Initial Structural Stability Assessment
Bottom Ash Pond No. 2
Sherburne County Generating Plant

Introduction

This report presents the assessment and certification of structural stability for the Bottom Ash Pond No. 2 (BAP2) at the Sherburne County Generating Plant (Sherco) in Becker, Minnesota. The BAP2 is a "new coal combustion residual (CCR) surface impoundment" according to 40 CFR Section §257.53. This document addresses the requirements of 40 CFR Section §257.74(d), Periodic structural stability assessments.

Compliance with §257.74(d)

Assess if the BAP2 was designed, constructed, operated and maintained with:

(i) *Stable foundations and abutments:*

The BAP2 is located in the Anoka sand plain region and the native soils consist of coarse sand with some gravel near the surface and intermittent glacial till approximately 20 to 30 feet below ground. This surficial geology provides a stable foundation and good source of dike construction materials.

(ii) *Adequate slope protection to protect against surface erosion, wave action, and adverse effect of sudden drawdown.*

The interior of BAP2 was designed and constructed with an alternative composite liner in accordance with 257.71(c) and is not prone to erosion. Once in operation, a minimum of 5 feet of deposited CCR material will be left on the liner to provide further protection. The exterior slopes are graded at a 3 to 1, horizontal to vertical (3H:1V) and vegetated to resist erosion.

The discharge structure of the BAP2 is not large enough to create rapid drawdown.

(iii) *Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit*

The dikes were designed and analyzed to withstand the range of loading conditions from the initial to maximum water elevation. All soils used to construct the BAP2 dikes were mechanically compacted to a minimum of 95% standard proctor density. Results of the in-place density tests and safety factor assessment can be found in the reference documents.

(iv) Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection

The BAP2 exterior slopes will be mowed to prevent the growth of woody or deep-rooted vegetation. Vegetation is dense enough to prevent erosion of the dike exterior.

(v) A single spillway or a combination of spillways configured as specified in paragraph (d)(1)(v) of this section.

(A) BAP2 was designed and constructed with a primary and secondary outlet pipe. The primary pipe is constructed out of 24-inch SDR 11 high density polyethylene (HDPE), with and inlet invert elevation at 964.5 feet mean sea level (MSL), or 30.5 feet below the crest of the impoundment. The water level in the BAP2 will be controlled using a motor-operated valve (MOV) in the vault located at the outlet of the pipe. Water level in the BAP2 will be raised and lowered using the MOV to control CCR deposition. The secondary pipe, also constructed of 24-inch SDR 11 HDPE, has an inlet elevation of 989 feet MSL (5 feet below crest), and outlets in the vault. The secondary pipe does not feature any valves and was designed as an overflow pipe if the primary discharge pipe becomes inoperable.

(1) The design velocities through the primary and secondary pipe are not enough to erode the HDPE material.
(2) BAP2 is classified as a significant hazard potential. As such, the secondary discharge pipe was designed to pass a 1,000 year, 24-hour storm event without overtopping the crest.

(vi) 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 primary and secondary pipes run through the dike of the CCR unit. The primary pipe is near the base of the dike (along existing ground), while the secondary pipe is near the top of the dike. During construction, the following steps were taken to ensure each pipe was constructed as specified:

- McElroy pipe fusion data logger reports were made for each joint to ensure the pipe was fused in accordance with ASTM F2620. Reports were periodically sent to the QPE (Daniel Riggs) for review. Any poorly constructed joints were cut out and re-fused.
- The soil along the bottom and sides of pipe was compacted to a minimum of 100% standard proctor density. All dike material outside the pipe bedding was compacted to a minimum of 95%.
- Continuous visual inspection was performed by an engineer from Carlson McCain and Xcel Energy staff throughout pipe construction to ensure no damage occurred to the pipe during placement.

- Once installed, the pipe was hydrostatically tested in accordance with ASTM F2164.

(vii) 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.

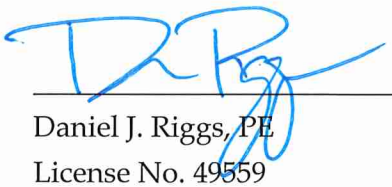
There are no downstream slopes affected by water levels.

Conclusion

The CCR unit is designed, constructed, operated and maintained with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded.

Certification

I hereby certify under penalty of law that this report was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment.



Daniel J. Riggs, PE
License No. 49559

September 29, 2020
Date

References (included in Operating Record and Website)

Carlson McCain, Inc. (September 2020). "Initial Safety Factor Assessment, Bottom Ash Pond No. 2, Sherburne County Generating Plant", CCR Compliance Document, Plymouth, Minnesota.

Carlson McCain, Inc. (September 2020). "Initial Hazard Potential Assessment, Bottom Ash Pond No. 2, Sherburne County Generating Plant", CCR Compliance Document, Plymouth, Minnesota.

Carlson McCain, Inc. (September 2020). "Construction Plans, Bottom Ash Pond No. 2, Sherburne County Generating Plant", CCR Compliance Document, Plymouth, Minnesota.