In Situ Source Zone Remediation Using Electrical Resistance Heating on a Project Site Located near Troyes, France

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Background/Objectives. Near Troyes in France, electrical resistance heating (ERH) was applied at a site where groundwater is heavily polluted by chlorinated solvents, resulting in an extensive plume that creates actual human risks for the neighboring town as well as the river Seine. The goal of the in situ thermal remediation project was to remove the source zone to such an extent that the plume will fade over time and no further active measures are required. The ERH approach was evaluated as the most environmentally and cost effective remedial option versus an endless pump & treat geohydrological barrier. The remedial target was to remove the DNAPL and concentrations that exceed 10 mg/kgdw of PCE. After remediation at the site is complete, it will be sold and likely redeveloped due to the attractive location near a residential area.

Approach/Activities. The site treatment area is ca. 1.150 m^2, with a volume of ca. 9.000 m^3. The source zone was present to a maximum depth of 15 mbgs and the primary contaminant is perchloroethylene (PCE). The mass estimate prior to ERH was expected to be 25 tonnes, estimate to date removed is ca. 6.500 kg, but will continue after shutdown. The site lithology consists of very chalky clay at the surface to chalk rock at depth, with groundwater is found at 4-5 mbgs. A total 52 shallow and 52 deep electrodes where installed with co-located vapor recovery wells. Nine monitoring points were also installed to monitor temperatures.

Results/Lessons Learned. ERH remediation began on May 8, 2017 and remedial results were monitored by periodic sampling of 5x3 monitoring wells. Using the on-site PLC and telemetric system, all sensors were monitored in real-time and data logged. Heating was completed and the system was shut down on September 22. This presentation will discuss the site-specific conditions, including: energy, mass removed, temperature profiles, as well as remedial results.