FOUR CORNERS POWER PLANT
CLOSURE PLAN §257.102(b)
LINED ASH IMPOUNDMENT (LAI)
FC_ClosPlan_008_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	Four Corners Power Plant / 691 CR-6100, Fruitland, NM 85416
Owner Name / Address	Arizona Public Service / 400 North 5th Street, Phoenix, AZ 85004
CCR Unit	Lined Ash Impoundment (LAI)
Location	36° 41' 04" N, 108° 30' 12" W
Reason for Initiating Closure	Known Final Receipt of Waste
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 LAI is an existing coal combustion residual (CCR) impoundment constructed for storage of fly ash and flue gas desulfurization (FGD) scrubber sludge, and is located to the southwest of the Four Corners Power Plant. The LAI was constructed on old Ash Ponds 3, 4, and 5, which were filled with varying thicknesses and combinations of fly ash and FGD solids. The LAI is lined with a single 60-mil HDPE geomembrane. The LAI will be closed in conjunction with the adjacent Lined Decant Water Pond (LDWP). The two units currently share operations-related features, such as discharge pipes and slopes. In addition, the LAI, LDWP, Dry Fly Ash Disposal Areas (DFADA), and existing closed Ash Pond 6 are adjacent to one another and will share selected closure-related features, including perimeter drainage channels and the type of cover.

	The major closure construction activities will be: 1) Dewatering, 2) Re-grading CCR to create acceptable slopes for closure, 3) Installing the final cover system, and 4) Constructing the perimeter drainage channels. The LAI will be dewatered to facilitate construction of a final cover system for leaving the CCR in place. The final cover will be constructed over a graded and prepared subgrade. The final cover will be graded to drain and the storm water runoff will be discharged off the LAI via sheet flow. The flow will be collected in a drainage channel immediately to the south. The drainage channel will discharge to a storm water detention basin. The existing riser decant pipes, outfall pipes, and the toe drain pipes associated with both the LAI and the LDWP will be grout-abandoned in place. A system of perimeter drainage channels will provide storm water diversion around the perimeter of the LAI and LDWP footprints. 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 LAI will be closed by leaving CCR in place and the cover will be 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	Applicable. The LAI will be closed by leaving CCR in place and the cover will be designed in accordance with §257.102(d).

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 area is in a semi-arid to arid climate with precipitation on the order of 10 inches per year and evaporation losses (pan evaporation rate) on the order of 60 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 minimize infiltration into the subgrade of the cover. The alternative ("evapotranspiration cap") final cover system, designed in accordance with 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 a cover system with a single geomembrane; 2) Six inches of soil capable of sustaining native plant growth and resisting erosion (erosion layer); and 3) Seeded with native vegetation. The existing CCR will be re-graded and earthen or CCR material fill will be placed, as required, 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, density, and permeability. After the erosion layer is placed, the final cover surface will be seeded with native vegetation. Figures 1 through 3 show the general grading concept for the closure of the LAI. The final cover will have a minimum as-constructed slope of 0.5 percent across the surface of the pond. The outer slopes of the embankments within the final closure configuration of the LAI will be re-graded to 4H:1V, or flatter where applicable, to improve long-term stability and limit erosion. The 0.5 percent slopes will convey storm water runoff via sheet flow to a storm water drainage channel that will discharge into a new detention basin. A

	system of perimeter drainage channels will provide storm water diversion for run-on flows from the north and east around the LAI and DFADA. A separate system of drainage channels will provide runoff collection and conveyance for the sheet flow from the top of the LAI to the 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 a cover system that includes a geomembrane. 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 overall drainage pattern of the final cover will follow the slope of the original ground. The final cover will generally slope from thinnest to thickest deposited CCR such that the expected future settlement of deposited CCR will tend to maintain or increase the drainage slopes. The final design for the final cover system will consider the magnitude of expected settlement of the wastes and the potential and locations of possible differential settlement. 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 closed configuration of the LAI will be re-graded to 4H:1V, or flatter where applicable. 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 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.	Phased or partial closure of the LAI is not considered technically feasible or efficient. Closure is projected to take greater than 5 years to complete. The closure of the LAI will require dewatering and stabilization of the ash materials sufficient for construction of the grading and final cover. These activities will be performed concurrently with the complete closure of the LDWP and the partial closure of one or more cells comprising the DFADA. Dewatering and stabilization may take approximately 4 to 5 years and construction of the grading and final cover with appurtenant drainage features may take an additional 4 years. Therefore, closure is expected to take 9 years to complete.
(d)(2)(i) – Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.	The unit will be sufficiently dewatered to remove free liquids and provide a stable base for the construction of the final cover system.
(d)(2)(ii) – Remaining wastes must be stabilized sufficiently to support the final cover system.	The existing (in-place) CCR will be sufficiently dewatered and re-graded so as to provide 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 promote 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 LAI. The rocky on-site soils or an off-site aggregate source will be used to provide an erosion layer to protect the infiltration layer. When the engineering design for the final cover system is completed, it will be issued in an amended closure plan.
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	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.

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).	
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 final cover will have minimum as-constructed slopes of 0.5 percent to accommodate potential future differential settlement and subsidence. The overall drainage pattern of the final cover will follow the slope of the original ground. The final cover will generally slope from the thinnest to the thickest impounded CCR. 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.	Volumetric calculations using existing and historical topographic data indicate a current inventory of CCR in the LAI of approximately 7,000 acre-feet. A parallel estimate based on records of

	coal usage and ash production indicates approximately 7,500 acre-feet.
(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.	130 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
Receipt of Final Waste	August 2019 (estimated)
Permits and Approvals from Agencies	July 2019
Closure Activities Initiated	September 2019
Complete Dewatering	December 2021
Complete Stabilization of CCR	December 2024
Installation of Final Cover	August 2028
Estimated Completion of Closure Activities	September 2028 (estimated 9-year closure completion schedule – 5 years with two 2-year extensions)

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

CCR Unit: Arizona Public Service; Four Corners Power Plant; Lined Ash Impoundment

I, Alexander W. Gourlay, being a Registered Professional Engineer in good standing in the State of New Mexico, 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 Surface Impoundment

CCR Unit: Arizona Public Service, Four Corners Power Plant; Lined Ash Impoundment

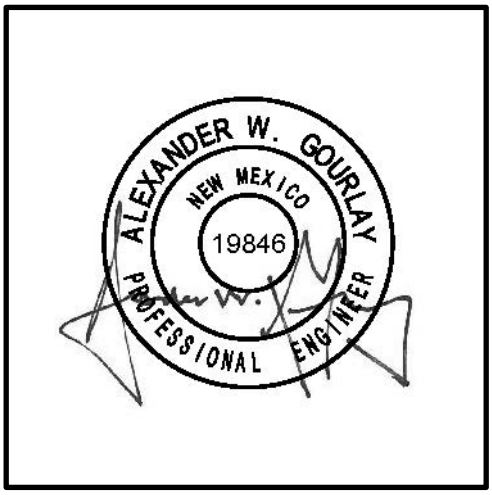
I, Alexander W. Gourlay, being a Registered Professional Engineer in good standing in the State of New Mexico, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. 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.

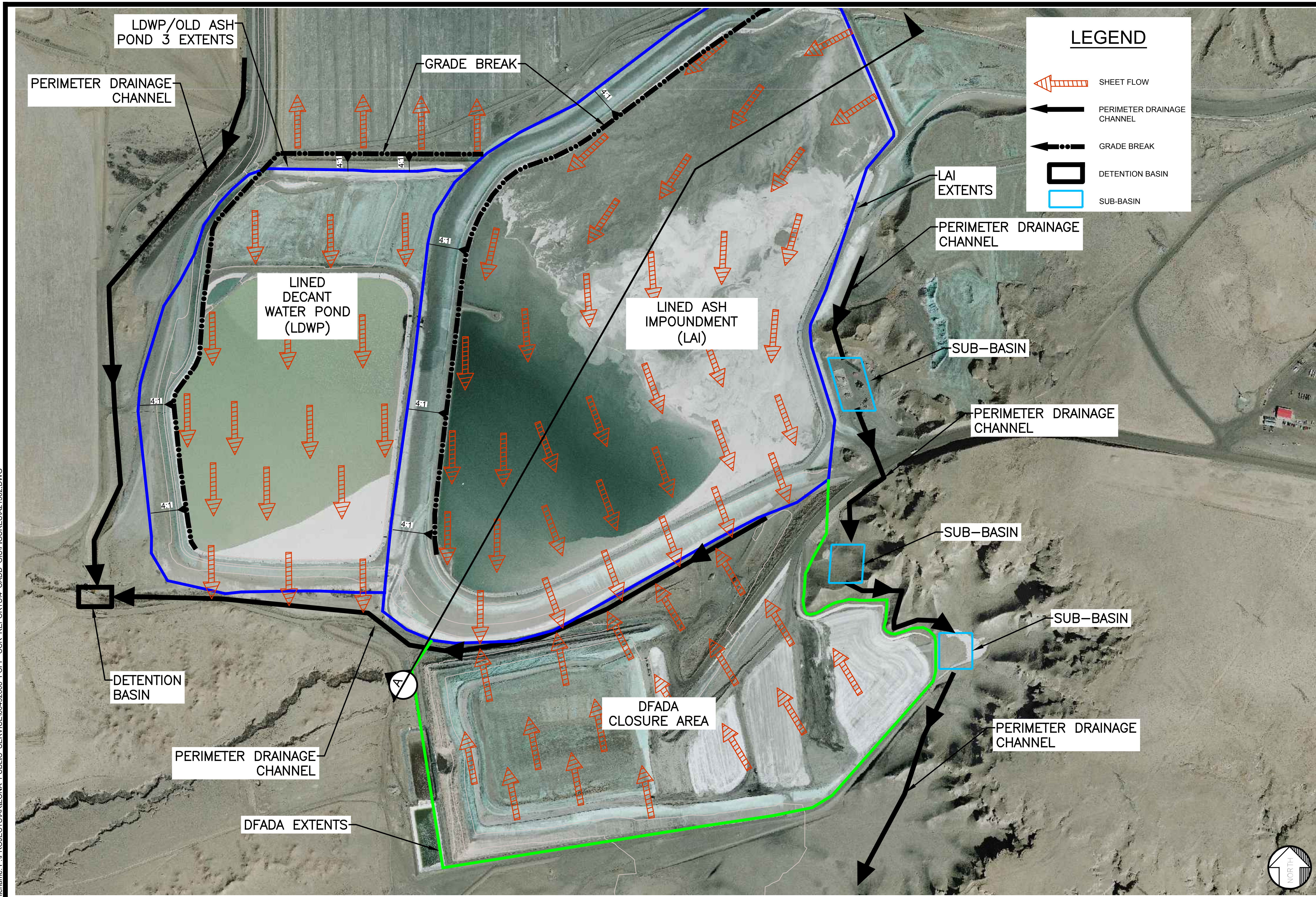
Alexander W. Gourlay, P.E.

Printed Name

August 30, 2016

Date





AECOM

Figure: 1

Four Corners LAI Closure
Plan View

Four Corners Power Plant
Arizona Public Service
Four Corners Power Plant, Fruitland, NM
60492608 Date: 2016-06-28

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

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LDWP/OLD ASH POND 3 EXTENTS

PERIMETER DRAINAGE CHANNEL

GRADE BREAK

LINED DECANT WATER POND (LDWP)

LINED ASH IMPOUNDMENT (LAI)

LAI EXTENTS

PERIMETER DRAINAGE CHANNEL

SUB-BASIN

PERIMETER DRAINAGE CHANNEL

SUB-BASIN

SUB-BASIN

PERIMETER DRAINAGE CHANNEL

DETENTION BASIN

PERIMETER DRAINAGE CHANNEL

DFADA CLOSURE AREA

DFADA EXTENTS

4:1

LEGEND

- SHEET FLOW
- PERIMETER DRAINAGE CHANNEL
- GRADE BREAK
- DETENTION BASIN
- SUB-BASIN

NORTH

AECOM

Figure: 2

Four Corners LAI Closure
Plan View

Four Corners Power Plant
Arizona Public Service
Four Corners Power Plant, Fruitland, NM
60492608 Date: 2016-06-28

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

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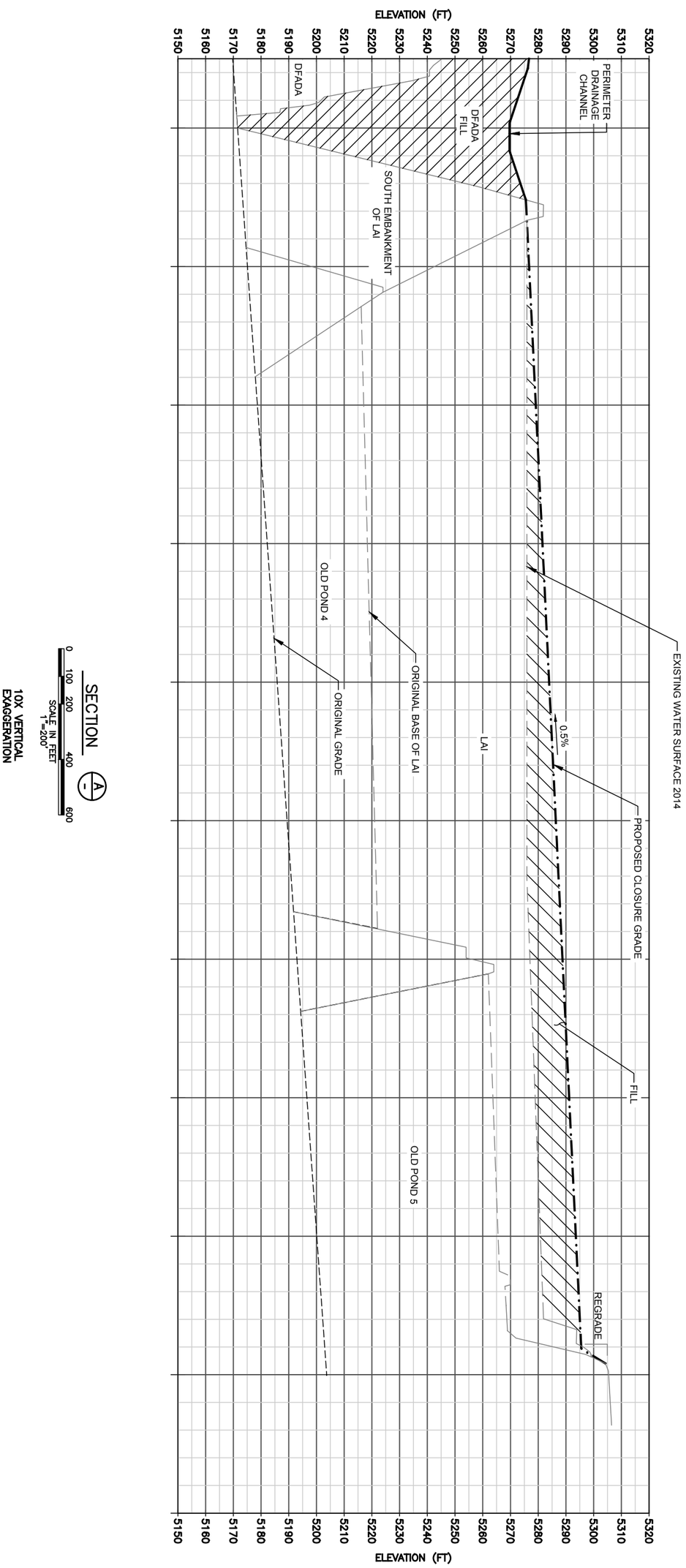

Four Corners Power Plant
Arizona Public Service
Four Corners Power Plant, Fruitland, NM
60492608 Date: 2016-08-25

Four Corners LAI Closure
Profile View

AECOM

Figure: 3