Effective Use of Granular Activated Carbon (GAC) Treatment for Removal of Hexafluoropropylene Oxide Dimer Acid (HFPO-DA) from Drinking Water

Bjorn Cuento (bjorn.cuento@aecom.com) and Katherine Davis (AECOM, Newark, DE, USA)
Andrew Hartten (Andrew.S.Hartten@chemours.com) (The Chemours Company, Wilmington, DE, USA)

Background/Objectives. In May 2007, a granular activated carbon (GAC) treatment system was installed to remove perfluorooctanoic acid (PFOA) from drinking water at a fluoropolymer manufacturing site in West Virginia. The on-site GAC treatment system effectively removes PFOA from drinking water. Use of PFOA at the site was completely phased out by May 2013 and was replaced by hexafluoropropylene oxide dimer acid (HFPO-DA; also referred to as Gen X). HFPO-DA was subsequently detected in the water media at the site. Starting in June 2017, the on-site GAC system was evaluated for effectiveness in removing HFPO-DA from the drinking water.

Approach/Activities. Starting in June 2017, monthly samples were collected for HFPO-DA analysis from the untreated water entering the on-site GAC treatment system (Prior to Treatment; PT) and after the lead and lag carbon beds (Bed1 and Bed2, respectively). In November 2017, sampling shifted to biweekly. In February 2018, evaluation of an alternative GAC type began and is ongoing. During this same time frame, limited HFPO-DA sampling and analysis (two events to date) was conducted at seven private and one public water supply GAC treatment systems located off-site, near the facility. Samples were collected from the untreated water entering the GAC treatment system (PT) and from after the lead and lag carbon beds. Additional sampling events for HFPO-DA in these systems are anticipated. All HFPO-DA samples described above were analyzed by TestAmerica Laboratories, Inc. in Arvada, Colorado, using the method as specified in their Standard Operating Procedure (DV-LC-0012, Rev. 14 (Analysis of PFOA and other PFCs and PFSs in Water and Soil by LC/MS/MS) with a reporting limit (RL) of 0.010 micrograms per liter (µg/L).

Results/Lessons Learned. While it is generally believed that GAC treatment is only somewhat or marginally effective for removal of HFPO-DA (Hopkins et. al., 2018), the evaluation of results indicate that the existing the GAC treatment systems are effective and practical for use in removing HFPO-DA from the drinking water. In addition, the alternative GAC type may ultimately be more effective for HFPO-DA removal then the previous GAC type used in the on-site GAC treatment system. Results available for the on-site GAC system from late February 2018 (following a carbon change out of both the lead and lag beds to the alternative GAC type) to date (August 2018) show HFPO-DA concentrations of less than the RL in all the lag bed results except the most recent result, where a concentration of 0.014 µg/L was measured. The range of concentrations of HFPO-DA in the PT samples during this time frame is 0.081 µg/L to 1.1 µg/L, while the lead bed results were below the RL for the first five sampling events and then ranged from 0.051 µg/L to 0.55 µg/L. The limited sampling performed to date of the off-site private GAC treatment systems also show effective removal of HFPO-DA in both the lead and lag beds with concentrations below the RL while the range of concentrations of HFPO-DA in the PT samples is 0.011 µg/L to 0.70 µg/L. Further, the limited sampling to date of the off-site public GAC treatment system also shows effective removal of HFPO-DA with the lag beds concentrations of HFPO-DA below the RL, with the PT concentrations of 0.032 µg/L and 0.099 µg/L, and the lead beds concentrations ranging from below the RL to 0.022 µg/L. As additional HFPO-DA sampling and analysis is completed for these GAC treatment systems, including

continued evaluation of alternative GAC types for the on-site GAC treatment system, the results will be evaluated and incorporated with the data set presented above.