



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2004TX156B

Title: Effect of Flow Velocity on Biodegradation of Trichloroethene (TCE) and Perchloroethene (PCE) During Restoration of Contaminated Groundwater Aquifers

Project Type: Research

Focus Categories: Treatment, Groundwater, Toxic Substances

Keywords: Groundwater remediation, toxic pollutants, volatile organic compounds

Start Date: 03/01/2004

End Date: 02/28/2005

Federal Funds: \$5,000

Non-Federal Matching Funds: \$10,533

Congressional District: 31st

Principal Investigators:

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Abstract

The objective of this project is to determine the extent to which the velocity of groundwater flows might affect the biological degradation of two toxic compounds perchloroethene (PCE) and trichloroethene (TCE). Other studies have suggested that several factors may affect the extent to which biodegradation can treat and dechlorinate aquifers contaminated with PCE, TCE, and other non-aqueous phase liquids (NAPLs). However, the role of groundwater velocity in affecting how pollutants are treated has not been investigated.

In this project, laboratory scale experiments will be designed and carried out to simulate a contaminated aquifer. Soil columns will be maintained in anaerobic conditions and will be filled with sand that has been contaminated with TCE and PCE. The columns will be inoculated with a bacteria culture that is known to dechlorinate TCE. Contaminated water (with varying levels of TCE and PCE) will be pumped through these columns at measured flow rates. Soil columns will receive this contaminated feed water at varying flow rates. Samples will be taken at regular intervals from ports installed in the columns.

Levels of TCE, PCE, and related compounds will be analyzed with such methods as gas chromatography, photo-ionization detection, and electron capture detection. If the research suggests that groundwater flow velocity may significantly influence dechlorination processes, further studies may be carried out to examine the attachment, detachment, transport, and survival of microbes in the soil column.

This project is expected to provide needed information about how groundwater flow velocity may influence remediation processes. Data will also be useful in optimizing the design and management of engineered remediation strategies.