

Major Ecological Project Leuna (Germany) - Stabilisation of Contamination Downstream the Old Refinery



BAUEREnvironmentGroup

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Since 1916, Leuna has been a major location for the chemical industry. On the site of the "Old Refinery", war destructions, operational losses and accidents caused severe contamination to soil and groundwater with petroleum hydrocarbons, BTEX and MTBE, the latter used as additives in fuels. Concentrations of up to 50 mg/l BTEX and 50 mg/l MTBE were registered in the groundwater. Besides, the groundwater is characterised by a high hardness of up to 50 °dH, high iron concentrations (up to 18 mg/l) and a high content of tensides.

Since the migration of the contamination plume posed a threat to the Daspig water works, a cut-off wall was erected and a groundwater treatment plant with a capacity of 25 m³/h was installed. During the pilot phase of 10 months the operational parameters for the long-term groundwater treatment plant are determined.

Remediation site

The stabilisation of the "Old Refinery" site is part of the major ecological project Leuna. The companies of the BAUER Group accomplished both the civil works and the installation and operation of the groundwater treatment plant. The remediation was financed in the framework of the release of contaminated sites by the responsible authority of the federal state of Saxony-Anhalt.

The cut-off wall presents the main item of the site stabilisation since it prevents groundwater flow from the hot spot. Bauer Spezialtiefbau erected the 450 m long wall using the cutter-soil-mixing technique (CSM). The groundwater is collected in a deep bed drainage system and extracted from four wells. After treatment, the cleaned water is re-infiltrated in infiltration reservoirs on the other side of the cut-off wall.



The cut-off wall was erected with a trench cutter using the CSM technique. In an alternating construction sequence the ground was loosened and mixed in situ with the slurry suspension.



The pilot phase required an adaptable water treatment plant which could be operated flexibly. During pilot operation, parameters for the design of the long-term plant were obtained.

A fraction of the contaminated water is directed to a research plant operated by the Centre for Environmental Research Leipzig-Halle. There, scientists investigate the microbiological degradation of MTBE within the framework of the METLEN research project.

Results

Bauer Spezialtiefbau erected the cut-off wall using the cutter-soil-mixing technique (CSM). The clear advantage of this technique is the minimisation of waste masses for disposal, since the ground is used as construction material and mixed in situ with the slurry suspension. The suspension quality was checked regularly in laboratories.

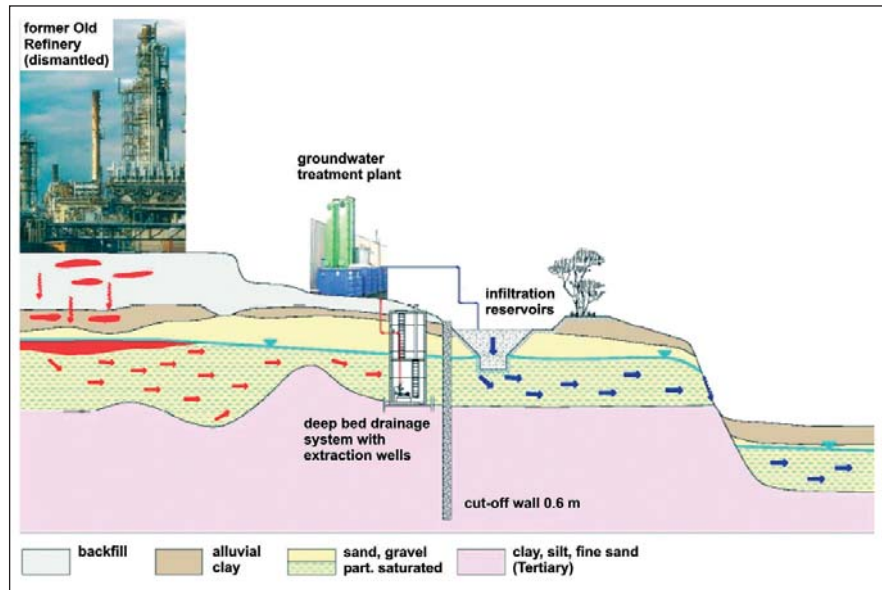
A CSM trench cutter was used to construct the 16 m deep and 0.6 m thick cut-off wall in an alternating construction sequence with cut-back joints. When crossing lines and wires, the cut-off wall was closed using the jet grouting technique (800 m³). 10,000 tons of contaminated soil was disposed-off. Four 8 m

deep wells are used to extract the water collected within the cut-off wall. BAUER Environment Group installed the groundwater treatment plant and provides its operation and maintenance. Besides, the Group operates and maintains all measuring and control equipment for groundwater extraction, treatment and re-infiltration as well as the monitoring wells.

The groundwater treatment includes the following stages:

- coalescence separator with coalescence package for removing petroleum hydrocarbons
- decarbonisation
- precipitation of iron compounds, flocculation and sedimentation
- sand and gravel filter
- two-stage stripping unit for removal of BTEX
- two-stage stripping unit for MTBE elimination
- activated carbon filter for process air treatment
- activated carbon filter for water treatment

During the excavation works, up to 40 m³ of water per hour were treated. Temporarily, more than 2000 litres of oil-phase were removed per day. Due to the high benzene concentrations, health and safety measures had to be taken and explosion protection had to be assured.



The 16 m deep cut-off wall prevents the migration of the contamination plume from the "Old Refinery" site. At the wall, contaminated groundwater is extracted and directed to the groundwater treatment plant. (Figure: G.U.T. mbH 2005)

Client:	MDVV Mitteldeutsche Vermögensverwaltungsgesellschaft mbH; Bitterfeld Landesanstalt für Altlastenfreistellung des Landes Sachsen-Anhalt, Magdeburg
Supervision :	G.U.T. Gesellschaft für Umweltsanierungstechnologien mbH, Merseburg GuD Ingenieurbuero fuer Spezialtiefbau GmbH, Berlin
Scope of works:	Erection of a cut-off wall using the cutter-soil-mixing technique; installation and operation of a groundwater treatment plant
Contract Period:	August 2005 till October 2006
Realisation:	For the stabilisation of the contamination downstream the Old Refinery, two members of the BAUER Group provided their expertise - BAUER Environment Group and BAUER Spezialtiefbau GmbH

The Members of the BAUER Group:

