

Inflow Design Flood Control System Plan

Bottom Ash Pond No. 2

Sherburne County Generating Plant

Introduction

This report presents documentation and certification of the inflow design flood control system 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 §257.53. This document addresses the requirements of 40 CFR §257.82, hydrologic and hydraulic capacity requirements for CCR surface impoundments.

Inflow Design Flood Control System

During storm events, the BAP2 does not receive any inflow from the surrounding native grades. The only source of stormwater inflow to the pond is by direct rainfall on the pond and runoff from the crest of the perimeter embankment. Non-stormwater pond inputs are pump-controlled, and consist of sluicing bottom ash solids.

Compliance with §257.82 (a)

Under the CCR rules §257.74(a)(2); the BAP2 was determined to be a significant hazard potential CCR surface impoundment and must comply with the 1,000-year flood event specified in §257.82(a)(3)(ii). The National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 8, Version 2, 24-hour, 1,000-year storm event for Becker, Minnesota is 9.78 inches.

The water level in the BAP2 is controlled from the Unit 3 control room by a gate valve and motor operated valve on the discharge pipe located in the discharge vault. The water level in the BAP2 will generally be between the elevations of 965 feet MSL and 980 feet MSL to control CCR deposition. The invert elevation of the bottom ash sluice pipes is approximately 992 feet MSL. The crest of the BAP2 liner is at 1,000 feet MSL on the west side of the pond and tapers to 995 at the east side of the pond. The maximum operating level is 991 feet MSL to maintain 2 feet of freeboard below the top of liner (993 feet MSL at the east side of the BAP2).

The attached figure shows the BAP2 inflow area and the maximum operating ponding area at 991 feet MSL. Using aerial measurements from Figure 1, the increase in water elevation from the prescribed flood event was calculated as shown in the following section.

Inflow Design Calculations

BAP2 Inflow Area: 18.8 Acres

Volume of water generated from a 1,000 year flood event (assuming direct rainfall on the BAP2 water surface and 100 percent runoff from embankment crests):

$$18.94 \text{ Acres} * \frac{43560 \text{ Square Feet}}{\text{Acre}} * 9.78 \text{ inch rain} * \frac{1 \text{ foot}}{12 \text{ inches}} = 672,396 \text{ Cubic Feet}$$

Current Maximum Operating Ponding Area (at 991 feet MSL): 16.6 Acres (723,100 Square Feet)

Increase in water elevation from flood event: $\frac{672,396 \text{ Cubic Feet of stormwater}}{723,100 \text{ Square Feet of ponding}} = 0.93 \text{ feet}$

Water Elevation after 1,000 year flood event: 991 feet + 0.93 feet = 991.93 feet MSL

Check: 991.92 feet MSL < 993 feet MSL (Top of Liner)

Results

As shown above BAP2 can contain a 1,000-year, 24-hour storm event without overtopping the berm. However, a 24-inch SDR 11 high density polyethylene pipe (secondary discharge pipe) was installed near the top of the dike (invert elevation of 989) to serve as a spillway should the lower primary discharge pipe become inoperable or to handle a 1,000-year, 60-day storm event of 23.7 inches.

Compliance with §257.82 (b)

BAP2 does not discharge CCR to a surface water (impounded water is used for plant processes), and is not subject to the surface water discharge requirements of §257.3-3.

Conclusion

Based on aerial measurements and flood event calculations, the Inflow Design Flood Control System for the Bottom Ash Pond No. 2 at the Sherburne County Generating Plant is able to collect and control the peak discharge resulting from the inflow design flood specified in §257.82(a)(3)(ii) for a significant hazard potential surface impoundment and complies with the requirements of §257.82(a) through (c).

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.



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September 28th, 2020

Date

References

National Oceanic and Atmospheric Administration, Atlas 14, Volume 8, Version 2, "Point Precipitation Frequency Estimates", Becker, Minnesota.

References (included in Operating Record and Website)

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