

Hugo CCR Surface Impoundment Closure Plan



Western Farmers Electric Cooperative

Project No. 85009

**Revision 0
October 14, 2016**

Hugo CCR Surface Impoundment Closure Plan

Prepared for

**Western Farmers Electric Cooperative
Project No. 85009
Hugo, Oklahoma**

**Revision 0
October 14, 2016**

Prepared by

**Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri**

COPYRIGHT © 2016 BURNS & McDONNELL ENGINEERING COMPANY, INC.

INDEX AND CERTIFICATION

Western Farmers Electric Cooperative Hugo CCR Surface Impoundment Closure Plan

Report Index

<u>Chapter Number</u>	<u>Chapter Title</u>	<u>Number of Pages</u>
1.0	Introduction	2
2.0	Closure Plan	7
3.0	Review and Revisions	1
4.0	Record of Revisions	1
Appendix A	Closure Schedule	1

Certification

I hereby certify, as a Professional Engineer in the state of Oklahoma, that the information in this document was assembled under my direct personal charge. I am a "Qualified Professional Engineer" as defined by 40 C.F.R. § 257.53 by the fact that I have the technical knowledge and experience to make the specific technical certifications set forth herein. This Closure Plan meets the requirements of 40 C.F.R. § 257.102. This Closure Plan is not intended or represented to be suitable for reuse by Western Farmers Electric Cooperative or others without specific verification or adaptation by the Engineer.

Robert N. Owens P.E. (No. 21260)

Date: _____

TABLE OF CONTENTS

	<u>Page No.</u>
1.0 INTRODUCTION	1-1
2.0 CLOSURE PLAN	2-1
2.1 Impoundment Description	2-1
2.1.1 CCR Inventory	2-2
2.2 Closure Method.....	2-2
2.2.1 Removal of CCR and Decontamination – CCR Unit 2	2-2
2.2.2 Cap in Place – CCR Unit 3	2-3
2.2.3 Installation of Final Cover	2-4
2.2.4 Methods to Achieve Closure Performance Standards	2-5
2.2.5 Groundwater Monitoring	2-5
2.3 Closure Commencement.....	2-6
2.4 Closure Completion	2-6
3.0 REVIEW AND REVISIONS	3-1
4.0 RECORD OF REVISIONS	4-1

LIST OF FIGURES

	<u>Page No.</u>
Figure 2-1: Hugo Site Plan	2-1
Figure 2-2: Impoundment Typical Cross Section (Prior to Closure).....	2-2
Figure 2-3: Typical Cover System	2-4

LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
ALM	Asset Life Management
BMcD	Burns & McDonnell
CCR	Coal Combustion Residual
C.F.R.	Code of Federal Regulations
CMMS	Computerized Maintenance Management System
EPA	Environmental Protection Agency
ESP	Electrostatic Precipitator
FGD	Flue Gas Desulfurization
NAVD 88	North American Vertical Datum of 1988
NGVD 29	National Geodetic Vertical Datum of 1929
OAC	Oklahoma Administrative Code
ODEQ	Oklahoma Department of Environmental Quality
OPDES	Oklahoma Pollution Discharge Elimination System
RCRA	Resource Conservation and Recovery Act
USC	United States Code
USGS	United States Geological Survey
WFEC	Western Farmers Electric Cooperative

1.0 INTRODUCTION

Burns & McDonnell (BMCD) has compiled information and prepared this Written Closure Plan (Closure Plan) for the existing CCR Surface Impoundment (Impoundment) at the Western Farmers Electric Cooperative (WFEC) Hugo Power Plant (Plant). The purpose of this Closure Plan is to comply with the United States Environmental Protection Agency's (EPA) Coal Combustion Residual Rule (CCR Rule), and the counterpart rules of the Oklahoma Department of Environmental Quality (ODEQ).

On April 17, 2015, EPA published the CCR Rule relating to the disposal of coal combustion residuals (CCR) materials generated at electric utilities coal-fired units. 80 Fed. Reg. 21302 (April 17, 2015). The CCR Rule was promulgated pursuant to the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. §§ 6901 *et seq.*), using the Subtitle D approach and is found at 40 C.F.R. § 257.50 *et seq.* Additionally, ODEQ adopted counterpart regulations to the CCR Rule effective September 15, 2016, which are found at OAC 252:517.

The owner or operator of a CCR surface impoundment subject to the CCR Rule must compile a Closure Plan in accordance with 40 C.F.R. § 257.102(b)(1) and OAC 252:517-15-7(b)(1). This Closure Plan provides the steps necessary to close the existing Impoundment at the Plant. The Closure Plan is required to describe the steps necessary to close the Impoundment at a point in its active life consistent with recognized and generally accepted good engineering practices. Specifically, this Closure Plan describes the following per 40 C.F.R. § 257.102(b)(1):

- A narrative description of how the Impoundment unit will be closed in accordance with the CCR Rule's requirements.
 - For closure through removal of CCR:
 - A description of the procedures to remove the CCR and decontaminate the Impoundment in accordance with 40 C.F.R. § 257.102(c).
 - For closure accomplished by leaving CCR in place:
 - A description of the final cover system designed in accordance with 40 C.F.R. § 257.102(d), a description of the methods and practices to be used to install the final cover system, and a discussion of how the final cover system will achieve the performance standards of 40 C.F.R. § 257.102(d).
- An estimate of the maximum inventory of CCR material ever stored in the Impoundment over its active life.

- An estimate of the largest area of the Impoundment ever requiring a final cover as required by 40 C.F.R. § 257.102(d) at any time during the Impoundment's active life.
- A schedule for completing closure activities, including the anticipated year of closure, sequential steps and estimated timeframes, and major milestones for permitting and construction activities.

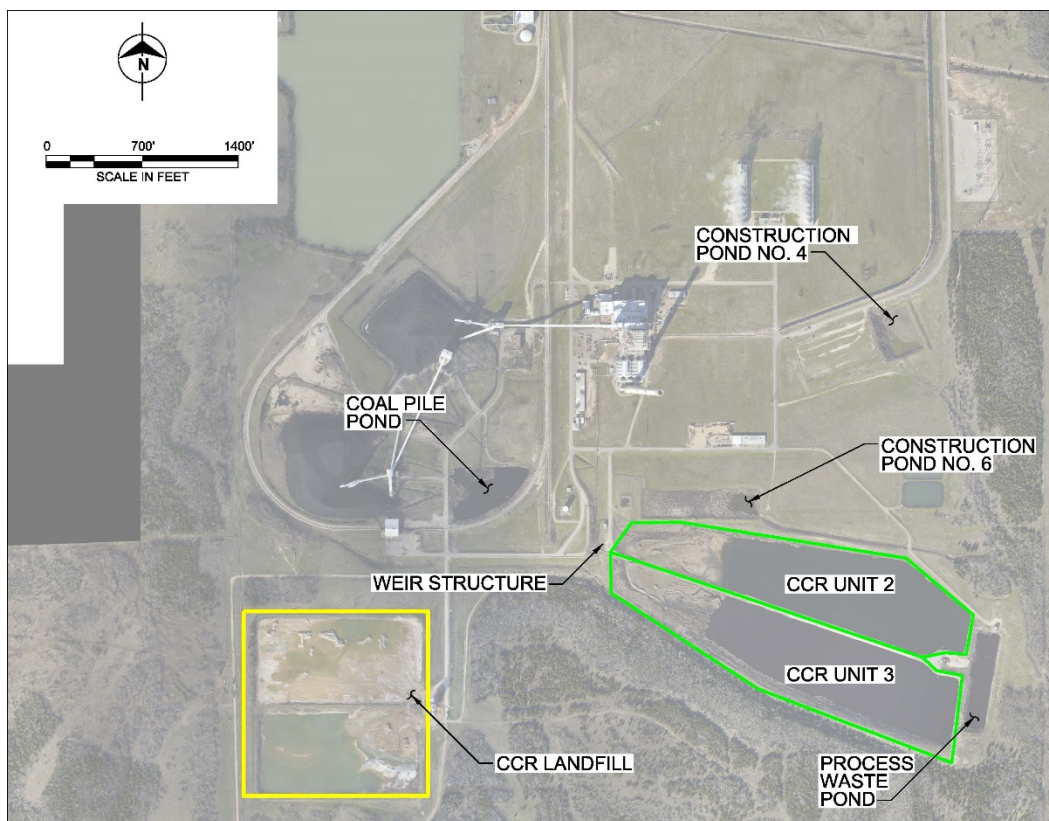
2.0 CLOSURE PLAN

2.1 Impoundment Description

The Plant is a single, coal-fired unit rated at 450 MW. The Plant is located south of highway US-70, west of the Town of Fort Towson, Oklahoma, and is owned and operated by WFEC. Fly ash and economizer ash generated by the Plant are beneficially reused or managed in the on-site Landfill. Bottom ash is available for beneficial reuse and managed in two cells of the Impoundment as described below.

Bottom ash is handled wet and sluiced to one or both of two cells of the Impoundment. The northern cell is designated as CCR Unit 2 and the southern cell is designated as CCR Unit 3. Both cells are approximately 30 acres¹ each in size and have a total intended design capacity of approximately 1,640,000 cubic yards of CCR. See Figure 2-1 for general site plan.

Figure 2-1: Hugo Site Plan



¹ Surface area is measured at elevation 446.0 feet, North American Vertical Datum, 1988.

2.1.1 CCR Inventory

The Impoundment has an approximate surface area of 60 acres measured within the perimeter dikes. The Impoundment has a total intended design capacity of approximately 1,640,000 cubic yards of CCR. The estimated maximum volume of CCR in the impoundment is approximately 231,000 cubic yards of CCR.

2.2 Closure Method

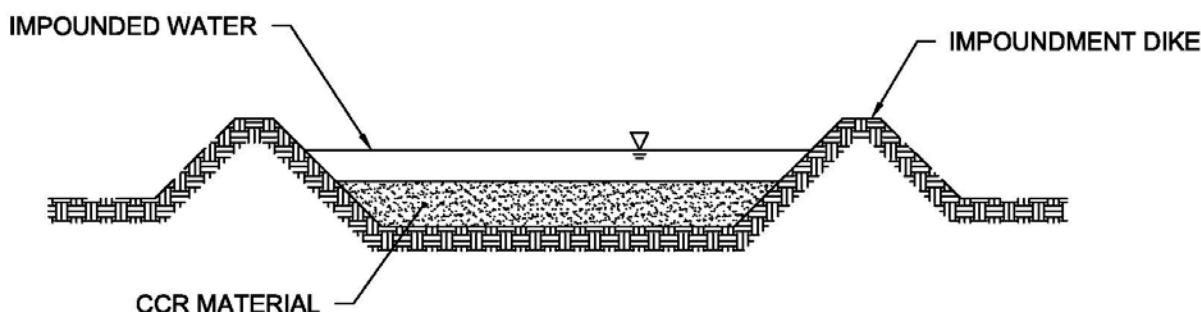
The Impoundment will be closed by a combination of complete removal of CCR from one cell and capping the CCR material in place in the second cell. CCR material from CCR Unit 2 will be removed and placed in CCR Unit 3. A cap will be placed on the CCR in CCR Unit 3. After CCR removal and decontamination, the CCR Unit 2 may be repurposed as a new non-CCR pond, pending necessary regulatory approvals. Procedures planned for closing the Impoundment are described in more detail herein.

2.2.1 Removal of CCR and Decontamination – CCR Unit 2

Removal of CCR material from CCR Unit 2 will be performed by excavating, dewatering, loading, and hauling the material out of the cell. Dewatering may be conducted through mechanical means such as double-handling, creating ditches, using a disc to dry out the material, and/or mixing in fly ash. The CCR material may also be dewatered through other methods such as the use of a well point system or wick drains. The water generated during dewatering will be discharged in accordance with the Plant's OPDES permit. The dewatered CCR material will be loaded onto trucks and hauled to CCR Unit 3, to the on-site CCR Landfill, or sold for beneficial re-use.

Visual observations will be conducted to verify that all CCR material has been removed from CCR Unit 2. Next, groundwater monitoring will be conducted as indicated in Section 2.2.3 to confirm CCR removal and decontamination has been completed pursuant to 40 C.F.R. § 257.102(c) of the CCR Rule. A typical cross section of a cell of the Impoundment is shown in Figure 2-2.

Figure 2-2: Impoundment Typical Cross Section (Prior to Closure)



2.2.1.1 Impoundment Drainage and Post-Closure Conditions

Upon completion of CCR removal and decontamination, the CCR Unit 2 area will be covered with an appropriate final cover and then be available for re-use as a non-CCR impoundment pending required regulatory approvals.

2.2.2 Cap in Place – CCR Unit 3

CCR Unit 3 will be dewatered in a similar manner to that which used for CCR Unit 2. The water generated during dewatering will be discharged in accordance with the Plant's OPDES permit. If necessary to establish final grades, material from CCR Unit 2 will be placed and graded in such a way to allow positive drainage off of the capped CCR Unit 3. Material placed in CCR Unit 3 will be placed in compacted lifts. A final cover system will be placed on top of the CCR material. The final cover system is described in the following section.

2.2.2.1 Final Cover System

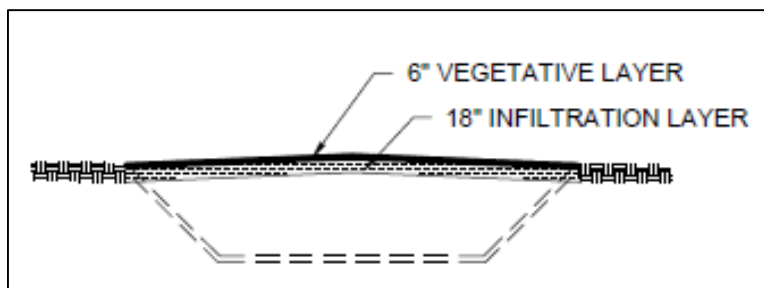
The final cover system will be designed and constructed to meet the following criteria pursuant to 40 C.F.R. § 257.102(d)(3)(i)(A)-(D):

- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} centimeters per second (cm/sec), whichever is less.
- The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.
- The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.
- The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

The final cover system will consist of an 18-inch infiltration layer and six-inch vegetative soil layer. The CCR materials will form a suitable subgrade for installation of the final cover material. Because the material will be placed in compacted lifts, and the physical properties of coal ash material, minimal settling is anticipated. Furthermore, settling would occur during the (prolonged) period of filling CCR Unit 3 during closure and minimal settling would occur after installation of the cover.

The final cover system will minimize infiltration of liquids, thus minimizing leachate production and migration from CCR Unit 3. Precipitation will be directed to drainage ditches. Vegetation will be established within the vegetative layer to prevent erosion of the soil from the slopes. A typical cross section of the final cover is shown in Figure 2-3.

Figure 2-3: Typical Cover System



The final cover system is designed to minimize the infiltration of liquids through the closed CCR Unit 3 and provides a vegetative erosion control layer. The Impoundment was originally designed to provide a permeability less than 1×10^{-7} cm/sec. Final construction drawings within CCR Unit 3 will be developed to provide a final cover design that meets or exceeds that permeability.

2.2.3 Installation of Final Cover

Installation of the final cover will include the following general steps:

- Development of construction plans and specifications.
- Final cover system construction bidding and procurement.
- Final cover system construction.
- Documentation of final cover system construction quality assurance activities.

Prior to development of the final cover system construction plans and specification, a ground or aerial survey will be conducted to develop a detailed surface topography. If vegetation exists on the surface of the CCR material or the intermediate cover, the vegetation will be removed. The soil subgrade will be prepared and the final cover system will be installed. The maximum area requiring final cover is estimated to be 30 acres.

Construction Quality Assurance (CQA) activities will be conducted in accordance with a CQA Plan. The final cover system installation will be closely documented in a CQA documentation report.

2.2.4 Methods to Achieve Closure Performance Standards

As outlined in 40 C.F.R. § 257.102(d), the closure of CCR Unit 3 will at a minimum:

- 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.
- Preclude the probability of future impoundment of water, sediment, or slurry.
- Provide for slope stability to protect against sloughing or movement of the final cover system.
- Minimize the need for further maintenance of the Impoundment.
- Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

The following sections describe performance standards by which closure of CCR Unit 3 will meet these listed criteria.

2.2.4.1 Soil Borrow Areas

Soil borrow areas will be identified during final design in order to support the construction of the final cover system. Soil removed from these borrow areas will be amended as necessary to promote vegetative growth in the final cap. Borrow areas will be graded and seeded to prevent erosion.

2.2.4.2 Methods of Revegetation

All areas that require seeding, both for final cover and in soil borrow areas, will be mulched at a rate of 1.5 tons/acre. Soil samples may be obtained prior to seeding to determine if amendments are necessary to promote growth.

Vegetation will provide 90 percent ground cover. Vegetation ground coverage will be evaluated during routine post-closure inspections.

2.2.5 Groundwater Monitoring

Groundwater will be monitored at the Impoundment in accordance with the Sampling and Analysis Plan (SAP) and Groundwater Monitoring Plan (GMP). The GMP will include establishment of a Groundwater Protection Standard (GWPS) for constituents listed in Appendix IV of 40 C.F.R. § 257 in accordance with 40 C.F.R. § 257.95(h).

Following CCR removal and decontamination as outlined in Section 2.2.1, the groundwater monitoring network will be sampled and analyzed for the constituents listed in Appendix IV of 40 C.F.R. § 257. CCR

removal and decontamination will be considered complete when all constituent concentrations are below the GWPS pursuant to 40 C.F.R. § 257.95(h) and § 257.102(c) of the CCR Rule. If Appendix IV constituent concentrations are found to be above the GWPS after all CCR has been removed from the Impoundment, an alternative source demonstration will be conducted in order to demonstrate the constituent concentrations are from a source other than the Impoundment. At which point, CCR removal and decontamination will be considered complete.

2.3 Closure Commencement

The anticipated closure trigger for the Impoundment is the final receipt of waste, either CCR or non-CCR streams. Closure of the Impoundment will commence no later than 30 days after the date on which the Impoundment receives the known final receipt of waste. The final receipt of waste is anticipated to be in April of 2023, however this date may be subject to change. For purposes of this Closure Plan, and in accordance with the CCR Rule, closure of the Impoundment has commenced when the Plant has ceased placing waste and has completed any of the following actions or activities:

- Taken any steps necessary to implement the written Closure Plan.
- Submitted a completed application for any required state or agency permit or permit modification.
- Taken any steps necessary to comply with any state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR Unit.

No later than the date Plant initiates closure of the Impoundment, a Notification of Intent to Close the Impoundment will be prepared. The notification has been completed when it has been placed in the Plant's CCR Operating Record. The notification will then be placed on WFEC's CCR public website within 30 days.

The planned closure schedule for the Impoundment is included within Appendix A of this Closure Plan.

2.4 Closure Completion

Closure for the Impoundment is required to be completed within five years of commencing closure activities per 40 C.F.R. § 257.102(f)(1)(ii). For the purposes of this Closure Plan, closure of the Impoundment is considered complete after CCR removal and decontamination of the Impoundment has been completed and groundwater monitoring concentrations have been found not to exceed the groundwater protection standard for constituents listed in Appendix IV of 40 C.F.R. §257. The closure activities outlined in Section 2.2 of this Closure Plan and groundwater monitoring activities outlined in Section 2.3 of this Closure Plan are anticipated to be completed no later than April of 2028.

Within 30 days of completion of closure of the Impoundment, a Notification of Closure of the Impoundment will be prepared and placed in the facility's CCR Operating Record and on WFEC's CCR public website. This notification will include a certification by a qualified professional engineer in the State of Oklahoma verifying that closure has been completed in accordance with this Closure Plan and the requirements of 40 C.F.R. § 257.102. In addition to the notification of closure, the Plant will have a deed notation prepared in accordance with 40 C.F.R. § 257.102(i). The deed notation will be documented by a notification prepared and placed in the Plant's Operating Record in accordance with the requirements of 40 C.F.R. § 257.102(i).

3.0 REVIEW AND REVISIONS

This Closure Plan will be placed in the Plant's Operating Record in accordance with the CCR Rule. Pursuant to the CCR Rule, if there is a significant change to any information compiled in the Closure Plan, the relevant information will be updated and the revised document will be placed in the Plant Operating Record with notice and public accessibility as required by the CCR Rule. A record of revisions made to this document is included in Section 4.0.

APPENDIX A – CLOSURE SCHEDULE

Preliminary Closure Schedule

Closure Activity	Timeframe (Working Days)	Accumulated Duration (Working Days)
Preparation for Closure		
Permitting / design	120	120
Submit Notification of Intent to Close to ODEQ	20	140
Design documents issued for bid	0	140
Bid period	15	155
Bid evaluation	10	165
Contract Award	20	185
Final placement of CCR material	0	185
Commence construction / mobilization	30	215
Closure Construction		
Dewatering / stabilization	90	305
Haul from CCR Unit 2 to CCR Unit 3	365	670
Grading / backfill of impoundment	60	730
Install compacted clay layer and membrane	90	820
Install erosion layer (topsoil)	20	840
ODEQ inspection	20	860
Seeding	20	880
Site clean-up / demobilization	10	890
Closure Completion		
Submit Notification of Completion of Closure	20	910



CREATE AMAZING.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
O 816-333-9400
F 816-333-3690
www.burnsmcd.com