

# Residential Redevelopment of Former Industrial Site, Helsingborg Sweden

## Enhanced Reductive Dechlorination Treats Chlorinated Solvents



### Summary

Extensive chlorinated solvent contamination was discovered during the redevelopment of a former manufacturing facility into residential properties, in Helsingborg Sweden. High concentrations of TCE (including DNAPL) were present within the soil and groundwater and the contamination had infiltrated the underlying fractured mudstone bedrock.

A remedial solution was required that would address the groundwater contamination, sorbed contamination in the soils and DNAPL in the impacted bedrock.

### Treatment

3-D Microemulsion, an advanced self-distributing and long-lasting electron-donor technology developed by Regenesis, was selected to enhance the natural process of anaerobic bioremediation, whereby indigenous microorganisms biologically degrade contamination.

The 4,000m<sup>2</sup> site was treated by 51 direct-push injection points and 32 treatment wells, a set of which were deeper wells drilled into bedrock and some shallower wells targeting the unconsolidated soils.

In total, 13 IBC's of concentrated 3-D Microemulsion were diluted into solution and injected over two mobilisations. As the injections were carried out in November, the ambient temperature was -20°C and the ground was frozen. Therefore, the solution was warmed to 40°C prior to injection.

### Why of Special Interest?

A single technology (3-D Microemulsion) was able remediate a range of contaminant concentrations within a variety of permeabilities.

The freezing conditions on site did not impede either the injection works nor the in-situ remediation of the contamination.

### Remediation Details

#### Site Type:

Former manufacturing facility

#### Remediation Driver:

Residential development

#### Remediation Approach:

Anaerobic Bioremediation /  
Enhanced Reductive Dechlorination

#### Technologies:

3-D Microemulsion®

### Geology

X	Bedrock
X	Gravel
	Sand
	Silt
	Clay

### Medium

X	Groundwater
	Saturated Soil
	Vadose Zone

### COC

	Petro HCs
	Petro LNAPL
X	Chlorinated VOCs
	Metals

#### COC Concentration Levels:

500 µg/L TCE and DNAPL

#### Treatment Depth:

9m BGL

#### Treatment Area:

4,000m<sup>2</sup>

#### Remediation Cost:

€100,000