

A Geological Engineering Perspective of In-Situ Thermal Remediation

Jarrod P. Yoder, PG, LSP, Jennifer Kingston, PhD, PE, and Michael Basel, PhD, PE
(Haley & Aldrich, Inc.)

When performing feasibility studies, we often ask ourselves several questions to identify the proper remedial action alternatives for site-specific conditions. One of the key considerations in any feasibility study is whether or not you have a source area with residual mass at elevated concentrations (including NAPL) and to what extent horizontally and vertically. There are very few remedial action alternatives that would effectively remediate high concentration saturated and unsaturated zone source areas and prevent long-term operation, maintenance, and monitoring costs. We ask ourselves, "Should I do thermal remediation" and if yes, then "what data do I need to assess if thermal remediation is feasible."

To aid consultants, clients, and regulators, this presentation will provide 1) a general overview of the three main thermal remediation processes, 2) provide insight into data needs, collection methods, and evaluation tools, and 3) best practices to consider when developing a thermal remediation design.

This presentation will summarize over 30 years of consulting experience and case studies with in situ thermal remediation. The presentation was developed based on key takeaways and root cause analyses from the mid 1990s when H&A personnel worked with Shell Oil Company to commercialize thermal remediation to the present-day standards of practice from 10 recent full-scale projects using ERH, SEE, and TCH thermal technologies. Innovative high-resolution site characterization techniques including membrane interface probe (MIP), DYE-LIF, Waterloo APS, or a combination thereof will be discussed and how these data are used in modeling software to develop a 3-D visualization and mass estimate to support thermal remediation designs.