

AECOM PFAS Water Capabilities

Learn more about our PFAS experience and capabilities at www.aecom.com/pfas

AECOM Delivering a better world

AECOM has been conducting PFAS investigations since 2001, and has worked on many of the world's most significant PFAS problems. We are currently working on over 400 PFAS sites around the globe, including over 20 potable water treatment plants, a statewide wastewater assessment of the presence and fate of PFAS along with numerous leachate, stormwater and groundwater pump and treat facilities, >50 DoD and 15 R&D projects.



AECOM Differentiators

- **AECOM'S TECHNICAL PRACTICE NETWORK** keeps our staff connected globally on this important issue, sharing regulatory developments, success from developing treatment technologies, as well as best practices for sampling and other technical aspects of this emerging contaminant.
- **CONTINUOUS INNOVATION:** Conducting innovative on-site soil, sludge/biosolids, surface water, leachate, wastewater, and groundwater bench, rapid small scale column testing, and pilot scale testing on behalf of clients in Australia and the U.S. with familiarity in Ion Exchange, GAC and novel adsorbent processes.
- **TECHNICAL EXPERTISE:** Worldwide, multi-country experience in all aspects of PFAS investigation, risk assessment and treatment in consulting, research, and regulatory developments.
- **CROSS-MARKET EXPERIENCE:** AECOM is 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 large river. We have conducted PFAS activities at hundreds U.S. DoD facilities and are currently conducting PFAS PA/SIs, RI/FSs, Conceptual Site Models (CSMs), and R&D for DoD. We designed, installed, operated, monitored and maintained dozens of full scale PFAS groundwater treatment systems, hundreds of residential and over 20 potable (both surface water and groundwater sources) supply PFAS treatment systems, including the recent design and build of one of the largest Ion Exchange Facilities for PFAS in the US.

Representative Projects

INVESTIGATION AND TREATMENT OF PFOA IN ENVIRONMENTAL MEDIA AND DRINKING WATER AT FORMER MANUFACTURING

SITE Ohio, West Virginia. AECOM was contracted to manage a screening level Perfluorooctanoic Acid (PFOA) site-related environmental assessment program that included multi-media monitoring on and around a fluoropolymer manufacturing facility in West Virginia. AECOM's thorough environmental assessment of the site left the client well informed of the transport and migration pathways of PFOA in environmental media and potential exposure pathways. As part of the work, AECOM designed and integrated PFAS treatment systems into twelve public utility facilities, some of which have operated successfully for over a decade, significantly reducing human exposure to PFOA and other PFAS. In addition, over 150 point-of-entry PFAS treatment systems were also installed to protect private well owners.

STATEWIDE ASSESSMENT OF PFAS IN WASTEWATER SYSTEMS

Michigan. AECOM prepared an inventory of PFAS throughout the state of Michigan to understand the presence and fate of PFAS through the process. The PFAS sampling data provides a robust evaluation of potential PFAS impacts to 75 WWTPs of various sizes and process configurations and their fate at select biosolids land application sites throughout Michigan. The impact of treatment processes and mass balance was also presented for select WWTPs, including temporal variations. The main industrial sources identified during the study were also presented and evaluated to see the impact of source controls.

ASSISTING CLIENTS IN MEETING NEW STATE MCL Massachusetts.

AECOM is working with three utilities in Massachusetts to help them comply with new regulations for the sum of six PFAS < 20 ng/l. Our experience with treatability assessments to cost-effectively achieve this stringent limit extends in both surface water and groundwater supplies. At the 13MGD surface water facility where disinfection by-product (DBP) concerns were also present, AECOM recommended an enlarged deep bed GAC filtration system to treat for both PFAS and DBP precursors concurrently, saving millions of dollars relative to a tertiary PFAS process. At another location, IX resin, GAC and a novel adsorbent are being compared through treatability testing to provide the best treatment while integrating into the site constraints and potentially reuse existing pressure vessels.

New Destructive Treatment Technology

DE-FLU•RO™
PFAS DESTRUCTION TECHNOLOGY

Recognizing an industry need for pfas destruction, AECOM formed a team to drive this promising technology from fundamental research to its maturity. All team members have been heavily involved, from the bench study and field demonstrations to commercialization. The multi-disciplinary global team has developed a platform to solve this most challenging environmental issue.

As of today, electrochemical oxidation is one of the most documented PFAS destruction technologies. Our team has successfully used a proprietary electrode to complete mineralization of C4~C8 perfluoroalkyl acids (PFAAs) with evidence of complete defluorination and desulfurization. PFAS are destroyed via direct electron transfer on "non-active" anodes under room temperature and atmospheric pressure with relatively low energy consumption. Our project team has also successfully used this proprietary electrode to treat PFAS in ion-exchange regenerant waste, foam fractionate and other PFAS-impacted wastewaters like testing on RO concentrate and novel adsorbent regenerant solutions. Large scale field piloting is underway in Australia and the US.

About AECOM

AECOM is the world's trusted infrastructure consulting firm, delivering professional services throughout the project lifecycle – from planning, design and engineering to program and construction management. On projects spanning transportation, buildings, water, new energy and the environment, our public- and private-sector clients trust us to solve their most complex challenges. Our teams are driven by a common purpose to deliver a better world through our unrivaled technical expertise and innovation, a culture of equity, diversity and inclusion, and a commitment to environmental, social and governance priorities. AECOM is a Fortune 500 firm and its Professional Services business had revenue of \$13.2 billion in fiscal year 2020.

See how we are delivering sustainable legacies for generations to come at aecom.com and @AECOM.

Commitment to Safety

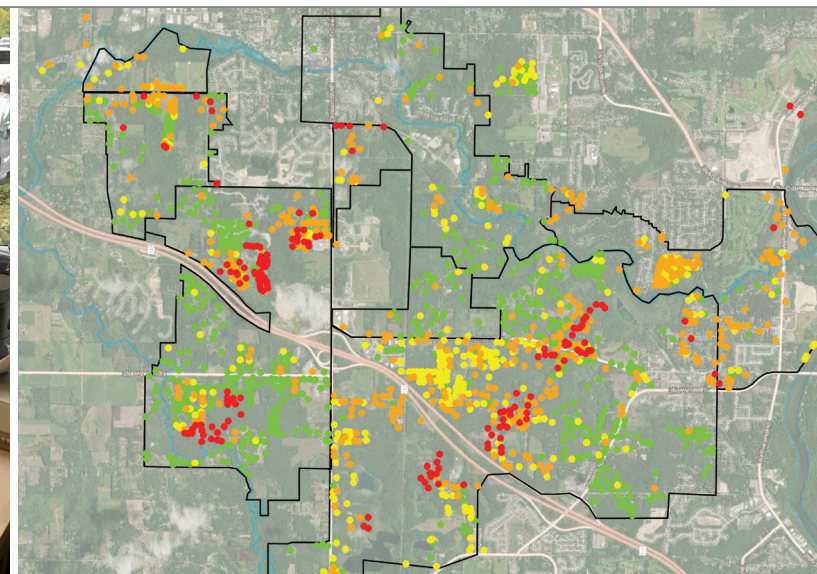
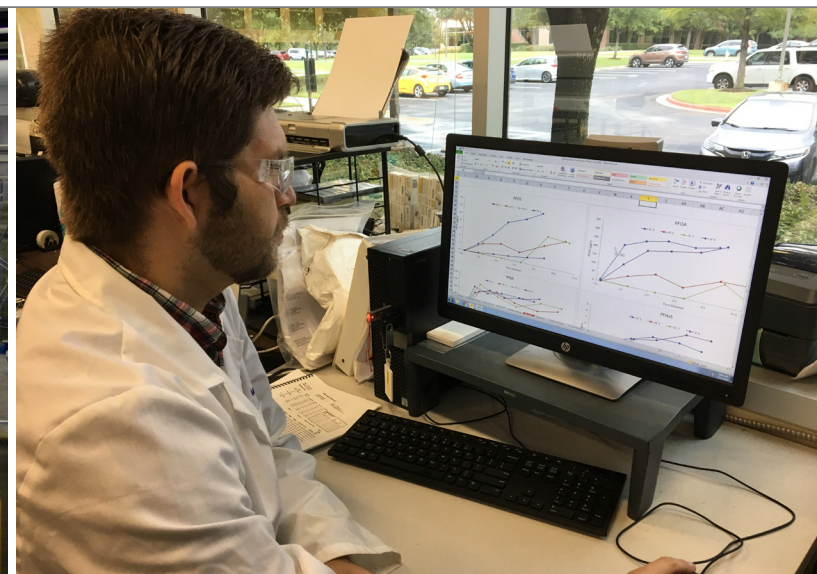
AECOM has a deep commitment to maintaining a safe and healthy workplace for our employees and the people we work with. A core value of AECOM, safety is a primary consideration in everything we do. Our Safety for Life program has a goal of zero incidents/accidents and is designed to prevent injuries, illnesses.



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What are PFAS?

Per- and Poly-fluoroalkyl Substances (PFAS) comprise a large and diverse group of synthetic regulated chemicals used for over 50 years for various industrial and consumer applications and products. PFAS are present in aqueous film forming foams (AFFF) used for fire-fighting and fire suppression starting in the 1960s. PFAS can also be present in:

- Many commercial household products, including stain- and water-repellent textiles and fabrics, polishes, waxes, paints, and cleaning liquids
- Food packaged in PFAS-containing materials, processed with equipment that uses PFAS, or grown in PFAS-contaminated soil or water

- Municipal and wastewater treatment effluents, including landfill refuse and biosolids
- Industrial process wastes and materials, including those from chrome-plating, electronics manufacturing, and petroleum "fracking" fluids
- Drinking water and soil, including industrial, commercial and agricultural land
- Living organisms, including fishes, terrestrial animals, plants, agricultural crops and humans

Properties of PFAS?

- Highly water soluble, non-volatile and extremely mobile in water
- Stable due to carbon-fluorine bonds
- Some compounds are air-water interface dwellers
- Persistent and recalcitrant with little attenuation
- Widely present in the environment and bioaccumulative, and found in biota, including plants, animals and humans



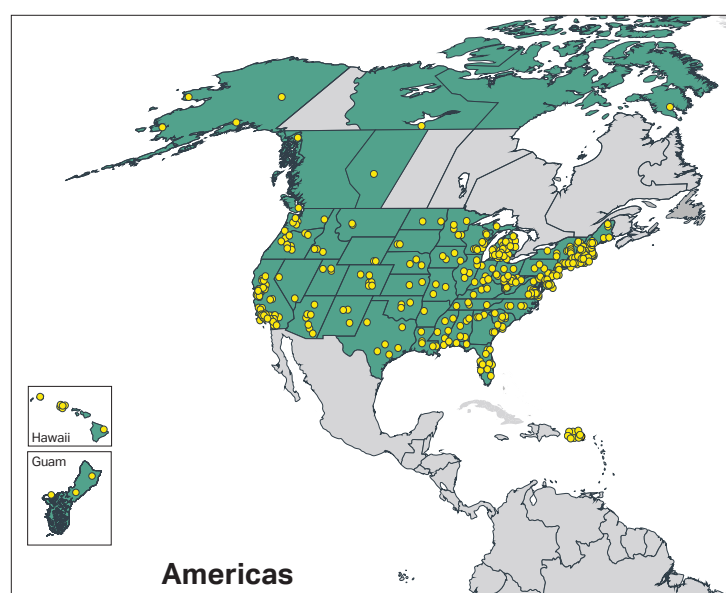
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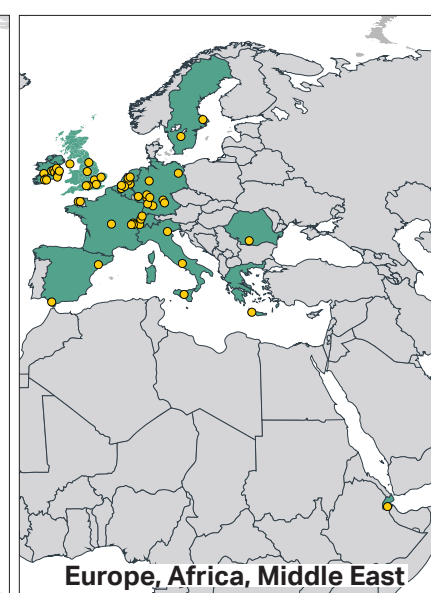
- #1 DAMS AND RESERVOIRS
- #1 WATER TREATMENT LINES & AQUEDUCTS
- #2 CHEMICAL & SOIL REMEDIATION
- #2 HAZARDOUS WASTE
- #2 SITE ASSESSMENT & COMPLIANCE
- #2 WASTEWATER TREATMENT PLANTS
- #2 WATER SUPPLY
- #3 CLEAN AIR COMPLIANCE
- #3 SEWER & WASTE
- #3 WATER TREATMENT, DESALINATION PLANTS

AECOM PFAS Expertise

- Potable Treatment System Design
- PFAS Sampling Protocols
- PFAS Treatability Testing
- Wastewater Characterization
- Laboratory Data Validation
- Toxicity/Risk Assessment
- Regulatory Navigation/Negotiation
- Site Assessment and Remediation
- PFAS Waste Management
- Geographic Information Systems
- PFAS Fate and Transport
- Biosolids studies and treatment



Americas



Europe, Africa, Middle East



Asia, Australia, New Zealand

Global AECOM PFAS Sites

Regulatory Status

PFAS are garnering heightened global attention by regulators and citizens. Regulators are transitioning focus from PFAS manufacturing facilities to other sources including landfills, facilities with incidental use, agricultural land which received biosolids, as well as re-training areas where AFFF were used. Many state regulators are proposing maximum contaminant levels (MCLs) for both individual and groups of PFAS along with lower PFAS groundwater standards, restrictions on biosolid's application, and EPA has now published effluent limitation guidelines for two industrial discharge categories. It appears that PFAS response actions and litigation will continue to increase, with state agencies taking the lead on establishing policy while the EPA PFAS Strategic Plan is implemented.



Contact us at askenvironment@aecom.com or Rosa Gwinn, PhD, Americas Environment PFAS Leader | rosa.gwinn@aecom.com | 301.820.3131