COAL ASH IMPOUNDMENT
SITE ASSESSMENT DRAFT REPORT

Coffeen Power Station
Ameren Energy Generating Company
Coffeen, Illinois

Prepared by:

KLEINFELDER
Bright People. Right Solutions.
611 Corporate Circle, Suite C
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KLEINFELDER PROJECT NUMBER 112618-3

October 15, 2010

I acknowledge that the management units referenced herein:

- Recycle Pond
- Gypsum Reclaim Pond

Were assessed on August 18, 2010

Signature: _____ Date: _____

Anthony G. Devine, P.E.
Lead Geotechnical Engineer

EXECUTIVE SUMMARY

Background information taken from the U. S. Environmental Protection Agency's (EPA's) website:

> "Following the December 22, 2008 dike failure at the TVA/Kingston, Tennessee coal combustion waste (CCW) ash pond dredging cell that resulted in a spill of over 1 billion gallons of coal ash slurry, covered more than 300 acres and impacted residences and infrastructure, the EPA is embarking on an initiative to prevent the catastrophic failure from occurring at other such facilities located at electric utilities in an effort to protect lives and property from the consequences of a impoundment or impoundment failure of the improper release of impounded slurry."

As part of the EPA's effort to protect lives and the environment from a disaster similar to that experienced in 2008, Kleinfelder was contracted to perform a site assessment at the Coffeen Power Generating Station that is owned and operated by Ameren Energy. This report summarizes the observations and findings of the site assessment that occurred on August 18, 2010.

The coal combustion waste impoundments observed during the site assessment included:

- Recycle Pond – Commissioned in 1979
- Gypsum Reclaim Pond – Commissioned in 2009

Preliminary observations made during the site assessment are documented on the Site Assessment Checklist presented in Appendix A. A copy of this checklist was transmitted to the EPA following the field walk-through. A more detailed discussion of the observations is presented in Section 4, "Site Observations."

The Recycle Pond is not regulated by a state agency and therefore does not currently have a designated hazard rating. Due to the potential environmental and economic impacts that a failure of this impoundment would present by breaching into Coffeen Lake, it is recommended a Hazard Classification of "Significant" be assigned to this impoundment. The Gypsum Reclaim Pond is classified as a small-size Class III (Low Hazard Potential) dam by the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR). However, the failure of the Gypsum Reclaim Pond could result in major economic loss, environmental damage, disruption of lifeline facilities, and impact other concerns and therefore is recommended a Hazard Classification of "Significant" according to US EPA hazard classification definitions.

Overall, the site is reasonably well maintained and operated with a few areas of concern as discussed in Section 6, "Recommendations."

On the date of this site assessment, there appeared to be no immediate threat to the safety of the impoundment embankments. No assurance can be made regarding the impoundments condition after this date. Subsequent adverse weather and other factors may affect the condition.

A brief summary of the Priority 1 and 2 Recommendations is given below. A more detailed discussion is provided in Section 6, "Recommendations."

Priority 1 Recommendations

1. Prepare an Emergency Action Plan (EAP) for the Recycle Pond and Gypsum Reclaim Pond.
2. Perform a hydrologic and hydraulic study for the Recycle Pond.
3. Establish a seepage and groundwater monitoring program.
4. Perform embankment and structural stability analyses.
5. Perform video assessments of CMP outlet on the Recycle Pond.
6. Control vegetation on the upstream and downstream slopes of the Recycle Pond.
7. Repair sloughs on South and East embankments of Recycle Pond.

Priority 2 Recommendations

1. Repair erosion of embankment.
2. Maintain a log of maintenance and other activities for both impoundments.
3. Develop an Operation and Maintenance (O&M) manual for Recycle Pond.

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List of Figures

(Note: Figures 4 and 5 show GPS location points taken during the field inspection; some of which coincide with photo locations)

List of Appendices

SECTION 1 – INTRODUCTION

1.1 General

This report has been prepared for the United States Environmental Protection Agency (EPA) to document findings and observations from a site assessment at the Coffeen Power Station on August 18, 2010.

The following sections present a summary of data collection activities, site information, performance history of the facility's impoundment ponds, a summary of site observations, and recommendations resulting from the site investigation.

1.2 Project Location

The Coffeen Power Generating Station is located on a peninsula between two branches of Coffeen Lake about two miles south of the Town of Coffeen, Illinois, as shown in Figure 1. The Town of Coffeen is located in Montgomery County at approximately 39° 05' 21'' N and 89° 23' 26'' W. In general, the town of Coffeen is a rural agricultural community with a population of about 700 people.

1.3 Site Documentation

Ameren Energy provided the following documents during the time of this inspection to aid in the review of the impoundments:

- Hansen Professional Services Inc., Operation and Maintenance Manual Coffeen Power Station, February 2008
- Hansen Professional Services Inc., "Design Drawings Sheets 19-22 and 27," 2010
- Hansen Professional Services, Inc., 2008 Coffeen Dam Inspection Observation Report, October 2008.
- Ameren, "Coffeen Plant – 2009 Annual ash Pond Inspection Form (internal Inspection)," April, 2009.
- Stearns and Roger, "Design Drawings S-44, S-45 and S-47," 1978
- Sargent and Lundy, "Design Drawing B-561," 1971

SECTION 2 – SITE ASSESSMENT

2.1 Attendees

The site assessment was performed on August 18, 2010 by Tony Devine, P.E. and Travis Kluthe, E.I.T. of Kleinfelder. Other persons present during the site assessment included:

- Paul Pike – Ameren Energy
- Michael Wagstaff, PE – Ameren Energy
- John Romang – Ameren Energy
- Vito Passariello – Ameren Energy

2.2 Impoundments Inspected

Impoundments and associated structures that were observed during the site assessment included:

- Recycle Pond – Commissioned in 1979
- Gypsum Reclaim Pond – Commissioned in 2009

Observations from the site assessment are documented on the Site Assessment Checklists presented in Appendix A. A summary of observations from the site assessment is presented in Section 4.

2.3 Weather During Assessment

During the assessment of the Coffeen Power Station impoundments, the weather was sunny and clear with high humidity. Temperatures ranged from 95^{o} to 100^{o}F, and wind ranged from 0 to 5 miles per hour (mph).

3.1 Site Information and History

The Coffeen Power Generating Station is a coal-fired facility. The facility currently sluices boiler slag and other materials into the Recycle Pond and flue gas emissions control residuals into the Gypsum Reclaim Pond. An aerial image of these impoundments can be seen in Figure 2. Beneficial use of the fly ash is not currently economically feasible at the Coffeen site but could possibly hold potential in the future, depending on local construction projects and their need for concrete admixtures.

The Recycle Pond is a combination earthen embankment and incised impoundment; a typical pond cross section is presented on Figure 3. Sluice pipes transporting ash from power generating operations discharge at the west side of the pond, south of the separation dike. From the discharge point, the ash slurry flows toward the east side of the pond, north around the end of the separation dike, and then back to the northwest corner of the pond, where the pump station and overflow are located. Under normal operations water is recycled from the pond, and there is no discharge. A 24-inch emergency overflow pipe discharges into Coffeen Lake and is set at an invert elevation of 631 feet. The typical operation water surface elevation is unknown.

A sheet pile wall located at the northeast corner of the Recycle Pond supports the toe of the pond embankment along a channel associated with a pump station located east of the pond.

The Gypsum Reclaim Pond is a combination earthen embankment and incised impoundment; a typical cross section of the pond is presented on Figure 3. Flue gas emission control residuals from the scrubbers are discharged on the west side of the pond. The pond outlet/inlet to the recycling system is located at the southeast corner of the pond. A set of three emergency overflow weirs are located near the northeast corner of the pond. The pond was constructed in 2009 and is lined with High-Density Polyethelene (HDPE).

A Decommissioned Ash Pond is located between the Gypsum Reclaim Pond and the Recycle Ash Pond. The exact date of the decommissioning and capping is unknown.

3.2 Pertinent Data

A. GENERAL

1. Name ..... Coffeen Power Generating Station
2. State ..... Illinois
3. County ..... Montgomery
4. Latitude ..... 39^{o} 03’ 41’’ North

5. Longitude ..... 90° 34' 20" West
6. River used for operations ..... Coffeen Lake
7. Year Constructed ..... Unknown
8. Modifications ..... Separation dike added to Recycle Pond, De-commissioned Ash Pond
9. Current Hazard Classification ..... None
10. Proposed Hazard Classification ..... Significant
11. Size ..... Gypsum Pond is Class III, Recycle is Unregulated – Small Impoundment[2]

B. IMPOUNDMENTS

RECYCLE POND

1. Type ..... Earthen – Diked/Incised Combination
2. Crest Elevation ..... 637.5± feet[1]
3. Crest Length ..... Approximately 4,300 feet
4. Crest Width ..... 15 feet
5. Impoundment Height ..... 15 to 42 feet
6. Upstream Slope 3H:1V
7. Downstream Slope 3H:1V
8. Volume of Stored Ash ..... 250 acre-feet

GYPSUM RECLAIM POND

1. Type ..... Earthen – Diked/Incised Combination
2. Crest Elevation ..... 629± feet[4]
3. Crest Length ..... Approx. 3,600 feet
4. Crest Width ..... 20 feet
5. Impoundment Height ..... Approx. 16 feet
6. Upstream Slope 3H:1V
7. Downstream Slope 3.5H:1V
8. Volume of Stored Ash ..... <1 acre-feet

C. DRAINAGE BASIN

1. Area of Drainage Basin ..... Unknown
2. Downstream Description: ..... Coffeen Lake and East Fork Shoal Creek

D. POND INLET

RECYCLE POND

1. Pond Inlet ..... Multiple inlet sluice pipes from the generating station

GYPSUM RECLAIM POND

1. Pond Inlet ..... Scrubber discharge pipe

E. POND

RECYCLE POND

1. Pond Capacity ..... 500 acre-feet

GYPSUM RECLAIM POND

2. Pond Capacity ..... 243 acre-feet

F. PRIMARY SPILLWAY

RECYCLE POND

1. Description ..... 24-inch Corrugated Metal Pipe (CMP) Overflow

GYPSUM RECLAIM POND

1. Description.....Three 6-foot by 6-foot concrete weir boxes for emergency spillway

G. OUTLET WORKS

RECYCLE POND

1. Description.....Pump station only means of draining impoundment

GYPSUM RECLAIM POND

1. Description.....Pump station only means of draining impoundment

H. MANAGEMENT

1. Owner .....Ameren Energy
2. Purpose ..... Coal Fired Energy Generation

Notes:

1. All elevations are based on original construction drawings by Stearns and Roger Incorporated
2. Impoundment is unregulated; size is based on Illinois Department of Natural Resources Administrative Code for Impoundment Safety
3. Structure was inundated during the time of inspection and was not able to be inspected
4. All elevations in feet based on original construction drawings by Hanson Professional Services

3.3 Regional Geology and Seismicity

The plant site is situated in a broad, flat, physiographic area called the Springfield Plain. The landscape was shaped largely by glaciers that covered much of Illinois repeatedly during the past million years. Glaciers left deposits of material on the irregular bedrock surface; these materials, generally, include pebbly clay (till), water-laid sand and gravel (outwash), and wind-laid silt (loess). Based on our review of information from the Web Soil Survey, it appears that the upper soil deposits at the plant site were comprised of glacial till. Based on our review of data published by the United States Geological Survey (USGS) and the Illinois State Geological Survey, the sedimentary rock formations below the glacial soils in Montgomery County include shale, sandstone, limestone, and coal.

The plant site is situated in a Seismic Zone 1 area. We have noted that the New Madrid Fault has a documented history of seismic activity but is located more than 130 miles south of the plant site.

3.4 Hydrology and Hydraulics

The Recycle Pond is not currently classified as a jurisdictional dam by the State of Illinois and is not regulated by a state agency. The Gypsum Reclaim Pond is classified as a Small-size Class III (Low Hazard Potential) dam by the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) and has a dam identification number of IL50578 and an Operation and Maintenance Manual (O&M) prepared by Hanson Professional Services, Inc. The O&M Manual recommends occasional “walk-around” inspections. Ameren staff indicated both ponds receive “walk-around” inspections on a monthly basis in addition to an annual

inspection performed by the Ameren dam safety group. The Recycle Pond was inspected in 2008 by Hanson Professional Services, Inc. and included recommendations for deficiencies (HPSI, 2008).

3.4.1 Recycle Pond

The Recycle Pond has a surface area of approximately 23 acres and is used to store various waste from the plant. The pond embankment is "perched" and likely receives no runoff from surrounding areas, only precipitation falling directly on the pond surface; however, the exact limits of the watershed would be difficult to determine without an updated survey of the impoundments, plant footprint, and surrounding areas as well as any storm sewer plans.

During the site assessment, no documents relating to a hydrologic study, hydraulic design calculations and assumptions, or dam break analyses were provided for review. It is unknown what the designed inflow, capacity of the ponds, freeboard, or other important components of the impoundment designs are without these studies and documents.

The Recycle Pond does not have an open channel spillway but does have an emergency outlet pipe as part of the pump station located in the northwest corner of the impoundment. A grading plan by Stearns Rogers, Inc. (SRI, 1978) showing the pond indicates the emergency overflow pipe is a 24-inch CMP that discharges into a canal north of the Recycle Pond that then discharges into Lake Coffeen. A complete set of plans was not provided by the owner and details of the overflow pipe cannot be verified, including elevations, connection types, and capacity. The pond is also equipped with a pump station capable of transferring water to the plant system for processing purposes. No information regarding the pump station capacity was provided by the owner.

Kleinfelder is not aware of any emergency action plan or breach analyses prepared for the Recycle Pond. It is unclear what areas would be inundated in the event of a breach or if any plant facilities would be damaged. The breach flows would likely eventually drain to Lake Coffeen. According to the owner, the nearest critical infrastructure is located in the City of Greenville, approximately 12 miles downstream of the site.

3.4.2 Gypsum Reclaim Pond

The Gypsum Reclaim Pond has a surface area of approximately 23 acres and can impound 243 acre-feet. The pond was designed to receive clarified process water from the Gypsum Stack Pond, located directly north of the Gypsum Reclaim Pond; however, it is currently being used to receive process water from the plant, while the Gypsum Stack Pond is under construction. The pond embankment is "perched" and likely receives no runoff from areas outside of the pond embankment, only precipitation falling directly on the pond surface; however, the exact limits of the watershed would be difficult to determine without an updated survey of the impoundments, plant footprint, and surrounding areas as well as any storm sewer plans.

The O&M Manual discusses perimeter ditches on the interior of the Gypsum Stack Pond designed to drain to a transfer channel leading to the Gypsum Reclaim Pond (HPSI, 2008). The volume and rate of runoff from these ditches is unknown. The O&M Manual also indicates the transfer channel is designed to allow overflow from the Stack Pond to the Recycle Pond and will be equipped with a stop log structure to control the overflow.

The O&M Manual indicates a failure of the recycle pond would discharge into Lake Coffeen but is not anticipated to cause loss of life or significant economic damage (HPSI, 2008). The document also states that a failure of the Recycle Pond during the Probable Maximum Flood (PMF) would cause Lake Coffeen to rise 0.5 inches (HPSI, 2008). No calculations were provided for review, so Kleinfelder cannot comment further on these results.

The Recycle Pond is equipped with an emergency spillway consisting of three 6-foot by 6-foot precast concrete weir boxes, each with a 48-inch HDPE discharge pipe. The emergency spillway is designed to pass the 24-hour PMF event with adequate freeboard to prevent overtopping of the pond crest by wind-generated waves (HPSI, 2008). Each pipe discharges independently into a riprap-lined stilling basin. The weir boxes are designed to operate at approximately elevation 624.0 feet and only in the event of large storm event. The O&M Manual reports the full PMF would reach a maximum water surface elevation (WSE) of 627.45 feet, assuming a starting WSE of 624 feet (emergency spillway elevation), leaving approximately 1.55 feet of freeboard (HPSI, 2008). The O&M Manual also evaluates more frequent storm events as well as different starting water surface elevations. The O&M Manual also reports the results of more frequent storm events as well as different starting water surface elevations. However, no calculations, assumptions, or methodology was provided for review.

The weir boxes on the emergency spillway are located near the embankment road and are protected by a handrail to ensure safety during inspection and maintenance.

3.5 Geotechnical Considerations

It is Kleinfelder's understanding that embankment stability analyses are currently being completed for the Recycle Pond by another consultant retained by Ameren Energy. Kleinfelder assumesthat embankment stability analyses were completed for the Gypsum Reclaim Pond as a part of the design process.

Kleinfelder understands that possible seepage was observed at the toe of the south berm of the Recycle Pond by Ameren Energy in 2009. Seepage calculations from design of the Recycle Pond were not provided.

3.6 Structural Considerations

Kleinfelder's review of the structural components was focused primarily on the decant system within the recycle pond, including a drop structure, a catwalk, and a center

pier support for the catwalk. Kleinfelder believes that these structures were constructed in about 1971.

The drop structure is a 6-foot by 6-foot reinforced concrete box approximately 43 feet in height. This structure is founded on a reinforced concrete spread footing with plan dimensions of about 9 feet by 9 feet. The only lateral resistance for this structure is the catwalk connection at the top of the drop structure. The catwalk structure appears to be in good condition. This catwalk runs approximately 60 feet from the top of the levee to the top of the reinforced concrete drop structure. The structure is a 2-span pedestrian bridge with a steel C-channel girder superstructure. Each span is approximately 26 feet long. There is horizontal lateral bracing in the superstructure; although, no diagonal bracing is present. The center pier of the catwalk consists of a H-Frame with diagonal bracing. The frame is approximately 18 feet high and appears to be in good condition. The catwalk bridge access portion appears to be in good condition and the superstructure appears to be intact with minor corrosion. The catwalk substructure concrete foundations appear to be in good condition with little to no concrete spalling or scaling. The condition of the concrete foundation is unknown, as it was not visible at the time of our inspection.

Structures associated with the new Gypsum Reclaim Pond include a primary decant system and an emergency spillway system. These structures were recently constructed and were found to be in good condition.

Documentation of the structural portions of the impoundments under seismic loading was not available for our review. Although the plant site is located in a zone of relatively low risk for damaging seismic activity, evaluation of the structural components of the impoundments under applicable seismic loading conditions merits consideration.

3.7 Performance Evaluations

There have been no previous federal or state assessments of the Coffeen Power Generating Station's Recycle Pond or Gypsum Reclaim Pond. Based on observations by Ameren Energy in their annual assessments, weekly assessments, and other documents and accounts, there have been no major incidents or releases involving the Recycle Pond or the Gypsum Reclaim Pond. Currently, Ameren Energy's local plant personnel perform weekly assessments of the impoundments and their associated structures. Ameren Energy also performs annual assessments of the Coffeen impoundments, similar to this assessment, via their Impoundment Safety and Environmental personnel. In addition, Ameren Energy retained Hanson Professional Services, Inc. to make a site assessment and provide recommendations during October 2008.

3.8 Hazard Classification

The Gypsum Reclaim Pond is classified as a Small-size Class III (Low Hazard Potential) dam by the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) and has a dam identification number of IL50578. The

Recycle Pond has not been assigned a hazard classification. However, due to the potential environmental and economic impacts that a failure at either of these impoundments would present, it is recommended that a hazard classification of "Significant" be assigned to both impoundments. A "High Hazard" rating was not assigned to the impoundments, because it is not expected that a loss of life situation would be likely in the event of a failure. A loss of life situation is not expected because the Recycle Pond sits immediately adjacent to Coffeen Lake without any homes, recreational facilities, businesses, major highways, or other structures immediately downstream of the impoundment. The Gypsum Reclaim Pond does not have any homes, recreational facilities, businesses, major highways, or other structures immediately downstream of the impoundment.

3.9 Site Access

We were required to seek permission from Ameren Energy to gain access to the plant site. After arriving at the site and meeting with representatives of Ameren Energy, we were escorted by facility personnel to assess the impoundments. The impoundments can be accessed by standard car during normal weather conditions via gravel-surfaced roadways on the Coffeen Power Generating Station property.

The impoundment embankments, toes, and outlet works (portions not inundated at the time of inspection) of both the Recycle Pond and Gypsum Reclaim Pond were observed during the August 18, 2010 site assessment. General observations of these features are presented below; more specific observations of the site and facilities are documented in the Site Assessment Checklist provided in Appendix A.

4.1 Recycle Pond

4.1.1 Upstream Slope

Overall, the upstream slope of the south and east embankments of the impoundment was in fair condition and the remainder of the upstream slope of the impoundment was in good condition. Photographs 2, 3, 5, 6, and 7 in Appendix B show the conditions of the upstream slope of the south embankment; Photographs 18 and 20 in Appendix B show the conditions of the upstream slope of the north embankment. Specific observations include:

- The upstream slope was laid back at approximately 1.5H:1V, based on visual observations. This varies from the construction documents provided by Ameren, probably due to the build-up of bottom ash on the embankment. However, it is possible that cleanout operations at the Recycle Pond could have cut into the embankment and steepened it over time.
- Minor erosion rills, less than 6 inches deep, were noted on some of the upstream slopes.
- Grasses and woody bushes were observed on the upstream slope for the majority of the south and east embankments of the impoundment.
- Mowing/Vegetation control had not been completed on the majority of the upstream slope.

4.1.2 Crest

Overall, the crest of the impoundment was in satisfactory condition. Photographs 1, 14, and 18 show the condition of the crest. Specific observations include:

- The impoundment crest is a gravel road.
- Sparse grasses were observed on the crest.
- No major depressions or rutting was noted on the impoundment crest.

4.1.3 Downstream Slope

Overall, the downstream slope was in fair to poor condition. Photographs 1, 3, 5, 8, 10 through 13, 15 through 19, and 21 through 23 in Appendix B show the conditions of the downstream slope. Specific observations include:

- Erosion rills, 6 to 12 inches deep, were noted on some of the downstream slopes (see Photographs 3 and 5).
- Grasses, woody bushes, and tree stumps were observed on the downstream slope and at the toe of the embankment (see Photographs 10, 19, 21, 22, and 23).
- Shallow sloughing was observed on the downstream slope of the south embankment (see Photographs 8 and 11).

4.1.4 Downstream Toe Areas

The toe areas of the embankment were in fair condition. See Photographs 4, 9, 12, 15, 16, 17, and 23 for the condition of these areas. Key features and observations of these areas include:

- Ponded water was observed at the toe of the south embankment and portions of the north embankment (see Photographs 4 and 9).
- The toe area had sparse grasses, some bushes, and multiple trees.
- A sheet pile wall supports the toe at the northeast corner of the pond (see Photographs 13, 15, and 16).

4.1.5 Outlet Works

The outlet works of the Recycle Pond consist of a pump station located at the northwestern corner of the impoundment. The pump station is accessible via a metal catwalk. Water from the pump station is recycled to the plant. The pump station configuration also includes a gravity fed 24-inch CMP for emergency overflows. The CMP discharges into a drainage canal north of the pond and eventually into Lake Coffeen.

4.1.6 Impoundment Inlet

Inflow into the Recycle Pond is via metal piping on the west side of the impoundment, as well as storm water runoff that flows naturally into the pond. The inlet pipe can be seen in Photograph 31 of Appendix B. The inlet pipe appears to be in satisfactory condition.

4.2 Gypsum Reclaim Pond

4.2.1 Upstream Slope

Overall, the upstream slope of the impoundment was in satisfactory condition. Photograph 33 in Appendix B shows the typical condition of the upstream slope. Specific observations include:

- The upstream slope was laid back at approximately 3H:1V.
- The upstream slope was lined with HDPE.

4.2.2 Crest

Overall, the crest of the impoundment was in satisfactory condition. Photograph 38 shows the typical condition of the crest. Specific observations include:

- The impoundment crest is a gravel road.
- Very sparse grasses were observed on the upstream side of the crest.
- No major depressions or rutting was noted on the impoundment crest.

4.2.3 Downstream Slope

Overall, the downstream slope was in satisfactory condition. Photograph 36 shows the typical condition of the downstream slope. Specific observations include:

- Sparse grass is becoming established on the downstream slope.
- Small rills, less than 6 inches deep, have formed on the upper portion of the downstream slope.

4.2.4 Toe Areas

The toe areas of the embankment were in satisfactory condition. See Photographs 36 and 45 for the condition of these areas. Key features and observations of these areas include:

- Toe areas directly adjacent to the embankment were recently disturbed by construction. Sparse grass is becoming established.
- Beyond disturbed areas, vegetation consists of grass with trees about 50 feet beyond the east embankment toe.

4.2.5 Outlet Works

The outlet works of the Gypsum Reclaim Pond consists of a pumping station near the southeast corner of the pond, which recycles water back to the plant (see Photographs 46 and 47). Three emergency overflow weir boxes are located along the north portion of the east embankment (see Photographs 42 through 45).

- Overall, the outlet works system appears to be functioning as intended at this time.

4.2.6 Impoundment Inlet

Inflow into the Gypsum Reclaim Pond is via a temporary pipeline from the scrubber (see Photograph 37). The primary Gypsum Stack Pond is under construction. Once the Gypsum Stack Pond is complete, the overflow will discharge through the connecting channel (see Photograph 39) to the Gypsum Reclaim Pond.

5.1 Analysis and Conclusions

Our analysis is summarized in three general considerations that are presented as follows:

Safety of the Impoundments, Including Maintenance and Methods of Operation

We understand that the impoundments have a history of safe performance. However, the future performance of these impoundments will depend on a variety of factors that may change over time, including surface water hydrology, changes in groundwater levels, changes in embankment integrity, etc. In light of this situation, we have noted several items as follows that present some concern in this regard:

- Large mature trees existed on the toe and slopes of the Recycle Pond and stumps remain in some areas where trees were recently cut down. These stumps can decompose over time and eventually create preferential paths for uncontrolled seepage.
- An Emergency Action Plan (EAP) is not currently in place at the site to mitigate damage in the event of an emergency related to failure of the impoundment(s).
- Analyses of the slope stability for the embankments are not currently available for our review. However, Kleinfelder understands that these analyses are in the process of being developed for the Recycle Pond, and we assume that theses analyses were previously developed for the Gypsum Reclaim Pond.
- Documentation, including calculations, of the Recycle Pond's capacity under potential hydrologic and hydraulic loading is not currently available for review. The capacity of the pump station and CMP outlet on the Recycle Pond should be evaluated to confirm that this system can safely pass the appropriate design flood. Hydrologic and hydraulic simulation results for the Gypsum Reclaim Pond were provided in the pond's O&M Manual. However, full calculations, assumptions and methodology should be provided to adequately assess the impoundment's ability to pass the appropriate design flood.
- We understand that an Operation and Maintenance (O&M) Manual is not currently in place for the Recycle Pond. Developing an O&M manual, which includes a section that discusses the safety inspection and monitoring program, is recommended to standardize safety inspection and monitoring practice.

Changes in Design or Operation of the Impoundments Following Initial Construction

The Recycle Pond was modified in 1979. Modifications included regrading of upstream and downstream slopes of the impoundment, construction of an internal separation dike, excavation and disposal of boiler slag, construction of several structures inside and outside of the impoundment, and various piping modifications.

The Gypsum Reclaim Pond currently receives discharge intended for the Gypsum Stack Pond while it is under construction. Ameren staff indicated the discharge will be rerouted to the Gypsum Stack Pond when construction is complete, resulting in a change in operations.

Adequacy of Program for Monitoring Performance of the Impoundments

The present monitoring program primarily involves visual inspections by plant personnel and by the Ameren Energy Dam Safety Group. These visual inspections seem to be adequate to address issues such as surface erosion and general condition of the impoundments. However, a more detailed monitoring program is recommended to be established to quantify various important factors associated with embankment stability. Those factors include, but are not limited to, surficial sloughing of the downstream slopes of the Recycle Pond and sources of water observed near the toe of the Recycle Pond.

5.2 Summary Statement

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

FAIR

Signature: _____ Date: _____

Tony Devine, P.E.
Lead Geotechnical Engineer

6.1 Definitions

Priority 1 Recommendation: Priority 1 Recommendations involve the correction of severe deficiencies where action is required to ensure the structural safety and operational integrity of a facility, or that may threaten the safety of the impoundment.

Priority 2 Recommendation: Priority 2 Recommendations are where action is needed or required to prevent or reduce further damage or impaired operation of the facility and/or improve or enhance the O&M of the facility, that do not appear to threaten the safety of the impoundment.

Based on observations during the site assessment, it is recommended that the following actions be taken at the Coffeen Power Generating Station.

6.2 Priority 1 Recommendations

1. **Prepare an Emergency Action Plan (EAP) for the Recycle Pond and Gypsum Reclaim Pond.** An EAP should be prepared for the Recycle Pond and Gypsum Reclaim Pond as well as any other pertinent features related to the impoundments.
2. **Perform a hydrologic and hydraulic study.** A hydrology and hydraulic (H&H) study should be performed for the Recycle Pond to determine if it is capable of impounding the appropriate inflow design flood without overtopping. At a minimum, documentation required for this evaluation will include a current topographic survey of the site and surrounding drainage basin, basin characteristics (surface runoff/infiltration condition), and sufficient hydrologic data to determine the design storm event. The capacity of the CMP outlet should also be determined. A complete set of calculations, assumptions, and methods for the Gypsum Reclaim Pond's hydrologic and hydraulic analysis should also be provided for review.
3. **Establish seepage and ground water monitoring program**
   As discussed in Section, 3.5, ponded water was observed at various locations along the downstream embankment of the Recycle Pond. The presence of water at the downstream toe of the embankment raises questions regarding the integrity and the stability of the embankment. Therefore, a detailed monitoring program should be established to quantify various important factors, including the source of the water (seepage or surface runoff) and, if seepage is the source of the ponded water, seepage quantities through the embankment, the amount of sediments carried by the seepage water, and the fluctuation of ground water levels.
4. **Perform embankment and structure stability analyses.** The slopes of the Recycle Pond were steep, appearing to be 1.5H:1V in some cases, and their stability is unknown. Due to the lack of documented engineering design analysis, new stability analyses of both impoundments should be performed, or recently

performed stability analyses should be provided for review. The analyses should incorporate seepage monitoring data and include evaluation of the embankments and the structures under seismic loading scenarios. According to Ameren, this task is currently being completed by another consultant retained by Ameren Energy. The results of this evaluation and the stability evaluation for the Gypsum Reclaim Pond should be provided for review by Kleinfelder.

5. **Perform video assessments of CMP outlet on the Recycle Pond.** A video inspection should be performed on this outlet to assess the condition of the conduit and its ability to pass the appropriate design event.
6. **Control vegetation on the upstream and downstream slopes.** Refer to Federal Emergency Management Agency's (FEMA) Manual 534, "Impact of Plants on Earthen Impoundments", for guidance on vegetation removal. This manual is available on the FEMA website.
7. **Repair sloughs on South and East embankments of Recycle Pond.** Minor sloughing on the south and east embankments should be repaired with engineered fill and sod cover re-established.

6.3 Priority 2 Recommendations

1. **Repair erosion of embankment.** Minor surface erosion was noted at both the Recycle Pond and Gypsum Reclaim Pond. Areas where erosion has occurred should be filled in and re-dressed with appropriate fill in order to prevent erosion from cutting further into the embankments.
2. **Maintain a log of maintenance and other activities at the impoundments and supporting facilities.** We believe that this log will provide continuity during periods of staff change.
3. **Develop an Operation and Maintenance (O&M) manual for the Recycle Pond.** The O&M manual should include at least the following three key elements:
   - Procedures needed for operation and maintenance of the impoundments during typical operating conditions
   - Procedures for monitoring performance of the impoundments, including visible changes (i.e. surface erosion, settlement and sloughing), internal embankment changes (i.e. erosion due to uncontrolled seepage), and fluctuations in groundwater level
   - Emergency Action Plan (also part of Priority 1 recommendations)

SECTION 7 – GLOSSARY OF TERMS

For the EPA Ash Pond Assessment program, the following glossary of terms shall be used for classification unless otherwise noted.

Hazard Potential Rating

"Hazard Potential" means the possible adverse incremental consequences that result from the release of water or stored contents due to the failure of the impoundment or pond or the misoperation of the impoundment, pond, or appurtenances. The Hazard Potential Classification of an impoundment or pond shall not reflect in any way on the current condition of the impoundment or pond and its appurtenant works, including the impoundment's or pond's safety, structural integrity, or flood routing capacity. These classifications are as described below:

1. **Low Hazard Potential**

   "Low Hazard" means a impoundment's or pond's failure will result in no probable loss of human life and low economic loss or environmental loss, or both. Economic losses are principally limited to the owner's property.

2. **Significant Hazard Potential**

   "Significant Hazard" means a impoundment's or pond's failure will result in no probable loss of human life but can cause major economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant Hazard Potential classification impoundments or ponds are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

3. **High Hazard Potential**

   "High Hazard" means an impoundment's or pond's failure will result in probable loss of human life.

Size Classification

In accordance with the Illinois Department of Natural Resources (IDNR) Administrative Code for Impoundment Safety, "Part 3702 - Construction and Maintenance of Impoundments" dated January 13, 1987, an impoundment system is classified by size based on its height and potential storage capacity. Size classification is determined by which category (storage or height) is greatest (produces the larger size classification).

Category	Storage (acre-feet)	Height (feet)
Small	<1,000	<40
Intermediate	≥ 1,000 to <50,000	≥ 40 to <100
Large	≥ 50,000	≥ 100

Overall Classification of Impoundment

In a system similar to the New Jersey Department of Environmental Protection Impoundment Safety Guidelines for the Inspection of Existing Impoundments (January 2008), when the following terms are capitalized, they denote and shall be used to describe the overall classification of the impoundment as follows:

SATISFACTORY - No existing or potential impoundment safety deficiencies are recognized. Acceptable performance is expected (the term expected is to be defined as likely) under all applicable loading conditions (static, hydrologic, and seismic) in accordance with the applicable criteria. Minor maintenance items may be required.

FAIR – Acceptable performance is expected (the term expected is to be defined as likely) under all required loading conditions (static, hydrologic, and 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, and seismic) in accordance with the applicable impoundment safety regulatory criteria. Remedial action is necessary. POOR also applies when further critical studies or investigations are needed to identify any potential impoundment safety deficiencies.

UNSATISFACTORY – The facility is considered unsafe. An impoundment safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Pond restrictions may be necessary.

Condition Rating Criteria

In a system similar to the U.S. Department of Interior, Safety Evaluation of Existing Impoundments (SEED 1995), the terms ”Satisfactory,” “Fair,” ”Poor,” and “Unsatisfactory” are used in a general sense when describing the structural condition and the operational adequacy of the equipment for a impoundment or pond and its appurtenant works during the visual assessment. In addition, the term, “Unknown,” may be utilized, as applicable.

Satisfactory – Expected to fulfill intended function.

Fair – Expected to fulfill intended function, but maintenance or other actions are recommended.

Poor – May not fulfill intended function; maintenance, repairs, or other actions are necessary.

Unsatisfactory – Is not expected to fulfill intended function; repair, replacement, or modification is necessary.

Unknown – Not visible, not accessible, not inspected, or unable to determine the condition rating based on the observation taken.

Recommendation Listing

Recommendations shall be written concisely and identify the specific actions to be taken. The first word in the recommendation should be an action word (i.e. "Prepare", "Perform", or "Submit"). The recommendations shall be prioritized and numbered to provide easy reference. Impoundment Safety Recommendations shall be grouped, listed or categorized similar to the U.S. Department of Interior, Reclamation Manual - Directives and Standards - Review/Examination Program for High- and Significant-Hazard Impoundments (July, 1998 FAC 01-07) as follows:

Priority 1 Recommendations: Priority 1 Recommendations involve the correction of severe deficiencies where action is required to ensure the structural safety and operational integrity of a facility or that may threaten the safety of the impoundment.

Priority 2 Recommendations: Priority 2 Recommendations are where action is needed or required to prevent or reduce further damage or impaired operation of the facility and/or improve or enhance the O&M of the facility, which do not appear to threaten the safety of the impoundment.

SECTION 8 – LIMITATIONS

The scope of this work is for a preliminary screening for the EPA and plant owner/operator of the visible performance and apparent stability of the impoundment embankments based only on the observable surface features and information provided by the owner/operator. Other features below the ground surface may exist or may be obscured by vegetation, water, debris, or other features that could not be identified and reported. This site assessment and report were performed without the benefit of any soil drilling, sampling, or testing of the subsurface materials, calculations of capacities, quantities, or stability, or any other engineering analyses. The purpose of this assessment is to provide information to the EPA and the plant owner/operator about recommended actions and/or studies that need to be performed to document the stability and safety of the impoundments.

This work was performed by qualified personnel in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession, practicing in the same locality, under similar conditions, and at the date the services are provided. Kleinfelder's conclusions, opinions, and recommendations are based on a limited number of observations. It is possible that conditions could vary between or beyond the observations made. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided. Kleinfelder makes no warranty or guaranty of future embankment stability or safety.

This report may be used only by the client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance but in no event later than one (1) year from the date of the report.

The information, included on graphic representations in this report, has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, expressed or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. These documents are not intended for use as a land survey product nor are they designed or intended as a construction design document. The use or misuse of the information contained on these graphic representations is at the sole risk of the party using or misusing the information.

Recommendations contained in this report are based on preliminary field observations without the benefit of subsurface explorations, laboratory tests, or detailed knowledge of the existing construction. If the scope of the proposed recommendations changes from that described in this report, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed and the conclusions of this report are modified or approved in writing by Kleinfelder. Kleinfelder cannot be responsible for interpretation by others of this report or the conditions encountered in the field.

- US Department of Agriculture (USDA)/ Natural Resources Conservation Service (NRCS) Web Soil Survey - online

- Illinois Department of Natural Resources (IDNR), Administrative Code for Impoundment Safety, "Part 3702 – Construction and Maintenance of Impoundments", January 13, 1987

- US Department of the Interior, Safety and Evaluation of Existing Impoundments (SEED), 1995

- New Jersey Department of Environmental Protection, Impoundment Safety Guidelines for the Inspection of Existing Impoundments, January 2008

- US Department of Interior, Reclamation Manual – Directives and Standards – Review/Examination Program for High and Significant Hazard Impoundments, July 1998

- Hanson Professional Services, Inc. (HPSI), "2008 Coffeen Dam Inspection," Springfield, IL, 2008.

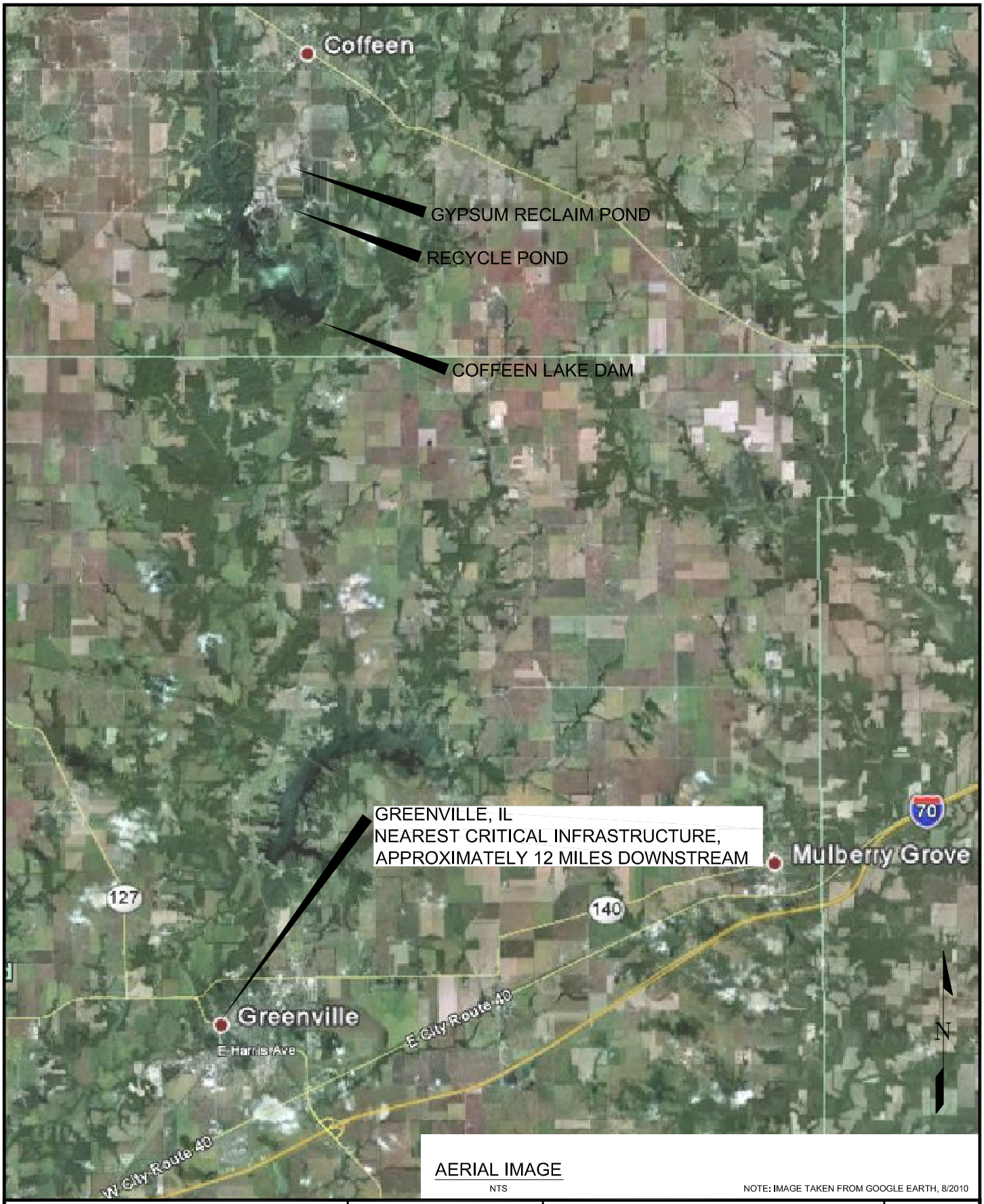
- Stearns Rogers, Inc. (SRI), "Civil Layout and Grading Plan, Sheets S-44, S-45, S-47," Coffeen Power Station, 1978.

- Hansen Professional Services Inc., Operation and Maintenance Manual Coffeen Power Station, February 2008

- Hansen Professional Services Inc., "Design Drawings Sheets 19-22 and 27," 2010

- Ameren, "Coffeen Plant – 2009 Annual ash Pond Inspection Form (internal Inspection)," April, 2009.

- Sargent and Lundy, "Design Drawing B-561," 1971



AERIAL IMAGE

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NOTE: IMAGE TAKEN FROM GOOGLE EARTH, 8/2010

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COFFEEN CRITICAL INFRASTRUCTURE MAP

COFFEEN POWER GENERATING STATION

COFFEEN, IL

FIGURE

1

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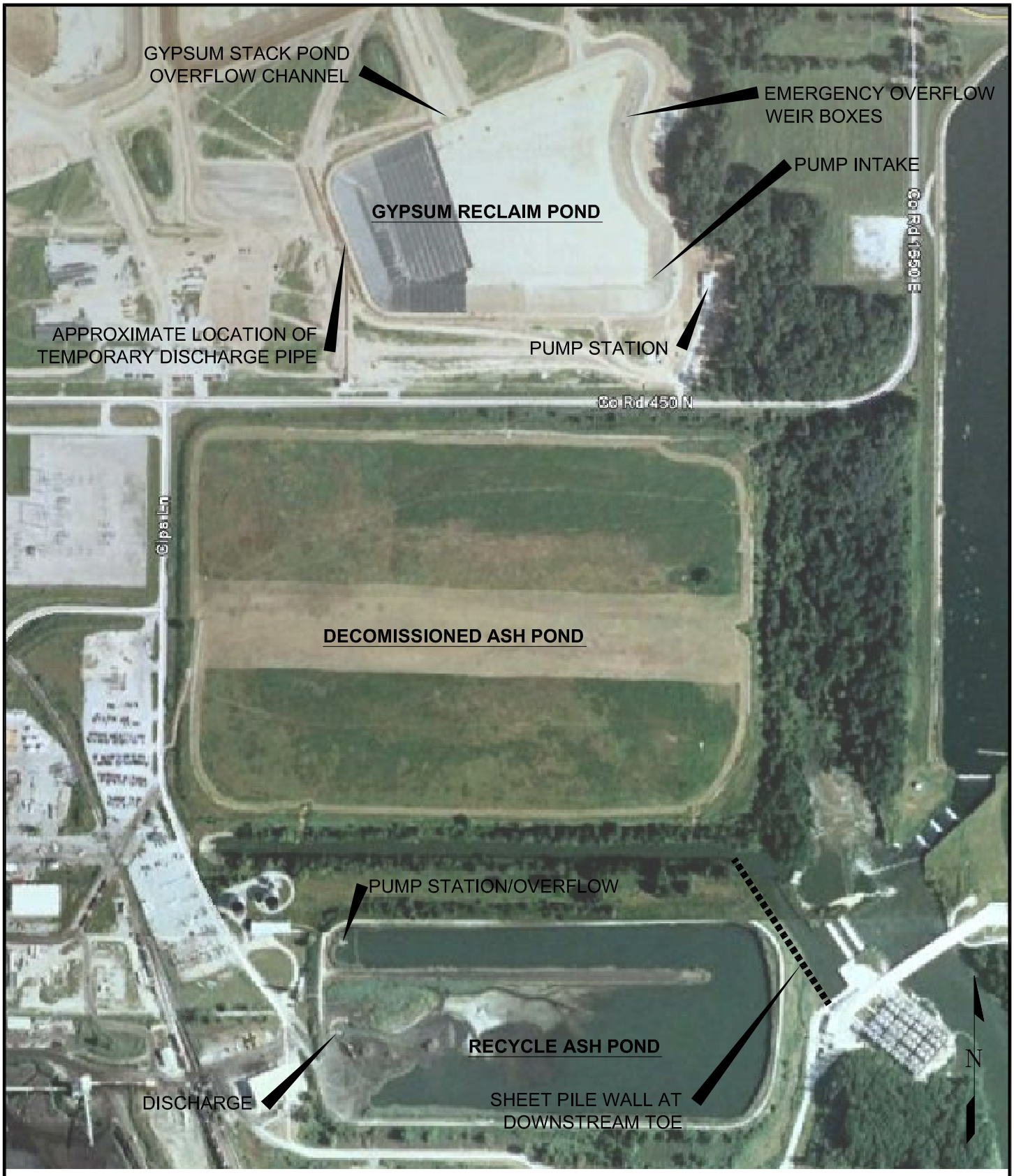

AERIAL IMAGE

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NOTE: IMAGE TAKEN FROM GOOGLE EARTH, 8/2010

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COFFEEN GENERATING STATION AERIAL LOCATION MAP

COFFEEN POWER GENERATING STATION

COFFEEN, IL

FIGURE

2

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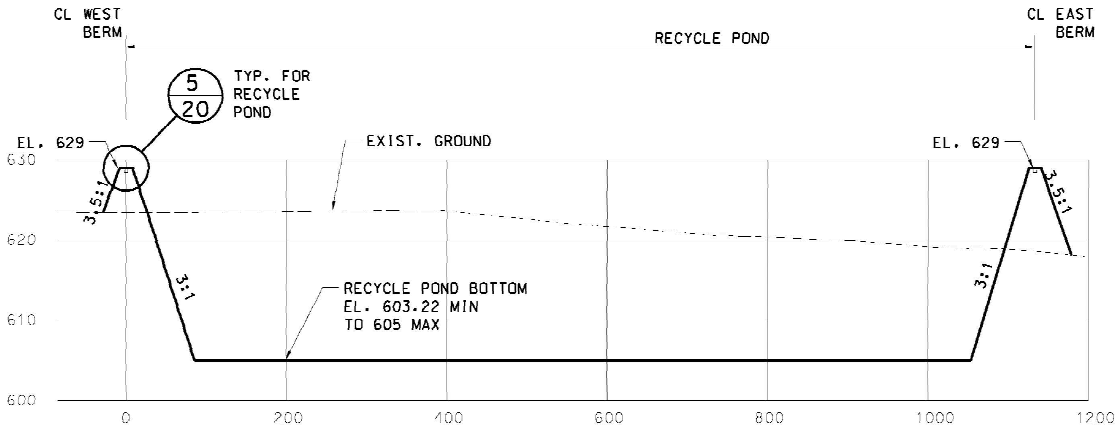

TYPICAL EMBANKMENT SECTION - GYPSUM RECLAIM POND

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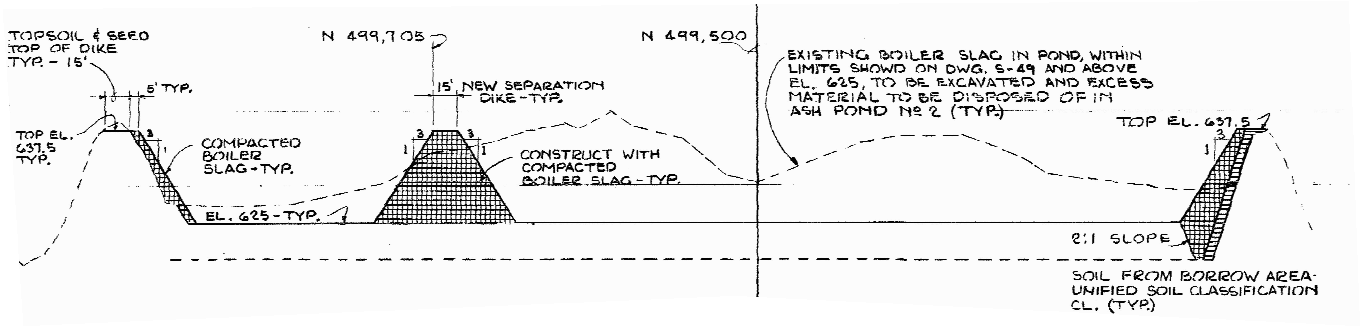

TYPICAL EMBANKMENT SECTION - RECYCLE POND

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KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com	PROJECT NO. 112618 DATE: 08/31/10 DRAWN BY: ACH CHECKED BY: TAK FILE NAME:	**TYPICAL CROSS SECTION** COFFEEN POWER GENERATING STATION COFFEEN, IL	FIGURE **3**

10 Sep 2010, 1:08pm, AHastings

S:\112618 EPA Ash Pond Inspections\Task 3 - Coffeen\

ATTACHED IMAGES: Images: coffeen 1 with points.jpg Images: coffeen 1 without points.jpg
ATTACHED XREFS:
Den-L:\2008\95399 CAD FILE: S:\112618 EPA Ash Pond Inspections\Task 3 - Coffeen\ LAYOUT: General (2)

WAYPOINT	DATE/TIME (DAY/MO/YEAR)	COORDINATES (LAT, LONG)	DESCRIPTION
1	18-AUG-10 11:12:54AM	N39 03.445 W89 23.756	Vegetation on U/S slope (Vantage point for photo 2)
2	18-AUG-10 11:14:46AM	N39 03.447 W89 23.753	Gully on U/S slope (Vantage point for photo 3)
3	18-AUG-10 11:15:45AM	N39 03.444 W89 23.753	Ponding at D/S toe (Vantage point for photo 4)
4	18-AUG-10 11:22:06AM	N39 03.444 W89 23.689	Animal burrow at D/S toe
5	18-AUG-10 11:26:28AM	N39 03.446 W89 23.651	Tree approx. 30" diameter on U/S slope (Vantage point for photo 7)
6	18-AUG-10 11:29:56AM	N39 03.441 W89 23.652	Shallow sloughing on D/S slope
7	18-AUG-10 11:31:16AM	N39 03.442 W89 23.655	South limit of sloughing
8	18-AUG-10 11:33:42AM	N39 03.441 W89 23.649	North limit of sloughing
9	18-AUG-10 11:35:16AM	N39 03.441 W89 23.631	Animal burrow at D/S toe
10	18-AUG-10 11:38:43AM	N39 03.445 W89 23.615	Abandoned pump crossing (Vantage point for photo 9)
11	18-AUG-10 11:39:59AM	N39 03.441 W89 23.604	Large tree stump, mid-slope (Vantage point for photo 10)
12	18-AUG-10 11:47:36AM	N39 03.442 W89 23.520	OHE crossing
13	18-AUG-10 11:51:47AM	N39 03.456 W89 23.492	South limit of scarp on D/S slope
14	18-AUG-10 11:53:41AM	N39 03.469 W89 23.487	North limit of scarp on D/S slope
15	18-AUG-10 11:56:03AM	N39 03.476 W89 23.485	Scarp on D/S slope, approx 36' long
16	18-AUG-10 11:58:33AM	N39 03.509 W89 23.485	Rut on crest (Vantage point for photo 14)
17	18-AUG-10 12:01:48PM	N39 03.540 W89 23.493	Tree on U/S slope, approx 6" diameter
18	18-AUG-10 12:21:27PM	N39 03.564 W89 23.608	Limit of D/S slope failure (Vantage point for photo 19)
19	18-AUG-10 12:23:19PM	N39 03.564 W89 23.624	Limit of D/S slope failure
20	18-AUG-10 12:24:15PM	N39 03.565 W89 23.643	Tree stumps (Vantage point for photo 21)
21	18-AUG-10 12:25:38PM	N39 03.566 W89 23.646	Culvert at D/S toe and scarp on D/S slope
22	18-AUG-10 12:31:11PM	N39 03.567 W89 23.755	Debris on D/S slope (Vantage point for photo 22)
23	18-AUG-10 12:33:22PM	N39 03.563 W89 23.807	Trees on D/S slope (Vantage point for photo 23)
24	18-AUG-10 12:34:19PM	N39 03.550 W89 23.824	Buried 24" outlet pipe
25	18-AUG-10 12:42:21PM	N39 03.515 W89 23.819	Waste slag outlet
26	18-AUG-10 12:43:44PM	N39 03.507 W89 23.825	Abandoned pipe crossing
27	18-AUG-10 12:47:28PM	N39 03.494 W89 23.804	Recycle pond discharge outlet, three pipes (Vantage point for photo 31)
28	18-AUG-10 12:49:10PM	N39 03.497 W89 23.820	Pipes crossing embankment

NOTE: IMAGE TAKEN FROM GOOGLE EARTH, 8/2010

FIGURE 4 4 of 5 sheets

SCALE: NTS
DATE: 08/30/10
CHECKED BY: T. KLUTHE
DRAWN BY: A. HASTINGS
DESIGNED BY: N/A

PHOTO PLAN OF INSPECTION POINTS - RECYCLE ASH POND

COFFEEN POWER GENERATING STATION

COFFEEN, IL

KLEINFELDER
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611 Corporate Circle, Suite C
Golden, Colorado 80401
PH. 303-237-6601 FAX. 303-237-6602
www.kleinfelder.com

PROJ. NO. 112618
ACAD FILE: Coffeen Figure 4.dwg

NO.	REVISION	BY	DATE
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PLOTTED: 10 Sep 2010, 1:26pm, AHastings

ATTACHED IMAGES: Images: coffeen 2 with points.jpg Images: coffeen 2 without points.jpg
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Den-L:\2008\95399 CAD FILE: S:\112618 EPA Ash Pond Inspections\Task 3 - Coffeen\ LAYOUT: General (2)

WAYPOINT	DATE/TIME (DAY/MO/YEAR)	COORDINATES (LAT, LONG)	DESCRIPTION
29	18-AUG-10 2:44:26PM	N39 03.906 W89 23.720	6" HDPE pipe crossing embankment, groundwater discharge from decommissioned pond
30	18-AUG-10 2:47:05PM	N39 03.944 W89 23.802	Scrubber discharge pipe (Vantage point for photo 37)
31	18-AUG-10 2:48:46PM	N39 03.986 W89 23.812	Landfill sump pump pipe crossing
32	18-AUG-10 2:51:26PM	N39 04.019 W89 23.724	Gypsum stack pond overflow channel (Vantage point for photos 39-40)
33	18-AUG-10 3:01:03PM	N39 04.019 W89 23.592	Weir box overflow (Vantage point for photo 43)
34	18-AUG-10 3:01:50PM	N39 04.015 W89 23.580	Overflow stilling basins (Vantage point for photos 44-45)
35	18-AUG-10 3:06:36PM	N39 03.929 W89 23.563	Inlet of recirculation system (Vantage point for photos 46-47)

FIGURE 5
5 of 5 sheets

SCALE: NTS
DATE: 08/30/10
CHECKED BY: T. KLUTHE
DRAWN BY: A. HASTINGS
DESIGNED BY: N/A

PHOTO PLAN OF INSPECTION POINTS - GYPSUM RECLAIM POND

COFFEEN POWER GENERATING STATION

COFFEEN, IL

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ACAD FILE Coffeen Figure 5.dwg

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Appendix A

Site Assessment Checklists

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: COFFEEN POWER STATION Date: 8/18/10

Unit Name: RECYCLE POND Operator's Name: AMEREN

Unit I.D.: IL 0000108 Hazard Potential Classification: High (Significant) Low

Inspector's Name: TONY DEVINE + TRAVIS KLUTHE

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?	SEE BELOW		18. Sloughing or bulging on slopes?	X	
2. Pool elevation (operator records)?	"		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	"		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	"		Is water entering inlet, but not exiting outlet?	N/A	
5. Lowest dam crest elevation (operator records)?	"		Is water exiting outlet, but not entering inlet?	N/A	
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	N/A	
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?	N/A		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?	N/A		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. WEEKLY INTERNAL REVIEW SINCE 2008. ANNUALLY BY AMERENS DAM SAFETY GROUP. PERIODIC CONSULTANT INSPECTIONS BY HANSEN ENGINEERS FROM SPRINGFIELD, IL.

6. WITHIN NEXT MONTH OR TWO, A GEOTECHNICAL INVESTIGATION WILL BE PERFORMED AND PIEZOMETERS WILL BE INSTALLED @ THE CROWN + TOE. ALSO PLANNED IS THE INSTALLATION OF 3 NEW MONITORING WELLS.

9. NUMEROUS TREES (UP TO 36" ϕ) ON LANDSIDE SLOPE; SOME CUTOFF @ GROUND SURFACE. SOME AREAS OF SMALL BRUSH ON WATERSIDE SLOPE. MORE DETAIL

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: COFFEEN POWER STATION Date: 8/18/10

Unit Name: RECYCLE POND Operator's Name: AMEREN

Unit I.D.: IL 0000108 Hazard Potential Classification: High (Significant) Low

Inspector's Name: TONY DEVILLE + TRAVIS KLUTHE

Inspection Issue #	Comments
9.(CONT'D)	WILL BE PROVIDED IN THE SUMMARY OF SITE INSPECTIONS OBSERVATIONS IN THE DRAFT REPORT.
14/15.	NO SPILLWAY; CLOSED SYSTEM W/ LAKE COFFEEN.
17/18.	SURFACE SLOUGHING ON LANDSIDE SOUTH SLOPE (ISOLATED). CONSIDERABLE SURFACE SLOUGHING ON EAST LANDSIDE SLOPE. MORE DETAIL TO BE PROVIDED IN DRAFT REPORT.
23.	WATER AT OR NEAR DOWNSTREAM TOE THROUGHOUT MOST OF SOUTH SLOPE + ISOLATED AREAS OF NORTH SLOPE.

NOTE: POOL, DEBRIS + LOW CREST ELEVATIONS PENDING INFO FROM PLANT.

NOTE: INSIDE SLOPE: UPSTREAM OR WATERSIDE SLOPE.
OUTSIDE " : DOWNSTREAM OR LANDSIDE SLOPE.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # IL 0000108 INSPECTOR TONY DEVINE
TRAVIS KLUTHE
Date 8/18/10

Impoundment Name COFFEEN POWER STATION
Impoundment Company AMEREN
EPA Region 5
State Agency (Field Office) Addresss IL. EPA - 1021 N. GRAND AVENUE EAST
SPRINGFIELD, ILLINOIS 62794
Name of Impoundment RECYCLE POND
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update X

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

IMPOUNDMENT FUNCTION: SETTLING POND + ASH STORAGE

Nearest Downstream Town : Name CLOSED SYSTEM W/LAKE. IF LAKE OVERFLOWS
Distance from the impoundment ± 15 M. GREENVILLE, IL. IS NEXT TOWN.
Impoundment
Location: Longitude -89 Degrees 23 Minutes 39.92 Seconds } APPROX. CENTER OF POND
Latitude 39 Degrees 3 Minutes 29.94 Seconds }
State ILLINOIS County MONTGOMERY

Does a state agency regulate this impoundment? YES X NO _____

If So Which State Agency? ILLINOIS EPA

HAZARD POTENTIAL (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.

_____ **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.

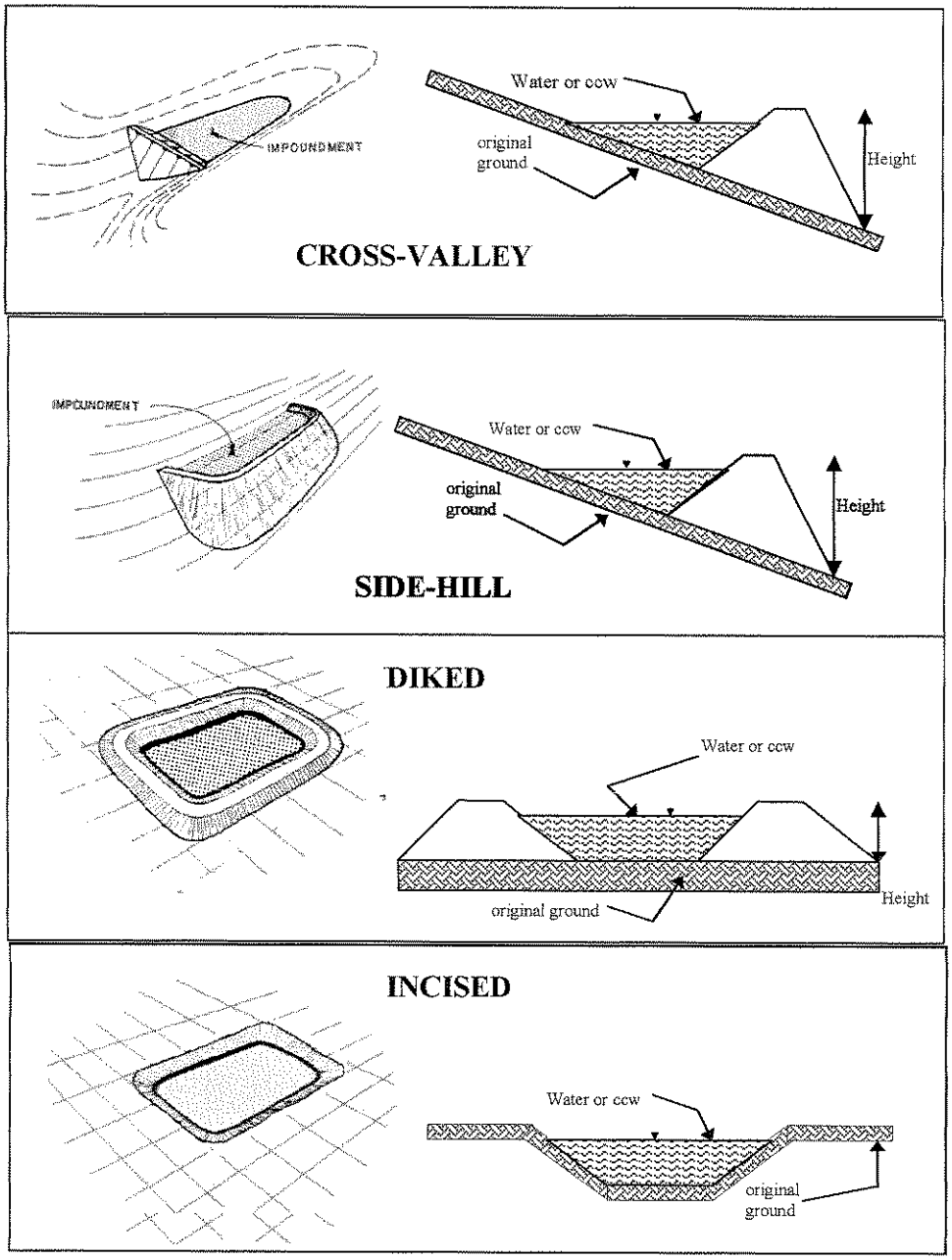
__K__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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:

No loss of life risk. Breach would flow into lake; environmental impacts.

CONFIGURATION:



_____ Cross-Valley
_____ Side-Hill
__K__ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

— SHEETPILE WALL @ EAST SLOPE TOE. DESIGNED BY SARGENT + LUNDY, CHICAGO, IL. IN 2000. RECORDS NOT AVAILABLE.

Embankment Height 15-40 feet
Pool Area 23 acres
Current Freeboard 5 ± 1 FOOT BY DECANT PIPE feet

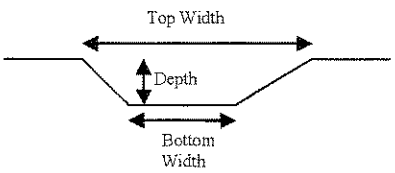
Embankment Material NATURAL SOILS
Liner No
Liner Permeability N/A

TYPE OF OUTLET (Mark all that apply)

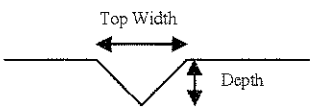
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

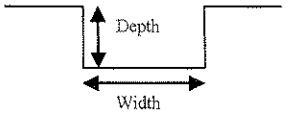
TRAPEZOIDAL



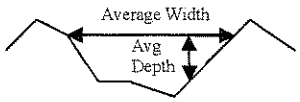
TRIANGULAR



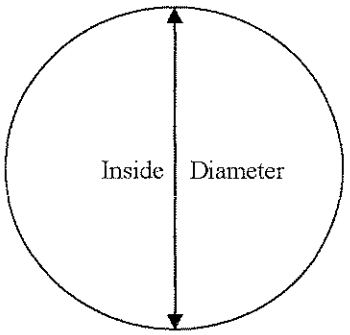
RECTANGULAR



IRREGULAR



X **Outlet** – OVERFLOW PIPE
24" inside diameter ELEV. 631.0



Material
X corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
X other (specify) CARBON STEEL ± 30"

_____

Is water flowing through the outlet? YES _____ NO X

_____ **No Outlet** YARD DRAINS + PROCESS FLOW PUMPED TO POND. OLD OUTLET AT NE CORNER IS SEALED OFF.

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By ORIGINALLY: SARGENT + LUNDY IN 1971; MODIFICATIONS: STEARNS + ROGER INC. IN 1979.

Has there ever been a failure at this site? YES _____ NO X

If So When? _____

If So Please Describe : _____

Shallow sloughs on North, East + South landside slopes.

Has there ever been significant seepages at this site? YES _____ NO X

If So When? _____

IF So Please Describe: _____

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 : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: COFFEEN POWER STATION Date: 8/18/10

Unit Name: GYPSUM RECLAIM POND Operator's Name: AMEREN

Unit I.D.: — Hazard Potential Classification: High (Significant) Low

Inspector's Name: TONY DEVINE + TRAVIS KLUTHE

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?	SEE BELOW		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	"		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	"		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	"		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	"		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	X		Is water exiting outlet flowing clear?	N/A	
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 sinkholes 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. INTERNAL: MONTHLY. ANNUALLY BY AMEREN'S DAM SAFETY GROUP. BY CONSULTANT FOR STATE EVERY 5 YEARS.
2. POOL, DECANT + LOWEST CREST ELEV'S PENDING FROM PLANT.
6. NEW'S MONITORING WELLS AT TOE.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # N/A - NO DISCHARGE INSPECTOR TONY DEVINE + TRAVIS KLUTHE
Date 8/18/10

Impoundment Name COFFEEN POWER STATION
Impoundment Company AMEREN
EPA Region 5
State Agency (Field Office) Addresss ILLINOIS EPA - 1021 N. GRAND AVE. EAST SPRINGFIELD, ILLINOIS 62794
Name of Impoundment GYPSUM RECLAIM POND
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update X

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

IMPOUNDMENT FUNCTION: SETTLING POND + ASH STORAGE

Nearest Downstream Town : Name BREACHES INTO LAKE. IF LAKE OVERFLOWS TO
Distance from the impoundment ± 15 m. GREENVILLE, IL.
Impoundment
Location: Longitude -89 Degrees 23 Minutes 41.15 Seconds
Latitude 39 Degrees 3 Minutes 58.49 Seconds
State _____ County _____

Does a state agency regulate this impoundment? YES X NO _____

If So Which State Agency? IL DNR DAM ID # IL50578

HAZARD POTENTIAL (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.

_____ **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.

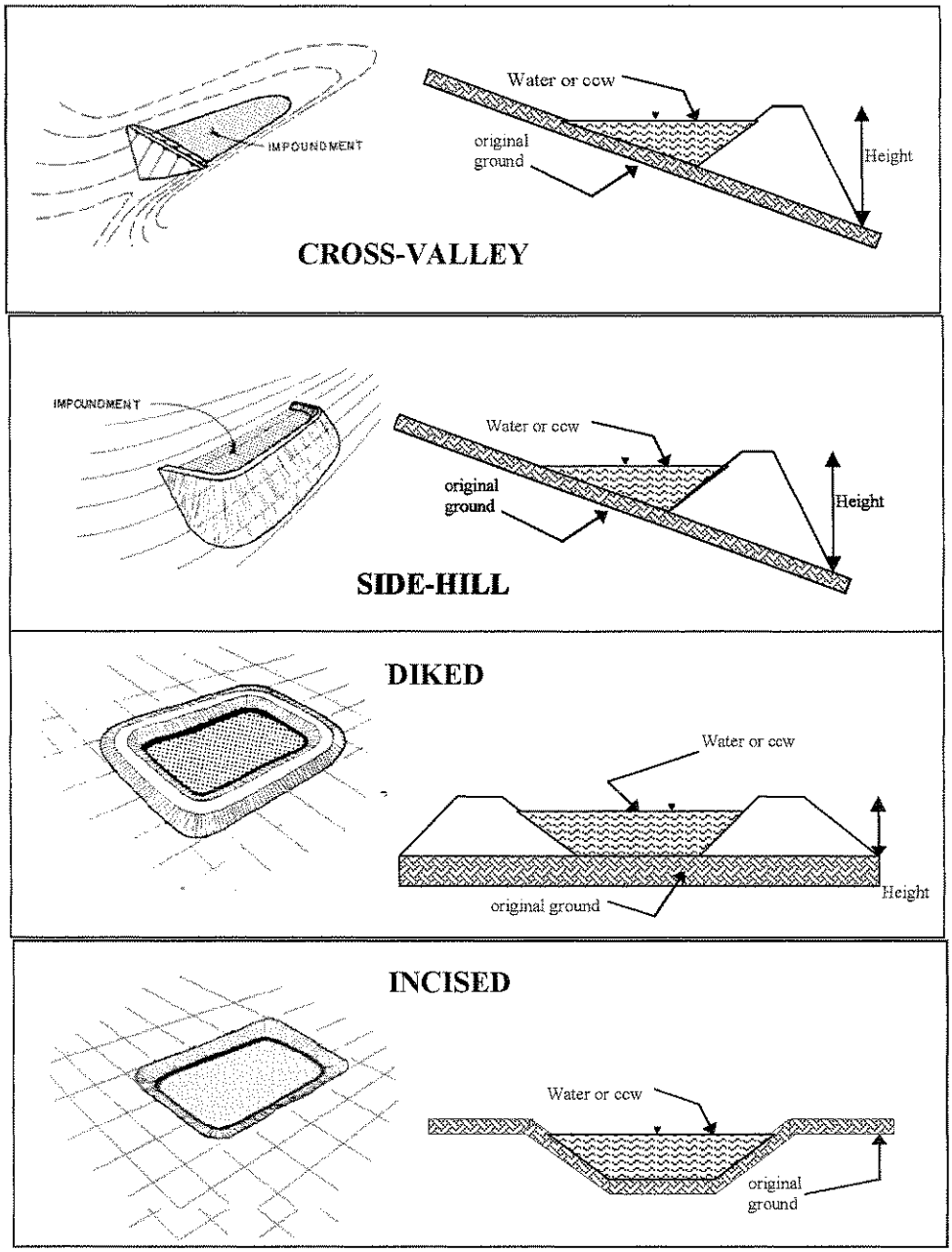
__X__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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:

No Loss of Life Risk. Breach would flow into Gypsum Stack Pond or River. If into River, Environmental Impacts.

CONFIGURATION:

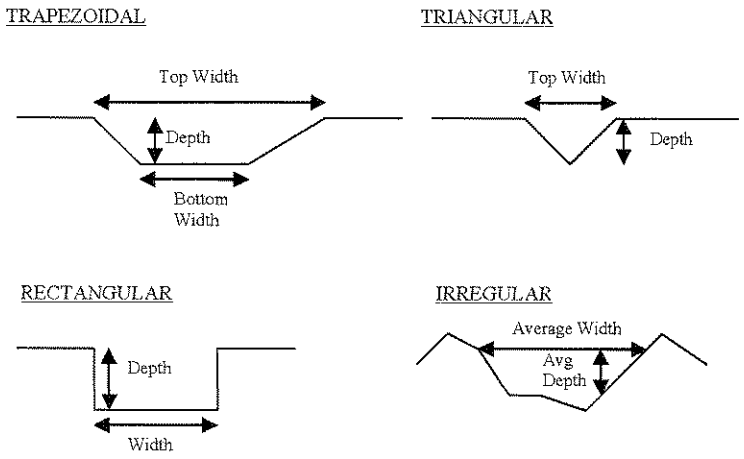


_____ Cross-Valley
_____ Side-Hill
__X__ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height 6-16 feet
Pool Area 17 acres
Current Freeboard 10 feet
Embankment Material IMPORTED Clay (COMPACTED)
Liner HDPE
Liner Permeability _____

TYPE OF OUTLET (Mark all that apply)

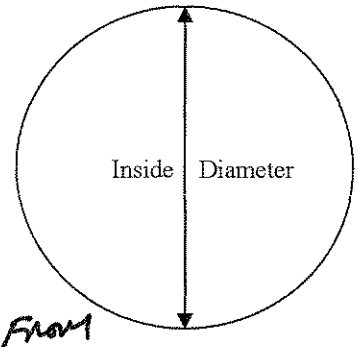
_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular → NONE
_____ Rectangular
_____ Irregular



_____ depth
_____ bottom (or average) width
_____ top width
_____

_____ **Outlet**

_____ inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
__X__ plastic (hdpe, pvc, etc.) PLANS PENDING FROM PLANT
_____ other (specify) _____

_____

Is water flowing through the outlet? YES _____ NO ✓

_____ **No Outlet**

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By HANSON ENGINEERS IN 2008

_____

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? _____

IF So Please Describe: _____

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

Site Assessment Photographs

Photo 1 – Looking East along South embankment

Photo 2 – Vegetation on upstream slope of South embankment

Photo 3 – Gulleys on upstream slope of South embankment

Photo 4 – Ponding at downstream toe of South embankment

Photo 5 - Erosion

Photo 6 – Erosion

Photo 7 – Tree, approximately 3 inch diameter

Photo 8 – Shallow sloughing on downstream slope of south embankment

Photo 9 – Abandoned pump crossing

Photo 10 – Large tree stump mid-slope

Photo 11 – East embankment looking North with minimal scarps

Photo 12 – Debris at downstream toe of East embankment

Photo 13 – Looking North on East embankment

Photo 14 – Rutting on crest

Photo 15 – Downstream of Northeast corner to sheetpile wall

Photo 16 – Downstream of Northeast corner to sheetpile wall

Photo 17 – Looking West along North embankment at the downstream slope

Photo 18 – Looking West along North embankment at the crest

Photo 19 – Slope failure along downstream slope

Photo 20 – Looking West along North embankment at the upstream slope

Photo 21 – Tree stumps

Photo 22 – Debris on downstream slope of North embankment

Photo 23 – Trees on downstream slope

Photo 24 – Outlet structure

Photo 25 – Outlet structure

Photo 26 – Outlet structure

Photo 27 – Outlet structure

Photo 28 – Outlet structure

Photo 29 – Looking South along West embankment

Photo 30 – Looking West at pond, Note inlet in picture

Photo 31 – Ash pond discharge outlet pipes

Photo 32 – Looking West along South embankment

Photo 33 – Looking East from South embankment

Photo 34 – Looking North from South embankment

Photo 35 – Looking West from South embankment

Photo 36 – Looking West along downstream slope of South embankment

Photo 37 – Scrubber discharge

Photo 38 – Looking East along North embankment

Photo 39 – Connecting channel

Photo 40 – Connecting channel

Photo 41 – Pipe between larger and smaller pond

Photo 42 – Outlet structure

Photo 43 – Outlet box inside

Photo 44 – Stilling basins

Photo 45 – Stilling basins

Photo 46 – Inlet of recirculation system

Photo 47 – Inlet of recirculation system

Appendix C

Response Letter to the EPA's Section 104(e) Request for Information

AmerenEnergy Resources Company Response

Coffeen Power Station
134 CIPS Lane
Coffeen, Illinois 62433

1. Coal-combustion by-product surface impoundments at this Station are not classified as dams by State or Federal regulatory agencies so they have not been rated.

2. See table below.

Management Unit	Year Commissioned or Expanded
Recycle Pond	1979
Gypsum Management Facility Recycle Pond	2009

3. See table below.

Management Unit	Materials Contained in Unit*
Recycle Pond	3, 5
Gypsum Management Facility Recycle Pond	4

*Use the following categories to respond to this question: (1) fly ash; (2) bottom ash: (3) boiler slag; (4) flue gas emission control residuals; (5) other.

Other types of materials that are temporarily or permanently contained in the unit(s) include, but are not limited to residual wastes remaining following treatment of wastewater from these systems: primary water treatment; boiler water make-up treatment; sanitary wastewater treatment; laboratory and sampling streams; boiler blowdown; floor drains; coal pile run off; house service water systems; and pyrites.

4. The management units at this facility were designed by a Professional Engineer. The construction of the management units were done under the supervision of a Professional Engineer. And, inspection and monitoring of the safety of the management units is under the supervision of a Professional Engineer.

5. The most recent annual internal professional engineering inspection of the management units occurred in 2009. AmerenEnergy Resources Company has formed a Dam Safety Group consisting of civil engineers who oversee the implementation of the company Dam Safety Program and this Group is supervised by a licensed Professional Engineer. The Dam Safety Program requires routine, annual and special inspection of the ash ponds and employees performing these inspections receive dam safety training. If maintenance issues are identified in these

visual inspections, then corrective actions are taken by either plant employees or contractors to remedy the issue and final acceptance of the work is reviewed and evaluated by Dam Safety Group personnel.

6. No State, or Federal regulatory official has inspected or evaluated the safety (structural integrity) of the management unit(s), and we are not aware of a planned state or federal inspection or evaluation in the future.

7. Not applicable, see response to Question 6.

8. See table below.

Management Unit	**Surface Area (Acres)**	**Total Storage Capacity (Acre-ft)**	**Volume of Stored Material (Acre-ft)**	**Maximum Height of Unit (ft.)**
Recycle Pond*	23	500	250	41.5
Gypsum Management Facility Recycle Pond	17	243	<1	16

* The volume measurement includes area excavated below natural surface level and was determined in 2007.

9. Assuming that brief history means incident(s) which could have occurred in the last ten (10) years, we are not aware of any spills or unpermitted releases of coal-combustion by-products from our surface impoundments to surface water or to the land.

10. The current legal owner and operator at the facility is AmerenEnergy Resources Company.