

# PROJECT HIGHLIGHT

**CLIENT:** NASA

**LOCATION:** Huntsville, AL

**TECHNOLOGY:** Pneumatic

Fracturing

**LITHOLOGY:** Asphalt, clay

**CONTAMINANTS:** Chlorinated

Solvents (TCE)

## PNEUMATIC FRACTURING AND CHEMICAL OXIDATION AT A SITE IN HUNTSVILLE, AL

### Site Information

During November 2002, Cascade completed a field-scale chemical oxidation pilot test at an active government facility in Huntsville, Alabama. The project scope consisted of integrating Pneumatic Fracturing and the injection of Fenton's reagent to address dense non-aqueous phase Liquid (DNAPL) source contamination within both the unsaturated and saturated zone at the site.

The site, a former drum storage area, contained TCE soil and groundwater concentrations ranging up to hundreds of thousands of ppb, with suspected presence of product phase in the subsurface.

The heterogeneous geology consisted of a tight, silty clay (unsaturated zone) overlying a gravel, chert, clay layer (saturated zone) above limestone bedrock.

### Approach

Using three injection wells in a triangular pattern around two existing monitoring wells, Pneumatic Fracturing was first applied to create an interconnected fracture network and increase the bulk permeability of the formation.

The enhanced fracture network served to optimize the reagent injection, improve contact between the target contaminant and the injected chemicals and allow for better pH adjustment control in the subsurface.

Once the Pneumatic Fracturing was complete, the team injected phosphoric acid to decrease the *in-situ* pH below 4 SU to facilitate the Fenton's reaction. The acid was injected using a combination of atomized liquid injection (ALI) process and hydraulic methods.

Once the pH was lowered, injection of hydrogen peroxide was conducted. Approximately 8,600 gallons of hydrogen peroxide at concentrations ranging from 5-12% were effectively emplaced within the unsaturated and saturated zones.

### Results

Three rounds of post-injection groundwater sampling events showed TCE concentrations to have decreased by 50-75% in the two target monitoring wells.

Cascade's Pneumatic Fracturing and chemical injection delivery method for chemical reagents is ideally suited for difficult geologic formations like the ones found at this site.

