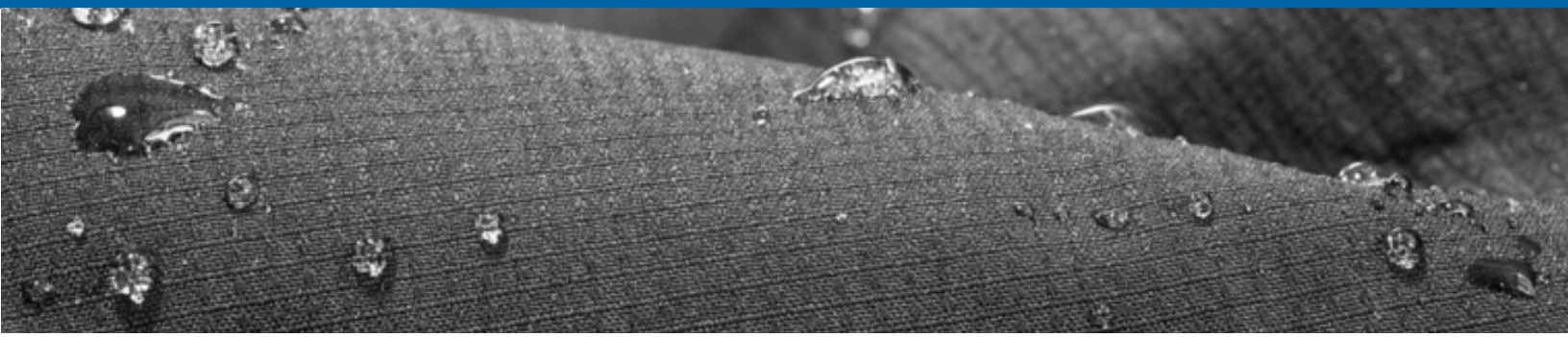
PFOA and PFOS



what are PFOA and PFOS?

PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonate) are perfluoroalkyl substances that were used in the manufacture of Teflon, breathable water-proof fabrics, carpet and textile coatings, treated food wrappers, wire coatings, aqueous fire-fighting foam (AFFF), and specialty dyes and paints. Both PFOA and PFOS are collectively referred to as "C8," because they are molecules with eight-carbon-chain chemicals bound to fluorine atoms.

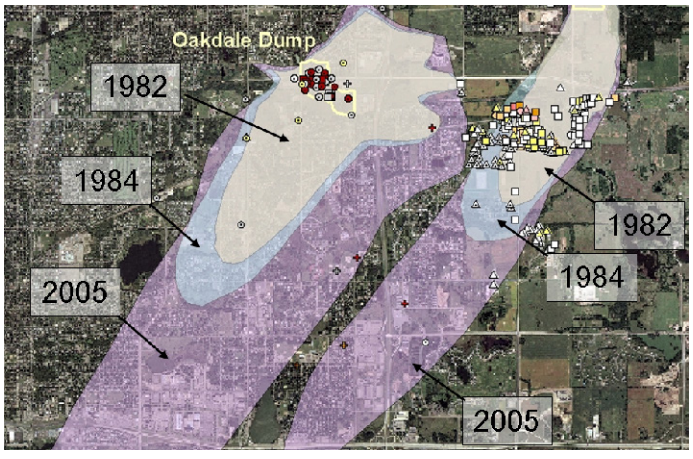
The fluorine-carbon bond is one of the strongest chemical bonds and gives products made from PFOA and PFOS the highly desirable properties of chemical, heat, and oil resistance; physical durability; and low electrical conductivity. Even though PFOA and PFOS were widely used in commercial and consumer products, they were made by a small handful of companies and are no longer produced.

PFOA and PFOS in water

PFOA and PFOS are unlike any other water contaminant. The same properties that make PFOA and PFOS durable and resistant also make them extremely persistent in the environment. PFOA and PFOS are unique because they are highly soluble in water, do not degrade or bio-transform, and do not precipitate or adsorb onto sediment. This means that even a very small amount of C8 can spread widely with groundwater flow and remain detectable for many years. Because of their diffuse nature, identifying a source can be difficult and in many cases, the source is non-point in nature. The U.S. Environmental Protection Agency has determined that PFOA and PFOS are suggestive of causing cancer in humans and, in May 2016, issued a health advisory limit (HAL) of 70 parts per trillion (ppt) for the combined level of PFOA and PFOS in drinking water. In Michigan, the Department of Health and Human Services is using 70 ppt (combined) as the PFOA/PFOS limit in drinking water. These levels are some of the lowest ever issued for a contaminant and represent a significant challenge, because PFOA and PFOS have been found to be present at very low levels in many settings.

making informed decisions requires reliable data

With parts per trillion level concentrations, data quality and data reliability are critical for project success. Barr has developed best practices for sample collection to reduce or eliminate water-sample-and-blank cross contamination. Due to our diligent field collection methodology, Barr has reduced and eliminated detectable concentrations of PFOA and PFOS in field blanks for more than 10 years. Barr has also worked with multiple laboratories to help them reduce or eliminate method blank cross contamination that may occur during the sample handling and analysis process. Consequently, clients can rely on the data collected by Barr to make well-informed decisions.



Barr's groundwater modeling results suggested that PFOA- and PFOS-contaminated groundwater from the former Oakdale Disposal site in Washington County may have migrated approximately 24,000 to 30,000 feet to the southwest.

municipal water supply evaluation

Treating a contaminated water supply can be a challenging process—municipalities want to know what options exist for either the removal of the contaminants or the replacement of the water supply. Barr has helped numerous municipalities evaluate water supplies that have become tainted with difficult-to-treat compounds such as PFCs and 1,4-dioxane. Our work has included evaluation of the existing treatment system, potential process changes or additions, and alternative water supply options—with a focus on developing practical solutions. When necessary, we have completed bench- and pilot-scale studies to confirm process removal efficiencies. Barr has provided design and construction oversight services to implement the solutions identified by these evaluations.

PFOA and PFOS fate-and-transport modeling

Barr is recognized as a worldwide expert in fate-and-transport modeling of PFOA and PFOS. In 2005, Barr developed solute-transport models for the Minnesota Pollution Control Agency and Minnesota Department of Health to evaluate the emerging PFOA and PFOS groundwater contamination in Washington County, Minnesota. Barr was instrumental in identifying a link between surface- and stormwater pathways and groundwater contamination, as well as predicting where C8 would subsequently be found in groundwater. We also assisted in evaluating alternative drinking water supplies, new municipal wells, carbon treatment units, and groundwater remediation at its former disposal area.

For a manufacturing facility in Europe, Barr helped identify one of the most important sources of PFOA groundwater contamination—air deposition and leaching to the water table. Barr developed PFOA retardation coefficients for saturated and unsaturated materials and developed sophisticated unsaturated-zone solute-transport models for input into groundwater fate-and-transport models. Barr's experts convinced the regulators that air deposition could be a much more important source than conventional spill sources.

In 2015, PFOA contamination was found near three manufacturing plants operated in New England, resulting in a large amount of public attention. Barr is serving as the client's technical expert on fate-and-transport of PFOA, guiding the investigations and negotiations with state and federal regulators and assisting in litigation support for several toxic tort cases. Our work includes PFOA air-dispersion modeling, unsaturated zone modeling, fate-and-transport modeling in groundwater, and remedial design.

Barr was also retained to track down the sources of PFOA and PFOS in contamination upstream of the City of Brainerd, Minnesota's wastewater treatment plant and in Lake Calhoun in Minneapolis. In both cases, Barr discovered that the source was a very small amount of PFOA and PFOS released from metal-plating facilities that use the compounds to minimize the volatilization of chromium-plating baths. In the case of Brainerd, Barr assisted with changes in the chemicals used at the metal-plating facility to bring the city into compliance with discharge limits.

Barr has also been involved in evaluating PFOA and PFOS migrating from municipal landfills and from airports and refineries where fire-fighting training has resulted in the discharge of AFFF onto the ground. The challenge of these situations is to characterize the actual source of the contamination and to differentiate this source from ambient background levels.

how can Barr help you?

Barr provides the weight of experience and expertise in negotiating with agencies on behalf of our clients, often by educating rather than advocating. We have saved our clients millions of dollars by applying our understanding of PFOA and PFOS fate-and-transport to limit liability, narrow data collection activities, and focus on long-term solutions.