Guide to Understanding and Addressing PFAS in our Communities

NC STATE EXTENSION

Introduction

Exposure to per- and polyfluoroalkyl substances (PFAS) is an emerging issue of concern. This FactSheet provides a guide to understanding and addressing PFAS in our communities, which may be helpful for Extension agents, community members, and others who are interested in learning more about PFAS and their potential impacts.

Specific topics covered in this FactSheet include:

- What are per- and polyfluoroalkyl substances (PFAS)?
- How may I be exposed to PFAS?
- What do we know about the health effects from exposure to PFAS?
- What are regulatory agencies doing to address PFAS?
- Can I have my drinking water tested for PFAS?
- What can I do to reduce my exposure to PFAS?
- How can I learn more about PFAS?

What are per- and polyfluoroalkyl substances (PFAS)?

PFAS are a large group of chemicals that have been manufactured by people since the 1940s and are widely used in society. Because many PFAS have interesting and useful properties, including their ability to be heat-, water-, or oil-resistant, they have been used in many consumer products including cosmetics, non-stick cookware, waterproof clothing, foodpacking, as well as in firefighting foam. However, these same properties also make PFAS easy to transport in the environment and are difficult to degrade. In fact, PFAS have been called “forever chemicals” - where they can build up and remain in the environment and in our bodies for years (EPA 2023a, NCDEQ 2023).

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate acid (PFOS) are two of the most widely used and investigated chemicals in the PFAS group, although they both have been replaced with other PFAS in recent years (EPA 2023a). Today, there are more than 10,000 different PFAS

chemicals, many of which behave differently in the environment and our bodies. While we are still in the beginning stages of understanding the effects of PFAS on our health, recent studies have shown that exposure to PFAS may be linked to many serious health effects, even at low concentrations.

How may I be exposed to PFAS?

Most people living in the United States (US) have been exposed to PFAS in their lifetimes. The main way that people are exposed is through drinking water, either through public drinking water sources or private wells (NCDHHS 2023). People living near PFAS-producing industries or PFAS-contaminated sites may have a greater chance of having contaminated drinking water. While water is the predominant way that people may be exposed to PFAS, there are other exposure routes as well. For example, people may be exposed to PFAS by eating foods from contaminated soil or water, such as fish or vegetables, and by breathing or swallowing PFAS-contaminated soil or dust. Because PFAS are used in a number of consumer products, such as cookware and clothing, people can also be exposed through using these products (ATSDR 2023a). As mentioned, these exposure routes to PFAS are expected to be relatively limited compared to exposures through drinking water sources based on current studies.

Some individuals may be exposed to PFAS more than others. For instance, firefighters may be exposed to PFAS during training exercises or when using firefighting foam to extinguish a fire. Children may be more exposed than adults, given their higher rates of consumption of food and water relative to their body weight. Individuals who work at or live near industrial facilities that manufacture or handle PFAS may be exposed at greater rates than others (EPA 2023a).

What do we know about the health effects from exposure to PFAS?

While research is still in its early stages, several health effects have been linked to exposures to PFAS. These include (ATSDR 2023b, EPA 2023a):

- *Increased cancer risks*: Several studies have reported an association between PFAS exposures and increased risks of some cancers, including kidney and testicular cancer.
- *Impacts on reproduction*: Exposure to PFAS has been associated with impacts on reproduction, including increased rates of infertility.
- *Impacts on liver and thyroid*: Studies have also reported an association between PFAS exposures and liver damage, change in liver function, changes in thyroid hormone levels.
- *Impacts on childhood development and behavior*: Exposure to PFAS has been linked to developmental issues in children, including reduced birth weight, delayed development, and changes in hormone levels.

- *Weakened immune functioning*: Some studies have suggested that exposure to PFAS may weaken the immune system and make people more susceptible to infections.
- *Increased risk of obesity*: Exposure to PFAS has been associated with increased body weight and body mass index, including in children.

It is important to note that the evidence on the health effects of PFAS is still evolving. Further, the impacts of PFAS exposure to individuals may also depend on the frequency, length, and concentration(s) of exposure in addition to personal factors such as age, gender, and overall health (NCDHHS 2023).

To understand the full extent of health effects from PFAS exposures, much more research is needed. In addition, because there are so many different types of PFAS, understanding the health effects from individual PFAS will take substantial investments in time and research funding. Nevertheless, many health organizations recommend taking steps to minimize exposure to these chemicals as a precautionary measure.

What are regulatory agencies doing to address PFAS?

After several years of conducting research on PFAS, regulatory agencies in the U.S. have started to take action. The U.S. Environmental Protection Agency (EPA) recently proposed new regulations for six PFAS in public water systems (EPA 2023b). Within this new regulation, EPA is proposing to establish a Maximum Contaminant Level (MCL) for PFOA and PFOS at 4 parts per trillion (ppt). The rule would also regulate four other PFAS chemicals, including GenX, PFNA, PFHxS and/or PFBS. For these PFAS, a hazard index calculation will be used to estimate if their combined concentrations would pose a risk to human health. After the proposed rule is finalized, it will go into effect within three years, after which public water systems need to ensure the MCLs are adhered to. In addition to regulation of these six PFAS in drinking water, the EPA also issued lifetime drinking water health advisory levels for two other PFAS, GenX and PFBS, at 10 ppt and 2,000 ppt respectively. These health advisory levels are guidelines but are not enforceable (EPA 2023b).

Recently, the EPA published a PFAS Strategic Roadmap that outlined other activities to address PFAS (EPA 2023c). These included a proposal to designate PFOA and PFOS as hazardous substances under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) that allows contaminated sites to be cleaned up, update guidelines to reduce PFAS upstream discharges, complete a risk assessment on PFOA and PFOS in biosolids

(estimated in 2024), improve public access to PFAS chemical data and safety information, and provide public access to PFAS analytic tools for reporting, testing, and occurrence of PFAS in communities (EPA 2023c).

The North Carolina Department of Environmental Quality has released an Action Strategy for PFAS (2022). In addition to establishing an Action strategy, the NCDEQ has conducted extensive testing for PFAS in surface water, groundwater, soil, sediment and air. Testing strategies have focused on areas in North Carolina where there may be higher rates of PFAS contamination, such as areas near industrial sites, military bases, and wastewater treatment plants. For details on DEQ's sampling of public water systems for PFAS, including the location, sampling dates, and PFOA/PFOS concentrations found, see DEQ PFAS Sampling of Public Water Systems.

The NCDEQ also set interim maximum allowable concentrations for several PFAS in drinking water, and has also required that some industrial facilities (such as the Chemours Company in Fayetteville, NC) sample for PFAS and report the results and take corrective actions as needed. The NCDEQ has also issued permits for facilities that discharge PFAS-contaminated wastewater into surface waters. In addition, the NDEQ has also established a PFAS Testing Network to provide technical assistance and support to local communities and stakeholders (NC PFAS Testing Network 2023).

Can I have my drinking water tested for PFAS?

If you would like to have your drinking water tested for PFAS, the steps to take depend on the source of your water and your location. Households relying on private well water may be eligible for free water testing or may have to pay to have their water tested by a laboratory (see below).

For households connected to a municipal water supply, it is advised to first contact the water utility to obtain information on whether they have already sampled for PFAS, if they plan to sample for PFAS in the future, and if they are taking any particular steps to address PFAS in drinking water supplies. If your water utility is not taking these steps, you may be eligible for free water testing or you may have to pay to have your water tested.

If you are a resident of the Cape Fear River Basin in North Carolina, you may request sampling of your drinking water due to contamination from the Chemours facility. Water sampling is provided by a certified, third-party environmental consultant. See here for further details:

- If you are a resident of Balden, Cumberland, Robeson, or Sampson counties, and you live near the Chemours facility (defined as 10 miles south and 25 miles north of the facility), you may be eligible to have your drinking water tested for PFAS at no cost. Contact Chemours at 910-678-1101 for further information on how to have your drinking water well sampled for PFAS.
- If you are a resident of Brunswick, Columbus, New Hanover, or Pender counties, you may be eligible to have your drinking water well sampled for PFAS at no cost. Contact Chemours at

910-678-1101 or complete their online form for further information on how to have your drinking water well sampled for PFAS.

If you reside outside the Cape Fear River Basin in North Carolina, you can request that a certified lab test your drinking water for PFAS (NC State-Superfund, 2022). For instance, the NC DEQ has provided a list of certified labs that are able to test for PFAS in drinking water, as well as in surface and groundwaters for in-state testing or out-of-state testing. In addition, the NC Public Health Department also has provided a list of certified labs for testing of PFAS in drinking water. Note that it often costs between $300 and $600 to test for PFAS in drinking water using a certified laboratory.

What can I do to reduce my exposure to PFAS?

One of the first steps to reducing exposures to PFAS is to determine concentrations in drinking water through testing (NCDEQ 2023). See the previous section for details on how your water may be tested for PFAS. For households in the Cape Fear River Basin, it may be advisable to assume there is PFAS in drinking water supplies until testing is conducted to confirm the presence or absence of PFAS, out of an abundance of caution. Note that there are free testing programs available for residents of the Cape Fear River Basin that are provided by third party, environmental consultants.

Residents may wish to reduce potential exposures to PFAS by installing filtration systems that rely on reverse osmosis or activated carbon filters. See PFAS Water Testing and Filtration Resources from the NC Department of Health and Human Services for details on which technologies and commercial brands may be effective at removing PFAS in drinking water using reverse osmosis or activated carbon. It may be best to consult with a professional about which of these filtration options best meets the needs of your household.

Exposures to PFAS can also be reduced by trying to avoid foods that contain PFAS, such as fish or other seafood that is caught or collected in water that is contaminated by PFAS. Similarly, it has been recommended to avoid eating food grown or raised near sites that have made or used PFAS (ATSDR 2023a).

When purchasing new cookware, individuals may also wish to choose stainless steel or cast iron cookware rather than nonstick cookware that may contain PFAS to reduce exposures. Individuals can also reduce exposures to PFAS by reducing or eliminating exposures through food packaging that may contain PFAS (such as grease-resistant papers commonly found in fast food containers or wrappers, microwave popcorn bags, or pizza boxes) or water-resistant clothing (such as waterproof jackets, pants).

Given the proliferation of PFAS in society, it may be difficult to avoid all potential exposures to PFAS. In this case, it is important to support policies and decisions to reduce or limit the use of PFAS in non-essential products and industrial applications, and restrict uses to cases in which they are

essential or not easily replaceable. It is also important to note here that PFAS exposures can have inequitable impacts on certain communities, creating additional burdens and environmental justice implications.

How can I learn more about PFAS?

If you are interested in learning more about PFAS and how to protect yourself or your community from potential exposures, the following resources may be particularly helpful.

- Agency for Toxic Substances and Disease Registry (ATSDR) resources:
    - PFAS Exposure Assessment
    - PFAS and Your Health
- Environmental Protection Agency (EPA) resources:
    - CompTox Chemical Dashboard: PFAS Master List of PFAS Substances
    - Our Current Understanding of the Human Health and Environmental Risks of PFAS
    - PFAS Explained
- North Carolina Department of Environmental Quality (NCDEQ) resources:
    - Action Strategy for PFAS
    - Understanding PFAS

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2023a. PFAS and your health.

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