Best Management Practices for Site Characterization: The End of Poke and Hope?

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Background: Site characterization has historically been performed by installing wells or borings separated by distances on the scale of five to ten meters or more. Drilling blind, or "poking and hoping," leaves a data gap that limits full understanding of subsurface conditions. Preferential groundwater flowpaths and resulting contaminant transport and distribution, for example, are often affected by subsurface heterogeneity due to presence of fractures and/or channels which are difficult to characterize solely with traditional wells. Advances in direct push tooling have led to high resolution site characterization (HRSC) work at many sites in recent years. These data are very useful but are limited to the domain of the boring and not applicable to harder soil types and bedrock. During the last 20 years, specialty environmental imaging technology (Ultra-HRSC) has been used at hundreds of sites in varying alluvial and bedrock geology to generate 2D continuous subsurface images/scans and 3D CSMs. These scanning data have also been collected over time as 4D datasets, which allow the observations of changes in subsurface processes such as injection distribution mapping.

Approach: Using a catalog of project/site data, the benefits of a scan first rather than drill blind approach were evaluated on both a cost and accuracy basis. Guidelines for successful management of these big data projects have been developed and include the importance of QA/QC protocols, 3D data integration and visualization of multiple lines of evidence (including historical site data and follow up ground-truthing confirmation drilling data), and robust virtual or in person collaboration by project team/stakeholders.

Lessons Learned: Utilization of proven scan first approach to site characterization provided greater certainty of subsurface conditions which resulted in more informed site management decisions and reduced trailing liabilities. In most cases, significant cost and time savings were also realized. Best management practices for sites requiring significant investment in characterization and/or remediation need to be revised. Biography

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Since joining Aestus in 2018, Samantha has performed all aspects of the Aestus project lifecycle, including acquisition field work, processing of geophysical data, data integration, 3D visualization, and reporting. As project manager, she oversees a variety of projects completed at complex sites across the United States. Prior to her time with Aestus, she completed her Master's degree in Exploration Geophysics at the University of Leeds (UK), utilizing several different geophysical techniques to characterize the subsurface remains of a former gasworks facility.

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