

In Situ Remediation at an Active Manufacturing Facility in Northern Italy

Cost-Effective Treatment of Hexavalent Chromium and Chlorinated Solvents



Summary

Historic leakages at an active manufacturing facility in Northern Italy resulted in the underlying groundwater becoming impacted with hexavalent chromium (Cr(VI)) contamination of up to 2,000 µg/L, and chlorinated solvents (CHC) concentrations of up to 10,000 µg/L. 3-D Microemulsion® (3DMe) and Metals Remediation Compound (MRC®) were selected to remediate the site because of:

- The combination of products allow for effective distribution and treatment within a highly heterogeneous and deep aquifer comprising gravels and boulders;
- Minimal disturbance caused by in situ remediation activities and the ability to inject indoors, on this tight and busy site.

Design and Application

The site was split into a number of zones, which have been treated in phases. For the source zone, 3DMe and MRC were injected into 16 wells on a 3m x 3m grid, providing a targeted treatment of the most impacted part of the site at a depth of 5 to 9 mBGL. The plume was then addressed through the use of a 3DMe and MRC barrier, which stopped the migration of the contaminant plume offsite, without affecting the groundwater flow itself. The application was completed through 8 fixed, multi-level wells installed from 5 to 25mBGL. Since this injection, further areas of the site have become accessible and future applications are planned.

What's Special?

- MRC provides rapid and sustained immobilisation of Cr(VI) by reducing the soluble hexavalent chromium into solid, non-hazardous trivalent chromium, which settles out of the groundwater.
- 3DMe's unique self-distribution mechanism allowed effective wide area treatment of both CHC's and Cr(VI) with limited access onsite.
- The remedial works included treatment inside an historic building
- Remediation works were carried out with minimal disruption to ongoing industrial activities and no equipment was left on site in between the first two injection phases.

Remediation Details

Site Type:

Active Manufacturing Facility

Project Driver:

Compliance with risk assessment; Compliance with table limits at the site boundaries

Remediation Approach:

Combined treatment: Metals immobilisation & bioremediation via direct push injection in wells

Technologies:

MRC® and 3-D Microemulsion®

Geology

	Bedrock
X	Gravel
	Sand
	Silt
	Clay

Medium

X	Groundwater
	Saturated Soil
	Vadose Zone

COC

	Petro HCs
	Petro LNAPL
X	Chlorinated VOCs
X	Metals

COC Concentration Levels:

up to 2,000 µg/L - Cr(VI)
up to 10,000 µg/L - CHC

Treatment Level:

5 to 9m BGL (source zone)

5 to 25m BGL (plume, vertical product barrier)