Demonstrating A Geophysics Strategy for Minimally Invasive Remediation Performance Assessment

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This presentation will focus on the use of geophysical imaging in subsurface remediation performance assessment and monitoring, with a specific emphasis on electrical geophysical imaging. In situ treatment methods have become widely used because they are relatively inexpensive and effective when implemented appropriately. One of the major limitations to the effectiveness of in situ treatment is that practitioners often have limited knowledge of the distribution of critical parameters away from sampling boreholes, such as the distribution of an injected amendment, or the spatial extent of enhanced microbial activity. As a result, there is often substantial uncertainty concerning whether treatment design criteria have been met, or if, where, and when additional measures are required. Such uncertainty is addressed either through dense sampling, or through overly conservative remedial efforts, both of which are costly. Recent advancements in geophysical data collection hardware, processing software, and understanding concerning the relationships between electrical properties and biogeochemical processes, have improved the capability of electrical geophysical imaging to provide continuous (in space and time) and cost-effective information concerning the performance and long-term behavior of in-situ remediation operations. However, electrical geophysical imaging only provides indirect information on subsurface remediation progress and is prone to misinterpretation or, even worse, overselling of the capabilities by geophysical practitioners. This presentation describes and demonstrates the current capabilities and limitations of geophysical imaging for site performance assessment and monitoring, including an illustrative bioremediation case study. Tools and techniques to help the remedial project manager make informed decisions about the use of geophysical methods at a remediation site are also introduced.

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