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FACTORS INFLUENCING BIOLOGICAL TREATMENT OF MTBE IN FIXED FILM REACTORS.

William T. Stringfellow (Lawrence Berkeley National Laboratory, Berkeley, CA)
Robert D. Hines (Envirex/U. S. Filter, Waukesha, WI)
Dirk K. Cockrum (Camp, Dresser & McKee Inc., Denver, CO)
Scott T. Kilkenny (Kinder Morgan Energy Partners, Orange CA)

ABSTRACT: Data from fluidized bed bioreactors treating contaminated ground water at two field sites have been collected and compared to laboratory studies with the objective of improving the reliability of methyl *tert*-butyl ether (MTBE) biotreatment in the field. Laboratory studies demonstrated that MTBE biodegradation was inhibited by a broad range of compounds, including o-xylene, methanol, toluene, and trichloroethylene (TCE). The general inhibition of MTBE degradation is similar to effects previously observed with nitrifying bacteria. Field data was examined to determine if two inhibitors, toluene and TCE, could be shown to effect MTBE treatment in fluidized bed reactors. It was found that there is a higher probability of poor MTBE removal efficiency during periods of higher toluene loading, but inhibition by TCE was not conclusively demonstrated. Results also show that periods of poor treatment also occur independently of effects attributable to toluene loading alone. These results illustrate the complexity of MTBE treatment and the limitations of using laboratory results to predict results in the field.

INTRODUCTION

MTBE has been used as a gasoline additive since 1979. As a consequence, MTBE is now a widespread environmental contaminant. Many gasoline and fuel transfer stations have MTBE contaminated ground water that must be recovered and treated before either re-injection or discharge. Activated carbon adsorption is currently the most widely used technology for the treatment of MTBE contaminated water.

Activated carbon is an effective treatment regime for MTBE, but has draw-backs. Activated carbon does not have a large sorption capacity for MTBE. It is also a phase transfer technology that does not result in the ultimate destruction of the MTBE. The spent carbon must be shipped off site for disposal or other treatment. Thus, there is a strong interest in developing alternative treatments for MTBE contaminated groundwater.

Our research has focused on the development of biological treatment as a viable, field-ready alternative for MTBE treatment at larger MTBE contaminated sites. We are developing biotreatment as both a stand alone technology and as a technology to be used in conjunction with carbon filters. Biological treatment