Using Targeted High Resolution Characterization to Improve Remedy Design and Implementation

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The EPA Superfund Optimization Program provides independent third party evaluations of sites at strategic locations along the Superfund pipeline from Remedial Investigation (RI) through Long Term Remedial Action (LTRA). At many sites, these evaluations indicate opportunities for improvement to the conceptual site model (CSM), data collection tools and strategies, and data management and visualization platforms, that can significantly improve the protectiveness and efficiency of remedy implementation. Use of targeted high resolution characterization techniques provides improved understanding of contaminant distribution and critical geologic/hydrogeologic features that control fate and transport mechanisms at meaningful scales necessary to optimize remedy implementation.

This presentation will provide an overview of common site characterization challenges identified through third party optimization reviews conducted at EPA Superfund sites and highlight high resolution characterization strategies and tools available to address these challenges. Trends in remedies chosen at EPA sites continue to move towards in-situ techniques such as chemical oxidation and enhanced biological processes further illustrating the need to adequately understand source material and plume morphology with greater resolution in the subsurface. Remedial strategies that combine multiple remedy technologies along distinct geologic facies or that may target source, free phase, residual, and dissolved phase contamination differently further aligns with the need to understand contaminant concentrations and hydrogeologic conditions at scales appropriate to optimize remedy applications.

High resolution tools and strategies can be applied at a variety of entry points along the assessment and cleanup process however optimization findings continue to show the potential for significant programmatic impact when considered before or during remedy design activities. Characterization investments that improve refinements of treatment zones potentially requiring more aggressive technologies and ensure appropriate reagent delivery location and mechanisms can have significant return on investment. Similarly, considering the extraction, destruction or treatment of contaminants in light of subsurface heterogeneity and variations in hydraulic conductivity not only serve to potentially improve remedy protectiveness and efficiency but are uniquely suited to streamline cleanup footprints and meet green remediation performance metrics.