Case Study 1: Oil Field Production Pit Closures

Petrox® was successfully used to close oil field production pits as ordered by the State of Louisiana. Closure Rule 29-B required all non-utilized oil production pits closed by January 1989. Successful and timely closures were achieved with Petrox.

The production pits with perimeter contaminated soil and bottom sludge were treated in place as biological treatment lagoons.

The timeframe for successful closure varied with the pit size and level of contamination. A few examples of the Louisiana pit closures accomplished with Petrox are listed below.

Sludge Volume ($ft.^3$)	Initial Oil and Grease Levels	Final Oil and Grease Levels	Days to Complete
4,800	4.2%	0.71%	17
13,500	28.9%	0.97%	30
5,400	9.5%	0.66%	20
4,500	3.1%	0.07%	30
72,000	1.4%	0.88%	25

Case Study 2: Oil Pipeline Leak in Texas

Site Summary

Petroleum was discovered seeping from a river bank in west Texas and was traced back to 8-inch oil pipeline leak approximately 40 feet from the river bank. Investigation of the pipeline leak showed contamination in the soil around the pipeline and in the ground water below it. Petrox was used to treat the soils and ground water at the source to mitigate the source of the seepage.

Geology and Hydrogeology

The geology of the site was typical fluvial floodplain with interbedded silty sand and clayey silty deposits. While the porosity may be high, the hydraulic conductivity was relatively low.

The affected aquifer was an unconfined silty sand approximately 20 to 25 feet thick. The water table was approximately 35 feet below ground surface. There were some indications that the hydraulic gradient was reversed during flood stage in the adjoining river.

Soil and Ground Water Contamination

Petroleum was found in the soil adjacent to the abandoned pipeline at approximately 15 feet deep and spread downward in a wide cone covering about 3,000 square feet when it reached the water table. Thus, the size of ground water plume that resulted from leaching soil contaminants was about 5,000 square feet. The contamination was mainly heavy petroleum constituents, with the highest concentrations in the C_{12} to C_{28} range.

The petroleum concentrations in the soil were as high as 41,000 mg/kg for total petroleum hydrocarbons (32,000 mg/kg for C_{12} to $C_{28)}$. The petroleum concentrations in the ground water were up 580 mg/L for total petroleum hydrocarbons (460 mg/l for C_{12} to C_{28}).

As regulated by the Texas Railroad Commission, the cleanup goal was to remove the sheen or free product layer. Petrox was used to reduce the contaminant mass in soil and ground water to achieve the cleanup goal. The monitoring consisted of ground water sampling for petroleum and observations of presence of absence of a sheen in the river bank seep.

Remediation Design

Two drums of Petrox (110 gallons) were injected into the contaminated soil and ground water through the existing monitoring wells. These wells were screened above and below the water table, which provided a conduit for the injection of the Petrox in the soil and ground water. Ground water samples were taken from the same wells to track the progress of the remediation. The wells were thoroughly purged prior to sampling to provide samples representative of the surrounding ground water.

Results

Petrox was injected on three occasions. After the first injection on October 5, 2005, the TPH concentrations decreased by 88%. While the contaminant concentration persisted, two additional Petrox applications were completed and followed with calcium peroxide to increase the dissolved oxygen concentrations.

	Hydrocarbon Concentrations (mg/L)		
	C_{6-12}	C_{12-28}	C_{28-35}
Pre-bioremediation	<40	460	120
Post-bioremediation	<4.6	19	8.4

The ground water contaminant concentrations were reduced signifcantly and the sheen was no longer observed at the riverbank seep. The responsible party has applied for site closure based on these results.

The cost for Petrox and calcium peroxide used in these three treatments was less than $6,000.