WOMEN *for a Healthy* ENVIRONMENT

Health Policy Brief:

PFAS

Per- and polyfluoroalkyl Substances

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a chemical class of thousands of human-made chemicals that are used in consumer products and many industries. What makes these substances unique are their extremely strong chemical bonds, which allow them to persist in the environment indefinitely – this is why they are known as "forever chemicals". PFAS chemicals known to be widely used in consumer products include PFOS, PFOA, PFTE, GenX, and more.

Where do PFAS come from?

PFAS are sometimes intentionally added to consumer products to give them a waterproof, stain-resistant, or non-stick quality, but PFAS can also unintentionally exist in products in trace amounts because of their use in the manufacturing process.[1] They are used in some products and processes for seemingly no reason, as the brand KEEN found when they investigated their use of PFAS and found that 65% of the PFAS compounds they were using were non-essential.[2]

Where are PFAS found in the environment?

PFAS are a complicated class of chemicals due to their widespread use and the many ways they get into our environment and our bodies. For that reason, this brief will separate sections by if they pertain to the environment or consumer products. When we refer to the environment, we are referring to both the built, natural, and occupational environment. PFAS are found in these environments in a myriad of ways, including:

Occupational Settings

- **Firefighter turnout gear** is typically lined with PFAS, posing an exposure risk for firefighters.
- **Class B Aqueous Film Forming Foam** (AFFF), a type of firefighting foam, is known to contain PFAS and contribute greatly to the contamination of the natural and home environment.
- **Production facilities**, including electronic and metal plating, textiles and clothing factories, chemical manufacturing, and the oil and gas industry are known to use PFAS in their processes and pose an exposure risk to workers and to communities. Many industries are not required to or do not report their use of PFAS, so the extent of this issue is not yet fully understood.

Environment

- **Water discharged from commercial manufacturing**, as previously discussed, can contain PFAS from a myriad of industries. This wastewater can be treated and discharged into surface water or sent to a municipal wastewater treatment facility.
- **Municipal wastewater effluent** still contains PFAS after the wastewater treatment process is completed, because wastewater treatment facilities do not treat the water for PFAS chemicals. PFAS get into the wastewater treatment system because PFAS are present in cleaning products, personal care products, and microplastics that we send down the sink and shower drains.

- **Agriculture** is another environmental source of PFAS contamination, primarily due to the land application of wastewater biosolids which may be contaminated with PFAS and can cause PFAS to accumulate in the soil.
- **Living organisms** contain and pass increasing levels of PFAS up the food chain, as its chemical properties allow it to build up in body tissues over time. Fish in contaminated waterways are of particular concern.[3]
- **Fracking waste** is also known to contain PFAS, including some fracking wells in southwest Pennsylvania where PFAS have been detected. This issue is not fully understood, because oil and gas companies do not have to disclose all the chemicals used in the fracking process.
- **Landfill leachate**, or the liquid waste generated by landfills from a combination of rainwater and decaying material, also contains PFAS from a myriad of consumer products in it. Some landfills also receive fracking waste and may have even higher levels of PFAS.[4]

Where are PFAS found in consumer products?

Consumer products cover a variety of items, from cosmetics to building materials, including[5]:

- **Many types of plastic** have been found to contain PFAS. Though PFAS do not exist in all plastic products, it is best to minimize plastic exposure if concerned about PFAS contamination.
- **Food packaging** includes take-out containers and fast-food packaging, as they are contained in plastic or in PFAS-treated wrappers to prevent grease and liquids from passing through the packaging.
- **Food** grown with PFAS-contaminated water or soil.
- **Processed foods** that are either processed in PFAS coated or containing equipment or that is packaged in PFAS containing or coated packing.
- **Personal care products**, including many cosmetics, skin products, and hygiene products.
- **Contact lenses** were recently found to contain high levels of PFAS chemicals.[6]
- **Outdoor and rain gear**, like raincoats, tents, and tarps, often contain PFAS to make them waterproof.
- **Nonstick kitchen products**, like pots, pans, and small appliances, are especially concerning given that heat is applied to them which allows the chemicals to leach into the food.
- **Other home products**, including furniture, cleaning products, polishes, waxes, paints, carpets, apparel, textiles, packaging materials, and more.

How are people exposed to PFAS?

Ingestion is the primary route that harmful PFAS substances enter the body, but the source that poses the greatest risk varies by situation. Unless there was a major spill or PFAS emitter near your drinking water supply, the consumption of contaminated foods rather than contaminated drinking water is the most common source of PFAS. Some of the pathways to ingestion, inhalation, and skin absorption of PFAS include[3]:

Ingestion

- Consuming contaminated drinking water.
- Eating contaminated foods.
- Accidentally eating contaminated soil (hand-to-mouth behaviors).
- Cross-contamination of foods or dishes by cleaning with products containing PFAS or handling them after using products containing PFAS.
- Wild-caught fish, deer, and other game that may be contaminated with PFAS.
- For infants, breast milk has been found to contain high levels of PFAS.

Inhalation

- Consumer products can shed PFAS into the dust and air in our homes, workplaces, and vehicles. For example, many carpets and rugs are treated with PFAS to make them stain resistant, but the PFAS chemicals in these treatments shed easily, and we can breathe them in when we inhale particles of dust.
- Those who work at or live close to waste incinerators or factories that produce or use PFAS may be exposed to aerosolized PFAS.

Skin absorption

- More research is needed to understand the health risks of PFAS in personal care and hygiene products in terms of wearing them on your skin, especially when it comes to contact lenses. Available data seems to show skin absorption as a lower risk than ingestion and inhalation, but more research is needed considering the number of products we wear that may contain PFAS.[7]

What are the health effects of exposure to PFAS?

Once PFAS enter our bodies, they can persist and accumulate there for up to several years. Both the amount of time that the substance is known to stay in the body and the associated health effects may vary by the specific PFAS chemical. Some other health affects linked to PFAS exposure include:

- Reduced immune system function, including a decreased response to vaccines.
- Cancer (including kidney, testicular, and breast cancers).
- Reproductive health effects, including increased time to pregnancy and miscarriage risk.
- Developmental effects, including low birth weight and changes to the onset of puberty.
- Liver damage.
- Thyroid disease and dysfunction.
- Increased cholesterol levels.
- Inflammatory bowel disease, or Ulcerative colitis.

Like for other chemicals, there is a wide range of health effects and the severity of these effects, which depend on how someone is exposed to the substance, for how long, and how much gets into their body.[8]

In November 2023, the International Agency for Research on Cancer (IARC) reclassified two types of PFAS (PFOA and PFOS) as to their carcinogenicity, or their ability to cause cancer. IARC now classifies PFOA as carcinogenic to humans (Group 1) and PFOS as possibly carcinogenic to humans (Group 2B).[9] This classification demonstrates the mounting evidence of the ability of these PFAS chemicals to cause cancer.

Who is most at risk?

Because PFAS stay in our bodies and in the environment for so long, studies have found that PFAS exist in the blood of most people.[10] Among the general population, pregnant women and children may be the most affected as there is evidence that PFAS exposure is linked to growth and learning delays in infants and children.[8]

Some workers and those living near certain industries may also be at risk of elevated exposure. Firefighters are at an increased risk of exposure, due to the presence of PFAS in their turnout gear and in Aqueous Film Forming Foam (AFFF). In addition, those in the military and who work at airports may be at an increased risk of exposure, again due to the use of AFFF, in addition to those who live nearby these facilities. Those working in the manufacture of textiles, waterproof gear, electronics, metal plating, and other industries may be at increased risk of workplace PFAS exposure.[3]

In Allegheny County, there have been three areas with reported high levels of PFAS in their groundwater: Coraopolis Borough[11], Neville Township, the Pittsburgh International Airport, and nearby military bases.[12]

Are PFAS especially unsafe for children?

Exposure to PFAS pose an additional risk to children, due to their vulnerable developmental state. Regardless of how they are exposed, emerging data shows a correlation between PFAS exposure and learning and development delays in children.[8]

Are PFAS disruptive to reproduction?

Current research shows that PFAS can affect fetal development and increase the risk of low birth weight, preterm birth, and miscarriage. There is also emerging evidence of effects to fertility for all people.[8]

How are PFAS changing?

There are thousands of PFAS chemicals on the market. Most of the research on the health effects of PFAS has been concentrated on “legacy” PFAS chemicals – like PFOA and PFOS. These substances were phased out from manufacturing and have been replaced with new, similar PFAS chemicals, of which the health effects are not known. This poses the risk of repeating the same mistakes. New research has shown that one popular replacement for some legacy PFAS – GenX, considered a replacement for PFOA – are similarly hazardous.[13] This means that we need to approach the manufacture and use of all PFAS, not just PFOA and PFOS, with extreme caution.[3]

The Environment

Current PFAS Regulations Relating to the Environment

Federal PFAS Laws

Regulation of PFAS at the federal level, as with most chemicals, is relatively limited, with most responsibility relegated to the states.

The EPA still has not established PFAS as a hazardous substance under the many laws that grant it regulatory authority – Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Clean Air Act, or Emergency Planning and Community Right-to-Know Act (EPCRA).[14]

CERCLA: The EPA designation of PFAS under CERCLA has been postponed from its original August 2023 proposal deadline to February 2024. If designated under CERCLA, manufacturers and users of PFAS would become liable for remediation of environmental contamination with PFAS and would have to comply with more stringent rules for things like transportation of materials. This delay could mean that more comprehensive regulation is pending, but it is also concerning because several bills pending in Congress that would prevent parties from receiving funds under CERCLA from various PFAS emitters: municipal drinking water, wastewater, and stormwater systems, as well as in the agriculture and resource management industries, fire suppression, and airports.[15]

RCRA: In October 2021, the EPA announced an ongoing process of evaluation of data for four PFAS compounds (PFOA, PFOS, PFBS, and GenX chemicals) under RCRA. Notably, this came after a request from New Mexico's governor, and presented the option to regulate PFAS chemicals as a class under RCRA, which was not done.[16]

Toxic Release Inventory (TRI): Under EPCRA, the EPA requires a registry of chemicals that cause cancer or other significant human health or environmental effects and requires reporting on releases of any chemicals in these categories above a certain level.[17] Currently, 180 PFAS chemicals are reportable under that list, and for reporting year 2023, nine additional PFAS will be added to the list.[18]

Toxic Substances Control Act (TSCA): The EPA proposed a significant new use rule (SNUR) in January 2023 to block industry from resuming the use of PFAS that have been inactive, meaning those that have not been imported, manufactured, or processed for many years, without EPA review.[19]

Drinking water: Though PFAS are regulated under the Safe Drinking Water Act, there is currently no enforceable federal drinking water standard, known as maximum containment levels (MCLs), for PFAS, but a proposed standard is currently under consideration by the U.S. Environmental Protection Agency (EPA).

- Proposed: In March 2023, the PEA proposed new drinking water MCL for six PFAS chemicals[20]:
  - PFOA: 4.0 parts per trillion (ppt).
  - PFOS: 4.0 ppt.
  - PFNA, GenX, PFHxS, and PFBS (as a mixture): 1.0 (unitless).

- It is important to note that the proposed PFAS regulations under the Safe Drinking Water Act are at the minimum detectable level of PFAS because there is no amount of PFAS in water that is safe to drink, as the Interim Updated Lifetime Health Advisory is set much lower for all these substances. For example, 0.004 ppt for PFOA and 0.02 ppt for PFOS.[21]

Waste

- **Wastewater:** The EPA announced several studies dedicated to understanding PFAS in wastewater across the nation that would be used to establish new regulations if determined necessary but have new limits have not announced.[22]
- **Biosolids:** No national requirements to test biosolids for PFAS chemicals before land application exists, though under the Clean Water Act the EPA has the authority to set contaminant limits.[23] The EPA's PFAS Strategic Roadmap only states that they will conduct a risk assessment of the issue by Winter 2024, but only mentions PFOA and PFOS.[24]
- **Landfill Leachate:** The EPA determined that it is warranted to update their effluent limitations guidelines and pretreatment standards to be incorporated into the National Pollutant Discharge Elimination System (NDPES) permit process under the Clean Water Act to limit PFAS contamination of the environment form landfills but have not announced any specific changes.[22]

Aqueous Film Forming Foam: The use of AFFF is not regulated at the federal level, except for jurisdictions under the Department of Defense. Under the National Defense Authorization Act (NDAA) for fiscal year 2020, passed by Congress in 2019, AFFF will be phased out from military uses by October 2024 and is currently prohibited from use in training exercises at all military sites.[25]

Overall, at the federal level, PFAS are regulated individually under a variety of environmental laws. Importantly, under none of these laws has PFAS been regulated as a class, but instead on a chemical-by-chemical basis.

State PFAS Laws

Pennsylvania: The Pennsylvania Department of Environmental Protection (DEP) set MCLs for drinking water for PFOA (14 ppt) and PFOS (18 ppt) in January 2023, but these are much higher than those proposed by the EPA (4.0 ppt for both compounds). If the EPA proposed limits are approved, they will supersede the DEP's MCLs. Still, DEP has the capacity to set more stringent MCLs if they elected to do so based on the best available science.[26] Additionally, in 2019, PA adopted HB 1410, which created a fund for remediation efforts of water utilities affected by military related PFAS contamination.[27]

This is the extent of rulemaking by Pennsylvania regarding PFAS in the environment. However, other states have been innovating ways to protect ecosystems and human health, in the following areas:

Waste

- **Wastewater:** Some states, like Minnesota, Michigan, and New Hampshire, have begun allocating funds to collect data on PFAS in discharge from industry and wastewater treatment plants.[27] Michigan's Industrial Pretreatment Program

has been utilized to determine the levels of PFAS in the influent and effluent of municipal wastewater authorities, to identify industrial sources, and to address PFAS discharges before they reach municipal wastewater authorities.[28]

- **Biosolids:** Maine prohibits the use of biosolid land application for fertilizing fields following the findings of widespread contamination as a result.[29] Other states like Michigan require testing of biosolids prior to land application, but critics point out that these levels are not low enough given the evidence we have regarding health effects and the bioaccumulation of PFAS in animal tissue.[30]
- **Landfill Leachate:** Maine has allocated money to research methods to remove PFAS from landfill leachate, and Vermont currently requires that landfills treat their leachate to remove PFAS compounds before discharge.[27]

Aqueous Film Forming Foam (AFFF): The state of Washington banned the use of PFAS chemicals in firefighting foam in 2018.[31]In 2019, Colorado[32] and New Hampshire[33] followed suit.

Local PFAS Policy

Currently, there are no local laws or regulations in Allegheny Country. Since PFAS are such a widespread issue, they are generally regulated at the state and federal level. However, many corporations, like KEEN as discussed earlier, have begun implementing changes, with many other corporations announcing the removal of PFAS from their products in the coming years.

Environmental Recommendations

Policy and Regulatory Recommendations for Limiting PFAS Contamination of the Environment

Federal

- Regulate PFAS as a class to avoid regrettable substitutions, whereby "legacy PFAS" are replaced with new ones that may have the same effects on ecosystems and humans.
- Designate PFAS as a priority under the Toxic Substances Control Act.
- Designate PFAS as a hazardous substance under CERCLA.
    - Do not pass any bills like SB 1430, SB 1427, SB 1429, SB 1432, and SB 1433, that would create loopholes to remove financial responsibility from any proposed point sources of environmental contamination with PFAS.[15]
- Designate PFAS-containing waste as hazardous waste under RCRA.
- Invest in sustainable chemistry research to identify PFAS alternatives that are not toxic to human health, nor able to bioaccumulate or persist in the environment indefinitely.

State

- Establish a program, like Michigan, to collect samples form wastewater treatment plant intake from industry, landfill leachate, and residential users, as well as samples of wastewater effluent to establish a database for tracking and assessing PFAS contamination of the environment and identifying and addressing the most crucial point sources.
- Require the testing of wastewater biosolids before land application, like Michigan, and ensure that the allowable PFAS level corresponds to the best existing science, or prohibit its use overall, like Maine.
- Provide safe water to communities that have identified contaminated water sources.
- Prohibit the use of PFAS-containing class B AFFF and establish a take back program to ensure the cost does not fall on fire departments.
- Continue to evaluate the most up-to-date science and consider developing drinking water and other limits more stringent than federal regulations when the science demonstrates its necessity.

Consumer Products

Current PFAS Regulations Relating to Consumer Products

Federal PFAS Laws

Regulation of PFAS at the federal level, as with most chemicals, in consumer products is relatively limited.

- The Food and Drug Administration (FDA) has regulatory authority over PFAS in consumer products, food, and food packaging.
    - Long chain PFAS (like PFOA and PFOS) have been banned from use in food contact applications.[34] This leaves room for regrettable substitutions, where these PFAS may be replaced with some that are as bad or worse.
- The EPA's New Chemicals Program (NCP) reviews long chain PFAS substitutes to ensure they are safer alternatives, with the currently available data. For shorter chain PFAS, EPA requires that the degradation products of that PFAS compound are both less toxic and less bioaccumulative than the long chain compounds they are to substitute.[35]
- PFAS in cosmetics are only voluntarily reported to a registry by manufacturers; no reporting or limits on PFAS in cosmetic products exist. However, the No PFAS in Cosmetics Act has been introduced in both the House and Senate, and if passed would require the FDA to ban PFAS from all makeup and personal care products.[36]

State PFAS Laws

Pennsylvania: PA does not currently have any laws or regulations targeted at limiting PFAS in consumer products. However, HB 11222 functions to prohibit the distribution of food packaging containing PFAS compounds.[37]

- **Food packing:** Many states have banned PFAS compounds from food packaging and food contact materials, including California, Colorado, Connecticut, Hawaii, Maine, Maryland, Minnesota, New York, Oregon, Rhode Island, Vermont, and Washington.[27]
- **Cosmetics:** Several states have passed laws that require publicly available reporting on PFAS in cosmetics and/or prohibit its addition to cosmetic products, including California, Colorado, Maine, Maryland, Minnesota, New York, Oregon, Vermont, and Washington.[27]
- **Children's Products:** New York banned PFAS and other hazardous materials from children's products in 2019.[38]
- **Class-based Regulation of PFAS:** Several states have established or are considering programs that would regulate PFAS use and manufacture in their states as a class, rather than by individual compound. Washington, for example, has implemented a program to regulate the use of harmful substances in industry and consumer products as a class, and PFAS compounds are one of the first classes of chemicals to be removed from use.[39]

Local PFAS Policy

PFAS is typically regulated on a state or federal level, so limited regulation of PFAS exists at the local level. However, companies and organizations can implement internal policies to remove PFAS from their processes and supply chain.

Consumer Products Recommendations

Policy Recommendations Relating to Consumer Products

Federal

- Prohibit the use of all PFAS in all food packaging, including for grocers, fast food retailers, and more.
- Require outdoor gear manufacturers to conduct a review of the materials they use to assess for unnecessary use of PFAS and require the use of best-known alternatives whenever possible.
- Regulate PFAS as a class to prevent equally harmful or more hazardous chemical cousins from replacing PFAS chemicals that are phased out, like PFOA and PFOS.
- Invest in green chemistry research to identify safe alternatives to PFAS compounds.

State

Food products

- Prohibit the use of PFAS-containing food packaging by food retailers, including grocers, restaurants, and fast-food retailers.
- Prohibit the sale of PFAS in food-grade plastics containing PFAS.
- Prohibit the sale of disposable dishes and cutlery containing PFAS.

Consumer products

- Prohibit the sale of PFAS in cosmetic, personal hygiene, and cleaning products.
- Prohibit the intentional addition of PFAS in other consumer products like clothing, textiles, outdoor gear, and more.
- Prohibit the use of PFAS in building materials, including flooring, carpet, paints, and more.

Conclusion

PFAS are expensive and laborious to remove from the environment. The Minnesota Pollution Control Agency released a report stating that removing and destroying PFAS from the state's wastewater streams could cost an estimated $2.7 to $18 million per pound, while the original purchase of the same amount of the chemicals is $50 to $1,000 per pound.[40] This demonstrates the need to design policy to prevent further contamination of our waterways by halting unnecessary uses of PFAS chemicals and regulating the chemical as a class. Acting first to prevent the contamination of the environment as upstream as possible is the best way to stop this problem from getting worse. PFAS are a highly complex environmental and public health issue and our scientific understanding of them is always evolving. To address the threat this poses requires fast action and a multi-faceted approach. Regulatory authorities should act quickly to remove PFAS from consumer products and manufacturing to prevent environmental contamination and human health impacts. For this reason, all PFAS regulations should be funded not by ratepayers, but by the chemical manufacturers and industrial users.

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