

AECOM PFAS Capability Overview



AECOM has conducted PFAS investigations since 2001, tackling many of the world's most challenging PFAS sites, and actively innovating methods to identify and resolve PFAS for our clients.

Areas of PFAS Expertise

- Site Characterization
- Risk Assessment and Management
- Development of Treatment Technologies
- Regulatory Navigation/Negotiation
- Forensic Chemical Assessments
- Waste Management
- Destructive Technology Innovation



2022 Environmental Business Journal Award Winner - Industry Leadership: PFAS Innovation and Collaboration

- Performed voluntary PFAS evaluation of municipal wastewater influent, effluent, and biosolids with nationwide US participation, providing insight into the nature of the PFAS loading and potential sources for pretreatment mitigation strategies.
- Self-funded studies of PFAS uptake in plants pursuant to better understanding PFAS behavior in plants and soil.
- AECOM sampled PFAS-containing seeps along banks of a river to characterize microbial populations including Feamox indicators, which research suggests may degrade PFAS.

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) constitute a class of thousands of synthetic compounds sharing at least one moiety of carbon bonded to fluorine. Because of their surfactant properties, many PFAS are employed in industry, such as aerospace, energy, automotive, health care, packaging, electronics, and first-responder services. Certain fluorinated firefighting foams — commonly called Aqueous Film-Forming Foam (AFFF) — were developed in the 1960s and became the standard for responding to liquid pool fires, such as might occur from a plane crash or fuel release. Consequently, PFAS-containing AFFF may have been released during training or in case of emergency at fire training areas, hangars, fire stations, crash response sites, or oil refineries.

Why PFAS are an Environmental Concern

The fate and transport properties of some PFAS in the environment create challenges in managing this broad class of compounds, such as:

- Limited sorption to soil and sediments
- Highly water soluble, non-volatile and extremely mobile in water
- Exceptional stability and resistance to biological, chemical, and thermal degradation
- Persistent in the environment with very little attenuation
- Widely present in environmental media
- Bioaccumulative in plants, many animals, and humans

Toxicological data are generally limited with the exception of a handful of the most commonly encountered PFAS. The USEPA reports that perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals, USEPA suspects they are likely human carcinogens. For the few PFAS with reliable toxicological information, health effects include:

- Developmental delays
- Increased cholesterol levels
- Low infant birth weights
- Suppressed immune response
- Liver effects
- Thyroid effects

Increased Regulatory Attention

Concerns associated with PFAS prompted the USEPA to include six PFAS compounds on its Unregulated Contaminant Monitoring Rule – 3 List (UCMR3) beginning in 2013. UCMR3 resulted in the discovery of impacted drinking water supplies across the United States, with millions of Americans having one or more PFAS in their drinking water. In 2023, USEPA proposed a National Primary Drinking Water Regulation setting a Maximum Contaminant Level for PFOS and PFOA at 4 nanograms per liter (ng/L), and a Hazard Index of less than 1 for PFNA, PFHxS, PFBS, and Gen X. While USEPA finalizes an enforceable regulation, state environmental and health agencies are setting standards for drinking water, often lower than the health advisories, and often for additional compounds.



Learn more about our comprehensive PFAS management capabilities at www.aecom.com/pfas

Areas of Expertise

PFAS SITE CHARACTERIZATION. PFAS sampling requires careful consideration of field sampling materials to obtain samples free of ambient contamination and high-quality analytical data. AECOM developed internal training for PFAS sampling, and all field teams are required to complete this training before conducting PFAS sampling. The unique behavior of PFAS benefit from robust Conceptual Site Models, often employing AECOM's Predictive Integrated Stratigraphic Modeling (PRISM®), to understanding preferential flow paths.

AECOM has responded quickly to off-site releases where there are potential human exposures. In addition to residential or private drinking water sampling, we have implemented active solutions to mitigate human exposure including design, installation, operation, and maintenance of hundreds of off-site residential point of entry treatment water systems and public water supply treatment systems.

RISK ASSESSMENT AND MANAGEMENT. AECOM has performed critical reviews of research on PFAS toxicity, maintains a current collection of human health/ecotoxicological information, and tracks this literature to allow us to select toxicity values that are appropriate for the receptors for different types of habitats and exposure pathways. This allows risk assessments to be targeted to the site and to reduce unnecessary remediation needs and costs by avoiding the use of default values. Our risk assessors globally have performed precedent-setting human health and ecological PFAS-specific risk assessments which assist our clients in managing PFAS impacts using state-of-the science information.



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AECOM PFAS Capability Overview *(continued)*



DEVELOPMENT OF TREATMENT TECHNOLOGIES. PFAS remediation is challenging, with a limited number of commercially available effective technologies. As permanent, destructive technologies become commercially available, AECOM can design and build conventional PFAS separation treatment to immediately mitigate human exposure, such as using with granular activated carbon or ion exchange resin. Using our in-house Treatability Laboratory, AECOM performs Rapid, Small-Scale Column Testing (RSSCT). As part of our academic collaborations, we are testing novel sorbents that are so cutting edge, they are not yet commercially available. AECOM is currently conducting PFAS wastewater destructive treatment research on behalf of the U.S. Department of Defense and Australian Defence.

REGULATORY NAVIGATION/NEGOTIATION. AECOM has been actively involved in negotiating with regulators to ensure that pragmatic management measures are put in place. As the regulations continue to evolve, AECOM has the capabilities to address sites regulated by USEPA and State/Local regulators. AECOM brings its regulatory expertise in solving complex waste management thereby minimizing environmental liabilities. Through our industrial and government relationships, We also track regulatory developments for PFAS closely.

FORENSIC CHEMICAL ASSESSMENT. Leveraging data investigation tools, such as principal component analysis, and advanced digital platforms using artificial intelligence, we have developed our own unique methods for understanding PFAS releases, sources, precursor transformation timelines, and other diagnostic chemical fingerprinting for PFAS release areas. At some sites, many adjacent and overlapping PFAS sources may exist, and our forensic chemists can perform diagnostics to better understand the full site history and potential for risks.

WASTE MANAGEMENT. With the latest constraints to limit future liability, it has become increasingly difficult for our clients to manage PFAS-contaminated wastes. Our teams can help you select the most cost-effective current and weigh future solutions for waste disposal, evaluating landfilling or incineration for solid wastes, or separation technologies to reduce liquid waste volumes. Our research includes developing innovative technologies to separate and destroy PFAS wastes, focusing on novel separation technologies or developing total destruction methods through electrochemical oxidation, or enzymatic oxidative destruction. Waste solutions are continually evolving, and AECOM maintains a cutting edge team to understand the full range of available options.

Our Approach

AECOM was awarded our first PFAS project in 2001, and has since become a recognized industry leader on PFAS around the globe. We've established global and regional leaders who support programs with hundreds of sites, as well as those who work on complex sites within every jurisdiction in the US, in Canada, the UK, the EU, and Australia. AECOM's PFAS Technical Practice Group (TPG) tracks regulatory and treatment technology developments and meets monthly to maintain a practice on the leading edge of scientific, regulatory, and engineering developments. We participate in research forums such as SERDP/ESTCP, collaborative teams such as ITRC or the PFAS Experts Symposium, and we benefit from our academic partnerships including the University of Georgia and Northwestern University.

Key AECOM Attributes

- Conducted PFAS activities at over 400 sites in every state and 3 territories in the US, including assessments, soil and groundwater sampling, risk assessment, and treatment evaluation.
- Worldwide, multi-country experience in all aspects of PFAS investigation, risk assessment and remediation in consulting, research, and regulatory developments.
- Conducting the largest PFAS investigation ever performed; collecting >15,000 samples, investigating several entire counties, and collecting samples along an 80 mile segment of a major river.
- Designed, installed, operated, monitored and maintained full-scale PFAS groundwater remediation systems, hundreds of residential and dozens of commercial supply well PFAS treatment systems.
- Conducting innovative on-site soil and groundwater remediation bench and pilot scale testing in the US and Australia.

PFAS Contacts

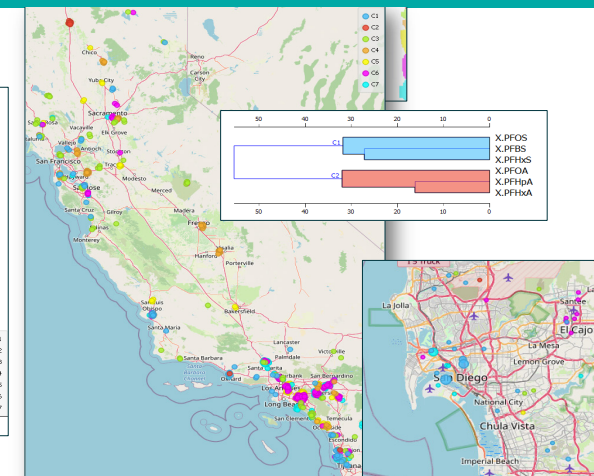
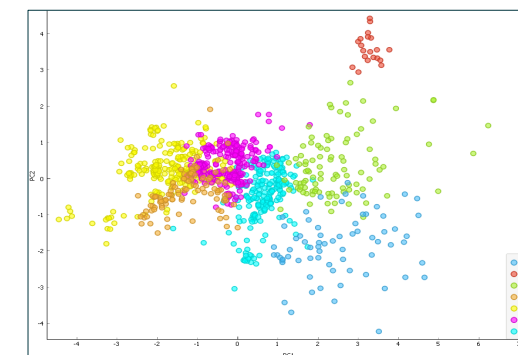
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Top 25%, (Total PFAS >= 81.4 ppt), n=1023



| components | variance | X.PFBS | X.PFHxA | X.PFHxS | X.PFOS | X.PFOA | X.PFHxA |
|------------|----------|-----------|----------|-----------|-----------|----------|------------|
| 1 PC1 | 0.575963 | -0.128389 | 0.410427 | -0.368253 | -0.597386 | 0.130932 | 0.552668 |
| 2 PC2 | 0.218006 | -0.462605 | 0.160205 | -0.551822 | 0.561067 | 0.368002 | -0.0748473 |