Addressing Contaminated Groundwater to Surface Water Discharge: Application of Materials and Methods for Construction of In Situ Permeable Reactive Barriers (PRBs) to Limit Migration of PFAS

Richard Stewart (Ziltek, Pty Ltd.)
John Collins and John Hull, PE, BCEE (AquaBlok)

Background/Objectives. When contamination in soil or groundwater reaches surface water, the cost and level of complexity for remediation typically increases dramatically. At many sites, pump and treat systems have been used to hydraulically control/limit groundwater migration and attempt to reduce contaminant concentrations. However, these systems are expensive to operate/maintain, are often less responsive to fluctuating flow rates or levels of contamination, and many have been running for decades without meeting goals or regulatory requirements. As a result, a number of projects have looked at alternative passive designs to reduce costs, minimize or prevent the potential transfer of contamination to surface water bodies. Control of PFAS impacted groundwater, particularly in areas adjacent to canals, waterways or other bodies of water is an important capability that can reduce impacts on water sources and habitat. It has been demonstrated that a permeable reactive barrier (PRB) can intercept and limit the migration of a range of contaminants. In particular, examples include petroleum related facilities including pipelines, storage and distribution facilities and sites where PFAS contamination is present. Such an approach will also protect sensitive ecological areas (including wetlands and stream crossings) in a manner that minimizes the potential impact to the existing habitat.

Approach/Activities. Best available technology in materials and construction methods will be discussed with respect to the design of a PRB to address PFAS in groundwater. A description of the type of materials, the treatment approach and the use of a funnel and gate design will be provided. The presentation will provide data and case studies and an overview of materials that have been applied to both isolate (low-permeability) and treat (via adsorptive amendments, e.g., RemBind®). Examples will highlight both petroleum- and PFAS-related sites and applications.

Results/Lessons Learned. Information available demonstrates that a PRB design can provide a cost-effective, in situ, passive alternative to pump-and-treat that can minimize the potential movement and impact of petroleum and PFAS contamination from upland areas into surface water.