Remediation of an Arsenic-Copper Contamination Using Replacement Borings at a Former Paint Factory in Segnitz (Germany)

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From 1838 to 1915, „B. Hainemann's Soehne"'s paint factory, manufactured the so-called "Schweinfurt Green" that was used as protective coating in shipbuilding and as pesticide in winegrowing. The industrial production left behind a terrain heavily contaminated with arsenic, copper and lead both in the unsaturated and the saturated zone.

Due to the close vicinity of buildings and a complex hydraulic situation the contaminated soil was exchanged using replacement borings. Overall, 80,000 tons of soil were removed at the two remediation sites "Mainlaende" and "Schoberspitze".

Following the successful remediation, the Schoberspitze site will now be re-developed as green belt and farm land, whereas the Mainlaende site will be used as a car-park.

The sites are going to be re-used as car-park at the "Mainlaende" site and green space and agricultural crop land at the "Schoberspitze" site.

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Remediation Site

The Mainlaende remediation site is located on the bank of the Main River. Therefore, it suffers seasonal floodings. In order to complete the drilling operations before the expected winter flood, two large diameter drilling rigs operated 6 days a week. To avoid disturbing the local population with construction traffic yet successfully transport both the con-

In order to avoid disturbance from heavy goods traffic, a shipping pier was erected to handle the transportation of construction equipment and contaminated material.

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taminated material and the back-fill material, a shipping pier was erected.

Results

During site installation all existing supply lines were temporarily relocated. Interim storage facilities for the excavated material were established and paved with asphalt. The excavation water passed a preliminary clarification stage before it was discharged to an existing treatment plant where the arsenic was removed.

Mainlaende Remediation Site

At first, a cut-off wall was erected using secant piles. 31 dewatering wells were installed to pump off the water from the pit. Then, the soil was excavated using large diameter secant borings (dia. 1800) in the core area of the contamination, and contiguous borings in the protraction area. The excavation depth ranged between 5 und 10 m.

Schoberspitze Remediation Site

From ground level to a depth of 4 m the site was pre-excavated. The trench of the excavation pit was supported by a 500 m² sheet pile wall. From the level of the excavation pit replacement borings were drilled to a depth of 18 m. Secant piles were used to erect a cut-off wall. The resulting remediation zone was dewatered by 8 wells. Afterwards, the contaminated soil was removed by contiguous borings in the core area.

At both remediation sites, the boreholes were re-filled with a cement-bentonite slurry mixed with gravel of grain size 16/32. The slurry was mixed in a mobile mixing plant on the construction site.

Finally, the supply lines were returned to their original locations and both remediation sites were re-cultivated.

In order to complete the drilling operations before the expected winter flood, a second large diameter drilling rig was used at the Mainlaende site. Both rigs operated 6 days a week.

At the Schoberspitze site, the replacement borings were drilled from the level of a conventional excavation pit that was supported by a 500 m² sheet pile wall.

Client:	Wuerzburg Road Construction Office Segnitz Municipality Kitzingen District Office GAB mbH, Munich
Engineering Consultants:	Dr. Rietzler & Heidrich GmbH Nuremberg
Scope of Works:	Soil exchange using replacement borings
Contract Period:	September 2005 till April 2006

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