# Remediation project at DSM


Summary

Contaminated soil at DSM's Special Products facility in Rozenburg, The Netherlands, has been successfully cleaned using Terreco's patented Purisoil® technology.


The site was designated in 1999 to be the location of new facilities for DSM's Special Products group with building due to start in 2001. To allow construction work to begin on time it was necessary to obtain the relevant permits from the Dutch environmental authority (DCMR) prior to the end of 2000.

The pollutants, consisting of Benzene, Toluene, Phenol, Thermax and others chemicals covered an area of 150,000 $m^3$ and were all present in the saturated zone.
The DMCR made it a pre-requisite that remediation of these pollutants in the soil would be required prior to issuing the necessary permits.

Six months after the start of the remediation work the level of contaminants in the soil were such that the DCMR was

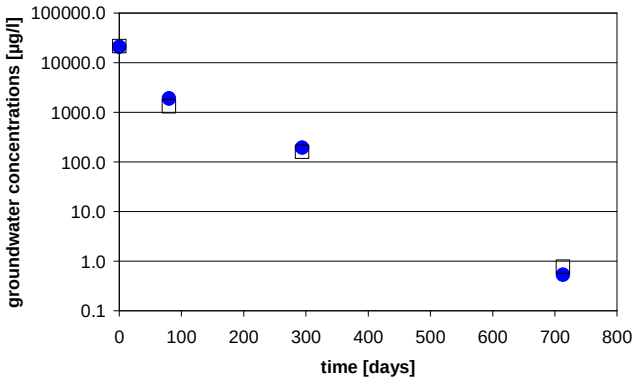
| Data | |
|---|---|
| Location | Industrial. DSM Special Products in Rotterdam, Botlek, havennummer 4322, The Netherlands |
| Customer | DSM Special Products in Rotterdam |
| Pollution and concentration | Benzene, toluene, phenol, thermex, diphenyl and diphenyloxide.<br>The concentration varied greatly with a maximum of 220 mg/l for both benzene en toluenes. On certain parts of the contaminated area, the toluene and benzene concentrations were of such magnitude as to categorize them as pure product. |
| Contaminated area | Area: 12.000 $m^2$. Contamination was present from the surface down to a depth of 13m below the surface. In total 150.000-$m^3$ soil was contaminated. The groundwater level fluctuated between the surface and 1 meter under the surface. The soil consists of (starting from the surface) 5-meter sand, 1-meter loam and 7-meter sand. |
| Started | December 1999 |
| Finished | November 2001 (for benzene, toluene and phenol) |

## Results

Within six months of starting the remediation work (mid 2000) over 90% of the pollutants had been removed. This result enabled the authorities to grant the necessary building permits to allow work to begin on time with confidence that the remaining pollutants would be adequately removed.

| | Benzene | | | Toluene | | |
|---|---|---|---|---|---|---|
| | 2.5-4 | 5-6 | 8-9 | 2.5-4 | 5-6 | 8-9 |
| concentration | 220000 | 140000 | 37000 | 170000 | 280000 | |
| | | 0 | 0 | | 0 | 720 |
| | | 1000 | 160 | | 87 | 1200 |
| | | 110 | 84 | | 900 | 91 |
| | | 88 | 78 | | 71 | 180 |
| | | 29 | 40 | | 170 | 69 |
| | | 28 | 6.1 | | 12.0 | 36 |
| | | 4.8 | 0.7 | | 410 | 2.7 |
| | | 3.0 | 0.7 | | 13.0 | 90 |
| | | 0.4 | 0.4 | | 46.0 | 3.7 |

Remediation of the Benzene and Toluene continued for a further 2 years until the agreed regulatory (T-value) value was achieved. In the graph the reduction of toluene (•) and benzene (□) as a function of time is presented.




## Conclusions

Purisoil® technology has clearly demonstrated its effectiveness as a very fast in-situ remediation process for the removal of volatile organic compounds (VOC) such as Benzene and Toluene in saturated soil.
The minimal level of intrusiveness during the remediation process, allowing normal operations and even construction work to continue, makes Purisoil® a unique and unmatched remediation technology for industrial areas.

Koestraat 3, Geleen • P.O. Box 1053, 6160 BB Geleen, The Netherlands • Tel: +31 46 4760074 • Fax: +31 46 4760076 • www.terreco.com
info@terreco.com · Rabobank Geleen 1705.74857 • KvK Limburg 14073620