JR Whiting History of Construction
Ponds 1&2

Initial Compiled History Certification by Owner or Operator

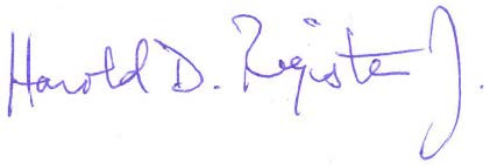
Contents

CERTIFICATION

Certification Statement by Owner or Operator

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Consumers Energy Company



Signature

October 17, 2016

Date of Report Certification

Harold D. Register, Jr.

Name

1.0 INTRODUCTION

The United States Environmental Protection Agency (EPA) promulgated the Resource Conservation and Recovery Act (RCRA) Coal Combustion Residuals (CCR) Rule ("CCR RCRA Rule") on April 17, 2015. The CCR RCRA 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 (xii). The history of construction, and any revisions of it, as required by 40 CFR 257.73(c) shall be placed in the operating record and shall be maintained until the CCR unit completes closure of the unit in accordance with 40 CFR 257.102 [40 CFR 257.105(f)(9)].

2.0 40 CFR 257.73 (C)(1)(I)

The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

Consumers Energy Company
Contact: Michelle Marion
1945 W. Parnall Road
Jackson, MI 49201

Name of CCR Unit: JR Whiting Ponds 1&2
State Assigned Identification Number: None

3.0 40 CFR 257.73 (C)(1)(II)

The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.

Figure 1 – Site Location Map presents the 7 ½ minute USGS quadrangle map of Erie, Michigan. The location of the CCR unit is denoted on the map with the callout box – Site Location.

4.0 40 CFR 257.73 (C)(1)(III)

A statement of the purpose for which the CCR unit is being used.

According to the Potential Failure Mode Analysis (PFMA) Report prepared by AECOM (2009), the JR Whiting Ash Disposal Facility is divided into three (3) locations of coal ash management. Ponds 1&2 are located to the east of the plant and north of the discharge canal. They were used historically for wet ash sluicing, and were maintained for occasional wet ash sluicing, which is the backup system for dry ash handling, and sump water discharge up until April 15, 2016 when the plant began decommissioning. Bottom ash and fly ash (when wet sluiced) were hydraulically discharged to Ponds 1&2. Pond 2 normally received bottom ash and process water from the plant. Pond 2 was split into sub ponds: one for fly ash

and one for bottom ash from the plant. Pond 2 flowed into Pond 1 which was historically discharged to a common internal outfall into the forebay (CEC, 2009).

5.0 40 CFR 257.73 (C)(1)(IV)

The name and size in acres of the watershed within which the CCR unit is located.

The CCR RCRA Rule requires the name and size (in acres) of the watershed within which the CCR surface impoundment is located. According to the EPA MyWATERS Mapper website (USEPA 2016), the CCR surface impoundment is located within the La Plaisance Creek – Frontal Lake Erie Watershed and comprised of approximately 20,853 acres.

6.0 40 CFR 257.73 (C)(1)(V)

A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.

As part of a subsurface investigation and sampling program conducted by Golder in 2015 and 2016, soil samples were collected from adjacent locations and from beneath the Ponds 1&2, respectively. Sampling locations are visually depicted on **Figure 2** – Existing Conditions Site Map. Physical properties of the soil samples are demonstrated by data included in **Appendix A** – Soil Sample Data.

Engineering properties for the foundation and abutment materials were selected from Cone Penetrometer Test (CPT) correlations, field testing, and laboratory testing that supplemented the structural stability and factor of safety assessments for the Ponds 1&2. A portion of the engineering properties of the foundation and abutment materials are presented in the "*Safety Factor Assessment Report Ponds 1&2, JR Whiting Plant, Erie, Michigan*" (2016d).

Additional engineering properties of the foundation and abutment materials are presented in the "*Summary of Monitoring Well Design, Installation, and Development, J.R. Whiting Electric Generation Facility*" (ARCADIS 2016).

7.0 40 CFR 257.73 (C)(1)(VI)

A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

7.1 Physical and Engineering Properties

Golder sampled and tested the materials that exists in the exterior berm of the Bottom Ash Pond to gather subsurface information for the structural stability and factor of safety assessment. The physical properties

are provided in **Appendix A** – Soil Sample Data. A portion of the engineering properties of the foundation and abutment materials are presented in the "*Safety Factor Assessment Report Ponds 1&2, JR Whiting Plant, Erie, Michigan*" (2016d).

Additional engineering properties of the foundation and abutment materials are presented in the "*Summary of Monitoring Well Design, Installation, and Development, J.R. Whiting Electric Generation Facility*" (ARCADIS 2016).

7.2 Site Preparation and Construction

Site drawings and historical aerial photographs from 1957, 1959 and 1963 included in the PFMA Report (AECOM 2009) and other imagery in **Appendix B** – Historical Aerial Photographs - were reviewed, and the following sequence of construction was developed:

- The J.R. Whiting plant was put into service in 1952. Prior to the plant going on-line, Ponds 1&2 were constructed to contain fly ash waste. These ponds were originally one pond (See **Appendix B** – 1955) which has since been divided into two ponds for clarification purposes.
- By 1964, this storage area was completely filled according to an as-built drawing shown on Figure 3 (AECOM 2009) and **Appendix B** – 1964.
- The following year, 1965, the dike creating Ponds 1&2 through the original storage area was constructed (**Appendix B** – 1973).
- Eventually, Ponds 1&2 were converted to bottom ash collection ponds (**Appendix B** – 1980).
- According to documentation found in CEC's records, Ponds 1&2 became too full, and in 1990 regulators noted seepage at the base of the dikes. To alleviate the uncontrolled seepage breakout and hydraulic stress on the dikes, the perimeter dikes were raised by approximately ten feet; and broadened and the pond surface water elevation was permanently lowered to reduce seepage pressures.

8.0 40 CFR 257.73 (C)(1)(VII)

At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Golder developed the following figures, which are attached hereto, for Ponds 1&2 at JR Whiting:

- Figure 2 – Borehole and Cross Section Location Map
- Figure 3 –Cross Section A-A'
- Figure 4 – Cross Section B-B'
- Figure 5 – Cross Section C-C'
- Figure 6 – Cross Section D-D'

Cross sections were developed based on an EES Survey (May 2016) and subsurface data collected and interpreted by Golder in 2015 and 2016. These cross sections are not intended to illustrate a comprehensive conceptual site model representing all data that may be available for Ponds 1&2.

9.0 40 CFR 257.73 (C)(1)(VIII)

A description of the type, purpose, and location of existing instrumentation.

The CCR RCRA Rule requires that a description of the type, purpose, and location of existing instrumentation be provided. Golder included the locations of the known instruments on **Figure 2** – Existing Conditions Site Map.

CEC retained ARCADIS to install RCRA monitoring wells to characterize groundwater quality conditions in the vicinity of the Bottom Ash Pond. The description and location of this existing instrumentation can be found in the "*Summary of Monitoring Well Design, Installation, and Development, J.R. Whiting Electric Generation Facility*" (ARCADIS 2016).

10.0 40 CFR 257.73 (C)(1)(IX)

Area-capacity curves for the CCR unit.

Area capacity curves for the Bottom Ash Pond were calculated by Mannik Smith Group using survey data collected by EES in May 2016. The area capacity curves are included in the "*Inflow Design Flood Control System Plan Ponds 1&2, JR Whiting Plant, Erie, Michigan*" (2016b).

11.0 40 CFR 257.73 (C)(1)(X)

A description of each spillway and diversion design features and capacities and calculations used in their determination.

11.1 Spillway and Diversion Description

Based on the "*Annual RCRA CCR Surface Impoundment Inspection Report Ponds 1&2, JR Whiting Plant, Erie, Michigan*" (2016a), an elevated trestle and pipe system that hydraulically conveyed sluiced bottom ash to Pond 1 prior to April 15, 2016 is no longer discharging CCR and non-CCR waste streams

into the ponds. Additionally, the decant water that was available to discharge from the pond via one 24-inch steel outflow pipe within the berm into the forebay that conveyed the flow to the NPDES outfall location has been grouted, so there is no longer any discharge either.

11.2 Capacities and Calculations

Capacities and calculations regarding the spillway and diversion features can be found in *Inflow Design Flood Control System Plan Ponds 1&2, JR Whiting Plant, Erie, Michigan*" (2016b).

12.0 40 CFR 257.73 (C)(1)(XI)

The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

12.1 Construction Specifications

Limited historical site drawings are included in the PFMA Report (AECOM 2009), however these drawings do not provide information regarding the construction methods and materials used during the construction of Ponds 1&2 and perimeter dikes.

12.2 Surveillance, Maintenance, and Repair

The December 2010 "*Coal Ash Landfill Surveillance and Monitoring Program"* (SMP) (CEC 2010) outlines CEC's surveillance, maintenance, and repair program specific to each CCR surface impoundment at J.R. Whiting. Beginning in October 2015, the Bottom Ash Pond was inspected by a qualified individual at least weekly and by a qualified professional engineer (QPE) annually in accordance with the CCR RCRA Rule.

13.0 40 CFR 257.73 (C)(1)(XII)

Any record or knowledge of structural instability of the CCR unit.

Plant records from the late 1980s indicate some structural weakness in the form of dike cracking and seepage. Additionally, records containing notes from state regulators also noted seepage from this unit.

Weekly inspections of the facility are performed by qualified individuals to detect potentially hazardous conditions or structural weakness per the CCR RCRA Rule and documented internally on CCR Weekly Inspection Observations Forms. Annual inspections at the facility have been performed by AECOM (2009a, 2012), Barr Engineering (2014), Golder (2016) and Mannik Smith Group (2016a).

14.0 ATTACHMENTS

Figure 1 – Site Location Map

Figure 2 – Existing Conditions and Borehole and Cross Section Location Map

Figure 3 –Cross Section A-A'

Figure 4 – Cross Section B-B'

Figure 5 – Cross Section C-C'

Figure 6 – Cross Section D-D'

Appendix A – Soil Sample Data

Appendix B – Historical Aerial Photography

15.0 REFERENCES

AECOM (2009). "*Potential Failure Mode Analysis (PFMA) Report, JR Whiting Generating Facility Ash Dike Assessment*."

AECOM (2009a). "*Inspection Report JR Whiting Generating Facility Ash Dike Risk Assessment, Erie, MI*."

AECOM (2012). "*JR Whiting Ash Disposal Area 2012 Ash Dike Risk Assessment Final Inspection Report*."

ARCADIS (2016). "*Summary of Monitoring Well Design, Installation, and Development, JR Whiting Electric Generation Facility*."

Barr Engineering (2014). "*JR Whiting Generating Facility Triennial Ash Dike Risk Assessment Report – Spring 2014*"

Consumers Energy (2010). "*Coal Ash Landfill Surveillance and Monitoring Program*."

Golder (2016). "*J.R. Whiting Ponds 1 and 2 Annual RCRA CCR Surface Impoundment Inspection Report – January 2016*."

Mannik Smith Group (2016a). "*Annual RCRA CCR Surface Impoundment Inspection Report Ponds 1&2, JR Whiting Plant, Erie, Michigan*,"

Mannik Smith Group (2016b). "*Inflow Design Flood Control System Plan Ponds 1&2, JR Whiting Plant, Erie, Michigan*."

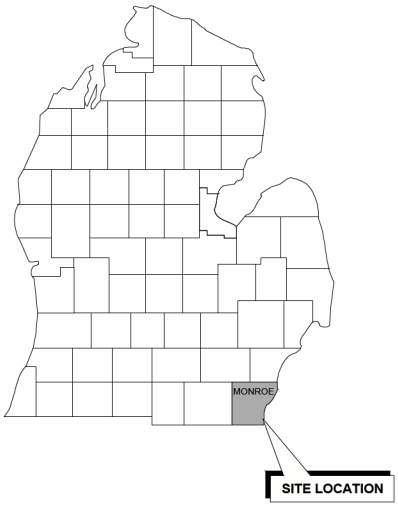
Mannik Smith Group (2016c). "*Structural Stability Assessment Report Ponds 1&2, JR Whiting Plant, Erie, Michigan*."

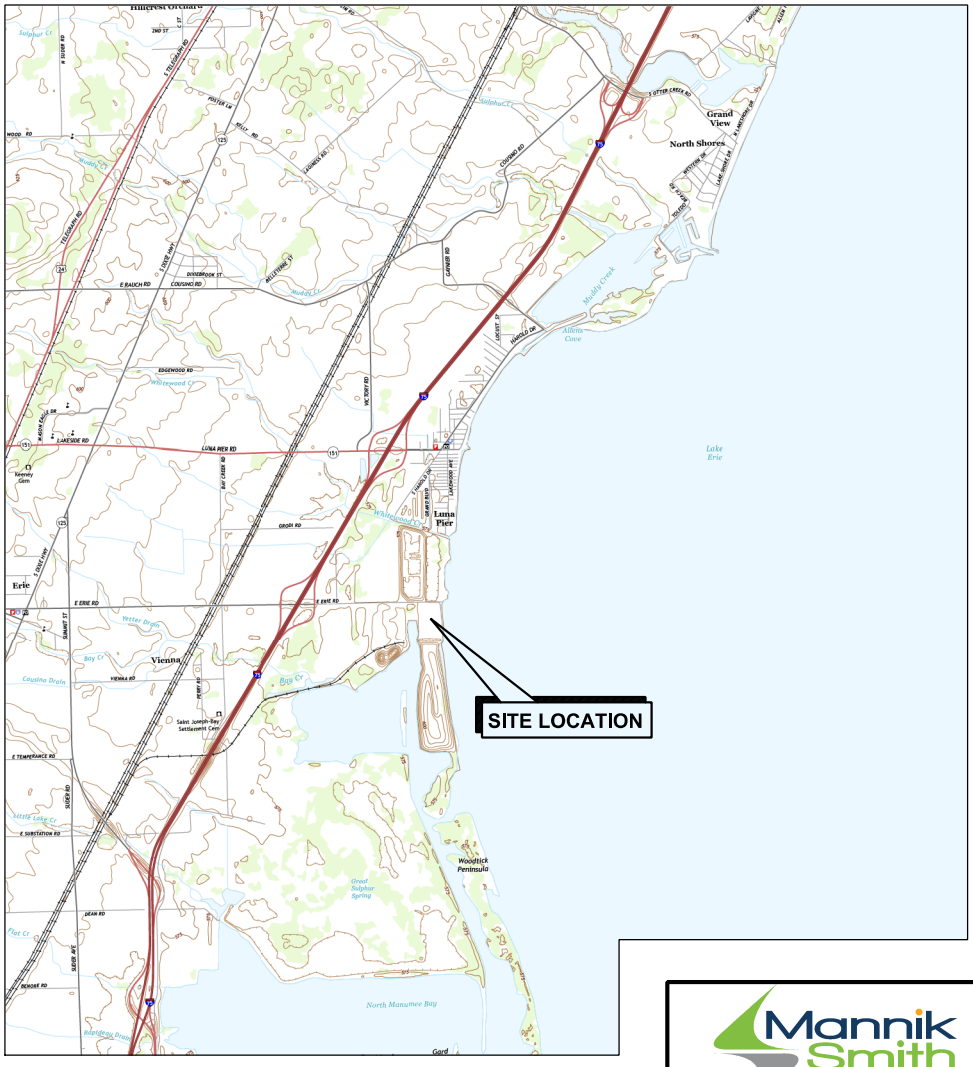
Mannik Smith Group (2016d). "*Safety Factor Assessment Report Ponds 1&2, JR Whiting Plant, Erie, Michigan*."

USEPA 40 CFR Parts 257 and 261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities, (2015). Environmental Protection Agency, Washington D.C. epa.gov.

USEPA MyWATERS Mapper (2016). https://watersgeo.epa.gov/mwm.

FIGURES





MONROE COUNTY
NOT TO SCALE

Mannik Smith GROUP
TECHNICAL SKILL. CREATIVE SPIRIT.
www.MannikSmithGroup.com

FIGURE 1

SITE LOCATION MAP

PONDS 1 & 2
JR Whiting Generating Facility
Erie, Monroe County, Michigan

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
10/11/2016	RAR	ISS	C1790017

10/11/2016 7:08:56 AM
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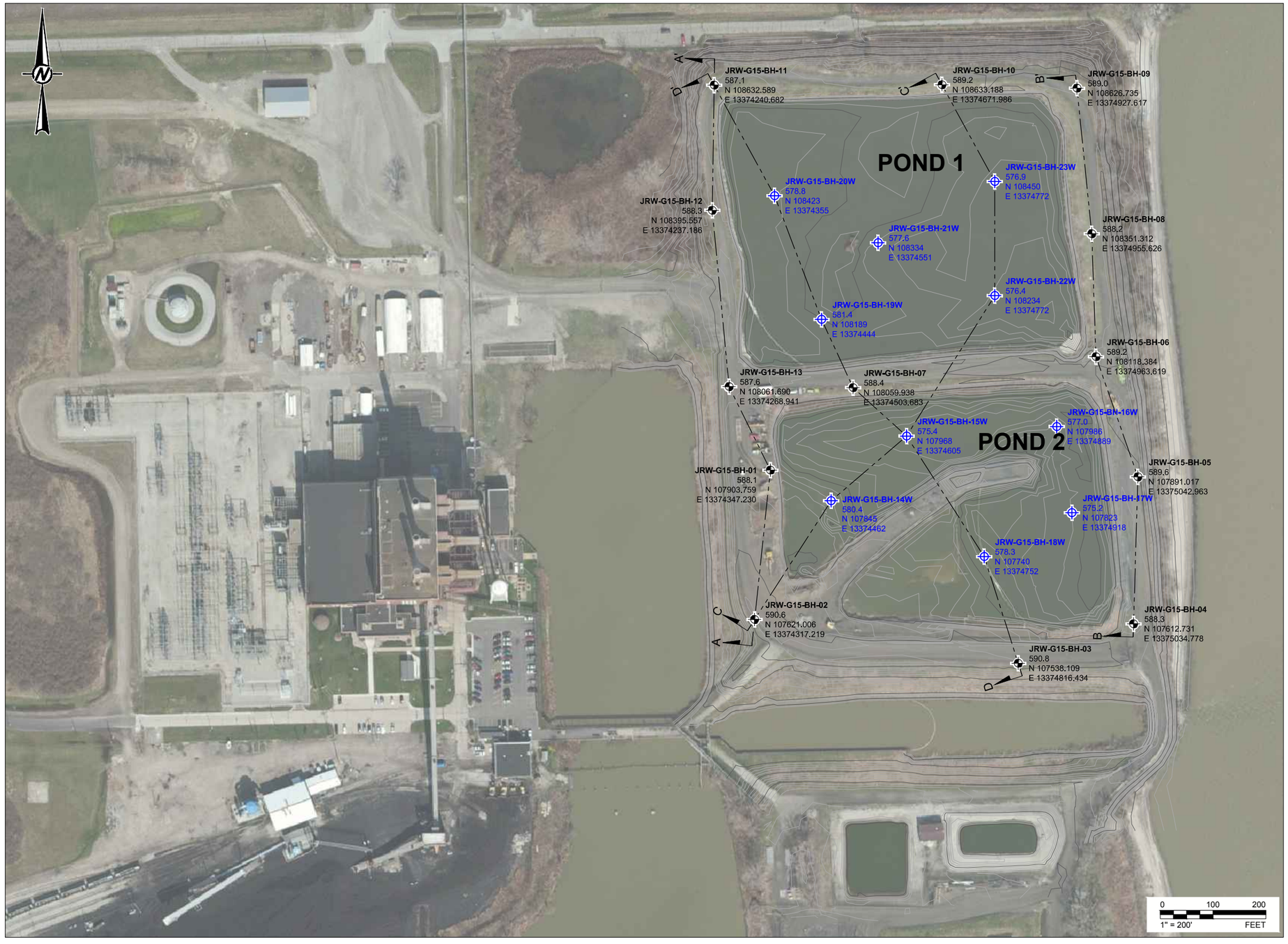

LEGEND

- JRW-G15-BH-## — 2015 LAND BOREHOLE LOCATION
- JRW-G15-BH-##W — 2015 WATER BOREHOLE LOCATION
- EXISTING GROUND MAJOR CONTOUR (5' INTERVAL)
- EXISTING GROUND MINOR CONTOUR (1' INTERVAL)

NOTES

1. ALL BOREHOLE LOCATIONS SHOWN ARE APPROXIMATE.
2. SCALE OF AERIAL IMAGERY IS APPROXIMATE.
3. AERIAL IMAGE IS SHOWN FOR GENERAL REFERENCE ONLY AND CURRENT SITE CONDITIONS MAY VARY FROM THE IMAGE SHOWN ON THIS FIGURE.
4. NO DIMENSIONS OR QUANTITIES ARE TO BE SCALED OR DEVELOPED FROM THIS FIGURE.
5. THIS FIGURE IS SIZED FOR 11"X17" ANSI-B PAPER AND ALL SCALES ASSOCIATED MUST BE VERIFIED.
6. 2015 WATER BOREHOLE LOCATIONS WERE LOCATED HORIZONTALLY BY GOLDER USING A HAND HELD GPS (TRIMBLE) AND VERTICALLY THE ELEVATIONS WERE CALCULATED FROM THE WATER DEPTH AND WATER ELEVATIONS.
7. 2015 LAND BOREHOLE LOCATIONS WERE STAKED OUT AND DOCUMENTED ON 2015-10-19 HORIZONTALLY AND VERTICALLY BY MUXLOW SURVEY COMPANY.

REFERENCES

1. AERIAL IMAGERY SOURCE: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY.
2. HORIZONTAL DATUM: NAD 1983 STATE PLANE COORDINATES, MICHIGAN SOUTH ZONE, INTERNATIONAL FEET.
3. VERTICAL DATUM: NAVD 88.
4. GROUND SURFACE SURVEY PROVIDED BY CEC TO GOLDER VIA DWG FILE. PER ELEVATION BASIS NOTE ON DRAWING NO SF-19884, SHEET 34 PROVIDED BY SHERIDAN SURVEYING CO. ELEVATIONS WERE LOWERED 0.90' TO OBTAIN NAVD 88 ELEVATIONS.
5. PONDS SURVEY COMPLETED IN MARCH 2015, ADDITIONAL SURVEY PERFORMED IN OCTOBER AND NOVEMBER 2015 PER SHERIDAN SURVEYING CO. DRAWING.

CLIENT
CONSUMERS ENERGY COMPANY
4525 E. ERIE ROAD
ERIE, MICHIGAN 48133

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-02-16
DESIGNED	CDB
PREPARED	MAC
REVIEWED	DPR
APPROVED	MJW

PROJECT
WHITING ASH POND MATERIAL CHARACTERIZATION

TITLE
BOREHOLE & CROSS SECTION LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
15-40973W	15-40973W.A0001	----	2

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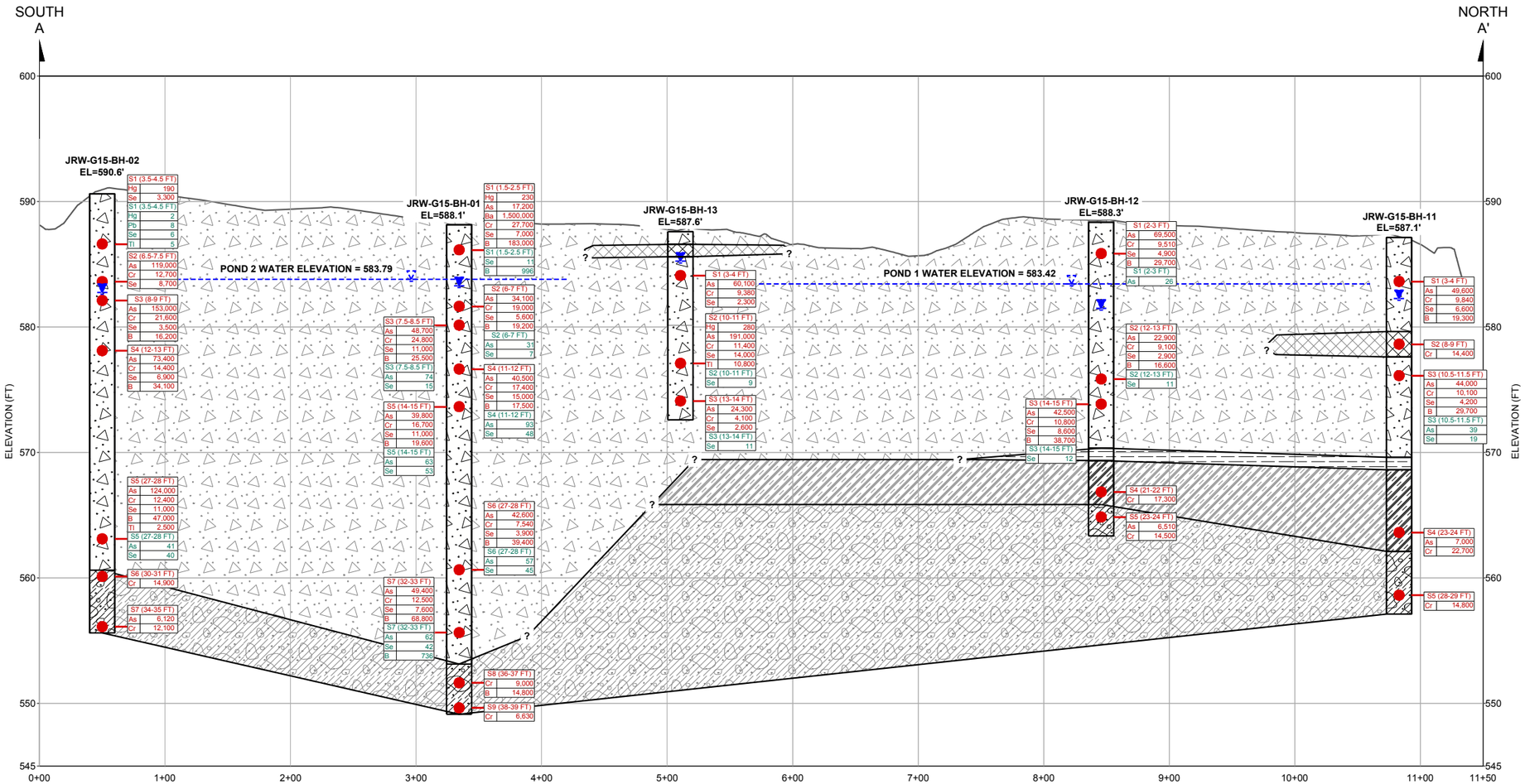

Parameter	Part 115 Inert Criteria (Total Metals) µg/kg	Part 115 Inert Criteria (SPLP Metals) µg/L
Mercury	130	0.2
Arsenic	5,800	10
Barium	4.4E+05	670
Cadmium	3,600	3.0
Chromium	3,300	100
Copper	75,000	13
Lead	7.0E+05	4.0
Selenium	410	5.0
Silver	1,000	0.2
Zinc	1.7E+05	170
Boron	10,000	500
Thallium	2,300	2.0

SCALE AS SHOWN A-A' 2 SUBSURFACE SECTION

LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- CONCRETE RUBBLE
- CLAY FILL
- ORGANIC SILT OR CLAY
- LEAN CLAY
- SANDY LEAN CLAY (GLACIAL TILL)
- EXISTING GROUND (APPROXIMATE)
- INTERPRETED MATERIAL BOUNDARY
- APPROXIMATE DEPTH OF SATURATION IN CORE
- POND WATER ELEVATION (OBTAINED OCTOBER 21, 2015)
- SAMPLE LOCATION - INERT CRITERIA EXCEEDANCE

NOTES

1. ANALYTICAL DATA (TEXT) SHOWN IN RED INDICATES SAMPLES THAT WERE ANALYZED FOR TOTAL METALS AND EXCEEDED PART 115 INERTNESS CRITERIA.
2. ANALYTICAL DATA (TEXT) SHOWN IN GREEN INDICATES SAMPLES THAT WERE ANALYZED FOR SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) METALS AND EXCEEDED PART 115 INERTNESS CRITERIA.
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VERTICAL SCALE: 0 5 10 — 1" = 10' FEET

HORIZONTAL SCALE: 0 50 100 — 1" = 100' FEET

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REVIEWED	DPR
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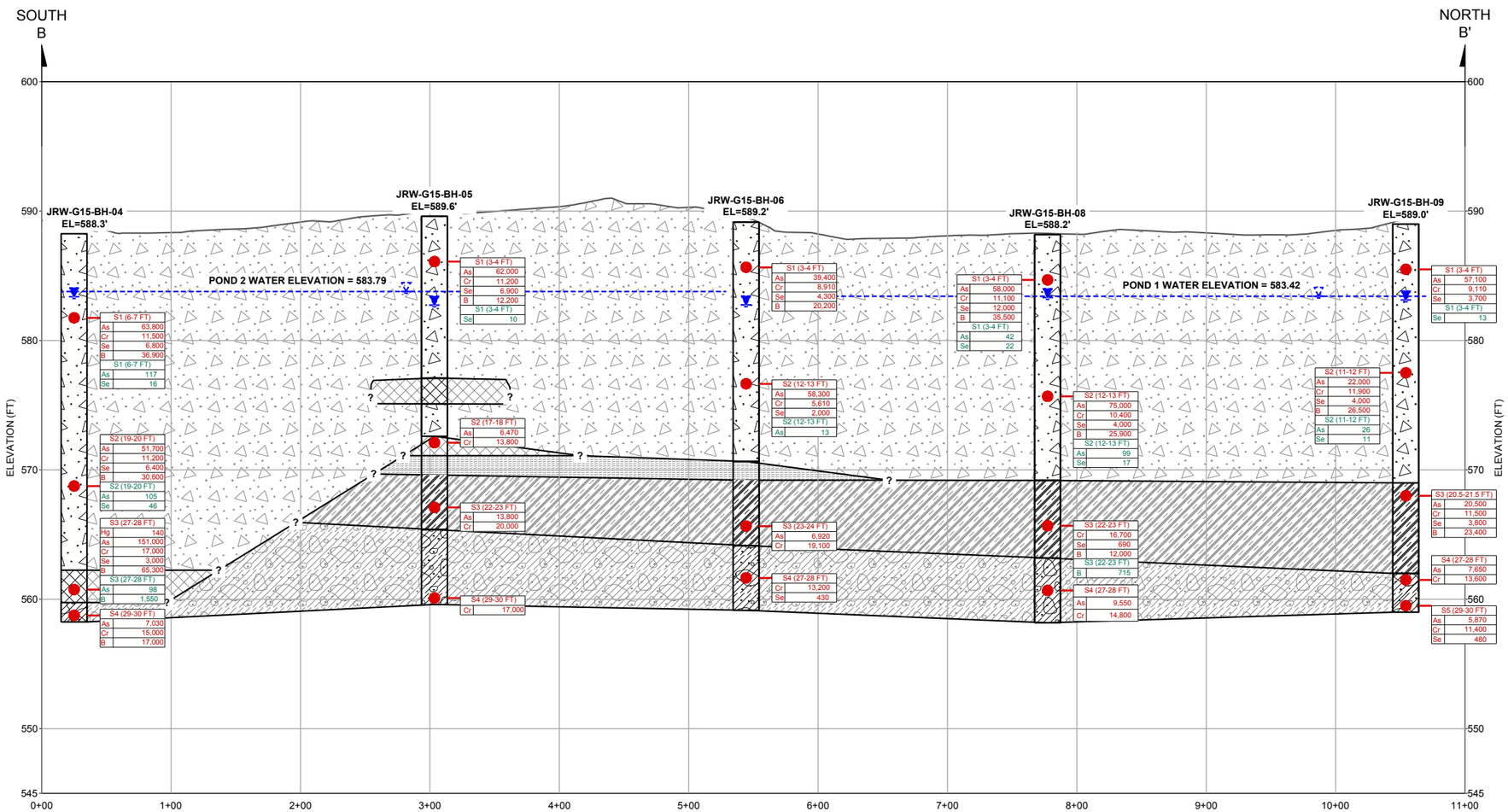
PROJECT
WHITING ASH POND MATERIAL CHARACTERIZATION

TITLE
SECTION
A–A'

PROJECT NO.	CONTROL	REV.	FIGURE
15-40973W	15-40973W.A0001	----	3



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Selenium	410	5.0
Silver	1,000	0.2
Zinc	1.7E+05	170
Boron	10,000	500
Thallium	2,300	2.0

SCALE AS SHOWN — B-B' (2) SUBSURFACE SECTION

LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- CONCRETE RUBBLE
- CLAY FILL
- ORGANIC SILT OR CLAY
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APPROVED	MJW

PROJECT
WHITING ASH POND MATERIAL CHARACTERIZATION

TITLE
SECTION
B–B'

PROJECT NO.	CONTROL	REV.	FIGURE
15-40973W	15-40973W.A0001	----	4

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

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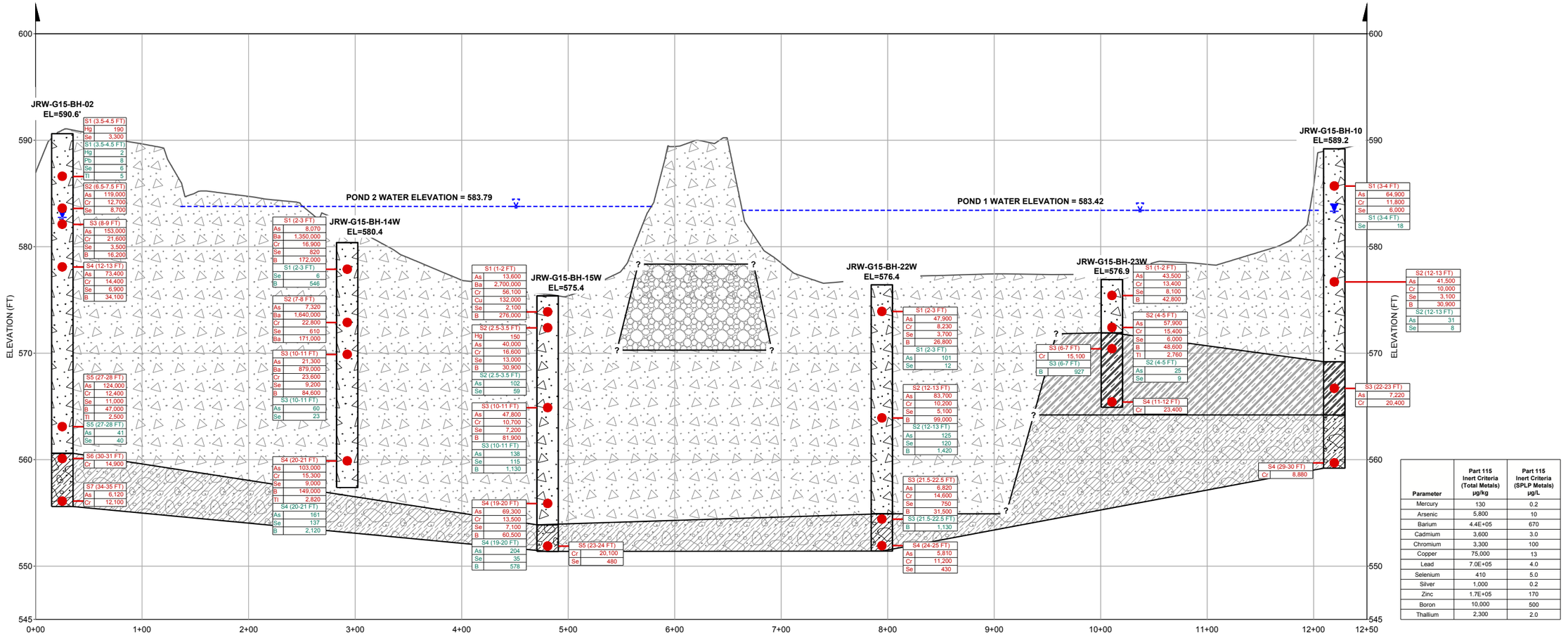
SOUTHWEST
C

NORTHEAST
C'



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SCALE AS SHOWN C-C' SUBSURFACE SECTION
2

LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
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APPROVED	MJW

PROJECT
WHITING ASH POND MATERIAL CHARACTERIZATION

TITLE
SECTION
C–C'

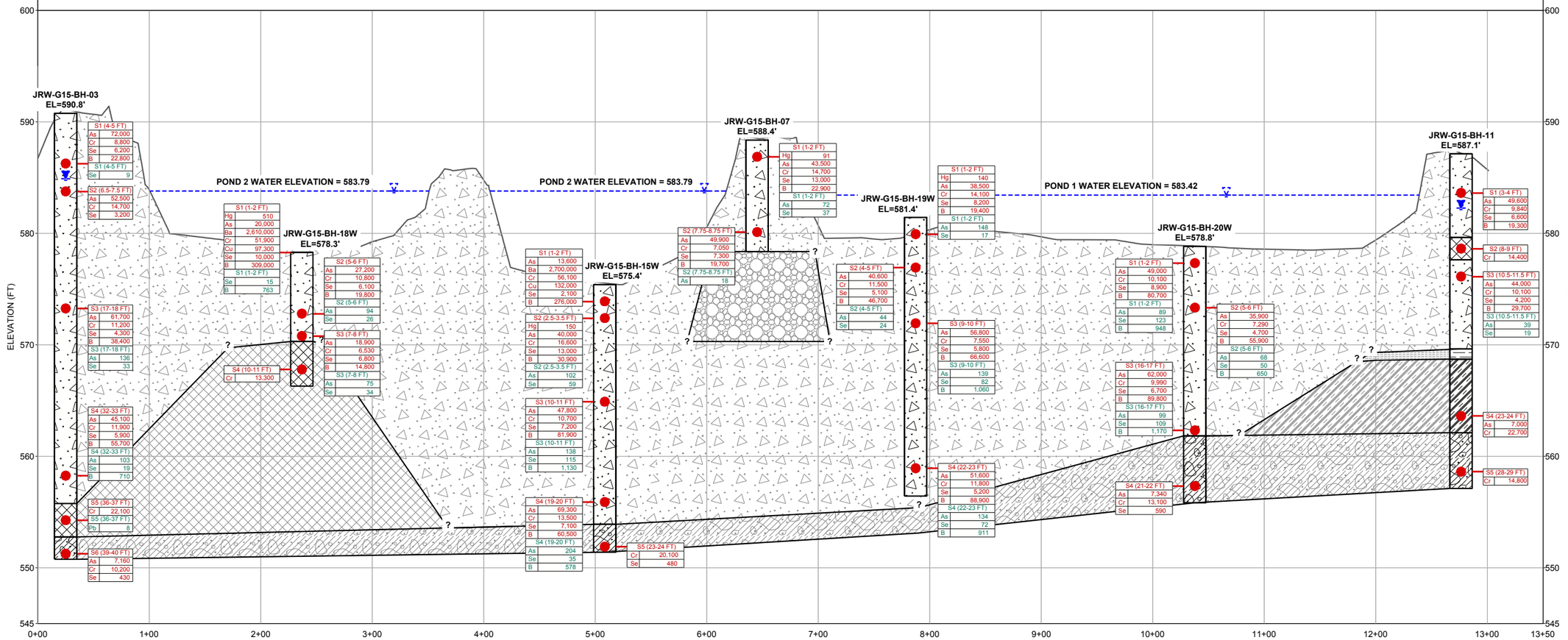
PROJECT NO.	CONTROL	REV.	FIGURE
15-40973W	15-40973W.A0001	----	5

Path: \\Lansing\cad\Projects\15x-Projects\15-40973W Whiting Ash Pond Decomm\PRODUCTION\A - 2015 GEOTECH INVESTIGATION\ | File Name: 15-40973W.A0001.dwg

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

SOUTHEAST
D

NORTHWEST
D'



SCALE AS SHOWN D-D' 2 SUBSURFACE SECTION

LEGEND

- COAL COMBUSTION RESIDUALS (CCR)
- CONCRETE RUBBLE
- CLAY FILL
- ORGANIC SILT OR CLAY
- LEAN CLAY
- SANDY LEAN CLAY (GLACIAL TILL)
- EXISTING GROUND (APPROXIMATE)
- INTERPRETED MATERIAL BOUNDARY
- APPROXIMATE DEPTH OF SATURATION IN CORE
- POND WATER ELEVATION (OBTAINED OCTOBER 21, 2015)
- SAMPLE LOCATION - INERT CRITERIA EXCEEDANCE

NOTES

1. ANALYTICAL DATA (TEXT) SHOWN IN RED INDICATES SAMPLES THAT WERE ANALYZED FOR TOTAL METALS AND EXCEEDED PART 115 INERTNESS CRITERIA.
2. ANALYTICAL DATA (TEXT) SHOWN IN GREEN INDICATES SAMPLES THAT WERE ANALYZED FOR SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) METALS AND EXCEEDED PART 115 INERTNESS CRITERIA.
3. 2015 WATER BOREHOLE LOCATIONS WERE LOCATED HORIZONTALLY BY GOLDER USING A HAND HELD GPS (TRIMBLE) AND VERTICALLY THE ELEVATIONS WERE CALCULATED FROM THE WATER DEPTH AND WATER ELEVATIONS.
4. 2015 LAND BOREHOLE LOCATIONS WERE STAKED OUT AND DOCUMENTED ON 2015-10-19 HORIZONTALLY AND VERTICALLY BY MUXLOW SURVEY COMPANY.
5. GROUND SURVEY PROVIDED BY CEC TO GOLDER VIA DWG FILE. PER ELEVATION BASIS NOTE ON DRAWING NO SF-19884, SHEET 34 PROVIDED BY SHERIDAN SURVEYING CO. ELEVATIONS WERE LOWERED 0.90' TO OBTAIN NAVD 88 ELEVATIONS.

Parameter	Part 115 Inert Criteria (Total Metals) µg/kg	Part 115 Inert Criteria (SPLP Metals) µg/L
Mercury	130	0.2
Arsenic	5,800	10
Barium	4.4E+05	670
Cadmium	3,600	3.0
Chromium	3,300	100
Copper	75,000	13
Lead	7.0E+05	4.0
Selenium	410	5.0
Silver	1,000	0.2
Zinc	1.7E+05	170
Boron	10,000	500
Thallium	2,300	2.0

VERTICAL SCALE: 0 5 10 — 1" = 10' FEET

HORIZONTAL SCALE: 0 50 100 — 1" = 100' FEET

CLIENT
CONSUMERS ENERGY COMPANY
4525 E. ERIE ROAD
ERIE, MICHIGAN 48133

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-02-16
DESIGNED	CDB
PREPARED	MAC
REVIEWED	DPR
APPROVED	MJW

PROJECT
WHITING ASH POND MATERIAL CHARACTERIZATION

TITLE
SECTION
D–D'

PROJECT NO.	CONTROL	REV.	FIGURE
15-40973W	15-40973W.A0001	----	6

Path: \\Ansing\cad\Projects\15x-Projects\15-40973W Whiting Ash Pond Decomm\PRODUCTION\A - 2015 GEOTECH INVESTIGATION | File Name: 15-40973W.A0001.dwg

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

Appendix A

Soil Laboratory Summary

TABLE 2: SOIL LABORATORY SUMMARY

Boring Location ID	Sample #	Depth (ft) from Top of Sediment	Depth (ft) from Top of Water	Description	% Gravel Size Particles	% Sand Size Particles	% Fine Size Particles	As Received %Moisture Content
JRW-G15-BH-01	S1	1.5-2.5	-	(CCR) ASH, black	12.2	42.1	45.7	23.3
JRW-G15-BH-01	S2	6-7	-	(CCR) ASH, gray	0.0	13.4	86.6	46.3
JRW-G15-BH-01	S3	7.5-8.5	-	(CCR) ASH, gray	0.0	13.7	86.3	50.9
JRW-G15-BH-01	S4	11-12	-	(CCR) ASH, dark gray	0.8	25.7	73.5	48.7
JRW-G15-BH-01	S5	14-15	-	(CCR) ASH, gray	0.0	21.8	78.2	52.4
JRW-G15-BH-01	S6	27-28	-	(CCR) ASH, dark brown	2.8	26.4	70.8	35.9
JRW-G15-BH-01	S7	32-33	-	(CCR) ASH, dark brown	0.0	6.0	94.0	48.1
JRW-G15-BH-01	S8	36-37	-	(CL) sandy CLAY, some gravel, olive yellow	5.6	25.0	69.4	19.0
JRW-G15-BH-01	S9	38-39	-	(CL) sandy CLAY, trace gravel, pale brownish gray	4.6	25.9	69.5	15.2
JRW-G15-BH-02	S1	3.5-4.5	-	(CCR) ASH, black	19.2	51.4	29.4	10.0
JRW-G15-BH-02	S2	6.5-7.5	-	(CCR) ASH, pale olive	6.4	21.8	71.8	35.1
JRW-G15-BH-02	S3	8-9	-	(CCR) ASH, black	22.2	53.7	24.1	21.0
JRW-G15-BH-02	S4	12-13	-	(CCR) ASH, dark brownish gray	0.4	9.5	90.2	50.7
JRW-G15-BH-02	S5	27-28	-	(CCR) ASH, olive brown	0.0	8.7	91.3	54.6
JRW-G15-BH-02	S6	30-31	-	(CL) sandy CLAY, trace gravel, brownish yellow	1.7	25.4	72.9	14.3
JRW-G15-BH-02	S7	34-35	-	(CL) sandy CLAY, trace gravel, light brownish gray	4.2	26.6	69.2	13.3
JRW-G15-BH-03	S1	4-5	-	(CCR) ASH, very dark gray	0.0	11.4	88.6	43.0
JRW-G15-BH-03	S2	6.5-7.5	-	(CCR) ASH, black	29.0	41.6	29.4	17.7
JRW-G15-BH-03	S3	17-18	-	(CCR) ASH, gray	0.0	3.1	96.9	63.3
JRW-G15-BH-03	S4	32-33	-	(CCR) ASH, grayish brown	0.0	5.2	94.8	64.2
JRW-G15-BH-03	S5	36-37	-	(CL) CLAY, some sand, light brownish gray	0.0	7.7	92.3	36.5
JRW-G15-BH-03	S6	39-40	-	(CL) sandy CLAY, trace gravel, light brownish gray	3.6	23.9	72.5	17.6
JRW-G15-BH-04	S1	6-7	-	(CCR) ASH, black	0.0	12.0	88.0	41.2
JRW-G15-BH-04	S2	19-20	-	(CCR) ASH, dark gray	0.0	18.9	81.1	47.8

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TABLE 2: SOIL LABORATORY SUMMARY

Boring Location ID	Sample #	Depth (ft) from Top of Sediment	Depth (ft) from Top of Water	Description	% Gravel Size Particles	% Sand Size Particles	% Fine Size Particles	As Received %Moisture Content
JRW-G15-BH-04	S3	27-28	-	(CL) sandy CLAY, trace gravel, trace organics, pale brown	1.1	23.5	75.5	43.0
JRW-G15-BH-04	S4	29-30	-	(CL) sandy CLAY, trace gravel, pale brown	2.3	26.7	71.1	15.3
JRW-G15-BH-05	S1	3-4	-	(CCR) ASH, black	0.0	15.7	84.3	31.2
JRW-G15-BH-05	S2	17-18	-	(CL) sandy CLAY, trace gravel, light brownish gray	3.9	17.2	78.8	19.9
JRW-G15-BH-05	S3	22-23	-	(CL) CLAY, trace sand, light yellowish brown	0.0	3.5	96.5	23.6
JRW-G15-BH-05	S4	29-30	-	(CL) sandy CLAY, trace gravel, light yellowish brown	3.2	25.1	71.8	14.3
JRW-G15-BH-06	S1	3-4	-	(CCR) ASH, very dark gray	0.8	13.7	85.5	34.0
JRW-G15-BH-06	S2	12-13	-	(CCR) ASH, brownish black	28.8	47.3	23.9	20.0
JRW-G15-BH-06	S3	23-24	-	(CL) CLAY, some sand, yellow	0.0	5.2	94.8	23.4
JRW-G15-BH-06	S4	27-28	-	(CL) sandy CLAY, trace gravel, brownish yellow	2.5	26.6	70.9	16.2
JRW-G15-BH-07	S1	1-2	-	(CCR) ASH, very dark gray	4.6	28.6	66.8	28.1
JRW-G15-BH-07	S2	7.75-8.75	-	(CCR) ASH, dark brownish gray	9.0	27.9	63.2	30.1
JRW-G15-BH-08	S1	3-4	-	(CCR) ASH, black	0.5	16.1	83.3	33.6
JRW-G15-BH-08	S2	12-13	-	(CCR) ASH, dark gray	0.7	15.0	84.3	47.3
JRW-G15-BH-08	S3	22-23	-	(CL) CLAY, trace sand, olive yellow	0.0	2.4	97.6	26.7
JRW-G15-BH-08	S4	27-28	-	(CL) sandy CLAY, trace gravel, brownish yellow	1.9	24.9	73.2	19.7
JRW-G15-BH-09	S1	3-4	-	(CCR) ASH, olive	0.0	12.8	87.2	40.0
JRW-G15-BH-09	S2	11-12	-	(CCR) ASH, dark grayish brown	0.0	5.8	94.2	55.6

TABLE 2: SOIL LABORATORY SUMMARY

Boring Location ID	Sample #	Depth (ft) from Top of Sediment	Depth (ft) from Top of Water	Description	% Gravel Size Particles	% Sand Size Particles	% Fine Size Particles	As Received %Moisture Content
JRW-G15-BH-09	S3	20.5-21.5	-	(CL) CLAY, some sand, light yellowish brown	0.0	6.5	93.5	23.0
JRW-G15-BH-09	S4	27-28	-	(CL) sandy CLAY, trace gravel, light yellowish brown	2.6	28.6	68.8	14.8
JRW-G15-BH-09	S5	29-30	-	(CL) sandy CLAY, trace gravel, light grayish brown	2.9	27.7	69.5	12.1
JRW-G15-BH-10	S1	3-4	-	(CCR) ASH, dark grayish brown	7.6	21.4	71.0	34.5
JRW-G15-BH-10	S2	12-13	-	(CCR) ASH, dark grayish brown	2.6	13.1	84.4	56.4
JRW-G15-BH-10	S3	22-23	-	(CL) CLAY, trace sand, light yellowish brown	0.0	2.8	97.2	24.9
JRW-G15-BH-10	S4	28-29	-	(CL) sandy CLAY, trace gravel, brownish yellow	2.5	34.6	62.8	14.9
JRW-G15-BH-11	S1	3-4	-	(CCR) ASH, dark olive gray	6.3	36.6	57.1	23.6
JRW-G15-BH-11	S2	8-9	-	(CL) sandy CLAY, some gravel, pale brown	9.8	23.3	66.9	16.6
JRW-G15-BH-11	S3	10.5-11.5	-	(CCR) ASH, black	5.3	28.7	66.0	25.1
JRW-G15-BH-11	S4	23-24	-	(CL) CLAY, some sand, trace gravel, brownish yellow	1.1	5.7	93.2	28.5
JRW-G15-BH-11	S5	28-29	-	(CL) sandy CLAY, some gravel, pale brown	7.9	29.6	62.5	14.4
JRW-G15-BH-12	S1	2-3	-	(CCR) ASH, black	8.5	29.2	62.3	25.1
JRW-G15-BH-12	S2	12-13	-	(CCR) ASH, dark olive brown	36.6	49.8	13.5	20.2
JRW-G15-BH-12	S3	14-15	-	(CCR) ASH, light olive brown	0.0	21.3	78.7	41.7
JRW-G15-BH-12	S4	21-22	-	(CL) CLAY, trace sand, yellow	0.0	3.8	96.2	25.7
JRW-G15-BH-12	S5	23-24	-	(CL) sandy CLAY, trace gravel, olive yellow	3.3	27.4	69.3	13.1
JRW-G15-BH-13	S1	3-4	-	(CCR) ASH, dark gray	26.7	67.6	6.7	11.0
JRW-G15-BH-13	S2	10-11	-	(CCR) ASH, black	14.7	35.6	49.7	23.8

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TABLE 2: SOIL LABORATORY SUMMARY

Boring Location ID	Sample #	Depth (ft) from Top of Sediment	Depth (ft) from Top of Water	Description	% Gravel Size Particles	% Sand Size Particles	% Fine Size Particles	As Received %Moisture Content
JRW-G15-BH-13	S3	13-14	-	(CCR) ASH, black	24.3	50.5	25.1	16.3
JRW-G15-BH-14W	S1	2-3	5.4-6.4	(CCR) ASH, very dark gray	0.0	30.6	69.4	80.9
JRW-G15-BH-14W	S2	7-8	10.4-11.4	(CCR) ASH, dark grayish brown	0.4	69.0	30.6	58.9
JRW-G15-BH-14W	S3	10-11	13.4-14.4	(CCR) ASH, dark grayish brown	0.0	4.7	95.3	49.5
JRW-G15-BH-14W	S4	20-21	23.4-24.4	(CCR) ASH, dark gray	1.4	6.3	92.4	49.3
JRW-G15-BH-15W	S1	1-2	9.4-10.4	(CCR) ASH, very dark gray	0.0	12.3	87.7	101.5
JRW-G15-BH-15W	S2	2.5-3.5	10.9-11.9	(CCR) ASH, very dark gray	0.8	46.6	52.7	67.7
JRW-G15-BH-15W	S3	10-11	18.4-19.4	(CCR) ASH, grayish brown	0.0	17.6	82.4	42.5
JRW-G15-BH-15W	S4	19-20	27.4-28.4	(CCR) ASH, very dark grayish brown	0.0	7.2	92.8	56.8
JRW-G15-BH-15W	S5	23-24	31.4-32.4	(CL) CLAY, some sand, grayish brown	0.0	5.1	94.9	29.7
JRW-G15-BH-16W	S1	0-1	6.8-7.8	(CCR) ASH, very dark grayish brown	0.0	13.8	86.3	107.9
JRW-G15-BH-16W	S2	3.5-4.5	10.3-11.3	(CCR) ASH, dark gray	2.0	23.5	74.6	58.1
JRW-G15-BH-16W	S3	9-10	15.8-16.8	(CCR) ASH, dark gray	0.0	26.9	73.1	47.9
JRW-G15-BH-16W	S4	12-13	18.8-19.8	(CL) sandy CLAY, trace gravel, reddish brown	2.4	20.9	76.7	18.1
JRW-G15-BH-17W	S1	0-1	8.6-9.6	(CCR) ASH, very dark gray	0.0	21.8	78.2	146.1
JRW-G15-BH-17W	S2	3-4	11.6-12.6	(CCR) ASH, dark gray	0.7	41.4	57.9	54.3
JRW-G15-BH-17W	S3	9.5-10.5	18.1-19.1	(CCR) ASH, very dark gray	7.2	35.9	56.8	47.7
JRW-G15-BH-17W	S4	13-14	21.6-22.6	(CL) sandy CLAY, trace gravel, reddish brown	3.0	17.8	79.2	20.3
JRW-G15-BH-18W	S1	1-2	6.5-7.5	(CCR) ASH, dark gray	0.0	18.6	81.4	115.4
JRW-G15-BH-18W	S2	5-6	10.5-11.5	(CCR) ASH, dark gray	0.6	39.3	60.1	72.7
JRW-G15-BH-18W	S3	7-8	12.5-13.5	(CCR) ASH, very dark gray	1.9	62.1	36.0	50.3
JRW-G15-BH-18W	S4	10-11	15.5-16.5	(CL) CLAY, some sand, trace gravel, yellow	0.2	5.8	94.0	22.3

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TABLE 2: SOIL LABORATORY SUMMARY

Boring Location ID	Sample #	Depth (ft) from Top of Sediment	Depth (ft) from Top of Water	Description	% Gravel Size Particles	% Sand Size Particles	% Fine Size Particles	As Received %Moisture Content
JRW-G15-BH-19W	S1	1-2	3-4	(CCR) ASH, dark gray	0.0	24.4	75.6	80.1
JRW-G15-BH-19W	S2	4-5	6-7	(CCR) ASH, very dark gray	16.6	42.2	41.2	28.9
JRW-G15-BH-19W	S3	9-10	11-12	(CCR) ASH, yellowish gray	11.2	44.9	43.9	24.7
JRW-G15-BH-19W	S4	22-23	24-25	(CCR) ASH, dark brownish gray	0.2	11.4	88.4	47.5
JRW-G15-BH-20W	S1	1-2	5.6-6.6	(CCR) ASH, brownish gray	1.5	33.9	64.6	36.1
JRW-G15-BH-20W	S2	5-6	9.6-10.6	(CCR) ASH, very dark gray	8.2	30.0	61.8	67.4
JRW-G15-BH-20W	S3	16-17	20.6-21.6	(CCR) ASH, gray	0.1	21.1	78.9	40.0
JRW-G15-BH-20W	S4	21-22	25.6-26.6	(CL) sandy CLAY, some gravel, pale brownish gray	9.8	25.3	64.9	15.2
JRW-G15-BH-21W	S1	0.5-1.5	6.3-7.3	(CCR) ASH, dark gray	0.0	3.5	96.5	124.5
JRW-G15-BH-21W	S2	7-8	12.8-13.8	(CCR) ASH, dark gray	0.2	4.2	95.7	60.7
JRW-G15-BH-21W	S3	12-13	17.8-18.8	(CCR) ASH, dark gray	14.2	23.4	62.4	39.7
JRW-G15-BH-21W	S4	15-16	20.8-21.8	(CL) CLAY, some sand, trace gravel, pale reddish brown	0.7	5.1	94.2	22.7
JRW-G15-BH-22W	S1	2-3	9-10	(CCR) ASH, gray	0.0	4.1	95.9	49.7
JRW-G15-BH-22W	S2	12-13	19-20	(CCR) ASH, gray	0.0	2.6	97.4	51.1
JRW-G15-BH-22W	S3	21.5-22.5	28.5-29.5	(CL) CLAY, some sand, trace gravel, dark gray	0.2	8.5	91.3	30.9
JRW-G15-BH-22W	S4	24-25	31-32	(CL) sandy CLAY, trace gravel, gray	3.9	26.4	69.6	14.1
JRW-G15-BH-23W	S1	1-2	7.5-8.5	(CCR) ASH, dark gray	0.8	23.5	75.8	58.1
JRW-G15-BH-23W	S2	4-5	10.5-11.5	(CCR) ASH, dark brownish gray	0.0	5.3	94.7	56.3
JRW-G15-BH-23W	S3	6-7	12.5-13.5	(CL) CLAY, some sand, very dark gray	0.0	5.7	94.3	42.3
JRW-G15-BH-23W	S4	11-12	17.5-18.5	(CL) CLAY, trace sand, dark yellow	0.0	3.8	96.2	23.3

APPENDIX B
HISTORICAL AERIAL PHOTOGRAPHY

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography March 06, 2014

Target Property:

4525 E ERIE Road

Erie, MI 48133

Year	***Scale***	***Details***	***Source***
1937	Aerial Photograph. Scale: 1"=500'	Flight Year: 1937	SEMCOG
1940	Aerial Photograph. Scale: 1"=500'	Flight Year: 1940	AAA
1949	Aerial Photograph. Scale: 1"=500'	Flight Year: 1949	D.E.
1955	Aerial Photograph. Scale: 1"=500'	Flight Year: 1955	CSS
1964	Aerial Photograph. Scale: 1"=500'	Flight Year: 1964	ASCS
1973	Aerial Photograph. Scale: 1"=600'	Flight Year: 1973	ASCS
1980	Aerial Photograph. Scale: 1"=500'	Flight Year: 1980	SEMCOG
1985	Aerial Photograph. Scale: 1"=500'	Flight Year: 1985	SEMCOG
1993	Aerial Photograph. Scale: 1"=500'	Flight Year: 1993	FSA
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	EDR
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	EDR
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	EDR
2010	Aerial Photograph. Scale: 1"=500'	Flight Year: 2010	EDR
2012	Aerial Photograph. Scale: 1"=500'	Flight Year: 2012	EDR


INQUIRY #: 3870672.8
YEAR: 1937
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 1940
= 500'
N
EDR

INQUIRY #: 3870672.8

YEAR: 1949

= 500'

N

EDR


INQUIRY #: 3870672.8
YEAR: 1955
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 1964
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 1973
= 600'
N
EDR


INQUIRY #: 3870672.8
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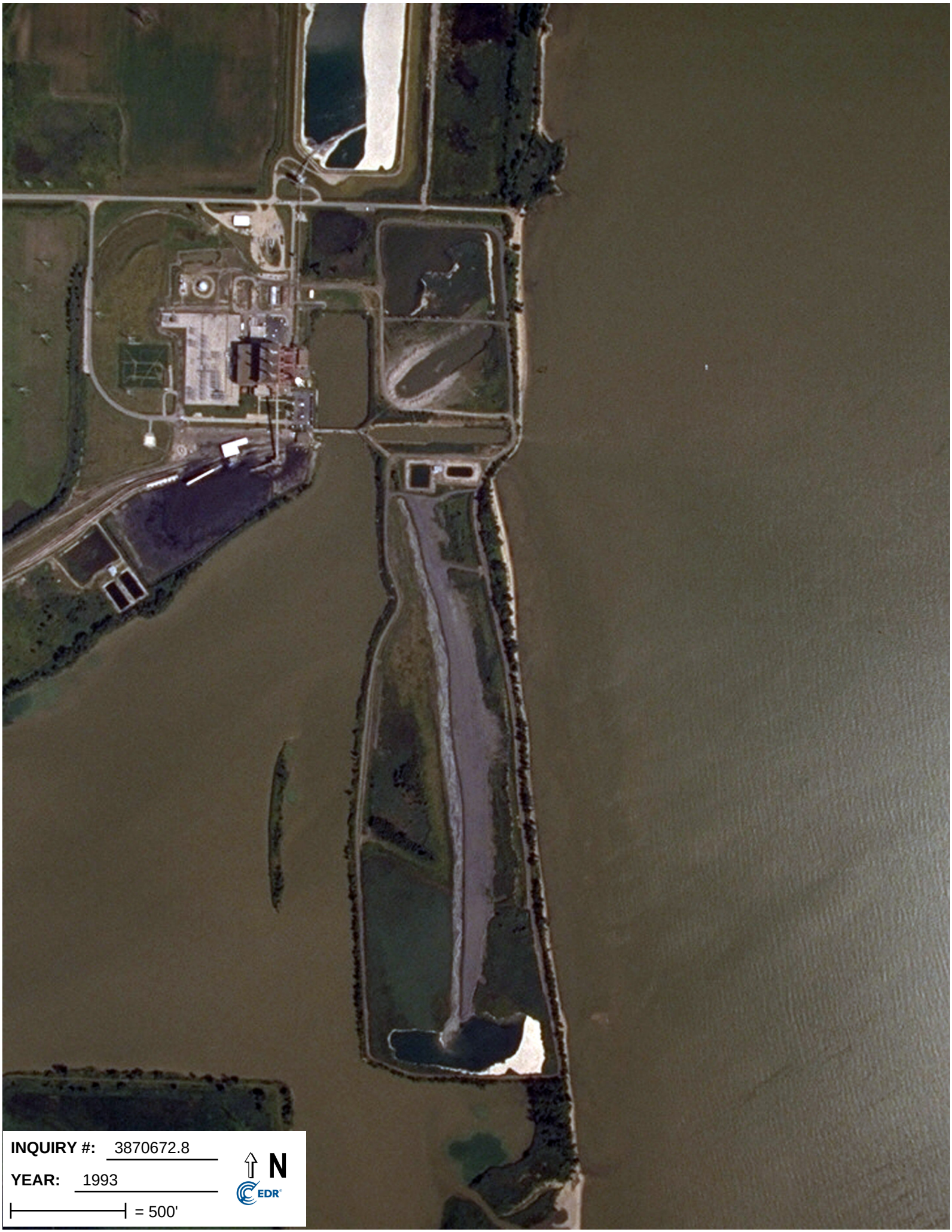
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 1985
= 500'
N
EDR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YEAR: 1993
= 500'
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EDR


INQUIRY #: 3870672.8
YEAR: 2005
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EDR


INQUIRY #: 3870672.8
YEAR: 2006
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 2010
= 500'
N
EDR


INQUIRY #: 3870672.8
YEAR: 2012
= 500'
N
EDR