



INITIAL HAZARD CLASSIFICATION  
REPORT

# NORTHERN INDIANA PUBLIC SERVICE COMPANY

## MICHIGAN CITY GENERATING STATION

Initial Hazard Potential Classification Assessment  
Report - RCRA CCR Units Pursuant to 40 CFR  
257.73

### PRIMARY SETTLING POND NO. 2 - SURFACE IMPOUNDMENT

**Submitted To:** Northern Indiana Public Service Company (NIPSCO)  
2723 East 1500 North  
Wheatfield, IN 46392

**Submitted By:** Golder Associates Inc.  
15851 South US 27, Suite 50  
Lansing, MI 48906 USA

March 6, 2018

**Project No. 1787453**

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## CERTIFICATIONS

### Professional Engineer Certification Statement [40 CFR 257.73(a)(2)(ii)]

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 257.73 (40 CFR Part 257.73), I attest that this Hazard Potential Classification Assessment Report is accurate has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.73.

Golder Associates Inc.

  
Signature

March 6, 2018

Date of Report Certification

Tiffany D. Johnson, P.E.

Name

Indiana PE #11500730





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## 1.0 INTRODUCTION

The United States Environmental Protection Agency (EPA) promulgated the Resource Conservation and Recovery Act (RCRA) Coal Combustion Residuals (CCR) Rule (Rule) on April 17, 2015, with an effective date of October 19, 2015. The Rule requires owners or operators of existing CCR surface impoundments to have Periodic Hazard Potential Classification Assessments certified by a qualified professional engineer in accordance with 40 CFR 257.73(a)(2). The initial hazard potential assessments are required to be completed and the results certified (per 40 CFR 257.73(a)(2)(ii)) for CCR surface impoundments. Golder Associates Inc. (Golder) was retained by Northern Indiana Public Service Company (NIPSCO) to perform the assessment and certification of Primary Settling Pond No. 2 (Primary 2) CCR surface impoundment located at the Michigan City Generating Station (MCGS, Site) in Michigan City, Indiana.

As per the 40 CFR Preamble - Hazard Potential Ratings, each impoundment assessed was given a Hazard Potential Classification rating of either Less-than-Low, Low, Significant, or High. The ratings do not refer to the condition or structural stability of the dam, or the potential for the dam to fail. The four hazard potential classifications are defined as:

- High hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.
- Significant hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.
- Low hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of life and low economic and/or environmental losses. Losses are principally limited to the surface impoundment's owner's property.
- Less than low hazard potential means a diked surface impoundment does not pose a high, significant, or low hazard.

Previous classifications performed for the Site's surface impoundments were determined following the 'General Guidelines For New Dams And Improvements To Existing Dams In Indiana', Indiana Department of Natural Resources, Division of Water (IDNR-DOW) (updated 2010). These were reviewed and amended as necessary to reflect guidance from the Federal Guidelines for Dam Safety: Hazard Potential Classification for Dams, Federal Emergency Management Agency ('FEMA') (reprinted January 2004) for which the CCR Rule is based.

Per the CCR Rule, owners and operators of all CCR surface impoundments must determine each unit's hazard potential classification through a hazard potential classification assessment. Hazard potential classification assessments must be certified by a qualified professional engineer and documentation must be provided that supports the basis for the current hazard potential rating. An initial hazard potential



assessment must be conducted within one year of the effective date of the rule for existing units and prior to the initial receipt of CCR in the unit for new units or lateral expansions.

CCR unit owners/operators must perform the hazard potential classification assessment for the following timeframes, as per the CCR Rule:

- initial assessments must be completed by April 17, 2018, per the direct final rule for inactive surface impoundments, and
- periodic re-assessment every five years.



## 2.0 BACKGROUND INFORMATION

This report presents the basis for the certification of the initial hazard potential classification assessment of the Primary 2 surface impoundment unit at the NIPSCO MCGS, located in Michigan City, LaPorte County, Indiana. The assessment was conducted to comply with 40 CFR 257.73(a)(2)(i) of the CCR Rule. An initial annual inspection per 40 CFR 257.83(b)(2) was performed on Primary 2 by Golder in July 2017 (*Michigan City Generating Station, Initial Annual RCRA CCR Unit Inspection Report, Primary Basin Number 2 – Surface Impoundment, Golder, July 2017*) and was referenced for this report.

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 is currently receives air heater wash and boiler room sump water. Primary 2 is currently not accepting CCR materials. At the time of the July 2017 inspection performed by Golder, Primary 2 was not receiving discharges from the generating station.

The location of Primary 2 relative to the generating station and surrounding structures is shown on Figure 1. A closer aerial view of Primary 2 is shown on Figure 2. Primary 2 is formed by an above grade embankment and is located south of the generating station and north of the out of service Secondary Settling Pond No. 1. 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.

Table 1 summarizes the back ground document review.

**Table 1: Primary 2 Background Document Review**

Document	Date	Author
Historical Boring Logs	1970	Sargent & Lundy Engineers
Various Construction Drawings	1972	Sargent & Lundy Engineers





<b>Document</b>	<b>Date</b>	<b>Author</b>
Pre-RCRA Facility Investigation Study Report Northern Indiana Public Service Company Michigan City Generating Station	1995	Geraghty & Miller, Inc.
Final Round 10 Dam Assessment Report Michigan City Generating Station Coal Ash Impoundments	2012	GZA GeoEnvironmental, Inc. for the EPA
2012 Geotechnical Investigation and Embankment Stability Analyses NIPSCO Michigan City Generating Station	2012	Golder Associates Inc.
Embankment, Soil Boring & Monitoring Well Survey; NIPSCO Michigan City Generating Station.	2015	Marbach, Brady, & Weaver, Inc.
Initial Annual RCRA CCR Unit Inspection Report Primary Settling Pond No. 2 – Surface Impoundment	2017	Golder Associates Inc.
Michigan City Generating Station Initial Hazard Potential Classification Assessment – RCRA CCR Units, Primary Settling Basin Number 2 – Surface Impoundment	2018	Golder Associates Inc.
Michigan City Generating Station – RCRA CCR Units, Primary Settling Basin Number 2 - CCR Surface Impoundment Inflow Design Flood Control System Plan.	2018	Golder Associates Inc.



Table 2 summarizes the construction information provided to Golder by NIPSCO.

**Table 2: Michigan City Generating Station – CCR Unit Summary Information**

Inactive CCR Unit	Approx. Area	Approx. Low Crest Elevation (ft-amsl)	Year Put In Service	Dike Height	Basin Depth	Construction	Estimated Ash Capacity (cubic yards)	Input
	(acres)			(feet above surrounding ground)	(feet below crest)			
Primary 2	3.4	609	1973	14	19	Compacted soil	70,260	Air heater wash water, reverse osmosis water, boiler room sumps





### 3.0 INITIAL HAZARD POTENTIAL CLASSIFICATION BREACH ANALYSIS

As shown on Figure 2 for Primary 2, depending on where the breach occurs, three scenarios can happen after the breach:

- The released volume is fully contained with the Final Settling Pond on site.
- A controlled release occurs to Lake Michigan through the Final Settling Basin spillway, flume, and NPDES discharge point. CCR product would settle out, and displace the water in the Final Settling Basin. Provided NPDES permit criteria would not be violated, this alone would not warrant a Significant Hazard rating. Controlling or stopping discharge from the Final Settling Basin may be addressed in the EAP.
- Overtopping of the double sheet pile wall along Lake Michigan, either by a breach near the edge or adjacent to Lake Michigan. This would result in uncontrolled release of CCR into Lake Michigan, and warrant a Significant Hazard rating.

Lake Michigan can contain the flows without measureable increase in stage; however, environmental and economic losses may be sustained in the event of a catastrophic breach of Primary 2. Depending on the time of year and water conditions, prevailing currents could carry CCR product along the coastlines.

Indiana Dunes National Lakeshore is situated to the southwest adjacent to the plant site. While the pond would not discharge directly to the National Park, CCR product could migrate down the coast and impact the ecology of the site and tourism within the area. Within 1 mile west of the site rare plant species exist including Pitcher's Thistle, Broom-rape, Rock sandwort, and Sea rocket. These are threatened species in Indiana and Michigan, with the Pitcher's thistle a candidate for Federal Endangered Species.

The Michigan City Harbor, Mouth of the Trail Creek, Michigan City Water Intake Structures and public beaches are located within 1 mile northeast of the site. Within 6 miles northeast of the site are the Michiana Shores, Indiana water intake and the Grand Beach, Michigan water intake. In the same area exist the rare plant species Bald-rush and Clubmoss, both Threatened Species in Michigan.

The south end of Lake Michigan around Michigan City and the Indiana-Michigan border is habitat for several species of fish including the River Redhorse, a Threatened Species in Michigan. (Reference: Sensitivity of Coastal Environments and Wildlife to Spilled Oil, Lake Michigan, Eastern Shore, National Oceanic and Atmospheric Administration, 1985).

A breach of Primary 2 would not result in probable loss of life, but could result in environmental impacts to the Lake Michigan water and coastal ecosystems and economic losses of the region as a result of damage to the nearby water intake structures and loss of tourism in the area. Primary 2 pond therefore, meets the definition of a significant hazard dam according to the CCR Rules.



#### **4.0 SUBSEQUENT CCR RULE REQUIREMENTS OF SIGNIFICANT HAZARD POTENTIAL CLASSIFICATION ASSESSMENT**

For Primary 2, a significant hazard potential classification assessment for existing CCR surface impoundments triggers the use of the 1,000-year flood event in the inflow design flood control system and the structural stability assessment as required in 40 CFR 257.82 and 40 CFR 257.73, respectively. It also triggers an emergency action plan be developed as required in 40 CFR 257.73.



## 5.0 CLOSING

This report has been prepared in general accordance with normally accepted civil engineering practices to fulfill the Resource Conservation and Recovery Act (RCRA) reporting requirements in accordance with 40 CFR 257.73(a)(2). Based on our review of the information provided by NIPSCO, on Golder's on-site visual inspection, and the Hazard Potential Classification documentation, Primary 2 is a Significant Hazard. Golder's assessment is limited to the information provided to us by NIPSCO and to the features that could be inspected visually in a safe manner. Golder cannot attest to the condition of subsurface or submerged structures.

This report must be placed in the facility's operating record in accordance with 257.105(f) and must be made available on the facility's publicly accessible internet site in accordance with 257.107(f).

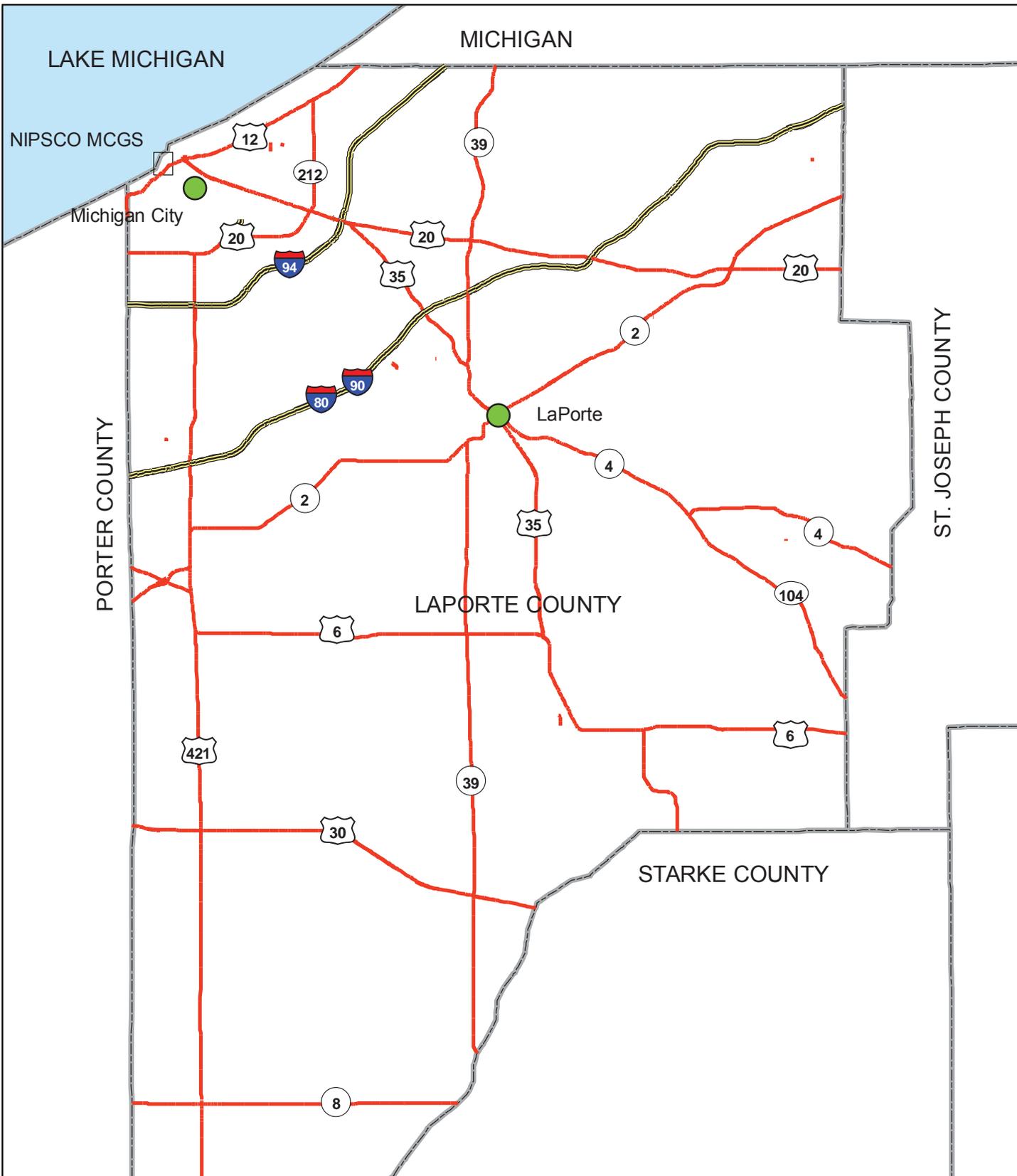
Sincerely,

### GOLDER ASSOCIATES INC.

Michael T. Chilson, P.E.  
Senior Civil Engineer

Tiffany D. Johnson, P.E.  
Associate

## FIGURES



Q:\GIS\NIPSCO\12388988 Michigan City\Projects



<b>NIPSCO MICHIGAN CITY GENERATING STATION</b>			
TITLE			
<b>SITE LOCATION</b>			
PROJECT No. 1787453		FILE No. Figure 2.mxd	
DESIGN	XXX	xxx	SCALE: 1:253,440
GIS	MTC	March 2018	REV. 0
CHECK	TDJ	March 2018	<b>FIGURE 1</b>
REVIEW	DML		





**PANEL 1 - SOUTH EAST CORNER BREACH**

A BREACH AT THE SOUTHEAST CORNER (PANEL 1) WILL LIKELY NOT RESULT IN A RELEASE OF WATER PROVIDED THE FINAL SETTLING BASIN IS AT LEAST 2 FEET BELOW THE OUTLET AT THE TIME OF BREACH.

**WEST SIDE BREACH**

A BREACH ALONG THE WEST SIDE ADJACENT TO LAKE MICHIGAN (NOT SHOWN) WILL RESULT IN A DIRECT RELEASE OF PRODUCT TO LAKE MICHIGAN.

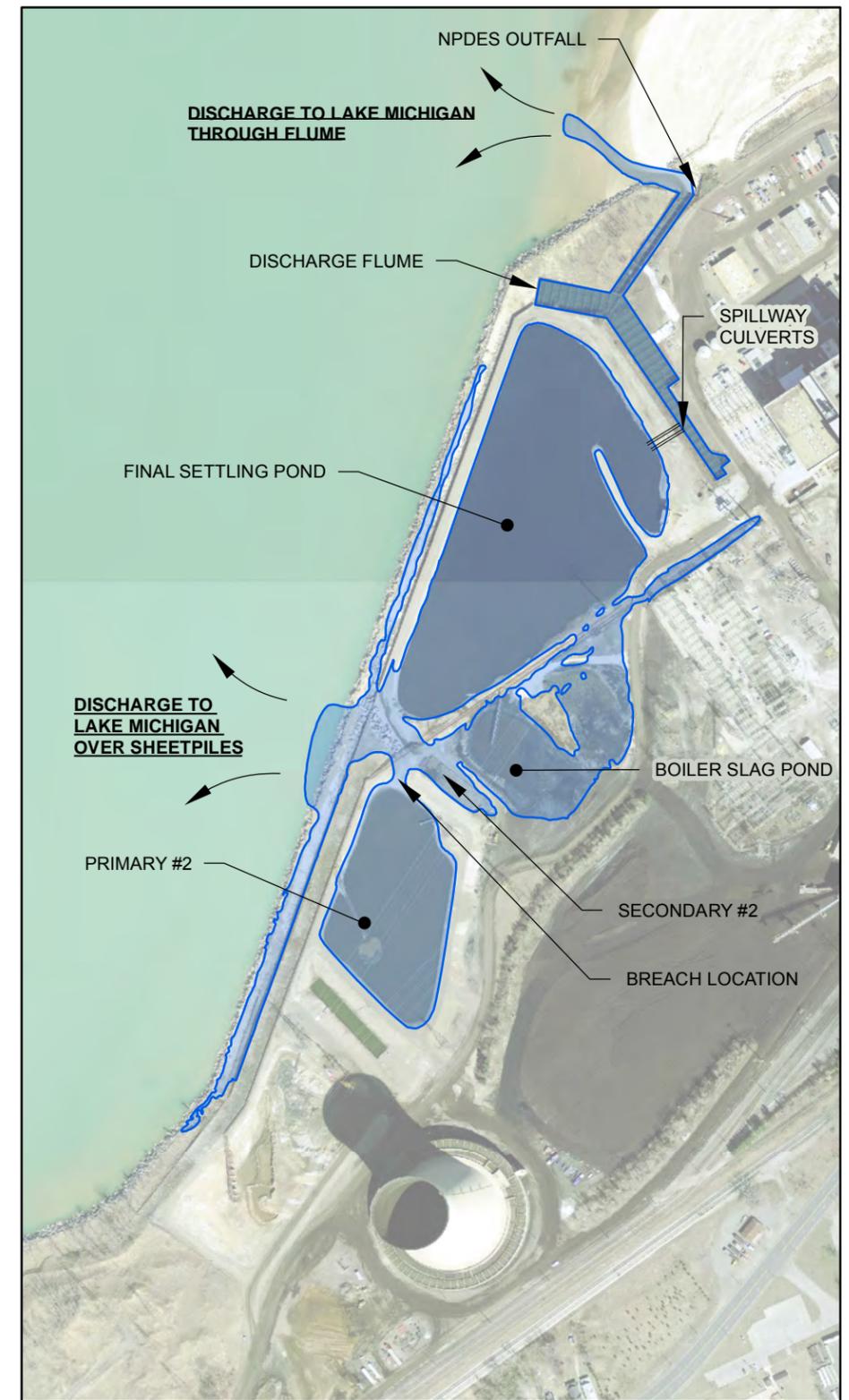


**PANEL 2 - NORTHEAST CORNER BREACH**

A BREACH AT THE NORTHEAST CORNER (PANEL 2) MAY RESULT IN A CONTROLLED RELEASE OF THE FINAL SETTLING BASIN CONTENTS THROUGH THE EXISTING NPDES PERMIT OUTFALL.



INUNDATION BREACH ZONE



**PANEL 3 - NORTHWEST CORNER BREACH**

A BREACH AT THE NORTHWEST CORNER (PANEL 3) MAY RESULT IN AN UNCONTROLLED RELEASE OF PRODUCT TO LAKE MICHIGAN.

CLIENT  
NORTHERN INDIANA PUBLIC SERVICE COMPANY

CONSULTANT



YYYY-MM-DD 2016-08-17

DESIGNED ###

PREPARED MTC

REVIEWED ###

APPROVED TJ

PROJECT  
CCR SURFACE IMPOUNDMENT INTEGRITY ASSESSMENT  
MICHIGAN CITY GENERATING STATION  
INITIAL HAZARD CLASSIFICATION

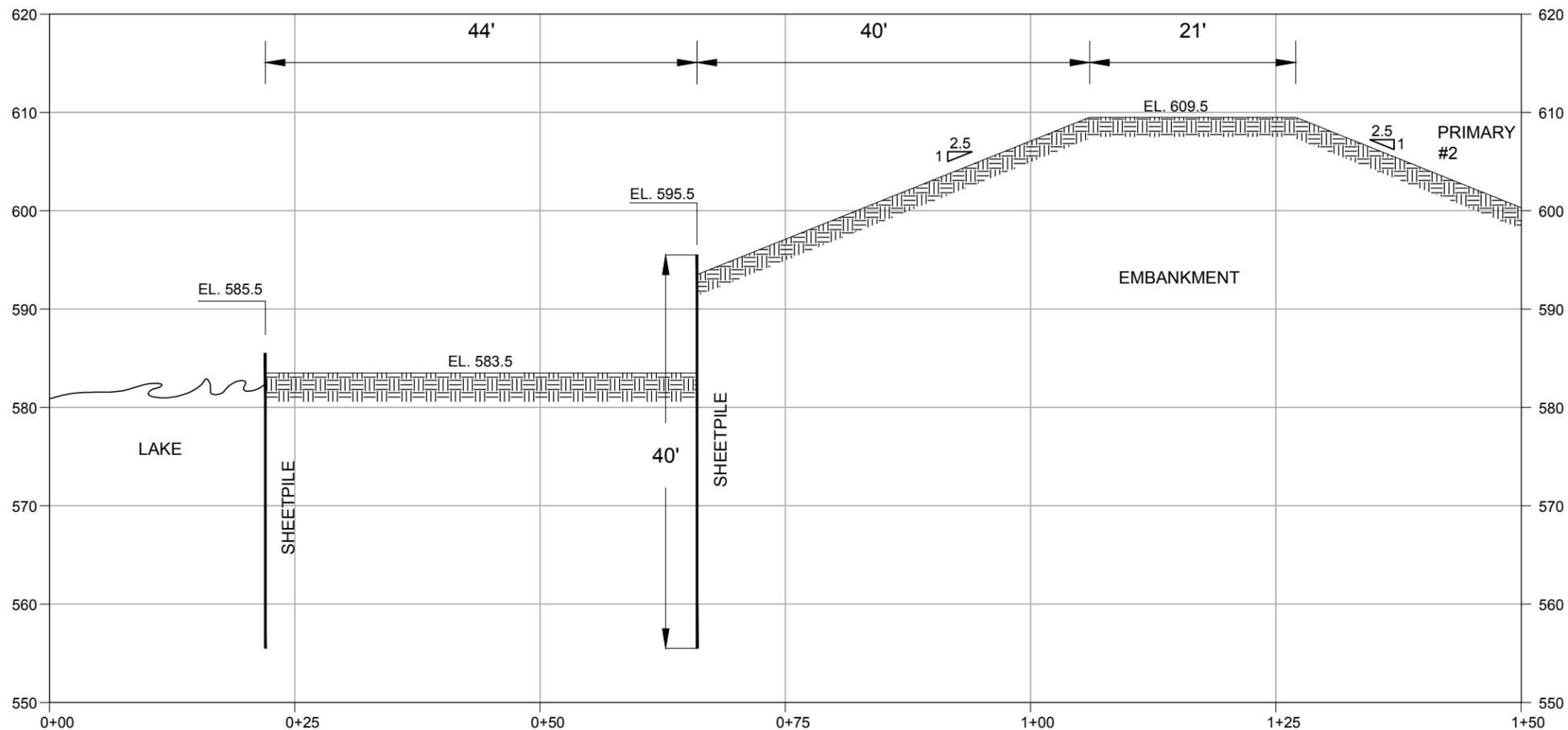
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**POTENTIAL BREACH INUNDATION ZONES**

PROJECT NO.  
1787453

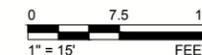
CONTROL  
####

REV.  
1

FIGURE  
2



**SECTION OF PRIMARY #2  
ADJACENT TO LAKE MICHIGAN**



Path: \\murcher\share\Drawings\2016\1651599 NIPSCO\1 File Name: 1651599A001.dwg

CLIENT  
NIPSCO

PROJECT  
MICHIGAN CITY GENERATING STATION  
MICHIGAN CITY, INDIANA

CONSULTANT



YYYY-MM-DD 2016-08-17

DESIGNED TJ

PREPARED RC

REVIEWED MC

APPROVED TDJ

TITLE  
**PRIMARY SETTLING POND #2  
CROSS-SECTION TO LAKE MICHIGAN**

PROJECT NO.  
1787453

SUBTITLE  
A

REV.  
0

FIGURE  
3

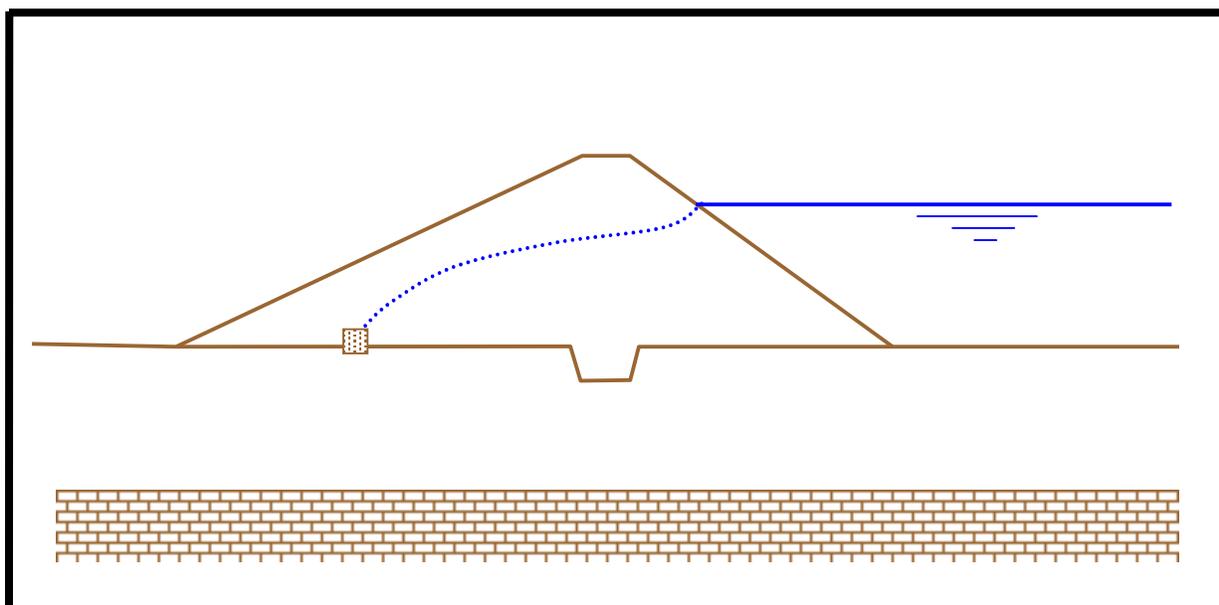
1" IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

**APPENDIX A**  
**EXCERPTS FROM GENERAL GUIDELINES FOR NEW DAMS AND IMPROVEMENTS TO**  
**EXISTING DAMS IN INDIANA (UPDATED 2010)**

# GENERAL GUIDELINES FOR NEW DAMS AND IMPROVEMENTS TO EXISTING DAMS IN INDIANA

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2001 Edition



Department of Natural Resources  
Division of Water  
Indianapolis, Indiana



# GENERAL GUIDELINES FOR NEW DAMS AND IMPROVEMENTS TO EXISTING DAMS IN INDIANA

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2001 Edition

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Department of Natural Resources  
Division of Water  
Indianapolis, Indiana

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2010 Appendix A, Appendix B Revisions included

of the drawdown pipe should be computed by the engineer and documented in both the Operation Plan and the Emergency Action Plan.

## 4.9 Spillway Materials

Proper selection and design of materials for a spillway system are as important as the capacity. Metal, concrete, riprap, geosynthetics, and high-density polymers are some of the materials available for spillway structures. The anticipated loads, required operations, expected performance, life cost, and the spillway environment should be considered in the selection of spillway materials.

Materials for pipe spillways should be selected carefully. Pipe spillways are designed for pressure flow. Corrugated metal pipe (CMP) joints are not designed to be watertight in high-pressure applications and are not recommended for use in spillway systems. Welded steel pipe is acceptable in low-head applications but cathodic protection should be provided to delay the onset of corrosion. Because of construction issues, past failures, and the lack of long-term performance documentation in spillway applications, the use of polyvinyl chloride (PVC) and high-density polyethylene (HDPE) pipes are not recommended for spillway pipes. Reinforced concrete pipe (RCP) is very durable and is typically used in pipe spillways. Bell and spigot joints with rubber o-ring gaskets provide a watertight joint in most RCP applications. The use of anti-seep collars and/or seepage control diaphragms should be included in the design and construction of conduit spillways through dams.

## 4.10 Hazard Evaluation and Dam Break Analyses

Properly designed, constructed, and operated dams can be expected to attenuate downstream discharges during flood events. However, failure of a dam during normal conditions or during a flood event can create a potential hazard far greater than that which existed without the dam. The consequences of dam failure should be fully evaluated and analyzed in order to properly identify and define the extent of the potential "hazard zone". The results of these analyses should be used in determining the hazard classification of the dam and developing the Emergency Action Plan procedures.

### 4.10.1 Dam Break Analysis Methods

The degree of study required to define the impacts of potential dam failures is site specific and will vary depending upon the type and height of dam, size of reservoir, and downstream conditions. In some cases, detailed studies referred to as, "dam break" or "dam breach" analyses, will be required to determine the anticipated downstream hazard zone.

The generally accepted procedure for dam break analysis involves application of unsteady flow and dynamic routing methods. The following computer programs apply this procedure:

- DAMBRK (National Weather Service)
- FLOODWAV (National Weather Service: combines the DAMBRK model with the DWOPER model)

The Corps of Engineers HEC-1 hydrologic model may also be used to perform a dam break analysis to determine downstream inundation areas. The HEC-1 dam break simulation assumes that the reservoir pool remains level while water is released through an incrementally changing triangular, rectangular, or trapezoidal breach in the dam. The HEC-1 model can be used with a river routing scheme to delineate downstream flood zones or in conjunction with the COE HEC-RAS or HEC-2 models to simulate steady, nonuniform flow conditions in the downstream channel and floodplain. When the COE models are used, the hydrologic methods are assumed to be appropriate for the dynamic flood wave. Under most conditions, these assumptions will be approximately true and will provide results that are sufficiently accurate for the determination of the downstream hazard zone. Appropriate care is recommended in interpreting the results of a dam break analysis based on these assumptions. If a higher order of accuracy is necessary, the National Weather Service unsteady flow models should be applied.

### 4.10.2 Dam Break Analysis Parameters

The accepted methods for determining dam break analysis scenarios require the user to select the dam failure parameters under a variety of failure modes. Table 2 provides typical values for these parameters. The parameters include the size, shape, and time of formation of the dam breach.

The conditions during which the simulated dam breach occurs is a critical component of the analysis. A "sunny day" breach analysis implies that the dam fails as a result of structural, geotechnical or mechanical failure, not as a result of overtopping of the dam. However, it is advisable, when performing a sunny day breach analyses, to assume (at a minimum) that the reservoir pool elevation is at the emergency spillway operating elevation. In the event that the reservoir does not have an emergency spillway or other open channel spillway outflow, the reservoir elevation should be considered to be at the minimum dam crest elevation.

Simulation of a dam break during the design storm is also advisable. This analysis should be considered in situations where there is the potential that the spillway system capacity could be significantly reduced as a result of blockage, operating failure, or some other condition. This dam break scenario assumes that the failure will occur as soon as the reservoir elevation exceeds the minimum dam crest elevation. Careful consideration should be given to the amount of inflow, the reservoir elevation at failure, and the downstream water elevation. If a recent storm event has occurred, downstream conditions may still be fully saturated or at a flood level.

When analyzing a sunny-day breach or a dam break during the design storm event, the flood storage provided by downstream dams may be considered by the engineer if these dams are approved by the state and regularly inspected. If a downstream dam is not approved by the Division of Water or if an approved downstream dam is found to overtop, the water stored by the dam is assumed to be released and included in the analysis.

Table 2: Suggested Breach Parameters for Indiana

Type of Dam	Avg. Breach Width BR (feet)	Breach Side Slope Z	Time to Failure TFH (Hours)
Arch	W	Vertical or Slope of Valley Walls	0.1
Masonry; Gravity	Monolith Width	Vertical	0.1 to 0.3
Rockfill	HD	---	---
Timber Crib	HD	Vertical	0.1
Slag; Refuse	80% of W	1.0 to 2.0	0.1 to 1.0
Earthen "non-engineered"	2HD to 5HD	0.0 to 1.0	0.1
Earthen "engineered"	0.5HD to 5HD	0.0 to 1.0	0.5 to 1.0

Definitions: BR Average Width of Breach  
 HD Height of Dam  
 TFH Time of Full Formation of the Breach  
 W Crest Length  
 Z Horizontal Component of Side Slope of Breach

#### 4.11 Documentation

The hydrologic and hydraulic design and analysis of a dam consists of extensive technical work. The engineering report should clearly document the programs, assumptions, parameters, equations, tables, graphs, methodology, engineering judgement, results, and recommendations that were used in the evaluation process. When computer programs are used to perform hydrologic and hydraulic computations, copies of the data files should be submitted in electronic format (floppy disk or CD). The engineering report should be submitted with the permit application to facilitate the review and approval process.

# Appendix A

## Hazard Classification

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Revised - February 2010

## **Rule 3 - Hazard Classification**

### **312 IAC 10.5-3-1 Consideration of hazard classification**

Authority: IC 14-27-7.5-8

Affected: IC 14-27-7.5

Sec. 1 (a) The division shall assign whether a dam is classified as:

- (1) high hazard;
- (2) significant hazard; or
- (3) low hazard;

based on best information available.

(b) In making the determination of assignment under subsection (a), the division shall apply existing U.S. Army Corps of Engineers Phase 1 reports and other appropriate documentation.

(c) The division may also consider observations of the dam and the vicinity of the dam, including the risk posed to human life and property if the dam fails.

(1) If an uncontrolled release of the structure's contents due to a failure of the structure may result in any of the following, the dam shall be considered high hazard:

- (A) The loss of human life.
- (B) Serious damage to:
  - (i) homes;
  - (ii) industrial and commercial buildings; or
  - (iii) public utilities.
- (C) Interruption of service for more than one (1) day on any of the following:
  - (i) A county road, state two-lane highway, or U.S. highway serving as the only access to a community.
  - (ii) A multilane divided state or U.S. highway, including an interstate highway.
- (D) Interruption of service for more than one (1) day on an operating railroad.
- (E) Interruption of service to an interstate or intrastate utility, power or communication line serving a town, community, or significant military and commercial facility, in which disruption of power and communication would adversely affect the economy, safety, and general well-being of the area for more than one (1) day.

(2) If an uncontrolled release of the structure's contents due to a failure of the structure may result in any of the following, the dam shall be considered significant hazard:

- (A) Damage to isolated homes.
- (B) Interruption of service for not more than one (1) day on any of the following:
  - (i) A county road, state two-lane highway, or U.S. highway serving as the only access to a community.

- (ii) A multilane divided state or U.S. highway, including an interstate highway.
- (C) Interruption of service for not more than one (1) day on an operating railroad.
- (D) Damage to important utilities where service would be interrupted for not more than one (1) day, but either of the following may occur:
  - (i) Buried lines can be exposed by erosion.
  - (ii) Towers, poles, and aboveground lines can be damaged by undermining or debris loading.

(3) If an uncontrolled release of the structure's contents due to a failure of the structure does not result in any of the items given in subdivision (1) or (2) and damage is limited to either farm buildings, agricultural land, or local roads, the dam shall be classified as low hazard.

(d) The division may modify an assignment of hazard classification, made previously under this article, if changes in the downstream development affect the potential for loss of human life and property. (Natural Resources Commission; 312 IAC 10.5-3-1; filed Jan 26, 2007, 10:45 a.m.: 20070221-IR-312060092FRA)

### **312 IAC 10.5-3-2 Reconsideration of hazard classification**

Authority: IC 14-27-7.5-8

Affected: IC 14-27-7.5

Sec. 2 (a) This section establishes a process by which a dam owner or another affected person may request reconsideration of a determination of hazard classification made under section 1 of this rule.

(b) The dam owner or other affected person may submit any technical information or reports that were not previously available to the division.

(c) The dam owner's or other affected person's professional engineer may develop and submit a maximum breach inundation area and current damage evaluation assessing the downstream area affected by a dam breach.

(1) If the maximum breach inundation area and current damage evaluation predicts any of the following, the dam shall be classified as high hazard:

- (A) Flood depths greater than one (1) foot in any occupied quarters.
- (B) Loss of human life may occur.
- (C) Interruption of service for more than one (1) day on any of the following:
  - (i) A county road, state two-lane highway, or U.S. highway serving as the only access to a community.
  - (ii) A multilane divided state or U.S. highway, including an interstate highway.
- (D) Interruption of service for more than one (1) day on an operating railroad.
- (E) Damage to any occupied quarters where the flow velocity at the building compromises the integrity of the structure for human occupation.

- (F) Interruption of service to an interstate or intrastate, utility, power or communication line serving a town, community, or significant military and commercial facility, in which disruption of power and communication would adversely affect the economy, safety, and general well-being of the area for more than one (1) day.
- (2) If the maximum breach inundation area and current damage evaluation predicts any of the following, the dam shall be classified as significant hazard:
- (A) Interruption of service for not more than one (1) day on any of the following:
    - (i) A county road, state two-lane highway, or U.S. highway serving as the only access to a community.
    - (ii) A multilane divided state or U.S. highway, including an interstate highway.
  - (B) Interruption of service for not more than one (1) day on an operating railroad.
  - (C) Damage to any occupied quarters that would not render the structure unusable.
  - (D) Damage to important utilities where service would be interrupted for not more than one (1) day, but either of the following may occur:
    - (i) Buried lines can be exposed by erosion.
    - (ii) Towers, poles, and aboveground lines can be damaged by undermining or debris loading.
- (3) If the maximum breach inundation area and current damage evaluation results predict none of the items in subdivision (1) or (2) and damage is limited to farm buildings, agricultural land, or local roads, the dam shall be classified as low hazard.

(Natural Resources Commission; 312 IAC 10.5-3-2; filed Jan 26, 2007, 10:45 a.m.: 20070221-IR-312060092FRA)

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The complete text of the IAC section should be reviewed. Up to date regulation can be found at the following URL:

<http://www.in.gov/dnr/water/>

**APPENDIX B**  
**EXCERPTS FROM FEDERAL GUIDELINES FOR DAM SAFETY: HAZARD POTENTIAL**  
**CLASSIFICATION FOR DAMS, FEDERAL EMERGENCY MANAGEMENT AGENCY**  
**(“FEMA”) (REPRINTED JANUARY 2004)**



# Federal Guidelines for Dam Safety

Hazard Potential Classification System for Dams

*April 2004*



**FEMA**

FEDERAL GUIDELINES FOR DAM SAFETY:  
HAZARD POTENTIAL CLASSIFICATION  
SYSTEM FOR DAMS

prepared by the  
INTERAGENCY COMMITTEE ON DAM SAFETY

U.S. DEPARTMENT OF HOMELAND SECURITY  
FEDERAL EMERGENCY MANAGEMENT AGENCY  
OCTOBER 1998

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### III. CLASSIFICATION SYSTEM

Three classification levels are adopted as follows: **LOW**, **SIGNIFICANT**, and **HIGH**, listed in order of increasing adverse incremental consequences. The classification levels build on each other, *i.e.*, the higher order classification levels add to the list of consequences for the lower classification levels, as noted in the table on the following page.

This hazard potential classification system should be utilized with the understanding that the failure of any dam or water-retaining structure, no matter how small, could represent a danger to downstream life and property. Whenever there is an uncontrolled release of stored water, there is the possibility of someone, regardless of how unexpected, being in its path.

A primary purpose of any classification system is to select appropriate design criteria. In other words, design criteria will become more conservative as the potential for loss of life and/or property damage increases. However, postulating every conceivable circumstance that might remotely place a person in the inundation zone whenever a failure may occur should not be the basis for determining the conservatism in dam design criteria.

This hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests. Improbable loss of life exists where persons are only temporarily in the potential inundation area. For instance, this hazard potential classification system does not contemplate the improbable loss of life of the occasional recreational user of the river and downstream lands, passer-by, or non-overnight outdoor user of downstream lands. It should be understood that in any classification system, all possibilities cannot be defined. High usage areas of any type should be considered appropriately. Judgment and common sense must ultimately be a part of any decision on classification. Further, no allowances for evacuation or other emergency actions by the population should be considered because emergency procedures should not be a substitute for appropriate design, construction, and maintenance of dam structures.

#### 1. LOW HAZARD POTENTIAL

Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

#### 2. SIGNIFICANT HAZARD POTENTIAL

Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

### 3. HIGH HAZARD POTENTIAL

Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)

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