

Combining Multiple Remedial Technologies to Accelerate Property Development and Manage Off-Site Risk

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Background/Objectives. This property in a residential community was contaminated through the discharge of chlorinated solvents (primarily trichloroethene or TCE) from buried drums and surface dumping. The resultant solvent plume migrated through the sandy shallow soils and deeper glacial till over time in the direction of off-site residences with private wells.

Approach/Activities. A remedial approach was adopted which combined two treatment technologies to facilitate residential property development by accelerating source reduction and minimizing the potential for off-site migration. In the 1,200 square foot source area, which had concentrations of up to 23,800 ug/L TCE, in situ chemical oxidation (ISCO) was implemented using sodium permanganate. ISCO was selected for its rapid reduction in contaminant concentration and to minimize creation of daughter products. One round of injection was completed in November 2014 with injection focused at the interface between the sand and till. TCE concentrations were reduced to below the regulatory standard of 5 ug/L. Permanganate is still visibly present, suggesting the potential for rebound is minimal.

The downgradient plume edge is 500 feet from the source, and off-site migration toward downgradient private wells was a second concern. Concentrations of up to 241 ug/L TCE have been detected near the downgradient edge of the plume. Creation of an injected permeable reactive barrier using BOS100®, activated carbon impregnated with reduced metallic iron, was selected for long-term prevention of off-site migration. Injections to install the reactive barrier were performed in October 2016. Significant decreases in TCE concentrations have been measured in groundwater samples collected since injection (4 to 8 months after injection), with the immediate downgradient well decreasing from 122 ug/L to 5.47 ug/L and a well 15 feet downgradient declining from 134 to 21.2 ug/L.

Results/Lessons Learned. Tailoring the remedial approach to the project/client goals is critical to managing risk, cost, and client satisfaction. In a sensitive residential area served by private wells, we were able to show both impressive source reduction with a “big hammer”, and provide a longer term protection to downgradient properties. Additional investigations of the two treatment areas for groundwater and soil TCE concentrations as well as geologic stratigraphy focused the treatment strategy and was critical to achieving rapid reductions in TCE concentrations in both areas. The remaining goal for the property is to achieve at least a temporary solution (closure) within the next 1-2 years to allow the dormant property to be developed for residential use, so the client can recoup his investment.