

Overburden and Bedrock Remediation at Retail Gas Site

SUMMARY

Trap & Treat® BOS 200® was used to remediate petroleum hydrocarbon impacted groundwater within fractured bedrock and overburden soil at a former retail gasoline site in North Carolina. After a thorough remedial design characterization was completed, BOS 200® was surgically injected over two field events to successfully achieve the site cleanup goals.

CHALLENGES & OBJECTIVES

The site was formerly a general store with two 1,000 gallon USTs; the primary constituents of concern were Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX). The shallow highly fractured phyllite schist bedrock is approximately 10 feet (ft) below ground surface (bgs). Groundwater is contained within the overburden and bedrock. The initial objective was to evaluate the performance of BOS 200® injections in bedrock to achieve the North Carolina 2B x 10 groundwater clean-up goals. If successful, the application would be expanded to the overburden. Monitoring wells were screened in the overburden, bedrock, and across the overburden/bedrock interface. The conceptual model theorized that hydrocarbon mass resided at the overburden/bedrock interface and was contributing to groundwater exceedances in bedrock.

APPROACH

An LNAPL investigation was performed (by others) using qualitative methods that concluded that zones of NAPL saturated soil were not present and NAPL was residual in nature rather than mobile. Laboratory tests were performed at the Remediation Products Inc. (RPI) Quality Assurance Laboratory using LNAPL from the site and Trap & Treat® BOS 200® to measure the capacity of the product to absorb the NAPL. The test results were subsequently used in development of the treatment design. AST Environmental, Inc. implemented the remedial approach in five specific areas on site in 2007. Roughly 24,000 lbs of BOS 200® were installed within various depth horizons beginning as shallow as 14 ft and extending as deep as 32 ft. Confirmation of distribution was verified by monitoring well water levels and visual presence of BOS 200®. Further, twelve post injection soil borings were completed within the injection areas to confirm distribution of the product throughout the injection horizons.

LOCATION

North Carolina

CLIENT

Retail Gasoline Site

SOLUTION

Once the aquifer and bedrock characterization activities were complete, the injection of the BOS 200® in discrete injection intervals was performed. Clean water injection tests were performed at the identified bedrock features prior to injection of the BOS 200®. The clean water and BOS 200® injections were completed using a truck mounted custom injection system containing a 165 HP triplex positive displacement pump that is powered by the truck's 425 HP diesel engine coupled to the truck's 8-speed transmission and a custom straddle packer system that allows for an 18-inch discrete injection interval. Approximately six months after the bedrock injections were complete and contaminant reductions below the target thresholds were obtained, BOS 200® was injected in the overburden saturated soil and groundwater. BOS 200® and Trap & Treat® facultative bacteria were injected in 44 injection points spaced on a 5-foot triangular grid pattern. Injections were completed every two vertical feet from four to eleven ft bgs.

RESULTS

After the first injection event, the compliance bedrock well achieved cleanup standards and a 50% to 75% reduction of BTEX concentrations was demonstrated in the wells screened across the bedrock interface. After the second injection event (overburden only), the overburden injections achieved cleanup standards in all of the targeted wells. Quarterly sampling events were completed after the injections and the results of the sampling demonstrated that the BOS 200® application achieved the cleanup goals (NC 2B X 10 freshwater standard).

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