GREDELL Engineering Resources, Inc.
ENVIRONMENTAL ENGINEERING LAND - AIR - WATER
Offices in Jefferson City, Kansas City Metro and Springfield, Missouri

August 30, 2018

Ms. Kim Dickerson
Associated Electric Cooperative, Inc.
Thomas Hill Energy Center – Power Division
5693 Highway F
Clifton Hill, Missouri 65244-9778

Re: Pond 001, Cell 2 Professional Engineering Annual Inspection of CCR Impoundment

Dear Ms. Dickerson:

GREDELL Engineering Resources, Inc. (Gredell Engineering) conducted the annual inspection by a qualified professional engineer of Pond 001, Cell 2 at Associated Electric Cooperative's (AECI) Thomas Hill Energy Center (THEC), as required by 40 CFR 257.83 (b) to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. This letter is the inspection report required by 40 CFR 257.83 (b) (2). Zachary Troesser, P.E., and Bruce Dawson, P.E., Principal Geotechnical Engineer, with Gredell Engineering, conducted an inspection of Pond 001, Cell 2 (Cell 2) between August 15 and 30, 2018. The inspection consists of a review of available information, on-site observation of the facility, and preparation of this report.

REVIEW OF AVAILABLE INFORMATION

Per 40 CFR 257.83 (b) (1), this inspection included:

> ***(i)*** *A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., CCR unit design and construction information required by §§ 257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under §§ 257.73(d) and 257.74(d), the results of inspections by a qualified person, and results of previous annual inspections).*

Gredell Engineering reviewed the following documents as part of this inspection:

- Pond 001, Cell 2 Professional Engineering Annual Inspection of CCR Impoundment dated September 5, 2017 by Gredell Engineering,
- Initial Periodic Structural Stability Assessment Pond 001 - Cell 002 dated 17 October 2016 by Haley & Aldrich of Cleveland, Ohio (Haley & Aldrich),
- Compliance Assistance for Clean Closure of Pond 001, Cell 2 West dated April 2018 by Gredell Engineering,
- Construction Modification Report for Ash Pond 001 Cell 2 East Basin dated October 2015 by Gredell Engineering,
- Construction Modification Report for Ash Pond 001 Cell 2 West Basin dated October 2015 by Gredell Engineering,
- Cell 2 - 2013/2014 Ash Pond 001 CCP Removal Project Construction Documents dated May 2013 by Gredell Engineering, and
- weekly inspection reports for 2017 and 2018 provided by AECI THEC.

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ON-SITE OBSERVATIONS

Per 40 CFR 257.83 (b) (1), this inspection included:

(ii) *A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures;*

There were no visually discernible signs of distress or malfunction of Cell 2 or its appurtenant structures at the time of this inspection.

(iii) *A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation.*

Cell 2 was divided into two basins in 2015; the basins are referred to as the east basin and west basin. The reinforced concrete inlet structure in the east basin appeared to be intact, stable, and properly aligned. There were no signs of concrete spalling or cracking that would impair structural integrity, there was no visible exposed reinforcing steel, and the structure appeared to be in correct vertical alignment. The water elevation in the inactive east basin was approximately 6 inches below the inlet structure weir elevation and no discharge was observed. The discharge end of the principal spillway pipe was submerged and could not be observed. Direct observation of the principal spillway discharge pipe will require confined space entry protocols and was not attempted during this inspection. The separation berm between the east and west basins acts as an emergency spillway with a crest elevation of 721 feet.

The primary discharge pipe for the west basin is a 15 inch corrugated metal pipe. The pipe is in excellent condition. The water elevation in the inactive west basin was approximately 8-feet below the invert of the primary outlet pipe and no discharge was observed. The separation berm between the east and west basins acts as an emergency spillway with a crest elevation of 721 feet.

Per 40 CFR 257.83 (b) (2), the following observations are noted:

(i) *Any changes in geometry of the impounding structure since the previous annual inspection;*

The embankment crest and slopes were of uniform line and grade. There was no discernible sag of the crest, or bulging of the embankment face. The downstream embankment was observed to be armored with a band of riprap near its toe. The riprap extended from about two to three feet above the water level to about one to two feet below the water level along the length of the embankment. (Cell 3 impounds water immediately downstream of Cell 2, at the toe of the Cell 2 embankment.) The riprap was placed to correct erosion and slumping as identified and recommended by the 2017 annual inspection.

(ii) *The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;*

There is no instrumentation of Cell 2.

(iii) *The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;*

Gredell Engineering is not aware of any minimum and maximum water level and CCR records for Cell 2. Cell 2 was divided into an east and a west basin by construction of an earthen separation berm in October 2015. All CCR was removed from the east basin in 2015, and the east basin is now a stormwater management feature and does not receive CCR. The west basin was placed in inactive status in October 2015 and CCR has been substantially removed from the west basin. The water level in the east basin at the time of this inspection was approximately elevation 716.5 feet, NAVD 88. The water level in the west basin at the time of this inspection was approximately elevation 709.9 feet, NAVD 88.

(iv) *The storage capacity of the impounding structure at the time of the inspection;*

The stormwater storage capacity of the east basin of Cell 2 is estimated to be 22 acre-feet at its principal spillway elevation, 716 feet. The stormwater storage capacity of the west basin of Cell 2 is estimated to be 45 acre-feet at its principal spillway elevation, 718 feet.

(v) *The approximate volume of the impounded water and CCR at the time of the inspection;*

The impounded water volume in the east basin of Cell 2 at the time of this inspection is estimated at 20 acre-feet. The impounded water volume in the west basin of Cell 2 at the time of this inspection is estimated at 2 acre-feet.

(vi) *Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures;*

There were no appearances of actual or potential structural weakness of the Cell 2 structures, nor any observed existing conditions disrupting or having the potential to disrupt the operation and safety of Cell 2 and its appurtenant structures.

(vii) *Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection.*

A band of riprap had been placed along the downstream toe of the embankment. The riprap extended from about two to three feet above the water level to about one to two feet below the water level along the length of the embankment. The riprap was placed to mitigate erosion and slumping along the waterline as identified and recommended by the 2017 annual inspection.

Per 40 CFR 257.83 (b) (5):

> *If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.*

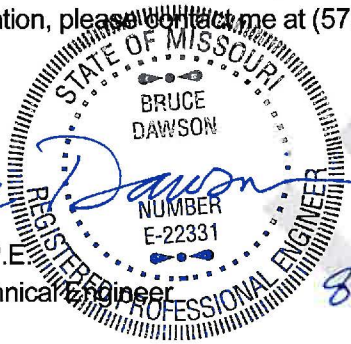
No visual evidence of a deficiency or release was identified during the course of this inspection.

GENERAL COMMENTS and RECOMMENDATIONS

Cell 2 currently has no instrumentation for determining water elevation. We recommend installing instrumentation to facilitate water elevation measurements during weekly, annual, and other inspections. The instrumentation may consist of installation of a staff gauge, placarding or inscribing the "top of box" elevation at the principal spillway discharge structure, or similar devices.

This concludes the 2018 annual inspection by a qualified professional engineer of Pond 001, Cell 2 at Associated Electric Cooperative's Thomas Hill Energy Center, as required by 40 CFR 257.83 (b). Gredell Engineering appreciates this opportunity to serve AECI THEC. If you have any questions or require additional information, please contact me at (573) 659-9078.

Sincerely,



Bruce Dawson, P.E.
Principal Geotechnical Engineer

8/30/18

C: Thomas R. Gredell, P.E., President