Petrox® Bioremediation of Phthalates

Background

Phthalates are common industrial chemicals used in the production of plastics, lubricating oils, and cosmetics. *Pseudomonas sp.* have been shown to be capable of metabolizing a variety of phthalates. Petrox® bioaugmentation has been tested in the laboratory and used in a field application to remediate several phthalates. The metabolic pathway has not been determined, but the metabolism appears to be complete as no regulated daughter products were discovered.

Laboratory Study

A laboratory microcosm study was completed using reagent-grade dioctlyphthalate (DOP). The initial DOP concentration was 100 mg/L. Sufficient Petrox® was added to establish a microbial population of 1,000,000 cfu/ml. After 5 days 30% of the DOP concentration was metabolized as the DOP concentration was reduced to 70 mg/L.

Field Application

Petrox® was used to treat contaminated soil and ground water at an industrial facility in Rochester, New York. The phthalate contaminants were bis(2-ethylhexyl)phthalate (BEP) and di-n-octylphthalate (DOP). The remediation objective was to reduce the concentrations of contaminants in both soil and ground water.

The impacted soil was excavated and replaced in the excavation with perforated piping that was used to administer the bioaugmentation. Petrox® was added to the soil through the perforated piping only once. The following table of the soil and ground water bioremediation results shows the average concentration of all soil and ground water samples within the treatment zone.

Contaminant	**Soil Sampling Results**			**Ground Water Sampling Results**	
	Pre-Treatment	Post-Treatment		Pre-Treatment	Post-Treatment
BEP	650 ppm	397 ppm		300 ppb	39 ppb
DOP	7.5 ppm	1.9 ppm		BDL	BDL

Conclusions

The laboratory study confirmed that the consortium of Petrox® organisms are capable of metabolizing phthalate compounds consistent with the published literature. The field application, while complicated by the mixing of soils during excavation and replacement, showed significant contamination removal as a result of bioaugmentation. In addition to remediation of the soil, bioaugmentation reduced the contaminant concentrations in the underlying ground water. Further bioaugmentation would provide further contaminant removal and active control of the site.