Five-Year Periodic Structural Stability Assessment

Retrofitted Bottom Ash Pond (rBAP)

Brilliant, Ohio

October 2026

Prepared For:

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1.0 Objective

This report was prepared by TRC Engineers, Inc. (TRC) to fulfill requirements of Title 40 Code of Federal Regulations (40 CFR) 257.74(d) and document whether the design, construction, operations, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices. The initial structural stability assessment was completed by Sargent & Lundy, and dated January 5, 2022. This is the first 5-year periodic assessment as required per 40 CFR 257.74(d).

To develop the periodic assessment review, TRC performed the following scope:

- Reviewed relevant documents including the initial Structural Stability Assessment for Retrofitted Bottom Ash Pond (Sargent & Lundy, 2022)
- Reviewed Initial Safety Factor Assessment (Sargent & Lundy, 2022)
- Reviewed 2025 Annual Dam and Dike Inspection Report (TRC, 2025)
- Developed observations related to the updated structural stability assessment review.

2.0 Name and Description of the CCR Surface Impoundment

The Cardinal Power Plant (Plant) is located in Wells Township, Jefferson County, near the town of Brilliant in eastern Ohio. The Plant is owned by Buckeye Power and operated by Cardinal Operating Company (Operator).

Formerly known as the Bottom Ash Complex, the complex consists of a North Pond and a South Pond, located at the southern end of the Plant (south of the Unit 3 Powerhouse) and directly west of the Ohio River. The retrofitted Bottom Ash Pond (rBAP) is retained by an exterior dike with a crest elevation of approximately 670 feet. The eastern dike of the pond is located adjacent to the Ohio River with a nominal dam height of 30 feet.

The Operator elected to retrofit the pond complex by segregating it into two separate ponds designed to manage CCR waste in the rBAP, subject to 40 CFR 257 Subpart D and Low Volume Waste Pond, subject to the Clean Water Act. Construction commenced in 2021 to reline the pond complex. The Operator completed the retrofit construction activities on March 27, 2022, for the South Pond of the Bottom Ash Complex. The retrofit activities were completed in accordance with the written retrofit plan (Bottom Ash Pond Complex South Pond Retrofit Plan, dated October 19, 2020) and the requirements of 40 CFR 257.102(k). Upon completion of the retrofit, the South Pond's name was changed from the former "Recirculation Pond" to the "Retrofit Bottom Ash Pond." On March 24, 2023, Cardinal initiated closure on the North Pond and converted the pond to receive non-CCR waste streams (i.e., low volume waste). Closure was completed on October 7, 2024.

3.0 Federal Regulations

To develop the structural stability assessment for the rBAP, the following excerpts from 40 CFR Part 257 Subpart D (Federal CCR Rule) are applicable:

§257.74(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. The assessment must, at a minimum, document whether the

CCR unit has been designed, 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 paragraph (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

(vii) 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) 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.

(3) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment was conducted in accordance with the requirements of this section.

4.0 Structural Stability Assessment Results

It is noted that the retrofit of this impoundment did not include significant modifications to the dam. Instead, it was to install a CCR compliant lining system. Thus, the existing dikes, which have been previously certified, are improved by the lowering of the phreatic surface within them.

4.1 Stable Foundations and Abutments- 40CFR 257.74(d)(1)(i)

Describe the basis for continued stability of the existing foundations supporting the perimeter dikes, including any effect of the liner retrofit.

Based on discussions with plant personnel and field observations during the August 14, 2025, annual site inspection, there were no changes to the rBAP since the 2025 annual inspection that would affect stability or safe operation of the impoundment. The soils supporting the exterior dikes were evaluated in

the 2022 Safety Factor Assessment (Sargent & Lundy), which found the factors of safety to meet or exceed the minimum required values and the dike soils to be non-liquefiable. The retrofit create the rBAP with a splitter dike to and then installed a new liner system; the existing, previously certified dikes are improved by the lowered phreatic surface. The foundations are considered stable, and no further action is required at this time other than continued inspection, maintenance, and monitoring. Abutments, as found on a valley-fill embankment dam, are not a feature of this perched, diked impoundment.

Per TRC's 2025 Annual Dam and Dike Inspection (ADDI) Report, subsurface water levels continued to be monitored by a network of three (3) piezometers read monthly by Cardinal Operating Company. These piezometers have shown very little to no change in average piezometric head relative to historical readings, indicating no significant changes to the subsurface water levels since the previous annual inspection. The piezometers were in good condition, protected by a casing, concrete pad and bollards.

4.2 Adequate Slope Protection- 40 CFR 257.74(d)(1)(ii)

Describe the slope protection measures on the interior (pond-side) and exterior slopes.

Per TRC's 2025 ADDI Report, the rBAP crest was in good condition with no signs of significant erosion, rutting, or misalignment. The interior slopes of the rBAP were in good condition, with the pond's liner protected by either riprap or concrete fabriform cover. The mostly riprap-protected east slope along the Ohio River appeared to be in good condition. The splitter dike was in good condition with no signs of wave-cut action, erosion, or slope instability on the inboard pond slopes. The slope protection is performing as intended.

4.3 Compacted Dikes- 40 CFR 257.74(d)(1)(iii)

Describe the basis for continued density adequacy of the previously-certified dikes.

The continued adequacy of the compacted dikes is supported by field observations. Per TRC's 2025 ADDI Report, the rBAP crest and the east slope of the rBAP along the Ohio River were in good condition, with the east slope appearing uniform and exhibiting no slumping or bulges indicative of movement. No signs of distress attributable to inadequate compaction were observed, consistent with dikes that continue to perform under the lowered phreatic surface resulting from the liner retrofit.

4.4 Vegetative Slopes - 40 CFR 257.74(d)(1)(iv)

Describe the maintenance plan for vegetative cover.

The slopes of the rBAP are regularly maintained and no woody vegetation was observed. Per TRC's 2025 ADDI Report, vegetated areas are maintained by regularly scheduled mowing and reseeding of minor barren areas. No vegetation-related conditions affecting the structural stability of the rBAP dikes were observed.

4.5 Spillway - 40 CFR 257.74(d)(1)(v)

Describe the spillway system and its capacity to pass the Inflow Design Flood as per its Hazard Classification.

This perched impoundment does not receive inflow from areas beyond the top of dike. There is no spillway. Instead, a blow down line to the flue gas desulfurization (FGD) system is used to dispose of excess water and to maintain an appropriate water quality. During normal operation, the majority of flow is recirculated into the plant via the pump station located on the west side of the rBAP.

4.6 Hydraulic Structures - 40 CFR 257.74(d)(1)(vi)

Describe the condition of any hydraulic structures passing through the dike or beneath the unit.

The only active pipes that penetrate the dike are discharge lines that exit the pump house and penetrate the dike above the normal operating water level. These active pipes exhibit no visual evidence of risk to the dikes. All other pipes have been removed or abandoned in place and exhibit no visual evidence of risk to the dikes.

Per TRC's 2025 ADDI Report, no deterioration, distortion, or other conditions adversely affecting the operation of the hydraulic structures were identified.

4.7 Adjacent Water Bodies - 40 CFR 257.74(d)(1)(vii)

Discuss the stability of the river-side slope under flood loading and rapid drawdown of the Ohio River.

The eastern exterior dike is located directly against the Ohio River and can be inundated by it, so the provisions of 40 CFR 257.74(d)(1)(vii) apply to this unit. The 2022 Safety Factor Assessment (Sargent & Lundy) analyzed the critical cross section and found the factors of safety to meet or exceed the minimum required values for the long-term maximum storage pool, maximum surcharge pool, and seismic loading conditions, with the dike soils found to be non-liquefiable. On that basis, the downstream slopes of the exterior dikes are adequate for the flooding risks of the adjacent Ohio River. Per TRC's 2025 ADDI Report, the east slope along the river was uniform and in good condition, with no slumping, bulging, or signs of instability.

5.0 Conclusions and Recommendations

This structural stability assessment confirms that the rBAP, at Cardinal Power Plant has been designed, constructed, operated, and maintained consistent with recognized and generally accepted good engineering practices to provide structural stability for the maximum volume of CCR and CCR wastewater which can be impounded therein. Upon review of the available documentation discussed above, it can be concluded that the rBAP continues to meet 40 CFR 257.74(d).

TRC recommends the following measures be continued as part of routine operation and maintenance:

1. Continue to perform routine inspections and monitor the rBAP for erosion, ensuring the slope protection measures - including the condition of the vegetation, riprap, and concrete fabriform cover - are performing satisfactorily. Repair areas of erosion as necessary and as quickly as feasible as part of routine maintenance.

2. Continue with regularly scheduled mowing and reseeding of minor barren areas, as needed.

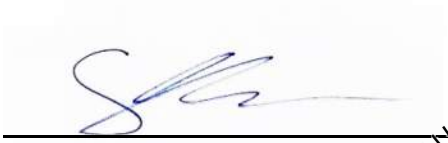
6.0 Limitations

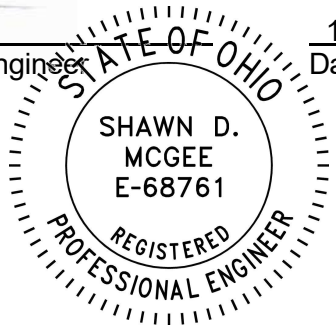
The observations, assessments, and recommendations presented in this Report are based on our limited scope of work reviewing relevant historic reports (including annual inspections reports), the conditions at the time of the August 14, 2025, site visit for the TRC 2025 Annual Inspection Report, the design information available at the time of this investigation and only apply to the Cardinal rBAP. This work has been performed in accordance with our authorized scope of work and is based on the level of effort and investigative techniques using that degree of care and skill ordinarily exercised under similar conditions by reputable members of the profession practicing in the same or similar locality at the time of service. No other warranties, expressed or implied, are made or intended by this Report. These services were intended to provide an indication of the current, observable conditions of the dam at the time of the visual observations on the date indicated in this Report. Such a limited visual review does not account for other non-visible, hidden, subsurface or material condition analyses, and the professional services rendered are not guaranteed to be a representation by TRC of inaccessible and unobservable site conditions or actual conditions subsequent to the date of TRC's site visit. Therefore, the evaluations, conclusions, recommendations and opinions provided in this Report are subject to change as a result of future natural or manmade processes and as a result of an additional comprehensive, intrusive investigation and engineering analyses beyond TRC's visual observations. TRC is not responsible for any conclusions or opinions drawn by others from the data included herein, nor are the recommendations specifically presented in this Report intended for use or reliance as construction specifications.

7.0 Certification

I, the undersigned Ohio Professional Engineer, hereby certify that I am familiar with the technical requirements of 40 CFR 257 Subpart D. I also certify that the information contained in this document was conducted in accordance with 40 CFR 257.74(d) and 40 CFR 257.74(f) based on the currently available data reviewed, and that the information reviewed is, to the best of my knowledge, accurate and correct.

For the purpose of this document, “certify” and “certification” shall be interpreted and construed to be a “statement of professional opinion.” The certification is understood and intended to be an expression of my professional opinion as a Licensed Professional Engineer, based upon knowledge, information, and belief. The statement(s) of professional opinion are not and shall not be interpreted or construed to be a guarantee or a warranty of the analysis herein.

Shawn D. McGee, P.E.	PE.68761
Name	Engineer License Number
	10/06/2026
Signature of Professional Engineer	Date



8.0 References

Sargent & Lundy, 2022. Structural Stability Assessment for Retrofitted Bottom Ash Pond of the Bottom Ash Pond Complex. January 5, 2022.

Sargent & Lundy, 2022. Safety Factor Assessment for Retrofitted Bottom Ash Pond of the Bottom Ash Pond Complex. January 13, 2022.

TRC Engineers, Inc., 2025. 2025 Annual Dam and Dike Inspection Report: Cardinal Power Plant, Brilliant, OH. October 8, 2025.

TRC Engineers, Inc., 2024. 2024 Annual Dam and Dike Inspection Report: Cardinal Power Plant, Brilliant, OH. October 8, 2025.

Amanda Graphics, 2023. 2023 Annual Dam and Dike Inspection Report: Cardinal Plant, Fly Ash Dams 1, 2 & Bottom Ash Complex. September, 25, 2023.