

# CLOSURE PLAN

**CFR 257.102(b)**

Bottom Ash Pond Complex  
Cardinal Plant  
Brilliant, Ohio

September, 2016

Prepared for: Cardinal Operating Company - Cardinal Plant  
Brilliant, Ohio


Prepared by: Geotechnical Engineering Services  
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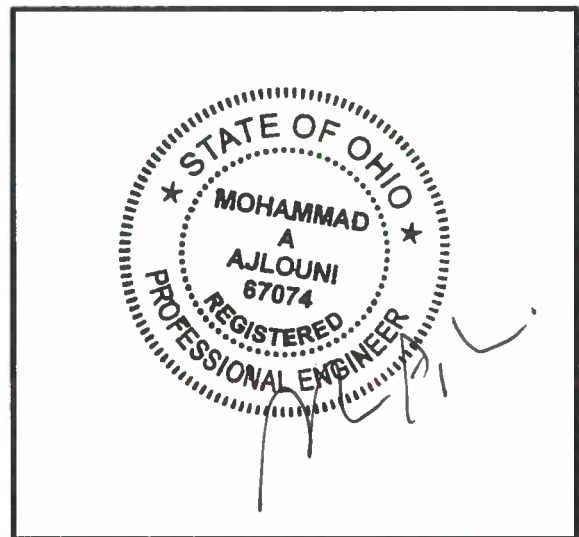
CLOSURE PLAN  
CFR 257.102(b)  
BOTTOM ASH POND COMPLEX  
CARDINAL PLANT

GERS-16-087

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I certify to the best of my knowledge, information, and belief that the information contained in this closure plan meets the requirements of 40 CFR § 257.102.

I certify to the best of my knowledge, information and belief that design of the final cover system as described in this closure plan meets the requirements of 40 CFR § 257.102.

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## **1.0 OBJECTIVE**

This report was prepared by AEP- Geotechnical Engineering Services (GES) section to fulfill requirements of CFR 257.102(b) for Closure Plans of Existing CCR Surface Impoundments.

## **2.0 DESCRIPTION OF THE CCR UNIT**

The Cardinal Power Plant in Wells Township, Jefferson County, near the town of Brilliant in eastern Ohio.

The Cardinal Power Plant is owned by Buckeye Power and AEP Generation Resources (GENCO) a unit of American Electric Power, is operated by Cardinal Operating Company. The facility operates two surface impoundments for storing CCR; the Bottom Ash Complex and Cardinal Fly Ash Reservoir 2 (FAR 2) Dam. The focus of this report is the Bottom Ash Complex.

The BAP complex is comprised of diked embankments on the east and west sides while the north and south sides of the BAP are incised. The complex consists of two separate ponds, the larger bottom ash pond and the smaller recirculation pond. The surface areas of the ponds and is approximately 24.3 acres. The entire crest length is just over a mile, and the nominal crest width is 20 feet. The north end of the pond has been partially filled in with ash and the exact limits of the pond are poorly defined.

The pond complex was originally developed as part of the construction of Units 1 and 2 in the 1960s. The crest of the dikes forming the original pond was at El. 658.0. However, the pond complex was raised to a crest elevation of 970.0 and extensively modified in 1974 as part of the construction of Unit 3.

## **3.0 DESCRIPTION OF CLOSURE PLAN 257.102(b)(1)(i)**

*[A narrative description of how the CCR unit will be closed in accordance with this section]*

The BAP complex will be closed by closure in place. The closure will consist of re-grading the existing onsite materials and the installation of an impermeable cap with vegetative cover. The existing surface will be graded to achieve a gently sloping surface to promote surface water runoff. The regraded surface will be covered with a flexible geomembrane system and 2-feet of soil fill consisting of an 18" soil infiltration layer and 6" of earthen material that is capable of sustaining native plant growth. The surface soil will be seeded and mulched to promote the growth of a vegetative cover.

## **4.0 CLOSURE IN PLACE 257.102 (b)(1)(iii)**

*[If closure of the CCR unit will be accomplished by leaving the CCR in place, a description of the final cover system, designed in accordance with paragraph(d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.]*

The final cover system will consist of a flexible geomembrane that will have a permeability that is less than or equal to the permeability of the natural subsoils and is no greater than  $1 \times 10^{-5}$  cm/sec. The geomembrane will be installed directly over the graded CCR material. Over the geomembrane will be installed an infiltration layer consisting of 18" of earthen material and an erosion layer consisting of 6" of earthen material that is capable of sustaining native plant growth. The final cover will be seeded and mulched to promote growth of a vegetative cover. The final cover slope will be a minimum of 2% and will convey water to a NPDES permitted outfall.

Prior to construction, the impoundment will be drained of the free water.

## **4.1 CLOSURE PERFORMANCE STANDARDS 257.102 (d)(1)**

### **4.1.1 SECTION 257.102(d)(1)(i)**

*[Control, minimize or eliminate, the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere.]*

The final cover system will cover the CCR material and will have a permeability that is less than or equal to the permeability of the natural subsoils and is no greater than  $1 \times 10^{-5}$  cm/sec.

### **4.1.2 SECTION 257.102(d)(1)(ii)**

*[Preclude the probability of future impoundment of water, sediment, or slurry.]*

The impoundment will be graded with minimum side slopes of 2% to prevent the ponding of water with channels graded to drain. The dam may be lowered to preclude the future impoundment of water, sediment, or slurry.

### **4.1.3 SECTION 257.102(d)(1)(iii)**

*[Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period.]*

The final cover system will be graded with side slopes with a minimum of 2% slope and a maximum 3:1 slope with channels provided to drain stormwater. The final configuration of the impoundment will meet the stability requirements to prevent the sloughing or movement of the final cover system during the closure and post-closure care period.

### **4.1.4 SECTION 257.102(d)(1)(iv)**

*[Minimize the need for further maintenance of the CCR unit.]*

The impoundment will be vegetated to prevent erosion. Maintenance of the final cover system will include mowing.

### **4.1.5 SECTION 257.102(d)(1)(v)**

*[Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.]*

The CCR unit will be closed in a multi-year phased manner as liquids are removed and areas are stabilized. There is currently no schedule for closure of this CCR unit.

## **4.2 DRAINING AND STABILIZING OF THE SURFACE IMPOUNDMENT 257.102(d)(2)**

*[The owner or operator of a CCR surface impoundment or any lateral expansion of a CCR surface impoundment must meet the requirements of paragraph (d)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (d)(3) of this section.]*

### **4.2.1 SECTION 257.102(d)(2)(i)**

*[Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residue.]*

As part of closure of the CCR unit, all free water will be removed and the ash dewatered to sufficient depth to provide a stable surface. All water discharge will be in accordance with the NPDES permit.

### **4.2.2 SECTION 257.102(d)(2)(ii)**

*[Remaining waste must be stabilized sufficient to support the final cover system.]*

The remaining waste that make up the subgrade of the final cover system will be stabilized by removal of liquids to sufficient depth and providing bridging as necessary.

#### **4.3 FINAL COVER SYSTEM 257.102 (d)(3)**

*[If a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.*

*The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan.]*

The final cover system will consist of a flexible geomembrane that will have a permeability that is less than or equal to the permeability of the natural subsoils and is no greater than  $1 \times 10^{-5}$  cm/sec. The geomembrane will be installed directly over the graded CCR material. Over the geomembrane will be installed an infiltration layer consisting of 18" of earthen material and an erosion layer consisting of 6" of earthen material that is capable of sustaining native plant growth. The final cover will be seeded and mulched to promote growth of a vegetative cover. The final cover slope will be a minimum of 2% and will convey water to a NPDES permitted outfall. The final cover slope will be a minimum of 2% to accommodate settling and subsidence.

#### **5.0 ESTIMATE OF MAXIMUM CCR VOLUME 257.102 (b)(1)(iv)**

*[An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.]*

The estimated maximum CCR volume ever on-site is approx. 435 acre feet.

#### **6.0 ESTIMATE OF LARGEST AREA OF CCR REQUIRING COVER 257.102 (b)(1)(v)**

*[An estimate of the largest area of CCR unit ever requiring a final cover*

The largest area of the CCR unit ever requiring a final cover is 29 acres.

#### **7.0 CLOSURE SCHEDULE 257.102(b)(1)(vi)**

*[A schedule for completing all activities necessary to satisfy the closure criteria in the section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of the CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of the CCR unit closure.*

At this time there are currently no plans to close this CCR unit. Once the CCR unit requires closure a schedule to satisfy this section will be prepared.