JH Campbell History of Construction
Bottom Ash Ponds 1-2

Initial Compiled History Certification by Owner or Operator

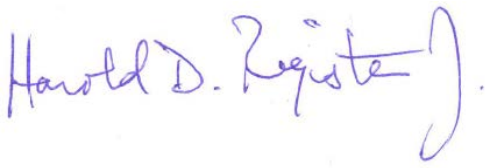
Contents

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

Name of CCR Surface Impoundment: JH Campbell Bottom Ash 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 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 though 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. The ash disposal area and the three operational CCR surface impoundments are presented on Figure 2. 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 while maintenance is conducted on the adjacent portion of the unit. 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 Ponds 1-2. 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 Unit 1-2N/1-2S*" (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 Ponds 1-2 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 Unit 1-2N/1-2S*" (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 Ponds 1-2 are 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 Ponds 1-2 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 Ponds 1-2 for CEC's review and use:

- Figure 2 – Existing Conditions Site Map
- Figure 3 – Ash Pond Characterization Bottom Ash Ponds 1-2 Plan View
- Figure 3A – Ash Pond Characterization Bottom Ash Ponds 1-2 Cross Section A-A'
- Figure 3BC – Ash Pond Characterization Bottom Ash Ponds 1-2 Cross Sections B-B' and 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 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. The following language was developed for CEC's review and use:

CEC retained ARCADIS to install RCRA monitoring wells to characterize groundwater quality conditions in the vicinity of Bottom Ash Ponds 1-2. 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 1-2N/1-2S*" (ARCADIS 2016). In 2016, Golder installed four two-inch diameter standpipe piezometers that range in depth from 11 feet to 24 feet below ground surface (bgs). The piezometers were installed to accurately model the phreatic surface and subsequently the factor of safety for the external dike of Bottom Ash Ponds 1-2.

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

Area-capacity curves for the CCR unit.

Area capacity curves for Bottom Ash Ponds 1-2 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 Ponds 1-2 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 Ponds 1-2*" (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 624.71 (NGVD29) (Golder 2016b), which surrounds Bottom Ash Ponds 1-2.

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 Ponds 1-2 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 Ponds 1-2 were 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.

On February 19, 1993, an approximately 40-foot long section of the perimeter dike of the northern portion of Bottom Ash Ponds 1-2 failed. An estimated 15,000 gallons of water was released from the pond resulting in the flooding of Lakeshore Drive and deposition of sand and bottom ash on Consumers Energy property. Details regarding this breach, the possible causes, and the repairs are included in the PFMA Report (AECOM, 2009).

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 Ponds 1-2 Plan View

Figure 3A – Ash Pond Characterization Bottom Ash Ponds 1-2 Cross Section A-A'

Figure 3BC – Ash Pond Characterization Bottom Ash Ponds 1-2 Cross Sections B-B' and 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 Unit 1-2N/1-2S*."

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 1-2, Annual RCRA CCR Surface Impoundment Inspection Report – January 2016*."

Golder Associates (2016a). "*J.H. Campbell Generating Facility – Bottom Ash Pond 1-2 Annual Inspection Report*."

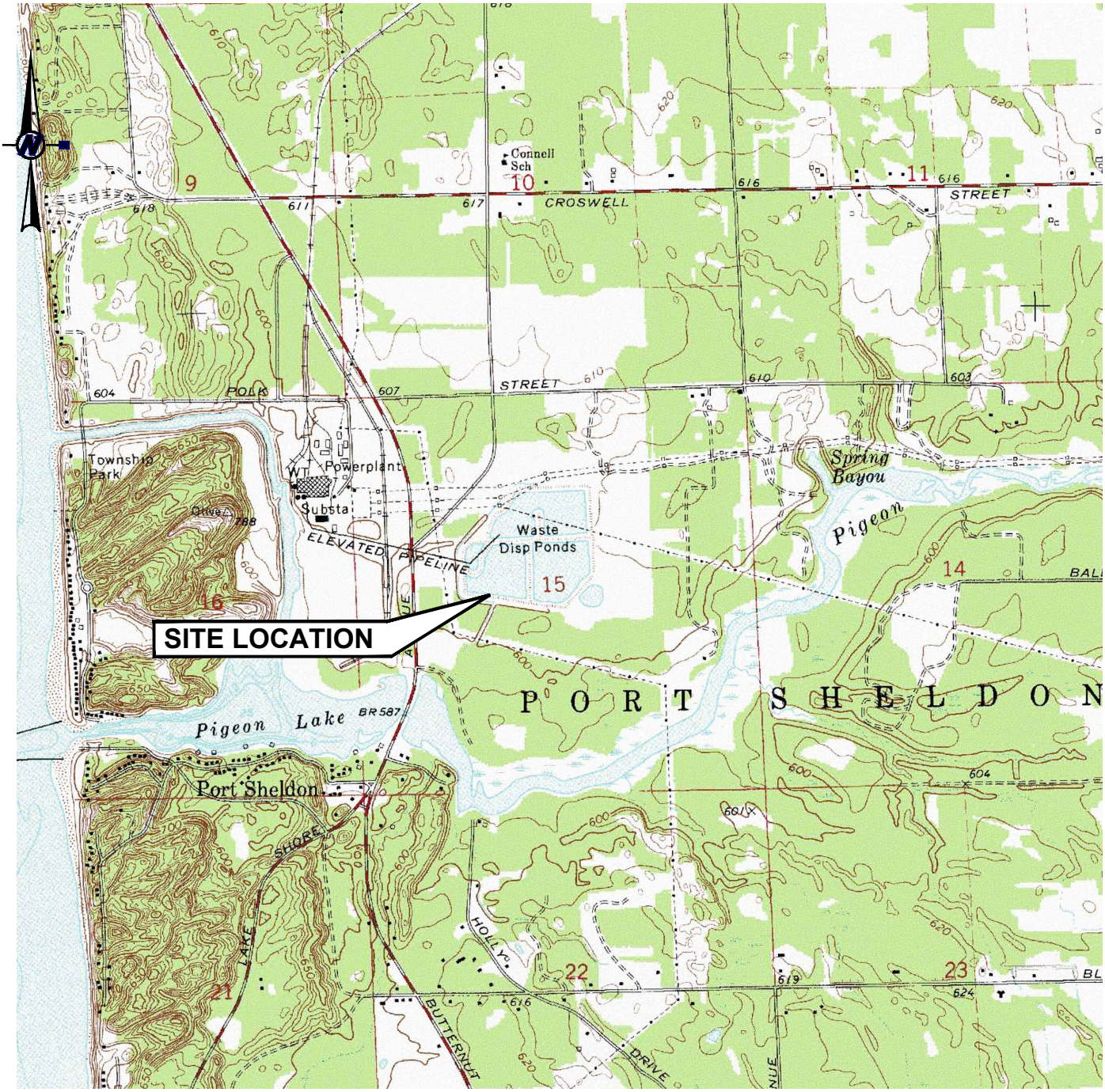
Golder Associates (2016b). "*J.H. Campbell Generating Facility Bottom Ash Ponds 1-2 Inflow Design Flood Control System Plan*."

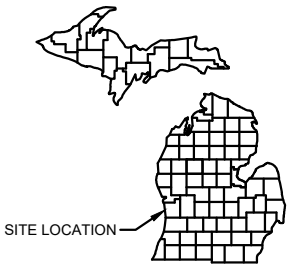
Golder Associated (2016c). "*J.H. Campbell Generating Facility Bottom Ash Ponds 1-2 Structural Stability and Safety Factor Assessment Report*."

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





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.

0 1000 2000
1" = 2000' FEET

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

CONSULTANT
Golder Associates

YYYY-MM-DD	2016-06-06
DESIGNED	BAL
PREPARED	ARM
REVIEWED	DJS
APPROVED	JRP

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

TITLE
SITE LOCATION MAP

PROJECT NO. 1654923
REV. #
FIGURE 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
1 in
0

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REFERENCE DRAWINGS	REV	DATE	DESCRIPTION	BY	CHK	APP

REV	DATE	DESCRIPTION	BY	CHK	APP
			---	---	---

Consumers Energy

J.H. CAMPBELL ASH STORAGE FACILITY

EXISTING CONDITIONS
SITE MAP

UNIT#

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

NOTES

1. CONTOURS SHOWN ARE FROM MAY 2016 GROUND SURVEY.

LEGEND

SOIL BORING (2016)

HISTORICAL SOIL BORING

PIEZOMETER

MONITORING WELL

ELECTRICAL TOWERS AND OVERHEAD LINES

ASH TRANSPORT PIPES AND TRESTLE

APPROXIMATE LOCATION OF BOTTOM ASH RECIRCULATION PIPE DRAWING 690-3026

JHC MW-15004

APPROXIMATE LOCATION OF BURIED COAL PILE RUNOFF PIPE DRAWING 690-G3047

42" HDPE PIPE

AREA OF SLOPE PROTECTION

APPROXIMATE LOCATION OF BURIED POWER LINE DRAWING 690-3273

APPROXIMATE LOCATION OF 42 INCH CPP CULVERT

B-524

JHC MW-15004

SB-1506

B-522

JHC-BH-16007A

JHC-BH-16007

JHC-BH-16007B

COAL PILE RUNOFF INLET PIPES

PERIMETER BERM ELFV.= 624.71

AREA OF SLOPE PROTECTION

AREA OF SLOPE PROTECTION

POND 1&2-2

POND 1&2-C2

POND 1&2-C1

POND 1&2-1

BOTTOM ASH PONDS 1-2 SOUTH

BOTTOM ASH PONDS 1-2 NORTH

JHC-BH-16006

JHC-BH-16005A

JHC-BH-16005

SB-1507

ASH RECIRCULATION BUILDING

24" CMP

JHC-BH-16008

SB-1505

24" CMP

JHC MW-15005

APPROXIMATE LOCATION OF BURIED POWER LINE DRAWING 690-G855055

JHC MW-15002

JHC MW-15003

B-510

OUTLET INV. = 618.82

RIM = 628.91
INV. (N) = 619.16
INV. (SE) = 619.06

RIM = 632.11
INV. (N) = 620.00
INV. (SE) = 619.90

APPROXIMATE LOCATION OF 18 INCH ASH POND OUTLETS DRAWING 690-G06537

CHEMICAL TREATMENT BUILDING

SEDIMENTATION BASIN

EQUALIZATION BASIN

APPROXIMATE LOCATION OF 10" BURIED PIPE DRAWING 690-82022

B-5

0 40 80

SCALE: 1"=40'

REFERENCE DRAWINGS	REV	DATE	DESCRIPTION	BY	CHK	APP

REV	DATE	DESCRIPTION	BY	CHK	APP
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Consumers Energy

J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION

BOTTOM ASH PONDS 1-2 PLAN VIEW

UNIT#

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

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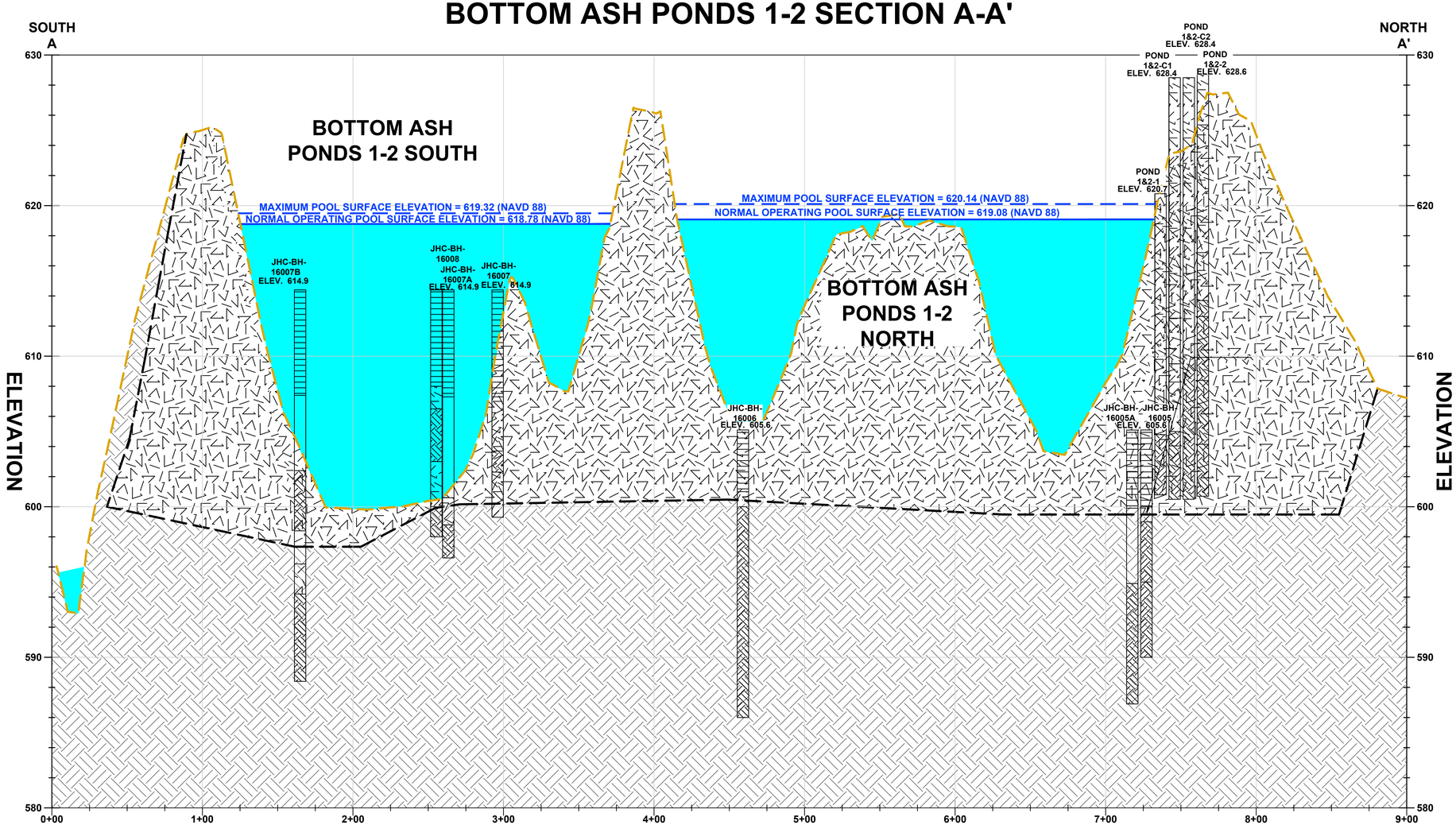
BOTTOM ASH PONDS 1-2 SECTION A-A'



LEGEND

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

NOTES

1. DRAWING CREATED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS, LLC.
2. EXISTING CONTOURS WERE GENERATED FROM A GROUND SURVEY PERFORMED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS LLC. IN MAY 2016.
3. 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.

0 40 80

SCALE: 1"=40' HORIZONTAL
SCALE: 1"=4' VERTICAL

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

J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION

BOTTOM ASH PONDS 1-2 CROSS SECTION A-A'

UNIT#

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

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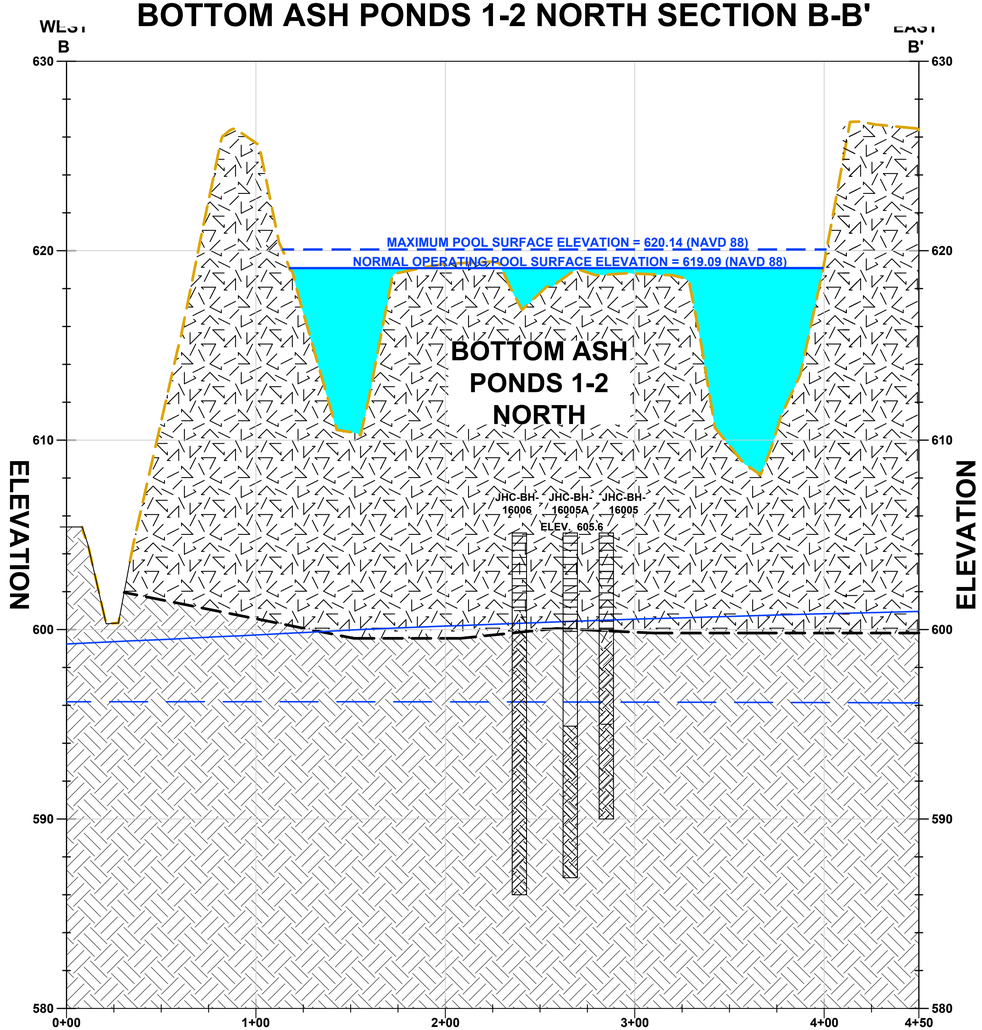
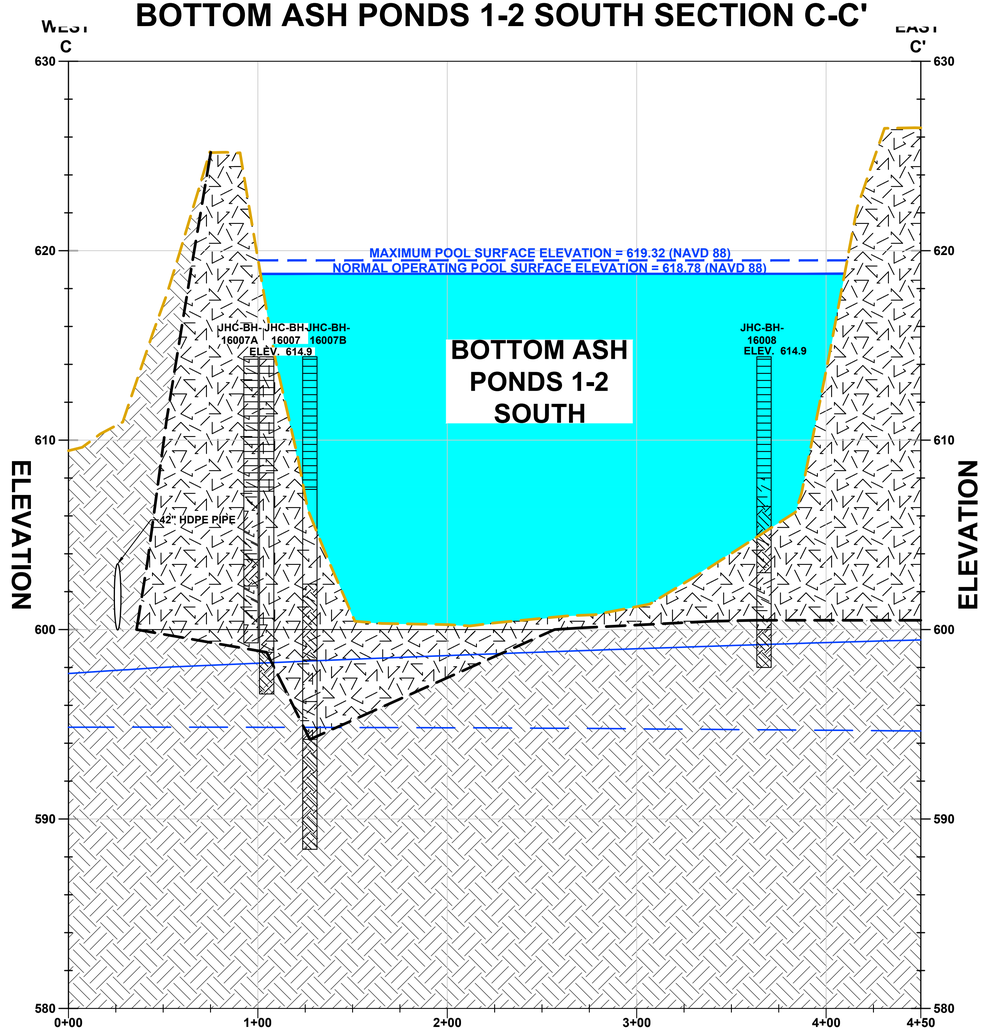
BOTTOM ASH PONDS 1-2 NORTH SECTION B-B'



BOTTOM ASH PONDS 1-2 SOUTH SECTION C-C'



LEGEND

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

NOTES

1. DRAWING CREATED BY ENGINEERING AND ENVIRONMENTAL SOLUTIONS, LLC.
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0 40 80
SCALE: 1"=40' HORIZONTAL
SCALE: 1"=4' VERTICAL

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

Consumers Energy

J.H. CAMPBELL ASH STORAGE FACILITY

ASH POND CHARACTERIZATION

BOTTOM ASH PONDS 1-2 CROSS SECTIONS B-B' & C-C'

UNIT#

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

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APPENDIX A
SOIL SAMPLE DATA

MOISTURE CONTENT DETERMINATIONS

Project Number	152-4652A	Tech	HD
Project Name	Consumers Campbell Bottom Ash Tank	Date	3/15/2015
		Checked	
		Reviewed	

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

HYDROMETER DATA ENTRY SHEET

AS RECEIVED WATER CONTENT

Mass Wet Soil & Tare (gm)	36.12
Mass Dry Soil & Tare (gm)	30.60
Mass of Tare (gm)	13.64
Mass of Water (gm)	5.52
Mass of Dry Soil (gm)	16.96
Moisture Content (%)	32.5

HYGROSCOPIC MOISTURE FOR HYDROMETER SAMPLE

Mass Wet Soil & Tare (gm)	34.38
Mass Dry Soil & Tare (gm)	34.34
Tare Mass (gm)	13.61
Moisture Content (%)	0.2

MONTH AND YEAR: March-15
PROJECT NAME: Campbell Bottom Ash Tank
PROJECT NUMBER: 152-4652A
SAMPLE ID: SB-1505 Depth (ft) 14.0-16.0
TYPE: Jar

Visual Description: Gray, FLY ASH

USCS -

LL	--
PL	--
PI	--

Total Mass of Sample Used for Analysis, with Finer Split Fraction Corrected for Hygroscopic Moisture

Mass of Sample (gm) 133.4

PLUS #4 MATERIAL SIEVE

Test Method for 100% finer than 3" only

Tare Mass: 0.00

	Individual (Mass + Tare)	Cumulative Mass Retained	% Passing
3-inch	0.00	0.0	100.0
2-inch	0.00	0.0	100.0
1.5-inch	0.00	0.0	100.0
1-inch	0.00	0.0	100.0
3/4-inch	0.00	0.0	100.0
1/2-inch	0.00	0.0	100.0
3/8-inch	0.00	0.0	100.0
#4	0.00	0.0	100.0

coarse gravel	0.00	
fine gravel	0.00	0.00
coarse sand	0.00	
medium sand	0.10	
fine sand	6.43	6.52
fines	93.48	
Total	100.00	

Tare Mass: 297.10 — Tot. Passing #4: 430.80 <--(Uncorrected for Hygroscopic Moisture)

HYGROSCOPIC MOISTURE FOR MINUS #4 SIEVE SAMPLE

Mass Soil & Tare (gm)	34.38
Mass Dry Soil & Tare (gm)	34.34
Tare Mass (gm)	13.61
Moisture Content (%)	0.2

BACK SIEVE Tare Mass: 30.31

	Cumulative Mass Retained	Cumulative Mass Retained	% Passing
#10	30.31	0.0	100.0
#20	30.32	0.0	100.0
#40	30.36	0.1	99.9
#60	30.59	0.3	99.4
#100	31.01	0.7	98.6
#200	33.61	3.3	93.5

HYDROMETER ANALYSIS

Cu = 5.77 < 6.00
Cc = 1.18 > 1.00

AIR-DRY MASS OF SAMPLE USED FOR HYDROMETER TEST

Mass of Sample (gm)	50.68
Specific Gravity (ass'd)	2.34
Amount Dispersing Agent (ml)	125.00
Type Dispersion Device	Mechanical
Length of Dispersion Period	1 Minute

DATE	TIME	READING R	TEMP T	COMPOSITE CORRECTION
3/9/2015	11:32			
3/9/2015	11:34	41.00	21.5	5.07
3/9/2015	11:37	33.00	21.5	5.07
3/9/2015	11:47	24.50	21.5	5.07
3/9/2015	12:02	19.00	21.6	5.04
3/9/2015	12:32	15.00	22.7	4.67
3/9/2015	15:42	9.00	22.4	4.77
3/10/2015	11:32	7.00	21.7	5.01

(mm)	%Finer
0.033	78.24
0.022	60.82
0.014	42.31
0.010	30.40
0.007	22.50
0.004	9.21
0.002	4.34

TEST BY	HD
DATE SET UP	3/16/2015
CHECK BY	
REVIEW BY	

Golder Associates

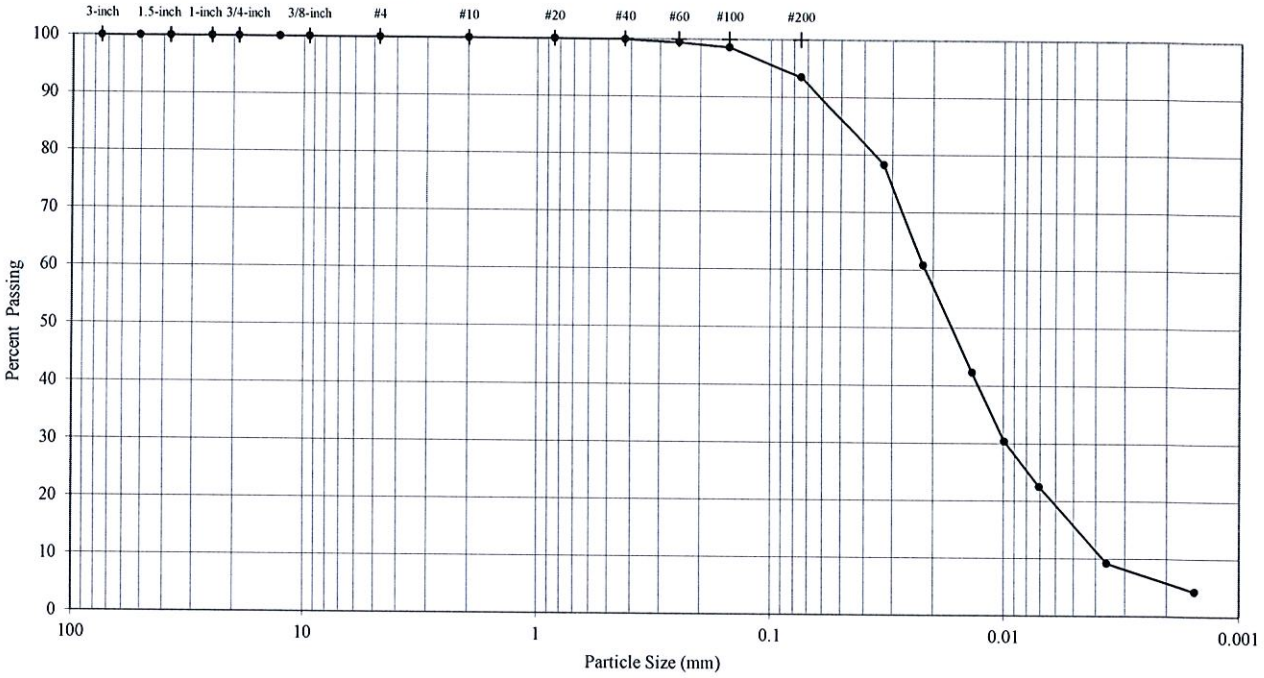
March-15

152-4652A

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

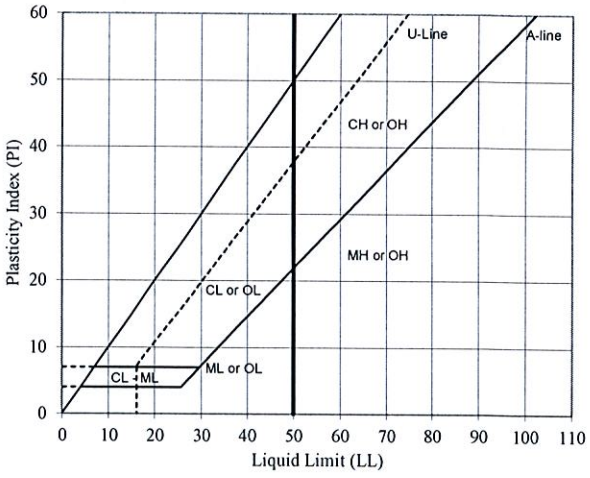
PROJECT NAME: **Campbell Bottom Ash Tank**
SAMPLE ID: **SB-1505**
TYPE: **Jar**
DEPTH (ft): **14.0-16.0**



Sieve	Particle Size (mm)	% Passing	Description	Percentage	
3-inch	75.0	100.0	Cobbles	0.00	
2-inch	50.8	100.0	Coarse Gravel	0.00	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	0.00	
3/8-inch	9.5	100.0			
#4	4.75	100.0			
#10	2.0	100.0	Coarse Sand	0.00	6.52
#20	0.85	100.0	Medium Sand	0.10	
#40	0.425	99.9			
#60	0.25	99.4	Fine Sand	6.43	
#100	0.15	98.6			
#200	0.075	93.5			
	0.033	78.2	Silt or Clay Fines	93.48	
	0.022	60.8			
	0.014	42.3			
	0.010	30.4			
	0.007	22.5			
	0.004	9.2			
	0.002	4.3			

Sieve Analysis (Initial Separation on No. 4 Sieve)

Hydrometer Analysis



Visual Description:

Gray, FLY ASH

LL	PL	PI	LI
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As-Received Moisture Content (%): **32.5**

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	HD
DATE	3/16/2015
CHECK	
REVIEW	

HYDROMETER DATA ENTRY SHEET

AS RECEIVED WATER CONTENT

Mass Wet Soil & Tare (gm)	40.77
Mass Dry Soil & Tare (gm)	36.36
Mass of Tare (gm)	13.72
Mass of Water (gm)	4.41
Mass of Dry Soil (gm)	22.64
Moisture Content (%)	19.5

MONTH AND YEAR: March-15
PROJECT NAME: Campbell Bottom Ash Tank
PROJECT NUMBER: 152-4652A
SAMPLE ID: SB-1507 Depth (ft) 9.0-11.0
TYPE: Jar

Visual Description: Dark grayish brown BOTTOM ASH

USCS --

LL	--
PL	--
PI	--

HYGROSCOPIC MOISTURE FOR HYDROMETER SAMPLE

Mass Wet Soil & Tare (gm)	34.01
Mass Dry Soil & Tare (gm)	33.87
Tare Mass (gm)	13.66
Moisture Content (%)	0.7

Total Mass of Sample Used for Analysis, with Finer Split Fraction Corrected for Hygroscopic Moisture

Mass of Sample (gm) 220.7

PLUS #4 MATERIAL SIEVE

Test Method for 100% finer than 3" only

Tare Mass: 13.64

	Individual (Mass + Tare)	Cumulative Mass Retained	% Passing
3-inch	13.64	0.0	100.0
2-inch	13.64	0.0	100.0
1.5-inch	13.64	0.0	100.0
1-inch	13.64	0.0	100.0
3/4-inch	13.64	0.0	100.0
1/2-inch	15.48	1.8	99.2
3/8-inch	15.48	1.8	99.2
#4	23.50	9.9	95.5

coarse gravel	0.00	
fine gravel	4.47	4.47
coarse sand	7.72	
medium sand	20.16	
fine sand	22.29	50.17
fines	45.36	
Total	100.00	

Tare Mass: 292.36

Tot. Passing #4: 504.63 <--(Uncorrected for Hygroscopic Moisture)

HYGROSCOPIC MOISTURE FOR MINUS #4 SIEVE SAMPLE

Mass Soil & Tare (gm)	34.01
Mass Dry Soil & Tare (gm)	33.87
Tare Mass (gm)	13.66
Moisture Content (%)	0.7

BACK SIEVE Tare Mass: 30.71

	Cumulative Mass Retained	Cumulative Mass Retained	% Passing
#10	34.73	4.0	87.8
#20	40.62	9.9	76.5
#40	45.22	14.5	67.6
#60	48.27	17.6	61.8
#100	51.59	20.9	55.4
#200	56.82	26.1	45.4

HYDROMETER ANALYSIS

Cu = 33.91 > 6.00
Cc = 0.45 < 1.00

AIR-DRY MASS OF SAMPLE USED FOR HYDROMETER TEST

Mass of Sample (gm)	50.06
Specific Gravity (ass'd)	2.2-2.34
Amount Dispersing Agent (ml)	125.00
Type Dispersion Device	Mechanical
Length of Dispersion Period	1 Minute

DATE	TIME	READING R	TEMP T	COMPOSITE CORRECTION
3/9/2015	11:30			
3/9/2015	11:32	22.50	21.5	5.07
3/9/2015	11:35	19.00	21.5	5.07
3/9/2015	11:45	15.00	21.5	5.07
3/9/2015	12:00	12.00	21.6	5.04
3/9/2015	12:30	10.00	22.7	4.67
3/9/2015	15:40	7.00	22.4	4.77
3/10/2015	11:30	6.00	21.7	5.01

(mm)	%Finer
0.038	36.89
0.024	29.48
0.014	21.01
0.010	14.73
0.007	11.28
0.004	4.72
0.002	2.10

TEST BY: HD
DATE SET UP: 3/16/2015
CHECK BY:
REVIEW BY:

Golder Associates

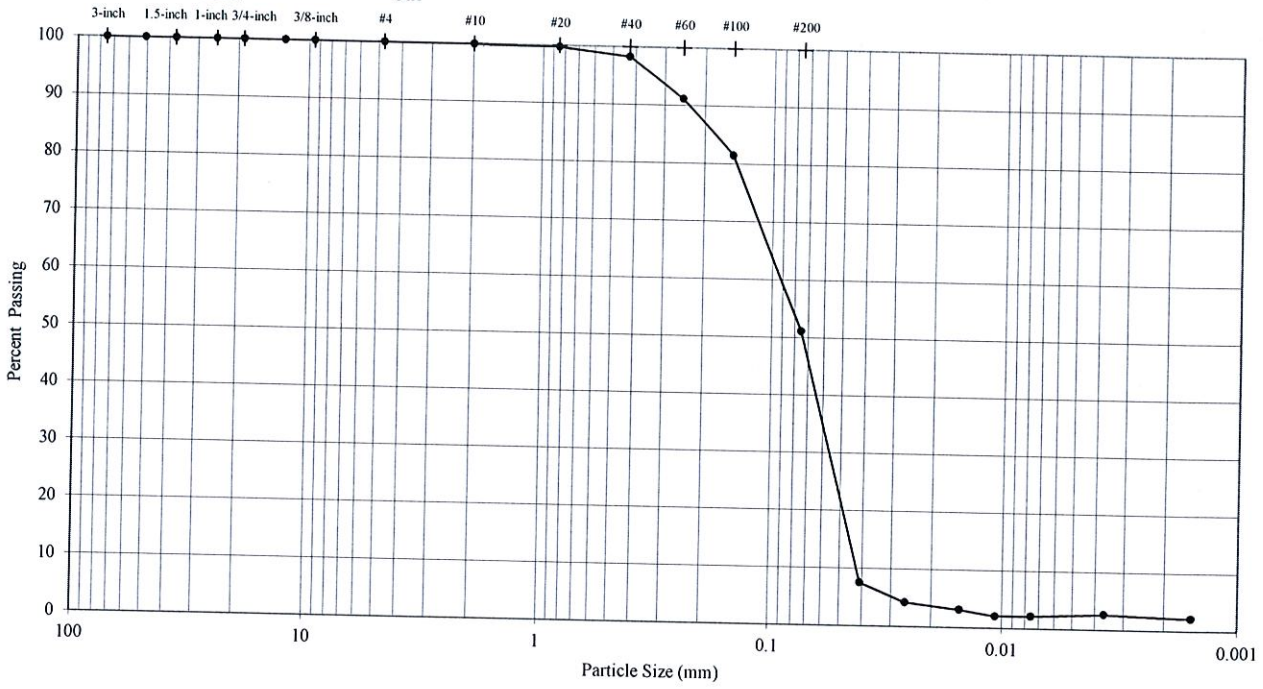
March-15

152-4652A

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

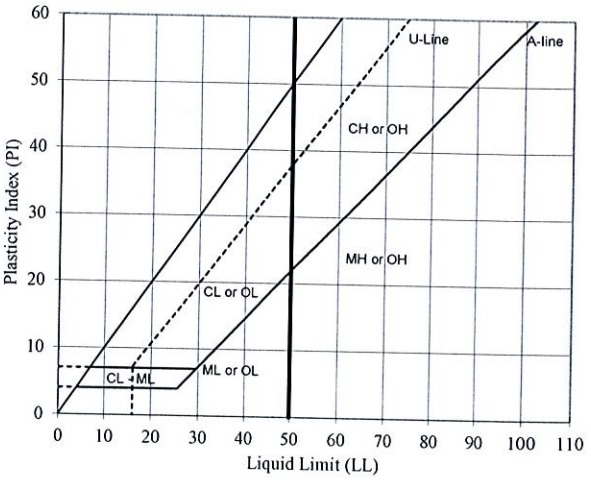
PROJECT NAME: **Campbell Bottom Ash Tank**
SAMPLE ID: **SB-1505**
TYPE: **Jar**
DEPTH (ft): **19.0-21.0**



Sieve	Particle Size (mm)	% Passing	Description	Percentage	
3-inch	75.0	100.0	Cobbles	0.00	
2-inch	50.8	100.0	Coarse Gravel	0.00	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	0.00	
3/8-inch	9.5	100.0			
#4	4.75	100.0			
#10	2.0	99.9	Coarse Sand	0.06	48.87
#20	0.85	99.8	Medium Sand	1.66	
#40	0.425	98.3			
#60	0.25	91.1	Fine Sand	47.15	
#100	0.15	81.5			
#200	0.075	51.1			
	0.041	7.5	Silt or Clay Fines	51.13	
	0.026	4.2			
	0.015	3.1			
	0.011	2.1			
	0.008	2.2			
	0.004	2.7			
	0.002	2.2			

Sieve Analysis (Initial Separation on No. 4 Sieve)

Hydrometer Analysis



Visual Description:

Dark grayish brown, FLY ASH

LL	PL	PI	LI
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As-Received Moisture Content (%): **27.4**

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	HD
DATE	3/5/2015
CHECK	BJ
REVIEW	GRS

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

PROJECT TITLE	Campbell Bottom Ash Tank	**SAMPLE ID**	SB-1507
PROJECT NO.	152-4652	**SAMPLE TYPE**	Jar
REMARKS		**SAMPLE DEPTH**	19.0'-21.0'

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	668.58
Wt Dry Soil & Tare (gm)	(w2)	645.48
Weight of Tare (gm)	(w3)	315.31
Weight of Water (gm)	(w4=w1-w2)	23.10
Weight of Dry Soil (gm)	(w5=w2-w3)	330.17
Moisture Content (%)	(w4/w5)*100	7.00

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	1.00
Dry Soil & Tare (gm)	1.00
Tare Weight (gm)	0.00
Moisture Content (%)	0.00%

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	645.48
	Tare Weight (gm)	315.31
(W6)	Total Dry Weight (gm)	330.17

SIEVE ANALYSIS

Tare Weight: 315.41

	Wt Ret +Tare	Cum. Ret. (Wt-Tare) (dry)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	SIEVE	
3.0"	315.41	0.00	0.00	100.00	3.0"	coarse gravel
2.5"	315.41	0.00	0.00	100.00	2.5"	coarse gravel
2.0"	315.41	0.00	0.00	100.00	2.0"	coarse gravel
1.5"	315.41	0.00	0.00	100.00	1.5"	coarse gravel
1.0"	315.41	0.00	0.00	100.00	1.0"	coarse gravel
0.75"	315.41	0.00	0.00	100.00	0.75"	fine gravel
0.50"	315.41	0.00	0.00	100.00	0.50"	fine gravel
0.375"	315.41	0.00	0.00	100.00	0.375"	fine gravel
#4	315.82	0.41	0.12	99.88	#4	coarse sand
#10	317.13	1.72	0.52	99.48	#10	medium sand
#20	320.83	5.42	1.64	98.36	#20	medium sand
#40	363.15	47.74	14.46	85.54	#40	fine sand
#60	525.10	209.69	63.51	36.49	#60	fine sand
#100	614.50	299.09	90.59	9.41	#100	fine sand
#200	637.91	322.50	97.68	2.32	#200	fines

% C GRAVEL	0.00
% F GRAVEL	0.12
% C SAND	0.40
% M SAND	13.94
% F SAND	83.22
% FINES	2.32
% TOTAL	100.00

Descriptive Terms	
trace	0 to 5%
little	5 to 12%
some	12 to 30%
and	30 to 50%

> 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	-
PL	-
PI	-
Gs	-

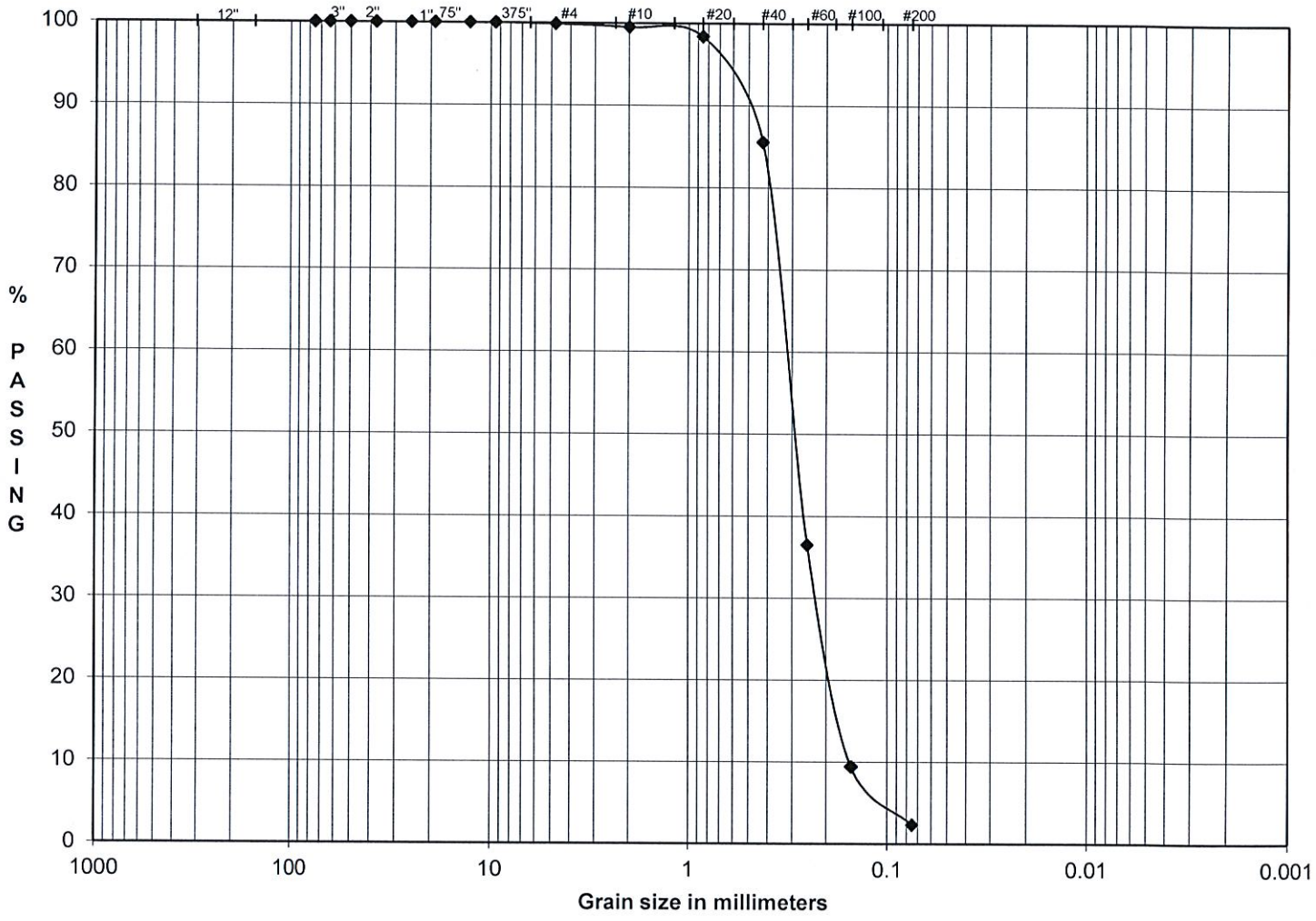
DESCRIPTION Reddish brown, POORLY GRADED SAND, trace gravel, trace fines

USCS SP

TECH	HD
DATE	3/5/2015
CHECK	RPS
REVIEW	SRS

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

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



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	GRAVEL		SAND			FINES
	0.00	0.00	0.12	0.40	13.94	83.22	2.32
		0.12		97.55			

SAMPLE ID	SB-1507
SAMPLE TYPE	Jar
SAMPLE DEPTH	19.0'-21.0'

LL	-
PL	-
PI	-

DESCRIPTION	Reddish brown, POORLY GRADED SAND, trace gravel, trace fines
USCS	SP

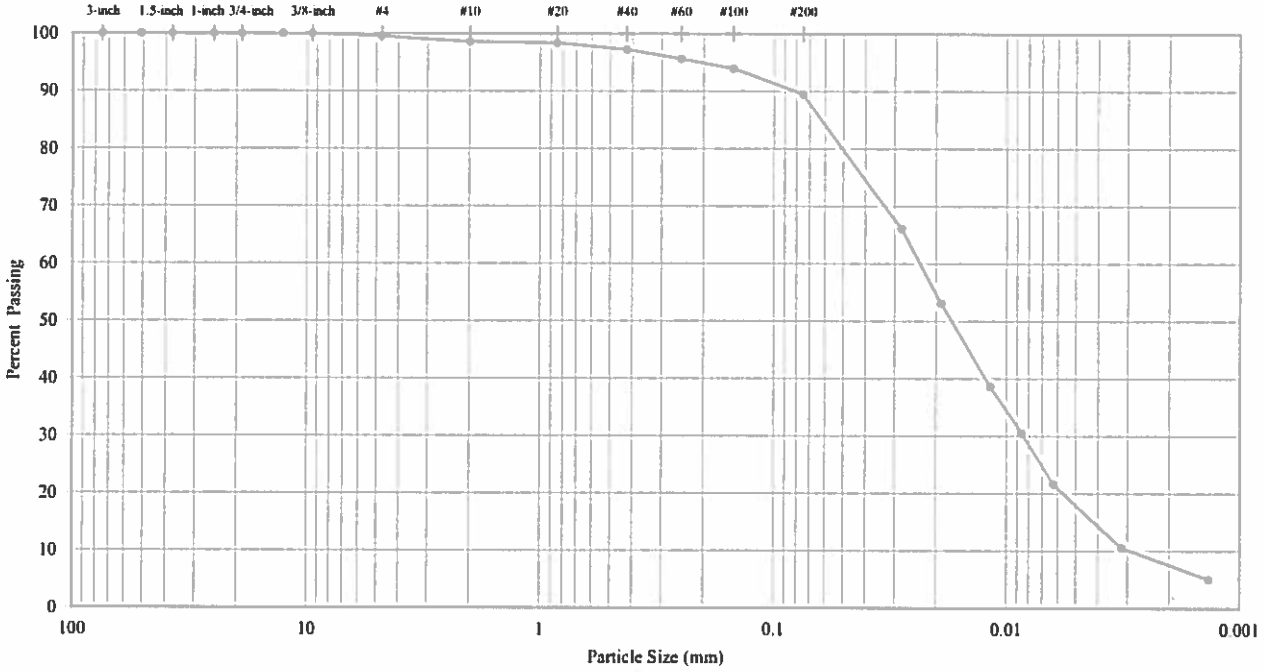
TECH	HD
DATE	3/5/2015
CHECK	
REVIEW	

May-16 165-4943

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

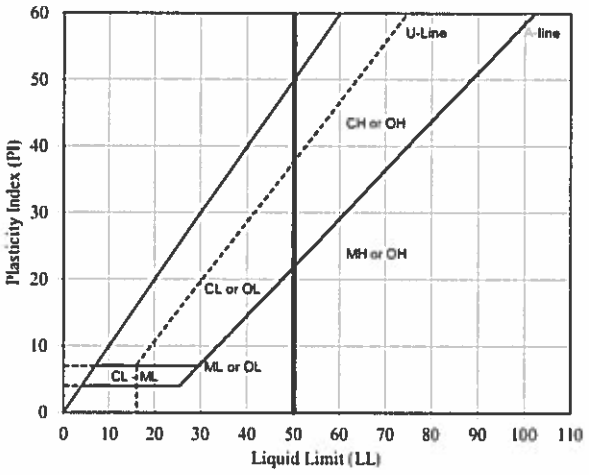
PROJECT NAME: **J.H. Campbell Ash Pond Characterization**
SAMPLE ID: **JHC-BH-16005 S-1** DEPTH (ft): **0.5**
TYPE: **Jar**



Sieve	Particle Size (mm)	% Passing	Description	Percentage	
3-inch	75.0	100.0	Cobbles	0.00	
2-inch	50.8	100.0	Coarse Gravel	0.00	0.44
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	0.44	
3/8-inch	9.5	100.0			
#4	4.75	99.6			
#10	2.0	98.6	Coarse Sand	0.96	10.09
#20	0.85	98.4	Medium Sand	1.38	
#40	0.425	97.2			
#60	0.25	95.6	Fine Sand	7.75	
#100	0.15	94.0			
#200	0.075	89.5			
	0.028	66.1	Silt or Clay Fines	89.48	
	0.019	53.1			
	0.012	38.6			
	0.009	30.5			
	0.006	21.7			
	0.003	10.6			
	0.001	5.1			

Sieve Analysis (Initial Separation on No. 4 Sieve)

Hydrometer Analysis



Visual Description:

Dark Gray, CCR

LL	PL	PI	LI
–	–	–	–

As-Received Moisture Content (%): 41.9

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	BS
REVIEW	BST

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

PROJECT TITLE	J.H. Campbell Ash Pond Characterization	**SAMPLE ID**	JHC-BH-16006 S-3
PROJECT NO.	165-4923	**SAMPLE TYPE**	Jar
REMARKS		**SAMPLE DEPTH (ft)**	7.5

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	35.99
Wt Dry Soil & Tare (gm)	(w2)	32.39
Weight of Tare (gm)	(w3)	13.84
Weight of Water (gm)	(w4=w1-w2)	3.60
Weight of Dry Soil (gm)	(w5=w2-w3)	18.55
Moisture Content (%)	(w4/w5)*100	19.41

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	1.00
Dry Soil & Tare (gm)	1.00
Tare Weight (gm)	0.00
Moisture Content (%)	0.00%

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	733.32
	Tare Weight (gm)	373.03
(W6)	Total Dry Weight (gm)	360.29

SIEVE ANALYSIS

Tare Weight: 373.03

	Wt Ret +Tare	Cum. Ret. (Wt-Tare) (dry)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	SIEVE	
3.0"	373.03	0.00	0.00	100.00	3.0"	coarse gravel
2.5"	373.03	0.00	0.00	100.00	2.5"	coarse gravel
2.0"	373.03	0.00	0.00	100.00	2.0"	coarse gravel
1.5"	373.03	0.00	0.00	100.00	1.5"	coarse gravel
1.0"	373.03	0.00	0.00	100.00	1.0"	coarse gravel
0.75"	373.03	0.00	0.00	100.00	0.75"	fine gravel
0.50"	373.03	0.00	0.00	100.00	0.50"	fine gravel
0.375"	373.03	0.00	0.00	100.00	0.375"	fine gravel
#4	374.99	1.96	0.54	99.46	#4	coarse sand
#10	376.65	3.62	1.00	99.00	#10	medium sand
#20	384.47	11.44	3.18	96.82	#20	medium sand
#40	480.12	107.09	29.72	70.28	#40	fine sand
#60	686.33	313.30	86.96	13.04	#60	fine sand
#100	727.67	354.64	98.43	1.57	#100	fine sand
#200	730.37	357.34	99.18	0.82	#200	fines

% C GRAVEL	0.00
% F GRAVEL	0.54
% C SAND	0.46
% M SAND	28.72
% F SAND	69.46
% FINES	0.82
% TOTAL	100.00

Descriptive Terms	
trace	0 to 5%
little	5 to 12%
some	12 to 30%
and	30 to 50%

> 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	-
PL	-
PI	-
Gs	-

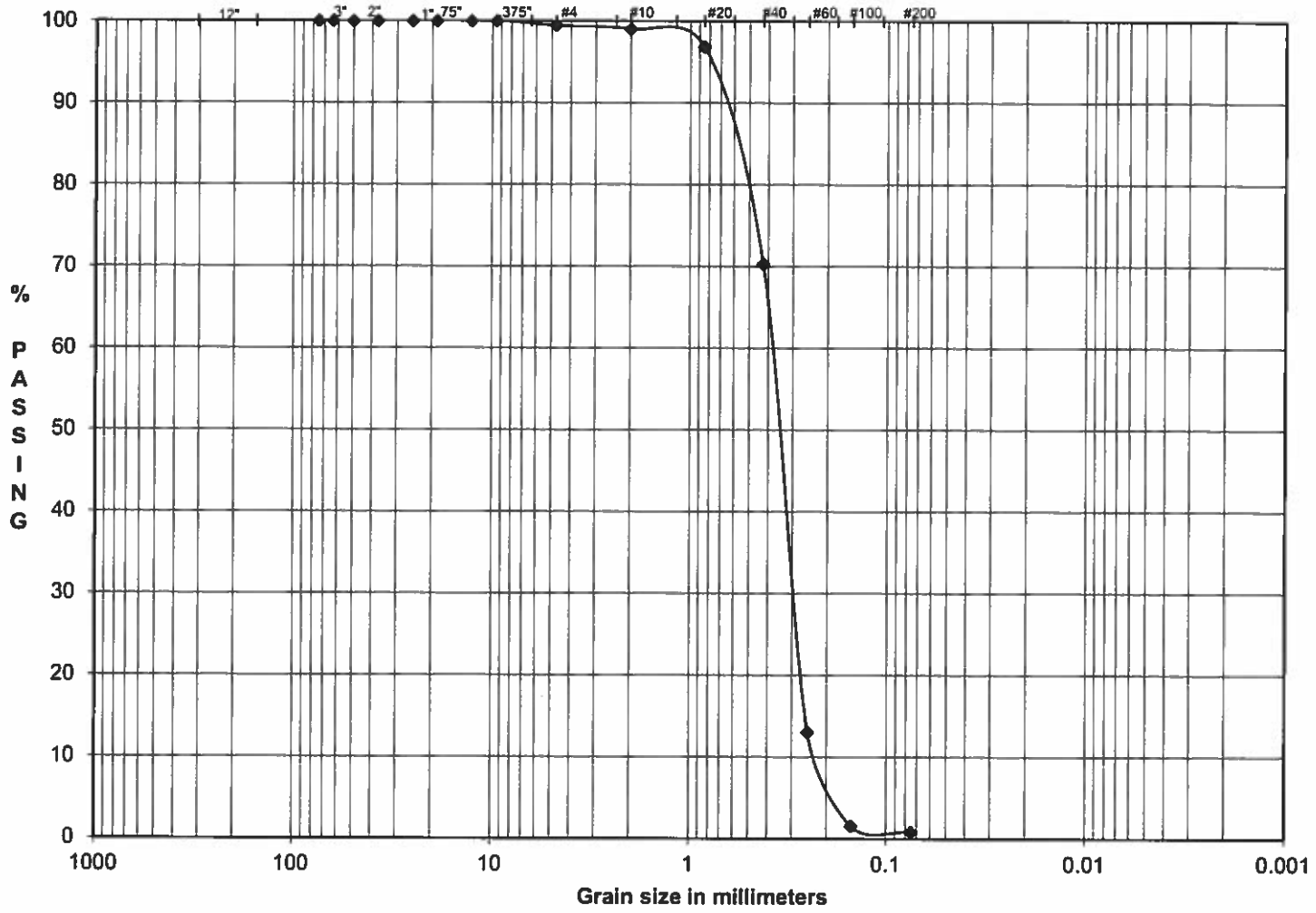
DESCRIPTION: Brown, POORLY GRADED SAND, trace gravel, trace fines

USCS: SP

TECH	DF
DATE	5/25/2016
CHECK	T
REVIEW	DSJ

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

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



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	GRAVEL		SAND			FINES
0.00		0.00	0.54	0.46	28.72	69.46	0.82
		0.54		98.64			

SAMPLE ID	JHC-BH-16006 S-3
SAMPLE TYPE	Jar
SAMPLE DEPTH (ft)	7.5

LL	-
PL	-
PI	-

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

TECH	DF
DATE	5/25/2016
CHECK	BS
REVIEW	BST

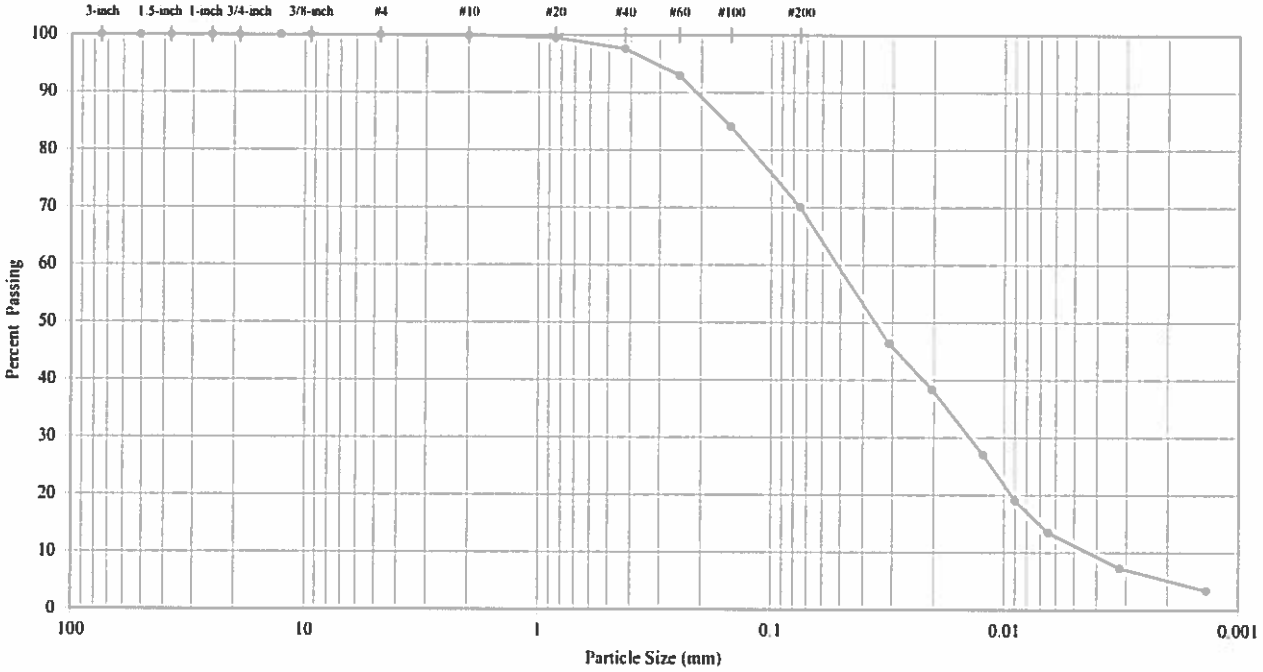
Golder Associates

May-16 165-4923

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

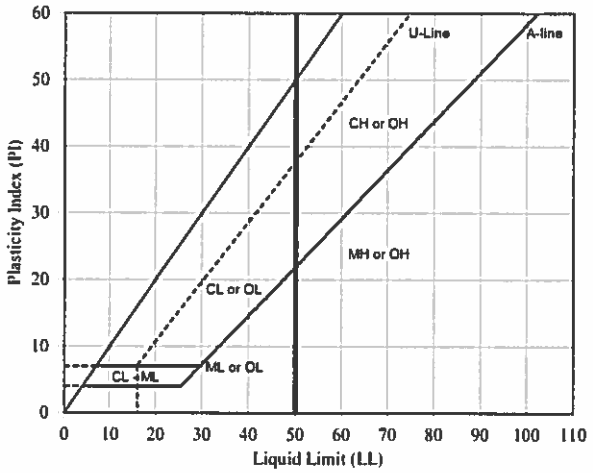
ASTM D421, D422, D4318

PROJECT NAME: J.H. Campbell Ash Pond Characterization
SAMPLE ID: JHC-BH-16007 S-1 DEPTH (ft): 1.0
TYPE: Jar



Sieve	Particle Size (mm)	% Passing	Description	Percentage	
3-inch	75.0	100.0	Cobbles	0.00	
2-inch	50.8	100.0	Coarse Gravel	0.00	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	0.00	
3/8-inch	9.5	100.0			
#4	4.75	100.0			
#10	2.0	99.9	Coarse Sand	0.13	29.88
#20	0.85	99.5	Medium Sand	2.24	
#40	0.425	97.6			
#60	0.25	93.0	Fine Sand	27.51	
#100	0.15	84.1			
#200	0.075	70.1			
Hydrometer Analysis	0.031	46.4	Silt or Clay Fines	70.12	
	0.020	38.4			
	0.012	27.1			
	0.009	19.1			
	0.006	13.5			
	0.003	7.3			
	0.001	3.4			

Sieve Analysis (Initial Separation on No. 4 Sieve)



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

Visual Description:
Very dark gray, CCR

As-Received Moisture Content (%): 58.9

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	JS
REVIEW	BJT

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

PROJECT TITLE	J.H. Campbell Ash Pond Characterization	**SAMPLE ID**	JHC-BH-16007 S-3
PROJECT NO.	165-4923	**SAMPLE TYPE**	Jar
REMARKS		**SAMPLE DEPTH (ft)**	4.0

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	35.25
Wt Dry Soil & Tare (gm)	(w2)	31.71
Weight of Tare (gm)	(w3)	14.93
Weight of Water (gm)	(w4=w1-w2)	3.54
Weight of Dry Soil (gm)	(w5=w2-w3)	16.78
Moisture Content (%)	(w4/w5)*100	21.10

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	1.00
Dry Soil & Tare (gm)	1.00
Tare Weight (gm)	0.00
Moisture Content (%)	0.00%

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	479.26
	Tare Weight (gm)	181.96
(W6)	Total Dry Weight (gm)	297.30

SIEVE ANALYSIS

Tare Weight: 181.96

	Wt Ret +Tare	Cum. Ret. (Wt-Tare) (dry)	Cumulative (%Retained) [(wt ret/w6)*100]	% PASS (100-%ret)	SIEVE	
3.0"	181.96	0.00	0.00	100.00	3.0"	coarse gravel
2.5"	181.96	0.00	0.00	100.00	2.5"	coarse gravel
2.0"	181.96	0.00	0.00	100.00	2.0"	coarse gravel
1.5"	181.96	0.00	0.00	100.00	1.5"	coarse gravel
1.0"	181.96	0.00	0.00	100.00	1.0"	coarse gravel
0.75"	181.96	0.00	0.00	100.00	0.75"	fine gravel
0.50"	181.96	0.00	0.00	100.00	0.50"	fine gravel
0.375"	181.96	0.00	0.00	100.00	0.375"	fine gravel
#4	182.08	0.12	0.04	99.96	#4	coarse sand
#10	183.07	1.11	0.37	99.63	#10	medium sand
#20	185.34	3.38	1.14	98.86	#20	medium sand
#40	206.00	24.04	8.09	91.91	#40	fine sand
#60	326.19	144.23	48.51	51.49	#60	fine sand
#100	432.20	250.24	84.17	15.83	#100	fine sand
#200	470.13	288.17	96.93	3.07	#200	fines

% C GRAVEL	0.00
% F GRAVEL	0.04
% C SAND	0.33
% M SAND	7.71
% F SAND	88.84
% FINES	3.07
% TOTAL	100.00

Descriptive Terms	
trace	0 to 5%
little	5 to 12%
some	12 to 30%
and	30 to 50%

> 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	-
PL	-
PI	-
Gs	-

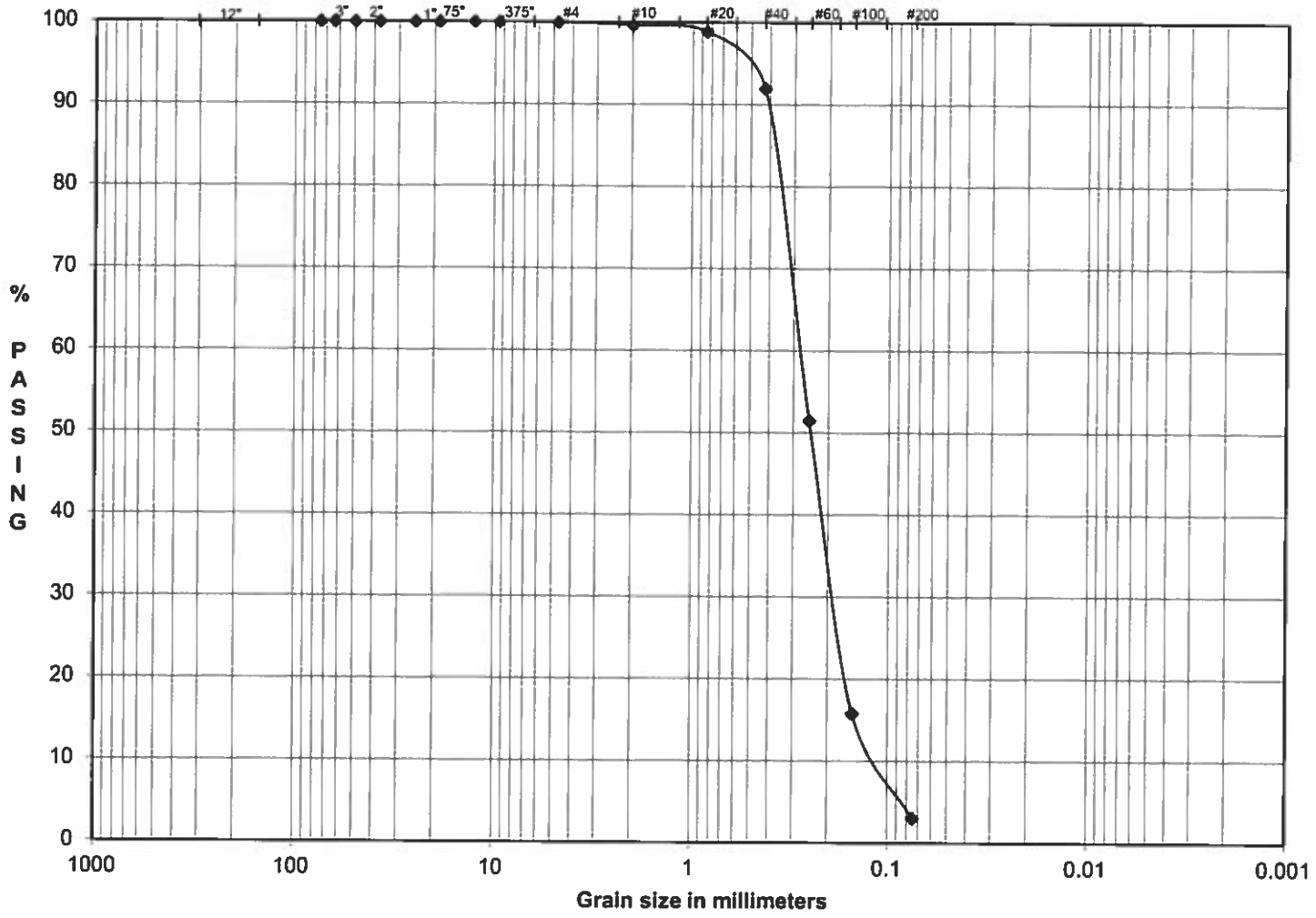
DESCRIPTION: Brown, POORLY GRADED SAND, trace gravel, trace fines

USCS: SP

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

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

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



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	GRAVEL		SAND			FINES
	0.00	0.00	0.04	0.33	7.71	88.84	3.07
		0.04		96.89			

SAMPLE ID	JHC-BH-16007 S-3
SAMPLE TYPE	Jar
SAMPLE DEPTH (ft)	4

LL	-
PL	-
PI	-

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

TECH	DF
DATE	5/25/2016
CHECK	
REVIEW	

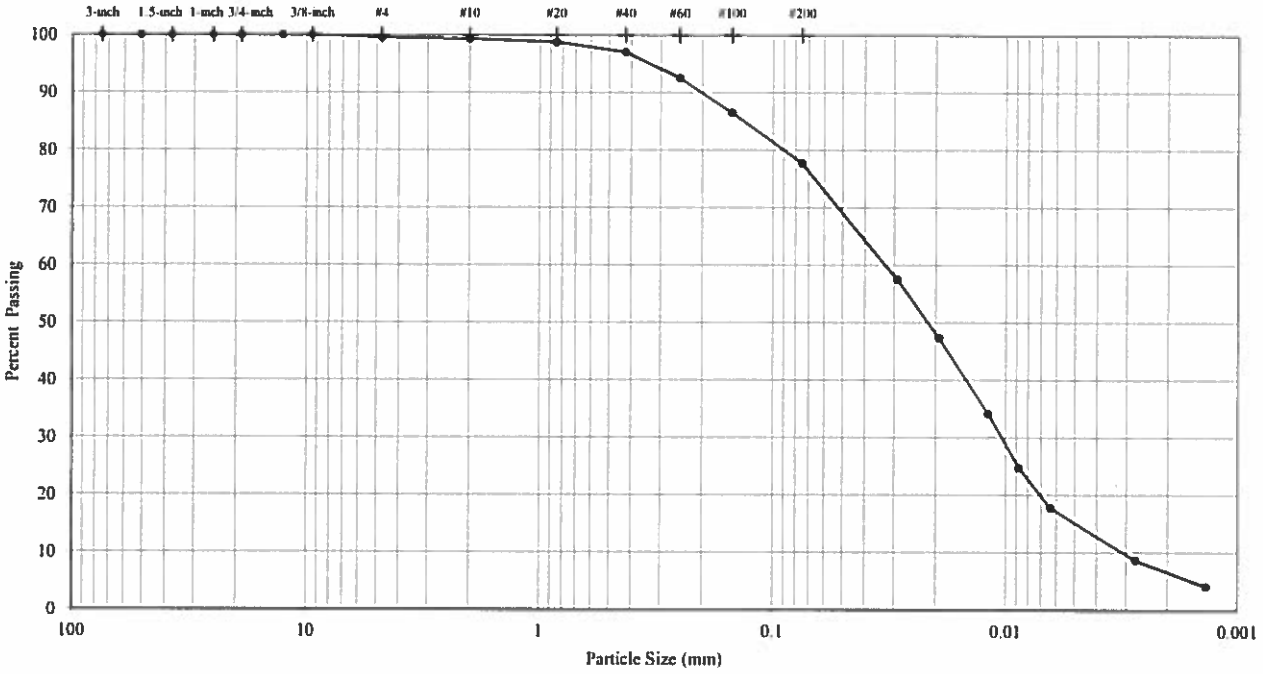
Golder Associates

May-16 165-4923

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

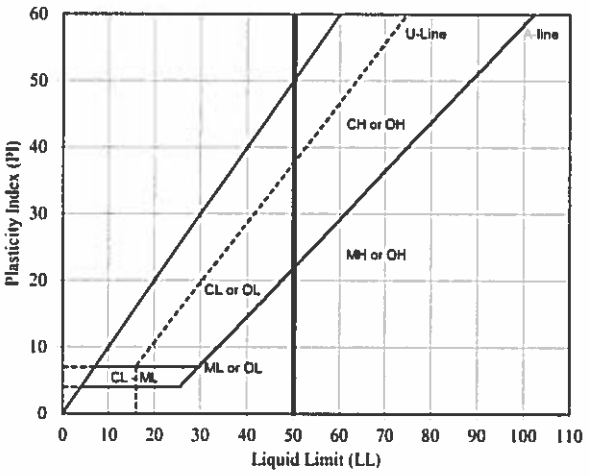
PROJECT NAME: J.H. Campbell Ash Pond Characterization
SAMPLE ID: JHC-BH-16007A S-1 DEPTH (ft): 7.5
TYPE: Jar



Sieve	Particle Size (mm)	% Passing	Description	Percentage	
3-inch	75.0	100.0	Cobbles	0.00	
2-inch	50.8	100.0	Coarse Gravel	0.00	0.41
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	0.41	
3/8-inch	9.5	100.0			
#4	4.75	99.6			
#10	2.0	99.3	Coarse Sand	0.27	21.82
#20	0.85	98.8	Medium Sand	2.30	
#40	0.425	97.0			
#60	0.25	92.5	Fine Sand	19.26	
#100	0.15	86.5			
#200	0.075	77.8			
	0.029	57.6	Silt or Clay Fines	77.77	
	0.019	47.4			
	0.012	34.2			
	0.009	24.8			
	0.006	17.8			
	0.003	8.7			
	0.001	4.1			

Sieve Analysis (Initial Separation on No. 4 Sieve)

Hydrometer Analysis



Visual Description:

Very dark gray, CCR

LL	PL	PI	LI
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As-Received Moisture Content (%): 61.3

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	
REVIEW	

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

PROJECT TITLE	J.H. Campbell Ash Pond Characterization	**SAMPLE ID**	JHC-BH-16007B S-2
PROJECT NO.	165-4923	**SAMPLE TYPE**	Jar
REMARKS		**SAMPLE DEPTH (ft)**	15.0

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	31.19
Wt Dry Soil & Tare (gm)	(w2)	28.08
Weight of Tare (gm)	(w3)	13.01
Weight of Water (gm)	(w4=w1-w2)	3.11
Weight of Dry Soil (gm)	(w5=w2-w3)	15.07
Moisture Content (%)	(w4/w5)*100	20.64

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	1.00
Dry Soil & Tare (gm)	1.00
Tare Weight (gm)	0.00
Moisture Content (%)	0.00%

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	546.09
	Tare Weight (gm)	367.90
(W6)	Total Dry Weight (gm)	178.19

SIEVE ANALYSIS

Tare Weight: 367.90

	Wt Ret +Tare	Cum. Ret. (Wt-Tare) (dry)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	SIEVE	
3.0"	367.90	0.00	0.00	100.00	3.0"	coarse gravel
2.5"	367.90	0.00	0.00	100.00	2.5"	coarse gravel
2.0"	367.90	0.00	0.00	100.00	2.0"	coarse gravel
1.5"	367.90	0.00	0.00	100.00	1.5"	coarse gravel
1.0"	367.90	0.00	0.00	100.00	1.0"	coarse gravel
0.75"	367.90	0.00	0.00	100.00	0.75"	fine gravel
0.50"	367.90	0.00	0.00	100.00	0.50"	fine gravel
0.375"	367.90	0.00	0.00	100.00	0.375"	fine gravel
#4	367.90	0.00	0.00	100.00	#4	coarse sand
#10	368.62	0.72	0.40	99.60	#10	medium sand
#20	371.39	3.49	1.96	98.04	#20	medium sand
#40	403.81	35.91	20.15	79.85	#40	fine sand
#60	510.96	143.06	80.29	19.71	#60	fine sand
#100	538.97	171.07	96.00	4.00	#100	fine sand
#200	540.81	172.91	97.04	2.96	#200	fines

% C GRAVEL	0.00
% F GRAVEL	0.00
% C SAND	0.40
% M SAND	19.75
% F SAND	76.88
% FINES	2.96
% TOTAL	100.00

Descriptive Terms		
trace	0 to 5%	> 10% mostly coarse (c)
little	5 to 12%	> 10% mostly medium (m)
some	12 to 30%	< 10% fine (c-m)
and	30 to 50%	< 10% coarse (m-f)
		< 10% coarse and fine (m)
		< 10% coarse and medium (f)
		> 10% equal amounts each (c-f)

LL	-
PL	-
PI	-
Gs	-

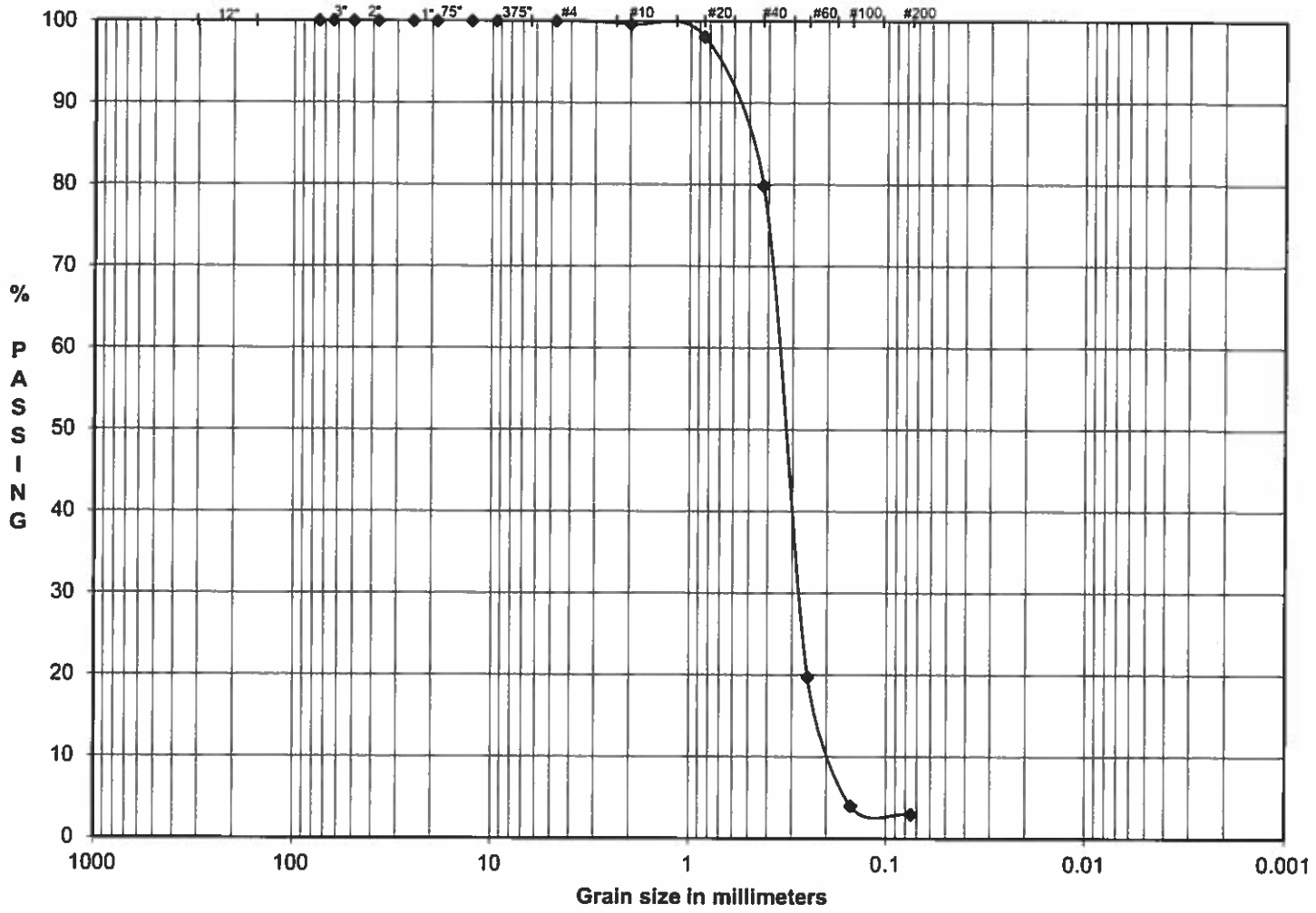
DESCRIPTION: Dark brown, POORLY GRADED SAND, trace fines

USCS: SP

TECH	DF
DATE	5/25/2016
CHECK	BS
REVIEW	BST

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

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



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	GRAVEL		SAND			FINES
	0.00	0.00	0.00	0.40	19.75	76.88	2.96
		0.00		97.04			

SAMPLE ID	JHC-BH-16007B S-2
SAMPLE TYPE	Jar
SAMPLE DEPTH (ft)	15

LL	-
PL	-
PI	-

DESCRIPTION	Dark brown, POORLY GRADED SAND, trace fines
USCS	SP

TECH	DF
DATE	5/25/2016
CHECK	BS
REVIEW	JST

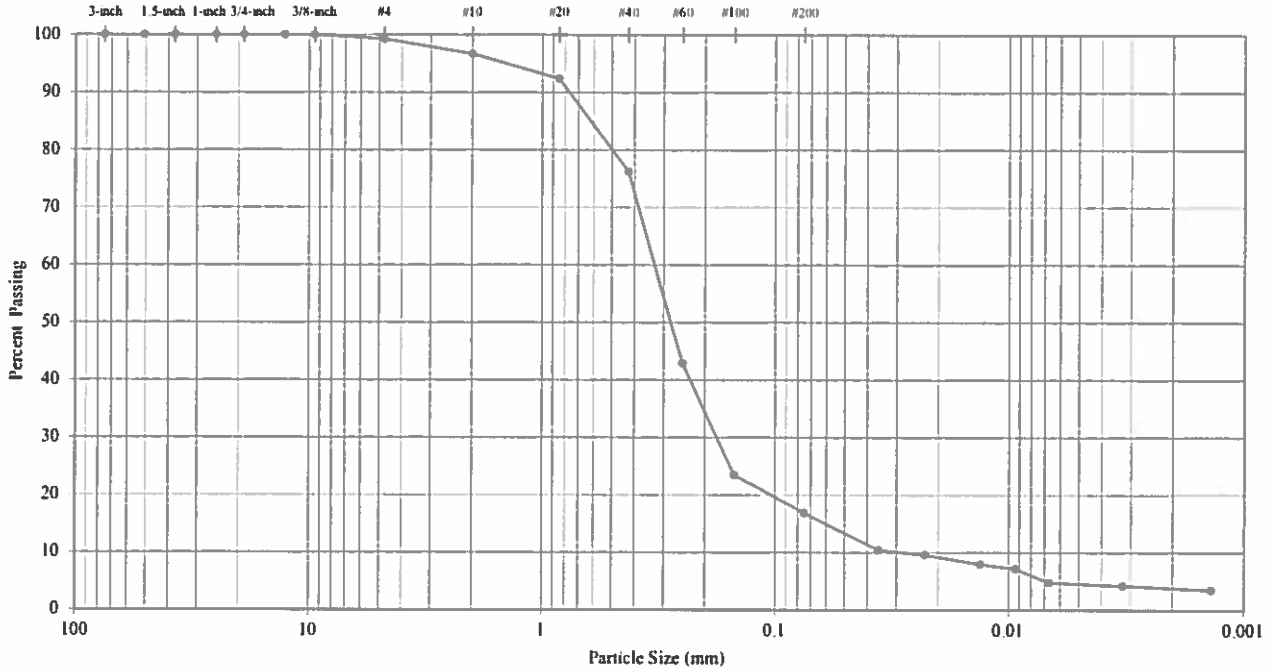
Golder Associates

May-16 165-4943

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

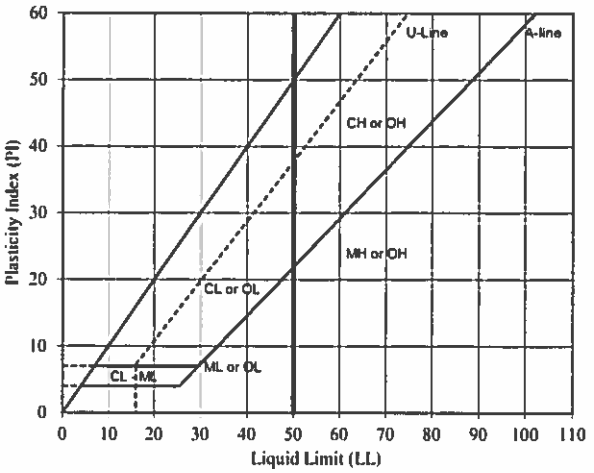
PROJECT NAME: **J.H. Campbell Ash Pond Characterization**
SAMPLE ID: **JHC-BH-16008 S-4** DEPTH (ft): **6.5**
TYPE: **Jar**



Sieve	Particle Size (mm)	% Passing	Description	Percentage	
3-inch	75.0	100.0	Cobbles	0.00	
2-inch	50.8	100.0	Coarse Gravel	0.00	0.76
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	0.76	
3/8-inch	9.5	100.0			
#4	4.75	99.2			
#10	2.0	96.7	Coarse Sand	2.55	82.35
#20	0.85	92.4	Medium Sand	20.43	
#40	0.425	76.3			
#60	0.25	42.9	Fine Sand	59.37	
#100	0.15	23.4			
#200	0.075	16.9			
	0.036	10.5	Silt or Clay Fines	16.89	
	0.023	9.6			
	0.013	8.0			
	0.009	7.2			
	0.007	4.8			
	0.003	4.2			
	0.001	3.5			

Sieve Analysis (Initial Separation on No. 4 Sieve)

Hydrometer Analysis



Visual Description:

Very dark gray, CCR

LL	PL	PI	LI
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As-Received Moisture Content (%): 23.8

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	
REVIEW	

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

PROJECT TITLE	J.H. Campbell Ash Pond Characterization	**SAMPLE ID**	JHC-BH-16008 S-5
PROJECT NO.	165-4923	**SAMPLE TYPE**	Jar
REMARKS		**SAMPLE DEPTH (ft)**	8.5

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	34.05
Wt Dry Soil & Tare (gm)	(w2)	30.85
Weight of Tare (gm)	(w3)	14.93
Weight of Water (gm)	(w4=w1-w2)	3.20
Weight of Dry Soil (gm)	(w5=w2-w3)	15.92
Moisture Content (%)	(w4/w5)*100	20.10

Hygroscopic Moisture For Sieve Sample

Wet Soil & Tare (gm)	1.00
Dry Soil & Tare (gm)	1.00
Tare Weight (gm)	0.00
Moisture Content (%)	0.00%

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

	Weight Of Sample (gm)	636.89
	Tare Weight (gm)	314.58
(W6)	Total Dry Weight (gm)	322.31

SIEVE ANALYSIS

Tare Weight: 314.58

	Wt Ret +Tare	Cum. Ret. (Wt-Tare) (dry)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	SIEVE	
3.0"	314.58	0.00	0.00	100.00	3.0"	coarse gravel
2.5"	314.58	0.00	0.00	100.00	2.5"	coarse gravel
2.0"	314.58	0.00	0.00	100.00	2.0"	coarse gravel
1.5"	314.58	0.00	0.00	100.00	1.5"	coarse gravel
1.0"	314.58	0.00	0.00	100.00	1.0"	coarse gravel
0.75"	314.58	0.00	0.00	100.00	0.75"	fine gravel
0.50"	314.58	0.00	0.00	100.00	0.50"	fine gravel
0.375"	314.58	0.00	0.00	100.00	0.375"	fine gravel
#4	315.60	1.02	0.32	99.68	#4	coarse sand
#10	316.22	1.64	0.51	99.49	#10	medium sand
#20	318.35	3.77	1.17	98.83	#20	medium sand
#40	387.19	72.61	22.53	77.47	#40	fine sand
#60	588.60	274.02	85.02	14.98	#60	fine sand
#100	630.00	315.42	97.86	2.14	#100	fine sand
#200	632.97	318.39	98.78	1.22	#200	fines

% C GRAVEL	0.00
% F GRAVEL	0.32
% C SAND	0.19
% M SAND	22.02
% F SAND	76.26
% FINES	1.22
% TOTAL	100.00

Descriptive Terms		
trace	0 to 5%	> 10% mostly coarse (c)
little	5 to 12%	> 10% mostly medium (m)
some	12 to 30%	< 10% fine (c-m)
and	30 to 50%	< 10% coarse (m-f)
		< 10% coarse and fine (m)
		< 10% coarse and medium (f)
		> 10% equal amounts each (c-f)

LL	-
PL	-
PI	-
Gs	-

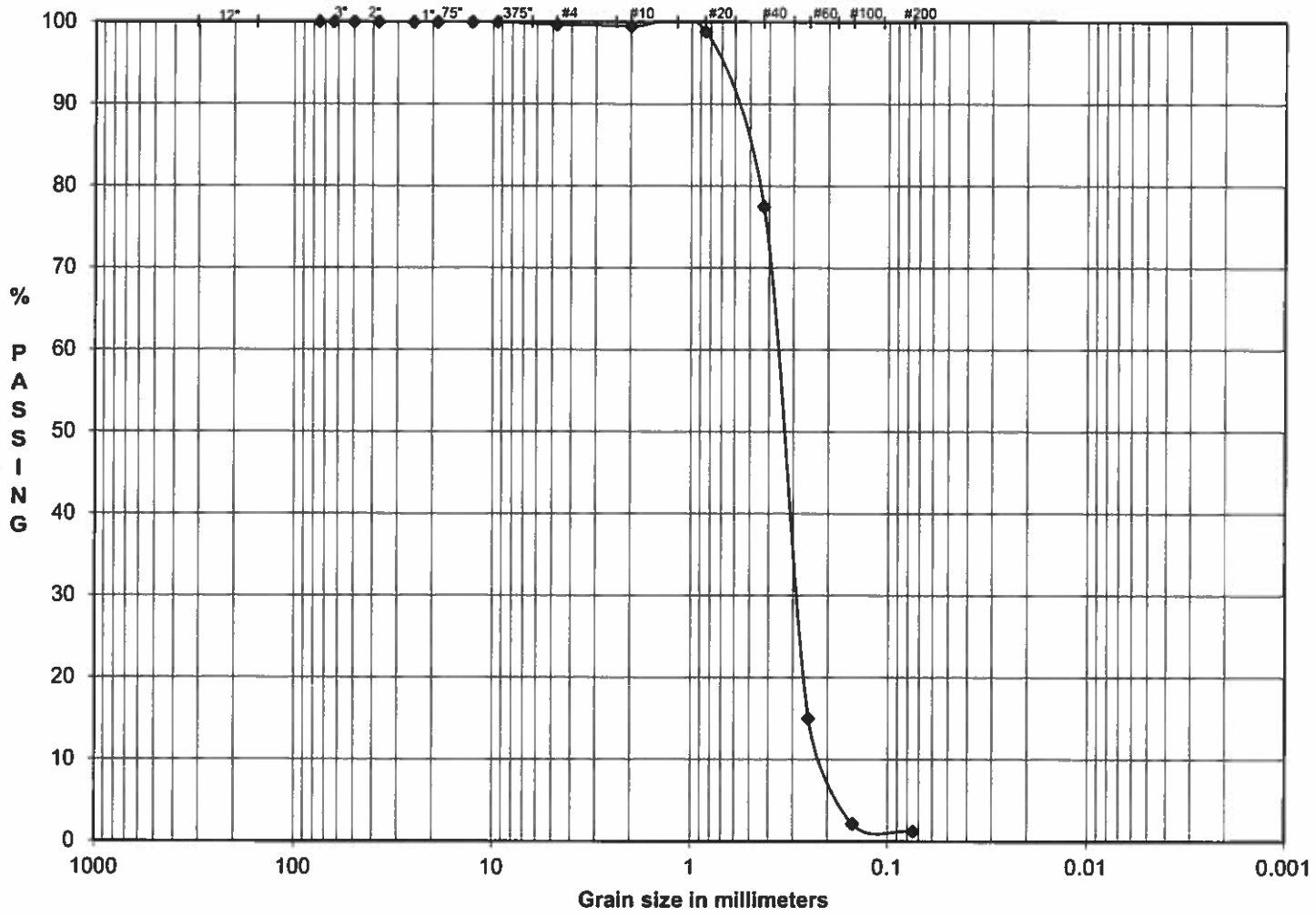
DESCRIPTION: Brown, POORLY GRADED SAND, trace gravel, trace fines

USCS: SP

TECH	DF
DATE	5/25/2016
CHECK	BS
REVIEW	BSJ

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

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



		Coarse	Fine	Cor	Med	Fine	SILT OR CLAY
Boulders	Cobbles	GRAVEL		SAND			FINES
	0.00	0.00	0.32	0.19	22.02	76.26	1.22
		0.32		98.47			

SAMPLE ID	JHC-BH-16008 S-5
SAMPLE TYPE	Jar
SAMPLE DEPTH (ft)	8.5

LL	-
PL	-
PI	-

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

TECH	DF
DATE	5/25/2016
CHECK	
REVIEW	

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® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

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 May 21, 2012

Target Property:

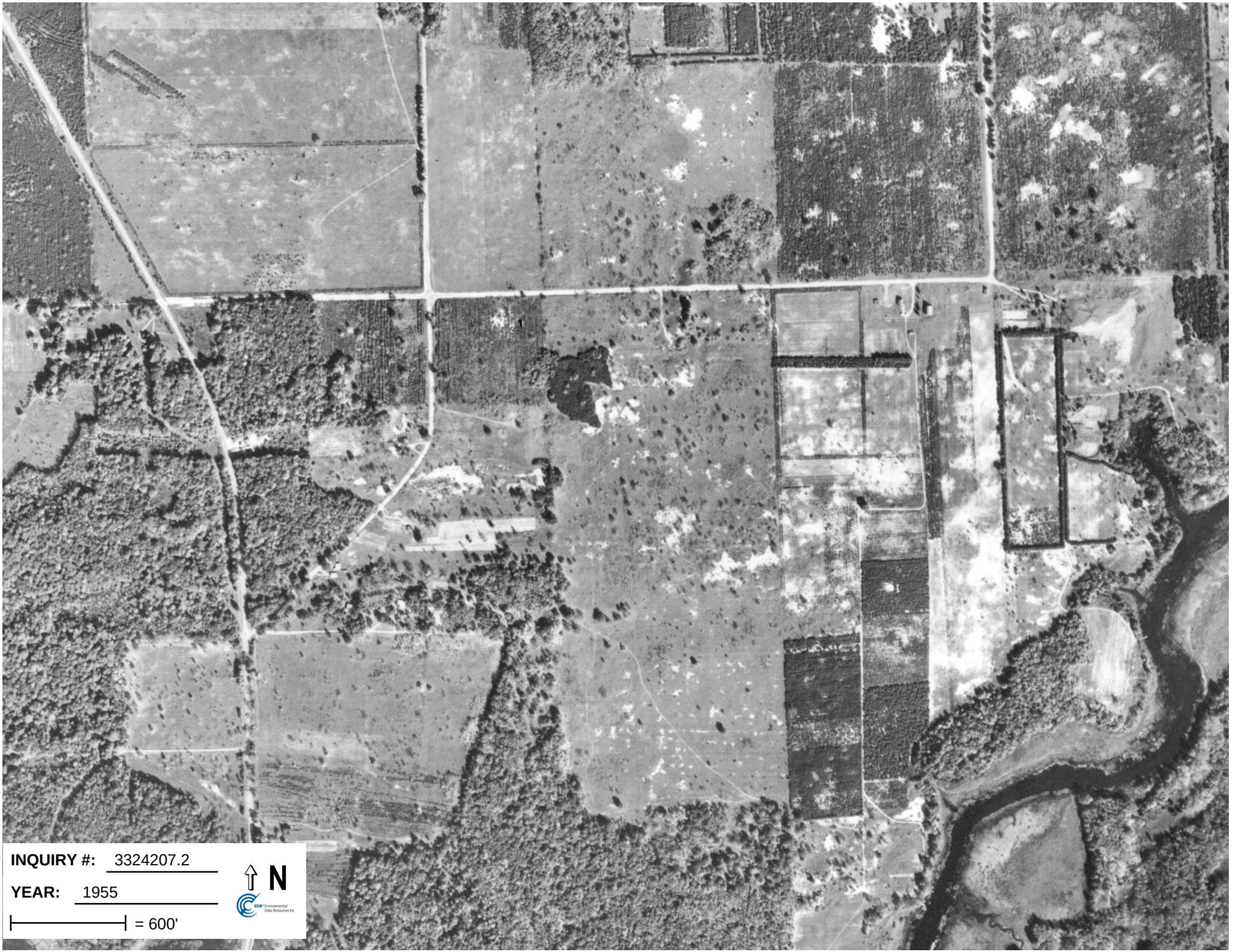
LAKESHORE DR

West Olive, MI 49460

Year	***Scale***	***Details***	***Source***
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
= 600'
N
EDR Environmental Data Resources Inc


INQUIRY #: 3324207.2
YEAR: 1950
= 600'
N
EDR Environmental Data Resources Inc


INQUIRY #: 3324207.2
YEAR: 1955
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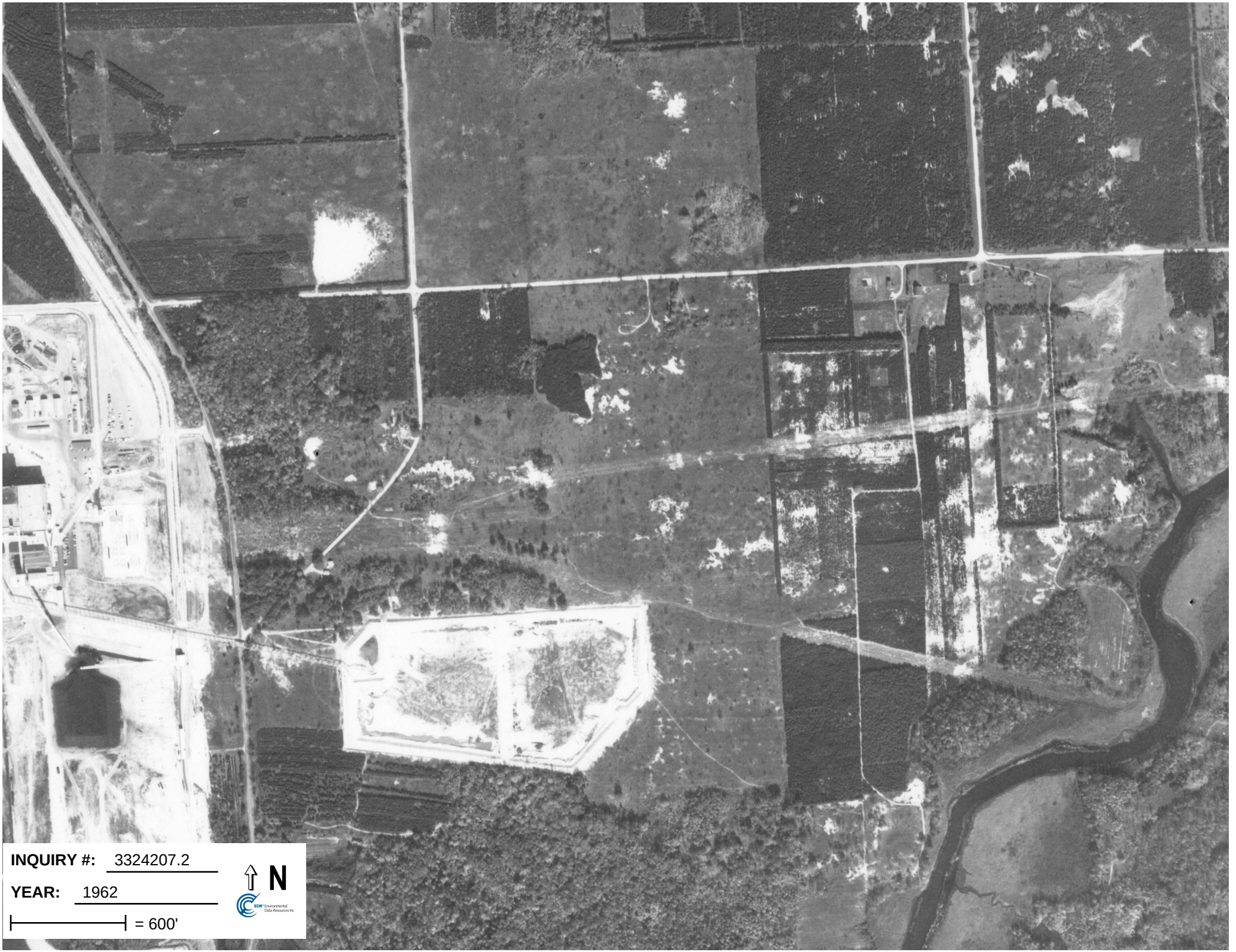
EDR Environmental Data Resources Inc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YEAR: 1962
= 600'
N
EDR Environmental Data Resources Inc


INQUIRY #: 3324207.2
YEAR: 1968
= 600'
N
EDR Environmental Data Resources Inc


INQUIRY #: 3324207.2
YEAR: 1974
= 600'
N
EDR Environmental Data Resources Inc


INQUIRY #: 3324207.2
YEAR: 1992
= unknown
N

INQUIRY #: 3324207.2

YEAR: 1997

= 500'

N

EDR Environmental Data Resources Inc


INQUIRY #: 3324207.2
YEAR: 2005
= 500'
N


INQUIRY #: 3324207.2
YEAR: 2006
= 500'
N
EDR Environmental Data Resources Inc