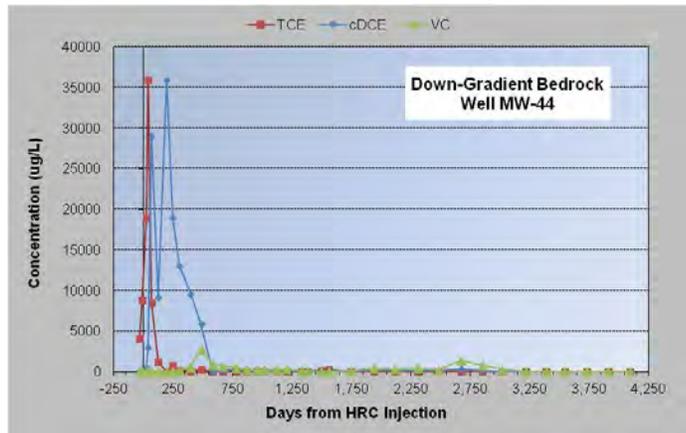


Groundwater Remediation Using Enhanced Biodegradation

Electrical Component Manufacturing Facility, Oconee County, SC

Site Description

Groundwater has been impacted by TCE at this active manufacturing facility. The owner elected to employ an innovative remediation technology in the source area to shorten the groundwater remediation time-frame. A review of available technologies resulted in the selection of HRC[®] as the reducing agent to stimulate anaerobic biodegradation of TCE via reductive dechlorination. Given the site geologic complexity, two large scale pilot studies were initially implemented in saprolite and bedrock.



Rogers & Callcott Services and Results

Preparation for Pilot Studies - Extensive characterizations of the bedrock and saprolite aquifers in the pilot study areas were conducted prior to HRC[®] injection to establish baseline conditions. Studies consisted of discrete soil and groundwater sampling, bedrock coring, packer testing, and water injection to measure fracture interconnectivity and aquifer conductivity. The characterization resulted in the design of an injection program suitable for each zone of the aquifer.

HRC[®] Injection - Approximately 1,000 pounds of material was injected in 6 bedrock and 23 saprolite injection wells installed during the pilot studies. Groundwater was monitored for geochemical parameters, TOC, HRC[®] acids, TCE, and daughter products for 9 years after injection. This has allowed monitoring the progress of TCE degradation simultaneously with the longevity of the HRC[®] injectate as well as the reducing environment established. As a result of the injections, TCE concentrations decreased by up to 99.9% in bedrock and 96% in saprolite in 28 months. Reduced contaminant concentrations persist 12 years after the HRC[®] injections in both study areas exhibiting total VOC reductions of 99.9% in bedrock



and 95% in saprolite over baseline values.

Full-Scale Injection – Based on the positive results of the pilot studies, implementation of two full-scale bioremediation barriers was completed at the subject facility in 2012 to continue decreasing the remediation time-frame and limit off-site migration. Combined, the barriers span 400 feet in length consisting of 20 newly installed bedrock injection wells, 17 new saprolite injection wells, and 18 saprolite injection wells installed as part of the pilot study. 3DMe (HRC[®] Advanced) was selected as the electron donor, and was delivered to the subsurface by Geoprobe and through injection wells installed up to 30 feet into bedrock. Reducing conditions were established within 40 days after injection followed by a declining trend in contaminant concentrations.