CCR Rule Report: Initial Structural Stability Assessment

Bottom Ash Pond 3
Laramie River Station
Wheatland, Wyoming

Basin Electric Power Cooperative
Bismarck, North Dakota

October 2016
Project No.: 60429243

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that Bottom Ash Pond 3 at the Basin Electric Power Cooperative Laramie River Station meets the initial structural stability assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(d).

Bottom Ash Pond 3 is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule[1] 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 structural stability assessment every five years.

[1] U.S. Environmental Protection Agency. (USEPA). (2015). *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule*, 40 CFR §257. Federal Register, Volume 80, Subpart D, April 17, 2015.

2 Structural Stability Assessment [§257.73(d)(1)(i) through (viii)]

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)(i)-(vii)].

An initial structural stability assessment has been performed to document that the design, construction, and operation of Bottom Ash Pond 3 is consistent with good engineering practices. The results of the structural stability assessment are discussed in the following sections, and the design, construction, operation, and maintenance of Bottom Ash Pond 3 were found to be consistent with recognized and generally accepted good engineering practices.

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

CCR unit has been 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. Bottom Ash Pond 3 is a ring dike structure and does not have abutments.

Based on the results of previous soil borings, the subsurface profile beneath the CCR impoundment generally consists of granular fill soils at the surface underlain by native granular deposits, and then sandstone bedrock. The relative density of the granular fill soils was typically in the medium dense to very dense range. Slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the foundation. 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 this evaluation, stable foundations were designed and constructed at Bottom Ash Pond 3, and operational and maintenance procedures are appropriate to maintain the stable conditions. Therefore, Bottom Ash Pond 3 meets the requirements presented in §257.73(d)(1)(i).

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

CCR unit has been 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 Bottom Ash Pond 3. No evidence of significant areas of erosion or wave action was observed. The interior slopes are protected with a geomembrane liner, and the exterior slopes are protected with vegetation. The geomembrane liner on the interior slopes isolates the embankment soils from surface erosion or wave action. Operational and maintenance procedures to repair the vegetation (exterior slopes) and liner (interior slopes) as needed are appropriate to protect against surface erosion or wave action. Given the presence of a liner that serves to prevent saturation of

the dike's soils below the normal pool, sudden drawdown, as well as the corresponding adverse effects, is not applicable to Bottom Ash Pond 3.Therefore, Bottom Ash Pond 3 meets the requirements in §257.73(d)(1)(ii).

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

CCR unit has been 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 dikes over the range of expected loading conditions as defined within the section (§257.73).

Based on this evaluation, the relative density of the granular fill soils was typically in the medium dense to very dense range, which is indicative of mechanically compacted dikes. Therefore, the original design and construction of Bottom Ash Pond 3 included sufficient dike compaction. The operational and maintenance procedures at Bottom Ash Pond 3 are appropriate for maintaining compaction of the dikes, as evidenced by the conditions observed by AECOM. Therefore, Bottom Ash Pond 3 meets the requirements in §257.73(d)(1)(iii).

2.4 Vegetated Slopes (§257.73(d)(1)(iv))[2]

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 slopes is adequate as no substantial bare or overgrown areas were observed. Exposed geomembrane liners on the interior slopes are used as an alternate form of slope protection, which is adequate as significant tears or defects were not observed. Therefore, the original design and construction of Bottom Ash Pond 3 included adequate vegetation of the dikes and surrounding areas, with geomembrane liner constituting equivalence on the interior slopes.

Operational and maintenance procedures are in place to regularly manage vegetation growth, including seeding any bare areas, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining vegetation. Therefore, Bottom Ash Pond 3 meets the requirements in §257.73(d)(1)(iv).

2.5 Spillways (§257.73(d)(1)(v)(A) and (B))

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.

[2] 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).

Hydrologic and hydraulic analyses were completed to evaluate the storage capacity of Bottom Ash Pond 3 relative to inflow estimated for the 1000-year flood event based on the significant hazard potential of Bottom Ash Pond 3.

Based on this evaluation, Bottom Ash Pond 3 is able to adequately manage the inflow during peak discharge conditions resulting from a 1000-year flood event. Therefore, the spillway requirements in §257.73(d)(1)(v)(A) and (B) are not applicable to Bottom Ash Pond 3.

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

CCR unit has been 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.

The structural stability and integrity of the hydraulic structures were evaluated using design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, no hydraulic structures are present that underlie the base or pass through the dike of Bottom Ash Pond 3. Therefore, the §257.73(d)(1)(vi) requirements are not applicable to Bottom Ash Pond 3 at Laramie River Station.

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 Bottom Ash Pond 3 was evaluated by comparing the location of Bottom Ash Pond 3 relative to adjacent water bodies using published United States Geological Survey (USGS) topographic maps, aerial imagery, and conditions observed in the field by AECOM.

Based on this evaluation, water bodies adjacent to the downstream slopes of Bottom Ash Pond 3 are not present, as the nearest downstream water body is the West Emergency Pond, which is more than 2,500 lateral feet beyond the downstream slopes of Bottom Ash Pond 3. Therefore, adjacent water bodies that can inundate the downstream slopes of Bottom Ash Pond 3 are not present. Based on this evaluation, the requirements listed in §257.73(d)(1)(vii) are not applicable to Bottom Ash Pond 3, as inundation of the downstream slopes is not expected to occur.

3 Certification Statement

CCR Unit: Basin Electric Power Cooperative; Laramie River Station; Bottom Ash Pond 3

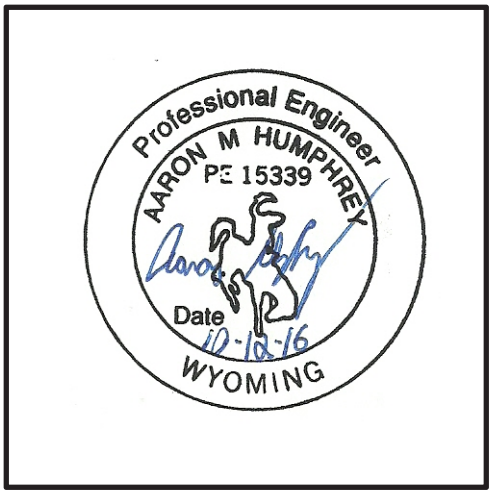
I, Aaron M Humphrey, being a Registered Professional Engineer in good standing in the State of Wyoming, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the Reconstitution of the CCR Surface Impoundment Design Subsurface and Geotechnical Engineering Analysis dated October 2016 was conducted in accordance with the requirements of 40 CFR § 257.73.

Aaron M Humphrey

Printed Name

October 12, 2016

Date



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