

IN SITU SOLUTIONS

In Situ Solutions – With the advent of innovative site characterization and treatment technologies, In situ degradation of contaminants is rapidly replacing more expensive physical options as the solution of choice, especially at large and complex remediation sites. These solutions can range from monitored natural attenuation through enhanced bioremediation and chemical oxidation or reduction. Appropriate monitoring, developed by Microseeps and now available from Pace Analytical can provide a better understanding of contaminant mass, distribution and behavior over time, leading to better decisions based upon multiple lines of evidence. These cutting edge solutions can also decrease the amount of time to cleanup a site, decrease the amount of residual contamination left at sites and minimize the need for long term operation and maintenance. Overall they represent a more cost-effective and “greener” approach to site remediation.

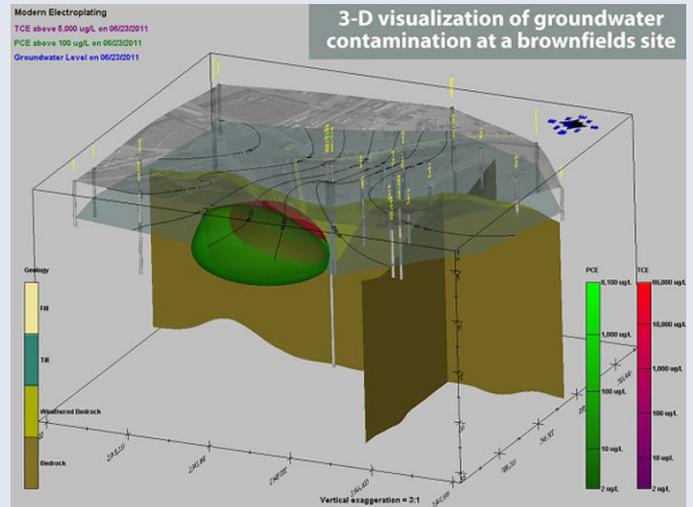


Photo Courtesy of EPA *Brownfields Road Map to Understanding Options for Site Investigation and Cleanup Fifth Edition*. EPA 542-R-12-001.

When you need to know that your In Situ Solution is working



Unique In Situ Solutions can supplement conventional environmental monitoring to provide additional lines of evidence or increased sensitivity to detect contaminant degradation activity at lower levels in parts of the plume far removed from an injection point. Although each site is unique, here are some general applications for the more frequently referenced tools:

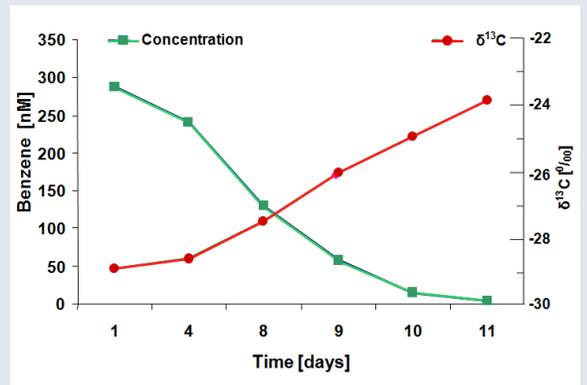
Methane, Ethane, Ethene – This proprietary method with a RL of 0.025µg/L for ethene can detect the microbial activity of Dehalococcoides completely degrading PCE to ethene at ultra-low levels.

Volatile Fatty Acids – When lactic acid or similar is used to stimulate dechlorination VFA can measure a broad range of acids (8) to confirm activity at the injection point, or lower levels at plume edge.

Dissolved Hydrogen – Hydrogen is essential for degradation of many chlorinated compounds.

Compound Specific Isotope Analysis (CSIA) is one of the most sophisticated tools in the in situ solutions arsenal, capable of determining not only the source of the contaminants, but also of providing in the words of the USEPA, “unequivocal documentation that biodegradation or abiotic transformation processes actually destroyed the contaminant.” As a contaminant degrades in situ its concentration decreases and its isotopic composition changes as well allowing us to detect and accurately characterize that degradation.

Microseeps Inc. Acquisition – in August of 2013 Pace Analytical acquired Microseeps Inc. of Pittsburgh Pennsylvania. Microseeps has a long history of developing unique solutions to meet the needs of the remediation market, and Pace is pleased to have retained the services of the two key Microseeps scientists with over 45 years of combined environmental in situ experience.



- **Dr. Robert J. Pirkle:** President and founder of Microseeps with over 28 years experience in CSIA and in situ monitoring.
- **Dr. Patrick W. McLoughlin:** Microseeps Technical Director with over 17 years experience in CSIA and in situ monitoring.

To learn how Pace In Situ Solutions might benefit you or your client, please contact your local Pace Account Executive.



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Pace Analytical[®]

**MICROSEEPS INC.
A DIVISION OF PACE ANALYTICAL**

IN SITU MONITORING:

NATURAL ATTENUATION

BIODEGRADATION

CHEMICAL OXIDATION

CHEMICAL REDUCTION

THERMAL TREATMENT

COMPOUND SPECIFIC ISOTOPE ANALYSIS