S. HRG. 116–11

EXAMINING THE FEDERAL RESPONSE TO THE RISKS ASSOCIATED WITH PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

MARCH 28, 2019

Printed for the use of the Committee on Environment and Public Works

Available via the World Wide Web: http://www.govinfo.gov

U.S. GOVERNMENT PUBLISHING OFFICE
36–162 PDF WASHINGTON : 2020

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED SIXTEENTH CONGRESS
FIRST SESSION

JOHN BARRASSO, Wyoming, *Chairman*

JAMES M. INHOFE, Oklahoma
SHELLEY MOORE CAPITO, West Virginia
KEVIN CRAMER, North Dakota
MIKE BRAUN, Indiana
MIKE ROUNDS, South Dakota
DAN SULLIVAN, Alaska
JOHN BOOZMAN, Arkansas
ROGER WICKER, Mississippi
RICHARD SHELBY, Alabama
JONI ERNST, Iowa

THOMAS R. CARPER, Delaware,
Ranking Member
BENJAMIN L. CARDIN, Maryland
BERNARD SANDERS, Vermont
SHELDON WHITEHOUSE, Rhode Island
JEFF MERKLEY, Oregon
KIRSTEN GILLIBRAND, New York
CORY A. BOOKER, New Jersey
EDWARD J. MARKEY, Massachusetts
TAMMY DUCKWORTH, Illinois
CHRIS VAN HOLLEN, Maryland

RICHARD M. RUSSELL, *Majority Staff Director*
MARY FRANCES REPKO, *Minority Staff Director*

C O N T E N T S

EXAMINING THE FEDERAL RESPONSE TO THE RISKS ASSOCIATED WITH PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

THURSDAY, MARCH 28, 2019

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The Committee met, pursuant to notice, at 10:04 a.m. in room 406, Dirksen Senate Office Building, Hon. John Barrasso (Chairman of the Committee) presiding.

Present: Senators Barrasso, Carper, Capito, Rounds, Boozman, Wicker, Ernst, Cardin, Gillibrand, Markey, Duckworth, and Van Hollen.

OPENING STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Good morning.

Before we start, I just want to mention that Senator Sullivan regrets that he is unable to join us today. Earlier this week his mother passed away, and he is with his family, mourning the loss. I know this is an issue that is very important to him, very important to the people of Alaska, and he will be following what is happening and certainly continue to be very engaged in this critical issue.

That is why we call this hearing to order, because today we are going to examine the issue of per- and polyfluoroalkyl substances, or PFAS.

You are OK if we just use PFAS?

Senator CARPER. No, I think we should use the real word.

[Laughter.]

Senator CARPER. That will double the length of the hearing.

[Laughter.]

Senator BARRASSO. PFAS are a large class of chemicals known for their resistance to oil and water.

Since the 1940s, PFAS has been used in a broad array of industrial, commercial, and consumer applications, including nonstick cookware, waterproof clothing, stain resistant fabrics, food packaging, and aqueous film forming foams. These are foams used by the U.S. military and others to fight fires.

Scientists have found that PFAS break down very slowly, if at all, in the natural environment. They have also found that some accumulate in the human body. These chemicals travel through water, through air, through soil, and humans absorb them through ingestion, inhalation, and their skin. It is estimated that about 97

percent of Americans have detectible concentrations of PFAS in their blood.

Scientists believe that PFAS are associated with negative health effects, and more research is needed. To date, scientists have detected PFAS pollution in nearly every State. It appears to be concentrated in communities adjacent to, nearby, or downstream from military bases, from airfields, from airports, from firefighting facilities, and chemical manufacturing and processing facilities.

Today we are going to hear from four very qualified witnesses representing three Federal agencies: the Environmental Protection Agency, the Department of Defense, and Health and Human Services. This is the first congressional hearing where all four witnesses from the relevant agencies will testify on the same panel, so we are looking forward to hearing from all of you today. This will give us a chance to hear how the Administration is addressing this important issue.

Last month, the EPA released its PFAS Action Plan. The Plan includes deciding by the end of the year whether to set a maximum contaminant level, or MCL, for two types of PFAS—PFOA and PFOS—under the Safe Drinking Water Act; deciding whether to list these two chemicals as hazardous substances under the Superfund law; and issuing cleanup guidance for groundwater contaminated with these two chemicals. EPA's cleanup guidance is currently pending at the Office of Management and Budget.

The Defense Department has identified 401 active or closed military facilities with known or suspected releases of PFOA and PFOS. These include the F.E. Warren Air Force Base and the Cheyenne Air National Guard Base in my home State of Wyoming. The Defense Department needs to take responsibility for its pollution. Most rural communities can't afford to clean up this contamination.

Scientists have identified over 4,700 different PFAS chemicals. Over 1,200 of these at some point in time entered U.S. commerce. To date, the EPA has only been able to publish a monitoring methodology for 18 different PFAS chemicals in drinking water, so it is important that industry work with the EPA, the Centers for Disease Control, and the National Institutes of Health to help these agencies better detect PFAS, identify where these chemicals are produced and used, and understand the risks associated with them.

In addition to the Federal agency response, I would like to take a moment and highlight the bipartisan work that Ranking Member Carper and I and members of the Committee have done on helping address this issue in our America's Water Infrastructure Act, which was signed into law by President Trump in October of last year.

This Committee, along with our House counterparts, placed several provisions in the legislation to help address PFAS. These include new grant opportunities for States to address contaminants that are present or likely present in public water systems or underground drinking water sources. These grants will assist States with small and disadvantaged communities to promptly address problems associated with testing, with treatment, and with remediation of contamination sources such as PFAS.

Our legislation also reauthorized the Drinking Water State Revolving Funds for the first time in decades. It greatly increases

funding for this critical program so that drinking water systems can improve or replace their facilities to meet Safe Drinking Water Act standards and to improve public health.

With the enactment of the America's Water Infrastructure Act, we have taken a significant step in the right direction to help address contaminants in drinking water, including PFAS, so we hope that this hearing can help the Committee assess the next steps on PFAS. Working together, we are committed to continue to find bipartisan solutions to address this important issue.

With that, I would like to turn to my friend and Ranking Member, Senator Carper.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Thanks, Mr. Chairman. It is good to be here with you and our colleagues.

I want to welcome all of our witnesses. At least one or two of you have been before us previously for a confirmation hearing, and I think this might be the first time we have seen Mr. Ross since he was before us. You look none the worse for wear. We are glad to see you all.

Mr. Chairman, thanks a whole lot for scheduling this hearing. I think it is an important hearing.

Just last week, our EPA Administrator, Andrew Wheeler, said that access to clean drinking water was, and I quote him, "the biggest environmental threat." Access to drinking water, the biggest environmental threat. Those are his words.

In a typical Administration, one could safely assume that we would see some greater sense of urgency from EPA to address this one significant aspect of what Administrator Wheeler describes as the biggest environmental threat that we face. But that is not the case here, at least so far. EPA is simply not approaching the issue of protecting drinking water for millions of Americans with the same sense of urgency and zeal with which it repeals Obama era regulations.

That brings us to our central focus today, per- and polyfluorinated alkyl substances, commonly referred to as PFAS. These chemicals can be found in many household products, as well as in firefighting foam used by the military. Unfortunately, though, some PFAS chemicals have been shown to cause cancer, thyroid problems, and other adverse health impacts.

Just last year, the town of Blades, Delaware, in southern Delaware—just south of Wyoming, Delaware—the town of Blades in my home State alerted more than 1,000 residents there and some area businesses and schools to stop drinking and cooking with public water because PFAS chemicals were found to be present at nearly twice the Federal health advisory level.

Just up the road from Route 13 from Blades, 36 of 67 sampled groundwater wells on Dover Air Force Base have reportedly shown dangerously high levels of PFOS and PFOA, two kinds of PFAS chemicals.

This is a map. It is hard to see Delaware. In fact, it is also hard to see Maryland. But we are over there under all those blue circles, and some red ones as well.

This is not just a problem in Delaware, as you can see; PFAS contamination is widespread. It is found in red States, it is found in blue States, in small water systems and large water systems, from dairy farms in Maine to Air Force bases in Alaska.

That brings us to EPA's PFAS Action Plan. In May 2018, then-Administrator Scott Pruitt held a PFAS National Leadership Summit, and there he announced four "concrete steps" that EPA would take to address PFAS contamination. Mr. Pruitt said that with one of those steps EPA would decide to set a drinking water standard for PFOA and PFOS.

Nearly a year after that summit, I asked then-Acting Administrator Andrew Wheeler, at his confirmation hearing for the post of Administrator, asked him if he would commit to setting a drinking water standard for PFAS. He would not make that commitment that day.

Shortly after that hearing, press reports revealed that EPA had actually decided not to set a drinking water standard for PFAS. Understandably, this news was met with real concern on both sides of the aisle here.

Weeks later, to my dismay, the final PFAS Action Plan essentially re-announced that EPA was still considering the very same four measures that Scott Pruitt had announced almost a year earlier, including that the Agency would decide whether to set a drinking water standard by the end of this year.

With Mr. Wheeler's nomination at stake, he was finally, I think, compelled to commit to setting a drinking water standard for PFOA and for PFOS. This is a considerable victory, except that it will likely take years to complete because EPA has not yet even started its work.

The second step that Mr. Pruitt laid out almost a year ago was that EPA would propose designating PFOA and PFOS as hazardous substances under the Superfund law. This move would help to hold polluters responsible for cleaning up contaminated areas. EPA's PFAS Action Plan said, again, that it would issue the proposal at some unspecified time in the future.

I have introduced legislation that has been cosponsored by 30 of our colleagues, bipartisan bill, that puts a 1 year deadline on this important action because the American people deserve to see some sense of urgency on this issue.

The third step that Scott Pruitt announced was that EPA would issue guidance for cleanup standards for PFAS at contaminated sites by the fall of 2018. That guidance has been trapped at the White House since last August because the Defense Department has apparently actively been trying to weaken the EPA's proposal.

Finally, Scott Pruitt said that EPA would assess the risks from other PFAS chemicals. Sadly, the PFAS Action Plan falls short of this promise as well. It does not include a commitment to ensure communities will be given information to assess whether their drinking water is safe from any identified risks.

At his confirmation hearing, Mr. Wheeler said this, and I'm going to quote again: "It is these Americans that President Trump and his Administration are focused on, Americans without access to safe drinking water or Americans living on or near hazardous sites, often unaware of the health risks that they and their families face.

Many of these sites have languished for years, even decades" in some instances. He goes on to ask, "How can these Americans prosper if they cannot live, learn, or work in healthy environments?"

EPA's PFAS Action Plan fails to answer that question and only leads to one other: Where is the urgency? Where is the urgency from EPA on this issue?

My hope—I think our hope—is that the witnesses before us today will commit to moving forward with a range of measures to protect Americans with an appropriate amount of urgency to befit a problem that Administrator Wheeler himself says is part of the biggest environmental threat that we face in this country.

Thank you all. Welcome.

Senator BARRASSO. Thank you very much, Senator Carper.

We are now going to hear from our witnesses. We are delighted to have the four of you here.

First is Mr. David Ross, who is the Assistant Administrator of the Office of Water at the Environmental Protection Agency.

We also have with us Ms. Maureen Sullivan, who is the Deputy Assistant Secretary for Environment at the Department of Defense.

Welcome.

We also have Dr. Patrick Breysse, who is the Director of the National Center for Environmental Health and the Agency for Toxic Substances and Disease Registry, both of which are part of the Centers for Disease Control and Prevention.

Thank you for being here.

Finally, Dr. Linda Birnbaum, who is the Director of the National Institute of Environmental Health Sciences and the National Toxicology Program, both of which are part of the National Institutes of Health.

This is a very distinguished panel.

I would like to remind the witnesses that your full testimony will be part of the record. Your written testimony, we will include all of that, so please try to keep your statements to 5 minutes so that we may have some time for questions.

We all look forward to hearing your testimony.

With that, I would invite you, Mr. Ross, to please begin.

STATEMENT OF DAVID ROSS, ASSISTANT ADMINISTRATOR, OFFICE OF WATER, U.S. ENVIRONMENTAL PROTECTION AGENCY

Mr. ROSS. Good morning, Chairman Barrasso, Ranking Member Carper, and members of the Committee.

I am Dave Ross, EPA's Assistant Administrator for Water. Thank you for the opportunity to testify today regarding the growing public health concern associated with the release of PFAS chemicals into the environment.

Since my first day on the job, I have been advised by our dedicated career professionals and scientists on all aspects of the emerging PFAS problem, from understanding the potential adverse health effects to the fate and transport of these chemicals in the environment, to what we know and what we don't know about the identification, treatment, and monitoring of these substances. EPA's scientists and technical staff have been amazing, and Ad-

ministrator Wheeler and I greatly appreciate their expertise and their counsel.

As we already heard, PFAS are a class of synthetic chemicals that have been widely used around the globe since the 1940s because of their stain resistant, waterproof, and nonstick properties. We use them to floss our teeth; we use them when we hike in the rain; and we use them to protect public health and safety. Despite their everyday use, the body of science necessary to fully understand and regulate these chemicals is not yet as robust as it needs to be.

Recognizing that, EPA is using and developing cutting edge research and moving forward with regulatory mechanisms designed to protect public health and the environment. EPA's commitments on these fronts are outlined in our PFAS Action Plan. That Action Plan was authored by our career professionals, and the recommended actions are a product of their expertise and counsel.

The Action Plan was also informed by extensive stakeholder engagement that the Agency formally initiated last year at our National Leadership Summit. EPA held listening sessions in several communities across the country and reviewed approximately 120,000 written comments. The views on how to address PFAS are diverse and sometimes at odds, but EPA learned through this engagement that this is a multidimensional problem that requires multidimensional solutions.

The Action Plan commits EPA to take important steps that will improve how we research, detect, monitor, and address PFAS chemicals. Today I would like to highlight five of the most important areas in the Action Plan, but I encourage you all to read the Plan in its entirety.

First, EPA is committed to following the MCL rulemaking process for PFOA and PFOS as established by the Safe Drinking Water Act, a process that is designed to ensure public participation, transparency, and the use of the best available science and other technical information. The Agency has committed to making a proposed regulatory determination for PFOA and PFOS, which is the next step in the regulatory process, by the end of this year. EPA will also evaluate whether a broader range of PFAS chemicals should be regulated under the Safe Drinking Water Act.

Second, EPA will continue our enforcement actions and will clarify our cleanup strategies. EPA has initiated the regulatory development process for designating PFOA and PFOS as hazardous substances under CERCLA and intends to issue interim groundwater cleanup recommendations for sites contaminated with those chemicals as soon as possible.

Third, EPA will expand its focus on monitoring and understanding PFAS in the environment. For example, the Agency will propose to include PFAS in the next round of drinking water monitoring under the Unregulated Contaminant Monitoring Program. This action will improve EPA's understanding of the frequency and concentration of PFAS occurrence in drinking water by using newer methods that will detect more PFAS chemicals at lower levels.

Fourth, EPA is expanding its research efforts and the scientific foundation for addressing PFAS by developing new analytical methods and toxicity assessments. Our goal is the close of the gap

on science as quickly as possible, especially as it relates to emerging risk. We are also working to develop new technologies and treatment options to remove PFAS from drinking water.

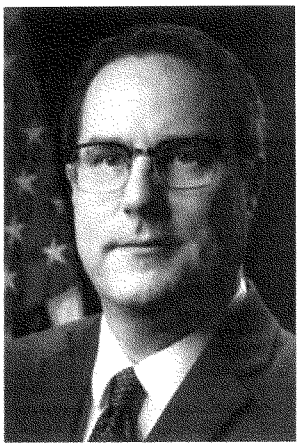
Finally, we will be working across the Agency and the Federal Government to develop a PFAS risk communication toolbox that includes materials that States, Tribes, and local partners can use to effectively communicate to the public.

Additionally, the Agency remains steadfast in our commitment to support States, Tribes, and local communities to address PFAS contamination where and when it has been identified.

Again, thank you for the opportunity to testify today with our Federal partners. I can assure you that the emerging PFAS exposure concern is a top priority for the Agency and our Administrator.

I look forward to answering any questions that you may have.

[The prepared statement of Mr. Ross follows:]



David Ross
Assistant Administrator, Office of Water,
Environmental Protection Agency

Dave Ross is the Assistant Administrator for the Office of Water at the U.S. Environmental Protection Agency. Dave has more than 20 years of experience working on water issues in both state government and the private sector.

Prior to joining EPA in January 2018, Mr. Ross worked as the Director of the Environmental Protection Unit at the Wisconsin Department of Justice. During his tenure, he served as the lead environmental prosecutor for the State of Wisconsin and worked closely with the Wisconsin Department of Natural Resources on environmental and natural resources issues.

Mr. Ross has also worked in the Wyoming Attorney General's Office representing the Water Quality Division of the Wyoming Department of Environmental Quality and as a partner in the land use and natural resources practice at an international law firm in Washington, D.C. Earlier in his career, he provided project management and environmental consulting services to the City of San Diego, California with a focus on designing, installing, and testing wastewater reclamation and re-purification technologies.

Mr. Ross received his J.D. and Masters in Environmental Law from Vermont Law School and graduated with a Bachelor of Arts from the University of Wisconsin-Madison.

TESTIMONY OF
DAVID P. ROSS, ASSISTANT ADMINISTRATOR
OFFICE OF WATER
U.S. ENVIRONMENTAL PROTECTION AGENCY

BEFORE THE
SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

MARCH 28, 2019

Good morning, Chairman Barrasso, Ranking Member Carper, and members of the Committee. I am David Ross, Assistant Administrator of the U.S. Environmental Protection Agency's Office of Water. Thank you for the opportunity to testify today.

I am here today to share with you the actions the EPA is taking to provide states, tribes, and communities with the tools they need to effectively address PFAS chemicals, particularly where they pose a risk to human health. I will also provide a summary of the agency's recently released PFAS Action Plan, a comprehensive, multi-media Action Plan designed to address PFAS chemicals more holistically.

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 water-repellant clothing. PFAS chemicals have also been used in aqueous film-forming foams. PFAS chemical manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the contributors of PFAS chemical releases into the air, soil, and water, including sources of drinking water.

Because of their widespread use, most people have been exposed to PFAS chemicals. Some PFAS chemicals can accumulate and stay in the human body for long periods of time. There is evidence that exposure to certain PFAS chemicals may lead to adverse health effects, including exposure to the more familiar chemicals perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), and GenX (HFPO dimer acid). The EPA has been and is continuing to actively work to address the emerging challenges associated with these chemicals.

EPA'S WORK ON PFAS

The EPA has taken steps over the past several years using its statutory authorities to understand and address these chemicals in commerce and in the environment. For example, PFOA and certain PFOA-related 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 (TSCA), the agency has also 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 chemicals under the Safe Drinking Water Act (SDWA)'s Unregulated Contaminant Monitoring Rule (UCMR) 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. 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 in drinking water. The EPA is also working to move research forward on other PFAS chemicals 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, in May 2018, the EPA convened a two-day National Leadership Summit on PFAS in Washington, D.C. that brought together more than 200 federal, state, and local leaders from across the country to discuss steps to address PFAS chemicals. The Summit provided an opportunity to share information on ongoing efforts, to identify specific short-term strategies and long-term solutions, and to address risk communication challenges. Following the Summit, the agency hosted a series of visits during the summer of 2018 in communities directly impacted by PFAS. The EPA interacted with more than 1,000 people during community engagement events in Exeter, New Hampshire; Horsham, Pennsylvania; Colorado Springs, Colorado; Fayetteville, North Carolina; and Leavenworth, Kansas, as well as through a roundtable in Kalamazoo, Michigan, and events with tribal representatives in Spokane, Washington.

The Action Plan, described in greater detail below, was developed based on feedback from these events. The EPA also provided an opportunity for the public to submit written comments to a

public docket, and the agency received approximately 120,000 comments that the EPA also considered when developing the Action Plan.

The EPA continues to provide support to states, tribes, and communities who are addressing PFAS issues. Specifically, at federal facility sites on the National Priorities List, the EPA continues to work with states and other federal agencies (such as the Department of Defense and the Department of Energy) pursuant to cleanup agreements referred to as Federal Facility Agreements (FFAs) to ensure that contamination is investigated and to take appropriate steps to protect human health and limit risks from the release of these chemicals from those facilities to the environment.

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 has coordinated with its federal agency partners on the ongoing process to develop toxicity values for GenX and PFBS. The EPA released draft toxicity values on November 14, 2018, sought public input until January 22, and is currently reviewing the input we received. As reflected in our PFAS Action Plan, interagency coordination is key to providing a common federal approach to addressing these substances to best support our state, local, and tribal partners as well as the public. The EPA looks forward to continuing our interagency dialogue and collaboration on PFAS issues.

EPA's NEW ACTION PLAN

On February 14, 2019, the EPA released its PFAS Action Plan. The Action Plan represents the first time the EPA has built a national, multi-media, multi-program, research, management, and risk communication plan to address an emerging class of chemicals of concern like PFAS. The Action Plan identifies both short-term solutions for addressing PFAS chemicals and long-term strategies that will help provide the tools and technologies states, tribes, and local communities need to clean up sites and to provide clean and safe drinking water to their residents. Major actions described in the Action Plan are highlighted below.

Drinking Water: The EPA is committed to following the MCL rulemaking process as established by SDWA—a process that is designed to ensure public participation, transparency, and the use of the best-available science and other technical information. As its next step, the EPA will propose a regulatory determination for PFOA and PFOS by the end of this year. The EPA is also gathering and evaluating information to determine if regulation under SDWA is appropriate for a broader class of PFAS chemicals.

Cleanup: The EPA has initiated the regulatory development process for proposing to designate PFOA and PFOS as Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances and is developing interim groundwater cleanup recommendations for sites contaminated with PFOA and PFOS. This important work will provide the EPA with additional options to help states, tribes, and local communities address existing contamination and can enhance the ability to hold responsible parties accountable.

Enforcement: The EPA will continue its ongoing enforcement investigations, create tools to help identify potential sources of PFAS releases, and assist states in their potential enforcement activities. Where the EPA finds that there may be an imminent and substantial endangerment to public health, the agency will consider using its response authority under CERCLA section 104, or its authorities such as SDWA section 1431 or section 7003 of the Resource Conservation and Recovery Act (RCRA).

Monitoring: The EPA will propose to include additional PFAS chemicals in the next round of nationwide drinking water monitoring under the UCMR program. This will improve the EPA's understanding of the frequency and concentration at which these PFAS chemicals occur in drinking water. This additional monitoring will utilize newer methods that will detect more PFAS chemicals and some at lower levels. The EPA will also consider certain PFAS chemicals for listing in the Emergency Planning and Community Right-to-Know Act (EPCRA)'s Toxics Release Inventory (TRI) to help the agency identify where these chemicals are being released.

Research: Through additional research, the EPA will expand the scientific foundation for understanding and managing risk from PFAS. The EPA will develop new analytical methods so that more PFAS chemicals can be detected in drinking water, in soil, and in groundwater. These efforts will improve our ability to monitor PFAS, understand exposures, and assess potential risks. The EPA's research efforts also include developing new technologies and treatment options to remove PFAS chemicals from drinking water and at contaminated sites.

Risk Communications: The EPA will work across the agency—and the federal government—to develop a PFAS risk communication toolbox that includes materials that states, tribes, and local

partners can use to effectively communicate with the public. It is imperative that all levels of government communicate accurately with the public about what is known and not known about PFAS chemical exposure and human health impacts.

In summary, the items identified in the PFAS Action Plan will help the EPA and its partners address PFAS and protect public health. To implement the Action Plan, the EPA will continue to work in close coordination with multiple entities, including other federal agencies, states, tribes, local governments, water utilities, the regulated community, and the public.

CONCLUSION

The EPA shares the Committee's concern for communities across the United States that continue to deal with these substances. The emerging PFAS exposure concern is a priority for the EPA, and the agency is working collaboratively with our federal and state partners to address PFAS-related issues in order to better protect human health and the environment.

Once again, Chairman Barrasso, Ranking Member Carper, and Members of the Committee, 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.

Senate Committee on Environment and Public Works
Hearing entitled, *"Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)"*
March 28, 2019
Questions for the Record for Mr. Ross

Chairman Barrasso:

1. When does EPA intend to issue a proposed rule for designating PFOA and PFOS as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act?

   The EPA has initiated the regulatory process for proposing to designate PFOA and PFOS as "hazardous substances" under CERCLA.

2. When does EPA intend to release its interim groundwater cleanup recommendations for PFOA and PFOS?

   The EPA released the draft Interim Recommendations for Addressing Groundwater Contaminated with PFOA and PFOS for public comment on April 25, 2019. The public comment period remained open through June 10, 2019. The comments received were reviewed and considered and the EPA issued the Interim Recommendations on December 20, 2019.

3. Is EPA aware of any informal or formal estimates of the costs to clean up all sites, where the Department of Defense (DOD) or other federal agencies have contaminated groundwater with PFOS and/or PFOA at levels above 70 parts per trillion (ppt), to a level of 70 ppt? If so, please provide those informal or formal cost estimates.

   The best estimates of cleanup costs, where the Department of Defense (DOD) or other federal agencies have contaminated groundwater with PFOS and/or PFOA, would come from DOD or the other responsible federal agency.

4. Is EPA aware of any informal or formal estimates of the costs to clean up all sites, where DOD or other federal agencies contaminated groundwater with PFOS and/or PFOA at levels above 380 ppt, to a level of 70 ppt? If so, please provide those informal or formal cost estimates.

   The best estimates of cleanup costs, where the Department of Defense (DOD) or other federal agencies have contaminated groundwater with PFOS and/or PFOA, would come from DOD or the other responsible federal agency.

5. Please provide the following:

   a. The legal citations to all the final Significant New Use Rules (SNURs) that address PFAS chemicals.

      See the references in Tab 1 and Column E on the Tab labeled "active & Non-CBI (191)" and Column E on the Tab labeled "active & CBI sanitized (125)" of

Attachment 1.

b. List all the PFAS chemicals (including acronyms and Chemical Abstracts Service Registry Numbers (CASRNs)) that are subject to these SNURs.

See Column C of the Tab labeled "active & Non-CBI (191)" and Tab labeled "active & CBI sanitized (125)" of Attachment 1.

c. List all the PFAS chemicals (including acronyms and CASRNs) that have entered the market under one of the exemptions to full pre-manufacture notice review under section 5 of the Toxic Substances Control Act (TSCA).

A notice of commencement (NOC) indicates intent to commence manufacture or import of a chemical. A NOC is the EPA's best indication of whether a PFAS chemical may have entered the market. However, chemicals subject to exemption notices are not added to the TSCA inventory and NOCs are not required to be filed. Therefore, the EPA cannot indicate with certainty which chemicals that are the subject of an exemption have entered the market.

d. List all the PFAS chemicals (including acronyms and CASRNs) that are *either* subject to final SNURs *or* have entered the market under one of the exemptions to full pre-manufacture notice review *and* are now considered "commercially active" on the TSCA Inventory.

See Column C of the Tab labeled "active & Non-CBI (191)" and the Tab labeled "active & CBI sanitized (125)" of Attachment 1.

Please note this information reflects chemicals which are on the TSCA Inventory. PFAS chemicals which have entered the market under one of the exemptions to full pre-manufacture notice review are not included on the TSCA Inventory and therefore are not subject to the Inventory Rule identifying chemicals as commercially active or inactive.

6. EPA has published a validated monitoring methodology (EPA Method 537.1) for detecting 18 PFAS chemicals in drinking water. In 2019, EPA is expected to publish validated monitoring methodologies for detecting 24 PFAS in media other than drinking water. Over 600 PFAS are considered "commercially active" on the TSCA Inventory.

   a. Why has EPA decided to focus on these specific PFAS chemicals?

   The EPA considers multiple factors when developing methods for PFAS chemicals. These factors include known or suspected PFAS chemical occurrence, availability of laboratory reference standards, gaps in existing analytical method coverage, and the interests and needs of internal and external Agency stakeholders. The EPA chose to develop methods for these specific PFAS chemicals based on evaluating these factors.

b. What are EPA's plans to publish validated monitoring methodologies for other PFAS chemicals in drinking water and media other than drinking water?

The EPA has numerous ongoing efforts. On December 19, 2019, the EPA released a new drinking water method (EPA Method 533) that measures additional compounds, particularly PFAS compounds with twelve carbons [C12] in chain length and fewer. EPA Method 533 allows for the measurement of the GenX chemical HFPO-DA and 24 other PFAS chemicals. EPA Method 533 also supports monitoring at lower concentrations than was possible during the EPA's third Unregulated Contaminant Monitoring Rule. For analyzing media other than drinking water, such as ground, surface, and waste waters, the EPA has released for public comment a validated method for a set of 24 PFAS using direct injection (Method 8327) and is working with DOD on validating a method for the same set of 24 PFAS using an isotope dilution method. There are also sample preparation methods that will support the analysis of solid samples (e.g. soils, sediments, tissue) using the isotope dilution method. Finally, the EPA is collaborating with states and DOD to develop sampling and analytical methods for detecting and identifying PFAS in ambient air and stack emissions.

7. You testified that EPA has "a holistic action plan" to address PFAS. You went on to say that: "I worry about the lifecycle of these chemicals. You take them out of water supply. Are we just transferring the media to which we have a problem?" Please describe EPA's plans to provide guidance on the disposal of PFAS, including the disposal of products with PFAS (including but not limited to aqueous film forming foam) and water filtration systems (including but not limited to granular activated carbon) that collect PFAS.

As part of the EPA's PFAS Action Plan, the EPA is gathering information to better understand treatment and disposal issues with respect to PFAS chemical waste, including considerations of the life cycle of these compounds. The EPA will continue to gather information and evaluate whether guidance is needed. PFAS chemicals can be extremely long-lived and there is a possibility for transfer across media including air, water, and land treatment/disposal systems. Depending on various technical considerations, including the volume and toxicity of the specific wastes, thermal destruction in high temperature incinerators may be the preferred treatment method to prevent cross media transfers, assuming sufficient temperatures and residence times are achieved to ensure adequate PFAS chemical destruction, and assuming adequate pollution controls are utilized.

8. EPA is in the process of conducting toxicity assessments for five PFAS chemicals through its Integrated Risk Information System. Separately, EPA released draft assessments for PFAS chemicals, known as GenX and PFBS, in 2018.

    a. Why did EPA focus on these specific nine PFAS?

    In late 2017, at the direction of the Administrator, the EPA prioritized seven PFAS chemicals for assessment to support agency and state decision makers. These seven PFAS include GenX, PFBS, PFBA, PFHxA, PFHxS, PFDA, and PFNA. (This priority list is seven PFAS, as noted in the initial question, not nine.) These were chosen primarily because these PFAS chemicals are the common focus of actions across the agency, because they are of high interest to states and other stakeholders,

and because they have a relatively large toxicity database that is needed to support assessment. All seven PFAS chemical assessments have undergone or will undergo an assessment development process designed to produce toxicity assessments of high quality that includes: systematic review methods, interagency review, public comment, and rigorous peer review.

b. Does EPA plan to conduct toxicity assessments on other PFAS chemicals? If so, please list which PFAS chemicals (including acronyms and CASRNs).

The EPA is currently focusing on the seven PFAS chemicals discussed above. However, the EPA will continue to evaluate whether other assessments are needed in the future.

Understanding which PFAS chemicals act similarly or differently can inform whether certain PFAS chemicals could be assessed together in one risk evaluation, thereby increasing efficiency of risk evaluations and potentially strengthening the scientific underpinnings. Research conducted by the EPA using in vitro tiered testing and computational methods may generate useful information to begin the evaluation of hazards across classes or for structurally similar PFAS chemicals, which will inform future prioritization and assessment of existing PFAS chemicals.

EPA researchers are also applying computational and high throughput toxicology tools for PFAS toxicity testing on a larger scale to enable faster understanding of potential toxicity for the universe of thousands of PFAS, most of which have little or no published toxicity data.

9. Please list which PFAS chemicals (including acronyms and CASRNs) EPA intends to propose including in Unregulated Contaminants Monitoring Rule 5.

The EPA has made no final decisions about which PFAS chemicals should be monitored in the Unregulated Contaminant Monitoring Rule (UCMR) 5. To determine which PFAS chemicals will be included in UCMR 5, the EPA plans to look at the newer methods that can detect more PFAS chemicals and at lower minimum reporting levels (MRLs) than possible in the EPA's previous data collection. The EPA anticipates proposing UCMR 5 in 2020, evaluating public comments, and plans to publish a final UCMR 5 in late 2021. The EPA will also evaluate the new requirements of the National Defense Authorization Act (NDAA) for Fiscal Year 2020 (P.L. 116-92) when proposing and finalizing UCMR 5, subject to the availability of appropriations.

10. What do you need from chemical manufacturers and processors or others in the private sector to better understand and respond to the risks associated with PFAS chemicals?

Under TSCA for new chemicals, the EPA receives information about the manufacture, processing and intended use (including industrial, commercial and consumer uses) of PFAS chemicals as part of the Pre-Manufacture Notice (PMN). During review the EPA may request, or submitters may provide, additional clarifying information to facilitate new chemical review. If the EPA finds the information insufficient to permit a reasoned evaluation of health and environmental effects, TSCA provides a statutory mechanism for

the EPA to require additional information necessary to permit a reasoned evaluation to be generated (i.e., the EPA may make a finding of 'insufficient information' and issue an order under TSCA section 5(e)). The TSCA New Chemicals Program has often required environmental fate testing on PFAS chemicals to understand the timeframe and extent of the degradation of PFAS chemicals in the environment and what chemicals they may transform into in the environment.

Under TSCA for existing PFAS chemicals (i.e., those that have not undergone new chemical review or PFAS chemicals for which uses have expanded since they were added to the TSCA Inventory), the EPA regularly gathers information (e.g., manufacturers, production volumes, uses) through regular (every four years) issuance of Chemical Data Reporting (CDR) Rules. It should be noted that certain information reported under CDR may be claimed as Confidential Business Information (CBI). In addition, the use categories are necessarily grouped or generalized to facilitate efficient reporting. Hence, the very specific products and/or applications of every PFAS chemical on the TSCA Inventory may not always be available to the public.

11. Are there lessons or best practices that we can learn from other countries, which are also addressing the risks to public health and the environment associated with PFAS? If so, what are these lessons or best practices?

The EPA is engaged with the international community (primarily Canada, Australia, and the EU) to share lessons learned and best practices. For example, the EPA has had discussions with the Australian Department of the Defense to exchange information on methods to treat and detect PFAS chemicals. Other international organizations, such as the International Organization for Standardization and ASTM International, have developed analytical methods that the EPA has explored for use. Also, the EPA's literature reviews for PFOA, PFOS and other PFAS chemicals included toxicity information from international authorities. The EPA will continue to coordinate with international partners, as well as our domestic partners from other federal agencies, states, tribes, industry groups, associations, local governments, communities and the public, to share knowledge, lessons learned and best practices.

12. What steps can the Executive Branch take to improve coordination among federal agencies as it responds to the risks associated with PFAS chemicals?

The EPA is already taking steps to coordinate responses to the potential risks associated with exposure to PFAS chemicals. For example, one of the primary focuses of the EPA's cross agency workgroup is to enhance coordination with states, tribes, and federal partners to provide communities with critical information and tools to address these risks and take steps to minimize them. Through efforts such as the National Summit, community engagements and reviews of scientific documents (e.g. GenX and PFBS toxicity assessments), the EPA has continued to collaborate with federal partners.

Additionally, the EPA continues to work in partnership with federal agencies, states, tribes, and local communities by coordinating with others to identify exposures, develop methods in order to measure PFAS in the environment, and support cleanup efforts where PFAS have been identified as a risk to human health. This includes working with other federal

partners and using enforcement tools where necessary. Additionally, in accordance with the "Directive to prioritize federal research on impacts to agriculture and rural economies in EPA's Per- and Polyfluoralkyl Substances (PFAS) Action Plan," issued by EPA Administrator Wheeler, the EPA is actively working to identify research needs of our federal partners and to allocate resources to those research needs.

13. What steps can the Executive Branch take to improve communication with states, tribes, local communities, and the public about the risks associated with PFAS chemicals?

The EPA is continuing to work with states, tribes, local communities, and the public to identify the best tools to communicate the potential risks associated with PFAS chemicals. Risk communication is a prominent part of the Agency's Action Plan, as the EPA seeks to provide the most accurate, scientifically sound, and current information to the public.

Ranking Member Carper:

Questions about the PFAS Action Plan

14. Please provide the following:

    a. Copies of all documents exchanged between EPA and DOD regarding the PFAS Action Plan or the groundwater cleanup guidelines for PFOS and PFOA.
    b. Copies of all documents exchanged between EPA and OMB regarding the PFAS Action Plan or the groundwater cleanup guidelines for PFOS and PFOA.
    c. Copies of all documents exchanged between EPA and HHS regarding the PFAS Action Plan or the groundwater cleanup guidelines for PFOS and PFOA.
    d. Copies of all documents exchanged between EPA and NASA regarding the PFAS Action Plan or the groundwater cleanup guidelines for PFOS and PFOA.

    For purposes of this request, "documents" includes, but is not limited to, comments, notes, emails, legal and other memoranda, white papers, scientific references, letters, telephone logs, text messages, meeting minutes and calendars, photographs, slides and presentations. In the case of meetings, calls, or other oral communications, please include the date, time, and location at which such communications took place, a list of the individuals who participated, as well as a description of the communication.

    The EPA recognizes the importance of Congress' need to obtain information necessary to perform its legitimate oversight functions and is committed to continuing to work with your staff to best accommodate the Committee's interests. The EPA received your March 6, 2019, letter, which includes this document request, and we are working to provide a response while also continuing our important mission of implementing the Agency's commitments in the Action Plan.

15. At the press conference announcing the PFAS Action Plan, Administrator Wheeler described eight instances in which EPA issued enforcement orders or assisted with state enforcement actions. Please provide details of each such instance (and any subsequent actions), including the name of the cases and defendants, the jurisdictions/states where enforcement occurred, and any notices of violation issued.

The following are enforcement actions the EPA has taken related to PFAS chemicals.

In 2005, the EPA entered into an administrative settlement with DuPont resolving violations related to PFOA under TSCA and RCRA at its West Virginia facility and required DuPont to pay $10.25 million in civil penalties and perform supplemental environmental projects worth $6.25 million.

Between 2002 and 2017, the EPA issued three Safe Drinking Water Act § 1431 imminent and substantial endangerment Orders on Consent, and one amendment to an order, to DuPont requiring the provision of alternative water supplies for public and private water systems in the vicinity of the Washington Works, West Virginia facility due to PFOA contamination. The 2009 order based its actions on the agency's 2009 Provisional Health Advisory for PFOA. The 2017 amendment was a significant amendment to the 2009 order, was issued to DuPont and Chemours, and tied actions to the agency's 2016 drinking water lifetime health advisory (LHA) for PFOA.

In 2018, at the EPA's request, Chemours began sampling numerous private wells and Public Water Systems (PWSs) for GenX chemicals.

In 2014 and 2015, the EPA issued a total of three Safe Drinking Water Act § 1431 imminent and substantial endangerment unilateral orders to Federal agencies for PFOA and/or PFOS above the Provisional Health Advisory in drinking water (these are also NPL sites). The Navy, Air National Guard, and Air Force have agreed to voluntarily use the newer lifetime health advisory values of 70 ppt as finalized in May 2016. The three facilities subject to orders include:

Naval Air Warfare Center, Warminster, PA (2014);
Horsham Air Guard Station/Willow Grove, PA (2015); and
Pease Air Force Base, NH (2015).

Note, in addition to the enforcement actions above, in 2009 as part of the premanufacturing review process for GenX, the EPA issued a TSCA section 5(e) Consent Order pursuant to its regulatory authority under the act, to DuPont requiring 99% capture of GenX releases. The EPA continues to monitor Chemours' compliance with that order.

On February 14, 2019, the EPA sent a Notice of Violation to Chemours outlining violations of TSCA at the Fayetteville facility in North Carolina, and the Washington Works facility in Parkersburg, West Virginia.

In 2011, EPA and the RACER Trust entered into an administrative order on consent (AOC) under RCRA 3008(h) to perform corrective measures at the Buick City facility. Under this AOC, the RACER Trust is conducting an investigation to define the level and extent of PFAS contamination at the facility and they plan to address the contamination in an upcoming Statement of Basis.

The EPA also has provided assistance to states on their PFAS chemical actions. Examples include:

Wolverine (MI) – The EPA is overseeing a federal CERCLA time-critical removal action and providing technical assistance to the Michigan Department of Environment, Great Lakes & Energy (EGLE) while EGLE responds to PFAS chemical contamination of residential wells from the Wolverine World Wide (Wolverine) Tannery and House Street Disposal Site. The EPA assistance has also included issuing a multi-media information request and sampling of residential wells for PFAS chemicals in December 2017 and providing technical assistance on sampling locations, filter effectiveness, sampling protocols, sample analysis, and public communication efforts.

Chemours (NC) – At the request of the NC DEQ, in 2017 and 2018, the EPA provided significant laboratory assistance to support the State's investigation of GenX in the Cape Fear River, which resulted in a state enforcement action and February 2019 settlement.

Hoosick Falls (NY) – The EPA added this site to the Superfund NPL in July 2017. NYSDEC is the lead for the cleanup with extensive EPA support.

16. The PFAS Action Plan describes research efforts designed to inform EPA's future regulatory efforts related to PFAS. How will EPA use non-targeted analysis to identify any and all PFAS in the environment to inform its decisions for the regulation of PFAS, for example by requiring listing of specific PFAS on the Toxics Release Inventory? If EPA has no such plans why not, since history has shown that the presence of one type of PFAS often means that others are also present at an environmental site?

Under TSCA, the use of non-targeted analysis is not particularly helpful for regulation, since it does not specifically identify chemicals. The nature of non-targeted testing is such that it allows researchers to test for unknown chemicals in water, soil, and other types of samples without having a preconceived idea of what chemicals are present.

Non-targeted analysis is one of the tools that the EPA will use to detect and identify previously unknown chemicals in the environment. This will then enable the agency to decide whether to prioritize such chemicals for toxicity and exposure assessment which in turn will inform decisions about whether and how to take regulatory or other actions.

Other activities described in the PFAS Action Plan, specifically the development of toxicity values for chemicals, may be helpful with TRI listing. The literature reviews and toxicity profiles developed to support toxicity value development and the toxicity values themselves, can be useful when considering chemicals for listing on the TRI.

17. The PFAS Action Plan describes EPA's efforts to use computational methods utilized in EPA's CompTox program "to explore different chemical categories of PFAS, to inform hazard effects characterization, and to promote prioritization of chemicals for further testing." How does EPA plan to integrate the results of this work into its regulatory efforts, for example, by ensuring that the information is considered when EPA is reviewing pre-manufacturing notices for new PFAS or using the results to inform its regulatory efforts for existing PFAS?

The EPA's TSCA New Chemicals Program has used computational methods and chemical categories for decades and is exceptionally positioned to utilize any methods and/or categories developed for characterizing PFAS chemicals. Based on years of reviewing

various PFAS chemicals, the TSCA program recognizes that not all PFAS chemicals share the same environmental fate and toxicity profiles and therefore should not be assessed as a single group. The New Chemicals Program routinely 'sub-categorizes' any new PFAS chemical during new chemical review, e.g. when selecting analogues to use in assessment.

Due to this long-standing application of computational methods and categories in particular the EPA has been working collaboratively within the agency on the PFAS chemical categories work; i.e., sharing of new chemicals information to help support development of categories and identify data gaps. This data gap analysis informed prioritization of chemicals for further testing.

Category definition and understanding of the underlying scientific basis for grouping of PFAS chemicals will also inform future prioritization and assessment of existing chemicals. For example, understanding which PFAS chemicals act similarly or differently can inform whether certain PFAS chemicals could be assessed together in one risk evaluation, thereby strengthening the scientific underpinnings and increasing efficiency of risk evaluations.

For other kinds of regulatory decisions, the EPA will be exploring how best to incorporate computational toxicological information into the decision-making process, for example by utilizing read-across methods to inform assessments of potential adverse health effects of chemicals or groups of chemicals.

18. The PFAS Action Plan stated that EPA plans to "finalize draft toxicity assessments for GenX chemicals and PFBS; develop additional PFAS toxicity values for PFBA, PFHxA, PFHxS, PFNA, and PFDA." How can approaches such as evidence mapping be used to identify other PFAS substances that might be good candidates for toxicity evaluations? How does EPA plan to use these toxicity values to inform decisions on tracking or regulating these PFAS?

The EPA is beginning to use evidence mapping approaches to monitor whether data becomes available for additional PFAS chemicals to potentially support future toxicity assessments. These approaches can also be informative for understanding the extent of toxicological similarity between different PFAS chemicals and for informing decisions about which PFAS chemicals should be prioritized for toxicity assessment. Toxicity assessments provide the scientific basis for the development of a toxicity value.

Toxicity values then become one piece of information used to inform regulatory decisions through providing information about the potential hazard to human health and the environment posed by the chemical. That information is often combined with information about exposure to support a regulatory decision. For example, to make a determination to regulate a contaminant in drinking water, the EPA must consider three criteria: 1) adverse human health effects, 2) occurrence in public drinking water systems with a frequency and at levels of health concern, and 3) in the sole judgement of the Administrator, a meaningful opportunity for health risk reduction through regulation. Toxicity values inform the first of those three criteria.

The EPA anticipates that development of toxicity values for any additional PFAS chemicals, which includes surveying/reviewing literature, evidence mapping and hazard

identification can benefit the TSCA risk evaluation program, as these first steps are common to most risk evaluation processes, including under TSCA.

Questions about PFAS-contaminated sludge

Recently, press reports described situations in New Mexico and Maine in which PFAS-contaminated sludge that had been used as fertilizer devastated dairies whose milk had become highly contaminated as well.

19. Is EPA aware of the degree to which PFAS-contaminated sludge has historically been spread in the United States? If so, please provide specific information that includes the estimated amount of PFAS that has been spread in sludge for each year for which EPA has such information (including the amount of sludge that was spread on each type of cropland, dairy farm, other land type, etc.). For farmland sites (including dairy farms) where sludge was spread in the United States, what is the name and location of each site, and what agricultural products are produced there? If EPA does not possess any of this information, please specifically describe the steps EPA plans to take to assess and quantify the extent and location of PFAS sludge-spreading activities.

    The EPA is not aware of the degree to which PFAS chemical-contaminated biosolids or sludge has historically been spread in the United States. In general, the EPA does not have the statutory authority to track information such as site name and location, date of biosolids application on farmland (or type of crops grown), or land application elsewhere (e.g., reclamation sites). Also, PFAS chemicals were not tested as part of three EPA national sewage sludge surveys (1988, 2001, 2006). In order to track the information requested, the EPA would have to submit an Information Collection Request as required by the Paperwork Reduction Act. Though the EPA does not generally have the authority or a method to track this type of information, some states do track this type of information.

    The EPA is required by the Clean Water Act (CWA) Section 405 to review biosolids regulations (40 CFR Part 503) every two years to identify additional toxic pollutants that occur in biosolids and set regulations for those pollutants if sufficient scientific evidence shows they may harm human health or the environment. To identify pollutants per the CWA, the EPA develops biennial reviews by collecting and reviewing publicly available data on the occurrence, fate and transport in the environment, human health and ecological effects and other relevant information for toxic pollutants that may occur in biosolids. This data is used for conducting risk assessments. Information on PFAS was first captured and reported in the 2013 Biennial Review and again in the 2016-2017 Biennial Review. Any information on PFAS chemicals will continue to be captured in future biennial reviews.

    The biennial reviews for 2005, 2007, 2009, 2011, 2013, 2015 and 2016-2017 are published on the EPA's website at: www.epa.gov/biosolids/biennial-reviews-sewage-sludge-standards.

20. For each year since the passage of the Clean Water Act of 1972, please provide a list that includes the name, location, and type (i.e. publicly owned treatment works, pulp and paper industry, etc.) of sludge generators that operated in the United States. Please also indicate which sludge generator required treatment of wastewater prior to discharge.

All POTWs generate sewage sludge. EPA's Clean Watersheds Needs Survey results contain the name and location of all POTWs in the United States. The total number of POTWs identified during the last Needs Survey was 14,748. Some information about sewage sludge from POTWs can also be found in the Clean Watersheds Needs Survey results (see the EPA's website at: https://www.epa.gov/cwns).

Through the Clean Water Act Effluent Guidelines Planning process, the EPA is examining readily-available information about PFAS chemical surface water discharges to identify industrial sources that may warrant further study for potential regulation through Effluent Limitation Guidelines.

21. Is EPA aware of the fate of sludge after it is generated, by amount, type of disposal (landfilling, incineration, land spreading, composting, etc.) and source of sludge (i.e. pulp and paper mills, other source category)? If so, please provide a specific description and quantification thereof. If not, please specifically describe the steps EPA plans to obtain such information.

Some POTW information about sewage sludge post-generation can be found in the EPA's ECHO database at: https://echo.epa.gov/. Types of information that can be found include annual biosolids produced and disposed (e.g., land application or other management practice). Note that biosolids electronic reporting began in 2016, so information for 2016, 2017, and 2018 can be found in ECHO.

By way of background, the EPA's Federal biosolids annual reporting regulations (see 40 CFR 503.18, 503.28, and 503.48) apply to the following facilities:

- **Class I sludge management facilities;**
- **Publicly Owned Treatment Works (POTWs) with a design flow rate equal to or greater than one million gallons per day; or**
- **POTWs that serve 10,000 people or more.**

These facilities are required to submit an annual report if their biosolids were land applied, surface disposed, or incinerated in the reporting period. Additionally, other facilities may need to report if required by their National Pollutant Discharge Elimination System (NPDES) permit, state regulations, or enforcement actions.

For example, some states require all POTWs to submit an annual report (e.g., Texas). These annual reports are submitted to the EPA or the state agency that is authorized for the Federal biosolids program (40 CFR part 503). Currently, only eight states are authorized for the Federal biosolids program (AZ, MI, OH, OK, SD, TX, UT, WI).

Since February 2016, the EPA has electronically collected the biosolids annual report data for the POTWs where the EPA administers the Federal biosolids program (42 states and all tribal lands and territories). These data are now available through ECHO (https://echo.epa.gov). The EPA is working with the eight authorized states to electronically collect and share these data with agency as part of Phase 2 implementation of the 2015 NPDES Electronic Reporting rule (40 CFR part 127).

22. For sludge that was composted, is EPA aware of the ultimate fate of such sludge (e.g. applied to farm land, applied to municipal land, provided to general public, etc.)? If so, please provide a specific description and quantification of any amounts thereof. If not, please specifically describe the steps EPA plans to take to obtain such information.

    There is limited information on composting available in the EPA's ECHO database (e.g., which facilities report composting as a management practice). The database can be accessed at: https://echo.epa.gov/.

23. Please provide a list of all sites of PFAS-contamination that are suspected to have been contaminated in whole or in part by sludge-spreading activities, including the site name and location, source of the sludge, environmental media affected (soils, ground water, drinking water, cow's milk, crops (specify), manure, etc.), and highest concentration of each individual PFAS compound measured in each medium, and known or suspected source of PFAS in the sludge (by name or category).

    The EPA has not historically tested for PFAS chemicals in biosolids and therefore has not tracked suspected PFAS chemical-contaminated sites due to biosolids use. For example, the EPA did not test for PFAS chemicals during the 2006 (published in 2009), 2001 (published in 2007) or 1988 (supported 1993 40 CFR Part 503 Rule) national sewage sludge surveys.

    The EPA does have information on PFAS-contaminated biosolids in Dalton, GA and Decatur, AL. Additional information can be found can be found using the following links:

    https://www.atsdr.cdc.gov/HAC/pha/Decatur/Perfluorochemical_Serum%20Sampling.pdf

    https://www.atsdr.cdc.gov/HAC/pha/decatur/Blood%20PFC%20Testing%20and%20Health%20Information.pdf

    https://www.atsdr.cdc.gov/HAC/pha/decatur/InformationupdatetotheATSDRExposureInvestigationReportFINALDRAFTadditionalcomment31JAN14.pdf

    https://archive.epa.gov/pesticides/region4/water/documents/web/pdf/factsheet_pub_mtg_rev1_05-16-09.pdf

    https://archive.epa.gov/pesticides/region4/water/documents/web/pdf/d_fact_sheet_october_2010_dalton.pdf

24. Please provide a list that includes any established federal or state standards or screening levels for beneficial reuse that have been established to limit the acceptable amount of PFAS in sewage sludge, for which specific PFAS compounds (or total PFAS) do they apply, and to which geographic locations the standards or levels apply.

    There are no federal EPA standards or screening levels established for PFAS chemicals in biosolids. Certain states have promulgated regulatory requirements for PFAS in sewage sludge. For example, the state of Maine established mandatory testing of biosolids for several PFAS prior to land application. Levels must not exceed: PFOA (0.0025 mg/kg);

PFOS (0.0052 mg/kg); PFBS (1.9 mg/kg). However, the EPA does not maintain a database with all state regulatory requirements for PFAS chemicals in sewage sludge.

25. The PFAS Action Plan states that "The EPA is in the early scoping stages of risk assessment for PFOA and PFOS in biosolids to better understand the implications of PFOA and PFOS in biosolids to determine if there are any potential risks." Please provide as much specificity on EPA's plans to conduct this risk assessment as possible, including the timeline for its completion.

    The EPA is initiating problem formulation, the first of five steps in the risk assessment framework, for PFOA and PFOS in biosolids. Problem formulation is the part of the risk assessment framework that articulates the purpose for the assessment, defines the problem, and determines a conceptual plan for analyzing and characterizing risk. Problem formulation provides a strategic framework to develop risk assessments by including an overview of a chemical's sources and occurrence, fate and transport in the environment, toxicological characteristics, and factors affecting toxicity, and includes an analysis plan describing the scientific approach. During this phase, the EPA will engage states and tribes, risk managers, scientists, and members of the biosolids community to get input on the science and implementation issues. As stated in the EPA's PFAS Action Plan, problem formulation should be completed in 2020.

26. The PFAS Action Plan states that EPA will "Provide additional methods for stakeholders and the EPA to identify the presence of PFAS in concentrations of concern for media other than drinking water" and cites biosolids as one such type of media for which methods will be developed. Please provide as much specificity on the development of these methods as possible, including the timeline for their completion.

    On December 19, 2019, the EPA released a new method for drinking water (EPA Method 533). This method focuses on short chain PFAS (e.g., PFBA) and incorporates isotope dilution quantitation. EPA Method 533 complements EPA Method 537.1 (published November 2018) and supports monitoring for 11 additional PFAS. Using both methods, a total of 29 unique PFAS can be monitored in drinking water.

    EPA researchers are developing and validating laboratory methods to detect and quantify selected PFAS in air, water, and soil. For environmental samples other than drinking water, EPA researchers are:

- **Finalizing SW846 Method 8327 and its associated preparation method (Method 3512, included in Appendix B of Method 8327). Method 8327 has been validated for 24 PFAS analytes.**
- **Collaborating with the Department of Defense (DOD) to validate an isotope dilution method for the analysis of aqueous samples (ground/surface water, wastewater influents/effluents, landfill leachates) and solid samples (soil, sediment, fish tissue, biosolids). This method will be validated under Clean Water Act method protocols and may also be adapted for the SW846 methods series.**
- **Exploring the development and application of a total organic fluorine method.**
- **Developing and testing sampling and analytical methods for identifying and quantifying PFAS in air and stack emissions.**

- **Extending the use of non-targeted chemical analysis for water, air emissions, and solids.**

Questions about PFAS and TSCA

27. The PFAS Action Plan says that EPA will finalize a Significant New Use Rule (SNUR) under TSCA, first proposed in 2015, for new uses of some PFAS. When will this rule be finalized?

    In 2015, the EPA proposed the most recent SNUR on PFAS chemicals to complement the long-chain PFAS chemical phaseout under the 2010/2015 PFOA Stewardship Program. The 2015 SNUR proposed to require manufacturers (including importers) of PFOA and certain long-chain perfluoroalkyl carboxylate chemicals including as part of articles, and processors of these chemicals, to notify the EPA at least 90 days before starting or resuming new uses of these chemicals. On February 20, 2020, the EPA announced a supplemental proposed SNUR, which proposes regulations on imported products that contain certain persistent long-chain PFAS chemicals that are used as surface coatings. In developing the supplemental proposal, the EPA considered the public comments received on the 2015 proposed SNUR, as well as the new statutory requirements added by the Frank R. Lautenberg Chemical Safety for the 21st Century Act. The EPA has sent the supplemental proposed SNUR to the Federal Register where it will soon be published for public comment.

28. For each year since 2007, please list each new PFAS for which there was both a pre-manufacturing notice (PMN) and notice of commencement (NOC) received by EPA. Please provide, for each such chemical, the CAS number, date received, case number, amendment number and version, manufacturer, and commencement date (as applicable, and excluding CBI), and whether the substance was subject to a consent order.

    See Attachment 3.

29. There are a number of PFAS that have been subject to SNURs in 2002 and 2007 that remain on the TSCA Inventory. Is EPA aware of which of these PFAS substances remained in active commerce later than 2016? If so, please provide a list. If not, what is EPA doing to determine the answer to this question, since many of the PFAS subject to these SNURs were 8-carbon PFAS related to voluntary and enforcement actions taken to phase out PFAS of concern?

    See Attachment 1, which includes active PFAS chemicals with associated SNURs. When the EPA collects information in 2020 under the Chemical Data Reporting rule, information on PFAS chemicals subject to CDR will be available for 2016-2019, which will provide a more precise accounting of PFAS substances in active commerce beyond 2016. Currently, the EPA can only identify those PFAS chemicals identified as "active" under the Inventory Rule (meaning they were in commerce during the 10 years prior to 2016).

Questions about PFAS and Superfund

30. Has EPA tested all Superfund sites for the presence of PFAS? If so, please provide a list of Superfund sites at which PFAS has been found, along with the name of the PFAS chemical identified and the levels measured. If not, when does EPA plan to undertake such testing? If so, how long will PFAS be monitored for at those sites?

The EPA has been testing Superfund sites where there is reason to believe PFAS chemicals might be present. Testing generally occurs as part of the site investigation, a five-year review, or as part of remedy optimization. Testing also has occurred in conjunction with state efforts where states are making an effort to test all or many Superfund sites for PFAS chemicals.

Attachment #2 contains a list of Superfund sites where PFAS chemicals have been detected. If PFAS chemicals are detected above CERCLA screening levels at a site, the site will be monitored along with other contaminants throughout the remediation process.

Questions about PFAS and Water

31. Does EPA have monitoring results for PFAS detections in drinking water systems below the minimum reporting level in UCMR 3? If so, please provide that data. If not, please explain why not, since it is my understanding that measurements were conducted down to the detection limit of the methodologies used.

The EPA establishes Minimum Reporting Levels (MRL) for each of the methods it publishes for the Unregulated Contaminant Monitoring Rule (UCMR). The EPA uses multi-lab validation studies to determine the lowest level at which laboratories can accurately quantify the concentration of the contaminants. By setting an MRL, the EPA assures the quality of the data reported to the Agency under the UCMR. The EPA established MRLs that range from 10 to 90 ppt for the six PFAS monitored under UCMR 3 using method 537. The EPA vetted those MRLs through the notice-and-comment UCMR 3 rulemaking. These multi- lab validation studies are typically performed before laboratories have had extensive experience using the methods and the MRLs are set at levels that all of the labs in the validation study can accurately measure. As laboratories gain more experience with the methods, their ability to measure at lower levels improves, as has been the case with Method 537. The EPA did not mandate reporting or receive results below the MRL for any UCMR 3 PFAS chemicals and therefore would not have any results below those levels to communicate to the public.

Other methods may be appropriate for the analysis of PFAS chemicals in drinking water but they have not been evaluated by the EPA's Office of Water. Those considering alternative methods should consider the degree to which method performance has been evaluated and documented, as well as the degree to which the method capabilities align with project-specific objectives that will be used to assess data quality.

32. Is it possible to develop a validated total PFAS or total organic fluorine methodology to detect and monitor PFAS in drinking water and ground water? If so, please describe the steps required to complete the development and/or validation of such a methodology, along with expected timelines for their completion. If such a methodology was completed, how could it best be used to advance EPA's PFAS research, monitoring and regulatory efforts? Could you describe any statutory barriers that could hinder or prevent the utilization of such a methodology to support the development or implementation of regulations under each of the Safe Drinking Water, Clean Water, Emergency Planning and Community Right-to-Know, Toxic Substances Control, Clean Air or Comprehensive Environmental Response, Compensation and Liability Acts? (As non-

exhaustive examples, could you describe any potential implementation challenges of i) promulgating a total PFAS drinking water standard, ii) adding all active PFAS chemicals to the Toxic Release Inventory, or iii) designating all PFAS as hazardous substances)?

It may be possible to develop a validated total PFAS chemical or total organic fluorine (TOF) methodology to detect and monitor PFAS chemicals in drinking water and ground water, but this work is still in the very early stages of development. The final utility of such a method would also need to be determined. For example, method sensitivity (i.e., the ability to measure at low levels of concern) may prove to be a challenge for drinking water samples. If a validated method can be developed, such a method might prove to be useful as one of many measurement and monitoring methods, i.e., to provide a quick screening-level survey to identify places where more detailed sampling and measurements would be indicated. Additional precautions are necessary with TOF analytical methods because these methods would not exclusively measure for total PFAS but will also include other, non-PFAS organic compounds that include fluorine. Recent published reports indicate, for example, that approximately 30-40% of agrochemicals, including 25% of licensed herbicides, contain organic fluorine. In addition, since 1970, the percentage of fluorine-containing drugs has grown from 2% to 25% and includes brand names such as Lipitor, Prevacid, Flonase, Prozac, and Ciprobay.

The EPA is not aware of any statutory barriers that could hinder or prevent the utilization of such a methodology to support the development or implementation of regulations under the laws listed above, though the method by itself (as noted above) might not be sufficient to provide the data needed to develop or implement regulations.

A TOF methodology used as a screening method could potentially be used in Superfund preliminary assessment/site investigations and remedial investigation/feasibility studies or to aid in remedial design. It could not be used for a risk assessment or to set cleanup levels. Under CERCLA, cleanup levels are based on reducing contaminant concentrations below unreasonable risk levels. Risk levels are based on toxicity information. At this time, there is no known toxicity information on total organic fluorine (as would be measured by a TOF method), and thus there is no way to calculate risk or cleanup levels or to make a drinking water regulatory determination for total organic fluorine.

Potential challenges with designating all PFAS chemicals as hazardous substances include first arriving at a consensus definition of what is and is not a PFAS, since not all PFAS compounds are equal in toxicity and other characteristics. Another challenge is finding evidence that all PFAS chemicals qualify as hazardous substances.

In considering listing a chemical on the TRI, the EPA must determine whether data and information are available to fulfill the statutory listing criteria (EPCRA Section 313(d)(2)) and consider the extent and utility of the data that would be gathered. In summary, Section 313(d)(2) indicates that a chemical may be added to the TRI list if it is determined that there is sufficient evidence to establish that the chemical is known to cause or can reasonably be anticipated to cause (A) significant adverse acute human health effects at concentration levels that are reasonably likely to exist beyond facility site boundaries, (B) chronic human health effects, or (C) a significant adverse effect on the environment of sufficient seriousness.

For the EPA to add a chemical to the TRI list of chemicals, EPCRA Section 313(d)(2) requires that the determination is based on the chemical being known to cause a significant adverse acute or chronic human health effect or a significant adverse effect on the environment due to its toxicity. The EPA is to base this determination on generally accepted scientific principles or laboratory tests, or appropriately designed and conducted epidemiological or other population studies. Accordingly, the EPA must have sufficient information to support the addition of a PFAS chemical to the TRI list of chemicals.

As indicated in the PFAS Action Plan, for most PFAS chemicals there is limited or no toxicity information. This lack of toxicity information would pose a potential implementation challenge for adding all active PFAS chemicals to TRI's scope of covered chemicals.

33. Many entities have recommended that all PFAS be regulated as a class, instead of via a chemical-by-chemical approach. Could you describe all efforts by EPA to research, monitor and regulate PFAS as a class (including sub-classes consisting of some but not all PFAS substances) as well as any statutory, scientific or other barriers to doing so?

The research being conducted by the EPA through the use of in vitro tiered testing and computational methods may generate useful information to begin the evaluation of hazards across classes or for structurally similar PFAS chemicals, but no methodology to group PFAS chemicals as a class or as subclasses has been developed at this time. A brief description of the research being conducted by the EPA's CompTox program can be found at: https://ehp.niehs.nih.gov/doi/full/10.1289/EHP4555.

The EPA can regulate and has regulated contaminants as a group in drinking water including, for example, disinfection byproducts such as haloacetic acids and trihalomethanes. To make a determination to regulate a contaminant in drinking water, the EPA must, consistent with the Safe Drinking Water Act, consider three criteria: 1) adverse human health effects, 2) occurrence in public drinking water systems with a frequency and at levels of health concern, and 3) in the sole judgement of the Administrator, a meaningful opportunity for health risk reduction through regulation. The EPA is gathering and evaluating information on PFAS chemicals other than PFOA and PFOS. As part of the Safe Drinking Water Act regulatory process for PFOA and PFOS, the EPA will invite the public to provide additional information, which will inform the agency's future decisions for a broader class of PFAS chemicals. The EPA's proposed regulatory determination for PFOA and PFOS, announced on February 20, 2020, requests information and data on other PFAS substances, and seeks comment on potential monitoring requirements and regulatory approaches the EPA is considering for PFAS chemicals.

Under TSCA, the EPA has managed PFAS chemicals as categories in a number of instances. In the 2013 and 2015 Significant New Use Rules[1] (Long-Chain Perfluoroalkyl Carboxylate and Perfluoroalkyl Sulfonate Chemical Substances; Proposed Rule, January 21, 2015, 80 FR 2885; and Perfluoroalkyl Sulfonates and Long-Chain Perfluoroalkyl Carboxylate Chemical Substances; Final Rule, October 22, 2013. 78 FR 62443), the EPA

[1] As well as in the supplemental proposed SNUR announced on February 20, 2020.

regulated a category of long-chain perfluoroalkyl carboxylate chemical substances, as defined at 40 CFR § 721.10536.

In the 2009 Long-Chain Perfluorinated Chemicals (PFCs) Action Plan, the EPA identified two subcategories of PFAS chemicals to address in the Action Plan: Long-Chain Perfluoroalkyl Sulfonate (PFAS) Sub-Category and Long-Chain Perfluoroalkyl Carboxylate (PFAC) Sub-Category.

In the 2010/2015 PFOA Stewardship Program, which launched in 2006, the EPA developed the program with commitments from participating companies to work toward a phaseout of not just perfluorooctanoic acid (PFOA) but also precursor chemicals that can break down into PFOA and related higher homologue chemicals.

Under TSCA, the EPA also uses category approaches in reviewing new PFAS chemicals. Upon receipt of a premanufacture notice for a new PFAS chemical, the EPA determines which sub-group of PFAS chemicals the chemical is most like (e.g., carboxylic acid, sulfonate, ether, etc.) and data for similar chemicals within that sub-group (category) are used to evaluate the new chemical.

34. Once EPA finalizes toxicity values for each PFAS or class of PFAS, does it plan to develop drinking water health advisories for each one? If not, why not, since a toxicity value in isolation will not provide a community with information that can be easily used to identify a safe level for that PFAS or class of PFAS in drinking water or groundwater.

    The agency is gathering and evaluating information, including toxicity values, to determine if health advisories or regulation are appropriate for additional PFAS.

Senator Capito:

35. Can you elaborate on how the ATSDR's Toxicological Profile factors into the EPA's regulatory processes, especially as concerns determining a potential MCL? Does the ATSDR Toxicological Profile require or directly translate into environmental standards to be set by the EPA?

    When the EPA develops the health effects document to support a regulation such as an MCL, the EPA considers all available peer reviewed studies and health assessments. As part of that regulatory process the EPA would coordinate with ATSDR and other federal partners and consider available ATSDR studies.

36. What is a realistic regulatory timeline for a determination on a potential MCL for a particular PFAS compound or class of PFAS?

    The EPA is continuing to work through the process outlined in the Safe Drinking Water Act (SDWA) as expeditiously as possible to evaluate drinking water standards for PFOA and PFOS—two of the most well-known and prevalent PFAS chemicals. This includes a formal process for public input and engagement with stakeholders and scientific advisors in order to ensure scientific integrity and transparency. On February 20, 2020, the EPA announced proposed regulatory determinations for PFOA and PFOS in drinking water, which will soon be published in the Federal Register. The EPA is also gathering and

evaluating information to determine if regulation under the SDWA is appropriate for other chemicals in the PFAS chemical family, including a request for public comment included in the proposed regulatory determinations announced on February 20, 2020. Science-driven standard development typically takes a few years to complete, particularly given the prescriptive mandates in the SDWA.

37. Can there be regulatory flexibilities under a potential MCL or other regulatory action to reduce the frequency and cost of sampling?

    a. Could the EPA's approach to regulating asbestos or VOCs in drinking water serve as a model for a flexible approach here?

    If a maximum contaminant level (MCL) is promulgated, according to the Safe Drinking Water Act (SDWA) section 1401, water systems are required to test their water for the presence of the regulated contaminant(s).

    The EPA has established a Standardized Monitoring Framework for many of its current regulatory requirements that simplifies monitoring for water systems. This is achieved by synchronizing monitoring requirements and reducing monitoring frequency for systems that are reliably and consistently below the MCL or do not detect the contaminant. Furthermore, primacy agencies, such as states, have the flexibility to issue monitoring waivers, with EPA approval, which take into account regional and state specific characteristics and concerns.

    If the EPA determines it will regulate a contaminant, the agency would consider regulatory flexibilities in monitoring and other requirements to the extent allowable under the Safe Drinking Water Act. The specific flexibilities would depend upon the characteristics of the contaminant and the data needed to determine if the contaminant occurs at a level that is reliably and consistently lower than a potential MCL.

38. Does EPA intend to add any PFAS or classes of PFAS to UMCR 5? If so, which?

The EPA intends to propose additional PFAS chemicals for inclusion in UCMR 5 but has not made final decisions about which PFAS chemicals to include. To determine which PFAS chemicals will be included in UCMR 5, the EPA plans to look at the newer methods that can detect more PFAS chemicals and at lower minimum reporting levels (MRLs) than possible in EPA's previous data collection. The EPA anticipates proposing UCMR 5 in 2020, evaluating public comments, and publishing a final UCMR 5 in late 2021. The EPA will also evaluate the new requirements of the National Defense Authorization Act (NDAA) for Fiscal Year 2020 (P.L. 116-92) when proposing and finalizing UCMR 5, subject to the availability of appropriations.

39. Will the agency conduct any sampling before UMCR 5?

The EPA uses the UCMR program authorized under the Safe Drinking Water Act to collect nationally representative data for contaminants suspected to be present in drinking

water, but that do not have regulatory standards. Currently, water systems are required to monitor for thirty contaminants in accordance with UCMR 4 (for more information, see https://www.epa.gov/dwucmr/fourth-unregulated-contaminant-monitoring-rule). The EPA will continue to collect available sampling data gathered by its federal, state, and local partners.

40. Under TSCA, what is EPA doing regarding SNURs for existing PFAS chemicals in the marketplace?

See Attachment 1.

41. How many PFAS are currently used in commerce?

Results of the retrospective reporting requirements of the TSCA Inventory Notification (Active/Inactive) Rule indicate that 602 PFAS chemicals on the TSCA Inventory are currently commercially active.

42. During the hearing, you mentioned that the EPA Office of Air is currently working on PFAS air standards and monitoring techniques.

    a. Can EPA elaborate on that work for the record and provide a timeline for finalization of standards or monitoring techniques?
    b. While these standards and monitoring techniques are being developed, how has the EPA certified or monitored existing facilities that are already being employed to destroy, via combustion, Department of Defense stockpiles of FFFO?
        i. How confident is the EPA that this mitigation of the Department of Defense's legacy PFAS material is not simply shifting this pollution to a different medium, namely air?

The PFAS Action Plan describes the EPA's approach to identifying and understanding PFAS chemicals, approaches to addressing current PFAS chemical contamination, preventing future contamination, and effectively communicating with the public about PFAS chemicals. Specifically, the Action Plan identifies several areas of active research including development of validated analytical methods for accurately testing PFAS chemicals in drinking water and other water matrices (wastewater, surface water, groundwater), as well as in solids (solids, sediment, biosolids, fish tissue) and in air (ambient, stack emission, off-gases), and treatment and remediation technologies for PFAS chemicals in the environment.

The EPA continues to assess air monitoring and measurement methods. Developing these methods is a first step toward characterization of PFAS chemicals in the air. The EPA has not set a timeline for finalization. The EPA's Office of Research and Development is currently studying PFAS incineration questions in experimental simulations, sampling and analytical methods development, and industrial field sampling. Research is examining the thermal stability of PFAS compounds, the ability to fully capture and identify PFAS compounds and their thermal decomposition byproducts, and the efficacy of emission control technologies.

The EPA has also heard from state air agencies concerned about environmentally correct ways of disposing of PFAS chemical products. The EPA will continue to partner with state air agencies, as well as other federal agencies and local communities, to limit human exposure to potentially harmful levels of PFAS chemicals in the environment.

Concerning standards, please note that the Action Plan discusses mitigating PFAS chemical exposures including moving forward with how best to designate two specific PFAS chemicals (PFOA and PFOS) as hazardous substances using one of the available existing statutory mechanisms. Currently, the EPA is initiating the regulatory development process for listing PFOA and PFOS as CERCLA hazardous substances.

Senator Cramer:

43. Mr. Ross, both you and Administrator Wheeler have stated that you intend to move forward with a rulemaking process to set an enforceable maximum contaminant levels (MCLs) for PFAS under the Safe Drinking Water Act. According to your website, there are three criteria that must be met in order to set a national MCL under the Safe Drinking Water Act. One of them is: "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." What metrics do you use to determine the prevalence or "high chance" of a substance in public waters systems nationally?

    The EPA collects contaminant occurrence data and assesses whether there is sufficient data and information to characterize known or likely occurrence in public water systems. The EPA primarily relies upon data collected under the UCMR, but also uses data from many sources to evaluate contaminant occurrence. When evaluating occurrence, the EPA reviews nationally representative finished drinking water occurrence data, but non-national data may also be used. The EPA compares occurrence data to a Health Reference Level (HRL) for a contaminant. HRLs are developed by the EPA using the best available, peer reviewed risk assessment for the contaminant and represent a level of health concern in drinking water. Based upon this analysis, the EPA evaluates if a 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." The EPA considers monitoring data, contaminant concentrations, contaminant characteristics, and other information to determine whether the contaminant may occur in public water systems at levels of public health concern.

44. The publicly available maps shows high concentrations of PFAS in certain regions while certain areas have very little, if any. There is concern that we create a national regulatory burden for everyone rather than proactively targeting the communities most in need. As you work through the rulemaking process, are there tools you can use to try and address this in a more targeted, regional fashion rather than a national mandate which will require water providers everywhere to do testing?

    If a maximum contaminant level (MCL) is promulgated, according to the Safe Drinking Water Act (SDWA) section 1401, water systems are required to test their water for the presence of the regulated contaminant(s).

The EPA has established a Standardized Monitoring Framework for many of its current regulatory requirements that simplifies monitoring for water systems. This is achieved by synchronizing monitoring requirements and reducing monitoring frequency for systems that are reliably and consistently below the MCL or do not detect the contaminant. Furthermore, primacy agencies, such as states, have the flexibility to issue monitoring waivers, with EPA approval, which take into account regional and state specific characteristics and concerns.

If the EPA determines it will regulate a contaminant, the agency would consider regulatory flexibilities in establishing monitoring and other requirements to the extent allowable under the SDWA. The specific flexibilities would depend upon the characteristics of the contaminant and the data needed to determine if the contaminant occurs at a level that is reliably and consistently lower than a potential MCL.

Senator Gillibrand:

45. Mr. Ross, the public has a right to know when PFAS are present in their drinking water or groundwater, as well as when these chemicals are released into the air. Does the EPA currently require monitoring or reporting for releases of PFAS into air and water?

Currently the EPA does not require monitoring of PFAS chemicals in drinking water. The EPA previously required water systems to monitor for six different PFAS chemicals under Unregulated Contaminant Monitoring Rule (UCMR) 3. The EPA uses the UCMR program, authorized under the Safe Drinking Water Act (SDWA), to collect nationally representative data for contaminants suspected to be present in drinking water, but that do not have regulatory standards. Water systems must include sampling results on UCMR contaminants that are detected in drinking water in their annual Consumer Confidence Reports (CCRs). Water systems must make these reports available to their customers annually. Thus, UCMR 3 PFAS results (from monitoring between 2013-2015) have already been reported in Public Water Systems' previous CCRs. The EPA also includes UCMR sampling results in the publicly available National Contaminant Occurrence Database. The EPA intends to propose additional PFAS chemicals for the next round of nationwide drinking water monitoring under the UCMR program.

The Action Plan identifies several areas of active research, including development of analytical methods for accurately testing PFAS in air (ambient, stack emission, off-gases). Concerning standards, please note that the Action Plan discusses mitigating PFAS exposures, including moving forward with how best to designate two specific PFAS (PFOA and PFOS) as hazardous substances using one of the available existing statutory mechanisms. The EPA has initiated the regulatory development process for listing PFOA and PFOS as CERCLA hazardous substances.

a. Why has EPA not used its existing authority under the Toxic Release Inventory to require polluters to report releases of PFAS to the public?

The EPA initiated a rulemaking published in the Federal Register on December 4, 2019, titled: Advanced Notice of Proposed Rulemaking, Addition of Certain Per-

and Polyfluoroalkyl Substances; Community Right-to-Know Toxic Chemical Releases Reporting.

46. Is EPA still approving new PFAS chemicals for commercial use under the Toxic Substances Control Act?

    a. If yes, how many new PFAS chemicals have been approved under the current Administration?

    The PFOA Stewardship Initiative began in 2006. Since that time, the EPA has reviewed 268 PFAS chemical substances and has received a total of 148 Notices of Commencement (NOC) for PFAS chemicals that had undergone new chemicals program review. A NOC indicates intent to commence manufacture or import of a chemical; hence it is EPA's best indication of whether a PFAS chemical may have entered commerce. Two of these NOCs have been received since June 22, 2016; the remaining 146 were received prior to that date. The EPA also receives exemption notices for certain low-volume chemical substances which are exempt from full premanufacture notice (PMN) review under TSCA section 5 provided they meet the criteria (e.g., chemical substances manufactured at 10,000 kg/year or less may be subject to a Low-Volume Exemption, LVE) and maintain certain conditions/controls throughout the duration of the exemption. Since 2006, the EPA has received a total of 328 LVEs for PFAS chemicals and granted 272 of them. Of those granted, 262 were granted prior to June 22, 2016 and 10 were granted after that date.

    It is important to understand that most of the PFAS chemicals that the EPA receives for review under the New Chemicals Review program are intended as replacement substances for existing long-chain PFAS chemicals.

47. You have indicated that the EPA intends to issue a regulatory determination on whether to regulate PFAS under the Safe Drinking Water Act by the end of the year. Once your regulatory determination has been made, how long does EPA intend to take to set an enforceable Maximum Contaminant Level for PFAS in drinking water?

    On February 20, 2020, the EPA announced proposed regulatory determinations for PFOA and PFOS in drinking water, which will soon be published in the Federal Register. The EPA must carefully evaluate these contaminants in accordance with the criteria in the SDWA. The process requires public input and engagement with stakeholders and scientific advisors in order to ensure scientific integrity and transparency. Typically, science-driven standard development takes a few years to complete, particularly given the prescriptive mandates of the SDWA.

Senator Inhofe:

48. There are claims that the Environmental Protection Agency's (EPA) health advisory is too low given the Agency for Toxic Substances and Disease Registry's (ATSDR) minimum risk level. It is my understanding that the EPA's health advisory and the ATSDR's level are answers to different questions.

a. Is this accurate?
b. If so, what are those differences?

The ATSDR's minimal risk levels (MRLs) and the EPA's drinking water health advisories (HAs) are two different tools that are used in different situations.

There has been significant confusion regarding the differences between recent draft screening values (Environmental Media Evaluation Guides [EMEGs]) developed by the Agency for Toxic Substances and Disease Registry (ATSDR) and the EPA's HAs for PFOA and PFOS. Questions generally focus on which may be more appropriate for analyzing potential adverse health effects associated with exposure to those chemicals. The reality is the two are designed for different purposes given the different missions of the agencies.

The EPA's lifetime HAs can be used by communities as they consider the appropriate actions to reduce exposure to PFOA and PFOS in drinking water. HAs are designed to protect the most sensitive populations from potential health effects associated with PFOA and PFOS in drinking water over a lifetime of exposure. ATSDR's screening values are designed to identify areas where exposure to PFOA and PFOS require further site-specific study. The screening values are conservatively designed to screen out areas that do not require further risk-based analysis. ATSDR and the EPA made different policy decisions to develop their respective water concentrations (i.e., EMEGs and HAs). These differences are related to study selection, exposure assumptions, uncertainty factors, and other relevant criteria, per each Agency's guidance.

49. The ATSDR report from last summer states, "The available human studies have identified some potential targets of toxicity; however, cause and effect relationships have not been established for any of the effects, and the effects have not been consistently found in all studies." To be clear, does this mean that the report did not establish "causation" relative to various health outcomes that were being cited?

The EPA cannot speak to ATSDR's conclusion. ATSDR is the appropriate agency to answer this question.

50. Given the various recent studies of PFAS chemicals that have taken place, including one clinical trial of PFOA doses administered to humans leading to average blood levels of 175,000 parts per *billion*, is EPA tracking the studies?

    a. If so, what role will they serve in informing the various regulatory actions the agency will be taking in the coming months?
    b. How will EPA determine which are most "informative" for the purpose of regulatory decisions?

    As a part of the evaluation for the EPA's proposed regulatory determination on PFOA and PFOS, the EPA reviewed newly available scientific information including human health studies. Future agency actions will consider new data as it becomes peer reviewed and publicly available in a final version.

51. Data from the annual CDC NHANES survey and the Red Cross show that as of 2015, the average levels of PFOA and PFOS in the general U.S. population have declined 70-80 percent since 2000. Given this data, does EPA expect that these levels would continue to decline?

The EPA is not making any assumptions with respect to the future trajectory of PFOA and PFOS average levels in the general U.S. population. Our current data indicates that the existing PFOA and PFOS released over the past 80 years may remain in the environment for centuries to come and other PFAS chemicals may degrade into different formulations in the environment, so we cannot rule out future exposures with future impacts on population serum levels. Note that current data shows that the half-life of these compounds in humans is less than five years. The EPA will continue to track NHANES and other rigorous scientific data sources for purposes of increasing our understanding of exposures to PFOA, PFOS, and other PFAS chemicals of concern.

52. What is EPA's understanding of the means of exposure for PFAS chemicals for people overall?

    a. Is it primarily through drinking water?

    The EPA considers drinking water to be one route of exposure but certainly not the only means of exposure. The potential relative contributions of PFAS chemical exposure pathways other than drinking water have yet to be completely quantified, and exposure depends very much on site-specific context. The EPA will continue to gather data and conduct research to improve our understanding of all relevant pathways of human exposure.

    Means of potential exposure other than drinking water identified in EPA's PFAS Action Plan include:

    - **Consumption of plants and meat from animals, including fish that have accumulated PFAS chemicals;**
    - **Consumption of food that was in contact with PFAS chemical-containing products (e.g., some microwaveable popcorn bags and grease-resistant papers);**
    - **Use of, living with or otherwise being exposed to commercial household products and indoor dust containing PFAS chemicals, including stain- and water-repellent textiles (including carpet, clothing and footwear), nonstick products (e.g., cookware), polishes, waxes, paints, and cleaning products;**
    - **Employment in a workplace that produces or uses PFAS chemicals, including chemical production facilities or utilizing industries (e.g., chromium electroplating, electronics manufacturing, or oil recovery); and**
    - **In utero fetal exposure and early childhood exposure via breastmilk from mothers exposed to PFAS chemicals.**

    b. If so, what percent of exposure risk is likely via drinking water versus other means?

    As the research is still emerging it is not possible for the EPA to provide a percent of exposure risk for all PFAS chemicals at this time. Exposure to PFAS chemicals varies on a case by case basis, and the EPA cannot generalize for all exposure

scenarios. For PFOA and PFOS, the EPA attributed 20% of the total exposure to drinking water based on the approach described in the EPA Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000). As stated above, available data indicate there is the potential for significant exposure to PFOA and PFOS from sources other than drinking water. The uncertainty in the available exposure information for PFOA, PFOS, and other PFAS chemicals precludes a more data-derived value at this time.

53. Other countries have been dealing with this issue as well and might be further along in their dealings with these chemicals.

    a. Is EPA looking at the international response?

    The EPA is engaged with the international community to address PFAS chemicals. The EPA has engaged with international entities in Australia, Canada, and the EU. For example, the EPA has had discussions with the Australian Department of the Defense to exchange information on methods to treat and detect PFAS chemicals. Other international organizations, such as the International Organization for Standardization and ASTM International, have developed analytical methods that the EPA has explored for use. Also, the EPA's literature reviews for PFOA, PFOS, and other PFAS chemicals included toxicity information from international authorities. The EPA will continue to coordinate with international partners, as well as our domestic partners from other federal agencies, states, tribes, industry groups, associations, local governments, communities, and the public.

    b. How does the EPA's health advisory level compare to other countries?

    Health based drinking water values generally range from 0.07 ug/L-10ug/L (70 ppt – 100ppt) for PFOA and between 0.07 ug/L-0.6ug/L (70 ppt – 600 ppt) for PFOS world-wide. The EPA is at the more protective end of this range at 0.07 ug/L (70 ppt). However, science is rapidly evolving on this topic and many of these values were established more than 4-5 years ago. See the Interstate Technology and Regulatory Council's (ITRC) website for a summary of these values for water at: https://pfas-1.itrcweb.org/fact-sheets/.

Senator Markey:

54. Out of the C8 PFAS chemicals on the Toxic Substances Control Act inventory, how many are still being actively used in commerce in 2019?

    Approximately 50 C8 PFAS chemicals are marked active on the Toxic Substances Control Act (TSCA) inventory; however, 32 of these are designated as CBI and may not be readily identifiable on the non-CBI TSCA Inventory.

Senator Sanders:

55. Elevated and unsafe levels of perfluoroalkyl substances (PFAS) have been found in hundreds of sites and at least one municipal water system in Vermont, and have contaminated public water

and other natural resources for an estimated 16 million people nationally. Despite this clear and serious health risk, the EPA has yet to make a final regulatory determination to regulate PFAS chemicals as a drinking water contaminant under the Safe Drinking Water Act. Please provide a timeline for a final regulatory determination to regulate PFAS chemicals as a drinking water contaminant under the Safe Drinking Water Act.

On February 20, 2020, the EPA announced proposed regulatory determinations for PFOA and PFOS in drinking water, which will soon be published in the Federal Register. The EPA must carefully evaluate these contaminants in accordance with the criteria in the SDWA. The process requires public input and engagement with stakeholders and scientific advisors in order to ensure scientific integrity and transparency. Typically, science-driven standard development takes a few years to complete, particularly given the prescriptive mandates of the SDWA.

56. Will you commit to meeting the Safe Drinking Water Act statutory deadlines to set a maximum contaminant limit once the EPA has made the regulatory determination to regulate PFAS chemicals as a drinking water contaminant?

The EPA is committed to complying with the Safe Drinking Water Act.

57. Several states, including my home state of Vermont, have set health advisories for drinking water containing PFAS chemicals that are significantly more stringent than the EPA's lifetime health advisory level. The most recent update to the Toxic Substances Control Act (TSCA) contained a provision that protects states that had more stringent standards on the books before April 22, 2016 (Sec. 13 State-Federal Relationship, 15 USC § 2617(e)(1)(A)). Will you commit to avoiding any actions that would preempt states' ability to enforce health advisory levels for PFAS enacted before April 22, 2016 that are more stringent than the EPA's standards? If you will not make this commitment, please describe the specific instances in which you believe TSCA would prevent states from enforcing more stringent requirements the state had established before April 22, 2016.

The preemption provisions of the Lautenberg Amendments to TSCA contain important directions that address when state actions will be preempted or not. The EPA will follow all regulatory requirements of the statute with regard to preemption.

Senator Sullivan:

58. You and the Administrator have stated that you are working through your action plan to set an MCL for and list as hazardous substances under CERCLA some set of PFAS chemicals this year. If listed under CERCLA owners or operators of facilities where a release took place would be strictly liable for cleaning up the site and the costs. In Alaska aircrafts are vital for transportation, supplies, and general access to various communities. Current FAA regulations require certain airport operators to maintain Aircraft Rescue and Firefighting equipment and systems, including Aqueous Firefighting Foams (AFFF). These AFFFs must meet military specifications that

include certain PFAS chemicals. Thus, airport operators have been required by federal law to use and discharge for training PFAS. Many airports in my state are owned and operated by the State or local municipalities. If PFAS chemicals are listed as hazardous under CERCLA, will these State and local governments be liable for both the clean-up and the costs from discharges of chemicals that were mandated by federal law? Can you under existing law exclude these entities from liability if the costs threaten to bankrupt a city or other entity? Finally, would an exclusion from liability for a state or local government if the release that contaminated the site were mandated under federal law, still allow for clean-up of affected sites?

The EPA has initiated the regulatory process for designating PFOA and PFOS as hazardous substances under CERCLA. If PFOA and PFOS are designated as hazardous substances, potentially responsible parties could be liable under CERCLA for releases of PFOA or PFOS so long as a defense or exemption does not apply. As part of the regulatory process for designating PFOA and PFOS as hazardous substances under CERCLA, the EPA intends to solicit public comment on the potential impacts of this designation and would consider any comments received in making its final decision.

59. Are their accepted techniques to properly clean up and dispose of PFAS contaminated soil? For instance can contaminated soil be burned to remediate a site?

As part of the PFAS Action Plan, the EPA is gathering information to better understand treatment and disposal issues with respect to PFAS chemical waste and has initiated the regulatory development process for listing PFOA and PFOS as CERCLA hazardous substances. The EPA is currently evaluating the use of incineration and other disposal techniques to effectively treat and dispose of PFAS chemical waste. Depending on various technical considerations including the volume and toxicity of the specific PFAS chemical wastes, thermal destruction in high temperature incinerators may be the preferred treatment method assuming sufficient temperatures and residence times are achieved to ensure adequate PFAS chemical destruction, and assuming adequate pollution controls are utilized.

60. Are existing funding sources to help affected communities adequate given the growing scope of sites that have been discovered?

The Superfund Remedial program addresses many of the worst contaminated sites on the National Priorities List (NPL) in the United States by conducting investigations, implementing long-term cleanups, and overseeing response work conducted by potentially responsible parties (PRPs) at NPL sites. Under CERCLA, Superfund cleanup may be accomplished by multiple funding sources, including funding provided by Congress and by states (e.g., state cost share), funding in special accounts provided by PRPs through settlement agreements for specific sites, PRPs performing the cleanups or other federal agencies conducting cleanups. When using its appropriated dollars at sites without responsible parties, the EPA selects new construction projects for funding based on prioritization of those sites that present the greatest risk to human health and the environment in addition to other programmatic factors. At the end of most fiscal years, some projects that rank lower in priority do not receive construction funding.

The EPA has initiated the regulatory process for designating PFOA and PFOS as hazardous substances under CERCLA. With such a designation, potentially responsible parties could be liable under CERCLA for PFOA or PFOS so long as a defense or exemption does not apply. As part of the regulatory process, the EPA intends to solicit public comment on the hazardous substance designation's potential impacts and would consider any comments received in making its final decision.

Senator Wicker:

61. Water utilities in rural and underserved communities may struggle to gather the resources necessary to filter PFAS out of their system. If EPA sets a maximum contaminant level (MCL) for certain PFAS chemicals, what will be the timeline for compliance for a noncompliant water utility? Additionally, how will EPA work with rural and underserved communities that have limited resources to ensure compliance?

    Any timelines for compliance will be consistent with those established by the Safe Drinking Water Act (SDWA). If the EPA determines it will regulate a contaminant, the agency could consider regulatory flexibilities in establishing monitoring and other requirements to the extent allowable under the SDWA. The specific flexibilities would depend upon the characteristics of the contaminant and the data needed to determine if the contaminant occurs at a level that is reliably and consistently lower than a potential MCL.

62. Will EPA be re-opening closed Superfund sites to evaluate the area for PFAS contamination? Will existing Superfund sites be reevaluated for PFAS contamination?

    It may be appropriate to reconsider prior remedy decisions at some Superfund sites in light of new information regarding potential PFAS chemical contamination. The EPA considers new site information as it becomes available. The lead federal agency (EPA for private sites; federal agencies for federal facility sites) uses site knowledge (operations and historic activities) as well as existing data to determine whether releases of PFAS chemicals into the environment may have occurred. If releases of PFAS chemicals may have occurred, the lead Federal agency takes steps to evaluate the presence of PFAS chemical contamination, including the sampling and analysis of drinking water, groundwater, soil and other environmental media. The Five-Year Review is the principal tool used to evaluate new information that becomes available post-remedy implementation at Superfund sites, including the potential presence of new contaminants or updated toxicity information.

63. Have there been any economic impact studies to determine at the State level how the regulation of PFAS will affect drinking water programs and cleanup programs?

    On December 3, 2019, the Congressional Budget Office provided a Cost Estimate of "S. 1507, the PFAS Release Disclosure and Protection Act of 2019." The EPA is not aware of any additional studies on the economic impact of regulating PFAS chemicals.

Document Developed April 2019

Excel Worksheets
Active & non-CBI: PFAS substances that are active & identified by a SNUR or consent order and are not CBI are listed on this sheet **Active & CBI (sanitized):** PFAS substances that are active & identified by a SNUR or consent order & are CBI protected are listed on this sheet (all CBI content has been **sanitized**)

Citation	SNUR	Associated CFRs
Note: citations below do not include SNURs associated with new chemical submissions, those chemical specific CFR citations are included in column F in tab two and column E in tab three.		
80 FR 2885	Significant New Use Rules: Long-Chain Perfluoroalkyl Carboxylate and Perfluoroalkyl Sulfonate Chemical Substances; Proposed Rule. January 21, 2015	§721.9582 & .10536
78 FR 62443	Perfluoroalkyl Sulfonates and Long-Chain Perfluoroalkyl Carboxylate Chemical Substances; Final Rule. October 22, 2013	§721.9582 & .10536
72 FR 57222	Perfluoroalkyl Sulfonates; Significant New Use Rule; Final Rule. October 9, 2007	§721.9582
67 FR 72854	Perfluoroalkyl Sulfonates; Significant New Use Rule; Final Rule. December 9, 2002	§721.9582
67 FR 11008	Perfluoroalkyl Sulfonates; Significant New Use Rule; Final Rule. March 11, 2002	§721.9582

CFR	Link	Comments
§721.9582	https://www.ecfr.gov/cgi-bin/text-idx?SID=c8175aed22d0b9446beca21293ba915f&mc=true&node=se40.33.721_19582&rgn=div8	271 chemicals phased out by 3M + 7 non-commenced chemicals
§721.10536	https://www.ecfr.gov/cgi-bin/text-idx?SID=c8175aed22d0b9446beca21293ba915f&mc=true&node=se40.33.721_110536&rgn=div8	Category listing for long-chain PFAC

Data Source
Substances include those from the public version of the TSCA Inventory that have a CF2(R')-CF(R'')(R''') substructure. For the data in this file, only the following substances were included: (1) substances that are "active" in US commerce based on the retrospective commercial activity reporting that was completed by October 5, 2018, and (2) substances that are regulated under a TSCA 5(e) consent order or Significant New Use Rule (SNUR). The dataset in this file was not further reduced using structural or other parameters.

Data Run April 2019

CASRN	casregno	CHEMICAL NAME	PMN or Original Inventory?	FLAGSNUR	ACTIVITY
307-35-7	307357	1-Octanesulfonyl fluoride, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	Original Inventory	SNUR (§721.9582)	ACTIVE
335-71-7	335717	1-Heptanesulfonyl fluoride, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-	Original Inventory	SNUR (§721.9582)	ACTIVE
355-46-4	355464	1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-	Original Inventory	SNUR (§721.9582)	ACTIVE
376-14-7	376147	2-Propenoic acid, 2-methyl-, 2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
383-07-3	383073	2-Propenoic acid, 2-[butyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
423-82-5	423825	2-Propenoic acid, 2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
1652-63-7	1652637	1-Propanaminium, 3-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]-N,N,N-trimethyl-, iodide (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
1691-99-2	1691992	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-	Original Inventory	SNUR (§721.9582)	ACTIVE
1763-23-1	1763231	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	Original Inventory	SNUR (§721.9582)	ACTIVE
2263-09-4	2263094	1-Octanesulfonamide, N-butyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-	Original Inventory	SNUR (§721.9582)	ACTIVE
2795-39-3	2795393	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
2991-51-7	2991517	Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
3107-18-4	3107184	Cyclohexanesulfonic acid, 1,2,2,3,3,4,4,5,5,6,6-undecafluoro-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
3871-99-6	3871996	1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
3872-25-1	3872251	1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
4151-50-2	4151502	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	Original Inventory	SNUR (§721.9582)	ACTIVE
17202-41-4	17202414	1-Nonanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-nonadecafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
24448-09-7	24448097	1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-N-methyl-	Original Inventory	SNUR (§721.9582)	ACTIVE
25268-77-3	25268773	2-Propenoic acid, 2-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]methylamino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
29081-56-9	29081569	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
29117-08-6	29117086	Poly(oxy-1,2-ethanediyl), .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
29457-72-5	29457725	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, lithium salt (1:1)	PMN	SNUR (§721.9582)	ACTIVE
31506-32-8	31506328	1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-methyl-	Original Inventory	SNUR (§721.9582)	ACTIVE
37338-48-0	37338480	Poly(oxy(methyl-1,2-ethanediyl)), .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
38006-74-5	38006745	1-Propanaminium, 3-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]-N,N,N-trimethyl-, chloride (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
52166-82-2	52166822	1-Propanaminium, N,N,N-trimethyl-3-[[[1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-, chloride (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
55910-10-6	55910106	Glycine, N-[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]-N-propyl-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
56372-23-7	56372237	Poly(oxy-1,2-ethanediyl), .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
56773-42-3	56773423	Ethanaminium, N,N,N-triethyl-, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonate (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
59071-10-2	59071102	2-Propenoic acid, 2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
60270-55-5	60270555	1-Heptanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
61660-12-6	61660126	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-[3-(trimethoxysilyl)propyl]-	Original Inventory	SNUR (§721.9582)	ACTIVE
67584-52-5	67584525	Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
67584-53-6	67584536	Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
67584-56-9	67584569	2-Propenoic acid, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
67584-57-0	67584570	2-Propenoic acid, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
67584-58-1	67584581	1-Propanaminium, N,N,N-trimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]-, iodide (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
67584-62-7	67584627	Glycine, N-ethyl-N-[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]-, potassium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
67906-42-7	67906427	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-henicosafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
67969-69-1	67969691	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-[2-(phosphonooxy)ethyl]-, ammonium salt (1:2)	Original Inventory	SNUR (§721.9582)	ACTIVE
68084-62-8	68084628	2-Propenoic acid, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl ester	Original Inventory	SNUR (§721.9582)	ACTIVE
68227-96-3	68227963	2-Propenoic acid, butyl ester, telomer with 2-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]methylamino]ethyl 2-propenoate, 2-[methyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl 2-propenoate, .alpha.-[2-methyl-1-oxo-2-prop	Original Inventory	SNUR (§721.9582)	ACTIVE
68259-07-4	68259074	1-Heptanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
68259-08-5	68259085	1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
68259-09-6	68259096	1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE

68259-38-1	68259381	Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
68259-39-2	68259392	Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
68298-62-4	68298624	2-Propenoic acid, 2-[butyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl ester, telomer with 2-[butyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl 2-propenoate, 2-methyloxirane polymer with oxira	Original Inventory	SNUR (§721.9582)	ACTIVE
68298-80-6	68298806	Poly(oxy-1,2-ethanediyl), alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
68298-81-7	68298817	Poly(oxy-1,2-ethanediyl), alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
68310-17-8	68310178	Poly[oxy(methyl-1,2-ethanediyl)], .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]ethyl]-.omega.-hydroxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
68555-74-8	68555748	1-Pentanesulfonamide, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-N-(2-hydroxyethyl)-N-methyl-	Original Inventory	SNUR (§721.9582)	ACTIVE
68555-75-9	68555759	1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-N-(2-hydroxyethyl)-N-methyl-	Original Inventory	SNUR (§721.9582)	ACTIVE
68555-76-0	68555760	1-Heptanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-N-(2-hydroxyethyl)-N-methyl-	Original Inventory	SNUR (§721.9582)	ACTIVE
68555-81-7	68555817	1-Propanaminium, N,N,N-trimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]-, chloride (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
68555-91-9	68555919	2-Propenoic acid, 2-methyl-, 2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl ester, polymer with 2-[ethyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl 2-methyl-2-propenoate, 2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,	Original Inventory	SNUR (§721.9582)	ACTIVE
68867-60-7	68867607	2-Propenoic acid, 2-[[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]methylamino]ethyl ester, polymer with 2-[methyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadeca	Original Inventory	SNUR (§721.9582)	ACTIVE
68957-55-1	68957551	1-Propanaminium, N,N,N-trimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]-, chloride (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
68957-57-3	68957573	1-Propanaminium, N,N,N-trimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]-, iodide (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
68957-58-4	68957584	1-Propanaminium, N,N,N-trimethyl-3-[[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]-, iodide (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
68957-62-0	68957620	1-Heptanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-	Original Inventory	SNUR (§721.9582)	ACTIVE
68958-60-1	68958601	Poly(oxy-1,2-ethanediyl), alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl]-.omega.-methoxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
68958-61-2	68958612	Poly(oxy-1,2-ethanediyl), .alpha.-[2-[ethyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctyl)sulfonyl]amino]ethyl]-.omega.-methoxy-	Original Inventory	SNUR (§721.9582)	ACTIVE
70225-14-8	70225148	1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
70225-15-9	70225159	1-Heptanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
70225-16-0	70225160	1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
70225-17-1	70225171	1-Pentanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,5-undecafluoro-, compd. with 2,2'-iminobis[ethanol] (1:1)	Original Inventory	SNUR (§721.9582)	ACTIVE
1892-03-1	1892031	Cyclopentene, 1,3,3,4,4,5,5-heptafluoro-	PMN	SNUR (§721.10584)	ACTIVE
335-67-1	335671	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
335-95-5	335955	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, sodium salt (1:1)	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
507-63-1	507631	Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-heptadecafluoro-8-iodo-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
678-39-7	678397	1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
865-86-1	865861	1-Dodecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluoro-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
2043-53-0	2043530	Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-heptadecafluoro-10-iodo-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
2043-54-1	2043541	Dodecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafluoro-12-iodo-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
3825-26-1	3825261	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, ammonium salt (1:1)	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
17741-60-5	1774160S	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluorododecyl ester	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
27905-45-9	27905459	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
30046-31-2	30046312	Tetradecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-pentacosafluoro-14-iodo	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
39239-77-5	39239775	1-Tetradecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafluoro	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
60699-51-6	60699516	1-Hexadecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-nonacosafluoro-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
65510-55-6	65510556	Hexadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14-nonacosafluoro-16-iodo-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
68187-47-3	68187473	1-Propanesulfonic acid, 2-methyl-, 2-[[1-oxo-3-[(.gamma.-.omega.-perfluoro-C4-16-alkyl)thio]propyl]amino] derivs., sodium salts	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
68391-08-2	68391082	Alcohols, C8-14, .gamma.-.omega.-perfluoro	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
70969-47-0	70969470	Thiols, C8-20, .gamma.-.omega.-perfluoro, telomers with acrylamide	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
307-55-1	307551	Dodecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-tricosafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
307-70-0	307700	1-Undecanol, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-eicosafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
335-76-2	335762	Decanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-nonadecafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
355-50-0	355500	Hexadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-tritriacontafluoro-16-iodo-	Original Inventory	SNUR (§721.10536)	ACTIVE
375-95-1	375951	Nonanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-heptadecafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
376-06-7	376067	Tetradecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-heptacosafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
376-27-2	376272	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, methyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
423-62-1	423621	Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafluoro-10-iodo-	Original Inventory	SNUR (§721.10536)	ACTIVE

1996-88-9	1996889	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
2144-53-8	2144538	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
2144-54-9	2144549	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluorododecyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
16517-11-6	16517116	Octadecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,18-pentatriacontafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
21652-58-4	21652584	1-Decene, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-	PMN	SNUR (§721.10536)	ACTIVE
26738-51-2	26738512	3,6,9,12-Tetraoxapentadecane, 1,1,1,2,4,4,5,7,7,8,10,10,11,13,13,14,14,15,15,15-eicosafluoro-5,8,11-tris(trifluoromethyl)-	Original Inventory	SNUR (§721.10536)	ACTIVE
27619-90-5	27619905	1-Decanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
27619-91-6	27619916	1-Dodecanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
27619-97-2	27619972	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
29809-34-5	29809345	Eicosane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,19,19,20,20-hentetracontafluoro-20-iodo-	Original Inventory	SNUR (§721.10536)	ACTIVE
29809-35-6	29809356	Octadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18-heptatriacontafluoro-18-iodo-	Original Inventory	SNUR (§721.10536)	ACTIVE
34362-49-7	34362497	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-nonacosafluorohexadecyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
34395-24-9	34395249	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafluorotetradecyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
52591-27-2	52591272	2-Propenoic acid, 3,3,4,4,5,5,6,6,6-nonafluorohexyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
61798-68-3	61798683	Pyridinium, 1-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)-, 4-methylbenzenesulfonate (1:1)	Original Inventory	SNUR (§721.10536)	ACTIVE
65104-65-6	65104656	1-Eicosanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,19,19,20,20,20-heptatriacontafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
65104-67-8	65104678	1-Octadecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,18-tritriacontafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
65545-80-4	65545804	Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy-, ether with .alpha.-fluoro-.omega.-(2-hydroxyethyl)poly(difluoromethylene) (1:1)	Original Inventory	SNUR (§721.10536)	ACTIVE
67905-19-5	67905195	Hexadecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-hentriacontafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
68140-18-1	68140181	Thiols, C4-10, .gamma.-.omega.-perfluoro	Original Inventory	SNUR (§721.10536)	ACTIVE
68140-20-5	68140205	Thiols, C6-12, .gamma.-.omega.-perfluoro	Original Inventory	SNUR (§721.10536)	ACTIVE
68140-21-6	68140216	Thiols, C10-20, .gamma.-.omega.-perfluoro	Original Inventory	SNUR (§721.10536)	ACTIVE
68141-02-6	68141026	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) salt (3:1)	Original Inventory	SNUR (§721.10536)	ACTIVE
68187-25-7	68187257	Butanoic acid, 4-[[3-(dimethylamino)propyl]amino]-4-oxo-, 2(or 3)-[(.gamma.-.omega.-perfluoro-C6-20-alkyl)thio] derivs.	Original Inventory	SNUR (§721.10536)	ACTIVE
68188-12-5	68188125	Alkyl iodides, C4-20, .gamma.-.omega.-perfluoro	Original Inventory	SNUR (§721.10536)	ACTIVE
68412-68-0	68412680	Phosphonic acid, perfluoro-C6-12-alkyl derivs.	Original Inventory	SNUR (§721.10536)	ACTIVE
68412-69-1	68412691	Phosphinic acid, bis(perfluoro-C6-12-alkyl) derivs.	Original Inventory	SNUR (§721.10536)	ACTIVE
68515-62-8	68515628	1,4-Benzenedicarboxylic acid, dimethyl ester, reaction products with bis(2-hydroxyethyl) terephthalate, ethylene glycol, .alpha.-fluoro-.omega.-(2-hydroxyethyl)poly(difluoromethylene), hexakis(methoxymethyl)melamine and polyethylene glycol	Original Inventory	SNUR (§721.10536)	ACTIVE
68758-57-6	68758576	1-Tetradecanesulfonyl chloride, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafluoro-	Original Inventory	SNUR (§721.10536)	ACTIVE
69116-73-0	69116730	Propanoic acid, 3-[1-[difluoro[1,2,2,2-tetrafluoro-1-(fluorocarbonyl)ethoxy]methyl]-1,2,2,2-tetrafluoroethoxy]-2,2,3,3-tetrafluoro-, methyl ester	Original Inventory	SNUR (§721.10536)	ACTIVE
70983-59-4	70983594	Poly(oxy-1,2-ethanediyl), .alpha.-methyl-.omega.-hydroxy-, 2-hydroxy-3-[(.gamma.-.omega.-perfluoro-C6-20-alkyl)thio]propyl ethers	Original Inventory	SNUR (§721.10536)	ACTIVE
70983-60-7	70983607	1-Propanaminium, 2-hydroxy-N,N,N-trimethyl-, 3-[(.gamma.-.omega.-perfluoro-C6-20-alkyl)thio] derivs., chlorides	Original Inventory	SNUR (§721.10536)	ACTIVE
71608-60-1	71608601	Pentanoic acid, 4,4-bis[(.gamma.-.omega.-perfluoro-C8-20-alkyl)thio] derivs.	Original Inventory	SNUR (§721.10536)	ACTIVE
72623-77-9	72623779	Fatty acids, C6-18, perfluoro, ammonium salts	Original Inventory	SNUR (§721.10536)	ACTIVE
72968-38-8	72968388	Fatty acids, C7-13, perfluoro, ammonium salts	Original Inventory	SNUR (§721.10536)	ACTIVE
78560-44-8	78560448	Silane, trichloro(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)-	PMN	SNUR (§721.10536)	ACTIVE
79070-11-4	79070114	Poly(difluoromethylene), .alpha.-chloro-.omega.-(2,2-dichloro-1,1,2-trifluoroethyl)-	Original Inventory	SNUR (§721.10536)	ACTIVE
97553-95-2	97553952	Thiocyanic acid, .gamma.-.omega.-perfluoro-C4-20-alkyl esters	PMN	SNUR (§721.10536)	ACTIVE
97659-47-7	97659477	Alkenes, C8-14 .alpha.-, .delta.-.omega.-perfluoro	Original Inventory	SNUR (§721.10536)	ACTIVE
118400-71-8	118400718	Disulfides, bis(.gamma.-.omega.-perfluoro-C6-20-alkyl)	PMN	SNUR (§721.10536)	ACTIVE
125061-94-1	125061941	Naphthalene, [difluoro(1,2,2,3,3,4,4,5,5,6,6-undecafluorocyclohexyl)methyl]heptadecafluorodecahydro-	PMN	SNUR (§721.10536)	ACTIVE
135228-60-3	135228603	Hexane, 1,6-diisocyanato-, homopolymer, .gamma.-.omega.-perfluoro-C6-20-alc.-blocked	PMN	SNUR (§721.10536)	ACTIVE
142636-88-2	142636882	2-Propenoic acid, 2-methyl-, octadecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluorododecyl 2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,1	PMN	SNUR (§721.10536)	ACTIVE
143372-54-7	143372547	Siloxanes and Silicones, (3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)oxy Me, hydroxy Me, Me octyl, ethers with polyethylene glycol mono-Me ether	Original Inventory	SNUR (§721.10536)	ACTIVE
148240-85-1	148240851	1,3-Propanediol, 2,2-bis[[(.gamma.-.omega.-perfluoro-C4-10-alkyl)thio]methyl] derivs., phosphates, ammonium salts	PMN	SNUR (§721.10536)	ACTIVE
148240-87-3	148240873	1,3-Propanediol, 2,2-bis[[(.gamma.-.omega.-perfluoro-C6-12-alkyl)thio]methyl] derivs., phosphates, ammonium salts	PMN	SNUR (§721.10536)	ACTIVE

148240-89-5	148240895	1,3-Propanediol, 2,2-bis[[(.gamma.-.omega.-perfluoro-C10-20-alkyl)thio]methyl] derivs., phosphates, ammonium salts	PMN	SNUR (§721.10536)	ACTIVE
150135-57-2	150135572	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymers with Bu acrylate, .gamma.-.omega.-perfluoro-C8-14-alkyl acrylate and polyethylene glycol monomethacrylate, 2,2'-(1,2-diazenediyl)bis[2,4-dimethylpentanenitrile]-initiated	PMN	SNUR (§721.10536)	ACTIVE
15290-77-4	15290774	Cyclopentane, 1,1,2,2,3,3,4-heptafluoro-	PMN	SNUR (§721.10434)	ACTIVE
813-45-6	813456	3-Hexanone, 1,1,1,2,4,4,5,5,6,6,6-undecafluoro-2-(trifluoromethyl)-	PMN	SNUR (§721.10413); SE	ACTIVE
132182-92-4	132182924	Pentane, 1,1,1,2,2,3,4,5,5,5-decafluoro-3-methoxy-4-(trifluoromethyl)-	PMN	SNUR (§721.10061)	ACTIVE
51851-37-7	51851377	Silane, triethoxy(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-	PMN	SNUR (§721.09504)	ACTIVE
83048-65-1	83048651	Silane, (3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)trimethoxy-	PMN	SNUR (§721.09503)	ACTIVE
375-03-1	375031	Propane, 1,1,1,2,2,3,3-heptafluoro-3-methoxy-	PMN	SNUR (§721.08145)	ACTIVE
138495-42-8	138495428	Pentane, 1,1,1,2,2,3,4,5,5,5-decafluoro-	PMN	SNUR (§721.05645)	ACTIVE
773-14-8	773148	Furan, 2,2,3,3,4,4,5,5-octafluorotetrahydro-	PMN	SNUR (§721.03818)	ACTIVE
335-66-0	335660	Octanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-	Original Inventory	SNUR (§721.10536); proposed SNUR	ACTIVE
756-12-7	756127	2-Butanone, 1,1,1,3,4,4,4-heptafluoro-3-(trifluoromethyl)-	PMN	proposed SNUR; SE	ACTIVE
125476-71-3	125476713	Silicic acid (H4SiO4), sodium salt (1:2), reaction products with chlorotrimethylsilane and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-1-decanol	PMN	proposed SNUR	ACTIVE
13252-13-6	13252136	Propanoic acid, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-	PMN	SE	ACTIVE
62037-80-3	62037803	Propanoic acid, 2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-, ammonium salt (1:1)	PMN	SE	ACTIVE
178094-69-4	178094694	1-Octanesulfonamide, N-[3-(dimethyloxidoamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-, potassium salt (1:1)	PMN	SNUR (§721.9582)	ACTIVE
1279108-20-1	1279108201	Hexane, 1,6-diisocyanato-, homopolymer, .alpha.-[1-[[[3-[[3-(dimethylamino)propyl]amino]propyl]amino]carbonyl]-1,2,2,2-tetrafluoroethyl]-.omega.-(1,1,2,2,3,3,3-heptafluoropropoxy)poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)]-blocked	PMN	SNUR (§721.10771); SE	ACTIVE
484024-67-1	484024671	1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-, ammonium salt (1:1)	PMN	SNUR (§721.10770); SE	ACTIVE
475678-78-5	475678785	Oxetane, 3-methyl-3-[[(3,3,4,4,5,5,6,6,6-nonafluorohexyl)oxy]methyl]-	PMN	SNUR (§721.10544); SE	ACTIVE
449177-94-0	449177940	Oxetane, 3-methyl-3-[(2,2,3,3,3-pentafluoropropoxy)methyl]-	PMN	SNUR (§721.10543)	ACTIVE
1078712-88-5	1078712885	Thiols, C4-20, .gamma.-.omega.-perfluoro, telomers with acrylamide and acrylic acid, sodium salts	PMN	SNUR (§721.10536); proposed SNUR	ACTIVE
1078715-61-3	1078715613	1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-[2-[(.gamma.-.omega.-perfluoro-C4-20-alkyl)thio]acetyl] derivs., inner salts	PMN	SNUR (§721.10536); proposed SNUR	ACTIVE
178535-23-4	178535234	Fatty acids, linseed-oil, .gamma.-.omega.-perfluoro-C8-14-alkyl esters	PMN	SNUR (§721.10536)	ACTIVE
180582-79-0	180582790	Sulfonic acids, C6-12-alkane, .gamma.-.omega.-perfluoro, ammonium salts	PMN	SNUR (§721.10536)	ACTIVE
182176-52-9	182176529	Ethaneperoxoic acid, reaction products with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl thiocyanate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl thiocyanate	PMN	SNUR (§721.10536)	ACTIVE
196316-34-4	196316344	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymers with .gamma.-.omega.-perfluoro-C10-16-alkyl acrylate and vinyl acetate, acetates	PMN	SNUR (§721.10536)	ACTIVE
200513-42-4	200513424	2-Propenoic acid, 2-methyl-, polymer with butyl 2-methyl-2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate, 2-hydroxyethyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate	PMN	SNUR (§721.10536)	ACTIVE
238420-80-9	238420809	Propanedioic acid, mono(.gamma.-.omega.-perfluoro-C8-12-alkyl) derivs., bis[4-(ethenyloxy)butyl] esters	PMN	SNUR (§721.10536)	ACTIVE
1033385-42-0	1033385420	Poly[oxy(trifluoro(trifluoromethyl)-1,2-ethanediyl)], .alpha.-[1,2,2,2-tetrafluoro-1-[[(2-hydroxyethyl)amino]carbonyl]ethyl]-.omega.-[tetrafluoro(trifluoromethyl)ethoxy]-, ether with .alpha.-hydro-.omega.-hydroxypoly(oxy-1,2-ethanediyl) (2:1)	PMN	SNUR (§721.10521); SE	ACTIVE
220689-12-3	220689123	Phosphonium, tetrabutyl-, 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonate (1:1)	PMN	SNUR (§721.10470)	ACTIVE
200013-65-6	200013656	Diphosphoric acid, polymers with ethoxylated reduced Me esters of reduced polymd. oxidized tetrafluoroethylene	PMN	SNUR (§721.10440)	ACTIVE
559-40-0	559400	Cyclopentene, 1,2,3,3,4,4,5,5-octafluoro-	PMN	SNUR (§721.10433)	ACTIVE
35397-13-8	35397138	Propane, 1,1,1,2,2,3,3-heptafluoro-3-[(1,2,2-trifluoroethenyl)oxy]-, polymer with 1-chloro-1,2,2-trifluoroethene and ethene	PMN	SNUR (§721.10420); SE	ACTIVE
328389-90-8	328389908	1,2-Propanediol, 3-(diethylamino)-, polymers with 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, propylene glycol and reduced Me esters of reduced polymd. oxidized tetrafluoroethylene, 2-ethyl-1-hexanol-blocked, acetates (salts)	PMN	SNUR (§721.10185)	ACTIVE
220075-01-4	220075014	Propanedioic acid, 2-(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-, 1,3-dimethyl ester	PMN	SNUR (§721.02385)	ACTIVE
238420-68-3	238420683	Propanedioic acid, mono(.gamma.-.omega.-perfluoro-C8-12-alkyl) derivs., di-me esters	PMN	SNUR (§721.02385)	ACTIVE
274917-93-0	274917930	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C3 fraction	PMN	SE	ACTIVE
274917-94-1	274917941	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C4 fraction	PMN	SE	ACTIVE
274917-95-2	274917952	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C5 fraction	PMN	SE	ACTIVE
274917-96-3	274917963	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C6 fraction	PMN	SE	ACTIVE
274917-97-4	274917974	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C7 fraction	PMN	SE	ACTIVE
274918-01-3	274918013	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C8 fraction	PMN	SE	ACTIVE
274918-02-4	274918024	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C9 fraction	PMN	SE	ACTIVE
274918-03-5	274918035	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C10 fraction	PMN	SE	ACTIVE
274918-09-1	274918091	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C11 fraction	PMN	SE	ACTIVE
274918-10-4	274918104	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C12 fraction	PMN	SE	ACTIVE
274918-12-6	274918126	Ethene, tetrafluoro-, oxidized, polymd., reduced, decarboxylated, C13 fraction	PMN	SE	ACTIVE
332350-90-0	332350900	Phosphonium, tributyl(2-methoxypropyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1-butanesulfonamide (1:1)	PMN	SE	ACTIVE
332350-93-3	332350933	Phosphonium, triphenyl(phenylmethyl)-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-N-methyl-1-butanesulfonamide (1:1)	PMN	SE	ACTIVE
1224429-82-6	1224429826	Phosphoric acid, mixed esters with polyethylene glycol and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-1-octanol, ammonium salts	PMN	SE	ACTIVE
1269217-82-4	1269217824	Thieno[3,4-b]thiophene, homopolymer, 2-[1-[difluoro[(1,2,2-trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoroethanesulfonic acid-tetrafluoroethylene polymer-doped	PMN	SE	ACTIVE
1807944-82-6	1807944826	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-, barium salt (2:1)	PMN	SE	ACTIVE

Data Run April 2019

PMN # or INV FORM #	ACCESSION #	GENERIC NAME	PMN or Original Inventory?	FLAG	ACTIVITY
P840107	62625	Disubstituted tetrafluoroalkane	PMN	SNUR (§721.03780); SE	ACTIVE
P840105	67993	Substituted tetrafluoroalkene	PMN	SNUR (§721.03780); SE	ACTIVE
P851025	71217	Polyfluoroalkyl betaine	PMN	proposed SNUR	ACTIVE
P840266	89419	Modified fluoroalkyl urethane	PMN	proposed SNUR	ACTIVE
P870481	105590	Salt of perfluoro fatty acids	PMN	SNUR (§721.04700)	ACTIVE
P970335	146282	Aromatic fluoroalkyl mixture complex	PMN	SNUR (§721.09582)	ACTIVE
P170270	193578	Alkyl perfluorinated acryloyl ester	PMN	proposed SNUR; SE	ACTIVE
P140580	194662	Alkenoic acid, polymer with alkyl alkenoate, alkylalkylalkenoate, alkenoic acid and tridecafluoro alkylalkenoate, compds. with alkylaminoalcanol	PMN	SNUR (§721.10934); SE	ACTIVE
P150154	199350	Fluoroalkyl acrylate copolymer	PMN	SNUR (§721.10895); SE	ACTIVE
P150154	199350	Fluoroalkyl acrylate copolymer	PMN	SNUR (§721.10895); SE	ACTIVE
P150154	199350	Fluoroalkyl acrylate copolymer	PMN	SNUR (§721.10895); SE	ACTIVE
P110088	204230	Polyfluoroalkyl phosphoric acid salt	PMN	SE	ACTIVE
P110089	221637	Polyfluoroalkyl phosphoric acid salt	PMN	SE	ACTIVE
P120351	225004	Siloxanes and Silicones, alkyl, alkyl propoxy ethyl, methyl octyl, alkyl polyfluorooctyl	PMN	SNUR (§721.10854); SE	ACTIVE
P070445	231255	Fluoroalkyl methacrylate copolymer	PMN	SE	ACTIVE
P110653	231937	Perfluoroalkylethyl methacrylate copolymer	PMN	SNUR (§721.10619); SE	ACTIVE
P110483	231993	Polyfluorinated alkyl thiol	PMN	SNUR (§721.10696); SE	ACTIVE
P110528	234458	Polyfluorinated alkyl thiol	PMN	SNUR (§721.10696); SE	ACTIVE
P060474	234981	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P080222	235586	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P090174	235724	Perfluoroalkylethylmethacrylate copolymer	PMN	SE	ACTIVE
P040176	236181	Fluorinated oligomer alcohol	PMN	SE	ACTIVE
P130647	236238	Fluoroalkyl acrylate copolymer	PMN	SNUR (§721.10817); SE	ACTIVE
P110527	236750	Polyfluorinated alkyl halide	PMN	SNUR (§721.10698); SE	ACTIVE
P100485	238096	Alkyl methacrylates, polymer with substituted carbomonocycle, hydroxymethyl acrylamide and fluorinatedalkyl acrylate	PMN	SNUR (§721.10517); SE	ACTIVE
P040174	238427	Fluoroacrylate modified urethane	PMN	SE	ACTIVE
P130678	239191	Fluoroalkyl methylacrylate copolymer	PMN	SNUR (§721.10818); SE	ACTIVE
P110384	239260	Fluorinated alkylsulfonamidol urethane polymer	PMN	SNUR (§721.10524); SE	ACTIVE
P060586	240392	Fluoroalkyl methacrylate co-polymer	PMN	SE	ACTIVE
P150502	241099	Perfluorobutanesulfonamide and polyoxyalkylene containing polyurethane	PMN	SNUR (§721.10918); SE	ACTIVE
P001132	242207	Siloxanes and Silicones, aminoalkyl fluorooctyl, hydroxy-terminatedsalt	PMN	SNUR (§721.09502)	ACTIVE
P100273	243266	Perfluoroalkylethyl methacrylate copolymer	PMN	SE	ACTIVE
P100470	243562	Fluoro modified, polyether modified and alkyl modified polymethylsiloxane	PMN	SNUR (§721.10630); SE	ACTIVE
P130648	244441	Fluoroalkyl acrylate copolymer modified with polysiloxanes	PMN	SNUR (§721.10816); SE	ACTIVE
P060494	245397	Fluoroalkyl methacrylate copolymer	PMN	SE	ACTIVE
P110534	245535	Polyfluorinated alkyl thio polyacrylic acid-acrylamide	PMN	SNUR (§721.10702); SE	ACTIVE
P090477	245820	Fluoroalkyl sulfonamide	PMN	SE	ACTIVE
P050075	245831	Polymer of perfluoroalkylethylmethacrylate, alkylacrylate, chloroethene, and urethane methacrylate	PMN	SE	ACTIVE
P060580	246287	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P070087	247111	Fluorinated aliphatic isocyanate polymer	PMN	SNUR (§721.10146); SE	ACTIVE
P110203	248192	Perfluoroalkylethyl methacrylate copolymer, salt	PMN	SNUR (§721.10522); SE	ACTIVE
P060390	248567	Perfluoroalkyl ethylmethacrylate copolymer	PMN	SE	ACTIVE
P110526	248589	Partially fluorinated alkyl betaine	PMN	SNUR (§721.10727); SE	ACTIVE
P120030	248647	Modified fluorinated acrylate	PMN	SNUR (§721.10528); SE	ACTIVE
P100148	249220	Partially fluorinated borate ester	PMN	SE	ACTIVE
P120169	249311	Fluoro-modified acrylic copolymer	PMN	SNUR (§721.10853); SE	ACTIVE
P070446	249399	Fluoralkyl acrylate copolymer	PMN	SE	ACTIVE
P110048	249559	Diethylene glycol, polymer with diisocyanatoalkane, polyethylene glycol monomethyl ether- and fluorinatedalkanol-blocked	PMN	SNUR (§721.10518); SE	ACTIVE
P001085	249720	Fluoroacrylate copolymer	PMN	SE	ACTIVE
P090246	251300	Partially fluorinated alcohol, reaction products with phosphorus oxide (P2O5)	PMN	SE	ACTIVE
P060478	251662	Fluoroalkyl acrylate co-polymer	PMN	SE	ACTIVE
P090037	251797	Fluoroalkyl methacrylate copolymer	PMN	SE	ACTIVE
P020016	252290	Urethane polymer modified with perfluoroalkylsulfonamide	PMN	SE	ACTIVE
P120406	253884	Fluoroalkyl sulfonamide derivative	PMN	SNUR (§721.10770); SE	ACTIVE
P080224	253975	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P010584	254456	Perfluoroalkylsulfonamidoalkyl acrylate, polymer with acrylic acid derivatives	PMN	SE	ACTIVE
P110087	254649	Polyfluoroalkyl phosphoric acid salt	PMN	SE	ACTIVE
P130649	255653	Fluoroalkyl acrylate copolymer	PMN	SNUR (§721.10817); SE	ACTIVE
P080664	255700	Fluorinated acrylic copolymer	PMN	SE	ACTIVE
P080643	255846	Fluorinated acrylic copolymer	PMN	SE	ACTIVE
P100472	256372	Fluoro modified, polyether modified polyacrylate	PMN	SNUR (§721.10397); SE	ACTIVE
P110063	256678	Perfluoroalkyl acrylate copolymer	PMN	SNUR (§721.10519); SE	ACTIVE
P050107	257171	Polymer of perfluoroalkylethylacrylate, alkylaminomethacrylate, hydroxyalkylmethacrylate, organic acid salt	PMN	SE	ACTIVE
P090293	257444	Phosphoric acid, mixed esters with partially fluorinated alcohol, ammonium salts	PMN	SE	ACTIVE
P120450	257580	Partially fluorinated alcohol, reaction products with phosphorus oxide (P2O5), amine salts	PMN	SNUR (§721.10855); SE	ACTIVE
P110247	257911	Perfluoroalkylethyl methacrylate copolymer	PMN	SNUR (§721.10523); SE	ACTIVE
P020920	257922	Alkane carboxylic acids esters with long chain fatty alcohol and fluorinated alkylsulfonamidoalkyl alcohol	PMN	SE	ACTIVE
P040417	258174	Polyfluoroalkyl ether	PMN	SNUR (§721.10105)	ACTIVE
P110646	258196	Perfluoroalkylethyl methacrylate copolymer	PMN	SNUR (§721.10527); SE	ACTIVE
P040289	258981	Ethylene-tetrafluoroethylene-fluorinated alkene copolymer	PMN	SE	ACTIVE
P020700	259360	Copolymer of perfluoroalkylsulfonamidoalkyl acrylate and alkyl acrylate modified fatty acid dimers	PMN	SE	ACTIVE
P110487	259633	Polyfluorinated alkyl polyamide	PMN	SNUR (§721.10697); SE	ACTIVE
P110484	259655	Perfluoroalkyl substituted alkyl sulfonate	PMN	SNUR (§721.10876); SE	ACTIVE
P110532	260196	Polyfluorinated alkyl amine	PMN	SNUR (§721.10701); SE	ACTIVE
P120404	260958	Fluoroalkyl sulfonamide derivative	PMN	SNUR (§721.10770); SE	ACTIVE
P100316	261428	Perfluoroalkyl acrylate	PMN	SE	ACTIVE
P080200	261462	Partially fluorinated amphiphilic condensation polymer	PMN	SE	ACTIVE

P060489	261826	Fluoroalkyl methacrylate co-polymer	PMN	SE	ACTIVE
P130646	262169	Fluoroalkyl acrylate copolymer modified with polysiloxanes	PMN	SNUR (§721.10816), SE	ACTIVE
P140523	262341	Copolymer of perfluorinated and alkyl methacrylates	PMN	SNUR (§721.10933); SE	ACTIVE
P110530	262545	Polyfluorinated alkyl thio polyacrylamide	PMN	SNUR (§721.10779); SE	ACTIVE
P100471	262885	Fluoro modified, polyether modified polyacrylate	PMN	SNUR (§721.10397), SE	ACTIVE
P110533	263093	Polyfluorinated alkyl thio polyacrylamide	PMN	SNUR (§721.10700); SE	ACTIVE
P060389	263208	Perfluoroalkylethylmethacrylate copolymer	PMN	SE	ACTIVE
P110543	263435	Polyfluorinated alkyl quaternary ammonium chloride	PMN	SNUR (§721.10877); SE	ACTIVE
P090291	264165	Ammonium salt of fluorinated alkoxyfluoropropanoic acid	PMN	SE	ACTIVE
P090511	264687	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P040537	264949	Fluorochemical ester	PMN	SE	ACTIVE
P110085	265453	Polyfluoroalkylproponic acid ethyl ester	PMN	SE	ACTIVE
P080642	265599	Fluorinated acrylic copolymer	PMN	SE	ACTIVE
P120241	267095	2-Propenoic acid, 2-methyl-, 2-hydroxyethyl esters, telomers with C18-26-alkyl acrylate, 1-dodecanethiol, N-(hydroxymethyl)-2-methyl-2-propenamide, polyfluorooctyl methacrylate, 2,2'-[1,2-diazenediylbis(1-methylethylidene)]bis[4,5-dihydro-1H-imidazole]hydrochloride (1:2)-initiated	PMN	SNUR (§721.10728); SE	ACTIVE
P100523	267948	Fluorinated alkylsulfonamido acrylate copolymer	PMN	SE	ACTIVE
P060472	268781	Fluoroalkyl methacrylate copolymer	PMN	SE	ACTIVE
P090485	268883	Fluorinated sulfonamide alcohol	PMN	SE	ACTIVE
P100060	269400	Partially fluorinated alcohol substituted glycol	PMN	SNUR (§721.10515), SE	ACTIVE
P110557	269604	2-Propenoic acid, 2-methyl-, 2-hydroxyethyl ester, telomers with C18-26-alkyl acrylate, 1-dodecanethiol, N-(hydroxymethyl)-2-methyl-2-propenamide,polyfluorooctyl methacrylate and vinylidene chloride, 2,2'-[1,2-diazenediylbis(1-methylethylidene)bis[4,5-dihydro-1H-imidazole] hydrochloride (1,2)-initiated	PMN	SNUR (§721.10526), SE	ACTIVE
P110561	270598	Tetrafluoroethylene chlorotrifluoroethylene copolymer	PMN	SNUR (§721.10419); SE	ACTIVE
P120032	270770	Modified fluorinated acrylate	PMN	SNUR (§721.10528), SE	ACTIVE
P110509	272038	Ethylene-tetrafluoroethylene copolymer	PMN	SE	ACTIVE
P130679	272583	Fluoroalkyl acrylate copolymer	PMN	SNUR (§721.10817); SE	ACTIVE
P110529	272618	Polyfluorinated alkyl thio acrylamide	PMN	SNUR (§721.10699); SE	ACTIVE
P090481	274136	Fluorinated alkylsulfonamido polymer	PMN	SE	ACTIVE
P000186	274147	Perfluorinated polyamine	PMN	proposed SNUR	ACTIVE
P060576	274352	Fluoroalkylacrylate co-polymer	PMN	SE	ACTIVE
P120031	274363	Modified fluorinated acrylate	PMN	SNUR (§721.10528), SE	ACTIVE
P100317	274421	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P090245	274658	Partially fluorinated alcohol, reaction products with phosphorus oxide (P2O5), ammonium salts	PMN	SE	ACTIVE
P080751	274670	Fluorinated acrylic alkylamino copolymer	PMN	SE	ACTIVE
P110086	276858	Polyfluoroalkyl phosphoric acid	PMN	SE	ACTIVE
P070447	277055	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P110091	277420	Fluorinated acrylic alkylamino copolymer	PMN	SE	ACTIVE
P060563	278105	Fluoroalkyl methacrylate co-polymer	PMN	SE	ACTIVE
P080223	278138	Fluoroalkyl acrylate copolymer	PMN	SE	ACTIVE
P060388	279108	Perfluoroalkylethylmethacrylate copolymer	PMN	SE	ACTIVE
P020609	279755	Urethane polymer modified with perfluoroalkylsulfonamide	PMN	SE	ACTIVE

There are 10 additional PFAS designated as active on the inventory for which providing the generic name on this list would potentially reveal CBI so they are not listed here. All 10 have an associated 5(e) order and SNUR.

Region	EPA ID	Site Name	City	County	State	Zip Code	NPL Status Code	Superfund Alternative Agreement Flag	Federal Facility Flag
10	AK1570028646	EIELSON AIR FORCE BASE	FAIRBANKS	FAIRBANKS NORTH STAR	AK	99702	F	N	Y
10	AK4170024323	ADAK NAVAL AIR STATION	ADAK		AK	99546	F	N	Y
10	AK6210022426	FORT WAINWRIGHT	FORT WAINWRIGHT		AK	99703	F	N	Y
10	AK6214522157	FORT RICHARDSON (USARMY)	ANCHORAGE		AK	99505	F	N	Y
10	AK8570028649	ELMENDORF AIR FORCE BASE	ANCHORAGE		AK	99506	F	N	Y
09	AZ0570024133	LUKE AIR FORCE BASE	GLENDALE	MARICOPA	AZ	85309	D	N	Y
09	AZ0971590062	YUMA MARINE CORPS AIR STATION	YUMA	YUMA	AZ	85369	F	N	Y
09	AZ7570028582	WILLIAMS AIR FORCE BASE	CHANDLER	MARICOPA	AZ	85224	F	N	Y
09	AZD980737530	TUCSON INTERNATIONAL AIRPORT AREA	TUCSON	PIMA	AZ	85734	F	N	N
09	CA1570024504	EDWARDS AIR FORCE BASE	EDWARDS AFB	KERN	CA	93524	F	N	Y
09	CA2170023236	ALAMEDA NAVAL AIR STATION	ALAMEDA	ALAMEDA	CA	94501	F	N	Y
09	CA2170023533	CAMP PENDLETON MARINE CORPS BASE	CAMP PENDLETON	SAN DIEGO	CA	92055	F	N	Y
09	CA2570024453	GEORGE AIR FORCE BASE	VICTORVILLE	SAN BERNARDINO	CA	92392	F	N	Y
09	CA3570024551	CASTLE AIR FORCE BASE (6 AREAS)	MERCED	MERCED	CA	95342	F	N	Y
09	CA4570024337	MCCLELLAN AIR FORCE BASE (GROUND WATER CONTAMINATION)	MCCLELLAN AFB	SACRAMENTO	CA	95652	F	N	Y
09	CA4570024345	NORTON AIR FORCE BASE (LNDFL1 #2)	SAN BERNARDINO	SAN BERNARDINO	CA	92408	F	N	Y
09	CA4570024527	MARCH AIR FORCE BASE	RIVERSIDE	RIVERSIDE	CA	92518	F	N	Y
09	CA5570024575	TRAVIS AIR FORCE BASE	TRAVIS AFB	SOLANO	CA	94535	F	N	Y
09	CA6170023208	EL TORO MARINE CORPS AIR STATION	EL TORO	ORANGE	CA	92709	F	N	Y
09	CA7210020676	FORT ORD	MARINA	MONTEREY	CA	93933	F	N	Y
09	CA8170024261	BARSTOW MARINE CORPS LOGISTICS BASE	BARSTOW	SAN BERNARDINO	CA	92311	F	N	Y
09	CA8570024143	MATHER AIR FORCE BASE (AC&W DISPOSAL SITE)	MATHER	SACRAMENTO	CA	95655	F	N	Y
08	CO7570090038	AIR FORCE PLANT PJKS	LITTLETON	JEFFERSON	CO	80127	F	N	Y
01	CTD009717604	SOLVENTS RECOVERY SERVICE OF NEW ENGLAND	SOUTHINGTON	HARTFORD	CT	06489	F	N	N
01	CTD051316313	PRECISION PLATING CORP.	VERNON	TOLLAND	CT	06066-4413	F	N	N
01	CTD072122062	BEACON HEIGHTS LANDFILL	BEACON FALLS	NEW HAVEN	CT	06403	F	N	N
01	CTD108960972	GALLUP'S QUARRY	PLAINFIELD	WINDHAM	CT	06374	F	N	N
01	CTD980521165	LAUREL PARK, INC.	NAUGATUCK BOROUGH	NEW HAVEN	CT	06770	F	N	N
01	CTD980670814	KELLOGG-DEERING WELL FIELD	NORWALK	FAIRFIELD	CT	06856	F	N	N
01	CTD980906515	NEW LONDON SUBMARINE BASE	NEW LONDON	NEW LONDON	CT	06349	F	N	Y
03	DC9170024310	WASHINGTON NAVY YARD	WASHINGTON	DISTRICT OF COLUMBIA	DC	20374-0001	F	N	Y
03	DE8570024010	DOVER AIR FORCE BASE	DOVER	KENT	DE	19901	F	N	Y
03	DED000605972	DELAWARE SAND & GRAVEL LANDFILL	NEW CASTLE	NEW CASTLE	DE	19720	F	N	N
03	DED980494496	ARMY CREEK LANDFILL	NEW CASTLE	NEW CASTLE	DE	19720	F	N	N
03	DEN000304203	BLADES GROUNDWATER	BLADES	SUSSEX	DE	19973	P	N	N
04	FL1570024124	TYNDALL AIR FORCE BASE	PANAMA CITY	BAY	FL	32403	F	N	Y
04	FL9170024567	PENSACOLA NAVAL AIR STATION	PENSACOLA	ESCAMBIA	FL	32508	F	N	Y
10	ID3572124557	MOUNTAIN HOME AIR FORCE BASE	MOUNTAIN HOME	ELMORE	ID	83648	F	N	Y
05	IL1570024157	CHANUTE AIR FORCE BASE	RANTOUL	CHAMPAIGN	IL	61866	P	N	Y
05	IL3210020803	SAVANNA ARMY DEPOT ACTIVITY	SAVANNA	JO DAVIESS	IL	61074	F	N	Y
07	KS6214020756	FORT RILEY	JUNCTION CITY	GEARY	KS	66441	F	N	Y
07	KSD065735912	PLATING, INC.	Great Bend	BARTON	KS	67530	F	N	N
06	LA0213820533	LOUISIANA ARMY AMMUNITION PLANT	DOYLINE	WEBSTER	LA	71130	F	N	Y
01	MA2170022022	SOUTH WEYMOUTH NAVAL AIR STATION	WEYMOUTH	NORFOLK	MA	02190	F	N	Y
01	MA2570024487	OTIS AIR NATIONAL GUARD BASE/CAMP EDWARDS	FALMOUTH	BARNSTABLE	MA	02542	F	N	Y
01	MA6170023570	NAVAL WEAPONS INDUSTRIAL RESERVE PLANT	BEDFORD	MIDDLESEX	MA	01730	F	N	Y
01	MA7210025154	FORT DEVENS	FORT DEVENS	MIDDLESEX	MA	01433	F	N	Y
01	MA8570024424	HANSCOM FIELD/HANSCOM AIR FORCE BASE	BEDFORD	MIDDLESEX	MA	01730	F	N	Y
01	MAD000192393	SILRESIM CHEMICAL CORP.	LOWELL	MIDDLESEX	MA	01853	F	N	N
01	MAD001002252	W.R. GRACE & CO., INC. (ACTON PLANT)	ACTON	MIDDLESEX	MA	01720	F	N	N
01	MAD001041987	BAIRD & MCGUIRE	HOLBROOK	NORFOLK	MA	02343	F	N	N
01	MAD001197755	WALTON & LONSBURY INC.	ATTLEBORO	BRISTOL	MA	02703	F	N	N

01	MAD001403104	OLIN CHEMICAL	WILMINGTON	MIDDLESEX	MA	01887	F	N	N
01	MAD001409408	MICROFAB INC (FORMER)	AMESBURY	ESSEX	MA	01913	F	N	N
01	MAD003809266	CHARLES GEORGE RECLAMATION TRUST LANDFILL	TYNGSBOROUGH	MIDDLESEX	MA	01879	F	N	N
01	MAD051787323	IRON HORSE PARK	BILLERICA	MIDDLESEX	MA	01862	F	N	N
01	MAD066166335	NUCLEAR METALS, INC.	CONCORD	MIDDLESEX	MA	01742-3897	F	N	N
01	MAD076580950	INDUSTRI-PLEX	WOBURN	MIDDLESEX	MA	01801	F	N	N
01	MAD980520621	RE-SOLVE, INC.	DARTMOUTH	BRISTOL	MA	02747	F	N	N
01	MAD980520670	FORT DEVENS-SUDBURY TRAINING ANNEX	SUDBURY	MIDDLESEX	MA	01775	D	N	Y
01	MAD980520696	SUTTON BROOK DISPOSAL AREA	TEWKSBURY	MIDDLESEX	MA	01876	F	N	N
01	MAD980731343	SULLIVAN'S LEDGE	NEW BEDFORD	BRISTOL	MA	02740	F	N	N
01	MAD980732168	WELLS G&H	WOBURN	MIDDLESEX	MA	01801	F	N	N
01	MAD980732317	GROVELAND WELLS	GROVELAND	ESSEX	MA	01834	F	N	N
01	MAD990685422	NYANZA CHEMICAL WASTE DUMP	ASHLAND	MIDDLESEX	MA	01721	F	N	N
01	MAN000106144	BJAT LLC	FRANKLIN	NORFOLK	MA	02038	F	N	N
03	MD0120508940	BELTSVILLE AGRICULTURAL RESEARCH CENTER (USDA)	BELTSVILLE	PRINCE GEORGE'S	MD	20705	F	N	Y
03	MD0570024000	ANDREWS AIR FORCE BASE	ANDREWS AIR FORCE BASE	PRINCE GEORGE'S	MD	20762	F	N	Y
03	MD2210020036	ABERDEEN PROVING GROUND (EDGEWOOD AREA)	EDGEWOOD	HARFORD	MD	21010	F	N	Y
03	MD2210021355	ABERDEEN PROVING GROUND (MICHAELSVILLE LANDFILL)	ABERDEEN	HARFORD	MD	21005	F	N	Y
03	MD4690307844	CURTIS BAY COAST GUARD YARD	BALTIMORE	ANNE ARUNDEL	MD	21226	F	N	Y
03	MD7170024536	PATUXENT RIVER NAVAL AIR STATION	PATUXENT RIVER	ST. MARY'S	MD	20670	F	N	Y
03	MD9210020567	FORT GEORGE G. MEADE	ODENTON	ANNE ARUNDEL	MD	21113	F	N	Y
03	MD9570024803	BRANDYWINE DRMO	BRANDYWINE	PRINCE GEORGE'S	MD	20613	F	N	Y
01	ME7170022019	PORTSMOUTH NAVAL SHIPYARD	KITTERY	YORK	ME	03904	F	N	Y
01	ME8170022018	BRUNSWICK NAVAL AIR STATION	BRUNSWICK	CUMBERLAND	ME	04011	F	N	Y
01	ME9570024522	LORING AIR FORCE BASE	LIMESTONE	AROOSTOOK	ME	04751	F	N	Y
01	MED042143883	UNION CHEMICAL CO., INC.	SOUTH HOPE	KNOX	ME	04862	D	N	N
01	MED980504435	WINTHROP LANDFILL	WINTHROP	KENNEBEC	ME	04364	F	N	N
01	MED980520241	SACO TANNERY WASTE PITS	SACO	YORK	ME	04072	D	N	N
01	MED980524078	MCKIN CO.	GRAY	CUMBERLAND	ME	04039	F	N	N
01	MEN000103584	LEEDS METAL	LEEDS	ANDROSCOGGIN	ME	04263	F	N	N
01	MEN000106078	KEDDY MILL	WINDHAM	CUMBERLAND	ME	04062	F	N	N
05	MIS570024278	WURTSMITH AIR FORCE BASE	OSCODA	IOSCO	MI	54961	P	N	Y
05	MID000260281	KENTWOOD LANDFILL	KENTWOOD	KENT	MI	49512	F	N	N
05	MID006522791	ADAM'S PLATING	LANSING	INGHAM	MI	48917	F	N	N
05	MID980609341	STATE DISPOSAL LANDFILL, INC.	GRAND RAPIDS	KENT	MI	49505	F	N	N
05	MIN000510362	DSC MCLOUTH STEEL GIBRALTAR PLANT	GIBRALTAR	WAYNE	MI	48173-9736	F	N	N
05	MND980609515	OAKDALE DUMP	OAKDALE	WASHINGTON	MN	55128	F	N	N
05	MND980704738	WASHINGTON COUNTY LANDFILL	LAKE ELMO	WASHINGTON	MN	55042	D	N	N
07	MO3213890012	LAKE CITY ARMY AMMUNITION PLANT (NORTHWEST LAGOON)	INDEPENDENCE	JACKSON	MO	64050	F	N	Y
04	NC1170022761	CHERRY POINT MARINE CORPS AIR STATION	HAVELOCK	CRAVEN	NC	28533	F	N	Y
04	NC6170022580	CAMP LEJEUNE MILITARY RES. (USNAVY)	ONSLOW COUNTY	ONSLOW	NC	28542	F	N	Y
01	NH7570024847	PEASE AIR FORCE BASE	PORTSMOUTH/NEWINGTON	ROCKINGHAM	NH	03803	F	N	Y
01	NHD001091453	NEW HAMPSHIRE PLATING CO.	MERRIMACK	HILLSBOROUGH	NH	03054	F	N	N
01	NHD018958140	BEEDE WASTE OIL	PLAISTOW	ROCKINGHAM	NH	03865	F	N	N
01	NHD062002001	KEARSARGE METALLURGICAL CORP.	CONWAY	CARROLL	NH	03818	F	N	N
01	NHD062004569	TIKKHAM GARAGE	LONDONDERRY	ROCKINGHAM	NH	03053	F	N	N
01	NHD064424153	COAKLEY LANDFILL	NORTH HAMPTON	ROCKINGHAM	NH	03840	F	N	N
01	NHD092059112	KEEFE ENVIRONMENTAL SERVICES (KES)	EPPING	ROCKINGHAM	NH	03042	F	N	N
01	NHD099363541	SYL VESTER	NASHUA	HILLSBOROUGH	NH	03062	F	N	N
01	NHD980503361	MOTTOLO PIG FARM	RAYMOND	ROCKINGHAM	NH	03077	F	N	N
01	NHD980520191	DOVER MUNICIPAL LANDFILL	DOVER	STRAFFORD	NH	03820	F	N	N
01	NHD980520217	TROY MILLS LANDFILL	TROY	CHESHIRE	NH	03465	F	N	N
01	NHD980520275	SOMERSWORTH SANITARY LANDFILL	SOMERSWORTH	STRAFFORD	NH	03878	F	N	N

01	NHD980524086	AUBURN ROAD LANDFILL	LONDONDERRY	ROCKINGHAM	NH	03053	F	N	N
01	NHD980671002	SAVAGE MUNICIPAL WATER SUPPLY	MILFORD	HILLSBOROUGH	NH	03055	F	N	N
01	NHD980671069	SOUTH MUNICIPAL WATER SUPPLY WELL	PETERBOROUGH	HILLSBOROUGH	NH	03458	F	N	N
01	NHD989096469	TIBBETTS ROAD	BARRINGTON	STRAFFORD	NH	03825	F	N	N
01	NHD990717647	OTTATI & GOSS/KINGSTON STEEL DRUM	KINGSTON	ROCKINGHAM	NH	03848	F	N	N
01	NHN000105928	COLLINS & AIRMAN PLANT (FORMER)	FARMINGTON	STRAFFORD	NH	03835	F	N	N
02	NJ0170022172	NAVAL WEAPONS STATION EARLE (SITE A)	COLTS NECK	MONMOUTH	NJ	07722	F	N	Y
02	NJ0570024018	MCGUIRE AIR FORCE BASE #1	WRIGHTSTOWN	BURLINGTON	NJ	08641	F	N	Y
02	NJ2210020275	FORT DIX (LANDFILL SITE)	PEMBERTON TOWNSHIP	BURLINGTON	NJ	08562	D	N	Y
02	NJ3210020704	PICATINNY ARSENAL (USARMY)	ROCKAWAY TOWNSHIP	MORRIS	NJ	07801	F	N	Y
02	NJ7170023744	NAVAL AIR ENGINEERING CENTER	LAKEHURST	OCEAN	NJ	08733	F	N	Y
02	NJ9690510020	FEDERAL AVIATION ADMINISTRATION TECHNICAL CENTER (USDOT)	ATLANTIC COUNTY	ATLANTIC	NJ	08405	F	N	Y
02	NJD002148799	ORANGE VALLEY REGIONAL GROUND WATER CONTAMINATION	WEST ORANGE/ORANGE	ESSEX	NJ	07051	F	N	N
02	NJD002173276	AMERICAN CYANAMID CO	BRIDGEWATER	SOMERSET	NJ	08805	F	N	N
02	NJD014623854	MARTIN AARON, INC.	CAMDEN	CAMDEN	NJ	08104	F	N	N
02	NJD980505366	HELEN KRAMER LANDFILL	MANTUA TOWNSHIP	GLOUCESTER	NJ	08051	F	N	N
02	NJD980654107	FAIR LAWN WELL FIELD	FAIR LAWN	BERGEN	NJ	07410	F	N	N
02	NJN000206317	GARFIELD GROUND WATER CONTAMINATION	GARFIELD	BERGEN	NJ	07026	F	N	N
02	NY0213820830	SENECA ARMY DEPOT	ROMULUS	SENECA	NY	14541	F	N	Y
02	NY4571924451	GRIFFISS AIR FORCE BASE (11 AREAS)	ROME	ONEIDA	NY	13440	F	N	Y
02	NY4571924774	PLATTSBURGH AIR FORCE BASE	PLATTSBURGH	CLINTON	NY	12901	F	N	Y
02	NY7890008975	BROOKHAVEN NATIONAL LABORATORY (USDOE)	UPTON	SUFFOLK	NY	11961	F	N	Y
02	NYD000512335	DEWEY LOEFFEL LANDFILL	NASSAU	RENSSELAER	NY	12123	F	N	N
02	NYD004986741	SAINT-GOBAIN PERFORMANCE PLASTICS	VILLAGE OF HOOSICK FALLS	RENSSELAER	NY	12090	F	N	N
02	NYD986768691	COLESVILLE MUNICIPAL LANDFILL	TOWN OF COLESVILLE	BROOME	NY	13813	F	N	N
02	NYO986913580	ONONDAGA LAKE	SYRACUSE	ONONDAGA	NY	13209	F	N	N
05	OH7571724312	WRIGHT-PATTERSON AIR FORCE BASE	DAYTON		OH	45324	F	N	Y
05	OHD980509657	BUCKEYE RECLAMATION	ST. CLAIRSVILLE	BELMONT	OH	43950	D	N	N
06	OK1571774191	TINKER AIR FORCE BASE (SOLDIER CREEK/BUILDING 3001)	OKLAHOMA CITY	OKLAHOMA	OK	73145	F	N	Y
03	PA2210090054	LETTERKENNY ARMY DEPOT (PDO AREA)	FRANKLIN COUNTY	FRANKLIN	PA	17201	F	N	Y
03	PA3170022104	NAVY SHIPS PARTS CONTROL CENTER	MECHANICSBURG	CUMBERLAND	PA	17055	F	N	Y
03	PA5213820892	TOBYHANNA ARMY DEPOT	TOBYHANNA	MONROE	PA	18466-5086	F	N	Y
03	PA6170024545	NAVAL AIR DEVELOPMENT CENTER (8 WASTE AREAS)	WARMINSTER TOWNSHIP	BUCKS	PA	18974	F	N	Y
03	PA6213820503	LETTERKENNY ARMY DEPOT (SE AREA)	CHAMBERSBURG	FRANKLIN	PA	17201	F	N	Y
03	PAD002323848	CHEM-FAB	Doylestown	BUCKS	PA	18901	F	N	N
03	PAD002342475	NORTH PENN - AREA 2	HATFIELD	MONTGOMERY	PA	19440	F	N	N
03	PAD003053709	AVCO LYCOMING (WILLIAMSPORT DIVISION)	WILLIAMSPORT	LYCOMING	PA	17701	F	N	N
03	PAD039017694	RAYMARK	HATBORO	MONTGOMERY	PA	19040	F	N	N
03	PAD980518763	MIDDLETOWN AIR FIELD	MIDDLETOWN	DAUPHIN	PA	17057	D	N	N
03	PAD980692693	NORTH PENN - AREA 5	MONTGOMERY TOWNSHIP	MONTGOMERY	PA	18915	F	N	N
03	PAD980706824	WATSON IOHNSON LANDFILL	RICHLAND TOWNSHIP	BUCKS	PA	18951	F	N	N
03	PAD981033285	RIDDALE MANUFACTURING CO., INC.	EMMAUS BOROUGH	LEHIGH	PA	18049	F	N	N
03	PAD982363970	VALMONT TCE SITE (FORMER - VALMONT INDUSTRIAL PARK)	WEST HAZLETON	LUZERNE	PA	18201	F	N	N
03	PAD987277837	WILLOW GROVE NAVAL AIR AND AIR RESERVE STATION	HORSHAM	MONTGOMERY	PA	19040	F	N	Y
03	PAD987295276	SAFETY LIGHT CORPORATION	BLOOMSBURG	COLUMBIA	PA	17815	F	N	N
01	RI6170022036	DAVISVILLE NAVAL CONSTRUCTION BATTALION CENTER	NORTH KINGSTOWN	WASHINGTON	RI	02818	F	N	Y
01	RI6170085470	NEWPORT NAVAL EDUCATION & TRAINING CENTER	NEWPORT	NEWPORT	RI	02871	F	N	Y
01	RID009764929	WESTERN SAND & GRAVEL	BURRILLVILLE	PROVIDENCE	RI	02895	F	N	N
01	RID093212439	LANDFILL & RESOURCE RECOVERY, INC. (L&RR)	NORTH SMITHFIELD	PROVIDENCE	RI	02876	F	N	N
01	RID980579056	PICILLO FARM	COVENTRY	KENT	RI	02816	F	N	N
04	SC6170022762	PARRIS ISLAND MARINE CORPS RECRUIT DEPOT	PARRIS ISLAND	BEAUFORT	SC	29902	F	N	Y
08	SD2571924644	ELLSWORTH AIR FORCE BASE	ELLSWORTH AFB		SD	57706	F	N	Y
06	TX7572024605	AIR FORCE PLANT #4 (GENERAL DYNAMICS)	FORT WORTH	TARRANT	TX	76108	F	N	Y

03	VA1170024813	NORFOLK NAVAL SHIPYARD	PORTSMOUTH	PORTSMOUTH CITY	VA	23709	F	N	Y
03	VA2800005033	LANGLEY AIR FORCE BASE/NASA LANGLEY RESEARCH CENTER	HAMPTON	HAMPTON CITY	VA	23665	F	N	Y
03	VA3971520751	DEFENSE GENERAL SUPPLY CENTER (DLA)	CHESTERFIELD COUNTY	CHESTERFIELD	VA	23237	F	N	Y
03	VA5170000181	ST. JULIENS CREEK ANNEX (U.S. NAVY)	CHESAPEAKE	CHESAPEAKE CITY	VA	23323	F	N	Y
03	VA6170061463	NORFOLK NAVAL BASE (SEWELLS POINT NAVAL COMPLEX)	NORFOLK	NORFOLK CITY	VA	23511	F	N	Y
03	VA8210020321	FORT EUSTIS (US ARMY)	NEWPORT NEWS	NEWPORT NEWS CITY	VA	23604	F	N	Y
03	VA7170024684	NAVAL SURFACE WARFARE CENTER - DAHLGREN	DAHLGREN	KING GEORGE	VA	22448	F	N	Y
03	VA8170024170	NAVAL WEAPONS STATION - YORKTOWN	YORKTOWN	YORK	VA	23690	F	N	Y
03	VAD042916361	ARROWHEAD ASSOCIATES, INC./SCOVILL CORP.	MONTROSS	WESTMORELAND	VA	22520	F	N	N
01	VTD000860239	OLD SPRINGFIELD LANDFILL	SPRINGFIELD	WINDSOR	VT	05156	F	N	N
01	VTD001965415	BURGESS BROTHERS LANDFILL	WOODFORD	BENNINGTON	VT	05201	F	N	N
01	VTD069910354	POWNAL TANNERY	POWNAL	BENNINGTON	VT	05261	F	N	N
01	VTD098352545	COMMERCE STREET PLUME	WILLISTON	CHITTENDEN	VT	05495	F	N	N
01	VTD980520092	BFI SANITARY LANDFILL (ROCKINGHAM)	ROCKINGHAM	WINDHAM	VT	05101	F	N	N
01	VTD981064223	BENNINGTON MUNICIPAL SANITARY LANDFILL	BENNINGTON	BENNINGTON	VT	05201	F	N	N
10	WA5170090059	NAVAL AIR STATION, WHIDBEY ISLAND (AULT FIELD)	WHIDBEY ISLAND	ISLAND	WA	98278	F	N	Y
10	WA7210090067	FORT LEWIS LOGISTICS CENTER	TILLICUM	PIERCE	WA	98433	F	N	Y
10	WA8570024200	MCCHORD AIR FORCE BASE (WASH RACK/TREATMENT AREA)	TACOMA	PIERCE	WA	98438	D	N	Y
10	WA9571924647	FAIRCHILD AIR FORCE BASE (4 WASTE AREAS)	SPOKANE	SPOKANE	WA	99011	F	N	Y
10	WAD988466355	MOSES LAKE WELLFIELD CONTAMINATION	MOSES LAKE	GRANT	WA	98837	F	N	N
03	WV0170023693	ALLEGANY BALLISTICS LABORATORY (USNAVY)	MINERAL COUNTY	MINERAL	WV	26753	F	N	Y
08	WYSS71924179	F.E. WARREN AIR FORCE BASE	CHEYENNE	LARAMIE	WY	82005	F	N	Y

Data Run April 2019

CASE NUMBER	Date received	Inv flag	Amendments?	CHEMICAL NAME	CAS NUMBER	GENERIC NAME match acc or original notice	SUBMITTER	COMMENCED DATE	ACCESS NO.
P-07-0087	11/13/2006	5(e) order	1			Partially fluorinated condensation polymer	CBI	8/28/2007	247111
P-07-0159	1/5/2007		2			Perfluoropolyether compound	Shin-Etsu Silicones of America, Inc.	4/17/2007	238052
P-07-0203	1/24/2007		no			Fluorinated alkenyl ether	3M Company	6/18/2007	276052
P-07-0445	5/17/2007	5(e) order	no			Fluoroalkyl methacrylate copolymer	CBI	1/14/2009	231255
P-07-0446	5/17/2007	5(e) order	no			Fluoralkyl acrylate copolymer	CBI	9/19/2008	249399
P-07-0447	5/17/2007	5(e) order	no			Fluoroalkyl acrylate copolymer	CBI	12/22/2008	277055
P-07-0576	7/25/2007		no			Hexafluoropropylene-perfluoro (alkyl vinyl ether)-tetrafluoroethylene copolymer	CBI	11/23/2007	255993
P-07-0601	8/2/2007		2	1-Propene, 2,3,3,3-tetrafluoro-	754-12-1		CBI	1/27/2011	
P-07-0618	8/10/2007		2			Alkyl acid fluoride	3M Company	6/5/2013	254116
P-08-0043	10/26/2007		no	1-Propene, 1,1,2,3,3,3-hexafluoro-	878545-84-7		CBI	1/30/2008	
P-08-0200	1/24/2008	5(e) order	1			Partially fluorinated amphiphilic condensation polymer	CBI	2/21/2009	261462
P-08-0222	2/8/2008	5(e) order	1			Fluoroalkyl acrylate copolymer	CBI	10/1/2008	235586
P-08-0223	2/8/2008	5(e) order	1			Fluoroalkyl acrylate copolymer	CBI	8/16/2008	278138
P-08-0224	2/8/2008	5(e) order	1			Fluoroalkyl acrylate copolymer	CBI	7/30/2010	253975
P-08-0508	6/30/2008	5(e) order	6	Propanoic acid, 2,3,3,3-tetrafluoro-	13252-13-6		Dupont Company	10/5/2009	
P-08-0509	6/30/2008	5(e) order	7	Propanoic acid, 2,3,3,3-tetrafluoro-	62037-80-3		Dupont Company	3/31/2010	
P-08-0642	8/13/2008	5(e) order	1			Fluorinated acrylic copolymer	CBI	3/31/2009	265599
P-08-0643	8/13/2008	5(e) order	3			Fluorinated acrylic copolymer	CBI	12/17/2010	255846
P-08-0664	8/19/2008	5(e) order	1			Fluorinated acrylic copolymer	CBI	2/4/2011	255700
P-08-0751	9/25/2008	5(e) order	1			Fluorinated acrylic alkylamino copolymer	CBI	6/6/2009	274670
P-09-0037	10/27/2008	5(e) order	no			Fluoroalkyl methacrylate copolymer	CBI	1/20/2010	251797
P-09-0099	12/3/2008		no			Fluoroethylene vinyl copolymer	CBI	7/18/2014	231642
P-09-0174	1/21/2009	5(e) order	1			Perfluoroalkylethylmethacrylate copolymer	CBI	11/13/2009	235724
P-09-0176	1/22/2009	5(e) order	no			Fluorinated copolymer	CBI	9/17/2009	256394
P-09-0245	2/24/2009	5(e) order	1			Partially fluorinated alcohol, reaction products with phosphorus oxide (P2O5), ammonium salts	CBI	12/14/2009	274658
P-09-0246	2/24/2009	5(e) order	1			Partially fluorinated alcohol, reaction products with phosphorus oxide (P2O5)	CBI	12/22/2009	251300
P-09-0291	3/30/2009	5(e) order	3			Ammonium salt of fluorinated alkoxyfluoropropanoic acid	CBI	9/21/2009	264165
P-09-0293	3/31/2009	5(e) order	7			Phosphoric acid, mixed esters with partially fluorinated alcohol, ammonium salts	CBI	7/29/2010	257444
P-09-0294	3/31/2009	5(e) order	7	Phosphoric acid, mixed esters with	1224429-82-6		CBI	4/9/2010	
P-09-0477	7/1/2009	5(e) order	no			Fluoroalkyl sulfonamide	3M Company	11/6/2009	245820
P-09-0481	7/1/2009	5(e) order	3			Fluorinated alkylsulfonamido polymer	3M Company	12/2/2009	274136
P-09-0485	7/1/2009	5(e) order	1			Fluorinated sulfonamide alcohol	3M Company	11/7/2009	268883
P-09-0511	7/16/2009	5(e) order	no			Fluoroalkyl acrylate copolymer	CBI	12/3/2009	264687
P-10-0060	11/12/2009	5(e) order	2			Partially fluorinated alcohol substituted glycol	CBI	10/17/2010	269400
P-10-0135	12/17/2009	5(e) order	1	3-Pentanone, 1,1,1,2,4,5,5,5-octaf	813-44-5; 813-45-6		3M Company	5/23/2012	
P-10-0148	12/23/2009	5(e) order	no			Partially fluorinated borate ester	CBI	10/22/2010	249220
P-10-0184	1/20/2010	5(e) order	1			Partially fluorinated alcohol substituted glycol	CBI	1/5/2012	269400
P-10-0273	3/12/2010	5(e) order	no			Perfluoroalkylethyl methacrylate copolymer	CBI	9/30/2011	243266
P-10-0316	3/31/2010	5(e) order	1			Perfluoroalkyl acrylate	CBI	10/20/2012	261428
P-10-0317	3/31/2010	5(e) order	2			Fluoroalkyl acrylate copolymer	CBI	10/7/2010	274421

P-10-0327	4/2/2010	5(e) order	1	1-Propene, 1,2,3,3,3-pentafluoro-	2252-83-7		DuPont	2/8/2011	
P-10-0470	7/28/2010	5(e) order	1			Fluoro modified, polyether modified and alkyl modified polymethylsiloxane	CBI	6/20/2011	243562
P-10-0471	7/28/2010	5(e) order	1			Fluoro modified, polyether modified polyacrylate	CBI	7/21/2011	262885
P-10-0472	7/28/2010	5(e) order	3			Fluoro modified, polyether modified polyacrylate	CBI	7/21/2011	256372
P-10-0485	7/30/2010	5(e) order	3			Alkyl methacrylates, polymer with substituted carbomonocycle, hydroxymethyl acrylamide and fluorinatedalkyl acrylate	CBI	2/1/2012	238096
P-10-0489	8/2/2010	5(e) order	1	1-Propene, 1,2,3,3,3-pentafluoro-	2252-83-7		Honeywell	2/14/2011	
P-10-0523	8/23/2010	5(e) order	2			Fluorinated alkylsulfonamido acrylate copolymer	3M Company	5/16/2011	267948
P-10-0580	9/27/2010	5(e) order	no	Thieno[3,4-b]thiophene, homopoly	1269217-82-4		CBI	2/28/2011	
P-11-0024	10/13/2010		no	Boron, trifluoro(tetrahydrofuran)-,	753501-40-5		OMNOVA Solutions Inc	3/18/2011	
P-11-0029	10/19/2010		no	Cyclopentene, 1,3,3,4,4,5,5-hepta	1892-03-1		Zeon Chemicals L.P.	3/25/2011	
P-11-0048	10/27/2010	5(e) order	3			Diethylene glycol, polymer with diisocyanatoalkane, polyethylene glycol monomethyl ether- and fluorinatedalkanol-blocked	CBI	2/2/2012	249559
P-11-0063	11/8/2010	5(e) order	no			Perfluoroalkyl acrylate copolymer	CBI	4/4/2012	256678
P-11-0085	12/3/2010	5(e) order	no			Polyfluoroalkylproponic acid ethyl ester	CBI	12/11/2011	265453
P-11-0086	12/3/2010	5(e) order	no			Polyfluoroalkyl phosphoric acid	CBI	3/17/2012	276858
P-11-0087	12/3/2010	5(e) order	1			Polyfluoroalkyl phosphoric acid salt	CBI	9/7/2012	254649
P-11-0088	12/3/2010	5(e) order	1			Polyfluoroalkyl phosphoric acid salt	CBI	6/7/2017	204230
P-11-0089	12/3/2010	5(e) order	1			Polyfluoroalkyl phosphoric acid salt	CBI	6/7/2017	221637
P-11-0091	12/3/2010	5(e) order	1			Fluorinated acrylic alkylamino copolymer	CBI	11/29/2011	277420
P-11-0181	1/31/2011	5(e) order	1	Poly[oxy(trifluoro(trifluoromethyl)-	1033385-42-0		RainDance Technologies, Inc.	6/26/2012	
P-11-0203	2/9/2011	5(e) order	1			Perfluoroalkylethyl methacrylate copolymer, salt	CBI	8/1/2012	248192
P-11-0247	3/4/2011	5(e) order	1			Perfluoroalkylethyl methacrylate copolymer	CBI	3/28/2013	257911
P-11-0384	5/18/2011	5(e) order	no			Fluorinated alkylsulfonamidol urethane polymer	3M Company	2/2/2012	239260
P-11-0473	6/30/2011		no	Boron, trifluoro(tetrahydrofuran)-,	753501-43-8		OMNOVA Solutions Inc.	11/2/2011	
P-11-0474	6/30/2011		1	Boron, trifluoro(tetrahydrofuran)-,	864910-70-3		OMNOVA Solutions Inc.	5/21/2013	
P-11-0483	7/8/2011	5(e) order	5			Polyfluorinated alkyl thiol	CBI	6/16/2013	231993
P-11-0484	7/8/2011	5(e) order	9			Perfluoroalkyl substituted alkyl sulfonate	CBI	3/6/2015	259655
P-11-0487	7/8/2011	5(e) order	9			Polyfluorinated alkyl polyamide	CBI	9/27/2014	259633
P-11-0509	7/18/2011	5(e) order	2			Ethylene-tetrafluoroethylene copolymer	CBI	1/28/2012	272038
P-11-0526	7/19/2011	5(e) order	4			Partially fluorinated alkyl betaine	CBI	6/26/2014	248589
P-11-0527	7/20/2011	5(e) order	5			Polyfluorinated alkyl halide	CBI	3/30/2014	236750
P-11-0528	7/20/2011	5(e) order	5			Polyfluorinated alkyl thiol	CBI	4/1/2014	234458
P-11-0529	7/20/2011	5(e) order	4			Polyfluorinated alkyl thio acrylamide	CBI	10/20/2013	272618
P-11-0530	7/20/2011	5(e) order	8			Polyfluorinated alkyl thio polyacrylamide	CBI	10/20/2013	262545
P-11-0532	7/20/2011	5(e) order	5			Polyfluorinated alkyl amine	CBI	10/20/2013	260196
P-11-0533	7/20/2011	5(e) order	10			Polyfluorinated alkyl thio polyacrylamide	CBI	12/24/2014	263093
P-11-0534	7/20/2011	5(e) order	10			Polyfluorinated alkyl thio polyacrylic acid-acrylamide	CBI	5/5/2014	245535
P-11-0543	7/26/2011	5(e) order	7			Polyfluorinated alkyl quaternary ammonium chloride	CBI	11/3/2015	263435

P-11-0557	8/3/2011	5(e) order	1			2-Propenoic acid, 2-methyl-, 2-hydroxyethyl ester, telomers with C18-26-alkyl acrylate, 1-dodecanethiol, N-(hydroxymethyl)-2-methyl-2-propenamide,polyfluorooctyl methacrylate and vinylidene chloride, 2,2'-[1,2-diazenediylbis(1-methylethylidene)bis[4,5-dihydro-1H-imidazole] hydrochloride (1,2)-initiated	CBI	3/31/2015	269604
P-11-0561	8/4/2011	5(e) order	1			Tetrafluoroethylene chlorotrifluoroethylene copolymer	CBI	5/18/2012	270598
P-11-0567	8/8/2011	5(e) order	1	1-Propene, 1,1,2,3,3,3-hexafluoro-	149935-01-3		CBI	2/2/2012	
P-11-0568	8/8/2011	5(e) order	2	Propane, 1,1,1,2,2,3,3-heptafluoro	35397-13-8		CBI	8/9/2012	
P-11-0569	8/8/2011	5(e) order	1	1-Propene, 1,1,2,3,3,3-hexafluoro-	57570-64-6		CBI	3/5/2012	
P-11-0646	9/20/2011	5(e) order	1			Perfluoroalkylethyl methacrylate copolymer	CBI	4/30/2012	258196
P-11-0653	9/26/2011	5(e) order	no			Perfluoroalkylethyl methacrylate copolymer	CBI	3/26/2013	231937
P-11-0656	9/27/2011		1	2-Propenoic acid, 2-methyl-, dode	1092822-31-5		OMNOVA Solutions Inc.	2/6/2012	
P-11-0657	9/27/2011		1	Boron, trifluoro(tetrahydrofuran)-,	1029089-63-1		OMNOVA Solutions Inc.	2/13/2012	
P-12-0030	10/27/2011	5(e) order	no			Modified fluorinated acrylate	CBI	6/18/2015	248647
P-12-0031	10/27/2011	5(e) order	no			Modified fluorinated acrylate	CBI	3/27/2013	274363
P-12-0032	10/27/2011	5(e) order	no			Modified fluorinated acrylate	CBI	9/4/2013	270770
P-12-0078	11/29/2011	5(e) order	6	1-Octanesulfonic acid, 3,3,4,4,5,5,	1807944-82-6		CBI	8/26/2015	
P-12-0080	11/29/2011		no			Fluoroethylene-vinylether copolymer	CBI	4/8/2013	264621
P-12-0169	1/26/2012	5(e) order	3			Fluoro-modified acrylic copolymer	CBI	10/28/2015	249311
P-12-0241	3/19/2012	5(e) order	1			2-Propenoic acid, 2-methyl-, 2-hydroxyethyl esters, telomers with C18-26-alkyl acrylate, 1-dodecanethiol, N-(hydroxymethyl)-2-methyl-2-propenamide, polyfluorooctyl methacrylate, 2,2'-[1,2-diazenediylbis(1-methylethylidene)]bis[4,5-dihydro-1H-imidazole]hydrochloride (1:2)-initiated	CBI	6/21/2013	267095
P-12-0351	5/10/2012	5(e) order	1			Siloxanes and Silicones, alkyl, alkyl propoxy ethyl, methyl octyl, alkyl polyfluorooctyl	CBI	3/22/2018	225004
P-12-0404	6/13/2012	5(e) order	no			Fluoroalkyl sulfonamide derivative	CBI	3/16/2014	260958
P-12-0405	6/13/2012	5(e) order	2	1-Butanesulfonamide, 1,1,2,2,3,3,4	484024-67-1		3M Company	3/20/2014	
P-12-0406	6/13/2012	5(e) order	2			Fluoroalkyl sulfonamide derivative	CBI	3/20/2014	253884
P-12-0425	6/22/2012		3	Methanol, reaction products with 1	1708962-18-8; 1708962-19-9		CBI	5/5/2015	
P-12-0450	7/8/2012	5(e) order	1			Partially fluorinated alcohol, reaction products with phosphorus oxide (P2O5), amine salts	CBI	9/14/2015	257580
P-13-0175	12/18/2012	5(e) order	no	Hexane, 1,6-diisocyanato-, homop	1279108-20-1		CBI	1/13/2014	
P-13-0282	2/13/2013		no			Trifluoroethene polymer with, 4-(ethenyloxy)-1-butanol, olefin copolymers and amine	DIC International (USA) LLC	6/27/2013	274534
P-13-0284	2/13/2013		1			Trifluoroethene polymer with 4-(ethenyloxy)-1-butanol, ethene, ethoxy- and olefin ethoxy copolymer	DIC International (USA) LLC	6/26/2013	273611
P-13-0305	2/21/2013	5(e) order	1			Fluorinated ester	3M Company	3/3/2015	232269
P-13-0424	5/1/2013		no	Furan, 2,3,3,4,4-pentafluorotetrah	957209-18-6		3M Company	10/19/2013	
P-13-0438	5/8/2013		no			Tetrafluoro acrylates copolymer with polyoxy methyl derivatives	DIC International (USA) LLC	10/16/2013	248023
P-13-0646	6/24/2013	5(e) order	1			Fluoroalkyl acrylate copolymer modified with polysiloxanes	CBI	9/11/2014	262169
P-13-0647	6/24/2013	5(e) order	1			Fluoroalkyl acrylate copolymer	CBI	9/11/2014	236238
P-13-0648	6/24/2013	5(e) order	1			Fluoroalkyl acrylate copolymer modified with polysiloxanes	CBI	9/11/2014	244441

P-13-0649	6/24/2013	5(e) order	no			Fluoroalkyl acrylate copolymer	CBI	9/11/2014	255653
P-13-0678	7/2/2013	5(e) order	no			Fluoroalkyl methylacrylate copolymer	CBI	9/11/2014	239191
P-13-0679	7/2/2013	5(e) order	3			Fluoroalkyl acrylate copolymer	CBI	9/11/2014	272583
P-13-0886	9/6/2013		no			Hydrofluoroolefin polymer with 1,1-difluoroethene	CBI	1/19/2015	205302
P-14-0321	6/22/2016	5(e) order	no	Propane, 2-chloro-1,1,1,2-tetrafluo	421-73-8		CBI	1/11/2017	
P-14-0473	4/3/2014		2			Alkylpolycarboxylic acid, derivative, tris(fluorinatedalkoxy)alkyl ester salt	CBI	8/26/2018	217095
P-14-0495	4/16/2014		2	Hexanedioic acid, polymers with 1,	1627515-87-0		Luna Innovations Incorporated	9/5/2014	
P-14-0523	4/29/2014	5(e) order	2			Copolymer of perfluorinated and alkyl methacrylates	CBI	9/15/2015	262341
P-14-0580	5/30/2014	5(e) order	1			Alkenoic acid, polymer with alkyl alkenoate, alkylalkylalkenoate, alkenoic acid and tridecafluoro alkylalkenoate, comods. with alkylaminoalcanol	CBI	1/17/2017	194662
P-14-0652	6/26/2014		no			Perfluoropolyether ally ether	CBI	11/19/2014	240052
P-14-0702	7/21/2014		no			Perfluoropolyether compound	Shin-Etsu Silicones of America	11/21/2014	279051
P-14-0765	8/5/2014		no			Fluorinated acrylic polymer with acrylate groups	DIC International (USA) LLC	1/6/2015	276950
P-14-0777	8/12/2014		no			Perfluoropolyether compound	Shin-Etsu Silicones of America, Inc.	1/17/2015	257966
P-14-0813	8/27/2014		no			Perfluoropolyether chlorosilane	CBI	1/14/2015	274512
P-14-0814	8/27/2014		1			Perfluoropolyether methoxysilane	CBI	1/15/2015	241271
P-15-0063	10/23/2014		no			Perfluoropolyether modified silane	Shin Etsu Silicones of America	3/16/2015	266423
P-15-0114	6/22/2016	5(e) order	5	2-Butanone, 1,1,1,3,4,4,4-heptaflu	756-12-7		3M Company	3/23/2018	
P-15-0154	12/18/2014	5(e) order	no			Fluoroalkyl acrylate copolymer	CBI	4/15/2016	199350
P-15-0239	1/23/2015		no			Siloxanes and silicones, amino alkyl substituted alkyl hydroxyl, hydroxyl fluorinated alkyl, ester salts, reaction products with mixed metal oxides	CBI	4/26/2015	276109
P-15-0320	6/22/2016	5(e) order	2	Propanenitrile, 2,3,3,3-tetrafluoro-	42532-60-5		3M Company	12/6/2017	
P-15-0354	3/19/2015		no			Perfluoropolyether-block-polytetrafluoroethylene	CBI	7/15/2015	275899
P-15-0502	6/2/2015	5(e) order	1			Perfluorobutanesulfonamide and polyoxyalkylene containing polyurethane	CBI	12/15/2015	241099
P-15-0507	6/4/2015		no	Borate(1-), tetrahydro-, sodium (1:	1214752-87-0		Shin-Etsu Silicones of America	10/6/2015	
P-15-0602	7/14/2015		2			Copolymer of tetrafluoroethene and perfluorosulfonylvinylether	CBI	11/12/2015	234389
P-15-0603	7/14/2015		no	Ethanesulfonyl fluoride, 1,1,2,2-tet	1687740-67-5		CBI	10/22/2015	
P-16-0094	11/13/2015		no			Perfluoropolyether modified organosilane	Shin Etsu Silicones of America	9/24/2016	200818
P-16-0221	2/19/2016	5(e) order	no			Fluorinated organopolysilazane	Shin Etsu Silicones of America	12/13/2018	218985
P-17-0175	3/28/2017	5(e) order	no			Fluorinated acrylic copolymer	Agfa Corporation, DIC International (USA) LLC	11/21/2017	196704
P-17-0270	3/30/2017	5(e) order	no			alkyl perfluorinated acryloyl ester	CBI	10/19/2018	193578

There are 8 additional PFAS on this list for which providing the generic name on this list would potentially reveal CBI so they are not listed here.

Senator BARRASSO. Thank you, Mr. Ross.
Ms. Sullivan.

STATEMENT OF MAUREEN SULLIVAN, DEPUTY ASSISTANT SECRETARY OF DEFENSE FOR ENVIRONMENT, U.S. DEPARTMENT OF DEFENSE

Ms. SULLIVAN. Chairman Barrasso, Ranking Member Carper, and members of the Committee, I am Maureen Sullivan, the Deputy Assistant Secretary of Defense for Environment. My portfolio includes policy and 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 want to thank this Committee for the opportunity to discuss PFAS. We believe the Department has been leading the way to address these substances.

One commercial product that contains PFOS and PFOA is aqueous film forming foam, or AFFF. This highly effective firefighting foam has been used by DOD, airports, fire departments, and the oil and gas industry. However, it only accounted for approximately 3 to 6 percent of the PFOS production in 2000, and DOD is just one of many users.

Over the last 3 years, the Department has committed substantial resources and taken action to respond to concerns with PFOS and PFOA. When EPA issued the Lifetime Health Advisory (LHA) for PFOS and PFOA in May 2016, DOD acted quickly to voluntarily test our 524 drinking water systems that serve approximately 2 million people on our installations worldwide. Twenty-four of these systems tested above EPA's LHA level. DOD followed the EPA's recommendation to include providing bottled water or additional water treatment.

CERCLA provides a consistent approach across the Nation for cleanup. The 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 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 if there was exposure through drinking water. If so, the priority has been to cut off human exposure where drinking water exceeds EPA's LHA level.

Now that exposure pathway is broken, the military departments are prioritizing 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.

As DOD moves through the CERCLA process, we will work in collaboration with our regulatory agencies and communities and share information in an open and transparent manner.

To prevent further releases into groundwater, DOD issued policy in January 2016 requiring the military departments to stop using AFFF during maintenance, testing, and training. The policy also required the military departments to remove and properly dispose of supplies of AFFF containing PFOS.

Currently, no fluorine-free versions of AFFF meet the military stringent performance requirements. We have funded research and demonstration projects to identify and test performance of fluorine-free AFFF. These efforts support the Department'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 funding.

In summary, DOD is taking actions to reduce the risks from PFOS and PFOA. Our efforts reinforce DOD's commitments to meeting critical mission requirements while protecting human health. The Department recognizes that this is a national problem involving a wide array of industries and commercial applications, as well as many Federal and State agencies; therefore, it needs a nationwide solution.

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

Thank you.

[The prepared statement of Ms. Sullivan follows:]

Maureen Sullivan
Deputy Assistant Secretary of Defense, Environment
Office of the Assistant Secretary of Defense

Ms. Sullivan is the Deputy Assistant Secretary of Defense for Environment in the Office of the Assistant Secretary of Defense (Sustainment). She is responsible for DoD's policies and programs related to compliance with environmental laws; management of natural and cultural resources; cleanup of contaminated sites; safety & occupational health; fire and emergency services; green/sustainable buildings; installation emergency management; international environmental compliance and cleanup efforts; strategic sustainability planning; and planning to address emerging contaminants. Ms. Sullivan is also responsible for the DoD Native American program. She oversees the Armed Forces Pest Management Board, the Department of Defense Explosives Safety Board, the Environmental Security Technology Certification Program (ESTCP), and the Strategic Environmental Research and Development Program (SERDP). Ms. Sullivan is the Department of Defense Federal Preservation Officer and represents the Secretary of Defense on the President's Advisory Council on Historic Preservation. Ms. Sullivan is a member of the General Services Administration's Green Building Advisory Committee. She also represents the Department of Defense on the National Invasive Species Council and the Wildland Fire Leadership Council. Ms. Sullivan serves as the DoD Chief Environmental Review and Permitting Officer.

For the past 27 years, Ms. Sullivan has served in various leadership positions as a member of the Office of the Secretary of Defense environmental staff, and possesses wide ranging experience in numerous DoD environmental programs to include Pollution Prevention, Environmental Compliance, Historic Preservation, and the Clean Air Act.

From 2013 thru 2014, Ms. Sullivan served as the DoD member of the Federal Interagency Floodplain Management Task Force. From 2009 to 2012, Ms. Sullivan served as the Department of Defense member of the White House Interagency Climate Change Adaptation Task Force. She served as the DoD representative to the Office of Management and Budget Interagency Panel which negotiated the final Ozone and Particulate Matter National Ambient Air Quality Standards in 1997. She also served as the DoD Liaison to the President Clinton's Council on Sustainable Development.

Ms. Sullivan was a member of the team that authored Executive Order 13148, "Greening the Government Through Leadership in Environmental Management," which President Clinton signed on April 22, 2000. She also helped draft Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements." After President Clinton signed Executive Order 12856, she was detailed to the Office of the Administrator, Environmental Protection Agency, to guide initial implementation.

Her total DoD career spans 38 years. Prior to joining the Office of the Secretary of Defense, she held positions with the Defense Logistics Agency in Virginia, Michigan,

Ohio and Germany where she worked in hazardous waste management, international environmental activities and pollution prevention. Ms. Sullivan has been a member of the Senior Executive Service since 2008.

Ms. Sullivan holds a Bachelor of Science in Natural Resource Economics from the University of Massachusetts at Amherst.

Senate Environment and Public Works Committee

By: Ms. Maureen Sullivan,
Deputy Assistant Secretary of Defense for Environment

Hearing: March 28, 2019 @ 1000
Room 406, Dirksen Senate Office Building

Chairman Barrasso, Ranking Member Carper and distinguished members of the Committee. 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. Current sales of 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 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

[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

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.

DoD will continue our three-pronged approach: 1) DoD has taken quick action to address 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 worked 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 well-established 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]

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 stock and 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

[2] This longstanding CERCLA prioritization process was developed by EPA and state regulators, as well as the other stakeholders such as DoD and various Non-Governmental Organizations, and documented in recommendations of the Federal Facilities Environmental Restoration Dialogue Committee (FERDEC 1999).

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 and have continued into 2019 as new technologies mature and are ready for field demonstration.

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 $60M in PFAS-related research and development through SERDP and ESTCP, with additional research and demonstration projects under consideration for funding beginning in FY 2020.

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, proof-of-concept projects have been initiated in this effort. In FY 2019, ESTCP initiated demonstrations of fluorine-free 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 SERDP and ESTCP funding over six years.

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 their efforts to conduct an exposure assessment at not less than 8 military installations and a multi-state health study, as required by the FY2018 NDAA. We recently provided ATSDR $30M to begin conducting the exposure assessment and health study. Another $10M will be transferred in FY2020. ATSDR established criteria to select the military installations to be included in the assessment, and announced their selection on February 21, 2019.

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. 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. This is a national problem involving a wide array of industries and commercial applications, as well as many Federal and state agencies. Therefore, it needs a nation-wide solution.

Senate Committee on Environment and Public Works
Hearing entitled, *"Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)"*
March 28, 2019
Questions for the Record for Ms. Sullivan

Chairman Barrasso:

1. **In 2017, the Department identified 401 active or closed military facilities with known or suspected releases of PFOS or PFOA. Has the Department finished determining whether the releases of PFOS or PFOA at all of these sites affect drinking water? If not, when will the Department finish the process? Please provide an estimated timeframe (quarter, year).**

   Response:

   Department of the Army (DA): The Army completed testing of all on-base drinking water systems in 2017 and determined that 12 systems contained PFOS and/or PFOA above the U.S. Environmental Protection Agency's (EPA) Health Advisory (HA).[1] Response actions have been taken, and no one on-base is drinking water with PFOS/PFOA above the HA.

   Additionally, the Army conducts CERCLA-mandated Site Inspections and if the sampling shows a pathway from on-base sources is leading to off-base drinking water, the Army has taken and will continue to take action to obtain permission to sample those off-base wells. Where drinking water was found to contain PFOS and/or PFOA above the EPA HA, alternative water was provided immediately. The Army is in the process of assessing where releases of PFOS/PFOA have or are suspected to have occurred with a planned completion by the end of Fiscal Year (FY) 2020.

   Department of the Navy (DON): The Navy and Marine Corps have completed testing of all on-base drinking water systems in 2017 and determined that 6 systems contained PFOS and/or PFOA above the U.S. Environmental Protection Agency's (EPA) Health Advisory (HA). Response actions have been taken, and no one on-base is drinking water with PFOS/PFOA above the HA.

   Additionally, the DON conducted screening level CERCLA Preliminary Assessments to identify potential PFOA/PFOS releases in close proximity (about 1 mile) to public or private drinking water wells; this was completed in 2016. Where there was a potential pathway from on-base sources leading to off-base drinking water, the DON took action to obtain permission to sample those off-base wells. Where drinking water was found to

[1] According to the U.S. Environmental Protection Agency, the HAs for PFOA and PFOS are lifetime HAs and were calculated to offer a margin of protection against adverse health effects to the most sensitive populations: fetuses during pregnancy and breastfed infants.

contain PFOS and/or PFOA above the EPA HA, alternative water was provided immediately.

Department of the Air Force (DAF): The Air Force has completed testing of all on-base drinking water systems in 2017 and determined that 6 systems contained PFOS and/or PFOA above the U.S. Environmental Protection Agency's (EPA) Health Advisory (HA). Response actions have been taken, and no one on-base is drinking water with PFOS/PFOA above the HA.

Additionally, the Air Force conducts CERCLA-mandated Site Inspections and if the sampling shows that a pathway from on-base sources is leading to off-base drinking water, the Air Force has taken and will continue to take action to obtain permission to sample those off-base wells. Where drinking water was found to contain PFOS and/or PFOA above the EPA HA, alternative water was provided immediately. The Air Force is in the process of assessing where releases of PFOS/PFOA have or are suspected to have occurred with a planned completion by the end of Fiscal Year (FY) 2020.

2. **What are the Department's legal obligations to a community whose groundwater the Department has contaminated with PFOS and/or PFOA in excess of 70 parts per trillion (ppt), but below 380 ppt?**

Response: CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and associated EPA guidance establishes a risk based process across the nation to address unacceptable risks to human health or the environment. Under the CERCLA risk assessment process, DoD uses the toxicity data ["reference dose"] from the EPA HA of 70 ppt to determine if there is an unacceptable risk to human health, and cleanup actions are warranted. DoD has legal authority, delegated under CERCLA section 104, to take "necessary" actions consistent with the NCP to protect public health from its releases of "pollutants or contaminants" such as PFOS and PFOA. Except as provided in section 120(a)(2) of CERCLA, DoD does not have a legal obligation under CERCLA to address PFOS and/or PFOA in groundwater below 380 ppt.

Going forward, DoD fully supports the screening level warranting additional investigation and the preliminary remediation goal contained in EPA's Draft Interim Recommendations to Address Groundwater Contaminated with PFOS/PFOA. EPA's *Draft Interim Recommendations to Address Groundwater Contaminated with PFOA and PFOS* provides helpful guidance for a consistent approach to PFOA and/or PFOS groundwater cleanups. We look forward to working with EPA to implement the final groundwater guidance.

3. **Has the Department (or another entity on behalf of the Department) informally or formally estimated the cost to clean up all sites, where it has contaminated groundwater with PFOS and/or PFOA above 70 ppt, to a level of 70 ppt? If so, please provide those informal or formal cost estimates.**

Response: 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. Since 2016, DoD has obligated approximately $500 million dollars to address PFOS and PFOA. DoD's rough estimate of future cleanup costs is $2 billion dollars. As we move through the CERCLA process the Department will be able to identify our cleanup requirements and more accurately estimate the cost of further cleanup actions.

4. **Has the Department (or another entity on behalf of the Department) informally or formally estimated the cost to clean up all sites, where it has contaminated groundwater with PFOS and/or PFOA above 380 ppt, to a level of 70 ppt? If so, please provide those informal or formal cost estimates.**

   Response: No, the Department has not estimated this cost.

5. **Has the Department identified and retrieved all aqueous film forming foam (AFFF) with PFOS within its inventory in the United States and around the world?**

   Response: The DoD Components are working to remove legacy AFFF containing PFOS from existing supply stocks (i.e. warehouses). In January 2016, the Assistant Secretary of Defense for Energy, Installations, and Environment (ASD(EI&E)) issued a policy requiring the DoD Components to: 1) issue Military Service-specific risk management procedures to prevent uncontrolled land-based releases of AFFF during maintenance, testing, and training activities and 2) remove and properly dispose of AFFF containing PFOS from the local stored supplies for non-shipboard use to prevent future environmental response action costs, where practical. Each of the Military Departments is taking actions to remove the AFFF containing PFOS from the local supply system. We provided a detailed timeline and status on the DoD Components' plans for replacing AFFF containing PFOS at military installations across the country to Congress in June of 2018, as required by Section 1059 of the Fiscal Year 2018 National Defense Authorization Act (NDAA).[2] See the response to the next question for further details.

6. **Please answer the following:**

   a. **What is the status of the AFFF with PFOS within its inventory?**

      Response: DoD has removed AFFF with PFOS from the local supply system including warehouses and some mobile equipment. DoD is working to remove AFFF with PFOS from the remaining mobile equipment and installed systems, such as fire suppression systems in hangers.

[2] https://www.denix.osd.mil/derp/home/documents/alternatives-to-aqueous-film-forming-foam-report-to-congress/

b. If the Department has destroyed all the AFFF with PFOS, what process did it use to ensure that the disposal of PFOS did not enter the environment?

Response: While PFAS do not meet the regulatory definition of hazardous waste, EPA has not issued any regulations on disposal of PFAS compounds, DoD has chosen to dispose of PFAS compounds through thermal destruction at permitted RCRA hazardous waste facilities. DoD believes this to be the most conservative option to protect human health and the environment. As required for all hazardous waste incinerators, air emissions are strictly controlled. DoD defers to the EPA on regulation and environmental and public health risks of incineration.

c. Are you confident that the process, which the Department used to destroy PFOS, protects human health and the environment?

Response: Yes. To destroy legacy AFFF, DoD utilized thermal treatment facilities that were permitted by the appropriate environmental regulator.

d. Is the Department seeking additional guidance from EPA on how to dispose of PFAS?

Response: Not at this time.

7. Please provide an update on the status of the Department's efforts to identify or develop AFFF that does not include PFAS, but meets the military's performance specifications.

Response: DoD continues to pursue research on alternatives, as well as development of new foam technologies in pursuit of finding a Fluorine Free alternative. DoD's Strategic Environmental Research and Development Program (SERDP) initiated a research and development program on fluorine-free alternative formulations in FY17. There are nine active projects in this effort. As FY19 budgets were finalized we were able to reprioritize over $1M to accelerate these efforts. These projects are scheduled for completion in approximately three years.

The Environmental Security Technology Certification Program (ESTCP) initiated three projects in FY19 to perform large-scale testing of existing fluorine-free alternatives to determine how close they come to meeting the stringent requirements of the military specification. These data will provide guidance on the path forward for fluorine-free formulations. A fourth project was started to validate a fast-turn, lab-scale test method to enable rapid testing of future alternatives as they are developed.

The Naval Research Laboratory, as well as other public and private entities, have been funded via the SERDP and ESTCP programs to develop new foam technologies. This research is in its early stages and is a multi-year effort.

8. Please answer the following:

a. Does the Department conduct any land-based testing, maintenance, or training exercises with AFFF, which contains PFAS?

Response: No. Per DoD policy, the DoD Components no longer use AFFF with PFAS for testing, maintenance, or training exercises. The Military Services have issued consistent policy and only use AFFF for emergency responses.

b. If so, under what circumstances do the testing, maintenance, or training exercises take place and to what extent does the Department prevent AFFF from contaminating the environment?

Response: No. Per DoD policy, the DoD Components do not use AFFF with PFAS for testing, maintenance, or training exercises. The Military Services have issued consistent policy and only use AFFF for emergency responses. In these cases DoD addresses the AFFF as a spill response to minimize the impact to the environment.

9. Do AFFF manufacturers disclose how much PFAS is in each unit of AFFF, which the Department procures? If not, has the Department asked AFFF manufacturers to disclose this information prior to procurement? If not, why not?

Response: In May 2016, manufacturers were asked to voluntarily provide PFOS and PFOA data for their products. Testing of all qualified MILSPEC AFFFs was conducted by Navy beginning in late 2016 in order to set initial limits for PFOS and PFOA. The September 2017 MILSPEC Amendment set a PFOS and PFOA limit at the lowest level of quantitation for these two chemicals, and all currently qualified products are tested to verify compliance. All AFFF purchased must meet this MILSPEC requirement.

10. I'm told that the Department uses PFAS for the purposes of chrome plating.

a. To what extent has the Department assessed its discharges of PFAS into the environment during the plating process?

Response: DoD has recently initiated actions to begin to assess the use of PFAS chemicals in chrome plating processes. PFAS were sometimes used during the hard chromium electroplating process to ensure all components stay mixed in chromic acid baths and possibly in fume suppressants. In the on-going Preliminary Assessments being conducted, current and former operations involving hard chrome electroplating are identified through records searches and interviews of current and former employees. These areas are being evaluated for potential releases to the environment, and if a potential release pathway is identified, the areas will be further investigated.

b. Please list the Department's other principal uses of PFAS.

Response: DoD's other uses of PFAS are believed to be the same as the general public use, such as procuring water and stain repellant clothing, carpets, and other water and stain resistant products and materials.

11. **When does the Department expect to test for PFAS in groundwater outside of the Cheyenne Air National Guard Base and F.E. Warren Air Force Base, respectively? Please provide an estimated timeframe (quarter, year) for each facility.**

Response: At Cheyenne ANGB, the Air National Guard has completed a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Preliminary Assessment and Site Inspection. While no impact to drinking water on- or off-base was identified, off-base groundwater will be sampled during the next phase of CERCLA, the Remedial Investigation. Cheyenne ANGB's Remedial Investigation will be prioritized against risk to human health with all other Air Force locations that require a Remedial Investigation, whether for PFOS/PFOA or other contaminants, so it is difficult to determine the exact timeframe.

At F.E. Warren AFB, a Preliminary Assessment and Site Inspection have also been completed. An Expanded Site Inspection contract is under development, with an estimated award in June/July 2019. The Expanded Site Inspection will determine if groundwater has migrated off-site and ensure contamination has not impacted private drinking water wells.

12. **If the Department finds that groundwater contaminated with PFAS has migrated outside of the Cheyenne Air National Guard Base or F.E. Warren Air Force Base, will it establish the full extent of the plume(s) of PFAS outside of the base(s)?**

Response: Yes. Information obtained during CERCLA Site Inspections and subsequent Remedial Investigations define the nature and extent of PFOS/PFOA in all environmental media on and off base.

13. **When does the Department expect to test for PFAS at Wyoming's Formerly Used Defense Sites – specifically, the Former Atlas "D" and "E" missile sites and the former Casper Army Airfield facility? Wyoming's Department of Environmental Quality would like Atlas D Missile Site 4, which is located near a source of Cheyenne's water supply, to be tested as soon as possible. Please provide an estimated timeframe (quarter, year) for each facility.**

Response: DoD performed an extensive review of historical records regarding PFAS use at these FUDS locations and has shared this information with Wyoming DEQ. The information indicates that DoD did not use AFFF with PFOS/PFOA during the time of DoD operations. Therefore, DoD does not plan to sample for PFOS/PFOA at this time. However, DoD will continue to work with Wyoming DEQ on this issue and will re-evaluate this decision if new information becomes available.

14. If the Department finds groundwater contaminated with PFAS at one or more of Wyoming's Formerly Used Defense Sites, will it establish the full extent of the plume(s) of PFAS at the site(s)?

Response: If DoD discovers groundwater contamination due to a release of PFOS, PFOA, or PFBS caused by DoD activities at one or more of Wyoming's FUDS, DoD will take necessary and appropriate response actions under CERCLA.

15. What do you need from chemical manufacturers and processors or others in the private sector to better understand and respond to the risks associated with PFAS chemicals?

Response: There are hundreds of manufactured PFAS chemicals, many without health effects data. We look to EPA and other public health organizations like HHS to research and provide further health information, and for manufacturers to work with these agencies to communicate health and environmental risk information. We are also engaging with the National Toxicology Program to explore screening approaches for assessing the toxicity of currently-used AFFF products, so as to inform our decision making process when selecting alternatives. Manufacturers' cooperation in these studies would be helpful to accelerate our efforts to identify alternatives and risks.

16. Are there lessons or best practices that we can learn from other countries' armed forces, which are also addressing the risks to public health and the environment associated with PFAS? If so, what are these lessons or best practices?

Response: Yes. PFAS is a national and international issue. While not a military-unique issue, DoD is generally looking at best practices from other countries. For example, the Australian Government Department of Defence's approach to addressing PFAS in the environment is similar to DoD's in following a CERCLA-like investigation and cleanup process. DoD has met frequently with the members of the Australian Department of Defense to share lessons learned and best management practices, such as mechanisms for public engagement and risk communication and effectiveness of remedial technologies.

17. What steps can the Executive Branch take to improve coordination among federal agencies as it responds to the risks associated with PFAS chemicals?

Response: 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. Continued collaboration within the Executive Branch is needed to address a variety of issues such as environmental, public health, occupational exposures, and food safety. PFAS needs coordinated efforts from many federal agencies, such as EPA, HHS (including CDC, ATSDR, FDA, and NIH), USDA, and OSHA.

18. **What steps can the Executive Branch take to improve communication with states, tribes, local communities, and the public about the risks associated with PFAS chemicals?**

    Response: DoD works in concert with regulatory agencies, communities, and base personnel, and shares information in an open and transparent manner. When elevated levels of PFOS and PFOA in drinking water are detected above the EPA HA levels, DoD used a proactive outreach strategy to promptly notify potentially affected consumers. The DoD Components use a variety of methods to actively reach out to and notify the surrounding community or people who live and work on base about the potential impacts of PFOS and PFOA.

Ranking Member Carper:

Questions about the PFAS Action Plan

19. **Please provide the following:**

    a. **Copies of all documents exchanged between DOD and EPA regarding the PFAS Action Plan or the groundwater cleanup guidelines for PFOS and PFOA.**

       Response: We have engaged our interagency colleagues regarding this item because it encompasses interagency communications.

    b. **Copies of all documents exchanged between OMB and DOD regarding the PFAS Action Plan or the groundwater cleanup guidelines for PFOS and PFOA.**

       Response: We have engaged our interagency colleagues regarding this item because it encompasses interagency communications.

    c. **A list of all diversions, or planned diversions, of funds intended for a site cleanup of non-PFAS contamination to PFAS clean-up efforts (including the name and location of the site, the purpose of the funds diverted or planned to be diverted from that site, and the nature of the PFAS efforts planned for the diverted funds).**

       Response: We are collecting the requested information to respond to your Congressional letter dated March 6, 2019, which was also signed by Senators Jack Reed, Tom Carper, Gary Peters, and Patty Murray, and anticipate responding by May 31, 2019.

       For purposes of this request, "documents" includes, but is not limited to, comments, notes, emails, legal and other memoranda, white papers, scientific references, letters, telephone logs, text messages, meeting minutes and calendars, photographs, slides and presentations. In the case of meetings, calls, or other oral communications, please include the date, time, and location at which such communications took place,

a list of the individuals who participated, as well as a description of the communication.

Questions on Groundwater Cleanup Guidance

20. In your testimony, you stated that "We support the use of the long-established CERCLA risk-based cleanup process established in EPA's implementing guidance."

a. Does DOD support the establishment by EPA of a screening level for PFAS-contaminated sites? By screening level, I mean a level of PFAS contamination that would be deemed to suggest the possible presence of more than one PFAS at potentially higher concentrations. PFAS contamination at this level would require additional testing. If not, why not?

Response: DoD fully supports the 40 ppt screening level included in the U.S. EPA Draft Interim Recommendations to Address Groundwater Contaminated with PFOA and PFOS. This screening level is consistent with the long-established CERCLA risk-based cleanup process.

b. Does DOD support the establishment by EPA of a remedial level for PFAS-contaminated sites? By remedial level, I mean a level of PFAS contamination that would trigger non-emergency clean-up actions to occur. If not, why not?

Response: DoD supports the use of the long-established CERCLA risk-based cleanup approach based on EPA's implementing regulation. Under CERCLA, cleanup levels are based on reducing contaminant concentrations below unacceptable risk levels. Risk levels are based on toxicity information incorporated into site-specific CERCLA risk assessments. DoD supports EPA working toward regulatory standards for PFOS and PFOA that help ensure a consistent and nationwide cleanup process.

c. Does DOD support the establishment by EPA of a removal level for PFAS-contaminated sites? By removal level, I mean a level of PFAS contamination that would trigger emergency measures, such as the provision of alternative water supplies, to be implemented. If not, why not?

Response: DoD supports the use of the long-established CERCLA risk-based cleanup approach based on EPA's implementing regulation. Under CERCLA, cleanup levels are based on reducing contaminant concentrations below unacceptable risk levels. Risk levels are based on toxicity information incorporated into site-specific CERCLA risk assessments. DoD supports EPA working toward regulatory standards for PFOS and PFOA that help ensure a consistent and nationwide cleanup process.

d. Does DOD support a requirement by EPA that clean-up of PFAS contamination must occur at levels that exceed the removal level, and that the levels of contamination be reduced down to the remedial level? Why or why not?

Response: DoD supports the use of the long-established CERCLA risk-based cleanup approach based on EPA's implementing regulations. Under CERCLA, cleanup levels are based on reducing contaminant concentrations below unacceptable risk levels. Risk levels are based on toxicity information incorporated into site-specific CERCLA risk assessments. DoD supports EPA working toward regulatory standards for PFOS and PFOA that help ensure a consistent and nationwide cleanup process.

e. Does DOD support a requirement by EPA that clean-up of PFAS contamination must occur at levels that exceed the remedial level but do not exceed the removal level, and that the levels of contamination be reduced down to the remedial level? Why or why not?

Response: DoD supports the use of the long-established CERCLA risk-based cleanup approach based on EPA's implementing regulations. Under CERCLA, cleanup levels are based on reducing contaminant concentrations below unacceptable risk levels. Risk levels are based on toxicity information incorporated into site-specific CERCLA risk assessments. DoD supports EPA working toward regulatory standards for PFOS and PFOA that help ensure a consistent and nationwide cleanup process.

21. According to EPA[3], "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, EPA has established the health advisory levels at 70 parts per trillion."

a. Does DOD agree that EPA's PFOA and PFOS health advisory level of 70 parts per trillion is the appropriately-protective level to protect against exposures to PFOA- and PFOS-contaminated drinking water? Why or why not?

Response: DoD supports EPA in its use of the Safe Drinking Water Act regulatory process to determine if a drinking water standard (i.e., Maximum Contaminant Level) is warranted for PFOS and PFOA. If a drinking water standard is set, it will establish the appropriately-protective level to protect against PFOS and PFOA in public supplies of drinking water. The health advisory is non-enforceable guidance that provides information for consideration by public water utilities . DoD has followed the HA's recommended actions where DoD is the drinking water supplier, to be protective of human health.

[3] https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos

b. Does DOD agree that residents of the United States are exposed to PFAS through many more pathways than drinking water, including from their carpets, food packaging and other every-day exposures? Why or why not?

Response: Yes, Americans are exposed to PFAS through other sources than drinking water. 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. PFAS 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.[4] 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. As outlined in the ITRC analysis, 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, and 3-6 percent for firefighting foam. Perfluorooctanyl chemicals are used in electroplating and etching, household additives, insecticides, and other applications.

c. Does DOD agree that EPA's cleanup guidance for groundwater contaminated by PFAS should take into account the fact that residents of the United States are exposed to PFAS via many other means? Why or why not?

Response: The federal cleanup law (CERCLA) provides the statutory basis for a risk-based cleanup program that identifies certain categories of people who can be held responsible for releases of hazardous substances. CERCLA generally does not hold people responsible to clean up exposures received from consumer products (such as stain resistant carpeting) or other exposures they did not cause or do not relate to the releases at the site. Instead, for example, if a person releases a chemical to groundwater that is used as drinking water, that person is responsible under CERCLA for addressing the drinking water exposures they caused to ensure that there is no unacceptable risk.

d. Does DOD agree that 32 percent of Americans' drinking water comes from groundwater, and that's not even counting the 13 million households who get their drinking water from private wells? Why or why not?

[4] 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, Pesticide and Toxic Substances on 3M Phase-Out plan for perfluorooctane sulfonyl fluoiride (POFS) based products. This analysis does not include PFOA produced by 3M or PFOS/PFOA other PFAS production by other manufacturers.

Response: While DoD is not aware of the source for this statistic, we acknowledge that a significant percentage of drinking water is treated groundwater.

e. **Does DOD agree that EPA's cleanup guidance for groundwater contaminated by PFAS should be as protective of human health as EPA's drinking water health advisory level? Why or why not?**

Response: The federal cleanup law (CERCLA) provides the statutory basis for a risk-based cleanup program that identifies certain categories of people who can be held responsible for the release of hazardous substances. For example, if a person releases a chemical to groundwater that is used as drinking water, that person is responsible under CERCLA for addressing the drinking water exposures they caused to ensure that there is no unacceptable risk.

CERCLA specifically identifies how a Safe Drinking Water Act standard (i.e., Maximum Contaminant Level) is used in determining cleanup levels, and the NCP also identifies health advisories as information "to be considered" in evaluating a site-specific remedy or cleanup level. See 40 CFR § 300.400(g)(3).

Questions on PFAS-contaminated DOD locations

22. **In response to Senator Rounds, you stated, about off-site contamination, that "where DOD is the known source, it is our responsibility to clean up the water and provide safe drinking water."**

a. **Please provide a list of all DOD sites at which PFAS contamination has been found or is suspected, along with the type (i.e. which PFAS) and amount of contamination. Has DOD tested all sites within the U.S. for such contamination? If not, how many sites remain untested, and when does DOD plan to test these locations?**

Response: DoD provided a list of its facilities with known or suspected releases of PFOS/PFOA as of December 2016 in the AFFF Report to Congress dated October 2017 (see list of installations attached, which was reviewed and verified in July 2018). These sites are in various stages of the CERCLA process and all initial investigations are anticipated to be completed by the end of Calendar Year 2020.

b. **For each DOD site that has been identified as known or suspected to be PFAS-contaminated, has DOD tested off-site to determine whether the contamination has spread outside the DOD site? Please provide a list of all known or suspected PFAS-contaminated DOD sites at which off-site contamination has also been identified, along with the type (i.e. which PFAS) and amount of contamination. If DOD has not yet tested off-site to determine whether the contamination has spread outside a DOD site, why not, and when does DOD plan to conduct such testing?**

Response: If environmental sampling information obtained from CERCLA Site Inspections indicate groundwater or surface water contains PFOS/PFOA at concentrations above the EPA Health Advisory level, releases are attributable to DoD, and potential off-base drinking water exposure pathways exist, off-base drinking water sources are sampled. If sampling results indicate PFOS/PFOA concentrations in excess of the EPA Health Advisory level, bottled water is immediately provided, followed by more permanent solutions such as installing filter systems or connecting private well owners to public utilities. The CERCLA investigations continue and off-installation sampling will occur where the investigations indicate such sampling is needed. Investigations are expected to carry into the mid-late 2020s.

c. When DOD identifies PFAS contamination, does DOD alert residents and former residents (both on- and off-site) who may have been exposed to it? If so, please describe these efforts. If not, why not?

Response: 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 information (e.g., status of investigations, cleanup progress) and partnering with local regulatory and governmental organizations to notify affected residents;
- Hosting public meetings;
- Alerting and engaging with the media;
- Messaging through community social media; and
- Updating community leaders.

d. Has DOD ever disagreed with an assertion that DOD was the source of off-site PFAS contamination? If so, please provide documentation describing the nature of the contamination and the basis for DOD's disagreement that DOD was its source.

Response: We have found situations where there may have been non-DoD sources of PFOS/PFOA at or around current or former installations, including what appear to be existing PFAS levels indicating chemicals present in the environment may have come from non-DoD sources. This is consistent with sampling results from across the country that indicate the presence of PFOS/PFOA in drinking water is not a military-unique issue.

23. In response to Senator Duckworth, you stated that "again, no one on our military installations is drinking water above the Lifetime Health Advisory, and that hasn't happened since 2016."

a. **Is that also the case for anyone not living on a DOD military installation but whose drinking water is contaminated by PFAS known to be the responsibility of DOD? If not, please provide a list of DOD sites for which the off-site communities have not yet been assured of drinking water that is at or below the Lifetime Health Advisory.**

Response: When a DoD installation identifies off-installation migration from DoD activities, DoD works in concert with regulatory agencies and communities to quickly address drinking water that exceeds EPA's Health Advisory. This is a priority for DoD to address our list of facilities with known or suspected releases of PFOS/PFOA as of December 2016 in the AFFF Report to Congress dated October 2017 (see list of installations attached, which was reviewed and verified in July 2018). Where identified, DoD has already addressed all such circumstances. DOD continues to assess any newly identified potential releases to drinking water wells from DoD activities.

b. **Is that also the case for anyone not living on a DOD military installation but whose drinking water is contaminated by PFAS *suspected* to be the responsibility of DOD? If not, please provide a list of DOD sites for which the off-site communities have not yet been assured of drinking water that is at or below the Lifetime Health Advisory.**

Response: Consistent with CERCLA and DoD's cleanup authorities, where there is some evidence that DoD is the source of offsite PFOS/PFOA releases, DoD takes action to address unacceptable risks to human health.

Questions on State Standards

24. **In response to Senator Markey, you stated that DOD "will meet any properly promulgated standard that is issued by the State and roll it into our cleanup program."**

a. Is it DOD's position that this applies to both State drinking water and groundwater cleanup standards? If not, why not?

Response: DoD follows CERCLA. Once a need for cleanup action has been determined based on CERCLA's risk assessment process, Federal and State cleanup standards are evaluated under the CERCLA process to see if they are Applicable or Relevant and Appropriate Requirements (ARARs) at the specific site. If so, they are incorporated into the cleanup levels that must be attained at the site. This process applies to both State drinking water and groundwater cleanup standards.

b. **Please provide a list of all State drinking water and groundwater cleanup PFAS standards that DOD believes were not 'properly promulgated,' along with a specific legal explanation for whatever impropriety DOD has concluded about each such State standard.**

Response: Section 121(d)(2) of CERCLA identifies the process for evaluating federal and state requirements as cleanup standards on a site-specific basis. This process is referred to as the Applicable or Relevant and Appropriate Requirements (ARARs) process. As explained in CERCLA regulations, the NCP, and court cases, a state standard or requirement may be deemed an ARAR "if it is (1) properly promulgated, (2) more stringent than federal standards, (3) legally applicable or relevant and appropriate, and (4) timely identified." U.S. v. Akzo Coating, 949 F.2d 1409, 1440 (6th Cir 1991). According to EPA's CERCLA regulations and case law, "promulgated" as used in CERCLA section 121(d) refers to "laws imposed by state legislative bodies and regulations developed by state agencies that are of general applicability and are legally enforceable." Id. and see 40 CFR 300.400(g). Because ARARs are evaluated on a site-specific basis, DoD can only identify some examples of items that do not categorically qualify as ARARs, such as unenforceable guidance, or state regulations that do not generally apply to all entities in a state.

c. **Please provide a list of all State drinking water and groundwater cleanup PFAS standards that DOD does believe were 'properly promulgated' and will meet.**

Response: Section 121(d)(2) of CERCLA identifies the process for evaluating federal and state requirements as cleanup standards on a site-specific basis. This process is referred to as the Applicable or Relevant and Appropriate Requirements (ARARs) process. Because ARARs are evaluated on a site-specific basis, DoD can only identify some examples of State regulations that it has identified as potential ARARs:

1. Alaska groundwater (as drinking water) human health cleanup level [18 Alaska Admin. Code 75.345(b) Table C]
2. New Hampshire groundwater (suitable for drinking water) contaminated site management rule [NH Code of Admin. Rules, Chapter Env-Or 600]
3. North Carolina groundwater (used for drinking water) classification rule [NC Admin. Code 02L.0202]
4. Michigan cleanup (drinking water) criteria [MI Rule 299, Table 1]
5. Minnesota health risk limits for groundwater (used as drinking water) [MI Admin Rules, parts 4717.7810]
6. Vermont groundwater protection (as high quality drinking water) rule [VT DEC Chapter 12, Appendix 1]

d. **A recent article[5] described several instances in which DOD was taking State regulators to court or otherwise opposing their efforts to hold DOD accountable for PFAS contamination in their states. For example, when New Mexico regulators issued a Notice of Violation against an Air Force base, the Air Force responded by saying that the New Mexico statute did not apply to Air Force Facilities, and sued the state. According to the article, the Air Force is also resisting compliance with State requirements in Michigan, New York and Colorado. Please provide a list of each instance in which DOD:**

[5] http://gatehousenews.com/unwellwater/battleground/site/theintell.com/

i) refused to comply with a state regulation, law or enforcement action related to PFAS,

Response: DoD has raised questions concerning compliance with a state regulation, law or enforcement action related to PFAS in specific circumstances at:

- Wurtsmith AFB, MI.
- Cannon AFB, NM.
- Holloman AFB, NM.
- Travis AFB, and Sierra Army Depot, CA.

DoD continues to work with the State environmental regulators to resolve these issues. For example, DoD worked with CA on an alternative process to voluntarily provide sampling information.

ii) sued a state because of its disagreement with a state regulation, law or enforcement action related to PFAS (along with the current status or final disposition of each lawsuit as applicable),

Response: *United States v. New Mexico Env't Dep't*, No. 2:19-cv-00046 (D.N.M. filed Jan. 17, 2019) and *United States v. New Mexico Env't Dept*, No. A-1-CA-37887 (N.M. Ct. App. filed Jan. 17, 2019). The United States filed an action in both state and federal courts to challenge *ultra vires* permit conditions NMED included in a "corrective action only" permit. NMED has moved to dismiss the federal action, arguing that the matter is best resolved by the state proceeding. The state proceeding has been stayed pending a ruling by the U.S. District Court.

iii) was sued by a state because of its failure to comply with a state regulation, law or enforcement action related to PFAS (along with the current status or final disposition of each lawsuit, as applicable) or

Response:

- *New Mexico v. United States*, No. 1:19-cv-00178 (D.N.M. filed March 5, 2019). New Mexico sued the United States for a declaration that the United States had violated the New Mexico Hazardous Waste Act and to abate "conditions creating an imminent and substantial endangerment." New Mexico has indicated it intends to amend the complaint. The parties have agreed to stay the United States' obligation to answer or otherwise respond to the complaint until after the amended complaint has been filed.

iv) complied as requested or directed with a state regulation, law or enforcement action related to PFAS.

Response: While too numerous to list, DoD provides the following examples of how it complies with state regulations or laws related to PFAS:

- DoD evaluates State cleanup standards related to PFAS under the CERCLA Applicable or Relevant and Appropriate Requirements (ARARs) process at each of its cleanup sites.
- DoD public water systems comply with all state drinking water laws related to PFAS, in accordance with the Safe Drinking Water Act.

Senator Capito:

25. **During my questioning, you acknowledged that the Department of Defense remains uncertain about the volumes and locations of stockpiles of legacy PFOA and PFOS. Yet, you estimated in this and other congressional hearings that the cost of remediation of these stockpiles would be around $2 billion. What is this cost estimate based upon if the scale of the problem remains unclear?**

    Response: To clarify Ms. Sullivan's statement, the $2 billion refers to the rough estimate for the cost of groundwater remediation, not the cost of disposing of legacy AFFF with PFOS.

    a. **Do you have a firmer sense of the scale of the stockpile for inclusion in the record?**

        Response: In January 2016, the Assistant Secretary of Defense for Energy, Installations, and Environment (ASD(EI&E)) issued a policy requiring the DoD Components to: 1) issue Military Service-specific risk management procedures to prevent uncontrolled land-based releases of AFFF during maintenance, testing, and training activities and 2) remove and properly dispose of AFFF containing PFOS from the local stored supplies for non-shipboard use to prevent future environmental response action costs, where practical. Each of the Military Departments has taken actions to remove the AFFF containing PFOS from the local supply system including warehouses and some mobile equipment. DoD is working to remove AFFF with PFOS from the remaining mobile equipment and installed systems, such as fire suppression systems in hangers.

        We provided a detailed timeline and status on the DoD Components' plans for replacing AFFF containing PFOA or PFOS at military installations across the country to Congress in June of 2018, as required by Section 1059 of the Fiscal Year 2018 National Defense Authorization Act (NDAA).[6]

26. **You stated that you were unsure if a facility in East Liverpool, Ohio was involved in the destruction of some portion of the Department's legacy PFAS. Can you verify for the record if Heritage Thermal Service's hazardous waste incinerator was involved in the destruction of some portion of the Air Force's AFFF stockpile?**

[6] https://www.denix.osd.mil/derp/home/documents/alternatives-to-aqueous-film-forming-foam-report-to-congress/

Response: Yes.

a. If so, how much material has been combusted there to date?

Response: The Defense Logistics Agency (DLA) is the primary DoD agency that supports disposal of DoD hazardous property. There were three (3) DLA Contracts administered for the Air Force that involved disposal of AFFF related waste. The contracts were awarded on September 21, 2016 and expired on March 20, 2018. Approximately 1.17 million gallons, or 9.76 million pounds of AFFF concentrate and rinsate were removed from Air Force installations under these DLA contracts by Heritage Thermal Services for incineration at their RCRA Permitted incineration facility in East Liverpool, OH (EPA ID# OHD980613541).

b. At what temperatures and for how long were these materials combusted?

Response: Operating conditions and permit limits to achieve thermal destruction are set by the regulatory authority and are described in the facility's approved RCRA permit. This information would have to be provided by Heritage Thermal Services.

c. How were these the temperatures and durations determined and is the Department confident that these measures are capable of completely destroying the PFAS material?

Response: The regulatory authority sets destruction efficiency and removal standards. The Department is confident in the ability of the Resource Conservation and Recovery Act hazardous waste permitting program to ensure safe management of wastes, thereby protecting human health and the environment.

27. During the hearing, you said that all destruction of the Department's legacy AFFF stockpiles is being conducted at EPA-certified facilities. Is the Heritage Thermal Service facility in East Liverpool, Ohio EPA-approved?

Response: Heritage Thermal Services, a subsidiary of Heritage Environmental Services, operates under a Resource Conservation and Recovery Act (RCRA) Permit issued by the Ohio Environmental Protection Agency (OEPA), authorizing Heritage Thermal Services to store and to treat hazardous and non-hazardous wastes by incineration in accordance with the terms and conditions of the Permit.

a. Has it had any history of significant Clean Air Act violations?

Response: A March 21, 2018 check of the EPA's Enforcement & Compliance History Online (ECHO) indicated a High Priority Violation involving the Clean Air Act. According to the regulatory authority (Ohio Department of Air Pollution Control) the High Priority designation was from a 2015 violation and the issue was closed and/or resolved to the regulators satisfaction.

28. In my questioning of EPA Assistant Administrator Ross, he stated that the EPA is currently working on air standards and monitoring techniques for PFAS in the air medium – including for stack emissions – as part of its PFAS Action Plan. This implies that there currently are no such standards. Without such standards, rooted in science, how does the Department select contractors to combust this material and certify that PFAS pollution is not being emitted into the air?

Response: The primary factor used in the vetting process is whether the facility is operating under the appropriate permit(s) issued by the authorized regulatory agency or agencies to handle the waste stream involved.

Senator Gillibrand:

29. Ms. Sullivan, the public has the right to know the scope of PFAS contamination at all military bases across the country, in order to protect drinking water on and near to those installations and address any impacts of contamination to those communities. In an exchange with Senator Rounds, with regard to PFAS at military bases you stated, "It's everywhere."

a. Will you provide Congress and the public with all records on PFAS contamination, including all detections at any level, not just those up to the 70 parts per trillion threshold?

Response: DoD provided a list of its facilities with known or suspected releases of PFOS/PFOA as of December 2016 in the AFFF Report to Congress dated October 2017 (see list of installations attached including web site links, which was reviewed and verified in July 2018). These sites are in various stages of the CERCLA process and all initial investigations are anticipated to be completed by the end of Calendar Year 2020.

b. What is the Department's plan to inform the public about the severity and scale of PFAS contamination on and near military installations?

Response: 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 information (e.g. status of investigations, cleanup progress) and partnering with local regulatory and governmental organizations to reach stakeholders;
- Hosting public meetings;
- Alerting and engaging with the media;
- Messaging through community social media; and

- Updating community leaders.

30. Is the Department of Defense (DOD) responsible for the environmental contamination caused by PFAS at National Guard bases resulting from DOD guidelines that clearly require those bases to use firefighting foam containing fluorinated chemicals?

Response: The Defense Environment Restoration Program (DERP) provides DoD the authority to perform and fund its environmental restoration responsibilities arising under CERCLA (aka Superfund). CERCLA responsibility (i.e., liability) extends to, among others, the owner and operator of the facility. DoD has determined that the use of DoD environmental restoration funds does not extend to releases that occurred at State-owned, State-controlled, and State-operated National Guard facilities. However, Army and Air Force National Guard Operation and Maintenance appropriations may be used for environmental activities, including cleanup and actions to address contaminants migrating off state-operated National Guard facilities.

31. Why has DOD not requesting more funding for Environmental Restoration accounts to provide those funds to National Guard bases for addressing PFAS contamination, and instead requiring those bases to use Operations & Maintenance funding?

Response: The Defense Environment Restoration Program (DERP) provides DoD the authority to perform and fund its environmental restoration responsibilities arising under CERCLA (aka Superfund). CERCLA responsibility (i.e., liability) extends to, among others, the owner and operator of the facility. DoD has determined that the use of DoD environmental restoration funds does not extend to releases that occurred at State-owned, State-controlled, and State-operated National Guard facilities.

However, Army and Air Force National Guard Operation and Maintenance appropriations may be used for environmental activities, including cleanup and actions to address contaminants migrating off state-operated National Guard facilities.

Senator Markey:

32. In the hearing, I asked you whether the Department of Defense will commit to meet lower State cleanup levels, if applicable, when working to remediate Federal facilities contaminated with PFAS. You responded, "We will meet any properly promulgated standard that is issued by the State and roll it into our cleanup program." However, press reports note that the Department of Defense is contesting state regulator actions on PFAS.

a. Please provide the Department of Defense's definition for a "properly promulgated standard."

Response: Section 121(d)(2) of CERCLA identifies the process for evaluating federal and state requirements as cleanup standards on a site-specific basis. This process is referred to as the Applicable or Relevant and Appropriate Requirements (ARARs) process. As explained in CERCLA regulations (the NCP) and court cases, a state standard or requirement may be deemed an ARAR "if it is (1) properly promulgated, (2) more stringent than federal standards, (3) legally applicable or relevant and appropriate, and (4) timely identified." U.S. v. Akzo Coating, 949 F.2d 1409, 1440 (6th Cir 1991). According to the NCP and case law, "promulgated" as used in CERCLA section 121(d) refers to "laws imposed by state legislative bodies and regulations developed by state agencies that are of general applicability and are legally enforceable." Id. and see 40 CFR 300.400(g).

b. Please provide a list of any state-level PFAS standards that the Department of Defense considers to be "properly promulgated."

Response: Section 121(d)(2) of CERCLA identifies the process for evaluating federal and state requirements as cleanup standards on a site-specific basis. This process is referred to as the Applicable or Relevant and Appropriate Requirements (ARARs) process. Because ARARs are evaluated on a site-specific basis, DoD can only identify some examples of State regulations that it has identified as potential ARARs:

1. Alaska groundwater (as drinking water) human health cleanup level [18 Alaska Admin. Code 75.345(b) Table C]
2. New Hampshire groundwater (suitable for drinking water) contaminated site management rule [NH Code of Admin. Rules, Chapter Env-Or 600]
3. North Carolina groundwater (used for drinking water) classification rule [NC Admin. Code 02L.0202]
4. Michigan cleanup (drinking water) criteria [MI Rule 299, Table 1]
5. Minnesota health risk limits for groundwater (used as drinking water) [MI Admin Rules, parts 4717.7810]
6. Vermont groundwater protection (as high quality drinking water) rule [VT DEC Chapter 12, Appendix 1]

c. Is the Department of Defense tracking all state regulatory orders on PFAS?

Response: Yes, DoD is tracking State PFAS orders.

i. If not, why not?

Response: See previous answer.

ii. If so, how many of these orders has the Department of Defense complied with?

Response: DoD had received one state regulatory order in California. DoD worked with CA on an alternative process to voluntarily provide the requested sampling information, and the State rescinded the order.

d. Is it DOD's position that state groundwater cleanup levels constitute "applicable, relevant or appropriate" requirements under CERCLA?

Response: Because Applicable or Relevant and Appropriate Requirements (ARARs) are evaluated on a site-specific basis, DoD cannot say that all state groundwater cleanup levels are ARARs, however a state groundwater cleanup level will be evaluated under the CERCLA ARARs process at each DoD CERCLA cleanup within that state. Section 121(d)(2) of CERCLA identifies the process for evaluating state requirements as cleanup standards on a site-specific basis. This process is referred to as the Applicable or Relevant and Appropriate Requirements (ARARs) process. As explained in the NCP and court cases, a state standard or requirement may be deemed an ARAR "if it is (1) properly promulgated, (2) more stringent than federal standards, (3) legally applicable or relevant and appropriate, and (4) timely identified." U.S. v. Akzo Coating, 949 F.2d 1409, 1440 (6th Cir 1991).

33. Please provide a list of all communities with which the Secretary of Defense has entered into Cooperative Agreements regarding PFAS contamination.

Response: The Army is in the process of negotiating a Cooperative Agreement with the Town of Ayer, MA. The Army may enter into a cooperative agreement when site conditions indicate PFOS/PFOA attributable to Army operations have impacted public drinking water system(s) and a cooperative agreement is an efficient and cost-effective mechanism to mitigate unacceptable human health risks posed by PFOS/PFOA.

The Navy has entered into Cooperative Agreements with five communities/local municipal authorities. Four of these Cooperative Agreements are with local municipal authorities in Pennsylvania to pay for drinking water treatment and municipal water connections related to PFAS contamination from former NASJRB Willow Grove and NAWC Warminster: Warminster Municipal Authority; Horsham Water and Sewer Authority; Warwick Township Water and Sewer Authority; and Northampton, Bucks County, Municipal Authority. The fifth Cooperative Agreement is with the Town of Coupeville, WA to pay for drinking water treatment and municipal water connections related to PFAS contamination from the Outlying Landing Field Coupeville which is associated with NAS Whidbey Island.

The Air Force has entered into Cooperative Agreements with:

- Horsham AGS, PA: Horsham Township, PA; Warrington Township, PA; Warminster Township, PA
- Fairchild AFB, WA: City of Airway Heights, WA
- Peterson AFB, CO: Fountain, CO; Security, CO; Widefield, CO
  Former Pease AFB, NH: City of Portsmouth, NH

- Former March AFB, CO: Eastern Municipal Water District (Perris, CA).

a. Please provide a list of the site criteria used to determine and establish these agreements.

Response: DoD is investigating long term solutions at all areas where historical PFAS releases have impacted off-base drinking water (i.e., where drinking water exceeds the EPA's health advisory). The long-term solution for each site will need to be a site-specific solution. As such, cooperative agreements are only one of many methods available for DoD to provide a long-term solution for off-base residents.

While criteria will vary depending on the work to be performed, criteria that were considered in developing these Cooperative Agreements included the following:

- Impacts to existing municipal drinking water systems. Are modifications to be made to existing plants or is a complete new plant required?
- Capabilities of municipalities to conduct the work (size of municipality, available resources, staff, contracting ability, technical specialties employed, etc. i.e., can they reasonably conduct the work).
- Level of detail of interim measure operation and maintenance manuals/requirements available for execution of work.
- Project execution time lines and DOD funding cycles, obligation requirements.

34. In your testimony, you said, "Currently, no fluorine-free versions of AFFF meet the military stringent performance requirements."

a. What specific Military Standard performance metrics are not met by fluorine-free firefighting foams?

Response: Although no manufacturer has expressed interest in full qualification testing of a fluorine-free foam, Navy testing of fluorine-free foams have shown they fail to pass the basic MILSPEC fire extinguishing tests in the allotted time at normal concentration and flow rates. Because they have not passed the initial tests, the follow-on fire tests (half strength and quintuple strength, freshwater and seawater, aged) have not been performed, nor the extensive tests for physical and chemical characteristics required by the MILSPEC. Current fluorine-free foams are also not compatible/interchangeable with one another. MILSPEC AFFFs are tested to ensure that products from different manufacturers can safely be mixed with one another without concerns for gelling, corrosion or any degradation in fire extinguishing performance

b. How do fluorine-free AFFF compare directly with currently-used AFFF in firefighting performance metrics?

Response: The basic fire extinguishing test is a 28 square foot pan fire and MILSPEC AFFF must extinguish the fire within 30 seconds. At this time, the best performance by a fluorine-free foam has been 77 seconds, nearly 2-1/2 times greater.

Fluorine-free foams can also be significantly more viscous than the MILSPEC permits. One particular Fluorine free product is nearly 250 times more viscous than permitted by the MILSPEC. Viscosity is one of the physical characteristics that is critical to a product being useable in existing systems.

The ESTCP demonstrations discussed in Question #7 are designed to get quantitative answers to this question.

Senator Sullivan:

35. **Under current FAA regulation AFFF meeting military specification that include certain PFAS chemicals are required at many State and local government operated airports. What is the anticipated timeline for a replacement non-fluorinated foam that would meet military specification?**

Response: DoD and DON have been funding and conducting research and development to find a safe, fluorine free substitute for AFFF that meets the military performance requirements. No suitable substitutes have been found to date and it is not possible to predict when this will occur.

These are research and development efforts so a definitive timeline is difficult. As new formulations are developed, they are being tested so we will know as soon as we have success. The SERDP projects are scheduled for three year duration.

36. **What are the total estimated costs for clean-up of PFAS contamination under DOD jurisdiction?**

Response: 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 CERCLA 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. Since 2016, DoD has obligated approximately $500 million dollars to address PFOS and PFOA. DoD's rough estimate of future cleanup costs is $2 billion dollars. As we move through the CERCLA process the Department will be able to identify our cleanup requirements and determine if we are adequately requesting funds to address PFOS/PFOA.

Senator BARRASSO. Well, thank you so very much for your thoughtful testimony, Ms. Sullivan. We appreciate you being here today.

Dr. Breysse.

STATEMENT OF PATRICK BREYSSE, DIRECTOR OF THE NATIONAL CENTER FOR ENVIRONMENTAL HEALTH/AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, CENTERS FOR DISEASE CONTROL AND PREVENTION

Mr. BREYSSE. Thank you, Chairman Barrasso, Ranking Member Carper, and distinguished members of the Committee.

I am Patrick Breysse, the Director of the National Center for Environmental Health at the CDC, Centers for Disease Control and Prevention, and the Agency for Toxic Substances and Disease Registry. In addition to my role as Director, I have over 35 years of experience working as an environmental health scientist at the Johns Hopkins University Bloomberg School of Public Health.

I appreciate the opportunity to be here today and to discuss our role in investigating the exposure and possible health effects associated with per- and polyfluoro substances, otherwise known as PFAS.

CDC has measured PFAS chemicals in people's blood since 1999 as a part of the National Health and Nutrition Examination Survey, known as NHANES. Since that initial analysis, CDC has detected four PFAS chemicals in at least 98 percent of NHANES participants.

PFAS, as we have heard, are very persistent in the environment, requiring decades to break down. Because of their use and persistence in the environment, PFAS are found in the blood in people and animals from around the world.

ATSDR is concerned about these potential exposures and are currently conducting work in more than 30 communities across the United States. For example, ATSDR and the State of Alaska were asked by the Navy to provide assistance near the Naval Arctic Research Laboratory in Lake Imikpuk where PFOA was found.

We also provided assistance to the city of Parchment, Michigan, when they found their drinking water system had significant contamination with PFAS.

ATSDR is also providing technical support to the State of Vermont around PFOA in private drinking water wells in North Bennington, as well as other sites across the country.

As a part of our work in communities, ATSDR developed tools to help State, local, and Tribal territory health departments conduct PFAS exposure assessments. We recently partnered with the Association for State and Territory Health Officials in the States of Pennsylvania and New York to test the exposure assessment tools and provide a basis for conducting further exposure assessments across the United States.

We have also developed guidelines for physicians to help them understand what PFAS is, how people are exposed, and the possible health effects associated with PFAS exposures.

In June 2018, ATSDR published a draft Toxicological Profile on perfluoroalkyls for public comment and summarized the information on PFAS toxicity that included oral minimal risk levels for

four PFAS compounds. We are now in the process of reviewing those comments.

On February 21st, ATSDR announced that, in addition to the two initial exposure assessments in New York and Pennsylvania, there will be eight additional exposure assessment sites in communities near current and former military installations known to have past or a current exposure through their drinking water route. ATSDR will stagger the exposure assessments one after the other beginning later this year.

ATSDR will measure PFAS levels in blood and urine of community members and examine the environmental factors that have contributed to their exposure. ATSDR will use these results to make public health recommendations to communicate to people about how to decrease their exposure. We plan to actively engage communities by interacting early and often, by sharing information proactively, and tailoring our messages. We hope these efforts garner buy in, encourage participation in our exposure assessments, and build relationships between ATSDR and the affected communities.

ATSDR is also conducting a proof of concept study in Pease International Tradeport, New Hampshire, known as the Pease Study. This will be a model site that will allow CDC/ATSDR to evaluate study procedures and methods before embarking on a national multi-site health study.

The exposure assessments, the Pease proof of concept study, and our community engagement activity are all being conducted in order to help us plan for and develop the multi-site national health study. This study will examine the relationship between PFAS and health outcomes in multiple communities with contaminated drinking water. It will take into account the lessons learned from the exposure assessments, the engagement activities in Pease, as well as other activities.

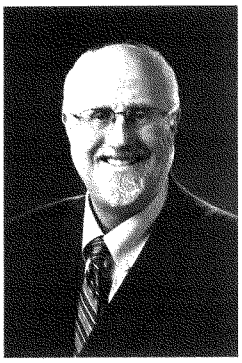
In closing, I would like to leave you with a few thoughts. PFAS exposure through drinking water is widespread, having occurred for many decades, and human health studies are limited. Successfully addressing PFAS will take a collaboration with Federal agencies, and I look forward to participating in that collaboration and working together to address this problem.

ATSDR is working across the United States to learn more about PFAS exposure and its health effects, and we are passionate about this work. There are extensive community concerns, and it is critical for ATSDR, local, State, Federal, and academia to work together to address these concerns.

Thank you again for the opportunity to discuss CDC's and ATSDR's role in investigating exposure and possible health effects associated with PFAS, as well as our current and future planned activities. I welcome your questions.

Thank you.

[The prepared statement of Mr. Breysse follows:]



Patrick Breysse
Director, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR)

Patrick Breysse, PhD, joined CDC in December 2014 as the Director of NCEH/ATSDR. Dr. Breysse leads CDC's efforts to investigate the relationship between environmental factors and health. He came to CDC from the Johns Hopkins University where his research focused on the evaluation and control of chemical, biological, and physical factors that can affect health, with a particular concentration on risk and exposure assessment. Under Dr. Breysse's leadership, the agency has prioritized work on exposure to lead, safe drinking water, initiated new ATSDR actions to address exposure to hazardous chemicals, and has played a critical role in CDC's emergency preparedness and response to natural disasters and chemical exposures.

Dr. Breysse received his PhD in Environmental Health Engineering from Johns Hopkins University in 1985 and completed postdoctoral training at the British Institute for Occupational Medicine in Edinburgh, Scotland.

Written Testimony
Senate Committee on Environment and Public Works

March 28th, 2019

Statement of
Patrick N. Breysse, PhD, CIH
Director, NCEH/ATSDR
Director, National Center for Environmental Health and Agency for Toxic Substances and Disease Registry
Centers for Disease Control and Prevention
Department of Health and Human Services

Chairman Barrasso, Ranking Member Carper, Distinguished Members of the Senate Committee on Environment and Public Works. I am Patrick Breysse, the Director of the National Center for Environmental Health at the Centers for Disease Control and Prevention, and the Director of the Agency for Toxic Substances and Disease Registry. I appreciate the opportunity to be here today to discuss CDC and ATSDR's (CDC/ATSDR) role in investigating exposure to and possible health effects associated with per- and polyfluoroalkyl substances (PFAS).

Agency for Toxic Substances and Disease Registry (ATSDR)

In 1980, Congress created the Agency for Toxic Substances and Disease Registry (ATSDR) to implement the health-related sections of laws that protect the public from hazardous wastes and spills of hazardous substances. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), commonly known as the "Superfund" Act, provided the Congressional mandate to remove or clean up abandoned and inactive hazardous waste sites and to provide Federal assistance in toxic emergencies. As the lead Agency within the Public Health Service for implementing the health-related provisions of CERCLA, ATSDR is charged under the Superfund Act to assess the presence and nature of health hazards at specific Superfund sites, to help prevent or reduce further exposure and the illnesses that result from such exposures, and to expand the knowledge-base about health effects from exposure to hazardous substances.

In 1984, amendments to the Resource Conservation and Recovery Act of 1976 (RCRA) which provides for the management of legitimate hazardous waste storage or disposal facilities, authorized ATSDR to conduct public health assessments at these sites, when requested by the Environmental Protection Agency (EPA), states, or individuals. ATSDR was also authorized to assist EPA in determining which substances may pose a threat to human health.

With the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), ATSDR received additional responsibilities in environmental public health. This act broadened ATSDR's responsibilities in the areas of public health assessments, establishment and maintenance of toxicological databases, information dissemination, and medical education.

In addition to the ATSDR headquarters office, ATSDR staffs a Regional Office within each of Department of Health and Human Services' 10 Regional Offices. ATSDR's regional representatives provide unique expertise, and special technical and field expertise within their assigned regions. Regional representatives serve as liaisons with all NCEH/ATSDR divisions and offices, and facilitate implementation of specific programs in each region

Per- and polyfluoroalkyl substances (PFAS) and Human Health

Per- and polyfluoroalkyl substances (PFAS) are a family of approximately 5,000 man-made chemicals, that have been used in industry and consumer products worldwide since the 1950s. They have been used in non-stick cookware, water-repellent clothing, stain resistant fabrics and carpets, some cosmetics, some firefighting foams, and products that resist grease, water, and oil. PFAS can be found near areas where they are manufactured or where products containing PFAS are often used. PFAS can travel long distances, move through soil, seep into groundwater, or be carried through air. PFAS are very persistent in the environment, requiring years to decades to break down. Because of their widespread use and their persistence in the environment, certain PFAS are found in the blood of people and animals all over the

world and are present at low levels in a variety of food products and in the environment. Some PFAS can build up in people and animals with repeated exposure over time.

ATSDR's Role in Addressing PFAS Contamination

Exposure to PFAS is an important public health concern. CDC/ATSDR is helping our local, territorial, tribal, state, and federal partners to address increasing concerns. Since 1999, CDC has measured several types of PFAS in the U.S. population as part of the National Health and Nutrition Examination Survey (NHANES). NHANES is a survey that measures the health and nutritional status of adults and children in the United States. In particular, the survey has measured perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA).

ATSDR first became engaged with PFAS in 2009 during an investigation of PFAS contamination in Decatur, Alabama. ATSDR found that people drinking water from one municipal water system and some private wells in the area had higher than average PFAS serum levels. ATSDR supported EPA's actions to provide the owners of contaminated private wells with access to uncontaminated municipal water and recommended that the contaminated municipal water system take action to reduce levels of PFAS in water. The impacted water supply system, servicing more than 100,000 residents, voluntarily began immediate monitoring for PFAS and has implemented water filtration to reduce levels of PFOA and PFOS below the EPA Lifetime Health Advisory.

Over the last decade, interest in PFAS has been growing. ATSDR and our state health partners are investigating exposure to and possible health effects associated with PFAS in more than 30 communities across the United States. Many sites are related to drinking water contamination connected with PFAS production facilities or fire training areas where aqueous film forming foam (AFFF) was regularly used.

ATSDR's overarching approach focuses on assessing and reducing/eliminating community PFAS exposures including: (1) addressing community health concerns related to existing or previous PFAS exposures, (2) supporting action on the basis of scientific information, and (3) conducting health studies on exposure and health endpoints to provide actionable information to communities and health care providers. ATSDR's activities include site assessments, health education, technical assists to health departments, and exposure investigations. Our site assessments originate when we receive federal and/or state requests for assistance, or when we receive a petition from the public.

ATSDR's site work involves extensive community engagement and support. ATSDR staff provide community members, health educators, health care providers, and other health professionals with community environmental health education products to increase environmental health literacy.

We provide products to include: information about specific types of exposures to hazardous substances, exposure routes and pathways; health effects; and how to prevent or minimize exposures to hazardous substances in the environment. To specifically address community, state and local health department needs and the needs of health care providers, ATSDR developed a variety of PFAS related education materials, guidance such as the PFAS Exposure Assessment Technical (PEATT) Toolkit, and risk communication materials, along with scientific materials and protocols.

ATSDR's Support to Communities and Related PFAS Activities

ATSDR Tox Profile

ATSDR published a draft Toxicological Profile (Tox Profile) for Perfluoroalkyls (PFAs) for public comment in June 2018, and is in the process of reviewing the comments. Tox Profiles are reference guides that provide information about a toxic substance, such as its chemical and physical properties, sources of exposure, routes of exposure, health effects, and how the substance may interact with the environment. Congress mandates that ATSDR produce Tox Profiles that include an examination, summary, and interpretation of available studies of the health effects of a hazardous substance. The primary users of these documents are expected to be researchers and health professionals, including health assessors at the regional and state level. Tox Profiles are peer reviewed before they are released for public comment, and will be peer reviewed again if significant revisions are made as a result of the public comments.

In addition to summarizing information on PFAS toxicity, the Tox Profile included oral minimal risk levels (MRLs) for four PFAS, perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorohexane sulfonic acid (PFHxS), and perfluorononanoic acid (PFNA). A MRL is an estimate of the amount of chemical a person can eat, drink, or breathe each day without a detectable risk to health. MRLs are intended to serve as a tool to help public health professionals determine areas and populations potentially at risk for health effects from exposure to a particular chemical. It is important to note that MRLs are a screening tool that help identify exposures that could be *potentially* hazardous to human health. MRLs do not define regulatory or action levels for ATSDR, nor for other agencies. Exposures above the MRL do not mean that health problems will occur, but rather serve as a signal to health assessors to look more closely at a particular site or exposure pathway.

PFAS Guidelines for Clinicians

With widespread exposure to PFAS, it is necessary that clinicians are well-informed to handle concerns of communities where contamination has occurred. ATSDR developed guidelines and continuing education to assist clinicians with how to deal with patient management and treatment after PFAS exposure. It highlights what PFAS are, which chemicals fall into this category of substances, routes of exposure, exposure limits, identifies health effects associated with exposure to various PFAS, and suggests answers to specific patient questions about potential PFAS exposure.

Pediatric Environmental Specialty Units (PEHSUs) and Clinician Guidance

Pediatric Environmental Health Specialty Units (PEHSUs) are a source of medical information and advice on environmental conditions that influence reproductive and children's health. PEHSUs are academically based and are located in each federal region across the U.S. PEHSUs fill clinical care gaps by ensuring that healthcare providers have access to specialized environmental medical knowledge and resources to care for children and women of reproductive age. Healthcare providers rely on PEHSUs for guidance on prevention, diagnosis, management, and treatment of health effects from environmental exposures. In fiscal year (FY) 2017, ATSDR and funded partners, such as state and local health departments, educated over 34,000 health professionals on ways to diagnose and treat conditions related to hazardous environmental exposures.

For example, ATSDR is currently working with the State of Michigan around community PFAS issues and we were able to facilitate the connection of regional PEHSU clinician expertise to help educate and answer questions about PFAS and health effects for the community.

Site Work

ATSDR is currently working in over 30 sites across the country that have potential PFAS concerns. Some examples include the following:

ATSDR and the Alaska Department of Health and Social Services were asked by the Navy to provide assistance near the Naval Arctic Research Laboratory and Imikpuk Lake where PFOA was found. This included providing health education and working with the Alaska Native Corporation, Ukpeagvuik Inupiat Corporation, to find alternative drinking water sources for whaling crews.

As a result of the state-wide testing of municipal water systems for PFAS, in July 2018 the City of Parchment, Michigan (Kalamazoo County) found that their drinking water system had significant contamination with PFAS. CDC/ATSDR provided assistance to the Kalamazoo County Health Department (KCHD) regarding clinician guidance and communication with healthcare providers.

The Vermont Department of Environmental Conservation (VDEC) found PFOA in private drinking water wells in North Bennington. VDEC is testing private wells within a 1.5-mile radius of the former ChemFab site, which is the source of the PFOA, to see how widespread the contamination is. The Vermont Department of Health (VDH) asked CDC/ATSDR for technical support in addressing health issues.

Current Activities Authorized through the National Defense Authorization Acts and Consolidated Appropriations Acts

The National Defense Authorization Acts (NDAA) and Consolidated Appropriations Acts for 2018 and 2019 authorized a transfer of funds from the Department of Defense (DOD) to CDC/ATSDR to study PFAS exposure and related health outcomes. CDC/ATSDR received $20 million in FY 2018, which will fund projects to advance our understanding about PFAS: exposure assessments, community engagement, and a health study at Pease International Tradeport in New Hampshire. Additional funding appropriated in FY 2019 will be used to support a multi-site health study.

The information gathered through the studies will allow governmental agencies and communities to make better decisions to protect the public's health. Additionally, CDC/ATSDR is consulting with our colleagues at the National Institute of Health, National Institute of Environmental Health Sciences on the health studies authorized by NDAA. The agency is working with DOD and EPA to gather data and information to assist in the exposure assessments and the health study.

Exposure Assessments/Community Engagement

ATSDR developed the PFAS Exposure Assessment Technical Tools (PEATT) to help state, local, tribal, and territorial health departments conduct PFAS biomonitoring activities to evaluate drinking water exposures to PFAS. The PEATT includes a protocol for statistically-based representative sampling, risk communication materials, questionnaires, and EPA's water sampling protocol to help characterize PFAS exposure in communities. Upon request, CDC/ATSDR will also provide technical assistance to health departments in developing and carrying out PFAS exposure assessments.

Through a cooperative agreement between CDC/ATSDR and the Association of State and Territorial Health Officials, the Pennsylvania Department of Health (PADOH) and the New York State Department of Health (NYSDOH) were provided funding to pilot the exposure assessment protocol as outlined in the PEATT. The work done by PADOH and NYSDOH at the pilot sites has contributed to the overall body of knowledge on PFAS exposure and has helped us refine our exposure assessment protocol. On February 21, 2019, CDC/ATSDR announced eight additional exposure assessment sites in communities

near current or former military installations known to have past or current PFAS exposure through drinking water. CDC/ATSDR will stagger the exposure assessments, and anticipates that the first one will begin in 2019 and the others will follow through 2020.

The exposure assessments focus on routes of exposure and will measure the blood and urine PFAS concentrations of community members, while taking into account environmental factors that may contribute to PFAS exposure. This will generate information about the impact of drinking water and non-drinking water PFAS exposure pathways on the PFAS body burden in each community. While contributing to the general science base of PFAS exposure, the exposure assessments will also provide a public health service to the community by providing information about both aggregate community exposures and individual exposures. The study is designed to give generalizable results that provide a valid overview of exposure and will allow the estimation of serum PFAS concentrations for community members who are not tested. Depending on the results of the investigation, ATSDR will make recommendations to further reduce exposure or conduct additional activities to better understand the impact of PFAS exposure on human health. ATSDR is in the process of finalizing the protocol for the exposure assessments.

CDC/ATSDR has also awarded a contract for community engagement during the exposure assessments and throughout CDC/ATSDR's work on PFAS. The community engagement aspect of the project will effectively communicate information to each community, using strategies tailored to meet the individual needs of each location. The community engagement activities will identify local concerns, connect with a variety of local audiences, garner buy-in from the community, encourage participation in the exposure assessments, and build trust between CDC/ATSDR and the communities. CDC/ATSDR will start the community engagement activities early and continue them throughout the exposure assessments so that communities have the support and information they need, enhancing the relationships between CDC/ ATSDR and the communities by promoting transparency and community understanding.

Pease Proof-of-Concept Study

The Pease Study will serve as a proof-of-concept model site for the multi-site study, allowing CDC/ATSDR to evaluate the study procedures and methods before embarking on the multi-site study.

In 2017, ATSDR conducted a feasibility assessment and literature review to identify candidate designs and health outcomes for a study at Pease International Tradeport and the multi-site health study. The proof-of-concept study will utilize the large amount of existing state and local data, so that CDC/ATSDR can model the relationship between the health effects shown in animal studies and measured and historically reconstructed serum levels of PFAS. CDC/ATSDR will test and validate the approach, collection methods, questionnaires, tools, procedures, and analyses required to conduct a PFAS health study. In addition to allowing for the fine-tuning of the future multi-site study, and contributing to the science base of information about PFAS and health outcomes, the Pease Study will also provide a public health service to the community by giving community members information that they can use as they follow-up with their health care providers. ATSDR is also in the process of finalizing the Pease study protocol.

CDC/ATSDR's Future Activities: Multi-Site Health Study

CDC/ATSDR is preparing a multi-site health study to learn about the potential relationship between PFAS and human health outcomes in multiple communities with contaminated drinking water. It will take into account information and lessons learned from the exposure assessments, community engagement activities and the Pease Study, as well any other available information in order to design a

study that maximizes the impact and provides information to communities across the nation. CDC/ATSDR is moving ahead with planning for the multi-site study and will announce a competitive funding opportunity later this spring.

Conclusion

In closing, I would like to leave you with a few key points. First, PFAS exposure is widespread due to the pervasiveness of these chemicals in society, persistence in the environment, and the multiple human exposure pathways. Second, CDC/ATSDR is working across the United States to learn more about PFAS exposure and its health effects. Third, there are extensive community concerns and it is critical for CDC/ATSDR, local, state, federal, and academia partners to work together to provide clear communication to the public about the risk and address their concerns. Thank you again for the opportunity to discuss CDC/ATSDR's role in investigating exposure to and possible health effects associated with PFAS, as well as our current and future planned activities. I welcome your questions.

Senate Committee on Environment and Public Works
Hearing entitled, "Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)"
March 28, 2019
Questions for the Record for Dr. Breysse

Chairman Barrasso:

1. **You testified that:**

   "I think one important point we all need to note is that the science around these compounds, as Dr. Birnbaum mentioned, is emerging rapidly, so almost as we establish a benchmark for whatever purpose it might be established for, in a matter of months it may be out of date based on the new science that is emerging."

   a. **How does ATSDR or other federal agencies effectively communicate the risks associated with PFAS chemicals as the science around these compounds emerges rapidly?**

   Response: Throughout all of the PFAS activities, CDC/ATSDR will conduct community engagement activities. This includes public meetings, updates to the CDC/ATSDR website, engagement with local stakeholders, and communication through other media to provide communities with information. CDC/ATSDR frequently updates messaging materials as new information becomes available.

2. **Dr. Birnbaum testified that, "[a]pproaching PFAS as a class, rather than as thousands of individual compounds, is the best approach for assessing exposure and biological impact, and for protecting public health."**

   a. **Do you agree with that statement?**
   b. **To what extent is ATSDR and/or NCEH examining or supporting others who are examining PFAS as a class rather than as individual chemicals?**

   Response: CDC/ATSDR agrees with Dr. Birnbaum's statement. The National Toxicology Program (NTP), which is headquartered at the National Institute of Health's (NIH) National Institute of Environmental Health Sciences (NIEHS) and the Environmental Protection Agency (EPA) have the primary roles in evaluating the toxicology data to understand common mechanisms of action among PFAS, and CDC/ATSDR continues to provide support to that work. However until such time as an evidence base for the class becomes available, CDC/ATSDR will continue to address these chemicals on an individual basis.

3. **What does the latest toxicological research suggest about the impacts to human health from multiple PFAS interacting with each other in the human body?**

Response: The toxicological understanding of all but a few PFAS is very limited.. However, it is possible that the effects of PFAS may be greater or less than the sum of their individual effects for specific combinations and/or concentrations. Assessing the possible human health risks of exposure to multiple PFAS is currently not feasible. CDC/ATSDR continue to search for data and methods that will guide the assessment of chemical mixtures in general, and PFAS specifically.

4. **When do you expect (rough estimate) ATSDR will be in a position to release its final toxicological profile on PFOA, PFOS, PFNA, and PFHxS?**

   Response: ATSDR is in the process of responding to comments on the draft Tox Profile on Perfluoroalkyls. ATSDR anticipates having a finalized document for release this year.

5. **What do you need from chemical manufacturers and processors or others in the private sector to better understand and respond to the risks associated with PFAS chemicals?**

   Response: The world of per- and polyfluorinated compounds is rapidly changing. As health concerns arise, some chemical companies seek to address them by making new chemicals with hopefully better properties, such as being less persistent in the body or being less toxic. For public health, it is important to know what is being developed so we can better understand potential hazards and their potential health impact.

6. **Are there lessons or best practices that we can learn from other countries, which are also addressing the risks to public health and the environment associated with PFAS? If so, what are these lessons or best practices?**

   Response: ATSDR continually evaluates efforts coming from other countries that are dealing with the same scientific issues. The science surrounding the potential risks of PFAS exposure to public health and the environment is an international effort.

7. **What steps can the Executive Branch take to improve coordination among federal agencies as it responds to the risks associated with PFAS chemicals?**

   Response: CDC/ATSDR work regularly with scientists across all levels of government and sharing information across agencies. ATSDR is part of several interagency efforts including the Federal Information Exchange on PFAS and the National Leadership Summit held May 22-23, 2018. CDC and ATSDR would welcome additional opportunities to coordinate across agencies.

8. **What steps can the Executive Branch take to improve communication with states, tribes, local communities, and the public about the risks associated with PFAS chemicals?**

   Response: One of CDC/ATSDR's roles as a public health agency is to provide technical assistance and tools to health departments so they can investigate and understand the

health impact of exposures. CDC/ATSDR works closely with our state, local, tribal and territorial partners to address concerns related to PFAS exposure. For example, CDC/ATSDR developed materials for clinicians about exposure sources and potential health risks of PFAS exposure so they can communicate with patients.

CDC/ASTSDR will continue to work with our Federal, state, and local partners, and with communities impacted by PFAS, towards the common goal of increasing the public's awareness about exposure pathways and potential risks associated with PFAS chemicals. This cooperation will ensure that our communications strategies speak directly to the information needs of our audiences. CDC/ATSDR will continue to work with our Federal partners to update our risk communication materials as more information becomes available.

Senator BARRASSO. Well, Dr. Breysse, thanks so much for that very thoughtful consideration in your testimony. We are very thankful that you are here today.

Dr. Birnbaum.

STATEMENT OF LINDA BIRNBAUM, DIRECTOR OF THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES AND THE NATIONAL TOXICOLOGY PROGRAM, NATIONAL INSTITUTES OF HEALTH

Ms. BIRNBAUM. Good morning, Chairman Barrasso, Ranking Member Carper, and distinguished members of this Committee.

I am Linda Birnbaum, the Director of NIH's National Institute of Environmental Health Sciences, known as NIEHS, and the Director of HHS's National Toxicology Program, or NTP.

For nearly 40 years I have conducted scientific research to better understand the health impacts of environmental exposures. I am here today to provide a scientific perspective about the large and complex class of chemicals known as per- and polyfluorinated substances, or PFAS.

For nearly three decades NIEHS has conducted and funded research on health effects associated with human exposures to PFAS. NIEHS supported research uses human observational studies, animal models, in vitro tissue and cell culture systems, in silico computer approaches, and high throughput screening to study the effects of PFAS exposures. Research conducted to date reveals associations between PFAS exposures and a variety of specific adverse human health outcomes, including immune system dysfunction, endocrine disruption, altered obesity profiles, impaired child development, and cancer.

While knowledge about these associations has steadily expanded in recent years, many questions remain unanswered. Therefore, NIEHS and NTP, in coordination with other Federal agencies and State and local governments, continue to conduct research to enhance our understanding of the biological mechanisms and processes that may be altered or harmed by PFAS.

Currently, NIEHS funds more than 40 academic PFAS related projects. In the past year alone, NIEHS has received a significant increase in the number of PFAS focused grant applications. As a result, we have competitively awarded more grants in this area.

Since September 2018, the last time I appeared at a Senate hearing on this subject, NIEHS has awarded 10 new PFAS research grants. Many of these projects are investigating early life exposures and long term health effects. NIEHS funded scientists have been extremely productive, publishing 28 manuscripts since September. A list of manuscripts is attached to my written testimony.

Apart from our support of external research grants, the NIEHS Superfund Research Program, which is under this Committee's jurisdiction, is studying how PFAS moves through the environment. The Superfund Research Program is translating scientific findings to establish best practices for PFAS management and developing novel technologies for remediation of PFAS contamination.

Additionally, NTP is collaborating with EPA to study more than 100 unique PFAS compounds. This collaboration enables us to com-

pare individual PFAS to identify common or overlapping patterns of toxicity.

While many research projects focus on a single or series of PFAS, current human exposures to PFAS involve complex mixtures, not individual chemicals. This reality complicates both the science of exposure measurement and the assessment of health risks. Current analytical techniques are limited for determining which specific PFAS are contained in a given complex mixture.

Furthermore, health impact information for combined PFAS mixtures remains incomplete. Additional research is needed to assess environmental exposures to mixtures of PFAS and to determine their combined effects.

Approaching PFAS as a class, rather than as thousands of individual compounds, is the best approach for assessing exposure and biological impact, and for protecting public health. PFAS are extremely persistent in our environment, they are transported globally with widespread human exposure, and we are learning more each day about PFAS toxicity. It is time we ask ourselves where are these widely used chemicals really needed? Does the value of PFAS use for modern day convenience outweigh the risks to public health and related health care costs?

No matter how we answer that question, one thing is clear: scientific innovation is critical for shifting to safer alternatives.

In closing, let me state that NIEHS is well positioned to continue contributing essential scientific knowledge about this large and complex class of chemicals. Our research 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 have submitted a more detailed statement for the record, and I welcome your questions.

Thank you.

[The prepared statement of Ms. Birnbaum follows:]

Linda S. Birnbaum
Director, National Institute of Environmental Health Sciences and the National Toxicology Program

Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S., became the Director of the National Institute of Environmental Health Sciences (NIEHS), one of the National Institutes of Health (NIH), and the National Toxicology Program (NTP) on January 18, 2009. In these roles Birnbaum oversees federal funding for biomedical research to discover how the environment influences human health and disease. Several advisory boards and councils provide Birnbaum and NIEHS/ NTP staff with input to accomplish this large task.

Birnbaum is the first toxicologist and the first woman to lead the NIEHS/NTP. She has spent most of her career as a federal scientist.

Birnbaum has received numerous awards and recognitions, including being elected to the Institute of Medicine of the National Academies, in October 2010, one of the highest honors in the fields of medicine and health.

Birnbaum's own research and many of her publications focus on the pharmacokinetic behavior of environmental chemicals; mechanisms of actions of toxicants, including endocrine disruption; and linking of real-world exposures to health effects.

Birnbaum also finds time to mentor the next generation of environmental health scientists. For example, she serves as an adjunct professor in the Gillings School of Global Public Health, the Curriculum in Toxicology, and the Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill, as well as in the Integrated Toxicology Program at Duke University.

A native of New Jersey, Dr. Birnbaum received her M.S. and a Ph.D. in microbiology from the University of Illinois at Urbana-Champaign.

DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Hearing on "Examining the Federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)"

Testimony before the
Senate Committee on Environment and Public Works

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

March 28, 2019

Chairman Barrasso, Ranking Member Carper, Distinguished Members of the Senate Committee on Environment and Public Works, 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) within the National Institutes of Health (NIH). 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 toxic substances, and to manage the Interagency Coordinating Committee on the Validation of Alternative Methods. For the past 40 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 and Centers 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 Worker Training Program (WTP) and the Superfund Research Program (SRP) within NIEHS.[2] The SRP is a broad university-based research program capable of addressing the wide array of scientific uncertainties facing the national Superfund program. 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. NIEHS-

[1] Section 463 of the Public Health Service Act. (42 USC 285l).
[2] Sections 126(g) and 209(b) of the Superfund Amendments and Reauthorization Act of 1986. Public Law 99-499. October 17, 1986. (42 USC 9660a and 42 USC 9660, respectively).
[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.

supported research uses human observational studies, animal models, *in vitro* tissue and cell culture systems, *in silico* approaches, and high throughput screening to study the effects of environmental exposure.

The most conclusive research focuses on a single chemical to understand the cause and effect on human health. While studying potentially 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 PFAS exposures and a variety of specific adverse human health outcomes. These include the potential for effects on children's cognitive and neurobehavioral development, immune system dysfunction, endocrine disruption, obesity, diabetes, 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 Federal agencies and State and local governments, continue to conduct research to enhance our understanding of the potential mechanisms and biological processes through which PFAS may be affecting human health. NIEHS coordinates and participates in governmental health research to assure applicability, disseminate findings, and prevent duplication of effort. To this end, NIEHS continues to co-host and participate in numerous symposia and collaborative 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 include 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 repellant clothing. In addition, PFAS play an important role in industrial processes and aqueous film-forming foams (AFFF) that are used as a firefighting tool.

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 PFAS to date. PFOA was used in the production of fluoropolymers such as Teflon®, and PFOS in the production of the original line of Scotchgard® water repellant products. PFOA and PFOS are considered "long-chain" PFAS due to the length of their carbon chain

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

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. All PFAS have garnered increased attention by both the scientific community and the public. Current efforts 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, and this characteristic 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 accurately 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 to PFAS releases into the air, soil, and water, including both surface and groundwater sources of drinking water.[5] Because PFAS are resistant to environmental degradation processes, they are subject to long-range atmospheric and oceanic current transport. PFAS have been identified in both environmental and biological samples collected in some of the most remote areas on earth.

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 be less harmful but still provide sufficient performance. As part of our portfolios, NIEHS and NTP contribute substantively to the field of alternatives assessment to ensure harmful chemicals are not replaced by similarly harmful but less well-studied related compounds.

Human Exposures

Humans are exposed to PFAS through myriad 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, are significant for human exposure.[7,8,9,10] Some PFAS

---

[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: https://doi.org/10.1080/15287394.2011.615108.

[10] Winkens K, Vestergren R, Berger U, Cousins IT. Early Life Exposure to Per- and Polyfluoroalkyl Substances

bioaccumulate, leading to concentrations in animals and humans that are significantly higher than the surrounding environment, and they enter the human food chain.[11,12,13]

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).[14] The most recent NHANES data indicate a reduction in serum concentrations of PFOS and PFOA since they were voluntarily phased out of production in the United States beginning in 2002 and 2006, respectively. Replacement PFAS have subsequently been rapidly introduced into the market 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 in human tissue and cell culture systems, and rapid high-throughput screening. It is important to note that epidemiology studies alone cannot definitively prove causation, and while animal studies are an important marker of scientific discovery, they may not be perfect predictors of effects in humans. By combining and carefully considering data across multiple types of studies, we can begin to build an understanding of how PFAS impact human health and recommend steps to mitigate deleterious impacts.

When investigating possible human health effects of chemical compounds distributed in the environment, it is also important to recognize that effects from exposure to mixtures pose unique challenges. While studies indicate adverse health effects due to exposures from certain PFAS, such as PFOA and PFOS, we have only limited or no data on which to base conclusions for the majority of PFAS. 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 identify causal relationships between exposure to PFAS and adverse health effects in

---

(PFASs): a Critical Review. *Emerging Contaminants*. June 2017; (3)2:55-68. DOI: 10.1016/j.emcon.2017.05.001.

[11] Bryne S, Seguinot-Medina S, Miller P, Waghiyi V, von Hippel FA, Loren Buck C, Carpenter DO. Exposure to Polybrominated Diphenyl Ethers and Perfluoroalkyl Substances in a Remote Population of Alaska Natives. 2017(Dec.); 231(1):387-395. *Environ. Poll.* DOI: 10.1016/j.envpol.2017.08.020.

[12] Ghisi R, Vamerali T, Manzetti S. Accumulation of Perfluorinated Alkyl Substances (PFAS) in Agricultural Plants: A Review. *Environ. Res.* 2019(Feb.); 169:326-341. DOI: 10.1016/j.envres.2018.10.023.

[13] 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.

[14] 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.

humans.

Decreased Immune System Function
As early as 1978, scientists observed immunotoxicity in non-human primates exposed to PFAS.[15] In 2016, NTP conducted a systematic literature review which concluded that PFOA and PFOS are presumed to be a hazard to healthy immune system function in humans.[16] 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.[17] NTP is building on this 2016 systematic review to evaluate immunotoxicity of six related PFAS: PFDA, PFNA, PFHxA, PFBA, PFBS and PFHxS.[18]

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.[19] 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.[20,21] For PFOS, one occupational exposure study reported an increase in bladder cancer,[22] 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.[23]

---

[15] 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.
[16] National Toxicology Program. Monograph on Immunotoxicity Associated with Exposures to PFOA and PFOS. Sept. 2016. Research Triangle Park, NC: U.S. Internet: https://ntp.niehs.nih.gov/pubhealth/hat/noms/pfoa/index.html.
[17] Kielsen K, Shamim Z, Ryder LP, Nielsen F, Grandjean P, Budtz-Jørgensen E, Heilmann C. Antibody Response to Booster Vaccination with Tetanus and Diphtheria in Adults Exposed to Perfluorinated Alkylates. *J. Immunotoxicol.* 2016; 13(2):270-3. DOI: 10.3109/1547691X.2015.1067259.
[18] The six PFAS for which the National Toxicology Program is building on its 2016 systematic review to evaluate immunotoxicity are: perfluorodecanoic acid (PFDA); perfluorononanoic acid (PFNA); perfluorohexanoic acid (PFHxA); perfluorobutanesulfonic acid (PFBS); perfluorobutanesulfonic acid (PFBS); and perfluorohexanesulfonic acid (PFHxS).
[19] Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Perfluoroalkyls. (Draft for Public Comment). 2018. 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.
[20] 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.
[21] 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.
[22] 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.
[23] Bonefeld-Jorgensen EC, Long M, Fredslund SO, Bossi R, Olsen J. Breast Cancer Risk After Exposure to

Another case- control study did not find increases in prostate cancer for PFOA, PFOS, PFHxS, PFNA, PFDeA, or PFUA.[24] However, among men with a first-degree relative with prostate cancer, associations were found for PFOA, PFOS, PFHxS, PFDeA, and PFUA, but not for PFNA."[25]

Child Development

PFOA and PFOS cause developmental toxicity in animals.[26,27,28] Human epidemiology studies also show associations between some PFAS and developmental effects.[29] One human study found that PFAS exposure during pregnancy was associated with decreased birth weight and head circumference only in males.[30] Similar decreases in birth weight have been reported in rodents for over a decade.[31] Recent findings from NIEHS-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.[32]

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.[33] Animal

---

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.

[24] 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.

[25] Ibid.

[26] White SS, Calafat AM, 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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: 10.1016/j.mce.2009.02.021.

[32] 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.

[33] 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.

studies are consistent with and provide additional biological plausibility for the developmental effects observed in the human studies.[34,35]

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 development. Human studies suggest a concern that early-life exposures to some PFAS may contribute to altered insulin resistance.[36,37] 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.[38] 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[39]—a finding reinforced by other epidemiological studies[40,41] and similar effects on excessive body weight gain reported for experimental animals.[42] 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.[43]

---

[34] 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.

[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; 304(1-2):97-105. DOI: 10.1016/j.mce.2009.02.021.

[36] Donat-Vargas C, Bergdahl IA, Tornevi A, Wennberg M, Sommar J, Kiviranta H, Koponen J, Rolandsson O, Åkesson A. Perfluoroalkyl Substances and Risk of Type II Diabetes: A Prospective Nested Case-Control Study. *Environ. Int.* 2019 Feb; 123:390-398. DOI: 10.1016/j.envint.2018.12.026.

[37] Fleisch AF, Rifas-Shiman SL, Mora AM, Calafat AM, Ye X, Luttmann-Gibson H, Gillman MW, Oken E, Sagiv SK. Early-Life Exposure to Perfluoroalkyl Substances and Childhood Metabolic Function. *Environ. Health. Perspect.* 2017 Mar; 125(3):481-487. DOI: 10.1289/EHP303.

[38] 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.

[39] 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.* 2016 Jan; 24(1):231-7. DOI: 10.1002/oby.21258.

[40] 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.

[41] 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.

[42] 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.

[43] Liu G, Dhana K, Furtado JD, Rood J, Zong G, Liang L, Qi L, Bray GA, DeJonge L, Coull B, Grandjean P, Sun Q. Perfluoroalkyl Substances and Changes in Body Weight and Resting Metabolic Rate in Response to Weight-Loss Diets: A Prospective Study. *PLoS Med.* 2018; 15(2):e1002502. DOI: 10.1371/journal.pmed.1002502.

Effects on weight gain have been seen in numerous animal studies,[44,45,46] supporting this association in humans. It is particularly concerning that some PFAS alter thyroid hormone homeostasis that regulates metabolism and growth.[47,48,49]

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 effects on the probability of conception.[50,51] In addition, several recent studies have shown that the duration of breastfeeding decreases with increasing blood concentrations of certain PFAS.[52,53] This is similar to 2006 findings in animals reporting impaired mammary gland development and lactation during and after pregnancy in mice.[54]

NIEHS Extramural PFAS Research Portfolio

NIEHS currently funds over 40 academic-based research projects that explore the health consequences of PFAS exposures. These projects include fundamental and human-based research projects that are funded through competitive awards using various NIH grant mechanisms. Concomitant with the recent emergence of public concerns about PFAS exposures, NIEHS has received a large increase in the number of grant applications and awarded more grants in this research area over the past year. For example, since September 2018, NIEHS has

---

[44] 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.

[45] 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.

[46] Holtcamp W. Obesogens: An Environmental Link to Obesity. *Environ. Health. Perspect.* 2012; 120:a62–8. DOI: 10.1289/ehp.120-a62.

[47] 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.

[48] 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.

[49] Preston EV, Webster TF, Oken E, Claus Henn B, McClean MD, Rifas-Shiman SL, Pearce EN, Braverman LE, Calafat AM, Ye X, Sagiv SK. Maternal Plasma per- and Polyfluoroalkyl Substance Concentrations in Early Pregnancy and Maternal and Neonatal Thyroid Function in a Prospective Birth Cohort: Project Viva (USA). *Environ. Health. Perspect.* 2018 Feb 27; 126(2):027013. DOI: 10.1289/EHP2534.

[50] 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.

[51] Jørgensen KT, Specht IO, Lenters V, Bach CC, Rylander L, Jönsson BAG, Lindh CH, Giwercman A, Heederik D, Toft G, Bonde JP. Perfluoroalkyl substances and time to pregnancy in couples from Greenland, Poland and Ukraine. *Environmental Health.* 2014; 13:116. DOI: 10.1186/1476-069X-13-116.

[52] 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.

[53] 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.

[54] 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.

awarded 10 new research project grants—representing a more than 30% increase in its extramural PFAS portfolio—focused on PFAS, many of which are investigating early life exposures (*in utero* and early childhood) and long-term health effects. Moreover, over the past seven months (September 2018-March 2019), NIEHS grantees have published 28 manuscripts detailing the health impacts of PFAS exposures. This list of manuscripts is attached to my testimony.

NIEHS Superfund Research Program (SRP)

Recently, 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).[55] 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).[56] Recent results from a prospective study of over 1,000 children show that weakened immune response is correlated with PFAS exposure.[57] The Center is also tracing unique PFAS chemical fingerprints at a contaminated groundwater site on Cape Cod, Massachusetts, 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.[58] Promising results to date indicate that these sampling tools can be effective monitors for airborne PFAS, a route that may contribute significantly to PFAS fate, transport, and human exposure. 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 regarding PFAS to State and local governments, water authorities, and private well users. The Brown University Superfund Research Center has developed Geographical Information Systems (GIS)-based databases for identifying municipalities at risk for PFAS exposure based on past land use data.[59,60] Other research at the University of Arizona is also developing groundwater modeling tools to predict how PFAS move in the subsurface, helping to

---

[55] 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.

[56] Dassuncao C, Pickard H, Pfohl M, Tokranov AK, Li M, Mikkelsen B, Slitt A, Sunderland EM. Phospholipid Levels Predict the Tissue Distribution of Poly- and Perfluoroalkyl Substances in a Marine Mammal. *Environ. Sci Technol. Lett.* 2019; 6(3):119-125. DOI: 10.1021/acs.estlett.9b00031.

[57] Budtz-Jørgensen E, Grandjean P. Application of Benchmark Analysis for Mixed Contaminant Exposures: Mutual Adjustment of Perfluoroalkylate Substances Associated with Immunotoxicity. *PLoS One.* 2018; 13(10):e0205388. DOI: 10.1371/journal.pone.0205388.

[58] Dixon-Anderson E, Lohmann R. Field-Testing Polyethylene Passive Samplers for the Detection of Neutral Polyfluorinated Alkyl Substances in Air and Water. *Environ. Toxicol. Chem.* 2018; 37:3002-3010. DOI: 10.1002/etc.4264.

[59] Guelfo J, Adamson DT. Evaluation of a National Data Set for Insights into Sources, Composition, and Concentrations of Per- and Polyfluoroalkyl Substances (PFASs) in U.S. Drinking Water. *Environ. Pollut.* 2018; 236:505-513. DOI: 10.1016/j.envpol.2018.01.066.

[60] Guelfo J, Marlow T, Klein D, Savitz D, Frickel S, Crimi M, Suuberg EM. Evaluation and Management Strategies for Per- and Polyfluoroalkyl Substances (PFASs) in Drinking Water Aquifers: Perspectives from Impacted U.S. Northeast Communities. *Environ. Health Perspect.* 2018; 126:13. DOI: 10.1289/ehp2727.

understand where to target remediation approaches.[61,62,63,64] SRP grantees have continued to work closely with Federal and State officials to translate scientifically defensible findings to guide best practices for PFAS monitoring and management—including several outreach efforts within regions impacted by PFAS—such as the New England States (Northeast Waste Management Officials' Association), as well as Michigan, North Carolina and New York. These outreach efforts also extend to communities grappling with the complexities of PFAS exposure and the uncertainties of risk.

The Superfund Research Program has been a key player in developing new solutions to PFAS contamination. Through Small Business Innovation Research (SBIR) grants, the Program provides support to scientists and engineers developing novel technologies for mitigation and remediation of PFAS in the environment. NIEHS SBIR grantee CycloPure, Inc., is developing novel, high-affinity cyclodextrin polymers for the cost-effective remediation of PFAS from water.[65] In another NIEHS 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 technology includes a mobile unit that combines a wash cycle using a non-toxic sugar, followed by an intense extraction and destruction process. Their results show more than 99% removal.[66] Yet another *in-situ / ex-situ* process is being developed by Lynntech, Inc. and utilizes plasma-based technology to decompose PFAS in water.[67] Additionally, the Michigan State University and Texas A&M University Superfund Research Centers are developing strategies to remediate PFAS via energy efficient nanoreactors capable of breaking the carbon-fluorine bond, as well as hydrogel sorbents to extract PFAS, respectively.[68,69,70] Also of note, the University of California, Berkeley Superfund Research

---

[61] NIH Grant No. P42ES004940. Sequestration Processes for Attenuation and Treatment of Arsenic and Other Toxic Elements in Mine Waters. Brusseau, Mark. University of Arizona. Awarded August 1, 2017. NIH RePORTER Link.

[62] Brusseau ML. The Influence of Molecular Structure on the Adsorption of PFAS to Fluid-Fluid Interfaces: Using QSPR to Predict Interfacial Adsorption Coefficients. *Water Res.* 2019; 152:148-158. DOI: 10.1016/j.watres.2018.12.057.

[63] Brusseau ML. Assessing the Potential Contributions of Additional Retention Processes to PFAS Retardation in the Subsurface. *Sci. Total Environ.* 2018; 613:176-185. DOI: 10.1016/j.scitotenv.2017.09.065.

[64] Brusseau M, Yan N, Van Glubt S, Wang Y, Chen W, Lyu Y, Dungan B, Carroll K, Holguin FO. Comprehensive Retention Model for PFAS Transport in Subsurface Systems. *Water Res.* 2019; 148:41-50. DOI: 10.1016/j.watres.2018.10.035.

[65] 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.

[66] 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.

[67] NIH Grant No. R43ES030250. Continuous Removal/Disposal System for the Concurrent Sorption and Breakdown of Contaminants into Harmless Precipitates. Miller, Joseph. Lynntech, Inc. Awarded September 18, 2018. NIH RePORTER Link.

[68] NIH Grant No. P42ES027704. Mitigation of Chemical and Mixture Effects Through Broad-Acting Sorbents. Phillips, Timothy. Texas A&M University. Awarded August 31, 2017. NIH RePORTER Link.

[69] Huang PJ, Hwangbo M, Chen ZY, Liu YN, Kameoka J, Chu KH. Reusable Functionalized Hydrogel Sorbents for Removing Long- and Short-Chain Perfluoroalkyl Acids (PFAAs) and GenX from Aqueous Solution. *ACS Omega.* 2018; 3(12):17447–17455. DOI: 10.1021/acsomega.8b02279.

[70] 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:

Center is combining biological and chemical treatment options to degrade and destroy PFAS and AFFF.[71,72,73]

NIEHS Time-Sensitive Research Awards

In addition to its regular funding programs, NIEHS has used a mechanism to support time-sensitive research opportunities related to PFAS. Time-sensitive grants are a rapid mechanism used to support research that characterizes initial exposures, collects human biological samples, and collects human health and exposure data.[74] 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).[75,76] 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 potential toxicity, how it is stored in the body, and how long it remains in the environment.[77,78] Sampling results to date indicate elevation of GenX above the North Carolina Department of Health and Human Services health goal—140 parts per trillion—in treated water from at least

---

10.1038/srep32949.

[71] Bruton TA, Sedlak DL. Treatment of Aqueous Film-Forming Foam by Heat-Activated Persulfate Under Conditions Representative of In Situ Chemical Oxidation. *Environ. Sci. Technol.* 2017; 51:13878-13885. DOI: 10.1021/acs.est.7b03969.

[72] Bruton TA, Sedlak DL. Treatment of Perfluoroalkyl Acids by Heat-Activated Persulfate Under Conditions Representative of In Situ Chemical Oxidation. *Chemosphere*. 2018; 206:457-464. DOI: 10.1016/j.chemosphere.2018.04.128.

[73] Yi S, Harding-Marjanovic KC, Houtz EF, Gao Y, Lawrence JE, Nichiporuk RV, Iavarone A, Zhuang W, 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; 5:283-288. DOI: 10.1021/acs.estlett.8b00148.

[74] National Institute of Environmental Health Sciences. Time-Sensitive Research Opportunities in Environmental Health. Internet: https://www.niehs.nih.gov/research/supported/timesensitve/index.cfm.

[75] 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.

[76] Gill N. 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.

[77] 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.

[78] Peake T. 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/.

one water treatment plant,[79] and groundwater-fed drinking water wells without granular activated carbon filtration.[80] 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. Blood and urine levels reported to date as part of this ongoing analysis reveal that PFOA, PFOS, and additional known and unknown PFAS have been detected in the study population. In rodent models, NTP is studying how GenX moves through the body and whether it affects function of the placenta, immune system, liver, and other tissues.

NTP REACT Program

The NTP Responsive Evaluation and Assessment of Chemical Toxicity, or REACT, Program is broadening our understanding of PFAS by studying over a hundred compounds that fall into different subclasses based on similarities in chemical properties. Scientists will be able to compare one PFAS to another, determine the relationship between chain length and other structural features and toxicity, and inform on whether there are common or overlapping patterns of toxicity.

REACT uses a combination of approaches. One 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 can be selected for further targeted 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 similar to, or a refinement of, those used in 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).[81] 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. Both NTP and EPA are contributing complementary resources to coordinate and share what is learned 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.[82] Currently, analytical techniques are limited for determining which specific PFAS are contained in a given

---

[79] North Carolina Department of Environmental Quality. GenX Results. Internet: https://www.ncwater.org/?page=690&Action=doGraphs.

[80] Leonard L. North Carolina Department of Environmental Quality. Latest test results show elevated levels of GenX in 30 more private wells. December 13, 2017. Internet: https://deq.nc.gov/news/press-releases/2017/12/13/latest-test-results-show-elevated-levels-genx-30-more-private-wells.

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

[82] Kotthoff M, Bücking M. 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,[83] in plasma, and in whole blood, as well as in serum.[84] 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 most prudent approach to protect public health. Based upon their persistent nature, widespread exposure, and known toxicity, it begs the question: does the net value of PFAS production and use for modern-day convenience outweigh the likely risks to public health and associated healthcare costs? Thus, scientific and technology innovation is critical to enable a shift to safer alternatives, as appropriate.

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.[85] NIEHS was among other Federal agencies that participated at the PFAS National

[83] 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.
[84] 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.
[85] Lenox K. Federal Agencies Exchange PFAS Updates. *NIEHS Environmental Factor*. 2018, Mar. Internet:

Leadership Summit hosted by EPA in May 2018.[86] Within the Department of Health and Human Services and primarily through NTP, NIEHS works closely with the FDA and the CDC on PFAS matters. Additionally, NIEHS is specifically being consulted by ATSDR on the design and conduct of the exposure assessments and health studies authorized by the National Defense Authorization Act for Fiscal Year 2018, as amended.[87]

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.

---

https://factor.niehs.nih.gov/2018/3/science-highlights/pfas/index.htm.

[86] U.S. Environmental Protection Agency. EPA PFAS National Leadership Summit and Engagement. May 22-23, 2018. Internet: https://www.epa.gov/pfas/pfas-national-leadership-summit-and-engagement.

[87] Sec. 316 of the National Defense Authorization Act for Fiscal Year 2018. Public Law 115-91. December 12, 2017.

Senate Committee on Environment and Public Works
Hearing entitled, *"Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)"*
March 28, 2019
Questions for the Record for Dr. Birnbaum

Chairman Barrasso:

1. You testified that, "NTP is collaborating with EPA to study more than 100 unique PFAS compounds." You further explained that,

   "We are working very closely with EPA's Office of Research and Development to study more than 100 different PFAS and to try to understand whether in fact they are all doing the same thing or maybe grouped into a number of specific classes. This is a program that we call REAC, which is a Rapid Experimental Advances. We hope to have results from that available within months, not years."

   a. Please list the 100 plus PFAS compounds (including acronyms and Chemical Abstract Service Registry Numbers (CASRNs)).

      Answer of Dr. Birnbaum: The NTP's Responsive Evaluation and Assessment of Chemical Toxicity (REACT) Program focuses on applying fit-for-purpose solutions such as literature mining, computational, and *in vitro* (tissue and cell culture systems) and *in vivo* (animal models) toxicological methods to environmental and public health problems. The following table lists the PFAS under study by the NTP in collaboration with the U.S. Environmental Protection Agency (EPA).

      In addition, this list of PFAS is available from the EPA CompTox Chemicals Dashboard at the following Internet addresses:

      - https://comptox.epa.gov/dashboard/chemical_lists/EPAPFAS75S1
        and
      - https://comptox.epa.gov/dashboard/chemical_lists/EPAPFAS75S2

Table 1. PFAS under study by NTP in collaboration with EPA		
	CASRN	**Preferred_Name**
1	19932-26-4	((2,2,3,3-Tetrafluoropropoxy)methyl)oxirane
2	80220-63-9	((Perfluorooctyl)ethyl)phosphonic acid
3	17587-22-3	(Heptafluorobutanoyl)pivaloylmethane
4	3834-42-2	(Heptafluoropropyl)trimethylsilane
5	50836-66-3	(Perfluoro-5-methylhexyl)ethyl 2-methylprop-2-enoate
6	559-94-4	(Perfluorobutyryl)-2-thenoylmethane
7	94159-84-9	1-(Perfluorofluorooctyl)propane-2,3-diol
8	2043-55-2	1,1,1,2,2,3,3,4,4-Nonafluoro-6-iodohexane

Table 1. PFAS under study by NTP in collaboration with EPA		
9	406-58-6	1,1,1,3,3-Pentafluorobutane
10	35192-44-0	1,8-Divinylperfluorooctane
11	423-65-4	11:1 Fluorotelomer alcohol
12	422-85-5	1-Bromoheptafluoropropane
13	375-88-2	1-Bromopentadecafluoroheptane
14	21652-58-4	1H,1H,2H-Perfluoro-1-decene
15	19430-93-4	1H,1H,2H-Perfluoro-1-hexene
16	15290-77-4	1H,1H,2H-Perfluorocyclopentane
17	355-80-6	1H,1H,5H-Perfluoropentanol
18	2264-01-9	1H,1H,6H,6H-Perfluorohexane-1,6-diol diacrylate
19	129301-42-4	1H,1H,8H,8H-Perfluoro-3,6-dioxaoctane-1,8-diol
20	4180-26-1	1H,1H,9H-Perfluorononyl acrylate
21	13695-31-3	1H,1H-Perfluorobutyl methacrylate
22	307-98-2	1H,1H-Perfluorooctyl acrylate
23	355-27-1	1H,1H-Perfluoropentylamine
24	1005-73-8	1H,2H-Hexafluorocyclopentene
25	1682-31-1	1-Iodo-1H,1H,2H,2H-perfluoroheptane
26	335-58-0	1-Iodopentadecafluoroheptane
27	374-40-3	1-Pentafluoroethylethanol
28	355-95-3	1-Propenylperfluoropropane
29	252237-40-4	2-(Perfluorohexyl)ethylphosphonic acid
30	34143-74-3	2-(Perfluorooctyl)ethanthiol
31	329710-76-1	2-(Trifluoromethoxy)ethyl trifluoromethanesulfonate
32	79963-95-4	2,2,2-Trifluoroethyl perfluorobutanesulfonate
33	74427-22-8	2,2-Difluoroethyl triflate
34	1619-92-7	2-Amino-2H-perfluoropropane
35	31253-34-6	2-Aminohexafluoropropan-2-ol
36	914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid
37	239795-57-4	2-Vinylperfluorobutane
38	125070-38-4	3-(Perfluoro-2-butyl)propane-1,2-diol
39	38565-52-5	3-(Perfluorohexyl)-1,2-epoxypropane
40	243139-64-2	3-(Perfluoroisopropyl)-2-propenoic acid
41	679-02-7	3-(Perfluoropropyl)propanol
42	1763-28-6	3,3-Bis(trifluoromethyl)-2-propenoic acid
43	356-02-5	3:3 Fluorotelomer carboxylic acid
44	20825-07-4	3H,3H-Perfluoro-2,4-hexanedione
45	77953-71-0	3H-Perfluoro-2,2,4,4-tetrahydroxypentane
46	1694-30-0	3H-Perfluoro-4-hydroxy-3-penten-2-one
47	132182-92-4	3-Methoxyperfluoro(2-methylpentane)
48	812-70-4	3-Perfluoroheptylpropanoic acid
49	2043-47-2	4:2 Fluorotelomer alcohol
50	757124-72-4	4:2 Fluorotelomer sulfonic acid
51	3792-02-7	4:4 Fluorotelomer alcohol
52	679-12-9	4H-Perfluorobutanoic acid
53	813-03-6	5H-Octafluoropentanoyl fluoride
54	2648-47-7	5H-Perfluoropentanal
55	375-82-6	6:1 Fluorotelomer alcohol
56	647-42-7	6:2 Fluorotelomer alcohol

Table 1. PFAS under study by NTP in collaboration with EPA		
57	2144-53-8	6:2 Fluorotelomer methacrylate
58	27619-97-2	6:2 Fluorotelomer sulfonic acid
59	1767-94-8	6H-Perfluorohex-1-ene
60	25600-66-2	7:3 Fluorotelomer alcohol
61	27905-45-9	8:2 Fluorotelomer acrylate
62	678-39-7	8:2 Fluorotelomer alcohol
63	39108-34-4	8:2 Fluorotelomer sulfonic acid
64	865-79-2	9-Chloro-perfluorononanoic acid
65	15242-17-8	Allyl perfluoroisopropyl ether
66	3825-26-1	Ammonium perfluorooctanoate
67	883498-76-8	Bis(1H,1H-perfluoropropyl)amine
68	56860-81-2	Difluoromethyl 1H,1H-perfluoropropyl
69	335-99-9	Dodecafluoroheptanol
70	163702-05-4	Ethyl perfluorobutyl ether
71	147492-57-7	Fluorinated triethylene glycol monomethyl ether
72	333-36-8	Flurothyl
73	375-01-9	Heptafluorobutanol
74	374-98-1	Heptafluorobutyl iodide
75	662-50-0	Heptafluorobutyramide
76	1623-05-8	Heptafluoropropyl trifluorovinyl ether
77	376-90-9	Hexafluoroamylene glycol
78	678-77-3	Hexafluoroglutaryl chloride
79	132424-36-3	Methyl 2H,2H,3H,3H-perfluoroheptanoate
80	356-24-1	Methyl heptafluorobutyrate
81	63863-43-4	Methyl perfluoro(3-(1-ethenyloxypropan-2-yloxy)propanoate)
82	374-41-4	Methyl perfluoroethyl ketone
83	424-18-0	Methyl perfluorohexanoate
84	1691-99-2	N-Ethyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide
85	4151-50-2	N-Ethylperfluorooctanesulfonamide
86	24448-09-7	N-Methyl-N-(2-hydroxyethyl)perfluorooctanesulfonamide
87	31506-32-8	N-Methylperfluorooctanesulfonamide
88	423-39-2	Nonafluoro-1-iodobutane
89	13485-61-5	Nonafluoropentanamide
90	355-66-8	Octafluoroadipamide
91	336-08-3	Octafluoroadipic acid
92	356-42-3	Pentafluoropropanoic anhydride
93	338-83-0	Perfluamine
94	65294-16-8	Perfluoro-(2,5,8-trimethyl-3,6,9-trioxadodecanoic)acid
95	863090-89-5	Perfluoro(4-methoxybutanoic) acid
96	382-28-5	Perfluoro(N-methylmorpholine)
97	335-27-3	Perfluoro-1,3-dimethylcyclohexane
98	423-60-9	Perfluoro-1-octanesulfonyl chloride
99	13252-14-7	Perfluoro-2,5-dimethyl-3,6-dioxanonanoic acid
100	13252-13-6	Perfluoro-2-methyl-3-oxahexanoic acid
101	3330-15-2	Perfluoro-3-(1H-perfluoroethoxy)propane
102	330562-41-9	Perfluoro-3,6,9-trioxatridecanoic acid

Table 1. PFAS under study by NTP in collaboration with EPA		
103	151772-58-6	Perfluoro-3,6-dioxaheptanoic acid
104	55621-21-1	Perfluoro-3,6-dioxaoctane-1,8-dioic acid
105	377-73-1	Perfluoro-3-methoxypropanoic acid
106	801212-59-9	Perfluoro-4-isopropoxybutanoic acid
107	375-73-5	Perfluorobutanesulfonic acid
108	375-72-4	Perfluorobutanesulfonyl fluoride
109	375-22-4	Perfluorobutanoic acid
110	375-02-0	Perfluorobutyraldehyde
111	6588-63-2	Perfluorocyclohexanecarbonyl fluoride
112	335-76-2	Perfluorodecanoic acid
113	678-78-4	Perfluoroglutaryl difluoride
114	375-92-8	Perfluoroheptanesulfonic acid
115	375-85-9	Perfluoroheptanoic acid
116	41997-13-1	Perfluorohexanesulfonamide
117	355-46-4	Perfluorohexanesulfonic acid
118	307-24-4	Perfluorohexanoic acid
119	355-43-1	Perfluorohexyl iodide
120	163702-08-7	Perfluoroisobutyl methyl ether
121	1805-22-7	Perfluoromethylcyclopentane
122	375-95-1	Perfluorononanoic acid
123	559-14-8	Perfluorooct-1-ene
124	423-54-1	Perfluorooctanamide
125	307-31-3	Perfluorooctanamidine
126	307-34-6	Perfluorooctane
127	754-91-6	Perfluorooctanesulfonamide
128	1652-63-7	Perfluorooctanesulfonamido ammonium iodide
129	45298-90-6	Perfluorooctanesulfonate
130	1763-23-1	Perfluorooctanesulfonic acid
131	307-35-7	Perfluorooctanesulfonyl fluoride
132	335-67-1	Perfluorooctanoic acid
133	355-81-7	Perfluoropentanamide
134	2706-90-3	Perfluoropentanoic acid
135	422-64-0	Perfluoropropanoic acid
136	699-30-9	Perfluorosuccinic anhydride
137	376-06-7	Perfluorotetradecanoic acid
138	72629-94-8	Perfluorotridecanoic acid
139	2058-94-8	Perfluoroundecanoic acid
140	29420-49-3	Potassium perfluorobutanesulfonate
141	3871-99-6	Potassium perfluorohexanesulfonate
142	2795-39-3	Potassium perfluorooctanesulfonate
143	28523-86-6	Sevoflurane
144	2806-15-7	Sodium perfluorodecanesulfonate
145	78560-45-9	Trichloro((perfluorohexyl)ethyl)silane
146	51851-37-7	Triethoxy((perfluorohexyl)ethyl)silane
147	58244-27-2	tris(Trifluoroethoxy)methane

b. What was NTP and EPA's reasoning for deciding to study these specific 100 plus PFAS compounds?

Answer of Dr. Birnbaum: The construction of the chemical library and the process for PFAS selection are described in the publication by Patlewicz *et al.* 2019.[1] As noted in the publication, "[m]ultiple factors were considered, including interest to the U.S. EPA, compounds within targeted categories, structural diversity, exposure considerations, procurability and testability, and availability of existing toxicity data." Note that once procured, selected PFAS undergo evaluation for suitability for *in vitro* screening in human cell culture systems. This includes evaluation of solubility, stability, and other physical and chemical properties. For many of these PFAS, there is limited, if any, information available on their physical and chemical properties. It is unlikely that all of the PFAS listed in Table 1 will be suitable for *in vitro* evaluation.

c. Would you provide an update on the status of NTP and EPA's research into these 100 plus PFAS compounds?

Answer of Dr. Birnbaum: The NTP's initial studies are focused on understanding whether PFAS are likely to be biopersistent and would remain in the body, rather than being quickly eliminated. The NTP is addressing this question by examining the hepatic clearance of these chemicals. Hepatic clearance can be modeled in cell culture studies and used to estimate how long a chemical may persist in a person. The NTP has developed methods for analyzing concentractions of 28 PFAS in cell cultures and is working to expand the number of PFAS that can be measured.[2]

The NTP is also evaluating whether PFAS affect cell viability and cause cell death. These studies, using several different cell lines, are nearly finished. The information from these studies will help guide what dose range to use in other studies that examine the bioactivity of PFAS *in vitro*.

Upon completion and analysis of the cell viability studies, the NTP plans to examine whether exposure to PFAS affects gene expression using a human liver cell model. Changes in gene expression can provide information about what biochemical pathways are altered by chemicals and may allow grouping of PFAS having similar effects.

---

[1] Patlewicz G. *et al.*, A chemical category-based prioritization approach for selecting 75 per- and polyfluoroalkyl substances (PFAS) for tiered toxicity and toxicokinetic testing. *Environ Health Perspect.* 2019 Jan;127(1):14501. doi: 10.1289/EHP4555.

[2] Gouliarmou *et al.*, Establishing a systematic framework to characterise in vitro methods for human hepatic metabolic clearance. *Toxicol In Vitro*. 2018 Dec;53:233-244. doi: 10.1016/j.tiv.2018.08.004.

The NTP, in collaboration with the EPA, is assessing quality of the individual PFAS in the library to ensure they are of acceptable purity and stability. This is important for interpreting the results from the NTP's studies, particularly for PFAS with results that are negative in any of the assays.

2. You testified that, "[a]pproaching PFAS as a class, rather than as thousands of individual compounds, is the best approach for assessing exposure and biological impact, and for protecting public health." Other than the NTP's work with EPA on the 100 plus PFAS compounds (noted above), to what extent is NIEHS and/or the NTP examining or supporting others who are examining PFAS as a class rather than as individual chemicals?

   Answer of Dr. Birnbaum: At the present time, there are approximately 4,700 chemicals that can be classified as per- and polyfluoroalkyl substances (PFAS). These substances, though individually unique, share several characteristics of environmental and toxicological concern. For example, they all contain carbon-fluorine bonds making them highly persistent in the environment, they partition into the blood and serum in similar ways, and many seem to cause toxicity by similar pathological mechanisms.

   Exposed individuals and populations nearly always encounter mixtures of PFAS in the water that they use, the food that they eat, and the air that they breathe. In response to the public concern and health risk posed by mixtures of PFAS, NIEHS has made significant progress to understand PFAS mixture exposures and toxicity. Using modern methods in analytical chemistry and toxicology, NIEHS scientists are developing advanced methods to characterize and address human exposure and adverse outcomes resulting from complex mixtures of PFAS.

   Remediation researchers, such as small business grantee EnChem Engineering, Inc., are trying to optimize technologies to mitigate PFAS so that clean-up procedures could be effective regardless of the influent PFAS, which is expected to vary from site to site. EnChem proposes a novel extraction technology with affinity to adhere to PFAS compounds, resulting in greater than 99 percent removal from contaminated media. Their design includes not only the extraction process, but also complete destruction through alkaline ozonation, all performed in a mobile treatment unit (a truck-bed trailer).[3] The cost effectiveness of this technology is not yet clear.

   The University of Rhode Island (URI) has a Superfund Research Program Center grant that includes projects in exposure pathways, epidemiology, and toxicity studies for PFAS.[4] Communication between scientists working on these projects is important

[3] 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.
[4] 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.

because it helps inform the selection of PFAS for further analyses. For example, their rodent studies are testing the PFAS compounds that were found in the cord blood of the human epidemiology cohort (PFOS, PFOA, PFDA, PFNA, and PFHxS). This strategic selection of PFAS may help them better understand the mechanisms to explain some of the metabolic dysfunction endpoints observed in epidemiology cohorts.

Another project from the URI team is developing novel monitoring devices to improve the accuracy of field sampling of PFAS compounds. In this research, they are tailoring their sampling tools to target classes of PFAS based on their chemical properties. Specifically, they are field validating a PFAS sampling tube for reporting time-weighted average of ionic PFAS concentrations in water (PFBA, PFBS, PFOA, PFOS, PFPeS, PFHpS, PFNS, 6:2-FTS). In addition, they are testing and validating a passive polyethylene sampler for PFAS volatile precursors (Fluorotelomer alcohols [FTOHs], perfluorooctane-sulfonamidoethanols [FOSEs], perfluorooctane-sulfonamides [FOSAs]). This ensures that all types of PFAS are being captured in their sampling procedures. See Dixon-Anderson and Lohmann, 2018.[5]

NIEHS is also funding research that looks at health effects associated with exposure to multiple PFAS as opposed to individual PFAS. One such study being led by the Silent Spring Institute in Newton, Massachusetts, is looking at pediatric immunotoxicity, public education, and capacity-building in communities impacted by PFAS-contaminated drinking water.[6] This research will provide scientific evidence to evaluate potential harmful effects on the immune systems of children and provide tools and information to support communities in identifying, responding to, and reducing exposures to PFAS from contaminated drinking water.

Another study that approaches health outcomes associated with PFAS exposure delves into the longitudinal association of PFAS with obesity, diabetes, and metabolic syndrome.[7] This study will provide further insight into the possible effects of PFAS compounds on diabetes and cardio-metabolic disease risk in adults. Results from this study will influence additional research on the mechanisms of PFAS action and individual behaviors to limit exposure to PFAS.

Furthermore, the NTP is collaborating with the Centers for Disease Control and Prevention's (CDC) National Institute for Occupational Safety and Health (NIOSH) to characterize occupational exposures to PFAS. The NTP is communicating its efforts with other Federal agencies such as the EPA, the Food and Drug Administration (FDA), the Consumer Product Safety Commission (CPSC), the Department of Defense (DOD), and the CDC/Agency for Toxic Substances and Disease Registry (ATSDR) to ensure that

[5] Dixon-Anderson E, Lohmann R. 2018. Field-testing polyethylene passive samplers for the detection of neutral polyfluorinated alkyl substances in air and water. *Environ Toxicol Chem* 37:3002-3010. DOI: 10.1002/etc.4264.
[6] NIH Grant No. R01ES028311. Assessment of Pediatric Immunotoxicity, Public Education, and Capacity-Building In Communities Impacted by PFAS-Contaminated Drinking Water. Schaider, Laurel A. Silent Spring Institute, Newton, Massachusetts. Awarded on September 7, 2018. NIH RePORTER Link.
[7] NIH Grant No. R01ES024765. Longitudinal Association of PFCs with Obesity, Diabetes, and Metabolic Syndrome. Oken, Emily. Harvard Pilgrim Health Care, Inc., Boston, Massachusetts. Awarded on February 14, 2019. NIH RePORTER Link.

NTP research planning considers information needs for these agencies and program areas.

3. You testified that:

"While many research projects focus on a single or series of PFAS, current human exposures to PFAS involve complex mixtures, not individual chemicals. This reality complicates both the science of exposure measurement and the assessment of health risks. Current analytical techniques are limited for determining which specific PFAS are contained in a given complex mixture. Furthermore, health impact information for combined PFAS mixtures remains incomplete. Additional research is needed to assess environmental exposures to mixtures of PFAS and to determine their combined effects."

a. What does the latest toxicological research suggest about the impacts to human health from multiple PFAS interacting with each other in the human body?

Answer of Dr. Birnbaum: There is great need to further research impacts to human health from multiple PFAS interacting with each other and affecting the human body. As part of the REACT Program, the NTP plans to evaluate PFAS mixtures. One example for addressing PFAS mixtures is the Relative Potency Factor approach reported by the Netherlands National Institute for Public Health and the Environment (RIVM report 2018-0070).[8] This approach expresses the toxic potency of a limited number of individual PFAS mixture components relative to PFOA based upon liver toxicity, which they identified as the most sensitive endpoint.

Of note, the 2016 EPA drinking water health advisory accounts for the interrelated effects of PFOS and PFOA.[9] The EPA drinking water health advisory levels are the same for PFOS, PFOA, and the the two compounds combined. Similiary, several State agencies have employed combinatorial approaches for assessing the risk of PFAS exposure.[10]

4. You testified that:

---

[8] Zeilmaker MJ *et al.* Mixture exposure to PFAS: A Relative Potency Factor approach. National Institute for Public Health and the Environment. Ministry of Health, Welfare and Sport. Kingdom of the Netherlands. 2018. Bilthoven, Netherlands. DOI: 10.21945/RIVM-2018-0070.

[9] Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate, 81 Fed. Reg. 101, Pgs. 33250-33251 (May 25, 2016). *Federal Register*: The Daily Journal of the United States. Internet: https://www.federalregister.gov/documents/2016/05/25/2016-12361/lifetime-health-advisories-and-health-effects-support-documents-for-perfluorooctanoic-acid-and

[10] For example, Connecticut, Massachusetts and Vermont have each established PFAS standards based on the sum of perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and perfluoroheptanoic acid (PFHpA).

"[T]here are a huge number of short chain chemicals...[and that] recent results from the National Toxicology Program have shown that some of the short chain chemicals like PFBS, which is a four-carbon chain sulfonated chemical, is associated with essentially the same effects as the PFOS and the PFHXS."

a. Would you elaborate on your comments that some of the short-chain PFAS are associated with essentially the same effects as some long-chain PFAS?

Answer of Dr. Birnbaum: The NTP conducted a class study for straight-chained perfluorinated carboxylates and sulfonates using short-term (28-day) studies in rats with four carboxylates and three sulfonates of varying chain length. These studies are completed, and the draft reports are currently undergoing external peer review. The data is available on the Internet at: https://ntp.niehs.nih.gov/results/path/index.html. The shorter-chained PFAS —perfluorohexanoic acid (PFHxA) and perfluorobutane sulfonic acid (PFBS)— induced similar toxicities as the longer-chained analogues, but the shorter-chained PFAS required higher doses. Effects between shorter-chain and longer-chain PFAS were similar with respect to disturbances of liver and thyroid hormones. For example, decreased levels of thyroid hormones were observed in short-chained PFBS and PFHxA and long-chained PFOA and PFOS.

b. Other than PFBS, which other short-chain PFAS chemicals are associated with the same effects as some long-chain PFAS? Please include acronyms and CASRNs.

Answer of Dr. Birnbaum: The NTP has studied PFBS (375-73-5) and PFHxA (307-24-4) in 28-day toxicity studies in rats (see the response to Question #4(a)). PFBS and PFHxA induced similar toxicities (e.g. liver effects and altered thyroid hormone levels) as the longer-chained PFOA and PFOS in these studies.

The Netherlands National Institute for Public Health and the Environment summarized available information on other short-chained PFAS and concluded that they induce similar liver toxicities as the prototype PFOS (1763-23-1) and PFOA (335-67-1) (see the response to Question #3(a)).

5. You testified that, "[i]t is time we ask ourselves where are these widely used chemicals really needed? Does the value of PFAS use for modern day convenience outweigh the risks to public health and related health care costs?"

Are there any specific applications or uses of PFAS where you believe that the risks to public health and related health care costs may outweigh modern day convenience?

Answer of Dr. Birnbaum: PFAS and other industrial chemicals have widely varying uses with societal benefits that are rarely quantified. While risks to public health are estimated

based on many factors, including human health research, costs associated with adverse health effects are not normally considered during regulatory registration and approval. Without such analysis, it is not possible to identify specific applications or uses of PFAS where the risks to public health and related health care costs may outweigh modern day convenience. NTP research is focused primarily on understanding potential human health effects of currently used PFAS, though the approaches developed could be applied to chemicals proposed as alternatives for specific uses.

6. What do you need from chemical manufacturers and processors or others in the private sector to better understand and respond to the risks associated with PFAS chemicals?

Answer of Dr. Birnbaum: NIEHS supports public-private collaborations on issues related to public health. We welcome support and information sharing with industry partners. Information relevant to understanding ongoing and past human exposures, historical information about production and/or disposal relevant to exposures, and any toxicological or epidemiological information that industry might have would be useful. Especially useful would be all information relevant to occupational exposures or effects and would allow NIEHS to better focus our resources on critical information gaps. Any information that might be available in the following categories would serve to streamline Executive Branch efforts to address PFAS concerns:

- Pharmacokinetic information (ADME). Any information regarding the Absorption of PFAS in mammals or other experimental animals, Distribution of individual PFAS through the body, the Metabolism (if any) of PFAS, and the extent and rate of Excretion of PFAS from the body would be useful.

- Industry information about the toxicology of PFAS. Any information—whether *in vitro* (tissue and cell culture systems), *in vivo* (animal models), or *in silico* (computer-based models)—about the toxicity of PFAS would help NIEHS identify and fill gaps in our understanding about public health concerns.

- Information about human exposure. Any information available about the locations of PFAS production and/or distribution would allow NIEHS to focus resources in these geographic areas. Information pertaining to production volumes, disposal locations and amounts disposed would be useful to identify populations that might be affected.

- Information about the destruction of PFAS. NIEHS is interested in improving the science and efficiencies of PFAS incineration. Any information available about the incineration or destructive oxidation processes and the efficiency of these processes would be helpful.

- Removal of PFAS from household water. NIEHS is interested in any information available on the removal of PFAS from household water. This might include information about large volume removal by utilities or whole house removal at the

site of use.

- Advanced analytical techniques for individual or bulk analysis of PFAS. NIEHS is working to improve the cost and efficiency of analytical chemistry methods to measure PFAS in water, air, and soil. We would be interested in working with industry to improve the efficiency and lower the cost of analyses for PFAS in environmental media.

7. Are there lessons or best practices that we can learn from other countries, which are also addressing the risks to public health and the environment associated with PFAS? If so, what are these lessons or best practices?

   Answer of Dr. Birnbaum: European countries are also struggling to address the wide range of PFAS chemicals. One approach they have developed is an assessment of where PFAS may not be essential in the product and where there may be non-fluorinated alternatives available.In some cases, industry has voluntarily abandoned use of PFAS in their products. For example, after a recent campaign by the Swedish Society for Nature Conservation (SSNC)—a non-governmental organization based in Sweden—t publicizing the presence of PFAS in certain cosmetics, several retailers and brands of cosmetics announced phaseouts of PFAS in their products, including L'Oreal, H&M, Lumene, The Body Shop, Isadora and Kicks. Similiarly, COOP Denmark A/S, a Danish consumer goods retailer, has completely removed PFAS from all their own products since September 2014. Through these examples, we see alternatives exist for some of the current use cases, and the pressures to develop PFAS alternatives has created opportunities for innovation (for example, PFAS-free microwave popcorn bags and durable water-repellant finishes on textiles.)

8. What steps can the Executive Branch take to improve coordination among federal agencies as it responds to the risks associated with PFAS chemicals?

   Answer of Dr. Birnbaum: A multiagency forum would be useful for coordination of the many issues that arise relevant to public health and the environment.

9. What steps can the Executive Branch take to improve communication with states, tribes, local communities, and the public about the risks associated with PFAS chemicals?

   Answer of Dr. Birnbaum: Federal health agencies have robust connections with health-related entities at all levels of government: State, territory, local and Tribal. NIH has relationships, both directly and through our grantees, with State, territory, local, and Tribal public health officials, while our partners at the CDC and the EPA also communicate to the public and to State, territory, local and Tribal governments about environmental public health actions (for example, CDC/ATSDR works closely with ASTHO's State Environmental Health Directors[11] to share information on PFAS.) Some

[11] The Association of State and Territorial Health Officials (ASTHO).

examples of NIH communication strategies relating to PFAS and similar issues are listed below:

- NIEHS's funded research portfolio. Through our funded centers and projects, investigators are examining the potential risks from PFAS on communities, including Tribal communities. One such project is with Alaska Community Action on Toxics (ACAT) which looks at the effects of many chemicals, including PFAS, on Alaska Natives. These funded centers are translating research findings for the public. Two of the Environmental Health Disparities Centers are focused on research with Tribal communities: the University of Arizona and the University of New Mexico. One of the Environmental Health Sciences Core Centers in Washington State is likewise focused on health issues important to Tribal communities. Through the translational activities associated with these grants, indigenous communities are learning about PFAS.

- PEHSUs. The Pediatric Environmental Health Specialty Units (PEHSUs) are a network of centers located across the United States and Canada, funded by the CDC/ATSDR and the EPA, which are a source of medical information and advice on children's and reproductive environmental health. A resource page on PFAS is available on the Internet: https://www.pehsu.net/PFAS_Resources.html.

- Public communications. Public communications strategies such as news releases, fact sheets, and interviews in the media. For example, I provided information for a relevant segment aired on National Public Radio on April 22, 2019. See: https://www.npr.org/sections/health-shots/2019/04/22/708863848/scientists-dig-into-hard-questions-about-the-fluorinated-pollutants-known-as-pfa.

- Targeted listservs and social media. Relevant environmental health news is distributed through several listservs targeted to specific groups and populations, including the TEK (Traditional Ecological Knowledge) listserv and the PEPH (Partners in Environmental Public Health) listserv. PEPH also publishes a monthly newsletter.

- Tribal engagement. NIEHS scientists help plan and attend NIEHS-funded Tribal summits annually. NIEHS also particpants in the semiannual NIH Tribal Advisory Committee (TAC) meeting. The TAC has recently asked for an entire meeting around environmental issues that will be held at NIEHS in March 2020. That meeting will highlight NIEHS support of Tribal research and will cover PFAS and other chemical exposures encountered by Tribal members. NIEHS also participates in a monthly NIH Tribal Health Research Coordinating Committee where staff give updates about important events or research.

- Publications. NIEHS staff and grantees write articles that are published in scientific journals such as *Environmental Health Perspectives* (EHP), highlighting specific research to address exposures such as PFAS. EHP maintains a collection of articles

on PFAS available on the Internet at: https://ehp.niehs.nih.gov/curated-collections/PFAS.

Ranking Member Carper:

10. Many entities have recommended that all PFAS be regulated as a class, instead of via a chemical-by-chemical approach. Would you describe all efforts by NIEHS to research PFAS as a class (including sub-classes consisting of some but not all PFAS substances) as well as any statutory, scientific or other barriers to doing so?

Answer of Dr. Birnbaum: Please see the response to Question #2 for details about "Rapid Experimental Advances," a collaboration between NIEHS and the EPA's Office of Research and Development to study more than 100 different PFAS and to understand whether PFAS may be grouped into a number of specific classes. At the present time, there are approximately 4,700 chemicals that can be classified as per- and polyfluoroalkyl substances (PFAS). These substances, though individually unique, share some characteristics of environmental and toxicological concern. For example, they all contain carbon-fluorine bonds making them highly persistent in the environment, the relatively small number of compounds that have been studied partition into the blood and serum in similar ways, and cause toxicity through similar biological mechanisms.

Exposed individuals and populations nearly always encounter mixtures of PFAS in the water that they use, the food that they eat, and the air that they breathe. In response to the public concern and health risks posed by mixtures of PFAS, NIEHS has made significant progress to understand PFAS mixture exposures and toxicity. Using modern methods in analytical chemistry and toxicology, NIEHS scientists are developing advanced methods to characterize and address human exposure and adverse outcomes resulting from complex mixtures of PFAS.

Remediation researchers, such as small business grantee EnChem Engineering, Inc., are tyring to optimize technologies to mitigate PFAS so that cleanup procedures could be effective regardless of the influent PFAS, which is expected to vary from site to site. EnChem proposes a novel extraction technology with affinity to adhere to PFAS compounds, resulting in greater than 99% removal from contaminated media. Their design includes not only the extraction process, but also complete destruction through alkaline ozonation, all performed in a mobile treatment unit (a truck-bed trailer).[12] The cost effectivess of this technology is not yet clear.

The University of Rhode Island (URI) has a Superfund Research Program Center grant that includes projects in exposure pathways, epidemiology, and toxicity studies for

[12] 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.

PFAS.[13] Communication between scientists working on these projects is important because it helps inform the selection of PFAS for further analyses. For example, their rodent studies are testing PFAS that were found in the cord blood of the human epidemiology cohort (PFOS, PFOA, PFDA, PFNA, and PFHxS). This strategic selection of PFAS may help them better understand the mechanisms to explain some of the metabolic dysfunction endpoints observed in epidemiology cohorts.

Another project from the URI team is developing novel monitoring devices to improve the accuracy of field sampling of PFAS. In this research, they are tailoring their sampling tools to target classes of PFAS based on their chemical properties. Specifically, they are field-validating a PFAS sampling tube for reporting the time-weighted average of ionic PFAS concentrations in water (PFBA, PFBS, PFOA, PFOS, PFPeS, PFHpS, PFNS, 6:2-FTS). In addition, they are testing and validating a passive polyethylene sampler for PFAS volatile precursors (Fluorotelomer alcohols [FTOHs], perfluorooctane-sulfonamidoethanols [FOSEs], perfluorooctane-sulfonamides [FOSAs]). This ensures that all types of PFAS are being captured in their sampling procedures. See Dixon-Anderson and Lohmann, 2018.[14]

NIEHS is also funding research that looks at health effects associated with exposure to multiple PFAS as opposed to individual PFAS. One such study being led by the Silent Spring Institute in Newton, Massachusetts, is looking at pediatric immunotoxicity, public education, and capacity-building in communities impacted by PFAS-contaminated drinking water.[15] This research will provide scientific evidence to evaluate potential harmful effects on the immune systems of children and provide tools and information to support communities in identifying, responding to, and reducing exposures to PFAS from contaminated drinking water.

Another study that approaches health outcomes associated with PFAS exposure delves into the longitudinal association of PFAS with obesity, diabetes, and metabolic syndrome.[16] This study will provide further insight into the possible effects of PFAS compounds on diabetes and cardio-metabolic disease risk in adults. Results from this study will influence additional research on the mechanisms of PFAS action and individual behaviors to limit exposure to PFAS.

Given the large PFAS class of chemicals the time required for a chemical-by-chemical approach for toxicity assessment is impractical. EPA and NTP scientists have developed a category-based approach for prioritizing and testing aimed at facilitating human health

---

[13] 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.

[14] Dixon-Anderson E, Lohmann R. 2018. Field-testing polyethylene passive samplers for the detection of neutral polyfluorinated alkyl substances in air and water. *Environ Toxicol Chem* 37:3002-3010. DOI: 10.1002/etc.4264.

[15] NIH Grant No. R01ES028311. Assessment of Pediatric Immunotoxicity, Public Education, and Capacity-Building In Communities Impacted by PFAS-Contaminated Drinking Water. Schaider, Laurel A. Silent Spring Institute, Newton, Massachusetts. Awarded on September 7, 2018. NIH RePORTER Link.

[16] NIH Grant No. R01ES024765. Longitudinal Association of PFCs with Obesity, Diabetes, and Metabolic Syndrome. Oken, Emily. Harvard Pilgrim Health Care, Inc., Boston, Massachusetts. Awarded on February 14, 2019. NIH RePORTER Link.

assessments for a larger number of PFAS.[17] Central to this approach is a method known as read-across which applies already available data on a well-characterized substance (source) to a poorly-characterized substance (target), where the target substance is considered *similar enough* structurally to the source substance to use the same data as the basis for a safety assessment.

The NTP, in collaboration with the EPA, is presently evaluating the read-across approach in the REACT Program. The NTP and the EPA have identified a chemical library that includes representative PFAS. The NTP and the EPA will attempt to group PFAS by their structure and bioactivity results in the various *in vitro* assays (see the response to Question #1(c)). This work will support methods and tools to predict the effects of combined exposures to different groups of PFAS.

11. Is it possible to develop a validated total PFAS or total organic fluorine methodology to detect and monitor PFAS in drinking water and ground water? If so, please describe the steps required to complete the development and/or validation of such a methodology, along with expected timelines for their completion. If such a methodology was completed, how could it best be used to advance EPA's PFAS research, monitoring and regulatory efforts? Are you aware of any statutory barriers that could hinder or prevent the utilization of such a methodology to support the development or implementation of regulations under each of the Safe Drinking Water, Clean Water, Emergency Planning and Community Right-to-Know, Toxic Substances Control, Clean Air or Comprehensive Environmental Response, Compensation and Liability Acts?

Answer of Dr. Birnbaum: Without regulatory responsibilies, NIEHS is focused primarily on development of techniques useful for environmental health and toxicological analyses. While NIEHS does not issue standard methods or protocols for chemical monitoring, we do support analytical chemical research that advances the accuracy and precision for measuring complex mixtures, like PFAS. There are multiple analytical methods in use that might eventually be applied to the measurement of total organic fluorine in environmental and physiological samples. Recently, an NIEHS grantee released a review identifying best practices for more thorough PFAS analyses. This review recommends combining targeted and nontargeted chemical analysis techniques for sample analysis.[18] Through application of such research, efforts to detect, monitor, and understand environmental and physiological effects of PFAS as a class or subclasses can be advanced. I am unaware of any statutory barriers hindering or preventing the utilization of such methodologies, although I am not an expert in statutes outside of NIH's purview.

Senator Markey:

[17] Patlewicz G. *et al.*, A chemical category-based prioritization approach for selecting 75 per- and polyfluoroalkyl substances (PFAS) for tiered toxicity and toxicokinetic testing. *Environ Health Perspect.* 2019 Jan;127(1):14501. doi: 10.1289/EHP4555.

[18] McDonough CA, Guelfo JL, Higgins CP. Measuring total PFASs in water: The tradeoff between selectivity and inclusivity. *Env. Science and Health.* 2019; 7:13-18. DOI: 10.1016/j.coesh.2018.08.005.

1. Does NIEHS believe that a Lifetime Health Advisory of 70 parts per trillion for PFOA and PFOS adequately protects developing children born with a pre-existing level of PFAS?

   Answer of Dr. Birnbaum: No. It was not designed to protect against exposure to all PFAS chemicals. The EPA Lifetime Health Advisory was established in 2016 using the best available data at that time, and only addresses two of the nearly 5,000 PFAS, i.e., PFOS and PFOA. Recent research shows the potential for adverse effects at lower levels for PFOS, PFOA, and other PFAS. Some States are currently establishing their own regulatory levels as much as five to eight times lower than the EPA Lifetime Health Advisory. There needs to be further research to identify the impacts to human health from multiple PFAS interacting with each other. In response to the public concern and health hazards posed by mixtures of PFAS, NIEHS scientists are developing advanced methods to characterize and address human exposure and adverse outcomes resulting from complex mixtures of PFAS. NIEHS will continue to collaborate with EPA on research concerning PFAS.

2. Does exposure to a mixture of PFAS chemicals change the toxicity of PFAS?

   Answer of Dr. Birnbaum: The published literature is limited in this area. However, where studied, some of the same effects have been observed with mixtures as were observed with individual chemicals. What remains uncertain is whether traditional mixtures risk assessment methods can accurately predict the dose-response relationship for PFAS mixtures. The NTP is presently designing studies to address this uncertainty.

3. What do you identify as key research needs related to PFAS, particularly for immediate use in EPA's commitment to reducing PFAS exposure?

   Answer of Dr. Birnbaum: From the perspective of the NTP and NIEHS, because of the large number of chemicals in this class, a better understanding of sources, uses and human exposures are essential for defining the toxicological data needs. A comprehensive investigation of which specific PFAS and the routes that lead to human exposure is required. It is imperative to have a complete understanding of PFAS uptake across the skin, lungs, and gastrointestinal tract from water, food, clothing, furniture and air. All efforts to reduce, mitigate or eliminate exposure require detailed understanding of these pathways. While NIEHS has been putting an increasing amount of funding and focus into PFAS research, there are still many unknowns about this class of chemicals that make it very complex to study. NIEHS and NTP efforts have been focused on understanding through a variety of methods the toxicity of PFAS, the mechanisms of action across various species, and the potential adverse human health effects of legacy chemicals as well as emerging substitutes.

Senator BARRASSO. Thank you so much for your testimony, and thank you also for your life's contribution to the body of work that you have done. Thank you.

Appreciate all of you being here.

We are going to start by asking some questions, and I will begin with questions, and then we will go to other members.

Ms. Sullivan, yesterday I think you know Todd Parfitt, who is the Director of the Wyoming Department of Environmental Quality, sent three letters to the Department of Defense. They concern known and suspected PFAS pollution at active and former military facilities in Wyoming. I think the map that was just shown by my colleague, Senator Carper, showed the dot there in Wyoming in the Cheyenne area.

The Defense Department has found that the F.E. Warren Air Force Base and the Cheyenne Air National Guard Base have groundwater, surface water, and soil that have been contaminated with high levels of PFAS pollution. Could you explain to us what the status of the Department's efforts are to determine the nature and the extent of the contamination at those sites?

Ms. SULLIVAN. Yes, sir, I will give you a brief overview, and I would be glad to have the Air Force come in and give you a much more detailed briefing at your convenience.

The Air Force has completed the initial site investigation where they did find that there is the presence of PFOS and PFOA in the groundwater. They have confirmed that all the drinking water is upstream and is not impacted, so they are moving into the next steps of the investigation process, which will start this year in cooperation with the States.

The same for the National Guard, that they are moving forward with the next phase of investigation now.

Senator BARRASSO. Great. I believe that contaminated groundwater at the National Guard Base is likely to migrate off base. There are residential areas around, so I just want to know when we can expect the Department to test the groundwater outside of the involved facilities as well.

Ms. SULLIVAN. Absolutely. That is part of the entire investigation process, sir.

Senator BARRASSO. One of Todd Parfitt's letters also mentioned Wyoming's formerly used Defense sites, specifically the former Atlas D and Atlas E missile sites and the former Casper Army Airfield facility. The State of Wyoming believes that PFAS pollution may also be present at these additional sites, so can we also expect the Department to test pollution at these sites?

Ms. SULLIVAN. Sir, the Corps of Engineers has done some research there, and we are committed to addressing our environmental liabilities at these sites. Initial investigation shows that the sites were closed prior to the use of AFFF, so they have done a certain amount of record search, and they will continue to determine whether or not we use the foam at these locations and are therefore a source. But most of them closed prior to the use of the foam.

Senator BARRASSO. Well, I appreciate that. I think it is critical that we do get these sites tested as well to confirm that there is no pollution there.

Mr. Ross and Dr. Breysse, there has been so much discussion that the EPA's Lifetime Health Advisories for the two types of PFAS that we are talking about, chemicals specifically, PFOA and PFOS; Lifetime Health Advisories seem to be inconsistent with the CDC's minimal risk levels for these chemicals.

I was just going to ask if both of you could maybe help explain the difference between the EPA's Lifetime Health Advisories and the CDC's minimal risk levels so that we all get a better understanding.

Mr. ROSS. I am happy to field that question first, Senator. They are different numbers, and they are different agencies with different missions, with different programs that use this information for different purposes. For example, we should really be talking about reference dose levels that EPA uses versus the minimum risk levels at the ATSDR. You really, as you are talking about our health advisories, should be comparing and talking about the actual screening levels.

So the agencies use slightly different science for PFOA; we use a different endpoint, a different study. We look at kind of contaminant levels that come through multiple routes of exposure, whereas the ATSDR I think we can explain use different systems, they use different levels of uncertainty. So we use them to take a look and protect public health over a 70 year lifecycle, and they use them for a different purpose, which I am sure the doctor can explain.

Senator BARRASSO. Doctor.

Mr. BREYSSE. Thank you very much. So, minimal risk levels are part of what we call a toxicological profile, which is a document that we produce based on congressional legislation. We produced over 300 toxicological profiles with MRL levels in the past 20 years. We use them for a very specific purpose, and I think that purpose needs to be understood in order to characterize the differences we are talking about today.

We use them as screening values, so we establish values using appropriate safety factors that we think below which health effects are not likely, above which it is possible, but we don't know for sure. So it allows investigators at hazardous waste sites to come in and screen chemicals, whether they are above or below that, to focus on the chemicals that we think the greater risk might occur. Oftentimes at hazardous waste sites there are dozens of chemicals, and the screening values allow us to do that.

So, they are, by definition, perhaps, a little bit more conservative than what the long term health advisory might be because of that unique role; they are used by health assessors; they are used by those health assessors in the States; the local health departments and our health assessors at ATSDR, whether they are in the field or in Atlanta.

Senator BARRASSO. Thank you.

Finally, Dr. Birnbaum, by your testimony, you have been focused on this for an entire career. Can you talk about what the most urgent public health questions related to PFAS chemicals are that we need to answer?

Ms. BIRNBAUM. The PFAS are chemicals that, from the growing body of literature, affect multiple tissues in both males and females of multiple species at all developmental life stages. So I think that

as the database grows and the research grows, we are beginning to understand more and more that it is not just cancer, it is not just effects on the immune system, it is not just effects, for example, on the kidney or the liver; it is also effects on development and reproduction and pretty much almost every system that you can think of.

Senator BARRASSO. Thank you.

Senator Carper.

Senator CARPER. I believe it was former U.S. Supreme Court Justice Potter Stewart who said—sometime in the mid-1960s he said these words, he said—talking about obscenity, he said, I know it when I see it. He said, I know it when I see it.

Part of our hearing today is focused on the word not obscenity, but urgency, and I would like to say I know it when I see it.

I don't feel it. I don't feel it with respect to EPA. I have concerns as a retired Navy captain, I have concerns about a guy who has worked for years to BRAC-proof the Dover Air Force Base, for 30 years. I have a huge interest in this as a veteran. The Dover Air Force Base is beloved by our State, so for us this is personal.

Ms. Birnbaum, do you sense the kind of urgency? Maybe you see something I don't see. Is there a sense of urgency here demonstrated by EPA, or should we just sit back and say, well, it is going along just fine?

Ms. BIRNBAUM. We are working very closely with EPA's Office of Research and Development to study more than 100 different PFAS and to try to understand whether in fact they are all doing the same thing or may be grouped into a number of specific classes. This is a program that we call REAC, which is a Rapid Experimental Advances. We hope to have results from that available within months, not years.

Senator CARPER. That was not my question. You answered a different question. My question is do you sense an urgency from EPA that I don't, that we don't.

Ms. BIRNBAUM. EPA appears to be interested in moving more rapidly than they have in the past on dealing with these PFAS chemicals, and I applaud that effort.

Senator CARPER. Maybe you are seeing something that we don't. I hope you are.

Mr. Ross, I said in my opening statement for an agency whose leader says that access to drinking water is the biggest environmental problem, PFAS Action Plan does not convey that same sense of urgency.

My question is a brief one, and I would ask for a brief response. After significant congressional pressure, the Agency has reversed itself and committed to setting an enforceable drinking water standard for PFOA and PFOS. We welcome that. When do you expect that rule will be finalized, please?

Mr. ROSS. We intend to propose the first step in the process this year. When we finalize it is a factor of what is in the proposal——

Senator CARPER. Just give us a rough idea. When do you expect the rule to be finalized?

Mr. ROSS. We are going to move as expeditiously as we possibly can. At this point, I do not know how many comments we will get; I don't know the science, and to give you an estimate at this point

really is a function of what the proposal will look like and what the public engagement is like. My job is to move as expeditiously as we can.

To your sense of urgency, with all due respect, I know it when I see it, and I see it every single day with the career employees who are working around the clock, and in fact, have pulled all-nighters on this issue. I have hundreds of people who are working at the Agency everyday who are dedicated to the mission of protecting public health and the environment, and when you say that EPA is not doing enough, that is a disservice to those people who are doing something every single day.

Senator CARPER. To the folks who are working hard, all-nighters, the folks at EPA and other agencies, convey our thanks.

We are doing oversight here. Got it? We are doing oversight. We are doing oversight here to make sure that you and the folks at EPA are doing your job. We have our constituents throughout this country that are at risk, and we want to see a sense of urgency and feel it every day, so keep it up. For those who are conveying that sense of urgency, terrific; for those who aren't, pedal to the metal.

Mr. ROSS. I agree with you, Senator.

Senator CARPER. Ms. Sullivan, 32 percent of Americans' drinking water comes from groundwater. That is not even counting the 13 million households who get their drinking water from private wells. Why is the Department of Defense trying to weaken the EPA cleanup guidance in a way that will leave hundreds of military sites contaminated at levels that are vastly higher than EPA's drinking water health advisory says is safe?

Ms. SULLIVAN. Sir, the Department takes our cleanup responsibilities seriously, and we are not seeking a different or weaker standard. We support the use of the long established CERCLA risk based cleanup process established in EPA's implementing guidance.

Senator CARPER. Is that all you have?

Ms. SULLIVAN. Well, the process is long established, it applies to all chemicals nationwide, and that is what we are trying to process. And honestly, sir, I have been asking for the groundwater guidance since the Lifetime Health Advisory came out, so I am very interested in it being finalized myself.

Senator CARPER. Thank you.

I think we will have another round of questions. I look forward to that.

Thank you.

Senator BARRASSO. Senator Rounds.

Senator ROUNDS. Thank you, Mr. Chairman.

Secretary Sullivan, in your testimony you discuss the three pronged approach you have taken to address drinking water impacted by DOD releases. In my home State of South Dakota, 21 off-base groundwater wells affected by Ellsworth Air Force Base have tested above the EPA's Lifetime Health Advisory level.

By the way, the Ellsworth Air Force Base was just selected as being the bed-down site for the new B-21 stealth bomber, and we will have the first training site as well as the first operational squadron there, so we have a long history ahead of us.

But 21 off-base groundwater wells have been affected by the Ellsworth Air Force Base, and these have tested above the EPA's Life-

time Health Advisory level. While we know the DOD is providing bottled water weekly to impacted residents, can you offer your perspective in regard to how DOD can best address these contaminations with respect to the economic hardships caused to private property owners long term?

Ms. SULLIVAN. Sir, I appreciate that. I am not familiar with the specifics of Ellsworth, but I am glad to get the Air Force up here to brief you. I can say that we are working diligently to get people off bottled water.

Senator ROUNDS. Look, here is the deal. It is not just Ellsworth.

Ms. SULLIVAN. It is everywhere.

Senator ROUNDS. Yes, it is. Another site in Sioux Falls, South Dakota, with the 114th Squadron at Joe Foss Field, we are discovering PFAS there as well. Any place basically where we have firefighting requirements, there is a case of where we have groundwater contamination.

Ms. SULLIVAN. Correct.

Senator ROUNDS. So nationwide. But when we come to this, any plans right now on how we want to address the long term impacts for these private property owners in those areas? Do you know of any plans right now laid out at all?

Ms. SULLIVAN. At these locations, we are entering into cooperative agreements so we can reimburse the communities for the costs, so that we are paying the costs of the treatment from the Department of Defense Environmental Restoration Program and our Operations and Maintenance budgets.

Senator ROUNDS. So, fair to say that you believe that it is the intent of DOD to take responsibility for the cleanup of these sites wherever we find them where DOD has an obligation?

Ms. SULLIVAN. Where DOD is the known source, it is our responsibility to clean up the water and provide safe drinking water.

Senator ROUNDS. And I agree with you. Secretary Sullivan; last year I joined with my colleague, Senator Gillibrand, on the Senate Armed Services Committee in introducing an amendment to the fiscal year 2019 National Defense Authorization Act. This amendment would have allowed the National Guard to access environmental restoration financing under the Defense Environmental Restoration Fund.

While the rest of the military has access to this fund, the National Guard is required to fund environmental remediation through their Operations and Maintenance accounts. As you know, diverting resources from O&M jeopardizes the readiness of our National Guard units.

Unfortunately, our amendment was not adopted in the 2019 NDAA. As we examine the extent of PFAS contamination nationwide, much of which originated from PFAS containing firefighting foam mandated by the Department of Defense, do you believe that the National Guard installations should have the same access to these environmental cleanup resources?

Ms. SULLIVAN. Sir, this is a complicated legal question on fiscal law, and I believe——

Senator ROUNDS. Now, wait a second. It is not a complicated question; it is real simple. Is DOD responsible for it? And why

would we exclude the National Guard bases from having access to it?

Ms. SULLIVAN. Sir, they are under the control of the Governor, and therefore, it has to come out of the Operations and Maintenance accounts.

Sir, I appreciate your concern. We have ensured that there is money in the Operation and Maintenance accounts. It is a zero sum game; we either allocate it to the Environmental Restoration account, or we allocate it to the O&M account. It is the same money.

Senator ROUNDS. I would accept that the Governors will tell you that we have two different titles that we operate the National Guard under, but clearly the guidelines coming from DOD that have laid out what the firefighting equipment is and how it should be handled, including the chemicals being used, is not under the control of a Governor and should not be expected to come out of O&M.

All I would ask is this. Would you help us in making darn sure that our National Guard bases have the resources, and not taken out of their other accounts, to fight to get these PFAS issues resolved one way or another and on an expedited basis?

Ms. SULLIVAN. We are fully supportive of putting the appropriate money in the account for the Air National Guard to be able to address this.

Senator ROUNDS. I look forward to working with you, and I hope Senator Gillibrand will join me again this year in making certain that we have an account set up so that these National Guard bases have the same protections as any other DOD facility would have. I thank you for your efforts.

Ms. SULLIVAN. Look forward to working with you, sir.

Senator ROUNDS. Thank you.

Senator CARPER [presiding]. Thank you, Senator Rounds.

Senator Cardin.

Senator CARDIN. Thank you, Mr. Chairman.

I am going to follow up on the issues of responsibility for remedial actions.

Secretary Sullivan, I appreciate your answer in regard to DOD taking responsibility for cleanup where it is clear that they are responsible for the contamination. In Maryland, we know that we have at least four military sites that have been declared—including White Oak, Fort Meade, the Naval Academy, Naval Research Lab, Chesapeake Bay, all of which have been determined to have contamination.

I want to get a little bit broader than this, Mr. Ross, as to the responsibilities for cleanup under the Clean Water Act. You are looking at a declaration that could very well require some remedial activities within our drinking water supplies, including our wastewater treatment facility issues. And the source of the contaminant may not be as well understood coming into our general water supply. Our managers are already stressed on the cost of improvements to the wastewater treatment facility plants. I just recently visited with Administrator Wheeler about an effort in Baltimore that we are doing in modernizing our wastewater treatment facility plants.

So can you just share with us how we can go about the remedial activities in holding those that are responsible for the contamination responsible, rather than putting additional burdens on our local governments or ratepayers that are already stressed?

Mr. ROSS. What you are getting at is the affordability issue, and that is an issue that I take very seriously. It is the affordability about just our wastewater, our drinking water, and our stormwater requirements as we grapple with aging infrastructure and all of those issues coming together. At the end of the day, it comes down to the single ratepayer, so we take our responsibility to think holistically about that ratepayer as we think about this.

Part of the answer to the question is a CERCLA answer, and it is one of the reasons why we are looking at the hazardous waste listing. You said if it is a groundwater source, and it is coming from a release, if we list those as hazardous substances, like PFOA and PFOS, that helps in the cost recovery aspects of the Federal Government or State and local government don't fund the cleanup, and there is another recovery mechanism there.

We have the grant programs that we have, the WIFIA program that I think you participated with Administrator Wheeler. It is a great program. So those are the issues that we have to take a look at, a site specific cleanup, can you find a way to pay for it for the responsible party, and that is one of the reasons that we are taking a hard look at CERCLA.

Senator CARDIN. I appreciate that. Our first objective is public health and safety, so that is No. 1, and I appreciate the fact that we are now looking at an assessment as to what is the appropriate level that we will tolerate. And moving toward remedial actions for levels that are higher than that.

As we go forward in looking at how to assess that responsibility, our first order also should be to prevent further contamination, so I hope as part of what we are looking at in the policies is that we prevent further contamination where we can so that we don't have to go through the costs of remediation.

But as we look at the remediation itself, holding responsible parties for the costs certainly needs to be part of the equation. We don't want to shortcut public safety, but we have to recognize the capacity of the ratepayers and of the local managers as to the issues that we are confronting.

So, I hope in your answer you weren't suggesting that we would use a cost analysis on public health, but a cost analysis as to how we are going to do the remedial work.

Mr. ROSS. Actually, this is why we have a holistic action plan, it is to reduce exposure where we have it, it is putting in the mechanisms to make sure that we are protecting public health is always our first priority, so developing the drinking water standards, the cleanup standards that we are talking about.

We are also looking, on the Clean Water Act side, whether or not we have technology based effluent limitation guidelines or water quality surface criteria. The Action Plan gets into all of that. Preventing future risk, our TSCA has a huge piece of the Action Plan as we are looking at new chemicals coming into the market.

I mentioned in my opening statement this is a multidimensional problem, and our Action Plan focuses on multidimensional solutions.

Senator CARDIN. Thank you.

Thank you, Mr. Chairman.

Senator BARRASSO [presiding]. Thank you very much.

Senator Capito.

Senator CAPITO. Thank you, Mr. Chairman.

Thank all of you for being here today.

My State, West Virginia, unfortunately is all too familiar with this issue. Our State faces PFAS contamination challenges from both a history of industrial emissions in Wood County, but also military use of firefighting foams in Berkeley County.

The Federal Government, in my opinion, needs a comprehensive approach to addressing this challenge. To be comprehensive, I think we need a three pronged solution here. One is identifying and preventing potential emissions of PFAS into the environment in the first place; two is protecting the drinking water sources through technical assistance and a maximum contaminant level adapted to the costs and challenges of sampling and mitigating PFAS, particularly in small rural areas, which is where, in my State, this is occurring; and then cleaning up any kind of legacy contamination.

I am working with Ranking Member Carper and Senator Gillibrand to try to do legislative approaches to this.

I am encouraged that EPA—and we talked about this, Mr. Ross, on the Action Plan adapting a holistic approach, but I am concerned that we are falling slightly short here. I always equate it to—which I think we all do on a personal level—if this was the water that your children and grandchildren were drinking, what would be the emerging level of concern, rather than having it occurring somewhere else. And I know at the heart of everybody we all feel that way, but when it is directly affecting you it really takes on a stronger urgency, I would say.

I am going to start with Ms. Sullivan because I think you were asked in a House hearing about how much PFOA and how much PFOS the Department of Defense currently has stockpiled, and the estimate of the cost to remediate this. Could you answer that question?

Ms. SULLIVAN. Honestly, ma'am, I don't know how much we have stockpiled. I can tell you that in 2016 we directed the military departments to stop using AFFF for testing and training and maintenance. They are not using it. So we are only using it where we actually have to fight a fire, which is a very limited circumstance. And in those occasions, we treat it as if it is a spill and contain it so it doesn't get into the groundwater.

We have taken all of the older versions of the foam that contained PFAS and removed them from the supply system and disposed of them.

Senator CAPITO. Disposing of them. Are you burning them?

Ms. SULLIVAN. Yes, we are.

Senator CAPITO. And what kind of air exposure do we have with burning PFAS?

Ms. SULLIVAN. We send it to EPA permitted hazardous waste incinerators that have the appropriate temperature and dwell time.

Senator CAPITO. Would that be one in East Liverpool, Ohio?

Ms. SULLIVAN. I honestly don't know, ma'am. I am not sure.

Senator CAPITO. The report is that that is where you are burning it. Then is there testing in the air? Is that EPA's——

Ms. SULLIVAN. That is EPA's permitting process. I would defer to them.

Senator CAPITO. Right.

I know, Mr. Ross, you are not Air, but do you have a response to that?

Mr. ROSS. I don't know that specific facility, but I do know that we are, as part of our research strategy, taking a look at, particularly our Office of Research and Development scientists, on how to monitor stack emissions and taking a look at—because I worry about the lifecycle of these chemicals. You take them out of water supply. Are we just transferring the media to which we have a problem? So our research scientists are taking a look at emissions testing and figuring out how we can monitor for that——

Senator CAPITO. Is that part of the Action Plan that came forward?

Mr. ROSS. It is part of the Action Plan. It is part of our holistic approach, yes.

Senator CAPITO. And I think some of the criticism of the Plan that was put forward, that there was no time certain as to when you would be getting maximum exposure levels. I am sorry I missed the beginning of the hearing; I was chairing another subcommittee. Could you expound on that for me, please?

Mr. ROSS. Yes, I am happy to. In the Action Plan, we commit to proposing a regulatory determination this year. There is interest in us giving a very specific timeline on when we are going to finish that, and my commitment to Senator Carper and to you now is that we are going to move through that process as expeditiously as possible.

We have very specific requirements in the Safe Drinking Water Act that Congress gave us that ensure public participation, scientific integrity, all those issues. It is a long process, to be frank, but it is designed to make sure that we use the best science possible to make sure that we are making the right decisions, and my job is to make it as defensible as possible.

Senator CAPITO. Are you telling me, then, that now we don't have adequate science to make a judgment?

Mr. ROSS. Well, part of this panel is holistically we certainly need more science across the entire realm of the PFAS world. For PFOA and PFOS, we have occurrence data that we gathered as part of our unregulated contaminant monitoring rule from 2013 to 2015. That is our base data. We are gathering the new information that the States are gathering, New Jersey, Pennsylvania, Michigan, New York, others, as Senator Carper showed on his chart, taking all that information to figure out how do we grapple with a nationwide regulation.

So we have the data, we are working through the data, and the science is constantly evolving, so our scientists are taking into account all that new information.

Senator CAPITO. Thank you.

Senator BARRASSO. Thank you, Senator Capito.

Senator Van Hollen.

Senator VAN HOLLEN. Thank you, Mr. Chairman.

Thank all of you for your testimony today. My colleague from Maryland, Senator Cardin, mentioned that in Maryland we have four DOD sites, either because they are currently active or previous sites, where you found PFAS contamination, so my question is when you make those findings, is that information made available to the surrounding community, and in what form?

Ms. SULLIVAN. Thank you, sir. Yes, we have to make that information available. It is available through multiple formats. Most of these installations have what we call restoration advisory boards, which are citizen groups, so the information is presented to them at their board meetings, as well as we post it on the Web sites for each of the military departments.

Senator VAN HOLLEN. So all of that. OK.

Ms. SULLIVAN. All of that is posted.

Senator VAN HOLLEN. Because we have heard from some citizens' groups they have had trouble accessing the results of some of the testing. Not in Maryland, but elsewhere.

Ms. SULLIVAN. We always have challenges with some of our Web based systems because of security controls, but that is just something we work through on a day to day basis.

Senator VAN HOLLEN. Thank you.

Mr. Ross, DOD is obviously undertaking these studies and tests of their facilities. For other Federal facilities—and right now I am thinking of a NASA facility. We have Wallops facility in Virginia. A lot of Marylanders work there. For other Federal facilities, are they each responsible for detecting contamination on their sites, or is that something in the purview of EPA?

Mr. ROSS. Well, if they are Federal military facilities, the Department of Defense——

Senator VAN HOLLEN. All others I am thinking of.

Mr. ROSS. All others? There is a combination of both State oversight and Federal oversight. We rely on our regional offices to work primarily with the States, so if those facilities are not under the Department of Defense control, there will be a combination of State and Federal work together, and our regional offices basically provide the technical assistance to the States to do a lot of that work.

Senator VAN HOLLEN. So, in the case of Wallops, which is a NASA facility over near Chincoteague but right near the Maryland-Virginia border, we have had concerns raised by Federal employees who work there. Would that be something that EPA was directly involved in monitoring and informing the community about the risks?

Mr. ROSS. I don't know a lot about the details, but I am aware of the facility there, and I know that our EPA regional staff are working with the State and the local community to evaluate and provide the technical assistance, so I do know that we have people on the ground there at that facility.

Senator VAN HOLLEN. Got it. Now, with regard to the best way to measure the results, and I am learning from all of you, some of the earlier testimony indicated that you use a minimal risk level.

I believe that DOD used something called the Long Range Health Assessment, the LHA. Is that correct?

Ms. SULLIVAN. EPA is the Lifetime Health Advisory.

Senator VAN HOLLEN. Lifetime, all right.

Ms. SULLIVAN. Lifetime Health Advisory that they have issued.

Senator VAN HOLLEN. Right. So there are obviously differences in how you measure risks between the two. Is there any consensus within the scientific community about whether one measure is a better measure of risk to human health than the other? Is this part of the ongoing discussion? I am just interested to hear that there are these two different systems; one seems to be more—as you described it, Doctor—conservative than the other. Could you just describe which you think is the best way to measure the potential harm to human health?

Mr. ROSS. With a couple of Ph.D.s on this, I would certainly defer to the Ph.D.s. Part of this is the challenge is it depends on what you are looking at. So, for EPA, if you are looking at drinking water systems, we have our methodologies that we do to provide, in this instance, a health advisory, a Lifetime Health Advisory that will protect the most sensitive population over 70 years of consumptive use.

So, in that circumstance, as the drinking water experts and the toxicologists and our scientists do that work, that may be the most appropriate. In other circumstances, screening levels, our Superfund program, they work carefully with the ATSDR, there are different methodologies that will go after the screening levels to be more conservative.

So, I think where we look for the commonalities is the core science, the studies that we all rely on, the different endpoints, the health effect responses within each of the individual compounds, that is where I think is the commonality amongst all the Federal agencies.

And correct me if I am wrong, please.

Mr. BREYSSE. I think that is right. I think one important point we all need to note is that the science around these compounds, as Dr. Birnbaum mentioned, is emerging rapidly, so almost as we establish a benchmark for whatever purpose it might be established for, in a matter of months it may be out of date based on the new science that is emerging.

We have States that are establishing benchmarks that are different than the Federal health advisories, that are different than our minimal risk levels, so there is a landscape of uncertainty around these chemicals that we are having to deal with today, and that is all the more important that we work together as a Federal group of people to understand that landscape, work within that landscape.

It is OK to talk to people about uncertainty and what that uncertainty translates into. That is, unfortunately, part of the science where we are right now. It makes our job harder, but it also means that we need to focus better on how we all work together, communicate things.

So ATSDR's mission is to address community health concerns around these chemicals. We stand in front of communities on a weekly basis to talk about these issues, and we discuss all the var-

ious benchmarks that might be and what they might mean, and from our experience, when you address these concerns in an honest way, they understand it, and they get it. They like to use whatever is most conservative. That is understandable. They like to have clean drinking water. That is understandable. And that is what we should all be working toward.

Senator VAN HOLLEN. Got it. Thank you.

Mr. Ross, we may follow up with you on the Wallops facility specifically in Maryland just because there are continuing concerns, I think.

Thank you.

Senator BARRASSO. Thank you so very much.

Senator Duckworth.

Senator DUCKWORTH. Thank you, Mr. Chairman.

Sorry for my voice; my daughter brings home every cold from preschool, which is a Petri dish over there.

Ms. Sullivan, while testifying before the House Committee on Oversight and Reform Subcommittee on Environment, you stated that the total cost of cleaning up PFAS pollution could reach approximately $2 billion and that cleanup could take years. Is that correct?

Ms. SULLIVAN. Yes, ma'am, it is correct.

Senator DUCKWORTH. That is a staggering amount of money, and our military families really can't afford to wait for action, and they certainly can't wait for $2 billion—first to find $2 billion to try to fix the problem. I have proposed that every family on every base that has been found to exceed EPA's health advisory limit receive a point of entry water filtration system that is capable of removing PFAS contamination.

Ms. Sullivan, I believe this solution would cost much less than the $2 billion and could deliver results for families now. Would you support my request, and do you agree that this is a cost effective and swift solution in the near term?

Ms. SULLIVAN. Ma'am, actually, no one on our military installations is drinking water above the LHA. We addressed that problem in 2016. The $2 billion is associated with cleaning up the groundwater, not the drinking water. The drinking water has already been addressed; we have already expended the moneys to address drinking water. Again, no one on our military installations is drinking water above the Lifetime Health Advisory, and that hasn't happened since 2016.

Senator DUCKWORTH. What about other exposure?

Ms. SULLIVAN. Well, the various exposures are from products that they use that are the same as any other commercial products at this point.

Senator DUCKWORTH. I would love to see the data on that, if you could provide that to my office.

Ms. SULLIVAN. Absolutely.

Senator DUCKWORTH. Thank you.

Far too many communities worry about the quality of their drinking water in this country. EPA and DOD have failed to understand the scope of the PFAS problem, and they have failed to determine how to dispose of the chemicals which persist in the environment and our bodies and regulate the chemical.

Mr. Ross, I am concerned that the EPA has been captured by chemical interests who do not want to be regulated, and that is why EPA has been slow to act. The PFAS Action Plan says that EPA will begin the process, will begin the process of determining whether any PFAS chemicals should be listed on the Toxic Release Inventory, which will provide communities with information about when these chemicals are released into the environment.

How long will it take to finalize a rule that lists one or more PFAS chemicals on the Toxic Release Inventory?

Mr. ROSS. Well, the Toxic Release Inventory, the TRI, under EPCRA Section 313, is one of the many tools that we mention. The TSCA program is focused a lot on using the TSCA authorities in the market entry.

For that particular one, to list something on the TRI you have to take a look at whether or not you have the data to list and then whether or not it is still in commerce, so for PFOA and PFOS, for example, we have the data, we have the hazard data, but those are the older compounds of the legacy chemicals that have been then cycled out, and I think that is what Ms. Sullivan was talking about in the military world.

Part of the analysis under the TRI is which compounds have sufficient data to match the TRI listing criteria, and right now they are doing the evaluation on how to and whether to move forward on TRI.

Senator DUCKWORTH. OK. So, is finalizing this rule subject to the same arbitrary Trump administration executive order that says we can't implement a new rule until two old rules are eliminated?

Mr. ROSS. All of our rulemaking is dictated by and controlled by all the executive orders, so, for example, we go through Office of Management and Budget and do cost-benefit analyses for a major rulemaking because of executive order. So, should we move forward with the TRI rulemaking, we have a robust amount of regulatory actions that have been de-reg and regulatory, so, for the PFAS world I am not overly concerned about being able to move forward with the regulation if and when we need to.

Senator DUCKWORTH. Recent press reports describe a dairy farm in Maine whose milk was found to have levels of PFAS of more than 1,400 parts per trillion. The source of contamination ended up being a sewage sludge that the owners had been spreading on their fields as fertilizer for years. It turns out that using sludge as fertilizer is a common practice in all 50 States, raising the concern that there could be widespread PFAS contamination of milk, farmland, and drinking water caused by this practice.

Mr. Ross, what plans does EPA have to provide guidance to the providers or users of these types of fertilizers to regulate their use to ensure that similar instances of contamination don't happen elsewhere?

Mr. ROSS. Part of our PFAS Action Plan, one of the actions is doing the risk assessment on PFOA and PFOS in bio-solids. I am familiar with the Maine scenario, and also there is a dairy down in New Mexico, so we have already met with USDA and we are working on setting meetings with FDA to make sure the Federal family coordinates. But the sludge issue, the bio-solids issue is part

of our Action Plan, and we are taking a look at the risks associated with potential contaminants in bio-solids.

Senator DUCKWORTH. If you could keep us updated on those actions, I would appreciate it.

Mr. ROSS. I would be happy to.

Senator DUCKWORTH. Thank you.

I yield back, Mr. Chairman.

Senator BARRASSO. Thank you very much.

Senator Gillibrand.

Senator GILLIBRAND. Thank you, Mr. Chairman.

Can you also submit that to the full Committee so that we all have the feedback on exactly what you are doing in terms of the farms?

Mr. ROSS. Oh, sure. I am happy to. Thank you, Senator.

Senator GILLIBRAND. Thank you.

Thank you, Mr. Chairman and Ranking Member Carper, for holding this hearing. Addressing PFAS contamination is an urgent matter in my State. My constituents in New York—all across the country—I have been to so many States in the last year, and they have the same crucial issue; Michigan, New Hampshire, less so in Iowa, but New Hampshire, yes. It is a huge problem, and I learned about it from my backyard.

People are very worried, they are angry, and they desperately want leadership out of this Committee and leadership out of our country. Mothers and fathers in Hoosick Falls, New York, right down the road from my home, are crippled with fear about whether their children will be safe, whether the water that they bathe their children in, whether the water they cook food for their families in has created a toxin in their bodies, in their blood that they won't be able to recover from. It is a huge issue.

Dr. Breysse, you sat with me at the auditorium in Hoosick Falls High School nearly 3 years ago, and we heard the most heart wrenching, powerful testimony from these families.

PFAS is also hurting families near Stewart and Gabreski Air National Guard bases in New York because for years, obviously, as we heard from earlier testimony from Senator Rounds, it has been required that our firefighting training, our foam actually contains these chemicals.

Access to clean drinking water is a right, and protecting clean water must be central to the work we do for all of us. This is not a partisan issue. I am working across the aisle with Senator Capito, as she said, to draft legislation to address PFAS in our drinking water, which we will be announcing soon.

Dr. Birnbaum, I would like to start with you, because the health risks are really what certainly my constituents in the audience want to hear more about. We know there are serious adverse health risks associated with PFAS chemicals. The science is abundantly clear, as I have heard from the families affected. This is such an important and powerful issue. Could you talk about some of the health risks associated with exposure to short chain PFAS chemicals like GenX, which the industry has developed to replace PFOA and PFOS?

Ms. BIRNBAUM. So, there are a huge number of short chain chemicals. GenX, the industry has actually conducted studies

which have shown that these chemicals impact the liver and other tissues and actually cause tumors in both rats and mice in those studies. That is GenX. GenX is eliminated from the human body quite rapidly, but it essentially is never eliminated from the environment. The problem with all of these chemicals is that the carbon fluorine bond is extremely difficult to break down, so these are chemicals that are essentially forever in the environment, even if not in our body.

Some of the other short chain chemicals—recent results from the National Toxicology Program have shown that some of the short chain chemicals like PFBS, which is a four carbon chain sulfonated chemical, is associated with essentially the same effects as the PFOS and the PFHXS. There are papers published literally almost every day showing effects of many of the different short chains, as well as the long chains.

Senator GILLIBRAND. Can you tell us some of those effects from PFAS exposure, particularly for pregnant women and for children?

Ms. BIRNBAUM. There were papers that were just published this week showing impacts, for example, on increased risk of Type 2 diabetes in the offspring and increased risk in obesity in the children following in utero exposure. Also, evidence that gestational diabetes can be associated in the mother with exposure to some of the shorter chain compounds.

Senator GILLIBRAND. Do you think it is possible to develop a total PFAS or total organic fluorine method for testing and monitoring PFAS in our drinking water and groundwater?

Ms. BIRNBAUM. There are methods that are being developed to look at total organic fluorine. It is very important, if you are dealing with water, that you are able to distinguish between the inorganic fluoride that is added to many of our drinking water systems for dental health from the organic fluorides, and there are several methods that are currently being used and being further developed.

I think it is also interesting that there are methods that are being used to measure organic fluorides in products and in human blood and serum.

Senator GILLIBRAND. Well, I would love some recommendations for the Committee on that, if you could put that in writing.

Ms. BIRNBAUM. Sure.

Senator GILLIBRAND. Dr. Breysse, I only have few minutes left, but what can the Federal Government do to prepare the victims of PFAS exposure for the serious health consequences, like cancer and kidney disease, that will expect to develop? And I ask specifically because through the 9/11 health bill we developed a medical monitoring program that is actually saving lives and making sure there aren't misdiagnoses, to making sure we have experts in the field who understand what these risks are so they can diagnose these illnesses early.

What do you think the Federal Government can do or should do?

Mr. BREYSSE. Giving advice to the clinical community is crucial going forward. When we go into communities, and we measure PFAS levels in people's blood for whatever reason they might be doing that, the first thing they do is they go to their doctor.

So we have an aggressive clinical outreach program as part of our work when we go into communities. We have guidelines for

physicians we publish on our Web page. We support, along with EPA, the Pediatric Environmental Health Specialty Units, which are clinical facilities that are designed specifically to answer questions like this, so we constantly refer the local medical community to our PEHSUs to get those concerns. We hold grand rounds to clinicians when we come into communities, and we are reaching out aggressively to communities about these issues.

Senator GILLIBRAND. Thank you.

Mr. BREYSSE. The medical communities.

Senator GILLIBRAND. Mr. Chairman, can I just ask for unanimous consent to include some statements from two of my constituents in the record, Mark Favors and Laurine Hackett, who is here, describing the experiences of their families resulting from the exposure to PFAS chemicals in their drinking water? As I said, these stories are heart breaking, and I just hope that all of my colleagues will take the opportunity to read them so they know the real intense, personal impact this issue is having on people's lives.

Senator BARRASSO. Without objection.

Senator GILLIBRAND. Thank you, Mr. Chairman.

[The referenced information was not received at time of print.]

Senator BARRASSO. Senator Markey.

Senator MARKEY. Thank you, Mr. Chairman.

PFAS substances have been silent terrors to communities across the country for too long. Residents of Westfield, Ayer, Devens, Hyannis, and several other towns across Massachusetts are haunted by the threat these chemicals pose to their health and the health of their children.

Mr. Chairman, I would like to submit to the record statements from Massachusetts residents concerned about the impact of PFAS exposure.

Senator BARRASSO. Without objection.

[The referenced information follows:]

27 Moseley Avenue
Westfield, MA 01085

March 27, 2019

The Honorable Edward J. Markey
United States Senate
255 Dirksen Senate Office Building
Washington, DC 20510

Dear Senator Markey,

My name is Kristen Mello. I am a resident of Westfield, MA - born and raised, and a co-founding member of Westfield Residents Advocating For Themselves (WRAFT), an ad hoc group of friends and neighbors whose mission is to provide community education and advocacy in response to the contamination of our natural resources. Thank you for the opportunity to share with you some of our experiences relating to the apparently permanent pollution of the groundwater supplying our City's North side. Please extend our thanks to Chairman Barrasso, Ranking Member Carper, and the other Members of the EPW Committee for holding this hearing *Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS).*

I first learned about the PFAS contamination of the Barnes Aquifer in September 2016. By this time, the bulk of our exposure to PFAS through drinking water had already occurred. Each of the four municipal groundwater wells that provide drinking water to the North side of our city taps into the contamination plume, being sited in between the fire training sites at Barnes Air National Guard Base and the Westfield River toward which the groundwater under the base naturally flows. In a letter dated May 3, 2018, Silent Spring Institute researchers advised the Westfield City Council that "PFOS levels in Well 7 were in the top 0.5% of all samples in public water supplies tested across the U.S.", indicating quite serious contamination. Research performed at the Colorado School of Mines indicates that groundwater polluted by aqueous film forming foam (AFFF) contains up to 40 distinct PFAS compounds, not all of which can be tested for by commercial laboratories[1]. There is also reason to believe that smaller chain PFAS and organic co-contaminants will reduce the effectiveness of GAC filters, and result in "breakthrough" of PFAS compounds in the finish water.

Since the City of Westfield owns the land beneath the base and surrounding the municipal wells, this creates a complex set of "potentially responsible parties", including the City of Westfield, State of Massachusetts, and National Guard Bureau / Dept. of Defense. The City of Westfield has bonded $18 million so far to address the issue with GAC filtration. To generate the money to pay these bonds, water rates were increased by 10% (compounded) for three years. During the City meetings discussing the bonds for water treatment, residents were advised that "Interim Remedial Action" on the part of the National Guard Bureau was not available because the Secretary of Defense was not authorized to enter in to a "Cooperative Agreement" with the City regarding this PFAS contamination

[1] Field, J.; Higgins, C.; Deeb, R.; Conder, J.. FAQs Regarding PFASs Associated with AFFF Use at U.S. Military Sites. August 2017. https://apps.dtic.mil/dtic/tr/fulltext/u2/1044126.pdf

and cleanup. Residents were further told it would take an "Act of Congress" to change that. Signed into law Sept 28, 2018, Section 8142 of the Conference Report accompanying HR 6157, provides that "act of congress". Alas, no Cooperative Agreement has been arranged for Westfield, and residents - the unconsenting victims of this PFAS contamination are left paying for inadequate filtration(under construction), bottled water, and medical bills with no assistance from State or Federal agencies, and are still exposed to PFAS from their tap. To date, no government entity has been willing to connect the North side residents of our City to a PFAS-free water source, despite an existing capped pipeline from the Tighe-Carmody Reservoir.

PFAS contamination has impacted the health of our City and residents. Absent full assessment and health consultation members of our community are left to wonder and worry about our health conditions and whether or not they are related. My own family suffers from thyroid conditions, non-alcohol related liver disease, ulcerative colitis that required surgery, abdominal masses, and immune system dysfunction. PFAS contamination eradicates your peace of mind. There is the constant worry about health effects to come; the pain and worry of health effects currently playing out; the guilt from having served it to your family, children, and pets; the violation you experience as you learn and process through the fact that you have been unknowingly poisoned for years and those who ***knew about it*** could have stopped it and did nothing. Lastly, the financial health of Westfield residents and people in other PFAS contamination suffers as victims are forced to purchase their own bottled water, home water filtration systems, medical copays and prescriptions, and lose money from lost time at work due to illness.

Residents of Westfield and other PFAS contamination communities need help from their government. We need **P**ublic involvement and transparency in the decision making process when it comes to addressing PFAS contamination. We need **F**unding for science in the form of increased laboratory capacity, public and provider education about PFAS, and research into PFAS health effects and safe elimination technologies. We need full **A**ssessment of the nature and extent of the contamination of our environments, bodies, and food supplies. Lastly, we need you to know that PFAS contamination victims need the legal framework to **S**upport our efforts to end our exposure and hold accountable those responsible. This Support comes in the form of peer-reviewed science based regulation and mandated reporting of PFAS in: drinking water, ground water, surface water, soils, composts & biosolids, and air; process discharges, wastewater, and air emissions; and consumer products and packaging.

Thank you taking these comments into consideration and submitting them into the official record of the hearing. I will be in the gallery on Thursday to witness the testimony for myself.

Sincerely,

Kristen L. Mello
Co-founder
Westfield Residents Advocating For Themselves
www.facebook.com/WRAFT01085
klm.wraft@gmail.com

To, Kristen Mello, WRAFT attending Senate PFAS Hearing Week of March 24, 2019

Statement and Question for Senator Markey at Senate PFAS Hearing please.

While the focus of PFAS is currently on water affected communities, this nation's fire service have been omitted from the conversation, we have no seat at the table, and have been omitted from the 100 million dollar PFAS study awarded to military communities, due to occupational exposure. We have had to hold bake sales and car washes to fund our own 'PFAS turnout gear studies' along with a large grant from Last Call Foundation of Boston. These studies will prove what PFAS chemicals are in our turnout gear ranging a span of the last 20 years. We had to procure new, never-worn gear via a grass roots efforts as the makers of our gear, who sit on every aspect of firefighter cancer prevention, refuse to discuss the chemical contents with us. Citing CBI.

This gear is degrading in our fire stations. This gear is degrading in our landfills. See the attached statement from Professor Graham Peaslee I read at the CLF and Toxics Action Center's Petition for Rule-making to Establish a Treatment Technique Drinking Water Standard for Per-and-Polyfluoroalkyl Substances on January 16, 2018 at Boston DES.

While we focus on the astounding number of PFAS contamination sites, with varying levels of MRL for PFOA or PFOS from state to state, I'd like you to please notice the fire fighter who is wearing turnout gear made with PFAS in amounts so staggering it is difficult to comprehend. The attached independent test results performed by nuclear physicist Professor Graham Peaslee of Notre Dame University and released in January 2018, were to test for PFAS in a set of 2004 new, never-worn turnout gear. This gear was purchased by myself, a housewife, who's firefighter husband suffered a career ending cancer. No turnout gear manufacturer or government agency stepped in to help us. In fact, the turnout gear manufacturers all vehemently defend that the gear is not made with PFOA. We will soon see if that is true when the results of 20 years worth of turnout gear are published by Professor Peaslee in the next 30 days.

In addition to the PFAS laden turnout gear, we have 58,000 fire stations going unchecked for well-water contamination. Only the state of New Hampshire has sent a ***'warning'*** letter to it's fire stations (attached). However, I maintain a list of 'fire stations' who are reporting elevated levels of PFOA in well water. These are not 'military' sites. These are municipal and rural fire stations.If the government is tracking these 'civilian' fire stations we do not know. It is my belief there is no such tracking taking place.

We have been omitted from the entire PFAS conversation. Is that because 65% of this nation's fire service will suffer a cancer diagnosis previously thought to be only from Products of Combustion? Quite possibly, it may not be Products of Combustion. Quite possibly, it is the Products of Deception.

I wish to ask Senator Markey ; ***"Why has the nation forsaken it's bravest?"***

Sincerly,
Diane Cotter
Rindge NH, formerly 58 year resident of Worcester County, MA.

Dear Chairman Barrasso, Ranking Member Carper, and Members of the EPW Committee,

My husband, Edward Mello, LtCol USAF, ret.; and I have lived in Westfield Massachusetts for over fifty years. My husband, a member of the Air National guard spent many hours at the base where fire fighting foam was used in fire suppression—both in drills for training and in emergencies. Nevermind the fact that our city water has been contaminated for years—a known fact by the Air Force and the US government agencies—water that was given to our children and grandchildren! Our family has suffered with thyroid issues, ulcerative colitis leading to surgeries, immune suppressive disorders and the potential of cancers. Surely now is the time to clean up a natural resource needed by all residents of the community. We pay for our water—shouldn't it be as pure as possible for our citizens?

Respectfully,

Ann J Mello
58 Vadnais St
Westfield MA 01085

I'm a lifelong resident of Westfield Ma. My drinking water has been contaminated. I have taken a more active role in the past year and I have learned more about the effects and harmfulness of the forever chemicals in my water. At first, I was mad no one in my community (elected officials and city workers) seemed concerned or informed me of what I have been drinking. I now buy my own water and I am always thinking twice before I drink water wherever I am. I do not water my vegetables garden anymore. I wonder how this chemical will affect me and my family. I wonder if this chemical caused the illnesses in my family members who have the same health problems I have. I wonder if the students I work with are affected by it. I wonder if the increase in learning difficulties and lack of executive functioning skills are caused by this chemical. I wonder why there are so many people in my community that are sick and dying. I wonder why no one seems concerned and eager to fix the problem and seem to think it's ok I still drink it. I wonder why other communities get help and funding and why mine does not. I wonder how long we have to wait for people to make effective laws to protect our health and safety.

Diane Pighetti

Westfield, MA

Susan Dubilo, RN, BSN, MA in Nursing
6 Long Pond Rd
Westfield, MA

March 24, 2019

Chairman Barrasso, Ranking Member Carper
and members of the committee
US Senate Committee the Environment and Public Works
Washington, DC

Dear Chairman Barrasso and members of the committee,

Five years ago I relocated to Western Massachusetts, namely Westfield, MA to marry a man I had met six months ago on "OK Cupid!" online dating site. What were the chances that a sixty-eight year old woman would find love again with a handsome, fun and loving man who happened to live right on a lake, loved being on and in the water like me, and was a great dancer to boot? Fantastic! I thought I was going to live out my golden years in a dream come true kind of situation. Pretty lucky, blessed, or whatever you want to call it!

One aspect of this wonderful new life adventure was not so lucky, nor was it a blessing. What I didn't know is that the water I would be drinking and cooking with during the first several years of my life here would be loaded with unsafe levels of a toxin called PFAS. This particular toxin, along with other poisons in the Westfield water system, would add to the toxic load of carcinogens and other poisons that had already built up in my system over the years. Taken into the body over time, these toxins have been proven through sound medical research to cause diseases like cancer and neurological disorders, such as Parkinson's Disease. This is a well known and established fact. I already had both cancer and Parkinson's Disease before I moved here. Now living in Westfield and ingesting this water, my body was still, little by little, slowly but surely, being poisoned even further.

And wouldn't you know, I landed in Westfield at a point in time when levels of these poison contaminants were very high.

As a breast cancer survivor (8 years) and a person with Parkinson's Disease (7 years), I have been thinking a lot about how I ever "happened" to get both these rather serious diseases. Cancer could kill me fast, if it comes back again. I live in fear of that. Parkinson's Disease is indeed killing me slowly. That's for sure. They say you don't die directly from Parkinson's Disease nor does it directly affect longevity. However, in the Parkinson's Disease monthly support group that my husband and I have helped to run, I have seen the various effects this disease has on the quality of life of the people in the group. Bottom line: There's nowhere to go but down.

Some PD folks have a hard time walking and can't stand up straight. Others shake a-lot, loose the ability to feed themselves, and are embarrassed to be seen in public. They can become socially isolated. Some folk's voices are nearly inaudible. Some have difficulty swallowing. There are many other problems as well, like digestive issues and constipation. Parkinson's Disease can and may affect every system in the body. It affects all of us differently. Most people progress from canes to walkers to wheelchairs to beds. Many suffer from depression and/or anxiety. Everyone's downward slide is different. One's ability to care for oneself gradually diminishes. Overall quality of life declines. Not only for the person with Parkinson's. For the husbands, wives, and partners, called "care-givers" or "care-partners". And you better have one. Or into one of the black holes called "Nursing Homes". Every PD or older person I know considers that a "fate worse than death".

What will my downward slide be like?

My highly competent, well respected cancer physician is Dr. Grace Makari-Judson, MD, who heads breast cancer services at Baystate Medical Center, the premier medical center in the Greater Springfield, Massachusetts area where I live. She is also a Professor of Medicine at U Mass Medical Center-Baystate. She gave me this valuable advice during my first visit with her about five years ago when relocated to this area: "It is important to stop doing whatever you were doing to get cancer in the first place." That got me thinking.

Cumulative toxic load. It's probably not one big thing you do, like falling on ice and breaking your leg, like I did last month, that gives you diseases such as cancer and Parkinson's Disease. It's the little things you do every day over time that damage your body and destroy those Golden Years I was hoping for.

What did I do wrong knowingly or not? What mistakes did the people who raised me, my parents, make knowingly or not? Is there anything I can change now to help prevent a reoccurrence of cancer? Can I slow down the PD downhill slide?

Possible/probable causes of cancer/PD:

1) Chest x-rays every six month's between the age of 5 and 10 to check for TB, which my uncle who lived with us had contracted. Having so many of these x-rays to the chest area especially at an early age can be carcinogenic.
2) Pesticide, herbicide and other toxins in or on food (vegetables, fruits, etc) ingested daily until only several years ago. Who knew about organic? My father, who owned a grocery store and handled pesticide laden fruits and vegetables seven days a week for over 50 years, did get PD and died from "complications of PD". As the disease progressed he lived with my sister and her husband for several years, until it got to the point where they couldn't handle his care anymore. He became wheelchair bound and eventually bedridden. In the end, stuck and languishing in a sorry-ass Nursing Home, he couldn't breathe. One day he said to his physician: "I thought you said I was going to die?" He wanted a quicker end to his pain, discomfort and loneliness.
3) Hair dye for 20 years practically every week. Cosmetics and skin care products loaded with parabens and other poisons that are now known to cause both of the diseases I have, or have had, or could get again. Use of toxic cleaning products, etc.....
4) The list goes on and on, but you get the picture.

Changes on the individual level:

1) Careful with more x-rays, though some can't be avoided.
2) Eliminate or reduce all environmental toxins as much as possible. They are everywhere: in our food, water (as noted, especially high in Westfield MA especially when I first moved here five years ago and knew nothing of their poisoned drinking water), air, cosmetics and skin care products, cleaning products, etc...

It is not easy to change patterns of living. Once you start exploring where the toxins exist in your overall environment, through organizations such as the Environmental Working Group (EWG), Silent Spring or the Massachusetts Breast Cancer Coalition (MBCC), for example, you can become overwhelmed fast. There are, in fact, so many changes to make, it is hard to know where to start. However, it's a matter of life or death, and quality of life, especially for those of us trying to stay happy and healthy in our older years.

I have started "No Toxins Please!" programs in both the local/regional cancer and Parkinson's Disease communities. Maybe people can learn to make positive changes together, supporting each other along the way. We invite speakers to talk to us about toxin's that exist in our food, water, air cosmetics/ skin care products, and cleaning supplies, etc. We ask questions; we discuss solutions and search together for better, healthier solutions or alternatives. The speaker's are reputable researchers, physicians, advocates in the environmental health field. The programs, especially within the cancer prevention (occurrence and reoccurrence) communities, have really taken off.

I believe each of us is responsible for the choices we make through life for ourselves and our families, including of course our kids. It is a fact that babies in uterus and human beings through childhood and adolescence are even more susceptible to the effects of environmental toxins than are adults. Important to keep in mind. The cancers and neurological diseases may not show up until years later.

Changes on the community level:

In addition to our individual responsibility, we have to hold our community leaders responsible for their actions or inaction.

1) The civic leaders in our town must do everything they can to correct the negligence of the Westfield Barnes Air Force Base that poisoned so many of our citizens over many years. Really clean up the city's water supply, removing all of the PFAS, or as much as is humanly possible, so none of us continue to add to whatever levels of toxins are already in our systems, including our children's systems. I repeat, do not add any more poisons to those toxic loads that are already present in our bodies. What the EPA says is OK is not OK. Their established and published safe levels are not really safe.
2) Find out what the organization WRAFT, Westfield Residents Advocating for Themselves, says about safe levels of PFAS, if there is one. People like WRAFT leader Kristen Mello and her gang know and care about what is safest for us. They have a firm handle on what is happening in the Westfield government and community to hopefully correct the still unsafe water situation. They know what must be done to help those people and families who, probably unknowingly, were negatively affected in years gone by.

I hope Westfield is chosen for one of the six communities to be studied. We sure have had the problem. We have a strong, active advocacy group pushing for corrective measures on the town governance, civic level. We have "No Toxins Please!", a community health education program organized through a joint project sponsored by The Cancer House of Hope in West Springfield and the Cancer Connection in Northampton. Again, the speakers include leading cancer researchers, doctors, community educators and advocates from a University of Massachusetts Cancer Research project and the School of Public Health. It's a great start or addition to community education for effective change.

We are set up to turn things around.

I hope you choose us.

Susan Dubilo, RN, BSN, MA in Nursing
Westfield MA resident
Breast Cancer survivor
Person with Parkinson's Disease

Cape Alliance for Pesticide Education
PO Box 631
West Barnstable, MA 02668
(508) 362-5927 info@greencape.org
Non-Toxic Strategies for a Sustainable Cape Cod

March 26, 2019

Senator John Barrasso, M.D.
Chair, Senate Committee on Environment and Public Works
307 Dirksen Senate Office Building
Washington, DC 20510

Senator Thomas Carper
513 Hart Senate Office Building
Washington, DC 20510

Chairman Barrasso, Ranking Member Carper, and EPW Committee Members:

On behalf of GreenCAPE and the PFAS-exposed community of the Hyannis, MA, community I am calling your attention to the serious environmental and public health crisis that continues to impact the Town of Barnstable and its residents. We respectfully request your help in getting Hyannis and other MA communities the assistance they need to move forward and be assured their water will be clean and protected from further pollution.

Cape Cod's exposure to PFAS (per and polyfluorinated alkyl substances) via contamination of drinking water supplies has not been remediated partly due to the considerable expense. This PFAS class of compounds poses threats to health due to persistence, bioaccumulation and toxicity-- according to a publication of the National Institutes of Health. https://www.ncbi.nlm.nih.gov/m/pubmed/19759456/. In my town of Barnstable, the residents of Hyannis, Hyannis Port, and West Hyannisport have been exposed to PFAS-contaminated drinking water for at least 4 decades without benefit of filters for most of that time. The PFAS-affected water district serves a State and Federally recognized Environmental Justice Community. Most residents do not have the resources or time to learn about their health risks or pay for special water filters or health monitoring. Many do not speak English and are altogether unaware of the risks from the water that supplied the hospital, several schools, businesses and residences for decades.

The Barnstable County Fire and Rescue Training Academy (BCFRTA)-the primary source of this PFAS contamination-is continuing to train with high volumes of water which continually move the PFAS contaminants in the soil into the Hyannis water supply wells. Wells have had to be taken off-line, expensive filters installed which require costly maintenance, and in addition, water is purchased from other suppliers at great expense. Only long chain PFASs are removed with the filtration method; short chain PFASs remain. The tourist season-during which our population triples-adds considerable strain to the system. Firefighter's health suffers from their exposure to the AFFF (aqueous film-forming foam) product and at the training site which is saturated with PFAS, through their drinking water and their turnout gear permeated with PFAS.

The Town of Barnstable is responding to the crisis as effectively and efficiently as possible despite the significant effort and monies to manage the contamination and the seasonal draw on the system. What is needed is a strong commitment from our Senators for the following concrete actions to adequately address the health and economic needs of affected residents and businesses:

1. **Nothing about us without us.** Impacted community members are critical stakeholders and need to have their voices heard. As those most affected by this crisis, they deserve to have strong involvement in any decisions made regarding their water supply and the future of the polluting site. Training at the BCFRTA should be discontinued until the site is fully remediated and no longer pollutes the well fields. In the spirit of concerned cooperation, we have already filed for a Public Involvement Plan Site status with the responsible party and MA DEP but have yet to be contacted for a meeting regarding this site.

2. Create a National/State PFAS Action Plan that includes enforceable drinking water standards that are science-based and protective of infants, children, and our most vulnerable populations, and for the combined total of all detectable PFAS. The process must be open, transparent, and thorough, and must include

voices and perspectives of those most impacted by PFAS contamination. **Related to this is our strong desire to see PFASs regulated as a chemical class and not individually which could take decades since all the PFASs have not even been identified. Public health would be better protected by regulating them as a class.**

3. **Improve in-state laboratory capacity and technical assistance for identifying all PFAS** in air, water, soil, and biomatrices (blood, fish, shellfish, produce, meats/livestock, dairy, eggs, honey, cranberries etc.). Public health advisories should be promulgated and widely advertised to minimize further health effects. Towns rely on the State and the EPA for scientific expertise and need the guidance for health protective regulations, so they can better understand the scope of the problem and find appropriate solutions to mitigate effects on residents and the economy. The federal government should allocate monies for these critical needs. If EPA was acting in accordance with their mission, PFASs would have been designated as hazardous substances and these communities would have been given Super Fund status along with the financial ability to clean up. Exposed residents should be provided with PFAS blood testing and health monitoring upon request due to their decades-long exposure via the public drinking water.

4. **Map the plumes.** A clear contamination plume has yet to be established even after several years but while it is well documented that PFAS have migrated more than 1500 feet from the training site, the margins of the contamination have yet to be delineated. Why the delay??? Nevertheless, the training continues, and intensified use of the site is planned. Continued application of water to contaminated soil -already averaging 680,000 gallon per year- even without the proposed expanded use--will drive the PFAS further off site into the ground water of a Sole-Source Aquifer in a Zone II, 1500 feet upgradient of public water supply wells- even as it exhausts ground water capacity. Hyannis constituents needs your IMMEDIATE attention. The site requires more aggressive treatment and immediate closure. Fire training at the site should cease immediately. The overriding priority must be public health.

5. **Improve public outreach about mechanisms of exposure and avoidance of PFAS.** This is more critical for communities already at risk from their water supply. Create and supply simple materials in several languages about where and how PFAS are created, used, and discharged and how to avoid them.

6. **Support changing the military specification to allow for PFAS-free firefighting foams in MA.** Governments around the world no longer use these fluorine-based foams. Washington state has restricted the sale of PFAS foams for their local firefighting districts and adopted a ban on training with PFAS foams at any facility, including airports. Massachusetts can do likewise. While these foams remain in use, further contamination of our drinking water and the environment is inevitable. We ask that EEA and DEP actively support changing the DOD's military specifications by helping to explore non-toxic alternatives to AFFF and eliminate the use of firefighting foam containing PFAS. Collections of old PFAS-containing AFFF should not be incinerated, but instead, stored securely until a safer method of destruction is determined.

7. **Blood Testing and Biomonitoring of Exposed Communities.** Lastly, but very importantly, we are requesting financial aid for exposed communities to determine the extent of their PFAS body burden. Exposed residents can provide the results of their blood analyses to their primary care providers who will be more informed about the direction of their future health care. PFAS-exposed communities everywhere will benefit from this program which the MA Department of Public Health has been unable to fund.

We are asking our Massachusetts Senators to be leaders on the issue of PFAS contamination as Senator Shaheen has been for New Hampshire. Pollution of drinking water impacts many MA communities, but Cape Cod is particularly vulnerable as it is an EPA-designated Sole-Source Aquifer. We are drinking our groundwater along with everything else that percolates through our sand bar. We need to protect this precious resource for our health as well as our economic lifeline- the tourism and fishing industries upon which Cape Cod depends.

We are asking for your help to swiftly provide the assistance outlined above to our communities. We appreciate your support and engagement on this issue. We look forward to further opportunities to work together on ways to address the PFAS crisis facing us all.

Sincerely,

Sue Phelan, Director
GreenCAPE
P.O. Box 631
West Barnstable, MA 02668
508.494.0276
www.GreenCAPE.org

Dear Senator Markey,

I was born in 1977, the same year my city drilled wells to service the northside of our town. In 2016 I found out that the wells sit directly over a plume of PFAS contamination from Fire Training used with AFFF at our National Guard Base. Since becoming aware of my life long exposure, I have become an advocate for my community. I have taken many hours away from my family learning about our exposure and fighting for laws to protect public health and create accountability for polluters. I am not a scientist, a politician, or a lawmaker. I am a member of five generations who were and who continue to be exposed to PFAS. I am a mother who wants better for her child and those she loves. Below is a punch list of thoughts, in no particular order, relative to the last 3 years of my life after learning of my exposure and battle against it from continuing to happen.

1. How much of this is in my body and what is it doing to me?
2. I thought my child was less exposed because I nursed him and didn't boil water for formula. I learned that because this bioaccumulates, he was exposed before he was even born and continued to be from my breastmilk. There are studies about exposure from breast milk.
3. Exposed community members should not have the burden of cost for cleanup. Our property taxes and water bills are rising to pay for filtration that cannot even guarantee PFAS free water. We are an environmental justice community and many people are getting taxed out of their homes.
4. I saved up and invested 350 dollars on a filtration system and the same week I received it I learned from The Colorado School of Mines that the system is not effective at removing short chains. I use it anyway because I am saving for RO. I do not feel secure.
5. Imagine going to make your family dinner and realizing you do not have enough filtered water to make pasta. Imagine not having the money for filtered water and making the pasta anyway because your children need to eat. Imagine having to think about the water that comes out of your tap, all the time.
6. Our community has received NO assistance and NO remediation from the DOD even though phase 1 of the CERCLA process is complete. No water, NO interim remedial action is allowed because there is no MCL and EPA has not declared this a hazardous chemical. It's on us, the cost of filtering, the cost of bottled water, the medical bills and the illness, stress and worry.
7. MA is seriously considering matching Vermont's standard of 20ppt for 5 PFAS. Our water is currently pumping out 30ppt with temporary filtration installed.
8. States are being more proactive than the EPA and setting lower standards, heeding the warnings of science. DOD says they will not honor State MCLs. This is wrong, unfair and unhelpful to all who have been exposed and those who spend endless time educating and advocating for protection of public health. One step forward, 12 steps back.
9. We have a clean water source available to our community and our city officials refuse to connect.
10. 70ppt Health Advisory for 2 PFAS by EPA is not protective of public health. It is shameful. They are willingly allowing the poisoning of millions of people.
11. It is the EPA's job to protect public health. They are failing.
12. We need continued acknowledgment of the HEALTH CRISIS that this is, coming from the top. Without hearings like this, it is unlikely anything will be done. That is wrong. Community members like myself need backup. I have been called hysterical, fear mongering, radical,

and have been harassed my local officials. All because I took the time to educate myself about exposure to these harmful substances. All because I am trying to help inform members of my community so they can better understand how to protect their families. All because I want better for my child and future generations. Something is wrong with that!

13. Maureen Sullivan keeps referencing that DOD only contributes to a very small percent of PFAS on the market. While that may be true it is trivial. It minimizes the problem. It doesn't matter how little they use. It matters that all my life I have had poison in my water. The contamination to my water was done by them. Families like mine, bathed in it, swam in it, grew food in it, cooked with it, drank it and made for formula for their babies with it. The effects through human consumption over decades is surely worse than other avenues of exposer. Bottom line, MY EXPOSURE SHOULD NOT BE MINIMIZED.
14. People are sick, they are dying, they are financially burdened, they need education, information needs to be put out in multiple languages so everyone can be informed.
15. Impacted communities need funding for blood testing, education, research.
16. How much has this plume of contamination spread to different parts of my community? Who is responsible for property degradation? How many people watered their lawns and vegetable gardens with high levels of a toxin. How has ingesting through homegrown food increased their health risks? How and can they remediate the soil.
17. Are the known cancer clusters and illnesses in my neighborhood and community a result of PFAS in our drinking water for decades?
18. It took a century and 16 years to regulate lead, one chemical. PFAS is a class with thousands of compounds. If EPA refuses to regulate as a class how long will it take to keep humans safe from exposure? It is necessary to demand they regulate PFAS as a class immediately. How many more people need to suffer and be burdened before they act appropriately?
19. EPA CAN NOT guarantee the protection of public safety for 70ppt for two PFAS but it is what they are doing. In fact they admitted that that health advisory is NOT PROTECTIVE OF VULNERABLE POPULATIONS, (elderly, children, infants, immune compromised, and those who have already been exposed for decades and live with high levels in their bodies already. That is WRONG! Why can't they regulate as a class if they can't guarantee it is harmful but set standards that they admit aren't protective? EPA needs to prioritize protection of public health and stop giving these known carcinogens the benefit of the doubt.
20. It is time to demand our agencies do what is right. There is enough science to back up why it can and should be done now. Please help us try to accomplish this.

Thank you for reading my thoughts and for your patience with my frustration. I could go on and on. It is encouraging that this issue is before congress and I appreciate your attention to this matter.

Respectfully,

Karen Pighetti
Westfield, MA

Dear Chairman Barrasso, Ranking Member Carper, and Members of the EPW Committee,

I grew up in Westfield, MA. I have two daughters who were breastfed as infants. The oldest who was born in Boston was diagnosed with Hashimotos disease at 11 years and my youngest born in 2003 in Springfield, MA lived in Westfield, MA - almost died and was diagnosed with type 1 diabetes at 15 months. Where is the concern for the citizens who can't speak for themselves?

Marianne Zimon

Holden, MA 01085

Stephen Seymour
179 Plum Street
West Barnstable, MA 02668
508-362-5172

March 26, 2019

Re: Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS).

Chairman Barrasso, Ranking Member Carper and EPW Committee:

I worked in Hyannis on Cape Cod for 32 years and drank the water daily, not knowing that I was drinking diluted firefighting foam that contaminated the public drinking water wells with PFAS from the Barnstable County Fire Training Academy.

After 8 years of thyroid problems including numerous negative biopsies and a surgical removal of half of my thyroid, my specialist urged me to have my thyroid totally removed due to the increasing size. Post-surgical pathology determined I had thyroid cancer. The surgeon requested a special consult to confirm her finding and that pathologist reported that he had never seen such an unusual thyroid tumor.

I am aware that my thyroid cancer may be due to another cause other than the contaminated water I drank for 32 years. However, recent studies, including the C-8 study, include thyroid problems and other cancers as health issues that may be associated with exposure to PFAS. I have concerns about my future health.

I am also very concerned about the residents in Hyannis where I worked and particularly the environmental justice community there who may still be unaware of their PFAS exposure and how to mitigate it. While the Hyannis water district has been proactive in treating the water to meet the EPA provisional health advisory, this occurred only after the water supply had been contaminated for decades. However, knowing that the PFAS bioaccumulates in our blood and organs, the current EPA health advisory does not go nearly far enough. Our young

residents have been exposed to PFAS since before birth and throughout their lives.

It is well past the time for the Federal Government to enact a national enforceable standard for drinking water, groundwater, soils, and foods. Also, PFASs should be regulated as a class, for the combined total of all PFAS- not chemical by chemical.

Additionally, there needs to be State and Federal funding to assist water systems in meeting these enforceable standards. The financial assistance is especially for the towns comprising large environmental justice communities, such as Hyannis and Westfield, MA.

Finally, the contaminated site at the Barnstable County Fire and Rescue Training Academy should be closed immediately and cleaned up by Barnstable County. Barnstable County has been determined by the MA Department of Environmental Protection to be the Responsible Party for the contamination, but the County has been extending the timeline on the cleanup to accommodate their bottom line. Continued use of the site exacerbates the problem and shifts a significant burden of costs of special filtration systems, purchased water, and the drilling of new wells to the Town and residents. A clean up of this contaminated site and the public drinking water supply of a popular tourist destination- and its economy- has little chance of succeeding unless the Federal Government establishes a health-protective MCL for PFAS as a chemical class and declares all PFAS chemicals as hazardous substances. PFAS contamination is a national crisis and needs to be addressed immediately.

Thank you for your consideration of my comments-

Stephen Seymour
179 Plum Street
West Barnstable, MA 02668
508-362-5172

Mary O'Connell

25 Old Park Lane

Westfield, MA 01085

Senator Ed Markey

255 Dirksen Senate Office Building

Washington DC 20510

Senator Markey, I am a resident of Westfield Massachusetts. I am also a retired City Councilor of our City. Over the past decades I have learned of many neighbors in my City who have dealt with cancer, asthma, Parkinson's Disease, and many other diseases. Men, Women and children have all been victims. Our City's major aquifer that supplies water to the northern side of Westfield lies under the Air National Guard Base at Barnes International Airport. During the past many decades Air National Guard staff have practiced fire prevention drills using chemical foam that finds its way down through the ground into our Aquifer. We have learned that this foam contains many poisonous chemicals and most likely is the root cause of the ill health of so many in our Community. We appreciate your involvement on the Environment and Public Works Committee and count on you to thoroughly examine and scrutinize the Federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS). One of our residents, Kristen Mello, will be at the hearings representing our City. Thank you for working to protect the health of our Citizens. We are depending on you to help us on this most important issue.

Mary O'Connell

MOCONNELL25@COMCAST.NET

City of Westfield, Massachusetts

Dear Chairman Barrasso, Ranking Member Carper, and Members of the Committee:

I am pleased that the CDC/ATSDR will be conducting an exposure assessment for those who consumed water from the Barnes Aquifer (BA) in Westfield, MA, but I believe more immediate action is necessary to protect the citizens of our community. We desperately need a second source of drinking water!

As an At-Large City Councilor, I have always advocated for the public health and safety of my constituents and the recent challenge in the provision of safe drinking water and restoration of our BA) is of utmost importance! We are not sure if these wells will ever deliver safe drinking water again without filtration as ongoing and future testing will reveal, but I believe it's our immediate responsibility to find alternative sources for the north side of our city.

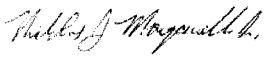
For now, we have bonded for, installed and will construct another Granulated Activated Carbon (GAC) filtration system for the wells that draw from the BA, but these have resulted in excessive costs and inefficiencies in other communities around the country, not to mention breakthrough of chemicals and the problem of disposal of the PFAS Carbon when it needs replacement.

PFAS Fire fighting foam use for decades at Barnes Air National Guard Base, which sits on the aquifer is the reason for our problem today. This is the source of the contamination and we need to totally eliminate all use of this chemical across our nation.

- In what way can you assist the residents of Westfield, MA. in cleaning up the contaminated soil and water where fire extinguishing drills were conducted?
- How will the DOD be held accountable and responsible for contaminating our water supply?
- What assistance can you give us in the pursuit of an alternate source of drinking water for our city?

Thank you for your time and attention to this very important public health and safety matter.

Respectfully Submitted,



Nicholas J. Morganelli Jr.
City Councilor At Large
Westfield, MA
Nicholas.Morganelli@cityofwestfield.org
413-949-0165

Senator MARKEY. Thank you.

We have Kristin Mello from Westfield who is in the audience here today.

EPA Administrator Andrew Wheeler recently stated that climate change isn't his top priority; the most serious environmental threat we face is access to clean water.

First, addressing climate change is inextricably linked to access to clean water. The more pollution we have in the air, the more we have in the water, the less available the water is for drinking, our recreation. That is just a fact scientifically.

Second, EPA has identified more than 1,000 PFAS chemicals historically approved for use in U.S. commerce, yet the EPA has narrowed its major actions to focus on just two of these chemicals present in drinking water; not 1,000 chemicals—two.

Third, just 2 weeks ago EPA submitted its budget request for 2020 that cuts funding for clean water by almost 40 percent. Cuts the budget for clean water by 40 percent; the Trump administration. Apparently, EPA's hypocrisy knows no bounds.

Mr. Ross, testing and cleaning up PFAS contamination is very expensive for States and localities. Just cleaning up contaminated wells in Barnstable, Massachusetts, cost nearly $3 million. Do you agree that fewer EPA resources for clean water may put more financial burden on States and towns that are worried about PFAS contamination?

Mr. ROSS. Related to PFAS contamination, of the action items within the Office of Water, under the proposed budget, I will have the resources I need to implement the Action Plan items. And our loan programs, the Drinking Water Revolving Funds, are very, very powerful tools. There is a very significant corpus in those loan programs that States can tap into to provide both technical assistance and infrastructure developments.

Senator MARKEY. So no city, no State will have to worry that the funding won't be there for them, is that what you are saying?

Mr. ROSS. That is not what I said, Senator. What I said, like today——

Senator MARKEY. You are saying for the plan that you have for them. But the problem is your plan doesn't match the magnitude of the problem. That is the point that we are making. A vision without funding is a hallucination. To say you have a plan, but we are not going to do all the chemicals, to say we have a plan, but we are not going to have the same amount of money, you wind up saying the plan will not be adequate.

So that ultimately becomes the problem, because despite Andrew Wheeler's stated commitment to clean water, EPA acted faster than William Barr declaring no collusion when it came to dismantling the clean water protections under the Waters of the United States Rule. The EPA even denied a request from 36 Senators and 160 Congresspeople to extend the public comment period for this disastrous action. But when it comes to cleaning up our water from toxins like PFAS, lead, copper, and other toxic contaminants in water, the EPA slows to a snail's pace.

The recently announced EPA Action Plan on PFAS is unfortunately more an inaction plan since it lacks any real deadlines or timeliness for protections.

Mr. Ross, could new PFAS forever chemicals be brought to market and put into our environment even as EPA struggles to address and understand the current scope of contamination?

Mr. ROSS. Right now those new chemicals to market go through the TSCA program, which was enhanced in 2016 with amendments to the TSCA program.

Senator MARKEY. So you can add.

Mr. ROSS. What I am aware of is as they go through the screening process in the new chemicals program, they look at the hazard data that is submitted, they take a look at exposure assessments. At this point I think only one chemical in the last 2 years has come through and into the market, but there are a lot of variety effects of that.

Senator MARKEY. So, total, how many new PFAS chemicals has EPA approved?

Mr. ROSS. Under this Administration, I am aware of one.

Senator MARKEY. One. So, 2 years ago the EPA set a Lifetime Health Advisory level of 70 parts per trillion for two chemicals in the PFAS family. Since then, several States have set or proposed their own limits, almost all of which are lower than the EPA's.

Ms. Sullivan, will the Department of Defense commit to meet lower State cleanup levels when working to remediate Federal facilities contaminated with PFAS?

Ms. SULLIVAN. Sir, first of all, I grew up in Massachusetts, so I am very concerned about what is going on there. We will meet any properly promulgated standard that is issued by the State and roll it into our cleanup program.

Senator MARKEY. OK. And on the issue of e-mails obtained last year by Politico which revealed a rift between Federal scientists at the Agency for Toxic Substances and Disease Registry and political staff at the White House, EPA, and the Department of Defense political staff allegedly sought to suppress a study that would show PFAS dangerous to human health at levels much lower than EPA has previously called safe. In e-mails the White House called the release of this study a "public relations nightmare."

Mr. Ross, Ms. Sullivan, yes or no, can you commit right now that you will not hide scientific information from the public for fear of political costs of bad PR?

Ms. SULLIVAN. We never actually saw the ATSDR document. I never asked that it be suppressed.

Senator MARKEY. Will you promise never to hide the science from the public?

Ms. SULLIVAN. Correct. Yes, sir.

Senator MARKEY. Mr. Ross.

Mr. ROSS. EPA believes in public transparency for scientific information, yes.

Senator MARKEY. So you will never hide it?

Mr. ROSS. We will never hide it.

Senator MARKEY. OK, good. Thank you.

Thank you, Mr. Chairman.

Senator BARRASSO. Thank you.

Senator Carper.

Senator CARPER. Again, our thanks to each of you for joining us today and responding to our questions, and we will have some more questions for the record.

Maybe one or two to close out with Ms. Sullivan.

I want to call you Maureen O'Sullivan.

EPA has said that it is unsafe to drink water that has more than 70 parts per trillion of PFAS in it. EPA has also said that military and Superfund sites with PFAS contamination should be cleaned up also to at least to a level that does not exceed 70 parts per trillion.

But as I understand, the Department of Defense is refusing to clean up contamination where it exceeds 400 parts per million, according to the information that my office and staff have received. If that is true, why does the Department of Defense think it is appropriate to subject servicemembers, their families, and the surrounding communities to a higher level of PFAS than EPA believes is safe?

Ms. SULLIVAN. Sir, first of all, we have already stepped out and addressed drinking water. Where DOD is the known source of PFOS and PFOA in drinking water, we have ensured that it is below the 70 parts per trillion, so no one is drinking water above the Lifetime Health Advisory where DOD is the known source.

For the long term strategy for cleanup, we are following the already established EPA CERCLA risk assessment process that applies to all chemicals, and that is the way we are proceeding under our responsibilities under the Defense Environmental Restoration Program statute and in full compliance with CERCLA.

Senator CARPER. So the concern I am pointing to here is one that says EPA says it is not safe to drink water with levels that exceed 70 parts per trillion. DOD is up here, as I have been told, has been up here saying we are not going to pay for anything on a cleanup unless it exceed 400 parts per trillion. That leaves a pretty big gap.

Ms. SULLIVAN. Sir, I don't want to——

Senator CARPER. Again, I just want to make sure that I am not missing something here.

Ms. SULLIVAN. Right. I don't want to confuse groundwater with drinking water. As I have stated, we have already addressed the drinking water that is above 70 parts per trillion, and we will continue to maintain that commitment, the drinking water of 70 parts per trillion, the EPA's Lifetime Health Advisory.

The groundwater is where we are having discussions and trying to figure out how this actually applies using the existing CERCLA process that applies for all chemicals.

Senator CARPER. My staff just handed me a note that says 32 percent of Americans get drinking water from groundwater.

Ms. SULLIVAN. That is true, sir.

Senator CARPER. Keep that in mind. We will come back. We will have some more questions.

Ms. SULLIVAN. No, I agree——

Senator CARPER. My time is about to expire, so let me ask you one more, and that is you say that since 2016 no military member is drinking contaminated water with PFAS above the Health Advisory level. Are you able to make the same kind of assurance for all the surrounding communities at these bases? Are all these citizens

also protected from contamination caused by the Department of Defense?

Ms. SULLIVAN. Yes, sir, we have been very aggressive to go out and look where we are the known source off the base, and if we are the known source off the base, we are in fact installing treatment systems, hooking homeowners up to municipal treatment systems, so, yes, off-base and on-base.

Senator CARPER. Thank you.

Let me just conclude by saying I want to again continue to convey a sense of concern, really, in some cases a sense of alarm at what we sense is a lack of urgency that we have heard about this issue, leading up to today and even to some extent at this hearing. It took mere months for EPA to announce and begin the process of repealing scores of Obama rules, ranging from the Clean Water Rule to the Clean Car Rule to the Clean Power Plan, and EPA is well along the process for finalizing replacements for all those rules with weaker, I think less protective, alternatives.

Yet when it comes to the issue that Mr. Wheeler himself says is the biggest environmental issue we face, that is, access to clean drinking water, we are told that EPA can't even begin to guess when even a single step to protect Americans is finalized, and that is just not acceptable if it is true.

If this Administration will not, I think Congress needs to, and I hope to work with all of our colleagues in the House and Senate to let on legislative initiatives that will address the threats that these chemicals pose. And to the extent we can find common ground in its efforts with the Administration and others, we want to do that, but this is an oversight hearing. Part of our job is oversight, and it is something that we take seriously, and we hope that you recognize that, too.

Thank you all for being here.

Senator BARRASSO. Thank you, Senator Carper.

Before we close, I do also have a number of letters from a variety of organizations, as well as statements from members of communities which have PFAS pollution, and I ask unanimous consent to enter these documents into the record.

Without objection, they are entered.

[The referenced information follows:]

Vicki Quint
1305 S Elm Grove Road
Brookfield, WI 53005
codePFAS@gmail.com
Cell #262-794-7226

March 22, 2019

The Senate Committee on Environment
and Public Works
Washington, DC

Re: Senate Hearing - Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)

Dear Chairman Barrasso, Ranking Member Carper and Committee Members

Thank you for this opportunity to document the federal response to PFAS.

We know PFAS have contaminated south central Wisconsin from the USEPA's Unregulated Contaminant Monitoring Rule (UCMR) testing. I believe this is due to the Watertown tire fire that occurred in July 2005. The site is a former Superfund location.

Nothing about PFAS has been addressed at the federal level for this location. USEPA closed the site as a Superfund location and they appear done. Can this site be re-opened as a Superfund so that PFAS chemicals can be removed? We need action.

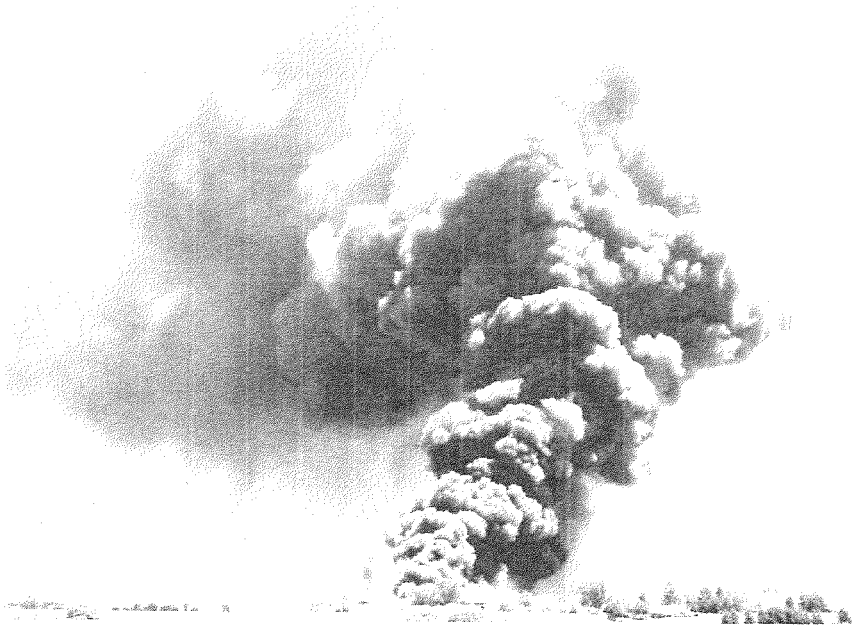
Sincerely,

Vicki Quint

Attachment

Watertown, Wisconsin
Tire Fire, July 19, 2005

- Considered one of the 9 largest tire fires in the world
- Largest coordinated emergency incident in Wisconsin state history
- 126 agencies involved including Wisconsin Department of Natural Resources and USEPA Region #5
- 14 million gallons of water used with only 7% field treated by USEPA
- 1 million burning tires
- 920 firefighters from 106 fire departments involved in the six day incident
- 9.6 tons of firefighting foam used
- Minimal USEPA Superfund clean-up directed because it was an agricultural area and the local populations' income average was below the state median
- PFAS chemicals along with 214 other chemicals dispersed by air over land and Lake Michigan



Vicki Quint, Code PFAS
Wisconsin
codePFAS@gmail.com

We, the People Request:
A PFAS free world where people are not exposed to any PFAS
Where poisoned people's health is protected,
Where there is justice for harms and deaths from past exposures, and
Where regulations change so that nothing like this can ever happen again.

March 24, 2019

The Honorable John Barrasso
Chairman, Senate Committee on Environment and Public Works
307 Dirksen Senate Office Building
Washington, DC 20150

The Honorable Thomas R. Carper
Ranking Member, Senate Committee on Environment and Public Works
513 Hart Senate Office Building
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper,

As the Director of the Informed-Public Project (IPP) in Okinawa, Japan, which has been working on the issues of environmental contamination related to the U.S. military bases in Okinawa, I write to inform you of the concerning situation of PFAS contamination in Okinawa and respectfully request you to take proper action.

PFAS Contamination on Okinawa

Okinawa, only 0.6% of Japan's total area, has 70 % of the US military bases in Japan concentrated on its small islands. US bases occupy 15% of the entire area of Okinawa Island (the main island of Okinawa). The disproportionate concentration of US bases and their proximity to local communities have adversely affected the communities in various ways, and the issue of PFAS contamination is one of the most serious and urgent matters that call for the full attention of the US Government.

On Okinawa Island, PFOS/PFOA have been detected around two U.S. bases, Kadena Air Base (KAB) and Marine Corps Air Station Futenma (MCAS Futenma). According to surveys conducted by Okinawa Prefecture, it is highly likely that the two US bases have caused PFAS contamination. A local expert's analysis of the survey data has also indicated that PFAS contamination should have occurred within the bases and PFOS/PFOA then would have seeped into water sources outside the bases.

A series of investigations by Jon Mitchell (correspondent reporter of Okinawa Times) using FOIA has revealed that KAB conducted on-site surveys on PFOS contamination in 2014, 2016 and 2017 (at 2 "hold ponds" and 16 "foam holding tanks"). It has also shown that US Military conducted surveys at MCAS Futenma in 2016 and PFOS (27,000 ng/L) and PFOA (1,800 ng/L) were detected from samples of wastewater from a fire pit training site on the base.

All the survey data available and analyses of them point to KAB and MCAS Futenma as the most likely sources of PFAS contamination on Okinawa.

Our Concern: PFOS/PFAS Affecting Sources of Drinking Water and Seeping into Agricultural Fields

I am very concerned that PFOS/PFOA have been detected in some of the sources of drinking water around KAB. For example, according to the recent report by the Okinawa Prefectural Enterprise Bureau (OPEB), the agency in charge of safeguarding drinking water, PFOS/PFOA (971ng/L) were detected in the Dakujyaku river in February 2019. (See this site http://www.eb.pref.okinawa.jp/opeb/309/619). In response, OPEB has installed a carbon filtration system at the Chatan Water Treatment Plant to remove PFOS/PFOA from water coming from the sources around KAB, and it has been monitoring the levels of PFOS/PFOA at the sources. Despite OPEB's efforts, however, the issue of PFAS contamination at the water sources around KAB remains unresolved.

It should be emphasized that the Chatan Water Treatment Plant provides drinking water for US bases in Okinawa via local municipalities. In fact, in light of the issue of PFAS contamination becoming public, KAB released an announcement to its community on January 27, 2016. The announcement, however, downplayed the seriousness of the issue. (See this site: https://www.kadena.af.mil/portals/40/documents/AFD-160124-001.pdf).

I am also very concerned that PFOS/PFOA have been detected in natural springs around MCAS Futenma and local community members have long used water from the springs, not as drinking water but for other purposes including growing agricultural products and domestic gardening. According to the most recent report by the Environmental Preservation Division at the Department of Environmental Affairs of the Okinawa Prefectural Government, the department in charge of safeguarding water sources other than those of drinking water, PFOS/PFOA (2,000 ng/L) were detected in the Chunnagaa spring in the summer of 2018. (See this site https://www.pref.okinawa.jp/site/kankyo/hozen/mizu_tsuchi/water/documents/jfy2018s_report.pdf). The water from this particular spring is used for domestic gardening, which certainly poses a danger to the health and safety of the local communities. While the Department of Environmental Affairs conducts surveys twice a year (summer and winter), the issue of PFAS contamination at MCAS Futenma remains unresolved.

Our Concern: US Military Evading Its Responsibility

Despite all the survey data available and analyses of them point to the US bases as the sources of PFAS contamination, the US Military has not taken proper action. Instead, in my view, it has evaded its responsibility.

Between 2016 and 2018, the Okinawa Prefectural Enterprise Bureau held four meetings with KAB and the Okinawa Defense Bureau (Japanese Government) with an aim to discuss the issues of PFOS/PFOA related to KAB. During the meetings, however, KAB did not mention its on-site surveys in 2014, 2016 and 2017 (at 2 "hold ponds" and 16 "foam holding tanks") and their concerning results. In fact, at no point, the US Military informed the Prefectural Government and the people of Okinawa that the military conducted on-site surveys regarding PFAS contamination.

In 2016, the US Military even declined the Environmental Preservation Division's request for a meeting to discuss the issues of PFAS contamination related to MCAS Futenma. As IPP's investigation using the Japanese FOIA has revealed, the Marine Corps Installations Pacific replied to the Environmental Preservation Division that "Since PFOS is not a regulated substance in the US and Japan, therefore there is no point in responding to additional questions or holding a meeting for which there are no established standards nor regulations." The US Military's declination was irresponsible, and its reply was contrary to the fact that DOD formally recognized PFOS/PFOA as "Emerging Contaminants" in 2009.

Moreover, the US Military has rejected the requests by the Government of Japan and Okinawa Prefectural Government to conduct surveys regarding PFOS/PFOA on the bases. The Department of Defense's report *Addressing Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)*, which was issued in March 2018 as an official response to the House Report 115-200, did not even include these test results from KAB and MCAS Futenma although it addressed test results from other US bases overseas.

Our struggle and Obstacles

The US Military has not been forthcoming with information on PFOS/PFOA on KAB and MCAS Futenma. It has not allowed the Okinawa Prefectural Government or the Japanese Government to carry out surveys on the bases. As a result, no comprehensive study and no sufficient clean-up of PFAS contamination have been carried out on Okinawa. No effective measure has been set up or implemented to safeguard the future of Okinawa. All the while, members of the communities, including members of US bases on Okinawa, are constantly exposed to the danger of PFOS/PFAS.

IPP and community members of Okinawa have been struggling to change this situation. We have spent so much time and energy to try to address the issue of PFAS contamination and protect ourselves and our environment. So far, we have made little progress. The US military remains indifferent to our concerns, and the way the Status of

Forces Agreement (SOFA) between the US and Japanese Governments has been interpreted and implemented remain obstacles to our struggle.

We are also concerned that the February 2019 (delayed) action of the US Environment Protection Agency addressing PFAS contamination is not enough. As in most of the states in the United States, the Okinawa Prefectural Government has used the EPA's Health Advisories as its guidelines and standards to evaluate the safety and quality of water contaminated by PFOS/PFOA. We believe that more stringent safety standards and measures have to be adopted.

Our Requests

It is imperative that proper action has to be taken in Okinawa and Japan and in the US. I thus wrote a letter of request to the Okinawa Prefectural Government, requesting them to review its policies on the issues of PFOS/PFOA contamination. I am now turning to the Senate Committee and respectfully request the Committee as follows:

1) Discuss and review the issue of PFAS contamination on the US military's bases overseas and affected local communities around the bases;

2) Hold the U.S. Military accountable for the issue of PFAS contamination on Okinawa by encouraging the US Military to be more forthcoming with information and by collaborating with the Okinawa Prefectural Government to conduct surveys on the bases;

3) Recognize that the SOFA violates the environment and human rights of the people of Okinawa.

Thank you for your time and attention to the issue of PFAS contamination on Okinawa.

Respectfully submitted,

Dr. Masami Kawamura
The Informed-Public Project,
Okinawa, Japan
http://ipp.okinawa
director@ipp.okinawa

City of Gustavus
P.O. Box 1
Gustavus, AK 99826
Phone: (907) 697-2451

March 25, 2019

Senator John Barrasso
307 Dirksen Senate Office Building
Washington D.C. 20510

Subject: Polyfluoroalkyl Substances (PFAS)

Dear Senator Barrasso:

On Thursday, March 28, 2019 the Senate Committee on Environment and Public Works will hold a hearing entitled, *"Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)."* Since I, and the thousands of Alaskans impacted by these dangerous substances cannot attend, I ask that you set into motion measures that address the scope of complex issues associated with this subject.

Specifically, **protection of our first responders/municipalities against ill-conceived prosecution through poorly crafted language that would indict them for executing their duty to save lives.** In many cases, the deployment of PFAS containing firefighting agents such as Aqueous Fire Fighting Foam (AKA AFFF) was done without knowledge of the dangers associated with it. In Gustavus, such a situation exists. The Alaska Department of Environmental Conservation has identified the City of Gustavus as a Potential Responsible Party (PRP) putting the economy and financial stability of this small, rural community in jeopardy and the volunteer fire fighters sullied reputations. Providing language in the federal response to the risks associated with PFAS would go a long way in resolving this critical issue.

In addition, **assuring that the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is adequately funded, and implemented in a way that makes it accessible for all Alaskans to request funding to address the devastating impacts caused by this hazardous substance.** Consider, having to spend thousands of dollars a year on filtration for drinking water, water used in the yard or to clean fish, watering subsistence gardens, etc. Imagine the extraordinarily high costs of remediating your property so your children can play in the yard, or no longer enjoying the area swimming holes without the dangers of contamination by PFAS. The depreciation of property values, loss in business revenues because of fears of exposure to PFAS. There are so many challenges to identify. Please have the legislation show compassion to all of us trying to recover from this horrific event and provide a process that is clear, quick, and just.

I understand that from a practical implementation perspective, funding and other means of recovery will likely come from the state. However, the state will only be able to implement what is provided by our Federal Government. Please ensure that the PFAS Action Act, and any associated legislation, provide the necessary language and procedures to facilitate easy access to funding through the state for distribution to its residents, businesses, and visitors to protect and preserve our environment and way of life.

Thank you in advance for protecting all Alaskans.

Sincerely,

Calvin Casipit, Mayor
City of Gustavus

ENVIRONMENTAL
HEALTH
STRATEGY CENTER

Portland:
565 Congress Street, Ste. 204
Portland, ME 04101

Bangor:
6 State Street, Ste. 504
Bangor, ME 04401

25 March 2019

The Honorable John Barrasso
Chairman, Committee on Environment and Public Works
United States Senate
307 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Thomas Carper
Ranking Member, Committee on Environment and Public Works
United States Senate
513 Hart Senate Office Building
Washington, D.C. 20510

Re: **Sludge Spreading with PFAS as a Threat to Our Food and Water**

Dear Chairman Barrasso and Ranking Member Carper,

Thank you for scheduling a hearing on March 28th to examine the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS). I represent a public health organization based in Portland, Maine that works at the state and national level to ensure that all people have access to safe food and water, and products that are healthy for people and the planet. I'm writing now to urge you to include a newly emergent concern in your assessment, i.e. the potential for widespread PFAS contamination of farmland, agricultural products such as milk, and drinking water resulting from the spreading of sewage sludge to land as a fertilizer, a common practice in all fifty states.

Last week, *Reuters* reported on a Maine dairy farm that was ruined by unsafe PFAS pollution from twenty years of sewage and industrial sludge spreading (see attached story). The cow's milk from this farm contained the highest levels ever reported of PFOS, a notorious PFAS. Two PFAS were also found at elevated levels in the drinking water on the farm and in a public water supply well. The sludge spreading at this site exposed thousands of consumers to PFAS in milk for up to thirty years and to PFAS in public drinking water for up to five years.

Sludge may be contaminated from the use of consumer, commercial, and industrial products that contain PFAS, and their eventual discharge into wastewater. Sludge, also known as biosolids, is the solid waste leftover after treatment of wastewater from sewage plants or industrial facilities. The U.S. Environmental Protection Agency encourages the beneficial reuse of sludge as an agricultural fertilizer and all sludge applications to farmlands are licensed and permitted by various state

agencies. Sludge may be directly applied to land or sent to composting facilities and mixed with other materials before being distributed to farms and the public.

Sludge spreading has remained a common practice since the 1970's. Yet PFAS in the environment have only been investigated in earnest for less than five years. That leads to two very serious and plausible concerns:

- Serious PFAS pollution may be lurking undiscovered beneath farmlands where sludge has been spread in the past; and
- Future sludge spreading may cause additional PFAS pollution unless it's tested first and shown to contain PFAS at levels below regulatory concern.

I've attached three fact sheets that detail the unsafe levels of PFAS detected at the Maine dairy farm, report on levels of PFOS measured in milk around the world, and document that sludge spreading has caused serious PFAS pollution elsewhere and that the current levels of PFAS in sludge may not be in compliance with standards adopted in 2018 by the State of Maine in response to this dairy farm contamination.

In light of the serious implications of this evidence for public health and the environment, we urge you to ask federal agencies to answer these questions:

1. Are farmlands where sludge was spread in the past being tested for PFAS, and if not, how can you best ensure that such testing takes place in a timely manner?
2. Since dairy farms may be uniquely vulnerable to PFAS in sludge, what assurance can be provided that the cow's milk from dairies is being screened for PFAS?
3. What standards exist to limit PFAS in sludge intended for land application, and to what extent is current sludge generation in compliance with those standards?
4. What affect does composting of sewage sludge containing PFAS, and distribution of that compost, have on the fate and transport of PFAS in the environment?
5. What are federal agencies doing to protect America's food supply and drinking water from PFAS pollution associated with sludge spreading on the land?

Thank you for good oversight and investigation of the federal response to the risks of PFAS pollution. Should you have questions for us or require additional information, please contact my deputy director Patrick MacRoy at (207) 699-5796 or pmacroy@preventharm.org.

Respectfully submitted,

Michael Belliveau
Executive Director

cc: The Honorable Susan Collins
The Honorable Angus King

REUTERS

https://www.reuters.com/article/us-usa-dairy-chemicals/the-curious-case-of-tainted-milk-from-a-maine-dairy-farm-idUSKCN1R01AJ

MARCH 19, 2019 / 7:11 AM / 3 DAYS AGO

The curious case of tainted milk from a Maine dairy farm

Richard Valdmanis, Joshua Schneyer

ARUNDEL, Maine (Reuters) - For Maine dairy farmer Fred Stone, the discovery in 2016 that his cows were producing tainted milk has since brought financial ruin and threatened to shut down a century-old family business.

Now state regulators and health experts are investigating whether the contamination could reflect a much broader problem for farms that used similar methods to fertilize their land.

The chemicals on Stone's farm likely came from biosolids, or nutrient-rich sewage from municipal utilities, that he spread across his fields, according to a report last year by Maine's Department of Environmental Protection (DEP). The chemicals are known as perfluoroalkyl substances, or PFAS – some of which have been linked to cancers, liver damage, low birth weight and other health problems.

The discovery of contaminated sites in Maine and around the country prompted Maine Governor Janet Mills this month to form a task force to study the extent of PFAS contamination and suggest protective measures. The state DEP says testing for the chemicals is underway at more than 95 sites.

"Staff has been specifically working on identifying farms statewide that may have received sludge and identifying the original source," department spokesman David Madore said in a statement to Reuters.

Patrick MacRoy, deputy director at the Maine-based Environmental Health Strategy Center, said the contamination at the Stoneridge Farm raises questions about the safety of biosolids used at farms nationwide.

"The Stone case is incredibly troubling because the source of exposure - waste sludge - is something that is also spread across hundreds of farms in Maine and thousands nationally," he said.

Experts said that far more research is needed to determine how sludge-spreading programs may be contributing to contamination of groundwater, crops, or finished products such as milk.

"Maybe this one farm is an oddball in Maine, but without further testing, there's no way to be sure," said Michael Rainey, a former biosolids inspector at the health department in neighboring New Hampshire.

Alan Bjerga, a spokesman for the National Milk Producers Federation, said that his organization believed the Stoneridge case to be an isolated event.

"We see no wide threat to the milk supply," he said in a statement.

Grease and water-repellent PFAS have been used for decades in cookware, specialty paper, fabrics, firefighting foam and other products. State and federal regulators have been scrambling to set safety standards for human exposure to some of the chemical compounds.

Scores of lawsuits have been filed in pollution cases seeking billions of dollars from chemical manufacturers and industrial PFAS users. Two major cases have already settled in recent years for a combined $1.5 billion.

'FOREVER CHEMICALS'

Stone and his wife Laura Stone run the Stoneridge Farm on 100 acres of land in southern Maine, one of hundreds of small-scale dairy operations across the U.S. northeast prized for the quality of their milk, cream and butter.

The Stones started spreading treated sewage in the 1980s as part of a state program that would help utilities get rid of the waste and fertilize pastures. They also used one delivery of sludge waste from a paper mill.

Concerns about PFAS in the farm's milk first arose in 2016, when the local water district found the pollutants - often referred to as "forever chemicals" because they don't break down easily - in a well it maintained on the Stones' land.

Stoneridge informed its milk distributor, Oakhurst, and the state DEP. Additional tests found high levels of PFAS in Stoneridge's milk, soil, hay, and cow manure. The areas of highest soil contamination overlapped with where the sewer district sludge had been heaped, Stone said.

The Environmental Protection Agency has said that biosolids spreading programs are active in all 50 states. In Maine, 66 sites are currently permitted for sludge spreading, according to state data.

The numbers were higher during the years Stoneridge participated in the state-sponsored waste-spreading program, between 1983 and 2004. Data compiled in 2000 by the Toxics Action Network, an environmental group, showed that 226 sites, mostly farms, had sludge-spreading permits.

Much of the regulatory push around PFAS so far has focused on water. In 2016, the Environmental Protection Agency set a lifetime "health advisory" for two of the compounds - PFOS and PFOA, which a growing body of research has linked to health problems. The EPA recommended that drinking water should contain no more than 70 parts per trillion of these chemicals combined.

There's no federal standard for safe levels in milk. But Maine public health officials said in 2017 that milk with PFOS exceeding 210 parts per trillion should be considered "adulterated" and banned from sale.

So far, this ban has only affected Stoneridge, whose milk had levels as high as 1,420 parts per trillion.

FADING FAMILY TRADITION

Fred Stone, 63, fears he's nearing the end of a century-old family tradition. The contamination ordeal has already put him in $500,000 of debt, he said. He's considering

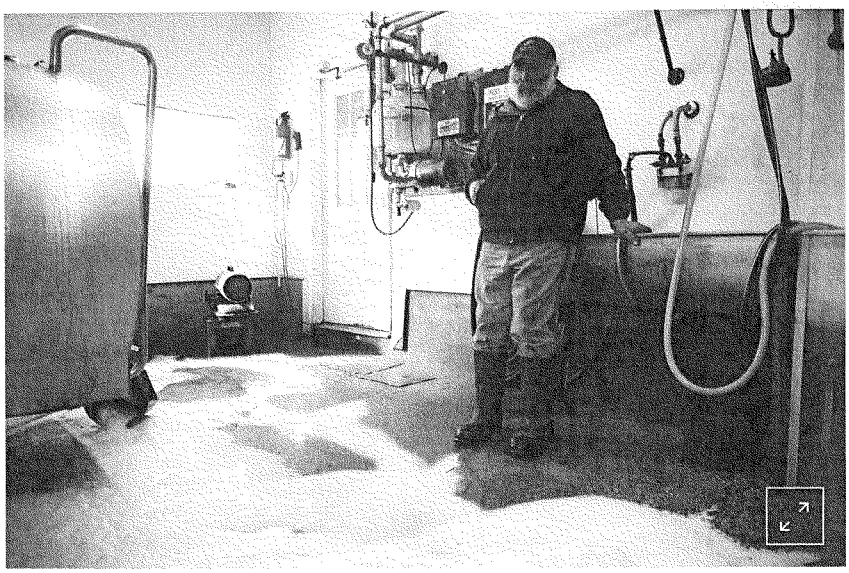
selling some land and looking for a job.

"My grandfather, my father, and myself, we've all been dairy farmers here," he said, wearing coveralls and mud-stained rubber boots as he walked the farmland his family bought in 1914.

Until a few weeks ago, Stone was still trying to salvage his dairy operation. He purchased several dozen new cows, installed a $20,000 water-filtration system and stopped using his farm's hay for feed.

The effort at first seem to work. Last year, test results on his farm's milk came back clean, and he was allowed to sell milk to Oakhurst again. But PFOS reappeared in the milk within months, causing distributor Oakhurst to permanently end its business relationship with Stoneridge.

"When they dropped us, that was the end of our milk market," Stone said. "So that was the end of us."



Dairy farmer Fred Stone watches the milk collected the previous day go down the floor drain, after discovering the soil, hay, and the milk from the cows on the farm contain extremely high levels of PFAS chemicals resulting from a 1980's state program to fertilize the pastures with treated sludge waste and making the milk unsuitable for sale, at the Stoneridge Farm in Arundel, Maine, U.S., March 11, 2019. Picture taken March 11, 2019. REUTERS/Brian Snyder

Unsafe Levels of PFAS Chemicals at a Maine Dairy Farm

PFOS and PFOA in Milk, Drinking Water & Soils Exceed Current Action Levels

Values reported in parts per trillion (ppt)

Media	PFAS Chemicals	Highest Level Measured[1]	Most Recent Action Level[2]	Times Above Action Level
MILK	PFOS: PFOA:	1,420 < 50	210 -	7 x -
DRINKING WATER – Farm Well	PFOS: PFOA:	42.1 8.9	7 11	6 x -
DRINKING WATER – Public Well	PFOS: PFOA:	76 13	7 11	10 x 1 x
SOILS	PFOS: PFOA:	878,000 23,600	21,000 9,500	42 x 2 x
MANURE PILE	PFOS: PFOA:	20,330 3,206	- -	? ?
HAY	PFOS: PFOA:	9,669 2,086	- -	? ?

Sources (all samples were from Stoneridge Farm, Arundel, Maine):

[1] ***Milk:*** Maine Department of Agriculture, Conservation, and Forestry
Drinking Water (Public): Kennebunk, Kennebunkport and Wells Water District, Maine
Drinking Water (Farm), Manure, Hay: Maine Department of Environmental Protection (higher levels of PFAS were found by the water district in a monitoring well adjacent to the farm well.)

[2] ***Milk:*** Adulteration Level, determined by Maine Center for Disease Control and Prevention (CDC), Maine Department of Health and Human Services (2017)
Drinking Water: Based on Minimal Risk Levels drafted by Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services (June 2018). (The U.S. Environmental Protection Agency and Maine CDC advises that the sum of PFOS and PFOA should not exceed 70 ppt as a health advisory level or maximum exposure guideline.)
Soils: Remedial Action Guideline to prevent leaching from soil to groundwater, set by Maine Department of Environmental Protection.

Environmental Health Strategy Center www.ourhealthyfuture.org March 2019

Highest Level of PFOS in Milk Reported at Maine Dairy Farm

Adulterated Milk Containing Unsafe Levels of PFOS cannot be sold for Human Consumption

Milk and other agricultural products are not routinely tested for perfluorooctanesulfonic acid (PFOS) or other per- and polyfluoroalkyl substances (PFAS). Although test data are limited, the PFOS levels measured in milk from Stoneridge Farm in Arundel, Maine are far higher than reported in any study, based on a sampling of the published scientific literature (see links for studies).

Author (Year)	Location	PFOS in Milk, Highest Level (ppt)	Notes
Maine DEP/DACF *	**Arundel, Maine**	**1,420**	Raw milk samples measured 1,420 ppt PFOS in November 2016, 938 ppt in January 2017, and then lower, including 220 ppt in January 2019.
Wang, et al. (2010)	China	695	As reported in Sungur, milk was purchased at retail in China between 2008 and 2009, with results ranging from 5 to 695 ppt.
Guerranti, et al. (2013)	Italy	360	Based on a mean of samples over the limit of detection in a small pilot study.
Maine CDC		**210 ****	**Level at which Milk is "Adulterated"**
Xing, et al. (2016)	China	173	Of 91 samples of milk purchased at retail, the mean level of PFOS measured was 24.5 ppt.
Young, et al. (2012)	United States	160	Reported at another dairy farm impacted by sludge spreading near Decatur, Alabama. PFOS was not detected in 60 other milk samples.
Yang, L., et al. (2015)	China	127	Twelve samples of milk from retail markets in eight provinces were tested.
Ericson et al. (2008)	Spain	121	As reported in Sungur, whole and semi-skim milk from the Spain market was tested for PFOS, with levels ranging from 14 to 121 ppt.

* *Sources:* Investigation report, Maine Department of Environmental Protection (DEP) and milk testing, Maine Department of Agriculture, Conservation, and Forestry (DACF). Available on request.

** Based on a 2016 Reference Dose from the U.S. Environmental Protection Agency, which is ten times *LESS* protective of human health than a 2018 Minimal Risk Level recommended by the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services.

Methods: A search of PubMed for "PFAS Milk", "PFOS Milk", and "PFC Milk" was conducted and the results reviewed for relevant studies of food for human consumption (excluding breast milk). Only selected studies reporting the highest results are presented in the table.

Sludge Spreading Threatens PFAS Pollution of Food & Drinking Water

Sludge – the solid waste left over after the treatment of industrial wastewater and domestic sewage – is often polluted from the manufacture, use, and disposal of extremely persistent, toxic chemicals known as per- and polyfluoroalkyl substances (PFAS). When spread on farmlands as fertilizer, PFAS-containing sludge has contaminated milk and drinking water to unsafe levels. Both past and current sludge spreading remains a serious concern.

Known PFAS Pollution from Sludge Spreading on Farmlands

- **Arundel, Maine**: PFAS contamination of a public drinking water well lead investigators to evaluate a neighboring dairy farm for PFAS in 2017. Soil tests found PFAS as high as 878,000 ppt PFOS and 23,600 ppt PFOA. Milk from the farm had PFOS levels as high as 1420 ppt, and contamination was also identified in the hay and manure. The source was identified as sludge spreading which occurred between 1983 and 2004.

- **Decatur, Alabama**: An industrial facility discharged PFAS waste into the sewers between 1996 and 2008, and the sewage sludge was spread on 5,000 acres of farm land. Later sludge testing revealed PFOA levels of up to 2,531,000 ppt and PFOS levels of up to 1,296,000 ppt. In farm fields where the sludge was spread, PFOA measured up to 317,000 ppt and PFOS levels to 408,000 ppt. The PFOS levels in cow's milk from an impacted dairy were as high as 170 ppt.

- **Sauerland, Germany**: In 2006, PFAS pollution followed the spreading of "soil improver" that included industrial sludge on more than 1,000 farm sites. The sludge contained total levels of PFOA and PFOS of up to 8,600,000 ppt. Soils tested as high at 5,500,000 ppt. The PFAS spread into surface waters, contaminating public drinking water supplies, as well as fish. Limited milk testing did not result in levels exceeding 10 ppt.

- **North Carolina:** In 2015, PFAS pollution of surface waters was linked to sludge spreading in the surrounding area. Surface water levels reached a high of 1,020 ppt PFOA and 720 ppt PFOS. Sludge levels were 1,130 ppt PFOA and 1,680 ppt PFOS, among other PFAS.

PFAS Still Routinely Contaminate Sewage Sludge

- **Sepulvado, et al (2011):** In a study of the levels and transport of PFAS in municipal sludge, PFOS was the dominant PFAS chemical, with levels ranging from 80,000 to 219,000 ppt. Soils treated with municipal sludge were found to have levels of PFOS ranging from 2,000 to 485,000 ppt. Levels in soil increased linearly in relation to volume of sludge applied.

- **North East Biosolids & Residuals Association (2017):** PFOS in the sludge from 22 facilities in New Hampshire and the Northeast averaged of 34,000 ppt, with a high of 390,000 ppt. Levels of eight other PFAS were also identified, with PFBA having the highest average concentration at 34,600 ppt.

- **Maine Screening Levels (2018):** Maine established lower levels in 2018 for the screening of solid waste for beneficial reuse, including sludge applications, recognizing the potential for PFAS contamination. These levels are 5,200 ppt for PFOS and 2,500 ppt for PFOA. However, there is currently no requirement for sludge to be tested for compliance.

CHAMBER OF COMMERCE
OF THE
UNITED STATES OF AMERICA

NEIL L. BRADLEY
EXECUTIVE VICE PRESIDENT &
CHIEF POLICY OFFICER

1615 H STREET, NW
WASHINGTON, DC 20062
(202) 463-5310

March 26, 2019

The Honorable John Barrasso
Chairman
Committee on Environment
and Public Works
United States Senate
Washington, D.C. 20510

The Honorable Tom Carper
Ranking Member
Committee on Environment
and Public Works
United States Senate
Washington, D.C. 20510

Dear Chairman Barrasso and Ranking Member Carper:

The U.S. Chamber of Commerce thanks you for holding the hearing, "Examining the Federal Response to the Risks Associated with Per- and Polyfluoroalkyl Substances (PFAS)."

PFAS are a large and diverse class of chemicals with unique properties that have been used in a broad number of beneficial applications for many years. Heightened attention to potential health effects of certain PFAS compounds has understandably led to increased public concern and interest in new regulatory protections in this area.

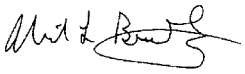
The U.S. Chamber supports action to address these concerns, and is committed to proactively working with legislators, regulators, and all stakeholders to establish risk-based standards that protect human health and the environment. We believe collaboration and transparency are critical to any such efforts, and the government, industry, and the scientific community must work together to share knowledge and focus resources on the highest priorities based on actual risk, while utilizing existing regulatory processes to proactively address both current and future issues.

There are more than 4,000 PFAS class chemicals. The chemistries among these chemicals vary substantially and have different characteristics, profiles, and uses. Any federal action – legislation and regulation – should be undertaken on an individual chemical basis, rather than as a class. We also believe that science should guide decisions and neither legislation nor regulation should predetermine outcomes.

We also encourage the development of a consistent approach and clear timelines for assessing and regulating specific PFAS across all relevant federal agencies to ensure that government regulations, actions, and communications are consistent and coordinated for maximum effectiveness. Further, federal agencies should prioritize clear, science-based risk communication and regulatory transparency to ensure that the American public can better understand the actual risks associated with specific PFAS compounds.

We look forward to working with you on this important matter.

Sincerely,



Neil L. Bradley

cc: Members of the Senate Committee on Environment and Public Works

Written Testimony Submitted to the Senate Committee on Environment and Public Works March 28, 2019 Hearing on Examining the Federal Response to the Risks Associated with Per- and Polyfluoroalkyl Substances (PFAS)
Submitted on Behalf of the Association of State Drinking Water Administrators

Summary

Per- and Polyfluoroalkyl Substances (PFAS) have been a growing concern for the drinking water community for more than a decade. The solubility, mobility and bio-accumulative properties of PFAS continue to heighten concerns about potential adverse health effects. States, water systems, and the public need national leadership now to figure out this growing public health problem. ASDWA believes the question is not whether to regulate PFAS, but when, how, and under which regulatory framework. ASDWA supports using appropriate authorities under EPA to address PFAS in drinking water and minimize environmental exposure. Actions can be taken under the Toxic Substance Control Act (TSCA), the Emergency Planning and Community Right-to-Know Act (EPCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Safe Drinking Water Act (SDWA) that will holistically mitigate PFAS exposure.

ASDWA has identified three key areas for action:

1. ASDWA asks Congress to direct EPA to use the appropriate statutes to list PFAS compounds as hazardous substances under CERCLA, require PFAS reporting under the Toxic Release Inventory (EPCRA), and take other steps to control and limit PFAS contamination through TSCA.
2. ASDWA asks that Congress provide additional funding to EPA and the states to address PFAS. At present, state primacy agencies are diverting resources from core drinking water programs (including inspections, technical assistance and training, permitting/plan approvals, and compliance/enforcement) to address PFAS. Without additional funding, both the core program and the additional work to address PFAS will suffer.
3. ASDWA asks that Congress recommend that EPA add PFAS chemicals to the 5th Contaminant Candidate List (CCL), use the 5th Unregulated Contaminant Monitoring Rule (UCMR) to increase data on PFAS occurrence in drinking water, and regulate PFAS as a chemical class if a positive regulatory determination is reached for developing a maximum contaminant level (MCL) for drinking water.

Introduction

The Association of State Drinking Water Administrators (ASDWA) is the independent, nonpartisan, national organization representing the collective interests of the drinking water program administrators in the 50 states, five territories, the District of Columbia, and the Navajo Nation who implement the Safe Drinking Water Act (SDWA) every day to ensure the protection of public health and the economy. ASDWA's members regulate and provide technical assistance and funding for the nation's 150,000 public water systems (PWS) and coordinate with multiple partners to ensure safe drinking water for our nation's over 300 million people that are served by a community water system (CWS).

In 2016, EPA finalized lifetime health advisories (HAs) for two of the most common PFAS, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) at 70 parts per trillion (ppt) as well as a combined HA of 70 ppt for the sum of PFOA and PFOS. HAs are not the same as Maximum Contaminant Levels (MCLs); they are non-regulatory and are non-enforceable, which can be confusing to states, water systems, and the public.

To add to the confusion, the Agency for Toxic Substances and Disease Registry (ATSDR) released a draft toxicological profile in 2018 that evaluates risk factors for PFOA and PFOS across all media while EPA's advisories are specific to drinking water. The draft profile also proposes different toxicity values, i.e. different levels of concern than EPA's. Absent a clear communication and consistent health risk numbers, this uncertainty has increased public concern and driven some state drinking water programs to establish their own PFAS action levels or guidelines. Such levels, for some states, are lower than EPA's HAs, while others are similar but contain caveats, and others use the same limits but add additional compounds beyond PFOA and PFOS. Other states have taken no independent action, lacking the authority to be more stringent than EPA standards.

In addition to developing the HAs under SDWA, PFAS have been subject to risk management action under TSCA, including a 2002 Significant New Use Rule (SNUR) to require notification to EPA before any future manufacture (including import) of 75 PFAS chemicals specifically included in the voluntary phase out of PFOS by 3M that took place between 2000 and 2002, a 2007 SNUR on 183 PFAS chemicals believed to no longer be manufactured (including imported) or used in the United States, and a 2015 SNUR to require manufacturers of PFOA and PFOA-related chemicals and processors of these chemicals to notify EPA at least 90 days before starting or resuming new uses of these chemicals in any products. EPA's TSCA New Chemicals program reviews alternatives for PFOA and related chemicals before they enter the marketplace.

The science is still evolving regarding PFAS exposure and health risks. Some studies document associations with adverse health effects, but not causality. Most studies have focused solely on PFOA and PFOS, which leaves a severe data gap for the other 3,500+ PFAS compounds. Animal studies that show that high PFAS exposure levels can result in changes in liver, thyroid, or pancreatic functions do not always translate well to effects in humans. The bioaccumulative properties of many PFAS heightens the concerns about potential adverse health effects. Ongoing PFAS research into health effects, analytical methods, occurrence, and treatment efficacy is essential. We must be mindful to base any decision for a regulatory approach or standard on sound scientific principles. EPA must also address PFAS in a holistic fashion. To accomplish this, more attention needs to be given to development of additional PFAS analytical methods for drinking water, wastewater, and other media which also requires greater lab capacity. ASDWA strongly believes that EPA must follow a deliberative and sound process to achieve a reasonable protective health level for PFAS.

EPA's recently released PFAS Action Plan is a step in the right direction, however, it falls far short of the guidance many states are looking for from the federal government. ASDWA was disappointed to see EPA abstain from committing to timelines, much less expedited timelines, for the actions outlined in the Action Plan.

Therefore, ASDWA is asking Congress to take action in the following areas:

Action Under All Appropriate Statutes

TSCA, EPCRA, and CERCLA all have authorities that should be used by EPA to reduce the risks of PFAS exposure to humans and the environment. As soon as possible, EPA should list PFAS compounds as hazardous substances under CERCLA. The hazardous substance designation will ensure that these PFAS removal actions are taken, but also allows EPA to enforce against potentially responsible parties.

EPA should also require PFAS reporting under the Toxic Release Inventory (TRI) for air and water. By adding PFAS chemicals to TRI, facilities that manufacture, process, or otherwise use these chemicals in amounts above established levels must submit annual TRI reports on how much of each chemical is released to the environment and/or managed through recycling, energy recovery and treatment. This information would help provide critical information in determining potential contamination locations.

In addition, If EPA feels they do not have enough information to initiate the prioritization process under the TSCA existing chemicals program, the agency should use the authorities under TSCA (15U.S.C. §2603 and 115 U.S.C. §2607) to gather information and if deemed appropriate, initiate a risk evaluation on PFAS. EPA has the authority to require manufacturers or processors of chemicals and mixtures to conduct testing to evaluate the health and environmental effects of such chemicals. EPA may also require that manufactures and processors of chemicals keep records and report on the identity of those chemicals, their use, production volume, byproducts, health and environmental effects and exposure, and other data. EPA should use these mechanisms in TSCA to gather the data needed to initiate a prioritization process under the existing chemicals program, which under statutory process will prioritize PFAS chemicals that are stored near drinking water sources.

Increased Funding to Address PFAS

ASDWA asks that Congress provide additional funding to EPA and the states to address PFAS as a public health concern. At present, state primacy agencies are having to divert resources from core drinking water program implementation efforts (inspections, rule implementation and compliance, technical assistance and training, and supporting system infrastructure needs) to address all aspects of PFAS management – source identification, mitigation, research, and public messaging. In this era of flat funding, the additional demands on states' resources are impacting their core programs.

One of the primary Federal funding sources for state drinking water programs is the Public Water System Supervision Program (PWSS). Given all the ongoing Federal budget demands, PWSS funding has remained flat for the past decade. Inflation over the past decade has eroded this funding by approximately 20%, and this flat funding has gradually eroded the funding for states' core programs.

Complicating the funding issues are additional demands being made on state drinking water programs to address several non-regulatory issues, including PFAS. In addition to PFAS, states are taking additional actions on lead post-Flint, working to minimize contamination from algal toxins from harmful algal blooms, and working with partners in healthcare agencies and other organizations to address Legionella in building water systems. In a survey of its members, ASDWA found these nonregulatory activities demand an additional 5%-10% of the state drinking water program's resources as outlined in the December 2018 Beyond Tight Budgets

report available at ASDWA.org. These increased demands, when added to the loss of 20% from inflation, compound the funding challenges that states face in meeting all the challenges facing drinking water now. Without additional funding, both the core program and the additional work to address PFAS will suffer.

ASDWA also supports increased funding for research, modeling, and other data development around PFAS to address the significant gaps in the current knowledge on PFAS occurrence, health effects, exposure rates, and more. Additionally, increasing the Drinking Water State Revolving Fund (DWSRF) authorization and appropriation will provide water systems with the funding they need through low interest loans and subsidized funding to address PFAS in their drinking water by installing appropriate treatment or conducting source water protection efforts.

Action Under SDWA

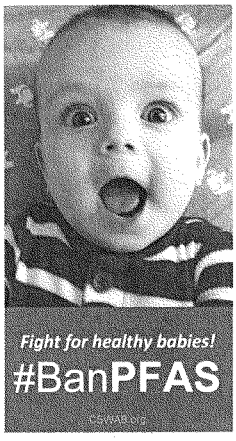
ASDWA asks that Congress recommend that EPA add PFAS chemicals to the 5th Contaminant Candidate List (CCL), use the 5th Unregulated Contaminant Monitoring Rule (UCMR) to increase national PFAS occurrence data in drinking water, and regulate PFAS as a chemical class if a positive regulatory determination is reached for developing an MCL.

ASDWA recommends that PFAS be included in the final CCL5 as a group because adding individual PFAS chemicals one by one is not going to be effective for the long-term. With health-based values in the parts per trillion range, emphasis should also be placed on achieving the lowest reliable quantitation limits possible.

ASDWA also recommends adding PFAS chemicals for which there is an approved analytical method to UCMR 5. Although testing under UCMR 5 will not begin until 2022, it is currently the best available regulatory process for collecting contaminant occurrence data for drinking water. Additionally, any PFAS chemicals included in UCMR5 must have a parallel analytical method for ambient water for source water tracking.

In conclusion, a February 15th, 2019 letter to Senator Tom Carper, David Ross, the Assistant Administrator for Water at EPA stated the agency, "intends to establish a maximum contaminant level (MCL) for PFOA and PFOS." ASDWA believes an MCL that regulates PFAS as a class, similar to the MCLs for disinfection by products (DBPs), would best protect public health. ASDWA also recommends creating a rule that provides off-ramps or reduced monitoring schedules for systems that find no PFAS in their water and are not located near known or potential sources of PFAS contamination as not to overburden systems with sampling and monitoring unnecessarily.

PFAS: Community Objectives & Priorities for Federal Policy



1. **Drinking water sources will be tested for all detectable PFAS analytes and precursors** utilizing tools such as the Total Oxidizable Precursor (TOP) Assay to help measure the concentration of non-discrete and difficult to measure PFAS compounds, in addition to conventional analytical methods. Currently is it not unusual for the military and other responsible parties to rely on testing for as few as two PFAS analytes (PFOA/PFOS) as the basis for critical decision-making.
2. **When off-site contamination is discovered or suspected, the military and responsible parties will no longer be shielded from disclosing PFAS content.**
3. **All communities will receive immediate and commensurate protection and analysis.** For example, drinking water wells for communities with less than a 10,000 population are not currently included in UCMR monitoring.
4. **Congress will mandate, by a date certain, that the Department of Defense (DoD) convert to all non-fluorinated alternatives.** DoD is the appropriate place to start as 75% of known PFAS sites are military and significant federal funding is currently being directed to DoD. Technological advancements made by DoD will benefit industry and communities alike.
5. **Within the next 90 days, DoD training** activities will only utilize non-fluorinated alternatives.
6. **Affected communities will be empowered and engaged by designating a percentage of federal funding** for communities to hire INDEPENDENT scientific, technical and health consultants. (In order to remove the burden of administering federal funds, partnerships with ITRC, universities, or other could be considered.)
7. **Environmental test methods will achieve the lowest possible level of detection.**
8. **PFAS cleanup methods and remedies will be** fully protective of human and ecological health, prevent toxic emissions, be readily and effectively monitored, provide long term effectiveness and permanence, will not create more toxic by-products and PFAS wastes that do not already have an authorized treatment plan, and will be accepted by communities, tribes and indigenous peoples who are both directly and indirectly impacted.
9. **Responsible parties will be accountable for life-time costs associated with selected remedies.**
10. **Stockpiled PFAS product will not be incinerated** and instead will be stored until safe alternative treatment technologies that DESTROY PFAS are fully developed and deployed.
11. **EPA will stop approving new PFAS** and will pull the registration on the 600 that have been approved by EPA in the last decade.
12. **The U.S. Congress will ban all PFAS by date certain.**
13. **PFAS will be formally classified as hazardous WASTES,** and will be regulated pursuant to all major federal environmental rules and law including the Clean Water Act, RCRA and the Clean Air Act.
14. **The U.S. Department of Defense and all federal responsible parties** will adhere to all state environmental standards and advisories relevant to PFAS.
15. **Occupational exposures to firefighters and first** responders to PFAS through bunker gear (PPE - personal protective equipment) and firefighting foams will be prevented.
16. **Drinking water supplies for all 58,000 U.S. fire stations will be tested** for PFAS contamination, similar to testing conducted by DOD at military installations.

Prepared for:

U.S. Senate Committee on Environment and Public Works Hearing on PFAS
by Laura Olah, Citizens for Safe Water Around Badger (CSWAB.org)
E12629 Weigand's Bay South, Merrimac, WI 53561 | P: 608 643 3124
March 27, 2019

The Commonwealth of Massachusetts
House of Representatives
State House, Boston 02133

JOHN VELIS
STATE REPRESENTATIVE
4TH HAMPDEN DISTRICT
ROOM 174, STATE HOUSE
TEL. (617) 722-2877
JOHN.VELIS@MAhouse.gov

VICE CHAIR
VETERANS AND FEDERAL AFFAIRS

HEALTH CARE FINANCING
MARIJUANA POLICY
ENVIRONMENT, NATURAL
RESOURCES AND AGRICULTURE

March 28th, 2019

Senator John Barrasso, Chairman
U.S. Senate Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, D.C. 20510

Chairman Barrasso, Ranking Member Carper, and Honorable Members of the Committee:

As a fellow legislator from a district affected by per- and polyflouroalkyl substances (PFAS), I wanted to thank you for your attention to this issue and ask you for your support as communities like mine attempt to deal with this on-going and pervasive concern.

Since the establishment of a PFAS lifetime health advisory limit in 2016, my hometown of Westfield, Massachusetts has been mired in a legal and financial nightmare. We are home to an Air National Guard base and several manufacturing companies that have used PFAS for decades, leaving almost half of our public wells contaminated with these "forever chemicals." In the absence of appropriate EPA regulations, such as groundwater clean-up recommendations or a maximum contaminant level, it has proved difficult to hold polluters accountable. Therefore, in order to provide residents with clean drinking water, the City of Westfield has taken out approximately $18 million in bonds, the costs which will now be borne by the very taxpayers already suffering the consequences of PFAS exposure. While the City has filed several lawsuits in an attempt to recoup these funds, it remains to be seen how large the financial impact will be on the residents over the long term.

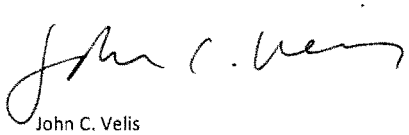
In addition to the cost burden associated with PFAS exposure, my constituents are also dealing with potentially serious long-term health effects, including cancer, immunodeficiency, infertility, and developmental delays. Talk of "cancer clusters" and anecdotes about neighbors with ulcerative colitis or thyroid disease are filling people's minds in the absence of tangible data. We are grateful that Westfield has been chosen as one of eight communities in the upcoming CDC exposure study, but until the multi-site study is concluded, knowing our level of exposure will do little to quell the fear and anxiety felt by many of our residents. Affected communities need more comprehensive resources to help raise awareness and spread fact-based information.

I urge you to err on the side of action and treat PFAS contamination like the emergency it is. Government on every level needs to work towards timely remediation for affected communities, but we

at the state- and local-level need your help. While agencies deliberate and equivocate over the appropriate response, the residents of Westfield and hundreds of other affected communities are left waiting for answers. I ask you to please do everything you can to hasten the development of evidence-based regulations and adequately fund health studies. Without the strong leadership of the federal government, more and more communities will find themselves like Westfield- sick, scared, and paying for the pleasure.

I thank you for your time and consideration and encourage you to reach out to my office at (413) 572-3920 or john.velis@mahouse.gov should you have any questions about my testimony.

Sincerely,



John C. Velis
State Representative
4th Hampden District
Massachusetts House of Representatives

NGWA℠
The Groundwater Association

March 27, 2019

The Honorable John Barrasso
Chairman, Senate Committee on
Environment and Public Works
U. S. Senate
Washington, DC 20510

The Honorable Tom Carper
Ranking Member, Senate Committee on
Environment and Public works
U. S. Senate
Washington, DC 20510

Re: March 28 hearing on Federal response to PFAS contamination

Dear Chairman Barrasso and Ranking Member Carper:

The National Ground Water Association (NGWA) commends the Committee for holding a hearing on "Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS)." Contamination from per- and poly-fluoroalkyl substances (PFAS) is nearly ubiquitous across the country—41 states have detected PFAS in the environment. More resources, both 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. While EPA released an action plan, the plan lacks timelines and urgency. 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

Southern Environmental Law Center

122 C Street NW, Suite 390
Washington, DC 20001-2109
202-828-8382
Fax 202-347-6041
SouthernEnvironment.org

March 28, 2019

The Honorable John Barrasso
Chairman, Committee on Environment and Public Works
United States Senate
410 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Tom Carper
Ranking Member, Committee on Environment and Public Works
United States Senate
456 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Barrasso and Ranking Member Carper:

Southern Environmental Law Center (SELC) thanks the U.S. Senate Committee on Environment and Public Works for holding the hearing "Examining the Federal Response to the Risks Associated with Per- and Polyfluoroalkyl Substances (PFAS)." We respectfully request to submit the attached comments to the record for the hearing. These comments were originally written for the Environmental Protection Agency's Docket EPA-HQ-OW-2018-0270 on PFAS contamination, however they can provide valuable information to the committee as it continues to investigate the PFAS chemical crisis.

Communities across the country, including communities in the Southeast, 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. Still it is leaving it to the individual states to try to fix the problem. Although some states are taking action, we need a comprehensive federal plan to combat this class of harmful chemicals.

The Environmental Protection Agency's (EPA) current PFAS Action Plan is wholly inadequate. It focuses on only two members of a larger group of toxic pollutants already in our rivers, groundwater, and water supplies, all of which must be cleaned up. Even for those two chemicals, EPA has not promised to do anything new under its Action Plan. Instead, EPA states it will continue to study and evaluate how and whether to protect our families and communities from the known risks of those two—out of thousands—PFAS chemicals. It does nothing to stop ongoing pollution. It does nothing to ensure our drinking water is safe. The federal government must take action immediately.

Sincerely,

Meghan M. Boian
Legislative Associate

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

---

[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

---

[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

---

[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 SpragueDawley 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.

---

[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

---

[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

---

[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

---

[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

---

[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.

---

[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. <u>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</u>.

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.

---

[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,

---

[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.

---

[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

[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).

---

[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

Senator BARRASSO. I want to thank all of you for being here today. I am very grateful for your time and your testimony.

Members may submit follow up written questions for the record. The hearing record will then be open for the next 2 weeks.

So, anyway, thank you so much. We appreciate your efforts and your interest and your testimony today.

The hearing is adjourned.

[Whereupon, at 11:38 a.m. the Committee was adjourned.]

○