

Soil replacement boreholes and groundwater exchange on an alkyl-lead contaminated site



Client: AK Chemie GmbH, Herne, Germany

Planning and Supervisor: HPC HARRES PICKEL CONSULT AG, Kriftel, Germany

Scope of Works: Replacement of alkyl-lead and total petroleum hydrocarbon (TPHs) contaminated material

Period of Works: September to December 2003



The Project:

Over an area of 300 m² the soil was contaminated to a depth of up to 12 m with alkyl-lead compounds and total petroleum hydrocarbons (TPHs) and, to a lesser degree, with inorganic lead compounds.

Background of the Site:

From 1966 until 1989, AK Chemie of Biebesheim produced tetraethyllead (TEL) and tetramethyllead (TML) on the site. This has for many years been added to motor fuel as an anti-knock compound.

Execution and Result:

In Biebesheim, BMU very successfully carried out a European-wide pilot project entitled "Remediation of alkyl-lead contamination of a former manufacturing facility".

In total, almost 4,500 tonnes of soil were replaced. From existing ground level to a depth of 2 m, the site was initially excavated in a conventional manner with the use of a mechanical excavator. A further 10 m of soil were subsequently removed by large diameter boreholes which completely overlapped with each other. The boreholes measured 1,500 mm in diameter. The drilling bucket had a capacity to excavate 2 m³ of soil material with each 'bite'.



Operatives on site had to wear protective masks during the works.

During drilling, mobilised alkyl-lead was not allowed to be dispersed by the groundwater. To comply with this challenge, BMU developed a special process of exchanging the groundwater and used it with enormous success in the remediation of the site. The extracted groundwater was treated in a water purification plant set up on site specifically for that purpose.

As alkyl-lead compounds are both highly toxic and volatile, the requirements in respect of site health and safety issues were extremely stringent.



To prevent emissions escaping into the atmosphere, the excavated soil material was stockpiled in a tent prior to its removal off-site.

In order to keep emissions from the excavated contaminated soil material to a minimum prior to off-site removal, it was stockpiled in a large tent under negative pressure. The waste air from the tent was cleaned by an active carbon filter unit.

The alkyl-lead contaminated soil material was treated by a thermal process in one of the European countries in accordance with an international notification scheme. As the remediation works had to be carried out within a very tight schedule, it was necessary at times to work multiple shifts.



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