

## **Development of Contaminated Site Enabled Following Enhanced Reductive Dechlorination of Chlorinated Solvents**

*Jeremy Birnstingl, Ph.D.* (jbirnstingl@regenesi.com) (Regenesi, Ltd., Bath, U.K.)  
Matt Royall (ENVIRON, Birmingham, U.K.)

Regulatory approval for residential development of a property site near Oxford, UK, was contingent upon adequately addressing chlorinated solvent contamination of groundwater attributed to former laundry operations at the site. Concentration trends of tetrachloroethene (PCE) were increasing with little or no measureable daughter products indicating negligible reductive dechlorination occurring in the subsurface. ENVIRON UK Ltd completed a Detailed Quantitative Risk Assessment (DQRA), remedial options appraisal and liaised with the regulatory authorities in order to agree on a remedial strategy and site specific remedial target values for the property. Anaerobic biostimulation using a proprietary electron donor was selected as the most cost-effective and unobtrusive approach to reduce chlorinated solvent concentrations at the site.

3-D Microemulsion (3DMe)<sup>TM</sup>, supplied by Regenesi Ltd. (Bath, UK), was selected as the electron donor and was applied as a microemulsion to enable wider distribution of the product through a reduced number of direct-push application points, thereby reducing fieldwork costs whilst maintaining sufficient reagent distribution and remedial performance through a single application event.

Comparison of pre- and post-application monitoring indicated substantial contaminant degradation was occurring. PCE declined from a high of over 3,500 micrograms per litre ( $\mu\text{g/L}$ ) to non-detect levels whilst breakdown products cis-dichloroethene (cis-DCE) and vinyl chloride (VC) increased and decreased as expected as sequential dechlorination proceeded, peaking around 5,000  $\mu\text{g/L}$  and 150  $\mu\text{g/L}$ , respectively, despite a major influx of PCE following removal of an adjacent concrete slab.

Core area contaminant reduction of 98% and 96% were reported for PCE and TCE respectively (location BHR2) whilst the total contaminant mass reduction across the site was estimated at between 80 – 85% overall. The site was submitted for closure on the basis of remediation secured and ongoing downward concentration trends. Redevelopment of the site was permitted in parallel to the remediation and regulatory sign off has been achieved.