

# 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, 2022

## The Empire District Electric Company

Prepared by:



Rachel J. Goeke, P.E.  
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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.

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:



Rachel J. Goeke, P.E.  
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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 is subdivided into three (3) 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 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.

### **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 12, 2022 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:

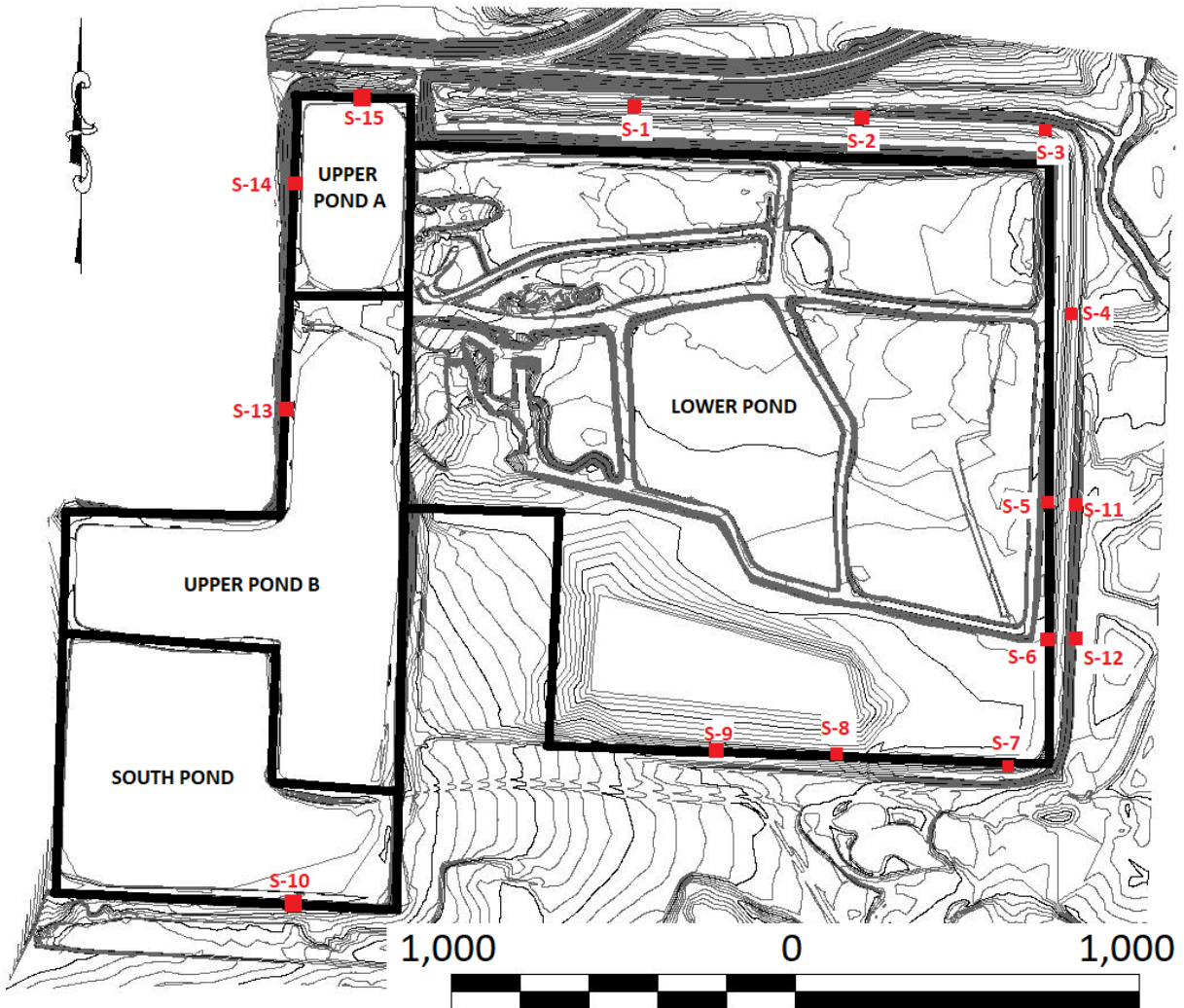
The last formal inspection of the CCR Impoundments, by a licensed third-party Professional Engineer, was completed by Palmerton & Parrish, Inc. (PPI) in 2021, with a formal Inspection Report dated January 17, 2021. Since that time, the geometry of the perimeter levee impoundment embankments is essentially unchanged.

#### 2. Locations and type of any existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection: As of the date of the 2022 inspection, there are twelve (12) settlement monuments and fifteen (15) vertical deflection monuments in place at the Asbury CCR Impoundment.

The twelve (12) settlement monuments were originally installed as part of the Site Structural Assessment Project in March 2012. The twelve (12) original settlement monuments were surveyed using traditional level loop survey methods by Allgeier, Martin & Associates (AMA) periodically from March 2012 to October 2015, when the CCR Rule went into effect. The settlement monuments were surveyed monthly from October 2015 through August 2016, at which time monthly monitoring transitioned to the vertical deflection monuments.

The fifteen (15) vertical deflection monuments were installed in July 2016 and have been monitored monthly in accordance with Section 257.83(a) since that time. Empire transitioned to voluntary annual surveying of the twelve (12) settlement monuments after installation of the vertical deflection monuments.

The general location of the vertical deflection monuments is shown on the Site Plan below. The vertical deflection monuments are identified as S-1 through S-15. Vertical deflection monuments S-1 through S-12 are located in close proximity to the twelve (12) settlement monuments, SM-1 through SM-12.



Empire's Generation Performance Manager confirmed that the vertical deflection monuments have been monitored monthly over the past year, and readings have been stable over time.

The table below summarizes selected Settlement Monument Readings by AMA since the date of initial survey in May 2012. Selected readings from 2016 are not shown in the table for the purpose of data presentation and clarity but are available for review upon request.

| Settlement Monument Readings, by AMA |                                   |         |         |         |         |         |         |        |         |         |         |
|--------------------------------------|-----------------------------------|---------|---------|---------|---------|---------|---------|--------|---------|---------|---------|
| Settlement Monument                  | Elevation (ft.), on Surveyed Date |         |         |         |         |         |         |        |         |         |         |
|                                      | 5/25/12                           | 5/13/14 | 1/29/16 | 4/28/16 | 8/31/16 | 2/27/17 | 8/31/17 | 9/4/18 | 9/30/19 | 8/14/20 | 8/25/21 |
| SM-1                                 | 929.17                            | 929.26  | 929.20  | 929.27  | 929.30  | 929.26  | 929.23  | 929.24 | 929.27  | 929.26  | 929.28  |
| SM-2                                 | 929.13                            | 929.16  | 929.14  | 929.16  | 929.19  | 929.16  | 929.16  | 929.17 | 929.16  | 929.16  | 929.18  |
| SM-3                                 | 927.39                            | 927.44  | 927.42  | 927.44  | 927.46  | 927.43  | 927.44  | 927.45 | 927.45  | 927.45  | 927.47  |
| SM-4                                 | 930.65                            | 930.69  | 930.66  | 930.68  | 930.69  | 930.66  | 930.67  | 930.68 | 930.68  | 930.68  | 930.69  |
| SM-5                                 | 930.91                            | 930.94  | 930.91  | 930.93  | 930.94  | 930.91  | 930.92  | 930.92 | 930.92  | 930.91  | 930.92  |
| SM-6                                 | 931.05                            | 931.05  | 931.02  | 931.05  | 931.05  | 931.03  | 931.04  | 931.05 | 931.04  | 931.04  | 931.04  |
| SM-7                                 | 931.95                            | 931.95  | 931.93  | 931.95  | 931.95  | 931.93  | 931.94  | 931.95 | 931.93  | 931.93  | 931.92  |
| SM-8                                 | 931.77                            | 931.75  | 931.74  | 931.75  | 931.75  | 931.74  | 931.74  | 931.75 | 931.73  | 931.74  | 931.73  |
| SM-9                                 | 933.86                            | 933.89  | 933.85  | 933.86  | 933.85  | 933.85  | 933.86  | 933.85 | 933.84  | 933.85  | 933.83  |
| SM-10                                | 956.38                            | 956.39  | 956.41  | 956.40  | 956.38  | 956.38  | 956.38  | 956.38 | 956.38  | 956.38  | 956.31  |
| SM-11                                | 926.33                            | 926.36  | 926.34  | 926.36  | 926.37  | 926.34  | 926.35  | 926.36 | 926.35  | 926.35  | 926.36  |
| SM-12                                | 926.69                            | 926.67  | 926.65  | 926.67  | 926.68  | 926.65  | 926.67  | 926.67 | 926.66  | 926.66  | 926.66  |

\* SM-1 was disturbed by truck traffic shortly after installation.  
 \*\* 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)

3. Approximate minimum, maximum, and present elevation of impounded water and CCR since the previous annual inspection: No additional CCR has been placed in the Impoundment since the date of the previous annual inspection. Impounded water elevations and CCR elevations within the Asbury CCR Impoundment are generally unchanged since the date of the previous annual inspection.

The water level in the Upper Pond and South Pond is most typically at an elevation close to or slightly above the top of CCR elevation. Typical CCR surface elevations in the South Pond range from 947 to 951 feet. The CCR surface in the Upper Pond varies from approximately 935 feet to 951 feet.

The maximum impounded water elevation in the Lower Pond is controlled by the spillway elevation of 930.35 feet. The maximum pool elevation during overflow is 931.5 feet. The typical elevation of the Lower Pond is between 929 and 930 feet. The CCR elevation within the Lower Pond is variable, as the interior dike embankments are typically constructed of CCR. The maximum elevation of the interior dikes is on the order of 950 feet.

4. The storage capacity of the impounding structure at the time of the inspection: The remaining storage capacity of the impoundment is unchanged since the 2021 Annual Inspection Report. The numerical value has been updated to reflect the final published volume of material placed as a result of the Coal Pile Area Closure: 75,200 cubic yards instead of the 90,000 cubic yards stated in PPI's 2021 Annual Inspection Report.

Conservatively, the remaining storage capacity at the Asbury CCR Impoundment is estimated to be approximately 683,000 cubic yards. This storage capacity based on (1) no additional CCR placed in the Upper Pond, South Pond, or standing water portion of the Lower Pond, and (2) a maximum filling elevation on the order of 959.25 feet.

5. The approximate volume of impounded water and CCR at the time of the inspection: The estimated volume of impounded CCR at the time of this Report is estimated to be on the order of 2,371,500 cubic yards, plus an additional 75,200 cubic yards of material resulting from the Coal Pile Area closure in 2020, for a total volume of impounded materials of 2,446,700 cubic yards. Historical development of the impounded CCR volume estimate is documented in previous Inspection Reports.

The volume of impounded water at the Asbury CCR Impoundment is essentially unchanged from the 2020 and 2021 Inspection Reports and is estimated to be approximately 163,000 cubic yards.

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 condition of the Asbury CCR Impoundment is largely unchanged since the 2021 Annual Inspection Report.

The extent of beneficial vegetation around the perimeter embankments is unchanged or improved from last year and should continue to be maintained.

Liberty Utilities has implemented a trapping program and has repaired animal burrow holes since the date of the 2021 Annual Inspection Report. Liberty Utilities should continue the trapping program and should continue to monitor for and repair animal burrow holes when they occur.

There are existing ruts resulting from vehicle traffic in the levee embankment roadway crests, which should be monitored and preferably filled to prevent ponded water. Ruts on the southeast corner and south side of the levee embankment crest of the South Pond should be repaired.



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## **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:** 1/12/22

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

**Name:** Asbury Power Plant

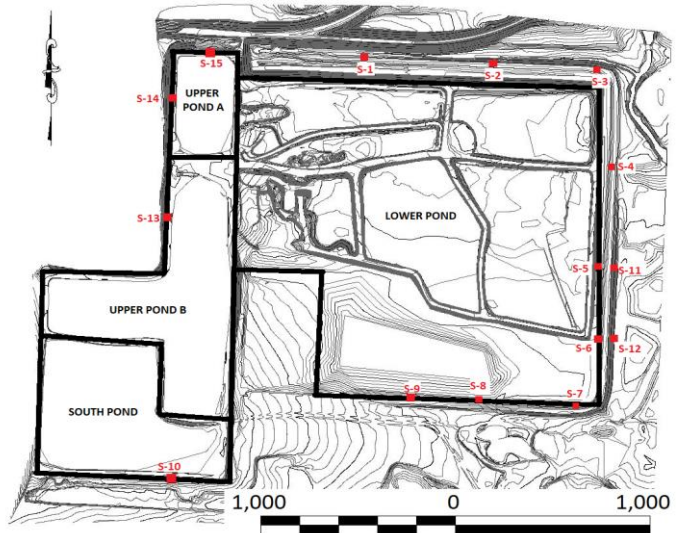
CCR Impoundment Levees

**Location:** Asbury Missouri

Jasper County

**Weather:** Clear, Sunny

**Temperature:** 35° to 40° F



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

Summarize Overall Condition of Levee Embankments: The overall condition of the perimeter levee embankments is good. Evidence of sloughing at the crest of the soil levee embankment crest was not observed. Seepage was not observed. Vegetative growth on the embankments looked good overall.

Summarize Areas of Concern / Recommended Action Items: Liberty should review the condition of the levee crest roadways. Significant ruts should be filled with earth fill and regraded as necessary to prevent ponded water at the levee crest. Ruts in the embankment crest of the South Pond, specifically on the south side and southeast corner, should be repaired.  
Liberty should continue the trapping program that was reinstated in 2021. Liberty should continue to monitor the levee embankments for the presence of animal burrow holes, and backfill holes of concern.

LEEVE INSPECTION FORM - 1/12/22

| ITEM                             | YES | NO | REMARKS   |
|----------------------------------|-----|----|---|
| 1. CREST                         |     |    | Rutting due to vehicles should be repaired.                                 |
| a. Any visual Settlement?        |     | X  |   |
| b. Misalignment?                 |     | X  |   |
| c. Cracking?                     |     | X  |   |
| 2. INTERIOR LEEVE SLOPES         |     |    |   |
| a. Adequate grass cover?         | X   |    |   |
| b. Any erosion?                  |     | X  |   |
| c. Trees growing on slope?       |     | X  |   |
| d. Longitudinal cracks?          |     | X  |   |
| e. Transverse cracks?            |     | X  |   |
| f. Adequate rip rap protection?  |     |    | NA  |
| g. Visual depressions or bulges? |     | X  |   |
| h. Visual Settlements?           |     | X  |   |
| j. Debris or trash present?      |     | X  |   |
| 3. EXTERIOR LEEVE SLOPES         |     |    |   |
| a. Adequate grass cover?         | X   |    | Vegetative growth looks better than last year and is being well maintained. |
| b. Any erosion?                  |     | X  |   |
| 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   |    |   |
| b. Do concrete surfaces show:   |     |    |   |
| (1.) Spalling?  |     | X  |   |
| (2.) Cracking?  |     | X  |   |
| (3.) Erosion?   |     | X  |   |
| (4.) Scaling?   |     | X  |   |
| (5.) Exposed Reinforcement?   |     | X  |   |
| (6.) Other?   |     | X  |   |
| c. Do the joints show:  |     |    |   |
| (1.) Displacement or offset?  |     | X  |   |
| (2.) Loss of joint material?  |     | X  |   |
| (3.) Leakage?   |     | X  |   |
| d. Is the conduit metal?  |     | X  |   |
| (1.) Corrosion present?   |     |    |   |
| (2.) Protective coatings adequate?  |     |    |   |
| (3.) Leakage?   |     |    |   |
| e. Seepage around the conduit?  |     | X  |   |
| 5 DITCHES / SITE DRAINAGE   |     |    |   |
| a. Describe ditch function:   |     |    | Drainage channels around Impoundment perimeter. |
| 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   |    |   |