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**REPORT ON
INITIAL PERIODIC STRUCTURAL STABILITY ASSESSMENT
POND 004
NEW MADRID POWER PLANT
NEW MADRID, MISSOURI**

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Associated Electric Cooperative, Inc.
New Madrid, Missouri

File No. 40616-300
October 2016





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16 October 2016
File No. 40616-300

Associated Electric Cooperative, Inc.
New Madrid Power Plant
P.O. Box 156
New Madrid, MO 63689

Attention: Ms. Jenny Burns
Environmental Analyst

Subject: Initial Periodic Structural Stability Assessment
Pond 004
New Madrid Power Plant
New Madrid, MO

Ms. Burns:

Enclosed please find our report on the Initial Periodic Structural Stability Assessment (Assessment) for the Associated Electric Cooperative, Inc. (AECI) coal combustion residuals (CCR) surface impoundment referred to as Pond 004 located at the New Madrid Power Plant (NMPP) in New Madrid, Missouri.

This work was performed by Haley & Aldrich, Inc. (Haley & Aldrich) on behalf of AECI in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257, specifically §257.73(d).

The scope of our work consisted of the following: 1) obtain and review readily available reports, investigations, plans and data pertaining to the Pond 004 surface impoundment; 2) visit the site to observe Pond 004; 3) evaluate whether the design, construction, operation, and maintenance of Pond 004 are consistent with recognized and generally accepted good engineering practices; and 4) prepare and submit this report presenting the results of our assessment including recommendations.

Associated Electric Cooperative, Inc. – New Madrid Power Plant
Initial Structural Stability Assessment – Pond 004
16 October 2016
Page 2

Thank you for inviting us to complete this assessment and please feel free to contact us if you wish to discuss the contents of the report.

Sincerely yours,
HALEY & ALDRICH, INC.

A handwritten signature in black ink, appearing to read "S. Putrich", written over a horizontal line.

Steven F. Putrich, P.E.
Project Principal

Enclosures

REPORT ON
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Executive Summary

This report summarizes the results of our Initial Periodic Structural Stability Assessment for the Associated Electric Cooperative, Inc. (AECI) owned and operated Pond 004, including our site inspection of the unit. Pond 004 is designated as an existing coal combustion residuals (CCRs) surface impoundment, located at the New Madrid Power Plant in New Madrid, Missouri.

Our assessment was conducted in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Parts 257 and 261 (CCR Rule).

The dike consists of an earthen embankment with a crest length of approximately 3,000 feet around the entire impoundment. In addition, the western embankment consists of the Mississippi River Levee for about 1,050 ft and the dike abuts into the Levee. The dike embankment is approximately 6 to 15 feet in height and according to records, and the embankment is constructed of locally available silty clay.

Pond 004 was constructed for the purpose of storing and managing CCR and plant process water.

Dam Inspection Assessment and Recommendations

Based on conditions observed during our visual inspection of Pond 004, discussions with site personnel, a review of available documents and subsequent site visits, the following deficiencies were noted:

- Minor rutting and erosion in the upstream slope.
- Minor erosion and rutting of the gravel access road on the Northern embankment.
- Sparse vegetation exceeding 6 in. in height and minor brush on upstream slope within riprap.
- Sparse vegetation exceeding 6 in. height and brush on upstream slope.
- Vegetation exceeding 6 in. in height on the downstream slope.

Haley & Aldrich recommends the following actions:

- Cut/mow the embankments and routinely mow the embankment slopes (upstream and downstream) and downstream areas to maintain vegetation at a height of 6 in. or less.
- Repair minor ruts and erosion at the Pond 004 dikes and crest.
- Conduct a video inspection of outlet pipe from the drop inlet structure at a time that is reasonable based on operation of the impoundment.

Structural Stability Assessment

In accordance with 40 CFR §257.73(d), the owner or operator of a CCR surface impoundment must conduct initial and periodic structural stability assessments to determine whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

Haley & Aldrich reviewed the information provided to us and inspected Pond 004 as described above. Based on our review of available information and observations during our inspection, we have concluded the following in accordance with 40 CFR §257.73(d):

1. §257.73(d)(1)(i) – Stable Foundations and Abutments:

Based on our review of available or developed subsurface information, as-built records, survey data, and observations during our inspection, the impoundment was judged to have stable foundations and abutments.

2. §257.73(d)(1)(ii) – Adequate Slope Protection:

Based on observations during our site visits, at the southern portion of the dike, the upstream slope was graded about 2-1/2H:1V to 3H:1V. The top half of the slope was covered with grass and the bottom half was covered with riprap. The downstream slope of Pond 004 included portions that were vegetated with grass that appeared to be regularly mowed and portions that consisted of riprap. The unit was determined to have adequate slope protection.

3. §257.73(d)(1)(iii) – Dikes Mechanically Compacted:

Although records on the construction of the Pond 004 are not available, the test borings and laboratory testing performed by Haley & Aldrich, the results indicate that the berm fill was mechanically compacted during construction.

4. §257.73(d)(1)(iv) – Height of Vegetation:

At the time of our impoundment inspection, portions of the east and south downstream slopes had vegetation taller than 6 inches in height, but this higher vegetation was sporadic and not excessively high.

5. §257.73(d)(1)(v)(A) – Spillway Cover:

Pond 004 discharges through a concrete box intake structure located at the south end of the impoundment. Being a concrete structure, the structure is non-erodible and appears to be in good condition. There is no emergency spillway.

6. §257.73(d)(1)(v)(B) – Spillway Capacity:

The spillway capacity for the impoundment will be modeled and calculated in accordance with §257.82 Hydrologic and Hydraulic Capacity Requirements for CCR surface impoundments. AECI will complete that capacity requirement under separate cover, consistent with the CCR Rule Preamble reference to the same.

7. §257.73(d)(1)(vi) – Hydraulic Structures Underlying or Passing Through Embankment:

Only limited portions of the intake and outlet structures were visible during our inspection. Regarding the 18-in. corrugated metal pipe, the pipe is buried below the dike and only the downstream end of the pipe is visible. The visible portion of the pipe appeared sound and during our inspection, we observed no signs that would indicate seepage or internal erosion along the length of the pipe where it penetrates the east dike. The headwall was in good condition as well.

8. §257.73(d)(1)(vii) – Inundation of Downstream Slopes:

The impoundment is located adjacent to the Mississippi River and has the potential to be inundated under higher than normal river elevations. Typically, the river has a gradual rise and fall over days and weeks, as opposed to a significant rapid drawdown on a much shorter timescale. To account for the unlikely event the Mississippi River experiences a significant low pool or sudden drawdown occurrence, a representative rapid drawdown review was considered to simulate the potential impact on the slopes. The results indicate that the impoundment will maintain adequate slope stability under this condition.

9. §257.73(d)(2) – Deficiencies and Recommendations:

The Structural Stability Assessment did not identify any structural stability deficiencies for Pond 004.

PREFACE

The assessment of the general condition of Pond 004 is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.

In reviewing this report, it should be realized that the described condition of Pond 004 is based on observations of field conditions at the time of inspection and other site visits, along with other data available. It is important to note that the condition of the structure depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the structure will continue to represent the condition of the structure at some point in the future.

CERTIFICATION

I certify that the Periodic Structural Stability Assessment for AECI's Pond 004 at the New Madrid Power Plant was conducted in accordance with the requirements of §257.73(d) of the USEPA's CCR Rule.



Signed: _____
Certifying Engineer

Print Name: Steven F. Putrich
Missouri License No.: 2014035813
Title: Project Principal
Company: Haley & Aldrich, Inc.

Professional Engineer's Seal:



Table of Contents

	Page
Executive Summary	i
List of Figures	vii
1. Description of Project	1
1.1 GENERAL	1
1.1.1 Authority	1
1.1.2 Purpose of Work	1
1.1.3 Definitions	1
1.2 DESCRIPTION OF PROJECT	2
1.2.1 Location	2
1.2.2 Owner/Operator	2
1.2.3 Purpose of Pond 004	2
1.2.4 Description of the Dam and Appurtenances	2
1.2.5 Standard Operational Procedures	3
1.2.6 Hazard Potential Classification	3
1.3 PERTINENT ENGINEERING DATA	3
1.3.1 Drainage Area	3
1.3.2 Reservoir	4
1.3.3 Discharges from Pond 004	4
1.3.4 Relevant Elevations	4
1.3.5 Design and Construction Records	4
1.3.6 Operating Records	4
2. Inspection	5
2.1 VISUAL INSPECTION	5
2.1.1 General Findings	5
2.2 CARETAKER INTERVIEW	6
2.3 OPERATION AND MAINTENANCE PROCEDURES	6
2.4 EMERGENCY ACTION PLAN	6
2.5 OVERTOPPING POTENTIAL	6
3. Impoundment Inspection Assessment and Recommendations	7
3.1 ASSESSMENT	7
3.2 RECOMMENDATIONS	7
3.3 REMEDIAL MEASURES	7
4. Structural Stability Assessment	8
5. References	10

Table of Contents

Page

Figures

Appendix A – Photographs

Appendix B - Inspection Checklist

Appendix C – Definitions

List of Figures

Figure No.	Title
1	Project Locus
2	Site Plan
3	Photo Location Plan

1. Description of Project

1.1 GENERAL

1.1.1 Authority

Haley & Aldrich, Inc. (Haley & Aldrich) has been contracted by Associated Electric Cooperative, Inc. (AECI) to perform the Initial Periodic Structural Stability Assessment (Assessment) for the AECI Pond 004 coal combustion residuals (CCR) surface impoundment located at New Madrid Power Plant (NMPP) in New Madrid, Missouri. This work was completed in accordance with the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257, specifically §257.73(d).

This report summarizes the results of our Initial Periodic Structural Stability Assessment for the Pond 004 and berms, including our 5 September 2015 visual inspection of the dam and additional site visits. Results of our inspection were also included in our Initial Annual CCR Surface Impoundment PE Inspection Report dated 15 January 2016.

1.1.2 Purpose of Work

The purpose of this assessment was to document whether the design, construction, operation, and maintenance of Pond 004 are consistent with recognized and generally accepted good engineering practices. The visual inspection is intended to identify signs of distress or malfunction of the existing CCR surface impoundment, should they exist. This report summarizes those findings and notes conditions observed that are disrupting or have the potential to disrupt the operation and safety of the surface impoundment.

The investigation is divided into four parts: 1) obtain and review readily available reports, investigations, plans and data pertaining to the Pond 004 surface impoundment; 2) perform a visual inspection of the surface impoundment dike; 3) evaluate whether the design, construction, operation, and maintenance of the impoundment and dike are consistent with generally accepted good engineering practices; and 4) prepare and submit this report presenting the results of our evaluation, including recommendations and remedial actions.

1.1.3 Definitions

To provide the reader a better understanding of the report, definitions of commonly used terms associated with dams/dikes are provided in Appendix C. Many of these terms may be included in this report. The terms are presented under common categories associated with surface impoundments which include: 1) orientation; 2) dam/dike components; 3) hazard potential classification; and 4) miscellaneous.

1.2 DESCRIPTION OF PROJECT

1.2.1 Location

The Pond 004, also referred to historically as the Slag Dewatering Pond, is located at the NMPP in New Madrid, Missouri. The site is located about 3 miles east of Marston, Missouri. The Site is accessible from the west via State Highway EE (off US route 55) and from the north and south from Levee Road. Pond 004 is located adjacent to the power plant, which is located at North latitude 36° 30.9' and West longitude 89° 33.6', as shown on the attached Project Locus in Figure 1. The impoundment can be accessed by vehicles from earthen access roads from the NMPP. Access to the site and dikes is restricted by full time security and barriers/fences at the plant.

1.2.2 Owner/Operator

Pond 004 is owned and maintained by Associated Electric Cooperative, Inc.

	Dam Owner/Caretaker
Name	AECI New Madrid Power Plant
Mailing Address	P.O. Box 156
Town, State, Zip	New Madrid, MO 63869
Contact	Roger Neumeyer
Title	Plant Manager
Email Address	rneumeyer@aeci.org
Emergency Phone	911

1.2.3 Purpose of Pond 004

The NMPP is a two-unit coal-fired power plant, with a maximum generating capacity of approximately 1200 Megawatts. Unit 1 was constructed in 1972 and Unit 2 was constructed in 1977. As part of plant operations, two impoundments were constructed for the purpose of storing and managing CCR and plant process water. The impoundments are known as Pond 004 and Pond 003 as related to their NPDES Outfall discharge names.

Pond 003 was constructed in 1972 and Pond 004 was constructed in 1984. The dikes function to impound fly ash and boiler slag for sedimentation and storage.

1.2.4 Description of the Dam and Appurtenances

Pond 004 is located east of the NMPP and north of Pond 003 with a Site Plan shown on Figure 2.

The dike consists of an earthen embankment with a crest length of approximately 3,000 feet around the entire impoundment. However, the northern portion of the impoundment consists of stage boiler slag within the impoundment footprint at the crest location which varies from about 100 to 200 ft in width for a length of about 800 ft. In addition, the western embankment consists of the Mississippi Levee for about 1,050 ft and the dike abuts into the Levee. For the purposes of this report, the entire 3,000 ft of

embankment surrounding the impoundment is considered the dike. The dike embankment is approximately 6 to 15 feet in height and according to records, and the embankment is constructed of locally available silty clay.

The impoundment has a surface area of approximately 10 acres at a water level elevation of 294 feet NAVD88. A gravel access road is present on the crest of the dam at El. 300 NAVD88.

As noted above, much of the northern portion of Pond 004 is filled with CCR that has settled in-place or has been staged within the impoundment footprint. Process water and CCR are discharged into the impoundment via four pipelines located at the north end of the pond. Process water and CCR are then decanted over/through a berm within the pond into the southern portion of the pond for final settling and flow management. Flows are directed to a concrete drop inlet structure with concrete stop logs and into a discharge pipe. Decant water discharges from the dam flow into the Mississippi River.

The downstream slopes are vegetated with grass cover and the upstream slopes are covered with grass cover and riprap at the water line.

1.2.5 Standard Operational Procedures

The impoundment is operated and maintained by NMPP personnel. Operation of the impoundment includes using the stop logs at the drop inlet structures to regulate the water levels and removal/recovery of settled CCR for reuse. Maintenance of the dike includes regular mowing of the downstream upstream and downstream slopes and removing vegetation from the riprap on upstream slopes. Weekly inspections are also completed.

The NMPP personnel monitor and inspect the dike according to a series of informal, unwritten and written protocols. These protocols include:

- Observation of the impoundment embankments during normal operation;
- Inspecting the slope protection, including the vegetation and riprap;
- Monitoring the water levels; and
- Historic semi-annual inspection of the impoundments by NMPP personnel (now completed weekly).

1.2.6 Hazard Potential Classification

Hazard Potential Classification is being completed outside the scope of this report in accordance with the applicable regulations. Results will be provided under separate cover.

1.3 PERTINENT ENGINEERING DATA

1.3.1 Drainage Area

Based on the original design documents and observations from the site visit, Pond 004 does not receive drainage from the surrounding areas, only the immediate access roads on top of the dike and direct precipitation. Water is directed to the impoundment from the NMPP operations (i.e. discharge of process water).

1.3.2 Reservoir

Pond 004 has an estimated surface area of approximately 10 acres and a storage volume of at least 14 acre-ft.

In general, the reservoir contains varying amounts of fly ash and boiler slag mixed with water. At some locations the ash has settled, or been staged, to levels above water levels and abuts the dams.

1.3.3 Discharges from Pond 004

Water discharged into Pond 004 flows from the north end of the reservoir through an open channel within the impoundment. CCR is separated from the water through settling and decant water flows to a concrete drop inlet structure at the southeastern end of the reservoir. Water is directed to a discharge pipe extending through the dike which flows to the Mississippi River.

1.3.4 Relevant Elevations

Elevations referenced in this report are in feet and are based on the North American Vertical Datum of 1988 (NAVD88).

The low point on crest elevation is at approximate El. 300 and the normal pool is generally at El. 293.6.

A. Top of Dam	301
B. Normal Pool	293.6
C. Spillway Crest	301
D. Upstream Water at Time of Inspection	296 (stoplogs temporarily at higher elevation)
E. Spillway Type	Concrete Drop Inlet with corrugated metal pipe
F. Spillway Invert	El. 289.3

1.3.5 Design and Construction Records

Pond 004 was constructed in 1984 to impound boiler slag. The dike was designed by Burns & McDonnell per plant personnel, however records of the design were not readily available.

1.3.6 Operating Records

Written operational records have not been historically maintained for the impoundment prior to the CCR Rule. AECl has been completing weekly inspections per the CCR Rule and maintains an operating record for required information.

2. Inspection

2.1 VISUAL INSPECTION

On 1 September 2015, Haley & Aldrich completed a visual inspection of Pond 004. The following paragraphs describe the conditions of the impoundment and dike observed during the inspection. In addition, refer to the photographs and checklist forms included in Appendices A and B, respectively for additional comments.

2.1.1 General Findings

2.1.1.1 *Upstream Slope*

The northern portion of the impoundment is utilized for CCR recovery operations and the CCR is at, or slightly above the crest at this location. The CCR recovery operation and the temporary staging created a dam crest that was essentially 150 ft wide or wider at some locations. This section of the impoundment was filled-in with CCR. The upstream slope of the dike was not exposed at the northern portion of the impoundment.

At the southern portion of the impoundment, the upstream slope was graded about 2-1/2H:1V to 3H:1V. The top half of the slope was covered with grass and the bottom half was covered with riprap. Overgrown vegetation was observed along the southern portion of the dike. Isolated pockets of erosion were observed at the western portion of the dike. Along the southern portion of the impoundment, the dike was graded into the Mississippi River Levee crest and upstream slope, which is about 6 to 8 ft above the dike general elevation. The water level at the time of the site visit was approximately El. 296.

2.1.1.2 *Crest*

The northern, eastern, and southern portions of the Pond 004 crest consisted of a gravel access road. The western portion of the crest consisted of a paved levee access road, which is also the Mississippi River Levee. The crest alignment appeared generally level in most locations. Minor rutting of the gravel access road was observed on the southern and eastern portion of the dike. In addition, an access ramp has been installed along the eastern side of the impoundment which cuts through the crest and downstream slope. The access ramp consists of loose gravel without erosion protection. The southern portion of the crest is graded at a slope up to the crest elevation of the Mississippi River Levee to provide vehicle access along the road system.

2.1.1.3 *Downstream Slope*

The downstream slope of Pond 004 included portions that were vegetated with grass that appeared to be regularly mowed and portions that consisted of rip rap. A series of pipes are present along the downstream slope of the western embankment which lead to Pond 003. Additionally, a road with an unlined drainage ditch is located along the downstream toe of the western embankment.

2.1.1.4 *Emergency Spillway*

Four (4) 10 in. pipes discharge CCR and water into Pond 004. There were no leaks or defects observed in the discharge pipes that required repair.

Water flows out of Pond 004 through a concrete drop outlet at the southeast corner of the impoundment. The water level in the impoundment is controlled by concrete stop logs. Water flows over the stoplogs and into an 18 in. diameter drain pipe and flow is discharged at a concrete headwall along the banks of the Mississippi River approximately 175 ft downstream. The concrete headwall is about 15 ft in length, 4 ft in height and 10 in. thick. An 18 in. diameter corrugated metal drain pipe with a metal backflow preventer extends about 4 ft out beyond the headwall.

The concrete drop inlet spillway appeared to have minor, isolated, concrete chips and weathering. Minor, surficial rusting was observed on the stoplog removal winch and frame. Deficiencies in the discharge headwall and drainage pipe were not observed.

No other emergency spillway exists.

2.1.1.5 *Downstream Area*

Downstream of the impoundment is a grassed area which varied in height from about 4 to 8 in. and appeared mowed. An overgrown area of brush and trees, less than 6 in. diameter, exists about 40 to 80 ft downstream of the downstream toe. The overgrown area is generally the top banks of the Mississippi River.

2.2 **CARETAKER INTERVIEW**

On the day of the inspection, Haley & Aldrich met with AECl personnel familiar with the operations, maintenance and construction of Pond 004. Information provided by AECl personnel has been incorporated into this report.

2.3 **OPERATION AND MAINTENANCE PROCEDURES**

The impoundment is operated and maintained by NMPP personnel. Operation of the impoundment includes using the stop logs at the drop inlet structures to regulate the water levels and removal/recovery of settled CCR for reuse. Maintenance of the dike includes regular mowing of the downstream upstream and downstream slopes and removing vegetation from the riprap on upstream slopes. Weekly inspections are also completed. A formal operations and maintenance plan does not exist for the unit.

2.4 **EMERGENCY ACTION PLAN**

A written Emergency Action Plan (EAP) does not exist for unit; however, plant personnel are generally familiar with dam operations and construction. Also, the site is staffed full time and heavy earthmoving construction equipment is at the site. A communications plan is in place for the Plant.

2.5 **OVERTOPPING POTENTIAL**

Based on the inflow to the impoundment from only plant water and direct precipitation, the overtopping potential of the dam is low based on management of water within the impoundment.

3. Impoundment Inspection Assessment and Recommendations

3.1 ASSESSMENT

We provide the following assessment of Pond 004. The following deficiencies were observed at Pond 004:

- Minor rutting and erosion in the upstream slope.
- Minor erosion and rutting of the gravel access road on the Northern embankment.
- Sparse vegetation exceeding 6 in. in height and minor brush on upstream slope within riprap.
- Sparse vegetation exceeding 6 in. height and brush on upstream slope.
- Vegetation exceeding 6 in. in height on the downstream slope.

3.2 RECOMMENDATIONS

Maintenance of the dike is required and should include cutting/mowing of vegetation on the dike and embankments for continued ability to adequately inspect the impoundment. Mowing of the vegetation should be completed as needed to maintain healthy grass cover at less than 6 in. in height in the current CCR Rule requirements. Additional evaluation of the outlet pipe is recommended as well to confirm integrity.

3.3 REMEDIAL MEASURES

We recommend the following remedial measures be undertaken:

- Cut/mow the embankments and routinely mow the embankment slopes (upstream and downstream) and downstream areas to maintain vegetation at a height of 6 in. or less.
- Repair minor ruts and erosion at the Pond 004 dikes and crest.
- Conduct a video inspection of outlet pipe from the drop inlet structure at a time that is reasonable based on operation of the impoundment.

4. Structural Stability Assessment

In accordance with 40 CFR §257.73(d), the owner or operator of a CCR surface impoundment must conduct initial and periodic structural stability assessments to determine whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

Haley & Aldrich reviewed the information provided to us and inspected Pond 004 as described above. Based on our review of available information and observations during our inspection, we have concluded the following in accordance with 40 CFR §257.73(d):

10. §257.73(d)(1)(i) – Stable Foundations and Abutments:

Based on our review of available or developed subsurface information, as-built records, survey data, and observations during our inspection, the impoundment was judged to have stable foundations and abutments.

11. §257.73(d)(1)(ii) – Adequate Slope Protection:

Based on observations during our site visits, at the southern portion of the dike, the upstream slope was graded about 2-1/2H:1V to 3H:1V. The top half of the slope was covered with grass and the bottom half was covered with riprap. The downstream slope of Pond 004 included portions that were vegetated with grass that appeared to be regularly mowed and portions that consisted of riprap. The unit was determined to have adequate slope protection.

12. §257.73(d)(1)(iii) – Dikes Mechanically Compacted:

Although records on the construction of the Pond 004 are not available, the test borings and laboratory testing performed by Haley & Aldrich, the results indicate that the berm fill was mechanically compacted during construction.

13. §257.73(d)(1)(iv) – Height of Vegetation:

At the time of our impoundment inspection, portions of the east and south downstream slopes had vegetation taller than 6 inches in height, but this higher vegetation was sporadic and not excessively high.

14. §257.73(d)(1)(v)(A) – Spillway Cover:

Pond 004 discharges through a concrete box intake structure located at the south end of the impoundment. Being a concrete structure, the structure is non-erodible and appears to be in good condition. There is no emergency spillway.

15. §257.73(d)(1)(v)(B) – Spillway Capacity:

The spillway capacity for the impoundment will be modeled and calculated in accordance with §257.82 Hydrologic and Hydraulic Capacity Requirements for CCR surface impoundments. AECI will

complete that capacity requirement under separate cover, consistent with the CCR Rule Preamble reference to the same.

16. §257.73(d)(1)(vi) – Hydraulic Structures Underlying or Passing Through Embankment:

Only limited portions of the intake and outlet structures were visible during our inspection. Regarding the 18-in. corrugated metal pipe, the pipe is buried below the dike and only the downstream end of the pipe is visible. The visible portion of the pipe appeared sound and during our inspection, we observed no signs that would indicate seepage or internal erosion along the length of the pipe where it penetrates the east dike. The headwall was in good condition as well.

17. §257.73(d)(1)(vii) – Inundation of Downstream Slopes:

The impoundment is located adjacent to the Mississippi River and has the potential to be inundated under higher than normal river elevations. Typically, the river has a gradual rise and fall over days and weeks, as opposed to a significant rapid drawdown on a much shorter timescale. To account for the unlikely event the Mississippi River experiences a significant low pool or sudden drawdown occurrence, a representative rapid drawdown review was considered to simulate the potential impact on the slopes. The results indicate that the impoundment will maintain adequate slope stability under this condition.

18. §257.73(d)(2) – Deficiencies and Recommendations:

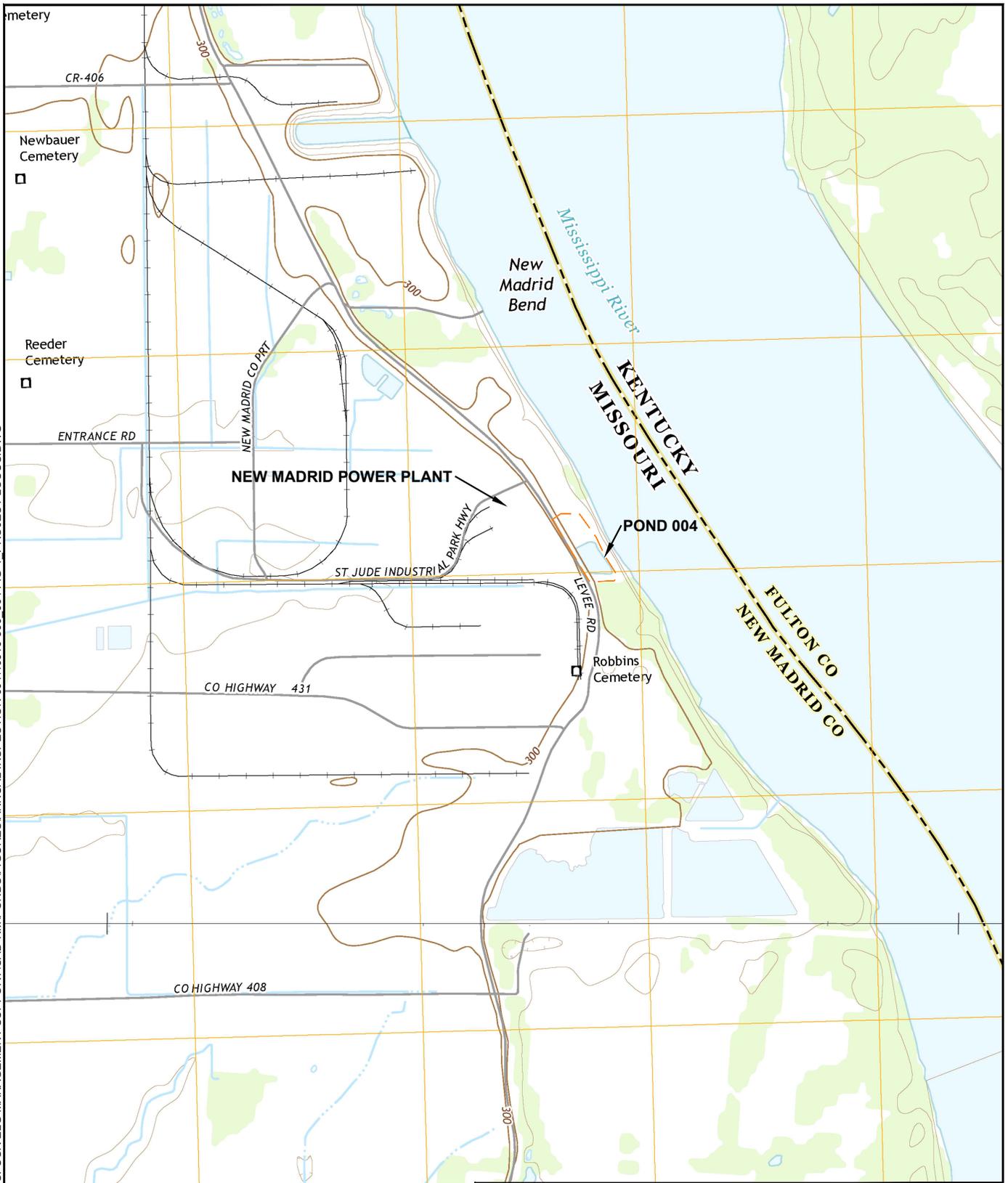
The Structural Stability Assessment did not identify any structural stability deficiencies for Pond 004.

AECI is performing a Safety Factor Assessment in accordance EPA's Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Parts 257 and 261. The results of the Safety Factor Assessment will be provided under separate cover.

5. References

1. GZA GeoEnvironmental, Inc., "Round 7 Dam Assessment, Associated Electric Cooperative, Inc. New Madrid Power Plant Ash Pond 1 & 2 and Slag Pond 1 & 2 Impoundments," June 2011.

LUCAS, ANDY Printed: 1/15/2016 3:11 PM Layout: PROJECT LOCUS
\\GLEN\COMMON\PROJECTS\40616_AECL-CCR ELG MANAGEMENT SUPPORT\CAD-NM\PONDS\FIGURES\ANNUAL INSPECTION 004\40616-300_004 FIG-1_PROJECT LOCUS.DWG



MAPSOURCE: USGS
NEW MADRID, MO-KY
POINT PLEASANT, MO-TN-KY
2015



**HALEY
ALDRICH**

ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
POND 004
NEW MADRID POWER PLANT
NEW MADRID, MO

PROJECT LOCUS

APPROXIMATE SCALE: 1" = 2000'
JANUARY 2016

FIGURE 1

LUCAS, ANDY
\\CLECOMMON\PROJECTS\40616_AECI-CCR_ELG_MANAGEMENT_SUPPORT\CAD-NM\POND\FIGURES\ANNUAL INSPECTION 004\40616-300_004 FIG-2 SITE PLAN.DWG
Printed: 1/15/2016 3:10 PM Layout: SITE PLAN



LEGEND

--- APPROXIMATE LIMITS OF POND 004

NOTES

- 1. AERIAL IMAGERY PROVIDED BY AECI AND WAS CONDUCTED BY PICTOMETRY INTERNATIONAL CORP BETWEEN 4-8 OCTOBER 2014.



0 120 240
SCALE IN FEET



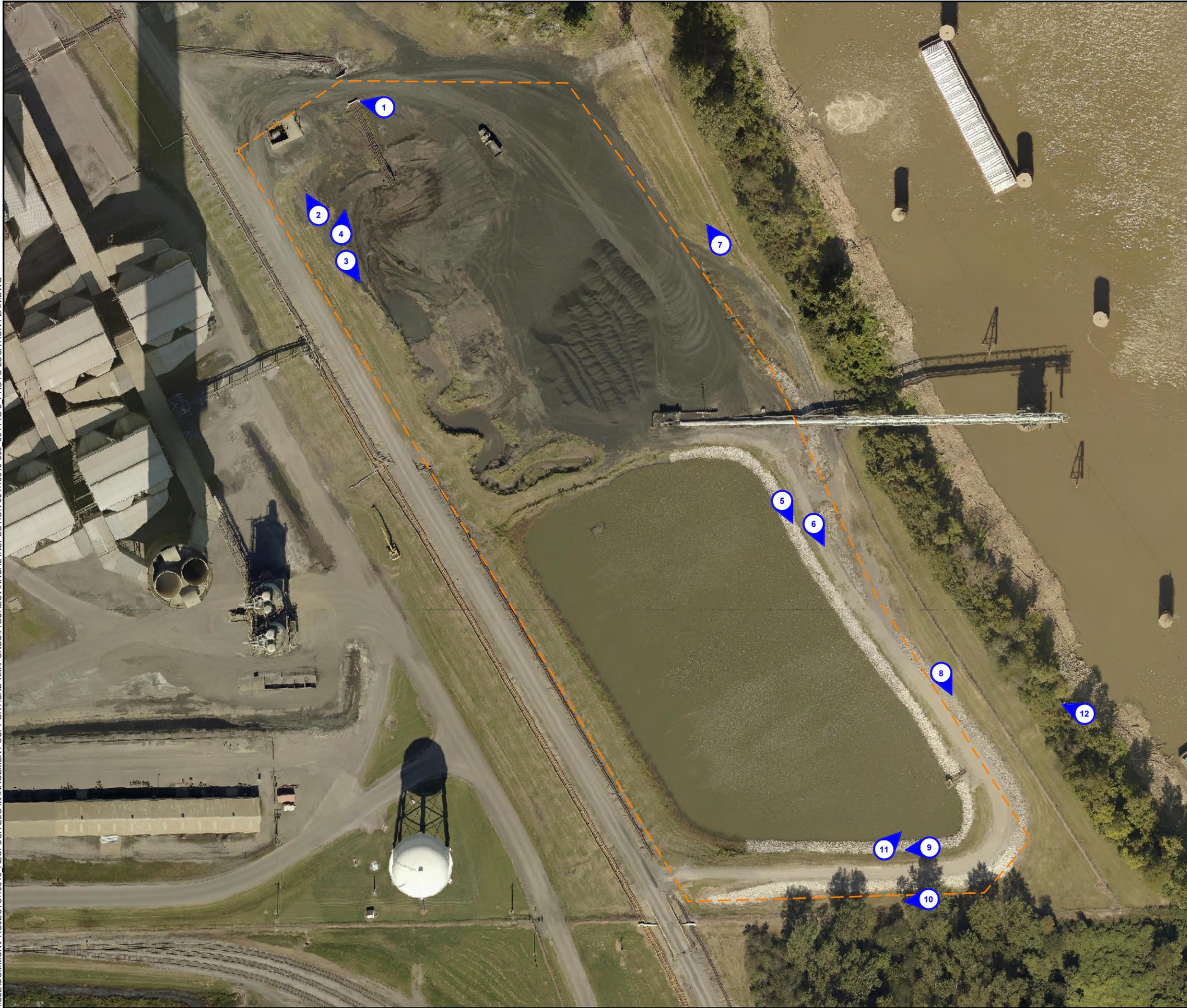
ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
POND 004
NEW MADRID POWER PLANT
NEW MADRID, MO

SITE PLAN

SCALE: AS SHOWN
JANUARY 2016

FIGURE 2

LUCAS, ANDY
\\CLECOMMON\PROJECTS\40616_AECI-CCR_ELG_MANAGEMENT_SUPPORT\CAD\NM\FONDS\FIGURES\ANNUAL INSPECTION 004\40616-300_004 FIG-3 PHOTO LOCATION PLAN.DWG
Printed: 1/15/2016 2:47 PM Layout: PHOTO LOCATIONS PLAN

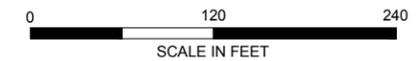


LEGEND

- APPROXIMATE LIMITS OF POND 004
- 1 PHOTO LOCATION/DIRECTION

NOTES

1. AERIAL IMAGERY PROVIDED BY AECI AND WAS CONDUCTED BY PICTOMETRY INTERNATIONAL CORP BETWEEN 4-8 OCTOBER 2014.



ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
POND 004
NEW MADRID POWER PLANT
NEW MADRID, MO

PHOTO LOCATION PLAN

SCALE: AS SHOWN
JANUARY 2016

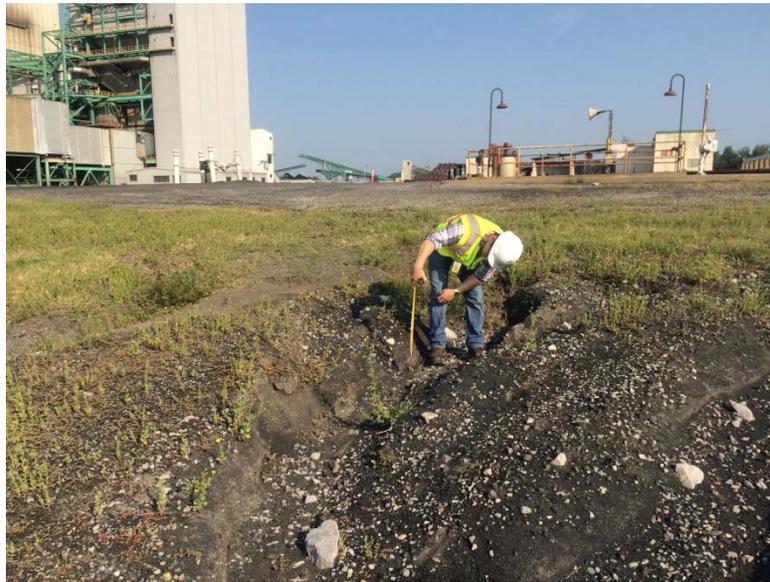
FIGURE 3

APPENDIX A

Photographs



Photograph No. 1
Slag Dewatering Pond Dam (004 Pond)
Four inlet pipes with headwall



Photograph No. 2
Slag Dewatering Pond Dam (004 Pond)
Minor rutting and erosion in upstream slope



Photograph No. 3
Slag Dewatering Pond Dam (004 Pond)
Upstream slope of western embankment



Photograph No. 4
Slag Dewatering Pond Dam (004 Pond)
Upstream slope of northern embankment



Photograph No. 5
Slag Dewatering Pond Dam (004 Pond)
Upstream slope of eastern embankment with riprap and vegetation



Photograph No. 6
Slag Dewatering Pond Dam (004 Pond)
Crest of eastern embankment



Photograph No. 7
Slag Dewatering Pond Dam (004 Pond)
Downstream slope of eastern embankment with ruts and uneven surface



Photograph No. 8
Slag Dewatering Pond Dam (004 Pond)
Downstream slope of eastern embankment with riprap



Photograph No. 9
Slag Dewatering Pond Dam (004 Pond)
Upstream slope with riprap and vegetation



Photograph No. 10
Slag Dewatering Pond Dam (004 Pond)
Downstream slope with Mississippi River Levee in Background



Photograph No. 11
Slag Dewatering Pond Dam (004 Pond)
Concrete drop inlet spillway with stoplogs
Mississippi River in background



Photograph No. 12
Slag Dewatering Pond Dam (004 Pond)
Discharge pipe to Mississippi River with backflow preventer

APPENDIX B

Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: <u>Slag Dewatering Pond (004 Pond) Dam</u>	STATE ID #: <u>MO-0001171</u>
REGISTERED: (YES/NO) <u>No</u>	NID ID #: <u>N/A</u>
STATE SIZE CLASSIFICATION: <u>Small</u>	STATE HAZARD CLASSIFICATION: <u>TBD</u>
	CHANGE IN HAZARD CLASSIFICATION REQUESTED?: (YES/NO) _____

DAM LOCATION INFORMATION

CITY/TOWN: <u>New Madrid</u>	COUNTY/STATE: <u>New Madrid/Missouri</u>
DAM LOCATION: <u>41 St. Jude Park, Marston, MO</u> (street address if known)	ALTERNATE DAM NAME: <u>N/A</u>
USGS QUAD.: <u>New Madrid, MO-KY</u>	LAT.: <u>36° 30.9' N</u> LONG.: <u>89° 33.6' W</u>
DRAINAGE BASIN: <u>N/A</u>	RIVER: <u>Mississippi River</u>
IMPOUNDMENT NAME(S): <u>Pond 004</u>	

GENERAL DAM INFORMATION

TYPE OF DAM: <u>Earthen Incised and Bermed</u>	OVERALL LENGTH (FT): <u>3000</u>
PURPOSE OF DAM: <u>Sedimentation and Storage Basin</u>	NORMAL POOL STORAGE (ACRE-FT): _____
YEAR BUILT: <u>1984</u>	MAXIMUM POOL STORAGE (ACRE-FT): <u>14</u>
STRUCTURAL HEIGHT (FT): <u>20</u>	EL. NORMAL POOL (FT): <u>294.0</u>
HYDRAULIC HEIGHT (FT): <u>6</u>	EL. MAXIMUM POOL (FT): <u>300.0 (minimum crest elevation)</u>
RESERVOIR SURFACE AREA (ACRES): <u>10</u>	WINTER DRAWDOWN (FT BELOW NORMAL POOL) <u>0.0</u>
PUBLIC ROAD ON CREST: <u>No</u>	DRAWDOWN VOL. (AC-FT) <u>0.0</u>
PUBLIC BRIDGE OVER SPILLWAY: <u>No</u>	

NAME OF DAM: Pond 004 STATE ID #: MO-0001171

INSPECTION DATE: September 1, 2015 NID ID #: N/A

INSPECTION SUMMARY

DATE OF INSPECTION: September , 2015 DATE OF PREVIOUS INSPECTION: October 6, 2010

TEMPERATURE/WEATHER: Sunny, 88 ARMY CORPS PHASE I: No
(YES/NO) If YES, date _____

CONSULTANT: Haley & Aldrich, Inc. PREVIOUS ALT. PHASE I: No
(YES/NO) If YES, date _____

BENCHMARK/DATUM: NAVD88

OVERALL PHYSICAL CONDITION OF DAM: _____ DATE OF LAST REHABILITATION: N/A

SPILLWAY CAPACITY: _____

EL. POOL DURING INSP.: 296 EL. TAILWATER DURING INSP.: 296

PERSONS PRESENT AT INSPECTION

<u>NAME</u>	<u>TITLE/POSITION</u>	<u>REPRESENTING</u>
Denis Bell	Senior Engineer	Haley & Aldrich, Inc
Andy Lucas	Staff Engineer	Haley & Aldrich, Inc
Dennis Cox		AECI

NAME OF DAM: <u>Pond 004</u>		STATE ID #: <u>MO-0001171</u>	
INSPECTION DATE: <u>September 1, 2015</u>		NID ID #: <u>N/A</u>	
OWNER: ORGANIZATION	<u>Associated Electric Cooperative,]</u>	CARETAKER: ORGANIZATION	<u>Associated Electric Cooperative, Inc.</u>
NAME/TITLE	<u>Mr. Dennis Cox</u>	NAME/TITLE	<u>Mr. Dennis Cox</u>
STREET	<u>P.O. Box 156</u>	STREET	<u>P.O. Box 156</u>
TOWN, STATE, ZIP	<u>New Madrid, MO 63869</u>	TOWN, STATE, ZIP	<u>New Madrid, MO 63869</u>
PHONE	<u></u>	PHONE	<u></u>
EMERGENCY PH. #	<u></u>	EMERGENCY PH. #	<u></u>
FAX	<u></u>	FAX	<u></u>
EMAIL	<u></u>	EMAIL	<u></u>
OWNER TYPE	<u>Private</u>		
PRIMARY SPILLWAY TYPE <u>Decant Structure</u>			
SPILLWAY LENGTH (FT) <u>N/A</u>		SPILLWAY CAPACITY (CFS) <u>N/A</u>	
AUXILIARY SPILLWAY TYPE <u>N/A</u>		AUX. SPILLWAY CAPACITY (CFS) <u>N/A</u>	
NUMBER OF OUTLETS <u>One</u>		OUTLET(S) CAPACITY (CFS) <u>Unknown</u>	
TYPE OF OUTLETS <u>One Decant</u>		TOTAL DISCHARGE CAPACITY (CFS) <u>Unknown</u>	
DRAINAGE AREA (SQ MI) <u>0.02</u>		SPILLWAY DESIGN FLOOD (PERIOD/CFS) <u>Unkown</u>	
HAS DAM BEEN BREACHED OR OVERTOPPED? (YES/NO): <u>No</u>		IF YES, PROVIDE DATE(S) <u></u>	
FISH LADDER (LIST TYPE IF PRESENT) <u>Unkown</u>			
DOES CREST SUPPORT PUBLIC ROAD? (YES/NO) <u>No</u>		IF YES, ROAD NAME: <u></u>	
PUBLIC BRIDGE WITHIN 50' OF DAM? (YES/NO): <u>No</u>		IF YES, ROAD/BRIDGE NAME: <u></u>	
		MHD BRIDGE NO. (IF APPLICABLE) <u></u>	

NAME OF DAM: Pond 004

STATE ID #: MO-0001171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

EMBANKMENT (U/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
U/S SLOPE	1. SLIDE, SLOUGH, SCARP	None observed	X		
	2. SLOPE PROTECTION TYPE AND COND.	None observed	X		
	3. SINKHOLE/ANIMAL BURROWS	None observed	X		
	4. EMB.-ABUTMENT CONTACT	None observed	X		
	5. EROSION	Erosion and rutting noted in the Northwestern portion of the impoundment			X
	6. UNUSUAL MOVEMENT	None observed	X		
	7. VEGETATION (PRESENCE/CONDITION)	None observed	X		

ADDITIONAL COMMENTS: Ash has been stockpiled to an elevation equal to the embankment in the Northern portion of the Slag Dewatering Pond. Therefore, the upstream slope was covered by ash and not visible for inspection.

NAME OF DAM: Pond 004

STATE ID #: MO-0001171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Gravel access road, western crest was paved levee road	X		
	2. SURFACE CRACKING	None observed	X		
	3. SINKHOLES, ANIMAL BURROWS	None observed	X		
	4. VERTICAL ALIGNMENT (DEPRESSIONS)	None observed	X		
	5. HORIZONTAL ALIGNMENT	None observed	X		
	6. RUTS AND/OR PUDDLES	None observed	X		
	7. VEGETATION (PRESENCE/CONDITION)	Regularly mowed grass	X		
	8. ABUTMENT CONTACT	N/A	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 004

STATE ID #: MO-0001171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

EMBANKMENT (D/S SLOPE)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S SLOPE	1. WET AREAS (NO FLOW)	None observed	X		
	2. SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. EMB.-ABUTMENT CONTACT	N/A	X		
	5. SINKHOLE/ANIMAL BURROWS	None observed	X		
	6. EROSION	None observed	X		
	7. UNUSUAL MOVEMENT	None observed	X		
	8. VEGETATION (PRESENCE/CONDITION)	Woody vegetation near toe of embankment			X

ADDITIONAL COMMENTS: Near the Northeast portion, woody vegetation was observed near the toe of the embankment of the downstream slope.

NAME OF DAM: Pond 004

STATE ID #: MO-000171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

PRIMARY SPILLWAY

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
SPILLWAY	SPILLWAY TYPE	Decant structure	X		
	WEIR TYPE	Concrete stoplogs in decant structure	X		
	SPILLWAY CONDITION	Fair	X		
	TRAINING WALLS	None present	X		
	SPILLWAY CONTROLS AND CONDITION	None present	X		
	UNUSUAL MOVEMENT	None present	X		
	APPROACH AREA	Fair	X		
	DISCHARGE AREA	Fair	X		
	DEBRIS	None present	X		
	WATER LEVEL AT TIME OF INSPECTION	294	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 004

STATE ID #: MO-000171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	Outlet - 18 in. diameter corrugated HDPE. Discharge to Mississippi River			
	INTAKE STRUCTURE	Decant structure with stoplogs			
	TRASHRACK	N/A			
	PRIMARY CLOSURE	N/A			
	SECONDARY CLOSURE	N/A			
	CONDUIT	N/A			
	OUTLET STRUCTURE/HEADWALL	15 ft. length, 4 ft. height, 10 in. thick. Appears stable			
	EROSION ALONG TOE OF DAM	None			
	SEEPAGE/LEAKAGE	None			
	DEBRIS/BLOCKAGE	None			
	UNUSUAL MOVEMENT	None			
	DOWNSTREAM AREA	Heavily vegetated. Woody vegetation.			
MISCELLANEOUS					

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 004

STATE ID #: MO-000171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

DOWNSTREAM AREA

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S AREA	1. ABUTMENT LEAKAGE	None Present	X		
	2. FOUNDATION SEEPAGE	None Present	X		
	3. SLIDE, SLOUGH, SCARP	None Present	X		
	4. WEIRS	None Present	X		
	5. DRAINAGE SYSTEM	None Present	X		
	6. INSTRUMENTATION	None Present	X		
	7. VEGETATION	Grass less than 6"	X		
	8. ACCESSIBILITY	Gravel access road along crest. Full time security and fence	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 004

STATE ID #: MO-0001171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	None present	X		
	2. OBSERVATION WELLS	None present	X		
	3. STAFF GAGE AND RECORDER	None present	X		
	4. WEIRS	None present	X		
	5. INCLINOMETERS	None present	X		
	6. SURVEY MONUMENTS	None present	X		
	7. DRAINS	None present	X		
	8. FREQUENCY OF READINGS	No measurements are taken	X		
	9. LOCATION OF READINGS	N/A	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 004

STATE ID #: MO-000171

INSPECTION DATE: September 1, 2015

NID ID #: N/A

UNDERLYING HYDRAULIC STRUCTURES/PIPES

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
UNDERLYING HYDRAULIC STRUCTURES /PIPES	TYPE	18" corrugated HDPE outlet	X		
	INLET				
	CONDUIT				
	OUTLET STRUCTURE/HEADWALL	Fair	X		
	EROSION ALONG STRUCTURE	None present	X		
	SEEPAGE/LEAKAGE	None present	X		
	DEBRIS/BLOCKAGE	None present	X		
	UNUSUAL MOVEMENT				
	DOWNSTREAM AREA				
	MISCELLANEOUS				

ADDITIONAL COMMENTS: _____

Note: Use additional sheets for additional outlets.

APPENDIX C

Definitions

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions, refer to the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, the Department of the Interior Bureau of Reclamation, or the Federal Emergency Management Agency.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – Shall mean any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate there from including but not be limited to spillways; reservoirs and their rims; low level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

Size Classification

Large – structure with a height greater than 40 feet or a storage capacity greater than 1,000 acre-feet.

Intermediate – structure with a height between 15 and 40 feet or a storage capacity of 50 to 1,000 acre-feet.

Small – structure with a height between 6 and 15 feet and a storage capacity of 15 to 50 acre-feet.

Non-Jurisdictional – structure less than 6 feet in height and having a storage capacity of less than 15 acre-feet.

Hazard Classification

(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.

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.

General

EAP – Emergency Action Plan - Shall mean a predetermined plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam break.

O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.

Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.

Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet

Height of Dam – Shall mean the vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the crest of the dam.

Spillway Design Flood (SDF) – Shall mean the flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Condition Rating

Unsafe - Major structural, operational, and maintenance deficiencies exist under normal operating conditions.

Poor - Significant structural, operation and maintenance deficiencies are clearly recognized for normal loading conditions.

Fair - Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur. Can be used when uncertainties exist as to critical parameters.

Satisfactory - Minor operational and maintenance deficiencies. Infrequent hydrologic events would probably result in deficiencies.

Good - No existing or potential deficiencies recognized. Safe performance is expected under all loading including SDF.