

Smear Zone Treatment at Former Factory in Madrid, Spain

ISCO of high levels of mixed contaminants achieved through soil mixing



Summary

A chemical works near Madrid had ceased operation and the site was in the process of being rehabilitated for future sale. The buildings were to be left in place but a targeted excavation was carried out to remove the high levels of soil contamination found in the vadose zone. Particularly high soil and groundwater contamination had been observed at, and just below, groundwater level. In Situ Chemical Oxidation (ISCO) using RegenOx, was applied to target these and to avoid excavation into the saturated zone. The remediation goal was to reduce the residual contaminant mass that might otherwise form a secondary source on the site.

Design & Application

Two excavations were made to 4m Below Ground Level (BGL). The first excavation was 40m by 15m wide, the second excavation 10m x 10m. They were dug to around 300mm below the groundwater level; then pumped out dry so that an excavator could enter the base of the pit. The first application of RegenOx was made by mixing RegenOx in the excavator bucket, pouring it onto the base of the excavation and then mixed in thoroughly. This rapidly created a significant desorption effect, producing free phase, emulsion and dissolved phase contamination. This liquid was then pumped out, removing a large mass of residual contamination (potential secondary source).

A second application of RegenOx was applied to the base of the excavation in the same way, focusing on the most impacted residual areas and then pumped out again. The excavation was then backfilled with clean stone, leaving in the remainder of the RegenOx to chemically oxidise the residual contamination in the groundwater.

What's Special?

- Treatment of low permeability soils; by mixing RegenOx into the soils, a powerful ISCO treatment was completed where injection may not have been successful.
- Rapid treatment of high levels of residual soil and groundwater contamination;
- Minimisation of excavation and cost;
- Treatment of smear zone, avoiding the need to excavate below groundwater level.

Remediation Details

Site Type:

Former Industrial / Brownfield

Project Driver:

Closure of site/Liability removal/
Preparation for sale

Remediation Approach:

Targeting high concentrations of mixed contaminants sorbed in soils and groundwater

Technologies:

Excavation and RegenOx®

Geology

| | |
|---|---------|
| X | Bedrock |
| | Gravel |
| | Sand |
| X | Silt |
| | Clay |

Medium

| | |
|---|----------------|
| X | Groundwater |
| X | Saturated Soil |
| | Vadose Zone |

COC

| | |
|---|------------------|
| X | Petro HCs |
| X | BTEX |
| X | Chlorinated VOCs |
| X | PAH |

COC Concentration Levels:

PCE 300mg/L, BTEX 10mg/L,
TPH 10mg/L, PAH 2mg/L

Treatment Level:

4.0 - 5.5m BGL

Treatment Area:

40m x 15m and 10m x 10m

Remediation Cost:

Approx. €30K