

Groundwater diversion with cut-off wall constructed by the Mixed-in-Place technique



Client: Town of Langelsheim

Planning and Supervision: Prof. Burmeier Ingenieurgesellschaft mbH, Gehrden, Germany

Scope of Works: Groundwater diversion and enclosure of heavy metal contaminated soil

Period of Works: April 2003 to August 2003



The Project:

At the former smelting works "Frau Sophienhütte (South)" in Langesheim near Goslar, Germany, slag and so-called "Restschlick", both contaminated residues from the original smelting process, were deposited in an uncontrolled manner. In addition, both the soil and the groundwater are contaminated with zinc, cadmium, lead, copper and nickel.

Background of the Site:

Since the 16th century, iron ore has been smelted in open chimney shaped clay furnaces after first having been heated or roasted in a pit. Both the slag and the fine-grained "Restschlick", which is rich in metal, were deposited on the site. As the metallic contaminants of the "Restschlick" are highly mobile, heavy metals have migrated into the groundwater in large quantities.

As part of an area regeneration programme, the site is being redeveloped into an industrial and commercial park.



Construction of a "Mini landfill" on the site of the former smelting works with a fully sealed base for controlled and safe disposal of the contaminated residues from the original smelting process.

Execution and Result:

In order to prevent the slag and the "Restschlick" continuing to be a source of contaminants in the future, both materials were systematically collected from all over the site, stockpiled in one location and then disposed of in a safe and controlled manner in a kind of "Mini landfill" with fully sealed base which was constructed on the site specifically for this purpose.

To prevent further leaching of heavy metal contaminants, the groundwater flow was



Plant and equipment used in the construction of a cut-off wall by the "Mixed-in-Place" technique patented by the BAUER Group

diverted around the plume of subsurface contamination. This was accomplished by the construction of a 415 m long and up to 12 m deep cut-off wall using the patented "MIP" (Mixed-in-Place) technique in which a suspension grout is injected as binder into the ground through the hollow stems of a triple continuous flight auger as it is drilled into the ground and subsequently withdrawn. As a result of the vertical upward and downward movement of the multiple overlapping counter-rotating augers the soil material is thoroughly mixed with the binder and homogenised. By installing overlapping panels of multiple MIP columns a continuous cut-off wall is formed in-situ in the ground.

This technique is fast, highly productive and cost-effective. In addition, the process is almost free from vibrations and the amount of spoil that may have to be removed off-site for disposal under controlled conditions is very small. As existing soil material is used as construction material, valuable resources are preserved.



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