D I A L O G U E

THE ENVIRONMENTAL JUSTICE IMPLICATIONS OF PFAS

SUMMARY

On June 13, 2024, the Environmental Law Institute and its Pro Bono Clearinghouse hosted the tenth installment of the continuing legal education series *Community Lawyering for Environmental Justice*, focusing on the environmental justice implications of "forever chemicals," including per- and polyfluoroalkyl substances (PFAS). A panel of experts highlighted developments, challenges, and opportunities in this burgeoning area, and discussed research on the disproportionate exposure experienced by communities of color; the U.S. Environmental Protection Agency's regulatory actions; and ongoing advocacy efforts. Below, we present a transcript of that discussion, which has been edited for style, clarity, and space considerations.

Jack Schnettler (moderator) is a Public Interest Law Fellow at the Environmental Law Institute.
Dr. Rashmi Joglekar is Associate Director of Science Policy and Engagement at the University of California, San Francisco.
Jahred Liddie is a Ph.D. candidate at Harvard's T.H. Chan School of Public Health.
Erik D. Olson is Senior Strategic Director for Environmental Health at the Natural Resources Defense Council.
Scott Faber is Senior Vice President of Government Affairs at the Environmental Working Group.

Jack Schnettler: Thank you for being here today. I work with the Environmental Law Institute's Pro Bono Clearinghouse, which hosts this community lawyering series. In addition, the clearinghouse operates an online tool that aims to connect environmental attorneys with communities who would otherwise be unable to access legal representation. To learn more about the clearinghouse or if you're an attorney and you're interested in joining the clearinghouse, please visit the site.[1]

We've convened a stellar panel to discuss the environmental justice implications of per- and polyfluoroalkyl substances (PFAS), which represent a category of chemicals known as "forever chemicals." Our panel is divided into two sections. Our first two panelists will be discussing the recent scientific and public health research into the PFAS issue, providing an overview of PFAS and their potential for harm, as well as discussing recent research on the disproportionate exposure to PFAS experienced by communities of color.

Our final two panelists are lawyers who will be explaining the U.S. Environmental Protection Agency's (EPA's) new PFAS regulations, which include new and safe drinking water standards for PFAS[2] and the hazardous substance designation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[3]

We are going to kick things off with Dr. Rashmi Joglekar, who will be presenting our introduction to PFAS. In addition to her professorship at the University of California, San Francisco (UCSF), Dr. Joglekar helps lead the university's program on reproductive health and the environment. She's also the director of the Community Engagement Core for the UCSF Environmental Research and Translation for Health Center. She is a toxicologist working at the intersection of science policy and environmental justice, and previously served as a staff scientist at Earthjustice.

Rashmi Joglekar: I'm thrilled to have the opportunity to speak with you all. The scientific evidence around the toxicity, persistence, and other shared characteristics of PFAS really makes it indisputable that these chemicals present danger to public health. I'll walk through the scientific evidence behind these indisputable dangers from human exposures to PFAS, and I'll start with background on the broader class of chemicals.

PFAS encompass an expansive class of chemicals. There are more than 15,000 known PFAS. This list is growing rapidly. The class includes long-chain PFAS, short-chain

1. Environmental Law Institute, *ELI Pro Bono Clearinghouse*, https://www.eli.org/probono (last visited Sept. 10, 2024).

2. PFAS National Primary Drinking Water Regulation, 89 Fed. Reg. 32532 (Apr. 26, 2024).
3. Designation of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substances, 89 Fed. Reg. 39124 (May 8, 2024); 42 U.S.C. §§9601-9675, ELR Stat. CERCLA §§101-405.

PFAS, fluoropolymers, and precursor compounds, which can degrade into long- and short-chain PFAS in the environment; and this is not an exhaustive list.

Overall, the class of chemicals comprises structurally diverse compounds. However, they do share many characteristics. For example, all PFAS are characterized by carbon-fluorine bonds. This is one of the strongest chemical bonds in existence, rendering most PFAS virtually indestructible in the environment, particularly those with many carbon-fluorine bonds. In fact, some PFAS can take thousands of years to break down in the environment. This trait is also known as environmental persistence.

Because of this shared characteristic, many PFAS are water-repellent and are used as nonstick coating on raincoats, nonstick pans, and food packaging. PFAS are also found in cosmetics, textiles, building materials, and other consumer items. For years, two PFAS in particular, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), which I'll break down in more detail later, were used in aqueous film-forming firefighting foam.

Because of their persistence in the environment, PFAS are highly mobile in most environmental media, including air, water, and soil. Their persistence also renders most PFAS difficult to metabolize in living organisms. As such, many PFAS will bioaccumulate or build to high concentrations in living organisms once ingested.

There is available data on the half-lives of several PFAS compounds, or the time required for a chemical to break down to half of its initial load, and it underscores this point.[4] Some PFAS have a half-life of close to 30 years in humans.

I want to provide a brief background on PFOS and PFOA, which are two of the most pervasive members of the PFAS class. Both of these chemicals are characterized by a long carbon chain backbone and many carbon-fluorine bonds. Both of these chemicals are also highly persistent in the environment and in the human body, and have very long half-lives.

The half-life of PFOA in the human body is up to 10 years, while the half-life of PFOS in the human body is as high as 27 years. These chemicals have been around for a while. Both were initially developed by the chemical company 3M in the late 1940s, and both are highly toxic to humans and wildlife.

For decades, scientific evidence, including studies conducted by PFAS manufacturers in the 1970s, has shown that these chemicals pose serious health risks to people, including multiple types of cancer, liver disease, autoimmune disorders, and other serious health harms. Moreover, because of their environmental persistence, the number of decades that they've been produced and disposed of in an unregulated fashion, and their ability to accumulate in living organisms, these chemicals have been detected in nearly all people living in the United States. Because of that, these chemicals present an urgent public health crisis.

PFOA and PFOS are considered the most well-studied PFAS. For decades, scientific research has underscored their toxicity and their indisputable danger to human and ecological health. There are hundreds of studies that have linked these chemicals to a range of health effects in people, including certain types of cancer; endocrine disruption; increased cholesterol; immunosuppression, including reduced response to vaccines in children; and several developmental harms, including low birth weight and even delayed mammary gland development.[5]

The health risks from these chemicals are well established and broadly recognized by international organizations, federal and state regulatory agencies, and leading scientific bodies. For example, the International Agency for Research on Cancer recently concluded that PFOA is carcinogenic to humans, and that PFOS is possibly carcinogenic to humans.[6] EPA concluded that there was suggestive evidence of the carcinogenic potential of PFOA and PFOS in humans.[7]

Increases in testicular and kidney cancer have been observed in highly exposed communities in the United States. These chemicals have also recently been linked to fatty acid changes in the liver that are associated with nonalcoholic fatty liver disease, a disease that now affects one in 10 children in the United States. Many of these health effects can result from extremely low levels of exposure.

EPA recently updated its toxicity assessments for PFOS and PFOA and found that they harm children's immune systems and reduce vaccine effectiveness at extremely low exposure levels in the parts-per-quadrillion range.[8] Those assessments were based on hundreds of studies that were published since 2013.

Accordingly, EPA updated its drinking water health advisory levels for PFOS to levels 3,500 times lower and for PFOA 17,500 times lower, respectively, than the previous levels.[9] Because the studies EPA identified found health risks below most laboratories' detection limits for these

4. Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services, Toxicological Profile for Perfluoroalkyls tb. 1-1 (2021), https://www.atsdr.cdc.gov/ToxProfiles/tp200.pdf.

5. *See id.*

6. Shelia Zahm et al., *Carcinogenicity of Perfluorooctanoic Acid and Perfluorooctanesulfonic Acid*, 25 Lancet Oncology 16 (2024).

7. U.S. EPA, Health Effects Support Document for Perfluorooctane Sulfonate (PFOS) (2016) (EPA 822-R-16-002), https://www.epa.gov/sites/default/files/2016-05/documents/pfos_hesd_final_508.pdf; U.S. EPA, Health Effects Support Document for Perfluorooctanoic Acid (PFOA) (2016) (EPA 822-R-16-003), https://www.epa.gov/sites/default/files/2016-05/documents/pfoa_hesd_final_508.pdf.

8. U.S. EPA, *Human Health Toxicity Assessment for Perfluorooctanoic Acid (PFOA)*, https://www.epa.gov/sdwa/human-health-toxicity-assessment-perfluorooctanoic-acid-pfoa (last updated May 13, 2024); U.S. EPA, *Human Health Toxicity Assessment for Perfluorooctane Sulfonic Acid (PFOS)*, https://www.epa.gov/sdwa/human-health-toxicity-assessment-perfluorooctane-sulfonic-acid-pfos (last updated May 13, 2024); U.S. EPA, Technical Fact Sheet: Drinking Water Health Advisories for Four PFAS (PFOA, PFOS, GenX Chemicals, and PFBS) (2022) (EPA 822-F-22-002), https://www.epa.gov/system/files/documents/2022-06/technical-factsheet-four-PFAS.pdf.

9. Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate, 81 Fed. Reg. 33250 (May 25, 2016); U.S. EPA, Technical Fact Sheet, *supra* note 8.

chemicals, EPA warned that any detectable level of PFOA and PFOS places children's health at risk.

PFAS enter the environment in several ways, including from the manufacturing, processing, use, and disposal of PFAS and products that either contain PFAS or generate PFAS as a waste byproduct. Disposal includes processes like incineration, which can generate new PFAS or release existing PFAS into the air.

In addition, PFAS precursors that are emitted or released into the environment via those pathways can biotransform into other PFAS, including long-chain PFAS like PFOA. Because of their environmental persistence, PFAS released into the environment linger for decades or longer and contribute to legacy exposures for years after their initial release.

People are then routinely exposed to these chemicals from multiple sources, including drinking water, food, and consumer goods and materials that they use or contact. PFAS exposures also occur inside homes through treated furniture, cookware, cleaning supplies, and inhalation of household dust particles. One study found that more than 90% of household dust contains PFAS, including PFOA and PFOS.[10]

As a result of their shared chemical characteristics, widespread use, and limited regulation of their manufacture, disposal, and releases into the environment, PFAS are now pervasive environmental contaminants. They've been detected in environmental media from rainwater to the ocean floor and in most people living in the United States.

To provide an example of the widespread contamination in the United States, contaminated drinking water is a significant exposure pathway of concern. A 2020 study found that more than 200 million people living in the United States likely drink water that's polluted with levels of PFOA and PFOS that are above EPA's previous health advisory levels.[11] And this was before EPA updated its health advisory levels, meaning that most people living in the United States are likely drinking water that is contaminated with hazardous levels of PFOA and PFOS.

Depicting this contamination crisis, the Environmental Working Group (EWG) has mapped PFAS-contaminated sites across the United States, including the 50 U.S. states, the District of Columbia, and four U.S. territories.[12] As of May 2024, EWG identified and mapped 6,189 known PFAS-contaminated sites, which is more than double the number of sites detected just two years ago. This includes drinking water sources and military sites. The EWG map also highlights drinking water sources where PFAS levels exceed EPA's maximum contaminant levels (MCLs).

There is clearly a need to regulate PFAS in drinking water. EPA's recent drinking water rule, which was finalized on April 10 of this year, addresses this issue for six PFAS by establishing legally enforceable MCLs.[13] EPA estimates that this rule will reduce PFAS exposure in drinking water for approximately 100 million people, preventing thousands of deaths and reducing tens of thousands of serious PFAS-attributed illnesses.

However, given that the class now exceeds 15,000 chemicals, more action needs to be taken. To make matters worse, persistent chemicals like PFAS travel to the Arctic through a process known as global distillation, or the grasshopper effect. Through this process, persistent chemicals that are emitted into the air or enter the water from polluting sources thousands of miles from the Arctic are picked up by oceanic and atmospheric currents and deposited in colder climates, eventually accumulating in the polar regions, including the Arctic and Alaska, at very high levels.

Scientists have noted that PFAS concentrations in aquatic ecosystems and in people inhabiting these areas are increasing over time and have reached levels that present a hazard to human health. Once persistent chemicals arrive in the Arctic ecosystem through global distillation, they accumulate in living organisms and can increase in the concentration of the food chain, reaching extremely high concentrations in larger animals like marine mammals, ringed seals, and polar bears, which contain some of the highest levels of persistent pollutants on the planet.

Some of these animals are integral components of the diets and cultures of Indigenous Peoples of Alaska and the Arctic. The widespread presence of PFAS in these traditional foods means that Arctic Indigenous Peoples regularly ingest chemicals that are harmful to human health. The result is that Arctic Indigenous Peoples have some of the highest levels of chemical contamination in blood and breast milk of any population on earth. A 2018 study found PFOA and PFOS in the serum of nearly 100% of Alaska Natives sampled, who lived thousands of miles from facilities that manufacture and release PFAS. Serum PFAS levels were also significantly associated with changes in thyroid hormone levels.[14]

Although harmful exposures to PFAS are widespread globally, research has shown that certain subpopulations are more susceptible to harm from these exposures due to intrinsic factors, such as preexisting disease, life stage, or sex or genetic traits, or to extrinsic factors, such as food insecurity, poverty, racism, or adverse childhood experiences.[15] When a population experiences multiple intrinsic and extrinsic factors, they face greater risks of adverse

10. Susanna D. Mitro et al., *Consumer Product Chemicals in Indoor Dust: A Quantitative Meta-Analysis of U.S. Studies*, 50 Env't Sci. & Tech. 10661 (2016).
11. David Q. Andrews & Olga V. Naidenko, *Population-Wide Exposure to Per- and Polyfluoroalkyl Substances From Drinking Water in the United States*, 7 Env't Sci. & Tech. Letters 931 (2020).
12. EWG, *PFAS Contamination in the U.S.*, https://www.ewg.org/interactive-maps/pfas_contamination/ (last updated Aug. 9, 2024).
13. PFAS National Primary Drinking Water Regulation, 89 Fed. Reg. 32532 (Apr. 26, 2024).
14. Samuel C. Byrne et al., *Exposure to Perfluoroalkyl Substances and Associations With Serum Thyroid Hormones in a Remote Population of Alaska Natives*, 166 Env't Rsch. 537 (2018), https://doi.org/10.1016/j.envres.2018.06.014.
15. Julia R. Varshavsky et al., *Current Practice and Recommendations for Advancing How Human Variability and Susceptibility Are Considered in Chemical Risk Assessment*, 21 Env't Health No. 133 (2023), https://doi.org/10.1186/s12940-022-00940-1; Cliona M. McHale et al., *Assessing Health Risks From Multiple Environmental Stressors: Moving From G × E to I × E*, 775 Mutation Rsch./Revs. Mutation Rsch. 11 (2018), https://doi.org/10.1016/j.mrrev.2017.11.003.

health outcomes. In addition to Arctic Indigenous Peoples, another example of a susceptible subpopulation is residents of fenceline communities who are more likely to be people of color, who experience various social determinants of health, including income inequality, health care inequity, food insecurity, and disproportionate burdens of underlying disease, which collectively increase their susceptibility to harm from chemicals like PFAS being released by nearby facilities.

It's therefore critical that the totality of chemical and nonchemical stressors is addressed when regulating the manufacturing, use, and disposal of PFAS. The combination of these stressors can be referred to as cumulative impacts. The traditional approach of conducting single chemical risk evaluations does not fully capture real-world PFAS exposures and risks, particularly for susceptible subgroups, like fenceline communities, where exposure to multiple chemical and nonchemical stressors occurs simultaneously.

In summary, PFAS encompass a wide range of structurally diverse compounds with shared characteristics, including persistence, mobility, and bioaccumulation potential. And ongoing scientific study suggests that many PFAS share the same toxicity endpoints as more well-studied PFAS, like PFOA and PFOS. One source of information in this area is the PFAS-Tox Database, an initiative that highlights the hazard evidence for less well-known PFAS.[16]

This database clearly demonstrates that emerging science underscores the substantial danger of other PFAS, some of which have more than 100 studies examining a single health endpoint. Given the more than 15,000 PFAS in existence, a number that is steadily increasing, there is growing consensus that regulatory decisions that better account for the entire class of chemicals is critical.

Jack Schnettler: Next up, Jahred Liddie is going to be doing a deeper dive into the environmental justice implications of the PFAS issue. Jahred is a Ph.D. candidate in population health sciences in the Environmental Health Department of the Harvard T.H. Chan School of Public Health. His lab's research attempts to quantify human exposure to PFAS, investigate related health effects, and understand the environmental justice ramifications of the PFAS issue.

Jahred Liddie: I'm going to talk about a project that I published as part of my Ph.D. research.[17] On a high-level note, this project is specific to drinking water, which is one of the several routes of exposure that Dr. Joglekar discussed.

I want to begin by discussing and giving an overview of some of the mechanisms that other researchers have highlighted as potential causes of environmental injustice related to drinking water exposures. Some of these may be relevant for PFAS. Again, these are all specific to drinking water exposures and aren't necessarily encompassing all mechanisms that other researchers have talked about in relation to disparities in other environmental exposures.

The Drinking Water Disparities Framework was developed by Carolina L. Balazs and Isha Ray.[18] It was proposed in 2014 relating to drinking water exposures in general. The framework comprises three main parts, including the natural environment, the built environment, and the sociopolitical environment. Factors related to each of these domains and differences in those domains from one community to another are believed to be possible mechanisms causing disparities in drinking water exposures.

The natural environment can include differences in climate and hydrogeology in soil. Some of the differences in the built environment include broad factors such as land use, which I think is particularly important for PFAS, as I'll discuss later. The built environment can also include infrastructure, including drinking water treatment infrastructure. Non-physical components, such as the financial, technical, and managerial capacities of drinking water treatment facilities, are also included in this component of this framework.

The sociopolitical environment encompasses a wide variety of factors. These include long-term historical settlement patterns, both forced and unforced, that have influenced where different demographic groups are located around the United States. It also includes factors related to social mobility at all different geographical scales—national, regional, and state, going down all the way to the household level. I should note that this framework was actually developed originally with a focus on naturally occurring or geogenic drinking water contaminants, like arsenic for example. But as I'll discuss, it can be easily mapped on to other contaminants like PFAS.

As I just have discussed a lot on mechanisms related to environmental justice, I want to introduce a quote that I think is undersold in some of the literature out there on environmental justice and environmental disparities:

> One could still argue that there is an injustice—even an injustice at the level of racial groups when there are inequities in the simple correlations, even if these correlations are the result of socio-economic processes. Simply because the inequity is mediated through some mechanism does not mean it isn't there.[19]

So, mechanisms in general can be helpful for us to ground existing disparities in existing processes. We can also identify them to figure out how to intervene to eliminate disparities, but they in themselves are not necessarily justification for a disparity that we observe in environmen-

16. PFAS-Tox Database, *Home Page*, https://pfastoxdatabase.org/ (last visited Sept. 10, 2024).
17. Jahred M. Liddie et al., *Sociodemographic Factors Are Associated With the Abundance of PFAS Sources and Detection in U.S. Community Water Systems*, 57 Env't Sci. & Tech. 7902 (2023).
18. Carolina L. Balazs & Isha Ray, *The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure*, 104 Am. J. Pub. Health 603 (2014), https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2013.301664.
19. Spencer Banzhaf et al., *Environmental Justice: The Economics of Race, Place, and Pollution*, 33 J. Econ. Persp. 185, 190 (Winter 2019).

tal exposures. I also want to highlight that I think several themes in the environmental justice movement have implications for PFAS. These were themes that also helped frame the hypotheses for the paper that I'm going to be talking about today.

The first theme is that historical discrimination and segregation in the United States have shaped where and how industrial sources of pollution are patterned, specifically resulting in a pattern that is social. It has a distinct social pattern in the United States. These are discussed more in depth in three reports: the United Church of Christ's Commission for Racial Justice report that came out in 1987,[20] *Dumping in Dixie* by Robert Bullard, who is a key figure in the environmental justice movement,[21] and a report from EPA that documented nationwide disparities in siting of hazardous waste facilities in the United States.[22]

Second, is a set of research primarily coming out more recently in the 2000s on drinking water quality and marginalized communities, discussing the disparate exposures that they face. The Natural Resources Defense Council (NRDC) provides a map that describes the intersection between MCL violations and racial, ethnic, and linguistic vulnerability in the United States.[23] MCLs are regulations for the maximum allowable concentration of a contaminant in drinking water for public water systems under the Safe Drinking Water Act (SDWA).[24] In certain areas of the United States, these things are happening together, indicating that there is environmental injustice.

As you've heard already, PFAS are drinking water contaminants, among many other things. I want to introduce what the state of monitoring for PFAS in drinking water is like around the country. It began nationwide with a survey by EPA in 2013 and ending in 2015 on PFAS.[25] The survey included other unregulated contaminants as well as a group of PFAS compounds.

There was an analysis of that survey that was published in 2016. This study documented associations between PFAS-contaminated sites and where PFAS were detected at high levels around the country based on EPA's initial drinking water survey. These included industrial sites that have historically manufactured PFAS, military required training areas where they're using foams that can contain high concentrations of PFAS, the same for airports that can use these foams as part of standard training for firefighting, as well as wastewater treatment plants that can release PFAS via their effluent.

Since then, there's been a range of studies that have tried to estimate populationwide exposures to PFAS. One of them estimates that up to 200 million U.S. residents are exposed to PFAS, including PFOA and PFOS, in drinking water.[26] Since 2015, several states have monitored drinking water for PFAS. We now have finalized MCLs for several PFAS, which will require more testing in the future. There's also another nationwide survey that's happening for an expanded group of PFAS.[27] But really, the statewide monitoring is what began this study, and I'll talk more about what that meant. I'm also specifically going to be talking about community water systems, which are public water systems, as opposed to private water systems, that serve the same population year-round.

This project had three primary research questions. The first was similar to the 2016 analysis: to reinvestigate the association between PFAS sources as well as PFAS concentrations in drinking water from watersheds around the United States.

The second and third questions are more related to exposure disparities in drinking water. The second being whether we see sociodemographic disparities in the proximity of PFAS sources to community water systems. The third is relating to sociodemographic disparities in detections in those community water systems of a group of PFAS.

Now, I'm going to describe some of the data for this project. These came from a multitude of sources. One of them is the U.S. Census Bureau,[28] which of course has data on racial/ethnic composition and socioeconomic factors. In our primary analysis, we focus on non-Hispanic Black residents and Hispanic residents as well as the percentage of residents under the federal poverty line. Although, in secondary analyses, we expand this to include other marginalized racial/ethnic groups as well as other factors related to socioeconomic status.

We combine this with data on PFAS contamination sources, focusing on the same sort of small set of sources analyzed in the 2016 study. These include airports that are certified to use firefighting foams that contain PFAS, military fire training areas with known or suspected PFAS contamination, major industrial facilities that historically in the United States have produced PFAS, municipal solid waste landfills, and wastewater treatment plants. Here, we also specifically include information on the volume of the effluent released by these wastewater treatment plants.

We combine these all with data from the Safe Drinking Water Information System,[29] an administrative database

20. United Church of Christ Commission for Racial Justice, Toxic Wastes and Race in the United States (1987), https://www.ucc.org/wp-content/uploads/2020/12/ToxicWastesRace.pdf.
21. Robert D. Bullard, Dumping in Dixie (1990).
22. U.S. EPA, Environmental Equity: Reducing Risk for All Communities (1992) (EPA 230-R-92-008), https://www.epa.gov/sites/default/files/2015-02/documents/reducing_risk_com_vol1.pdf.
23. NRDC, Watered Down Justice 6 (2019), https://www.nrdc.org/sites/default/files/watered-down-justice-report.pdf.
24. 42 U.S.C. §§300f to 300j-26, ELR Stat. SDWA §§1401-1465.
25. U.S. EPA, *Third Unregulated Contaminant Monitoring Rule*, https://www.epa.gov/dwucmr/third-unregulated-contaminant-monitoring-rule (last updated June 10, 2024).
26. Andrews & Naidenko, *supra* note 11.
27. U.S. EPA, *Fifth Unregulated Contaminant Monitoring Rule*, https://www.epa.gov/dwucmr/fifth-unregulated-contaminant-monitoring-rule (last updated Aug. 1, 2024).
28. U.S. Census Bureau, *2014-2018 ACS 5-Year Estimates*, https://www.census.gov/programs-surveys/acs/technical-documentation/table-and-geography-changes/2018/5-year.html (last revised Dec. 8, 2021).
29. U.S. EPA, *Safe Drinking Water Information System (SDWIS) Federal Reporting Services*, https://www.epa.gov/ground-water-and-drinking-water/safe-drinking-water-information-system-sdwis-federal-reporting (last updated Mar. 14, 2024).

that contains information on the population served, the water source type or the type of water system, as well as the city or county served by a water system in the United States. These are all then combined with statewide monitoring data of PFAS in 18 states.

This monitoring happened from 2016 to 2022. It happened for a variety of reasons, including required sampling that states were doing as part of their own state-level MCL violation monitoring as well as sampling to better understand contamination after the conclusion of EPA's nationwide survey of PFAS.

As part of this project, we also produced an interactive map,[30] which I recommend looking at. This map details a lot of the data that we've analyzed as part of the project. Watershed units are shown on the map where you can view the maximum detections of PFOA and PFOS. You can also view these data from the county-level perspective. Specifically, you can view detections for water systems serving those counties as well as a host of demographic information on those counties, where they're located in these counties as well as in those watershed regions. Then, you can also view a few different sources that we analyzed.

To provide an overview and an update to this data synthesis, the data presented comprise over 7,800 community water systems around the country. They serve 70 million people total in 18 states.[31] We also have a more recent update to these data, as of 2024, comprising 27 states total with 10,000 community water systems serving close to 100 million people.[32]

Now, I want to give a quick overview of how the three main parts of the analysis were conducted. The first question, again, relates to the association between PFAS contamination sources and PFAS drinking water concentrations. We're analyzing those using watershed units. We're analyzing whether there are disparities in the siting of these specific contamination sources using the data that I mentioned earlier and then specifically focusing on military fire training areas, airports, major facilities that produce PFAS, landfills, and wastewater treatment plant effluent.

Then, we're analyzing the association between these specific sociodemographic factors and PFAS contamination. We're defining that as values above five nanograms per liter (or five parts per trillion) as well as values above state MCL violations at that time. We focus on five PFAS—perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), PFOS, PFOA, and perfluorononanoic acid (PFNA)—as well as at least one detection of each of those PFAS above a state-level MCL.

I'm going to move into some discussion on the results and a brief data summary. Again, these systems are serving 70 million people across 18 states. Five PFAS, the ones that we focused on throughout the analysis, were measured and reported most consistently across the 18 states. Many of these are actually now being included in the EPA regulations. About one in four residents we found were served by community water systems that detected at least one of the five PFAS above five nanograms per liter.

We also found a lot of agreement with the prior study—it's not necessarily a surprise—that several PFAS sources were associated with drinking water concentrations. Comparing this current study with the 2016 study, we found very similar associations between drinking water PFAS concentrations and major industrial facilities that produce PFAS, as well as military fire training areas where those foams are often used.

We also looked at airports in this study. The airports also potentially using these foams were associated with large increases in PFAS concentrations. Among additional predictors, we found that the combined effluent from wastewater treatment plants and landfills were associated with PFAS concentrations in drinking water. Thus, there is really a diverse group of sources associated with PFAS concentrations.

I want to highlight again that this is despite pretty stark differences in geographical coverage between these two studies. For example, one study was nationwide. The other one was conducted just amongst the 18 states. These two data sets include different water systems as well as differing detection limits. Particularly in the newer statewide data, the PFAS could be quantified at much lower levels than in the 2016 survey.

Relevant to the second research question, we found in general that community water systems serving higher proportions of people of color were more likely to share watersheds with PFAS sources.

As one example, as you raise the percentage of Black and Hispanic residents served by a water system, you get increases of up to 10% in the odds of having a PFAS source, like a military fire training area, in your watershed. Odds are similar to probabilities.

On the other hand, we saw an inverse relationship with percentage of residents under the federal poverty line, so we're actually seeing that when the proportion of this demographic group is higher, it is less likely that the system was sharing their watershed with a PFAS source. I'll talk a little bit more about this later as it went against our initial hypotheses.

Summarizing our third research question, we found overall that community water systems with detectable PFAS serve greater proportions of people of color. This follows from that prior finding as well. As an example, if the proportion of Hispanic residents is one percentage point higher, the odds of detecting PFOA above five nanograms per liter is raised by 6%.

We saw similar associations with the percentage of Black residents. When that group is increasing, the likelihood of detecting several PFAS also increases. However, we saw, with the proportion of residents under the federal poverty line, as that group is increasing, these systems were

30. Jahred Liddie et al., *Interactive PFAS Map*, https://sunderlandlab.github.io/pfas_interactive_maps/PFAS_EJ_interactive_map.html (last updated Jan. 3, 2024).
31. Liddie et al., *supra* note 17 (replication data sets available at https://doi.org/10.7910/DVN/0C06MR).
32. *Id.* (summary data set and full data available via request at https://doi.org/10.7910/DVN/8LPLCF).

less likely to detect several PFAS. I want to be clear that the thresholds analyzed here for PFOA and PFOS are just above the two newly finalized MCLs, which are four nanograms per liter for each of these compounds.

We can describe these findings in another way. Across the distribution, we found that systems with detectable PFAS serve a greater proportion of people of color. The people-of-color group is including not just Black and Hispanic and Latino residents, but also Asian American and other Pacific Islander groups, Alaska Native, and Indigenous groups as well.

I'm comparing these quantiles in terms of the proportion of people of color from the median all the way up to the 90th percentile. I'm comparing groups that had and didn't have PFAS contamination above four nanograms per liter for at least one PFAS. At the median, the proportion of people of color is almost double the proportion among the systems with contamination compared to the group that didn't have contamination at that threshold, and all the way up to the 90th percentile we still see a difference between these two groups.

Going back to the finding related to socioeconomic status, among all water systems, we found that the proportion of residents under the federal poverty line was inversely associated with PFAS contamination of drinking water. So overall, when that group is higher in proportion, we're seeing the likelihood of contamination decreasing.

We noticed in aggregating a lot of the PFAS source data in this project that many of the major sources of PFAS were more likely to be located in regions with a lot of urbanicity and also a lot of historic industrialization. We ended up splitting our data to separate the more urban systems from the more rural systems.

One good bit of context here is that counties in these more urban regions generally have lower values of these different socioeconomic status measures than more rural areas of the country. Some of that is probably related to the isolation of these industries from the rural areas in the United States. When we split our data along these urban and rural lines, we actually found that among these more rural systems, there was a positive association between residents under the federal poverty line and contamination. In contrast, among more urban systems, we found that that relationship from the main analysis at the top was similar.

I want to recap some of the key conclusions of this project. The statewide drinking water monitoring data show evidence of sociodemographic disparities in PFAS contamination of drinking water sources. These are related, at least in part, to the disparate proximities of PFAS sources to community water systems. Our findings also reinforced that several PFAS sources were in fact predictors of PFAS concentrations.

As I close out, I want to highlight a few key data gaps, some of the key limitations of this work that I think are helpful to think about moving forward. The first relates to gaps in drinking water monitoring data nationally for PFAS. As I mentioned, a lot of this is going to be expanded as part of the monitoring for the newly released MCLs in the next few years, as well as that nationwide survey on an expanded group of PFAS that's underway currently.

I want to highlight here that the systems we analyze are similar to systems nationwide in a few categories. But again, we're analyzing data only for 18 states, so our results are mostly applicable to these 18 states. More broadly, I think this is a concern for public health monitoring in general. But data are quickly becoming available to close this gap.

Second, is that there is a limited granularity to characterize sociodemographic composition for drinking water systems in the United States. This has been a problem for a while for researchers throughout the drinking water space, both in terms of trying to estimate exposures for communities and trying to understand exposure disparities to enable us to answer questions related to drinking water and health.

This analysis is using counties served by community water systems to ascertain their sociodemographic composition to do those analyses, although systems often serve populations at more granular scales. There are a few ongoing efforts currently to try to close this gap as well.

As we talked about earlier, there are numerous other routes of exposure for PFAS. We're focusing only on drinking water. It's one of many possible routes for PFAS that we see including dietary sources, such as locally caught fish. That can often be a culturally significant source of food for many groups as well. Research attention is needed not just for drinking water, but for these other key routes of exposure with environmental justice in mind.

As I close out here, I want to highlight again that these nationwide regulations are a historic development. But for marginalized communities, it may be likely that they face additional barriers to reduce drinking water exposures even after the regulations have been finalized. This is a research topic I'm not going to be able to talk about today, but that I think is a valuable next question to study as we learn more about these compounds and how we remediate contamination.

More broadly, environmental justice should be a concern and should be a component of efforts to mitigate risk for actors at multiple scales, for example when drafting sampling plans or remediation plans. This can all help us to better characterize exposure to this class of compounds and to reduce those exposures.

Jack Schnettler: Moving our discussion to EPA's most recent regulatory actions, our next two panelists will be discussing the Agency's rulemaking regarding the CERCLA hazardous substance designation and safe drinking water standards.

Presenting the newly designated safe drinking water standards, we have Erik D. Olson, the senior strategic director for environmental health at NRDC. For 15 years, he worked as a senior attorney at NRDC and as director of its Advocacy Center and Public Health Program and before that, he was the general counsel and deputy staff director for the U.S. Senate Committee on Environment and Public Works. He also oversaw food safety and other food-related work at the Pew Charitable Trusts, where he was able to assist in efforts to enact the first major overhaul of the Food and Drug Administration's (FDA's) food safety laws in more than 70 years. In his earlier NRDC tenure, he helped lead the successful campaigns to revamp laws protecting the nation's drinking water from contamination and its food supply from pesticides.

Erik Olson: As Rashmi and Jahred both mentioned, the PFAS class are very risky at much lower levels than we thought in the past. EPA used to have a health advisory not that many years ago of 70 parts per trillion for PFOA and PFOS. That has now dropped, as Rashmi mentioned, down to the parts per *quadrillion*. The more we learn about these chemicals, the more we know that they're extremely dangerous at very low levels.

They also have triggered a lot of public concern. As Jahred mentioned, we've got a lot of information that there are disproportionate effects in certain communities, especially communities of color that are more highly exposed. In NRDC's view, there needs to be much more action and accountability. I believe Scott is going to be talking after me about the cleanup responsibilities of the people who are causing this pollution.

I want to emphasize that the way that EPA's drinking water standard-setting process is supposed to work is that the Agency is supposed to look at the full array of adverse health effects and try to protect against all of them to the extent it can. This is not just a crazy thought that somebody at EPA had that maybe these chemicals are dangerous. In fact, the National Academies of Sciences, Engineering, and Medicine, EPA, the Centers for Disease Control and Prevention, the EPA Science Advisory Board, and international authorities like the European Environment Agency all agree that these compounds are extremely dangerous at very low doses.

There is a map, up-to-date as of last week, that shows the PFAS contamination sites.[33] What's happening is that every time more monitoring is done, we're finding more and more sites. EPA has issued the Fifth Unregulated Contaminant Monitoring Rule, under which monitoring is ongoing now and is going to be happening over the next couple of years.[34] So, the map is going to fill up. A lot of states haven't done much monitoring yet, but when that monitoring is done, I think we're going to see sites all over the country. All 50 states have this problem.

Jahred mentioned that we know PFAS pollution has disproportionate impacts, especially on small and disadvantaged communities, some rural communities, and of course communities of color. I want to highlight one study that NRDC recently did.[35] We looked very carefully at the data in California, specifically, which is more extensive for PFAS contamination than the national data.

The most recent round of data showed that up to 25 million people in California alone, about 64% of the population, are drinking water from systems that had found PFAS contamination. In addition, we also found that Californians living in state-identified disadvantaged communities were disproportionately affected. It's broken down in the study. You should look at it if you're interested in areas and the racial composition, which also is consistent with what Jahred and his study recently showed.

EPA has long been developing drinking water standards for PFAS. Even the Donald Trump Administration said they were needed.[36] The Agency originally was focused on PFOA and PFOS. These are the legacy compounds that were largely phased out of domestic manufacture more than a decade ago, but they are widespread contaminants. They occur all over the place.

EPA's regulatory determination, the formal decision that the Agency had to regulate PFOA and PFOS, was made in 2021 shortly after the Joseph Biden Administration came in.[37] Then, the Agency proposed and has now finalized regulatory determinations for an additional four PFAS. So, a total of six PFAS are being regulated under the new EPA standards that came out just a couple of months ago. EPA got more than 120,000 comments. A lot of people are very interested in this subject and commented on it. There was an extensive peer review by the EPA Science Advisory Board and multiple other scientists to confirm EPA's findings.

The final rule has a lot of depth, and it's a very lengthy *Federal Register* notice.[38] Basically, the Agency set health goals, called MCL goals, which are required. The SDWA requires EPA to set these health-based goals that are not enforceable, but they drive what the actual enforceable standards, called MCLs, will be. The health goals for PFOA and PFOS were zero based on the latest science. The Agency also set health goals of 10 parts per trillion for three other PFAS.

As for the enforceable part of the rules, the Agency set the standards based on what is feasible and what it found can be measured well. For PFOA and PFOS, those legacy chemicals, the Agency set the MCLs at four parts per trillion. The Agency found these are feasible levels and can be measured at that level.

For the other PFAS, the Agency set individual standards for three of them of 10 parts per trillion. GenX (a Chemours trade name) is one of them. It's a widespread con-

33. EWG, *supra* note 12.
34. U.S. EPA, *Fifth Unregulated Contaminant Monitoring Rule*, *supra* note 27.
35. NRDC, *Dirty Water: Toxic "Forever" PFAS Chemicals Are Prevalent in the Drinking Water of Environmental Justice Communities*, https://www.nrdc.org/resources/dirty-water-toxic-forever-pfas-chemicals-are-prevalent-drinking-water-environmental (last updated Feb. 21, 2024).
36. News Release, U.S. EPA, EPA Announces Proposed Decision to Regulate PFOA and PFOS in Drinking Water (Feb. 20, 2020), https://www.epa.gov/newsreleases/epa-announces-proposed-decision-regulate-pfoa-and-pfos-drinking-water. *See also* U.S. EPA, Announcement of Preliminary Regulatory Determinations for Contaminants on the Fourth Drinking Water Contaminant Candidate List, 85 Fed. Reg. 14098 (Mar. 10, 2020).
37. Announcement of Final Regulatory Determinations for Contaminants on the Fourth Drinking Water Contaminant Candidate List, 86 Fed. Reg. 12272 (Mar. 3, 2021).
38. PFAS National Primary Drinking Water Regulation, 89 Fed. Reg. 32532 (Apr. 26, 2024).

taminant in North Carolina. The more we test elsewhere, we're starting to see it in other places as well.

In addition to those individual MCLs, the Agency also set the MCL for a mixture of those four PFAS—PFHxS, PFNA, PFBS, and GenX (which is basically a trade name for hexafluoropropylene oxide-dimer acid). The PFAS mixture standard is based on what they call the Hazard Index.[39] This is what EPA has used multiple times across the country in Superfund cleanups, Resource Conservation and Recovery Act (RCRA)[40] cleanups, and hazardous waste sites. The Agency used this for the first time for an MCL, although EPA has often set MCLs for mixtures—for example, for polychlorinated biphenyls (PCBs) and others.

So, the Agency set this standard for the mixture of the four PFAS based on a simple formula. Basically, it looks at the mixture in a drinking water sample and compares each individual PFAS to the safe level as determined by EPA. The levels of each PFAS found are compared to their safe levels, and then these ratios are added. If this value of the added-up ratios exceeds one, then you're in violation. The reason for doing this is that you almost never see a single PFAS. They always come in packs; they are a mixture. Often, we regulate based on one chemical at a time. For PFAS, we know that they virtually never occur by themselves. They're a complex mixture of a bunch of different PFAS and need to be controlled as a group.

What EPA has to consider when they're setting these standards is to set the MCLs as close as feasible to those health goals. Then, they have to look at what is analytically detectable. They set those, as I mentioned, at four parts per trillion for PFOA and PFOS. For the other PFAS, it was around three to five parts per trillion.

They looked at what treatment technologies are immediately available off the shelf. EPA then looked at the costs of the technologies, whether it's feasible to treat down to those detectable levels, and also whether it's feasible for that mixture to be treated. For all of those, they found it was feasible.

In addition, EPA did an extensive environmental justice analysis of the rule. The analysis found that communities with environmental justice concerns are sometimes indeed disproportionately affected by PFAS in their drinking water. The Agency found that the final rule is likely to reduce existing disproportionate adverse impacts on environmental justice communities, including people of color, low-income populations, and/or Indigenous people.

The Agency had to look at the costs and benefits. EPA's estimate was about $1.5 billion annually in costs. They only quantified a narrow set of the benefits. They found those benefits were about the same as the quantified costs, but there are a lot of other health benefits that the Agency recognized but did not quantify.

I'll mention that independent analysis by Safe Water Engineering, which is run by a former EPA employee and a current consultant to us as well as many industry folks, found that EPA's cost estimates were pretty reasonable and that the water utility cost estimates were grossly inflated.[41] Also, independent economists found that EPA had actually underestimated the benefits, and even EPA noted that if it had been able to fully quantify all the benefits, they would have been higher.[42] EPA and others have spent a lot of time thinking about how to make sure water is affordable, because water utilities are complaining that these rules are expensive and saying that it's going to have a huge impact on water affordability.

Water affordability is definitely an issue that needs to be addressed, but I'll mention a few relevant things. One is that the Bipartisan Infrastructure Law includes $9 billion targeted for PFAS contamination of drinking water utilities.[43] In addition, there's about $12 billion or more in settlements with polluters like 3M and DuPont that have already been reached in a multidistrict litigation.[44] So, there's well over $20 billion already on the table for water utilities to help them pay for treating PFAS in their drinking water.

In addition, it's really important to note that some progressive utilities have started restructuring their rates so that low-income people have an affordable bill that they can pay. Actually, NRDC has worked with some utilities and documented that there is a business case to be made for structuring rates so they are affordable for people having a hard time making ends meet.[45] When people can afford their water bills and pay them, utilities don't have to chase after low-income people, turning their water off and turning it back on, repeatedly dunning them or taking them into collections for late payments, or even applying liens on their homes. All of these transaction costs and delays add up to real money for utilities. In fact, if you have a water rate restructuring, as for example Philadelphia has that bases your water rates on your income so that low-

39. *Id.*
40. 42 U.S.C. §§6901-6992k, ELR Stat. RCRA §§1001-11011.

41. Elin W. Betanzo, Analysis of the USEPA Proposed PFAS National Primary Drinking Water Regulation Treatment Costs and Comparison to the AWWA National PFAS Cost Model Report (2023), *available at* https://www.nrdc.org/sites/default/files/2023-06/epa-proposed-mcls-six-pfas-comments-with-exhibits-20230530.pdf (see Exhibit C).
42. *See, e.g.*, Memorandum from Dennis Guignet, Ph.D., to Earthjustice re: Review of the Economic Analysis for the Proposed PFAS NPDWR (May 26, 2023), *available at* https://www.nrdc.org/sites/default/files/2023-06/epa-proposed-mcls-six-pfas-comments-with-exhibits-20230530.pdf (see Exhibit B); PFAS National Primary Drinking Water Regulation, 89 Fed. Reg. at 32696-708. *See generally* Alissa Cordner et al., *The True Cost of PFAS and the Benefits of Acting Now*, 55 Env't Sci. & Tech. 9630 (2021), doi: 10.1021/acs.est.1c03565.
43. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021).
44. The 3M PFAS Public Water Provider Settlement: What You Need to Know, *available at* https://afff-mdl.com/wp-content/uploads/2023.11.01-3M-White-Paper.pdf (discussing "record-breaking settlement with 3M of up to $12.5 billion for America's Public Water Systems"). For settlement documents and docket, see https://afff-mdl.com/3m-pws-settlement/. *See also Baron & Budd: Court Approves Massive $1.1 Billion Settlement With DuPont to Resolve "Forever Chemicals" Contamination Suits*, Businesswire (Feb. 8, 2024), https://www.businesswire.com/news/home/20240208772923/en/Baron-Budd-Court-Approves-Massive-1.1-Billion-Settlement-With-DuPont-to-Resolve-%E2%80%9CForever-Chemicals%E2%80%9D-Contamination-Suits.
45. Larry Levine & Ed Osann, *Water Affordability Business Case Downloadable Tool*, NRDC (Oct. 4, 2023), https://www.nrdc.org/resources/water-affordability-business-case-downloadable-tool.

income people can afford it, it actually pays for itself and you're addressing this underlying problem.

There's also an underlying need for a low-income household water assistance program. Michigan is the only state now that's likely to enact a program like this, where it would be much like the Low Income Home Energy Assistance Program many people may be familiar with for their heating bills and electricity bills.[46] This would help low-income people afford their water if they can't afford it otherwise. As Bruno Pigott, the acting EPA Assistant Administrator for Water said, "Every life saved and every life that's improved by this rule is priceless."[47] We would agree with him on that.

Looking at implementation, the initial monitoring under this rule will have to happen in the first three years. There will be continued monitoring after that, which will kick in three years from now. The results from that testing will be included in right-to-know reports (called "Consumer Confidence Reports" under the statute) that are supposed to be regularly issued to consumers. Then, five years from now, the utilities will have to start complying with the new MCLs and start giving public notification if they violate those standards.

Just recently, several water utility trade associations and manufacturers and chemical companies sued EPA in the U.S. Court of Appeals for the District of Columbia (D.C.) Circuit.[48] The American Water Works Association (AWWA) and Association of Metropolitan Water Agencies (AMWA) joined the chemical companies in challenging the PFAS standards.

You might think that water utilities would like to treat their water and get rid of the PFAS rather than allying with the companies that made the chemicals contaminating their water supplies. But they've actually joined the National Association of Manufacturers, the American Chemistry Council, which are all the chemical manufacturers, and Chemours, which is the big manufacturer of GenX and the biggest manufacturer of PFAS now in the country, I believe. They've all sued EPA and are challenging these new drinking water standards. The first statements of issues are due for the AWWA and AMWA case on July 8. I think the other cases are a couple of days later.

I'll end with NRDC's view, which is that every person has a right to safe and affordable drinking water no matter what their age, race, health status, zip code, or income. That, unfortunately, is a right that has not yet been achieved in the United States. We're making progress and we think this rule is going to help move us in that direction, but we still have a long way to go.

Jack Schnettler: Our last presenter today is Scott Faber. Scott is the senior vice president of government affairs for the Environmental Working Group. He joined EWG in 2012 and has since led their campaigns related to farm, food, and chemical safety policies. He was previously vice president for government affairs of the Grocery Manufacturers Association. He also served as the campaign manager for the Environmental Defense Fund. He frequently testifies before the U.S. Congress as an expert on farm, food, and chemical safety policies, and recently testified before the Senate Committee on Environment and Public Works on the importance of designating PFAS as a hazardous substance.

Scott Faber: As you've heard from all of our speakers, the Administration's historic decision and drinking water standard for PFAS will provide cleaner water to more than 100 million people. What hasn't been mentioned is that the benefits of the rule will not only come from removing PFAS from tap water and reducing the risks of certain cancers, reproductive harms, immune system harms, and so on posed by PFAS, but many will come from removing other co-contaminants, other contaminants that have also been linked to serious health harms, including bladder cancer. It's really a historic rule not just because it will reduce the amount of PFAS, but because it will reduce many other contaminants in our tap water that harm many people, especially people in underserved communities.

But there's still much more to be done. Before I turn to CERCLA and RCRA, I want to mention something that's been touched on a little bit here: there are many thousands—we estimate more than 30,000—makers and users of PFAS who are likely discharging PFAS into the water and into the air. For the most part, with a few exceptions, there are no limits on these releases. It could be many, many years based on current plans before states or EPA requires polluters to reduce or eliminate these discharges. Again, we estimate 30,000 suspected dischargers of PFAS, right now, into the air and water.

Let me turn to CERCLA. The designation of PFOA and PFOS as hazardous substances under CERCLA will certainly provide a powerful signal to the makers and users of PFAS to be better stewards of their PFAS waste because of the risk of being liable for the harms that may be caused by those discharges. The designation of PFOA and PFOS as hazardous substances will also help ensure that polluters, not just drinking water ratepayers but polluters, will share the costs of PFAS cleanup at the most contaminated sites.

There are already about 800 substances that have been designated as hazardous substances under CERCLA, including scores of hazardous substances in drinking water systems and hundreds of hazardous substances in our landfills. So, adding PFOA and PFOS to the list of hazardous substances is nothing new. The mere presence of hazardous substances is not cause for creating unprecedented loopholes in CERCLA, as some proposed.

46. Press Release, Senator Stephanie Chang, Sen. Chang and Broad Coalition Introduce Transformative Water Affordability Package (Oct. 2, 2023), https://senatedems.com/chang/2023/10/02/transformative-water-affordability/.

47. Bruno Pigott, Acting Assistant Administrator for Water, U.S. EPA, Final PFAS National Primary Drinking Water Regulation (PowerPoint presentation) (Apr. 9, 2024), https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr-presentation_4.9.24_overview.pdf.

48. American Water Works Ass'n v. U.S. Env't Prot. Agency, No. 24-1188 (D.C. Cir. filed June 7, 2024), consolidated with National Ass'n of Manufacturers v. U.S. Env't Prot. Agency, No. 24-1191 (D.C. Cir. filed June 10, 2024), and The Chemours Co. v. U.S. Env't Prot. Agency, No. 24-1192 (D.C. Cir. filed June 10, 2024).

CERCLA allows EPA and the courts to use their discretion to focus on the polluters and to assign responsibility to those who should bear responsibility. In fact, EPA's final rule designating PFOA and PFOS as two of the substances includes a discretion memo, which very clearly states that EPA will not be pursuing recovery from water utilities, publicly owned treatment works (POTWs), stormwater systems, solid waste landfills, airports, local fire departments, and farms where contaminated biosolids have been applied.[49] Instead, according to EPA's discretion memo, EPA will be using settlement agreements with these entities to shield them from future liability.

There are other benefits to this designation. One is that it provides a powerful signal to polluters to be good stewards of their PFAS wastes. Another is that it will ensure polluters help pay for the cost of cleanup at the most contaminated sites. A third benefit is that it will accelerate the cleanup of PFAS at military sites where, as Jahred mentioned, firefighting foam used with PFAS was routinely used for many years.

These are some of the most contaminated sites in the world. There are many people who live near these sites whose drinking water is threatened by the plumes of PFAS flowing from these installations. CERCLA designation will also accelerate this process. Granting statutory exemptions, as some members of Congress proposed, will only encourage bad behavior. It will remove the signal to be good stewards of PFAS wastes. It will remove the risk that polluters will have to pay some of the costs for cleanup at the most contaminated sites. I'm sorry to say that there are times when even water utilities, POTWs, and others do make mistakes and engage in bad behavior. So, just retaining the signal provided by the hazardous substance designation is really, really important.

I want to finish by talking a bit about RCRA. As I said, much more needs to be done to address the risks posed by PFAS pollution. We need to do much more to address the PFAS wastes in RCRA. As many of you know, EPA did take an important first step by listing nine PFAS hazardous constituents, but the Agency must move much faster to ensure that PFAS wastes are being properly disposed of and to ensure that the United States is not treated as a dumping ground for other nations' PFAS wastes.

Because PFAS are not yet hazardous wastes under RCRA, we simply don't know where and how most PFAS wastes are being disposed. But using data collected from EPA's Hazardous Waste Electronic Manifest (e-Manifest) System, all voluntarily disclosed data, a small sample paints a very disturbing picture. Again, this is what we know of, what's been voluntarily disclosed through EPA's e-Manifest System.

PFAS is being transported to incinerators. For example, to East Liverpool, Ohio, and El Dorado, Arkansas. PFAS waste is being transported for deep well injection, such as to Deep Creek, Texas. PFAS waste is being transported—that we know of based on voluntary disclosures, because these are not yet hazardous waste under RCRA—to landfills.

Wastes are being transported to one small town in Nevada, Beatty. One of the transfers, again according to EPA's e-Manifest System, was for open burning of these PFAS wastes. All of the other transfers were for other recovery and reclamation. This is the only site in the country, based on what's currently available in the e-Manifest System, where wastes were designated for other recovery and reclamation. So, it causes one to wonder how these wastes are being managed.

Lastly, I want to highlight all of the shipments of PFAS waste to North Carolina. As many of you have heard, EPA recently reversed or put a pause on a decision to allow PFAS waste to be imported from the Netherlands to North Carolina.[50] Among other things, designation of PFAS wastes as hazardous waste under RCRA would give EPA the clear power to end these imports. But it's really important to note that ending imports of PFAS wastes to North Carolina will not end transfers of PFAS waste to North Carolina or other communities that are already overburdened by PFAS contamination.

To wrap up, enormous progress has been made. No administration has done more to address the harms caused by PFAS and other toxic substances and chemicals than the Biden Administration. But there is more that needs to be done. We need to turn off the tap. We need EPA and states to put limits on industrial discharges of PFAS waste. As you heard from Jahred, many of the communities are already overburdened by other sources of pollution and are disproportionately harmed by these discharges from the estimated 30,000 manufacturers and users of PFAS.

We need to end needless uses of PFAS in the products we bring into our homes and businesses. States have taken action and have really led the way to end the use of PFAS in everything from food packaging to cosmetics, cleaners, textiles, juvenile products, and menstrual products. The list is long, but we need to do much more to end needless uses of PFAS in the things we bring into our homes and businesses and places of worship.

We need to get PFAS out of our food. We need to do much more to address sources of contamination of food. In particular, we need to end the use of PFAS in food packaging and manufacturing. Unfortunately, FDA has understood these risks longer than any federal agency, since the 1960s, and they have been the last to act. Hopefully they will quickly take steps to get PFAS out of our packaging and manufacturing.

But there are other things we need to do, including ending the use of PFAS in our pesticides and ending the

49. Memorandum from David M. Uhlmann, Assistant Administrator for Enforcement and Compliance Assurance, U.S. EPA, to Regional Administrators, Deputy Regional Administrators, Regional Counsels, and Deputy Regional Counsels re: PFAS Enforcement Discretion and Settlement Policy Under CERCLA (Apr. 19, 2024), https://www.epa.gov/system/files/documents/2024-04/pfas-enforcement-discretion-settlement-policy-cercla.pdf.

50. Letter from Michael S. Regan, Administrator, U.S. EPA, to Ray Cooper, Governor, North Carolina (Nov. 29, 2023), https://governor.nc.gov/ad-regan-letter/open.

use of PFAS-contaminated sludge on our farm fields. A good place to end this conversation is that we need to do a better job of focusing on hot spots. We're learning more about them as we get more data through the Fifth Unregulated Contaminant Monitoring Rule, through the Toxics Release Inventory, and through other data sources to know that there are places—especially places where poor people and people of color live—that are disproportionately exposed to the harms caused by PFAS.

We need to use all the tools that we have under the Clean Water Act (CWA),[51] the Clean Air Act (CAA),[52] and other laws to clean up these hot spots. Especially our defense installations, which are some of the most contaminated sites in the country.

Jack Schnettler: The first question is for Scott. Would designating PFAS as a hazardous substance have any impact on the widespread use of wastewater sludge for land application, or would one of the many normal agricultural operation exemptions still apply for sludge spreading to continue?

Scott Faber: First of all, thank you for calling it "sludge" because that will save Erik Olson the problem of correcting you. I know other folks on the panel have thoughts on this.

At a minimum, we should be requiring our POTWs to test and notify the folks who are using sludge that they're about to contaminate their fields. It also seems obvious to me that we should be prohibiting the use of contaminated sludge on lands that are used to produce our food. We now know enough about contaminated biosolids to know that applying contaminated biosolids to our fields as a fertilizer simply transports that PFAS into the food we eat or food that animals eat and ultimately become animal products. So, it seems like the very first step is to require testing and reporting and, at least at a minimum, to limit the use of PFAS-contaminated sludge in places where we're growing food.

Jack Schnettler: The next question is about PFAS as a global problem and other responses countries have been using to address PFAS. Are there any cases of class action lawsuits or other interesting legal strategies in other countries or any other international multilateral bodies dealing with the PFAS issue?

Scott Faber: I'm sure others are following this closely, but that might be another panel. There's a lot of really important work happening in other parts of the world because of international treaties and because other countries are leading the way to address PFAS, including the European Union. We could spend the next 10 minutes just talking about that.

Jack Schnettler: Another question is about the definition of PFAS and how to define PFAS regulatorily. Are there definitions of PFAS that are comprehensive enough to cover all risks, including risks from precursors, and do any presenters have ideas or recommendations for a source for robustly defining PFAS in statute or regulation?

Erik Olson: More than 20 states have already adopted a good definition of PFAS.[53] Unfortunately, EPA has been problematic in how it defines PFAS. The Office of Chemical Safety and Pollution Prevention defines it overly narrowly. The Office of Water has a somewhat different definition. We really need a broad definition along the lines of what those states have adopted: one fully fluorinated carbon atom, basically.

But there are multiple definitions out there. Congress has actually adopted on occasion a good definition in the National Defense Authorization Act, which happens every year.[54] I think the chemical industry has really made an effort to try to define it in a way that excludes some of their products so that they're not going to face any scrutiny. In NRDC's view, so many states have defined it well. But yes, there is an effort to define it narrowly to pretend that some PFAS are not PFAS.

Rashmi Joglekar: From a scientific perspective, the broadest consideration, as Erik mentioned, is having one fully fluorinated group to define the PFAS class. When I was at Earthjustice, we wrote letters from scientists urging EPA to adopt this broad definition.

But as Erik mentioned, what we're seeing is they're using a narrow, overly restrictive definition where they're parsing out the class into different categories. Because of that, because of their overly narrow definition, it's excluding these really commonly used fluoropolymers, for example,

51. 33 U.S.C. §§1251-1387, ELR Stat. FWPCA §§101-607.
52. 42 U.S.C. §§7401-7671q, ELR Stat. CAA §§101-618.

53. *See* Safer States, Accurate, Comprehensive, Widespread, and Protective: Explaining the PFAS Definition That Has Been Adopted by 23 States and the US Military (2024), https://www.saferstates.org/wp-content/uploads/PFAS-Definition-Factsheet_2.7.2024.pdf.
54. *See, e.g.*, FY2023 National Defense Authorization Act (NDAA), Pub. L. No. 117-263, §341(a)(3), 136 Stat. 2395 (Dec. 23, 2022) ("'perfluoroalkyl substance' means a man-made chemical of which all of the carbon atoms are fully fluorinated carbon atoms . . . The term 'polyfluoroalkyl substance' means a man-made chemical containing a mix of fully fluorinated carbon atoms, partially fluorinated carbon atoms, and nonfluorinated carbon atoms."); *id.* §343(f)(same); *id.* §345(e)(same). *See also* FY2022 NDAA, Pub. L. No. 117-81, §341(a), 135 Stat. 1541 (Dec. 27, 2021) (enacting 10 U.S.C. §2714(g) ("The term 'perfluoroalkyl substance' means a man-made chemical of which all of the carbon atoms are fully fluorinated carbon atoms. . . . The term 'polyfluoroalkyl substance' means a man-made chemical containing a mix of fully fluorinated carbon atoms, partially fluorinated carbon atoms, and nonfluorinated carbon atoms."); *id.* §345(f)(4) ("The term 'perfluoroalkyl or polyfluoroalkyl substance' means any man-made chemical with at least one fully fluorinated carbon atom."); *id.* §348(b) ("The term 'perfluoroalkyl substance' means a man-made chemical of which all of the carbon atoms are fully fluorinated carbon atoms. . . . The term 'polyfluoroalkyl substance' means a man-made chemical containing a mix of fully fluorinated carbon atoms, partially fluorinated carbon atoms, and nonfluorinated carbon atoms."); *id.* §349(b) ("The term 'perfluoroalkyl substance' means a man-made chemical of which all of the carbon atoms are fully fluorinated carbon atoms. . . . The term 'polyfluoroalkyl substance' means a man-made chemical containing a mix of fully fluorinated carbon atoms, partially fluorinated carbon atoms, and nonfluorinated carbon atoms.").

and providing more loopholes for industry to keep producing PFAS that would fall outside of the EPA definition.

Jack Schnettler: Another question is whether there are any studies or data showing correlations between construction activity and infrastructure activity or infrastructure burdens and PFAS exposure, perhaps, for example, through runoff and construction sites or PFAS and dust that is stirred up and released from construction activity?

Rashmi Joglekar: I'm not familiar with any studies directly, but we do know that there's PFAS in building materials. Those chemicals can leach into the indoor and outdoor environments. This kind of exposure pathway would not be surprising to me. But I don't know of any studies I can point to specifically.

Jahred Liddie: I also don't know of any, but the chemicals are often used as a finishing application on furniture and other building materials for their stain-resistant and water- and oil-repellent chemical properties. But I'm not sure of any studies on that.

Jack Schnettler: We have a couple of questions looking ahead to the future of PFAS regulation and the like. One question is about the recent rulemakings that identified a few specific chemicals within the PFAS family. Can we expect to see future similar rulemakings as the body of science on PFAS grows? What will regulation of PFAS look like in the long term? What do you expect down the pipeline, say, in the next five years?

Erik Olson: I'll start by pointing out the obvious, and will speak as a staffer for the NRDC Action Fund, NRDC's (c)(4) affiliate. We're at a really critical inflection point. We are finally, after decades of failure, setting limits on PFAS in our tap water. That is a huge achievement. We're also finally holding polluters accountable. Whether we reverse course or whether we build on that success will be decided this fall.

It probably goes without saying that it's never been clearer that voters are facing a binary choice in November. Either we're going to have a lot less PFAS and other types of chemicals in our tap water or we're going to have more. So, in terms of what to expect, if we saw a second term for President Biden, I think we'd see an accelerated effort to address industrial releases of PFAS under the CWA and the CAA.

I'm hopeful that they will accelerate the plans, which are not very ambitious right now, to set effluent limitation guidelines in particular for more categories, including electrical components. I also expect that we will see, again if President Biden gets a second term, action to finally designate PFAS as hazardous waste under RCRA. That will enable us to begin to make sure, first of all, that we're not a dumping ground for other nations' hazardous PFAS waste, but also that we're also beginning to properly dispose of our own hazardous PFAS waste. That's a complicated question. We probably won't answer the question about how to destroy all of our PFAS waste in four years, but we will certainly give EPA the power to ensure that we're making the best of a bunch of bad choices.

I would also expect to see more action. I'm glad someone asked a question about sludge. More efforts are needed to really address the harms that PFAS is posing to our farmers. None of our farmers volunteered to have their farms poisoned by their neighborhood POTW. They were probably unaware that they were contaminating 10 to 20 million acres of their farmland. But I'm hopeful that by the end of the second term, if President Biden does get a second term, that there will finally be a strategy to not only avoid further contaminating our farmland, but to begin to think about how to remediate the millions of acres that have been poisoned.

Jack Schnettler: Another question looking forward, especially in light of some of the research that Jahred presented, is whether there's a potential role for civil rights law, like Title VI of the Civil Rights Act, to play in protecting communities from PFAS exposure. Has anyone encountered any ideas along those lines?

Erik Olson: The short answer is, yes, there is definitely a role there. We have joined some community groups in Alabama challenging the lack of adequate sanitation under Title VI of the Civil Rights Act. The NAACP has challenged in Mississippi the lack of funding that's gone to drinking water, especially for Jackson and predominantly African-American communities in the state.

So yes, to the extent that we can show that there is a civil rights implication, we can look at Title VI, which only applies if there's federal funding. It's something we've been very focused on with some of our community partners. There's definitely a role there.