Remedial Investigations and Remedial Action Services

Chlorinated Solvents in Fractured Bedrock

CLIENT:
BEM Systems Inc.

DATE STARTED: September 2003
DATE COMPLETED: September 2005
CONTRACT AMOUNT: $145,000

SCOPE OF WORK

PROJECT DESCRIPTION:

Based on years of remedial investigations and remedial actions which included pump and treat and chemical oxidation, Sovereign was asked to develop and implement a remedial action that would meet the New York State Department of Environmental Conservation (NYSDEC) cleanup goals and allow the site to be taken off the New York State Registry of Inactive Hazardous Waste Disposal Sites, to allow for the sale of the property.

Therefore, Sovereign reviewed the existing site data and developed a remedial alternative that would bring the site to closure within 12-24 months. Based on the site conditions and our evaluation, Sovereign proposed the injection of a hydrogen release compound (HRC) to supplement the ongoing attenuation through anaerobic bioremediation of chlorinated hydrocarbons (i.e., reductive dechlorination), at the site. However based on the low permeable and very dense glacial till and weathered bedrock at the Cornell Manufacturing site, flows through soil pores and natural cracks will be impeded, and are the primary limitation for the effectiveness of the HRC. To overcome this limitation, Sovereign proposed pneumatic fracturing, is recommended to enhance the Site’s naturally low formation permeability. Pneumatic fracturing consists of the controlled injection of high pressure nitrogen into an isolated subsurface zone at a rate which exceeds the natural permeability of the formation. The result is a fractured zone extending radially outward from the point of injection. Locally, pneumatic fracturing will create new convective pathways in the formation that increase permeability and shorten diffusive distances. The improved formation interconnectivity will allow for an increased and more uniform distribution of the hydrogen release compound in the formation, and minimize the number of injection points.

The pneumatic fracturing within the treatment area is an important factor to the effective application of the hydrogen release compound because the remediation of the groundwater at the site depends on an increased pore fluid exchange rate (i.e. the ability to increase the distribution of the hydrogen release compound) and the increased contact of the hydrogen release compound with contaminated groundwater.

Subsequently, Sovereign pneumatically fractured 10 wells within the area of concern and injected approximately 3,000 pounds of HRC into the formation. After the injection Sovereign performed Anaerobic Analysis Monitoring to evaluate the desired geochemical changes in the shallow groundwater. Based on the results of the anaerobic analysis monitoring it was decided to inject a dechlorinating culture, which contains the *Dehalococcoides*, to complete and/or increase the rate of reductive dechlorination. Therefore, 108-gallons of Bio-Dechlor Inoculum was injected at three (3) locations.

The results of the remedial action showed more than an 80% reduction in TCE concentration, 3 months after the injection. One year after the injection the total VOCs at the site reduced by over 92% and the client petitioned for closure.