



JH Campbell History of Construction Bottom Ash Pond 3

Initial Compiled History Certification by Owner or Operator

Contents

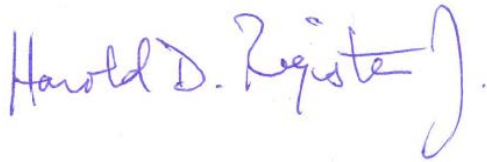
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CERTIFICATION

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

A handwritten signature in blue ink that reads "Harold D. Register, Jr." with a stylized flourish at the end.

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 (CEC)
Contact: Brad Runkel
1945 W. Parnall Road
Jackson, Michigan 49201

Name of CCR Surface Impoundment: JH Campbell Bottom Ash Pond 3
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 Port Sheldon, Michigan dated June 2016. 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 JH Campbell generating facility consists of three coal-fired electric generating units located on the western portion of the site. The ash disposal area of the facility is bounded by perimeter dikes and includes former Ponds B through K as well as the existing wet ash disposal area that includes three operational CCR surface impoundments: Bottom Ash Ponds 1-2, Bottom Ash Pond 3, and Pond A. Both Bottom Ash Ponds 1-2 and Bottom Ash Pond 3 contain an internal dike which separates a north and

south basin in each pond. The internal dike allows the owner/operator to direct flow to one portion of the unit so maintenance can be conducted on the adjacent portion of the unit. The three operational CCR surface impoundments are presented on **Figure 2**.

Bottom ash is sluiced into Bottom Ash Ponds 1-2 (which also receives coal pile run-off) and Bottom Ash Pond 3 where water is retained unless an overflow condition is reached. Under overflow conditions, the water is directed into a series of surface ditches, which ultimately discharge into the northwest corner of Pond A. Effluent from Pond A is directed through an outfall pipe that penetrates the perimeter dike into an open channel ditch leading to the recirculation pond, which ultimately discharges through the National Pollutant Discharge Elimination System (NPDES) permitted outfall into Pigeon River (AECOM 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.

According to the EPA MyWATERS Mapper website (USEPA 2016), the JH Campbell Ponds 1-2 CCR surface impoundment is located within the Pigeon River Subwatershed, which encompasses approximately 17,000 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 May 2016, soil samples were collected from beneath Bottom Ash Ponds 1-2, Bottom Ash Pond 3, and Pond A. Sampling locations are visually depicted on **Figure 2** – Existing Conditions Site Map. Physical properties of the soil samples are 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 Bottom Ash Pond 3. A portion of the engineering properties of the foundation and abutment materials are presented in the “Structural Stability and Safety Factor Assessment Report” (Golder 2016c). Additional engineering properties of the foundation and abutment materials are presented in the “Summary of Monitoring Well Design, Installation, and Development – Bottom Ash Pond 3N/3S” (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 soil and CCR that exists in the exterior berm of Bottom Ash Pond 3 to gather subsurface information to develop certifications for the structural stability and factor of safety assessment. A portion of the engineering properties of the foundation and abutment materials are presented in the “Structural Stability and Safety Factor Assessment Report” (Golder 2016c). Additional engineering properties of the foundation and abutment materials are presented in the “Summary of Monitoring Well Design, Installation, and Development – Bottom Ash Pond 3N/3S” (ARCADIS 2016).

7.2 Site Preparation and Construction

Construction drawings included in the PFMA Report (AECOM 2009) were reviewed, and the following sequence of construction was developed:

- Construction of the ash pond area began in the 1960s with several expansions, closures, and historic pond and dike configuration alterations continuing until 1997 (AECOM 2009).
- Bottom Ash Pond 3 is not present on the CEC Ash Disposal Area 1971 Addition – Pond D Plan and Sections drawing from 1971 (AECOM 2009). even though the area is not seen developed in the 1955 historical imagery but then appears in the 1962 and 1968 images and even more pronounced in the 1974 imagery (**Appendix B** – Historical Imagery).
- The CEC Boring Locations in Ash Pond Area drawing from 1977 (AECOM 2009) depicts Bottom Ash Pond 3 in similar configuration to present day.

Information regarding site preparation and construction of the CCR surface impoundment can be found on the CEC Ash Pond Plan pursuant to the June 22, 1978 solid waste permit application as well as the subsequent plan set drawings (AECOM 2009).

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 Bottom Ash Pond 3:

- Figure 2 – Existing Conditions Site Map
- Figure 3 – Ash Pond Characterization Bottom Ash Pond 3 Plan View
- Figure 3A – Ash Pond Characterization Bottom Ash Pond 3 Cross Section A-A'
- Figure 3B – Ash Pond Characterization Bottom Ash Pond 3 Cross Sections B-B'
- Figure 3C – Ash Pond Characterization Bottom Ash Pond 3 Cross Section C-C'

Cross sections were developed based on an EES Survey (September 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 Bottom Ash Ponds 3.

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 Bottom Ash Pond 3. The description and location of this existing instrumentation can be found in the "Summary of Monitoring Well Design, Installation, and Development –Bottom Ash Pond Unit 3N/3S" (ARCADIS 2016). In 2016, Golder installed five two-inch diameter standpipe piezometers that range in depth from 24 feet to 27 feet bgs. The piezometers were installed to accurately model the phreatic surface and subsequently the factor of safety for the external dike of Bottom Ash Pond 3. In 2016, EES installed four standpipe piezometers that range in depth from 27 feet to 33 feet bgs in the interior berm of Bottom Ash Pond 3. These piezometers are being used to develop construction dewatering methods for the Bottom Ash Pond 3 closure.

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

Area-capacity curves for the CCR unit.

Area capacity curves for Bottom Ash Pond 3 were calculated by Golder using survey data collected by EES in May 2016. The area capacity curves are included in the "J.H. Campbell Generating Facility Bottom Ash Pond 3 Inflow Design Flood Control System Plan" (Golder 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 completed by Golder for Bottom Ash Pond 3" (Golder 2016), an elevated trestle and pipe system hydraulically conveys bottom ash to the pond system. Water is discharged from the unit via corrugated metal pipe (CMP) outflow pipes into a series of surface ditches that convey the flow to an internal pond system and ultimately to the NPDES outfall location.

Diversion is provided by the perimeter berm, minimum elevation of 631.75 (NGVD29) (Golder 2016b), which surrounds Bottom Ash Pond 3.

11.2 Capacities and Calculations

Capacities and calculations regarding the spillway and diversion features can be found in "J.H. Campbell Generating Facility Bottom Ash Pond 3 Inflow Design Flood Control System Plan" (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

Construction specifications are detailed on drawings included in the PFMA Report (AECOM 2009).

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 JH Campbell. Beginning in October 2015, Bottom Ash Pond 3 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.

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), and Golder (2016, 2016a).

14.0 ATTACHMENTS

Figure 1 – Site Location Map

Figure 2 – Existing Conditions Site Map

Figure 3 – Ash Pond Characterization Bottom Ash Pond 3 Plan View

Figure 3A – Ash Pond Characterization Bottom Ash Pond 3 Cross Section A-A'

Figure 3B – Ash Pond Characterization Bottom Ash Pond 3 Cross Sections B-B'

Figure 3C – Ash Pond Characterization Bottom Ash Pond 3 Cross Section C-C'

Appendix A – Soil Sample Data

Appendix B – Historical Aerial Photography

15.0 REFERENCES

- AECOM (2009). "Potential Failure Mode Analysis (PFMA) Report, J.H. Campbell Generating Facility Ash Dike Assessment."
- AECOM (2009a). "Inspection Report J.H. Campbell Generating Facility Ash Dike Risk Assessment, West Olive, MI."
- AECOM (2012). "J.H. Campbell Ash Disposal Area 2012 Ash Dike Risk Assessment Final Inspection Report."
- ARCADIS (2016). "Summary of Monitoring Well Design, Installation, and Development – Bottom Ash Pond 3N/3S."
- Barr Engineering (2014). "Triennial Ash Dike Risk Assessment Report – Spring 2014"
- Consumers Energy (2010). "Coal Ash Landfill Surveillance and Monitoring Program."
- Golder Associates (2016). "J.H. Campbell Bottom Ash Pond 3, Annual RCRA CCR Surface Impoundment Inspection Report – January 2016."

Golder Associates (2016a). "J.H. Campbell Generating Facility – Bottom Ash Pond 3 Annual Inspection Report."

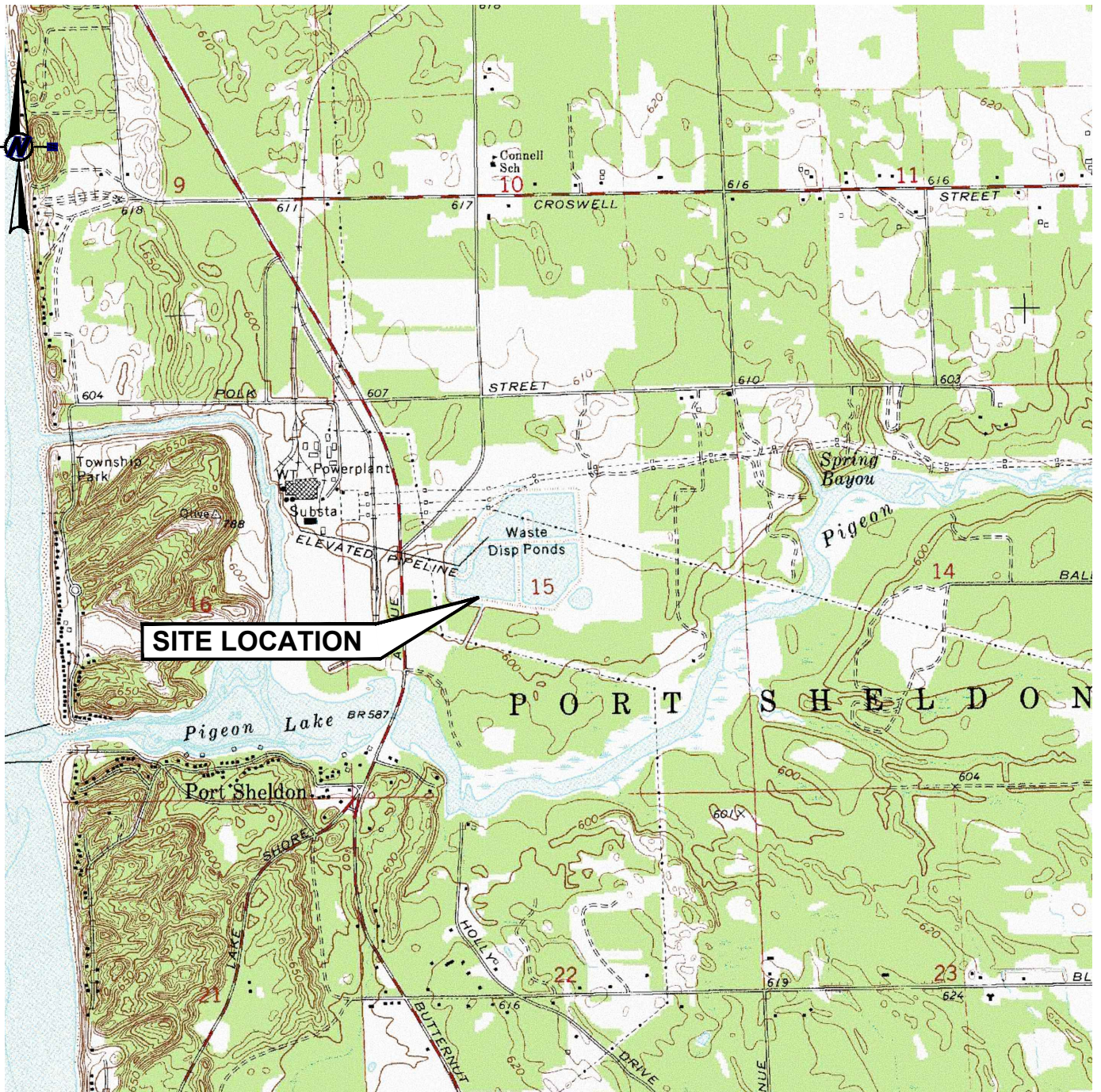
Golder Associates (2016b). "J.H. Campbell Generating Facility Bottom Ash Pond 3 Inflow Design Flood Control System Plan."

Golder Associates (2016c). "J.H. Campbell Generating Facility Bottom Ash Pond 3 Structural Stability and Safety Factor Assessment Report."

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



SITE LOCATION



MICHIGAN COUNTIES
NOT TO SCALE

REFERENCE(S)

1. BASE MAP TAKEN FROM 7.5 MINUTE U.S.G.S. QUADRANGLES OF PORT SHELDON MICHIGAN, DOWNLOADED FROM MICHIGAN DNR WEBSITE JUNE 2016.



CLIENT
CONSUMERS ENERGY COMPANY
 17000 CROSWELL ST.
 WEST OLIVE, MI 49460

PROJECT
J.H. CAMPBELL PLANT GENERATING FACILITY
 HISTORY OF CONSTRUCTION

CONSULTANT

YYYY-MM-DD 2016-06-06

DESIGNED BAL

PREPARED ARM

REVIEWED DJS

APPROVED

TITLE

SITE LOCATION MAP

PROJECT NO.
 1654923

REV.
 #

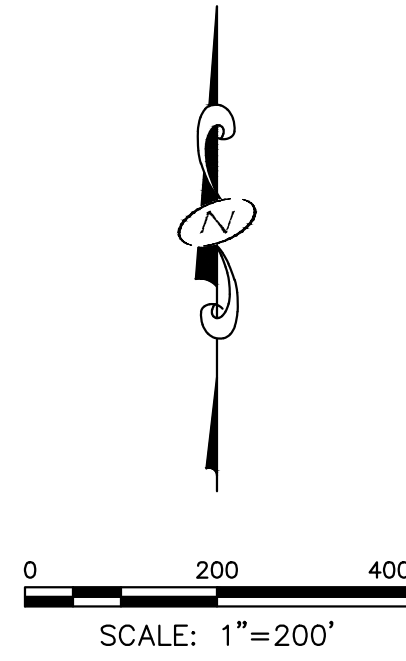
FIGURE
 1



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



LEGEND
 SOIL BORING ▲
 PIEZOMETER ⊕
 MONITORING WELL ⊕



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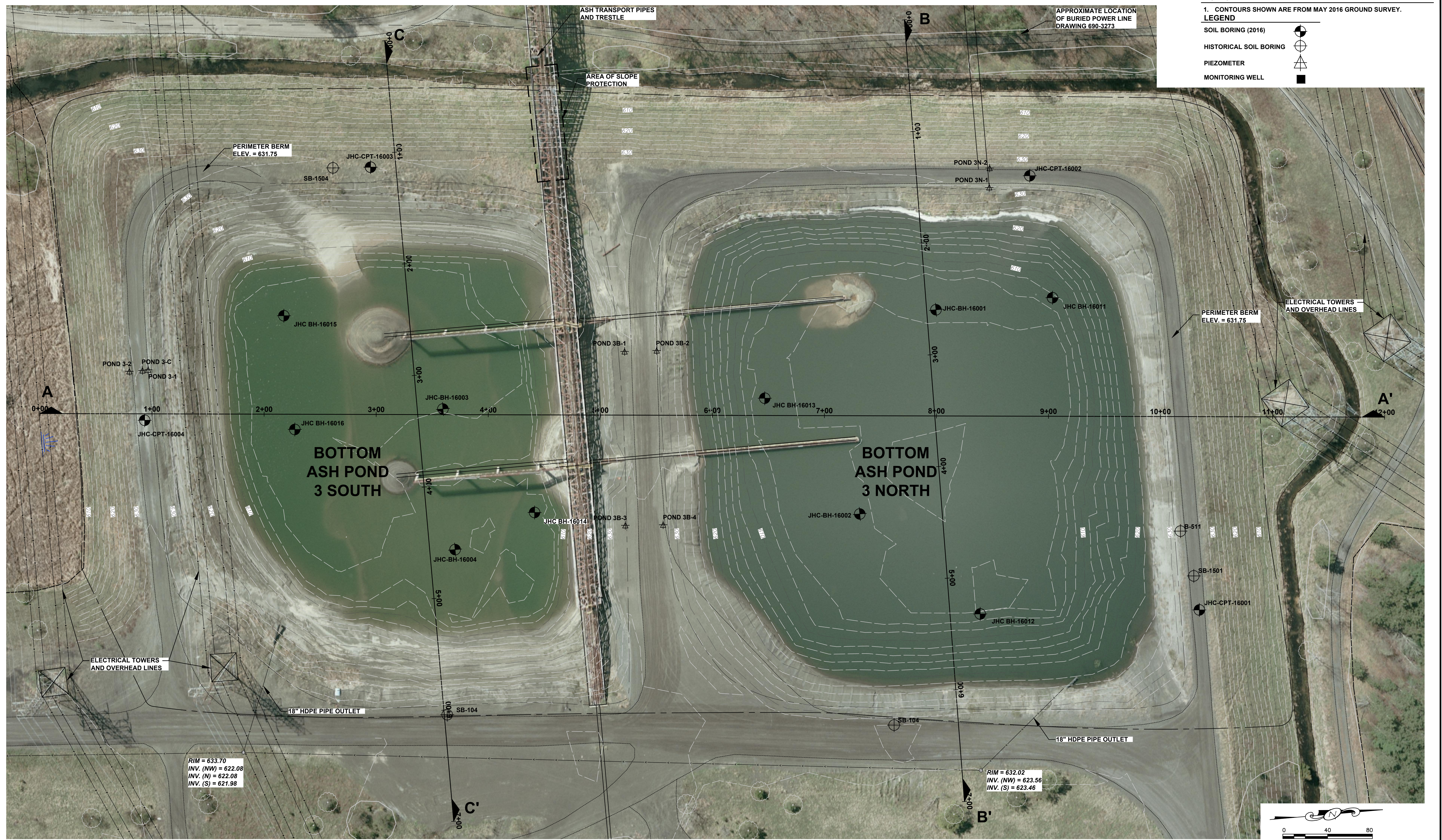


J.H. CAMPBELL ASH STORAGE FACILITY

**EXISTING CONDITIONS
SITE MAP**

SCALE	1" = 200'	DRAWING NO.		FIGURE	2	UNIT#	
JOB	1654923			REV.	A		

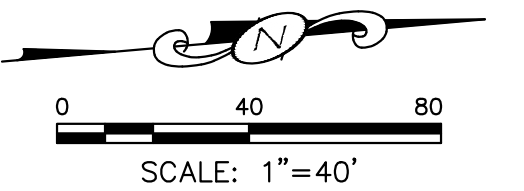
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NOTES
 1. CONTOURS SHOWN ARE FROM MAY 2016 GROUND SURVEY.

LEGEND

- SOIL BORING (2016)
- HISTORICAL SOIL BORING
- PIEZOMETER
- MONITORING WELL



REFERENCE DRAWINGS	REV	DATE	DESCRIPTION	BY	CHK	APP	REV	DATE	DESCRIPTION	BY	CHK	APP

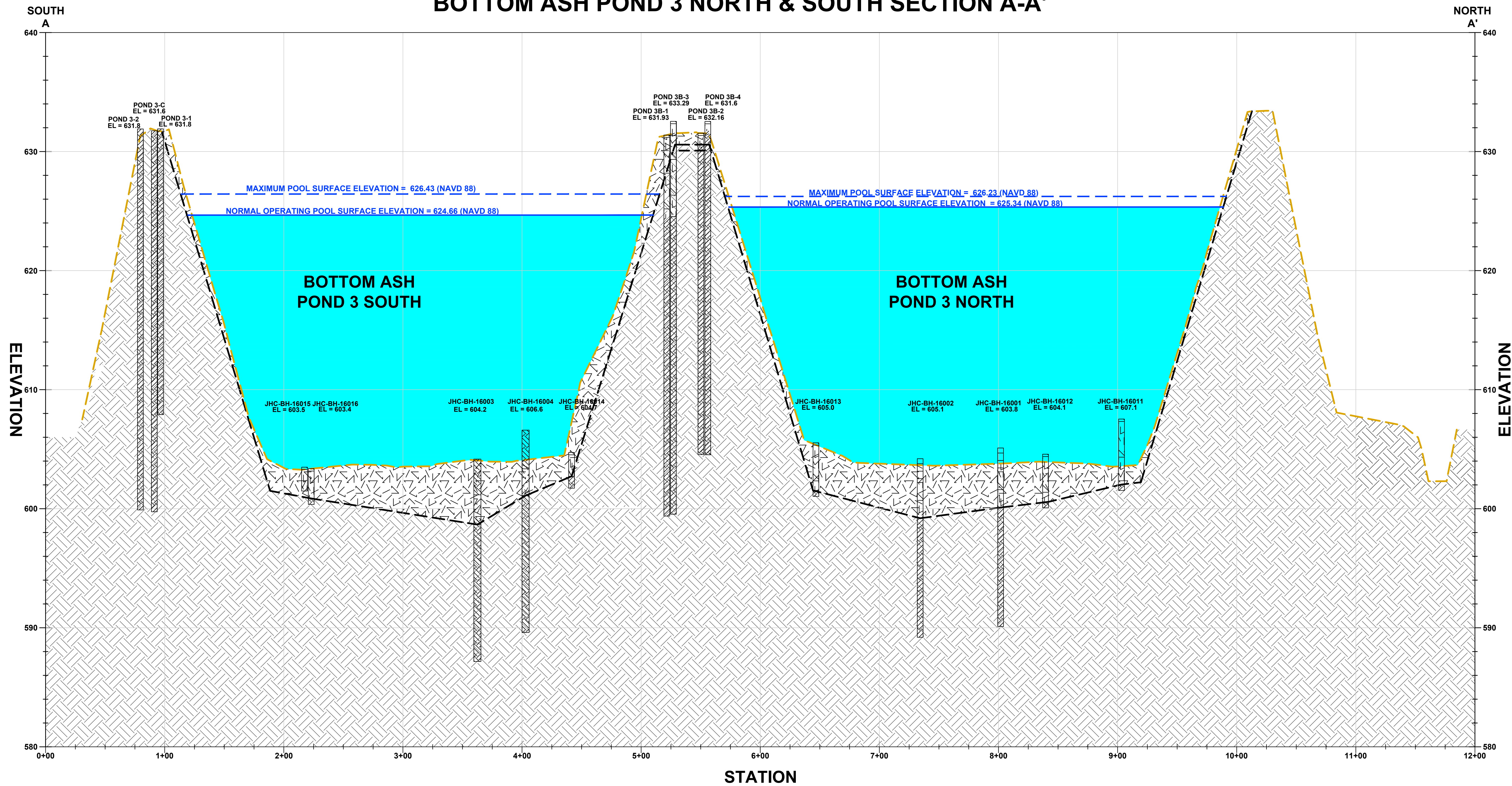


J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION
 BOTTOM ASH POND 3 PLAN VIEW

SCALE	1" = 40'/1" = 4'	DRAWING NO.	----	FIGURE	3	UNIT#	REV.	A
JOB	1654923							

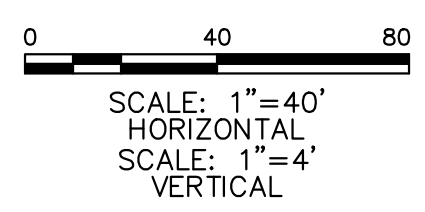
BOTTOM ASH POND 3 NORTH & SOUTH SECTION A-A'



LEGEND

EXISTING GROUND (MAY 2016)	
BOTTOM OF CCR SURFACE PROFILE	
CCR MATERIAL	
NATIVE MATERIAL	

- NOTES**
- DRAWING CREATED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS, LLC.
 - EXISTING CONTOURS WERE GENERATED FROM A GROUND SURVEY PERFORMED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS LLC. IN MAY 2016.
 - THE CONTOURS FOR THE WESTERN PERIMETER DITCH AND THE PIPE ELEVATIONS WERE GENERATED FROM SURVEYS COMPLETED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS, LLC IN FEBRUARY 2015.



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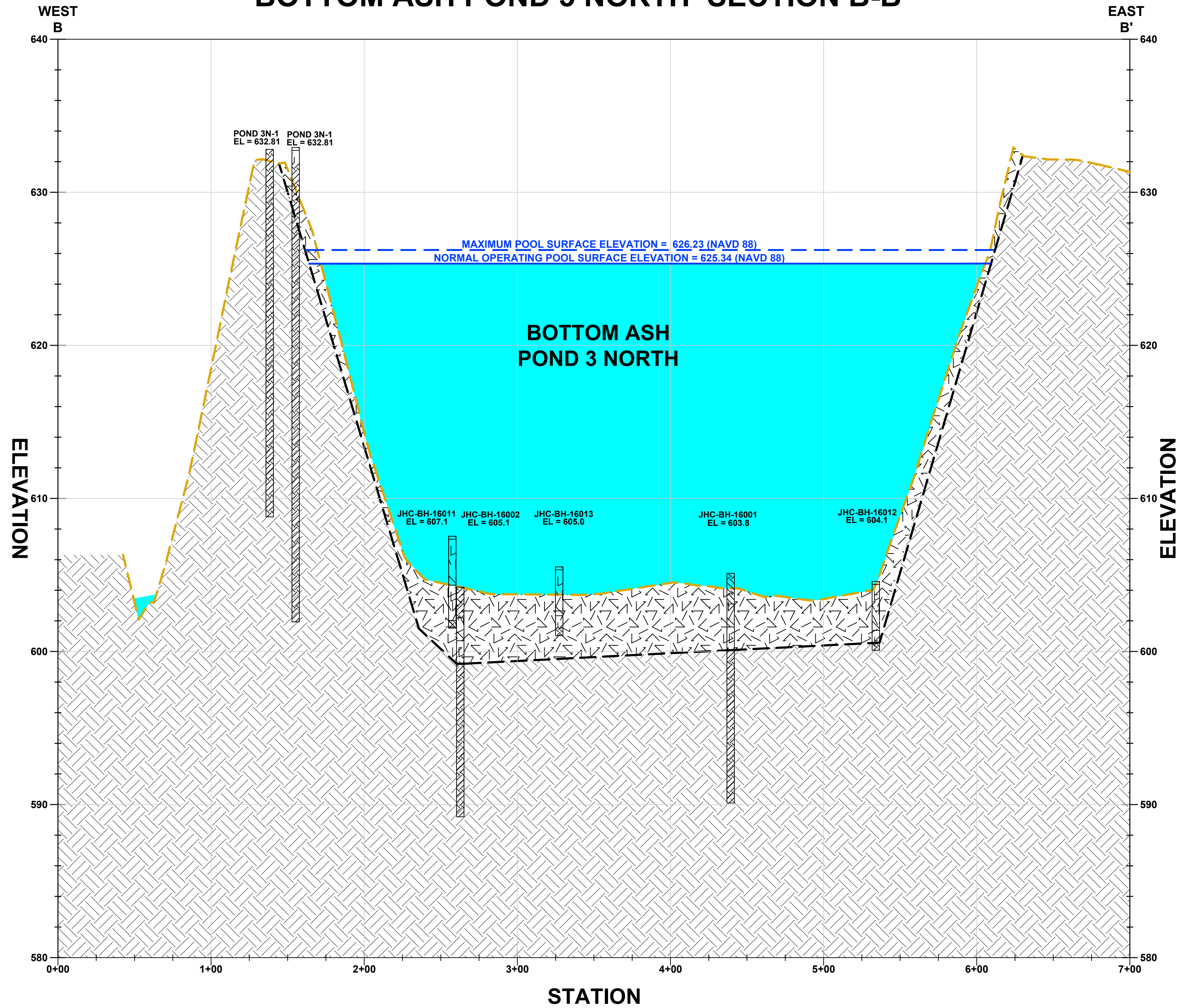
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J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION			
BOTTOM ASH POND 3 CROSS SECTION A-A'			
SCALE	1" = 40'/1" = 4'	DRAWING NO.	----
JOB	1654923	FIGURE	3A
UNIT#		REV.	A

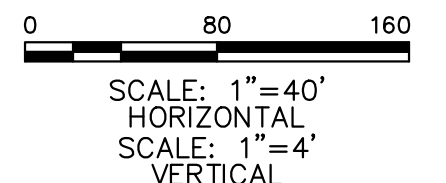
BOTTOM ASH POND 3 NORTH SECTION B-B'



LEGEND

EXISTING GROUND (MAY 2016)	
BOTTOM OF CCR SURFACE PROFILE	
CCR MATERIAL	
NATIVE MATERIAL	

- NOTES**
- DRAWING CREATED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS, LLC.
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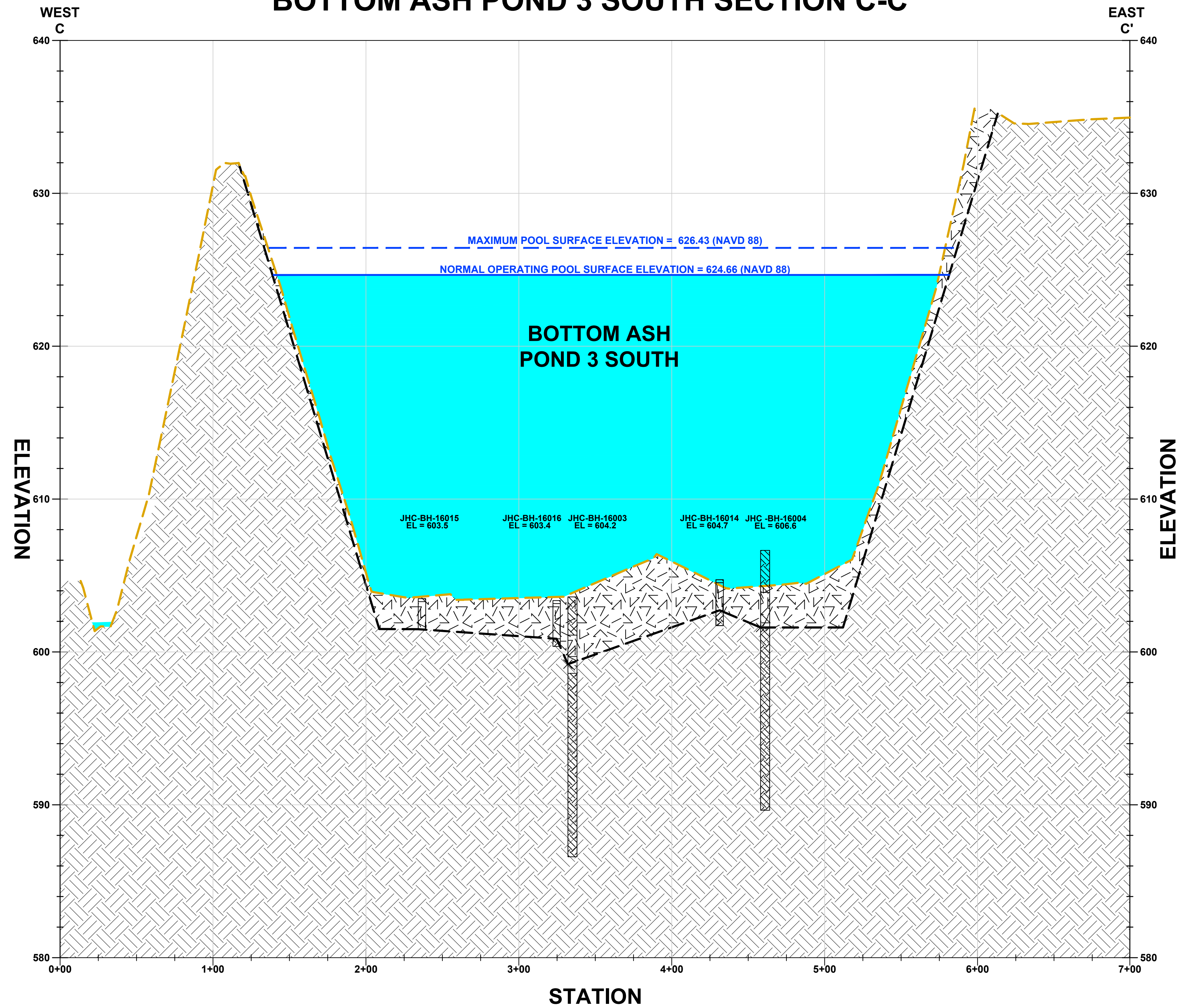


J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION
BOTTOM ASH POND 3 CROSS SECTION B-B'

SCALE	1" = 40'/1" = 4'	DRAWING NO.	----	FIGURE	3B	UNIT#	REV.	A
JOB	1654923							

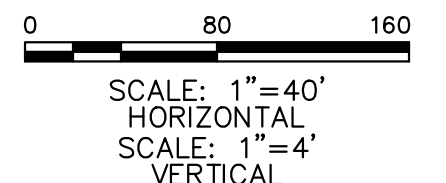
BOTTOM ASH POND 3 SOUTH SECTION C-C'



LEGEND

EXISTING GROUND (MAY 2016)	
BOTTOM OF CCR SURFACE PROFILE	
CCR MATERIAL	
NATIVE MATERIAL	

- NOTES**
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J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION
BOTTOM ASH POND 3 CROSS SECTION C-C'

SCALE	1" = 40'/1" = 4'	DRAWING NO.	----	FIGURE	3C	UNIT#	REV.	A
JOB	1654923							

**APPENDIX A
SOIL SAMPLE DATA**

MOISTURE CONTENT DETERMINATIONS

Project Number 152-4652A
Project Name Consumers Campbell Bottom Ash Tank

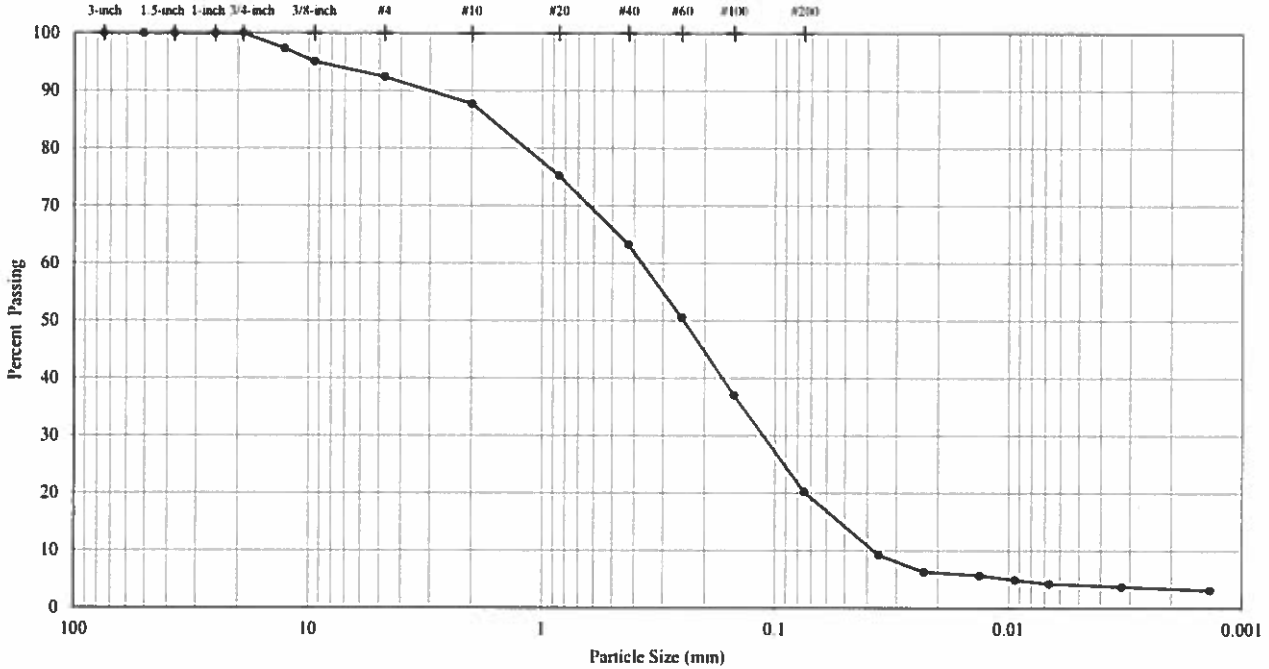
Tech HD
Date 3/15/2015
Checked Reviewed *PR*

Borehole Number	Sample Depth (ft)	Sample Number	Wt. of Wet Soil & Tare (g)	Wt. of Dry Soil & Tare (g)	Weight of Tare (g)	Weight of Water (g)	Weight of Dry Soil (g)	Water Content (%)
SB-1501	9.0-11.0	-	40.15	39.22	14.88	0.93	24.34	3.8
SB-1501	14.0-16.0	-	46.58	41.61	13.67	4.97	27.94	17.8
SB-1501	24.0-26.0	-	42.75	39.52	13.65	3.23	25.87	12.5
SB-1502	19.0-21.0	-	55.90	51.22	13.87	4.68	37.35	12.5
SB-1502	34.0-36.0	-	52.47	45.80	14.79	6.67	31.01	21.5
SB-1503	4.0-6.0	-	41.53	40.54	13.57	0.99	26.97	3.7
SB-1503	9.0-11.0	-	58.58	52.11	13.51	6.47	38.60	16.8
SB-1503	24.0-26.0	-	51.23	45.55	14.85	5.68	30.70	18.5
SB-1504	4.0-6.0	-	45.91	44.51	14.80	1.40	29.71	4.7
SB-1504	14.0-16.0	-	61.71	53.05	13.53	8.66	39.52	21.9
SB-1504	24.0-26.0	-	48.93	44.96	14.82	3.97	30.14	13.2
SB-1504	44.0-46.0	-	58.28	50.03	13.66	8.25	36.37	22.7
SB-1505	2.0-4.0	-	38.49	34.31	14.97	4.18	19.34	21.6
SB-1505	9.0-11.0	-	40.15	34.21	13.70	5.94	20.51	29.0
SB-1506	4.0-6.0	-	40.42	38.40	13.84	2.02	24.56	8.2
SB-1506	9.0-11.0	-	37.86	34.68	13.64	3.18	21.04	15.1
SB-1506	15.4	-	32.34	26.99	13.71	5.35	13.28	40.3
SB-1506	14.0-16.0	-	34.11	30.78	13.50	3.33	17.28	19.3
SB-1506	19.0-21.0	-	53.30	40.85	13.84	12.45	27.01	46.1
SB-1506	44.0-46.0	-	51.95	45.52	13.84	6.43	31.68	20.3
SB-1507	4.0-6.0	-	51.17	48.17	14.94	3.00	33.23	9.0
SB-1507	14.0-16.0	-	34.69	33.77	13.60	0.92	20.17	4.6
SB-1507	24.0-26.0	-	50.13	43.49	13.75	6.64	29.74	22.3

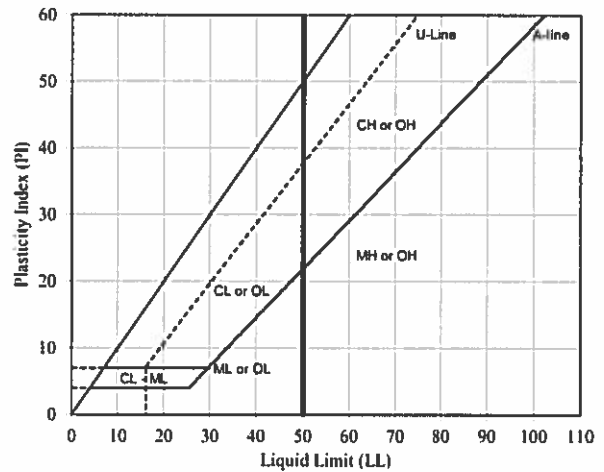
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **J.H. Campbell Ash Pond Characterization**
 SAMPLE ID: **JHIC-BH-16001 S-2**
 TYPE: **Jar**

DEPTH (ft): **2.5**



Sieve Analysis (Initial Separation on No. 4 Sieve)	Particle Size		Description	Percentage
	Sieve	(mm)		
	3-inch	75.0	Cobbles	0.00
	2-inch	50.8	Coarse Gravel	0.00
	1.5-inch	37.5		
	1-inch	25.0		
	3/4-inch	19.0		
	1/2-inch	12.7	Fine Gravel	7.59
	3/8-inch	9.5		
	#4	4.75		
	#10	2.0	Coarse Sand	4.67
	#20	0.85		
	#40	0.425	Medium Sand	24.48
	#60	0.25		
	#100	0.15	Fine Sand	43.01
	#200	0.075		
Hydrometer Analysis		0.036	Silt or Clay Fines	20.24
		0.023		
		0.013		
		0.009		
		0.007		
		0.003		
	0.001			



Visual Description:
 Very dark gray, CCR

LL	PL	PI	LI
-	-	-	-

As-Received Moisture Content (%): **44.6**

USCS Group Symbol: **-**

Notes: (1) Particle size analysis sample Mechanically dispersed using Stirring Apparatus A for about 1 Minute.
 (2) Sample prepared for Atterberg Limits testing by the dry method. Material retained on No. 40 sieve removed from Atterberg Limits sample by dry sieving. Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using manual device.

TECH	DW
DATE	5/24/2016
CHECK	PS
REVIEW	BSV

ASTM GRAIN SIZE ANALYSIS
ASTM D 421, D 2217, D 1140, C 117, D 422, C 136, C 142

PROJECT TITLE PROJECT NO. REMARKS	J.H. Campbell Ash Pond Characterization	SAMPLE ID SAMPLE TYPE SAMPLE DEPTH (ft)	JHC-BH-16002 S-4
	165-4923		Jar
			6.0

WATER CONTENT (Delivered Moisture)				Hygroscopic Moisture For Sieve Sample	
Wt Wet Soil & Tare (gm)	(w1)	33.12	Wet Soil & Tare (gm)	1.00	
Wt Dry Soil & Tare (gm)	(w2)	30.30	Dry Soil & Tare (gm)	1.00	
Weight of Tare (gm)	(w3)	13.59	Tare Weight (gm)	0.00	
Weight of Water (gm)	(w4=w1-w2)	2.82	Moisture Content (%)	0.00%	
Weight of Dry Soil (gm)	(w5=w2-w3)	16.71	Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture		
Moisture Content (%)	(w4/w5)*100	16.88	Weight Of Sample (gm)	592.88	
			Tare Weight (gm)	298.23	
			(W6) Total Dry Weight (gm)	294.65	

SIEVE ANALYSIS		Wt Ret	Cum. Ret.	Cumulative	% PASS	SIEVE
Tare Weight		+Tare	(Wt-Tare)	(%Retained)	(100-%ret)	
298.23			(dry)	[(wt ret/w6)*100]		
3.0"	298.23	0.00	0.00	100.00	3.0"	coarse gravel
2.5"	298.23	0.00	0.00	100.00	2.5"	coarse gravel
2.0"	298.23	0.00	0.00	100.00	2.0"	coarse gravel
1.5"	298.23	0.00	0.00	100.00	1.5"	coarse gravel
1.0"	298.23	0.00	0.00	100.00	1.0"	coarse gravel
0.75"	298.23	0.00	0.00	100.00	0.75"	fine gravel
0.50"	298.23	0.00	0.00	100.00	0.50"	fine gravel
0.375"	298.23	0.00	0.00	100.00	0.375"	fine gravel
#4	298.90	0.67	0.23	99.77	#4	coarse sand
#10	300.40	2.17	0.74	99.26	#10	medium sand
#20	305.39	7.16	2.43	97.57	#20	medium sand
#40	399.12	100.89	34.24	65.76	#40	fine sand
#60	552.99	254.76	86.46	13.54	#60	fine sand
#100	582.03	283.80	96.32	3.68	#100	fine sand
#200	591.12	292.89	99.40	0.60	#200	finer

% C GRAVEL	0.00	Descriptive Terms > 10% mostly coarse (c) > 10% mostly medium (m) < 10% fine (c-m) < 10% coarse (m-f) < 10% coarse and fine (m) < 10% coarse and medium (f) > 10% equal amounts each (c-f)	LL	-
% F GRAVEL	0.23		PL	-
% C SAND	0.51		PI	-
% M SAND	33.50		Gs	-
% F SAND	65.16			
% FINES	0.60			
% TOTAL	100.00			

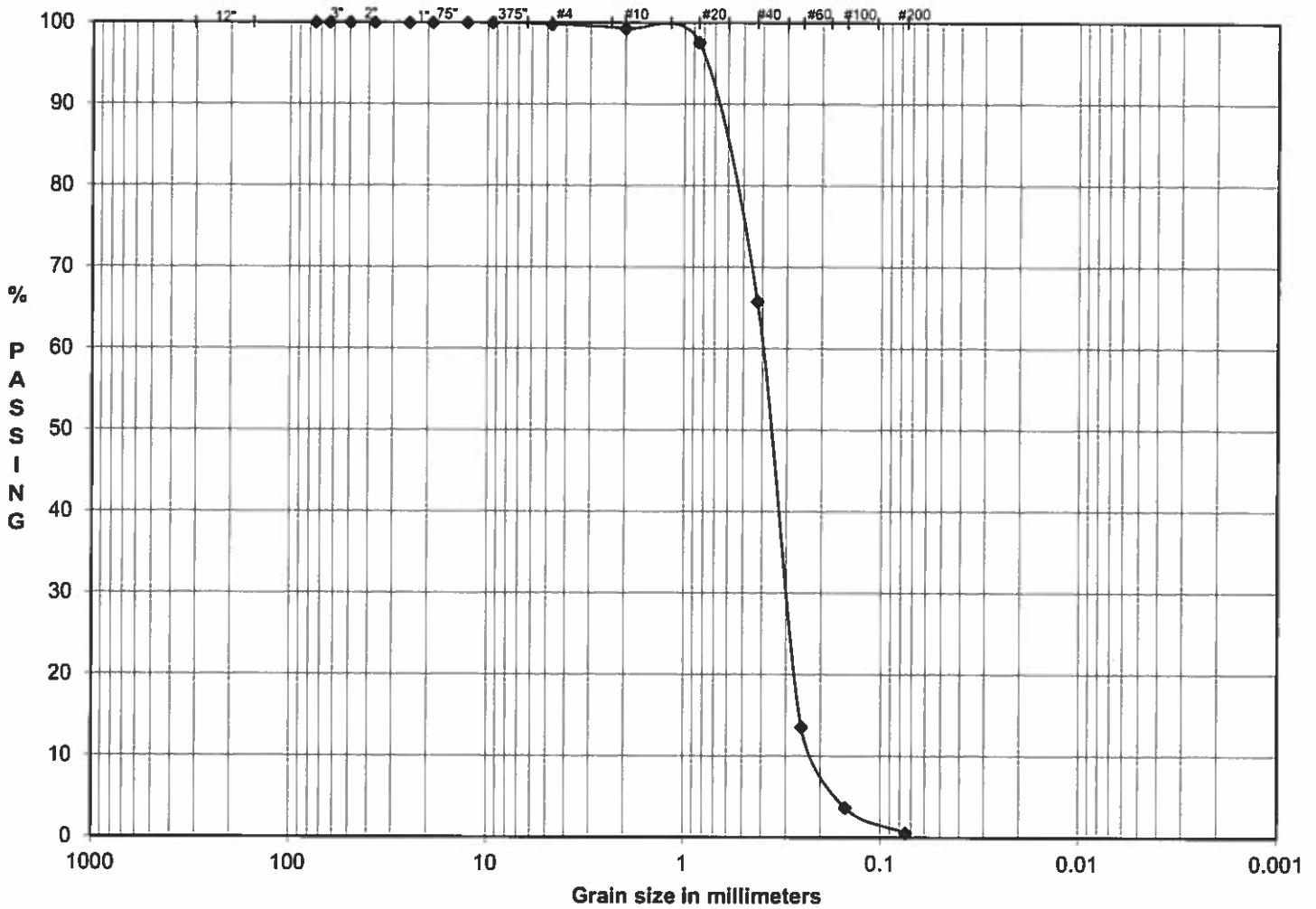
DESCRIPTION Light brown, POORLY GRADED SAND, trace gravel, trace fines

USCS SP

TECH DF
DATE 5/25/2016
CHECK PS
REVIEW BSV

* material finer than #4 sieve corrected for hygroscopic moisture.

**PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES**



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		GRAVEL		SAND			FINES
	0.00	0.00	0.23	0.51	33.50	65.16	0.60
		0.23		99.18			

SAMPLE ID	JHC-BH-16002 S-4
SAMPLE TYPE	Jar
SAMPLE DEPTH (ft)	6

LL	-
PL	-
PI	-

DESCRIPTION: Light brown, POORLY GRADED SAND, trace gravel, trace fines

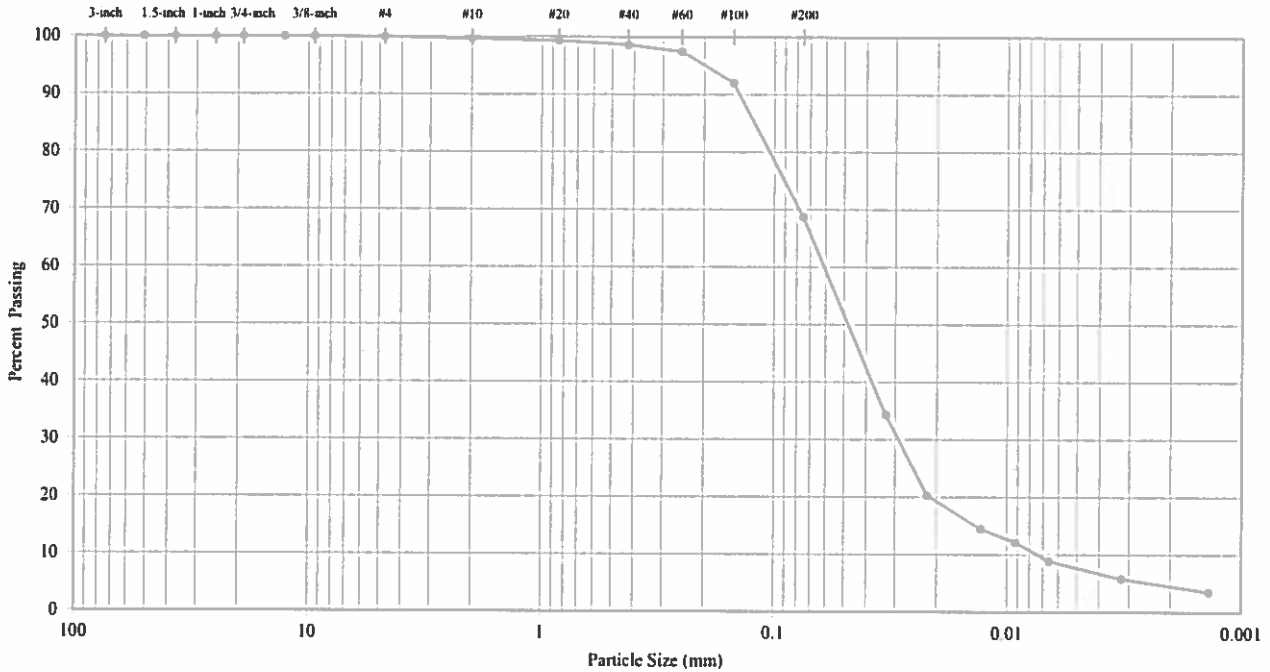
USCS: SP

TECH	DF
DATE	5/25/2016
CHECK	<i>[Signature]</i>
REVIEW	<i>[Signature]</i>

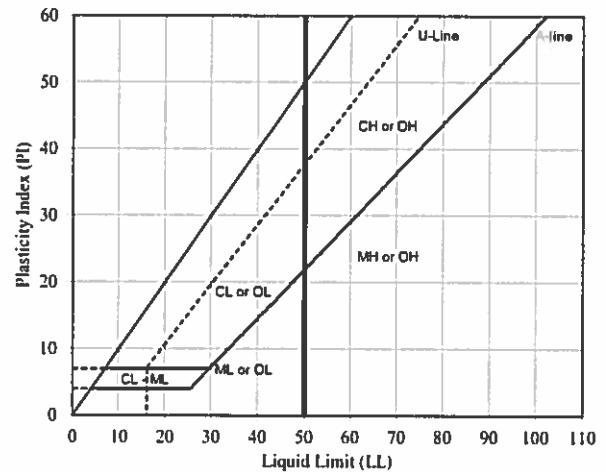
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **J.H. Campbell Ash Pond Characterization**
 SAMPLE ID: **JHC-BH-16003 S-2**
 TYPE: **Jar**

DEPTH (ft): **3.0**



Sieve	Particle Size		Description	Percentage
	(mm)	% Passing		
3-inch	75.0	100.0	Cobbles	0.00
2-inch	50.8	100.0	Coarse Gravel	0.00
1.5-inch	37.5	100.0		
1-inch	25.0	100.0		
3/4-inch	19.0	100.0		
1/2-inch	12.7	100.0	Fine Gravel	0.10
3/8-inch	9.5	100.0		
#4	4.75	99.9	Coarse Sand	0.23
#10	2.0	99.7		
#20	0.85	99.3		
#40	0.425	98.7	Medium Sand	1.01
#60	0.25	97.5		
#100	0.15	92.0	Fine Sand	29.98
#200	0.075	68.7		
Hydrometer Analysis	0.033	34.3	Silt or Clay Fines	68.68
	0.022	20.3		
	0.013	14.5		
	0.009	12.1		
	0.007	8.9		
	0.003	5.8		
	0.001	3.5		



Visual Description:
 Very dark gray, CCR

LL	PL	PI	LI
--	--	--	--

As-Received Moisture Content (%): **51.9**

USCS Group Symbol: **-**

Notes: (1) Particle size analysis sample Mechanically dispersed using Stirring Apparatus A for about 1 Minute.
 (2) Sample prepared for Atterberg Limits testing by the dry method. Material retained on No. 40 sieve removed from Atterberg Limits sample by dry sieving. Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using manual device.

TECH: DW
 DATE: 5/24/2016
 CHECK: *PS*
 REVIEW: *RST*

ASTM GRAIN SIZE ANALYSIS
ASTM D 421, D 2217, D 1140, C 117, D 422, C 136, C 142

PROJECT TITLE PROJECT NO. REMARKS	J.H. Campbell Ash Pond Characterization	SAMPLE ID SAMPLE TYPE SAMPLE DEPTH (ft)	JHC-BH-16004 S-4
	165-4923		Jar
			6.0

WATER CONTENT (Delivered Moisture)		Hygroscopic Moisture For Sieve Sample	
Wt Wet Soil & Tare (gm)	(w1) 37.43	Wet Soil & Tare (gm)	1.00
Wt Dry Soil & Tare (gm)	(w2) 33.90	Dry Soil & Tare (gm)	1.00
Weight of Tare (gm)	(w3) 13.77	Tare Weight (gm)	0.00
Weight of Water (gm)	(w4=w1-w2) 3.53	Moisture Content (%)	0.00%
Weight of Dry Soil (gm)	(w5=w2-w3) 20.13	Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture	
Moisture Content (%)	(w4/w5)*100 17.54	Weight Of Sample (gm)	605.26
		Tare Weight (gm)	297.48
		(W6) Total Dry Weight (gm)	307.78

Tare Weight	Wt Ret +Tare	Cum. Ret. (Wt-Tare) (dry)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	SIEVE
297.48					
	297.48	0.00	0.00	100.00	3.0" coarse gravel
	297.48	0.00	0.00	100.00	2.5" coarse gravel
	297.48	0.00	0.00	100.00	2.0" coarse gravel
	297.48	0.00	0.00	100.00	1.5" coarse gravel
	297.48	0.00	0.00	100.00	1.0" coarse gravel
	297.48	0.00	0.00	100.00	0.75" fine gravel
	297.48	0.00	0.00	100.00	0.50" fine gravel
	297.48	0.00	0.00	100.00	0.375" fine gravel
	306.65	9.17	2.98	97.02	#4 coarse sand
	319.55	22.07	7.17	92.83	#10 medium sand
	329.30	31.82	10.34	89.66	#20 medium sand
	340.11	42.63	13.85	86.15	#40 fine sand
	453.05	155.57	50.55	49.45	#60 fine sand
	572.88	275.40	89.48	10.52	#100 fine sand
	599.37	301.89	98.09	1.91	#200 fines

% C GRAVEL	0.00	Descriptive Terms > 10% mostly coarse (c) trace 0 to 5% > 10% mostly medium (m) little 5 to 12% < 10% fine (c-m) some 12 to 30% < 10% coarse (m-f) and 30 to 50% < 10% coarse and fine (m) < 10% coarse and medium (f) > 10% equal amounts each (c-f)	LL	-
% F GRAVEL	2.98		PL	-
% C SAND	4.19		PI	-
% M SAND	6.68		Gs	-
% F SAND	84.24			
% FINES	1.91			
% TOTAL	100.00			

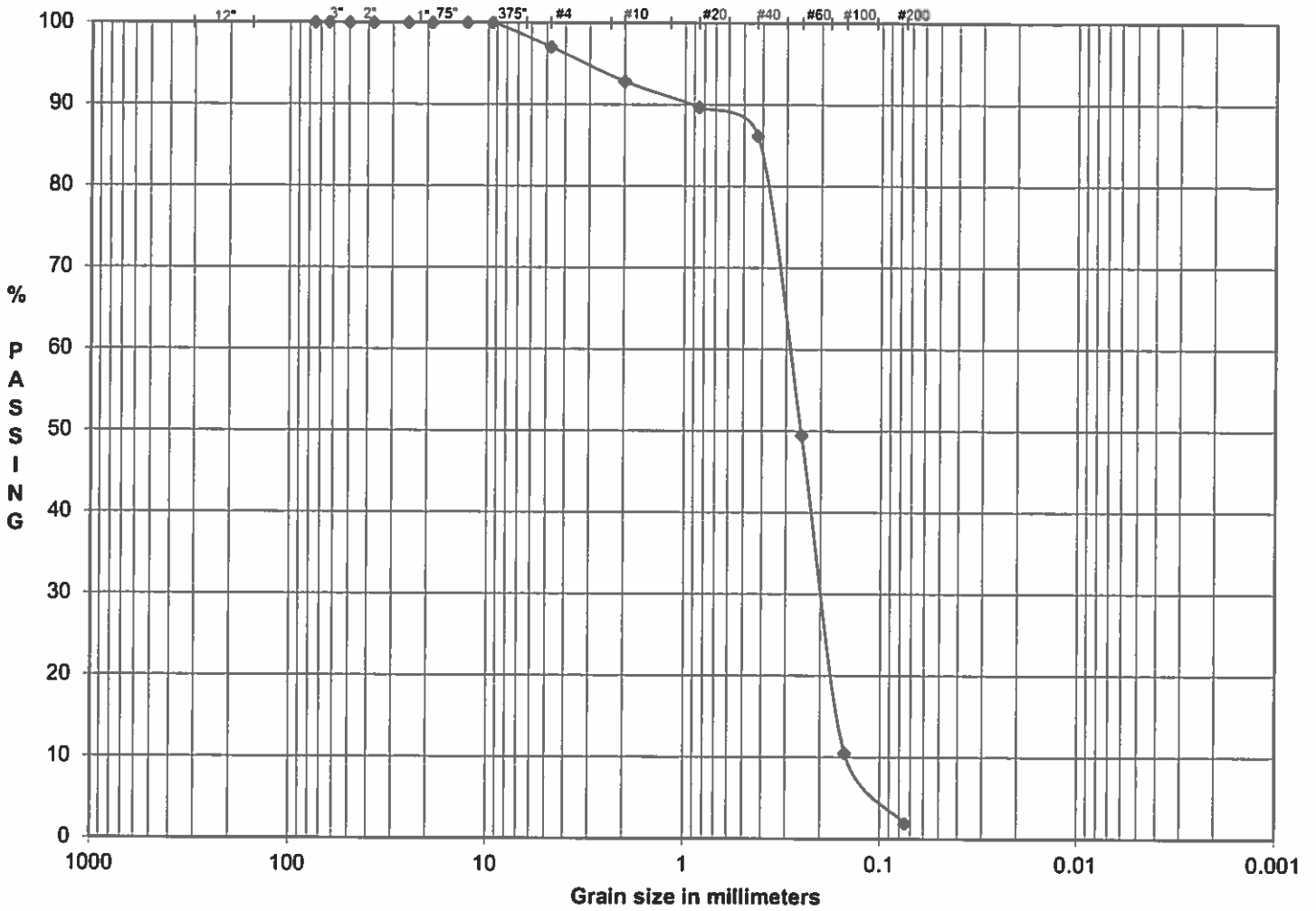
DESCRIPTION Brown, POORLY GRADED SAND, trace gravel, trace fines

USCS SP

TECH DF
DATE 5/25/2016
CHECK [Signature]
REVIEW [Signature]

* material finer than #4 sieve corrected for hygroscopic moisture.

**PARTICLE SIZE DISTRIBUTION ASTM D 421 AND D 422
US STANDARD SIEVE OPENING SIZES**



Boulders	Cobbles	Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
		GRAVEL		SAND			FINES
	0.00	0.00	2.98	4.19	6.68	84.24	1.91
		2.98		95.11			

SAMPLE ID	JHC-BH-16004 S-4
SAMPLE TYPE	Jar
SAMPLE DEPTH (ft)	6

LL	-
PL	-
PI	-

DESCRIPTION: Brown, POORLY GRADED SAND, trace gravel, trace fines

USCS: SP

TECH	DF
DATE	5/25/2016
CHECK	<i>[Signature]</i>
REVIEW	<i>[Signature]</i>

APPENDIX B
HISTORICAL AERIAL PHOTOGRAPHY



J.H. Campbell Solid Waste Disposal Area

LAKESHORE DR

West Olive, MI 49460

Inquiry Number: 3324207.2

May 21, 2012

The EDR Aerial Photo Decade Package

EDR Aerial Photo Decade Package

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with any questions or comments.

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Date EDR Searched Historical Sources:

Aerial Photography May 21, 2012

Target Property:

LAKESHORE DR

West Olive, MI 49460

<u><i>Year</i></u>	<u><i>Scale</i></u>	<u><i>Details</i></u>	<u><i>Source</i></u>
1938	Aerial Photograph. Scale: 1"=600'	Flight Year: 1938	AAA
1950	Aerial Photograph. Scale: 1"=600'	Flight Year: 1950	PMA
1955	Aerial Photograph. Scale: 1"=600'	Flight Year: 1955	CSS
1962	Aerial Photograph. Scale: 1"=600'	Flight Year: 1962	CSS
1968	Aerial Photograph. Scale: 1"=600'	Flight Year: 1968	ASCS
1974	Aerial Photograph. Scale: 1"=600'	Flight Year: 1974	ASCS
1992	Aerial Photograph. Scale: unknown	Flight Year: 1992 Best Copy Available from original source	FSA
1997	Aerial Photograph. Scale: 1"=500'	/Composite DOQQ - acquisition dates: 1997	EDR
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	EDR
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	EDR



INQUIRY #: 3324207.2

YEAR: 1938

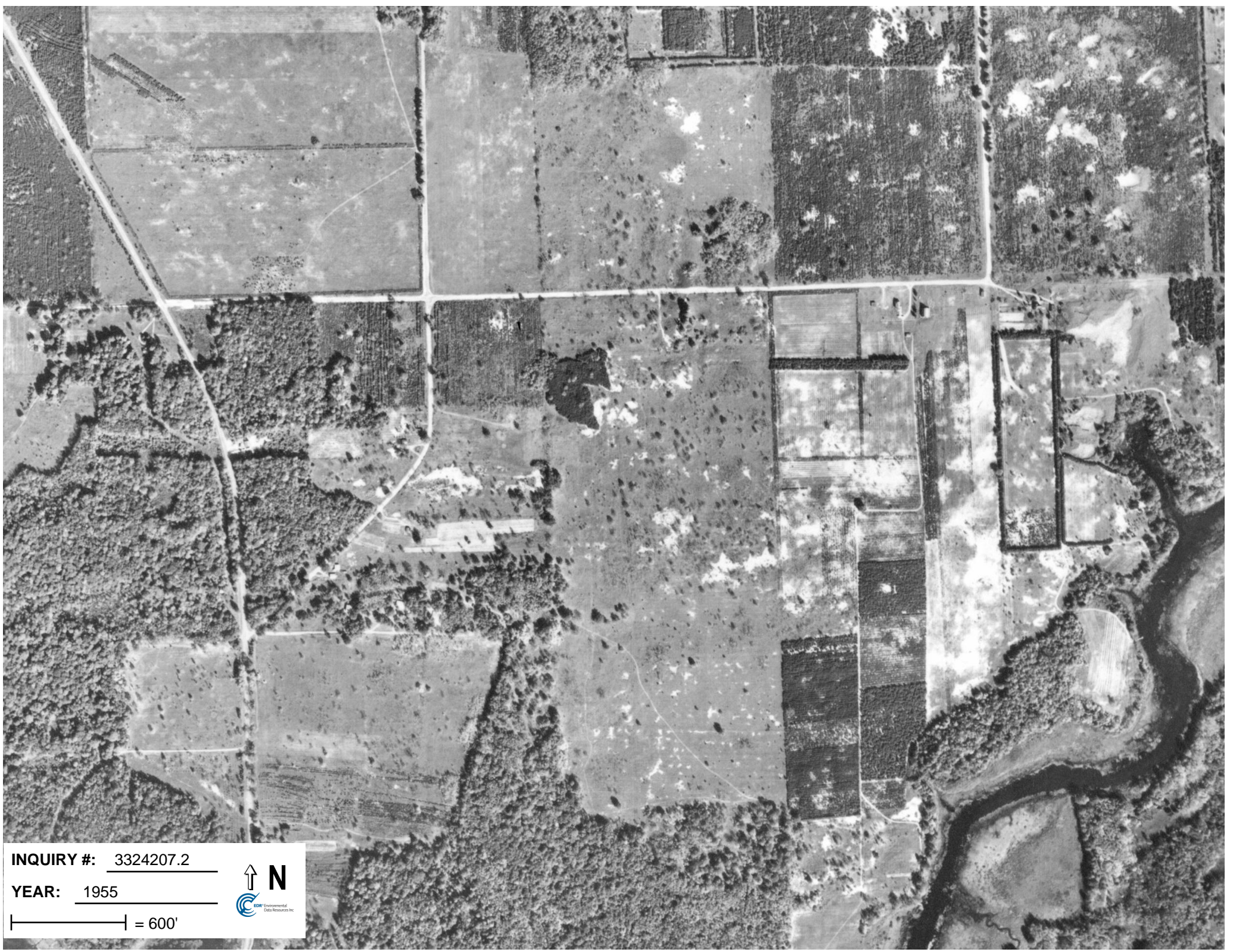
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YEAR: 1950
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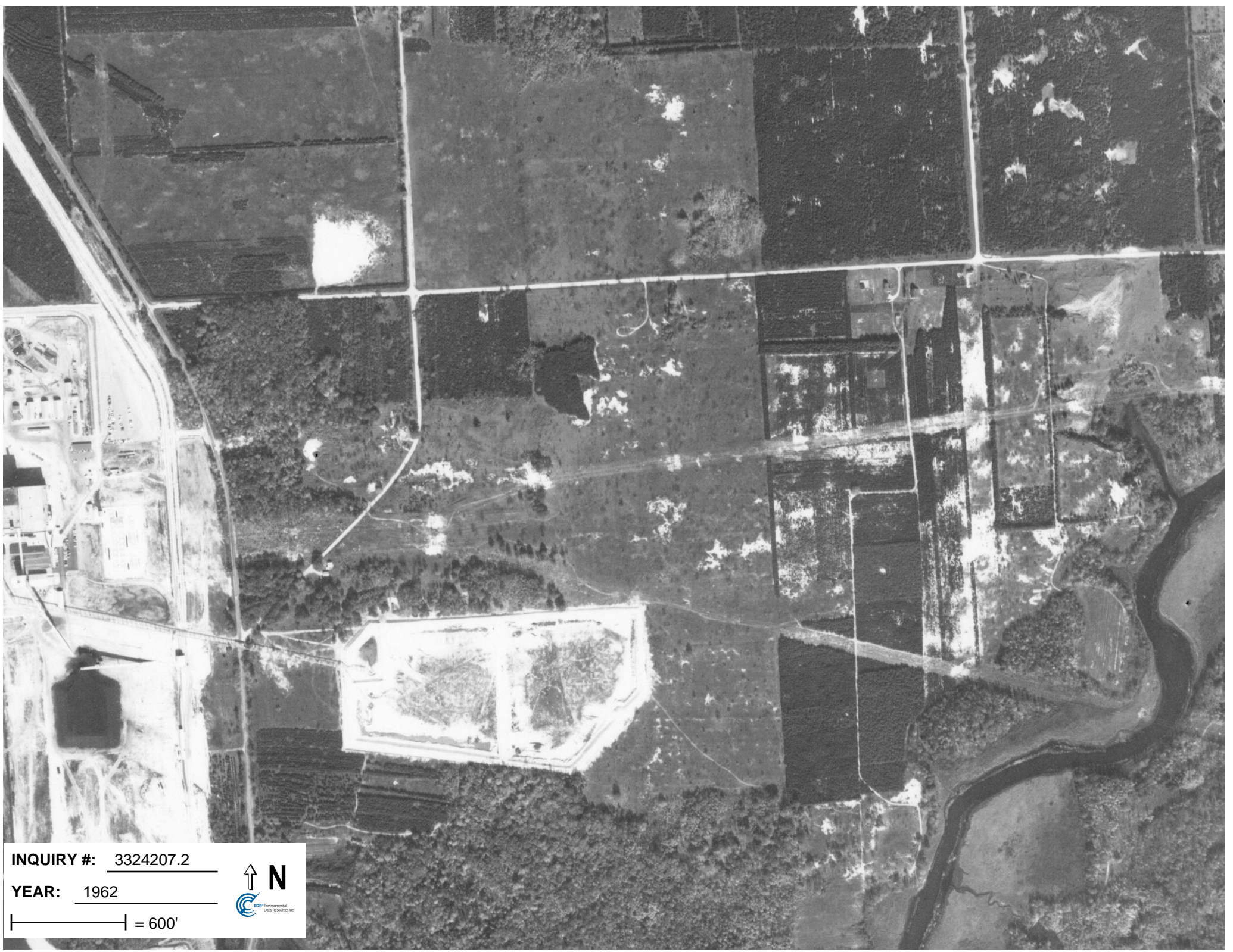


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YEAR: 1955

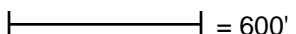
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INQUIRY #: 3324207.2

YEAR: 1962

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INQUIRY #: 3324207.2

YEAR: 1968

| = 600'





INQUIRY #: 3324207.2
YEAR: 1974
|-----| = 600'





INQUIRY #: 3324207.2

YEAR: 1992

| = unknown





INQUIRY #: 3324207.2

YEAR: 1997

| = 500'

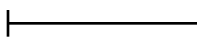


EDR Environmental Data Resources Inc.



INQUIRY #: 3324207.2

YEAR: 2005

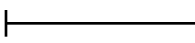
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INQUIRY #: 3324207.2

YEAR: 2006

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