Calvert County Environmental Commission

PFAS (2022)

What does PFAS stand for?
"PFAS" stands for per- and polyfluoroalkyl substances, a group of over 4,000 human-made chemicals that include the following:

- PFOA: perfluorooctanoic acid ($C_8HF_{15}O_2$)
- PFOS: perfluorooctanoic sulfonate ($C_8HF_{17}O_3S$)
- PFNA: perfluorononanoic acid ($C_9HF_{17}O_2$)
- PFBA: perfluorobutanoic acid ($C_4HF_7O_2$)
- PFBS: perfluorobutanesulfonic acid ($C_4HF_9O_3S$)
- GenX chemicals: Hexafluoropropylene oxide (HFPO) dimer acid and its ammonium salt

PFAS molecules are very stable; they are hard to break down into other smaller molecules. PFAS chemicals are highly resistant to environmental stressors like heat, water and oils.

Why were PFAS chemicals developed and what are they used for?
They were developed essentially for the same reason that they pose a health hazard: they are extremely stable compounds that are difficult to break down in the environment. They have been used since the 1940s in a variety of industries and can be found in several consumer goods, including:

- Non-stick cookware (e.g., Teflon)
- Textiles
- Leather
- Stain-resistant carpets
- Polishes
- Paints
- Metal plating
- Manufacturing electronic and circuit boards
- Fire-retarding foam
- Aviation hydraulic fluid
- Photographic processing paper
- Food packaging
- Cleaning products
- Pesticides
- Surfactants
- Products designed to be waterproof or stain-resistant

Many industries in the United States phased out production of PFOA and PFOS in the early 2000's. However, PFAS is still used in many consumer goods.

Why are PFAS compounds a health hazard?
Many people have been exposed to PFAS compounds because of their use in common consumer goods, or by consuming PFAS-contaminated food or water. Certain PFAS can accumulate in the human body over a long period of time since they do not break down or pass through the body. There is evidence that exposure to PFAS may lead to adverse health effects in humans. Tests on laboratory animals showed adverse reproductive, developmental, liver, kidney, thyroid, and immunological effects.

According to the Agency for Toxic and Disease Registry (ATSDR), some studies in humans with PFAS exposure have shown that certain PFAS compounds may have the following effects:

- Affect growth, learning, and behavior of infants and older children;
- Lower a woman's chance of becoming pregnant;
- Interfere with the body's natural hormones;
- Increase cholesterol levels;
- Possible impacts to male fertility;
- Affect the immune system; or

- Increase the risk of cancer.

What are regulatory agencies doing to reduce PFAS contamination in our environment?
The US Environmental Protection Agency (EPA) has studied PFAS for many years and proposed that PFOA and PFOS compounds should be designated as hazardous substances under Superfund (also known as the Comprehensive Environmental Response, Compensation and Liability Act, or CERCLA). EPA believes that this designation will ultimately facilitate the cleanup of contaminated sites and reduce human exposure to these "forever" chemicals.

In addition, EPA is issuing interim updated health advisories for PFOA and PFOS in drinking water. These interim health advisories will be in place until EPA's forthcoming PFAS National Primary Drinking Water Regulation is in effect. The new Health Advisory Levels are as follows.

- Interim updated Health Advisory for PFOA = 0.004 parts per trillion (ppt)
- Interim updated Health Advisory for PFOS = 0.02 ppt
- Final Health Advisory for GenX chemicals = 10 ppt
  (GenX is a processing aid technology used to make high-performance fluoropolymers without the use of PFOA)
- Final Health Advisory for PFBS = 2,000 ppt

How can PFAS compounds be removed from the environment?
Testing has shown that many PFAS compounds can be removed to a significant extent from water using either carbon adsorption or ion exchange technologies.

Where can I find more detailed information about PFAS compounds and their effects?
The websites listed below provide additional information about PFAS.

MDE's PFAS Landing Page

EPA Actions to Address PFAS

EPA's Drinking Water Health Advisories for PFAS (June 2022)

Department of Defense Per- and Polyfluoroalkyl Substances

Naval Research Laboratory, Chesapeake Bay Detachment, Environmental Restoration Program

Chesapeake Beach, MD: Naval Research Laboratory - Chesapeake Bay Detachment Environmental Restoration Efforts

"Chesapeake Beach affirms drinking water is safe from PFAS" (somdnews.com, May 2021)

"Advancing per- and polyfluoroalkyl substances (PFAS) research: an overview of ATSDR and NCEH activities and recommendations" (J. of Exposure Sci. & Env'l Epidemiology, Apr. 2021)

PFAS — the forever chemicals » Miami Conservancy District (mcdwater.org)

Perfluoroalkyl Chemicals and Male Reproductive Health: Do PFOA and PFOS Increase Risk for Male Infertility? (*Int J Environ Res Public Health*, Apr. 2021)

EPA's Human Health Toxicity Assessments for GenX Chemicals