HYDRAULICALLY CONTROLLED, IN-SITU CHEMICAL OXIDATION (ISCO) OF A TCE AND TCA SOURCE IN GROUNDWATER USING SODIUM PERSULFATE

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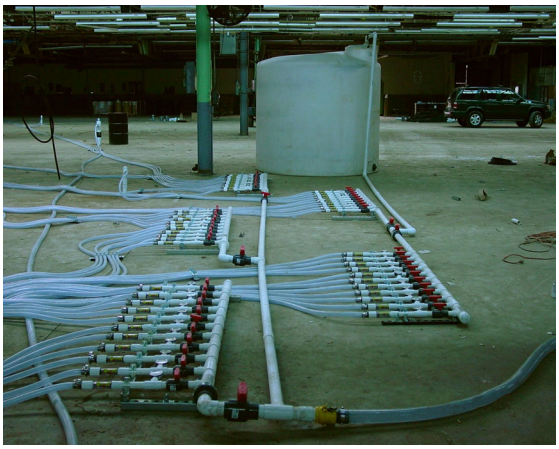

A mixed trichloroethene (TCE) and trichloroethane (TCA) contaminant plume was discovered in groundwater below a 422,000 square foot building as a result of a site wide remedial investigation of a former manufacturing facility. A pre-design investigation (PDI) was subsequently conducted to fill data gaps and ensure that sufficient data were available to evaluate and design the selected technology. Based on the PDI, using a combination of mobile and fixed base laboratory data, the contaminated media was found to be approximately 160,000 square feet in size below the building footprint to a depth of 12 feet BGS.

Overall, the commingled TCE and TCA plume is approximately 51,000 square feet in size, and the remaining portions contain primarily TCE. Concentrations of TCE and TCA in the treatment area range from 100 ug/l to 100,000 ug/l. Because the facility is to be sold for redevelopment, remediation goals include the rapid destruction of the contaminants. Several ISCO technologies were evaluated and bench tested to determine the most effective combination of technologies to treat the contaminants. Because of site re-use concerns and shallow depth; technology selection was based in part on an oxidation reaction that is relatively non-exothermic, while aggressive enough to achieve destruction of the contaminants. Sodium permanganate ($NaMnO_4$) is being used to treat the chlorinated ethenes, but was determined to be ineffective in treating the chlorinated ethanes. A catalyzed sodium persulfate ($Na_2S_2O_8$) chemistry (FMC patent pending) is being applied to the mixed TCE/TCA plume after achieving 95% reduction during bench testing. A key component of this application is controlling the movement of chemical oxidants in the aquifer through a series of injection and extraction wells. This will ensure physical contact between the oxidants and contaminants, and minimize any displacement.

The subject site lies in the area of glacial Lake Passaic in New Jersey and has unique characteristics that will facilitate a hydraulically controlled application of ISCO. The contaminant plume is in a sandy zone of perched groundwater underlain by a glacial clay layer. This unique hydrogeology will facilitate the injection and hydraulic control of the oxidants. Hydraulic testing was conducted as part of the PDI to determine the general radius of influence for injections. This information, along with other PDI data, was used in designing the injection and extraction layout. Bench-scale testing was conducted on soils and groundwater from the site to select the most appropriate chemical oxidant.

At present, full-scale implementation is underway with post-treatment data being collected in the coming weeks. Key data requirements that have assured our group success on numerous other similar projects included properly identifying data gaps, determining geologic and hydrogeological characteristics and bench-scale testing. These elements are critical in evaluating and designing a customized oxidation technology that is appropriate for a specific site. **Panther's** experience with a range of oxidation projects allows us to provide a thoroughly designed program and avoid the trial and error process that is commonly applied today for many ISCO applications.