Environmental Health Information

Perfluorochemicals and Health

What are Perfluorochemicals?
Perfluorochemicals (PFCs) are a family of manmade chemicals that have been used for decades to make products that resist heat, oil, stains, grease and water. Common uses include nonstick cookware, stain-resistant carpets and fabrics, as components of fire-fighting foam, and other industrial applications.

Two of the chemicals in the PFC group are perfluorooctane sulfonate (PFOS; $C_8F_{17}SO_3$) and perfluorooctanoic acid (PFOA; $C_8F_{15}O_2H$). The chemical structures of PFOS and PFOA make them extremely resistant to breakdown in the environment.

The term “PFOA” is used to indicate not only perfluorooctanoic acid itself, but also its principal salts. The most commonly used PFOA salt is sometimes called "C8." The "C8" name came about because the compound includes a string of eight carbon atoms that are bonded to fluorine atoms.

Do PFCs occur naturally or are they man-made?
PFCs are man-made chemicals, and do not occur naturally. Minnesota is one of the few states in the country where these chemicals were made and used. The 3M Company made PFCs at its Cottage Grove facility from the late 1940’s until 2002. Wastes from the production process were placed in several local disposal sites.

Are PFCs found in everyday products used by people?
PFCs are used both as an ingredient in the manufacturing process as well as being part of some finished products. It is unclear if PFCs are released from commercial products during normal use.

What do we know about PFCs in the environment? …in people?
PFCs are very stable chemicals that do not change or break down in the environment. As a result, they may build up in soil, sediments, or in other places. There are a few studies indicating that PFCs easily enter groundwater and move long distances. Some experts suggest that PFCs in air can also travel long distances, deposit on soil and leach into groundwater.

PFCs have been found in the blood of several species of wildlife around the world; the highest concentrations are in bald eagles and mink in the midwestern U.S. Studies also show that PFOS bioconcentrates: older, larger fish have more PFOS in their bodies than younger, smaller fish.

Studies show that nearly all people have some PFCs in their blood, regardless of age. The way PFCs get into human blood is not known at this time. People could be exposed through food, water, use of commercial products or from the environment. PFCs stay in the human body for many years.

Are PFCs harmful?
The PFC family of chemicals is relatively new and there are not many studies of health effects in people. In animal studies, high concentrations of PFCs harm the liver and other organs. High concentrations of PFOA over a long period of time also cause cancer in animals. Developmental problems have been seen in the offspring of rats exposed to PFCs while pregnant.

Studies by 3M of workers exposed to PFOS and PFOA during manufacturing show no apparent impact on their health. There is no similar health study information for the general population.

What concentrations of PFCs in water are safe to drink?
The Minnesota Department of Health (MDH) is responsible for ensuring safe drinking water for all Minnesotans. One way MDH does this is through regular testing of public water supplies for contaminants. MDH also investigates situations where groundwater contaminants may affect private wells. Because PFCs are known to be in the environment here in Minnesota, the MDH developed drinking water criteria, known as Health Based Values (HBVs), for PFOA and PFOS. The HBV for PFOA is 7 parts per billion (ppb) and the HBV for PFOS is 1 ppb. These criteria are the levels that MDH currently considers safe for human consumption over a lifetime.

How can PFCs be removed from water?
Filters containing granular activated carbon (GAC) have been shown to be effective at removing higher concentrations of PFOS and PFOA from one water supply where they have been used and tested. It is unknown if other types of common water treatment systems, such as water softeners or reverse osmosis units, could remove PFCs. Boiling the water will not remove the PFCs.

Beware of "fly by night' water treatment vendors. If you are interested in installing a water treatment system of any sort, be sure to work with a reputable supplier and check references.

How can I reduce my other exposures to PFCs?
Other than removing them from water, there aren't any steps that consumers can take to reduce exposures to PFCs. This because the sources of PFCs in the environment and the pathways by which people are exposed are not known. The US Environmental Protection Agency (EPA) is engaged in a major effort with companies that have made or used PFCs to investigate the ways that PFCs enter the environment, and ultimately how people and animals are exposed to them.

For more information contact:
MDH/Site Assessment and Consultation: (651) 215-0916 or 1 (800) 657-3908, press "4"and leave a message.
To request this document in another format, call (651) 215-0700, TDD: (651) 215-0707 or, the Minnesota Relay Service at 1 (800) 627-3529

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