



# Closure Plan Jeffrey Energy Center Bottom Ash Pond (Inactive)

Prepared for:

Evergy Kansas Central, Inc.

Jeffrey Energy Center

St. Marys, Kansas

Prepared by:

APTIM Environmental & Infrastructure, LLC

Revision 0 - April 18, 2018

Revision 1 - January 26, 2021



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## Plan Review/Amendment Log §257.102(b)(3)

Date of Review	Reviewer Name	Amendment Required (YES/NO)	Sections Amended and Reason
April 18, 2018 (original version)	APTIM Environmental & Infrastructure, LLC	N/A	Original
January 26, 2021 (Revision 1)	APTIM Environmental & Infrastructure, LLC	YES	<p>Revised company name, updated regulatory references, clarified closure acreage, in-place volume, closure schedule, and various revisions for better alignment with other Evergy closure plans.</p> <p>Note that no triggering event has necessitated this revision.</p>



## 1.0 INTRODUCTION

APTIM Environmental and Infrastructure, LLC (APTIM) has revised the following Closure Plan (Plan) at the request of Evergy Kansas Central, Inc. (Evergy) for the inactive Bottom Ash Pond (Pond) located at Jeffrey Energy Center (JEC) in St. Marys, Kansas.

The Pond has been deemed to be a regulated, inactive coal combustion residual (CCR) unit under the United States Environmental Protection Agency (USEPA) Disposal of Coal Combustion Residuals from Electric utilities Final Rule (CCR Rule) 40 CFR §257 and §261. On July 26, 2016 the USEPA extended the CCR Rule requirements for certain inactive CCR surface impoundments. Evergy provided closure notification for the Pond within the timeframes of §257.100(e). Evergy is in the process of completing in-place closure of the Pond in accordance with §257.102(d).

This Plan details the closure requirements outlined in §257.102(b), for CCR units closed in place. The criteria for conducting the closure or retrofit of CCR units for the Pond are detailed in Section 2.0. Additionally, this Plan details the necessary steps to close the Pond based on recognized and good engineering practices.



## 2.0 REGULATORY OVERVIEW OF CCR CLOSURE PLAN REQUIREMENTS

On April 17, 2015, USEPA published the CCR Rule under Subtitle D of the Resource Conservation and Recovery Act (RCRA) as 40 CFR Part §257 and §261. The purpose of the CCR Rule is to regulate the management of CCR in regulated CCR units for landfill and surface impoundments. The Pond has been deemed to be a regulated inactive CCR unit at JEC.

Section 257.102(b) of the CCR Rule requires owners or operators of CCR landfills and surface impoundments to prepare a Plan describing the closure of the unit and schedule for implementation of the Plan. The following citations from the CCR Rule are applicable for the Pond as discussed in this Plan:

§257.102(b)(1) stipulates:

*(b) Written closure plan – (1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section*

- (i) A narrative description that discusses how the CCR unit will be closed in accordance with this section. (See Section 4.1)*
- (ii) If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section. (N/A)*
- (iii) If closure of the CCR unit will be accomplished by leaving 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. (Sections 4.2, 4.3, and 5.0)*
- (iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit. (See Section 3.4)*
- (v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life. (Section 3.5)*
- (vi) A schedule for completing all activities necessary to satisfy the closure criteria in this 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 CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section. (See Section 6.0)*



Moreover, the final cover system has been planned in accordance with the following requirements of §257.102(d)(3), which stipulates:

*“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 paragraphs (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.*

- (i) *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 include the written closure plan required by paragraph (b) of this section.*
  - (A) *The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or permeability no greater than  $1 \times 10^{-5}$  cm/sec, whichever is less. (Section 4.2)*
  - (B) *The infiltration of liquids through the CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material. (Section 4.2)*
  - (C) *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. (Section 4.2.3)*
  - (D) *The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence” (Section 4.3)*

An outline of the closure performance standards for closure of units where CCR material will be left in place is described in §257.102(d)(1), which stipulates:

*“The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner than will:*

- (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; (Section 5.1)*
- (ii) *Precludes the probability of future impoundment of water, sediment, or slurry; (Section 5.2)*
- (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; (Section 5.3)*
- (iv) *Minimize the need for further maintenance of the CCR unit; and (Section 5.4)*
- (v) *Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.” (Section 5.5)*

A written certification is provided in Section 8.0 from a qualified professional engineer in the State of Kansas, to certify that this Plan meets the requirements of the CCR Rule.



### **3.0 JEC POND OVERVIEW**

#### **3.1 Location, Topography, and Description**

The Pond has not received CCR material since October 2015 and is in the process of closure. The closure of the Pond will be accomplished by dewatering and capping the unit with a final cover. The following Plan was developed to satisfy the CCR Rule requirements for in-place closure per §257.102(b)(1)(iii).

The Pond foundation and abutment materials primarily consists of the native underlying geologic materials. The Pond was not constructed with an engineered liner system. The Pond Dam is approximately 1,050-foot long with a crest elevation of 1,170 ft MSL and 3H:1V sideslopes.

#### **3.2 Existing Solid Waste Regulatory Permits and Consents**

Evergy was previously granted an Industrial Landfill Permit (Permit No. 0359) at JEC by the Kansas Department of Health and Environment – Bureau of Waste Management (KDHE-BWM), in accordance with Kansas Statutes Annotated (KSA) 65-3407. KDHE modified the solid waste permit, per K.A.R. 28-29-6a, in response to the CCR Rule to include all on-site CCR waste materials management units as disposal areas under the existing solid waste permit for JEC. The current Industrial Landfill Permit modification was approved on October 15, 2015.

#### **3.3 CCR Material Generation, Recycling, and Disposal**

The Pond has not received CCR material since October 2015 and is in the closure process. CCR material, plant process water, stormwater runoff and decant water from the Bottom Ash Area was historically sent to the Pond.

#### **3.4 Maximum Volume Estimate (§257.102(b)(1)(iv))**

The maximum volume of CCR ever on site was estimated by Black & Veatch to be approximately 1 million cubic yards based on a survey completed in 2016 by Terracon Consultants. The final closure volume may exceed this since it would include additional amounts of soil fill needed for site grading.

#### **3.5 Largest Area Requiring Final Cover (§257.102(b)(1)(v))**

The largest area of the unit requiring final cover at any time during the CCR unit's operating period is the total area of the Pond, which is estimated to be approximately 65 acres.



#### **4.0 CLOSURE PLAN (§257.102(b)(1))**

This Plan has been prepared in accordance with requirements of the CCR Rule and includes a written certification in Section 8.0 from a qualified Professional Engineer for the State of Kansas.

#### **4.1 Narrative Description (§257.102(b)(1)(i))**

Closure of the Pond will be accomplished by leaving the CCR material in place, and as required in accordance with Permit No. 0359 by KDHE. This method of closure has been designed and approved to minimize maintenance, leachate generation, and control run-on and run-off to ensure the protection of human health and the environment. The CCR material contained in the Pond will be dewatered, as necessary, prior to and during the addition of fill material and final cover placement.

#### **4.2 Final Cover and Subgrade Overview (§257.102(b)(1)(iii) and §257.102(d)(3)(i))**

Closure of the Pond will be completed in two phases. Phase I will consist primarily of dewatering; Phase II will consist primarily of the phased placement of fill for positive drainage, and the installation of final cover. The final cover will include the following, from bottom to top:

- 1) A minimum 18-inch infiltration layer consisting of compacted earthen material; and
- 2) A minimum 6-inch vegetated, erosion control layer consisting of earthen material capable of sustaining native plant growth.

The final cover system will meet the requirements of §257.102(d)(3)(i) and have a maximum permeability of  $1 \times 10^{-5}$  cm/sec. An alternate final cover may be used in lieu of the final cover system described above, and if used, will be in accordance with §257.102(d)(3)(ii). In the event that an alternate cover system is considered, KDHE will be notified and appropriate permitting will be secured.

##### *4.2.1 Uppermost Final Cover Subgrade (Top of CCR) Surface*

CCR material and/or earthen material will be added and/or graded to achieve final design subgrade slopes and grades using appropriate earthmoving equipment. The final cover will be installed over a subgrade of CCR or soil material. The subgrade will be compacted, then graded with appropriate earthmoving equipment, and smoothed to ensure a uniform subgrade surface. After the grading and compaction of the subgrade, the area will be inspected to ensure the working surface is consistent with the design plans and allows for drainage.

##### *4.2.2 Infiltration Layer*

An 18-inch compacted soil infiltration layer will be installed to minimize infiltration of moisture through the final cover into the CCR material. The 18-inch soil infiltration layer will be compacted with a maximum permeability of  $1 \times 10^{-5}$  cm/sec. The soil infiltration layer will be constructed from soil obtained from either local or on-site borrow sources and will be free of large particles or debris, which is consistent with the design plans.





#### 4.2.3 Erosion Control Layer

A 6-inch erosion control layer will be located above the infiltration layer and will be comprised of soils capable of sustaining native vegetation. After placement, the soil will be seeded to promote the establishment of a healthy stand of vegetation. The vegetation will assist in limiting the infiltration of surface waters and effects of erosion on the final cover.

### 4.3 Construction Methods and Procedures (§257.102(b)(1)(iii) and §257.102(d)(3)(i))

#### 4.3.1 Stormwater Run-On and Run-Off Controls

Stormwater at the Pond will be managed by dewatering ditch segments, permanent ditch segments, and diversion ditches that have been designed to properly convey stormwater from the unit. All non-contact stormwater run-off will flow into ditch segments within or adjacent to the final cover of the Pond. The dewatering ditches will drain to the diversion ditches along the north and south borders of the Pond, before discharging to Tower Hill Lake.

#### 4.3.2 Stability

Minimal CCR material consolidation is anticipated due to material dewatering, the physical characteristics of the bottom ash material deposited, the CCR material being vibrated/compacted during placement and because most settlement will have occurred shortly after placement. Stability issues are not expected for this unit.



## **5.0 CLOSURE PERFORMANCE STANDARDS (§257.102(d)(1))**

### **5.1 Minimization of Liquid Infiltration into CCR Material Mass (§257.102(d)(1)(i))**

As detailed above, the final cover system for the Pond will include an infiltration layer consisting of compacted soils with a maximum permeability of  $1 \times 10^{-5}$  cm/sec and an erosion control layer. The compacted soils will help to minimize the potential infiltration of water into the CCR material.

The fill material and final cover system will assist in enhancing run-off and evapotranspiration and will minimize the contact between the surface water and the CCR material. This will minimize the infiltration of water, as required by the performance standard.

### **5.2 Preclusion of Future Impoundment of Water, Sediment, or Slurry (§257.102(d)(1)(ii))**

The closure design of the Pond includes graded slopes and designed surface water features to control run-off and run-on, which precludes the future impoundment of water, sediment, or slurry. No plant-related water will be directed into the unit. Therefore, the closure design is in compliance with the required performance standard.

### **5.3 Measures to Maintain Slope Stability (§257.102(d)(1)(iii))**

Run-off is collected and controlled in erodible areas, such as the side slopes and top slope, in order to maintain slope stability of the final cover. The run-off controls and shallow slopes prevent erosion, movement, and sloughing of the final cover system. Final cover stability will also be maintained by limiting unit access to the public. The primary material disposed in this unit is bottom ash, so little to no settlement is expected. Therefore, the closure design is in compliance with the required performance standard.

### **5.4 Design to Minimize Ongoing Maintenance (§257.102(d)(1)(iv))**

The incorporation of slope stability and erosion control measures will minimize the need for significant on-going maintenance on the Pond final cover. The design will minimize the requirement for larger ongoing maintenance of the Pond cover. Therefore, the closure design is in compliance with the required performance standard.

### **5.5 Timely Completion - Engineering Good Practices (§257.102(d)(1)(v))**

Although this is a large project, the design as reviewed by APTIM should allow completion of the final cover construction within five years of commencing final closure activities. Therefore, the closure design is in compliance with the required performance standard. Closure extensions are allowed if necessary, per 40 CFR 257.102(f)(2).



## 6.0 CLOSURE ACTIVITY SCHEDULE (§257.102(b)(1)(vi))

The size of area and time of year closure construction takes place will vary, therefore closure construction schedules will vary. The schedule provided in this section is therefore a general estimation.

### 6.1 Commencement of Closure

Commencement of final closure has occurred if placement of waste in the Pond has ceased and any of the following actions or activities has been completed (40 CFR 257.102(e)(3)):

- (i) Steps necessary to implement this Plan;
- (ii) Submittal of a completed application for any required state or agency permit or permit modification; or
- (iii) 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.

### 6.2 Closure Schedule

The milestones and the associated timeframes in this section are initial estimates. Some of the activities associated with the milestones will overlap.

**Table 1: Estimated Closure Schedule**

Notification of Intent to Close Placed in Operating Record	December 15, 2015 <sup>1</sup>
Initiation of Closure	January 2016 (year 1) <sup>1</sup>
Written Closure Plan and Updated Closure Notification of Intent to Close Placed in Operating Record	April 18, 2018
Coordinating with and obtaining necessary approvals and permits from other agencies	2016 - 2020
Mobilization	2017
Dewater and Installation of Final Cover System	2017 - 2020
Year all closure activities for the CCR unit will be completed	2021 <sup>2</sup>
Notes: 1. Initiation of Closure may be extended for multiple two-year periods in accordance with 40 CFR 257.102(e)(2)(ii) and (iii). 2. Final closure of Surface Impoundments must be completed within five years of commencing closure unless a demonstration is placed in the operating record document (40 CFR 257.102(f)(2)).	



## **7.0 AMENDMENT OF CCR CLOSURE PLAN (§257.102(b)(1))**

The owner or operator may amend the initial or any subsequent written Plan developed pursuant to §257.102(b)(1) at any time.

The written Plan must be amended at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written Plan. If a written Plan is revised after closure activities have commenced for a CCR unit, the current written Plan must be amended no later than 30 days following the triggering event.

A written certification from a qualified professional engineer that the initial and any amendment of the written Plan meets the requirements of §257.102(b) must be obtained.

Plan changes will be documented using the Revision History which prefaces this Plan. Substantial changes to this Plan will be certified by a Qualified Professional Engineer.



**8.0 PROFESSIONAL ENGINEER CERTIFICATION (§257.102(b)(4))**

The undersigned registered professional engineer is familiar with the requirements of CCR Rule requirements of §257.102 of the CCR Rule and has visited and examined JEC or has supervised examination of JEC by appropriately qualified personnel. The undersigned registered professional engineer attests that this Closure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of §257.102, and that this Plan is adequate for JEC's facility. This certification was prepared as required by §257.102(b)(4).

Name of Professional Engineer: Richard Southorn

Company: APTIM

Professional Engineer Seal:

