PERIODIC STRUCTURAL STABILITY ASSESSMENT

UNIT 2/3 BOTTOM ASH POND

Charles R. Lowman Power Plant

October 15, 2021

PREPARED FOR

PowerSouth Energy Cooperative
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PREPARED BY

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REFERENCES

CDG Engineers and Associates Inc. (2021). *Periodic Safety Factor Assessment: Coal Combustion Residuals Impoundment Embankments: Charles R. Lowman Power Plant*. Andalusia, AL.

CDG Engineers and Associates, Inc. (2016). *History of Construction Unit 2/3 Bottom Ash Pond*: *Charles R. Lowman Power Plant*. Andalusia, AL.

CDG Engineers and Associates, Inc. (2021). *Inflow Design Control Plan Unit 2/3 Bottom Ash Pond, Charles R. Lowman Power Plant.* Andalusia, AL.

1.0 UNIT 2/3 BOTTOM ASH POND

1.1 Operator Information

Name: Unit 2/3 Bottom Ash Pond

Owner/Operator: PowerSouth Energy Cooperative, Inc.
Charles R. Lowman Power Plant
Leroy, AL 36458

State ID: None Assigned

1.2 Location

The Unit 2/3 Bottom Ash Pond is located in Section 18, Township 6N, Range 2 East in Washington, County Alabama and more specifically on the Western bank of the Tombigbee River. Figures 1 and 2 of this report show the location of the Pond.

1.3 Statement of Purpose

The Unit 2/3 Bottom Ash Pond was previously used as a settling pond for CCR wastes containing bottom ash, fly ash, and other plant wastes. CCR waste is no longer placed in the Unit 2/3 Bottom Ash Pond.

1.4 Foundation and Embankments

The Unit 2/3 Bottom Ash Pond was constructed in 1975-1979 in conjunction with Units 2 and 3 of the Charles R. Lowman Power Plant. Based on a review of the available documentation, the Unit 2/3 Bottom Ash Pond was constructed by excavating below the original ground surface and placing the excavated soils as fill to form the pond floor and surrounding embankments. The original ground surface within the pond area ranged from ±EL 12' to EL 30'. Plans indicate that the pond was excavated to EL 13' and returned to EL 15' with a soil fill described as Type "A" embankment material. Two feet of Type "A" embankment material was also placed on the interior slopes of the embankment.

The Unit 2/3 Bottom Ash Pond contains exterior embankments located on its southern and western sides. A shared, interior embankment is located to the north adjacent to the FGD Waste Pond. A shared, interior embankment is located to the east adjacent to the Unit 1 Bottom Ash Pond which serves as the Plant's entrance road. The plans indicated that the embankments were constructed with Type "B" embankment material.

Based on soil boring information, the foundation soils underlying the embankments consist of Low Terrace Deposits and Coastal Plain Deposits. Low Terrace Deposits are water-deposited soils typically resulting from meanderings of rivers and streams. The Charles R. Lowman Power Plant is located along the western bank of the Tombigbee River. Therefore, the Terrace Deposits at this site appear to have resulted from meanderings and flooding of the Tombigbee River.

A toe embankment was constructed along the exterior face of the western embankment in 2015. The toe embankment is approximately 13 feet wide and a maximum of 16 feet in height extending to ±EL 38'. The embankment face was constructed on a ±2.5(H):1(V) inclination or flatter with select, structural fill. The structural fill was placed in thin lifts with individual lifts being moisture conditioned, compacted and tested to ensure a high consistency. The exterior slope of the toe embankment was lined with rip-rap to minimize the potential for erosion and sloughing during flood events of the Tombigbee River

Based on operational parameters provided by the owner, historical construction data and recent engineering analysis, it is our opinion that the Unit 2/3 Bottom Ash Pond exhibits suitable stability for its anticipated maximum CCR and CCR wastewater levels. For further information on foundations and embankments refer to the *Periodic Safety Factor Assessment*, dated October 2021.

1.5 Slope Protection and Vegetation

All Unit 2/3 Bottom Ash Pond slopes are comprised of compacted embankment fill material and rip-rap lined. Rip-rap lining is such that erosion due to surface flows and wave action is resisted and the erosive effects are minimal.

For further information on slope protection and vegetation refer to the *History of Construction Unit 2/3 Bottom Ash Pond*, dated October 2016.

1.6 Spillways and Diversion Systems

There is one inflow into the Unit 2/3 Bottom Ash Pond. All water leaving the pond is currently being treated in a CCR impoundment dewatering treatment system. As such, water from the FGD Waste Pond is being pumped to the Unit 2/3 Bottom Ash Pond for treatment. This inflow is achieved via a temporary diesel powered transfer pump with a flow of 900gpm.

The Unit 2/3 Bottom Ash Intake structure is capable of adequately managing the flow from the 1000-yr flood event. The Unit 2/3 Bottom Ash Intake allows for a maximum hydraulic grade (HGL) of 36.9' MSL. This maximum HGL leaves a freeboard of 5.1' in the pond.

There are no hydraulic structures passing through or under any of the pond structural berms.

For further information on spillways and diversion systems refer to the *Inflow Design Control Plan Unit 2/3 Bottom Ash Pond*, dated October 2021.

1.7 Periodic Safety Factor Assessments

State regulations [ADEM Admin. Code 335-13-15-.04(4)(e)] require that the stability of CCR impoundment embankments be periodically evaluated. A stability evaluation was conducted on the exterior embankments associated with the Unit 2/3 Bottom Ash Ponds and is detailed in the *Periodic Safety Factor Assessment*, dated October 2021.

The evaluation indicates that the embankments exhibit factors of safety that equal or exceed the required minimum values under the maximum storage pool, maximum surcharge pool and seismic loading scenarios. Additionally, the embankment soils are demonstrated not to be susceptible to liquefaction, and further analyses under the liquefaction loading scenario is not required. Therefore, the embankments are in compliance with the periodic safety factor assessment requirements. The following table summarizes the results of our analyses.

Table 1: Summary of Analyses Results – Unit 2/3 Bottom Ash Pond			
Loading Condition	**Calculated Minimum Factor of Safety**	**Required Factor of Safety**	**Conforms to Regulations**
Long-Term Maximum Storage Pool	2.2	1.5	Yes
Maximum Surcharge Pool	2.1	1.4	Yes
Seismic	4.9	1.0	Yes
Liquefaction	6.4	1.2	Yes

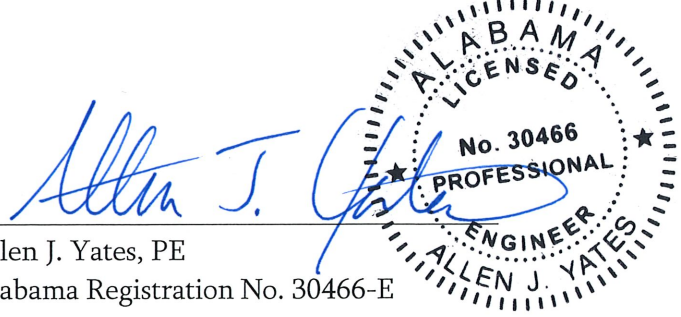
For further information on the Unit 2/3 Bottom Ash Pond safety factor assessments please refer to the *Periodic Safety Factor Assessment*, dated October 2021.

The potential for instability in the exterior Unit 2/3 Bottom Ash Pond embankments was evaluated based on loading associated with rapid drawdown. This potential scenario would involve flooding of the Tombigbee River followed by a subsequent rapid drop in water elevation as the flood waters subside. Based on available data (USGS, Station 02470050), the maximum recession rate of the flood waters occurs relatively slowly at approximately 2.5 feet per day. Excess pore pressures within the primarily granular berm soils are able to dissipate due to the slow drop in flood waters. Therefore, a rapid drawdown condition does not develop within the exterior embankment and further analysis is not warranted.

1.8 Engineer's Certification

The findings in this report were developed from visual observations made by CDG personnel during the preparation of this report and its supporting documents. If significant changes are made to the use of the upstream and downstream areas or capacity of the impoundments, CDG should be allowed to review our findings in light of the changes to determine if an alternate hazard potential classification is warranted.

I hereby certify that, in my professional judgement, the components of this document and associated work satisfy the applicable requirements set forth in ADEM Admin. Code r. 335-13-15.04(4)(d) and 40 CFR 257.73(d) and are consistent with generally accepted professional engineering principles and practices. The information submitted herein, to the best of my knowledge and belief, is true, accurate and complete.



Allen J. Yates, PE
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10/15/2021
Date

Appendix A

Project Maps

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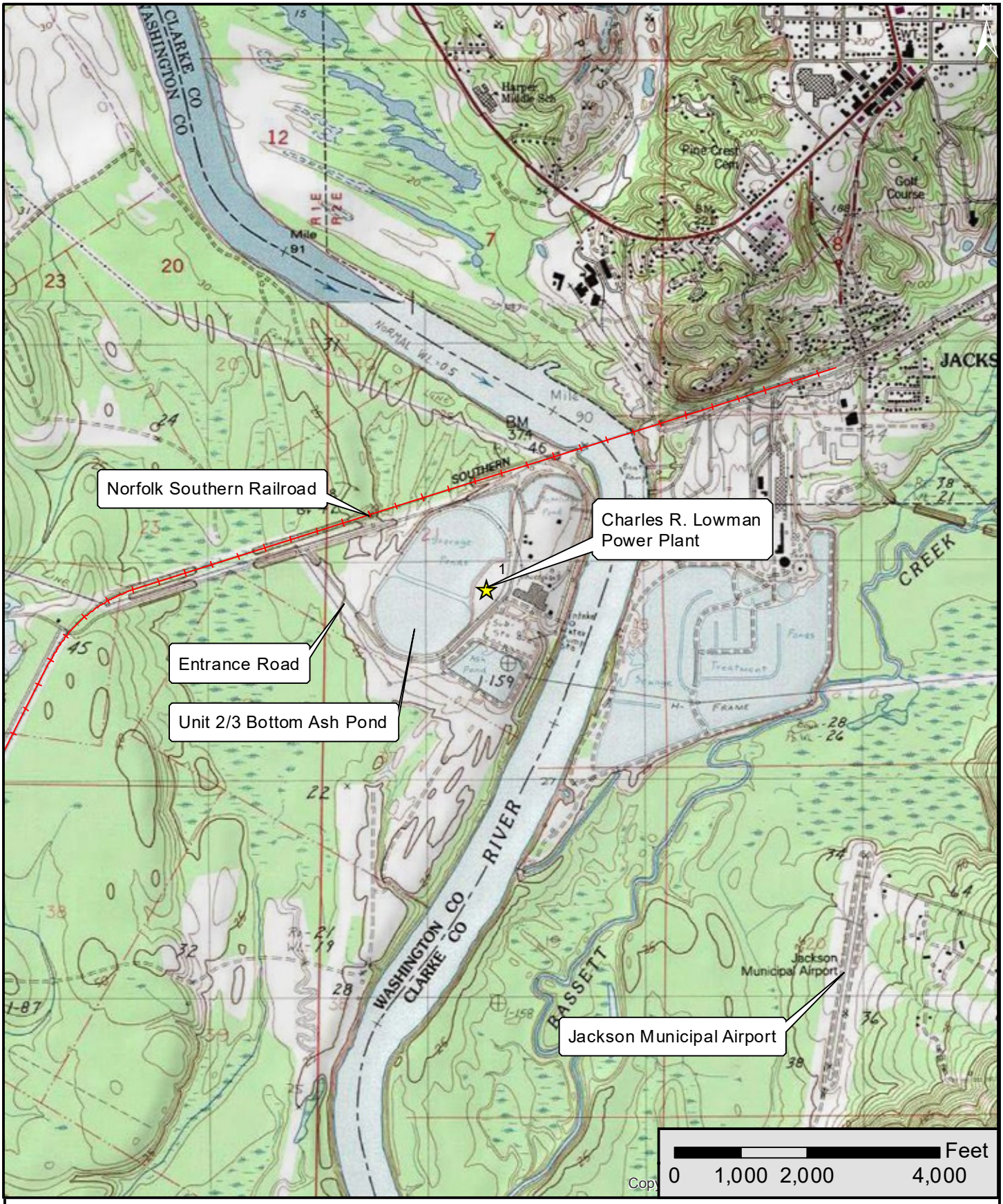

Figure 1 - Unit 2/3 Bottom Ash Pond Location Map

Charles R. Lowman Power Plant
PowerSouth Energy Cooperative
Leroy, AL

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Aerial Map of Impoundments

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Drawn By:	JRA
Checked By:	RDW
Date:	OCTOBER 2021