

Remediation of a Failed Primary Spillway Device at a High Hazard Classification Impoundment

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The Office of Surface Mining
Reclamation and Enforcement (OSM)
is a *regulatory agency*.

OSM *does not*:

- Own any impoundments...
- Operate any impoundments...
- Or manage any impoundments....

The Office of Surface Mining

OSM *does*:

- have regulatory authority over activities related to coal mining as defined under the Surface Mining Control and Reclamation Act (SMCRA) of 1977.
- OSM generally delegates that authority to the various states and tribes through approval of state or tribal regulatory programs.
- OSM retains oversight authority over those various state or tribal programs.

Tennessee is a federal regulatory program...

Therefore...in Tennessee, OSM has regulatory authority over all things SMCRA...and that includes all impoundments related to surface mining activity.....

Impoundments under SMCRA are classified according to hazard risk by criteria as defined:

U.S. Department of Agriculture
Soil Conservation Service publication:
Technical Release 60 (210-VI-TR-60)
“Earth Dams and Reservoirs (1985)”

Tennessee has *three* impoundments that meet the classification of USDA, SCS, TR-60 as Class C (high hazard) impounding structures. Minimum criteria for a Class C structure:

- Dam height minimum of 20 feet
- Impound capacity of 20 acre/feet or greater

Two impoundments are coal fines slurry impoundments associated with washing coal at a preparation plant.

The *other* impoundment is: “the freshwater lake”, and is associated with one of the preparation plants and is the subject of this discussion.

January 22, 2009

- The operator notified OSM that there was an issue of concern with the Freshwater Lake.
- The lake was de-watering through the principal spillway device in a manner without “*control*”.
- It was determined the principal spillway “decant riser” had malfunctioned below the water line.

View of the Freshwater Lake



Brief overview of the Freshwater Lake:

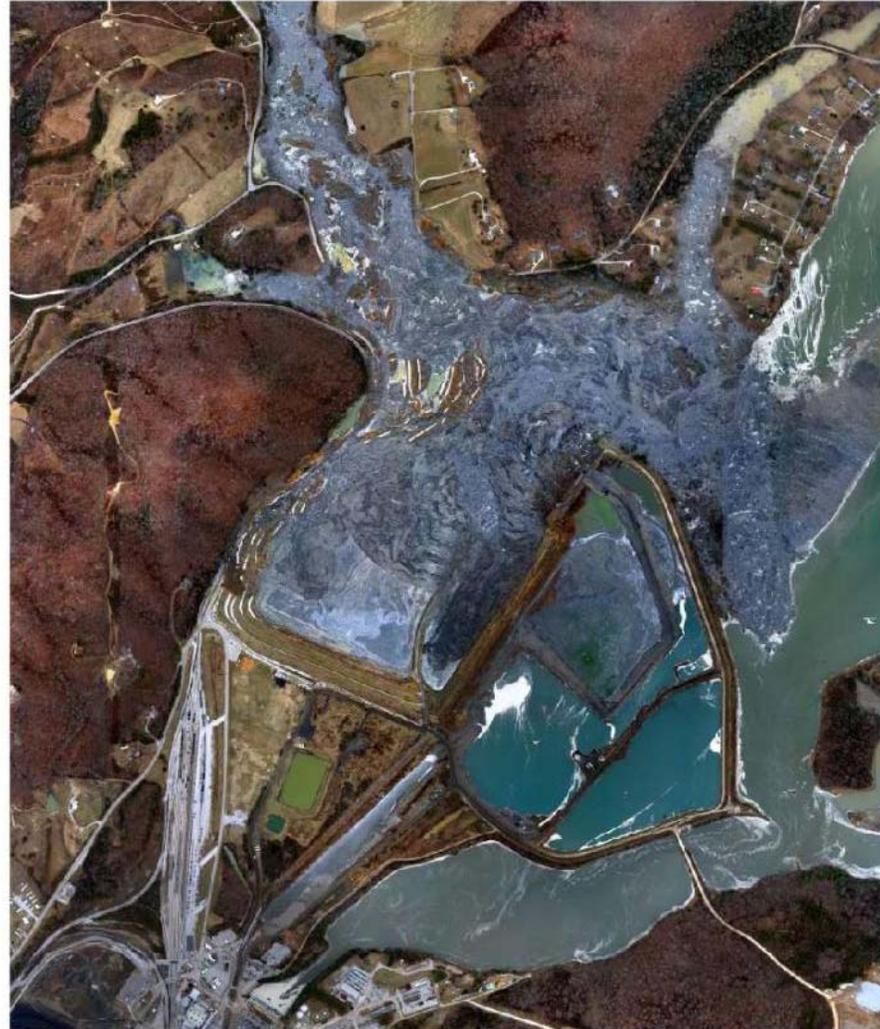
- Dam height: 27 feet
- Dam length: 375 feet
- Impounding: 43 acre feet
- Principal spillway: 12 inch cast iron pipe extending approximately 280' from downstream outlet to the decant riser.
- Emergency spillway: excavated channel approximately 60 ft. wide
- Intended purpose: preparation plant water supply for washing coal

Consequences of decant device failure:

- Failure of dam structure...through “piping” ...
- Potential for loss of life...”flood surge” ...
- Environmental disaster...loss of “environmental habitat” ...
- Loss of preparation plant functionality...
- Public perception of coal as an energy source...(very important)...

TVA Kingston Ash Pond Failure

Aerial Image of Kingston Ash Slide 12/23/2008



0 500 1,000 1,500 2,000
Feet

Tennessee Valley Authority
CE&R - ER&S
Geographic Information & Engineering

The decant riser is housed in this tank like structure.



Close up of the tank like structure showing structural deterioration.



Another view of the tank like structure



Another view of the tank like structure



View of decant riser from the top of the tank like structure



Remediation plans require OSM approval through permit revision

The operator:

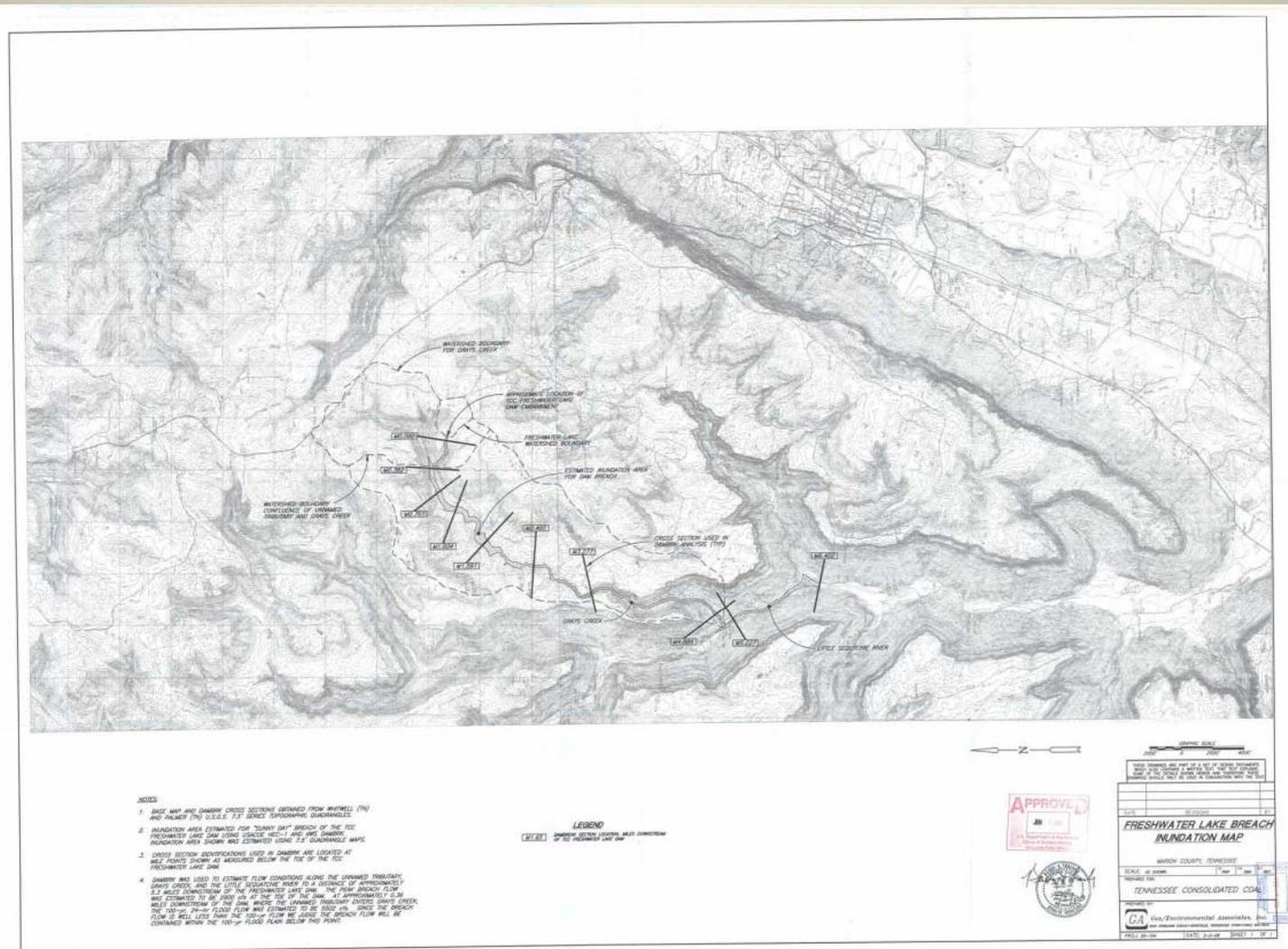
- stabilized the impoundment by draw down.
- Initiated a structural stability analysis including a flood inundation study.
- submitted a plan to abandon the principal spillway by grout injection
- proposed to construct a new open channel principal spillway

Draw down stabilization



flood inundation study

- Showed there were no dwellings in the inundation zone in the event of dam failure.



View of dam from toe



Discharge from principal spillway through failed decant riser



Principal Spillway Grout Injection: Preparing the bulkhead



Injecting the grout



Injecting the grout



Grout Eruption at Toe of Dam



Grout Eruption at Toe of Dam



Grout Eruption at Toe of Dam



Eruption Exploration



Eruption Exploration



Principal Spillway Reconstruction



Principal Spillway Reconstructed



02/20/2009 14:02

What did we learn from the failure of the primary spillway device?

- Aging impoundments present unanticipated risk...
- Regular inspections by the inspectors, the operator, and the certifying engineer may fail to indicate existing problems...
- For OSM...aging structures and mining permits that are no longer being actively “mined” present a special regulatory challenge.

Questions/Answers?

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