

## Green Remediation, Environmental Analysis & Engineering Workshop

A Webinar for Attorneys & Environmental Industry Professionals  
Professional Practice Development



This timely and practical presentation covers the latest developments for state-of-the-art environmental practices and is designed specifically for environmental industry professionals preparing for trial, depositions or discovery. Course focus will relate to releases to soils, surface water and groundwater of hydrocarbons and chlorinated solvents. Course participants will also learn about the latest environmental forensic laboratory techniques and procedures essential for successful analysis & engineering optimization of remediation systems; key for Industry's sustainability programs and USEPAs Green Remediation.

### Featuring...

- Two presentations on cutting-edge environmental forensic and analytical techniques:  
*Environmental Forensic Isotope Analysis* by Yi Wang, Ph.D.  
*Remediation Optimization Using Stable Isotopes* by Greg Smith, P.E.
- Course includes hand-outs of presenter slides and reference materials.
- Q&A direct access to the industry's leading experts.
- MCLE Credits Available

### Course Itineraries...

#### Chlorinated Isotope Analysis One Hour - Yi Wang, Ph.D.

• **What are environmental isotopes?**  
Atom, element, proton, neutron, stable and radioactive isotopes, environmental isotopes, isotope fractionation.

• **Why are isotopes useful in environmental forensic investigations?**  
Identifying sources, defining commingled plumes, distinguishing degradation products from manufactured products...

• **How to perform forensic isotope analysis?**  
Sample preparation, U.S. EPA recommended Compound Specific Isotope Analysis (CSIA) of <sup>13</sup>C, <sup>37</sup>Cl and <sup>2</sup>H in chlorinated solvents, etc.

• **What are the cost and turnaround time for forensic isotope analysis?**  
A comparison of costs and TAT for CSIA services currently available in the North America.

• **How to interpret isotope data?**  
Forensic report, expert witness and litigation support available at ZymX Forensics.

#### Isotopes for Remediation Optimization One Hour - Greg Smith, P.E.

• **DNAPL: Is there Progress**  
DNAPL acts as a seemingly unlimited source of PCE and/or TCE, so even if it is degrading, the dissolved concentration won't go down. But CSIA information can tell if there is degradation.

• **Pump and Treat Shutoff?**  
CSIA can tell if there is already preexisting biodegradation, which can shorten the time until biodegradation alone can be protective.

• **What is the Degradation Mechanism?**  
Many site managers can't get closure because they can't prove a mechanism. CSIA can help achieve the site closure by differentiating between "lost" contaminant and degraded contaminant.

• **Is There Successful Degradation?**  
CSIA proves the concentration went down because contaminant was destroyed.

• **Is Current Existing Remediation Strategy Effective?**  
CSIA can evaluate the extent and rate of degradation.

### Meet Your Instructors...



Dr. Yi Wang has a B.S. in Environmental Science, an M.S. in Environmental Chemistry, and a Ph.D. in Environmental Geochemistry. He has been working for 20 years in the environmental field on issues related to soil and water contamination. He developed compound specific isotope analysis (CSIA) techniques at Brown and Princeton University and applied isotope forensics in the environmental fields. Dr. Wang is a specialist in the analysis of isotope ratios for carbon, chlorine, hydrogen, nitrogen, oxygen, and sulfur. He has published over 40 articles and books on soil and water contamination topics and has shared this information via lectures throughout the world. Dr. Wang is working as an expert for the U.S. Environmental Protection Agency (EPA) and members of the State Coalition for Remediation of Drycleaners (SCRD) on projects using CSIA techniques to determine remedy selection effectiveness and forensic source analysis.



Greg J. Smith, P.E., P.G. is a Senior Hydrogeologist at DPRA with more than 20 successful DNAPL site closures starting with the industry's first in 1999 at the former AT&T Skokie Works in Illinois where regulatory standards were reached. Mr. Smith has also employed other remediation technologies, including in situ biodegradation, permeable reactive barriers, as well as conventional recovery methods including groundwater pump and treat and soil vapor extraction. Mr. Smith has worked with researchers at the California State University at Los Angeles, University of Illinois at Chicago and Argonne National Laboratory performing stable isotope surveys (<sup>87</sup>Sr/<sup>86</sup>Sr, <sup>37</sup>Cl and <sup>14</sup>C) to determine fate and transport of contaminant plumes in groundwater in California, Missouri, Illinois and South Carolina. Mr. Smith has provided expert witness testimony on the fate and transport of chlorinated solvents in federal court in Michigan. He has published more than 20 articles on various aspects of soil and groundwater remediation, including a chapter on Coupled Electrokinetics – Thermal Desorption, in a book entitled: Electrochemical Remediation Technologies for Polluted Soils, Sediments and Groundwater, and co-authored the Encyclopedic Dictionary of Hydrogeology.