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October 2016

# CCR Rule Report: Initial Safety Factor Assessment

For

East Ash Pond

At Joppa Power Station

# 1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the East Ash Pond at the Electric Energy, Inc. (EEI) Joppa Power Station meets the safety factor assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(e). The East Ash Pond is located near Joppa, Illinois in Massac County, approximately 0.1 miles northeast of the Joppa Power Station. The East Ash Pond serves as the ash impoundment basin for CCRs produced at the Joppa Power Station.

The East Ash Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the initial safety factor assessment for an existing CCR surface impoundment be completed by October 17, 2016.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial safety factor assessment meets the requirements of 40 CFR § 257.73(e). The owner or operator must prepare a safety factor assessment every five years.

## 2 Initial Safety Factor Assessment

### 40 CFR §257.73(e)(1)

The owner or operator must conduct initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in (e)(1)(i) through (iv) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.

(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.

(iii) The calculated seismic factor of safety must equal or exceed 1.00.

(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

A geotechnical investigation program and stability analyses were performed to evaluate the design, performance, and condition of the earthen dikes of the East Ash Pond. The exploration consisted of hollow-stem auger borings, cone penetration testing with seismic wave velocity measurements and pore pressure dissipation testing, piezometer installation and monitoring, and a laboratory program including strength and index testing. Data collected from the geotechnical investigation, available design drawings, construction records, inspection reports, previous engineering investigations, and other pertinent historic documents were utilized to perform the safety factor assessment and geotechnical analyses.

The East Ash Pond embankment is generally medium stiff to stiff and overlies predominantly alluvial foundation materials. The alluvial foundation consists of soft to stiff clay overlying medium dense to dense sand. A zone of sluiced flyash that existed before the embankment dike was constructed was encountered below the compacted embankment in the southeast corner. The zone of sluiced flyash was modified by the installation of Deep Mixing Method (DMM) ground improvement technology using the wet soil mixing method. Explorations were terminated in the soil overburden and were not extended to bedrock. The phreatic surface is typically at or slightly above the embankment/foundation interface.

Six (6) representative cross sections were analyzed using limit equilibrium slope stability analysis software to evaluate stability of the perimeter dike system and foundations. The cross sections were located to represent critical surface geometry, subsurface stratigraphy, and phreatic conditions across the CCR unit. Each cross section was evaluated for each of the loading conditions stipulated in §257.73(e)(1).

The Soils Susceptible to Liquefaction loading condition, §257.73(e)(1)(iv), was not evaluated because a liquefaction susceptibility evaluation did not find soils susceptible to liquefaction within the East Ash Pond dikes. As a result, this loading condition is not applicable to the East Ash Pond at the Joppa Power Station.

Results of the Initial Safety Factor Assessments, for the critical cross-section for each loading condition (i.e., the lowest calculated factor of safety out of the cross sections analyzed for each loading condition), are listed in Table 1.

**Table 1 – Summary of Initial Safety Factor Assessments**

Loading Conditions	§257.73(e)(1) Subsection	Minimum Factor of Safety	Calculated Factor of Safety
Maximum Storage Pool Loading	(i)	1.50	1.59
Maximum Surcharge Pool Loading	(ii)	1.40	1.57
Seismic	(iii)	1.00	1.01
Soils Susceptible to Liquefaction	(iv)	1.20	Not Applicable

Based on this evaluation, the East Ash Pond meets the requirements in §257.73(e)(1).

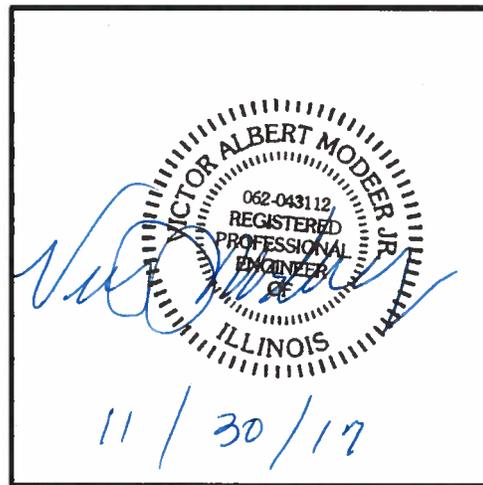
### 3 Certification Statement

**CCR Unit:** Electric Energy, Inc.; Joppa Power Station; East Ash Pond

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 safety factor assessment dated October 14, 2016 meets the requirements of 40 CFR §257.73.

Victor A. Modeer Jr  
Printed Name

10 / 14 / 16  
Date



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