Advanced Oxidation/Reduction for PFAS in Co-Contaminated Groundwater

Scott Grieco, Ph.D., P.E. and ***Jessica Persons***, P.E. (Jacobs)

Background/Objectives. Per- and polyfluoroalkyl substances (PFAS) are increasingly being identified in groundwater and potable water supplies at concentrations exceeding State and Federal guidance values and standards. Currently, only transfer technologies such as adsorption or reverse osmosis are being utilized for treatment. As a pre-treatment or full replacement to adsorption, destructive technologies for PFAS need to be demonstrated at scale.

Previous work has shown significant rates of degradation of PFOA and PFOS (>85%) via ozonation under alkaline conditions and catalyzed with hydrogen peroxide (Lin et al., 2012). This work was recently replicated using ozone only with commercially scalable equipment with excellent replication of results (>95%) (Piper, 2016). The confirmational work supports the benefit of alkaline conditions. For this current work, methods similar to those employed previously were evaluated using a commercially available system.

Approach/Activities. Groundwater samples were collected from the most impacted portion of the PFAS groundwater plume at the subject sites. A screening matrix was developed to evaluate performance variables. Based on this screening matrix, bench-scale testing was conducted to assess application methodology (with and without peroxide catalyzation), pH, and oxidant dosage on the destruction efficiency of PFAS using site groundwater impacted by a commingled plume containing high concentrations of both PFAS and other organic compounds (VOCs and TPH). The results of the screening matrix were used to select optimum conditions to establish destruction dose-response curves for targeted contaminants and identify the optimal conditions needed to translate the bench-scale results into a field-scale pilot study.

Results/Lessons Learned. This study supports previous academic testing into a potentially field-worthy application using commercially available advanced oxidation equipment. Previous results will be presented to be compared to data from the current testing program. Impacts of process variables will be analyzed and discussed. The field pilot implementation plan will also be presented.