

# Report for 2004CT45B: Project Extension and Supplemental Funding for Investigating the Influence of Purging on Long-Term Remediation Compliance Monitoring

## Publications

- Articles in Refereed Scientific Journals:
  - Metcalf, M., and Robbins, G.A. 2005, Dissipation of MTBE Ground Water Contamination Following the Connecticut 2004 MTBE Ban, Ground Water Monitoring and Remediation, <In Revision>
  - Metcalf, M., and Robbins, G.A. 2005, Comparison of Water Quality Profiles from Shallow Monitoring Wells and Adjacent Multilevel Samplers submitted to Ground Water Monitoring and Remediation, In Review.
- Conference Proceedings:
  - Robbins, G.A., Metcalf, M. and Budaj, 2005, Observations of Spurious MTBE Fluctuations, presented at API Soil and Groundwater Technical Task Force Meet., June 15, Storrs, CT.
  - Robbins, G.A., Metcalf, M., 2006, Evaluating the Effectiveness of Connecticut's MTBE Ban, presented at the USEPA, National UST Conference, Memphis, TN, March 20-22.
  - Robbins, G.A., 2006, 17 Years of Groundwater Sampling at a UST Site: So what have we learned? EPA Region 3 Technical Conference, May 5, Roanoke, VA.
  - Robbins, G.A., 2006 To Purge or Not to Purge that is the question, but is it the right one?, presented at Environmental Professional Organization of Connecticut, June 6, Rocky Hill, CT.

## Report Follows

PROGRESS REPORT  
2005 - 2006

Investigating the Influence of Purging on Long-Term  
Remediation Compliance Monitoring

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Problem and Research Objectives

Monitoring wells are commonly used for remediation compliance monitoring across the Country. The objective of this study is to determine if monitoring wells should be purged when conducting groundwater monitoring. The study will provide information to regulatory agencies and the environmental consulting industry that can be used to develop sound sampling guidance and improve compliance monitoring at ground water contamination sites.

Methodology

The research site is the Motor Pool at the University of Connecticut in Storrs, Connecticut. The Motor Pool is the refueling station for the University, and the location of previous gasoline and diesel fuel spills. A near field monitoring well was sampled three different ways, during nine sampling rounds to develop data for conducting a statistical comparison on water quality parameters. We also profiled the water quality in the well before and after sampling. Water quality data was also compared to that derived from an adjacent multilevel sampling cluster. This permitted examining how the water quality derived from wells compares with formation water quality and to model concentration averaging in the well.

Principal Findings and Significance

The research has been completed and papers on the work have been submitted and are being developed. Our major findings are as follows:

- The undisturbed concentration distribution in the well bore does not mimic the formation vertical concentration distribution. This implies that the characterization of the vertical concentration distribution of a formation by taking

grab or passive (e.g., diffusion bag samplers) samples in a shallow monitoring well will be highly inaccurate.

- Statistical analysis indicated the three sampling methods tested provide similar results for inorganic constituents and MTBE.
- The curtailment of MTBE in gasoline can eliminate the contamination of ground water by gasoline vapor releases. MTBE levels were monitored during this study shortly after it was banned in Connecticut gasoline. Levels continually declined throughout the monitoring period from over 1000 ppb to near non-detections. As of 2006, the site was free of MTBE.
- Our past models predicted that constituent concentrations from no purge samples should differ from those taken after purging because of flow weighted averaging. But this was not observed. Well mixed contaminant concentration conditions occur in the well bore owing perhaps to thermal mixing, turbulence when water enters the screen section or by divergent flow caused by the screen section low porosity. The well mixed water forms a shadow zone downgradient of the well that reenters the well during purging and mutes out predicted affects of flow weighted averaging. It is our conclusion that typical ground water monitoring wells screened across the water table do not have to be purged before sampling.