

## Chlorinated Solvents in Tight Clay/Weathered Rock Reduced 98% in 17 Months at a Superfund Site

Kristine Casper (AECOM, Milwaukee, WI, USA)

Anthony Moore (Environmental Works, Inc., Kansas City, MO, USA)

**Ryan Moore** (rmoore@regenesi.com) (REGENESIS, Valparaiso, IN, USA)

Owen Miller (REGENESIS, Milwaukee, WI, USA)

**Background/Objectives.** Chlorinated solvents in a low-permeability overburden unit posed a continuing threat of impacting the underlying karstic limestone bedrock at a Superfund site in Missouri. Uncertainty existed regarding whether the overburden unit, primarily identified as fat clays, was capable of sufficiently allowing for transmission and effective distribution of injected fluids to allow for a successful in situ injection program.

**Approach/Activities.** To address this uncertainty, a pre-remedial clear water injection test was conducted to demonstrate that in situ injections were feasible and capable of achieving sufficient lateral distribution to facilitate full-scale implementation. The test included monitoring of injection pressures, flow rates, water level changes, and field water quality measurements. This test led to a successful full-scale enhanced reductive dechlorination (ERD) treatment in the overburden unit. Concurrent to the ERD treatment, a transitional weathered rock unit between the overburden and limestone aquifer was targeted using liquid activated carbon and ERD to simultaneously capture and treat cVOCs before migrating to the underlying limestone.

**Results/Lessons Learned.** In the five most impacted monitoring wells in the target treatment zone, total dissolved-phase cVOCs, including parent and daughter compounds, were reduced 98%, from an average of greater than 2,000 micrograms per liter ( $\mu\text{g/L}$ ) to less than 40  $\mu\text{g/L}$  within 17 months. Time series data for cVOC concentrations within the treatment zone will be presented along with an analysis of dechlorination rates which will demonstrate that contaminants in clay soils can be remediated relatively quickly using this approach.