

Per- and Polyfluoroalkyl Substances (PFAS) in Tap Water

This fact sheet answers questions about per- and poly-fluoroalkyl substances (PFAS) in drinking water in your home (*i.e.*, tap water). It also includes information about potential health effects associated with PFAS exposure, and ways to limit your exposure to PFAS when using your tap water.

What are PFAS?

PFAS are a group of fluorinated organic chemicals that have been used since the 1950s to make consumer products and materials that are resistant to water, grease, and stains (e.g., non-stick cookware, textiles, and paper food packaging). PFAS are also used in some firefighting foams and in some industrial processes. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) have been the most extensively produced and studied of these chemicals.

How can I be exposed to PFAS?

Although many PFAS are no longer produced in this country, nearly all people are exposed to PFAS. Most people are exposed through consumption of food and use of consumer products. Drinking water can be a significant exposure source in communities with PFAS-contaminated water supplies. Contamination of drinking water is typically localized and associated with an industrial facility where the chemicals were produced or used or where firefighting foam was used. Contamination of drinking water may also be associated with municipal waste, and land application of certain waste (e.g., industrial compost facilities).

How are PFAS regulated in drinking water?

Regulatory agencies establish public health guidelines and standards for drinking water in order to protect people from exposure to contaminants in drinking water. In Massachusetts, the Massachusetts Department of Environmental Protection (MassDEP) regulates drinking water under the federal Safe Drinking Water Act. MassDEP has established a maximum contaminant level (MCL; which is an enforceable standard) for PFAS that is safe for daily exposure, for a lifetime. The MassDEP MCL is 20 parts per trillion (ppt) or nanograms per liter (ng/L) for the sum of six PFAS in drinking water. These six PFAS include perfluorohexane sulfonic acid (PFHxS), perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorononanoic acid (PFNA), and perfluorodecanoic acid (PFDA).

The US Environmental Protection Agency (EPA) has issued MCLs for PFOA and PFOS of 4 ng/L. EPA has also issued MCLs for PFHxS, PFNA, and hexafluoropropylene oxide dimer acid and its ammonium salt (referred to as "GenX chemicals") of 10 ng/L. MassDEP is currently evaluating these new drinking water values, and will update the Massachusetts MCL to comply with EPA's MCLs. More information about EPA's MCLs is available on [EPA's website](#).

Can PFAS affect my health?

Researchers have evaluated the potential for PFAS to cause adverse health effects in both humans and laboratory animals. Although there are some gaps in the current scientific knowledge, environmental health scientists believe that exposure to PFAS may affect human health. Effects from exposure to PFAS depend on how much a person is exposed to and how often and for how long they are exposed. Possible harm from exposure also depends on personal factors such as age, sex, diet, lifestyle, and current health status.

In animal studies, which mostly involved exposure to high levels, PFAS have been associated with effects on the liver, kidneys, immune system, thyroid gland, and developing fetus. The most consistent finding in studies of humans exposed to elevated levels of PFAS is increased cholesterol levels. Additional effects in humans include:

- increased risk of high blood pressure or pre-eclampsia in pregnant women
- decreased infant birth weights
- decreased antibody response to vaccines in children
- increased liver enzymes

Scientists are still learning about the health effects of exposure to mixtures of PFAS.

Can PFAS cause cancer?

The EPA has concluded that PFOA and PFOS are likely to be carcinogenic in humans. Studies in humans suggest that PFOA may increase the risk of kidney and testicular cancer, and that PFOS may increase the risk of liver cancer. The risk of cancer for an individual depends on many factors, including the amount and duration of exposure and the underlying health status of the individual.

Will I get sick if I drink water with PFAS levels higher than a health guideline or standard?

Drinking water with PFAS higher than health guidelines or standards does not mean you will get sick. This is because health guidelines and standards, including the MassDEP MCL for PFAS, are set below a level that is likely to make you sick, and are based on a level that is expected to be safe to drink for an entire lifetime.

Are there any special measures I should take if I am pregnant?

If there is PFAS in your drinking water, you should limit your exposure. Otherwise, it is not necessary to take any additional measures during your pregnancy. In some studies, women exposed to PFAS before they became pregnant experienced elevated blood pressure, and in some cases pre-eclampsia when pregnant. However, it is not uncommon for women to experience elevated blood pressure during pregnancy, even when there's no known exposure to PFAS. As such, you should continue with your regular doctor's visits during pregnancy, which should include monitoring your blood pressure.

Should I breastfeed if PFAS have been detected in my drinking water?

The US Centers for Disease Control and Prevention (CDC) recommends nursing mothers continue to breastfeed. Based on current science, the many benefits of breastfeeding appear to outweigh the risks to infants who may be exposed to PFAS in breastmilk. If you have concerns, you should consult with your medical care provider.

Will I/my child still be protected by vaccines if we have been exposed to PFAS?

Although several studies have found that the body's immune response to some vaccinations might be slightly diminished by PFAS, vaccines should still provide protection from diseases that vaccines prevent. Thus, both you and your child should follow the normal vaccination schedule recommended by your or your child's medical provider.

Is it possible to lower PFAS levels in my blood or my child's blood?

There are no medical treatments that lower PFAS levels in blood. The only way to lower PFAS levels in blood is to limit exposure to PFAS. Because of their widespread use in a variety of consumer products and their presence in various food items, it is not possible to completely eliminate exposure to PFAS. Compared to drinking water contaminated with PFAS, exposure to PFAS in consumer products and food items is relatively minor. If you have been exposed to PFAS in your drinking water, your blood PFAS levels should decrease by switching to PFAS-free bottled water or by using a filter.

PFAS may also be present in household dust, especially if there are stain-resistant textiles in the home, such as carpets and upholstery. Exposure to PFAS in household dust can represent a significant source of exposure for young children, who tend to ingest more dust than older children and adults. If you believe there are stain-resistant textiles in your home, you can reduce exposure for young children by frequently controlling dust levels in the home, for example by regularly cleaning floors and other surfaces young children may come in contact with.

How can I tell if my drinking water contains PFAS?

PFAS are odorless and tasteless. Water testing is the only way to know if PFAS are present. You can contact your public water supplier or local health department to obtain information on your public water supply and on areas of private well PFAS contamination. If you have a private well, your drinking water may be at risk if it is near a known PFAS-contaminated site or source. PFAS sources may include fire training facilities, military areas, airports, certain manufacturing facilities, and some waste disposal sites. You can visit [MassDEP's website](#) for information on where drinking water testing has occurred in Massachusetts and for information on how to test your drinking water for PFAS.

Should I switch to bottled water to limit my exposure to PFAS?

PFAS are found at low levels in the environment, consumer products, and food, so it is nearly impossible to eliminate all exposure. If your drinking water has PFAS at levels greater than the MassDEP MCL, you can limit your exposure by drinking and cooking with bottled water that has been tested for PFAS. Bottled water sold in Massachusetts is required to be tested for PFAS and has been shown to comply with the MassDEP MCL. If you purchase bottled water outside of Massachusetts, you can contact the bottled water provider for information about PFAS levels. For formula-fed infants, use pre-mixed baby formula or tested bottled water for reconstituting powdered formula.

Does in-home filtration reduce levels of PFAS in water?

In 2016, the National Sanitation Foundation (NSF) developed standards and testing to certify filters that effectively remove PFOA and PFOS from water to levels less than 70 parts per trillion (EPA's drinking water health advisory from 2016). It is unknown how much PFAS are removed by filters manufactured prior to 2016.

Choose at-home or point-of-use water filters that are certified by an independent third-party organization, such as NSF and for which the manufacturer can provide documentation that the filters will effectively remove PFAS to levels less than 20 ppt. You can find information about NSF-certified filters on [MassDEP's website](#). An in-home filtration system should be maintained and monitored so the system continues to effectively remove PFAS from water.

Can I shower or bathe if PFAS levels in my water are greater than the MassDEP MCL?

Because PFAS are not readily absorbed through the skin, contacting water containing PFAS while showering and bathing is not a health concern. However, small amounts of water may be ingested while showering and bathing. If PFAS has been identified in water at concentrations substantially greater than the MCL, avoid swallowing water while showering or bathing and monitor young children to limit the amount of water they swallow.

If your skin has cuts, abrasions, open sores, or other wounds, you may want to limit the amount of time spent showering, bathing, or soaking in water with PFAS levels greater than the MassDEP MCL.

Is it OK to clean wounds or sores with PFAS-contaminated water?

Cleaning broken skin with water that contains PFAS at levels greater than the MassDEP MCL is not expected to be harmful, but extended contact should be avoided.

Is it safe to wash dishes with water found to have levels of PFAS above the MassDEP MCL?

Dishes that have been washed with water containing PFAS do not pose a health risk. Furthermore, PFAS in water are not easily absorbed through the skin. If you have a rash, cuts, or broken skin on your hands, you can minimize any absorption by wearing rubber gloves when washing dishes.

Is it OK to eat fruits and vegetables from my garden if my soil, compost, or irrigation water is contaminated with PFAS?

It is possible for plants to take up PFAS from external sources (e.g., water, soil, compost). Although PFAS do not stick to soil very well, gardens watered with PFAS-contaminated water or enriched with PFAS containing compost may have somewhat higher levels of PFAS in the soil. The amount of PFAS in home-grown plants depends on levels in the water, soil, and compost as well as the type of plant, nutrient levels in soil, and the specific PFAS. At this time, it is not possible to predict what the PFAS concentration would be in plants grown in an environment containing PFAS.

To reduce potential exposure to PFAS in home-grown produce, you can:

- Water seedlings and gardens with an alternative source of water, such as collected rain water.
- If using compost, note that PFAS concentrations in biosolid compost may contain higher levels of PFAS than other types of compost (such as backyard compost or manure). If you are unsure whether the compost you select contains PFAS, contact the manufacturer.
- Wash all fruits, vegetables, and herbs in clean water before eating.
- Peel root vegetables before eating.
- Use a raised bed filled with clean soil or add clean soil to existing beds.

What is the safe level of PFAS in my compost?

Currently, there are no established limits for compost or other land applied soil amendments in the Commonwealth of Massachusetts. MassDEP is in the process of developing screening limits for various soil amendment products, informed by ongoing research to better understand what proportion of PFAS in compost may end up in the plants we eat or the water we drink.

Can I eat locally-raised livestock or poultry if they have been drinking PFAS-contaminated water?

PFAS tend to accumulate in certain internal organs of livestock and poultry, so you should avoid eating the liver or other internal organs of animals that drank water with elevated levels of PFAS. PFAS may also be present in the meat of livestock and poultry that drank water with elevated levels of PFAS, so you may also want to limit eating meat from animals exposed to PFAS.

Is it safe to clean things like dentures or pacifiers with water found to have levels of PFAS above the MassDEP MCL?

Even though only a small amount of water might be swallowed and the risk of experiencing adverse health effects is very low, you can minimize any risk by not using water with PFAS greater than the MassDEP MCL to wash items that might go directly in your mouth. If PFAS levels in your drinking water are substantially greater than the MCL, you may wish to use PFAS-tested bottled or filtered water for:

- Brushing your teeth
- Cleaning dentures
- Cleaning baby bottles and nipples, pacifiers, and teething toys

If I have a swimming pool, is it OK to fill it with PFAS-contaminated tap water?

Although PFAS are not readily absorbed through the skin, small amounts of water may be accidentally ingested while swimming. DPH recommends that if the PFAS concentration in your tap water is greater than 90 ng/L (MassDEP's Imminent Hazard Level for PFAS in drinking water), you should consider using an alternative source of water to fill your swimming pool. You can find information about PFAS and swimming on [DPH's website](#).

My pet or companion animal has been drinking PFAS-contaminated water, will they get sick?

Because companion animals and pets are different sizes, have different lifespans, and drink different amounts of water than people, it's not possible to predict what health effects an animal may experience from drinking water with PFAS concentrations greater than the MassDEP MCL. To be on the safe side, give pets and companion animals clean drinking water when possible. If you have concerns, you may want to consult with your veterinarian.

How do I avoid buying household products that contain PFAS?

Although PFOA and PFOS are no longer used in household products produced in the US, they may still be used in certain imported or existing household products, including carpets and other textiles. PFAS other than PFOA and PFOS may also still be present in textiles with stain-resistant coatings, such as carpets and upholstery, and in certain cleaning products, including waxes. You can purchase textiles that have not been treated with stain-resistant coatings. When purchasing cleaning products, you can look for ones that do not contain ingredients that include "perfluor-" or "polyfluor-" in their name or do not contain PTFE (used in non-stick coatings).

Where can I get more information?

For questions about PFAS health effects:

<https://www.atsdr.cdc.gov/pfas/about/health-effects.html>

For clinician information about PFAS:

<https://www.atsdr.cdc.gov/pfas/hcp/clinical-overview/index.html>

For questions about PFAS and drinking water quality, visit MassDEP's website:

<https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas>

To find filters certified to reduce the levels of PFOA and PFOS in tap water, visit:

<https://www.nsf.org/consumer-resources/articles/pfoa-pfos-drinking-water>

or call the NSF Consumer Information Specialists at 1-800-673-6275

For questions about PFAS in private wells, see:

<https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas-in-private-well-drinking-water-supplies-faq>

For a list of MassDEP-approved laboratories for analysis of PFAS in drinking water, see:

<https://www.mass.gov/how-to/find-a-certified-laboratory-for-water-testing>

For questions about PFAS in composts made from a variety of mixed feedstocks:

<https://www.epa.gov/system/files/documents/2021-08/emerging-issues-in-food-waste-management-persistent-chemical-contaminants.pdf>

For general questions about drinking water quality in Massachusetts, contact:

MassDEP Drinking Water Program

617-292-5770

Program.Director-DWP@mass.gov

