Technical Note 4

FIELD PILOT TRIAL

In March 2011 a field pilot trial was initiated on an industrial site in Hampshire historically contaminated with high levels of chlorinated solvents. The aim of the trial was to intercept and treat solvent contaminated groundwater in a permeable reactive barrier arrangement.

Ten 7m deep boreholes were installed comprising seven injection wells and three new monitoring boreholes. DCL Biolsolv was prepared on site by diluting by a factor of ten with water and adding the buffering agent. This was then gravity fed to the injection wells. The monitoring boreholes were located 1m, 2m and 4m down hydraulic gradient of the injection wells.

In-situ groundwater monitoring indicated sub-surface conditions rapidly becoming favourable for degradation of chlorinated solvents following injection of remediation product. Oxidation-reduction potential (ORP) is an important parameter for anaerobic degradation of chlorinated solvents. The average ORP value in the injection boreholes prior to introduction of DCL Biosolv was -18.2 mV (range -68.6 to +85.3mV) which is likely to result in low levels of natural anaerobic degradation of chlorinated solvents. Four weeks after injection the range was -32.6 to -220.7 mV with an average of -120.7 mV in the injection boreholes. The average dissolved oxygen concentration in the injection boreholes immediately prior to introduction of remediation product was 1.8 mg/l (range 0.9 – 3.4 mg/l). Four weeks after injection the average concentration had fallen to 0.2 mg/l (range 0.1 – 0.5 mg/l).

Large reductions in chlorinated solvent concentrations became apparent in the down stream monitoring boreholes. For example trichloroethene (TCE) concentrations in monitoring borehole MW12, located 2m down hydraulic gradient fell from an initial concentration of 47,000 µg/l to 70 µg/l after 20 weeks. Similarly, tetrachloroethene (PCE) concentrations fell from 59,000 µg/l to 29 µg/l after 20 weeks in MW12.

Analytical results indicated significant, but temporary, increases in the degradation intermediates cis 1,2 dichloroethene (cDCE) and vinyl chloride (VC) providing evidence for the anaerobic degradation of the contaminants of concern.