

Soil and Groundwater Investigation and In-Situ Thermal Desorption

Former Electronics Manufacturing Facility, Greenville, SC

Site Description

Chlorinated solvents have been detected in soil and groundwater at this former manufacturing facility in the Piedmont. The groundwater contamination is present in both the saprolite and bedrock aquifers, and NAPL has been observed during the field investigation. The investigation and remediation are being conducted under a state voluntary cleanup program administered by the state Superfund group.



Rogers & Callcott Services and Results

Site Investigation – Soil and groundwater investigations have been conducted using a phased approach, which resulted in an efficient, focused, and cost-effective assessment process. The phased site investigations utilized various drilling and sampling methods, innovative colorimetric field screening, DNAPL characterization, packer testing, aquifer hydraulic testing, geochemical characterization, surface water and sediment sampling and diffusion sampling.

Remedy Selection, Design and Implementation – Remedial actions, including limited soil excavation and soil vapor extraction, have been implemented in conjunction with the ongoing investigation. Numerous remedial options have been evaluated in light of site-specific conditions. A pump-and-treat barrier system was designed and installed to capture contaminated groundwater and mitigate offsite migration of the contaminant plume.

Source treatment was conducted utilizing In-Situ Thermal Desorption (ISTD). ISTD is the simultaneous application of heat by thermal conduction and vacuum. The ISTD system was designed to remediate a TCE source zone that is approximately 33 ft x 76 ft (2,508 ft²) extending from ground surface to approximately 10 feet below the typical bedrock surface or 85 feet below ground surface (bgs). The total volume encompassed by the TTZ is 7,900 cubic yards. The extended TTZ depth allowed for undulations in the bedrock surface and ensured treatment of all of the soil within the TTZ. The heated interval extended to approximately 90 ft bgs to ensure complete heating of the TTZ.

Soil Characteristics: The site is located in the Inner Piedmont physiographic province of South Carolina. The source area targeted for treatment was underlain by 4 geologic units. The units are listed below in order from the ground surface down.

- 1) *Fill (re-worked saprolite):* 0-25 ft bgs
- 2) *Saprolitic Soil (weathered granite):* 25-55 ft bgs
- 3) *Partially Weathered Bedrock:* 55-75 ft bgs
- 4) *Fractured Bedrock:* The bedrock surface undulates with an average depth to the bedrock surface of approximately 5 ft.

The water table is at the bottom of the saprolitic soil at approximately 55 feet bgs, resulting in a total saturated thickness of approximately 20 feet of soil and partially weathered bedrock overlying the fractured bedrock.

Project Approach: ISTD remediation at the SC Piedmont, former manufacturing facility included the following design features: a) minimum target temperature of 100°C; b) 15-ft spacing between thermal wells; c) 24 thermal wells; d) vapor barrier; e) heated interval extending from 1 ft to ~90 ft bgs (i.e., approximately 15 ft into the top of bedrock).

Project Results: The project was finished within the planned 120 day heating period and the treatment zone reached steam temperatures within 100 days. All remedial goals were reached. The ISTD heaters and vapor collection system operated continuously 100% of the time with no failures or downtime. Approximately 6 tons of VOCs were removed in less than 5 months. Laboratory data from sampling showed that the 95% UCL of the TCE concentrations in soil above and below the water table was less than 0.02 mg/kg, well below the remediation goal of 0.06 mg/kg.

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