PFAS Sampling and Analytical Toolbox: Novel Tools for PFAS Site Characterization

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Background/Objectives. Per- and polyfluoroalkyl substances (PFAS) are widely used for many commercial and industrial applications. Most PFAS-containing products use a proprietary, technical grade mixture of PFAS designed to impart specific performance-based characteristics to the products (e.g., heat resistance, surfactant properties). There are more than 5000 PFAS chemicals in the global market, the known quantifiable PFAS account for a very small fraction and only limited number of analytes can be quantified using the known analytical procedures. PFAS groundwater and soil contamination at aqueous film forming foam (AFFF)-impacted sites often cover large areas and may include multiple source areas. As the number of PFAS-contaminated sites are on the rise, there is a need for novel site characterization tools to quantify PFAS near contaminated sites and investigate the sources of contamination.

Approach/Activities. Battelle has developed novel site characterization tools to measure the total PFAS and identify the sources of PFAS contamination. These site characterization tools include: (a) a PFAS passive sampler to obtain time-integrated PFAS concentrations in both surface water and groundwater, (b) a rapid potentiometric method to measure the free fluoride generated by the quick reductive defluorination of PFAS in the environmental samples, and (c) a high-resolution mass spectrometric (HRMS) tool for better understanding of PFAS profiles in differentiating sources of contamination at PFAS-contaminated sites.

Results/Lessons Learned. The presentation will discuss (a) the field demonstration results of the PFAS passive sampler, showing that the results compare well with the PFAS concentrations measured using conventional water sampling; (b) the results of the total organofluorine method using the optimized conditions on the samples spiked with known PFAS concentrations resulted in greater than 70% of defluorination; and (c) method validation results of the HRMS approach and a case study conducted at an AFFF-impacted site to evaluate source contribution of PFAS detected at offsite locations.