BIOREMEDIATION of 1,2-dichloroethane

with INTEROX® Hydrogen peroxide

CONCLUSIONS

At a chemical plant in a harbour area, the surface aquifer was contaminated with 1,2-dichloroethane (1,2-DCEa) which had to be remediated.

Site characterisation, and laboratory tests demonstrated that oxygen was the limiting factor for the in-situ biodegradation of 1,2-DCEa.

The remedial strategy was based on flushing with simultaneous aerobic biodegradation enhancement.

Biodegradation was stimulated by injecting water with a diluted hydrogen peroxide solution (50 – 500ppm) as an oxygen source, and nutrients (N, P).

Full scale operation enabled the remedial objective to be reached within 3 years.

Solvay Chemicals

SOLVAY

Description

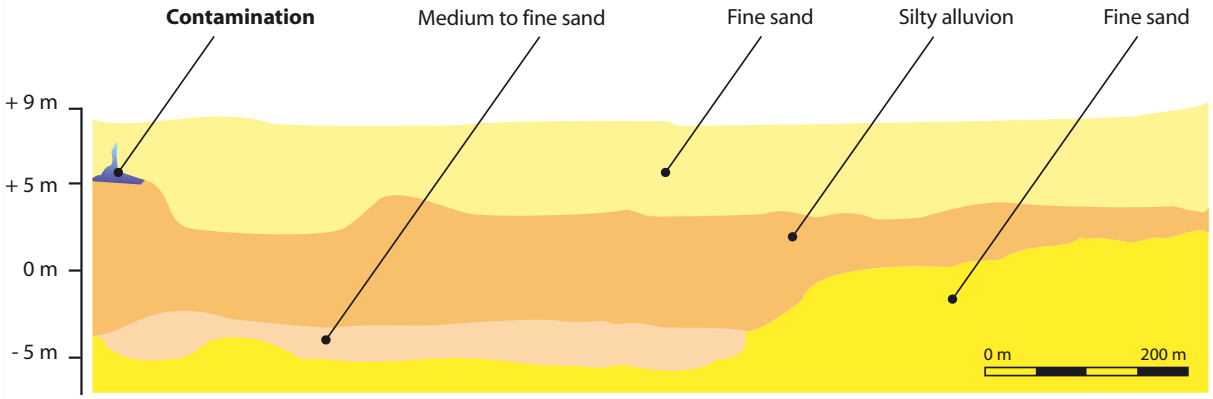
At a chemical plant located in a harbour area, the surface aquifer was contaminated with 1,2-dichloroethane (1,2-DCEa) which had to be remediated.

Locally concentrations above solubility (>300ppm) were encountered implying the presence of pure products. The surface groundwater flow rates were very slow. The water level was about 1 m below the ground surface

Local geology is characterized by :

- 5-6m of fine sand made up ground (shallow aquifer)
- 2-8m of silty alluvium of low permeability
- 20-30m of sand (regional aquifer, made of layer of fine to medium sand with low content of glauconite)

Figure 1 : Site Geology



Site characterisation and laboratory tests demonstrated that oxygen was the limiting factor for the in-situ bio-degradation of 1,2-DCEa.

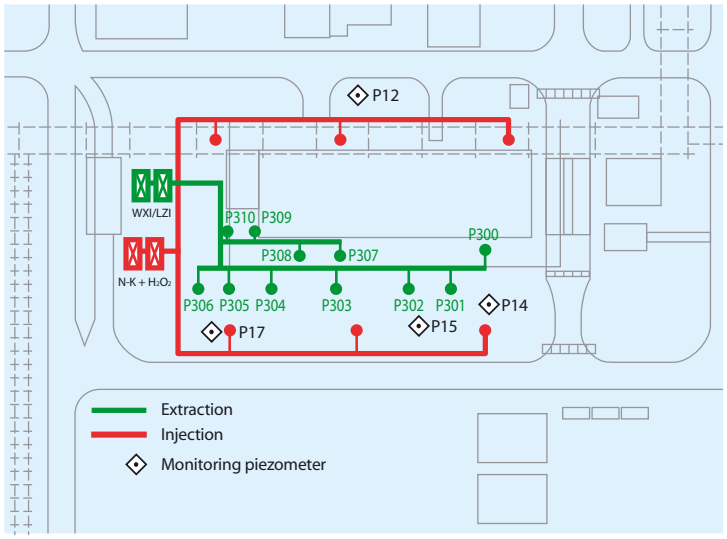
Remedial Strategy

The remedial strategy implemented by SANIFOX, was based on flushing with simultaneous aerobic biodegradation enhancement.

Due to the absence of natural flow in the shallow aquifer, flushing was necessary to disperse the hydrogen peroxide and the nutrients. The injection/extraction flow rates were set at respectively 3 and 4 m^3/h.

Biodegradation was stimulated by supplying the injected water with a diluted hydrogen peroxide solution (50 – 500ppm) as oxygen source, and nutrients (N, P).
The extracted groundwater was treated by air stripping before being discharged in the wastewater system of the plant.
The air was treated with activated carbon prior to discharge to the atmosphere.

Figure 2 : set up of the remediation injection/extraction system



(March.1995 – July 1997) Remediation was started at the end of March 1995

Monitoring dissolved oxygen in the extracted groundwater (Figure 3) demonstrated the feasibility of manipulating this parameter with hydrogen peroxide.

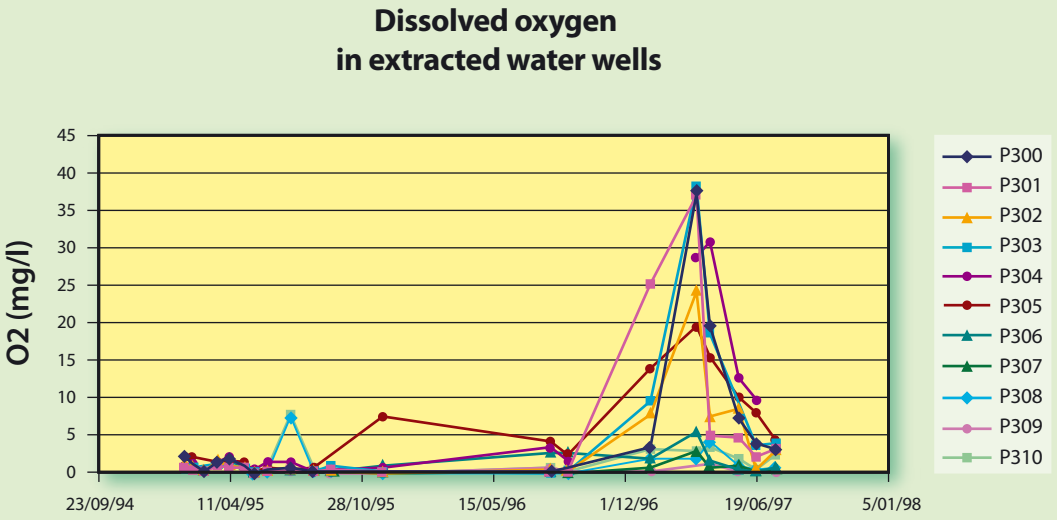


Figure 3

Within three years of operation, the concentration of 1, 2-dichloroethane had dropped by four orders of magnitude, from 100ppm high to below 0,1ppm in the monitoring wells as shown in Figure 4.

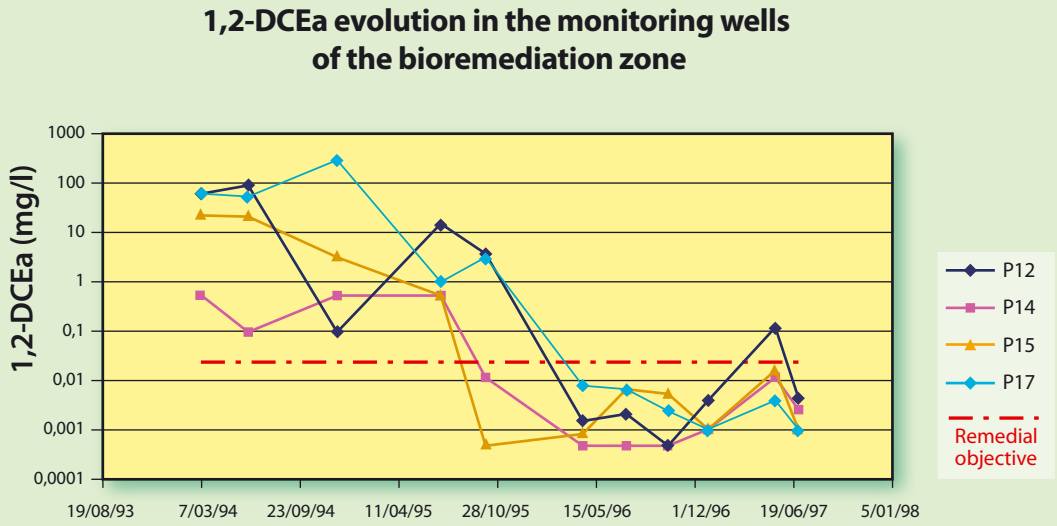


Figure 4

SOLVAY CHEMICALS

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