

Groundwater Remediation

Iron Reactive Barriers

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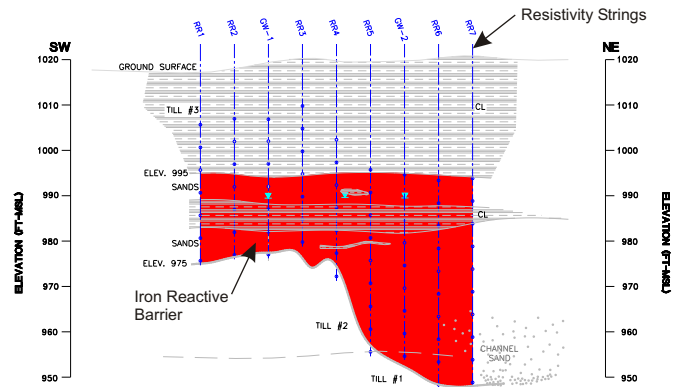
Location: South-Central, Iowa
 Year completed: 1999

A former manufacturing facility in South-Central, Iowa was contaminated with trichloroethene (TCE) in the soil and groundwater. Groundwater concentrations of TCE were detected up to levels of 14,000ppb. The existing remedy involved a vacuum recovery pump and treat system for the groundwater and a high density soil vapor extraction (SVE) system for the vadose zone source remediation. The record of decision (ROD) was modified to a horizontal fracture enhanced SVE system for source removal in the vadose zone and an *in situ* iron reactive barrier for groundwater remediation. Both systems were designed and built by GeoSierra. The reactive barrier was selected over pump and treat due to better remedial performance, minimal operation and maintenance and lower cost.

The site consists of medium to fine channel sands overlying an over consolidated till. The overall remediation system for the site included a fracture enhanced SVE system in the unsaturated till, and a iron reactive barrier for remediation of the groundwater VOC contamination. The remnant plume down gradient of the reactive barrier is expected to be *in situ* bio-remediated by the natural attenuation mechanisms active at the site.

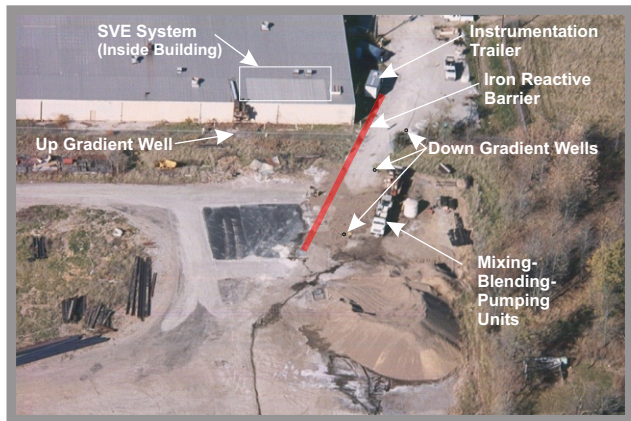
The iron reactive barrier system was constructed to intercept channel sands characterized as loose flowing sands with a permeability of approximately 1 Darcy. The iron reactive barrier is a source control barrier 240 feet long installed from a depth of 25 feet down to a total

depth of 75 feet below ground surface with an average thickness of 3 inches. The reactive barrier was installed by GeoSierra's azimuth control vertical hydraulic fracturing technology with the reactive barrier constructed perpendicular to the groundwater flow direction.

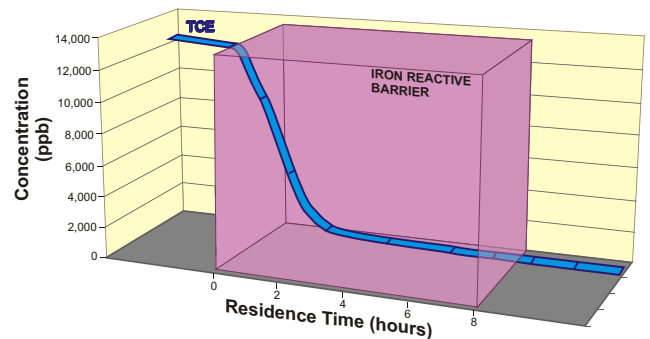


Cross Section of Iron Reactive Barrier

The *in situ* reactive barrier has the capacity to degrade extremely high concentrations of TCE to below the MCL level. Of particular importance in selecting the remedy was that the reactive barrier system is complimentary and enhances the natural attenuation mechanisms active at the site. The remnant plume down gradient of the reactive barrier is expected to be naturally attenuated to MCL levels in approximately 10 years.



Aerial View of Reactive Barrier



Degradation of TCE within the Reactive Barrier



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