



NASJRB Willow Grove & Biddle ANG Base PFAS Treatment Demonstration Day - TUESDAY, 20 AUGUST 2024

BACKGROUND

Aqueous film-forming foam (AFFF) has been used to suppress liquid fuel fires for many decades. These firefighting agents contain per- and polyfluoroalkyl substances (PFAS), which have impacted soil and groundwater at many locations. The DoD, through its Environmental Security Technology Certification Program (ESTCP), has funded the development and validation of many PFAS treatment technologies to address associated environmental risks from PFAS. Through a partnership with the Defense Innovation Unit (DIU), ESTCP and DIU have awarded contracts to a cohort of prototype projects that will deploy remediation technologies for extracted groundwater at the former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove and nearby Biddle Air National Guard (ANG) Base, Pennsylvania.

Allonnia, Cyclopure, and Emerging Compounds Treatment Technologies (ECT₂) will provide an overview of their respective technologies to concentrate PFAS from impacted groundwater at NASJRB Willow Grove and Biddle ANG Base.

TECHNOLOGY OVERVIEWS

Cyclopure will lead a site tour of their ESTCP field demonstration project, showcasing remediation of AFFF-impacted groundwater using a novel cyclodextrin adsorbent (DEXSORB®). Cyclopure developed the DEXSORB® adsorbent, made with renewable β -cyclodextrins, with a high capacity to sequester PFAS from water. Importantly, spent DEXSORB® media can be regenerated under ambient conditions providing complete desorption and concentration of extracted PFAS.

Cyclopure installed a DEXSORB® packed-bed filtration (PBF) system at NASJRB Willow Grove in March 2024. In single-step, lead-lag configuration, this DEXSORB® system will operate continuously to validate effective removal of PFAS from the AFFF-impacted groundwater for a demonstration period of 4 months (from March to July 2024). Water samples will be periodically collected from three sampling ports (i.e., before treatment, after the lead vessel, and after the lag vessel) to monitor the removal of each PFAS using EPA 1633 and other screening



analytical methods. After the 4-month on-site treatment, the DEXSORB® vessels will be transported to Cyclopure's regeneration facility in Indiana for PFAS desorption and concentration. PFAS desorption and recovery will be confirmed using mass balance models. The isolated and concentrated PFAS waste stream will be delivered to a cohort of vendors demonstrating destructive techniques for further processing. The regenerated DEXSORB® will then be re-installed at NASJRB Willow Grove in August to treat AFFF-impacted groundwater for an additional demonstration period of 10 weeks. This is to validate the effectiveness of regenerated DEXSORB® for PFAS treatment in heavily impacted waters.

Emerging Compounds Treatment Technologies (ECT₂) will lead a site tour of their ESTCP field demonstration project focused on treatment of PFAS in groundwater with a regenerable anion exchange resin. ECT₂ is implementing their patented regenerable anion exchange process to remove PFAS from groundwater at a flow rate of approximately 10 gallons per minute. ECT₂ will operate over an 8-month period and intends to conduct four to six resin regeneration events, which will desorb PFAS from the resins and generate a low volume, high PFAS concentrate ("still



bottom”) that PFAS destruction vendors will subsequently treat further. The project is intended to demonstrate the robustness of the resin over multiple treatment cycles as well as the ability to achieve low level treatment goals for a range of PFAS. The project will also demonstrate the waste minimization capability of the regenerable anion exchange treatment process and the flexibility this technology offers in meeting evolving treatment criteria for PFAS. Monitoring of PFAS concentrations in treated groundwater and in the still bottoms will be used to demonstrate technology effectiveness. Operational data collected during the demonstration will be used to conduct a life cycle cost assessment of the technology.



Allonnia will lead a site tour of the surface active foam fractionation (SAFF®) system, which is a simple, self-contained PFAS removal solution. Foam fractionation is an adsorptive bubble separation technique that can remove amphiphilic chemicals like PFAS from an aqueous solution. Amphiphiles tend to adsorb onto the surface of rising bubbles (i.e., air-water interfaces), which SAFF® leverages for a sustainable, nearly waste-free PFAS solution. The first SAFF® stage (primary fractionation) ‘strips’ PFAS from influent water using air pulled in from the atmosphere and produces a PFAS-depleted effluent that has a treatment objective to meet EPA’s new maximum contaminant levels (MCLs) for PFAS. The primary foamate containing the concentrated PFAS comprises the feed to the second stage (secondary fractionation), which concentrates the foamate to a factor of over 5,000:1 (super-concentrate). If further concentration is desired, a highly enriched PFAS hyper-concentrate at a factor of over 200,000:1 can be produced. The super- or hyper-concentrate represents a low-volume, high-concentration, aqueous PFAS solution

that is uniquely suitable for destruction by any number of emerging destruction technologies. At Biddle ANG Base, SAFF® will be treating groundwater impacted by PFAS, producing clean water for discharge and a low-volume of PFAS concentrate that will be given to destruction technology vendors for demonstration of the effectiveness of their PFAS destruction technologies. This creates the potential for a combined technology train to provide a closed-loop, on-site technology for complete PFAS treatment as a unique benefit of SAFF®, potentially avoiding any potential long-term risk of transferring hazardous materials for off-site disposal or destruction. SAFF® was invented and is manufactured by Allonnia partner EPOC Enviro.

PUBLIC COMMENT

The morning informational session will be open to the public. For press inquiries or questions, please reach out to:

Mr. Jon Harris

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INFORMATIONAL SESSION AGENDA

0830 - Arrival

0900 - Technical Overview Session

1130 - Adjourn

MEETING ADDRESS

Horsham Community Center
1025 Horsham Road
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