Evaluation of PFAS Removal Efficacy Using Commercially-Available GACs and IX Resins: A Bench-Scale Treatability Study

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Background/Objectives. A bench-scale treatability study was conducted to evaluate the efficacy of a number of commercially-available granular activated carbon (GAC) and ion exchange resin (IX resin) products in removing perfluoroalkyl substances (PFAS) in impacted drinking water wells at a confidential drinking water treatment facility located in Eastern United States. Results from this bench-scale study were also intended to provide parameters and considerations pertinent to the design of a full-scale treatment system.

Approach/Activities. The rapid small-scale column test (RSSCT) experimental approach was employed to minimize the study duration as well as the volume of site-specific groundwater required for the treatability study. In select test conditions, the commercially-available GAC and IX resins were grinded and sieved to achieve the target particle size reduction. Column influent and effluent samples were periodically collected to aid in evaluation of PFAS removal efficacy at varying empty bed volumes. In addition, impacts of residual chlorine removal and GAC pre-treatment on the treatment media's longevity; regenerability of the IX resins using brine solutions; and the scalability of the RSSCT approach using grinded treatment media were also evaluated.

Results/Lessons Learned. Preliminary results indicate that different GAC and IX resin types behave very differently with respect to PFAS removal efficacy. In addition, shorter-chained PFAS tend to break through faster than their longer-chained counterparts. Removal of residual chlorine using calcium thiosulfate can greatly enhance the PFAS removal efficacy of GACs and their longevity. In some cases, GAC pre-treatment may be implemented to improve IX resins' longevity and ultimately reduce treatment costs. Brine regeneration was generally ineffective in prolonging the longevity of the two IX resins tested. Design parameters chosen for the final full-scale design will be provided at the time of the presentation.