

Project Title:

“Laboratory studies on the fate of MTBE, TBA, and Ethanol in Aquifer Material.”

Investigators:

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Collaborators:

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Introduction to the problem:

The Federal Reformulated Gasoline Program (RFG) established in the Clean Air Act Amendments of 1990 called for the reduction of air pollutant emissions from motor vehicles. Methyl tertiary butyl ether was introduced as a fuel additive for gasoline. Methyl tertiary butyl ether (MTBE) is an oxygenate that allows gasoline to burn cleaner - releasing fewer pollutants into the atmosphere. The addition of MTBE created a risk to drinking water and ground water resources.

Background:

EPA commissioned a Blue Ribbon Panel to study MTBE and Oxygenates in Gasoline. On July 27, 1999 the Panel recommended ways to maintain air quality while protecting water quality from the risks of MTBE. The goal was to phase out the use of MTBE while avoiding gasoline supply shortages and ensuring price stability. The Panel suggested the institution of an alternative fuel oxygenate such as ethanol.

Objectives:

The states use a risk based approach to select remedies for spills of gasoline at underground storage tank sites. The risk evaluation requires an understanding of the rate and extent of biological degradation of fuel components in ground water. This project is a survey to develop information on the rates of transformation, the pathways of transformation, and the important transformation products for important fuel components that are major contaminants of ground water.

Approach:

Use soil microcosms to determine the rate and extent of biodegradation and sorption of MTBE, TBA, Ethanol, and other oxygenates in sediment samples from six sites where gasoline spills have resulted in methanogenic conditions in ground water.

Source Locations



Accomplishments to date (11 Aug 2003):

Anaerobic Biodegradation in Microcosms

	Benzene	MTBE	TBA	Ethanol
Nederland, TX	Not present	Yes	No	Not present
Boca Raton, FL	Yes	No	No	No
Parsippany, NJ	Yes	Yes	No	Yes
Deer Park, NY	Yes	No	No	Yes
Petaluma, CA	Yes	No	Yes	Yes
Port Hueneme, CA	Not tested	No	No	Yes
Vandenberg, CA	Yes	No	No	Yes

The following manuscript is in review for Ground Water Monitoring and Remediation:
Contribution of Anaerobic Biodegradation of MTBE in Ground Water to Natural Attenuation at a Gasoline Spill Site. John T. Wilson, Cherri Adair, and Ravi Kolhatkar

Near future tasks:

The microcosm study is nearly complete. Microcosms constructed from core material from the gasoline spills have been incubated for time intervals extending from 18 to 24 months. A manuscript is in preparation that describes the relative rates of natural biodegradation of MTBE, TBA and ethanol, and effect of ethanol on benzene biodegradation in the microcosms.