PERIODIC STRUCTURAL STABILITY ASSESSMENT

EXISTING CCR IMPOUNDMENTS

CCR Rule Section 257.73(d)

ASBURY POWER PLANT

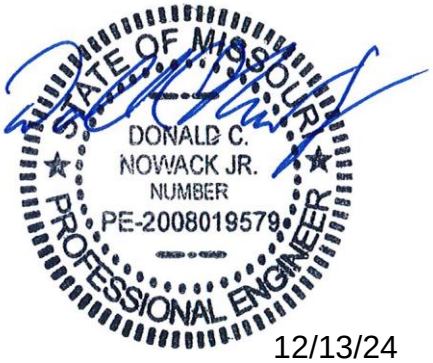
21133 Uphill Lane
Asbury, Missouri 64832

December 13, 2024

The Empire District Electric Company d/b/a Liberty Utilities

Prepared by:

PALMERTON & PARRISH, INC.



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December 13, 2024

The Empire District Electric Company d/b/a Liberty Utilities
Asbury Power Plant
21133 Uphill Lane
Asbury, Missouri 64832

RE: **Periodic Structural Stability Assessment** – CCR Rule Section 257.73(d)
Asbury Power Plant
Asbury, Missouri
PPI Project Number 231518-2024

To Whom it May Concern:

This Report presents the results of the **Periodic Structural Stability Assessment** of the CCR Impoundment at the Asbury Power Plant (Asbury CCR Impoundment). This document has been prepared to meet the requirements of Section 257.73(d) of the CCR Rule.

In accordance with Section 257.105(f)(10) of the CCR Rule, a copy of this document should be maintained in The Empire District Electric Company d/b/a Liberty Utilities operating records. In accordance with Section 257.107(f)(9), a copy of this document should also be posted to The Empire District Electric Company d/b/a Liberty Utilities CCR Compliance website. Notification of the availability of this document should be provided to the State Director, as required in Section 257.106(f)(9).

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THE EMPIRE DISTRICT ELECTRIC COMPANY D/B/A LIBERTY UTILITIES

ASBURY POWER PLANT

ASBURY, MISSOURI

1.0 INTRODUCTION

In accordance with Section 257.73(b), the Asbury CCR Impoundment has a height of five feet or more and a storage volume of 20 acre-feet or more, and is therefore subject to the requirements of Section 257.73(c) through (e). In accordance with Section 257.73(a)(2) of the CCR Rule, the hazard potential classification for the existing Asbury CCR Impoundments is *significant hazard potential CCR surface impoundment.* The design storm event for a significant hazard potential CCR surface impoundment is a 1,000-year flood, as stated in Section 257.73(d)(v)(B)(2).

"CCR Rule Section 257.73(d) Periodic Structural Stability Assessments: (1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein."

Section 257.73(d) of the CCR Rule requires completion of Initial and Periodic Structural Stability Assessments to document that the CCR Impoundment meets the criteria listed In Section 257.73(d)(1)(i) through (viii) of the CCR Rule. If structural stability deficiencies are identified, corrective measures must be implemented and documented in accordance with Section 257.73(d)(2).

PPI published an Initial Structural Stability Assessment dated October 17, 2016. The most recent Periodic Structural Stability Assessment was published on October 15, 2021. This Periodic Structural Stability Assessment has been completed in accordance with Section 257.73(d) and is being published effective December 13, 2024.

2.0 PERIODIC STRUCTURAL STABILITY ASSESSMENT

"CCR Rule Section 257.73(d)… The assessment must, at a minimum, document whether the CCR unit has been design, constructed, operated, and maintained with:

(i) Stable foundations and abutments;

(ii) Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown;

(iii) Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit;

(iv) Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike except for slopes which have an alternate form or forms of slope protection;

(v) A single spillway or a combination of spillways configured as specified in paragraphs (d)(1)(v)(A) of this section. The combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in paragraph (d)(1)(v)(B) of this section.

(A) All spillways must be either:

(1) Of non-erodible construction and designed to carry sustained flows; or

(2) Earth-or grass-lined and designed to carry short-term infrequent flows at non-erosive velocities where sustained flows are not expected.

(B)The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

(vi) Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure; and

(viii) For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body."

2.1 Stable Foundation and Abutments

The Asbury CCR Impoundment has stable foundation conditions. The perimeter levee embankments are constructed of earth fill materials and are founded on natural medium stiff to very stiff clay soils or shale bedrock. The stability of the Asbury CCR Impoundment slopes has been documented in Periodic Safety Factor Assessment that included analysis of the in-situ density, shear strength parameters, and geologic stratigraphy.

2.2 Slope Protection

The Asbury CCR Impoundment is not subject to wave action from an adjacent body of water. The interior CCR fill slopes are covered with a geomembrane and engineered turf with sand infill. Exterior levee embankment slopes below the impoundment are vegetated, and the vegetation provides adequate protection against erosion from storm

water runoff. Sudden drawdown is not an applicable design case for the Asbury CCR Impoundment.

2.3 Compaction

The perimeter embankments of the Asbury CCR Impoundment are constructed of earth fill. As-built documentation of the compaction of the Asbury CCR Impoundment embankments prior to closure is not available. The results of previous studies document that the in-situ density and associated strength parameters of the earthen embankments are adequate to withstand the various loading conditions that occur at the Asbury CCR Impoundment. The interior CCR fill slope constructed during CCR impoundment closure were compacted and tested according to the closure plan.

2.4 Vegetation Height

The Empire District Electric Company d/b/a Liberty Utilities periodically mows the vegetated portion of the perimeter embankment slopes, and schedules mowing immediately prior to the Periodic Annual Levee Inspection required by Section 257.83 of the CCR Rule.

2.5 Spillway

The Asbury CCR Impoundment has a final cover consisting of the ClosureTurf system. ClosureTurf is a patented, three component system that is EPA Subtitle D compliant landfill that is specifically designed to address and solve soil erosion, slope integrity, installation and maintenance cost control, EPA regulation compliance, and longevity of structure and appearance. The anticipated design life of ClosureTurf is 100 years. ClosureTurf consists of the following components, top to bottom.

- Specialized sand infill
- Engineered artificial turf
- Flexible geomembrane liner (FML)
- Prepared CCR subgrade

The stormwater on the ClosureTurf is controlled by a series of 6-inch rip-rap channels that empty into armored letdowns. These letdowns empty into the two sediment ponds directly or into a channel that conveys the stormwater into the two sediment ponds. The liner is contoured to direct water towards the channels and letdowns. The channels are 6-inch rip-rap that is 2-feet deep and 20-feet wide, except for the easternmost channel that is 30-feet wide. The letdowns consist of articulated concrete blocks 2-feet deep, 20-feet wide, and with a slope of 4:1.

The West (Upper) Sediment Pond is approximately 4.2 acres, receives runoff from approximately 45.5 acres of the liner, and the pond berm is at approximate elevation 936. The primary spillway consists of a 36-inch concrete pipe and a 36-inch square culvert set 4 feet above the pond bottom. A skimmer is used to drain the basin slowly over several days at a constant rate to maximize settling. A 20-feet wide emergency spillway, lined with articulated concrete block, is present on the berm.

The East (Lower) Sediment Pond is approximately 5 acres, receives runoff from approximately 57.3 acres of the liner, and the pond berm is at approximate elevation 930. The primary spillway consists of a 36-inch concrete pipe and a 36-inch square culvert set 4 feet above the pond bottom. A skimmer is used to drain the basin slowly over several days at a constant rate to maximize settling. A 10-feet wide emergency spillway, lined with articulated concrete block, is present on the berm.

2.5.1 Spillway Erodibility

The channels on the liner have rip-rap surfaces and the letdowns are armored with articulated concrete blocks to prevent erosion on the liner and exterior levee embankments. The channels and letdowns are considered non-erodible in accordance with the CCR Rule.

Discharges from the primary and auxiliary spillways at the two sediment ponds occur away from the outside of the CCR Impoundment berm.

2.5.2 Spillway Capacity

The stormwater channels, letdowns, and sediment ponds were designed to pass the 25-year, 24-hour storm (6.8 inches) through the principal spillways with the emergency spillways capable of passing the 100-year, 24-hour storm (8.4 inches).

2.6 Hydraulic Structures

There are no hydraulic structures passing through the perimeter embankments of the Asbury CCR Impoundment.

2.7 Downstream Slopes

The downstream (exterior) slopes of the Asbury CCR Impoundment embankments are not subject to inundation by an adjacent body of water, such as a river, stream, or lake. Blackberry Creek is channelized in a ditch north of the Asbury CCR Impoundment, but does not inundate the toe of the impoundment embankment. Slope stability analysis results show that the water level in Blackberry Creek is sufficiently far away from the levee toe and does not impact the global slope stability of the levee embankment.

3.0 SUMMARY OF DEFICIENCIES

"CCR Rule Section 257.73(d)(2): The periodic assessment described in paragraph (d)(1) of this section must identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken."

No deficiencies were identified as part of this Periodic Structural Stability Assessment.

4.0 CERTIFICATION 257.73(d)(3)

The undersigned Professional Engineer certifies that the initial structural stability assessment was completed in accordance with the requirements of 40 CFR 257.73(d).

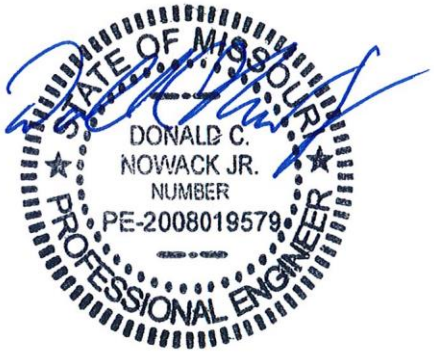
State of Missouri Professional Engineering License Number: 2008019579

Name: Donald C. Nowack, P.E.

Signature:

Date: December 13, 2024

Seal:



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