ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

DWGB-3-25 2020

Per- and Polyfluoroalkyl Substances (PFAS) in New Hampshire Well Water

INTRODUCTION AND OCCURRENCE

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic or man-made chemicals that are increasingly being found in our environment. PFAS do not break down easily and can move through soil, get into groundwater, and be carried through air. Because they are stable chemicals and move so easily in the environment, PFAS have been found far away from where they were made or used.

PFAS have been used for decades to manufacture household and commercial products that resist heat, oil, stains, grease and water. These chemicals have been used in many consumer products, including non-stick cookware, stain-resistant furniture and carpets, waterproof clothing, microwave popcorn bags, fast food wrappers, pizza boxes, and personal care products They have also been used in certain firefighting foams and various industrial processes.

Certain PFAS chemicals are no longer manufactured in the United States as a result of phase-out programs, including the EPA PFOA Stewardship Program in which eight major chemical manufacturers agreed to eliminate the use of perfluorooctanoic acid (PFOA) and PFOA-related chemicals in their products and as emissions to all media from their facilities. Although PFOA and perfluorooctane sulfonic acid (PFOS) are no longer manufactured in the United States, they are still produced and used internationally and can be imported into the United States in consumer goods such as carpet, leather and apparel, textiles, paper and packaging, coatings, rubber and plastics.

HEALTH EFFECTS

Studies have shown that chronic or repeated ingestion of water with certain PFAS over a person's lifetime may be associated with increased cholesterol and liver enzyme levels, as well as disorders of the cardiovascular, immunological, developmental and reproductive systems. Some scientific evidence suggests that certain PFAS, such as PFOA, may increase the risk of kidney and testicular cancer. According to the CDC's Agency for Toxic Substances and Disease Registry (ATSDR), skin contact with PFAS in well water is not a major concern for exposure in most residential situations. This means washing and bathing are not expected to pose a known risk to human health. Additional information on health effects is available in the 2019 NHDES Technical Report, as well as from the Agency for Toxic Substances and Disease Registry.

HEALTH STANDARDS

State law enacted in 2018 directed the New Hampshire Department of Environmental Services (NHDES), in consultation with the New Hampshire Department of Health and Human Services (DHHS), to set drinking water standards/maximum contaminant levels (MCLs) that are protective of human health for PFOA, PFOS, perfluorohexane sulfonic acid (PFHxS) and perfluorononanoic acid (PFNA). These four compounds were selected

because they have the greatest number of scientifically peer-reviewed studies and are found in New Hampshire. In July 2020, New Hampshire House Bill 1264 was signed into law establishing the following MCLs:

Per- and polyfluoroalkyl substances (PFAS)	Maximum Contaminant Level nanograms/liter (parts per trillion or ppt)
Perfluorooctanoic acid (PFOA)	12
Perfluorooctane sulfonic acid (PFOS)	15
Perfluorohexane sulfonic acid (PFHxS)	18
Perfluorononanoic acid (PFNA)	11

TESTING

NHDES recommends that a residential well be tested for PFAS if it has not been tested previously and that prospective homebuyers test the water in a home with a residential well before purchase. Residential well users can obtain water sample bottles by contacting an accredited laboratory from the list provided on the NH PFAS Investigation website. NHDES recommends testing for additional PFAS analytes not listed above to fully assess the potential for contamination impacting a water source.

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 residential well users to test for these contaminants using a standard water quality test before selecting and installing a water treatment system to ensure the treatment system will work properly. Obtain water sample bottles by contacting an accredited laboratory from the list provided on the NHDES website.

TREATMENT

After receiving the laboratory's report of your water test results, visit NHDES' Be Well Informed website for an interpretation of your test results and recommendations regarding which of the following water treatment options might be appropriate in light of your test results.

Point-of-Use (POU) vs. Whole-House – For most wells, POU treatment is recommended as the most cost-effective and simplest solution since PFAS have a low volatility and there is minimal concern for skin contact through contaminated residential well water at the current MCLs. Whole-house treatment is only necessary if some members of the household (such as young children) are likely to drink water from taps other than the tap where treatment is installed, or for pretreatment of other water quality parameters including iron, manganese, hardness, taste and odor, or radon.

POU Treatment

When POU treatment is used, all water for cooking, drinking and ice-making should be obtained from this tap.

a) **POU Reverse Osmosis filtration** retains the larger dissolved molecules by applying pressure on one side of a selective membrane, forcing purified water to the other side. The "reject" water is directed to the septic system or a drywell, while filtered water is stored in a small pressure tank and dispensed through a dedicated tap. Reverse osmosis is generally used only at the POU faucet due to the high water waste (3-4 gallons of water for every one gallon treated). A major benefit of this technology is that it reduces the largest number of contaminants (e.g., PFAS, arsenic, uranium and nitrate).

b) POU Granular Activated Carbon (GAC) can also be used to remove or reduce certain PFAS 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 PFAS treatment. Almost all GAC filters will reduce PFAS 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.

c) Filter Pitchers– 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 PFAS from drinking water. Studies have shown these types of filters typically remove approximately 30%-70% of the PFAS in water.

Whole-House Treatment

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

- Five-micron particulate filter for pre-filtering.
- 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).
- Five-micron particulate filter for post-filtering.
- Totalizer meter.
- Ultra-violet treatment system and associated controllers if untreated water from the well exhibits bacteria contamination.
- 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 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 POE GAC 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.

PERIODIC MAINTENANCE AND TESTING

The continued effectiveness of any treatment process should be monitored by periodic testing and filter 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. NHDES recommends quarterly testing for the first year of treatment, and semi-annually after that depending on results.

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.

FOR MORE INFORMATION

Contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov, or visit us at des.nh.gov. You may also input your water test results into the NHDES Be Well Informed water treatment application to interpret your results and identify appropriate treatment options. Additional resources and information can be found on the web:

- NHDES PFAS Investigation
- NH DHHS Poly- and Per-fluoroalkyl Substances (PFAS or PFCs)
- U.S. EPA Per- and Polyfluoroalkyl Substances (PFAS)
- ATSDR PFAS and Your Health
- U.S. Centers for Disease Control and Prevention, Per- and Polyfluorinated Substances (PFAS) Factsheet
- National Sanitation Foundation (NSF), NSF's certification listings

Or by contacting staff at the NHDES Environmental Health Program at (603) 271-6802.

Note: This fact sheet is accurate as of November 2020. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.