

**Presentation Type:**

Poster

**Track:**

Special Symposium

**Session:**

TVA Kingston Fly Ash Release: Environmental Studies in Progress

**Abstract Title:**

A Multi-phased Toxicity Study for Evaluating Potential Risks of Kingston Fossil Plant Fly Ash Exposures to Benthic and Aquatic Biota

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**Abstract:**

TVA initiated multi-phase laboratory toxicity studies in March 2009 to evaluate potential risks to biota from exposure to fly ash from the Kingston ash release to the Emory River and subsequent dredging. The overall objective is to evaluate toxicity (survival, growth, reproduction) and metals bioaccumulation elicited by exposure of benthic and aquatic species to whole ash, elutriates, dredge plume water, and ash stilling pond effluent. Various acute and chronic test protocols were used in the first phase with (1) two 3.1-m Vibracore® ash composite samples collected March 17; (2) two 3.1-m Vibracore® ash composite samples collected June 11-12; and, (3) monthly Emory River dredge plume and stilling pond effluent samples collected April – June. Results from the March 17 ash composite samples indicated no appreciable bioaccumulation of metals in *Corbicula fluminea* exposures (28-d) to whole ash nor any toxic effects in *Ceriodaphnia dubia* (96-h), *Pimephales promelas* (96-h), or *Lampsilis siliquoidea* (10-d) exposures to ash elutriates. *Lumbriculus variegatus* exposures (4-d) to whole ash showed no effects on survival, but worms did not burrow so bioaccumulation was not assessed. No effects on survival were noted for *L. siliquoidea* 5-d exposures to whole ash, but 10-d exposures to one of the whole ash samples did result in significant effects on survival relative to laboratory control sediment. *Hyaella azteca* exposures (10-d) to both whole ash samples indicated adverse effects on survival. No effects (survival, reproduction) were observed in 7-day chronic exposures with *C. dubia* to plume or stilling pond effluent samples collected April – June. Results with identical exposures to the April and May samples by *P. promelas* (survival, growth) were invalidated due to confirmed pathogen interference. *P. promelas* chronic tests with Ultraviolet-treated plume and stilling pond effluent samples collected in June resulted in no adverse effects. The second phase of testing (96-h *C. dubia* and *P. promelas*) involves weekly (August – September) and bimonthly (October – present) monitoring of dredge plume and stilling pond effluent samples in response to increased dredging rates; results through mid October have shown no effects on survival. Test results from the June 11-12 ash composite samples are currently being evaluated. A third phase of this study focusing on the bioavailability of metals in ash and evaluating resin-treatment of ash to provide a suitable reference control is underway.