

**COUPLING COMPOUND SPECIFIC ISOTOPE ANALYSIS (CSIA) WITH BIO-TRAPS TO
DEMONSTRATE *IN SITU* BIODEGRADATION POTENTIAL IN GROUNDWATER**

**Katherine C. Key
Kerry Sublette***

Center for Applied Biogeosciences
The University of Tulsa
800 South Tucker Drive
Tulsa, OK 74104
Voice: 918-631-3085
Fax: 918-631-3268
kerry-sublette@utulsa.edu

**Greg Davis
Dora Ogles
Brett Baldwin**

Microbial Insights, Inc.
Rockford, TN

**Robert Pirkle
Patrick McLoughlin**

Microseeps, Inc.
Pittsburgh, PA

Compound specific isotope analysis (CSIA) measures the $^{13}\text{C}/^{12}\text{C}$ ratio of individual chemical species in an environmental sample. The utility of this technique in environmental applications is the ability to detect the ^{13}C enrichment of pools of contaminants in groundwater. Enrichment occurs during bioremediation due to the preferential use of molecules containing only ^{12}C carbon-carbon bonds. The amount of enrichment can give insight into the extent of biodegradation that has occurred and in some cases whether the mechanism of biodegradation is aerobic or anaerobic. Therefore, obtaining an isotopic signature for contaminants in groundwater can be very helpful in demonstrating biodegradation. However, concentrations of contaminants can at times be below the detection limits of this technique.

The powdered activated carbon component of Bio-Sep[®] beads in bio-traps will adsorb hydrocarbons and chlorinated hydrocarbons from groundwater during incubation in a groundwater monitoring well. Extraction of these compounds from the beads post-deployment can produce extracts with sufficiently high concentrations of the contaminants to allow for CSIA analysis. Thus the same bio-traps can yield both microbial biofilms for analysis of the microbial community, including potential degraders, and samples of subsurface contaminants for CSIA. Case studies will be presented.

###