Remediation Case Studies Gone Wrong: From Bench- to Full-Scale and the Cost of Assumptions

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In-situ remediation technologies offer the promise of efficient, sustainable, minimally invasive cleanup of contaminated sites, but when implemented without adequate upfront planning the result can fall short of expectations, leading to costly fixes, regulatory setbacks, and/or persistent contamination. Practitioners regularly enjoy sharing success stories but its often the lessons learned from failures where wisdom is gained. This presentation will explore real-world case studies including when remediation efforts failed to achieve cleanup goals due to a variety of factors such as inadequate site understanding, lack of bench-scale or pilot-scale testing, flawed assumptions about contaminant behavior and/or erratic decision-making from clients. Critical reflections and insights will be offered partially by comparison to similar case studies where the outcomes were successful. The list of case studies to present include injection to treat light non-aqueous phase liquids (LNAPL), completion of a Permeable Reactive Barrier (PRB) that was properly designed but poorly installed, remediation of surface and subsurface water on a site where the client struggled with consistent decision making and project direction, as well as a novel PFAS remediation approach, and in-situ treatment of chlorinated solvents and heavy metals.

Through these contrasting examples, the presenter will share war stories and examine the critical decisions that influence remediation performance, including contaminant and amendment interaction chemistry, hydrogeologic complexity, amendment delivery challenges, and contaminant matrix interactions. The session will conclude with a set of practical recommendations for new and veteran environmental professionals alike, emphasizing the value of early-stage testing, iterative design, and data-driven decision-making to improve the reliability and effectiveness of in-situ remediation strategies.

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Bruce Tunnicliffe is President of VEI Contracting Inc., is an Environmental Engineer, and has 25 years of experience designing and implementing remediation of chlorinated solvents and petroleum hydrocarbons. Mr. Tunnicliffe holds a Master's degree from the University of Waterloo where he studied oxidation in fractured bedrock.