

ANNUAL INSPECTION BY A QUALIFIED PROFESSIONAL ENGINEER

ALL CCR IMPOUNDMENTS
CCR Rule Section 257.83(b)

ASBURY POWER PLANT

21133 Uphill Lane
Asbury, Missouri 64832

January 17, 2023

The Empire District Electric Company

Prepared by:



Rachel J. Goeke, P.E.
MO P.E. 2007020268

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The Empire District Electric Company
Asbury Power Plant
21133 Uphill Lane
Asbury, Missouri 64832

RE: **Annual Inspection by a Qualified Professional Engineer –**
CCR Rule Section 257.83(b)
The Empire District Electric Company – Asbury Power Plant
Asbury, Missouri
PPI Project Number: 231518-2022

To Whom It May Concern:

The attached Report presents the results of Palmerton & Parrish, Inc.'s (PPI's) **Annual Inspection by a Qualified Professional Engineer** at the Empire District Electric Company's (Empire's) CCR Impoundment at the Asbury Power Plant (Asbury CCR Impoundment).

PPI has been involved with several projects at the Asbury Power Plant since 2010 and has been able to observe and study the condition of the existing CCR Impoundment periodically throughout that time. Based upon historical information provided by Empire, PPI's professional training and experience, the results of PPI's studies, and PPI's observations during visual inspection of the CCR Impoundment, the Asbury CCR Impoundment was designed and constructed, and is operated and maintained, in general accordance with recognized and generally accepted engineering standards.

Of note, Empire was nearing completion of Closure of the Asbury CCR Impoundment at the time of the Annual Inspection Site Visit on January 4, 2023. There were many changes to the geometry and other aspects of the Impoundment as part of the Closure Project, as noted throughout this Annual Inspection Report.

In accordance with Section 257.105(g) of the CCR Rule, a copy of this document should be maintained in Empire's operating records. In accordance with Section 257.107(g), a copy of this document should also be posted to Empire's CCR Compliance website. Notification of the availability of this document should be provided to the State Director, as required in Section 257.106(g).

PALMERTON & PARRISH, INC.

By:



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ANNUAL INSPECTION BY A QUALIFIED PROFESSIONAL ENGINEER – ALL CCR IMPOUNDMENTS

CCR RULE SECTION 257.83(b)

THE EMPIRE DISTRICT ELECTRIC COMPANY – ASBURY POWER PLANT

ASBURY, MISSOURI

1.0 INTRODUCTION

“CCR Rule Section 257.83(b) Annual inspections by a qualified professional engineer. (1) If the existing or new CCR surface impoundment or any lateral expansion of the CCR surface impoundment is subject to the periodic structural stability assessment requirements under Section 257.73(d) or Section 257.74(d), the CCR unit must additionally be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards...”

Section 257.83(b) requires completion of an Annual Inspection of all CCR Impoundments by a qualified professional engineer, including a review of available documentation and previous inspection reports, and a visual inspection of the CCR unit and any hydraulic structures underlying the base of the CCR unit. This Report has been prepared in general accordance with the requirements of Section 257.83(b)(2) Inspection Report.

2.0 REVIEW OF AVAILABLE INFORMATION – CCR RULE §257.83(b)(1)(i)

PPI has worked on numerous Projects at the Asbury Power Plant throughout the years. Since 2010, PPI has been involved as the Geotechnical Engineer of Record for projects including the Asbury Environmental Retrofit, Asbury Office Building, Asbury Railroad Embankment Repair, and the Asbury Coal Ash Site Structural Assessment. Pertinent to the CCR Rule, PPI assisted Empire with preparation of a weekly inspection report form. PPI transitioned completion of monthly monitoring tasks to Empire’s staff at the end of 2016.

PPI reviewed our internal files pertaining to the Asbury CCR Impoundment as part of this Levee Inspection Report. Information pertaining to the original design and construction of the Asbury CCR Impoundment is summarized in PPI’s Report entitled “Coal Ash Site Structural Assessment Report,” dated December 28, 2012. In general, the Asbury CCR Impoundment was subdivided into three (3) operating ponds: the Lower Pond, South Pond, and Upper Pond. The Upper Pond is subdivided into two (2) cells, identified as Upper Pond – A and Upper Pond – B.

Operating conditions at the Asbury Power Plant changed considerably since PPI’s 2012 Report, as Empire transitioned to a dry hauling system when the Asbury Environmental Retrofit Project was commissioned in November 2014. The amount of impounded operating water has decreased since 2012, and the volume of stored CCR has increased in correlation to the volume of CCR byproduct that has been produced and stored in the CCR Impoundment since that time.

The Asbury Power Plant last burned coal in December 2019 and was officially taken out of service on March 1, 2020. No additional CCR byproduct was placed in the CCR Impoundment in 2020 as a result of Plant operations. The remainder of the coal pile was disposed of in the CCR Impoundment in 2020, as was FGD byproduct resulting from the bag house decommissioning. The Asbury Power Plant completed placement of any material in the CCR Impoundment by April 11, 2021.

Empire commenced with Closure Activities in the second quarter of 2022. The geosynthetic cover system “ClosureTurf” was utilized as the final cap for the Impoundment. The Impoundment Closure was nearing completion as of PPI’s January 4, 2023 Inspection. As of January 4, 2023, the Impoundment has been dewatered, interior grading was complete, both geosynthetic components (geomembrane and ClosureTurf) of the ClosureTurf System were installed, sand infill was installed (less final infill approval), and a large percentage of the perimeter rip rap lining was installed.

3.0 VISUAL INSPECTION – CCR RULE §257.83(b)(1)(ii) and §257.83(b)(1)(iii)

PPI completed a visual inspection of the CCR levee impoundment and hydraulic structures in general accordance with the requirements of CCR Rule Sections 257.83(b)(1)(ii) and 257.83(b)(1)(iii). The levee inspection was completed on Wednesday, January 4, 2023 by Ms. Rachel Goeke, P.E. The completed Levee Inspection Form is included in Appendix I.

4.0 CCR RULE §257.83(b)(2) INSPECTION REPORT

Section 257.83(b)(2) lists specific information that is required in the Inspection Report. This entire Report document, including Appendix I constitutes the “Inspection Report” for the purposes of the CCR Rule. The requirements of Section 257.83(b)(2) are summarized in the list below, along with supplemental information as appropriate.

1. Changes in impoundment structure geometry since the previous annual inspection:
The last formal inspection of the CCR Impoundment, by a licensed third-party Professional Engineer, was completed by Palmerton & Parrish, Inc. (PPI) in 2022, with a formal Inspection Report dated January 17, 2022. The geometry of the Impoundment has changed considerably since that time. Closure construction activities commenced in the second quarter of 2022, and were nearing completion at the time of the inspection on January 4, 2023.

The Asbury CCR Impoundment was dewatered and regraded during the Closure Project. The historic perimeter ditches were dewatered and filled in. Historic areas of standing water, including Upper Pond A, Upper Pond B, portions of the South Pond, and the South end of the Lower Pond, were filled in. Perimeter CCR slopes, above-lying the earthen embankment, were typically flattened as part of the grading for the Closure Project.

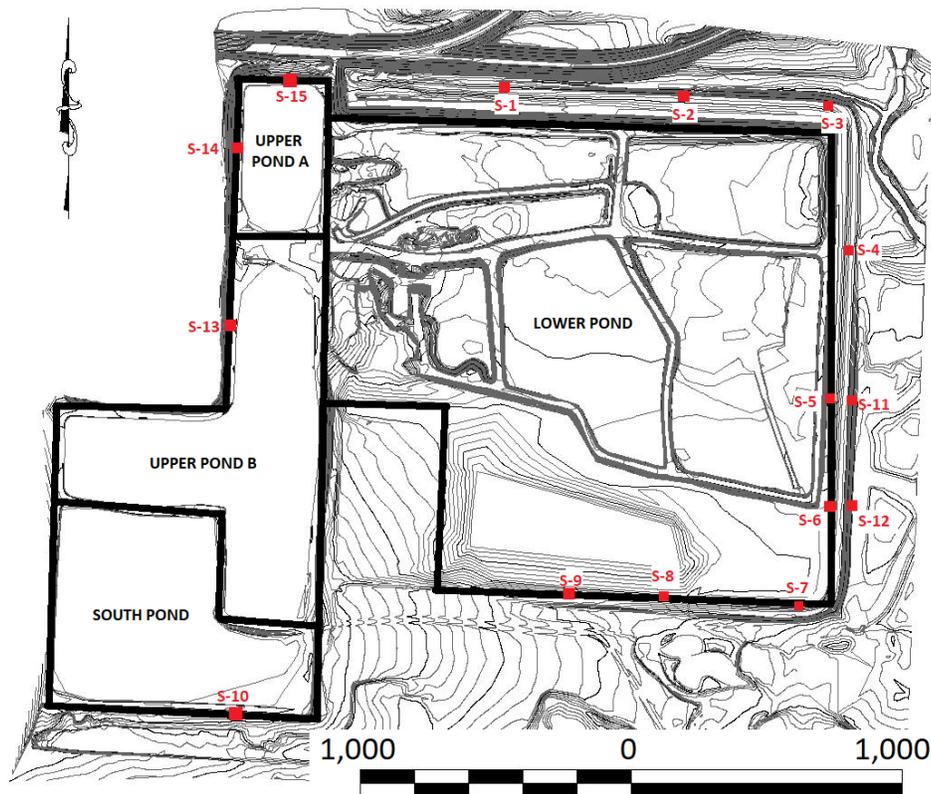
The existing earthen embankments were cut down at several locations throughout the Impoundment, resulting in a reduction of the total embankment slope height. The height of the levee embankment slope was reduced on the North and West sides of Upper

Pond A, most of the perimeter of Upper Pond B (with the exception of the West side adjacent to the Cooling Pond), most of the perimeter of the South Pond (with the exception of the West side adjacent to the Cooling Pond), and portions of the Lower Pond (the West side adjacent to the Leachate Pond, the South side, and a short length on the East side near the Southeast corner).

The final grading of the Impoundment was typically fairly flat, with finished slopes on the order of 1 percent. During grading for the Closure Project, there was a shortage of fill material, and the Design Grading Plan was modified to include grade breaks at two (2) locations. A 4-foot grade break was added in the Northwest area of the Lower Pond, running North to South, and a 2-foot grade break was added in the Southeast area of the Lower Pond, running East to West. Rip rap channels were installed in general accordance with the Design Grading Plan to facilitate site drainage.

2. Locations and type of any existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection: Historically, there were twelve (12) settlement monuments and fifteen (15) vertical deflection monuments installed around the perimeter of the Asbury CCR Impoundment. The settlement monuments were installed in March 2012 as part of the Site Structural Assessment Project. The vertical deflection monuments were installed in July 2016 after the CCR Rule was adopted.

The Site Plan below shows the historic location of the vertical deflection monuments, identified as S-1 through S-15. Settlement monuments SM-1 through SM-12 were located in close proximity to the corresponding vertical deflection monument.



Empire’s Generation Performance Manager confirmed that the vertical deflection monuments had been monitored monthly since the date of PPI’s 2022 Annual Inspection and that the readings have been stable over time. Several of the vertical deflection monuments were removed during completion of the Closure Project as a function of the Site Grading Plan, and others were disturbed. Empire continued to monitor the remaining vertical deflection monuments on a monthly basis through January 10, 2023. On January 17, 2023, the Project Team determined that it was appropriate to remove the remaining vertical deflection monuments; that work was completed by the Contractor on the same day.

The settlement monuments, identified as SM-1 through SM-12, were preserved to the extent possible during the Closure Project. Settlement Monuments SM-7, SM-9, and SM-10 were removed during the Closure Project as a function of the Site Grading Plan. The remaining nine (9) settlement monuments are intact, with the caveat that the rebar was broken off of the top of SM-6, so that will be a step change adjustment going forward. Allgeier, Martin & Associates, Inc. (AMA) completed a level loop survey of the settlement monuments on December 22, 2022. The table below summarizes selected Settlement Monument Elevation Readings by AMA since the date of initial survey in May 2012. Additional readings are available for review, but are not shown below for the purpose of presentation clarity.

Settlement Monument Readings, by AMA										
Settlement Monument	Elevation (ft.), on Surveyed Date									
	5/25/12	5/13/14	4/28/16	8/31/16	8/31/17	9/4/18	9/30/19	8/14/20	8/25/21	12/20/22
SM-1	929.17	929.26	929.27	929.30	929.23	929.24	929.27	929.26	929.28	929.26
SM-2	929.13	929.16	929.16	929.19	929.16	929.17	929.16	929.16	929.18	929.17
SM-3	927.39	927.44	927.44	927.46	927.44	927.45	927.45	927.45	927.47	927.45
SM-4	930.65	930.69	930.68	930.69	930.67	930.68	930.68	930.68	930.69	930.67
SM-5	930.91	930.94	930.93	930.94	930.92	930.92	930.92	930.91	930.92	930.93
SM-6	931.05	931.05	931.05	931.05	931.04	931.05	931.04	931.04	931.04	930.95
SM-7	931.95	931.95	931.95	931.95	931.94	931.95	931.93	931.93	931.92	-
SM-8	931.77	931.75	931.75	931.75	931.74	931.75	931.73	931.74	931.73	931.75
SM-9	933.86	933.89	933.86	933.85	933.86	933.85	933.84	933.85	933.83	-
SM-10	956.38	956.39	956.40	956.38	956.38	956.38	956.38	956.38	956.31	-
SM-11	926.33	926.36	926.36	926.37	926.35	926.36	926.35	926.35	926.36	926.35
SM-12	926.69	926.67	926.67	926.68	926.67	926.67	926.66	926.66	926.66	926.65

* SM-1 was disturbed by truck traffic shortly after installation; located by erosion area along creek.
 ** SM-12 bolt is bent over (May 2014)
 ***SM-7 and SM-9 bolts are bent (August 2019)
 ^SM-10 bolt is broken off flush with concrete (August 2021)
 ^^SM-6 bolt is broken off flush and concrete is disturbed (December 2022)
 -SM-7, SM-9, and SM-10 were destroyed as a function of Closure Activities and were not available for survey on 12/20/22.

3. Approximate minimum, maximum, and present elevation of impounded water and CCR since the previous annual inspection: No additional CCR was placed in the Impoundment since the date of the previous annual inspection. The Impoundment was dewatered as part of the Closure Project. The Impoundment was regraded prior to installation of the permanent ClosureTurf Cover System. The maximum CCR elevation underlying the ClosureTurf Cover System after regrading occurs in the Northeast corner of the Lower Pond, at approximate elevation 952 feet.

4. The storage capacity of the impounding structure at the time of the inspection: Closure of the Asbury CCR Impoundment was nearing completion at the time of PPI's January 4, 2023 Inspection. There is no remaining storage capacity at the Impoundment.

5. The approximate volume of impounded water and CCR at the time of the inspection: The estimated volume of impounded CCR is on the order of 2,446,700 cubic yards. Historical development of the impounded CCR volume estimate is documented in previous Inspection Reports. There is no impounded water in the Impoundment.

6. 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: Evidence of structural weakness was not observed at the time of the inspection.

7 Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection: The Asbury CCR Impoundment was regraded as part of the Closure Project. As previously discussed, the upper elevation of several of the perimeter earthen embankments was reduced as part of the Closure Project. Existing vegetation was heavily disturbed or removed at many locations throughout the site as part of the Closure Project. Erosion channels had developed in the earthen slopes in some locations, specifically on the North slope of Upper Pond A. Final grading, remediation of shallow erosion channels, and re-establishment of vegetation will all be completed as part of the Closure Project.

Evidence of animal burrow holes was not noted during the inspection. However, it is anticipated that construction activities deterred wildlife throughout the Closure Project. The Empire District Electric Company should monitor the earthen embankments and ClosureTurf System for evidence of animal activity, and take appropriate corrective actions as needed.

5.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. (PPI) observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. PPI's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.



APPENDIX I
LEEVE INSPECTION FORM

LEVEE INSPECTION FORM

Date: 1/4/23

Inspection By: Rachel Goeke, P.E., PPI

Name: Asbury Power Plant

CCR Surface Impoundment

Location: Asbury Missouri

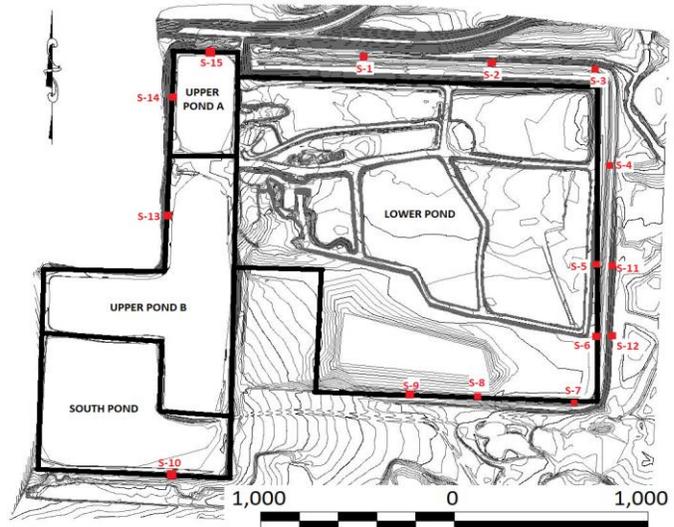
Jasper County

Weather: Clear, Sunny

Temperature: 40° to 50° F

Notes / Instructions: Reference previous Annual Levee Inspection prior to commencement of field work. Observe entire perimeter levee of the Impoundment.

The exhibit below is presented for general scale only; the Impoundment Closure was nearing completion at the time of the inspection. The geometry has changed, as noted on this form.



Summarize Overall Condition of Levee Embankments: The overall condition of the perimeter levee embankments is good. The Closure Project affected the geometry of the perimeter earthen embankments along portions of Upper Pond A, Upper Pond B, the South Pond, and the South and Southeast sides of the Lower Pond. The overall embankment heights were reduced. Existing vegetation was disturbed and/or completely removed around most of the perimeter earthen embankments as part of the Closure Project.

Summarize Areas of Concern / Recommended Action Items: As of the date of the inspection, the Contractor still had quite a bit of work to do with final clean up and re-establishing vegetation. It is anticipated that most of the areas of concern identified during the levee inspection will be addressed prior to the Final Punch List Walk scheduled for January 17, 2023. Remediation of shallow erosion channels that have developed in areas of the North Slope of Upper Pond A is planned, as well as installation of Curlex Erosion Control Mat. Other finish grading should address minor concerns in the levee embankment crest, such as shallow ruts and excess soil piled at the crest of the slope, resulting from construction. Given the time of year, new vegetation will likely not be established until spring.

LEVEE INSPECTION FORM - 1/4/23

ITEM	YES	NO	REMARKS
1. CREST			Rutting resulting from construction activities should be repaired. Final grading is yet to be completed as of 1/4/23.
a. Any visual Settlement?		X	
b. Misalignment?		X	
c. Cracking?		X	
2. INTERIOR LEVEE SLOPES			
a. Adequate grass cover?			NA - there are no interior levee slopes subsequent to completion of the grading for the Closure Project.
b. Any erosion?			NA
c. Trees growing on slope?			NA
d. Longitudinal cracks?			NA
e. Transverse cracks?			NA
f. Adequate rip rap protection?			NA
g. Visual depressions or bulges?			NA
h. Visual Settlements?			NA
j. Debris or trash present?			NA
3. EXTERIOR LEVEE SLOPES			
a. Adequate grass cover?		X	Vegetation was heavily disturbed during construction. Perimeter slopes need to be revegetated.
b. Any erosion?	X		Erosion Channels on the West and North Slopes of Upper Pond A are planned for repair during final grading.
c. Trees growing on slope?		X	
d. Longitudinal cracks?		X	
e. Transverse cracks?		X	
f. Visual depressions or bulges?		X	
g. Visual Settlements?		X	
h. Debris or trash present?		X	
i. Boils or seepage at toe?		X	
j. Seepage on slope face?		X	
k. Soft or spongy zones?		X	

ITEM	YES	NO	REMARKS
4 SPILLWAY OUTLET			
a. Is the conduit concrete?		X	The historic 002 spillway was removed as part of the Closure Project. The drainage system is now a series of rip rap lined channels on top of the ClosureTurf system.
b. Do concrete surfaces show:			
(1.) Spalling?			NA
(2.) Cracking?			NA
(3.) Erosion?			NA
(4.) Scaling?			NA
(5.) Exposed Reinforcement?			NA
(6.) Other?			NA
c. Do the joints show:			
(1.) Displacement or offset?			NA
(2.) Loss of joint material?			NA
(3.) Leakage?			NA
d. Is the conduit metal?		X	
(1.) Corrosion present?			NA
(2.) Protective coatings adequate?			NA
(3.) Leakage?			NA
e. Seepage around the conduit?		X	
5 DITCHES / SITE DRAINAGE			
a. Describe ditch function:			There are no longer any perimeter ditches. New rip rap channels were constructed as part of the ClosureTurf Installation and flow by gravity to controlled exit and eventual discharge into the Detention Ponds. Rip rap was installed around the Impoundment perimeter, on top of and just beyond the anchor trench of the ClosureTurf System.
b. Are ditches free of debris?	X		
c. Is adequate erosion protection present at the toe of slope around the perimeter?	X		
6 PHOTOGRAPHS TAKEN:	X		
7 INSTRUMENTATION IN TACT:	X	X	9 of the original 12 settlement monuments remain in tact after closure grading.