Liquid Activated Carbon Used in Barrier Application for a Large Chlorinated Plume in Place of P&T Hydraulic Control and ERD with Modeling Results

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Background/Objectives. Liquid Activated Carbon™ (LAC) was used in a barrier application to secure rapid groundwater contaminant reduction via partitioning out of the aqueous phase, treating chlorinated ethene groundwater contamination in a bedrock aquifer in Texas. Numerous private water wells have dispersed the solute plume throughout the site, so arresting plume migration utilizing LAC was implemented as the in situ remedy instead of groundwater extraction for hydraulic control. Additionally, LAC provides a low-cost, long-term performance monitoring solution by reducing rigorous sampling requirements associated with typical ERD technologies, while providing an alternative to prevent biofouling impacts to the downgradient potable wells.

Approach/Activities. The barrier location transects the distal plume to prevent contaminant migration downgradient into private water wells. Of the technologies considered, LAC provided the most cost-effective solution as well as an innovative solution to prevent biofouling, which sometimes develops as a result of typical ERD in situ remedies impacting the downgradient private water wells. Prior to the barrier application, a high-resolution site characterization was completed to guarantee product delivery into the bedrock aquifer and ensure performance. The barrier design was completed utilizing injection wells on 12.5 feet on-center spacing. Geophysical logging was used to clearly identify the target zone and determine the optimal placement of the screen. The injection wells were sampled using an innovative array of passive diffusion bags (PBDs) to vertically and horizontally profile the VOC distribution in the aquifer across the proposed barrier. Additionally, field calibration testing was conducted to confirm the injection porosity and optimize the injection rates necessary to achieve the required ROI for optimal product placement in the sandstone bedrock unit. Six (6) performance wells were installed to evaluate the contaminant concentrations entering and leaving the barrier.

Results/Lessons Learned. Laboratory analytical data from nine (9) groundwater sampling events has been used to evaluate the barrier performance compared to LAC performance models developed using site-specific conditions (i.e., groundwater velocity, degradation rates, etc.). Data collected 1 year post application indicates that 10 of the 12 monitoring locations are below MCLs with the remaining two locations trending toward MCLs. Due to the success and performance of the initial barrier, additional barriers are planned for other areas of the site.