

PFAS - Point of Use Water Treatment

Home water treatment to reduce levels of PFAS in drinking water

Home water treatment systems to reduce the levels of per- and polyfluoroalkyl substances (PFAS) in drinking water can be installed to treat the water at the point of entry or at the point of use. Point of entry (POE) water treatment systems, also called whole house treatment systems, treat all of the water entering the household plumbing system. Point of use (POU) water treatment systems treat the water at a specific location within the house, typically the kitchen sink or primary source of water for drinking and cooking (some also provide water to the refrigerator).

Either type of water treatment has pros and cons that should be considered before selecting the best treatment option for a household. The type of treatment system chosen should consider the volume of water that will be used in the home, the number and location of sites where water is consumed in the home, and the type of PFAS chemical identified in the laboratory result.

If water for drinking, cooking and making ice is primarily obtained from the kitchen sink, then the installation of a treatment unit below the sink or on the sink faucet is an option. If drinking water and ice are obtained from the refrigerator, then it is important to consider treating the water line to the refrigerator also. If drinking water is obtained from multiple locations in a home, then a point of entry, or whole house treatment system may be preferred. See [PFAS – Whole House Water Treatment] factsheet for more information.

If possible, it is important to choose a treatment system that has been tested and certified to remove the PFAS present in the water based on data provided from the public water system provider or from a laboratory analysis.

Certified POU water treatment products to remove PFOA and PFOS

Currently, certified products are only for point of use (POU) treatment, which means they are products designed to treat the water at only one or two locations, usually at the kitchen sink and possibly the refrigerator if it has water connected. Certified products are either granular activated carbon (GAC) filtration or reverse osmosis (RO) treatment systems. It should be noted that some of the products certified to treat water at the point of use are counter top products or pour through (like a pitcher filter that you fill from the tap yourself as needed).

NSF International and the Water Quality Association are independent third-party testing agencies that currently test and certify products to remove the specific PFAS PFOA and PFOS.

Look for products identified as certified to NSF International's Standard P473 (on-line listing is located at: <http://info.nsf.org/Certified/DWTU/Listings.asp?ProductFunction=P473%7CPFOA+Reduction&ProductFunction=P473%7CPFOS+Reduction&ProductType=&submit2=Search>). The NSF International consumer information team can also be contacted at info@nsf.org or 1-800-673-8010 for assistance in finding a certified product.

Products tested and certified by the Water Quality Association can be found here: <https://www.wqa.org/find-products#/>

NSF Standard P473 was retired in March of 2019 when the testing protocol was incorporated into existing water treatment standards, so new products certifications are tested to meet either NSF/ANSI Standard 53: Drinking Water Treatment Units – Health Effects for the reduction of PFOA and PFOS with granular activated carbon filtration systems or to NSF/ANSI Standard 58 Reverse Osmosis Drinking Water Treatment Systems for the reduction of PFOA and PFOS with reverse osmosis systems. There is currently not a standard for certification of other types of treatment systems.

POU water treatment products to remove other PFAS

There are currently no certified standards for removing PFAS other than PFOA and PFOS, however, consideration of the type of PFAS chemical can inform the selection of the best water treatment system. PFOA and PFOS are longer chain PFAS than other chemicals in the PFAS family. Longer chain chemicals are larger which makes it easier for a filter or membrane to trap them. Shorter chain PFAS are harder to remove with granular activated carbon treatment alone. Though there is no product certification standard at this time, research has shown that reverse osmosis treatment systems can effectively remove a wide range of PFAS, including the shorter chain chemicals in the PFAS family.

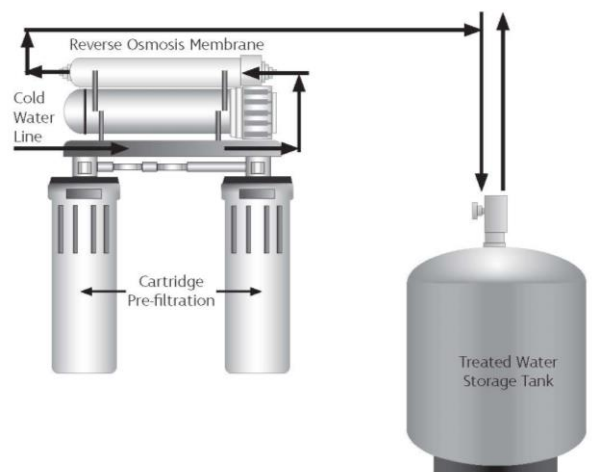
Considerations for POU granular activated carbon (GAC) treatment

- Physical filter cartridge “traps” contaminant(s) which is then removed and disposed of at the end of its rated lifecycle.
- Filter must be replaced on a regular schedule (identified by the manufacturer).
- Generally, granular activated carbon filters provide more water flow than a reverse osmosis system.
- May not effectively treat shorter chain PFAS if present in addition to the longer chain PFOA and/or PFOS.



Considerations for POU reverse osmosis (RO) treatment

- Typically requires pre-filtration to be installed to remove any sediment and small particles as well to maximize the life and effectiveness of the membrane.
- Large volumes of water are wasted in the treatment process. Typically, for every 10 gallons sent into the treatment unit, 7-8 gallons are sent down the drain as waste, and 2-3 gallons of treated water are produced.
- Membranes must be replaced on a regular schedule (identified by the manufacturer) in addition to any pre-filtration cartridges.
- Research has shown it to effectively reduce shorter chain PFAS in addition to the longer chain PFOA and/or PFOS.



Costs

US EPA has estimated costs for different types of point of use water treatment systems.

	Approximate Initial Equipment Purchase Cost	Approximate Replacement Treatment Media Cost
NSF P473 Certified Point of Use Granular Activated Carbon (GAC) Filter	\$100 to \$1200	\$200 to \$300 each year
NSF P473 Certified Point of Use Reverse Osmosis (RO)	\$400 to \$700	\$200 each year

Maintenance

Any water treatment system installed requires regular maintenance to help ensure effective treatment. Follow the instructions that come with your system for filter and membrane replacements. The instructions will identify how often they need to be replaced as well as the specific filter or membrane that must be used.

If a system is not properly maintained, water will still flow through it, but the system will not work and the water will not be treated. PFAS do not change the taste, smell, or color of the water and are not indicators of when a system needs maintenance. Always refer to the manufacturer's recommendations for how and when to maintain your system.

For More Information

For more information on PFAS, including the health effects of PFAS, PFAS in drinking water, water testing and treatment, and other PFAS activities in Ohio, visit the Ohio PFAS webpage here: www.pfas.ohio.gov.

For more information on point of use water treatment to reduce PFAS concentrations, contact the ODH Residential Water and Sewage Program at BEH@odh.ohio.gov or at (614) 644-7558.

PFAS in Drinking Water

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals applied to many consumer goods to make them waterproof, stain resistant, or nonstick. PFAS are also used in products like cosmetics, fast food packaging, and a type of firefighting foam called aqueous film forming foam (AFFF) which are used mainly on large spills of flammable liquids, such as jet fuel.

How do PFAS get into drinking water?

PFAS enter the environment at sites where they are made, used, disposed of, or spilled. PFAS are mobile and transported through rainwater run-off and enter surface water (lakes, ponds, etc.) or seep through the soil and migrate into groundwater (underground sources of drinking water). Because PFAS are very long-lasting and are not easily broken down by sunlight or other natural processes, they may remain in water for many years.

If a public water system or your private well gets its water from a surface or groundwater source that is contaminated with PFAS, and the water is not properly treated to remove the PFAS, the chemicals may be in your drinking water and can pass into your body when you ingest (drink or eat food cooked in) them.

What are the health effects of drinking water that contains PFAS?

There are many chemicals in the PFAS family, and they may cause different health effects if you are exposed to them. Some, but not all, studies in humans with PFAS exposure have shown that certain PFAS may:

- Affect growth, learning, and behavior of infants and children;
- Lower a woman's chance of getting pregnant;
- Interfere with the body's natural hormones;
- Increase cholesterol levels;
- Affect the immune system; or
- Increase the risk of certain cancers.

Scientists are still learning about the health effects of exposures to mixtures of PFAS. Laboratory animals exposed to high doses of one or more PFAS chemicals have shown changes in liver, thyroid, and pancreas function, as well as some changes in hormone levels. Because animals and humans process these chemicals differently, more research will help scientists fully understand how PFAS affect human health.

Exposure to PFAS does not always mean a person will have health effects. Whether a person gets sick depends on how long they were exposed (duration), how often they were exposed (frequency), and how much PFAS they were exposed to (dose). Personal factors like age, lifestyle, and other illnesses may also contribute to whether a person gets sick. Young children, infants, and unborn babies may be at more risk of health effects.

What levels of PFAS in drinking water are unsafe?

The Ohio Environmental Protection Agency (OEPA) and the Ohio Department of Health (ODH) have established PFAS Action Levels for the six PFAS chemicals listed in the table below. OEPA and ODH use these action levels as thresholds in providing guidance to residents, drinking water system owners and operators on health effects, ways to reduce exposures, and options for treating drinking water.

PFAS Chemicals ¹						
	PFOA	PFOS	GenX	PFBS	PFHxS	PFNA
Action Level (ppt) ²	>70 single or combined with PFOS	>70 single or combined with PFOA	>700	>140,000	>140	>21

¹ PFOA (Perfluorooctanoic acid); PFOS (Perfluorooctane sulfonate); GenX (HFPO dimer acid); PFBS (Perfluorobutanesulfonic acid); PFHxS (Perfluorobexane sulfonic acid); and PFNA (Perfluorononanoic acid).

² PPT (Parts per trillion)

How can I test my water and what are treatment options if PFAS is present?

Water Testing

Ohio residents who get their water from a private water system (well, spring, pond, cistern, or hauled water storage tank) may be interested in having their water tested. Because PFAS are in many items most people use daily, including waterproof or stain-resistant fabrics, personal hygiene products, and food and beverage packaging, it is difficult to collect a sample without contaminating it. It is recommended that water samples be collected by someone specifically trained to sample drinking water for PFAS analysis. Ohio's PFAS [webpage](#) provides a list of labs and resources for water testing. If you receive your water from a public water system, you may contact the utility to obtain more information.

Water Treatment

Based on the laboratory results, you may want to install a PFAS water treatment system in your home. These treatment systems may be:

- At the point of entry (POE) where treatment for all the water entering the household plumbing system occurs; or
- At the point of use (POU) which is often at the kitchen sink or primary source of water for drinking or cooking (potentially also including a water line to the refrigerator if it has a plumbed in water line).

Either type of water treatment system has pros and cons that should be considered before selecting the best treatment option for a home. The type of treatment system chosen should consider the volume of water that will be used in the home, the number and location of sites where water is consumed in the home, and the type of PFAS chemicals identified by laboratory testing.

For More Information

For more information on PFAS, including the health effects of PFAS, PFAS in drinking water, water testing and treatment, and other PFAS activities in Ohio, visit the Ohio PFAS webpage here: pfas.ohio.gov.

For more information on PFAS and your health, contact the ODH Health Assessment Section at BEH@odh.ohio.gov or at (614) 728-9452.

PFAS and Sensitive Populations

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals applied to many consumer goods to make them waterproof, stain resistant, or nonstick. PFAS are also used in products like cosmetics, fast food packaging, and a type of firefighting foam called aqueous film forming foam (AFFF) which are used mainly on large spills of flammable liquids, such as jet fuel.

What is a sensitive population?

Coming into contact with chemicals (like PFAS) is called “exposure.” Most of the time, the amounts of chemicals people are exposed to is far less than the amount that can cause health problems. However, some people cannot tolerate chemical exposure as well as others. These groups of people are called “sensitive populations”.

Who are the sensitive populations for PFAS?

Babies and Young Children

Because babies and young children tend to explore the world around them by putting their fingers, toys, and other objects into their mouth, they are more likely to accidentally eat (ingest) PFAS dust from household goods like upholstery and carpeting than adults. Also, because babies and young children are still developing, they may be at higher risk of certain health effects from PFAS exposure.

Fetuses

Similar to young children, unborn babies’ bodies are still developing, and they may be at higher risk of certain health effects. PFAS may pass from the mother to the fetus through the umbilical cord if the mother is exposed to PFAS while pregnant. Studies have shown that fetuses exposed to PFAS may be born at a slightly lower weight.

Pregnant and Nursing Women

Pregnant and nursing women tend to drink more water. If the water they are drinking contains PFAS, they may be exposed to more PFAS than a woman who is not pregnant. A higher dose of PFAS makes them more at-risk of developing health conditions. Studies have shown that pregnant women exposed to PFAS may be at higher risk of pre-eclampsia and high blood pressure.

Nursing women may pass PFAS to their babies through breastmilk. It is important to remember that, according to the Centers for Disease Control and Prevention (CDC), the benefits of breastfeeding outweigh the risks of PFAS in breastmilk. Breastfeeding can reduce a baby’s risk of certain conditions like asthma, obesity, and sudden infant death syndrome (SIDS). Breastfeeding can also lower a mother’s risk of high blood pressure, type 2 diabetes, and ovarian and breast cancer.

Immunocompromised People and People with Certain Health Conditions

Because scientists do not yet fully understand all PFAS chemicals or their health effects, there may be other sensitive populations, such as people who are immunocompromised (have weakened immune systems) or people who have certain health conditions like liver disease or certain kinds of cancer. Currently, it is not well understood whether PFAS can make certain health conditions worse.

What are the health effects of PFAS exposure for a sensitive population?

Being exposed to PFAS does not mean you will necessarily have health effects.

Whether you get sick from exposure to any chemical depends on how much you were exposed to (dose), how long you were exposed for (duration), and how often you were exposed (frequency).

Sensitive populations are at risk of the same health effects from PFAS exposure as the average person. However, where it may take a large amount of PFAS to make the average person sick, someone in a sensitive population may get sick after being exposed to only a small amount.

Scientists are still learning about the health effects of exposures to mixtures of PFAS. Some, but not all, studies in humans with PFAS exposure have shown that certain PFAS may:

- Affect growth, learning, and behavior of infants and children;
- Lower a woman's chance of getting pregnant;
- Interfere with the body's natural hormones;
- Increase cholesterol levels;
- Affect the immune system; or
- Increase the risk of certain cancers.

How can sensitive populations protect themselves from PFAS?

PFAS may be present in drinking water, food and many consumer products. While avoiding all exposures to all sources of PFAS may not be feasible due to the wide use of PFAS in many consumer products, following the recommendations below can help a person reduce their exposure greatly:

- Treating drinking water that contains PFAS or using an alternate source (like bottled water) for drinking, cooking, making ice, and preparing infant formula is one way to reduce exposures. See the PFAS Whole House or Point of Use Treatment Fact sheets for more information at pfas.ohio.gov.
- Be an informed consumer and research whether manufacturers are using PFAS in the household products you buy, especially anything labeled waterproof, non-stick and stain-resistant. Certain brands of stain-resistant carpeting and upholstery, stain-resistant or waterproof clothing, fast food packaging like pizza boxes and microwave popcorn bags, non-stick cookware and some cosmetics and personal care products are known to contain PFAS.
- To keep PFAS dust out of your home and body, clean your house and dust surfaces regularly.

For More Information

For more information on PFAS, including the health effects of PFAS, PFAS in drinking water, water testing and treatment, and other PFAS activities in Ohio, visit the Ohio PFAS webpage at pfas.ohio.gov.

For more information on PFAS and your health, contact the ODH Health Assessment Section at BEH@odh.ohio.gov or at (614) 728-9452.

Always talk with your doctor or primary care provider if you are concerned about your health or have medical questions.

PFAS Drinking Water Sample Collection Services

The consultants and labs listed below will collect PFAS drinking water samples from your home and ship them to a certified lab for analysis

NAME	PHONE #	COLLECTION COSTS	SHIPPING & ANALYSIS COST
Alloway, Marion 1776 Marion-Waldo Road Marion, OH 43302	(740) 389-5991 Or (800) 873-2835	\$75 - \$150 flat rate OR \$70/hour travel time	\$350
Biosolutions, LLC 10180 Queens Way Suite 6 Chagrin Falls, OH 44023	(440) 708-2999	Contact for pricing	Contact for pricing
Bennett & Williams Environmental Consultants, Inc. 98 County Line Rd. West Suite C Westerville, Ohio 43082	(614) 361-0153	Contact for pricing	\$350
Fairway Laboratories, Inc 246 Main Street Suite A Byesville, OH 43723	(740) 630-8040	\$75/ hour travel time	\$425

Mahoning County Board of Health 50 Westchester Drive Youngstown, OH 44515	(330) 270-2855	Contact for pricing	Contact for pricing
The Mannik & Smith Group, Inc 1800 Indian Wood Circle Maumee, OH 43537	(419) 891-2222 Michael Momenee, CP at Extension 2086	Contact for pricing	Contact for pricing
Summit Environmental Technologies, Inc 3310 Win Street Cuyahoga Falls, OH 44223	(330) 253-8211	\$250 flat rate (must be within 1 hour of lab)	\$450

Certified Labs that will deal directly with an individual resident for drinking water testing for PFAS by US EPA Method 537.1

LAB	CONTACT #	COSTS	PROCEDURE
Con-Test Environmental Lab 39 Spruce St. East Longmeadow, MA 01028	(413) 525-2332 x45	\$250 + return shipping (must ship overnight)	<ul style="list-style-type: none"> • Customer contacts lab • Lab ships kit (with instructions) • Customer sends sample to lab, overnight shipping
Weck Laboratories Inc 14859 Clark Ave. City of Industry, CA 91745	(626) 336-2139 x116	\$371 + return shipping	<ul style="list-style-type: none"> • Customer contacts lab • Lab ships kit (with instructions) • Customer follows instructions to return sample to lab
Wisconsin State Laboratory of Hygiene 2601 Agriculture Dr. Madison, WI 53718	(608) 224-6202 Contact: Erin Mani: 608-224-6269	\$325 + return shipping (must overnight ship)	<ul style="list-style-type: none"> • Customer contacts lab • Lab ships kit (includes instructions and cooler) • Customer sends sample to lab, overnight shipping
Eurofins Eaton Analytical, LLC 110 S Hill St. South Bend, IN 46617	(574) 233-4777	Contact Lab Directly	Contact Lab Directly
Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762	(916) 673-1520	Contact Lab Directly	Contract Lab Directly