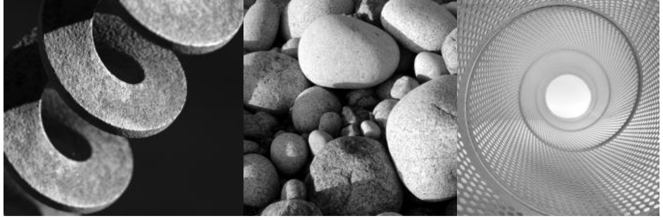

Geotechnical
Environmental and
Water Resources
Engineering

DRAFT

Specific Site Assessment for Coal Combustion Waste Impoundments at Thomas Hill Energy Center

Clifton Hill, Missouri

Submitted to:
U.S. Environmental Protection Agency
Office of Resource Conservation and Recovery
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Washington, DC 20460

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Project Number: 092884

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Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

1.1 Purpose

This report presents the results of a specific site assessment of the slag dewatering basin and Ash Pond – Cell No. 2 at the Thomas Hill Energy Center in Clifton Hill, Missouri. The Thomas Hill Energy Center is owned and operated by Associated Electric Cooperative, Inc. The Specific Site Assessments (SSA) was performed on November 9, 2010.

The SSA was performed with reference to Federal Emergency Management Agency (FEMA) guidelines for dam safety, which includes other federal agency guidelines and regulations (such as U.S. Army Corps of Engineers [USACE] and U.S. Bureau of Reclamation [USBR]) for specific issues. The assessment defaults to state requirements where not specifically addressed by federal guidance or if the state requirements were more stringent.

1.2 Scope of Work

The scope of work between GEI Consultants, Inc. (GEI) and the U.S. Environmental Protection Agency (EPA) for the SSA is summarized in the following tasks:

1. Acquire and review any existing reports and drawings relating to the safety of the project provided by the EPA and Owners.
2. Conduct detailed physical inspections of the project facilities. Document observed conditions on Field Assessment Check Lists provided by EPA for each management unit being assessed.
3. Review and evaluate any existing stability analyses of the project's coal combustion waste impoundment structures.
4. Review the appropriateness of the inflow design flood (IDF), and adequacy of ability to store or safely pass the inflow design flood, provision for any spillways, including considering the hazard potential in light of conditions observed during the inspections or to the downstream channel.
5. Review existing dam safety performance monitoring programs and recommend additional monitoring, if required.
6. Review existing geologic assessments for the projects.
7. Submit draft and final reports.

1.3 Authorization

GEI performed the coal combustion waste impoundment assessment as a contractor to the EPA. This work was authorized by EPA under Contract No. EP09W001698 between EPA and GEI, dated August 12, 2009.

1.4 Project Personnel

The scope of work for this task order was completed by the following personnel from GEI:

Steven R. Townsley, P.E.	Senior Project Engineer/Task Leader
Stephen G. Brown, P.E.	Project Manager
William Butler, P.E.	Project Geotechnical Engineer
Nick Miller, P.E.	Project Water Resources Engineer

The Program Manager for the EPA was Stephen Hoffman.

1.5 Limitation of Liability

This report summarizes the assessment of dam safety of the Slag Dewatering Basin and the Ash Pond – Cell No. 2 at Thomas Hill Energy Center located in Clifton Hill, Missouri. The purpose of each assessment is to evaluate the structural integrity of the impoundments and provide summaries and recommendations based on the available information provided and on engineering judgment. GEI used a professional standard of practice to review, analyze, and apply pertinent data. No warrantees express or implied, are provided by GEI. Reuse of this report for any other purpose, in part or in whole, is at the sole risk of the user.

1.6 Project Datum

The project datum was not identified on the documents reviewed by the assessment team.

1.7 Prior Inspections

The embankments for both of the Thomas Hill Energy Center impoundments assessed during our visit are inspected annually by plant personnel. However, reports documenting findings during the inspections and/or corrective actions taken as a result of the inspection have not historically been prepared.

Thomas Hill Energy Center impoundments were last inspected by the Missouri Department of Natural Resources in June of 2008; we understand that the inspection was primarily focused on operational issues. It is also our understanding that no other third party inspections of the ash pond embankments have been preformed.

2.0 Description of Project Facilities

2.1 General

Thomas Hill Energy Center is a coal-fired power plant located in the town of Clifton Hill, in Randolph County, Missouri (see Figure 1). The site also contains a former coal strip mine that is being reclaimed after closing in 1993. The power plant consists of three units that have a combined generating capacity of about 1,153 megawatts (MW). Unit one is a 1966 General Electric turbine with a net capacity of 180 MW, Unit 2 is a 1969 Westinghouse turbine with a net capacity of 303 MW, and Unit 3 is a 1982 Westinghouse turbine with a net capacity of 670 MW. When operating a full net capacity, the combined coal burn rate of all three units is approximately 14,461 tons per day. The Thomas Hill Energy Center is owned and operated by Associated Electric Cooperative, Inc.

The power plant facility has six storage cell/disposal areas, but only two were found to be active wet storage for Coal Combustion Waste (CCW) by GEI. The six management units are listed below:

- Slag Dewatering Basin – wet storage
- Ash Pond – Cell 1 – dry storage
- Ash Pond – Cell 2 – wet storage
- Ash Pond – Cell 3 – decant water storage only
- Fly ash disposal cell – wet storage of fly ash, but in a natural depression with no dikes or embankments (regulated as a landfill)
- Bottom ash/slag disposal cell – dry storage (regulated as a landfill)

Based on the information regarding the storage areas, GEI has determined that the Slag Dewatering Basin and Cell 2 of the Ash Pond met the criteria for the SSA inspections.

2.2 Impoundment Dams and Reservoirs

The CCW impoundment dikes at the Thomas Hill Energy Center have not been assigned a hazard potential by a state or federal agency. Based on the geometry of the impoundments and the ancillary facilities, recommended hazard potential classifications for the impoundments are discussed in Section 4.0 of this report.

The materials stored in each of the CCW impoundment dikes are summarized below:

- Slag Dewatering Basin – This basin is a wet storage area that is used to contain both bottom ash and boiler slag. The ash and slag is continuously dredged and is sold to a private contractor who uses the material as roofing granules.

- Ash Pond – Cell No. 2 – This cell is a wet storage that is used to contain fly ash, bottom ash, boiler slag, and sediments from the coal pile runoff. The fly ash is collected and used as part of the mine reclamation activities on the power plant property.

Based on our observation and the soil boring information presented in the Global Stability Evaluation report prepared by Geotechnology, Inc. in May of 2010, the CCW impoundment dikes appear to have homogeneous construction using silty clayey fill soils. The dikes were designed without internal drains from the collection of seepage.

The dike for the Slag Dewatering Basin has an approximate crest width of 10 feet and design upstream and downstream side slopes of 3H:1V and 2H:1V, respectively. The perimeter dike for Ash Pond – Cell No. 2 has an approximate crest width of 18 feet and design upstream and downstream side slopes of 3H:1V.

The basic dimensions and geometry of each impoundment is summarized in Table 2.1.

Table 2:1: Summary Information for Impoundment Dike Parameters

Parameter	Value	
Dam	Slag Dewatering Basin	Ash Pond – Cell No. 2
Maximum Height (ft)	Approximately 10	25
Approximate Length (ft)	1500	830
Approximate Crest Width (ft)	15	18
Lowest Crest Elevation (ft)	735	717
Design Side Slopes (H:V)	3:1 US/2:1 DS	3:1 US/3:1 DS
Estimated Freeboard (ft) at time of site visit	2.7	4
Total Storage Capacity (cubic yards)*	16,000	50,000
Approximate Surface Area (acres)*	3	12

*Storage capacity and area values provided by Associated Electric Cooperative, Inc.

2.3 Spillways

The Ash Pond - Cell No. 2 Impoundment has an emergency spillway (Photo 16) which, if utilized, would flow into Ash Pond – Cell No. 3. The emergency spillway is an Open Channel Spillway, trapezoidal in shape, with a top width of approximately 18 feet, an average bottom width of 12 feet, and a depth of 2 feet below the top of the dike crest. The emergency spillway crest is lined with 3 to 6 inch crushed rock.

The Slag Dewatering Pond does not have a spillway associated with the impoundment.

2.4 Intakes and Outlet Works

2.4.1 Slag Dewatering Basin

The coal ash slurry line at the Slag Dewatering Basin consists of an 18-inch steel pipe from the power plant. Photos 1 and 2 in Appendix B show the inlet structure to the Slag Dewatering Basin.

The outlet structure (Photos 3 and 7) consists of a 30-inch diameter concrete outlet pipe from the concrete decant tower with 60-inch wide, 6" square concrete stop logs. The outlet structure releases the decant water into a bypass channel (Photo 4) which bypasses Ash Pond – Cell No. 1 and discharges into the Ash Pond – Cell No. 2 (Photos 8 and 9). At the time of our visit to the site, there was active flow through the outlet structure.

2.4.2 Ash Pond – Cell No. 2

Decant water is received from the Slag Dewatering Basin through a bypass channel (Photos 8 and 9) and from a concrete decant tower with 60-inch wide, 6" square concrete stop logs in the Ash Pond – Cell No. 1. This decant water is collected from natural runoff around Ash Pond – Cell No. 1.

The outlet structure (Photo 12) consists of a 36-inch diameter concrete outlet pipe from the concrete decant tower with 72-inch wide, 6" square concrete stop logs. At the time of our visit to the site, there was active flow through the outlet structure into Ash Pond – Cell No. 3. Ash Pond – Cell No. 3 contains only decant water prior to its release to the Middle Fork of the Little Chariton River.

2.5 Vicinity Map

Thomas Hill Energy Center is located in the town of Clifton Hill in Randolph County, Missouri, as shown on Figure 1. The specific latitude and longitude of the ponds is provided below:

Longitude: 92 Degrees, 38 Minutes, 17 Seconds
Latitude: 39 Degrees, 32 Minutes, 34 Seconds

2.6 Plan and Sectional Drawings

GEI was provided with two partial sets of design documents for this project and a geotechnical engineering report. These documents included:

- Engineering drawings for the "Ash Pond Facilities" project in 1978-79. These plans were prepared by Burns and McDonnell dated December 1, 1978 and March 23, 1979.

- Engineering drawings for the "Ash Pond Modifications" project in 1984. These plans were also prepared by Burns and McDonnell and are dated June 4, 1984.

- Global Stability Evaluation, Mine Waste and Ash Pond Embankments, AECI Facilities, Bee Veer and Thomas Hill, Missouri, prepared by Geotechnology, Inc dated May 25, 2010.

2.7 Standard Operational Procedures

Thomas Hill Energy Center is a coal-fired power plant composed of three coal-fired steam turbine electric power generating units that can produce a total combined capacity of 1,153 MW. The coal supply is from Kansas and is delivered to the power plant by truck, where it is then combusted to power the steam turbines. The burning of coal produces several gases which are vented from the boiler; fly ash, which is collected from the exhaust prior to venting to the atmosphere; and coarser bottom ash, which falls to the bottom of the boiler and is removed along with boiler slag.

Bottom ash is wet sluiced into the Slag Dewatering Basin where it is continuously dredged and sold to a private contractor for the production of roofing granules. Water is discharged to a drainage ditch from the Slag Dewatering Basin into Ash Pond – Cell No. 2. It is our understanding that Ash Pond – Cell No. 2 is dredged approximately every 7 years. Water from the Ash Pond – Cell No. 2 is released into Ash Pond – Cell No. 3 which serves as clarification pond before being discharged to the Middle Fork of the Little Chariton River (Photo 19). The discharge water from the pond is monitored to meet the National Pollutant Discharge Elimination System (NPDES) permit requirements for discharge without chemical treatment.

3.0 Summary of Construction History and Operation

There are three power generating units at the Thomas Hill Energy Center. The first power generating units went online in 1966, the second in 1969, and the third unit went online in 1982. It is our understanding that the impoundments were constructed in 1978-79. Prior to the construction of the impoundments, the CCW waste materials were used as mine reclamation materials for the former mine site on the owners property. The impoundments underwent modifications in 1984. During the modification project, the impoundment dike between Ash Pond – Cell No. 2 and Ash Pond – Cell No. 3 was completely reconstructed and the former dike was abandoned in-place. The design for the 1978-79 projects and the modification project was performed by Burns and McDonnell.

We have reviewed the design drawings provided to us for each of the impoundments, however, design reports and construction records were not located for review. Based on our review of subsurface information obtained by Geotechnology, Inc. for Associated Electric Cooperative in May 2010, and our site observations, it appears that the dikes for the Slag Dewatering Basin and Ash Pond – Cell No. 2 were constructed of earthfill materials obtained from on-site, which generally consists of a combination of silty clays. No documentation about foundation preparation is present on the design drawings nor is as-constructed reports available.

4.0 Hazard Potential Classification

4.1 Overview

According to the Federal Guidelines for Dam Safety, the hazard potential classification for the impoundments is based on the possible adverse incremental consequences that result from release of stored contents due to failure or improper operation of the dam or appurtenances. Impoundments are classified as: Less than Low, Low, Significant, or High Hazard, depending on the potential for loss of human life and/or economic and environmental damages.

4.2 Slag Dewatering Basin Discussion

The Slag Dewatering Basin has a total surface area of 3 acres and a total storage capacity of 16,000 cubic yards. The maximum height of the pond dike embankment is approximately 10 feet. Based on current embankment heights and storage capacity shown in Table 2.1, the size classification for the Slag Dewatering Basin is "Small" in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria.

4.3 Ash Pond – Cell No. 2 Discussion

Ash Pond – Cell No. 2 has a total surface area of 12 acres and a total storage capacity of 50,000 cubic yards. The maximum height of the pond is 25 feet. Based on current pond heights and storage capacity shown in Table 2.1, the size classification for Ash Pond – Cell No. 2 is "Small" in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria.

Discharge water from Slag Dewatering Basin and storm water that enters the impoundment outlets to Ash Pond – Cell No. 3.

4.4 Hazard Classifications

A failure of the Slag Dewatering Basin would be contained in either Cell No. 1 or Cell No. 2 of the Ash Pond. Therefore, failure of the Slag Dewatering Basin would result in no probable loss of life and could only cause low economic and environmental damage mostly to the owner's property.

A failure of the Ash Pond – Cell No. 2 would likely be contained in Ash Pond – Cell No. 3. If any CCW were to pass Ash Pond – Cell No. 3 by either dike failure or passing through the decant outlet, these events would result in no probable loss of life and could only cause low economic and environmental damage mostly to the owner's property.

Based on this information, our observations, and to comply with the Federal Guidelines for Dam Safety, we recommend the dikes for the Slag Dewatering Basin and Ash Pond – Cell No. 2 be classified as "Low" hazard structures.

5.0 Hydrology and Hydraulics

5.1 Floods of Record

Floods of record have not been evaluated and documented for the impoundments at the Thomas Hill Energy Center. Based on Intellicast Data Records, the average monthly rainfall for Clifton Hill, Missouri ranges from 1.56 inches in January to 5.16 inches in May. According to the National Climatic Data Center, which holds data for daily rainfall recorded for the period between 1946 and 2010, the maximum 24 hour rainfall event in Salisbury, Missouri occurred on September 13, 1961 with a rainfall amount of 6.12 inches.

These rainfall events are not expected to result in overtopping of the dams under the current normal operating conditions. No documentation has been provided to verify the storm results.

5.2 Inflow Design Floods

Currently there is no hazard classification for the CCW impoundments at the Thomas Hill Energy Center. Based on observations during the field inspection, we recommend the Slag Dewatering Basin and Ash Pond – Cell No. 2 be rated "Low" hazard dams (see Section 4.0). Based on the recommended "Low" hazard classification, the Missouri Dam Safety Laws and Regulations specifies conventional environmental Class III dams be capable of passing the 100-year flood event without overtopping the dam. The USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 recommends a small "Low" hazard dam be capable of passing the 50-year to 100-year storm event without overtopping the dam. Considering the "Low" hazard rating, the scale of the economic and environmental damages that could potentially occur upon failure, and the recommended range of inflow design storms, it is reasonable to select the 100-year design storm for the Slag Dewatering Basin and Ash Pond – Cell No. 2. Accordingly, the 100-year 24-hour storm precipitation at the Thomas Hill Energy Center is about 7.2 inches based on Technical Paper No 40, Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 hours and Return Periods from 1 to 100 Years Report Number 51 6-hour PMP data.

5.2.1 Slag Dewatering Basin

The contributing drainage area to the Slag Dewatering Basin includes the impoundment's surface area (Table 2.1) and a small portion of surface drainage located east of the basin, for a total contributing area of about 14 acres. The water surface in Slag Dewatering Basin is regulated by a decant structure located in the northwestern portion of the pond that discharges to the drainage ditch and eventually to Ash Pond – Cell No. 2. Currently, the Slag Dewatering Basin water level is maintained at about elevation 732.3 feet, providing about 2.7 feet of freeboard. Under the current configuration, the decant structure invert elevation is at about elevation 731 feet. Based on the 24-hour 100-year precipitation event of 7.2 inches, the Slag Dewatering Basin would receive about 8.4 acre-feet of storm water. Without detailed hydraulic routing simulations, it is difficult to determine the resulting water surface elevation in Slag Dewatering Basin, however the available storage volume and discharge capacity of the decant structure is likely enough to maintain at least 1 foot of residual freeboard during the design event. Based on these results, the Slag Dewatering Basin meets the regulatory requirements for storing and passing the 24-hour 100-year inflow design flood without overtopping the dam.

5.2.2Ash Pond – Cell No. 2

The contributing drainage area to the Ash Pond – Cell No. 2 includes the impoundment's surface area (Table 2.1) and a considerable amount of surrounding surface drainage. Additionally, decant water from the Slag Dewatering Basin and Ash Pond – Cell No. 1 can be routed to Ash Pond – Cell No. 2 through the decant structures, producing a total contributing drainage area of about 148 acres. However, currently Ash Pond – Cell No. 1 does not store any water and has considerable available storage capacity to store the design storm precipitation that falls over the reservoir surface. Therefore, based on the current configuration, Ash Pond – Cell No. 1 does not contribute storm water runoff to Ash Pond – Cell No. 2, resulting in a total contributing drainage area to Ash Pond – Cell No. 2 of about 136 acres.

The water surface in Ash Pond - Cell No. 2 is regulated by a decant structure located through the south dike that discharges water into Ash Pond – Cell No. 3. Additionally, Ash Pond – Cell No. 2 has an 18-foot wide by 2-foot deep emergency spillway located over the south dike that can also discharge water into Ash Pond – Cell No. 3. Currently, the Ash Pond – Cell No. 2 water level is maintained at about elevation 713 feet, providing about 4.0 feet of freeboard. Based on the current configuration and the 24-hour 100-year precipitation event of 7.2 inches, the Ash Pond – Cell No. 2 would receive about 83 acre-feet of storm water. Without detailed hydraulic routing simulations, it is difficult to determine the resulting water surface elevation in Ash Pond – Cell No. 2, however the combined discharge capacity of the decant structure and emergency spillway is likely enough to maintain at least 1 foot of residual freeboard during the design event. Based on these results, the Ash Pond – Cell No. 2 will likely meet the regulatory requirements for storing and passing the 24-hour 100-year inflow design flood without overtopping the dam.

5.2.3 Determination of the PMF

Not applicable.

5.2.4 Freeboard Adequacy

Based on the data obtained, the freeboard is adequate at each of the two CCW impoundments at the Thomas Hill Energy Center.

5.2.5 Dam Break Analysis

It is our understanding that there have been no dam break analyses performed for the impoundments at the Thomas Hill Energy Center.

5.3 Spillway Rating Curves

The spillway rating curve for Ash Pond – Cell No. 2 was not provided.

5.4 Evaluation

Based on the current facility operations and inflow design floods documents, the impoundments at the Thomas Hill Energy Center appear to have adequate capacity to store or pass the regulatory design floods without overtopping the dams based on the recommended hazard classifications for the dams. However, these results should be confirmed with detailed hydrologic and hydraulic studies of the CCW impoundments. Additionally, if the current operations or facility configurations change in the future these flood studies should be re-evaluated.

6.0 Geologic and Seismic Considerations

The Geotechnology, Inc. performed soil borings and Cone Penetration Tests (CPT) for the May 2010 subsurface exploration at the Thomas Hill Energy Center. The exploration consisted of two soil borings and two CPT soundings. One boring (Boring C-1) and CPT Sounding (Sounding CC -1) was performed within the dike between Ash Pond – Cell No. 1 and Ash Pond – Cell No. 2 and extended to a depth of 50 feet below the existing grade. . The second boring (Boring C-2) and CPT Sounding (CC-2) were performed within the dike between Ash Pond – Cell No. 2 and Ash Pond – Cell No. 3 and extended to practical refusal within weathered Limestone bedrock at 37.2 feet in depth. Soil samples obtained from the dike fill materials consisted of highly plastic clay with trace amounts of silt and sands and are similar to the underlying material soils.

The site is located in a region of the country that has a significant seismic risk due to the presence of the New Madrid Seismic Zone (NMSZ) in southeastern Missouri. The NMSZ is the site of three of the largest magnitude earthquake events (estimated surface-wave magnitudes greater than or equal to 8.0) to strike North America in recorded history (December 1811 through February 1812). (Geotechnology, Inc Global Stability Evaluation May 2010.)

According to the 2008 U.S. Geological Survey (USGS) Seismic Hazard Map of Missouri (see Figure 2), the site has a regional probabilistic peak ground acceleration of 0.05882g with a 2 percent Probability of Exceedance within 50 years (recurrence interval of approximately 2,500 years).

7.0 Instrumentation

7.1 Location and Type

We are not aware of any instrumentation associated with the Slag Dewatering Basin and Ash Pond – Cell No. 2 impoundments at the Thomas Hill Energy Center.

7.2 Readings

7.2.1 Flow Rates

It is our understanding that flow rates are not monitored within the inlet or outlet structures within the Slag Dewatering Basin and Ash Pond – Cell No. 2 impoundments at the Thomas Hill Energy Center. The outflow from Ash Pond – Cell No. 3 is monitored as part of the NPDES permit requirements.

7.2.2 Staff Gauges

There was no staff gauge observed at either the Slag Dewatering Basin and Ash Pond – Cell No. 2 impoundments.

7.3 Evaluation

At this time, there is no geotechnical instrumentation in-place at either pond. The decision to install instrumentation at either dike should be based on the recommendations of project geotechnical engineer.

8.0 Field Assessment

8.1 General

A site visit to assess the condition of the Slag Dewatering Basin and Ash Pond – Cell No. 2 impoundments at the Thomas Hill Energy Center was performed on November 9, 2010, by Steven R. Townsley, P.E., and William Butler, P.E., of GEI; and Kim Dickerson, CHMM and David White, R.G. with Associated Electric Cooperative, Inc. who assisted in the assessment.

The weather during the site visit (November 9, 2010) was partly cloudy with temperatures around 50 degrees Fahrenheit and windy. The majority of the ground was dry at the time of the site visit. The last "significant" rainfall event at this site occurred on October 26, 2010 when 0.10 inches of rain recorded.

At the time of inspection, GEI completed EPA inspection checklists for each impoundment which are provided in Appendix A. Photographs are provided in Appendix B. Field assessment of the impoundments included a site walk to observe the dam crest, upstream slope, downstream slope, intake structures and outlet structures. Both of the impoundments are discussed separately below.

8.2 Slag Dewatering Basin

8.2.1 Impoundment Dike

8.2.1.1 Dike Crest

The crest of the dike at the Slag Dewatering Basin appeared to be in good condition. No signs of cracking, settlement, movement, erosion or deterioration were observed during the assessment. The crest appears to be well-drained and no standing water was observed. The dike crest surface is generally composed of gravel road base material that traverses the length of the dike for vehicle access.

8.2.1.2 Upstream Slope

The upstream slopes of the dike at the Slag Dewatering Basin are generally covered with well established grass and/or CCW waste. The upstream slope protection appeared to be in good condition. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.2.1.3 Downstream Slope

The downstream slope of the dike at the Slag Dewatering Basin generally has well-established grass growth, which provides some erosion protection (Photos 5 and 6). No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.2.2 Seepage and Stability

There are no signs of seepage or slope instability along the impoundment dike for the Slag Dewatering Basin.

8.2.3 Appurtenant Structures

8.2.3.1 Outlet Structure

The outlet structure (Photos 3 and 7) consists of a 30-inch diameter concrete outlet pipe and a concrete decant tower with 60-inch wide, 6” square concrete stop logs. The outlet structure releases the decant water into a bypass channel which discharges into the Ash Pond – Cell No. 2. At the time of our visit to the site, there was active flow through the outlet structure.

8.2.3.2 Pump Structures

No pumps are present at the Slag Dewatering Basin.

8.2.3.3 Emergency Spillway

No spillways are present at the Slag Dewatering Basin.

8.2.3.4 Drains

No internal or toe drains are present in the dike at the Slag Dewatering Basin.

8.2.3.5 Water Surface Elevations and Reservoir Discharge

At the time of our inspection on November 9, 2010, the Slag Dewatering Basin water level was observed to be at an approximate elevation of 731 feet. The water surface of the Slag Dewatering Basin is controlled by the outlet structure that discharges into the Ash Pond – Cell No. 2.

8.3 Ash Pond – Cell No. 2

8.3.1 Impoundment Dike

8.3.1.1 Dike Crest

The crest of the dike at the Ash Pond – Cell No. 2 appeared to be in good condition. No signs of cracking, settlement, movement, erosion or deterioration were observed during the assessment. The crest appears to be well-drained and no standing water was observed. The dike crest surface is generally composed of gravel road base material that traverses the length of the dike for vehicle access.

8.3.1.2 Upstream Slope

The upstream slope (Photos 10, 14, 15 and 18) of the dike at the Ash Pond – Cell No. 2 is partially covered with small riprap near the toe and well established grass growth near the crest of the embankment. The remaining slope is unprotected. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.3.1.3 Downstream Slope

The downstream slope (Photos 11 and 17) of the dike at the Ash Pond – Cell No. 2 (which is also the upstream slope of Ash Pond – Cell No. 3) has well-established grass growth, which provides some erosion protection. At the toe of the slope is Ash Pond – No. 3. The lower 10 feet of the slope is rip rap with small to medium size rock. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.3.2 Seepage and Stability

We observed no signs of seepage or slope instability in the dike during our inspection of Ash Pond – Cell No. 2.

8.3.3 Appurtenant Structures

8.3.3.1 Outlet Structure

The outlet structure (Photo 12) consists of a 36-inch diameter concrete outlet pipe and a concrete decant tower with 72-inch wide, 6” square concrete stop logs. The outlet structure releases decant water into Ash Pond – Cell No. 3. At the time of our visit to the site, there was active flow through the outlet structure.

8.3.3.2 Pump Structures

No pumps are present at Ash Pond – Cell No. 2.

8.3.3.3 Emergency Spillway

Just west of the Ash Pond – Cell No. 2 spillway (decant outlet) is the emergency spillway (Photo 16). The emergency spillway is an Open Channel Spillway, trapezoidal in shape, with a top width of approximately 18 feet, an average bottom width of 12 feet, and a depth of 2 feet below the top of the dike crest. The emergency spillway crest is lined with 3 to 6 inch crushed rock.

8.3.3.4 Drains

No internal or toe drains are present in the dike at Ash Pond – Cell No. 2.

8.3.3.5 Water Surface Elevations and Reservoir Discharge

At the time of our inspection on November 9, 2010, the Ash Pond – Cell No. 2 water level was observed to be at an approximate elevation of 713 feet (Photo 13). The water surface of Ash Pond – Cell No. 2 is controlled by the outlet structure that discharges into the Ash Pond – Cell No. 3.

9.0 Structural Stability

9.1 Visual Observations

The assessment team saw no visible signs of instability associated with the dikes of the Slag Dewatering Basin and Ash Pond – Cell No. 2 impoundments during the November 9, 2010 site assessment.

9.2 Field Investigations

Records of borings completed when the Slag Dewatering Basin and Ash Pond – Cell No. 2 were designed and constructed were not available. We did review boring logs and CPT soundings performed by Geotechnology, Inc. during the Global Stability Evaluation performed in May 2010. Two borings and two CPT soundings were performed. The first boring and CPT were performed within the dike between Ash Pond – Cell No. 1 and Ash Pond – Cell No. 2 and extended to a depth of 50 feet and 48.3 feet, respectively, below the existing grade at the time of the exploration. The second boring and CPT were performed within the dike between Ash Pond – Cell No. 2 and Ash Pond – Cell No. 3 and extended to a depth of approximately 37.2 feet and 51.1 feet, respectively. It should be noted that practical refusal was encountered within weathered Limestone at a depth of 37.2 feet.

Limited laboratory tests were performed by Geotechnology, Inc. including natural moisture content and Atterberg limits tests on cohesive soil samples. Unconfined compression tests were performed on select Shelby tube samples. Lastly, consolidated-undrained triaxial compression tests were performed on representative samples.

9.3 Methods of Analysis

Geotechnology Inc. performed slope stability analysis for deep seated, global failure of the embankment dike between Ash Pond – Cell No. 1 and Ash Pond – Cell No. 2 and on the dike between Ash Pond – Cell No. 2 and Ash Pond – Cell No. 3 as part of their Global Stability Evaluation (2010). A stability analysis was not performed for the Slag Dewatering Basin. Typical cross sections of the embankments were generated for the analyses. One cross section was developed through the north dike and one through the south dike of Ash Pond – Cell No. 2. Soil properties used in the stability analyses were selected based on the laboratory test results, soil borings, CPT data interpretation and Geotechnology's previous experience with similar soils. For their analysis, Geotechnology, Inc. used normal pool level elevations of 724 feet and 710 feet for Ash Pond – Cell No. 2 and Ash Pond – Cell No. 3, respectively.

A pseudo-static seismic analysis was also performed on the typical embankment cross sections using horizontal and vertical accelerations of 0.04g and 0.02g, respectively, which corresponds to a seismic event with a 90 percent probability of not being exceeded in 50 years (i.e. 1 in every 500 years).

The values Geotechnology, Inc. used in their analyses are summarized in Table 9.1 below:

Table 9:1: Summary of Embankment Geometry used in Stability Analysis

Cell 2 Embankment Location	North Embankment	South Embankment
Criteria		
Height (ft)	11	30
North Slope (H:V)	N/A	2.5:1
South Slope (H: V)	Varies from 7:1 to 2:1	3:1

Geotechnology Inc. used the computer program SLOPE/W and the Morgenstern-Price method to compute slope stability factors of safeties.

9.4 Discussion of Stability and Seismic Analysis and Results

The material properties used in the Geotechnology, Inc. stability evaluations for the north and south impoundment slopes stability sections indicate a cohesion value for the perimeter dike embankment material and underlying natural soils ranging from 50 to 100 pounds per square foot (psf) and friction angles of 26-27 degrees in the clay to 28 degrees in the Embankment fill.

For long term slope stability, a factor of safety (F.O.S) of 1.5 or greater was recommended in the report. During events such as earthquakes or a rapid drawdown of the pond due to a dam breach, a factor of safety of greater than 1.0 was also recommended in the report. Geotechnology Inc.'s results of the analyses are summarized in Table 9.2 below:

Table 9:2: Summary of Factors of Safety Results from Stability and Seismic Analysis

Location	Criteria		
	Static F.O.S.	Rapid Drawdown F.O.S.	Seismic F.O.S.
Ash Pond - Cell No. 2 North Embankment	2.1	N/A	1.9
South Embankment/Upstream Slope	2.6	2.0	2.1
South Embankment/Downstream Slope	1.5	1.3	1.3

9.5 Seepage Analysis

To our knowledge, a seepage analyses has not been performed for the Slag Dewatering Basin or Ash Pond – Cell No. 2. If this analysis has been performed in the past, the documents could not be located for review during the inspection or reporting period.

9.6 Liquefaction Potential

The documentation of liquefaction potential of the embankment and foundation materials could not be located and may not exist.

10.0 Maintenance and Methods of Operation

10.1 Procedures

The Thomas Hill Energy Center is manned 24 hours a day, seven days a week. Annual inspections are performed for the ash pond facilities by operations staff to observe the general condition of structures and dikes. It is our understanding that the inspection procedure is not documented and the personnel involved in the inspections are not formally trained to perform the inspections.

10.2 Maintenance of Impoundments

Maintenance of the impoundments is performed by Thomas Hill Energy Center staff under the guidance of Thomas Hill Energy Center managers and engineers.

10.3 Surveillance

The ash ponds are not regularly patrolled by Thomas Hill Energy Center operations personnel. Plant personnel are available at the power plant and on 24-hour call for emergencies that may arise. The plant does not have an emergency alarm system, but they do have a public announcement system which can be used to notify personnel on site in the event of an emergency and convey instructions quickly and effectively.

11.0 Conclusions

11.1 Assessment of Dams

11.1.1 Field Assessment

The dams and outlet works facilities associated with the impoundments at the Thomas Hill Energy Center were generally found to be in satisfactory condition. No visual signs of instability, erosion, or movement were observed.

Slope protection and appurtenant structures appeared to be in good condition.

11.1.2 Adequacy of Structural Stability

Slope stability and seismic analyses have been performed for the north and south embankments of Ash Pond No. 2. Based on our review of the information provided and the criteria used to perform the analyses, the stability and seismic analyses suggest the dikes are adequately constructed and will perform as intended.

We were not provided with any documents related to these types of analyses being performed for the dike at the Slag Dewatering Basin. Additionally, assessment of liquefaction potential of the embankment and foundation materials could not be located for the Slag Dewatering Basin or Ash Pond – Cell No. 2 and may not exist. We recommend that these analyses be performed to properly assess the stability of these dike embankments.

11.1.3 Adequacy of Hydrologic/Hydraulic Safety

Based on the current facility operations, recommended hazard classifications, and inflow design flood documents, the Slag Dewatering Basin and Ash Pond – Cell No. 2 impoundments appear to have adequate capacity to store the regulatory design floods without overtopping the dike.

11.1.4 Adequacy of Instrumentation and Monitoring

It is our understanding that there is no instrumentation in use associated with the Slag Dewatering Basin and Ash Pond – Cell No. 2. This instrumentation could include installation of piezometers, settlement plates and/or inclinometers at various locations along the dikes depending on the recommendations of the engineer performing the analyses.

11.1.5 Adequacy of Maintenance and Surveillance

The impoundments at the Thomas Hill Energy Center have fair maintenance and surveillance programs. The facilities are adequately maintained and routine surveillance.

11.1.6 Adequacy of Project Operations

Operating personnel are knowledgeable and are well trained in the operation of the project. The current operations of the facilities are satisfactory. We do recommend that an ash pond operation manual be prepared and maintained.

12.0 Recommendations

12.1 Corrective Measures and Analyses for the Structures

A preliminary analysis of static and seismic slope stability and liquefaction potential of the Slag Dewatering Basin impoundment should be completed to determine whether more detailed seismic studies are necessary.

12.2 Corrective Measures Required for Instrumentation and Monitoring Procedures

No corrective measures are required. We do recommend that instrumentation determined by the engineer performing the seepage and stability analyses be installed and maintained.

12.3 Corrective Measures Required for Maintenance and Surveillance Procedures.

None.

12.4 Corrective Measures Required for the Methods of Operation of the Project Works

None.

12.5 Summary

The following factors were the main considerations in determining the final rating of the impoundments at Thomas Hill Energy Center.

- The dikes at each of the impoundments are low-hazard structures based on federal and state classifications.
- The impoundments were generally observed to be in good condition in the field assessment.
- Hydrologic analyses indicate the dikes at each pond can store the regulatory design flood without overtopping.
- Stability and seismic analyses indicate that the dikes for Ash Pond – Cell No. 2 appear to be adequately constructed and will perform as intended.

- Stability and seismic analyses of the dike associated with the Slag Dewatering Basin could not be located and should be performed.
- Maintenance, surveillance and operational procedures are considered adequate.
- An operation plan should be developed and maintained.

12.6 Acknowledgement of Assessment

I acknowledge that the management unit(s) referenced herein was personally inspected by me and was found to be in the following condition **(select one only):**

SATISFACTORY

FAIR

POOR

UNSATISFACTORY

SATISFACTORY
No existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria. Minor maintenance items may be required.

FAIR
Acceptable performance is expected under all required loading conditions (static, hydrologic, seismic) in accordance with the applicable safety regulatory criteria. Minor deficiencies may exist that require remedial action and/or secondary studies or investigations.

POOR
A management unit safety deficiency is recognized for any required loading condition (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Remedial action is necessary. POOR also applies when further critical studies or investigations are needed to identify any potential dam safety deficiencies.

UNSATISFACTORY
Considered unsafe. A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary.

I acknowledge that the management unit referenced herein:

Has been assessed on: November 9, 2010

Signature: ______________________________

List of Participants:

Steven R. Townsley, P.E.	Senior Project Engineer/Task Leader, GEI Consultants, Inc.
Stephen G. Brown, P.E.	Project Manager
William Butler, P.E.	Project Geotechnical Engineer
Nick Miller, P.E.	Project Water Resources Engineer

13.0 References

Geotechnology Inc. "Global Stability Evaluation, Mine Waste and Ash Pond Embankments, AECI Facilities, Bee Veer and Thomas Hill Missouri," Report 2010.

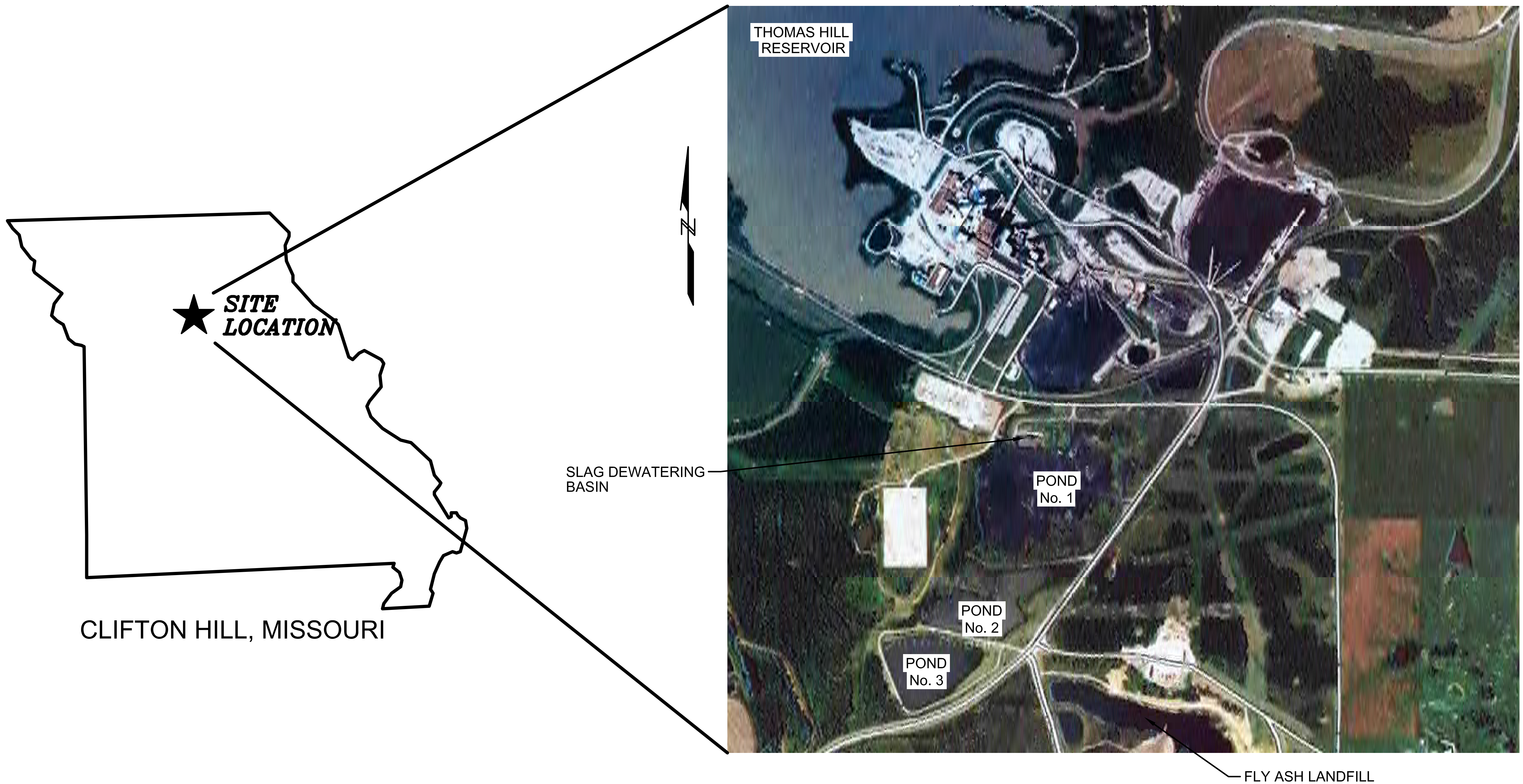
Burns and McDonnell. (1978-79). "Ash Pond Facilities, Project Design Documents Y-6 through Y-10, Y12, and S-1 through S-3.

Burns and McDonnell. (1978-79). "Ash Pond Modifications, Project Design Documents Y-2 through Y-5.

U.S. Army Corps of Engineers (1979). "Recommended Guidelines for Safety Inspections of Dams. (ER 1110-2-106)." September.

United States Geologic Survey (2008). Seismic Hazard Map for Missouri: Peak Ground Acceleration with 2% Probability of Exceedance within 50 years.

Figures



SPECIFIC SITE ASSESSMENT FOR THOMAS HILL ENERGY CENTER, SLAG DEWATERING BASIN
CLIFTON HILL, MISSOURI

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

GEI Consultants

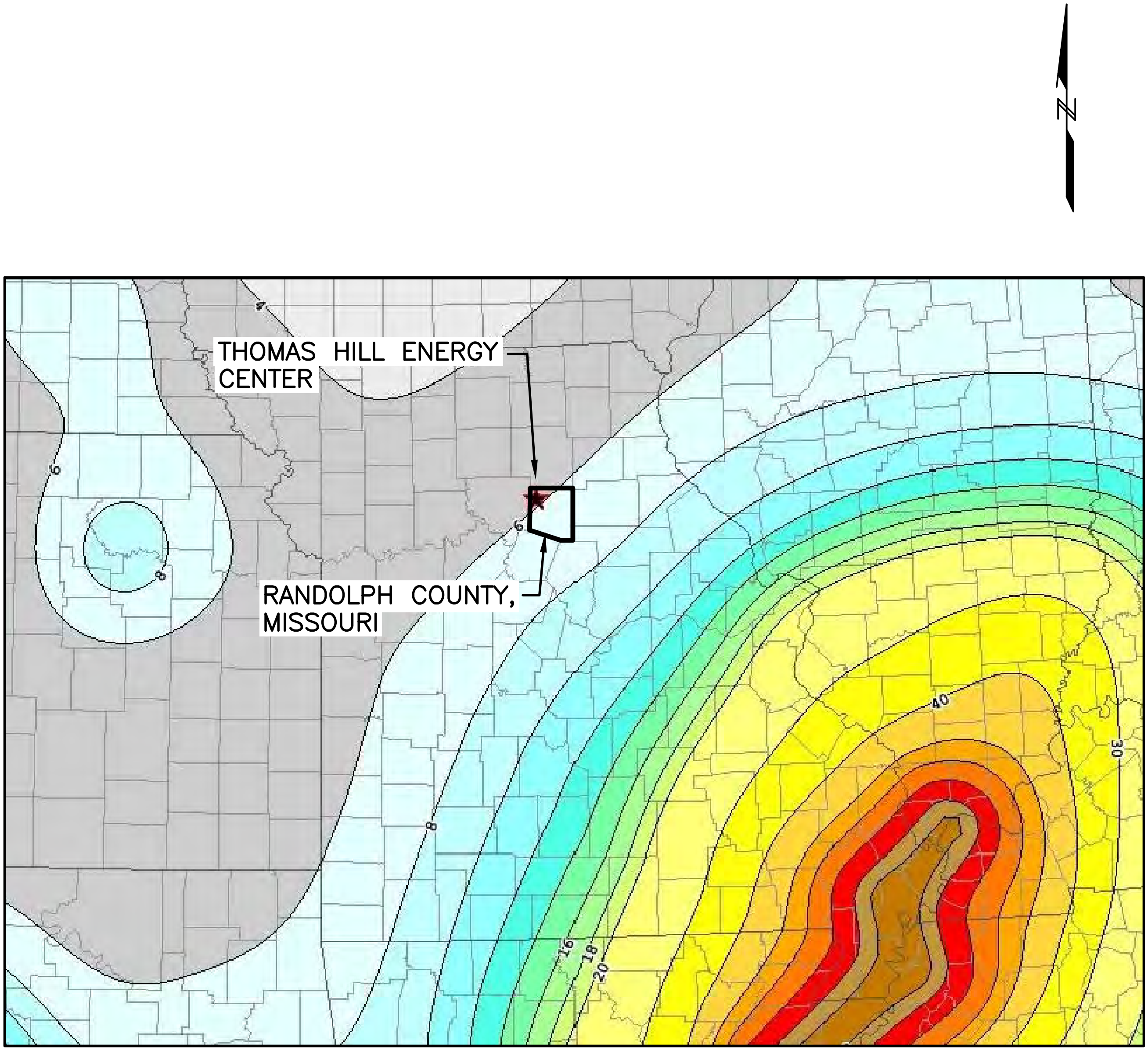
Project 092884

SITE LOCATION DIAGRAM

December 2010

Fig. 1

J:\2010\092884 - Thomas Hill Energy\figure 1



Specific Site Assessment for Thomas Hill Energy Center, Slag Dewatering Pond
Clifton Hill, Missouri

Environmental Protection Agency
Washington, D.C.

GEI Consultants

Project 10123-0

2008 U.S. GEOLOGIC SURVEY (USGS) SEISMIC HAZARD MAP OF MISSOURI

December 2010

Fig. 2

J:\2010\092884 - Thomas Hill Energy\figure 2

Appendix A

Inspection Checklists

November 9, 2010

Site Name: **Thomas Hill Energy Ctr, Clifton Hill, MO** Date: **11/9/2010**

Unit Name: **Slag Dewatering Basin** Operator's Name: **Assoc. Electric Cooperative, Inc.**

Unit ID: ______ Hazard Potential Classification: High Significant **Low**

Inspector's Name: **Steve Townsley and William Butler - GEI Consultants, Inc.**

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	~732.3		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	~730		20. Decant Pipes		
4. Open channel spillway elevation (operator records)?	NA		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	735		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	NA		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?		X	From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below.)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		X	From downstream foundation area?		X
13. Depressions or sink holes in tailings surface or whirlpool in the pool area		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
1. Frequency of Company's Dam Inspections?	**Maintenance inspections performed annually but no written documentation of observations or maintenance activities.**

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # **TBD** INSPECTOR **S. Townsley/W. Butler**

Date **11/9/2010**

Impoundment Name **Slag Dewatering Basin, Thomas Hill Energy Center, Clifton Hill, MO**

Impoundment Company **Associated Electric Cooperative, Inc.**

EPA Region **7**

State Agency (Field Office) Address **N/A**

Name of Impoundment **Slag Dewatering Basin**
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New **X** Update ______

	Yes	No
Is impoundment currently under construction?		**X**
Is water or ccw currently being pumped into the impoundment?	**X**	

IMPOUNDMENT FUNCTION: **Fly ash, bottom ash, boiler slag, flue gas emission control residuals, sediment and coal pile runoff storage**

Nearest Downstream Town: Name **Salisbury, MO**
Distance from the impoundment **~8 miles**
Impoundment
Location:

Longitude	**92**	Degrees	**38**	Minutes	**17W**
Latitude	**39**	Degrees	**32**	Minutes	**34N**
State	**MO**	County	**Randolph**		

Does a state agency regulate this impoundment? YES______ NO **X**

If So Which State Agency?______

<u>HAZARD POTENTIAL</u> (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL**: Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

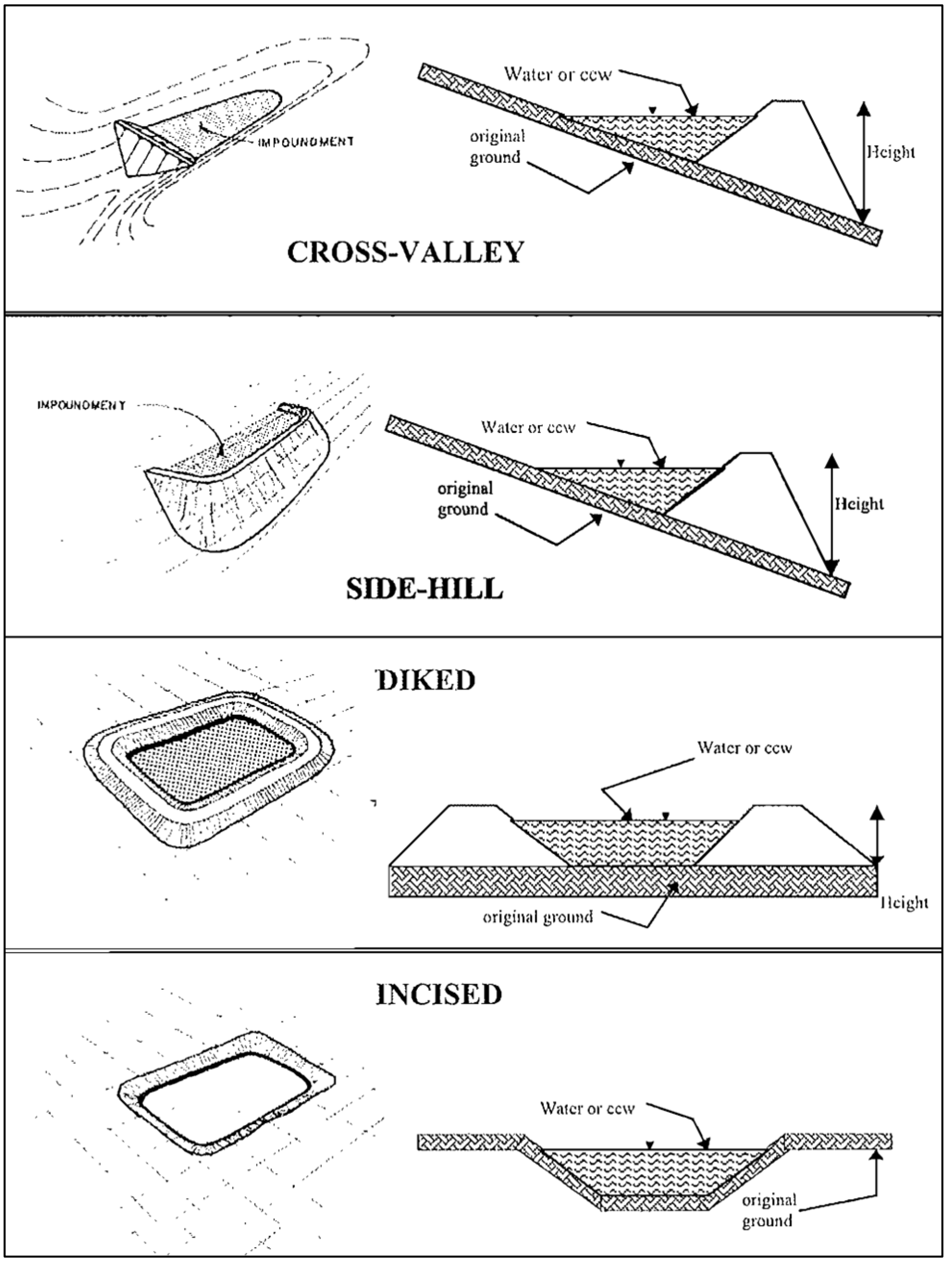
__X__ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

______ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

______**HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:
The Slag Dewatering Basin receives the CCW, which are removed after settling for commercial use. Decant water is released via a decant tower and pipe into a bypass channel that discharges into Ash Pond – Cell No. 2. A failure of the Slag Dewatering Basin would be contained in either Cell No. 1 or Cell No. 2 of the Ash Pond. Therefore, failure of the Slag Dewatering Basin would result in no probable loss of life and could only cause low economic and environmental damage mostly to the owner's property.

CONFIGURATION:



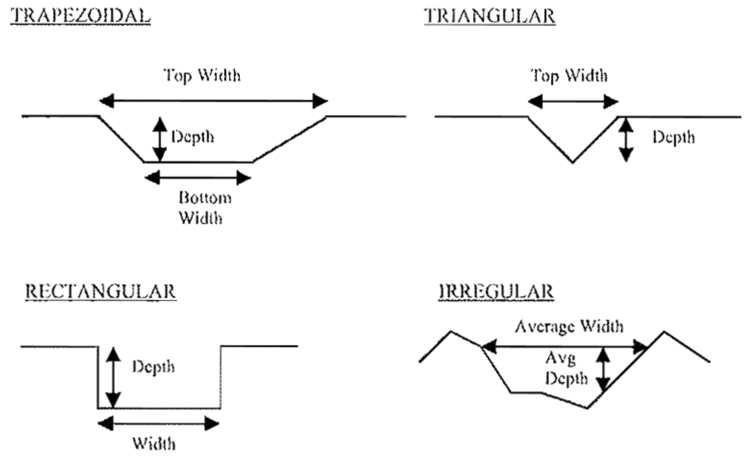
__X__ Cross-Valley
______ Side-Hill
______ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height __~10__ feet   Embankment Material __Compacted earthfill__
Pool Area __3__ acres   Liner __NA__
Current Freeboard __2.7__ ft   Liner Permeability __NA__

TYPE OF OUTLET (Mark all that apply)

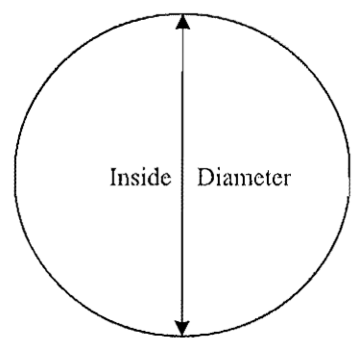
______ **Open Channel Spillway**
______ Trapezoidal
______ Triangular
______ Rectangular

______ Depth
______ Bottom (or average) width
______ Top width



__X__ **Outlet**

__30 in__ inside diameter



Material
______ corrugated metal
______ welded steel
__X__ concrete
______ plastic (hdpe, pvc, etc.)
__X__ other (specify) - **concrete decant tower with 60"W x 6" x 6" concrete stoplogs**

Is water flowing through the outlet? YES__X__ NO______

______ **No Outlet**

______ **Other Type of Outlet (Specify)** ______________________________

The Impoundment was Designed By: **Burns and McDonnell Engineers**

Has there ever been a failure at this site? YES ______ NO __X__

If So When? ____

If So Please Describe:

Has there ever been significant seepages at this site? YES ______ NO__X___

If So When? ____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ______ NO__X___

If So which method (e.g., piezometers, gw pumping, …)? ________________________

If So Please Describe:

Site Name: **Thomas Hill Energy Ctr, Clifton Hill, MO** Date: **11/9/2010**

Unit Name: **Ash Pond – Cell No. 2** Operator's Name: **Assoc. Electric Cooperative, Inc.**

Unit ID: Hazard Potential Classification: High Significant **Low**

Inspector's Name: **Steve Townsley and William Butler - GEI Consultants, Inc.**

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	~713		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	~712		20. Decant Pipes		
4. Open channel spillway elevation (operator records)?	715		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	717		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	NA		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?		X	From underdrain?		X
9. Trees growing on embankment? (If so, indicate largest diameter below.)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		X	From downstream foundation area?		X
13. Depressions or sink holes in tailings surface or whirlpool in the pool area		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
1. Frequency of Company's Dam Inspections?	**Maintenance inspections performed annually but no written documentation of observations or maintenance activities.**
16. Are outlets of decant or underdrains blocked?	**Outlet of decant pipe from Cell No. 1 is dredged annually or as needed to keep the outlet clear of ash and cattails.**

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # **TBD** INSPECTOR **S. Townsley/W. Butler**

Date **11/9/2010**

Impoundment Name **Ash Pond - Cell No. 2, Thomas Hill Energy Center, Clifton Hill, MO**

Impoundment Company **Associated Electric Cooperative, Inc.**

EPA Region **7**

State Agency (Field Office) Address **N/A**

Name of Impoundment **Ash Pond - Cell No. 2**
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New **X** Update ______

	Yes	No
Is impoundment currently under construction?		**X**
Is water or ccw currently being pumped into the impoundment?	**X**	

IMPOUNDMENT FUNCTION: **Fly ash, bottom ash, boiler slag, flue gas emission control residuals, sediment and coal pile runoff storage**

Nearest Downstream Town: Name **Salisbury, MO**
Distance from the impoundment **~8 miles**

Impoundment Location:						
	Longitude	**92**	Degrees	**38**	Minutes	**17W**
	Latitude	**39**	Degrees	**32**	Minutes	**34N**
	State	**MO**	County	**Randolph**		

Does a state agency regulate this impoundment? YES______ NO **X**

If So Which State Agency?______

<u>HAZARD POTENTIAL</u> (In the event the impoundment should fail, the following would occur):

______ **LESS THAN LOW HAZARD POTENTIAL**: Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

__X__ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

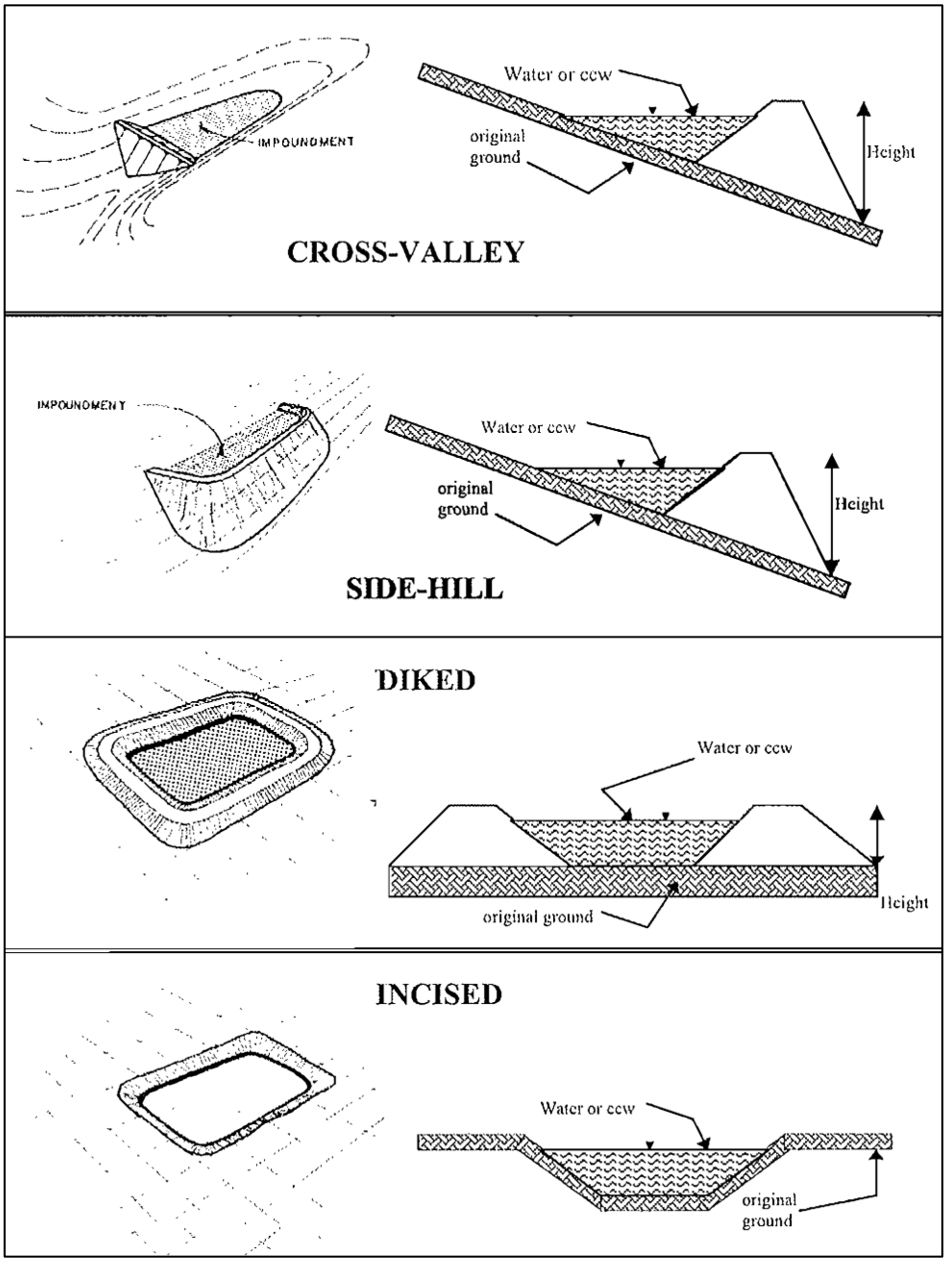
______ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

______**HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

The Slag Dewatering Basin receives the CCW, which are removed after settling for commercial use. Decant water is released via a decant tower and pipe into a bypass channel that discharges into Ash Pond – Cell No. 2. A failure of the Ash Pond – Cell No. 2 would likely be contained in Ash Pond – Cell No. 3. If any CCW were to pass Ash Pond – Cell No. 3 by either dike failure or passing through the decant outlet, these events would result in no probable loss of life and could only cause low economic and environmental damage mostly to the owner's property.

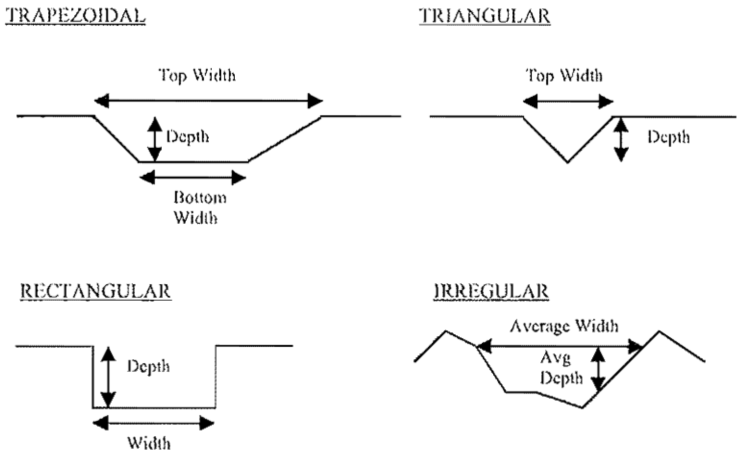
CONFIGURATION:



__X__ Cross-Valley
______ Side-Hill
______ Diked
______ Incised (form completion optional)
______ Combination Incised/Diked

Embankment Height 25 feet   Embankment Material Compacted earthfill
Pool Area 12 acres   Liner NA
Current Freeboard 4 feet   Liner Permeability NA

<u>TYPE OF OUTLET</u> (Mark all that apply)

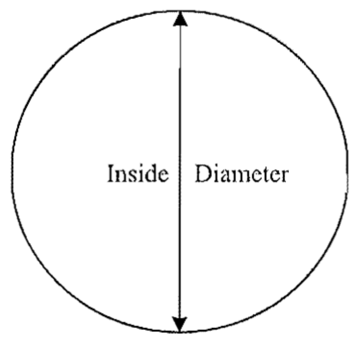


__X__ **Open Channel Spillway**
__X__ Trapezoidal
______ Triangular
______ Rectangular

__2 ft__ Depth
__12 ft__ Bottom (or average) width
__18 ft__ Top width

__X__ **Outlet**

__36 in__ inside diameter



Material
______ corrugated metal
______ welded steel
__X__ concrete
______ plastic (hdpe, pvc, etc.)
__X__ other (specify) - **concrete decant tower with 72"W x 6" x 6" concrete stoplogs**

Is water flowing through the outlet? YES__X__ NO______

______ **No Outlet**

______ **Other Type of Outlet (Specify)** ______________________________

The Impoundment was Designed By: **Burns and McDonnell Engineers**

Has there ever been a failure at this site? YES ______ NO __X___

If So When?____

If So Please Describe:

Has there ever been significant seepages at this site? YES ______ NO __X___

If So When? ____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES ______ NO __X__

If So which method (e.g., piezometers, gw pumping, …)? ________________________

If So Please Describe:

Appendix B

Inspection Photographs

November 9, 2010

Photo 1 – Looking east at Slag Dewatering Basin inlet.

Photo 2 – Inlet pipes discharging into the Slag Dewatering Basin.

Photo 3 – The outlet structure for the Slag Dewatering Basin.

Photo 4 – Water from the Slag Dewatering Pond being discharged into the ditch to Ash Pond, Cell No. 2.

Photo 5 – The north downstream dike for the Slag Dewatering Pond.

Photo 6 – The downstream slope of the west dike to the Slag Dewatering Pond.

Photo 7 – The outlet structure for the Slag Dewatering Pond.

Photo 8 – The ditch from the plant that conveys water to Ash Pond – Cell No. 2.

Photo 9 – The ditch outlet into Ash Pond – Cell No. 2.

Photo 10 – Taken at the east abutment, looking west at the Upstream dike slope and dike crest for the Ash Pond – Cell No. 2. Note to the left of the dike is the Ash Pond – Cell No. 3 pond.

Photo 11 – Taken from the east dike abutment looking west at the dike crest and downstream slope for the Ash Pond – Cell No. 2 dike.

Photo 12 – The outlet structure for the Ash Pond – Cell No. 2.

Photo 13 – Measuring the Ash Pond – Cell No. 2 pond level at the time of the inspection.

Photo 14 – Taken from the outlet structure looking east at the upstream dike slope.

Photo 15 – Taken from the outlet structure looking west at the upstream dike slope.

Photo 16 – The Ash Pond – Cell No. 2 emergency spillway.

Photo 17 – Taken from the west abutment looking east at the downstream dike slope for Ash Pond – Cell No. 2.

Photo 18 – Taken from the west abutment looking east at the upstream dike slope for Ash Pond – Cell No. 2.

Photo 19 – Water from Ash – Pond No. 3 being discharged at NPDES Outlet No. 001.