

# FOUR CORNERS POWER PLANT LINED ASH IMPOUNDMENT - Periodic Structural Integrity Assessment

Periodic Hazard Potential Classification  
Periodic Structural Stability Assessment  
Periodic Safety Factor Assessment

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AECOM Project 60664563

Prepared for:

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## Attachment

Attachment A: AECOM, 2016. *Final Summary Report, Structural Integrity Assessment: Lined Ash Impoundment, Four Corners Power Plant, Fruitland, New Mexico*. Prepared for: Arizona Public Service, AECOM Job No. 60445844, August 2016.

## 1. Introduction

This periodic update to the Structural Integrity Assessment for the Lined Ash Impoundment (LAI) at Four Corners Power Plant operated by Arizona Public Service (APS) has been prepared in accordance with the requirements of Title 40 of the Code of Federal Regulations Part 257 (40 CFR 257) (“the Coal Combustion Residuals [CCR] Rule” or “the Rule”) and the specific requirements within 40 CFR § 257.73 for periodic (every 5 years) assessment regarding structural integrity.

## 2. Methodology

The methodology used to prepare this 2021 Periodic Assessment of Hazard Potential Classification, Structural Stability Assessment, and Periodic Safety Factor Assessment for the LAI at the Four Corners Power Plant is for the certifying Qualified Professional Engineer (QPE) to:

- a. Perform a documented review of the 5 years of annual inspection reports since 2016, the most recent of which is:
  - i. APS, 2020. Annual CCR Impoundment and Landfill Inspection Report: Four Corners Power Plant Lined Ash Impoundment, Lined Decant Water Pond, Combined Waste Treatment Pond, and Dry Fly Ash Disposal Area. Generation Engineering, Phoenix, AZ.
- b. Perform a documented review of each major component of the contributing technical information from:
  - i. AECOM, 2016. *Final Summary Report, Structural Integrity Assessment: Lined Ash Impoundment, Four Corners Power Plant, Fruitland, New Mexico*. Prepared for: Arizona Public Service, AECOM Job No. 60445844, August 2016 (hereafter referred to as the “2016 Report” and incorporated and referenced directly as Attachment A to this document); and
- b. Consider and document whether the 2016 Report and its conclusions:
  - i. Meet the current reporting requirements of the Rule;
  - ii. Reflect the current condition of the structure, as known to the QPE and documented in the annual inspections;
  - iii. Are compromised by any identified issues of concern; and
  - iv. Are consistent with the standard of care of professionals performing similar evaluations in this region of the country; and
- d. Identify any additional analyses, investigations, inspections, and/or repairs that should be completed in order to complete this 2021 Periodic Assessment.

This report documents the results of these considerations, incorporates the 2016 Report as an Appendix, identifies any additional technical investigation or evaluations (if needed), and presents an updated certification by the QPE.

### **3. 2017–2021 Annual Inspection Reports**

Information relevant to the general site conditions and current adequacy and performance of the LAI embankment and outlet works have been considered. No issues were identified during the review that would affect the performance of the system and its compliance, as described in the 2016 Report, with the various requirements of the CCR Rule relative to (1) hazard potential classification, (2) structural stability, or (3) safety factor assessment.

The number of entries to the annual list of “Observed Conditions,” over the last 5 years of reports, has remained roughly consistent. The most consistently observed, or significant, conditions involve: (1) bulges of the exposed liner between the crest and the solids deposition level on the upstream slope of the LAI embankment; (2) settlement of the West Embankment; and (3) overfilling of the impoundment during the final year of operation.

The localized bulges of the exposed liner on the upstream face of the LAI embankment are caused by leaks in the upstream face HDPE liner that allow water to get between the liner and clay blanket of the embankment, thereby “floating” the HDPE liner and allowing a constrained “bulge”. The Plant has a procedure to identify bulges, identify the initiation leak, cut the liner to relieve the water pressure, and then patch the initiation and relief cuts. The design of the embankment to resist seepage relies on the combination of the 15-foot wide compacted clay blanket to minimize seepage loss and the large downstream wedge of fly and bottom ash to perform as a drain to relieve, drawdown, and prevent excessive seepage hydraulic gradients. With this embankment section, temporary ponding of water between the liner and clay low-permeability zone is not considered to have an adverse impact on the stability or structural integrity of the LAI embankments.

Settlement is measured by monuments SM-7 and SM-9 at the toe of the West Embankment of the LAI. There are no settlement monuments on the crest of the South, West, or North embankments. SM-7 and SM-9 indicate settlement of 10 and 8 inches, respectively, between 2015 and 2021. A 2021 topographic survey of the LAI embankments and reservoir indicates settlement of the central portion of the crest of the West Embankment of between 6 and 9 inches compared to the original design grade. Considering that the LAI is founded on old unlined Ash Ponds 3, 4, and 5, continued loading of the LAI will cause consolidation of the ash pond subgrade that will be expressed as broad settlement. No external bulges or other movements have been identified by the weekly or annual inspections to suggest a mechanism other than broad settlement. This form of settlement is not considered to have an adverse impact on the available storage capacity, stability, or structural integrity of the LAI embankments.

During the final years of operation of the LAI, before cessation of deposition in 2021, the properties of the flue gas desulfurization (FGD) slurry being discharged caused the material to drop out faster and at a steeper beach slope than the earlier mix of fly ash and FGD. As a result,

the northern portions of the pond (closer to the discharge locations) filled faster than the southern portions. Although the capacity of the impoundment to store the inflow design flood (IDF) was not diminished, the Plant took special measures to ensure that liquid flows were directed towards the center of the reservoir and away from portions of the embankment with diminished freeboard. Discharge ceased in April 2021. The topography of the final solids surface within the impoundment will direct runoff towards the flood pool in the southern end of the impoundment.

The 2017-2021 Annual Inspection Reports also provide information on minimum and maximum values for various types of geotechnical instrumentation installed within the embankments and foundations. Periodically, deviations or technical issues may be identified that limit or alter readings and these instances are reported in the Annual Inspection Reports. For the LAI, the instruments consist of vibrating wire and standpipe piezometers, inclinometers, buried settlement monuments, and surface settlement monuments. The records, including the SM-7 and SM-9 settlement records, were reviewed and no significant, adverse trends were identified that would cause structural instability or change in safety factor.

## **4. 2016 Certification – Review by Section**

Other than as described in the remainder of this section, the details presented in this section of the 2016 Report adequately represent current conditions and satisfy the requirements of the Rule.

### **4.1 “1.4 Facility Description”**

The LAI is no longer an operating CCR surface impoundment. APS provided notification, dated April 10, 2021, of its intent to close the LAI and APS ceased discharge of CCR to the LAI on or before April 10, 2021. In order to maintain adequate freeboard to contain the IDF, APS periodically pumps precipitation runoff and drain down water from the CCR solids from the free water pool at the southwest corner of the impoundment to the drop inlet tower, which discharges by gravity to the Lined Decant Water Pond (LDWP).

APS intends to close the LAI and its contents in place, similar to the closure approach used for old Pond 6. APS is currently undertaking a phased geotechnical investigation to identify safe and effective procedures to construct a soil cap over the soft contents of the impoundment.

APS is evaluating whether it wishes to restore the crest elevation of the West Embankment to its as-designed, pre-settlement elevation; this restoration would provide more flexibility for managing the normal operating pool and maintaining sufficient storage capacity for the IDF. The outcome of this evaluation will likely be reported in the 2021 (published in 2022) annual inspection report.

### **4.2 “2 Hazard Potential Classification”**

The details presented in this section of the 2016 Report adequately represent current conditions and satisfy the requirements of the Rule.

Based on a review of the information presented in the 2016 Report, the LAI impoundment currently satisfies the criteria for Significant Hazard Potential classification.

### **4.3 “3 History of Construction”**

The details presented in this section of the 2016 Report adequately represent current conditions and satisfy the requirements of the Rule.

The only construction actions that have occurred at the facility since the 2016 Report relate to maintenance activities, measures to control the deposition of solids around the discharge locations, and geotechnical investigations. In 2020 and 2021, APS advanced several pilot roads onto the solids surface to allow geotechnical testing and to assess the stability of different portions of the surface for eventual closure construction.

### **4.4 “4 Structural Stability Assessment”**

The details presented in this section of the 2016 Report adequately represent current conditions and satisfy the requirements of the Rule.

AECOM assesses that the design, construction, operation, and maintenance of the LAI are consistent with recognized and generally accepted good engineering practice for the maximum volume of CCR and CCR wastewater that can be impounded therein.

### **4.5 “5 Safety Factor Assessment”**

The details presented in this section of the 2016 Report adequately represent current conditions and satisfy the requirements of the Rule.

AECOM is not aware of any new information that would warrant reevaluation of any material properties, cross-section configurations, or piezometric conditions of the perimeter embankment.

The calculated factors of safety for the three critical cross sections along the LAI perimeter embankment exceeded the required minimum values for the long-term, maximum storage pool; the maximum surcharge pool; the seismic (pseudo-static); and liquefaction loading conditions.

### **4.6 “6 Conclusions”**

The details presented in this section of the 2016 Report adequately represent current conditions and satisfy the requirements of the Rule.

## **5. Recommended Additional Technical Investigations or Evaluations**

None identified and none recommended.

## 6. Conclusion

The 2016 Report and its conclusions meet the current reporting requirements of the Rule, reflect the current condition of the structure as known to the QPE and documented in the annual inspections, are not compromised by any identified issues of concern, and are consistent with the standard of care of professionals performing similar evaluations in this region of the country.

## 7. Limitations

This report is for the sole use of APS on this project only and is not to be used for other projects. In the event that conclusions based upon the data presented in this report are made by others, such conclusions are the responsibility of others.

The Periodic Structural Integrity Assessment presented in this report is based on the 2016 Report and relies and incorporates any Limitations expressed in that report.

The Certification of Professional Opinion in this report is limited to the information available to AECOM at the time this Assessment was performed in accordance with current practice and the standard of care. Standard of care is defined as the ordinary diligence exercised by fellow practitioners in this area performing the same services under similar circumstances during the same period. Professional judgments presented herein are primarily based on information from previous reports that have been assumed to be accurate, knowledge of the site, and partly on our general experience with dam safety evaluations performed on other dams.

No warranty or guarantee, either written or implied, is applicable to this work. The use of the word “certification” and/or “certify” in this document shall be interpreted and construed as a Statement of Professional Opinion and is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.



## 8. Certification Statement

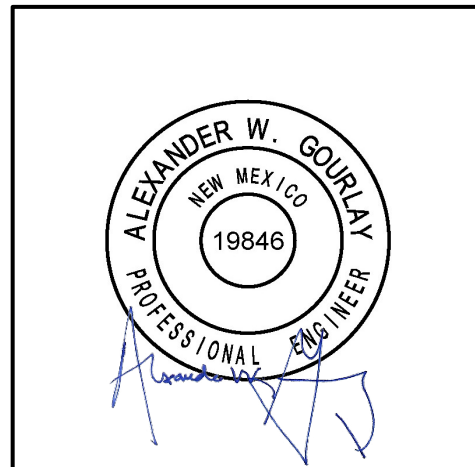
### Certification Statement for:

- 40 CFR § 257.73(a)(2)(ii) – Periodic Hazard Potential Classification for an Existing CCR Surface Impoundment
- 40 CFR § 257.73(d)(3) – Periodic Structural Stability Assessment for an Existing CCR Surface Impoundment
- 40 CFR § 257.73(e)(2) – Periodic Safety Factor Assessment for an Existing CCR Surface 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 periodic hazard potential classification, periodic structural stability assessment, and periodic safety factor assessment provided in this Periodic Structural Integrity Assessment Report, and referencing the 2016 Report, were conducted in accordance with the requirements of 40 CFR § 257.73.

Alexander W. Gourlay, P.E.  
Printed Name

October 11, 2021  
Date



### Attachment A:

AECOM, 2016. *Final Summary Report, Structural Integrity Assessment: Lined Ash Impoundment, Four Corners Power Plant, Fruitland, New Mexico*. Prepared for: Arizona Public Service, AECOM Job No. 60445844, August 2016.

**ATTACHMENT A**

**AECOM, 2016. *Final Summary Report, Structural Integrity Assessment: Lined Ash Impoundment Pond, Four Corners Power Plant, Fruitland, New Mexico.* Prepared for: Arizona Public Service, AECOM Job No. 60445844, August 2016.**

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