Treatment Technology Considerations at Plating Facilities Commingled with PFAS and Chromium-6

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Background/Objectives. The number of chrome plating facilities undertaking remedial action on their own or guided by regulators has seen a noticeable increase in recent years. Many of these facilities are commingled sources of per- and polyfluoroalkyl substances (PFAS) and hexavalent chromium (Cr(VI)), as both were used in the plating process. The co-occurrence of these contaminants presents unique challenges to in situ remediation, yet careful amendment selection and a clear understanding of treatment mechanisms can assist in developing effective remedial plans. This presentation will explore bench- and field-scale development of a combined Cr(VI) PFAS treatment strategy.

Approach/Activities. One proposed approach to manage commingled Cr(VI) and PFAS plumes is the application of zero-valent iron (ZVI) and colloidal activated carbon (CAC): ZVI to treat Cr(VI) via immobilization or reduction to Cr(III) and CAC to immobilize PFAS. Multiple examples of in situ applications for sites have been studied. Both single mobilization treatments and remediation using multiple phased treatment trains will be presented. All of the sites analyzed have both Cr(VI) and PFAS. Data including early and moderate monitoring results have been compiled as well as analysis of remedial application type and selection considerations. Additionally, the potential for interference from each of the two co-occurring treatment processes was investigated on the bench scale. A series of bench-scale tests was performed to determine if the presence of Cr(VI) and/or Cr(III) would have a measurable effect on the adsorption of PFAS by CAC.

Results/Lessons Learned. Bench-scale results indicated substantial to complete removal of both Cr(VI) and PFAS when treated in a combined manner. Little to no effect on the adsorption of PFAS was seen on the CAC in the presence of field-relevant (mg/L) concentrations of Cr(VI)/Cr(III), whether reduced by ZVI or not. By carefully considering the remedial needs of each contaminant type and observing the challenges associated with complex applications, a good understanding of future design types and project needs has been obtained. Results at these sites indicate obtaining remediation goals in most cases and many lessons learned with regard to the relative behavior of the contaminant suits as they interact with each other and with in situ remediation additions. Further monitoring and testing are warranted to increase effectiveness and efficacy of these in situ remediation solutions.