



Technical Memorandum

To: Charles Reece IV, PE
Arizona Electric Power Cooperative, Inc.

File No: 17-2015-4019

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Re: Closure Plan – Revision No. 1
Apache Generating Station
Arizona Electric Power Cooperative, Inc.
Cochise County, Arizona



1.0 INTRODUCTION AND SCOPE

The Environmental Protection Agency (EPA) has finalized national regulations to provide a comprehensive set of requirements for the safe disposal of coal combustion residuals (CCRs), commonly known as coal ash, from coal-fired power plants. The rule establishes technical requirements for CCR landfills and surface impoundments under subtitle D of the Resource Conservation and Recovery Act, the nation's primary law for regulating solid waste. The final rule provides greater clarity on technical requirements in response to questions received during the comment period. Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) is pleased to provide Arizona Electric Power Cooperative, Inc. (AEP) with this Closure Plan for the Ash and Scrubber Sludge Disposal facilities in accordance with 40 CFR   257 and 261 (2015)¹, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. Specifically, this Closure Plan applies to Ash Ponds No. 1 through No. 4 and Scrubber Sludge Pond No. 2.

The development of the Closure Plan included a review of existing data, an evaluation of alternative closure plans and design of a closure plan that meets EPA requirements. The results of the subsurface data review, alternative assessment and closure plan recommendations are discussed in subsequent sections.

¹ Federal Register, 40 Code of Federal Regulations (CFR) Parts 257 and 261, Hazardous and Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule. Vol 80, No. 74, April 17, 2015.

2.0 REVIEW OF EXISTING GEOTECHNICAL INFORMATION

Amec Foster Wheeler reviewed the following documents during preparation of this technical memorandum.

- AEPCO, Ash Ponds (Burns & McDonnell, 1980).
- Arizona Electric Power Cooperative, Inc. Subsurface Investigation Report for Ash Pond Modifications at the Arizona 28 Apache Station, Cochise County (Burns & McDonnell, 1992).
- Design Notes and Analysis for the Ash and Scrubber Sludge Disposal Ponds and Pond Dikes for Arizona Electric Power Cooperative, Inc. (Burns & McDonnell, 1993).
- Response to ADWR Comments Regarding Dike Stability for the Ash Pond Modification Project, Arizona Electric Power Cooperative, Inc., Apache Generating Station, Cochise, Arizona (Burns & McDonnell, 1994).
- Supplemental Analyses Regarding Dike Stability for the Ash Pond Modification Project, Arizona Electric Power Cooperative, Inc., Apache Generating Station, Cochise, Arizona (Burns & McDonnell, 1994).
- Combustion Waste Disposal Facility, Fissure Investigation, Apache Generating Station, Arizona Electric Power Cooperative, Inc., Cochise County (AGRA Earth & Environmental, Inc., 1993).
- Scrubber Pond No. 2, Dike Sloughing Investigation, Apache Generating Station, Arizona Electric Power Cooperative, Inc., Cochise County (AGRA Earth & Environmental, Inc., 2000).
- Draft Groundwater System Monitoring Report, Coal Combustion Residuals (CCR) Rule Compliance, Apache Generating Station, Arizona Electric Power Cooperative, Inc., Cochise County, Arizona, Project No. 17-2015-4019. (Amec Foster Wheeler Environment & Infrastructure, Inc., 2015).

The ash and scrubber sludge disposal facilities were constructed in 1995 and are located northwest of the Apache Generating Station. The above reports were the primary sources of geotechnical data as they represent typical conditions across the site. The intent of the data review was to ascertain if sufficient quantities of suitable soil for use in the final cover existed within close proximity to the site.

The dike fill and secondary ash pond liner were both noted to have a hydraulic conductivity of 1×10^{-6} centimeters per second (cm/s) (AGRA 1993). It appears that the subsurface profile is generally comprised of sandy clay to clayey sand materials with hydraulic conductivities in the range of 1×10^{-6} to 1×10^{-8} cm/s.

3.0 CLOSURE PLAN

The Closure Plan shall meet the requirements for Closure and Post-Closure Care set forth in 40 CFR § 257.101 Closure or retrofit of CCR units and § 257.102 Criteria for conducting the closure or retrofit of CCR units. The CCR surface impoundment that completes closure of such CCR unit by leaving the CCR in place shall meet requirements of § 257.102 (b) through (j).

§ 257.101

The ash and sludge ponds are classified as an unlined CCR surface impoundment as determined in accordance with § 257.71 (a) as the existing liner does not meet the required two-foot thickness of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/s. If any time after October 19, 2015, an owner or operator of an existing unlined CCR surface impoundment determines in any sampling event that the concentration of one or more constituents listed in Appendix IV of § 257 are detected at statistically significant levels above the groundwater protection standard established under § 257.95 (h) for such CCR unit, within six months of making such determination, the owner or operator of the existing unlined CCR surface impoundment must cease placing CCR and non-CCR wastestreams into such CCR surface impoundment and either retrofit or close the CCR unit in accordance with § 257.102.

§ 257.102 (b)

This Closure Plan includes the information specified in paragraphs (b)(1)(i) through (vi) in accordance with § 257.102.

257.102 (b)(1)(i)	Narrative description of closure
257.102 (b)(1)(ii)	Closure through removal
257.102 (b)(1)(iii)	Closure through leaving in place
257.102 (b)(1)(iv)	Maximum inventory
257.102 (b)(1)(v)	Largest area
257.102 (b)(1)(vi)	Schedule

§ 257.102 (b)(1)(i)

The ash and scrubber sludge ponds will be closed after the facility's available storage capacity is consumed. Prior to closing the facility, the ponds will be dewatered by allowing the free water to evaporate and the deposited ash and scrubber sludge to air dry. After the free water is evaporated and the sludge is dried, the sludge will be graded to provide an even surface that generally slopes from the center of the pond to the outer perimeter. A 30-inch clay cap will be placed over the graded ash and sludge to reduce infiltration. Finish grades on the pond top will range between 2 and 5 percent. The clay cap will be overlaid with 6 inches of topsoil and seeded to inhibit erosion and to establish a vegetative growth. A perimeter berm and swale will be constructed at the top of the slope to divert storm water runoff to riprap-lined let-down channels. The let-down channels will transport the surface runoff to the diversion ditches existing at the toe of the dike slope.

§ 257.102 (b)(1)(ii)

This section applies to CCR units that will be closed through removal of CCR. Closure of the CCR unit will be accomplished by leaving the CCR in place. Therefore, this section does not apply.

§ 257.102 (b)(1)(iii)

Closure of the CCR unit will be accomplished by leaving the CCR in place. Therefore, the final cover system was designed in accordance with § 257.102 (d) (1) through (4). Details of the system are presented in those sections.

§ 257.102 (b)(1)(iv)

The Supplement to the Borrower's Environmental Report – Ash and Scrubber Sludge Disposal Facilities (Burns & McDonnell, 1992) estimated the maximum inventory of CCR ever on-site to be 4,600,000 cubic yards of fly ash and bottom ash, and 840,000 cubic yards of scrubber sludge. This material will remain in the facility after closure. As of August 10, 2015, Scrubber Pond No. 1 is no longer receiving CCR containing materials and is not considered by AEPCO to be subject to the CCR Rule. Therefore, only 420,000 cubic yards associated with Scrubber Sludge Pond No. 2 is subject to this Closure Plan.

§ 257.102 (b)(1)(v)

Based on the approximate surface area, the largest area of the CCR unit ever requiring a final cover at any time is estimated to be approximately 5,805,000 square feet or approximately 133 acres for Ash Pond Nos. 1 through 4, and 2,025,000 square feet or approximately 47 acres for Scrubber Sludge Pond No. 2.

§ 257.102 (b)(1)(vi)

The original facility life was estimated at 20 years. However, the sales of fly ash have extended the anticipated life of the facility to approximately 2035. In accordance with § 257.102 (f)(i) the complete closure of the CCR unit will be accomplished within six months of commencing closure activities. A tentative project schedule is listed in Table 1. The durations indicated in Table 1 are tentative because the Aquifer Protection Permit (APP) requires approval from the Arizona Department of Environmental Quality (ADEQ). Time has been allotted for this, however, actual timeframes for approval are unknown. If the timeframes in Table 1 need to be revised due to delays in obtaining ADEQ approval, an extension will be filed in accordance with Section 257.102 (f)(2)(i)(D), which allows for an extension due to delays caused by the need to coordinate with and obtain necessary approvals and permits from a state or other agency.

Table 1 - Proposed Schedule for Closure

Item	Duration	Notes:
Schedule Pre-application Conference with Arizona Department of Water Resources (ADWR) to discuss dam closure	6 months prior to notification of intent to close CCR unit	ARS §45-1203
Submit written notice of closure of APP to ADEQ (Notice of intent to cease)	5 months prior to notification of intent to close CCR unit	ARS § 49-252
Dam closure application to ADWR	4 months prior to notification of intent to close CCR unit	ARS §45-1203
Submit Closure Plan to ADEQ for approval	4 months prior to notification of intent to close CCR unit	ARS § 49-252
Obtain ADEQ decision on closure plan.	1 month prior to notification of intent to close CCR unit	ARS § 49-252
Notification of intent to close CCR unit	Within 30 days of reaching storage capacity	§ 257.102 (e) & § 257.102 (g)
Dewatering of CCR unit	2 months*	§ 257.102(d)(2)(i)
Stabilization of CCR unit	1 months*	§ 257.102 (d)(2)(ii)
Installation of final cover	3 months*	§ 257.102 (d)(2)(iii)
Notification of closure CCR unit	Within 30 days of completion of closure	§ 257.102 (h)
Initiate deed notation	Within 30 days of recording notation	§ 257.102 (i).
Submit Complete Closure Plan (As-Built CQA Report)	Within 90 days of completion of closure	ARS § 49-252

*Duration stated will begin once ADEQ approval of Closure Plan has been obtained. If the timeframes in Table 1 need to be revised due to delays in obtaining ADEQ approval, an extension will be filed in accordance with Section 257.102 (f)(2)(i)(D), which allows for an extension due to delays caused by the need to coordinate with and obtain necessary approvals and permits from a state or other agency.

§ 257.102 (d)

Closure of the CCR unit will be accomplished by leaving the CCR in place. The closure plan must also discuss how the final cover system will achieve the performance standards in accordance with § 257.102 (d) (1) through (4) Closure performance standard when leaving CCR in place.

§ 257.102 (d)(1)

Post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground will be controlled, minimized, or eliminated to the extent feasible by

installing a final cover system in accordance with § 257.102 (d)(1)(i). Proper site drainage consisting of a graded final cover and let-down channels will be provided to preclude the probability of future water, sediment, or slurry impoundment in accordance with § 257.102 (d)(ii). The final cover system will provide for adequate site grading with grades at approximately 2 to 5 percent with native vegetation as erosion control to provide for slope stability to prevent sloughing or movement of the final cover system in accordance with § 257.102 (d) (iii), and minimize the need for further maintenance of the CCR unit in accordance with § 257.102 (d)(iv).

§ 257.102 (d)(2)

Prior to closure, the ponds will be dewatered by allowing the free water to evaporate and the deposited sludge to air dry in accordance with § 257.102 (d)(2)(i). After the liquid waste has evaporated and the sludge dried, the dried sludge will be graded to provide an even surface that generally slopes from the center of the pond to the outer perimeter to provide sufficient support for a final cover in accordance with § 257.102 (d)(2)(ii).

§ 257.102 (d)(3)(i)

The owner must install a final cover system to minimize infiltration and erosion, and meet the requirements of § 257.102 (d)(3)(i) (A) through (D). The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils presents, or permeability no greater than 1×10^{-5} cm/s, whichever is less in accordance with § 257.102 (d)(3)(i)(A). The bottom liner system, as noted in the data review, has a hydraulic conductivity of 1×10^{-6} cm/s. Based on the data review, it would appear that there are sufficient soils with hydraulic conductivity no greater than 1×10^{-6} cm/s within close proximity to the project site. Thus, an alternative final cover system design was not considered per § 257.102 (d)(3)(ii). The existing ponds have three feet of freeboard, therefore, to avoid costly regrading it is recommended the final cover must be at least three feet thick. Therefore, Amec Foster Wheeler recommends the final cover shall contain a minimum of 30 inches of earthen material in accordance with § 257.102 (d)(3)(i)(B) with a permeability no greater than 1×10^{-6} cm/s in accordance with § 257.102 (d)(3)(i)(A). The erosion of the final cover system must be minimized by the use of an erosion layer that contains six inches of topsoil capable of sustaining native plant growth in accordance with § 257.102 (d)(3)(i)(C). It is anticipated with recommended grades varying between 2 and 5 percent the higher portion must be 15 inches higher than the outer perimeter. The ash ponds are experiencing differential settlement across the site. Since the end of construction, the amount of total settlement & subsidence in the vicinity of the ponds is on the order of 2 to 3 feet. The ash ponds tend to settle & subside to the east while the scrubber ponds settle and subside to the west. It is unknown whether the rate of total settlement and subsidence will continue based on future water use. The yearly monitoring should document the overall and rate of settlement and subsidence, and the total settlement and subsidence should be accounted for when designing the final cover upon closure in accordance with § 257.102 (d)(3)(i)(D). One option may be to grade the final cover to account for continued settlement and subsidence (i.e. grade ash ponds to the east and scrubber ponds to the west).

§ 257.102 (j)

The owner or operator must comply with the closure recordkeeping requirements specified in § 257.105 (i), the closure notification requirement specified in § 257.106 (i), and the closure internet requirements specified in § 257.107 (i) which include the following:

- (1) Notification of intent to initiate closure
- (2) Annual progress reports
- (3) Notification of closure completion
- (4) Written Closure Plan
- (5) Written demonstrations of time extension for initiating closure
- (6) Written demonstrations of time extension for completing closure
- (7) Notification of intent to close CCR Unit
- (8) Notification of completion of closure of CCR unit
- (9) Notification of notation on the deed
- (10) Notification of intent to comply with alternative closure (does not apply)
- (11) Annual progress reports under alternative closure (does not apply)
- (12) Written closure plan and any amendments
- (13) Notification of completion of post-closure care period