



## **Closure Plan for Fly Ash Reservoir II Amendment Certification**

**Cardinal Operating Company**

The Closure Plan for Fly Ash Reservoir II dated October 2019 and prepared by TRC is a revision to original closure plan prepared by AEP dated August 2016. I, the undersigned Ohio Professional Engineer, hereby certify that I am familiar with the technical requirements of 40 CFR 257.102 and that the revised closure plan meets the requirements of 257.102(b)(4) and 257.102(d).



Michael Amstadt, P.E.  
Professional Engineer

**Michael Amstadt** Digitally signed by  
Michael Amstadt  
Date: 2020.11.03  
12:47:59 -06'00'



Mike DeWine, Governor  
Jon Husted, Lt. Governor  
Laurie A. Stevenson, Director

February 20, 2020

Buckeye Power Inc  
Attn: Tom Alban

6677 Busch Blvd  
Columbus, OH 45229

RE: Buckeye Power Inc  
Permit-Long Term  
Approval  
Surface Water Permit to Install  
Jefferson  
DSWPTI1313440

Subject: Cardinal Plant Fly Ash Reservoir II Closure Project, Wells Twp.  
Plans Received on October 30, 2019  
Plans Revised on February 7, 2020  
From: TRC Engineers, Inc.

Ladies and Gentlemen:

Enclosed is an approved Ohio EPA Permit to Install. This permit contains several conditions and restrictions; I urge you to read it carefully. A general condition of your permit states that issuance of the permit does not relieve you of the duty of complying with all applicable federal, state, and local laws, ordinances, and regulations. You are hereby notified that this action of the Director is final and may be appealed to the Environmental Review Appeals Commission pursuant to Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with the Commission within thirty (30) days after notice of the Director's action. The appeal must be accompanied by a filing fee of \$70.00, made payable to "Treasurer State of Ohio", which the Commission, in its discretion, may reduce if by affidavit you demonstrate that payment of the full amount of the fee would cause extreme hardship. Notice of the filing of the appeal shall be filed with the Director within three (3) days of filing with the Commission. Ohio EPA requests that a copy of the appeal be served upon the Ohio Attorney General's Office, Environmental Enforcement Section. An appeal may be filed with the Environmental Review Appeals Commission at the following address: Environmental Review Appeals Commission, 30 East Broad Street, 4<sup>th</sup> Floor, Columbus, OH 43215. If you have any questions, please contact the Ohio EPA District Office.

Ohio EPA has developed a customer service survey to get feedback from regulated entities that have contacted Ohio EPA for regulatory assistance, or worked with the Agency to obtain a permit, license or other authorization. Ohio EPA's goal is to provide our customers with the best possible customer service, and your feedback is important to us in meeting this goal. Please take a few minutes to complete this survey and share your experience with us at <http://www.surveymonkey.com/s/ohioepacustomersurvey>. If you have any questions, please contact the Ohio EPA district office to which you submitted your application.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin J. Fowler".

Kevin J. Fowler, Supervisor  
Permit Processing Unit, Division of Surface Water

KJF/bd

9489 0090 0027 6053 8201 65

Enclosure  
CERTIFIED MAIL

cc: Southeast District Office

TRC Engineers, Inc.

This permit shall expire if construction has not been initiated by the applicant within eighteen months of the effective date of this permit. By accepting this permit, the applicant acknowledges that this eighteen month period shall not be considered or construed as extending or having any effect whatsoever on any compliance schedule or deadline set forth in any administrative or court order issued to or binding upon the permit applicant, and the applicant shall abide by such compliance schedules or deadlines to avoid the initiation of additional legal action by the Ohio EPA.

The director of the Ohio Environmental Protection Agency, or his authorized representatives, may enter upon the premises of the above named applicant during construction and operation at any reasonable time for the purpose of making inspections, conducting tests, examining records, or reports pertaining to the construction, modification, or installation of the above described source of environmental pollutants.

Issuance of this permit does not relieve you of the duty of complying with all applicable federal, state, and local laws, ordinances, and regulations.

Any well, well point, pit or other device installed for the purpose of lowering the ground water level to facilitate construction of this project shall be properly abandoned in accordance with the provisions of Section 3745-9-10 of the Ohio Administrative Code or in accordance with the provisions of this plan or as directed by the Director or his representative. For more information please contact: Division of Drinking and Ground Water - Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, Ohio 43215 (614) 644-2752.

Any person installing any well, well point, pit or other device used for the purpose of removing ground water from an aquifer shall complete and file a Well Log and Drilling Report form with the Ohio Department of Natural Resources, Division of Water, within 30 days of the well completion in accordance with the Ohio Revised code Section 1521.01 and 1521.05. In addition, any such facility that has a capacity to withdraw waters of the state in an amount greater than 100,000 gallons per day from all sources shall be registered by the owner with the chief of the Division of Water, Ohio Department of Natural Resources, within three months after the facility is completed in accordance with Section 1521.16 of the Ohio Revised Code. For copies of the necessary well log, drilling report, or registration forms, please contact:

Ohio Department of Natural Resources  
2045 Morse Road Bldg. E  
Columbus, OH 43229-6693  
(614) 265-6717

1. The proposed wastewater disposal system shall be constructed in strict accordance with the plans and application approved by the director of the Ohio Environmental Protection Agency. There shall be no deviation from these plans without the prior express, written approval of the agency. Any deviations from these plans or the above conditions may lead to such sanctions and penalties as provided for under Ohio law. Approval of these plans and issuance of this permit does not constitute an assurance by the Ohio Environmental Protection Agency that the proposed facilities will operate in compliance with all Ohio laws and regulations. Additional facilities shall be installed upon orders of the Ohio Environmental Protection Agency if the proposed sources are inadequate or cannot meet applicable standards.

2. Permittee shall submit notice of final closure to Ohio EPA's, Southeast District Office upon completion of the cover system. The intention for the notice is to establish a date of completion to be used for assessing the term of post-closure care.

**Report on the Permit to Install Application  
and Detailed Plans for Cardinal Operating Company  
Fly Ash Reservoir II Closure Project  
Wells Twp., Jefferson County  
PTI No. 1313440  
February 10, 2020**

On October 30, 2019, an application for Permit to Install (PTI No. 1313440) was received in the Southeast District Office. The submittal included four 3-ring binders titled Volume 3 – Final Closure/Post-Closure Plan. The binders included applications for permit to install, post closure care plan, and 10-sheet plan set (C1-C10). Ohio EPA requested a revision on December 12, 2019. The revision was submitted as a 3-ring binder that included a comment letter, 5 additional sheets (1-5) to supplement the original plan set, and additional information. Three additional copies were requested on January 31, 2020 and received on February 7, 2020.

**Consultant/Representative of Owner:**

Nakia Addison, P.E., Project Manager                      Ph: (864) 275-1285  
TRC Engineers, Inc.  
1382 West Ninth Street, Suite 400  
Cleveland, OH 44113

Michael Amstadt, P.E. certified the Plan Drawings

**Owner:**

Tom Alban, V.P. Power Generation                      PH: (614) 430-7814  
Cardinal Operating Company  
6677 Busch Boulevard  
Columbus, OH 43229

**Location Description:**

Cardinal Plant – 306 County Road 7 East. Village of Brilliant in Wells Township, Jefferson County.

**General/Background Information:**

The project is focused on the closure of the Fly Ash Reservoir II (FAR II) which contains coal combustion residuals.

**Method of Closure:**

Applicant had pre-application meeting.

Facility plans to close the unit in place by regrading the ash, installing a cover and providing drainage channels to the existing dam. The existing dam and emergency spillway are proposed to remain. Storm water is proposed to exit from the FAR II area through modifying

the existing 54" diameter inlet associated with Outfall 01B00009019.

**Groundwater Monitoring Consideration:**

For groundwater monitoring, the revision comment letter stated:

*For the purposes of monitoring all three units (FAR I, FAR II, and FGD Landfill), the groundwater monitoring plan currently in place in accordance with OAC 3745-30-08 will continue to be sampled and remain unchanged throughout closure and post-closure.*

*For the purposes of monitoring FAR II during closure and post-closure in accordance with Federal Coal Combustion Residual Rule (40 CFR 257.90 through 98), groundwater monitoring will be conducted following Cardinal's CCR Groundwater Monitoring Design Network and Statistical Analysis Plan, which are provided,*

**Post Closure Care Consideration:**

The submitted plan includes statement that Cardinal will submit written certification that the closure was completed in accordance with plans and specifications. A post-closure care period of 30 years is included unless the CCR Unit is operating under assessment monitoring in accordance with 40 CFR 257.95, then post-closure will continue until the unit returns to detection monitoring.

**Estimated Cost(s):**

Construction - \$40,000,000


**Special Conditions:**

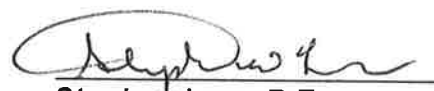
The permit will have the following special condition:

1. Permittee shall submit notice of final closure to Ohio EPA's, Southeast District Office upon completion of the cover system. The intention for the notice is to establish a date of completion to be used for assessing the term of post-closure care.

**Conclusion:**

The detailed plans for the Cardinal Operating Company Fly Ash Reservoir II Closure project have been reviewed, appear to be satisfactory and are recommended for approval.

  
\_\_\_\_\_  
**Aaron Pennington**  
District Representative  
SEDO, Division of Surface Water

  
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**Stephen Lear, P.E.**  
Reviewer  
SEDO, Division of Surface Water



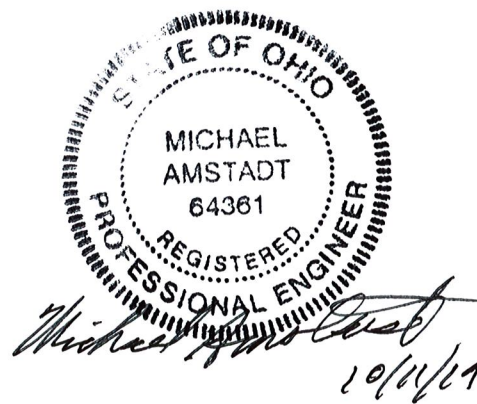
# Closure Plan for Fly Ash Reservoir II

**Cardinal Operating Company**

*Cardinal Plant  
Brilliant, Ohio*

October 2019

*Prepared For  
Cardinal Operating Company*



A handwritten signature in black ink, appearing to read "Nakia Addison".

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Nakia Addison  
Project Manager

A handwritten signature in black ink, appearing to read "Michael Amstadt", with the date "10/14/19" written below it.

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Michael Amstadt, P.E.  
Principal Project Engineer

*TRC Engineers, Inc. | Cardinal Operating Company  
Closure Plan for Fly Ash Reservoir II*

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# Section 1

## Introduction

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The Cardinal Power Plant (Plant) is owned by Buckeye Power and AEP Generation Resources (GENCO) and is operated by the Cardinal Operating Company (Cardinal). The Plant operates two surface impoundments for managing CCR; the Bottom Ash Complex and Fly Ash Reservoir II (FAR II). FAR II meets the definition of a coal combustion residual (CCR) surface impoundment under the United States Environmental Protection Agency (USEPA) Disposal of Coal Combustion Residuals From Electric Utilities Final Rule (CCR Rule). This Closure Plan (Plan) describes the activities associated with the closure of FAR II to meet the requirements of 40 Code of Federal Regulations (CFR) 257.102(b) in the CCR Rule. This Plan was prepared for Cardinal by TRC Engineers, Inc. (TRC).

### 1.1 Description of the Unit

FAR II is a valley filled reservoir with a unique structure whose current configuration is the result of the original earth fill dam and two separate raisings. The original earth fill dam (Stage 1) consisted of a 180 feet high arched earth embankment incorporating a zoned cross section. At 925 feet NGVD, the dam featured a 70-foot wide by 1,055-foot long crest. The maximum operating pool that could be achieved with the original configuration was El. 913. In 1997, the original dam was raised, referred to as Stage 2. Following this raising, the dam was 237 feet high with a 30-foot wide crest. In 2013, the dam was raised 13 feet using back-to-back Mechanically Stabilized Earth (MSE) walls, bringing the dam to its current, Stage 3 configuration. The principle features of the typical section are the MSE wall themselves and a vinyl sheet pile wall extending from the existing clay core to the top of the Probably Maximum Flood (PMF) level for seepage cutoff purposes. FAR II receives sluiced fly ash and waste water from the plant via the bottom ash/recirculation pond, as well as leachate and storm water from the landfill and FAR I. Storm water run-on from the upgradient valley also flows into the FAR II.

### 1.2 Site Information

The Plant is located within Wells Township, Jefferson County, near the town of Brilliant in eastern Ohio. FAR II is located approximately 1.5 miles north of the Plant and is located about 6,500 feet northeast of the intersection of Riddles Run Road (Township Road 163) and Township Road 164.



# Section 2

## Closure Plan

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### 2.1 Closure Description

FAR II will be closed by closure in place in accordance with 40 CFR 257.102(d). Certification of the closure will be provided by a registered professional engineer. Closure will consist of regrading the existing material and the installation of an impermeable cap with vegetative cover. Closure is anticipated to commence in 2021 and completed at the end of 2026 as described below.

In 2021, FAR II will stop receiving Plant process waters (*i.e.*: ash transport water, leachate, etc.) and storm water flows will be diverted. Free water will be removed by lowering the stop logs of the existing service spillway and with pumps when needed. The CCR will be dewatered and stabilized to create a working surface that can be accessed by heavy equipment. The existing CCR surface will be graded to achieve a gently sloping surface to promote positive drainage. The regraded CCR surface will be covered with a final cover system with 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 final cover system will be in compliance with 40 CFR 257.102(d)(3) and will be composed, from top to bottom, of the following elements:

- An erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth;
- An infiltration layer that contains a minimum of 18 inches of earthen material;
- A geocomposite drainage layer (geonet with double sided geotextile) within the swale or a cushion geotextile; and
- A 40-mil linear low-density polyethylene (LLDPE) geomembrane placed directly on the CCR material.

Or:

- An erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth; and
- An infiltration layer that contains a minimum of 18 inches of earthen material.

The final cover will be seeded and mulched to promote growth of a vegetative cover. The final cover slope will promote positive drainage and will convey water to a NPDES permitted outfall.

## 2.2 Closure Performance Standards

The FAR II closure will meet the performance standards identified in 40 CFR 257.102(d) with the following design considerations:

**2.2.1 40 CFR 257.102(d)(1)(i) – Control, minimize or eliminate, to 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.

**2.2.2 40 CFR 257.102(d)(1)(ii) – Preclude the probability of future impoundment of water, sediment, or slurry.**

The impoundment will be graded to prevent ponding of water with channels graded to drain. The current outfall piping will be modified to preclude future impoundment of water, sediment, or slurry.

**2.2.3 40 CFR 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 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.

**2.2.4 40 CFR 257.102(d)(1)(iv) – Minimize the need for further maintenance of the CCR unit.**

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

**2.2.5 40 CFR 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 phase manner as liquids are removed and areas are stabilized. Good engineering practices will be incorporated into the design

to help facilitate construction being completed in the shortest amount of time possible.

**2.2.6 40 CFR 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 the closure, all free water will be removed and the CCR dewatered to sufficient depths to provide a stable surface. All water discharges will be in accordance with the NPDES permit.

**2.2.7 40 CFR 257.102(d)(2)(ii) – Remaining waste must be stabilized sufficient to support the final cover system.**

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

**2.2.8 40 CFR 257.102(d)(3) – 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 final cover system will consist of a flexible geomembrane or general fill 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 or fill will be directly over the graded CCR material. Over the geomembrane will be installed an infiltration layer consisting of 18 inches of earthen material and an erosion layer consisting of six inches 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 will be sloped to promote positive drainage and will convey water to a NPDES permitted outfall. The final cover slopes will be designed to accommodate settling and subsidence.

## **2.3 CCR Volume and Area Estimate**

It is estimated that the maximum amount of CCR ever on site is approximately 8,200-acre feet. The largest area of the CCR unit ever requiring a final cover is 161 acres.

## **2.4 Schedule**

The original engineering and design for the closure of FAR II was prepared and approved in 2012. The 2012 design is being updated and a permit modification is being submitted to Ohio Environmental Protection Agency in 2019. The Plant will stop receiving Plant process waters (*i.e.*: ash transport water, leachate, etc.) and divert storm water flows in 2021 and begin FAR II closure. Closure activities, which

will include dewatering, CCR stabilization, CCR regrading, cover installation, and final site restoration, is expected to take five years to complete.

## **2.5 Notifications**

In accordance with the CCR Rule (40 CFR 257.102(g)), Cardinal will add an Intent to Initiate Closure notice to the Plant's operating record prior to initiating closure activities. In addition, a Notification of Completion of Closure with an engineer's certification will be posted to the operating record within 30 days of completion of closure activities (40 CFR 257.102(h)). The Plan and notifications will also be posted to Cardinal's publicly accessible internet site

# Section 3 Certification

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I, the undersigned Ohio Professional Engineer, hereby certify that I am familiar with the technical requirements of 40 CFR 257.102. I also certify that it is my professional opinion that, to the best of my knowledge, information, and belief, that the activities outlined in this closure plan are in accordance with current good and accepted engineering practice(s) and standard(s) appropriate to the nature of the project and the technical requirements of 40 CFR 257.102(d).

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 an Ohio Registered 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 closure activities.

Michael Amstadt, P.E.

\_\_\_\_\_  
Printed Name of Professional Engineer

64361

\_\_\_\_\_  
State of Ohio License Number

