



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

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)

Ecological Restoration/Recreation Enhancements

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

Public meetings, availability sessions, and workshops sponsored

More than 50

Project updates provided by public notices and e-mails

More than 400

Funds provided by TVA to support economic development initiatives

\$43,000,000

Total number of hits on TVA/EPA project websites

184,000

Independent medical screenings conducted

214

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**

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EPA Remedial Project Manager

Craig Zeller
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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



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

RETURN ADDRESS REQUESTED

FIRST CLASS