Inflow Design Flood Control System Plan, Revision 1

Upstream Raise 91 CCR Surface Impoundment, Coal Creek Station

Submitted to:

Great River Energy

Coal Creek Station, 2875 Third Street SW, Underwood, North Dakota 58576

Submitted by:

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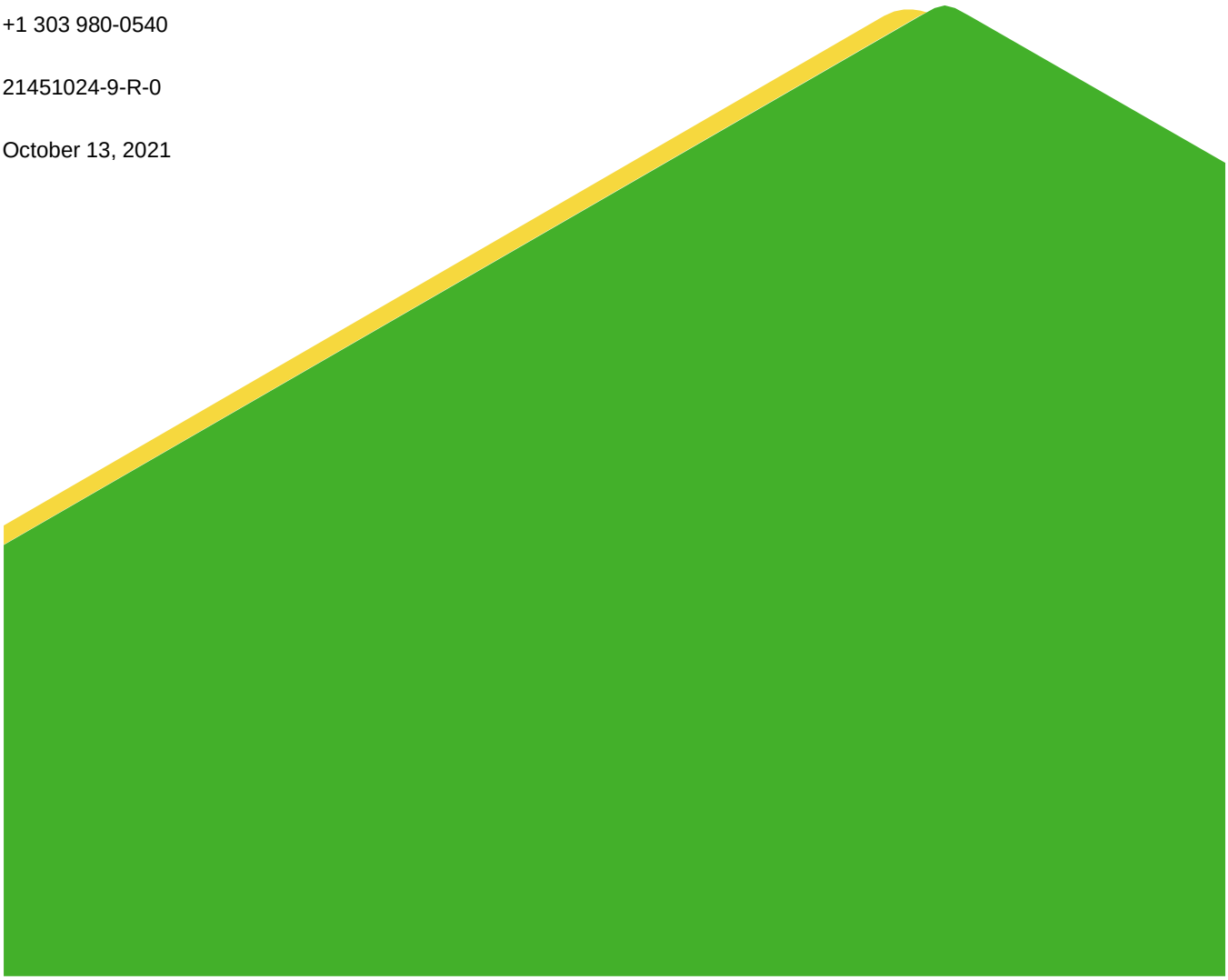

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1.0 INTRODUCTION

Golder Associates Inc. (Golder), a member of WSP, has prepared this inflow design flood control system plan for the Upstream Raise 91 CCR Surface Impoundment (Upstream Raise 91) at Great River Energy's (GRE's) Coal Creek Station (CCS). The United States Environmental Protection Agency's (USEPA's) Coal Combustion Residuals (CCR) Rule, 40 Code of Federal Regulations (CFR) Part 257 (USEPA 2015) requires an inflow design flood control system plan be completed as specified in 40 CFR 257.82(c)(3)(i). Per 40 CFR 257.82(c)(4), inflow design flood control system plans must be revisited every five years. This document serves as the current version of the inflow design flood control system plan.

Upstream Raise 91 is also regulated by the North Dakota Department of Environmental Quality (NDDEQ) under Permit 0033. The NDDEQ requires an inflow design flood control system plan as part of the application for a permit, as described in Section 33.1-20-08-05.3.c.3.a. of the North Dakota Administrative Code (NDAC 2020). This inflow design flood control system plan satisfies the state-specific requirement.

2.0 REQUIREMENTS FOR HYDROLOGIC AND HYDRAULIC CAPACITY SYSTEMS

In accordance with 40 CFR 257.82(a)(1) and NDAC Section 33.1-20-08-05.3.a.1., "the inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge from the inflow design flood." Further, per 40 CFR 257.82(a)(2) and NDAC Section 33.1-20-08-05.3.a.2., "the inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood." The requirements for appropriate inflow design floods are as follows:

- For a high hazard potential CCR surface impoundment, the probable maximum flood.
- For a significant hazard potential CCR surface impoundment, the 1,000-year flood.
- For a low hazard potential CCR surface impoundment, the 100-year flood.
- For an incised CCR surface impoundment, the 25-year flood.

Upstream Raise 91 is classified as a low hazard potential CCR surface impoundment, and the inflow design flood control system plan is based on the 24-hour, 100-year storm event (4.82 inches, NOAA 2016). The inflow design flood control system designed for and operated at Upstream Raise 91 is described below.

3.0 INFLOW DESIGN FLOOD CONTROL SYSTEM

Upstream Raise 91 is designed to be a vertically expanding CCR surface impoundment with the ability to be closed with CCR materials remaining in place. The design crest of the soil embankments surrounding Upstream Raise 91 are approximately 20 feet above surrounding topography (elevation 1922 feet), preventing stormwater run-on into Upstream Raise 91. As dry CCR materials (fly ash and bottom ash) are deposited around the perimeter of Upstream Raise 91, the crest of the CCR surface impoundment will rise as well as the pool within Upstream Raise 91. The maximum crest elevation will be at elevation 2004 feet. As Upstream Raise 91 progresses in this manner, the design freeboard within the center of Upstream Raise 91 will be 6 feet, with a minimum freeboard of 3 feet.

The only inflow to the facility (besides precipitation) includes hydraulically conveyed flue-gas desulfurization (FGD) material. Outflows from Upstream Raise 91 consist of a series of gravity drainage pipes, perimeter

drainage ditches, and culverts that passively transfer CCR conveyance water and run-off from precipitation to the adjacent Drains Pond System CCR Surface Impoundment (Drains Ponds System).

3.1 Flood Control Calculation

At the maximum design impoundment condition, the top elevation of Upstream Raise 91 is at elevation 2004 feet and the impoundment capture area is approximately 27 acres (16.5 acres of crest and 10.5 acres of pool). Approximately 11 acre-feet of run-off are estimated to be collected in the Upstream Raise 91 operating pool during the 24-hour, 100-year storm (assuming 100% of the 4.82 inches of precipitation falling on the crest and pool is captured). Assuming the impoundment is at the minimum operating freeboard of 3 feet (elevation 2001 feet) during the storm event, the facility's operating pool capacity is roughly 32 acre-feet. The estimated 11 acre-feet of run-off will raise the water level in the operating pool by approximately 1 foot to an elevation of 2002 feet, leaving approximately 2 feet of remaining freeboard to the top of the berm at elevation 2004 feet.

Controls will be used to modify the water levels in Upstream Raise 91 during operation. Should water levels within Upstream Raise 91 reach above desired operating levels, GRE has operating procedures to lower gravity drain (decant) pipelines into the water to transfer water to the adjacent Drains Pond System. Additionally, contact water in perimeter ditches flows passively from Upstream Raise 91 to the Drains Pond System.

4.0 REVISION HISTORY

A history of revisions to this document:

Revision 0 – Published October 13, 2016.

Revision 1 – 5-Year Update: Published October 13, 2021

1) New CCR unit naming convention (Ash Pond 91 to Upstream Raise 91)

5.0 CERTIFICATION

The undersigned attest to the completeness and accuracy of this inflow design flood control plan, and certify that the plan meets the requirements of 40 CFR 257.82(c) and Section 33.1-20-08-05.3.c. of the North Dakota Administrative Code.

Signature Page

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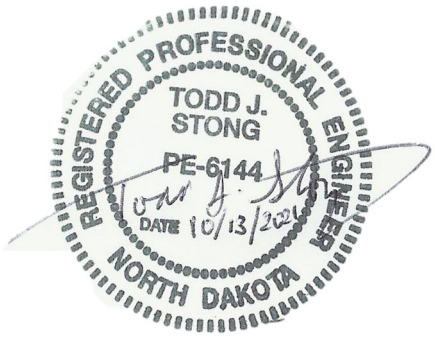

6.0 REFERENCES

NOAA (National Oceanic and Atmospheric Administration). 2016. Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS). Retrieved April 30, 2021, from https://hdsc.nws.noaa.gov/hdsc/pfds/.

NDAC (North Dakota Administrative Code). 2020. Chapter 33.1-20-08 – Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.

USEPA (United States Environmental Protection Agency). 2015. Code of Federal Regulations Title 40 Part 257: Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities. April 17.

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