From DETS to PETS, the Development of Mobile Aqueous Treatment Reactor for Perfluorinated Alkyl Substances: The PFAS Effluent Treatment System

Victor F. Medina, Scott A. Waisner, and ***Chris S. Griggs***

Background/Objectives. The Decontamination Effluent Treatment System (DETS) was developed by the Army Engineer Research & Development Center (ERDC) to treat wastewater generated from chemical, biological, radiological/nuclear (CBRN) decontamination. It uses a combination of granular media filters coupled with a six stage reverse osmosis system, allowing it to effectively treat virtually any source water and removal highly toxic constituents to very low levels. The system is fully mobile and capable of treating water up to 10 gallons per minute (gpm) (38 liters/min). The physico-chemical treatment processes recovers over 90% of the influent water. Testing has shown that the DETS is highly effective at treating highly contaminated water, removing 99% of most constituents and meeting treatment goals for chemical agent and radiological simulants.

The six stage RO system generates a concentrate with a much smaller volume the initial contaminated water. However, we have demonstrated that the concentrate can also be returned to the reactor and be recovered. By treating the concentrate, the process can therefore approach zero discharge.

Approach/Activities. It is well established that aqueous firefighting foams (AFFF) are a potential source of PFAS environmental contamination. The U.S. Air Force (and to a lesser degree, the U.S. Navy and Army) has numerous training facilities in which AFFF was used and is still being used. Many of these facilities have recovery systems that collect the contaminated water. Although some of these can have large water volumes, (>1 million gallons), many of these systems are actually relatively small, ranging from 10,000 to 50,000 gallons of water. A mobile system to periodically treat the contaminated water from these systems could be very useful.

Results/Lessons Learned. This presentation will discuss the conversion of the DETS systems to one focused on treating PFAS, the PFAS Effluent Treatment System (PETS). These included changes in which GAC was replaced by ion exchange resins designed to target PFAS removal and processes were added to address oils and petroleum residual. Modeling coupled with testing in the laboratory and in the field will be presented.