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## MEMORANDUM

16 October 2016  
File No. 40616-108

SUBJECT: Written Closure Plan  
Associated Electric Cooperative, Inc.  
New Madrid Power Plant – Utility Waste Landfill  
New Madrid, MO

Associated Electric Cooperative, Inc. (AECI) operates the coal-fired New Madrid Power Plant (NMPP), including an active coal combustion residuals (CCR) Utility Waste Landfill (UWL), located near New Madrid, MO. The UWL is permitted through the Missouri Department of Natural Resources (MDNR) and is planned to continue receiving CCR generated by the NMPP plant into 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 effective 19 October 2015 (CCR Rule).

This Plan has been developed based upon information provided by AECI and describes the landfill unit, closure elements, a general schedule for closure, and steps required to amend the Plan in the future if necessary. This Plan assumes that the landfill will be closed leaving CCR in-place by installing a final cover system, consistent with the intended and permitted design of the landfill. The following sections provide information as required by the Final CCR Rule.

*§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.*

At any point during the active life of the Landfill, closure of this unit may be required by regulatory compliance and/or deemed operationally appropriate as determined by AECI. Currently, AECI plans to operate the NMPP facility into the future and operate the UWL throughout the life of the plant or until it reaches capacity. The UWL was designed and permitted to be constructed in ten separate lateral expansion phases, with the closure of the ten individual cells occurring incrementally. Regardless of when the landfill is closed the following steps will be necessary for closure of the unit:

1. Finalize detailed engineering construction plans for closure. MDNR will approve those plans as well as the materials used to construct the final cover system.
2. By MDNR regulation, notify MDNR of the intent to close, a minimum 180 days before closure commencement.

3. Obtain written Professional Engineer (PE) certification that design of the cover system meets the requirements of the CCR Rule.
4. 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 (see Step 2). The notification of intent to close must include the PE certification from Step 3.
5. Cease placing CCR in the UWL.
6. Commence closure activities no later than 30-days after known final receipt CCR.
7. Complete installation of final cover system within 6-months of commencing closure activities, unless reasons for time extensions are demonstrated.
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*

AECI plans to close this unit by leaving CCR in-place with a final cover system designed and constructed to meet, at a minimum, the USEPA's Final CCR Rule requirements of §257.102(d)(3)(i)(A-D) and/or §257.102(d)(3)(ii)(A-C). The proposed final cover system will be designed in accordance with the requirements of §257.102(b)(1)(iii), at a minimum and as described in the pertinent section below. The final cover system will also be required to meet any applicable permit obligations associated with the MDNR permit. The more stringent of requirements between the MDNR approved permit and the CCR Rule will be utilized in the design.

The final cover system will be placed and graded to elevations necessary to prevent future impoundment of stormwater on the final cover system. The method of placement of CCR in the UWL is intended to allow for closure in the manner described in this Plan at any time during operation. Grading of the in-place CCR may be necessary prior to placement of cover system soils to promote positive drainage and manage surface water run-off. 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 slope stability of the final cover system. Final cover grades will also be designed to accommodate settling of the landfill 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 landfill is planned to be closed-in-place; in the event that AECl 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. Geosynthetics may be required to achieve permeability requirements. The infiltration layer will have a permeability less than or equal to the bottom liner system or any natural subsoils present, or no greater than  $1 \times 10^{-5}$  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 Final CCR Rule. The soil layers may be obtained from local borrow sources or imported from off-site locations.

The infiltration layer thickness and permeability, and the soil erosion layer thickness used in the final cover system will meet, at a minimum, the requirements of the CCR Rule. However, if a thicker and/or less permeable infiltration layer, a thicker soil erosion layer, and/or additional final cover system components are required by the MDNR permit, the final cover system will meet those requirements.

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 should be removed and the surface graded to provide a suitable working base for cover system installation. Fill soil may be required to shape the subgrade and fill in low areas or repair erosion as necessary. Any soft areas should be under-cut and recompacted as necessary to provide a firm, competent 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 the minimum layer thickness 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 be completed within reasonable timeframe after placement (weather permitting). Upon completion, the erosion layer will be surveyed to establish elevations and verify the minimum layer thickness 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 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 the base liner any natural subsoils present, or no greater than  $1 \times 10^{-5}$  cm/s, whichever is less, or less permeable if required by the state permit. The final cover system will limit post-closure infiltration by managing stormwater run-off and run-on to prevent stormwater collection on the final cover. The final cover system will minimize releases of CCR and CCR contaminated run-off by 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. The top of the final cover will be graded at a minimum slope and will direct stormwater to a series of benches that will be graded to low points where letdown channels and pipes will direct runoff to perimeter ditches. The final grading and stormwater conveyance system will prevent the impoundment of water on the cap.

*§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;*

As part of the landfill design process, slope stability analysis was performed to determine that the slopes of the landfill would be stable against sloughing or movement. The establishment of vegetation and stormwater controls designed for the landfill will help prevent sloughing and ensure stability of the final cover. Any additional slope stability analyses will be performed based on actual materials chosen during the final design process and to meet actual slope grades and conditions.

*§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 the stormwater conveyance system 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 without disrupting the integrity of the final cover system. By accounting for potential settlement, 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. The size of the unit, availability of soil materials, weather, and/or state required approval process.

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

The maximum volume of CCR expected to be stored in the unit over the active life will occur at closure of the tenth and final cell, and is estimated to be approximately 21,100,000 CY per the MDNR permit.

§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 landfill requiring final cover is approximately 250 acres per the MDNR permit.

§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 landfill.

**AECI - NMPP UWL Landfill  
 Closure in Place Schedule**

Item #	Task Item	Completion Timeframe (months)																
		Design and Permitting																
		-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8
1	Prepare Construction Plans																	
2	MDNR Closure Notification																	
3	PE Design Certification																	
4	Notice of Intent to Close Landfill																	
5	Cease Placing CCR in Landfill																	
		Closure																
		-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8
6	Commence Closure																	
7	Final Cover Installation <sup>1</sup>																	
8	PE Closure Certification																	
9	Notice of Closure																	
10	Record Deed Notation																	
11	Notice of Deed Recordation																	

1. Note that the Final Cover Installation may allow for up to 2 years of closure timing if allowable extensions are obtained.

AECI will plan 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 landfill. The schedule as shown is based on a compliant operation and closure. A trigger of closure for non-compliance may require a revised schedule. Therefore, 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 landfill will commence when AECI has ceased placing CCR in the landfill 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 the CCR landfill.

AECI intends to operate the plant and landfill through their useful lives. Closure activities for the CCR landfill will occur in accordance with the allowable timeframes when either the landfill ceases receiving CCRs, reaches capacity, or is triggered for closure. Allowable extensions may be utilized as determined appropriate.

*§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 UWL that would substantially affect the 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 UWL 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 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 Plan will be noted on the front cover of the Plan.

<b>Version</b>	<b>Date</b>	<b>Description of Changes Made</b>
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 for AECl's Utility Waste Landfill at the New Madrid Power Plant meets the USEPA's CCR Rule requirements of §257.102(b).

Signed:   
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Certifying Engineer

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

Professional Engineer's Seal:

