

# Hugo CCR Surface Impoundment Closure Plan



**Western Farmers Electric Cooperative**

**Project No. 85009**

**Revision 4  
December 2019**

# **Hugo CCR Surface Impoundment Closure Plan**

**Prepared for**

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

**Revision 4  
December 2019**

**Prepared by**

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

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### Western Farmers Electric Cooperative Hugo CCR Surface Impoundment Closure Plan

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#### 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: 12/5/2019

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## LIST OF ABBREVIATIONS

<b><u>Abbreviation</u></b>	<b><u>Term/Phrase/Name</u></b>
BMcD	Burns & McDonnell
CCR	Coal Combustion Residual
CCR Rule	Coal Combustion Residual Rule
C.F.R.	Code of Federal Regulations
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
GMP	Groundwater Monitoring Plan
GWPS	Groundwater Protection Standard
OAC	Oklahoma Administrative Code
ODEQ	Oklahoma Department of Environmental Quality
OPDES	Oklahoma Pollution Discharge Elimination System
Plant	Hugo Power Plant
RCRA	Resource Conservation and Recovery Act
U.S.C.	United States Code
WQD	Water Quality Division
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 under Oklahoma Administrative Code (OAC) 252:517. In addition, ODEQ's State CCR program was approved by EPA with an effective date of July 30, 2018.

The owner or operator of a CCR surface impoundment subject to the CCR Rule must compile a Closure Plan in accordance with OAC 252:517-15-7(b)(1) and 40 C.F.R. §257.102(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 OAC 252:517-15-7(b)(1) [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 OAC 252:517-15-7(c) [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 OAC 252:517-15-7(d) [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 OAC 252:517-15-7(d)(3) [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 OAC 252:517-15-7(b)(1)(D) [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.

This Closure Plan is a revision to/amendment of the Plant's initial Closure Plan for the Impoundment dated October 14, 2016 pursuant to OAC 252:517-15-7(b)(3)(A) [40 C.F.R. § 257.102(b)(3)(i)]. The purpose of this Closure Plan is to, among other required elements, describe the means and methods of WFEC's current proposed approach to initiate and complete closure of the Impoundment, including the schedule for closure activities.



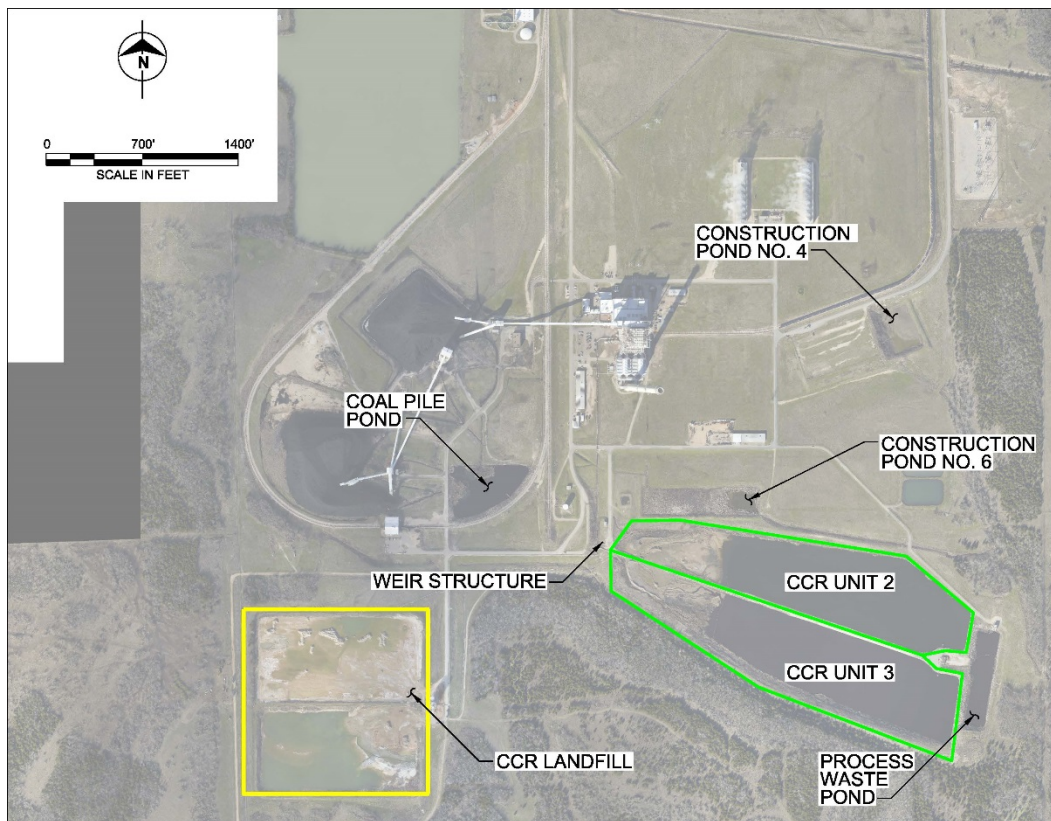
## 2.0 CLOSURE PLAN

### 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 was 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. The cells are approximately 30 acres<sup>1</sup> each in size. The Impoundment has 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



<sup>1</sup> 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 design capacity of approximately 1,640,000 cubic yards of CCR. The estimated volume of CCR in the Impoundment is approximately 555,400 cubic yards of CCR.

## **2.2 Closure Methods**

According to the CCR Rule, surface impoundments may be closed by a cap in place method or by closure through removal of material. This Closure Plan describes how either or both options may be utilized to close the Impoundment.

WFEC plans to remove CCR material from the Impoundment for beneficial use purposes, thereby decreasing the volume of CCR material that is subject to closure in place or disposal in the onsite CCR landfill. It is WFEC's goal for 100% of usable CCR material in the Impoundment to be beneficially reused. Due to compliance scheduling requirements, WFEC plans to close the impoundment through removal of material by utilizing the onsite landfill. If any CCR material remains in the impoundment at that time, it would then be closed in place through installation of a final cover system. Procedures planned for closing the Impoundment are described in more detail herein.

### **2.2.1 Removal of CCR Closure Method**

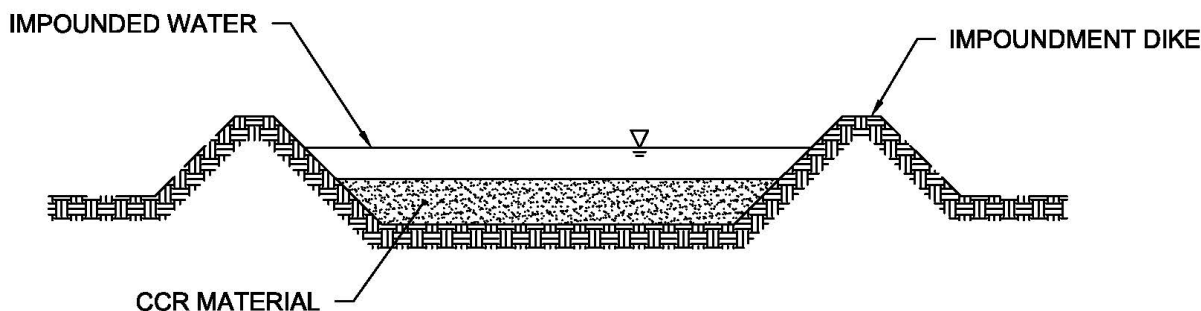
Removal of CCR material from the Impoundment will be performed by excavating, dewatering, loading, and hauling the material out of the Impoundment. Dewatering may be conducted through mechanical means such as creating a series of berms and ditches, using a disc to dry out the material, and/or mixing 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 sold for beneficial re-use, or loaded onto trucks and hauled from one cell to the other, or to the on-site CCR Landfill.

Visual observations will be conducted by a third-party Professional Engineer (PE) to verify the CCR material has been removed from the Impoundment. The PE will certify that closure by removal has been completed in accordance with OAC 252:517-15-7(c).

Identification of material as being either CCR material or soil will be made by inspecting the material for color and/or texture and consistency. The CCR material will be gray, grayish brown, or black in color and will be loose and sandy or silty in consistency. The existing subgrade of native low permeability soil will be brown or brownish gray in color and will be firm, cohesive, and slick when wetted.

Following certification of the closure by removal of material, a single round of sampling of the existing impoundment monitoring well system will be conducted and analyzed as indicated in Section 2.2.4 to confirm CCR removal and decontamination has been completed pursuant to OAC 252:517-15-7(c) [40 C.F.R. §257.102(c)]. A typical cross section of a cell of the Impoundment is shown in Figure 2.

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



### **2.2.1.1 Impoundment Drainage and Post-Closure Conditions**

Once CCR Units 2 and/or 3 are certified as being closed by removal of CCR, the certification of final closure must be approved by the Oklahoma Department of Environmental Quality (DEQ)'s Land Division.

### **2.2.2 Cap in Place Closure Method**

If closure through a cap in place method is utilized, the ponded CCR material will be dewatered in a similar manner to that indicated in Section 2.2.1. If necessary, to establish final grades, material from the impoundment will be placed and graded in such a way to allow positive drainage off of the capped material. Material 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**

If CCR materials must be closed in place as described above, the final cover system will be designed and constructed to meet the following criteria pursuant to OAC 252:517-15-7(d)(3) [40 C.F.R.

§257.102(d)(3)(i)(A) through (D)]:

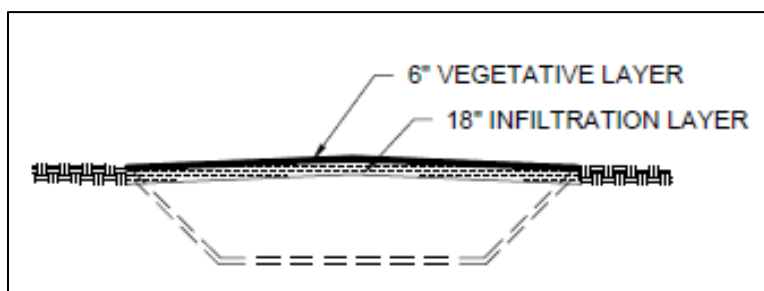
- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than  $1 \times 10^{-5}$  centimeters per second (cm/sec), whichever is less.

- 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 materials in the Impoundment 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 the Impoundment. 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 3: Typical Cover System**



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

### 2.2.2.2 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.

### **2.2.2.3 Methods to Achieve Closure in Place Performance Standards**

As outlined in OAC 252:517-15-7(d) [40 C.F.R. §257.102(d)], the closure of the Impoundment, when capping in place, 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 in place will meet the listed criteria.

### **2.2.2.4 Soil Borrow Areas**

Offsite 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.

### **2.2.3 Methods of Revegetation Following Closure**

All areas that require seeding, whether it be in areas where CCR material has been removed, for final cover, or 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.

### **2.2.4 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 OAC 252:517 Appendix A and B [Appendix IV of 40 C.F.R. §257] in accordance with OAC 252:517-9-4 (b)-(j) [40 C.F.R. §257.95(h)].

Following closure of the Impoundment, as outlined in Section 2.2.1, the groundwater monitoring network will be sampled and analyzed for the constituents listed in OAC 252:517 Appendix A and B [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 OAC 252:517-15-9(b)(3) [40 C.F.R. §257.95(h) and §257.102(c) of the CCR Rule]. If Appendix A and B 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. Should any portion of the Impoundment be closed with CCR in place, groundwater monitoring must occur for a minimum of 30 years after closure in accordance with OAC 252:517-15-9 and the Post-Closure Plan.

### **2.2.5 Continued Operation of Plant OPDES Discharge System**

WFEC will continue placing non-CCR wastewater into the Impoundment under Consent Order Case No. 19-090, which requires WFEC to cease placing all waste streams into the Impoundment no later than October 31, 2020 and commence closure in accordance with the closure plan and OAC 252:517-15-7. During closure activities prior to October 31, 2020, CCR Unit 2's non-CCR wastewater streams will be routed through CCR Unit 3. Please see Figure 4 for a more detailed schedule.

### **2.3 Closure Commencement**

The WFEC Impoundment failed to meet the Location Restriction criteria outlined in OAC 525:517-5 and is therefore required to initiate closure.

No later than the date the 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.

### **2.4 Closure Schedule and Completion**

As indicated in Section 2.3, closure of the WFEC Impoundment was triggered in October 2018 through failure to meet the Location Restriction criteria. According to OAC 525:517-15-6(b), and subject to any changes in the rules and regulations governing the timeframes and requirements for closure, WFEC must cease sending CCR material to the Impoundment and commence closure. Additionally, under OAC 525:517-15-7(f)(1), WFEC must close the Impoundment within five years of commencing closure activities. Since the Impoundment footprint is greater than 40 acres, the closure timeline may be extended in up to two-year increments, for a maximum of five extensions. OAC 252:517-15-7(b)(1)(F) and (f)(2)(A) require a site-specific demonstration to support the need for two-year extensions beyond the five-year closure period timeframe. The demonstration must show that closure within five years of commencement is not feasible due to factors beyond WFEC's control. WFEC's proposed closure schedule is as follows:

**Figure 4: Proposed Closure Schedule**

Task Name	2018	2019				2020				2021				2022				2023				
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Initiate Closure	Yellow																					
Drain CCR 2 and reroute plant drains to CCR 3	Green	Green																				
Dewater Bottom Ash CCR 2		Green	Green	Green	Green																	
Non-CCR wastewater routed to CCR 3 to support CCR Dewatering of CCR 2		Green																				
Removal of Ash Offsite for Beneficial Reuse (CCR3)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green									
Prepare Specification for Clean Closure of CCR 2				Green																		
Remove bottom ash from CCR 2 to CCR 1 (landfill)				Green	Green	Green	Green	Yellow														
Submit closure documents to DEQ on CCR 2								Yellow						Green								
DEQ approval of closure of CCR 2 by October 31, 2020								Yellow														
Reroute plant drains from CCR 3 to DEQ Water Quality regulated impoundment								Yellow														
Prepare Specification for Clean Close of CCR 3												Green										
Remove bottom ash from CCR 3 to CCR 1 (landfill)														Green	Green	Green	Green					
Submit closure documents to DEQ on CCR 3																				Yellow		
Approval of Closure of CCR 3 by DEQ																					Yellow	

Within 30 days of completion of closure of the Impoundment, a Notification of Closure of the Impoundment will be prepared and sent to ODEQ. 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.



### **3.0 REVIEW AND REVISIONS**

This Closure Plan will be placed in the Plant's Operating Record in accordance with the CCR Rule and OAC 252:517-19. 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. A record of revisions made to this document is included in Section 4.0.

**4.0 RECORD OF REVISIONS**

<b>Revision Number</b>	<b>Date</b>	<b>Revisions Made</b>	<b>By Whom</b>
0	10/14/2016	Initial Issue	Burns & McDonnell
1	12/7/2018	Revised Closure Options	Burns & McDonnell
2	2/15/2019	Revised per DEQ Comments	Burns & McDonnell
3	11/21/2019	Revised per DEQ Comments	Burns & McDonnell
4	12/5/2019	Revised per DEQ Comments	Burns & McDonnell



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