Long-Term Stability and Efficacy of Historic Activated Carbon (AC) Deployments at Diverse Freshwater and Marine Remediation Sites

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Objective | Technology | Benefits

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Objective

Activated carbon (AC) has been deployed as a remediation strategy at a number of sites around the world. Site-specific variation likely influences the long-term fate and efficacy of AC treatment. This project will collect data to develop lines-of-evidence regarding long-term performance and efficacy at two candidate sites where sediments have been treated with AC, representing a range of physical environments, possibly including an estuarine area, freshwater vegetated wetlands, and a riverine system. The goal of this assessment is to characterize the distribution, activity, and continued efficacy of the previously deployed AC in context with the diverse spectrum of physical, chemical, and biological processes at these sites. The team hypothesizes that in each of the two selected sites, AC continues to function in reducing the bioavailability of polychlorinated biphenyls (PCBs) in the sediments.

Back to Top

Technology Description

The long-term efficacy of AC as an approach to in situ remediation has been a recurring and central question raised in discussions among regulators and the parties conducting sediment clean-ups. The long-term efficacy and permanence of remedies is one of the nine National Contingency Plan criteria that are used in evaluating and selecting remedies. One of the key issues of concern in comparisons of removal/dredging to in situ remediation, such as AC treatment, is that in situ remediation is more vulnerable to changes in conditions that can compromise the performance of the remedy over time. The data collected in this project will enable the project team to develop lines-of-evidence related to the long-term effectiveness and success of in situ remediation using AC.

This project will assess the long-term (6-10 yr) performance of AC at multiple sites and determine the relative importance of physical processes to long-term efficacy. The team will:

1. Determine the mass of AC present and its vertical distribution within the sediment following the initial introduction.
2. Determine if the AC still retains its functional efficacy (PCB sorption, bioavailability reduction).
3. Apply this information to develop lines-of-evidence regarding the long-term efficacy of in situ remediation using AC.
4. Provide information that can be incorporated into sediment remediation guidance.

Back to Top

Benefits

In situ remediation of contaminated sediments offers several advantages over remediation via removal/dredging. In situ remediation can be performed at substantially lower cost, results in less disturbance to the environment, liberates less contamination through resuspension of sediment, and eliminates the risks and logistics related to handling and disposal of contaminated dredged sediments. However, in order for in situ remedies to "compete" in the evaluation of alternatives that is conducted as a part of the decision-making process, the long-term effectiveness of in situ remediation using AC must be established. A number of pilot and full-scale projects using AC have been implemented over the last decade; however, very limited monitoring results that pertain to long-term effectiveness have been generated to date. This study presents an invaluable opportunity to examine the critical lines-of-evidence pertaining to long-term effectiveness for projects as old as 10 years. In addition, by including sites that range across such distinct physical environments (nearshore estuarine, tidal wetland, river), the results of the investigation will provide an opportunity to develop robust conclusions about long-term effectiveness for a range of environments that are directly relevant to conditions at Department of Defense (DoD) sites where in situ remediation using AC could be applicable. This project is expected to also produce valuable information regarding approaches for developing efficient and effective long-term monitoring plans for full-scale in situ remedies. Developing the data and insights that enable wider use of in situ remediation could save the DoD hundreds of millions of dollars compared to more conventional approaches. (Anticipated Project Completion - 2018)

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Back to Top

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