Project

Haley & Aldrich’s new treatment approach destroys PFAS in groundwater, with zero waste

Zero liquid waste

at end of treatment process

Nearly 100% of PFAS

destroyed by new treatment approach

Summary

- The Air Force Civil Engineer Center (AFCEC) sought a more efficient way to remediate PFAS-contaminated groundwater — ideally one that would generate no additional waste.
- Haley & Aldrich won the opportunity to field-test a novel treatment train approach that combined a PFAS separation and concentration process with our EradiFluor PFAS destruction technology.
- The separation process efficiently removed PFAS from groundwater. Our team then treated the concentrated waste with EradiFluor, which destroyed more than 99.9 percent of PFAS.
- EradiFluor effluent, containing low residual PFAS and harmless products such as sulfate and fluoride, was sent back to the influent of the treatment train for dilution and further separation treatment, achieving closed-loop treatment and no waste discharge.

Client challenge

As part of the Department of Defense (DOD)'s quest for more-effective PFAS remediation, the AFCEC invited proposals to test new approaches on PFAS-contaminated groundwater.

PFAS (a group of thousands of chemicals known as per- and polyfluoroalkyl substances) are notoriously difficult to destroy, and many existing treatment technologies only concentrate or transfer PFAS to another form that still needs further treatment or disposal. The AFCEC sought a more efficient way to deal with PFAS on-site — ideally, one that would generate no additional waste.

After a highly competitive selection process, the AFCEC chose to field-test Haley & Aldrich's innovative treatment train. We aimed to combine EradiFluor, our proprietary PFAS destruction technology, with a surface active foam fractionation (SAFF) process distributed by our partner firm Allonnia. Given separate successful demonstrations of each method, we believed that we could combine them with powerful results: The SAFF process would separate and concentrate PFAS from the contaminated groundwater, and EradiFluor could then destroy the PFAS in that concentrated waste.

Haley & Aldrich had already successfully demonstrated EradiFluor at a U.S. Navy site on the East Coast, and we had developed the tech with support from competitive DOD funding. So the U.S. Air Force knew we could deliver scientifically sound results and a solution to this urgent environmental concern.

Our approach

First, we conducted a lab test using groundwater samples from the site to set optimal conditions for the field test. Then, we took our treatment train to the field for a two-month demonstration. The project team set up a SAFF unit to treat a continuous flow of groundwater from an existing extraction well. This process was designed to generate two outputs: 1) groundwater cleaned of most PFAS and 2) a small amount of waste liquid containing those PFAS that can be routed back to the SAFF unit, resulting in no discharge or waste management from EradiFluor.

After SAFF processing, the treated water was sent to an on-site groundwater treatment system with granular activated carbon for polishing and discharge.

We then had to show that EradiFluor could effectively treat the PFAS concentrate produced by the SAFF process. Unlike previous EradiFluor applications, the waste also contained a high concentration of a surfactant added to enhance the removal by SAFF of some particularly stubborn PFAS. High concentrations of this organic surfactant have caused other PFAS destruction technologies to be less effective, inhibiting the reaction that destroys the compounds.

However, EradiFluor worked as well as it had in previous tests, destroying 99.9 percent of the scores of PFAS we tested for, based on three independent sets of data including PFAS analytical results by EPA Method 1633, total organic fluorine results, and fluoride measurements. The demonstration had achieved its objective for the AFCEC.

Value delivered

- Established that SAFF treatment combined with EradiFluor could effectively treat and destroy PFAS in groundwater with zero liquid waste discharge
- Achieved the destruction of 99.9 percent of PFAS, even while treating liquid with a high concentration of surfactant, which had limited the effectiveness of other destructive technologies
- Reduced PFAS in groundwater to levels that required no further treatment for discharge into the environment

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