

# PFAS REMEDICATION TREATMENT TECHNOLOGY



AECOM in collaboration with the University of Georgia have developed an economically and environmentally sustainable water treatment technology that destroys PFAS.



Per- and poly-fluoroalkyl substances (PFAS) have historically been widely used and released into the environment. There has been significant concern globally about the effect PFAS potentially has on humans and the environment, and its migration ability. The uniquely engineered properties for PFAS mean that conventional technologies stop well short in effectively remediating this contaminant.

Commercially available treatment technologies transfer PFAS from water and concentrate it to filtration media and other waste streams, requiring disposal management. These PFAS-laden wastes are dealt with off-site, retaining legacy and associated liability.

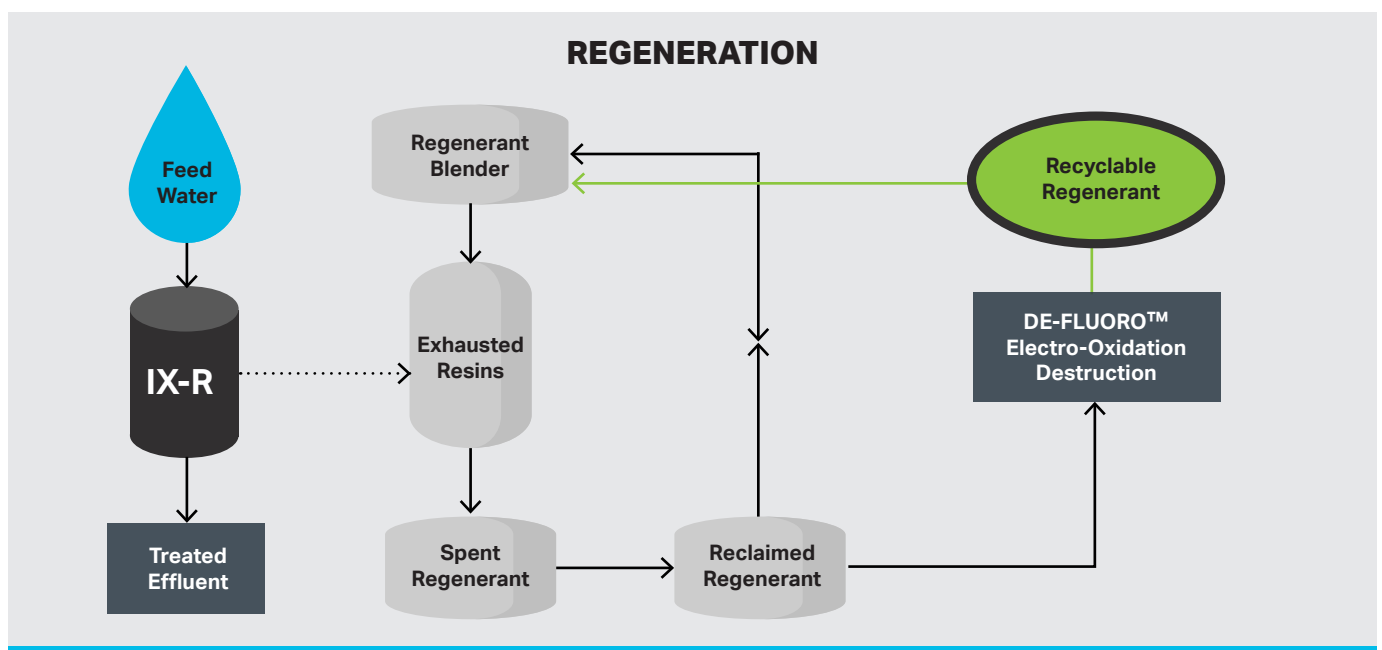
To negate ongoing client liabilities, AECOM developed an on-site PFAS remediation technology that destroys PFAS compounds in water and waste streams. In 2018, AECOM

designed, constructed, and demonstrated DE-FLUORO™, an electrochemical oxidation treatment technology to destroy PFAS in water. The PFAS treatment utilizes a proprietary, durable, low-cost electrode that can be manufactured in different sizes and shapes for various applications.

AECOM is currently performing a robust demonstration project within Australia and New Zealand to treat eight real-world PFAS-impacted liquids. The treatment is compact, highly efficient, cost-effective and mobile, destroying PFAS on-site. DE-FLUORO™ has destroyed PFAS mass in liquids containing PFAS concentrations over 10,000 parts per billion (ppb). Globally, the team is also pilot testing the technology at multiple United States Department of Defense sites under grants awarded by the Strategic Environmental Research and Development Program and U.S. Air Force Board Agency Announcement.

This treatment eliminates the requirement for by-product management, offering a complete on-site PFAS destruction solution, a game changer in the PFAS remediation industry and one that will be ready for the market in mid-2019.

**AECOM's PFAS treatment technology DE-FLUORO™, through identifying synergy between existing treatment technologies, now eliminates the requirement for by-product management by offering a complete on-site PFAS destruction solution.**



## Challenges of PFAS treatment

The chemical structure of PFAS comprises a backbone of carbon and fluorine (C-F) elements of varying chain length, noting the C-F covalent bond is one of the strongest bonds in nature. Mass transfer technologies that are currently available in the market (e.g. granular activated carbon, ion exchange resin, reverse osmosis) do not destroy PFAS. Instead, they separate PFAS from solution and concentrate onto the filtration media. This spent media may require off-site incineration or regeneration for reuse. The regeneration process will produce wastes that will require further management or treatment.

## What is the technology?

DE-FLUORO™ is a cost-effective, sustainable treatment option for PFAS-impacted liquids. The electrochemical oxidation (EO) process uses highly conductive, chemically inert, and proprietary electrodes to effectively destroy PFAS.

EO is a well-studied and documented destruction technology for PFAS. Our team has successfully used a proprietary electrode to complete mineralization of C4~C8 perfluoroalkyl acids (PFAAs) with evidence of complete defluorination and desulfurization (i.e. destruction of PFAS/PFAA). PFAS are destroyed via direct electron transfer on 'non-active' anodes under room temperature and atmospheric pressure with relatively low energy consumption.

Our team has also successfully used this proprietary electrode to treat PFAS in ion-exchange regenerant waste and other PFAS-impacted waste water.

## Why was it created?

PFAS water remediation projects in Australia and overseas have been dominated by sorption based technologies, primarily granulated activated carbon (GAC), and more recently, ionic-exchange resin (IX-R). Industry experts recognise that there is currently no 'silver bullet' solution to the treatment of PFAS in water, until now.

DE-FLUORO™ is a field demonstration EO reactor with specially designed electrodes (patented composition) which are robust and can be moulded into different sizes and multiple shapes for various PFAS treatment applications.

Potential applications of the technology include:

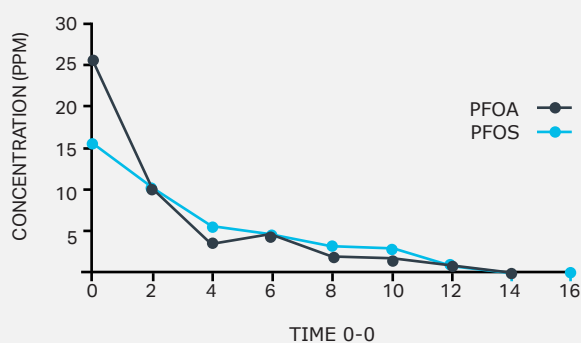
- Groundwater
- Industrial waste water
- Drinking water
- Investigation-derived waste water
- Liquid waste
- Surface water

## Proven success

AECOM, in collaboration with the University of Georgia have treated PFAS spiked water, real-world PFAS impacted groundwater and PFAS impacted wastes generated during other water filtration / separation methodologies (e.g. IX-R regenerant waste, ozone fractionation) in a laboratory setting. The PFAS was demineralised (i.e. destroyed), even those not quantifiable by current laboratory analytical methods.

DE-FLUORO™ can be designed as a coupling technology, or potentially with further development, a stand-alone technology. It is not limited by concentration ranges and it treats all measurable PFAS in a sustainable manner.

### DE-FLUORO™ Treatment of PFAS in Wastewater



PFOS and PFOA degradation in ion exchange resin regeneration waste (liang et al 2018)

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