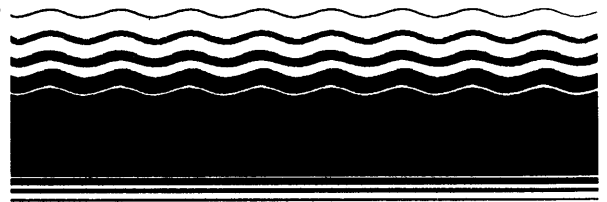




# SITE

SUPERFUND INNOVATIVE  
TECHNOLOGY EVALUATION



## Emerging Technology Bulletin

### Methanotrophic Bioreactor System

*Biotrol<sup>®</sup>, Inc.*

**Technology Description:** BioTrol's Methanotrophic Bioreactor is an above-ground remedial system for water contaminated with halogenated volatile organic compounds, including trichloroethylene (TCE) and related chemicals. Its design features circumvent problems peculiar to treatment of this unique class of chemicals. First, microorganisms are not known which utilize these chemicals as a primary carbon source; so a specific organism (*Methylosinus trichosporium* OB3b, or simply OB3b) is used which oxidizes these compounds rapidly while utilizing methane, an abundant and inexpensive source of carbon, as its growth substrate. Second, because of the ability of the bacterium to degrade TCE in the absence of the growth substrate, growth of the organism and degradation of the contaminants can take place in separate reactor vessels. This is important because these contaminants are extremely volatile, and bubbling of methane or air

through the reaction vessel would likely result in stripping of the contaminants from the water.

A two-stage bioreactor system (diagramed in Figure 1) was designed which circumvents these problems. The first stage involves the propagation of OB3b on methane in a continuous-flow suspended growth reactor (culture vessel). Cells grown in the culture vessel are supplied to the second stage (plug flow) contactor where the culture medium is mixed with the contaminated water.

For the pilot demonstration, the culture vessel consisted of a 400-L fermenter which was modified to permit continuous-flow fermentation and the use of methane as the growth substrate. Methane transfer efficiency to the culture vessel was improved by addition of a circulating gas-saturation device. The plug flow

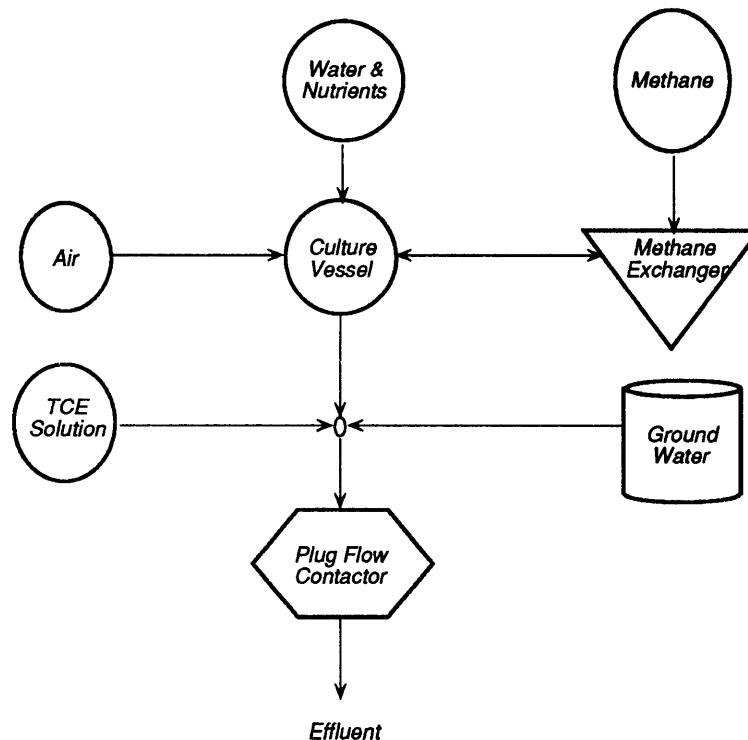


Figure 1. Bioreactor system flow diagram.





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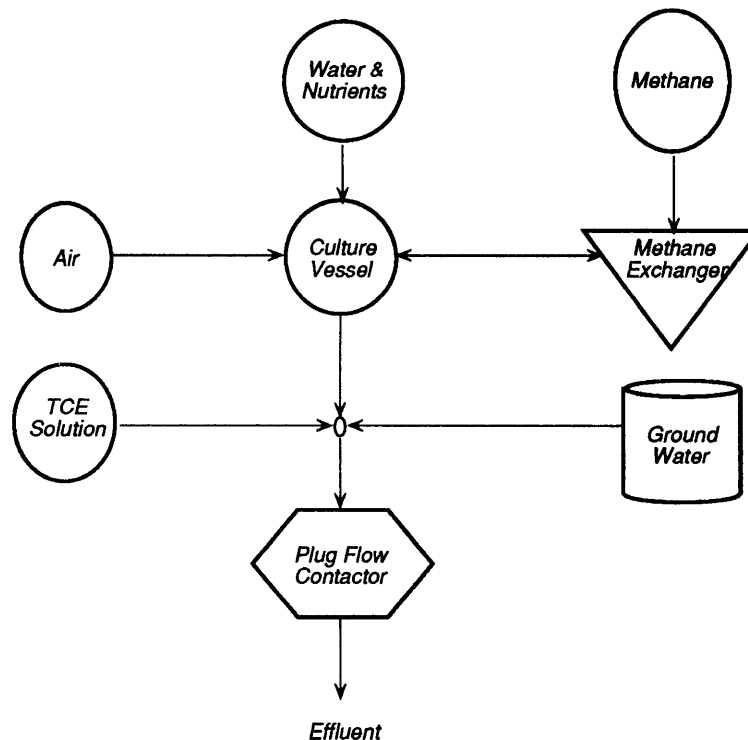


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