More Lessons Learned from Common Mistakes Applying In Situ Remediation Technologies in the Field

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Background/Objectives. Field implementation of projects involving in situ bioremediation (ISB) or in situ chemical oxidation (ISCO) to treat volatile organic compounds (VOCs) is often challenging. The success of each project depends on factors like the quality of the conceptual site model, how well the site has been characterized, the currency of data, whether there is sufficient monitoring, the technology or technologies selected, how well the technologies are understood, and the misconceptions held by the project team. There are many lessons that can be learned from projects that were less than fully successful.

Approach/Activities. This presentation will cover issues identified from several full-scale field implementation projects where ISB and ISCO were implemented. Specific topics covered will include sites with old data or insufficient data, heterogeneous subsurface geology, the need to fully characterize light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL), testing for and monitoring all VOCs and related contaminants, the necessity for pre-design characterization, and maintaining suitable subsurface conditions to treat contaminants.

Results/Lessons Learned. Experience overseeing remediation projects has shown that in situ remediation is a contact sport. Significant reductions in VOC concentrations can be obtained when technologies are applied properly and site conditions are well understood. However, when site conditions are not fully understood or the implications of geology for remediation (e.g., matrix diffusion/back diffusion) are ignored, cleanup goals may not be achieved. Failure to obtain cleanup goals in a reasonable timeframe may indicate that the site conceptual model is flawed, the design is flawed, or that the wrong in situ technology was chosen. A robust design and data quality objectives are crucial elements for any remedial project. Misconceptions like believing that it is only necessary to test for and monitor the contaminants of concern (COCs) that have cleanup levels listed in the Record of Decision or that remediation will be successful when site data are 10 to 15 years old may lead to surprises that can be avoided. LNAPL and DNAPL may have unexpected constituents that should be considered during design. A primary lesson learned is that in most situations, multiple applications of ISB substrates or ISCO reagents will be required.