



Sub surface finishing of electrodes



**SIX-PHASE HEATING**

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**OPERATING GAS STATION, LUXEMBOURG  
 Lump Sum Remediation**

For the clean up of a retail gas station, open 24 hours per day, Texaco chose Six-Phase Heating (SPH) technology. SPH could remediate the site in a short period of time and not disrupt business or inconvenience customers.

BTEX was found as the contaminant of concern at the site. Contamination was only present in the soil matrix because the groundwater table was present at a depth of 12 meter below grade (m-bg). Maximum concentration of BTEX in the soil was 340 ppm. Due to a sloping silt layer the contamination was present in vertical direction from 1 m-bg (East) and 7 m-bg (West) and between 3 m-bg (East) and 9 m-bg (West).

The electrodes were accessible through heavy duty traffic manhole covers.

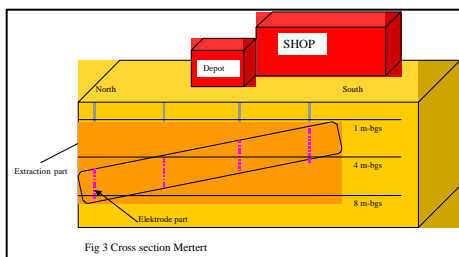


Subsurface electrode/extraction systems

THE heating system consisted of multiple SPH arrays, in total 13 electrodes were used. The exact depth of the conductive interval of 2 meters changed per electrode due to the tilted contaminated area.

FOR temperature monitoring 3 thermowells were installed with 5 thermosensors each.

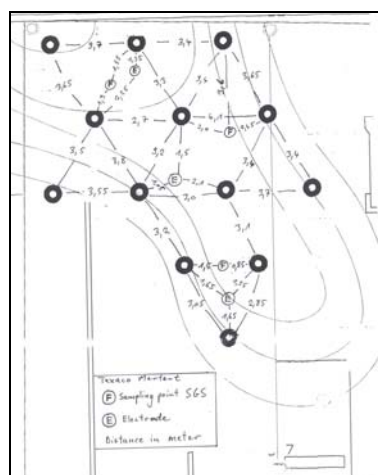
FIELD data, such as temperature and energy consumption, was collected by an on site computer. This computer was equipped with a telemetry system and GPRS network connection. Via the GPRS connection data was transferred to the system operator in Holland. This data was regularly examined and if necessary, adjustments were made and sent back via the telemetry system to Luxembourg. After 12 weeks of heating the remediation goals were met and the site was declared clean.



Cross section of contaminated area

A surface area of approx. 150 m<sup>2</sup> the total soil volume, was impacted with BTEX. Concentrations exceeding the remediation goal of 10 PPM, was estimated at 350 m<sup>3</sup>.

INSTALLATION was performed at the beginning of October 2004. After installing the subsurface power cables, wire-reinforced extraction hoses and a water drip system the site was paved.



Drawing with electrode layout

WITH the subsurface installation completed, system heating could begin.

This project offered us the opportunity to work on a design where the power distribution and the heating process were different because of the conductive intervals at varying depths. This design was equally as effective as standard electrode installations. This project was also our first without groundwater. The water drip system that was installed controlled the water supply for each electrode separately and prevented the area from drying out.

THIS was another successful international project with SPH™ remediation. The location owner experienced no inconvenience during the project.