GREDELL Engineering Resources, Inc.

ENVIRONMENTAL ENGINEERING LAND - AIR - WATER

Offices in Jefferson City, Kansas City Metro and Springfield, Missouri

August 30, 2019

Mr. Ryan Bennett
Associated Electric Cooperative, Inc.
Thomas Hill Energy Center – Power Division
5693 Highway F
Clifton Hill, Missouri 65244-9778

Re: Pond 001, Cell 3 Professional Engineering Annual Inspection of CCR Impoundment

Dear Mr. Bennett:

GREDELL Engineering Resources, Inc. (Gredell Engineering) conducted the annual inspection by a qualified professional engineer of Pond 001, Cell 3 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., Geotechnical Engineer, with Gredell Engineering, conducted an inspection of Pond 001, Cell 3 between August 23 and 30, 2019. 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 3 Professional Engineering Annual Inspection of CCR Impoundment, dated August 30, 2018 by Gredell Engineering,
- Initial Annual CCR Surface Impoundment PE Inspection Ash Pond 001 – Cell 001, Cell 002, Cell 003, Cell 004 dated January 19, 2016 by Curtis Stundebeck, P.E.,
- Initial Periodic Structural Stability Assessment Pond 001 - Cell 003 dated 17 October 2016 by Haley & Aldrich of Cleveland, Ohio (Haley & Aldrich),
- Inflow Design Flood Control System Plan Pond 001 – Cell 003 dated 16 October 2016 by Haley & Aldrich,
- History of Construction – Cell 003 Associated Electric Cooperative, Inc. dated 16 October 2016 by Haley & Aldrich,
- Site Plan Drawing Y6, Revision 2 dated December 1, 1978 by Burns & McDonnell of Kansas City, Missouri,
- Proposed Pond 001 Slag Removal Project construction documents dated April 2011 by Gredell Engineering,
- Cell 3 2013 Ash pond 001 CCP Removal Project, AECI THEC construction documents dated May 2013 by Gredell Engineering, and

- weekly inspection reports for 2018 and 2019 provided by AECI THEC.

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 Pond 001 Cell 3 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.*

The reinforced concrete principal spillway inlet structure of Cell 3 appeared to be intact, stable, and properly aligned. The structure displayed 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 and horizontal alignment. The discharge end of the principal spillway pipe is submerged in Cell 4 and was not observed. Direct observation of the principal spillway discharge pipe will require confined space entry protocols and was not attempted during this inspection. The emergency spillway crosses the berm and top-of-berm roadway just west of the principal spillway and was observed to be in good condition and had been reinforced with dense graded aggregate since the last annual inspection.

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, slumping, bulging or other geometric indications of adverse embankment or embankment foundation performance. Dense graded aggregate base with a top size of about 3-inches appeared to have been placed within the emergency spillway recently; the spillway height is about 1.3 feet below the typical dam crest elevation.

(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 3.

(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 3. The water level in Cell 3 was approximately elevation 712.6 feet, NAVD 29. CCR was submerged, except in the northwest corner of the pond where a minor amount of CCR was observed, and no direct indication of CCR depth was available.

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

The estimated storage volume between the observed water surface elevation and emergency spillway elevation is 30 acre-feet.

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

Gredell Engineering is not aware of any record information that would provide a basis for estimating the volume of Cell 3. The Initial Annual CCR Surface Impoundment PE Inspection by Curtis Stundebeck, P.E. reports an approximate total volume for Cell 3 of 160 acre-feet. CCR was primarily submerged and no direct indication of CCR depth was available. Based on reported CCR removal operations at the northwest corner of Cell 3 and previous CCR removal records for Cell 3, the estimated CCR volume in Cell 3 is 45 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 3 structures. However, the modified emergency spillway crest will reduce the freeboard during major storm events should the primary outlet structure fail. There were no other observed existing conditions disrupting or having the potential to disrupt the operation and safety of Cell 3 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.*

None observed.

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

The emergency spillway elevation has been slightly increased since the last annual inspection. We recommend removing the recently placed aggregate base such that the emergency spillway maximum elevation is a minimum of two feet lower than the dam's crest elevation.

A few burrows were observed along the perimeter of Cell 3 and a muskrat was observed swimming in Cell 3 during our annual inspection. THEC indicated they have worked with U.S. Fish & Wildlife Service to relocate muskrats in the past. We recommend continuing to work with the U.S. Fish & Wildlife Service to capture muskrats and relocating them to a suitable location off site.

Cell 3 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 2019 annual inspection by a qualified professional engineer of Pond 001, Cell 3 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,

8/30/19

Zachary Troesser, P.E.
Geotechnical Engineer

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

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