Assessment and Remediation

Former Electronics Manufacturing Facility, Greenville, South Carolina

PROJECT DESCRIPTION

Chlorinated solvents were detected in soil and groundwater at this former manufacturing facility in the Piedmont. Groundwater contamination is present in both the saprolite and bedrock aquifers, and DNAPL was observed during the field investigation. The work is being conducted under the South Carolina voluntary cleanup program administered by the state Superfund group following CERCLA protocol.

Rogers & Callcott completed source characterization and on- and off-site plume definition in the vadose zone and the saprolite and bedrock aquifers. Interim remedies were implemented for source and hot spot removal and hydraulic containment, and the final remedy is now in place.

ROGERS & CALLCOTT SERVICES

Site Investigation: Phased site investigations made use of various drilling and sampling methods, colorimetric field screening, DNAPL characterization, packer testing, pumping tests, geochemical characterization, diffusion profiling, and surface water and sediment sampling to complete efficient site assessment. Chemical analyses were performed at our in-house laboratory with the benefit of high quality data generated by a fully-certified, fixed-base laboratory producing data within 24 hours as needed.

Interim Remedy Selection, Design, and Results: Interim Remedial actions, including soil excavation and soil vapor extraction (SVE), were implemented in conjunction with ongoing investigation. Numerous remedial options were evaluated for site-specific conditions. A pump-and-treat barrier system was initially used to capture contaminated groundwater and mitigate off-site migration of the contaminant plume. Source contamination was addressed by In-Situ Thermal Desorption (ISTD), the first remedy of its kind performed in South Carolina. ISTD is the simultaneous application of heat by thermal conduction and vacuum to soils within a target treatment zone. Complete source removal within the target treatment zone was completed in 5 months. The ISTD significantly reduced the remediation time of the overall plume.

Waste Treatment: Excavated soils that were classified as hazardous waste were rendered non-hazardous on-site using a mobile steam desorption unit, resulting in lower disposal costs for the client.

Modeling: REMChlor, a computer analytical model released by EPA, has been used to simulate the effects of source remediation at the site. This effort provided an analytical evaluation of the results of source removal on the longevity of the contaminant plume in groundwater. This model has been refined multiple times as new data has been obtained.

Risk Assessment: Exposure pathways of the contaminants were evaluated for multiple media and populations to identify potential hazards, additional response action, and remediation goals in soil surface water and sediment.

Remedial Investigation/Feasibility Study: Results of the earlier investigation, interim remediation, and risk assessment were used to finalize the Remedial Investigation. Consequently, several remediation approaches and technologies were evaluated in a complete Feasibility Study report.

Pilot Studies: In-situ chemical oxidation (ISCO) and in-situ chemical reduction were coupled in two pilot studies conducted at the site in the source area and down-gradient of the source area, respectively. Solid potassium permanganate was injected into induced fractures in the source area to reduce contamination by ISCO. Contaminant destruction was achieved within the zone of influence of the injection wells, where TCE concentrations were reduced by up to 100 percent. Down-gradient of the source area, a zero-valent iron (ZVI) barrier was installed by injecting into induced fractures to mitigate plume migration by ISCR. Four

months after installation of the barrier, all downgradient monitoring wells within 120 feet exhibited a decrease in TCE concentration, with reduction percentages ranging from 57–100 percent.

Remedial Design/Remedial Action: Based on the successful pilot study results, a Remedial Design for full-scale implementation of ISCO source area treatment and three downgradient ISCR barriers was completed and has been implemented. Additional SVE was also performed as part of the final site remedy and has exceeded the remediation goal for VOCs in soil.