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TVA Kingston Fly Ash Release: Environmental Studies in Progress

Abstract Title:

Investigating TVA Kingston Fossil Plant coal fly ash toxicity to larval and juvenile fathead minnows using extended elutriate bioassays

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Abstract:

In order to assess the potential impacts to fish of coal fly ash resuspension during dredging operations at the TVA Kingston site, extended (10-d) elutriate bioassays were conducted with larval (9-d old) and juvenile (3-month old) fathead minnows. Elutriates were prepared using a greatly extended aeration time of 10-d in order to provide an extreme case scenario for metal release, dissolution and changes in speciation and a settling time of 1-h. Larval fish were exposed to elutriates created from fly ash from the Emory River and Ash Recovery Ditch, while the juvenile fish were exposed to only the Emory River fly ash elutriate. Other treatments included an Emory River reference water and a performance control (dechlorinated tap water). In the juvenile exposure, rigorous aeration was used to keep fly ash particles suspended in the water column during the bioassay. The larval fish exposure chambers were aerated

less vigorously to avoid energetic stress associated with high flow conditions. Both exposures were static-renewal, renewed on days 3 and 7. Larval and juvenile fish were fed Artemia or flake food, respectively, every other day. Endpoints assessed include survival and growth in the larval bioassay and survival, growth, liver-somatic index, gill histopathology, and metal bioaccumulation in the juvenile bioassay. No significant toxic effects to larval or juvenile fathead minnows were observed. Gill histopathology results were inconclusive. Bioaccumulated metal concentrations in juvenile fish were compared to literature toxicity reference values (TRVs). Only vanadium exceeded literature TRVs, but this was likely due to vanadium associated with fly ash in the fish gut.