

ESTCP PROJECT OF THE YEAR

VALIDATION OF CHLORINE AND OXYGEN ISOTOPE RATIO ANALYSIS TO DIFFERENTIATE PERCHLORATE SOURCES AND TO DOCUMENT PERCHLORATE BIODEGRADATION

DR. PAUL B. HATZINGER
Shaw Environmental, Inc.
Lawrenceville, New Jersey
(609) 895-5356
paul.hatzinger@shawgrp.com

CO-PERFORMERS: Dr. Neil Sturchio (University of Illinois at Chicago); Dr. John Karl Böhlke (USGS); Dr. Baohua Gu (ORNL); Mr. Bryan Harre (NAVFAC-ESC)

Perchlorate-contaminated groundwater is an issue of national concern. In the past, it was assumed that historical use and disposal practices by the military and military contractors, perchlorate manufacturers, and several commercial industries were the sole contributors of perchlorate contamination in the environment. Recent studies also suggest that natural sources of perchlorate, including Chilean nitrate fertilizer and atmospheric processes, add perchlorate to soils and groundwater. Knowledge of whether perchlorate contamination originates from natural or man-made sources can have a significant impact on remediation management strategies.

Dr. Paul Hatzinger and his team have developed a forensic technique to distinguish natural from man-made perchlorate using isotope-ratio mass spectrometry, as well as improve understanding of the extent and origin of variations in the isotopic compositions of man-made and natural perchlorate. Techniques were developed to collect, purify, and measure the isotopic composition of perchlorate in both source materials and environmental samples. Isotopic analyses of perchlorate in groundwater were performed at locations across the United States. Both man-made and natural signatures were observed, as well as signatures indicating local mixtures of these sources.

This novel forensic technique will enable DoD and other interested parties to distinguish military from other anthropogenic and naturally occurring sources of perchlorate and aid in determining appropriate liability for remediating perchlorate contamination and targeting management strategies effectively. The technique also has applications for documenting perchlorate biodegradation in the field.

For more specific information about this project, stop by Poster #125.