Aerobic Bioremediation Case Study:

In Situ Soil and Ground Water Bioremediation Using CL-Out Cometabolism for PCE and TCE Removal

Location
Dry Cleaners
Southern California

Site Conditions
PCE and TCE contamination in soil under the dry cleaner building. The contamination in ground water extended off-property.

Target Chemicals
The target chemical was mainly PCE with lower concentrations of TCE. The risk driver and most significant exposure was via vapor intrusion.

Special Considerations
The ground water bioaugmentation was augmented with an oxygen supplement to maintain aerobic conditions.

Application
550 gallons of hydrated CL-Out microbes were injected split between the soil under the dry cleaning machine and the downgradient ground water

Results
After 30 days the PCE concentrations in soil decreased by 85% . TCE and DCE in ground water decreased by 90%.

Background
The dry cleaning solvent was found in an area around a dry cleaning machine. The solvent entered the soil below the building and percolated through the soil to a perched ground water zone and an underlying second ground water zone. The soil and sediments are interbedded alluvial and marine sediments with a high permeability. The site was close to the beach, and ground water is influenced by tidal fluctuations. The impacted soil volume was approximately 80 cubic yards. The area of ground water impact and treatment was approximately 2,000 square feet.

Remediation Design
The dry cleaning solvent was found in an area around a dry cleaning machine. The solvent entered the soil below the building and percolated through the soil to a perched ground water zone and an underlying second ground water zone. The soil and sediments are interbedded alluvial and marine sediments with a high permeability. The site was close to the beach, and ground water is influenced by tidal fluctuations. The impacted soil volume was approximately 80 cubic yards. The area of ground water impact and treatment was approximately 2,000 square feet.

Based on the volumes of impacted soil and ground water, five drums of hydrated CL-Out® were used. Two drums were injected into the soil and perched ground water beneath the dry cleaning machine. Three drums were injected into the deeper ground water in the diffused area of the plume. The total injection volume was less than .1% of the pore volume of the treated soil and ground water.

CL-Out® bioremediation destroys chlorinated solvents by aerobic cometabolism. Dextrose was added to provide the carbon source to support microbial growth. EHC-O™ by Adventus was added to maintain the aerobic conditions to support cometabolism.

Results and Conclusions

The 30-sampling results show that the site is progressing toward fast closure. The shallow soil samples all showed a decrease in solvent concentrations and no vinyl chloride was generated. The ground water contaminant concentrations decreased 90% as much as 100 feet down gradient of the injection point. Additional ground water treatment is unlikely to be necessary to achieve site closure after sufficient post-treatment monitoring.

Contaminant	Soil Results (µg/Kg) Average of 5 Locations		Deep Ground Water Results (µg/L)	
	Before	After	Before	After
PCE	772	115	ND	ND
TCE	9.8	ND	37	3.2
Cis 1,2-DCE	ND	ND	440	48
Vinyl Chloride	ND	ND	ND	ND

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