ISCO and Bioremediation at Former Petrol Station in the Loire Valley, France

Combined use of PersulfOx and ORC-A to effectively remediate BTEX

Summary

Under a former petrol filling station the soil and groundwater was found to be contaminated with petroleum hydrocarbons (primarily BTEX). This had been caused by leaks from the station's underground storage tanks (USTs). The storage tanks have been removed and surrounding soils excavated, however residual contamination persisted in both the soil and groundwater within the source area and the downgradient plume. The regulatory cleanup target is a 50% reduction of the BTEX / HC C5-C10 concentrations in groundwater.

Design & Application

An integrated in-situ remedial solution has been put in place by specialist remediation contractor Valgo, consisting of 26 **PersulfOx** injections on a 2 x 2m grid in the source zone for fast and effective treatment of the most impacted soils and groundwater. **ORC Advanced** was also applied in the source zone to achieve long term in situ bioremediation of any remaining petroleum hydrocarbons. In addition, Valgo installed an ORC Advanced barrier in the downstream plume area, to prevent off-site migration of the contamination.

PersulfOx is a sodium persulfate based chemical oxidation agent in which a patented catalyst has already been premixed into the formulation. This allows for safe and simple fieldwork and avoids the delivery and handling of large amounts of hazardous activator chemicals onsite. The reduced fieldwork complexity and smaller application volumes also provide cost savings for the remediation project.

What's Special?

- PersulfOx contains a unique built-in catalyst to enhance the oxidative destruction of hydrocarbons in the subsurface. The patented catalyst is already mixed in the product, so the application is much safer and easier to apply compared to other ISCO products.
- This is the first PersulfOx application in France
- Appropriate treatment technologies were used across the site:
    - In the core area; ISCO was used firstly, in order to reduce the high concentrations, followed by ENA to address the residual dissolved phase contamination.
    - In the downgradient plume, where there were lower concentrations and a long-term barrier was required, ENA only, using ORC-Advanced was most applicable.

Remediation Details

Site Type:
Former Petrol Station

Project Driver:
Regulatory

Remediation Approach:
Integrated Treatment: In Situ Chemical Oxidation (ISCO) and Enhanced Natural Attenuation (ENA)

Technologies:
PersulfOx® and ORC-Advanced®

Geology	
	Bedrock
X	Gravel
X	Sand
X	Silt
	Clay

Medium	
X	Groundwater
	Saturated Soil
X	Vadose Zone

COC	
X	Petro HCs
	Petro LNAPL
	Chlorinated VOCs
	Metals

COC Concentration Levels:
TPH to 5200 mg/kg in soils;
TPH ranging from 0.4 to 22 mg/l in groundwater

Treatment Level:
3 – 7 m BGL and 7 – 10 m BGL

Injection Points: 26

Injection Grid: 2 x 2m