



Emerging Contaminants

Improved analytical methods have made it possible to analyze for contaminants that occur within our environment, and possibly our drinking water. Additional research is needed to understand potential health effects, along with the occurrence and cost of treatment to remove these contaminants from our drinking water.

UNREGULATED CONTAMINANT MONITORING RULE

The Unregulated Contaminant Monitoring Rule (UCMR) collects data for potential contaminants. The program monitors selected large and small water systems for as many as 30 contaminants in a five year cycle. UCMR 1 (2001-2005) monitored 35 contaminants, which included:

- Acetochlor
- Methyl tert-butyl ether (MTBE)
- Nitrobenzene
- Perchlorate
- Aeromonas
- AlachlorESA
- Lead-210
- Polonium-210
- Cyanobacteria
- Echoviruses
- Helicobacter pylori
- Microsporidia
- Adenoviruses

UCMR 2 (2008-2010) is monitoring contaminants in these categories:

- Insecticide and Insecticide Degradates
- Flame Retardants
- Explosives
- Acetanilide Herbicides and Herbicide Degradates
- Nitrosamines (often resulting from nitrate-reducing bacteria)

UCMR monitoring is based on availability of analytical methods and contaminant prioritization, with known and/or suspected health effects as top priority. Results from each cycle of the UCMR are used to develop the Candidate Contaminant Lists (CCLs) and future regulated contaminants.



PHARMACEUTICALS AND PERSONAL CARE PRODUCTS

Pharmaceuticals and Personal Care Products (PPCPs), including Endocrine Disruptors (EDs), typically refer to any product used by individuals for personal health or cosmetic reasons or used by agribusiness to enhance growth or health of livestock. PPCPs represent a diverse collection of thousands of chemical substances, including, but not limited to:

- Prescription drugs
- Estrogenic steroids
- Insect repellent
- Detergent metabolites
- Plasticizers
- Fire retardants
- Antibiotics
- Genotoxic drugs
- Insecticides
- Hormones
- Antibiotics
- Antimicrobials
- Fragrances
- Solvents
- Veterinary drugs
- Sunscreen products
- Antidepressants
- Caffeine
- Antiepileptic drugs
- Nonprescription drugs

The Minnesota Department of Health MDH has been active in identifying the occurrence of some of these PPCPs and partnered with the U.S. Geological Survey as part of a study, *Presence and Distribution of Organic Wastewater Compounds in Wastewater, Surface, Ground, and Drinking Waters, 2000-2002, Minnesota, Report 2004-5138*.

While research is being done to more fully determine potential health effects related to PPCPs, the best and most cost-effective way to ensure safe drinking water is to protect our drinking water at the source. The federal Office of National Drug Control Policy recommends not flushing prescription drugs down the toilet, unless the accompanying patient information specifically instructs it is safe to do so.



The Minnesota Pollution Control Agency also encourages citizens to dispose of unused pharmaceuticals by keeping the medication in its original container, modifying the contents to discourage consumption, sealing and concealing the package contents, and discarding the container in your garbage can. Communities are also implementing pharmaceutical take-back programs to limit the amount of pharmaceuticals disposed of through our wastewater systems.

PERFLUOROCHEMICALS

Perfluorochemicals (PFCs) are a family of man-made 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.

Some of the chemicals in the PFC group are perfluorooctane sulfonate (PFOS; $C_8F_{17}SO_3$), perfluorooctanoic acid (PFOA; $C_8F_{15}O_2H$), and perfluorobutanoic acid (PFBA; $C_4F_7O_2H$). The chemical structures of PFCs make them extremely resistant to breakdown in the environment. PFCs are manmade chemicals and do not occur naturally. Minnesota is one of the few states in the United States where these chemicals were made and used. The 3M Company made PFCs at its Cottage Grove facility beginning in the late 1950's. Wastes from the production process were placed in several local disposal sites. 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.

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

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. Some PFCs stay in the human body for many years.

The PFC family of chemicals is relatively new and is the focus of active scientific research. In laboratory animal studies, high concentrations of PFCs cause harmful changes in the liver and other organs. Developmental problems (e.g., delays in growth and maturation) have been seen in the offspring of rats and mice exposed to PFCs while pregnant. Both PFOA and PFOS in high concentrations over a long period of time also cause cancer in laboratory animals. PFBA is not suspected of causing cancer in animals.



MDH has developed drinking water criteria, known as Health Risk Limits (HRLs), for PFOA and PFOS. HRLs are criteria that MDH considers safe for human consumption over a lifetime. In August 2007, MDH enacted a rule with HRLs for PFOA and PFOS of 0.5 micrograms per liter ($\mu\text{g/L}$) and 0.3 $\mu\text{g/L}$, respectively. In February 2008, MDH issued a Health Based Value (HBV) for PFBA of 7 $\mu\text{g/L}$ based on studies conducted over the previous year. An HBV is similar to an HRL, but has not been formally enacted through rulemaking.

Due to limited toxicological research on the four remaining PFCs for which MDH's Public Health Laboratory currently tests, there isn't enough scientific information to develop HBVs. However, based on their chemical characteristics, we anticipate that research will show that these four PFCs are less toxic for people than PFOA and PFOS. Levels of these other PFCs, perfluoropentanoic acid (PFPeA), and perfluorohexanoic acid (PFHxA), perfluorobutane sulfonate (PFBS), and perfluorohexane sulfonate (PFHxS), have been very low in area groundwater samples.

Filters containing activated carbon or reverse osmosis units have been shown to be effective at removing PFCs from water supplies where they have been used and tested. Other types of common water treatment systems, such as water softeners, are not likely to remove PFCs. Boiling the water will not remove the PFCs.

The U. S. Environmental Protection Agency 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. In addition, the EPA has announced an initiative to phase out 95 percent of the uses of PFOA by 2010 and entirely by 2015. PFOA and PFOS production were eliminated by 3M in 2002.

Excerpts taken from MDH Website, dated March 2008.