BASELINE ECOLOGICAL RISK ASSESSMENT STRATEGY FOR THE TVA KINGSTON FLY ASH RECOVERY PROJECT

D. Jones¹, S. Young¹, A. Stojak¹, N. Carriker², M. Stack³
¹ ARCADIS, Knoxville, TN; ² Tennessee Valley Authority, Kingston Ash Recovery Project, Kingston, TN; ³ Jacobs, Oak Ridge, TN

ABSTRACT

The release of fly ash at the Tennessee Valley Authority (TVA) Kingston Fossil Plant (KFPC) on December 22, 2008 created unprecedented challenges for the protection of the surrounding ecosystems. The initial response focused on public protection and stabilization of the released ash. However, the potential hazards from the release were not fully understood. A comprehensive strategy was then used to refine the numerous field and laboratory studies conducted to date for the Kingston Fly Ash Recovery Project (KFARP). A Conceptual Site Model (CSM) was developed to summarize and illustrate the ecological receptors and potential exposure pathways associated with this project.

The Screening Level Ecological Risk Assessment (SLERA) indicated that a perturbation of the aquatic food web was created at the location of the release, and potential exposure pathways associated with the release.

ASSESSMENT ENDPOINTS

PELAGIC-FISH
BENTHIC INVERTEBRATES
AQUATIC PLANTS
AQUATIC-OR AERIAL-FEEDING HERBIVOROUS BIRDS
AQUATIC-OR AERIAL-FEEDING OMNIVOROUS BIRDS
AQUATIC-OR AERIAL-FEEDING PISCIVOROUS BIRDS
ANIMALS
BENTHIC INVERTEBRATES
PELAGIC INVERTEBRATES
PELAGIC-FISH

EVALUATION OF CONCEPTUAL SITE MODEL

CONCEPTUAL SITE MODEL: PICTOGRAPH

ECOLOGICAL MEASUREMENT ENDPOINTS

LITERATURE VALUES: BODY BURDEN

LITERATURE VALUES: FOODWEB

REFERENCES: Food web matrices are organized in prey and predator pairings with body burden levels and associated reference values.

BIOSURVEYS

Benthic invertebrate community metrics

Whole sediment samples

Biota samples

Blood, organ status

Sediment, porewater, groundwater

Water samples

Eggs, nestlings, community

Community surveys

SURFACE WATER:

LITERATURE VALUES: DIRECT CONTACT

LITERATURE VALUES: CHEMICAL CONCENTRATIONS

LITERATURE VALUES: HYDROPATHOGENS

BIOASSAYS

Bioresponses of organisms exposed to contamined water and sediment

ECOLOGICAL CONCEPTUAL SITE MODEL

SAMPLING PLAN SUMMARY

RIVER REACHES

Locations: Emory, Clinch, and Tennessee Rivers

Sampling Plan Summary

ASH DEPOSITS

Locations: Fly ash on banks and slopes

SEASONALLY EXPOSED SEDIMENT

Locations: Fly ash on banks and slopes

SUBMERGED SEDIMENT

Locations: Fly ash on banks and slopes

SEDIMENT POREWATER

Locations: Fly ash on banks and slopes

SAMPLING PLANS

RIVER REACHES

Locations: Emory, Clinch, and Tennessee Rivers

SAMPLING PLAN SUMMARY

ASH DEPOSITS

Locations: Fly ash on banks and slopes

SEASONALLY EXPOSED SEDIMENT

Locations: Fly ash on banks and slopes

SUBMERGED SEDIMENT

Locations: Fly ash on banks and slopes

SEDIMENT POREWATER

Locations: Fly ash on banks and slopes