



# Technical Memorandum

**To:** Charles Reece IV, PE  
Arizona Electric Power Cooperative, Inc.

**File No:** 17-2015-4019

**From:** Francisco J. Garza, PE

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**Re:** Inflow Design Flood Control System Plan  
Apache Generating Station  
Arizona Electric Power Cooperative, Inc.  
Cochise County, Arizona

## 1.0 INTRODUCTION AND SCOPE

The Environmental Protection Agency has finalized national regulations to provide a comprehensive set of requirements for the safe disposal of coal combustion residuals (CCRs), commonly known as coal ash, from coal-fired power plants. The rule establishes technical requirements for CCR landfills and surface impoundments under subtitle D of the Resource Conservation and Recovery Act, the nation's primary law for regulating solid waste. The final rule provides greater clarity on technical requirements in response to questions received during the comment period. Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) is pleased to provide Arizona Electric Power Cooperative, Inc. (AEP CO) with this Inflow Design Flood Control System Plan for the Ash and Scrubber Sludge Disposal facilities in accordance with 40 CFR § 257 and 261 (2015), Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities.

The development of this Inflow Design Flood Control System Plan included a review of existing data including inflow design, construction, operation, and maintenance of the facility to confirm adequacy to handle rated inflow flood. The results of the data review, probable maximum precipitation analyses and inflow design recommendations are discussed in subsequent sections.

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## 2.0 REVIEW OF EXISTING INFORMATION

Amec Foster Wheeler has reviewed the following documents during preparation of this technical memorandum:

- Design Notes and Analysis for the Ash and Scrubber Sludge Disposal Ponds and Pond Dikes for Arizona Electric Power Cooperative, Inc. (Burns & McDonnell 1993).
- Plant Water Balance, Apache Generating Station, Arizona Electric Power Cooperative, Inc., Cochise, Arizona (AEPCO 2012).
- E-mail dated November 10, 2015, from AEPCO personnel to Amec Foster Wheeler.
- Probable Maximum Precipitation Study for Arizona (Arizona Department of Water Resources [ADWR] 2013).

The above documents were the primary sources of inflow data.

## 3.0 INFLOW DESIGN FLOOD CONTROL PLAN

The owner or operator of the CCR unit must design, construct, operate, and maintain an inflow design flood control system in accordance with § 257.82 (a)(1) and (2).

### § 257.82 (a)(1)

The existing ash and sludge ponds are constructed of embankment that extends above existing grade approximately 20 feet. Thus, the only inflow is from the probable maximum precipitation (PMP) falling directly on the pond footprint area. The PMP calculated as part of the original construction, was derived from National Oceanographic & Atmospheric Administration Hydrometeorological Report No. 49, was approximately 11.2 inches for the site (Burns & McDonnell 1993). The periodic inflow design flood control system must be updated every five years in accordance with § 257.82 (c)(4). The PMP for the project site was analyzed using information for the State of Arizona (ADWR 2013). The local PMP for the project site varied from 9.8 to 15.4 inches depending on the storm type. The Tropical PMP (72-hour) of 15.4 inches was selected for design. The engineering calculations are included as an attachment in accordance with § 257.82 (c)(1).

The PMP of 15.4 inches will be controlled by ensuring adequate freeboard within the ponds is available. Currently, the pond levels are maintained at least three feet below the crest in compliance with the Arizona Department of Environmental Quality and ADWR permits. Therefore, the existing ash and sludge ponds provide adequate storage to handle the rated inflow flood. This technical memorandum serves as certification stating the periodic inflow design flood control system plan meets the requirements of § 257.82 in accordance with § 257.82 (c)(5).

### § 257.82 (a)(2)

There are no outflow spillways from the existing ash and sludge ponds. Thus, the peak discharge from § 257.82 (a)(2) does not apply.



## **ATTACHMENTS**

## Summary of Probable Maximum Precipitation (PMP)

### - AEPCO Ash Ponds

1. The ADWR update to the PMP data (ADWR, 2013) was used to compute the PMP for the Ash Pond inflow design.
2. The PMP values at the center of the watershed were computed. The watershed was delineated based on the USGS dem data (ned\_10m) downloaded from <https://gdg.sc.egov.usda.gov/GDGOrder.aspx> (See Figure 1)
3. The General PMP predicted is 9.84 inches while the 1/2 General PMP is 4.92 inches. The local PMP predicted is 12.4 inches while the 1/2 Local PMP is 6.2 inches.
4. It is unclear which PMP, General PMP or Local PMP, was used in the existing report, "Design Notes and Analysis for the Ash and Scrubber Sludge Disposal Ponds and Pond Dikes." (Burns & McDonnell, 1993).

The summary tables are given below.

**Table 1 - Probable Maximum Precipitation (PMP)**

	<b>General PMP(72-hour)</b>	<b>1/2 General PMP</b>
General PMP	9.84 inches	4.92 inches
	Local PMP(6-hour)	1/2 Local PMP
Local PMP	12.40 inches	6.20 inches
	Tropical PMP(72-hour)	1/2 Tropical PMP
Tropical PMP	15.38 inches	7.69 inches

**Table 2: Distribution of Probable Maximum Precipitation (PMP) in inches**

	<b>PMP (6-hour)</b>	<b>PMP (12-hour)</b>	<b>PMP (18-hour)</b>	<b>PMP (24-hour)</b>	<b>PMP (48-hour)</b>	<b>PMP (72-hour)</b>
General PMP	3.07	4.26	5.21	6.33	8.07	9.84
	PMP (1-hour)	PMP (2-hour)	PMP (3-hour)	PMP (4-hour)	PMP (5-hour)	PMP (6-hour)
Local PMP	5.94	9.80	12.06	12.21	12.35	12.40
	PMP (6-hour)	PMP (12-hour)	PMP (18-hour)	PMP (24-hour)	PMP (48-hour)	PMP (72-hour)
Tropical PMP	9.02	10.17	11.74	11.80	13.20	15.38

Note: This table may be used for predictions of the probable maximum flows.

Figure 1: Watershed Boundary

