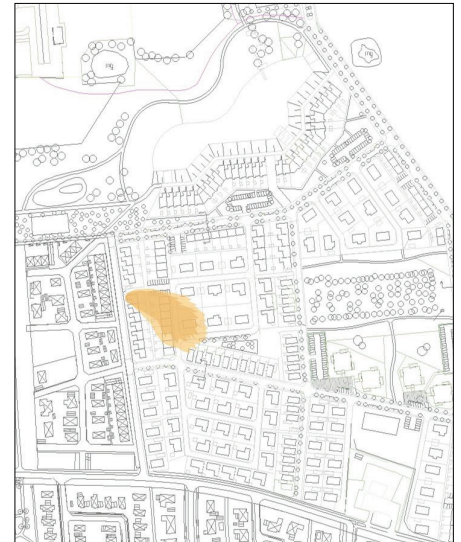


Groundwater in Soils and Bedrock Treated at an Industrial Site, Sweden

A single application provides enhanced reductive dechlorination in both aquifers

with Arkil A/S Miljøteknik and WSP

| | |
|----------------------------|---|
| Geology | Gravel and Shalestone |
| Contaminant Of Concern | TCE |
| COC Range | 500 µg/L TCE |
| Treatment Area & Thickness | 19,000m ³ total, based on 4,050m ² at 3-8 m BGL |
| Former Site Use | Manufacturing Facility |
| Project Driver | Redevelopment |
| Product Design details | 3-D Microemulsion® |



Plume spread and location

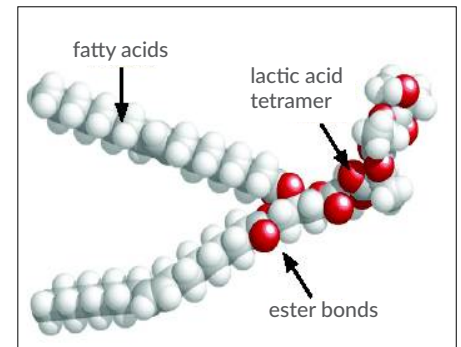
Introduction

Extensive chlorinated solvent contamination was discovered during the redevelopment of a former manufacturing facility into residential properties. Low but persistent concentrations of TCE were present within the soil and groundwater and the contamination had infiltrated the underlying fractured mudstone bedrock.

A remedial solution was required that would address the groundwater contamination in the bedrock and sorbed contamination in the soils.

Treatment

3-D Microemulsion (3DMe), an advanced self-distributing and long-lasting electron-donor technology developed by REGENESIS, was selected to enhance the natural process of anaerobic bioremediation. 3DMe stimulates and maintains enhanced reductive dechlorination (ERD) for an extended period from a single injection.



3DMe's molecular structure



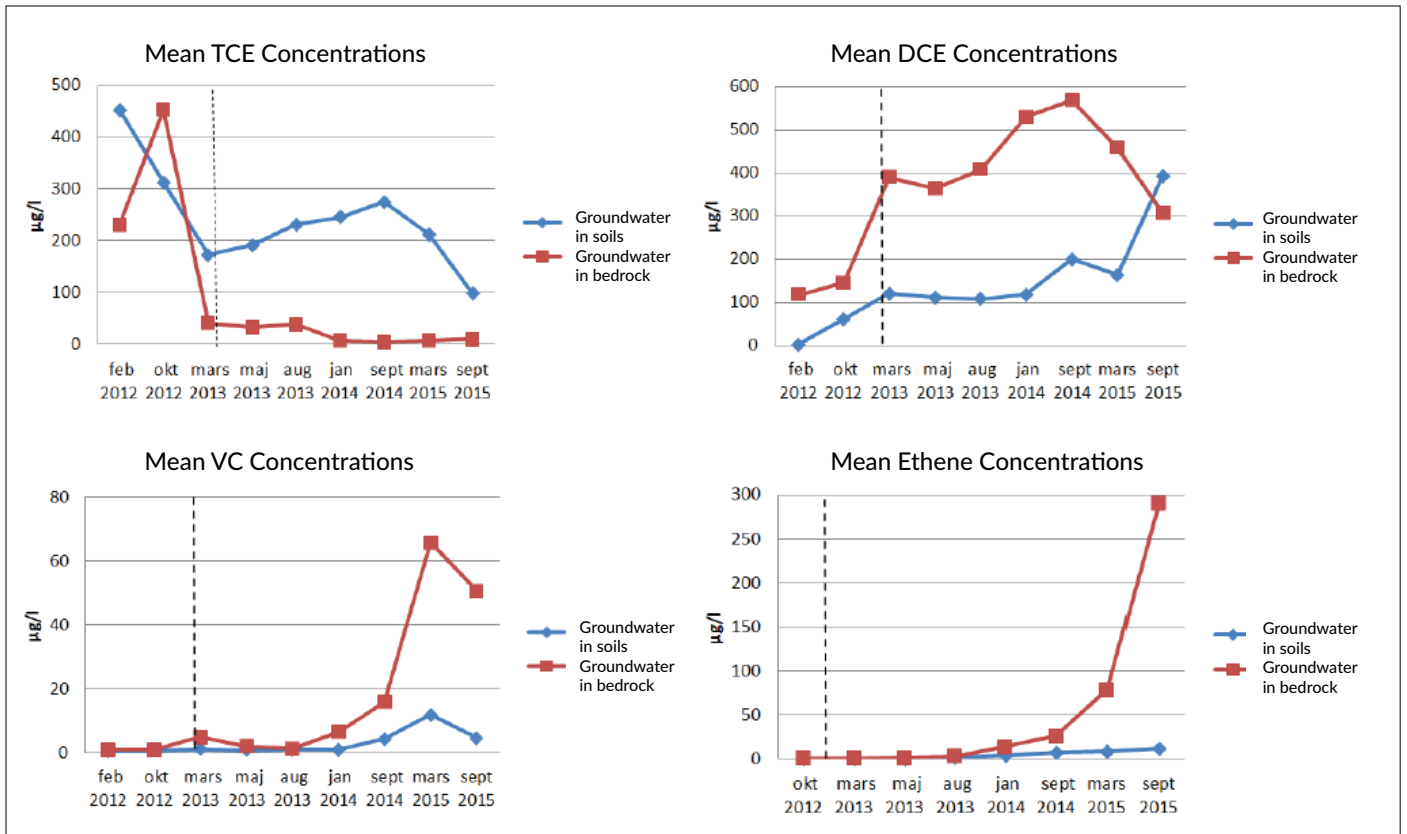
photo: Arkil

The 3DMe application was completed across the 4,050 m² area using 51 direct push injection points to target the shallow soils. 32 injection wells were also used, allowing application into the bedrock and unconsolidated soils above. In total 143,000 L of 3DMe was injected over 43 days. Remediation then continued in situ with no further onsite works required.

As the injections were carried out in November, the ambient temperature was -20°C and the ground was frozen. Therefore, the solution was warmed to 40°C prior to injection.



The heating of 3DMe to 40° prior to injection (photo: Arkil)



Chlorinated solvent concentrations over time (Results Graphs: WSP)

Results

The ideal conditions for ERD were quickly established by the application, resulting in the rapid reduction in TCE within the groundwater in the bedrock aquifer. Degradation of the parent compound in the soils aquifer took a little longer to occur, but once established, full reductive dechlorination of the contamination was evident.

TCE concentrations have reduced from 500µg/L to almost non-detect in the bedrock and have decreased to 100µg/L in the soil aquifer and is continuing to reduce. Full reductive dechlorination is occurring in both aquifers with no problematic increase in daughter products.

Conclusion

- A single application of 3DMe provided full reductive dechlorination of the contamination from a single application.
- Successful treatment was made in two aquifers at the same time; in unconsolidated soils and underlying bedrock.
- The freezing conditions on site did not impede the injection works, and neither did they impede the in-situ remediation of the contamination.



Drill rigs performing direct injection (photo: Arkil)

For more information or to discuss your project, please contact:

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