USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Technical Proposal

3.1 Title: Developing comprehensive criteria for dehalorespiratory bioremediation of chlorinated ethenes in a contaminated aquifer

3.3 Key Words: Biodegradation, Reductive dechlorination, Trichloroethene, Detoxification, Intrinsic Bioremediation, Groundwater, Technology

3.4 Duration: July 1, 1998-June 30, 2000

3.5 Federal Funds Requested: $72,665

3.6 Non-Federal (Matching funds pledged): $145,633

3.7 Principal Investigator: Eugene L. Madsen

3.8: Congressional District: 26

3.9 Statement of Critical Regional or State Water Problems:

Chlorinated solvents [e.g., trichloroethene (TCE) and perchloroethene (PCE)] can constitute a significant threat to public health and are among the most widespread groundwater contaminants. In addition, the elimination of chlorinated solvents from groundwater can be a major financial liability to the many Northeastern regional municipalities and industries responsible for industrial pollution. This proposal seeks to augment an industry-sponsored project designed to document rates of TCE biodegradation in fractured rock beneath an industrial manufacturing plant. This NIWR-strengthened project will expand the overall project scope to include stable isotopic, physiological, and field-deployed passive sampler assays that will provide basic knowledge of dehalorespiration that can lead to a broad understanding of how this process can be reliably exploited to supplement or replace costly engineered groundwater clean up technologies. This project will advance basic knowledge of dehalorespiration and factors that govern this important detoxification process in field sites.

3.10 Statement of Results or Benefits

Dehalorespiration is a recently discovered physiological process carried out by naturally occurring microorganisms. Dehalorespiration links the sequential removal of chlorine atoms from toxic chlorinated solvents to growth of the responsible bacteria. The end product of dehalorespiration is ethene, a non-toxic, biodegradable gas (actually a plant growth hormone). An improved understanding of how naturally-occurring microorganisms spontaneously eliminate groundwater pollutants can provide added technological flexibility and cost savings (supplementing or replacing costly air strapping and other clean-up technologies) for regulatory officials, municipalities, and industrial operations in the Northeastern US.