

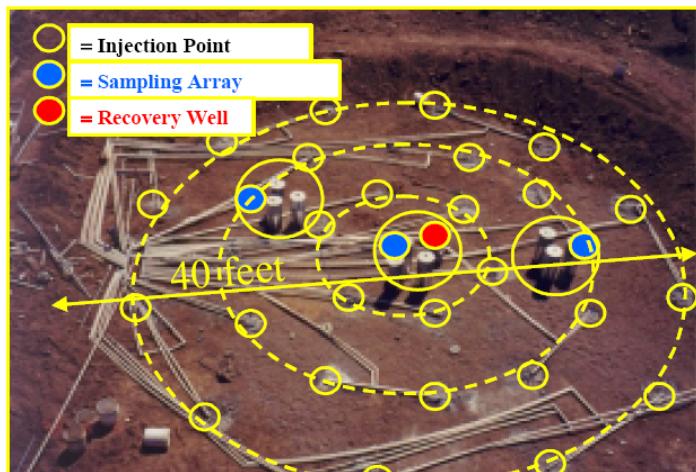
## IN SITU AEROBIC BIOREMEDIATION OF DIESEL DO-IT™ SYSTEM & ENHANCEMENTS

<b>Type of Project:</b>	Full-scale
<b>Contaminants Treated:</b>	Free-product diesel
<b>Contaminants:</b>	3 feet free-product diesel, soil containing 83,000 mg/kg TPH
<b>Technology Applied:</b>	Bioremediation via GW augmentation, oxygenation & recirculation
<b>Geology:</b>	Silty and sandy cemented soil with intermittent sand lenses
<b>Treatment Interval:</b>	Soil from 0-110 feet bgs
<b>Average % Reduction:</b>	>80% reductions of TPH in vadose soils and removal of free-product diesel
<b>Timeframe:</b>	total of 30 months
<b>Project Reference:</b>	Mr. Dan Blaes, Blaes Environmental Management, Phoenix, AZ (602) 728-0707 main office

**SITE DISCUSSION:** ETEC was contracted to design and install a Dissolved Oxygen In Situ Treatment™ (DO-IT™) system at a former truck stop site located in Phoenix, Arizona. The DO-IT™ technology is a unique process control system that generates extremely high levels of dissolved oxygen for rapid in situ treatment, as well as providing an automated platform for biological product inoculation, and on-site water treatment.

**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.

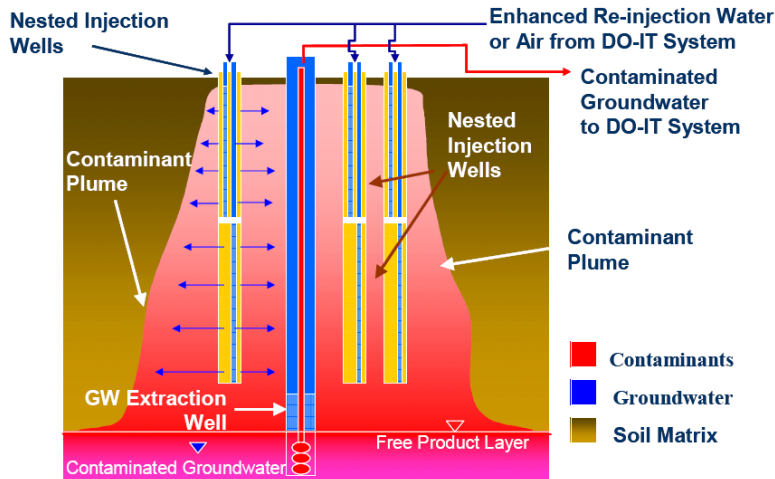
**SYSTEM LAYOUT:** The DO-IT™ system for this site was customized to allow independent control of 45 vertical injection points. The injection points were used to introduce biological enhancements, high D.O. water, and an oxygen/air mixture into the contaminated soil volume. The total volume of impacted 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 (bgs). Free



# CASE STUDY

TYPE: In Situ Bioremediation (TPH)  
 COMPONENTS: Oxygenation Equipment and Amendments

## DO-IT Injection Layout



product and impacted saturated zone soils existed from approximately 95 feet to 110 feet bgs. 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. Oxygen was provided via the DO-IT™ system, which generates high-dissolved oxygen water at concentrations of approximately 40 parts per million (ppm), and injects and air/oxygen mixture.

**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 cleanup criteria. The site was granted closure by the Arizona DEQ.

