Regional PFAS Soil Investigation of the Air Deposition Pathway

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Background/Objectives. Several facilities within a small community historically utilized PFAS-containing materials in their manufacturing processes beginning as early as 1950. This potentially dispersed per- and polyfluoroalkyl substances (PFAS) into the environment via atmospheric emissions and deposition. To support multiple site investigations, a regional-scale investigation specifically designed to evaluate the air emission and deposition pathway was initiated. The objective of the investigation was to determine if PFAS impacts from air deposition were observable in representative soils and consistent with an air deposition conceptual site model (CSM) for sources within the municipality.

Approach/Activities. At the initiation of the investigation, a weather station was installed within the municipality. This provided site-specific information on predominant wind directions and allowed for evaluation of sampling results against an air deposition CSM. The investigation area was divided into a radial grid and ultimately extended to 10,000 feet beyond the municipal boundary to ensure sampling in all directions and at multiple distances from sources within the municipality.

Each sampling location was carefully vetted to ensure samples were representative of air deposition and avoid PFAS concentrations attributable to other potential sources/pathways. Sample location vetting included historical image review, property records review, wetland/floodplain maps, and visual site reconnaissance. Due to this vetting, sampling locations were collected from undisturbed locations on private properties mostly in forested areas. Soil samples were collected from three depth intervals (0-0.17 feet below ground surface [bgs], 0.17-1 feet bgs, and 1-2 feet bgs) at each sampling location and analyzed for a list of 21 PFAS, total organic carbon (TOC), and pH. Currently the dataset includes 321 soil samples collected from 107 individual sampling locations. Sampling locations were distributed throughout the investigation area to evaluate concentration trends with distance and spatial distributions of PFAS.

Results/Lessons Learned. The results of the investigation indicate that the vetting and sampling approach can be used to observe PFAS impacts resulting from air deposition and may have implications for other PFAS investigations. Various evaluations will be discussed including: concentration trends of PFAS by chain length and sample depth; PFAS concentrations trends with distance and direction; and spatial correlation/disparity among different PFAS. The results will also be briefly compared to other similar available datasets. Ultimately discussions will focus on the connection between CSMs, sample design and evaluation of results.

** Barr employees performed work while seconded to BEC Engineering and Geology, PC.*