

**BIOREMEDIATION OF PCB CONTAMINATED  
SURFACE SOIL - A MICROCOSM STUDY**

by

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## **(ABSTRACT)**

This feasibility study was performed at Virginia Polytechnic Institute and State University (Blacksburg, VA) in collaboration with BioSystems Technology, Inc. (Blacksburg, VA). In this study, degradability of PCBs (Aroclor 1242) from an aged surface soil was evaluated using serum bottle microcosms containing acetoclastic methanogenic consortium, enriched from a municipal anaerobic digester. Two different experiments, “intermediate feed” and “starve and feed” were conducted by manipulating the methanogenic consortium with different amounts of acetate feeding, during 30 days of incubation. Disappearance of Aroclor 1242 in the microcosms was quantified using gas chromatography (GC). Significant differences in Aroclor 1242 removal between inoculated and uninoculated (control) microcosms were observed suggesting that the methanogenic consortium was responsible for Aroclor 1242 disappearance. However, GC-mass spectrometry (GC-MS) results could not confirm that disappearance of Aroclor 1242 was due to anaerobic dehalogenation. From another experiment, it was confirmed that removal of Aroclor 1242 was not due to evaporation losses during sample extraction.

Toxicity of an aged Aroclor 1242 contaminated surface soil was evaluated on an acetoclastic methanogenic consortium, enriched from a municipal anaerobic digester. Microcosms were set up using different amounts of soil and inoculum. Total gas production in the microcosms was monitored during 30 days of incubation, using a glass syringe. Total methane production in the microcosms was quantitated using GC. Toxicity of the soil on the methanogenic inoculum was determined based on the decreased rate of methane production in the microcosms relative to non-

soil containing controls. Compared to the control, there was reduction in total methane production in soil containing microcosms. Between 3-27% reduction in total methane production was noticed in microcosms containing different amounts of soil and consortium. Reduction in methane production seemed to increase with increasing amount of soil. Whether this decrease in methane production was due to toxicity of Aroclor 1242 on the methanogenic consortium or due possibly to the toxicity of trapped oxygen in the soil could not be determined. The rate of gas production in the soil microcosm was linear.

## **DEDICATION**

I would like to dedicate this thesis to my husband and best friend, Prakriti K. Das. Without his love, understanding, encouragement, and support, none of this would have been possible. His neverending support and love have given me the desire and momentum to complete my degree. I will always appreciate his unfailing faith and understanding in me, despite having to leave apart for the past two years. Finally, we realize that our personal sacrifices were well worth.

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