

PFOA & PFOS Drinking Water Health Advisories

In Home Water Filtration Options for PFCs (PFASs) in Household Drinking Water

Filtration cannot eliminate all PFASs, however it is better than no filtration. Test your water to tailor your filter to the specific contaminant(s).

Per- and Polyfluoroalkyl Substances (PFASs) are a class of highly persistent, man-made compounds that are showing up in drinking water across the US, including the Hyannis water system and private wells near Joint Base Cape Cod.

The **STEEP (Sources, Transport, Exposure and Effects of PFASs) Superfund Research Center** is a five-year project that will study how PFASs move through the environment, how people can be exposed through drinking water, and how these compounds can affect our health.

Some of STEEP's activities will be based on Cape Cod, including testing private wells for PFASs, studying the movement of PFASs in groundwater from firefighting foams used at Joint Base Cape Cod, field testing new methods for detecting PFASs in surface waters, and engaging with residents and officials to share STEEP research findings and address local concerns. Other STEEP research projects will include health studies in children in the Faroe Islands, laboratory studies on toxicity in animals, and studies of the bioaccumulation and chemical properties of PFASs. The project is led by Rainer Lohmann, an oceanographer at URI, and co-led by Philippe Grandjean, an environmental epidemiologist at Harvard. Other team members include: Geoffrey Bothun, Bongsup Cho, Alyson McCann, Nicole Rohr, Angela Slitt, and Judith Swift from URI; Elsie Sunderland from Harvard; and Laurel Schaider and Cheryl Osimo from Silent Spring Institute.

Local project partners include the Mass. Breast Cancer Coalition, GreenCAPE, and the Sierra Club Cape and the Islands Group.

This project is funded by the National Institute of Environmental Health Sciences.

Schaider, L. **Fluorinated Chemicals in Consumer Products and Drinking Water: Health Concerns and Tips to Reduce Your Exposure.** Massachusetts Breast Cancer Coalition. February 25, 2016. [Webinar Recording](#)

Schaider, L. **Septic systems as sources of pharmaceuticals, fluorinated chemicals, and other emerging contaminants in private wells on Cape Cod, Massachusetts.** CDC Private Well Community of Practice Webinar. March 16, 2016. [Webinar Recording](#)

Perfluorinated compounds (aka PFCs and PFASs) are a family of commonly used synthetic compounds with many applications in commercial products. Some PFASs remain persistent within the human body due, in part, to enterohepatic recirculation and renal tubular reabsorption. Due to unique chemical properties, selected PFASs have been used to make commercial products that are resistant to both water and oil, are stain resistant, and can also withstand the extremes of temperature, pH, and oxidizing conditions. Human exposure in

domestic and commercial settings has occurred as a result of processes such as inhalation of contaminated air, ingestion of tainted dust and foodstuffs, and dermal absorption in treated clothing. With inherent chemical stability and slow elimination from the human body, accrual of these persistent compounds continues in the population at large. In addition, spills of PFASs have occurred where individuals have been exposed to elevated levels of these agents through avenues such as the water supply. Furthermore, high levels of PFAS exposures have been reported in drinking water sources located near plants manufacturing PFASs.

Relatively high levels of PFASs have also been found in the Greenlandic Inuit and other circumpolar populations who consume large quantities of fish and marine mammals contaminated with PFASs. In the general western population, it is estimated that diet provides most (~91% Perfluorooctane sulfonate (PFOS); ~99% Perfluorooctanoic acid (PFOA)) of the total PFAS intake. In some groups, however, drinking water as well as indoor air and house dust can also provide significant PFAS exposure. Human studies have also reported that PFASs can cross the placenta and are present in breast milk. One study reported significant declines in serum PFOS in breastfeeding mothers, presumably due to vertical transmission of some PFASs into the infant via breast milk.

Recent research has uncovered assorted health concerns related to exposure and accrual of PFASs, including issues related to gestational and prenatal contamination. In addition, animal and human studies have now linked PFAS exposure with developmental toxicity, neurotoxicity, hepatotoxicity, carcinogenicity, metabolic dysregulation, immunotoxicity, and endocrine disruption. One study of 587 Faroe Islands children vaccinated with diphtheria and tetanus toxoids reported that higher serum levels of PFOS and PFOA were associated with significantly lower levels of tetanus and diphtheria antibody concentrations at 5 or 7 years.

Stephen J. Genuis, Luke Curtis, and Detlef Birkholz, "Gastrointestinal Elimination of Perfluorinated Compounds Using Cholestyramine and *Chlorella pyrenoidosa*," *ISRN Toxicology*, vol. 2013, Article ID 657849, 8 pages, 2013. doi:10.1155/2013/657849_CCMmodified

OVERVIEW of PERFLUORINATED COMPOUNDS (aka PFC, PFAS or PFOS/PFOA, C8)

[Time Course of Important Developments Regarding PFAS and Health Risks \(2015\)](#)

[Detection of Poly- and Perfluoroalkyl Substances \(PFASs\) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants. \(10/11/2016\)](#)

[Study identifies sources of drinking water contamination for millions of Americans](#)

[In These Times - Fire Departments, Airports and Military Bases May Be More Toxic to Workers Than You Think \(8/11/2016\)](#)

[WV Public Broadcasting - Studies Highlight Toxic Chemicals in Drinking Water \(8/9/2016\)](#)

[EWG - New Studies Trace PFC Pollution from Sources to the Next Generation \(8/9/2016\)](#)

[\(EPA\) Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate \(5/25/2016\) Federal Register Notice](#)

[Drinking Water Health Advisories for PFOA and PFOS](#)

[Serum Vaccine Antibody Concentrations in Children Exposed to Perfluorinated Compounds \(1/25/2012\)](#)

[EHN-Perfluorinated chemicals stay in people for years not days.\(5/22/2009\)](#)

[Poisoned Legacy: The C8 Science Panel \(5/1/2015\)](#)

[Comprehensive Overview of Perfluorinated Chemicals](#) (a collaborative work of the [Boston University Superfund Research Program](#) and [Toxics Action Center](#))

RELATED NEWS ARTICLES on the CONTAMINATION OF HYANNIS PUBLIC WATER SUPPLY WELLS

[**CAPE COD'S BIG DRINKING WATER PROBLEM \(8/2/2016\)**](#)

[**\\$6.5M sought to treat Hyannis water contaminants \(3/1/2017\)**](#)

[**Barnstable County files suit against firefighting foam companies \(1/13/2017\)**](#)

[**Barnstable sues makers of firefighting foams \(11/22/2016\)**](#)

[**Barnstable sues county for \\$2M over contamination concerns \(7/13/2016\)**](#)

[**Water restrictions in effect for Hyannis \(6/24/2016\)**](#)

[**Barnstable: County Must Shut Down Fire Training Academy \(1/23/2016\)**](#)

While the greatest threat from PFASs is from manufacturing or military and firefighting facilities, there are many widely sold products containing them as well. These chemicals are notoriously persistent in the environment and the human body including breast milk, and some have been linked to serious health effects.

[**Environmental Working Group Guide to Perfluorinated Chemicals**](#)

The abbreviations PFC and PFAS refer to the same chemical group. This brochure discusses the ubiquitous sources of these which can be eliminated in your household. However there are so many sources outside the home, its best to become familiar with this list and avoid being exposed to these products.

[**Fast Food Packaging Contains Potentially Harmful Chemicals**](#)

[**High Levels of Contaminant Found in Osprey Eggs: A stain repellent may affect hatching and the hunting ability of birds in Casco Bay, a scientist says.**](#)



The Teflon Problem: Why More Action is Needed



Source: ntp.niehs.nih.gov

Highly fluorinated chemicals (PFCs) have been detected in the blood of more than 95% of Americans. How can this have happened? Facilities where they are manufactured for use in consumer products and their use in fire-fighting training have contaminated drinking water across the United States. Some manufacture and use of PFCs have been discontinued. Although short-chain versions have been substituted and advertised as safe, they are not proving to be safe alternatives.

“Most short-chain alternatives do not break down in nature. Like their long-chain cousins, they will be with us forever. Short-chain fluorinated alternatives are even more difficult to clean up from the environment than the long-chains. Activated carbon filtration, commonly used for removing long-chain compounds from water, is much less effective at removing short-chains. Studies show that highly fluorinated chemicals can move from contaminated water into food crops such as lettuce and strawberries. Surprisingly, short-chain alternatives are found in such crops at higher levels than long-chains.” (Green Science Policy Institute).

Major scientists working on this problem signed this

letter <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-017-0321-6>

PFAs were in wide use before the health hazards were identified

According to the National Institute of Environmental Health Sciences “PFCs, perfluorinated chemicals, are a large group of manufactured compounds that are widely used to make everyday products more resistant to stains, grease, and water. For example, PFCs may be used to keep food from sticking to

cookware, to make sofas and carpets resistant to stains, to make clothes and mattresses more waterproof, and may also be used in some food packaging, as well as in some firefighting materials. Because they help reduce friction, they are also used in a variety of other industries, including aerospace, automotive, building and construction, and electronics. PFCs break down very slowly in the environment and are often characterized as persistent. There is widespread wildlife and human exposure to several PFCs, including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Both PFOA and PFOS are byproducts of other commercial products, meaning they are released into the environment when other products are made, used, or discarded.”

(https://www.niehs.nih.gov/health/materials/perflourinated_chemicals_508.pdf)

Individual states are leading the way in taking action because of the specific problems encountered across the nations. Several have set drinking water advisory levels lower than 70 parts per trillion (ppt) the level set by EPA. New Jersey's is 14 ppt.

Washington state just adopted HB 2658 banning the intentional use of “perfluoroalkyl and polyfluoroalkyl substances” (PFAS) in food packaging made from plant fibers

Here is a list of legislation proposed in other states:

<http://www.saferstates.com/toxic-chemicals/perfluorinated-chemicals/>

More websites with helpful information

“The Teflon Toxin: Dupont and the Chemistry of Deception” -

<https://theintercept.com/2015/08/11/dupont-chemistry-deception/>

Silent Spring Institute <https://silentspring.org/research-update/fast-food-packaging-contains-potentially-harmful-chemicals>

Fluorinated Chemicals in Food Packaging <http://pubs.acs.org/doi/abs/10.1021/acs.estlett.6b00435>

Scientists call for action: <http://greensciencepolicy.org/drinking-water-of-millions-contaminated-by-fluorinated-chemicals-scientists-call-for-action/>

Green Science Policy “Myths vs Facts” - <http://greensciencepolicy.org/wp-content/uploads/2017/04/Fluorinated-Alternatives-Myths-vs.-Facts.pdf>

More Green Science Policy Institute information: <http://greensciencepolicy.org/highly-fluorinated-chemicals/>

EPA What EPA is Doing: <https://www.epa.gov/pfas/and-polyfluoroalkyl-substances-pfass-what-epa-doing#tab-1>

EPA Background and Resources: [https://clu-in.org/contaminantfocus/default.focus/sec/Per-and_Polyfluoroalkyl_Substances_\(PFASs\)/cat/Overview/](https://clu-in.org/contaminantfocus/default.focus/sec/Per-and_Polyfluoroalkyl_Substances_(PFASs)/cat/Overview/)

Health Advisories for PFAs: <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos>

Bioaccumulation of PFAs in food

crops https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=307369

Department of Defense <https://serdp-estcp.org/News-and-Events/Blog/New-Projects-Addressing-Issues-Associated-with-Per-and-Polyfluoroalkyl-Substances-PFASs>

PFASs and Pregnancy

What are PFASs? Per- and poly-fluoroalkyl Substances (PFASs), previously known as perfluorinated chemicals or PFCs, are a family of man-made chemicals that have been used since the 1950s in a wide variety of consumer products including carpets, clothing, cookware, food packaging, and aqueous fire fighting foam because of their resistance to water, grease, and staining. Unfortunately, these properties also cause them to be highly toxic, persistent in the environment, and bioaccumulating.

How can PFASs affect pregnancy? Research is ongoing. Results thus far have shown associations between maternal serum PFAS concentrations and:

Maternal	Child
<ul style="list-style-type: none">• Pregnancy Induced Hypertension• Preeclampsia• Lipid metabolism• Glucose Tolerance	(potential exposure through umbilical cord blood) <ul style="list-style-type: none">• Lower Birth Weight• Immunotoxicity

Should I breastfeed? Newborns and babies can be exposed to PFASs through breast milk or formula made with PFAS contaminated water. While research continues, at this time it is still believed that the benefits of breastfeeding outweigh the risks from PFASs being transferred through breast milk. Discuss any concerns with your doctor.

If PFASs have been detected in your drinking water:

- Boiling it will not remove these chemicals. It will concentrate them.
- You can reduce your risk of exposure to these compounds by using a water filtration method certified to remove these contaminants (reverse osmosis or activated carbon), or purchasing water that has been tested to be free of these chemicals. The Environmental Working Group researches both bottled water and water filters. Their reviews are available at www.ewg.org.

For more information:

Physician fact sheet from Agency for Toxic Substances and Disease

Registry:

https://www.atsdr.cdc.gov/pfc/docs/pfas_clinician_fact_sheet_508.pdf

The National Toxicology Program Monograph on Immunotoxicity:

https://ntp.niehs.nih.gov/ntp/ohat/pfoa_pfos/pfoa_pfosmonograph_508.pdf

Publications from the C8 health study: <http://www.c8sciencepanel.org/publications.html>

References: (copies available here: https://drive.google.com/open?id=1JSs3aUReb-gf_C0I_OzdZ8Oz6lo-H4_7)

- Darrow, L. A., Stein, C. R. & Steenland, K. Serum Perfluorooctanoic Acid and Perfluorooctane Sulfonate