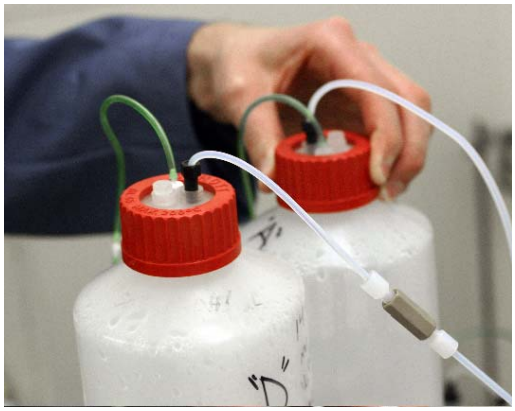
Microseeps Training Options



Microseeps, Inc.

University of Pittsburgh Applied Research Center
220 William Pitt Way
Pittsburgh, PA 15238
412-826-5245
800-659-2887

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Microseeps E-training Courses

As part of Microseeps' commitment to providing its customers with an assortment of training materials and resources, we are now pleased to host free e-training sessions covering a range of topics including Compound Specific Isotope Analysis, Monitored Natural Attenuation, Dissolved Gas Sampling and more.

These informative and cutting edge e-training seminars are a state-of-the art means of learning about the latest techniques for understanding your project, all available to you in the comfort of your own office! Microseeps' e-training allows your clients and technical staff from around the country to join the virtual presentation live via computer while interacting with Microseeps' experts over the phone.

Currently offered courses:

- Compound Specific Isotope Analysis (50 minutes)
- CSIA: A Primer on Stable Isotope Techniques and Their Applications (25 minutes)
- Monitored Natural Attenuation (50 minutes)
- Microseeps Services (30 minutes)
- Dissolved Gas Sampling (20 minutes)

Visit www.microseeps.com/training to sign up today!

Compound Specific Isotope Analysis (50 minutes)
CSIA: The Science, Technology and Selected Literature Examples

Compound Specific Isotope Analysis (CSIA) is a powerful new technique which has been developed to evaluate the state and progress of in-situ degradation processes at field scale. In many cases, (e.g. benzene, MTBE, TBA, DCE) CSIA may provide the only definitive proof that a contaminant is degrading in-situ. Additionally, evaluation of this data can provide a conservative estimate of the fraction of the component degraded, the mechanism of degradation, and the in-situ rate of degradation.

While the study of isotopes is not new, the ability to determine isotope ratios in continuous flow mode has only recently been developed to be useful at concentrations of interest in environmental studies. This presentation will briefly discuss the analytical technology and the fundamentals of stable isotopes so that we may understand its application to in-situ processes. We will use these concepts to illustrate the use of CSIA in evaluating in-situ degradation of the fuel oxygenates MTBE, TBA, and the chlorinated solvents such as PCE and its daughter products. Finally we will discuss how the use of isotopic constraints in groundwater transport modeling may significantly improve our ability to predict the development of plumes.

Compound Specific Isotope Analysis (25 minutes)

A Primer on Stable Isotope Techniques and Their Applications

A less technical discussion of the Techniques and Applications of CSIA with respect to hydrocarbons, chlorinated hydrocarbons and fuel oxygenates.

Monitored Natural Attenuation (50 Minutes)

"Monitored Natural Attenuation Basics for Hydrocarbons, Chlorinated Hydrocarbons and Fuel Oxygenates"

Natural attenuation processes should be evaluated when preparing a remedial action plan for a site with petroleum or chlorinated solvent contaminated soils and groundwater. While natural attenuation processes include biodegradation, abiotic degradation, sorption, dispersion, and volatilization, numerous studies have indicated that the natural, in-situ biodegradation process is the primary mechanism for the attenuation of petroleum hydrocarbons and chlorinated solvents in the subsurface. Biodegradation is a natural attenuation mechanism that has the potential to destroy the contaminants in-situ with nontoxic inorganic end products. As we understand the natural process, we are learning how to enhance and accelerate it.

An approach for evaluation of intrinsic bioremediation processes focused on evaluation of terminal electron acceptors in the groundwater for both petroleum hydrocarbons and chlorinated solvents will be presented. Microseeps has recently announced the development of low level volatile fatty acid (LLVFA) analysis which is a key to understanding the process of stimulation of biodegradation of chlorinated solvent and other contaminant plumes.

Abiotic degradation processes have also been recognized to be of significance in some chlorinated solvent plumes. The degradation pathway for this process is significantly different from the more familiar biological degradation pathway and requires unique analytical parameters to confirm. The state of understanding of this process will be discussed.

The current state of understanding of natural and enhanced attenuation of MTBE in groundwater will also be discussed, including a brief discussion of the use of Stable Isotopes of carbon and hydrogen in evaluation of degradation progress.

Microseeps Services (30 minutes)

A discussion of Microseeps analytical services, in particular the niche analytical services and their application and use with respect to in-situ degradation will be presented. Services to be discussed include:

- Dissolved Permanent gases
- Total Inorganic Carbon
- Dissolved Hydrogen
- Dissolved Light Hydrocarbons
- Low Level Volatile Fatty Acids
- Compound Specific Isotope Analysis
- BioTraps
- AMIBA
- BioAvailable Ferric Iron

Dissolved Gas Sampling (20 minutes)

Microseeps' sampling services in support of intrinsic and enhanced in-situ degradation will be discussed. In particular, the use of the bubble strip sampler for dissolved hydrogen will be discussed. This sampler eliminates several problems associated with sampling for dissolved hydrogen, the master variable for assessing groundwater redox processes.

Advanced Tools for In-Situ Remediation Training

Half and Full day Courses Available

Recent presenters have included (presenters vary):
John Wilson, USEPA, Michael Hyman, PHD, NC State University, Robert J. Pirkle, Microseeps, Inc., Pittsburgh, PA, Greg Davis, Microbial Insights, Inc., Rockford , TN , Aaron Peacock, Ph.D., Haley and Aldrich, Oak Ridge, TN, Joe Haas, M.Sc., P.Eg., P.Hg., NY State Ag's Office, New York, NY

Half day workshop (2 presenters)

Recent advances in analytical chemistry and microbiology have created opportunities for experts in groundwater contaminant assessment to take quantum leaps in their understanding of fate and transport of volatile organic compounds. These techniques demonstrate definitive pathways to degradation.
With this information, regulatory authorities, responsible parties and consultants are able to make more informed decisions and apply more effective and often less costly solutions to tough groundwater contaminant problems.

In this half-day workshop, presenters will discuss the application of advanced tools for fuel oxygenates, chlorinated hydrocarbons and hydrocarbons.

This workshop will explore

- the benefits of nucleic acid based technologies;
- how in-situ degradation can be stimulated using detailed site data;
- the use of compound specific isotope analysis;
- the role of stable isotope probing in demonstrating biodegradation;
- Bio-Trap samplers, a low cost, in-situ alternative to laboratory microcosms and pilot studies;
- advanced analytical applications for fuel oxygenates, chlorinated hydrocarbons and hydrocarbons, including:
  MTBE, ETBE, TAME, DIPE, TAA, TBA, PCE, TCE,
  cis-DCE, VC, 111-TCA, 112-TCA, 11-DCA, 12-DCA, CA,
  11-DCE, trans-DCE, 1122-TeCA, 1112-TeCA, BTEX,
  ethene, ethane, carbon tetrachloride, and chloroform;

Half day workshop (5 presenters)

Presentations explore the following topics:

- Stable Isotopes, Microbiology and Biodegradation Processes
- Theory and Application of Molecular Biological Tools (MBTs) and Biogeochemistry to Bioremediation Process Monitoring and Monitored Natural Attenuation Programs
- Compound Specific Isotope Analysis: The Science, Technology and Selected Examples with Application to Fuel Oxygenates and Chlorinated Solvents
- Application of Molecular Biological Tools to a Mixed Plume Site
- Fuel Oxygenate Case Study

Description:
This workshop will be focused on recent advancements in analytical chemistry and microbiology that improve the understanding of fate and transport of volatile organic compounds. The application of advanced tools for fuel oxygenates, chlorinated hydrocarbons and hydrocarbons and how these techniques demonstrate definitive pathways to degradation will be discussed. This will include a workshop exercise. Pizza will be served.

Goals of Workshop:
• Latest developments in Microbial Degradation Processes for Chlorinated Solvents and Fuel Oxygenates
• the benefits of nucleic acid based technologies;
• how in-situ degradation can be stimulated using detailed site data;
• the use of compound specific isotope analysis;
• the role of stable isotope probing in demonstrating biodegradation;
• Bio-Trap samplers, a low cost, in-situ alternative to laboratory microcosms and pilot studies.

Topics will Include:
• the benefits of nucleic acid based technologies;
• how in-situ degradation can be stimulated using detailed site data;
• the use of compound specific isotope analysis;
• the role of stable isotope probing in demonstrating biodegradation;
• Bio-Trap samplers, a low cost, in-situ alternative to laboratory microcosms and pilot studies;
• advanced analytical applications for MTBE, ETBE, TAME, DIPE, TAA, TBA, PCE, TCE, cis-DCE, VC, 111-TCA, 112-TCA, 11-DCA, 12-DCA, CA, 11-DCE, trans-DCE, 1122-TeCA, 1112-TeCA, BTEX, ethene, ethane, carbon tetrachloride, and chloroform.

Full day workshop

The Advanced Tools for In-Situ Remediation Workshop is an 8 contact hour program presented in a combined classroom and participatory workshop format. The workshop is formulated for Environmental Professionals with a broad range of skills, but focused on those who evaluate environmental data, or design environmental remedial projects, where in-situ degradation is a significant component. This is NOT a course in microbiology, though even experienced microbiologists will benefit from exposure to the latest information on contaminant degraders, degradation pathways, and process assessment and quantification techniques. The focus of the work shop is the proper selection and implementation of state of the art tools and strategies for the assessment and documentation of in-situ degradation processes. In addition to providing an overview of the fundamentals of the in-situ degradation of fuel oxygenates and chlorinated solvents, the participant will gain an in depth understanding of the theory and application of compound specific stable isotope analysis, biomarker analysis and the use of Bio-Trap samplers as an alternative to laboratory microcosms and pilot studies.

Presentations focus on the following topics:

- Microbial Degradation Processes for Chlorinated Solvents and Fuel Oxygenates
- MNA for Chlorinated Solvents stable carbon isotopes
- MNA for Fuel Oxygenates: Why it occurs, how it evolved, and using stable carbon isotopes to predict plume behavior
- Applications of Advanced Tools- A Panel Presentation
- Tiered Approach to Groundwater Evaluation of Biodegradation
- Using Carbon and Hydrogen Isotope Analysis to Investigate Biodegradation
- Application Exercise-led by Joe Haas
- MTBE - TBA Example Application
- Chlorinated Solvent Example Application

Biographies of Key Presenters

Bob Pirkle, President

Bob Pirkle has over twenty-five years of experience in geotechnical and geochemistry research and development. After a lengthy tenure with Gulf Research and Development Company and the Geotechnical Research Institute, Dr. Pirkle and his partners founded Microseeps in 1984.

Dr. Pirkle completed undergraduate and graduate studies in Chemistry at Auburn University. In 1973, he obtained the degree of Doctor of Philosophy in Chemistry from The University of Western Ontario - London, Ontario, Canada. Dr. Pirkle completed Postdoctoral Studies and Research Associateship in Chemistry & Applied Physics at Cornell University. He is a member of the American Chemical Society, the National Ground Water Association, and the American Association of Petroleum Geologists. Dr. Pirkle has been a featured speaker at numerous technical symposiums and published extensively in technical publications.

Pat McLoughlin, Technical Director

Pat McLoughlin has over fifteen years of laboratory and research experience. As Technical Director and Manager of Quality Systems at Microseeps, Dr. McLoughlin is responsible for the laboratory QA/QC program, as well evaluating technical issues and writing technical proposals and reports. Dr. McLoughlin has been responsible for developing new technical applications and currently has two patents pending. Dr. McLoughlin obtained the degree of Doctor of Philosophy with a major in Physical Chemistry from Cornell University. He has a Master of Science degree in Physical Chemistry from Cornell University and a Bachelor of Science in Chemistry from University of Notre Dame. Dr. McLoughlin has authored numerous technical papers and has numerous presentations at national conferences.