



# U.S. Environmental Protection Agency and Tennessee Valley Authority Kingston Coal Ash Release Site Project Completion Fact Sheet



Harriman, Roane County, Tennessee

December 2014

## PROJECT HISTORY



On December 22, 2008, at approximately 1:00 a.m., the northwest side of a dike used to contain coal ash failed at the dewatering area of the Tennessee Valley Authority (TVA) Kingston Fossil Plant, located at 714 Swan Pond Road in Harriman, Roane County, Tennessee. After the dike failed, approximately 5.4 million cubic yards (cy) of coal ash was released into Swan

Pond Embayment and three adjacent sloughs, eventually spilling into the main Emory River channel. The release extended approximately 300 acres outside of the fly ash dewatering and storage areas of the plant. The TVA, state and local emergency management agencies first responded to the scene and began to assist residents affected by the coal ash release. The U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) responded shortly after to monitor the cleanup, provide air and water quality sampling, and help establish a unified command system.

On May 11, 2009, TVA entered into an Administrative Order on Consent (AOC) with the EPA Region 4 Office, under the regulatory authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), to address the coal ash released to the environment. The Superfund program was selected as the preferred regulatory framework because of its comprehensive human health and ecological risk assessment process and its proven ability to actively engage and involve multiple stakeholders in large, complex environmental cleanup projects. TVA was the lead federal agency to implement the cleanup actions required by the AOC. EPA approved all cleanup actions in consultation with the TDEC.

The recovery project was divided into **three distinct phases** using time-critical and non-time critical removal action authority to address coal ash that was released into the Emory River.



Emory River closed

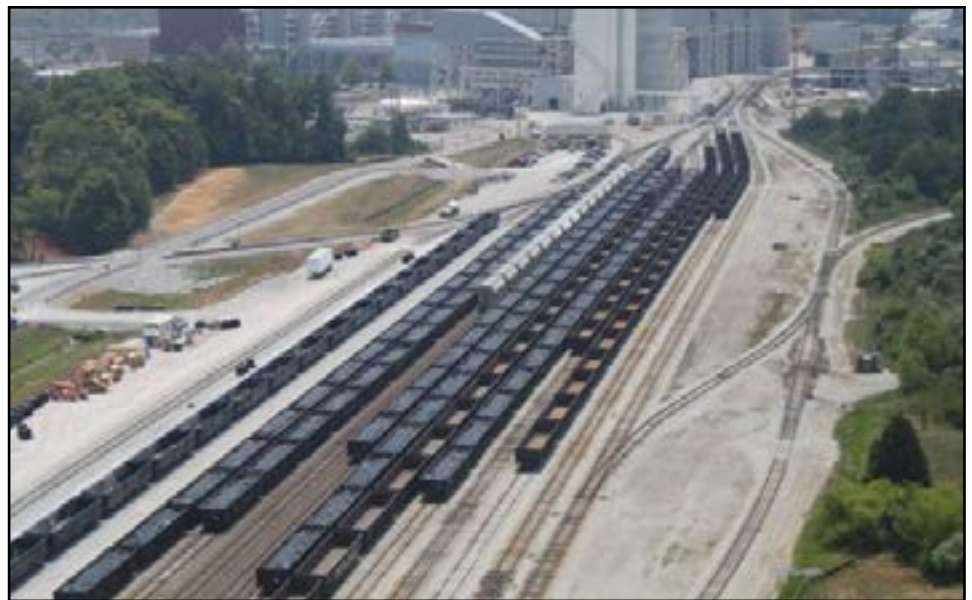
**Phase 1** was an 18-month time-critical removal action that involved mechanical excavation, hydraulic dredging, rapid materials handling, and disposal of 3.5 million cy of ash from the Emory River to alleviate upstream flooding concerns and to mitigate further downstream transport. Ash removed from the river was dewatered on-site and loaded onto rail cars for disposal at the approved Arrowhead Landfill in Perry County, Alabama. Ash removal under the time-critical phase was completed in May 2010 when the Emory River re-opened for navigation and recreation. Railroad transportation and off-site ash disposal were completed in December 2010.



On-site ash dewatering



Loading ash onto rail car



Dewatered ash loaded onto rail cars and ready for shipment



**Phase 2** was a non-time-critical removal action conducted pursuant to an engineering evaluation/cost analysis (EE/CA) and a subsequent action memorandum issued in May 2010. Phase 2 involved mechanical excavation of approximately 2.3 million cy of ash in the north and middle Swan Pond Embayments of Watts Bar Reservoir. Recovered ash was dried to optimum moisture content, spread into thin lifts, and compacted on site in a disposal cell of approximately 240 acres. The disposal cell was re-engineered with a subsurface stabilization slurry wall designed to withstand liquefaction forces caused by a local 6.0 magnitude earthquake on the East Tennessee fault line and a 7.6 magnitude earthquake on the New Madrid fault line. The 4-foot-wide slurry wall was constructed around the perimeter of the disposal cell, extended 50-to-70 feet below ground surface, and was keyed into the underlying shale bedrock 2-to-7 feet. The whole wall system was up to 100-feet wide. The cell was capped and covered with a 40-mil high density polyethylene liner, a geo-composite drainage layer, 2-feet of clay and topsoil, and a vegetative cover. The majority of Phase 2 work was completed by December 2014.



On-site excavation



Construction of the slurry wall



Monitoring ash impact on swallow population

**Phase 3** was also a non-time-critical removal action that involved a comprehensive human health and ecological risk assessment of the estimated 500,000 cy of residual ash that was not removed from the Emory River during the Phase 1 time-critical dredging work or was transported downstream during storm events. Independent medical screening by Oak Ridge Associated Universities concluded that there were no adverse health impacts caused by the coal ash spill. Although the study concluded that the pre-existing fish consumption advisories should remain in effect. The ecological risk assessment evaluated twenty measurement endpoints for coal ash-related impacts including six species of fish, four species of birds, and three species of amphibians, three species of turtles, raccoons, mayflies, snails, and aquatic vegetation. Extensive geochemistry studies, sediment and pore water bioassays,

benthic macroinvertebrate assessments, two-dimensional sediment-ash fate and transport modeling, and groundwater modeling were also conducted. The Phase 3 action memorandum selected Monitored Natural Recovery (MNR) as the preferred remedy in November 2012. MNR relies on



Media briefing

natural processes such as mixing, scouring and redeposition, and sedimentation (burial) to reduce the relatively low risks posed to benthic macroinvertebrates (bugs) and to birds that prey on bugs.



Monitoring ash impact on macroinvertebrate population

EPA and TDEC worked closely with TVA throughout all three phases of the recovery project by providing continuous on-site oversight and support and conducting community outreach efforts. EPA, TDEC along with TVA, participated in many public meetings and established the Community Advisory Group (CAG). EPA, TDEC, and TVA, also conducted site tours; worked with the media to keep the

community informed; presented at various community organizations and schools; managed a website that provided up-to-date information on site activities; and prepared and mailed fact sheets to community members.

## CURRENT PROJECT STATUS



After 6 years of teamwork and dedication, the recovery project is winding down. The majority of cleanup work will be completed by TVA at the end of 2014. Miscellaneous housekeeping items will continue into the spring of 2015, including removal of all haul roads from the middle embayment, construction of a perimeter access road around the disposal cell, maintenance of the drainage ditches and vegetative cover on the disposal cell, and final grading and vegetation of the Swan

Pond Recreation Area. Five years of river monitoring indicate that naturally occurring processes continue to be effective in mitigating any potential for adverse ecological effects of residual ash and that the ecosystem has essentially returned to pre-spill conditions. MNR proved to be effective in 5 years versus the 10-to-15-year time frame predicted by sediment fate and transport modeling. Annual monitoring of the river system will continue for up to 30 years to confirm that risks associated with the residual ash remains low and that ash-related concentrations of metals decline with time. Groundwater monitoring and maintenance of the on-site coal ash disposal cell will also be conducted over the long term.

# TVA Kingston Ash Recovery Project Metrics

## Resources

Time ≈ 6 years	Cost <b>\$1,178,000,000</b>	Project personnel <b>900</b> <i>(daily on-site at peak)</i>
		Total Man Hours <b>6,700,000</b>

## Perimeter Containment Wall

**Total length of 4-foot wide slurry trench**  
69,000 linear feet  
**13 miles – longest ever constructed in United States**

Volume of spoils generated  
More than 500,000 cubic yards (cy)  
**153 Olympic-sized swimming pools**

Quality Assurance and Quality Control

- **14,262 samples collected to test for wall strength and stability**
- **20 miles of holes drilled through the wall to test for proper mixing of slurry material**

## Ash Dredging, Excavation and Disposal

**Volume of ash removed from river system**

**3,500,000 cy**

**This volume would fill the Empire State Building about 2.5 times; or fill the Khufu Pyramid (“The Great Pyramid”) in Egypt.**

**Weight of ash transported to Alabama landfill**

**4,000,000 tons**

**This is as heavy as about 40 aircraft carriers or 27 cruise ships**

**Total number of railcars for ash transport to Alabama landfill**

**41,000 railcars**

**As a single train, this many cars would stretch from Knoxville to Nashville.**

**Volume of ash mechanically excavated from embayments**

**2,300,000 cy**

**This volume would fill the Empire State Building 1.7 times**

**Volume of ash moved from other areas**

**1,900,000 cy**

**This volume would fill the Empire State Building 1.4 times**

**Acres of river system cleaned up**

**255 acres**

**This is almost 2.5 times the size of the LP Field Complex (*Tennessee Titans stadium*)**

**Sediment samples collected to confirm river system was clean**

**1,500**



## Ash Stacking, Cap and Cover

Volume of ash stacked and compacted in on-site landfill

**4,000,000 cy**

**This volume would fill the Empire State Building three times**

Total volume of ash permanently contained in on-site landfill

**20,000,000 cy**

**This volume would fill The Great Pyramid six times.**

Length of seams welded together for liner

**86 miles**

Area of on-site landfill

**240 acres**

**This is about the size of 56 Walmart Superstores**

Truckloads of clay and topsoil for landfill cover system

**16,500 truckloads**

Grass seed sprayed  
**More than 70,000 pounds**

**This amount of seed is just under the maximum weight for an 18-wheeler (80,000 pounds)**

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## Ecological Restoration/Recreation Enhancements

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Environmental samples collected  
**More than 16,000**

Analyses conducted on those samples  
**About 400,000**

Miles of shoreline restored  
**5 miles**

Miles of shoreline revegetated  
**2 miles**

Trees planted for reforestation of shoreline  
**7,000 trees**

Miles of walking trails created  
**3.5 miles**

**Wetlands and native vegetation  
created/restored**

**More than 70 acres**

Fishing piers, canoe and kayak  
launches, and boat ramps  
created  
**4 fishing piers, 2 canoe  
launches, and 1 boat dock  
and ramp**

**This is about  
14 Tennessee State Capitol buildings**



## Community Outreach

Amount of surplus material donated to Roane County

**About \$500,000**

Total number of hits on TVA/EPA project websites

**184,000**

Public meetings, availability sessions, and workshops sponsored

**More than 50**

**Funds provided by TVA to support economic development initiatives**

**\$43,000,000**

Independent medical screenings conducted

**214**

Project updates provided by public notices and e-mails

**More than 400**

Site tours conducted

**More than 100**

## Check out these before and after shots



North Embayment then



North Embayment now



East Embayment then



East Embayment now



Swan Pond Circle then



Swan Pond Circle now





Middle Embayment then



Middle Embayment now



Aerial Photo- December 28, 2008



Aerial Photo- November 7, 2014

## Watch for More Information

*A public meeting to conclude the project will be held in the spring 2015.*

**INFORMATION SOURCES**

**TVA Kingston Cleanup Website:** *www.tva.gov/kingston*

**EPA Kingston Cleanup Website:** *www.epakingstontva.com*

**TVA and EPA Team Contacts****Kingston Recovery Project General Manager**

Carol E. Eimers  
865-717-1629  
ceimers@tva.gov

**EPA Remedial Project Manager**

Craig Zeller  
404-562-8827  
Zeller.Craig@epa.gov

**Information Repositories**

View the administrative record at one of the information repositories:

**Kingston Public Library**

1004 Bradford Way  
Kingston, TN 37763

**U.S. EPA Region 4**

Sam Nunn Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, GA 30303

**Harriman Public Library**

601 Walden Street  
Harriman, TN 37748  
(865) 882-3195



United States  
Environmental Protection  
Agency

U.S. EPA Region 4  
Attn: Stephanie Y. Brown  
61 Forsyth Street, SW  
Atlanta, GA 30303-8960

RETURN ADDRESS REQUESTED

FIRST CLASS