

# Groundwater Remediation

## Iron Reactive Barriers

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Location: Fairfield, New Jersey  
Year completed: 1998

A groundwater contaminated plume extends 4,000' down gradient from a Superfund Site in Fairfield, New Jersey. The plume contains high concentrations of chlorinated solvents in the range of thousands of ppb of TCE, cDCE, TCA and TCM. The prime risk from the contaminated groundwater is where it upwells in a seep approximately 3,000' down gradient from the site. An iron reactive barrier system was selected over the ROD Pump and Treat Remedy primarily to address this risk exposure. GeoSierra designed and built the iron reactive barrier using GeoSierra's azimuth control vertical hydraulic fracturing technology. The iron reactive barrier was selected over the Pump and Treat remedy due to better and faster remedial performance at the Seep, minimal operation and maintenance and lower cost.



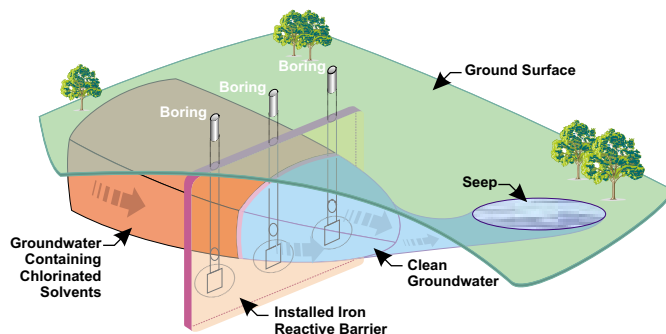
Contaminated Groundwater Plume

The iron reactive barrier at the Site is for full scale remediation and intersects a risk exposure pathway of the contaminated groundwater upwelling in the Seep. The Seep area geology consists of fractured basalt bedrock, overlain by a sand, gravel and cobble eskar deposit, with a competent clay overlying the eskar. The permeability of the eskar deposit varies widely from a low of 10 Darcy in fine sand deposits, to highs of hundreds of Darcy in the clean gravel and cobbles. The fractured bedrock also has a wide range of permeability from a tight fractured competent rock, to open channels and fissures. The groundwater flow velocities vary widely due to the variation in strata, and are estimated to be 2'/day in the eskar and possibly up to an order of magnitude greater in the fractured bedrock.



Aerial View of Reactive Barrier

The reactive barrier was constructed by GeoSierra's azimuth control vertical hydraulic fracturing technology in the unconsolidated sediments and infill permeation injection in the fractured bedrock. The reactive barrier consists of two parallel vertical hydraulic fracture placed barriers in the eskar deposit, orientated perpendicular to the groundwater flow regime, and an infilled permeation zone in the underlying fractured bedrock. The reactive barriers are each approximately 180 feet long and extend from a depth of 25' down to a total depth of 65'. Down gradient groundwater monitoring data has quantified the field performance of the iron reactive barrier in this extremely complex glacial geology. The barrier has dechlorinated greater than 95% of the TCE contaminant in the groundwater at low seep flow rates. At higher seep flow rates the barrier is typically destroying greater than 50% of the VOC contaminants.



Installed Iron Reactive Barrier