EVALUATING PFAS LEACHABILITY FROM WELL CONSTRUCTION AND HOUSEHOLD PLUMBING MATERIALS: A BENCH-SCALE SOAK TEST STUDY

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Background/Objectives:
Per- and polyfluoroalkyl substances (PFAS) are emerging contaminants of concern in residential drinking water supplies. While we often imagine large, point-source releases of PFAS as the greatest risk to contamination, we wanted to know what everyday materials might have considerable impact on drinking water. This study aimed to identify potential sources of PFAS contamination in residential wells by conducting a laboratory-based soak test to evaluate the leachability of PFAS from common well construction materials, household plumbing items, and groundwater sampling supplies.

Approach/Activities:
A five-week bench-scale soak test was conducted at the Parsons Industrial Wastewater Treatability Lab in Syracuse, New York, from May to June 2024. Test materials gathered from hardware stores, including well construction, field sampling supplies, and household plumbing components, were submerged in lab-grade PFAS-free water and intermittently shaken. Control samples (e.g., blanks, spikes, and duplicates) were included to ensure data quality. At the conclusion of the test, samples were analyzed for PFAS using EPA Method 533 at ALS Environmental Laboratories. Some sample bottles became cloudy or contained suspended solids following the five-week period. EPA Method 533 is intended for drinking water samples and has a low tolerance for sediment in samples. This caused elevated detection limits and high surrogate recoveries due to matrix interference.

Results/Lessons Learned:
Control samples confirmed the absence of PFAS in the laboratory-provided water and test setup. A sorption control bottle showed that PFAS compounds' sorption to certain materials did not occur and skew results, but it cannot be determined how much each material sorbed or released within the sample bottles. Among the eight non-control samples, 75% exceeded the EPA MCL for PFOA, and 50% exceeded the EPA MCL for PFOS. Other PFAS compounds, including HFPO-DA (GenX), PFHxS, and PFBS, were detected at varying frequencies in the sample bottles, with some exceeding the 2024 Interim EPA Hazard Index. Short-chain PFAS, such as PFBA, PFBS, and PFHxA, were also detected at elevated concentrations. Among the three groups of materials, well construction materials had the highest average concentration across all compounds measured. Results demonstrated that well construction and household plumbing materials can act as potential sources of PFAS contamination in residential water supplies, with implications for water quality monitoring and material selection. It is important to note that this work was done under static conditions to provide an initial evaluation of PFAS leachability from these materials. Future work would benefit from incorporating a dynamic element to understand how flow rates, purging, and extended weathering may influence leachability of these materials over years of continuous use.

About The Author

Eleanore Larson is a Geologist at Parsons with experience in field investigations, bench-scale treatability studies, and statistical data analysis for contaminated sites. She holds a Master of Science in Geology, where her research focused on tracking fecal and chemical contaminants in surface water using a multiproxy approach. At Parsons, Eleanore has managed large environmental databases, coordinated public outreach for state-led remediation projects, and supported PFAS-focused treatability studies, including leachability, fluoride and iron sulfide extraction, and microcosm monitoring. Her field experience includes vertical aquifer profiling, lake sediment coring, ground and surface water sampling, and construction of monitoring wells to support robust conceptual site models and remediation decision-making.