# Remediation of the Tri-Halde Site, Stadtallendorf

## Project details

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| Region: | Hesse / Germany |
| Client: | Department of Waste Disposal, HIM<br>(On behalf of the State of Hesse) |
| Involved parties: | ARE Deutzen GmbH |
| Construction period: | November 2001 / November 2004 |
| Contract value: | 16m EUR |

## Completed work

- Conditioning of 50,000 tons of mud highly contaminated with nitro aromatics
- Transportation in gastight containers to the soil treatment facilities in Deutzen
- Transportation of 40,000 tons of soil contaminated with nitro aromatics to the soil treatment facilities in Deutzen
- Thermal treatment and subsequent disposal of a total of 90,000 tons of removed material


## Background

For decades, the so-called Tri-Halde disposal site was the residue landfill of explosives production in Stadtallendorf, Hesse. The nitro aromatic contaminated soil posed a danger to the local area, especially to the residents living there, but the greatest threat came from percolating water from the landfill site, which threatened the groundwater and the local supply of drinking water. On top of the nitro aromatics, there was also a critically large amount of toxic mononitroaromatics.

50,000 tons of gypsiferous neutralising mud was stored on the site. Dikes, cover and bottom soil produced around 40,000 tons of contaminated soil, which had to be thermally treated. Contamination levels during the remediation work were much higher than those discovered during the environmental investigation. Around 60,000 mg/kg nitro aromatics were discovered.

## Remediation work

The soil, which was removed by a construction company, was transported from halls using a lock system into containers and then taken to be thermally treated at the ARE Deutzen facilities near Leipzig. The production mud was screened at 50 mm and pumped by a heavy-duty slurry pump through a pipe into a specially designed and constructed solidification plant. The mud was then fed from a storage silo into a mixing unit and conditioned with binding agents. It is only in this conditioned form that the mud can be transported to Deutzen in gastight containers especially built for this remediation work. After being filled on site, the containers are automatically moved out on a roller track and then loaded onto trucks using a gantry-crane.

The conditioning plant was approved according to Part 4 of the Federal Emission Protection Regulations Nr. 8.11(aa). This included special requirements necessary for explosion protection. Catalytic combustion exhaust air purification is covered by part 17 of the Federal Emission Protection Regulations. Continuous exhaust monitoring was complimented with regular individual measurements. Due to the high nitrogen content of the mud, a DeNOx process had to be applied to reduce NOx-emissions. All relevant systems were partly multiple redundant. The conditioning facilities were installed within a lightweight building construction that was constantly under negative air pressure. This was due to the highly toxic and extremely odorous gas emissions from the material. This could only be dealt with after conditioning in the facilities in Deutzen by constructing special high security storage areas. These had storage capacities of 20,000 to 30,000 tons and are stand alone, vacuum proof enclosures within thermal treatment halls fitted with their own air systems. Despite this, the odours could only be controlled with special odour absorbers sprayed through jet systems. The high water content of the mud presented a challenge to the thermal treatment facilities. Due to the highly sensitive origin of the material and the lack of threshold values for nitro aromatics on landfills outside of the state of Hesse, reuse of the treated material was only possible based on specific individual permits.

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