

## CASE STUDY

### In Situ Aerobic Bioremediation of Diesel Truck Stop - Phoenix, Arizona

<b>Type of Project:</b>	In Situ Bioremediation (TPH)
<b>Contaminants Treated:</b>	Free-product diesel
<b>Concentration:</b>	3 feet free-product diesel, soil containing 83,000 mg/kg TPH
<b>Technology Applied:</b>	Bioremediation, air sparging and recirculation
<b>Geology:</b>	Silty and sandy cemented soil with intermittent sand lenses
<b>Average % Reduction:</b>	>90% reduction of TPH and removal of free-product
<b>Timeframe:</b>	30 months

#### GOALS

The closed-loop groundwater recirculation system has several remediation goals, including hydraulic control of the existing plume, removal of all appreciable free product, and treatment to Arizona soil and groundwater standards. Groundwater was extracted from 5 recovery wells. Following extraction, amendment and oxygenation, the treatment water was redistributed into injection points.

#### LAYOUT

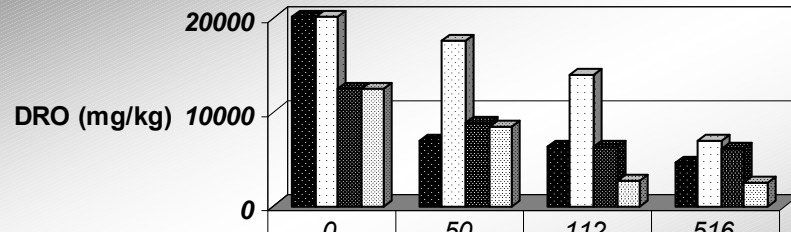
The site was customized to allow independent control of 45 vertical injection points. The injection points were used to introduce biological enhancements (BioRem-2000 Products), high D.O. water, and an oxygen/air mixture into the contaminated soil volume. The total volume of impacted soil at this site was approximately 5,000 cubic yards. The contamination existed largely in vadose zone soils that extended in a 40-foot diameter cylinder from ground surface to the groundwater interface approximately 95 feet below ground surface. Free product and impacted saturated zone soils existed from approximately 95 feet to 110 feet. The soil was a silty, sandy, cemented soil with intermittent sand lenses. The soils were impacted by aged #2 Diesel fuel ranging from 13,000 ppm to 83,000 ppm, and there was approximately of 3-feet of free product on the groundwater in the center of the plume area. ETEC used a combination of biological amendments, nutrients, and oxygenated water. The biological amendments ensured an active petroleum-degrading microbial population was maintained, and the diesel contaminants were biologically available. The nutrients provided all the necessary cell-building components along with a large mass of electron acceptors.



#### RESULTS

Over 70% TPH reduction was achieved within the first 4 months of system operation. However, because of hot spot areas and persistent free-product, remediation on the site continued for a total of 30 months. At the end of this period, all confirmation soil samples were below the 7,000 ppm clean-up criteria. The site was granted closure by the Arizona DEQ.

### Average TPH Reductions in Vadose Zone



	0	50	112	516
■ Average	20000	7000	6250	4500
□ Sampling 1	20000	17500	14000	7000
■ Sampling 2	12500	8750	6250	6125
■ Sampling 3	12500	8500	2750	2500