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**REPORT ON
INITIAL PERIODIC STRUCTURAL STABILITY ASSESSMENT
POND 003
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 003
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 003 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 003 surface impoundment; 2) visit the site to observe Pond 003; 3) evaluate whether the design, construction, operation, and maintenance of Pond 003 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 003
16 October 2016
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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 003, including our site inspection of the unit. Pond 003 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 9,300 feet around the entire impoundment. However, part of the impoundment is incised on the northern side and includes the Mississippi River Levee to the west of the impoundment. Therefore, the constructed dike is considered to be the approximately 5,000 ft of the east side of the unit and portions of the north and south sides. The dike embankment is approximately 10 to 20 feet in height and according to records and survey information; the embankment is constructed of locally available silty clay. The impoundment has a surface area of approximately 110 acres

Pond 003 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 003, discussions with site personnel, a review of available documents and subsequent site visits, the following deficiencies were noted:

- Vegetation exceeding 6 in. in height on the upstream slope.
- Vegetation exceeding 6 in. in height on the downstream slope.
- Vegetation exceeding 6 in. in height within the riprap on the upstream slope.
- Two (2) dead trees within 50 feet of toe of downstream slope of the dike.
- Mature trees in the downstream area of the dam.

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.
- Cut the two (2) dead trees downstream of Pond 003.
- Monitor the mature trees downstream of Pond 003 for signs of decay and impact to the dike during the weekly and monthly inspections.
- Conduct a video inspection of outlet pipe from the drop inlet structures when flow is reduced to expose the downstream end of the pipe.

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 003 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, on the upstream slope, the top half of the slope was covered by grassy vegetation, some of which was overgrown. The bottom half of the slope, including below the water line, consisted of riprap. The downstream slope of the eastern and southern portion of the dike was graded to an approximate slope of 3H:1V, or flatter towards the north. Slope was covered in healthy grass cover about 8 to 12 in. in height and appeared to be regularly mowed. The southern portion of the impoundment shares a dike with an adjacent impoundment and is protected as well.

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

Although records on the construction of the Pond 003 are not available, the test borings and laboratory testing performed by Haley & Aldrich and others, 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 north, east and south downstream slopes had vegetation taller than 6 inches in height, but this higher vegetation was sporadic and not excessively high. On the upstream slopes, some vegetation was higher as well, some as high as 36 inches.

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

Pond 003 discharges through a concrete box intake structure located at the southeastern 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. AECl 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 structure was visible during our inspection. Regarding the 24-in. clay pipe, the pipe is buried below the dike and the downstream portion is submerged by the discharge channel. There were no signs of settlement or slope displacement above the pipe.

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 003.

PREFACE

The assessment of the general condition of Pond 003 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 003 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 AECl's Pond 003 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:



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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 003 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 003 and its dikes, including our 5 September 2015 visual inspection of the unit 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 003 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 003 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

Pond 003, also historically referred to as Slag Pond 1, Ash Pond 1, and the Unlined Ash Pond, is located at the New Madrid Power Plant (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 003 is located adjacent to the power plant, which is located at North latitude 36° 30.4' and West longitude 89° 33.5', as shown on the attached Project Locus in Figure 1. The impoundments 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 003 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 003

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

The dike consists of an earthen embankment with a crest length of approximately 9,300 feet around the entire impoundment. However, part of the impoundment is incised on the northern side and includes the Mississippi River Levee to the west of the impoundment. In addition, much of the impoundment consists of settled/staged CCR which rises above the current water level, and at some locations the CCR rises above the dam crest elevation. Therefore, the constructed dike is considered to be the

approximately 5,000 ft of the east side of the unit and portions of the north and south sides. The dike embankment is approximately 10 to 20 feet in height and according to records and survey information; the embankment is constructed of locally available silty clay.

The impoundment has a surface area of approximately 110 acres and the observed water level elevation was at approximately 301 feet NAVD88. A gravel access road is present on the dam crest at about El. 308. The upstream and downstream slopes are vegetated and the upstream shoreline is protected with riprap. Pond 003 embankments were designed with 3 horizontal on 1 vertical (3H:1V) upstream and downstream slopes.

Process water and CCR are discharged into Pond 003 via two pipelines located at the northern end of the impoundment. The discharged process water and CCR flow through a channel in the stockpiled/settled ash. Discharges from the impoundment flow to a concrete drop inlet structure with concrete stoplogs. A discharge pipe directs water through the dike and into a discharge channel which flows to the Mississippi River.

Pond 003 storage volume at the top of the dam is estimated to be about 1,700 acre-ft and the dam has a structural height of about 20 feet.

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 003 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 003 has an estimated surface area of 110 acres and a storage volume of 1,700 acre-ft.

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

The impoundment is located outside (on the river side) of the Mississippi River levee system. The top of embankment elevation of Pond 003 generally matches the elevation of the Mississippi River Levee.

1.3.3 Discharges from Pond 003

Process water discharged into Pond 003 flows from the north end of the impoundment through an open channel within the footprint. CCR is separated from the water through settling and decanting and flows to a concrete drop inlet structure at the southeastern end of the impoundment. Decant water is directed to a discharge pipe extending through the dike and into an earth lined discharge channel 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. 307 and the normal pool is generally at El. 299.

A. Top of Dam	309
B. Normal Pool	299
C. Spillway Crest	307
D. Upstream Water at Time of Inspection	301
E. Spillway Type	Concrete Drop Inlet with VCP
F. Spillway Invert	El. 282.8

1.3.5 Design and Construction Records

Pond 003 was constructed in 1972 to create a sedimentation and storage basin for fly ash and boiler slag. The dam was designed by Burns & McDonnell in 1970-1971.

1.3.6 Operating Records

Written operational records have not been historically maintained for the impoundment prior to the CCR Rule. AECI 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 the Pond 003. The following paragraphs describe the conditions of the dikes 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*

CCR has been staged to an elevation above the dam crest to the west and north, and above the water level for much of the upstream slope and the upstream slope was not observed at these locations. At locations where the upstream slope was observed, the slope appeared uniform, at an approximate 3H:1V slope, or flatter and protected from erosion and wave action. The top half of the slope was covered by grassy vegetation, some of which was overgrown. The bottom half of the slope, including below the water line, consisted of riprap. Isolated areas of the riprap contained vegetation less than about 3 ft in height. Misalignments, depressions, ruts, bulging, erosion, burrows or other signs of distress were not observed.

It should be noted that since the initial inspection, AECl relocated CCR that was staged to elevations above the dike when adjacent to the dike to other locations within the impoundment.

2.1.1.2 *Crest*

The crest of the western portion of the dike consists of a paved access road. This area of the dike crest also blends into the Mississippi River Levee crest. The crest of the eastern and southern portions of the dike consists of a gravel access road. The crest alignment appeared generally level, with no depressions, or irregularities observed. Minor rutting, less than 2 in. in depth, were observed on the gravel access road portion of the crest. This minor rutting was likely from vehicle traffic. The crest elevation was at approximately El. 310. Settlement or misalignment was not observed.

2.1.1.3 *Downstream Slope*

The downstream slope of the dike was generally graded to an estimated slope of about 3H:1V and healthy grass vegetation covered much of the slope. The western portion of the dam was also part of the Mississippi River Levee and was covered with grass about 6-10 in. in height. The grass appeared to be regularly mowed.

The downstream slope of the eastern and southern portion of the dike was graded to an approximate slope of 3H:1V, or flatter towards the north. Slope was covered in healthy grass cover about 8 to 12 in. in height and appeared to be regularly mowed. The downstream slope at the western portion of the south side was shared with the Lined Pond to the south, and that area of the Lined Pond was generally filled to the crest elevation. Therefore, there was no downstream slope at this location to observe. This area between Pond 003 and the Lined Pond was separated by an access road which is considered the western portion of the southern dam crest. The downstream slope consists of the Lined Pond which is lined with a Hyperflex© liner.

Misalignments, depressions, ruts, bulging, erosion, burrows or other signs of distress were not observed.

2.1.1.4 *Spillway and Emergency Spillway*

Two (2) 12 in. metal pipes discharge ash and water into the Unlined Ash Pond. Decant water flows out of Pond 003 through a concrete drop outlet at the southern end of the pond. The water level in the impoundment is controlled by concrete stop logs. Water flows over the stoplogs and into a 24 in. diameter discharge pipe to an unlined discharge channel that flows to the Mississippi River. 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. The discharge pipe was below the water level during the time of the site visit and was not visible.

No other emergency spillway exists.

2.1.1.5 *Downstream Area*

Downstream of the eastern portion of the dike mature trees exist within about 25 ft of the downstream toe of the dam. At the southern end of the eastern side, the trees exist within about 40 ft of the downstream toe of the dike. Between the toe of the dike and the trees, 12 in. to 36 in. tall grass existed during our inspection. During our site visit, we observed two (2) trees, approximately 30 in. diameter, which were dead and closest to the dike. Wet or soft spots were not observed.

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 003. 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. AECI installed a riprap cover over the upstream slope as well to provide protection of the slopes.

3. Impoundment Inspection Assessment and Recommendations

3.1 ASSESSMENT

We provide the following assessment of Pond 003. The following deficiencies were observed at Pond 003:

- Vegetation exceeding 6 in. in height on the upstream slope.
- Vegetation exceeding 6 in. in height on the downstream slope.
- Vegetation exceeding 6 in. in height within the riprap on the upstream slope.
- Two (2) dead trees within 50 feet of toe of downstream slope of the dike.
- Mature trees in the downstream area of the dam.

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.
- Cut the two (2) dead trees downstream of Pond 003.
- Monitor the mature trees downstream of Pond 003 for signs of decay and impact to the dike during the weekly and monthly inspections.
- Conduct a video inspection of outlet pipe from the drop inlet structures when flow is reduced to expose the downstream end of the pipe.

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 003 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, on the upstream slope, the top half of the slope was covered by grassy vegetation, some of which was overgrown. The bottom half of the slope, including below the water line, consisted of riprap. The downstream slope of the eastern and southern portion of the dike was graded to an approximate slope of 3H:1V, or flatter towards the north. Slope was covered in healthy grass cover about 8 to 12 in. in height and appeared to be regularly mowed. The southern portion of the impoundment shares a dike with an adjacent impoundment and is protected as well.

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

Although records on the construction of the Pond 003 are not available, the test borings and laboratory testing performed by Haley & Aldrich and others, 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 north, east and south downstream slopes had vegetation taller than 6 inches in height, but this higher vegetation was sporadic and not excessively high. On the upstream slopes, some vegetation was higher as well, some as high as 36 inches.

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

Pond 003 discharges through a concrete box intake structure located at the southeastern 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 structure was visible during our inspection. Regarding the 24-in. clay pipe, the pipe is buried below the dike and the downstream portion is submerged by the discharge channel. There were no signs of settlement or slope displacement above the pipe.

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:

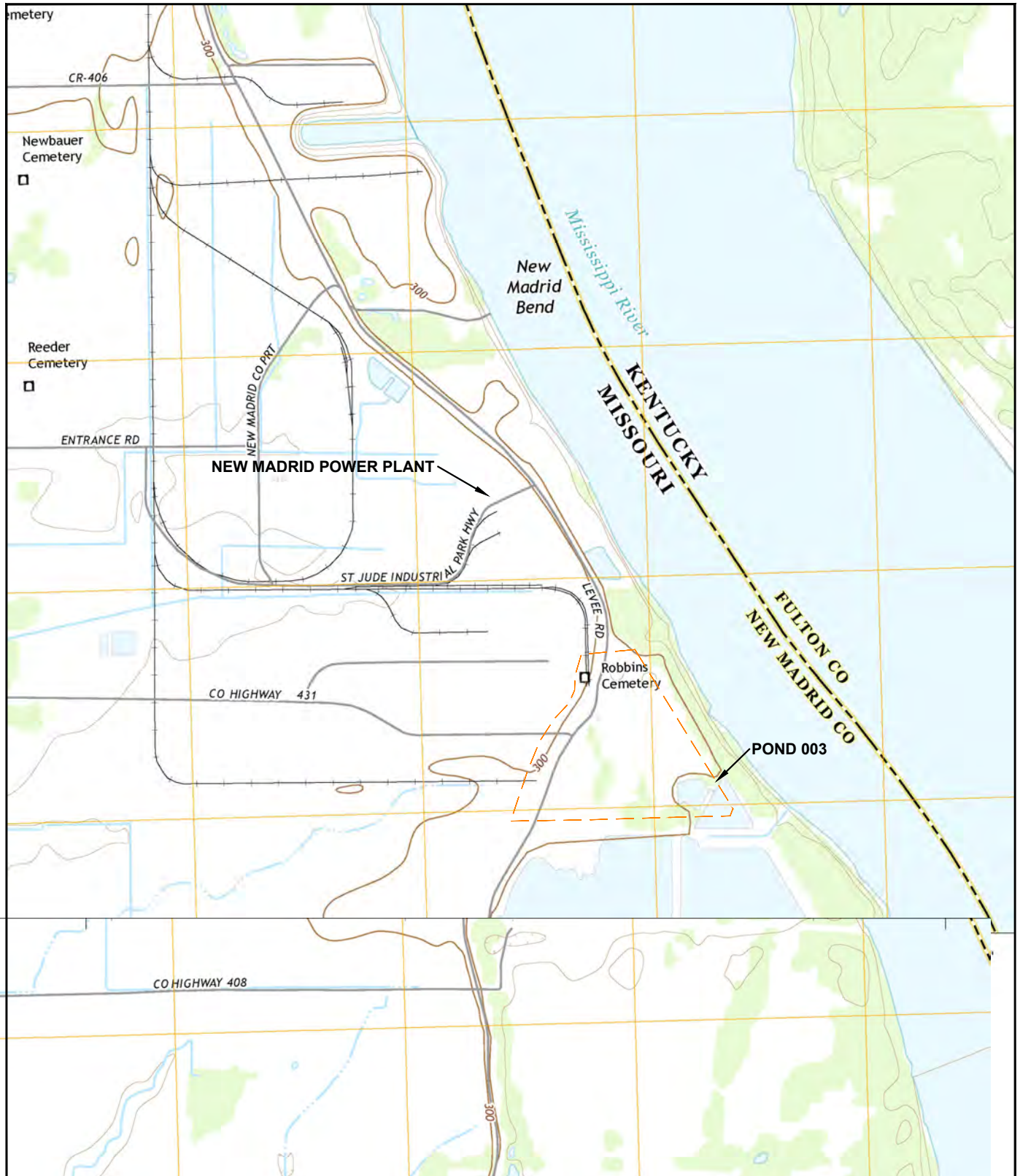
The Structural Stability Assessment did not identify any structural stability deficiencies for Pond 003.

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.

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

NORTH AMERICAN VERTICAL DATUM OF 1988



ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
POND 003
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\NMPONDS\FIGURES\ANNUAL INSPECTION 003\40616-300_003 FIG-2 SITE PLAN.DWG
Printed: 1/15/2016 2:43 PM Layout: SITE PLAN

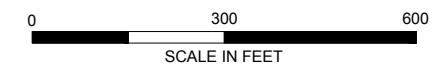


LEGEND

--- APPROXIMATE LIMITS OF POND 003

NOTES

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



**HALEY
ALDRICH**

ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
POND 003
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\POND\FIGURES\ANNUAL INSPECTION 003\40616-300_003 FIG-3 PHOTO LOCATION PLAN.DWG
Printed: 1/15/2016 2:42 PM Layout: PHOTO LOCATION PLAN

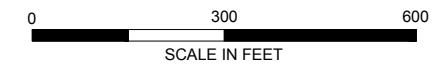


LEGEND

- APPROXIMATE LIMITS OF POND 003
- 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 003
NEW MADRID POWER PLANT
NEW MADRID, MO

PHOTO LOCATION PLAN

SCALE: AS SHOWN
JANUARY 2016

FIGURE 3

APPENDIX A

Photographs



Photograph No. 1
Pond 003 - two inlet pipes



Photograph No. 2
Pond 003
Crest and access road on northern embankment



Photograph No. 3
Pond 003
Downstream slope on eastern embankment



Photograph No. 4
Pond 003
Dead trees at downstream toe of eastern embankment



Photograph No. 5
Pond 003

Upstream slope with riprap and vegetation on eastern embankment



Photograph No. 6
Pond 003

Upstream slope of south end of eastern embankment with riprap and vegetation



Photograph No. 7

Pond 003

Vegetation at toe of downstream slope of south end of eastern embankment



Photograph No. 8

Pond 003

Downstream slope of southern embankment
Discharge channel at left



Photograph No. 9
Pond 003
Concrete drop inlet spillway with concrete stop logs



Photograph No. 10
Pond 003
Discharge Channel



Photograph No. 11
Pond 003
Crest on southern embankment



Photograph No. 12
Pond 003
Paved Crest on southern embankment



Photograph No. 13

Pond 003

Upstream slope on western embankment

Note vegetation growing on Ash stockpiled above water level to the right.



Photograph No. 14

Pond 003

Downstream slope of Mississippi River Levee/Unlined Ash Pond Dam

APPENDIX B

Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: <u>Pond 003</u>	STATE ID #: <u>MO-0001171</u>
REGISTERED: (YES/NO) <u>No</u>	NID ID #: <u>N/A</u>
STATE SIZE CLASSIFICATION: <u>N/A</u>	STATE HAZARD CLASSIFICATION: <u>TBD</u>
	CHANGE IN HAZARD CLASSIFICATION REQUESTED?: (YES/NO) _____
<u>DAM LOCATION INFORMATION</u>	
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° 30.4' N</u> LONG.: <u>89° 33.5' W</u>
DRAINAGE BASIN: <u>N/A</u>	RIVER: <u>Mississippi River</u>
IMPOUNDMENT NAME(S): <u>Unlined Ash Pond (003 Pond)</u>	
<u>GENERAL DAM INFORMATION</u>	
TYPE OF DAM: <u>Earthen Incised and Bermed</u>	OVERALL LENGTH (FT): <u>9300</u>
PURPOSE OF DAM: <u>Sedimentation and Storage Basin</u>	NORMAL POOL STORAGE (ACRE-FT): _____
YEAR BUILT: <u>1972</u>	MAXIMUM POOL STORAGE (ACRE-FT): <u>1707</u>
STRUCTURAL HEIGHT (FT): <u>20</u>	EL. NORMAL POOL (FT): <u>302.0</u>
HYDRAULIC HEIGHT (FT): <u>8</u>	EL. MAXIMUM POOL (FT): <u>307.0 (minimum crest elevation)</u>
RESERVOIR SURFACE AREA (ACRES): <u>110</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 003 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.: 302 EL. TAILWATER DURING INSP.: 302

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: Pond 003

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	None observed	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 Unlined Ash Pond. Therefore, the upstream slope was covered by ash and not visible for inspection.

NAME OF DAM: Pond 003

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 003

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: Two dead trees within 50 ft. of embankment.

NAME OF DAM: Pond 003

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	302	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 003

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 unable to be inspected. Downstream submerged in unlined creek.	X		
	INTAKE STRUCTURE	Decant structure with stoplogs	X		
	TRASHRACK	N/A	X		
	PRIMARY CLOSURE	N/A	X		
	SECONDARY CLOSURE	N/A	X		
	CONDUIT	N/A	X		
	OUTLET STRUCTURE/HEADWALL	Fair	X		
	EROSION ALONG TOE OF DAM	None	X		
	SEEPAGE/LEAKAGE	None	X		
	DEBRIS/BLOCKAGE	None	X		
	UNUSUAL MOVEMENT	None	X		
	DOWNSTREAM AREA	Regularly mowed. Woody vegetation along unlined creek	X		
MISCELLANEOUS					

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 003

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		
9. DOWNSTREAM HAZARD DESCRIPTION					
10. DATE OF LAST EAP UPDATE					

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 003

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	P-1 through P-3	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 003

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	Not observed	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: Outlet pipe unable to be inspected. Downstream end of outlet was submerged in unlined creek to Mississippi River.

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.