

Vacuum-Enhanced, Dual-Phase Extraction and Bioremediation with HRC[®] HRC-Advanced[®]/HRC-XTM for Remediation of Chlorinated Hydrocarbons

David J. Russell, P.E, DEE (david.russell@aecom.com), Federic Bruneau, and Richard Staron
(AECOM, Trevose, PA, USA)

A chemical manufacturer and distributor's site in New Jersey has been the subject of significant investigative and remedial efforts, beginning with investigations conducted in 1985 that were triggered by a proposed real estate transaction under the New Jersey Industrial Site Recovery Act.

Attempts to control site risks to human health and the environment have been conducted through remediation of impacted soils, the continued operation of a groundwater extraction and treatment system, and installation of a concrete culvert to eliminate contaminant migration to a surface water body that traverses the center of the property. Due to the lack of progress toward closure of the environmental issues at the site, a site-wide remedial strategy to facilitate closure of environmental issues was required to allow development of the property.

Based upon review of existing site conditions and remedial efforts to date, a site-wide remedial strategy and fixed fee to closure was developed for the site. Three active remedial options were identified as applicable approaches for meeting remedial objectives that would support business decision-making regarding future site development:

- Vacuum-enhanced Dual-phase Extraction (DPE) as a source control measure;
- Grid injections with Hydrogen Release Compound (HRC[®] and HRC-Advanced[®]) to address areas of residual contamination;
- Injection of a Hydrogen Release Compound (HRC[®]/HRC-XTM) barrier system for migration control of contaminated groundwater discharging to an on-site stream; and
- Upgrading of the existing groundwater recovery and treatment system.

Once source control was initiated, the HRC[®]/HRC-XTM barrier system was implemented providing downgradient migration control. HRC[®] and HRC-Advanced[®] grid injections were used to address targeted areas of residual contamination not completely addressed by the DPE system. Ongoing groundwater monitoring would be required under a Classification Exception Area (CEA) and natural remediation monitoring plan to confirm remediation for an additional time period.

The DPE system has been in operation for seven years and has recovered an estimated total volatile organic compound mass of over 8,000 pounds while eliminating historic migration of contaminants to the on-site stream. The HRC[®]/HRC-XTM Migration Barrier was installed in October 2003 and groundwater monitoring has demonstrated a significant reduction in total volatile organic compound concentrations due to the HRC[®]/HRC-XTM injections. The groundwater recovery and treatment system upgrades have also enhanced control of off-site migration of contaminants.

This project is being conducted under a fixed price to closure contract with an environmental cost cap insurance policy to implement the site-wide remedial strategy. The fixed price to closure is \$3,729,500.