

**REPORT ON
PERIODIC STRUCTURAL STABILITY ASSESSMENT
POND 001 – CELL 004
THOMAS HILL ENERGY CENTER
CLIFTON HILL, MISSOURI**

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Associated Electric Cooperative, Inc.
Clifton Hill, Missouri

File No. 128064-022
October 2021





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15 October 2021
File No. 128064-022

Associated Electric Cooperative, Inc.
Thomas Hill Energy Center
5693 Highway F
Clifton Hill, Missouri 65244

Attention: Mr. Curtis Stundebek
Principal Engineer

Subject: Periodic Structural Stability Assessment
Pond 001 - Cell 004
Thomas Hill Energy Center
Clifton Hill, Missouri

Mr. Stundebek:

Enclosed please find our report on the Periodic Structural Stability Assessment (Assessment) for the Associated Electric Cooperative, Inc. (AECI) Pond 001 - Cell 004 (Cell 004) coal combustion residuals (CCR) surface impoundment located at the Thomas Hill Energy Center (THEC) in Clifton Hill, Missouri. This assessment is the 5-year update assessment from the initial version completed previously in October 2016.

We completed an inspection on behalf of AECI on 21 July 2021 and have completed this assessment as a follow up activity. 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) CCR Rule effective 19 October 2015 including subsequent revisions, specifically Code of Federal Regulations Title 40 (40 CFR) §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 Cell 004 surface impoundment and appurtenant structures; 2) visit the site to observe Cell 004; 3) evaluate whether the design, construction, operation, and maintenance of Cell 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 and remedial actions.

Associated Electric Cooperative, Inc.

15 October 2021

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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 'Steven F. Putrich', written over a horizontal line.

Steven F. Putrich, P.E.
Project Principal

Enclosures

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General

1.1 AUTHORITY

Haley & Aldrich, Inc. (Haley & Aldrich) has been contracted by Associated Electric Cooperative, Inc. (AECI) to perform the Periodic Structural Stability Assessment (Assessment) for the AECI Pond 001 – Cell 004 (Cell 004) coal combustion residuals (CCR) surface impoundment located at Thomas Hill Energy Center (THEC) in Clifton Hill, Missouri. This work was completed in accordance with the US Environmental Protection Agency’s (EPA’s) CCR Rule effective 19 October 2015 including subsequent revisions, specifically Code of Federal Regulations Title 40 (40 CFR) §257.73(d).

1.2 PURPOSE OF STRUCTURAL STABILITY ASSESSMENT

The purpose of this Structural Stability Assessment was to document whether the design, construction, operation, and maintenance of Cell 004 are consistent with recognized and generally accepted good engineering practices. This assessment is the 5-year update assessment from the initial version completed previously in October 2016.

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

Description and Operation of Cell 004

2.1 DESCRIPTION OF CELL 004

Cell 004 is a CCR surface impoundment located to the south of the Thomas Hill power plant. Cell 004 was originally designed by Burns & McDonnell in 1978-1979 and constructed shortly thereafter. It is understood that Cell 004 was modified in the 1980's.

Cell 004 is the final settling pond and stores decant water from Cell 003 and a limited quantity of CCR material. The impoundment is surrounded mostly by earthen berms on all sides except for a portion that is natural ground in the northwest corner and other dike abutment areas. Maximum embankment height is approximately 15 ft. Exterior slopes range from approximately 4H:1V to 5H:1V with some flatter areas. Interior slopes are typically 3H:1V. Crest width varies from approximately 14 to 16 ft.

The embankments are constructed from clay fill obtained from an on-site borrow source. The embankments are underlain by naturally deposited soft to stiff clay with trace sand and/or gravel, which is in turn underlain by weathered limestone, siltstone, or shale.

Cell 004 has a surface area of approximately 9.9 acres based on a normal operating water level of 700. Based on a comparison of the most recent survey performed in 2019 to the approximate topography prior dam construction, the approximate volume of water and CCR within the unit is 103 acre-ft. Cell 004 has a total storage capacity of approximately 162 acre-ft. based on a comparison of elevation 705 (dam low crest elevation) in the 2019 survey to the approximate topography prior to dam construction.

The outlet structure from Cell 004 consists of a rectangular concrete drop inlet tower equipped with 60-in. wide concrete stop logs. Decant water enters the structure and flows through a 48-in. diameter steel pipe that penetrates the Cell 004 south embankment and discharges from the NPDES-permitted Outfall #001 into a concrete open channel before flowing to the Middle Fork of the Little Chariton River.

The Cell 004 emergency spillway consists of an 18-ft wide riprap-lined channel which is approximately 2 ft in depth located across the crest of the south embankment. To provide vehicle access across the riprapped channel, the riprap has been topped off with a layer of crushed stone within the limits of access road.

2.2 OPERATION, MAINTENANCE, AND INSPECTION

Cell 004 and the other cells within the Pond 001 system are operated and managed by AECl personnel in accordance with AECl's "Operating and Management Plan" dated 14 December 2012 (Reference 1).

AECl personnel are conducting 7-day and annual inspections of the Cell 004 impoundment in accordance with EPA's Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257.83. In addition, the impoundment is inspected following heavy rain events. No instrumentation exists in the dike for the 30-day inspection.

Maintenance of Cell 004 includes regular mowing of grass, seeding of thinly vegetated areas, control of woody growth, repair of erosion as needed, repair of riprap as needed, maintenance of the outfall to the Middle Fork of the Little Chariton River, and inspection of the outlet structure and stoplogs.

Operation includes regulating water levels in the impoundment, regulating and monitoring wastewater discharge from Cell 003 into Cell 004, and regulating and monitoring flow from Cell 004 to the outfall to the Middle Fork of the Little Chariton River.

Structural Stability Assessment

3.1 REVIEW OF EXISTING INFORMATION

For this assessment, Haley & Aldrich reviewed multiple sources of information including:

- Report on the Initial Structural Stability Assessment performed by Haley & Aldrich in accordance with 40 CFR §257.73(d), dated October 2016
- Previous Annual Inspections performed by Gredell Engineering Resources in accordance with 40 CFR §257.83
- Report on the Initial Safety Factor Assessment performed by Haley & Aldrich in accordance with 40 CFR §257.73(e), dated October 2016
- Operating and Management Plan
- Topographic plans and aerial photos
- Construction drawings
- Subsurface information
- Geotechnical laboratory test results
- Slope stability evaluations
- Variety of other information in addition to verbal information provided by AECl during our Assessment.

Our review included, but was not limited to the references listed in Appendix C.

3.2 SITE VISIT AND FIELD OBSERVATIONS

On 21 July 2021, Haley & Aldrich visited Thomas Hill Energy Center to observe conditions at Cell 004, and to meet with AECl personnel to discuss operations and maintenance of the impoundment. Prior to the site visit, we reviewed previous annual inspection, and previous inspection reports referenced above and listed in Appendix C. At the time of our site visit, Cell 004 was in operation with water levels at the normal operating level.

3.3 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 visited the site to observe Cell 004. Based on our review of available information and observations during our 21 July 2021 site visit, 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 subsurface information, impoundment inspection reports, geotechnical laboratory test results, slope stability analyses, and observations during our 21 July 2021 site visit, Cell 004 was judged to have stable foundations. The Cell 004 embankments have not exhibited signs of excessive settlement, instability, or other signs of inadequate foundation support.

During the inspection, evidence of seepage was noted along the southwest embankment. This seep has been noted in previous weekly and annual inspections. Flowing water was not present at the site and there was no visible erosion or instability at the time of the inspection.

2. *§257.73(d)(1)(ii): Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown.*

Along the west embankment and northern half of the east embankment, the Cell 004 interior slopes are covered with vegetation for the full height of the slope. On all other interior slopes, riprap protection is provided on the lower 8 to 15 ft of the slope.

Based on observations during our 21 July 2021 site visit, the slope protection on the interior slopes was judged to provide adequate slope protection against surface erosion, wave action and adverse effects from sudden drawdown. The exterior slopes of Cell 004 are vegetated for the full height of the slopes and were judged to have adequate slope protection.

3. *§257.73(d)(1)(iii): Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.*

Construction records are not available for the Cell 004 embankments.

However, in 2010, Geotechnology, Inc. performed one test boring and one cone penetrometer sounding through the north embankment. In 2011, Geotechnology drilled one test boring through the south embankment and one boring at the exterior toe of the embankment. The borings and cone penetrometer were drilled through the embankment fill and into the underlying natural soils.

The subsurface explorations indicate the embankment fill in the north embankment consists of medium stiff to stiff clay with varying amounts of silt, sand, and gravel. In the south embankment, the borings encountered embankment fill generally consisting of medium stiff clay with varying amounts of gravel.

During our 21 July 2021 site visit, we observed no evidence of slope instability or other signs of inadequate compaction of the embankment fill. In addition, based on the information reviewed for this Structural Stability Assessment, there has been no historic evidence of slope instability or other signs of inadequate embankment compaction.

Based on our review of subsurface exploration logs and other available information on the Cell 004 embankments, as well as our observations during the 21 July 2021 site visit, we have concluded the fill used to construct the Cell 004 embankments was likely mechanically compacted.

4. *§257.73(d)(1)(iv): Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection.*

The vegetation on the interior and exterior slopes of Cell 004 was generally 12 to 48 inches in height at the time of our 21 July 2021 site visit.

5. §257.73(d)(1)(v)(A): *Spillway Erosion Protection – All spillways must be either: (1) Of non-erodible construction and designed to carry sustained flows; or (2) Earth- of grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.*

The primary spillway in Cell 004 consists of the concrete decant structure located in the south corner of the impoundment. The concrete construction is non-erodible and designed to carry sustained flows. A minor crack in the concrete apron at the downstream end of the outlet pipe was noted but did not appear to affect the performance of the outlet or cause instabilities.

The emergency spillway in Cell 004 consists of an 18-ft wide riprap-lined channel which is approximately 2 ft in depth located across the crest of the west dike. The emergency spillway channel was judged to have adequate erosion protection to withstand short-term, infrequent flows.

6. §257.73(d)(1)(v)(B): *Spillway Capacity – The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a: (1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or (2) 1000-year flood for a significant hazard potential CCR surface impoundment; or (3) 100-year flood for a low hazard potential CCR surface impoundment.*

The spillway capacity for the impoundment is required to be modeled and analyzed in accordance with §257.82 Hydrologic and Hydraulic Capacity Requirements for CCR surface impoundments. AECl has completed the Initial Inflow Design Flood Control System Plan and it is available on AECl's CCR compliance website. AECl will complete the Periodic Inflow Design Flood Control System Plan requirement under separate cover, consistent with the CCR Rule Preamble reference to the same section.

7. §257.73(d)(1)(vi): *Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.*

Cell 004 hydraulic structures include the rectangular concrete decant structure and outlet pipe. The decant structure was judged to be in good condition.

Flow entering the decant structure is conveyed through the Cell 004 embankment and discharges from the NPDES-permitted Outfall #001 into a concrete open channel before flowing to the Middle Fork of the Little Chariton River. The discharge pipe is buried within the embankment and is not visible. There are no signs of ground settlement above or around the pipe. No sediment or debris was observed at either end of the outlet pipe.

8. §257.73(d)(1)(vii): *For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.*

The only natural water body in the vicinity of Cell 004 is the Middle Fork of the Little Chariton River. Due to the limited size of the channel and the local topography, inundation of the Cell 004

downstream slopes by the Middle Fork of the Little Chariton River is not possible nor is a sudden drawdown condition.

9. §257.73(d)(2): *Identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures.*

See Section 4 of this report for a discussion of deficiencies and recommendations.

4. Impoundment Inspection Assessment and Recommendations

4.1 ASSESSMENT

The following deficiencies were observed at the Cell 004 Impoundment:

1. Vegetation along the crest of the embankment ranged from 6 to 18 inches in height.
2. Standing water observed in areas along the toe of slope on the downstream side of the southwest embankment indicative of seepage.
3. Woody vegetation observed near the southwest downstream slope of the cell.
4. Tall vegetation over 4 feet high was observed along upstream and downstream embankments as well as the downstream area.
5. A staff gage is not present for AECL to regularly document the water level in the unit.
6. Cell 004 signage was displaced and laying in grass.
7. A minor crack in the concrete apron at the downstream end of the discharge pipe was noted.

4.2 RECOMMENDATIONS

Haley & Aldrich recommends the following remedial measures:

1. Tall vegetation – Cut vegetation and maintain at the required maximum height per the regulations. Maintain in a manner to reduce and control woody vegetation.
2. Seeps – Evaluate the cause(s) of the seeps. Take appropriate measures to reduce seeps based on findings. Monitor and document the condition of the seeps while the cause(s) are evaluated, and longer-term measures are developed.
3. Woody Vegetation – Remove woody vegetation encroaching on embankments to prevent degradation of the embankment.
4. Tall vegetation – Cut vegetation and maintain at the required maximum height per the regulations. Maintain in a manner to reduce and control woody vegetation.
5. Staff gage – Install staff gage to document water level in unit.
6. Reinstall Cell 004 sign.
7. Continue to monitor the crack in the concrete at the Cell 004 discharge during future inspections.

5. Conclusions/Certification

Based on our review of the information provided to us and observations during our 21 July 2021 site visit, it is our opinion that the design, construction, operation, and maintenance of Pond 001 – Cell 004 at Thomas Hill Energy Center is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded in Cell 004.

I certify that the Periodic Structural Stability Assessment for AECI's Pond 001 – Cell 004 at the Thomas Hill Energy Center was conducted in accordance with the requirements of §257.73(d) of the USEPA's Final CCR Rule.

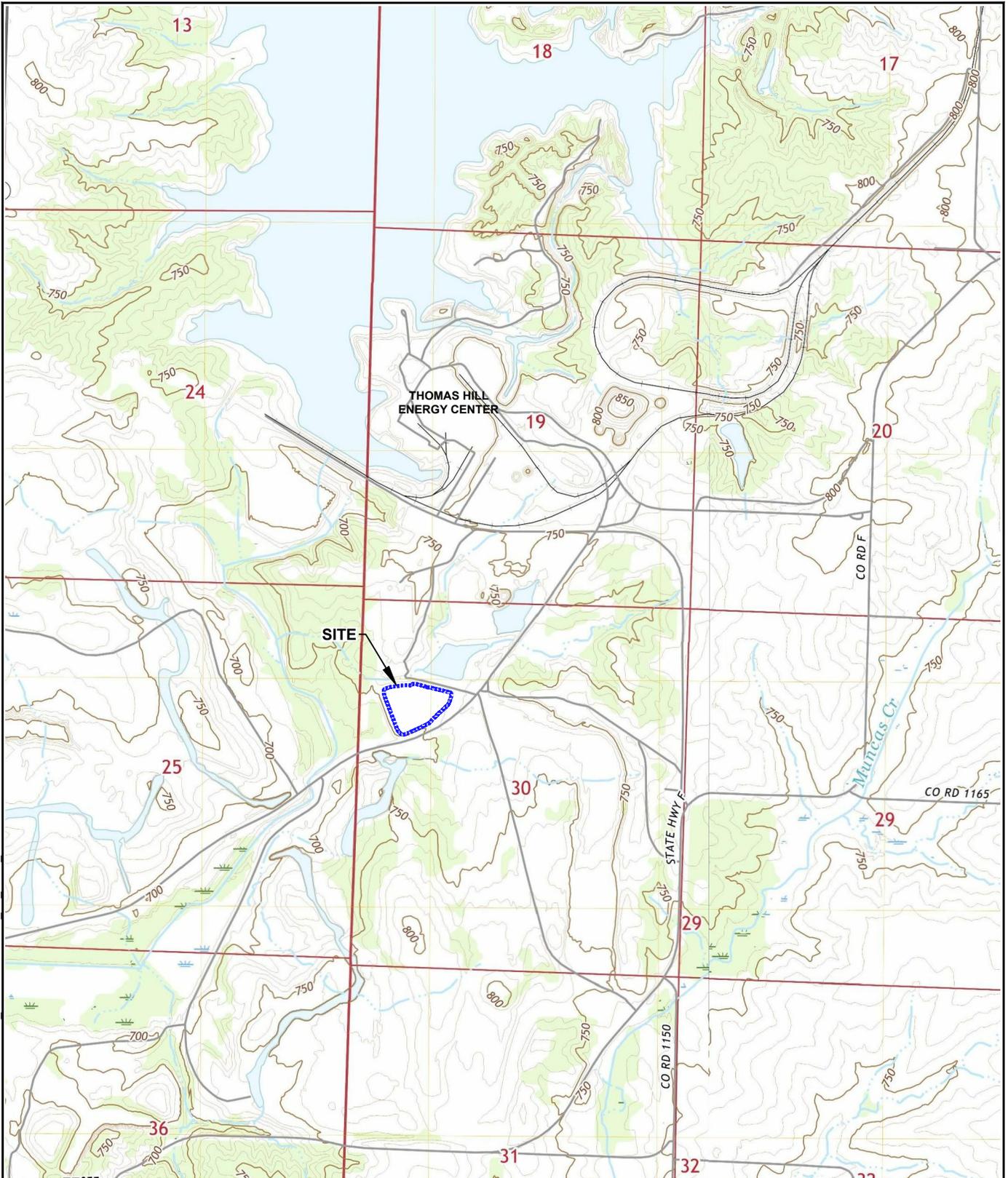
Signed: 
Certifying Engineer

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

Professional Engineer's Seal:



LUCAS, ANDY Printed: 9/28/2021 7:53 AM Layout: FIGURE 1
G:\128064-AECI THEC CCR SUPPORT\FIGURES\ANNUAL INSP. C004\128064-022_C4_FIG-1_PLM.DWG



MAP SOURCE:
PRAIRIE HILL AND COLLEGE MOUND QUADRANGLES
MISSOURI, 7.5-MINUTE SERIES, 2021



QUADRANGLE LOCATION

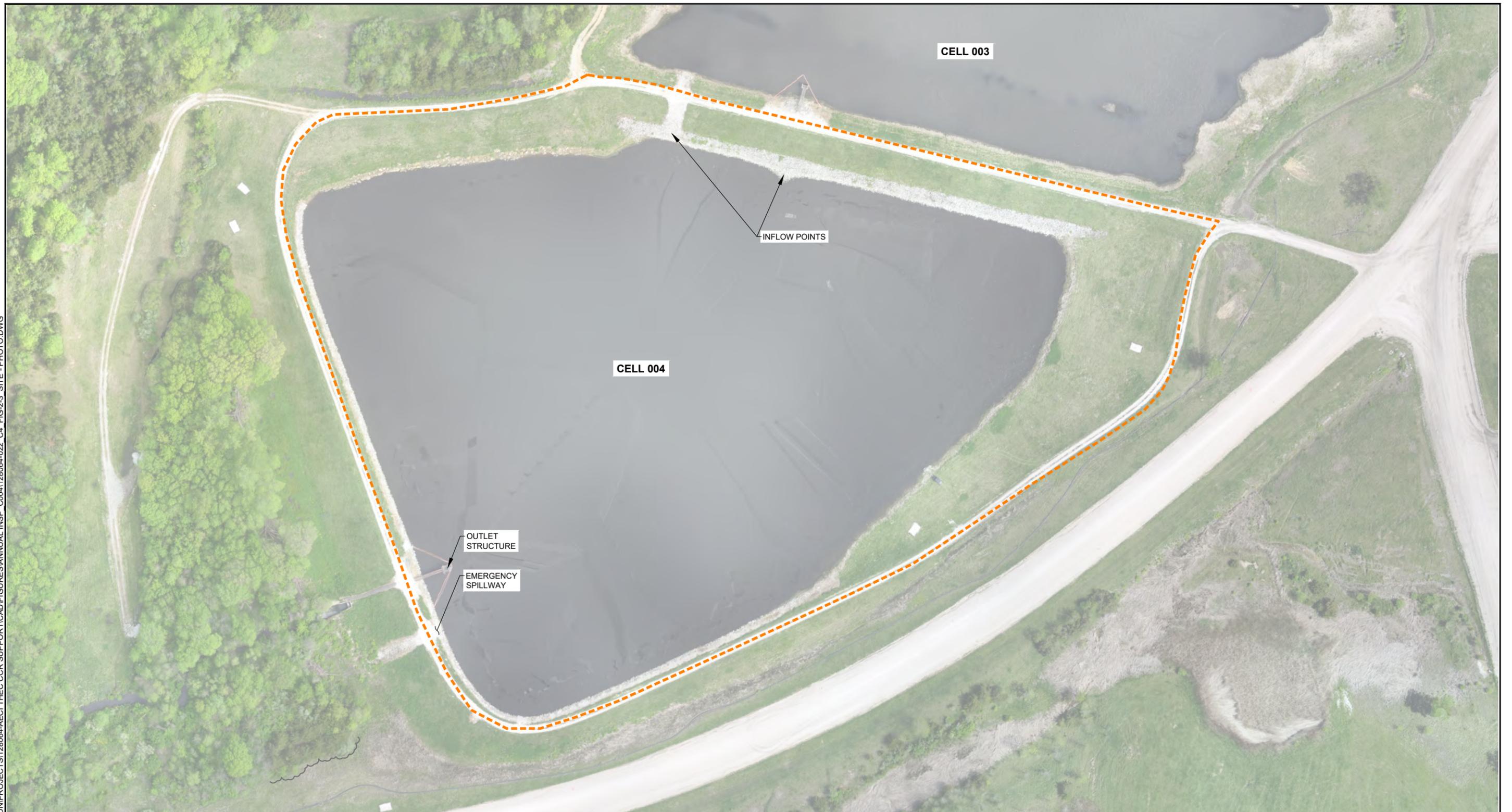


ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
ASSOCIATED ELECTRIC COOPERATIVE, INC.
THOMAS HILL ENERGY CENTER - CELL 004
CLIFTON HILL, MISSOURI

PROJECT LOCATION MAP

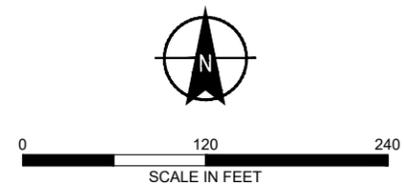
APPROXIMATE SCALE: 1IN = 2000 FT
AUGUST 2021

FIGURE 1



LEGEND
----- APPROXIMATE LIMITS OF CELL

- NOTES**
1. AERIAL IMAGE FROM HAMPTON, LENZINI, AND RENWICK, INC. (HLR), DATED MAY 08, 2019.
 2. LIMITS OF THE PONDS BASED ON EXISTING TOPOGRAPHY FROM ASSOCIATED ELECTRIC COOPERATIVE, INC. DATED AUGUST 2016. HORIZONTAL CONTROL IS BASED ON NAD83 ZONE 15N. VERTICAL CONTROL IS BASED ON NAVD88.

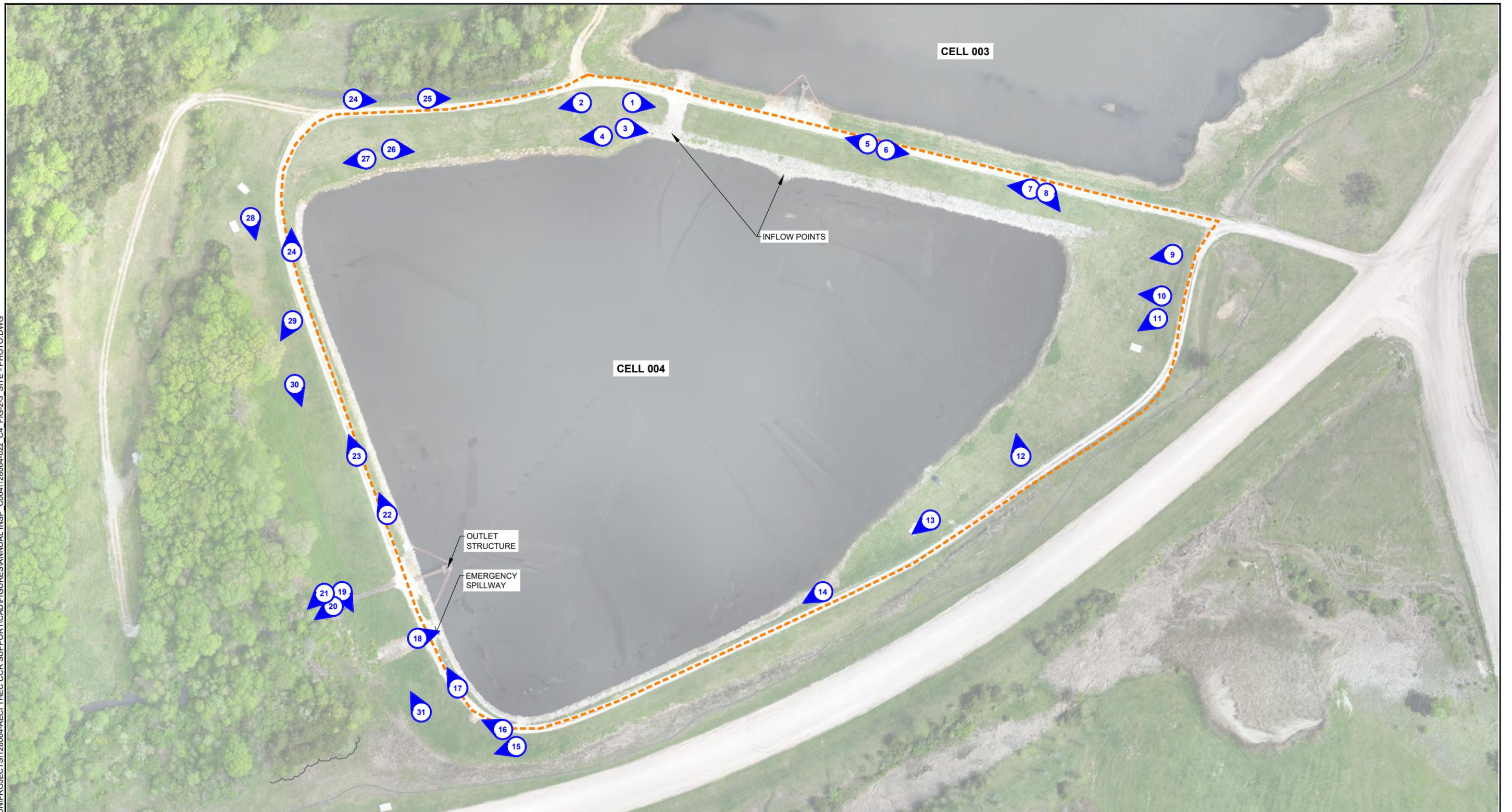


HALEY ALDRICH
ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
ASSOCIATED ELECTRIC COOPERATIVE, INC.
THOMAS HILL ENERGY CENTER - CELL 004
CLIFTON HILL, MISSOURI

SITE PLAN

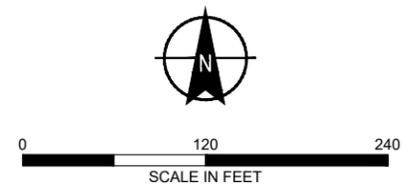
SCALE: AS SHOWN
AUGUST 2021

FIGURE 2



- LEGEND**
- APPROXIMATE LIMITS OF CELL
 - 1 PHOTO LOCATION/DIRECTION

- NOTES**
1. AERIAL IMAGE FROM HAMPTON, LENZINI, AND RENWICK, INC. (HLR), DATED MAY 08, 2019.
 2. LIMITS OF THE PONDS BASED ON EXISTING TOPOGRAPHY FROM ASSOCIATED ELECTRIC COOPERATIVE, INC. DATED AUGUST 2016. HORIZONTAL CONTROL IS BASED ON NAD83 ZONE 15N. VERTICAL CONTROL IS BASED ON NAVD88.

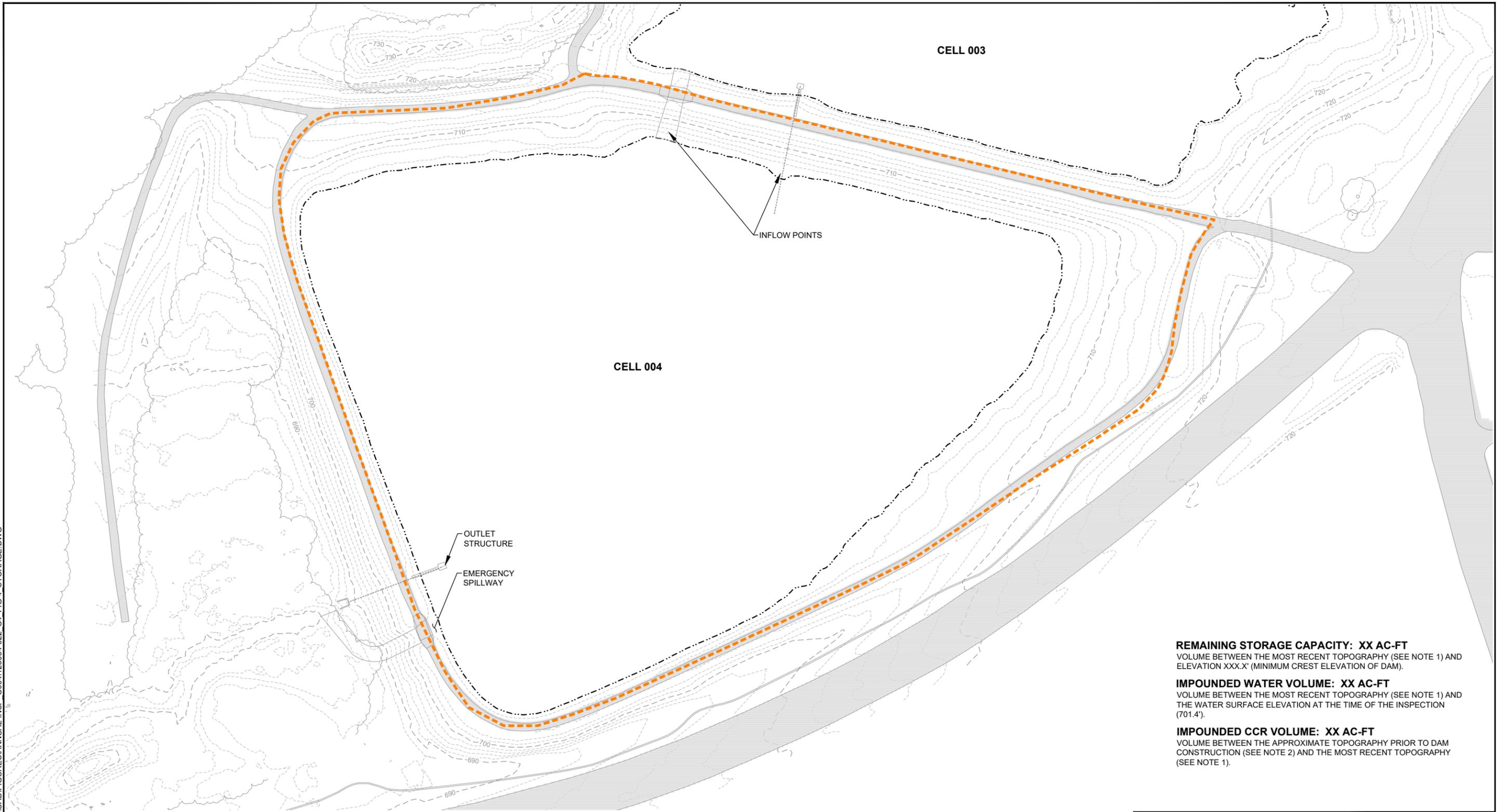


HALEY ALDRICH
 ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
 ASSOCIATED ELECTRIC COOPERATIVE, INC.
 THOMAS HILL ENERGY CENTER - CELL 004
 CLIFTON HILL, MISSOURI

PHOTO LOCATION PLAN

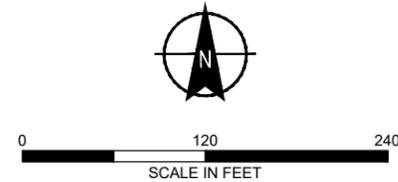
SCALE: AS SHOWN
 AUGUST 2021

FIGURE 3



LEGEND
- - - - - APPROXIMATE LIMITS OF CELL

- NOTES**
1. SURVEY BY HAMPTON, LENZINI, AND RENWICK, INC., (HLR) DATED MAY 08, 2019.
 2. LIMITS OF THE PONDS BASED ON EXISTING TOPOGRAPHY FROM ASSOCIATED ELECTRIC COOPERATIVE, INC. DATED AUGUST 2016. HORIZONTAL CONTROL IS BASED ON NAD83 ZONE 15N. VERTICAL CONTROL IS BASED ON NAVD88.



REMAINING STORAGE CAPACITY: XX AC-FT
VOLUME BETWEEN THE MOST RECENT TOPOGRAPHY (SEE NOTE 1) AND ELEVATION XXX.X' (MINIMUM CREST ELEVATION OF DAM).

IMPOUNDED WATER VOLUME: XX AC-FT
VOLUME BETWEEN THE MOST RECENT TOPOGRAPHY (SEE NOTE 1) AND THE WATER SURFACE ELEVATION AT THE TIME OF THE INSPECTION (701.4').

IMPOUNDED CCR VOLUME: XX AC-FT
VOLUME BETWEEN THE APPROXIMATE TOPOGRAPHY PRIOR TO DAM CONSTRUCTION (SEE NOTE 2) AND THE MOST RECENT TOPOGRAPHY (SEE NOTE 1).

HALEY ALDRICH
ANNUAL CCR SURFACE IMPOUNDMENT PE INSPECTION
ASSOCIATED ELECTRIC COOPERATIVE, INC.
THOMAS HILL ENERGY CENTER - CELL 004
CLIFTON HILL, MISSOURI

**STORAGE CAPACITY AND
IMPOUNDED CCR AND WATER
VOLUMES**

SCALE: AS SHOWN
AUGUST 2021

FIGURE 4

APPENDIX A

Photographs



Photo No. 1

Tall vegetation along downstream slope of Cell 003 embankment facing west



Photo No. 2

Vegetation greater than 1 ft along incised slope of northwest embankment



Photo No. 3

Tall vegetation at emergency spillway downstream slope of Cell 003 embankment



Photo No. 4

Tall vegetation along incised slope of northwest embankment



Photo No. 5

Aggregate surface atop Cell 003 embankment crest facing west



Photo No. 6

Aggregate surface atop Cell 003 embankment crest facing east



Photo No. 7

Vegetation along downstream slope of Cell 003 embankment facing northwest



Photograph No. 8

Vegetation along downstream slope of Cell 003 embankment facing southeast
Incised slope of Cell 004 eastern embankment shown in background



Photo No. 9
Sign labeling Cell 004 needs reinstalled



Photo No. 10
Monitoring well along east embankment



Photo No. 11
Vegetation greater than 1 ft along east embankment facing southwest



Photo No. 12
Vegetation greater than 1 ft along east embankment
Overview of Cell 003 embankment in background



Photo No. 13

Tall vegetation along upstream slope of incised east embankment facing southwest



Photo No. 14

Tall vegetation as well as bare spots along upstream slope of Cell 004 southeast embankment



Photo No. 15

Vegetation greater than 1 ft along downstream slope of southern Cell 004 embankment
East Ditch shown at left

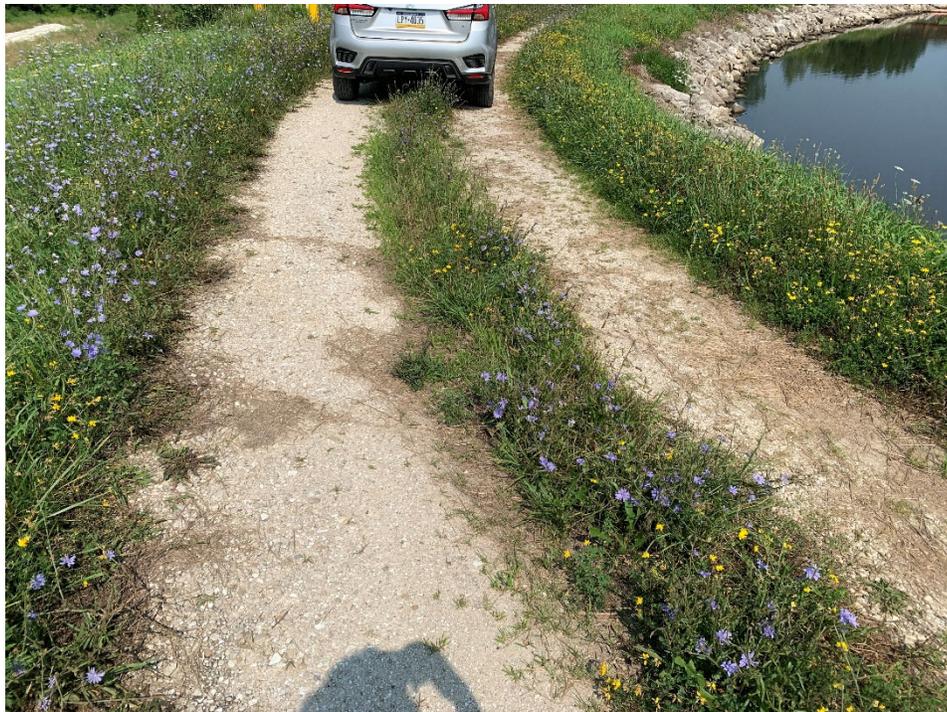


Photo No. 16

Aggregate surface and vegetation greater than 1 ft atop southern Cell 004 embankment



Photo No. 17

Vegetation greater than 1 ft and aggregate along upstream slope of Cell 004 embankment
Cell 004 outlet structure walkway shown in background



Photo No. 18

Cell 004 emergency spillway facing northeast



Photo No. 19

Downstream side of outlet pipe with headwall facing upstream



Photo No. 20

Downstream side of outlet pipe facing downstream



Photo No. 21

Crack in concrete apron along northwest slope of outlet discharge stream



Photo No. 22

Vegetation greater than 1 ft along upstream slope of Cell 004 southwest embankment



Photo No. 23

Aggregate surface and vegetation greater than 1 ft atop Cell 004 southwest embankment



Photo No. 24

Tall vegetation along downstream slope of Cell 004 northwest embankment



Photo No. 25

Tall vegetation along downstream slope of Cell 004 northwest embankment



Photo No. 26

Tall vegetation at upstream slope of Cell 004 northwest embankment facing northeast



Photo No. 27

Tall vegetation at upstream slope of Cell 004 northwest embankment facing southwest



Photo No. 28

Vegetation greater than 1 ft along downstream slope of Cell 004 west embankment



Photo No. 29

Woody vegetation near toe of slope at Cell 004 west embankment



Photo No. 30

Evidence of seepage at toe of slope along Cell 004 west embankment



Photo No. 31

Vegetation greater than 1 ft along downstream slope of Cell 004 west embankment

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APPENDIX B

Inspection Checklist

DAM SAFETY INSPECTION CHECKLIST

NAME OF DAM: <u>Pond 001 - Cell 004</u>	STATE ID #: <u>MO-0097675</u>
REGISTERED: (YES/NO) <u>No</u>	NID ID #: <u>N/A</u>
STATE SIZE CLASSIFICATION: <u>N/A</u>	STATE HAZARD CLASSIFICATION: <u>Low</u>
	CHANGE IN HAZARD CLASSIFICATION REQUESTED?: (YES/NO) _____
<u><i>DAM LOCATION INFORMATION</i></u>	
CITY/TOWN: <u>Clifton Hill, Missouri</u>	COUNTY/STATE: <u>Randolph / Missouri</u>
DAM LOCATION: <u>5693 Highway F, Clifton Hill, MO</u> (street address if known)	ALTERNATE DAM NAME: <u>N/A</u>
USGS QUAD.: <u>New Madrid, MO-KY</u>	LAT.: <u>39°32.5' N</u> LONG.: <u>92°38.4' W</u>
DRAINAGE BASIN: <u>N/A</u>	RIVER: <u>N/A</u>
IMPOUNDMENT NAME(S): <u>Cell 004</u>	
<u><i>GENERAL DAM INFORMATION</i></u>	
TYPE OF DAM: <u>Earthen Incised and Bermed</u>	OVERALL LENGTH (FT): <u>1,200</u>
PURPOSE OF DAM: <u>Sedimentation and Storage Basin</u>	NORMAL POOL STORAGE (ACRE-FT): <u>103</u>
YEAR BUILT: <u>1979</u>	MAXIMUM POOL STORAGE (ACRE-FT): <u>162</u>
STRUCTURAL HEIGHT (FT): <u>14</u>	EL. NORMAL POOL (FT): <u>700.0</u>
HYDRAULIC HEIGHT (FT): <u>12</u>	EL. MAXIMUM POOL (FT): <u>705.0</u>
RESERVOIR SURFACE AREA (ACRES): <u>12</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 001 - Cell 004 STATE ID #: MO-0097675

INSPECTION DATE: July 21, 2021 NID ID #: N/A

INSPECTION SUMMARY

DATE OF INSPECTION: July 21, 2021 DATE OF PREVIOUS INSPECTION: August 29, 2016

TEMPERATURE/WEATHER: Sunny, 78 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: N/A

EL. POOL DURING INSP.: 701.4 EL. TAILWATER DURING INSP.: N/A

PERSONS PRESENT AT INSPECTION

<u>NAME</u>	<u>TITLE/POSITION</u>	<u>REPRESENTING</u>
<u>Andy Lucas</u>	<u>Senior Engineer</u>	<u>Haley & Aldrich, Inc.</u>
<u>Matthew Krakora</u>	<u>Staff Engineer</u>	<u>Haley & Aldrich, Inc.</u>
<u>Curtis Stundebeck</u>	<u>Principal Engineer</u>	<u>AECI - Thomas Hill Energy Center</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

NAME OF DAM: <u>Pond 001 - Cell 004</u>		STATE ID #: <u>MO-0097675</u>	
INSPECTION DATE: <u>July 21, 2021</u>		NID ID #: <u>N/A</u>	
OWNER: ORGANIZATION	<u>AECI - Thomas Hill Energy Center, Inc.</u>	CARETAKER: ORGANIZATION	<u>AECI - Thomas Hill Energy Center, Inc.</u>
NAME/TITLE	<u>Jenny Jones</u>	NAME/TITLE	<u>Curtis Stundebeck</u>
STREET	<u>5693 Highway F</u>	STREET	<u>5693 Highway F</u>
TOWN, STATE, ZIP	<u>Clifton Hill, Missouri 65244</u>	TOWN, STATE, ZIP	<u>Clifton Hill, Missouri 65244</u>
PHONE	<u></u>	PHONE	<u></u>
EMERGENCY PH. #	<u></u>	EMERGENCY PH. #	<u></u>
FAX	<u></u>	FAX	<u></u>
EMAIL	<u>jjones@aeci.org</u>	EMAIL	<u>cstundebeck@aeci.org</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>0.26</u>	SPILLWAY DESIGN FLOOD (PERIOD/CFS)	<u>Unknown</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>No</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 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: July 21, 2021

NID ID #: N/A

EMBANKMENT (CREST)

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
CREST	1. SURFACE TYPE	Aggregate and grassy vegetation	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)	Grass vegetation up to 1 ft tall			X
	8. ABUTMENT CONTACT	N/A		X	

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: Juy 21, 201

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	Evidence of seepage along southwest toe of slope			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)	Areas vegetated by grasses and brush up to 4 ft tall			X
		Woody vegetation observed along the southwest embankment			X

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: July 21, 2021

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)	Areas vegetated by grasses and brush up to 3 ft tall			X

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: July 21, 2021

NID ID #: N/A

INSTRUMENTATION

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
INSTR.	1. PIEZOMETERS	Piezometers observed along downstream area	X		
	2. OBSERVATION WELLS	Wells observed along downstream area	X		
	3. STAFF GAGE AND RECORDER	None observed	X		
	4. WEIRS	None observed	X		
	5. INCLINOMETERS	None observed	X		
	6. SURVEY MONUMENTS	None observed	X		
	7. DRAINS	None observed	X		
	8. FREQUENCY OF READINGS	Quarterly	X		
	9. LOCATION OF READINGS	AECT's operating record	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 001 - Cell 004

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INSPECTION DATE: July 21, 2021

NID ID #: N/A

DOWNSTREAM AREA

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
D/S AREA	1. ABUTMENT LEAKAGE	N/A			
	2. FOUNDATION SEEPAGE	None observed	X		
	3. SLIDE, SLOUGH, SCARP	None observed	X		
	4. WEIRS	N/A	X		
	5. DRAINAGE SYSTEM	N/A	X		
	6. INSTRUMENTATION	N/A	X		
	7. VEGETATION	Areas vegetated by grasses and brush up to 5 ft tall			X
	8. ACCESSIBILITY	Difficult in some areas due to dense vegetation		X	

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: July 21, 2021

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 observed	X		
	SPILLWAY CONTROLS AND CONDITION	None observed	X		
	UNUSUAL MOVEMENT	None observed	X		
	APPROACH AREA	Fair	X		
	DISCHARGE AREA	Fair.	X		
	DEBRIS	None observed	X		
	WATER LEVEL AT TIME OF INSPECTION	701.4	X		

ADDITIONAL COMMENTS: _____

NAME OF DAM: Pond 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: July 22, 2021

NID ID #: N/A

OUTLET WORKS

AREA INSPECTED	CONDITION	OBSERVATIONS	NO ACTION	MONITOR	REPAIR
OUTLET WORKS	TYPE	Outlet pipe inspected at downstream. Crack noted in concrete apron	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. Crack observed in concrete apron of discharge channel		X	
	EROSION ALONG TOE OF DAM	None observed	X		
	SEEPAGE/LEAKAGE	None observed	X		
	DEBRIS/BLOCKAGE	None observed	X		
	UNUSUAL MOVEMENT	None observed	X		
	DOWNSTREAM AREA	Vegetation exceeding 6-in. Ground surface not visible in areas.	X		
	MISCELLANEOUS				

ADDITIONAL COMMENTS: _____

Note: Use additional sheets for additional outlets.

NAME OF DAM: Pond 001 - Cell 004

STATE ID #: MO-0097675

INSPECTION DATE: July 21, 2021

NID ID #: _____

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. Crack in concrete apron in discharge channel	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

References

References

1. Haley & Aldrich, Inc., "Initial Periodic Structural Stability Assessment, Pond 001 – Cell 004," dated 17 October 2016.
2. Gredell Engineering Resources, Inc., "Report: Pond 001, Cell 004 Professional Engineering Annual Inspection of CCR Impoundment," dated 2017, 2018, 2019, and 2020.
3. Burns & McDonnell, Various Construction Drawings, dated 1979 and 1984.
4. GEI Consultants, "Specific Site Assessment for Coal Combustion Waste Impoundments at Thomas Hill Energy Center," dated June 2011.
5. Geotechnology, Inc., "Global Stability Evaluation, Mine Waste and Ash Pond Embankments, AECI Facilities, Bee Veer and Thomas Hill, Missouri," dated 22 April 2010.
6. Geotechnology, Inc., "Slope Stability and Seepage Analysis, Ash Pond No. 3, Thomas Hill Energy Center," dated 3 February 2012.