

# FOUR CORNERS POWER PLANT LINED ASH IMPOUNDMENT

Periodic Inflow Design Flood Control System Plan

October 2021  
AECOM Project 60664563

Prepared for:

Arizona Public Service  
400 North 5<sup>th</sup> Street  
Phoenix, AZ 85004

Prepared by:

AECOM  
7720 North 16th Street, Suite 100  
Phoenix, AZ 85020  
[aecom.com](http://aecom.com)

## Table of Contents

<b>1. Introduction</b>	<b>1</b>
<b>2. Methodology</b>	<b>1</b>
<b>3. Applicability of 2016 Plan Hydrologic Design Basis</b>	<b>2</b>
<b>4. 2016 Plan – Review by Section</b>	<b>3</b>
4.1 “§257.82 Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”	3
4.2 “Overview”	3
4.3 “§257.82 (a)(1)(2)(3) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”	4
4.4 “§257.82 (b) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”	4
4.5 “§257.82 (c)(1)(2)(3)(4)(5) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”	4
4.6 “§257.82 (d) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”	4
<b>5. Recommended Additional Technical Investigations or Evaluations</b>	<b>5</b>
<b>6. Conclusion</b>	<b>5</b>
<b>7. Limitations</b>	<b>5</b>
<b>8. Certification Statement</b>	<b>6</b>

## Attachment

Attachment A: AECOM, 2021, *Calculation - IDF Storage Capacity of APS FC Lined Ash Impoundment (LAI)*, October 8, 2021,

Attachment B: AECOM, 2016, *Four Corners Power Plant, Lined Ash Impoundment, Inflow Design Flood Control System Plan, FC\_InflowFlood\_008\_20161017*, August 31, 2016.

## 1. Introduction

This Periodic Inflow Design Flood Control System Plan for the Lined Ash Impoundment 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 requirement of 40 CFR § 257.82(c)(4) that “(t)he owner or operator of the CCR unit must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years.”

## 2. Methodology

The methodology used to prepare this 2021 Periodic Inflow Design Flood Control System Plan for the Lined Ash Impoundment (LAI) at the Four Corners Power Plant is for the certifying Qualified Professional Engineer (QPE) to:

Identify and review the hydrologic design basis references used for the 2016 Plan and verify applicability for use in 2021.

- a. Perform a documented review of each major component of the contributing technical information from:
  - i. AECOM, 2016, Four Corners Power Plant, Lined Ash Impoundment, Inflow Design Flood Control System Plan, FC\_InflowFlood\_008\_20161017, August 31, 2016, (hereafter referred to as the “2016 Plan” and incorporated and referenced directly as Attachment B to this document).
- b. Consider and document whether the 2016 Plan 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
- c. Identify any additional analyses, investigations, inspections, and/or repairs that should be completed in order to complete this 2021 Recertification.

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

### 3. Applicability of 2016 Plan Hydrologic Design Basis

In 2016, the LAI was an active pond, receiving a gravity inflow of sluiced FGD solid. Between 2016 and cessation of deposition April 2021, the pond received and was significantly filled by FGD solids.

In 2016, and in 2021, studies have assigned the Significant Hazard Potential classification to the LAI. 40 CFR §257.82(a)(3)(ii) requires that, for a Significant Hazard Potential CCR surface impoundment, the Inflow Design Flood (IDF) is the 1,000-year flood.

In 2016, APS elected to demonstrate capacity to store and/or pass the IDF by presenting similar, earlier calculations of a 72-hour PMP flood storage/routing through the LAI to the Lined Decant Water Pond (LDWP). The LAI and LDWP are both formed by perimeter embankments and therefore receive runoff only from direct precipitation, although the LAI may drain to the LDWP by the gravity decant tower. The 2016 hydrologic design basis requires that the LAI be able to store the IDF on the LAI and the LDWP be able to store the IDF on the LDWP and drained from the LAI, in the case that the LAI does drain during the storm to the LDWP.

The 72-hour PMP was estimated to have a precipitation depth of 10.9 inches, which is significantly greater than the precipitation estimate for the 1000-year flood event (“less than 4 inches”). The 2016 hydrologic design basis demonstrated that the more extreme flood, the 72-hour PMP runoff, could be stored/routed successfully in the LAI and concluded, therefore, that the this aspect of the LAI complies with the less-stringent requirement of the CCR Rule for the LAI to store/route the smaller 1,000-year flood.

In 2021, for this Periodic Inflow Design Flood Control System Plan, APS has elected to provide a new calculation to demonstrate capacity of the LAI to store the 1,000-year flood IDF for a Significant Hazard Potential CCR surface impoundment. This calculation, “AECOM, 2021, *Calculation - IDF Storage Capacity of APS FC Lined Ash Impoundment (LAI)*, October 8, 2021” is included in the 2021 Plan as Attachment A.

The 2021 calculation, presented as Attachment A, concludes the following:

- a. The 1,000-year flood with the highest precipitation depth (3.92 inches) is the “72-hour tropical storm”;
- b. The anticipated runoff volume to the LAI for the 1,000-year, 72-hour tropical storm event is 44.4 acre-feet;
- c. The current minimum crest elevation of the West Embankment is 5279.0 feet (NGVD29), based on 2021 topographic survey;
- d. The NMOSE-required 2.8 feet of residual freeboard (for wave run-up, etc.) requires the maximum flood pool elevation be 2.8 feet lower than the minimum crest, i.e. 5276.2 feet (NGVD29);
- e. The 44.4 acre-feet runoff from the IDF can be stored between elevations 5276.2 feet and 5274.1 feet (NGVD29); and, therefore,
- f. the maximum normal operating level in the LAI must be maintained at or below Elevation 5274.1 feet (NGVD29).

In future years, APS may elect to place additional fill on the crest to restore the West Embankment minimum crest elevation to 5280.0 feet (NGVD29). However, AECOM concludes that, for the current configuration of the LAI impoundment, the IDF runoff of 44.4 acre-feet can be stored with adequate residual freeboard with a Plant operational requirement to maintain the normal operating pool at or below Elevation 5274.1 feet (NGVD29).

Therefore, this section of the 2016 Plan, as amended by this analysis and the calculation in Attachment A, adequately represents current conditions and satisfies the requirements of the Rule.

## 4. 2016 Plan – Review by Section

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

### 4.1 “\$257.82 Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”

The details presented in this section of the 2016 Plan accurately describe the requirements of the Rule.

### 4.2 “Overview”

In April 2021, APS ceased discharges, including slurried FGD solids, to the LAI. FGD slurry is now blended with dry fly ash within the Plant and disposed as a blended solid in the Dry Fly Ash Disposal Area (DFADA) facility. Other flows previously reporting to the LAI now report to the Return Water Pond (RWP). APS intends to close the LAI by “closure in place”, with an evapotranspiration soil cover within the time frames allowed by the Rule for a surface impoundment of this size.

The design basis and calculation (attachment A) described in Section 3 “Applicability of 2016 Plan Hydrologic Design Basis” of this 2021 Plan are intended to supersede the following statements in this section of the 2016 Plan:

*“The LAI provides sufficient storage volume to accommodate the Probable Maximum Precipitation (PMP) runoff volume of 123 acre-feet. This PMP event is based on a precipitation depth of 10.9 inches and exceeds the runoff volume associated with a 1,000 year flood event which would be based on a rainfall depth of less than 4 inches.”*

With the new information introduced in Section 3, the new calculation in Attachment A, and the clarification of the superseded information, the details presented in this section of the 2016 Plan adequately represent current conditions and satisfy the requirements of the Rule.

### **4.3 “§257.82 (a)(1)(2)(3) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”**

A separate 2021 Periodic Hazard Potential Study confirms the assignment of the Significant Hazard Potential classification to the LAI. Therefore, this aspect of the 2016 Plan adequately represents current conditions and satisfies the requirements of the Rule.

Operational aspects described in the 2016 Plan have changed significantly due to the cessation of discharge of sluiced FGD to the LAI in 2021. These changes are described in Section 4.2 “Overview”.

The information presented in the right column of the 2016 Plan in the third of three paragraphs in answer to 40 CFR §257.82 (a)(1) is now superseded by the new information introduced in Section 3 and the new calculation in Attachment A of this 2021 Plan.

The information presented in the right column of the 2016 Plan in answer to 40 CFR §257.82 (a)(2) is accurate and current, with the following exception:

- a. The LAI does not in 2021 have sufficient capacity to retain the 72-hour PMP with 2.8 feet of residual freeboard, although it does have equivalent capacity to retain the 1,000-year, 72-hour IDF.

The information presented in the right column of the 2016 Plan in answer to 40 CFR §257.82 (a)(3) is accurate and current.

Therefore, this section of the 2016 Plan, as amended by this analysis, adequately represents current conditions and satisfies the requirements of the Rule.

### **4.4 “§257.82 (b) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”**

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

### **4.5 “§257.82 (c)(1)(2)(3)(4)(5) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”**

The owner or operator continues to acknowledge and will comply with these requirements.

Per the requirement of §257.82 (c)(4), this document constitutes the “every five years” Periodic Inflow Design Flood Control System Plan.

A certification of this Periodic Inflow Design Flood Control System Plan by a QPE is included in this document per the requirement of §257.82(c)(5).

### **4.6 “§257.82 (d) Hydrologic and Hydraulic capacity requirements for CCR surface impoundments”**

The owner or operator continues to acknowledge and will comply with these requirements.

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

None identified and none recommended.

## **6. Conclusion**

The 2016 Plan and its conclusions, as amended by the analyses presented in this 5-Year periodic revision, 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 document 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 document are made by others, such conclusions are the responsibility of others.

The Periodic Inflow Design Flood Control System Plan presented in this report is based on the 2016 Plan and relies and incorporates any Limitations expressed in that document.

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

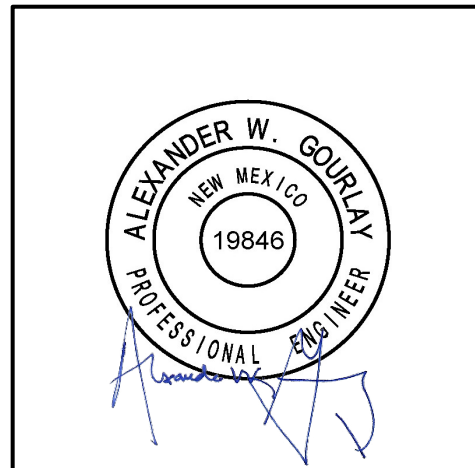
### Certification Statement for:

- Certification Statement 40 CFR § 257.82(c)(5) – Periodic Inflow Design Flood Control System Plan for an Existing 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 this Periodic Inflow Design Flood Control System Plan dated October 2021, including the technical content in Attachments A and B, meets the requirements of 40 CFR § 257.81.

Alexander W. Gourlay, P.E.  
Printed Name

October 11, 2021  
Date



### Attachment A:

AECOM, 2021, *Calculation - IDF Storage Capacity of APS FC Lined Ash Impoundment (LAI)*, October 8, 2021.

### Attachment B:

AECOM, 2016, *Four Corners Power Plant, Lined Ash Impoundment, Inflow Design Flood Control System Plan, FC\_InflowFlood\_008\_20161017*, August 31, 2016.

**ATTACHMENT A**  
**AECOM, 2021, *Calculation - IDF Storage Capacity of APS FC Lined***  
***Ash Impoundment (LAI),***  
**October 8, 2021.**

**ATTACHMENT B**  
**AECOM, 2016, *Four Corners Power Plant, Lined Ash Impoundment,***  
***Inflow Design Flood Control System Plan,***  
***FC\_InflowFlood\_008\_20161017, August 31, 2016.***

[aecom.com](http://aecom.com)