

RESULTS FROM SIX INSITU FIELD TESTS FOR THE TREATMENT OF PFAS-IMPACTED GROUNDWATER

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INTRODUCTION

Literature reviews and laboratory testing for the insitu treatment of PFAS-impacted groundwater has evaluated numerous reagents including chemical oxidants and adsorptive media. Five reagents were chosen for pilot testing including hydrogen peroxide, unactivated sodium persulfate, colloidal activated carbon, biochar and exchange resins to determine if the reagents could be effective at reducing/removing the PFAS within the groundwater over time. Various PFAS were detected within the pre-treatment groundwater including PFDS, PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFOS and PFNA with concentrations ranging up to 18,000 ng/L for PFPeA.

APPROACH

Six pilot-scale permeable reactive zones (PRZs) were created in a shallow, unconfined aquifer which was impacted with gasoline-range petroleum hydrocarbons along with various additives including MTBE and TBA. Six PRZs were created by injecting stabilized hydrogen peroxide, unactivated sodium persulfate, powdered and colloidal activated carbon (PAC and CAC), biochar and ion exchange resin (IER). Each PRZ was created using direct push technology. Groundwater samples for PFAS and other organic and inorganic parameters were collected over an 18-month period which represented approximately five pore volumes of flow through the PRZs. Finally, cores were collected from PRZs to evaluate the post-injection distribution of the reagents during the injection process.

RESULTS

The results from the six PRZs suggest that the chemical oxidants, stabilized hydrogen peroxide, and unactivated persulfate were ineffective at attenuating the PFAS compound analyzed with little to no reduction occurring. The results from the adsorption-based PRZs indicated that attenuation of the PFAS was occurring with the CAC-based PRZ showing the best performance with all of the PFAS analyzed being removed to below their respective detection limits (10 ng/L) within all of the groundwater samples collected post-injection. The PAC, IER and biochar-based PRZs showed variable treatment with breakthrough of the C4 PFAS compounds noted between 6 and 9 months post injection.