In situ treatment of toluene in groundwater, Helsingborg, Sweden

Working with multiple stakeholders to complete chemical oxidation and enhanced aerobic bioremediation works

Summary

Multiple historic leakages from stored chemicals on an industrial site led to hydrocarbon contamination of the underlying groundwater, predominantly with toluene. Multiple site investigations indicated that the plume had migrated beyond the site boundary and into land owned by the neighbouring harbour authorities. An initial treatment comprised a pump and treat system which had successfully recovered 14m^3 of toluene. However, the contaminant concentrations exceeded the legal limits for less sensitive or industrial land use (Swedish MKM values). Therefore, additional remediation phases were required to address the residual dissolved phase. An in situ remedial approach was chosen, using RegenOx and ORC Advanced.

Treatment

Access for the injection works was limited to two areas: one on the original industrial site, and the other in the harbour downgradient. Both areas comprised operation industrial facilities and were separated by a public road and a railway line associated with the harbour.

Initial pilot trials were completed to assess which treatment options would be most effective for the site. The results demonstrated that RegenOx was the most suitable oxidant to address the elevated sorbed-phase and high concentrations of dissolved phase contamination. In the full-scale works, RegenOx was combined with ORC Advanced. ORC Advanced provides a constant supply of dissolved oxygen to enhance aerobic biodegradation, in order to further reduce dissolved phase contaminant concentrations below the target criteria.

What's Special?

- Pilot trials were used to determine the best remediation options for full-scale works.
- Engagement with multiple stakeholders to complete remediation of a toluene plume extending over several site boundaries.
- In-situ injection works were completed on two separate industrial facilities without disturbance to their operations.

Remediation Details

Site Type:
Operational Industrial Facility

Project Driver:
Regulatory Requirement

Remediation Approach:
In-Situ Chemical Oxidation, Enhanced Aerobic Biodegradation

Technologies:
RegenOx®, ORC-Advanced®

Geology	
	Bedrock
	Gravel
x	Sand
	Clay

Medium	
x	Groundwater
	Saturated Soil
	Smear Zone

COC	
	Metals
	Chlorinated Solvents
x	Petroleum Hydrocarbons

COC Concentration Levels:
300 mg/L Toluene

Treatment Depth:
Varying (3m treatment horizon)

Treatment Area:
1,100m^2 total

Remediation Cost:
€ 290,000

Injection Grid:
3m - 4m

Injection Points:
109 fixed wells