MONITORING FOR CAP EFFCTIVENESS

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ABSTRACT

Long-term monitoring programs should be designed to evaluate cap efficacy and identify deviations from expected performance. The components of monitoring plans should be directly tied to cap design and performance goals. The primary performance goal of capping is sustained risk reduction. Sustained risk reduction is provided by several design approaches: isolation of contaminants, cap stability (integrity), and reduction in contaminant flux and bioavailability. A secondary goal may be habitat restoration to improve the ecosystem and enrich environmental resources.

Cap stability is the long-term preservation of the integrity of the conceptual cap design in the presence of the on-going physical, chemical and biological processes. Physical stability preserves cap thickness and coverage from erosion, gas ebullition, groundwater advection, differential settling, slope failures and disturbances. Chemical stability preserves contaminant gradients in the pore water, natural retardation and favorable geochemical properties of the cap. Biological stability preserves cap structure in the presence of bioturbation by limiting biouptake/bioaccumulation and translocation of contaminated sediment particles to the sediment-water interface.

Monitoring of cap stability and performance require parameterization of performance and processes that quantify short-term and long-term cap efficacy. Monitoring results and trends provide comparisons to predictions of cap performance parameters as a function of time in response to all of the physical, chemical and biological processes acting on the cap. Comparisons of parameter deviations from the post-construction monitoring show whether the cap is performing as designed, requires changes in monitoring, requires maintenance, or require rehabilitation.

Monitoring should be scheduled to capture early changes in the cap and to identify long-term trends to provide a warning before cap failure. Integrating adaptive management concepts into the monitoring plans provides a tool with the flexibility to address unanticipated results of project implementation, poorly characterized conceptual site model, catastrophic events, and superior performance.

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