Environmental Alert

PFOS and PFOA Pose a Unique Threat to Municipal Drinking Water

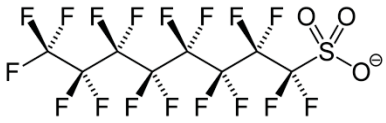
Many New Jersey municipalities are now facing an emerging contamination threat to their water supply systems. Two contaminants named perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are considered contaminants of emerging concern that pose a significant health risk to humans because they are readily absorbed by the body and can bioaccumulate in the food chain. Some studies link these chemicals to reproductive and developmental disorders as well as kidney and liver function impairments, ***even at very low concentrations.*** As a result, a number of health-based advisories have been issued by the EPA and many state governments. EPA's health advisory for PFOA and PFOS stands at a maximum drinking water concentration of 70 parts per trillion (ppt), while New Jersey is recommending maximum concentrations for drinking water of 14 ppt. ***These levels are among the lowest regulated concentrations of any chemical, and may cause municipalities to incur significant costs to test and treat their drinking water to make it safe for human consumption.***

The EPA collected more than 1,000 samples from 80 New Jersey Public Water Supplies (PWSs), and the results are quite shocking. Using low detection levels of <5 ng/L, ***PFOA was found in samples from approximately 60% of the New Jersey PWSs tested.*** Additionally, in a survey of large (>10,000 people) and smaller PWSs across the U.S., ***PFOA was detected more than five times more frequently in New Jersey's public water supply (10.3%) than in the rest of the U.S. (2.1%).***

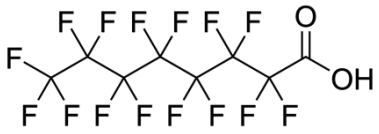
In addition, the New Jersey Department of Environmental Protection is proposing to add a related compound, perfluorononanoic acid (or PFNA), to the List of Hazardous Substances under its Spill Act regulations entitled Discharges of Petroleum and Other Hazardous Substances (N.J.A.C. 7:1E-1.1 et seq.). This addition would make discharges of PFNA to the environment subject to the strict lability cleanup provisions of the Spill Act.

Where are the sources of these chemicals?

Even though these chemicals seem to be far removed from New Jersey's local water sources, they are not. Although it is true that large amounts of PFOS and PFOA were released to the air, water, and soil in and around fluorochemical manufacturing facilities located in chemical producing states such West Virginia and Delaware, ***municipalities may have significant sources of both PFOA and PFOS right in their backyards.*** According to the EPA, PFOS and PFOA have been detected in a number of U.S. cities in surface water and sediments not only downstream of former fluorochemical production facilities, but also ***in wastewater treatment plant effluent, sewage sludge and landfill leachate.*** Perhaps even more significant for New Jersey municipalities is the fact that the environmental release of these chemicals may also occur from fire suppression foams and firefighting training facilities. ***Municipalities with airports face an even greater threat*** as fire-fighting foam is extensively used at airports, and fire training activities using such foams is commonplace.



PFOS chemical structure



PFOA chemical structure

Why are PFOA and PFOS such a problem?

In addition to having the potential for causing significant human health concerns, PFOA and PFOS are unique in the way they act in the environment. Both chemicals are chemically and biologically stable in the environment and resist typical environmental degradation processes such as biodegradation, photo-degradation, and hydrolysis; as a result, these chemicals are extremely persistent. PFOA and PFOS are also water-soluble and can migrate readily from soil to groundwater, where they can be transported long distances to drinking water supply wells and surface water supplies. PFOS and PFOA have very low volatility because of their chemistry, and are therefore ***extremely persistent in water and soil***. When released directly to the atmosphere, these chemicals can adsorb to particles and settle to the ground through wet or dry deposition. These chemicals have even been detected in the Arctic region and other remote areas, demonstrating that long-range transport has already occurred.

What products contain these chemicals?

In addition to fire suppression foams, ***PFOS and PFOA are used in many household and business products that municipalities use on a daily basis.*** They are surface-active agents and are used as a coating on surfaces that come into contact with humans such as furniture and carpeting. They are also used in textiles and leather products, metal plating, the photographic industry, photolithography, semi-conductors, paper and packaging, coating additives, cleaning products, and pesticides. Their firefighting application comes from their use to manufacture Aqueous Film Forming Foam (AFFF). PFOS-based AFFF is commonly used as the active ingredient in fire-fighting foam that is typically used to extinguish flammable liquid fires, such as fires involving cars, trucks, gasoline tankers, and airplanes. Notably, the 3M Company – the primary manufacturer of PFOS – completed a voluntary phase-out of PFOS production in 2008.

What can I do to protect my water supply?

Municipalities are faced with two treatment concerns regarding PFC compounds (i.e., PFOS, PFOA PFNA): (1) spills and discharges of the substances onto soils that seep into groundwater; and (2) contamination that is present in a community's drinking water supply. For drinking water supplies, ***activated carbon filters, nano-filtration and reverse osmosis units have been shown to remove PFCs from water.*** These systems may already be in place at a number of municipal water treatment plants. Other less conventional treatment technologies may also be available in future markets, including photochemical oxidation, thermally induced reduction, and ultrasound technologies. Some of these technologies generate residual/concentrated PFC wastes, which would require potentially costly incineration.

With regard to spills and discharges, the PFC compounds resist most conventional in situ treatment technologies such as direct oxidation. Factors such as ***(1) initial concentration of PFCs; (2) the background organic and metal concentration; (3) available degradation time; and (4) other site-specific conditions are the keys to selecting the appropriate remediation technology.*** Some studies suggest the use of a double-layer permeable reactive barrier system using various layers containing oxidants, quartz sands and enzymes may work for the in situ containment of PFC-contaminated soil and groundwater. Chemical oxidation, activated persulfate and permanganate technologies may also degrade PFOS and PFOA in water. Treatment studies and research are ongoing and may generate more practical and economically feasible technologies in the near future.

Many experts agree that the best thing to do to avoid PFOA and PFOS contamination is to remove the threat by keeping these chemicals out of the environment. Unfortunately, substantial concentrations of these chemicals have already been released to the environment, much of which has become a risk to drinking water supplies. Nevertheless, there are options for keeping drinking water systems safe through improved assessment techniques, water treatment technologies, and an informed public. An environmental consultant or attorney should be consulted to map out the best course of action for your town.

This newsletter is for information purposes only and does not represent legal or technical advice.

If you need a more detailed explanation of this topic or need assistance in interpreting how it may impact your site, the EJIF suggests that you contact the EJIF environmental consultants for further information.

Members of the Bergen, Morris, South Bergen, Suburban Essex, and NJUA JIFs please contact Richard Erickson of First Environment, Inc. at rerickson@firstenvironment.com or 973.334.0003.

Members of the Camden, Monmouth, Ocean, PMM, Suburban, Central, TRICO and BURCLO JIFs, please contact Chris Gulics of PS&S at cgulics@psands.com or 732.430.7012.