

## **Accelerated Deployment and Startup of Ion Exchange Groundwater Treatment System Addresses PFAS Contamination at Australian Air Base**

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**Background/Objectives.** Polyfluorinated and perfluorinated alkyl substances (PFAS) are emerging as high-priority and high-profile contaminants in Australia. Historical use of aqueous film-forming foam (AFFF) at Royal Australian Air Force (RAAF) Base Williamtown in New South Wales has resulted in PFAS contamination of groundwater and stormwater, both of which migrate off base. After defining the nature and extent of PFAS contamination, the Australian Department of Defence (Defence) retained Emerging Compounds Treatment Technologies (ECT) to supply and operate multiple PFAS-removal water treatment systems.

This paper describes Defence's phased approach to manage the PFAS contamination at RAAF Williamtown, including the accelerated design, fabrication, overseas transport, startup and operation of a successful Phase 1 system that treats contaminated stormwater. The project was complicated by the moving target of evolving PFAS regulations in Australia.

**Approach/Activities.** Defence retained ECT in March 2017 to begin remediating the PFAS contamination in two phases. The first phase involved supplying and operating a 50-gpm treatment system to demonstrate the effectiveness of the ion exchange resin-based technology. The sum of all PFAS compounds measured in the stormwater averages 9.1 µg/l. The interim treatment system was originally designed to comply with the national drinking water standard at the time the contract was signed, where the sum of PFOS and PFHxS had to be less than 0.5 µg/l, and PFOA less than 5.0 µg/l. The modular treatment system was installed in a 40-foot shipping container for ease of transport and installation, and includes pretreatment filters to remove suspended solids, iron and TOC. PFAS removal is performed by a set of lead and lag vessels that contain Sorbix A3F regenerable anion exchange resin. The entire design/fabrication/shipping/installation process was expedited to minimize the time required to initiate PFAS remediation. A RAAF C-17 cargo plane was used to transport the modular system from the United States to Australia, shaving a month off the transport time. The unit arrived at the Williamtown base on May 28 and was fully operational in less than a month.

The Phase 2 system is scheduled for startup in April 2018. This larger, 200-gpm groundwater treatment system is housed in three 53-foot storage containers, and includes filters for pretreatment, ion exchange vessels for removing elevated concentrations of PFAS, and a regeneration system for in-vessel resin regeneration. Also, the regenerant solution will be recovered using distillation and reused on site to further minimize waste generation.

**Results/Lessons Learned.** The Phase 1 stormwater treatment system began operation in June 2017 and was fully commissioned in July. Two polish resin vessels, each containing Sorbix LC1 resin, were added during system installation to address the new, appreciably more stringent PFAS drinking water guidelines for Australia and New Zealand, where the sum of PFOS and PFHxS must now be less than 0.07 µg/l, and PFOA less than 0.56 µg/l. Defence's desire to demonstrate non-detect treated effluent concentrations for as many PFAS compounds as possible also contributed to the decision to add the polish vessels. The system has been operating continuously and successfully since startup in June 2017. There have been no detections of any PFASs in the treated effluent, and no resin regeneration or change-out has been required.