



## CASE STUDY

**SITE: RETAIL GASOLINE STATION, COLORADO**

**CLIENT: SINCLAIR MARKETING CO.**

### INTRODUCTION

The scope of work for this site included an expansion of an existing soil venting system to remediate impacted soil and injection of a carbon-based petroleum degrading product to remediate long-term groundwater impacts. By using a combination of remediation technologies, including LT Environmental's (LTE) **TerraCert™** program, the overall goal of a cost effective cleanup was achieved.



### EVALUATION

The client requested an alternative to the existing remedial system to reduce lifecycle costs and obtain closure. Since 1993 the client had used an active air sparging/soil vapor extraction (AS/SVE) remedial system, but continued downgradient migration of impacted groundwater and onsite impacts appeared to be recalcitrant to the traditional remedial technique. The client requested that onsite work limit downtime to retail gasoline sales, and that the solution requires minimal maintenance. In order to accomplish these requests, LTE applied our **TerraCert™** program to develop an injection plan that used a small footprint track rig. LTE worked during non-business hours to limit inconvenient restricted access to pump islands and the retail business. A limited expansion to the SVE portion of the mechanical system in place was designed to remove the impacts in the unsaturated horizon.

Site assessment activities identified hydrocarbon impacts in the fractured claystone bedrock aquifer. Prior to injection and expansion of the SVE system, groundwater concentrations exceeded 1.0 milligrams per liter (mg/L) benzene and 25 mg/L MTBE.

Clean-up goals of the groundwater using the **TerraCert™** program focused on benzene remediation, as MTBE is only regulated in Colorado to the extent that a human receptor is threatened, and none was identified.



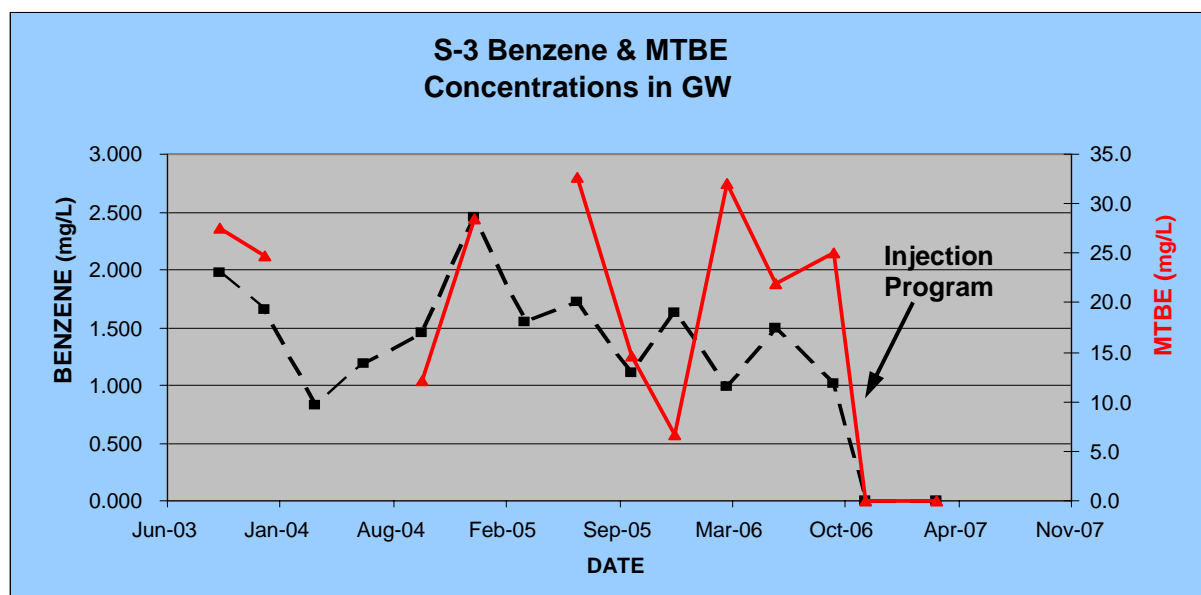
## DESIGN/INSTALLATION

A carbon-based injectate, BOS 200<sup>®</sup>, is well suited for remediation of gasoline, as it has been designed to degrade petroleum products. The technology has been proven to be superior to AS for groundwater mitigation in fractured bedrock aquifers. The design of the hydrocarbon degradation product was based on the hydrocarbon suite of contaminants in gasoline, as remediation of MTBE was not required. Using a track mounted direct push rig and high pressure positive displacement pumps, a total of 5,000 pounds of carbon based injectate was placed in a star-shaped array during the injection program.

Injections of the carbon-based product and expansion of the SVE system were completed by October 2006. Performance monitoring is conducted quarterly.

## RESULTS

By the fourth-quarter of 2006, monitoring wells within the plume that previously had reported benzene concentrations greater than 1.0 mg/L had been reduced to non-detect levels of benzene (<0.001 mg/L). The SVE system was shut down in July 2006, with full closure anticipated by mid 2008.



An unexpected positive result of the TerraCert<sup>™</sup> program was the substantial reduction of MTBE to 0.004 mg/L observed in a large portion of the defined plume. The Colorado state clean-up target of 0.020 mg/L was achieved in an area where greater than 25 mg/L had been reported prior to the injection program.