

Attainment Monitoring and Planning for Site Closure
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As in situ remedial technologies and implementations mature, site managers are increasingly faced with decisions on whether to continue active treatment, move to passive remedies such as monitored natural attenuation (MNA), or pursue site closure. Often, these decisions are guided by contractual obligations or payment milestones. Because monitoring data play a key role in supporting and documenting these transitions, planning for future data needs, including demonstrations of attainment, is an important feature of in situ remedy monitoring optimization.

In 2014, EPA issued guidance on demonstrating attainment of groundwater cleanup goals for remedial action sites in the Superfund program. The *Groundwater Remedy Completion Strategy* (OSWER 9355.0-129) provides a framework for groundwater data collection and interpretation intended to establish a scientific basis that groundwater has met and will continue to meet remedial goals. A spreadsheet tool and manual were issued along with the strategy illustrating and performing recommended statistical analyses. The Completion Strategy outlines data requirements and recommended statistical analysis methods supporting a demonstration of attainment that can be used to negotiate site closure. While the framework and methods described in the EPA guidance are not specific requirements at most remedial action sites, they provide a basic approach for designing attainment monitoring supporting an exit strategy and site closure.

Key elements of the Completion Strategy are that attainment is assessed on a well-by-well basis and that there are two distinct phases of site monitoring: Remediation Monitoring and Attainment Monitoring. The requirement for well-by-well demonstrations and the identification of separate phases of monitoring, with different data requirements, presents a foundation for developing spatial and temporal data sufficiency for site closure. If an aggressive monitoring optimization strategy has permanently reduced the number of sampling locations or reduced the frequency of sampling, site managers may have insufficient data to demonstrate attainment at the earliest opportunity.

The elements of the EPA strategy and specific statistical guidance will be summarized, with an emphasis on application to in situ remedies. A case study from the Fort Ord Performance Based Remediation (PBR) will be used as an example of successful negotiation of site closure using guidance on attainment monitoring.