

PATRICK W. MCLOUGHLIN, Ph.D

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(724) 272-4631

ENVIRONMENTAL PROJECTS

EDUCATION

Cornell University, Doctor of Philosophy
Major: Physical Chemistry

Cornell University, Master of Science
Major: Physical Chemistry

University of Notre Dame, B.S.
Major: Physical Chemistry

- Resolved mixed plume of tetrachloroethene (PCE) and trichloroethene (TCE)
- Identified two PCE releases that impacted both properties and a TCE release that was only on one property.
- Authored protocol for CSIA based investigations of VOCs in groundwater.
- Identified multiple sources of aquifer impacts of 1,4-dioxane and TCE in a “single” ground water plume.

QUALITY CONTROL PROJECTS

Designed, produced, validated and implemented software to report CSIA results that:

- Imported raw data and performed necessary calculations
- Combined results from different isotope techniques to make a single report
- Performed and documented multiple quality control tests
- Provided detailed explanations of the calculation for simplified validation

Standardized Petroleum Forensic analysis:

- Created necessary software utilities
- Compiled library of reference spectra from NIST
- Optimized both gas chromatography and mass-spectroscopy to aid in chemical identification
- Designed and conducted user training on new utilities and procedures

Developed tests for biodegradation in groundwater:

- Identified unique CSIA signature of degrading cis-dichloroethene (cis-DCE) and vinyl chloride (VC) in groundwater
- Developed calculations to reveal CSIA signature
- Enabled rapid and simple visual interpretation of a large volume of complex data

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PROFESSIONAL EXPERIENCE

McLoughlin Environmental Science, President

- Provide geochemical consulting to support both forensics and remediation.
- Review technical interpretations checking for validity and potential improvement.

Pace Analytical Energy Services (PAES), Technical Director

- Merged CSIA capabilities of Zymax and Microseeps into PAES, preserving best practices
- Fostered client relationships by presenting use of CSIA to reveal environmental forensics or inform site remediation
- Assumed operational management and instrumentation functionality responsibilities for CSIA department

Microseeps, Technical Director

- Proposed, directed and reported field studies for engineered attenuation and MNA of MTBE
- Established sensitive, accurate and affordable analysis of fuel oxygenates in groundwater
- Discerned analytical bias in results of fuel oxygenates in groundwater and developed, tested and documented a solution
- Commercialized service applying CSIA to groundwater contaminants

Microseeps, Quality Control Officer

- Rewrote standard operating procedures and quality systems manual to standardize use of quality tools
- Led laboratory through certification process for multiple states and the National Conference of Environmental Laboratories

Microseeps, Research Scientist

- Assessed Natural Attenuation market needs and developed internal analytical capabilities in response
- Invented robust sampling apparatus for rapid, reliable and simple hydrogen gas sampling

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RELEVANT PUBLICATIONS

Peer Reviewed Publications

- McLoughlin, P.W., Pirkle, R.J., Fine, D. and Wilson, J.T. (2004), TBA Production by Acid Hydrolysis of MTBE During Heated Headspace Analysis and Evaluation of a Base as a Preservative. *Groundwater Monitoring & Remediation*, 24: 57-66. doi:10.1111/j.1745-6592.2004.tb01302.x
- McLoughlin, P.W., Peacock, A.D., Pirkle, R.J., Wilson, J.T. and McCracken, R.W. 2014. "CSIA of TCE and Daughter Products with Multiple Sources, Multiple Attenuation Mechanisms, and Low Ethene." *Remediation*, Winter, pp. 11-21. doi.org/10.1002/rem.21411
- McLoughlin P. 2019. "Protocol for using compound-specific isotope analysis in environmental forensics." *Remediation* 2019; 29:45–52. doi.org/10.1002/rem.215881

Book Chapters

- Pirkle R.J., McLoughlin P.W. (2003) Laboratory Analysis of Oxygenated Gasoline Constituents. In: Moyer E.E., Kosteci P.T. (eds) *MTBE Remediation Handbook*. Springer, Boston, MA.
- Jeffrey, A.W.A. & McLoughlin, Patrick & Pirkle, R.J. (2016). Application of Isotopic Compositions in Fugitive Petroleum Product Identification and Correlation. In: Stout, S.A., Wang, Z. (eds) *Standard Handbook Oil Spill Environmental Forensics*. Academic Press, London, UK. doi:10.1016/B978-0-12-809659-8.00010-3

Platform and Poster Presentations

- 2019: Is it All From Biodegradation? Forensics with Tetrachloroethene d13C values and Concentrations of Tetrachloroethene Biodegradation Products
- 2018: Implementing Monitored Natural Attenuation with Multiple Contaminants, Modulating Ground Water Flow, and Multiple Attenuation Mechanisms
- 2017: Using the Remediation Test Panel to Determine Contaminant Fate and Support MNA
- 2016: Clarifying Conceptual Site Models with CSIA: Seeing a Path to Closure
- 2014: CSIA and Ethene as Footprint Indicators for Attenuation of Chlorinated Ethenes
- 2011: Solid Phase Sampling and Analysis to Document Conditions Conducive to Biogeochemical Transformations of Chlorinated Solvents
- 2008: Natural Attenuation – Do We Know Enough to Address the Question of Sustainability?
- 2006: Implications From An Overview of Volatile Fatty Acid and Ethene Observations
- 2005: Electron Shuttles in Redox Processes: Characterization, Quantification and Remediation Optimization