PFAS Source Determination in a Community with Public and Private Water Supply Impacts

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Background/Objectives. Several perfluoroalkyl substances (PFAS) have recently been identified in drinking water supply wells at a number of locations in New England above United States Environmental Protection Agency (EPA) health advisory for long-term exposure of 70 parts per trillion (ppt) in drinking water. Impacted private and public water supply wells, with a wide variety of construction methods and flow demands, have often been found in close proximity to each other. The source(s) of PFAS is often not obvious from a review of current and past commercial/industrial uses in the area. Identifying the source of the contamination is vital to determine the best remedial options for reducing risk to the public. PFAS characterization is challenging due to the chemical characteristics and the need for ppt quantification levels. High solubility, low adsorption coefficients, and resistance to biodegradation allow advective transport of PFAS in groundwater with little attenuation. Differing manufacturing processes and the wide-ranging uses of PFAS also result in varying chemical makeup and methods of introduction to the environment. Characterization approaches and methods must be designed in consideration of these factors to efficiently and effectively define a PFAS source. The methods utilized to identify a source of PFAS in a small communities public and private water supply wells will be presented.

PFAS were identified above the EPA 70ppt health advisory in a public water supply system serving approximately 35 connections via a sole source bedrock well. Dozens of private bedrock water supply wells primarily serving single family homes are also located nearby. Several potential PFAS sources were identified in the general area, but no “obvious” user of PFAS was identified. The PFAS focused investigation methods effectively and efficiently defined the source area despite unique geologic and aquifer conditions.

Approach/Activities. PFAS sampling of all private water supply wells within a 1/4 mile radius of the impacted public water supply well was performed. Detailed research into the historical uses of properties within 1 mile of the impacted public well was also completed to identify potential PFAS sources and release methods. Utilizing GIS mapping, the distribution of PFAS impacts in the private water supplies as related to the potential sources was visualized. A subsurface investigation designed to evaluate the distribution of PFAS in the unconsolidated aquifer was used to identify the PFAS release source. Environmental media sampling focused on vertically integrated discreet interval groundwater sample (DIGS) analyses. Permeant monitoring wells were placed based upon the DIGS results to provide additional hydrogeologic data for the unconsolidated aquifer. Minimal soil sampling of near surface soils was performed based upon the likely PFAS release mechanism.

Results/Lessons Learned. The release method, geologic conditions and aquifer uses resulted in confounding and overlapping PFAS transport. An intermittent phreatic surface above the bedrock immediately beneath the PFAS source area allowed PFAS contaminated discharge to directly enter the bedrock aquifer. Varied bedrock aquifer uses have caused plume migration in several directions. Surface water sampling and hydrogeologic data measuring bedrock pumping

well impacts on the shallow aquifer should be available by April, providing additional information regarding plume migration dynamics.