

Arizona Public Service Four Corners Power Plant

Dry Fly Ash Disposal Area Sites 1, 2, and 3

Location Restriction Demonstration Report

Prepared for :
Arizona Public Service

AECOM Job No. 60587725
October 8, 2018

Table of Contents

Certification Statement	i
1 Introduction	1-1
1.1 Report Purpose and Description	1-1
1.2 EPA Regulatory Requirements	1-1
1.3 Report Organization	1-1
1.4 Facility Description	1-1
2 Location Relative to Unstable Areas	2-1
2.1 Methodology	2-1
2.2 Discussion and Conclusion	2-1
2.2.1 Geologic Setting	2-1
2.2.2 Foundation Conditions	2-2
2.2.3 Areas Susceptible to Mass Movement	2-2
3 Conclusion	3-1
4 Limitations	4-1
5 References	5-1

Figure

Figure 1-1: Site Vicinity Map

Certification Statement

Certification Statement for Location Restrictions:

- **40 CFR § 257.64 – Unstable Areas**

CCR Unit: Arizona Public Service Company; Four Corners Power Plant; Dry Fly Ash Disposal Area Sites 1, 2, and 3

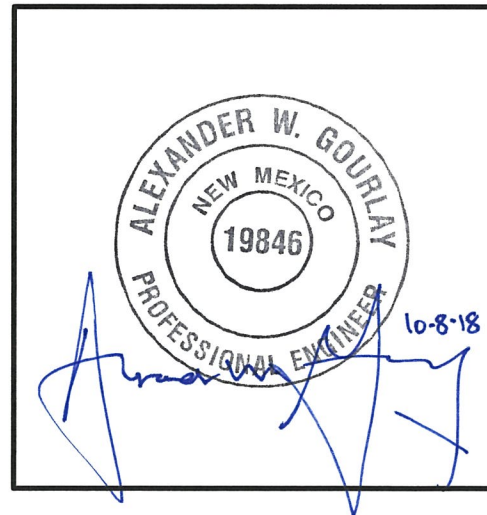
I, Alexander Gourlay, being a Registered Professional Engineer in good standing in the State of New Mexico, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR unit, the demonstration that the location of the CCR unit is not in an unstable area, as included in the Location Restrictions Demonstration Report dated October 8, 2018 meets the requirements of 40 CFR § 257.64(a).

Alexander W. Gourlay, P.E.

Printed Name

October 8, 2018

Date



1 Introduction

Arizona Public Service Company (APS) contracted AECOM to assist in the location restriction demonstration of the existing Dry Fly Ash Disposal Area (DFADA) Sites 1, 2, and 3 coal combustion residual (CCR) landfill at the Four Corners Power Plant (FCPP, the Plant) within the Navajo Nation, near Fruitland, New Mexico. Figure 1-1 shows the location for DFADA Sites 1, 2, and 3 at the FCPP. This Demonstration Report documents the location-specific condition relevant to DFADA Sites 1, 2, and 3.

1.1 Report Purpose and Description

The purpose of this report is to document the location restriction demonstration for DFADA Sites 1, 2, and 3. The DFADA is an existing CCR landfill operated by APS. In 2015, the United States Environmental Protection Agency (EPA) finalized a rule (Rule) regulating CCRs under subtitle D of the Resource Conservation and Recovery Act (RCRA). As part of this Rule, owners and operators of existing CCR landfills must obtain a certification from a qualified professional engineer stating that the demonstration for the existing CCR landfill meets the requirements relative to unstable areas.

1.2 EPA Regulatory Requirements

On April 17, 2015 the United States Environmental Protection Agency issued 40 CFR Part 257 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule (the Rule). Section 257.64 defines the location restriction criterion for all existing CCR landfills and requires the owner or operator of the CCR unit to demonstrate that the unit meets minimum requirements for location relative to unstable areas.

Existing CCR landfills, such as DFADA Sites 1, 2, and 3, are required to demonstrate compliance with the location restriction no later than October 17, 2018. An owner or operator unable to demonstrate compliance is prohibited from placing CCR in the CCR unit under 40 CFR § 257.64(c)(4).

1.3 Report Organization

This Demonstration Report is organized into the following sections:

<u>Report Section</u>	<u>Applicable CFR 40 Part 257 Citation</u>
• Section 1 – Introduction	
• Section 2 – Location Relative to Unstable Areas	§ 257.64 Unstable areas
• Section 3 – Conclusions	
• Section 4 – Limitations	
• Section 5 – References	

1.4 Facility Description

The FCPP is an electric generating station located within the Navajo Nation, near Fruitland, New Mexico. The FCPP is operated by APS and owned by a consortium of utility companies. The FCPP consists of two coal-fired electrical generating units, Units 4 and 5. Units 1, 2, and 3 ceased generation in 2013 and were then

decommissioned. The two generating units are cooled by water from Morgan Lake, a man-made reservoir located immediately north of the Plant. Five existing CCR units are located at the FCPP: the Combined Waste Treatment Pond (CWTP) located immediately east of the Plant, the Lined Ash Impoundment (LAI) located approximately 1 mile west of the Plant, the Lined Decant Water Pond (LDWP) located approximately 1.5 miles west of the Plant and adjacent to the LAI, the Upper Retention Sump located immediately southeast of the Plant, and the DFADA, located approximately 2 miles southwest of the Plant and south of the LAI. Figure 1-1 shows the locations of these units. The DFADA configuration consists of three sites – Site 1, Site 2, and Site 3 – forming one CCR unit.

The DFADA is a lined landfill and dry fly ash disposal facility. The DFADA currently consists of three conjoined cells: Sites 1, 2, and 3. Construction at the three Sites has been ongoing since 2007. Site 1 is constructed with an HDPE geomembrane overlying a compacted clay subgrade. Sites 2 and 3 are constructed with a composite liner system selected for general compliance with the EPA's *Guide for Industrial Waste Management*: a geosynthetic clay liner (GCL) overlain by an HDPE geomembrane. A drainage layer was installed over the HDPE geomembrane in all three cells as recommended in the EPA guidance. Each cell is connected to a leachate collection system designed to remove water from the storage area. Leachate from DFADA Sites 1, 2, and 3 drains to one of two geomembrane-lined leachate ponds that are contiguous to and considered to be a part of the DFADA.

2 Location Relative to Unstable Areas

40 CFR § 257.64 requires that existing CCR landfills must not be located in an unstable area unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted. The owner or operator must consider the following factors when determining whether the area is unstable:

- 1) On-site or local soil conditions that may result in significant differential settling;
- 2) On-site or local geologic or geomorphologic features; and
- 3) On-site or local human-made features or events (both surface and subsurface).

Structural components mean liners, leachate collection and removal systems, final covers, run-on and run-off systems, inflow design flood control systems, and any other component used in the construction and operation of the CCR unit that is necessary to ensure the integrity of the unit and that the contents of the unit are not released into the environment.

Unstable area means a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity, including structural components of some or all of the CCR unit that are responsible for preventing releases from such unit. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and karst terrains.

2.1 Methodology

The location of DFADA Sites 1, 2, and 3 was assessed by reviewing design and construction documentation, historic geological and geotechnical investigations, and engineering analyses (safety factor calculations). Information was reviewed to assess: 1) whether poor foundation conditions may exist and whether or not they could result in inadequate foundation support for structural components of Sites 1, 2, and 3; and 2) whether areas susceptible to mass movement (such as subsidence, landslides, avalanches, debris slides and flows, block sliding, or rock falls) capable of impairing the integrity of the structural components of DFADA Sites 1, 2, and 3 are present.

2.2 Discussion and Conclusion

2.2.1 Geologic Setting

The FCPP is located on the western flank of the San Juan Basin, in the Colorado Plateau physiographic province in northwestern New Mexico. The San Juan Basin is a structural basin approximately 100 miles from north to south and 90 miles from east to west underlain by laterally extensive, gently dipping to flat-lying sedimentary rocks of Late Cretaceous age. The northwestern boundary of the San Juan Basin is defined by the Hogback Monocline. The Hogback Monocline is a structural monocline where the generally horizontal to gently dipping Cretaceous sedimentary rock units in the area are uplifted into a one-sided fold which dips steeply (approximately 38 degrees) to the east. The resulting bedrock ridge approximately 3 miles west of the Plant is composed of younger rock units on the eastern flank and progressively older units exposed in the central and western portions of the Hogback.

Karst terrain is not known to be present beneath the FCPP or DFADA Sites 1, 2, and 3 footprint based on the predominance of shale and sandstone in the area.

2.2.2 Foundation Conditions

DFADA Sites 1, 2, and 3 are founded on native soil primarily consisting of hard weathered shale. The native soils and shale underlying the DFADA appear to be competent materials based on nearby well logs near the DFADA footprint (AECOM 2017). Based on knowledge of the site and available geologic information, AECOM does not believe that the presence of the DFADA has caused or would cause significant differential settling across the weathered shale underlying the site. There do not appear to be other unfavorable geologic or geomorphological features beneath the DFADA Sites 1, 2, and 3 footprint, nor is AECOM aware of any unfavorable surface or subsurface human-made features or events beneath DFADA Sites 1, 2 or 3.

2.2.3 Areas Susceptible to Mass Movement

The topography surrounding the DFADA consists of steep sandstone cliffs, the existing Lined Ash Impoundment, and short hills. The adjacent sandstone cliffs and underlying shale do not appear to exhibit sufficient potential for abrupt or differential movement that would compromise the performance of Sites 1, 2, and 3. Sites 1, 2, and 3 are conjoined, thereby eliminating the possibility of internal mass movement (APS 2014). Site 3 is tied into the LAI, thereby eliminating the possibility of mass movement along the northern boundary of the landfill (APS 2014).

Surface water run-on is collected around the DFADA complex with an engineered diversion channel as described in the Dry Fly Ash Disposal Area Run-On and Run-Off Control System Plan (AECOM 2016). The diversion channel was designed to intercept the 24-hour, 100-year run-on storm flows from the area north and east of the DFADA.

Conclusion: DFADA Sites 1, 2, and 3 are not located in an unstable area.

3 Conclusion

Based on the findings and result of the location restriction demonstration, AECOM provides the following conclusion for DFADA Sites 1, 2, and 3:

- DFADA Sites 1, 2, and 3 are not located in an unstable area.

4 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 obtained in this report are made by others, such conclusions are the responsibility of others. The Certification of Professional Opinion is limited to the information available to AECOM at the time this report was written. This report was written 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 were assumed to be accurate partly based on knowledge of the site and partly based on our general experience with similar evaluations performed for similar structures. No warranty or guarantee, either express or implied, is applicable to this work.

The use of the words "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion and are not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.

5 References

- AECOM, 2016. "Four Corners Power Plant – Dry Fly Ash Disposal Area – Run-On and Run-Off Control System Plan."
- AECOM, 2017. "CCR Monitoring Well Network Report and Certification, Four Corners Power Plant, Fruitland, New Mexico." September 18.
- Arizona Public Service Company (APS), 2014. "Dry Fly Ash Disposal Area 3 for the Four Corners Power Plant, Units 4&5." As-Built Drawing set, December.
- Arizona Public Service Company (APS), 2018. "Four Corners Power Plant Lined Ash Impoundment, Lined Decant Water Pond, Combined Waste Treatment Pond, Upper Retention Sump, and Dry Fly Ash Disposal Area – Annual CCR Impoundment and Landfill Inspection Report – 2017." January.
- URS Corporation (URS), 2014. "Engineering Design Report – Dry Fly Ash Disposal Area 3." Prepared for Arizona Public Service, April.

Figure

