

PFAS: Basics & Concerns

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What Are PFAS?

PFAS stands for per- and polyfluoroalkyl substances, a large group of human-made chemicals used in industrial and consumer products since the 1940s. PFAS are valued because they resist heat, water, oil, and stains. PFAS include thousands of different compounds. Two of the most well-known are PFOS (perfluorooctanesulfonic acid) and, PFOA (perfluorooctanoic acid).

Where Are PFAS Found?

PFAS are found in many everyday materials and industrial applications. Some common consumer products that contain PFAS include nonstick cookware, stain-resistant carpets and furniture, and food packaging (grease-resistant wrappers, pizza boxes). PFAS are also commonly used in industrial processes such as metal plating and semiconductor production (the foundational components of modern electronics including smart phones and cars). PFAS have also been used in aqueous film-forming foam used in firefighting by airports, military bases, and fire training facilities. Many older PFAS have been phased out in the U.S., but newer PFAS replacements are still widely used.



Photo by Cooker King on Unsplash

Why Are PFAS a Concern?

PFAS are concerning because they are persistent (do not break down) in the environment, bioaccumulative (can build up in organisms), and are potentially toxic even at low concentrations.

PFAS exposure has been associated with reproductive and immune impacts in fish, birds, and mammals. Toxicological studies have shown that exposure to PFAS affects nearly every organ and the physiological system in both humans and animals. Some of the most documented effects include endocrine-system dysfunction, reproductive problems, cancer, metabolism, circulatory, kidney, and brain/nervous system problems.

How Do PFAS Enter the Environment?

PFAS contamination often occurs through industrial discharge into waterways, landfill leachate, wastewater treatment plant effluent, application of contaminated biosolids to farmland, and runoff/leaching from firefighting foam sites. PFAS can also be transported in the atmosphere. PFAS compounds have even been found in the Antarctic. PFAS contamination of groundwater and municipal water systems is one of the biggest public health concerns.

How Are People Exposed to PFAS?

The most common human exposure pathways include drinking water and food consumption. PFAS compounds can leach into groundwater and contaminate our drinking water. PFAS may enter the food supply through contaminated water used in irrigation, contaminated soil, packaging materials, and fish living in contaminated water. Soils acquire PFAS when contaminated municipal biosolids or irrigation water are applied to the soil, or in lesser amounts from atmospheric deposition. Plants can take up PFAS from the soil. Livestock can become contaminated when they drink contaminated water, or eat contaminated feed. PFAS can be found in eggs, milk, and meat. Human consumption of contaminated water or food moves the PFAS into the human food chain.

Why Are PFAS Called “Forever Chemicals”?

PFAS are often called “forever chemicals” because they are extremely stable and do not break down easily in the environment. The strong carbon–fluorine bond is one of the strongest chemical bonds known, making PFAS resistant to natural degradation processes. As a result, PFAS can persist for decades in soil and water, accumulate in living organisms, and remain in the human body for years.

Why PFAS Are Difficult to Manage

PFAS compounds are extremely persistent, and cleanup is difficult and expensive. Prevention and monitoring are critical for minimizing the impacts. However, because there are thousands of different PFAS compounds, monitoring and regulation remains challenging.

Resources

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