Former UST Leakage

Summary ORIN successfully treated petroleum contaminated soil and groundwater with an enhanced bioremediation chemistry. Unsaturated contaminant levels were reduced from 2,900 ug/L to less than detection over a four-month period. ORIN's approach saved the client approximately $20K to $48K over traditional remediation approaches.

Site Characteristics:

Geology – clayey silt with intermittent sand lenses
Groundwater velocity – variable (10^{-4} to 10^{-6} cm/sec)
Size of plume treated – 41,200 ft^3
Contaminants – 1,400 ppb benzene in soil
500 ppb toluene in soil
300 ppb ethylbenzene in soil
700 ppb xylene in soil

Remediation Approach:

Treatment chemistry - PermeOx® Plus
Treatment application – Chemical injection through a series of direct push points

Chemistries used during injection

Successful bioremediation of petroleum contamination via aerobic microbial respiration depend on a number of factors including the presence of appropriate microbes, nutrients, electron donors and terminal electron acceptors. In the aerobic metabolism of petroleum contaminants, oxygen acts as a terminal electron acceptor and petroleum contaminants act as electron donors, which are oxidized. Often, the limiting factor in aerobic bioremediation of petroleum contaminants is oxygen. PermeOx® Plus provides oxygen through a reaction of calcium peroxide and water:

$$CaO_2 + 2H_2O \rightarrow Ca(OH)_2 + H_2O_2$$
$$2H_2O_2 \rightarrow O_2 + 2H_2O$$

Summary of Implementation

The chemistry was designed for the enhanced bioremediation of BTEX compounds found in the soils and groundwater at this site. The targeted injection area at the site was down gradient of a former leaking UST. Forty direct push injection points received 25 gallons of PermeOx® Plus, at a rate ranging from 1 to 5 gallons per minute.

Two permanent points within the former UST basin were also utilized at this site. Each of the permanent points received 300 gallons of 15% PermeOx® Plus, at a rate ranging from 5 to 15 gallons per minute.

Evidence of oxidant influence was observed during the injection by the increase of key groundwater parameters such as DO, ORP, pH and conductivity in monitoring wells within the plume. Chemical was visually observed in down and side gradient wells.

Effectiveness

Three months following the injection, soil samples were taken within the targeted plume area. Benzene concentrations were reduced from 1,400 ug/l to 1.8 ug/l in the highest impacted soils within the plume. Down and side gradient groundwater monitoring wells were purged and sampled and also showed a significant reduction.

The Bottom Line

ORIN successfully remediated the site by injecting PermeOx® Plus through a series of direct push points over a three-day period. Compared to alternative cleanup approaches, using chemical injection not only reduced site disruption, but also was quicker and cheaper. Performing chemical injection saved the client over $20,000 compared to competitive injection chemistries and over $48,000 for a dig and haul approach.

Phone: 608-838-6699 **Fax: 608-838-6695**
Email: lkinsman@orinrt.com **Web: www.orinrt.com**