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

September 5, 2017

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). Bruce Dawson, P.E., Principal Geotechnical Engineer with Gredell Engineering, conducted an inspection of Pond 001, Cell 2 (Cell 2) between August 23 and 28, 2017. 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:

- a prior annual inspection report dated January 19, 2016 by Curtis Stundebeck, P.E.,
- Initial Periodic Structural Stability Assessment Pond 001 - Cell 002 dated 17 October 2016 by Haley & Aldrich of Cleveland, Ohio (Haley & Aldrich),
- 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 2016 and 2017 provided by AECI THEC.

ON-SITE OBSERVATIONS

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

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Jefferson City, Missouri 65101-4826

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(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.*

The reinforced concrete inlet structure near the southeast corner of Cell 2 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. Direct observation of the principal spillway discharge pipe will require confined space entry protocols and was not attempted during this inspection. The discharge end of the principal spillway pipe was submerged and could not be observed. The emergency spillway pipe is located near the southwest corner of Cell 2 and was observed to be in excellent condition where exposed upstream and downstream.

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. Intermittent slumping of the downstream embankment face was observed just above the downstream water level along approximately half of the length of downstream embankment face. (Cell 3 impounds water immediately downstream of Cell 2, at the toe of the Cell 2 embankment.) This slumping presents as an intermittent series of short scarps and a relatively flat bench just above water level. The condition appears similar to rapid drawdown slumping and is common to earthen embankments. Some of the scarps were vegetated, indicating they may have occurred one or more growing seasons prior, while others were sparsely vegetated, indicating they may be more recent. This condition was not noted in the prior annual inspection report dated January 19, 2016 by Curtis Stundebeck, P.E., nor the prior structural stability assessment dated October 2016 by Haley & Aldrich of Cleveland, Ohio.

(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. The water level in Cell 2 at the time of this inspection was approximately elevation 715.5 feet, NAVD 88. 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 no longer receives CCR. Runoff collected in the west basin is currently pumped to Pond 001 Cell 3. The west basin was impounding a negligible depth and volume of stormwater runoff at the time of this inspection. There are small, scattered areas of CCR of negligible to minor volume in the west basin.

(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 east basin of Cell 2 is estimated to be 42 acre-feet at the crest of the separation berm between the east and west basin, 720 feet. The stormwater storage capacity of the west basin of Cell 2 is estimated to be 55 acre-feet at the principal spillway elevation, 716 feet. The stormwater storage capacity of the west basin of Cell 2 is estimated to be 72 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 1 acre-foot.

(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.*

Intermittent slumping of the downstream embankment face was observed just above the downstream water level along approximately half of the length of downstream embankment face. (Cell 3 impounds water immediately downstream of Cell 2, on the toe of the Cell 2 embankment.) This slumping presents as an intermittent series of short scarps and a relatively flat bench just above water level. The condition appears similar to rapid drawdown slumping and is common to earthen embankments. Some of the scarps were vegetated, indicating they may have occurred one or more growing seasons prior, while others were sparsely vegetated, indicating they may be more recent. This slumping effectively steepens the embankment slope, and may gradually remove more material, leading to localized slides that reduce embankment stability and can be difficult to repair.

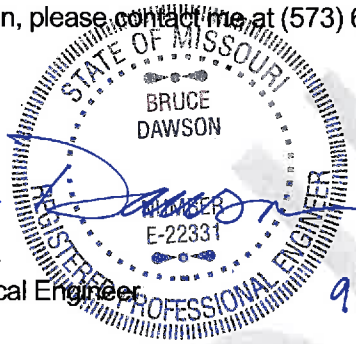
(5) *If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.*

We consider the described slumping and related short scarps along the downstream embankment face to require remedial action. Due to the currently limited extent of material loss and intermittent appearance of slumps, it is reasonable to "spot repair" the slumped areas. Since the slumping may be triggered by fluctuations in water level during rainy seasons, we recommend installing rip-rap stabilization at slumped areas with scarps taller than about one foot, and completing this maintenance before the end of winter 2017-2018. A similar rip-rap stabilization system should be programmed for construction along the entire downstream embankment toe as soon as practical.

GENERAL COMMENTS and RECOMMENDATIONS

This concludes the 2017 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,



9/5/17

Bruce Dawson, P.E.
Principal Geotechnical Engineer

C: Thomas R. Gredell, P.E., President w/o enclosure