PowerSouth Energy Cooperative

Charles R. Lowman Power Plant Leroy, AL

Structural Stability Summary Report

Unit 2/3 Bottom Ash Pond

Issued October 2016

CDG Engineers and Associates, Inc.
1840 East Three Notch St.
Andalusia, AL 36421
| cdge.com

PowerSouth
ENERGY COOPERATIVE

REPORT
Structural Stability Summary Report
Unit 2/3 Bottom Ash Pond
Charles R. Lowman Power Plant

October 2016

ALABAMA LICENSED No. 27[illegible] PROFESSIONAL ENGINEER R. DANIEL WELLS
12/15/16

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References

CDG Engineers and Associates Inc. (2016). Report of 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. (2016). 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 is currently used as a settling pond for CCR wastes containing bottom ash, fly ash, and other plant wastes. Bottom ash from Units 2 and 3 is transported to the impoundment via wet sluicing. In addition to the bottom ash sluicing operation, the Facility periodically disposes of fly ash and scrubber waste within the impoundment through similar methods.

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 Scrubber 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 Report for Safety Factor Assessment, dated October 2016.

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

The Unit 2/3 Bottom Ash Intake structure is an enclosed pumping facility. The water from the pond passes over a weir structure and into a concrete sump structure. The water is then pumped out of the sump and into the Scrubber Waste Pond. The Unit 2/3 Intake consists of two suction lift pumps with a normal operating flow of 825 gpm (1.84 cfs).

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 40.3' MSL. This maximum HGL leaves a freeboard of 1.7' in the pond.

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

During high rainfall events, mobile suction lift pumps are utilized at the pond to supplement permanent intake structures to control the flood event and to maintain pool operating levels.

For further information on spillways and diversion systems refer to the Inflow Design Control Plan Unit 2/3 Bottom Ash Pond, dated October 2016.

1.7 Periodic Safety Factor Assessments

40 CFR 257.73 (e)(1)(i) through (e)(1)(iv) requires 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 Report for Safety Factor Assessment, dated October 2016.

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.

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	2.0	1.5	Yes
Maximum Surcharge Pool	2.0	1.4	Yes
Seismic	3.4	1.0	Yes
Liquefaction	5.5	1.2	Yes

For further information on the Unit 2/3 Bottom Ash Pond safety factor assessments please refer to the Report for Safety Factor Assessment, dated October 2016.

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. This report was created in accordance with the CCR rule Section 257.73(d) (i) through (vii). All future periodic assessments shall be conducted in accordance with this rule and any of its revisions or additions at the time of the assessment.

Appendix A

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

Figure 2 – Unit 2/3 Aerial Map of Impoundments

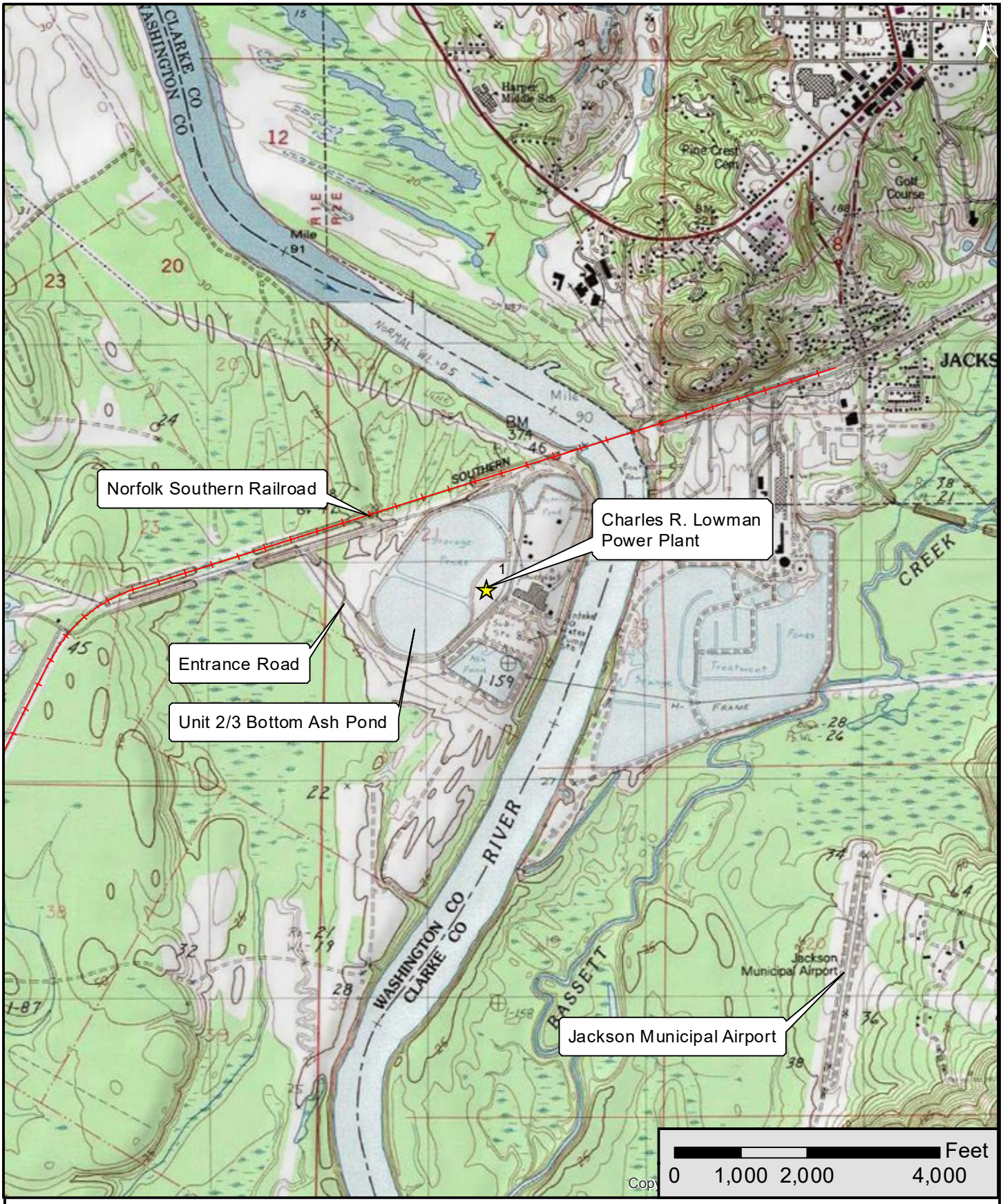

Figure 1 - Unit 2/3 Bottom Ash Pond Location Map

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Figure 2 - Aerial Map of Impoundments

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