



In-Home Water Filtration Options for PFCs in Household Drinking Water

Some residents have asked about the use of in-home drinking water filtration units for reducing the amount of perfluorooctanoic acid (PFOA) or other perfluorinated chemicals (PFCs) in drinking water. The New Hampshire Department of Environmental Services (NHDES) works to ensure that alternative drinking water or water treatment is provided to homeowners when a release of contaminants has caused drinking water to be contaminated above applicable health standards or health advisory levels. Many homeowners that have PFCs in their drinking water at levels below such standards or advisory levels, however, have expressed an interest in treating their drinking water.

Water filtration units that use **granular activated carbon (GAC, also called charcoal filters)** or **reverse osmosis (RO)** can both be effective in removing PFCs. Generally speaking, RO is more appropriate for treating water at a single location such as the kitchen sink, while GAC is more appropriate when treating all of the water used in the home. GAC, however, does not remove other contaminants commonly found in well water in New Hampshire. Please read on for a better understanding of what you should consider when evaluating your options.

Unless you obtain your water from a community water system, your water is likely to contain other contaminants such as arsenic, uranium, radon, manganese, nitrate and bacteria that present health risks and that are naturally occurring or originate from nearby land uses. It is important for all private well users to test for these contaminants using an accredited laboratory and to ensure that the water treatment technology selected is effective at removing any contaminants that are present at elevated levels. A standard water quality test is also important to complete before selecting and installing a water treatment system to ensure a water system will work properly. For more information about the health concerns associated with common contaminants and technical assistance about removing them from your drinking water, go to <http://xml2.des.state.nh.us/DWITool/>. A reputable installer should be used to ensure proper selection, design, installation, operation, and maintenance of any water filter system.

Treatment of Drinking Water at One or Two Locations in the Home (“Point-of-Use” (POU) Systems)

With the exception of radon, the primary concern for exposure to common contaminants and PFCs in your water supply is associated with drinking or preparing food with the water. Exposing skin to water containing part-per-trillion levels of PFCs is not considered a significant health threat. If water used for drinking and cooking can be obtained from a dedicated location in the home such as the kitchen sink and/or refrigerator dispenser, then a “*point-of-use*” (POU) water treatment system can be installed. An RO filtration unit is the most effective technology in removing the largest number of contaminants (e.g., PFCs, arsenic, uranium and nitrate) that may be in your water supply and generally consists of multiple filters including a sediment filter, carbon filters, and RO membrane filters. However, an RO filtration system typically wastes about two to four gallons of water for every one gallon of treated water produced. For this reason, RO filtration should only be used on a POU basis and not to treat all of the water used in the home. RO POU filters are small and can be located in a cabinet, closet or basement.

A GAC POU system can also be used to remove or reduce PFCs concentrations in drinking water. However, GAC systems do not remove arsenic, uranium, nitrate, manganese or bacteria from water. Additionally, there are many sizes and types of carbon filters utilized for drinking water, and most of these were designed to address issues such as taste and odor and not for PFCs treatment. Almost all GAC filters will reduce PFCs levels in water and the effectiveness of the reduction will depend on how often the filters are changed out, the size of the filter, and other water quality considerations.

Some water treatment companies have experience in treating for PFCs and likely can provide recommendations for treatment to reduce PFCs in water to non-detect levels. The State of Minnesota studied the effectiveness of several RO and GAC POU systems and their findings are published at <http://www.health.state.mn.us/divs/eh/water/factsheet/com/pou.html>.

A number of water pitcher, water faucet and refrigerator-based carbon filters are used in homes because they came with an appliance or water fixture, or a homeowner added these components to improve the taste and odor of the water. These water filters are not certified by manufacturers to remove PFCs from drinking water. Studies have shown these types of filters typically remove approximately 30%-70% of the PFCs in water. The effectiveness of a filter in removing PFCs depends on the input concentration, age of the filter, size of the filter, flow rate and other raw water quality factors.

Treatment of Drinking Water for the Entire Home (“Point-of Entry” (POE) Systems)

Treatment of all of the water entering the home can be best accomplished by a carbon-based POE system. Particulate filters alone, or particulate filters with some amount of carbon to improve taste and odor issues, are not effective at removing PFCs from water. Treatment systems proven to be effective at removing PFCs to non-detectable levels in New Hampshire and other New England states typically have consisted of the following components connected in series:

- 1) Five-micron particulate filter for pre-filtering;
- 2) Two GAC treatment vessels (two cubic feet each) in series with a test port installed after the lead treatment unit (the exact size and number of carbon vessels required depends on flow rate and flow volume associated with the home);
- 3) Five-micron particulate filter for post-filtering;
- 4) Totalizer meter;
- 5) Ultra-violet treatment system and associated controllers if untreated water from the well exhibits bacteria contamination; and
- 6) Connection to the household plumbing.

The water treatment system described above is not generally sold as a single off-the-shelf product. Rather, professionals specializing in water treatment and plumbing of these systems specifically design, obtain the components for, and construct the water system.

A POE GAC treatment system does not remove other contaminants that could be in well water, such as arsenic, uranium, bacteria and nitrate. Additionally, it is important to assess whether water from your well contains elevated concentrations of radon before installing a GAC POE system because GAC removes and concentrates radon and could generate an in-home radiation hazard. GAC filters that have absorbed high amounts of radon can also become a regulated radioactive waste material and be difficult and expensive to dispose of. If well water contains high levels of radon, additional treatment processes should be used to remove radon from the water prior to treating the water with GAC.

Operation and Maintenance of Water Treatment Systems

Water treatment systems require routine operation and maintenance. Prior to installing any treatment system, it is important that the cost of testing the treatment system and maintaining and replacing components of the system to keep it in proper operating order be factored into the homeowner's assessment of the best treatment option for their particular circumstance. Even if the filter media is effectively removing contaminants from the well water, filters and associated media require periodic replacement for sanitary reasons. Water treatment professionals and the manufacturers of the applicable components of the water treatment system should be consulted to determine the maintenance requirements.

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