AECOM

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CCR Rule Report: Initial Structural Stability Assessment

For

Ash Pond No. 1

At Coffeen Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that Ash Pond No. 1 at the Illinois Power Generating Company Coffeen Power Station meets the structural stability assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(d), except as noted herein. Ash Pond No. 1 is located near Coffeen, Illinois in Montgomery County, approximately 0.3 miles east of the Coffeen Power Station. Ash Pond No. 1 serves as the primary wet impoundment basin for bottom ash produced by the Coffeen Power Station.

Ash Pond No. 1 is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that an initial structural stability assessment for an existing CCR surface impoundment be completed by October 17, 2016. In general, the initial structural stability assessment must document that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial structural stability assessment was conducted in accordance with the requirements of 40 CFR §257.73(d). The owner or operator must prepare a periodic structural stability assessment every five years.

2 Initial Structural Stability Assessment

40 CFR §257.73(d)(1)
The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with [the standards in (d)(1)(i)-(vii)].

An initial structural stability assessment has been performed to document that the design, construction, operation and maintenance of Ash Pond No. 1 is consistent with recognized and generally accepted good engineering practices. The results of the structural stability assessment are discussed in the following sections. Based on the assessment and its results, the design, construction, operation, and maintenance of Ash Pond No. 1 were found to be consistent with recognized and generally accepted good engineering practices, and meets the standards in 257.73(d)(1)(i)-(vii), except as noted herein.

2.1 Foundations and Abutments (§257.73(d)(1)(i))

CCR unit designed, constructed, operated, and maintained with stable foundations and abutments.

The stability of the foundations was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the foundations. Ash Pond No. 1 is a ring dike structure and does not have abutments.

The foundation consists of medium stiff to stiff soil, overlying very soft soil, which in turn overlies very stiff to hard glacial till. Slope stability analyses exceed the criteria listed in §257.73(e)(1)(i) through (iii) for slip surfaces passing through the foundation. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Ash Pond No. 1 at Coffeen Power Station* (October 2016). Additional slope stability analyses were performed to evaluate the effects of cyclic softening in the foundation, and were found to satisfy the criteria listed in §257.73(e)(1)(iv) applicable to dikes. A review of operational and maintenance procedures as well as current and past performance of the dikes has determined appropriate processes are in place for continued operational performance.

Based on the conditions observed by AECOM, Ash Pond No. 1 was designed and constructed with stable foundations. Operational and maintenance procedures are in place to address any issues related to the stability of foundations. Therefore, Ash Pond No. 1 meets the requirements in §257.73(d)(1)(i).

2.2 Slope Protection (§257.73(d)(1)(ii))

CCR unit designed, constructed, operated, and maintained with adequate slope protection to protect against surface erosion, wave action and adverse effects of sudden drawdown.

The adequacy of slope protection was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, adequate slope protection was designed and constructed at Ash Pond No. 1. No evidence of significant areas of erosion or wave action was observed. The interior slopes are protected with vegetation and stacked bottom ash, and the exterior slopes are protected with vegetation. Operational and

maintenance procedures to repair the vegetation and stacked bottom ash as needed are appropriate to protect against surface erosion or wave action. Sudden drawdown of the pool in Ash Pond No. 1 is not expected to occur due to operational controls associated with lowering the pool level. Therefore, slope protection to protect against the adverse effects of sudden drawdown is not required as sudden drawdown conditions are not expected to occur. Therefore, Ash Pond No. 1 meets the requirements in §257.73(d)(1)(ii).

2.3 Dike Compaction (§257.73(d)(1)(iii))

CCR unit designed, constructed, operated, and maintained with dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.

The density of the dike materials was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the dike over the range of expected loading conditions as defined within §257.73(e)(1).

Based on this evaluation, the dike consists of medium stiff to stiff material, which is indicative of mechanically compacted dikes. As discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Ash Pond No. 1 at Coffeen Power Station* (October 2016), slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the dike. Therefore, the original design and construction of Ash Pond No. 1 included sufficient dike compaction. Operational and maintenance procedures are in place to identify and mitigate deficiencies in order to maintain sufficient compaction of the dikes to withstand the range of loading conditions. Therefore, Ash Pond No. 1 meets the requirements in §257.73(d)(1)(iii).

2.4 Vegetated Slopes (§257.73(d)(1)(iv))[1]

CCR unit designed, constructed, operated, and maintained with vegetated slopes of dikes and surrounding areas, except for slopes which have an alternate form or forms of slope protection.

The adequacy of slope vegetation was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, the vegetation on the exterior and interior slopes is adequate as no substantial bare or overgrown areas were observed. Stacked bottom ash is present on some portions of the interior slopes and is used as an alternate form of slope protection, which is adequate as significant areas of erosion were not observed. Therefore, the original design and construction of Ash Pond No. 1 included adequate vegetation of the dikes and surrounding areas. Adequate operational and maintenance procedures are in place to regularly manage vegetation growth, including mowing and seeding any bare areas, as evidenced by the conditions observed by AECOM. Therefore, Ash Pond No. 1 meets the requirements in §257.73(d)(1)(iv).

[1] As modified by court order issued June 14, 2016, Utility Solid Waste Activities Group v. EPA, D.C. Cir. No. 15-1219 (order granting remand and vacatur of specific regulatory provisions).

2.5 Spillways (§257.73(d)(1)(v))

CCR unit designed, constructed, operated, and maintained with a single spillway or a combination of spillways configured as specified in [paragraph (A) and (B)]:

(A) All spillways must be either:

(1) of non-erodible construction and designed to carry sustained flows; or

(2) earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

The spillway was evaluated using design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, hydrologic and hydraulic analyses were completed to evaluate the capacity of the spillway relative to inflow estimated for the 1,000-year flood event for the significant hazard potential Ash Pond No. 1. The hazard potential classification assessment was performed by Stantec in 2016 in accordance with §257.73(a)(2).

The spillway is comprised of a concrete riser structure, a steel primary outflow pipe, and corrugated metal and steel overflow pipe, which are non-erodible materials designed to carry sustained flows. The capacity of the spillway was evaluated using hydrologic and hydraulic analysis performed per §257.82(a). The analysis found that the spillway can adequately manage flow during peak discharge resulting from the 1,000-year storm event without overtopping of the embankments. The hydrologic and hydraulic analyses are discussed in the *CCR Rule Report: Initial Inflow Design Flood Control System Plan for Ash Pond No. 1 at Coffeen Power Station* (October 2016). Operational and maintenance procedures are in place to repair any issues with the spillway and remove debris or other obstructions from the spillway, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillway. Therefore, Ash Pond No. 1 meets the requirements in §257.73(d)(1)(v).

2.6 Stability and Structural Integrity of Hydraulic Structures (§257.73(d)(1)(vi))

CCR unit designed, constructed, operated, and maintained with hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.

Two hydraulic structures pass through the dike at Ash Pond No. 1: the steel recycle intake pipe, which acts as the primary outflow pipe for Ash Pond No. 1, and a corrugated metal and steel secondary overflow pipe. The stability and structural integrity of the pipes was evaluated using design drawings, operational and maintenance procedures, inspections, and conditions observed in the field by AECOM. No other hydraulic structures are known to pass through the dike or underlie the base of Ash Pond 1.

The evaluation of design drawings, operational and maintenance procedures, and conditions observed in the field did not identify any issues with the steel recycle intake pipe. However, the evaluation of the stability and structural integrity of the steel recycle intake pipe has not been fully completed because high pipe flows, required for operation of the Coffeen Power Station, precluded closed circuit television (CCTV) inspection.

The CCTV pipe inspection of the corrugated metal and steel secondary overflow pipe covered the complete length of the pipe and found the pipe to be free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris that may negatively affect the operation of the hydraulic structure. Evaluation of design drawings and operational and maintenance procedures for this pipe also did not identify any issues.

Based on this evaluation, all Ash Pond No. 1 hydraulic structures cannot be certified to meet the requirements of §257.73(d)(1)(iv) because a CCTV inspection of the steel recycle intake pipe has not yet been performed, thus, precluding completion of the evaluation of the stability and structural integrity of that pipe. In accordance with §257.73(d)(2), AECOM recommends that a CCTV pipe inspection of the steel recycle intake pipe be completed as soon as feasible and that this assessment be updated once the inspection is completed.

2.7 Downstream Slope Inundation/Stability (§257.73(d)(1)(vii))

CCR unit designed, constructed, operated, and maintained with, for CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

The structural stability of the downstream slopes of Ash Pond No. 1 was evaluated by comparing the location of Ash Pond No. 1 relative to adjacent water bodies using published Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), aerial imagery, and conditions observed in the field by AECOM.

The nearest downstream water bodies are Coffeen Lake and the Coffeen Station's process water flume. However, as shown on the FEMA FIRM for the area, the 100-year flood zone for Coffeen Lake is beyond the downstream slopes of Ash Pond No. 1. The process water flume only has water to a depth of approximately 3 ft, and a drawdown of this magnitude is not expected to affect the structural stability of the Ash Pond No. 1 downstream slopes. Additionally, a steel sheet pile wall separates the pool in the process water flume from the Ash Pond No. 1 downstream slopes.

Based on this evaluation, the requirements in §257.73(d)(1)(vii) are not applicable to Ash Pond No. 1, as inundation of the downstream slopes by a water body such as a river, stream, or lake is not expected to occur, and the depth of water in the process flume is shallow enough that drawdown would not be expected to affect the structural stability of the downstream slopes.

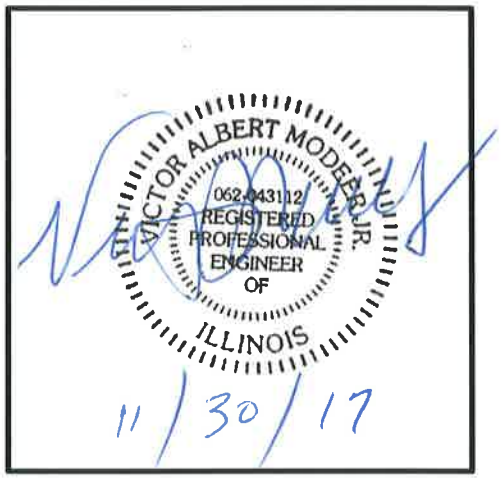
3 Certification Statement

CCR Unit: Illinois Power Generating Company; Coffeen Power Station; Ash Pond No. 1

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial structural stability assessment dated October 13, 2016 was conducted in accordance with the requirements of 40 CFR § 257.73(d).

VICTOR A MODEER JR.
Printed Name

10/13/16
Date



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