

LNAPL Remediation in a Chalk Aquifer under a Residential Property, UK

High levels of TPH treated to site closure and with minimal disturbance

with BRD Environmental Ltd

Geology	Limestone (chalk)
Contaminant Of Concern	TPH
COC Range	LNAPL
Treatment Area & Thickness	Vadose zone and Groundwater
Former Site Use	Industrial Manufacturing
Project Driver	Regulator
Product Design details	RegenOx®



Introduction

After completion of the redevelopment of former industrial land into residential properties, significant Total Petroleum Hydrocarbon (TPH) contamination was discovered in the groundwater and smear zone under the gardens and parking area. The TPH comprised diesel and heating oil, with up to 40mm of Light Non-Aqueous Phase Liquid (LNAPL) evident in the monitoring wells.

The original source of contamination (an above-ground storage tank) was removed during redevelopment; however, residual contamination had migrated into a lower chalk aquifer and after the discovery of LNAPL present within chalk fissures above the water table, remedial action was required.

Method

The two most highly contaminated boreholes, BH13 and BH14, were located in a back garden and a car parking space. As space was restricted and to minimise the impact of works on residents, an in situ remedial technique was deemed the only viable option.

RegenOx® is an In Situ Chemical Oxidation (ISCO) reagent capable of treating high concentrations of a broad range of soil and groundwater contaminants including both petroleum hydrocarbons and chlorinated solvents. The alkaline nature of RegenOx® enabled its use within the chalk aquifer without adverse matrix reaction.

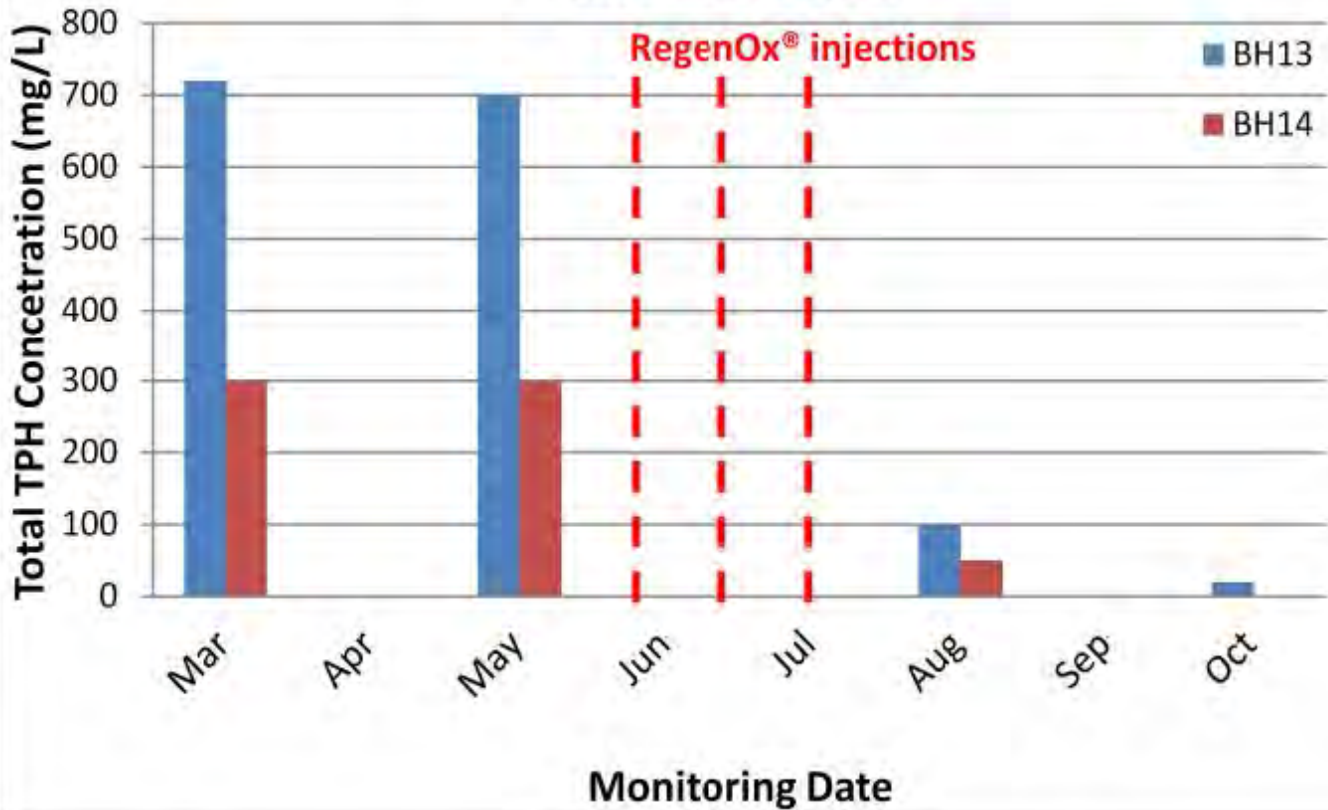
The ability of RegenOx to deal with both LNAPL and dissolved phase contamination avoided the use of 'pump and treat' equipment onsite. This minimised both operational and disposal costs and negated the requirement for bulky equipment on the site. Applications were completed using a small direct-push injection rig (Figure 1). This meant that the resident's parking area could be reinstated at the end of each working day, so that they could park overnight as usual.

The RegenOx injections were completed in three events at two week intervals during June and July.



Figure 1: On site RegenOx injections using a direct push injection rig

Figure 2: Total TPH Concentration in Boreholes BH13 and BH14



Results

A 99% reduction of TPH concentrations occurred rapidly in boreholes BH13 and BH14 following the injection works, with LNAPL no longer observed on the site.

Conclusion

A short campaign of RegenOx applications at the site completely removed any LNAPL and reduced TPH concentrations by 99% in a chalk aquifer and regulatory closure was achieved within a short period.

At £55,000 for the product and application work, the project was extremely cost effective, avoiding the use of operational and disposal costs on the site. The in situ nature of the works avoided disturbing or inconveniencing residents living on the site.

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