IDENTIFYING THE SIGNATURE OF THE NATURAL ATTENUATION OF MTBE IN GROUNDWATER USING MOLECULAR METHODS AND "BUG TRAPS"

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Natural attenuation through intrinsic bioremediation is the risk-based management approach commonly used for gasoline (BTEX) contamination sites. This approach has not yet been utilized for the fuel oxygenate methyl tert-butyl ether (MTBE). MTBE is more resistant to biodegradation than BTEX. MTBE is more abundant than benzene in oxygenated gasoline, has a greater water solubility than BTEX, and sorbs weakly to soil. These properties complicate developing a risk-based management option to be implemented as easily as for BTEX.

Many studies have shown the ability of MTBE to biodegrade and its potential for intrinsic bioremediation in the field, however to date various studies have produced conflicting results as to the extent and conditions for MTBE biodegredation.

The purpose of this project is to build a database through monitoring several model and highly characterized MTBE biodegradation sites. This will determine the possible "signature" of the natural attenuation of MTBE. The Science Advisory Board of the U.S. EPA has stated the importance of such a database to parallel one for BTEX, which has already been developed. Reference to the database may provide insights as to whether or not intrinsic bioremediation is occurring and allow for risk-based management to be implemented.

In collaboration with BP, a subset of gasoline spill retail sites that have been naturally attenuating MTBE will be used in the exploration of the degradative microbial ecologies present. "Bug traps" will be deployed into the polluted groundwater as well as into control wells to concentrate the microorganisms for analysis. Analysis of the microbial ecology associated with the attenuation is defined by the biomarkers in the indigenous organisms that also monitor in situ conditions. This insight along with indirect geochemical measurements will define the footprint "signature" of MTBE bioremediation.