Addressing Uncertain Site Conditions in Sediment Remediation Bid/Tender Documents

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Background/Objectives. Sediment remediation projects include variable levels of uncertainty that must be addressed and quantified in the engineering design process before issuing design documents to remediation contractors for bid/tender. Design engineers must coordinate with project owners to develop an approach to risk tolerance and mitigation that is specific to each project, and then estimate (as part of the design phase) construction costs and contingency costs that capture potential changes that may occur during implementation. This presentation presents specific approaches that can be used to quantify risk elements for a project during engineering design based on definition of the project owner's risk management approach.

Approach/Activities. Design engineers use available data and reports prepared during investigation of a sediment remediation site to delineate the site conditions, the nature and extent of contamination, and the presence of potential obstructions, as well as identify data gaps where collecting additional design data may better quantify the final costs of implementation once construction activities are completed. The design engineers then provide this information to remediation contractors during bid/tender periods to help develop the approach to construction implementation and quantify the cost and schedule. However, many unknown factors can introduce risk that must be borne by the project owner/designer or the remediation contractor. These uncertainties can include whether contamination at the site was completely delineated, how well the physical strength and behavior properties of existing sediment are understood, whether any obstructions are present, and whether bid/tender quantities are accurate. These uncertainties must be identified during design to appropriately decide how to quantify the associated costs and schedule in the baseline project effort or in the estimated project contingency. Understanding how project uncertainties affect baseline and contingency costs and schedules allows engineers to reserve funds appropriately and schedule allow for schedule risks to achieve the remediation objectives and meet budget requirements. Specific examples of recently completed sediment remediation projects completed as part of the Esquimalt Harbour Remediation Project (EHRP, Vancouver Island, British Columbia) by the Canadian Department of National Defence (DND) will be discussed as case studies.

Results/Lessons Learned. Identifying and quantifying uncertain site conditions is essential to the design of a sediment remediation project. Based on this knowledge and a clear understanding of the project owner's approach to risk tolerance, engineers can make appropriate assumptions in design, as well as appropriately allocate costs and time to baseline or contingency budgets/schedules. To inform the overall cost of implementing a project, remediation design efforts should also carefully evaluate the risk placed on a remediation contractor during bid and implementation. Accurately assessing uncertain site conditions during remediation design efforts can mitigate significant schedule and cost implications and help achieve the project's objectives for sediment remediation.