Drinking Water Facts:

Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water

Updated April 2024

General information

PFAS are a large group of manmade chemicals which repel water and oil and are resistant to heat and chemical reactions. Because of these properties, they have important industrial and commercial uses and have been used since the 1940s. PFAS are used in the production of some non-stick cookware, in waterproof and stain proof coatings, in "leak-proof" coatings on food packaging materials, in fire-fighting foams, and other applications.

PFAS can enter drinking water through industrial release to water, air, or soil; discharges from sewage treatment plants; land application of contaminated sludge; leaching from landfills; and use of certain fire-fighting foams. These chemicals do not break down in the environment.

Four types of PFAS have been found in the blood (serum) of greater than 98% of the United States population. **These long-chain PFAS build up and stay in the human body for many years. The levels decrease very slowly over time after exposure is reduced or stopped.**

- **PFOS:** perfluorooctane sulfonate
- **PFOA:** perfluorooctanoic acid
- **PFNA:** perfluorononanoic acid
- **PFHxS:** perfluorohexane sulfonate

Exposure to PFAS

PFOA, PFOS, and PFNA dissolve in water. If drinking water is contaminated, it is a primary source of exposure to PFAS as compared with other common exposure sources. Other sources of exposure to these PFAS include food, food packaging, consumer products, house dust, indoor and outdoor air, and workplaces where PFAS are used or made. Exposure in drinking water is primarily from ingestion of the water and food prepared with the water. These **PFAS are not removed from water by boiling.** Exposure to these PFAS from showering, bathing, laundry, dishwashing, and rinsing produce is not significant.

Health effects of PFAS

Studies of the general population, communities with PFAS-contaminated drinking water, and exposed workers indicate that exposure to PFAS increases the risk of a number of health effects. **Health effects from PFAS are observed within the general population even without exposure to PFAS from contaminated drinking water.**

The most consistent human health effect findings for PFOA and PFOS – the most well studied of the PFAS types – are increases in serum cholesterol, uric acid levels, decreased birthweight, and decreased antibody response following vaccination, as well as increased blood levels of some liver enzymes for PFOA. Although not as well studied, PFNA appears to increase blood levels of cholesterol and some liver enzymes. Human health effects of these PFAS are generally consistent with the toxicity of PFAS observed in laboratory animals.

PFOA and PFOS caused tumors in rodents, while PFNA has not been tested for this effect. In humans, PFOA exposure was associated with a higher incidence of kidney cancer in both the general population and in a community with substantial levels of PFOA in drinking water, and with testicular cancer in the community with contaminated drinking water.

The Centers for Disease Control and Prevention's Agency for Toxic Substance Disease Registry (CDC/ATSDR) is conducting the "PFAS Multi-site Study," to learn more about the relationship between PFAS exposure and health outcomes. This work is taking place across seven U.S. communities exposed to PFAS-contaminated drinking water. Work is ongoing, and results are pending. To learn more visit bit.ly/ATSDR-HealthStudies.

Consumer, Environmental and Occupational Health Service
Environmental and Occupational Health Surveillance Program
nj.gov/health/ceohs/sanitation-safety/drinking-water-public-health/index.shtml

NJHealth New Jersey Department of Health

Impact of PFAS on children

Infants and children consume more water per body weight than older individuals, so their exposure may be higher than adults when drinking water is contaminated with PFAS. They may also be more sensitive to the effects of PFAS.

In humans, exposure to PFAS before birth or in early childhood may result in health effects including decreased birth weight, decreased response to vaccinations, and increased risk of infectious disease. In laboratory animals, some PFAS, including PFOA, PFOS, PFNA, and others, cause developmental delays.

Can I have my blood tested for PFAS?

Laboratory tests are available to measure PFAS in blood serum, but this is not a routine test. Health insurance may not cover the cost of this testing. While pursuing this type of specialized testing is a personal decision between you and your doctor, it is important to understand what testing can and cannot tell you.

What blood testing *can* tell you –

- Blood test results can be compared to national monitoring data collected from a representative sample of the U.S. population. The table below provides the most recently available (2017-2018) blood serum levels of the four PFAS most commonly detected in the U.S. population.

PFAS	Mean (geometric)	50th percentile	95th percentile
PFOS	4.25	4.30	14.6
PFOA	1.42	1.47	3.77
PFNA	0.41	0.40	1.40
PFHxS	1.08	1.10	3.70

- For example, if your concentration is higher than the 95th percentile, this means your blood serum is higher than the concentration found in 95% of the U.S. population.

What blood testing *cannot* tell you –

- While exposure to PFAS can increase the risk of certain health effects, a blood test indicating that you have been exposed to PFAS cannot be used to predict whether you will experience health effects or if PFAS exposure caused any health problems you may have.
- Test results alone cannot be used to identify specific sources of exposure.
- There is no accepted treatment to reduce levels of PFAS in the blood. Levels decrease slowly over many years when exposure has been reduced or eliminated.

What are the NJ drinking water standards for PFAS?

In 2018, NJ became the first state to establish an **enforceable** drinking water standard for a PFAS chemical when it set a Maximum Contaminant Level (MCL) for PFNA. MCLs for PFOA and PFOS followed in 2020.

NJ MCLS for PFAS	
PFNA	13 ppt
PFOA	14 ppt
PFOS	13 ppt

Abbreviations: ppt=parts per trillion; ppt = ng/L = nanograms per liter

A maximum contaminant level (MCL) is an **enforceable** drinking water standard which requires all public water systems to routinely monitor. If levels are found to be above the NJ MCL, the water utility **must** take actions to reduce levels below the MCL. Available water treatment technologies can effectively reduce levels of PFAS. Many systems that exceeded the NJ MCLs, have since reduced PFAS concentrations to non-detectable levels. Your public water utility will monitor and report these levels on a regular basis. Water results are available on NJDEP's Drinking Water Watch website.

The NJ Drinking Water Quality Institute (DWQI), an advisory body composed of scientists and technical experts from academia, the water industry, environmental health, the NJ Department of Environmental Protection (NJDEP), and the NJ Department of Health (NJDOH) is responsible for developing NJ MCLs and recommending them to the NJDEP. The NJ PFAS MCLs are based on studies of effects on laboratory animals.

Until recently, there were no national PFAS drinking water standards. In April 2024, USEPA finalized MCLs that considers including data on health effects in human populations exposed to low levels of PFAS. These new MCLs will result in additional public health protection from exposure to these chemicals in drinking water. Federal USEPA MCLs will require NJ drinking water systems to reduce PFOA and PFOS concentrations to even lower levels in drinking water and will address three additional PFAS not currently regulated in NJ. More detail is provided on Page 3.

What are the USEPA drinking water standards for PFAS?

USEPA finalized National Primary Drinking Water Regulations (MCLs) for six PFAS in April 2024. These standards are **enforceable**.

PFAS Compounds	Final MCL
PFOS	4.0 ppt
PFOA	4.0 ppt
PFHxS	10 ppt
PFNA	10 ppt
GenX	10 ppt
Mixture containing two or more of PFNA, PFHxS, PFBS, and GenX (HFPO-DA)	Hazard Index =1.0

- Public water systems must monitor for these PFAS. They have **three years** to complete initial monitoring (by 2027) and then must continue ongoing compliance monitoring. Water systems must provide the public with their monitoring results beginning in 2027.
- If levels of PFAS are found to exceed the USEPA MCLs, water systems will have **five years** (by 2029) to implement solutions to reduce levels below the MCL. By 2029, water systems will have to provide notification to the public of a violation.
- State standards may not be higher (less strict) than federal standards. Now that the USEPA has adopted national MCLs, New Jersey public water systems will be required to comply with the lower USEPA MCLs, by no later than 2027.
- Water systems in NJ are currently required to monitor for three PFAS and comply with NJ MCL standards. Many NJ water systems have now reduced PFAS to non-detectable levels. NJDEP and your public water system will have the most up to date PFAS monitoring data.
- The Hazard Index approach adopted by USEPA will regulate four additional PFAS as a mixture. USEPA has developed the following Health Based Water Concentrations (HBWCs) for the four PFAS included in the Hazard Index:
  - **PFHxS** – 10 ppt
  - **PFNA** – 10 ppt
  - **GenX** – 10 ppt
  - **PFBS** – 2000 ppt
- The USEPA's Hazard Index MCL applies to any mixture containing two or more of the four PFAS (listed above). The Hazard Index is calculated by summing the ratios of each individual PFAS measured chemical compared to its HBWC.
- The USEPA MCLs of 4.0 ppt for PFOA and PFOS are set at the USEPA Practical Quantitation Levels, which are the levels that laboratory methods can accurately measure PFOA and PFOS in water.
- USEPA has concluded that PFOA and PFOS are likely human carcinogens and has set their Maximum Contaminant Level Goals (MCLGs; health-based levels) at zero.
- Additional information on USEPA MCLs is available: epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

Recommendations:

PFOA, PFOS, and PFNA build up in the body over time, and it takes many years for the levels of these PFAS in your body to decrease after exposure has ended. Since New Jersey has established MCLs, water systems across the state are taking action to reduce concentrations of these PFAS to levels below the NJ MCLs. Some utilities have achieved non-detectable levels since the NJ MCLs have been in place. You can find more information at the NJDEP website: dep.nj.gov/pfas/

If PFAS are detected in your drinking water:

Some water systems are still working on establishing treatment solutions to reduce PFAS concentration below the NJ MCL. **If you learn that a PFAS is detected in your drinking water supply above a New Jersey MCL, until your water utility has reduced PFAS levels:**

- **For nursing (breastfed) babies:** PFAS are present in breast milk and can be transferred to nursing babies. Despite this exposure, mothers who are breastfeeding should continue to nurse. The extensive information on the health benefits of breastfeeding suggests that benefits of breastfeeding outweigh potential risk of additional PFAS exposure.
- **For all babies:** Bottled water should be used when giving infants just water and preparing juice made from concentrate for infants.
- **For pregnant women, nursing women and women considering or planning on having a child:** Switching to bottled water or using a home water filter for drinking and cooking will reduce PFAS exposure. However, PFAS are slowly excreted from the body. Therefore, risk reduction will not be immediate, as exposure to the fetus and nursing infant is influenced by the mother's past exposure.
- **For older children and adults:** If a public water utility notifies you that a PFAS exceeds the NJ MCL, they are required to promptly take actions to reduce these levels. Individuals who wish to reduce exposure to PFAS while the water utility is taking actions to reduce levels can consider switching to bottled or home filtered water for drinking and cooking.

Anyone concerned about their health should consult with their personal health care provider.

For health care providers:

Health care providers can find more information on clinical evaluation and management of patients from ATSDR at: atsdr.cdc.gov/pfas/hcp/clinical-overview/index.html

For the general population:

Drinking water is an important exposure source to PFAS. Your public water system is required to monitor for PFOA, PFOS, and PFNA. If results exceed the NJ MCLs, the water utility must inform you. More information on where to find water results are in the section that follows. Monitoring for additional PFAS is required by 2027.

Bottled water sold in NJ is required to meet the NJ MCLs. Additionally, some water filters are certified to reduce PFAS concentrations below 20 ppt but these alternative drinking water sources are not ensured to have PFAS concentrations lower than the NJ MCLs. More information on where to find out about bottled water monitoring and home water filters can be found on Page 5.

How can I find out if PFAS are detected in my drinking water?

Public Water Users

NJ public water systems were required to begin monitoring for PFNA in 2020 and for PFOA and PFOS in 2021. These results are available on NJDEP's Drinking Water Watch website. This is a database that is searchable by water system ID number, system name, or (if you don't know the ID number or name) by county and municipality, to identify all systems serving that area. Information on which utilities serve your area can also be found at this site.

Some water systems have earlier results through the EPA Unregulated Contaminant Monitoring Rule (UCMR3). These UCMR3 results were reported in your annual Consumer Confidence Reports (CCRs) which may be available online or mailed to your home directly by your water provider. CCRs are also found on NJDEP Drinking Water Watch. UCMR5, which began in Jan. 2023 and is testing all PWS with >3300 users for 29 PFAS at low Reporting Levels and results will be reported as they become available. Additionally, a list of public water systems with PFOA, PFOS, and/or PFNA MCL violations is available here: visit NJDEP DataMiner: njems.nj.gov/DataMiner/ [Search by Category > Water Supply and Geoscience > Scroll to "Public Water Systems with PFAS MCL Violations"]

Private Well Users

As of December 1, 2021, the NJ MCLs for PFNA, PFOA, and PFOS were included as required parameters in the NJ Private Well Testing Act (NJ PWTA). The NJ PWTA is a consumer information law that requires private well water be tested by a certified laboratory during real estate transfer. It also requires landlords to test well water supplied to tenants every five years and provide the results.

Well owners who are not selling their home may want to test their drinking water for PFAS. If you decide to test, we recommend you use a certified laboratory: njems.nj.gov/DataMiner/Search/SearchByCategory?isExternal=y&getCategory=y&catName=Certified%20Laboratories

Private well owners should be aware of the more stringent USEPA standards when interpreting their results. However, bottled water or filters are not yet certified to reduce PFAS concentration to the new USEPA standards. Also, at this time if PFAS are detected in your well water, only homes above the NJ standards would be eligible for the NJ Spill Fund: dep.nj.gov/srp/finance/eca-spill-fund/.

Did You Know?

Bottled water sold in NJ is regulated by the NJ Department of Health and is required to meet Safe Drinking Water standards. N.J.A.C. 8:21-5.1 et. seq

How do I know that my bottled water does not exceed the NJ drinking water standards for PFAS?

Companies that sell bottled water in NJ were required to analyze for PFNA, PFOA, and PFAS annually. Bottled water companies are required to submit their annual monitoring results to NJDOH with the application for their annual license. At this time, they are only required to meet the NJ standards. More information on NJ's Bottled Water Program can be found here: nj.gov/health/ceohs/documents/phfpp/BWStandards.pdf

Where can I get more information about home water filters?

Water treatment devices utilizing granular or powdered activated carbon filters, reverse osmosis, ion exchange resins and other specialized treatment media are technologies that can reduce the level of PFAS in drinking water. If a water treatment device is used, it is important to follow the manufacturer's guidelines for maintenance and operation.

NSF International, an independent and accredited organization, certifies products proven effective for reducing PFOA and PFOS below the previous USEPA Health Advisory of 70 ppt (2020 standard version). Recently, the NSF standards have been updated to more stringent levels below 20 ppt (2022 standard version). When purchasing a filter, verify that the product is NSF/ANSI standard 53 and check for the standard version to know at which level the filter is certified to remove total PFAS (PFOA, PFOS, PFNA, PFHxS, PFHpA).

Please note, these products are not certified for removal to the lower NJ MCLs of 14 and 13 ppt or the lower USEPA MCLs.

Additional Questions

If high levels of PFAS were detected in my water, how will it affect fruits and vegetables in my garden?

For gardening or farming, certain plants may take up some PFAS from irrigation and soil. Unfortunately, there is not enough scientific data to predict how much will end up in any specific crop. For most people the risk from the occasional consumption of produce grown in soil or irrigated with water contaminated with PFAS is likely to be low. For families who grow a large fraction of their produce, the risk of exposure to PFAS may be higher and they can consider the following steps:

- Maximize use of water from an uncontaminated source for your garden.
- Wash your produce in clean water after you harvest it.
- Modify your soil with clean compost. Increasing the organic content of your garden soil can prevent the uptake of PFAS into plants.

If PFAS are present above the NJ MCL, what water should I give my pets?

Scientists are not certain of the health impacts to pets. If you are concerned, you may choose to give your pet bottled or filtered water until your water utility has reduced the concentrations of PFAS in the drinking water below the NJ MCL.

If PFAS are present above the NJ MCL, what water should I use in my humidifier?

In line with USEPA recommendations, bottled water or home filtered water should be used in your humidifier until levels of PFAS in your drinking water are reduced.

What water should I use in my continuous positive airway pressure (CPAP) machine?

Individuals should continue to follow existing medical guidance regarding the use of distilled water in CPAP machines as instructed by the manufacturer and their doctor.

Additional Resources

NJ Department of Environmental Protection –

- NJDEP PFAS: dep.nj.gov/pfas/
- Drinking Water: dep.nj.gov/pfas/drinking-water/
- Site Remediation Program: nj.gov/dep/srp/emerging-contaminants/
- New Jersey Drinking Water Quality Institute: state.nj.us/dep/watersupply/g_boards_dwqi.html

NJ Department of Health

- Bottled Water: nj.gov/health/ceohs/documents/phfpp/BWStandards.pdf

NSF International –

- More info NSF certified home water filters, visit: nsf.org/consumer-resources/water-quality/drinking-water/

CDC ATSDR –

- PFAS Multi-site Study: atsdr.cdc.gov/pfas/health-studies/multi-site-study.html
- Detailed summaries of the toxicology and epidemiology studies on PFAS: atsdr.cdc.gov/toxprofiles/tp200.pdf
- Health care provider guidance: atsdr.cdc.gov/pfas/hcp/clinical-overview/index.html

US Environmental Protection Agency –

- Final PFAS National Primary Drinking Regulation: epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas