Partitioning of PFAS and Metals in Dredging Operations: A Scientific Basis Toward Compliance Under Challenging Regulations

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS　　　　　　　　　**BUILDING STRONG**®

Problem

State governments are regulating PFAS and metals in the environment. Recently, states have been requesting USACE to analyze PFAS in dredged material to establish regulatory compliance with newly promulgated water quality criteria. One such requirement is already in place by the state of Michigan. To assess the risk of dredged material to the pelagic environment, compliance with WQS must be demonstrated. Generally, the dissolved or total concentration of contaminants must remain below national WQC and applicable state WQS, as applicable, after initial mixing and dispersion of the DM discharge. Elutriate tests are designed to measure the release of contaminants to the pelagic environment. Understanding how elutriate preparation affects PFAS and metal partitioning is essential to ensure accurate regulatory compliance. Understanding how elutriate preparation affects PFAS and metal partitioning and relevant factors influencing partitioning is essential for accurate compliance demonstrations.

Study Description

The objective of the proposed research is to investigate the factors that influence the partitioning of PFAS and metals between sediment and water. Representative USACE project harbor sediments from the Great Lakes and from coastal areas will be evaluated. Standard Elutriate Test (SET) and Effluent Elutriate Test (EET) elutriates (total and filtered) will be prepared, and the effect of aeration will be evaluated for the EET. Bulk sediment and elutriate chemistry data will be used to calculate Kd values, which will be compared with equilibrium distribution coefficients (Kd values) determined using porewater data Sediment attributes (e.g., sediment organic matter content, both labile and refractory, grain size distribution, and AVS/SEM) and PFAS chemistry (head-group class, chain length, degree of fluorination) will be correlated with distribution coefficients. PFAS-specific water column evaluations, both Tier II (screening evaluation using bulk sediment characterization and chemistry) and Tier III will be developed.

Products

A technical report will provide a compilation and critical review of published partitioning coefficients (Kd) values for PFAS and metals. Experimental research results will be presented in two journal articles, one focusing on factors influencing the sediment/water partitioning of PFAS in elutriates, and a similar one on metals. A guidance Tech Report and associated spreadsheets housed in the ADDAMS/Dredged Material Models website will be developed for Tier II dredged material evaluation.

Summary

The objective of the proposed research is to investigate the factors that influence the partitioning of PFAS and metals between sediment and water. Representative USACE project harbor sediments from the Great Lakes and from coastal areas will be evaluated. Sediment attributes and PFAS chemistry will be correlated with distribution coefficients. Critical information regarding PFAS partitioning and predicting releases of PFAS to the water column and the effectiveness of elutriate testing for estimating this will provide benefit to the USACE districts, and Army missions that require work with PFAS-containing sediments and compliance with state and federal regulations. Representative USACE project harbor sediments and sediments from other suitable locations (e.g., not contaminated by known point source) from the Great Lakes and from coastal areas will be evaluated.

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