



HALEY & ALDRICH, INC.
6500 Rockside Road
Suite 200
Cleveland, OH 44131
216.739.0555

MEMORANDUM

16 October 2016
File No. 40616-108

SUBJECT: Written Closure Plan
Associated Electric Cooperative, Inc.
New Madrid Power Plant – Pond 003
New Madrid, MO

Associated Electric Cooperative, Inc. (AECI) operates the existing coal combustion residuals (CCR) surface impoundment referred to as Pond 003 at the Mew Madrid Power Plant (NMPP) located in New Madrid, MO. This CCR surface impoundment is active and will continue to receive CCR generated by the NMPP in the future. This Written Closure Plan (Plan) addresses the requirements of §257.102 *Criteria for conducting the closure or retrofit of CCR units*, specifically section §257.102(b) for written closure plans, of the US Environmental Protection Agency's (EPA's) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, 40 CFR Part 257 (CCR Rule) effective 19 October 2015. The information required for the Plan for Pond 003 is presented in the following sections in accordance with §257.102(b) of the CCR Rule.

This Plan has been developed based upon information provided by AECI and describes the CCR impoundment, closure elements, a general schedule for closure, and steps required to amend the Plan in the future if necessary. This plan describes closing the impoundment by leaving the CCR in place and installing a final cover system. If AECI decides to close the impoundment through the removal of all CCR instead of closing it in place, this plan will be amended as such in the future.

§257.102(b)(1): 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.

Closure of the unit at any point during the active life of the impoundment closure may be necessary. Regardless of when the impoundment is closed the following steps will be necessary for closure of the unit:

1. Finalize detailed construction plans for closure.
2. Obtain written Professional Engineer (PE) certification that design of the cover system meets the requirements of the CCR Rule.
3. No later than the date closure is initiated, prepare a notification of intent to close a CCR unit and place notification in the facility operating record. The notification of intent to close must include the PE certification from Step 2.

4. Obtain closure design approval from Missouri Department of Natural Resources (MDNR) as determined necessary at that time.
5. Cease placing CCR in the impoundment.
6. Commence closure no later than 30-days after known final receipt of CCR.
7. Complete installation of final cover system within 5-years of commencing closure activities, unless allowable extensions are determined appropriate and certified.
8. Obtain PE certification verifying closure has been completed in accordance with this closure plan.
9. Within 30-days of completion of closure of the CCR unit, prepare a notification of closure of a CCR unit and place notification in the facility operating record. The notification of closure must include the PE certification from step 8.
10. Following closure of the CCR unit, record a notation on the deed to the property or some other instrument normally examined during title search.
11. Within 30-days of recording a notation on the deed to the property, prepare a notification stating that the notation has been recorded and place the notification in the facility operating record.

§257.102(b) (1) (i): *A narrative description of how the CCR unit will be closed in accordance with this section*

The final cover system will be designed and constructed to meet the USEPA's CCR Rule requirements of §257.102(i)(A-D). The proposed final cover system will consist of a minimum 18-inch thick soil infiltration layer that will minimize the infiltration of liquids through the CCR unit. The infiltration layer will have a permeability less than or equal to any natural subsoils present, or no greater than 1×10^{-5} cm/s, whichever is less. An equivalent alternative may also be chosen in the future. Erosion of the final cover system will be minimized by the placement of a minimum 6-inch thick soil erosion layer, capable of supporting native plant growth. It is anticipated that soils will be imported from adjacent borrow areas proximate to the CCR impoundment.

The final cover system will be placed and graded to elevations necessary to prevent future impoundment of stormwater on the final cover system. Grading of the in-place CCR may be necessary prior to placement of cover system soils to ensure positive drainage and manage surface water run-off. Additional fill may also be necessary to meet design subgrade elevations. Surface water run-off and run-on will be managed to minimize the need for future maintenance of the cover system. The final cover system design grades will be analyzed and designed to provide appropriate safety factors against slope failure, sloughing or movement of the final cover system. Final cover grades will also be designed to accommodate settling and subsidence of the impoundment to minimize disruption of the integrity and function of the final cover system.

§257.102(b)(1)(ii): If closure of the 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.

The pond is planned to be closed-in-place; in the event that AECI chooses to close this unit by removal, this Plan will be amended accordingly.

§257.102(b)(1)(iii): If closure of the 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.

The proposed final cover system is currently planned to consist of a minimum 18-inch thick soil infiltration layer that will minimize the infiltration of liquids through the CCR unit. The infiltration layer will have a permeability less than or equal to the natural subsoils present, or no greater than 1×10^{-5} cm/s, whichever is less. Erosion of the final cover system will be minimized by the placement of a minimum 6-inch thick soil erosion layer, capable of supporting native plant growth will be installed for compliance with the CCR Rule. The soil layers may be obtained from local borrow sources or imported from off-site locations.

An equivalent alternative may also be chosen in the future.

§257.102(b)(1)(iii): If closure of the 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.

The following general installation methods and procedures are expected to be used to construct the final cover system:

Subgrade Preparation

Prior to installation of the infiltration layer, any existing vegetation will be removed and the surface smoothed to provide a suitable working base for cover system installation. Fill soil may be required to bridge soft materials, shape the subgrade, fill in low areas or repair erosion as necessary. As determined necessary, any soft soils will be under-cut and recompacted as necessary to provide a firm, unyielding foundation for placement and compaction of the infiltration layer. The subgrade shall be maintained in a smooth, uniform, and drained condition prior to placement of the infiltration layer.

The subgrade will be surveyed to establish elevations of the surface prior to placement of the infiltration layer.

Infiltration Layer

Soil materials for the infiltration layer will be obtained from an on-site or off-site source, delivered using haul trucks, spread with a dozer, and compacted with soil compaction equipment. Soil will be compacted to achieve compaction and permeability requirements. The final surface of the infiltration layer will be maintained in a smooth, uniform drainage condition. Upon completion, the infiltration layer will be surveyed to establish elevations and verify a minimum thickness of 18-inches is provided.

Erosion Layer

Soil materials for the erosion layer will be obtained from an on-site or off-site source, delivered using haul trucks, and spread with a dozer. The erosion layer does not require compaction control however it should be stable for construction traffic. The erosion layer top surface will remain rough to promote the establishment of native vegetation. Stabilization and seeding of the erosion layer must begin immediately after placement (weather permitting).

Upon completion, the erosion layer will be surveyed to establish elevations and verify a minimum thickness of 6-inches is provided.

Temporary or permanent erosion control materials (mulches, fabrics, rock check dams, soil tackifier) may be used to minimize erosion and aid in establishment of vegetation. Hard armor such as cobbles or rip rap may be used in areas where establishment of vegetation may be difficult or impractical.

Stormwater Run-off Controls

Appropriate drainage channel design and/or sediment/stormwater management ponds may be used to manage runoff.

§257.102(b)(1)(iii): If closure of the 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.

§257.102(d)(1): The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:

§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 proposed final cover system will have a permeability less than or equal to any natural subsoils present, or no greater than 1×10^{-5} cm/s, whichever is less, which will minimize infiltration of liquids into the waste and generate of leachate. The final cover system will minimize releases of CCR and CCR contaminated run-off by completely covering the in-place CCR

preventing exposure to erosive conditions. The final cover system will minimize the potential for CCR fugitive dust by covering the in-place CCR preventing exposure to wind and vehicle traffic.

§257.102(d)(1)(ii): *Preclude the probability of future impoundment of water, sediment, or slurry;*

The final cover will be graded to promote positive drainage and prevent the impoundment of water, sediment, or slurry.

§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 design grades will be analyzed and designed to provide appropriate slope stability and be designed to guard against slope failure, sloughing or movement of the final cover system. Stormwater controls will be designed to remove stormwater from the impoundment and prevent erosion.

§257.102(d)(1)(iv): *Minimize the need for further maintenance of the CCR unit; and*

Erosion of the final cover system will be minimized by design of stormwater controls such as ditches, swales, and diversions and establishment of native vegetation on the erosion layer minimizing the need for future maintenance. The design grades of the final cover system will accommodate settling and subsidence without disrupting the integrity of the final cover system. By accounting for potential settlement and subsidence the final cover system minimizes the need for future maintenance.

§257.102(d)(1)(v): *Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.*

Closure will be completed in the shortest amount of time consistent with generally accepted good engineering practices and industry standard construction methods but need to incorporate detailed engineering design, any regulating agency review and comment, weather conditions, and available construction materials.

§257.102(b)(1)(iv): *An estimate of the maximum inventory ever on-site over the active life of the CCR unit.*

The approximated maximum volume of CCR expected to be stored in the unit over the active life is approximately 3.1 million cubic yards, if the impoundment is filled to its design total capacity, per the Annual Inspection report.

§257.102(b)(1)(v): *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.*

The area of the impoundment requiring final cover is approximately 110 acres.

§257.102(b)(1)(vi): A schedule for completing all activities necessary to satisfy the closure criteria in this sections, 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.

An estimated schedule for completing the activities necessary to satisfy the closure in place criteria of the CCR Rule is provided below. The schedule lists the sequential steps that need to be taken to close the impoundment.

**AECI – NMPP Pond 003
Closure in Place Schedule**

Item #	Task Item	Completion Timeframe														
		Design and Permitting (months)														
		-8	-7	-6	-5	-4	-3	-2	-1							
1	Prepare Construction Plans															
2	PE Design Certification															
3	Notice of Intent to Close Impoundment															
4	MDNR Closure Approval (As Needed)															
5	Cease placing CCR in impoundment															
		Closure (years)														
											1	2	3	4	5	6
6	Commence Closure															
7	Final Cover Installation															
8	PE Closure Certification															
9	Notice of Impoundment Closure															
10	Record Deed Notation															
11	Notice of Deed Recordation															

AECI will need to initiate some activities prior to commencing closure. As indicated on the schedule, AECI will need to take action on Steps 1-4 as early as 8 months prior to the anticipated

final receipt of CCR at the impoundment. The schedule as shown above should be considered a preferred timing path and that the order and ability to perform the upfront work prior to AECI ceasing placing CCR in the unit is subject to circumstances at the time of closure and will be altered accordingly.

Per §257.102(e)(3) closure of the impoundment has commenced when AECI has ceased placing CCR in the impoundment and completes any of the following actions or activities: (i) Taken any steps necessary to implement the written closure plan; (ii) Submitted a completed application for any required state or agency permit or permit modification; (iii) Taken any steps necessary to comply with state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the closure of the CCR impoundment.

Closure activities for the CCR impoundment will occur in accordance with the allowable timeframes when either the impoundment ceases receiving CCRs, reaches capacity, or is triggered for closure. AECI will complete closure in the allowable timeframes including any closure time extensions in accordance with §257.102(f).

§257.102(b)(3)(i): The owner or operator may amend the initial or any subsequent written closure plan developed pursuant to paragraph (b) (1) of this section at any time.

AECI will assess the Plan and amend the Plan whenever there is a change in operation of the CCR impoundment that would substantially affect the closure plan or when unanticipated events necessitate a revision of the plan either before or after closure activities have commenced.

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

The amended closure plan will be placed in the facility operating record as required by the CCR Rule.

A record of amendments to the plan will be tracked below. The latest version of the closure plan will be noted on the front cover of the plan.

Version	Date	Description of Changes Made
1	16 October 2016	Initial Issuance

§257.102(b)(4): The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this section.

I certify that this initial written closure plan meets the requirements of §257.102(b).

I certify that the design of the final cover system referenced in this Closure Plan for AECI's closure of Pond 003 at the New Madrid Power Plant meets the USEPA's CCR Rule requirements of §257.102(d)(3)(i).

Signed: 

Certifying Engineer

Print Name: Steven F. Putrich
Missouri License No.: 2014035813
Title: Project Principal
Company: Haley & Aldrich, Inc.

Professional Engineer's Seal:

