Inflow Design Flood Control System Plan

MICHIGAN CITY GENERATING STATION

CCR SURFACE IMPOUNDMENT INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

Michigan City, Indiana

Pursuant to 40 CFR 257.82

Submitted To: Northern Indiana Public Service Company
2755 Raystone Drive
Valparaiso, IN 46383

Submitted By: Golder Associates Inc.
670 North Commercial Street, Suite 103
Manchester, New Hampshire 03101

October 2016 **1650772**

CERTIFICATION

Professional Engineer Certification Statement [40 CFR 257.82(c)(5)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Section 257.82 (40 CFR Part 257.82), I attest that this Inflow Design Flood Control System Plan is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.82.

Golder Associates Inc.

Signature

10-11-2016

Date of Report Certification

Richard A. Wesenberg, PE

Name

PE 11500584

Professional Engineer License Number

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1.0 INTRODUCTION

1.1 Background

The Northern Indiana Public Service Company (NIPSCO) Michigan City Generating Station (MCGS) is an operating coal-fired electric generating plant located at 101 Wabash Street in Michigan City, LaPorte County, Indiana. MCGS occupies 131 acres in a mixed industrial, commercial, and residential area along the southern shoreline of Lake Michigan. The facility includes power generation and transmission facilities; buildings and associated infrastructure; coal storage and handling operations; pollution control equipment; and various active, inactive, and closed surface impoundments.

1.2 CCR Surface Impoundments

Northern Indiana Public Service Company (NIPSCO) has determined that MCGS has two CCR surface impoundments that are subject to the requirements of the CCR Final Rule including:

- Boiler Slag Pond (BSP)– approximate two-acre unlined impoundment
- Primary 2 – approximate three-acre unlined surface impoundment roughly 435 feet long, ranging from about 230 to 290 feet wide

This inflow design flood control system plan is for the Boiler Slag Pond only. This plan will be updated to include Primary 2 at a later date as allowed by EPA. The CCR unit locations identified above are shown in Figure 2.

1.2.1 Boiler Slag Pond (BSP)

The Boiler Slag Pond was designed by Sargent and Lundy Engineers (S&L) of Chicago, Illinois in 1972 and is an approximately five feet deep, two acre, unlined, incised pond. The BSP shares an embankment with the Final Settling Pond (FSP) along the northwest side, is adjacent to the out of service Secondary No. 2 to the south, adjacent to the site access road to the east, and abuts a repurposed portion of the BSP to the northeast. Based on discussions with NIPSCO and site reconnaissance by Golder personnel, an approximately one acre area located in the northeastern third of the BSP has been repurposed and is hydraulically separated from the remaining active portion of the BSP by a median berm. The remaining active portion of the BSP is approximately two acres. This active two-acre area is shown on the attached figure and is operated by NIPSCO as the Boiler Slag Pond subject to the CCR Final Rule.

The Boiler Slag Pond accepts primarily bottom ash sluice from the station and surface water runoff from adjacent operational areas. The BSP slopes toward the northwest from ground surface to the common embankment that is shared with the FSP. Several culverts between the BSP and the FSP are identified in the Sargent & Lundy Design package from 1972. It is believed that most of these culverts are either removed or non-functional. As shown on Figure 2, only one operational culvert remains within the active BSP area outlet between the BSP and FSP.

1.3 Purpose

The purpose of the Inflow Design Flood Control System Plan (Plan) is to provide a basis for the certification required by 40 CFR 257.82 Hydrologic and Hydraulic Capacity Requirements for CCR Surface Impoundments. 40 CFR 257.82(a) requires the owner or operator of a CCR surface impoundment to design, construct, operate, and maintain an inflow flood control system as follows:

- Adequately manage the flow into the CCR unit during and following the peak discharge of the inflow design flood as specified in 40 CFR 257.82(a)(3).
- Adequately manage the flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood as specified in 40 CFR 257.82(a)(3).
- Handle discharge from the CCR unit in accordance with the surface water requirements under 40 CFR 257.3-3.

Since the BSP is determined to be an incised impoundment, the flood control system must provide protection to the CCR unit during a 25-year flood event per 40 CFR 257.82(a)(3)(iv).

2.0 FLOOD CONTROL SYSTEM

To satisfy the requirements of 40 CFR 257.82(a), the flood control system must provide flood protection to the CCR unit during the inflow design flood for two cases: 1) floodwater from outside the unit, and 2) controlling internal water levels within the unit. The sections below describe the run-on control systems in place at the CCR unit, describe the analysis performed to evaluate the adequacy of the existing structure, and list any operational limitations required to maintain adequate flood control measures as required by 40 CFR 257.82(a).

2.1 BSP Analysis

The BSP is an incised CCR surface impoundment, which requires that the flood control system must provide protection to the CCR unit during a 25-year flood event. To evaluate the ability of the BSP to adequately manage the flow during and following the peak discharge of the design storm event a hydrologic and hydraulic analysis was performed. As discussed above, the active BSP is an unlined surface impoundment that receives storm water runoff from the adjacent upland area and boiler slag sluice from the generating station. The analysis assumed that during large storm events, MCGS operations will be managed to discontinue the inflow of bottom ash sluice to the BSP. As such, the inflow into the BSP during storm events is from direct precipitation and surface water runoff only. Also as discussed above, the analysis assumed outflow to the FSP is through one culvert in the north embankment of the BSP. A HEC-HMS analysis was performed for the active BSP and incorporated the following.

- A meteorological model to simulate the 25-year flood that combined the precipitation depth associated with the 24-hour duration, 25-year recurrence interval storm event and the Natural Resource Conservation Service (NRCS) Type II temporal rainfall distribution.
- A hydrological model to simulate the collection and conveyance of surface water within the BSP and upland areas during the storm event.
- Geometric model of the impoundments to simulate the water storage and the variation in water levels during and following the design storm event based on the geometries included in the construction drawings, information provided by NIPSCO, and satellite imagery. The model assumed a bottom elevation of 587.0 feet msl, an initial water surface of 587.7 feet msl to match the invert elevation of the outlet pipe, and crest elevation of 592 feet msl.
- Discharge curves to simulate the outflow of water from the impoundments during the design storm event.

In addition, a wave action analysis was performed for the BSP to calculate the freeboard required above the maximum water surface elevation during the design storm event.

2.1.1 BSP Conclusions and Recommendations

Results of the hydrology and hydraulics analysis of the BSP are summarized below.

BSP Hydrology and Hydraulics Analysis Results

Depth of Precipitation (in)	5.26
Initial Water Surface Elevation (ft msl)	587.7
Crest Elevation (ft msl)	592
Maximum Rate of Inflow from Runoff and Direct Precipitation (cfs)	31.5
Total Inflow (Acre-feet)	1.9
Maximum Volume of Water Storage (acre-feet) [1]	1.7
Maximum Water Surface Elevation (ft amsl)	588.7
Height of Wave Action (ft)	0.49
Net Freeboard during Design Storm Event (ft)	2.8
Maximum Operational Water Surface Elevation (ft msl)	590.5

Notes:
[1] Includes water stored prior to beginning of design storm event minus the outlet flow through the culvert.

The current configuration of the BSP is compliant with 40 CFR 257.82(a). This conclusion is based on the assumptions presented herein and the following operational conditions.

- The BSP must be operated at or below the maximum operational water surface elevations presented in the table above.
- The BSP must be operated such that the CCR stored in the impoundment does not accumulate above elevation 588.7 feet msl.
- MCGS operations will be managed to discontinue the inflow of bottom ash sluice to the BSP during large storm events.

3.0 PLAN REVISION AND RECORDKEEPING

Per 40 CFR 257.82(c)(2): "The owner or operator of the CCR unit may amend the inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by §257.105(g)(3). The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect."

Per 40 CFR 257.81(c)(4): "The owner or operator must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed a periodic inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(3)."

Per 40 CFR 257.82(d): "The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(g), the notification requirements specified in §257.106(g), and the internet requirements specified in §257.107(g)."

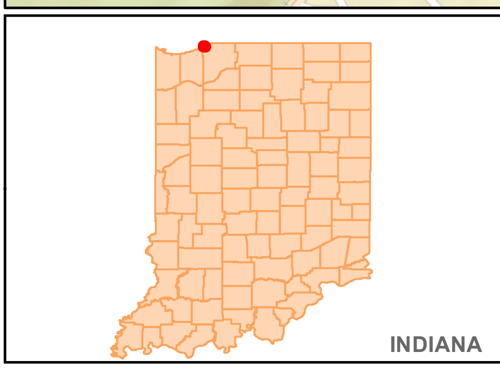
4.0 REFERENCES

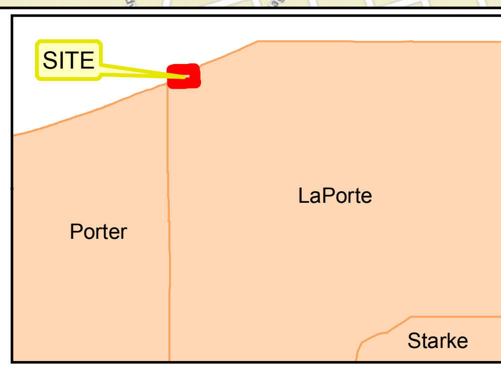
Golder Associates, Final Report – Summary of Hydraulic Evaluation of Impoundments, Technical Memo, NIPSCO MCGS, August 27, 2012.

USEPA (US Environmental Protection Agency). 2015. Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 40 CFR Part 257. Effective Date October 19, 2015.

Golder Associates, Hydrologic and Hydraulic Analysis for Boil Slag Pond – Michigan City Generating Station, October 11, 2016.

FIGURES





REFERENCE(S)
SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, DELORME, USGS, INTERMAP, INCREMENT P CORP., NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI (THAILAND), MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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NORTHERN INDIANA PUBLIC SERVICE COMPANY

CONSULTANT

Golder Associates

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DESIGNED	CDS
PREPARED	SHL
REVIEWED	MCM
APPROVED	RAW

PROJECT
CCR SURFACE IMPOUNDMENT
INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
MICHIGAN CITY GENERATING STATION
MICHIGAN CITY, INDIANA

TITLE
SITE LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

Existing Sheet Piles

Approximate Property Line

NARRATIVE

This figure shows the approximate boundaries of the CCR units submitted as part of this inflow design control system plan for compliance with the final rule, 40 CFR, Part 257.82.

REFERENCES

Ortho Imagery from Indiana University Indiana Spatial Data Portal

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT
CCR SURFACE IMPOUNDMENT
INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
MICHIGAN CITY GENERATING STATION
MICHIGAN CITY, INDIANA

TITLE
EXISTING CONDITIONS

Golder Associates
Manchester, New Hampshire

PROJECT No.		165-0772	FILE No. 1650772A008_Figure2
DESIGN	MCM	10/11/2016	SCALE: AS SHOWN REV. 0
GIS	CDS	10/11/2016	FIGURE 2
CHECK	MCM	10/11/2016	
REVIEW	RAW	10/11/2016	

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