



Drinking Water Facts:

Perfluorinated Chemicals (PFCs) in Private Wells



Key Points

- Perfluorinated chemicals (PFCs) are a group of chemicals with many commercial and industrial uses.
- PFCs have been associated with a variety of adverse health effects in humans but it has not been established that PFCs directly cause these effects.
- PFCs are not currently regulated in drinking water but their occurrence in drinking water is being studied to determine if future regulation is needed.

What are perfluorinated chemicals (PFCs)?

Products made from man-made perfluorinated chemicals (PFCs) can repel water and oil, and are resistant to heat and chemical reactions. They therefore have important industrial and commercial uses. PFCs are used in production of waterproof and stain proof fabric, in some stick-free cookware, in “leak-proof” coatings on packaging materials, in fire-fighting foams, and in other uses.

These compounds 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 four PFCs stay in the body for many years:

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

PFCs can enter drinking water through industrial release to water or air, discharges from sewage treatment plants, land application of contaminated sludge, and use of fire-fighting foam.

Where can PFCs be found?

Because PFCs do not break down, they remain in the environment for a long time. They have been found in water, air, soil, house dust, wildlife, and polar ice caps. Some PFCs, including PFOS and PFNA, accumulate in fish living in contaminated waters.

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

Are PFCs harmful to my health?

Much of the information on the health effects of PFCs in humans and animals is recent and new studies are continually becoming available. More data about possible health effects are available for PFOA and PFOS than for PFNA, PFHxS, and other PFCs.

In experimental animals, PFCs have been found to cause developmental, immune, neurobehavioral, liver, endocrine, and metabolic toxicity, generally at levels well above human exposures. Studies of the general population, communities with drinking water exposures, and exposed workers suggest that PFCs increase the risk of a number of health effects. The most consistent human health effect findings for PFOA – the most well-studied of the PFCs – are increases in cholesterol and uric acid levels.

In humans, exposure to PFCs 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 PFCs in developmental effects.

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

How can I be exposed to PFCs?

Exposure to PFCs in drinking water is primarily from ingestion. PFCs are **not** removed from water by boiling.

Infants consume much more water per body weight than older individuals, so their exposures may be higher than adults if drinking water has elevated levels of PFCs.

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What levels of PFCs found in drinking water may be harmful to my health?

PFCs are **not** currently regulated drinking water contaminants. However, increased attention to these compounds in drinking water has resulted in federal and state guidance.

USEPA developed Provisional Health Advisory levels protective for **short-term** exposures to **PFOA** of 400 parts per trillion (ppt) or (ng/L) and for **PFOS** of 200 ppt (ng/L)

The New Jersey Department of Environmental Protection (NJ DEP) developed a guideline for **chronic (lifetime)** exposures to **PFOA** of 40 ppt (ng/L). NJ DEP has also developed a draft interim specific ground water criterion for **PFNA** of 20 ppt (ng/L) - see <http://www.state.nj.us/dep/dsr/pfna>.

What should I do if my private well drinking water has elevated levels of PFC(s)?

If the levels of PFCs in your private well drinking water exceed NJDEP guidance values, we recommend the following:

- Your household should be connected to a public water system or a professionally-installed home treatment unit designed to remove PFCs in order to reduce exposure.
- Until actions are taken to reduce exposure, it is advisable to use bottled water to prepare infant formula for bottle-fed babies. Beverages for infants up to one year of age, such as juice made from concentrate, should also be prepared with bottled water, since infants consume much more water per body weight than older individuals. PFCs accumulate in the body over time and are found in breast milk. Since the benefits of breast-feeding are well-established, infants should continue to be breast-fed.
- If PFC reduction methods will not be in place for an extended time, it is advisable to use bottled water for drinking and cooking for people of all ages.
- If PFC levels are elevated, we recommend you consult with the New Jersey Department of Health at (609) 826-4920 for further guidance on household water uses other than drinking and cooking.

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Commercially available home water treatment devices that can be purchased at home improvement stores are currently not designed or certified for removal of PFCs. Granular activated carbon filters or reverse osmosis water treatment devices may reduce the level of PFCs in drinking water but the effectiveness of these units for PFC removal or the requirements for proper maintenance have not been established.

Is there a medical test to see if I have been exposed to PFCs?

PFCs can be measured in your blood serum, but this is not a routine test. While a blood test may indicate whether someone has been exposed, it cannot be used to tell someone whether there is a health risk. Having a PFC in your blood does not mean that you will experience adverse health effects.

Since 2003, a national biomonitoring program performed by the Centers for Disease Control and Prevention (CDC) has been measuring levels of 12 types of PFCs in a representative sample of the U.S. population. This information establishes background levels of PFC concentrations in blood and allows public health agencies to monitor levels over time.

What is the government doing about PFCs in drinking water?

The USEPA is currently requiring large public water systems in the U.S. to test for PFCs as part of the Unregulated Contaminant Monitoring program. This information will assist the USEPA in determining whether future regulation is needed.

In cooperation with USEPA, major manufacturers have agreed to phase out the production of many PFCs with the goal of eliminating their use by 2015.

More information and resources about PFCs can be found at:

<http://nj.gov/health/eohs/index.shtml>

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