April 11, 2018 Project No. 1787453

Mr. Joseph E. Kutch
Coal Combustion Residuals Program Manager
Northern Indiana Public Service Company
2755 Raystone Drive
Valparaiso, IN 46383

RE: NIPSCO – MICHIGAN CITY GENERATING STATION, MICHIGAN CITY, LA PORTE COUNTY, INDIANA – PRIMARY 2 – HISTORY OF CONSTRUCTION

Dear Mr. Kutch:

The United States Environmental Protection Agency (EPA) promulgated the Resource Conservation and Recovery Act (RCRA) Coal Combustion Residuals (CCR) Final Rule (CCR Rule) on April 17, 2015. The CCR Rule requires that owners or operators of existing CCR surface impoundments with a height of five feet or more and a storage volume of 20 acre-feet or more compile a history of construction, which shall contain, to the extent feasible, the information specified in 40 CFR 257.73 (c)(1)(i) through (xi).

Golder Associates Inc. (Golder) was retained by Northern Indiana Public Service Company (NIPSCO) to assist in the compilation of the necessary documentation associated with construction of the Primary Settling Pond No. 2 (Primary 2) unit located at the Michigan City Generating Station (MCGS). This letter report details the available information, figures, and previous reports associated with Primary 2 pursuant to 40 CFR 257.73 (c)(1)(i) through (xi).

Existing documents associated with Primary 2 are listed below.

Table 1: Construction Background Documentation

Document	Date	Author
Various design/construction drawings	1972	Sargent & Lundy Engineers
Technical Memorandum – Final Report – Summary of Hydraulic Evaluation of Impoundments	August 27, 2012	Golder Associates Inc.
2012 Geotechnical Investigation and Embankment Stability Analyses, NIPSCO Michigan City Generating Station	August 27, 2012	Golder Associates Inc.
Final Round 10 Dam Assessment Report NIPSCO Michigan City Generating Station Coal Ash Impoundments	October 19, 2012	GZA Environmental, Inc.

Golder Associates Inc.
15851 South US 27, Suite 50
Lansing, MI 48906 USA
Tel: (517) 482-2262 Fax: (517) 482-2460 www.golder.com

Embankment & Soil Boring Monitoring Well Survey, NIPSCO Michigan City Generating Station	July 7, 2015	Marbach, Brady and Weaver, Inc.
NIPSCO MCGS Primary 2 CCR Post-Closure Plan Rev. 1 – NIPSCO Michigan City Generating Station	October 2016	Golder Associates Inc.
Michigan City Generating Station, Initial Annual RCRA CCR Unit Inspection Report, Primary Basin Number 2 – Surface Impoundment	July 2017	Golder Associates Inc.
Michigan City Generating Station Initial Hazard Potential Classification Assessment – RCRA CCR Units, Primary Settling Pond Number 2 – Surface Impoundment	March 6, 2018	Golder Associates Inc.
Calculations - Michigan City Generating Station – Hydrologic and Hydraulic Analysis for Primary Settling Basin Number 2	November 16, 2017	Golder Associates Inc.
Statement of Certification – NIPSCO MCGS Primary Basin Number 2 - Liner Design Criteria for Existing CCR Surface Impoundments	March 6, 2018	Golder Associates Inc.
Michigan City Generating Station Primary Settling Pond No. 2 (Primary 2) Structural Stability and Safety Factor Assessment	March 5, 2018	Golder Associates Inc.
Michigan City Generating Station Primary Settling Pond No. 2 (Primary 2) – CCR Surface Impoundment Inflow Design Flood Control System Plan	April 11, 2018	Golder Associates Inc.

1.0 40 CFR 257.73 (C)(1)(I) – CCR UNIT NAME AND ADDRESS OF OWNER

Owner and Address:

Northern Indiana Public Service Company (NIPSCO)
Michigan City Generating Station
101 Wabash Street
Michigan City, La Porte County
Indiana

CCR Unit: Primary Settling Pond Number 2 (Primary 2)

Indiana Department of Water State Inventory Identification Number: NA

CCR Unit Contact: Joseph E. Kutch, Coal Combustion Residuals Program Manager, Phone: 1-800-464-7726.

2.0 40 CFR 257.73 (C)(1)(II) – CCR UNIT LOCATION

The Primary 2 CCR Unit is located in Michigan City, LaPorte County, Indiana, as shown on Figure 1 – Site Location Map, attached. An aerial view of Primary 2 is shown on Figure 2, attached.

3.0 40 CFR 257.73 (C)(1)(III) – CCR UNIT PURPOSE

Primary 2 was designed by Sargent and Lundy Engineers (S&L) of Chicago, Illinois in 1972, and put into service in 1973 and has been continuously owned and operated by NIPSCO to the present time. Primary 2 is formed by an above grade embankment that is approximately 14 feet high on the outside and approximately 19 feet high on the inside.

The contractor who built Primary 2 is not known. Historical geotechnical data from hydrogeologic and geotechnical investigation reports completed at the site by others were provided to Golder. Drawings and numerous boring logs were available from the initial 1970s facility design/construction. Golder also completed a geotechnical investigation and embankment stability analyses in 2012.

Primary 2 currently receives air heater wash and boiler room sump water from the generating station, via aboveground steel pipelines that discharge into Primary 2. Primary 2 is currently not accepting CCR materials. 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. .

4.0 40 CFR 257.73 (C)(1)(IV) – CCR UNIT WATERSHED

According to the USGS National Map Viewer (https://viewer.nationalmap.gov/advanced-viewer/) website, Primary 2 is located within the Southwestern Lake Michigan Basin, more specifically the Calumet River-Frontal Lake Michigan Watershed. The Sub-watershed (Calumet River-Frontal Lake Michigan) is 139,870,000 square meters (54 square miles).

5.0 40 CFR 257.73 (C)(1)(V) – FOUNDATION DESCRIPTION

Golder performed a geotechnical investigation of Primary 2 and prepared the *2012 Geotechnical Investigation and Embankment Stability Analyses* report, dated August 27, 2012 and evaluated the engineering properties of the foundation materials as part of the *Structural Stability and Safety Factor Assessment*, dated March 5, 2018. The Michigan City Generating Station is underlain by more than 200 feet of unconsolidated glacial and lacustrine sediments. The MCGS site is located near the eastern end of the physiographic region of Indiana known as the Calumet Lacustrine Plain. The plain is topographically-low region bordering Lake Michigan, and is a remnant of the Lake Chicago stage of the Wisconsinan glaciations. The geology of the plain is characterized by complex clay, sand, and silt deposits, ranging from ground moraines to aeolian sand and silt, as the shoreline of glacial Lake Chicago moved with its rising and falling stage.

As indicated in the Geotechnical Investigation (Golder 2012), the soil sequence at MCGS is dominated by massive, very stiff silt and clay, but contains numerous lenses of fine and/or silty sand particularly in the uppermost 50 feet. Additionally, the presence of thin lenses of ash, and trace amounts of ash mixed with sand in the uppermost 20 to 40 feet suggests some excavation and re-grading of shallow soils has occurred. The groundwater table is between 5 and 25 feet below grade. The area around the site is suburban and industrial, and the near surface is known to have been reworked.

5.1 Physical and Engineering Properties of Abutments and Foundation Materials

The *Final 2012 Geotechnical Investigation and Embankment Stability Analyses* and the *2018 Structural Stability and Safety Factor Assessment*, prepared by Golder, were referenced during the file review for Primary 2. Historic design and construction drawings (Sargent and Lundy, 1972), geotechnical investigations (1970s and Golder 2012), topographic surveys (Marbach, Brady and Weaver, 2015), and field inspections (Golder 2017) suggest that the Primary 2 was constructed with reasonable and sound construction practices. However, a complete set of construction documents and as built surveys were not available for review.

Primary 2 is enclosed by an earth fill embankment, the top of which serves as an access road. The northwest portion of this embankment separates Primary 2 from Lake Michigan and incorporates two rows of sheet piling, between which heavy riprap has been placed. 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 No. 2 is formed by an above grade embankment that is approximately 14 feet high on the outside and approximately 19 feet high on the inside. Both interior and exterior slopes are approximately 2.5H:1V. The crest is at approximate elevation 609 ft msl, normal high water level is not evident on the construction drawings. The surrounding ground varies from approximately 596 ft to 602 ft msl. A typical embankment cross section of Primary No. 2 is shown below.

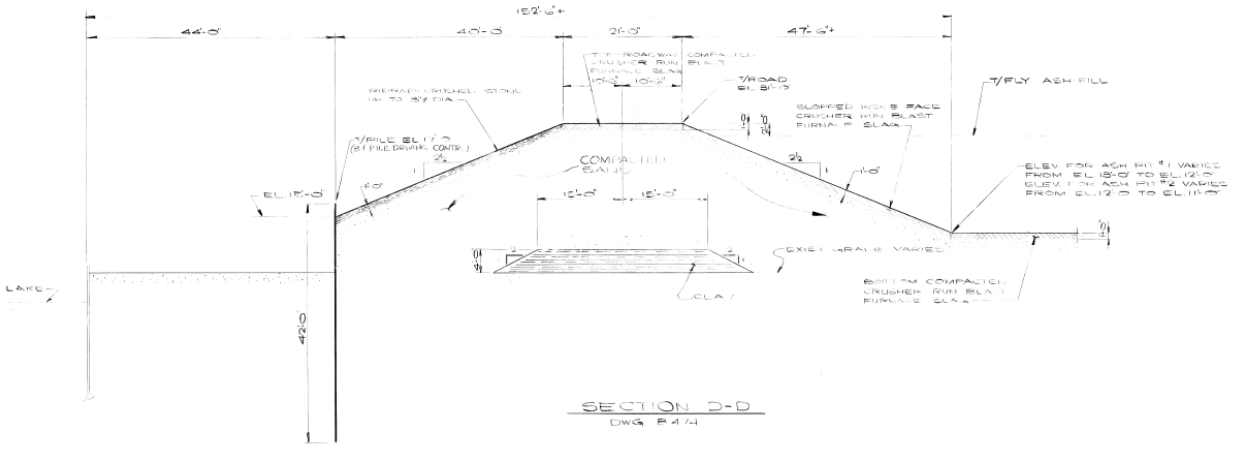


Figure 3 Typical Section for Primary No. 2 from Sargent and Lundy (1972)

Geotechnical investigations through the embankments indicate the subsurface material consists of dense to very dense crushed blast furnace slag and sand from ground surface (top of embankment) to approximately 1 ft bgs. Immediately below this upper layer there is an approximate 35 ft thick layer of loose to medium dense sand fill, followed by a 2.5 ft to 5 ft thick layer of medium dense bottom ash. Below this ash layer, is a layer of dense to very dense native sand underlain by a medium stiff clay layer that extends to approximately 75 feet below the embankment crest.

The geotechnical model for Primary 2 is shown below.

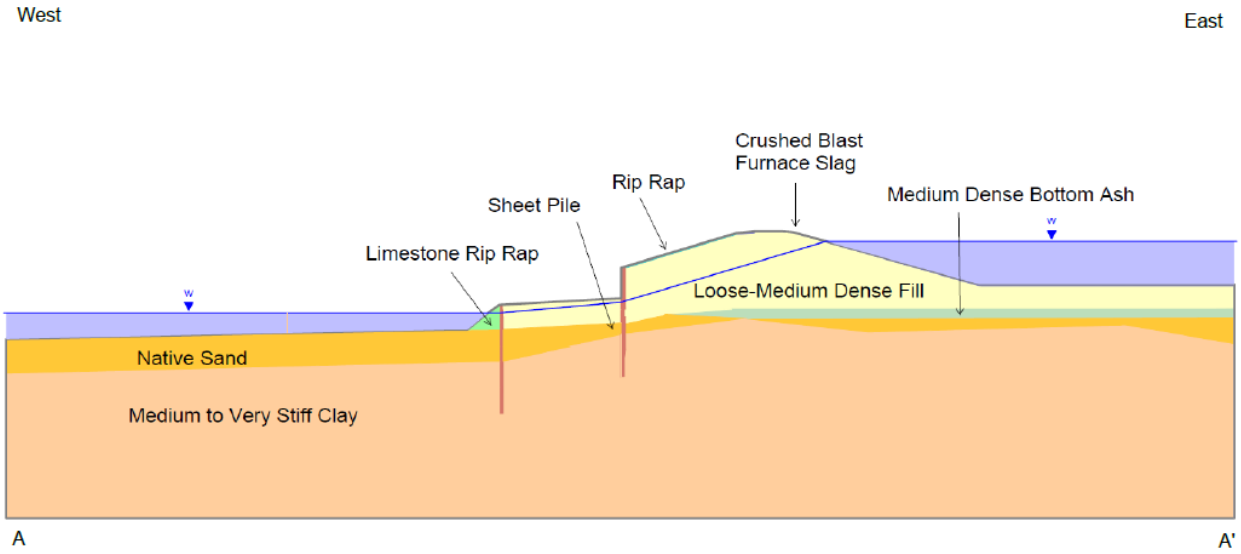


Figure 4: Geotechnical Model at Primary 2

Material properties of each of the modeled layers are included in Table 1 below. These properties are based on the geotechnical investigation and associated laboratory testing that was performed by Golder (Golder, 2012).

Table 1: Material Properties used in Geotechnical Analyses

Material	Internal Friction Angle, ϕ (deg)	Peak Cohesion, c (psf)	Dry Unit Weight, γ_d (pcf)	Saturated Unit Weight, γ_{sat} (pcf)	Undrained Shear Strength, s_u (psf)	Hydraulic Conductivity, k (cm/s)
Loose to Medium Dense Fill (SP)	33	0	100	110	NA	$1x10^{-3}$
Bottom Ash Fill-Medium Dense	35	0	100	110	NA	$1X10^{-3}$
Clay-Medium to V. Stiff	30	70	116	136	750 – 2500	$1x10^{-6}$
Native Sand-Dense	40	0	110	120	NA	$1x10^{-3}$
Crushed Blast Furnace Slag	40	0	120	130	NA	1
8-inch Riprap	45	0	140	145	NA	100
Limestone Riprap	45	0	140	145	NA	100
Steel Sheeting	NA	NA	120	NA	NA	NA

Notes: deg = degrees, psf = pounds per square foot, pcf = pounds per cubic foot, ft = feet, and cm/s = centimeters per second

6.0 40 CFR 257.73 (C)(1)(VI) – CONSTRUCTION INFORMATION

Applicable Sargent & Lundy (1972) design and construction drawings provided by NIPSCO were reviewed and utilized during the preparation of this letter report.

An embankment survey dated July 8, 2015 was performed by Marbach, Brady & Weaver, Inc. (Marbach 2011). Survey data was obtained along the crest of the embankment and down the exterior slope of the embankment and down the interior slope to the edge of water at the time of the survey. Note that the 2015 survey reference vertical datum is North American Vertical Datum (NAVD) 88, while the original Sargent & Lundy construction drawing reference is U.S. Geological Survey (USGS) 1929 vertical datum adjustment.

Primary 2 was constructed for NIPSCO, put in service in 1973, and has been continuously owned and operated by NIPSCO. Primary 2 was designed by Sargent & Lundy Engineers of Chicago, Illinois. The constructor of Primary 2 is not known. A geotechnical investigation was performed by Golder in 2012.

7.0 40 CFR 257.73 (C)(1)(VII) – CONSTRUCTION DRAWINGS

Applicable Sargent & Lundy (1972) design and construction drawings provided by NIPSCO were reviewed and utilized during the preparation of this letter report.

8.0 40 CFR 257.73 (C)(1)(VIII) – EXISTING INSTRUMENTATION

No existing monitoring equipment is present at the time of this letter report.

9.0 40 CFR 257.73 (C)(1)(IX) – AREA CAPACITY CURVES

Area capacity curves for Primary 2 were calculated by Golder during the completion of the Hydrologic and Hydraulic Analysis for Primary Settling Pond Number 2 completed in November 2017. Primary 2 surface impoundment only accepts air heater wash and boiler room sump water from the generating station. The analysis assumed that the flow from the generating station was negligible and as such, assumed the only inflow to the impoundment is from direct precipitation and surface water runoff. The area capacity curve prepared for Primary 2 is shown on the figure below.

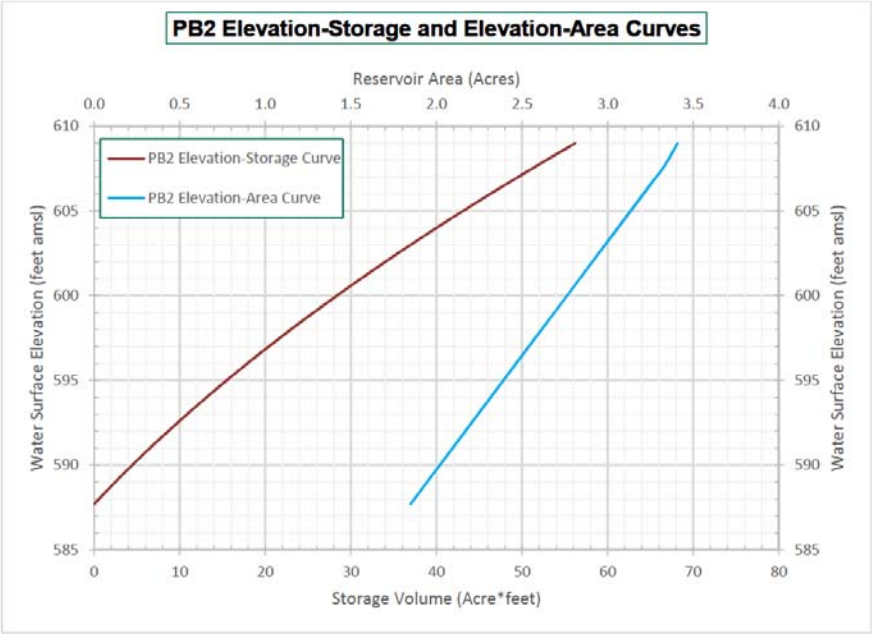


Figure 5: Primary 2 Area Capacity Curve

10.0 40 CFR 257.73 (C)(1)(X) – SPILLWAY AND DIVERSION DESCRIPTIONS

The location of Primary 2 relative to the surrounding structures is shown on Figure 2, attached. Primary 2 is currently not receiving CCR materials. There is one discharge structure located on the pond's north side. The discharge structure is concrete and utilizes stop logs to control water elevation. Flow through the discharge structure reports to the Final Settling Pond. The following dimensions are based on the design and construction drawings by Sargent and Lundy (1972) and GZA Dam Assessment Report (2012).

SIZE AND PHYSICAL DATA

Embankment Crest Elevation:	609 feet above mean sea level (ft MSL)
Bottom Elevation:	588 ft MSL
Operating Water Level:	605.79 ft MSL
Height:	19 feet
Interior SIdeslope:	2.5H:1V
Watershed Area:	3.4 acres (max pool elevation)
Bottom Area:	1.9 acres
Reservoir Volume:	55 acre-feet
Outflow Pipe:	24 inch inside diameter; corrugated metal; Invert: 588 ft MSL

A hydrologic and hydraulic analysis was completed by Golder for Primary 2 as part of the requirements for CCR Rule 257.73(d)(1)(v)(B) and 257.82. Per the CCR Rule, Primary 2 has been classified as a significant hazard potential CCR surface impoundment and it is required to manage the flow during and following the peak discharge from a 1,000-year recurrence interval flood event. A HEC-HMS (USACE, 2015) analysis and wave analysis was performed for Primary 2. The results of this analysis are presented in the Inflow Design Flood Control Plan, prepared by Golder, and summarized below in Table 2.

Table 2: Hydrology and Hydraulics Analysis Results

Depth of Precipitation (in) for 1,000-year Flood Event	10.4
Primary 2 Catchment Area (acres)	4.1
Primary 2 Lowest Crest Elevation (ft amsl)	608.7
Maximum pool storage elevation (ft amsl)	605.7
Maximum Inflow to Primary 2 (cubic feet per second; cfs)	59.8
Maximum Water Surface Elevation (ft amsl)	606.8
Height of Wave Action (feet)	0.44
Net Freeboard during Design Storm Event (feet) [2]	1.4
Maximum Allowable Operational Water Surface Elevation (ft amsl)	607.1

Notes:
[1] The analysis presented assumed there to be no outflow from Primary 2 during the design storm event.
[2] Net freeboard = lowest crest elevation minus the maximum water surface elevation and the height of wave action.

As shown in Table 2, the current configuration and operational status of Primary 2 meet the requirements of 40 CFR 257.73(d)(1)(v).

11.0 40 CFR 257.73 (C)(1)(XI) – SURVEILLANCE, MAINTENANCE, AND REPAIR INFORMATION

NIPSCO personnel performs inspections every seven days on Primary 2. Every seven day in-house inspections include a visual inspection of the impoundment and surrounding area to access any changes in appearance or identify any signs of distress. In addition, an annual inspection of Primary 2 is performed by a third party qualified professional engineer. The last annual inspection was performed by Golder in July 2017. The annual inspection included a review of design and construction information, review of previous structural stability assessments, review of previous annual inspections, visual inspection of the unit to identify signs of distress or malfunction, and visual inspection of hydraulic structures for structural integrity and continued safe and reliable operation.

The annual inspection performed by Golder in July 2017 noted minor vegetation within the rip-rap along the northwestern downstream slope that a NIPSCO representative indicated would be removed and minor erosion was noted on the upstream slope. The inspection report concluded that based on visual observations made, the overall condition of Primary 2 is acceptable. No structural weaknesses or safety issues were observed within the upstream, downstream, crest or hydraulic structures and there were no conditions visually identified that would likely impact the operation of Primary 2.

12.0 40 CFR 257.73 (C)(1)(XII) – STRUCTURAL INSTABILITY KNOWLEDGE

A geotechnical model of the embankment and embankment foundation was developed based on the conditions inferred from the geotechnical investigation (Golder 2012). As part of the *2012 Geotechnical Investigation and Embankment Stability Analyses* report and the 2018 *Structural Stability and Safety Factor Assessment*, slope stability analyses were performed using Rocscience 'Slide' software. The analyses were performed in general accordance with Indiana Department of Natural Resources, Division of Water guidelines and the CCR RCRA Rule Section 257.73(e)(1). The analyses results indicate acceptable factors of safety for all cases considered when evaluated with respect to US Army Corps of Engineers criteria for the conditions analyzed. The results of this analysis are presented in the aforementioned report prepared by Golder, and summarized below in Table 3.

Table 3: Slope Stability Analysis Results Summary

Scenario	Minimum Calculated Factor of Safety		Minimum Acceptable Factor of Safety
	Circular Failure Surface	Planar (Block) Failure Surface	
Static Maximum **Storage** Pool - 257.73(e)(1)(i)	2.0	1.9	1.5
Static Maximum **Surcharge** Pool - 257.73(e)(1)(ii)	1.9	1.6	1.4
Static Maximum **Storage** Pool – Rapid Drawdown 257.73(d)(1)(ii)	1.3	1.3	1.2
Seismic (Pseudo-Static) Maximum **Storage** Pool - 257.73(e)(1)(iii)	1.6	1.5	1.0

As stated above, Golder has also performed an annual inspection of Primary 2 in July 2017. The inspections included a review of the previous inspection reports and recommendations for the site as well as an onsite visual inspection of the impoundment. Based on the conditions observed at the time of inspection, no

significant changes have occurred at Primary 2 since the previous inspection and the impoundment appeared to be stable.

Sincerely,

GOLDER ASSOCIATES INC.

Megan Melendy, P.E.
Senior Engineer

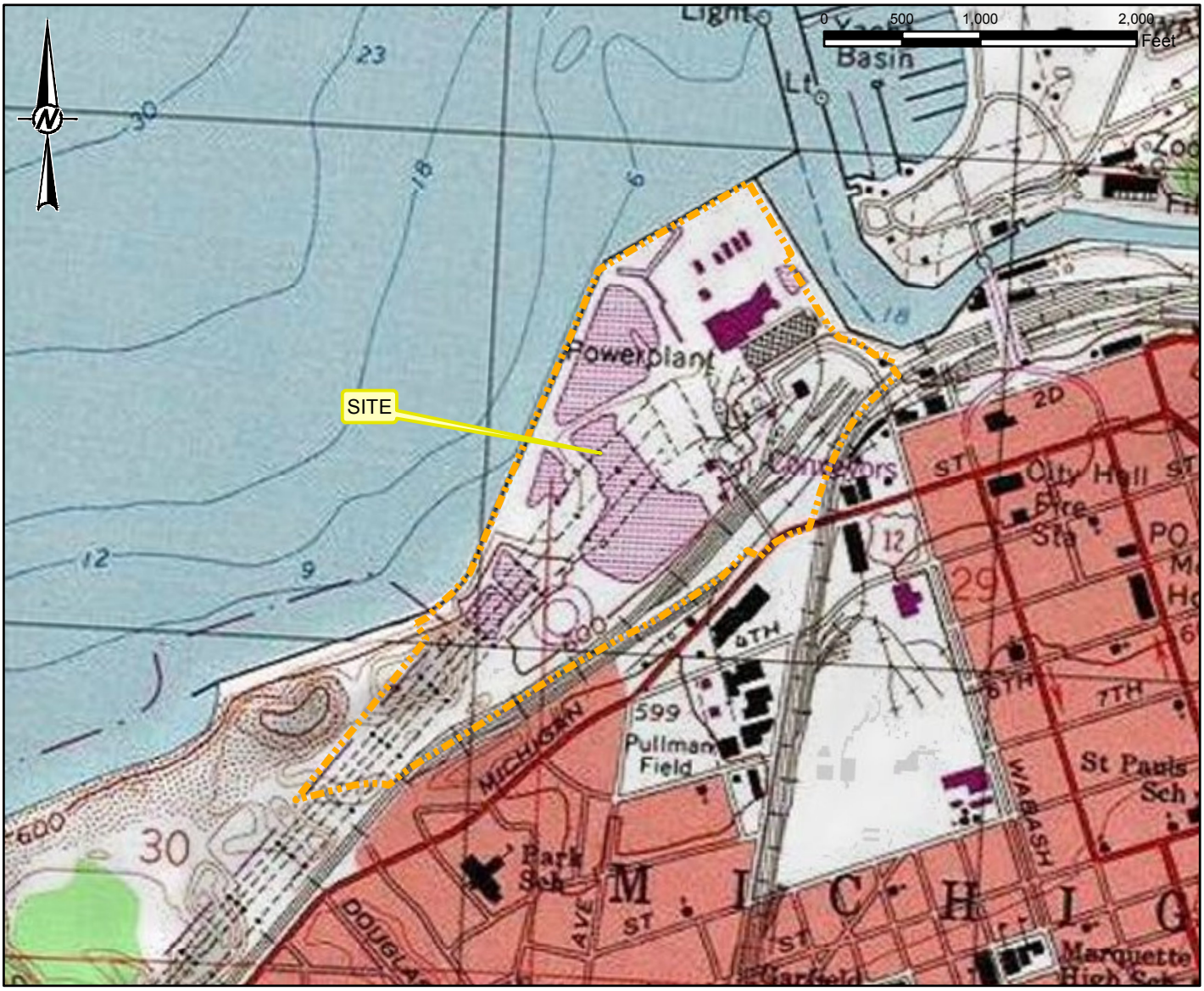
Richard Wesenberg, P.E.
Principal

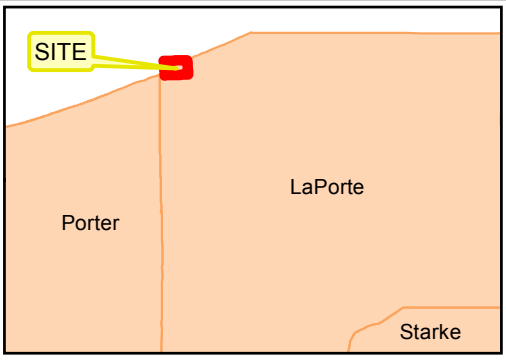
Attachments:

Figure 1 – Site Location Map

Figure 2 – Site Plan – Primary 2

FIGURES





REFERENCE(S)
SERVICE LAYER CREDITS:
1. U.S. GEOLOGICAL SOCIETY 7.5 MINUTE MICHIGAN CITY WEST, IN, TOPOGRAPHIC QUADRANGLE MAP, 1994.
2. COPYRIGHT:© 2013 NATIONAL GEOGRAPHIC SOCIETY, I-CUBED

CLIENT
NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT
MICHIGAN CITY GENERATING STATION
MICHIGAN CITY, INDIANA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-12-19
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PREPARED	SHL
REVIEWED	
APPROVED	

TITLE
SITE LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

CCR Unit

Approximate Property Line

REFERENCE

SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

NORTHERN INDIANA PUBLIC SERVICE COMPANY

PROJECT

NORTHERN INDIANA PUBLIC SERVICE COMPANY
MICHIGAN CITY GENERATING STATION
MICHIGAN CITY, INDIANA

TITLE

SITE PLAN - PRIMARY 2

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-12-20
PREPARED	SHL
DESIGN	MCM
REVIEW	-
APPROVED	-

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