

Phased Amendment Delivery at Urban Brownfield to Address Mixed Plume

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Background/Objectives. Environmental investigation, associated with proposed redevelopment of an approximately 27,000-square-foot brownfield in the Williamsburg neighborhood of Brooklyn, New York, identified chlorinated volatile organic compounds (CVOCs) including tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE) and vinyl chloride (VC) and petroleum contamination in soil, groundwater and soil vapor. Analytical data revealed concentrations of CVOCs exceeding their respective standards in soil samples to depths of up to about 8 feet bgs, and in shallow, and to a lesser extent deep, groundwater samples that exceed their respective standards. Concentrations of petroleum-related compounds in deep well samples above the standard were typically orders of magnitude less than the shallow results, indicating residual impacts of shallower source material. The presence of CVOCs and petroleum contaminants in soil, groundwater, and soil vapor is attributable to historical releases associated with the former auto repair facilities and historical USTs on the site.

Approach/Activities. In order to meet remedial action objectives while accommodating the development timeline, a two-phase treatment program was devised. A bench-scale study was performed to confirm applicability and determine design parameters for the in-situ remedy implementation. The first phase, performed after removal of contaminated overburden and USTs/ASTs, consisted of direct-injection of base-activated persulfate in the area of commingled petroleum and CVOC contamination. The second phase consisted of site-wide application of liquid-activated carbon (PlumeStop®), selected due to its ability to rapidly disperse and degrade CVOC contaminants. The PlumeStop® was applied through an intricate network of sub-foundation injection and monitoring wells and through direct-injection where pre-existing buildings were to remain in-place.

Results/Lessons Learned. ISCO injections were completed in March 2017. Results from the first round of post-injection sampling showed up to two orders of magnitude reduction in total VOCs from pre-injection conditions. PlumeStop® injections were performed in November and December 2017. The presentation will discuss results from multiple monitoring events post carbon injection that show further contaminant reductions.

The phased remedial approach (ISCO and PlumeStop®) proved effective at degrading commingled contamination. The in situ well network allowed for phased treatment, preventing major project delays and associated cost impacts, and provided confidence in the remedial approach should rebound be identified in the future.