# Rapid Dredged Material Management Protocol for Amendment Dosage Selection

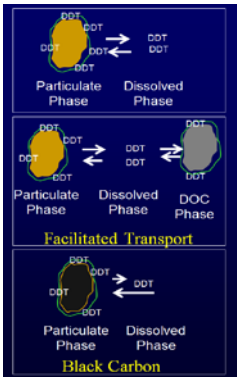
Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

## Focus Area

Risk Management

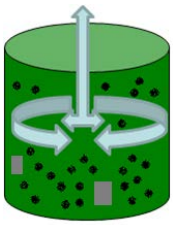
## Problem




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. Additionally, the demonstration project showed that the performance was a function of the bioavailability of the contaminants. In addition, the amendments can provide substantial exposure reduction (below reference sites for open water or beneficial use) for PCB concentrations below 1 ppm. The field needs a tool to predict the transition in performance from laboratory testing to field applications by addressing site characteristics to select size and nature of amendment, mixing and placement methods, to achieve the required performance of amendments over time, and to develop realistic expectations for monitoring.

## Study Description

Develop a rapid amendment dosage selection protocol using solid-phase microextraction fibers (SPMEs), polyethylene-based samplers (PSDs) and/or polymer-based measurements of Cfree to predict bioavailability reduction in dredged material unsuitable for unrestricted open water placement; (2) evaluate amendment performance for a range of dosages, nature (granular versus powder) and quality of amendment (activated carbon vs. biochar, etc.), and placement method to develop more adaptive approaches for managing the resilience of control strategies; (3) predict the temporal bioaccumulation response and contaminant flux to amendment addition as a function of mixing; (4) conduct webinars, seminars and workshops in the Great Lakes to promote use of dredged material as a carrier for placing amendment on contaminated sediments; and (5) develop field demonstrations of beneficial use of amended dredged material in the Cleveland area and at Thomson or Scanlon Reservoirs on the St. Louis River in the Duluth, MN area as partners with leveraged funding from the Buffalo and Detroit Districts and Great Lake states.



## Products

The project will produce: 1) a rapid amendment dosage selection protocol using passive samplers of Cfree to predict bioavailability reduction in dredged material unsuitable for unrestricted open water placement; (2) guidance on amendment performance for a range of dosages, nature and quality of amendment and placement method to achieve adaptive approaches for managing the resilience of control strategies; (3) a tool to predict the temporal bioaccumulation response and contaminant flux as a function of mixing; and (4) demonstrated beneficial use of dredged material as a carrier for amendments.

## Summary

The results of the laboratory studies will be used with modeling to transition laboratory results into predicted field performance considering nature and quality of the amendments to select dosage and placement methods. The prediction of temporal response to amendment addition will address site characteristics, including bioturbation intensity and depth, and sedimentation and resuspension rates, as well as mixing and placement characteristics, including heterogeneity as a function of mixing method and duration, intermixing with sediment bed, thickness of amended layer, and stability.

*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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October 2018