



# Drinking Water Facts: Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water

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\*formerly titled PFCs in Drinking Water

- Per- and polyfluoroalkyl substances (PFAS) are a group of chemicals with many commercial and industrial uses.
- PFAS have been associated with a variety of adverse health effects in humans, but it has not been definitively established that PFAS cause these effects.
- PFOA, PFNA, and PFOS have proposed or recommended drinking water regulations in New Jersey.

## What are PFAS and perfluorinated chemicals (PFCs)?

PFAS are a group of manmade chemicals which include a smaller group of chemicals called PFCs. PFAS repel water and oil, and are resistant to heat and chemical reactions. They therefore have important industrial and commercial uses. PFAS are used in 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 in other uses. PFAS can enter drinking water through industrial release to water, air, or soil; discharges from sewage treatment plants; land application of contaminated sludge; and use of fire-fighting foam.

PFCs are not broken down in the body. Four types of PFCs have been found in the blood (serum) of greater than 98% of the United States population. **These PFCs build up and stay in the human body for many years, and the amount goes down very slowly over time.**

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

## How can I be exposed to PFAS?

Some PFAS can dissolve in water. Therefore, drinking water may be a major source of exposure to PFAS for people living in communities with contaminated drinking water. Other sources of PFAS exposure include food, food packaging, consumer products, house dust, indoor and outdoor air, and at workplaces where PFAS are made or used.

Exposure to PFAS in drinking water is primarily from ingestion. Exposure to PFAS through other household uses of water such as showering, bathing, laundry and dishwashing is not significant.

## Are PFAS harmful to my health?

There is considerable information on the health effects of PFAS in humans and animals, and more information is continually becoming available. In experimental animals, some PFAS have been found to cause developmental, immune, neurobehavioral, liver, endocrine, and metabolic toxicity, generally at levels well above human exposures. Some studies of the general population, communities with drinking water exposures, and exposed workers suggest that PFAS increase the risk of a number of health effects. The most consistent human health effect findings for PFOA – the most well-studied of the PFAS – are increases in serum cholesterol, some liver enzymes, and uric acid levels. For PFOS, the most consistently found human health effects include increased serum cholesterol and uric acid levels. PFOA and PFOS have been associated with decreased antibody response following vaccination.

PFOA and PFOS caused tumors in rodents. In a community with substantial exposure to PFOA through drinking water, PFOA exposure was associated with higher incidence of kidney and testicular cancers.

## How can PFAS affect children?

In experimental animals, some PFAS cause developmental effects. In humans, exposure to PFAS before birth or in early childhood may result in decreased birth weight, decreased immune responses, and hormonal effects later in life. More research is needed to understand the role of PFAS in developmental effects.

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

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When PFAS are elevated in a drinking water supply, it is advisable to use bottled water to prepare infant formula for bottle-fed babies. Beverages for infants, such as juice made from concentrate, should also be prepared with bottled water. PFAS are present in breast milk. Based on the scientific understanding at this time, since the benefits of breast-feeding are well-established, infants should continue to be breast-fed. Pregnant, nursing, and women considering having children may choose to use home water filters or bottled water for drinking and cooking to reduce exposure to PFAS in your water. However, exposure to fetuses and nursing infants is influenced by past exposures and slow excretion of these substances from the body, so risk reduction will not be immediate.

## What levels of PFAS in drinking water are safe?

The New Jersey Department of Environmental Protection (NJDEP) is moving forward with setting enforceable Maximum Contaminant Levels (MCLs) for **PFOA (14 parts per trillion (ppt) [ng/L]) and PFNA (13 ppt)**. NJDEP will also be considering a recommended MCL for **PFOS (13 ppt)**. These levels are based on current scientific information and are intended to protect for lifetime exposure.

USEPA has issued a lifetime drinking water Health Advisory for **PFOA and PFOS of 70 ppt** individually or when concentrations of PFOA and PFOS are combined. A Health Advisory is non-enforceable guidance that identifies the concentration of a contaminant in drinking water at which USEPA has concluded adverse health effects are not anticipated to occur. The proposed and recommended NJ MCLs are more stringent.

## How do I know if I have PFAS in my drinking water?

Large public water systems in the U.S. and a subset of smaller water systems were required to test for some PFAS as part of the USEPA Unregulated Contaminant Monitoring program. All of the water systems which tested for PFAS have reported their results in your annual Consumer Confidence Report (CCR). The CCR may be available online or can be provided by your water provider. The only way to know whether your private well has PFAS is to have it tested. To find a laboratory certified to test for PFAS, you can contact NJDEP Office of Quality Assurance at 609-292-3950 or access the information at: <https://www13.state.nj.us/DataMiner>

## What should I do if I am concerned about PFAS in my drinking water?

PFAS are **not** removed from water by boiling. **If tap or well water is found to contain PFAS, people may choose to use home water filters or bottled water for drinking and cooking to reduce exposure to PFAS in their water.**

Granular activated carbon filters or reverse osmosis water treatment devices are technologies that can reduce the level of PFAS in drinking water. If a treatment 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 USEPA Health advisory level (70 ppt) (<http://info.nsf.org/Certified/DWTU/>). The Minnesota Department of Health tested several household water treatment devices and found many to be effective. See link: <http://www.health.state.mn.us/divs/eh/wells/waterquality/poudevicefinalsummary.pdf>

## What can blood testing for PFAS tell me?

PFAS can be measured in your blood serum but this is not a routine test. While a blood test may indicate whether you have been exposed to PFAS, results cannot be used to predict your health effects nor can they be linked to specific health problems. Also test results alone cannot be used to specifically identify sources of exposure, and there is no treatment to reduce levels of PFAS in blood. A national program has been measuring PFAS in blood among the U.S. population. This information can be used to determine if the levels of PFAS in your blood are higher than national background levels. For example, if your concentration is higher than the 95<sup>th</sup> percentile, this means your blood serum concentration is higher than the concentration found in 95% of the U.S. population.

| Estimates of four most common PFAS measured in the U.S. general population, 2013-2014 (ng/ml [ppb]) |                |                             |                             |
|---|----------------|-----------------------------|-----------------------------|
| PFAS  | Geometric Mean | 50 <sup>th</sup> Percentile | 95 <sup>th</sup> Percentile |
| PFOS  | 4.99           | 5.20                        | 18.42                       |
| PFOA  | 1.94           | 2.00                        | 5.51                        |
| PFNA  | 0.67           | 0.64                        | 1.99                        |
| PFHxS   | 1.35           | 1.33                        | 5.54                        |

## Additional Resources:

<http://www.nj.gov/health/ceohs/environmental-occupational/drinking-water-public-health/>