INTRODUCTION
In 2002, a pilot test evaluated biodegradation in situ for the Remediation of Organic contaminants (SIT) System. The pilot testing demonstrated the feasibility of using microorganisms as biocatalysts for the degradation of chlorinated ethenes and ethanes in groundwater. This study was the first step in a longer-term, more comprehensive remediation strategy that aimed to reduce the concentration of chlorinated ethenes and ethanes in groundwater. Field conditions were monitored to determine the effectiveness of the remediation strategy and to assess the potential for groundwater remediation.

BACKGROUND
Complimentary biological and physical processes are used to make the system operational. The use of natural remediation processes can lead to significant reductions in the concentration of contaminants in the groundwater. The use of biodegradation processes can be more effective in the long term, but they require a longer time to achieve the desired results. The use of physical processes, such as pumping and treating the groundwater, can be more effective in the short term, but they require a larger investment of time and money.

More than a Decade of Challenges and Success: Enhanced In Situ Reductive Dechlorination of Trichloroethene/1,1,1-Trichloroethane Source Area in Fractured Bedrock

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Key Implementation Steps

Laboratory Microcosm Study (2005–2006)
Objective: Use a PSA/BGA/PSA microcosm to evaluate the feasibility of using microorganisms as biocatalysts for the degradation of chlorinated ethenes and ethanes in groundwater.

AISB Test Series (2006–2009)
Objective: Use a PSA/BGA/PSA microcosm to evaluate the feasibility of using microorganisms as biocatalysts for the degradation of chlorinated ethenes and ethanes in groundwater.

AISB Full-Scale Design (2009–2013)
Objective: Use a PSA/BGA/PSA microcosm to evaluate the feasibility of using microorganisms as biocatalysts for the degradation of chlorinated ethenes and ethanes in groundwater.

AISB Pilot Test (2007–2011)
Objective: Use a PSA/BGA/PSA microcosm to evaluate the feasibility of using microorganisms as biocatalysts for the degradation of chlorinated ethenes and ethanes in groundwater.

Challenges and Diagnostic Testing

AISB Peripheral Groundwater Elevations vs. Average Monthly Flow

Chlorinated Ethenes and Ethane Concentrations vs. Total Acids

Chlorinated Ethane Concentrations vs. Total Acids

Total Chlorinated Ethane Concentration Over Time (PBV vs. Molar)

Percent Reduction of Total Chlorinated Volatile Organic Compounds (CVOCs)

Results After Six Years of Full-Scale Operations

Conclusions and Recommendations

Several groundwater conditions and wet-season variation must be considered carefully. Enhanced In Situ Reductive Dechlorination of Trichloroethene/1,1,1-Trichloroethane Source Area in Fractured Bedrock

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