

STABLE ISOTOPE ANALYSIS IN REMEDIATION OF GASOLINE OXYGENATES AND HYDROCARBONS

Tomasz Kuder*

Paul Philp

University of Oklahoma

100 E. Boyd, SEC 810

Norman, OK 73019

Voice: 405-325-4453

Fax: 405-325-3140

Email: tkuder@ou.edu

This presentation summarizes progress in compound-specific isotope analysis (CSIA) applied to remediation of gasoline-range contaminants. Three complementary sets of results are: 1) carbon and hydrogen isotope composition of individual compounds in fresh gasolines, to provide a benchmark for degradation studies; 2) microcosm evaluation of isotope effects caused by biodegradation; 3) detection of biodegradation in the field based on the changes of carbon and/or hydrogen isotope ratios of contaminants. The two latter topics focus on MTBE and TBA, while fresh gasoline characterization also includes the aromatic fraction (benzene to methyl-naphthalenes). A number of newly analyzed field sites yielded strongly enriched isotope ratios in MTBE, and few of them indicate that TBA may be also biodegraded as suggested by isotope ratios enriched in ^{13}C . The field data were used to screen candidates for microcosm studies. Microcosm work has been initiated to: 1) collect isotope fractionation data on MTBE biodegradation by diverse anaerobic cultures; 2) confirm TBA biodegradation potential and determine the magnitude of associated isotope effects. Better definition of the magnitude of isotope fractionation by anaerobic MTBE (and possibly TBA degraders) will be of great utility for improving the precision of in-situ application of CSIA.