Using Groundwater Plume Analytics® Tools to Assess PFAS Fate and Transport

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Background/Objectives. Evaluating fate and transport of PFAS plumes is a relatively new endeavor since many remediation sites have very limited historical data sets for PFAS compounds. Researchers have recently asserted that monitored natural attenuation (MNA) plays a critical and accepted role both spatially and temporally in the remediation of contaminants in groundwater, and it is postulated that if PFAS remediation follows the arc of previous contaminants, then MNA is presumed to be a component of many PFAS remedial strategies1. These researchers go on to state that that "Potentially confounding fate and transport factors include the characteristic diversity of the PFAS chemical class, precursor loads, and rates of transformation, as well as even data uncertainties related to the low concentrations that are of interest. These can be addressed with currently available analytical and statistical solutions. The MNA of PFAS, like other contaminants, can be a viable alternative, as either a standalone or combined remedy, if the concepts of plume stability and receptor protection … are implemented."

Approach/Activities. The Ricker Method® for plume stability analysis is a unique public-domain method of evaluating plume stability that overcomes limitations posed by conventional well-by-well analysis techniques. Outputs from the Ricker Method® can be used to reliably and effectively communicate meaningful patterns in groundwater plume behavior. The Ricker Method® was used to evaluate fate and transport of PFAS compounds for multiple PFAS remediation sites. Each of the sites had at least five years of historical data available for analysis and no active remediation had been conducted. This allowed for the evaluation of PFAS plume behavior under natural conditions.

In additional to evaluating plume behavior for numerous PFAS compounds (e.g., PFOS, PFOA, etc.) in terms of plume area, average concentration, mass, and center of mass, spatial changes in each plume were evaluated using the Spatial Change Indicator™ (SCI) analysis. This powerful tool provides detailed insight into specific parts of a plume. It can demonstrate mass movement with the plume, inform remediation strategy optimization, identify potential sources, and illustrate how the plume is reacting to natural and engineered environmental conditions at a remediation site.

Results/Lessons Learned. Evaluating PFAS plumes using Groundwater Plume Analytics® tools has resulted in a better understanding of the fate and transport of PFAS plumes under natural conditions. The results of two to three case studies will be presented.

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1 Abrams, S., McGregor, R., Burns, M., Galasso, J., Havranek, T., Hesemann, J., Longsworth, J., McDonough, J., & Mora, R. (2022). PFAS Experts Symposium 2: Statements on available in situ remediation technologies. Remediation Journal, 1–9.