

# FOUR CORNERS POWER PLANT COMBINED WASTE TREATMENT POND

Periodic Inflow Design Flood Control System Plan

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AECOM Project 60664563

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## Attachment

Attachment A: AECOM, 2016, *Four Corners Power Plant, Combined Waste Treatment Pond, Inflow Design Flood Control System Plan, FC\_InflowFlood\_012\_20161017*, August 31, 2016.

## 1. Introduction

This Periodic Inflow Design Flood Control System Plan for the Combined Waste Treatment Pond 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 Combined Waste Treatment Pond (CWTP) at the Four Corners Power Plant is for the certifying Qualified Professional Engineer (QPE) to:

- a. Identify and review the hydrologic design basis references used for the 2016 Plan and verify applicability for use in 2021.
- b. Perform a documented review of each major component of the contributing technical information from:
  - i. AECOM, 2016, Four Corners Power Plant, Combined Waste Treatment Pond, Inflow Design Flood Control System Plan, FC\_InflowFlood\_012\_20161017, August 31, 2016, (hereafter referred to as the “2016 Plan” and incorporated and referenced directly as Attachment A to this document).
- c. 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
- d. 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 CWTP was an active pond, receiving a gravity inflow of bottom ash sluice water estimated at an average of 5 million gallons per day (MGD). With a pond surface area of approximately 13.4 acres, the daily inflow was equivalent to over 12 inches of direct precipitation on the pond, every day. Therefore, the hydrologic methodology presented in the 2016 Plan followed a flood routing protocol with the following steps:

- a. Estimate the 100-Year, 24-Hour precipitation depth as 2.36 inches from NOAA 14;
- b. Derive the modified SCS rainfall distribution, per New Mexico Department of Transportation (NMDOT) Hydrology Manual;
- c. Estimate the 100-Year, 24-Hour event contribution to the CWTP as 19.6 acre-feet; and
- d. Use HEC-HMS 4.1 to route the storm precipitation through the operating pond, to obtain a maximum water surface elevation in the pond, and to show that the two-foot required embankment freeboard was maintained.

In 2021, the Plant has ceased daily discharge to the CWTP, lowered the normal operating level by 2.5 feet, and now requires that the IDF be stored within the allowed freeboard and not discharged through the outlet works. In reviewing the applicability of the 2016 Plan hydrologic design basis to requirements in 2021, AECOM has verified the following:

- a. The tributary area to the pond has decreased significantly because:
  - i. In 2016, a significant portion of the attributed tributary area were gathered in sumps, pumped to the elevated Pirate Ship tank, and then drained by gravity to the CWTP;
  - ii. In 2021, all flows pumped to the Pirate Ship tank now flow by gravity to the Bottom Ash Sluice Water (BASWR) tank.
  - iii. Therefore, the tributary area used for the 2016 Plan can be considered significantly conservative relative to the actual tributary area in 2021.
- b. NOAA Atlas 14 Volume 1 remains the applicable precipitation frequency guide for New Mexico;
- c. The NMDOT Hydrology Manual was updated in 2018 but the results for rainfall distribution do not change;
- d. Site surfacing, grading, and other conditions have not changed, so the surface runoff coefficients used in the 2016 Plan remain valid; and
- e. The normal operating level has been lowered from Elevation 5332.01 feet (NAVD88), as reported in the 2016 Plan, to approximate Elevation 5329.5 feet (NAVD88), just below the inlet apron of the outlet works, in order not to allow discharge from the CWTP to the Plant's cooling water canal.

In summary, the IDF precipitation estimate of 2.36 inches remains valid, the tributary area is now smaller than in 2016 by an undetermined but significant amount, the runoff coefficients remain valid, and the normal pond level has been lowered to Elevation 5329.5 (NAVD88). The 2016 Plan estimated the 100-Year, 24-Hour event inflow and direct precipitation on the CWTP as 19.6 acre-feet, which is equivalent to a depth of 1.46 feet over the combined 13.4-acre area

of the CWTP decant cells and free water pond. With a normal operating level of 5329.5 feet (NAVD88), the maximum flood pool resulting from the IDF would be, conservatively, 5231.0 feet (NAVD88), which is 5.4 feet lower than the embankment crest elevation of 5336.4 feet (NAVD88) reported in the 2016 Plan.

AECOM concludes that the runoff volume likely to flow to the CWTP during the IDF is significantly lower in 2021 than in 2016, that the hydrologic basis for the derivations used in the 2016 Plan are conservative yet still valid in 2021, and that the estimated 19.6 acre-feet of runoff from the IDF, with no discharge from the stop-logged outlet works, would pool in the CWTP to an elevation 5.4 feet below the crest of the embankment. Therefore, this section of the 2016 Plan, as amended by this analysis, 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”**

The details presented in this section of the 2016 Plan adequately represent current conditions and satisfy the requirements of the Rule, with the following updates to reflect 2021 conditions.

In November 2020, APS ceased discharge of sluiced bottom ash to the CWTP. Flows instead are routed to a new Bottom Ash Sluice Water (BASWR) tank. APS intends to close the CWTP by dredge removal of bottom ash sediments within the time frames allowed by the Rule for a surface impoundment of this size.

In 2018, APS made minor improvements to the CWTP embankment that included adding fill to restore crest height in left abutment area. The minimum crest height is now greater than reported in the 2016 Plan.

In 2021, the normal operating level has been lowered from Elevation 5332.01 feet (NAVD88), as reported in the 2016 Plan, to approximate Elevation 5329.5 feet (NAVD88), just below the apron of the outlet works, in order not to allow discharge from the CWTP to the Plant’s cooling water canal. The pond is refilled by temporary pump with water from the cooling water canal to maintain hydrostatic balance between the water levels in the Pond and in the adjacent cooling water canal.

#### **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 lowest classification, Low Hazard Potential, to the CWTP. 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 bottom ash sluice water to the CWTP in 2020. The majority of these changes are described in Section “3. Applicability of 2016 Plan Hydrologic Design Basis” of this 2021 Plan. In addition, the following changes relative to information presented in this section of the 2016 Plan are documented:

- a. The estimate of 15 MGD discharge reported in the 2016 Plan is now believed to have been affected by a measurement error and the more reasonable estimate would have been 5 MGD. As stated, this discharge is now directed to the BASWR tank, which discharges to the cooling water canal.
- b. The CWTP is now blocked from discharging to the cooling water canal and Morgan Lake.

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 no longer represent current conditions. There is no longer a discharge from the CWTP to Morgan Lake, therefore this requirement of the Rule is satisfied.

#### **4.5 “§257.82 (c) 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

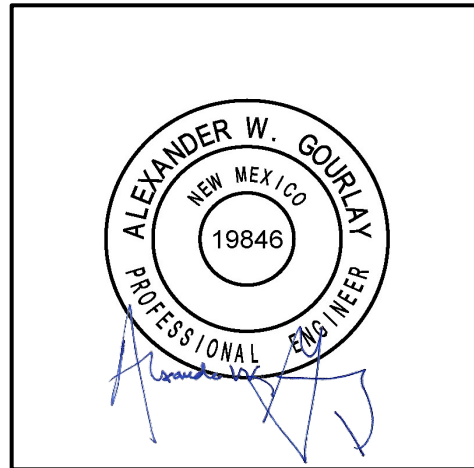
### Certification Statement for:

- 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; Combined Waste Treatment Pond

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 Attachment A, meets the requirements of 40 CFR § 257.81.

Alexander W. Gourlay, P.E.  
Printed Name

October 11, 2021  
Date



Attachment A:

*AECOM, 2016, Four Corners Power Plant, Combined Waste Treatment Pond, Inflow Design Flood Control System Plan, FC\_InflowFlood\_012\_20161017, August 31, 2016.*

**ATTACHMENT A**

**AECOM, 2016, *Four Corners Power Plant, Combined Waste Treatment Pond, Inflow Design Flood Control System Plan, FC\_InflowFlood\_012\_20161017*, August 31, 2016.**

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