Understanding Field Performance of Amendments as a Function of the Application

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Risk Management

Problem

Activated carbon addition to dump scow of dredged material for open water placement

USACE has committed to a beneficial use goal of 70% of all dredged material by the year 2030. The presence of contaminants severely limits the ability to use some dredged materials in a beneficial use capacity. Application of amendments can promote keeping sediment within the system by converting dredged material deemed marginally unsuitable for open water placement or beneficial use into suitable material. As much as 40% of dredged material from Great Lakes urban harbors likely would be included in this marginally unsuitable category, especially when considering the State of Ohio's position on open water placement.

Experimental data collected during ER-2431 and a DOER EWN bioaccumulation control demonstration showed that application rates of activated carbon much lower than commonly applied rates (3-5%) can provide substantial exposure reduction for a broad range of contaminants. Further evaluation is needed to better understand field performance of amendments in order to provide guidance on their use for a range of dredged material applications including improving viability for beneficial use. This would conserve storage capacity in the dwindling supply of confined disposal facilities for dredged materials that exhibit acute toxicity or significant bioaccumulation.

Study Description

Laboratory research will be conducted to further evaluate amendment performance for a range of dosages, nature (granular versus powder) and quality of amendment (activated carbon vs. biochar, etc.), level of mixing and placement method to develop more adaptive approaches for managing the resilience of control strategies. The results of the laboratory studies will be used with modeling to transition laboratory results into predicted field performance considering site characteristics to select dosage, mixing and placement methods. Techniques will be evaluated for amendment application both during the dredging and placement process, as well as for previously dredged and dewatered material. Site characteristics include bioturbation intensity and depth, and sedimentation and resuspension rates. Mixing and placement characteristics include heterogeneity as a function of mixing method and duration, intermixing with sediment bed, thickness of amended layer, and stability.

Products

Initial laboratory studies will result in a Technical Note documenting dosage needs as a function of bioavailability and bioaccumulation control needs. Additionally, a bioaccumulation calculation tool will be developed to address mixing, heterogeneity, amendment size and particle dispersion. A Journal Paper documenting amendment performance as a function of application will also be produced.

Summary

The results of laboratory evaluation in combination with modeling will provide guidance to users to balance dosage needs with mixing and placement options to achieve the required performance of amendments over time and to develop realistic expectations for monitoring. Results will promote Engineering With Nature® projects, help meet USACE BU goals and reduce placement costs where open water placement would be restricted.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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