



Inflow Design Flood Control System Plan

MICHIGAN CITY GENERATING STATION

CCR SURFACE IMPOUNDMENT PRIMARY 2 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.
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April 2018

1787453





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

April 11, 2018

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, La Porte 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 Primary Settling Pond No. 2 (Primary 2)

Northern Indiana Public Service Company (NIPSCO) has determined that MCGS Primary Settling Pond No. 2 (Primary 2) is subject to the requirements of the CCR Final Rule. Primary 2 was designed by Sargent and Lundy Engineers (S&L) of Chicago, Illinois in 1972 and as shown on Figure 2 is roughly 3-acre structure, located in the southwestern portion of the Site. Primary 2 is enclosed by an earth fill embankment, the top of which serves as an access road. Primary 2 was constructed in the early 1970s and is approximately 435 feet long, ranging from approximately 230 to 290 feet wide, with a maximum theoretical capacity of approximately 70,000 cubic yards (cu yd). The embankment that forms Primary 2 is approximately 14 feet high on the outside slope and approximately 19 feet high on the inside slope. Both the interior and exterior slopes are 2.5H:1V. The crest of the embankment is approximately 15 to 21 feet wide and is at approximately elevation (El.) 609 mean sea level (msl), normal high water level is not evident on the construction drawings. The surrounding ground elevation varies from approximately 596 ft to 602 ft msl. The northwest portion of this embankment separates Primary 2 from Lake Michigan and incorporates two rows of sheet piling and riprap lined slopes. The Secondary Settling Pond numbers 1 and 2 are located southwest and northeast of the Primary 2, respectively. The MCGS coal storage area is located east of the Primary 2.

Primary 2 historically received fly ash, economizer ash, recirculated water from the ash sluice system, boiler blow down, and wastewater from the boiler drains sluiced directly from the generating station. Primary 2 was formerly operated on an alternating basis with Primary Settling Pond #1 (Primary 1), now out of service. Primary 2 discharged water to Secondary 2, also now out of service. Currently, Primary 2 contains both CCR and liquids. Primary 2 receives air heater wash and boiler room sump water but is currently not accepting CCR materials from the generating station. Water is pumped from the generating station, via aboveground steel pipelines that discharge into Primary 2. There is one discharge structure in Primary 2. The discharge structure is concrete and utilizes stop logs to control water elevation and currently discharges to the Final Settling Pond. Water levels within Primary 2 continue to be manually controlled by MCGS operations personnel.



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 Primary 2 is determined to be a significant hazard potential classification assessment, the flood control system must provide protection to the CCR unit during a 1,000-year flood event per 40 CFR 257.82(a)(3)(ii).



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 Primary 2 Analysis

Primary 2 is determined to be a significant hazard potential classification assessment, the flood control system must provide protection to the CCR unit during a 1,000-year flood event. To evaluate the ability of Primary 2 to adequately manage the flow during and following the peak discharge of the design storm event a hydrologic and hydraulic analysis was performed.

Primary 2 surface impoundment does not currently receive CCR materials from the generating station, but still receives air heater wash and boiler room sump water. This small amount of air heater wash and boiler room sump water was assumed negligible compared to the design storm event. As such, the analysis assumed during the design storm event, the only inflow to the impoundment is from hydro-meteorological sources (direct precipitation and surface water runoff). There is a concrete outflow structure in the north end of Primary 2 that discharges water to the Final Settling Pond. The standing water level has been conservatively assumed to be 3 feet below the top of the embankment crest, based on the 2017 RCRA Inspection performed by Golder in 2017. The catchment area includes the Primary 2 area and the immediately adjacent upland areas around the unit. It was conservatively assumed that all runoff is reported immediately to Primary 2 during storm events.

A HEC-HMS analysis was performed for Primary 2 and incorporated the following.

- A meteorological model to simulate the 1,000-year flood that combined the precipitation depth associated with the 24-hour duration, 1,000-year recurrence interval storm event and the Natural Resource Conservation Service (NRCS) Type II temporal rainfall distribution. The total depth of precipitation associated with the 24-hour duration, 1,000-year recurrence interval storm event at MCGS is 10.4 inches (in), as calculated from the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14, Volume 2, Version 3.0.
- A hydrological model to simulate the collection and conveyance of surface water within Primary 2 and upland areas during the storm event. The model conservatively assumed that Primary 2 and the upland catchment area (the perimeter embankment) reporting to Primary 2 is impervious to infiltration.
- 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 587.7 feet msl, an initial water surface of 605.7 feet msl (~3 feet below the top of the embankment crest) based on photos taken during the



2017 RCRA Inspection performed by Golder in 2017. The model conservatively assumed that no outflow through the outlet structure will occur from Primary 2 during the design storm event.

In addition, a wave action analysis was performed for Primary 2 to calculate the freeboard required above the maximum water surface elevation during the design storm event.

2.1.1 Primary 2 Conclusions and Recommendations

Results of the hydrology and hydraulics analysis of Primary 2 are summarized below. These include the results of HEC-HMS (USACE, 2015) modelling analysis and the results of the wave action analysis.

Primary 2 Hydrology and Hydraulics Analysis Results

Depth of Precipitation (in)	10.4
Initial Water Surface Elevation (ft amsl)	605.7
Crest Elevation (ft amsl)	609
Maximum Rate of Inflow from Runoff and Direct Precipitation (cfs)	59.8
Total Inflow (Acre-feet)	3.6
Maximum Volume of Water Storage (acre-feet) ¹	48.9
Maximum Water Surface Elevation (ft amsl)	606.8
Height of Wave Action (ft)	0.44
Net Freeboard during Design Storm Event (ft)	1.4
Maximum Allowable Operational Water Surface Elevation (ft amsl)	607.1

Notes:

¹ Includes water stored prior to beginning of design storm event.

The current configuration of Primary 2 is compliant with 40 CFR 257.82(a). This conclusion is based on the assumptions presented herein and the following operational conditions.

- Primary 2 must be operated at or below the maximum operational water surface elevations presented in the table above.



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

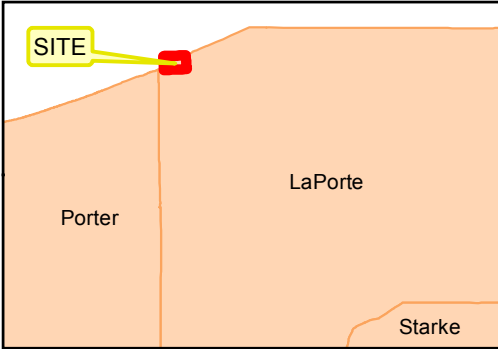
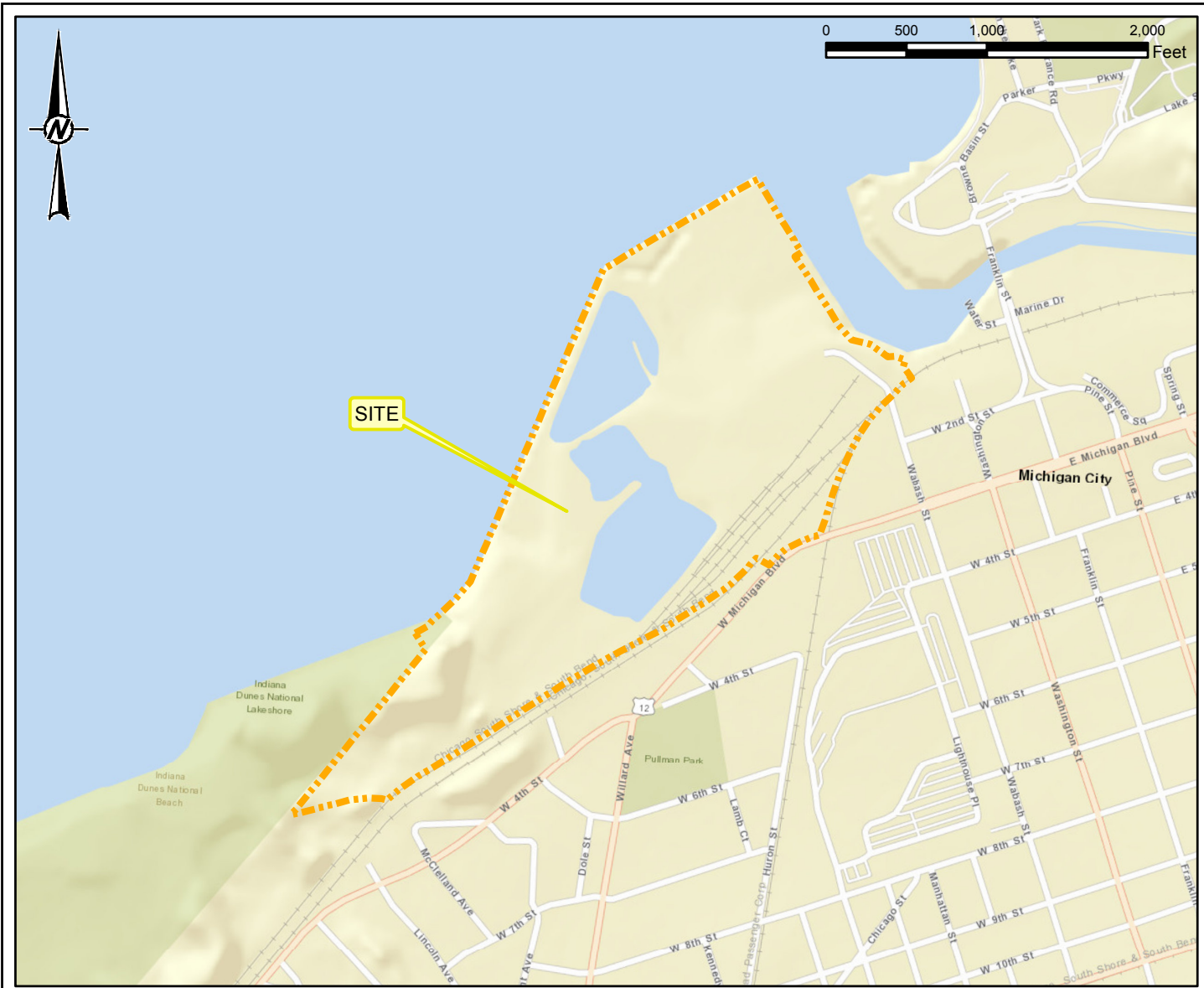
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USEPA (US Environmental Protection Agency). 2015. Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 40 CFR Part 257. Effective Date October 19, 2015.

Golder Associates, Hydrologic and Hydraulic Analysis for Primary Settling Basin Number 2 – Michigan City Generating Station, November 16, 2017.

Golder Associates, Initial Hazard Potential Classification Assessment – RCRA CCR Units, Primary Settling Pond No. 2 – Surface Impoundment, March 6, 2018.


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

PROJECT
 CCR SURFACE IMPOUNDMENT - PRIMARY 2
 INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
 MICHIGAN CITY GENERATING STATION
 MICHIGAN CITY, INDIANA




CONSULTANT	YYYY-MM-DD	2018-03-06
	DESIGNED	CDS
	PREPARED	SHL
	REVIEWED	MCM
	APPROVED	RAW

TITLE			
SITE LOCATION MAP			
PROJECT NO.	CONTROL	REV.	FIGURE
1787453	A	0	1

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LEGEND

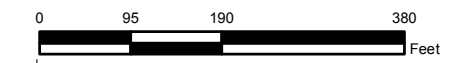
-  Existing Sheet Piles
-  CCR Units
-  Approximate Property Line

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	RWW

PROJECT CCR SURFACE IMPOUNDMENT - PRIMARY 2
 INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
 MICHIGAN CITY GENERATING STATION
 MICHIGAN CITY, INDIANA

TITLE
 EXISTING CONDITIONS

	PROJECT No.	1787453	FILE No.	1787453_A0001_ExistingConditions
	DESIGN	MCM	3/6/2018	SCALE: AS SHOWN
	GIS	SHL	3/6/2018	REV. 0
	CHECK	MCM	3/6/2018	FIGURE 2
	REVIEW	RAW	3/6/2018	

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