

Water Treatment System Modification for PFCs at Mather AFB

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Background/Objectives. Design, install, and demonstrate successful operation of a granular activated carbon (GAC) system to treat perfluorinated compounds (PFCs) on the back end of existing VOC treatment air strippers at two separate sites at the former Mather AFB. The GAC system is required to treat perflourooctanoic acid (PFOA) and perflourooctane sulfonate (PFOS) to below 70 parts per trillion (ppt) total PFOA/PFOS, with an Air Force goal to reduce PFOA/PFOS concentrations in the effluent to as low as practicable. Additionally, the system operations and monitoring will evaluate GAC performance and mass loading for PFCs, including a side by side performance comparison of GAC media.

Approach/Activities. At the Site 7 groundwater treatment system, the average flowrate through the air stripper tower for VOC treatment is 50 gallons per minute (gpm). The baseline concentration of PFOA/PFOS was 143 ppt. Two 1,000-pound GAC vessels were installed and each charged with 750 pounds of bituminous coal GAC and designed for an empty bed contact time of 6 minutes. System installation started on December 12, 2016 and system startup on December 16, 2016.

The second system will be installed at the Main Base groundwater treatment system with an average flowrate of 1,500 gpm and a total PFOA/PFOS concentration of 270 ppt (based on May 2016 data). Four 30,000-pound GAC vessels will be installed, 2 in series and 2 in parallel. Each pair of vessels in lead-lag series will treat 750 gpm, with an approximate contact time of 10 minutes per vessel. System installation is planned for December 2017.

Two types of GAC will be evaluated in the parallel operation – bituminous coal based GAC on one side and special reactivated, virgin coconut shell based GAC on the other side. The effects of the pore size distribution differences between these types of carbons will be evaluated for the removal of total PFOA/PFOS, and the results will be used for future GAC change outs at the site.

Results/Lessons Learned. Through July 2017, the Site 7 system has processed nearly 17 million gallons. Sampling performed in May 2017 showed no detectable (< 6 ppt) total PFOA/PFOS in the effluent from the GAC treatment with 12 ppt of total PFOA/PFOS at the GAC midpoint. Complete breakthrough of the lead GAC vessel is not anticipated for over 19 million gallons. The system was designed with a contact time of 6 minutes, but groundwater extraction has required treatment at higher flows, reducing the contact time to between 2.7 to 3.8 minutes. Performance has exceeded expectations.