



# TCE Remediation With BioLogix CL<sup>®</sup> Bioremediation

## Case Study: Industrial Site, Houston, Texas

### Site Summary

BioLogix CL<sup>®</sup> bioaugmentation was implemented in combination with dual phase extraction at an industrial site near Houston, Texas to remove trichloroethylene (TCE) from ground water. The overlying contaminated soil was excavated, but perched ground water and a deeper aquifer had TCE concentrations greater than 10,000 µg/L. A dual-phase vacuum extraction system was installed to control the ground water gradient and increase distribution of the BioLogix CL<sup>®</sup> organisms in the aquifer. The TCE concentrations were reduced by 99.9% in one year.

### Geology and Hydrogeology

The site is located on coastal plain sediments characteristically interbedded sands, silts and clays. The first impacted ground water was a thin perched layer 16 to 18 feet below ground surface. A more transmissive, water bearing zone was at 25 to 30 feet deep. Both water-bearing layers and the interbedded fine-grained layers had TCE concentrations above regulatory standards.

### Contamination

High concentrations of TCE were present in perched and deeper ground water. Prior to treatment, a small area of soil less than 500 square feet had TCE concentrations greater than 20,000 µg/L. The underlying impacted perched ground water area was the same size and had TCE concentrations up to 30,000 µg/L. The TCE migrated laterally in the underlying deeper ground water where the TCE concentrations were greater than 10,000 µg/L. The area of the deeper ground water plume was approximately 30,000 square feet.

### Remediation

The contaminated unsaturated soil was excavated for treatment to the perched ground water. The perched ground water was treated by a combination of potassium permanganate and vapor extraction. The deeper aquifer was treated by a combination of dual-phase extraction and BioLogix CL<sup>®</sup> bioremediation.

BioLogix CL<sup>®</sup> was applied eight times between January, 2010 and February, 2011. During each application 55 to 110 gallons of BioLogix CL<sup>®</sup> was injected into the ground water. The dual-phase extraction system was used to control the ground water gradient and induce greater distribution of the BioLogix CL<sup>®</sup> microbes. Periodic plate count analysis of the microbial population in the treated aquifer was completed to guide where and when the BioLogix CL<sup>®</sup> population should be supplemented. The repeat applications were on approximately 4 to 6 week intervals.

### Results

Following one year of bioaugmentation, the contaminant concentrations were reduced by more than 99%. The daughter products caused by incomplete natural breakdown were removed as well as the TCE. The following table shows the contaminant concentration trends in the treatment area.

Contaminant	MW-1 (Source)		MW-6 (Mid-plume)	
	Pre-Treatment	Post Treatment	Pre-Treatment	Post Treatment
TCE	11,000	< 1	2,500	< 1
Cis-1,2 DCE	8,700	< 1	940	1.6
Vinyl Chloride	14	4.7	15	<1
Total CVOC	19,714	4.7	3,455	1.6