

IN SITU AEROBIC BIOREMEDIATION OF BTEX AND MTBE SUPER-OX™ SYSTEM & ENHANCEMENTS

Type of Project:	Full-scale
Contaminants Treated:	BTEX, MTBE and gasoline-range hydrocarbons
Concentration:	2,000 ppb dissolved benzene and 10,000 ppb dissolved MTBE
Technology Applied:	Aerobic Bioremediation via GW augmentation, oxygenation & recirculation
Geology:	Silty sand
Treatment Interval:	GW and smear zone at 4-9 feet bgs
Average % Reduction:	benzene <5 ppb and MTBE concentrations <20 ppb site-wide
Timeframe:	total of 3 years while station remained active
Project Reference:	Chambers Environmental Group, Bellefonte, PA

SITE DISCUSSION: ETEC, LLC installed an automated Super-Ox™ system to operate in conjunction with an existing pump-and-treat (P&T) system to treat BTEX- and MTBE-contaminated soil and groundwater. The gasoline release originated from leaking underground storage tanks (USTs) and dispenser piping. ETEC worked with the environmental site consultant to retrofit the Super-Ox™ equipment within an existing remediation compound. In this configuration, extracted groundwater was pre-treated using the existing equipment, processed through the Super-Ox™ equipment to deliver >40 ppm DO levels along with nutrients and bacteria, and re-injected by the Super-Ox™ equipment into former AS/SVE wells throughout the plume. Existing monitoring points were used to track remediation progress.

GOALS: The closed-loop groundwater recirculation system has several remediation goals, including:

- hydraulic control of the existing plume
- degradation of the persistent MTBE and benzene to PA Statewide Health Standards
- no contaminant rebound during post-remedial monitoring

SYSTEM LAYOUT: Remediation system operation included:

- Ongoing delivery of appropriate masses of nutrients and MTBE-utilizing bacteria
- Aerobic plume conditions constantly maintained through automatic, programmed delivery of 40-ppm DO concentrations
- Injection/extraction well layout creating recirculation “cells” for optimum DO, nutrient, and bacteria delivery

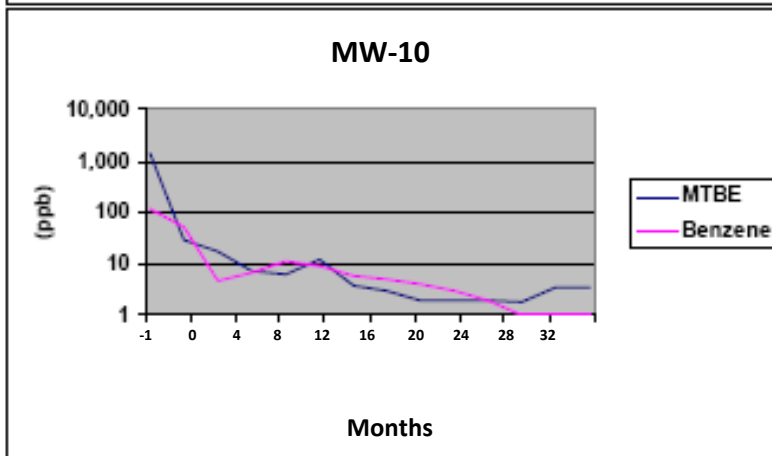
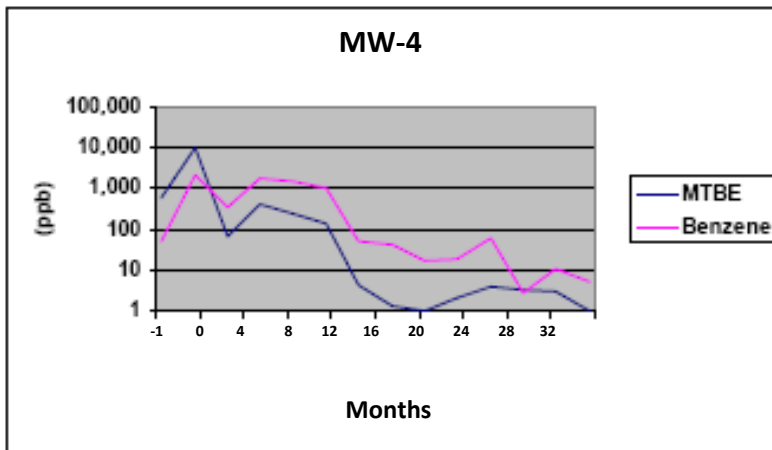
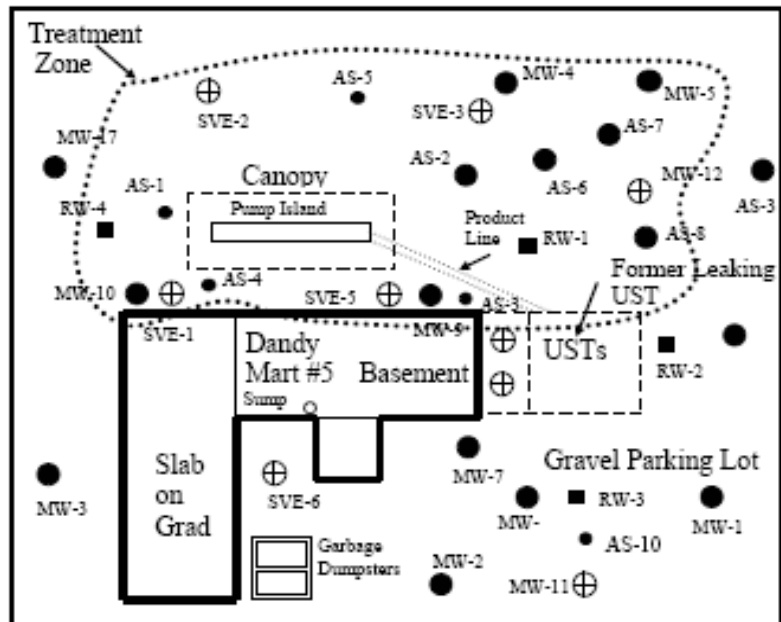


CASE STUDY

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

RESULTS:

- During the 3-year life of the project, more than 2 million gallons of oxygenated water was recirculated
- By circulating multiple GW pore volumes, the Super-Ox™ equipment maximized oxygenation and contact with dissolved MTBE
- Within the first 9 months of treatment, the system achieved 97% reductions in dissolved benzene, and 96% reductions in MTBE concentrations across the entire plume.



The most important aspect of this remediation project was the consistent reductions in MTBE, which were directly attributable to aerobic biological degradation.

This aerobic biological activity was only possible with constant delivery of dissolved oxygen, nutrients, and MTBE-utilizing bacteria.

The total remediation cost for the equipment and biological enhancements over the 3-year treatment timeframe was \$160,000.