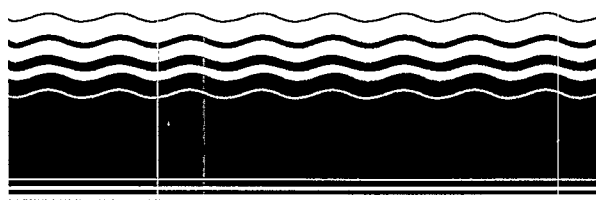




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## **Emerging Technology Bulletin**

### ***Two-Zone PCE Bioremediation System ABB Environmental Services, Inc.***

#### ***U.S. Environmental Protection Agency***

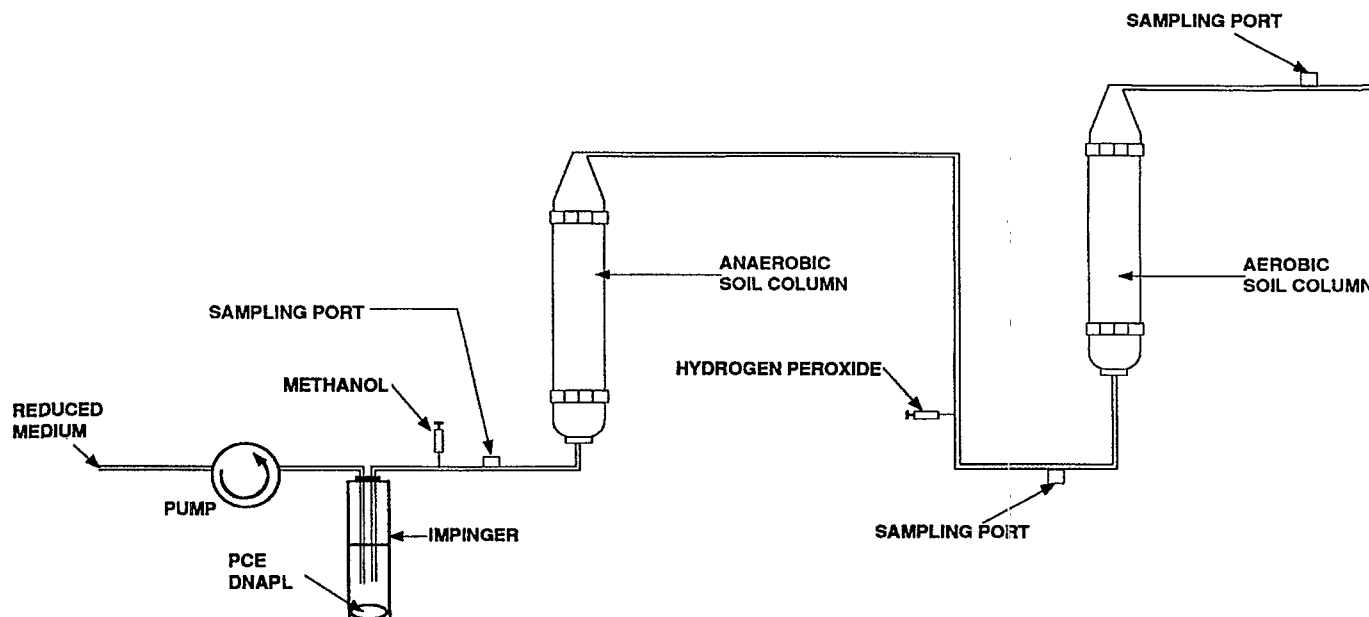
**Technological Description:** ABB Environmental Services, Inc.'s (ABB-ES), research has demonstrated that sequential anaerobic/aerobic biodegradation of tetrachloroethylene (PCE) is feasible if the proper conditions can be established. The anaerobic process can potentially completely dechlorinate PCE. However, conversion of vinyl chloride (VC) to ethylene is the slowest step in this process. Of the chlorinated ethenes, VC is the most amenable to treatment by aerobic methanotrophic processes. Therefore, a two-step process is thought to be the most efficient. The first step is anaerobic, which rapidly dechlorinates PCE and trichloroethylene (TCE) to breakdown products 1,2-dichloroethylene (DCE) and VC. Since the anaerobic dechlorination of DCE and VC to ethylene can be quite slow, a second aerobic step is implemented that can more quickly complete the remediation process. The schematic diagram below illustrates this technology.

The goal of this project is to field test the effectiveness of creating and maintaining the proper insitu conditions for chlorinated ethene

degradation in an aquifer. To achieve this goal, ABB-ES will test methods of carbon and mineral nutrient injection and delivery into an aquifer contaminated with PCE or TCE. Groundwater chemical conditions will be monitored within and downgradient of the anaerobic treatment zone to gauge the efficiency of the anaerobic process. If volatile organic compound analyses show that the resulting downgradient breakdown products include TCE, DCE, or VC, oxygen and methane will be added to the groundwater to stimulate aerobic degradation by indigenous methanotrophic bacteria.

**Waste Applicability:** This technology removes PCE, TCE, DCE, and VC from groundwater.

An Emerging Technology Summary on the bench-scale testing results will be available from EPA in late 1995.



**Figure 1.** Sequential anaerobic/aerobic treatment.



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