Investigation of the Effect of Prior Remedial Treatment on the Fate and Transport of Per- and Polyfluoroalkyl Substances (PFAS) Present at AFFF-Impacted Sites

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Background/Objectives. Per- and polyfluoroalkyl substances (PFAS) have been identified as an emerging contaminant (EC) by the Environmental Protection Agency (EPA) and the Department of Defense (DoD). PFAS at DoD sites is most often associated with aqueous film-forming foams (AFFFs) used for firefighting operations (including potentially high volumes used at crash sites and during firefighter training). In addition, PFAS occurrence is seen along with other co-contaminants such as petroleum hydrocarbons and chlorinated solvents. Remediation technologies such as in situ chemical oxidation and other reduction treatments that were employed to treat these co-contaminants may have an impact on PFAS degradation and mobility. However, there is a knowledge gap on how these conventional remediation techniques affect the fate and transport of PFAS. The objective of the current study is to investigate the effect of selected treatments (e.g., oxidation and reduction) on the fate and transport of PFAS present at AFFF-impacted sites.

Approach/Activities. Column studies were conducted using AFFF-impacted soils from DoD sites. Treatments studied include: (a) hydrogen releasing compound (HRC) for reduction technique, and (b) persulfate oxidation technique. The laboratory studies were performed under controlled conditions, where pre-tested PFAS-free groundwater was pumped through treated columns, and PFAS leaching measurements were taken at regular intervals. The HRC treatment was conducted in an anaerobic chamber (to maintain reducing conditions); and sodium lactate was amended three times in a 21-day study period. For the persulfate oxidation technique, the persulfate treated soil was loaded onto the columns and the PFAS leaching was monitored at regular intervals. Subsequent PFAS analysis was performed for 24 analytes, using liquid chromatography tandem mass spectrometry.

Results/Lessons Learned. The results from the study inform how different treatment technologies directed to treat the co-contaminants affect the mobility of PFAS at DoD sites. The results of both the HRC and persulfate oxidation treatment will be presented and discussed. For reduction treatment, after the second amendment of the HRC, the PFAS was stabilized and no further leaching of PFAS was observed. The information obtained from the current study will aid in understanding the fate and transport of PFAS and risk management of these chemicals in the environment.