

KINGSTON ASH RELEASE – ECOLOGICAL RISK ASSESSMENT OVERVIEW

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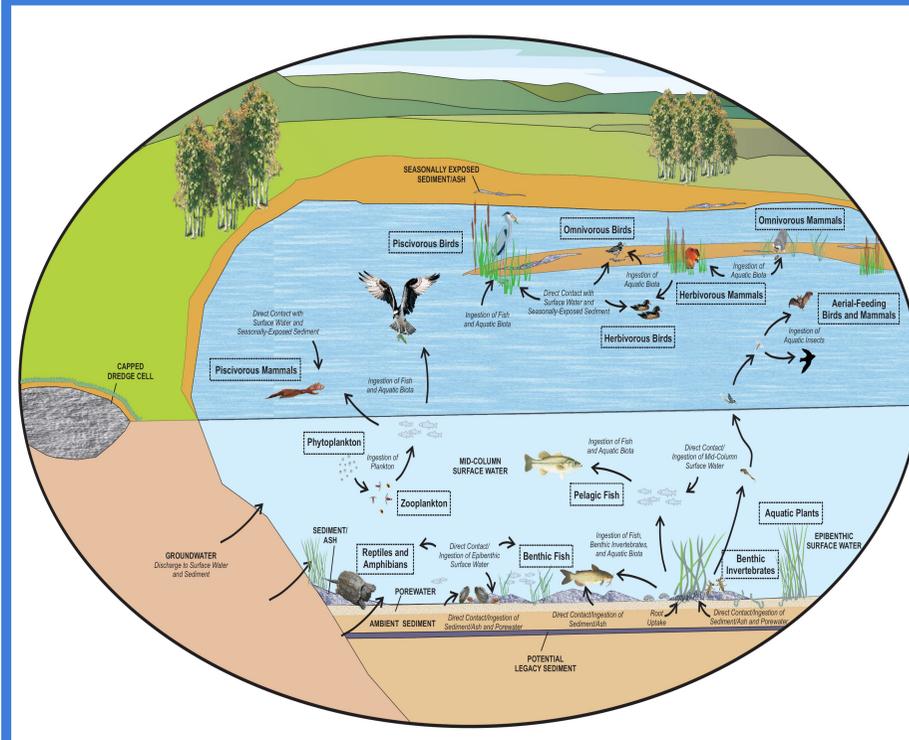
ABSTRACT

The largest release of coal ash to the environment occurred on Monday, December 22, 2008, when a dike containing the Tennessee Valley Authority (TVA) Kingston Fossil Plant (KIF) coal ash dredge cells failed, releasing approximately 5.4 million cubic yards (cy) of fly ash and bottom ash into adjacent waterways and over land. The KIF is located near the confluence of the Emory and Clinch Rivers on Watts Bar Reservoir near Kingston, Tennessee. Recovery of ash from the Emory River near the point of release is scheduled to be complete by May 2010 under a CERCLA time-critical removal action. Disposition of any remaining ash in the River System is being addressed as a non-time-critical CERCLA action that will include extensive environmental sampling, ecological studies, and a baseline ecological risk assessment.

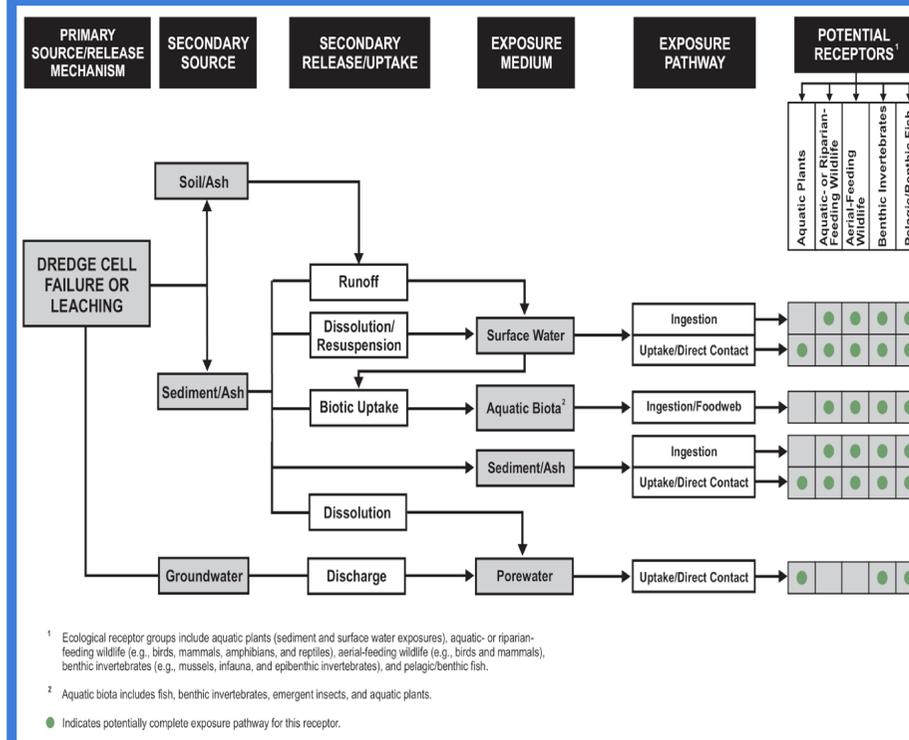
In cooperation with State and Federal entities, TVA's initial environmental monitoring efforts rapidly evolved to include comprehensive monitoring of potentially exposed ecological receptors and their prey and forage. This poster presents an overview of the ecological risk assessment, which is designed to estimate the potential risk to ecological receptors from exposure to environmental media impacted by the ash following completion of the time-critical removal action.

Direct exposure pathways being evaluated at this site include exposures to seasonally-exposed sediment, ash as sediment, sediment porewater, groundwater discharging to surface water, and surface water. Dietary exposures are also a concern for some ash-related metals, including arsenic and selenium. The ecological receptors for which bioaccumulation and/or food web pathways are being studied at this site include fish, benthic invertebrates, birds and mammals from various feeding guilds, reptiles, and amphibians. A conceptual site model is used to organize and evaluate the numerous pathways of exposure and assessment endpoints identified for the site.

CONCEPTUAL SITE MODEL: PICTOGRAPH



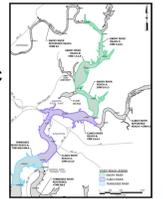
CONCEPTUAL SITE MODEL: FLOWCHART



SAMPLING PLAN SUMMARY

RIVER REACHES:

- Emory River Reference; Reaches A, B, C
- Clinch River Reference; Reaches A, B
- Tennessee River Reference; Reach A



ASH DEPOSITS:

- Sampling Strategy – Alternating left-center-right of channel Additional samples for larger coves
- Locations: Emory, Clinch, and Tennessee Rivers

SEASONALLY-EXPOSED SEDIMENT:

- Sampling Strategy – Alternating left-right of channel Adjusted to depositional areas
- Locations: Emory and Clinch Rivers
- Bioassays – Locations: Emory and Clinch Rivers Whole sediment samples Dilution series (100%, 75%, 50%, 25%, 0%) Indicator species: *H. azteca*, *C. dubia*, *P. promelas*

SEDIMENT POREWATER:

- Locations: Emory and Clinch Rivers
- Bioassays – Locations: Emory River Indicator species: *H. azteca*

SURFACE WATER:

- Epibenthic and mid-column water depths
- Locations: Emory, Clinch, and Tennessee Rivers
- Bioassays – Indicator species: *C. dubia*, *P. promelas*

GROUNDWATER:

- Installation of new wells
- Modeling of groundwater discharge to Emory River

BENTHIC INVERTEBRATES:

- Bioaccumulation Studies – Snails Mayflies (nymphs and adults)
- Community Surveys – Benthic invertebrate community metrics Locations: Emory, Clinch, and Tennessee Rivers

FISH:

- Bioaccumulation Studies – Largemouth bass, bluegill, channel catfish, gizzard shad, threadfin shad Locations: Emory and Clinch Rivers
- Community Surveys – Fish community metrics Locations: Emory and Clinch Rivers

WILDLIFE:

- Bioaccumulation Studies – Tree swallow and great blue heron eggs/nestlings Locations: Nest colonies on the site
- Community Surveys – Tree swallow and great blue heron Evaluating: clutch size, hatchling success, physical conditions (abnormalities)

ASSESSMENT ENDPOINTS

- 1: Pelagic Fish
- 2: Benthic Fish
- 3: Benthic Invertebrates
- 4: Aquatic Plants
- 5: Aquatic- or Riparian-Feeding Herbivorous Birds (wood duck; *Aix sponsa*)
- 6: Aquatic- or Riparian-Feeding Omnivorous Birds (mallard; *Anas platyrhynchos*) (killdeer; *Charadrius vociferous*)
- 7: Aquatic- or Riparian-Feeding Piscivorous Birds (osprey; *Pandion haliaetus*) (great blue heron; *Ardea herodias*)
- 8: Aquatic- or Riparian-Feeding Herbivorous Mammals (muskrat; *Ondatra zibethicus*)
- 9: Aquatic- or Riparian-Feeding Omnivorous Mammals (raccoon; *Procyon lotor*)
- 10: Aquatic- or Riparian-Feeding Piscivorous Mammals (mink; *Neovision vision*)
- 11: Aerial-Feeding Insectivorous Birds (tree swallow; *Tachycineta bicolor*)
- 12: Aerial-Feeding Insectivorous Mammals (gray bat; *Myotis grisescens*)
- 13: Aquatic- or Riparian-Feeding Reptiles
- 14: Aquatic- or Riparian-Feeding Amphibians

ECOLOGICAL MEASUREMENT ENDPOINTS

