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PRELIMINARY EVALUATION OF THE EFFECTS OF COAL FLY ASH AMENDMENTS ON THE TOXICITY OF A CONTAMINATED MARINE SEDIMENT

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Contaminated sediments are recognized as a global environmental problem with adverse ecological and economic effects. Approaches for cleaning-up contaminated sediments range from dredging to *in situ* treatment. In this research, we discuss the toxicological and geochemical effects of amending reference and contaminated sediments with coal fly ash in an effort to reduce the bioavailability and toxicity of polycyclic aromatic hydrocarbons (PAHs). Five fly ashes and a coconut charcoal (an activated carbon) were evaluated in seven day whole sediment toxicity tests with a marine amphipod (*Ampelisca abdita*) and mysid (*Americamysis bahia*). The fly ashes with high carbon content, based on loss on ignition measurements, and the coconut charcoal showed proficiency at reducing toxicity. Some of the fly ashes demonstrated toxicity in the reference treatments. We suspect this toxicity is related to the presence of ammonia associated with fly ashes as a result of post-oxidation treatment to reduce nitrous oxides (NO_x) emissions. Although not evaluated exhaustively in this study, relatively simple methods are available to remove ammonia from fly ash prior to use. Fly ashes were also shown to effectively reduce concentrations of several PAHs in water overlying the contaminated sediments. There was no evidence of the release of the metals cadmium, copper, nickel or lead from the fly ash into the toxicity testing system during the study. These preliminary data show fly ashes with high carbon contents may represent viable remedial materials for reducing the bioavailability of organic contaminants in sediments. Further research is needed to fully assess potential ammonia toxicity from fly ash, possible ecological effects of fly ash amendments in the field, and importance of carbon on fly ash performance.

Key Words: Contaminated sediment, Fly ash, Toxicity; Ammonia, Bioavailability