CHOLLA POWER PLANT
CLOSURE PLAN §257.102(b)
BOTTOM ASH MONOFILL
CH_ClosPlan_001_20161017

Closure Plan Contents §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.

SITE INFORMATION	
Site Name / Address	Cholla Power Plant / 4801 I-40 Frontage Road, Joseph City, AZ 86032
Owner Name / Address	Arizona Public Service / 400 North 5th Street, Phoenix, AZ 85004
CCR Unit	Bottom Ash Monofill (BAM)
Location	34° 57′ 33″ N, 110° 16′ 57″ W
Reason for Initiating Closure	Permanent cessation of a coal-fired boiler(s) by a date certain
Final Cover Type	Evapotranspiration Cover
Closure Method	Closure by leaving CCR in place
CLOSURE PLAN DESCRIPTION	
(b)(1)(i) – A narrative description of how the CCR unit will be closed in accordance with this section.	The Bottom Ash Monofill (BAM) is a coal combustion residual (CCR) landfill. A final cover for the BAM CCR landfill (the "CCR unit") will be constructed over a graded and prepared subgrade. The subgrade and final cover will be sloped to promote drainage across the surface of the landfill. Storm water runoff will discharge from the BAM surface via sheet flow into one of two drainage collection channel around the perimeter of the CCR unit. The channels will discharge to a new storm water detention basin, which will outfall to Tanner Wash. Closure operations will consist of: 1) Re-grading CCR material and outer slopes to create acceptable grades for closure, 2) Installing the final cover system, and 3) Constructing the new storm water detention basin.

	In accordance with §257.102(b)(3), this initial written closure plan will be amended to provide additional details after the final engineering design for the grading and cover system is completed. The initial version of the closure plan reflects the information and planning available at the time of issuance.
(b)(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.	Not applicable. The BAM will be closed by leaving CCR in place and designed in accordance with §257.102(d).
(b)(1)(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.	Applicable. The BAM will be closed by leaving CCR in place and designed in accordance with §257.102(d). The area is in a semi-arid to arid climate with precipitation on the order of 6 inches per year and evaporation losses (pan evaporation rate) on the order of 50 inches per year. Therefore, this environment is appropriate for using a water-balance soil cover system that relies on the net water losing climate to reduce infiltration into the subgrade of the cover. The final cover system will be installed in direct contact with a sloped subgrade of CCR or other fill to achieve final subgrade elevations designed for positive drainage of storm water. The alternative final cover ("evapotranspiration cap") system, designed in accordance with the requirements of §257.102(d)(3)(ii), will consist of the following (from bottom to top): 1) a minimum of 18 inches of compacted earthen material with a discharge (flux) through the cover material equivalent to or lower than the base of the CCR Unit; 2) Six inches of soil capable of sustaining native plant growth and resisting erosion (erosion layer); and 3) Seeded with native vegetation.

	CCR material will be re-graded and earthen material placed as fill to bring the grades to the design slopes. Earthen material for the infiltration layer will be placed, graded, and compacted to meet the specified thickness and permeability. The final cover surface will be seeded with native vegetation. Figures 1 and 2 show the general grading concept for the closure of the BAM. The final cover will be graded to drain across the top slopes. The closed configuration of the BAM will consist of outer slopes re-graded to 4H:1V, or flatter where applicable, to improve long-term stability and limit erosion. Two perimeter drainage channels will provide storm water diversion for run-on flows arriving around the BAM. The proposed grading will allow water to flow down the outside slopes and into the drainage collection channels. The runoff water in the drainage collection channels will be conveyed to a new detention basin.
(b)(1)(iii) – How the final cover system will achieve the performance standards in §257.102(d). **Five Performance Standards:**	
1. (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 infiltration (flux) through the final cover will be demonstrated to be equivalent to or less than flux through the compacted native soil comprising the base of the BAM. The demonstration of the alternative final cover system will be completed during final engineering design for the grading and cover system and issued in an amended closure plan.
2. (d)(1)(ii) – Preclude the probability of future impoundment of water, sediment, or slurry.	The final cover will have a minimum as-constructed top slope of 0.5 percent to preclude the probability of ponding. The post-closure plan includes maintenance measures to correct local grading deficiencies.
3. (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 outer slopes of the final configuration will be re-graded to a 4H:1V slope, where feasible. The final engineering design for the grading and cover system will include geotechnical analyses to demonstrate that the final outer slopes and cover will satisfy the stability requirements to prevent

	sloughing or mass movement.
4. (d)(1)(iv) – Minimize the need for further maintenance of the CCR unit.	The final cover will be seeded with native vegetation to minimize erosion maintenance. Drainage channels will have appropriate erosion protection measures to minimize erosion maintenance.
5. (d)(1)(v) – Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.	Closure is expected to occur in coordination with the schedule for cessation of coal-fired electricity generation at the Cholla Power Plant. Coal-fired electricity generation is scheduled to cease in 2025 and the BAM will commence closure no later than 30 days after the expected receipt of final waste. Closure will be complete within 6 months of commencement. Selected closure-related activities, such as re-grading the existing CCR, may begin earlier than 2025 to allow the project to meet the required schedule.
(d)(2)(i) – Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.	The BAM is a landfill for "dry" disposal of CCR and generally only consists of interstitial water within the CCR or water from precipitation. The cells are filled in a manner to minimize the opportunity to impound free liquid caused by construction and/or by precipitation. Dewatering is not expected to be necessary to close the BAM.
(d)(2)(ii) – Remaining wastes must be stabilized sufficiently to support the final cover system.	The existing CCR are compacted by the incidental movement of construction equipment during placement operations. Therefore, the existing CCR will not require compactive effort to generate a stable base for the final cover.
(d)(3) – A final cover system must be installed to minimize infiltration and erosion, and at minimum, meets the requirements of (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section. (d)(3)(i) – The design of the final cover system must be included in the written closure plan.	The alternative final cover system will meet the requirements of §257.102(d)(3)(ii). The requirements of §257.102(d)(3)(ii) will be achieved using the clayey and silty soils present at the site to construct an infiltration layer that promotes runoff and evapotranspiration. The infiltration layer will be a minimum of 18 inches thick and will be constructed to reduce infiltration or flux into the BAM. On-site soils or an off-site aggregate source will be used to provide an erosion layer to protect the infiltration layer.

	The engineering design for the final cover system will be issued in an amended closure plan when the final cover system is completed.
EITHER (d)(3)(i)(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 a permeability no greater than 1 x 10^{-5} cm/sec, whichever is less. (d)(3)(i)(B) – The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer than contains a minimum of 18 inches of earthen material. OR (d)(3)(ii)(A) – The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B).	The alternative final cover system will meet the requirements of §257.102(d)(3)(ii). The permeability of the final cover will be demonstrated prior to closure.
EITHER (d)(3)(i)(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. OR (d)(3)(ii)(B) – The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.	The final cover will include either: 1) a minimum of 6 inches of a soil erosion layer that is capable of sustaining native plant growth (erosion layer) that will be seeded and vegetated to meet the requirements of §257.102(d)(3)(i)(C); or 2) a minimum of 6 inches of rock armor erosion protection to meet the requirements of §257.102(d)(3)(ii)(B).
(d)(3)(i)(D), (d)(3)(ii)(C) – The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.	The engineering design for the final cover system will consider the magnitude of the expected settlement of the wastes and the potential and locations of possible differential settlement. The relatively freely-draining properties of bottom ash minimize the likelihood of delayed drainage or consolidation of wastes. The majority of settlement is likely to be immediate and not evident as additional waste is placed. The final cover will have as-constructed slopes

	graded to drain to accommodate potential future differential settlement and subsidence. The final cover will incorporate an 18-inch thick, loosely-compacted evapotranspiration layer that will behave in a flexible manner so as to minimize the risk of disrupting the continuity of the cap due to settlement.
INVENTORY AND AREA ESTIMATES	
(b)(1)(iv) – An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.	1,700,000 cubic yards
(b)(1)(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.	43 acres
CLOSURE SCHEDULE	
(b)(1)(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/milestones that will be taken to close the CCR unit, and the estimated timeframes to complete each step or phase of CCR unit closure. If closure timeframe is anticipated to exceed the timeframes specified in paragraph §257.102(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 §257.102(f)(2).	
The milestone and the associated timeframes are initial estimates. Some of the activities associated with the milestones will overlap. Amendments to the milestones and timeframes will be made as more information becomes available.	
Initial Written Closure Plan Completed	By October 17, 2016
Date of Final Receipt or Removal of CCR	May 2025 (estimated)
Permits and Approvals from Agencies	May 2024 (estimated)
Closure Activities Initiated	June 2025 (estimated)
Installation of Final Cover	December 2025 (estimated)
Estimated Completion of Closure Activities	December 2025 (estimated)

Certification Statement 40 CFR § 257.102(b)(4) – Initial Written Closure Plan for a CCR Landfill

CCR Unit: Arizona Public Service; Cholla Power Plant; Bottom Ash Monofill

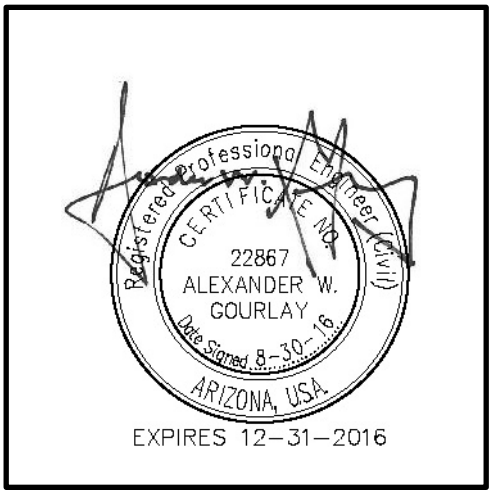
I, Alexander W. Gourlay, being a Registered Professional Engineer in good standing in the State of Arizona, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the information contained in the initial written closure plan dated October 17, 2016 meets the requirements of 40 CFR § 257.102.

Alexander W. Gourlay, P.E.

Printed Name

August 30, 2016

Date



Certification Statement 40 CFR § 257.102(d)(3)(iii) – Design of the Final Cover System for Closure of a CCR Landfill

CCR Unit: Arizona Public Service; Cholla Power Plant; Bottom Ash Monofill

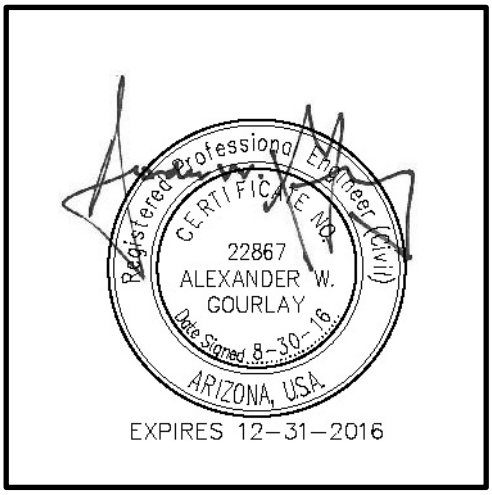
I, Alexander W. Gourlay, being a Registered Professional Engineer in good standing in the State of Arizona, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the design of the final cover system as included in the design statement dated October 17, 2016 meets the requirements of 40 CFR § 257.102.

Alexander W. Gourlay, P.E.

Printed Name

August 30, 2016

Date



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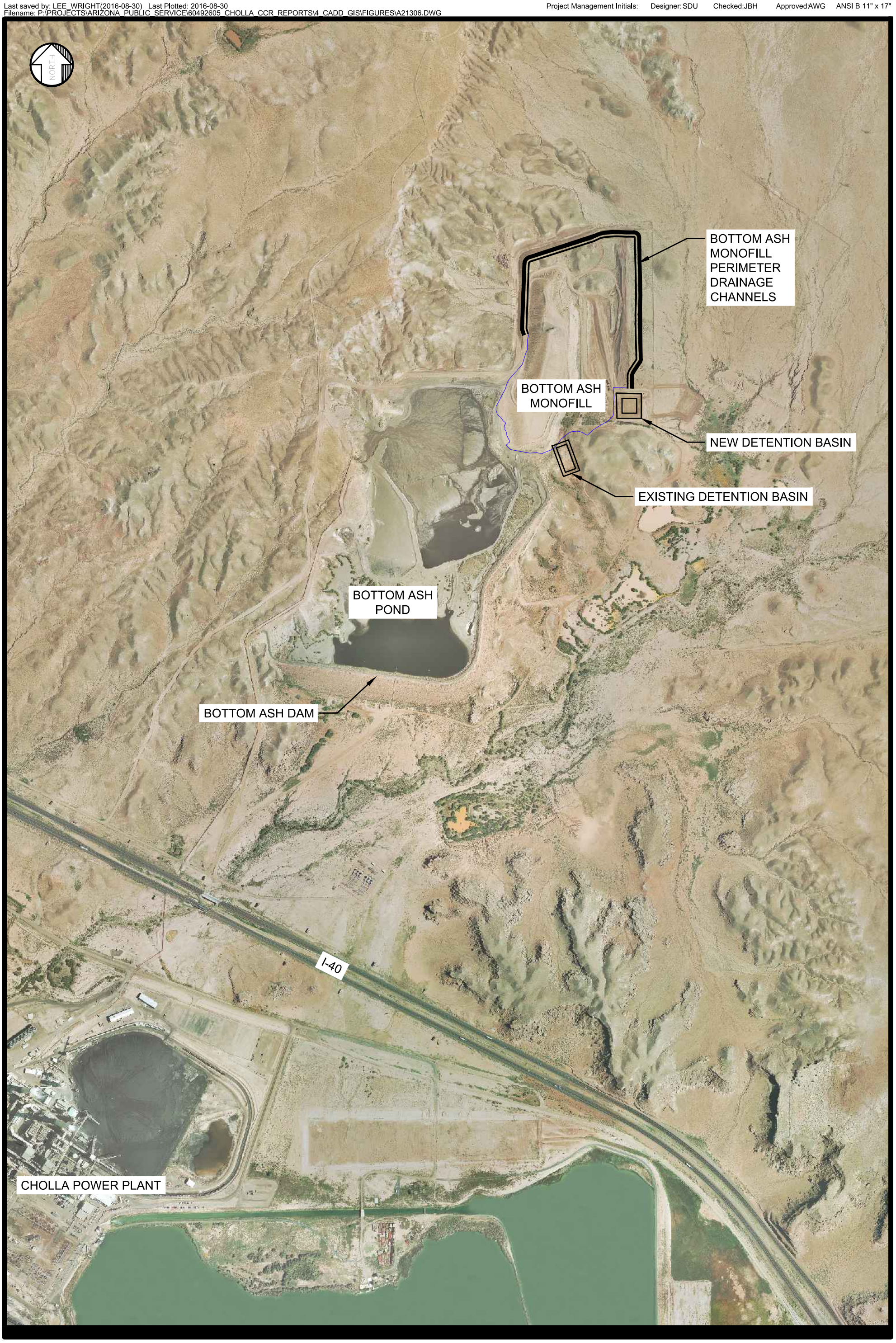
Project Management Initials: Designer: SDU Checked: JBH Approved: AWG ANSI B 11" x 17"



Cholla Power Plant
Arizona Public Service
Cholla Power Plant, Joseph City, AZ
60492605 Date: 2016-08-23

Cholla Power Plant
Bottom Ash Monofill Closure

AECOM

Figure: 1

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Project Management Initials: Designer: SDU Checked: JBH Approved: AWG ANSI B 11" x 17"

NORTH

BOTTOM ASH
MONOFILL EXTENTS

PROPERTY LINE

4:1

4:1

BOTTOM ASH
MONOFILL

4:1

A
2

NEW
DETENTION
BASIN

EXISTING
DETENTION
BASIN

BOTTOM ASH
POND

TOP SLOPE
VARIES
0.5 TO 1.0%

BOTTOM ASH
POND EXTENTS

LEGEND

- SHEET FLOW
- PRIMARY DRAINAGE
- MAJOR CONTOUR
- MINOR CONTOUR
- DETENTION BASIN LIMITS

Cholla Power Plant
Arizona Public Service
Cholla Power Plant, Joseph City, AZ
60492605 Date: 2016-08-23

Cholla Power Plant
Bottom Ash Monofill Closure

AECOM

Figure: 2