

The South Carolina Association of Environmental Professionals invites you to attend!

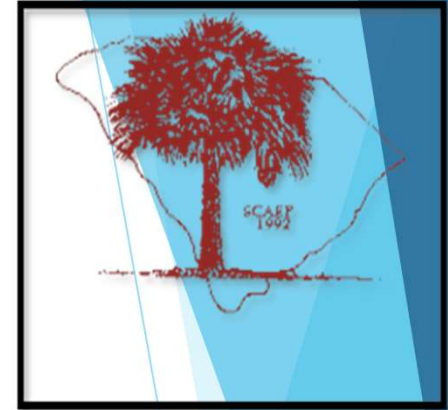
- Date:** Thursday, May 16, 2024
- Time:** 6:30 pm (social) 7:00 pm (meeting start time)
- Where:** Weston and Sampson Office – 1201 Main Street, Suite 930, Columbia, SC 29201 or Zoom (link below)
- Cost:** No charge for paid members or first-time attendees
- Speaker:** Gary Birk, Tersus Environmental
- Topic:** Application of Combined Technologies for Remediation and Performance Monitoring of Carbon Tetrachloride

This presentation showcases a comprehensive remediation strategy tailored for a challenging case of groundwater contamination in the Midwest. The project targets a 900 ft x 600 ft plume contaminated with carbon tetrachloride (CT) and other chlorinated solvents, presenting concentrations ranging from 4 to over 4,000 µg/L. The contaminated zone, situated in the uppermost saturated sand unit at depths approximately 26 to 32 ft below ground surface (BGS), posed significant remediation complexities. The remediation approach integrates direct push technology injections (DPT) to distribute amendments efficiently in the subsurface. Linear barriers, formed by injection points, are strategically placed, effectively creating barriers separated by the equivalent of 2 years of groundwater flow. Additionally, three permanent wells facilitate large batch soluble-based amendment injections upgradient to the source zone, targeting areas inaccessible via DPT. The remediation strategy combines a blend of zero-valent iron (ZVI), electron donors, pH buffers, micronutrients, and a chlorinated-methane degrading bioaugmentation culture. This sequential approach addresses CT through in situ chemical reduction and its breakdown products via anaerobic bioremediation. Performance monitoring employs a suite of tools, including groundwater modeling coupled with molecular genetic testing, Compound-Specific Isotope Analysis (CSIA), and Volatile Fatty Acids Analysis. Geochemical groundwater parameters are monitored periodically to assess injectate impacts on aquifer conditions. Quantitative Polymerase Chain Reaction (qPCR) tests in groundwater gauge the evolution of microbial cultures capable of dechlorination, focusing on *Dehalococcoides* Mcartil, *Dehalobacter*, and key functional genes (*cfrA*, *tceA*, *vcrA*, *bvcA*). CSIA tracks changes in carbon isotopic composition ($\delta^{13}C$) of CT and its breakdown products (chloroform, dichloromethane, tetrachloroethylene, trichloroethene, cis-dichloroethene, and vinyl chloride), distinguishing between biotic and abiotic processes. CSIA is also used to detect inhibition of incomplete dechlorination processes, providing insights into remediation efficacy.

Gary Birk, PE is Founder and Managing Partner of Tersus Environmental, LLC, headquartered in North Carolina. With four decades of experience, Gary specializes in engineered biotechnology-based solutions for soil and groundwater management. He has led numerous national and international projects, addressing complex environmental challenges. He holds four U.S. Patents related to reductive bioremediation and in-situ chemical reduction of soil and groundwater.

Zoom Link: <https://us02web.zoom.us/join/zoom/register/tZEqdgj8vGt3NZAqSeX3wJ9qic9DQNBtR>

Passcode: 020791



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- SCAEP was founded in 1992 as a non-profit organization with the following objectives in mind:
- Promote harmony, cooperation, and mutual understanding among environmental consultants, regulatory agencies, educational professionals, business professionals, etc.
- Allow members of the various disciplines represented, both public and private, the opportunity to interact at a social level
- Encourage the transfer of technical information
- Provide a vehicle for continuing technical education
- Foster the highest standards of Professional Ethics within the environmental field
- Combat unfair practices within the environmental field

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- Membership fees are only \$35/calendar year and \$15 for students



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