Evaluation of an Organophilic Clay for Sorption of Dissolved Polycyclic Aromatic Hydrocarbon Compounds

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Background/Objectives. For over a decade, contaminated sediment remediation projects have increasing utilized amendments for both capping and in-situ treatment. The appropriate use of these amendments for capping has the potential to limit exposure to sediment contaminants and reduce risk. Organophilic clay is an amendment that have been used for controlling dense non-aqueous phase liquids (DNAPL). Organophilic clay is also capable of sorption of dissolved organics, including polycyclic aromatic hydrocarbons (PAHs). This study provides partition coefficient data required for the design of sediment remediation caps for dissolved PAHs with organophilic clay using CAPSIM or a similar model.

Approach/Activities. This study involved 21-day laboratory sorption tests between an organophilic clay and four PAH compounds. The best-fit partition coefficient, $K_{d,}$ between the organophilic clay and each dissolved contaminant was estimated from the slope of the least squares fitted curve of dissolved concentration versus sorbed quantity. The relationship between these partition coefficients and the contaminants' solubility, based upon referenced octanol-water partition coefficients, was also explored. Oil sorption capacity and organic-treat loading tests of the organophilic clay were performed per ASTM standards to further characterize the organophilic clay.

Results/Lessons Learned. The three least hydrophobic PAH compounds exhibited the highest coefficient of determination, R^2, for linear sorption. For benzo(a) pyrene, there is more variation around the best-fit linear curve, possibly due to kinetic effects leading to only partial equilibration for this highly hydrophobic compound. The linear sorption observed of the contaminants onto the organophilic clay suggests that the mechanism of sorption is absorption.