



Dynegy Midwest Generation, LLC
1500 Eastport Plaza Dr.
Collinsville, IL 62234

October 25, 2021

Illinois Environmental Protection Agency
DWPC – Permits MC #15
Attn: Part 845 Coal Combustion Residual Rule Submittal
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Re: Hennepin Power Plant Old West Ash Pond No. 1 and No. 3; Old West Ash Polishing Pond; IEPA ID W1550100002-01, 03

Dear Mr. LeCrone:

In accordance with 35 I.A.C. § 845.200, Dynegy Midwest Generation, LLC (DMG) is submitting an operating permit application for the Hennepin Power Plant Old West Ash Pond No. 1 and No. 3; Old West Ash Polishing Pond (IEPA ID W1550100002-01, 03). One hardcopy and one digital copy are provided with this submittal.

The permit application was prepared in accordance with 35 I.A.C. § 845.230(d)(2) (Existing, Inactive and Inactive Closed CCR Surface Impoundment that have completed an Agency approved closure before July 30, 2021). This submittal includes the completed permit forms as required by § 845.210.

Sincerely,

A handwritten signature in blue ink that reads "Cynthia Vodopivec".

Cynthia Vodopivec
SVP-Environmental Health and Safety

Enclosures

Prepared for

Dynegy Midwest Generation, LLC

1500 Eastport Plaza Drive
Collinsville, Illinois 62234

**INITIAL OPERATING PERMIT
HENNEPIN WEST ASH POND SYSTEM**

Prepared by



425 South Woods Mill Road, Suite 300
St. Louis, MO 63017

October 25, 2021

1.	Introduction.....	1
	1.1. Facility Information.....	1
	1.2. Owner Signatures.....	2
	1.3. Legal Description.....	2
	1.4. Previous Assessments.....	2
2.	Operating Permit.....	4
	2.1. Initial Operating Permit.....	4
	2.2. History of Construction.....	4
	2.3. Permanent Markers.....	4
	2.4. Slope Maintenance.....	4
	2.5. Groundwater Monitoring.....	4
	2.6. Initial Post-Closure Care Plan.....	5
	2.7. History of Groundwater Exceedances.....	5
	2.8. Financial Assurance Requirements.....	6
3.	Permit Application.....	7

ATTACHMENTS

Attachment A	Legal Description
Attachment B	History of Construction (845.220)
Attachment E	Permanent Markers (845.130)
Attachment H	Hydrogeologic Site Characterization (845.620)
Attachment I	Groundwater Sampling and Analysis Program (845.640)
Attachment J	Slope Maintenance (845.430)
Attachment K	Post Closure Care Plan (845.780)
Attachment M	History of Known Groundwater Exceedances (845.600)
Attachment N	Financial Assurance Requirements (845.900)

1. INTRODUCTION

Dynegy Midwest Generation, LLC (DMG) is operator of the inactive coal-fired Hennepin Power Plant (Plant) located in Putnam County near Hennepin, Illinois. The IEPA assigned identification numbers assigned to the Hennepin Old West Ash Pond (Pond No. 1 and No. 3) and Old West Ash Polishing Pond is: W1550100002-01, 03. The National Inventory of Dams (NID) number assigned for the Hennepin West Ash Pond System by the Illinois Department of Natural Resources (IDNR) is IL50698.

This initial operating permit application was developed in accordance with 35 Ill. Admin. Code 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (Part 845).

This initial operating permit application is for Hennepin Old West Ash Pond (Pond No. 1 and No.3) and Old West Ash Polishing Pond will be referred to as the West Ash Pond System.

1.1. Facility Information

Section 845.210(b)(1): All permit applications must contain the name, address, email address and telephone number of the operator, or duly authorized agent, and the property owner to whom all inquiries and correspondence shall be addressed.

Facility: Hennepin West Ash Pond System
Hennepin Power Plant
13498 East 800th Street
Hennepin, IL 61327

Owner/Operator: Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, Illinois 62234

1.2. Owner Signatures

Section 845.210(b)(2): All permit applications must be signed by the owner, operator or a duly authorized agent of the operator.

The owner of the Hennepin Power Plant is a corporation.

Section 845.210(b)(3): An application submitted by a corporation must be signed by a principal executive officer of at least the level of vice president, or his or her duly authorized representative, if that representative is responsible for the overall operation of the facility described in the application form.

The signature of Cynthia Vodopivec on behalf of Dynegy Midwest Generation, LLC can be found in the permit applications located in Section 3.

1.3. Legal Description

Section 845.210(c): All permit applications must contain a legal description of the facility boundary and a description of the boundaries of all units included in the facility.

A legal description has been developed in compliance with Section 845.210(c) and is included in Attachment A.

1.4. Previous Assessments

Section 845.210(d): Previous Assessments, Investigations Plans, and Programs

Previous assessments were performed in accordance with 40 CFR § 257 and are referenced within the permit application and included in the appropriate Attachments.

Section 845.210(d)(1): The Agency may approve the use of any hydrogeologic site investigation or characterization, groundwater monitoring well or system, or groundwater monitoring plan, bearing the seal and signature of an Illinois Licensed Professional Geologist or Licensed Professional Engineer, completed before April 21, 2021 to satisfy the requirements of this Part.

A previous hydrogeologic site investigation or characterization, groundwater monitoring well or system, or groundwater monitoring plan have been completed with a seal from an Illinois Licensed Professional Geologist or Licensed Professional Engineer. However, field investigations have been completed that supplement that work that will be utilized in the following sections of this report.

Section 845.210(d)(2): For existing CCR surface impoundments, the owner or operator of the CCR surface impoundment may use a previously completed location restriction demonstration required by Section 845.300 (Placement Above the Uppermost Aquifer), Section 845.310 (Wetlands), Section 845.320 (Fault Areas), Section 845.330 (Seismic Impact Zones), and Section 845.340 (Unstable Areas) provided that the previously completed assessments meet the applicable requirements of those Sections.

No previous assessments are included in the Hennepin West Ash Pond System permit application.

Section 845.210(d)(3): For existing CCR surface impoundments, the owner or operator of the CCR surface impoundment may use a previously completed assessment to serve as the initial assessment required by Section 845.440 (Hazard Potential Classification Assessment), Section 845.450 (Structural Stability Assessment) and Section 845.460 (Safety Factor Assessment) provided that the previously completed assessment: A) Was not completed more than five years ago; and B) Meets the applicable requirements of those Sections.

No previous assessments are included in the Hennepin West Ash Pond System permit application.

Section 845.210(d)(4): For inactive closed CCR surface impoundments, the owner or operator of the CCR surface impoundment may use a post-closure care plan previously approved by the Agency.

No post-closure care plan was previously approved by the Agency.

2. OPERATING PERMIT

2.1. Initial Operating Permit

Section 845.230(d): Initial Operating Permit for Existing, Inactive and Inactive Closed CCR Surface Impoundments

The Hennepin West Ash Pond System is defined by the IEPA as a closed inactive CCR surface impoundment that has not completed post-closure care. Per Part 845, DMG is submitting an initial operating permit application to IEPA by October 31, 2021. The permit applications (CCR-1 and CCR-2OE) are provided in Section 3.

The following sections contain information or references to documents required for the Operating Permit application (Section 845.230).

2.2. History of Construction

Section 845.230(d)(2)(A): The history of construction specified in Section 845.220(a)(1);

The history of construction prepared in 2016 pursuant to 40 CFR § 257.73(c) is provided in Attachment B.

2.3. Permanent Markers

Section 845.230(d)(2)(E): Evidence of permanent markers required by Section 845.130 have been installed;

Evidence of permanent markers at the Hennepin West Ash Pond System as required by Section 845.130 is provided in Attachment E.

2.4. Slope Maintenance

Section 845.230(d)(2)(F): Documentation that the CCR surface impoundment, if not incised, will be operated and maintained with one of the forms of slope protection specified in Section 845.430;

The Hennepin West Ash Pond System is not incised. Documentation of slope protection as required by Section 845.430 is provided in Attachment J.

2.5. Groundwater Monitoring

Section 845.230(d)(2)(I): Groundwater monitoring information:

The groundwater monitoring information for the Hennepin West Ash Pond U{ugo "are described in the following sections.

Section 845.230(d)(2)(I)(i): Hydrogeologic site characterization (see Section 845.620);

Hydrogeologic site characterization for the Hennepin West Ash Pond U{utem provided in Attachment H.

Section 845.230(d)(2)(I)(ii): Design and construction plans of a groundwater monitoring system (see Section 845.630);

Design and construction plans of a groundwater monitoring system are provided in Attachment I.

Section 845.230(d)(2)(I)(iii): A groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data (see Section 845.640); and

A groundwater sampling and analysis program that meets the requirements of Section 845.640 is provided in Attachment I.

Section 845.230(d)(2)(I)(iv): Proposed groundwater monitoring program that includes a minimum of eight independent samples for each background and downgradient well (see Section 845.650(b));

A proposed groundwater monitoring program that meets the requirements of Section 845.650(b) is provided in Attachment I.

2.6. Initial Post-Closure Care Plan

Section 845.230(d)(2)(K): Initial written post-closure care plan, if applicable (see Section 845.780(d));

The Hennepin West Ash Pond System was closed by capping the CCR in place. The initial post closure care plan was developed in accordance with Section 845.780 and is provided in Attachment K.

2.7. History of Groundwater Exceedances

Section 845.230(d)(2)(M): History of known exceedances of the groundwater protection standards in Section 845.600, and any corrective action taken to remediate the groundwater;

A history of known exceedances and any corrective action taken is provided in Attachment M.

2.8. Financial Assurance Requirements

Section 845.230(d)(2)(N): A certification that the owner or operator meets the financial assurance requirements of Subpart I;

A certification meeting the requirement of Section 845.230(d)(2)(N) stating that the Owner meets the financial assurance requirements of *Subpart I* is provided in Attachment N.

3. PERMIT APPLICATION

All permit applications must be made on the forms prescribed by the Agency and must be mailed or delivered to the address designated by the Agency on the forms. The permit applications (CCR-1 and CCR-2OE) are provided below.



**Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 1 – General Provisions**

Bureau of Water ID Number:

For IEPA Use Only

CCR Permit Number:

Facility Name:

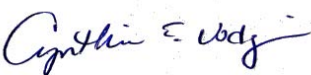
SECTION 1: FACILITY, OPERATOR, AND OWNER INFORMATION (35 Ill. Adm. Code 845.210(b))

Facility, Operator, and Owner Information	1.1	Facility Name		
	1.2	Illinois EPA CCR Permit Number (if applicable)		
	1.3	Facility Contact Information		
		Name (first and last)	Title	Phone Number
		Email address		
	1.4	Facility Mailing Address		
		Street or P.O. box		
		City or town	State	Zip Code
	1.5	Facility Location		
		Street, route number, or other specific identifier		
		County name	County code (if known)	
		City or town	State	Zip Code
	1.6	Name of Owner/Operator		

Facility, Operator, and Owner Info	1.7	Owner/Operator Contact Information		
		Name (first and last)	Title	Phone Number
		Email address		
	1.8	Owner/Operator Mailing Address		
		Street or P.O. box		
	City or town	State	Zip Code	
SECTION 2: LEGAL DESCRIPTION (35 Ill. Adm. Code 845.210(c))				
Legal Description	2.1	Legal Description of the facility boundary		
SECTION 3: PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (35 Ill. Adm. Code 845.810)				
Internet Site	3.1	Web Address(es) to publicly accessible internet site(s) (CCR website)		
	3.2	Is/are the website(s) titled "Illinois CCR Rule Compliance Data and Information"		
		Yes	No	
SECTION 4: IMPOUNDMENT IDENTIFICATION				
Impoundment Identification	4.1	List all the impoundment identification numbers for your facility and check the corresponding box to indicate that you have attached a written description for each impoundment.		
			Attached written description	
			Attached written description	
			Attached written description	
			Attached written description	
			Attached written description	
			Attached written description	

			Attached written description
			Attached written description
			Attached written description
			Attached written description

SECTION 5: CHECKLIST AND CERTIFICATION STATEMENT

Checklist and Certification Statement	5.1	In Column 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing.		
		Column 1		Column 2
		Section 1: Facility, Operator, and Owner Information		w/attachments
		Section 2: Legal Description		w/attachments
		Section 3: Publicly Accessible Internet Site Requirement		w/attachments
		Section 4: Impoundment Identification		w/attachments
	5.2	Certification Statement		
		I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.		
	Name (print or type first and last name) of Owner/Operator		Official Title	
	Signature 		Date Signed	



Illinois Environmental Protection Agency
CCR Surface Impoundment Permit Application
Form CCR 20E – Initial Operating Permit for Existing or Inactive CCR
Surface Impoundment Where an Agency-approved Closure
Has Been Completed Before July 30, 2021

Bureau of Water ID Number:

For IEPA Use Only

CCR Permit Number:
Initial Permit

Facility Name:
Hennepin Power Plant

SECTION 1: CONSTRUCTION HISTORY (35 Ill. Adm. Code 845.220 and 35 Ill. Adm. Code 845.230)

Construction History	1.1	CCR surface impoundment name.
	1.2	Identification number of the CCR surface impoundment (if one has been assigned by the Agency).
		W1550100002 - 01, 03
	1.3	Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).
	1.4	State the purpose for which the CCR surface impoundment is being used.
	1.5	How long has the CCR surface impoundment been in operation?
	1.6	List the types of CCR that have been placed in the CCR surface impoundment.
	1.7	List the name of the watershed within which the CCR surface impoundment is located.
	1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?
	1.9	Check the corresponding boxes to indicate that you have attached the following:
		<input type="checkbox"/> A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.

Construction History		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 surface impoundment.		
		A statement of the method of site preparation and construction of each zone of the CCR surface impoundment.		
		A statement of the approximate dates of construction of each successive stage of construction of the CCR surface impoundment.		
		Drawings satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(1)(F).		
		A description of the type, purpose, and location of existing instrumentation.		
		Area Capacity Curves for the CCR Impoundment.		
		A description of each spillway and diversion design features and capacities and provide the calculations used in their determination.		
		The construction specifications and provisions for surveillance, maintenance, and repair of the CCR surface impoundment.		
	1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?		
		Yes		No

1.10.2 If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.

SECTION 2: ATTACHMENTS

Attachments	2.1	Check the corresponding boxes to indicate that you have attached the following:	
		Evidence that the permanent markers required by 35 Ill. Adm. Code 845.130 have been installed.	
		Documentation demonstrating that the CCR surface impoundment, if not incised, will be operated and maintained with one of the forms of slope protection specified in 35 Ill. Adm. Code 845.430.	
		Emergency Action Plan and accompanying certification required by 35 Ill. Adm. Code 845.520(e).	
		Written post-closure care plan, if applicable (see 35 Ill. Adm. Code 845.780(d)).	
		History of known exceedances of the groundwater protection standards in 35 Ill. Adm. Code 845.600, and any corrective action taken to remediate the groundwater.	

SECTION 3: GROUNDWATER MONITORING

	3.1	Check the corresponding boxes to indicate whether you have attached the following groundwater monitoring information:	
		A hydrogeologic site characterization meeting the requirements of 35 Ill. Adm. Code 845.620.	

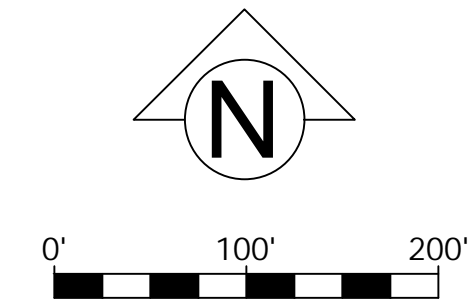
Groundwater		Design and construction plans of a groundwater monitoring system meeting the requirements of 35 Ill. Adm. Code 845.630.
		A groundwater sampling and analysis program that includes section of the statistical procedures to be used for evaluating groundwater monitoring data, required by 35 Ill. Adm. Code 845.640.
		Proposed groundwater monitoring program that includes a minimum of eight independent samples for each background and downgradient well, required by 35 Ill. Adm. Code 845.650(b).

ATTACHMENT A

Point #	Northing	Easting	Elevation	Description
1000	1688776.04	2526732.57	443.46	SET I.P.
1001	1689050.18	2528195.84	450.48	SET I.P.
1002	1689406.21	2528844.65	446.97	SET I.P.
1003	1689492.46	2529083.14	452.70	SET I.P.
1004	1688270.20	2529123.32	459.59	SET I.P.
1005	1688266.21	2526745.91	448.21	SET I.P.



Luminant DYNEGY MIDWEST GENERATION, LLC HENNEPIN POWER PLANT

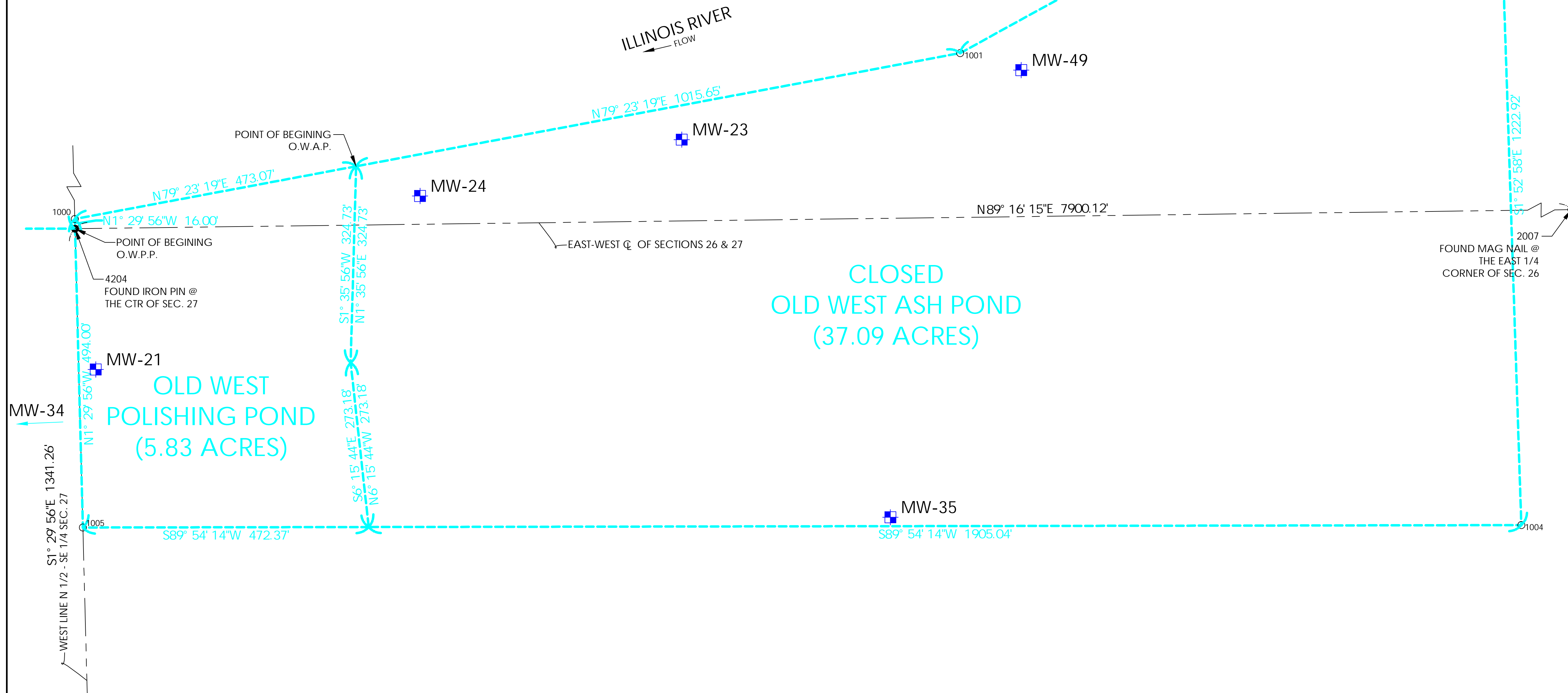


LEGEND

- SECTION LINE
- RESTRICTED USE BOUNDARY
- FOUND SURVEY MARKER AS NOTED
- SET 5/8" IRON REBAR (UNLESS OTHERWISE NOTED)
- DOWNGRADIENT WELL
- UPGRADIENT WELL

SURVEY NOTE:
THIS DRAWING AND THE INFORMATION SHOWN HERE ON WAS OBTAINED FROM DATA COLLECTED FROM A FIELD SURVEY MADE BY INGENAE, LLC BETWEEN FEBRUARY 12 THROUGH JULY 21, 2021. SURVEY COORDINATES, BEARINGS & DISTANCES ARE REFERENCED TO ILLINOIS WEST 1202 STATE PLANE COORDINATE SYSTEM NAD 1983.

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
2007	1689050.18	2529123.32	459.59	FOUND MAG NAIL
2026	1688266.21	2526732.57	448.21	BRASS PLUG IN PVC CONCRETE MONUMENT
4204	1689406.21	2528844.65	443.246	FOUND IRON PIN
2050	1689413.471	2529031.977	463.587	MW-50 GROUND
2080	1689228.209	2528778.555	462.007	MW-220 GROUND
2084	1689228.209	2528778.555	461.958	MW-23 GROUND
2082	1688202.190	2528386.703	455.073	MW-48 GROUND
2083	1688907.190	2527735.615	462.068	MW-23 GROUND
2084	1688914.132	2527703.105	461.808	MW-24 GROUND
2085	1688527.396	2526767.107	448.695	MW-21 GROUND
2086	1688908.298	2528784.678	453.888	NW-54 TOP METAL CASING
2087	1688283.08	2528283.549	451.538	MW-25 GROUND



IngenAE
502 Earth City Plaza, Suite 120
Earth City, MO 63045
www.ingenae.com

Submissions / Revisions: Date:

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

Luminant

Project Name & Location:
**HENNEPIN
POWER PLANT
13498 EAST 800TH STREET
HENNEPIN, IL
61327**

Copyright © 2021
IngenAE, LLC
www.ingenae.com

DO NOT SCALE PLANS
Copying, Printing, Software and other processes required to produce these prints can stretch or shrink the actual paper or layout. Therefore, scaling of this drawing may be inaccurate. Contact IngenAE with any need for additional dimensions or clarifications.

Drawing Name:
**OLD WEST POLISHING POND
& OLD WEST ASH POND
RESTRICTED USE BOUNDARY
EXHIBIT**

Date: 9/22/2021 Project No.
Type: SITE Drawing No.
Drawn By: CB **1**
Approved By: MG
Scale: AS NOTED

**Land Description of the Hennepin Power Plant
Old West Polishing Pond Area
5.83 Acres**

Part of the North Half of the Southeast Quarter of Section 27 and Part of the Fractional Northeast Quarter of Section 27 in Township 33 North, Range 2 West of the Third Principal Meridian, Putnam County, Illinois being more particularly described as follows:

Beginning at the found Iron Pin at the Center of Section 27, from which bears a found Brass Plug in a PVC Concrete Monument at the Southwest Corner of the North Half of the Southeast Quarter of Section 27, South 1 degrees 29 minutes 56 seconds East a distance of 1341.26 feet and from which also bears a found Magnetic Nail at the East Quarter Corner of Section 26, North 89 degrees 16 minutes 15 seconds East a distance of 7900.12 feet; thence from said found Iron Pin at the Center of Section 27 being the Point of Beginning of the tract described herein North 1 degrees 29 minutes 56 seconds West a distance of 16.00 feet; thence North 79 degrees 23 minutes 19 seconds East a distance of 473.07 feet; thence South 1 degrees 35 minutes 56 seconds West a distance of 324.73 feet; thence South 6 degrees 15 minutes 44 seconds East a distance of 273.18 feet; thence South 89 degrees 54 minutes 14 seconds West a distance of 472.37 feet to the West line of the North Half of the Southeast Quarter of Section 27; thence North 1 degrees 29 minutes 56 seconds West, along said line, a distance of 494.00 feet to the Point of Beginning and containing 5.83 Acres.

**Land Description of the Hennepin Power Plant
Closed Old West Ash Pond Restricted Use Area
37.09 Acres**

Part of the North Half of the Southeast Quarter of Section 27 and Part of the Fractional Northeast Quarter of Section 27 in Township 33 North, Range 2 West of the Third Principal Meridian, Putnam County, Illinois being more particularly described as follows:

Beginning at the found Iron Pin at the Center of Section 27, from which bears a found Brass Plug in a PVC Concrete Monument at the Southwest Corner of the North Half of the Southeast Quarter of Section 27, South 1 degrees 29 minutes 56 seconds East a distance of 1341.26 feet and from which also bears a found Magnetic Nail at the East Quarter Corner of Section 26, North 89 degrees 16 minutes 15 seconds East a distance of 7900.12 feet; thence from said found Iron Pin at the Center of Section 27 being the Point of Beginning of the tract described herein North 79 degrees 23 minutes 19 seconds East a distance of 1015.65 feet; thence North 61 degrees 14 minutes 41 seconds East a distance of 740.08 feet; thence North 70 degrees 07 minutes 04 seconds East a distance of 253.61 feet; thence South 1 degrees 52 minutes 58 seconds East a distance of 1222.92 feet; thence South 89 degrees 54 minutes 14 seconds West a distance of 1905.04 feet; thence North 6 degrees 15 minutes 44 seconds West a distance of 273.18 feet; thence North 1 degrees 35 minutes 56 seconds East a distance of 324.73 feet to the Point of Beginning and containing 37.09 Acres.

SURVEYOR CERTIFICATE:
THIS IS TO CERTIFY THAT WE, INGENAE, LLC, HAVE AT THE REQUEST OF AND FOR THE EXCLUSIVE USE OF THE OWNERS, PERFORMED A SURVEY OF THE TRACT AS SHOWN HEREON AND THAT THIS IS A TRUE REPRESENTATION OF THAT SURVEY. THIS PLAN AND THE SURVEY FROM WHICH IT IS BASED WERE DONE IN ACCORDANCE WITH THE "MINIMUM STANDARDS OF PRACTICE" FOR LAND SURVEYING IN THE STATE OF ILLINOIS.

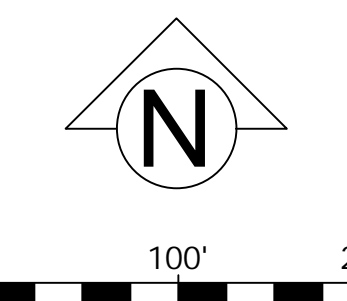
INGENAE, LLC
PROFESSIONAL DESIGN FIRM
LICENSE NO. 184.007588-0010

Michael J. Graminski
MICHAEL J. GRAMINSKI, I.P.L.S. NO. 035.002901 DATE
EXPIRES: 11/30/2022

Point #	Northing	Easting	Elevation	Description
1000	1688776.04	2526732.57	443.46	SET I.P.
1001	1689050.18	2528195.84	450.48	SET I.P.
1002	1689406.21	2528844.65	446.97	SET I.P.
1003	1689492.46	2529083.14	452.70	SET I.P.
1004	1688270.20	2529123.32	459.59	SET I.P.
1005	1688266.21	2526745.91	448.21	SET I.P.



Luminant DYNEGY MIDWEST GENERATION, LLC HENNEPIN POWER PLANT

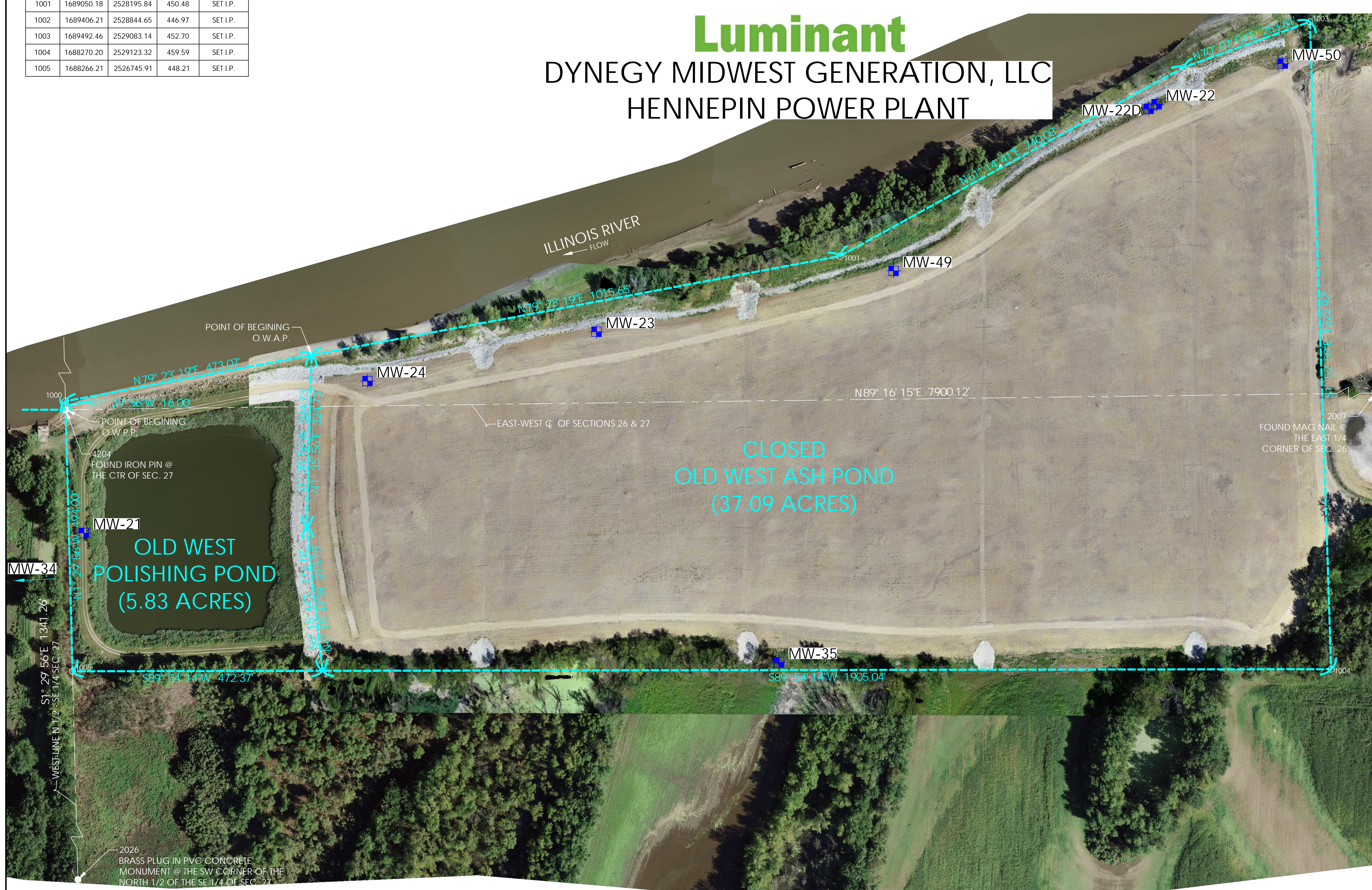


LEGEND

	SECTION LINE
	RESTRICTED USE BOUNDARY
	FOUND SURVEY MARKER AS NOTED
	SET 5/8" IRON REBAR (UNLESS OTHERWISE NOTED)
	DOWNGRADIENT WELL
	UPGRADIENT WELL

SURVEY NOTE:
THIS DRAWING AND THE INFORMATION SHOWN HERE ON WAS OBTAINED FROM DATA COLLECTED FROM A FIELD SURVEY MADE BY INGENAE, LLC BETWEEN FEBRUARY 12 THROUGH JULY 21, 2021. SURVEY COORDINATES, BEARINGS & DISTANCES ARE REFERENCED TO ILLINOIS WEST 1202 STATE PLANE COORDINATE SYSTEM NAD 1983.

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
2026	1688266.21	2526732.57	443.46	BRASS PLUG IN PVC CONCRETE MONUMENT
4204	1689406.21	2529083.14	452.70	FOUND IRON PIN
2059	1689492.46	2529083.14	452.70	MW-50 GROUND
2080	1689226.209	2528778.555	462.007	MW-22D GROUND
2084	1689226.209	2528778.555	462.007	MW-22 GROUND
2082	1689226.209	2528778.555	462.007	MW-48 GROUND
2083	1689226.209	2528778.555	462.007	MW-23 GROUND
2084	1689226.209	2528778.555	462.007	MW-24 GROUND
2085	1689226.209	2528778.555	462.007	MW-21 GROUND
2086	1689226.209	2528778.555	462.007	NW-58 TOP METAL CASING
2087	1689226.209	2528778.555	462.007	MW-25 GROUND



IngenAE
502 Earth City Plaza, Suite 120
Earth City, MO 63045
www.ingenae.com

Submissions / Revisions:	Date:
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	



Project Name & Location:
**HENNEPIN
POWER PLANT
13498 EAST 800TH STREET
HENNEPIN, IL
61327**

Copyright © 2021
IngenAE, LLC
www.ingenae.com

DO NOT SCALE PLANS
Copying, Printing, Software and other processes required to produce these prints can stretch or shrink the actual paper or layout. Therefore, scaling of this drawing may be inaccurate. Contact IngenAE with any need for additional dimensions or clarifications.

Drawing Name:
**OLD WEST POLISHING POND
& OLD WEST ASH POND
RESTRICTED USE BOUNDARY
EXHIBIT**

Date: 9/22/2021	Project No.
Type: SITE	Drawing No. 2
Drawn By: CB	
Approved By: MG	
Scale: AS NOTED	

ATTACHMENT B



October 2016

Dynegy Midwest Generation, LLC
13498 E 800th St.
Hennepin, IL 61327

**RE: History of Construction
USEPA Final CCR Rule, 40 CFR § 257.73(c)
Hennepin Power Station
Hennepin, Illinois**

On behalf of Dynegy Midwest Generation, LLC, AECOM has prepared the following history of construction for the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond at the Hennepin Power Station in accordance with 40 CFR § 257.73(c).

BACKGROUND

40 CFR § 257.73(c)(1) requires the owner or operator of an existing coal combustion residual (CCR) surface impoundment that either (1) has a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) has a height of 20 feet or more to compile a history of construction by October 17, 2016 that contains, to the extent feasible, the information specified in 40 CFR § 257.73(c)(1)(i)–(xii).

The history of construction presented herein was compiled based on existing documentation, to the extent that it is reasonably and readily available (see 80 Fed. Reg. 21302, 21380 [April 17, 2015]), and AECOM's site experience. AECOM's document review included construction drawings, geotechnical investigations, operation and maintenance information, etc. for Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond at the Hennepin Power Station.

HISTORY OF CONSTRUCTION

§ 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.

Owner: Dynegy Midwest Generation, LLC

Address: 1500 Eastport Plaza Drive
Collinsville, IL 62234

CCR Units: Old West Polishing Pond
Old West Ash Pond (Pond No. 1 and Pond No. 3)
Ash Pond No. 2
East Ash Pond, IDNR Dam ID No. IL50363

The Old West Polishing Pond, Old West Ash Pond, and Ash Pond No. 2 do not have a state assigned identification number.

§ 257.73(c)(1)(ii): The location of the CCR unit identified on the most recent USGS 7¹/₂ or 15 minute topographic quadrangle map or a topographic map of equivalent scale if a USGS map is not available.

The locations of the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond have been identified on an USGS 7-1/2 minute topographic quadrangle map in **Appendix A**.

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

The following captures the purpose of each CCR unit:

- The Old West Polishing Pond (inactive) was used to store and dispose fly ash and bottom ash and is currently being used to clarify stormwater runoff from the Old West Ash Pond prior to discharge in accordance with the station's NPDES permit.
- The Old West Ash Pond (inactive) was used to store and dispose fly ash and bottom ash.
- The Ash Pond No. 2 (inactive) was used to store and dispose fly ash, bottom ash, and other non-CCR waste streams including coal pile runoff.
- The East Ash Pond is being used to store and dispose bottom ash, fly ash, and other non-CCR waste and to clarify process water prior to discharge in accordance with the station's NPDES permit.

Notice of intent to close the Old West Polishing Pond, Old West Ash Pond, and Ash Pond No. 2 was provided in November 2015.¹

¹ This history of construction report was prepared on a facility-wide basis for CCR surface impoundments at the Hennepin Power Station. The inclusion of the Old West Polishing Pond, Old West Ash Pond, and Ash Pond No. 2 in this history of construction report does not concede and should not be construed to concede that the Old

§ 257.73(c)(1)(iv): The name and size in acres of the watershed where the CCR unit is located.

The Hennepin Power Station and the above-referenced CCR units are located at the western edge of the Depue Lake-Illinois River Watershed with a 12-digit Hydrologic Unit Code (HUC) of 071300010804 and a drainage area of 44,525 acres (USGS 2016).

§ 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.

Physical properties of the foundation materials for the Old West Polishing Pond and Old West Ash Pond are described as cohesive material underlain by granular material. The cohesive material consists of lean clay, gravelly clay, silt, clayey silt, and sandy silt. The consistency of the cohesive material varies from very soft to medium stiff. The granular material consists of silty sand and clayey gravel. The relative density of the granular materials varies from loose to very dense and generally increases with depth. An available summary of the engineering properties of the foundation materials for the Old West Polishing Pond and Old West Ash Pond is presented in **Table 1** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 1. Summary of Material Engineering Properties for the Old West Polishing Pond and Old West Ash Pond

Layer	Unit Weight (pcf)	Total (undrained) Shear Strength Parameters		Effective (drained) Shear Strength Parameters	
		ϕ (deg)	c (psf)	ϕ' (deg)	c' (psf)
CL (soft)	120	0	500	28	0
CL (medium stiff gravelly clay)	120	28	0	28	0
ML (soft to medium stiff)	125	28	0	28	0
CL-ML (very soft)	120	0	400	26	0
SM (very loose)	125	28	0	28	0
GC (dense)	130	34	0	34	0
GC (very dense)	130	36	0	36	0
Fill: GC (very dense)	130	34	50	34	0

West Polishing Pond, Old West Ash Pond, and Ash Pond No. 2 are subject to the Design Criteria or all Operating Criteria in the CCR Rule.

The Old West Polishing Pond and Old West Ash Pond are enclosed impoundments with dikes and do not have abutments.

Physical properties of the foundation and abutment materials for Ash Pond No. 2 and the East Ash Pond are described as gravel materials with varying amounts of silt and clay. The relative density of the gravel is medium dense to very dense. An available summary of the engineering properties of the foundation materials for Ash Pond No. 2 and the East Ash Pond is presented in **Table 2** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 2. Summary of Foundation and Abutment Material Engineering Properties for the Ash Pond No. 2 and East Ash Pond

Material	Unit Weight (pcf)	Effective (drained) Shear Strength Parameters		Total (undrained) Shear Strength Parameters	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)
Alluvial Foundation	135	0	38	0	38

§ 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.

Physical properties of the embankment materials for the Old West Polishing Pond and Old West Ash Pond are described as gravel with occasional zones of clayey sand and lean clay. The gravel has a general relative density of very dense. An available summary of the engineering properties of the embankment materials for the Old West Polishing Pond and Old West Ash Pond is presented in **Table 1** above. The engineering properties are based on previous geotechnical explorations and laboratory testing.

The physical properties of Ash Pond No. 2 embankment construction materials are described in this paragraph. The original embankments are constructed of sand with varying amounts of coal pieces and gravel. The initial embankment raise is constructed of silty clay, clayey sand, sand, and gravel and the later embankment raise is constructed with layers of lean clay, silty clay, clayey silt, clayey, and gravel. An available summary of the engineering properties of the embankment materials for Ash Pond No. 2 is presented in **Table 3** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 3. Summary of Construction Material Engineering Properties for Ash Pond No. 2

Material	Unit Weight (pcf)	Effective (drained) Shear Strength Parameters		Total (undrained) Shear Strength Parameters	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)
Fill: GP-GM (medium dense)	125	0	32	0	32
Fill: CL (hard)	120	0	32	4000	0
Fill: ML (hard)	120	0	32	4500	0
Fill: SC (medium dense)	120	0	28	0	28

Physical properties of the embankment materials for the East Ash Pond are described as clayey silt and clay. The consistency of both the clayey silt and clay ranges from stiff to hard. The original pond surface is lined with a 4-foot thick compacted clay layer of 1.0×10^{-7} cm/s underlain by a 1-foot thick sand layer. The liner system of the embankment raise consists of a (from top to bottom) 45 mil reinforced polyethylene geomembrane, a 1-foot thick clay layer, and an 8 oz/sy polypropylene geotextile. A typical cross section profile of the liner system is shown on drawing C-56 presented in **Appendix B**. An available summary of the construction material engineering properties for the East Ash Pond is presented in **Table 4** below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 4. Summary of Construction Material Engineering Properties for the East Ash Pond

Material	Unit Weight (pcf)	Effective (drained) Shear Strength Parameters		Total (undrained) Shear Strength Parameters	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)
Embankment Fill	105	30	32	2500	0
Liner System	120	60	30	2500	0

The method of site preparation and construction of the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and the original East Ash Pond are not reasonably and readily available. Site preparation and construction of the 2003 East Ash Pond liner raise were completed in accordance with the applicable construction specification (see § 257.73(c)(1)(xi) below).

Reasonably and readily available approximate dates of construction of each successive stage of construction of the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond are provided in **Table 5** below.

Table 5. Approximate dates of construction of each successive stage of construction.

Date	Event
1951 to 1952	Construction of historical Ash Pond No. 1
1958	Construction of Ash Pond No. 2
Late 1960's	Construction of historical Ash Pond No. 3
1978	Embankment raise of Ash Pond No. 2
1985	Embankment raise of Ash Pond No. 2 to elevation 484 feet and Ash Pond No. 3 (Old West Ash Pond) to elevation 460 feet
1988 to 1989	Embankment raise of Old West Ash Pond to elevation 465 feet that merged historical Ash Pond No. 1 and Ash Pond No. 3 into one single pond and created the Old West Polishing Pond
1989	Embankment raise of Ash Pond No. 2 to elevation 494 feet
1995 to 1996	Construction of East Ash Pond
2003	Embankment liner raise of East Ash Pond
2009 to 2010	Eastern portion of Ash Pond No. 2 was removed to facilitate construction of the Leachate Pond
2011	Landfill Cell 1 was constructed over placed CCR in Ash Pond No. 2 adjacent to the Leachate Pond
2014	North Embankment tree removal, grading, and vegetation re-establishment of Ash Pond No. 2

§ 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.

Drawings that contain items pertaining to the requested information for the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond are listed in **Table 6** below. Items marked as "Not Available" are items not found during a review of the reasonably and readily available record documentation.

Table 6. List of drawings containing items pertaining to the information requested in § 257.73(c)(1)(vii).

	Old West Polishing Pond	Old West Ash Pond	Ash Pond No. 2	East Ash Pond
Dimensional plan view (all zones)	HEN1-B460-2	HEN1-B460-1 to 2	HEN1-B461, HEN1-C117	HEN1-C55
Dimensional cross sections	HEN1-B452 to B457	HEN1-B452 to B457	HEN1-B458-1 to 7, Berm Modification Drawings 7 to 9	HEN1-C56 to C59
Foundation Improvements	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Drainage Provisions	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Spillways and Outlets	Not Available	Not Available	Not Applicable	HEN1-C8 to C9, HEN1-C109, HEN1-C113
Diversion Ditches	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Instrument Locations	Figure 2D	Figure 2C	Figure 2A	Figure 2B
Slope Protection	Not Available	Not Available	Berm Modification Drawings 3 to 9	HEN1-C56 to C59
Normal Operating Pool Elevation	Not Available	Not Available	Not Available	Not Available
Maximum Pool Elevation	Not Available	Not Available	Not Available	Not Available
Approximate Maximum Depth of CCR in 2016	11 feet	15 feet	46 feet	35 feet

All drawings referenced in **Table 6** above can be found in **Appendix B** and **Appendix C**.

Based on the review of the drawings listed above, no natural or manmade features that could adversely affect operation of these CCR units due to malfunction or mis-operation were identified.

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Existing instrumentation consists of open-standpipe piezometers installed in 2015. The purpose of the piezometers is to measure the pore water pressures within the embankments of the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond. There are seven (7) existing piezometers within the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond. A location map of the existing instrumentation is presented in **Appendix C**.

§ 257.73(c)(1)(ix): Area-capacity curves for the CCR unit.

Area-capacity curves for the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond are not reasonably and readily available.

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

The Old West Polishing Pond contains a 24-inch diameter corrugated metal pipe (CMP) outlet that discharges stormwater to the Illinois River in accordance with the station's NPDES permit. Current capacity and calculation information for the Old West Polishing Pond's discharge capability is not reasonably and readily available.

The Old West Ash Pond contains a 24-inch dia. pipe culvert. Stormwater collected within the CCR unit drains via surface flow and through the pipe culvert into the Old West Polishing Pond. Current capacity and calculation information for the Old West Ash Pond's discharge capability is not reasonably and readily available.

The Ash Pond No. 2 does not contain a spillway or diversion feature. Stormwater collected within the CCR unit drains via surface flow into the East Ash Pond. Current capacity and calculation information for the Ash Pond No. 2's discharge capability is not reasonably and readily available.

The East Ash Pond contains two outlet structures. The southeast outlet is a 5-foot wide stop-log structure that is connected to a 36-inch diameter reinforced concrete pipe (RCP). The 36-inch diameter RCP discharges into the East Polishing Pond. The northeast outlet, located on the northeast corner of the East Ash Pond, is a headwall structure connected to an 18-inch diameter RCP. The 18-inch diameter RCP discharges into the East Leachate Pond. In 2016, the discharge capacity of the East Ash Pond was evaluated using HydroCAD 10 software modeling a 1,000-year, 24-hour rainfall event. The model results indicate that the East Ash Pond has enough storage capacity and will not overtop the embankment during the 1,000-year, 24-hour storm event. The results of the HydroCAD 10 analysis are presented below in **Table 7**.

Table 7. Results of HydroCAD 10 analysis

	East Ash Pond
Approximate Minimum Berm Elevation¹ (ft)	493.0
Approximate Emergency Spillway Elevation¹ (ft)	Not Applicable
Starting Pool Elevation¹ (ft)	490.4
Peak Elevation¹ (ft)	492..2
Time to Peak (hr)	12.5
Surface Area (ac)	6.5
Storage² (ac-ft)	8.4

Note: 1. Elevations are based on NAVD88 datum
 2. Storage given is from Starting Pool Elevation to Peak Elevation.

§ 257.73(c)(1)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

The construction specifications for Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and the original East Ash Pond are not reasonably and readily available. The construction specification for the 2003 East Ash Pond liner raise is located in *Specification J-2616, Rev. A* (presented in **Appendix D**).

The provisions for surveillance, maintenance, and repair of the Old West Polishing Pond and Old West Ash Pond are located in *Hennepin Power Station; West Ash Disposal Pond Maintenance Plan* (2013) (presented in **Appendix E**). The provisions for surveillance, maintenance, and repair of Ash Pond No. 2 are located in *Hennepin Power Station; Old East Ash Disposal Pond Maintenance Plan* (2013) (presented in **Appendix F**). The provisions for surveillance, maintenance, and repair of the East Ash Pond are located in *Hennepin Power Station; East Ash Disposal Pond Maintenance Plan* (2014) (presented in **Appendix G**).

The operations and maintenance plans for the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond are currently being revised by Dynegy Midwest Generation, LLC.

§ 257.73(c)(1)(xii): Any record or knowledge of structural instability of the CCR unit.

There is no record or knowledge of structural instability of the Old West Polishing Pond, Old West Ash Pond, Ash Pond No. 2, and East Ash Pond at the Hennepin Power Station.

LIMITATIONS

The signature of AECOM's authorized representative on this document represents that to the best of AECOM's knowledge, information and belief in the exercise of its professional judgment, it is AECOM's professional opinion that the aforementioned information is accurate as of the date of such signature. Any recommendation, opinion or decisions by AECOM are made on the basis of AECOM's experience, qualifications and professional judgment and are not to be construed as warranties or guaranties. In addition, opinions relating to environmental, geologic, and geotechnical conditions or other estimates are based on available data and that actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

Sincerely,



Claudia Prado
Project Manager



Victor Modeer, P.E., D.GE
Senior Project Manager

REFERENCES

United States Environmental Protection Agency (USEPA). (2015). *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule*. 40 CFR Parts 257 and 261, 80 Fed. Reg. 21302, 21380 April 17, 2015.

United States Geological Survey (USGS). (2016). The National Map Viewer. <http://viewer.nationalmap.gov/viewer/>. USGS data first accessed in March of 2016.

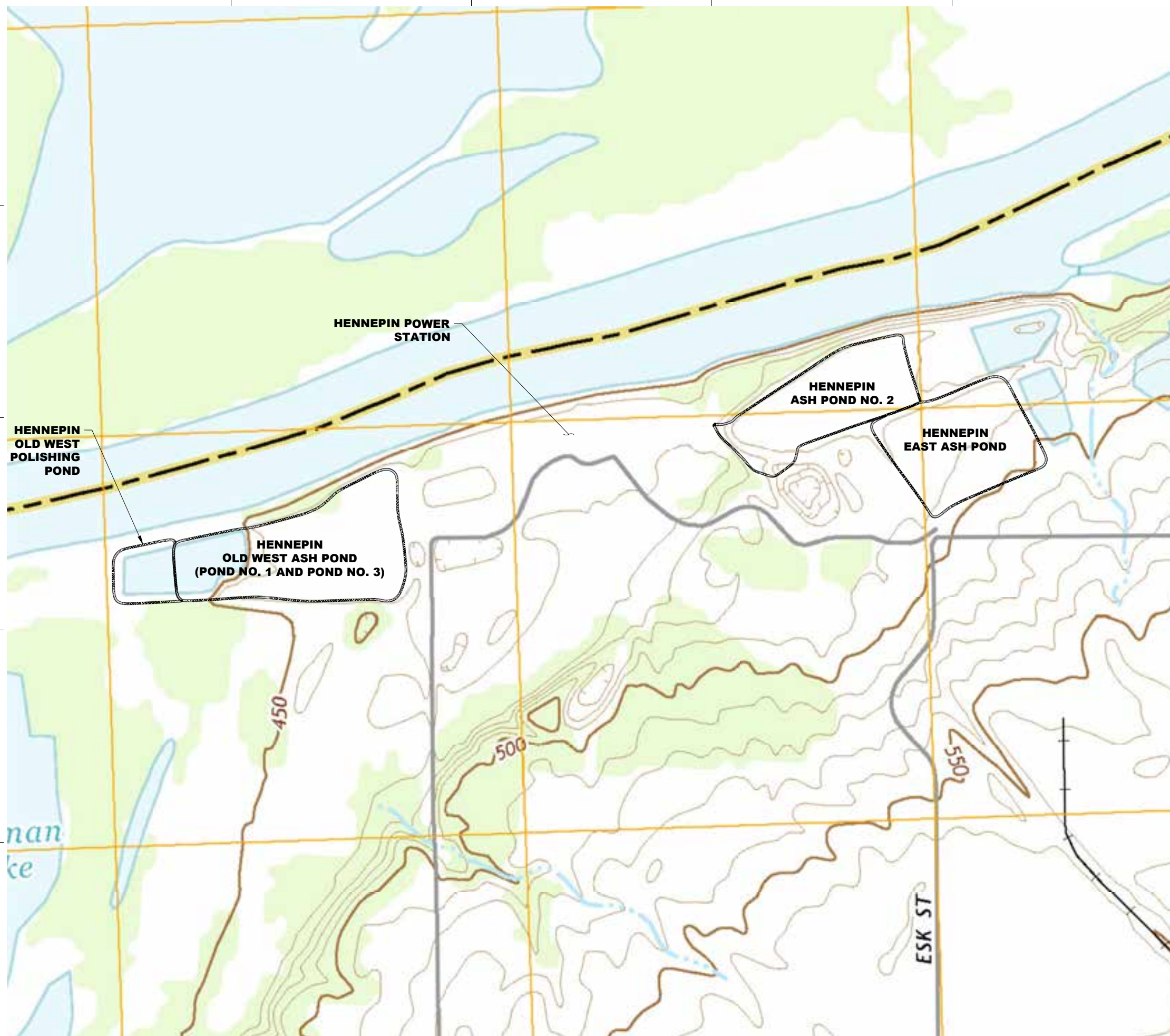
APPENDICES

- Appendix A: History of Construction Vicinity Map
- Appendix B: Hennepin Power Station Drawings
- Appendix C: Hennepin Power Station Piezometer Locations
- Appendix D: Specification J-2616, Rev. A, Primary Ash Pond Modifications
- Appendix E: Hennepin Power Station; West Ash Disposal Pond Maintenance Plan (2013)
- Appendix F: Hennepin Power Station; Old East Ash Disposal Pond Maintenance Plan (2013)
- Appendix G: Hennepin Power Station; East Ash Disposal Pond Maintenance Plan (2014)



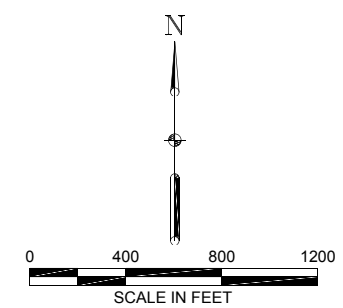
Appendix A: History of Construction Vicinity Map

AECOM DRAWING PATH: P:\Projects\Geotech\60428794_DynergyCCR\13_Construction_History\04_Technical_Production\4_Hennepin\Reference_Documents\Vicinity_Location_Map_References\Figures\C-01_History_of_Construction_Vicinity_Map_(Hennepin) - MUN.dwg
 NAVWK, MAT, 9/28/2016 4:11 PM



LEGEND
 CCR UNITS

SOURCE:
 MAP PROVIDED FROM ELECTRONIC
 USGS DIGITAL RASTER GRAPHIC 7.5
 MINUTE TOPOGRAPHIC MAP OF DEPUE
 ILLINOIS, REVISED 2015.



1001 Highlands Plaza Drive, Suite 300
 St. Louis, Mo. 63110
 314 429-0100 (phone)
 314 429-0462 (fax)

**DYNEGY MIDWEST
 GENERATION, L.L.C.**
 13498 East 800th Street
 Hennepin, IL 61327

**HISTORY OF
 CONSTRUCTION**
 HENNEPIN POWER STATION
 HENNEPIN, ILLINOIS

ISSUED FOR BIDDING _____ DATE BY _____

ISSUED FOR CONSTRUCTION _____ DATE BY _____

REVISIONS		
NO.	DESCRIPTION	DATE
△		
△		
△		
△		
△		

AECOM PROJECT NO:	60489731
DRAWN BY:	DJD
DESIGNED BY:	DJD
CHECKED BY:	MN
DATE CREATED:	2016-04-13
PLOT DATE:	
SCALE:	1" = 400'
ACAD VER:	2014

SHEET TITLE
 HISTORY OF
 CONSTRUCTION
 VICINITY MAP



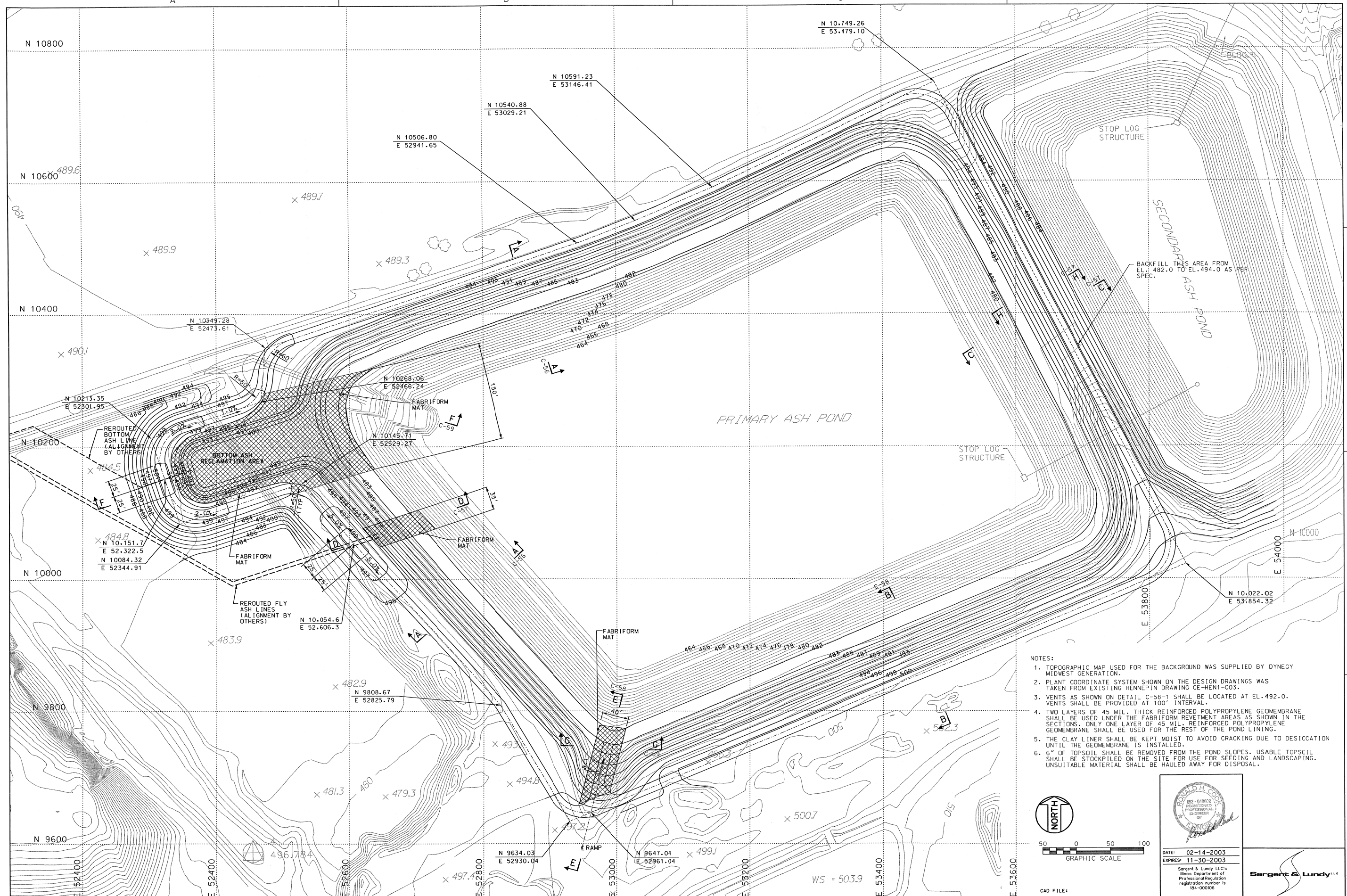
Appendix B: Hennepin Power Station Drawings

1. "Plan of Primary Ash Pond, Modification to Primary Ash Pond", Drawing No. C-55, Revision 0.1, 14 February, 2003, Sargent & Lundy, LLC.
2. "Sections and Details – Sheet 1, Modification to Primary Ash Pond", Drawing No. C-56, Revision 0.1, 14 February, 2003, Sargent & Lundy, LLC.
3. "Sections and Details – Sheet 2, Modification to Primary Ash Pond", Drawing No. C-57, Revision 0.1, 14 February, 2003, Sargent & Lundy, LLC.
4. "Sections and Details – Sheet 3, Modification to Primary Ash Pond", Drawing No. C-58, Revision 0.1, 14 February, 2003, Sargent & Lundy, LLC.
5. "Sections and Details – Sheet 4, Modification to Primary Ash Pond", Drawing No. C-59, Revision 0.1, 14 February, 2003, Sargent & Lundy, LLC.
6. "Cross Sections of Ash Pond Berm Extension, Sta 1+00, 5+00 & 9+50", Drawing No. E-HEN1-B452, Revision 0, 4 November, 1997, Illinois Power Company.
7. "Cross Sections of Ash Pond Berm Extension, Sta 14+25, 20+80 & 26+00", Drawing No. E-HEN1-B453, Revision 0, 4 November, 1997, Illinois Power Company.
8. "Cross Sections of Ash Pond Berm Extension, Sta 30+00, 35+00 & 39+00", Drawing No. E-HEN1-B454, Revision 0, 4 November, 1997, Illinois Power Company.
9. "Cross Sections of Ash Pond Berm Extension, Sta 40+00, 42+00, 44+90", Drawing No. E-HEN1-B455, Revision 0, 4 November, 1997, Illinois Power Company.
10. "Cross Sections of Ash Pond Berm Extension, Sta 47+00, 51+00 & 56+00", Drawing No. E-HEN1-B456, Revision 0, 4 November, 1997, Illinois Power Company.
11. "Cross Sections of Ash Pond Berm Extension, Sta 61+50", Drawing No. E-HEN1-B457, Revision 0, 4 November, 1997, Illinois Power Company.
12. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-1, Revision 0, 8 March, 1990, Illinois Power Company.
13. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-2, Revision 0, 8 March, 1990, Illinois Power Company.
14. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-3, Revision 0, 8 March, 1990, Illinois Power Company.
15. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-4, Revision 0, 8 March, 1990, Illinois Power Company.
16. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-5, Revision 0, 8 March, 1990, Illinois Power Company.
17. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-6, Revision 0, 8 March, 1990, Illinois Power Company.
18. "Cross Sections, East Ash Pond Extension", Drawing No. E-HEN1-B458-7, Revision 0, 8 March, 1990, Illinois Power Company.
19. "Plan-Unit #1 Ash Pond Extension, Sheet #1", Drawing No. E-HEN1-B460-1, 2 February, 1988, Illinois Power Company.
20. "Plan-Unit #1 Ash Pond Extension, Sheet #2", Drawing No. E-HEN1-B460-2, 2 February, 1988, Illinois Power Company.

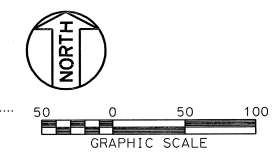


Appendix B: Hennepin Power Station Drawings (continued)

21. "Contour and Grading Plan, Unit #2 Ash Pond Extension", Drawing No. CE-HEN1-B461, Revision 0, 8 March, 1990, Illinois Power Company.
22. "Pond 2 East, Flexible Membrane Liner and Structures", Drawing No. HEN1-C109, Revision 0, 28 July, 2010, Civil & Environmental Consultants, Inc.
23. "Pond 2 East, Details", Drawing No. HEN1-C113, Revision 0, 28 July, 2010, Civil & Environmental Consultants, Inc.
24. "Landfill Phase 1 Construction, Existing Conditions", Drawing No. HEN1-C117, Revision 0, 28 November, 2010, Civil & Environmental Consultants, Inc.
25. "Layout-Pond Discharge Structures, 1995 Ash Facility", Drawing No. CE-HEN1-C8, Revision 0, 17 September, 1996, Illinois Power Company.
26. "Details: Pond Discharge Structure, 1995 Ash Facility", Drawing No. CE-HEN1-C9, Revision 0, 17 September, 1996, Illinois Power Company.
27. "East Berm Modification, Existing Site Conditions", Drawing No. 3, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.
28. "East Berm Modification, Proposed Site Plan", Drawing No. 4, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.
29. "East Berm Modification, Proposed Grading Plan 1 of 2", Drawing No. 5, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.
30. "East Berm Modification, Proposed Grading Plan 2 of 2", Drawing No. 6, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.
31. "East Berm Modification, Proposed Sections Sta 1+00 to 15+00", Drawing No. 7, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.
32. "East Berm Modification, Proposed Sections Sta 16+00 to 23+50", Drawing No. 8, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.
33. "East Berm Modification, Berm and Erosion Control Details", Drawing No. 9, Revision 3, 4 February, 2015, Civil & Environmental Consultants, Inc.



- NOTES:
1. TOPOGRAPHIC MAP USED FOR THE BACKGROUND WAS SUPPLIED BY DYNEGY MIDWEST GENERATION.
 2. PLANT COORDINATE SYSTEM SHOWN ON THE DESIGN DRAWINGS WAS TAKEN FROM EXISTING HENNEPIN DRAWING CE-HEN1-C03.
 3. VENTS AS SHOWN ON DETAIL C-58-1 SHALL BE LOCATED AT EL. 492.0. VENTS SHALL BE PROVIDED AT 100' INTERVAL.
 4. TWO LAYERS OF 45 MIL. THICK REINFORCED POLYPROPYLENE GEOMEMBRANE SHALL BE USED UNDER THE FABRIFORM REVETMENT AREAS AS SHOWN IN THE SECTIONS. ONLY ONE LAYER OF 45 MIL. REINFORCED POLYPROPYLENE GEOMEMBRANE SHALL BE USED FOR THE REST OF THE POND LINING.
 5. THE CLAY LINER SHALL BE KEPT MOIST TO AVOID CRACKING DUE TO DESICCATION UNTIL THE GEOMEMBRANE IS INSTALLED.
 6. 6" OF TOPSOIL SHALL BE REMOVED FROM THE POND SLOPES. USABLE TOPSOIL SHALL BE STOCKPILED ON THE SITE FOR USE FOR SEEDING AND LANDSCAPING. UNSUITABLE MATERIAL SHALL BE HAULED AWAY FOR DISPOSAL.



DATE: 02-14-2003
 EXPIRES: 11-30-2003
 Sargent & Lundy LLC's
 Illinois Department of
 Professional Regulation
 registration number is
 184-000106



DYNEGY CONFIDENTIAL
 This drawing is the property of
 DYNEGY INC. Neither
 this drawing, nor reproductions
 of it, nor information derived
 from it, shall be given to others
 without the expressed written
 consent of DYNEGY INC.
 No use is to be made of
 it which is or may be injurious
 to DYNEGY INC.

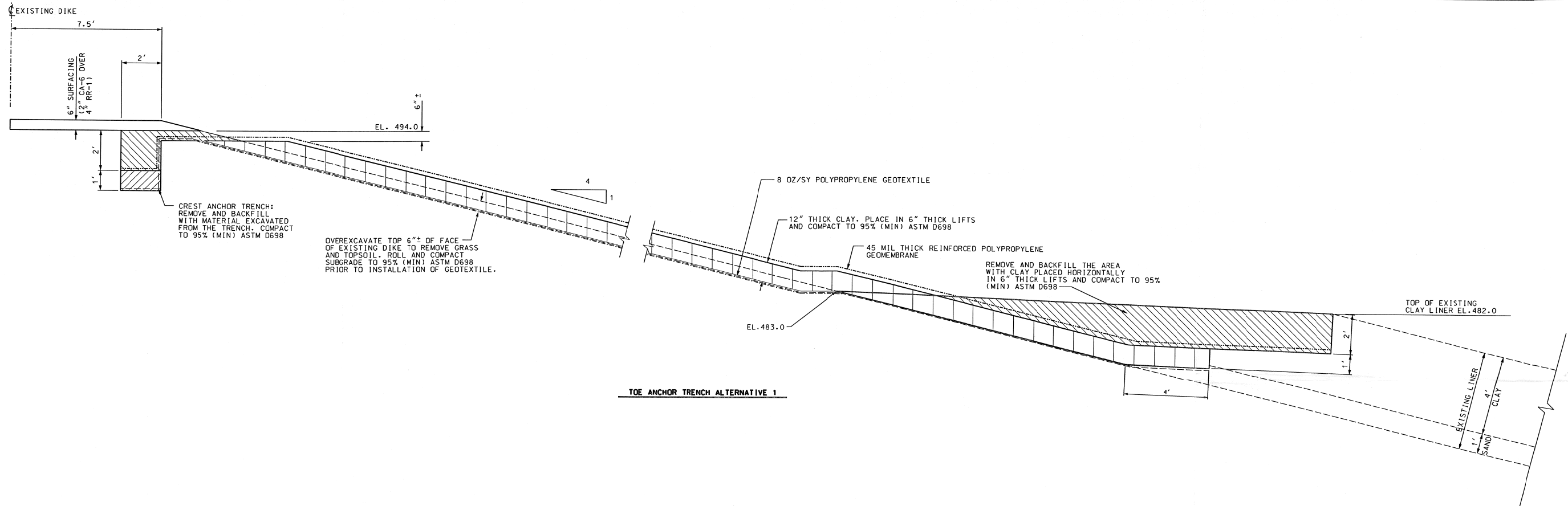
NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
D.1	02-14-2003	FOR PERMIT	MED	VP							

SCALE:	1"=50'		
DWN.	M. DOWNS	DATE	02-12-03
CHK.	V. PATEL	DATE	02-14-03
APPV.		DATE	

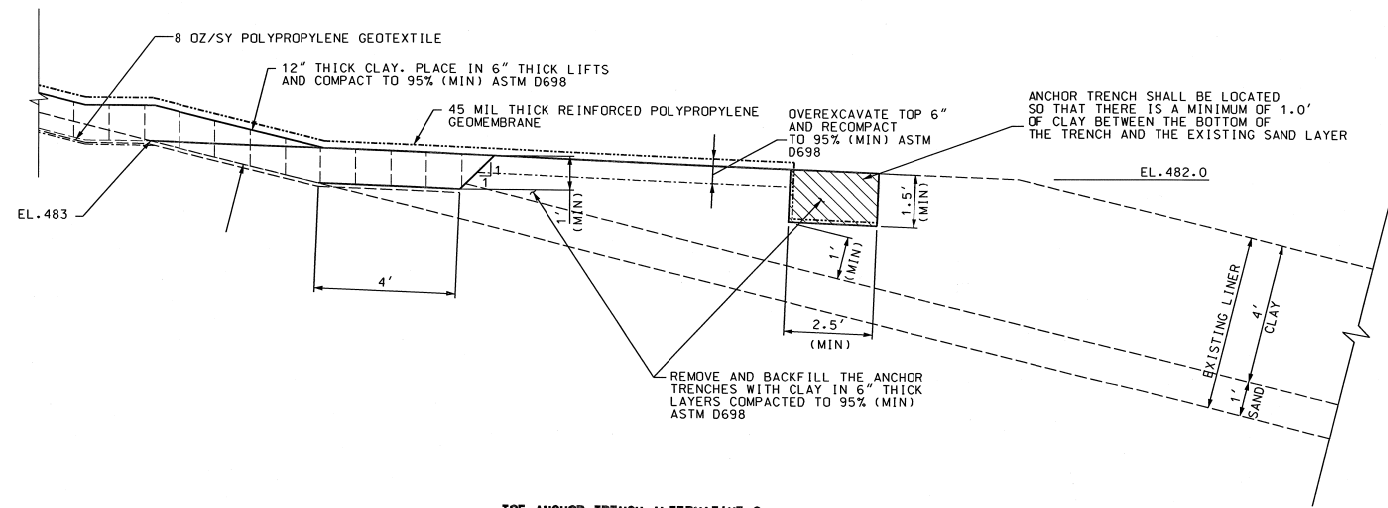
DYNEGY

PLAN OF PRIMARY ASH POND
 MODIFICATION TO PRIMARY ASH POND
 HENNEPIN POWER STATION

PROJECT NO.: 08820-331
 CLIENT: DYNEGY MIDWEST GENERATION
 DWG. NO.: C-55
 REV. 0.1



TOE ANCHOR TRENCH ALTERNATIVE 1

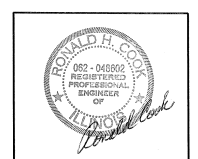


TOE ANCHOR TRENCH ALTERNATIVE 2

SECTION A
SEE DWG C-55



- NOTES:
1. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING EXISTING ELEVATIONS AND DIMENSIONS PRIOR TO FABRICATION OF THE GEOMEMBRANE LINER.
 2. CONTRACTOR MAY USE EITHER ALTERNATIVE 1 OR ALTERNATIVE 2 AS APPROVED BY THE BUYER FOR ALL TOE ANCHOR TRENCH DETAILS.
 3. DIMENSIONS WERE TAKEN FROM TYPICAL SECTION ON DRAWING CH-HEN1-C6.1 DATED 12-9-93.



DATE: 02-14-2003
EXPIRES: 11-30-2003
Sargent & Lundy LLC's Illinois Department of Professional Regulation registration number is 184-000106



CAD FILE:

DYNEGY CONFIDENTIAL
This drawing is the property of DYNEGY INC. Neither this drawing, nor reproductions of it, nor information derived from it, shall be given to others without the expressed written consent of DYNEGY INC. No use is to be made of it which in any way may be injurious to DYNEGY INC.

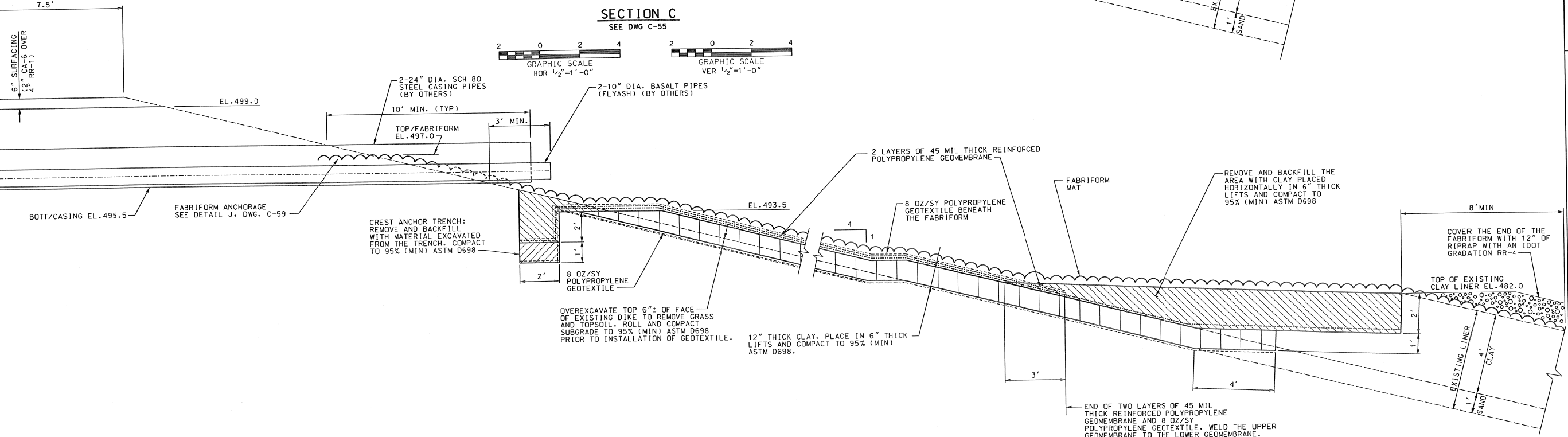
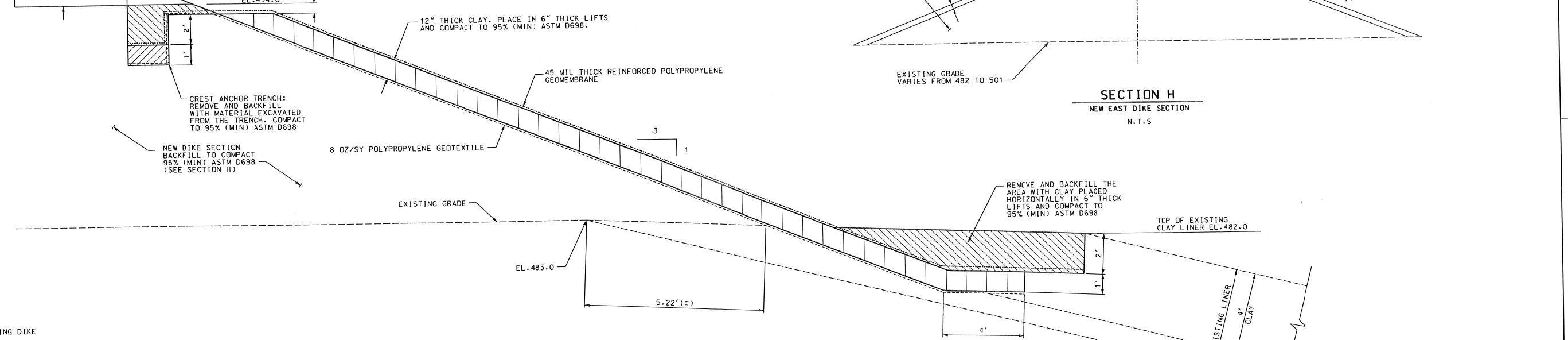
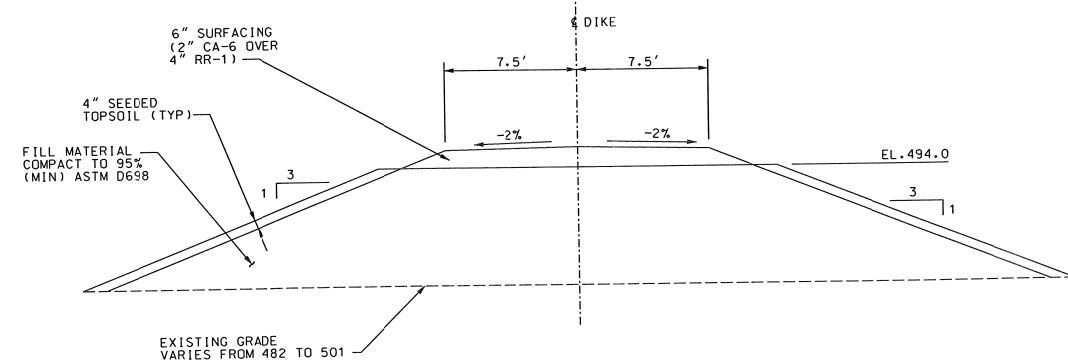
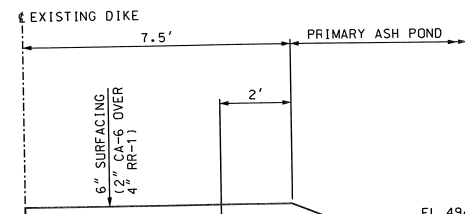
NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0.1	02-14-2003	FOR PERMIT	MED	VP							

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D

SCALE:	DATE
DWN. M. DOWNS	02-12-02
CHK. V. PATEL	02-14-03
APPV.	

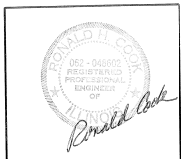
DYNEGY
SECTIONS AND DETAILS - SHEET 1
MODIFICATION TO PRIMARY ASH POND
HENNEPIN POWER STATION

PROJECT NO.:	08820-331
CLIENT:	DYNEGY MIDWEST GENERATION
DWG. NO.:	C-56
REV. NO.:	0.1



SECTION C
SEE DWG C-55

SECTION D
SEE DWG C-55



DATE: 02-14-2003
EXPIRES: 11-30-2003
Sargent & Lundy LLC's Illinois Department of Professional Regulation registration number is 184-000106



CAD FILE:

DYNEGY CONFIDENTIAL
This drawing is the property of DYNEGY INC. Neither this drawing, nor reproductions of it, nor information derived from it, shall be given to others without the expressed written consent of DYNEGY INC. No use is to be made of it which is, or may be, injurious to DYNEGY INC.

REFERENCE DRAWINGS

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0.1	02-14-2003	FOR PERMIT	MED	VP							

DYNEGY

SECTIONS AND DETAILS - SHEET 2

MODIFICATION TO PRIMARY ASH POND
HENNEPIN POWER STATION

PROJECT NO.: 08820-331
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C-57

SCALE: 1/2"=1'-0"

DATE: 02-12-02
DATE: 02-14-03

REV. 0.1

02-13-03 ALS

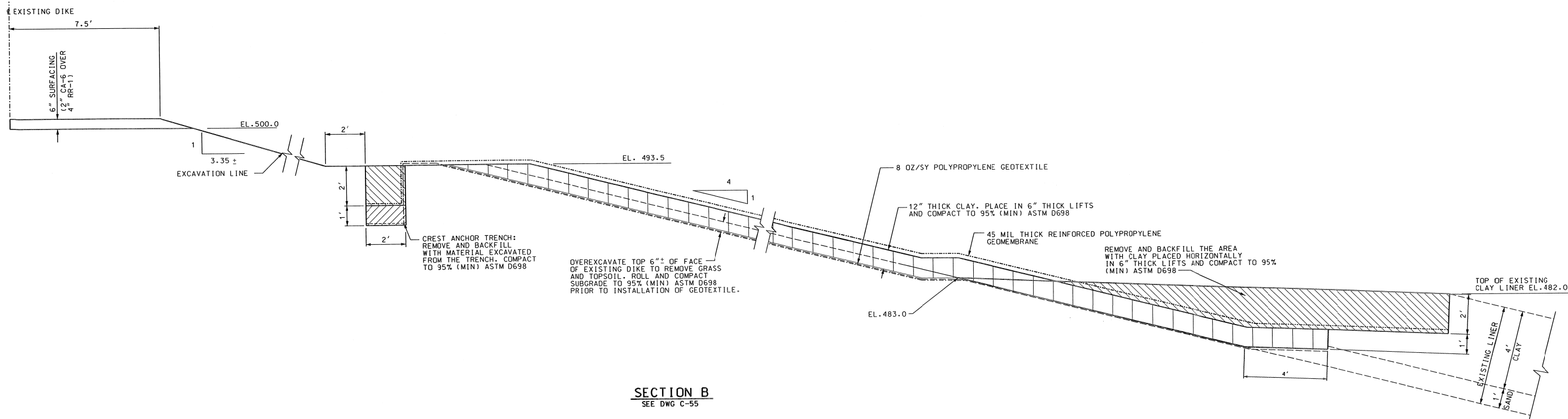
E:\WORK\EST-1\DOCK VAW 07-10-2001

A

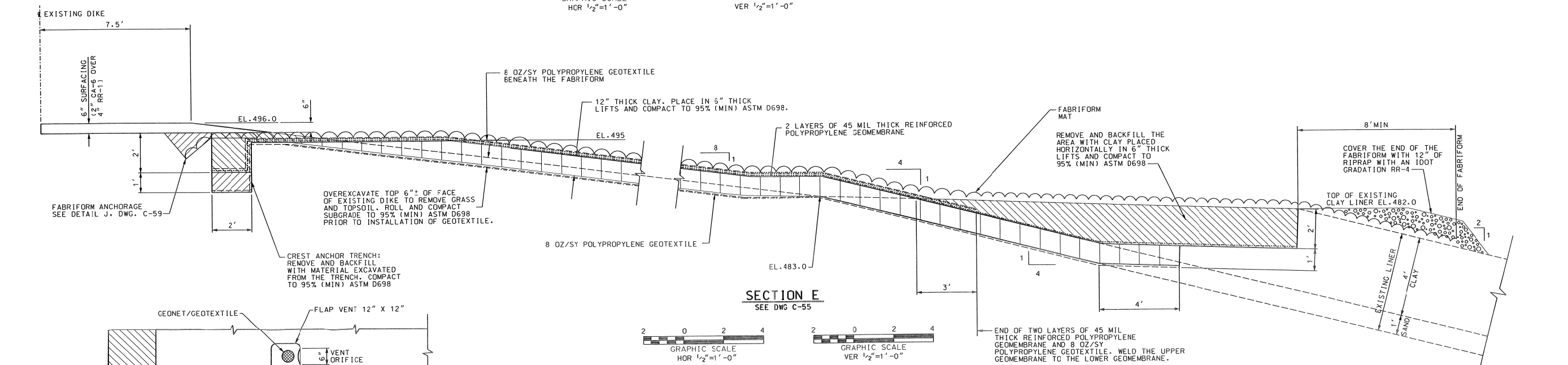
B

C

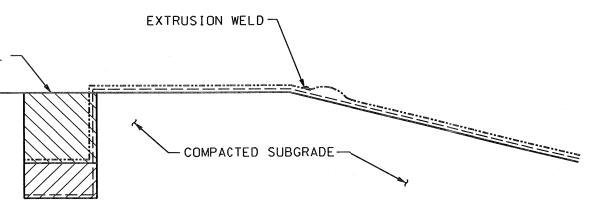
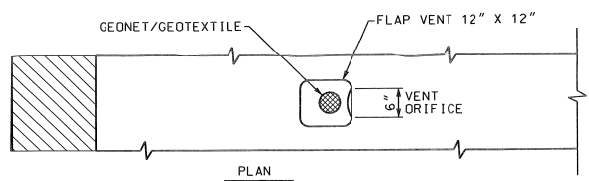
D



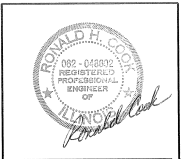
SECTION B
SEE DWG C-55



SECTION E
SEE DWG C-55



SECTION
DETAIL C-58-1
MAXIMUM INTERVAL SHALL BE 100'



DATE: 02-14-2003
EXPIRES: 11-30-2003

Sargent & Lundy LLC's
Illinois Department of
Professional Regulation
registration number is
184-000106



CAO FILE:

DYNEGY CONFIDENTIAL
This drawing is the property of
DYNEGY LLC. Neither
this drawing, nor reproductions
of it, nor information derived
therefrom, shall be given to others
without the expressed written
consent of DYNEGY LLC. No use is to be made of
it which is, or may be, injurious
to DYNEGY LLC.

REFERENCE DRAWINGS

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
0.1	02-14-2003	FOR PERMIT	MED	VP							

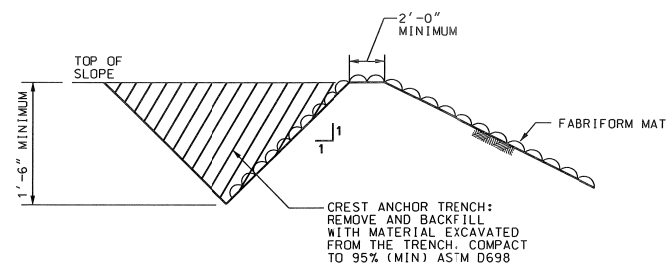
SCALE	DATE
1/2"=1'-0"	02-14-03
	02-14-03



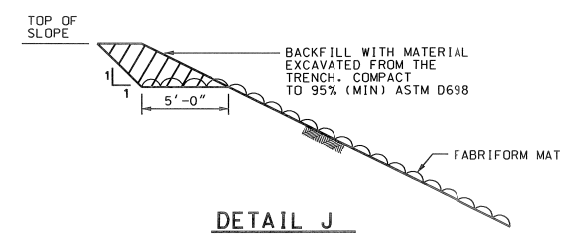
SECTIONS AND DETAILS - SHEET 3
MODIFICATION TO PRIMARY ASH POND
HENNEPIN POWER STATION

PROJECT NO.: 08820-331
CLIENT: DYNEGY MIDWEST GENERATION
DWG. NO.: C-58
REV. 0.1

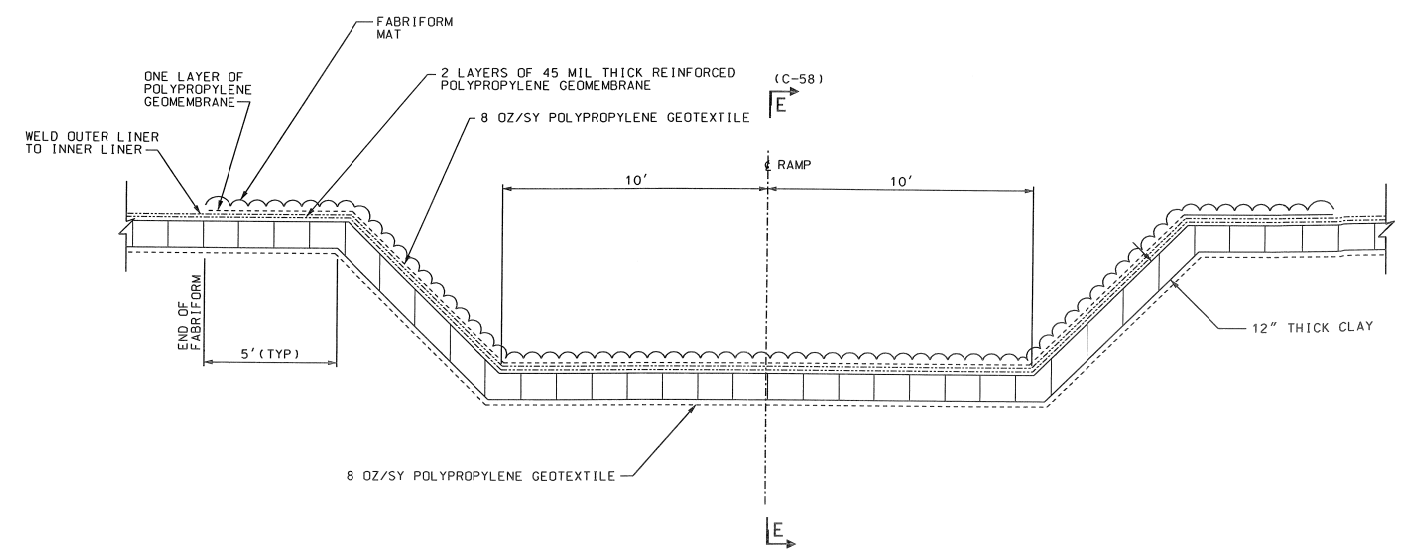
E:\BORT-E151-1.DGN VAY



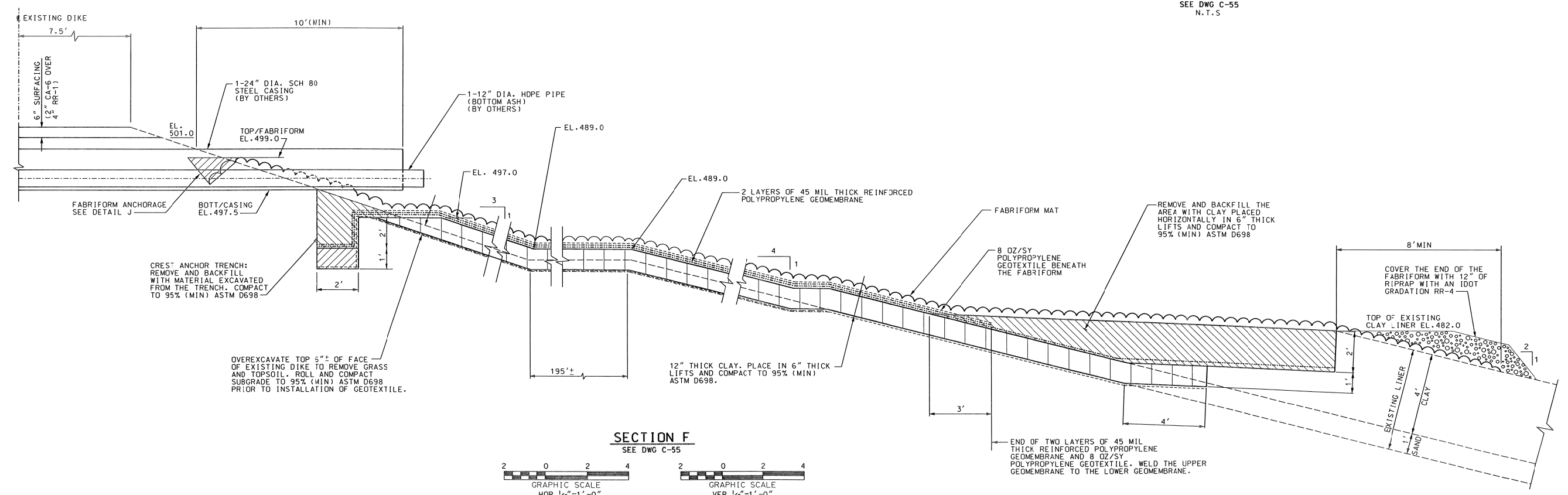
ANCHORAGE IF PROTECTION IS PROVIDED TO THE TOP OF THE SLOPE



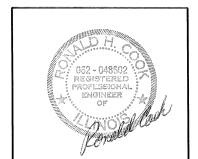
DETAIL J
ANCHORAGE FOR FABRIFORM MAT
N.T.S.



SECTION G
SEE DWG C-55
N.T.S.



SECTION F
SEE DWG C-55



DATE: 02-14-2003
EXPIRES: 11-30-2003
Sargent & Lundy LLC's Illinois Department of Professional Regulation registration number is 184-000105



CAD FILE:

DYNEGY CONFIDENTIAL
This drawing is the property of DYNEGY INC. Neither this drawing nor reproductions of it, nor information derived from it, shall be given to others without the expressed written consent of DYNEGY INC. No use is to be made of it which is, or may be, injurious to DYNEGY INC.

REFERENCE DRAWINGS

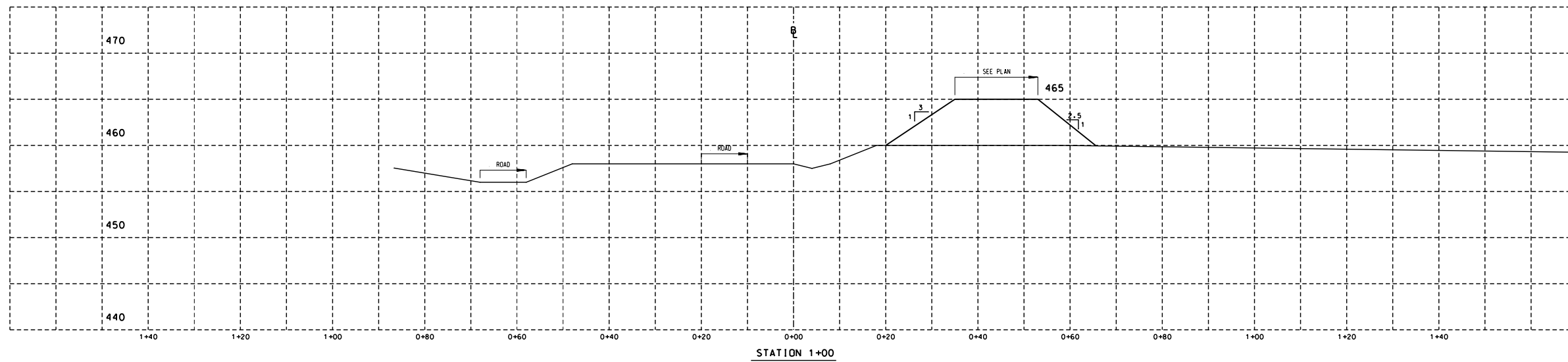
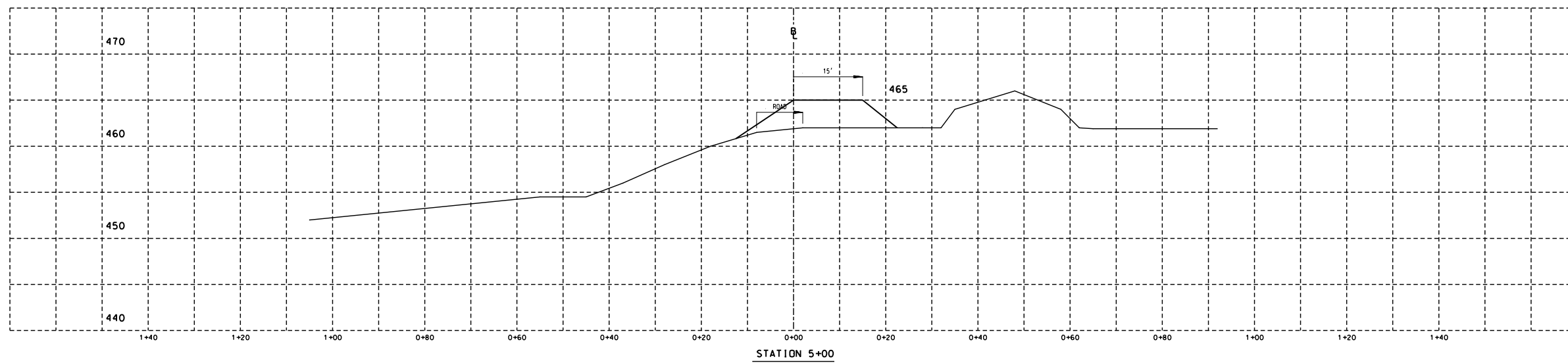
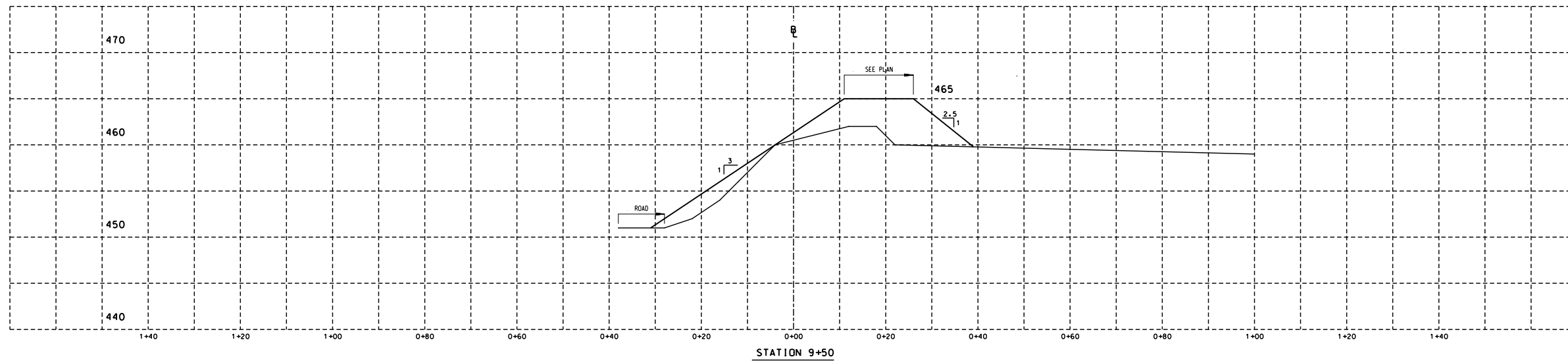
NO.	DATE	REVISION
0.1	02-14-2003	FOR PERMIT

NO.	DATE	REVISION	PREP'D	REV'D	APPR'D	NO.	DATE	REVISION	PREP'D	REV'D	APPR'D
			MED	VP							

SCALE:	DATE
1/4" = 1'-0"	02-12-02
DWN. M. DOWNS	02-14-03
CHK. V. PATEL	
APPV. DATE	

DYNEGY
SECTIONS AND DETAILS - SHEET 4
MODIFICATION TO PRIMARY ASH POND
HENNEPIN POWER STATION

PROJECT NO.:	08820-331
CLIENT:	DYNEGY MIDWEST GENERATION
DWG. NO.:	C-59
REV. NO.:	0.1

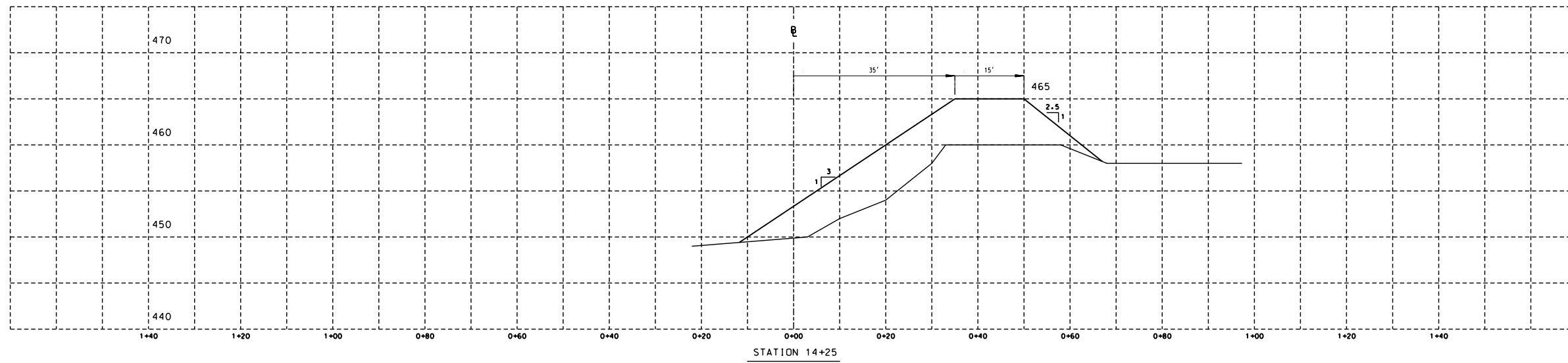
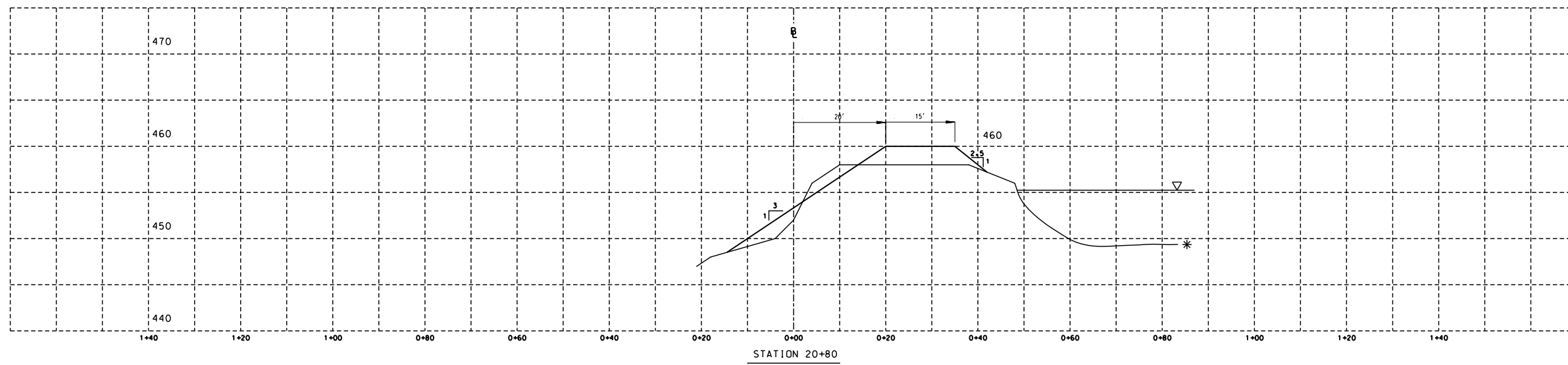
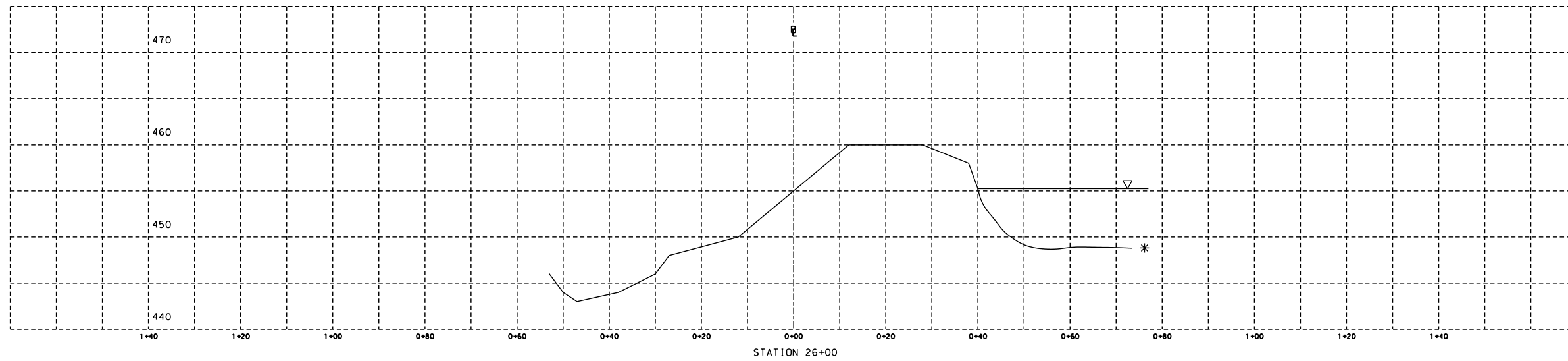


- LEGEND**
- REFERENCE BASE LINE SHOWN ON PLAN
 - OLD BERM
 - NEW BERM
 - WATER LINE
 - ESTIMATED ELEVATION

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES
1														

REFERENCES

REVISION STATUS □ - CONSTRUCTION ○ - RECORD		ILLINOIS POWER COMPANY DECATUR	
CROSS SECTIONS OF ASH POND BERM EXTENSION STA 1+00, 5+00 & 9+50 HENNEPIN POWER STATION			
DR GRH	CAD EM	DATE 12-30-87	
OK	CKD	SCALE 1"=10'H, 1"=5'V	
APP	PLOTTED	11-4-97	
		E-HEN1-B452	



LEGEND

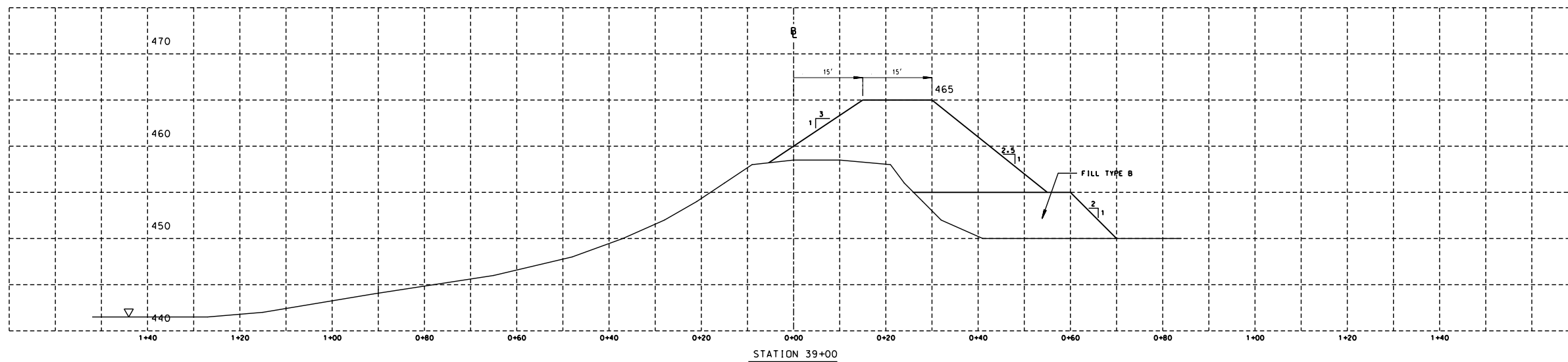
- REFERENCE BASE LINE SHOWN ON PLAN
- OLD BERM
- NEW BERM
- WATER LINE
- ESTIMATED ELEVATION

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES
1														

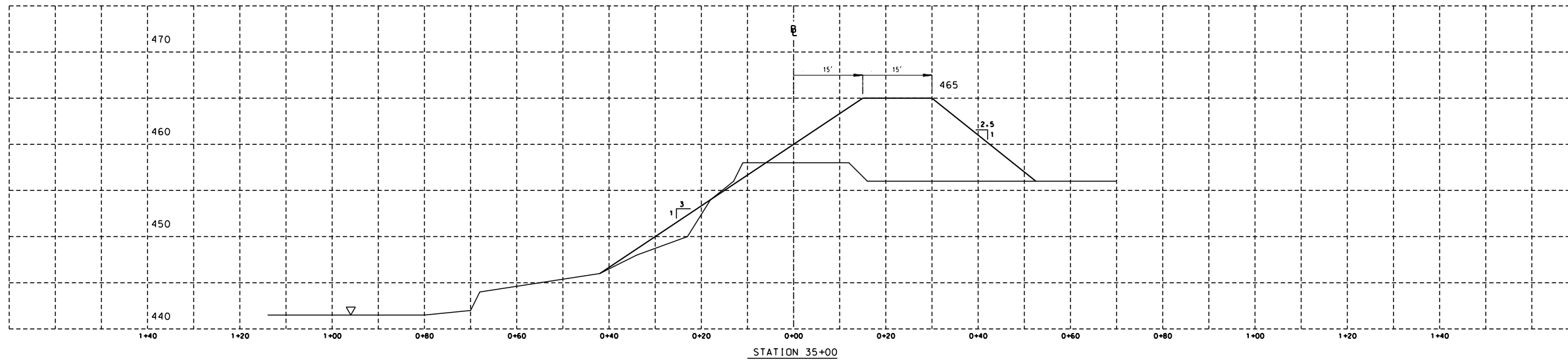
REFERENCES

ILLINOIS POWER COMPANY DECATUR			
CROSS SECTIONS OF ASH POND BERM EXTENSION STA 14+25, 20+80 & 26+00 HENNEPIN POWER STATION			
DR GRH	CAD EM	DATE	12-30-87
DK	CKD	SCALE	1"=10'H, 1"=5' V
APP	PLOTTED	DATE	11-4-91
APP			

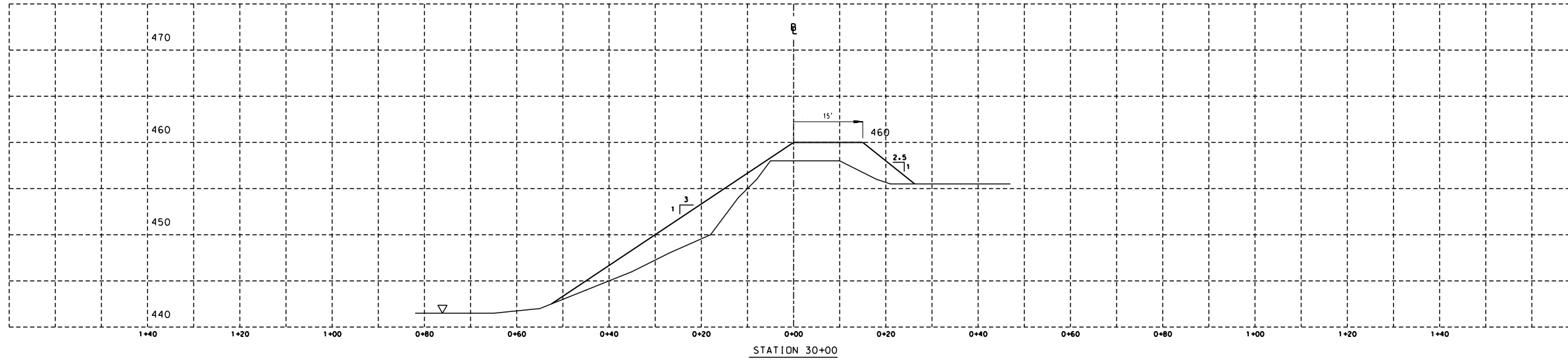
E-HEN1-B453



STATION 39+00



STATION 35+00



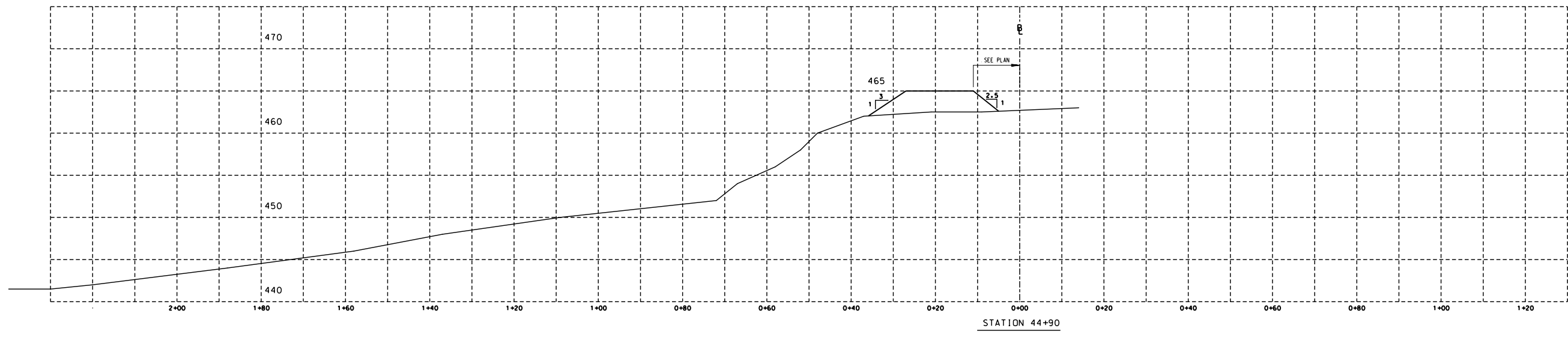
STATION 30+00

- LEGEND**
- REFERENCE BASE LINE SHOWN ON PLAN
 - OLD BERM
 - NEW BERM
 - WATER LINE
 - * ESTIMATED ELEVATION

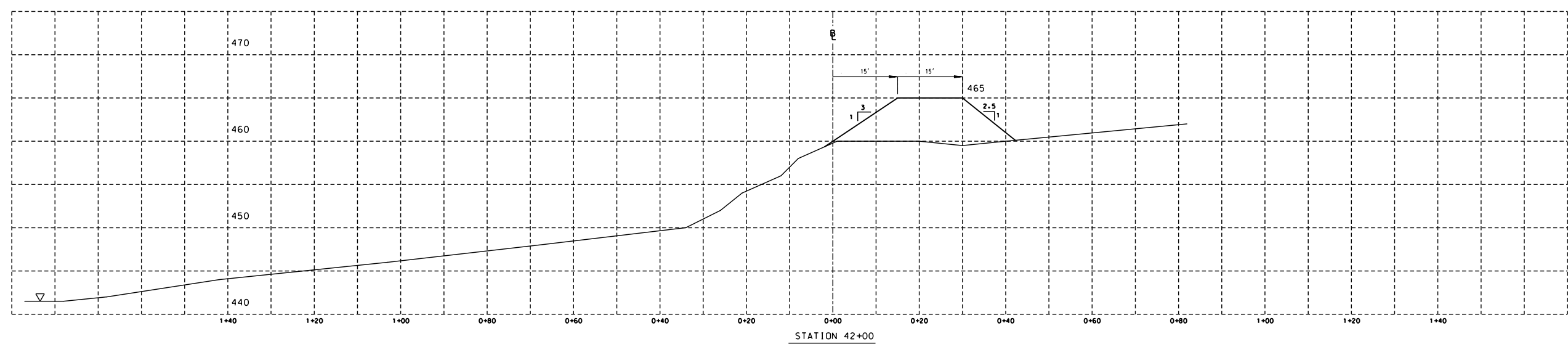
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES
1														

REFERENCES

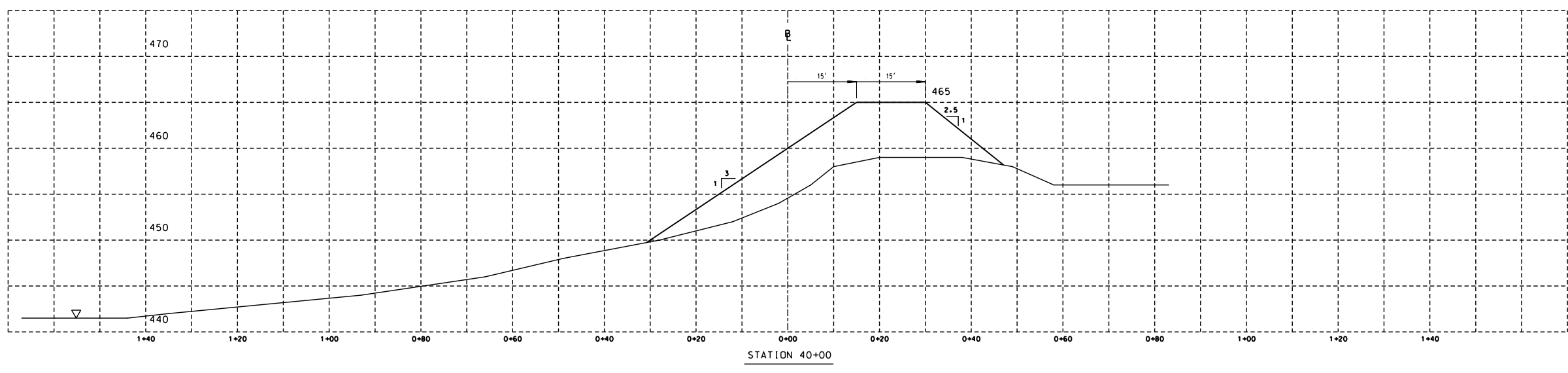
REVISION STATUS	ILLINOIS POWER COMPANY
	DECATUR
	CROSS SECTIONS OF
	ASH POND BERM EXTENSION
	STA 30+00, 35+00 & 39+00
	HENNEPIN POWER STATION
	DATE 12-30-87
	SCALE 1"=10' H, 1"=5' V
	PLOTTED 11-4-97
	E-HEN1-B454



1+40



STATION 42+00



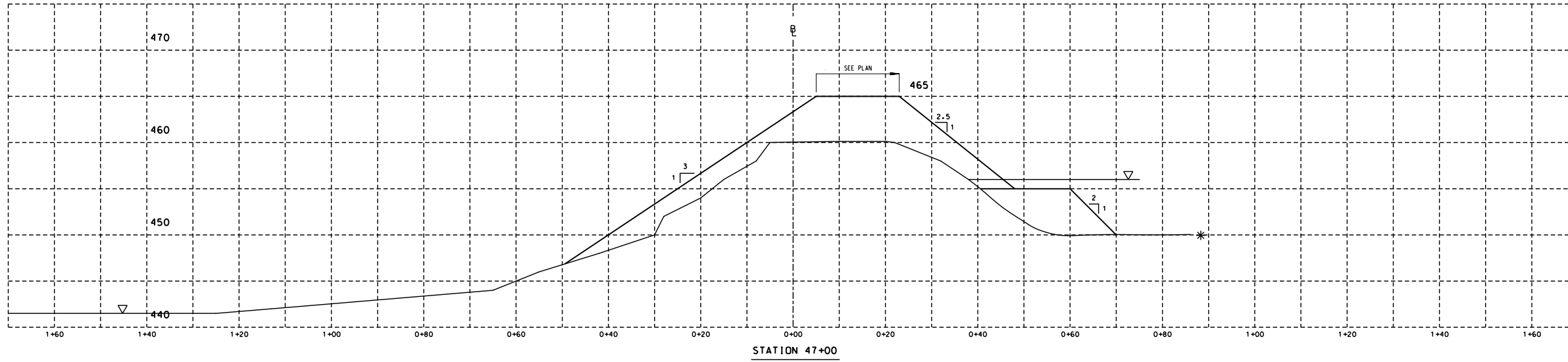
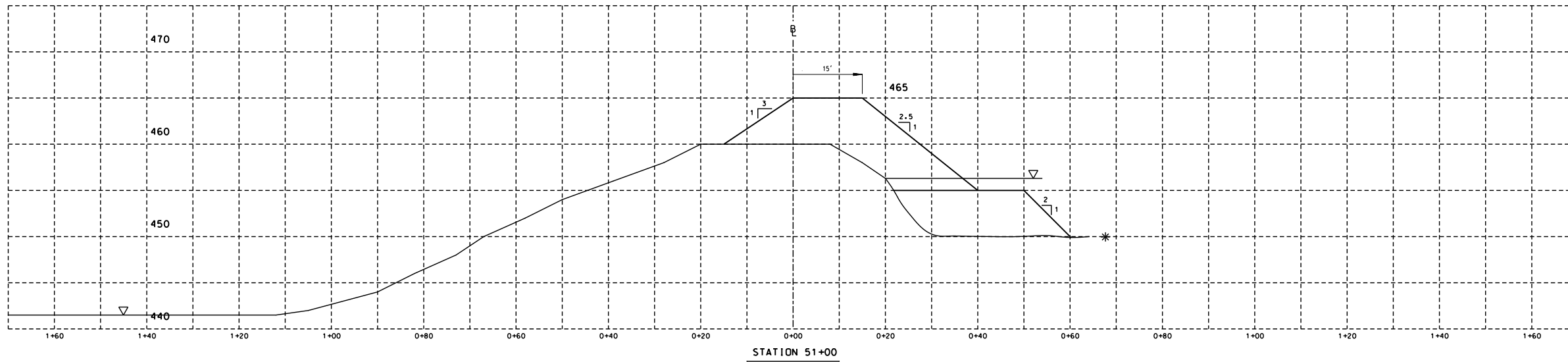
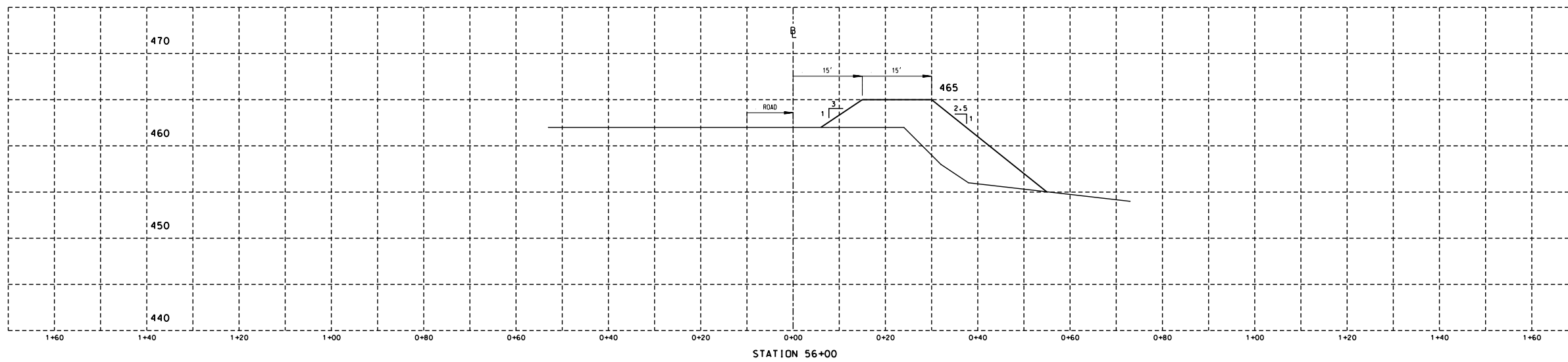
STATION 40+00

- LEGEND**
- \ominus REFERENCE BASE LINE SHOWN ON PLAN
 - OLD BERM
 - - - NEW BERM
 - ∇ WATER LINE
 - * ESTIMATED ELEVATION

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES

REFERENCES

REVISION STATUS		ILLINOIS POWER COMPANY	
\square CONSTRUCTION	\square RECORD	DECATUR	
\odot		CROSS SECTIONS OF	
		ASH POND BERM EXTENSION	
		STA 40+00, 42+00 & 44+90	
		HENNEPIN POWER STATION	
DR GRH	CKD EM	DATE 12-30-87	
OK	CKD	SCALE 1"=10' H, 1"=5' V	
APP	APP	PLOTTED 11-4-97	
		E-HEN1-B455	



- LEGEND**
- \overline{B} REFERENCE BASE LINE SHOWN ON PLAN
 - OLD BERM
 - NEW BERM
 - ∇ WATER LINE
 - * ESTIMATED ELEVATION

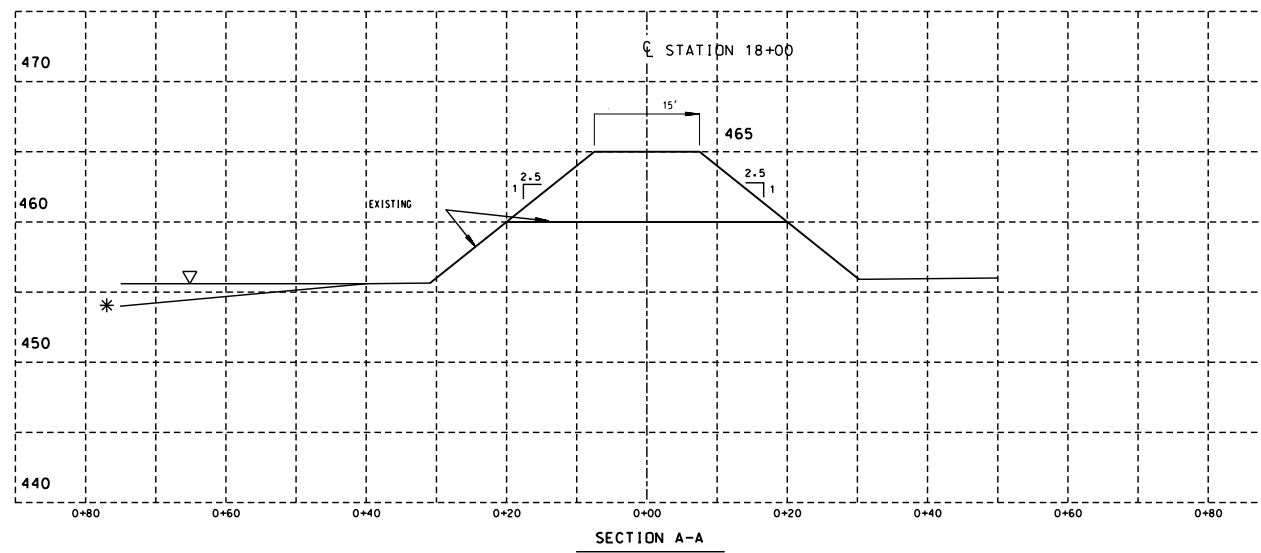
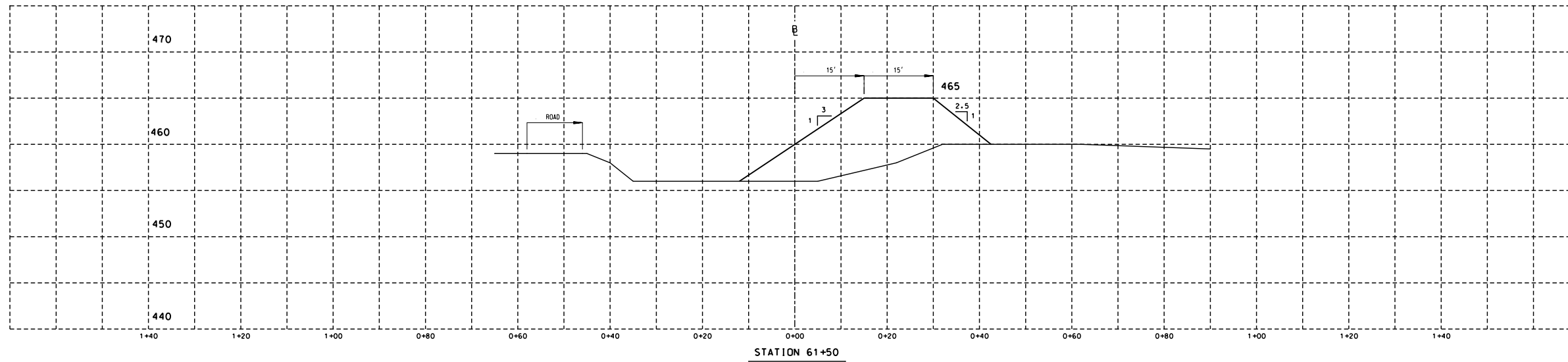
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES

REFERENCES

REVISION STATUS	ILLINOIS POWER COMPANY		
□ - CONSTRUCTION	DECATUR		
○ - RECORD	CROSS SECTIONS OF		
	ASH POND BERM EXTENSION		
	STA 47+00, 51+00 & 56+00		
	HENNEPIN POWER STATION		
	DR GRH	CAD EM	DATE 12-30-87
	OK	CKD	SCALE 1"=10' H., 1"=5' V
	APP	APP	PLOTTED 11-4-97
			E-HEN1-B456

COMPUTER DIG. - DO NOT REVISE MANUALLY

E-HEN1-B456



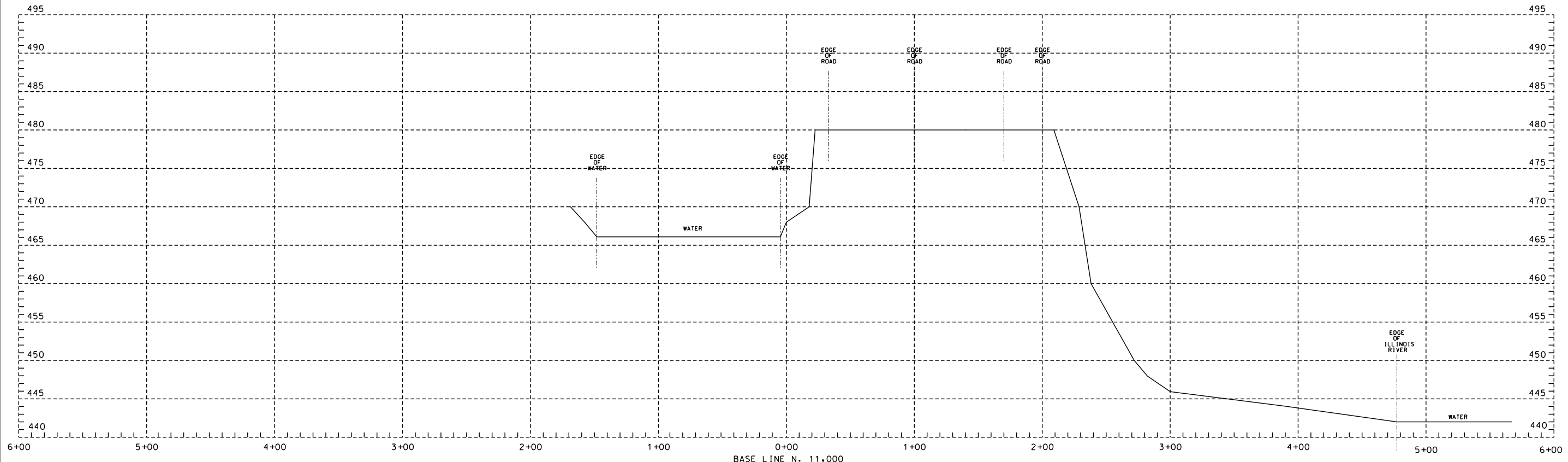
- LEGEND**
- REFERENCE BASE LINE SHOWN ON PLAN
 - OLD BERM
 - NEW BERM
 - WATER LINE
 - ESTIMATED ELEVATION

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES
①														

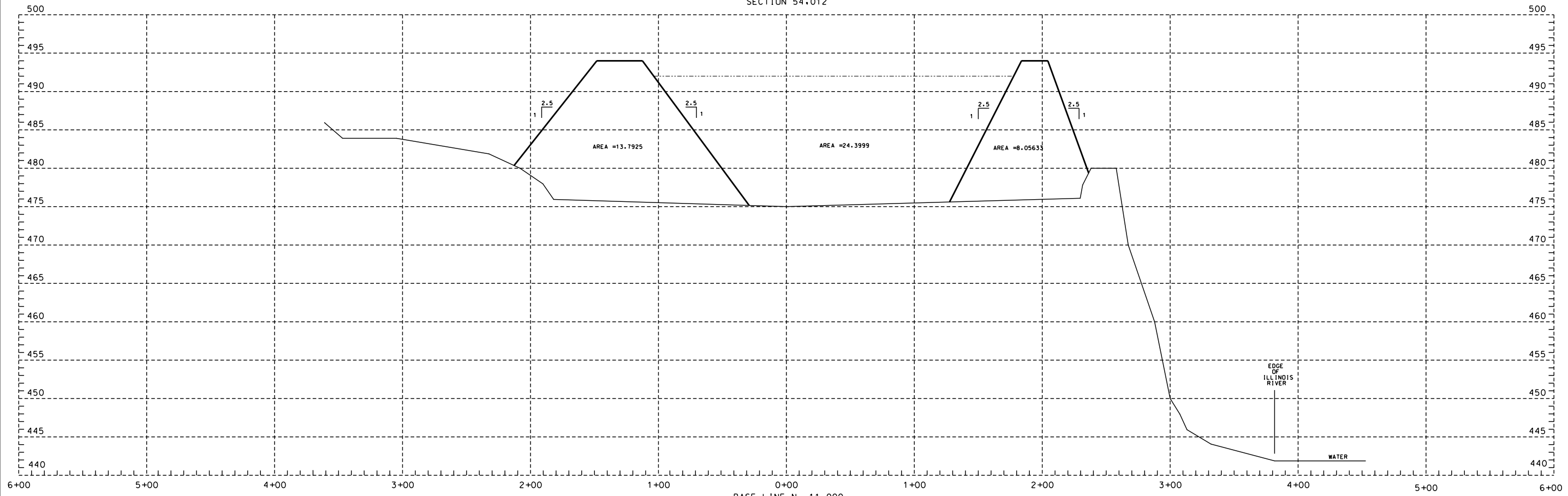
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES

NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES

REVISION STATUS	DECATUR	ILLINOIS POWER COMPANY
□ - CONSTRUCTION		
○ - RECORD		
①		
DR GRH	CAD EM	DATE 12-30-87
OK	CKD	SCALE 1"=10'H, 1"=5'V
APP	PLOTTED	E-HEN1-B457
	11-4-97	



BASE LINE N. 11.000
SECTION 54.012



BASE LINE N. 11.000
SECTION E. 53.812

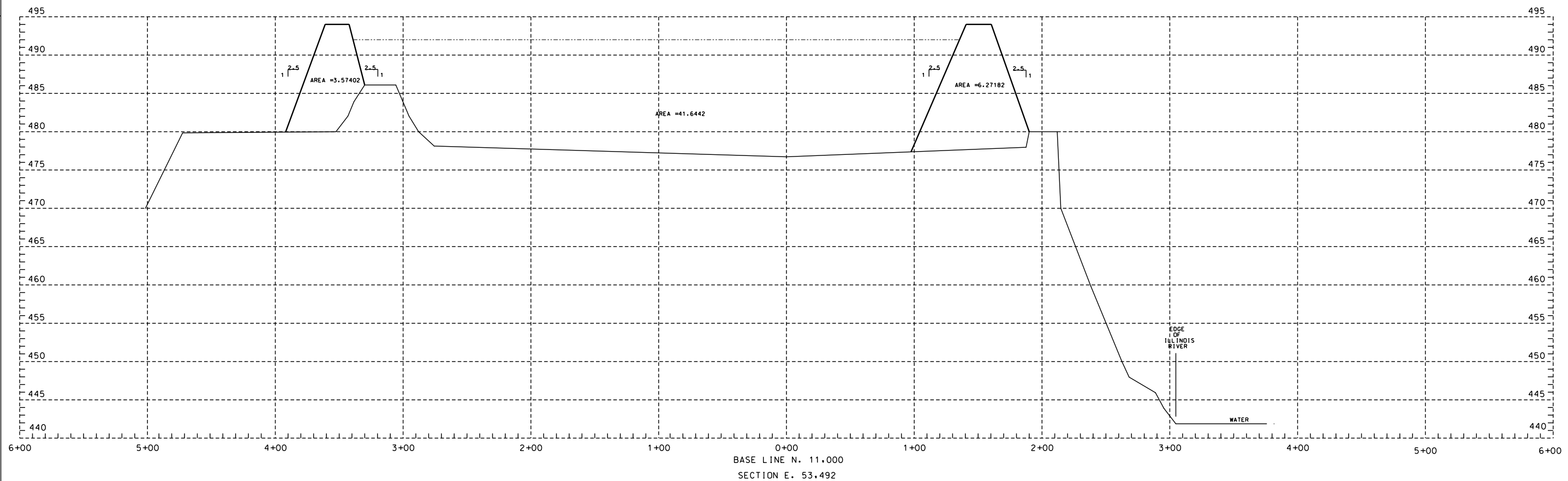
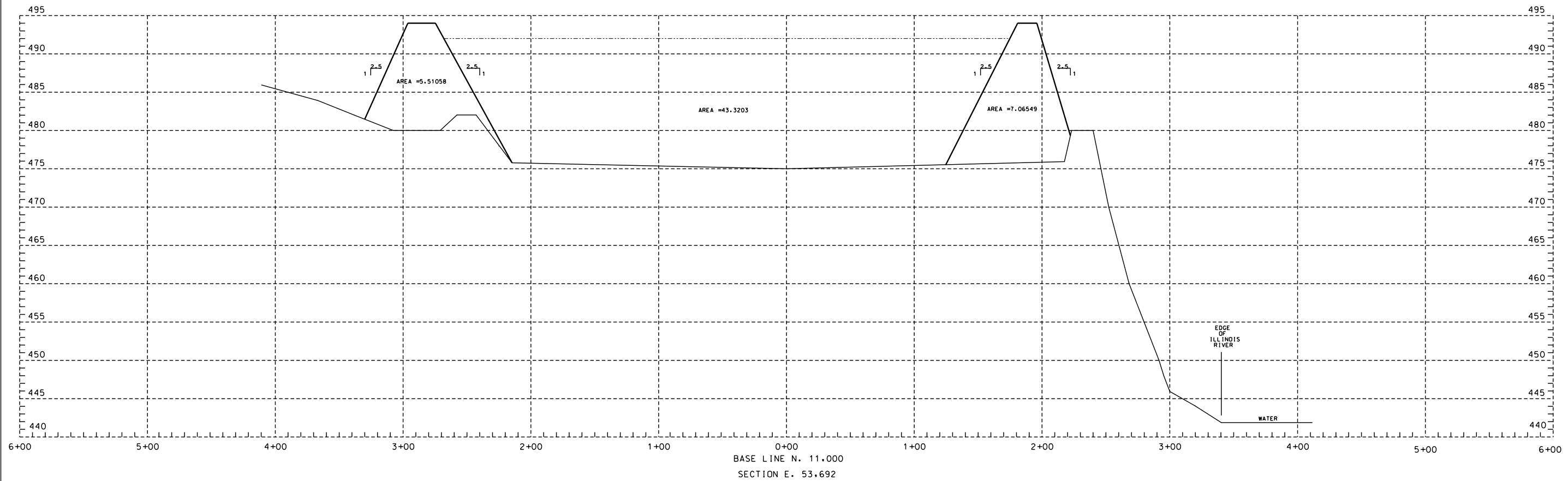
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
0													

NOTES

- DATA COLLECTED FROM TOPO ON DWG. CE-HEN1-B-450 DATED NOV. 4, 1987. REV. 0
- COORDINATES WERE SUPPLIED BY G. DECKARD FIELD INFORMATION TIEING TO J.L. FISHER'S PANELS.

REFERENCES

REVISION STATUS		ILLINOIS POWER COMPANY	
<input type="checkbox"/> CONSTRUCTION	<input type="checkbox"/> RECORD	DECATUR	
0		CROSS SECTIONS	
		EAST ASH POND EXTENSION	
		HENNEPIN POWER STATION	
DR	WJM	CAD	WJM
DK		DATE	1-11-89
APP		SCALE	1"=5' V. 1"=30' H.
APP		PLOTTED	
		DATE	03-08-90
			CE-HEN1-B458-1



NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
0													

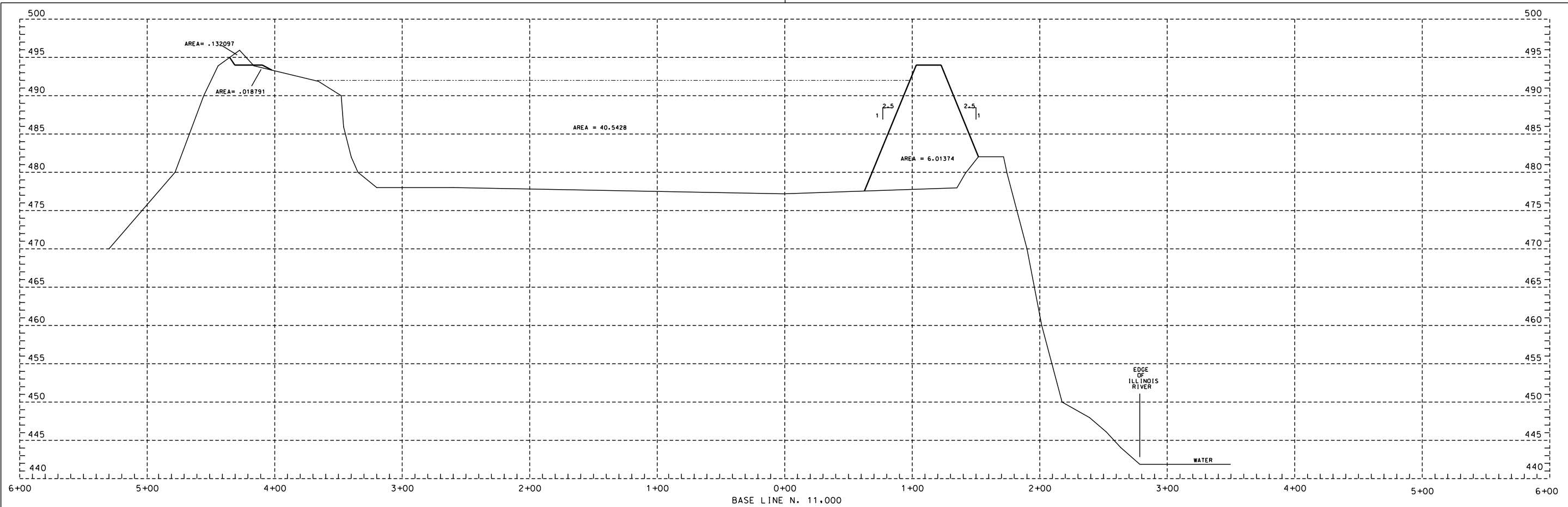
NOTES

- DATA COLLECTED FROM TOPO ON DWG. CE-HEN1-B-450 DATED NOV. 4, 1987, REV. 0
- COORDINATES WERE SUPPLIED BY G. DECKARD FIELD INFORMATION TIEING TO J.L. FISHER'S PANELS.

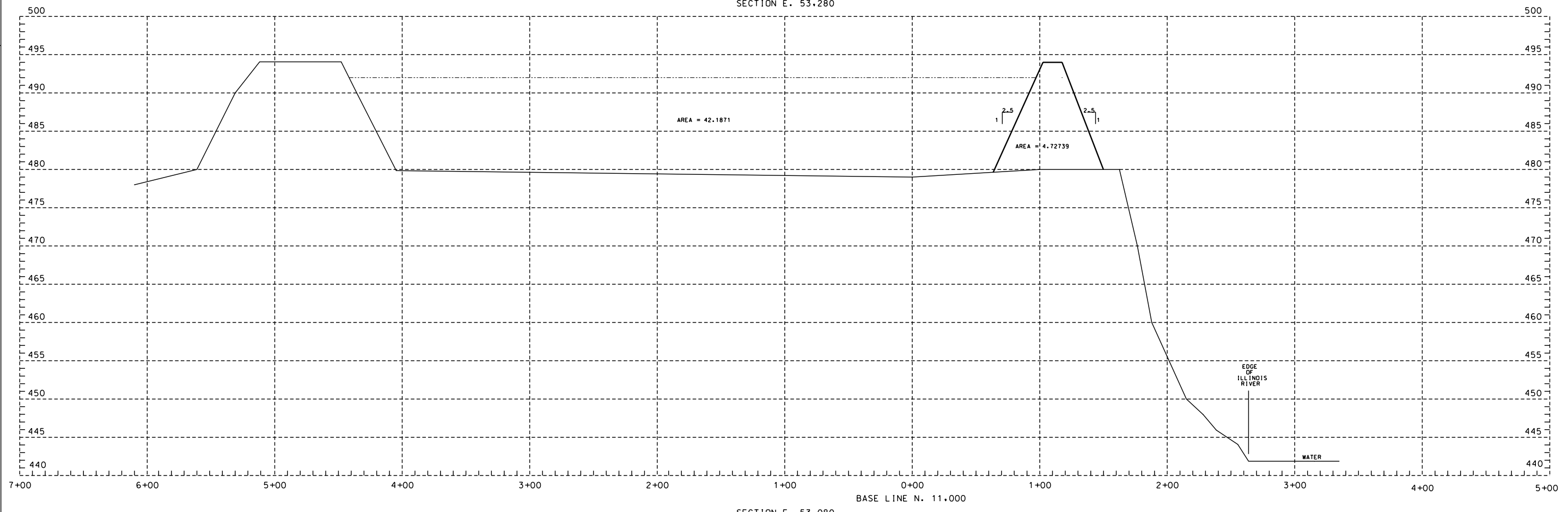
REFERENCES

--	--	--	--

REVISION STATUS				ILLINOIS POWER COMPANY			
□ - CONSTRUCTION				DECATUR			
□ - RECORD				CROSS SECTIONS			
0				EAST ASH POND EXTENSION			
				HENNEPIN POWER STATION			
DR	WJM	CAD	WJM	DATE	1-12-89		
OK		CKD		SCALE	1"=5' V. 1"=30' H.		
APP		APP		PLOTTED	03-08-90		
					CE-HEN1-B458-2		



BASE LINE N. 11.000
SECTION E. 53.280



BASE LINE N. 11.000
SECTION E. 53.080

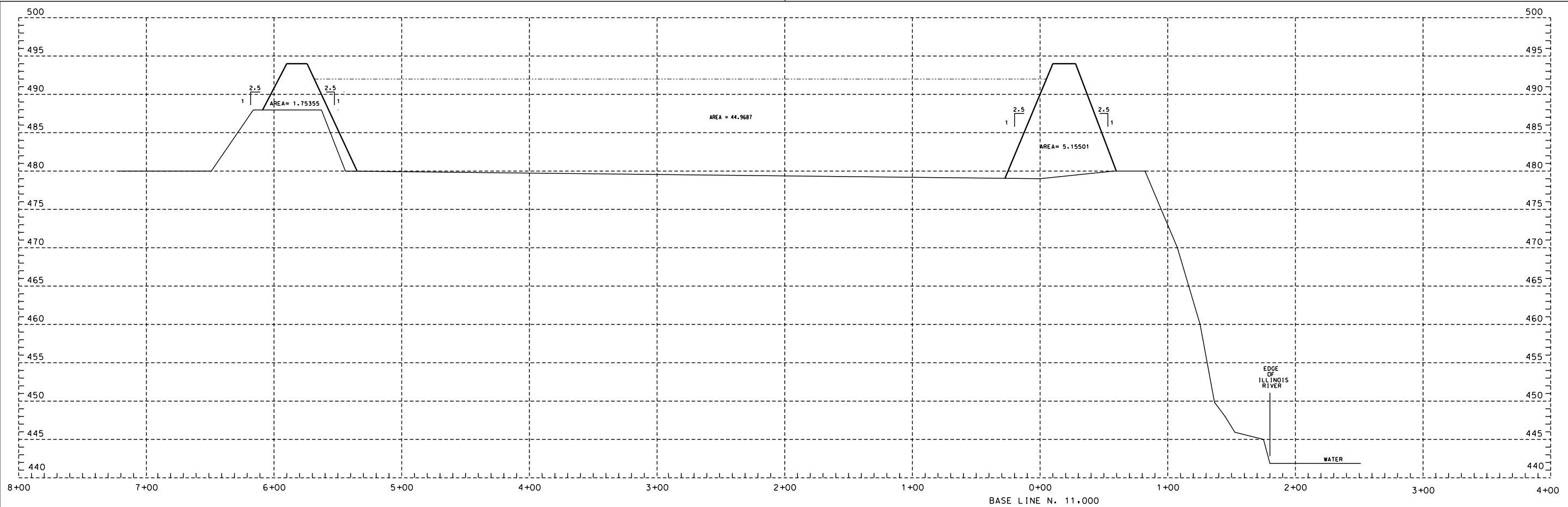
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
0													

NOTES
 1. DATA COLLECTED FROM TOPO ON DWG. CE-HEN1-B-450 DATED NOV. 4, 1987, REV. 0
 2. COORDINATES WERE SUPPLIED BY G. DECKARD FIELD INFORMATION TIEING TO J.L. FISHER'S PANELS.

REFERENCES

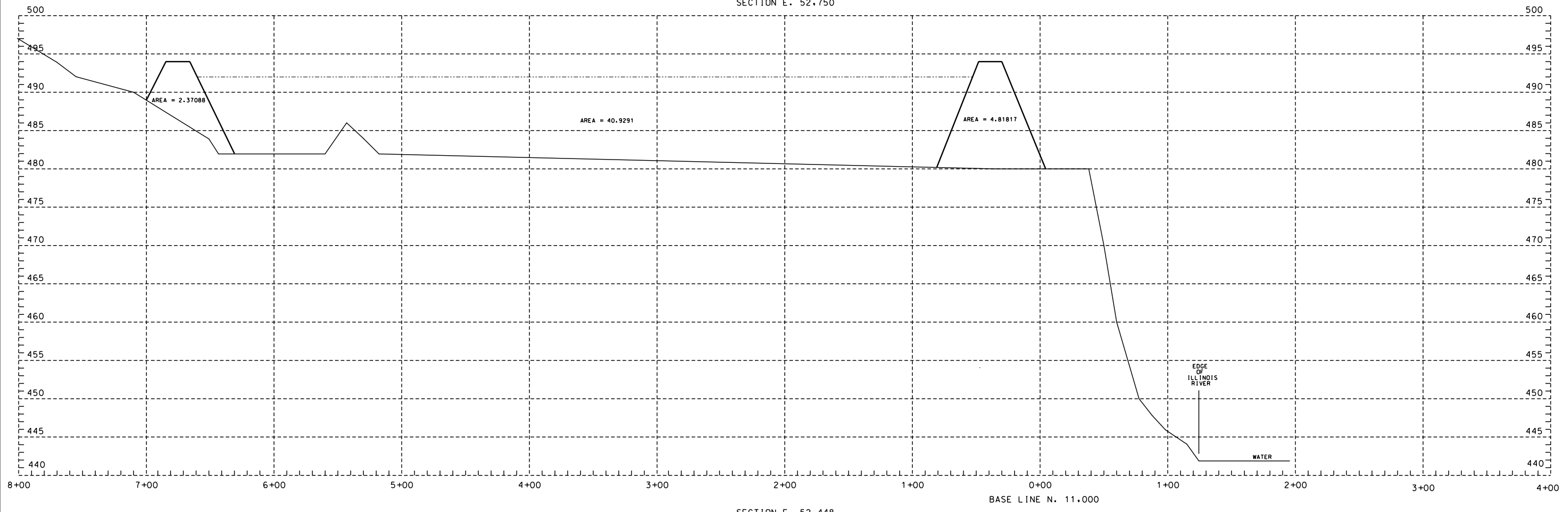
--	--

REVISION STATUS		ILLINOIS POWER COMPANY	
□ - CONSTRUCTION	□ - RECORD	DECATUR	
0		EAST ASH POND EXTENSION	
		HENNEPIN POWER STATION	
DR	WJM	CAD	WJM
DATE	1-12-89	SCALE	1"=25' V. 1"=30' H.
OK	CKD	PLOTTED	
APP		DATE	03-08-90
		DWG NO.	CE-HEN1-B458-3



SECTION E. 52.750

BASE LINE N. 11.000



SECTION E. 52.448

BASE LINE N. 11.000

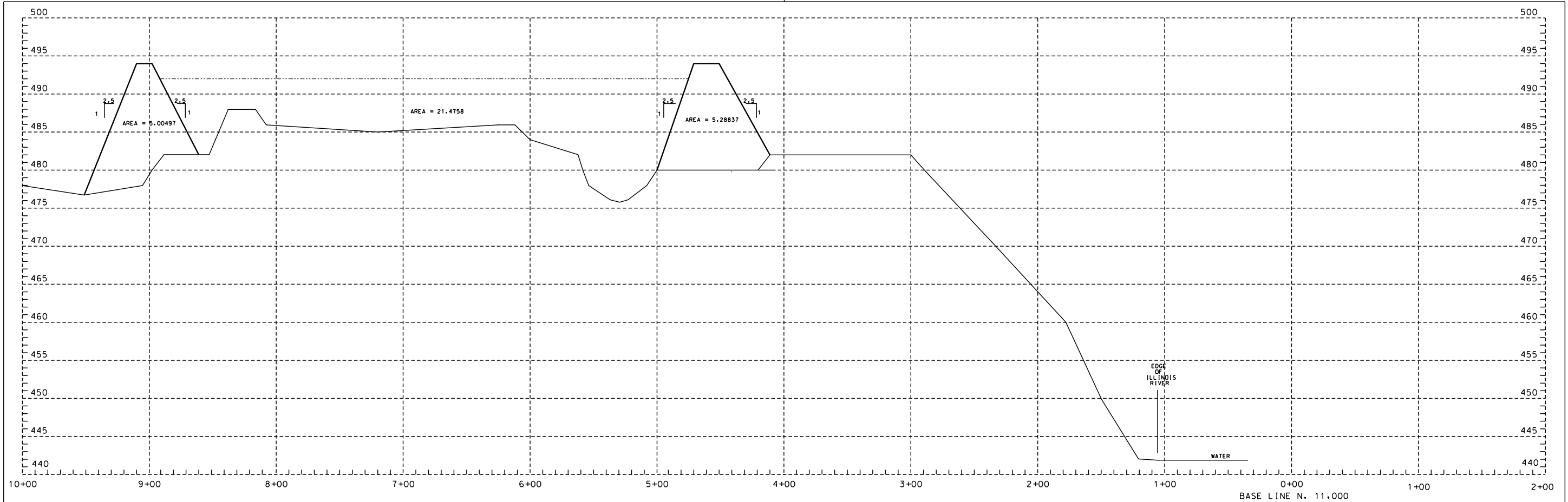
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
0													

NOTES

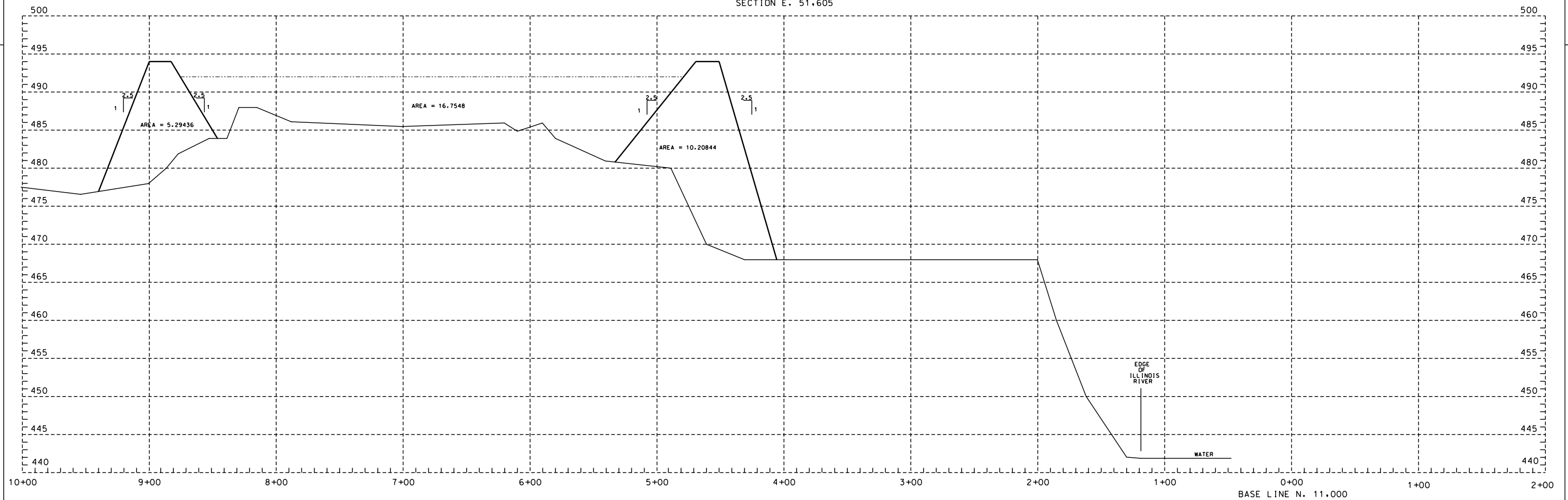
- DATA COLLECTED FROM TOPO ON DWG. CE-HEN1-B-450 DATED NOV. 4, 1987, REV. 0
- COORDINATES WERE SUPPLIED BY G. DECKARD FIELD INFORMATION TIEING TO J.L. FISHER'S PANELS.

REFERENCES

REVISION STATUS	ILLINOIS POWER COMPANY		
<input type="checkbox"/> CONSTRUCTION	DECATUR		
<input type="checkbox"/> RECORD	EAST ASH POND EXTENSION		
	HENNEPIN POWER STATION		
DR	WJM	CAD	WJM
DATE	1-12-89	CKD	SCALE 1"=25' V. 1"=30' H.
APP		PLOTTED	
		APP	03-08-90
			CE-HEN1-B458-4



SECTION E. 51.605



SECTION E. 51.552

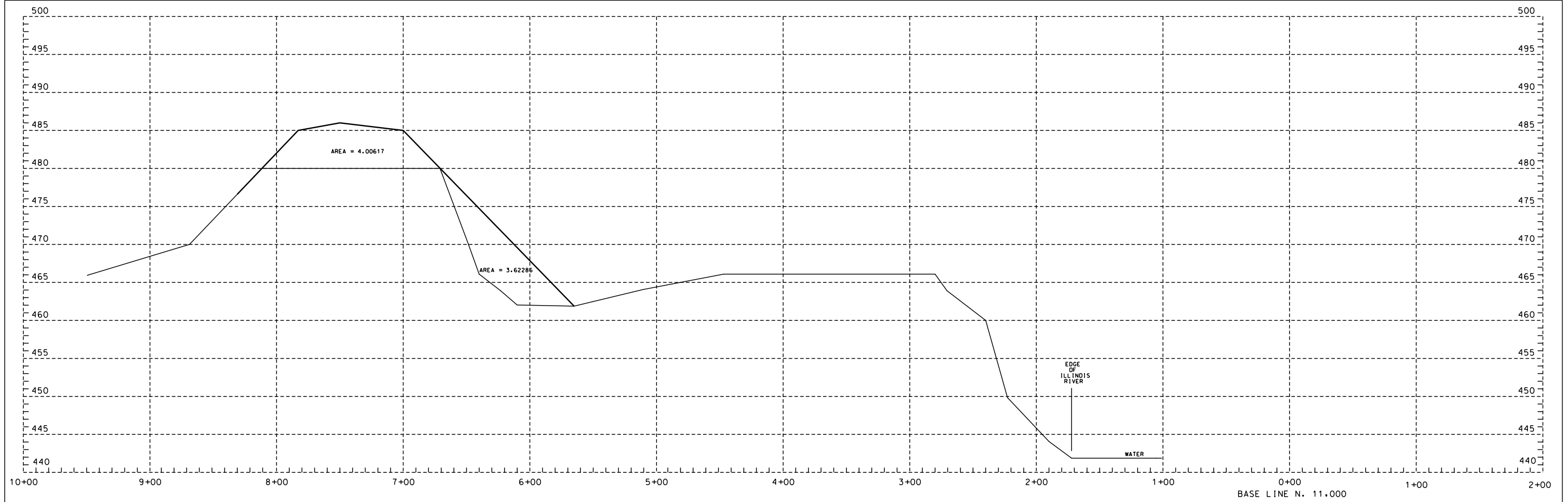
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
0													

NOTES

- DATA COLLECTED FROM TOPO ON DWG. CE-HEN1-B-450 DATED NOV. 4, 1987. REV. 0
- COORDINATES WERE SUPPLIED BY G. DECKARD FIELD INFORMATION TIEING TO J.L. FISHER'S PANELS.

REFERENCES

REVISION STATUS		ILLINOIS POWER COMPANY	
<input type="checkbox"/> CONSTRUCTION	<input type="checkbox"/> RECORD	DECATUR	
CROSS SECTIONS		EAST ASH POND EXTENSION	
HENNEPIN POWER STATION		DATE 1-12-89	
DR WJM	CAD WJM	SCALE 1"=25' V. 1"=30' H.	
DK	CKD	DATE 03-08-90	
APP	APP	CE-HEN1-B458-6	



NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A
0													

NOTES

- DATA COLLECTED FROM TOPO ON DWG. CE-HEN1-B-450 DATED NOV. 4, 1987. REV. 0
- COORDINATES WERE SUPPLIED BY G. DECKARD FIELD INFORMATION TIEING TO J.L. FISHER'S PANELS.

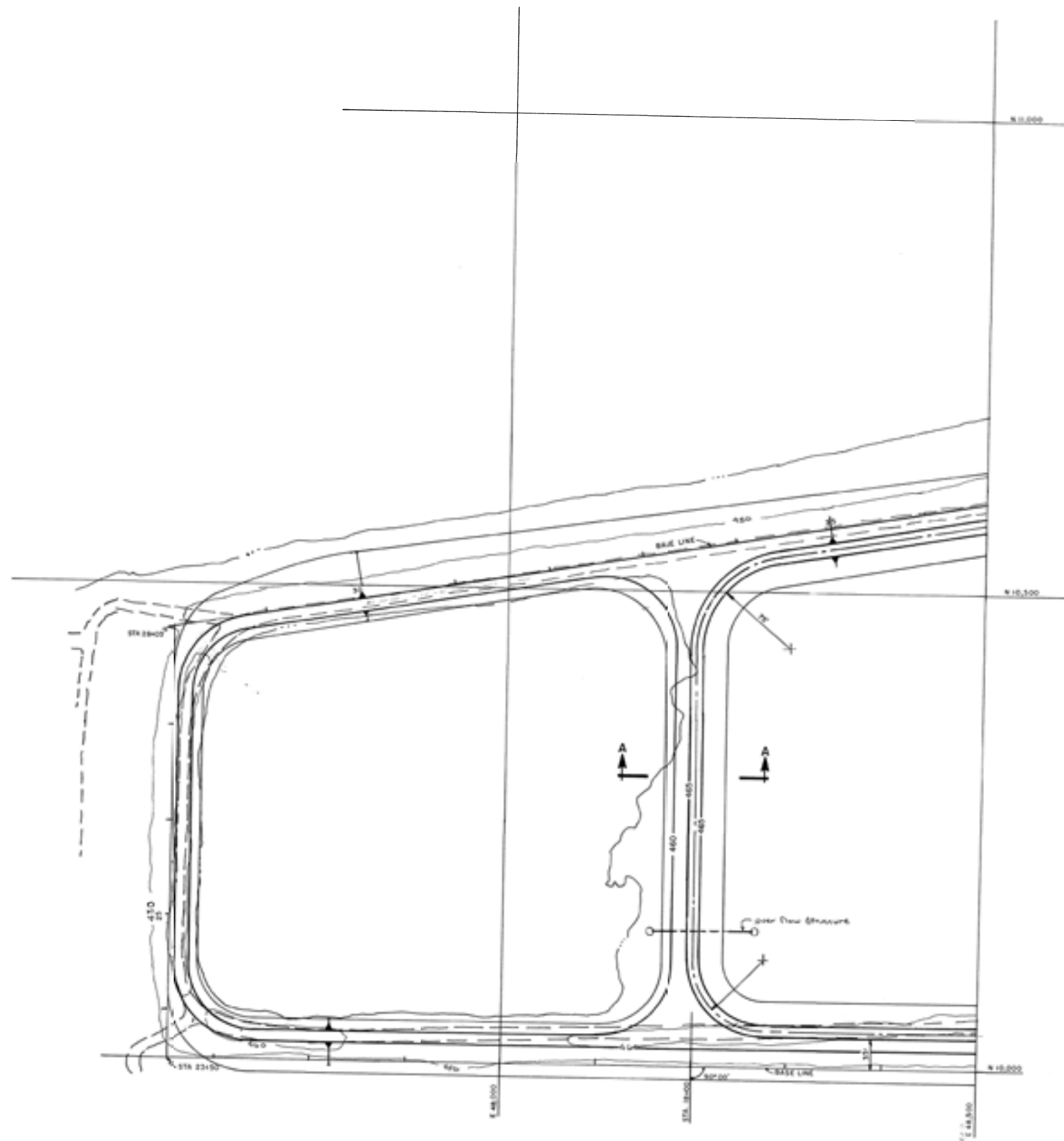
REFERENCES

REVISION STATUS				ILLINOIS POWER COMPANY			
<input type="checkbox"/>	CONSTRUCTION			DECATUR			
<input type="checkbox"/>	RECORD			CROSS SECTIONS			
				EAST ASH POND EXTENSION			
				HENNEPIN POWER STATION			
DR	WJM	CAD	WJM	DATE	1-12-89		
OK		CKD		SCALE	1"=5' V. 1"=30' H.		
APP		PLUTTED					
APP		03-08-90		CE-HEN1-B458-7			



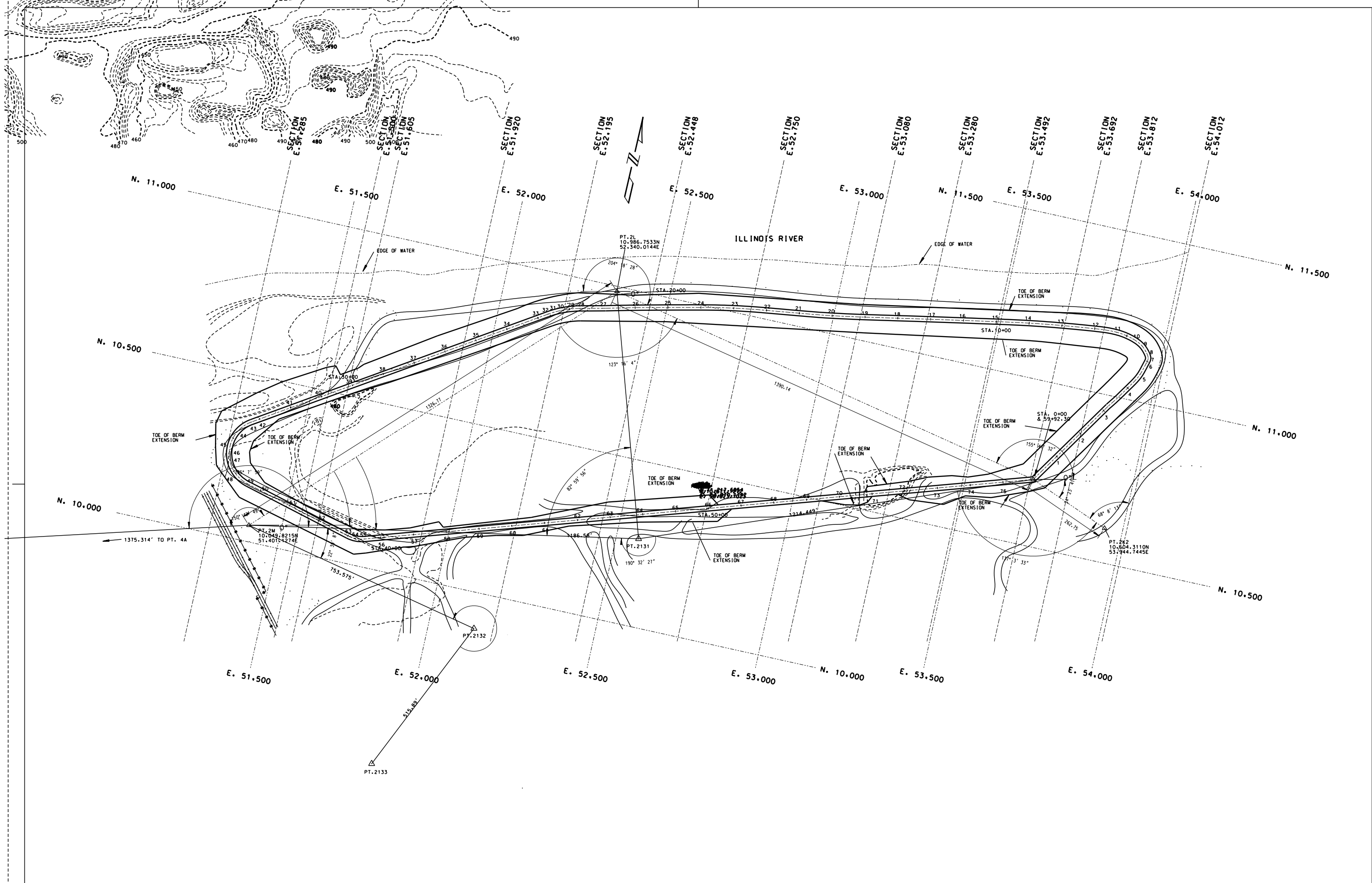
BASE LINE
FOR DRAINAGE
FOR 80479
2 10 500'

REVISIONS		ILLINOIS POWER COMPANY DESIGNS	
NO.	DATE	BY	CHK.
1	10/20/50	E. J. B.	J. C. S.
PROJECT		SHEET # 1	
PLATE NO. 1		E-HEN1-B460-1	



Scanned by T.I.I.'s Power Company

DIVISION OF THE CONSTRUCTION DIVISION		ILLINOIS POWER COMPANY DECA, ILL.	
PLAN - UNIT# ASH POND EXTENSION HENNEPIN POWER STATION			
SHEET # 2			
DR. G. S. G.	BY	DATE	SCALE
DR. J. G. G.	DR. J. G. G.	2-17-58	1" = 50'
DR. J. G. G.	DR. J. G. G.		
			E-HEN1-B460-2



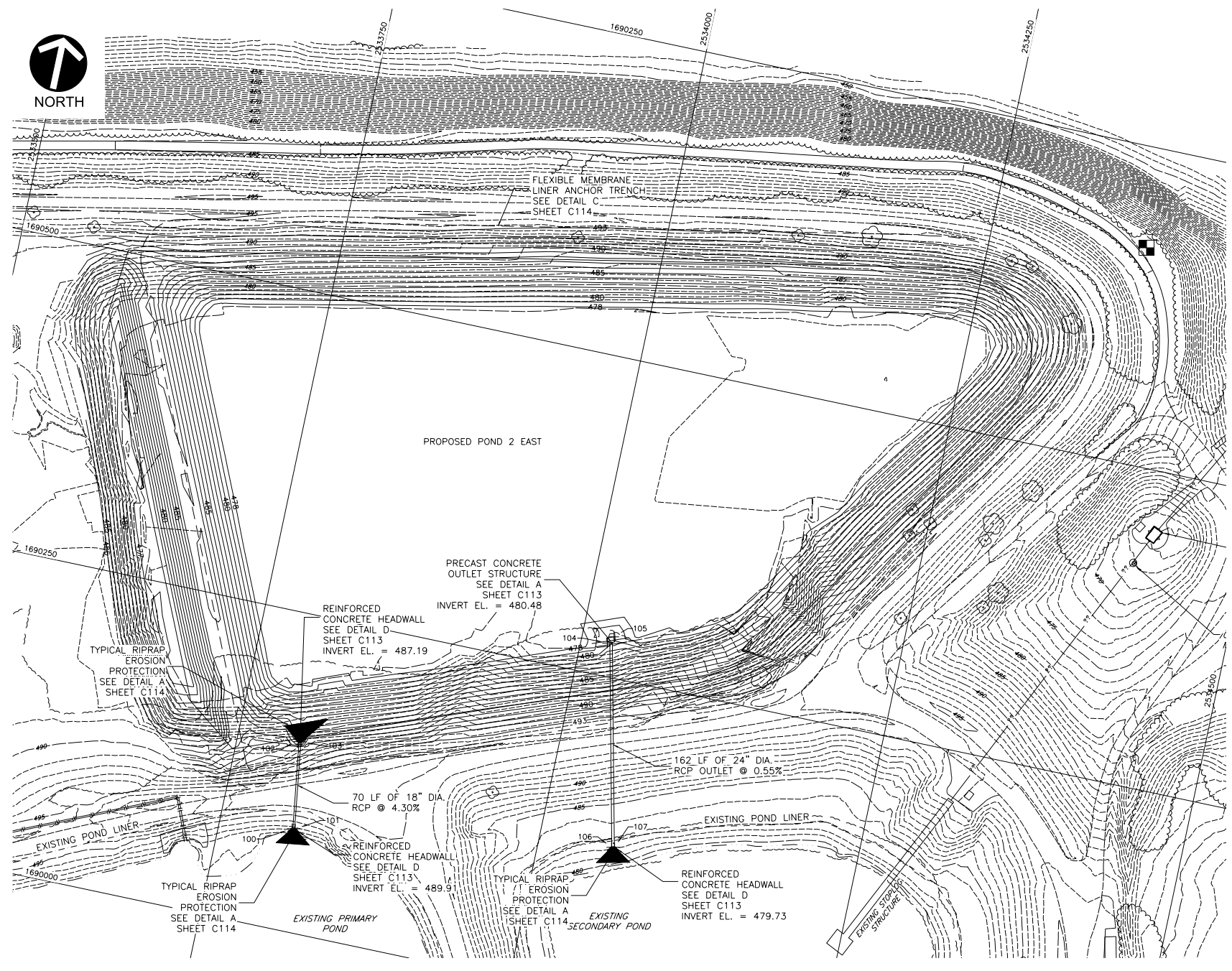
NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	NOTES
0														

REFERENCES	

NOTE: TOPD WAS DIGITIZED FROM DWG. CE-HEN1-B-450 DATED 11-4-87

REVISION STATUS	ILLINOIS POWER COMPANY
□ CONSTRUCTION	DECATUR
○ RECORD	
	CONTOUR AND GRADING PLAN
	UNIT #2 ASH POND EXTENSION
	HENNEPIN POWER STATION
DR WJM	CAD WJM
DR CRG	DATE 1-11-89
APP APP	SCALE 1"=100'
	03-08-90
	CE-HEN1-B461

DWG. 1.2.3.4.5



STRUCTURE TABLE		
Point #	Northing	Easting
100	1690080.864	2533807.450
101	1690081.207	2533809.928
102	1690149.246	2533797.977
103	1690149.589	2533800.456
104	1690276.331	2534020.790
105	1690282.205	2534024.973
106	1690118.909	2534057.560
107	1690119.451	2534060.003

NOTE
 THE LOCATION OF THE ABOVE AND BELOW GRADE STRUCTURES SHOWN ON THESE DRAWINGS ARE APPROXIMATE. PRIOR TO PERFORMING EXCAVATIONS, THE CONTRACTOR SHALL FIELD LOCATE STRUCTURES THAT MAY BE WITHIN THE LIMITS OF WORK AND PROTECT THEM ACCORDINGLY.

LEGEND

---	PROPOSED INDEX CONTOURS
---	PROPOSED INTERMEDIATE CONTOURS
---	EXISTING INDEX CONTOURS
---	EXISTING INTERMEDIATE CONTOURS
---	EXISTING STORM WATER DRAINS
---	EXISTING ACCESS ROAD

SCALE IN FEET
 0 40 80
 DRAWING NOT TO SCALE IF SCALE BAR DOES NOT MEASURE 2 INCHES

REFERENCE
 1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON OCTOBER 26, 2008.

CEC
Civil & Environmental Consultants, Inc.
 5910 Haper Road, Suite 106 • Solon, OH 44139
 Ph: 330.310.6800 • 866.507.2324
 www.cecinc.com

DYNEGY CONFIDENTIAL
 This drawing is the property of DYNEGY INC. Neither this drawing, nor reproductions of it, nor information derived from it, shall be given to others without the expressed written consent of DYNEGY INC. No use is to be made of it which is, or may be, injurious to DYNEGY INC.

REFERENCE DRAWINGS

NO.	DATE	REVISION	BY	APPROVED
1	7/28/10	RECORD REVISION - 082-255	DFB	SFP

NO.	DATE	REVISION	BY	APPROVED
1	7/28/10	RECORD REVISION - 082-255	DFB	SFP

SCALE	AS NOTED
DWN	DATE
DFB	07/05/2010
CHK	DATE
RTM	07/12/2010
APPV	DATE
SFP	07/12/2010

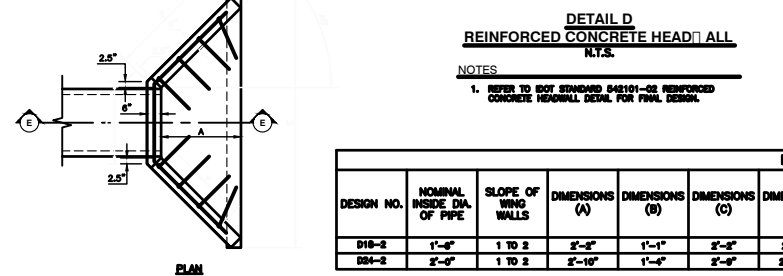
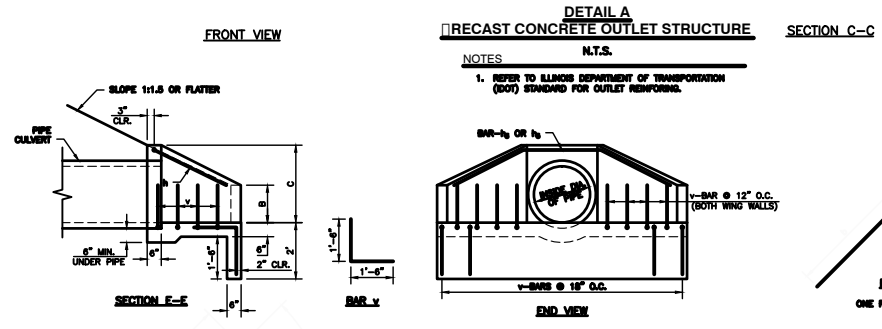
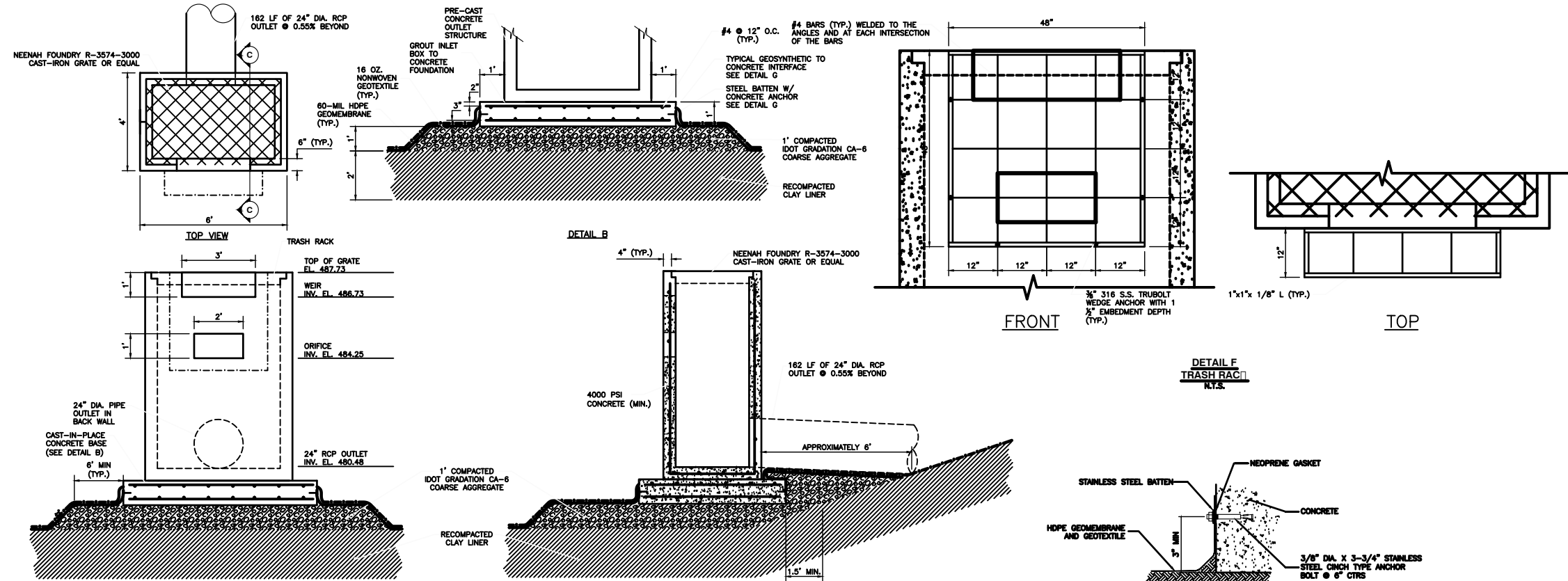
DYNEGY

DYNEGY MIDWEST GENERATION, INC.
 HENNEPIN POWER STATION
 POND 2 EAST
 FLEXIBLE MEMBRANE LINER AND STRUCTURES

PROJECT NO: 082-255
 CLIENT: DYNEGY
 DWG NO: HENI-C109

REV: 07/05/2010

1
2
3
4
HENNEPIN
HENI-C109
DFB
07/05/2010



DIMENSIONS OF BARS - h_1 AND h_2

BAR	a	b
h_1	2'-1"	3'-0.50"
h_2	2'-0"	4'-1.00"

DIMENSIONS AND QUANTITIES

DESIGN NO.	NOMINAL INSIDE DIA. OF PIPE	SLOPE OF WING WALLS	DIMENSIONS (A)	DIMENSIONS (B)	DIMENSIONS (C)	DIMENSIONS (D)	DIMENSIONS (E)	DIMENSIONS (F)	DIMENSIONS (G)	CONCRETE 2 END SECS. CU. YDS.	NO.4 REBAR h_1 -BARS (BAR)	NO.4 REBAR h_2 -BARS (LENGTH)	NO.4 REBAR v -BARS NO.	NO.4 REBAR TOTAL WT. 2 END SECS. LBS.
D18-2	1'-6"	1 TO 2	2'-0"	1'-1"	2'-0"	2'-3"	6'-10.00"	3'-3.50"	1.30	h_1	6'-0"	22	60	
D8-2	2'-0"	1 TO 2	2'-10"	1'-0"	2'-0"	2'-11"	6'-10.00"	4'-2.00"	2.00	h_2	11'-0"	28	70	

DYNEGY CONFIDENTIAL
This drawing is the property of DYNEGY INC. Neither this drawing, nor reproductions of it, nor information derived from it, shall be given to others without the expressed written consent of DYNEGY INC. No use is to be made of it which is, or may be, injurious to DYNEGY INC.

REFERENCE DRAWINGS

NO.	DATE	REVISION	BY	APPROVED	NO.	DATE	REVISION	BY	APPROVED	SCALE	AS NOTED
						7/28/10	RECORD REVISION - 082-255	DFB	SFP		

NO.	DATE	REVISION	BY	APPROVED	NO.	DATE	REVISION	BY	APPROVED	SCALE	AS NOTED
						7/28/10	RECORD REVISION - 082-255	DFB	SFP		

C&E
Civil & Environmental Consultants, Inc.
330.310.6800 • 866.507.2324
www.ccecinc.com

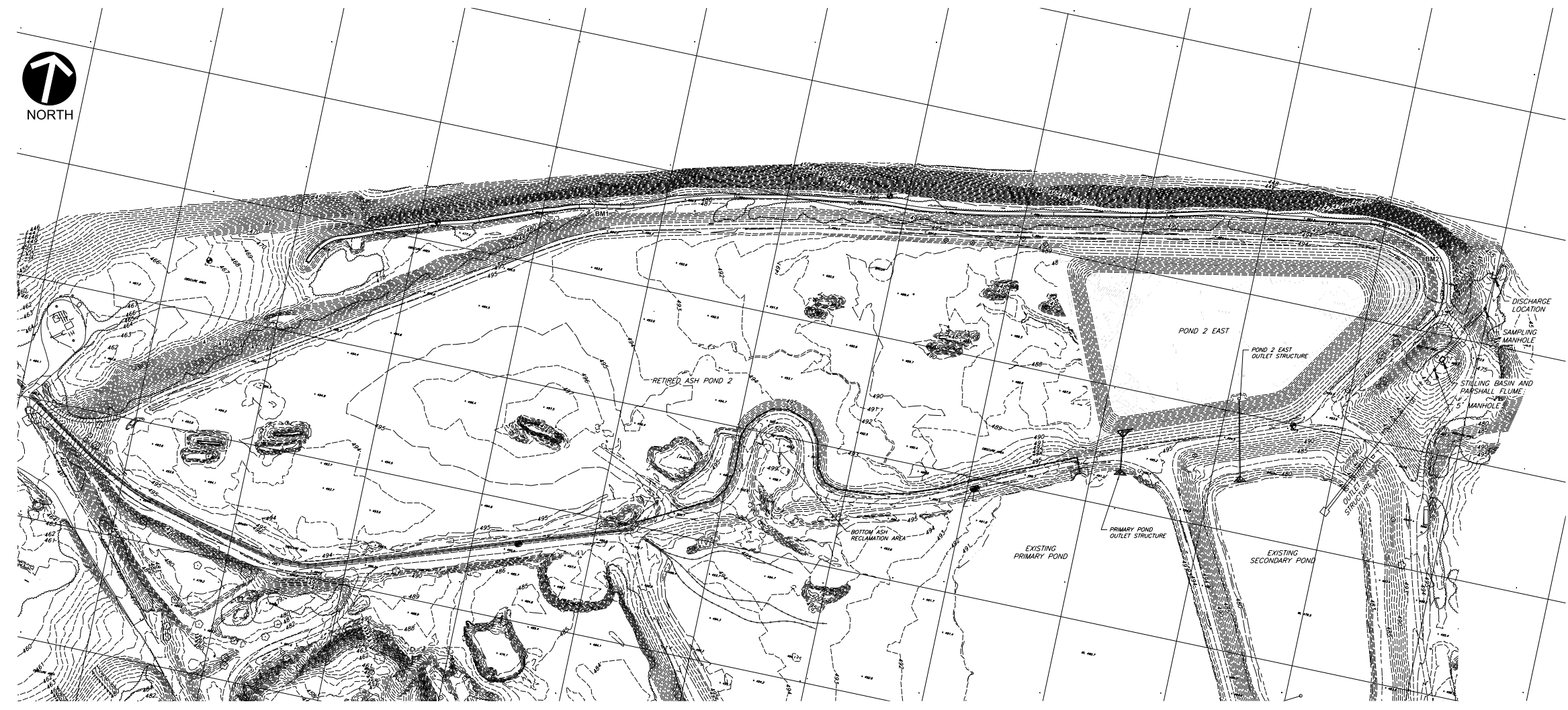
DYNEGY

DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
POND 2 EAST
DETAILS

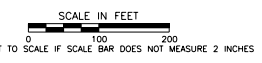
PROJECT NO. 082-255
CLIENT: DYNEGY
DWG. NO. HEN1-C113

DATE: 07/05/2010
DATE: 07/12/2010
DATE: 07/12/2010

REV. 07/05/2010



BENCHMARK LOCATIONS			
NUMBER	NORTHING	EASTING	ELEVATION
1	1690395.43	2532618.60	482.19
2	1690670.86	2534372.87	484.08
3*	1689478.87	2534643.99	506.80
4*	1688458.82	2533256.76	499.45
5*	1688781.84	2531352.15	468.27
6*	1688975.08	2531310.12	463.75



- * BENCHMARKS BEYOND DRAWING BOUNDARY.
- REFERENCE:
1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURPEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
DUE TO CONSTRUCTION ACTIVITIES, ACTUAL FIELD TOPOGRAPHY MAY VARY.
 2. POND 2 EAST CONTOURS FROM CONSTRUCTION DRAWINGS SUBMITTED AUGUST 2009.

LEGEND

— ? —	MISCELLANEOUS FLOW PIPING
— ?? —	EXISTING STORMWATER DRAINS
— — — — —	EXISTING TREELINE
— — — — —	EXISTING PIPING
— — — — —	EXISTING ACCESS ROAD
— — — — —	EXISTING PONDS/STREAMS
— · — · —	EXISTING FENCE
⊕	EXISTING BENCHMARK
— -500 —	EXISTING INDEX CONTOUR
— -499 —	EXISTING INTERMEDIATE CONTOUR
⊗	EXISTING ROCK CHANNEL PROTECTION
⊙	EXISTING MONITORING WELL



DYNEGY CONFIDENTIAL
This drawing is the property of DYNEGY INC. Neither this drawing, nor reproductions of it, nor information derived from it, shall be given to others without the expressed written consent of DYNEGY INC. No use is to be made of it which is, or may be, injurious to DYNEGY INC.

REFERENCE DRAWINGS

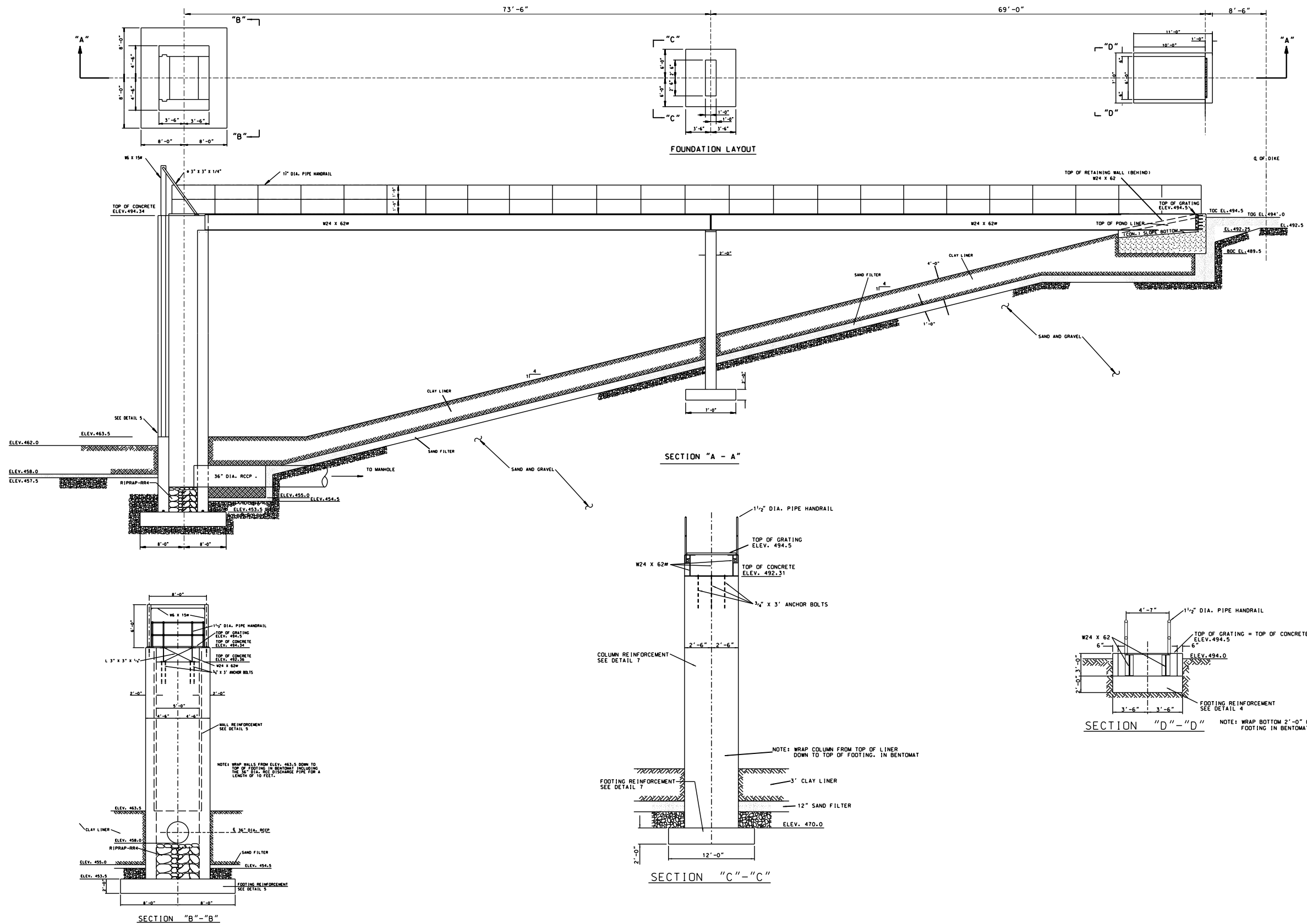
NO.	DATE	REVISION	BY	APPROVED	NO.	DATE	REVISION	BY	APPROVED
					①	11/28/10	RECORD REVISION - 082-255	DFB	SFP

SCALE:	AS NOTED
DWN. DATE	11/05/2010
CHK. DATE	11/12/2010
APPV. DATE	11/12/2010
EAPP_BY	EABD
FEAPP_BY	FEABD

DYNEGY
DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
LANDFILL PHASE 1 CONSTRUCTION
EXISTING CONDITIONS

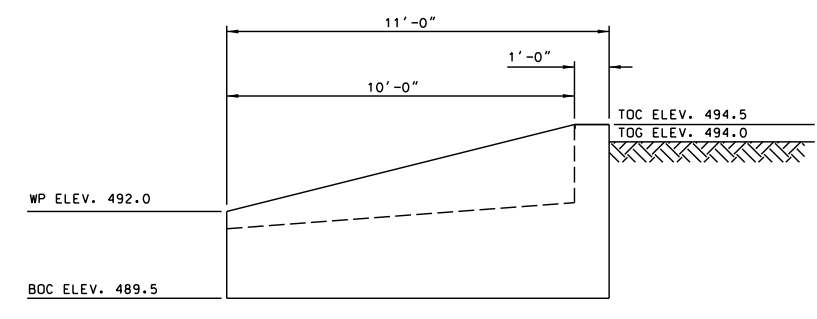
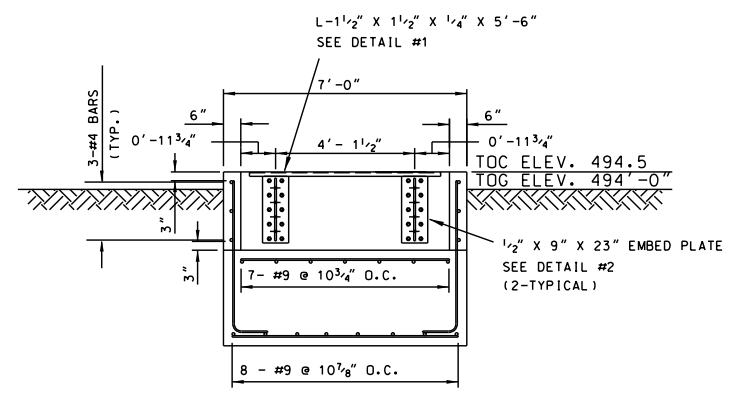
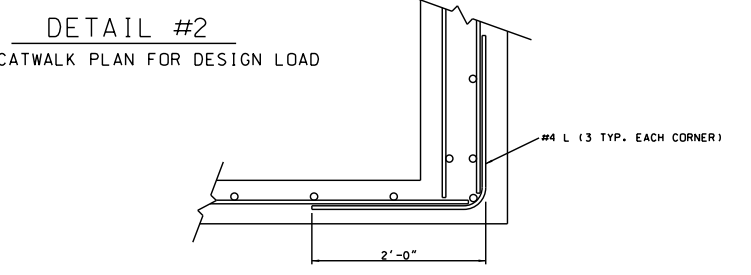
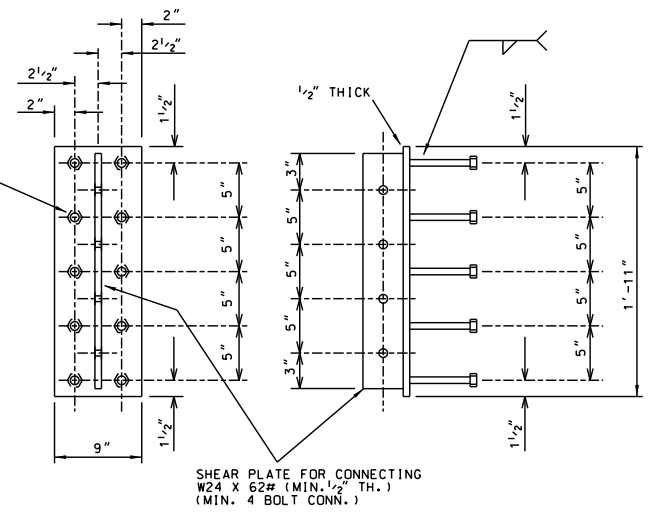
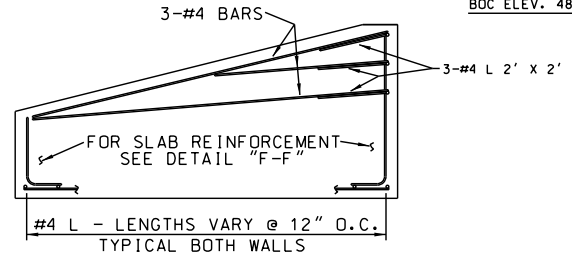
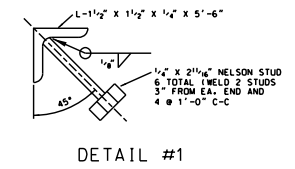
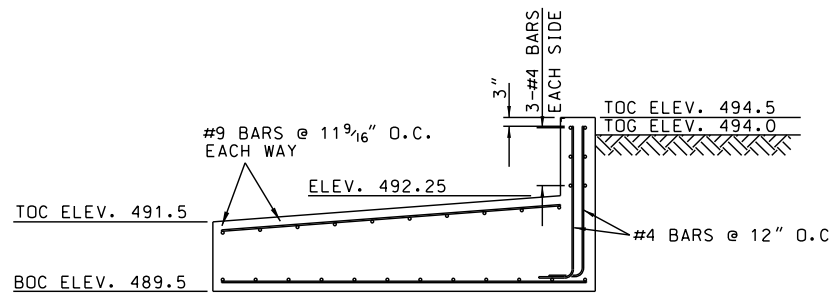
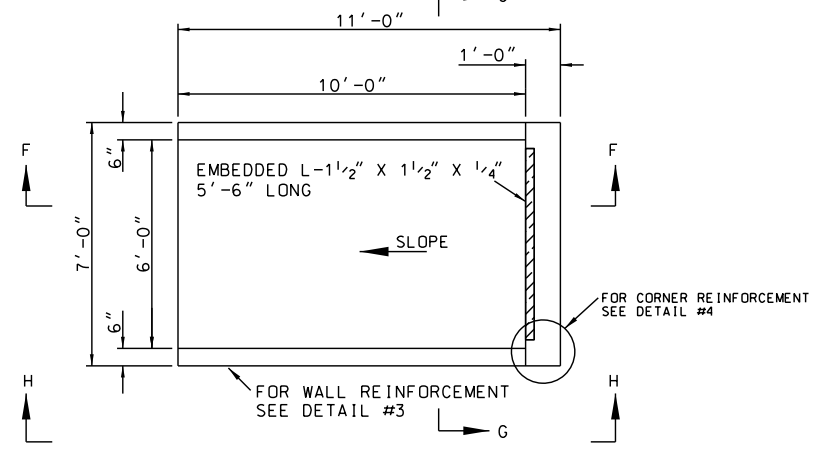
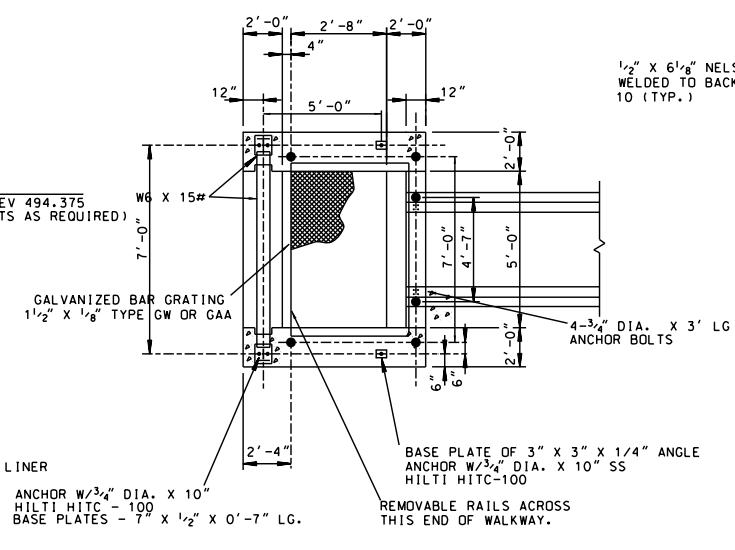
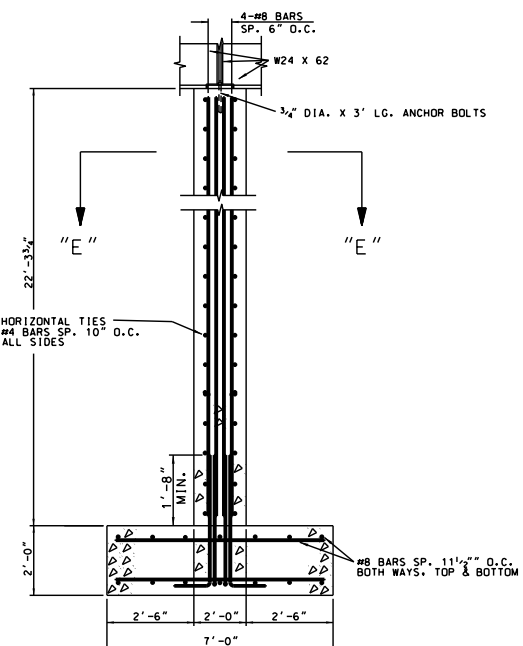
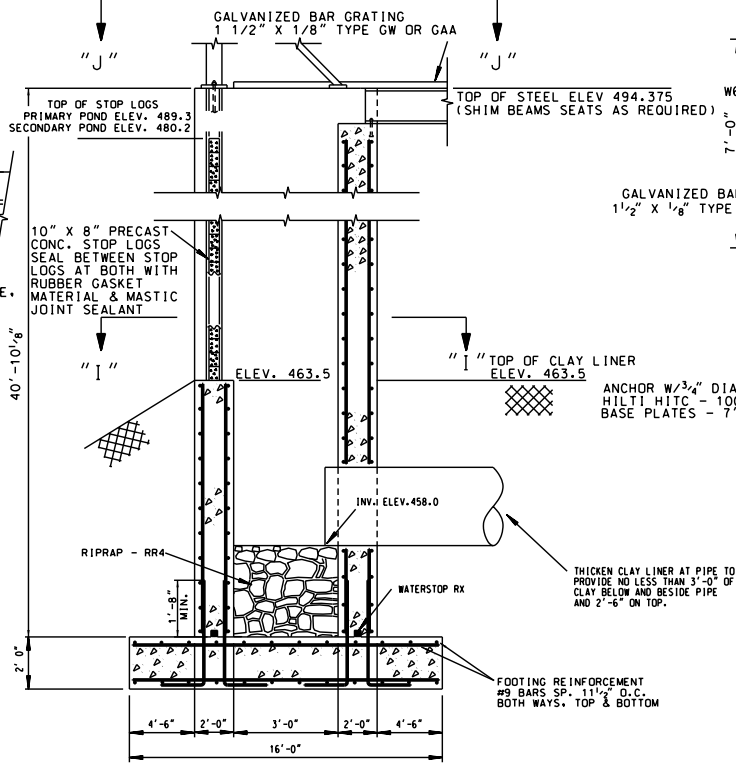
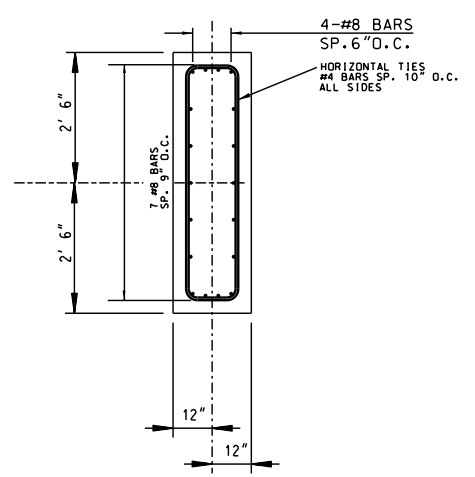
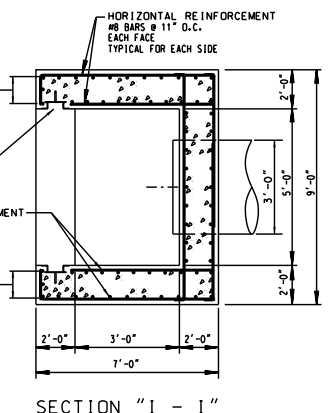
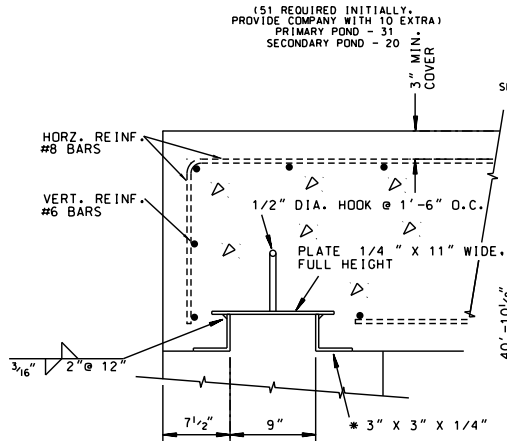
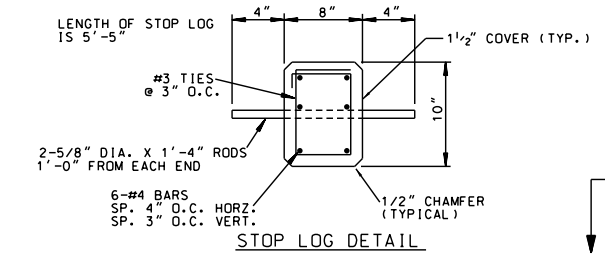
PROJECT NO.	082-255
CLIENT	DYNEGY
DWG. NO.	HENI-C117

HENNEPIN
HENI-C117
DFB
07/05/2010



NO	DATE	DRF	DESCRIPTION	E	C	A	NO	DATE	DRF	DESCRIPTION	E	C	A	REVISION STATUS	ILLINOIS POWER COMPANY
0														<input type="checkbox"/> -CONSTRUCTION <input type="checkbox"/> -RECORD <input checked="" type="checkbox"/> -PLOT	DECATUR LAYOUT-POND DISCHARGE STRUCTURES 1995 ASH FACILITY HENNEPIN POWER STATION
														DR G.R.H.	CAD G.R.H.
														DATE	1/5/94
														APP	SCALE NO SCALE
														APP	PLOTTED 9/17/96
														APP	CE-HEN1-C8

p0019275.dgn



REVISION STATUS		ILLINOIS POWER COMPANY		
NO.	DESCRIPTION	DATE	BY	APP.
0	CONSTRUCTION			
0	RECORD			
		DECATUR		
		DETAILS: POND DISCHARGE STRUCTURE		
		1995 ASH FACILITY		
		HENNEPIN POWER STATION		
DR	G.R.H.	CAD	G.R.H.	DATE 1/5/94
OK		CKD		SCALE AS NOTED
APP		PLOTTED		
APP		9/17/96		CE-HEN1-C9

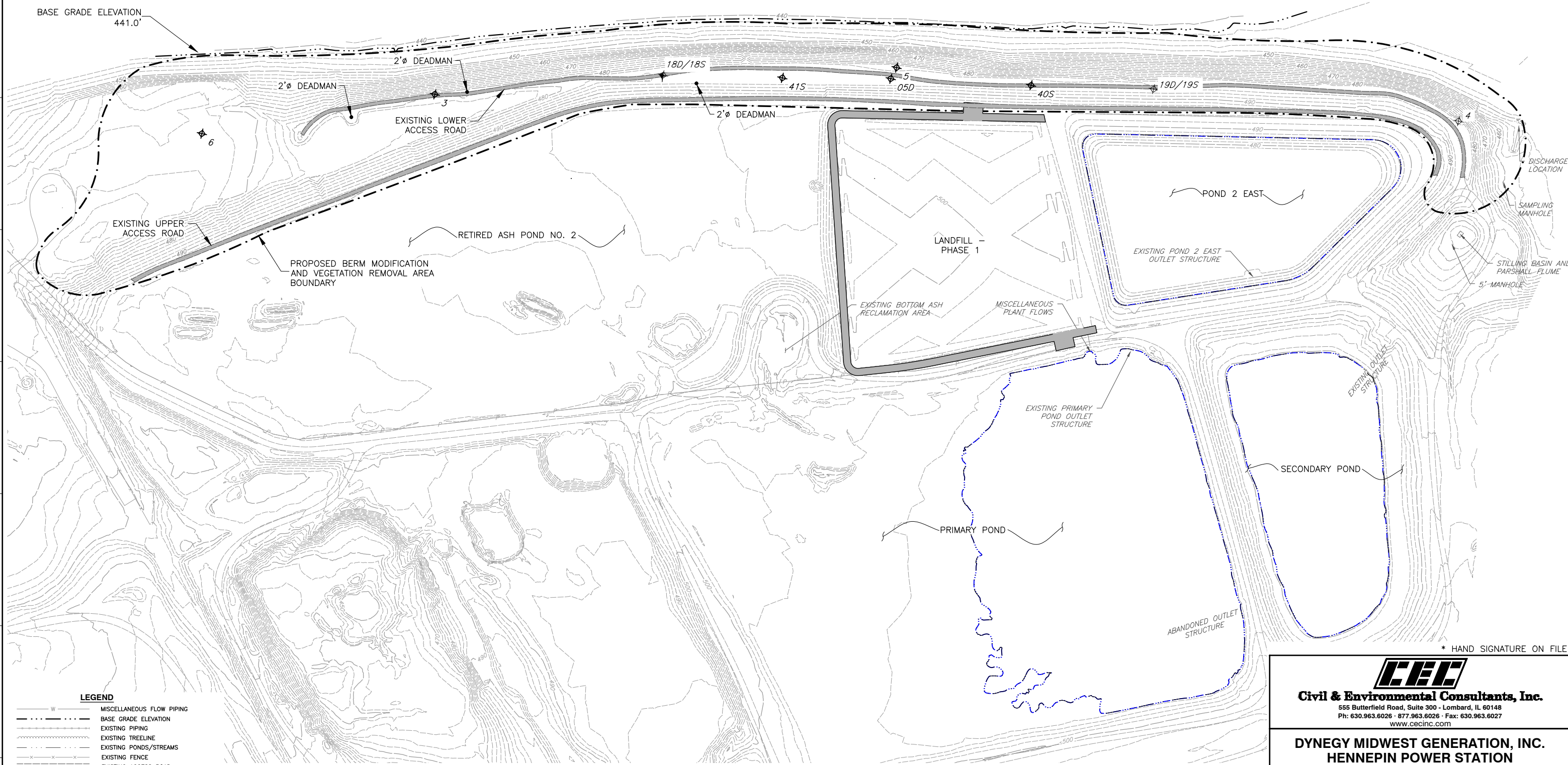


SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1	5/2013	IDNR DAM MODIFICATION PERMIT
2	6/9/2014	ISSUED FOR CONSTRUCTION
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION

BASE GRADE ELEVATION
441.0'

ILLINOIS RIVER
FLOW



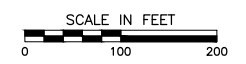
P:\2015\132-650\2015-CAD\DWG\132-650-010-EXISTING SITE CONDITIONS PLAN.dwg (1/26/2015 10:43 AM) - LP: 2/17/2015 10:43 AM

LEGEND

- W — MISCELLANEOUS FLOW PIPING
- - - - - BASE GRADE ELEVATION
- — — — — EXISTING PIPING
- — — — — EXISTING TREELINE
- — — — — EXISTING PONDS/STREAMS
- — — — — EXISTING FENCE
- — — — — EXISTING ACCESS ROAD
- ST — EXISTING STORM WATER PIPING
- P — EXISTING UNDERGROUND PLANT FLOW PIPING
- — — — — EXISTING PLANT FLOW PIPING
- 495 — EXISTING INDEX CONTOURS
- 495 — EXISTING INTERMEDIATE CONTOURS
- ▲ 18D — EXISTING MONITORING WELL LOCATIONS
- — — — — EXISTING ACCESS ROAD
- - - - - PROPOSED EAST BERM MODIFICATIONS AREA BOUNDARY

- REFERENCE:**
1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
 2. EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
 3. IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
 4. AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.

AS-BUILT CONSTRUCTION PLANS



* HAND SIGNATURE ON FILE



Civil & Environmental Consultants, Inc.
555 Butterfield Road, Suite 300 - Lombard, IL 60148
Ph: 630.963.6026 - 677.963.6026 - Fax: 630.963.6027
www.cecinc.com

DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

DRAWN BY: DFB | CHECKED BY: MDJ | APPROVED BY: *MDJ
DATE: FEBRUARY 2015 | DWG SCALE: AS NOTED | PROJECT NO: 132-650

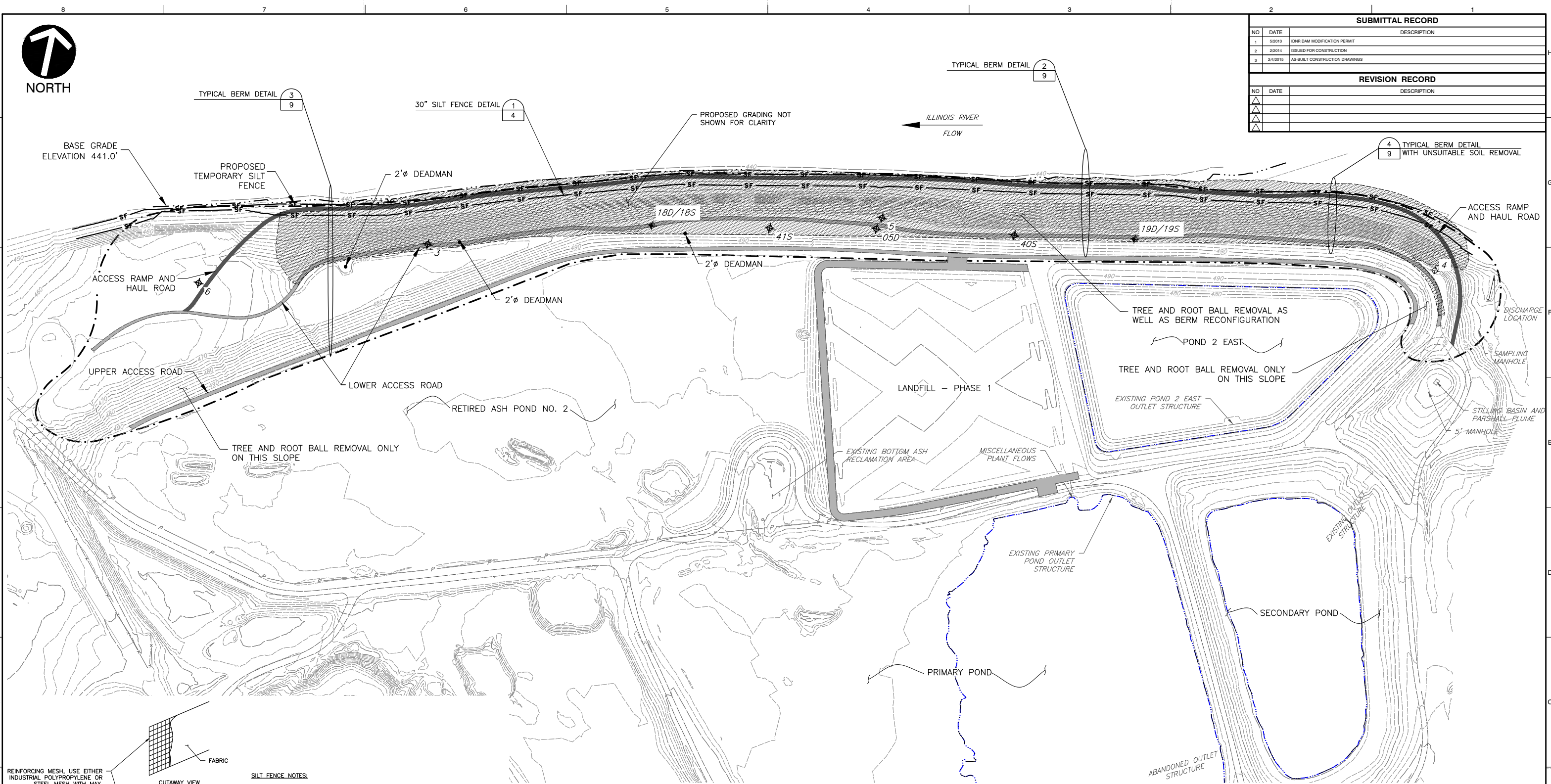
EXISTING SITE CONDITIONS PLAN

DRAWING NO.:
3
SHEET 3 OF 9

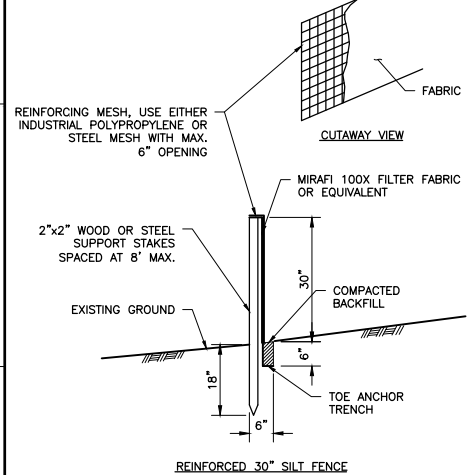


SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1	5/2013	ISDR DAM MODIFICATION PERMIT
2	2/2014	ISSUED FOR CONSTRUCTION
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION



SITE PLAN
SCALE: 1" = 100'



DETAIL 1
30" SILT FENCE DETAIL
N.T.S.

- SILT FENCE NOTES:**
1. SILT FENCE SHALL BE PLACED ON LEVEL GRADE, WHERE POSSIBLE, AND BOTH ENDS OF THE SILT FENCE SHALL BE EXTENDED UP THE SLOPE.
 2. SILT FENCE SHALL NOT BE PLACED IN ANY AREA OF CONCENTRATED FLOW NOR IN AREAS WHERE ROCK OR ROCKY SOILS PREVENT THE FULL AND UNIFORM ANCHORING OF THE FENCE TOE.
 3. THE CONTRACTOR SHALL INSPECT THE SILT FENCE AFTER EVERY PRECIPITATION EVENT AND IMMEDIATELY REPAIR ANY DEFICIENCIES.
 4. THE CONTRACTOR SHALL REMOVE ACCUMULATED SEDIMENTS AS REQUIRED TO KEEP THE FENCE FUNCTIONAL. IN ALL CASES, THE CONTRACTOR SHALL REMOVE DEPOSITS WHERE ACCUMULATIONS REACH ONE-HALF THE ABOVE GROUND HEIGHT OF THE FENCE.
 5. THE CONTRACTOR SHALL IMMEDIATELY REPAIR ALL UNDERCUTTING OR EROSION OF THE ANCHOR TOE WITH A ROCK FILTER OUTLET.
 6. THE CONTRACTOR SHALL CONFORM TO ANY RECOMMENDATIONS BY THE MANUFACTURER FOR REPLACING FILTER FABRIC FENCE DUE TO WEATHERING.

LEGEND

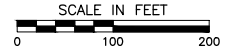
--- W ---	MISCELLANEOUS FLOW PIPING
---	BASE GRADE ELEVATION
---	EXISTING PIPING
---	EXISTING TREELINE
---	EXISTING PONDS/STREAMS
---	EXISTING FENCE
---	EXISTING ACCESS ROAD
---	EXISTING STORM WATER PIPING
---	EXISTING UNDERGROUND PLANT FLOW PIPING
---	EXISTING PLANT FLOW PIPING
---	EXISTING INDEX CONTOURS
---	EXISTING INTERMEDIATE CONTOURS
---	EXISTING MONITORING WELL LOCATIONS
---	PROPOSED CONSTRUCTION ACCESS ROAD
---	PROPOSED EAST BERM MODIFICATIONS AREA BOUNDARY
---	PROPOSED SILT FENCE
---	PROPOSED GRADING LIMITS

AS-BUILT CONSTRUCTION PLANS

NOTE:
MONITORING WELLS EXIST WITHIN THE PROPOSED BERM MODIFICATION AREA. CONTRACTOR SHALL PROTECT EXISTING MONITORING WELLS WHILE PERFORMING BERM MODIFICATION ACTIVITIES.

REFERENCE:

1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
2. EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
3. IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
4. AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.



* HAND SIGNATURE ON FILE



Civil & Environmental Consultants, Inc.
555 Butterfield Road, Suite 300 - Lombard, IL 60148
Ph: 630.963.6026 · 877.963.6026 · Fax: 630.963.6027
www.cecinc.com

DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

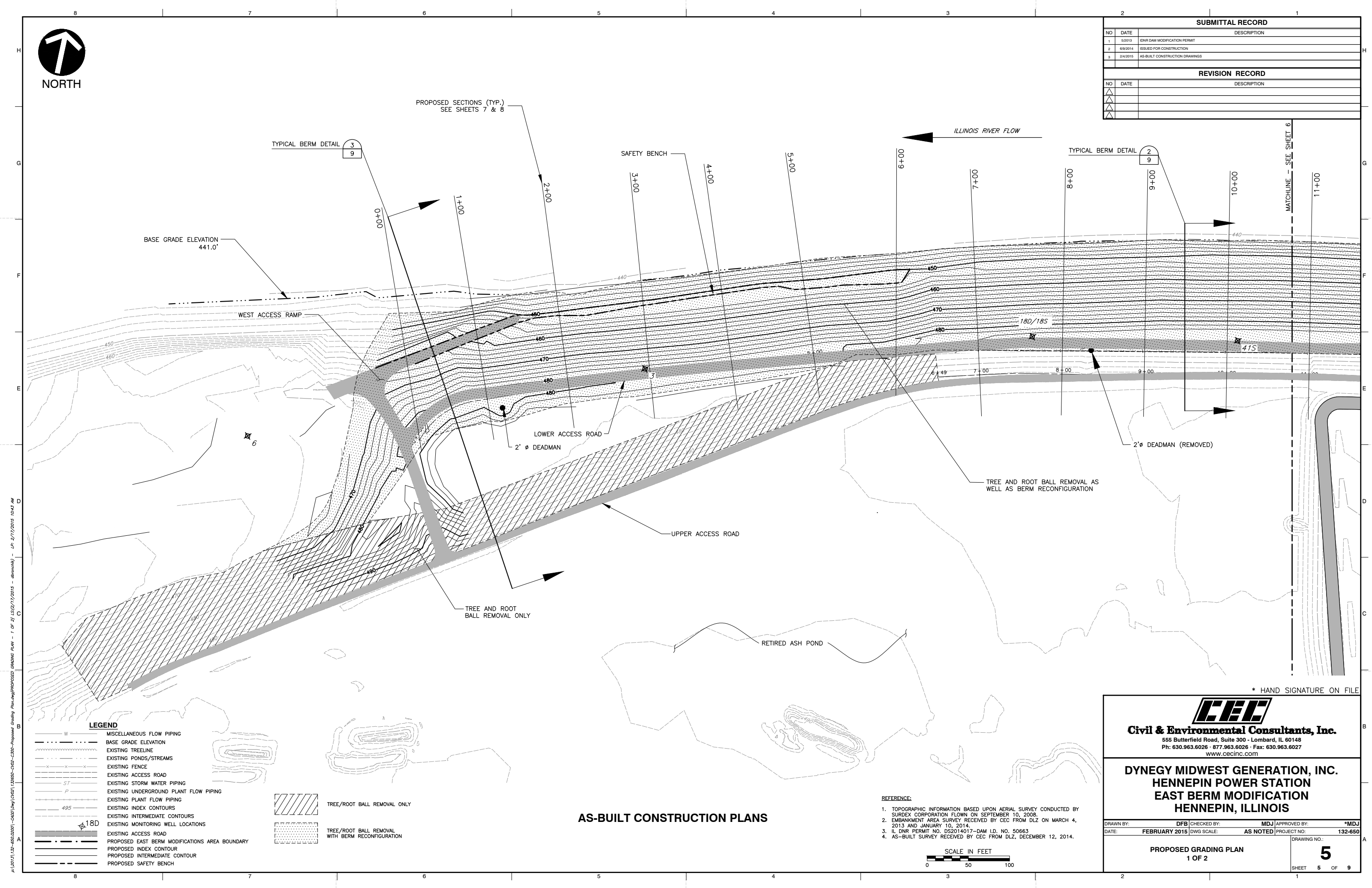
DRAWN BY: DFB	CHECKED BY: MDJ	APPROVED BY: MDJ	DATE: FEBRUARY 2015	DWG SCALE: AS NOTED	PROJECT NO: 132-650
---------------	-----------------	------------------	---------------------	---------------------	---------------------



NORTH

SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1	5/2013	IDNR DAM MODIFICATION PERMIT
2	6/9/2014	ISSUED FOR CONSTRUCTION
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION



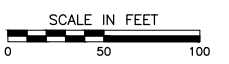
p:\13015\132-650-0001-CADD\DWG\13015\132-650-0001-Proposed Grading Plan.dwg (1/2) 1:2500-0001-CADD-0001-Proposed Grading Plan - 1 of 2] LS(2/17/2015 - abramm) - LP: 2/17/2015 10:43 AM

LEGEND

- MISCELLANEOUS FLOW PIPING
- BASE GRADE ELEVATION
- EXISTING TREELINE
- EXISTING PONDS/STREAMS
- EXISTING FENCE
- EXISTING ACCESS ROAD
- EXISTING STORM WATER PIPING
- EXISTING UNDERGROUND PLANT FLOW PIPING
- EXISTING PLANT FLOW PIPING
- EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- EXISTING MONITORING WELL LOCATIONS
- EXISTING ACCESS ROAD
- PROPOSED EAST BERM MODIFICATIONS AREA BOUNDARY
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED SAFETY BENCH
- TREE/ROOT BALL REMOVAL ONLY
- TREE/ROOT BALL REMOVAL WITH BERM RECONFIGURATION

AS-BUILT CONSTRUCTION PLANS

- REFERENCE:
- TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
 - EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
 - IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
 - AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.



* HAND SIGNATURE ON FILE



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300 - Lombard, IL 60148
 Ph: 630.963.6026 · 677.963.6026 · Fax: 630.963.6027
 www.cecinc.com

DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

DRAWN BY: DFB CHECKED BY: MDJ APPROVED BY: *MDJ
 DATE: FEBRUARY 2015 DWG SCALE: AS NOTED PROJECT NO: 132-650

PROPOSED GRADING PLAN
 1 OF 2

DRAWING NO.:
5
 SHEET 5 OF 9



PROPOSED SECTIONS (TYP.)
SEE SHEETS 7 & 8

ILLINOIS RIVER FLOW

BASE GRADE ELEVATION
441.0'

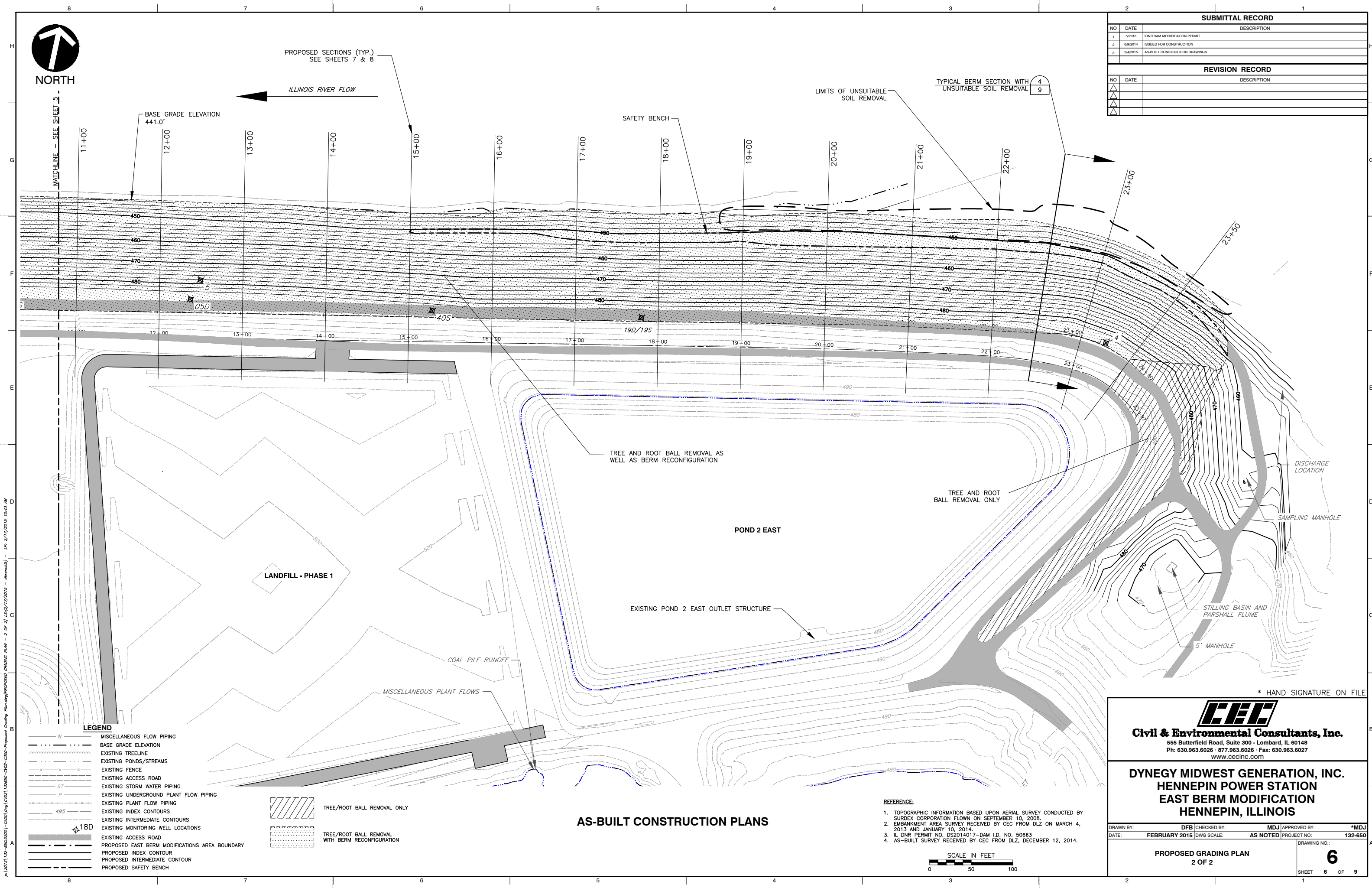
SAFETY BENCH

LIMITS OF UNSUITABLE
SOIL REMOVAL

TYPICAL BERM SECTION WITH
UNSUITABLE SOIL REMOVAL

SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1	5/2013	ISNR DAM MODIFICATION PERMIT
2	6/9/2014	ISSUED FOR CONSTRUCTION
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION

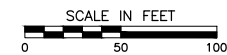


P:\2015\132-650\2015-CAD\DWG\132-650-012-CAD-C100-Proposed Grading Plan.dwg (132-650-012-CAD-C100-Proposed Grading Plan - 2 of 2) LS(2/17/2015 - abronski) - LP: 2/17/2015 10:43 AM

AS-BUILT CONSTRUCTION PLANS

REFERENCE:

1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
2. EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
3. IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
4. AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.



* HAND SIGNATURE ON FILE



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300 - Lombard, IL 60148
 Ph: 630.963.6026 - 877.963.6026 - Fax: 630.963.6027
 www.cecinc.com

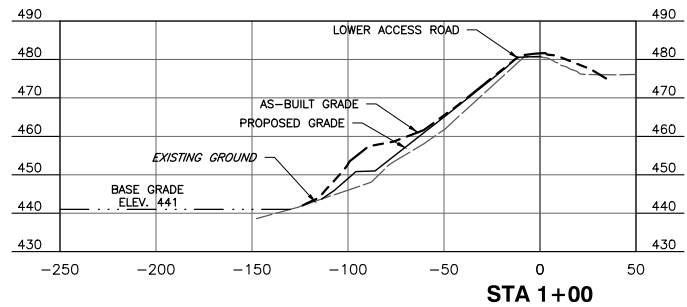
DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

DRAWN BY: DFB CHECKED BY: MDJ APPROVED BY: *MDJ
 DATE: FEBRUARY 2015 DWG SCALE: AS NOTED PROJECT NO: 132-650

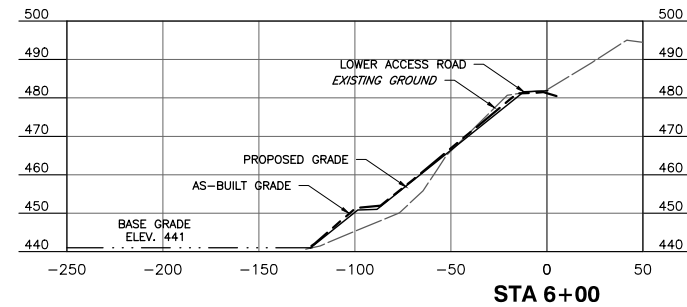
PROPOSED GRADING PLAN
2 OF 2

DRAWING NO.:
6
 SHEET 6 OF 9

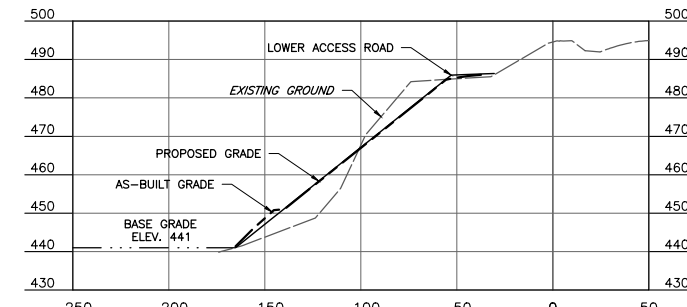
p:\2015\132-650\2015-0201-CADD\DWG\132-650-010-C100-Proposed Grading Plan.dwg (PROCESS SECTIONS (1)) LS(2/17/2015 10:43 AM) - LP: 2/17/2015 10:43 AM



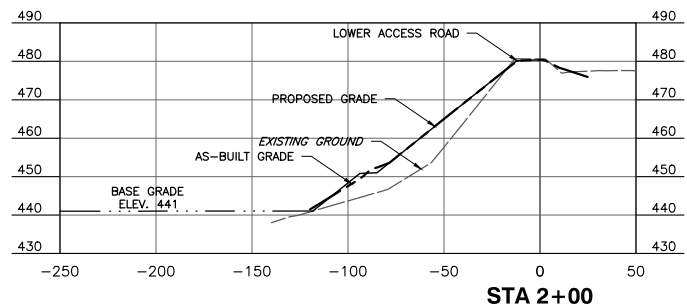
STA 1+00



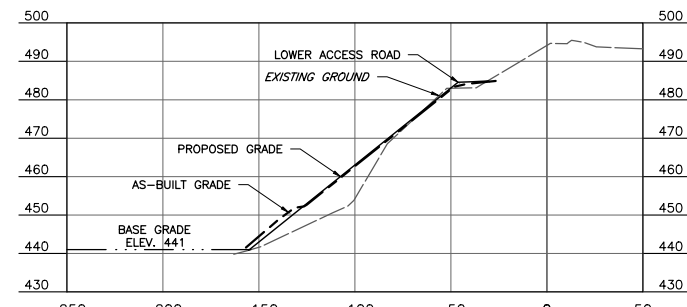
STA 6+00



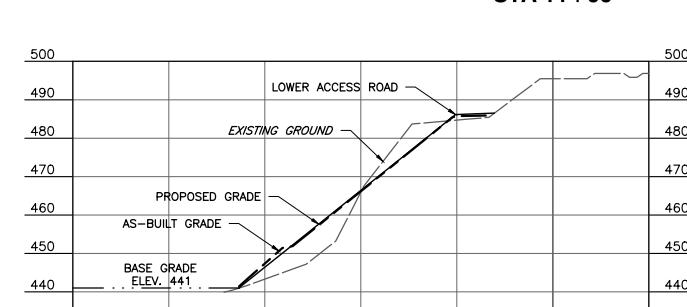
STA 11+00



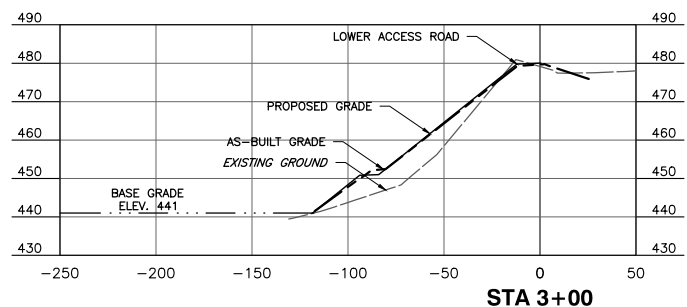
STA 2+00



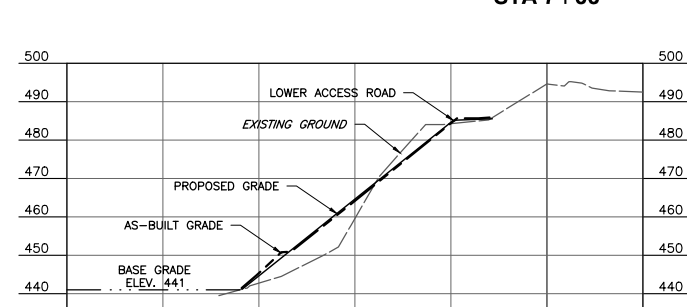
STA 7+00



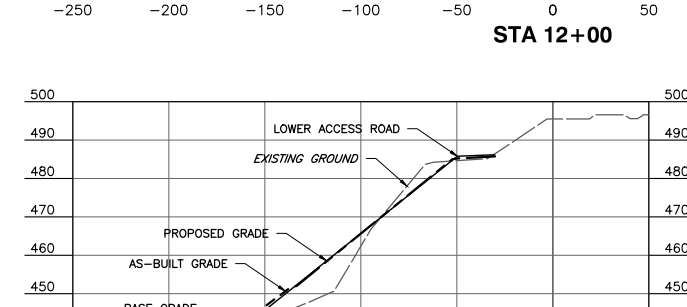
STA 12+00



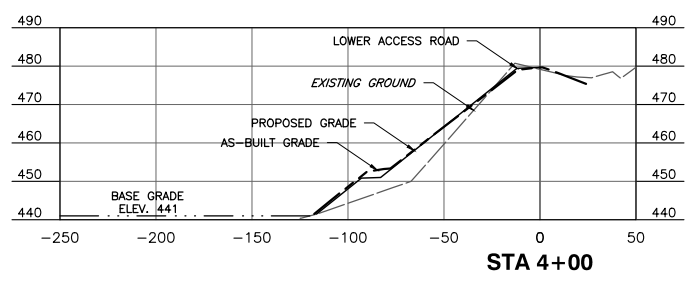
STA 3+00



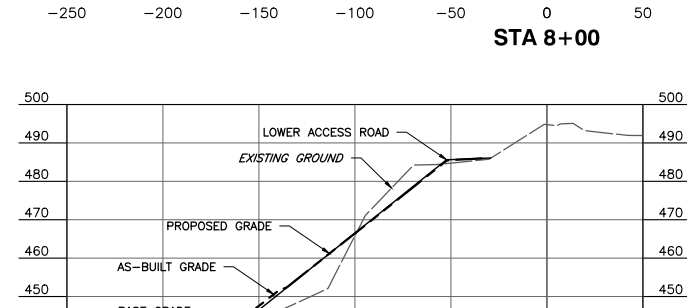
STA 8+00



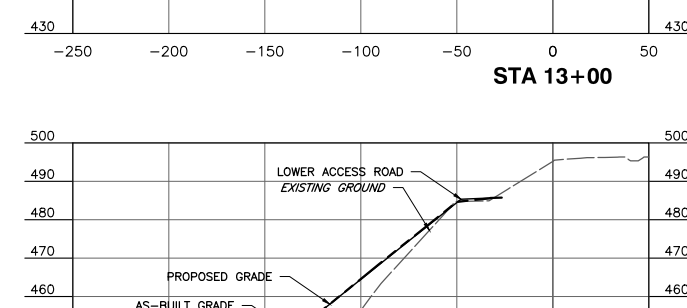
STA 13+00



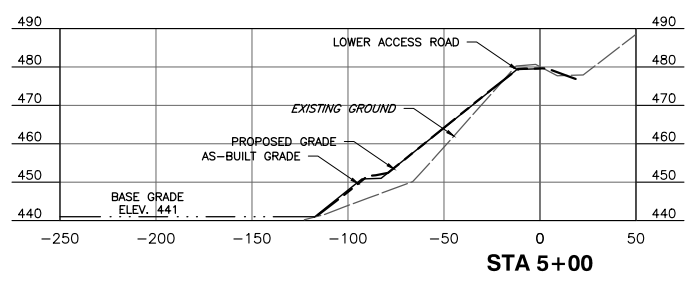
STA 4+00



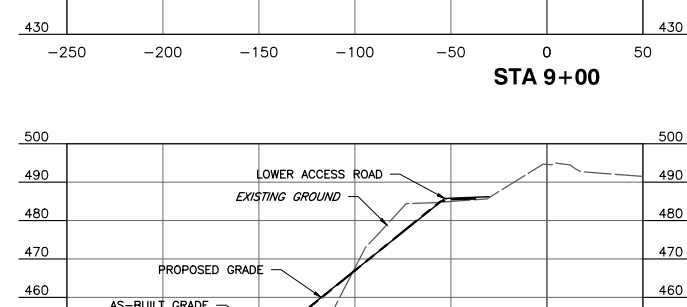
STA 9+00



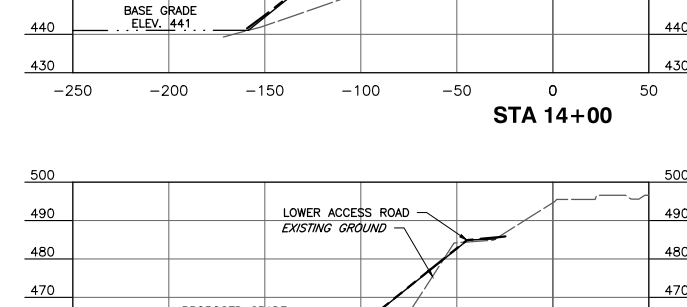
STA 14+00



STA 5+00



STA 10+00



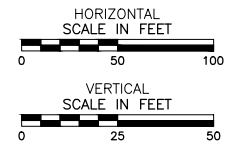
STA 15+00

SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1	5/2013	INDR DAM MODIFICATION PERMIT
2	6/9/2014	ISSUED FOR CONSTRUCTION
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION

- REFERENCE:
1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
 2. EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
 3. IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
 4. AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.

AS-BUILT CONSTRUCTION PLANS



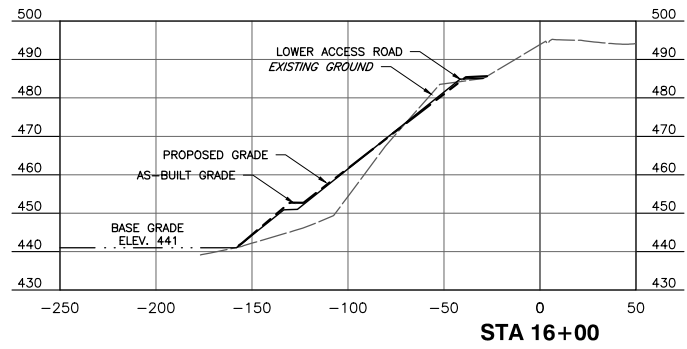
* HAND SIGNATURE ON FILE


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300 - Lombard, IL 60148
 Ph: 630.963.6026 · 877.963.6026 · Fax: 630.963.6027
 www.cecinc.com

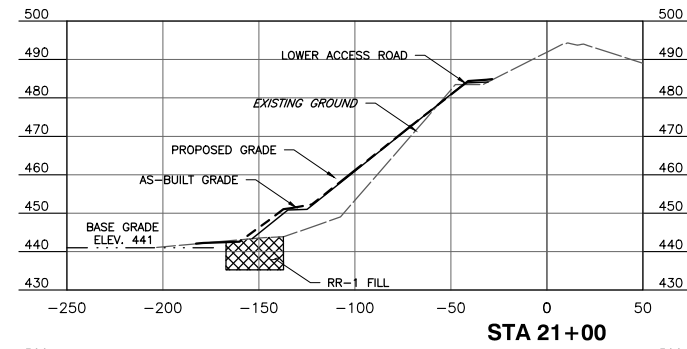
DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

DRAWN BY: DFB	CHECKED BY: MDJ	APPROVED BY: *MDJ
DATE: FEBRUARY 2015	DWG SCALE: AS NOTED	PROJECT NO: 132-650
DRAWING NO.: 7 SHEET 7 OF 9		PROPOSED SECTIONS STA 1+00 TO 15+00

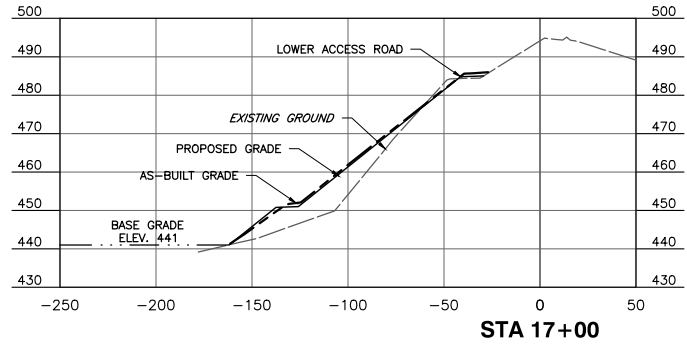
p:\13015\132-650\2015-CAD\DWG\132-650-012-C100-Proposed Grading Plan.dwg (PROCESS SECTION (2)) (LS(2/17/2015 - 10:43 AM) - LFP: 2/17/2015 10:43 AM)



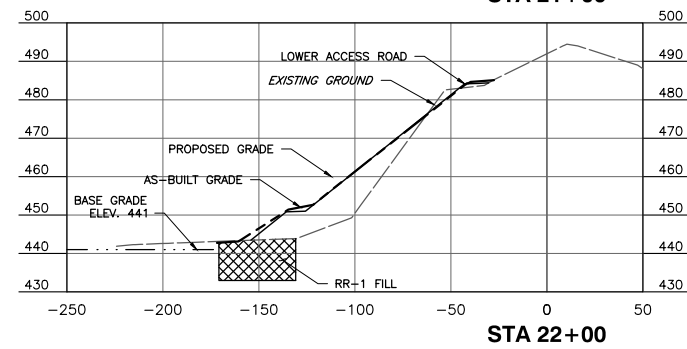
STA 16+00



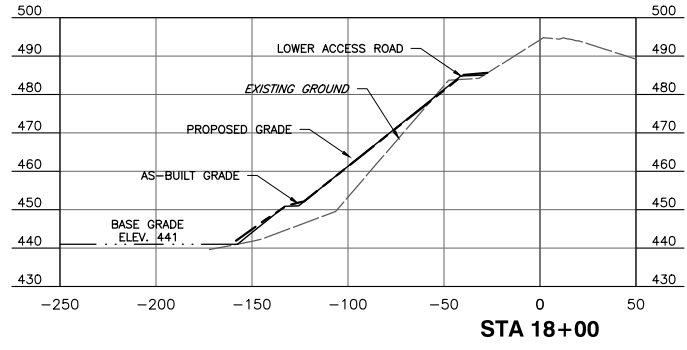
STA 21+00



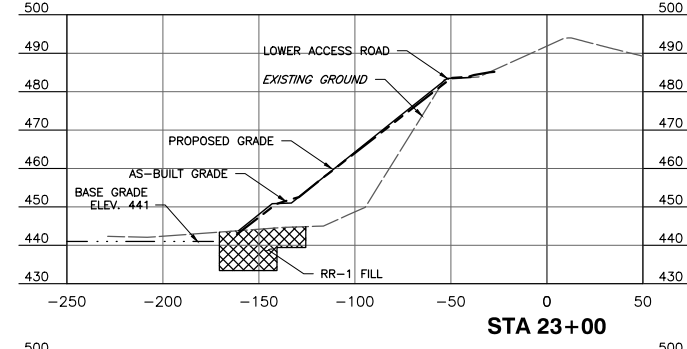
STA 17+00



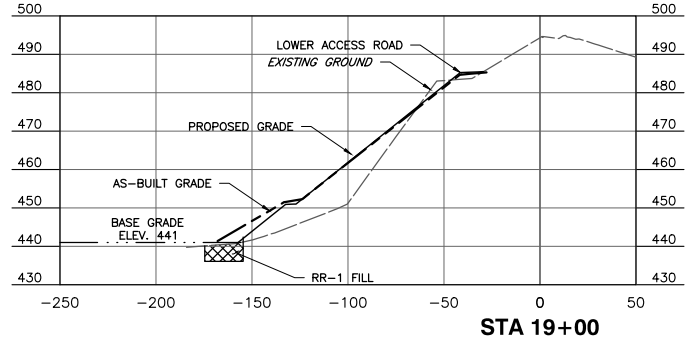
STA 22+00



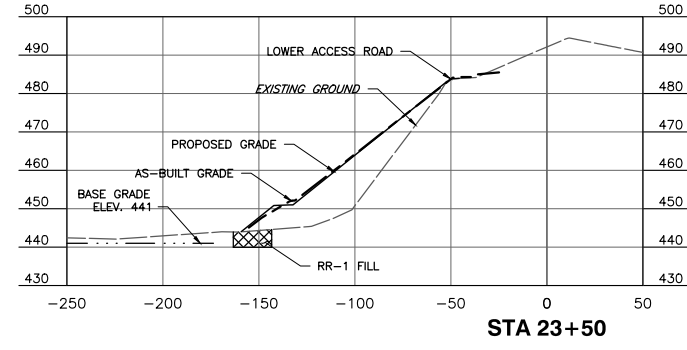
STA 18+00



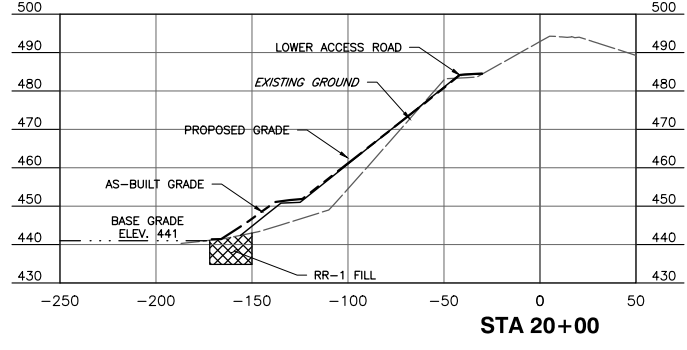
STA 23+00



STA 19+00



STA 23+50



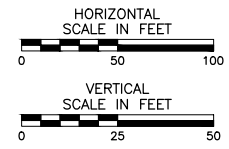
STA 20+00

SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1	5/2013	IGNR DAM MODIFICATION PERMIT
2	6/9/2014	ISSUED FOR CONSTRUCTION
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS

REVISION RECORD		
NO	DATE	DESCRIPTION

- REFERENCE:
1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
 2. EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
 3. IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
 4. AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.

AS-BUILT CONSTRUCTION PLANS



* HAND SIGNATURE ON FILE

Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300 - Lombard, IL 60148
 Ph: 630.963.6026 · 877.963.6026 · Fax: 630.963.6027
 www.cecinc.com

DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

DRAWN BY: DFB	CHECKED BY: MDJ	APPROVED BY: *MDJ	
DATE: FEBRUARY 2015	DWG SCALE: AS NOTED	PROJECT NO: 132-650	

PROPOSED SECTIONS
STA 16+00 TO 23+50

8

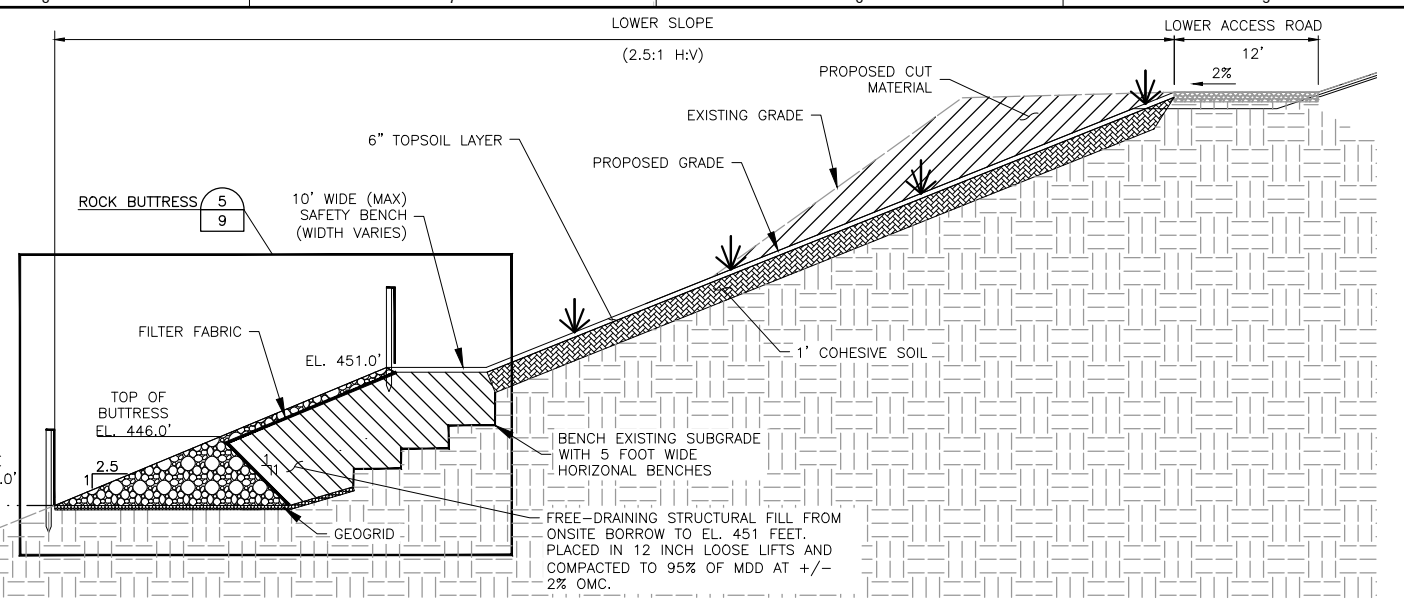
SHEET 8 OF 9

SUBMITTAL RECORD			
NO	DATE	DESCRIPTION	
1	5/2013	SDNR DAM MODIFICATION PERMIT	
2	6/9/2014	ISSUED FOR CONSTRUCTION	
3	2/4/2015	AS-BUILT CONSTRUCTION DRAWINGS	

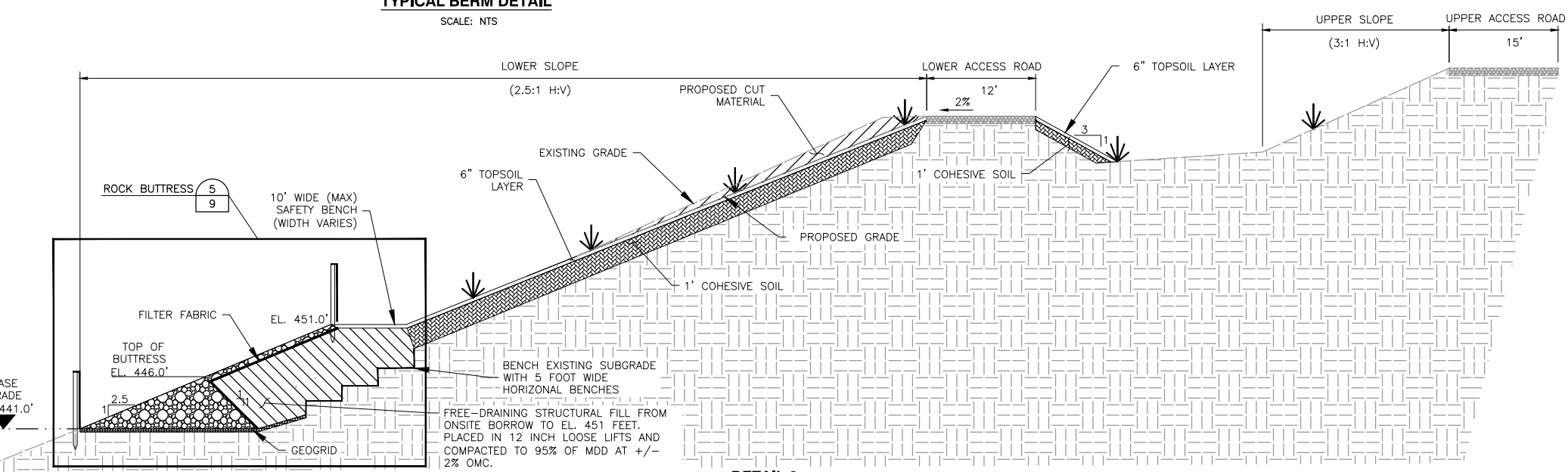
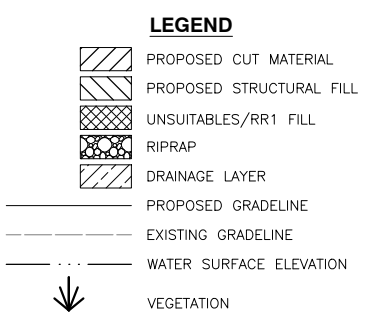
REVISION RECORD			
NO	DATE	DESCRIPTION	

REFERENCE:

1. TOPOGRAPHIC INFORMATION BASED UPON AERIAL SURVEY CONDUCTED BY SURDEX CORPORATION FLOWN ON SEPTEMBER 10, 2008.
2. EMBANKMENT AREA SURVEY RECEIVED BY CEC FROM DLZ ON MARCH 4, 2013 AND JANUARY 10, 2014.
3. IL DNR PERMIT NO. DS2014017-DAM I.D. NO. 50663
4. AS-BUILT SURVEY RECEIVED BY CEC FROM DLZ, DECEMBER 12, 2014.



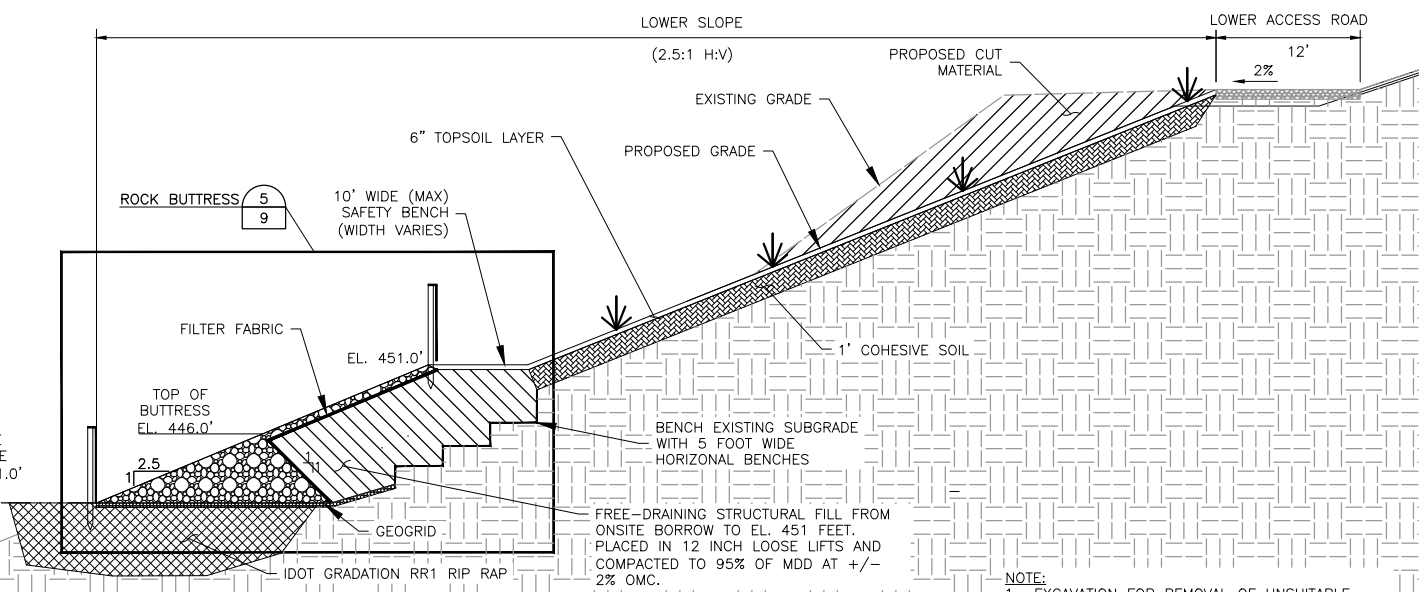
DETAIL 2
TYPICAL BERM DETAIL
SCALE: NTS



DETAIL 3
TYPICAL BERM DETAIL
SCALE: NTS

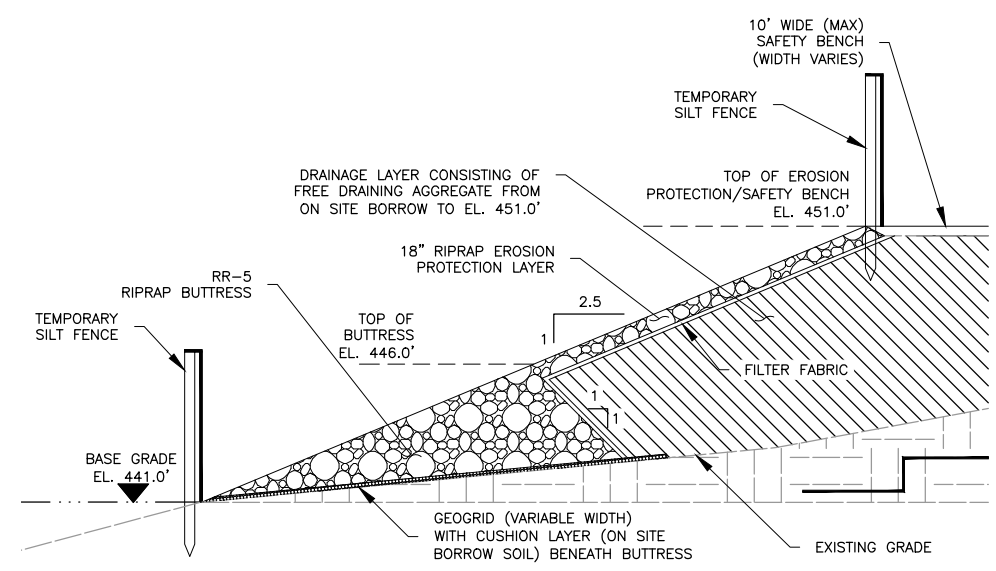
NOTE:

1. TEMPORARY SILT FENCE WAS INSTALLED PRIOR TO ROCK BUTTRESS INSTALLATION. UPON COMPLETION OF ROCK BUTTRESS, SILT FENCE WAS INSTALLED UP SLOPE OF ROCK BUTTRESS AND TEMPORARY SILT FENCE REMOVED.
2. AFTER PLACING TOPSOIL AND SEEDING, EROSION CONTROL BLANKETS WERE INSTALLED ON ALL SLOPES STEEPER THAN 3:1 FOR EROSION PROTECTION AND SEED ESTABLISHMENT. STRAW WATTLES WERE PLACED AT MID-HEIGHT OF BERM FOR ADDITIONAL EROSION PROTECTION.



DETAIL 4
TYPICAL BERM WITH UNSUITABLE SOIL REMOVAL DETAIL
SCALE: NTS

NOTE:
1. EXCAVATION FOR REMOVAL OF UNSUITABLE SOIL EXTENDED A DISTANCE OUT FROM THE TOE OF BERM EQUAL TO THE DEPTH OF EXCAVATION.



DETAIL 5
ROCK BUTTRESS AND EROSION PROTECTION LAYER DETAIL
SCALE: NTS

AS-BUILT CONSTRUCTION PLANS

* HAND SIGNATURE ON FILE



Civil & Environmental Consultants, Inc.
555 Butterfield Road, Suite 300 - Lombard, IL 60148
Ph: 630.963.6026 · 877.963.6026 · Fax: 630.963.6027
www.cecinc.com

DYNEGY MIDWEST GENERATION, INC.
HENNEPIN POWER STATION
EAST BERM MODIFICATION
HENNEPIN, ILLINOIS

DRAWN BY: DFB	CHECKED BY: MDJ	APPROVED BY: MDJ	DWG SCALE: AS NOTED	PROJECT NO: 132-650
DATE: FEBRUARY 2015				

BERM AND EROSION CONTROL DETAILS

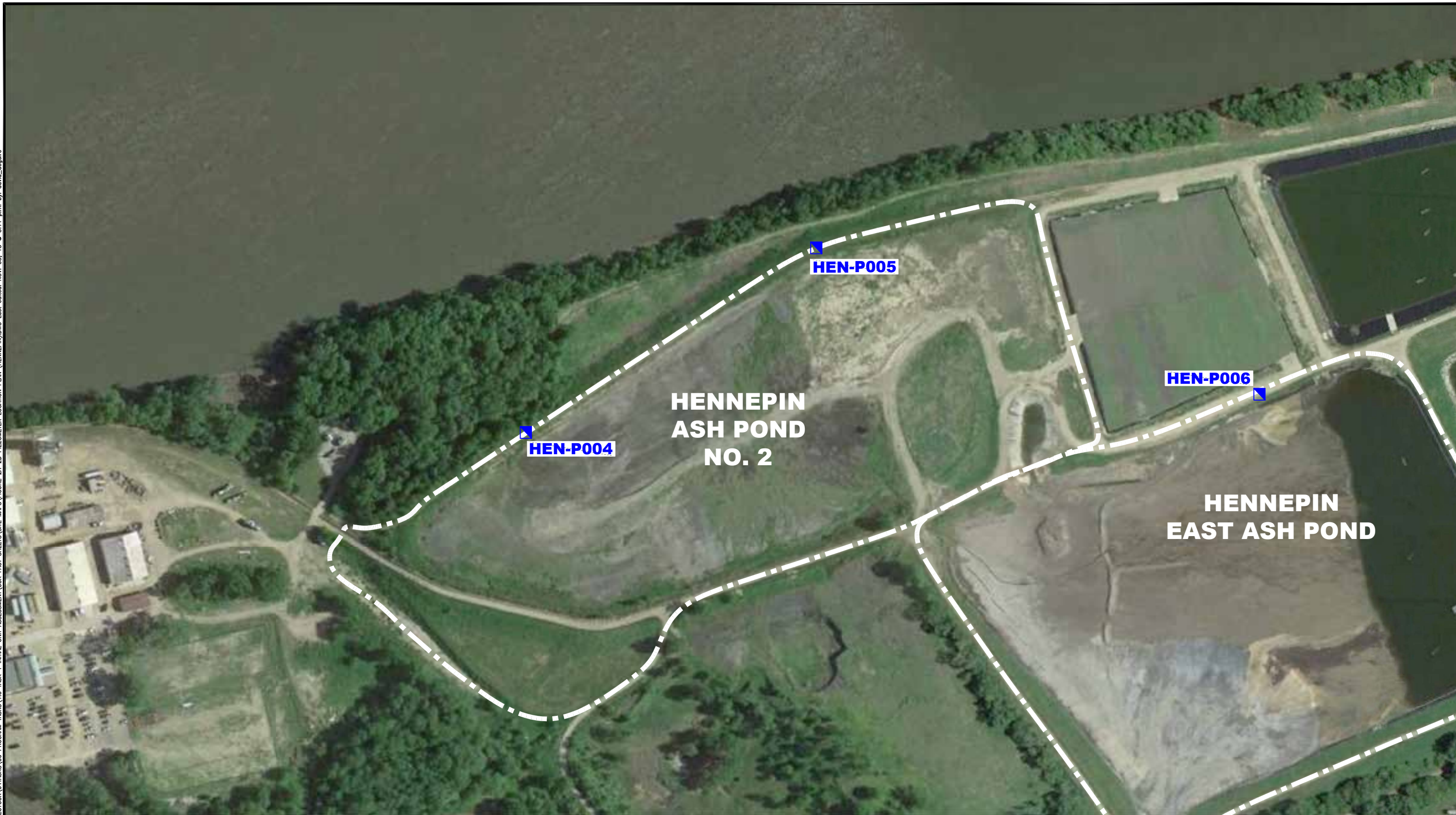
DRAWING NO.: **9**
SHEET 9 OF 9

p:\13015\132-650\2015 - CAD\DWG\132-650-0102-0102-0000-0000-0000 - Erosion Control Details.dwg (DETAILS 2X) LRS(2/17/2015 10:43 AM) - LP: 2/17/2015 10:43 AM



Appendix C: Hennepin Power Station Piezometer Locations

File: P:\PROJECTS\GEOTECH\60428794_DYNEGY\CCR\04\TASKS\00_PROGRAM_TASKS\1.0_TASK_1_INITIAL_UNIT_ASSESSMENT\CCR_FACT_SHEETS\SITE_MAPS\FIGURE_2A-2D_PIEZOMETER_LOCATION_PLAN (HENNEPIN).DWG Last edited: NOV. 03. 15 3:11 p.m. by: david_deguire



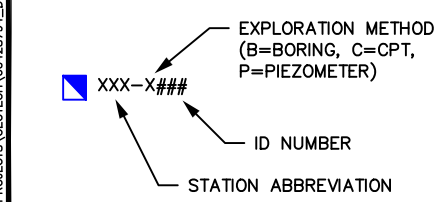
**HENNEPIN
ASH POND
NO. 2**

**HENNEPIN
EAST ASH POND**

HEN-P005

HEN-P004

HEN-P006



LEGEND
 ■ PIEZOMETER LOCATION
 - - - CCR UNIT BERM ALIGNMENT



APPROXIMATE SCALE FEET

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

DYNEGY MIDWEST GENERATION, LLC		PROJECT NO. 60439752
AECOM		
DRN. BY:djd October 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Ash Pond No. 2 Piezometer Locations	FIG. NO. 2A

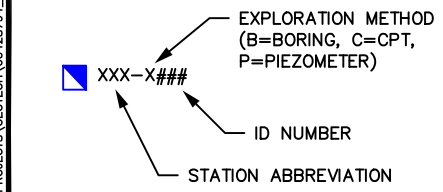
File: P:\PROJECTS\GEOTECH\60428794_DYNEGY\CCR_04\TASKS\00_PROGRAM_TASKS\1.0 TASK_1_INITIAL_UNIT_ASSESSMENT\CCR_FACT_SHEETS\SITE_MAPS\FIGURE_2A-2D_PIEZOMETER_LOCATION_PLAN (HENNEPIN).DWG Last edited: NOV. 03. 15 @ 3:11 p.m. by: david_deguire



HEN-P006

HEN-P007

**HENNEPIN
EAST ASH POND**



LEGEND

PIEZOMETER LOCATION

CCR UNIT BERM ALIGNMENT



APPROXIMATE SCALE FEET

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

DYNEGY MIDWEST GENERATION, LLC	PROJECT NO. 60439752
--------------------------------	-------------------------



DRN. BY:djd October 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin East Ash Pond Piezometer Locations	FIG. NO. 2B
--	--	----------------

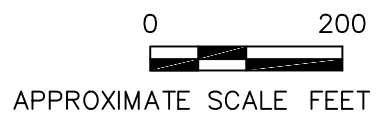
File: P:\PROJECTS\GEOTECH\60428794_DYNEGY\CCR\04\TASKS\00_PROGRAM_TASKS\1.0_TASK_1_INITIAL_UNIT_ASSESSMENT\CCR_FACT_SHEETS\SITE_MAPS\FIGURE_2A-2D_PIEZOMETER_LOCATION_PLAN (HENNEPIN).DWG Last edited: NOV. 03. 15 3:11 p.m. by: david_deguire



**HENNEPIN OLD WEST ASH POND
(POND NO. 1 AND POND NO. 3)**

XXX-X###
 ■ EXPLORATION METHOD
 (B=BORING, C=CPT,
 P=PIEZOMETER)
 ID NUMBER
 STATION ABBREVIATION

LEGEND
 ■ PIEZOMETER LOCATION
 - - - CCR UNIT BERM ALIGNMENT



SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

DYNEGY MIDWEST GENERATION, LLC		PROJECT NO. 60439752
AECOM		
DRN. BY:djd October 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Old West Ash Pond (Pond No. 1 and Pond No. 3) Piezometer Locations	FIG. NO. 2C

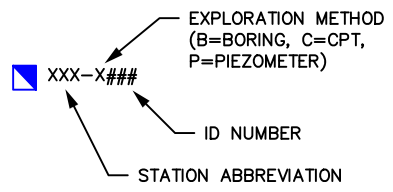
File: P:\PROJECTS\GEOTECH\60428794_DYNEGY\CCR\04\TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 2A-2D PIEZOMETER LOCATION PLAN (HENNEPIN).DWG Last edited: NOV. 03. 15 3:11 p.m. by: david_deguire



**HENNEPIN
OLD WEST
POLISHING POND**

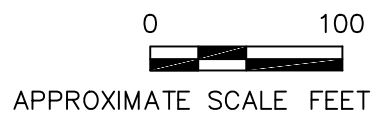
HEN-P001

HEN-P002



LEGEND

- PIEZOMETER LOCATION
- CCR UNIT BERM ALIGNMENT




SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

DYNEGY MIDWEST GENERATION, LLC		PROJECT NO. 60439752
AECOM		
DRN. BY:djd October 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Old West Polishing Pond Piezometer Locations	FIG. NO. 2D



Appendix D: Specification J-2616, Rev. A, Primary Ash Pond Modifications



Sargent & Lundy^{LLC}

**DYNEGY MIDWEST GENERATION
HENNEPIN POWER STATION**

**SPECIFICATION J-2616, REV. A
PERMIT APPLICATION**

PRIMARY ASH POND MODIFICATIONS

Prepared By:
Sargent & Lundy, LLC
55 East Monroe Street
Chicago, Illinois 60603

PRIMARY ASH POND MODIFICATIONS

ISSUE SUMMARY

Rev.	Purpose of Issue	Date	Sections Affected
A	Spec No. J-2616 Released for Permit Application	02/14/03	All



CERTIFICATION OF SPECIFICATION
FOR
PRIMARY ASH POND MODIFICATION

I certify that this Specification was prepared by me or under my supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Sargent & Lundy LLC's Illinois Department of Professional Regulation registration number is 184-000106.

Certified By: Ronald Cook Date: Feb 14, 2003



EXP. 11-30-03

Seal

Revision: _____ Certified By: _____ Date: _____

PRIMARY ASH POND MODIFICATIONS

TABLE OF CONTENTS

Notes:

- (1) Where Division and/or Sections are not included, work under the unlisted headings is not part of the Work.
- (2) This Table of Contents will indicate the date of issue for the latest complete issue or revision issue of each section and any subsequent revision issue thereto.
- (3) The numbering and subsequent Revisions to the Specification are in sequence with the previously issued Revision mark number.

<u>SECTION</u>	<u>DATE OF ISSUE</u>	<u>LATEST ISSUE/REVISION</u>
PCTC 08003 Fabric Formed Concrete Mats	02/14/03	A
PCTC 12001 Temporary and Permanent Seeding (Illinois)	02/14/03	A
PCTC 36007 Crushed Stone Surfacing for Unpaved Roads, Parking Lots, and Laydown Areas (IDOT)	02/14/03	A
PCTC 54005 Earthwork and Clay Lining for a Clay/Geomembrane Lined Ash Pond	02/14/03	A
PCTC 56008 Polypropylene Geomembrane Liner for a Pond	02/14/03	A
PCTC 57001 Geotextile for Lined Ponds	02/14/03	A
PCTC 60008 Quality Assurance for Installation of Earthwork and Clay Lining for the Ash Pond	02/14/03	A



FABRIC FORMED CONCRETE MATS

ISSUE SUMMARY

Rev.	Purpose of Issue	Date	Sections Affected	Prepared By	Reviewed By	Approved By
A	Permit Application	02/14/03	ALL	<i>Ronald Cook</i>	<i>Daniel C. Kowik</i>	<i>Ronald Cook</i>

FABRIC FORMED CONCRETE MATS

TABLE OF CONTENTS

Notes:

- (1) This Table of Contents will indicate the date of issue for the latest complete issue or revision issue of each section and any subsequent revision issue thereto.
- (2) The numbering and subsequent Revisions to the Specification are in sequence with the previously issued Revision mark number.

	Page
1.0 Scope of Work	1
1.1 Work Included	1
2.0 Codes and Standards	1
2.1 ASTM – American Society for Testing and Materials.....	1
3.0 Supplier’s Drawings and Data Submittals.....	2
3.1 Submittals Prior to Installation	2
3.2 Submittals During and After Installation	3
4.0 Construction Quality Assurance.....	3
4.1 Testing.....	4
4.1.1 Independent Testing Service	4
4.1.2 Concrete Grout Testing	4
5.0 Materials.....	5
5.1 Fabric Design.....	5
5.2 Fiber and Fabric Material	5
5.3 Fabric Assembly	7
5.4 Concrete Grout	7
5.5 Acceptable Materials.....	7
6.0 Execution.....	7

6.1	Acceptance and Storage at the Project Site	7
6.1.1	Handling of Rolls.....	7
6.1.2	Storage at the Field Site	8
6.2	Inspection upon Delivery	8
6.3	Fabric Placement.....	8
6.4	Concrete Injection.....	8

Fabric Formed Concrete Mats - Technical Specification and Optional Features/Accessories

1.0

Scope of Work

The intent of this specification is to define the material and installation requirements for fabric formed concrete mats installed in accordance with the Design Drawings, technical data and as specified herein.

1.1

Work Included

The work shall include, but not be limited to, the following items as indicated:

- A. Preparation and grading of surfaces to receive fabric mats.
- B. Placing fabric mats and filling them with a pumpable sand/cement slurry to form a stable erosion protection system.
- C. Offsite disposal of excess or unsuitable materials and debris.

2.0

Codes and Standards

- A. Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state or local codes having jurisdiction.
- B. References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of contract for the work.
- C. Abbreviations listed indicate the form used to identify the reference documents in the specification text.

2.1

ASTM – American Society for Testing and Materials

- A. ASTM C 31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- B. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- C. ASTM C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
- D. ASTM C 172 – Standard Practice for Sampling Freshly Mixed Concrete.
- E. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their contractors, subcontractors, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2000 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

- F. ASTM C 231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- G. ASTM C1064 – Standard Test Method for Temperature of Freshly Mixed Portland-Cement Concrete.
- H. ASTM D 543 – Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
- I. ASTM D 751 – Standard Test Methods for Coated Fabrics.
- J. ASTM D 792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- K. ASTM D1777 – Standard Test Method for Thickness of Textile Materials.
- L. ASTM D2101 – Standard Test Method for Tensile Properties of Single Man-Made Textile Fibers Taken From Yarns and Tows.
- M. ASTM D3776 – Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.
- N. ASTM D3786 – Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics (Mullen Burst).
- O. ASTM D3787 – Standard Test Method for Bursting Strength of Knitted Goods: Constant-Rate-of-Traverse (CRT) Ball Burst Test.
- P. ASTM D3885 – Standard Test Method for Abrasion Resistance of Textile Fabrics.
- Q. ASTM D4355 – Standard Test Methods for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
- R. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- S. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- T. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- U. ASTM D5034 – Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).
- V. ASTM D5035 – Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Strip Method).

3.0

Supplier's Drawings and Data Submittals

- A. Supplier shall submit drawings and data as specified. Supplier's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Buyer's information systems specified by the Buyer.

3.1

Submittals Prior to Installation

The Supplier shall submit the following items at least 30 days prior to scheduled delivery of materials:

- A. Manufacturer's literature providing specifications on the fabric mats that will be supplied.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their contractors, subcontractors, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2000 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

- B. Manufacturer's certification that the fabric mats to be supplied comply with the requirements of this Technical Specification.
- C. Manufacturer's Quality Control and Construction Quality Control Plans. The MQC Plan shall state the frequency that index tests are performed on the fabric mat during manufacturing.
- D. If requested by the Buyer, four samples of each fabric mat suitable for testing.
- E. Required concrete grout slurry mix design, including requirements for compressive strength, slump, air content and maximum temperature.

3.2

Submittals During and After Installation

The Supplier shall submit the following items on a daily basis during installation and a complete set of data within 30 days of the completion of the work:

- A. Results of tests performed on the concrete grout fill.

4.0

Construction Quality Assurance

- A. The Supplier shall examine the areas and conditions under which the work is to be installed and notify Buyer in writing of conditions detrimental to the proper and timely completion of the work that have changed from the time of the bidder's walkdown.
- B. Material and installation procedures are subject to inspection and tests conducted by an Independent Testing Service employed by the Buyer. Such inspections and tests will not relieve the Supplier of responsibility for providing material and installation procedures in compliance with specified requirements. The Buyer reserves the right, at any time before final acceptance, to reject material not complying with the specified requirements.
- C. The Supplier shall correct deficiencies in the work which inspections and laboratory test reports have indicated to be not in compliance with requirements. The Supplier shall perform additional tests, at his expense, as may be necessary to reconfirm any noncompliance of the original work, and as may be necessary to show compliance of corrected work.
- D. The Supplier shall promptly correct errors or flaws in material or placement of the protection mats identified during construction. The Supplier shall make immediate substitution of non-complying component or make field changes to make the non-complying component acceptable. Whether the correction is made by substitution or field correction, it shall be performed without cost to the Buyer.

4.1 Testing

4.1.1 Independent Testing Service

An Independent Testing Service shall perform the following:

- A. Test material for the concrete slurry fill and prepare initial test cylinders in accordance with the requirements specified herein.
- B. Prepare test cylinders and determine the compressive strength of job concrete fill test cylinders.

4.1.2 Concrete Grout Testing

- A. Obtaining and testing concrete grout shall be by the Independent Testing Service in accordance with the following specifications:
 - Sampling freshly mixed grout shall be done in accordance with ASTM C172.
 - Making and curing concrete test specimens shall be in accordance with ASTM C31.
 - Slump test shall be in accordance with ASTM C143.
 - Air Content tests shall be in accordance with ASTM C173 or ASTM C231.
 - Tests for the temperature of the freshly mixed grout shall be in accordance with ASTM C1064.
 - Compressive strength test shall be in accordance with ASTM C39.
- B. The frequency of testing shall be as directed by Buyer as follows:
 - At least one test shall be made for each day's placement of grout, but not less than once for each 100 cubic yards or part thereof placed.
 - A test shall consist of a minimum of four cylinders taken from the same truck. One 7-day and two 28-day tests shall be performed by the laboratory with results submitted to the Buyer as soon as possible. One spare cylinder shall be made and used as directed by the Buyer.
 - A slump test and air content test shall be performed on every 100 cubic yards of concrete grout.
 - The temperature of each 100 cubic yards shall be recorded in the field prior to placement. If the concrete grout temperature is in excess of 100°F, the concrete shall be rejected.

5.0 Materials

5.1 Fabric Design

- A. Fabric-forming material shall consist of double-layer, open-selvage fabric joined in a mat configuration. The fabric shall be woven of 100% continuous multi-filament nylon fiber of which 50% by weight shall be bulk textured fiber. The use of staple yarns will not be permitted.
- B. The fabric shall be woven in such a manner as to provide interwoven points of attachment on spaced centers. These points of attachment shall serve to control the thickness of the finished product and to also act as a filter point to provide relief of hydrostatic uplift pressure beneath the completed revetment. The fabric shall be woven in a basket or other open pattern to provide permeability at the filter points and the main fabric field.
- C. The spacing of the filter points is indicated on the Design Drawings. This spacing will result in an average revetment thickness that is consistent with the average thickness published by the manufacturer for the designated style specified.

5.2 Fiber and Fabric Material

- A. The warp fiber shall be 1260 Denier Nylon, 18.5 ends/inch per single layer and the fill fiber shall be 1900 Denier Nylon, 14 picks/inch per single layer. The fiber and fabric material shall meet the minimum requirements listed in Table 1.

TABLE 1
MATERIAL PROPERTIES

PROPERTY	ASTM TEST METHOD	MINIMUM TEST VALUE
Fiber count	-	0.164 g/m
Trapezoidal tear breaking force on the warp fiber at 70% elongation	D 4533	80 lbs/in
Trapezoidal tear breaking force on the fill fiber at 70% elongation	D 4533	40 lbs/in
Density	D 792	1.00 g/cm ³
Fiber dry breaking strength at 48% elongation	D 2101	20 lbs
Fiber wet breaking strength at 53% elongation (soaked in water for 2 hours)	D 2101	19 lbs
Tensile strength in the warp direction after exposure to 300 hours of Ca (OH) at a pH of 10	D 543	180 lbs/in
Tensile strength in the warp direction after exposure to 300 hours of H ₂ SO ₄	D 543	170 lbs/in
Tensile breaking strength in the warp direction on a strip of the fabric at 39% elongation ⁽¹⁾	D 5034, D 5035	160 lbs/in
Tensile breaking strength in the fill direction on a strip of the fabric at 34% elongation ⁽¹⁾	D 5034, D 5035	190 lbs/in
Mass/unit area for a single layer of fabric	D 3776	7.8 oz/sq yd
Thickness of a single layer of fabric	D 1777	31 mils
Falling head permittivity of two layers of fabric woven together	D 4491	0.28 s ⁻¹ 0.04 cm/s ⁽³⁾
Falling head permittivity of a single layer of fabric	D 4491	1.3 s ⁻¹ 0.12 cm/s
Seam strength ⁽²⁾	D 751	35 lbs/in
Abrasion resistance in the warp direction	D 3885	160 lbs/in
Grab strength in the warp direction at 31% elongation	D 4632	350 lbs
Grab strength in the fill direction at 41% elongation	D 4632	275 lbs
Breaking strength in the warp direction after exposure to 500 hours of UV light	D 4355	190 lbs/in
Mullen burst test	D 3786	750 psi
Puncture test	D 3787	80 lbs

Notes for Table 1:

- (1) 3" x 8" sample gripped along full width of the specimen with 3" of separation between grips. Strip test to be performed on single layer of fabric at cross-head speed of 5 inches per minute.
- (2) Seam centered between grips 3" apart and gripped the full width of the specimen.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their contractors, subcontractors, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2000 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

- (3) Applies to Filter Points only

5.3

Fabric Assembly

- A. Adjacent fabric panels shall be connected by sewing or by means of zipper.
- B. The two top layers of fabric and the two bottom layers of fabric shall be joined separately permitting full mat thickness between the two parallel seams. A single seam in which all four layers of the fabric are joined at one point will not be permitted.
- C. If required, grout stops may be installed parallel to and in between individual mill widths at predetermined intervals to regulate the flow of the concrete fill. Grout stops shall be so designed as to produce full mat thickness along the full length of the grout stop.

5.4

Concrete Grout

- A. The concrete grout shall consist of a mixture of Portland cement, fine aggregate and water so proportioned and mixed as to provide a readily pumpable slurry.
- B. Admixtures and/or a pozzolan may be used with the approval of the Buyer. The use of superplasticizers and/or silica fume require special precautions and the approval of the Buyer.
- C. The hardened concrete shall exhibit a minimum compressive strength of 2,500 psi at 28 days when specimens are made and tested in accordance with the provisions of ASTM C 31 and ASTM C 39.

5.5

Acceptable Materials

The following companies manufacture products that meet the requirements of the specification:

- A. Fabriform Filter Point Fabric as manufactured by Construction Techniques, Inc., Cleveland, Ohio, 440-572-8300.
- B. Other approved by Buyer.

6.0

Execution

6.1

Acceptance and Storage at the Project Site

6.1.1

Handling of Rolls

- A. The method of off-loading the fabric at the project site shall not cause any damage to the fabric, its core, nor its protective covering.
- B. Any protective covering that is accidentally damaged or stripped off of a pallet or roll shall be immediately repaired or the pallet or roll shall be moved to an enclosed facility until the repair can be made.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their contractors, subcontractors, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2000 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

6.1.2

Storage at the Field Site

- A. The Buyer shall provide on-site storage space in a location near where the fabric will be placed such that on-site transportation and handling are minimized. The Supplier shall be responsible for protecting the stored material from theft and vandalism.
- B. Rolls or pallets of fabric shall be stored in such a manner that cores are not crushed, the fabric damaged, and as required to provide protection from exposure to ultraviolet light, inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious condition.
- C. Outdoor storage of rolls or pallets shall not exceed the manufacturer's recommendations or longer than six months, whichever is less.

6.2

Inspection upon Delivery

- A. Upon delivery of the materials to the site, the Supplier shall conduct a visual inspection of all rolls of fabric for damage or defects. This inspection shall be done without unrolling any rolls unless damage to the inside of a roll is found or suspected.
- B. Any damage or defects shall be noted and immediately reported to the Buyer, the manufacturer and the carrier that transported the material. Any roll, or portion thereof, which, in the judgement of the Buyer, is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Buyer.

6.3

Fabric Placement

- A. Prior to concrete injection, the fabric shall be positioned over a geotextile on the grade as indicated on the Design Drawings making appropriate allowances for contraction of the fabric mats as a result of injecting the concrete grout.
- B. Anchoring of fabric shall be as shown on the Design Drawings.
- C. Fabric panels may be factory assembled in predetermined sizes and joined together side-by-side at the project site by field sewing or by means of zipper closures attached to the upper and lower layers of the fabric. In no case will simple unattached butt joints between panels be allowed. Overlapping shall be allowed only if approved by the Buyer.

6.4

Concrete Injection

- A. Following placement of the fabric mats the specified concrete grout shall be injected between the top and bottom layers of the fabric through small slits cut in the upper layer of the fabric. The injection pipe shall be wrapped tightly at the point of injection with a strip of burlap, or similar material, during pumping to seal the joint between the injection pipe and the slit. After pumping, the burlap shall be pushed into the slit as the injection pipe is withdrawn in order to minimize spillage of the concrete slurry onto the surface of the revetment.

- B. The sequence of concrete slurry injection shall be such as to insure complete filling of the revetment-forming fabric to average thickness indicated by the manufacturer for the designated style specified on the Design Drawings.
- C. Foot traffic will not be permitted on the freshly pumped mat since such traffic will cause permanent indentations in the mat surface. Walk boards shall be used where necessary.
- D. Excess concrete slurry which has been inadvertently spilled on the mat surface shall be cleaned up with a broom and shovel. The use of a water hose to remove spillage from the surface of a freshly pumped mat will not be permitted.
- E. During concrete slurry injection, the mat thickness shall be measured by inserting a short piece of stiff wire through the crowns of the mats midway between the filter points at several locations from the crest to the toe of the slope. Any mat measurements less than 90% of the average of all thickness measurements shall be re-injected until the average thickness indicated for the style specified has been attained.

TEMPORARY AND PERMANENT SEEDING (ILLINOIS)

ISSUE SUMMARY

Rev.	Purpose of Issue	Date	Sections Affected	Prepared By	Reviewed By	Approved By
A	Permit Application	02/14/03	ALL	<i>Ronald Cook</i>	<i>Daniel C. Frank</i>	<i>Ronald Cook</i>

TEMPORARY AND PERMANENT SEEDING (ILLINOIS)

TABLE OF CONTENTS

Notes:

- (1) This Table of Contents will indicate the date of issue for the latest complete issue or revision issue of each section and any subsequent revision issue thereto.
- (2) The numbering and subsequent Revisions to the Specification are in sequence with the previously issued Revision mark number.

	Page
1.0 Scope of Work.....	1
1.1 Purpose and Use	1
1.2 Method of Seed and Mulch Application	1
1.3 Work Included	1
2.0 Codes and Standards.....	2
2.1 USDA-United States Department of Agriculture, Soil Conservation Service ..	2
2.2 ASTM-American Society for Testing and Materials.....	2
3.0 Supplier's Drawings and Data Submittals	2
3.1 Topsoil	2
3.2 Seed	3
3.3 Data on Materials as Applied	3
3.4 Binder Spray.....	3
3.5 Matting.....	3
3.6 Samples.....	3
4.0 Products	4
4.1 Top Soil.....	4
4.2 Seed	4
4.2.1 General Requirements.....	4

4.2.2	Seed Storage.....	5
4.2.3	Seed Mixture	5
4.3	Lime (Agricultural Ground Limestone).....	8
4.4	Fertilizer.....	8
4.5	Mulch.....	8
4.5.1	Straw Mulch.....	8
4.5.2	Wood Cellulose Fiber Mulch.....	8
4.5.3	Binder Sprays.....	9
4.6	Tackifier (Synthetic Binder).....	9
4.7	Inoculant	9
4.8	Matting for Erosion Control.....	9
5.0	Execution	10
5.1	Site Preparation	10
5.2	Limestone for pH Adjustment.....	10
5.3	Fertilizer.....	10
5.4	Tilling of Subsoil.....	10
5.5	Placing Topsoil.....	11
5.6	Seeding (Conventional Method).....	11
5.7	Mulching (Conventional Method).....	11
5.7.1	Straw Mulching.....	11
5.7.2	Anchoring Mulch Using a Mulch Anchoring Tool.....	12
5.7.3	Anchoring Mulch Using a Sprayed Liquid Binder.....	12
5.7.4	Repairing and Reseeding	12
5.8	Hydro seeding	13
5.9	Laying and Securing Matting.....	13
5.9.1	Laying and Securing Jute Matting.....	13

5.9.2	Laying and Securing Excelsior Matting	14
5.10	Construction Completed after Acceptable Seeding Dates	14
6.0	Protection	14
7.0	Maintenance	14

Temporary and Permanent Seeding (Illinois) – Technical Specification and Optional Features/Accessories

1.0 Scope of Work

The intent of this specification is to define the minimum requirements for material and work for establishing a vegetative cover by planting grass seed.

1.1 Purpose and Use

- A. All graded areas, slopes, and ditches which will not be paved or otherwise surfaced shall be provided with permanent seeding.
- B. Graded areas subject to erosion shall not remain unprotected for longer than 30 days. Temporary seeding shall be provided by the Supplier to protect graded areas from erosion where permanent protection is not scheduled to be installed for 2 to 12 months after grading is completed.

1.2 Method of Seed and Mulch Application

Seed may be spread by a conventional method of application such as broadcasting, grass drill, or cultipacker followed by an application of mulch or by a hydro seeding procedure consisting of spraying a slurry mixture of water, seed, mulch, fertilizer, and tackifier onto the prepared seedbed.

1.3 Work Included

- A. Furnish all materials.
- B. Subgrade preparation.
- C. Seedbed preparation, including placing topsoil and the addition of lime and fertilizer.
- D. Seeding using broadcast, grass drill, or the cultipacker method and mulching, or hydro seeding with a mixture that contains seed, mulch and a tackifier.
- E. Installation of matting where specified for erosion control.
- F. Protection.
- G. Maintenance.
- H. Repairing and reseeded.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

2.0

Codes and Standards

- A. Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state or local codes having jurisdiction.
- B. References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.
- C. Abbreviations listed indicate the form used to identify the reference documents in the Specification text.

2.1

USDA - United States Department of Agriculture, Soil Conservation Service

- A. USDA-SCS Soil Classification - Supplement to Soil Classification System (7th Approximation), SCS, USDA, Second Printing, March 1967.

2.2

ASTM - American Society for Testing and Materials

- A. C602 - Specification for Agricultural Liming Materials.
- B. D977 - Specification for Emulsified Asphalt.
- C. D2026 - Specification for Cutback Asphalt (Slow-Curing Type).
- D. D2027 - Specification for Cutback Asphalt (Medium-Curing Type).
- E. D2028 - Specification for Cutback Asphalt (Rapid-Curing Type).
- F. D2397 - Specification for Cationic Emulsified Asphalt.
- G. D5268 - Specification for Topsoil Used for Landscaping Purposes.

3.0

Supplier's Drawings and Data Submittals

Supplier shall submit drawings and data not less than 30 days before material is to be delivered. Supplier's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Buyer's information systems specified by the Buyer.

3.1

Topsoil

- A. Topsoil Material:
 - A copy of laboratory reports on two representative samples of topsoil. Laboratory tests shall be performed for:
 - Percent deleterious material.
 - Total organic content.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

- Silt and clay contents.
- Sand content.
- pH.

B. If it is anticipated that topsoil stripped from either the present site or the borrow area will be used for permanent seeding, if requested by the Buyer, the Supplier shall provide two 50-pound samples to the Buyer's Testing Service for analyses.

3.2

Seed

- A. A certified copy of a statement signed by the seed supplier that each lot of seed has been tested by a recognized seed-testing laboratory within six months before the date of delivery to the plant site.
- B. A certified statement signed by the seed supplier that the maximum percentage of noxious weeds in the seed mixture complies with state law.

3.3

Data on Materials as Applied

As applied data on the following items:

- A. Seed mixture and seed application rate.
- B. Limestone application rate.
- C. Fertilizer type, trademark name (if any), chemical composition, and application rate.
- D. Mulch.
- E. Tackifier.

3.4

Binder Spray

Data on the binder spray (tackifier) to be used on straw mulch or with hydro seeding. If a synthetic binder (tackifier) will be used, the Supplier shall provide a complete set of Manufacturer's specifications at least 30 days prior to anticipated use. Manufacturer's specifications shall contain a description of the binder material, the recommended method of application, and the recommended application rate.

3.5

Matting

Catalog data on the proposed erosion control matting and Manufacturer's literature on the recommended method of installation.

3.6

Samples

If requested by the Buyer, submit a sample of each material designated by the Buyer for laboratory testing.

4.0 Products

4.1 Topsoil

- A. Topsoil shall consist of sandy clay loam, sandy loam, loam, clay loam, silty clay loam or silt loam as defined by the SCS Soil Classification System.
- B. Topsoil shall be relatively free from large roots, sticks, weeds, brush or stones larger than 1 inch in diameter or other litter and waste products. It shall have at least 90 percent passing the No. 10 sieve.
- C. The topsoil shall meet requirements of ASTM D5268 as follows:
- It shall contain not less than 2 percent nor more than 20 percent total organic matter.
 - It shall contain not less than 35 percent nor more than 70 percent silt and clay.
 - It shall contain not less than 20 percent nor more than 60 percent sand.
 - The pH of the sample shall not be lower than 5.0 nor higher than 7.5.
 - The percent deleterious material (rock, gravel, slag, cinder, roots, sod) shall not exceed 5 percent.

4.2 Seed

4.2.1 General Requirements

- A. Grasses, legumes, or cover crop seed of the type specified herein shall conform to the standards of the United States Department of Agriculture for seed certification.
- B. Seed or seeding mixtures shall be furnished in sealed bags or containers in accordance with standard commercial practice.
- C. Each bag or container shall be tagged or labeled in accordance with state law. As a minimum, the tag or label shall provide the following information:
- Name and address of the supplier.
 - Common name of seed.
 - Lot number.
 - Net weight.
 - Guaranteed percentage of germination.
 - Percentage of weed seed and inert material content.
- D. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.
- E. All seed furnished shall be free of primary noxious weed seed such as Russian or Canadian Thistle, European Birdweed, Johnson Grass and Leafy Spurge. The maximum allowable percentage of noxious weed seed in the seed mixture shall comply with state law.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

4.2.2

Seed Storage

If it is necessary to store seeds after their arrival on the site, they shall be stored in an approved weatherproof building in such a manner as to protect the seeds from deterioration and to permit easy access for inspection. The Buyer's approval for the storage building and the method of storage shall not relieve the Supplier of responsibility for the quality and fitness of the seeds at the time of their use.

4.2.3

Seed Mixture

- A. Seed species, rate per acre, and other data relevant to permanent seeding are given in Table 1.
- B. Seed species, rate per acre, and other data relevant to temporary seeding are given in Table 2.

TABLE I
 ACCEPTABLE MIXTURES FOR PERMANENT SEEDING

Mixture	Seed Species (1)	Seeding Rate, Pure Live Seed for Conventional Seed Application (2)		Suitable pH	Site Suitability			Acceptable Dates for Seeding
		Lbs. per acre	Lbs. per 1,000 sq. ft.		Sunny, Dry	Well Drained	Wet	
1	Smooth Bromegrass or Tall Fescue Alfalfa or Birdsfoot Trefoil	30	0.75	6.0-7.5	X	X	X	4-1 to 6-1 8-1 to 9-1
		10	0.25					
		30	0.75					
2	Smooth Bromegrass or Tall Fescue Crown Vetch	20	0.50	6.0-8.0	X	X	X	4-1 to 6-1 8-1 to 9-1
		15	0.35					
		3	0.07					
3	Timothy or Redtop Birdsfoot Trefoil	15	0.35	5.5-7.5	X	X	X	4-1 to 6-1 8-1 to 9-1
		15	0.35					
		15	0.35					
4	Reed Canary Grass Smooth Bromegrass or Tall Fescue Ladino (optional)	3	0.07	5.5-7.5	X	X	X	4-1 to 6-1 8-1 to 9-1

Notes: (1) Mixtures as defined by SCS for Illinois.

(2) Triple the seeding rate shown in the table when hydro seeding.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

TABLE 2
 ACCEPTABLE MIXTURES FOR TEMPORARY SEEDING

MIXTURE	SEED SPECIES	MAXIMUM WEED SEED (percentage)	SEEDING RATE PER ACRE	SUITABLE pH	PLANTING DEPTH	ACCEPTABLE DATES FOR SEEDING
1	Wheat	0.50	150 lbs	5.5 to 7.0	1" to 1 1/2"	3-1 to 5-15 7-1 to 10-15
2	Cereal Rye	0.50	150 lbs	5.5 to 7.0	1" to 1 1/2"	3-1 to 5-15 7-1 to 10-15
3	Spring Oats	0.50	100 lbs	5.5 to 7.0	1"	3-1 to 7-1
4	Perennial Ryegrass	0.50	40 lbs	5.0 to 7.5	1/4"	4-1 to 6-1 8-1 to 9-15

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

4.3

Lime (Agricultural Ground Limestone)

Agricultural lime shall be flour grade meeting the requirements of ASTM C602.

4.4

Fertilizer

- A. Fertilizer shall be a standard brand commercial grade of inorganic fertilizer furnished in unopened containers. The material may be separate or in a mixture containing the percentage of total nitrogen, available phosphoric acid and water-soluble potash in the amounts specified. If materials are separate, the Buyer shall be present when the separate fertilizers are mixed in the field. The fertilizer shall be odor free.
- B. Fertilizer shall be supplied in one of the following forms:
- A dry free-flowing granular fertilizer suitable for application by an agricultural fertilizer spreader.
 - A soluble form that will permit complete suspension of insoluble particles in water, suitable for application by power sprayer.
- C. The following information shall be shown on the fertilizer container or on a tag attached thereto:
- Name and address of manufacturer.
 - Name, brand or trademark.
 - Number of net pounds of ready-mixed material in the package.
 - Chemical composition or analysis.
 - Guarantee of analysis.

4.5

Mulch

4.5.1

Straw Mulch

- A. Straw shall be stalks of small grain straw of wheat, rye, oats, barley or other approved grain. Straw shall be air dried and free of grain and noxious weed seed, other materials detrimental to plant life, and mold.
- B. Straw shall be seasoned before baling or loading. Straw mulch shall be suitable for spreading with mulch blower equipment.
- C. Old dry straw which breaks up in the crimping process instead of bending, or straw in such advanced stages of decomposition that it will smother or retard the normal growth of grass, is not acceptable.

4.5.2

Wood Cellulose Fiber Mulch

- A. Wood cellulose fiber shall be partly digested wood fibers.
- B. The material shall be dyed green.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

- C. The material shall not contain growth or organism inhibiting agents.
- D. The material shall be air-dried with a minimum of 30 percent of the fibers 3.7 mm (0.145 inch) or longer.

4.5.3

Binder Sprays

- A. Cutback Asphalt shall be in accordance with ASTM D2026 (Slow-Curing Type), ASTM D2027 (Medium-Curing Type) or ASTM D2028 (Rapid-Curing Type).
- B. Emulsified Asphalt shall be in accordance with D977 (Emulsified Asphalt) or D2397 (Cationic Emulsified Asphalt).

4.6

Tackifier (Synthetic Binder)

- A. Tackifier material shall be an acrylic copolymer or a polyvinyl acetate emulsion in a liquid form. The material may contain additives to enhance its ability to penetrate the soil.
- B. The material shall be non-toxic, non-flammable, and biodegradable.
- C. Approved Materials:
 - Soil Seal Concentrate manufactured by Soil Seal Corp., 1111 W. Sixth St., Los Angeles, California 90017, telephone number 213-481-7185.
 - Reinco Mulch Binder and Terra Tac manufactured by Rienco Mulch Binder Corp., 520 North Avenue, Plainfield, New Jersey 07060, telephone number 1-800-526-7687.
 - Aerospray 70 Binder manufactured by American Cyanamid Company, Mobile, Alabama 36601, telephone number 205-476-5800.

4.7

Inoculant

- A. The inoculant for treating legume seeds shall be a pure culture of nitrogen fixing bacteria prepared specifically for the species and shall not be used later than the date indicated on the container. A mixing medium, as recommended by the manufacturer, shall be used to bond the inoculant to the seed.
- B. All legumes not pre-inoculated shall be inoculated within 12 hours of seeding. If the seed was pre-inoculated more than 60 days prior to seeding then it must be reinoculated.

4.8

Matting for Erosion Control

- A. Matting for erosion control may be one of the following unless a specific matting is specified on the Design Drawings.
 - Jute mat shall be cloth of a uniform plain weave of undyed and unbleached single jute yarn, 48 inches in width, plus or minus 1 inch and weighing an average of 1.2 pounds per linear yard of cloth with a tolerance of plus or minus 5 percent, with approximately 78 warp ends per width of cloth and 41 weft ends per linear yard of cloth. The yarn shall be

- of a loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than one-half its nominal diameter.
- Excelsior mat shall be wood excelsior, 48 inches in width plus or minus 1 inch and weighing 0.8 pounds per square yard plus or minus 10 percent. The excelsior material shall be covered with a netting to facilitate handling and to increase strength.
 - Glass fiber matting of bonded textile glass fibers with an average fiber diameter of 8 to 12 microns, 2 to 4 inch strands of fiber bonded with phenol formaldehyde resin. Mat shall be roll type, water permeable, minimum thickness 1/4 inch, maximum thickness 1/2 inch, density not less than 3 pounds per cubic foot.
- B. Staples for anchoring soil stabilizing materials shall be No. 11 gauge wire or heavier. Their length shall be 6 to 10 inches. Ten inch long staples shall be used on loose, unstable soils.

5.0

Execution

5.1

Site Preparation

- A. Prior to seeding, install all erosion control facilities specified on the Design Drawings. These include: diversions, berms, sediment control traps, silt fences and straw bale dikes.
- B. Grade areas as specified on the Design Drawings. Gullied and uneven areas shall be smoothed before starting seedbed preparation.

5.2

Limestone for pH Adjustment

- A. The Supplier shall apply limestone as required to raise the pH of the subsoil. Apply a minimum of 4 tons of limestone per acre for clayey soils, 3 tons of limestone per acre for sandy loam, and 2 tons of limestone per acre for loamy sand or silty soils.
- B. Thoroughly work the limestone into the subsoil to a depth of 2 to 3 inches with a harrow or disk. The limestone may be applied prior to or concurrently with the fertilizer described.

5.3

Fertilizer

- A. The Supplier shall apply a 12-12-12 fertilizer to the subsoil at a rate of 300 pounds per acre.
- B. Work the fertilizer into the soil to a depth of 2 to 3 inches with a harrow, disk, or rake. On slopes, operate the disk or rake across the slope.
- C. If hydro seeding is used, the fertilizer may be added to the hydroseed mixture.

5.4

Tilling of Subsoil

Prior to placing the topsoil, scarify the subsoil to a depth of 3 inches immediately prior to spreading topsoil to ensure bonding of the topsoil and the subsoil. Repeat scarification in areas where equipment used for hauling and spreading topsoil has compacted the subsoil.

5.5

Placing Topsoil

Note: topsoil does not have to be placed for temporary seeding. Topsoil must be placed prior to permanent seeding.

- A. Place topsoil during dry weather on a dry, unfrozen subgrade. Topsoil shall not be spread if it is frozen or muddy.
- B. Remove large pieces of organic matter and foreign non-organic material from topsoil while spreading. There shall be no large roots, branches or trash of any kind in the topsoil.
- C. Spread the topsoil to provide a compacted thickness of not less than 4 inches.
- D. Compact the topsoil with a roller not exerting more than 100 pounds per square inch. The topsoil must be loose enough for water infiltration and root penetration. The soil surface on slopes shall be roughened to catch seeds if they are to be broadcast.

5.6

Seeding (Conventional Method)

- A. Tables 1 and 2 list acceptable seed mixtures that may be used for seeding. The Supplier shall select a mixture from the appropriate table and plant within the dates shown in that table for that mixture.
- B. Apply seed uniformly at the rate shown in the appropriate table with a rangeland grass drill or cultipacker type seeder, or broadcast seed uniformly. The seeding methods and equipment shall be submitted to the Buyer for approval prior to beginning work.
- C. All seeders shall be calibrated and adjusted to sow seeds at the proper rate. Equipment shall be operated to ensure a complete and even coverage. Do not seed areas greater than that which can be mulched on the same day.
- D. Do not sow immediately following a rain, where the ground is too dry, during windy periods, or otherwise when conditions are not proper for seeding.
- E. No seeds shall be sown until the purity test has been completed for the seeds to be used and the tests show that the seed meets the noxious weed seed requirements.
- F. Within 12 hours, all seeded areas shall be rolled at right angles to the runoff with a cultipacker or approved roller to compact the seedbed and place the seed in contact with the soil. The optimum depth for planting shall be 1/4 inch. Rolling is not required if the seeding equipment is equipped with a roller that achieves the desired compaction or a grass drill has been used. Note: For temporary seeding planted without topsoil, the optimum planting depth is shown in Table 2.

5.7

Mulching (Conventional Method)

5.7.1

Straw Mulching

- A. All seeded areas shall be mulched with straw mulch within 24 hours after seeding. The mulch may be hand or machine applied. The mulch shall be uniformly applied in a loose enough condition to permit air to circulate, but compact enough to reduce erosion. About 25 percent of

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

the solid surface should show through the mulch. If baled mulch material is used, care shall be taken that the material is in a loosened condition and contains no lumps or knots of compacted material.

- B. Straw mulch shall be applied at the rate of 2 tons per acre, or 75 to 100 (two bales) pounds per 1,000 square feet.
- C. Straw mulch shall be anchored immediately after placement to minimize loss by wind or water. Straw mulch shall be anchored using a mulch anchoring tool or by spraying with a liquid binder.

5.7.2

Anchoring Mulch Using a Mulch Anchoring Tool

- A. The mulch anchoring tool shall be designed to punch and anchor the mulch into the top 2 to 3 inches of soil at 6 inch intervals. As an alternative, a smooth disk set in a straight position may be used.
- B. On slopes flatter than 3 horizontal to 1 vertical, mulch anchoring shall cross the contour of the land (across slopes). On slopes steeper than 3 horizontal to 1 vertical, the mulch shall be anchored by tracking a bulldozer with 1-1/2 inch track cleats up and down slope making grooves running across the slope.

5.7.3

Anchoring Using a Sprayed Liquid Binder

- A. A sprayed liquid binder may be used in lieu of crimping to anchor the mulch. The binder may be sprayed into the mulch as it leaves the blower pipe or it may be applied as an over spray. If over sprayed, the binder spray should be heavier at the edges where wind catches the mulch, in valleys and at crests of banks. Binder shall be applied uniformly over the remainder of the area. Caution shall be used when spraying binder near areas occupied by construction personnel.
- B. Binder Spray shall be applied at the following rates:
 - Cutback asphalt - Rapid curing (RC-70, RC-250, and RC-800) or medium curing (MC-250 or MC-800). Apply 5 gallons per 1,000 square feet or 218 gallons per acre.
 - Emulsified asphalt - (SS-1, CSS-1, CMS-2, MS, RS-1, RS-2, CRS-1, and CRS-2). Apply 5 gallons per 1,000 square feet or 218 gallons per acre.
 - Synthetic binders - Synthetic binders such as Acrylic Dir (Agri-Tac), DCA-70, Petroset or Terra Tack may be used at rates recommended by the manufacturer to anchor mulch material.

5.7.4

Repairing and Reseeding

- A. Areas not mulched and anchored within 24 hours after seeding shall be reseeded and mulched.
- B. Areas not properly mulched, or damaged due to construction activities, shall be repaired, reseeded, and remulched.

5.8

Hydro Seeding

- A. Hydro seeding consists of spraying a slurry mixture of water, seed, fertilizer, mulch, and a tackifier on a prepared seed bed.
- B. The slurry mixture shall be mixed and applied using a hydraulic seeder. Hydraulic seeding equipment shall include a pump rated and operated at not less than 100 gallons per minute and 100 psi pressure. The tank shall have a mechanical agitator powerful enough to keep the slurry mixture in a uniform suspension in water.
- C. Hydrated lime **shall not** be added to the slurry mixture.
- D. The slurry mixture shall contain a maximum of 55 percent solids (125 pounds of solids per 100 gallons of water).
- E. The seed mixture shall be as specified in Table 1 or Table 2 except that the weight of seed in the slurry mixture shall be a minimum of three times the weight of pure live seed per acre specified in the appropriate table for conventional seed application.
- F. The slurry mixture shall contain a minimum of 1500 pounds of wood cellulose fiber mulch per acre or 2000 pounds of straw mulch per acre.
- G. The amount of tackifier provided per acre shall be in accordance with Manufacturer's recommendations.
- H. The slurry-mixture shall contain a minimum of 1000 pounds of grade 12-12-12 fertilizer per acre or the equivalent weight of chemicals if another grade is used.
- I. The soil surface shall be moist when the slurry mixture is applied.

5.9

Laying and Securing Matting

5.9.1

Laying and Securing Jute Matting

- A. Prepare the seed bed as specified and lime, fertilize, and seed, except that when using jute matting, apply approximately one-half of the seed after laying the mat.
- B. Most drainage channels will require multiple widths of jute matting. The total width shall be as specified on the Design Drawings. Unroll matting starting at the upper end of the channel allowing a 4 inch overlap of mattings along center of channel.
- C. Bury the top ends of jute matting in a narrow trench. Backfill the trench and tamp firmly to conform to channel cross-section. Secure the matting with a row of staples about 4 inches down slope from the trench. Spacing between staples shall be a maximum of 6 inches.
- D. Staple the 4 inch overlap in the center of the channel using an 18 inch spacing between staples. Before stapling the outer edges of the matting, make sure the matting is smooth and in firm contact with the soil. Staples shall be placed 2 feet apart along the outer edge of matting.
- E. Where one roll of jute matting ends and another begins, the end of the top strip shall overlap the upper end of the lower strip by 4 inches, shiplap fashion.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, subSuppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

- F. Where matting crosses erosion stops, reinforce with a double row of staples placed six (6) inches apart in a staggered pattern on either side of erosion stop. Likewise, overlaps joining the length of matting together and the discharge end of the matting liner should be similarly secured with 2 double rows of staples.

5.9.2

Laying and Securing Excelsior Matting

- A. Provide the same seedbed preparation as specified for jute matting with the exception that all seeding must be completed before laying excelsior matting.
- B. Bury the top ends of excelsior matting in a trench as described for jute matting. As the blankets are unrolled down slope, the matting must be on top with the wood fibers in contact with the soils. Butt snugly at the ends and sides before stapling.
- C. Using two (2) foot spacing between staples, excelsior matting shall be secured with four rows for each strip, with one row along each edge and alternating parallel rows down the center. The stapling over erosion stops, entrance and discharge ends of matting and butted end joints shall be the same as described for jute matting.

5.10

Construction Completed after Acceptable Seeding Dates

When construction is completed between October 15 and March 1 prepare the seedbed, fertilize and mulch as specified. Apply seed for permanent seed sometime between December 1 and March 1 increasing the seeding rates shown in Table 1 by 50 percent.

6.0

Protection

Planted areas shall be protected from damage and erosion. The Supplier shall provide and erect temporary barriers and signs as necessary to prevent vehicles, equipment and foot traffic from damaging seeded areas.

7.0

Maintenance

The Supplier shall perform the following maintenance tasks:

- A. Keep seedbed continually moist with light, frequent sprinklings several times a day to prevent seedlings from drying out.
- B. Inspect periodically after planting to see that vegetative stands are adequately established. Immediately reseed areas which show bare spots larger than 2 feet by 2 feet after germination.
- C. Check for erosion damage after storm events and repair damage. Reseed and mulch, if necessary.
- D. Fertilize newly permanent seeded areas one year after seeding with 300 pounds per acre of a complete (N-P-K) 10-10-10 or equivalent turf type slow release fertilizer.
- Application rate per acre shall be:
Nitrogen (N) - 120 pounds of actual nitrogen.

This document contains information which is confidential and proprietary to Sargent & Lundy (S&L). It was prepared by S&L for use by S&L, its clients, their Suppliers, sub-Suppliers, and bidders on projects where S&L provides engineering services and shall not otherwise be reproduced in whole or in part or released to any third party without the prior written consent of S&L. Copyright Sargent & Lundy 2001 all rights reserved. Specifications located in the Document Management System are to be considered as the official version of the Specification.

Phosphorus (P) - 120 pounds of P_2O_5 .
Potassium (K) - 120 pounds of K_2O .



Appendix E: Hennepin Power Station; West Ash Disposal Pond Maintenance Plan (2013)

DYNEGY MIDWEST GENERATION, LLC

Hennepin Power Station

Hennepin, Illinois

Putnam County

West Ash Disposal Pond

IDNR Permit No. (not permitted)

Dam ID No. (not permitted)

Maintenance Plan

September 2013

TABLE OF CONTENTS

<u>Paragraph</u>	<u>Description</u>	<u>Page</u>
1.0	GENERAL	1
2.0	EMERGENCY OPERATIONS	1
2.1	Unusual Conditions	1
2.2	Dewatering	2
3.0	MAINTENANCE	2
3.1	Vegetation	2
3.2	Discharge Structure	2
3.3	Animal Damage and Repairs	2
3.4	Restriction of Unauthorized Vehicles	2
3.5	Inspections/Remedial Measures	3
3.5.1	Weekly Inspections	3
3.5.2	Quarterly Inspections	3
3.5.3	Five-year Inspections	
4.0	INSPECTION CHECKLISTS	3

1.0 GENERAL

The following operations and maintenance procedures are provided to maintain the structural integrity of the west ash storage surface impoundment at the Hennepin Power Station, which is unclassified and unpermitted, by the Illinois Department of Natural Resources, Office of Water Resources.

2.0 EMERGENCY OPERATIONS

2.1 Unusual Conditions

Any unusual condition discovered during major storm events or routine inspection, which may constitute an emergency, shall be handled as follows. Notice of any type of emergency involving the dikes or outfall shall be made to the Shift Leader on duty [(815) 339-9211]. The Shift Leader on duty shall notify the Station Manager, Ted Lindenbusch [home: (815) 875-2381], or, in his absence, the Environmental Coordinator, John P. Augspols [home: (815) 925-7488]. One of the above designated personnel shall notify the following city, county, state and federal regulatory authorities of the emergency condition.

- Division of Water Resources, Dam Safety Section, Dam Safety Engineers (217) 782-3862
- Illinois Emergency Management Agency, 24-hour service 1-(800) 782-7860
- Putnam County Sheriff/Hennepin Police Department (815) 925-7015
- Senior Director – Environmental Compliance, Dynegy Operating Company (618) 206-5912

2.2 Dewatering

The Station Manager or the Environmental Coordinator shall have the responsibility of determining how repairs shall be accomplished and whether dewatering of the disposal facility is necessary. Emergency dewatering shall be accomplished by portable pumps.

3.0 MAINTENANCE

3.1 Vegetation

Dikes shall be maintained to protect the structural integrity of the disposal facility. Damaged and barren areas shall be repaired as soon as appropriate after being discovered. Damaged areas shall be filled with topsoil. Limed, fertilized, and seeded with appropriate vegetation. Trees and shrubs observed during semiannual inspections shall be cut and removed from the dikes and discharge channel. This shall be done as frequently as is necessary to insure that no tree reaches a size where the root structure would require removal and filling. Woody vegetation, shrubs, and trees shall be removed during the early stages of growth before reaching a three-inch diameter.

Low growing vegetation, a prairie grass mixture that grows to a height of no more than six inches, shall be planted and maintained to facilitate inspections.

3.2 Discharge Structure

The discharge structure shall be inspected periodically for significant corrosion and deterioration. Any defects discovered shall be promptly repaired.

3.3 Animal Damage and Repairs

Animal burrows discovered during inspections shall be promptly repaired by filling with grout.

3.4 Restriction of Unauthorized Vehicles

Facility approaches shall be posted with signs restricting unauthorized travel on the roadways and slopes.

3.5 Inspections/Remedial Measures

3.5.1 Weekly Inspections

Weekly inspections of the perimeter berms shall be conducted, looking for seepage and slumping, and unusual seepage at and/or blockage of the outfall structures in each cell. All findings shall be entered into the weekly inspection checklist, discussed in Section 4.0. Maintenance activities shall be initiated, if required. Refer to Section 4.0 for the recommended inspection checklist to be used for the weekly inspections.

3.5.2 Quarterly Inspections

Inspections shall be made quarterly by Station personnel to determine the general condition of the dam and embankments. During these inspections, embankment erosion, tree growth, and embankment seepage shall be monitored. Seepage shall be observed for change in quantity and coloration. Refer to Section 4.0, for the recommended inspection checklist to be used for documenting the quarterly inspections.

3.5.3 Annual Inspections

An annual inspection shall be made by a licensed professional engineer. This inspection shall follow the Illinois Department of Natural Resources (IDNR) *Guidelines and Forms for Inspection of Illinois Dams*, and shall be followed by verbal and written reports by the consulting engineer. Based on the findings of the inspection, the Station Manager shall implement corrective action as required to promote dam safety. Procedures and methods for corrective action shall be performed in accordance with recommendations of the consulting engineer and as outlined above. Because the dam is not permitted by the IDNR, copies of the engineer's report, along with corrective action taken, will not be reported to the IDNR.

4.0 INSPECTION CHECKLISTS

The following Inspection checklists should be used during the weekly and quarterly inspections.

WEEKLY DAM INSPECTION FORM

Dam Location: Hennepin Power Station – West Ash Pond

Owner: Dynegy Midwest Generation, LLC, Havana Power Station

Permit No.: Not permitted

Class of Dam: Not classified

Type of Dam: Homogeneous earth dam

Type of Spillway: Drop structure

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

Name / Title

Signature

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Unusual Movement or Cracking at or Beyond Toe		
Seepage		
Vegetative Cover		
Embankment Erosion		
Structural Cracking		
Outfall Structures		
Other		

QUARTERLY DAM INSPECTION FORM

Dam Location: Hennepin Power Station – West Ash Pond

Owner: Dynegy Midwest Generation, LLC, Hennepin Power Station

Permit No.: Not permitted

Class of Dam: Not classified

Type of Dam: Homogeneous earth dam

Type of Spillway: Drop structure

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

Signature

Name / Title	Signature	
Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest	Good condition, with no significant issues	
Downstream Fill Slopes	Good condition, with no significant issues	
Upstream Fill Slopes	Good condition, with no significant issues	
Unusual Movement or Cracking at or Beyond Toe	Good condition, with no significant issues	
Seepage (Condition/Color)	Good condition, with no significant issues	
Vegetative Cover (Tree growth)	Good condition, with no significant issues	
Animal Damage	Good condition, with no significant issues	
Embankment Erosion	Good condition, with no significant issues	
Water Passages	Good condition, with no significant issues	
Structural Cracking	Good condition, with no significant issues	
Outfall Structures	Good condition	
Other		



Appendix F: Hennepin Power Station; Old East Ash Disposal Pond Maintenance Plan (2013)

DYNEGY MIDWEST GENERATION, LLC

Hennepin Power Station

Hennepin, Illinois

Putnam County

Old East Ash Disposal Pond

IDNR Permit No. (not permitted)

Dam ID No. (not permitted)

Maintenance Plan

September 2013

TABLE OF CONTENTS

<u>Paragraph</u>	<u>Description</u>	<u>Page</u>
1.0	GENERAL	1
2.0	EMERGENCY OPERATIONS	1
2.1	Unusual Conditions	1
2.2	Dewatering	2
3.0	MAINTENANCE	2
3.1	Vegetation	2
3.2	Discharge Structure	2
3.3	Animal Damage and Repairs	2
3.4	Restriction of Unauthorized Vehicles	2
3.5	Inspections/Remedial Measures	3
3.5.1	Weekly Inspections	3
3.5.2	Quarterly Inspections	3
3.5.3	Five-year Inspections	
4.0	INSPECTION CHECKLISTS	3

1.0 GENERAL

The following operations and maintenance procedures are provided to maintain the structural integrity of the old east ash storage surface impoundment at the Hennepin Power Station, which is unclassified and unpermitted, by the Illinois Department of Natural Resources, Office of Water Resources.

This is primarily the @ 0.5 mile significant berm system that extends along the Illinois River. The old east ash pond system consists of the inactive cells # 2 and # 4. As a result of the May 2011 USEPA dam assessment, a dam safety permit was submitted to IDNR in May 2013, to address major modifications to this significant berm. These major modifications include extensive tree removal and resloping. Resloping is required to improve slope stability and allow safe access to slope, for long-term mowing and maintenance.

2.0 EMERGENCY OPERATIONS

2.1 Unusual Conditions

Any unusual condition discovered during major storm events or routine inspection, which may constitute an emergency, shall be handled as follows. Notice of any type of emergency involving the dikes or outfall shall be made to the Shift Leader on duty [(815) 339-9211]. The Shift Leader on duty shall notify the Station Manager, Ted Lindenbusch [home: (815) 875-2381], or, in his absence, the Environmental Coordinator, John P. Augspols [home: (815) 925-7488]. One of the above designated personnel shall notify the following city, county, state and federal regulatory authorities of the emergency condition.

- Division of Water Resources, Dam Safety Section, Dam Safety Engineers (217) 782-3862
- Illinois Emergency Management Agency, 24-hour service 1-(800) 782-7860
- Putnam County Sheriff/Hennepin Police Department (815) 925-7015
- Senior Director – Environmental Compliance, Dynegy Operating Company (618) 206-5912

2.2 Dewatering

Not applicable.

3.0 MAINTENANCE

3.1 Vegetation

Dikes shall be maintained to protect the structural integrity of the disposal facility. Damaged and barren areas shall be repaired as soon as appropriate after being discovered. Damaged areas shall be filled with topsoil. Limed, fertilized, and seeded with appropriate vegetation. Trees and shrubs observed during semiannual inspections shall be cut and removed from the dikes and discharge channel. This shall be done as frequently as is necessary to insure that no tree reaches a size where the root structure would require removal and filling. Woody vegetation, shrubs, and trees shall be removed during the early stages of growth before reaching a three-inch diameter.

Low growing vegetation, a prairie grass mixture that grows to a height of no more than six inches, shall be planted and maintained to facilitate inspections.

3.2 Discharge Structure

Not applicable.

3.3 Animal Damage and Repairs

Animal burrows discovered during inspections shall be promptly repaired by filling with grout.

3.4 Restriction of Unauthorized Vehicles

Facility approaches shall be posted with signs restricting unauthorized travel on the roadways and slopes.

3.5 Inspections/Remedial Measures

3.5.1 Weekly Inspections

Weekly inspections of the perimeter berms shall be conducted, looking for seepage and slumping. All findings shall be entered into the weekly inspection checklist, discussed in Section 4.0. Maintenance activities shall be initiated, if required. Refer to Section 4.0 for the recommended inspection checklist to be used for the weekly inspections.

3.5.2 Quarterly Inspections

Inspections shall be made quarterly by Station personnel to determine the general condition of the dam and embankments. During these inspections, embankment erosion, tree growth, and embankment seepage shall be monitored. Seepage shall be observed for change in quantity and coloration. Refer to Section 4.0, for the recommended inspection checklist to be used for documenting the quarterly inspections.

3.5.3 Annual Inspections

An annual inspection shall be made by a licensed professional engineer. This inspection shall follow the Illinois Department of natural Resources (IDNR) *Guidelines and Forms for Inspection of Illinois Dams*, and shall be followed by verbal and written reports by the consulting engineer. Based on the findings of the inspection, the Station Manager shall implement corrective action as required to promote dam safety. Procedures and methods for corrective action shall be performed in accordance with recommendations of the consulting engineer and as outlined above. Because the dam is not permitted by the IDNR, copies of the engineer's report, along with corrective action taken, will not be reported to the IDNR.

4.0 INSPECTION CHECKLISTS

The following Inspection checklists should be used during the weekly and quarterly inspections.

WEEKLY DAM INSPECTION FORM

Dam Location: Hennepin Power Station – Old East Ash Pond

Owner: Dynegy Midwest Generation, LLC, Havana Power Station

Permit No.: Not permitted

Class of Dam: Not classified

Type of Dam: Homogeneous earth dam

Type of Spillway: N/A

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

Name / Title

Signature

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Unusual Movement or Cracking at or Beyond Toe		
Seepage		
Vegetative Cover		
Embankment Erosion		
Structural Cracking		
Outfall Structures		
Other		

QUARTERLY DAM INSPECTION FORM

Dam Location: Hennepin Power Station – Old East Ash Pond

Owner: Dynegy Midwest Generation, LLC, Hennepin Power Station

Permit No.: Not permitted

Class of Dam: Not classified

Type of Dam: Homogeneous earth dam

Type of Spillway: Not applicable

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

Signature

Name / Title	Signature	
Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest	Good condition, with no significant issues	
Downstream Fill Slopes	Good condition, with no significant issues	
Upstream Fill Slopes	Good condition, with no significant issues	
Unusual Movement or Cracking at or Beyond Toe	Good condition, with no significant issues	
Seepage (Condition/Color)	Good condition, with no significant issues	
Vegetative Cover (Tree growth)	Good condition, with no significant issues	
Animal Damage	Good condition, with no significant issues	
Embankment Erosion	Good condition, with no significant issues	
Water Passages	Good condition, with no significant issues	
Structural Cracking	Good condition, with no significant issues	
Outfall Structures	Good condition	
Other		



Appendix G: Hennepin Power Station; East Ash Disposal Pond Maintenance Plan (2014)

DYNEGY MIDWEST GENERATION, LLC

Hennepin Power Station

Hennepin, Illinois

Putnam County

East Ash Disposal Pond

Small Class III Dam

IDNR Permit No. DS2011079

Dam ID No. IL50363

Maintenance Plan

Revised – August 2014

TABLE OF CONTENTS

<u>Paragraph</u>	<u>Description</u>	<u>Page</u>
1.0	GENERAL	1
2.0	EMERGENCY OPERATIONS	1
2.1	Unusual Conditions	1
2.2	Dewatering	2
3.0	MAINTENANCE	2
3.1	Vegetation	2
3.2	Discharge Structure	2
3.3	Animal Damage and Repairs	2
3.4	Restriction of Unauthorized Vehicles	2
3.5	Inspections/Remedial Measures	3
3.5.1	Weekly Inspections	3
3.5.2	Quarterly Inspections	3
3.5.3	Five-year Inspections	
3.6	Annual Statement	3
4.0	INSPECTION CHECKLISTS	3

1.0 GENERAL

The following operations and maintenance procedures are provided to maintain the structural integrity of the east ash storage surface impoundment at the Hennepin Power Station, which is classified as a small Class III dam by the Illinois Department of Natural Resources, Office of Water Resources. The primary pond's maximum normal pool elevation will be 489.5 msl with a dam crest at elevation 494.0 msl. The secondary pond's maximum normal pool elevation will be 480.5 with a dam crest at 494.0 msl.

2.0 EMERGENCY OPERATIONS

2.1 Unusual Conditions

Any unusual condition discovered during major storm events or routine inspection, which may constitute an emergency, shall be handled as follows. Notice of any type of emergency involving the dikes or outfall shall be made to the Shift Leader on duty [(815) 339-9211]. The Shift Leader on duty shall notify the Managing Director, Byron Veech [cell: (309) 543-8714], or, in his absence, the Environmental Coordinator, John P. Augspols [home: (815) 925-7488]. One of the above designated personnel shall notify the following city, county, state and federal regulatory authorities of the emergency condition.

- Division of Water Resources, Dam Safety Section, Dam Safety Engineers (217) 782-3862
- Illinois Emergency Management Agency, 24-hour service 1-(800) 782-7860
- Putnam County Sheriff/Hennepin Police Department (815) 925-7015
- Senior Director – Environmental Compliance, Dynegy Operating Company (618) 343-7761

2.2 Dewatering

The Station Manager or the Environmental Coordinator shall have the responsibility of determining how repairs shall be accomplished and whether dewatering of the disposal facility is necessary. Dewatering shall be accomplished by manually removing the concrete beams from the primary and/or secondary pond structures until the desired water level is reached.

3.0 MAINTENANCE

3.1 Vegetation

Dikes shall be maintained to protect the structural integrity of the disposal facility. Damaged and barren areas shall be repaired as soon as appropriate after being discovered. Damaged areas shall be filled with topsoil. Limed, fertilized, and seeded with appropriate vegetation. Trees and shrubs observed during periodic inspections shall be cut and removed from the dikes and discharge channel. This shall be done as frequently as is necessary to insure that no tree reaches a size where the root structure would require removal and filling. Woody vegetation, shrubs, and trees shall be removed during the early stages of growth before reaching a three-inch diameter.

Low growing vegetation shall be planted and maintained to facilitate inspections.

3.2 Discharge Structure

The discharge structure shall be inspected periodically for significant corrosion, spalling, and cracking. Any defects discovered shall be promptly repaired.

3.3 Animal Damage and Repairs

Animal burrows discovered during inspections shall be promptly repaired by filling with grout.

3.4 Restriction of Unauthorized Vehicles

Facility approaches shall be posted with signs restricting unauthorized travel on the roadways and slopes.

3.5 Inspections/Remedial Measures

3.5.1 Weekly Inspections

Weekly inspections of the perimeter berms shall be conducted, looking for seepage and slumping, and unusual seepage at and/or blockage of the outfall structures in each cell. All findings shall be entered into the weekly inspection checklist, discussed in Section 4.0. Maintenance activities shall be initiated, if required. Refer to Section 4.0 for the recommended inspection checklist to be used for the weekly inspections.

3.5.2 Quarterly Inspections

Inspections shall be made quarterly by Station personnel to determine the general condition of the dam and embankments. During these inspections, embankment erosion, tree growth, and embankment seepage shall be monitored. Seepage shall be observed for change in quantity and coloration. Refer to Section 4.0, for the recommended inspection checklist to be used for documenting the quarterly inspections.

3.5.3 Five-Year Inspections

Every five years, an inspection shall be made by a licensed professional engineer. This inspection shall follow the Illinois Department of natural Resources (IDNR) *Guidelines and Forms for Inspection of Illinois Dams*, and shall be followed by verbal and written reports by the consulting engineer. Based on the findings of the inspection, the Station Manager shall implement corrective action as required to promote dam safety. Procedures and methods for corrective action shall be performed in accordance with recommendations of the consulting engineer and as outlined above. Copies of the engineer's report, along with corrective action taken, shall be reported to the IDNR.

3.6 Annual Statement

An annual statement on forms furnished by IDNR, certifying compliance with this maintenance plan, shall be submitted to IDNR.

4.0 **INSPECTION CHECKLISTS**

The following Inspection checklists should be used during the weekly and quarterly inspections.

WEEKLY DAM INSPECTION FORM

Dam Location: Hennepin Power Station – East Ash Pond

Owner: Dynegy Midwest Generation, LLC, Havana Power Station

Permit No.: DS2011079

Class of Dam: III

Type of Dam: Homogeneous earth dam, with clay and geosynthetic / clay liner

Type of Spillway: Drop structure and stop logs

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

Name / Title	Signature
_____	_____
_____	_____

Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest		
Unusual Movement or Cracking at or Beyond Toe		
Seepage		
Vegetative Cover		
Embankment Erosion		
Structural Cracking		
Outfall Structures		
Other		

QUARTERLY DAM INSPECTION FORM

Dam Location: Hennepin Power Station – East Ash Pond

Owner: Dynegy Midwest Generation, LLC, Hennepin Power Station

Permit No.: DS2011079

Class of Dam: III

Type of Dam: Homogeneous earth dam, with clay and geosynthetic / clay liner

Type of Spillway: Drop structure and stop logs

Date Inspected: _____

Weather Conditions: _____

Pool Elevation: _____

Inspection Personnel:

Signature

Name / Title	Signature	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Inspection Item	Conditions	Location of Problem and Recommended Remedial Measures and Implementation Schedule
Vertical and Horizontal Alignment of Crest	Good condition, with no significant issues	
Downstream Fill Slopes	Good condition, with no significant issues	
Upstream Fill Slopes	Good condition, with no significant issues	
Unusual Movement or Cracking at or Beyond Toe	Good condition, with no significant issues	
Seepage (Condition/Color)	Good condition, with no significant issues	
Vegetative Cover (Tree growth)	Good condition, with no significant issues	
Animal Damage	Good condition, with no significant issues	
Embankment Erosion	Good condition, with no significant issues	
Water Passages	Good condition, with no significant issues	
Structural Cracking	Good condition, with no significant issues	
Outfall Structures	Good condition	
Other		

ATTACHMENT E

**HENNEPIN
WEST ASH POND 1**

ID #: W1550100002-01

**DYNEGY MIDWEST
GENERATION, LLC**

HENNEPIN
WEST POLISHING POND
ID #: W1550100002-03
DYNEGY MIDWEST
GENERATION, LLC

ATTACHMENT H

OBG

Hydrogeologic Site Characterization Report

Hennepin West Ash Pond System

Hennepin, Illinois

Dynegy Midwest Generation, LLC

FINAL

December 20, 2017



DECEMBER 20, 2017 | FINAL | PROJECT #2413

Hydrogeologic Site Characterization Report

Hennepin West Ash Pond System
Hennepin, Illinois

Prepared for:

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, IL 62234



STUART J. CRAVENS, PG
Principal Hydrogeologist



ROBERT J KARNAUSKAS, PG, PH
Principal Hydrogeologist

TABLE OF CONTENTS

LIST OF TABLES	iii
LIST OF FIGURES	iii
LIST OF APPENDICES	iii
ACRONYMS AND ABBREVIATIONS	iv
1 INTRODUCTION	1
1.1 Overview.....	1
1.2 Site Location and Background.....	2
1.3 Site History.....	3
2 REGIONAL AND LOCAL GEOLOGY	4
2.1 Topography.....	4
2.2 Regional Geomorphology.....	4
2.3 Soils.....	4
2.4 Bedrock.....	4
2.4.1 Lithology.....	4
2.4.2 Structure.....	5
2.4.3 Seismic Setting.....	5
2.5 Unlithified Deposits Geology.....	6
2.5.1 General Unlithified Geology.....	6
2.5.2 Detailed Site Lithology.....	6
3 REGIONAL AND LOCAL HYDROGEOLOGY	8
3.1 Bedrock – Regional and Local.....	8
3.2 Unlithified Deposits - Regional.....	8
3.3 Unlithified deposits – Site Specific.....	9
3.3.1 Water Table Elevation and Groundwater Flow.....	9
3.3.2 Saturated Ash.....	10
3.3.3 Hydraulic Conductivity.....	11
3.3.3.1 Field Hydraulic Conductivity.....	11
3.3.3.2 Laboratory Hydraulic Conductivity.....	12
3.3.3.3 Groundwater Velocity.....	12
3.3.4 Groundwater Classification.....	12
3.4 Surface Water Hydrology.....	12
3.5 Water Well Survey.....	13
4 GROUNDWATER QUALITY	15
4.1 Summary of Groundwater Monitoring Activities.....	15
4.1.1 Groundwater Monitoring – Illinois EPA Closure Work Plan.....	15
4.1.2 40 CFR Part 257 Monitoring.....	16
4.2 Groundwater Monitoring Results and Analysis – Illinois EPA Closure Work Plan Parameters.....	16
4.2.1 Boron.....	17

4.2.2	Sulfate.....	17
4.2.3	Iron	18
4.2.4	Manganese.....	18
4.2.5	pH.....	19
4.2.6	TDS	19
4.2.7	Chloride	19
4.3	Groundwater Monitoring Results and Analysis – IAC 35 Part 620.410 Parameters	19
4.3.1	Arsenic.....	19
4.3.2	Selenium.....	19
4.3.3	Lead.....	19
4.3.4	Nitrate	20
4.3.5	Other Inorganic Water Quality Parameters.....	20
4.3.5.1	Fluoride	20
4.3.5.2	Cyanide (Total).....	20
4.3.5.3	Perchlorate.....	20
4.3.6	Trace Elements.....	20
4.3.7	Organic Water Quality Parameters.....	21
5	POTENTIAL IMPACTS TO THE ILLINOIS RIVER.....	23
6	CONCLUSIONS.....	25
	REFERENCES.....	27

LIST OF TABLES

Table 1	Monitoring Well Construction Summary
Table 2	Field Hydraulic Conductivity
Table 3	Summary of Exceedances of Class I Groundwater Standards
Table 4	Median Boron and Sulfate Concentrations – 1997 through 2016

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Ash Impoundment Location Map
Figure 3	Soil Survey Map
Figure 4	Generalized Stratigraphic Column for the Hennepin Area
Figure 5	Major Structural Features of Illinois
Figure 6	Surficial Geologic Deposits
Figure 7	Monitoring Well and Boring Locations
Figure 8	Known Minimum Thickness of Clay Immediately Beneath the Ash
Figure 9	Cross Sections A-A' and B-B'
Figure 10	Cross Section C-C' and D-D'
Figure 11	Existing Monitoring Well Locations
Figure 12	Water Table Contour Map – December 10, 2013
Figure 13	Water Table Contour Map – March 18, 2015
Figure 14	Boron Concentrations in Groundwater – March 9, 2016

LIST OF APPENDICES

Appendix A	Boring and Well Construction Logs
	A1 MATHES Boring Logs and Well Details
	A2 STMI Boring Logs and Well Details
	A3 NRT Boring Logs and Well Details
	A4 AECOM Boring Logs and Well Details
	A5 CEC Boring Logs and Well Details
Appendix B	Water Table Contour Maps - 2013 through 2016
Appendix C	Hydraulic Conductivity Test Data
	C1 STMI Field Hydraulic Conductivity Tests
	C2 AECOM Laboratory Hydraulic Conductivity Tests
Appendix D	Geotechnical Test Data
	D1 MATHES Grain Size Analysis
	D2 AECOM Geotechnical Test Results
Appendix E	FEMA National Flood Hazard Map
Appendix F	Water Wells Survey (NRT/Kelron, June 3, 2009)
Appendix G	Groundwater Quality Monitoring Data
	G1 Time Concentration Plots – 2005 through 2016
	G2 Class I Groundwater Quality Standards Monitoring Results – Inorganic Parameters
	G3 Class I Groundwater Quality Standards Monitoring Results – Organic Parameters

ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
bgs	below ground surface
CCR	coal combustion residual
CFR	Code of Federal Regulations
cm/s	centimeters per second
CWS	Community Water Supply
DMG	Dynegy Midwest Generation, Inc.
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
ft	feet
ft/ft	feet per feet
ft MSL	feet above Mean Sea Level
gal/day	gallons per day
IAC	Illinois Administrative Code
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
MDL	method detection limit
mg/L	milligram per liter
NRT	Natural Resource Technology, an OBG Company
PWS	Public Water Supply
S.U.	Standard Units
TDS	total dissolved solids
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WHPA	Wellhead Protection Area
WMA	Wildlife Management Area

1 INTRODUCTION

1.1 OVERVIEW

This Hydrogeologic Site Characterization Report was prepared by Natural Resource Technology, Inc., an OBG Company (NRT) in support of a Closure Plan for impoundments located at the Hennepin Power Station, Hennepin, Illinois which is owned by Dynegy Midwest Generation, LLC (DMG). This report and the Closure Plan apply to Coal Combustion Residuals (CCR) surface impoundments associated with the Hennepin West Ash Pond System and not to any of the other impoundments present on the Site (i.e. East Ash Pond System). However, information gathered to evaluate other CCR units on site regarding geology, hydrogeology, and groundwater quality is included, where appropriate. The Hennepin West Ash Pond System includes the following components:

Old West Ash Pond (which includes Pond No.1: 9.3 acres and Pond No. 3: 16.4 acres)

- Old West Polishing Pond: 4.7 acres [Polishing Pond]

Numerous hydrogeologic investigations have been performed concerning the CCR Units located at the Site. The information presented in this site characterization report includes recent data collected to comply with the Federal CCR Rule (40 CFR Part 257) as well as comprehensive data collection and evaluations from prior hydrogeologic investigation reports, including, but not limited to, the following:

- **Hydrogeologic Study, Existing Ash Ponds, Hennepin Power Plant, Illinois Power Company, Hennepin, Illinois. John Mathes & Associates, Inc.; April 19, 1983.** Five monitoring wells were installed, currently designated as wells 21 through 25. Monitoring wells 21 through 24 are downgradient of the West Ash Pond System and well 25 is an upgradient well located south of the impoundment. Grain size analyses were performed on soil samples.
- **Investigation of Site Closure Options at Illinois Power Company's West Ash Impoundment. Report No. STMI/135/97-01. Science & Technology Management, Inc.; September, 1997.** A supplemental hydrogeologic characterization was conducted to further characterize the West Ash Pond System, develop a groundwater flow and transport model and evaluate three alternative closure options using the model. Seven new permanent monitoring wells (26, 27, 30, 31, 32, 33, 34) and three new temporary leachate wells (L1, L3, L4) were installed around and within the impoundment. Field permeability tests were conducted on seven wells.
- **Model Recalibration and Prediction of Closure Options for the West Ash Impoundment; Hennepin Power Station Putnam County, Illinois. Natural Resource Technology, Inc.; October, 2002.** NRT drilled four soil borings within the ash impoundment (A1, A3, 23S, L5), installed monitoring well 35 along the south berm of Pond No. 3, well 36 south of Pond No. 1, and installed one leachate well L5 within the east end of Pond No. 3 in support of a groundwater flow and transport model for predicting future boron concentrations. The principal objective of the additional boring and well installation was to better define the depth of the ash ponds and determine the thickness of saturated ash. Additional groundwater quality data within the impoundment and along the south side the Old West Ash Pond was collected from the new wells for recalibrating the 1997 STMI groundwater model.
- **Water Well Survey, Dynegy Midwest Generation, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology and Kelron Environmental; June 3, 2009.** A water well survey was performed in accordance with the "Right to Know" Potable Water Well Survey procedures of 35 Illinois Administrative Code 1600.210(b)(1) and 1600.210(b)(2). The purpose of this survey was to identify water wells located within 2,500 feet of DMG's Hennepin Power Station property boundary.
- **Assessment of Potential for Groundwater Impact on Identified Water Wells, Dynegy Midwest Generation, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology and Kelron Environmental; August 26, 2009.** An assessment of the potential for impact of the ash impoundment on water quality of potable water wells identified in the water well survey.

- **Hydrogeologic Summary and Groundwater Quality Assessment, West Ash Pond System, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology, Inc., July 24, 2014.** The summary, including four quarters of groundwater quality monitoring, was conducted to develop information necessary to recalibrate the existing groundwater model of the West Ash Pond System and evaluate closure alternatives for the impoundment. This report is a compendium and reanalysis of information from three previous reports prepared for the West Ash Pond System along with an assessment of the most recent groundwater data collected from a network of 16 wells (14 monitoring wells and 2 leachate wells) in 2013 and 2014.
- **Closure Alternatives Evaluation, West Ash Pond System, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology, Inc., July 24, 2014.** This evaluation documented alternatives for closure of the West Ash Pond System, based on their effectiveness, implementation feasibility, and construction and maintenance costs. Groundwater transport modeling was completed to assess the effects of alternatives on surrounding groundwater quality. Implementation feasibility and costs were presented along with a recommended alternative.
- **Monitoring Well 49 Installation. Natural Resource Technology, Inc., July 6, 2015.** Documents the installation of CCR monitoring network Well 49.
- **30% Design Data Report for Dynegy Hennepin Power Station; West Polishing Pond, West Ash Pond, East Ash Pond and Ash Pond No. 2 CCR Units. AECOM, January 12, 2016.** The data package included summary tables, geotechnical laboratory data and exploratory logs for 32 auger borings, 38 CPT soundings and 7 standpipe piezometers installed at selected locations around the West Ash Pond System.
- **Old West Polishing Pond Subsurface Investigation, Hennepin Power Station, Hennepin, Illinois. Civil & Environmental Consultants, Inc. (CEC), April 1, 2016.** Data package included logs for 9 piston sampling and push probe borings along with two impoundment cross-sections within the Old West Polishing Pond of the West Ash Pond System.
- **Closure Work Plan Annual Report, Hennepin Power Station, West Ash Pond System: Nos. 1 and 3. Dynegy Operating Company. Natural Resource Technology, Inc., October 21, 2016.** In accordance with the Closure Work Plan approved by the Illinois EPA (November 8, 1996), DMG is required to perform groundwater monitoring and prepare annual reports for the Old West Ash Pond System. These annual reports have been submitted to the Illinois EPA from October 2000 through October 2016. Although the number of monitoring wells, sampling frequency, and water quality parameters has changed, these annual reports have documented the groundwater levels, flow, and water quality at the West Ash Pond System for all of the monitoring events conducted over a 16-year period.
- **Subsurface Investigation Within West Ash Ponds 1 and 3. CEC, March 2017.** Data package included boring logs for 20 auger borings, four impoundment cross-sections, well construction logs for 6 ash leachate wells and leachate elevations within the West Ash Pond System.

In conjunction with this report, a Groundwater Monitoring Plan and a Groundwater Management Zone Application are being prepared to support the closure of the West Ash Pond Complex. In addition, the groundwater flow and transport models were updated to evaluate the effect of various ash pond closure scenarios on groundwater quality and to predict the fate and transport of CCR leachate components (NRT, 2017c). Modeling has also been conducted to enable estimation of the time required for hydrostatic equilibrium of groundwater to be achieved beneath the West Ash Pond Complex (NRT, 2017d).

1.2 SITE LOCATION AND BACKGROUND

The West Ash Pond System is located in the northeast quarter of Section 27, Township 33 North, Range 2 West, Putnam County, Illinois and approximately 3 miles north-northeast of the Village of Hennepin (Figure 1). The impoundments are situated less than 200 feet south of the Illinois River and approximately one mile east of the Big Bend, where the river shifts course from predominantly west to predominantly south. The impoundment is bordered to the southeast by farm fields (i.e. corn and soybeans) with scattered clumps of rows or trees; to the southwest and west by low lying floodplains within the Donnelley Wildlife Management Area (Donnelley WMA)

administered by the Illinois Department of Natural Resources (IDNR); and to the east by the power generating facility (Figure 2).

Ponds are maintained within the Donnelley WMA for migratory waterfowl. Water levels in these ponds are maintained by a system of pumps operated during migration season, with water pumped from the Illinois River through a channel that runs immediately west of the Old West Polishing Pond. The Donnelley WMA is predominantly a swampy area vegetated by grasses and trees.

The eastern third of the impoundment is on a terrace about 15 feet higher than normal river stage. The western two-thirds are on lowlands that are about 5 to 10 feet higher than normal river stage.

1.3 SITE HISTORY

The Hennepin Power Station had two coal-fired units constructed in 1953 and 1959 with a capacity of 210 MW. The coal source changed several times since the station was constructed; however, all coal ash disposed to the West Ash Pond System is derived from Illinois coal.

DMG operated the West Ash Pond System at the Hennepin Power Station from 1952 through 1996. The impoundment consists of two units, all of which are now out-of-service. The Old West Ash Pond which includes Pond No. 1, at the eastern end of the impoundment, which primarily consists of bottom ash and slag and Pond No. 3, in the central portion of the impoundment, which contains mixed coal ash. The Old West Polishing Pond is located at the western end of the impoundment. All of the ponds are bermed. The berms, which are 15 feet above grade, were constructed from locally occurring sandy soils. The entire west impoundment covers an area of approximately 30.4 acres.

During operation, service water was used to sluice fly ash, bottom ash, and low-volume wastes to the impoundment. There was initially a surface water discharge from this impoundment which ceased after the impoundment was reworked in 1989. At the time the impoundment was removed from service in late 1996, there was no surface water discharge and all sluice water ex-filtrated via evapotranspiration, seepage through the berms, or leakage through the base of the ponds.

Coal ash sluiced to this impoundment was a by-product of high-sulfur Illinois coal. The operational history of the West Ash Pond System is as follows:

- 1952 – 1955: Construction of Old West Ash Pond, Pond No. 1. Berms constructed from locally sandy materials to an original elevation (since modified) of 457 feet.
- 1968: Construction of Old West Ash Pond, Pond No. 3. Berms were constructed to an elevation of 457 feet.
- 1979: Berms surrounding the Old West Ash Pond raised by 3 feet to elevation of 460 feet.
- 1988 – 1989: Ponds No. 1 and No. 3 within the Old West Ash Pond were consolidated and divided into primary and secondary cells, and the berm around the primary portion was raised 5 feet to an elevation of 465 feet. It was after this consolidation that surface water discharge from the impoundment ceased.
- December 1996: West Ash Pond System Ponds No. 1 and No. 3 were removed from service.

The West Ash Pond System was not capped following removal from service in order to facilitate future mining and beneficial re-use of the ash. The impoundment is partially dewatered by gravity drainage, although pumps were used to complete the dewatering process in 1998. The ash is currently dry over most of the surface through most of the year except for (i) the Old West Polishing Pond, which always contains water; and, (ii) the western end of the Old West Ash Pond, Pond No. 3, where runoff water collects and is ponded most of the year.

The ash at the surface of the Old West Ash Pond supports some vegetation. The surface topography of ash in, Pond No. 1 is uneven with no pronounced slope. The top of ash in Pond No. 3 slopes downward from the east, where the sluiced ash inlet was located, to the west. Top of ash elevation in all three ponds is lower than the surrounding berms, providing full containment. There are no controls to collect storm water so all runoff collects in the lowest portion of each pond, where it evaporates or infiltrates through the ash.

2 REGIONAL AND LOCAL GEOLOGY

2.1 TOPOGRAPHY

There are three geomorphic features dominant in the immediate vicinity of the Hennepin Power Station: an upper river terrace at an elevation of about 500 to 550 feet, a lower river terrace at an elevation of about 450 to 460 feet, and the current river valley filled with alluvium to an elevation of about 445 feet. The power station and eastern portion of the west impoundment (Old West Ash Pond, Pond No. 1) are on the narrow lower terrace between the Illinois River and the uplands. The western portion of the impoundment (most of Old West Ash Pond, Pond No. 3 and Old West Polishing Pond) overlies alluvium.

2.2 REGIONAL GEOMORPHOLOGY

The Hennepin Power Station is in the Bloomington Ridged Plain Section of the Central Lowland Province. The Bloomington Ridged Plain includes most of the Wisconsin Stage moraines and is characterized by low, broad morainic ridges with intervening stretches of relatively flat or gently rolling ground moraine. Drainage is generally in the initial stages of development, and most streams follow, and are eroding, in constructional depressions, many of which cross morainic ridges. The valleys of principal streams are large and have floodplains bordered by valley-train terraces. The Illinois River has a broad, flat-bottomed valley with steep walls and is bordered by numerous steep-walled valleys with steep gradients.

2.3 SOILS

Surficial soils at the West Ash Pond System and vicinity are shown on Figure 3, based on the soil survey performed in Putnam County in 1986 (Soil Conservation Service, May 1992). Former soils underlying the impoundment are identified as Moundprairie Silty Clay Loam, wet. The Moundprairie series soils consist of poorly drained, moderately permeable soils on floodplains. These soils formed in alluvium. This soil association is well suited for and used as habitat for wetland wildlife. These soils are unsuitable for dwellings and only moderately suitable for cultivated crops, due to shallow water table and flooding.

The area west of the Old West Polishing Pond is designated Moundprairie Silty Clay Loam, frequently flooded. Areas south of the Old West Polishing Pond and Pond No. 3 are also designated as wet or frequently flooded Moundprairie Silty Clay Loam. South of the eastern end of the impoundment (i.e. south of Pond No. 1) are several units, including: Rodman Gravelly Sandy Loam, 12 – 30% slopes; Landes Fine Sandy Loam, occasionally flooded; Ade Loamy Fine Sand, 1 – 7% slopes; and, Dakota Loam, 0 – 2 % slopes. The power station and coal pile area located east of the impoundment are classified as urban land.

2.4 BEDROCK

2.4.1 Lithology

The uppermost bedrock near the Hennepin Power Station, including the West Ash Pond System, is the Pennsylvanian Carbondale Formation (Kolata, 2005), which consists of shale with thin limestone, sandstone, and coal beds (Figure 4). The bedrock surface elevation in the vicinity of the Site is between 400 and 450 feet (Willman et al., 1967). Three deeper borings around the perimeter of the East Ash Pond System confirm the presence of shale bedrock between elevations 400 and 410. Water well logs at the power plant indicate shale bedrock at an elevation of roughly 350.

The thickness of the Pennsylvanian rocks range from 150 feet in the western part of Putnam County to more than 525 feet along the eastern margin of the county (Woller, 1976). In the vicinity of the Site, the Pennsylvanian rocks have an estimated thickness of approximately 300 to 400 feet. Beneath the Pennsylvanian rocks are Mississippian and Devonian-age interbedded layers of limestone and shale over Silurian-age dolomite. The dolomite generally ranges in thickness from 410 to 505 feet in the immediate region (Willman, 1942; Frankie, 2002). Crevassing in the unit varies widely and well yields are inconsistent.

Deeper bedrock units beneath the Silurian-age dolomite consist of the following in descending order (Woller, 1976; Frankie, 2002):

- Maquoketa Shale Group of Ordovician age, composed primarily of blue to green shales with some limestone and dolomite layers, occurs at depths of less than 1,000 feet in the northwest part of Putnam County to 1,200 feet in southern Putnam County, with a thickness generally ranging from 155 to 240 feet. This shale is an aquitard between the Silurian dolomite and deeper dolomite and sandstone aquifers.
- Ordovician age dolomite and sandstone aquifers, including the following:
 - » Galena-Platteville Dolomite Group at depths of about 1,150 feet in northwest Putnam County to about 1,400 feet in the southeast, ranging in thickness from 320 to 380 feet
 - » Glenwood-St. Peter Sandstone at depths of about 1,450 feet in west Putnam County near the site to 1,750 feet in the southeast part of the county, ranging in thickness from about 120 to 170 feet
 - » Dolomite with some shale and sandstone beds below depths of 1,750 to 1,800 feet near the site, principally consisting of the Shakopee (130 to 150 feet thick), New Richmond (approximately 165 feet thick), and the Oneota (approximately 215 feet thick) formations
 - » Cambrian age dolomite and sandstone aquifers, including the Ironton-Galesville and Elmhurst-Mt. Simon formations
 - » Precambrian age igneous and metamorphic

Based on the directory of coal mines for Putnam County (ISGS, 2006), the nearest coal mines in the vicinity of the site are located approximately 3 miles to the northeast and 4 miles to the southeast. These mines, identified as #8 and #298, are both abandoned underground shaft mines that used the longwall method of mining, essentially removing all of the coal. The #8 mine, called the Lacey Mine, was active from 1883 to 1890. The coal seam at this location ranged from 28 to 42 inches in thickness. The #298 mine, called the St. Paul Mine, and later the Prairie State Mine, operated from 1905 to 1925 and from 1930 to 1939. The coal seam at this location ranged from 42 to 66 inches in thickness.

The coal mined is called the Colchester Seam, also known as the No. 2 and LaSalle Seam. The Colchester Seam is located within the lower portion of the Carbondale Formation, which is the shallowest coal mined in the region. In the vicinity of the site, the Colchester Coal occurs at a depth of approximately 200 to 300 feet.

2.4.2 Structure

The major geologic structural features around Illinois are shown on Figure 5. The Hennepin Power Station is located within a relatively stable region of the continent within the north-central portion of the Illinois Basin. Rock units to the northeast of the Site form the La Salle Anticlinorium where folds are expressed in synclines, anticlines, arches, and monoclines present in the area (Nelson 1995; Anderson 1988). The Paleozoic bedrock strata, consisting of Pennsylvanian and older rocks, have a southwestern regional dip of approximately 15 to 30 feet per mile due to the effects of the anticlinorium. Variations to the bedrock dip occur in areas where there are local structures. The anticlinorium has subparallel anticlines, domes, monoclines, and synclines, which can change local dip and strike of bedrock units (Nelson, 1995).

2.4.3 Seismic Setting

The Sandwich Fault Zone is located approximately 35 miles northeast of the Site (Figure 5). Vertical displacement on the Sandwich Fault Zone ranges from 150 to 800 feet. The fault zone is downthrown to the northeast. Due to the depth of burial by Quaternary sediments and the lack of well or seismic data, detailed information about the fault zone is unavailable. Although depicted as a single fault on this map, evidence from surrounding counties indicates that the Sandwich Fault Zone is a complex configuration of many faults of varying direction and amount of displacement (Kolata, 1976).

The Plum River Fault Zone is a 112 mile long, east-west trending zone of high-angle faulting in east-central Iowa and northwest Illinois, roughly 60 miles northwest of the Site. The north side of the fault zone is downthrown,

with documented net vertical displacements of Silurian strata up to 270 feet. The physical relationships of Pennsylvanian deposits to the Plum River Fault Zone are not known with sufficient precision to preclude up to 33 feet of post-Pennsylvanian displacement. Historic data are inadequate to evaluate the potential for seismic hazard associated with the Plum River Fault Zone (Bunker, B.J., G.A. Ludvigson, B.J. Witzke, 1985). United States Geological Survey (USGS) seismic hazard maps show no enhanced ground acceleration in the Plum River Fault Zone vicinity.

2.5 UNLITHIFIED DEPOSITS GEOLOGY

2.5.1 General Unlithified Geology

The unlithified geologic deposits covering bedrock in the region surrounding the West Ash Pond System are derived from recent river deposition (alluvium), glacial outwash, and glacial till deposits. Total unlithified (drift) thickness ranges from 50 to 200 feet, generally becoming thicker with distance from the Illinois River southward from the impoundment. The geologic history of the Illinois River Valley was described in detail by Willman (1973), Hansel (1996), and Frankie (2002).

The Illinoian and Wisconsinan glaciers repeatedly moved over the area. The Illinois River established its present position during the Woodfordian substage of Wisconsinan glaciation, which covered the area as far south as Peoria. Wisconsinan drift lies directly on bedrock as a result of repeated Woodfordian glacial episodes eroding earlier deposits of loess and glacial drift.

During the glacial retreats from the Hennepin area, numerous moraines were deposited across the Illinois Valley. Large areas between these moraines and/or the glaciers subsequently flooded from meltwaters. One such lake was glacial Lake Illinois, which formed behind the Bloomington Moraine, crossing the Illinois River valley near Peoria. Rapid melting and drainage from this area (Kankakee Flood) deepened and widened the valley, cutting an extensive terrace at an elevation of 500 to 550 feet about 14,500 years ago. These deposits (Henry Formation) are mostly fine gravel and pebbly sand and may be as much as 150 to 200 feet thick in the large terrace on which the city of Hennepin is located (areas shown as 'gh' on Figure 6), along with the eastern (i.e. East Ash Pond System) and southeastern portion of the Hennepin Power Station property.

Another major flooded area formed behind the Tinley Moraine creating Lake Chicago. During downcutting of the Lake Chicago outlet about 3,000 years ago, the Chicago Outlet River deposited coarse gravel in bars on the eroded surfaces. The lower river terrace that underlies the eastern end of the west impoundment (Pond No. 1) includes deposits of the Chicago Outlet River. These deposits commonly occur about 20 to 40 feet above the Illinois River and may be up to about 50 feet in thickness. They are generally coarser and more uniformly sorted than the higher terrace deposits that occur immediately south of the Site.

The Illinois River is currently shallowly entrenched in glacial outwash and the Chicago Outlet River deposits. Lateral erosion by the river has developed a floodplain and deposited alluvium (Cahokia Alluvium) in abandoned channels. Alluvial deposits of the modern Illinois River consist largely of clayey silt and sandy silt with lenses of sand and gravel. The alluvium, where present, is 20 to 40 feet thick, overlying thick deposits of sand and gravel of the Henry Formation. These areas (shown as 'al' on Figure 6), are located beneath the Old West Polishing Pond, most of Pond No. 3, and areas to the west and southwest of the West Ash Pond System.

2.5.2 Detailed Site Lithology

Borings performed at the West Ash Pond System and vicinity are shown on Figure 7. Boring logs are provided in Appendix A. The four principal stratigraphic layers encountered at the West Ash Pond System and adjacent areas are:

1. Fill - coal combustion residuals (CCRs) consisting primarily of fly ash with lesser amounts of bottom ash and slag. This layer also includes the constructed fill berms around the ash ponds, which contain variable admixtures of CCRs and re-worked native silt, clay and sand
2. Alluvial fine grained silts and clays, classified as Cahokia Alluvium

3. Alluvial fine to medium sands
4. Sand and gravel with boulders, deposited by glacial meltwaters and classified as Henry Formation

The river-laid deposits are classified as Cahokia Alluvium. The Henry Formation sands and gravels make up the upper and lower terraces, and fill the valley beneath the alluvium. A fifth stratigraphic layer (Layer 5) – loamy and sandy diamicton (i.e. till) of the Wedron or Glasford Formation – was encountered at one location (Boring 32) approximately 2,560 feet (½ mile) south of the western end of the impoundment.

The stratigraphy of unlithified materials underlying the Henry Formation is uncertain, but it is assumed based on nearby borings at the power plant, East Ash Pond System, and vicinity that the Henry Formation most likely sits directly on top of bedrock in the vicinity of the West Ash Pond System. However, based on the identification of till approximately ½ mile south of the impoundment, it is possible that at some locations either till or an older sand formation, the Sankoty Sand, lies between the Henry Formation sand and gravel and bedrock.

The west impoundment lies over both glacial deposits (Henry Formation) and alluvium (Cahokia Alluvium). Pond No. 1 lies on top of lower terrace glacial deposits. The eastern portion of Pond No. 3 overlies alluvial sand, while the western portion of Pond No. 3 and the Old West Polishing Pond overlay silty clay alluvial channel fill deposits (Figure 8). Borings have been performed within the ash ponds to assess ash thickness and underlying soil types (CEC, 2016, 2017). West-east cross-section lines A-A' and B-B', and north-south cross-section lines C-C' and D-D', are shown on Figures 9 and 10, respectively.

Cross-section line A-A' through the central portion of the West Ash Pond System begins at Boring 34 (west of the impoundment) with silty and organic alluvial clays (Layer 2) that are 26.5 feet thick and underlain by over 11 feet of fine to medium grained alluvial sands (Layer 3). At the west end of the Old West Polishing Pond (Boring 21) are approximately 10 feet of CCRs (Layer 1) underlain by 34 feet of clay and silt (Layer 2) and greater than 8 feet of fine sand (Layer 3). At the west end of Pond No. 3 at Boring L1 there are 25 feet of CCRs underlain by more than 17 feet of silty clay and silt deposits of Layer 2. In the center of Pond No. 3 at Boring L3 there are 14.5 feet of CCRs underlain by 10.5 feet of fine sand (Layer 3) and greater than 25 feet of sand and gravel (Layer 4). The east end of Pond 3 contains 17 to 18 feet of CCRs underlain by 9 feet of silty clay and clayey silt at Boring L5 (Layer 2) and at least 1.5 feet of clayey silt and silty fine sand (Layer 3) at Boring A3, underlain by sand and gravel (Layer 4). The center of Pond No. 1 (Boring L2) has 25 feet of CCRs underlain by 3.5 feet of fine silty sand (Layer 3) and greater than 17.5 feet of gravel with sand (Layer 4).

West-east cross-section line B-B', located south of the ash impoundment, has a similar areal and vertical lithology to line A-A' with the exception that there is no Layer 1 with CCRs. The west end at borings 33 and 27 has thick silty clay and clayey silt deposits (Layer 2) ranging in thickness from 24 to 35 feet, underlain by up to 9 feet of silty, fine to medium sand (Layer 3), and sand and gravel (Layer 4). Moving eastward, Layer 2 is absent at borings 30/31 and Layer 3 is 17 feet thick above Layer 4. At borings 25/26 there is 4 feet of sandy silt (Layer 2) and no Layer 3 above the sand and gravel of Layer 4. Finally, at Boring 36, which is located south of the eastern end of the West Ash Pond System, there are 4 feet of silt (Layer 2) and 6 feet of fine sand (Layer 3) above the sand and gravel of Layer 4.

Cross-Sections C-C' and D-D' both show the thick CCR and fill deposits along the west and central portions of Pond No. 3, respectively, which are underlain by 17 to 25 feet of silty clay and clay of Layer 2. Layer 3 (fine to medium sand) is 8 feet thick at borings 24/L4 on the west side of Pond No. 3 and ranges from 0 feet closer to the river to 10.5 feet thick beneath the middle of Pond No. 3. South of the impoundment at borings 30/31 (cross-section C-C') and borings 25/26 (cross-section D-D') there is no Layer 2 present at borings 30/31 and a 4 foot thickness at borings 25/26. Layer 3 is 17 feet thick at borings 30/31 and is absent at borings 25/26, where Layer 2 lies directly above Layer 4.

3 REGIONAL AND LOCAL HYDROGEOLOGY

3.1 BEDROCK – REGIONAL AND LOCAL

The Pennsylvanian rocks in the region are not considered a municipal or subdivision water supply source (Gibb, 1979). Water-bearing openings are extremely variable from place to place and are best developed near the surface in thin limestones and sandstones, when present within the predominantly shale formation. In the bedrock upland areas away from the Illinois River, farm and domestic water supplies are obtained locally from sandstone and creviced limestone in the upper 250 feet of these rocks (Woller, 1976). When present, the limestone and sandstone units yield less than 10 gallons per minute (gpm) (Visocky et. al, 1985). Water quality within the bedrock varies considerably and it becomes highly mineralized with increasing depth. As a result, the Pennsylvanian bedrock is not a reliable source of groundwater.

The Pennsylvanian rocks generally have low porosity and hydraulic conductivity. The porosity of shale typically ranges from 1 to 20 percent (Walton, 1988). Representative horizontal hydraulic conductivity for shale typically ranges from 5×10^{-6} to 5×10^{-10} centimeters per second (cm/s). Representative vertical hydraulic conductivity ranges for shale are 5×10^{-8} to 5×10^{-12} cm/s (Walton, 1988).

Recharge to the Pennsylvanian rocks is derived locally from vertical leakage through the glacial drift and other unlithified materials that are in turn recharged from precipitation.

Deeper bedrock units beneath the Pennsylvanian rocks and their water-bearing properties (Woller, 1976) are as follows:

- Silurian dolomite, which may provide water to wells in moderate quantities from cracks and crevices, but is too mineralized for most uses.
- Maquoketa Group of Ordovician age composed of non-water-bearing shales and acts as an aquitard between the Silurian dolomite and deeper water-bearing units.
- Cambrian-Ordovician Aquifer (a/k/a Midwest Bedrock Aquigroup), composed of the Ironton-Galesville aquifer at the base of this group up through the Glenwood-St. Peter Sandstones. These formations are the major bedrock aquifer and principal water producing zones in the region capable of yielding moderate quantities of groundwater (Visocky et. al, 1985).

In the region surrounding the site, these bedrock aquifers provide municipal water supply sources. The villages of Granville and Standard, about five miles southeast of the Site, both obtain their water supply from the Galena-Platteville Dolomite and Glenwood-St. Peter Sandstone, with wells ranging in depth from 1,740 to 1,793 feet. Pumping rates range from about 60 to 150 gpm.

As noted earlier, the Pennsylvanian-age Carbondale Formation defines the base of the unlithified deposits (and uppermost aquifer) underlying the West Ash Pond System and is regarded as the first confining unit beneath the uppermost aquifer. Water well logs at the power plant indicate shale bedrock at an elevation of roughly 350. In the vicinity of the Hennepin Power Station the Pennsylvanian rocks have an estimated thickness of approximately 300 to 400 feet. The Pennsylvanian rocks of this area contain little or no usable water and are seldom considered for even domestic water supply purposes due to generally low effective porosity and hydraulic conductivity (Gibb, 1979).

3.2 UNLITHIFIED DEPOSITS - REGIONAL

Regional groundwater flow in the unlithified deposits above the shale bedrock discharges into the Illinois River. Depth to the water table is typically greater than 20 feet below ground surface around the Site. The water table elevation can vary significantly, depending on the river stage. During flood stages, exfiltration from the river may temporarily recharge groundwater close to the river and the water table beneath the West Ash Pond System and adjacent areas of the floodplain may rise to levels mimicking river elevations.

The Henry Formation deposits have high hydraulic conductivity compared to the underlying bedrock. Pump test and specific capacity data were obtained for five high capacity industrial and municipal wells screened in the unlithified deposits along the Illinois River within several miles of the Hennepin Power Station (ISWS, 1989). Hydraulic conductivity of the Henry Formation sand and gravel ranged from 5×10^{-2} cm/s to 3×10^{-1} cm/s, with a median of 1×10^{-1} cm/s. Pumping rates ranged from 125 to 1,570 gpm and the tests were conducted over periods ranging from 30 minutes to 24 hours. Effective porosity typically ranges from 20 to 35 percent for poorly sorted sand and gravel alluvial deposits (Walton, 1988; Fetter, 1980).

Hydraulic conductivity of the alluvial deposits, generally consisting of lower permeability materials (i.e. silt, silty sand, and clay), will typically be several orders of magnitude lower than the more permeable outwash sand and gravel deposits of the Henry Formation. However, no published regional data is available specifically for the shallow alluvial deposits. Silt, clay, and mixtures of sand, silt, and clay typically have horizontal hydraulic conductivity ranging from 10^{-4} to 10^{-7} cm/s (USDI, 1981; Fetter, 1980).

3.3 UNLITHIFIED DEPOSITS – SITE SPECIFIC

The four water-bearing layers encountered at the West Ash Pond System and adjacent areas are: (1) Fill (Unit 1) - CCRs, consisting primarily of fly ash with lesser amounts of bottom ash and slag; (2) fine grained silts and clays (Cahokia Alluvium); (3) fine to medium sands (Cahokia Alluvium); and, (4) sand and gravel with boulders (Henry Formation). The Cahokia Alluvium and Henry Formation together comprise the uppermost aquifer (Unit 2) at the West Ash Pond System and extend from the water table to the bedrock. The underlying shale bedrock has low hydraulic conductivity and defines the lower boundary of the uppermost aquifer. The till is also a confining unit and rests unconformably on top of the shale bedrock; however, the closest this unit has been observed relative to the impoundment is approximately ½ mile south of the Old West Ash Polishing Pond.

Lithologic Layers/Sublayer		Hydrogeologic Unit Designation		
ID	General Description	ID	Name	Description: Materials
1a	Mixed Fill, Sand, Silt, Clay	1	Fill Unit	Coal Combustion Residuals: Fly Ash, Bottom Ash, Slag
1b	Old West Ash Ponds No. 1 and No. 3 – Fill – Coal Combustion Residuals and Constructed Berms			
2	Alluvial Silts and Clays (Cahokia Alluvium)	2	Uppermost Aquifer Unit	Mixed Alluvial Deposits: Clay, Silt, and Sand
3	Alluvial Sands (Cahokia Alluvium)			Outwash Deposits: Sand and Gravel
4	Glacial Outwash – Sand and Gravel (Henry Formation)			
5	Till – Loamy and Sandy Diamictons (Wedron or Glasford Formation)	3	Till Confining Unit	Silty Clay with Trace Sand
6	Pennsylvanian Bedrock (Carbondale Formation)		Bedrock Confining Unit	Shale, Minor Limestone and Sandstone, Coal

*Till identified at one location – boring for monitoring well 32, located approximately 2,560 feet south of West Ash Pond System. No till identified beneath or within 2,500 feet of impoundment.

As previously discussed, the Henry Formation sand and gravel and the alluvial sands are very permeable, while the alluvial silts and clays have relatively low permeability.

3.3.1 Water Table Elevation and Groundwater Flow

Monitoring wells installed at the West Ash Pond System are shown on Figure 11. Well construction details are provided in Appendix A and summarized on Table 1.

Groundwater elevation data is available beginning in 1993. The Illinois River is the local and regional groundwater discharge area under normal river stage. River stage is usually lowest during the months of August through October. During normal river stage, a slight groundwater mound occurs within the West Ash Pond

System with radial flow north toward the river as well as flow to the southwest that eventually discharges into the river west of the impoundments. Surface water elevations are managed within the conservation area (Donnelley WMA) located west and southwest of the impoundment. Wells 32, 33, and 34 are within the conservation area. The water table contour map for December 10, 2013 (Figure 12) is representative of groundwater flow conditions during normal Illinois River stage elevation of approximately 441 ft.

The river basin experiences annual spring flooding during the months of March, April, May, and sometimes June, while lesser flooding occasionally occurs during autumn. River stage during high precipitation and/or flood events seasonally rises above adjacent groundwater elevations and in low lying areas of the floodplain, particularly within the Donnelley WMA at wells 32, 33, and 34. During these events, the river temporarily recharges the aquifer and groundwater flow direction close to the river reverses. Horizontal gradients across the Site become flat. The water table contour map for March 18, 2015 (Figure 13) is representative of groundwater flow conditions during flood stage, with an approximate river elevation of 446 ft. These groundwater flow reversals are limited in duration and extent.

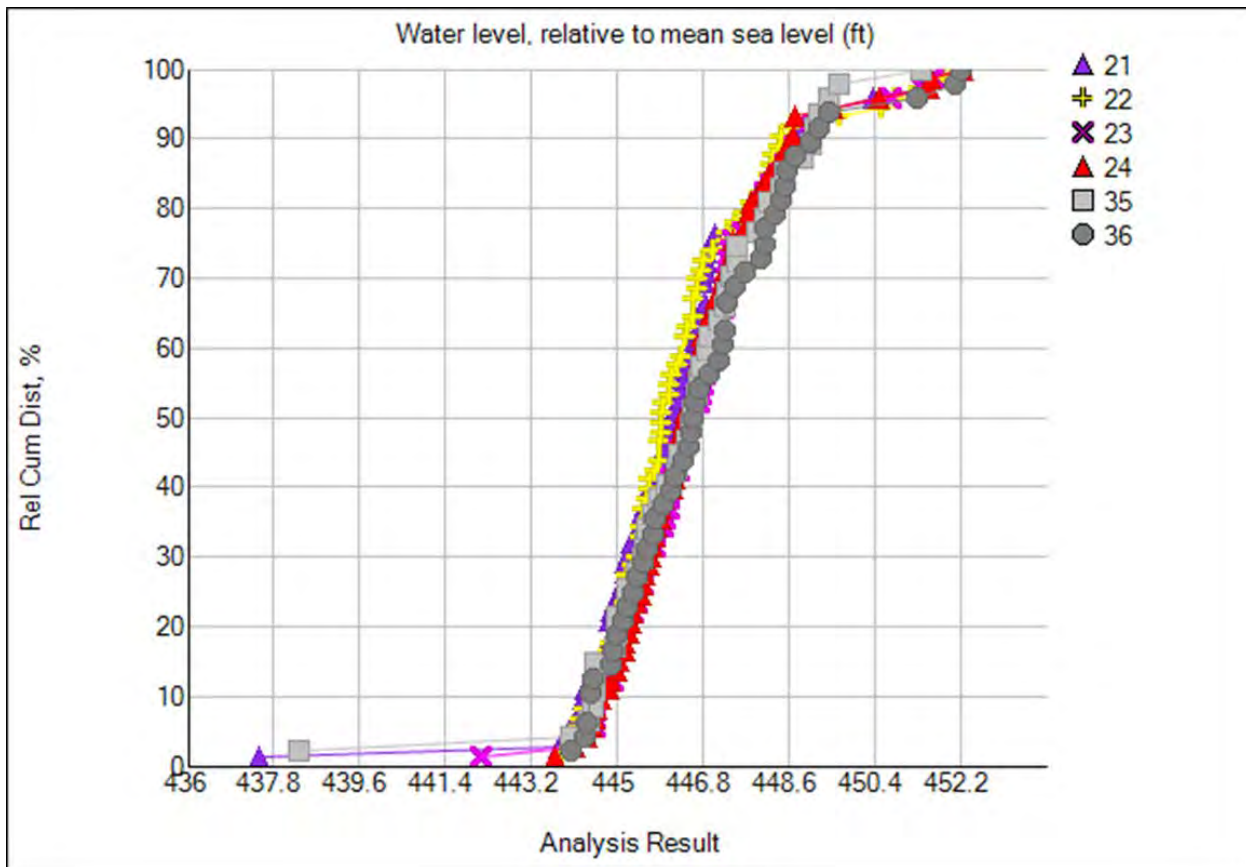
Horizontal hydraulic gradients from the West Ash Pond System to off-site areas ranges from 0.001 foot per foot (ft/ft) during Illinois River flood stage to about 0.005 ft/ft during normal river stage.

Appendix B provides additional water table contour maps prepared for the Closure Work Plan Annual Reports during the years 2013 through 2016.

3.3.2 Saturated Ash

Soil boring logs performed within Pond No. 1 and Pond No.3 (CEC, 2017) indicate the base of the ash is variable but generally rises from west to east. The ash elevation is as low as approximately 441 feet at the west end of Pond No. 3 and rises to 447 feet in the northeast portion of Pond No. 1 (Figure 8).

The Illinois River and the sand and gravel aquifer underlying the West Ash Pond are hydraulically connected. Groundwater hydrographs recorded on the south berm of East Ash Pond No. 2 (Hennepin East Ash Pond System) show that groundwater elevations respond rapidly to higher river elevations associated with major flood events (STMI, June, 1996). As shown in the graph below, the average measured groundwater elevation at the West Ash Ponds (50% occurrence) is 446.3 ft based on 23 years of monitoring data. Ninety percent of measured groundwater elevations (10% occurrence) occur at and below 449.2 ft. The highest groundwater elevations observed have averaged about 451.5 ft.



The above recurrence interval of groundwater elevations is biased low because the monitoring wells are measured on a quarterly basis and measurement dates may not coincide with maximum river flood events.

Based on the above, it can be anticipated that a large portion of the West Ash Pond System base elevations will become saturated when groundwater levels rise to the 10% recurrence interval elevation of 449.2 ft. Illinois River flood elevations are discussed further in Section 3.4.

3.3.3 Hydraulic Conductivity

3.3.3.1 Field Hydraulic Conductivity

Based on the field permeability tests and calculations on seven wells at the West Ash Pond System (Table 2), hydraulic conductivity ranges from 1.2×10^{-2} cm/s for the most permeable gravel deposits of the Henry Formation to 1.3×10^{-4} cm/s for the least permeable deposits (silt) of the of the Cahokia Alluvium. The geometric mean hydraulic conductivity of wells finished in sand and/or gravel (alluvial or glacial) is 6.0×10^{-3} cm/s. The geometric mean hydraulic conductivity of wells finished only in gravel (i.e. Henry Formation) is 1.7×10^{-2} cm/s. The lowest permeability occurred in the alluvial silt, with a hydraulic conductivity of 1.3×10^{-4} cm/s. The hydraulic conductivity test analysis and results are provided in Appendix C1.

Pump test data from the fire well installed at the power plant in 1968 was also available to estimate the permeability of the Henry Formation. This fire well is located at the southwest corner of the plant and was drilled to a depth of 112 feet, terminating on shale. The lower 30 feet of the well is screened within unlithified deposits. The well log is contained in 'Water Well Survey' (Kelron/NRT; June 3, 2009). The pump test hydraulic conductivity result reported by Mathes (1983) was 1.3×10^{-1} cm/s (Table 2).

3.3.3.2 Laboratory Hydraulic Conductivity

Two samples were collected by AECOM for laboratory hydraulic conductivity tests (ASTM D 5084). HEN-B010 was located on the south berm of Pond 3. HEN-B017 was located on the west berm of the Old West Polishing Pond.

Sample Location	Sample Depth (ft bgs)	Description	Hydraulic Conductivity (cm/sec)
HEN-B010	10.0 ft – 11.5 ft	Very dark gray fly ash with sand and gravel	1.16×10^{-5}
HEN-B017	5.0 ft – 7.0 ft	Very dark gray lean clay with sand	6.79×10^{-7}

Laboratory hydraulic conductivity test results are provided in Appendix C2. Other geotechnical test results on soil samples are provided in Appendix D.

3.3.3.3 Groundwater Velocity

Groundwater velocity was calculated in the vicinity of the West Ash Pond System under normal flow conditions where the aquifer discharges to the Illinois River using the following formula:

$$\text{velocity} = \frac{(\text{hydraulic conductivity}) (\text{hydraulic gradient})}{\text{effective porosity}}$$

For representative conditions existing in June and September, 2013 the calculated velocities were as follows:

Flow Path	Average Hydraulic Conductivity (cm/sec)	Hydraulic Gradient	Effective Porosity	Velocity (ft/day) ⁽¹⁾
Well 21 to Well 34	1.7×10^{-2}	0.005	0.22	1.1
Well 21 to Well 34	6.0×10^{-3}	0.001	0.22	0.1
Well 27 to Well 33	6.0×10^{-3}	0.005	0.22	0.4
Well 27 to Well 33	1.7×10^{-2}	0.001	0.22	0.2

⁽¹⁾ cm/sec x 2,835 = feet/day

For the range in hydraulic conductivities and hydraulic gradients observed, the calculated velocities away from the impoundment range from 0.1 to 1.1 ft/day (37 to 401 ft/yr).

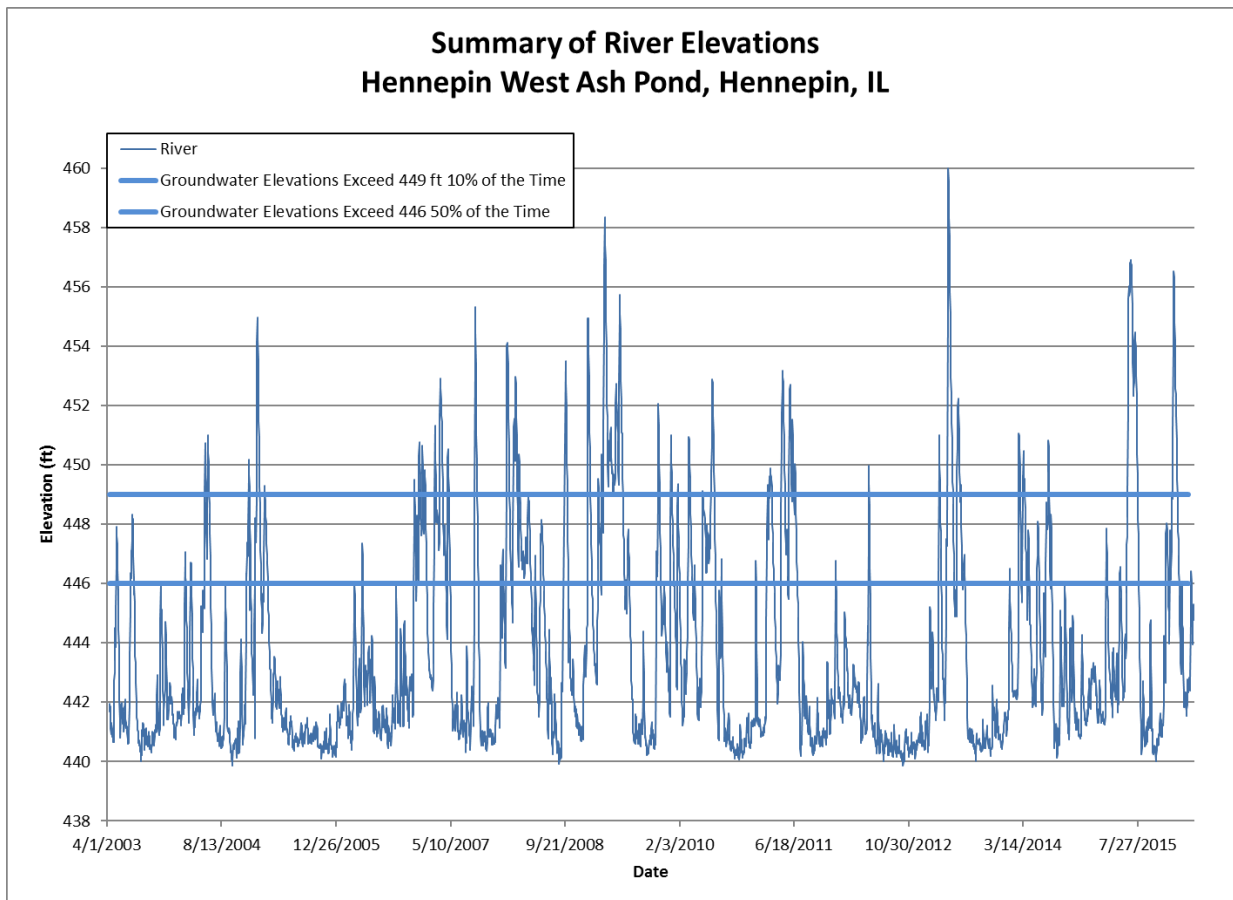
3.3.4 Groundwater Classification

Per Illinois Administrative Code (IAC) Title 35, Section 620.210, groundwater within the Uppermost Aquifer at the West Ash Pond System meets the definition of a Class I, Potable Resource Groundwater based on the following criteria:

- Groundwater in the uppermost aquifer extends 10 feet or more below the land surface
- Hydraulic conductivity exceeds the 1×10^{-4} cm/s criterion (Table 2)

3.4 SURFACE WATER HYDROLOGY

The predominant surface water body in the region is the Illinois River and associated lowland backwater lakes. The Illinois River is located directly adjacent to and down-gradient from the West Ash Pond System under normal flow conditions. River elevation data collected at Hennepin Power are shown below for the period 2003 through 2016.



Bordering the north perimeter of the west impoundment, the river has a normal pool elevation of about 441 ft. A FEMA Flood Insurance Rate Map for Putnam County (Map No. 17155C0015E; Effective Date: February 4, 2011) is attached in Appendix E and can also be viewed online at: http://www.illinoisfloodmaps.org/DFIRMpdf/putnam/putnam_fin_0025.jpg.

The base flood elevation value of 462 feet is located through the center of the Old West Ash Pond's Pond No. 3. As identified on the 2011 FEMA map, the floodway boundary encompasses the entire area of the Old West Ash Pond except for Pond No. 1. However, the berms of the impoundment were raised in 1979 and 1988-1989, with only the Old West Polishing Pond remaining subject to flooding at the 462 foot elevation. The flood hazard areas shown on the map are defined as those areas subject to inundation by the 1% annual chance flood (i.e. 100-year flood), also known as the base flood, that has a 1% chance of being equaled or exceeded in any given year.

3.5 WATER WELL SURVEY

A comprehensive water well survey was conducted by NRT and Kelron (2009a) for a 2,500-foot radius around the entire Hennepin Power Station property boundary, inclusive of the West Ash Pond System (Appendix F). Based on State of Illinois records obtained from the Illinois EPA, Illinois State Geological Survey (ISGS), and Illinois State Water Survey (ISWS) there are only two wells located outside of the Hennepin Power Station property boundary and within 2,500 feet of the West Ash Pond System. The two wells, constructed in 1844 and 1922 to depths of 30 and 17 feet bgs, respectively, according to State of Illinois records, have been verified and were most likely abandoned decades ago. There are no homes, farms or other potential users present at the two locations. There are also no public water supply (PWS), community water supply (CWS) or non-CWS wells or wellhead protection areas (WHPAs) within 2,500 feet of the West Ash Pond System.

Within the plant property boundary, and within 2,500 feet of the West Ash Pond System, there are four wells owned by DMG, all of which are non-potable and non-contact industrial wells.

An assessment of the potential for groundwater impact to water wells, as identified in the water well survey (NRT and Kelron, 2009b) demonstrated that there are no existing off-site water wells, potable or non-potable, that are likely to be impacted by groundwater from the West Ash Pond System or the Hennepin Power Station.

4 GROUNDWATER QUALITY

4.1 SUMMARY OF GROUNDWATER MONITORING ACTIVITIES

4.1.1 Groundwater Monitoring – Illinois EPA Closure Work Plan

Groundwater sampling at the West Ash Pond System was initiated in 1983; however, consistent data collection began in 1996 in accordance with the Closure Work Plan approved by the Illinois EPA on November 8, 1996. The 1996 Closure Work Plan required DMG to sample groundwater quarterly at the West Ash Pond System and to submit the data in an annual report. Requested modifications to the 1996 Closure Work Plan were approved by the Illinois EPA on January 27, 2005 and included the following:

- Reduce monitoring frequency for wells on a quarterly schedule to semiannually;
- Reduce reporting of data to the Illinois EPA on disc to semiannually; and,
- Remove parameters from the monitoring program that do not have a groundwater standard, with the exception of water elevation.

The current Illinois EPA groundwater monitoring program consists of collecting samples from 3 background wells (32, 33, 34) and 9 downgradient wells (21 through 27, 30, 31). Samples are collected semi-annually except for background wells 33 and 34, which are sampled annually. Groundwater samples are analyzed for the following parameters:

Field Parameters		
Ph	Temperature	
Specific Conductivity	Groundwater Elevation (ft)	
Laboratory Parameters		
Boron (Dissolved)	Iron (Dissolved)	Sulfate (Total)
Chloride (Total)	Manganese (Dissolved)	Total Dissolved Solids (TDS)

Time concentration plots showing the results of the above monitoring are provided in Appendix G1. Four additional monitoring wells (L3, L5, 35 and 36) have been monitored periodically for groundwater elevation only. The monitoring well locations are shown on Figure 11.

Groundwater monitoring results are reported to the Illinois EPA annually in accordance with the approved Closure Work Plan. The most recent data and analysis were submitted in '2016 Closure Work Plan Annual Report (NRT, October 21, 2016).

Additional groundwater monitoring was initiated for four quarters (June [Q2] 2013 through March [Q1] 2014) at the above 12 well locations to assess compliance with the IAC 35 Part 620 Section 410 *Groundwater Quality Standards for Class I: Potable Resource Groundwater*. Sampling was conducted for an expanded list of parameters that included the following:

Field Parameters	
Ph	Temperature
Specific Conductivity	Turbidity

Laboratory Parameters			
Inorganics (Total)			
Chloride	Fluoride	Nitrite	Sulfate
Cyanide	Nitrate	Perchlorate	TDS
Metals (Total and Dissolved)			
Antimony	Cadmium	Lead	Silver
Arsenic	Chromium	Manganese	Thallium
Barium	Cobalt	Mercury	Vanadium
Beryllium	Copper	Nickel	Zinc
Boron	Iron	Selenium	
Organic Compounds			
Volatile Organic Compounds	Polychlorinated Biphenyls (PCBs)		
Semi-Volatile Organic Compounds	Specialized Organic Parameters: Endohall, Ethyl Dibromide (EDB) and		
Chlorinated Pesticides	1,2-Dibromo-3-Chloropropane (DBCP)		
Chlorinated Herbicides			

The groundwater quality results for the above field, inorganic and organic parameters listed in IAC 35 Part 620 Section 410 (except for Radium 224/226) for the four quarters of monitoring are provided in Appendices F2 and F3, respectively.

4.1.2 40 CFR Part 257 Monitoring

Groundwater data collection under the CCR Rule was initiated in fourth quarter, 2015. The CCR Rule monitoring network consists of background/upgradient monitoring wells 32 and 34, and downgradient monitoring wells 21, 22, 23, 24, 35, and 49. Monitoring well 49 was installed by NRT in July, 2015 (Appendix A3) on the north berm of Old West Ash Pond to supplement the CCR Rule groundwater monitoring network. Monitoring of this well commenced in 2016. Parameters tested under the initial CCR Rule groundwater monitoring requirements include Appendix III and Appendix IV parameters (see below). All existing groundwater monitoring wells are measured at least annually for groundwater elevation.

40 CFR Part 257 Monitoring			
Appendix III Parameters (Total, except TDS)			
Boron	Chloride	pH	TDS
Calcium	Fluoride	Sulfate	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lead	Selenium
Arsenic	Chromium	Lithium	Thallium
Barium	Cobalt	Mercury	Radium 226/228
Beryllium	Fluoride	Molybdenum	
Field Parameters			
Dissolved Oxygen	Specific Conductivity	Turbidity	pH

Data collected under the CCR Rule groundwater monitoring program will be available when CCR reporting begins in January 2018. Following the completion of eight quarterly sampling events, the monitoring program will be modified so that the analytical parameters and sampling frequency are appropriate to the objectives and requirements of the CCR Rule.

4.2 GROUNDWATER MONITORING RESULTS AND ANALYSIS – ILLINOIS EPA CLOSURE WORK PLAN PARAMETERS

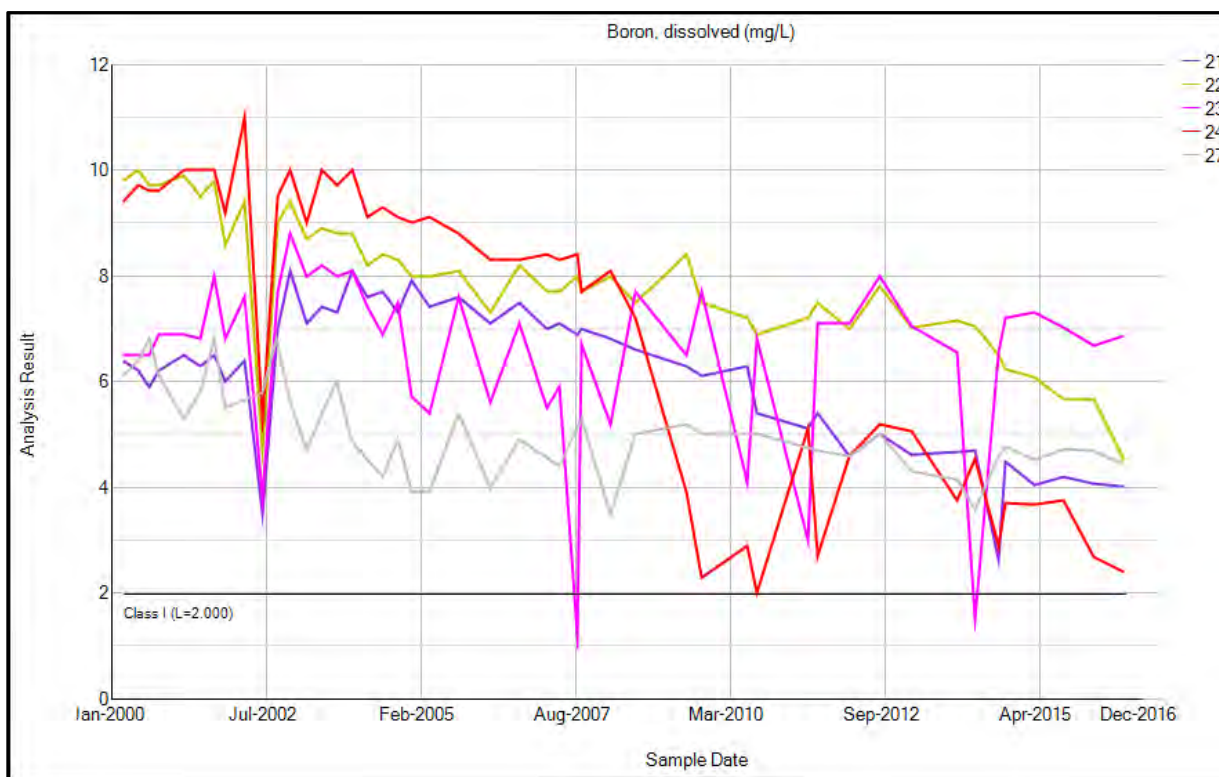
A summary of the number of groundwater quality exceedances at each well, and the date of the last exceedance, are provided in Table 3. The parameters observed in groundwater with exceedances of Class I standards during the most recent 2016 Closure Work Plan sampling event included boron, iron, manganese and sulfate. Time

versus parameter concentration plots for the Illinois EPA parameters over the period 2005 through 2016 are provided in Appendix G1. These parameters are discussed in greater detail below.

4.2.1 Boron

Boron is a primary indicator parameter for CCR leachate impacts on groundwater quality. Boron exceeds the 2 milligrams per Liter (mg/L) standard at 5 of the 12 monitoring wells as shown on Figure 14. Exceedances occur in wells 21 through 24 on the West Ash Pond System berms and well 27, located south of the Old West Polishing Pond. None of the other monitoring wells have had a boron exceedance since 1996, or prior to the removal of the west impoundment from service.

Boron concentrations in downgradient monitoring wells 21 through 24 and 27 have been trending downward (see Table 4 and graph below) since the impoundment was removed from service in 1996. For the period of January 2000 – September 2016, the five downgradient wells have had downward (i.e. negative) concentrations trends:



4.2.2 Sulfate

Sulfate is also a primary indicator parameter of CCR leachate impacts on groundwater quality. Since the impoundment was removed from service in 1996, sulfate concentrations at the five downgradient wells (21 through 24 and 27) have been trending downward (see graph below) and decreased from their peak by 22 to 69 percent (Table 4). Exceedances of the Class I groundwater standard for sulfate are continuing to be observed at well 23 between the river and the impoundments. Sulfate concentrations in the four wells to the south (wells 25, 26, 30, and 31) have also declined by 38 to 54 percent from their peak (i.e. post-1996) concentrations.



4.2.3 Iron

Iron is a redox-sensitive parameter that typically has low concentration in oxic groundwater and elevated concentration in reduced groundwater. Iron concentrations greater than 1 mg/L in neutral pH groundwater are indicative of strongly reduced conditions.

Iron concentrations in wells 22 and 23 are typically lower than 0.2 mg/L, indicating oxic conditions are prevalent at these monitoring points. Conversely, iron concentrations were typically greater than 2 mg/L in monitoring wells 21 and 34, indicative of persistent strongly reducing conditions. Other wells had variable iron concentrations, indicating that redox conditions varied over the course of the year. Well 25 had its only recorded exceedance in June 2013 during a period of flooding along the Illinois River. Other wells (22, 23, 26, 27, 30, 31, 32) also had unusually high iron concentrations during this period, suggesting that flood conditions affected geochemical conditions and iron concentrations,

Iron has been monitored since 1995. Concentrations higher than the Class I standard were frequently observed at wells 24 (1995 through 2000), 33 (through 2013), and 34 (through 2016), and there was only one exceedance in another monitoring well, well 26 in 2005. Based on concentrations before and after the exceedance at well 26, this value appears to be an outlier (Table 3). These observations indicate that the exceedance observed in well 25 in Q2 2013 likely represents an unusual event, while the exceedances in background wells 33 and 34 are normal.

Elevated concentrations of iron do not correlate to the CCR leachate indicator parameters of boron and sulfate, and are not caused by a release from the West Ash Pond System. The observed variability in iron concentrations in groundwater sampled from different parts of the area are controlled by variations in groundwater geochemistry rather than a release from the West Ash Pond System.

4.2.4 Manganese

Like iron, manganese is controlled by geochemical conditions, and its concentration distribution in groundwater is not due to a release from the West Ash Pond System. Elevated concentrations of manganese do not correlate

to CCR leachate indicator parameters boron and sulfate. Exceedances of the manganese Class I groundwater quality standard (0.15 mg/L) occurred in 2016 at downgradient monitoring well 23 as well as south wells 27 and 31 and background well 34.

These highly variable manganese concentrations are due to variable geochemical conditions rather than a release from the West Ash Pond System. Detailed discussions of the manganese geochemistry in wells at the West Ash Pond System are provided in the EPRI manganese research report submitted to the Illinois EPA on November 6, 2002 (EPRI, 2002).

4.2.5 pH

Median pH values at all 12 monitoring wells range from 6.88 to 7.71. There have been no exceedances of Class 1 Groundwater upper (pH 9.0) or lower (pH 6.5) standards at any monitoring wells since 2010 (Table 5).

4.2.6 TDS

Total Dissolved Solids (TDS) concentration trends generally mirror those of sulfate, which is a major anion that affects TDS concentrations. None of the wells monitored have exhibited a TDS exceedance of Class I standard (1,200 mg/L) since 1993, prior to closure of the West Ash Pond System in 1996 (Table 3).

4.2.7 Chloride

Chloride has not exceeded the 200 mg/L Class I standard in 19 years of monitoring except in one well in one sampling event. This exceedance occurred in 2013 (Table 3) and is an anomaly unrelated to any groundwater quality impacts attributable to the West Ash Pond System.

4.3 GROUNDWATER MONITORING RESULTS AND ANALYSIS – IAC 35 PART 620.410 PARAMETERS

Of the additional inorganic parameters monitored in 2013 and 2014, arsenic and selenium were detected above Class I groundwater quality standard in downgradient wells and may be related to CCRs. Arsenic also occurs in a background well and selenium was observed only one time at one well. Nitrate and lead exceedances occurred in background and/or south monitoring wells and are not related to CCR leachate. These parameters are discussed in greater detail below

4.3.1 Arsenic

Arsenic concentrations exceeded the Class I standard of 0.01 mg/L at three wells: downgradient wells 21 and 24, with maximum concentrations of 0.0104 and 0.030 mg/L, respectively, and background well 33 had one exceedance with a concentration of 0.017 mg/L (Appendix G2). These three wells also had relatively high iron concentrations. High iron concentrations are indicative of reduced redox conditions in groundwater, and arsenic concentrations in groundwater can be naturally-occurring under these conditions. The arsenic concentration in background well 33 represents a naturally occurring condition. The two other downgradient monitoring wells (22 and 23), where iron concentrations are relatively low, suggesting less-reducing or perhaps oxic conditions, had arsenic concentrations below the method detection limit (MDL) during all four quarters. These observations suggest that the arsenic observed in wells 21 and 24 are naturally occurring rather than due to arsenic release from the West Ash Pond System.

4.3.2 Selenium

All samples analyzed from 12 monitoring wells during the four sampling events were below the MDL of 0.04 mg/L except in the December 2014 groundwater sample from well 24, located adjacent to the impoundments (Appendix G2). The observed concentration of 0.073 mg/L exceeded the Class I standard of 0.05 mg/L. This isolated detection near the detection limit indicates selenium is not a constituent of concern.

4.3.3 Lead

Out of 47 groundwater samples collected from 12 monitoring wells during the four sampling events, lead was detected once above the MDL (0.0075 to 0.008 mg/L) in the June 2013 groundwater sample from south monitoring well 25 at a concentration of 0.009 mg/L (Appendix G2). The Class I standard for lead is 0.0075 mg/L. Groundwater sampled during the June 2013 event at this well also had unusually high concentrations of

iron and manganese. The one-time lead exceedance at well 25 is related to geochemical changes in groundwater because of flooding along the Illinois River. The West Ash Pond System was not the source of lead observed in this sample.

4.3.4 Nitrate

Nitrate concentrations in groundwater exceeded the Class I standard of 10 mg/L at south monitoring wells 25 and 26 during at least one quarterly sampling event, with maximum concentrations of 12.2 and 15.1 mg/L (Appendix G2). Nitrate occurrence in groundwater at the West Ash Pond System is related to widespread use of nitrogen fertilizers upgradient of the site. Nitrate is a widespread and nonpoint source of contamination to shallow groundwater in the region and is not related to CCRs at the West Ash Pond System.

4.3.5 Other Inorganic Water Quality Parameters

None of the inorganic parameters listed in IAC 35 Part 620.410 monitored in 2013-2014 (Appendix G2) and not discussed above have exceedances of Class I groundwater standards that occur at downgradient monitoring wells at detectable or significant concentrations, or have concentrations in downgradient wells that can be attributed to CCR-impacts related to the West Ash Pond System. These parameters include the following:

4.3.5.1 Fluoride

No groundwater samples at any of the monitoring wells exceeded the Class I groundwater standard of 4 mg/L. Fluoride concentrations in the downgradient, south, and background monitoring well groups were within a similar range. Fluoride concentrations in groundwater in the vicinity of the West Ash Pond System are naturally occurring and not related to CCRs.

4.3.5.2 Cyanide (Total)

Cyanide was detected twice at the detection limit in the December 2013 and March 2014 groundwater sample from downgradient monitoring well 24 at a concentration of 0.008 and 0.007 mg/L, respectively. The Class I standard for cyanide is 0.2 mg/L. Cyanide is not a constituent of concern.

4.3.5.3 Perchlorate

Perchlorate was analyzed during the first quarterly sampling event, conducted in June 2013. Perchlorate was not detected at concentrations above the MDL of 0.004 mg/L. The Class I groundwater standard for perchlorate is 0.0049 mg/L. Perchlorate is not a constituent of concern.

4.3.6 Trace Elements

The following parameters were not detected above their MDL during the 2013 and 2014 sampling events:

Parameter	Method Detection Limit (MDL) (mg/L)	Class I Groundwater Standard (mg/L)
Antimony	0.005	0.006
Beryllium	0.001	0.004
Cadmium	0.002	0.005
Chromium	0.01	0.1
Cobalt	0.01	1.0
Copper	0.01	0.65
Mercury	0.0002	0.002
Silver	0.01	0.05
Thallium	0.002	0.002

Of the 47 samples collected, the following parameters were detected above their MDLs during the 2013 and 2014 sampling events. None of these parameters exceeded their Class I groundwater standards.

Parameter	Number of Detections	Maximum Concentration Detected (mg/L)	Class I Groundwater Standard (mg/L)
Barium	47	0.20	2.0
Nickel	1	0.0127	0.1
Vanadium	1	0.011	0.049
Zinc	9	0.048	5.0

4.3.7 Organic Water Quality Parameters

Organic water quality parameters listed in IAC Part 620, Section 410 were sampled and analyzed in all four quarters at the 12 monitoring wells. Laboratory analytical results for groundwater samples are summarized in Appendix G3. A summary of all detected organic parameters is listed by monitoring well and date in the table below. Although a few organic parameters were detected at eight of the twelve monitoring wells, there were no exceedances of the Class I groundwater standards and over 50 percent of the detected parameters were below quantitation limits (i.e. J-flag on the lab report). When detected, the parameters concentrations were well below Class I groundwater standards.

Detected Organic Parameters (mg/L)

Well Number	Parameter	Class I Standard (mg/L)	Q1 (June 2013)	Q2 (Sept. 2013)	Q3 (Dec. 2013)	Q4 (March 2014)
Background Monitoring Wells						
32	Acetone	6.3	-	0.007 J	-	-
	Atrazine	0.003	0.0001 J	-	0.00006 J	-
	Naphthalene	0.14	-	-	0.00013	-
	1,4-Dioxane	0.0077	-	-	-	0.00068 J
33	Acetone	6.3	-	0.007 J	-	-
	Atrazine	0.003	-	0.0002	-	-
	Naphthalene	0.14	0.00011	-	-	-
34	Acetone	0.19	NS	0.007 J	-	-
	1,4-Dioxane	0.0077	NS	-	-	0.00076 J
Downgradient Monitoring Wells						
21	None	NA	-	-	-	-
22	Bis 2-ethylhexyl phthalate	0.006	-	-	-	0.005 J
23	None	NA	-	-	-	-
24	Acetone	6.3	-	0.006 J	-	-
	1,4-Dioxane	0.0077	-	-	-	0.00069 J
	Phenol	0.1	-	0.052	-	-
	1,1,1-Trichloroethane	0.2	-	0.001 J	-	0.0084
	Trichlorofluoromethane	2.1	-	-	-	0.0044 J

Well Number	Parameter	Class I Standard (mg/L)	Q1 (June 2013)	Q2 (Sept. 2013)	Q3 (Dec. 2013)	Q4 (March 2014)	Well Number
South Monitoring Wells							
25	None	NA	-	-	-	-	
26	Atrazine	0.003	0.0004	-	0.00008 J	-	
27	Atrazine	0.003	0.0005	0.0001	0.00011	0.00008 J	
30	None	NA	-	-	-	-	
31	Atrazine	0.003	0.0002	-	0.0001	-	
	Naphthalene	0.14	0.00011	-	-	-	--

Notes:

- Not detected in sample.
- J Analyte detected below quantitation limits.
- NS No sample collected on the date indicated due to flooding along the Illinois River.
- NA Not applicable. No organic parameters tested had a detected concentration in groundwater at this monitoring well during the four quarters of sampling from June 2013 through March 2014.

No detected organic parameters listed in the above table exceed their respective Class I groundwater standards as listed in IAC Part 620 Section 410.

The most frequently detected compounds were acetone, atrazine, 1,4-Dioxane, and naphthalene. Acetone was detected below quantitation limits in four samples, all collected on the same date during the 2nd quarter of monitoring in September 2013. The acetone is most likely a laboratory contaminant as it was only detected during one sampling event at concentrations below quantitation limits, and with no re-occurrence.

Atrazine is a common herbicide and was detected in two background monitoring wells (32 and 33) and three south monitoring wells (26, 27, and 31). Atrazine was detected in samples from two or more quarterly events at four of the five wells where it was reported. No downgradient wells had a detected concentration of Atrazine.

The compound 1,4-Dioxane was detected during one or more quarters in samples from three monitoring wells – background wells 32 and 34 and downgradient well 24.

Naphthalene was detected near the MDL of 0.0001 mg/L in samples from three monitoring wells – background wells 32 and 33 and south monitoring well 31. There were no detected concentrations of naphthalene in downgradient wells.

Four other organic compounds were detected at a lower frequency and at concentrations below their respective Class I groundwater standards: Bis 2-ethylhexyl phthalate, 1,1,1-trichloroethane, trichlorofluoromethane and phenol.

5 POTENTIAL IMPACTS TO THE ILLINOIS RIVER

As discussed previously in this report, groundwater flows north/northeast during baseflow conditions and groundwater from below the Hennepin West Ash Pond System discharges to the Illinois River. During baseflow conditions the groundwater discharging to the Illinois River has the potential to impact the river, increasing concentrations of the two primary CCR indicators for this site, boron and sulfate. Calculations for the potential impact from groundwater discharge to the Illinois River are provided in the tables below for boron and sulfate, respectively. The 7-day, 10-year low flow event (i.e. 7Q10) was used to estimate flow volume in the river and a mixing zone of 50 feet was used to determine dilution of the groundwater concentrations.

Conservative assumptions were used to calculate the resulting change in concentration to the Illinois River. Based on the calculations, groundwater discharge to the Illinois River could potentially increase concentrations of boron by 0.0034 mg/L and sulfate by 0.19 mg/L. Both concentrations are below their respective detection limits reported by the laboratory, indicating that changes in concentration would likely not be detected and impacts would be negligible.

Mixing Calculation Showing Effect of Boron Loading on Illinois River Quality at Low Flow

Baseflow	3515 cfs	Source: NPDES Permit IL0001554
=	8.6E+09 L/day	
Boron loading rate		
Maximum Boron Concentration in Groundwater (CAvg)	8.5 mg/L	Maximum Concentration Well 23 - 6/2016
Hydraulic Conductivity (between Ash Complex and River)	0.0060 cm/s	Geometric mean of sand and gravel (Table 3)
Hydraulic Gradient	0.0050	Maximum included in report (Subsection 3.3.3.3)
Aquifer Thickness	50 ft	Estimated maximum depth of impacts in sand and gravel
Length of Ponds (max length, west to east)	2,500 ft	
Q = KIA		
K = Max Hydraulic Conductivity	2.0E-04 ft/s	
I = Hydraulic Gradient	0.00500	
A = Cross-Sectional Area	125,000 ft ²	
Q (per second)	0.12303 cfs	
Q (per day)	301,007.48 L/day	
Loading Rate (L)	2.6E+06 mg/day	= Cmax * Q
L =	5.63 lb/day	
Boron concentration increase in Illinois River at low flow due to loading from West Ash Pond System		
d _B =	3.0E-04 mg/L	= L/Q _{7,10}
Boron concentration increase near-shore in Illinois River at low flow due to loading from the West Ash Pond System		
Assumes loading distributed within 75 feet of shoreline	0.0034 mg/L	River is approximately 850 ft wide
Typical boron laboratory detection limit	0.01 mg/L	Source: Teklab Report 3/2016

Conclusion:

The calculated boron concentration increase in the Illinois River at **low flow** due to groundwater loading from the West Ash Pond System is less than half the typical boron detection limit, indicating that increases due to impacted discharge would not be detectable. These calculations indicate that the effects of boron loading in groundwater discharge to the Illinois River are negligible.

Mixing Calculation Showing Effect of Sulfate Loading on Illinois River Quality at Low Flow

Baseflow	3515 cfs	Source: NPDES Permit IL0001554
	= 8.6E+09 L/day	
Sulfate loading rate		
Maximum Sulfate Concentration in Groundwater (CAvg)	483 mg/L	Maximum Concentration Well 23 - 6/2016
Hydraulic Conductivity (between Ash Complex and River)	0.0060 cm/s	Geometric mean of sand and gravel (Table 3)
Hydraulic Gradient	0.0050	Maximum included in report (Subsection 3.3.3.3)
Aquifer Thickness	50 ft	Estimated maximum depth of impacts in sand and gravel
Length of Ponds (max length, west to east)	2,500 ft	
Q = KIA		
K = Max Hydraulic Conductivity	2.0E-04 ft/s	
I = Hydraulic Gradient	0.00500	
A = Cross-Sectional Area	125,000 ft ²	
Q (per second)	0.12303 cfs	
Q (per day)	301,007.48 L/day	
Loading Rate (L)	1.5E+08 mg/day	= Cmax * Q
	L = 319.85 lb/day	
Sulfate concentration increase in Illinois River at low flow due to loading from West Ash Pond System		
	d _B = 1.7E-02 mg/L	= L/Q _{7,10}
Sulfate concentration increase near-shore in Illinois River at low flow due to loading from the West Ash Pond System		
Assumes loading distributed within 75 feet of shoreline	0.1916 mg/L	River is approximately 850 ft wide
Typical sulfate laboratory detection limit	5 mg/L	Source: Teklab Report 3/2016

Conclusion:

The calculated sulfate concentration increase in the Illinois River at **low flow** due to groundwater loading from the West Ash Pond System is an order of magnitude less than the typical sulfate detection limit, indicating that increases due to impacted discharge would not be detectable. These calculations indicate that the effects of sulfate loading in groundwater discharge to the Illinois River are negligible.

6 CONCLUSIONS

Data acquired from prior investigations and activities at the West Ash Pond System were incorporated into this Hydrogeologic Site Characterization Report to provide a complete physical and chemical evaluation of the impoundments and vicinity. The site characterization findings are summarized below:

- The West Ash Pond System encompasses two ash ponds of approximately 30.4 acres total and were operational from 1952 through 1996.
- Three hydrogeologic units are present at the site:
 - » Fill Unit, the uppermost unit, is comprised of CCRs – fly ash, bottom ash, and minor slag. In some areas, such as constructed berms, the Fill Unit has CCRs mixed with sand, silt, and clay. CCRs of the Fill Unit are found in all ponds – Old West Ash Pond (including Pond No. 1, Pond No. 3) and Old West Polishing Pond.
 - » Uppermost Aquifer Unit is comprised of mixed alluvial deposits (clay, silt, and sand) which overlie coarser grained outwash sand and gravel deposits. This unit is the uppermost aquifer and primary groundwater transport pathway in the vicinity of the West Ash Pond System.
 - » Bedrock Confining Unit is defined by Pennsylvanian age shale with minor layers of limestone, sandstone, and coal. This low permeability unit defines the lower boundary of the Uppermost Aquifer Unit.
- Median saturated ash thickness for the period of 2003 through 2013 ranged from no saturated ash at the northwest corner of Pond No. 1 (eastern portion of the Old West Ash Pond) to 6.6 feet of saturated ash at the western edge of Pond No. 3 (western portion of the Old West Ash Pond). Based on a representative median groundwater elevation of 447 feet and average base of ash elevation of 444 feet within Pond No. 3, the median saturated ash thickness is three feet. Conversely, since maximum groundwater elevations measured near Pond No. 1 are below the base of ash, it can be concluded that there is typically no saturated ash within Pond No. 1.
- The Illinois River is located directly adjacent to and downgradient from the West Ash Pond System. Flood events typically occur in March, April, May, and sometimes June, while lesser flooding occasionally occurs during autumn. Only the Old West Polishing Pond is subject to 100-year flooding at the base flood elevation value of 462 feet.
- The Illinois River is the regional groundwater discharge area, but localized groundwater flow directions that are westward and southward from the West Ash Pond System are present due to localized groundwater mounding under the impoundments. River stage during high precipitation and/or flood events seasonally rises above adjacent groundwater elevations and in low lying areas of the floodplain. During these events the river temporarily recharges the aquifer and groundwater flow direction close to the river reverses.
- Within the Uppermost Aquifer, the geometric mean hydraulic conductivity of wells finished in sand and gravel is 6×10^{-3} cm/s versus 2×10^{-3} cm/s for wells finished predominantly in gravel. The lowest measured hydraulic conductivity occurred in silt deposits with a value of 1×10^{-4} cm/s. Hydraulic conductivity was not measured in the Bedrock Confining Unit.
- Groundwater within the Uppermost Aquifer at the West Ash Pond System meets the definition of a Class I, Potable Resource Groundwater.
- The current Illinois EPA-approved groundwater monitoring program consists of collecting samples from 3 background wells (32, 33, 34) and 9 downgradient wells (21 through 27, 30, 31). Additional groundwater monitoring was initiated at these locations for an expanded list of parameters for four quarters (June 2013 through March 2014) to assess compliance with the IAC 35 Part 620 Section 410 Groundwater Quality Standards for Class I: Potable Resource Groundwater. The results of the groundwater monitoring program to-date indicate the following:
 - » Parameters observed in groundwater that are derived from CCRs and exceeded Class I standards were boron and sulfate. Exceedances of Class I standards for boron and sulfate occur in monitoring wells

located immediately adjacent to the ash ponds and one downgradient well (27); these wells also exhibit decreasing boron and sulfate concentrations with time. Monitoring wells located further from the ash ponds, specifically wells 25, 26, 30, and 31 to the south, no longer exceed the Class I standard for boron and have not exceeded a standard since 1996. Based on these observations, the total mass-loading of coal-ash leachate constituents on the groundwater system continues to decline.

- » Arsenic and selenium detected in downgradient wells may be related to CCRs, but selenium was only detected on one occasion at one well located adjacent to the impoundments. Observed geochemical indicators and an arsenic exceedance in a background monitoring well suggest that arsenic may be naturally-occurring.
- » Parameters observed in groundwater that exceeded Class I standards but are not related to CCRs at the West Ash Pond System were iron, lead, manganese, and nitrate.
- » Other inorganic parameters detected occur at concentrations below their respective Class I groundwater standards: TDS, chloride, fluoride, cyanide, barium, nickel, vanadium, and zinc.
- » Antimony, beryllium, cadmium, chromium, cobalt, copper, mercury, silver, and thallium were not detected above their MDLs in any groundwater samples.
- » Organic constituents tested included volatile organic compounds, polychlorinated biphenyls, semi-volatile organic compounds, chlorinated pesticides, chlorinated herbicides and specialized organic parameters endoathal, ethylene dibromide and 1,2-dibromo-3-chloropropane. None of organic constituents were detected at concentrations higher than their respective Class I standard.
- An assessment of potable and non-potable water wells for a 2,500-foot radius around the entire Hennepin Power Station property boundary demonstrated that there is no potential for groundwater impact to existing off-site wells from the West Ash Pond System or Hennepin Power Station.
- An evaluation was completed to determine potential CCR groundwater impacts on the Illinois River. The evaluation determined that the primary CCR indicator parameters for the West Ash Pond System, boron and sulfate, would have negligible impacts to the Illinois River.

REFERENCES

- AECOM, January 12, 2016. 30% Design Data Report for Dynegey Hennepin Power Station; West Polishing Pond, West Ash Pond, East Ash Pond and Ash Pond No. 2 CCR Units.
- Algermissen, S.T., Perkins, D.M., Thenhaus, P.C., Hanson, S.L., and Bender, B.L., 1982. Probabilistic estimates of maximum acceleration and velocity in rock in the contiguous United States. U.S. Geological Survey Open-File Report 82-1033, 99 p. (plus appendix).
- Berg, R.C. and J.P. Kempton, 1988. Stack-Unit Mapping of Geologic Materials in Illinois to a Depth of 15 Meters. Illinois State Geological Survey Circular 542. Champaign, Illinois.
- Bouwer, H. and R.C. Rice, 1976. A slug test for determining conductivity of unconfined aquifers with completely or partially penetrating wells, *Water Resources Research*, v. 12, no. 3, p. 423-428.
- Bunker, B.J., G.A. Ludvigson, B.J. Witzke, 1985. The Plum River Fault Zone and The Structural and Stratigraphic Framework of Eastern Iowa. Iowa Department of Natural Resources, Geological Survey Bureau, Technical Information Series 13, 126 p.
- Civil & Environmental Consultants, Inc., April 1, 2016. Old West Polishing Pond Subsurface Investigation, Hennepin Power Station, Hennepin, Illinois.
- Civil & Environmental Consultants, Inc., March 2017. Subsurface Investigation Within West Ash Ponds 1 and 3. Hennepin Power Station.
- Csallany, S., 1966. Yields of Wells in Pennsylvanian and Mississippian Rocks in Illinois. Illinois State Water Survey Report of Investigation 55. Champaign, Illinois.
- Electric Power Research Institute (EPRI), 2002. Manganese Occurrence Near Three Coal Ash Impoundments in Illinois. Report Number 1005257. Palo Alto, California.
- Fetter, C.W., 1980. *Applied Hydrogeology*. Charles E. Merrill Publishing Co., Columbus, Ohio.
- Frankie, W.T. and others, 2002. Guide to the Geology of the Hennepin Area, Putnam, Bureau, and Marshall Counties, Illinois. Illinois State Geological Survey Field Trip, Guidebook 2002A. Champaign, Illinois.
- Gibb, J.P., D.C. Noel, W.C. Bogner and R.J. Schicht, 1977. Groundwater Conditions and River-Aquifer Relationships along the Illinois Waterway. Illinois State Water Survey, Urbana, Illinois.
- Hansel, A.K. and W.H. Johnson, 1996. Wedron and Mason Groups: Lithostratigraphic reclassification of deposits of the Wisconsin Episode, Lake Michigan Lobe area. Illinois State Geological Survey, Bulletin 104. Champaign, Illinois.
- Illinois State Geological Survey (ISGS), 2001. Questor Data Extraction and Map. Champaign, Illinois.
- Illinois State Geological Survey, 2006. Directory of Coal Mines in Illinois: Putnam County. Champaign, Illinois.
- Illinois State Water Survey (ISWS), 1989. Aquifer Properties Database for Sand & Gravel and Bedrock Aquifers in Illinois (unpublished). Champaign, Illinois.
- John Mathes & Associates, Inc. (Mathes), 1983. Hydrogeologic Study, Existing Ash Ponds, Hennepin Power Plant, Illinois Power Company, Hennepin Illinois. Unpublished report to Dynegey Midwest Generation, Inc.
- Kelron Environmental/Natural Resource Technology, 2009a. Water Well Survey, Hennepin Power Station. June 3, 2009.

- Kelron Environmental/Natural Resource Technology, 2009b. Assessment of Potential for Groundwater Impact on Identified Water Wells, Hennepin Power Station. August 26, 2009.
- Kolata, D.R., T.C. Buschbach, and J.D. Treworgy, 1976. The Sandwich Fault Zone of Northern Illinois. Illinois State Geological Survey Circular 505, 26 p.
- Kolata, D.R., 2005. Bedrock Geology of Illinois. Illinois State Geological Survey, Map 14. Champaign, Illinois.
- McComas, M. R., 1968. Geology Related To Land Use In The Hennepin Region. Illinois State Geological Survey, Circular 422. Champaign, Illinois.
- Midwestern Regional Climate Center (MRCC). 2013. NOAA National Climatic Data available on the World Wide Web (Historical Climate 30-Year Average Data from 1981-2010 for the Hennepin, Illinois Climatological Station #114013). Accessed [October 22, 2013], at URL [http://www.isws.uiuc.edu/atmos/statecli/newnormals.htm#stationlist].
- Natural Resource Technology, Inc., 2002. Model Recalibration and Prediction of Closure Options for the West Ash Impoundment; Hennepin Power Station Putnam County, Illinois. October, 2002.
- Natural Resource Technology, Inc., July 6, 2015. Monitoring Well 49 Installation.
- Nelson, W. J., 1993. Structural Features in Illinois, Plates 1 and 2. Illinois State Geological Survey, Bulletin 100. Champaign, Illinois.
- Nelson, W. J., 1995. Structural Features in Illinois. Illinois State Geological Survey, Bulletin 100. Champaign, Illinois.
- Petersen, Mark D., Arthur D. Frankel, Stephen C. Harmsen, Charles S. Mueller, Kathleen M. Haller, Russell L. Wheeler, Robert L. Wesson, Yuehua Zeng, Oliver S. Boyd, David M. Perkins, Nicolas Luco, Edward H. Field, Chris J. Wills, and Kenneth S. Rukstales, 2008. Documentation for the 2008 Update of the United States National Seismic Hazard Maps. US Geological Survey Open-File Report 2008-1128. 61 p.
- Piskin, K. and R.E. Bergstrom, 1975. Glacial Drift in Illinois: Thickness and Character. Illinois State Geological Survey, Circular 490. Champaign, Illinois.
- Puls, R.W. and M.J. Barcelona, 1996. Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures. USEPA Office of Research and Development. Document EPA/540/S-95/504, April 1996.
- Soil Conservation Service, 1992. Soil Survey of Putnam County Illinois.
- Science and Technology Management, Inc. (STMI), 1996. Investigation of Site Closure Options at Illinois Power Company's Hennepin East Ash Impoundment. Report No. STMI/135/96-02. Brookfield, Wisconsin.
- United States Environmental Protection Agency, 2010. 40 CFR Parts 257, 261, 264, 265, 268, 271 and 302. Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals From Electric Utilities; Proposed Rule. Federal Register: June 21, 2010, Volume 75, Number 118, pp 35127-35264
- U.S. Geological Survey (USGS). 2016. National Water Information System data available on the World Wide Web (Peak Streamflow for Illinois, USGS 05558300, Illinois River at Henry IL). Accessed November 18, 2016 at URL: http://nwis.waterdata.usgs.gov/usa/nwis/uv/?cb_00065=on&format=gif_default&site_no=05558300&period=&begin_date=2013-01-01&end_date=2016-11-18
- United States Department of the Interior, 1981. Groundwater Manual. U.S. Government Printing Office, Denver, Colorado.

- Visocky, A.P., M.G. Sherrill and K. Cartwright, 1985. Geology, Hydrology and Water Quality of the Cambrian and Ordovician Systems in Northern Illinois. Cooperative Groundwater Report 10. ISGS ISWS, Champaign, Illinois.
- Willman, H.B. and others. 1967. Geologic Map of Illinois. Illinois State Geological Survey. Champaign, Illinois.
- Willman, H.B. and J.C. Frye. 1970. Pleistocene Stratigraphy of Illinois. Illinois State Geological Survey Bulletin 94. Champaign, Illinois.

Tables

**Table 1. Monitoring Well Construction Summary
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station**

Current Well and/or Boring Designation ⁽¹⁾	Year Constructed	Driller	Well Top Elevation ⁽²⁾	Ground Elevation	Screen Top Depth (BGS)	Screen Bottom Depth (BGS)	Screen Top Elevation	Screen Bottom Elevation	Bottom of Well Elevation	Slotted Screen Length	Screen Diameter (Inches)	Formation Screened
21 (W-1)	Dec-1982	Mathes	459.34	459.8	49.0	59.0	410.8	400.8	400.2	10	2	sand
22 (W-2)	Dec-1982	Mathes	464.45	461.5	24.4	34.4	437.1	427.1	426.9	10	2	gravel
23 (W-3)	Dec-1982	Mathes	463.39	460.9	34.0	44.0	426.9	416.9	415.7	10	2	gravel
24 (W-4)	Dec-1982	Mathes	462.14	461.1	56.4	66.4	404.7	394.7	396.6	10	2	gravel
25 (W-5)	Dec-1982	Mathes	462.61	460.2	24.4	34.4	435.8	425.8	424.7	10	2	gravel
26	Aug-1995	STMI	462.70	459.4	11.0	21.0	448.4	438.4	433.7	10	2	gravel
27	Sep-1995	STMI	450.58	448.2	30.0	35.0	418.2	413.2	411.9	5	2	sand/gravel
30	Aug-1995	STMI	453.16	450.9	30.0	35.0	420.9	415.9	418.2	5	2	gravel
31	Aug-1995	STMI	453.13	450.9	5.0	15.0	445.9	435.9	435.2	10	2	sand
32	Aug-1996	STMI	451.38	448.7	7.0	17.0	441.7	431.7	431.4	10	2	sand/gravel
33	Aug-1996	STMI	449.71	447.8	37.5	42.5	410.3	405.3	406.2	5	2	sand
34	Aug-1996	STMI	449.56	448.2	30.0	35.0	418.2	413.2	413.2	5	2	sand
35	Sep-1999	NRT	454.83	451.5	8.0	18.0	443.5	433.5	433.9	10	2	sand
36	Sep-1999	NRT	462.02	459.7	18.0	28.0	441.7	431.7	431.8	10	2	sand/gravel
49	Jul-2015	NRT	468.17	465.8	35.0	45.0	430.8	420.8	420.8	10	2	sand/gravel
L1	Aug-1995	STMI	464.56	465.1	25.0	30.0	440.1	435.1	422.5	5	2	silt
L3	Sep-1995	STMI	462.18	459.3	7.5	12.5	451.8	446.8	433.3	5	2	ash
L4	Aug-1995	STMI	460.90	461.0	12.6	22.6	448.4	438.4	432.4	10	2	ash/silt
L5	Apr-2000	NRT	464.22	461.3	27.0	32.0	434.3	429.3	429.3	5	2	sand/gravel

Notes:

All depth and elevation measurements are in feet.

(1) Original well designations are in parentheses.

(2) Wells 25 through 33 were surveyed by Chastain (6/11/14); Other wells surveyed by IngenAE (11/21/16)

Mathes John Mathes and Associates, Inc.

NRT Natural Resource Technology, Inc.

STMI Science and Technology Management, Inc.

**Table 2. Field Hydraulic Conductivity
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station**

Well Identification	Analysis Method	Primary Lithology Within Screened Interval	Confidence Level ¹	Horizontal Hydraulic Conductivity (cm/sec)
22	Bouwer-Rice Confined	Gravel	1	1.20E-02
24	Bouwer-Rice Confined	Alluvial Sand	1	2.00E-02
26	Bouwer-Rice Unconfined	Gravel	2	1.20E-02
27	Bouwer-Rice Confined	Alluvial Sand	2	6.90E-03
30	Bouwer-Rice Unconfined	Gravel	1	3.32E-02
31	Bouwer-Rice Unconfined	Alluvial Sand	1	3.40E-03
L4	Bouwer-Rice Confined	Alluvial Silt	1	1.30E-04
Plant	Specific Capacity Analysis / ISWS ²	Gravel	3	1.27E-01
Geometric Mean Hydraulic Conductivity		Wells Finished in Sand & Gravel ³		6.0E-03
		Wells Finished in Gravel Only ³		1.7E-02
		Wells Finished in Alluvial Sand Only ³		7.8E-03
		Wells Finished in Alluvial Silt (i.e., L4)		1.3E-04

Notes:

See Appendix B for hydraulic conductivity test analyses. Tests and analyses are from STMI, 1997 (see references).

cm/sec

centimeters per second

¹

Confidence in Hydraulic Conductivity Value: 1 = Good Recovery Curve and Analysis
2 = Recovery Curve Required Interpretation
3 = Estimated

²

ISWS - Illinois State Water Survey Analysis based on pumping well data.

³

Geometric mean hydraulic conductivity for confidence levels 1 and 2; mean values do not include Plant well.

Reference:

Bouwer-Rice Bouwer and Rice Analytical Method for Unconfined Aquifers, 1976. (note: also used for Confined Aquifers).

**Table 3. Summary of Exceedances of Class 1 Groundwater Standards
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station**

Parameters Submitted to the IEPA for Routine Groundwater Monitoring	Class 1 Standard	unit	Number of exceedances of Class 1 Groundwater Standards between December 1994 and September 2016 (and year of last exceedance)												
			Downgradient Wells				South Wells					Background Wells			
			21	22	23	24	25	26	27	30	31	32	33	34	
Boron (d)	2	mg/L	70 ₍₂₀₁₆₎	71 ₍₂₀₁₆₎	69 ₍₂₀₁₆₎	70 ₍₂₀₁₆₎	4 ₍₁₉₉₆₎	0	63 ₍₂₀₁₆₎	9 ₍₁₉₉₆₎	0	0	0	0	
Chloride (t)	200	mg/L	0	0	0	0	0	0	0	0	0	1 ₍₂₀₁₃₎	0	0	0
Iron (d)	5	mg/L	0	0	0	25 ₍₂₀₀₀₎	0	1 ₍₂₀₀₅₎	0	0	0	0	0	9 ₍₂₀₁₃₎	19 ₍₂₀₁₆₎
Manganese (d)	0.15	mg/L	7 ₍₁₉₉₇₎	0	50 ₍₂₀₁₆₎	1 ₍₁₉₉₄₎	0	1 ₍₂₀₀₅₎	63 ₍₂₀₁₆₎	0	16 ₍₂₀₁₆₎	34 ₍₂₀₁₄₎	12 ₍₂₀₁₃₎	26 ₍₂₀₁₆₎	
Sulfate (t)	400	mg/L	0	25 ₍₂₀₁₀₎	52 ₍₂₀₁₆₎	22 ₍₂₀₁₂₎	0	0	1 ₍₁₉₉₆₎	0	0	0	0	0	0
Total Dissolved Solids	1,200	mg/L	0	0	1 ₍₁₉₉₆₎	0	0	0	0	0	0	0	0	0	0
pH	6.50 / 9.00	Std. Units	1 ₍₂₀₀₃₎	9 ₍₂₀₀₂₎	0	3 ₍₂₀₁₀₎	0	0	0	0	0	1 ₍₂₀₀₃₎	1 ₍₂₀₀₀₎	2 ₍₂₀₀₇₎	

Notes:

Bold notation for number of exceedances indicates the latest exceedance occurred during current monitoring period.

Current monitoring wells monitored semi-annually for reporting to the IEPA unless otherwise indicated.

(t) = total; (d) = dissolved

Table 4. Median Boron and Sulfate Concentrations - 1997 through 2016
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Median Boron Concentration (mg/L) ¹																							% Change Since	
Well	Position	In Service ²	1997	1998	1999	2000	2001	2002	2003	2004	2005*	05-06	06-07	07-08	08-09	09-10**	2011	2012	2013	2014	2015	2016	In Service ³	Peak ⁴
21	Downgradient	4.85	5.75	6.70	6.70	6.20	6.40	6.70	7.35	7.65	7.40	7.35	7.10	6.90	6.30	6.10	5.25	4.80	5.09	6.77	5.00	4.70	-3%	-39%
22	Downgradient	8.00	9.00	10.00	11.00	9.75	9.65	9.20	8.80	8.25	8.00	7.70	7.70	8.00	8.40	7.20	7.35	7.40	7.39	6.77	7.20	7.10	-11%	-35%
23	Downgradient	7.00	5.95	5.70	5.80	6.50	6.85	7.65	8.05	7.15	5.40	6.60	5.90	5.20	6.50	6.80	5.05	7.55	5.79	4.03	7.00	6.90	-1%	-14%
24	Downgradient	7.80	7.55	8.30	9.05	9.60	10.00	9.75	9.85	9.10	9.10	8.55	8.30	8.10	3.90	2.30	3.90	4.90	3.66	3.71	3.80	3.80	-51%	-62%
25	South	2.00	1.80	1.15	0.99	0.82	0.54	0.57	0.53	0.49	0.37	0.44	0.36	0.42	0.22	0.24	0.27	0.28	0.25	0.21	0.25	0.25	-88%	-88%
26	South	1.10	1.01	0.54	0.56	0.52	0.37	0.35	0.33	0.31	0.18	0.24	0.22	0.23	0.24	0.25	0.20	0.19	0.18	0.18	0.23	0.24	-78%	-78%
27	South	6.00	7.90	7.80	7.20	6.25	5.65	5.80	5.15	4.35	3.90	4.70	4.65	4.40	5.20	5.00	4.70	4.80	4.32	4.09	4.70	4.70	-22%	-41%
30	South	2.40	1.50	1.10	0.89	0.70	0.59	0.55	0.40	0.40	0.43	0.29	0.29	0.16	0.16	0.16	0.19	0.19	0.21	0.22	0.19	0.19	-92%	-92%
31	South	0.17	0.07	0.09	0.10	0.10	0.07	0.09	0.07	0.07	0.05	0.08	0.08	0.17	0.10	0.09	0.08	0.07	0.07	0.07	0.08	0.08	-53%	-53%
32	Background	0.12	0.05	0.07	0.11	0.10	0.09	0.11	0.10	0.13	0.11	0.13	0.14	0.12	0.09	0.08	0.07	0.07	0.08	0.09	0.09	0.08	-33%	-41%
33	Background	0.10	0.05	--	0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	0.04	0.06	<0.05	<0.04	-60%	-60%
34	Background	0.10	0.05	0.07	0.06	0.07	0.06	0.06	0.06	0.06	0.07	0.09	0.09	0.09	0.09	0.13	0.09	0.11	0.10	0.11	0.10	0.11	10%	-15%

1. Shading indicates concentrations that are greater than Class I boron standard of 2.0 mg/L. Blank indicates no samples taken during that year.
2. Impoundment removed from service in December 1996.
3. In Service difference based on change in median concentration from In Service to 2016.
4. Peak difference based on change in median concentration from highest median observed during any period prior to 2016.
*March 2005 data through 2009, medians are calculated from July to June of the next year.

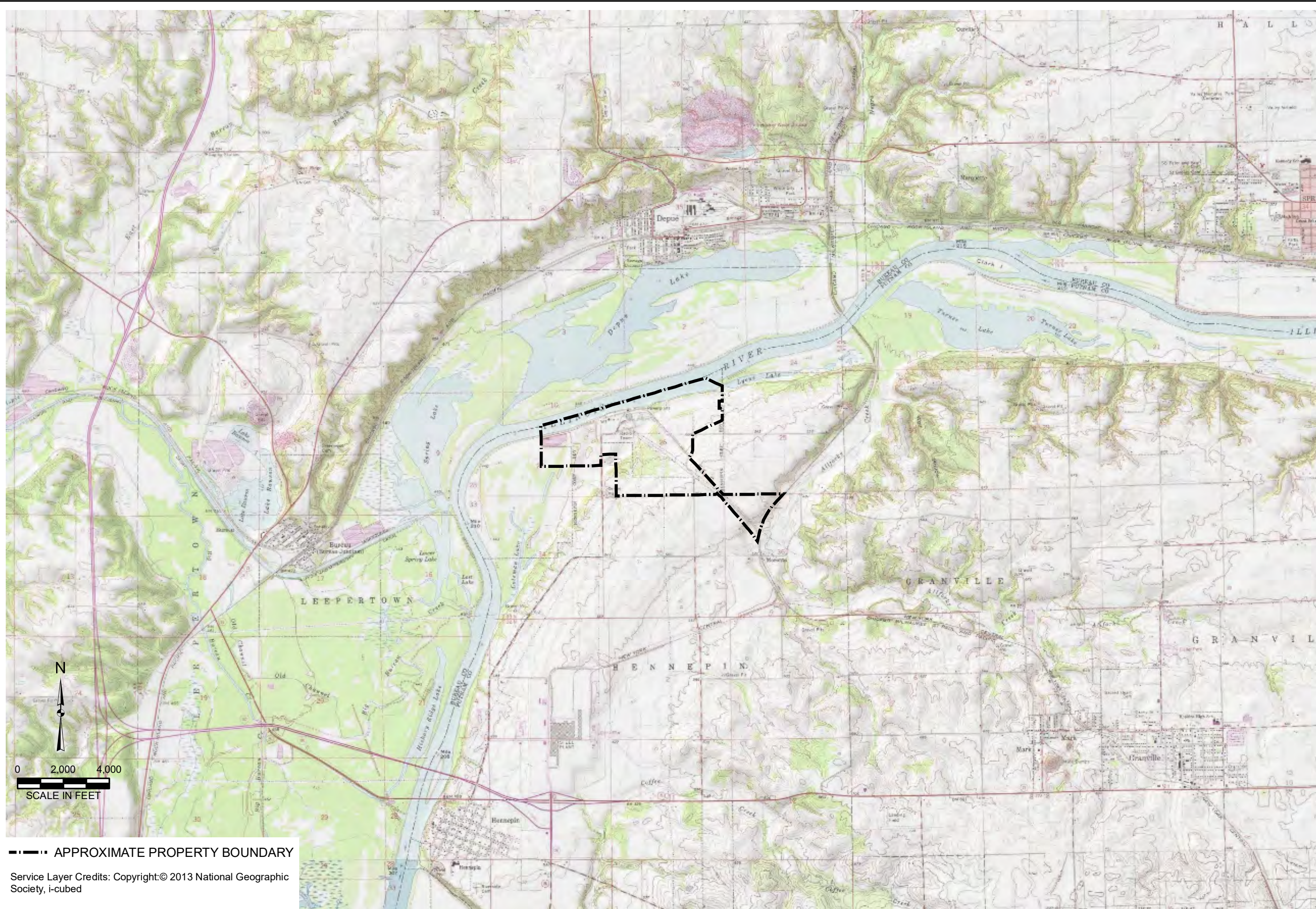
Median Sulfate Concentration (mg/L) ¹																							% Change Since	
Well	Position	In Service ²	1997	1998	1999	2000	2001	2002	2003	2004	2005*	05-06	06-07	07-08	08-09	09-10**	2011	2012	2013	2014	2015	2016	In Service ³	Peak ⁴
21	Downgradient	225	260	285	305	305	300	310	280	245	200	210	200	200	145	140	130	110	149	112	140	142	-37%	-54%
22	Downgradient	370	660	585	525	415	435	335	300	315	310	275	340	370	410	370	280	210	341	256	340	310	-16%	-53%
23	Downgradient	480	510	445	510	570	565	525	515	445	280	420	340	210	520	540	385	300	456	240	445	445	-7%	-22%
24	Downgradient	390	430	450	445	415	335	275	300	255	220	220	220	230	127	35	123	325	108	123	147	141	-64%	-69%
25	South	97	100	66	59	52	54	47	47	47	40	47	50	55	56	51	46	39	38	38	46	46	-53%	-54%
26	South	57	65	54	37	45	41	38	39	40	36	43	41	42	46	36	34	33	29	47	41	41	-28%	-37%
27	South	315	340	345	325	285	245	230	250	270	230	235	205	155	165	170	190	190	192	188	190	190	-40%	-45%
30	South	140	120	100	95	100	91	81	86	86	75	86	73	81	70	68	77	86	72	81	75	75	-46%	-46%
31	South	43	49	44	46	38	35	31	35	37	29	36	39	35	47	45	43	57	54	89	53	55	28%	-38%
32	Background	91	96	83	83	105	83	68	88	81	77	79	81	61	65	61	65	77	102	83	73	72	-21%	-31%
33	Background	8	10	--	<5	6	<5	5	<5	<5	<5	<5	8	11	<5	13	16	12	10	36	12	12	59%	-67%
34	Background	190	160	150	130	130	110	98	110	110	85	82	120	90	100	96	100	98	95.5	78	93	96	-49%	-49%

1. Shading indicates concentrations that are greater than Class I sulfate standard of 400 mg/L. Blank indicates no samples taken during that year.
2. Impoundment removed from service in December 1996.
3. In Service difference based on change in median concentration from In Service to 2016.
4. Peak difference based on change in median concentration from highest median observed during any period prior to 2016.
*March 2005 data through 2009, medians are calculated from July to June of the next year.
** 2009-2010 median based on samples collected in September 2009, June 2010, and August 2010.



Figures

Y:\Mapping\Projects\24124\13\MXD\HSCSR\Figure 1_Site Location Map.mxd Author: stotzsd Date/Time: 8/29/2017, 11:59:42 PM



--- APPROXIMATE PROPERTY BOUNDARY
Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

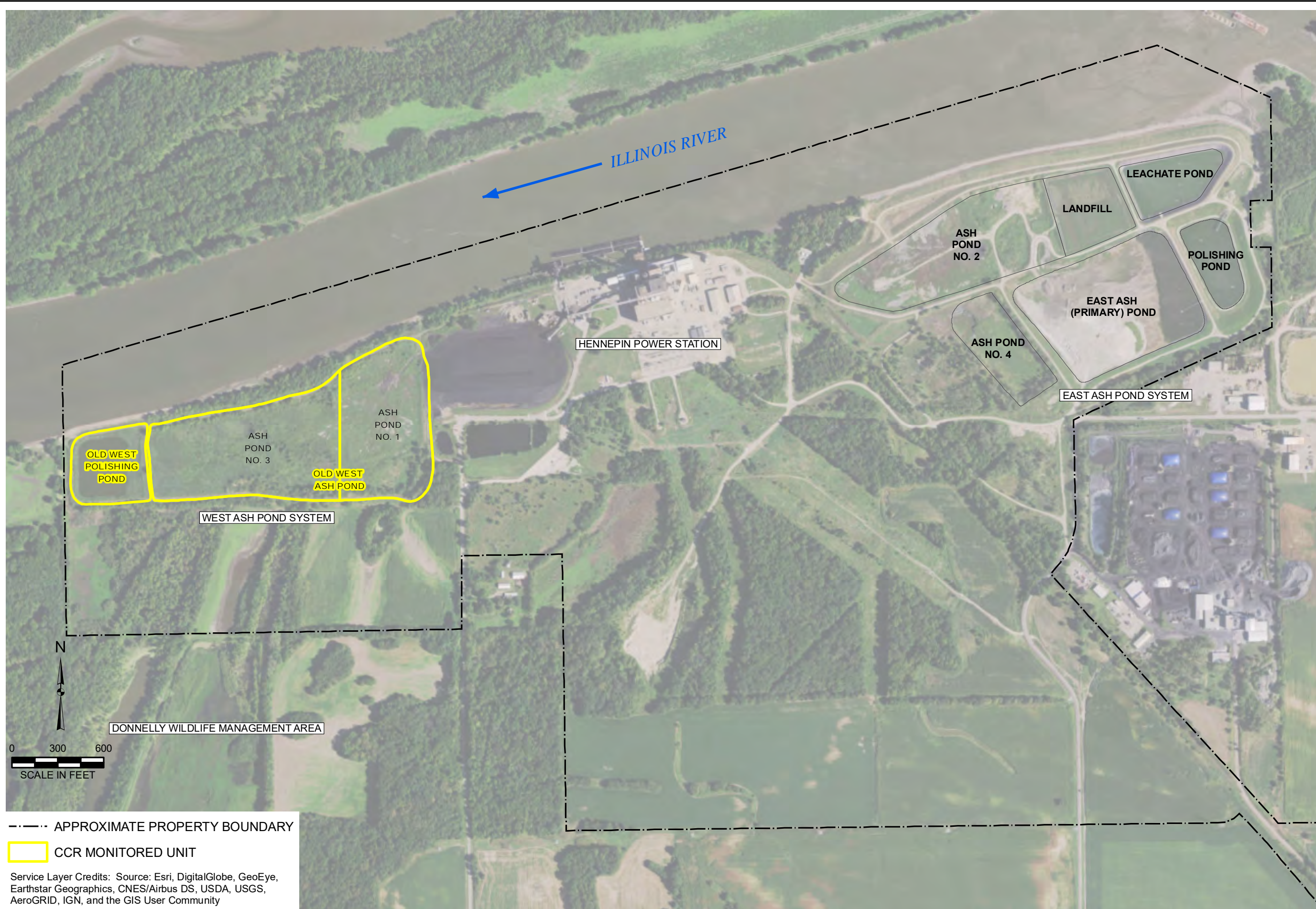
DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/17/17

SITE LOCATION MAP
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413
FIGURE NO: 1



Y:\Mapping\Projects\2412413\MXD\HSCSR\Figure 2_Ash Impound Loc.mxd_Author: stobzsd; Date/Time: 12/18/2017, 5:00:13 PM



--- APPROXIMATE PROPERTY BOUNDARY
 CCR MONITORED UNIT

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

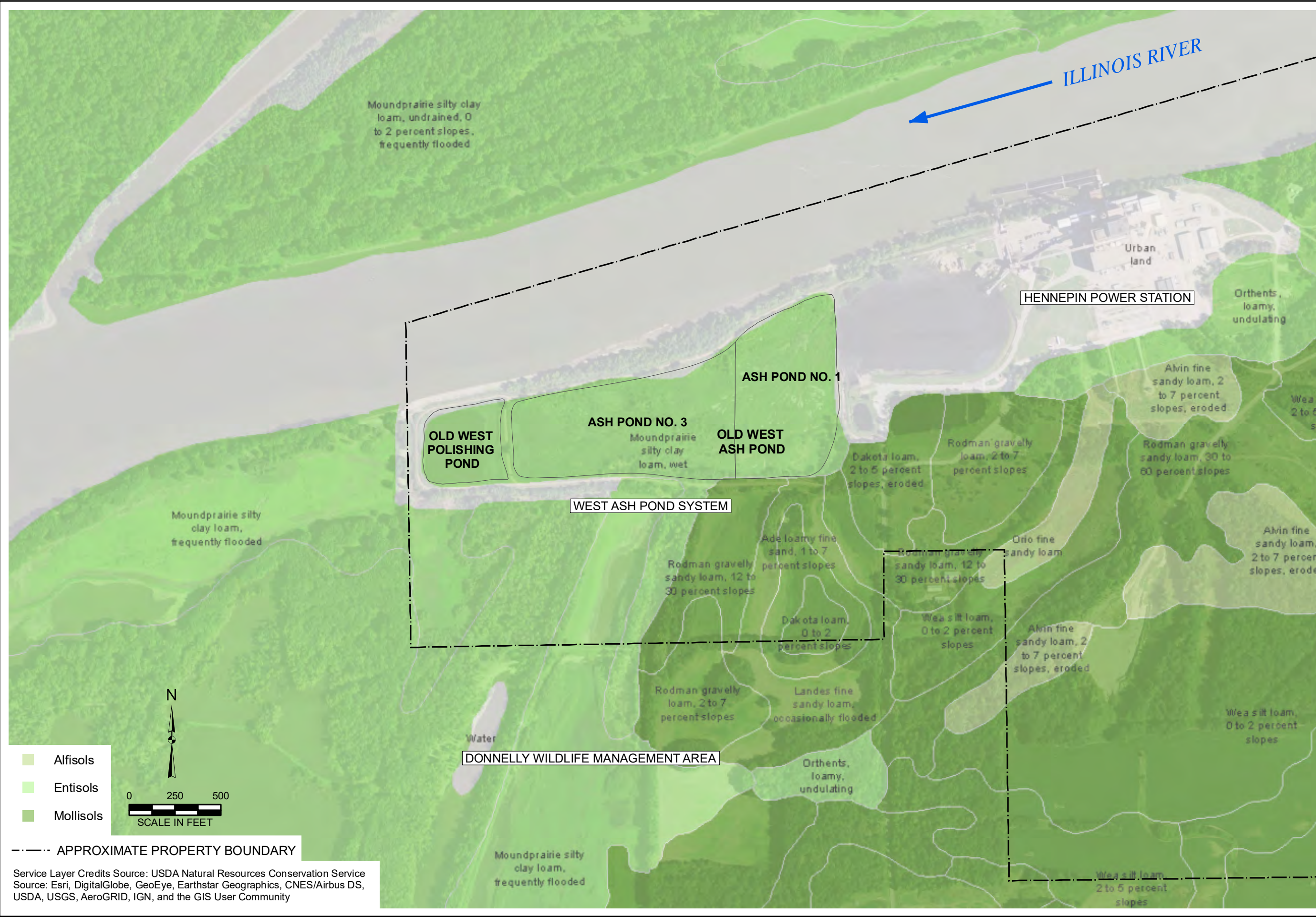
DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

ASH IMPOUNDMENT LOCATION MAP
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413
FIGURE NO: 2



Y:\Mapping\Projects\2412413\MXD\HSCSR\Figure 3_Soil_Survey_Map.mxd Author: slolizsd Date/Time: 12/15/2017, 4:45:49 PM



- Alfisols
- Entisols
- Mollisols

--- APPROXIMATE PROPERTY BOUNDARY

Service Layer Credits Source: USDA Natural Resources Conservation Service
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



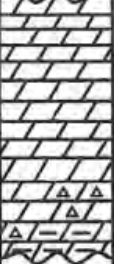





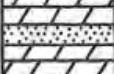
DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

SOIL SURVEY MAP
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413

FIGURE NO: 3



SYSTEM or SERIES	HYDROGEOLOGIC UNITS	GRAPHIC LOG	ROCK TYPE	WATER-YIELDING CHARACTERISTICS
PLEISTOCENE	Drift (0-300 feet)		Unconsolidated glacial deposits, loess and alluvium (drift).	Water yields variable, largest from thick basal sand and gravel deposits (Sankoty Sand) in bedrock valleys.
PENNSYLVANIAN	(280-475 feet)		Mainly shale with thin sandstone, limestone, and coal beds.	Generally unfavorable as an aquifer. Locally, domestic and farm supplies obtained from thin limestone and sandstone beds. Casing usually required.
SILURIAN	Niagaran-Alexandrian (410-505 feet)		Dolomite; argillaceous near base, lower part cherty.	Generally yields poor quality water.
ORDOVICIAN	Maquoketa (155-240 feet)		Green to blue shale with limestone and dolomite beds.	Not water yielding at most places. Casing required.
	Galena-Platteville (320-380 feet)		Dolomite, with shaly zone near the middle; some limestone in the lower part.	Not important as an aquifer, Creviced dolomite probably yields some water. Water quality good.
	Glenwood-St. Peter (115-135 feet)		Sandstone, white, clean.	Dependable source of groundwater. Water quality good.
	Shakopee (130-150 feet)		Dolomite, with some shale and sandstone.	Not important as aquifer.
	New Richmond (165 feet ±)		Sandstone, with some dolomite.	May yield some water.
	Oneota (215 feet ±)		Dolomite, with some sandstone beds.	Not important as aquifer.

SOURCE NOTE: MODIFIED FROM "MCCOMAS, M.R. (1968), GEOLOGY RELATED TO LAND USE IN THE HENNEPIN REGION FIGURE 2, ILLINOIS STATE GEOLOGICAL SURVEY, CIRCULAR 422, CHAMPAIGN, ILLINOIS.

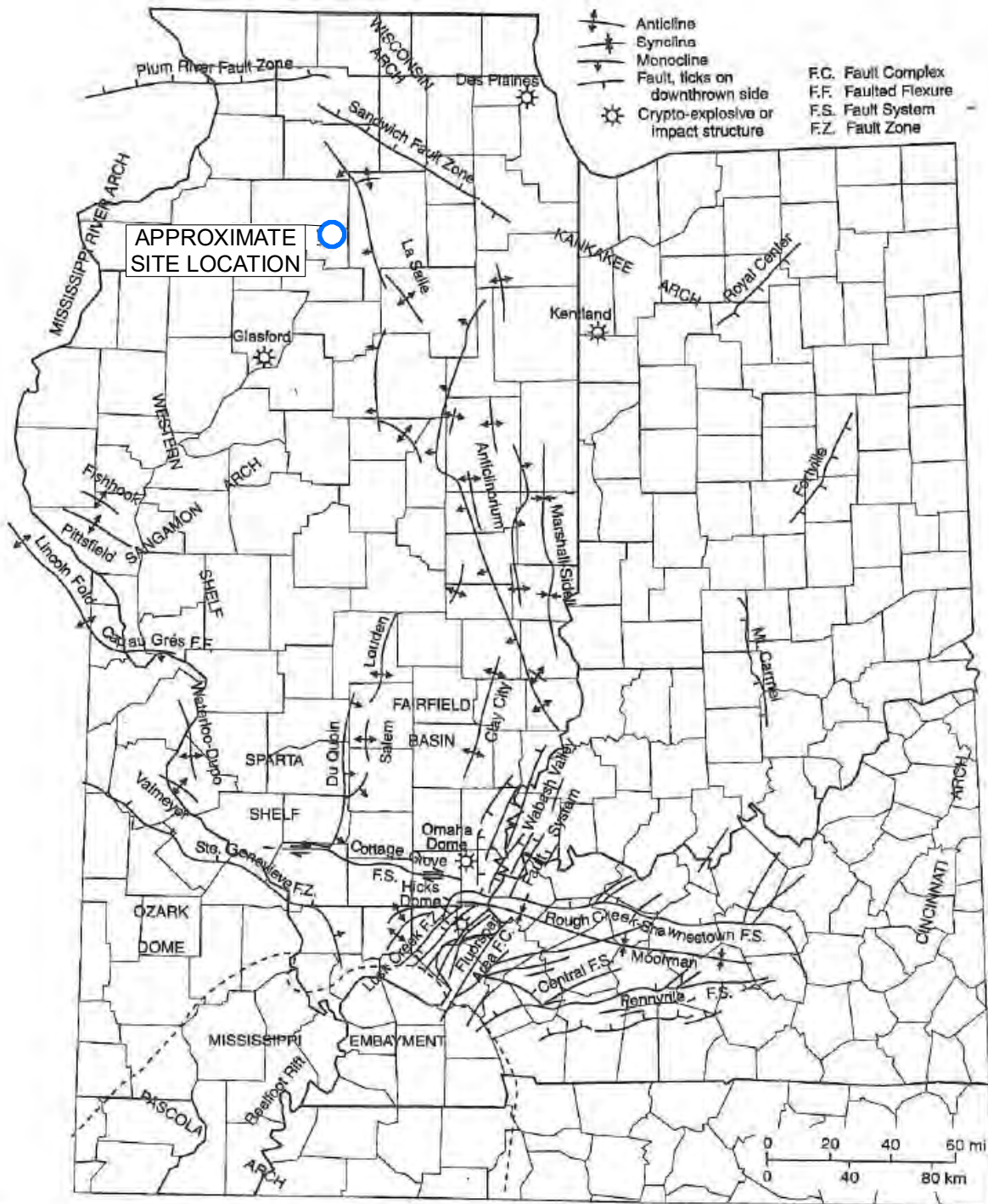
DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/30/17

GENERALIZED STRATIGRAPHIC COLUMN FOR THE HENNEPIN AREA

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413
FIGURE NO: 4





SOURCE NOTE: MODIFIED FROM "NELSON, W.J. 1995, STRUCTURAL FEATURES IN ILLINOIS, ILLINOIS STATE GEOLOGICAL SURVEY, BULLETIN 100, CHAMPAIGN, ILLINOIS.

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/30/17

MAJOR STRUCTURAL FEATURES OF ILLINOIS

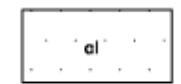
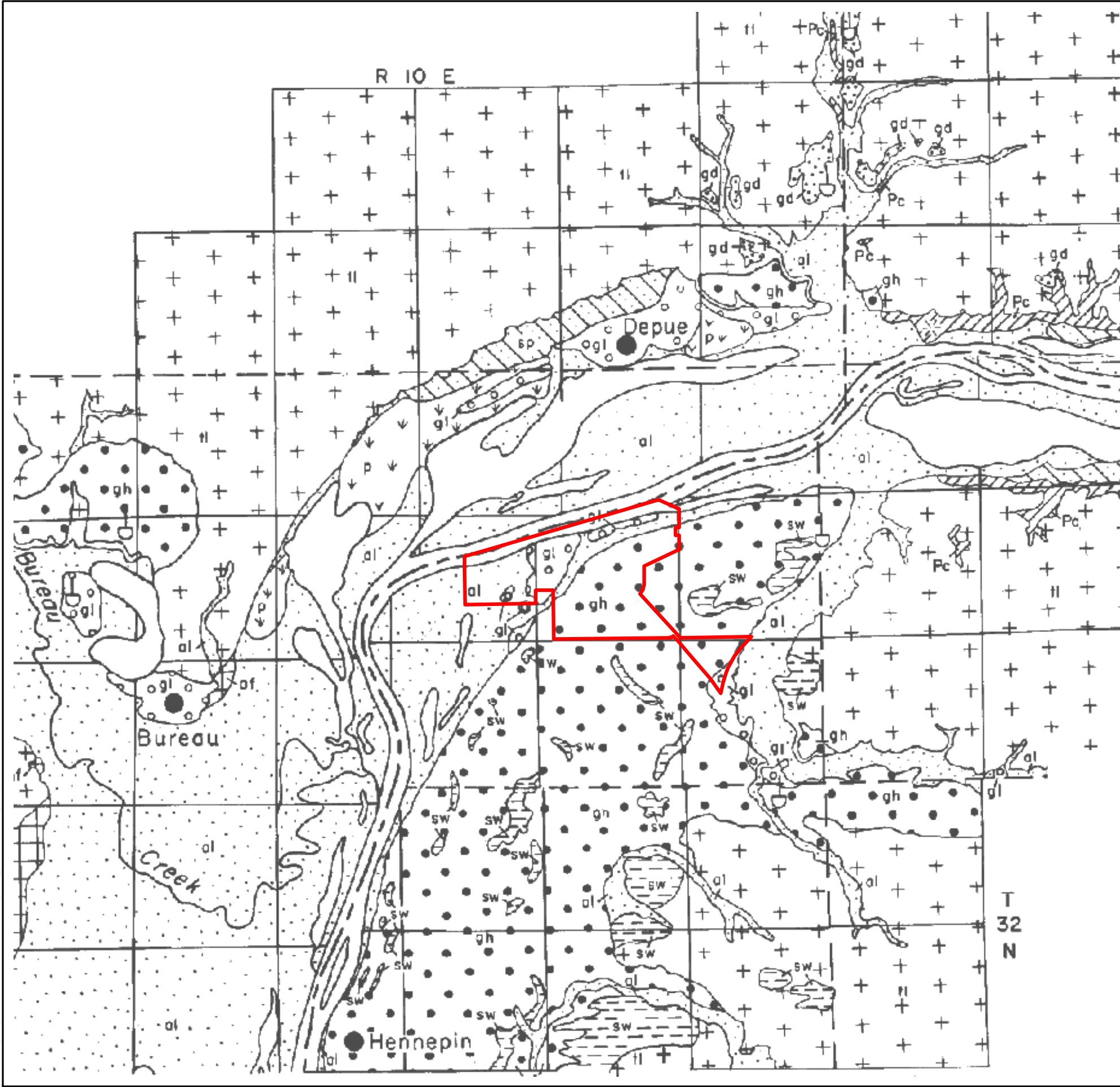
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413

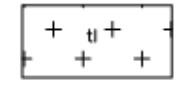
FIGURE NO: 5



V:\Mapping\Projects\2413\13M\XD\HSCSR\Figure 6_Surficial Geology Deposits.mxd_Author: slz\sd Date/Time: 8/29/2017, 10:54:54 PM



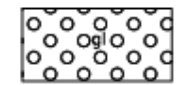
ALLUVIUM. DEPOSITS OF MODERN RIVERS AND STREAMS IN FLOODPLAINS. LARGELY CLAYEY SILT AND SANDY SILT WITH LENSES OF SAND AND GRAVEL. GENERALLY LESS THAN 20 FEET THICK. IN THE ILLINOIS VALLEY WEST OF STARVED ROCK, IT IS AS MUCH AS 40 FEET THICK AND IT overlies THICK DEPOSITS OF SAND AND GRAVEL OF THE HENRY FORMATION. IN THE ILLINOIS VALLEY EAST OF STARVED ROCK, IT IS LARGELY SAND AND GRAVEL 15-30 FEET THICK UNDER THIN SILT AND IT overlies BEDROCK FORMATIONS. (CAHOKIA ALLUVIUM)



TILL. MOSTLY UNSORTED CALCAREOUS PEBBLY SILTY CLAY DEPOSITED BY GLACIERS. CONTAINS SCATTERED COBBLES AND BOULDERS AND, IN PLACES, LENSES OF SAND AND GRAVEL. GENERALLY 25-50 FEET THICK BUT AS MUCH AS 300 FEET THICK IN DEEP VALLEYS IN THE BEDROCK SURFACE, WHERE IT INCLUDES THE GLASFORD AND BANNER FORMATIONS. THE TILL HAS A THIN COVER OF CLAYEY SILT (RICHLAND LOESS), THE THICKNESS OF WHICH IS SHOWN ON THE SMALL INSET MAP. (WEDRON FORMATION)



HIGH-LEVEL TERRACES UNDERLAIN BY GLACIAL OUTWASH. SURFACES ARE 75-100 FEET ABOVE THE ILLINOIS RIVER. MOSTLY FINE GRAVEL AND PEBBLY SAND, BUT THE UPPER PART IS LOCALLY COARSER AND BOULDERY, AS ALONG ALLFORKS CREEK, NORTHEAST OF HENNEPIN. GENERALLY 10-30 FEET THICK IN THE TRIBUTARY VALLEYS, BUT AS MUCH AS 150-200 FEET THICK IN THE LARGE TERRACE ON WHICH HENNEPIN IS LOCATED. (HENRY FORMATION)



LOW-LEVEL TERRACES UNDERLAIN BY DEPOSITS OF THE CHICAGO OUTLET RIVER. SURFACES ARE COMMONLY 20-40 FEET ABOVE THE ILLINOIS RIVER. MOSTLY FINE TO COARSE GRAVEL, COARSER AND MORE UNIFORMLY SORTED THAN THE HIGH-TERRACE DEPOSITS. LARGELY 20-50 FEET THICK ALONG THE ILLINOIS VALLEY AND 10-20 FEET ALONG TRIBUTARIES. (HENRY FORMATION)

— APPROXIMATE PROPERTY BOUNDARY

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/30/17

SURFICIAL GEOLOGIC DEPOSITS
 HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
 WEST ASH POND SYSTEM
 DYNEGY MIDWEST GENERATION, LLC
 HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413

FIGURE NO: 6



Aug 31, 2017 1:53pm PLOTTED BY: Overlifen
 I:\Submitt-Natl-15090\ST05\US\DWG\Hennepin\OBG-MOD-164478-C200-Cross Sections.dwg - Print View
 User: Overlifen
 Plot Device: HP DesignJet 5000 Series
 Plot Date: 8/31/2017 1:53:00 PM
 Plot Scale: 1:1
 Plot Orientation: Landscape
 Plot Size: 36x48
 Plot Color: Black
 Plot Lineweight: 0.25
 Plot Linetype: Solid
 Plot Font: Arial, 10pt



- REFERENCES**
1. SOURCE DRAWING DERIVED FROM CEC, INC., PROJECT NUMBER 164-478, DRAWING NUMBER C200, DATED 3/27/17.
 2. TOPOGRAPHIC INFORMATION BASED ON AERIAL SURVEY COMPLETED BY SURDEX ON AUGUST 17, 2015 AND TOPOGRAPHIC/BATHYMETRIC SURVEY COMPLETED BY WEAVER CONSULTANTS GROUP ON SEPTEMBER 22, 2015.
 3. IMAGE PROVIDED BY GOOGLE EARTH. DATE OF IMAGE: SEPTEMBER 20, 2015.

- LEGEND**
- - - WEST ASH POND SYSTEM LIMITS
 - - -450 - - - EXISTING 10 FT CONTOUR
 - - -452 - - - EXISTING 2 FT CONTOUR
 - ⊕ B13 CEC BORING LOCATION
 - ⊕ P-1 SOIL BORING BY OTHERS
 - ⊕ A-C200 CROSS SECTION LOCATION

DRAWN BY:	AGC	DATE:	02/15/2017
CHECKED BY:	NRK	DATE:	02/21/2017
APPROVED BY:	SJC	DATE:	08/25/2017
DRAWING NO:	OBG MOD - 16448 CROSS SECTIONS		
REFERENCE:	.		

MONITORING WELL AND BORING LOCATIONS

HYDROGEOLOGIC CHARACTERIZATION REPORT

WEST ASH POND SYSTEM
 DYNEGY MIDWEST GENERATION, LLC
 HENNEPIN POWER STATION, HENNEPIN, ILLINOIS



PROJECT NO.
2421

FIGURE NO.
7

Y:\Mapping\Projects\24124131\MapXD\HSCSR\Figure 8_Known Min Thickness of Clay.mxd Author: stolsbd Date/Time: 12/18/2017 5:01:35 PM



- BORING LOCATION WHERE ASH IS UNDERLAIN BY SAND AND/OR GRAVEL
- BORING LOCATION AND KNOWN MINIMUM THICKNESS OF CLAY UNDERLYING ASH
- CCR UNIT
- INTERPOLATED BOTTOM OF ASH ELEVATION CONTOUR

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

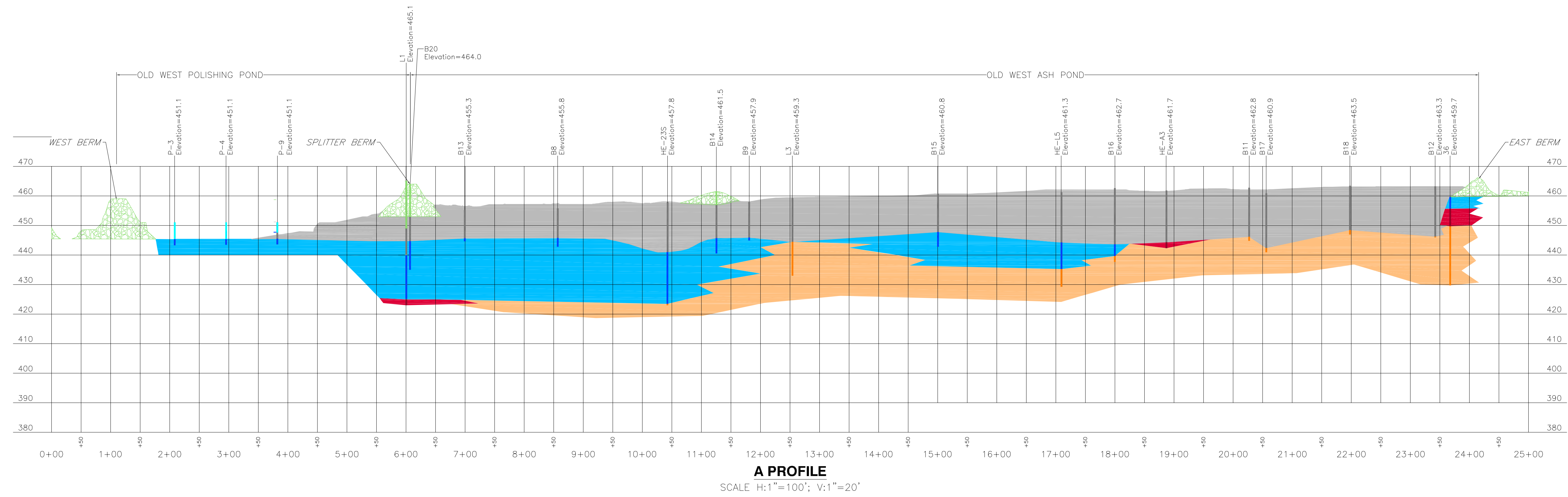
BOTTOM OF ASH ELEVATION CONTOUR MAP AND MINIMUM THICKNESS OF CLAY

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

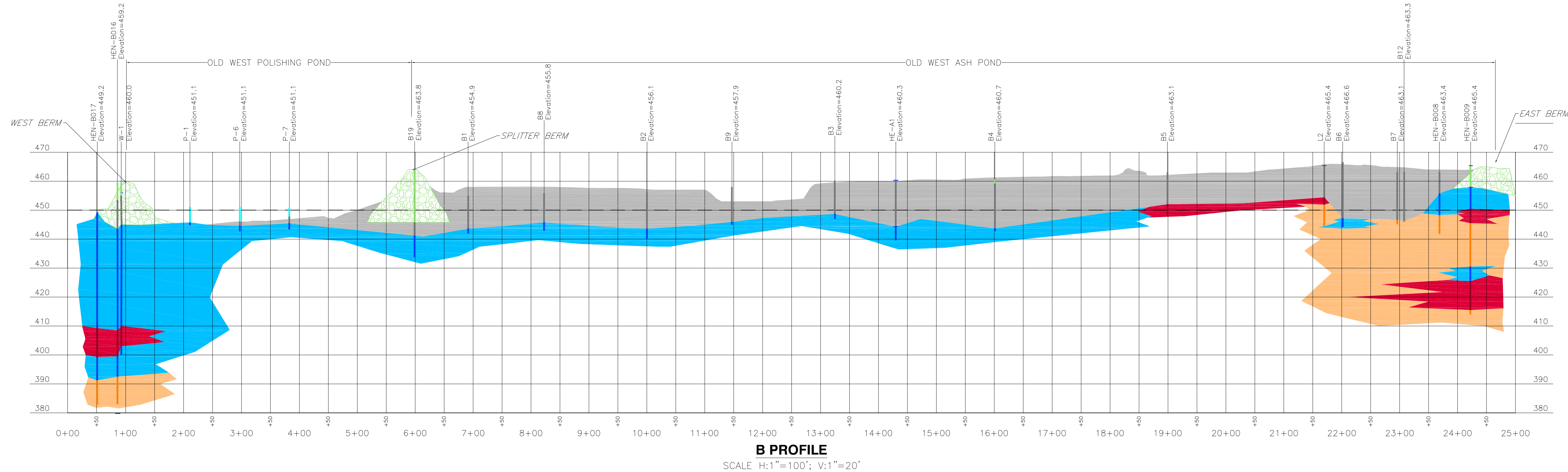
PROJECT NO: 2413
FIGURE NO: 8



Aug 29, 2017 1:07pm PLOTTED BY: Qwelijm SAVED BY: Qwelijm
 I:\Submitt-Nul15000\15105\GIS\Map\Hennepin\OBG MOD - 164478-C200-C100-Cross Sections.dwg A-A' & B-B'
 WKS: V:\Users\Qwelijm\Documents



A PROFILE
 SCALE H:1"=100'; V:1"=20'



B PROFILE
 SCALE H:1"=100'; V:1"=20'

- REFERENCES**
- SOURCE DRAWING DERIVED FROM CEC, INC.; PROJECT NUMBER 164-478, DRAWING NUMBER C200, DATED 3/27/17.
 - TOP OF EXISTING GRADE BASED ON DATA PROVIDED BY WEAVER CONSULTING GROUP SURVEY (2015) AS PRESENTED BY CEC, INC.
 - GEOLOGIC INTERPRETATIONS ARE BASED ON BORING LOGS PERFORMED BY CEC, INC., AECOM, SCIENCE AND TECHNOLOGY MANAGEMENT INC., JOHN MATHES & ASSOCIATES INC., AND NATURAL RESOURCE TECHNOLOGY, INC.

LEGEND

	MISCELLANEOUS BERM SOIL FILL
	CCR/ASH
	SILTS AND CLAYS (ALLUVIAL)
	SANDS WITH FINES (ALLUVIAL)
	SAND AND GRAVEL (GLACIAL OUTWASH)

- GEOLOGIC CONDITIONS**
- THE TEST BORING INFORMATION PRESENTED HEREIN DEPICTS SUBSURFACE CONDITIONS AT THE TEST BORING LOCATIONS AND AT THE TIME OF DRILLING. SOIL CONDITIONS AT OTHER LOCATIONS MAY DIFFER.
 - GEOLOGIC CORRELATIONS BETWEEN TEST BORINGS ARE GENERALLY BASED ON STRAIGHT-LINE INTERPOLATION. ACTUAL CONDITIONS BETWEEN TEST BORINGS MAY DIFFER.

CROSS-SECTION A-A' AND B-B'
 HYDROGEOLOGIC CHARACTERIZATION REPORT
 WEST ASH POND SYSTEM
 DYNEGY MIDWEST GENERATION, LLC
 HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

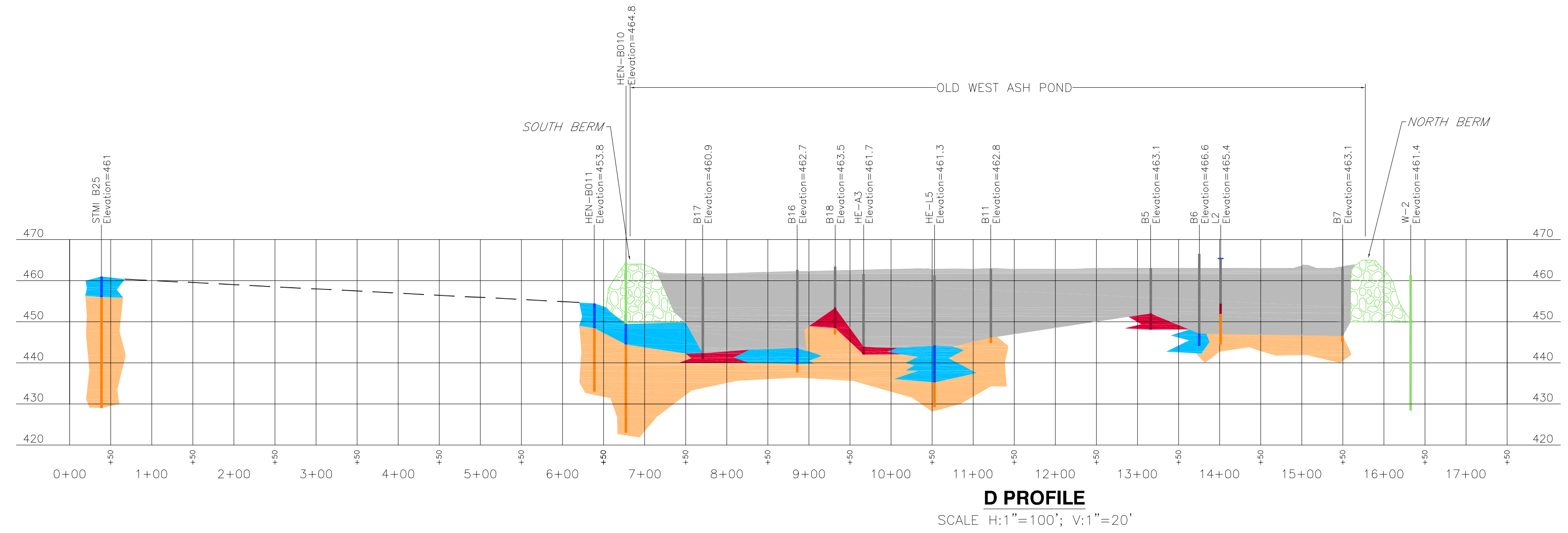
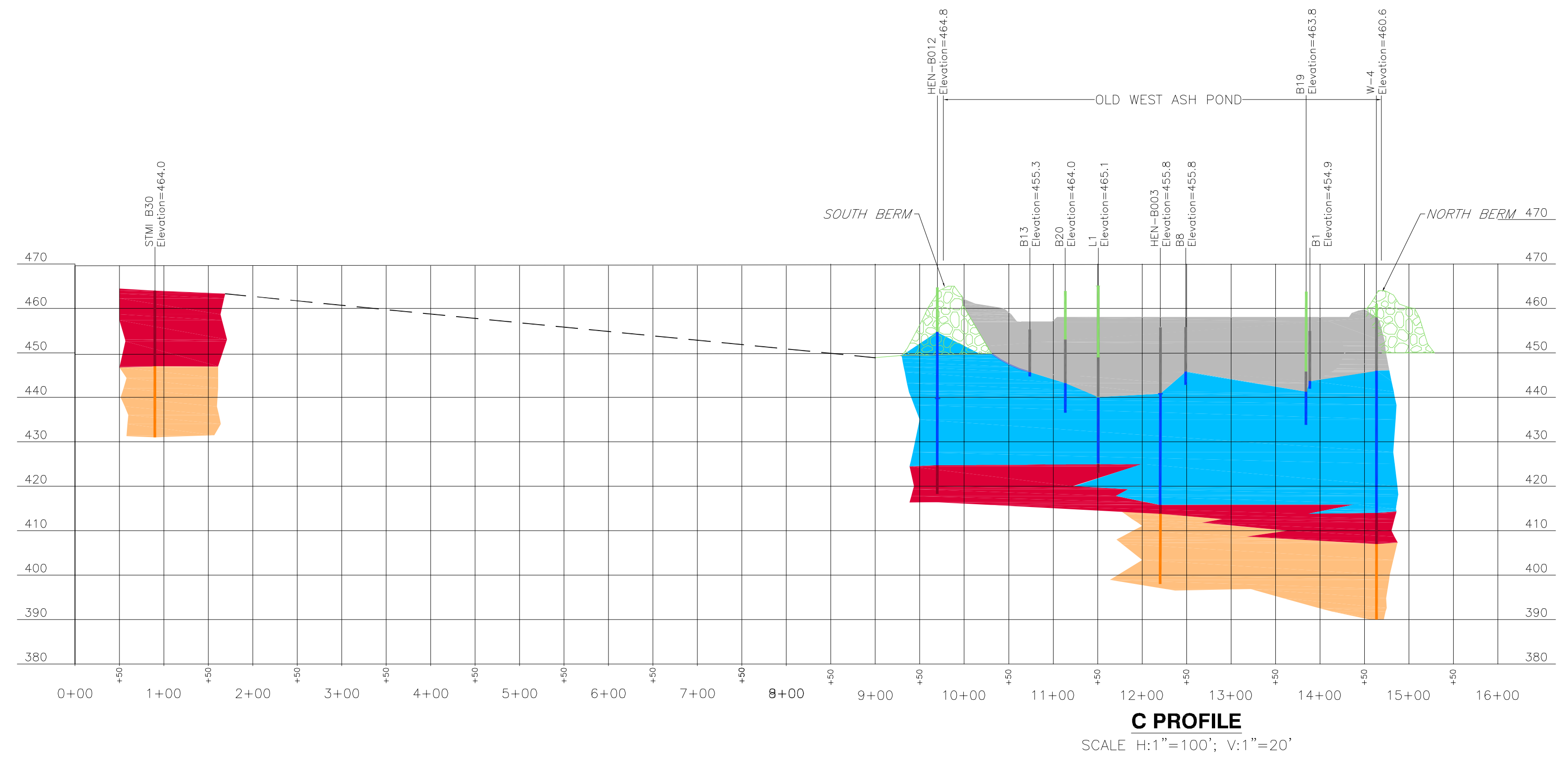


DRAWN BY:	AGC	DATE:	02/15/2017
CHECKED BY:	NRK	DATE:	02/21/2017
APPROVED BY:	SJC	DATE:	08/25/2017
DRAWING NO:	OBG MOD - 164488 CROSS SECTIONS		
REFERENCE:	.		

PROJECT NO.
2421

FIGURE NO.
9

Aug 29, 2017 1:06pm PLOTTED BY: Overlupm SAVED BY: Overlupm
 I:\Submitt-Nu115000\ST05\GIS\Map\Hennepin\OBG MOD - 164478-C200-C100-Cross Sections.dwg C-C' & D-D'
 DWG: Hennepin\Overlupm.dwg



- REFERENCES**
- SOURCE DRAWING DERIVED FROM CEC, INC., PROJECT NUMBER 164-478, DRAWING NUMBER C200, DATED 3/27/17.
 - TOP OF EXISTING GRADE BASED ON DATA PROVIDED BY WEAVER CONSULTING GROUP SURVEY (2015) AS PRESENTED BY CEC, INC.
 - GEOLOGIC INTERPRETATIONS ARE BASED ON BORING LOGS PERFORMED BY CEC, INC., AECOM, SCIENCE AND TECHNOLOGY MANAGEMENT INC., JOHN MATHES & ASSOCIATES INC., AND NATURAL RESOURCE TECHNOLOGY INC.

LEGEND

	MISCELLANEOUS BERM SOIL FILL
	CCR/ASH
	SILTS AND CLAYS (ALLUVIAL)
	SANDS WITH FINES (ALLUVIAL)
	SAND AND GRAVEL (GLACIAL OUTWASH)
	INTERPRETED NATURAL GROUND SURFACE OUTSIDE OF ASH POND

- GEOLOGIC CONDITIONS**
- THE TEST BORING INFORMATION PRESENTED HEREIN DEPICTS SUBSURFACE CONDITIONS AT THE TEST BORING LOCATIONS AND AT THE TIME OF DRILLING. SOIL CONDITIONS AT OTHER LOCATIONS MAY DIFFER.
 - GEOLOGIC CORRELATIONS BETWEEN TEST BORINGS ARE GENERALLY BASED ON STRAIGHT-LINE INTERPOLATION. ACTUAL CONDITIONS BETWEEN TEST BORINGS MAY DIFFER.

CROSS-SECTION C-C' AND D-D'
 HYDROGEOLOGIC CHARACTERIZATION REPORT
 WEST ASH POND SYSTEM
 DYNEGY MIDWEST GENERATION, LLC
 HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

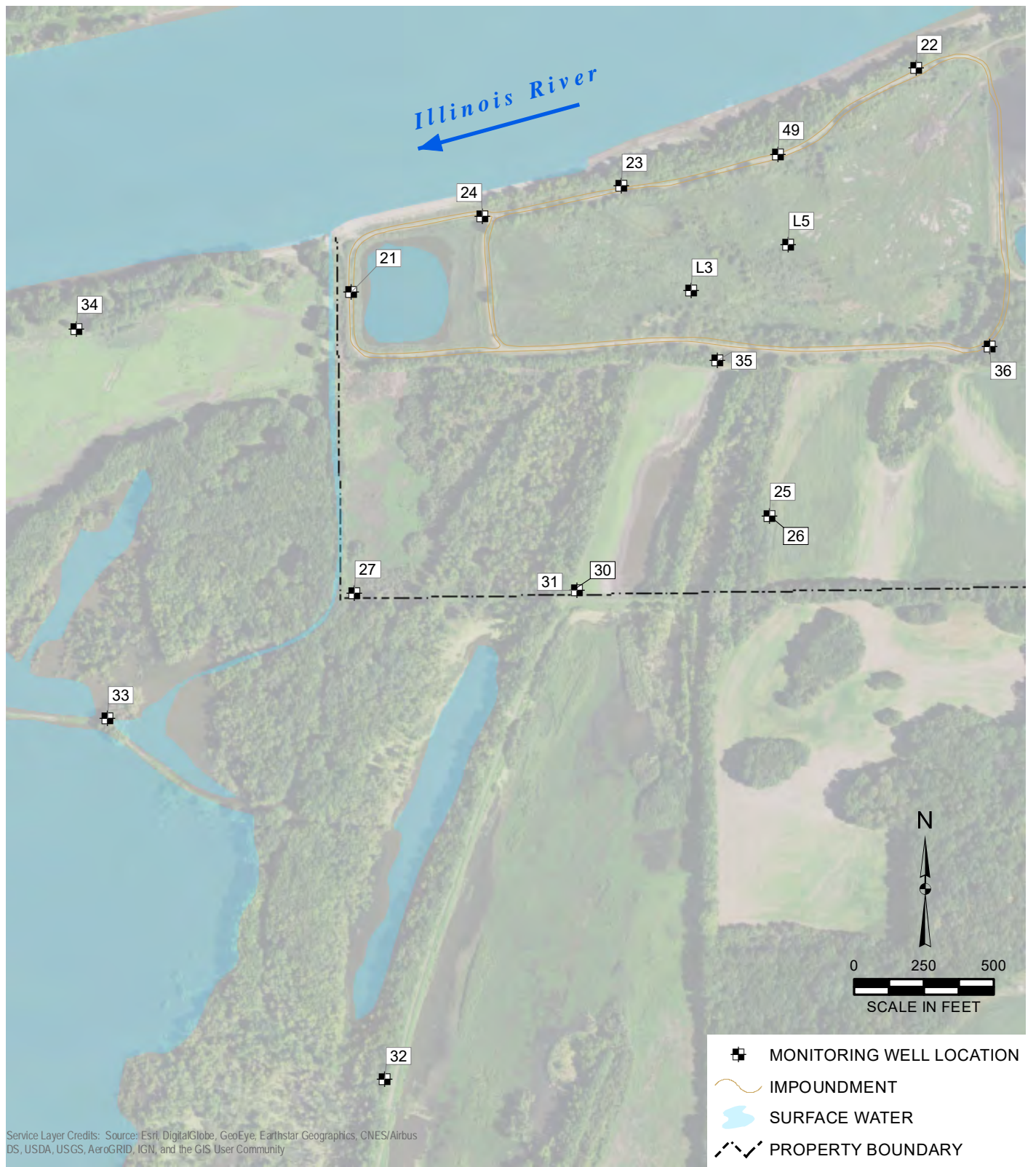


PROJECT NO.
2421

FIGURE NO.
10

DRAWN BY: AGC	DATE: 02/15/2017
CHECKED BY: NRK	DATE: 02/21/2017
APPROVED BY: SJC	DATE: 08/25/2017
DRAWING NO: OBG MOD - 16448 CROSS SECTIONS	
REFERENCE: .	

Y:\Mapping\Projects\24124-13\MXD\HCS\CR\Figure 11_Existing MW Locs.mxd - Author: slolzsd - Date/Time: 8/31/2017, 1:06:46 PM



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

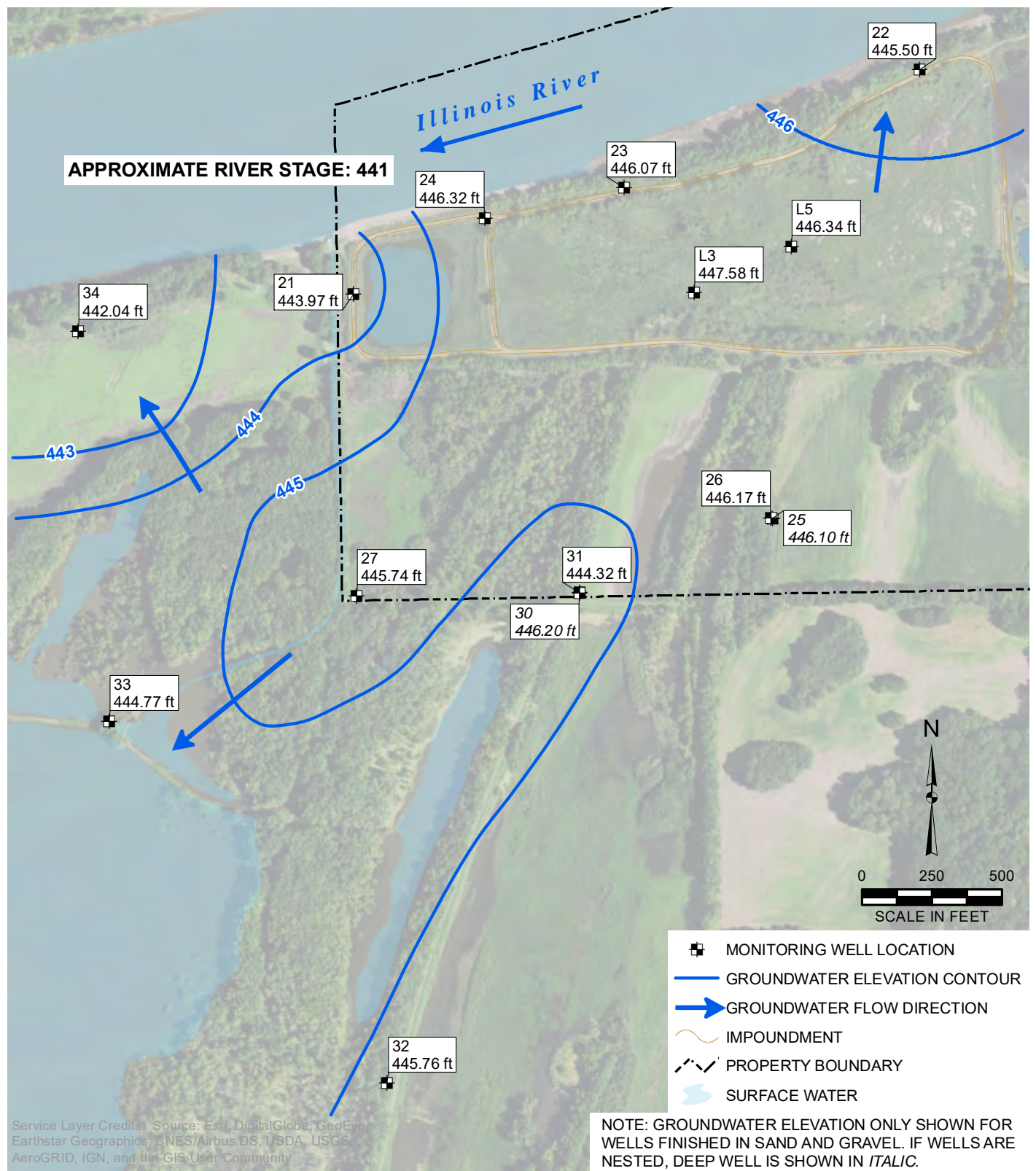
EXISTING MONITORING WELL LOCATIONS
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413
FIGURE NO: 11



DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

Y:\Mapping\Projects\24124-13\MXD\HCS\CR\Figure 12_GWE Contour Map_Dec 2013.mxd Author: stobzsd; Date/Time: 8/31/2017, 1:08:25 PM



**WATER TABLE CONTOUR MAP
DECEMBER 10, 2013**

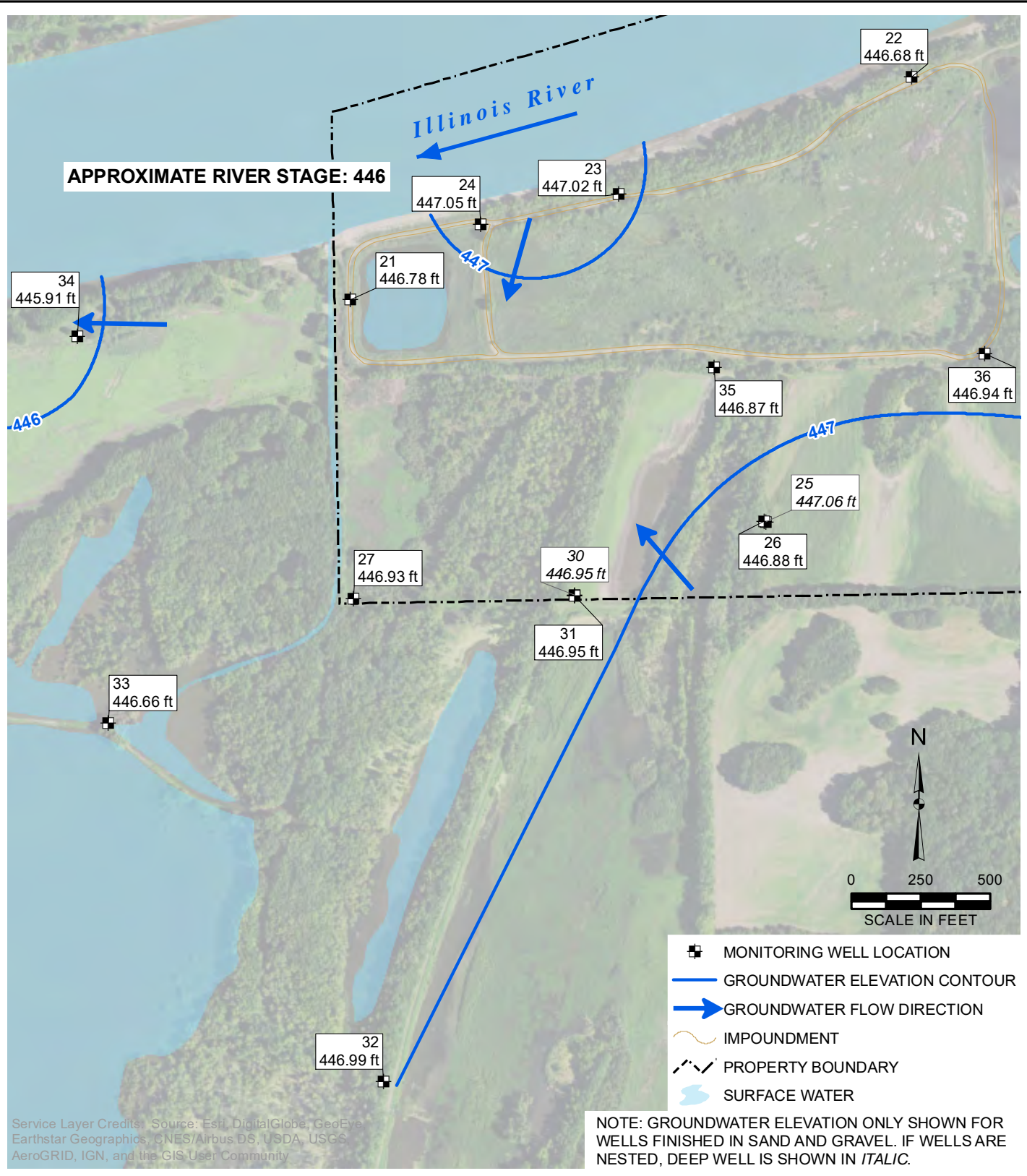
**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

PROJECT NO: 2413
FIGURE NO: 12



Y:\Mapping\Projects\24124-13\MXD\HSCSR\Figure 13_GWE Contour Map_March 2015.mxd Author: stobzsd; Date/Time: 8/31/2017, 1:08:58 PM



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

WATER TABLE CONTOUR MAP MARCH 18, 2015

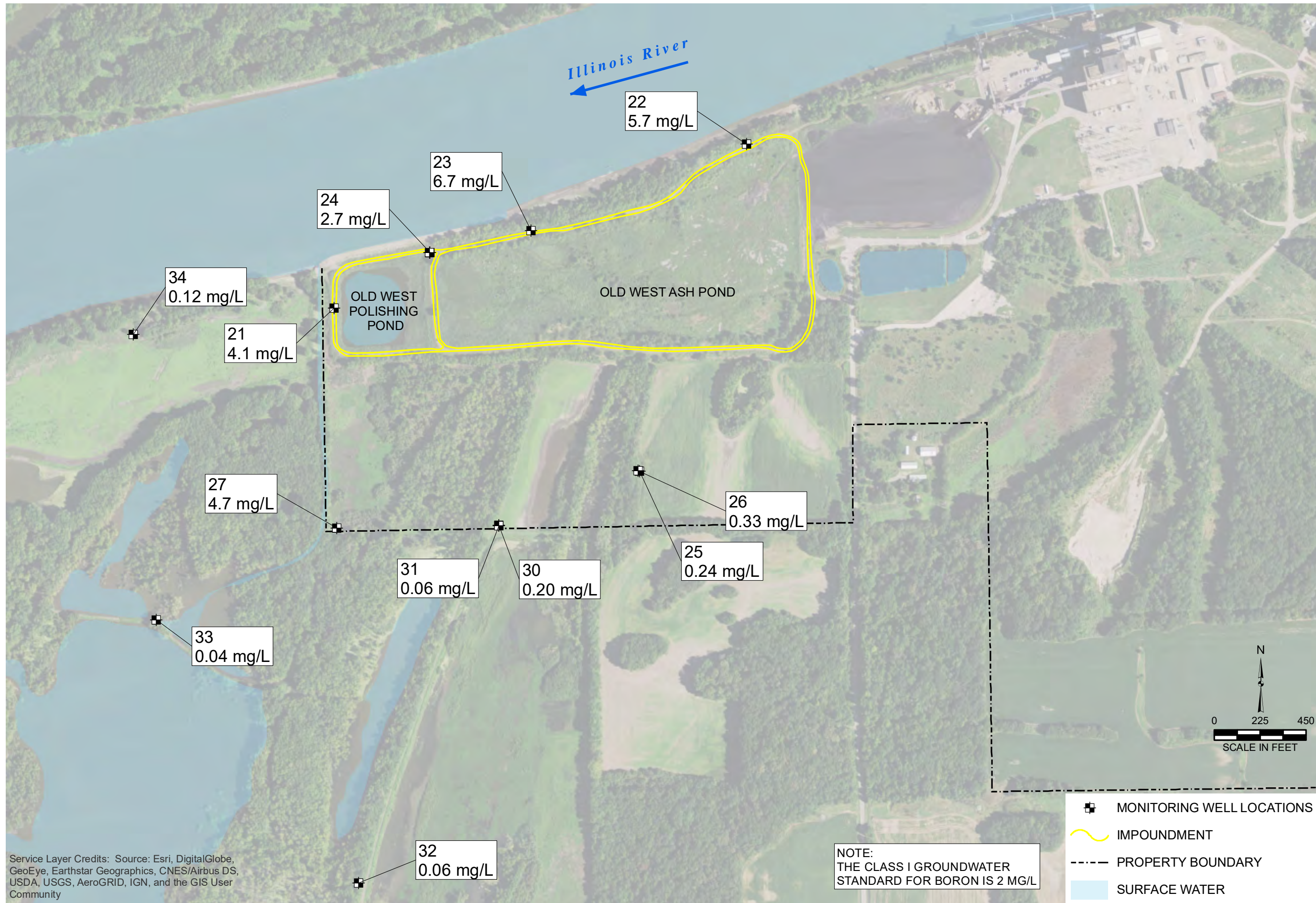
DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413
FIGURE NO: 13



Y:\Mapping\Projects\2412413\MXD\HGSCR\Figure 14_Boron Concentrations.mxd Author: stolzsd Date/Time: 12/15/2017, 4:07:41 PM



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

BORON CONCENTRATIONS IN GROUNDWATER
MARCH 9, 2016

HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO. 2413
FIGURE NO. 14





Appendix A
Boring and Well
Construction Logs



Appendix A1
MATHES Boring Logs
and Well Details

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-1
 SHEET 1 OF 2

21

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.0'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf										
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP 1/2 □	QU 1/2 ○	PL +	NMC •	LL x					
	1A	AS			Brown Sandy CLAY w/Gravel, FILL, CL													
-5	1	SS	18/16		Dark Gray FLYASH w/Bottom Ash, FILL, ML	10-7-9												
0	2	SS	18/16			5-8-16												
-15		SS	18/17	1		7-8-3												
0	4	SS	18/14		Dark Gray-Brown Silty CLAY, CL	1-2-1												
25	5	SS	18/16			WH/9-1-2												
30	6	SS	18/17			WH-WH-2												
35	7	SS	18/17			WH/12"-2												

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/8, 9/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 COMEQUETER Yes

GROUNDWATER LEVELS

Encountered at Feet
0 Hours after completion 3.0 Feet
6 Days after completion 6.3 Feet
 after completion Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-1
 SHEET 2 OF 2

21

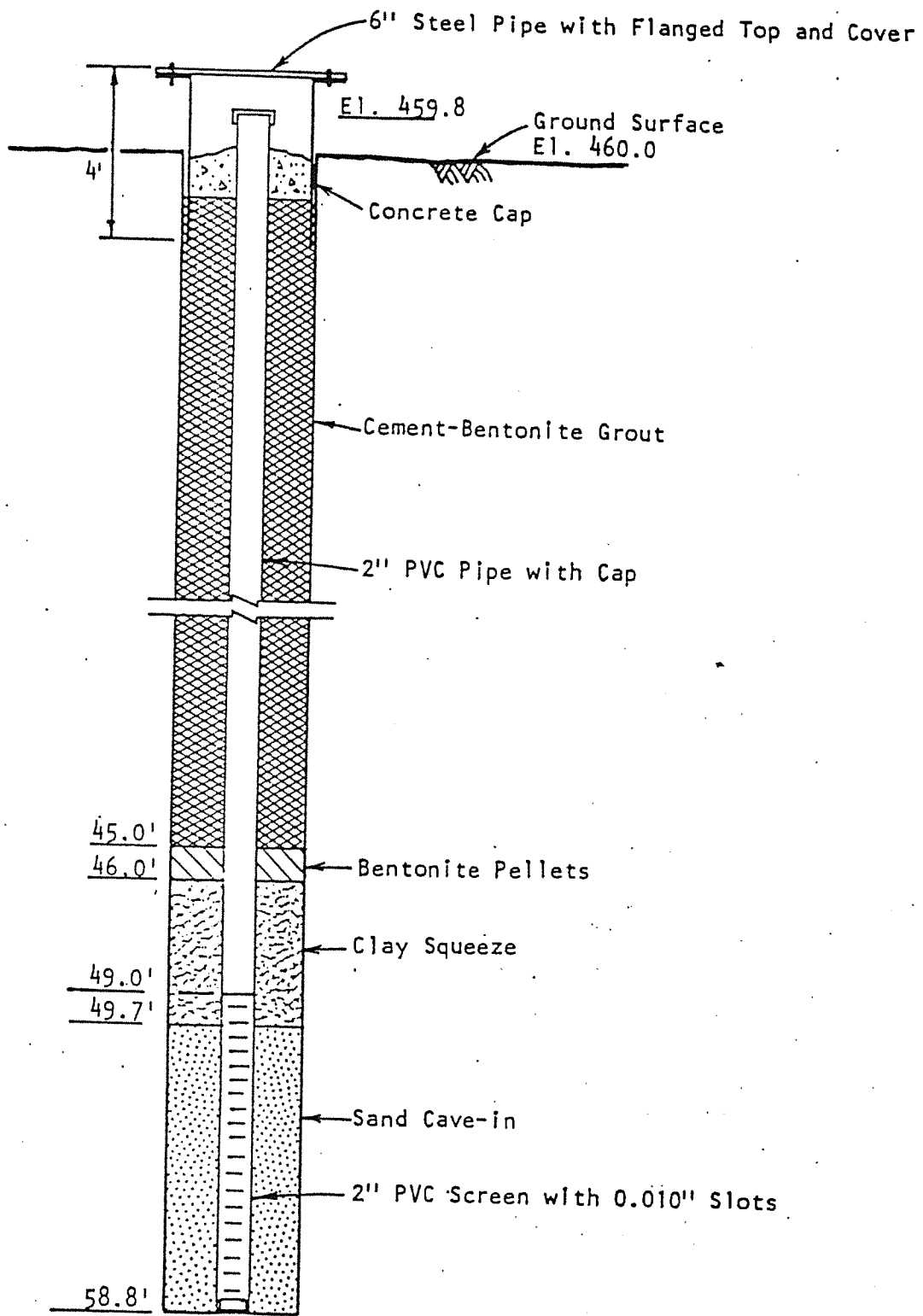
DEPTH (ft)	SAMPLE		SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.0'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf												
	NUMBER	INTERVAL AND TYPE					ADVANCED / RECOVERED (in)	SV Δ	QP/2 \square	QU/2O	PL	NMC	LL						
7	SS			Dark Gray-Brown Silty CLAY, CL															
40	8	SS	18/18	Dark Gray CLAY w/Silt, Sand, Shells, Organics, OH	WH-1-1														
45	9	SS	18/18		WH/12"-1														
50	10	SS	18/18	2 Gray Fine - Medium SAND W/Shells Trace Silt, SP-SM	WH-1-3														
55	11	SS	18/6		2-3-6														
60	12	SS	18/15	Dark Gray CLAY w/Silt Trace Sand, Shells, OH TOB	WH-1-1														
				Remarks: 1. Dry hole approximately 15.0 - 50.0' 2. Water level in Auger rose to river level immediately after retrieving sample 10															

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/8, 9/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at - Feet
0 Hours after completion 3.0 Feet
6 Days after completion 6.3 Feet
 after completion Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.





6" Borehole to Termination Depth

Not to Scale



John Mathes & Associates, Inc.

(21)

PIEZOMETER W-1

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-2
 SHEET 1 OF 1

22

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf										
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP/2 □	QU/2 O	PL	NMC	LL					
	1	AS			Brown Sandy CLAY, CL													
-5	2	SS	18/9		Gray - Brown Silty CLAY Trace Sand, CL	3-5-5												
-10	3	SS	18/16		Brown Fine SAND w/Silt Trace Gravel, SM	5-7-5												
-15	4	SS	18/16		Gray-Brown GRAVEL w/Sand Trace Clay, GP	19-20-28												
-20	5	SS	18/18			17-27-38												
-25	6	SS	18/13		-Coal @ 25.4'	23-18-12												
-30	7	SS	18/15		Brown Fine SAND, SP	6-11-11												
-35	8	SS	18/6		Brown GRAVEL w/Sand Trace Clay, GP-GC													
					TOB	0-4-6												

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/9/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

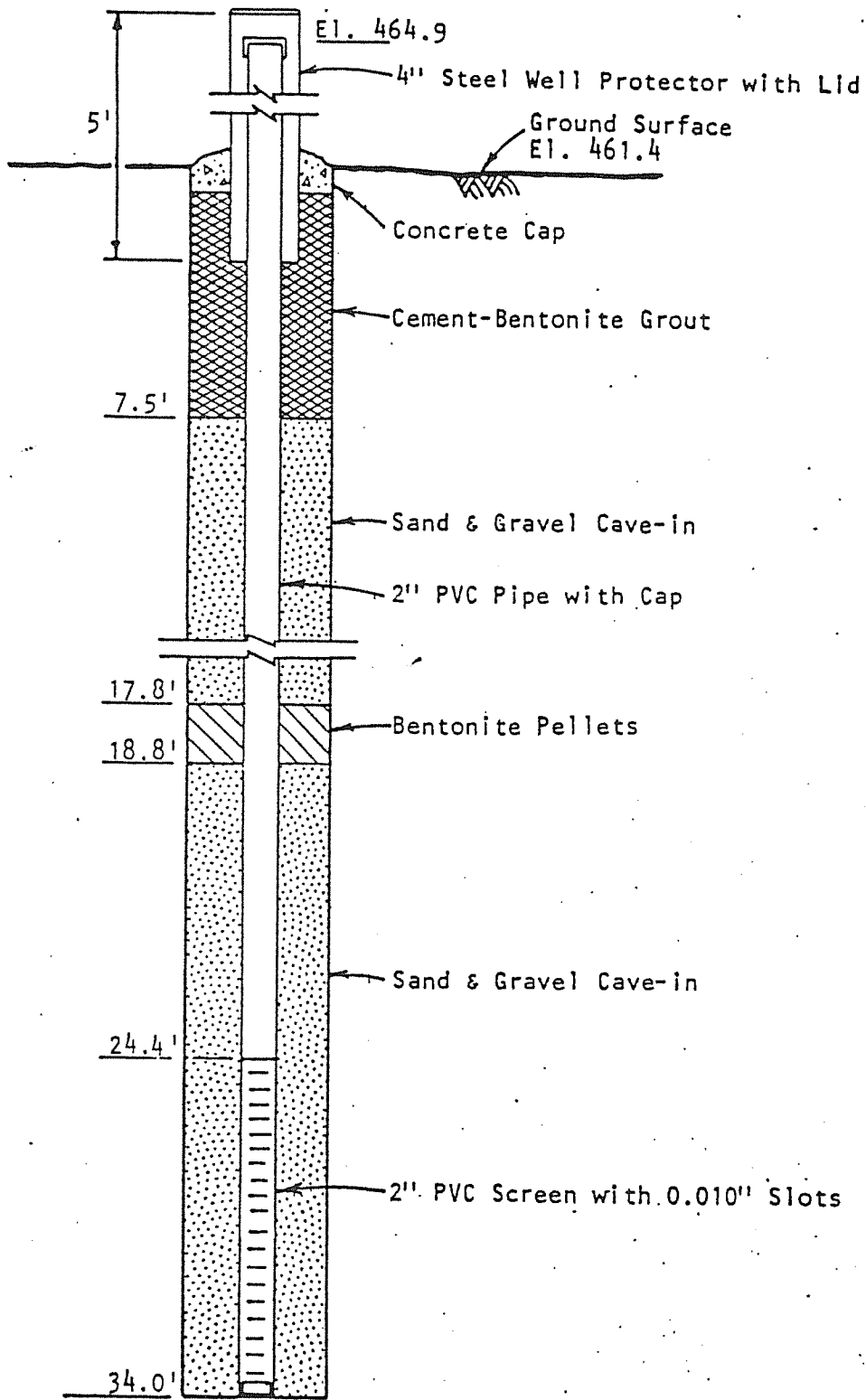
GROUNDWATER LEVELS

Encountered at 8.0 Feet
 _____ Hours after completion _____ Feet
6 Days after completion 8.0 Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.



6" Borehole to Termination Depth

Not to Scale



John Mathes & Associates, Inc.

PIEZOMETER W-2

22

PLATE 16

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-5
 SHEET 1 OF 2

23

DEPTH (ft)	SAMPLE		SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.2'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf		
	NUMBER	INTERVAL AND TYPE					ADVANCED / RECOVERED (in)	SV Δ	QP \square
	1	AG		Brown Sandy CLAY w/Gravel, Fill, CL					
-5	2	SS 18/18		Dark Gray FLYASH w/Bottom Ash, FILL, ML	7-9-8				
-10	3	SS 18/14		Dark Gray BOTTOM ASH, FILL, ML	7-17-16				
-15	4	SS 18/12		Dark Gray Silty CLAY, CL	7-7-5				
-20	5	SS 18/15			1-1-1				
-25	6	SS 18/16			WH-2-1				
-30	7	SS 18/18		Dark Gray CLAY w/Silt Trace Sand, Shells, OH	WH-2-2				
-35	8	SS 18/10		Brown GRAVEL w/Sand Trace Clay, GP-GC	8-19-16				

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/10/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at 18.4 Feet
 0 Hours after completion 4.2 Feet
 5 Days after completion 6.8 Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-3
 SHEET 2 OF 2

23

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.2</u> ¹	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf			
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SVΔ	QP/2□	QU/2○	
					Brown GRAVEL w/Sand Trace Clay, GP-GC						
-40	9	SS	18/18		Brown Sandy CLAY w/Gravel, CL	4-2-37					
-45	10	SS	18/10		Brown GRAVEL w/Sand Trace Clay, GP-GC						
					TOB.	10-33-38					
-50											

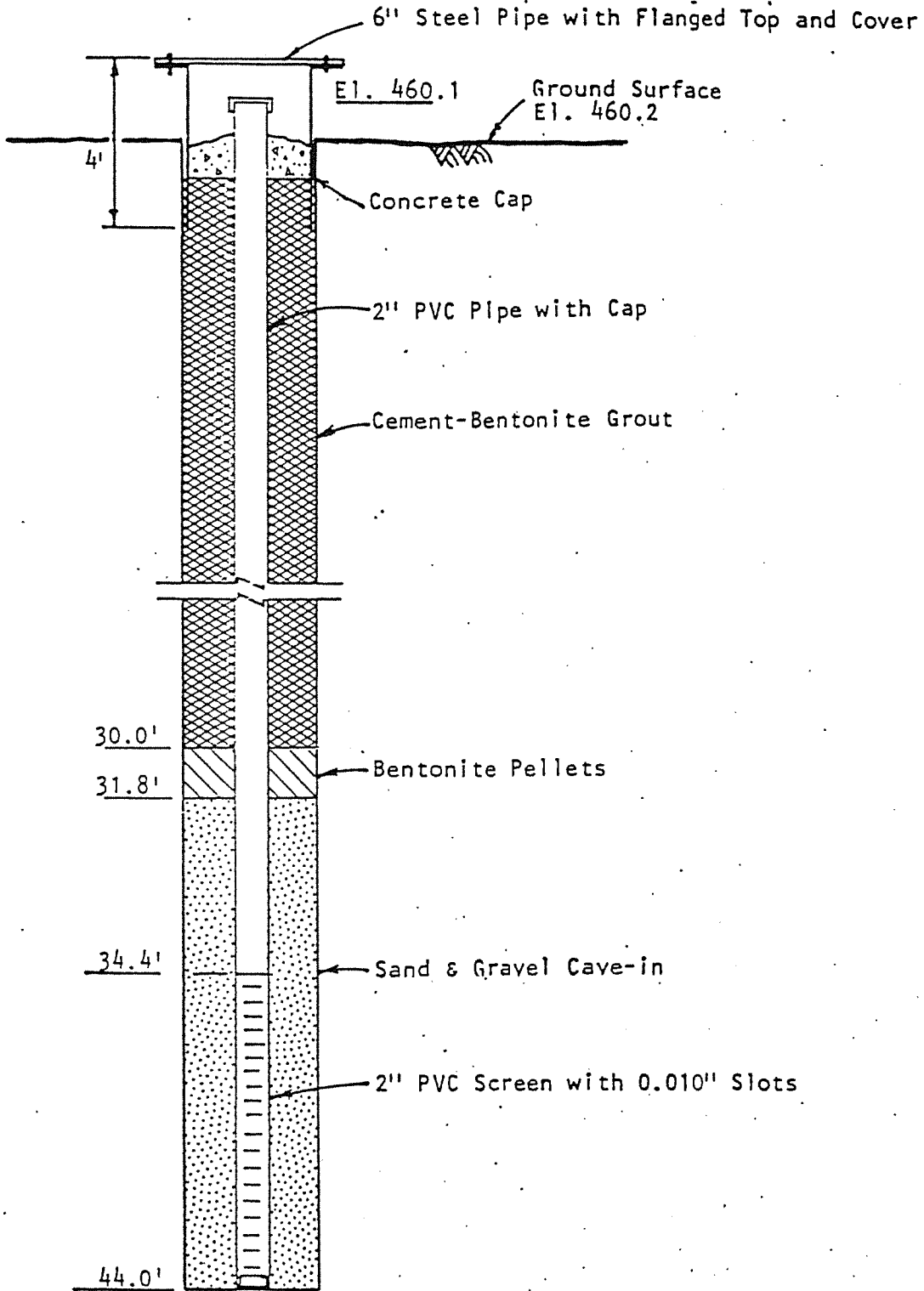
DRILLING METHOD Hollow Auger
 DATE DRILLED 12/10/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS

Encountered at 18.9 Feet
 0 Hours after completion 4.2 Feet
 5 Days after completion 6.8 Feet
 after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.





6" Borehole to Termination Depth

Not to Scale



John Mathes & Associates, Inc.

23

PIEZOMETER W-3

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-4
 SHEET 1 OF 2

24

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf											
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP/2 □	QU/2 ○	PL +	NMC •	LL x	Rock Quality Designation					
								0	1/2	1	1 1/2	2	2 1/2	0	50	100	0	50	100
1	AS				Brown Sandy CLAY w/Gravel, CL														
5	2	SS	18/16		Dark Gray FLYASH w/Bottom Ash, ML	3-4-5													
10	3	SS	18/18			2-5-6													
15	4	SS	18/18		Dark Gray Silty CLAY, CL	1-2-3													
20	5	SS	18/9			1-1-2													
25	6	SS	18/18			WH-2-2													
30	7	SS	18/16			WH-2-3													
35	8	SS	18/18		Dark Gray CLAY w/Silt Trace Sand, OH	WH-1-2													

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/10, 13/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at - Feet
66 Hours after completion 14.0 Feet
2 Days after completion 6.0 Feet
 after completion Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-4 24
 SHEET 2 OF 2

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.6'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf										
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP \square	QU \circ	PL	NMC	LL					
40	SS	18/18			Dark Gray CLAY w/Silt Trace Sand, OH	WH-WH-2												
45	10 SS	18/18				WH-2-1												
50	11 SS	18/12			Dark Gray Fine SAND w/Clay, SC	WH-3-8												
55	12 SS	18/4	1			1-4-7												
60	13 SS	18/18			Dark Gray Gravelly Fine SAND Trace Silt, SP-SM	8-15-5												
65	14 SS	18/16			Gray GRAVEL w/Sand Trace Clay, GP-GC	14-17-22												
70					TOB Remarks: 1. Water level approximately 6.0' appears same as river level.													

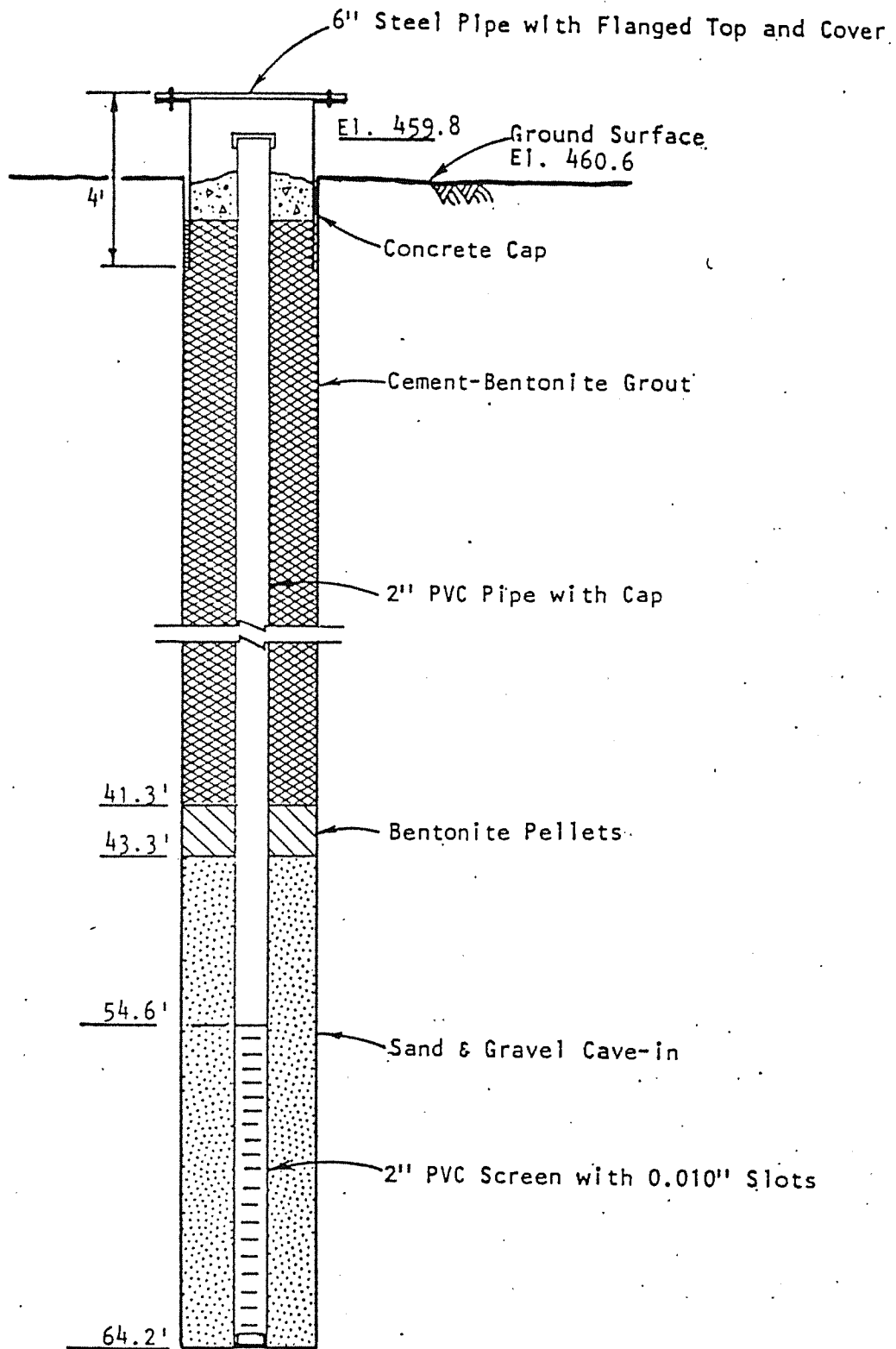
DRILLING METHOD Follow Auger
 DATE DRILLED 12/10, 13/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at - Feet
66 Hours after completion 14.0 Feet
2 Days after completion 6.7 Feet
- after completion - Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.



6" Borehole to Termination Depth

Not to Scale



PIEZOMETER W-4

24

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-5
 SHEET 1 OF 1

25

DEPTH (ft)	SAMPLE		SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf							
	NUMBER	INTERVAL AND TYPE					ADVANCED / RECOVERED (in)	SV Δ	QP \square	QU \circ	Rock Quality Designation			
				Soil Classification System <u>Unified</u>			0	1/2	1	1 1/2	2	2 1/2		
				Surface Elevation <u>459.8'</u>			0		50		100			
							Rock Quality Designation							
							0		50		100			
5	1	SS	18/7	Dark Brown Sandy SILT Trace Clay, ML	4-10-14									
				Brown GRAVEL w/Sand Trace Silt, Clay, GP										
10	2	SS	18/13		6-12-17									
15	3	SS	18/13		7-12-16									
20	4	SS	18/18	Brown Fine SAND Trace Silt, SP	8-25-27									
25		SS	18/6	Brown Medium SAND w/Gravel, SP	4-7-7									
30	6	SS	18/9	Brown Gravelly SAND Trace Clay SP	6-12-10									
35	7	SS	18/6	TOB	7-8-13									

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/14/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

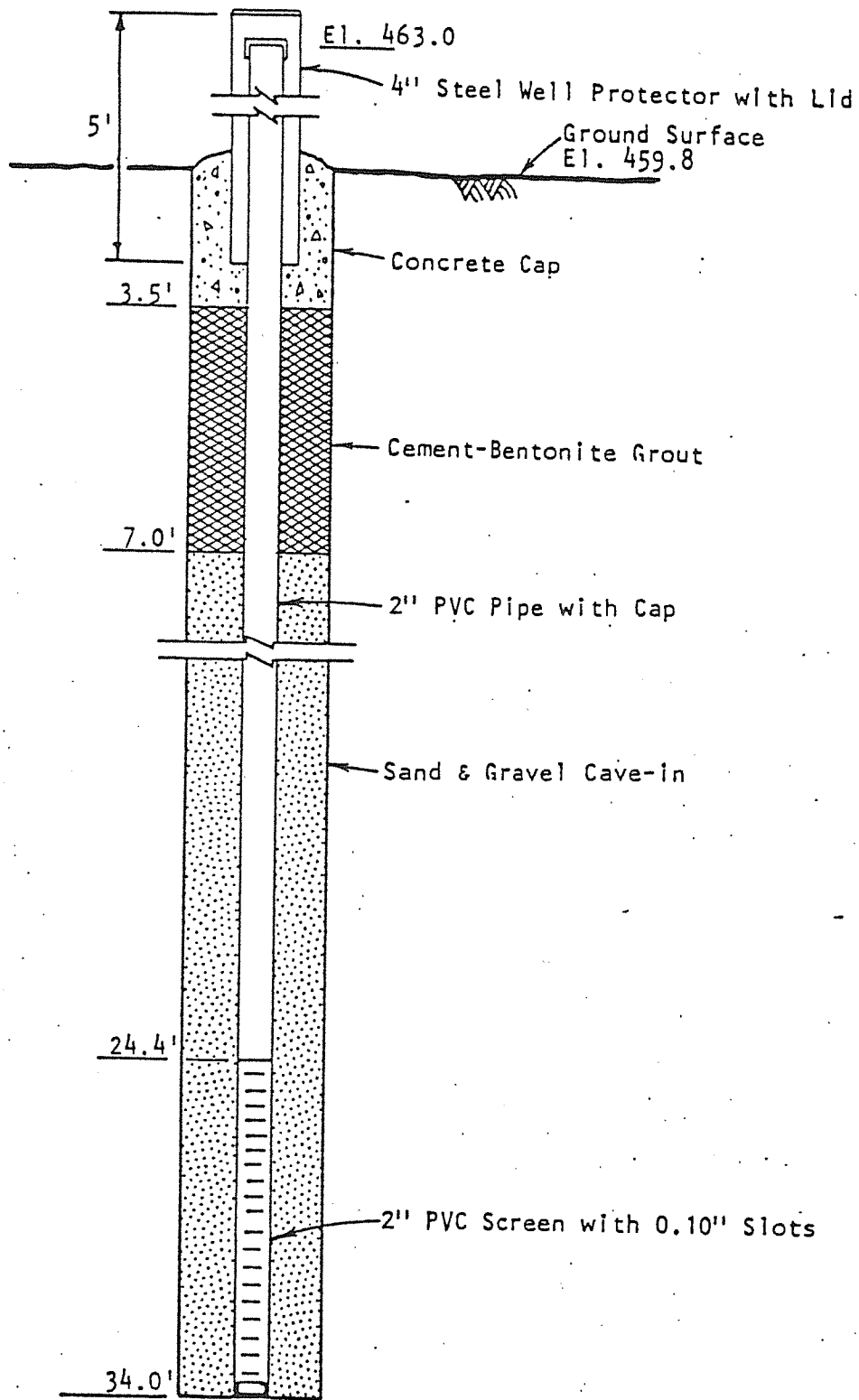
GROUNDWATER LEVELS

Encountered at 6.0 Feet
24 Hours after completion 5.8 Feet
 _____ after completion _____ Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.



6" Borehole to Termination Depth

Not to Scale



John Mathes & Associates, Inc.

25

PIEZOMETER W-5

PLATE 19



Appendix A2
STMI Boring Logs
and Well Details

Monitoring Well No. 26

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

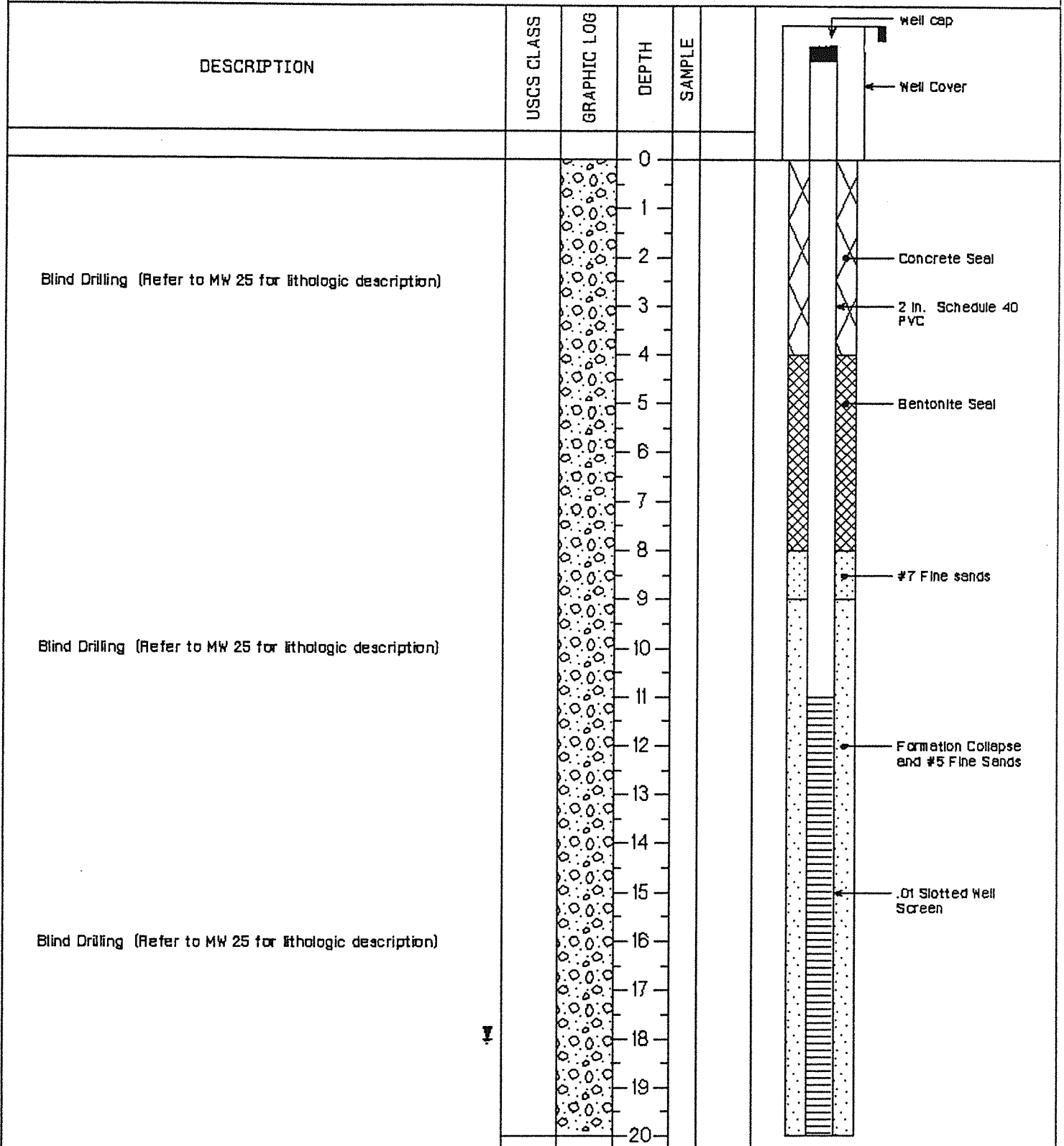
HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear ft.

FINAL GW: 18 ft.

HOLE ELEV.: 460.66 ft. MSL



STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 2

Monitoring Well No. 26

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger


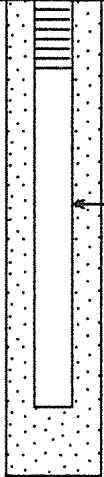
HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear ft.

FINAL GW: 18 ft.

HOLE ELEV.: 460.66 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Blind Drilling (Refer to MW 25 for lithologic description)			20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 2

Monitoring Well No. 27

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 09-11-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 3.88 ft.

HOLE ELEV: 447.94 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	Diagram
			0		well cap Well Cover
			1		
			2		Concrete Seal
			3		
			4		
Dark gray, clayey silt, uniform, organic matter, soft, sticky			5		
			6		Bentonite Seal
			7		
			8		
			9		
Dark gray, clayey silt w/ some sand, roots, soft, uniform, wet			10	SS-1	2 in. Schedule 40 PVC
			11		
			12		
			13		
			14		
Same as above, except color changes to lighter gray at 16 ft.			15	SS-2	
			16		
			17		
			18		
Mottled gray, orange, uniform, clayey silt, soft, moist			19	SS-3	
			20	SS-3	

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 2

Monitoring Well No. 27

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 09-11-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 3.88 ft.

HOLE ELEV.: 447.94 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Same as above		[Vertical line pattern]	20 21 22 23 24	SS-3	<p>2 in. Schedule 40 PVC</p> <p>Bentonite Seal</p> <p>#7 Fine Sand</p> <p>Formation Collapse and #5 Sand</p> <p>.01 Slotted Well Screen</p>
Uniform, brown grading to gray silty fine sand, wet, soft		[Vertical line pattern]	25 26 27 28	SS-4	
uniform gray silty fine sand, wet, soft		[Vertical line pattern]	29 30	SS-5	
uniform brown fine-medium sand, wet, soft		[Vertical line pattern]	31 32	SS-5	
Uniform brown fine-medium sand with pebbles (may be blown in)		[Vertical line pattern]	33 34	SS-6	
Poorly sorted brown coarse sand and gravel, wet (glacial)		[Vertical line pattern]	35 36	SS-6	
			37		
			38		
			39		
			40		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Monitoring Well No. 30

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

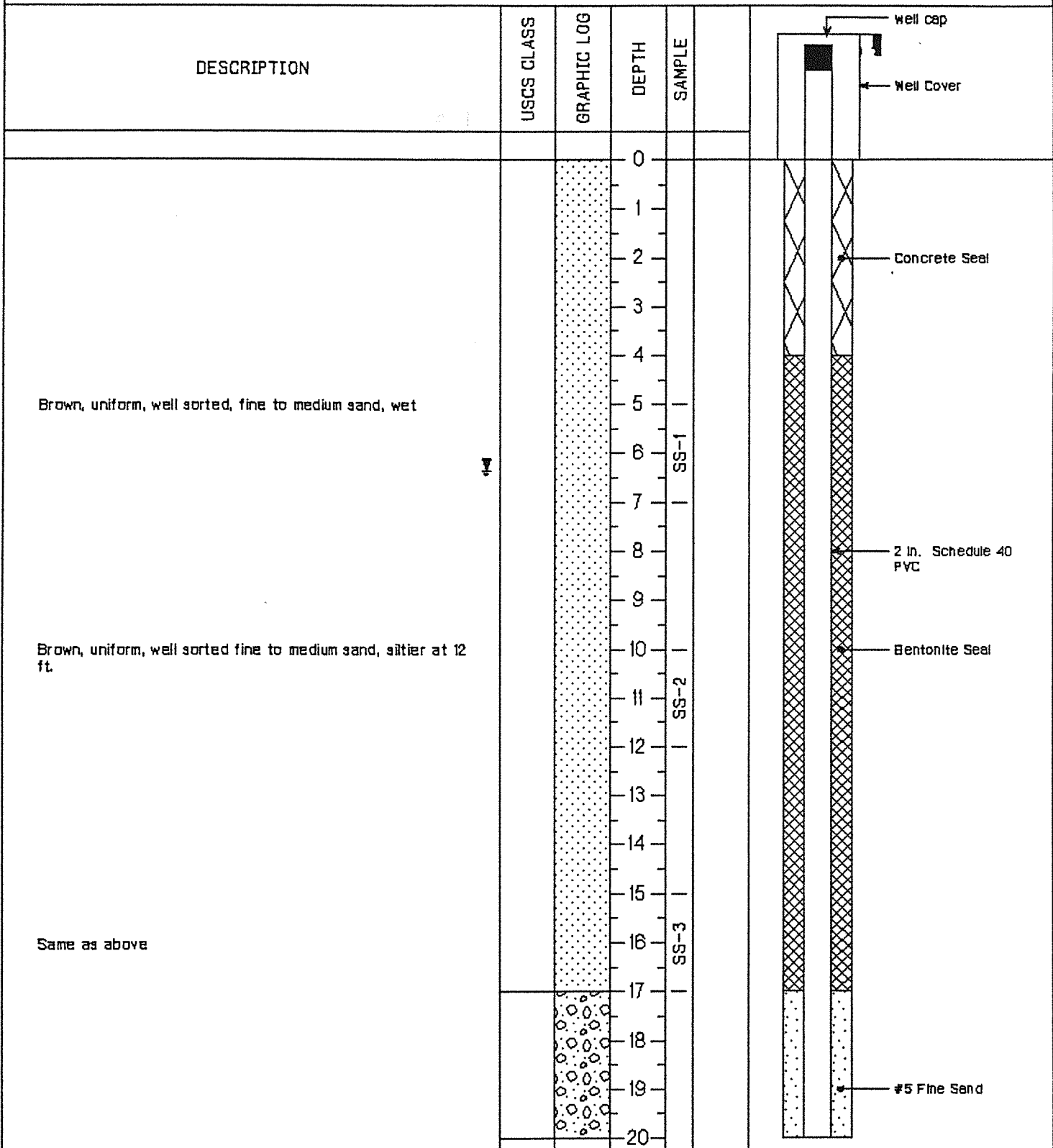
HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 6.36 ft.

HOLE ELEV: 451.24 ft. MSL



STMI
2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:
Sample numbers refer to saved samples

Project No.
135-131

Page 1 of 2

Monitoring Well No. 30

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

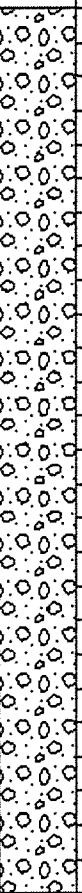
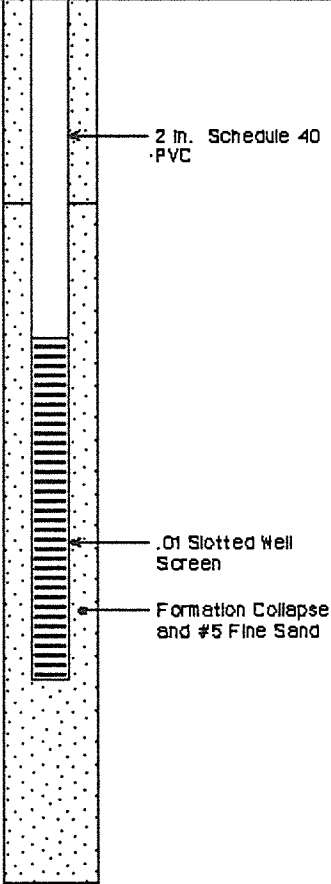
HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL BW: 6.36 ft.

HOLE ELEV: 451.24 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
<p>Sand as above (probably blow-in), grading to silty sand with coarse gravel</p> <p>Silty sand with gravel, brown, poorly sorted, wet, like above</p>			<p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>26</p> <p>27</p> <p>28</p> <p>29</p> <p>30</p> <p>31</p> <p>32</p> <p>33</p> <p>34</p> <p>35</p> <p>36</p> <p>37</p> <p>38</p> <p>39</p> <p>40</p>	<p>SS-4</p> <p>SS-6</p>	 <p>2 in. Schedule 40 PVC</p> <p>.01 Slotted Well Screen</p> <p>Formation Collapse and #5 Fine Sand</p>

STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:
 Sample numbers refer to saved samples

Monitoring Well No. 31

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 6.30 ft.

HOLE ELEV: 461.24 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	
Blind Drilling (Refer to boring logs for MW 30 for lithologic description)			0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 1

Monitoring Well No. 32

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-21-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

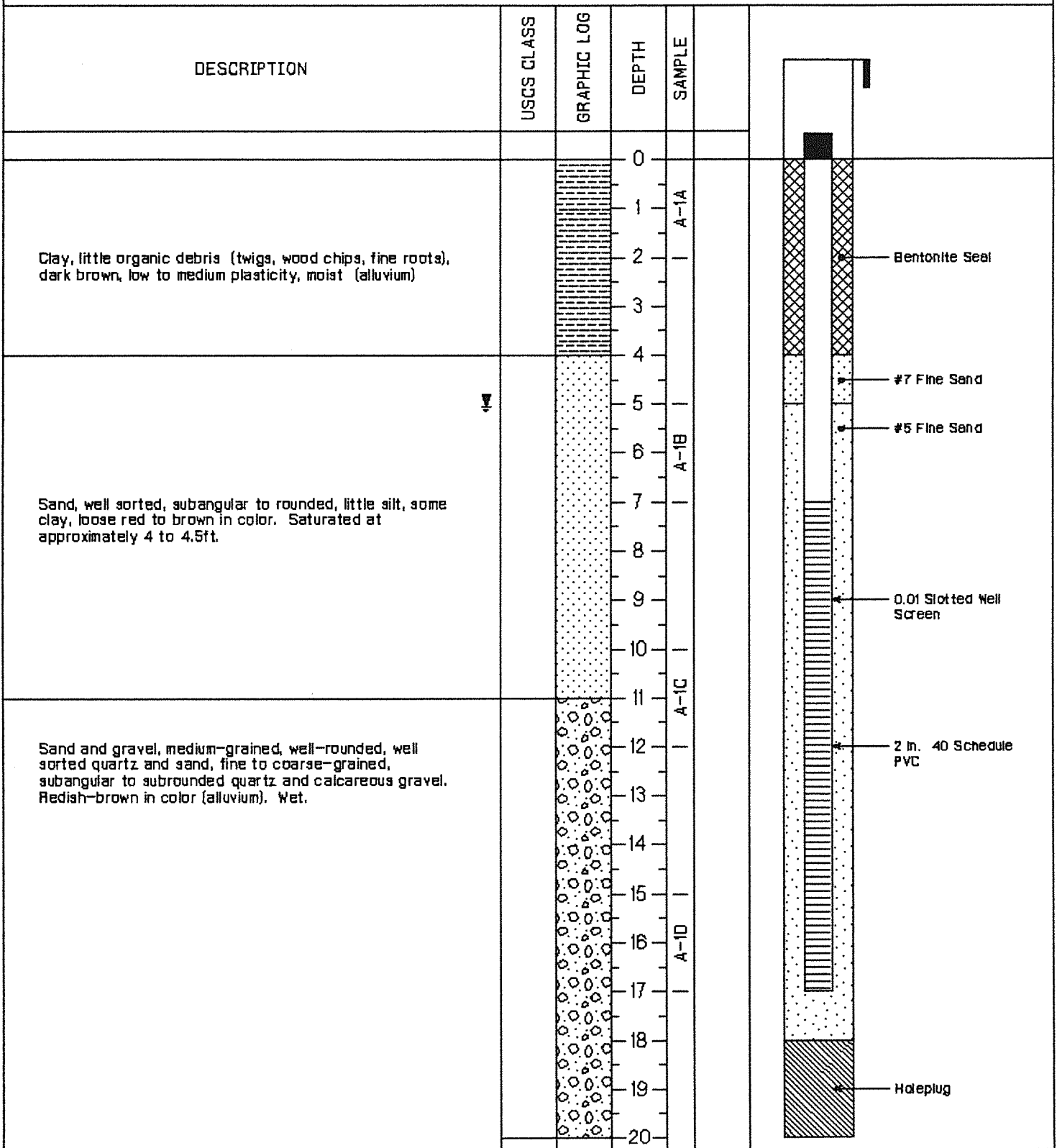
HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 6.06 ft.

HOLE ELEV: 451.35 ft. MSL



STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Discontinuously sampled every 5 feet. Sample numbers refer to saved samples

Project No.
135-131

Page 1 of 2

Monitoring Well No. 32

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-21-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger


HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 5.08 ft.

HOLE ELEV: 451.35 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
			20		
Sandy clay, no plasticity, reddish brown in color, with rusty red laminations. Wet.		[Symbol]	21	A-1E	 <p style="margin-left: 20px;">← Hole plug</p>
		[Symbol]	22		
		[Symbol]	23		
		[Symbol]	24		
		[Symbol]	25		
		[Symbol]	26	A-1F	
		[Symbol]	27		
		[Symbol]	28		
		[Symbol]	29		
		[Symbol]	30		
Silty clay, trace coarse subangular sand, mixed lithologies, olive gray, no to low plasticity, hard, moist (till).		[Symbol]	31		
		[Symbol]	32		
		[Symbol]	33		
		[Symbol]	34		
		[Symbol]	35	A-1G	
		[Symbol]	36		
			37		
			38		
			39		
			40		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Discontinuously sampled every 5 feet. Sample numbers refer to saved samples

Project No.
135-131

Monitoring Well No. 33

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger


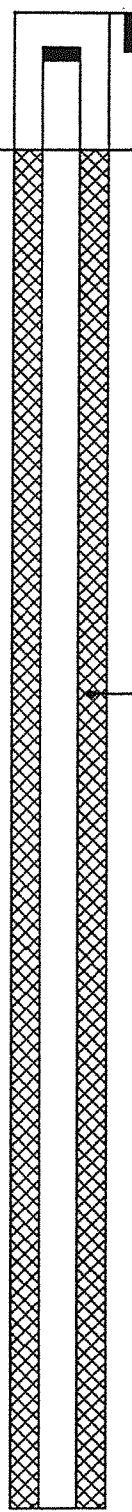


HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 4.38 ft.

HOLE ELEV.: 448.69 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	
<p>Silty clay, trace of very fine-grained sand, trace of plant debris, dark brown, medium plasticity (alluvium). Wet. Stagnant swampy odor.</p>			0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	B-1A B-1B B-1C B-1D	 <p style="text-align: right; margin-right: 20px;">Bentonite Seal</p>
<p>Silty clay, trace fine to medium-grained sand, medium to high plasticity, dark gray in color. Wet</p>					
<p>Same as Above</p>					

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131


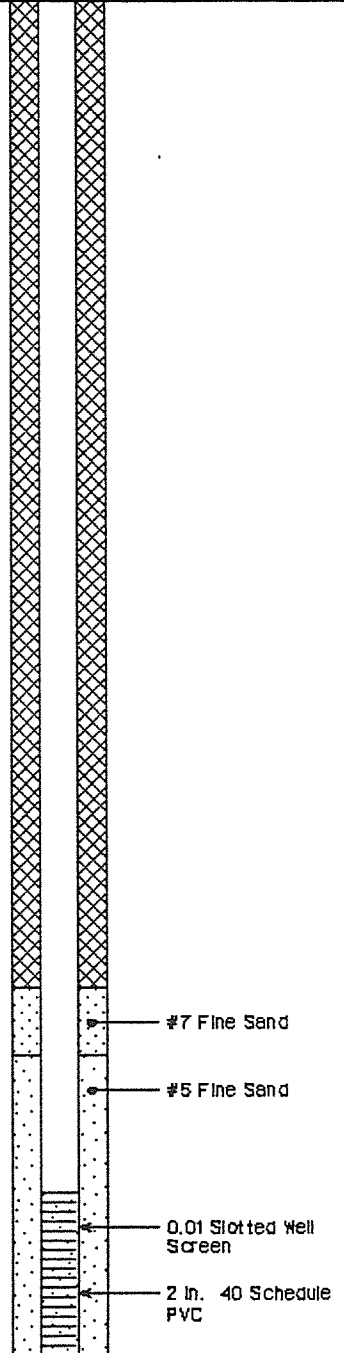
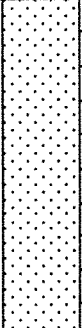
Page 1 of 3

Monitoring Well No. 33

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 8-22-96
HOLE DIA: 7 in.
FINAL GW: 4.38 ft.

LOGGED BY: Mueller/Tu
SAMPLER: Split Spoon
HOLE ELEV: 448.69 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Same As Above			20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35	B-1E B-1F B-1G	
Sand, fine grained, well-sorted, well-rounded, quartz, trace calcareous, gray. Saturated.			36 37 38 39 40	B-1H	

STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Page 2 of 3

Monitoring Well No. 33

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

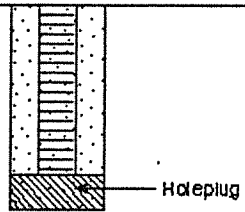
HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 4.38 ft.

HOLE ELEV.: 448.69 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
		40			
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			
		50			
		51			
		52			
		53			
		54			
		55			
		56			
		57			
		58			
		59			
		60			

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 3 of 3

Monitoring Well No. 34

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 7.54 ft.

HOLE ELEV: 448.19 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	
Silty clay, trace of plant debris, little fine-grained sand, very dark brown in color, medium to high plasticity (alluvium).		[Hatched Pattern]	0		
		[Hatched Pattern]	1	C-1A	
		[Hatched Pattern]	2		
		[Hatched Pattern]	3		
		[Hatched Pattern]	4		
		[Hatched Pattern]	5		
		[Hatched Pattern]	6	C-1B	
		[Hatched Pattern]	7		
		[Hatched Pattern]	8		
		[Hatched Pattern]	9		
		[Hatched Pattern]	10		
		[Hatched Pattern]	11	C-1C	
		[Hatched Pattern]	12		
		[Hatched Pattern]	13		
		[Hatched Pattern]	14		
		[Hatched Pattern]	15		
		[Hatched Pattern]	16	C-1D	
		[Hatched Pattern]	17		
		[Hatched Pattern]	18		
		[Hatched Pattern]	19		
		[Hatched Pattern]	20		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 2

Monitoring Well No. 34

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 7.54 ft.

HOLE ELEV: 448.19 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Clayey silt, trace to little fine-grained sand and shell fragments, soft, olive-gray. Wet.		20			<p style="text-align: right;">Bentonite Seal</p> <p style="text-align: right;">2 in. 40 Schedule PVC</p> <p style="text-align: right;">#7 Fine Sand</p> <p style="text-align: right;">#5 Fine Sand</p> <p style="text-align: right;">0.01 Slotted Well Screen</p> <p style="text-align: right;">Holeplug</p>
		21	C-1E		
		22			
		23			
		24			
		25			
Sand, fine-grained to medium-grained, well-sorted, quartz, trace of silt, loose. Yellowish brown color grades to olive gray below 31 ft.		26	C-1F		
		27			
		28			
		29			
		30			
		31	C-1G		
		32			
		33			
		34			
		35			
		36			
		37			
		38			
		39			
		40			

STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 2

Monitoring Well No. L1

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL BW: 12.75 ft.

HOLE ELEV.: 465.11 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
<p>Fill, consisting of dark brown uniform silty sand with gravels, grading to poorly sorted gravelly sand (Dry)</p> <p>Fill, consisting of dark grey silt with sand and gravel, mixed with fly ash, moist, very soft</p>			0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	SS-1 SS-2 SS-3	<p style="text-align: right;">Well Cap</p> <p style="text-align: right;">Cement Seal</p> <p style="text-align: right;">Bentonite Seal</p>
<p>Gray fly ash, silty, moist, well-sorted</p>			16 17 18 19 20	SS-3	

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Page 1 of 3

Monitoring Well No. L1

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 12.75 ft.

HOLE ELEV: 466.11 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
<p>Black silty flyash with some sand, wet (2 samples stored for lab)</p>		[Solid black bar]	20 21 22 23 24	SS-4	<p style="font-size: small;"> Fine Sand Pack #5 Fine Sand 2 in. 40 Schedule PVC 0.01 Slotted Well screen Holeplug </p>
<p>Black silty clay with shell fragments. Wet, firmer than above (2 samples stored for lab)</p>		[Dotted pattern bar]	25 26 27 28 29 30	SS-5	
<p>Silt, with dark brown mottles, uniform texture, shell fragments.</p>		[Horizontal dashed pattern bar]	31 32 33 34	SS-6	
<p>Black uniform silt, soft, more plastic than above</p>		[Vertical dashed pattern bar]	35 36 37 38 39 40	SS-7	

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Page 2 of 3

Monitoring Well No. L1

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

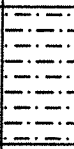

HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 12.76 ft.

HOLE ELEV.: 465.11 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Black silt with sand, uniform texture, numerous roots.			40 41 42	SS-S	
			43		
			44		
			45		
			46		
			47		
			48		
			49		
			50		
			51		
			52		
			53		
			54		
			55		
			56		
			57		
			58		
			59		
			60		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Monitoring Well No. L2

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 08-23-96
HOLE DIA: 7 in.
FINAL GW: Not Measured ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split Spoon
HOLE ELEV: 465.43 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
			0		
Black, coarse, dry bottom ash.			1		
			2		
			3		
			4		
Black, coarse, moist bottom ash			5		
			6	SS-1	
			7		
			8		
			9		
			10		
			11	SS-2	
Black, fine-silty sand, uniform			12		
			13		
			14		
Brown, poorly sorted, silty coarse sand & gravel, dry			15		
			16	SS-3	
			17		
			18		
			19		
			20		

Hole backfilled with bentonite chips and cuttings

Monitoring Well No. L2

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger


HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: Not Measured ft.

HOLE ELEV: 466.43 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
			20		
Brown, poorly sorted silty sand & gravel, wet			21	SS-4	Hole backfilled with bentonite chips and cuttings
			22		
			23		
			24		
			25		
			26		
			27		
			28		
			29		
			30		
			31		
			32		
			33		
			34		
			35		
			36		
			37		
			38		
			39		
			40		

Monitoring Well No. L3

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 9-12-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

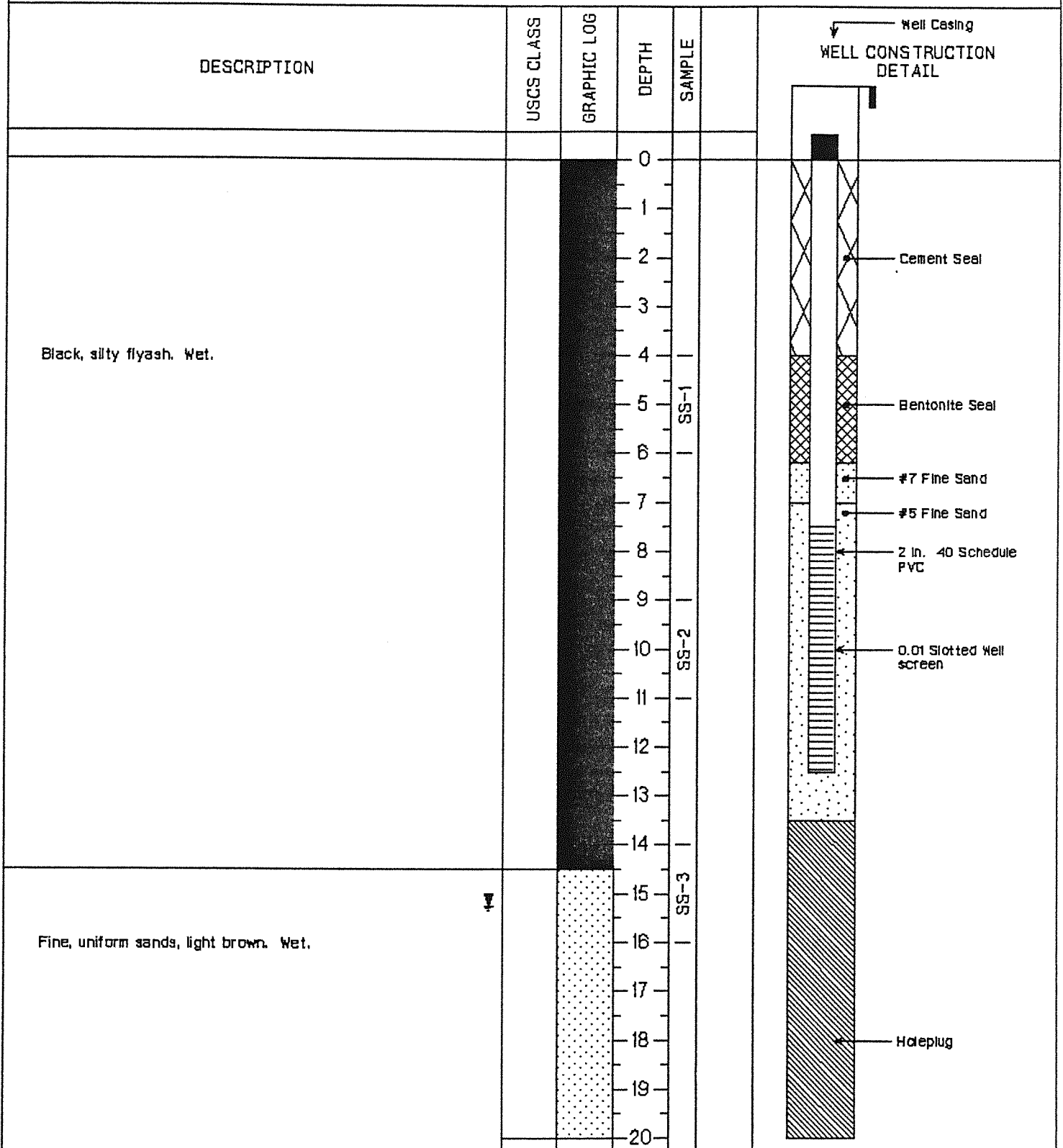
HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 16.26 ft.

HOLE ELEV: 459.26 ft. MSL



STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Continuously sampled bore-hole. Sample numbers refer to saved samples

Project No.
135-131

Monitoring Well No. L3

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 9-12-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

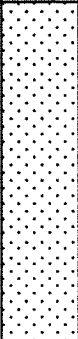


HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 15.26 ft.

HOLE ELEV: 459.26 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Fine, uniform sand, light brown. Wet.			20 21 22 23 24	SS-4	 ← Holeplug
Fine to medium sand with gravels.			25 26		
			27 28 29 30 31 32 33 34 35 36 37 38 39 40		

STMI

2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Continuously sampled bore-hole. Sample numbers refer to saved samples

Project No.
 135-1.31

Monitoring Well No. L4

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-21-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

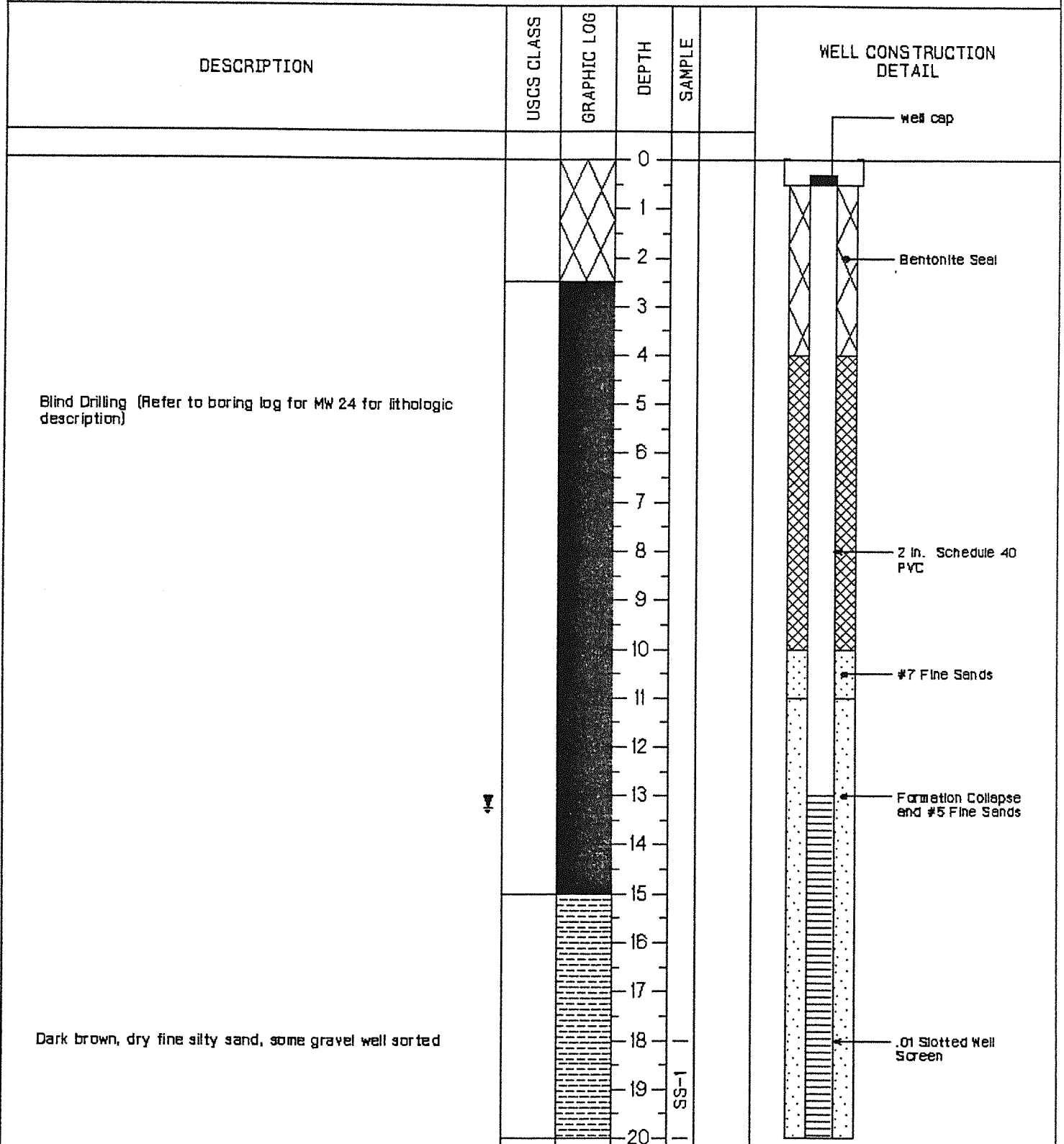
HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 13.25 ft.

HOLE ELEV: 481.95 ft. MSL



STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Monitoring Well No. L4

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-21-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

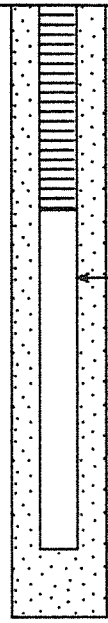
HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 13.26 ft.

HOLE ELEV.: 461.96 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Blind Drilling (Refer to boring log for MW 24 for lithologic description)		20			 <p style="text-align: right; margin-right: 50px;">← Sediment Trap</p>
		21			
		22			
		23			
		24			
		25			
		26			
		27			
		28			
		29			
		30			
		31			
		32			
		33			
		34			
		35			
		36			
		37			
		38			
		39			
		40			

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 2



Appendix A3
NRT Boring Logs
and Well Details

- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-235
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/03/00	Date Drilling Completed 04/03/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 457.8 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					ROD/ Comments	
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200		
			1	0'-15' DRILL WITHOUT SAMPLING, COAL ASH, fine to coarse	FILL										
			2												
			3												
			4												
			5												
			6												
			7												
			8												
			9												
			10												
HE-235 (10-12)	24	4	11	10'-16.5' COAL ASH, dark gray to black, fine to medium sand consistency, soft, slightly moist	FILL										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: *C. J. Robb* Firm: Natural Resource Technology, Inc.

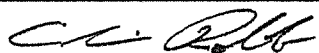
- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-A1
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/05/00	Date Drilling Completed 04/05/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 460.3 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample Number and Type	Length Att. & Recovered (ft)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1	0'-10' DRILL WITHOUT SAMPLING, COAL ASH	FILL									
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
			10											
HE-A1 (10-12)	24	12	11	10'-13.5' COAL ASH, fine grained, 10-15% coal cinders, stiff, dry									D	

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature:  Firm: Natural Resource Technology, Inc.

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-A3
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/06/00	Date Drilling Completed 04/06/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 461.7 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1	0'-8' DRILL WITHOUT SAMPLING	FILL									
			2											
			3											
			4											
			5											
			6											
			7											
			8											
HE-A3 (8-10)	12	26	9	8'-18' COAL ASH, silt to fine grained sand consistency, coal cinders, very stiff, moist to dry								M/D		
HE-A3 (10-10)	8	12	11									W/D		

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
---------------	---

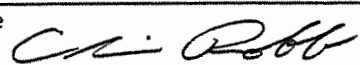
- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:



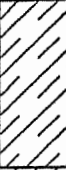



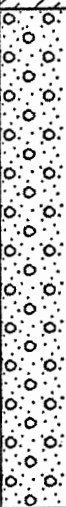
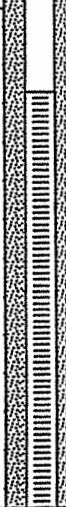
Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-L5
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/06/00	Date Drilling Completed 04/06/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 461.3 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

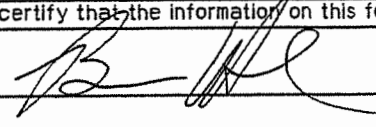
Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments	
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200		
			1	0'-8' DRILL WITHOUT SAMPLING, (COAL ASH)											
			2												
			3												
			4												
			5												
			6												
			7												
			8												
HE-L5 (8-10)	15	66/0.3	9	8'-12' COAL ASH, gray, silt to fine sand consistency, very dense, wet to dry at 9'											
			10												
HE-L5 (10-12)	--	50/0.2	11												

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
---	--

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments		
Number and Type	Length Att. & Recovered (ft)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200			
HE-L5 (12-14)	24	24	13	12'-17' <u>COAL ASH/SILT</u> , dark gray, (5Y 4/1) with brown pockets, very stiff, dry	ML ASH											
			14	5% rounded brown pebbles												
HE-L5 (14-16)	24	15	15													
			16													
HE-L5 (16-18)	24	4	17	17'-19' <u>CLAYEY SILT</u> , black (2.5Y 2.5/1) 40% clay, moist, soft	ML											
			18													
HE-L5 (18-20)	24	4	19	19'-26' <u>SILTY CLAY</u> , olive brown (2.5Y 4/3), 40% silt, 5-10% fine grained sand, soft, moist	CL											
			20	20'-25' <u>DRILL WITHOUT SAMPLING</u> , wet at approximately 19'-20'												
			21													
			22													
			23													
			24													
			25													
HE-L5 (25-27)	17	27	26	26'-32' <u>SAND WITH GRAVEL</u> , light olive brown (2.5Y 5/4), fine to medium sand, 15-20% fine sub-angular gravel, medium dense, wet	SP											
			27	increasingly coarser with depth												
			28													
			29													
			30													
HE-L5 (30-32)	6	14	31													
				EOB @ 32'												

- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment				License/Permit/Monitoring Number				Boring Number HE-35						
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Bob Erickson				Date Drilling Started 9/28/99		Date Drilling Completed 9/28/99		Drilling Method HSA 4 1/4"						
Facility Well No.		Unique Well No.		Common Well Name		Final Static Water Level Feet MSL		Surface Elevation -- Feet MSL		Borehole Diameter 8.25 inches				
Boring Location State Plane				Feet N		Feet E		Lat		Long				
Local Grid Location (if applicable)				<input type="checkbox"/> N		<input type="checkbox"/> E		<input type="checkbox"/> S		<input type="checkbox"/> W				
County Putnam				Civil Town/City/ or Village Hennepin, IL										
Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					ROD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1 2 3 4 5 6 7 8 9 10 11	0-7' Fill, brown sand and gravel.	FILL									
				7-12' Fill, black silt, uniform, dry, coal ash.	FILL									
I hereby certify that the information on this form is true and correct to the best of my knowledge.														
Signature 						Firm Natural Resource Technology, Inc.								

Route To:

- Solid Waste
- Emergency Response
- Wastewater
- Superfund
- Haz. Waste
- Underground Tanks
- Water Resources
- Other:

Form

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number WELL-35
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Bob Erickson			Date Drilling Started 9/28/99	Date Drilling Completed 9/28/99	Drilling Method HSA 4 1/4"
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane			Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W
County Putnam			Civil Town/City/ or Village Hennepin, IL		

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1 2 3 4 5	0-5' Fill, white-grey, angular sandy gravel, dry.	FILL									
			6 7	5-7' Black silty sand, roots, small grey pebbles, dry.	SM									
			8 9 10 11	7-18' Brown medium sand, uniform texture.	SP									







I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature Firm **Natural Resource Technology, Inc.**

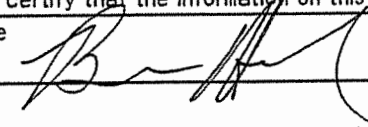
- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-36
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Bob Erickson			Date Drilling Started 9/28/99	Date Drilling Completed 9/28/99	Drilling Method HSA 4 1/4"
Facility Well No.	Unique Well No.	Common Well Name 36	Final Static Water Level -- Feet MSL	Surface Elevation Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin
-------------------------	--

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1	0-4' Black silt, roots, topsoil.	ML									
			2											
			3											
			4											
			5	4-10' Red-brown unifrom fine sand, dry.	SP									
			6											
			7											
			8											
			9											
			10											
			11		GW									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
---	---



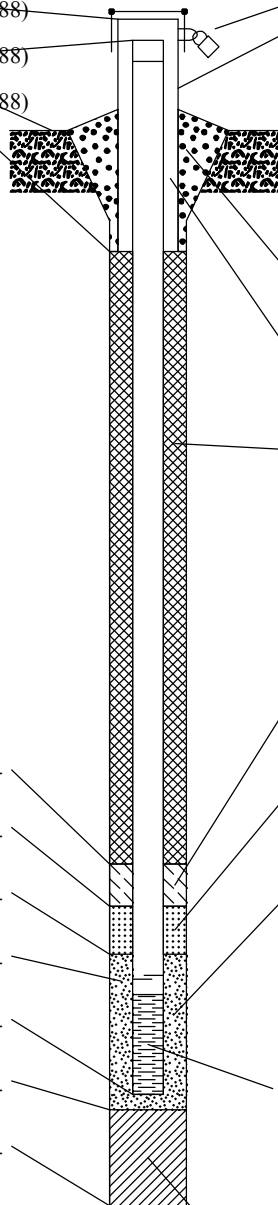
Facility/Project Name Hennepin Power Station		License/Permit/Monitoring Number		Boring Number 49	
Boring Drilled By: Name of crew chief (first, last) and Firm Chad Dutton Bulldog Drilling		Date Drilling Started 7/2/2015		Date Drilling Completed 7/6/2015	
Common Well Name 49		Final Static Water Level Feet (NAVD88)		Surface Elevation 465.76 Feet (NAVD88)	
				Borehole Diameter 8.3 inches	
Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/>) or Boring Location <input checked="" type="checkbox"/>		State Plane 1,689,022.19 N, 2,528,297.09 E E/W		Local Grid Location	
1/4 of 1/4 of Section , T N, R		Lat 41° 18' 4.255"		Feet <input type="checkbox"/> N <input type="checkbox"/> E	
		Long -89° 19' 23.987"		Feet <input type="checkbox"/> S <input type="checkbox"/> W	
Facility ID		County Putnam		State Illinois	
				Civil Town/City/ or Village Hennepin	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties					RQD/ Comments
								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 13	3 4 7 10	1	0 - 5.3' FILL, SILT WITH GRAVEL: (ML)g , very dark grayish brown (10YR 3/2), trace sand and roots, rounded to subangular fine gravel, noncohesive, nonplastic, dry.									
2 SS	24 10.5	4 6 9 3	3	2.5' increase in gravel content and gravel size to fine to coarse, coarse sand (5-15%), dry.	(FILL) (ML)g								
3 SS	24 19	2 3 9 10	5	5' moist. 5.3 - 20.2' FILL, ASH (Coal): very dark gray (10YR 3/1), mostly silt sized particles, few interbedded sand sized layers, trace coarse ash, noncohesive, nonplastic, moist to wet.									
4 SS	24 22	5 27 30 50 for 5'	8	7.5' black (10YR 2/1). 8.2' mostly medium sand-sized particles with some coarse sand to fine gravel-sized ash.	(FILL)								
5 SS	24 24	5 11 20 50 for 5'	10	10' mostly silt sized particles, trace fine gravel to coarse sand sized ash, trace fine sand sized ash.									
6	24	4 22	13										

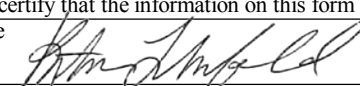
I hereby certify that the information on this form is true and correct to the best of my knowledge.


Signature 	Firm Natural Resource Technology 234 W. Florida St., Fifth Floor, Milwaukee, WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608
---------------	---	--

Facility/Project Name Hennepin Power Station		Local Grid Location of Well _____ ft. <input type="checkbox"/> N. _____ ft. <input type="checkbox"/> E. <input type="checkbox"/> S. _____ ft. <input type="checkbox"/> W.		Well Name 49	
Facility License, Permit or Monitoring No.		Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/>) or Well Location <input checked="" type="checkbox"/> Lat. <u>41° 18' 4.255"</u> Long. <u>-89° 19' 23.987"</u> or		Date Well Installed <u>07/06/2015</u>	
Facility ID		St. Plane <u>1,689,022.19</u> ft. N, <u>2,528,297.09</u> ft. E. E/W		Well Installed By: (Person's Name and Firm) <u>Chad Dutton</u>	
Type of Well mw		Section Location of Waste/Source _____ 1/4 of _____ 1/4 of Sec. _____, T. _____ N, R. _____ <input type="checkbox"/> E <input type="checkbox"/> W		Bulldog Drilling	
Distance from Waste/Source ft.		Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input checked="" type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known		Gov. Lot Number	
State Illinois					

<p>A. Protective pipe, top elevation _____ ft. (NAVD88)</p> <p>B. Well casing, top elevation <u>468.19</u> ft. (NAVD88)</p> <p>C. Land surface elevation <u>465.76</u> ft. (NAVD88)</p> <p>D. Surface seal, bottom <u>464.8</u> ft. (NAVD88) or <u>1.0</u> ft.</p> <div style="border: 1px solid black; padding: 5px;"> <p>12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input checked="" type="checkbox"/> SW <input checked="" type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/></p> <p>13. Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>14. Drilling method used: Rotary <input type="checkbox"/> Hollow Stem Auger <input checked="" type="checkbox"/> _____ Other <input type="checkbox"/></p> <p>15. Drilling fluid used: Water <input checked="" type="checkbox"/> 0.2 Air <input type="checkbox"/> Drilling Mud <input type="checkbox"/> 0.3 None <input type="checkbox"/></p> <p>16. Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Describe _____</p> <p>17. Source of water (attach analysis, if required): _____ Onsite Potable Well</p> </div> <p>E. Bentonite seal, top <u>435.8</u> ft. (NAVD88) or <u>30.0</u> ft.</p> <p>F. Fine sand, top _____ ft. (NAVD88) or _____ ft.</p> <p>G. Filter pack, top <u>430.8</u> ft. (NAVD88) or <u>35.0</u> ft.</p> <p>H. Screen joint, top <u>430.8</u> ft. (NAVD88) or <u>35.0</u> ft.</p> <p>I. Well bottom <u>420.8</u> ft. (NAVD88) or <u>45.0</u> ft.</p> <p>J. Filter pack, bottom <u>420.8</u> ft. (NAVD88) or <u>45.0</u> ft.</p> <p>K. Borehole, bottom <u>420.8</u> ft. (NAVD88) or <u>45.0</u> ft.</p> <p>L. Borehole, diameter <u>8.3</u> in.</p> <p>M. O.D. well casing <u>2.38</u> in.</p> <p>N. I.D. well casing <u>2.07</u> in.</p>	 <p>1. Cap and lock? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>2. Protective cover pipe: a. Inside diameter: <u>4.0</u> in. b. Length: <u>5.0</u> ft. c. Material: Steel <input checked="" type="checkbox"/> Other <input type="checkbox"/> d. Additional protection? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: <u>Three steel bollards</u></p> <p>3. Surface seal: Bentonite <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> Other <input type="checkbox"/></p> <p>4. Material between well casing and protective pipe: Bentonite <input checked="" type="checkbox"/> Sand <input checked="" type="checkbox"/> Other <input type="checkbox"/></p> <p>5. Annular space seal: a. Granular/Chipped Bentonite <input checked="" type="checkbox"/> b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> c. _____ Lbs/gal mud weight . . . Bentonite slurry <input type="checkbox"/> d. <u>30</u> % Bentonite . . . Bentonite-cement grout <input checked="" type="checkbox"/> e. _____ Ft³ volume added for any of the above f. How installed: Tremie <input type="checkbox"/> Tremie pumped <input checked="" type="checkbox"/> Gravity <input type="checkbox"/></p> <p>6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> b. <input type="checkbox"/> 1/4 in. <input type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite chips <input type="checkbox"/> c. _____ Prepacked bentonite riser _____ Other <input checked="" type="checkbox"/></p> <p>7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft³</p> <p>8. Filter pack material: Manufacturer, product name & mesh size a. _____ Sand prepacked screen. b. Volume added _____ ft³</p> <p>9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> Flush threaded PVC schedule 80 <input type="checkbox"/> _____ Other <input type="checkbox"/></p> <p>10. Screen material: <u>Schedule 40 PVC</u> a. Screen Type: Factory cut <input type="checkbox"/> Continuous slot <input type="checkbox"/> Sand prepacked screen _____ Other <input checked="" type="checkbox"/> b. Manufacturer _____ c. Slot size: <u>0.010</u> in. d. Slotted length: <u>10.0</u> ft.</p> <p>11. Backfill material (below filter pack): None <input checked="" type="checkbox"/> Other <input type="checkbox"/></p>
---	---

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 11/4/2015

Signature 	Firm Natural Resource Technology 234 W. Florida Street, Floor 5, Milwaukee, WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608
--	--	--

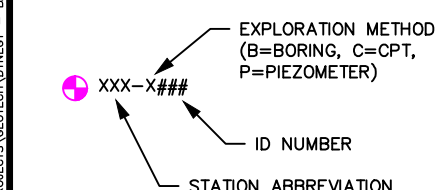


Appendix A4
AECOM Boring Logs
and Well Details

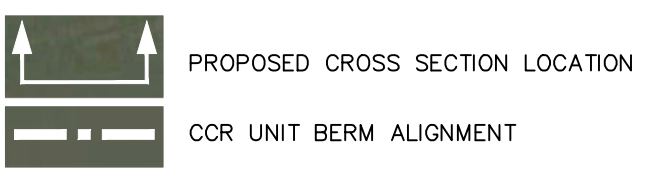
File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15 11:19 a.m. by: david_dequire



**HENNEPIN OLD WEST ASH POND
(POND NO. 1 AND POND NO. 3)**



- LEGEND**
- PROPOSED BORING LOCATION
 - ▲ PROPOSED CPT LOCATION
 - PROPOSED PIEZOMETER LOCATION



DRAFT

0 200

APPROXIMATE SCALE FEET

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

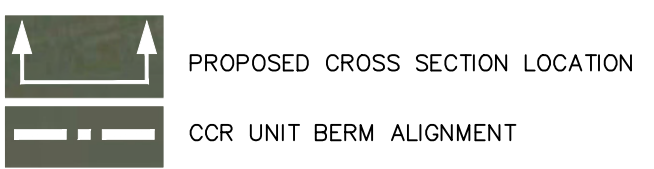
DYNEGY, INC	PROJECT NO. 60428794	AECOM
DRN. BY:djd July 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Old West Ash Pond (Pond No. 1 and Pond No. 3) Field Investigation Plan	FIG. NO. D-03

File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15, 15 11:19 a.m. by: david_dequire



XXX-X###
 EXPLORATION METHOD
 (B=BORING, C=CPT,
 P=PIEZOMETER)
 ID NUMBER
 STATION ABBREVIATION

- LEGEND**
- PROPOSED BORING LOCATION
 - ▲ PROPOSED CPT LOCATION
 - PROPOSED PIEZOMETER LOCATION



DRAFT

0 200

APPROXIMATE SCALE FEET

DYNEGY, INC	PROJECT NO. 60428794
AECOM	
DRN. BY: djd July 2015 DSGN. BY: eg CHKD. BY: eg	Hennepin Old West Polishing Pond Field Investigation Plan
FIG. NO. D-04	

Project: Hennepin Power Station	Log of Boring HEN-B001
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/08/2015 to 10/08/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 56.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)											
0	SS-1	7 6 6	67		Medium dense, dry, brown, clayey GRAVEL (GC) [Fill].	0.0									
2.5	SS-2	4 4 4	100		Loose, dry, brown, clayey SAND (SC) [Fill].	2.5						2.0			
5	SS-3	3 4 5			Soft, moist, brown, sandy lean CLAY (CL).	5.0						0.5			
7.5	ST-4		100									2.0			<i>Pushed shelly tube from 7.5 to 9.5 feet</i>
10	SS-5	WOH 3 3	89									0.5			<i>10.0 feet of casing set</i>
15	SS-6	WOH	44		Very soft, moist to wet, gray, SILT (ML).	15.0									
20	ST-7		90									0.25			<i>Pushed shelly tube from 20.0 to 22.0 feet</i>
25	SS-8	WOH	89		Very soft, moist to wet, dark gray mottled with brown, clayey SILT (ML-CL), trace white shells.	25.0						0.25			
30															

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:19 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B001

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:19 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH 3 4	22								0.25			
35	SS-10	3 3 4	100		Medium dense, wet, black to dark gray, lean CLAY (CL).						0.25			
40	SS-11	WOH WOH 4	100								0.25			
45	SS-12	6 3 3	78		Medium dense, wet, dark gray, sandy SILT (ML) with wood fragments.						0.25			45.1 feet: Sand seam from 45.1 to 45.2 feet
50	SS-13	6 6 8	56		Very dense, wet, gray, silty SAND (SM), trace fine to coarse gravel.									
55	SS-14	43 37 47	67		Very dense, wet, brown, clayey fine to coarse GRAVEL (GC).									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
					End of Boring at 56.5 ft									
60														
65														

Date(s) Drilled: 10/07/2015 to 10/08/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 60.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 10.0 ft on 10/8/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol											
0	SS-1	14 15 17	100		Medium dense, dry, brown, clayey fine to coarse GRAVEL (GC)										
	SS-2	28 27 12	100												
5	SS-3	9 21 24	100		Hard, dry, black to dark gray, clayey SILT (ML-CL), trace fine to coarse gravel. Stiff, dry brown, sandy lean CLAY (CL) with fine to coarse gravel.	5.5 6.5					0.5 1.5				
	SS-4	10 5 5	78												
10	SS-5	6 4 3	0												10.0 feet of casing set Drove wood in Sample 5, no recovery
	SS-6	5 5 3	22		Loose to medium dense, moist to wet, brown, silty SAND (SM), trace fine to coarse gravel.	15.0									
20	SS-7	4 4 4	67		Loose, moist to wet, brown, clayey SAND (SC). Ash, medium dense, wet, gray, SILT (ML) [Fill].	20.0 20.8					0.5 <0.25				
	ST-8		100												
25											0.25 0.5				Pushed Shelby tube from 25.0 to 27.0 feet
30						30.0									

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:25 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B002

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:25 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	1 3 3	94		Soft to medium, wet, dark gray mottled with brown, lean CLAY (CL), trace shell fragments.						0.25 0.5			
35	ST-10		80								0.25 0.5			Pushed Shelby tube from 35.0 to 37.0 feet
40	SS-11	WOH 2 7	100		Very soft to medium, wet, black, lean CLAY (CL), trace wood fragments.						0.5 0.75			
45	SS-12	2 5 7	94		Medium dense, moist, black, SILT (ML) with wood fragments, trace shells. Medium dense, wet, dark gray, CLAYEY SAND (SC).						0.5			
50	SS-13	4 11 11	100		Medium dense, gray, well graded medium to fine SAND (SW).									
55	SS-14	18 17 23	100		Dense, wet, brown, well graded SAND (SW), little fine to coarse gravel.									
60	SS-15	54/6"			Very dense, wet, well graded GRAVEL (GW).									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
61.5					End of Boring at 60.5 ft									
65														

Project: Hennepin Power Station	Log of Boring HEN-B003
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/06/2015 to 10/06/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 57.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 0.0 ft on 10/6/2015		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:30 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS			
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)															
0						Ash, very stiff, moist to wet, gray, sandy SILT (ML) [Fill].	0.0												
	SS-1	WOH	33																
	SS-2	WOR	100																
5	SS-3	WOR	100																
	SS-4	WOR	100																
10	ST-5		100																<i>Pushed shelly tube from 10.0 to 12.0 feet</i>
15	SS-6	WOH WOH 4	89			Very soft, moist to wet, dark gray to black, clayey SILT (CL-ML).	15.0												
	SS-7	WOH	94																<i>Mottled with dark brown and trace shells in Sample 7</i>
20	ST-8		100																<i>Pushed shelly tube from 25.0 to 27.0 feet</i>
25																			
30																			



Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B003

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:30 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH 3 4	100								0.5			Wood fragments in Sample 9
35	SS-10	WOH 3	100								0.5			
40	SS-11	10 8 7	56		Medium dense, wet, gray, silty fine SAND (SM).									
45	SS-12	20 26 16	44		Dense to very dense, wet, grayish brown to brown, silty fine to coarse GRAVEL (GM).									
50	SS-13	30 47 50												
55														
60														Boring backfilled with Portland Cement and bentonite
65														

Project: Hennepin Power Station	Log of Boring HEN-B004
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/02/2015 to 10/02/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 46.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 20.0 ft on 10/5/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0					A A A A	Brown, silty GRAVEL (GM) [Fill].	0.0									
	SS-1	9	14	18		Dense, brown, clayey fine to medium coarse GRAVEL (GC).	0.5									
	SS-2	32	18	30												
5	SS-3	13	40	42												
	SS-4	5	7	8		Stiff, dry, gray, SILT (ML), trace fine to coarse gravel.	7.5				1.5	3.0				
10	ST-5										<0.5					Pushed shelly tube from 10.0 to 12.0 feet
15	SS-6	2	3	1		Medium dense to soft, moist, brown, lean CLAY (CL) with sand.	15.0				<0.5					
20	ST-7										0.5					Pushed shelly tube from 20.0 to 22.0 feet
25	SS-8	WOH	WOH	WOH		Clayey silt, gray, very soft, moist, clayey SILT (CL-ML).	25.0				0.5					
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:36 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B004

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:36 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
30	ST-9		79									0.25			Pushed shelby tube from 30.0 to 32.0 feet
35	SS-10	2 2 4	89		35.0	Soft, wet, brownish gray, sandy SILT (ML).						0.5			38.0 feet: Drillers Note - hard drilling
40	SS-11	7 10 23	83		40.0	Medium dense, wet, brown, clayey GRAVEL (GC).									
45	SS-12	30 30 29	78		46.5	End of Boring at 46.5 ft									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50															
55															
60															
65															

Project: Hennepin Power Station	Log of Boring HEN-B005
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 09/24/2015 to 09/24/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 28.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Boring Location: East due to sunken barge (ft NAD83)	Groundwater Level(s): ft on	

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5	SS-1	WOH 1 2 1	33			Dark gray to black silty SAND (SM), some organics and clay.								
	ST-2		83			Dark gray silty organic CLAY (OH), some sand.					0.5			
10	SS-3	WOH WOH WOH	56											
	ST-4		92								0.5			
15	SS-5	3 3 2	33			Dark green, gravelly CLAY (CL), trace sand and silt.								
20	SS-6	7 6 12	11			Green to dark green fine to coarse SAND and gravel (SP-GP), trace silt.								
25	SS-7	6 5 9	17											
30						End of Boring at 28.5 ft								28.0 feet: Drillers Note - obstruction or boulder

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:41 AM

Project: Hennepin Power Station

Log of Boring HEN-B006

Project Location: Hennepin, Illinois

Sheet 1 of 2

Project Number: 60439752

Date(s) Drilled	10/13/2015 to 10/13/2015	Logged By	Robert Weseljak	Checked By	AJW
Drilling Method	Mud Rotary	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	41.5 ft
Drill Rig Type	Mobile 57 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:44 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	25 26 22	78			Dense, dry, brown, clayey fine to coarse GRAVEL (GC).								
	SS-2	15 17 26	100								0.5 1.5			
5	SS-3	15 23 15	78											
	SS-4	5 7 8	89				Medium dense, dry, brown, clayey SAND (SC), little fine to coarse gravel.				0.5 1.5			
10	SS-5	7 6 7	89								0.25			
	SS-6	8 9 11	78								0.25			
20	SS-7	13 12 20	89				Medium dense, moist to wet, brown, well graded fine to coarse GRAVEL (GW), trace fines and sand.							
25	SS-8	39 43 43	44				Very dense, moist to wet, brown, fine to coarse GRAVE (GM) with sand.							
30														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B006

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:45 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	29 32 30	67											
35	SS-10	9 9 9	33		Medium dense, moist to wet, yellowish brown, silty fine to coarse GRAVEL (GM), little fine to coarse sand.									
40	SS-11	10 8 6	22											
					End of Boring at 41.5 ft									Boring backfilled with 95 pounds of Portland Cement and 25 pounds of bentonite
45														
50														
55														
60														
65														

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5	SS-1	WOR 1 3	11			Dark gray to brown, fine SAND and organic CLAY (OH-SP).								
	SS-2	7 7 4	56			Dark gray organic CLAY (OH), trace sand.								
	SS-3	20 24 33	33			Brown to black, fine to coarse SAND and GRAVEL (SP-GP), trace silt.								7.5 feet: Drillers Note - harder drilling
10	SS-4	16 19 8	56			Brown, clayey GRAVEL (GC), trace silt and sand.								
	SS-5	12 12 13	33											
15	SS-6	8 15 17	44			Brown, fine to coarse SAND and GRAVEL (SP-GP), some clay.								
20	SS-7	10 9 6	17											
						End of Boring at 21.5 ft								Boring backfilled with bentonite cement fluid
25														
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:50 AM

Project: Hennepin Power Station	Log of Boring HEN-B008
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 10/13/2015 to 10/13/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 17.0 ft on 10/13/2015		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:53 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	1 2 2	100		Ash, gray sandy SILT (ML) [Fill].						0.50			
	SS-2	2 3 3	94								0.50			
5	SS-3	11 7 5	100								0.50			5.5 feet: Wet layer from 5.5 to 6.0 feet
	ST-4		100		Very stiff, dry, brown, lean CLAY (CL), few fine to coarse gravel.						4.0			Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	9 9 23	67											
15	SS-6	13 15 19	78		Medium dense, moist to dry, brown, well graded fine to coarse GRAVEL (GW) with sand, trace fines.									17.0 feet: Drillers note - water
20	SS-7	14 41 42	67		Very dense, brown, well graded fine to coarse GRAVEL (GW-GM) with silt.									
					End of Boring at 21.5 ft									Boring backfilled with 49 pounds of Portland Cement and 15 pounds of bentonite
25														
30														

Date(s) Drilled: 10/13/2015 to 10/13/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 51.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:56 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0	SS-1	5 7 10	78		Gravelly lean CLAY (CL) with sand.	0.0						2.0			
	SS-2	17 22 29	100									1.5			
5	SS-3	26 50/5"	61		Dry, black to dark gray, fine to coarse gravelly SILT (ML), trace coal.	5.0						0.25			
	SS-4	17 10 17	89		Stiff to very stiff, dry, black and dark brown, sandy lean CLAY (CL), trace fine to coarse gravel.	7.5						1.5 2.0			
10	SS-5	4 5 6	78		Stiff, dry to moist, reddish brown, lean CLAY (CL) with sand, trace fine to coarse gravel.	10.0						.75 1.75			
15	SS-6	27 31 29	78		Very dense, dry to moist, brown, well graded SAND (SW-SM) with silt, and fine to coarse gravel.	15.0									
20	SS-7	23 27 25	94		Very dense, moist to wet, brown, well graded fine to coarse GRAVEL (GW-GM) with silt, little fine to coarse sand.	20.0									
25	SS-8	22 22 22	100		Dense, moist to wet, brown, well graded fine to coarse SAND (SW).	25.0									
30															

12.5 feet: Drillers Note - hard drilling

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B009

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:56 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
30	SS-9	20 28 28	100													
35	SS-10	4 5 7	100		35.0 35.5 36.0	Brown lean CLAY (CL). Brown silty SAND (SM). Brown sandy SILT (ML).					0.25 0.75					
40	SS-11	9 9 12	100		40.0	Medium dense, moist to wet, brown, well graded SAND (SW).										
45	SS-12	9 10 11	94		45.0 45.5	Brown SILT (ML). Wet, brown, well graded SAND (SW-SM) with silt.					0.5					
50	SS-13	12 30 20	67		50.0 51.5	Dense to very dense, wet, brown, clayey fine to coarse GRAVEL (GC). End of Boring at 51.5 ft										
55																
60																
65																

Boring backfilled with 94 pounds of Portland cement and 25 pounds of bentonite

Project: Hennepin Power Station	Log of Boring HEN-B010
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/07/2015 to 10/07/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	19 30 23	100	0.0	Dense, dry, brown, clayey fine to coarse GRAVEL (GC).									
2.5	SS-2	10 24 20	100	3.5	Hard, dry, brown, cohesive sandy lean CLAY (CL), trace fine to coarse gravel.						1.5 2.0			
5	SS-3	12 17 22	100	5.0	Dense, dry, brown, clayey fine to coarse GRAVEL (GC).						0.2 0.5			
7.5	SS-4	15 19 17	100	7.5	Very stiff to hard, dry, black to dark gray SILT (ML).						0.5			
10	ST-5		94								4.0			Pushed Shelby tube from 10.0 to 11.5 feet
15	SS-6	4 3 4	61	15.0	Medium, moist, dark brown, sandy lean CLAY (CL).						.75			
20	SS-7	10 11 15	56	20.0	Medium dense, moist to wet, brown, well graded SAND (SW), trace to little fine to coarse gravel.									
25	SS-8	20 13 13	56											
30				30.0										

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:01 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B010

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:02 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS									
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)																			
30	SS-9	25 28 30	67			Very dense, wet, brown, well graded fine to coarse GRAVEL (GW-GM) with silt and sand.																	
35	SS-10	15 18 25	89	35.0											Dense, wet, brown, well graded fine to coarse SAND (SW), trace fine to coarse gravel.								
40	SS-11	10 9 10	67	41.5																			
End of Boring at 41.5 ft																							
45																							
50																							
55																							
60																							
65																							

Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite

Project: Hennepin Power Station	Log of Boring HEN-B011
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 10/06/2015 to 10/06/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 7.0 ft on 10/7/2015		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:07 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	4 6 11	100		Stiff, dry, dark brown, sandy lean CLAY (CL), trace fine to coarse gravel.	0.0										
	SS-2	5 5 8	100										0.75			
5	SS-3	9 6 6	100		Medium dense, wet, brown, poorly graded SAND (SP), trace gravel.	5.5							1.0			4.0 feet: Drillers Note - rock
	SS-4	11 12 12	78													6.0 feet: Drillers Note - wet at 6.0 feet WD with HSA
10	SS-5	14 15 20	78		Medium dense, wet, brown, well graded SAND (SW) with fine to coarse gravel.	10.0										
15	SS-6	13 26 27	78		Dense, wet, brown, silty fine to coarse GRAVEL (GM) with fine to coarse sand.	15.0										
20	SS-7	20 33 32	6													20.0 feet: Drillers Note - pushed rock in Sample 7
					End of Boring at 21.5 ft	21.5										Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
25																
30																

Date(s) Drilled: 10/07/2015 to 10/07/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 46.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	7 9 15	44		Medium dense, dry, brown, clayey fine to coarse GRAVEL (GC).	0.0										
	SS-2	12 17 17	100										1.0 2.5			
5	SS-3	4 13 21	89										0.5 2.0			
	SS-4	9 9 27	89		Dry, brown to dark gray, sandy lean CLAY to clayey silt (CL-ML).	8.0							1.0			
10	SS-5	5 8 7	78		Stiff, moist, brown and black, sandy lean CLAY (CL).	10.0							1.0 2.0			
15	SS-6	11 19 28			Hard, moist, dark gray to black, sandy SILT (ML) with Ash [Fill].	15.0										
20	ST-7		87.5										1.0			Pushed shelly tube from 20.0 to 22.0 feet
25	SS-8	2 3 5	78		Medium, moist, black lean CLAY (CL).	25.0							0.75 1.0			
30																

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B012

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	ST-9		95	31.0	Soft, moist to wet, yellowish brown mottled with gray and brown, lean CLAY (CL).						0.5			Pushed shelly tube from 30.0 to 32.0 feet
35	SS-10	WOH 4 5	94									0.75		
40	SS-11	10 17 11	67	40.0	Medium dense, moist to wet, brown, clayey fine to coarse GRAVEL (GC).									
45	SS-12	18 18 17	44	46.5										
					End of Boring at 46.5 ft									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50														
55														
60														
65														

Date(s) Drilled: 10/12/2015 to 10/12/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 61.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	19 20 18	78	0.0	Dense, brown, clayey fine to coarse GRAVEL (GC) [Fill].									
	SS-2	15 30 17	67											
5	SS-3	4 7 5	89	5.5	Stiff, moist, brown, SILT (ML).					0.4				
	SS-4	13 14 18	100	7.5	Very stiff, dry to moist, dark gray, sandy SILT (ML) with Ash, trace fine to coarse gravel [Fill].					0.25 0.75				
10	SS-5	8 11 13	78	11.0	Very stiff, moist, dark gray SILT (ML).					0.5				
15	SS-6	5 6 6	100	16.0	Stiff, moist, black, lean CLAY (CL).					0.25 1.5				
20	SS-7	WOH 2 4	100	20.0	Soft, wet, dark gray to greenish gray, silty CLAY (CL-ML).					0.25				
25	ST-8		65							0.25				Pushed shelly tube from 25.0 to 27.0 feet
30				30.0										

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:15 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B014

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:16 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH WOH 4	100		Very soft, moist to wet, dark gray, lean to silty CLAY (CL-ML).						0.25 0.5			
35	ST-10		100									0.5		
40	SS-11	WOH 5 6	100		Soft, moist, dark gray to black SILT (ML), trace wood fragments.						0.5			
45	SS-12	2 7 10	89		Medium dense to dense, wet, gray, silty SAND (SM).									
50	SS-13	13 17 16	78		Very dense, wet, light gray to light brown, silty fine to coarse GRAVEL (GM) with fine to coarse sand.									Trace fine to coarse gravel in Sample 13
55	SS-14	46 52 37	78											
60	SS-15	27 40 38	67											Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
65					End of Boring at 61.5 ft									

Project: Hennepin Power Station	Log of Boring HEN-B015
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/05/2015 to 10/06/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 46.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 3.0 ft on 10/5/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	3 3 5	67		Black topsoil, lean CLAY (CL). Loose, moist, brown, clayey SAND (SC).	0.5	0.0						0.25			
	SS-2	6 8 12	100		Stiff, moist, black, lean CLAY (CL).	2.5							2.0 3.0			
5	SS-3	3 6 5	100		Stiff, moist, dark gray, clayey SILT (CL-ML).	5.0							0.5 0.75			
	ST-4		80										0.5			Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	WOH 2 1	100										0.25			
15	SS-6	1 2 3	78										0.25			
20	SS-7	WOH	89										0.25			
25	ST-8		95										0.25			Pushed shelly tube from 25.0 to 27.0 feet
30							30.0									

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:21 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B015

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:21 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH 2 5	100		Soft, wet, dark gray SILT (ML), trace wood and shells, occasional sand seam.						0.25			
35	SS-10	2 3 7	100		Medium dense, wet, well graded SAND (SW).									
40	SS-11	21 27 20	56		Dense to very dense, moist to wet, brown to grayish brown, silty fine to coarse GRAVEL (GM), little sand.									39.0 feet: Drillers Note - change in drilling
45	SS-12	24 53 50	89		End of Boring at 46.5 ft									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B016
Project Location: Hennepin, Illinois	Sheet 1 of 3
Project Number: 60439752	

Date(s) Drilled: 10/09/2015 to 10/12/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 76.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS									
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)																			
0						Dense to very dense, dry, brown, clayey fine to coarse GRAVEL (GC).																	
	SS-1	21 21 13	100																				
	SS-2	18 33 18	100																				
5	SS-3	10 9 19	100																				
	SS-4	28 23 36	100																				
10	SS-5	15 9 3	67												Stiff to very stiff, moist, black to dark gray, sandy SILT (ML) with Ash, trace hard ash pieces [Fill].	10.0				0.25			
15	SS-6	4 5 3	100												Medium to stiff, moist, black, lean CLAY (CL), some wood fragments.	15.0				0.25 0.5			
20	ST-7		100		Soft, black to dark gray silty CLAY (ML-CL).	20.0				0.25			Pushed shelly tube from 20.0 to 22.0 feet										
25	SS-8	WOH WOH 2	100		Soft, wet, grayish brown mottled with brown to dark gray, lean CLAY (CL).	25.0				0.25													
30																							

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:27 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B016

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:27 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH WOH 4	83								0.25 0.5			
35	ST-10		100								0.25			Pushed Shelby tube from 35.0 to 37.0 feet
40	SS-11	WOH 2 4	67		Very soft, wet, dark gray, SILT (ML), trace shells.						0.25			
45	SS-12	WOH WOH WOH	22								0.25			
50	SS-13	3 7 8	67		Medium dense, wet, gray, silty SAND (SM), trace fine gravel.									
55	SS-14	8 8 10	56											
60	SS-15	WOR WOH WOH	100		Very soft, wet, clayey SILT (CL-ML), trace shells.						0.25			
65														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B016

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:27 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
67.0	SS-16	WOR WOH WOH	100			67.0	Dense, wet, gray, well graded fine to coarse GRAVEL (GW-GM) with sand.								67.0 feet: Drillers Note - change in drilling
70	SS-17	19 16 15	44												
75	SS-18	22 28 39	44												
76.5						76.5	End of Boring at 76.5 ft								Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
80															
85															
90															
95															
100															

Project: Hennepin Power Station	Log of Boring HEN-B017
Project Location: Hennepin, Illinois	Sheet 1 of 3
Project Number: 60439752	

Date(s) Drilled: 10/05/2015 to 10/05/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 66.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 3.0 ft on 10/5/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	2 4 3	67		Topsoil, lean CLAY (CL). Soft, moist, brown, lean CLAY (CL) with sand.	0.5	0.0									
	SS-2	6 9 12	100		Stiff to soft, moist to wet, black, clayey SILT (ML-CL).	2.5						1.25				
5	ST-3		87													Pushed Shelby tube from 5.0 to 7.0 feet
	SS-4	2 2 3	100									0.25				Trace sand seams in Samples 4, 5, 7, and 8
10	SS-5	WOH WOH 2	78									0.25				
15	ST-6		75									0.25				Pushed Shelby tube from 15.0 to 17.0 feet
20	SS-7	WOH	100									0.25				
25	SS-8	WOR WOH WOH	100									0.25				
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:34 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B017

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:35 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	ST-9		95								0.75			Pushed shelby tube from 30.0 to 32.0 feet
35	SS-10	WOH	100								0.5			Trace sand seams and shells in Samples 10 and 11
40	SS-11	1 6 6	100		40.5	Medium dense, wet, dark gray, silty fine to coarse SAND (SM), trace shells and gravel.					0.25 0.5			
45	SS-12	3 7 7	78											
50	SS-13	WOR WOH WOH	100		50.0	Very soft, wet, dark gray, clayey SILT (CL-ML), trace shells.					0.25			
55	SS-14	WOR WOH WOH	100								0.25			
60	SS-15	15 16 15	67		58.0	Dense, wet, gray, well graded fine to coarse GRAVEL (GW).								58.0 feet: Drillers Note - change in drilling
65					65.0									

Project: Hennepin Power Station


Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B017

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:35 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
66.5	SS-16	17 16 20				66.5									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
70															
75															
80															
85															
90															
95															
100															

Project: Hennepin Power Station	Log of Boring HEN-B018
Project Location: Hennepin, Illinois	Sheet 1 of 3
Project Number: 60439752	

Date(s) Drilled: 10/08/2015 to 10/09/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 71.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 15.0 ft on 10/9/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	25 25 26	100		Very dense, dry, brown, clayey fine to coarse GRAVEL (GC)	0.0										
	SS-2	42 34 18	100													
5	SS-3	12 35 22	100		Very dense, dry, brown, clayey fine to coarse GRAVEL (GC), trace black ash at bottom.	5.0										
	SS-4	4 4 10	100													
10	ST-5		85		Stiff, moist, dark gray, sandy SILT (ML) with Ash [Fill].	6.5										Pushed Shelby tube from 10.0 to 12.0 feet
	SS-6	WOH 2 3	100													
15	SS-7	WOH WOH 3	100		Very soft to soft, moist, black to dark gray, silty CLAY (CL-ML).	15.0										Trace shells in Sample 7
	ST-8		70													
20																
25																
30						30.0										

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:42 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B018

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:43 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH WOH 4	100		Very soft, moist to wet, dark gray and trace black, lean CLAY (CL).						0.25			
35	SS-10	WOH	100		Very soft, wet, dark gray, clayey SILT (CL-ML), trace shells.						0.25			
40	ST-11		100								0.5			Pushed Shelby tube from 40.0 to 42.0 feet
45	SS-12	WOH WOH WOH	100								0.25			
50	SS-13	WOH 3 4	33		Loose to medium dense, wet, dark gray, sandy SILT (SM).									
55	SS-14	4 6 12	67											
60	SS-15	WOH WOH WOH	100		Very soft, wet, dark gray, silty CLAY (CL-ML), trace shells.						0.25			
65														

Project: Hennepin Power Station


Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B018

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:43 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
67	SS-16	53 37 44	67			Very dense, wet, gray, silty fine to coarse GRAVEL (GM).								
70	SS-17	23 21 19	67											
71.5	End of Boring at 71.5 ft													
75														
80														
85														
90														
95														
100														
														Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite

Project: Hennepin Power Station	Log of Boring HEN-B019
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 09/24/2015 to 09/24/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 55.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5	SS-1	1	33	4.0 4.3		Dark brown fine to coarse SAND and GRAVEL (SP-GP). Soft to stiff, dark gray organic silty CLAY (OH).								
	ST-2		80								0.25			Pushed Shelby tube from 7.5 to 9.5 feet
10	SS-3	WOR WOH 1	56								0.5			
	ST-4		85								1.5			Pushed Shelby tube from 12.5 to 14.5 feet
15	SS-5	1 2 2	83	14.5		Stiff to medium, dark gray silty CLAY (CL), trace organics and shells.					1.0			
20	ST-6		100								0.75			Pushed Shelby tube from 20.0 to 22.0 feet
25	ST-7		100								1.0			Pushed Shelby tube from 25.0 to 27.0 feet
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR_HENNEPIN\400-TECHNICAL\BORING_LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:50 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B019

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:50 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-8	1 2 2	100								1.25			
35	SS-9	1 1 2	100		Loose, dark gray clayey fine SAND (SC), trace silt.						1.0			
40	SS-10	6 7 6	78		Medium dense fine SAND (SP), trace silt.									
45	SS-11	5 3 3	78		Medium dense, dark gray silty CLAY (CL), trace shells and organics.						0.75			
50	SS-12	1 1 2	67								0.75			
55	SS-13	7 14 16	11		Medium dense, dark gray fine to coarse SAND and GRAVEL (SP-GP).									
					End of Boring at 55.5 ft									Boring backfilled with bentonite and cement fluid
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B020
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/01/2015 to 10/02/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 50 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	19 17 13	56		Gravel (GP). Lean CLAY (CL), trace fine to coarse gravel.	0.0								
	SS-2	6 8 7	67		Medium dense, moist, brown, clayey fine to coarse GRAVEL (GC).	2.5					0.0 1.0			
5	SS-3	6 8 7	83		Stiff, moist, sandy lean CLAY (CL), trace fine to coarse gravel.	5.0					1.5			
	SS-4	1 3 4	78								1.0			
10	ST-5		52											Pushed shelly tube from 9.5 to 11.5 feet
15	SS-6	5 3 7	6		Loose, brown well graded GRAVEL (GW).	15.0								
20	SS-7	30 48 50/5"	72		Dry, brown with some rust and black, well graded SAND (SW) with gravel [Fill].	20.0								
25	SS-8	22 33 29	67		Very dense, dry, brown clayey GRAVEL (GC), little sand.	25.0								
30														17.0 feet: Drillers Note - cobbles from 17.0 to 20.0 feet

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:56 AM

Project: Hennepin Power Station

Log of Boring HEN-B020

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:56 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	27 19 22	78											
35	SS-10	19 27 20	78											
40	SS-11	15 16 41	56											
						End of Boring at 41.5 ft	41.5							Less fines in Sample 11 Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
45														
50														
55														
60														
65														

Date(s) Drilled: 10/01/2015 to 10/02/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 45.1 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	80/6"	17		Topsoil, lean CLAY (CL).	0.0										
	SS-2	6 5 4	44		Stiff, brown, sandy lean CLAY (CL), trace fine to coarse gravel.	2.5						<0.5				
5	ST-3											2.0				<i>Pushed Shelby tube from 5.0 to 6.0 feet</i>
	SS-4	10 61	83		Very dense, dry, brown, silty GRAVEL (GM).	8.3										
10	SS-5	14 14 12	67		Medium dense, moist, brown, clayey GRAVEL (GC).	10.0										
15	SS-6	20 15 19	44		Stiff, moist, dark brown to gray and black, medium plastic cohesive lean CLAY (CL).	15.0						<0.5				
20	SS-7	9 12 9	100		Very stiff, moist, gray to black, sandy SILT (ML) with Ash [Fill].	20.0						1.0				
	ST-8		72													<i>Pushed Shelby tube from 22.0 to 24.0 feet</i>
25	SS-9	6 20 32	100									<0.5				
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:01 AM

Project: Hennepin Power Station

Log of Boring HEN-B021

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:01 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-10	11 20 24	94								0.5			Less sand in Sample 10
35	SS-11	4 8 10	100		Stiff, moist, black, lean CLAY (CL) with Ash, trace to little sand [Fill].						2.5			
40	SS-12	5 6 5	100		Medium dense, moist to wet, brown, silty SAND (SM).									
45	SS-13	50/2"	0		End of Boring at 45.1 ft									45.0 feet: Drillers Note - hit rock Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B022
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Hollow-Stem Auger	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Drill Cuttings and Bentonite Chips	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:07 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	1 1 1	100		Very soft, moist, brown to dark gray, sandy SILT (ML).						0.0 0.5			0.0 feet: Trace roots from 0.0 to 0.5 feet
	ST-2		71											Pushed shelly tube from 2.5 to 4.5 feet
5	SS-3	2 2 2	100		Soft, moist, dark gray, SILT (ML).						0.5			
	ST-4		100		Stiff, dry, dark gray, silty SAND (SM) with Ash [Fill].									Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	5 5 6	67								0.0 0.5			
15	SS-6	21 25 20	100		Dense, dry, dark brown to black, silty SAND (SM) with Ash [Fill].						0.0 0.75			
20	SS-7	3 4 5	100		Stiff, moist, brown, sandy lean CLAY (CL).						1.0 1.25			
					End of Boring at 21.5 ft									Boring backfilled with 75 pounds of bentonite chips and soil cuttings
25														
30														

Date(s) Drilled: 09/22/2015 to 09/23/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 76.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	7 11 15	100		Dense, moist, brown, fine to medium sandy silty GRAVEL (GM) [Fill]	0.0											
	SS-2	8 15 18	100		Stiff to hard, moist, sandy silty CALY (CL) with medium to coarse gravel [Fill]. Grades with medium brown sand in occasional lenses. Grades with zones of high plastic clay.	2.0							4.5				
5	SS-3	10 27 18	100										3.5 4.25				
	SS-4	7 17 20	100										4.5				
10	SS-5	13 12 10	83		Medium dense, moist, brown clayey silty fine to medium SAND (SM) [Fill].	9.5							4.5				
					Hard, moist, brown, silty sandy CLAY (CL) with fine to medium gravel [Fill].	11.0											
					Medium dense, moist, brown fine to medium GRAVEL with sand and clay lenses [Fill].	13.0											
15	SS-6	22 32 52	83														
					Moist, dark gray to black, silt to fine gravel sized fly / bottom ASH [Fill].	18.0											
20	SS-7	51 39 26	94														
					Moist to wet, dark gray, silt sized fly ash with some sand to small gravel sized FLY ASH particles [Fill].	23.0											
25	SS-8	4 6 5	83										0.0 0.25				
	ST-9		63														
30																	

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:10 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B023

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-10	15 11 11	100								0.25 0.5			
35	SS-11	20 36 53	100		Medium dense to dense, moist, dark gray to black, silty sand to small gravel sized bottom ASH [Fill].						0.5 3.5			
40	SS-12	14 11 12	100		Medium dense, moist to wet, dark gray to black, silty SAND (SM), trace gravel and ash [Fill].						0.5 1.3			
45	SS-13	7 4 14	33		Very stiff, wet, brown, sandy lean CLAY (CL) with fine to coarse gravel.						0.5			
50	SS-14	34 52	83		Very dense, wet, brown, clayey fine to coarse angular GRAVEL (GC) with sand.									
55	SS-15	18 11 8	78											
60	SS-16	11 7 8	17											
65														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B023

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
67	SS-17	6 4 5	67		Loose, wet, brown, silty fine to coarse GRAVEL (GM).										
70	SS-18	19 19 13	67		Dense, wet, brown, silty fine to coarse GRAVEL (GM) with fine sand.	70.0									70.6 feet: Sand seam from 70.6 to 71.0 feet
75	SS-19	18 17 9	33		Medium dense, wet, silty fine to coarse GRAVEL (GM).	75.0									
					End of Boring at 76.5 ft	76.5									Boring backfilled with 94 pounds of Portland Type I Cement
80															
85															
90															
95															
100															

Date(s) Drilled 09/22/2015 to 09/22/2015	Logged By Andrew Wilding	Checked By AJW
Drilling Method Mud Rotary	Drill Bit Size/Type 3 7/8" Tricone Roller Bit	Borehole Depth 62.7 ft
Drill Rig Type Diedrich D-120 Rubber Tired ATV	Drilling Contractor Strata Earth Services	Surface Elevation ft
Borehole Backfill Portland Cement and Grout	Sampling Method(s) Split Spoon/3" Thin Walled Tube	Hammer Data Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)											
0															
	SS-1		14 15 15	100		Dense, moist, brown fine to medium silty GRAVEL [Fill].									
	SS-2		19 23 18	100											
5	SS-3		5 7 15	100		Stiff, moist, brown silty CLAY with some medium gravel and sand [Fill].						3.5			
						Medium dense, moist, brown, silty medium SAND, trace organics [Fill].									
	SS-4		4 15 23	78		Medium stiff, moist, brown, silty SAND, with some small to medium gravel [Fill].						2.25 3.0			
10	SS-5		10 12 16	78		Medium stiff, moist, dark gray, clayey SILT with medium to coarse sand, some gravel (presumably fly ash) and seams of brown silty clay [Fill].						4.0 4.5			
						Dense, moist, dark gray to black fine to coarse sand sized bottom ASH with some fine gravel [Fill].									
15	SS-6		13 20 29	94	Grades with fine gravel.										
20	SS-7		75/0.3'	38											
25	SS-4		3 2 3	100											
	ST-9			57											
30															
														<i>Pushed Shelby tube from 27.0 to 29.0 feet Shelby tube refusal at 29.2</i>	

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:18 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B024

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:18 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-10	1 3 2	100		Grades with thin, hard cemented layers.									
35	SS-11	5 9 12	100								0.5			
40	SS-12	55/6"	50		Medium dense, wet, sandy silty fine to coarse GRAVEL (GM).	39.0								
45	SS-13	22 27 21	78											
50	SS-14	15 18 15	50		Grades with ~1" silty clay layers and zones of silty clay matrix (silty clay, brownish gray, soft to medium stiff, moist).									
55	SS-15	55/0.2'	0											
60	SS-16	20 22 13	78		Medium dense, moist, silty SAND (SM) with trace to fine medium gravel.	58.0								
	SS-17	80/0.1'	17		Wet, sandy fine to medium, rounded GRAVEL (GP).	62.0								
65					End of Boring at 62.7 ft	62.7								Boring backfilled with Portland Type I cement

Project: Hennepin Power Station	Log of Boring HEN-B025
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/01/2015 to 10/01/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 56.5 ft
Drill Rig Type: Mobile 50 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	23 19 22	56	0.0	Medium dense, dry, brown, silty SAND (SM) with gravel [Road Fill].									
2.5	SS-2	5 7 9	72	2.5	Stiff, dry, brown, lean CLAY (CL).						3.0			
5	SS-3	14 26 19	78	5.0	Dense, dry, silty GRAVEL (GM) with sand [Fill].									
7.5	SS-4	2 2 2	89	7.5	Soft, gray with some black SILT (ML) to very fine silty SAND (SM).						<0.5			
10	SS-5	2 3 4	33								0.5			Pushed Shelby tube from 10.5 to 14.0 feet
	ST-6		100								1.0			
15	SS-7	2 3 2	56								<0.5			
20	SS-8	9 5 3	56	20.0	Stiff, moist to wet, gray with some black layering, sandy SILT (ML).						<0.5			
25	ST-9		100											Pushed Shelby tube from 25.0 to 27.0 feet
	SS-10	4 4 5	56								1.0			
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:23 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B025

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:23 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
30	SS-11	3 4 5	67									<0.5			
35	SS-12	5 7 7	72									1.0			
40	SS-13	6 12 11	61									1.1			
45	SS-14	6 7 8	83									1.0			
50	SS-15	7 8 10	89									0.5 1.5			
55	SS-16	10 12 13	94		55.0	Very stiff, moist to wet, black, gray and some dark brown, sandy SILT (ML).						3.5 4.0			
					56.5	End of Boring at 56.5 ft									
60															
65															

Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 12.0 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		







Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0						Barge.		0.0								
						Water.		1.5								
								4.0								
5	SS-1	4 5 7	56		Dark brown fine to coarse SAND and GRAVEL (SP-GP). Dark gray to brown gravelley CLAY (GC), trace sand.			4.5								
	SS-2	8 4 9														
10																
						End of Boring at 12 ft		11.5								
15																
20																
25																
30																

11.5 feet: Drillers Note - hard drilling from 11.5 to 12.0 feet
 12.0 feet: Possible boulder or obstruction
 Boring backfilled with bentonite grout

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:29 AM

Project: Hennepin Power Station	Log of Boring HEN-B026A
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	








Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 26.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Blind drill - see HEN-B026.								Blind drilled to 10.0 feet
10	SS-1	7 6 7	11	10.0		Brown gravelly CLAY (GC), trace sand.								Large rock in Sample 3
	SS-2	25 42 13	0											
	SS-3	6 7 5	33											
	SS-4	5 5 9	11											
20	SS-5	7 8 6	11	20.0		Brown GRAVEL (GP) with sand and clay.								
25	SS-6	8 9 6	33	25.0 26.5		Brown fine to coarse SAND (SP) and GRAVEL (GP), trace silt and clay.								
				26.5		End of Boring at 26.5 ft								Boring backfilled with bentonite grout
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:31 AM

Project: Hennepin Power Station	Log of Boring HEN-B027
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 09/22/2015 to 09/22/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 31.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5														
	SS-1	2 3 3 WOH	78	7.5		Dark brown SAND (SP) and GRAVEL (GP). Dark gray, silty CLAY (CL), trace sand.					1.5			
10	ST-2		72	12.0							2.5			<i>Pushed Shelby tube from 10.0 to 12.0 feet</i>
	SS-3	3 4 7	61			Dark gray to brown, silty CLAY (CL) with some gravel and sand.					1.5 2.0			
15	SS-4	4 5 7	22								1.75			
20	SS-5	3 5 4	33	20.0		Brown gravelly CLAY (GP) with some sand.								
25	SS-6	7 8 12	22	25.0		Brown to gray clayey SILT (ML) with some sand and gravel.								
30				28.0		Fine to coarse SAND (SP) and GRAVEL (GP).								28.0 feet: Cave in

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:34 AM

Project: Hennepin Power Station

Log of Boring HEN-B027

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:34 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-7	898	56											
					End of Boring at 31.5 ft	31.5								Boring backfilled with bentonite grout
35														
40														
45														
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B029
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/01/2015 to 10/01/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	24 28 34	100		Very dense, dry, brown, silty GRAVEL (GM) [Road Fill].									
	SS-2	10 6 11	100		Stiff to very stiff, dry, lean CLAY (CL).						4.5			
5	ST-3		100								4.5			<i>Pushed Shelby tube from 5.0 to 7.0 feet</i>
	SS-4	12 14 17	100								4.0			
10	ST-5		100								2.5			<i>Pushed Shelby tube from 10.0 to 12.0 feet</i>
15	SS-6	4 6 8	83		Stiff, dark brown with trace rust, lean CLAY (CL), trace fine to coarse gravel.						1.5			
20	SS-7	6 12 20	78		Dense, dry, brown, clayey GRAVEL (GC).						1.5			
25	SS-8	17 17 43	56											
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:40 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B029

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:40 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
30	SS-9	29 50/5"	22												Less fines in Sample 9	
35	SS-10	20 25 28	61													
40	SS-11	16 14 15	6													
						41.5	End of Boring at 41.5 ft								Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite	
45																
50																
55																
60																
65																

Project: Hennepin Power Station

Log of Boring HEN-B030

Project Location: Hennepin, Illinois

Sheet 1 of 1

Project Number: 60439752

Date(s) Drilled	09/29/2015 to 09/30/2015	Logged By	Norm Seiler	Checked By	AJW
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	11.0 ft
Drill Rig Type	Mobile 57 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	9.0 ft on 9/29/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	22 17 37	83		Brownish gray sand, gravel, and clay [Fill].									
	SS-2	15 17 15	67		Brown fine to coarse sand and gravel with some clay [Fill].									
5	SS-3	18 20 30	83											
	SS-4	4 5 6	100		Dark gray with trace gravel, sand, and clay, with ASH [Fill].									
10	ST-5		33		Black ASH with gravel [Fill].									
					End of Boring at 11 ft									
15														
20														
25														
30														

9.0 feet: Wet
 Pushed shelly tube from 10.0 to 11.0 feet
 10.0 feet: Switch to mud rotary Boring backfilled with Portland Type I cement

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:45 AM

Project: Hennepin Power Station

Log of Boring HEN-B032

Project Location: Hennepin, Illinois

Sheet 1 of 2

Project Number: 60439752

Date(s) Drilled	09/30/2015 to 09/30/2015	Logged By	Robert Weseljak	Checked By	AJW
Drilling Method	Mud Rotary	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	41.5 ft
Drill Rig Type	Mobile 57 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	32 29 20	67	▲▲▲▲▲	Very dense, dry, brown, fine to coarse well graded GRAVEL (GW) with silt and sand [Fill].	0.0					4.5			
	SS-2	6 18 17	100	▨▨▨▨▨	Hard, dry, black, lean CLAY (CL), trace fine to medium gravel.	1.0					3.5			
5	ST-3		79	▨▨▨▨▨							4.5			<i>Pushed Shelby tube from 5.0 to 7.0 feet</i>
	SS-4	8 12 16	100	▨▨▨▨▨							3.5			
10	SS-5	8 16 20	44	▨▨▨▨▨							0.5			<i>10.0 feet: Coarse gravel</i>
15	SS-6	19 39 43	72	●●●●●	Very dense, moist, brown and black, clayey fine to coarse GRAVEL (GC).	15.0								
20	SS-7	18 36 50/3"	61	●●●●●										
25	SS-8	98 35 50/4"	78	●●●●●										<i>24.5: Drillers Note - boulder from 24.5 to 25.2 feet</i>
30						30.0								

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:48 AM

Project: Hennepin Power Station



Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B032

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:48 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)											
30	SS-9	18 11 30	100			Hard, moist, brown, fine to coarse gravelly lean CLAY (CL).					3.0 4.5				
35	SS-10	41 28 40	67				35.0		Very dense, moist, brown and black, clayey fine to coarse GRAVEL (GC).						
40	SS-11	12 18 50/4"	72				41.5			End of Boring at 41.5 ft					
45														Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite	
50															
55															
60															
65															

Date(s) Drilled: 09/30/2015 to 10/01/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0														
0.5	SS-1	25 19 21	100		Very dense, dry, brown, silty SAND (SM) [Fill].	0.5					1.5 2.5			
5	SS-2	7 8 11	100		Hard, dry, black, gravelly lean CLAY (CL) [Fill].						3.5 4.5			
5.5	SS-3	17 28 32	100		Dense, dry, brown, silty SAND (SM). Very dense, brown to gray, silty fine to coarse GRAVEL (GM) with sand.	5.0 5.5								
10	SS-4	11 18 32	100											
10.0	SS-5	27 35 18	56		Very dense, moist, brown, clayey GRAVEL (GC).	10.0								
15	SS-6	21 24 25	44											
20	SS-7	10 11 9	44		Medium dense, dry, silty fine to coarse GRAVEL (GM).	20.0								
25	SS-8	11 13 16	6											
30						30.0								

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:53 AM

Project: Hennepin Power Station

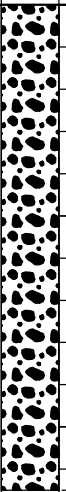
Log of Boring HEN-B034

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGBORINGLOGS.GPJ; 12/18/2015 9:43:53 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)											
30	SS-9	14 14 12	22			Medium dense, moist to wet, brown, well graded GRAVEL (GW).									
35	SS-10	9 11 10	67												
40	SS-11	10 8 9	17												
						End of Boring at 41.5 ft	41.5							Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite	
45															
50															
55															
60															
65															

Date(s) Drilled: 09/23/2015 to 09/24/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)														
0	SS-1	12 15 21	100		Dense, dry, brown, silty SAND (SM) with fine to coarse gravel [Road Fill].	0.0											
	SS-2	12 17 20	100		Dense, dry, poorly graded SAND (SP), trace fine to medium gravel [Fill].	2.0											
5	SS-3	12 19 26	100		Dense, dry, brown, silty SAND (SM) with fine to coarse gravel [Fill].	5.0											
	SS-4	10 8 12	94		Very stiff, dark gray to black, lean CLAY (CL), trace fine to coarse gravel [Fill].	8.0											
10	SS-5	12 33 31	100		Dry to moist, dark brown, clayey fine to coarse GRAVEL (GC) with sand.	10.0											
																	11.3 feet: Rusty in color
																	13.0 feet: 100% water loss
15	SS-6	10 43 40	67		Very dense, moist, light brown, fine to coarse clayey GRAVEL (GC) with sand.	15.0											
20	SS-7	10 14 22	94														
25	SS-8	19 21 16	56														
30																	

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:59 AM

Project: Hennepin Power Station



Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B037

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:59 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	21 14 19	83	30.5	 <p>Hard, moist, dark greenish gray, fine to coarse, rounded to angular gravelly lean CLAY (CL).</p>					1.25				
35	SS-10	7 12 18	83	35.0		 <p>Very stiff, moist, brown, clayey fine to coarse GRAVEL (GC).</p>								
40	SS-11	13 20 21	67	41.5										
					End of Boring at 41.5 ft									Boring backfilled with Portland Type I Cement
45														
50														
55														
60														
65														

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Hollow-Stem Auger	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Drill Cuttings and Bentonite Chips	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:44:04 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS		
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)														
0						Dense, dry, dark brown, well graded GRAVEL with CLAY (GW-GC) [Road fill]	0.0											
	SS-1	12 18 22	89															
	SS-2	16 30 50/5.5"	97				Very dense, dry, gray, well graded fine to coarse GRAVEL (GW) [Fill].	3.0										
5	SS-3	37 50/5"	50															
	SS-4	5 6 31	94				Stiff, moist, black and brown, lean CLAY (CL), trace sand and fine gravel [Fill].	8.1 8.6										
10	SS-5	6 10 12	100				Very dense, dry, brown, well graded GRAVEL (GW) [Fill].	10.5					6.0					
							Very stiff, dry, greenish gray, lean CLAY (CL) [Fill].											
15	SS-6	15 15 24	100			Dense, moist, brown, clayey GRAVEL (GC) with sand [Fill].	15.0											
20	SS-7	7 17 13	94															
						End of Boring at 21.5 ft	21.5											
25																		
30																		

Boring backfilled with 75 pounds of bentonite chips and soil cuttings

Project: Dynegy

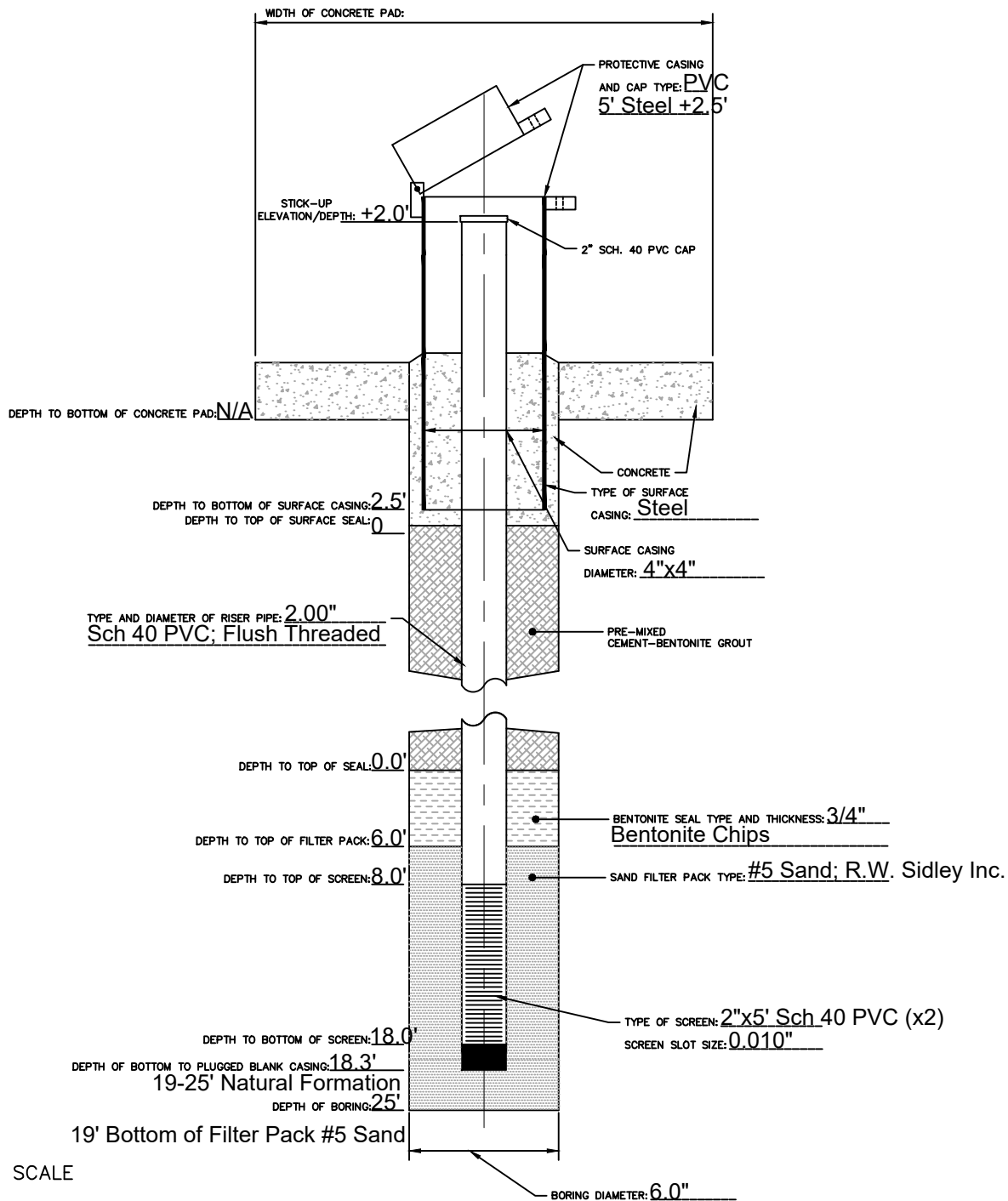
Project Location: Hennepin, IL

Project Number: 60439752

Log of Piezometer

Sheet 1 of 1

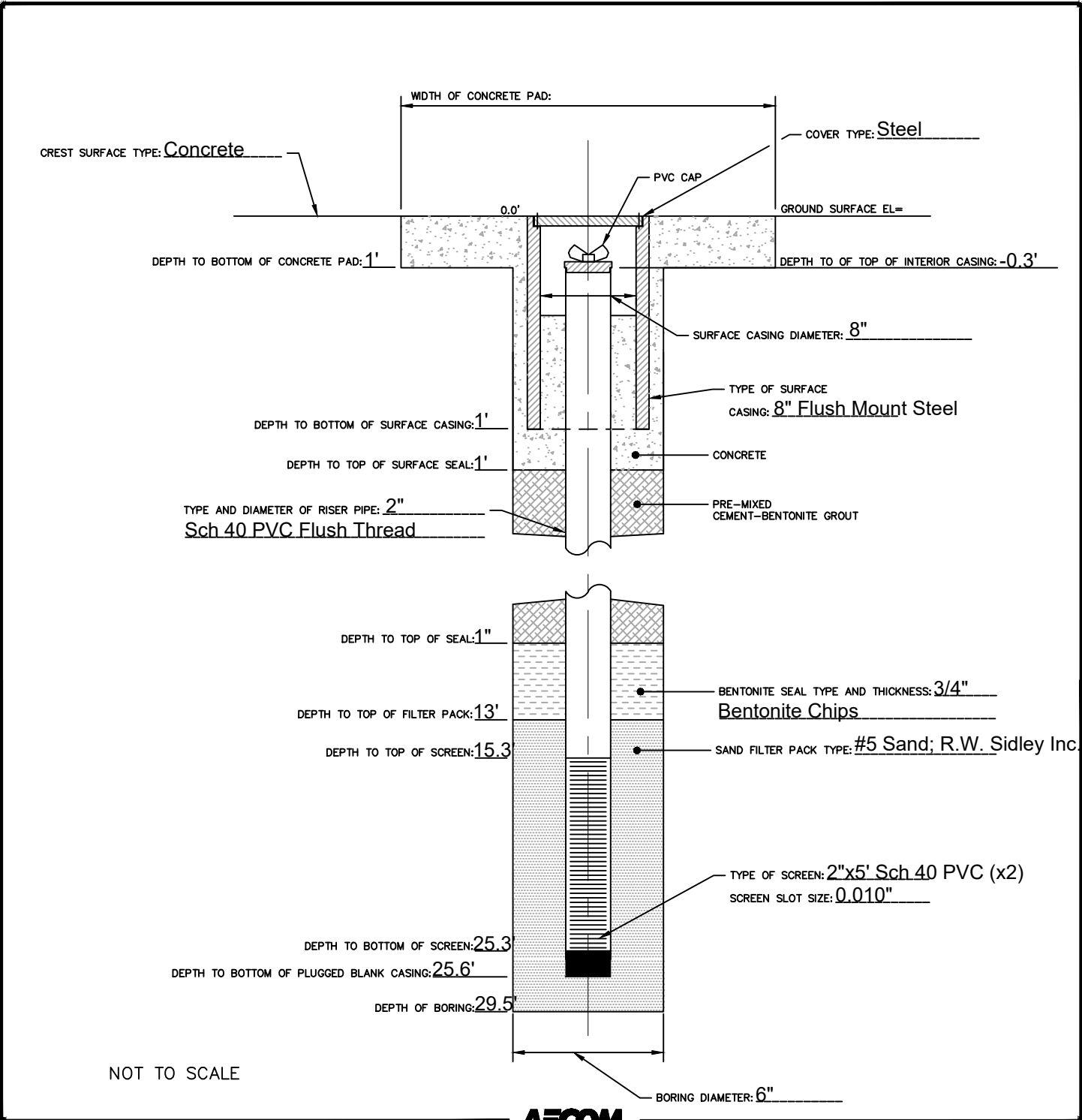
Piezometer Location	P001	Date Installed	10/15/15	Time	9:10 A.M.
Installed By	Scott Komen	Observed By	R. Weseljak	Total Depth	25'
Method of Installation	6" Solid Flight Auger	Drilling Contractor	Strata	Surface Elevation	
Screened Interval	8-18'	Completion Zone	Silts and Clays		
Remarks	Groundwater Level(s) 13.33' T.O.C.				



Project: Dynege
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

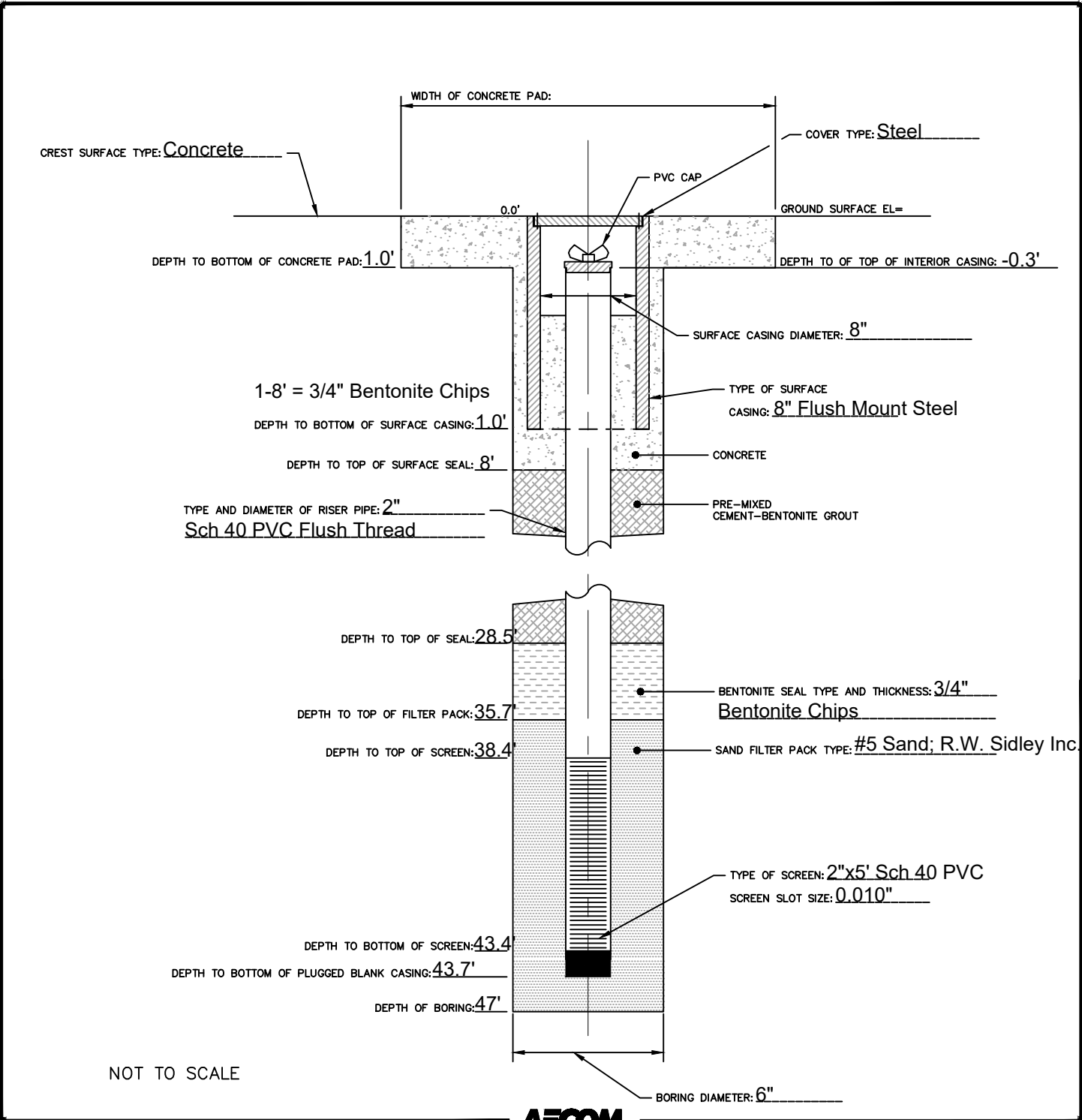
Piezometer Location P002	Date Installed 10/15/15	Time 11:10 A.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 29.5'
Method of Installation 6" Solid Flight Auger	Drilling Contractor Strata	Surface Elevation
Screened Interval 15.3-25.3'	Completion Zone Sands	
Remarks	Groundwater Level(s) 15.90' T.O.C.	



NOT TO SCALE

Project: Dynegy	Log of Piezometer	
Project Location: Hennepin, IL	Sheet 1 of 1	
Project Number: 60439752		

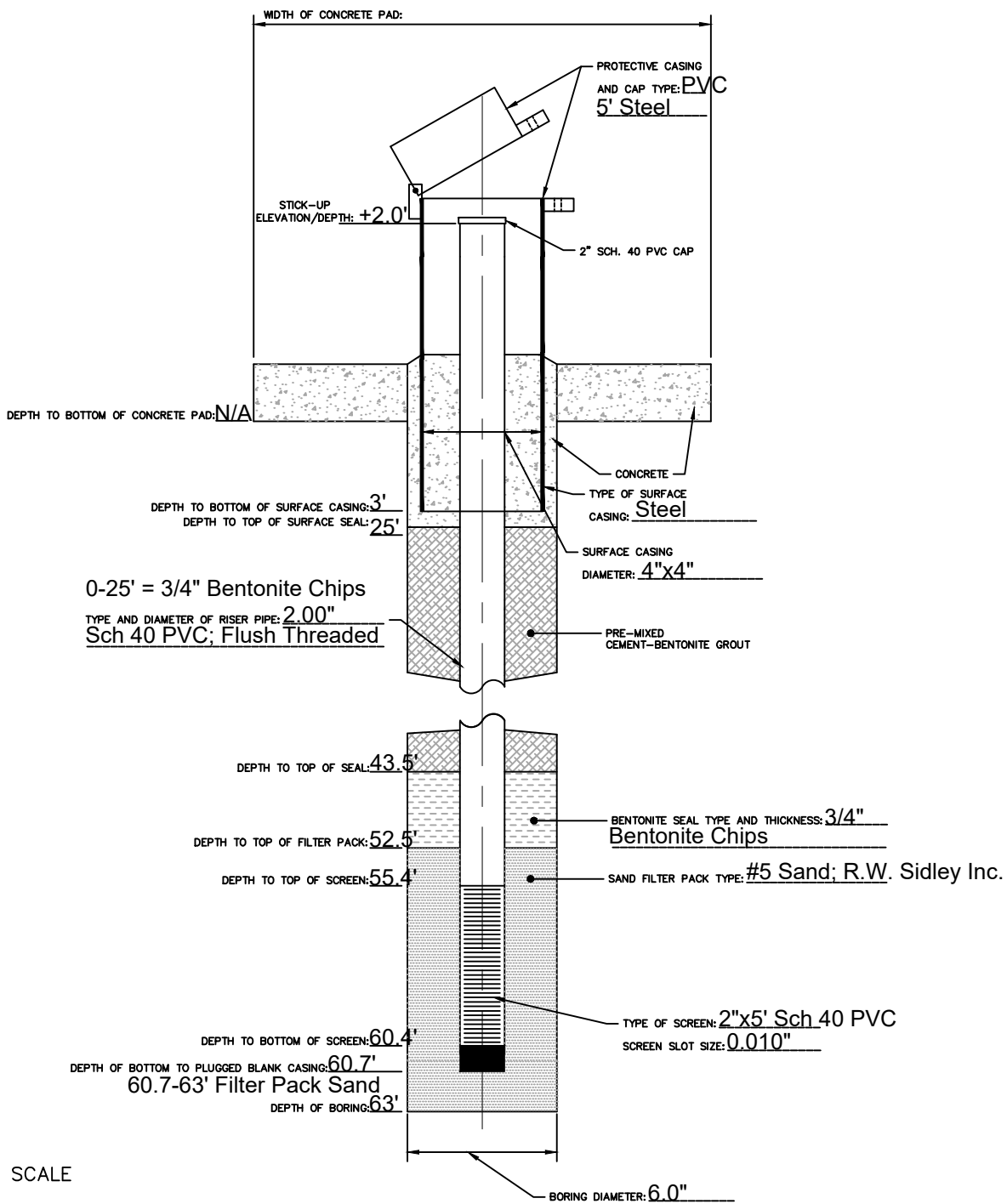
Piezometer Location P003	Date Installed 10/14/15	Time 9:45 A.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 47'
Method of Installation 6" Mud Rotary/ 6" Casing	Drilling Contractor Strata	Surface Elevation
Screened Interval 38.4'-43.4'	Completion Zone Gravels	
Remarks	Groundwater Level(s) 17.15' T.O.C.	



Project: Dynegy
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

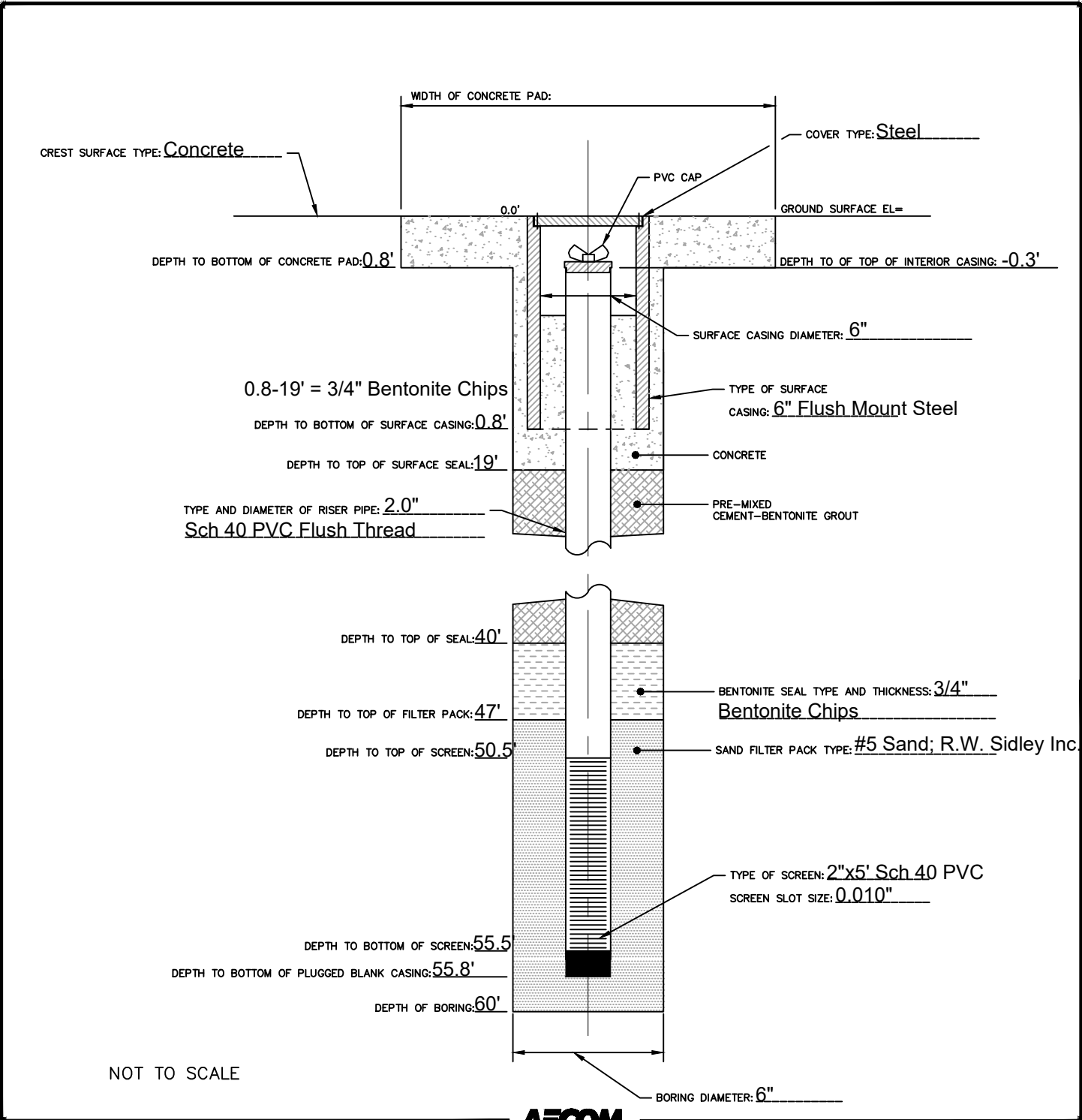
Piezometer Location	P004	Date Installed	10/16/15-10/19/15	Time	8:00 A.M.
Installed By	Scott Komen	Observed By	R. Weseljak	Total Depth	63'
Method of Installation	6" Mud Rotary with 6' Casing	Drilling Contractor	Strata	Surface Elevation	
Screened Interval	55.4-60.4'	Completion Zone	Gravels		
Remarks	Groundwater Level(s) 48.65' T.O.C.				



Project: Dynegy
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

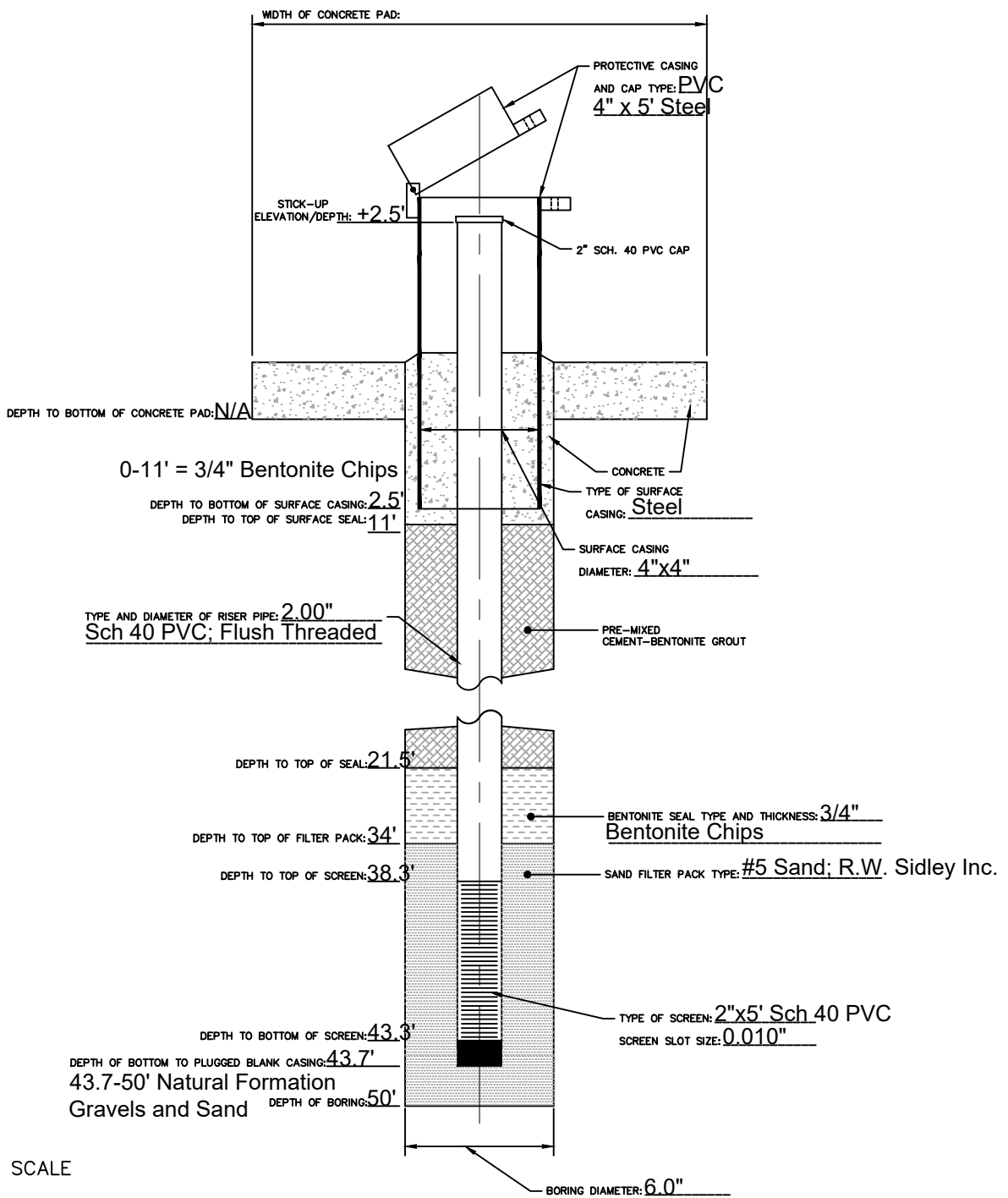
Piezometer Location P005	Date Installed 10/20/15	Time 4:30 P.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 60'
Method of Installation 6" Tricone Mud Rotary	Drilling Contractor Strata	Surface Elevation
Screened Interval 50.5-55.5'	Completion Zone Gravels and Sands	
Remarks	Groundwater Level(s) 45.80' T.O.C.	



Project: Dynegy
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

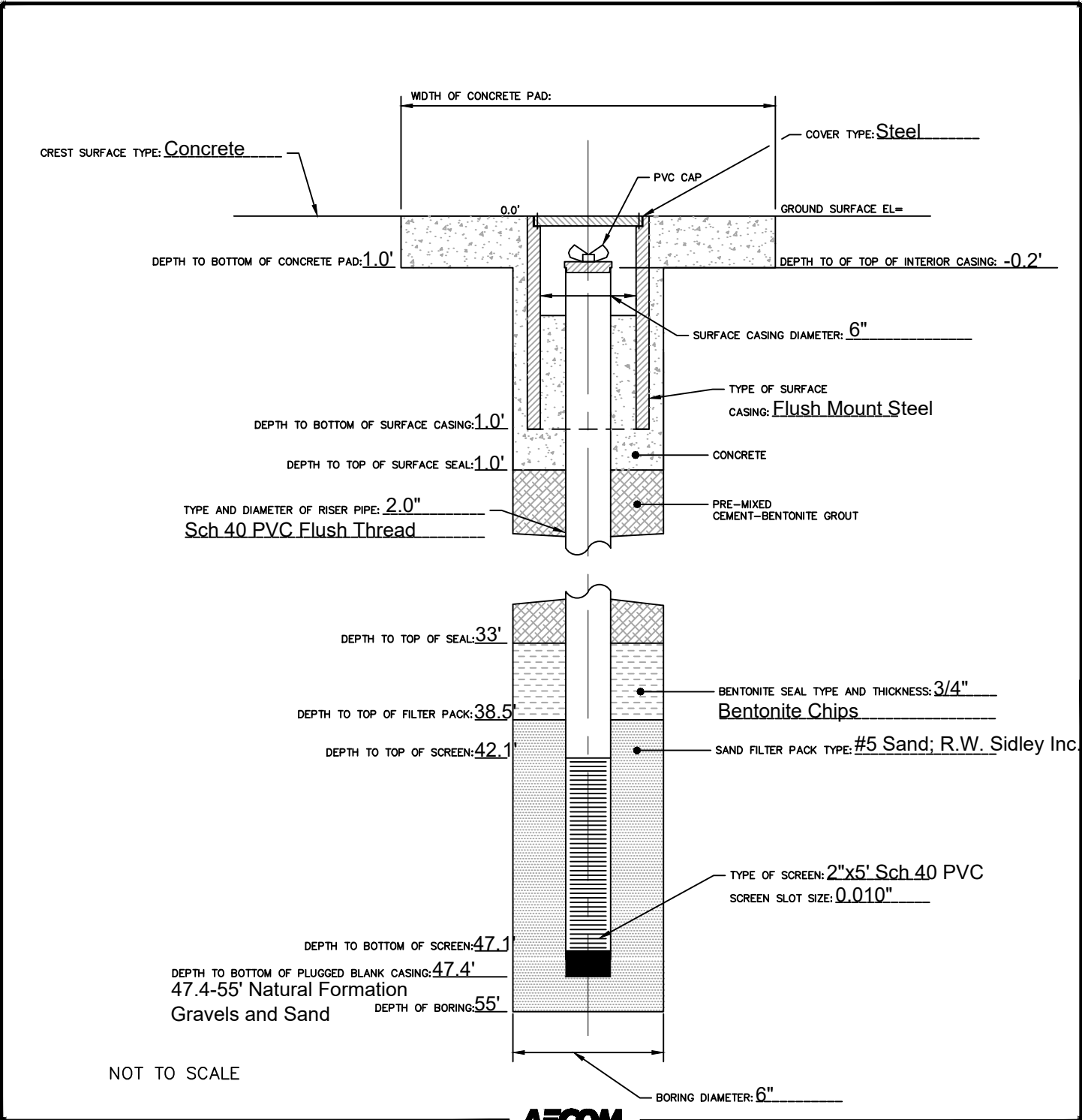
Piezometer Location	P006	Date Installed	10/20/15	Time	11:20 A.M.
Installed By	Scott Komen	Observed By	R. Weseljak	Total Depth	50'
Method of Installation	6" Tricone Mud Rotary	Drilling Contractor	Strata	Surface Elevation	
Screened Interval	38.3-43.3'	Completion Zone	Gravel		
Remarks	Groundwater Level(s) 45.74' T.O.C.				



NOT TO SCALE

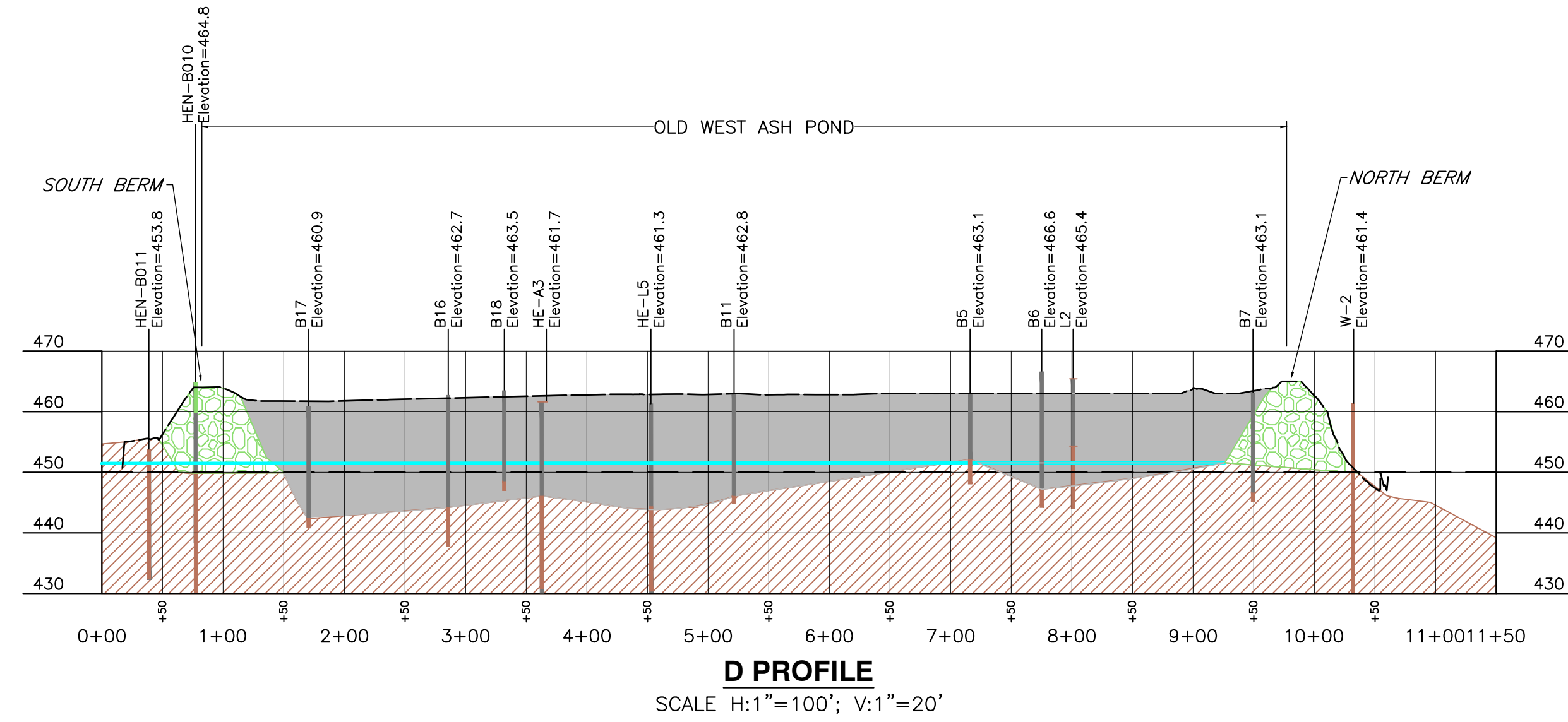
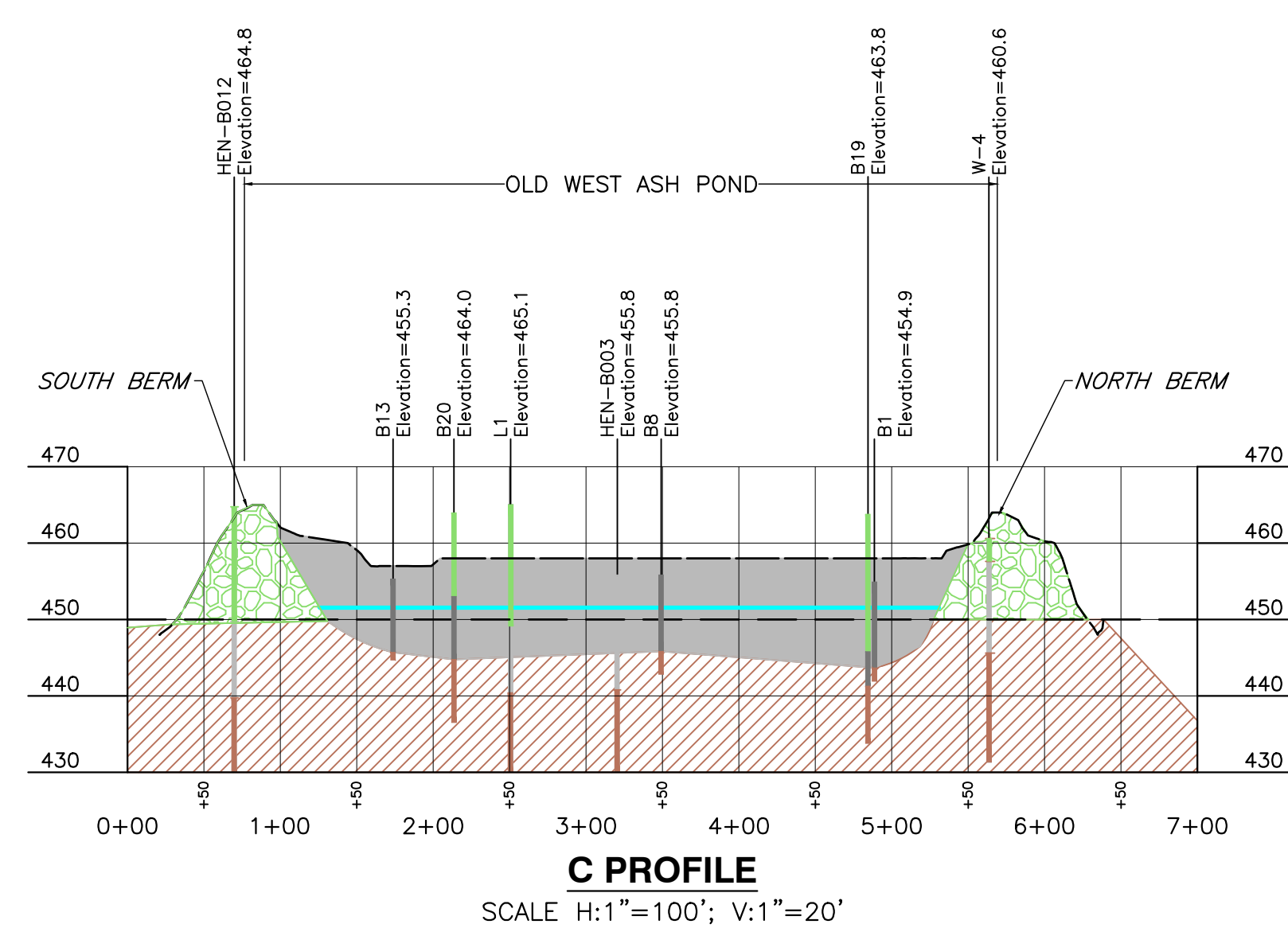
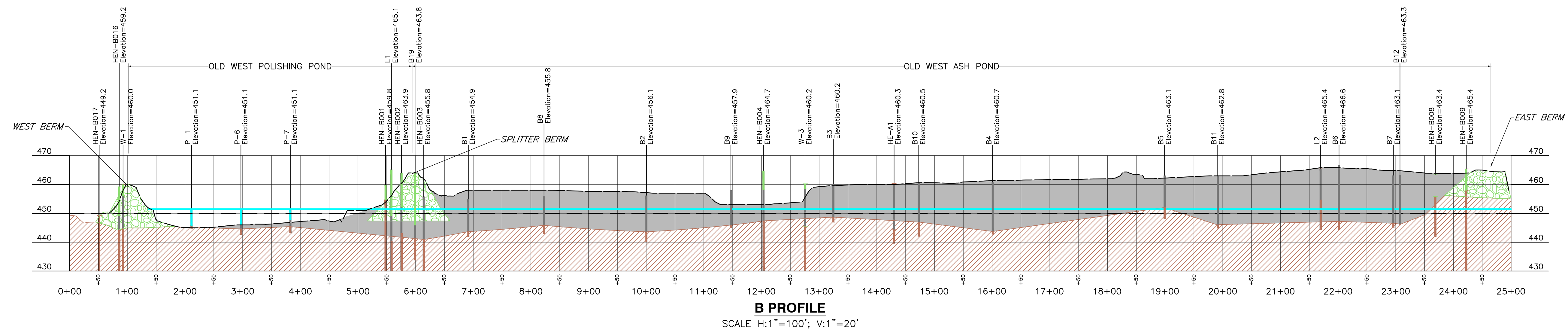
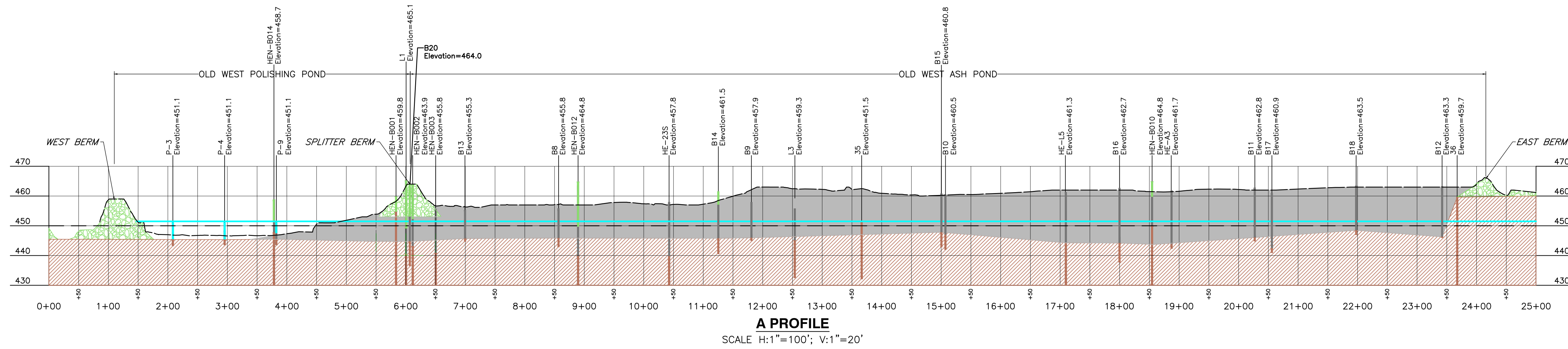
Project: Dynegy	Log of Piezometer	
Project Location: Hennepin, IL	Sheet 1 of 1	
Project Number: 60439752		

Piezometer Location P007	Date Installed 10/21/15	Time 5:00 P.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 55'
Method of Installation 6" Tricone Mud Rotary	Drilling Contractor Strata	Surface Elevation
Screened Interval 42.1-47.1'	Completion Zone Gravels	
Remarks	Groundwater Level(s) 44.65' T.O.C.	





Appendix A5
CEC Boring Logs
and Well Details



REFERENCE

- DATA FROM GROUNDWATER SURFACE PROVIDED BY NRT, DATED SEPTEMBER 2015.

LEGEND

	AVERAGE NORTH/NORTHWEST OF UNIT HIGH GROUNDWATER ELEVATIONS FROM 1996-2015 (451.5 FT. MSL)		MISCELLANEOUS BERM SOIL FILL
	TOP OF EXISTING GRADE (2015 WEAVER CONSULTING GROUP SURVEY)		CCR/ASH
	INTERPRETED NATURAL GROUND SURFACE (450) OUTSIDE OF ASH POND		NATIVE SOIL
	P-4 SOIL BORING GROUND SURFACE ELEVATION 451.1		

GEOLOGIC CONDITIONS

- THE TEST BORING INFORMATION PRESENTED HEREIN DEPICTS SUBSURFACE CONDITIONS AT THE TEST BORING LOCATIONS AND AT THE TIME OF DRILLING. SOIL CONDITIONS AT OTHER LOCATIONS MAY DIFFER.
- GEOLOGIC CORRELATIONS BETWEEN TEST BORINGS ARE GENERALLY BASED ON STRAIGHT-LINE INTERPOLATION. ACTUAL CONDITIONS BETWEEN TEST BORINGS MAY DIFFER.

REVISION RECORD

NO	DATE	DESCRIPTION
1	07/11/17	REVISION BORING LOCATIONS AND ELEVATIONS. REVERSED CROSS SECTIONS

DYNEGY INC.
Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300 - Lombard, IL 60148
 630-963-6026 - 877-963-6026
 www.dynegy.com

EXISTING CONDITIONS - SECTIONS
OLD WEST ASH POND SYSTEM
SATURATED ASH EVALUATION
HENNEPIN STATION
HENNEPIN, ILLINOIS

DATE:	03/27/2017	DRAWN BY:	CAC
DWG SCALE:	AS SHOWN	CHECKED BY:	DRAFT
PROJECT NO.:	164-478	APPROVED BY:	DRAFT

DRAWING NO.: **C200**
 SHEET 2 OF 2

P:\2016\164-478-C200\DWG\C200-100-Cross Sections.dwg (2/2017 - csm) - LP: 4/2/2017 8:38 AM



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B1/LPZ-1

PAGE 1 OF 1

CLIENT Dynegy Inc. - Hennepin Station

PROJECT NAME Old West Ash Pond System: Data Gap Analysis

PROJECT NUMBER 164-478

PROJECT LOCATION Hennepin Station, Hennepin, Illinois

DATE STARTED 3/15/17 COMPLETED 3/15/17

GROUND ELEVATION 454.928 ft BACKFILL Monitoring Well MW-1

DRILLING CONTRACTOR Holcomb Foundation Engineering, Co

GROUND WATER LEVELS:

DRILLING METHOD HSA with Auto Hammer

▽ WHILE DRILLING 1.0 ft / Elev 453.9 ft

CEC REP CAC CHECKED BY MDJ

▼ AT END OF DRILLING 3.0 ft / Elev 451.9 ft

NOTES _____

▼ 24hrs AFTERDRILLING 3.0 ft / Elev 451.9 ft

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
								PL	MC	LL				
								20	40	60	80			
								□ UCS (tsf) □						
								1	2	3	4			
454.928		ASH: Gray SILT - FLY ASH, moist to wet, very loose, (ASH)	0											
				SS 1	0	1-0-1-0 (1)	NP							
				SS 2A	50	0-0-2 (2)	NP							
450			5	SS 2B	50	4-0-0 (0)	NP							
		% Gravel ~ 0.1% % Sand ~ 9.1% % Silt ~ 85.3% % Clay ~ 5.4%		SS 3	50	0-0-0-0 (0)	NP							
		ASH: Gray and brown SANDY SILT - BOTTOM ASH, moist to wet, very loose, (ASH)		SS 4A	50	0-0-0 (0)	NP							
		ASH: Gray SILT - FLY ASH, moist to wet, very loose, (ASH)		SS 4B	50	0-0-0 (0)	NP							
445			10	SS 5	100	2-3-3-3 (6)	1.0 P							
		Black SILTY CLAY, moist, medium stiff, (CL)												
		End of boring at 13.0 feet.												

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

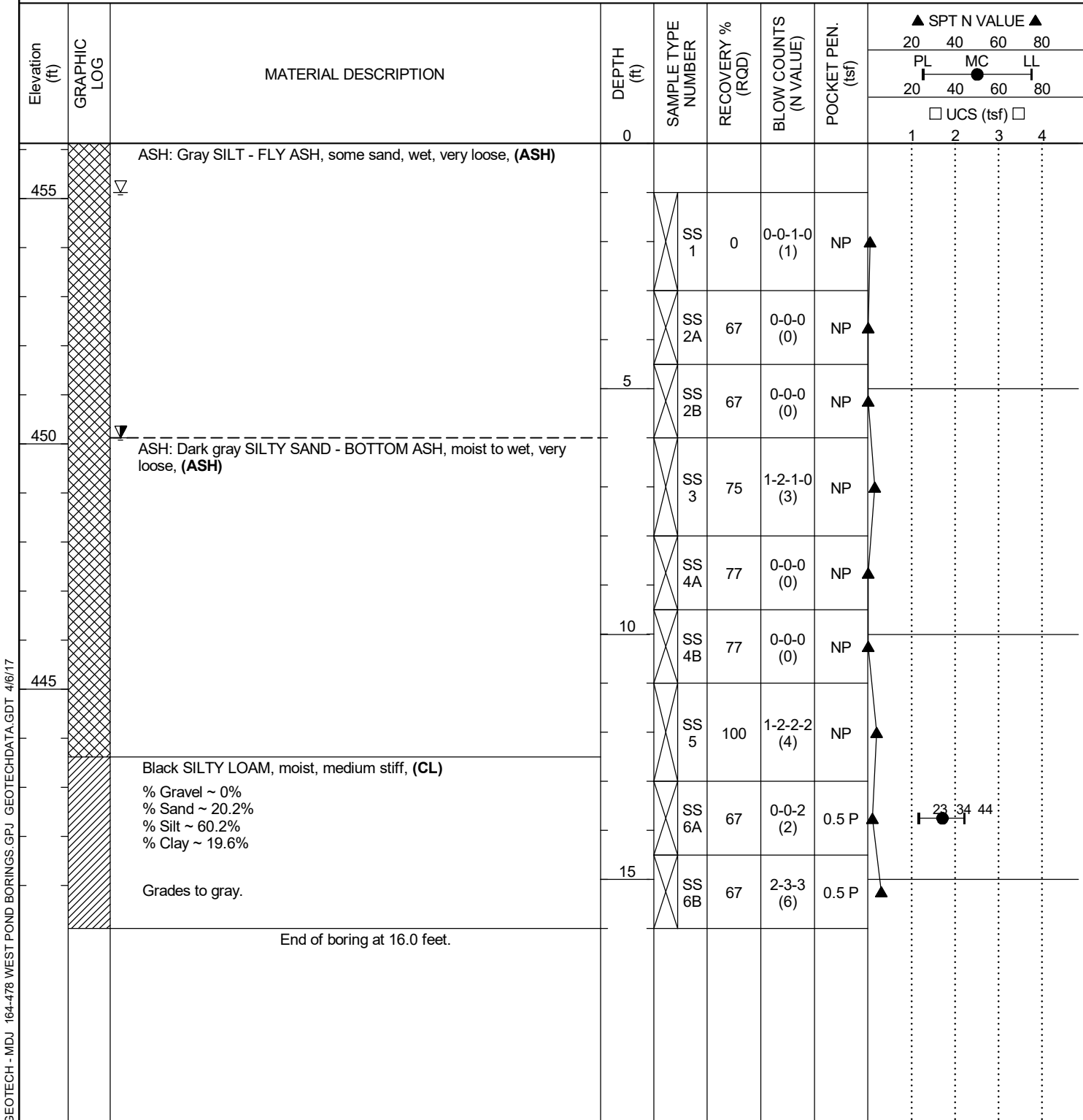


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B2

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/15/17</u> COMPLETED <u>3/15/17</u>	GROUND ELEVATION <u>456.123 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>1.0 ft / Elev 455.1 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>---</u>
NOTES _____	▽ 24hrs AFTERDRILLING <u>6.0 ft / Elev 450.1 ft</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B3/LPZ-3

PAGE 1 OF 1

CLIENT Dynegy Inc. - Hennepin Station **PROJECT NAME** Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478 **PROJECT LOCATION** Hennepin Station, Hennepin, Illinois
DATE STARTED 3/16/17 **COMPLETED** 3/16/17 **GROUND ELEVATION** 460.19 ft **BACKFILL** Monitoring Well MW-3
DRILLING CONTRACTOR Holcomb Foundation Engineering, Co **GROUND WATER LEVELS:**
DRILLING METHOD HSA with Auto Hammer **WHILE DRILLING** 3.0 ft / Elev 457.2 ft
CEC REP CAC **CHECKED BY** MDJ **AT END OF DRILLING** ---
NOTES --- **24hrs AFTERDRILLING** 10.7 ft / Elev 449.5 ft

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲							
								20	40	60	80				
								PL	MC	LL					
								20	40	60	80				
								□ UCS (tsf) □							
								1	2	3	4				
460		ASH: Dark gray SANDY SILT - BOTTOM ASH, trace gravel, moist to wet, loose to dense, (ASH)	0												
					SS 1	100	2-3-3-3 (6)	NP							
					SS 2A	100	3-7-11 (18)	NP							
455				5	SS 2B	100	9-10-11 (21)	NP							
					SS 3	100	3-3-4-7 (7)	NP							
					SS 4A	93	2-8-20 (28)	NP							
450			ASH: Dark gray SILT - FLY ASH, wet, loose, (ASH)	10	SS 4B	93	14-13-10 (23)	NP							
		Black SILTY CLAY, moist, stiff, (CL)		SS 5	85	0-1-4-4 (5)	1.5 P								
			End of boring at 13.0 feet.					2.5 P							

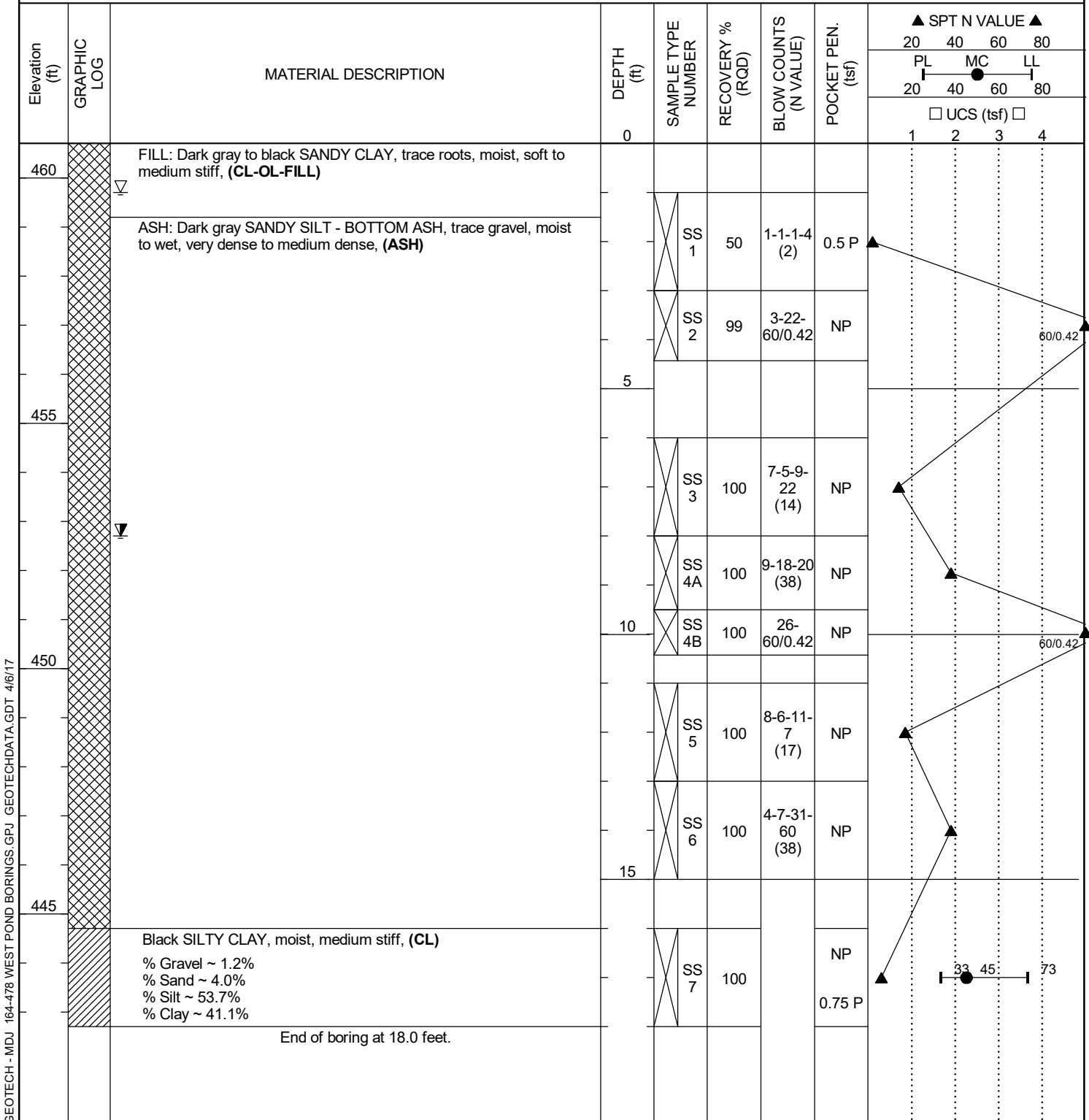


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B4

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/15/17</u> COMPLETED <u>3/15/17</u>	GROUND ELEVATION <u>460.703 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>1.0 ft / Elev 459.7 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>---</u>
NOTES _____	▽ 24hrs AFTERDRILLING <u>8.0 ft / Elev 452.7 ft</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ - GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B5/LPZ-5

PAGE 1 OF 1

CLIENT Dynegy Inc. - Hennepin Station **PROJECT NAME** Old West Ash Pond System: Data Gap Analysis

PROJECT NUMBER 164-478 **PROJECT LOCATION** Hennepin Station, Hennepin, Illinois

DATE STARTED 3/16/17 **COMPLETED** 3/16/17 **GROUND ELEVATION** 463.062 ft **BACKFILL** Monitoring Well MW-5

DRILLING CONTRACTOR Holcomb Foundation Engineering, Co **GROUND WATER LEVELS:**

DRILLING METHOD HSA with Auto Hammer **▽ WHILE DRILLING** 3.0 ft / Elev 460.1 ft

CEC REP CAC **CHECKED BY** MDJ **AT END OF DRILLING** ---

NOTES _____ **24hrs AFTERDRILLING** Dry

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
								PL	MC	LL				
								20	40	60	80			
								□ UCS (tsf) □						
								1	2	3	4			
		ASH: Dark gray and brown SANDY SILT - BOTTOM ASH, sandy silt, moist, very loose, (ASH)	0											
460	▽	ASH: Gray SILT - FLY ASH, silt, wet, very loose to loose, (ASH) % Gravel ~ 0.1% % Sand ~ 9.9% % Silt ~ 81.4% % Clay ~ 8.6%		SS 1	80	2-1-1-2 (2)	NP							
		ASH: Dark gray SANDY SILT - BOTTOM ASH, sandy silt, (ASH)	5	SS 2A	93	0-2-3 (5)	NP							
		ASH: Gray SILT - FLY ASH, wet, very loose, (ASH)		SS 2B	93	6-3-2 (5)	NP							
455		ASH: Dark gray SANDY SILT - BOTTOM ASH, sandy silt, (ASH)		SS 3	100	0-1-2-3 (3)	NP							
		Dark brown SITLY SAND, wet, (SM)	10	ST 4	0		NP							
		Dark brown GRAVELLY SANDY LOAM, moist, (SP)		SS 5	75	2-2-8-5 (10)	NP							
450		% Gravel ~ 16.3% % Sand ~ 54.9% % Silt ~ 20.8% % Clay ~ 8.0%		SS 6	70	4-4-3-3 (7)	NP							
		End of boring at 15.0 feet.	15											

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

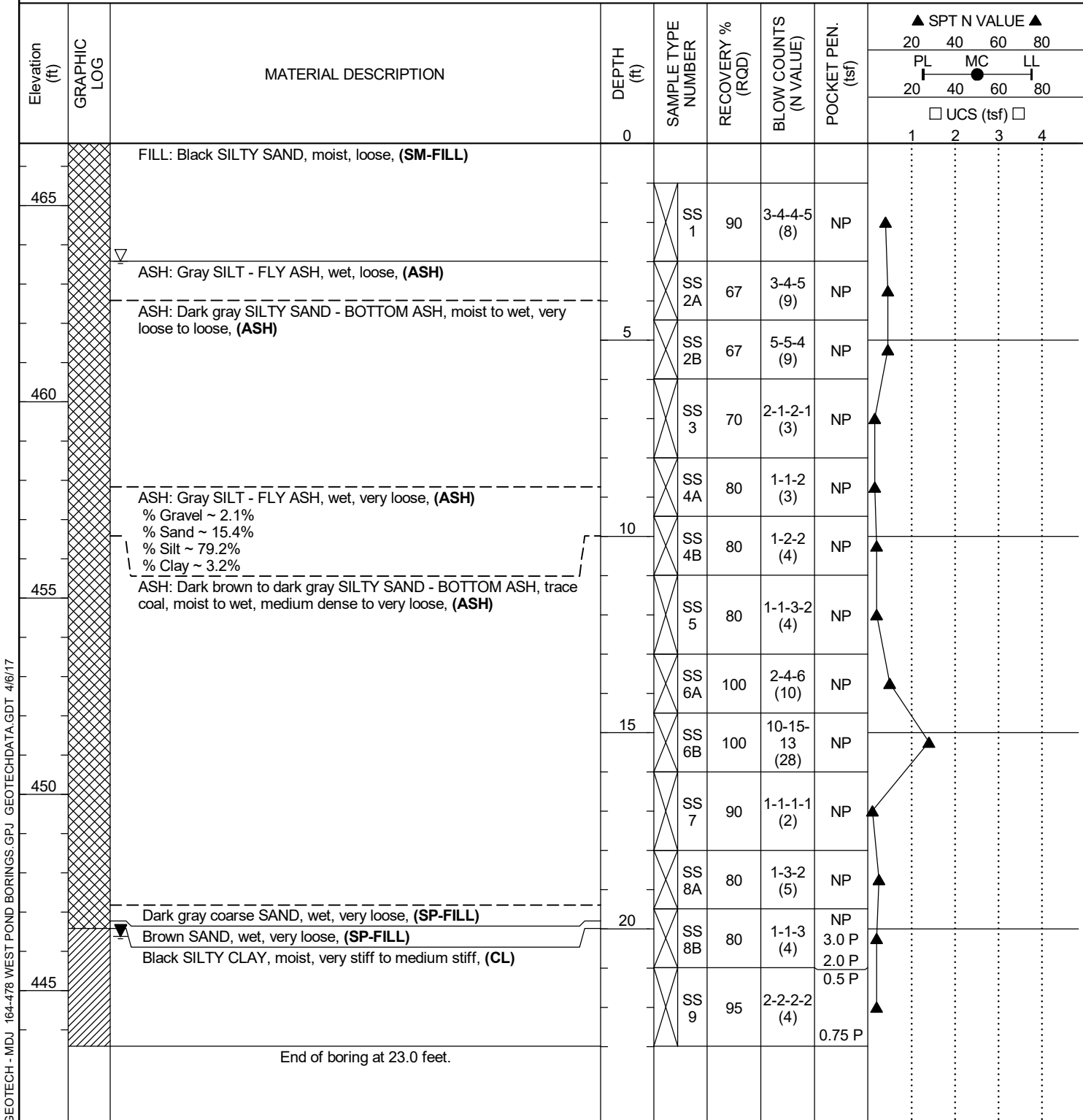


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B6

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/16/17</u> COMPLETED <u>3/16/17</u>	GROUND ELEVATION <u>466.583 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>3.0 ft / Elev 463.6 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	▼ AT END OF DRILLING <u>20.2 ft / Elev 446.4 ft</u>
NOTES _____	24hrs AFTERDRILLING <u>Dry</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

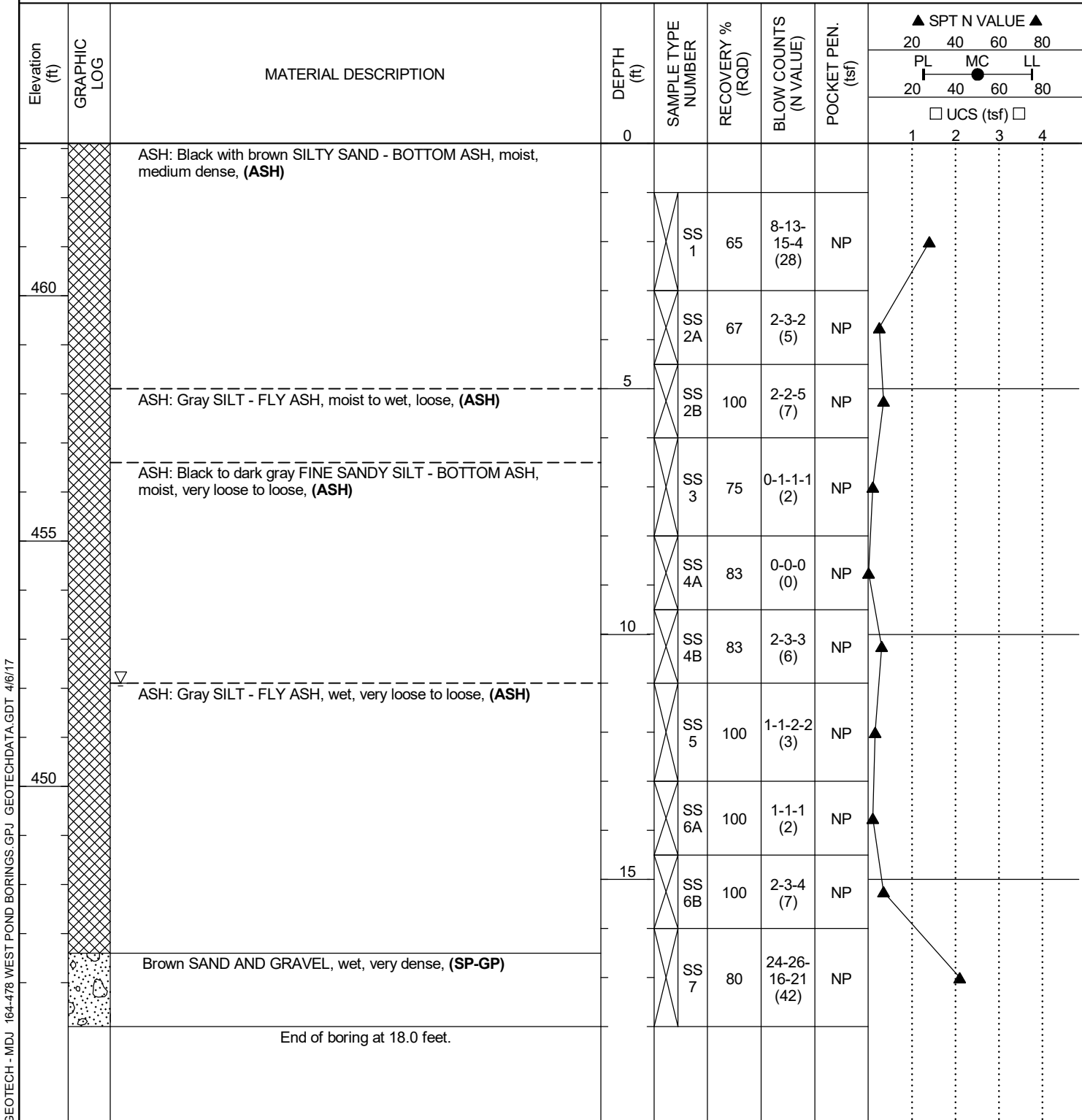


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B7

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/16/17</u> COMPLETED <u>3/16/17</u>	GROUND ELEVATION <u>463.102 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>11.0 ft / Elev 452.1 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>Dry</u>
NOTES _____	24hrs AFTERDRILLING <u>Dry</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

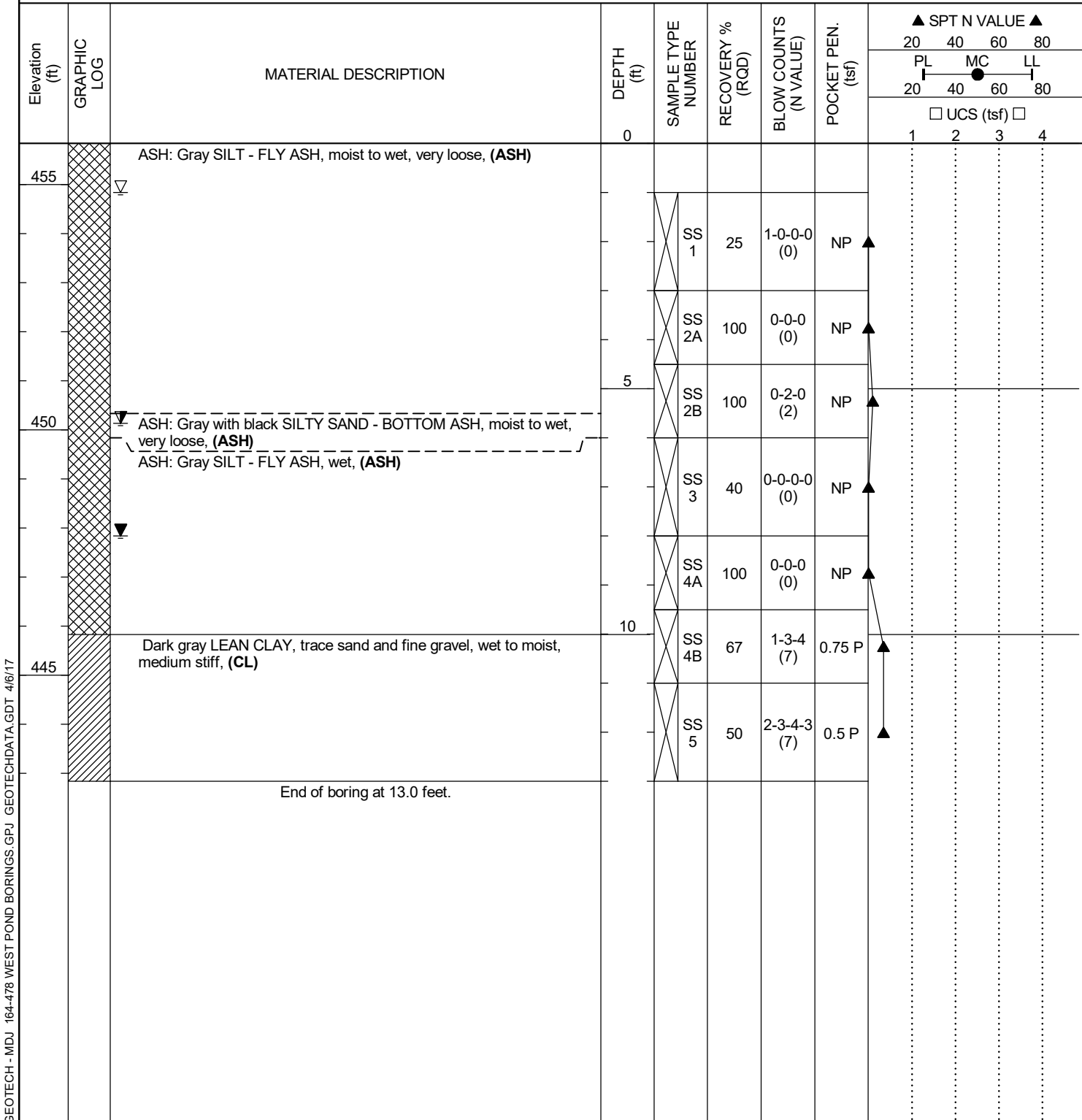


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B8

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/14/17</u> COMPLETED <u>3/14/17</u>	GROUND ELEVATION <u>455.837 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>1.0 ft / Elev 454.8 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	▼ AT END OF DRILLING <u>8.0 ft / Elev 447.8 ft</u>
NOTES _____	▼ 24hrs AFTERDRILLING <u>5.7 ft / Elev 450.1 ft</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



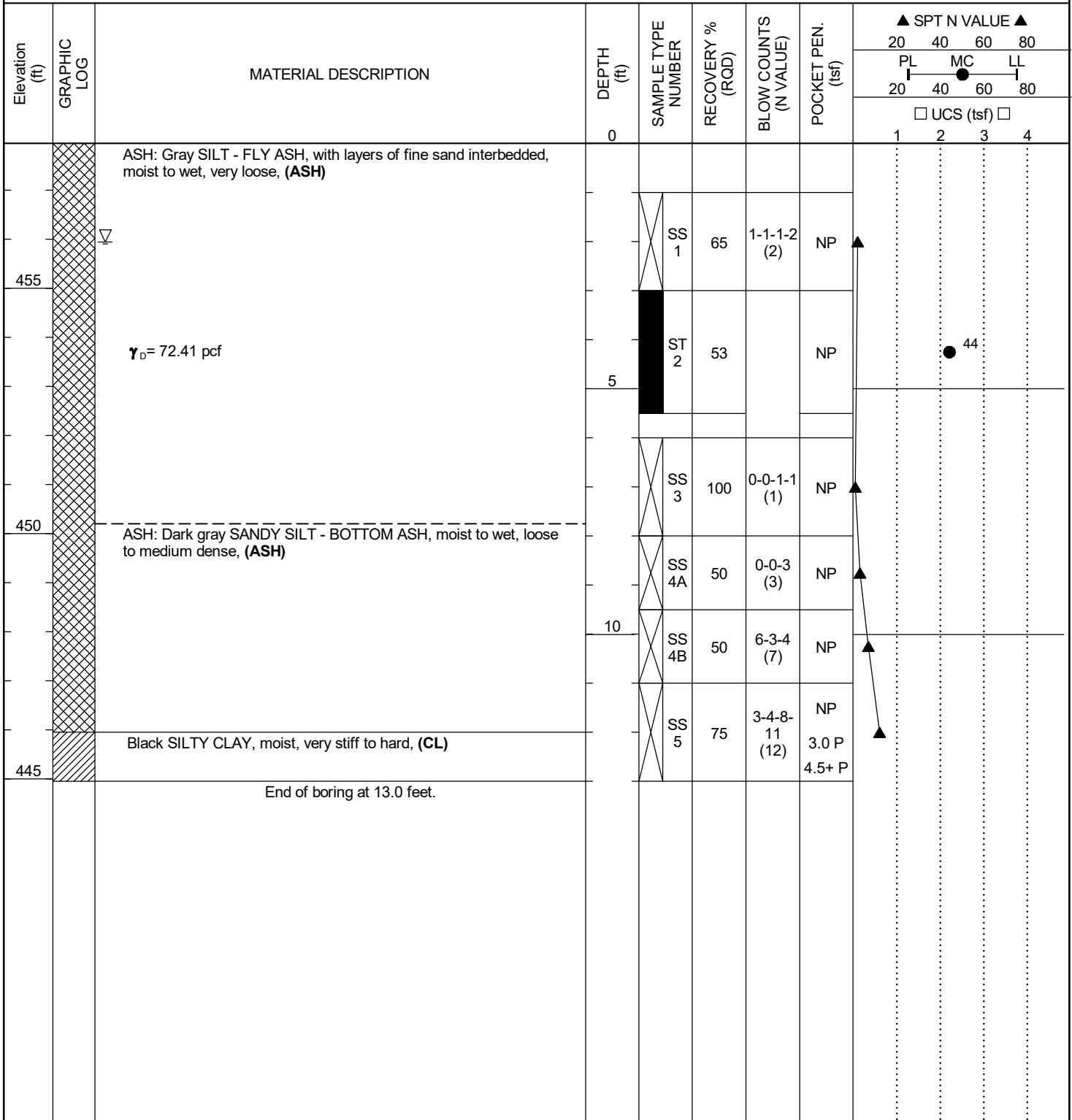
Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B9

PAGE 1 OF 1

CLIENT <u>Dynergy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/15/17</u> COMPLETED <u>3/15/17</u>	GROUND ELEVATION <u>457.949 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>2.0 ft / Elev 455.9 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>---</u>
NOTES _____	24hrs AFTERDRILLING <u>Dry</u>

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



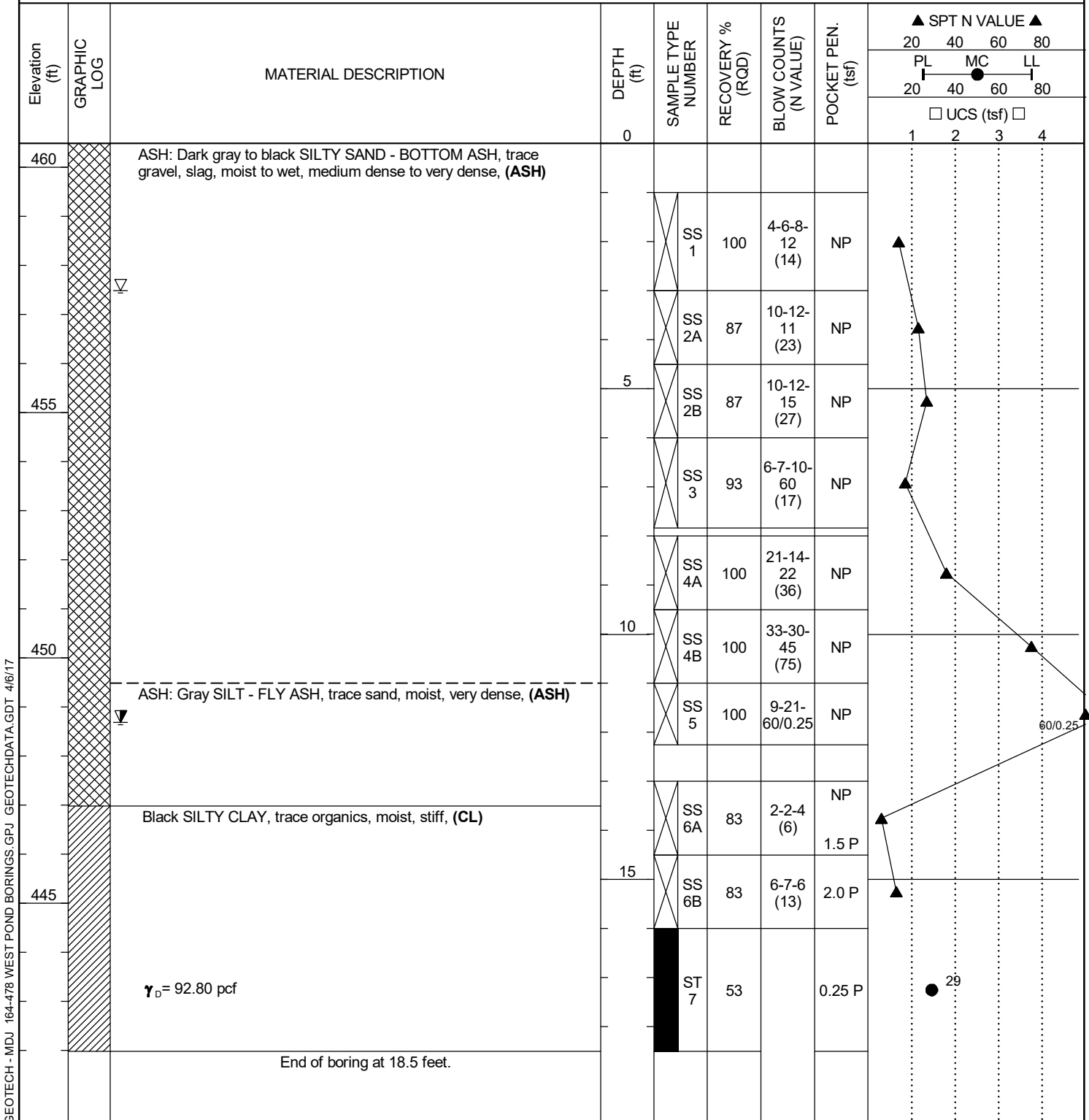


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B10

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/15/17</u> COMPLETED <u>3/15/17</u>	GROUND ELEVATION <u>460.481 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>3.0 ft / Elev 457.5 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>---</u>
NOTES _____	▽ 24hrs AFTERDRILLING <u>11.8 ft / Elev 448.7 ft</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B11

PAGE 1 OF 1

CLIENT <u>Dynergy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/16/17</u> COMPLETED <u>3/16/17</u>	GROUND ELEVATION <u>462.798 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>1.0 ft / Elev 461.8 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>---</u>
NOTES _____	24hrs AFTERDRILLING <u>Dry</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
								PL	MC	LL				
								20	40	60	80			
								□ UCS (tsf) □						
			0					1	2	3	4			
460		ASH: Dark gray and dark brown SANDY SILT - BOTTOM ASH, with interbedded black sand lenses, trace gravel, moist to wet, very loose, (ASH) ▽		SS 1	90	2-2-1-1 (3)	NP							
					SS 2A	87	0-0-0 (0)	NP						
				5	SS 2B	87	0-1-1 (2)	NP						
					SS 3	75	0-0-0-1 (0)	NP						
455					SS 4A	50	1-1-3 (4)	NP						
			ASH: Brown SILT - FLY ASH, moist to wet, very loose, (ASH)	10	SS 4B	50	1-1-2 (3)	NP						
			ASH: Gray SILT - FLY ASH, moist to wet, very loose, (ASH)		SS 5	80	1-1-1-2 (2)	NP						
450				SS 6A	67	0-0-1 (1)	NP							
			15	SS 6B	67	0-1-0 (1)	NP							
		Brown SAND, trace gravel, wet, medium dense, (SP)		SS 7	70	1-1-6-13 (7)	NP							
445														
		End of boring at 18.0 feet.												

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B12

PAGE 1 OF 1

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/16/17</u> COMPLETED <u>3/16/17</u>	GROUND ELEVATION <u>463.279 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	<u>∇ WHILE DRILLING</u> <u>2.5 ft / Elev 460.8 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>Dry</u>
NOTES _____	24hrs AFTERDRILLING <u>Dry</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲												
								20	40	60	80									
			0																	
460		ASH: Gray SANDY SILT - BOTTOM ASH, trace coal, moist to wet, very loose, (ASH)		SS 1	75	1-1-2-3 (3)	NP													
		ASH: Dark gray to black SILTY SAND - BOTTOM ASH, with coal, moist, medium dense to very dense, (ASH)	5	SS 2A	80	1-1-2 (3)	NP													
					SS 2B	80	9-18-16 (34)	NP												
455					SS 3	90	4-7-4-8 (11)	NP												
					SS 4A	67	1-1-3 (4)	NP												
				10	SS 4B	67	6-9-9 (18)	NP												
450					SS 5	100	2-4-5-10 (9)	NP												
				SS 6	78	3-4-15-60 (19)	NP													
		ASH: Gray SILT - FLY ASH, moist, very dense, (ASH)	15																	
		Brown SAND AND GRAVEL, moist, very dense, (SP)		SS 7	90	14-32-60/0.33	NP													
		End of boring at 17.3 feet.																		

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B13/LPZ-13

PAGE 1 OF 1

CLIENT Dynergy Inc. - Hennepin Station
PROJECT NUMBER 164-478
DATE STARTED 3/15/17 **COMPLETED** 3/15/17
DRILLING CONTRACTOR Holcomb Foundation Engineering, Co
DRILLING METHOD HSA with Auto Hammer
CEC REP CAC **CHECKED BY** MDJ
NOTES _____

PROJECT NAME Old West Ash Pond System: Data Gap Analysis
PROJECT LOCATION Hennepin Station, Hennepin, Illinois
GROUND ELEVATION 455.302 ft **BACKFILL** Monitoring Well MW-13
GROUND WATER LEVELS:
 ▽ **WHILE DRILLING** 1.0 ft / Elev 454.3 ft
 ▼ **AT END OF DRILLING** 3.0 ft / Elev 452.3 ft
AFTERDRILLING ---

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
								PL	MC	LL				
								20	40	60	80			
								□ UCS (tsf) □						
								1	2	3	4			
455		ASH: Gray ASPHALT, wet, very loose, (ASH)	0											
				SS 1	0	0-1-1-1 (2)	NP							
				SS 2A	0	0-0-0 (0)	NP							
450			5	SS 2B	0	1-0-0 (0)	NP							
				SS 3	100	0-0-0-0 (0)	NP							
				SS 4A	0	0-0-0 (0)	NP							
			10	SS 4B	0	0-0-0 (0)	NP							
445				SS 5	50	1-2-2-3 (4)	NP							
		Black SILTY CLAY, moist, medium stiff, (CL)					0.5 P							
		End of boring at 13.0 feet.												

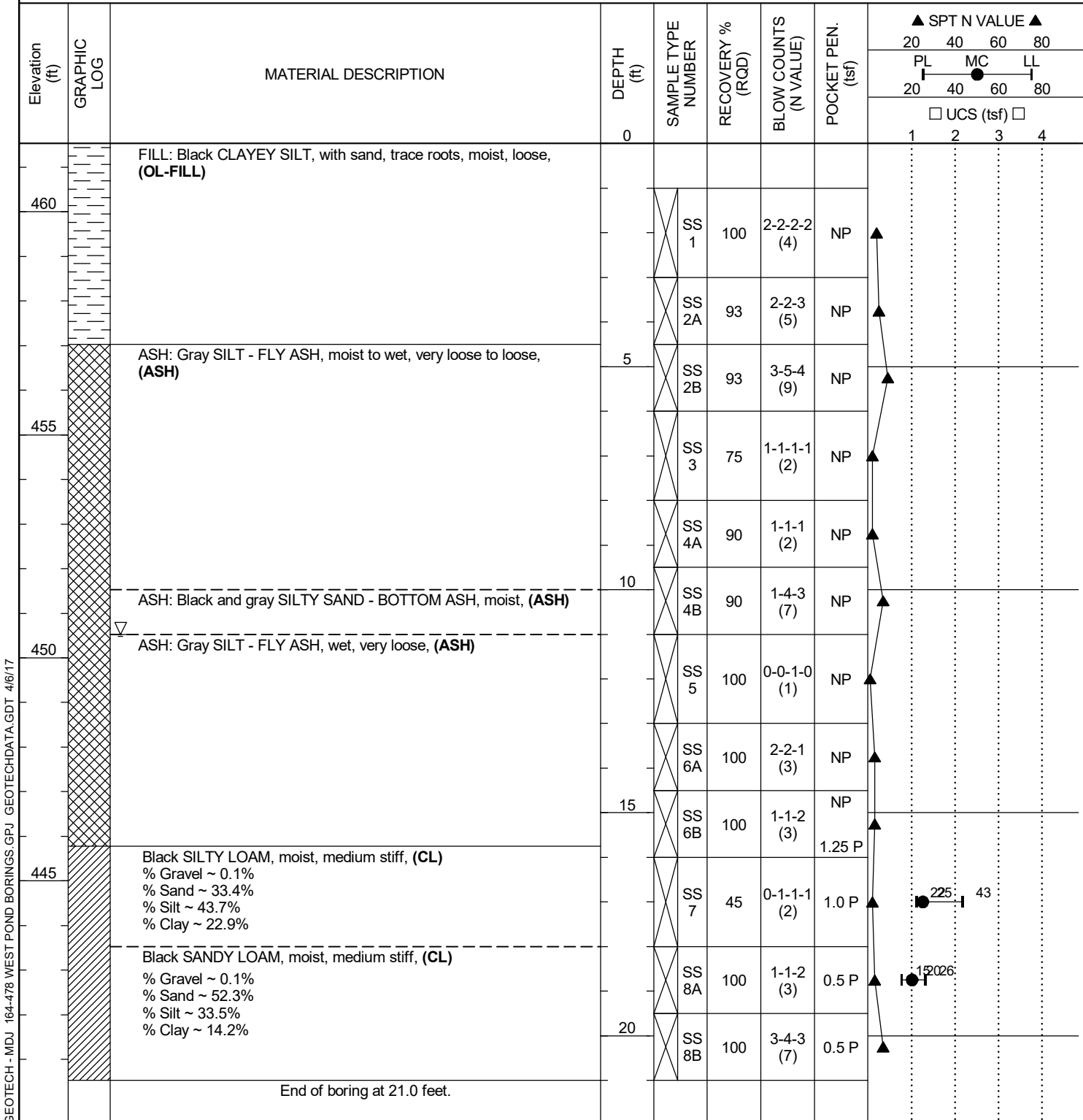
GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B14

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/14/17</u> COMPLETED <u>3/14/17</u>	GROUND ELEVATION <u>461.529 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>11.0 ft / Elev 450.5 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>Dry</u>
NOTES _____	24hrs AFTERDRILLING <u>Dry</u>



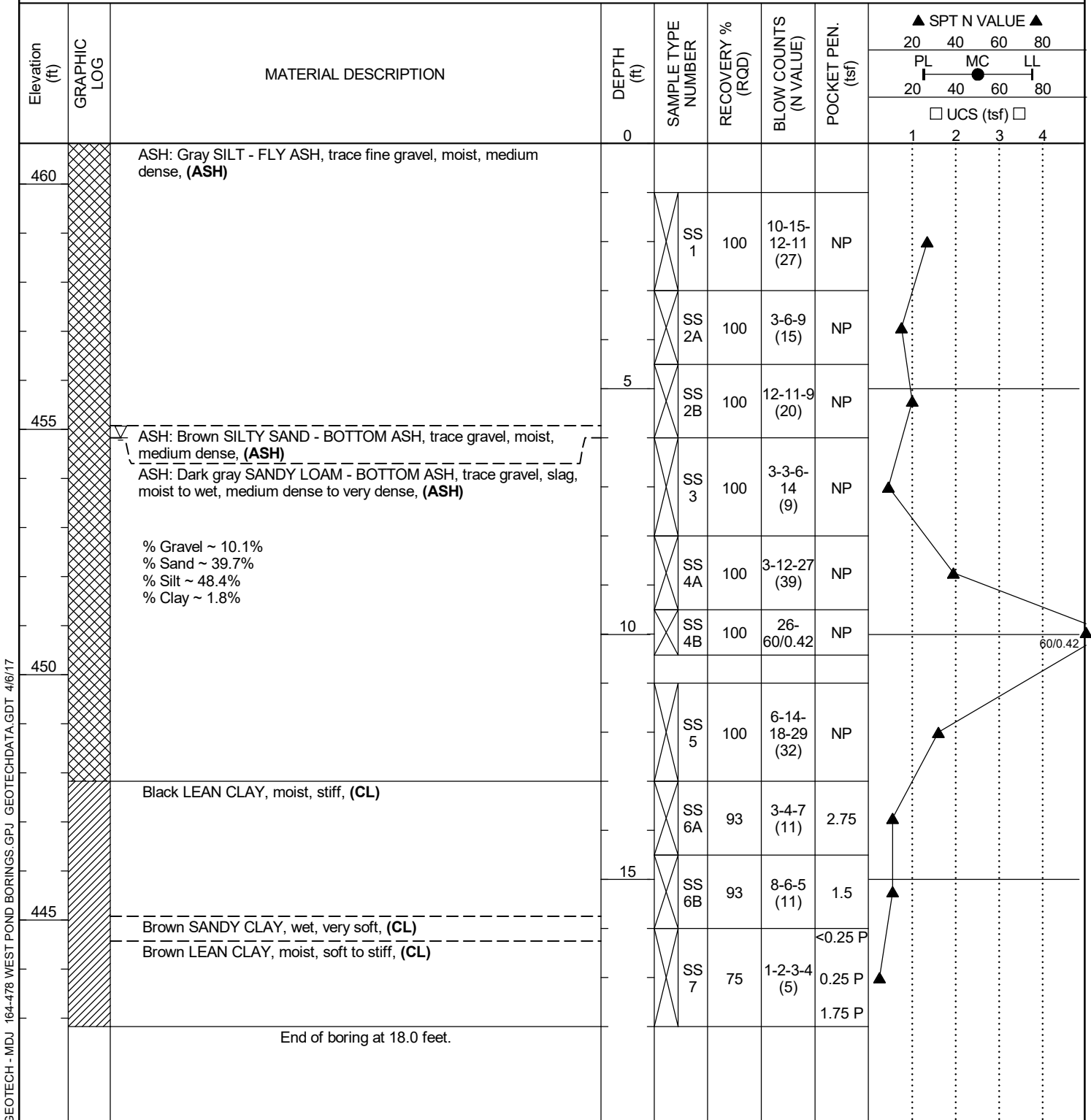
GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B15/LPZ-15

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/14/17</u> COMPLETED <u>3/14/17</u>	GROUND ELEVATION <u>460.82 ft</u> BACKFILL <u>Monitoring Well MW-15</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>6.0 ft / Elev 454.8 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>---</u>
NOTES _____	AFTER DRILLING <u>---</u>



GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B16

PAGE 1 OF 2

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/14/17</u> COMPLETED <u>3/14/17</u>	GROUND ELEVATION <u>462.696 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>CME Continuous Sampler</u>	▽ WHILE DRILLING <u>23.0 ft / Elev 439.7 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	▼ AT END OF DRILLING <u>17.0 ft / Elev 445.7 ft</u>
NOTES _____	▼ 24hrs AFTERDRILLING <u>16.0 ft / Elev 446.7 ft</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲											
								20	40	60	80								
460		ASH: Gray SILTY SAND - BOTTOM ASH, some gravel, moist, medium dense, (ASH)	0																
		ASH: Dark gray and brown SILTY SAND - BOTTOM ASH, some gravel, moist, dense, (ASH)		SS 1	54		NP												
455			ASH: Gray GRAVELLY SILTY LOAM -, trace fine gravel, moist, dense to very dense, (ASH)	5	SS 2	73	NP												
			% Gravel ~ 17.8% % Sand ~ 28.2% % Silt ~ 52.1% % Clay ~ 1.9% Wet at 11-ft to 12-ft.	10	SS 3	70	NP												
450					SS 4	66	NP												
445		ASH: Dark gray SANDY SILT - BOTTOM ASH, with slag, moist, very dense, (ASH)	15	SS 5	76	NP													
		Black and brown LEAN CLAY, moist, medium stiff, (CL)	20			0.5 P 1.0 P													

(Continued Next Page)



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B16

PAGE 2 OF 2

CLIENT Dynegy Inc. - Hennepin Station **PROJECT NAME** Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478 **PROJECT LOCATION** Hennepin Station, Hennepin, Illinois

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲							
								20	40	60	80				
								PL	MC	LL					
								20	40	60	80				
								□ UCS (tsf) □							
								1	2	3	4				
440		Gray SANDY CLAY, wet, medium stiff, (CL)	20				0.25 P								
		Brown SAND, trace gravel, wet, (SP)		SS 6	50		1.5 P								
		End of boring at 25.0 feet.	25				NP								

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B17/LPZ-17

CLIENT Dynergy Inc. - Hennepin Station **PROJECT NAME** Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478 **PROJECT LOCATION** Hennepin Station, Hennepin, Illinois
DATE STARTED 3/14/17 **COMPLETED** 3/14/17 **GROUND ELEVATION** 460.931 ft **BACKFILL** Monitoring Well MW-17
DRILLING CONTRACTOR Holcomb Foundation Engineering, Co **GROUND WATER LEVELS:**
DRILLING METHOD CME Continuous Sampler **▽ WHILE DRILLING** 8.0 ft / Elev 452.9 ft
CEC REP CAC **CHECKED BY** MDJ **AT END OF DRILLING** ---
NOTES _____ **▽ 48hrs AFTERDRILLING** 13.0 ft / Elev 447.9 ft

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲							
								20	40	60	80				
								PL	MC	LL					
								20	40	60	80				
								□ UCS (tsf) □							
								1	2	3	4				
460		ASH: Dark gray SILTY SAND - BOTTOM ASH, trace gravel, moist, medium dense to dense, (ASH)	0												
					SS 1	54		NP							
455				5											
			ASH: Gray SILT - FLY ASH, wet, (ASH)		SS 2	72		NP							
450			ASH: Dark gray SILTY SAND - BOTTOM ASH, trace gravel, moist to wet, (ASH)	10											
		ASH: Gray SILT - FLY ASH, wet, (ASH)		SS 3	84		NP								
445			15												
				SS 4	58		NP								
		Brown SAND, wet, (SP) % Gravel ~ 3.2% % Sand ~ 79.2% % Silt ~ 14.7%	20												

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

(Continued Next Page)



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B17/LPZ-17

CLIENT Dynegy Inc. - Hennepin Station **PROJECT NAME** Old West Ash Pond System: Data Gap Analysis
PROJECT NUMBER 164-478 **PROJECT LOCATION** Hennepin Station, Hennepin, Illinois

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲				
								20	40	60	80	
		% Clay ~ 2.9% End of boring at 20.0 feet.						PL ----- MC ----- LL 20 40 60 80				
								<input type="checkbox"/> UCS (tsf) <input type="checkbox"/>	1	2	3	4
								

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

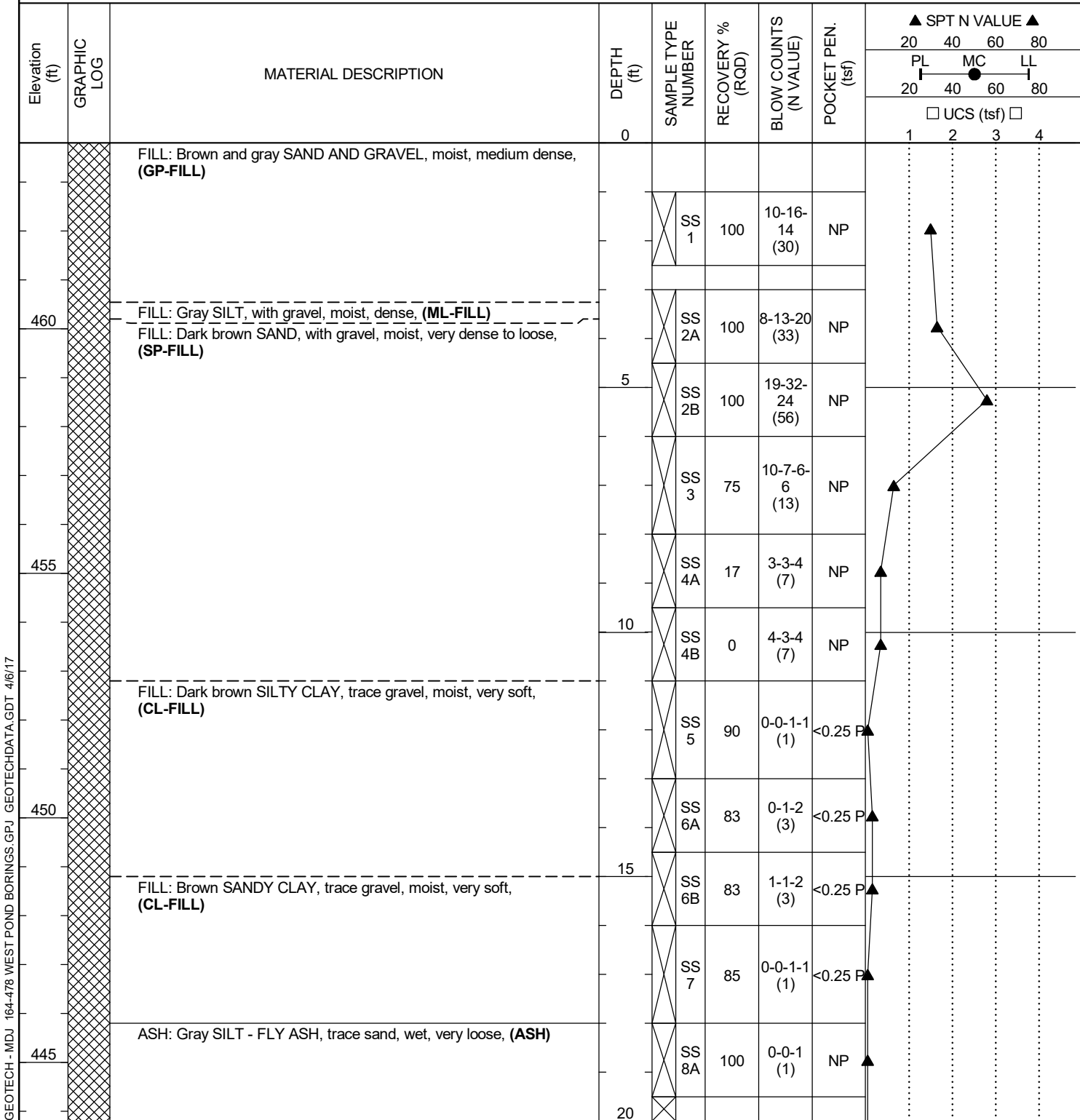


Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B19

PAGE 1 OF 2

CLIENT <u>Dynegy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/17/17</u> COMPLETED <u>3/17/17</u>	GROUND ELEVATION <u>463.793 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	WHILE DRILLING <u>Dry</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>Dry</u>
NOTES _____	AFTERDRILLING <u>--</u>



(Continued Next Page)



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B19

PAGE 2 OF 2

CLIENT Dynegy Inc. - Hennepin Station

PROJECT NAME Old West Ash Pond System: Data Gap Analysis

PROJECT NUMBER 164-478

PROJECT LOCATION Hennepin Station, Hennepin, Illinois

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
		ASH: Gray SILT - FLY ASH, trace sand, wet, very loose, (ASH) <i>(continued)</i>	20	SS 8B	100	0-1-0 (1)	NP							
		Black SILTY CLAY, moist, medium stiff, (CL)		SS 9	90	0-0-1-2 (1)	NP							
440		Gray SILTY CLAY, moist, medium stiff, (CL)		SS 10A	83	1-2-4 (6)	1.0 P							
			25	SS 10B	83	4-5-5 (10)	1.0 P							
				SS 11	100	2-2-3 (5)	1.0 P							
435		Grades to brown.		SS 12	100	1-2-2-3 (4)	1.0 P							
		End of boring at 30.0 feet.	30											

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B20

PAGE 1 OF 2

CLIENT <u>Dynergy Inc. - Hennepin Station</u>	PROJECT NAME <u>Old West Ash Pond System: Data Gap Analysis</u>
PROJECT NUMBER <u>164-478</u>	PROJECT LOCATION <u>Hennepin Station, Hennepin, Illinois</u>
DATE STARTED <u>3/17/17</u> COMPLETED <u>3/17/17</u>	GROUND ELEVATION <u>463.974 ft</u> BACKFILL <u>Bentonite/Ash</u>
DRILLING CONTRACTOR <u>Holcomb Foundation Engineering, Co</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>HSA with Auto Hammer</u>	▽ WHILE DRILLING <u>11.0 ft / Elev 453.0 ft</u>
CEC REP <u>CAC</u> CHECKED BY <u>MDJ</u>	AT END OF DRILLING <u>Dry, Cave in at 25 ft</u>
NOTES _____	AFTERDRILLING <u>--</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲											
								20	40	60	80								
			0																
		FILL: Brown and gray SAND AND GRAVEL, moist, medium dense to dense, (SP-FILL)		SS 1	113	7-12-16-18 (28)	NP												
460				SS 2A	63	34-22-17 (39)	NP												
		FILL: Dark brown SILTY CLAY, some sand and gravel, moist, hard, (CL-FILL)	5	SS 2B	63	10-13-18 (31)	4.5+ P												
		FILL: Brown and gray SAND AND GRAVEL, moist, medium dense, (SP-FILL)		SS 3	45	10-13-9-7 (22)	NP												
455				SS 4A	33	4-5-5 (10)	NP												
			10	SS 4B	33	4-4-3 (7)	NP												
		ASH: Gray SILT - FLY ASH, trace sand, moist to wet, very loose, (ASH)		SS 5	60	0-1-0-0 (1)	NP												
450				SS 6A	93	1-1-1 (2)	NP												
			15	SS 6B	93	1-2-2 (4)	NP												
				SS 7	70	1-0-0-1 (0)	NP												
445				SS 8A	50	0-0-0 (0)	NP												
			20																

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

(Continued Next Page)



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026

BORING NUMBER B20

PAGE 2 OF 2

CLIENT Dynegy Inc. - Hennepin Station

PROJECT NAME Old West Ash Pond System: Data Gap Analysis

PROJECT NUMBER 164-478

PROJECT LOCATION Hennepin Station, Hennepin, Illinois

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲							
								20	40	60	80				
								PL	MC	LL					
								20	40	60	80				
								□ UCS (tsf) □							
			20									1	2	3	4
				SS 8B	50	0-0-1 (1)	NP								
		Black to gray SILTY CLAY, moist, medium stiff, (CL-FILL)													
				SS 9	40	2-3-3-4 (6)	1.0 P								
440				SS 10	55	2-3-3-3 (6)	0.75 P								
			25												
				SS 11	90	2-2-2-2 (4)	0.5 P								
				SS 12	70	1-2-2-2 (4)	0.75 P								
435															
		End of boring at 29.0 feet.													

GEOTECH - MDJ 164-478 WEST POND BORINGS.GPJ GEOTECHDATA.GDT 4/6/17

Leachate Well Construction Details
 West Ash Ponds 1 and 3
 Hennepin Power Station

Monitoring Well:	TOP to TOC (ft)	TOP to GS (ft)	Bottom of Well to TOC (ft)	ELEV _{GS}	ELEV _{BOT}	ELEV _{TOP}	ELEV _{TOC}
LPZ-1	0.05	3	14.4	454.9	443.5	457.9	457.9
LPZ-3	0.0625	4.25	14.35	460.2	450.0	464.5	464.4
LPZ-5	0.05	3	10.46	463.1	455.6	466.1	466.0
LPZ-13	0.05	2.8	14.25	455.3	443.8	458.1	458.1
LPZ-15	0.05	3	15.3	460.8	448.5	463.8	463.8
LPZ-17	0.05	3	21.1	460.9	442.8	463.9	463.9

Notes:

- GS** Ground Surface
- BOT** Bottom of Well
- TOC** Top of Well Casing
- TOP** Top of Protective Pipe
- GW** Ground Water

P:\2016\160-905\CADD\Drawg\EN01-Sample Locations\160905-EN01-E100 Sample Location Plan.dwg\LAYOUT1} LS:(4/1/2016 - mkarpf) - LP: 4/1/2016 12:47 PM



REFERENCE

1. IMAGE PROVIDED BY GOOGLE EARTH. DATE OF IMAGE: SEPTEMBER 20, 2015.
2. BASE TOPOGRAPHIC INFORMATION PROVIDED BY WEAVER CONSULTANTS GROUP. FILE 4153-300-11-01 DATED DECEMBER 1, 2015.

LEGEND

- P8 SAMPLE LOCATION
- MW 21 MONITORING WELL No. 21
INSTALLED BY JOHN MATHES & ASSOCIATES, DEC. 1992.
GROUND SURFACE ELEV. = 460.0 FEET.

*HAND SIGNATURE ON FILE

SCALE IN FEET



Civil & Environmental Consultants, Inc.

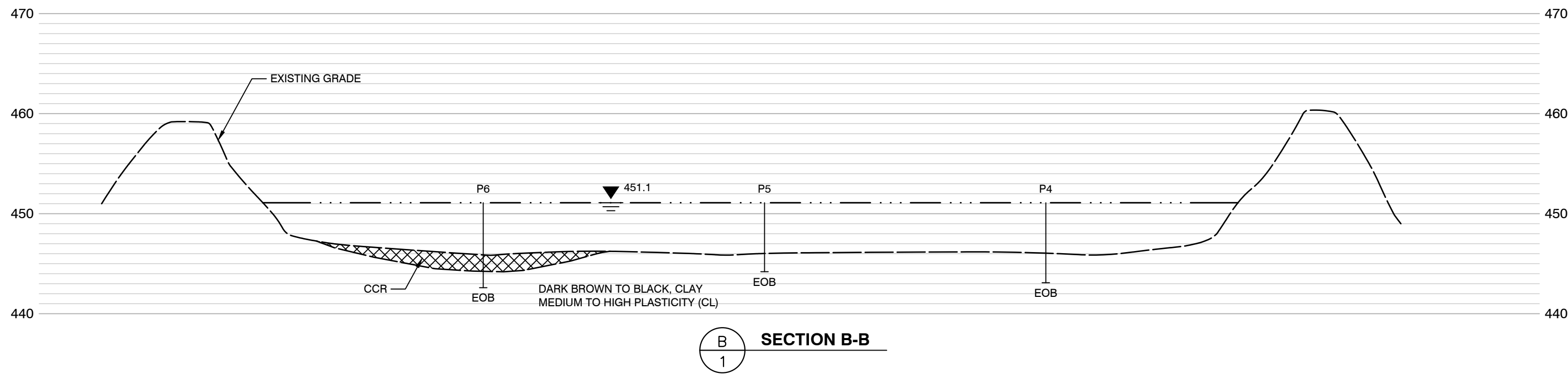
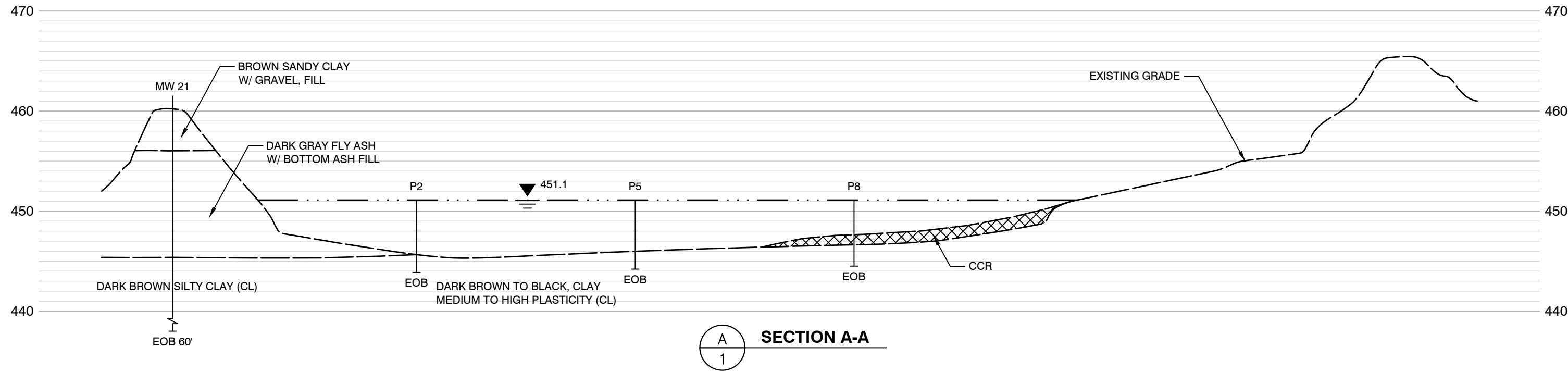
555 Butterfield Road, Suite 300 - Lombard, IL 60148
630-963-6026 · 877-963-6026
www.cecinc.com

DYNEGY INC.
OLD WEST FINISHING POND
HENNEPIN POWER STATION
HENNEPIN, ILLINOIS

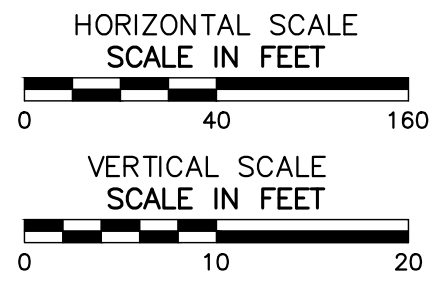
SAMPLE LOCATION PLAN

DRAWN BY: MSK	CHECKED BY: MDJ	APPROVED BY: MDJ*	FIGURE NO.:
DATE: 04/01/2016	DWG SCALE: 1"=80'	PROJECT NO: 160-905.0100	<input type="text"/>

P:\2016\160-905\--CAAD\Draw\EN01-Sample Locations\160905-EN01-E100 Sample Location Plan.dwg[LAYOUT] LS:\4/1/2016 - mkrpf) - LP: 4/1/2016 1:23 PM



*HAND SIGNATURE ON FILE



CEC
Civil & Environmental Consultants, Inc.
555 Butterfield Road, Suite 300 - Lombard, IL 60148
630-963-6026 · 877-963-6026
www.cecinc.com

DYNEGY INC.
OLD WEST FINISHING POND
HENNEPIN POWER STATION
HENNEPIN, ILLINOIS

CROSS-SECTIONS

DRAWN BY:	MSK	CHECKED BY:	MDJ	APPROVED BY:	MDJ*	FIGURE NO.:	2
DATE:	04/01/2016	DWG SCALE:	AS SHOWN	PROJECT NO:	160-905.0100		



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P1

PAGE 1 OF 1

CLIENT <u>Dynegy, Inc.</u>	PROJECT NAME <u>Old West Polishing Pond Site Investigation</u>
PROJECT NUMBER <u>160-905</u>	PROJECT LOCATION <u>Hennepin Power Station</u>
DATE STARTED <u>3/29/16</u> COMPLETED <u>3/29/16</u>	GROUND ELEVATION <u>451.1 ft</u> BACKFILL <u>none</u>
DRILLING CONTRACTOR <u>Patrick Engineering</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Hand Sampling</u>	▽ WHILE DRILLING <u>0.0 ft / Elev 451.1 ft</u>
CEC REP <u>MDJ</u> CHECKED BY <u>CAC</u>	▼ AT END OF DRILLING <u>0.0 ft / Elev 451.1 ft</u>
NOTES _____	▼ AFTER DRILLING <u>0.0 ft / Elev 451.1 ft</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
	▼	WATER	0.0											
450.0			2.5											
447.5			5.0											
445.0	▨	Dark brown to black CLAY, trace sand, wet, soft to medium stiff, medium to high plasticity, (CL)		SP 1			<0.25							
		Sample S-1 collected 6.0 to 6.4 feet. End of boring at 6.4 feet.					0.5 to 0.75							

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P2

PAGE 1 OF 1

CLIENT <u>Dynegy, Inc.</u>	PROJECT NAME <u>Old West Polishing Pond Site Investigation</u>
PROJECT NUMBER <u>160-905</u>	PROJECT LOCATION <u>Hennepin Power Station</u>
DATE STARTED <u>3/29/16</u> COMPLETED <u>3/29/16</u>	GROUND ELEVATION <u>451.1 ft</u> BACKFILL <u>none</u>
DRILLING CONTRACTOR <u>Patrick Engineering</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Hand Sampling</u>	▽ WHILE DRILLING <u>0.0 ft / Elev 451.1 ft</u>
CEC REP <u>MDJ</u> CHECKED BY <u>CAC</u>	▼ AT END OF DRILLING <u>0.0 ft / Elev 451.1 ft</u>
NOTES _____	▼ AFTER DRILLING <u>0.0 ft / Elev 451.1 ft</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲					
								20	40	60	80		
	▼	WATER	0.0										
450.0			2.5										
447.5		Sample S-1 collected 5.6 to 6.0 feet.	5.0										
445.0	▨	Dark brown to black CLAY, wet, soft, (CL)		SP 1			<0.25						
		Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL) Sample S-2 collected 6.5 to 6.9 feet.					0.5 to 0.75						
		End of boring at 7.5 feet.	7.5										

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P3

PAGE 1 OF 1

CLIENT <u>Dynergy, Inc.</u>	PROJECT NAME <u>Old West Polishing Pond Site Investigation</u>
PROJECT NUMBER <u>160-905</u>	PROJECT LOCATION <u>Hennepin Power Station</u>
DATE STARTED <u>3/29/16</u> COMPLETED <u>3/29/16</u>	GROUND ELEVATION <u>451.1 ft</u> BACKFILL <u>none</u>
DRILLING CONTRACTOR <u>Patrick Engineering</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Hand Sampling</u>	▽ WHILE DRILLING <u>0.0 ft / Elev 451.1 ft</u>
CEC REP <u>MDJ</u> CHECKED BY <u>CAC</u>	▼ AT END OF DRILLING <u>0.0 ft / Elev 451.1 ft</u>
NOTES _____	▼ AFTER DRILLING <u>0.0 ft / Elev 451.1 ft</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲					
								20	40	60	80		
	▼	WATER	0.0										
450.0			2.5										
447.5			5.0										
445.0	▨	Dark brown to black CLAY, wet, very soft, (CL)					<0.25						
	▨	Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL) Sample S-1 collected 6.4 to 6.8 feet.		SP 1			0.5						
		End of boring at 7.6 feet.	7.5										

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P4

PAGE 1 OF 1

CLIENT <u>Dynegy, Inc.</u>	PROJECT NAME <u>Old West Polishing Pond Site Investigation</u>
PROJECT NUMBER <u>160-905</u>	PROJECT LOCATION <u>Hennepin Power Station</u>
DATE STARTED <u>3/29/16</u> COMPLETED <u>3/29/16</u>	GROUND ELEVATION <u>451.1 ft</u> BACKFILL <u>none</u>
DRILLING CONTRACTOR <u>Patrick Engineering</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Hand Sampling</u>	▽ WHILE DRILLING <u>0.0 ft / Elev 451.1 ft</u>
CEC REP <u>MDJ</u> CHECKED BY <u>CAC</u>	▽ AT END OF DRILLING <u>0.0 ft / Elev 451.1 ft</u>
NOTES _____	▽ AFTER DRILLING <u>0.0 ft / Elev 451.1 ft</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
	▼	WATER	0.0											
450.0			2.5											
447.5			5.0											
445.0	▨	Dark brown to black CLAY, wet, soft, (CL)					<0.25							
	▨	Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL)	7.5	SP 1			0.5							
		End of boring at 8.0 feet.												

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P5

PAGE 1 OF 1

CLIENT <u>Dynergy, Inc.</u>	PROJECT NAME <u>Old West Polishing Pond Site Investigation</u>
PROJECT NUMBER <u>160-905</u>	PROJECT LOCATION <u>Hennepin Power Station</u>
DATE STARTED <u>3/29/16</u> COMPLETED <u>3/29/16</u>	GROUND ELEVATION <u>451.1 ft</u> BACKFILL <u>none</u>
DRILLING CONTRACTOR <u>Patrick Engineering</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>Hand Sampling</u>	▽ WHILE DRILLING <u>0.0 ft / Elev 451.1 ft</u>
CEC REP <u>MDJ</u> CHECKED BY <u>CAC</u>	▽ AT END OF DRILLING <u>0.0 ft / Elev 451.1 ft</u>
NOTES _____	▽ AFTER DRILLING <u>0.0 ft / Elev 451.1 ft</u>

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲					
								20	40	60	80		
	▼	WATER	0.0										
450.0			2.5										
447.5			5.0										
	▨	Dark brown to black CLAY, wet, soft, (CL)					<0.25						
445.0		Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL)		SP 1									
		Sample S-1 collected 6.5 to 6.9 feet. End of boring at 6.9 feet.					0.5						

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P6

PAGE 1 OF 1

CLIENT Dynegey, Inc.	PROJECT NAME Old West Polishing Pond Site Investigation
PROJECT NUMBER 160-905	PROJECT LOCATION Hennepin Power Station
DATE STARTED 3/29/16	COMPLETED 3/29/16
DRILLING CONTRACTOR Patrick Engineering	GROUND ELEVATION 451.1 ft
DRILLING METHOD Hand Sampling	BACKFILL none
CEC REP MDJ	CHECKED BY CAC
NOTES	GROUND WATER LEVELS:
	▽ WHILE DRILLING 0.0 ft / Elev 451.1 ft
	▽ AT END OF DRILLING 0.0 ft / Elev 451.1 ft
	▽ AFTER DRILLING 0.0 ft / Elev 451.1 ft

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
	▼	WATER	0.0											
450.0			2.5											
447.5			5.0											
445.0		Light gray ASH, wet, very loose, (ASH) Sample S-1 collected 5.6 to 6.0 feet.						NP						
		Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL) Sample S-2 collected 8.0 to 8.4 feet.	7.5	SP 1			0.25 to 0.5							
		End of boring at 8.5 feet.												

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P7

PAGE 1 OF 1

CLIENT Dynegey, Inc.	PROJECT NAME Old West Polishing Pond Site Investigation
PROJECT NUMBER 160-905	PROJECT LOCATION Hennepin Power Station
DATE STARTED 3/29/16 COMPLETED 3/29/16	GROUND ELEVATION 451.1 ft BACKFILL none
DRILLING CONTRACTOR Patrick Engineering	GROUND WATER LEVELS:
DRILLING METHOD Hand Sampling	▽ WHILE DRILLING 0.0 ft / Elev 451.1 ft
CEC REP MDJ CHECKED BY CAC	▽ AT END OF DRILLING 0.0 ft / Elev 451.1 ft
NOTES	▽ AFTER DRILLING 0.0 ft / Elev 451.1 ft

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
	▼	WATER	0.0											
450.0			2.5											
447.5		Light gray ASH, wet, very loose, (ASH) Sample S-1 collected 4.3 to 4.7 feet.	5.0				NP							
445.0		Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL) Sample S-2 collected 6.9 to 7.3 feet.	7.5	SP 1			0.25 to 0.5							
		End of boring at 7.8 feet.												

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P8

PAGE 1 OF 1

CLIENT Dynegey, Inc.	PROJECT NAME Old West Polishing Pond Site Investigation
PROJECT NUMBER 160-905	PROJECT LOCATION Hennepin Power Station
DATE STARTED 3/29/16 COMPLETED 3/29/16	GROUND ELEVATION 451.1 ft BACKFILL none
DRILLING CONTRACTOR Patrick Engineering	GROUND WATER LEVELS:
DRILLING METHOD Hand Sampling	▽ WHILE DRILLING 0.0 ft / Elev 451.1 ft
CEC REP MDJ CHECKED BY CAC	▽ AT END OF DRILLING 0.0 ft / Elev 451.1 ft
NOTES	▽ AFTER DRILLING 0.0 ft / Elev 451.1 ft

Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
	▼	WATER	0.0											
450.0														
447.5		Light gray ASH, wet, very loose, (ASH)					NP							
445.0		Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL)	5.0	SP 1			<0.25 to 0.5							
		End of boring at 6.2 feet.												

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Civil & Environmental Consultants, Inc.
 555 Butterfield Road, Suite 300
 Lombard, Illinois 60148
 Telephone: 630-963-6026
 Fax: 630-963-6027

BORING NUMBER P9

PAGE 1 OF 1

CLIENT Dynegey, Inc.	PROJECT NAME Old West Polishing Pond Site Investigation
PROJECT NUMBER 160-905	PROJECT LOCATION Hennepin Power Station
DATE STARTED 3/29/16 COMPLETED 3/29/16	GROUND ELEVATION 451.1 ft BACKFILL none
DRILLING CONTRACTOR Patrick Engineering	GROUND WATER LEVELS:
DRILLING METHOD Hand Sampling	▽ WHILE DRILLING 0.0 ft / Elev 451.1 ft
CEC REP MDJ CHECKED BY CAC	▽ AT END OF DRILLING 0.0 ft / Elev 451.1 ft
NOTES	▽ AFTER DRILLING 0.0 ft / Elev 451.1 ft

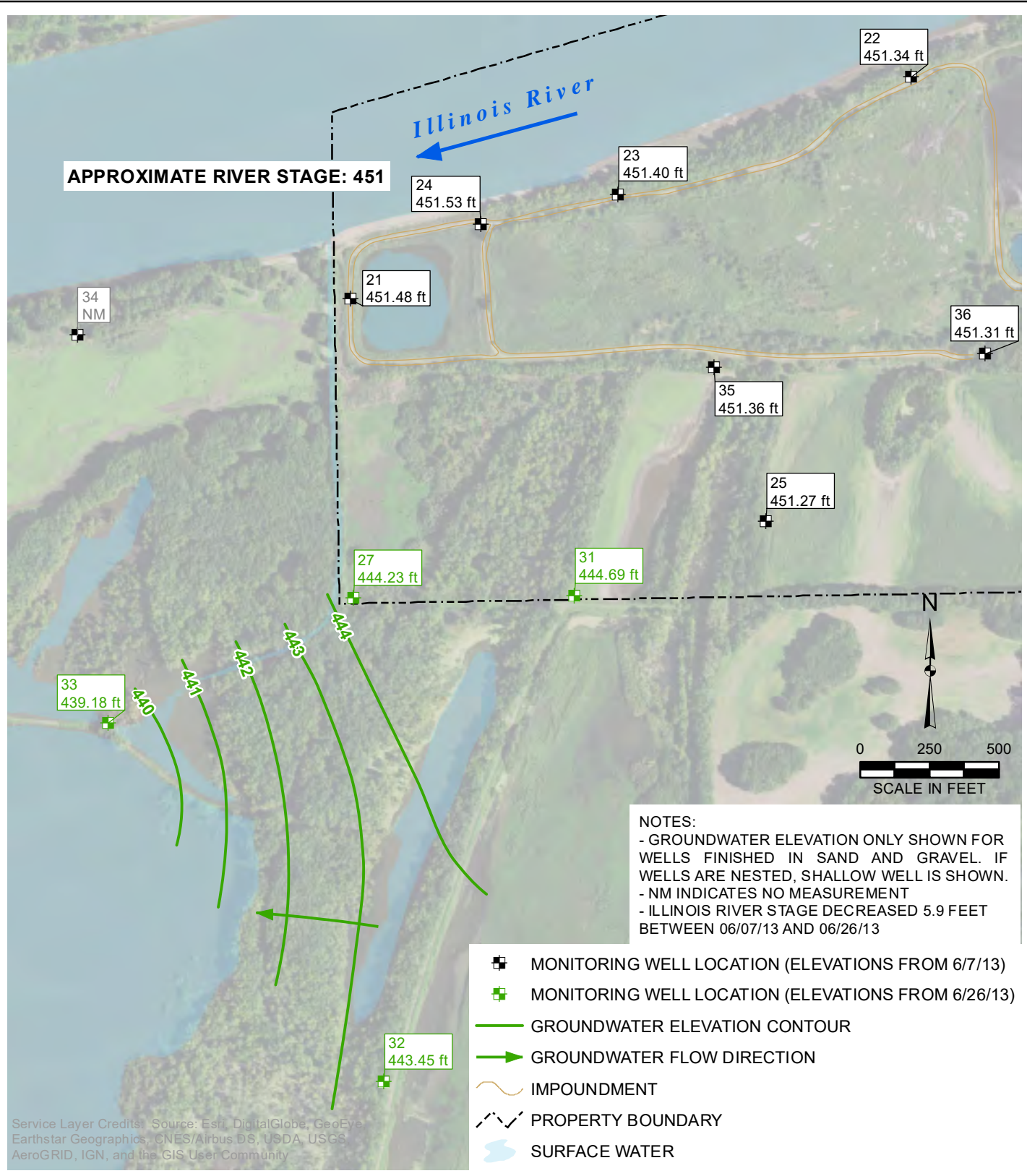
Elevation (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	▲ SPT N VALUE ▲						
								20	40	60	80			
450.0	▼	WATER	0.0					PL	MC	LL				
447.5		Light gray ASH, wet, very loose, (ASH)	2.5											
445.0		Dark brown to black CLAY, trace sand, wet to moist, soft to medium stiff, medium high plasticity, (CL)	5.0	SP 1			NP							
		Sample S-1 collected 6.7 to 7.1 feet. End of boring at 7.1 feet.					<0.25 to 0.75							

GEOTECH - MDJ 160-905 BORING LOGS.GPJ GEOTECHDATA.GDT 3/31/16



Appendix B
Water Table Contour
Maps 2013 through 2016

Y:\Mapping\Projects\2413\MXD\A\ppB_1_GWE_Contour_Map_June_2013.mxd Author: stolozsi Date/Time: 4/20/2017, 11:41:29 AM



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/17

WATER TABLE CONTOUR MAP
JUNE 7 AND 26, 2013

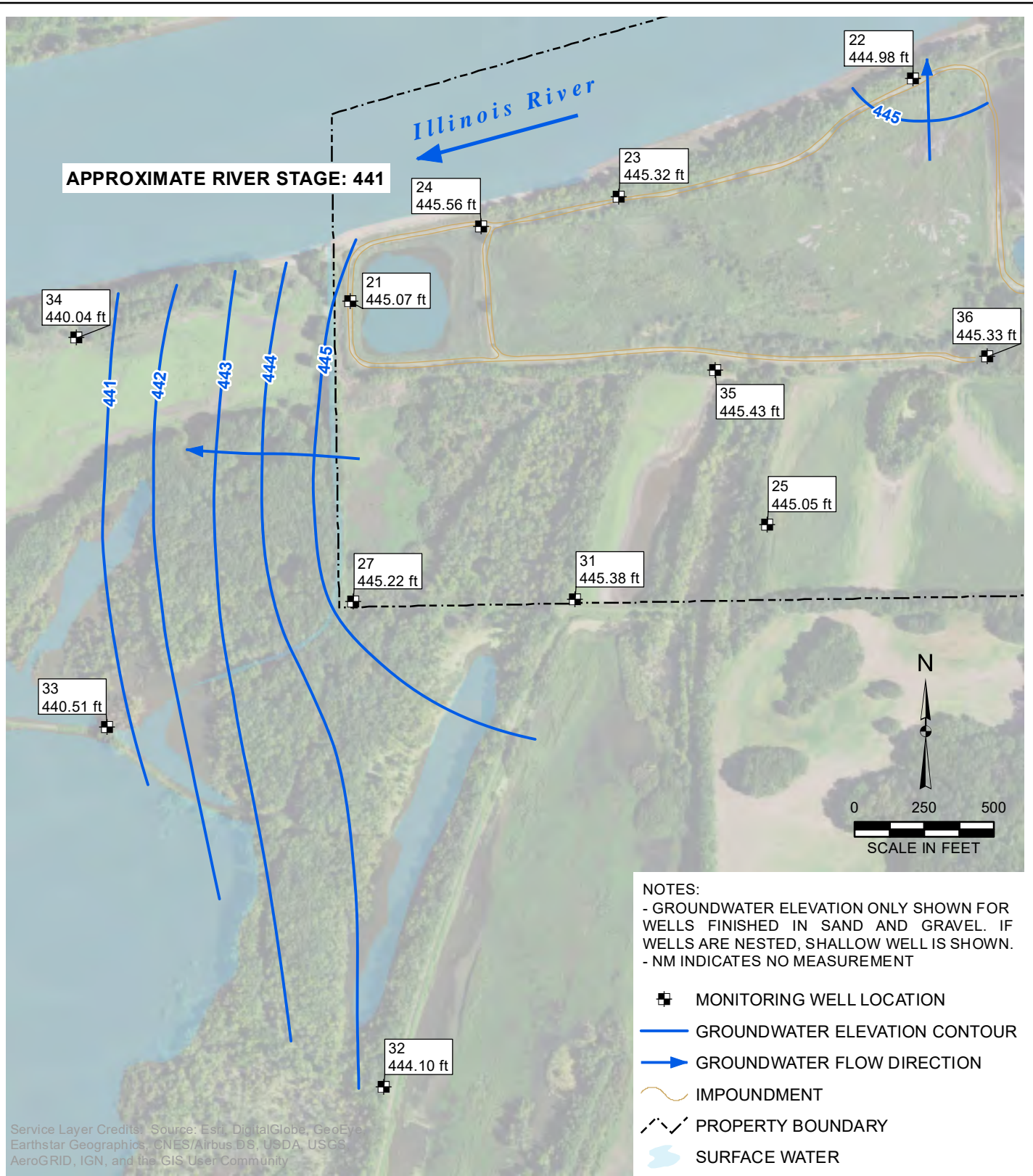
HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413

APPENDIX B

Natural Resource Technology
AN OBG COMPANY

Y:\Mapping\Projects\2413\MXD\Map_2_GWE_Contour_Map_Sept2013.mxd - Author: stolzsd; Date/Time: 4/20/2017, 11:42:42 AM



**WATER TABLE CONTOUR MAP
SEPTEMBER 3, 2013**

**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

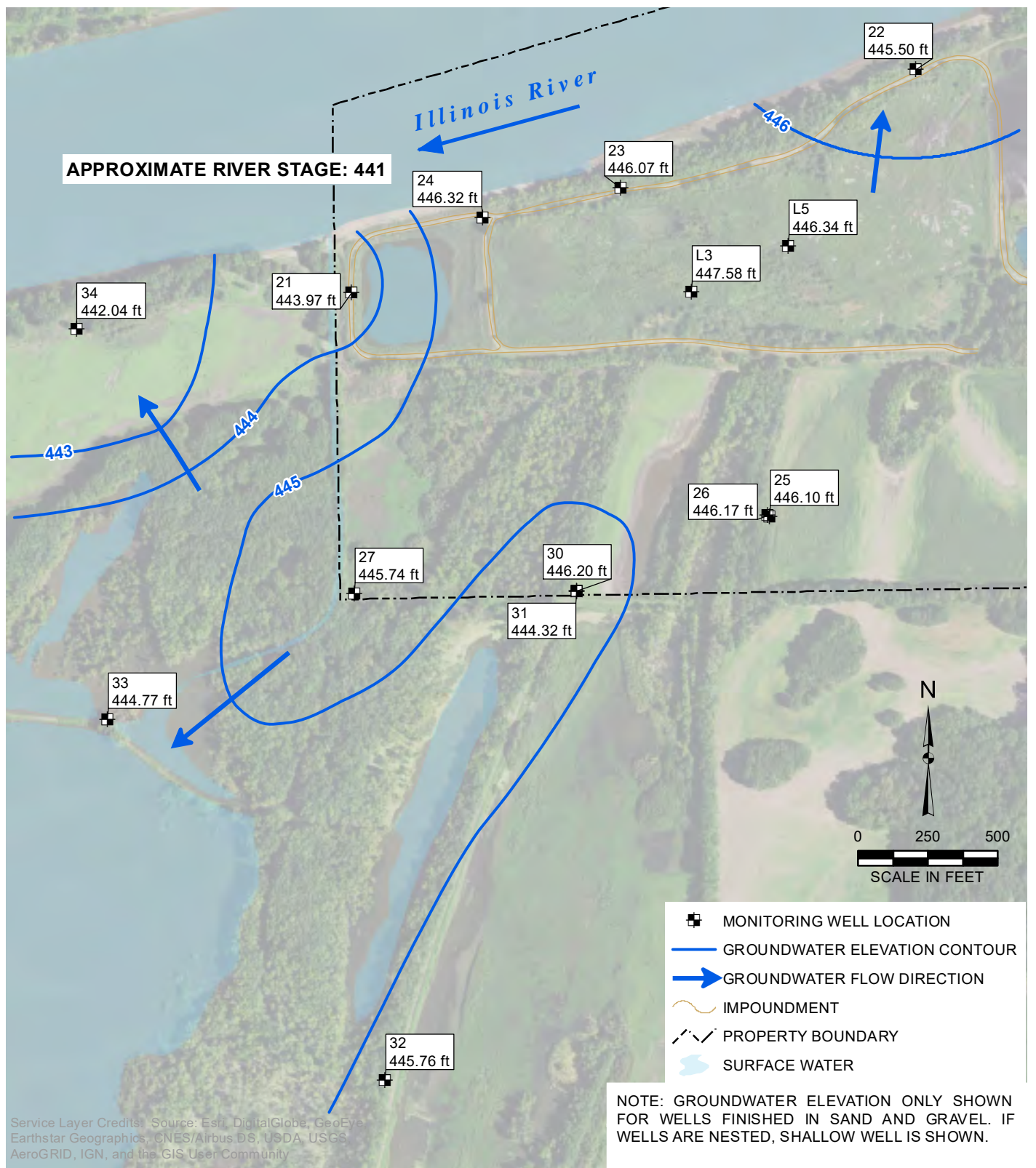
PROJECT NO: 2413

APPENDIX B



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/__/17

Y:\Mapping\Projects\2413\MXD\A\ppB_3_GWE_Contour_Map_Dec 2013.mxd Author: sblzsd Date/Time: 4/20/2017, 11:43:43 AM



**WATER TABLE CONTOUR MAP
DECEMBER 10, 2013**

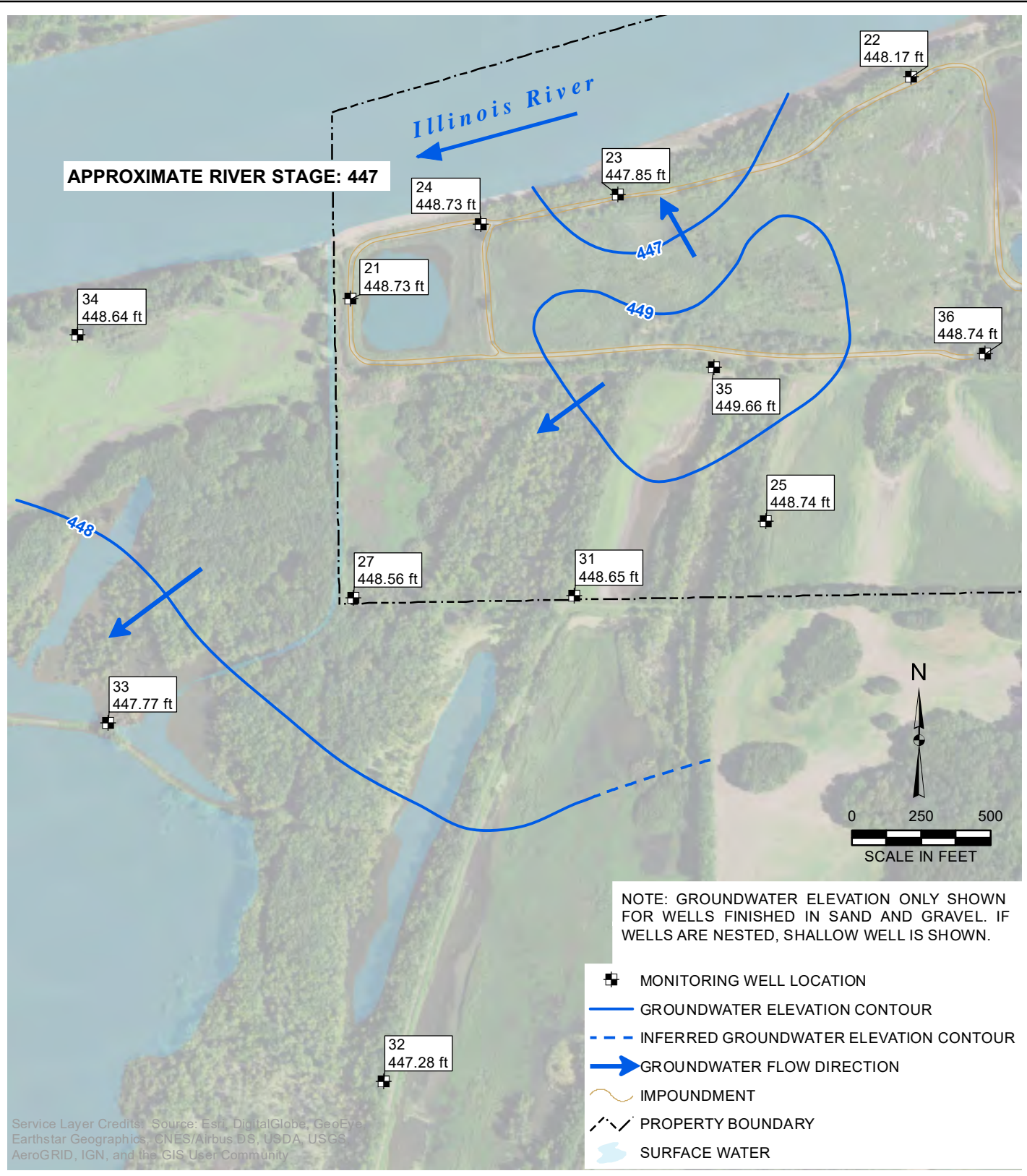
**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

**PROJECT NO: 2413
APPENDIX B**



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/__/17

Y:\Mapping\Projects\2412413\MXD\A\ppB_4_GWE_Contour_Map_March_2014.mxd Author: stolzsd Date/Time: 4/20/2017, 11:45:09 AM



**WATER TABLE CONTOUR MAP
MARCH 25, 2014**

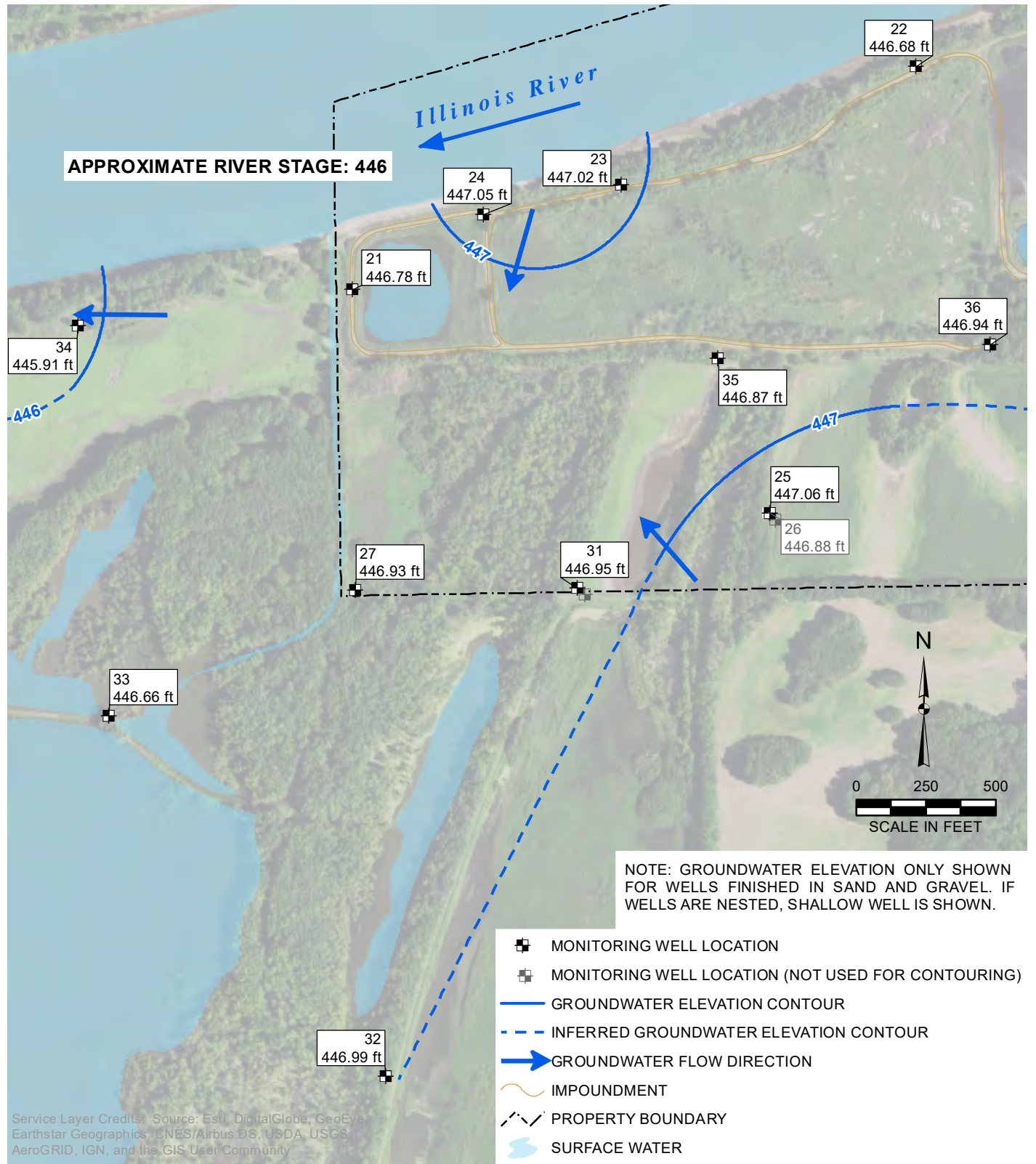
**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

**PROJECT NO: 2413
APPENDIX B**



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/17

Y:\Mapping\Projects\2413\MXD\A\ppB_5_GWE_Contour_Map_March_2015.mxd Author: stolzsd Date/Time: 4/20/2017, 11:48:25 AM



**WATER TABLE CONTOUR MAP
MARCH 18, 2015**

**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

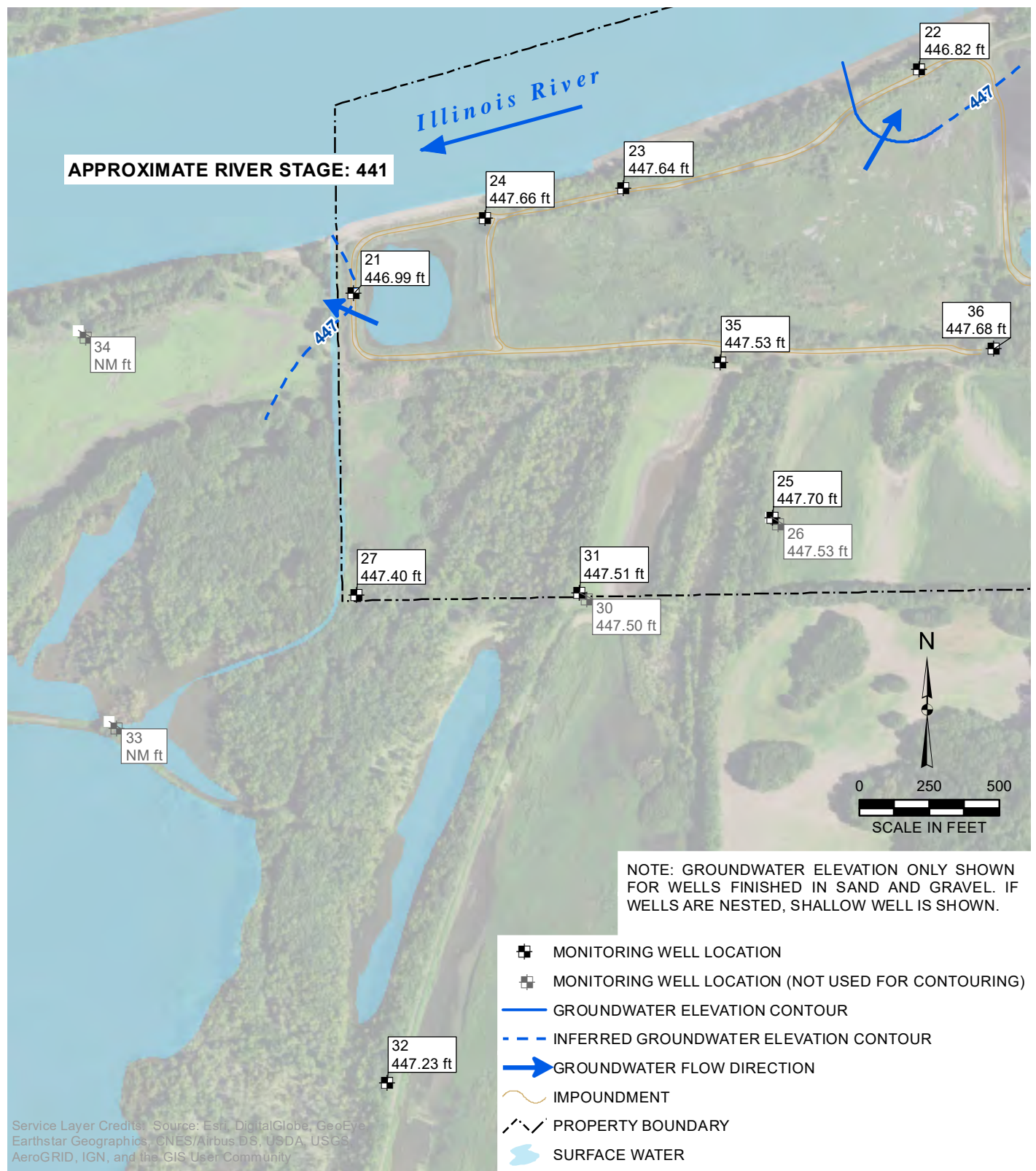
PROJECT NO: 2413

APPENDIX B



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/17

Y:\Mapping\Projects\24\2413\MXD\A\ppB_6_GWE_Contour_Map_Sept2015.mxd - Author: stolzsd; Date/Time: 4/20/2017, 11:49:37 AM



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/__/17

**WATER TABLE CONTOUR MAP
SEPTEMBER 16, 2015**

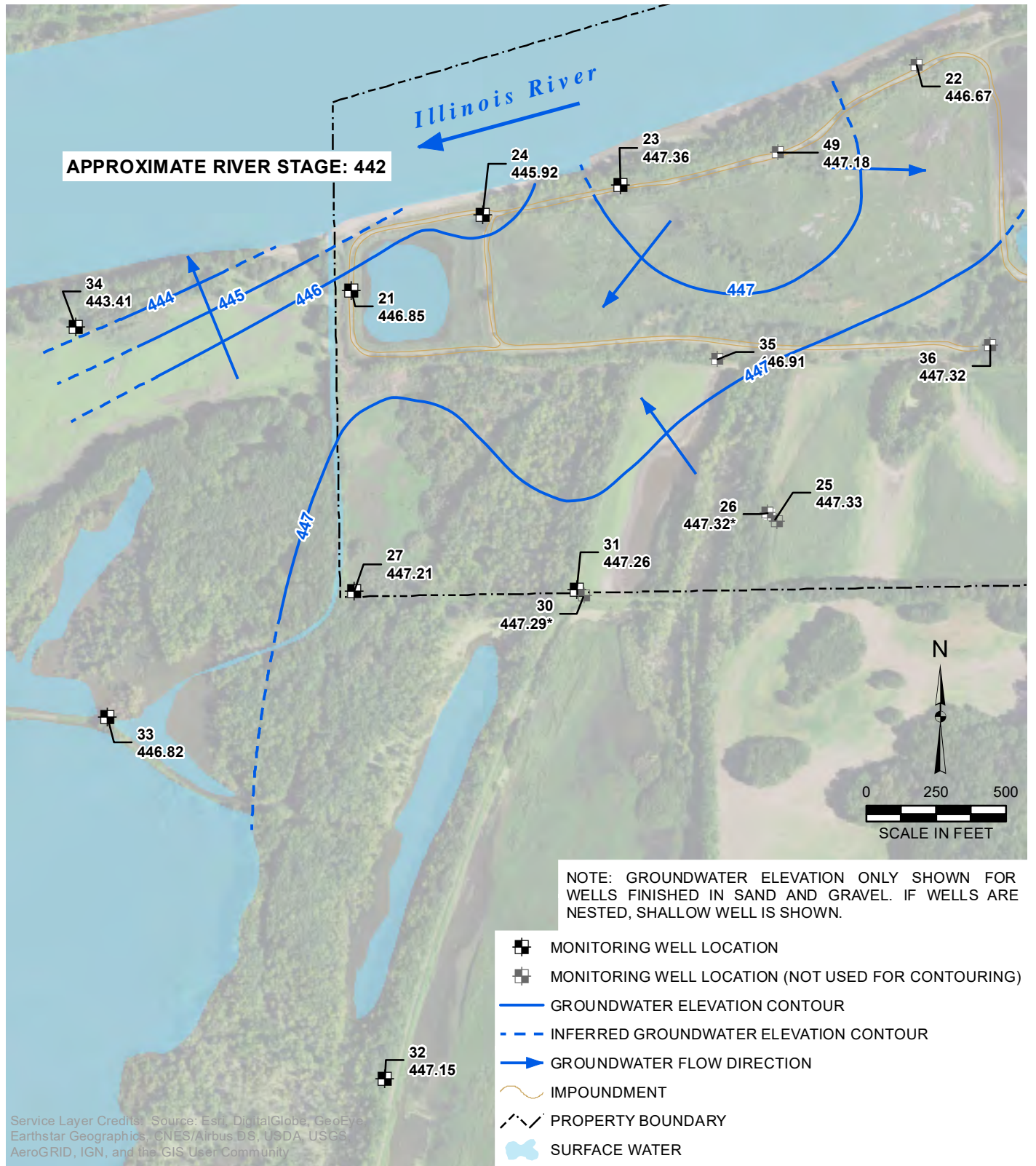
**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

PROJECT NO: 2413

APPENDIX B

Natural Resource Technology
AN OBG COMPANY

Y:\Mapping\Projects\2413\MXD\A\ppB_7_GWE_Contour_Map_March_2016.mxd Author: stolzsd Date/Time: 4/20/2017, 11:52:49 AM



**WATER TABLE CONTOUR MAP
MARCH 8, 2016**

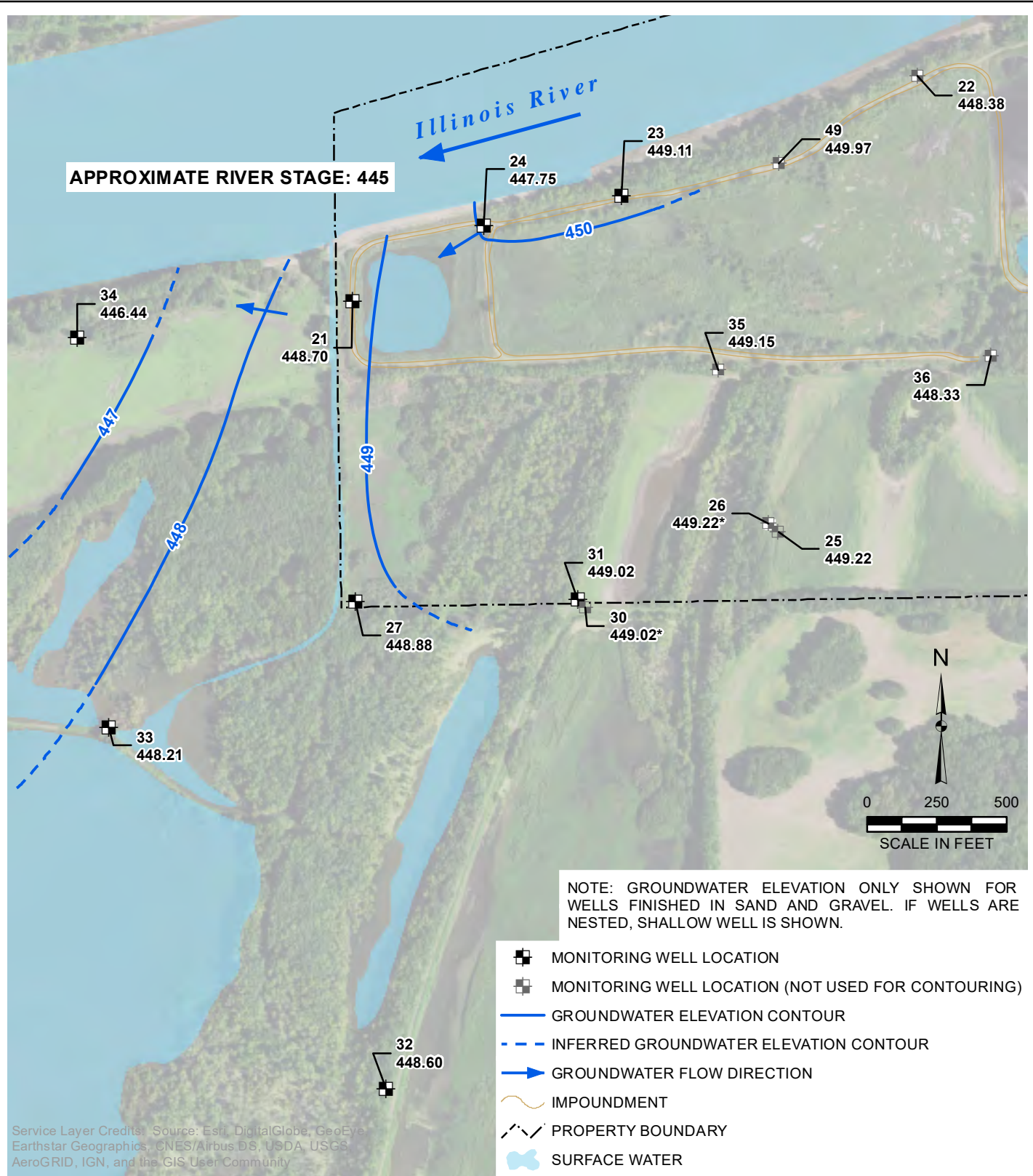
**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

**PROJECT NO: 2413
APPENDIX B**



DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/__/17

Y:\Mapping\Projects\2413\MXD\A\ppB_8_GWE_Contour_Map_Sept2016.mxd - Author: stolzsd; Date/Time: 4/20/2017, 11:56:38 AM




**WATER TABLE CONTOUR MAP
SEPTEMBER 18, 2016**

**HYDROGEOLOGIC SITE CHARACTERIZATION REPORT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

**PROJECT NO: 2413
APPENDIX B**



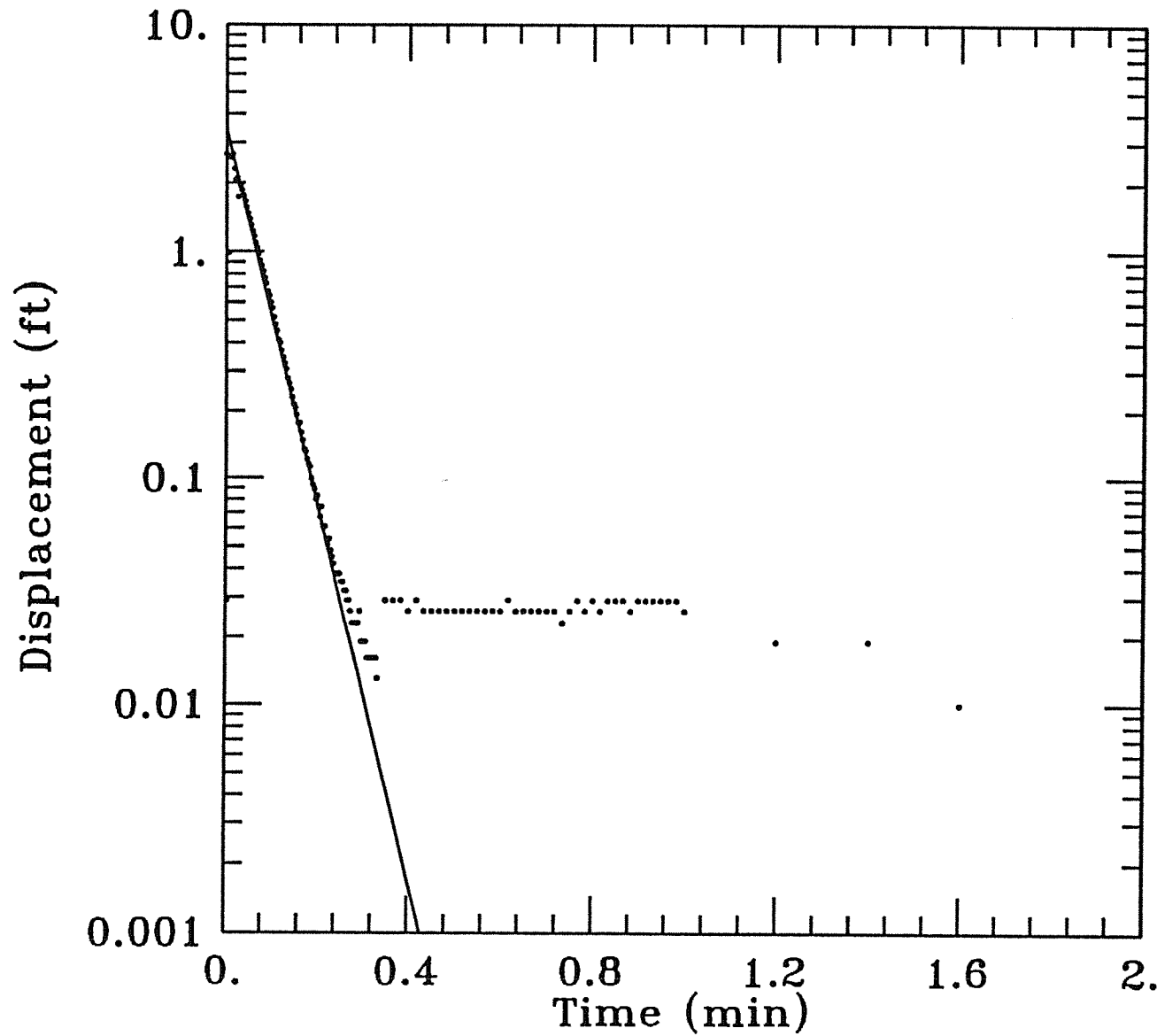
DRAWN BY/DATE:
SDS 4/19/17
REVIEWED BY/DATE:
RJK 4/19/17
APPROVED BY/DATE:
RJK __/__/17



Appendix C
Hydraulic Conductivity
Test Data



Appendix C1
STMI Field Hydraulic
Conductivity Tests



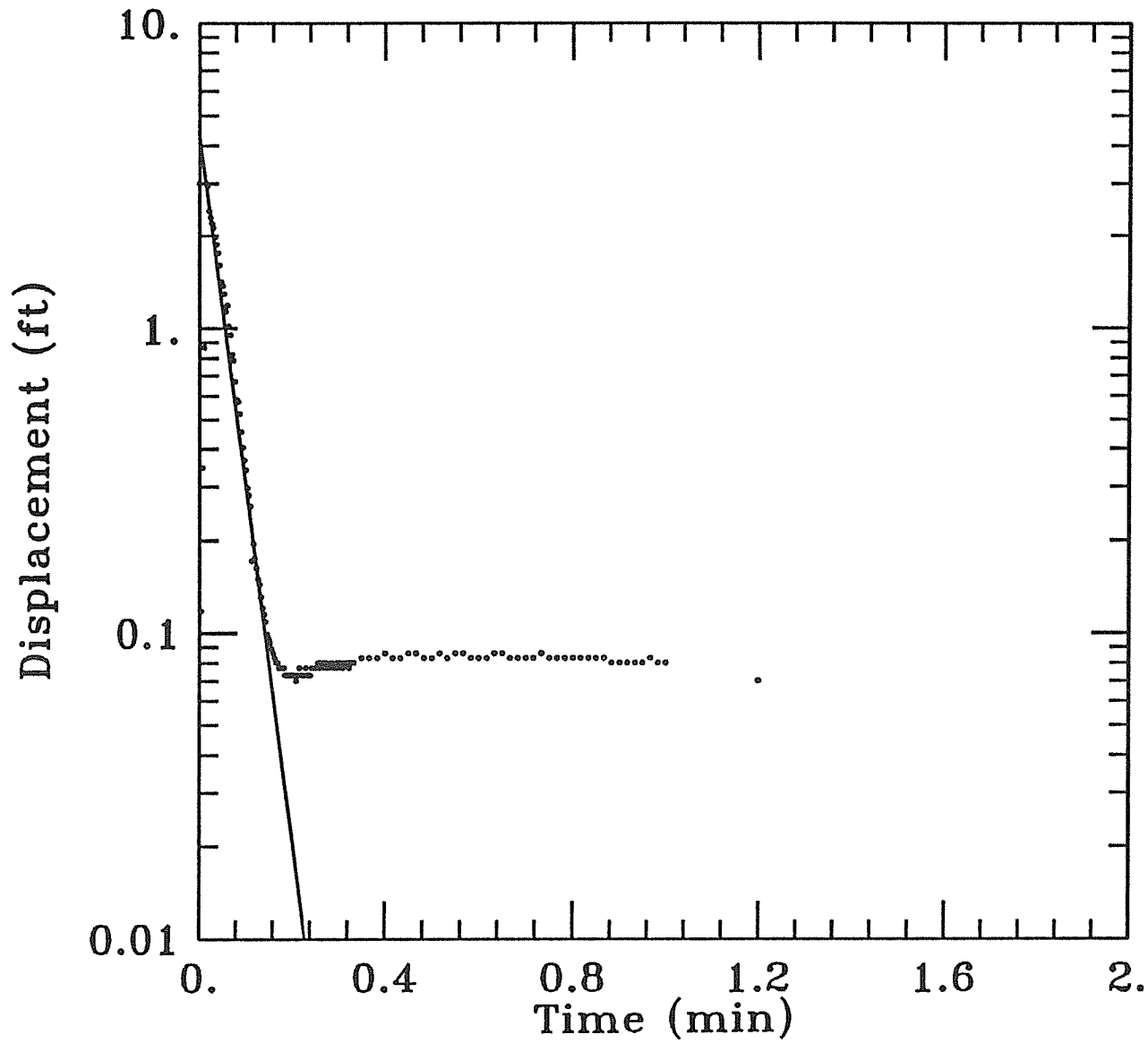
DATA SET:
 T1W22.DAT
 10/03/95

AQUIFER MODEL:
 Confined

SOLUTION METHOD:
 Bouwer-Rice

TEST DATA:
 $H_0 = 2.67$ ft
 $r_c = 0.083$ ft
 $r_w = 0.083$ ft
 $L = 10.$ ft
 $b = 40.$ ft
 $H = 20.$ ft

PARAMETER ESTIMATES:
 $K = 0.02354$ ft/min
 $y_0 = 3.361$ ft



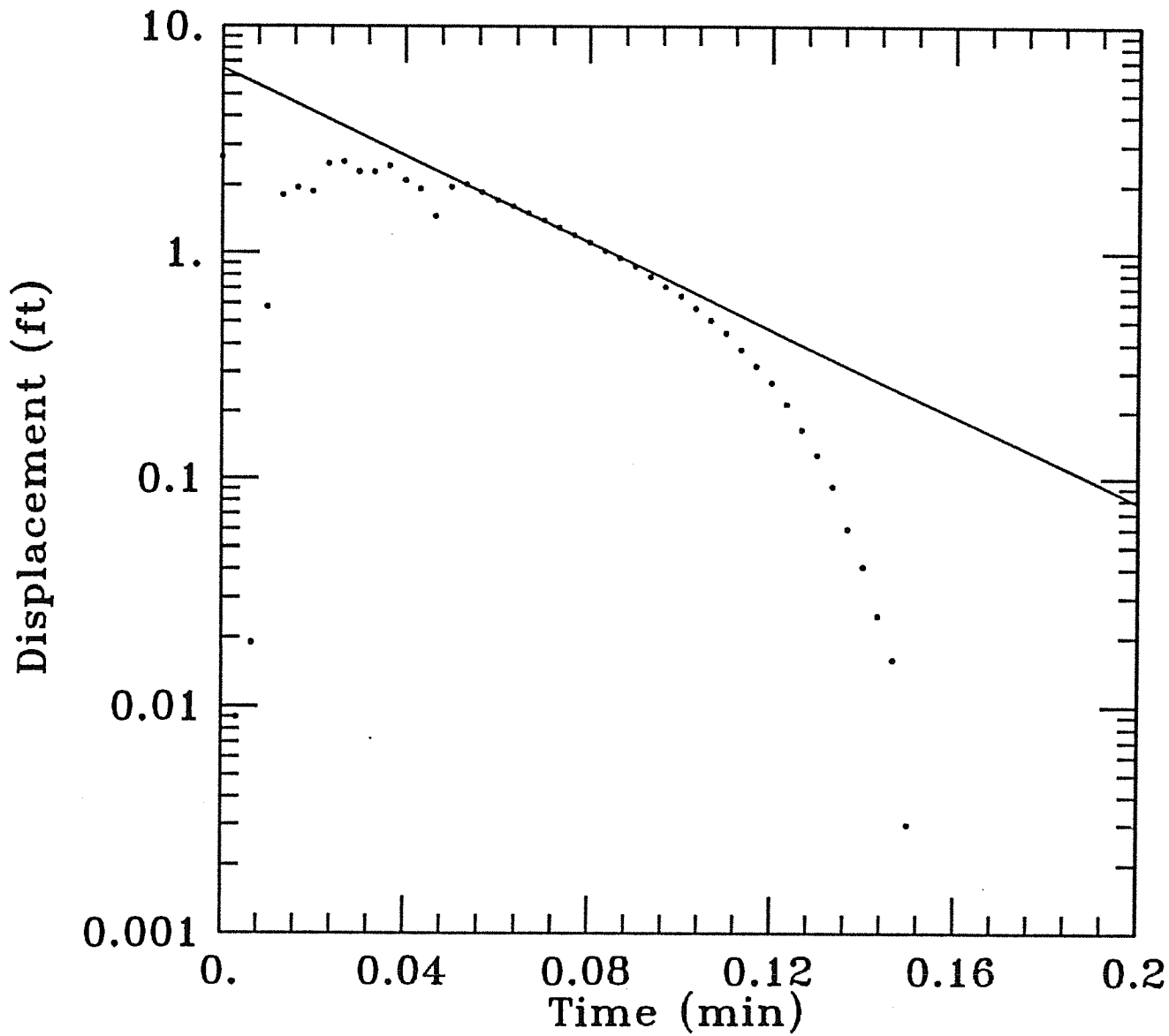
DATA SET:
TOW24.DAT
10/03/95

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 3.002 ft
rc = 0.083 ft
rw = 0.083 ft
L = 10. ft
b = 50. ft
H = 48. ft

PARAMETER ESTIMATES:
K = 0.03878 ft/min
y0 = 4.176 ft

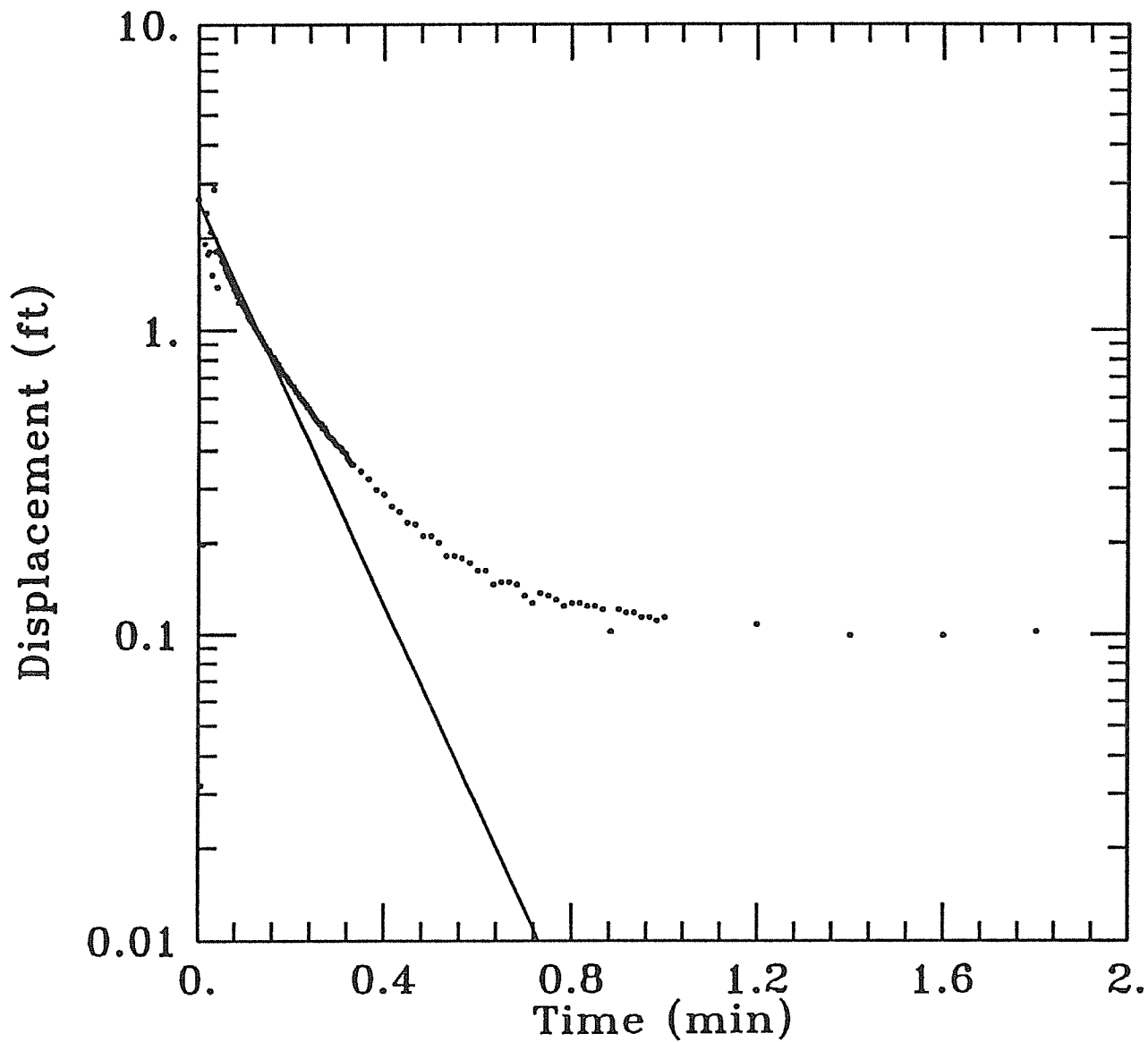


DATA SET:
T3W26.DAT
10/04/95

AQUIFER MODEL:
Unconfined
SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 2.67 ft
rc = 0.083 ft
rw = 0.083 ft
L = 10. ft
b = 40. ft
H = 8. ft

PARAMETER ESTIMATES:
K = 0.02375 ft/min
y0 = 6.515 ft



DATA SET:
TOW27.DAT
10/03/95

AQUIFER MODEL:
Confined

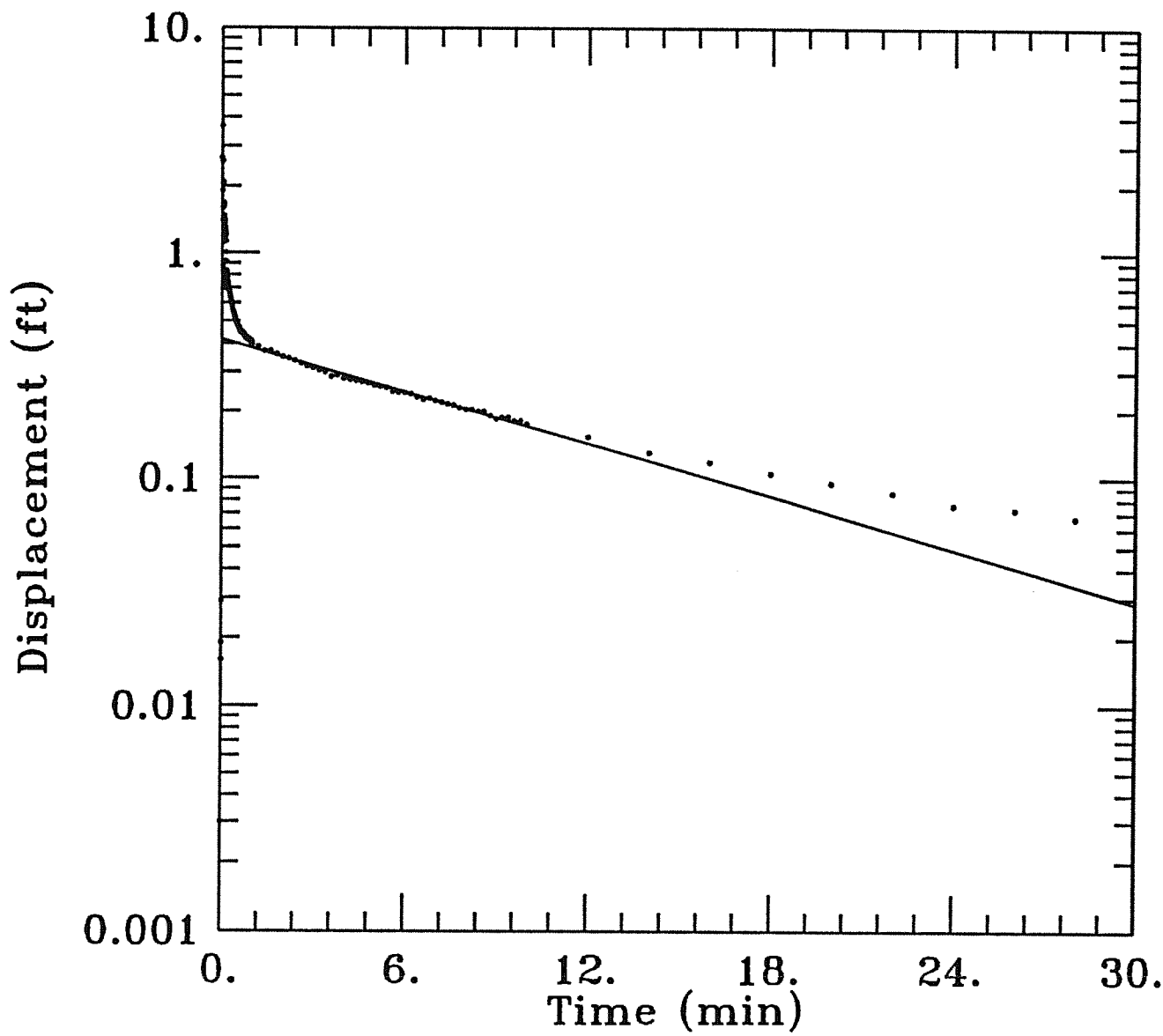
SOLUTION METHOD:
Bouwer-Rice

TEST DATA:

H0 = 2.67 ft
rc = 0.083 ft
rw = 0.25 ft
L = 5. ft
b = 40. ft
H = 33. ft

PARAMETER ESTIMATES:

K = 0.01349 ft/min
y0 = 2.606 ft

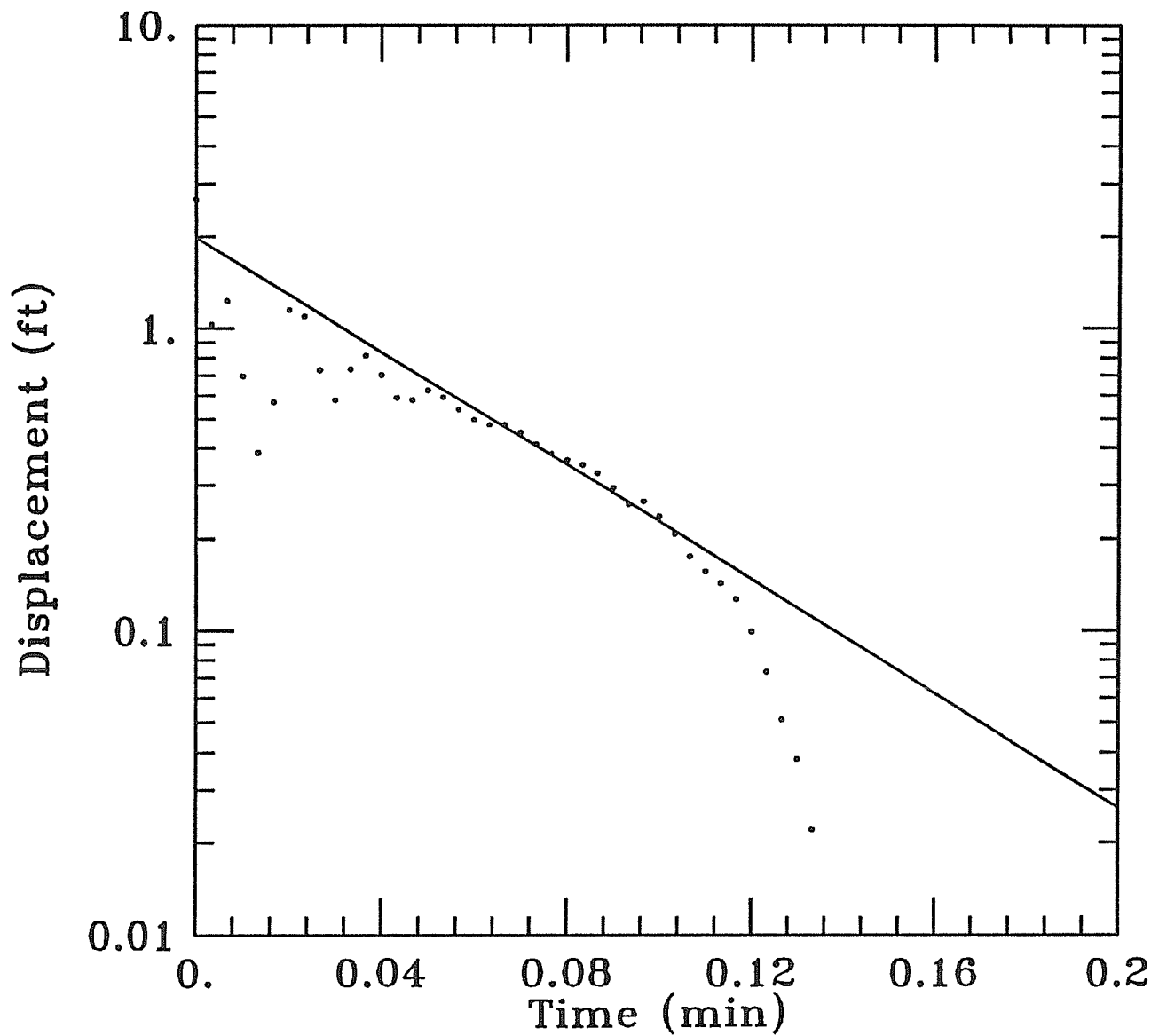


DATA SET:
 T6W29.DAT L4
 10/09/95

AQUIFER MODEL:
 Confined
 SOLUTION METHOD:
 Bouwer-Rice

TEST DATA:
 H0 = 2.67 ft
 rc = 0.083 ft
 rw = 0.25 ft
 L = 10. ft
 b = 40. ft
 H = 10. ft

PARAMETER ESTIMATES:
 K = 0.0002509 ft/min
 y0 = 0.4182 ft

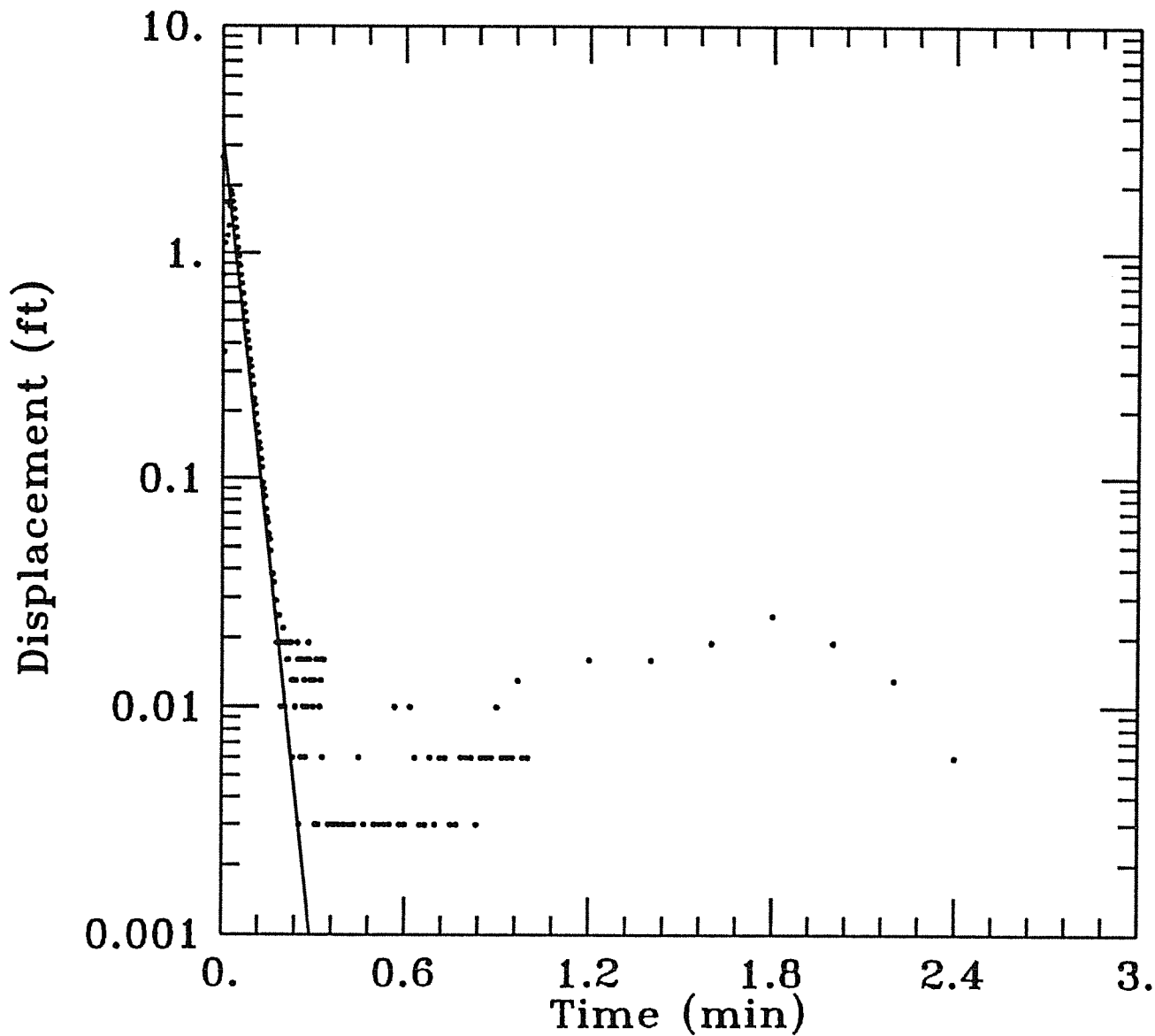


DATA SET:
 T5W29.DAT L4
 10/04/95

AQUIFER MODEL:
 Confined
 SOLUTION METHOD:
 Bouwer-Rice

TEST DATA:
 H0 = 2.67 ft
 rc = 0.083 ft
 rw = 0.083 ft
 L = 10. ft
 b = 40. ft
 H = 10. ft

PARAMETER ESTIMATES:
 K = 0.02409 ft/min
 y0 = 1.983 ft



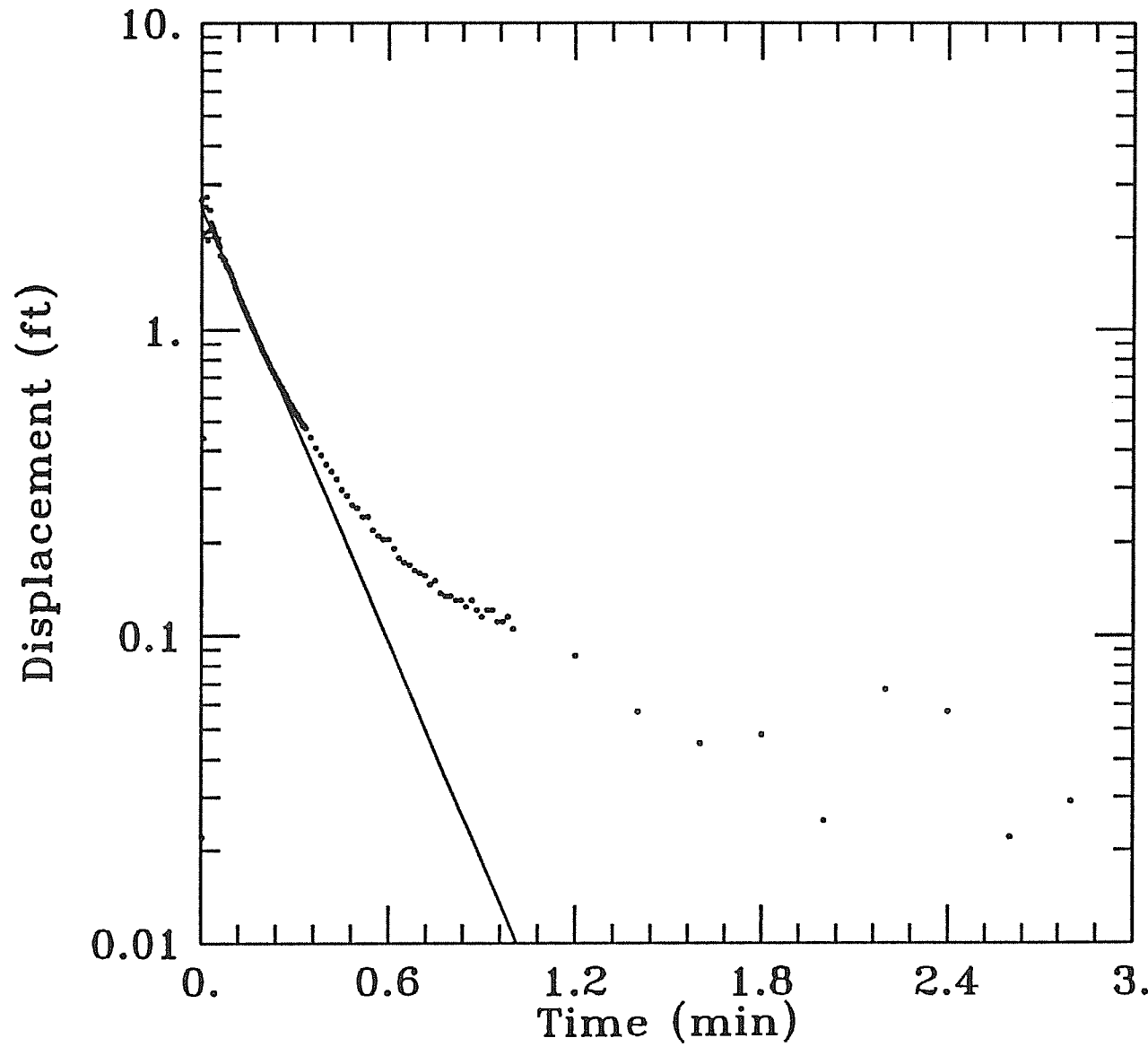
DATA SET:
 T1W30.DAT
 10/03/95

AQUIFER MODEL:
 Unconfined

SOLUTION METHOD:
 Bower-Rice

TEST DATA:
 $H_0 = 2.67$ ft
 $r_c = 0.083$ ft
 $r_w = 0.083$ ft
 $L = 5.$ ft
 $b = 40.$ ft
 $H = 26.$ ft

PARAMETER ESTIMATES:
 $K = 0.06532$ ft/min
 $y_0 = 3.22$ ft




DATA SET:
T2W31.DAT
10/04/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0 = 2.67 ft
rc = 0.083 ft
rw = 0.083 ft
L = 10. ft
b = 40. ft
H = 18. ft

PARAMETER ESTIMATES:
K = 0.006646 ft/min
y0 = 2.49 ft

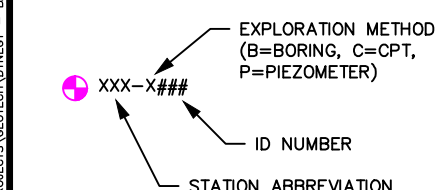


Appendix C2
AECOM Laboratory
Hydraulic Conductivity
Tests

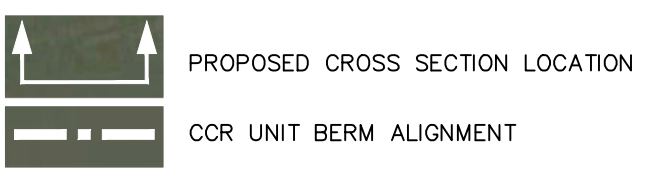
File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15, 15 @ 11:19 a.m. by: david_dequire



HENNEPIN OLD WEST ASH POND
 (POND NO. 1 AND POND NO. 3)



- LEGEND**
- PROPOSED BORING LOCATION
 - ▲ PROPOSED CPT LOCATION
 - PROPOSED PIEZOMETER LOCATION



DRAFT

0 200

APPROXIMATE SCALE FEET

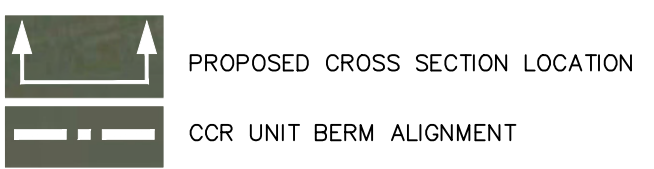
DYNEGY, INC	PROJECT NO. 60428794
AECOM	
DRN. BY:djd July 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Old West Ash Pond (Pond No. 1 and Pond No. 3) Field Investigation Plan
FIG. NO. D-03	

File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15, 15 @ 11:19 a.m. by: david_dequire



XXX-X###
 EXPLORATION METHOD
 (B=BORING, C=CPT,
 P=PIEZOMETER)
 ID NUMBER
 STATION ABBREVIATION

- LEGEND**
- PROPOSED BORING LOCATION
 - ▲ PROPOSED CPT LOCATION
 - PROPOSED PIEZOMETER LOCATION



DRAFT

0 200

APPROXIMATE SCALE FEET


DYNEGY, INC	PROJECT NO. 60428794
AECOM	
DRN. BY: djd July 2015 DSGN. BY: eg CHKD. BY: eg	Hennepin Old West Polishing Pond Field Investigation Plan
FIG. NO. D-04	

TERRACON PROJECT NO.: **MR155233**
PROJECT NAME: **DYNERGY - HENNEPIN SITE**
CLIENT: **AECOM**
LOCATION : **HENNEPIN, IL**

12/21/2015

SUMMARY OF TEST RESULTS

BORING NO. HEN-B010
SAMPLE NO. S-5
DEPTH: 10.0'-11.5'
CLASSIFICATION VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL

	<u>INITIAL</u>	<u>FINAL</u>	<u>SAMPLE PHOTO</u>
DRY UNIT WEIGHT (pcf)	86.6	93.3	
WATER CONTENT (%)	26.5	23.2	
DIAMETER (cm)	7.215	6.956	
LENGTH (cm)	4.527	4.521	
HYDRAULIC GRADIENT (MAXIMUM)	20.83		
PERCENT SATURATION	99.5		(Percent saturation calculation is based on final measurements and an estimated specific gravity.)
HYDRAULIC CONDUCTIVITY k (cm/sec)	1.16E-05		


Deaired water was used as the liquid permeant.

TERRACON PROJECT NO.: **MR155233**
PROJECT NAME: **DYNERGY - HENNEPIN SITE**
CLIENT: **AECOM**
LOCATION : **HENNEPIN, IL**

12/21/2015

SUMMARY OF TEST RESULTS

BORING NO. HEN-B017
SAMPLE NO. S-3
DEPTH: 5.0'-7.0'
CLASSIFICATION VERY DARK GRAY LEAN CLAY WITH SAND

	<u>INITIAL</u>	<u>FINAL</u>	<u>SAMPLE PHOTO</u>
DRY UNIT WEIGHT (pcf)	76.0	82.8	
WATER CONTENT (%)	36.7	38.2	
DIAMETER (cm)	6.929	6.692	
LENGTH (cm)	7.541	7.425	
HYDRAULIC GRADIENT (MAXIMUM)	26.49		
PERCENT SATURATION	99.3		(Percent saturation calculation is based on final measurements and an estimated specific gravity.)
HYDRAULIC CONDUCTIVITY k (cm/sec)	6.79E-07		


Deaired water was used as the liquid permeant.

TERRACON PROJECT NO.: **MR155233**
PROJECT NAME: **DYNERGY - HENNEPIN SITE**
CLIENT: **AECOM**
LOCATION : **HENNEPIN, IL**


12/21/2015

SUMMARY OF TEST RESULTS

BORING NO. HEN-B023
SAMPLE NO. S-9
DEPTH: 27.0'-29.0'
CLASSIFICATION VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL

	<u>INITIAL</u>	<u>FINAL</u>	<u>SAMPLE PHOTO</u>
DRY UNIT WEIGHT (pcf)	81.8	83.2	
WATER CONTENT (%)	28.3	31.5	
DIAMETER (cm)	7.154	7.063	
LENGTH (cm)	5.432	5.479	
HYDRAULIC GRADIENT (MAXIMUM)	17.36		
PERCENT SATURATION	100.4		(Percent saturation calculation is based on final measurements and an estimated specific gravity.)
HYDRAULIC CONDUCTIVITY k (cm/sec)	1.00E-05		

Deaired water was used as the liquid permeant.



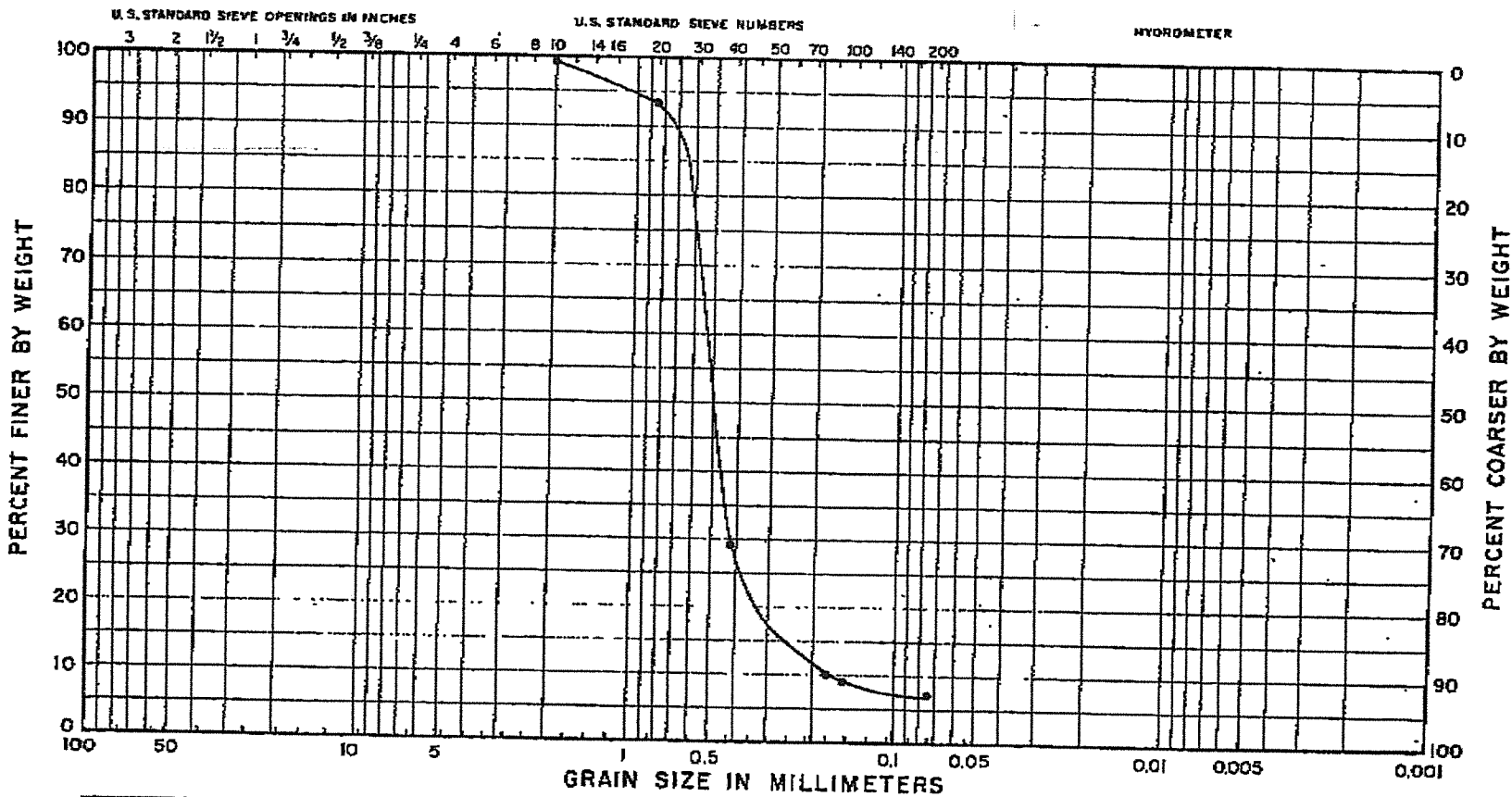
Appendix D

Geotechnical Test Data



Appendix D1
MATHES Grain Size
Analysis

GRAIN SIZE CURVES

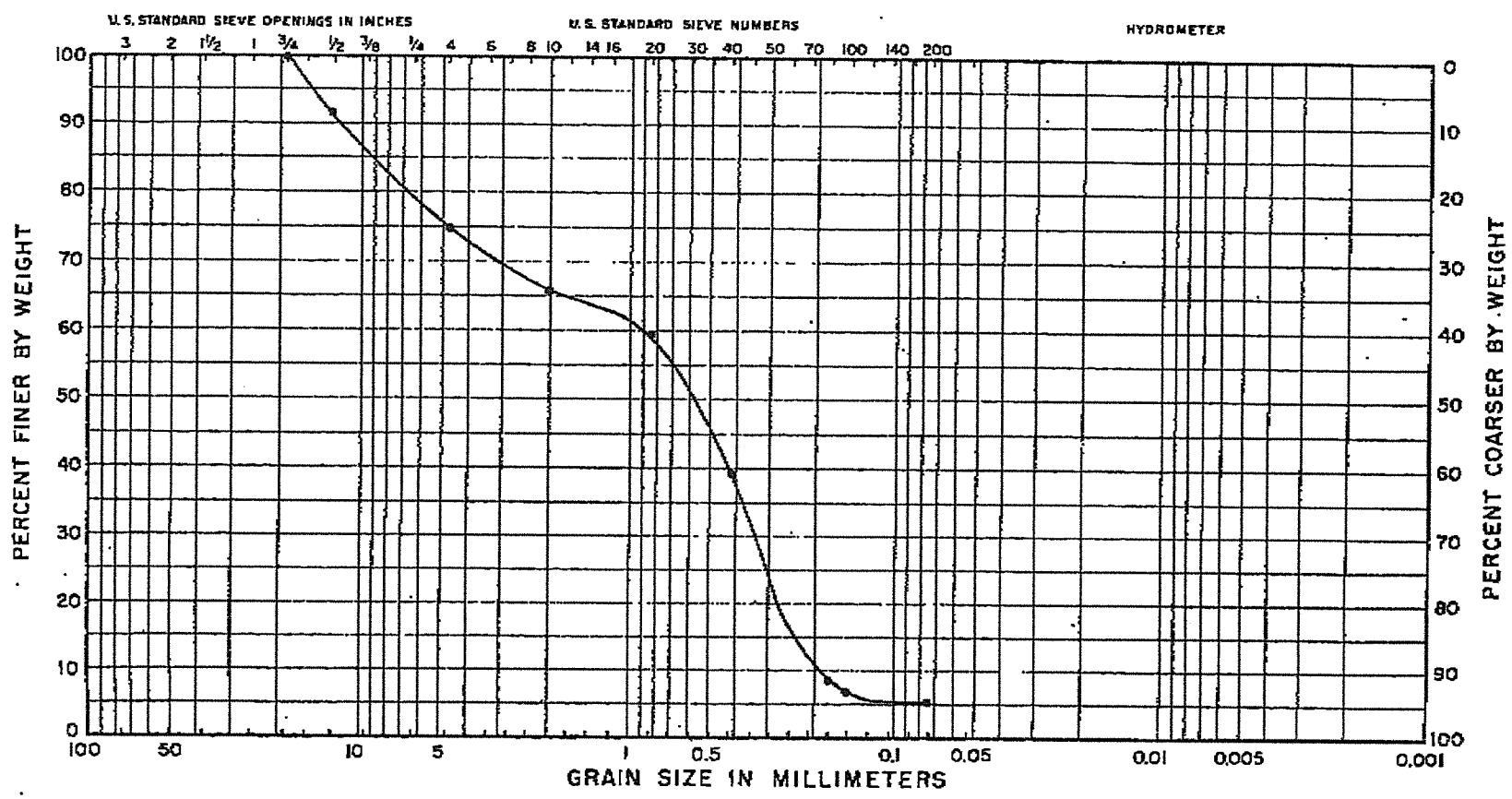


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

Boring	Sample	Depth	D_{10}	Description
W1	11	54.0-55.5'	.2	Gray Fine-Medium SAND w/Shell's Trace Silt, SP-SM

MAR-2-95 THU 15:10 IP ENVIRONMENTAL AFFAIRS FAX NO. 2173627849 P. 05

GRAIN SIZE CURVES



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

<u>Boring</u>	<u>Sample</u>	<u>Depth</u>	<u>D₁₀</u>	<u>Description</u>
W4	13	59.0-60.5'	.19	Dark Gray Gravelly Fine-Medium SAND Trace Silt, SP-SM



Appendix D2
AECOM Geotechnical Test
Results

January 12, 2016

Mr. Matt Ballance, PE
Senior Project Engineer
Dynergy Inc.
1500 Eastport Plaza Drive
Collinsville, Illinois 62234

**RE: 30% Design Data Report for Dynergy Hennepin Power Station; West Polishing Pond,
West Ash Pond, East Ash Pond and Ash Pond No. 2 CCR Units**

Dear Mr. Ballance:

AECOM is pleased to provide this 30% Design Data Package for the West Polishing Pond, West Ash Pond, East Ash Pond and Ash Pond No. 2 Coal Combustion Residuals (CCR) units at Hennepin Power Station (Hennepin, IL). The Data Package includes summary tables, field exploration plan, and laboratory data.

At Hennepin, the geotechnical exploratory program included the following:

- 32 auger borings
- 38 CPT soundings
- 7 standpipe piezometers installed at selected boring locations.

AECOM looks forward to providing continued support to Dynergy and working together on this important program. Please do not hesitate to call the undersigned, if you have any questions or comments on this 30% Design Data Package.

Sincerely,

AECOM



Jeremy M. Thomas, P.E.
Project Manager
jeremy.thomas@aecom.com



Victor Modeer, PE, D.GE
Program Manager
victor.modeer@aecom.com

Attachments:

Tables

Table 1-1 Exploration Location Table

Table 1-2 Water Level Measurements – Piezometers

Figures

D-01 Ash Pond No. 2 and East Ash Pond

D-02 Ash Pond No. 2

D-03 West Ash Pond

D-04 West Polishing Pond

Appendices

Appendix A Boring Logs

Appendix B Piezometer Installation Logs

Appendix C CPT Sounding Logs

Appendix D Laboratory Test Results

TABLES

Hennepin Power Station

Table 1-1 Exploration Location Table

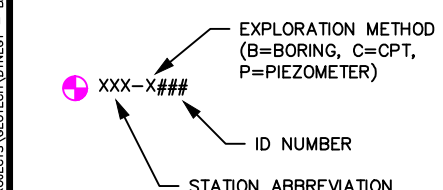
Location ID	Depth	Longitude	Latitude	Elevation
HEN-B001	56.5	-89.327282	41.299899	452
HEN-B002	60.5	-89.327143	41.299917	460
HEN-B003	57.5	-89.327097	41.299922	456
HEN-B004	46.5	-89.324817	41.300893	460
HEN-B005	28.5	-89.324801	41.301437	444
HEN-B006	41.5	-89.321438	41.302013	456
HEN-B007	21.5	-89.321403	41.302391	444
HEN-B008	21.5	-89.320751	41.3009	464
HEN-B009	51.5	-89.320468	41.300909	463
HEN-B010	41.5	-89.322512	41.299269	464
HEN-B011	21.5	-89.322576	41.299188	456
HEN-B012	46.5	-89.325988	41.299317	465
HEN-B014	61.5	-89.327894	41.299266	458
HEN-B015	46.5	-89.327898	41.299214	449
HEN-B016	76.5	-89.328924	41.299861	450
HEN-B017	66.5	-89.329005	41.299873	448
HEN-B018	71.5	-89.328149	41.300492	458
HEN-B019	55.5	-89.328089	41.300723	444
HEN-B020	41.5	-89.307558	41.302859	495
HEN-B021	45.1	-89.309977	41.302545	495
HEN-B022	21.5	-89.310208	41.302239	478
HEN-B023	76.5	-89.309977	41.303581	495
HEN-B024	62.7	-89.307606	41.304701	493
HEN-B025	56.5	-89.305546	41.304133	503
HEN-B026	26.5	-89.310696	41.304504	444
HEN-B027	31.5	-89.307864	41.305141	444
HEN-B029	41.5	-89.306181	41.302195	500
HEN-B030	11.0	-89.304073	41.303807	495
HEN-B032	41.5	-89.302368	41.303242	493
HEN-B034	41.5	-89.303172	41.301634	500
HEN-B037	41.5	-89.301091	41.304257	494
HEN-B038	21.5	-89.300939	41.304427	480
HEN-C002	55.6	-89.327143	41.299917	461
HEN-C004	41.3	-89.324817	41.300893	465
HEN-C005	62.7	-89.321438	41.302013	457
HEN-C006	26.7	-89.320751	41.3009	464
HEN-C007	88.9	-89.320468	41.300909	462
HEN-C008	85.8	-89.322512	41.299269	463
HEN-C009	23.5	-89.322576	41.299188	454
HEN-C010	42.2	-89.325988	41.299317	465
HEN-C012	34.0	-89.324899	41.300184	461
HEN-C013	6.2	-89.323204	41.300285	463
HEN-C014	24.3	-89.321772	41.300519	463
HEN-C015	52.3	-89.327894	41.299266	458
HEN-C017	66.4	-89.328924	41.299861	450
HEN-C019	62.8	-89.328149	41.300492	458
HEN-C020	18.4	-89.307558	41.302859	494
HEN-C021	32.5	-89.309977	41.302545	495
HEN-C022	13.9	-89.310208	41.302239	478
HEN-C023	16.6	-89.309977	41.303581	495
HEN-C024	13.6	-89.307606	41.304701	493
HEN-C025	47.2	-89.305546	41.304133	503
HEN-C026	30.0	-89.30957	41.303106	495
HEN-C027	30.0	-89.307199	41.303864	495
HEN-C029	21.2	-89.306181	41.302195	500
HEN-C030	11.2	-89.304073	41.303807	495
HEN-C032	12.3	-89.302368	41.303242	493
HEN-C034	29.5	-89.303172	41.301634	500
HEN-C038	9.2	-89.301091	41.304257	494
HEN-C039	4.4	-89.300939	41.304427	480

Table 1-2 Water Level Measurements - Piezometers

Piezometer	Ground Surface Elevation (ft)	Screen Depth Interval (ft)		Water Surface Elevation (ft)		
		Top	Bottom	10/27/2015	11/24/2015	12/17/2015
HEN-P001	457.9	8.0	18.0	446.6	447.8	449.7
HEN-P002	463.6	15.3	25.3		451.0	452.5
HEN-P003	464.0	38.7	43.4		447.4	447.9
HEN-P004	495.0	55.4	60.4	448.3	448.8	449.5
HEN-P005	494.0	50.5	55.5		448.6	449.3
HEN-P006	495.3	38.3	43.3	452.0	452.0	452.1
HEN-P007	494.0	42.1	47.1	450.4	449.1	449.4

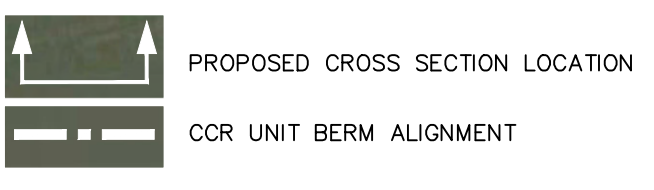
FIGURES

File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 2).DWG Last edited: JUL 15, 15 @ 11:19 a.m. by: david_dequire



LEGEND

- ⊕ PROPOSED BORING LOCATION
- ▲ PROPOSED CPT LOCATION
- PROPOSED PIEZOMETER LOCATION



DRAFT

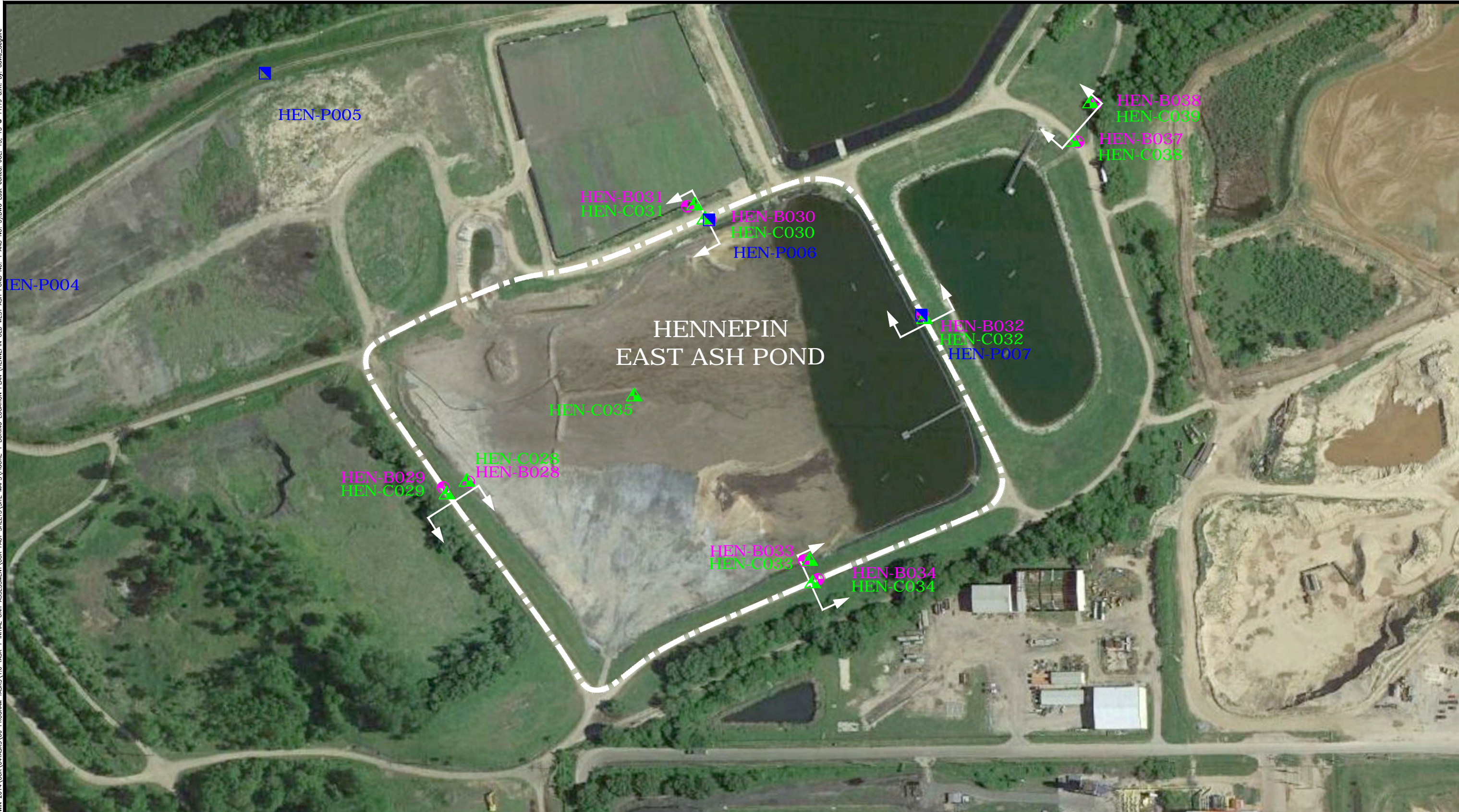
0 200

APPROXIMATE SCALE FEET

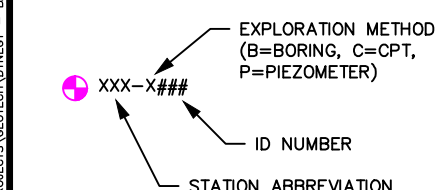
SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

DYNEGY, INC	PROJECT NO. 60428794
AECOM	
DRN. BY:djd July 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Ash Pond No. 2 Field Investigation Plan
FIG. NO. D-01	

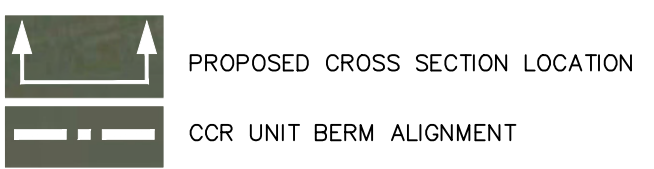
File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15 11:19 a.m. by: david_dequire



HENNEPIN
EAST ASH POND



- LEGEND**
- PROPOSED BORING LOCATION
 - ▲ PROPOSED CPT LOCATION
 - PROPOSED PIEZOMETER LOCATION



DRAFT

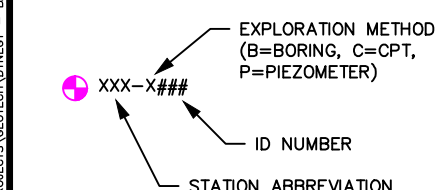
0 200
APPROXIMATE SCALE FEET

DYNEGY, INC		PROJECT NO. 60428794
AECOM		
DRN. BY: djd July 2015 DSGN. BY: eg CHKD. BY: eg	Hennepin East Ash Pond Field Investigation Plan	FIG. NO. D-02

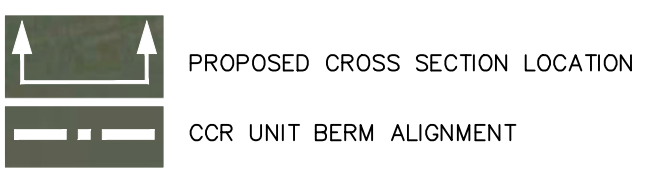
File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15 11:19 a.m. by: david_dequire



HENNEPIN OLD WEST ASH POND
 (POND NO. 1 AND POND NO. 3)



- LEGEND**
- ⊕ PROPOSED BORING LOCATION
 - ▲ PROPOSED CPT LOCATION
 - PROPOSED PIEZOMETER LOCATION



DRAFT

0 200

APPROXIMATE SCALE FEET

SOURCE:
MAP PROVIDED BY GOOGLE EARTH PRO 2015

DYNEGY, INC	PROJECT NO. 60428794	AECOM
DRN. BY: djd July 2015 DSGN. BY: eg CHKD. BY: eg	Hennepin Old West Ash Pond (Pond No. 1 and Pond No. 3) Field Investigation Plan	FIG. NO. D-03

File: P:\PROJECTS\GEO\DYNEGY - BALDWIN 2014\CCR\04TASKS\00 PROGRAM TASKS\1.0 TASK 1 INITIAL UNIT ASSESSMENT\CCR FACT SHEETS\SITE MAPS\FIGURE 1 BORING LOCATION PLAN (HENNEPIN OLD WEST ASH POND NO. 1 AND NO. 3).DWG Last edited: JUL 15 11:19 a.m. by: david_dequire



XXX-X###
 EXPLORATION METHOD
 (B=BORING, C=CPT,
 P=PIEZOMETER)
 ID NUMBER
 STATION ABBREVIATION

LEGEND
 PROPOSED BORING LOCATION
 PROPOSED CPT LOCATION
 PROPOSED PIEZOMETER LOCATION

PROPOSED CROSS SECTION LOCATION
 CCR UNIT BERM ALIGNMENT

DRAFT
 0 200
 APPROXIMATE SCALE FEET

DYNEGY, INC	PROJECT NO. 60428794
AECOM	
DRN. BY:djd July 2015 DSGN. BY:eg CHKD. BY:eg	Hennepin Old West Polishing Pond Field Investigation Plan
FIG. NO. D-04	

APPENDIX A

Project: Hennepin Power Station	Log of Boring HEN-B001
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/08/2015 to 10/08/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 56.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0	SS-1	7 6 6	67		Medium dense, dry, brown, clayey GRAVEL (GC) [Fill].	0.0									
2.5	SS-2	4 4 4	100		Loose, dry, brown, clayey SAND (SC) [Fill].	2.5									
5	SS-3	3 4 5			Soft, moist, brown, sandy lean CLAY (CL).	5.0									
7.5	ST-4		100												Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	WOH 3 3	89												10.0 feet of casing set
15	SS-6	WOH	44		Very soft, moist to wet, gray, SILT (ML).	15.0									
20	ST-7		90												Pushed shelly tube from 20.0 to 22.0 feet
25	SS-8	WOH	89		Very soft, moist to wet, dark gray mottled with brown, clayey SILT (ML-CL), trace white shells.	25.0									
30															

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:19 AM



Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B001

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:19 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH 3 4	22								0.25			
35	SS-10	3 3 4	100		Medium dense, wet, black to dark gray, lean CLAY (CL).						0.25			
40	SS-11	WOH WOH 4	100								0.25			
45	SS-12	6 3 3	78		Medium dense, wet, dark gray, sandy SILT (ML) with wood fragments.						0.25			45.1 feet: Sand seam from 45.1 to 45.2 feet
50	SS-13	6 6 8	56		Very dense, wet, gray, silty SAND (SM), trace fine to coarse gravel.									
55	SS-14	43 37 47	67		Very dense, wet, brown, clayey fine to coarse GRAVEL (GC).									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
					End of Boring at 56.5 ft									
60														
65														

Date(s) Drilled: 10/07/2015 to 10/08/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 60.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 10.0 ft on 10/8/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	14 15 17	100		Medium dense, dry, brown, clayey fine to coarse GRAVEL (GC)									
	SS-2	28 27 12	100											
5	SS-3	9 21 24	100		Hard, dry, black to dark gray, clayey SILT (ML-CL), trace fine to coarse gravel.	5.5								
	SS-4	10 5 5	78		Stiff, dry brown, sandy lean CLAY (CL) with fine to coarse gravel.	6.5				0.5 1.5				
10	SS-5	6 4 3	0											10.0 feet of casing set Drove wood in Sample 5, no recovery
15	SS-6	5 5 3	22		Loose to medium dense, moist to wet, brown, silty SAND (SM), trace fine to coarse gravel.	15.0								
20	SS-7	4 4 4	67		Loose, moist to wet, brown, clayey SAND (SC). Ash, medium dense, wet, gray, SILT (ML) [Fill].	20.0 20.8				0.5 <0.25				
25	ST-8		100							0.25 0.5				Pushed Shelby tube from 25.0 to 27.0 feet
30						30.0								

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:25 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B002

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:25 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	1 3 3	94		Soft to medium, wet, dark gray mottled with brown, lean CLAY (CL), trace shell fragments.						0.25 0.5			
35	ST-10		80								0.25 0.5			Pushed Shelby tube from 35.0 to 37.0 feet
40	SS-11	WOH 2 7	100		Very soft to medium, wet, black, lean CLAY (CL), trace wood fragments.						0.5 0.75			
45	SS-12	2 5 7	94		Medium dense, moist, black, SILT (ML) with wood fragments, trace shells. Medium dense, wet, dark gray, CLAYEY SAND (SC).						0.5			
50	SS-13	4 11 11	100		Medium dense, gray, well graded medium to fine SAND (SW).									
55	SS-14	18 17 23	100		Dense, wet, brown, well graded SAND (SW), little fine to coarse gravel.									
60	SS-15	54/6"			Very dense, wet, well graded GRAVEL (GW).									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
61.5					End of Boring at 60.5 ft									
65														

Project: Hennepin Power Station	Log of Boring HEN-B003
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/06/2015 to 10/06/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 57.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 0.0 ft on 10/6/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)											
0						Ash, very stiff, moist to wet, gray, sandy SILT (ML) [Fill].									
	SS-1	WOH	33												
	SS-2	WOR	100												
5	SS-3	WOR	100												
	SS-4	WOR	100												
10	ST-5		100												
15						Very soft, moist to wet, dark gray to black, clayey SILT (CL-ML).									
	SS-6	WOH WOH 4	89												
20	SS-7	WOH	94												
25															
	ST-8		100												
30															

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:30 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B003

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:30 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH 3 4	100								0.5			Wood fragments in Sample 9
35	SS-10	WOH 3	100								0.5			
40	SS-11	10 8 7	56	40.0	Medium dense, wet, gray, silty fine SAND (SM).									
45	SS-12	20 26 16	44	45.0	Dense to very dense, wet, grayish brown to brown, silty fine to coarse GRAVEL (GM).									
50	SS-13	30 47 50												
55				57.5	End of Boring at 57.5 ft									
60														Boring backfilled with Portland Cement and bentonite
65														

Project: Hennepin Power Station	Log of Boring HEN-B004
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/02/2015 to 10/02/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 46.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 20.0 ft on 10/5/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0					A A A A	Brown, silty GRAVEL (GM) [Fill].	0.0									
	SS-1	9	14	18		Dense, brown, clayey fine to medium coarse GRAVEL (GC).	0.5									
	SS-2	32	18	30												
5	SS-3	13	40	42												
	SS-4	5	7	8		Stiff, dry, gray, SILT (ML), trace fine to coarse gravel.	7.5					1.5 3.0				
10	ST-5											<0.5				<i>Pushed shelly tube from 10.0 to 12.0 feet</i>
15	SS-6	2	3	1		Medium dense to soft, moist, brown, lean CLAY (CL) with sand.	15.0					<0.5				
20	ST-7											0.5				<i>Pushed shelly tube from 20.0 to 22.0 feet</i>
25	SS-8	WOH	WOH	WOH		Clayey silt, gray, very soft, moist, clayey SILT (CL-ML).	25.0					0.5				
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:36 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B004

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:36 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	ST-9		79								0.25			Pushed shelby tube from 30.0 to 32.0 feet
35	SS-10	2 2 4	89	35.0	Soft, wet, brownish gray, sandy SILT (ML).						0.5			38.0 feet: Drillers Note - hard drilling
40	SS-11	7 10 23	83	40.0	Medium dense, wet, brown, clayey GRAVEL (GC).									
45	SS-12	30 30 29	78	46.5	End of Boring at 46.5 ft									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B005
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 09/24/2015 to 09/24/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 28.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Boring Location: East due to sunken barge (ft NAD83)	Groundwater Level(s): ft on	

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:41 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5	SS-1	WOH 1 2 1	33			Dark gray to black silty SAND (SM), some organics and clay.								
	ST-2		83			Dark gray silty organic CLAY (OH), some sand.					0.5			
10	SS-3	WOH WOH WOH	56											
	ST-4		92								0.5			
15	SS-5	3 3 2	33			Dark green, gravelly CLAY (CL), trace sand and silt.								
20	SS-6	7 6 12	11			Green to dark green fine to coarse SAND and gravel (SP-GP), trace silt.								
25	SS-7	6 5 9	17											
30						End of Boring at 28.5 ft								28.0 feet: Drillers Note - obstruction or boulder

Project: Hennepin Power Station

Log of Boring HEN-B006

Project Location: Hennepin, Illinois

Sheet 1 of 2

Project Number: 60439752

Date(s) Drilled	10/13/2015 to 10/13/2015	Logged By	Robert Weseljak	Checked By	AJW
Drilling Method	Mud Rotary	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	41.5 ft
Drill Rig Type	Mobile 57 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:44 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	25 26 22	78			Dense, dry, brown, clayey fine to coarse GRAVEL (GC).								
	SS-2	15 17 26	100			Medium dense, dry, brown, clayey SAND (SC), little fine to coarse gravel.					0.5 1.5			
5	SS-3	15 23 15	78											
	SS-4	5 7 8	89								0.5 1.5			
10	SS-5	7 6 7	89								0.25			
	SS-6	8 9 11	78								0.25			
20	SS-7	13 12 20	89				Medium dense, moist to wet, brown, well graded fine to coarse GRAVEL (GW), trace fines and sand.							
25	SS-8	39 43 43	44				Very dense, moist to wet, brown, fine to coarse GRAVE (GM) with sand.							
30														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B006

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:45 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	29 32 30	67											
35	SS-10	9 9 9	33		Medium dense, moist to wet, yellowish brown, silty fine to coarse GRAVEL (GM), little fine to coarse sand.									
40	SS-11	10 8 6	22											
					End of Boring at 41.5 ft									Boring backfilled with 95 pounds of Portland Cement and 25 pounds of bentonite
45														
50														
55														
60														
65														

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS		
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)															
0						Barge.		0.0										
						Water.		1.5										
								3.5										
5	SS-1	WOR 1 3	11			Dark gray to brown, fine SAND and organic CLAY (OH-SP).		5.5										
	SS-2	7 7 4	56			Dark gray organic CLAY (OH), trace sand.		7.5										
	SS-3	20 24 33	33			Brown to black, fine to coarse SAND and GRAVEL (SP-GP), trace silt.		11.0										7.5 feet: Drillers Note - harder drilling
10	SS-4	16 19 8	56			Brown, clayey GRAVEL (GC), trace silt and sand.		14.5										
	SS-5	12 12 13	33					21.5										
15	SS-6	8 15 17	44			Brown, fine to coarse SAND and GRAVEL (SP-GP), some clay.												
20	SS-7	10 9 6	17															
						End of Boring at 21.5 ft												Boring backfilled with bentonite cement fluid
25																		
30																		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:50 AM

Project: Hennepin Power Station	Log of Boring HEN-B008
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 10/13/2015 to 10/13/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 17.0 ft on 10/13/2015		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:53 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	1 2 2	100		Ash, gray sandy SILT (ML) [Fill].						0.50			
	SS-2	2 3 3	94								0.50			
5	SS-3	11 7 5	100								0.50			5.5 feet: Wet layer from 5.5 to 6.0 feet
	ST-4		100		Very stiff, dry, brown, lean CLAY (CL), few fine to coarse gravel.	7.5					4.0			Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	9 9 23	67											
15	SS-6	13 15 19	78		Medium dense, moist to dry, brown, well graded fine to coarse GRAVEL (GW) with sand, trace fines.	15.0								17.0 feet: Drillers note - water
20	SS-7	14 41 42	67		Very dense, brown, well graded fine to coarse GRAVEL (GW-GM) with silt.	20.0								
					End of Boring at 21.5 ft	21.5								Boring backfilled with 49 pounds of Portland Cement and 15 pounds of bentonite
25														
30														

Date(s) Drilled: 10/13/2015 to 10/13/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 51.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:56 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0	SS-1	5 7 10	78		Gravelly lean CLAY (CL) with sand.	0.0									
	SS-2	17 22 29	100									2.0			
5	SS-3	26 50/5"	61		Dry, black to dark gray, fine to coarse gravelly SILT (ML), trace coal.	5.0						0.25			
	SS-4	17 10 17	89		Stiff to very stiff, dry, black and dark brown, sandy lean CLAY (CL), trace fine to coarse gravel.	7.5						1.5 2.0			
10	SS-5	4 5 6	78		Stiff, dry to moist, reddish brown, lean CLAY (CL) with sand, trace fine to coarse gravel.	10.0						.75 1.75			
15	SS-6	27 31 29	78		Very dense, dry to moist, brown, well graded SAND (SW-SM) with silt, and fine to coarse gravel.	15.0									
20	SS-7	23 27 25	94		Very dense, moist to wet, brown, well graded fine to coarse GRAVEL (GW-GM) with silt, little fine to coarse sand.	20.0									
25	SS-8	22 22 22	100		Dense, moist to wet, brown, well graded fine to coarse SAND (SW).	25.0									
30															

12.5 feet: Drillers Note - hard drilling

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B009

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:41:56 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	20 28 28	100											
35	SS-10	4 5 7	100		35.0 Brown lean CLAY (CL). 35.5 Brown silty SAND (SM). 36.0 Brown sandy SILT (ML).					0.25 0.75				
40	SS-11	9 9 12	100		40.0 Medium dense, moist to wet, brown, well graded SAND (SW).									
45	SS-12	9 10 11	94		45.0 Brown SILT (ML). 45.5 Wet, brown, well graded SAND (SW-SM) with silt.					0.5				
50	SS-13	12 30 20	67		50.0 Dense to very dense, wet, brown, clayey fine to coarse GRAVEL (GC). 51.5 End of Boring at 51.5 ft									
55														
60														
65														

Boring backfilled with 94 pounds of Portland cement and 25 pounds of bentonite

Project: Hennepin Power Station	Log of Boring HEN-B010
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/07/2015 to 10/07/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	19 30 23	100	0.0	Dense, dry, brown, clayey fine to coarse GRAVEL (GC).									
2.5	SS-2	10 24 20	100	3.5	Hard, dry, brown, cohesive sandy lean CLAY (CL), trace fine to coarse gravel.						1.5 2.0			
5	SS-3	12 17 22	100	5.0	Dense, dry, brown, clayey fine to coarse GRAVEL (GC).						0.2 0.5			
7.5	SS-4	15 19 17	100	7.5	Very stiff to hard, dry, black to dark gray SILT (ML).						0.5			
10	ST-5		94								4.0			Pushed Shelby tube from 10.0 to 11.5 feet
15	SS-6	4 3 4	61	15.0	Medium, moist, dark brown, sandy lean CLAY (CL).						.75			
20	SS-7	10 11 15	56	20.0	Medium dense, moist to wet, brown, well graded SAND (SW), trace to little fine to coarse gravel.									
25	SS-8	20 13 13	56											
30				30.0										

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:01 AM

Project: Hennepin Power Station

Log of Boring HEN-B010

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:02 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS									
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)																			
30	SS-9	25 28 30	67			Very dense, wet, brown, well graded fine to coarse GRAVEL (GW-GM) with silt and sand.																	
35	SS-10	15 18 25	89	35.0											Dense, wet, brown, well graded fine to coarse SAND (SW), trace fine to coarse gravel.								
40	SS-11	10 9 10	67	41.5																			
End of Boring at 41.5 ft																							
45														Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite									
50																							
55																							
60																							
65																							

Project: Hennepin Power Station	Log of Boring HEN-B011
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 10/06/2015 to 10/06/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 7.0 ft on 10/7/2015		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:07 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	4 6 11	100		Stiff, dry, dark brown, sandy lean CLAY (CL), trace fine to coarse gravel.	0.0										
	SS-2	5 5 8	100									0.75				
5	SS-3	9 6 6	100		Medium dense, wet, brown, poorly graded SAND (SP), trace gravel.	5.5						1.0				4.0 feet: Drillers Note - rock
	SS-4	11 12 12	78													6.0 feet: Drillers Note - wet at 6.0 feet WD with HSA
10	SS-5	14 15 20	78		Medium dense, wet, brown, well graded SAND (SW) with fine to coarse gravel.	10.0										
15	SS-6	13 26 27	78		Dense, wet, brown, silty fine to coarse GRAVEL (GM) with fine to coarse sand.	15.0										
20	SS-7	20 33 32	6													20.0 feet: Drillers Note - pushed rock in Sample 7
					End of Boring at 21.5 ft	21.5										Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
25																
30																

Project: Hennepin Power Station	Log of Boring HEN-B012
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/07/2015 to 10/07/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 46.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0	SS-1	7 9 15	44		Medium dense, dry, brown, clayey fine to coarse GRAVEL (GC).	0.0										
	SS-2	12 17 17	100									1.0 2.5				
5	SS-3	4 13 21	89									0.5 2.0				
	SS-4	9 9 27	89		Dry, brown to dark gray, sandy lean CLAY to clayey silt (CL-ML).	8.0						1.0				
10	SS-5	5 8 7	78		Stiff, moist, brown and black, sandy lean CLAY (CL).	10.0						1.0 2.0				
15	SS-6	11 19 28			Hard, moist, dark gray to black, sandy SILT (ML) with Ash [Fill].	15.0										
20	ST-7		87.5									1.0				Pushed shelly tube from 20.0 to 22.0 feet
25	SS-8	2 3 5	78		Medium, moist, black lean CLAY (CL).	25.0						0.75 1.0				
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:10 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B012

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	ST-9		95	31.0	Soft, moist to wet, yellowish brown mottled with gray and brown, lean CLAY (CL).						0.5			Pushed shelly tube from 30.0 to 32.0 feet
35	SS-10	WOH 4 5	94									0.75		
40	SS-11	10 17 11	67	40.0	Medium dense, moist to wet, brown, clayey fine to coarse GRAVEL (GC).									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
45	SS-12	18 18 17	44	46.5										
End of Boring at 46.5 ft														
50														
55														
60														
65														

Date(s) Drilled: 10/12/2015 to 10/12/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 61.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0	SS-1	19 20 18	78		Dense, brown, clayey fine to coarse GRAVEL (GC) [Fill].	0.0									
	SS-2	15 30 17	67												
5	SS-3	4 7 5	89		Stiff, moist, brown, SILT (ML).	5.5					0.4				
	SS-4	13 14 18	100		Very stiff, dry to moist, dark gray, sandy SILT (ML) with Ash, trace fine to coarse gravel [Fill].	7.5					0.25 0.75				
10	SS-5	8 11 13	78		Very stiff, moist, dark gray SILT (ML).	11.0					0.5				
15	SS-6	5 6 6	100		Stiff, moist, black, lean CLAY (CL).	16.0					0.25 1.5				
20	SS-7	WOH 2 4	100		Soft, wet, dark gray to greenish gray, silty CLAY (CL-ML).	20.0					0.25				
25	ST-8		65								0.25				Pushed shelly tube from 25.0 to 27.0 feet
30						30.0									

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:15 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B014

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:16 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH WOH 4	100		Very soft, moist to wet, dark gray, lean to silty CLAY (CL-ML).						0.25 0.5			
35	ST-10		100									0.5		
40	SS-11	WOH 5 6	100		Soft, moist, dark gray to black SILT (ML), trace wood fragments.						0.5			
45	SS-12	2 7 10	89		Medium dense to dense, wet, gray, silty SAND (SM).									
50	SS-13	13 17 16	78		Very dense, wet, light gray to light brown, silty fine to coarse GRAVEL (GM) with fine to coarse sand.									Trace fine to coarse gravel in Sample 13
55	SS-14	46 52 37	78											
60	SS-15	27 40 38	67											Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
65					End of Boring at 61.5 ft									

Project: Hennepin Power Station	Log of Boring HEN-B015
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/05/2015 to 10/06/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 46.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 3.0 ft on 10/5/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	3 3 5	67		Black topsoil, lean CLAY (CL). Loose, moist, brown, clayey SAND (SC).	0.5	0.0						0.25			
	SS-2	6 8 12	100		Stiff, moist, black, lean CLAY (CL).	2.5							2.0 3.0			
5	SS-3	3 6 5	100		Stiff, moist, dark gray, clayey SILT (CL-ML).	5.0							0.5 0.75			
	ST-4		80										0.5			Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	WOH 2 1	100										0.25			
15	SS-6	1 2 3	78										0.25			
20	SS-7	WOH	89										0.25			
25	ST-8		95										0.25			Pushed shelly tube from 25.0 to 27.0 feet
30							30.0									

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:21 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B015

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:21 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH 2 5	100		Soft, wet, dark gray SILT (ML), trace wood and shells, occasional sand seam.						0.25			
35	SS-10	2 3 7	100		Medium dense, wet, well graded SAND (SW).									
40	SS-11	21 27 20	56		Dense to very dense, moist to wet, brown to grayish brown, silty fine to coarse GRAVEL (GM), little sand.									39.0 feet: Drillers Note - change in drilling
45	SS-12	24 53 50	89		End of Boring at 46.5 ft									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B016
Project Location: Hennepin, Illinois	Sheet 1 of 3
Project Number: 60439752	

Date(s) Drilled: 10/09/2015 to 10/12/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 76.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:27 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)										
0														
	SS-1	21 21 13	100			Dense to very dense, dry, brown, clayey fine to coarse GRAVEL (GC).								
	SS-2	18 33 18	100											
5	SS-3	10 9 19	100											
	SS-4	28 23 36	100											
10	SS-5	15 9 3	67			Stiff to very stiff, moist, black to dark gray, sandy SILT (ML) with Ash, trace hard ash pieces [Fill].	10.0							
	SS-6	4 5 3	100											
15						Medium to stiff, moist, black, lean CLAY (CL), some wood fragments.	15.0							
	ST-7		100											
20						Soft, black to dark gray silty CLAY (ML-CL).	20.0							
	SS-8	WOH WOH 2	100											
25						Soft, wet, grayish brown mottled with brown to dark gray, lean CLAY (CL).	25.0							
30														

Pushed shelly tube from 20.0 to 22.0 feet

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B016

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:27 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH WOH 4	83								0.25 0.5			
35	ST-10		100								0.25			Pushed Shelby tube from 35.0 to 37.0 feet
40	SS-11	WOH 2 4	67	40.0	Very soft, wet, dark gray, SILT (ML), trace shells.						0.25			
45	SS-12	WOH WOH WOH	22								0.25			
50	SS-13	3 7 8	67	51.0	Medium dense, wet, gray, silty SAND (SM), trace fine gravel.									
55	SS-14	8 8 10	56											
60	SS-15	WOR WOH WOH	100	60.0	Very soft, wet, clayey SILT (CL-ML), trace shells.						0.25			
65														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B016

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:27 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
	SS-16	WOR WOH WOH	100												
70	SS-17	19 16 15	44			Dense, wet, gray, well graded fine to coarse GRAVEL (GW-GM) with sand.									67.0 feet: Drillers Note - change in drilling
75	SS-18	22 28 39	44												
						End of Boring at 76.5 ft									Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
80															
85															
90															
95															
100															

Project: Hennepin Power Station	Log of Boring HEN-B017
Project Location: Hennepin, Illinois	Sheet 1 of 3
Project Number: 60439752	

Date(s) Drilled: 10/05/2015 to 10/05/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 66.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 3.0 ft on 10/5/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	2 4 3	67		Topsoil, lean CLAY (CL). Soft, moist, brown, lean CLAY (CL) with sand.	0.5	0.0									
	SS-2	6 9 12	100		Stiff to soft, moist to wet, black, clayey SILT (ML-CL).	2.5							1.25			
5	ST-3		87													Pushed Shelby tube from 5.0 to 7.0 feet
	SS-4	2 2 3	100										0.25			Trace sand seams in Samples 4, 5, 7, and 8
10	SS-5	WOH WOH 2	78										0.25			
15	ST-6		75										0.25			Pushed Shelby tube from 15.0 to 17.0 feet
20	SS-7	WOH	100										0.25			
25	SS-8	WOR WOH WOH	100										0.25			
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:34 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B017

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:35 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
30	ST-9		95									0.75			Pushed Shelby tube from 30.0 to 32.0 feet
35	SS-10	WOH	100									0.5			Trace sand seams and shells in Samples 10 and 11
40	SS-11	1 6 6	100		40.5	Medium dense, wet, dark gray, silty fine to coarse SAND (SM), trace shells and gravel.						0.25 0.5			
45	SS-12	3 7 7	78												
50	SS-13	WOR WOH WOH	100		50.0	Very soft, wet, dark gray, clayey SILT (CL-ML), trace shells.						0.25			
55	SS-14	WOR WOH WOH	100									0.25			
60	SS-15	15 16 15	67		58.0	Dense, wet, gray, well graded fine to coarse GRAVEL (GW).									58.0 feet: Drillers Note - change in drilling
65					65.0										

Project: Hennepin Power Station


Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B017

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:35 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
66.5	SS-16	17 16 20				Dense, wet, grayish brown to light to medium gray, well graded fine to coarse GRAVEL (GW-GC) with clay. End of Boring at 66.5 ft	66.5								Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
70															
75															
80															
85															
90															
95															
100															

Project: Hennepin Power Station	Log of Boring HEN-B018
Project Location: Hennepin, Illinois	Sheet 1 of 3
Project Number: 60439752	

Date(s) Drilled: 10/08/2015 to 10/09/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 71.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): 15.0 ft on 10/9/2015		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0					[Symbol: Diagonal lines /]	Very dense, dry, brown, clayey fine to coarse GRAVEL (GC)	0.0										
	SS-1		25 25 26	100										4.0			
	SS-2		42 34 18	100	[Symbol: Diagonal lines \]	Brown to black clayey SAND to lean CLAY (SC-CL).	3.5						4.0				
5	SS-3		12 35 22	100			Very dense, dry, brown, clayey fine to coarse GRAVEL (GC), trace black ash at bottom.	5.0						4.0			
	SS-4		4 4 10	100	[Symbol: Triangles]	Stiff, moist, dark gray, sandy SILT (ML) with Ash [Fill].	6.5						0.25				
10	ST-5			85										1.5			
15	SS-6		WOH 2 3	100	[Symbol: Horizontal lines]	Very soft to soft, moist, black to dark gray, silty CLAY (CL-ML).	15.0						0.25				
20	SS-7		WOH WOH 3	100										0.25			
25	ST-8			70	[Symbol: Vertical lines]								0.25				<i>Pushed Shelby tube from 25.0 to 27.0 feet</i>
30								30.0									

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:42 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B018

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:43 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	WOH WOH 4	100		Very soft, moist to wet, dark gray and trace black, lean CLAY (CL).						0.25			
35	SS-10	WOH	100		Very soft, wet, dark gray, clayey SILT (CL-ML), trace shells.						0.25			
40	ST-11		100								0.5			Pushed Shelby tube from 40.0 to 42.0 feet
45	SS-12	WOH WOH WOH	100								0.25			
50	SS-13	WOH 3 4	33		Loose to medium dense, wet, dark gray, sandy SILT (SM).									
55	SS-14	4 6 12	67											
60	SS-15	WOH WOH WOH	100		Very soft, wet, dark gray, silty CLAY (CL-ML), trace shells.						0.25			
65														

Project: Hennepin Power Station


Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B018

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:43 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
67	SS-16	53 37 44	67			Very dense, wet, gray, silty fine to coarse GRAVEL (GM).								
70	SS-17	23 21 19	67											
71.5	End of Boring at 71.5 ft													
75														
80														
85														
90														
95														
100														

Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite

Project: Hennepin Power Station	Log of Boring HEN-B019
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 09/24/2015 to 09/24/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 55.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5	SS-1	1	33	4.0 4.3		Dark brown fine to coarse SAND and GRAVEL (SP-GP). Soft to stiff, dark gray organic silty CLAY (OH).								
	ST-2		80								0.25			Pushed Shelby tube from 7.5 to 9.5 feet
10	SS-3	WOR WOH 1	56								0.5			
	ST-4		85								1.5			Pushed Shelby tube from 12.5 to 14.5 feet
15	SS-5	1 2 2	83	14.5		Stiff to medium, dark gray silty CLAY (CL), trace organics and shells.					1.0			
20	ST-6		100								0.75			Pushed Shelby tube from 20.0 to 22.0 feet
25	ST-7		100								1.0			Pushed Shelby tube from 25.0 to 27.0 feet
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING_LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:50 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B019

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:50 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-8	1 2 2	100								1.25			
35	SS-9	1 1 2	100		Loose, dark gray clayey fine SAND (SC), trace silt.						1.0			
40	SS-10	6 7 6	78		Medium dense fine SAND (SP), trace silt.									
45	SS-11	5 3 3	78		Medium dense, dark gray silty CLAY (CL), trace shells and organics.						0.75			
50	SS-12	1 1 2	67								0.75			
55	SS-13	7 14 16	11		Medium dense, dark gray fine to coarse SAND and GRAVEL (SP-GP).									
					End of Boring at 55.5 ft									Boring backfilled with bentonite and cement fluid
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B020
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/01/2015 to 10/02/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 50 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	19 17 13	56		Gravel (GP). Lean CLAY (CL), trace fine to coarse gravel.	0.0								
	SS-2	6 8 7	67		Medium dense, moist, brown, clayey fine to coarse GRAVEL (GC).	2.5					0.0 1.0			
5	SS-3	6 8 7	83		Stiff, moist, sandy lean CLAY (CL), trace fine to coarse gravel.	5.0					1.5			
	SS-4	1 3 4	78								1.0			
10	ST-5		52											Pushed shelly tube from 9.5 to 11.5 feet
15	SS-6	5 3 7	6		Loose, brown well graded GRAVEL (GW).	15.0								17.0 feet: Drillers Note - cobbles from 17.0 to 20.0 feet
20	SS-7	30 48 50/5"	72		Dry, brown with some rust and black, well graded SAND (SW) with gravel [Fill].	20.0								
25	SS-8	22 33 29	67		Very dense, dry, brown clayey GRAVEL (GC), little sand.	25.0								
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:56 AM

Project: Hennepin Power Station

Log of Boring HEN-B020

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:42:56 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	27 19 22	78											
35	SS-10	19 27 20	78											
40	SS-11	15 16 41	56											
						End of Boring at 41.5 ft	41.5							Less fines in Sample 11 Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
45														
50														
55														
60														
65														

Date(s) Drilled: 10/01/2015 to 10/02/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 45.1 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0	SS-1	80/6"	17		Topsoil, lean CLAY (CL).		0.0									
	SS-2	6 5 4	44		Stiff, brown, sandy lean CLAY (CL), trace fine to coarse gravel.		2.5					<0.5				
5	ST-3											2.0				<i>Pushed Shelby tube from 5.0 to 6.0 feet</i>
	SS-4	10 61	83		Very dense, dry, brown, silty GRAVEL (GM).		8.3									
10	SS-5	14 14 12	67		Medium dense, moist, brown, clayey GRAVEL (GC).		10.0									
15	SS-6	20 15 19	44		Stiff, moist, dark brown to gray and black, medium plastic cohesive lean CLAY (CL).		15.0					<0.5				
20	SS-7	9 12 9	100		Very stiff, moist, gray to black, sandy SILT (ML) with Ash [Fill].		20.0					1.0				
	ST-8		72													<i>Pushed Shelby tube from 22.0 to 24.0 feet</i>
25	SS-9	6 20 32	100									<0.5				
30																

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:01 AM

Project: Hennepin Power Station

Log of Boring HEN-B021

Project Location: Hennepin, Illinois

Sheet 2 of 2

Project Number: 60439752

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:01 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-10	11 20 24	94								0.5			Less sand in Sample 10
35	SS-11	4 8 10	100		Stiff, moist, black, lean CLAY (CL) with Ash, trace to little sand [Fill].						2.5			
40	SS-12	5 6 5	100		Medium dense, moist to wet, brown, silty SAND (SM).									
45	SS-13	50/2"	0		End of Boring at 45.1 ft									45.0 feet: Drillers Note - hit rock Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B022
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Hollow-Stem Auger	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Drill Cuttings and Bentonite Chips	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:07 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	1 1 1	100		Very soft, moist, brown to dark gray, sandy SILT (ML).						0.0 0.5			0.0 feet: Trace roots from 0.0 to 0.5 feet
	ST-2		71											Pushed shelly tube from 2.5 to 4.5 feet
5	SS-3	2 2 2	100		Soft, moist, dark gray, SILT (ML).						0.5			
	ST-4		100		Stiff, dry, dark gray, silty SAND (SM) with Ash [Fill].									Pushed shelly tube from 7.5 to 9.5 feet
10	SS-5	5 5 6	67								0.0 0.5			
15	SS-6	21 25 20	100		Dense, dry, dark brown to black, silty SAND (SM) with Ash [Fill].						0.0 0.75			
20	SS-7	3 4 5	100		Stiff, moist, brown, sandy lean CLAY (CL).						1.0 1.25			
					End of Boring at 21.5 ft									Boring backfilled with 75 pounds of bentonite chips and soil cuttings
25														
30														

Date(s) Drilled: 09/22/2015 to 09/23/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 76.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0					[Symbol: Diagonal lines /]	Dense, moist, brown, fine to medium sandy silty GRAVEL (GM) [Fill]	0.0										
	SS-1	7 11 15	100			2.0											
					[Symbol: Diagonal lines \]	Stiff to hard, moist, sandy silty CALY (CL) with medium to coarse gravel [Fill]. Grades with medium brown sand in occasional lenses. Grades with zones of high plastic clay.							4.5				
	SS-2	8 15 18	100														
5					[Symbol: Diagonal lines /]								3.5 4.25				
	SS-3	10 27 18	100														
					[Symbol: Diagonal lines \]								4.5				
	SS-4	7 17 20	100														
10					[Symbol: Diagonal lines /]	Medium dense, moist, brown clayey silty fine to medium SAND (SM) [Fill].	9.5										
	SS-5	13 12 10	83											4.5			
					[Symbol: Diagonal lines \]	Hard, moist, brown, silty sandy CLAY (CL) with fine to medium gravel [Fill].	11.0										
					[Symbol: Diagonal lines /]	Medium dense, moist, brown fine to medium GRAVEL with sand and clay lenses [Fill].	13.0										
15																	
	SS-6	22 32 52	83														
					[Symbol: Diagonal lines \]	Moist, dark gray to black, silt to fine gravel sized fly / bottom ASH [Fill].	18.0										
20																	
	SS-7	51 39 26	94														
					[Symbol: Diagonal lines /]	Moist to wet, dark gray, silt sized fly ash with some sand to small gravel sized FLY ASH particles [Fill].	23.0										
25														0.0 0.25			
	SS-8	4 6 5	83														
					[Symbol: Horizontal lines]												
	ST-9		63														
30																	

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B023

Sheet 2 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-10	15 11 11	100								0.25 0.5			
35	SS-11	20 36 53	100		Medium dense to dense, moist, dark gray to black, silty sand to small gravel sized bottom ASH [Fill].						0.5 3.5			
40	SS-12	14 11 12	100		Medium dense, moist to wet, dark gray to black, silty SAND (SM), trace gravel and ash [Fill].						0.5 1.3			
45	SS-13	7 4 14	33		Very stiff, wet, brown, sandy lean CLAY (CL) with fine to coarse gravel.						0.5			
50	SS-14	34 52	83		Very dense, wet, brown, clayey fine to coarse angular GRAVEL (GC) with sand.									
55	SS-15	18 11 8	78											
60	SS-16	11 7 8	17											
65														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B023

Sheet 3 of 3

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGBORINGLOGS.GPJ; 12/18/2015 9:43:10 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
67	SS-17	6 4 5	67		Loose, wet, brown, silty fine to coarse GRAVEL (GM).									
70	SS-18	19 19 13	67		Dense, wet, brown, silty fine to coarse GRAVEL (GM) with fine sand.									70.6 feet: Sand seam from 70.6 to 71.0 feet
75	SS-19	18 17 9	33		Medium dense, wet, silty fine to coarse GRAVEL (GM).									
76.5					End of Boring at 76.5 ft									Boring backfilled with 94 pounds of Portland Type I Cement
80														
85														
90														
95														
100														

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B024

Sheet 1 of 2

Date(s) Drilled	09/22/2015 to 09/22/2015	Logged By	Andrew Wilding	Checked By	AJW
Drilling Method	Mud Rotary	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	62.7 ft
Drill Rig Type	Diedrich D-120 Rubber Tired ATV	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	14 15 15	100		Dense, moist, brown fine to medium silty GRAVEL [Fill].									
	SS-2	19 23 18	100											
5	SS-3	5 7 15	100		Stiff, moist, brown silty CLAY with some medium gravel and sand [Fill].						3.5			
	SS-4	4 15 23	78		Medium dense, moist, brown, silty medium SAND, trace organics [Fill].						2.25 3.0			
10	SS-5	10 12 16	78		Medium stiff, moist, dark gray, clayey SILT with medium to coarse sand, some gravel (presumably fly ash) and seams of brown silty clay [Fill].						4.0 4.5			
15	SS-6	13 20 29	94		Dense, moist, dark gray to black fine to coarse sand sized bottom ASH with some fine gravel [Fill].									
					Grades with fine gravel.									
20	SS-7	75/0.3'	38											
25	SS-4	3 2 3	100		Very soft, moist to wet, dark gray silt to fine sand sized FLY ASH [Fill].									
	ST-9		57											
30														Pushed Shelby tube from 27.0 to 29.0 feet Shelby tube refusal at 29.2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:18 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B024

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:18 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
30	SS-10	1 3 2	100													
35	SS-11	5 9 12	100								0.5					
40	SS-12	55/6"	50			39.0	Medium dense, wet, sandy silty fine to coarse GRAVEL (GM).									
45	SS-13	22 27 21	78													
50	SS-14	15 18 15	50				Grades with ~1" silty clay layers and zones of silty clay matrix (silty clay, brownish gray, soft to medium stiff, moist).									
55	SS-15	55/0.2'	0													
60	SS-16	20 22 13	78			58.0	Medium dense, moist, silty SAND (SM) with trace to fine medium gravel.									
	SS-17	80/0.1'	17			62.0 62.7	Wet, sandy fine to medium, rounded GRAVEL (GP). End of Boring at 62.7 ft									
65																Boring backfilled with Portland Type I cement

Project: Hennepin Power Station
 Project Location: Hennepin, Illinois
 Project Number: 60439752

Log of Boring HEN-B025
 Sheet 1 of 2

Date(s) Drilled	10/01/2015 to 10/01/2015	Logged By	Robert Weseljak	Checked By	AJW
Drilling Method	Mud Rotary	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	56.5 ft
Drill Rig Type	Mobile 50 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0	SS-1	23 19 22	56	0.0	Medium dense, dry, brown, silty SAND (SM) with gravel [Road Fill].									
2.5	SS-2	5 7 9	72	2.5	Stiff, dry, brown, lean CLAY (CL).					3.0				
5.0	SS-3	14 26 19	78	5.0	Dense, dry, silty GRAVEL (GM) with sand [Fill].									
7.5	SS-4	2 2 2	89	7.5	Soft, gray with some black SILT (ML) to very fine silty SAND (SM).					<0.5				
10.0	SS-5	2 3 4	33							0.5				<i>Pushed Shelby tube from 10.5 to 14.0 feet</i>
	ST-6		100							1.0				
15.0	SS-7	2 3 2	56							<0.5				
20.0	SS-8	9 5 3	56	20.0	Stiff, moist to wet, gray with some black layering, sandy SILT (ML).					<0.5				
25.0	ST-9		100											<i>Pushed Shelby tube from 25.0 to 27.0 feet</i>
	SS-10	4 4 5	56							1.0				
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:23 AM



Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B025

Sheet 2 of 2




Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:23 AM

Depth (feet)	SAMPLES				Graphic Symbol	Elevation (feet)	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
30	SS-11	3 4 5	67									<0.5			
35	SS-12	5 7 7	72									1.0			
40	SS-13	6 12 11	61									1.1			
45	SS-14	6 7 8	83									1.0			
50	SS-15	7 8 10	89									0.5 1.5			
55	SS-16	10 12 13	94		55.0	Very stiff, moist to wet, black, gray and some dark brown, sandy SILT (ML).						3.5 4.0			
					56.5	End of Boring at 56.5 ft									
60															
65															

Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite

Project: Hennepin Power Station	Log of Boring HEN-B026
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 12.0 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		







Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
0						Barge.		0.0								
						Water.		1.5								
								4.0								
5	SS-1	4 5 7	56			Dark brown fine to coarse SAND and GRAVEL (SP-GP).		4.5								
						Dark gray to brown gravelley CLAY (GC), trace sand.										
	SS-2	8 4 9														
10																
								11.5								
						End of Boring at 12 ft										
15																
20																
25																
30																

11.5 feet: Drillers Note - hard drilling from 11.5 to 12.0 feet
 12.0 feet: Possible boulder or obstruction
 Boring backfilled with bentonite grout

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:29 AM

Project: Hennepin Power Station	Log of Boring HEN-B026A
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	








Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 26.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Blind drill - see HEN-B026.								Blind drilled to 10.0 feet
10	SS-1	7 6 7	11	10.0		Brown gravelly CLAY (GC), trace sand.								Large rock in Sample 3
15	SS-2	25 42 13	0											
15	SS-3	6 7 5	33											
20	SS-4	5 5 9	11											
20	SS-5	7 8 6	11	20.0		Brown GRAVEL (GP) with sand and clay.								
25	SS-6	8 9 6	33	25.0		Brown fine to coarse SAND (SP) and GRAVEL (GP), trace silt and clay.								
26.5				26.5		End of Boring at 26.5 ft								Boring backfilled with bentonite grout
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:31 AM

Project: Hennepin Power Station	Log of Boring HEN-B027
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 09/22/2015 to 09/22/2015	Logged By: Norm Seiler	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 31.5 ft
Drill Rig Type: Diedrich D-26 Barge Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
0						Barge.								
						Water.								
5														
	SS-1	2 3 3 WOH	78	7.5		Dark brown SAND (SP) and GRAVEL (GP). Dark gray, silty CLAY (CL), trace sand.					1.5			
10	ST-2		72	12.0							2.5			<i>Pushed Shelby tube from 10.0 to 12.0 feet</i>
	SS-3	3 4 7	61			Dark gray to brown, silty CLAY (CL) with some gravel and sand.					1.5 2.0			
15	SS-4	4 5 7	22								1.75			
20	SS-5	3 5 4	33	20.0		Brown gravelly CLAY (GP) with some sand.								
25	SS-6	7 8 12	22	25.0		Brown to gray clayey SILT (ML) with some sand and gravel.								
30				28.0		Fine to coarse SAND (SP) and GRAVEL (GP).								28.0 feet: Cave in

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:34 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B027

Sheet 2 of 2

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-7	8 9 8	56											
						End of Boring at 31.5 ft	31.5							Boring backfilled with bentonite grout
35														
40														
45														
50														
55														
60														
65														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:34 AM

Project: Hennepin Power Station	Log of Boring HEN-B029
Project Location: Hennepin, Illinois	Sheet 1 of 2
Project Number: 60439752	

Date(s) Drilled: 10/01/2015 to 10/01/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	24 28 34	100		Very dense, dry, brown, silty GRAVEL (GM) [Road Fill].									
	SS-2	10 6 11	100		Stiff to very stiff, dry, lean CLAY (CL).						4.5			
5	ST-3		100								4.5			<i>Pushed Shelby tube from 5.0 to 7.0 feet</i>
	SS-4	12 14 17	100								4.0			
10	ST-5		100								2.5			<i>Pushed Shelby tube from 10.0 to 12.0 feet</i>
15	SS-6	4 6 8	83		Stiff, dark brown with trace rust, lean CLAY (CL), trace fine to coarse gravel.						1.5			
20	SS-7	6 12 20	78		Dense, dry, brown, clayey GRAVEL (GC).						1.5			
25	SS-8	17 17 43	56											
30														

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:40 AM

Project: Hennepin Power Station

Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B029

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:40 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)													
30	SS-9	29 50/5"	22												Less fines in Sample 9	
35	SS-10	20 25 28	61													
40	SS-11	16 14 15	6													
						End of Boring at 41.5 ft	41.5								Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite	
45																
50																
55																
60																
65																

Project: Hennepin Power Station

Log of Boring HEN-B030

Project Location: Hennepin, Illinois

Sheet 1 of 1

Project Number: 60439752

Date(s) Drilled	09/29/2015 to 09/30/2015	Logged By	Norm Seiler	Checked By	AJW
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	11.0 ft
Drill Rig Type	Mobile 57 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	9.0 ft on 9/29/2015		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:45 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)												
0	SS-1	22 17 37	83		Brownish gray sand, gravel, and clay [Fill].	0.0									
	SS-2	15 17 15	67		Brown fine to coarse sand and gravel with some clay [Fill].	2.5									
5	SS-3	18 20 30	83												
	SS-4	4 5 6	100		Dark gray with trace gravel, sand, and clay, with ASH [Fill].	7.5									
10	ST-5		33		Black ASH with gravel [Fill].	10.0									
					End of Boring at 11 ft	11.0									
15															
20															
25															
30															

9.0 feet: Wet
 Pushed shelly tube from 10.0 to 11.0 feet
 10.0 feet: Switch to mud rotary Boring backfilled with Portland Type I cement

Project: Hennepin Power Station

Log of Boring HEN-B032

Project Location: Hennepin, Illinois

Sheet 1 of 2

Project Number: 60439752

Date(s) Drilled	09/30/2015 to 09/30/2015	Logged By	Robert Weseljak	Checked By	AJW
Drilling Method	Mud Rotary	Drill Bit Size/Type	3 7/8" Tricone Roller Bit	Borehole Depth	41.5 ft
Drill Rig Type	Mobile 57 Truck Mounted	Drilling Contractor	Strata Earth Services	Surface Elevation	ft
Borehole Backfill	Portland Cement and Grout	Sampling Method(s)	Split Spoon/3" Thin Walled Tube	Hammer Data	Automatic, 140 lbs, 30" drop
		Groundwater Level(s)	ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0	SS-1	32 29 20	67		Very dense, dry, brown, fine to coarse well graded GRAVEL (GW) with silt and sand [Fill].	0.0					4.5			
	SS-2	6 18 17	100		Hard, dry, black, lean CLAY (CL), trace fine to medium gravel.	1.0					3.5			
5	ST-3		79								4.5			Pushed shelly tube from 5.0 to 7.0 feet
	SS-4	8 12 16	100								3.5			
10	SS-5	8 16 20	44								0.5			10.0 feet: Coarse gravel
15	SS-6	19 39 43	72		Very dense, moist, brown and black, clayey fine to coarse GRAVEL (GC).	15.0								
20	SS-7	18 36 50/3"	61											
25	SS-8	98 35 50/4"	78											24.5: Drillers Note - boulder from 24.5 to 25.2 feet
30						30.0								

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:48 AM

Project: Hennepin Power Station




Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B032

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:48 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)											
30	SS-9	18 11 30	100			Hard, moist, brown, fine to coarse gravelly lean CLAY (CL).					3.0 4.5				
35	SS-10	41 28 40	67					Very dense, moist, brown and black, clayey fine to coarse GRAVEL (GC).							
40	SS-11	12 18 50/4"	72												
						End of Boring at 41.5 ft								Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite	
45															
50															
55															
60															
65															

Date(s) Drilled: 09/30/2015 to 10/01/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Mobile 57 Truck Mounted	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:53 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Graphic Symbol										
0														
0.5	SS-1	25 19 21	100		Very dense, dry, brown, silty SAND (SM) [Fill].	0.5					1.5 2.5			
5	SS-2	7 8 11	100		Hard, dry, black, gravelly lean CLAY (CL) [Fill].						3.5 4.5			
5.5	SS-3	17 28 32	100		Dense, dry, brown, silty SAND (SM). Very dense, brown to gray, silty fine to coarse GRAVEL (GM) with sand.	5.0 5.5								
10	SS-4	11 18 32	100											
10.0	SS-5	27 35 18	56		Very dense, moist, brown, clayey GRAVEL (GC).	10.0								
15	SS-6	21 24 25	44											
20	SS-7	10 11 9	44		Medium dense, dry, silty fine to coarse GRAVEL (GM).	20.0								
25	SS-8	11 13 16	6											
30						30.0								

Project: Hennepin Power Station


Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B034

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPINDYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:53 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)											
30	SS-9	14 14 12	22			Medium dense, moist to wet, brown, well graded GRAVEL (GW).									
35	SS-10	9 11 10	67												
40	SS-11	10 8 9	17												
						End of Boring at 41.5 ft	41.5							Boring backfilled with 94 pounds of Portland Cement and 25 pounds of bentonite	
45															
50															
55															
60															
65															

Date(s) Drilled: 09/23/2015 to 09/24/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Mud Rotary	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 41.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Portland Cement and Grout	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s): ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Elevation (feet)	Depth (feet)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS	
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)														
0	SS-1	12 15 21	100		Dense, dry, brown, silty SAND (SM) with fine to coarse gravel [Road Fill].	0.0											
	SS-2	12 17 20	100		Dense, dry, poorly graded SAND (SP), trace fine to medium gravel [Fill].	2.0											
5	SS-3	12 19 26	100		Dense, dry, brown, silty SAND (SM) with fine to coarse gravel [Fill].	5.0											
	SS-4	10 8 12	94		Very stiff, dark gray to black, lean CLAY (CL), trace fine to coarse gravel [Fill].	8.0											
10	SS-5	12 33 31	100		Dry to moist, dark brown, clayey fine to coarse GRAVEL (GC) with sand.	10.0											
																	11.3 feet: Rusty in color
																	13.0 feet: 100% water loss
15	SS-6	10 43 40	67		Very dense, moist, light brown, fine to coarse clayey GRAVEL (GC) with sand.	15.0											
20	SS-7	10 14 22	94														
25	SS-8	19 21 16	56														
30																	

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:59 AM

Project: Hennepin Power Station



Project Location: Hennepin, Illinois

Project Number: 60439752

Log of Boring HEN-B037

Sheet 2 of 2

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY_CCR\HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:43:59 AM

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type Number	Sampling Resist. OR Core RQD (%)	Recovery (%)	Elevation (feet)										
30	SS-9	21 14 19	83	30.5	 <p>Hard, moist, dark greenish gray, fine to coarse, rounded to angular gravelly lean CLAY (CL).</p>					1.25				
35	SS-10	7 12 18	83	35.0		 <p>Very stiff, moist, brown, clayey fine to coarse GRAVEL (GC).</p>								
40	SS-11	13 20 21	67	41.5										
					End of Boring at 41.5 ft									Boring backfilled with Portland Type I Cement
45														
50														
55														
60														
65														

Project: Hennepin Power Station	Log of Boring HEN-B038
Project Location: Hennepin, Illinois	Sheet 1 of 1
Project Number: 60439752	

Date(s) Drilled: 09/23/2015 to 09/23/2015	Logged By: Robert Weseljak	Checked By: AJW
Drilling Method: Hollow-Stem Auger	Drill Bit Size/Type: 3 7/8" Tricone Roller Bit	Borehole Depth: 21.5 ft
Drill Rig Type: Diedrich D-120 Rubber Tired ATV	Drilling Contractor: Strata Earth Services	Surface Elevation: ft
Borehole Backfill: Drill Cuttings and Bentonite Chips	Sampling Method(s): Split Spoon/3" Thin Walled Tube	Hammer Data: Automatic, 140 lbs, 30" drop
Groundwater Level(s) ft on		

Depth (feet)	SAMPLES				Graphic Symbol	MATERIAL DESCRIPTION	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	Pocket Pen. Su (ksf)	Torvane Su (ksf)	TXUU (ksf)	REMARKS
	Type	Number	Sampling Resist. OR Core RQD (%)	Recovery (%)										
0														
	SS-1	12 18 22	89		Dense, dry, dark brown, well graded GRAVEL with CLAY (GW-GC) [Road fill]									
	SS-2	16 30 50/5.5"	97		Very dense, dry, gray, well graded fine to coarse GRAVEL (GW) [Fill].									
5	SS-3	37 50/5"	50											
	SS-4	5 6 31	94		Stiff, moist, black and brown, lean CLAY (CL), trace sand and fine gravel [Fill].									
					Very dense, dry, brown, well graded GRAVEL (GW) [Fill].									
10	SS-5	6 10 12	100		Very stiff, dry, greenish gray, lean CLAY (CL) [Fill].					6.0				
15	SS-6	15 15 24	100		Dense, moist, brown, clayey GRAVEL (GC) with sand [Fill].									
20	SS-7	7 17 13	94											
					End of Boring at 21.5 ft									
25														
30														

Boring backfilled with 75 pounds of bentonite chips and soil cuttings

Report: GEO_SOIL; File K:\PROJECTS\60439752_DYNEGY CCR HENNEPIN\400-TECHNICAL\BORING LOGS\60439752_HENNEPIN\DYNEGYBORINGLOGS.GPJ; 12/18/2015 9:44:04 AM

APPENDIX B

Project: Dynegy

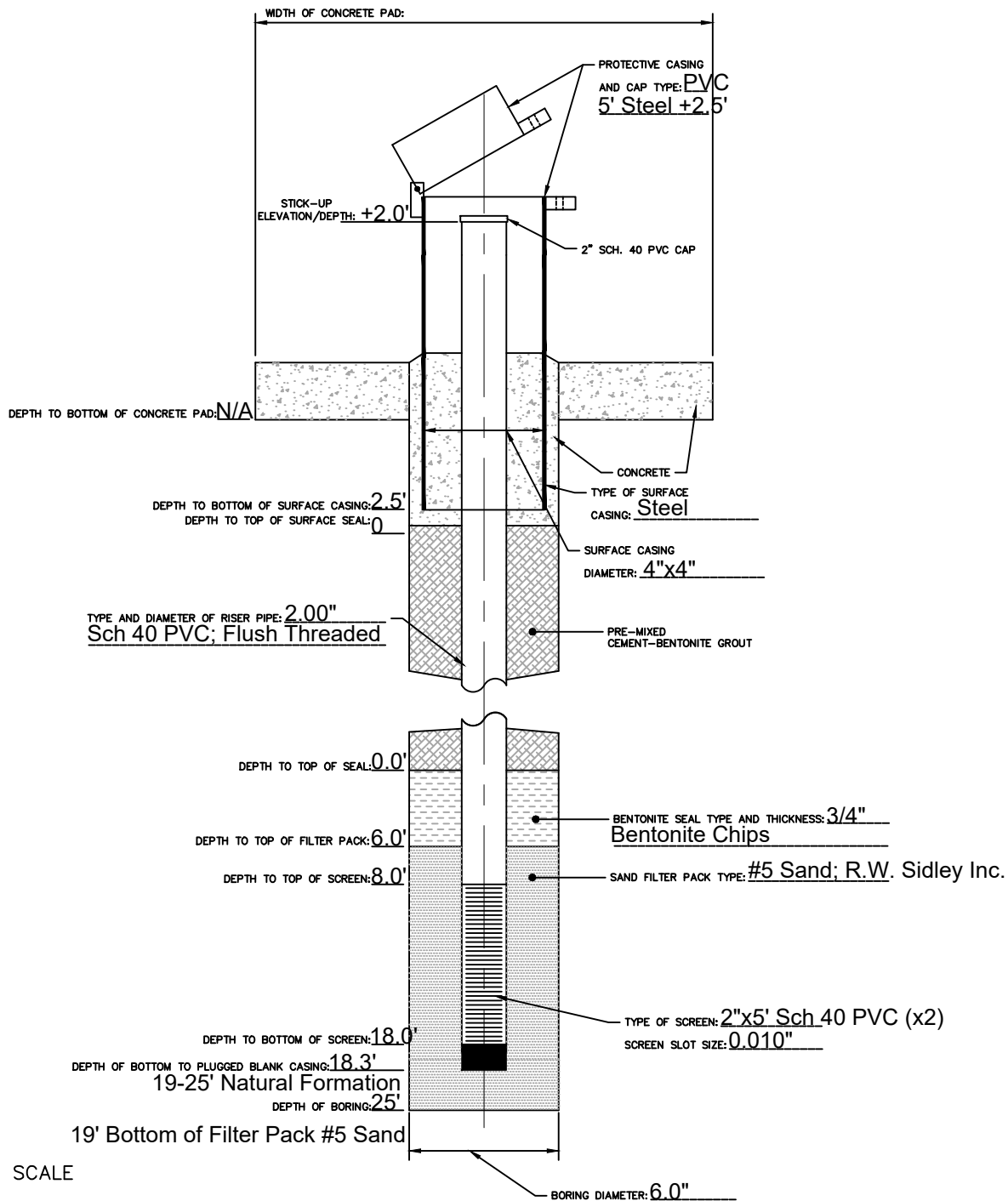
Project Location: Hennepin, IL

Project Number: 60439752

Log of Piezometer

Sheet 1 of 1

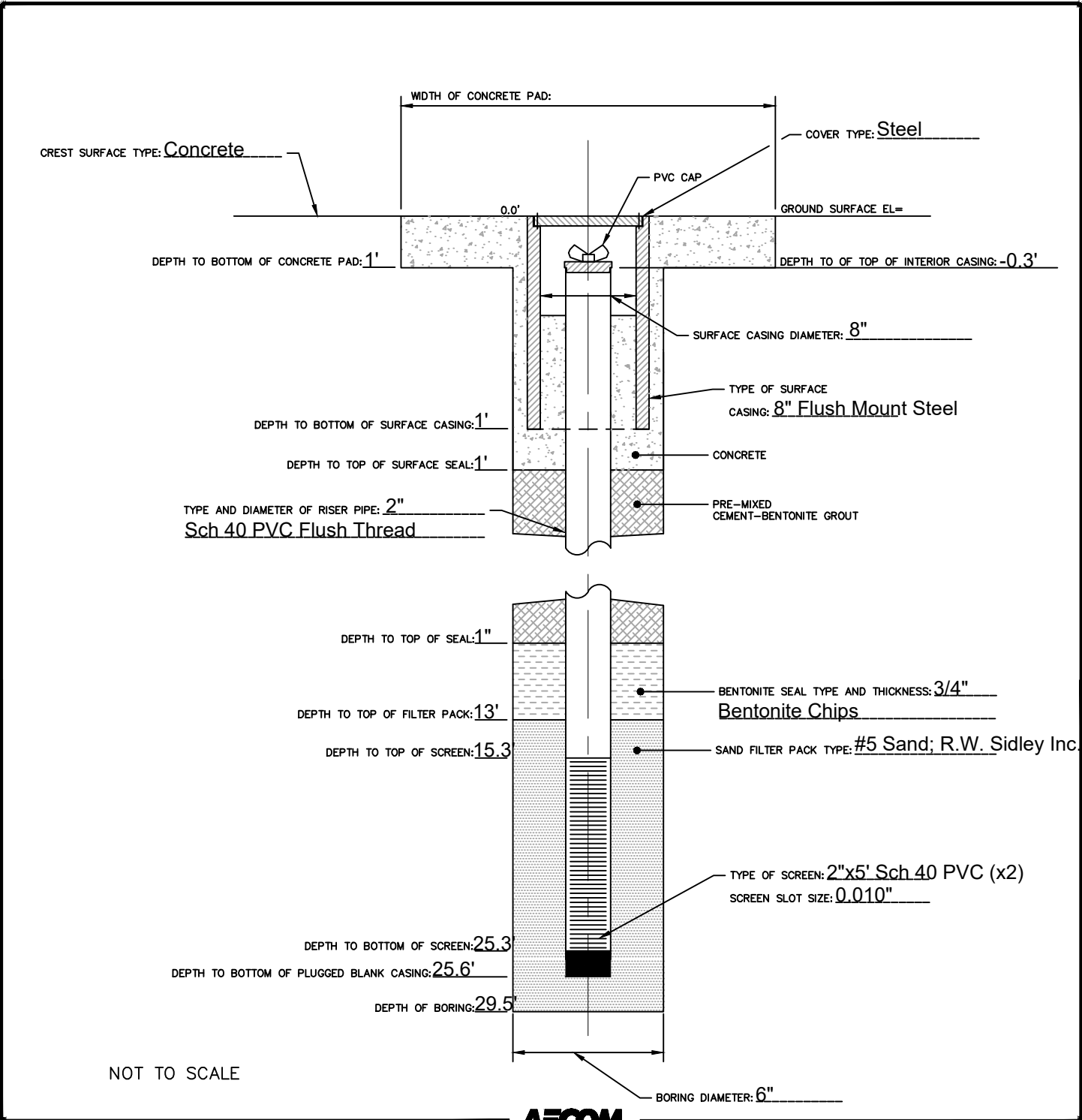
Piezometer Location	P001	Date Installed	10/15/15	Time	9:10 A.M.
Installed By	Scott Komen	Observed By	R. Weseljak	Total Depth	25'
Method of Installation	6" Solid Flight Auger	Drilling Contractor	Strata	Surface Elevation	
Screened Interval	8-18'	Completion Zone	Silts and Clays		
Remarks	Groundwater Level(s) 13.33' T.O.C.				



Project: Dynege
 Project Location: Hennepin, IL
 Project Number: 60439752

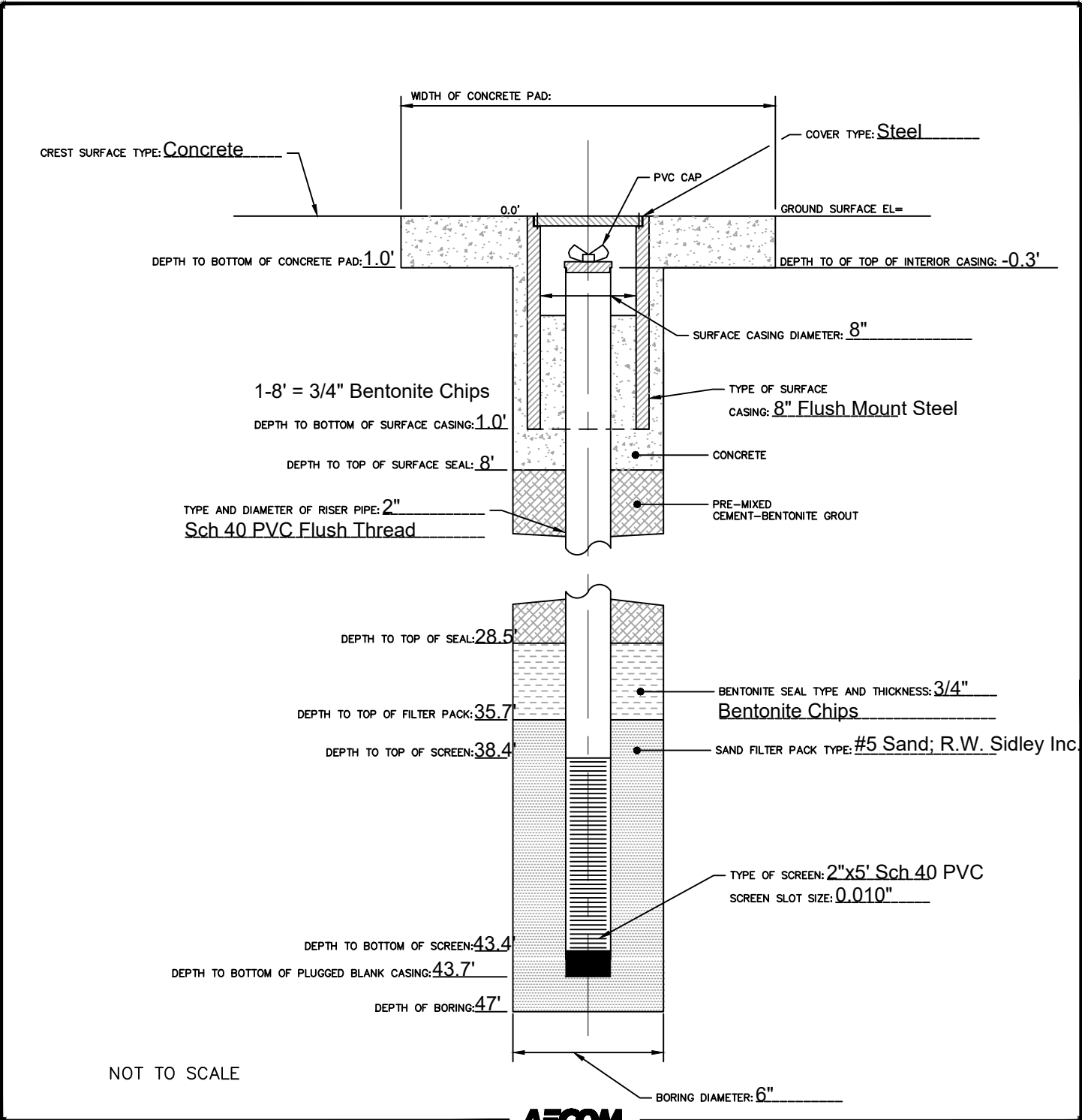
Log of Piezometer
 Sheet 1 of 1

Piezometer Location P002	Date Installed 10/15/15	Time 11:10 A.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 29.5'
Method of Installation 6" Solid Flight Auger	Drilling Contractor Strata	Surface Elevation
Screened Interval 15.3-25.3'	Completion Zone Sands	
Remarks	Groundwater Level(s) 15.90' T.O.C.	



Project: Dynegy	Log of Piezometer	
Project Location: Hennepin, IL	Sheet 1 of 1	
Project Number: 60439752		

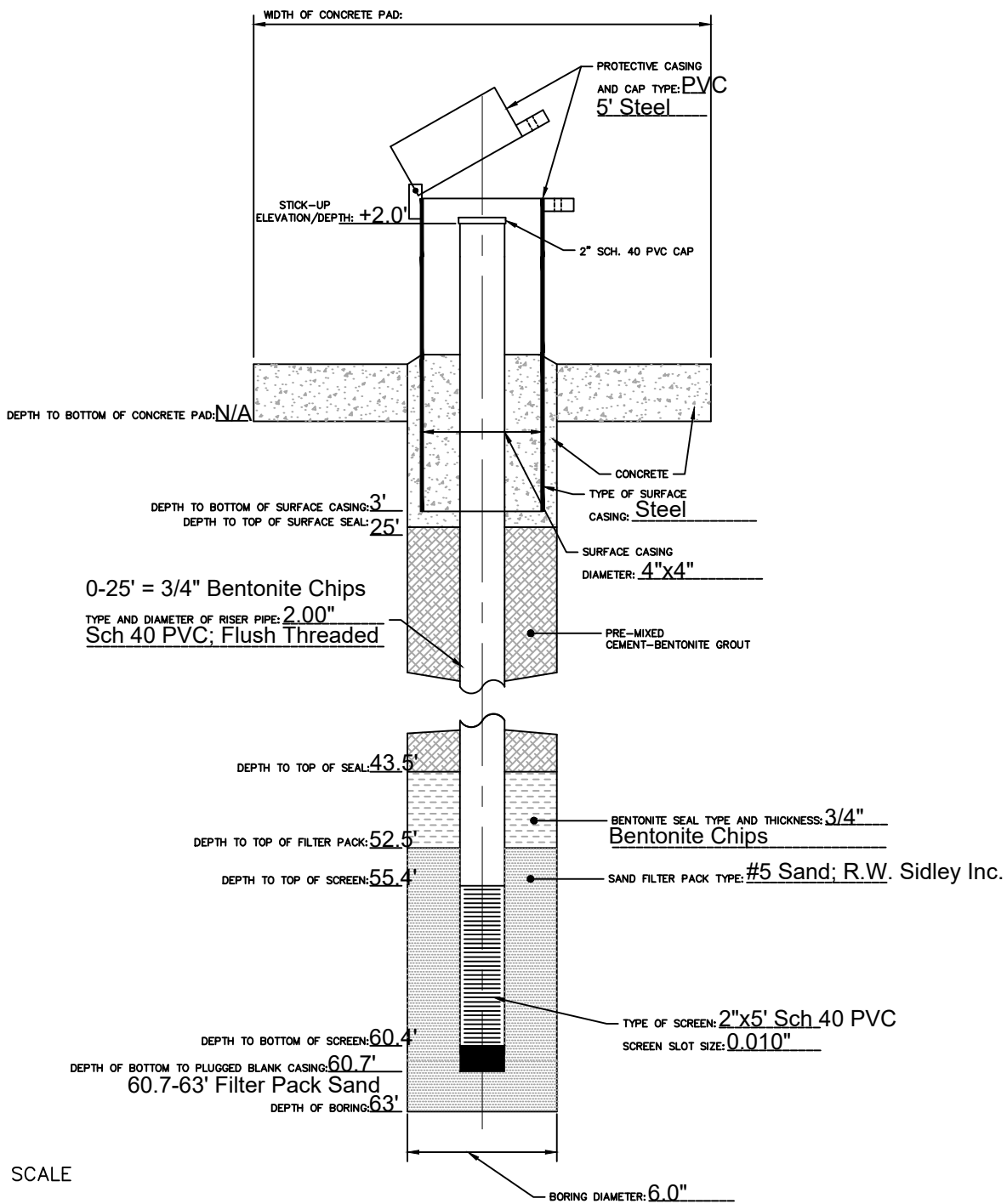
Piezometer Location P003	Date Installed 10/14/15	Time 9:45 A.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 47'
Method of Installation 6" Mud Rotary/ 6" Casing	Drilling Contractor Strata	Surface Elevation
Screened Interval 38.4'-43.4'	Completion Zone Gravels	
Remarks	Groundwater Level(s) 17.15' T.O.C.	



Project: Dynegy
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

Piezometer Location	P004	Date Installed	10/16/15-10/19/15	Time	8:00 A.M.
Installed By	Scott Komen	Observed By	R. Weseljak	Total Depth	63'
Method of Installation	6" Mud Rotary with 6' Casing	Drilling Contractor	Strata	Surface Elevation	
Screened Interval	55.4-60.4'	Completion Zone	Gravels		
Remarks	Groundwater Level(s) 48.65' T.O.C.				

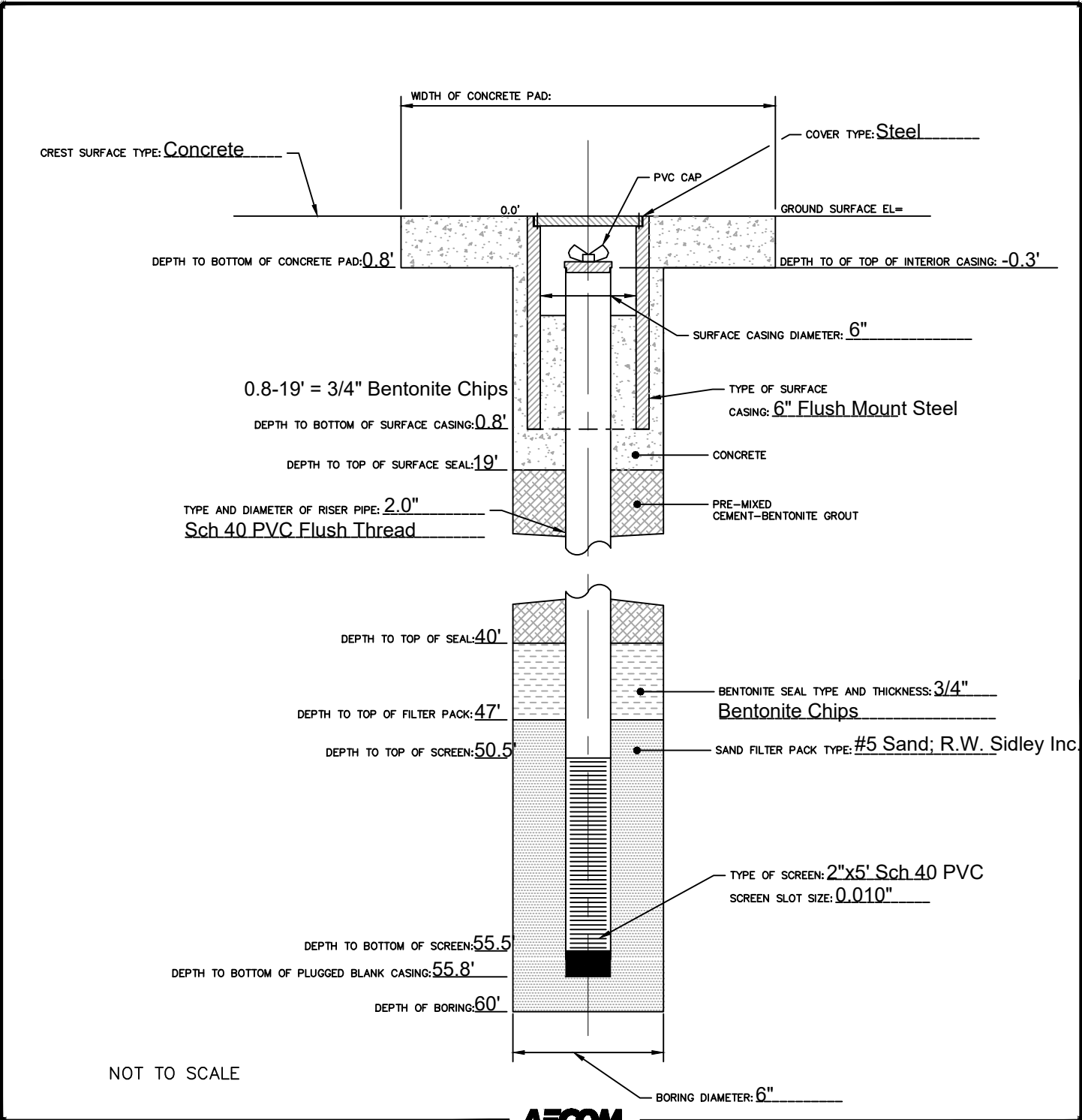


NOT TO SCALE

Project: Dynegy
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

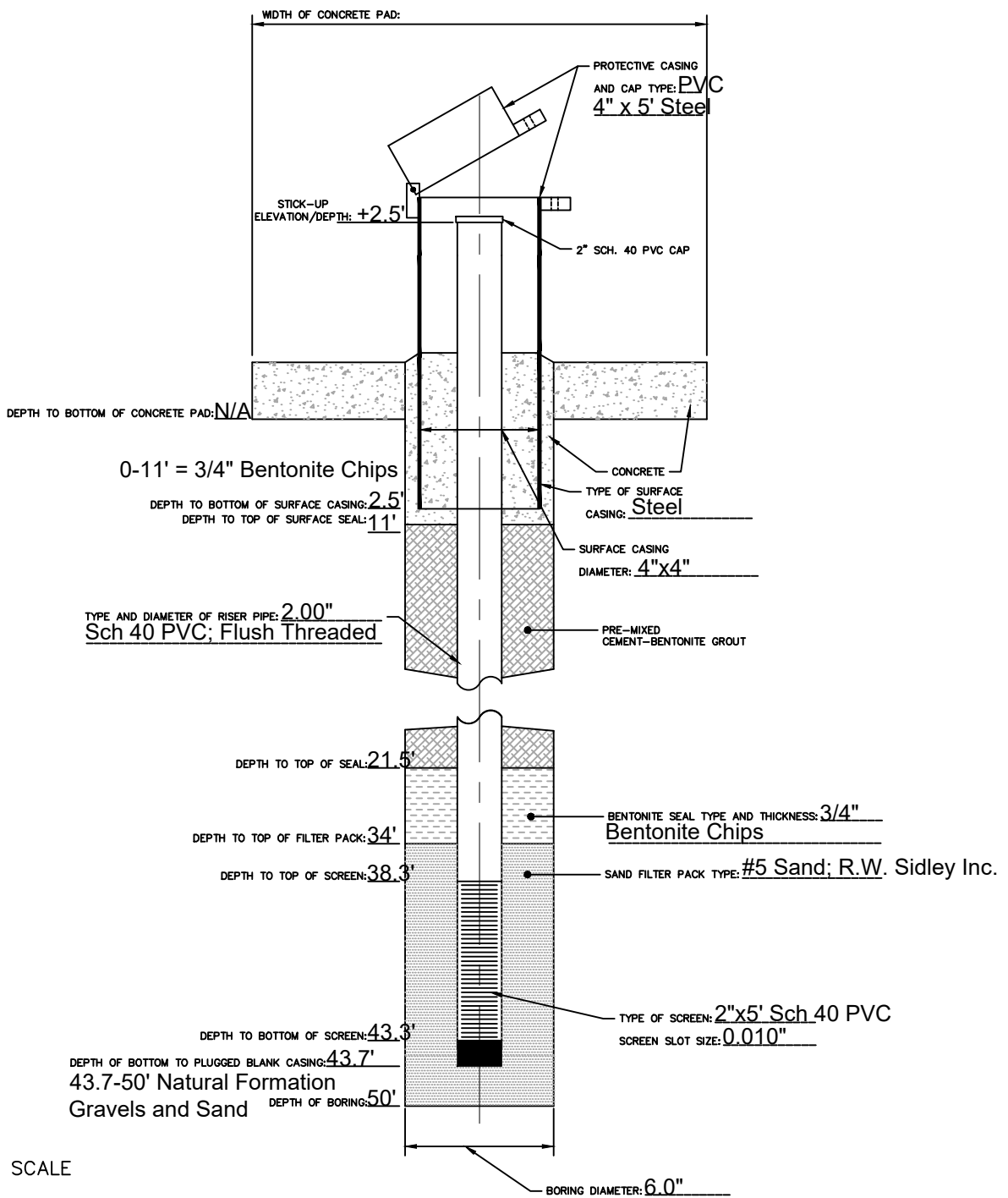
Piezometer Location P005	Date Installed 10/20/15	Time 4:30 P.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 60'
Method of Installation 6" Tricone Mud Rotary	Drilling Contractor Strata	Surface Elevation
Screened Interval 50.5-55.5'	Completion Zone Gravels and Sands	
Remarks	Groundwater Level(s) 45.80' T.O.C.	



Project: Dynegy
 Project Location: Hennepin, IL
 Project Number: 60439752

Log of Piezometer
 Sheet 1 of 1

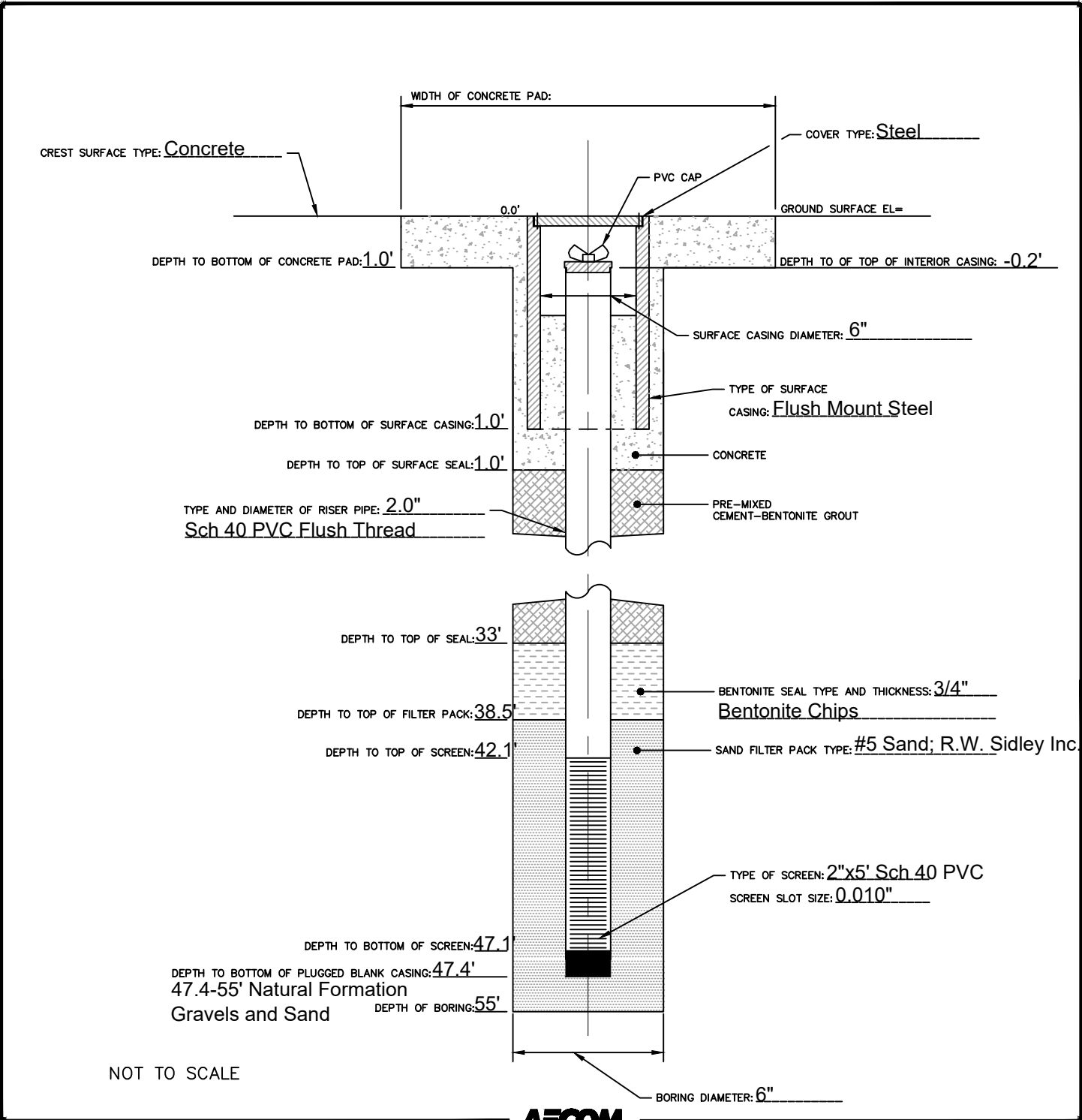
Piezometer Location	P006	Date Installed	10/20/15	Time	11:20 A.M.
Installed By	Scott Komen	Observed By	R. Weseljak	Total Depth	50'
Method of Installation	6" Tricone Mud Rotary	Drilling Contractor	Strata	Surface Elevation	
Screened Interval	38.3-43.3'	Completion Zone	Gravel		
Remarks	Groundwater Level(s) 45.74' T.O.C.				



NOT TO SCALE

Project: Dynegy	Log of Piezometer	
Project Location: Hennepin, IL	Sheet 1 of 1	
Project Number: 60439752		

Piezometer Location P007	Date Installed 10/21/15	Time 5:00 P.M.
Installed By Scott Komen	Observed By R. Weseljak	Total Depth 55'
Method of Installation 6" Tricone Mud Rotary	Drilling Contractor Strata	Surface Elevation
Screened Interval 42.1-47.1'	Completion Zone Gravels	
Remarks	Groundwater Level(s) 44.65' T.O.C.	



APPENDIX C



AECOM

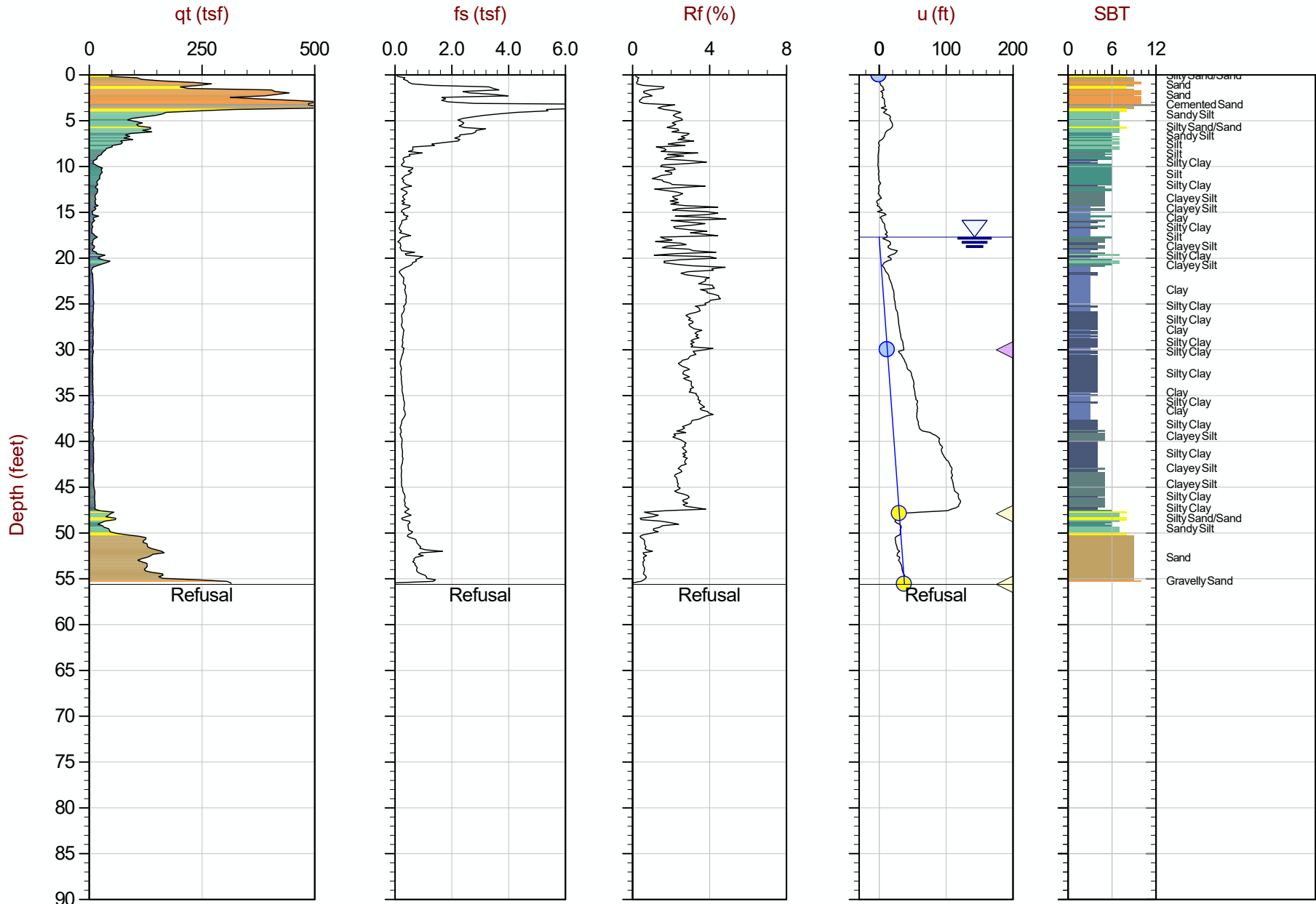
Job No: 15-53081

Date: 09:10:15 08:58

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C002

Cone: 301:T1500F15U500



Max Depth: 16.950 m / 55.61 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP02.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574662m E: 305168m



AECOM

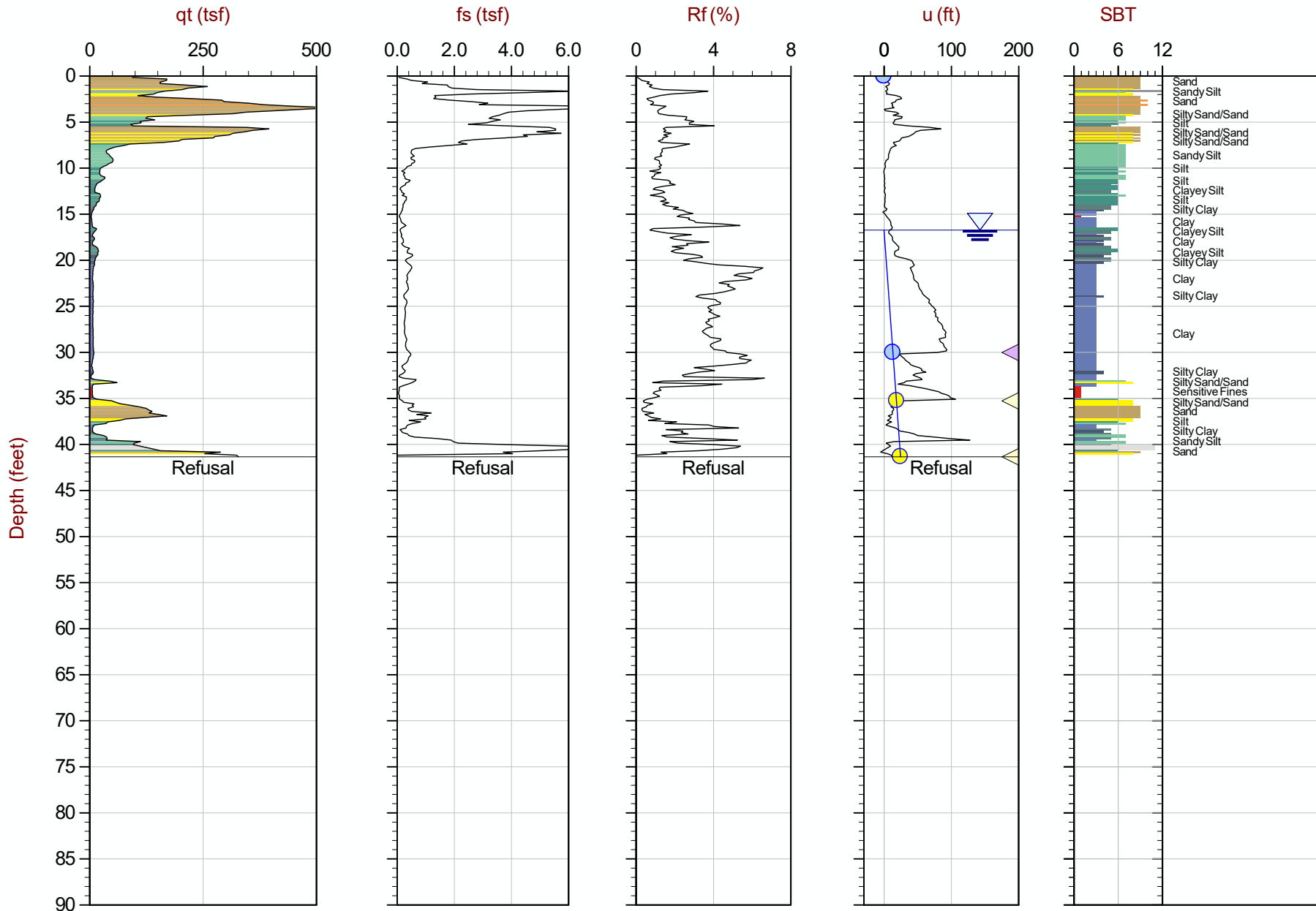
Job No: 15-53081

Date: 09:03:15 12:09

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C004

Cone: 301:T1500F15U500



Max Depth: 12.600 m / 41.34 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP04.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574765m E: 305345m



AECOM

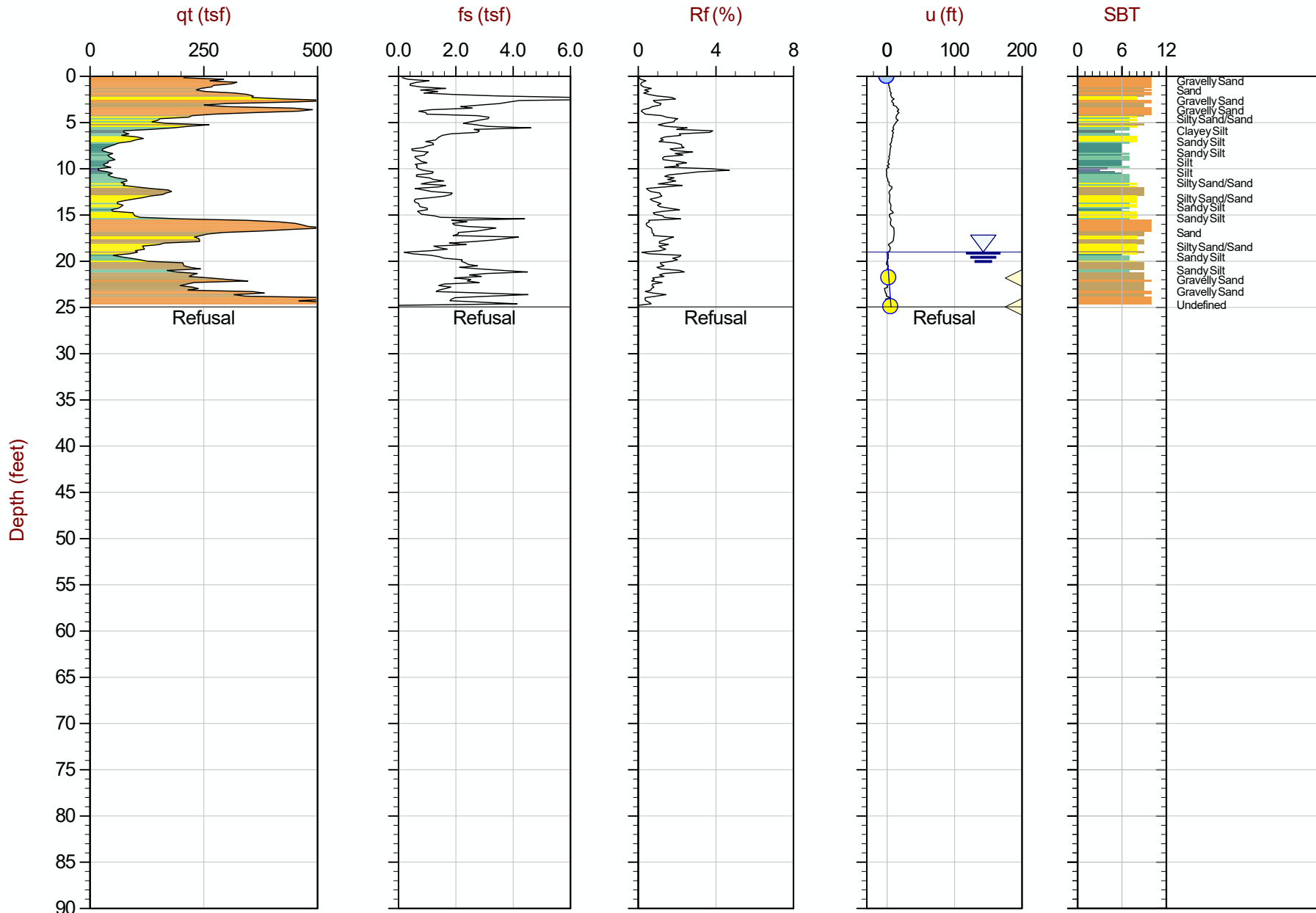
Job No: 15-53081

Date: 09:03:15 09:08

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005

Cone: 301:T1500F15U500



Max Depth: 7.600 m / 24.93 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP05.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574883m E: 305653m



AECOM

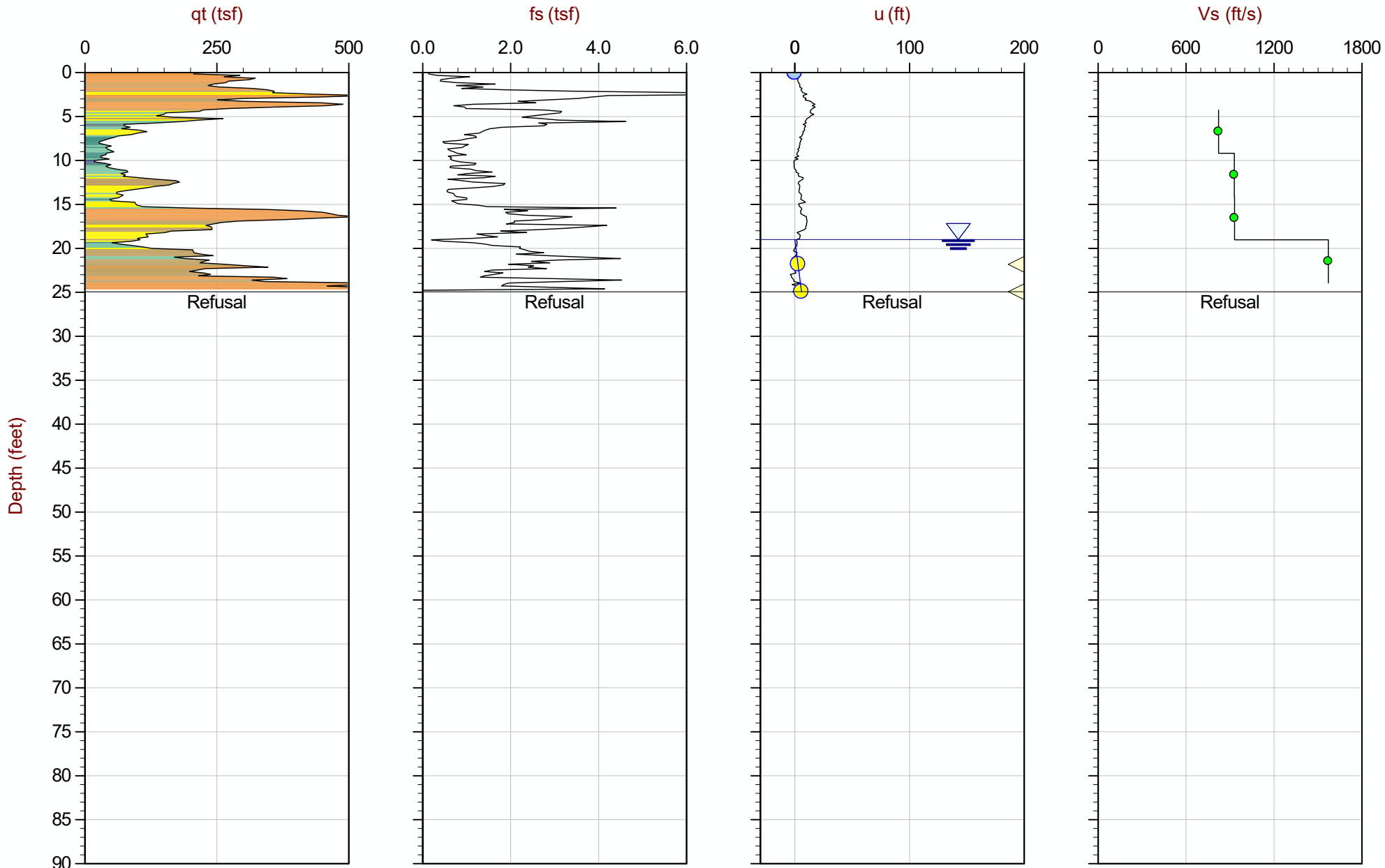
Job No: 15-53081

Date: 09:03:15 09:08

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005

Cone: 301:T1500F15U500



Max Depth: 7.600 m / 24.93 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP05.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574883m E: 305653m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

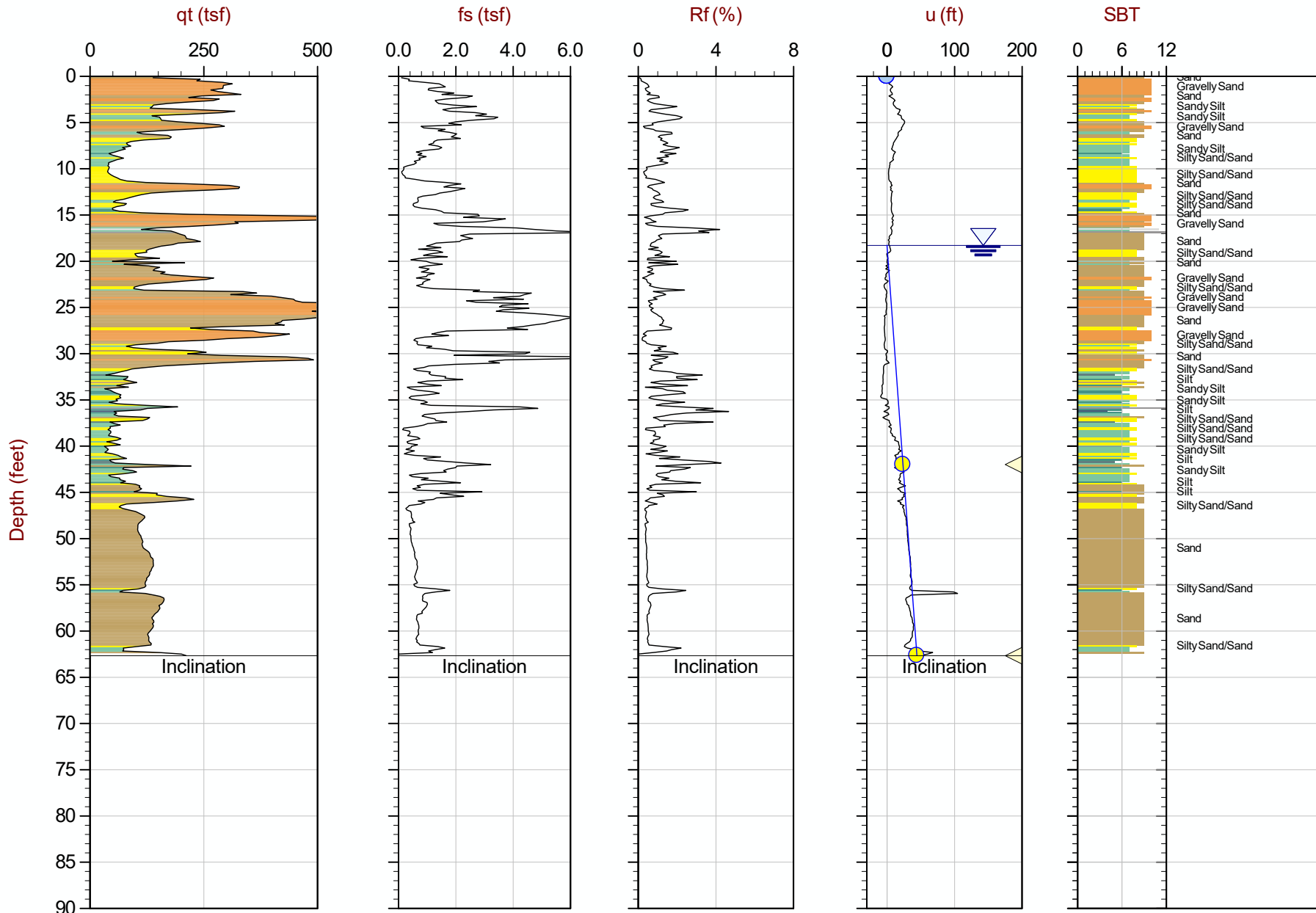
Job No: 15-53081

Date: 09:03:15 10:10

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005A

Cone: 301:T1500F15U500



Max Depth: 19.100 m / 62.66 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP05A.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574883m E: 305655m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

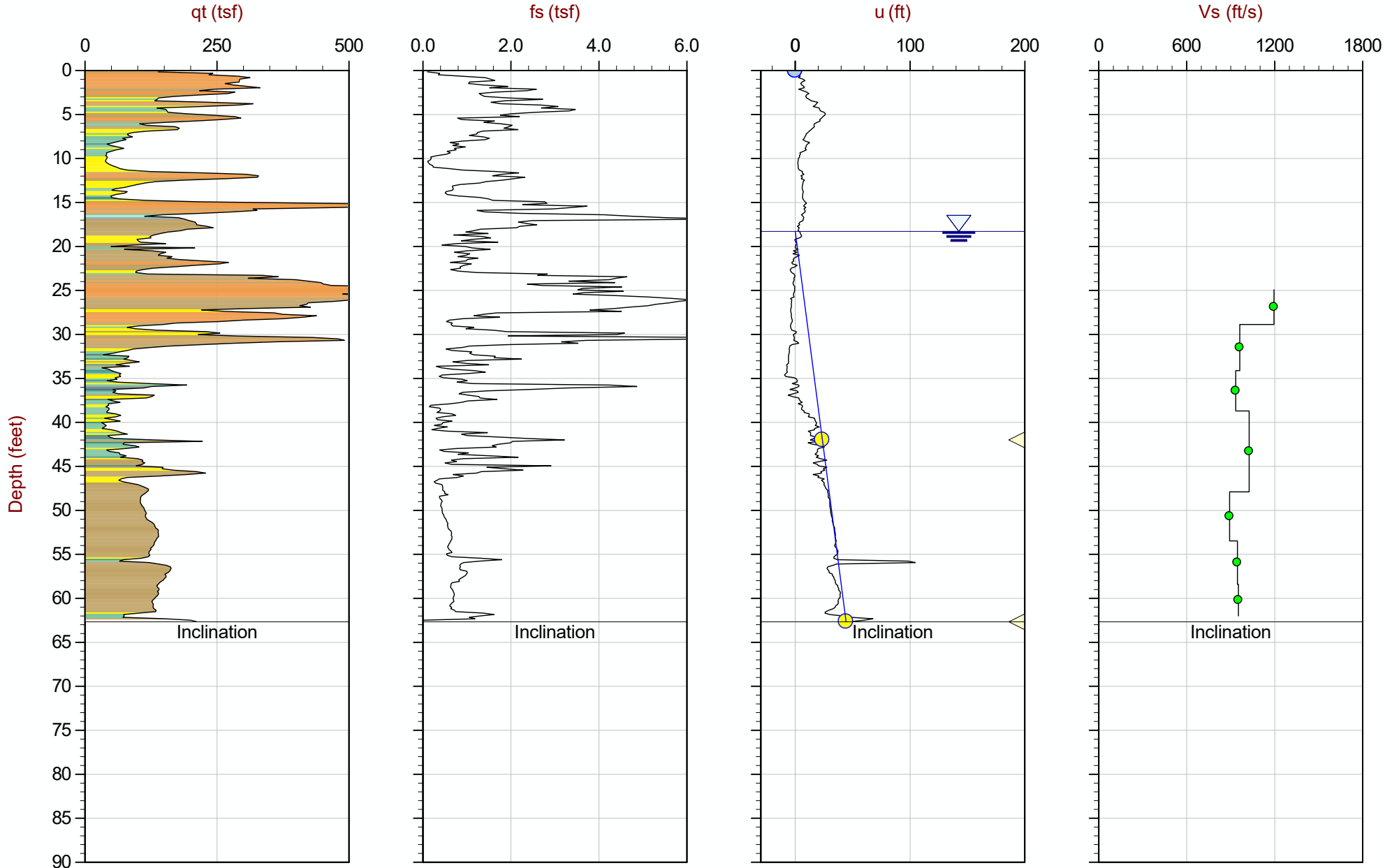
Job No: 15-53081

Date: 09:03:15 10:10

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005A

Cone: 301:T1500F15U500



Max Depth: 19.100 m / 62.66 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP05A.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574883m E: 305655m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

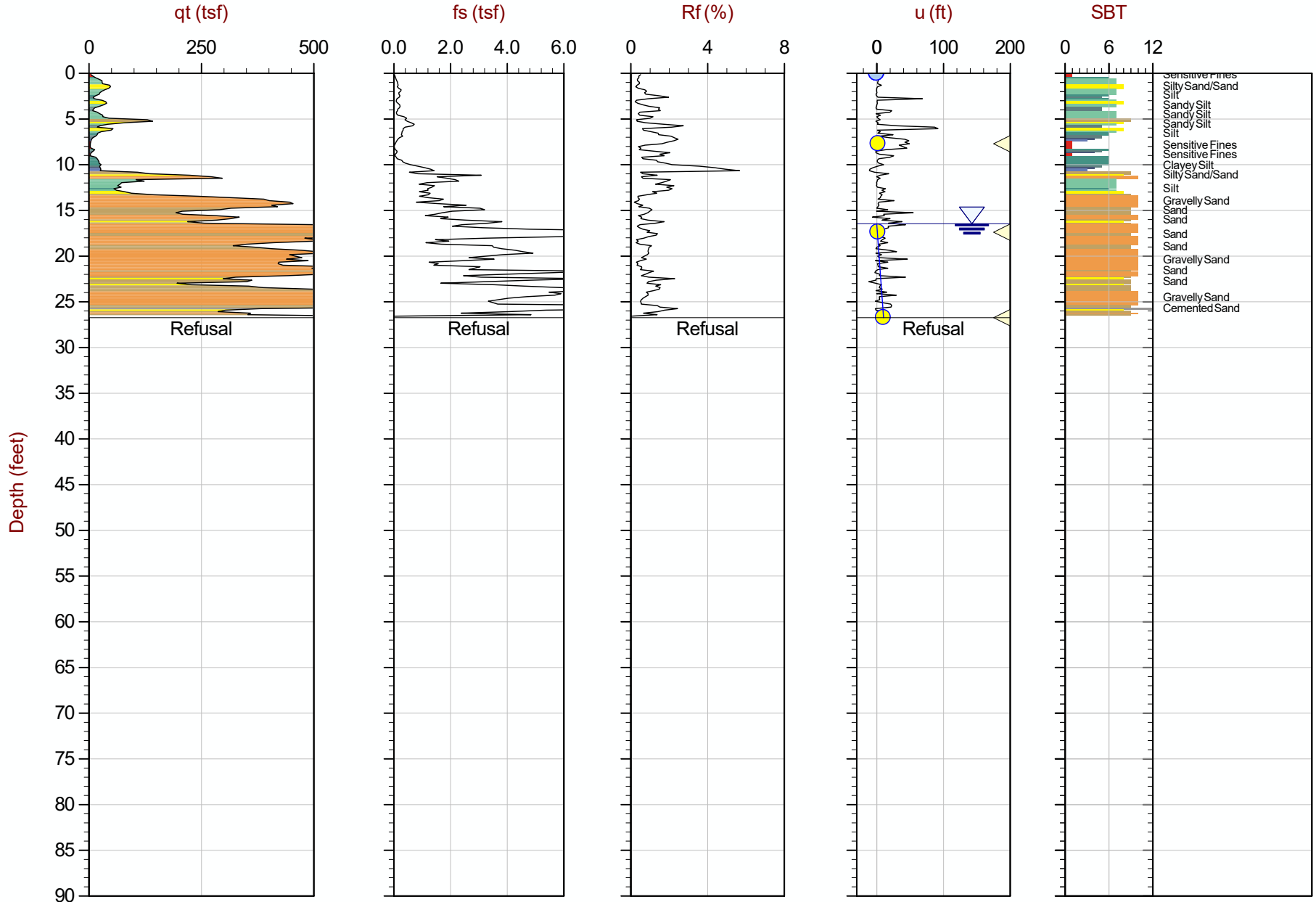
Job No: 15-53081

Date: 09:03:15 13:48

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C006

Cone: 374:T1500F15U500



Max Depth: 8.150 m / 26.74 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP06.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574762m E: 305708m



AECOM

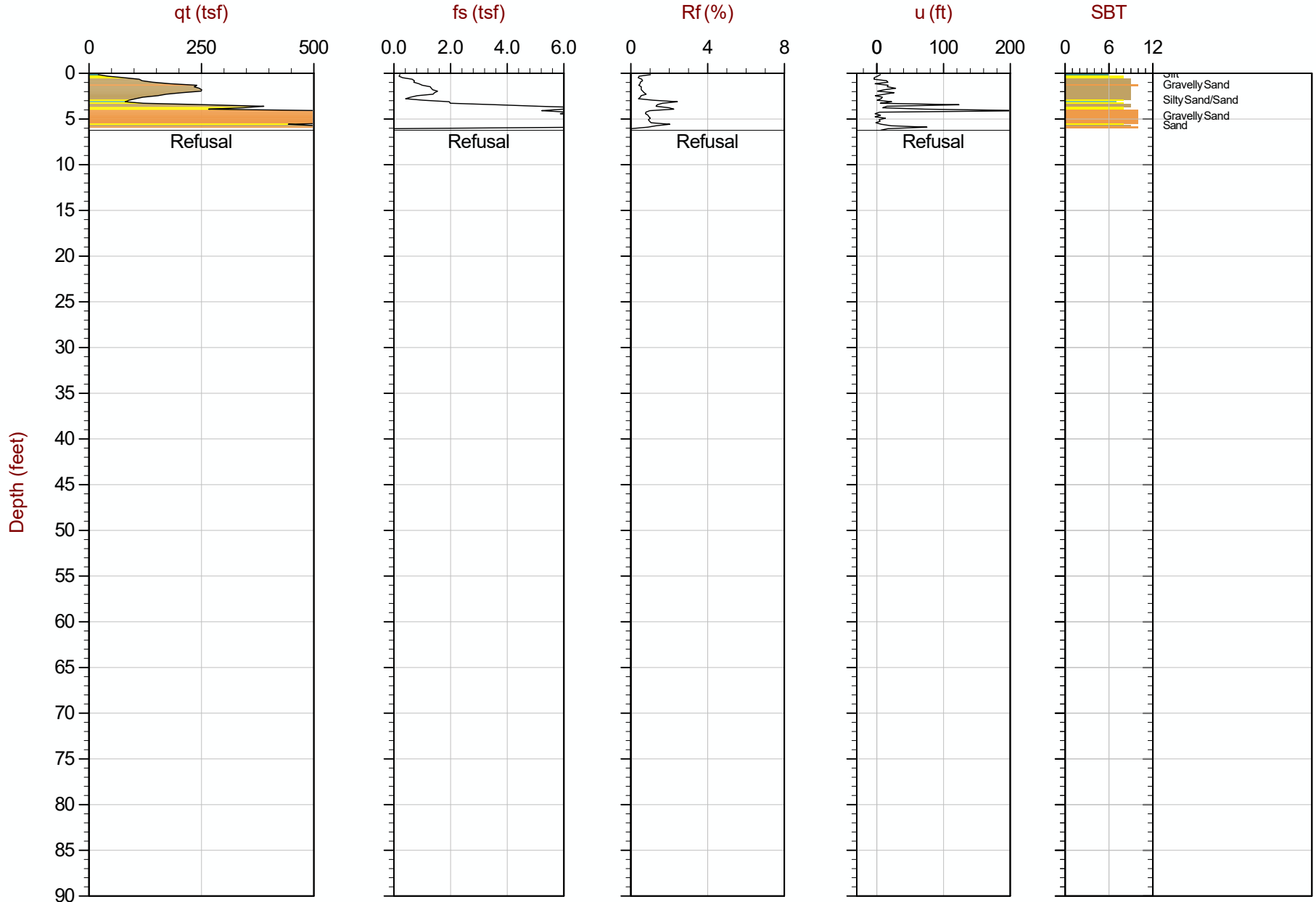
Job No: 15-53081

Date: 09:09:15 09:10

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C007

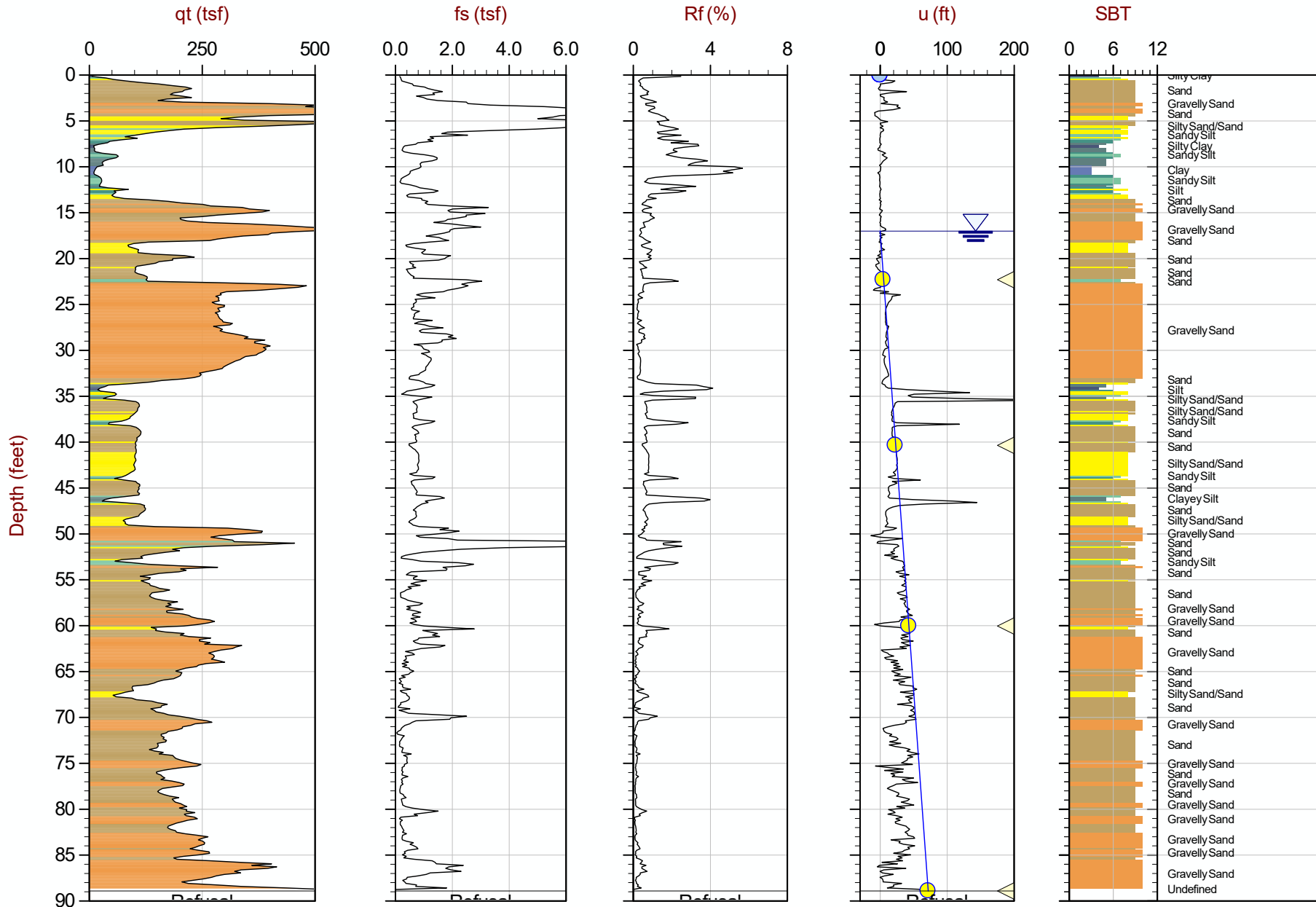
Cone: 374:T1500F15U500



Max Depth: 1.900 m / 6.23 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_SP07.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574759m E: 305719m



Depth (feet)

Max Depth: 27.100 m / 88.91 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP07B.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574758m E: 305719m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

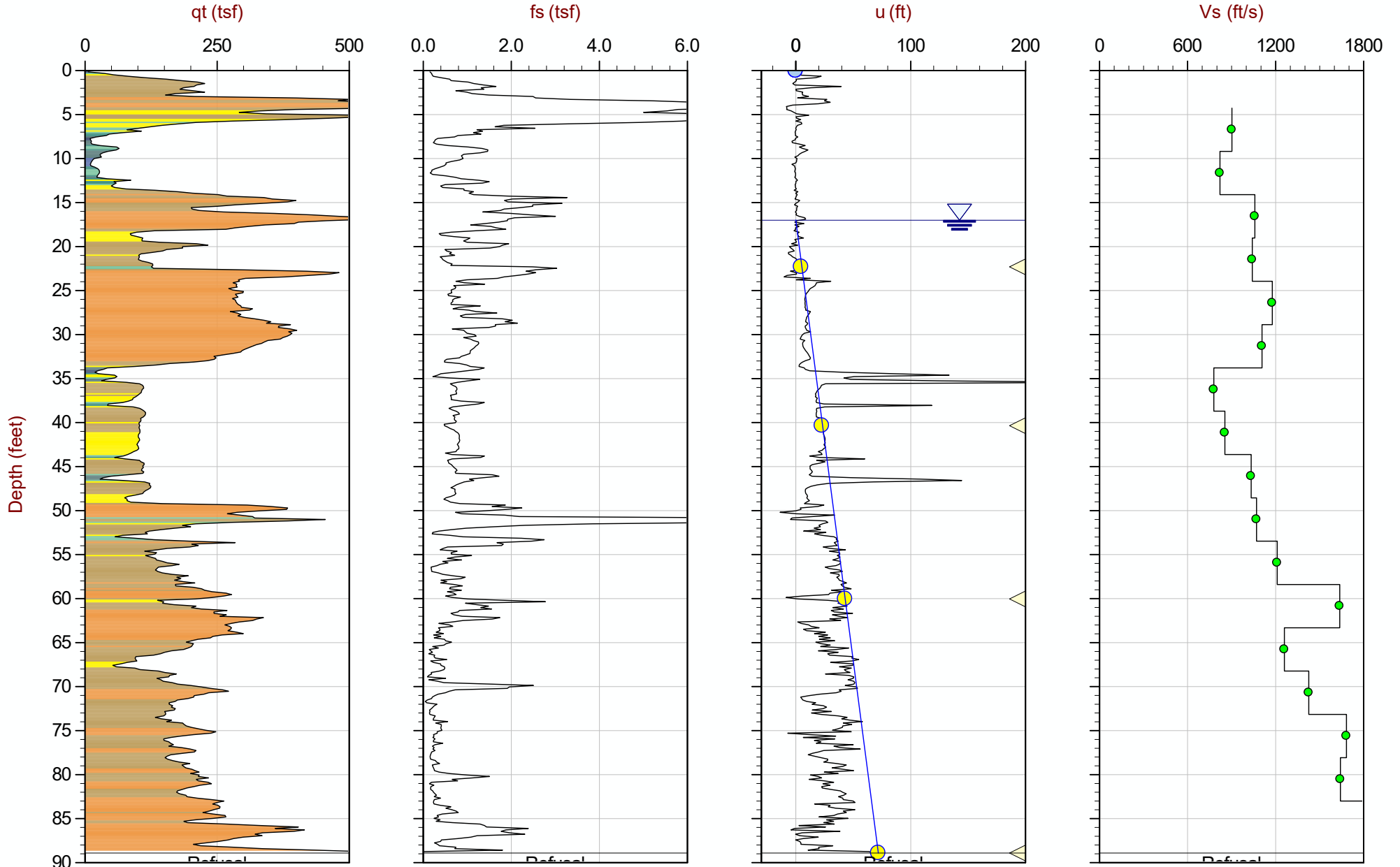
Job No: 15-53081

Date: 09:09:15 09:54

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C007B

Cone: 374:T1500F15U500



Max Depth: 27.100 m / 88.91 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP07B.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574758m E: 305719m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

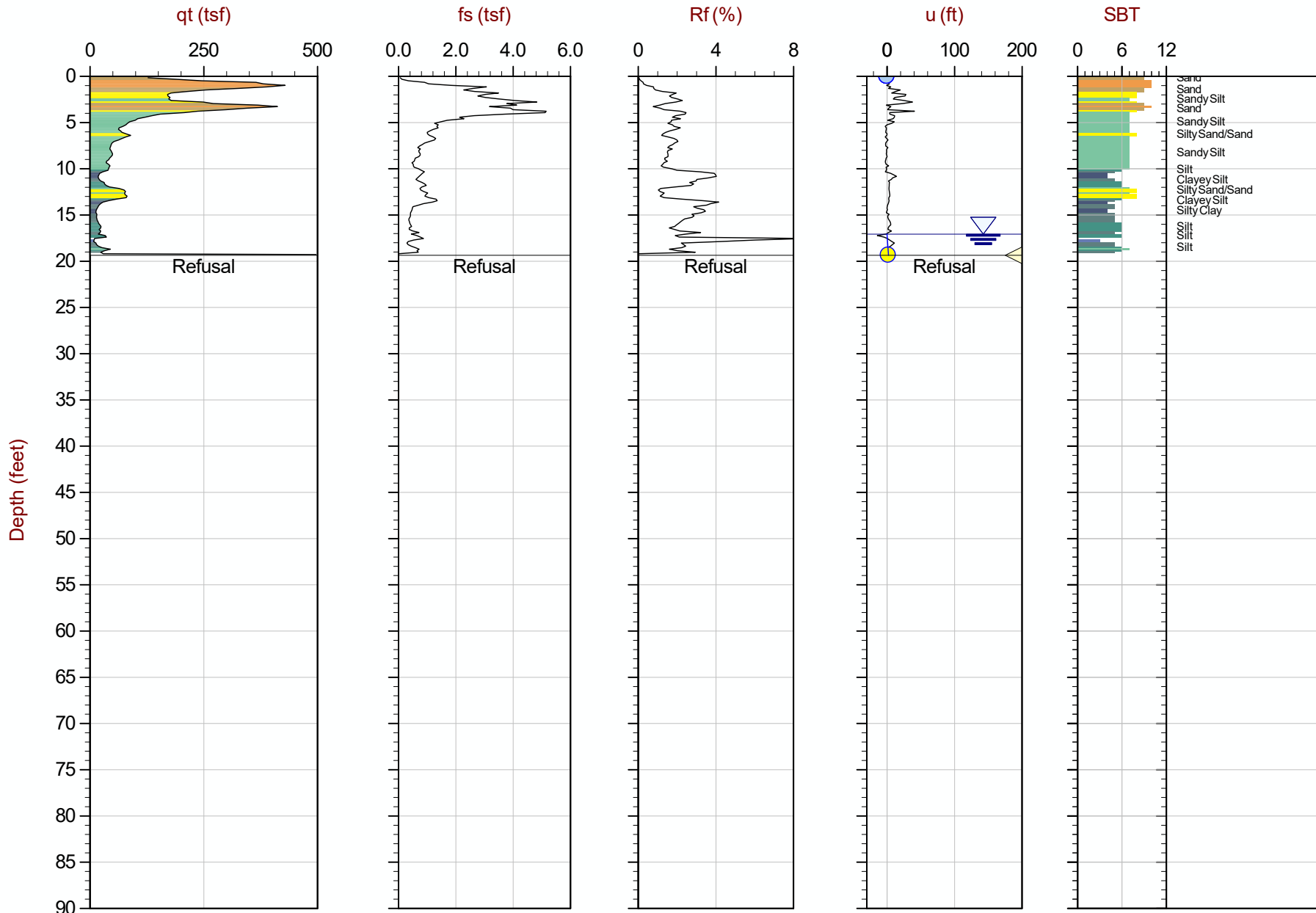
Job No: 15-53081

Date: 09:11:15 09:31

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008

Cone: 374:T1500F15U500



Max Depth: 5.900 m / 19.36 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP08.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574579m E: 305555m



AECOM

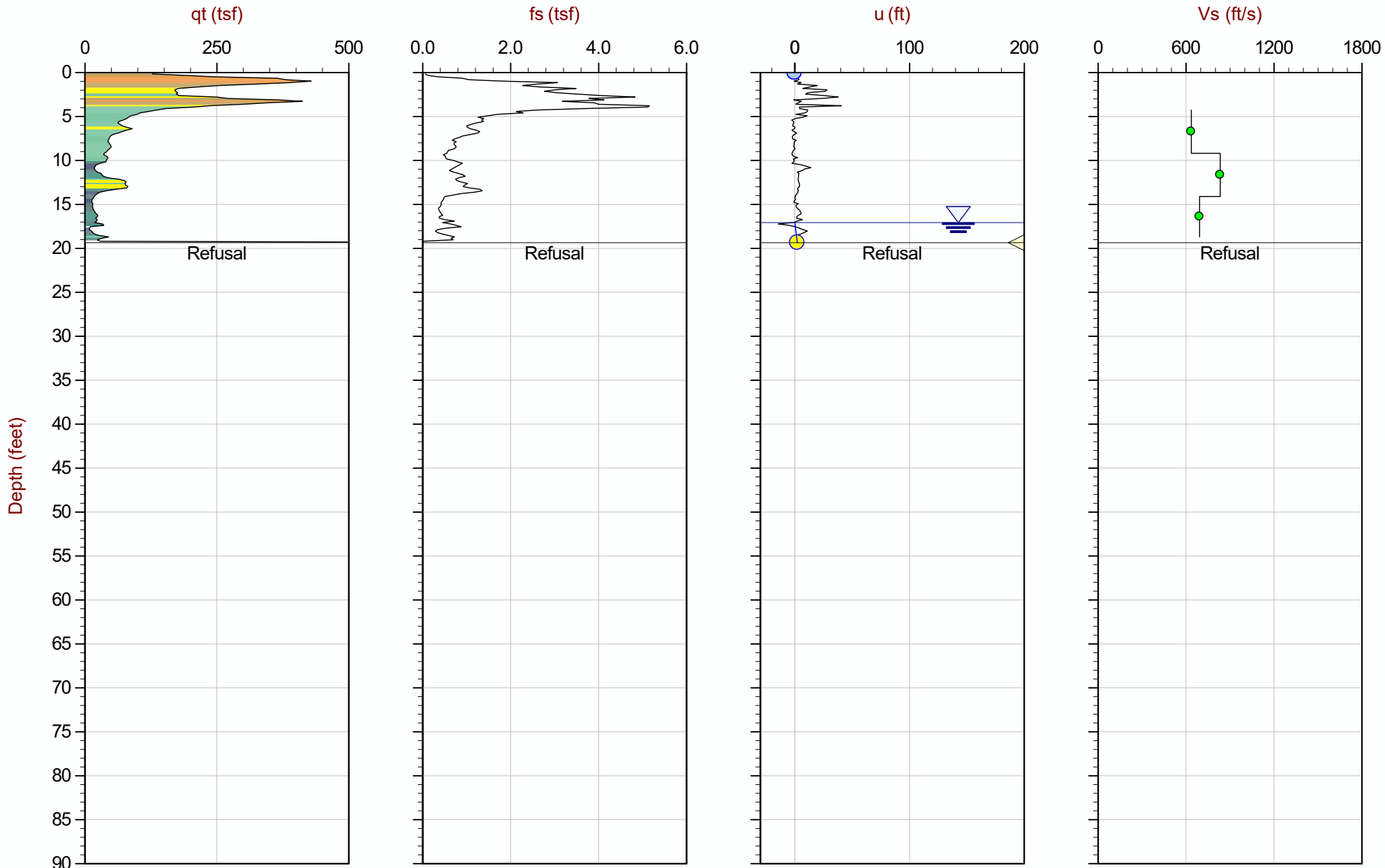
Job No: 15-53081

Date: 09:11:15 09:31

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008

Cone: 374:T1500F15U500



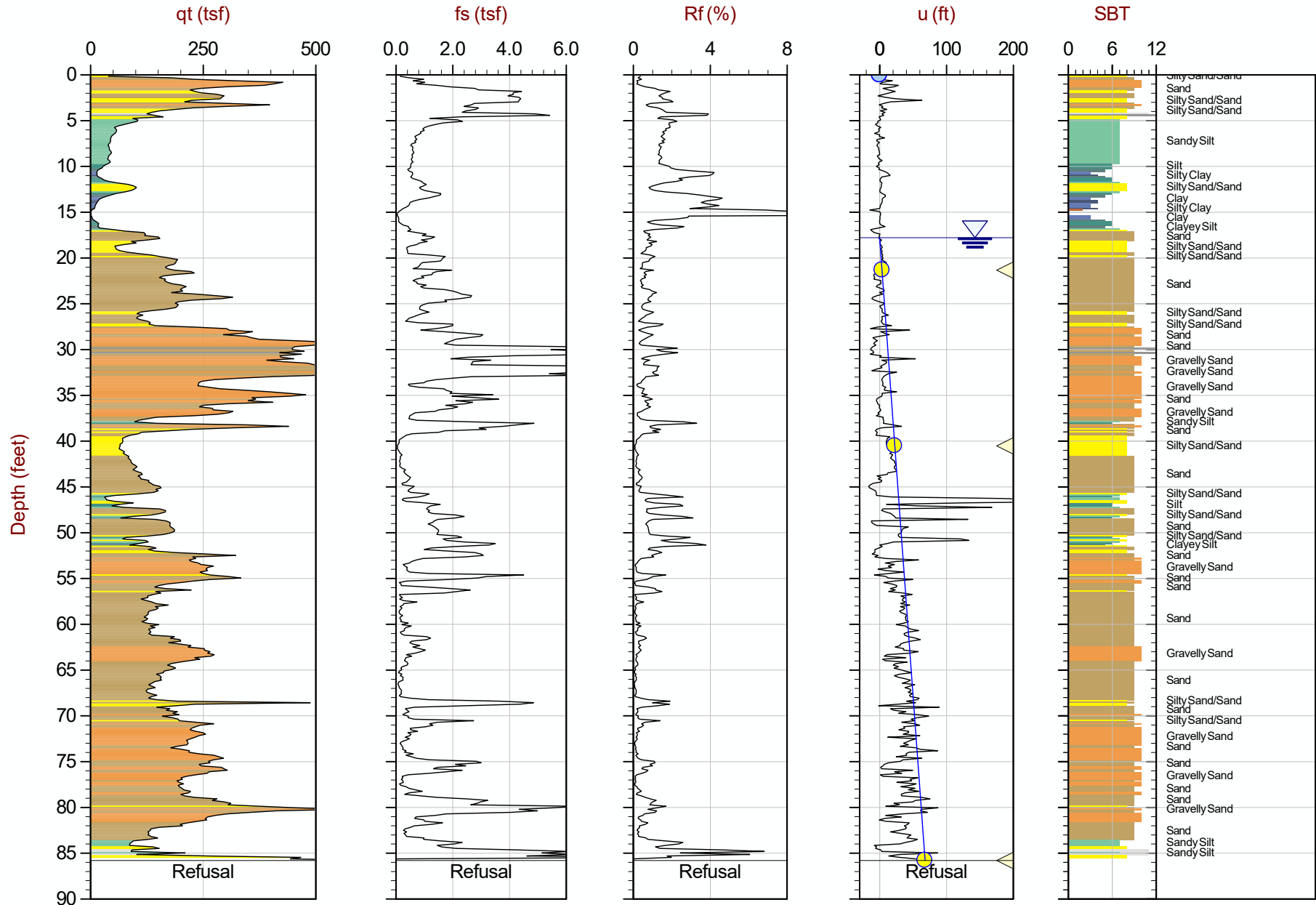
Max Depth: 5.900 m / 19.36 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP08.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574579m E: 305555m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Max Depth: 26.150 m / 85.79 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP08B.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574578m E: 305559m



AECOM

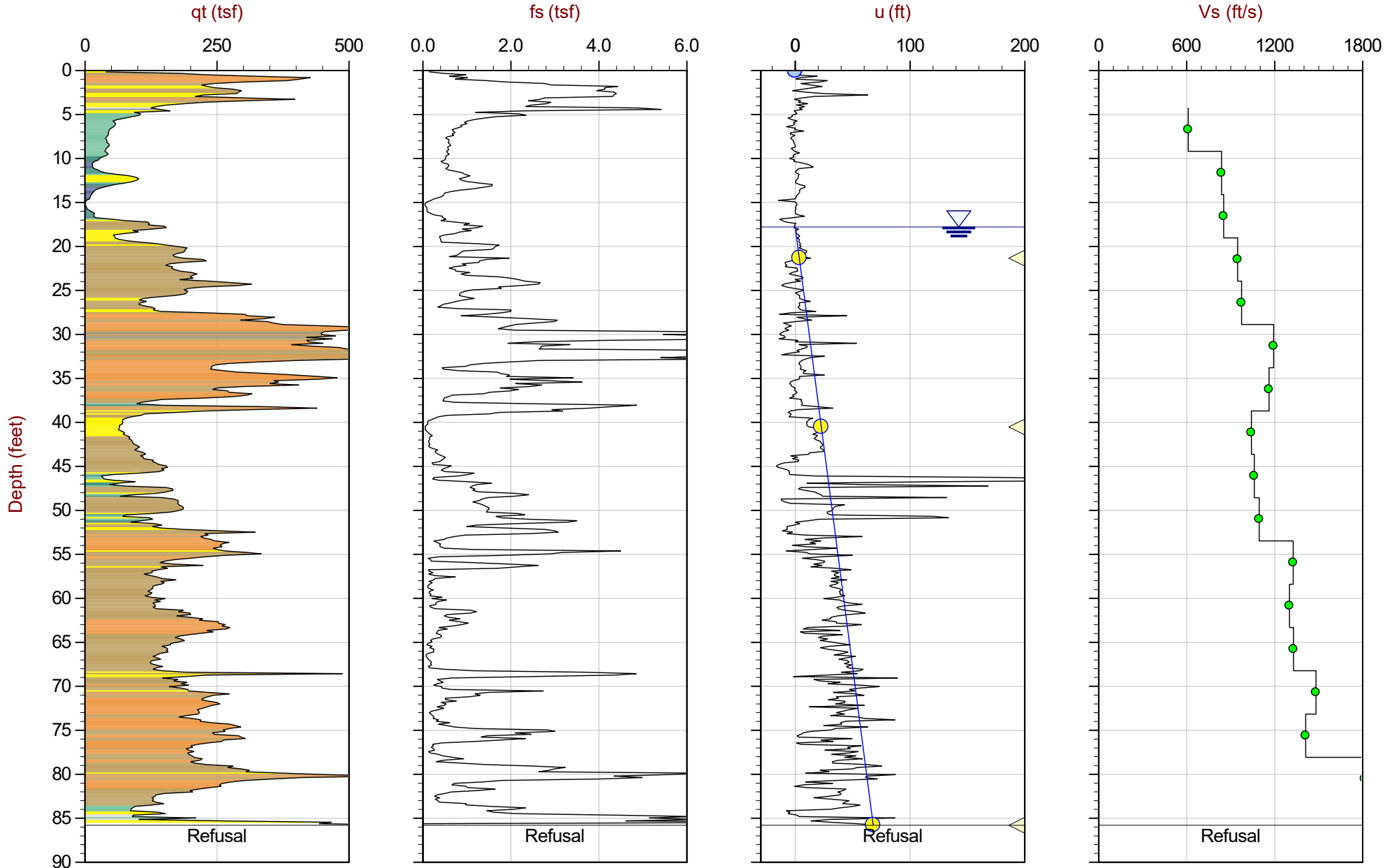
Job No: 15-53081

Date: 09:11:15 10:25

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008B

Cone: 374:T1500F15U500



Max Depth: 26.150 m / 85.79 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP08B.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574578m E: 305559m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

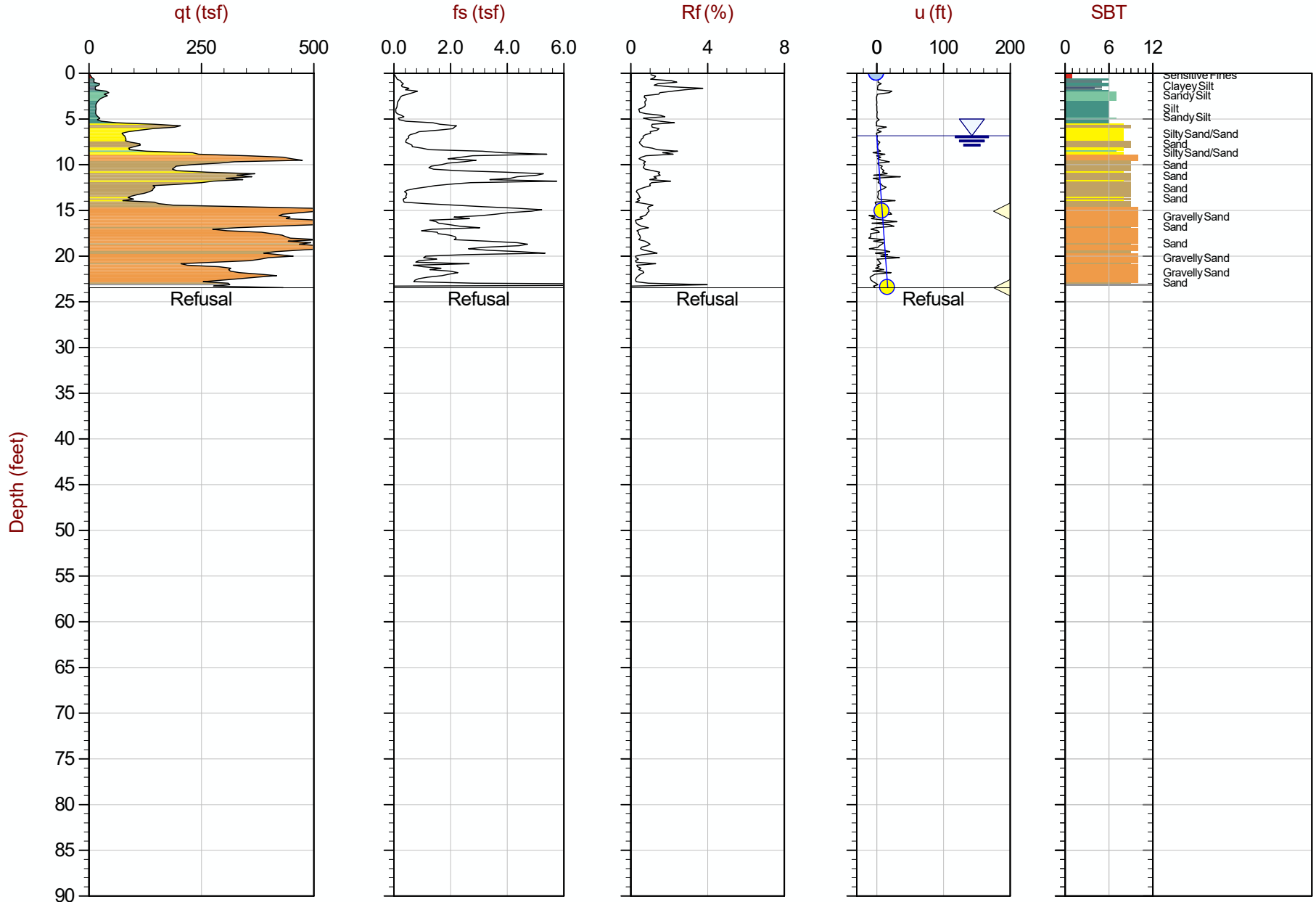
Job No: 15-53081

Date: 09:10:15 14:28

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C009

Cone: 374:T1500F15U500



Max Depth: 7.150 m / 23.46 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: EveryPoint

File: 15-53081_CP09.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 16 N: 4574570m E: 305552m



AECOM

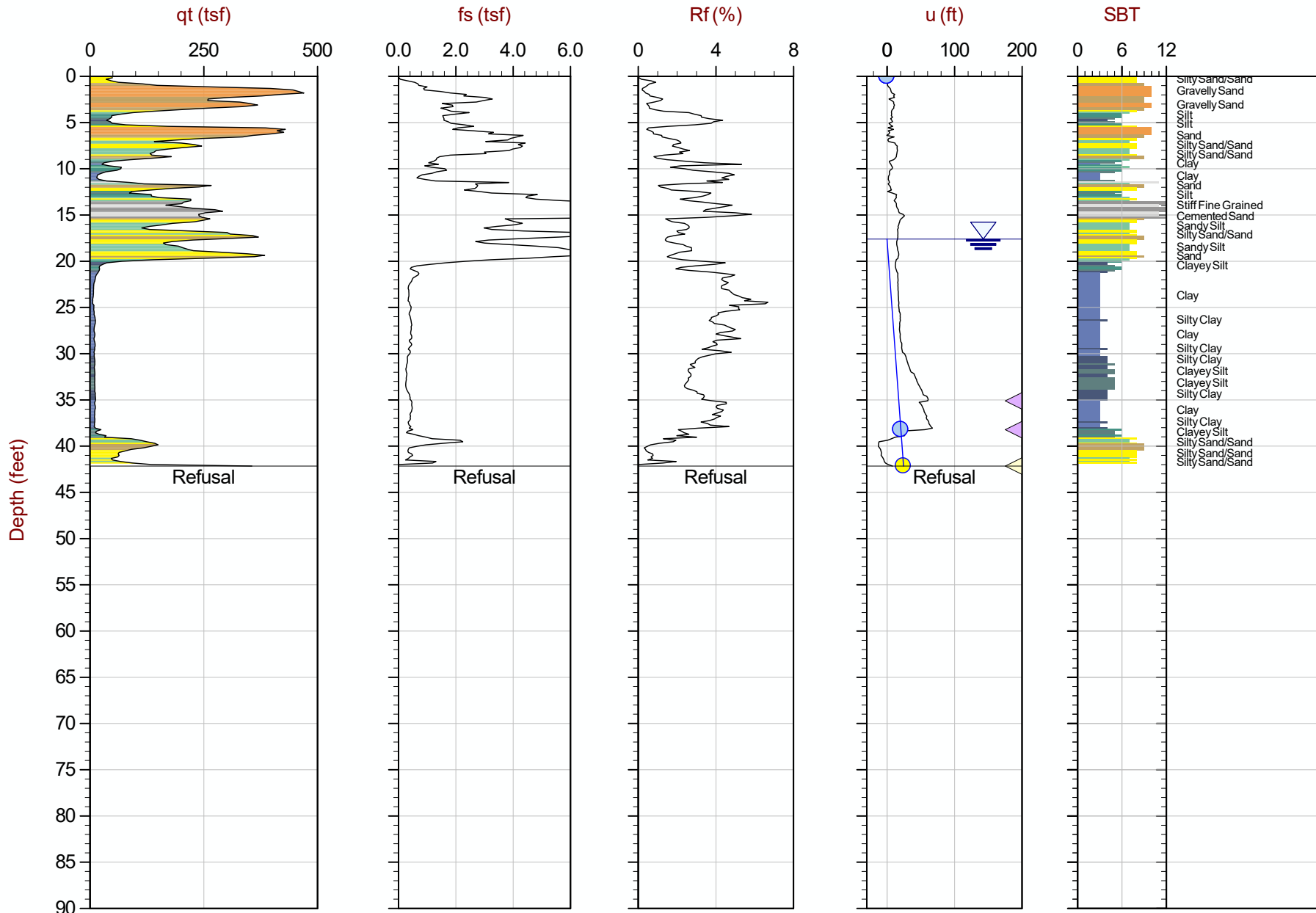
Job No: 15-53081

Date: 09:11:15 09:08

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C010

Cone: 301:T1500F15U500



Max Depth: 12.850 m / 42.16 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP10.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574593m E: 305262m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

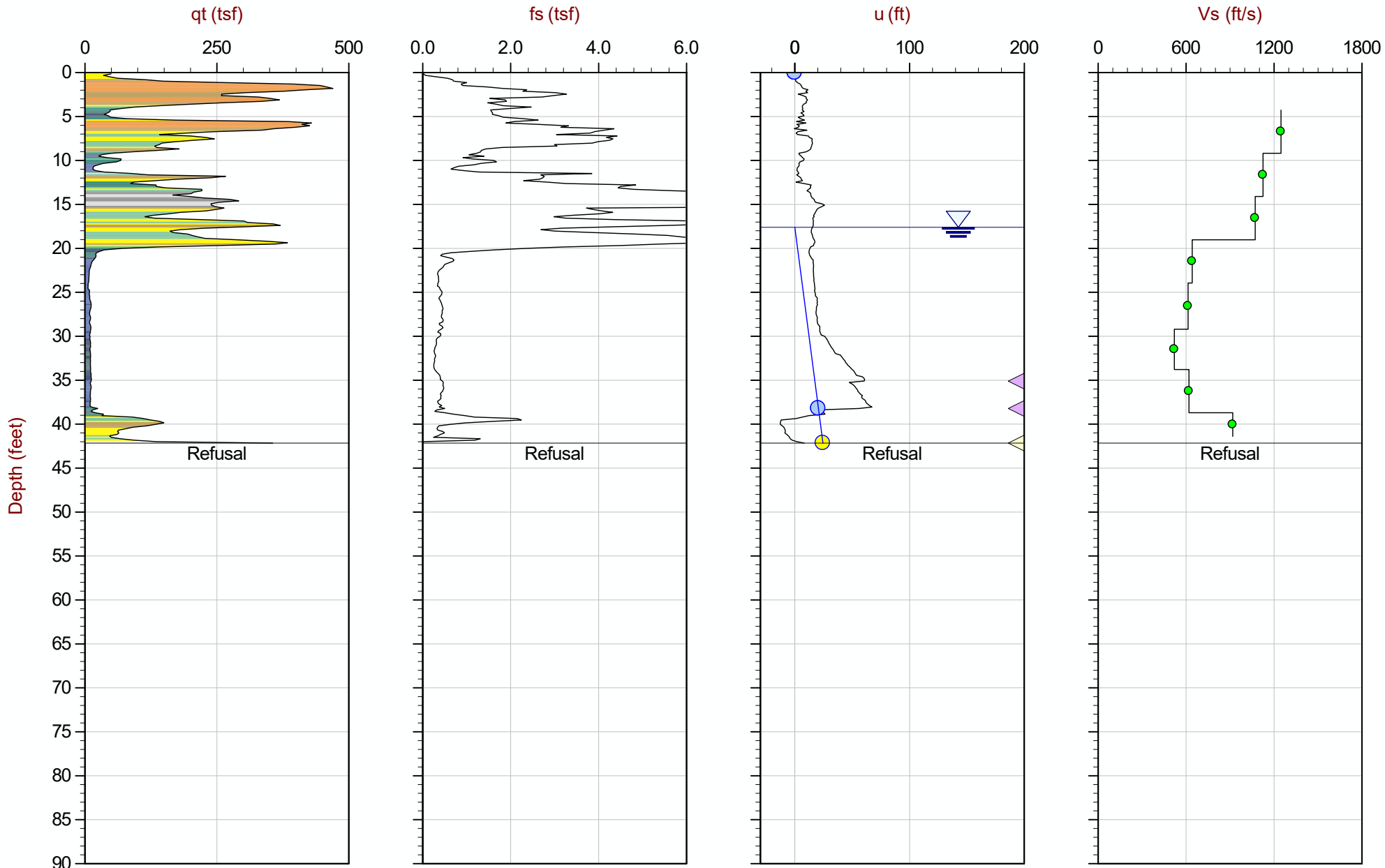
Job No: 15-53081

Date: 09:11:15 09:08

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C010

Cone: 301:T1500F15U500



Max Depth: 12.850 m / 42.16 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP10.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574593m E: 305262m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

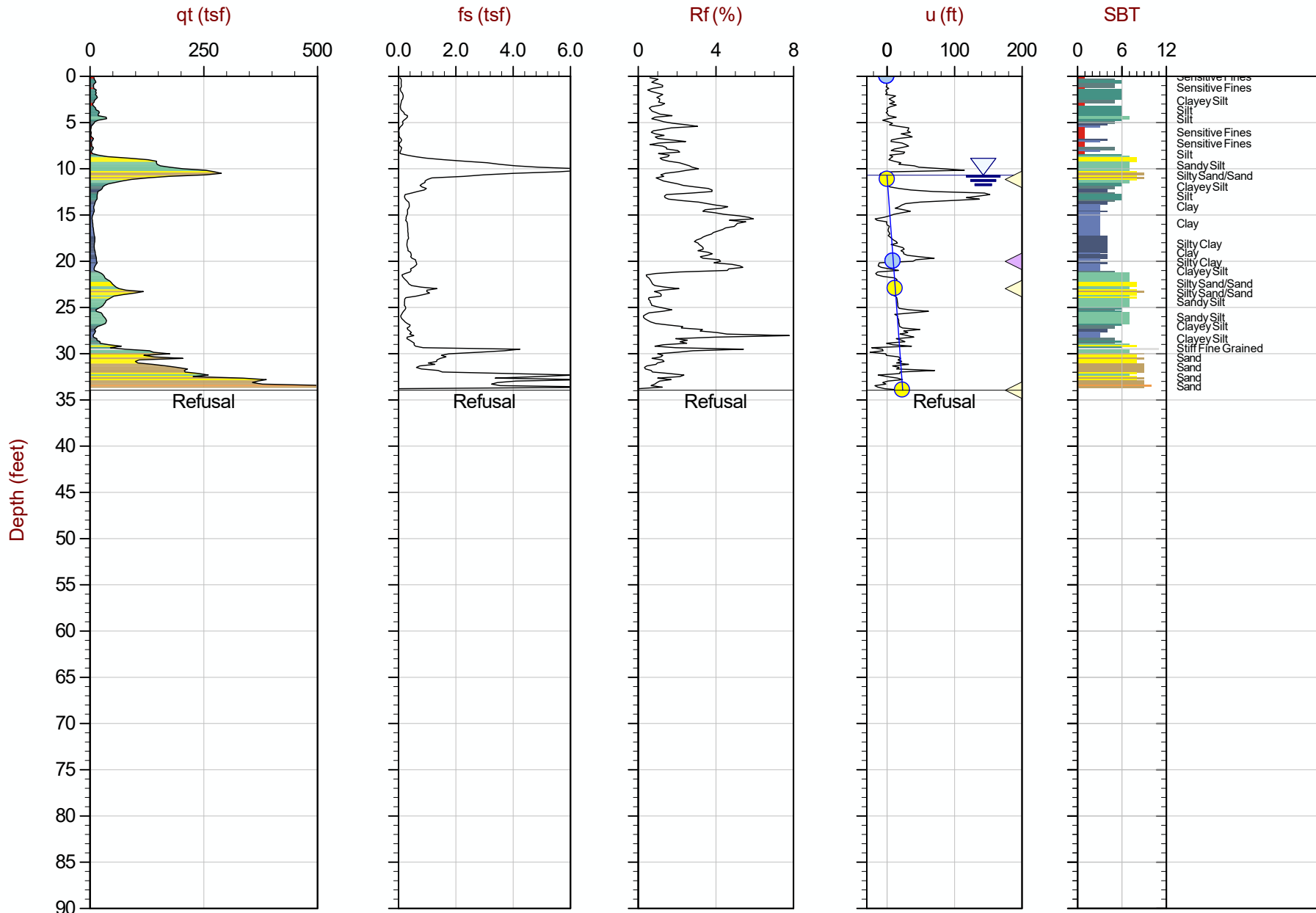
Job No: 15-53081

Date: 09:10:15 09:34

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C012

Cone: 374:T1500F15U500



Max Depth: 10.350 m / 33.96 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP12.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574689m E: 305353m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

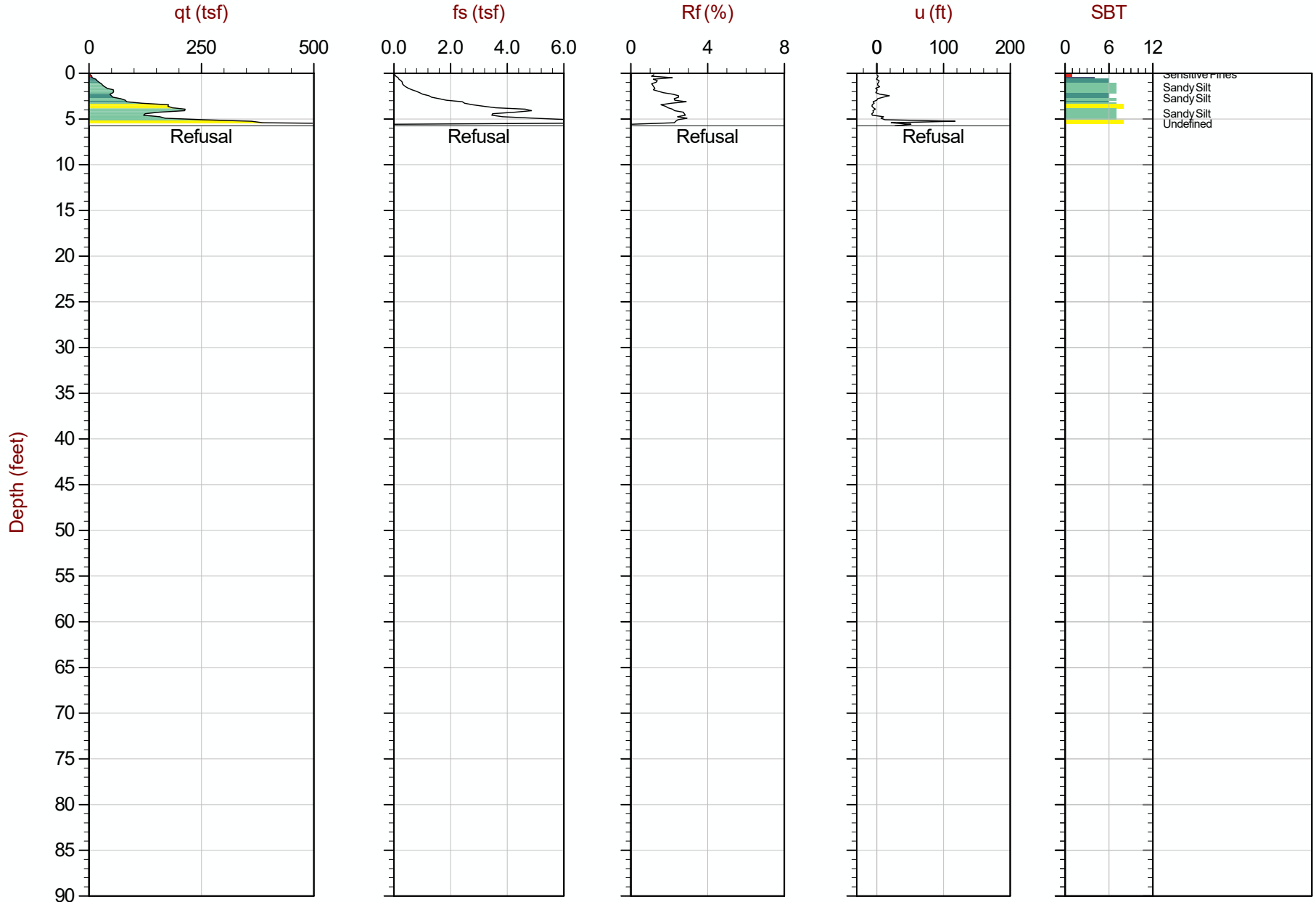
Job No: 15-53081

Date: 09:09:15 14:37

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C013

Cone: 374:T1500F15U500



Max Depth: 1.750 m / 5.74 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_SP13.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574687m E: 305500m



AECOM

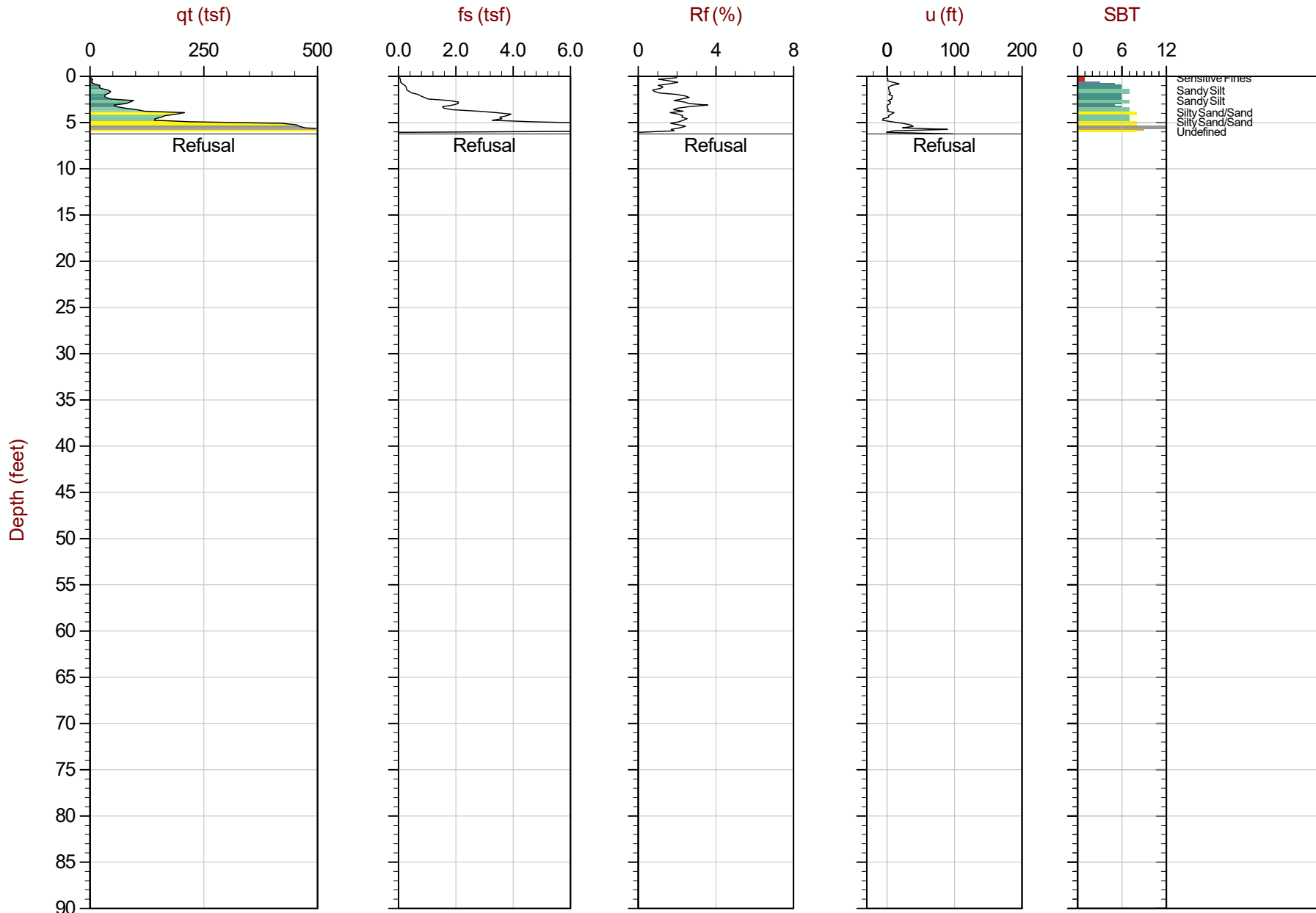
Job No: 15-53081

Date: 09:09:15 15:40

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C013B

Cone: 374:T1500F15U500



Max Depth: 1.900 m / 6.23 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_SP13B.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574690m E: 305498m

100

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

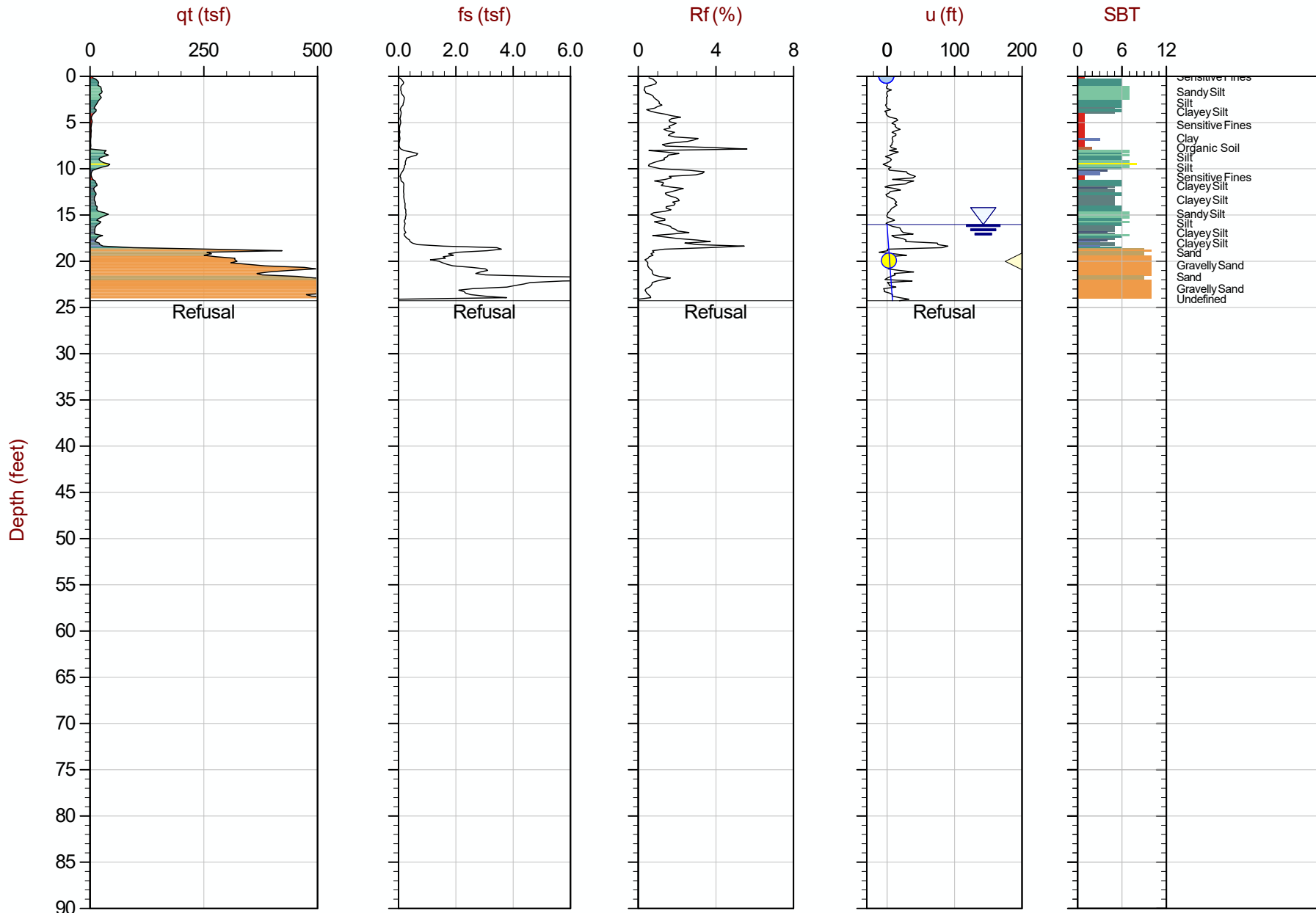
Job No: 15-53081

Date: 09:09:15 13:22

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C014

Cone: 374:T1500F15U500



Max Depth: 7.400 m / 24.28 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP14.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574716m E: 305618m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

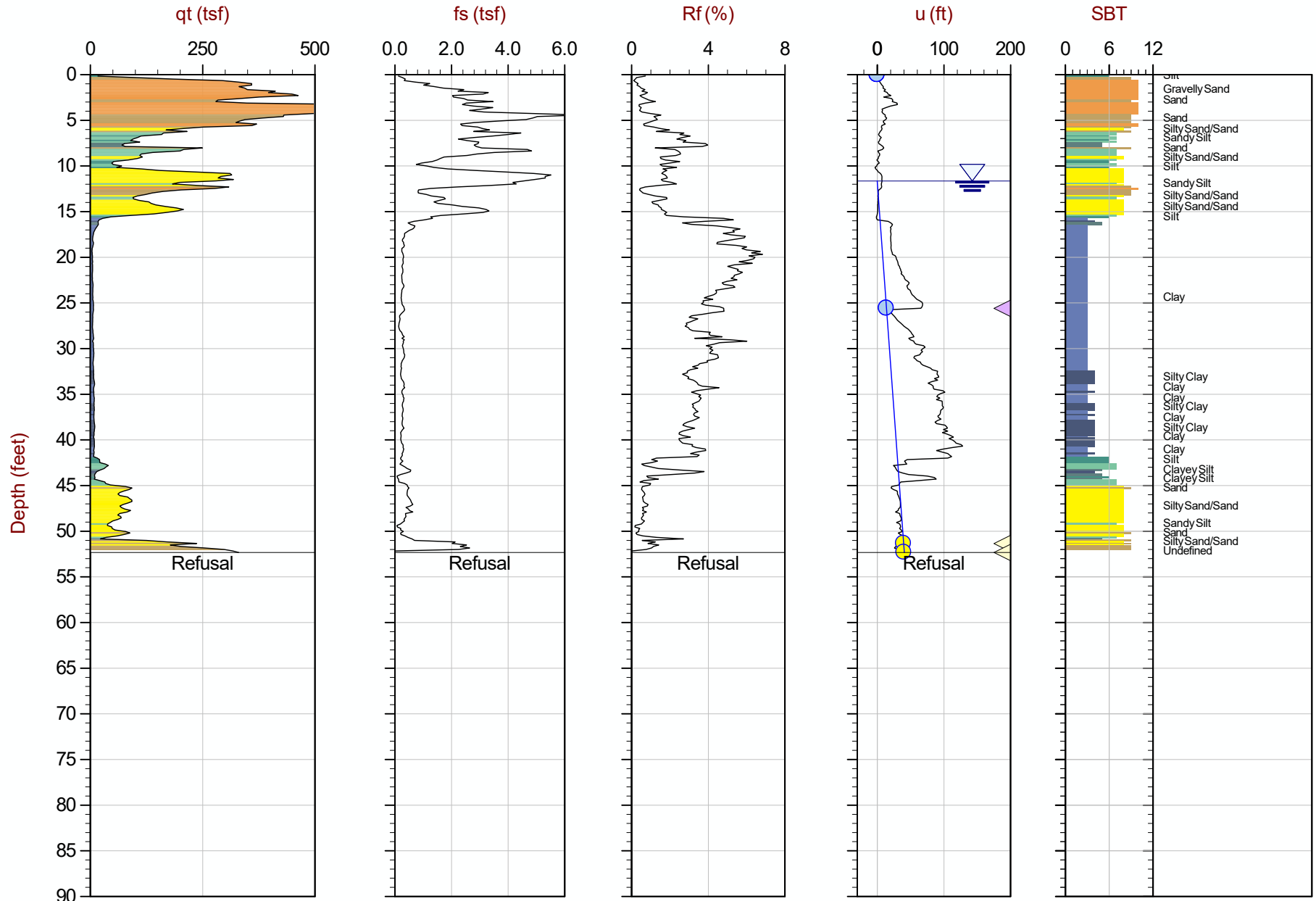
Job No: 15-53081

Date: 09:10:15 14:10

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C015

Cone: 301:T1500F15U500



Max Depth: 15.950 m / 52.33 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP15.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574590m E: 305103m



AECOM

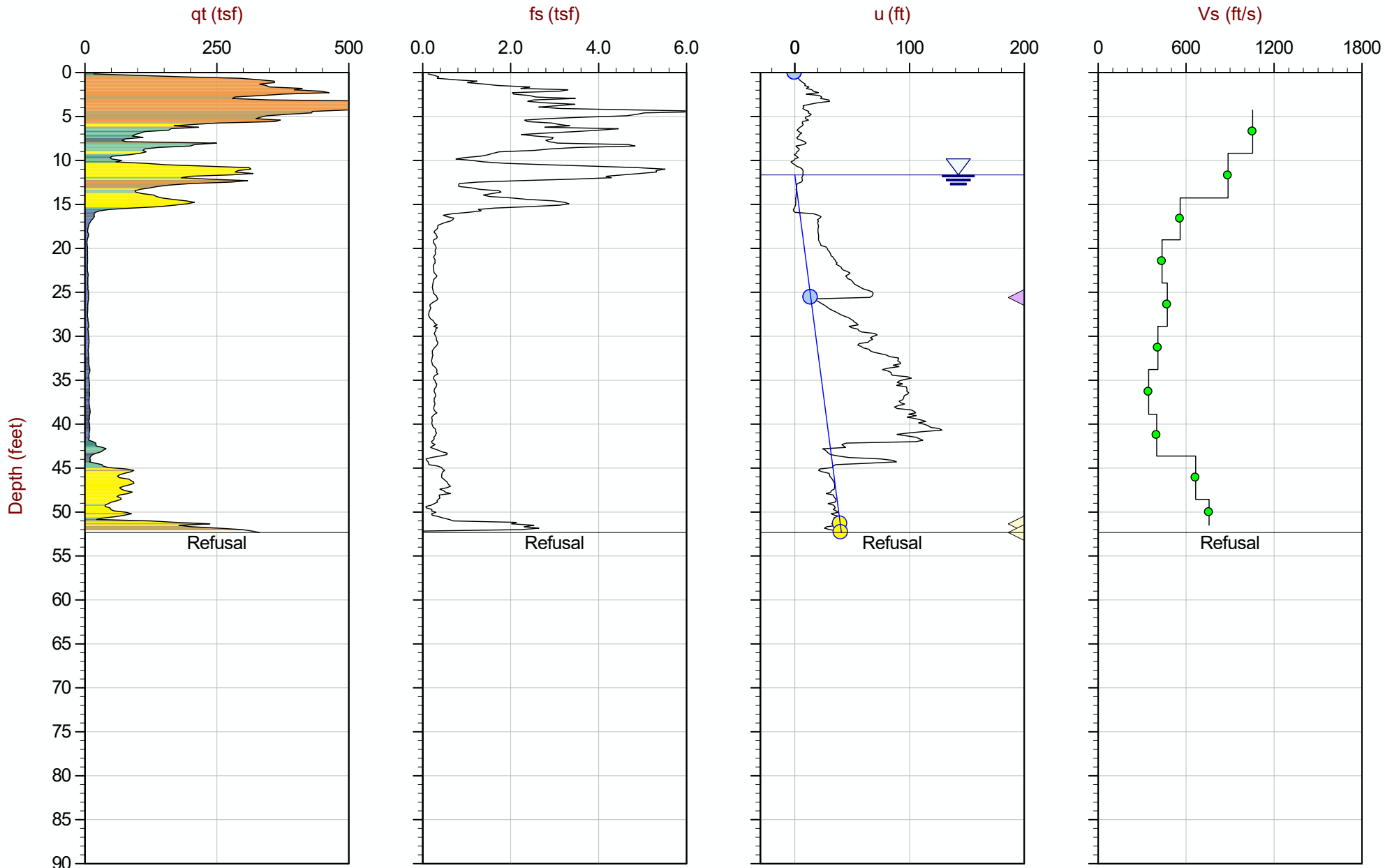
Job No: 15-53081

Date: 09:10:15 14:10

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C015

Cone: 301:T1500F15U500



Max Depth: 15.950 m / 52.33 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP15.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574590m E: 305103m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

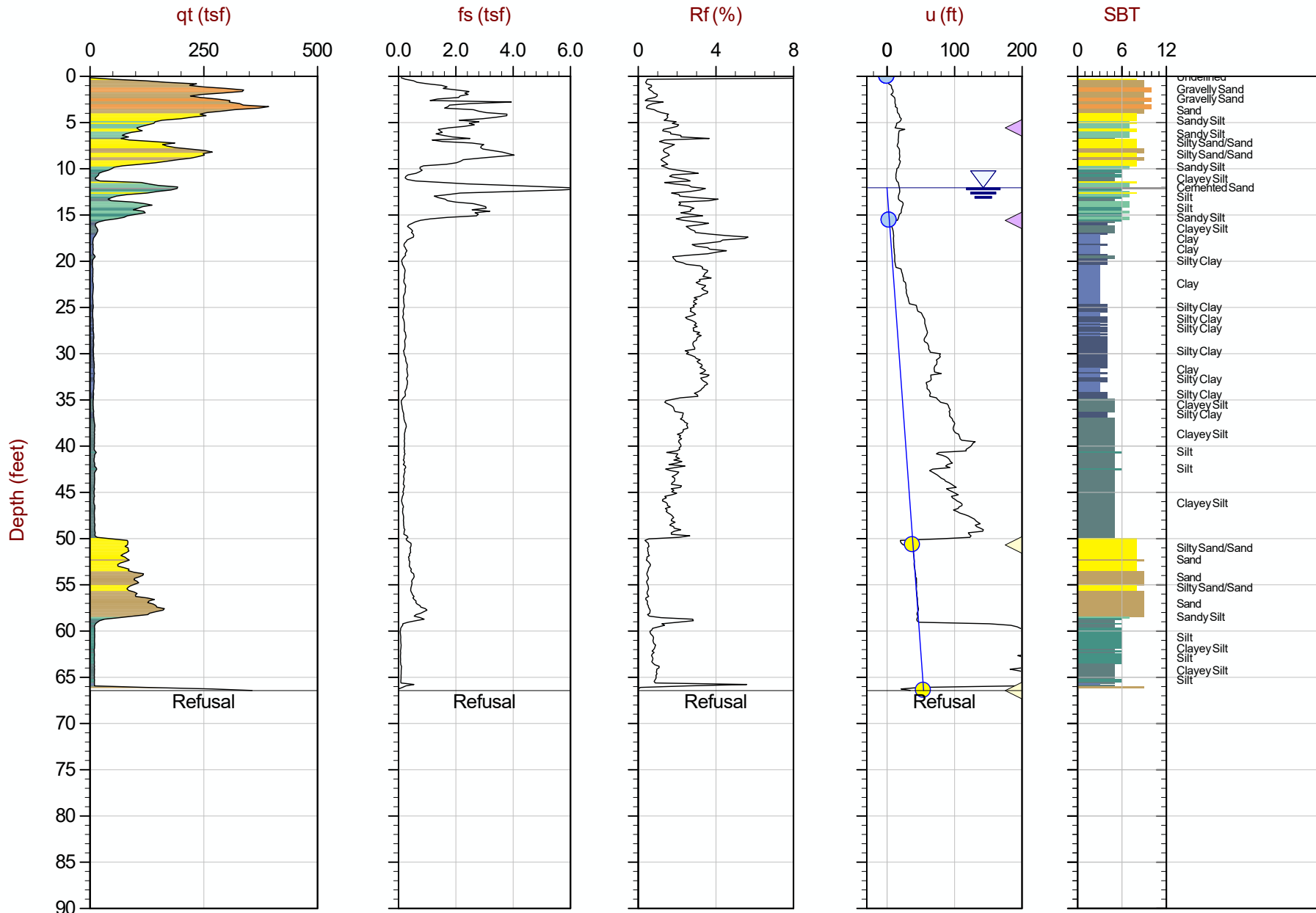
Job No: 15-53081

Date: 09:09:15 13:54

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C017

Cone: 301:T1500F15U500



Max Depth: 20.250 m / 66.44 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP17.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574661m E: 305021m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

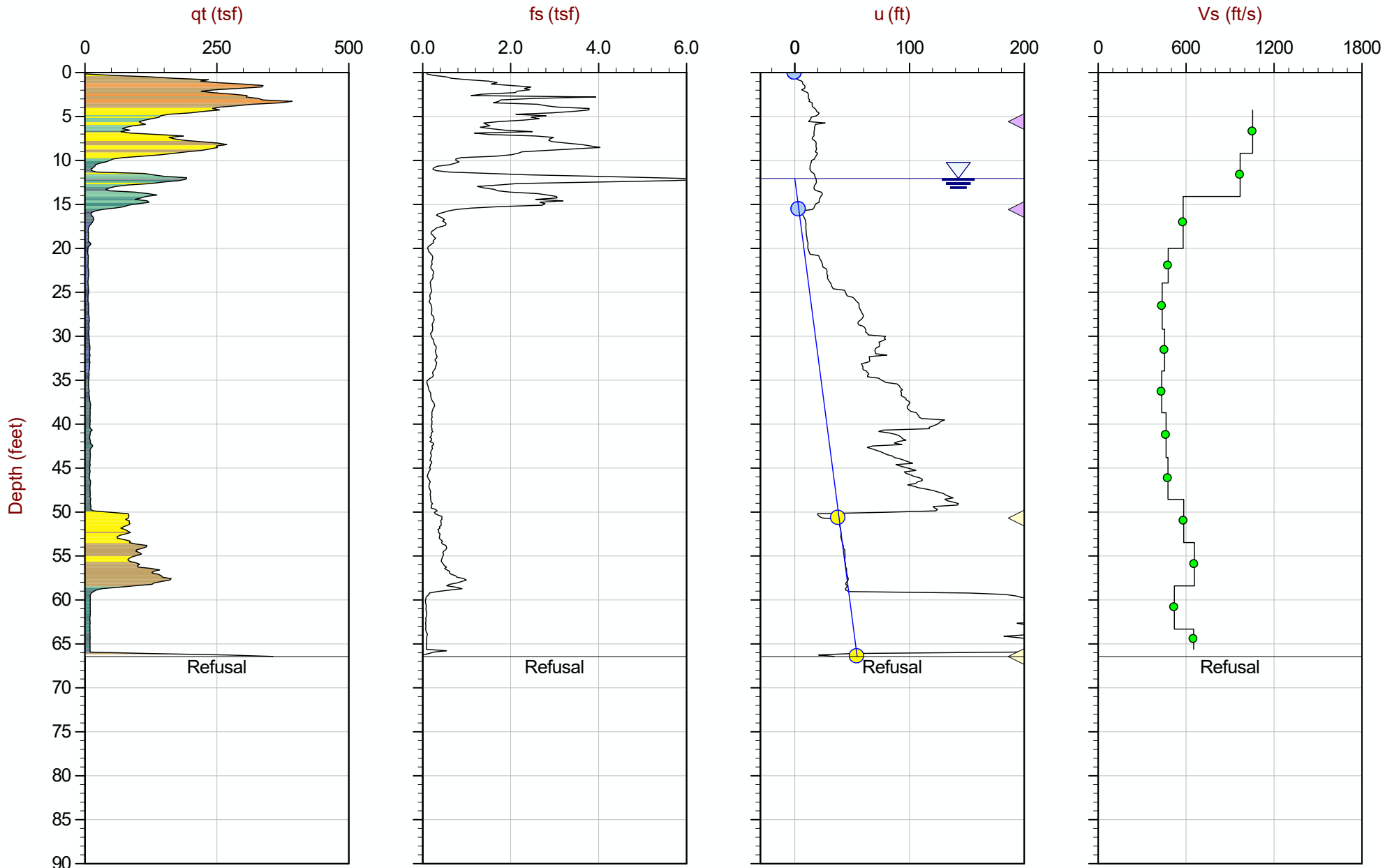
Job No: 15-53081

Date: 09:09:15 13:54

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C017

Cone: 301:T1500F15U500



Max Depth: 20.250 m / 66.44 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP17.COR

105

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574661m E: 305021m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

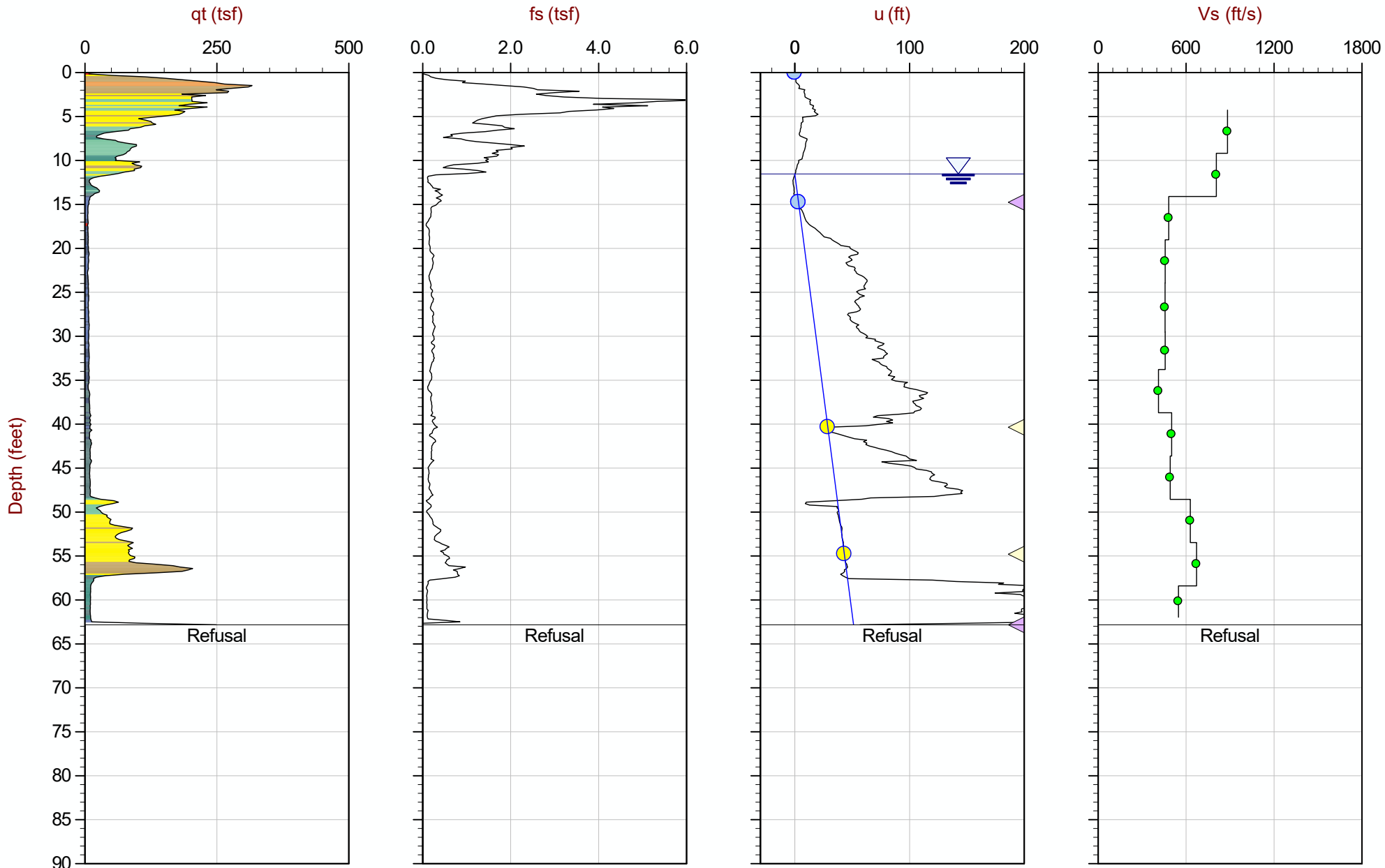
Job No: 15-53081

Date: 09:09:15 09:45

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C019

Cone: 301:T1500F15U500



Max Depth: 19.150 m / 62.83 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP19.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574729m E: 305083m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

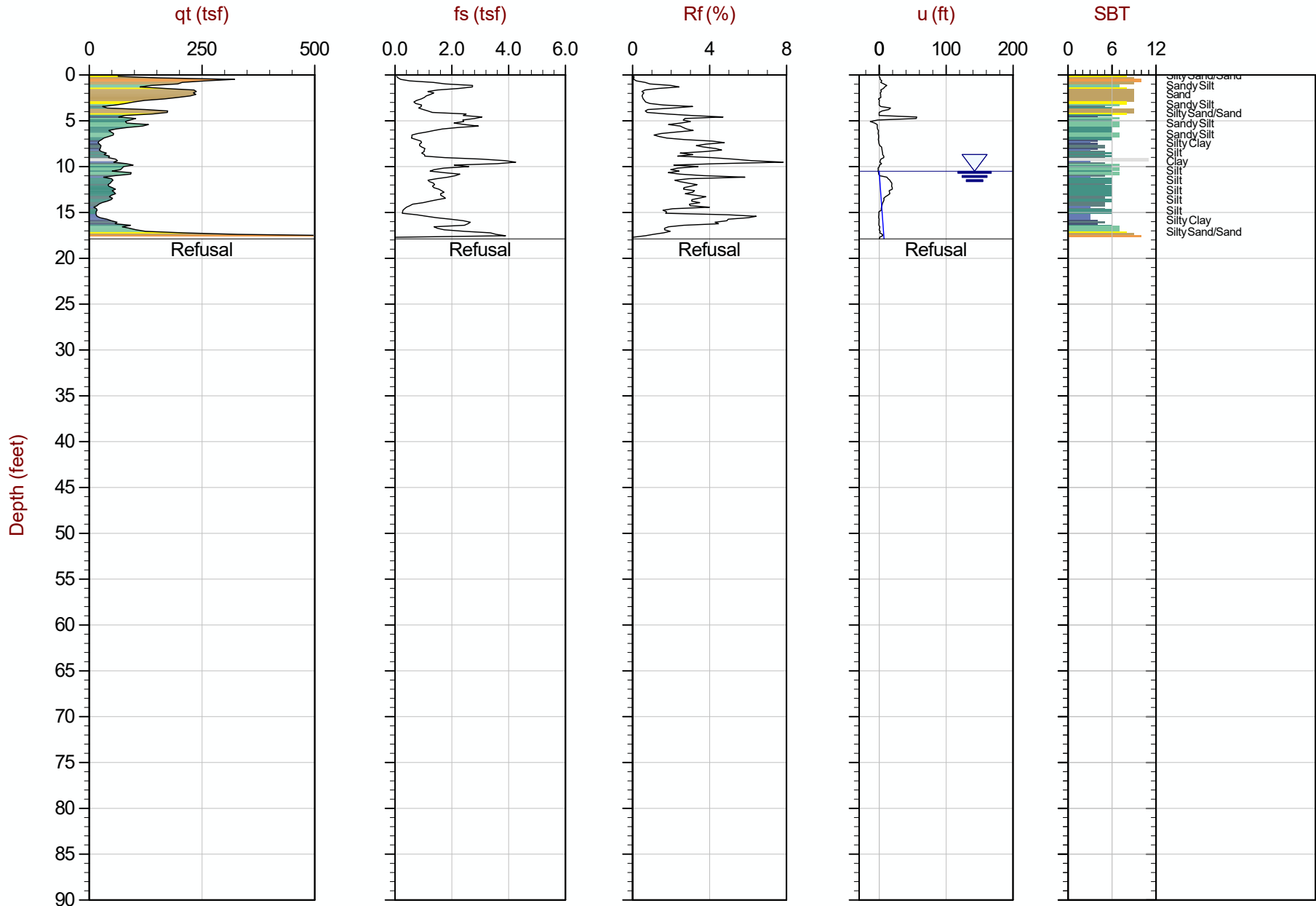
Job No: 15-53081

Date: 09:01:15 15:21

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C020

Cone: 340:T1500F15U500



Max Depth: 5.450 m / 17.88 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP20.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574944m E: 306822m



AECOM

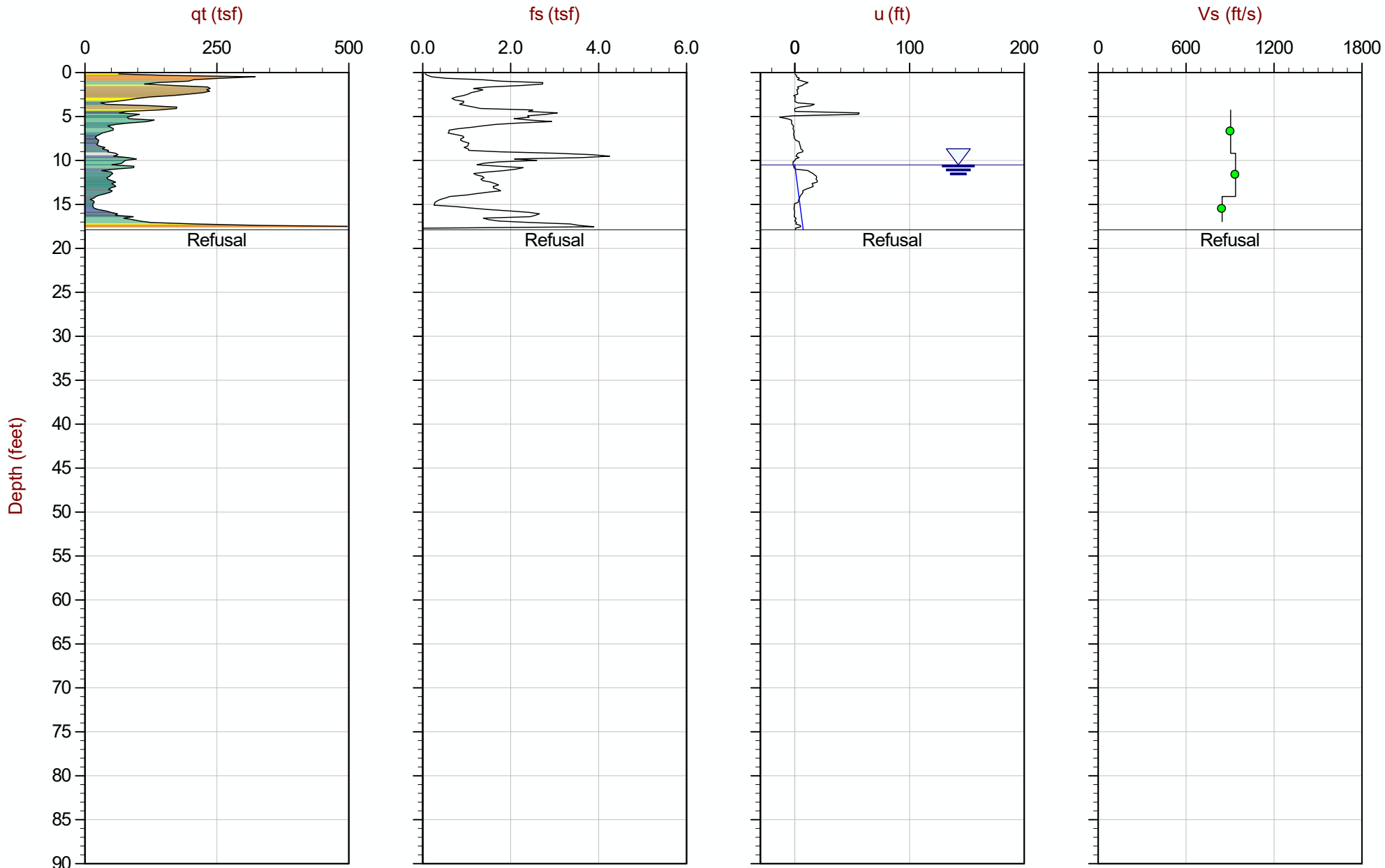
Job No: 15-53081

Date: 09:01:15 15:21

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C020

Cone: 340:T1500F15U500



Max Depth: 5.450 m / 17.88 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP20.COR

109

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574944m E: 306822m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

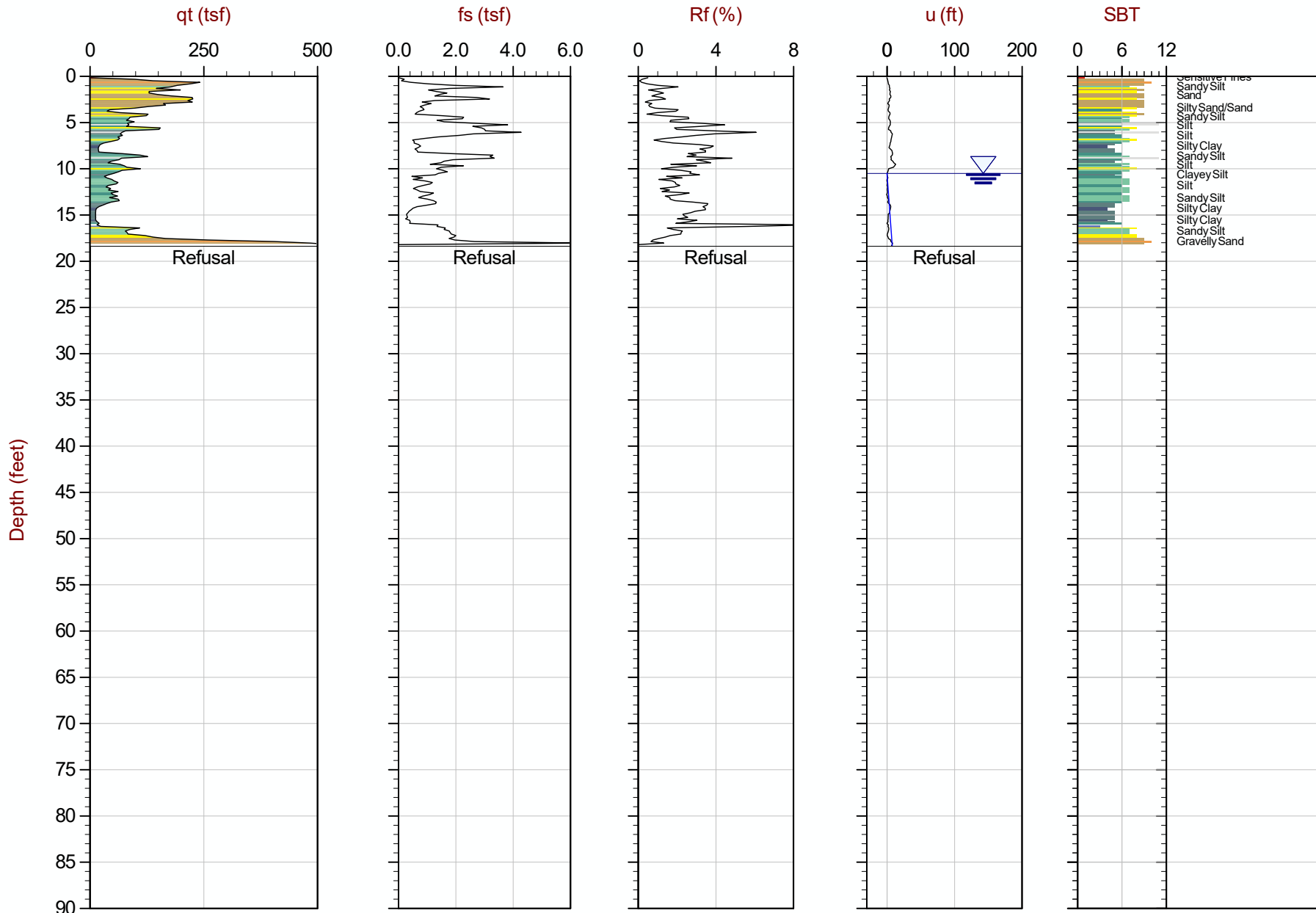
Job No: 15-53081

Date: 09:01:15 16:04

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C020A

Cone: 340:T1500F15U500



Max Depth: 5.600 m / 18.37 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP20A.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574942m E: 306820m



AECOM

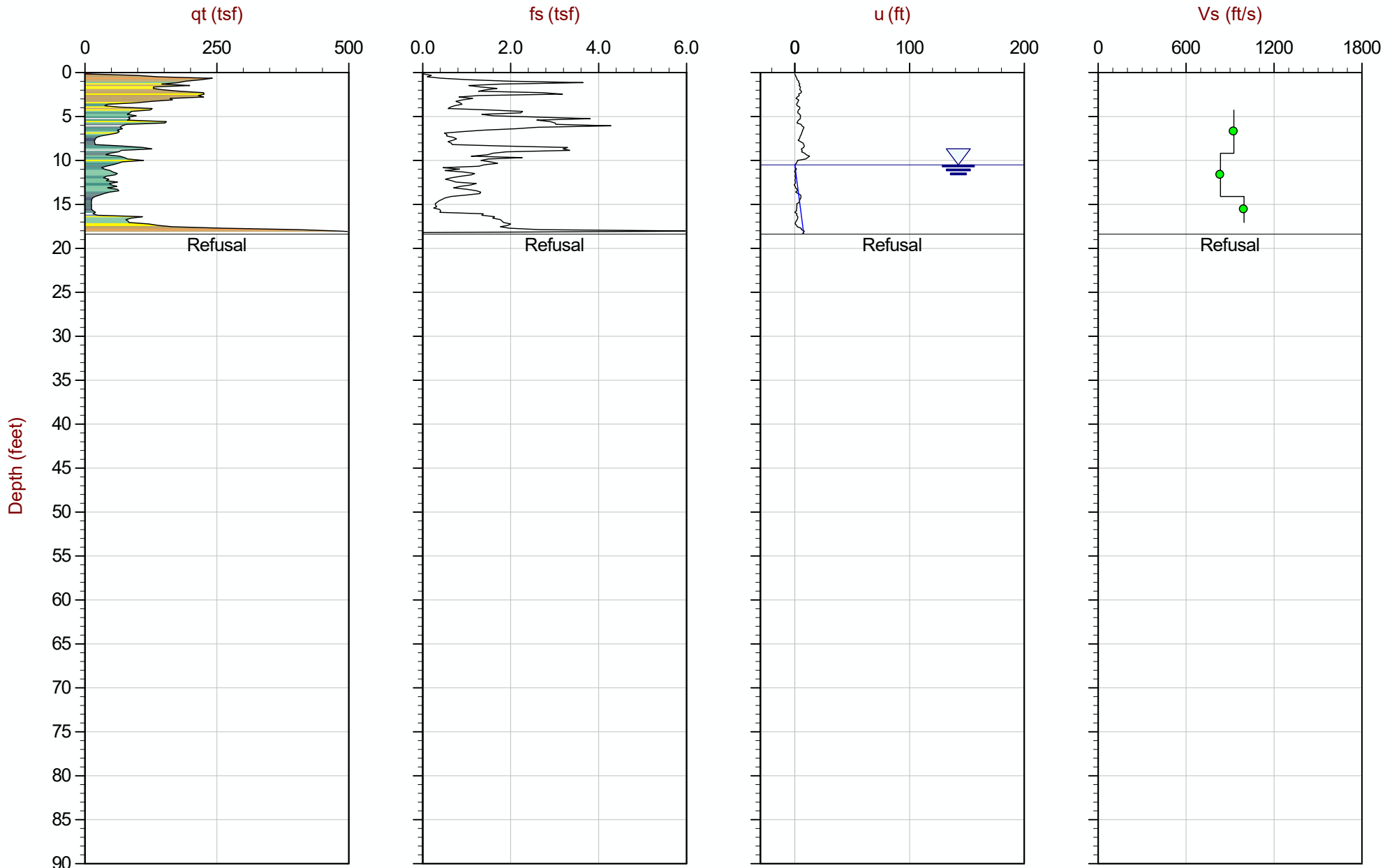
Job No: 15-53081

Date: 09:01:15 16:04

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C020A

Cone: 340:T1500F15U500



Max Depth: 5.600 m / 18.37 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP20A.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574942m E: 306820m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

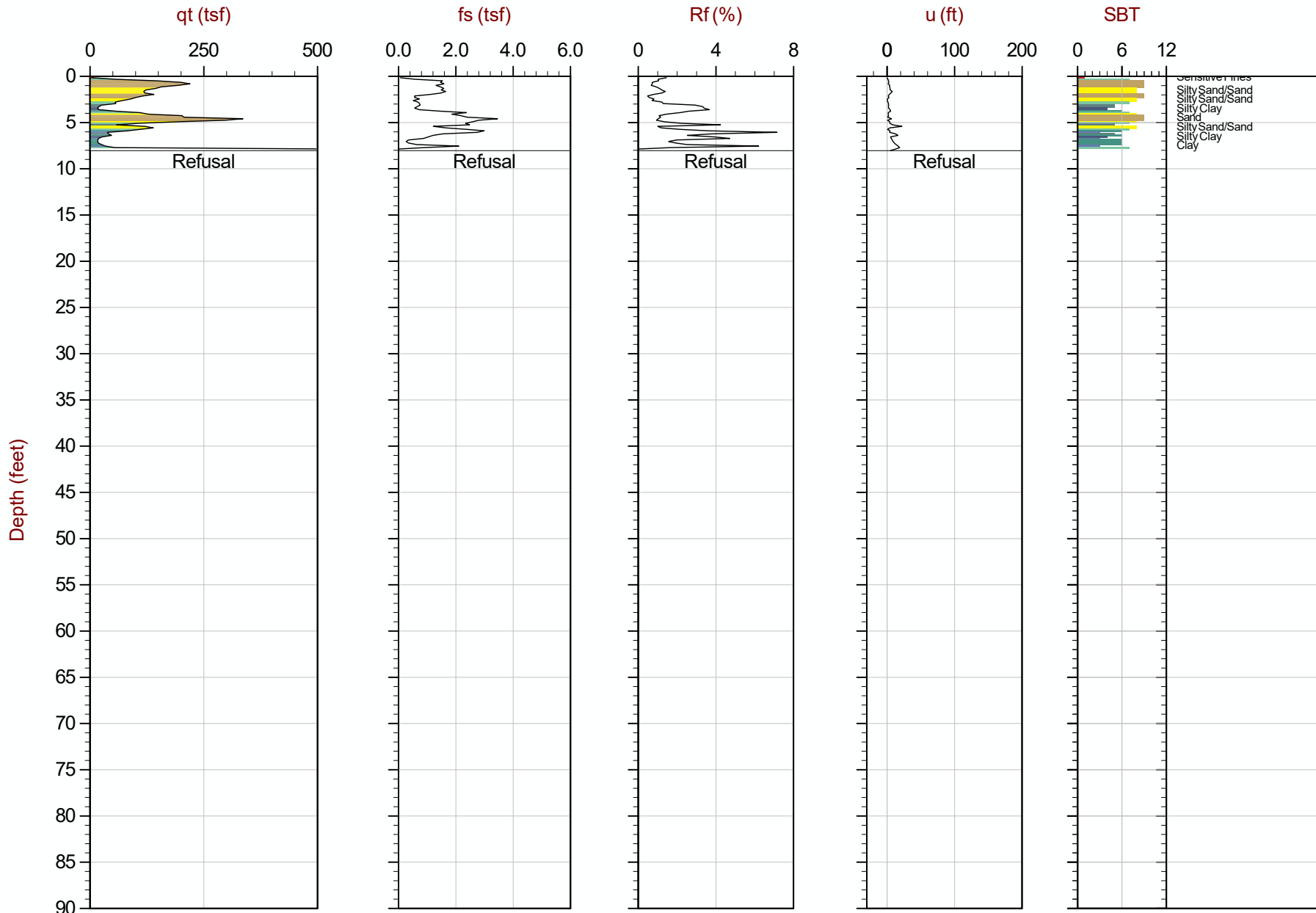
Job No: 15-53081

Date: 09:01:15 12:42

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C021

Cone: 340:T1500F15U500



Max Depth: 2.450 m / 8.04 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP21.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574913m E: 306616m



AECOM

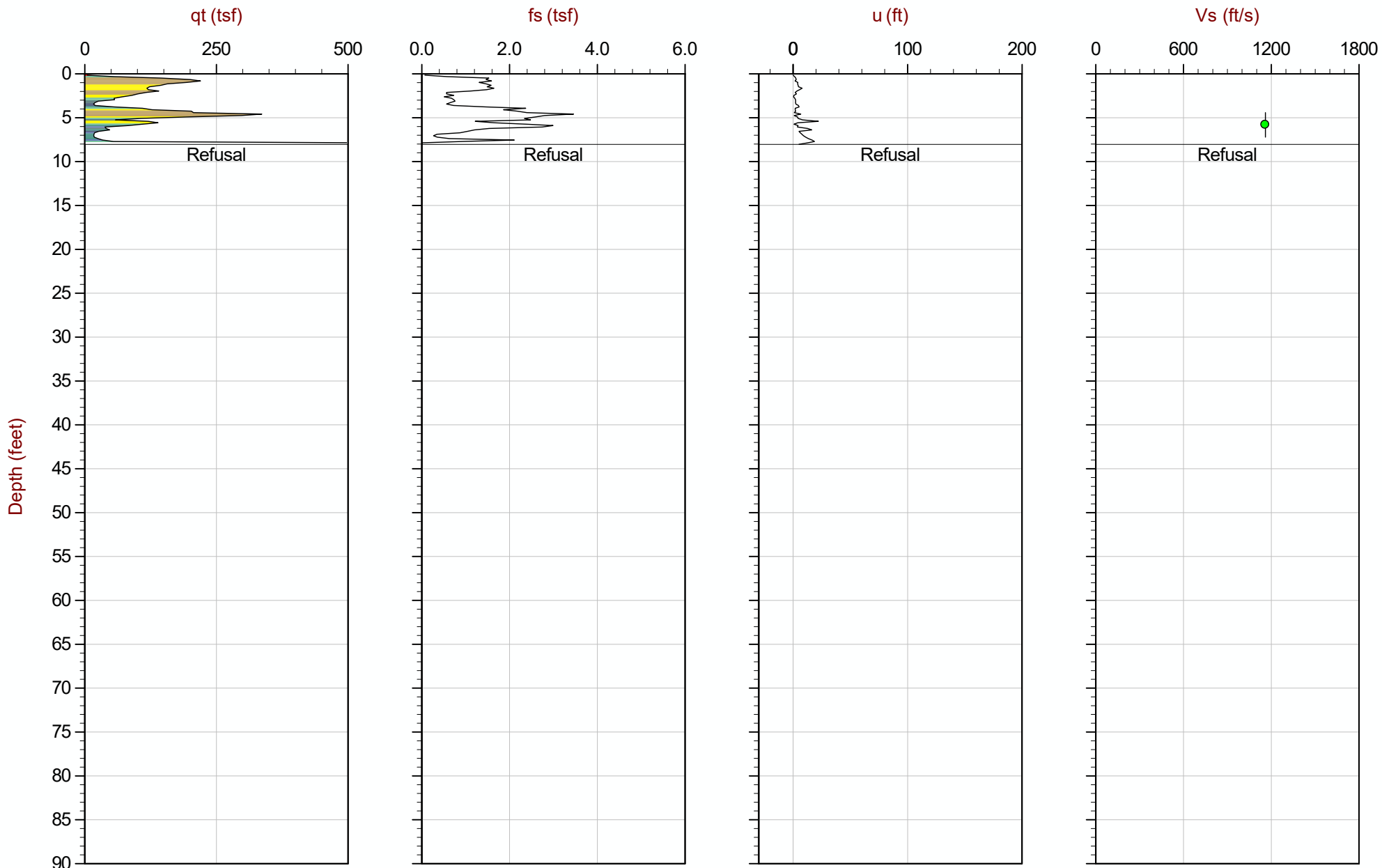
Job No: 15-53081

Date: 09:01:15 12:42

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C021

Cone: 340:T1500F15U500



Max Depth: 2.450 m / 8.04 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP21.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574913m E: 306616m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

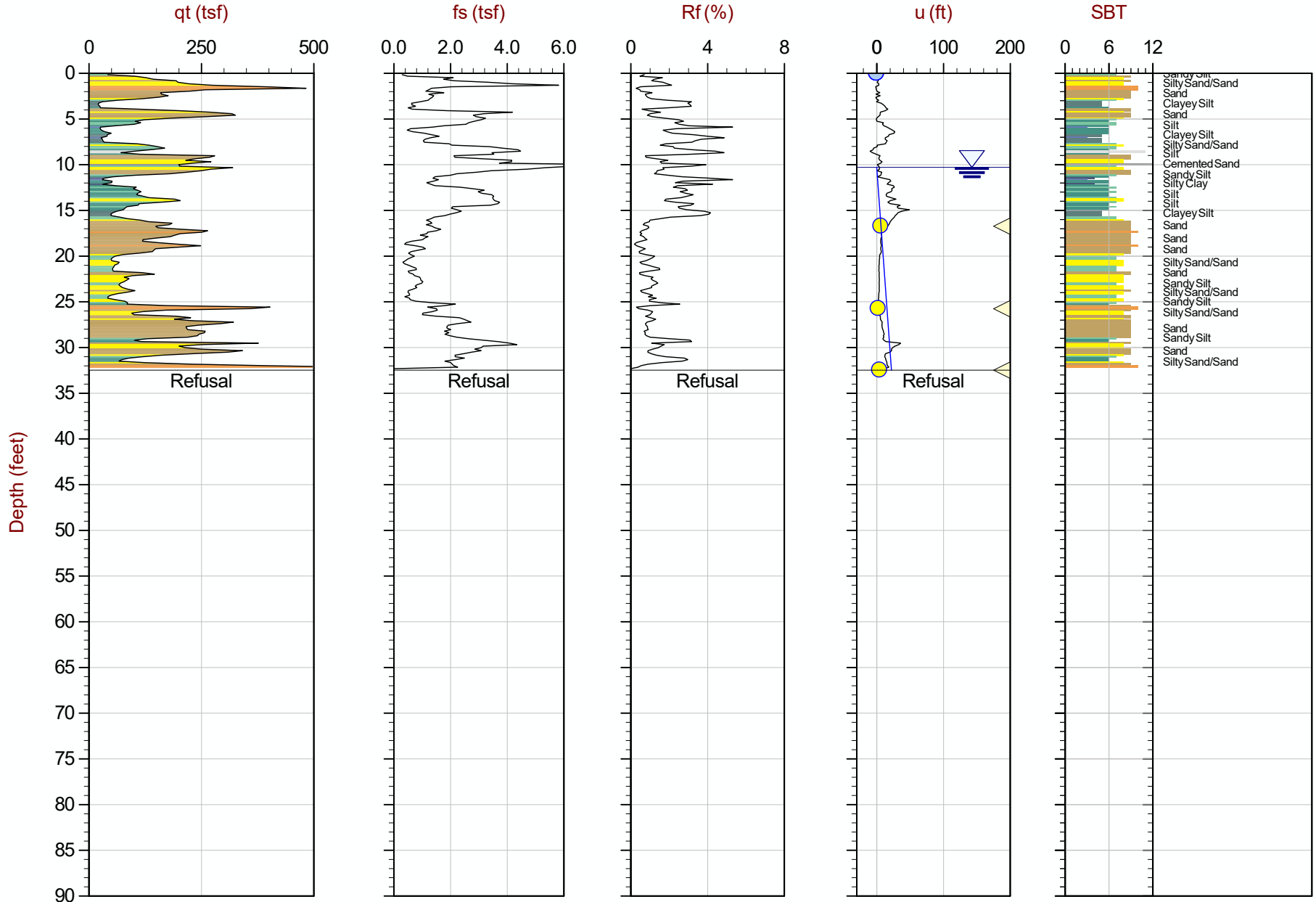
Job No: 15-53081

Date: 09:01:15 13:06

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C021A

Cone: 340:T1500F15U500



Max Depth: 9.900 m / 32.48 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP21A.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574913m E: 306613m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved
 The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

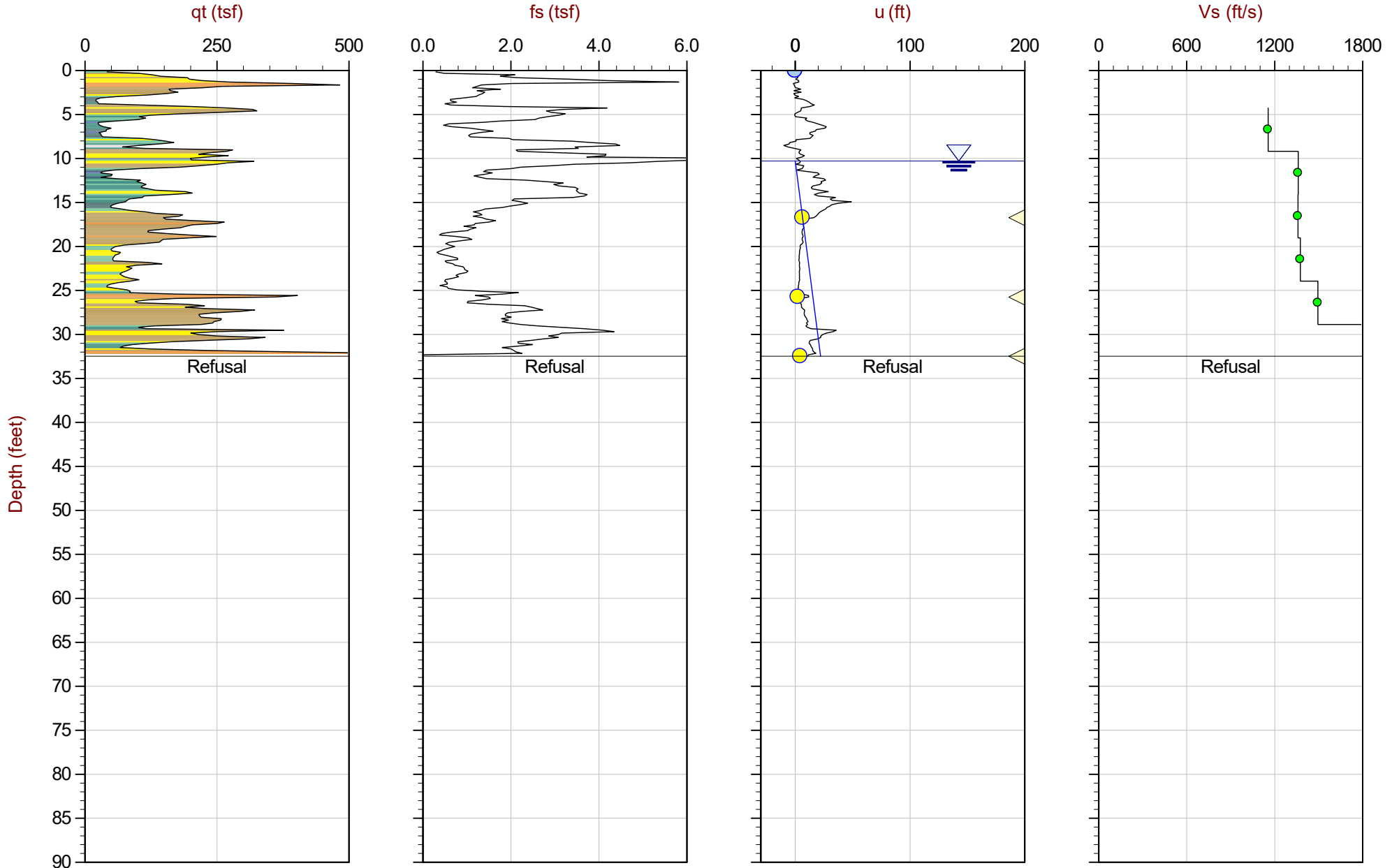
Job No: 15-53081

Date: 09:01:15 13:06

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C021A

Cone: 340:T1500F15U500



Max Depth: 9.900 m / 32.48 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP21A.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574913m E: 306613m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

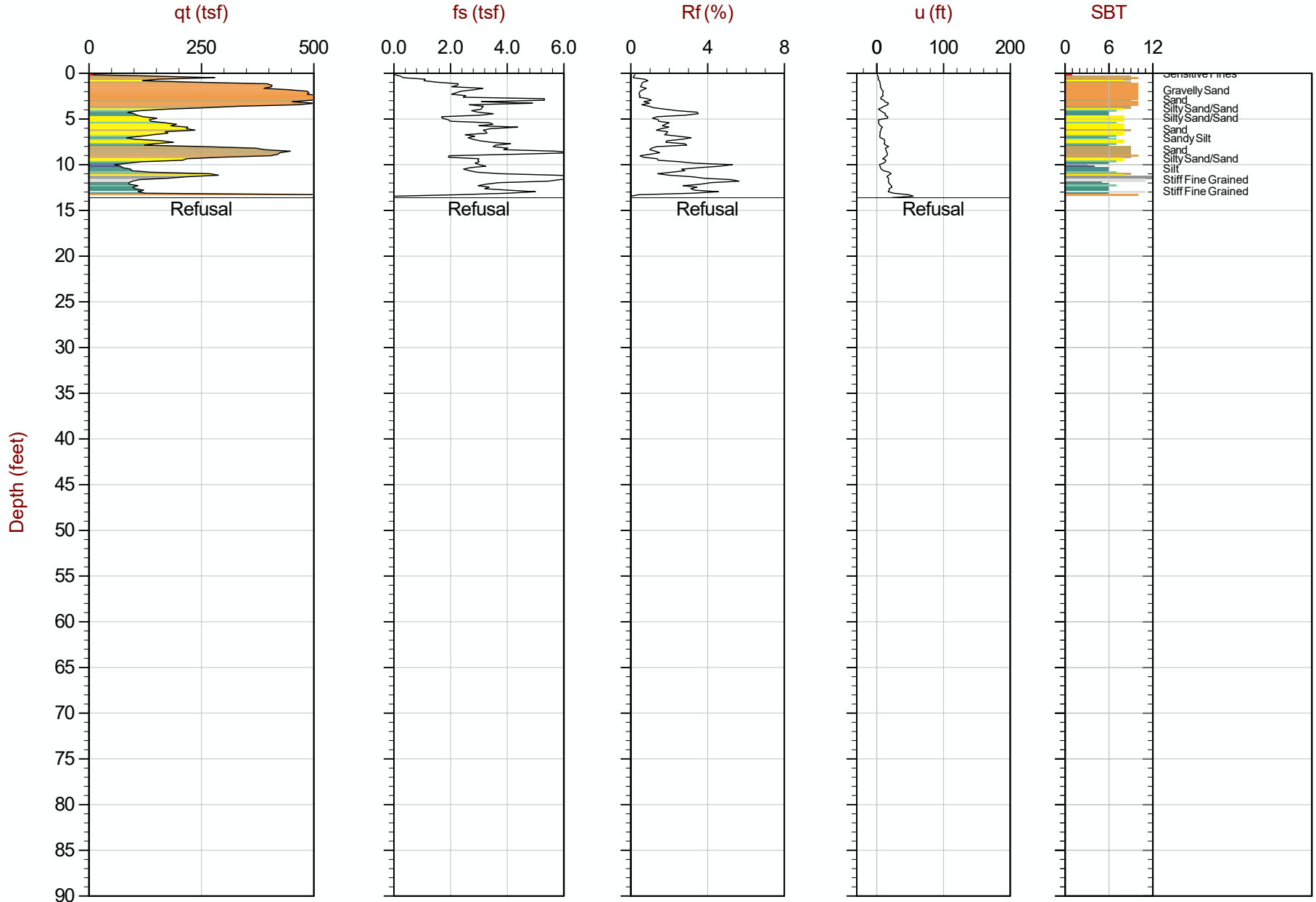
Job No: 15-53081

Date: 09:02:15 11:13

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C024

Cone: 340:T1500F15U500



Max Depth: 4.150 m / 13.62 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_SP24.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575150m E: 306819m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

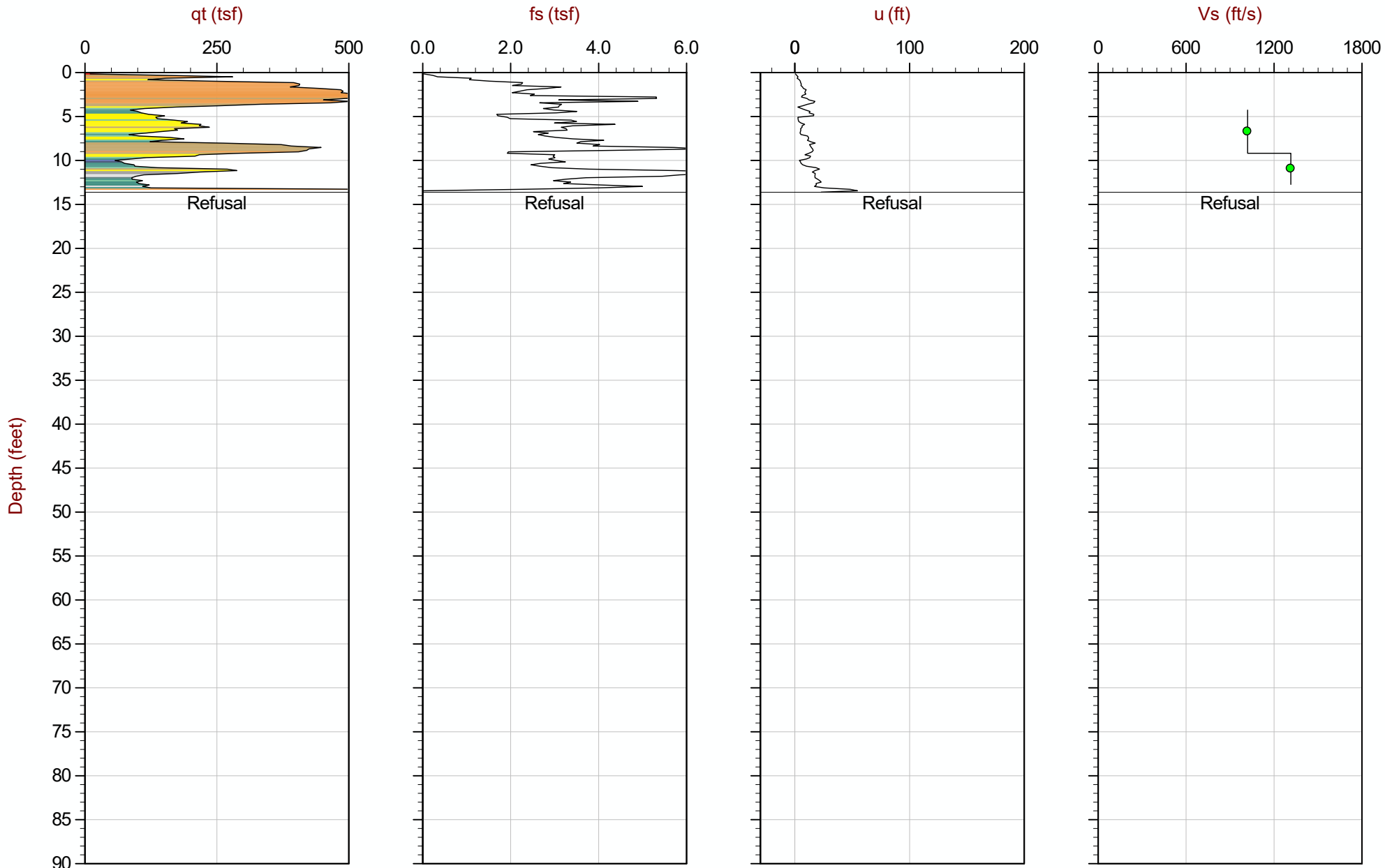
Job No: 15-53081

Date: 09:02:15 11:13

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C024

Cone: 340:T1500F15U500



Max Depth: 4.150 m / 13.62 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP24.COR

120

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4575150m E: 306819m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

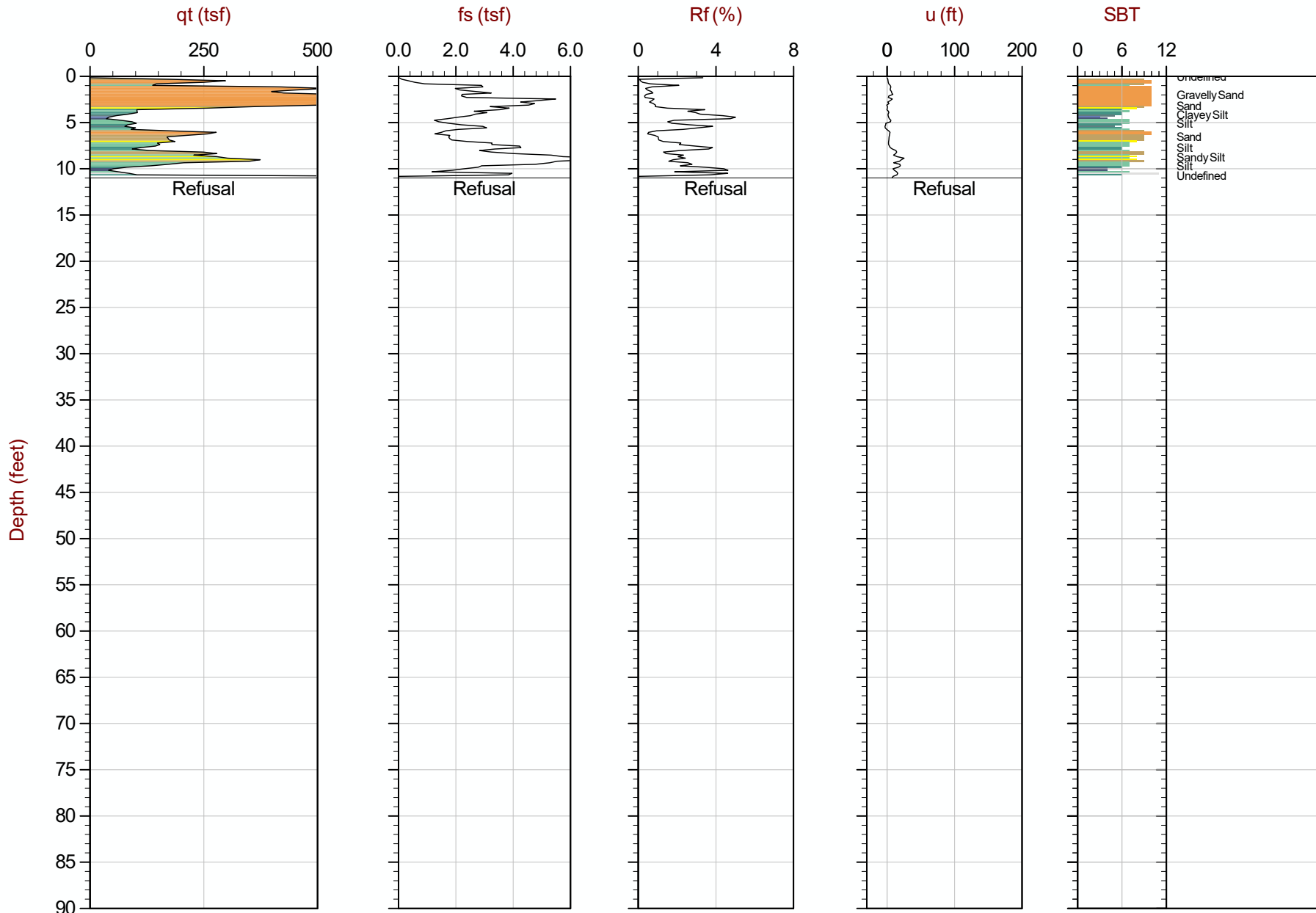
Job No: 15-53081

Date: 09:02:15 11:52

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C024A

Cone: 340:T1500F15U500



Max Depth: 3.350 m / 10.99 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 15-53081_SP24A.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 16 N: 4575152m E: 306820m

121

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

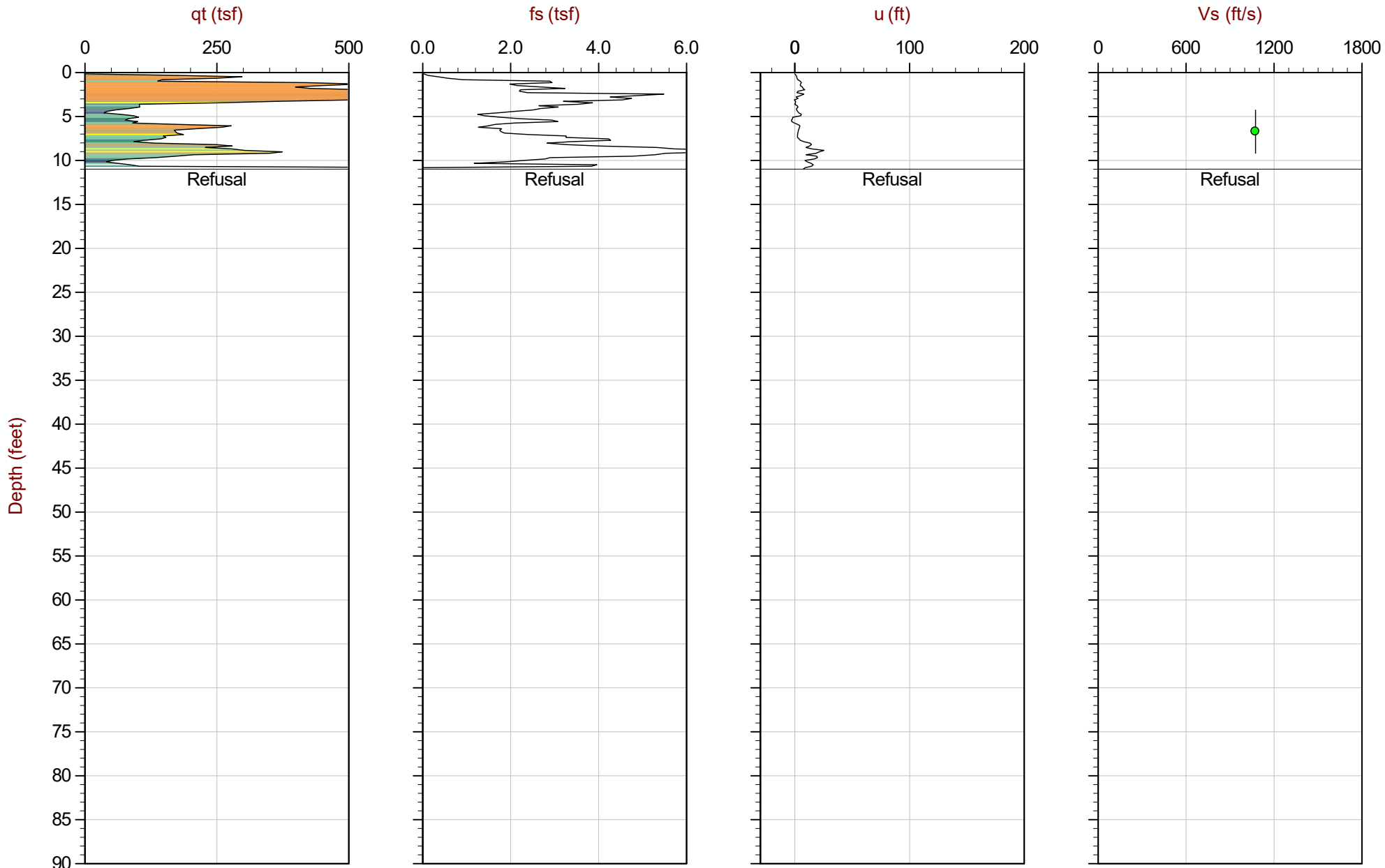
Job No: 15-53081

Date: 09:02:15 11:52

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C024A

Cone: 340:T1500F15U500



Max Depth: 3.350 m / 10.99 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP24A.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575152m E: 306820m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

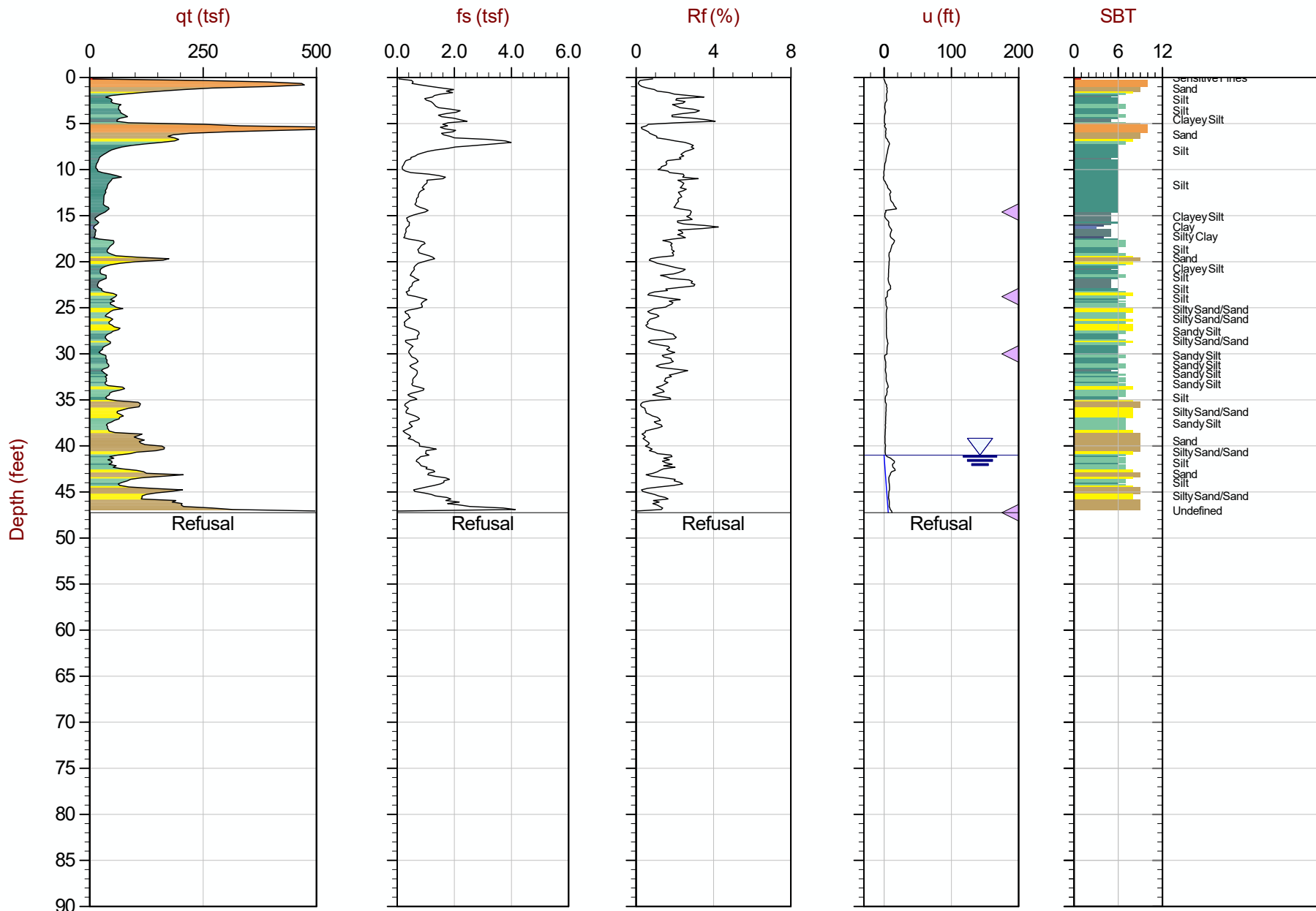
Job No: 15-53081

Date: 09:02:15 08:19

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C025

Cone: 340:T1500F15U500



Max Depth: 14.400 m / 47.24 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP25.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575088m E: 306990m



AECOM

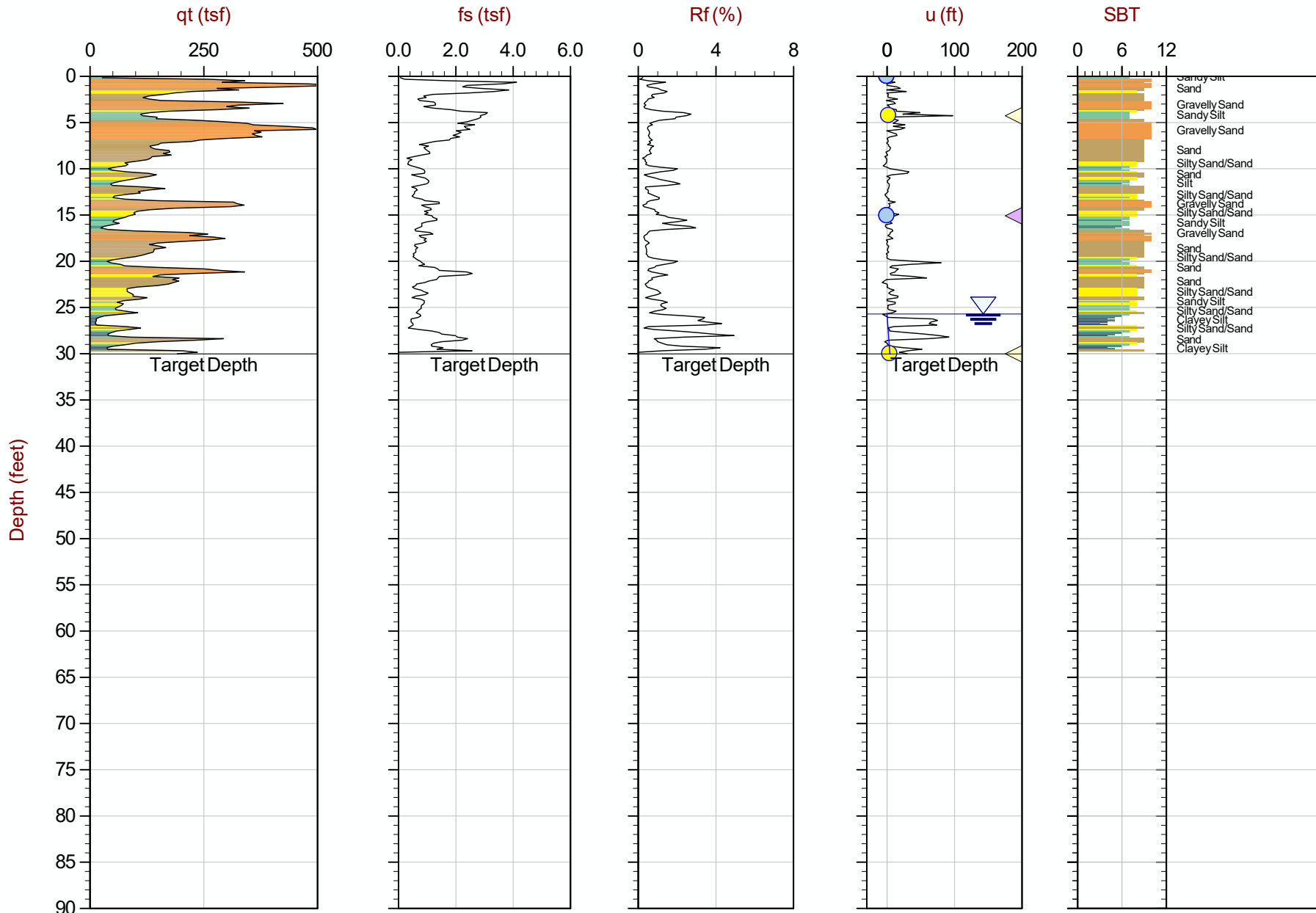
Job No: 15-53081

Date: 09:03:15 11:32

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C026

Cone: 374:T1500F15U500



Max Depth: 9.150 m / 30.02 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP26.COR

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4574976m E: 306648m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

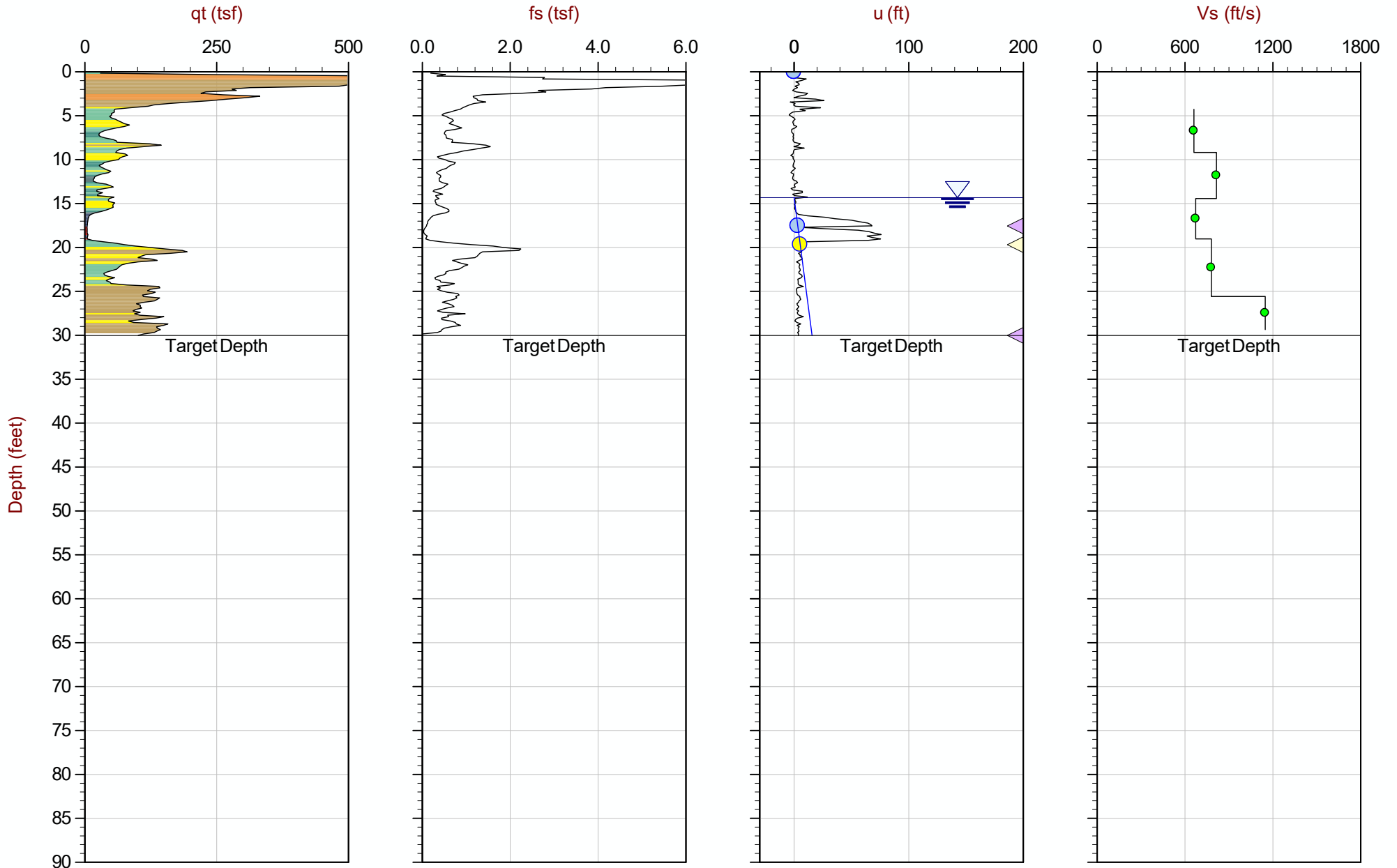
Job No: 15-53081

Date: 09:03:15 09:01

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C027

Cone: 374:T1500F15U500



Max Depth: 9.150 m / 30.02 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: EveryPoint

File: 15-53081_SP27.COR

126

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4575057m E: 306848m

Hydrostatic Line ● Ueq ● Assumed Ueq ◁ PPD, Ueq achieved ◁ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

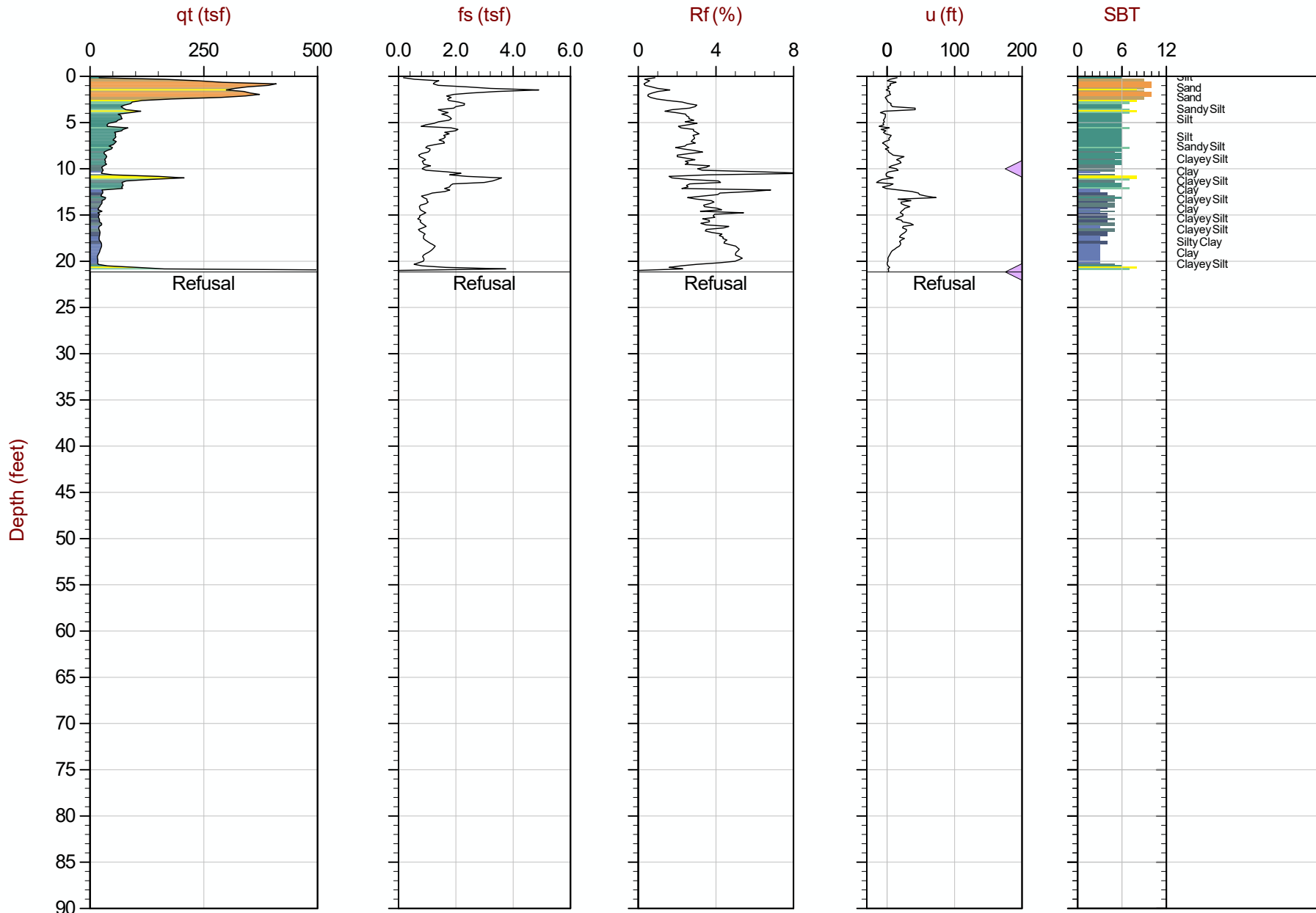
Job No: 15-53081

Date: 09:01:15 15:44

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C029

Cone: 374:T1500F15U500



Max Depth: 6.450 m / 21.16 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_CP29.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574869m E: 306935m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

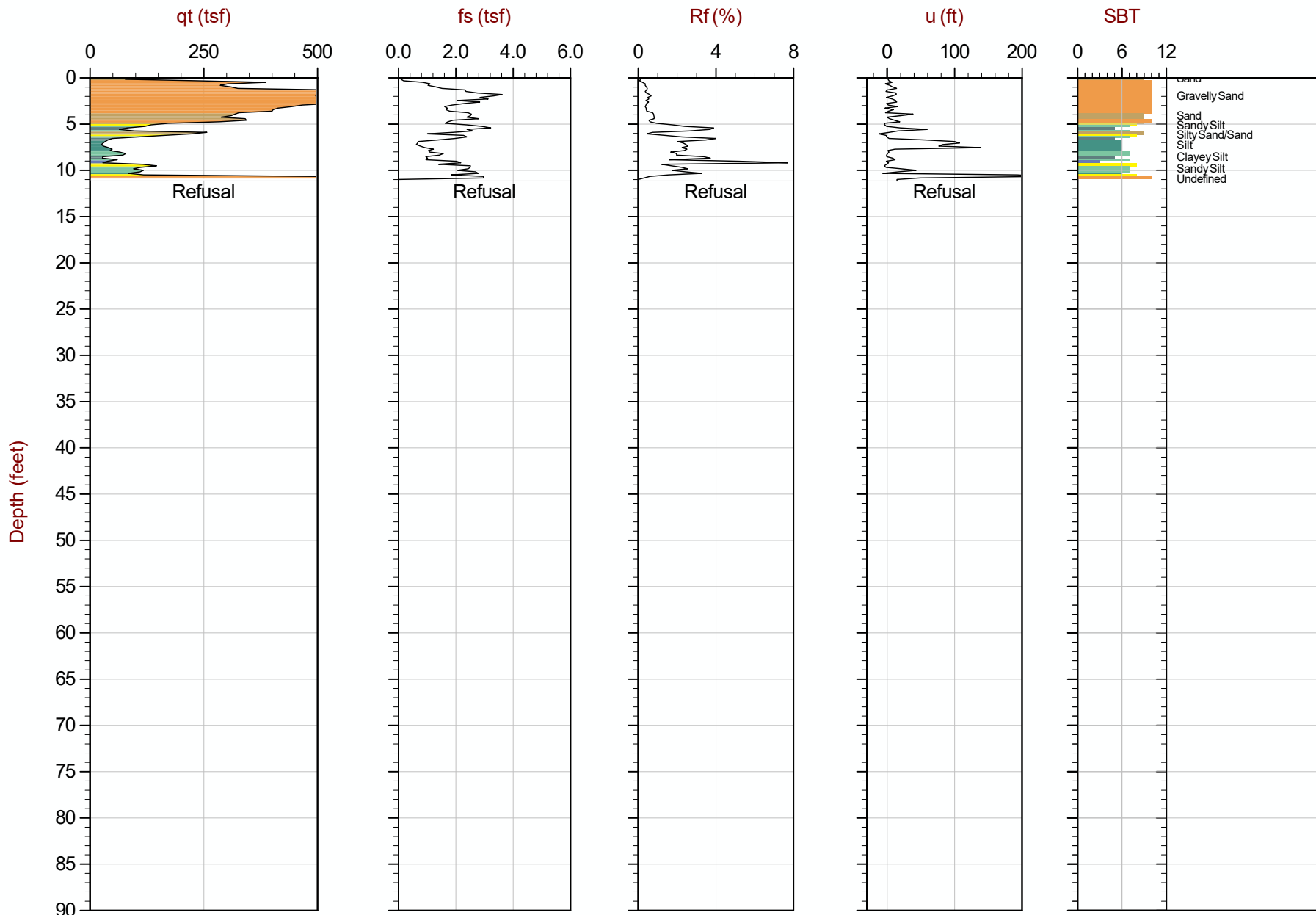
Job No: 15-53081

Date: 09:02:15 14:24

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C030

Cone: 374:T1500F15U500



Max Depth: 3.400 m / 11.15 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP30.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575040m E: 307109m



AECOM

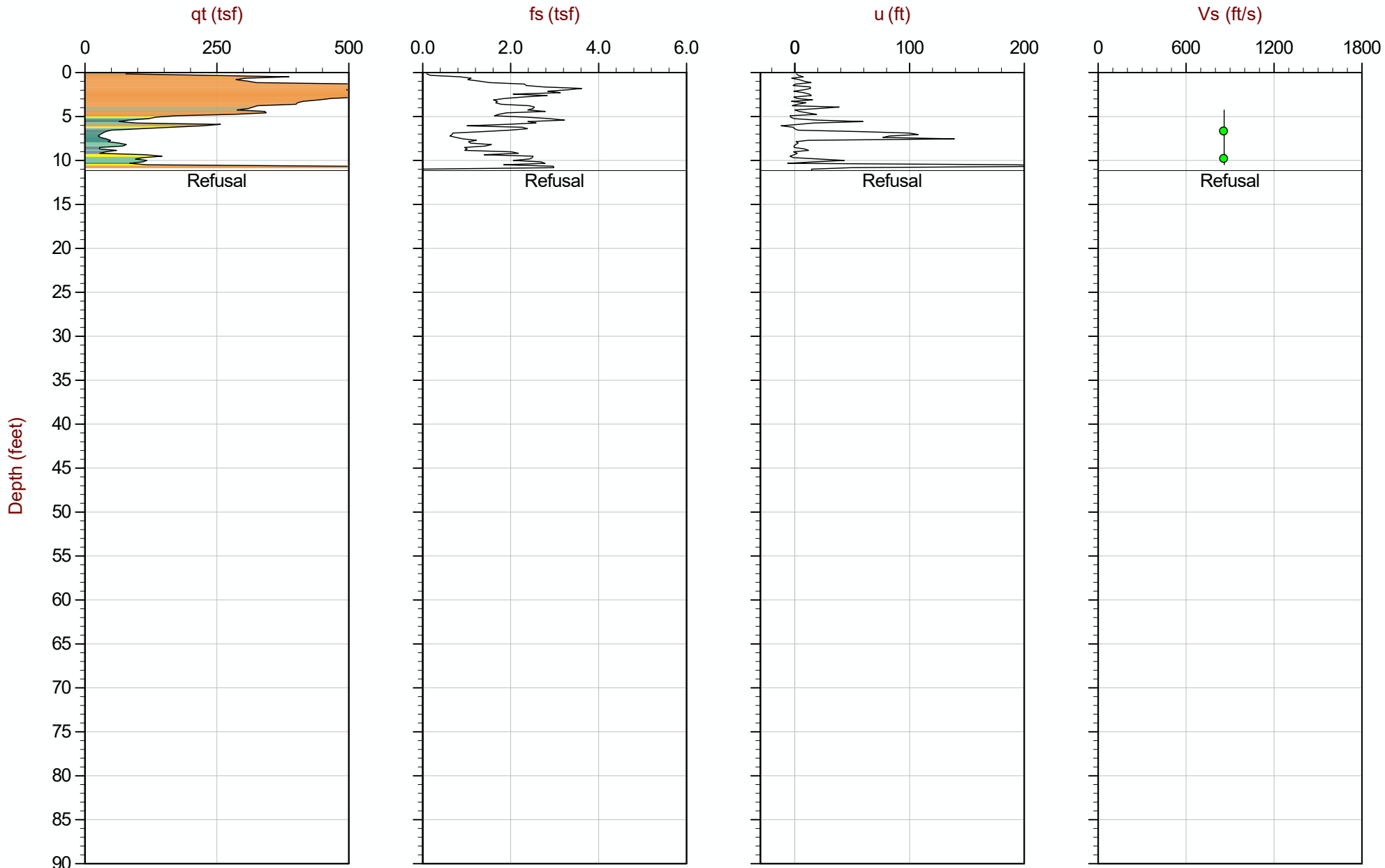
Job No: 15-53081

Date: 09:02:15 14:24

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C030

Cone: 374:T1500F15U500



Max Depth: 3.400 m / 11.15 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP30.COR

129

SBT: Robertson and Campanella, 1986

Coords: UTM Zone 16 N: 4575040m E: 307109m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

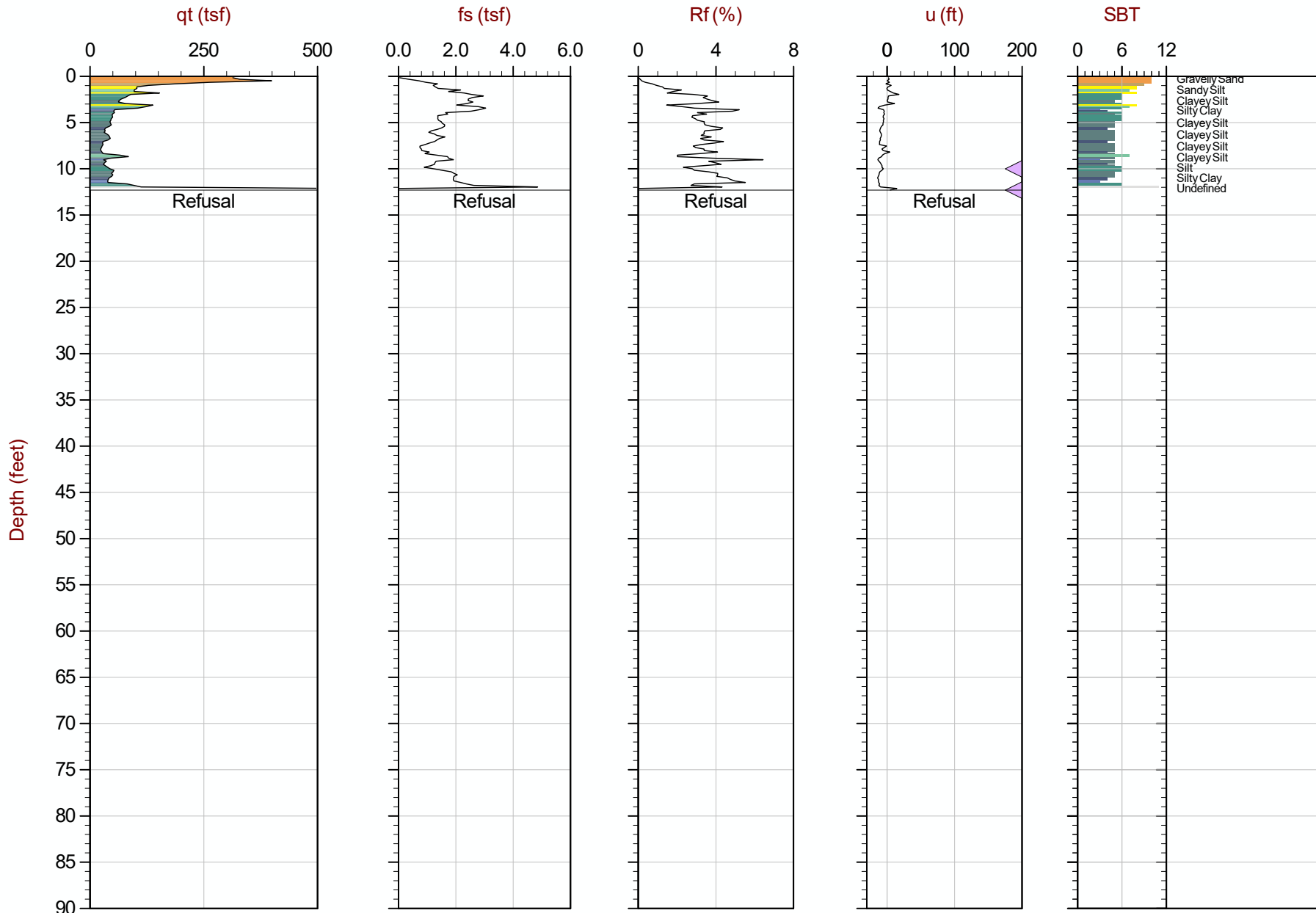
Job No: 15-53081

Date: 09:02:15 10:27

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C032

Cone: 374:T1500F15U500



Max Depth: 3.750 m / 12.30 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_CP32.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574980m E: 307252m



AECOM

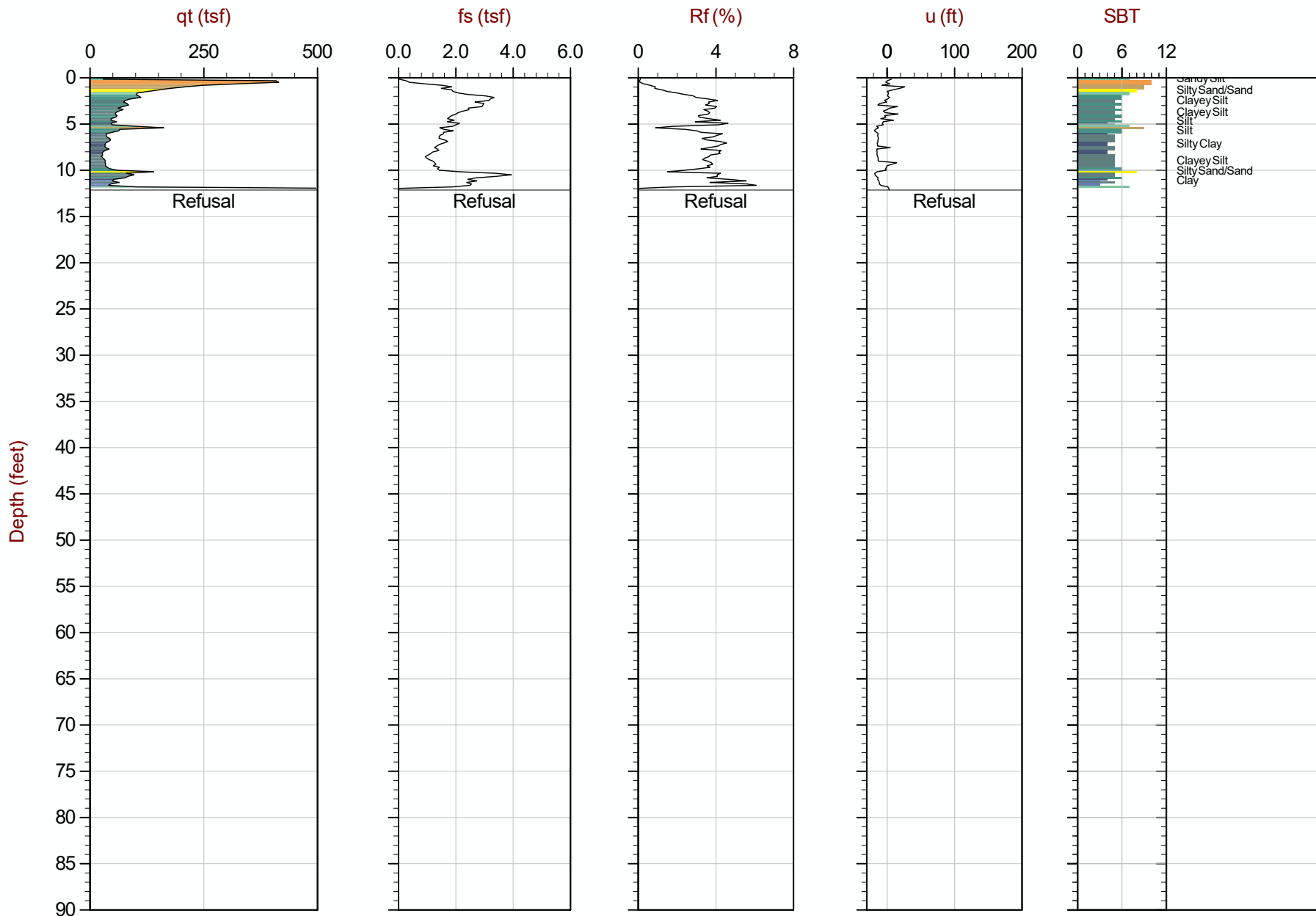
Job No: 15-53081

Date: 09:02:15 11:26

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C032B

Cone: 374:T1500F15U500



Max Depth: 3.700 m / 12.14 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_CP32B.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574980m E: 307253m



AECOM

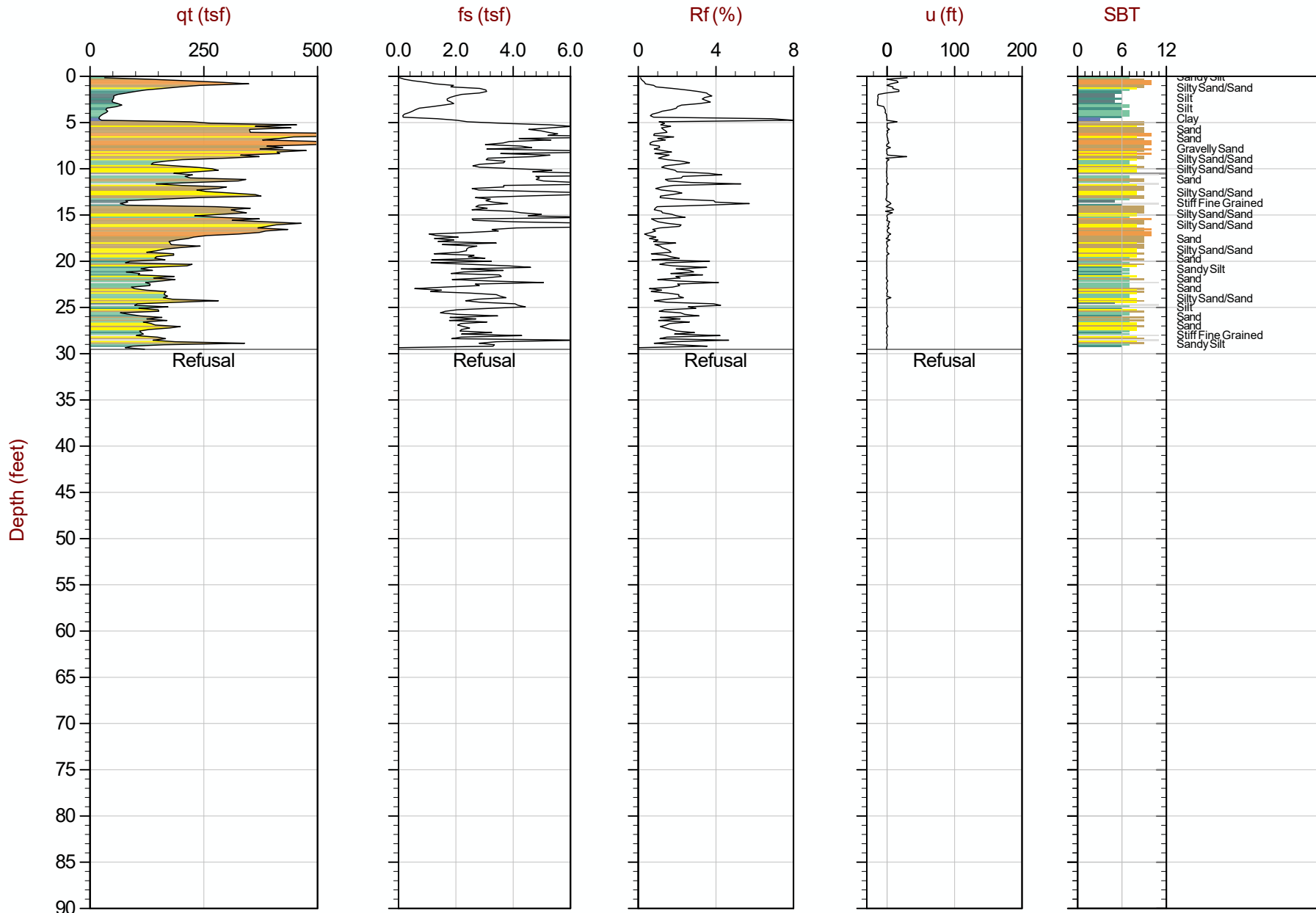
Job No: 15-53081

Date: 09:02:15 08:46

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C034

Cone: 374:T1500F15U500



Max Depth: 9.000 m / 29.53 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP34.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574804m E: 307178m



AECOM

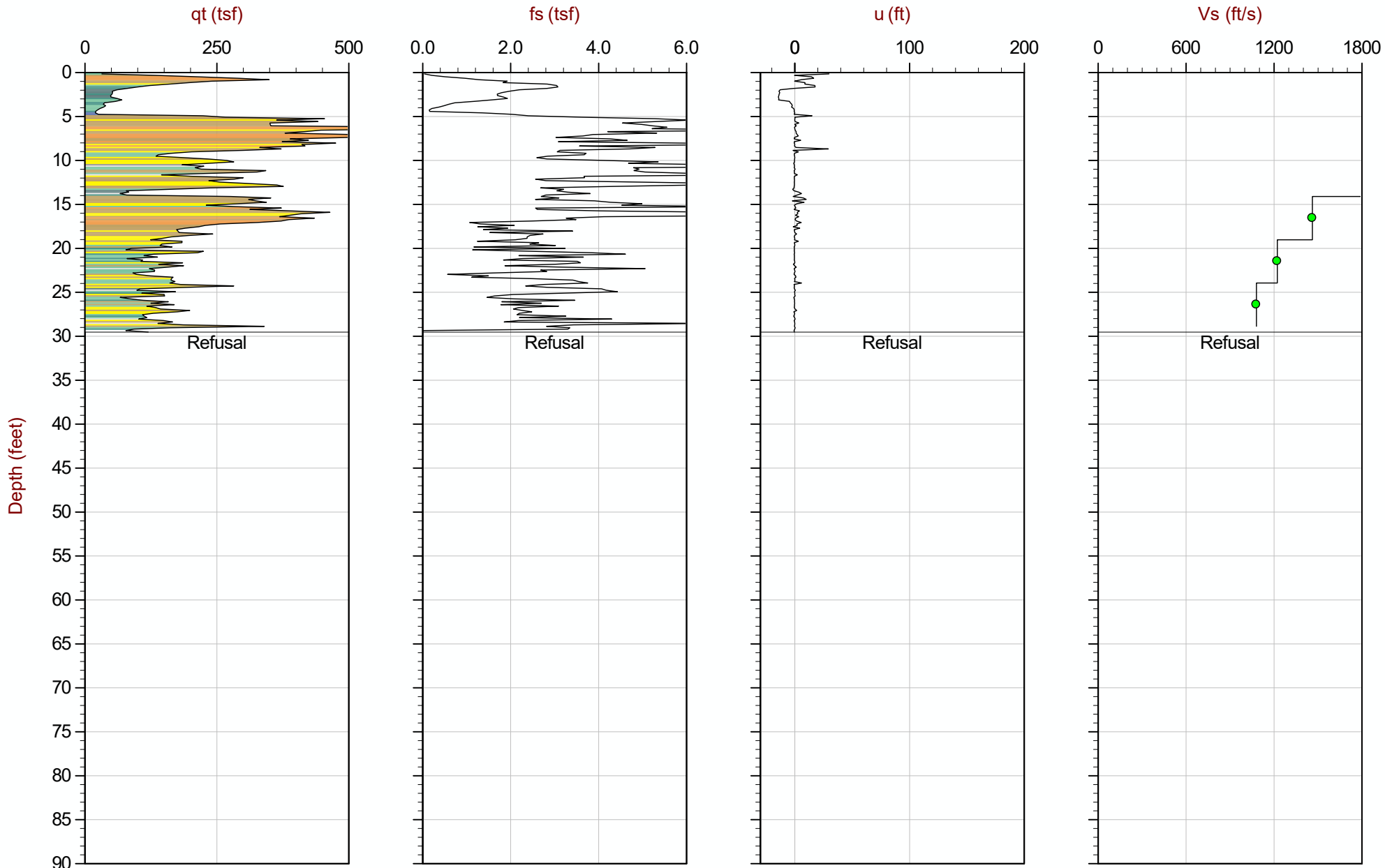
Job No: 15-53081

Date: 09:02:15 08:46

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C034

Cone: 374:T1500F15U500



Max Depth: 9.000 m / 29.53 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_SP34.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4574804m E: 307178m

— Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

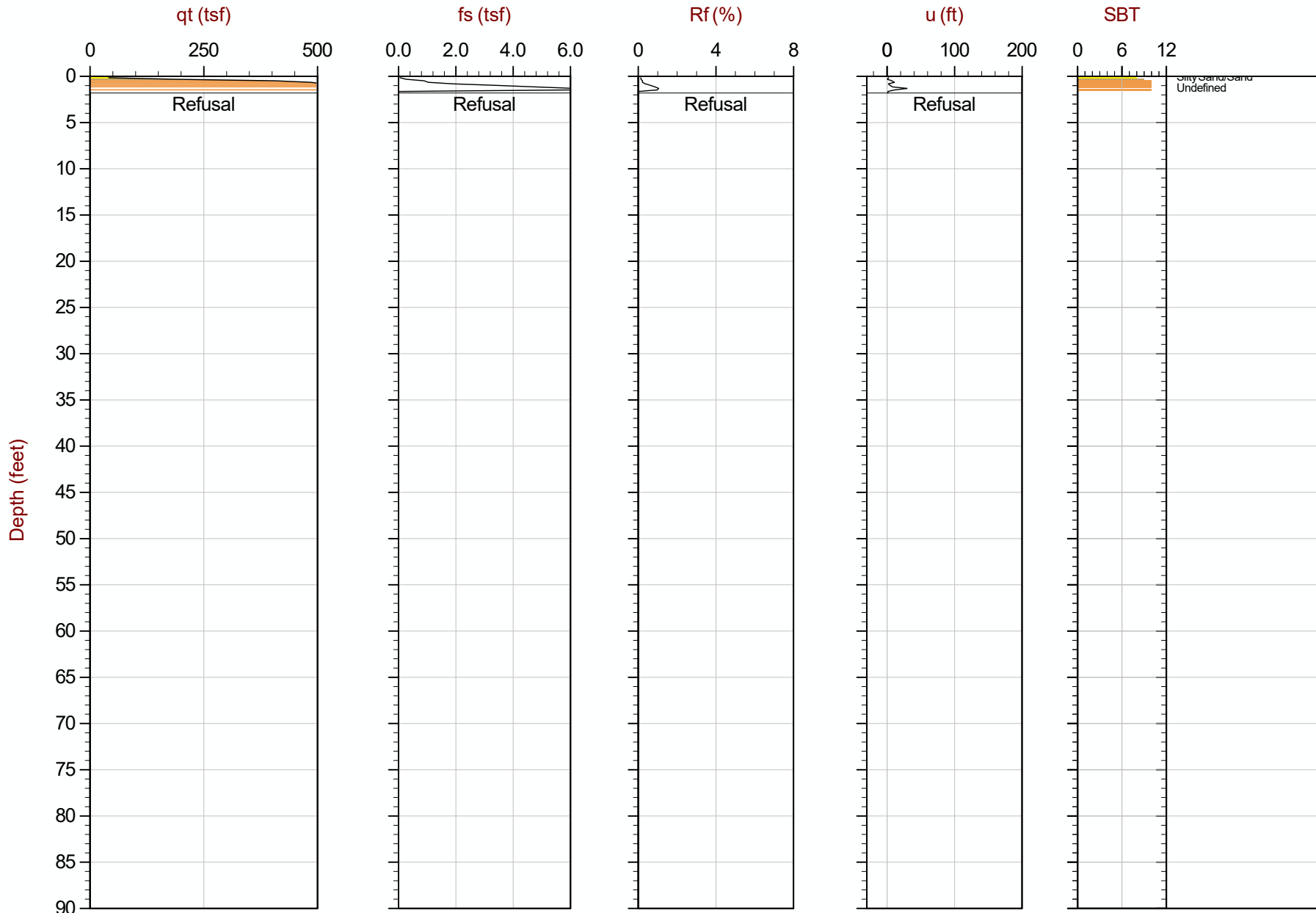
Job No: 15-53081

Date: 09:02:15 13:27

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C038

Cone: 374:T1500F15U500



Max Depth: 0.550 m / 1.80 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_CP38.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575106m E: 307334m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

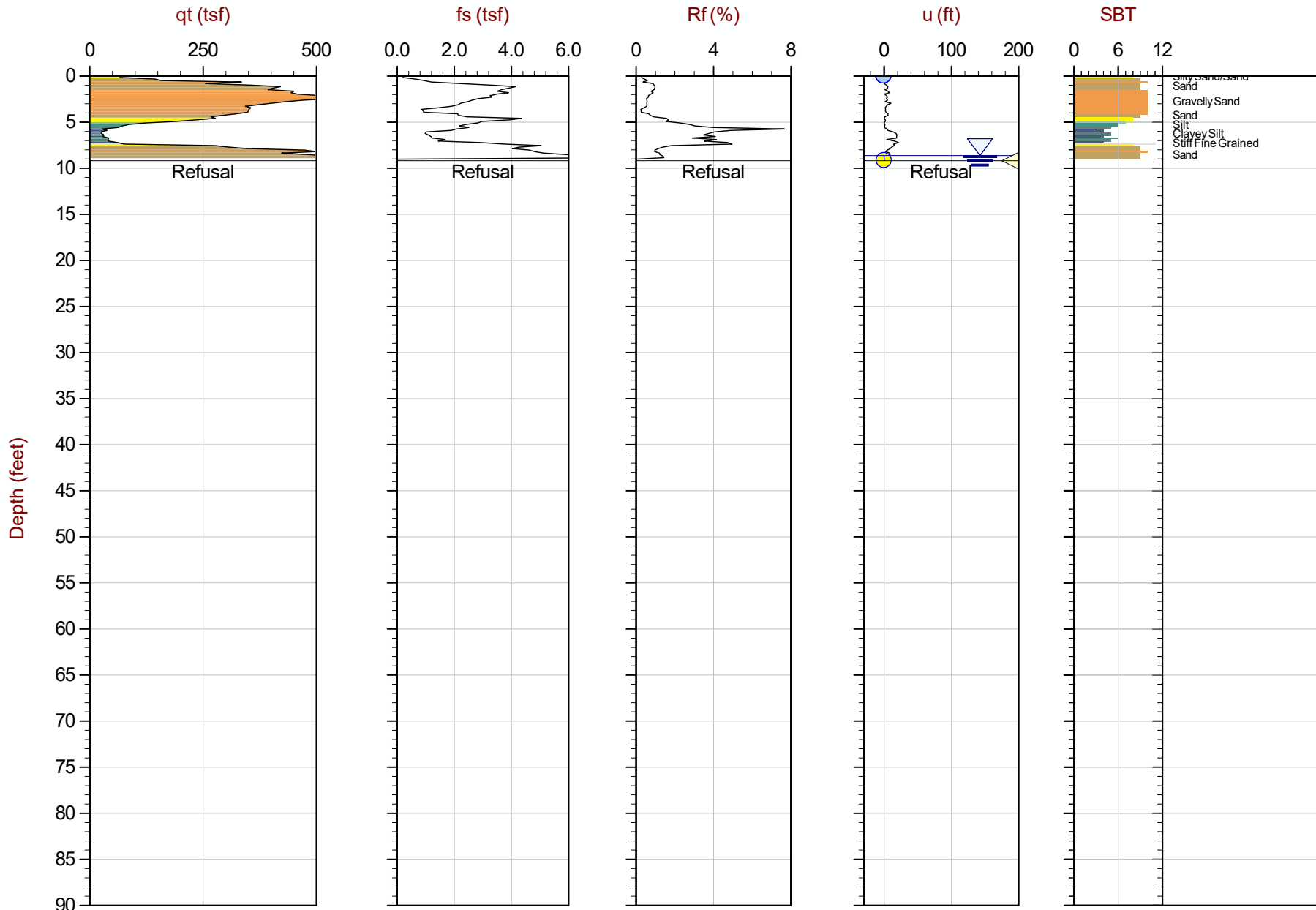
Job No: 15-53081

Date: 09:02:15 15:55

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C038A

Cone: 301:T1500F15U500



Max Depth: 2.800 m / 9.19 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: EveryPoint

File: 15-53081_CP38A.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575087m E: 307369m

Hydrostatic Line ● Ueq ● Assumed Ueq ◀ PPD, Ueq achieved ◀ PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



AECOM

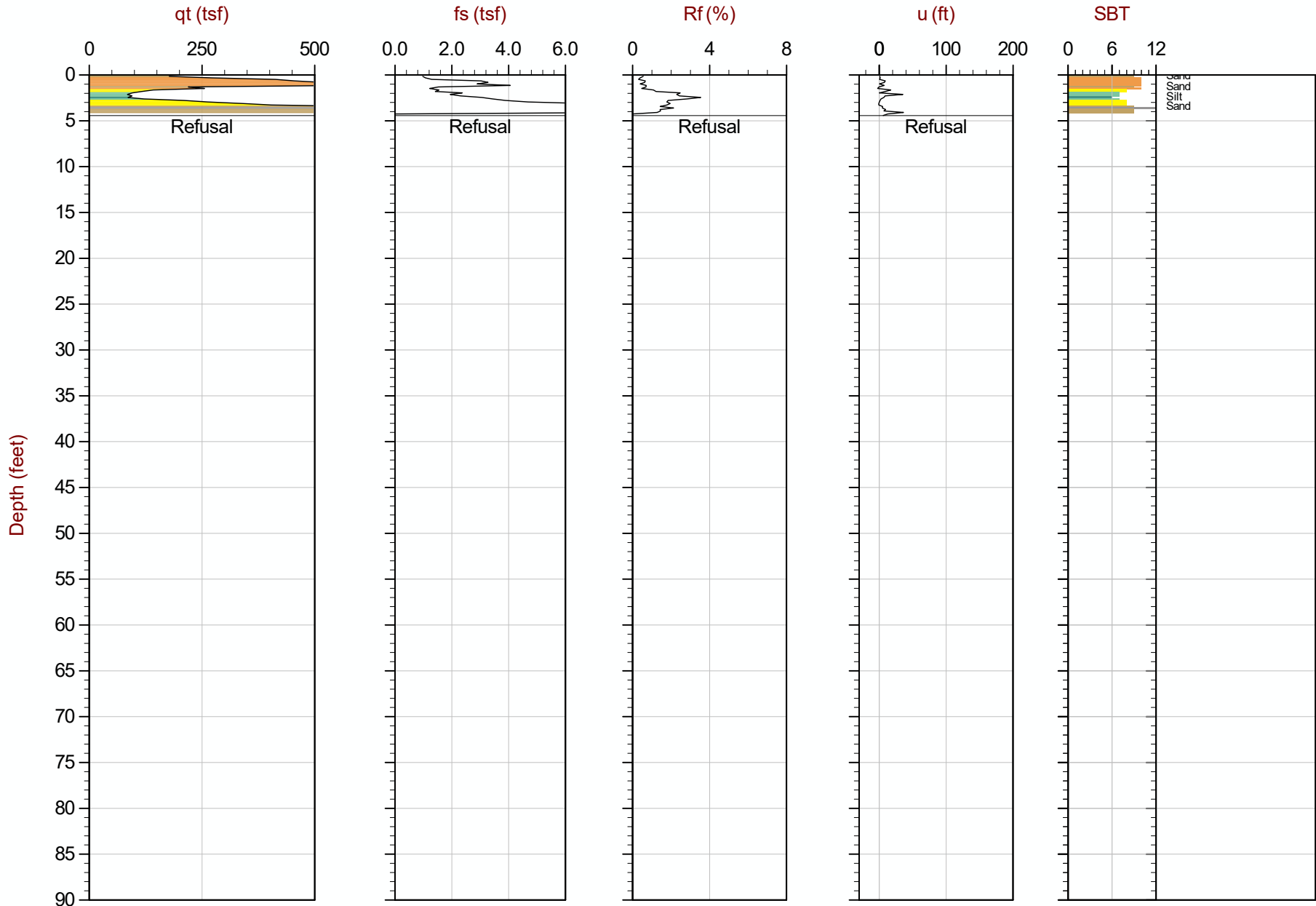
Job No: 15-53081

Date: 09:02:15 12:25

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C039

Cone: 374:T1500F15U500



Max Depth: 1.350 m / 4.43 ft
 Depth Inc: 0.050 m / 0.164 ft
 Avg Int: Every Point

File: 15-53081_CP39.COR

SBT: Robertson and Campanella, 1986
 Coords: UTM Zone 16 N: 4575108m E: 307373m

Pore Pressure Dissipation Summary and
Pore Pressure Dissipation Plots



Job No: 15-53081
 Client: AECOM
 Project: Hennepin Power Station, Hennepin, IL
 Start Date: 01-Sep-2015
 End Date: 11-Sep-2015

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm ²)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U _{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t ₅₀ ^a (s)	Assumed Rigidity Index (I _r)	C _n ^b (cm ² /min)
HEN-C002	15-53081_CP02	15	8000	30.02	12.31		17.71	4157	100	0.17
HEN-C002	15-53081_CP02	15	600	47.90	30.56	17.34				
HEN-C002	15-53081_CP02	15	500	55.61	37.90	17.71				
HEN-C004	15-53081_CP04	15	8000	30.02	13.29		16.73	2533	100	0.28
HEN-C004	15-53081_CP04	15	500	35.27	18.99	16.28				
HEN-C004	15-53081_CP04	15	1005	41.34	24.61	16.73				
HEN-C005	15-53081_SP05	15	500	21.82	2.25	18.84				
HEN-C005	15-53081_SP05	15	800	24.93	1.91	19.00				
HEN-C005A	15-53081_SP05A	15	605	41.99	10.28	18.29				
HEN-C005A	15-53081_SP05A	15	2000	62.66	8.20	18.28				
HEN-C006	15-53081_CP06	15	500	7.71	16.63	5.46				
HEN-C006	15-53081_CP06	15	300	17.39	0.75	15.48				
HEN-C006	15-53081_CP06	15	1800	26.74	9.31	16.46				
HEN-C007B	15-53081_SP07B	15	700	22.31	12.43	17.59				
HEN-C007B	15-53081_SP07B	15	1100	40.35	23.26	17.55				
HEN-C007B	15-53081_SP07B	15	500	60.04	3.99	16.97				
HEN-C007B	15-53081_SP07B	15	1700	88.91	0.77	17.00				
HEN-C008	15-53081_SP08	15	300	19.36	2.59	17.07				
HEN-C008B	15-53081_SP08B	15	400	21.33	0.90	17.51				
HEN-C008B	15-53081_SP08B	15	700	40.52	0.00	17.71				
HEN-C008B	15-53081_SP08B	15	600	85.79	0.00	17.78				
HEN-C009	15-53081_CP09	15	1800	15.09	0.00	6.89				
HEN-C009	15-53081_CP09	15	3000	23.46		6.83				
HEN-C010	15-53081_SP10	15	855	35.10	2.70					
HEN-C010	15-53081_SP10	15	3000	38.22	0.00		17.60	228	100	3.08
HEN-C010	15-53081_SP10	15	605	42.16	4.31	17.60				
HEN-C012	15-53081_CP12	15	900	11.15		10.41		42	100	16.90
HEN-C012	15-53081_CP12	15	3600	20.01	0.09		10.70	1719	100	0.41
HEN-C012	15-53081_CP12	15	300	22.97		10.53				
HEN-C012	15-53081_CP12	15	300	33.96	0.00	10.70				
HEN-C014	15-53081_CP14	15	900	20.01	0.56	16.02				
HEN-C015	15-53081_SP15	15	7500	25.59	2.98		11.64	969	100	0.72
HEN-C015	15-53081_SP15	15	500	51.34	5.93	11.64				
HEN-C015	15-53081_SP15	15	300	52.33	23.71	12.07				
HEN-C017	15-53081_SP17	15	400	5.58	44.38					
HEN-C017	15-53081_SP17	15	1000	15.58	4.72		12.05	103	100	6.78
HEN-C017	15-53081_SP17	15	500	50.69	22.81	12.64				
HEN-C017	15-53081_SP17	15	600	66.44	43.07	12.05				
HEN-C019	15-53081_SP19	15	4000	14.76	71.91		11.53	654	100	1.07
HEN-C019	15-53081_SP19	15	2010	40.35	2.28	11.52		48	100	14.73
HEN-C019	15-53081_SP19	15	500	54.79	3.82	11.53				
HEN-C019	15-53081_SP19	15	3600	62.83	22.81					
HEN-C021A	15-53081_SP21A	15	1500	16.73	68.01	10.29		86	100	8.16
HEN-C021A	15-53081_SP21A	15	900	25.75		23.36		174	100	4.04
HEN-C021A	15-53081_SP21A	15	1500	32.48	20.62	27.91		268	100	2.62



Job No: 15-53081
 Client: AECOM
 Project: Hennepin Power Station, Hennepin, IL
 Start Date: 01-Sep-2015
 End Date: 11-Sep-2015

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm ²)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U _{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)	t ₅₀ ^a (s)	Assumed Rigidity Index (I _r)	C _n ^b (cm ² /min)
HEN-C022	15-53081_CP22	15	800	7.71	24.56	6.94				
HEN-C022	15-53081_CP22	15	3700	13.78	13.95	11.19		168	100	4.17
HEN-C023	15-53081_CP23	15	1600	11.32	39.70					
HEN-C025	15-53081_CP25	15	1500	14.60	40.26					
HEN-C025	15-53081_CP25	15	805	23.79						
HEN-C025	15-53081_CP25	15	1000	30.02	3.53					
HEN-C025	15-53081_CP25	15	3200	47.24	38.05					
HEN-C026	15-53081_CP26	15	900	4.27	54.38	1.57		17	100	40.40
HEN-C026	15-53081_CP26	15	900	15.09	3.23		15.09	36	100	19.26
HEN-C026	15-53081_CP26	15	1800	30.02	28.84	25.71		18	100	38.18
HEN-C027	15-53081_SP27	15	4200	17.55	43.26		14.33			
HEN-C027	15-53081_SP27	15	600	19.68		14.33				
HEN-C027	15-53081_SP27	15	500	30.02	6.44					
HEN-C029	15-53081_CP29	15	900	10.01						
HEN-C029	15-53081_CP29	15	600	21.16						
HEN-C032	15-53081_CP32	15	1200	10.01	2.40					
HEN-C032	15-53081_CP32	15	300	12.30	4.57					
HEN-C038A	15-53081_CP38A	15	905	9.19	4.65	8.63				
Totals	63 dissipations		1609.8 min							

a. Time is relative to where umax occurred
 b. Hously and Teh, 1991



AECOM

Job No: 15-53081

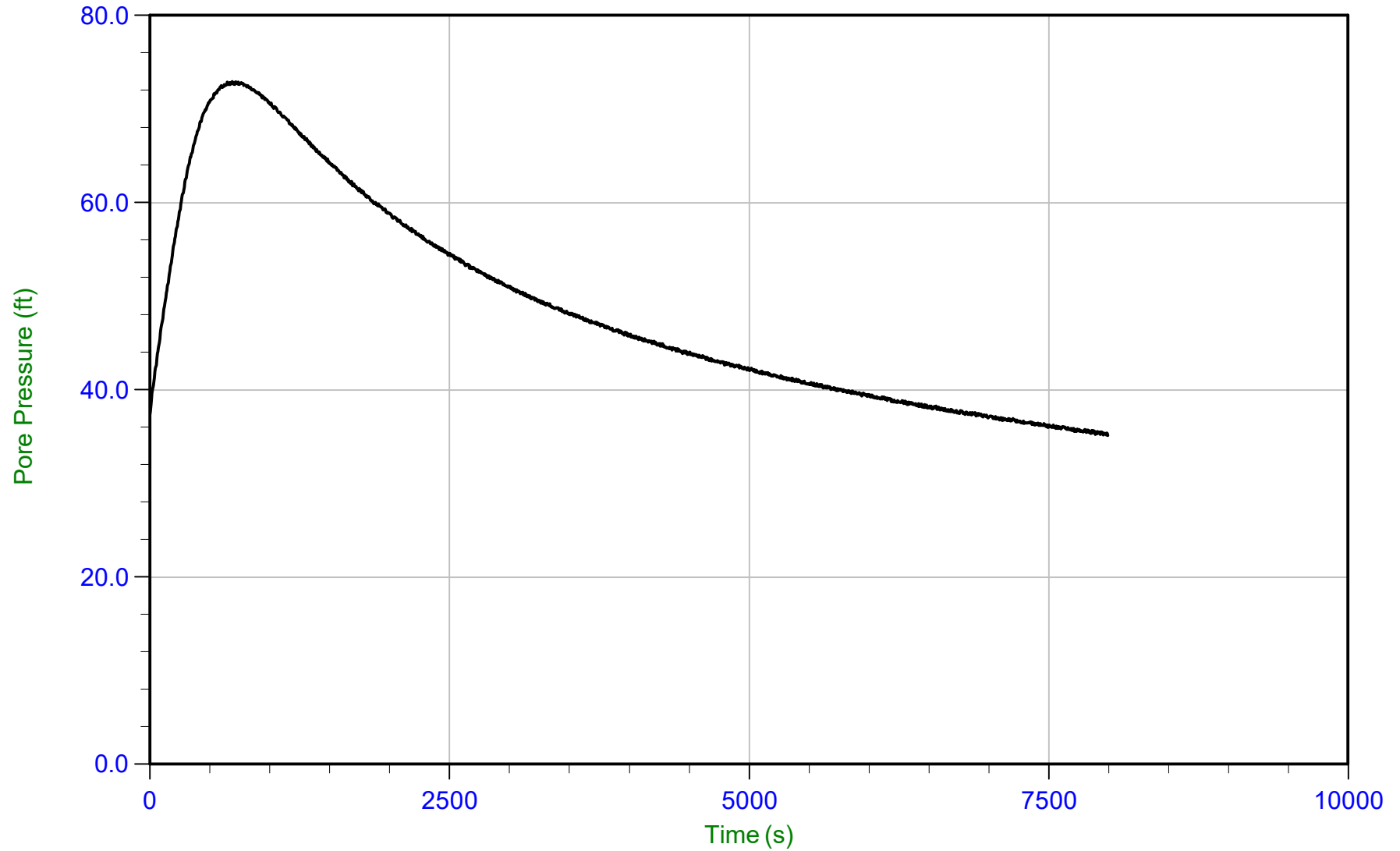
Date: 10-Sep-2015 08:58:37

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C002

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP02.PPD U Min: 35.1 ft WT: 5.397 m / 17.706 ft T(50): 4157.5 s
Depth: 9.150 m / 30.019 ft U Max: 72.9 ft Ueq: 12.3 ft Ir: 100
Duration: 8000.0 s U(50): 42.61 ft Ch: 0.2 sq cm/min



AECOM

Job No: 15-53081

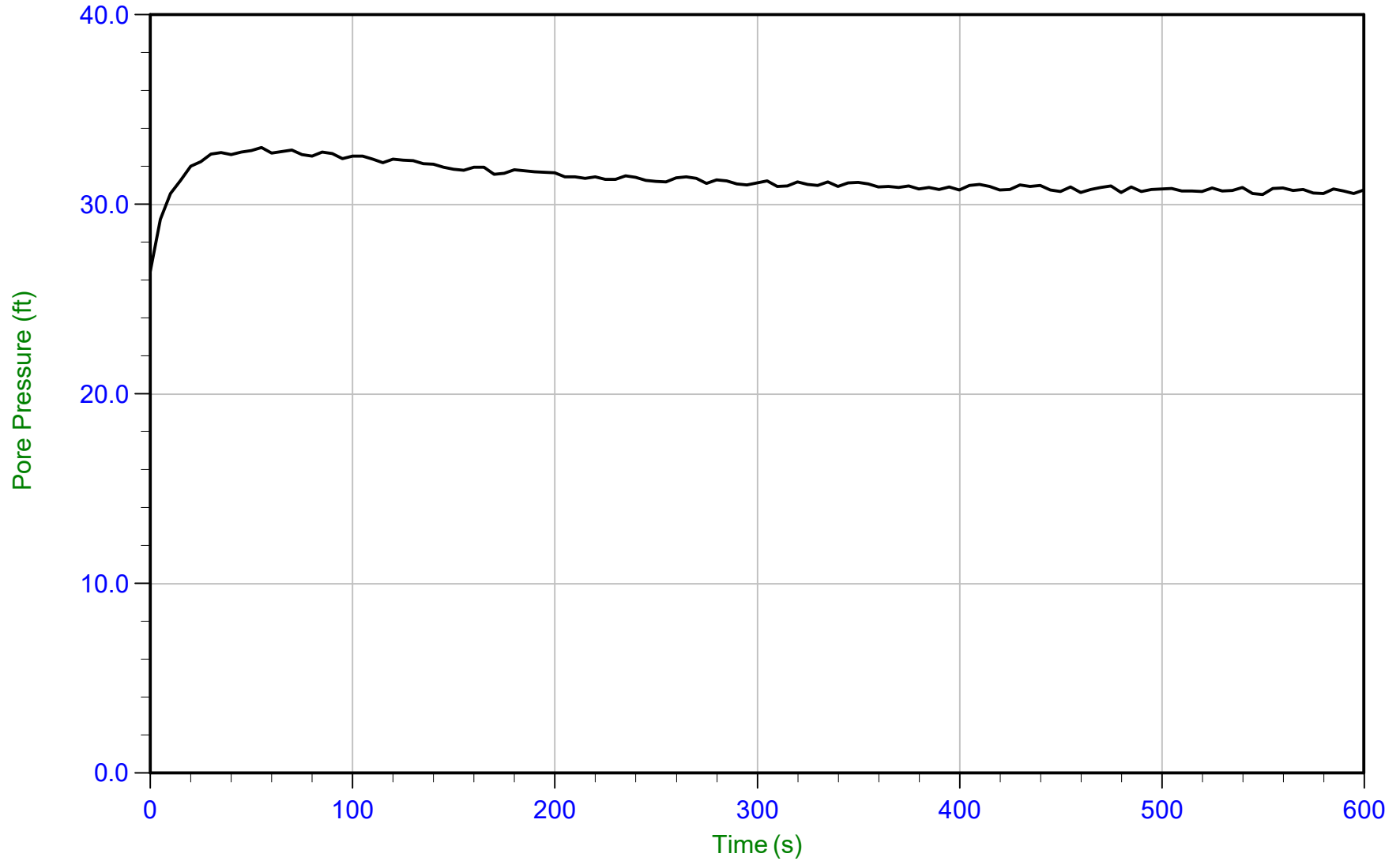
Date: 10-Sep-2015 08:58:37

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C002

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP02.PPD
Depth: 14.600 m / 47.900 ft
Duration: 600.0 s

U Min: 26.5 ft
U Max: 33.0 ft

WT: 5.285 m / 17.339 ft
Ueq: 30.6 ft



AECOM

Job No: 15-53081

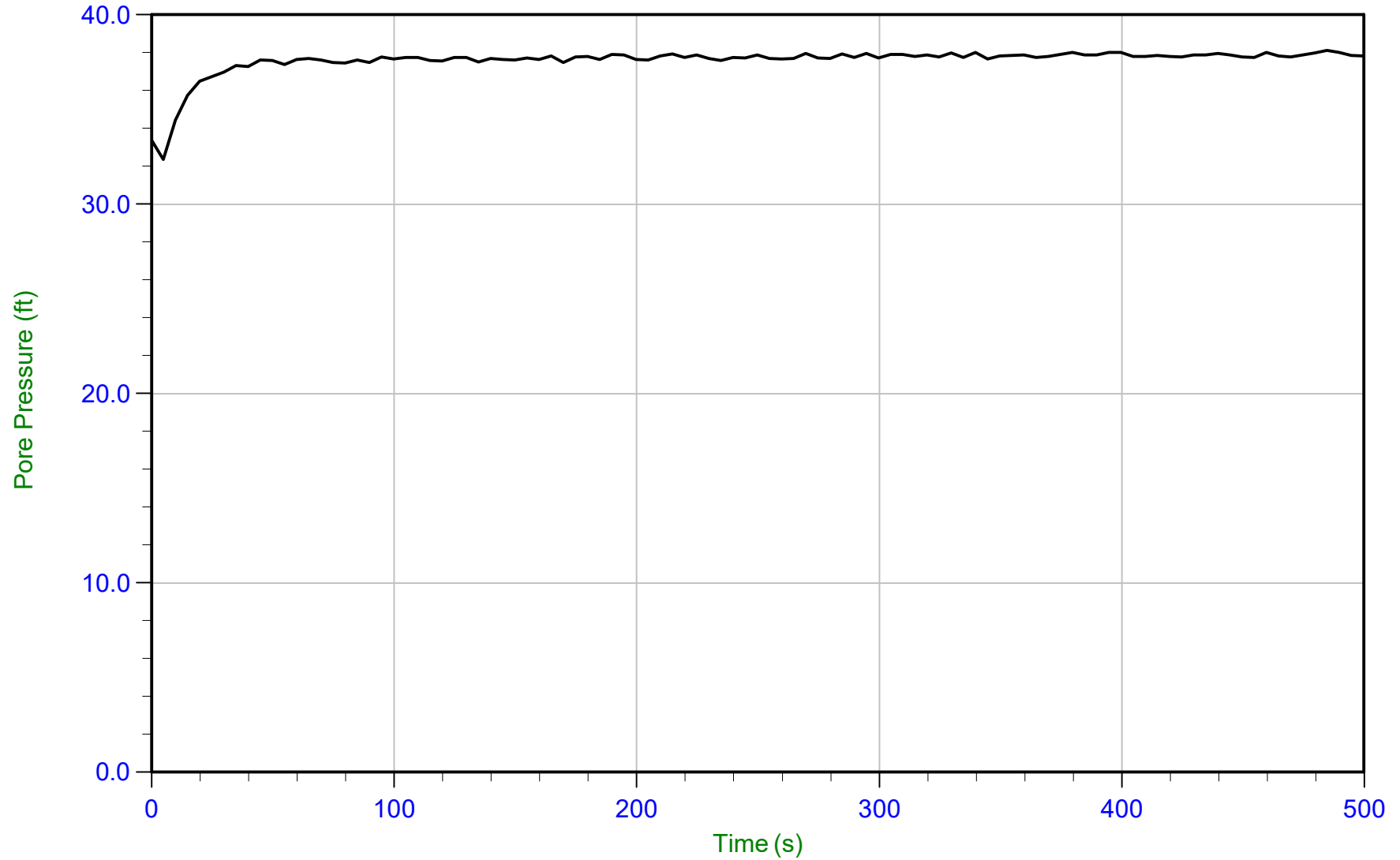
Date: 10-Sep-2015 08:58:37

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C002

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP02.PPD
Depth: 16.950 m / 55.610 ft
Duration: 500.0 s

U Min: 32.4 ft
U Max: 38.1 ft

WT: 5.397 m / 17.706 ft
Ueq: 37.9 ft



AECOM

Job No: 15-53081

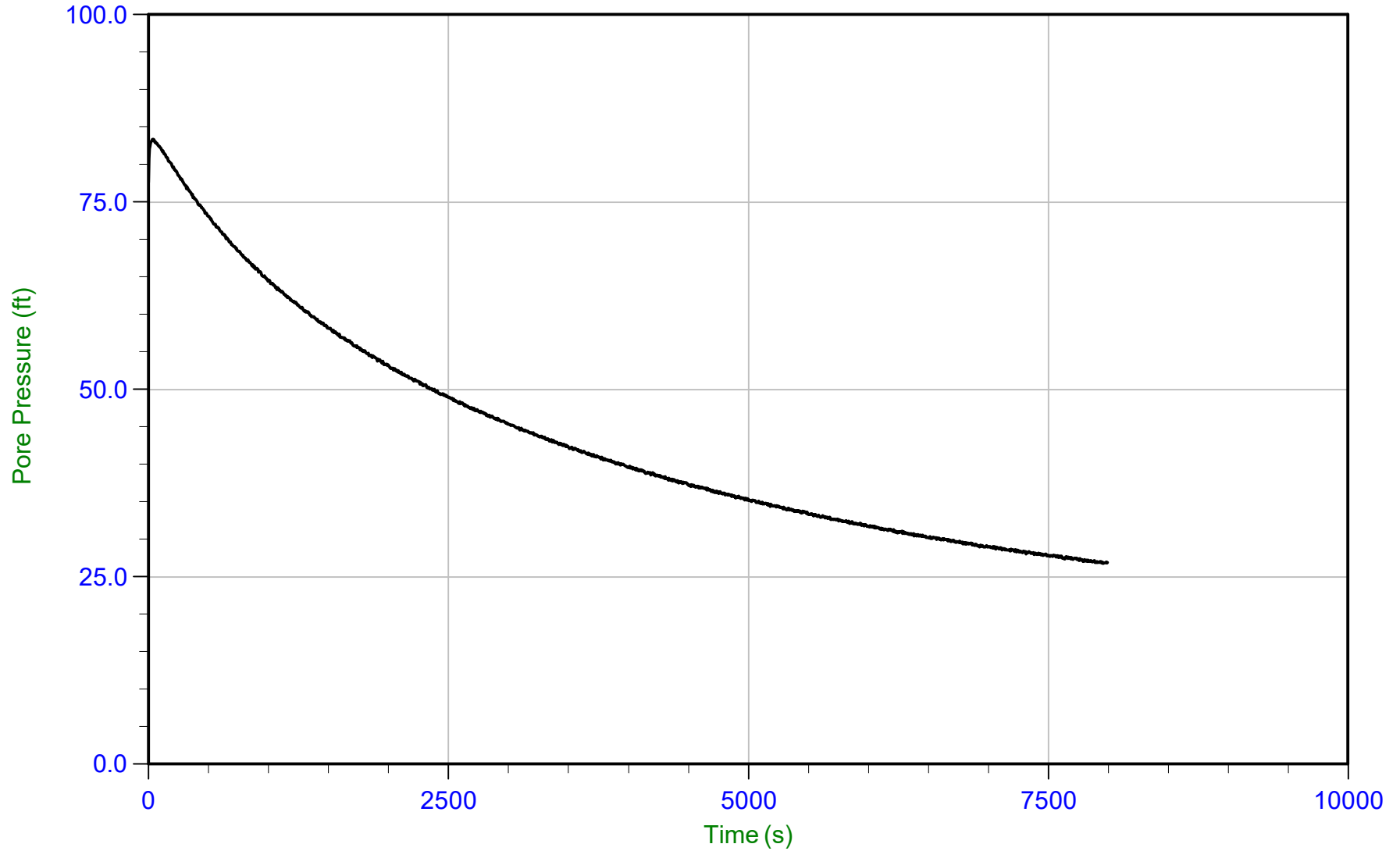
Date: 03-Sep-2015 12:09:43

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C004

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP04.PPD U Min: 26.8 ft WT: 5.100 m / 16.732 ft T(50): 2533.4 s
Depth: 9.150 m / 30.019 ft U Max: 83.4 ft Ueq: 13.3 ft Ir: 100
Duration: 8000.0 s U(50): 48.32 ft Ch: 0.3 sq cm/min



AECOM

Job No: 15-53081

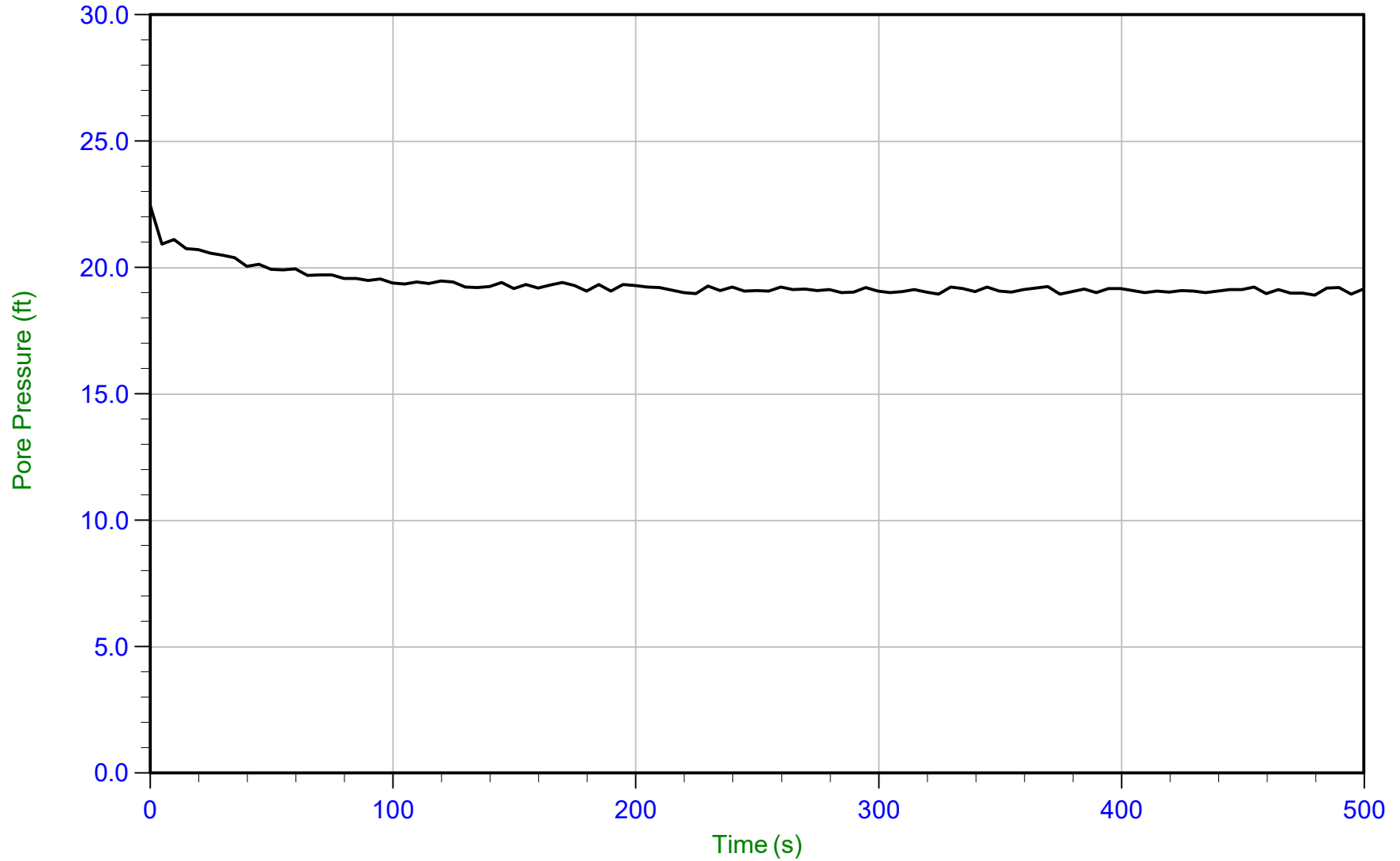
Date: 03-Sep-2015 12:09:43

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C004

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP04.PPD U Min: 18.9 ft WT: 4.962 m / 16.279 ft
Depth: 10.750 m / 35.269 ft U Max: 22.5 ft Ueq: 19.0 ft
Duration: 500.0 s



AECOM

Job No: 15-53081

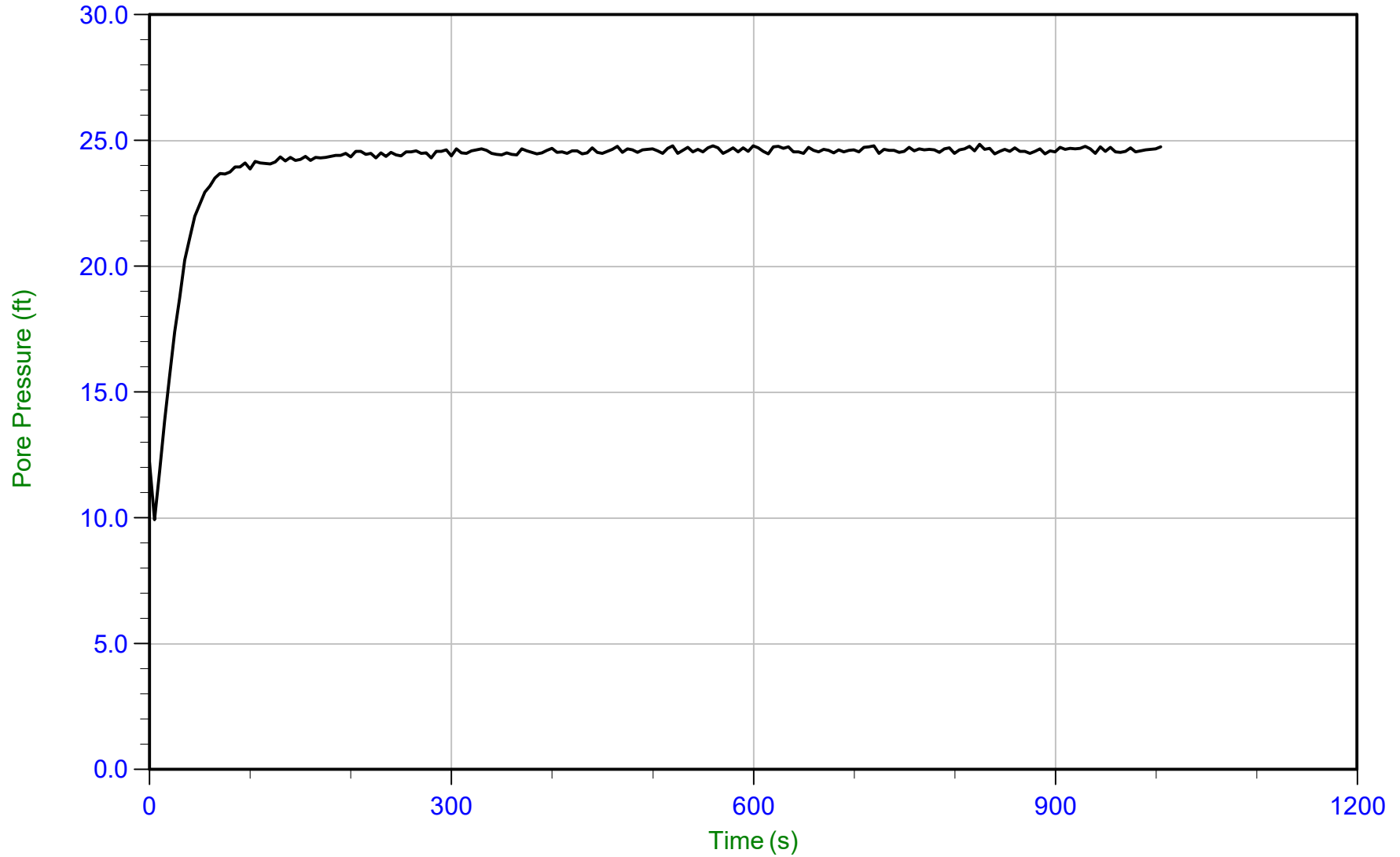
Date: 03-Sep-2015 12:09:43

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C004

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP04.PPD
Depth: 12.600 m / 41.338 ft
Duration: 1005.0 s

U Min: 9.9 ft
U Max: 24.9 ft

WT: 5.100 m / 16.732 ft
Ueq: 24.6 ft



AECOM

Job No: 15-53081

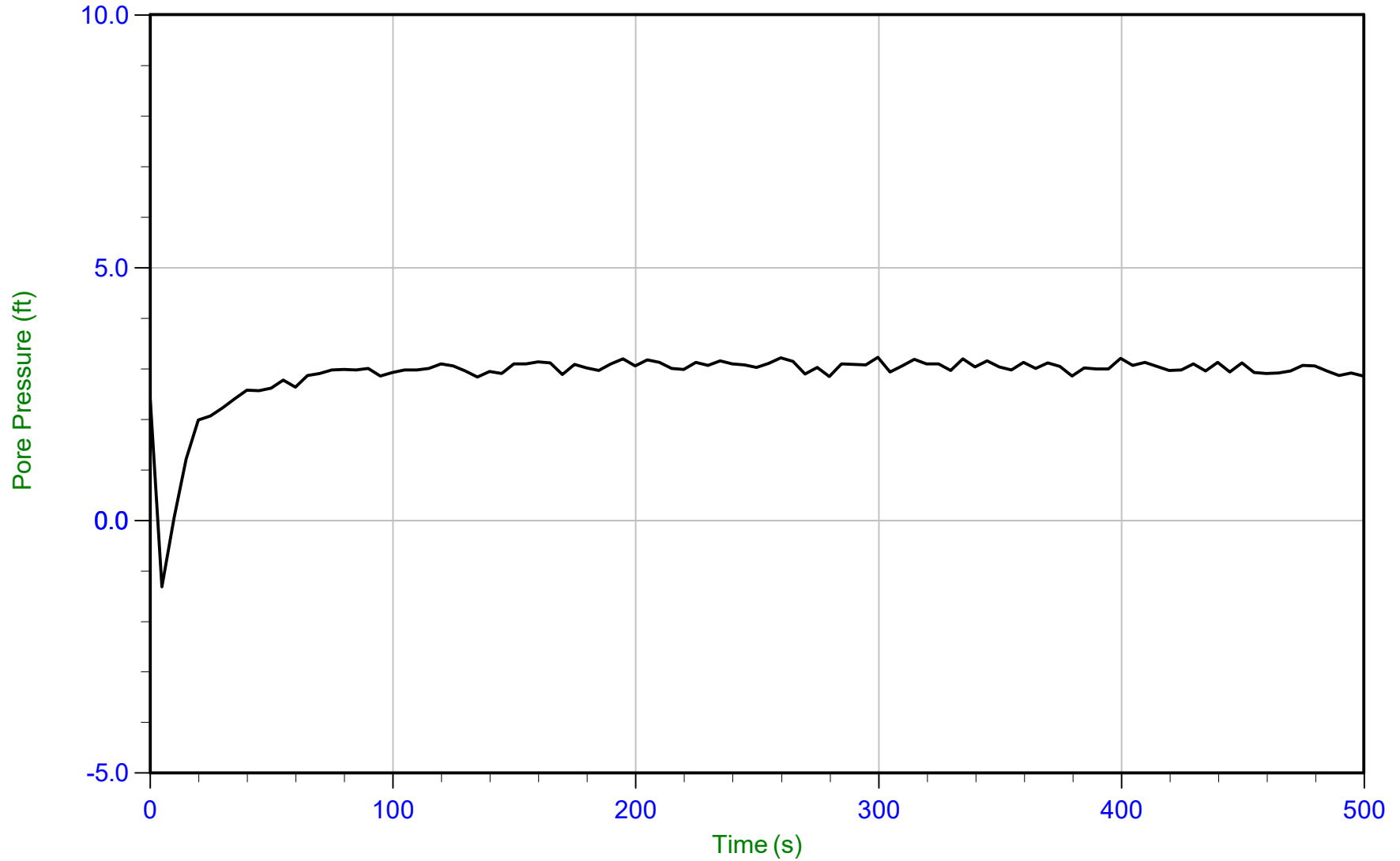
Date: 03-Sep-2015 09:08:45

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP05.PPD
Depth: 6.650 m / 21.817 ft
Duration: 500.0 s

U Min: -1.3 ft
U Max: 3.2 ft

WT: 5.742 m / 18.838 ft
Ueq: 3.0 ft



AECOM

Job No: 15-53081

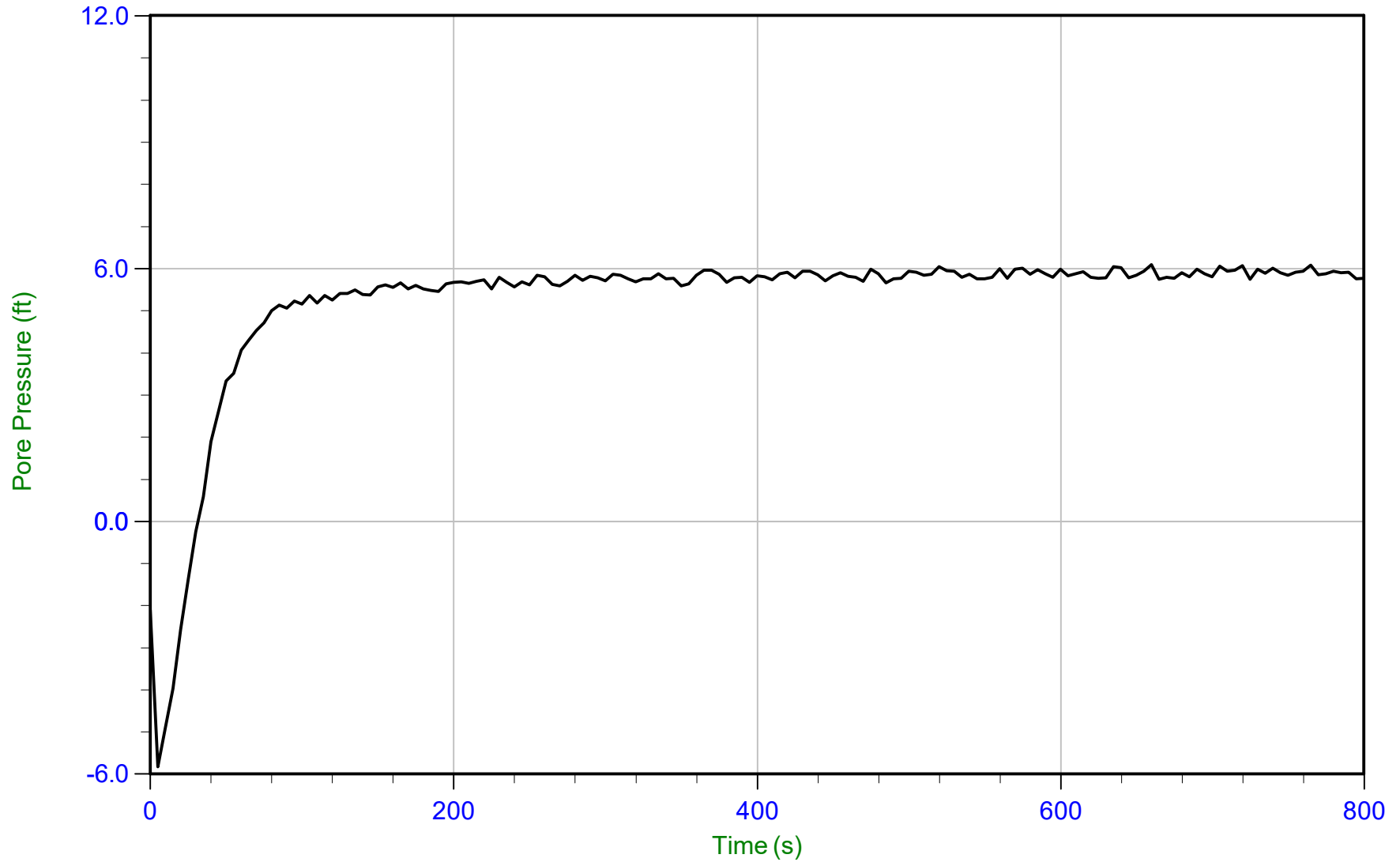
Date: 03-Sep-2015 09:08:45

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C005

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP05.PPD U Min: -5.8 ft WT: 5.792 m / 19.002 ft
Depth: 7.600 m / 24.934 ft U Max: 6.1 ft Ueq: 5.9 ft
Duration: 800.0 s



AECOM

Job No: 15-53081

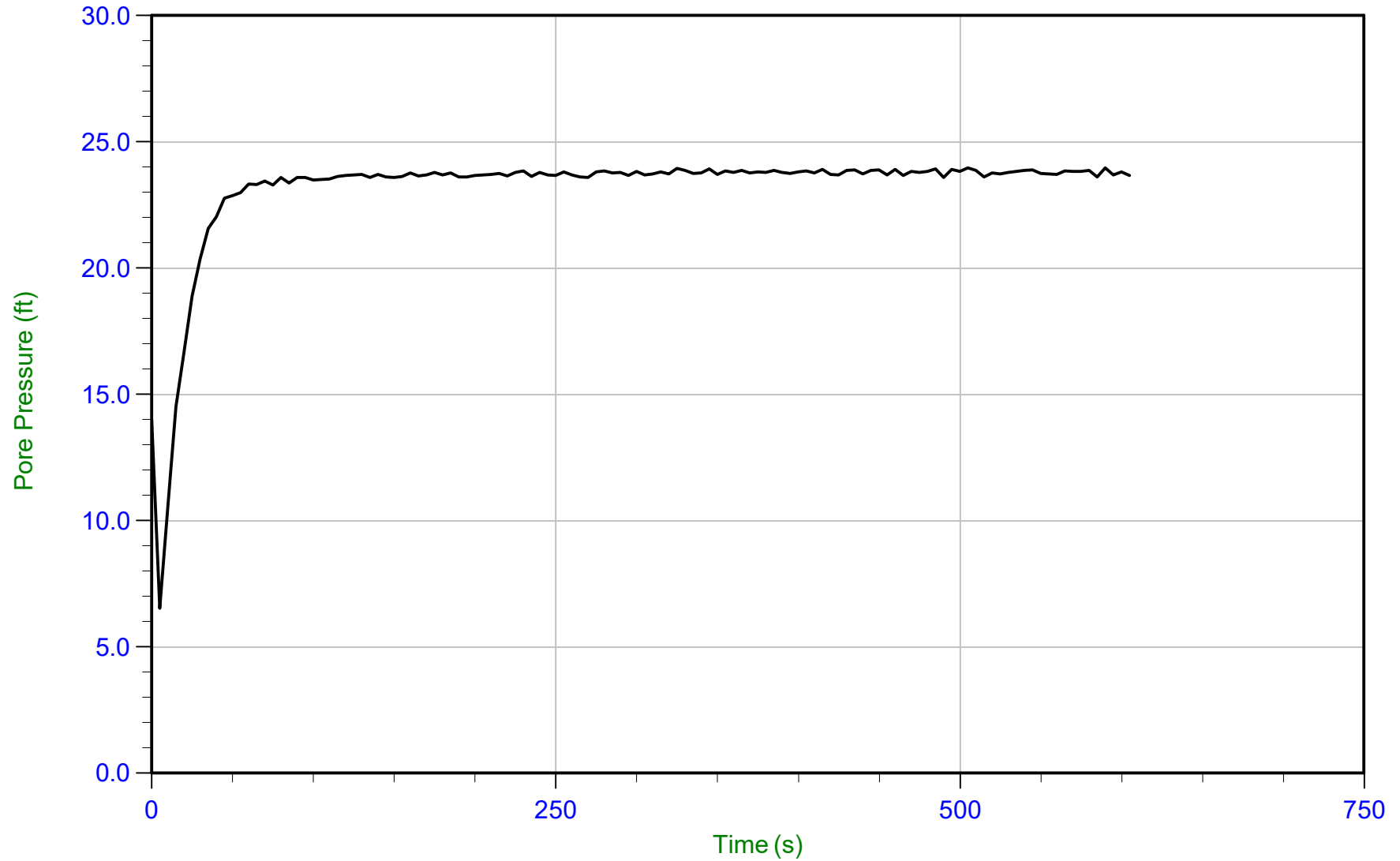
Date: 03-Sep-2015 10:10:22

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005A

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP05A.PPD
Depth: 12.800 m / 41.994 ft
Duration: 605.0 s

U Min: 6.5 ft
U Max: 24.0 ft

WT: 5.574 m / 18.287 ft
Ueq: 23.7 ft



AECOM

Job No: 15-53081

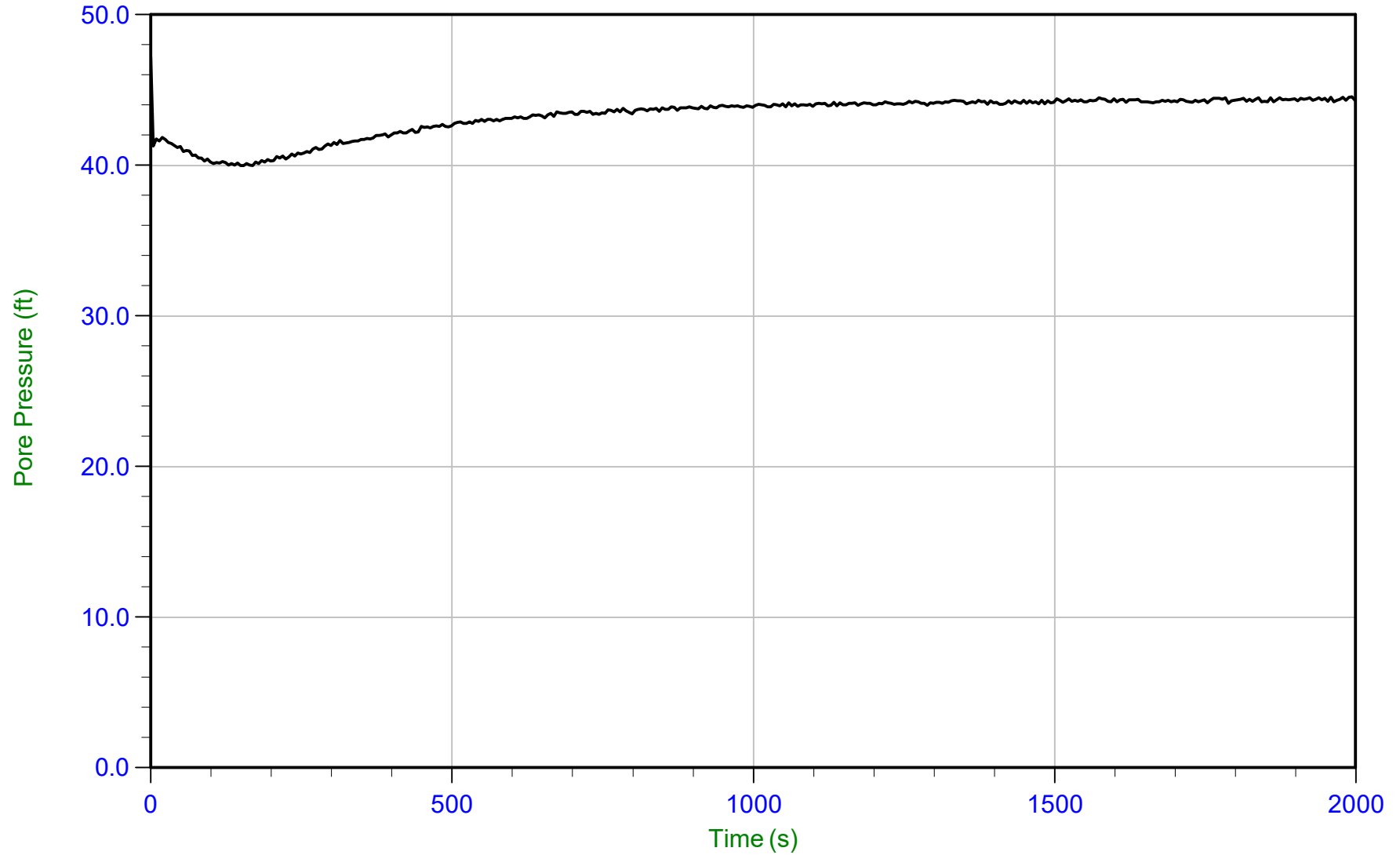
Date: 03-Sep-2015 10:10:22

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C005A

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP05A.PPD U Min: 40.0 ft WT: 5.572 m / 18.281 ft
Depth: 19.100 m / 62.663 ft U Max: 47.2 ft Ueq: 44.4 ft
Duration: 2000.0 s



AECOM

Job No: 15-53081

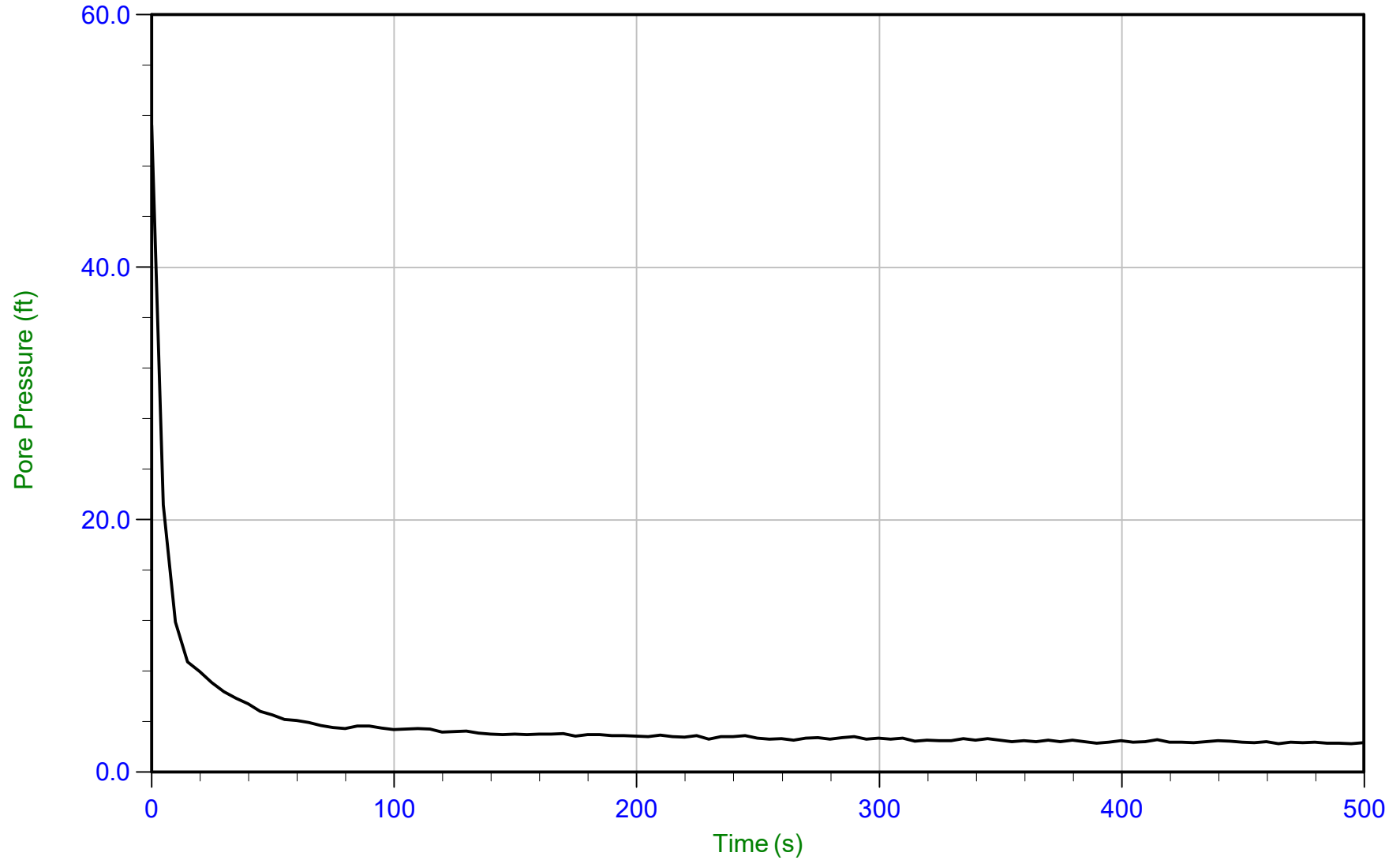
Date: 03-Sep-2015 13:48:17

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C006

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP06.PPD
Depth: 2.350 m / 7.710 ft
Duration: 500.0 s

U Min: 2.3 ft
U Max: 51.3 ft

WT: 1.665 m / 5.463 ft
Ueq: 2.2 ft



AECOM

Job No: 15-53081

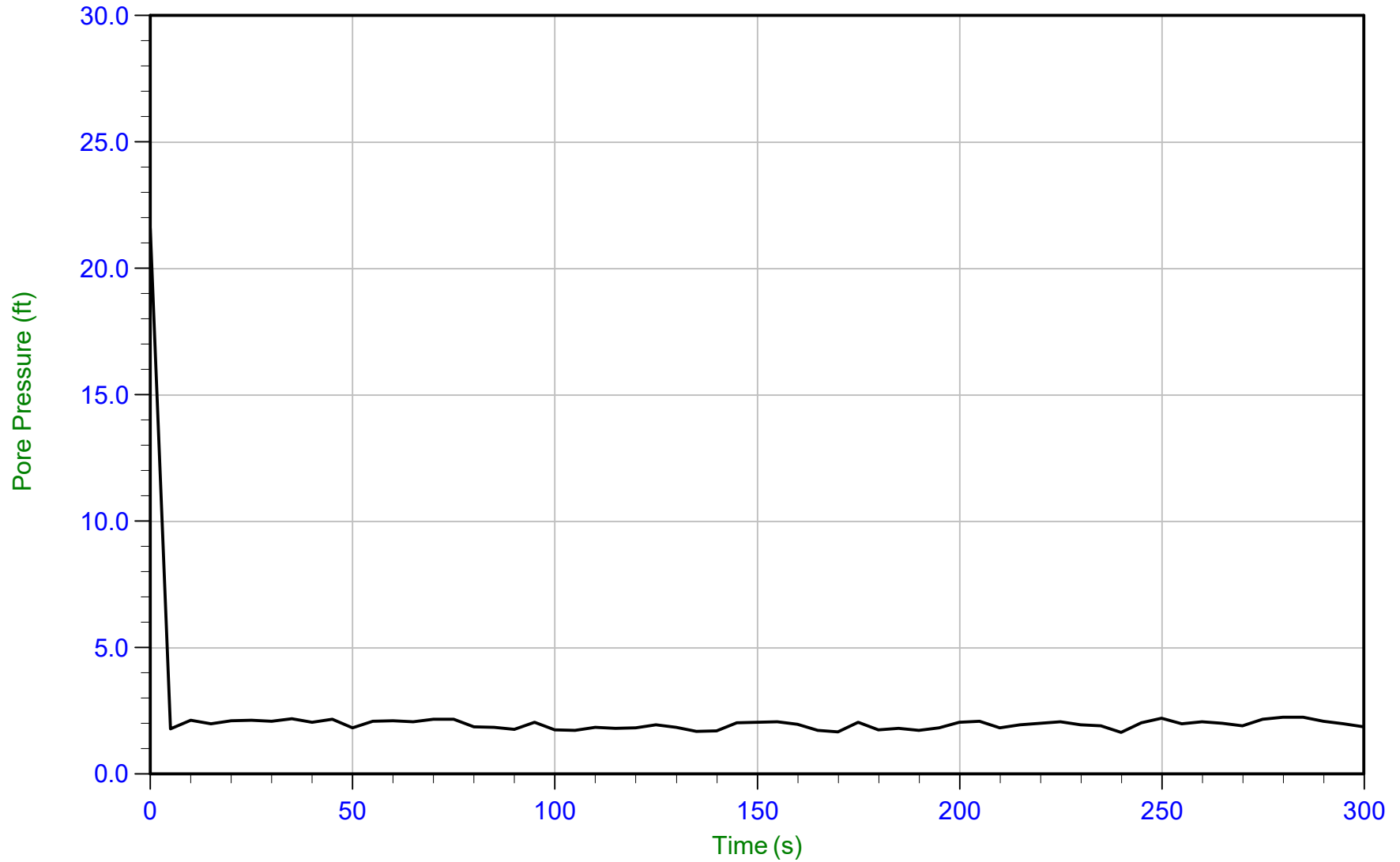
Date: 03-Sep-2015 13:48:17

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C006

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP06.PPD
Depth: 5.300 m / 17.388 ft
Duration: 300.0 s

U Min: 1.7 ft
U Max: 21.6 ft

WT: 4.718 m / 15.479 ft
Ueq: 1.9 ft



AECOM

Job No: 15-53081

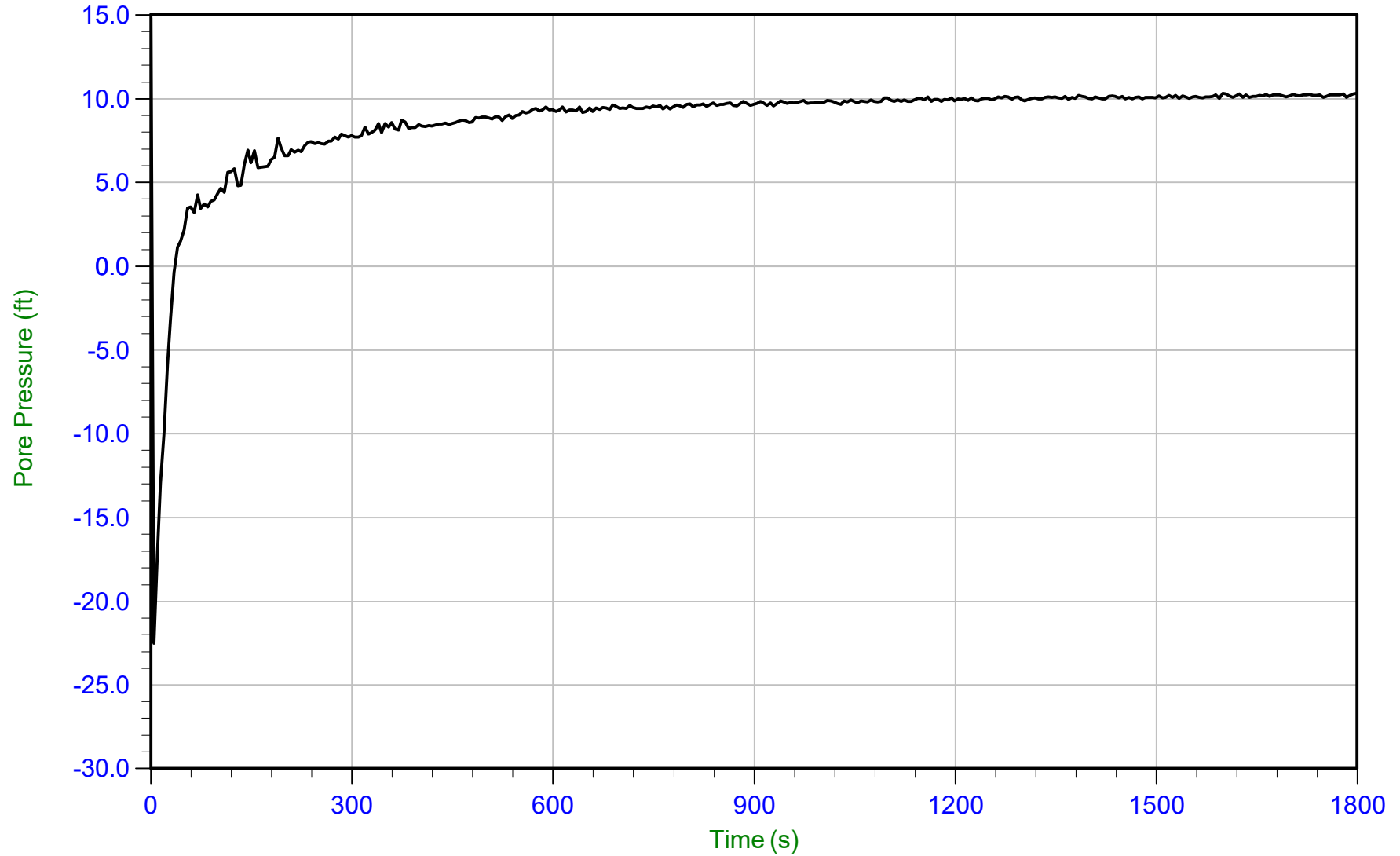
Date: 03-Sep-2015 13:48:17

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C006

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP06.PPD
Depth: 8.150 m / 26.739 ft
Duration: 1800.0 s

U Min: -22.5 ft
U Max: 14.8 ft

WT: 5.016 m / 16.456 ft
Ueq: 10.3 ft



AECOM

Job No: 15-53081

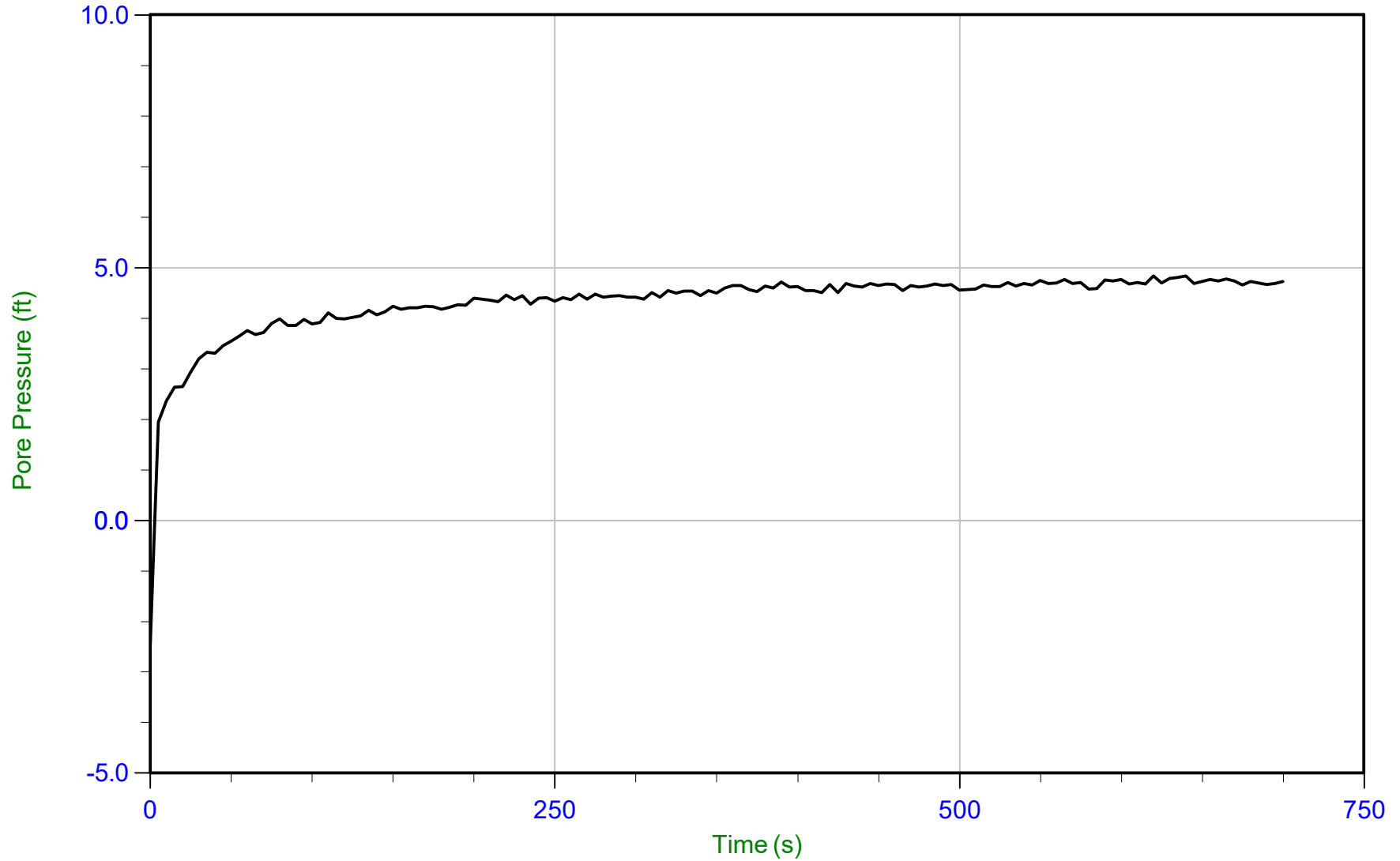
Date: 09-Sep-2015 09:54:16

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C007B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP07B.PPD U Min: -2.4 ft WT: 5.362 m / 17.592 ft
Depth: 6.800 m / 22.309 ft U Max: 4.8 ft Ueq: 4.7 ft
Duration: 700.0 s



AECOM

Job No: 15-53081

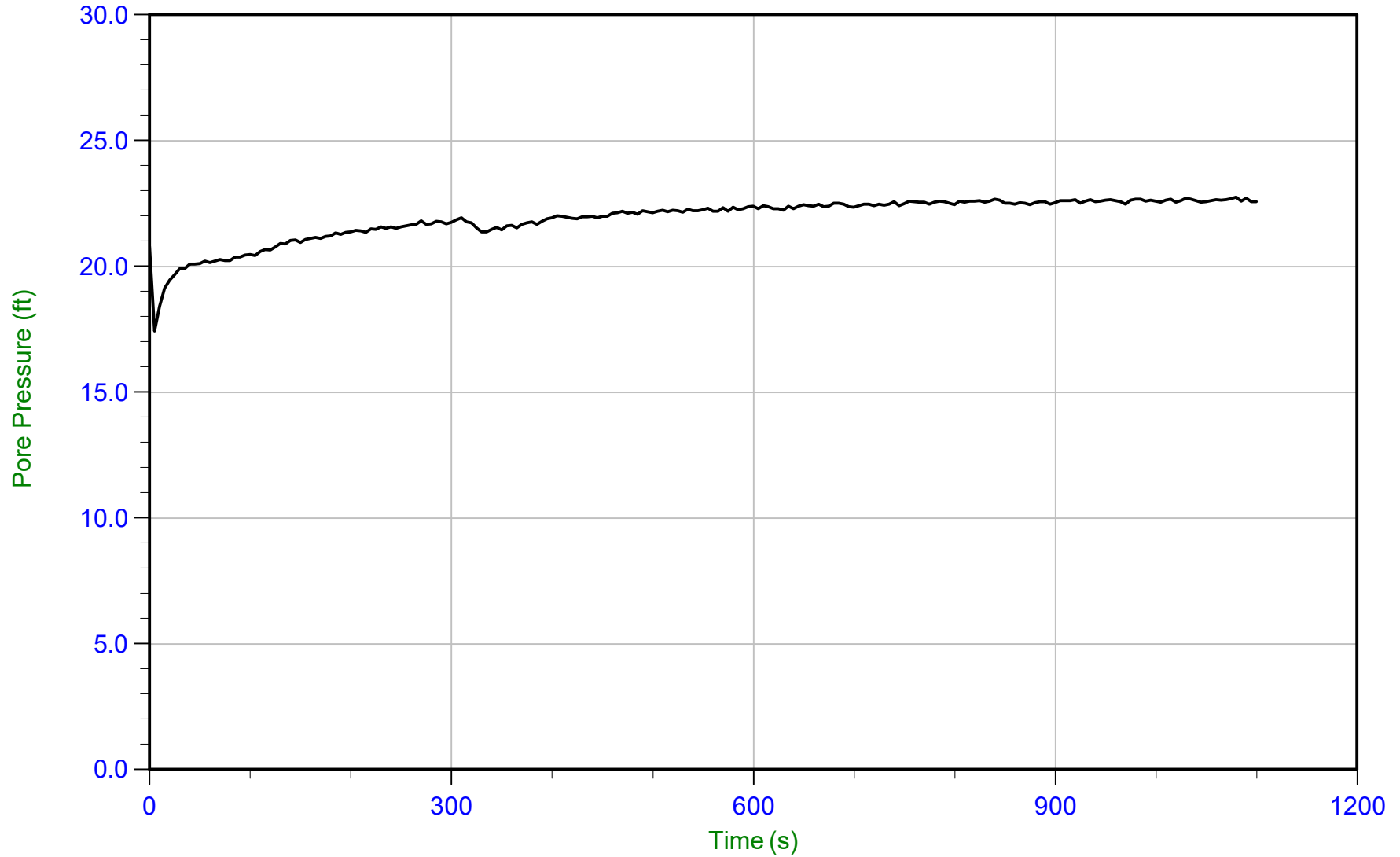
Date: 09-Sep-2015 09:54:16

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C007B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP07B.PPD U Min: 17.4 ft WT: 5.348 m / 17.546 ft
Depth: 12.300 m / 40.354 ft U Max: 22.7 ft Ueq: 22.8 ft
Duration: 1100.0 s



AECOM

Job No: 15-53081

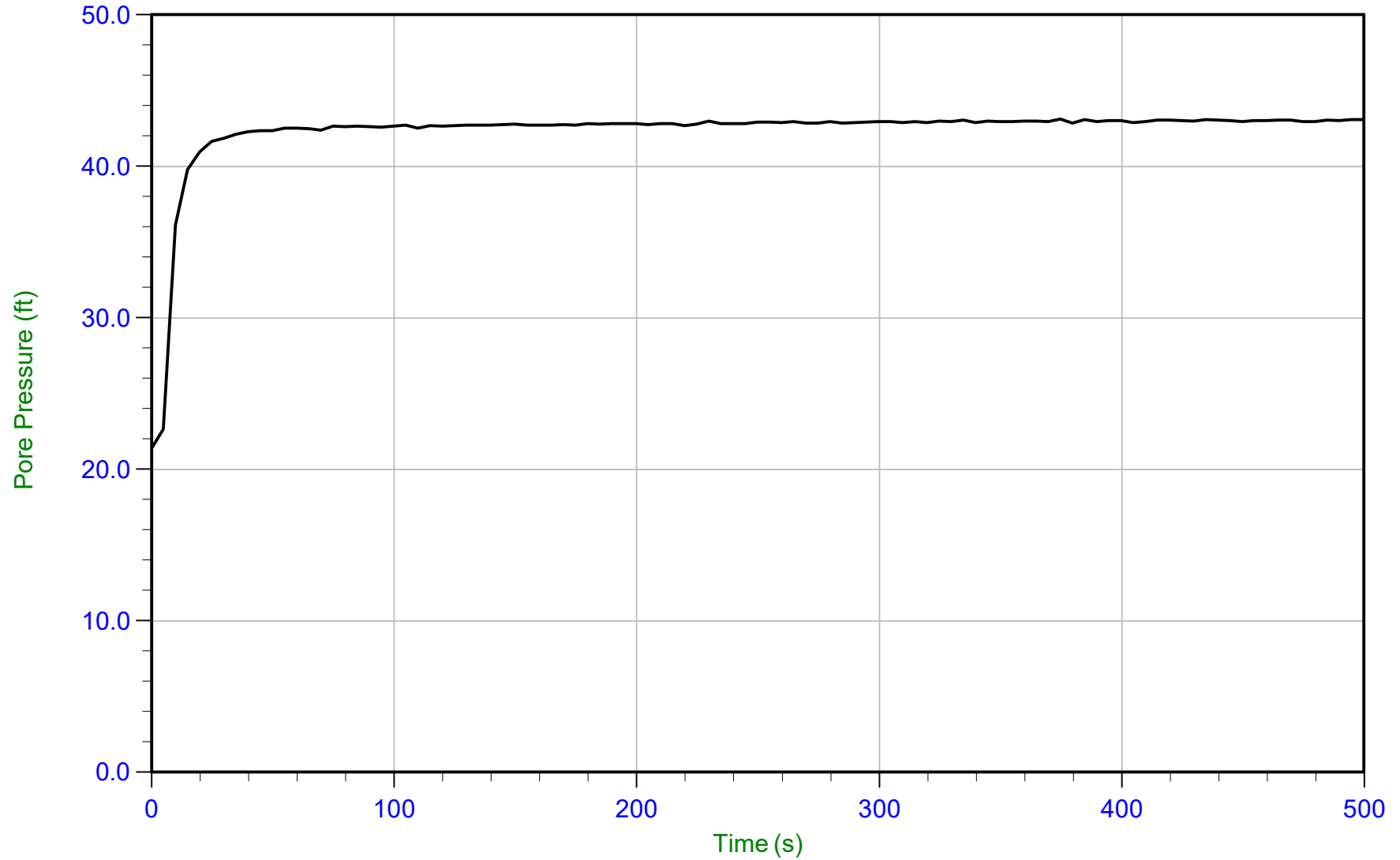
Date: 09-Sep-2015 09:54:16

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C007B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP07B.PPD
Depth: 18.300 m / 60.039 ft
Duration: 500.0 s

U Min: 21.4 ft
U Max: 43.1 ft

WT: 5.172 m / 16.968 ft
Ueq: 43.1 ft



AECOM

Job No: 15-53081

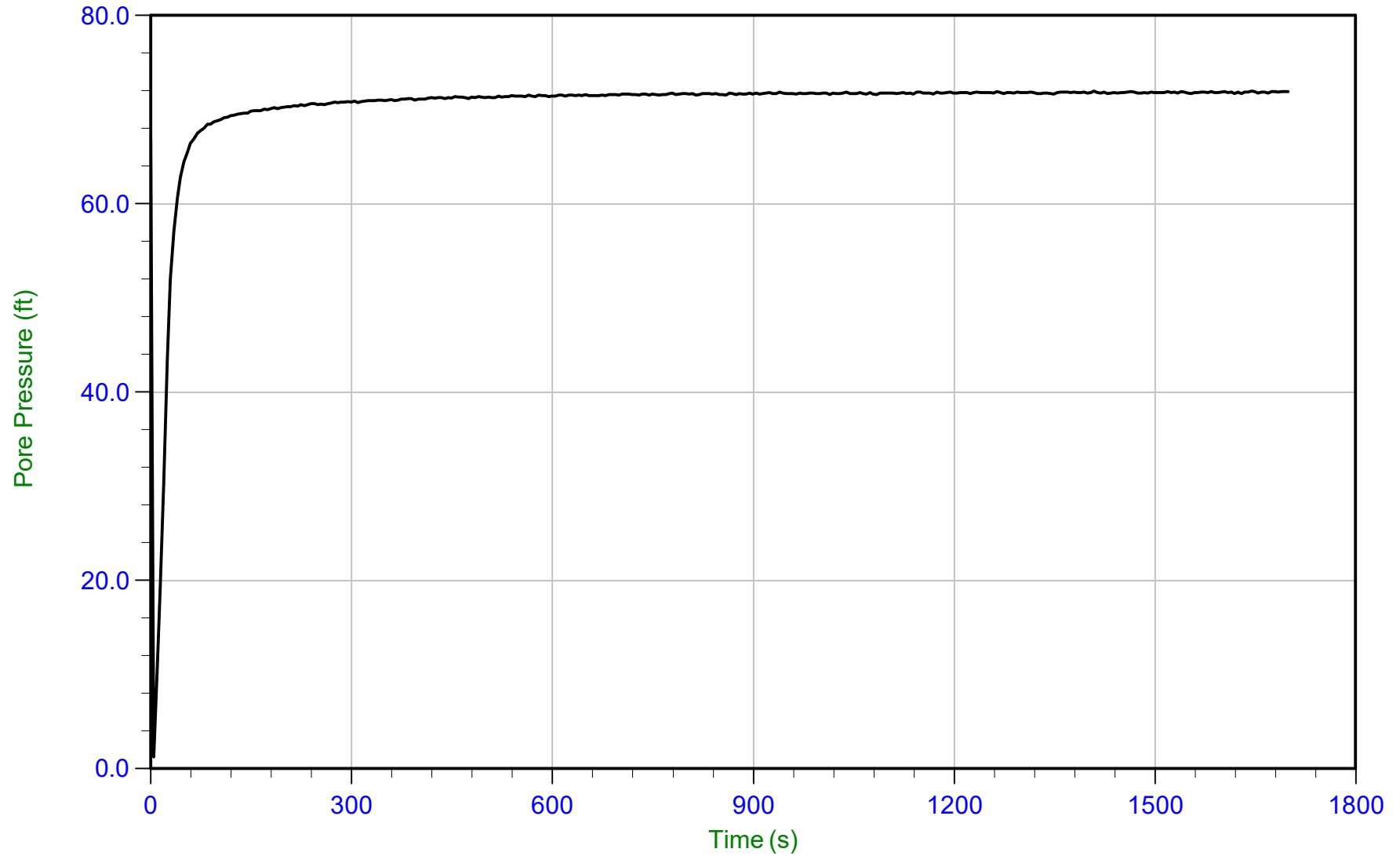
Date: 09-Sep-2015 09:54:16

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C007B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP07B.PPD U Min: 1.2 ft WT: 5.182 m / 17.001 ft
Depth: 27.100 m / 88.910 ft U Max: 72.0 ft Ueq: 71.9 ft
Duration: 1700.0 s



AECOM

Job No: 15-53081

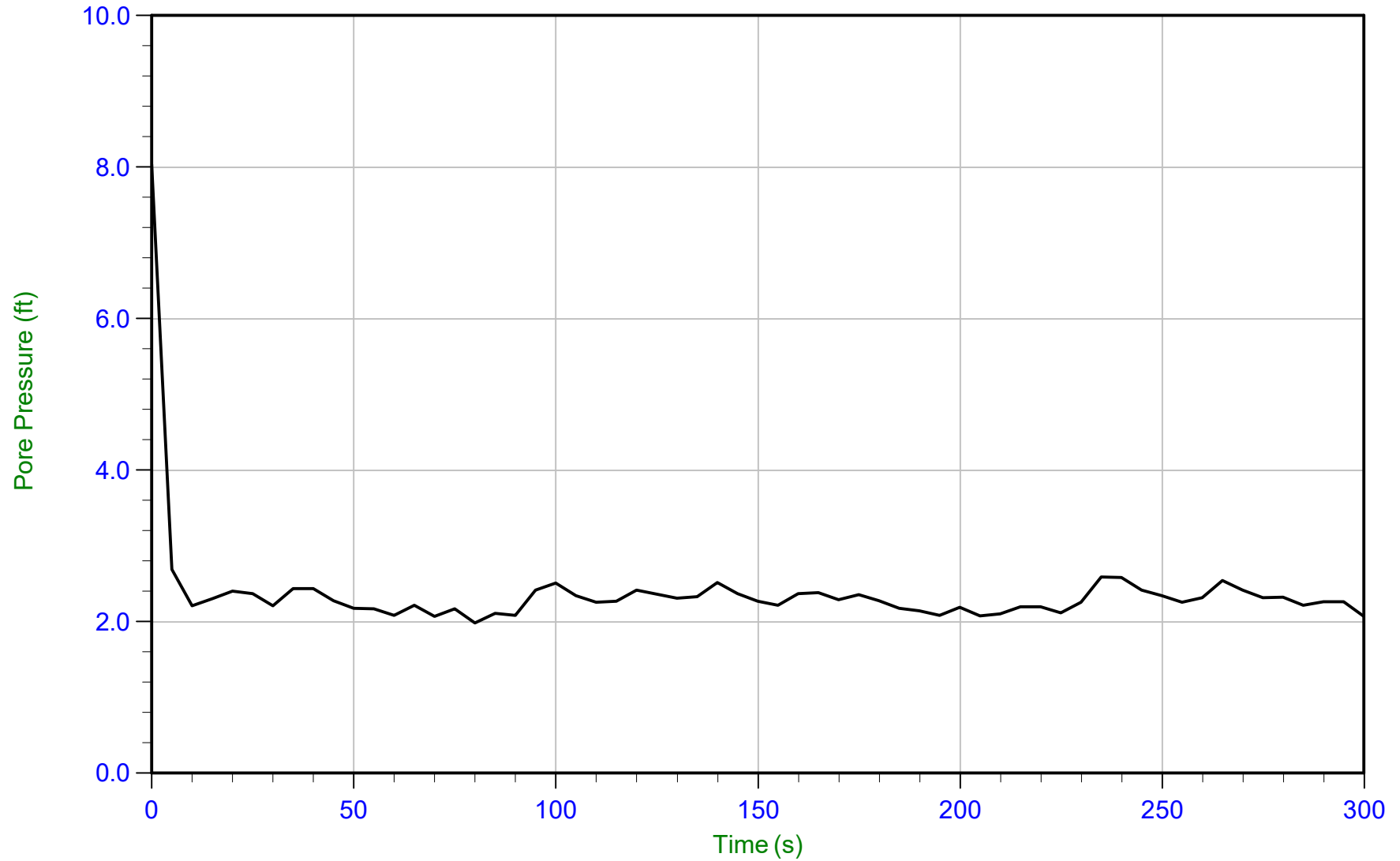
Date: 11-Sep-2015 09:31:49

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP08.PPD
Depth: 5.900 m / 19.357 ft
Duration: 300.0 s

U Min: 2.0 ft
U Max: 8.0 ft

WT: 5.204 m / 17.073 ft
Ueq: 2.3 ft



AECOM

Job No: 15-53081

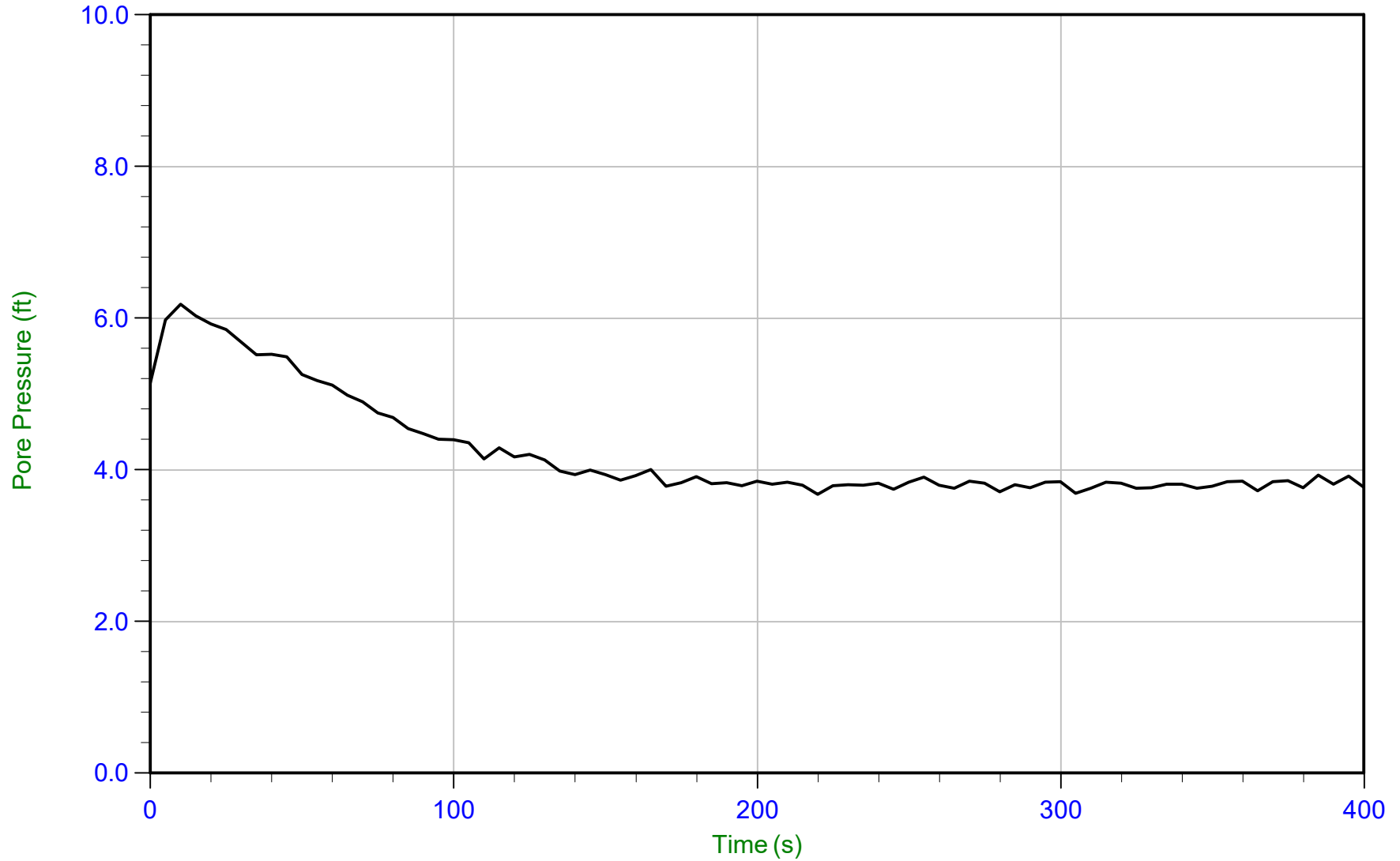
Date: 11-Sep-2015 10:25:46

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP08B.PPD U Min: 3.7 ft WT: 5.336 m / 17.506 ft
Depth: 6.500 m / 21.325 ft U Max: 6.2 ft Ueq: 3.8 ft
Duration: 400.0 s



AECOM

Job No: 15-53081

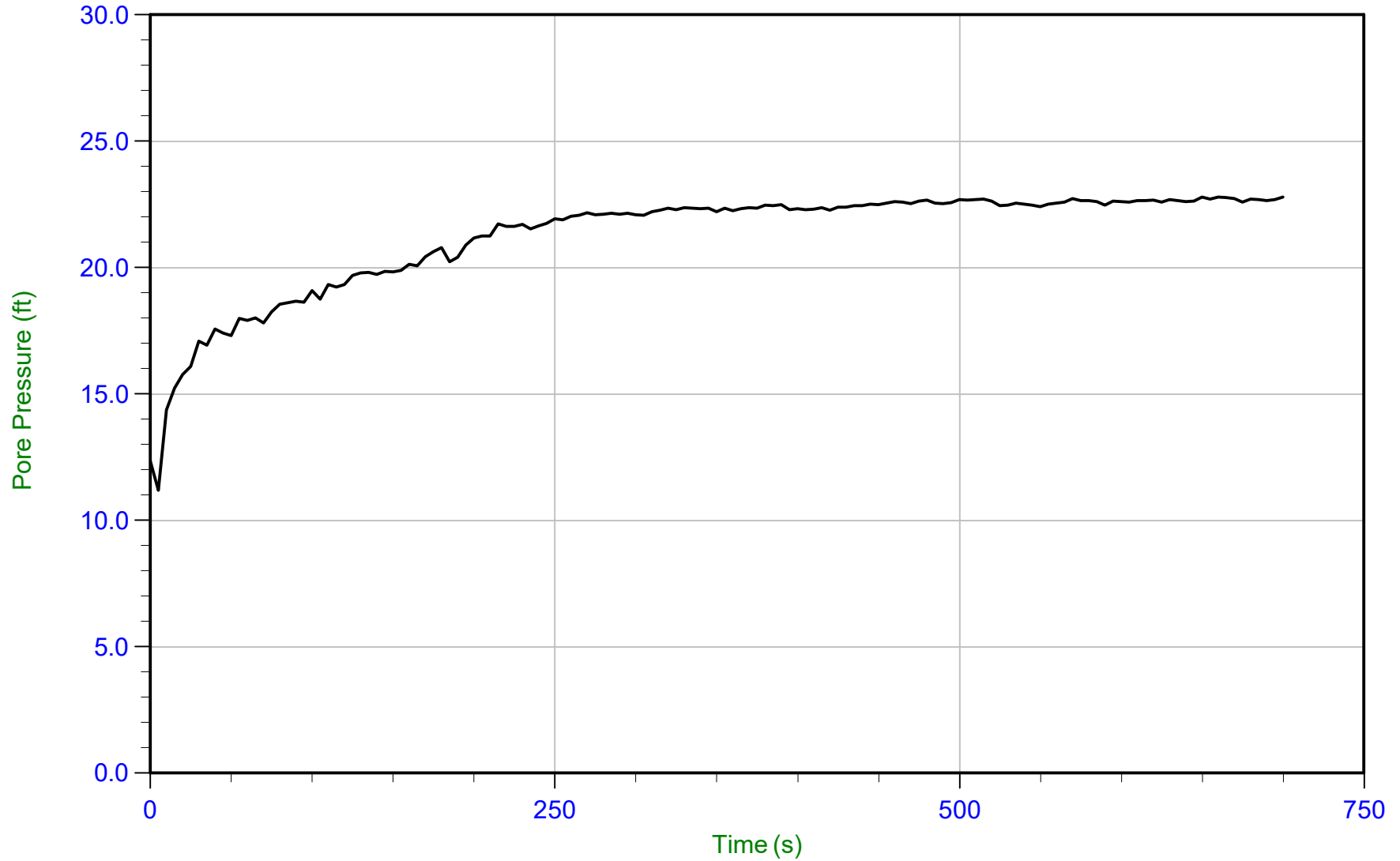
Date: 11-Sep-2015 10:25:46

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP08B.PPD
Depth: 12.350 m / 40.518 ft
Duration: 700.0 s

U Min: 11.2 ft
U Max: 22.8 ft

WT: 5.398 m / 17.710 ft
Ueq: 22.8 ft



AECOM

Job No: 15-53081

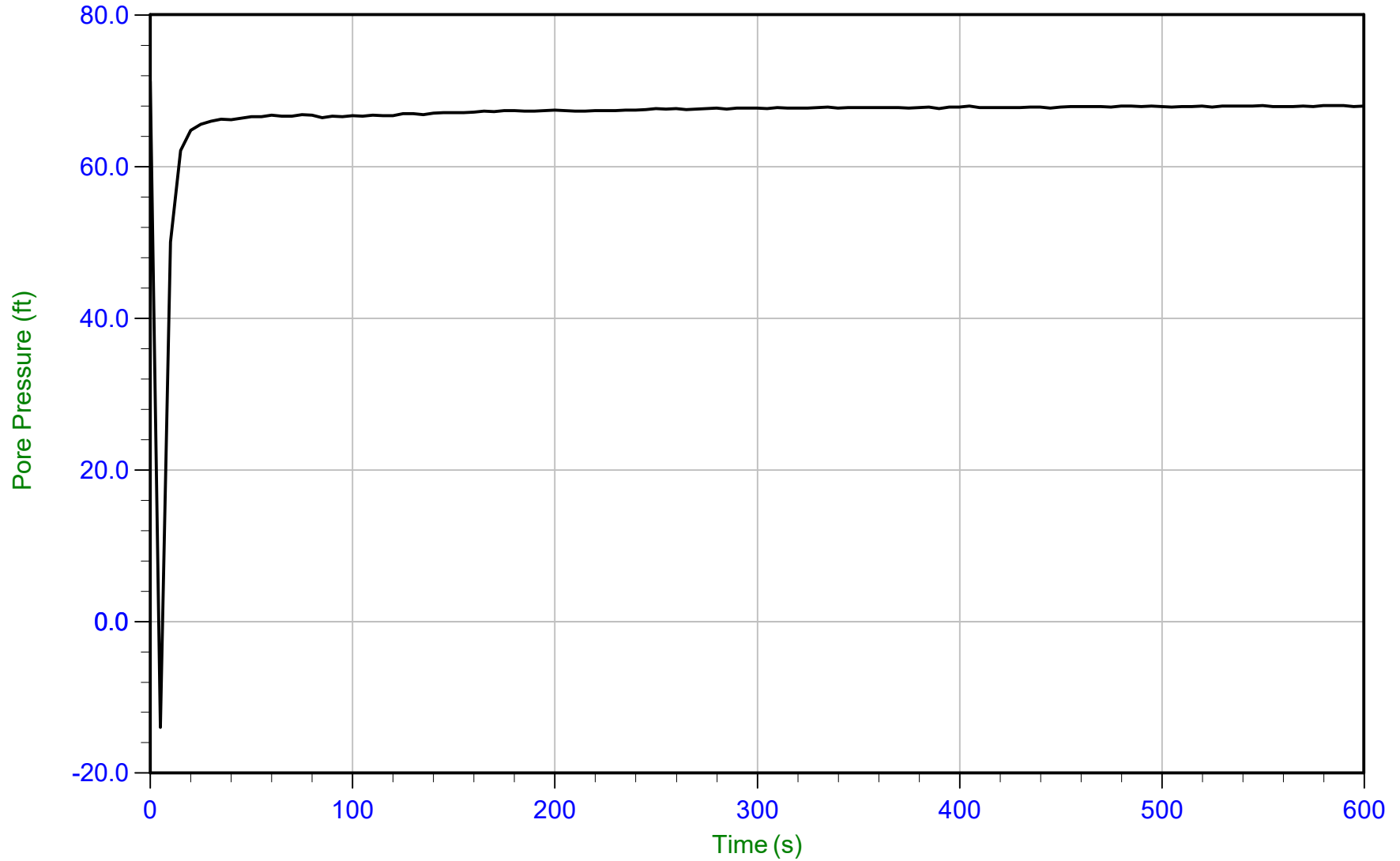
Date: 11-Sep-2015 10:25:46

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C008B

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP08B.PPD U Min: -14.0 ft WT: 5.419 m / 17.779 ft
Depth: 26.150 m / 85.793 ft U Max: 71.2 ft Ueq: 68.0 ft
Duration: 600.0 s



AECOM

Job No: 15-53081

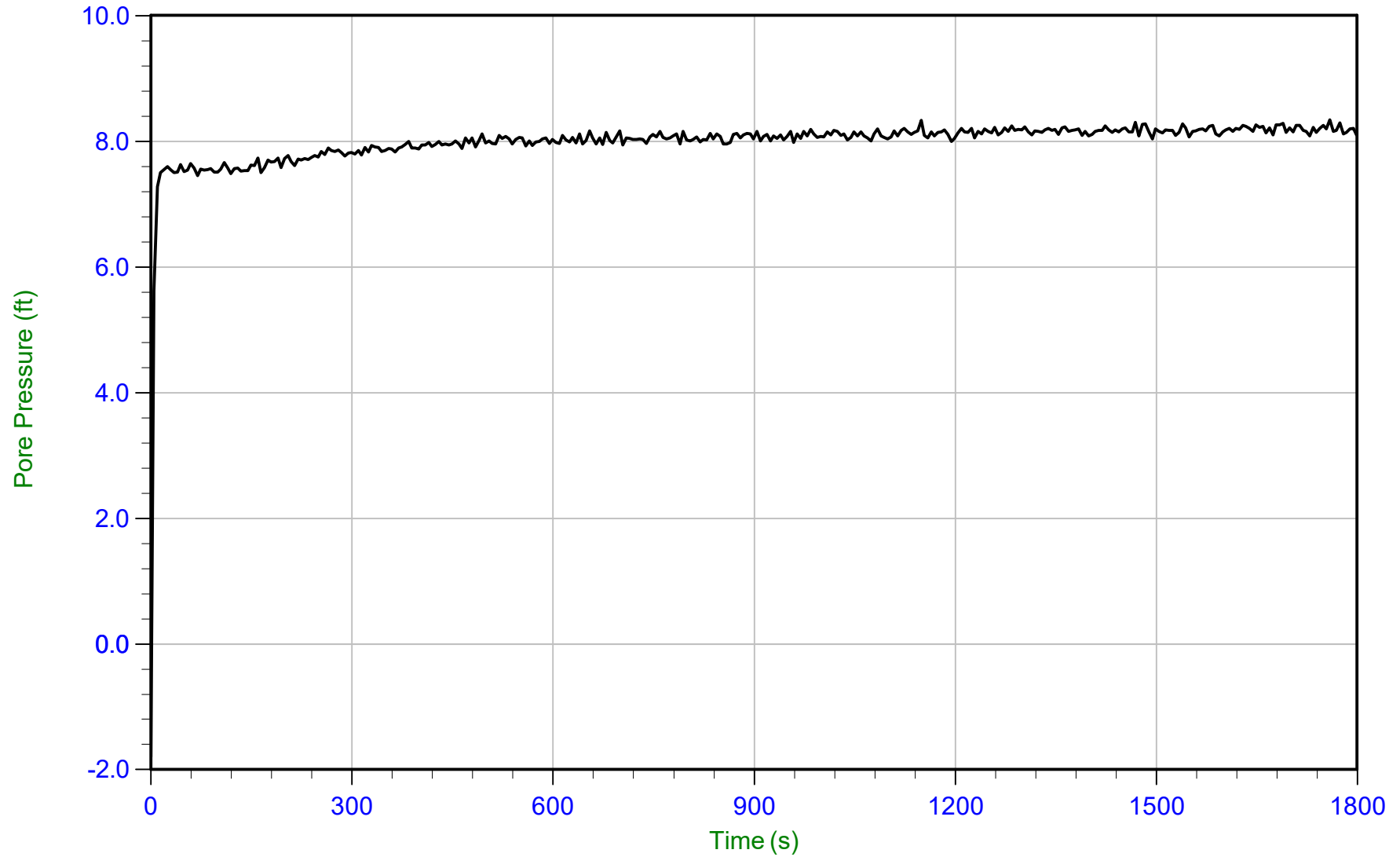
Date: 10-Sep-2015 14:28:48

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C009

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP09.PPD
Depth: 4.600 m / 15.092 ft
Duration: 1800.0 s

U Min: -1.8 ft
U Max: 8.3 ft

WT: 2.100 m / 6.890 ft
Ueq: 8.2 ft



AECOM

Job No: 15-53081

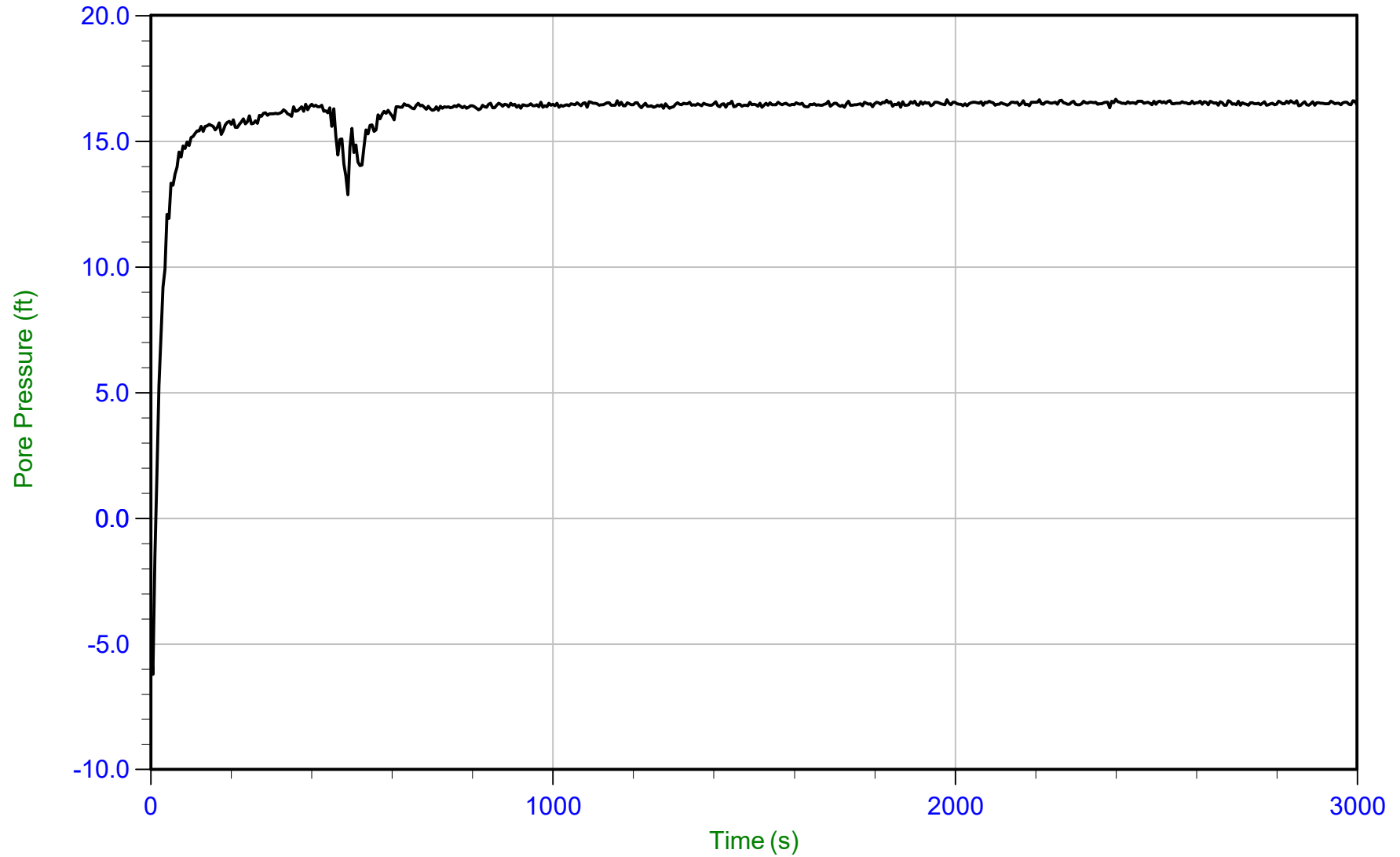
Date: 10-Sep-2015 14:28:48

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C009

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP09.PPD
Depth: 7.150 m / 23.458 ft
Duration: 3000.0 s

U Min: -6.2 ft
U Max: 16.7 ft

WT: 2.081 m / 6.827 ft
Ueq: 16.6 ft



AECOM

Job No: 15-53081

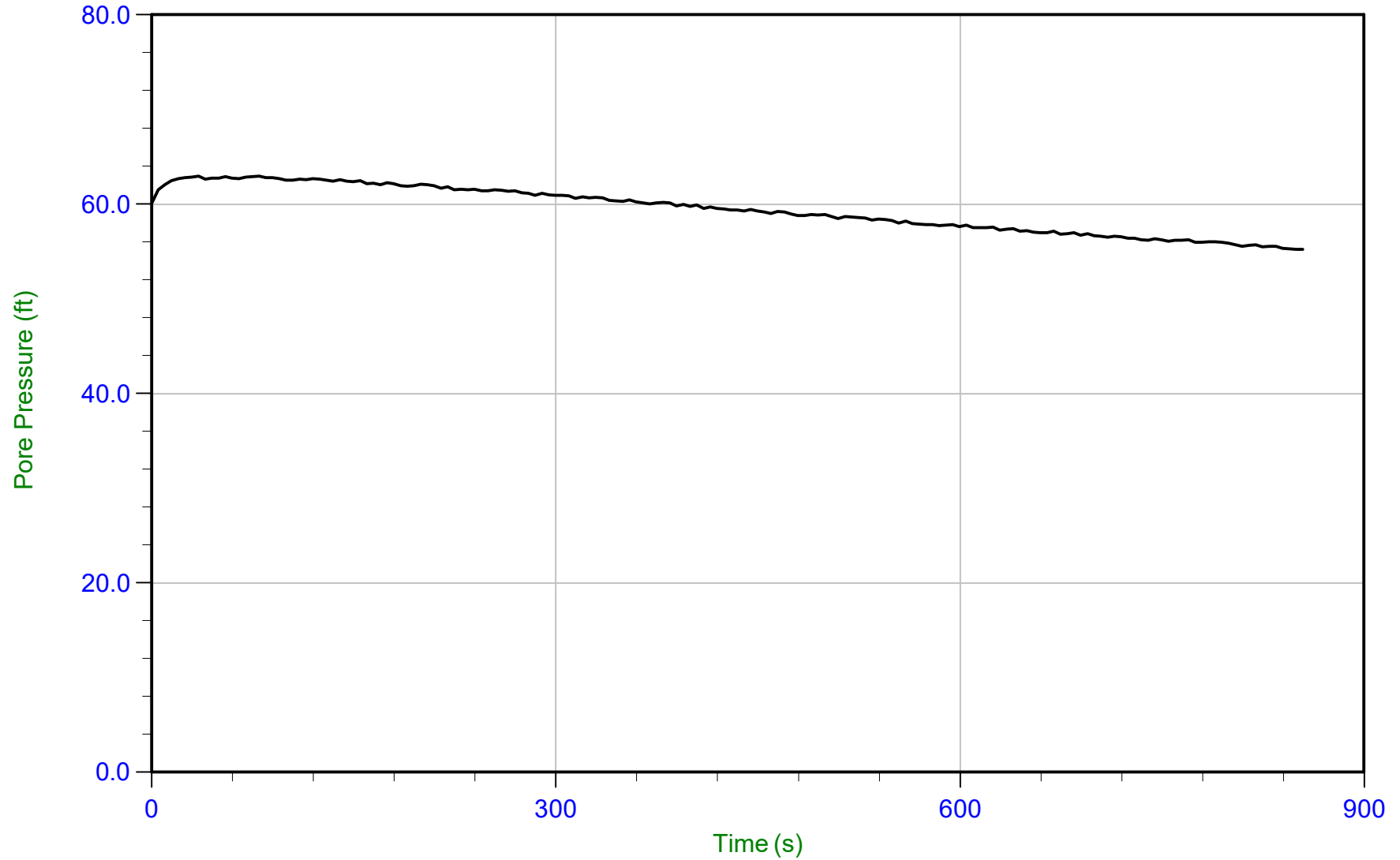
Date: 11-Sep-2015 09:08:18

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C010

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP10.PPD
Depth: 10.700 m / 35.105 ft
Duration: 855.0 s

U Min: 55.2 ft
U Max: 62.9 ft



AECOM

Job No: 15-53081

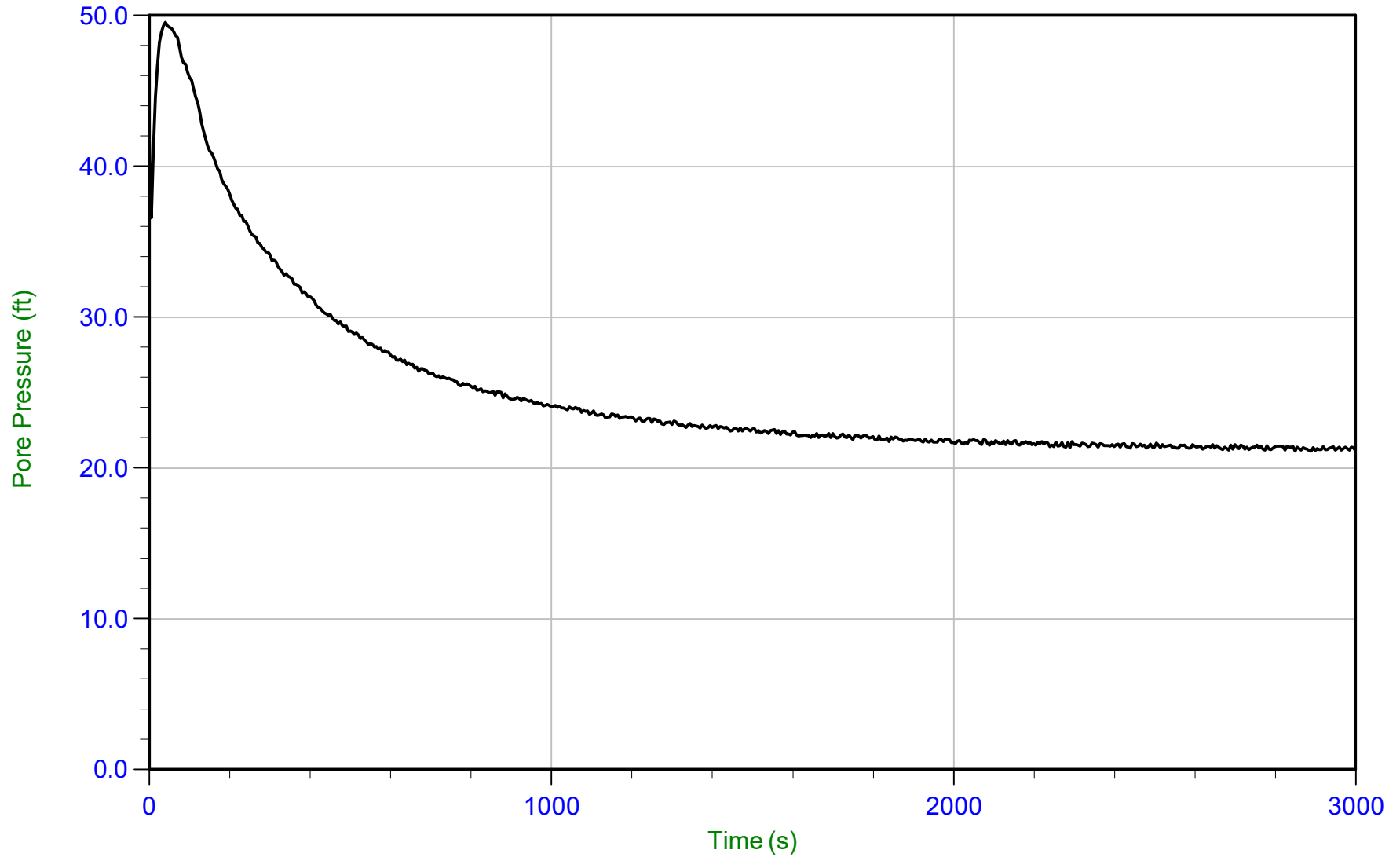
Date: 11-Sep-2015 09:08:18

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C010

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP10.PPD
Depth: 11.650 m / 38.221 ft
Duration: 3000.0 s

U Min: 21.1 ft
U Max: 49.5 ft

WT: 5.365 m / 17.601 ft
Ueq: 20.6 ft
U(50): 35.08 ft

T(50): 228.1 s
Ir: 100
Ch: 3.1 sq cm/min



AECOM

Job No: 15-53081

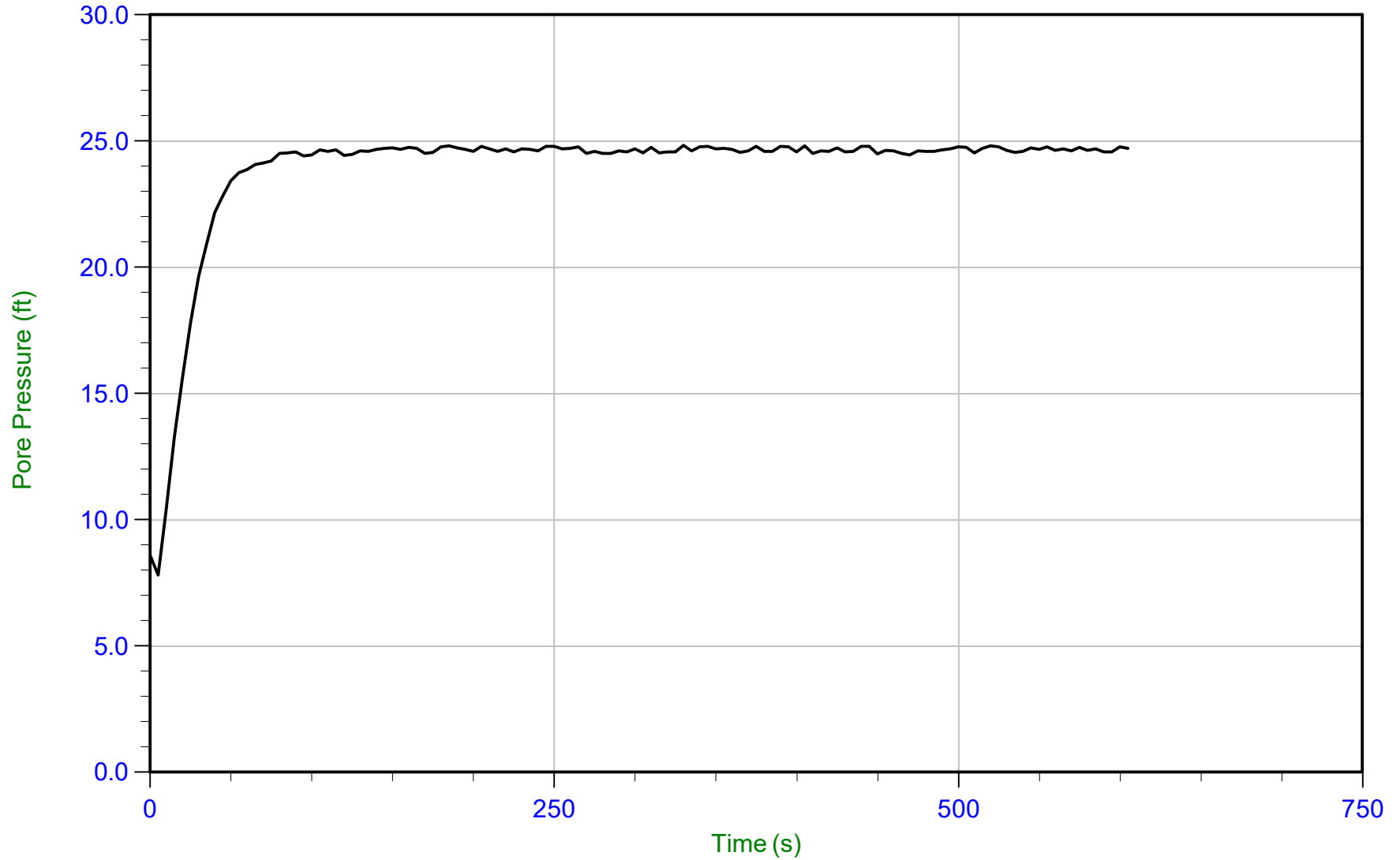
Date: 11-Sep-2015 09:08:18

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C010

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP10.PPD
Depth: 12.850 m / 42.158 ft
Duration: 605.0 s

U Min: 7.8 ft
U Max: 24.8 ft

WT: 5.365 m / 17.601 ft
Ueq: 24.6 ft



AECOM

Job No: 15-53081

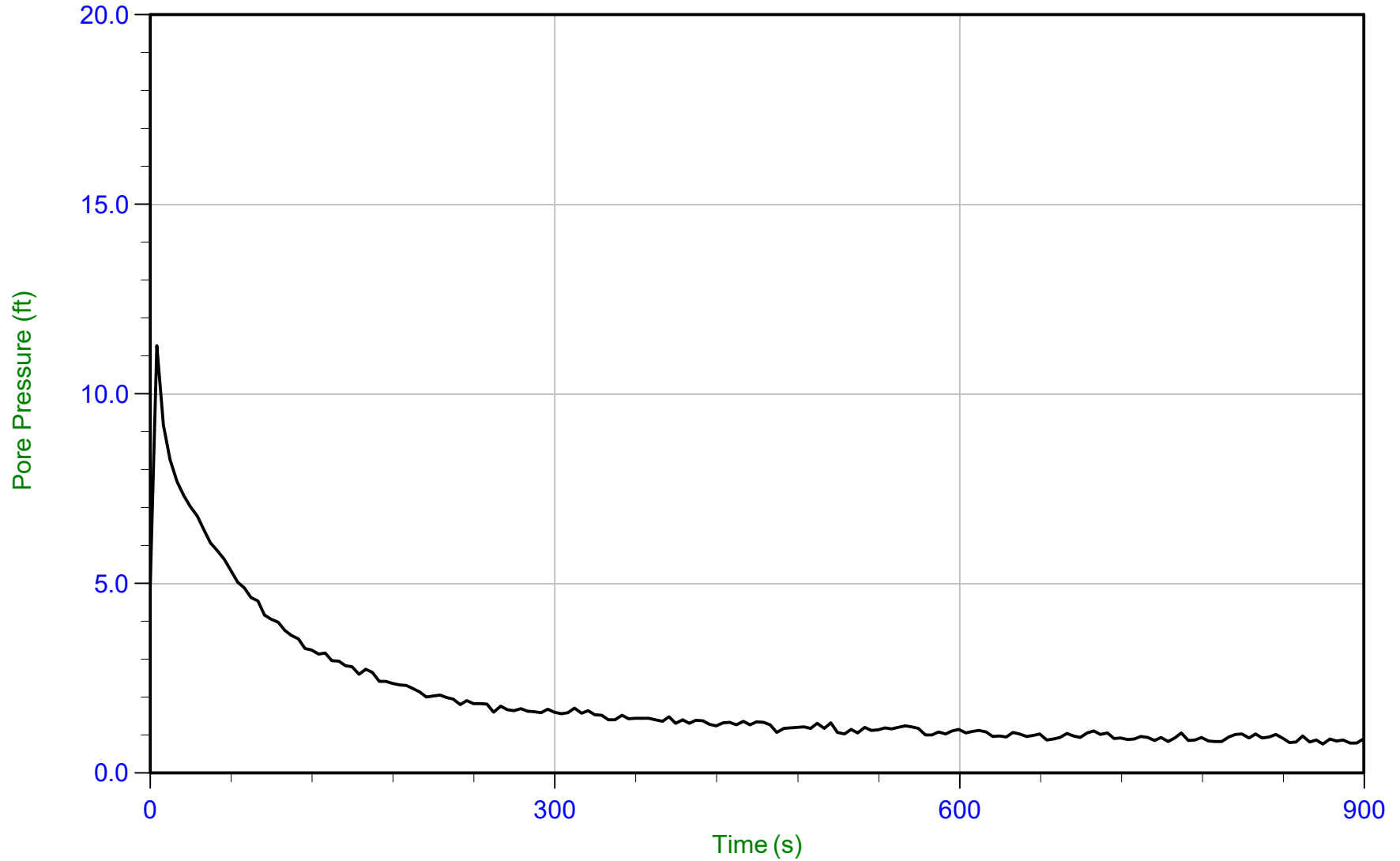
Date: 10-Sep-2015 09:34:24

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C012

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP12.PPD
Depth: 3.400 m / 11.155 ft
Duration: 900.0 s

U Min: 0.8 ft
U Max: 11.3 ft

WT: 3.172 m / 10.407 ft
Ueq: 0.7 ft
U(50): 6.01 ft

T(50): 41.5 s
Ir: 100
Ch: 16.9 sq cm/min



AECOM

Job No: 15-53081

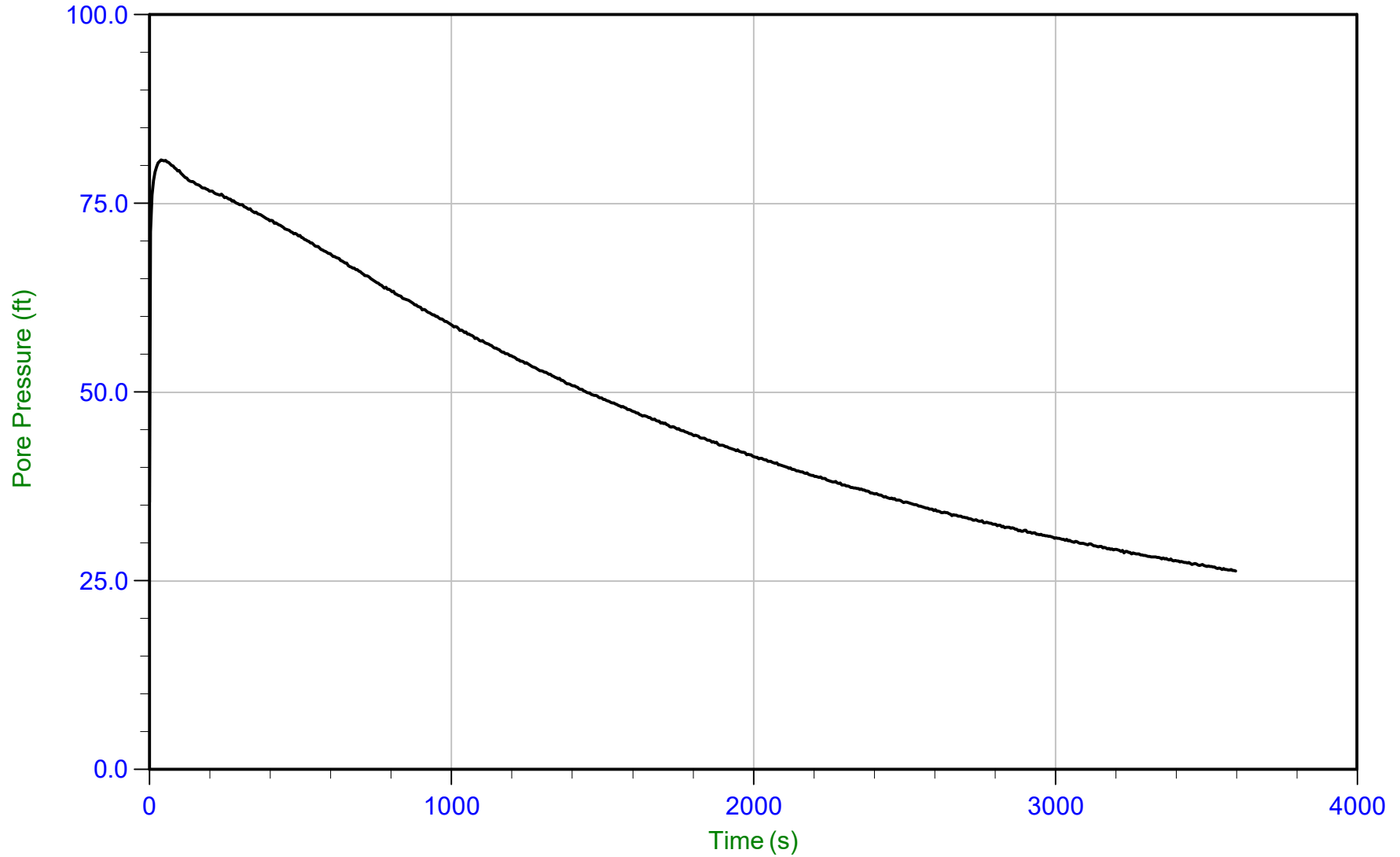
Date: 10-Sep-2015 09:34:24

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C012

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP12.PPD
Depth: 6.100 m / 20.013 ft
Duration: 3600.0 s

U Min: 26.3 ft
U Max: 80.7 ft

WT: 3.261 m / 10.699 ft
Ueq: 9.3 ft
U(50): 45.03 ft

T(50): 1718.6 s
Ir: 100
Ch: 0.4 sq cm/min



AECOM

Job No: 15-53081

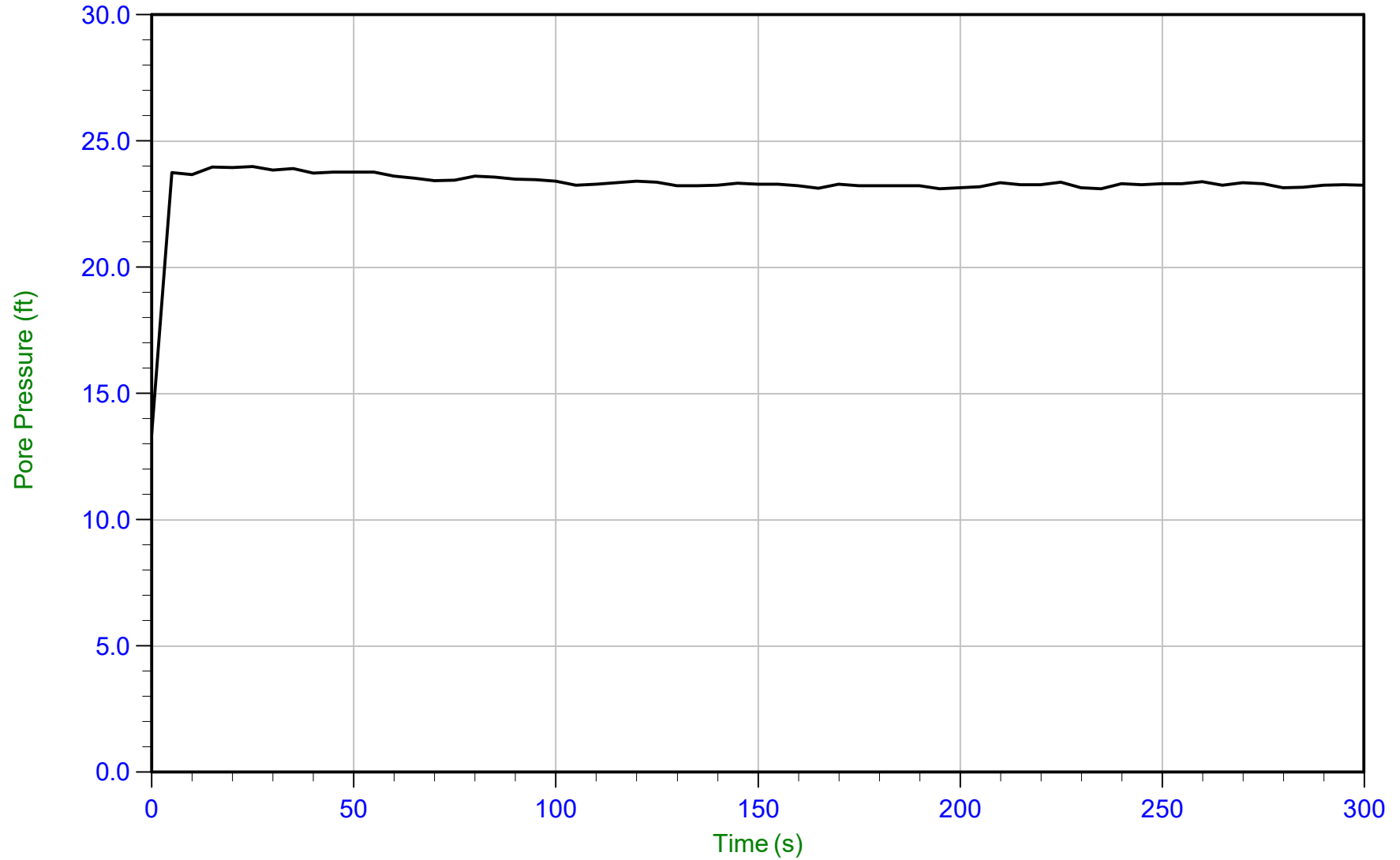
Date: 10-Sep-2015 09:34:24

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C012

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP12.PPD
Depth: 10.350 m / 33.956 ft
Duration: 300.0 s

U Min: 13.4 ft
U Max: 24.0 ft

WT: 3.261 m / 10.699 ft
Ueq: 23.3 ft



AECOM

Job No: 15-53081

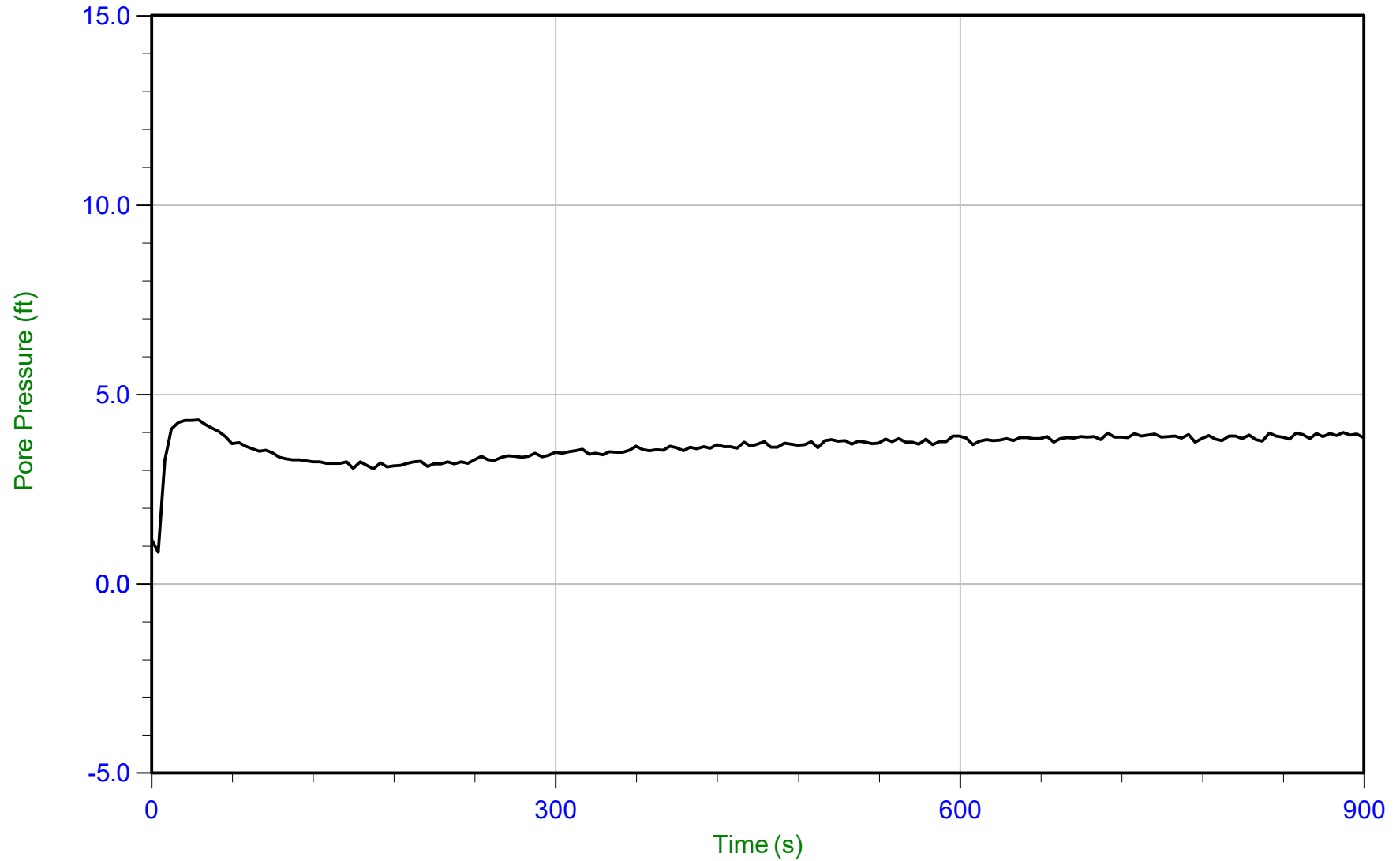
Date: 09-Sep-2015 13:22:45

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C014

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP14.PPD
Depth: 6.100 m / 20.013 ft
Duration: 900.0 s

U Min: 0.8 ft
U Max: 4.3 ft

WT: 4.884 m / 16.023 ft
Ueq: 4.0 ft



AECOM

Job No: 15-53081

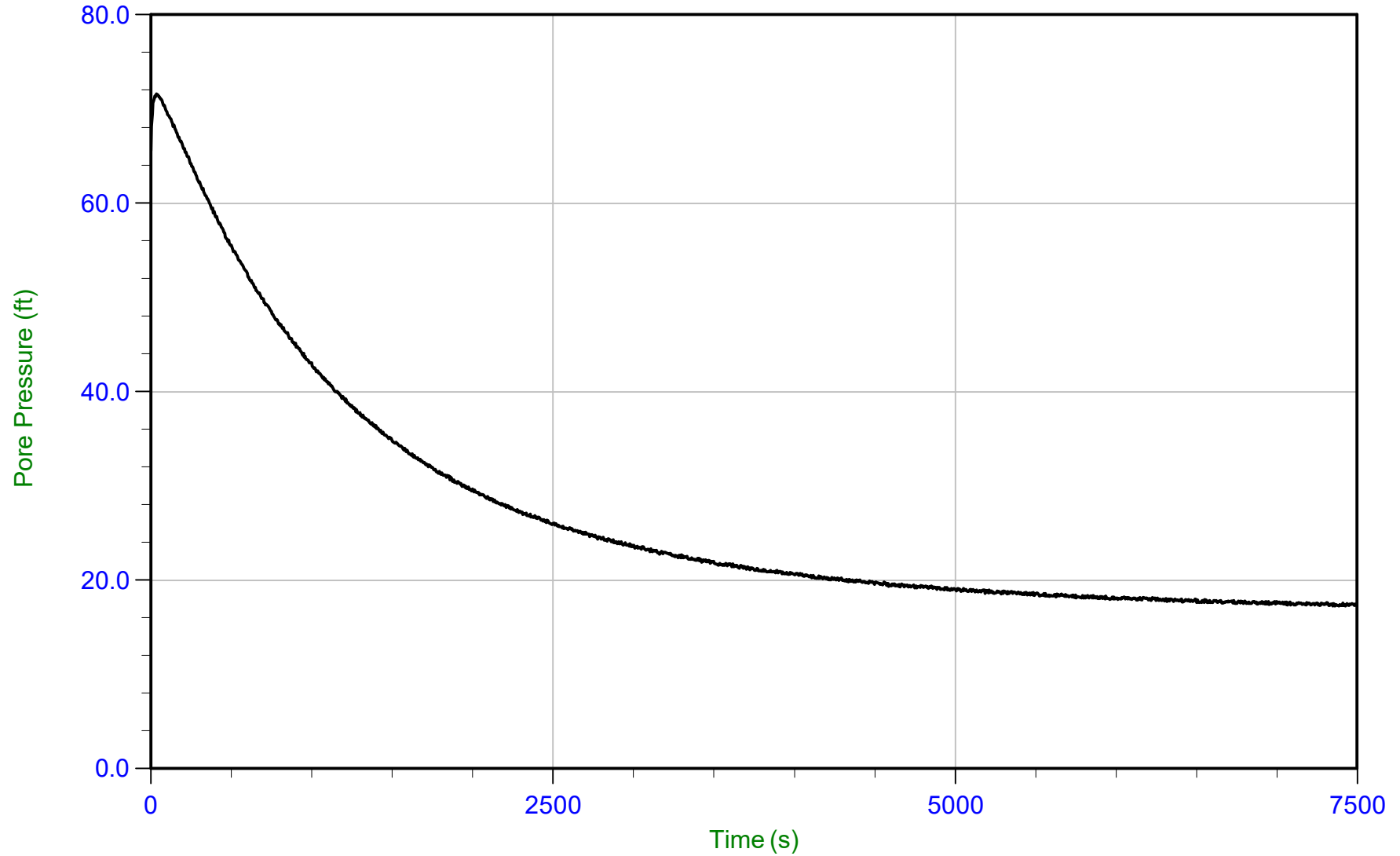
Date: 10-Sep-2015 14:10:27

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C015

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP15.PPD
Depth: 7.800 m / 25.590 ft
Duration: 7500.0 s

U Min: 17.2 ft
U Max: 71.6 ft

WT: 3.549 m / 11.644 ft
Ueq: 13.9 ft
U(50): 42.77 ft

T(50): 969.2 s
Ir: 100
Ch: 0.7 sq cm/min



AECOM

Job No: 15-53081

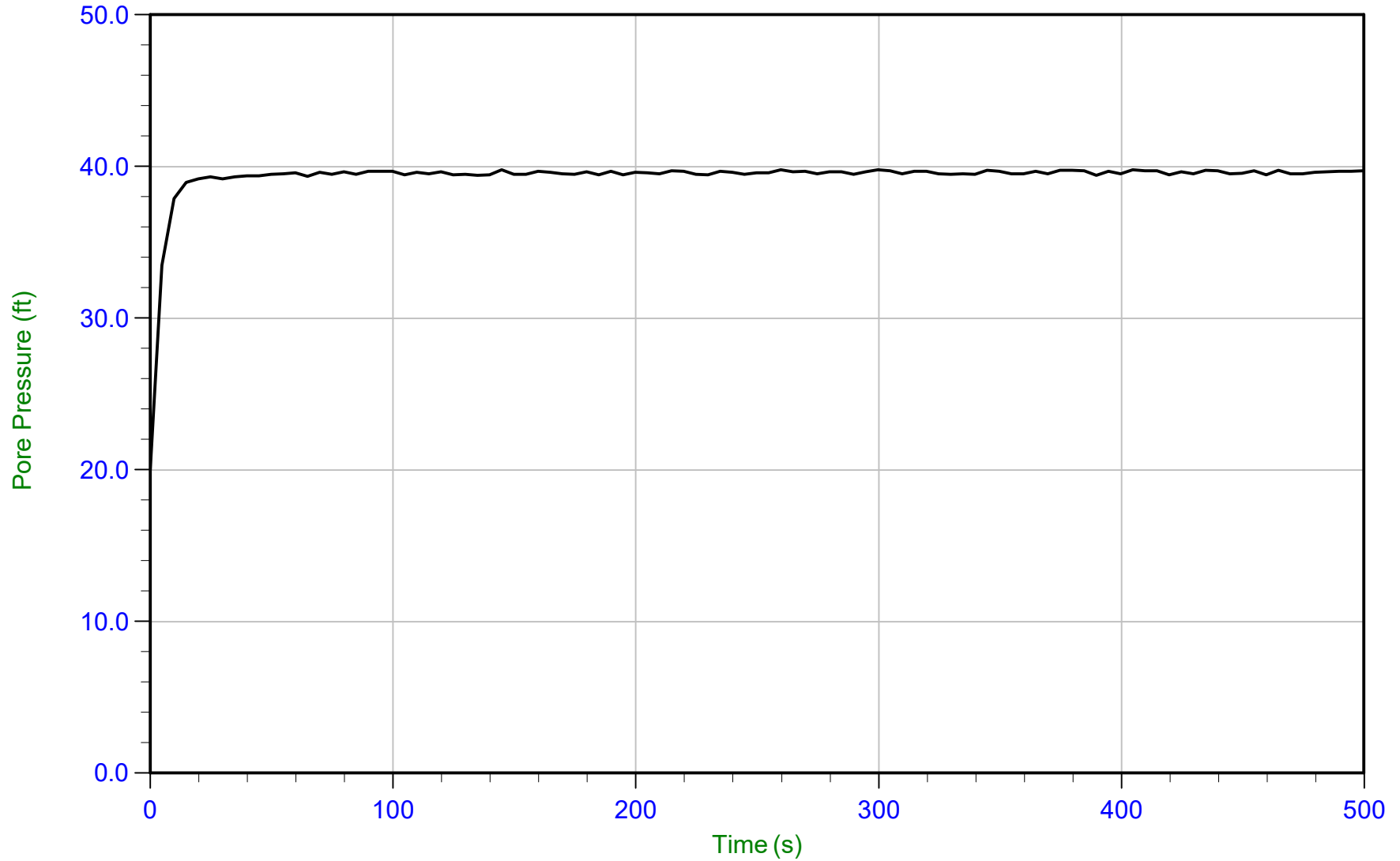
Date: 10-Sep-2015 14:10:27

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C015

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP15.PPD
Depth: 15.650 m / 51.345 ft
Duration: 500.0 s

U Min: 20.0 ft
U Max: 39.8 ft

WT: 3.549 m / 11.644 ft
Ueq: 39.7 ft



AECOM

Job No: 15-53081

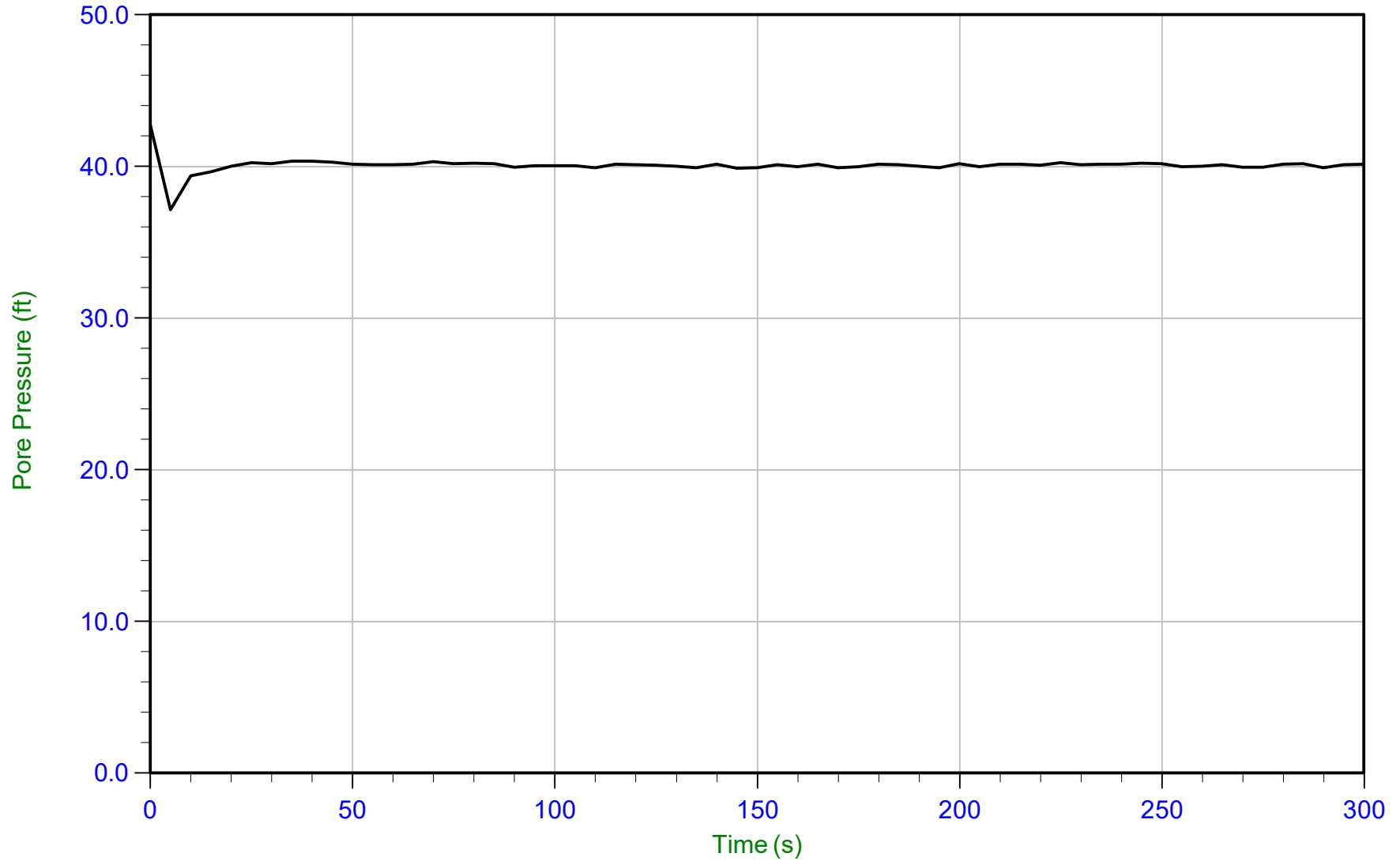
Date: 10-Sep-2015 14:10:27

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C015

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP15.PPD
Depth: 15.950 m / 52.329 ft
Duration: 300.0 s

U Min: 37.2 ft
U Max: 42.8 ft

WT: 3.678 m / 12.067 ft
Ueq: 40.3 ft



AECOM

Job No: 15-53081

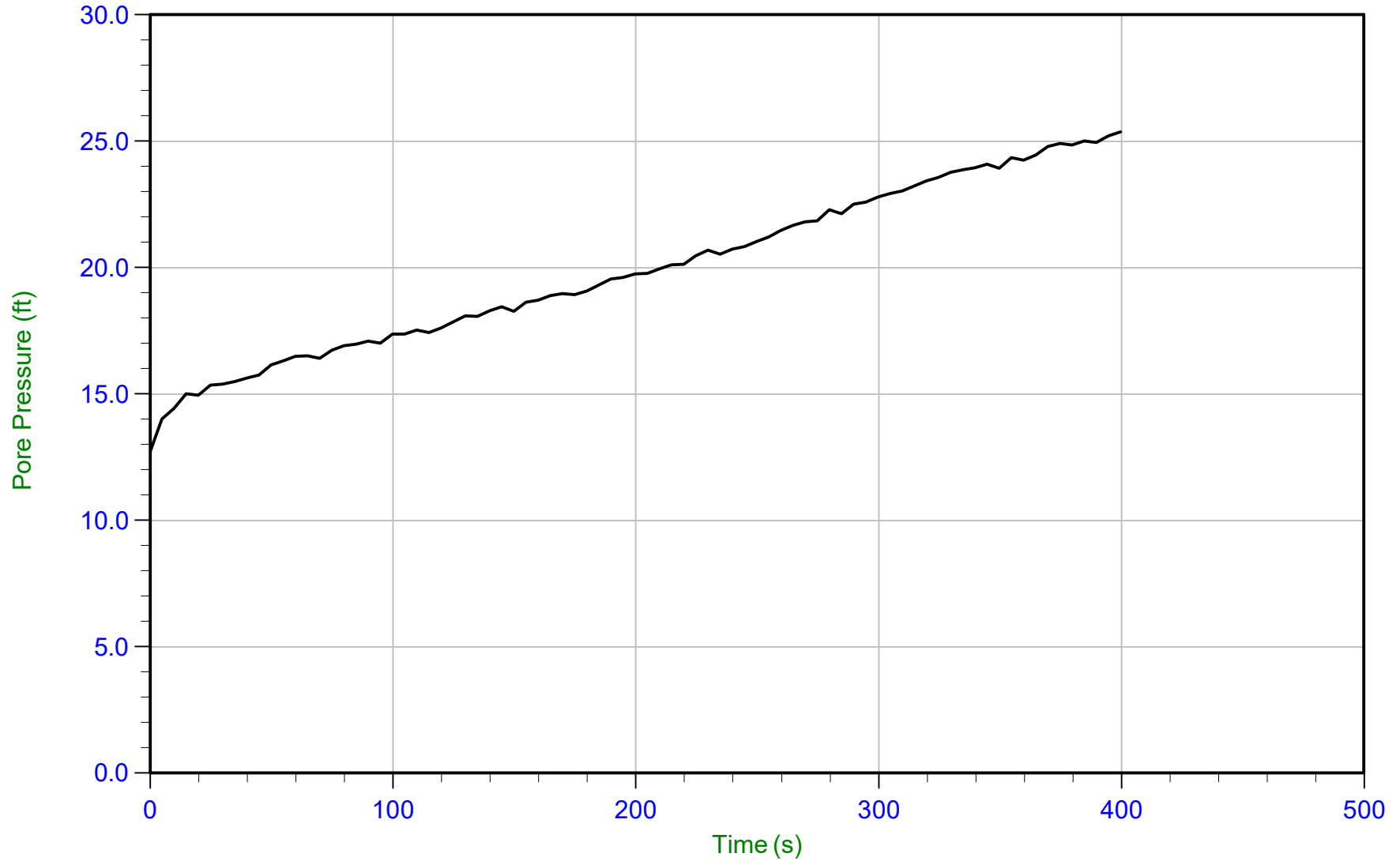
Date: 09-Sep-2015 13:54:48

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C017

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP17.PPD
Depth: 1.700 m / 5.577 ft
Duration: 400.0 s

U Min: 12.7 ft
U Max: 25.4 ft



AECOM

Job No: 15-53081

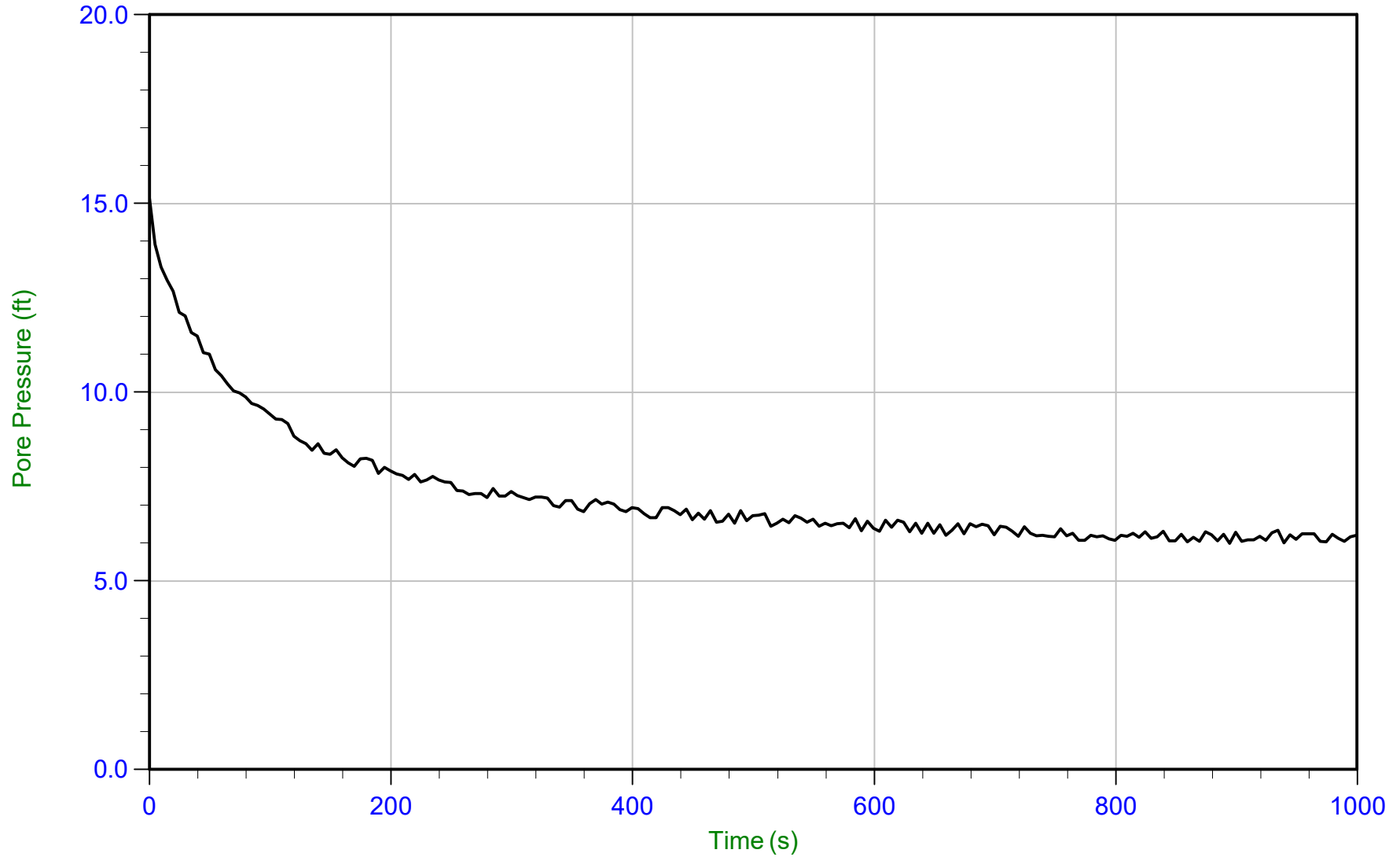
Date: 09-Sep-2015 13:54:48

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C017

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP17.PPD
Depth: 4.750 m / 15.584 ft
Duration: 1000.0 s

U Min: 6.0 ft
U Max: 15.1 ft

WT: 3.674 m / 12.054 ft
Ueq: 3.5 ft
U(50): 9.33 ft

T(50): 103.5 s
Ir: 100
Ch: 6.8 sq cm/min



AECOM

Job No: 15-53081

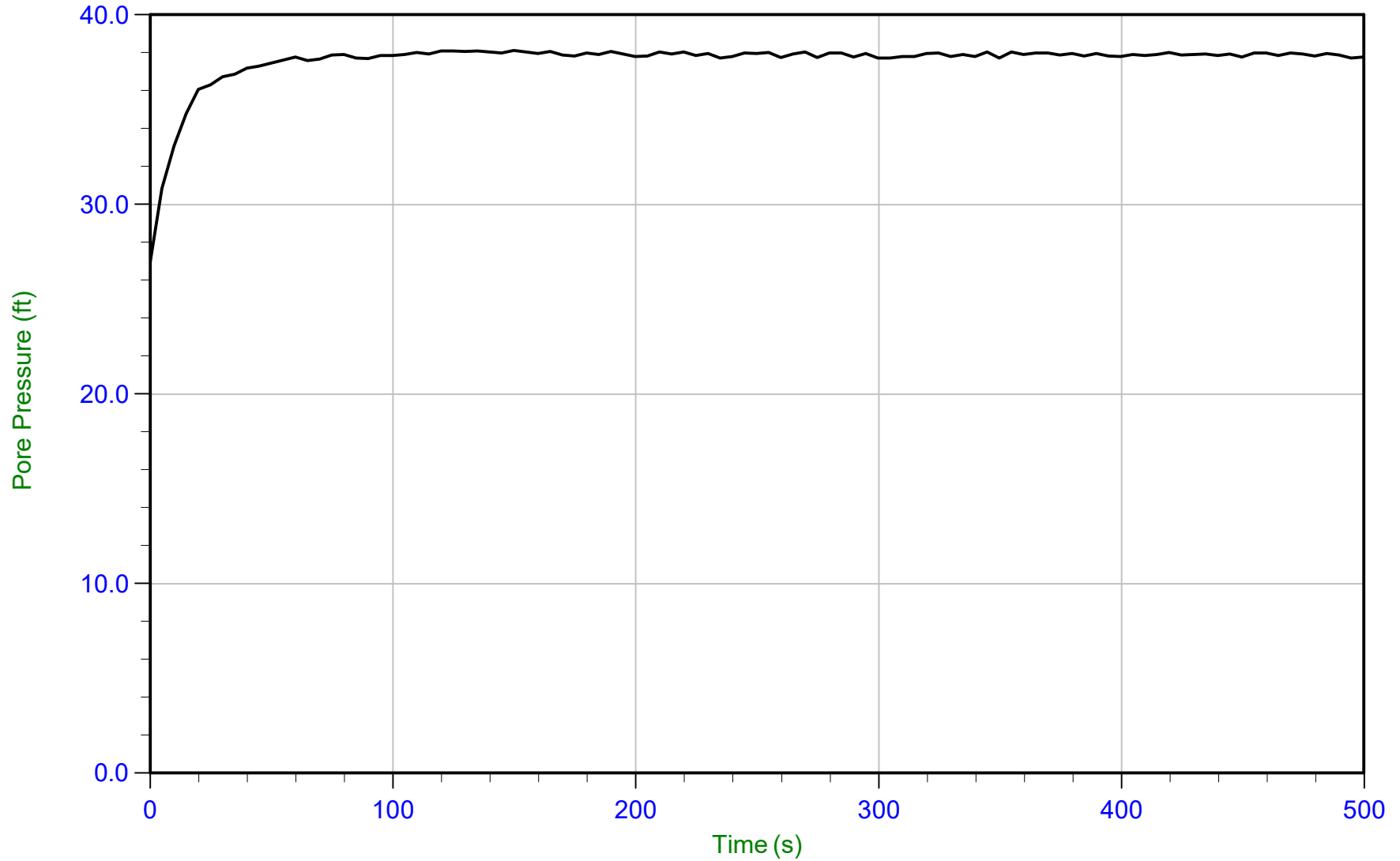
Date: 09-Sep-2015 13:54:48

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C017

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP17.PPD
Depth: 15.450 m / 50.688 ft
Duration: 500.0 s

U Min: 27.0 ft
U Max: 38.1 ft

WT: 3.852 m / 12.638 ft
Ueq: 38.1 ft



AECOM

Job No: 15-53081

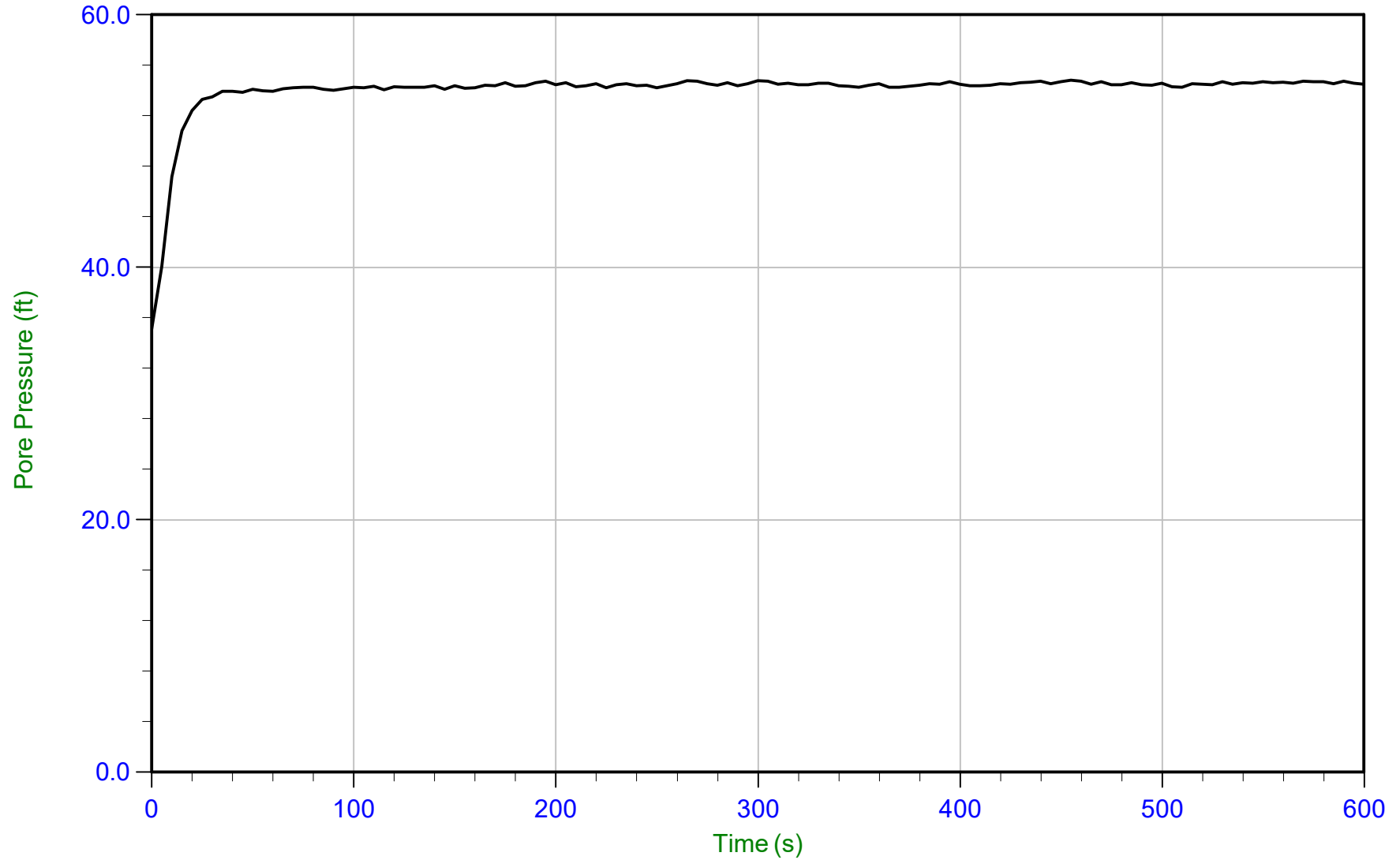
Date: 09-Sep-2015 13:54:48

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C017

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP17.PPD
Depth: 20.250 m / 66.436 ft
Duration: 600.0 s

U Min: 35.1 ft
U Max: 54.8 ft

WT: 3.674 m / 12.054 ft
Ueq: 54.4 ft



AECOM

Job No: 15-53081

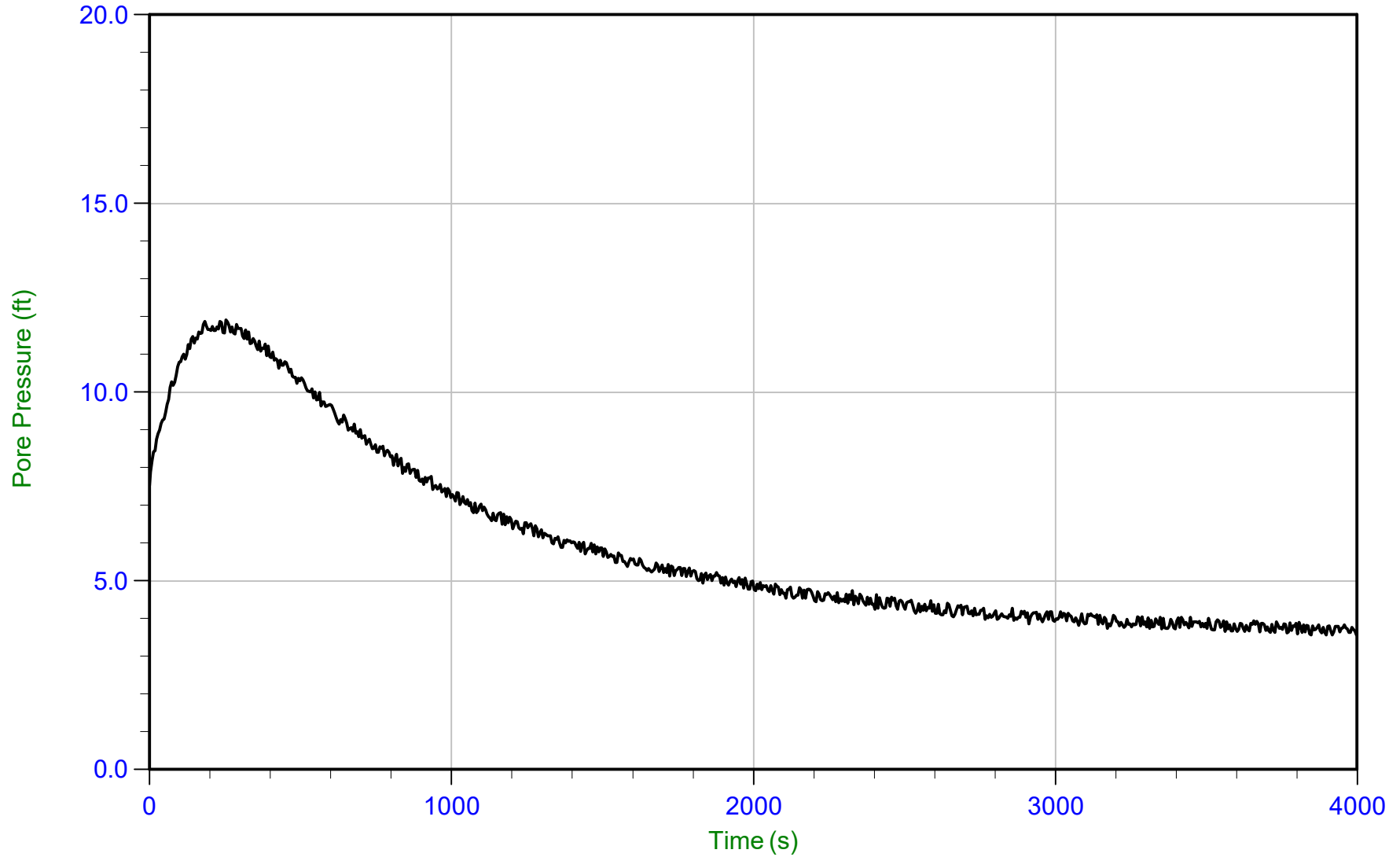
Date: 09-Sep-2015 09:45:05

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C019

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP19.PPD
Depth: 4.500 m / 14.764 ft
Duration: 4000.0 s

U Min: 3.6 ft
U Max: 11.9 ft

WT: 3.515 m / 11.532 ft
Ueq: 3.2 ft
U(50): 7.57 ft

T(50): 654.3 s
Ir: 100
Ch: 1.1 sq cm/min



AECOM

Job No: 15-53081

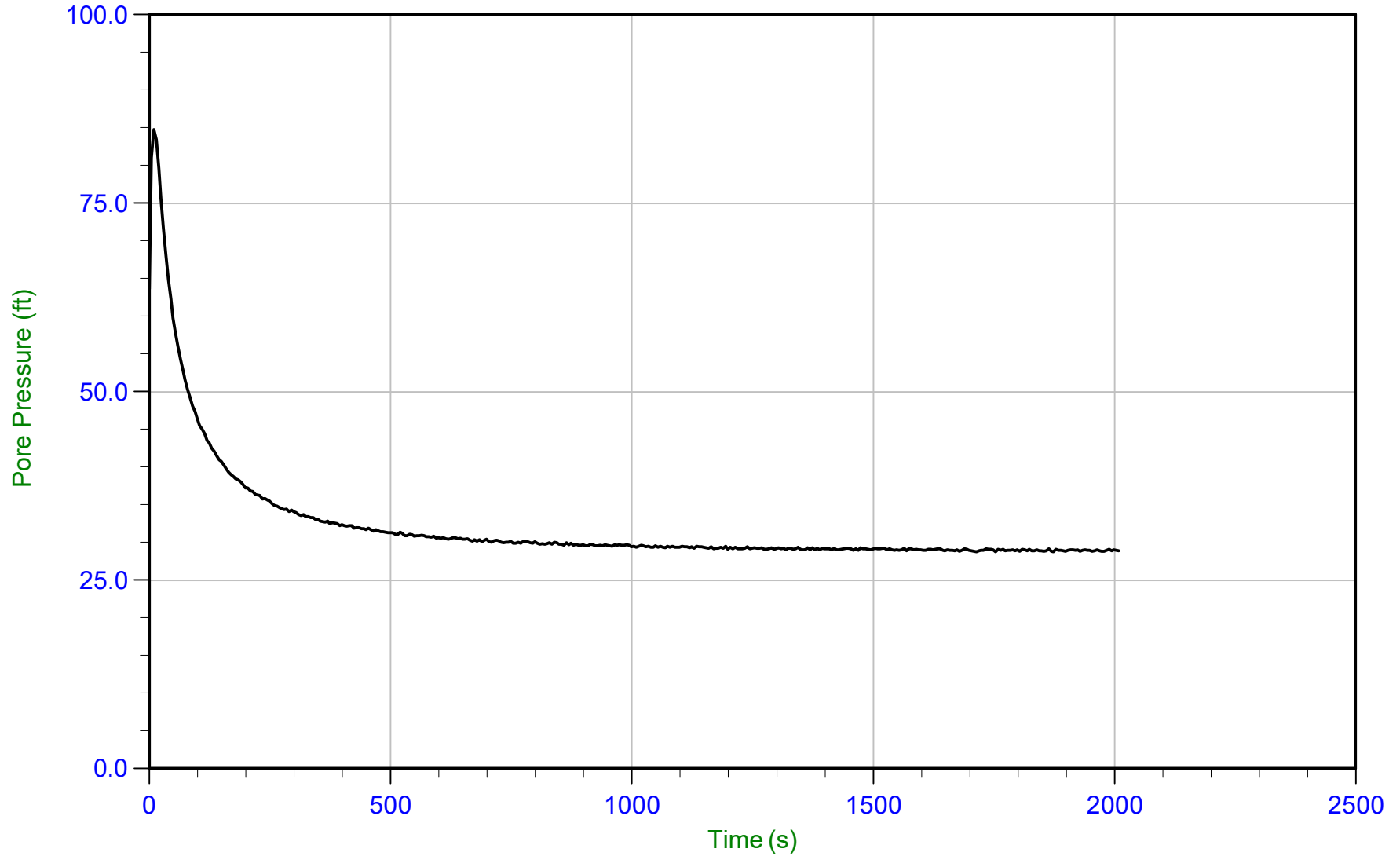
Date: 09-Sep-2015 09:45:05

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C019

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP19.PPD
Depth: 12.300 m / 40.354 ft
Duration: 2010.0 s

U Min: 28.8 ft
U Max: 84.8 ft

WT: 3.510 m / 11.516 ft
Ueq: 28.8 ft
U(50): 56.81 ft

T(50): 47.7 s
Ir: 100
Ch: 14.7 sq cm/min



AECOM

Job No: 15-53081

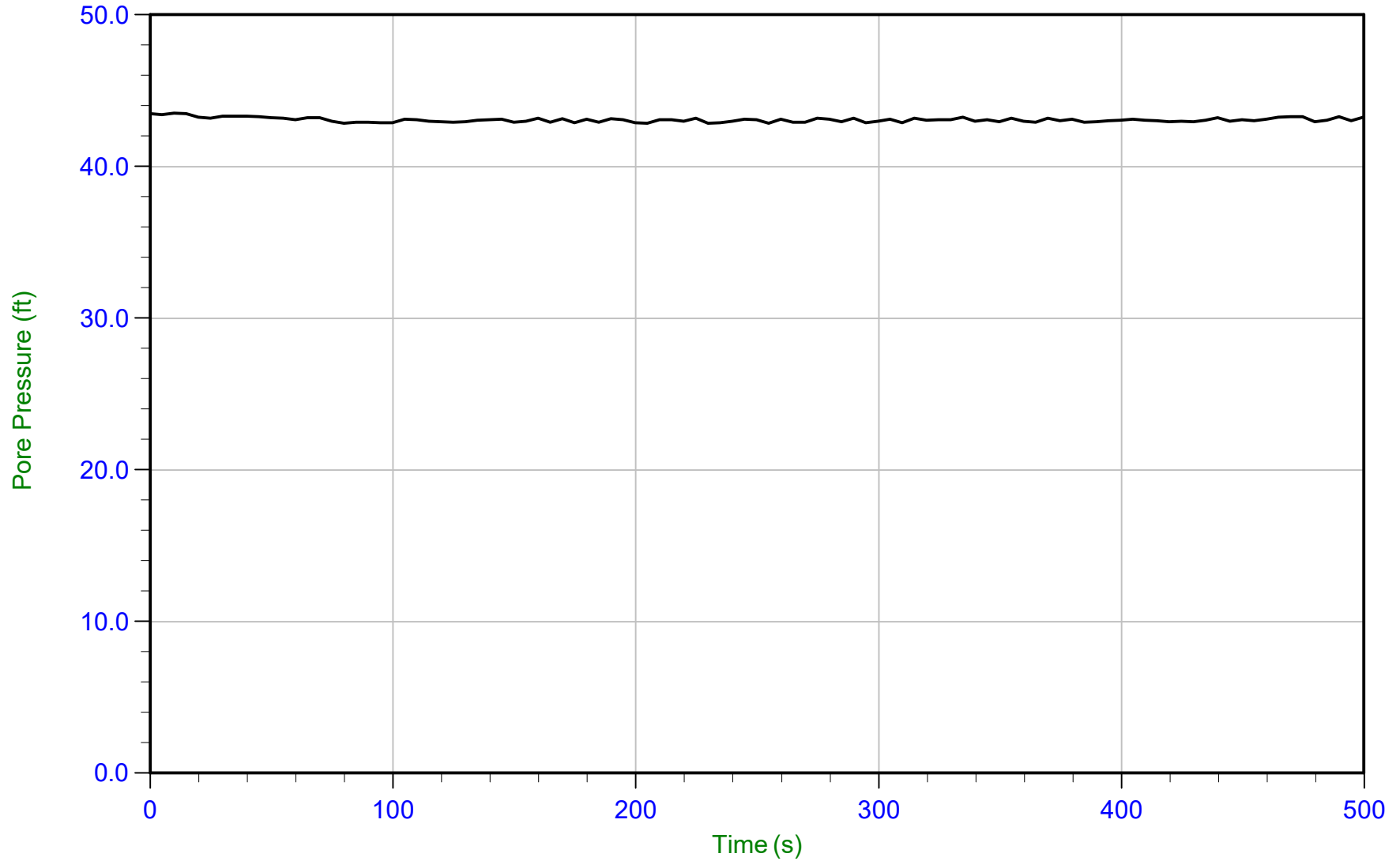
Date: 09-Sep-2015 09:45:05

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C019

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP19.PPD
Depth: 16.700 m / 54.789 ft
Duration: 500.0 s

U Min: 42.8 ft
U Max: 43.5 ft

WT: 3.515 m / 11.532 ft
Ueq: 43.3 ft



AECOM

Job No: 15-53081

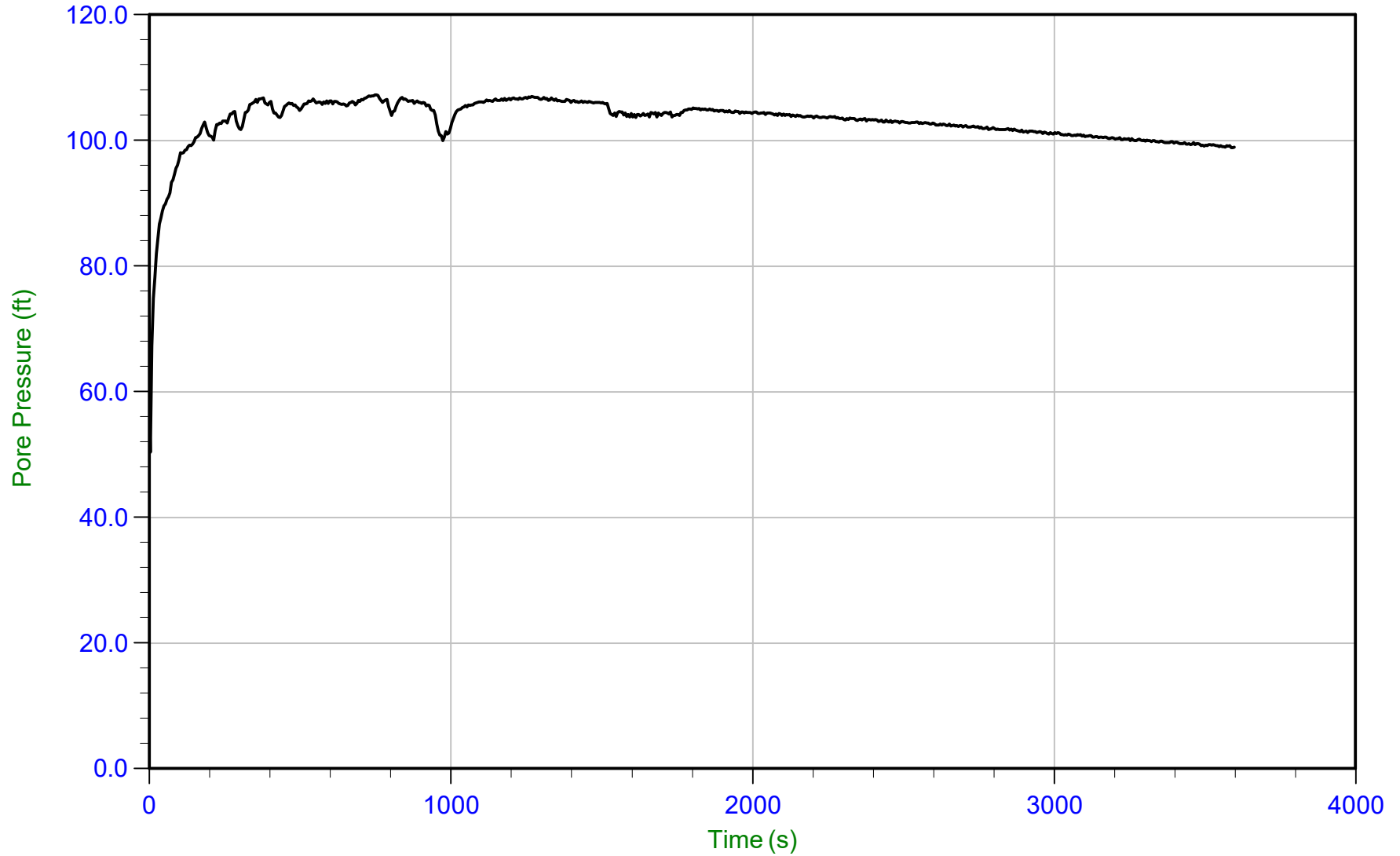
Date: 09-Sep-2015 09:45:05

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C019

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP19.PPD U Min: 50.4 ft
Depth: 19.150 m / 62.827 ft U Max: 107.3 ft
Duration: 3600.0 s



AECOM

Job No: 15-53081

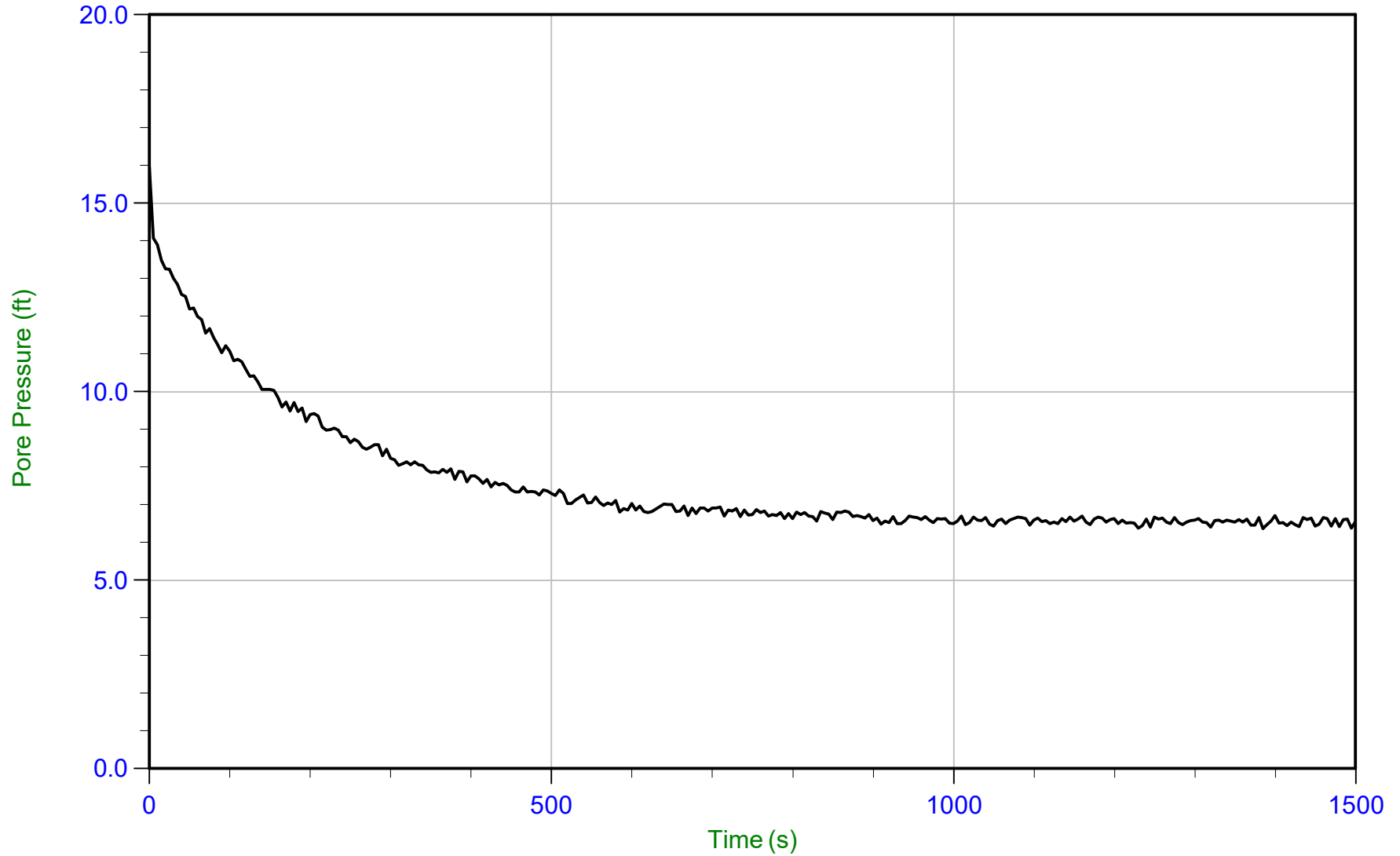
Date: 01-Sep-2015 13:06:56

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C021A

Cone: AD340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP21A.PPD
Depth: 5.100 m / 16.732 ft
Duration: 1500.0 s

U Min: 6.4 ft
U Max: 16.0 ft

WT: 3.136 m / 10.289 ft
Ueq: 6.4 ft
U(50): 11.20 ft

T(50): 86.0 s
Ir: 100
Ch: 8.2 sq cm/min



AECOM

Job No: 15-53081

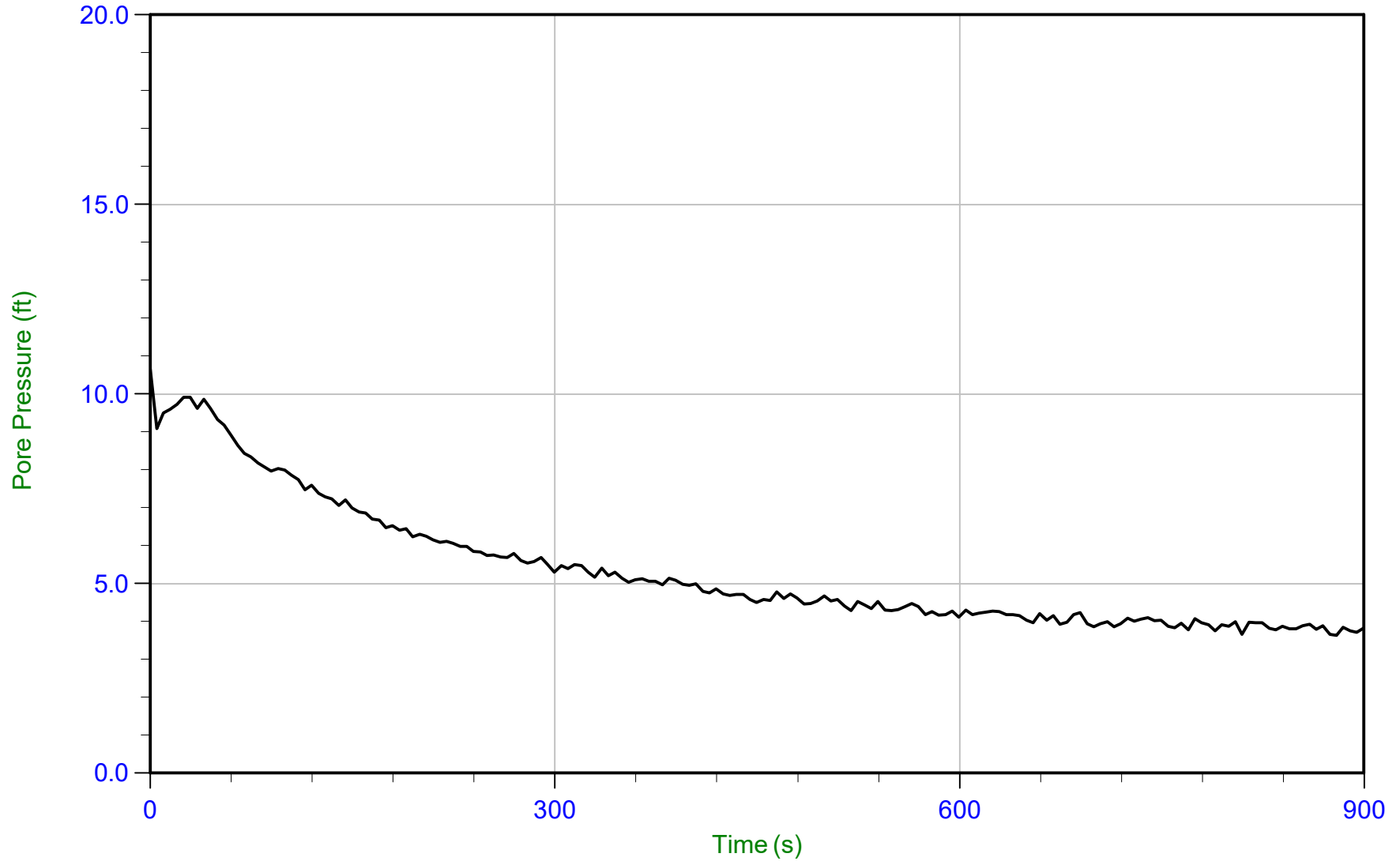
Date: 01-Sep-2015 13:06:56

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C021A

Cone: AD340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP21A.PPD U Min: 3.6 ft WT: 7.119 m / 23.356 ft T(50): 173.7 s
Depth: 7.850 m / 25.754 ft U Max: 10.7 ft Ueq: 2.4 ft Ir: 100
Duration: 900.0 s U(50): 6.53 ft Ch: 4.0 sq cm/min



AECOM

Job No: 15-53081

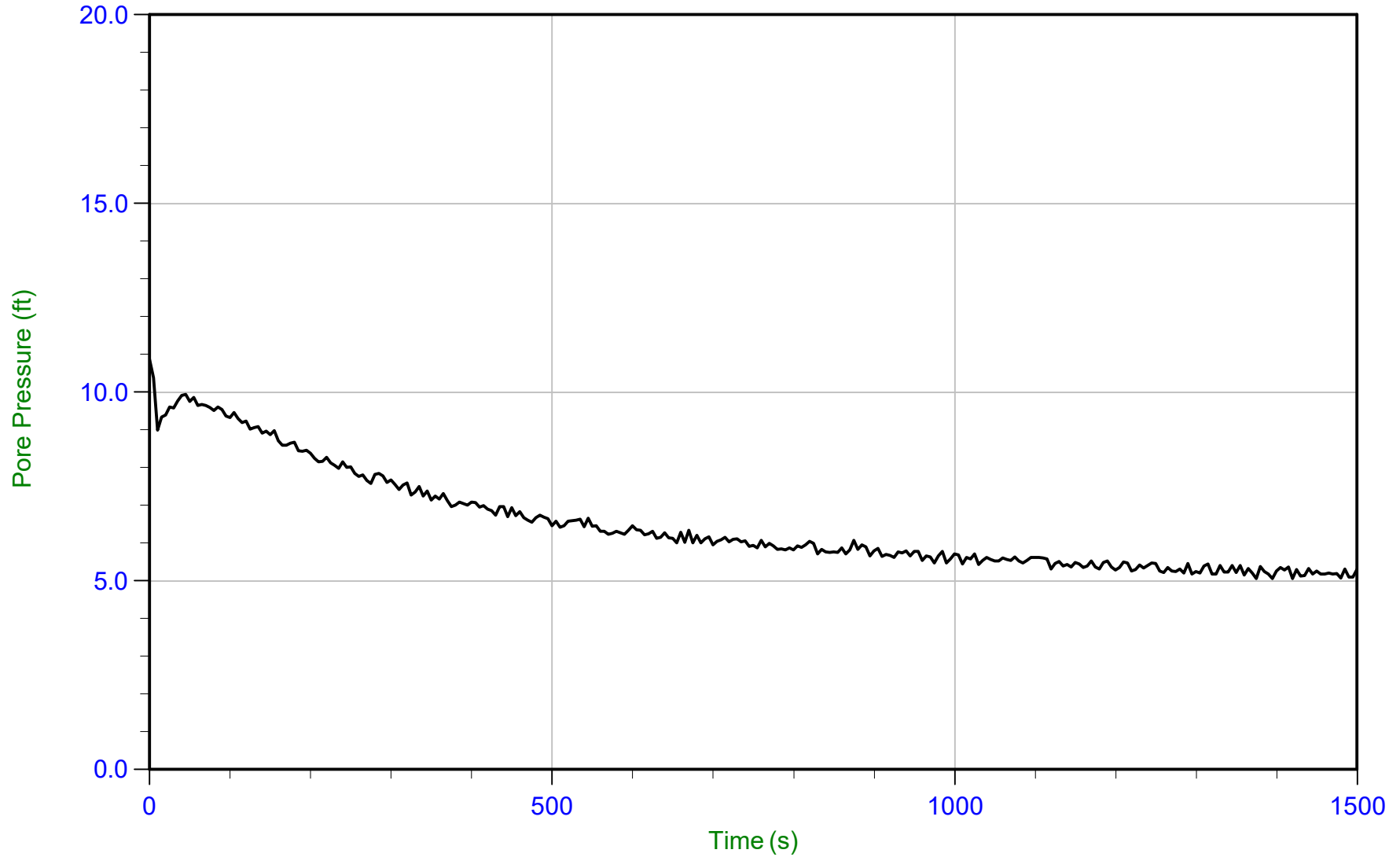
Date: 01-Sep-2015 13:06:56

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C021A

Cone: AD340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP21A.PPD
Depth: 9.900 m / 32.480 ft
Duration: 1500.0 s

U Min: 5.1 ft
U Max: 10.9 ft

WT: 8.507 m / 27.910 ft
Ueq: 4.6 ft
U(50): 7.72 ft

T(50): 267.8 s
Ir: 100
Ch: 2.6 sq cm/min



AECOM

Job No: 15-53081

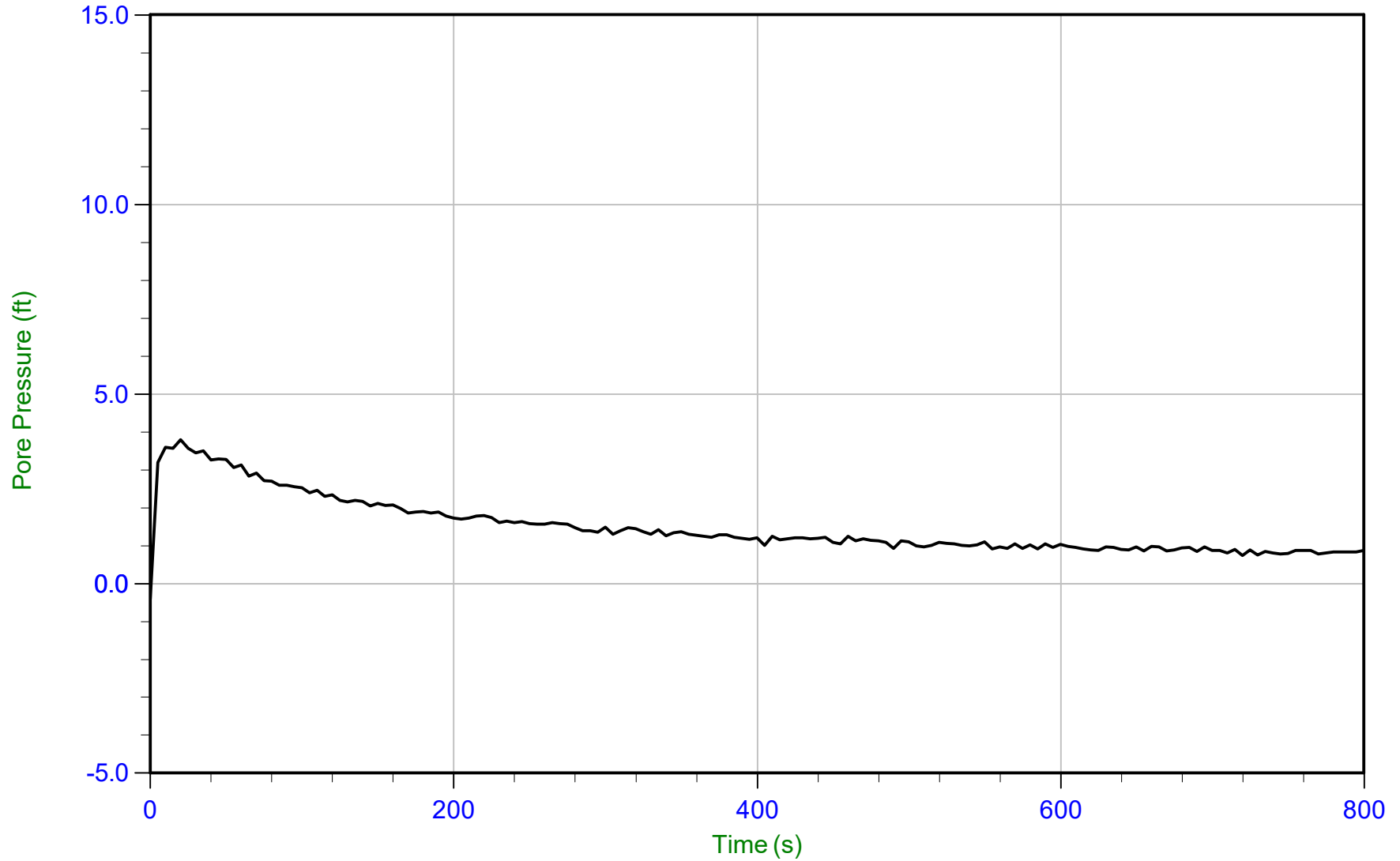
Date: 01-Sep-2015 13:08:18

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C022

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP22.PPD U Min: -0.4 ft WT: 2.116 m / 6.942 ft
Depth: 2.350 m / 7.710 ft U Max: 3.8 ft Ueq: 0.8 ft
Duration: 800.0 s



AECOM

Job No: 15-53081

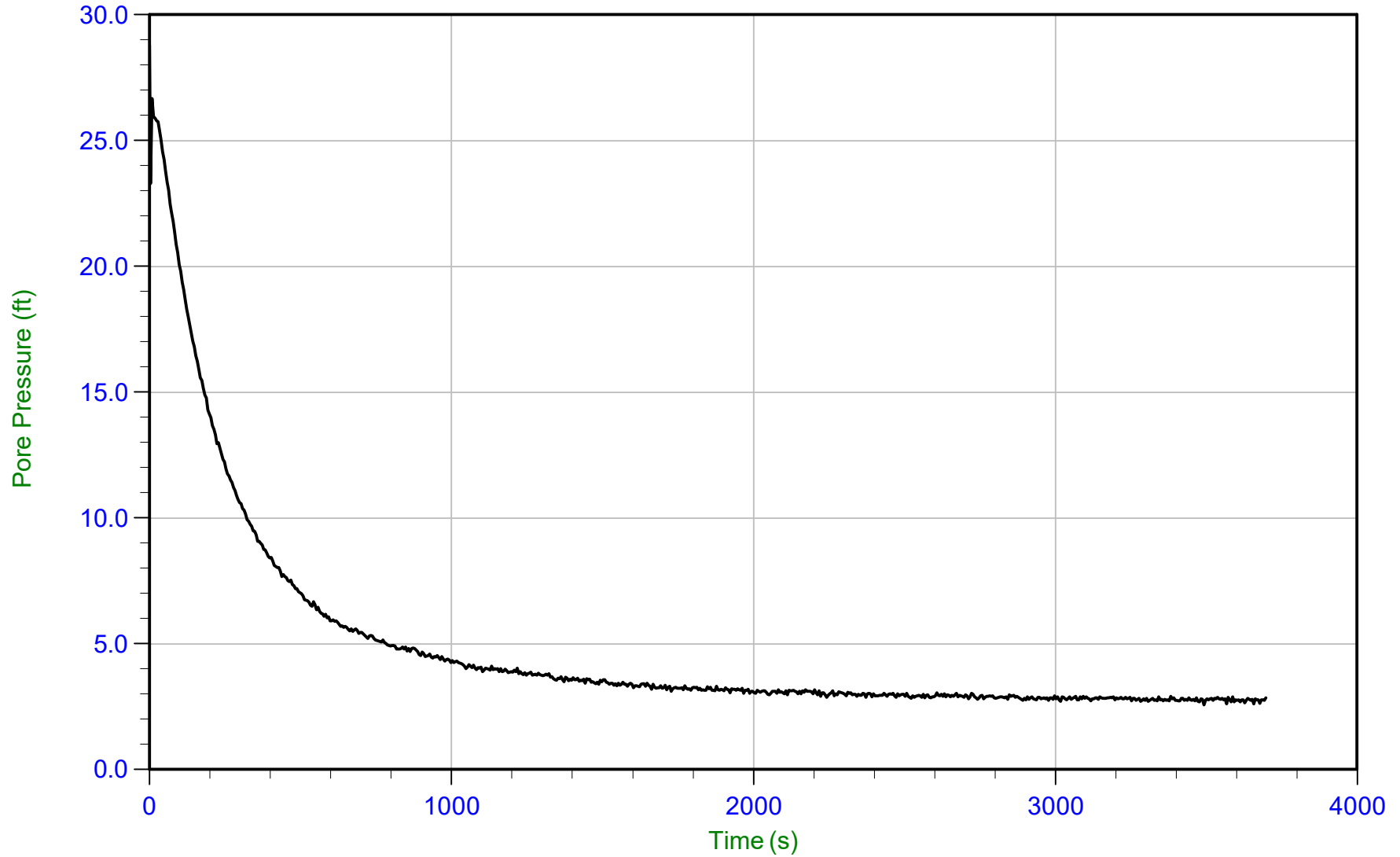
Date: 01-Sep-2015 13:08:18

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C022

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP22.PPD U Min: 2.6 ft WT: 3.412 m / 11.194 ft T(50): 168.3 s
Depth: 4.200 m / 13.779 ft U Max: 28.8 ft Ueq: 2.6 ft Ir: 100
Duration: 3700.0 s U(50): 15.69 ft Ch: 4.2 sq cm/min



AECOM

Job No: 15-53081

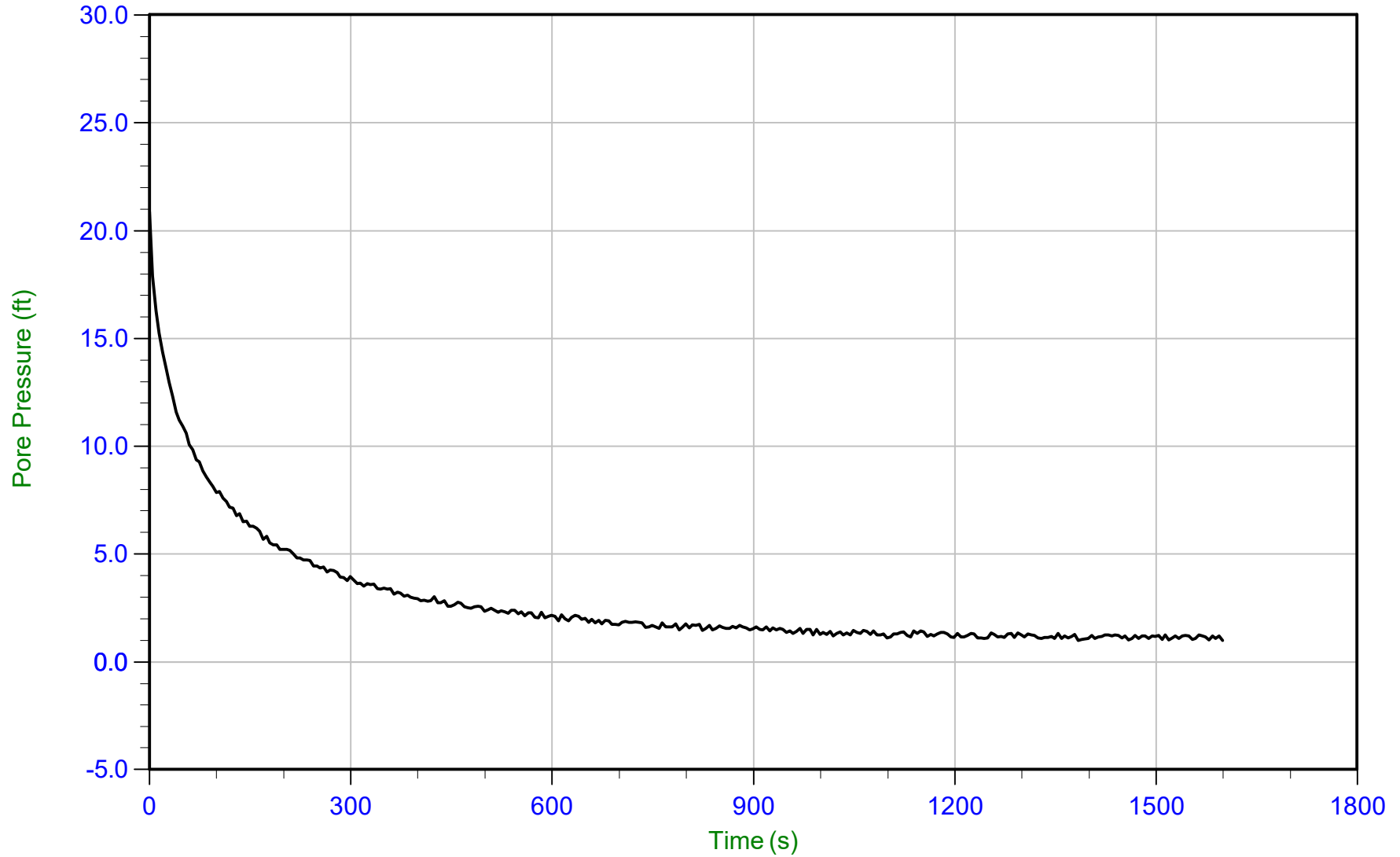
Date: 02-Sep-2015 12:42:36

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C023

Cone: 340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP23.PPD
Depth: 3.450 m / 11.319 ft
Duration: 1600.0 s

U Min: 1.0 ft
U Max: 20.9 ft



AECOM

Job No: 15-53081

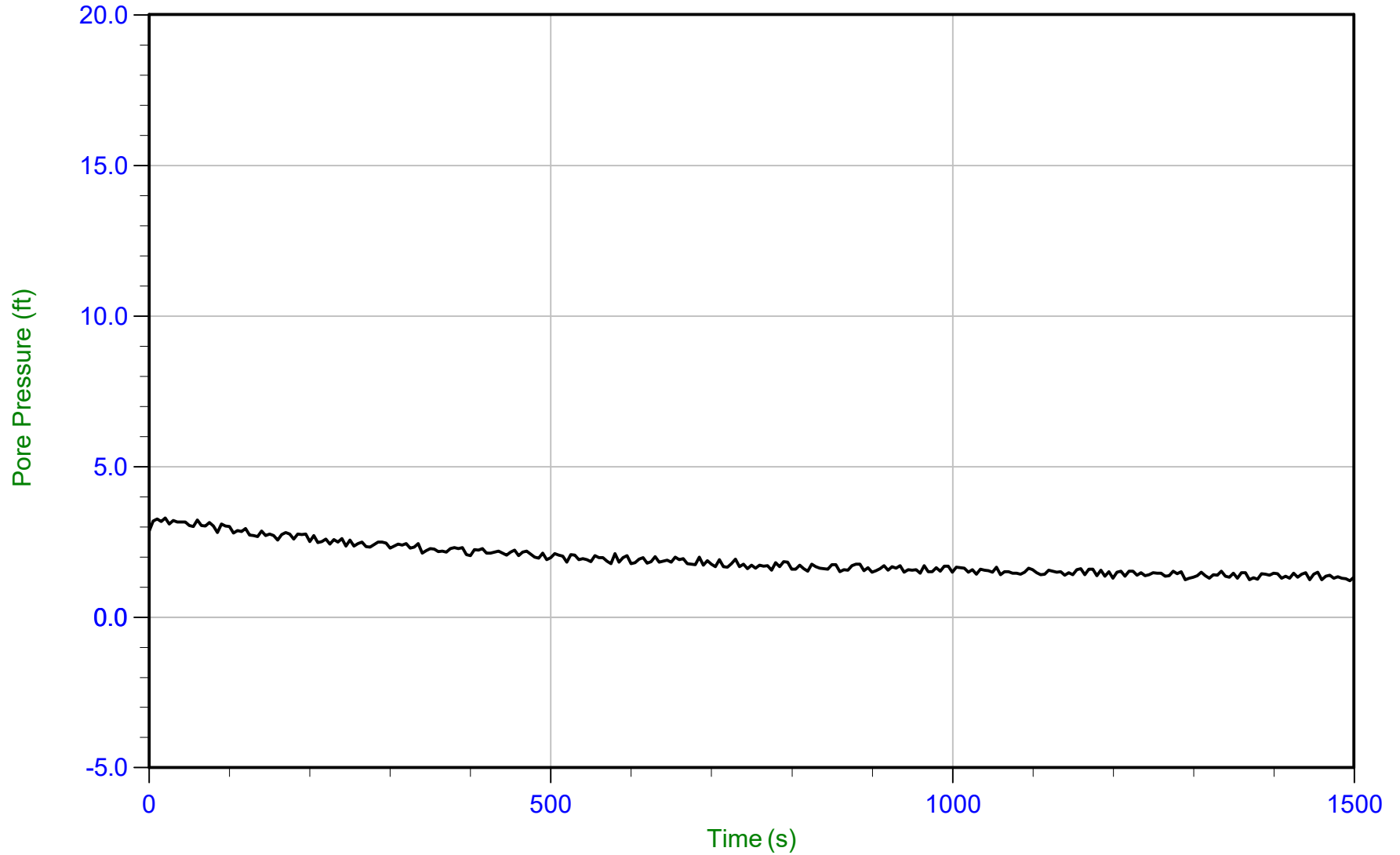
Date: 02-Sep-2015 08:19:07

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C025

Cone: 340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP25.PPD
Depth: 4.450 m / 14.600 ft
Duration: 1500.0 s

U Min: 1.2 ft
U Max: 3.3 ft



AECOM

Job No: 15-53081

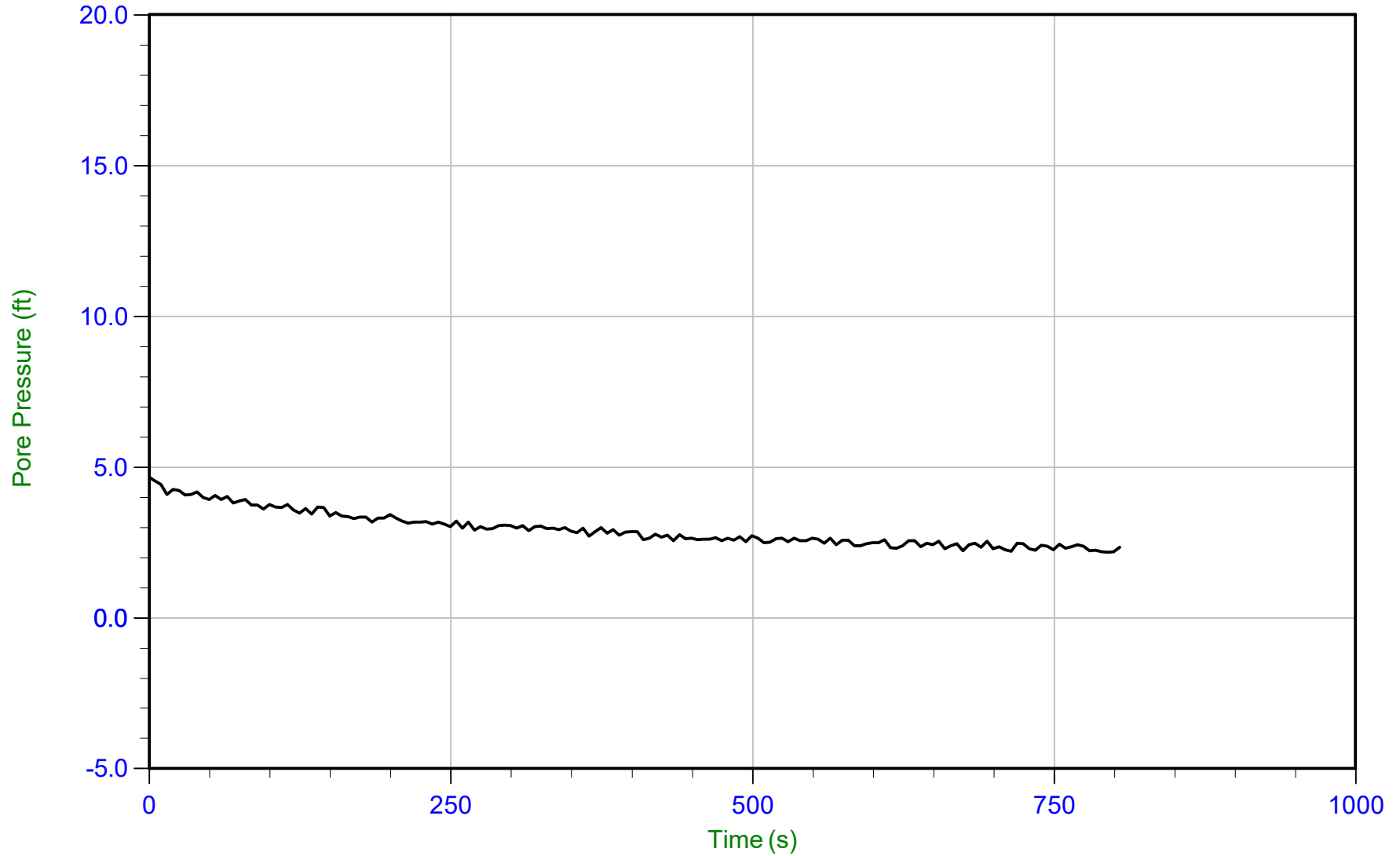
Date: 02-Sep-2015 08:19:07

Site: Hennepin Power Station, Hennepin, Il

Sounding: HEN-C025

Cone: 340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP25.PPD
Depth: 7.250 m / 23.786 ft
Duration: 805.0 s

U Min: 2.2 ft
U Max: 4.7 ft



AECOM

Job No: 15-53081

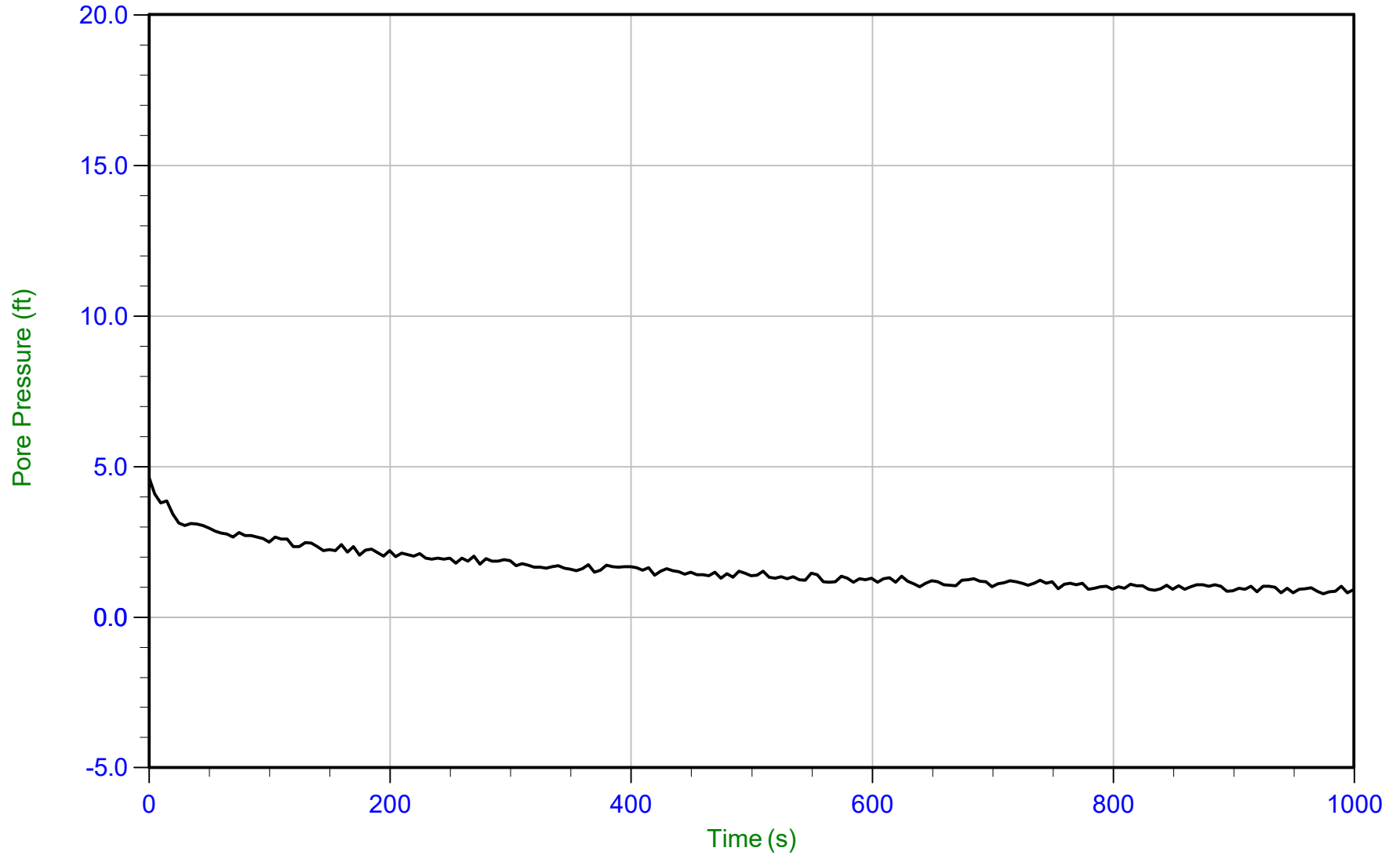
Date: 02-Sep-2015 08:19:07

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C025

Cone: 340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP25.PPD
Depth: 9.150 m / 30.019 ft
Duration: 1000.0 s

U Min: 0.8 ft
U Max: 4.6 ft



AECOM

Job No: 15-53081

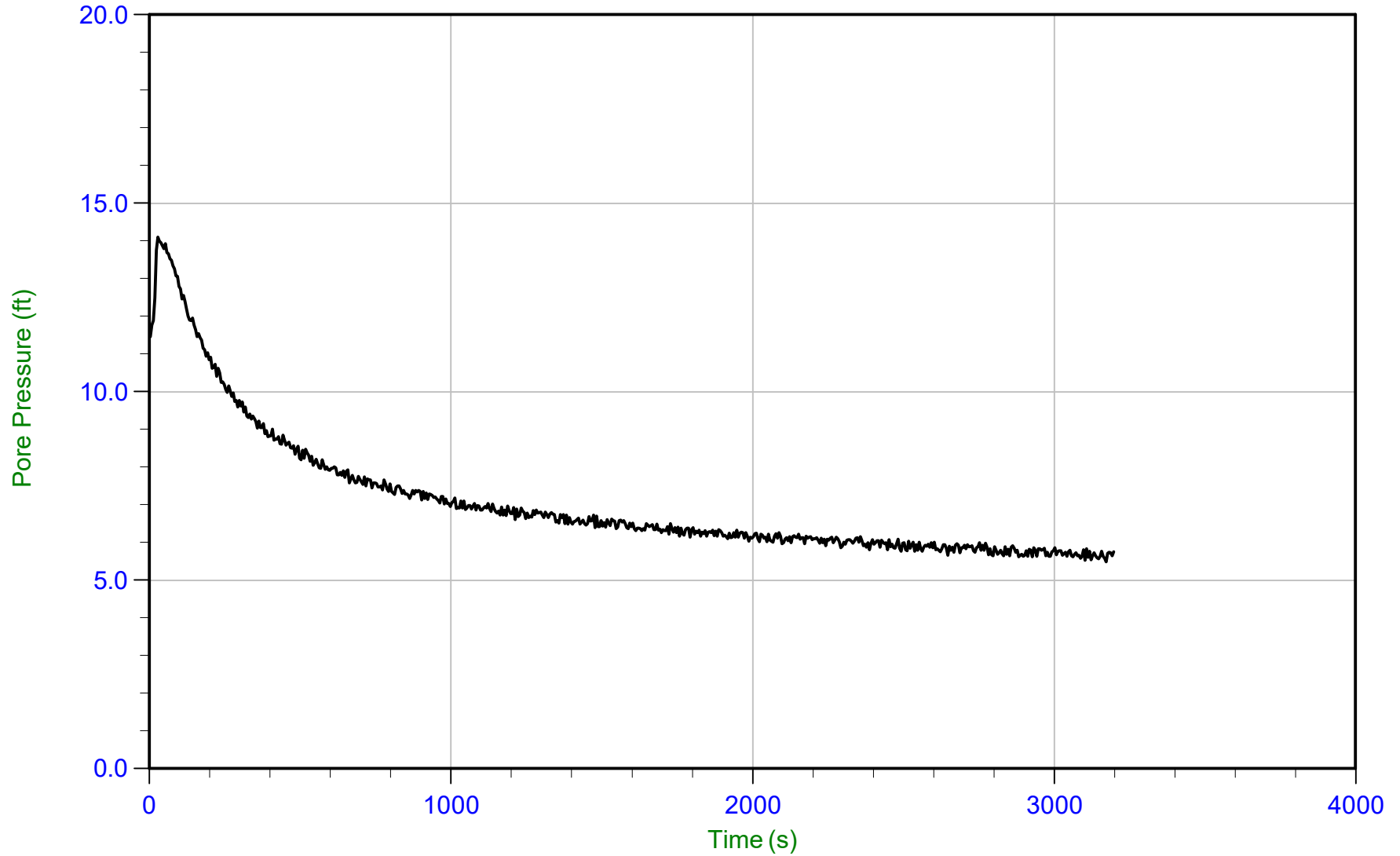
Date: 02-Sep-2015 08:19:07

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C025

Cone: 340

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP25.PPD
Depth: 14.400 m / 47.244 ft
Duration: 3200.0 s

U Min: 5.5 ft
U Max: 14.1 ft



AECOM

Job No: 15-53081

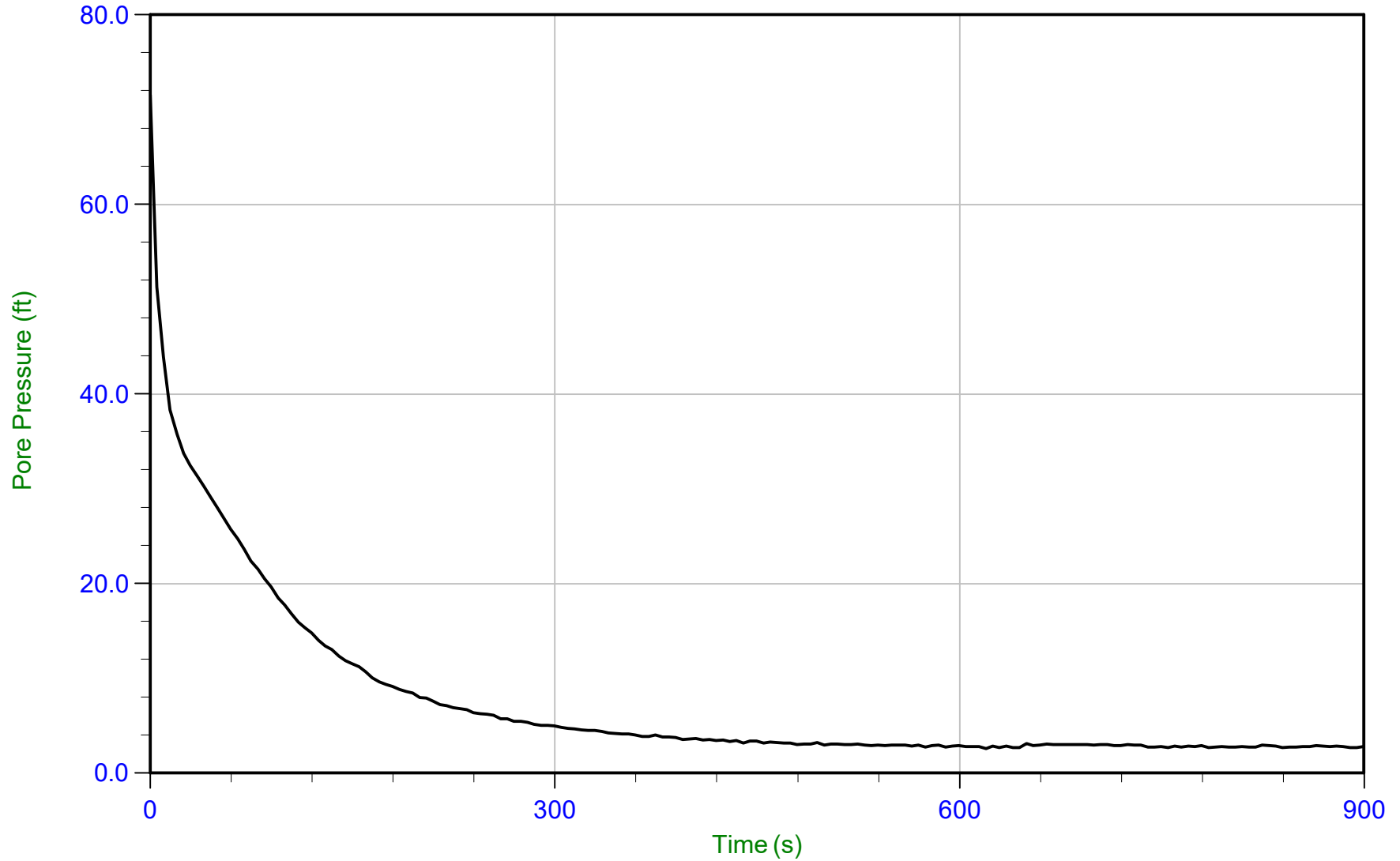
Date: 03-Sep-2015 11:32:02

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C026

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP26.PPD
Depth: 1.300 m / 4.265 ft
Duration: 900.0 s

U Min: 2.6 ft
U Max: 71.5 ft

WT: 0.478 m / 1.568 ft
Ueq: 2.7 ft
U(50): 37.11 ft

T(50): 17.4 s
Ir: 100
Ch: 40.4 sq cm/min



AECOM

Job No: 15-53081

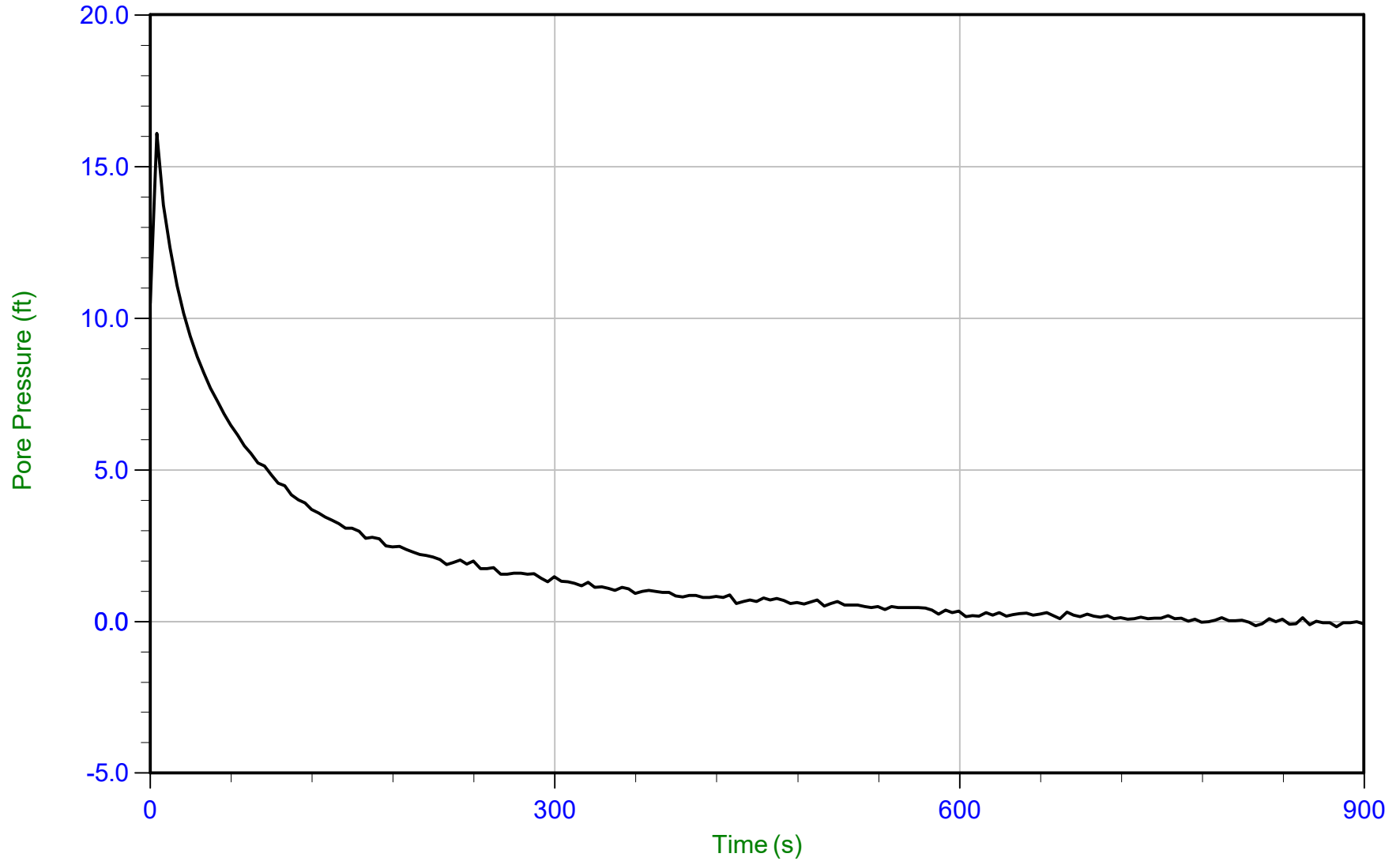
Date: 03-Sep-2015 11:32:02

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C026

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP26.PPD
Depth: 4.600 m / 15.092 ft
Duration: 900.0 s

U Min: -0.2 ft
U Max: 16.1 ft

WT: 4.600 m / 15.092 ft
Ueq: -0.0 ft
U(50): 8.05 ft

T(50): 36.4 s
Ir: 100
Ch: 19.3 sq cm/min



AECOM

Job No: 15-53081

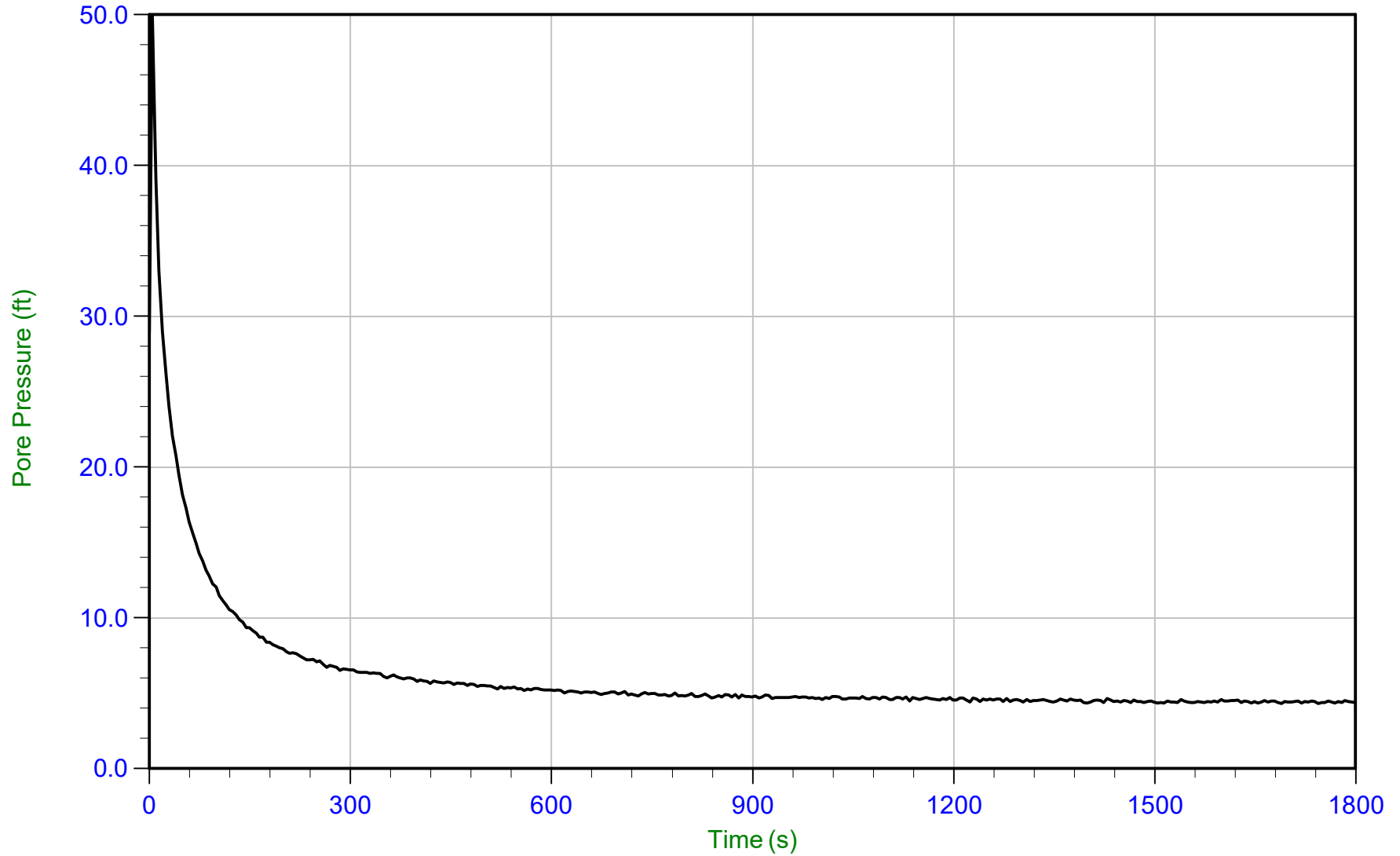
Date: 03-Sep-2015 11:32:02

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C026

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP26.PPD
Depth: 9.150 m / 30.019 ft
Duration: 1800.0 s

U Min: 4.3 ft
U Max: 50.0 ft

WT: 7.837 m / 25.712 ft
Ueq: 4.3 ft
U(50): 27.14 ft

T(50): 18.4 s
Ir: 100
Ch: 38.2 sq cm/min



AECOM

Job No: 15-53081

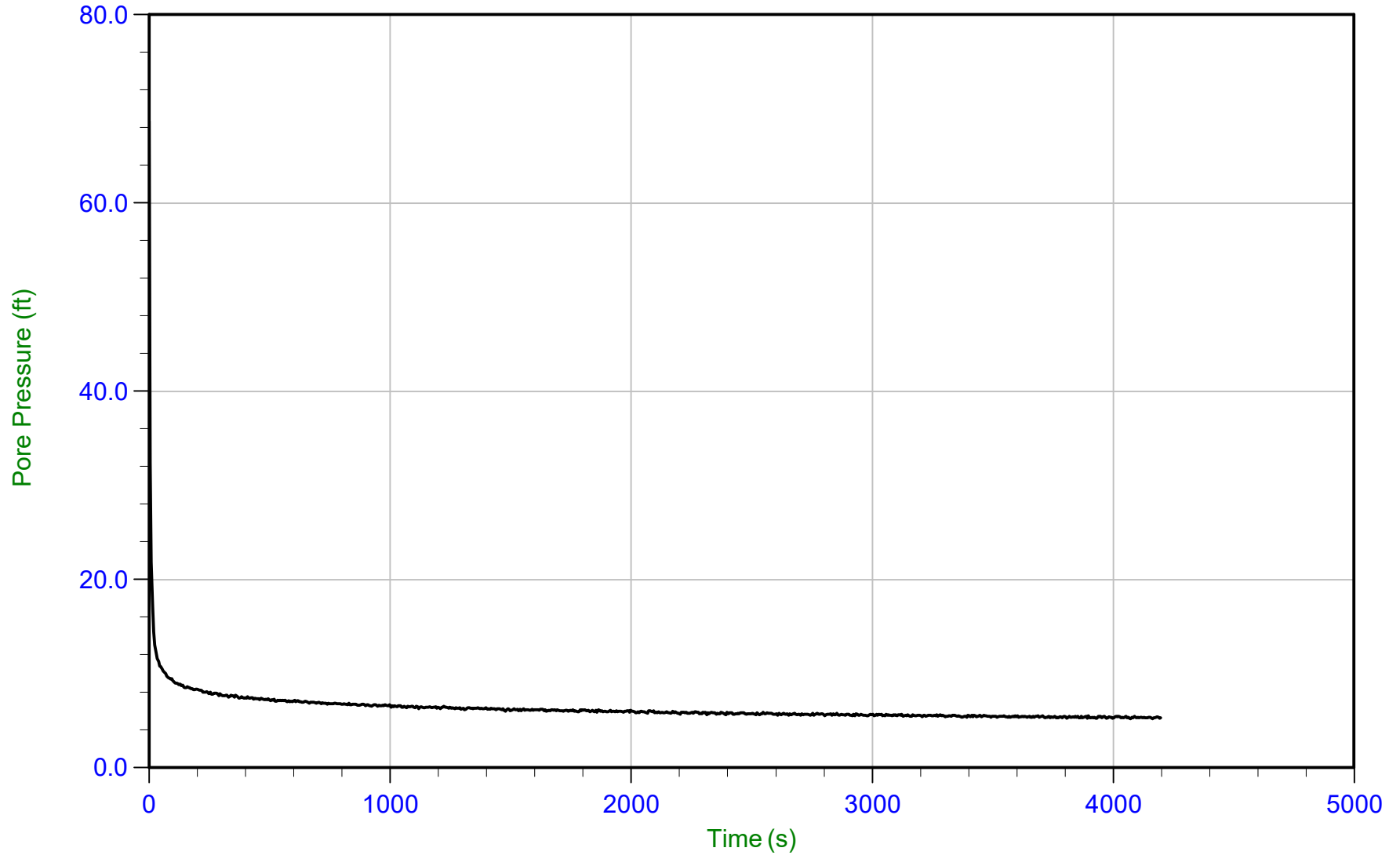
Date: 03-Sep-2015 09:01:03

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C027

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP27.PPD
Depth: 5.350 m / 17.552 ft
Duration: 4200.0 s

U Min: 5.2 ft
U Max: 68.7 ft

WT: 4.368 m / 14.331 ft
Ueq: 3.2 ft



AECOM

Job No: 15-53081

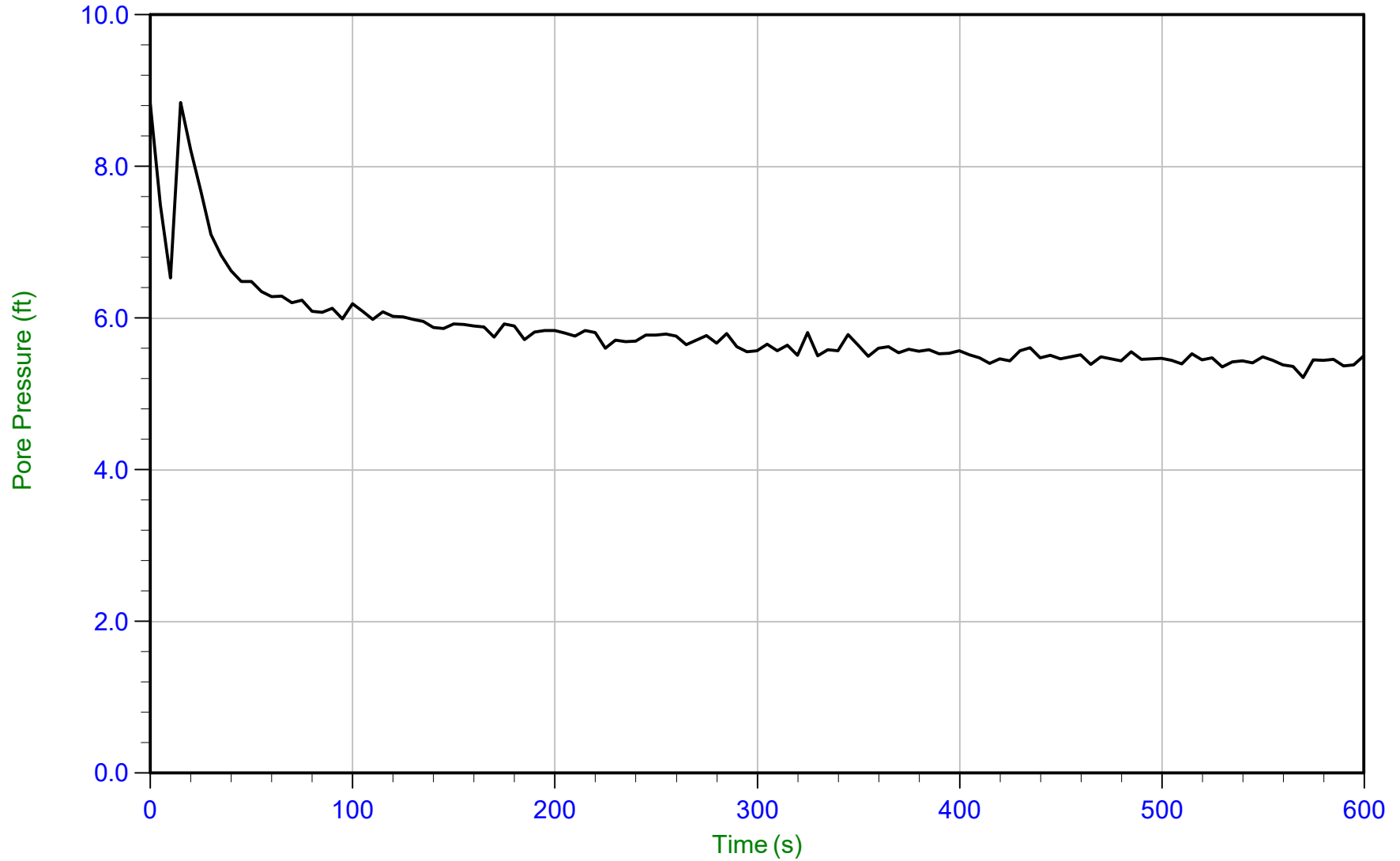
Date: 03-Sep-2015 09:01:03

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C027

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP27.PPD
Depth: 6.000 m / 19.685 ft
Duration: 600.0 s

U Min: 5.2 ft
U Max: 8.8 ft

WT: 4.368 m / 14.331 ft
Ueq: 5.4 ft



AECOM

Job No: 15-53081

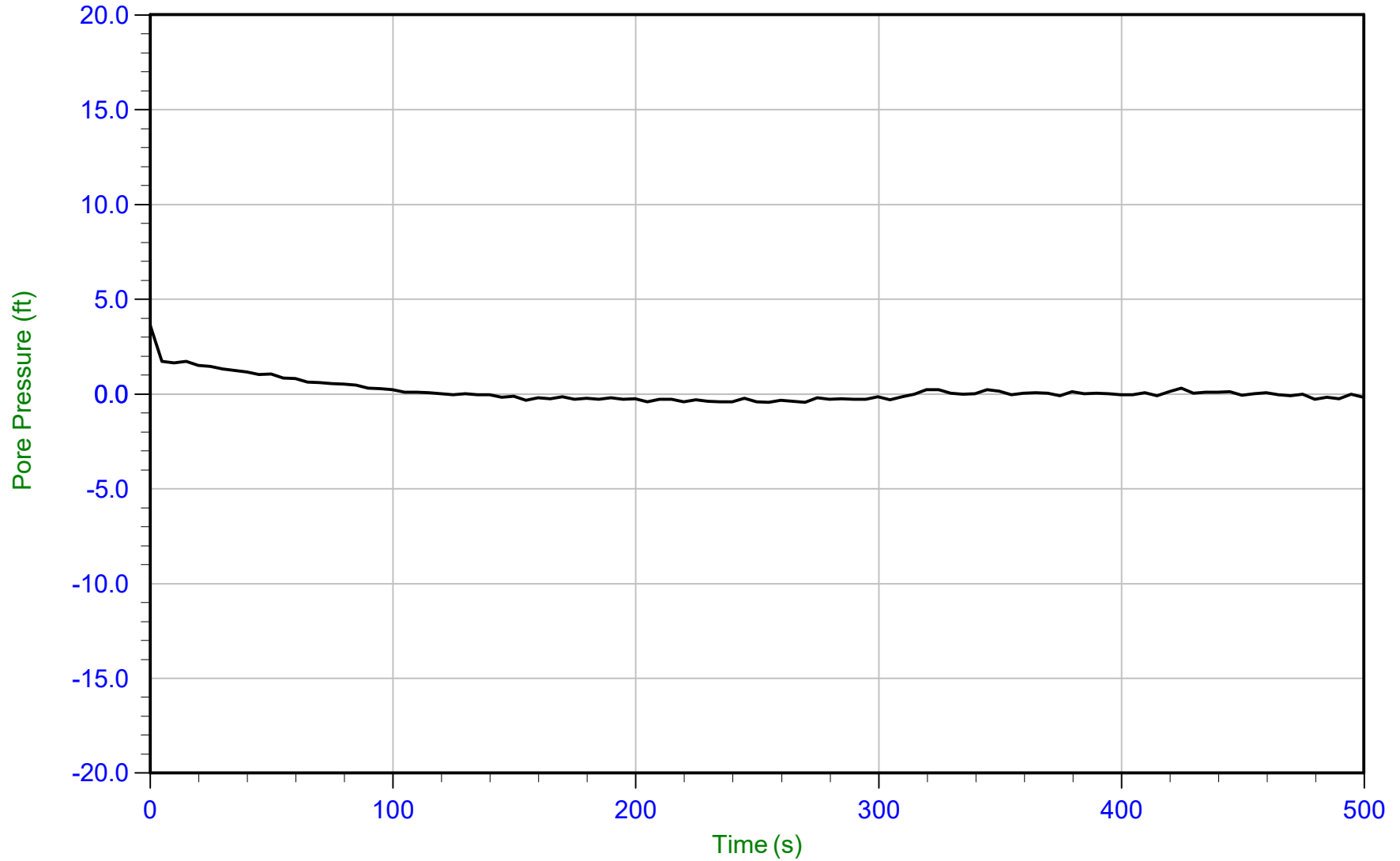
Date: 03-Sep-2015 09:01:03

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C027

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_SP27.PPD
Depth: 9.150 m / 30.019 ft
Duration: 500.0 s

U Min: -0.4 ft
U Max: 3.6 ft



AECOM

Job No: 15-53081

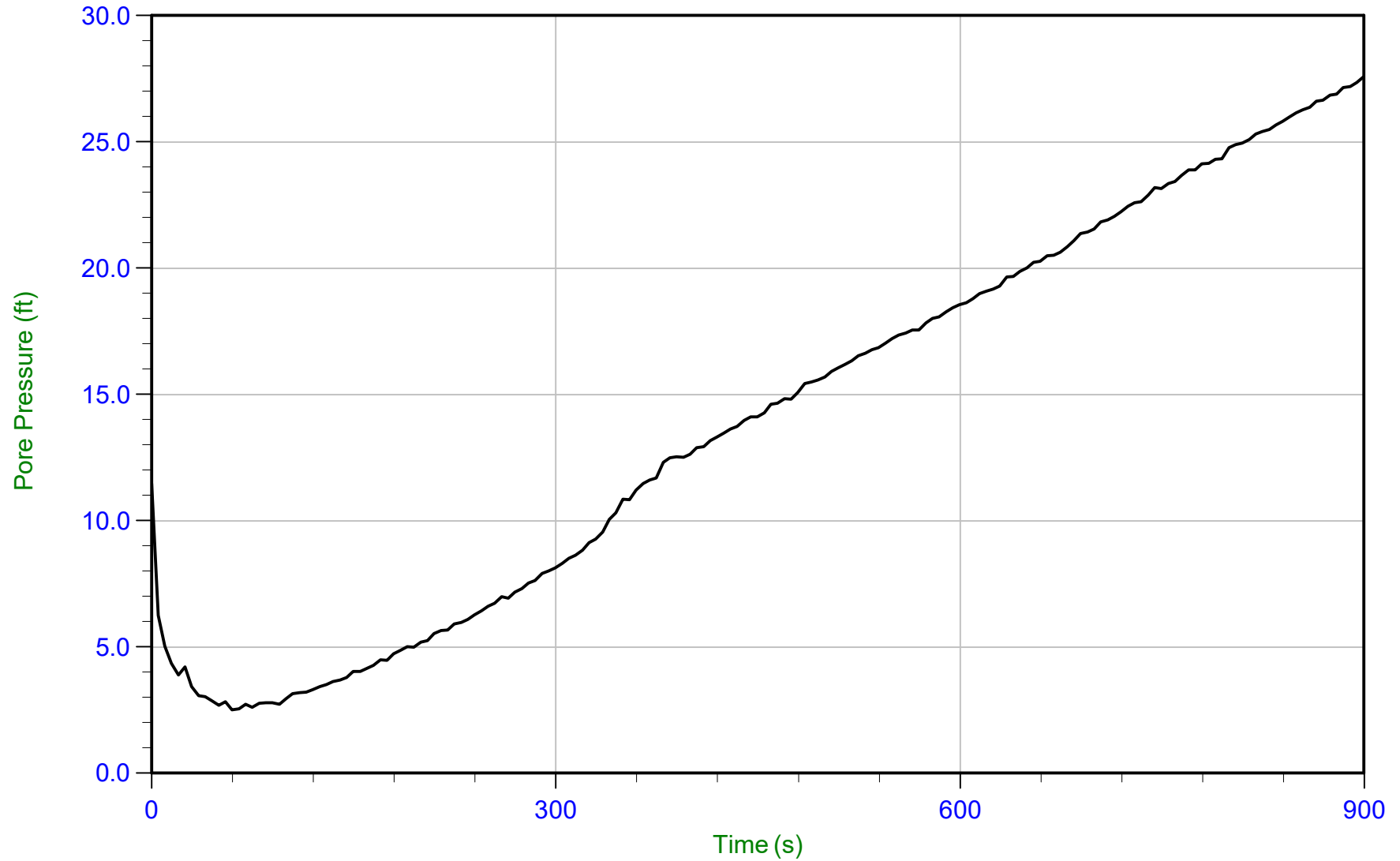
Date: 01-Sep-2015 15:44:33

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C029

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP29.PPD
Depth: 3.050 m / 10.006 ft
Duration: 900.0 s

U Min: 2.5 ft
U Max: 27.6 ft



AECOM

Job No: 15-53081

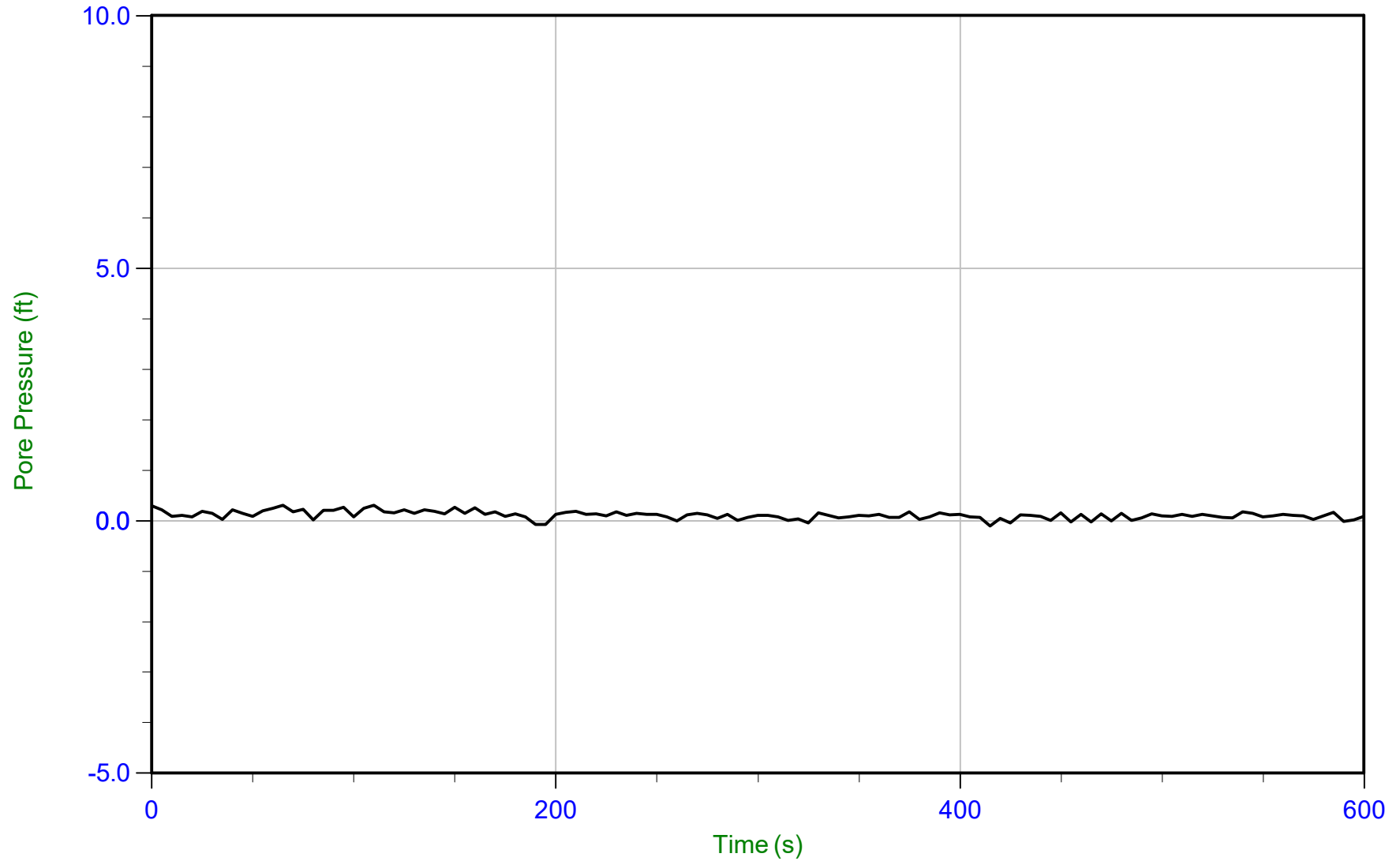
Date: 01-Sep-2015 15:44:33

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C029

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP29.PPD
Depth: 6.450 m / 21.161 ft
Duration: 600.0 s

U Min: -0.1 ft
U Max: 0.3 ft



AECOM

Job No: 15-53081

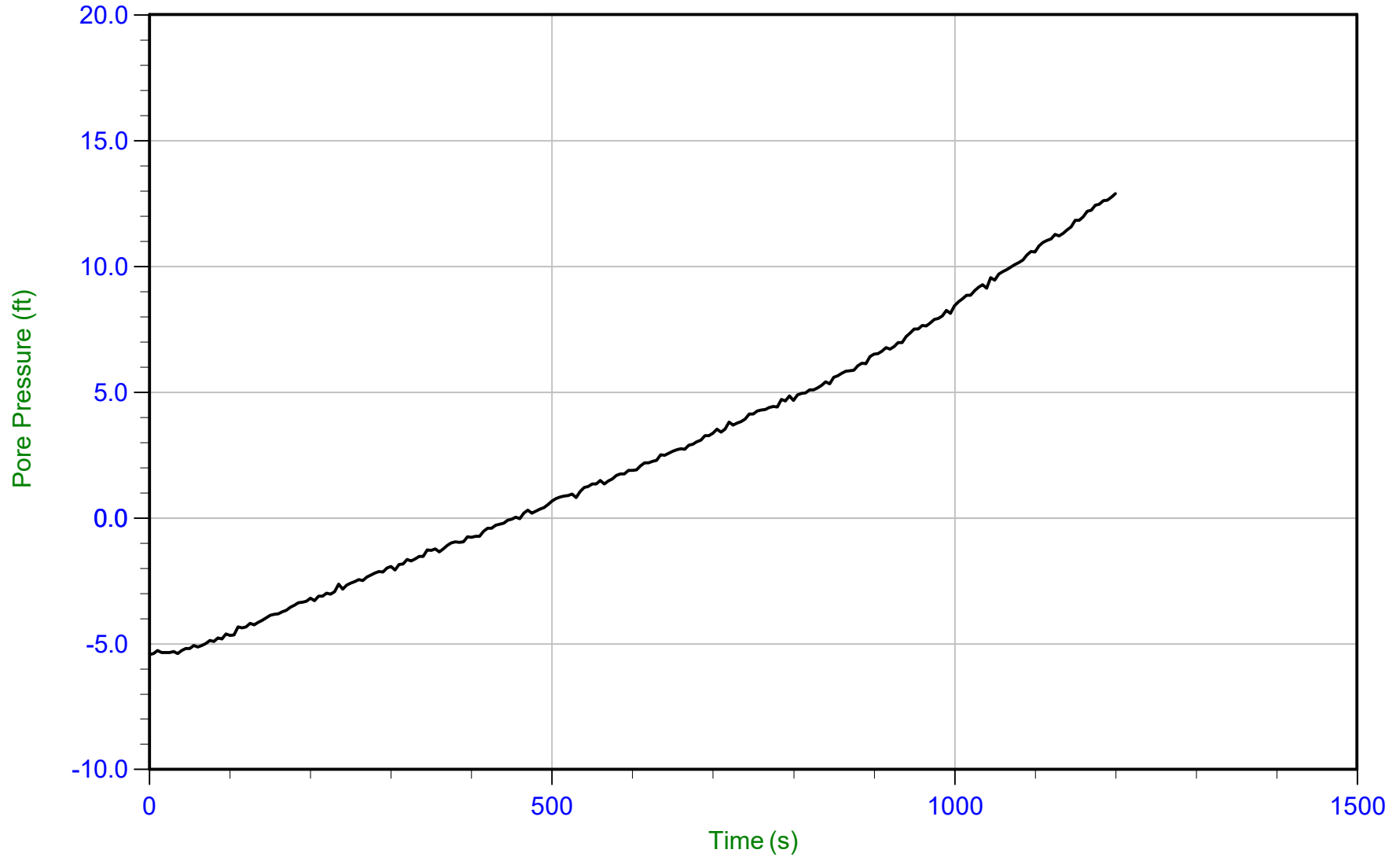
Date: 02-Sep-2015 10:27:31

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C032

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP32.PPD
Depth: 3.050 m / 10.006 ft
Duration: 1200.0 s

U Min: -5.4 ft
U Max: 12.9 ft



AECOM

Job No: 15-53081

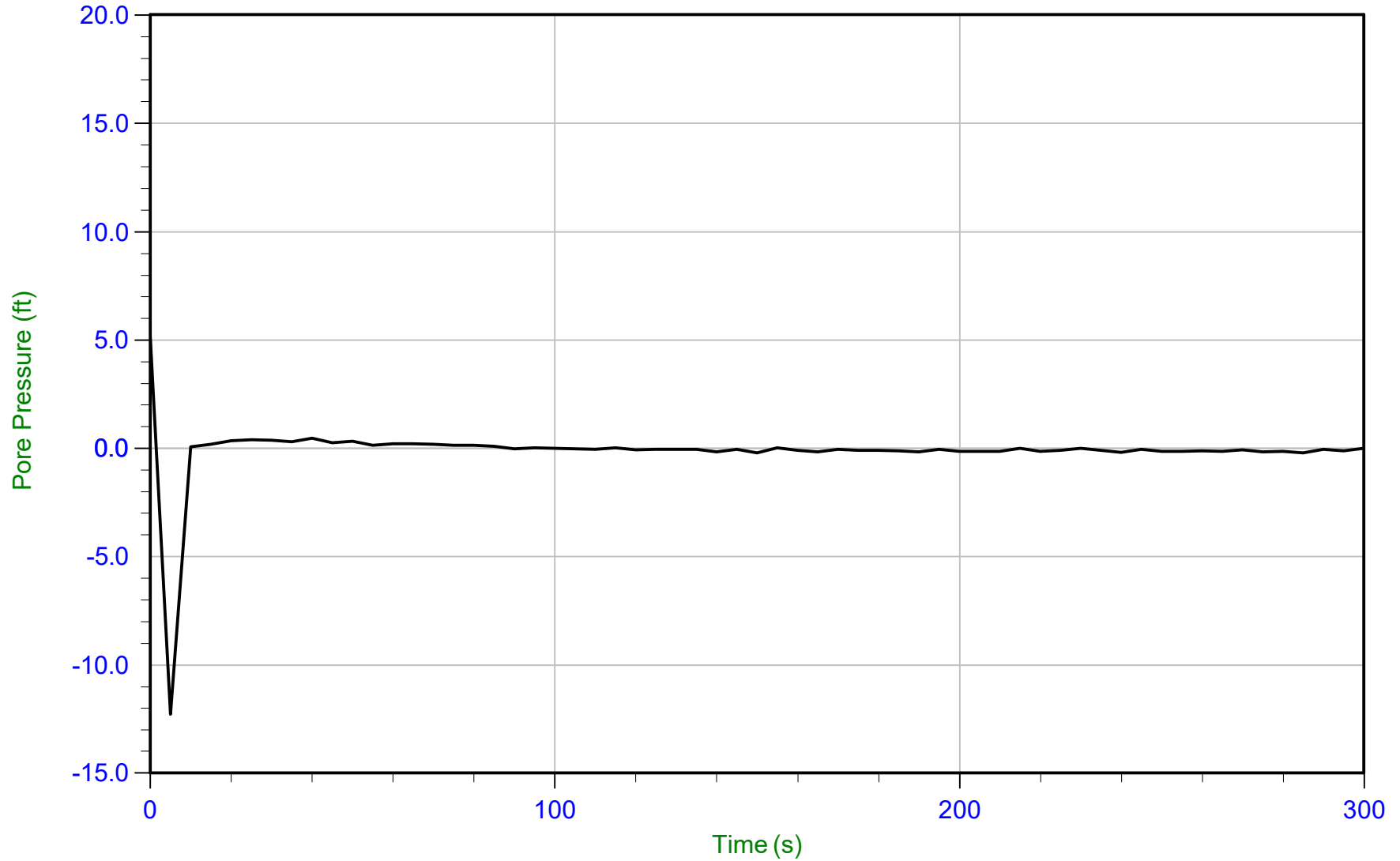
Date: 02-Sep-2015 10:27:31

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C032

Cone: 374

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP32.PPD
Depth: 3.750 m / 12.303 ft
Duration: 300.0 s

U Min: -12.3 ft
U Max: 5.1 ft



AECOM

Job No: 15-53081

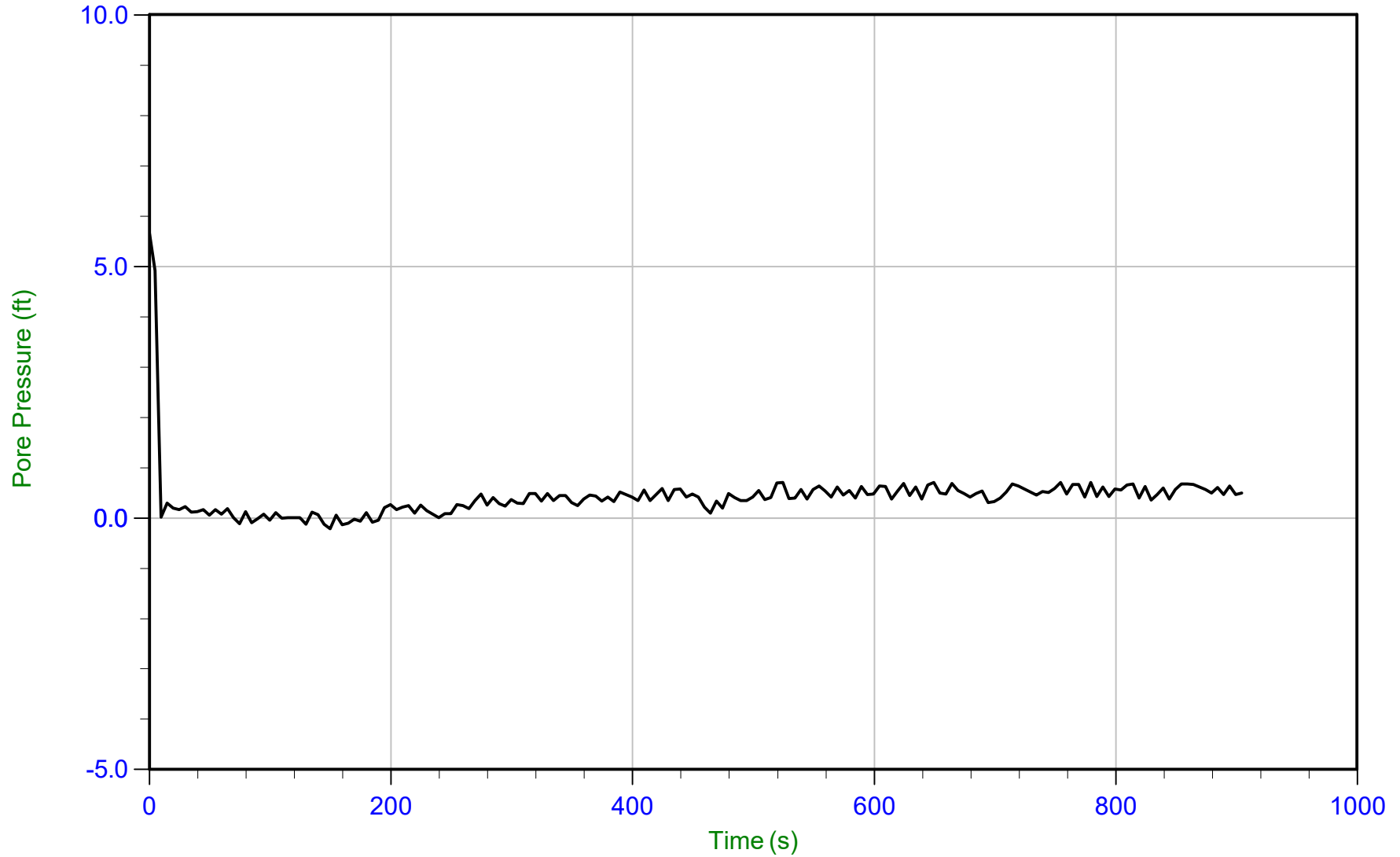
Date: 02-Sep-2015 15:55:12

Site: Hennepin Power Station, Hennepin, IL

Sounding: HEN-C038A

Cone: 301

Cone Area: 15 sq cm



Trace Summary: Filename: 15-53081_CP38A.PPD U Min: -0.2 ft WT: 2.629 m / 8.625 ft
 Depth: 2.800 m / 9.186 ft U Max: 5.7 ft Ueq: 0.6 ft
 Duration: 905.0 s

APPENDIX D

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B001	S-1	0.0'-1.5'	POSSIBLE FILL: REDDISH BROWN SANDY LEAN CLAY - ROOTS AND BRICK NOTED	CL	7.6										
HEN-B001	S-2	2.5'-4.0'	DARK BROWN SANDY LEAN CLAY	CL	13.1										
HEN-B001	S-3	5.0'-7.5'	DARK BROWN LEAN CLAY WITH SAND	CL	19.0										
HEN-B001	S-4	7.5'-9.5'	BROWN AND GRAY LEAN CLAY WITH SAND - SAND SEAMS NOTED	CL	17.4							21	14	7	
HEN-B001	S-5	10.0'-11.5'	BROWN AND DARK BROWN SANDY LEAN CLAY	CL	16.8										
HEN-B001	S-6	15.0'-16.5'	GRAY LEAN CLAY	CL	44.8										
HEN-B001	S-7	20.0'-22.0'	GRAY ORGANIC LEAN CLAY - SHELL NOTED	CL	37.0							38	22	16	
HEN-B001	S-8	25.0'-26.5'	GRAYISH BROWN LEAN CLAY	CL	30.6										
HEN-B001	S-9	30.0'-31.5'	BROWN LEAN CLAY	CL	36.6										
HEN-B001	S-10	35.0'-36.5'	DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	39.8										
HEN-B001	S-11	40.0'-41.5'	DARK GRAY FAT CLAY	CH	43.3							59	30	29	
HEN-B001	S-12	45.0'-46.5'	GRAY SANDY LEAN CLAY	CL	31.5										
HEN-B001	S-13	50.0'-51.5'	GRAY SAND WITH GRAVEL	SP	18.6										
HEN-B001	S-14	55.0'-56.5'	BROWN AND GRAY SILTY SAND WITH GRAVEL	SM	7.4										
HEN-B002	S-1	0.0'-1.5'	FILL: BROWN SANDY LEAN CLAY	CL	5.7										
HEN-B002	S-2	2.5'-4.0'	BROWN POORLY GRADED SAND WITH CLAY	SP-SC	6.8										2.68
HEN-B002	S-3	5.5'-6.5'	GRAY SANDY LEAN CLAY	CL	15.0										
HEN-B002	S-4	7.5'-9.0'	BROWN SILT WITH CLAY	ML	9.3							20	14	6	
HEN-B002	S-6	15.0'-16.5'	BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP-SM	15.7		22.7	65.7	7.2	4.4	11.6				
HEN-B002	S-7A	20.0'-20.8'	BROWN CLAYEY SAND	SC	7.4										
HEN-B002	S-7B	20.8'-21.5'	GRAY SILTY LEAN CLAY	CL-ML	47.1										
HEN-B002	S-8	25.0'-27.0'	DARK GRAY LEAN CLAY WITH SAND AND GRAVEL - FLY ASH NOTED	OL	24.6							41	23	18	
HEN-B002	S-9	30.0'-31.5'	GRAYISH BROWN LEAN CLAY	CL	32.0										
HEN-B002	S-10	35.0'-37.0'	GRAY LEAN CLAY	CL	31.7							46	21	25	
HEN-B002	S-11	40.0'-41.5'	BROWN AND GRAY LEAN CLAY	CL	57.9										
HEN-B002	S-12A	45.0'-46.0'	DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	57.9										
HEN-B002	S-12B	46.0'-46.5'	GRAY CLAYEY SILT	CL-ML	43.1										
HEN-B002	S-13	50.0'-51.5'	BROWN AND GRAY SILTY SAND	SM	21.2										
HEN-B002	S-14	55.0'-56.5'	BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP-SM	15.3		16.8	71.3			11.9				
HEN-B002	S-15	60.0'-61.5'	GRAY GRAVEL	GP	4.0										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B003	S-1	0.0'-1.5'	GRAY SILTY LEAN CLAY	CL	70.4										
HEN-B003	S-2	2.5'-4.0'	GRAY CLAYEY SILT	CL-ML	42.9										
HEN-B003	S-3	5.0'-6.5'	GRAY CLAYEY SILT	CL-ML	49.5										
HEN-B003	S-4	7.5'-9.0'	GRAY SILTY LEAN CLAY	CL	48.5										
HEN-B003	S-5	10.0'-12.0'	BLACK ORGANIC CLAY WITH SAND - WOOD NOTED	OL	38.5										
HEN-B003	S-6	15.0'-16.5'	BROWN TO GRAY LEAN CLAY	CL	36.8										
HEN-B003	S-7	20.0'-21.5'	GRAYISH BROWN LEAN CLAY	CL	32.2										
HEN-B003	S-8	25.0'-27.5'	DARK GRAY LEAN CLAY	CL	32.1							45	21	24	
HEN-B003	S-9	30.0'-31.5'	DARK GRAY LEAN CLAY	CL	66.3										
HEN-B003	S-10	35.0'-36.5'	GRAY LEAN CLAY	CL	44.4										
HEN-B003	S-11	40.0'-41.5'	BROWN AND GRAY SANDY SILT	ML	30.3										
HEN-B003	S-12	45.0'-46.5'	CLAYEY SAND WITH SILT	SC	15.6										
HEN-B003	S-13	50.0'-51.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	7.7										
HEN-B004	S-1	0.0'-0.5'	FILL: SILTY SAND - CLAY LENSES NOTED	SM	8.9										
HEN-B004	S-1A	0.5'-1.5'	BROWN SILTY SAND WITH GRAVEL - CLAY LENSES NOTED	SM	6.8										
HEN-B004	S-2	2.5'-4.0'	BROWN, TAN AND GRAY POORLY GRADED GRAVEL WITH SAND	GP	2.9										2.746
HEN-B004	S-3	5.0'-6.5'	BROWN SANDY LEAN CLAY WITH GRAVEL	CL	6.3										
HEN-B004	S-4	7.5'-9.0'	GRAY SILTY SAND	SM	22.2										
HEN-B004	S-5	10.0'-12.0'	BROWN BLACK AND GRAY SANDY SILT WITH GRAVEL	ML	36.8							32	35	NP	
HEN-B004	S-6	15.0'-16.5'	DARK BROWN SANDY LEAN CLAY	CL	14.9										
HEN-B004	S-7	20.0'-22.0'	VERY DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	29.7							45	23	22	
HEN-B004	S-8	25.0'-26.5'	GRAY LEAN CLAY	CL	32.0										
HEN-B004	S-9	30.0'-32.0'	BROWN AND GRAY LEAN CLAY	CL	33.5							43	22	21	
HEN-B004	S-10	35.0'-36.5'	GRAYISH BROWN LEAN CLAY WITH SAND	CL	19.5										
HEN-B004	S-11	40.0'-41.5'	DARK BROWN LEAN CLAY	CL	10.9										
HEN-B004	S-12	45.0'-46.5'	BROWN CLAYEY SAND WITH SILT AND GRAVEL	SC	7.2										
HEN-B005	S-1	4.0'-6.0'	DARK GRAY TO BROWN CLAYEY SILT WITH SAND	CL-ML	28.5										
HEN-B005	S-2	7.5'-9.5'	BLACK TO VERY DARK GRAY ORGANIC CLAY	OL	59.5										
HEN-B005	S-4	12.5'-14.5'	DARK GRAY LEAN CLAY WITH SAND AND FLY ASH	CL	53.0		0.0	16.2	51.2	32.6	83.8	43	24	19	
HEN-B005	S-5	14.5'-16.0'	DARK GRAY LEAN CLAY WITH GRAVEL	CL	16.3										
HEN-B005	S-3	10.0'-12.5'	GRAY ORGANIC CLAY WITH SAND	OL	41.4										
HEN-B005	S-6	20.0'-21.5'	BROWN AND GRAY CLAYEY GRAVEL WITH SAND	GC	7.8										
HEN-B005	S-7	25.0'-27.0'	BROWN CLAYEY GRAVEL	GC	7.2										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B006	S-1	0.0'-1.5'	FILL: BROWN SILTY SAND WITH GRAVEL	SM	4.4										
HEN-B006	S-2	2.5'-4.0'	BROWN AND LIGHT BROWN POORLY GRADED SAND WITH GRAVEL	SP	6.8										2.665
HEN-B006	S-3	5.0'-6.5'	BROWN SILTY SAND - CLAY LENSES NOTED	SM	5.9										
HEN-B006	S-4	7.5'-9.0'	POSSIBLE FILL: DARK BROWN SANDY LEAN CLAY	CL	7.1										
HEN-B006	S-5	10.0'-11.5'	BROWN SILTY SAND	SM	14.6										
HEN-B006	S-6	15.0'-16.5'	BROWN SILTY SAND	SM	13.8		0.8	62.3	23.1	13.8	36.9				
HEN-B006	S-7	20.0'-21.5'	BROWN GRAVELLY SAND	SP-SM	7.9										
HEN-B006	S-8	25.0'-26.5'	BROWN GRAVELLY SAND	SP-SC	8.2										
HEN-B006	S-9	30.0'-31.5'	LIGHT BROWN SILTY GRAVEL WITH SAND	GM	15.2		42.4	38.3	12.1	7.2	19.3				
HEN-B006	S-10	35.0'-36.5'	BROWN GRAVELLY LEAN CLAY WITH SAND	CL	10.7										
HEN-B006	S-11	40.0'-41.5'	BROWN GRAVELLY SAND	SP	9.1										
HEN-B007	S-1	3.5'-5.0'	FILL: GRAY SILTY SAND - ASPHALT NOTED	SM	31.2										
HEN-B007	S-2	5.0'-5.5'	GRAYISH BROWN TO DARK GRAY SILTY SAND WITH CLAY	SM	36.2										
HEN-B007	S-2A	5.5'-6.5'	GRAY GRAVELLY LEAN CLAY WITH SAND	CL	7.1										
HEN-B007	S-3	7.5'-9.0'	GRAYISH BROWN CLAYEY GRAVEL WITH SAND	GC	6.0										
HEN-B007	S-4	10.0'-11.0'	BROWN POORLY GRADED GRAVEL WITH CLAY	GP-GC	17.6										
HEN-B007	S-4A	11.0'-11.5'	BROWN CLAYEY GRAVEL WITH SAND	GC	9.5										
HEN-B007	S-5	12.5'-14.5'	BROWN CLAYEY SAND WITH SILT	SC	10.2										
HEN-B007	S-6	15.0'-16.5'	BROWN GRAVEL WITH POORLY GRADED SAND AND SILT	GP	11.1		59.2	28.9	7.2	4.7	11.9				
HEN-B007	S-7	20.0'-21.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	11.3										
HEN-B008	S-1	0.0'-1.5'	POSSIBLE FILL: GRAY FLY ASH - WOODCHIPS NOTED		34.5										
HEN-B008	S-2	2.5'-4.0'	GRAY FLY ASH		44.7										
HEN-B008	S-3	5.0'-6.5'	DARK GRAY TO BLACK SANDY SILT	ML	49.0		1.5	41.0	47.9	9.6	57.5				
HEN-B008	S-4	7.5'-9.5'	MULTI STRATA SAMPLE: TOP, FLY ASH - MIDDLE, FLY ASH LEAN CLAY WITH SAND MIX - BOTTOM, BROWN SANDY CLAY		43.4										
HEN-B008	S-5	10.0'-11.5'	BROWN AND DARK BROWN LEAN CLAY	CL	16.2										
HEN-B008	S-6	15.0'-16.5'	BROWN POORLY GRADED SAND WITH GRAVEL	SP	9.8										
HEN-B008	S-7	20.0'-21.5'	BROWN POORLY GRADED GRAVEL WITH SILT AND SAND	GP-GM	7.4		54.4	33.9			11.7				

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B009	S-1	0.0'-1.5'	FILL: DARK BROWN SILTY SAND	SM	10.6										
HEN-B009	S-2	2.5'-4.0'	DARK GRAY AND BLACK SILT WITH SAND AND GRAVEL	ML	11.3										
HEN-B009	S-3	5.0'-6.5'	GRAY SILTY SAND	SM	15.5										
HEN-B009	S-4	8.0'-9.0'	DARK BROWN SILT WITH SAND	ML	10.0										2.672
HEN-B009	S-5	10.0'-11.5'	DARK BROWN AND BROWN LEAN CLAY WITH SILT AND SAND	CL	17.7										
HEN-B009	S-6	15.0'-16.5'	BROWN SILTY SAND WITH GRAVEL	SM	7.3										
HEN-B009	S-7	20.0'-21.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	7.7										
HEN-B009	S-8	25.0'-26.5'	BROWN SILTY SAND	SM	20.1		0.4	76.9			22.7				
HEN-B009	S-9	30.0'-31.5'	BROWN POORLY GRADED SAND	SP	20.9										
HEN-B009	S-10A	35.0'-35.5'	BROWN SILTY LEAN CLAY	CL	27.7										
HEN-B009	S-10B	35.5'-36.0'	BROWN SILTY LEAN CLAY	CL	26.4										
HEN-B009	S-10C	36.0'-36.5'	BROWN SILTY LEAN CLAY	CL	25.9										
HEN-B009	S-11	40.0'-41.5'	BROWN SILTY SAND	SM	27.2		0.0	70.3			29.7				
HEN-B009	S-12A	45.0'-45.5'	BROWN SILTY LEAN CLAY	CL	24.4										
HEN-B009	S-12B	45.5'-46.5'	BROWN SILTY SAND	SM	26.4										
HEN-B009	S-13	50.0'-51.5'	BROWN AND DARK BROWN CLAYEY SAND WITH GRAVEL	SC	10.3										
HEN-B010	S-1	0.0'-1.5'	POSSIBLE FILL: BROWN, GRAYISH BROWN AND GRAY SAND WITH GRAVEL	SP-SM	3.6										
HEN-B010	S-2A	2.5'-3.5'	BROWN SANDY CLAY	CL	11.2										
HEN-B010	S-2B	3.5'-4.0'	BROWN, GRAY AND DARK GRAY POORLY GRADED SAND WITH GRAVEL	SP	7.6										
HEN-B010	S-3	5.0'-6.5'	DARK GRAY FLY ASH		26.6										
HEN-B010	S-4	7.5'-9.0'	BROWN AND DARK BROWN SILTY SAND	SM	28.3		1.3	77.9			20.8				2.723
HEN-B010	S-5	10.0'-11.5'	VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL		29.8							29	33	NP	
HEN-B010	S-6	15.0'-16.5'	DARK BROWN LEAN CLAY	CL	19.7										
HEN-B010	S-7	20.0'-21.5'	BROWN TO DARK BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP-SM	14.2		24.8	61.0	9.3	4.9	14.2				
HEN-B010	S-8	25.0'-26.5'	BROWN POORLY GRADED SAND	SP	10.4										
HEN-B010	S-9	30.0'-31.5'	BROWN GRAVELLY SAND	SP	9.1										
HEN-B010	S-10	35.0'-36.5'	BROWN POORLY GRADED SAND	SP	20.3										
HEN-B010	S-11	40.0'-41.5'	BROWN SILTY SAND WITH GRAVEL	SM	16.2		8.2	67.9			23.9				
HEN-B011	S-1	0.0'-1.5'	POSSIBLE FILL: DARK BROWN POORLY GRADED SAND - ROOTS NOTED	SP	10.5										
HEN-B011	S-2	2.5'-4.0'	RUST BROWN SANDY LEAN CLAY	CL	12.7							22	15	7	2.693
HEN-B011	S-3	5.0'-6.5'	BROWN POORLY GRADED SAND	SP	15.2										
HEN-B011	S-4	7.5'-9.0'	BROWN AND DARK BROWN POORLY GRADED SAND	SP	19.8										
HEN-B011	S-5	10.0'-11.5'	BROWN POORLY GRADED SAND	SP	13.2										
HEN-B011	S-6	15.0'-16.5'	BROWN SILTY GRAVEL WITH SAND	GM	7.3		47.4	36.6			16.0				
HEN-B011	S-7	20.0'-21.5'	BROWN AND GRAYISH BROWN POORLY GRADED GRAVEL	GP	6.3										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B012	S-1	0.0'-1.5'	DARK BROWN SILTY SAND WITH GRAVEL - CLAY LENSES NOTED	SM	4.5										
HEN-B012	S-2	2.5'-4.0'	LIGHT BROWN AND LIGHT GRAY SILTY GRAVEL WITH SAND	GM	4.9		47.5	33.4	11.1	8.0	19.1				
HEN-B012	S-3	5.0'-6.5'	BROWN SANDY LEAN CLAY WITH GRAVEL	CL	7.7										
HEN-B012	S-4	8.0'-9.0'	BROWN SILTY LEAN CLAY WITH SAND	CL	9.0										
HEN-B012	S-5	10.0'-11.5'	DARK BROWN LEAN CLAY WITH SILT AND SAND - SILT AND SAND SEAM NOTED	CL	14.3							23	14	9	
HEN-B012	S-6	15.0'-16.5'	DARK GRAY SILTY SAND	SM	45.4										
HEN-B012	S-7	20.0'-22.0'	VERY DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	38.1		0.0	2.7	38.5	58.8	97.3				
HEN-B012	S-8	25.0'-26.5'	DARK GRAY LEAN CLAY	CL	22.5										
HEN-B012	S-9	30.0'-32.0'	BROWN AND GRAYISH BROWN LEAN CLAY WITH SAND	CL	26.0							30	15	15	
HEN-B012	S-10	35.0'-36.5'	GRAYISH BROWN LEAN CLAY	CL	26.2										
HEN-B012	S-11	40.0'-41.5'	BROWN SILTY SAND WITH GRAVEL	SM	4.4										
HEN-B012	S-12	45.0'-46.5'	BROWN SILTY SAND WITH GRAVEL	SM	11.3										
HEN-B014	S-1	0.0'-1.5'	FILL: DARK BROWN AND GRAYISH BROWN SILTY SAND WITH GRAVEL	SM	7.0										
HEN-B014	S-2	2.5'-4.0'	FILL: DARK BROWN SILTY SAND WITH GRAVEL - ORGANIC CLAY AND BRICK NOTED	SM	7.0										
HEN-B014	S-3	5.5'-6.5'	GREENISH GRAY CLAYEY SILT WITH SAND	CL-ML	39.2										
HEN-B014	S-4	7.5'-9.0'	DARK GRAY FLY ASH		36.8		1.1	32.1	58.1	8.7	66.8				
HEN-B014	S-5A	10.0'-11.0'	DARK GRAY FLY ASH WITH SAND		34.2										
HEN-B014	S-5B	11.0'-11.5'	DARK GRAY FLY ASH		43.4										
HEN-B014	S-6A	15.0'-16.0'	DARK GRAY FLY ASH		61.1										
HEN-B014	S-6B	16.0'-16.5'	DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	29.8										
HEN-B014	S-7	20.0'-21.5'	GRAYISH BROWN AND DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	33.7										
HEN-B014	S-8	25.0'-27.0'	BROWN AND GRAY LEAN CLAY	CL	32.4							43	20	23	
HEN-B014	S-9	30.0'-31.5'	GRAYISH BROWN AND DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	38.1										
HEN-B014	S-10	35.0'-37.0'	VERY DARK BROWNISH GRAY ORGANIC SILT	OH	63.4							70	38	32	
HEN-B014	S-11	40.0'-41.5'	DARK GRAY PEAT	PT	77.8										
HEN-B014	S-12	45.0'-46.5'	GRAY POORLY GRADED SAND WITH SILT	SP-SM	22.6		4.3	86.4	5.1	4.2	9.3				
HEN-B014	S-13	50.0'-51.5'	GRAY SILTY SAND	SM	13.2										
HEN-B014	S-14	55.0'-56.5'	GRAYISH BROWN SILTY SAND WITH GRAVEL	SM	8.1										
HEN-B014	S-15	60.0'-61.5'	BROWN AND GRAYISH BROWN SILTY SAND WITH CLAY AND GRAVEL	SM	14.4										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B015	S-1	0.5'-1.5'	BROWN AND GRAY SANDY LEAN CLAY	CL	18.4										
HEN-B015	S-2	2.5'-4.0'	DARK GRAY LEAN CLAY	CL	2.9										
HEN-B015	S-3	5.0'-6.5'	BROWN TO GRAY LEAN CLAY	CL	35.7										
HEN-B015	S-4	7.5'-9.5'	BLACK AND DARK GRAY ORGANIC LEAN CLAY WITH SAND AND GRAVEL	OL	131.9							48	25	23	
HEN-B015	S-5	10.0'-11.5'	DARK BROWN TO GRAY LEAN CLAY	CL	32.3										
HEN-B015	S-6	15.0'-16.5'	BROWN AND GRAY LEAN CLAY	CL	32.1										
HEN-B015	S-7	20.0'-21.5'	GRAY LEAN CLAY	CL	41.6										
HEN-B015	S-8	25.0'-27.0'	BLACK ORGANIC SILT WITH SAND	OH	67.8							74	37	37	
HEN-B015	S-9	30.0'-31.5'	GRAY AND DARK GRAY CLAYEY SAND WITH SILT	SC	40.1										
HEN-B015	S-10	35.0'-36.5'	GRAY POORLY GRADED SAND WITH SILT	SP-SM	24.5										
HEN-B015	S-11	40.0'-41.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	8.7										
HEN-B015	S-12	45.0'-46.5'	GRAY AND BROWN POORLY GRADED GRAVEL WITH SILT AND SAND	GP-GM	10.9		49.3	40.5	7.1	3.1	10.2				
HEN-B016	S-1	0.0'-1.5'	POSSIBLE FILL: DARK BROWN SANDY LEAN CLAY - GRAVEL AND BRICK NOTED	CL	7.1										
HEN-B016	S-2	2.5'-4.5'	BROWN SANDY LEAN CLAY	CL	6.3										
HEN-B016	S-3	5.0'-6.5'	DARK BROWN AND BROWN SILTY SAND WITH GRAVEL		10.1		31.5	45.2	13.0	10.3	23.3				
HEN-B016	S-4	7.5'-9.0'	BROWN SANDY LEAN CLAY WITH GRAVEL	CL	7.3										
HEN-B016	S-5	10.0'-11.5'	DARK GRAY FLY ASH WITH SAND		29.8										
HEN-B016	S-6	15.0'-16.5'	DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	31.8										
HEN-B016	S-7	20.0'-22.0'	VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED	CL	35.2							38	21	17	
HEN-B016	S-8	25.0'-26.5'	GRAY LEAN CLAY	CL	32.7										
HEN-B016	S-9	30.0'-31.5'	GRAYISH BROWN LEAN CLAY	CL	32.9										
HEN-B016	S-10	35.0'-37.0'	DARK GRAY LEAN CLAY WITH SAND - FLY ASH AND ORGANICS NOTED	CL	22.3							41	23	18	
HEN-B016	S-11	40.0'-41.5'	DARK GRAY ORGANIC CLAY	OL	48.8										
HEN-B016	S-12	45.0'-46.5'	GRAY LEAN CLAY	CL	42.3										
HEN-B016	S-13	51.0'-51.5'	GRAY POORLY GRADED SAND	SP	26.4										
HEN-B016	S-14	55.0'-56.5'	GRAY TO BROWN POORLY GRADED SAND	SP	18.7										
HEN-B016	S-15	60.0'-61.5'	DARK GRAY LEAN CLAY WITH SILT	CL	51.9							55	34	21	
HEN-B016	S-16	65.0'-66.5'	BROWN LEAN CLAY	CL	38.9										
HEN-B016	S-17	70.0'-71.5'	BROWNISH GRAY GRAVEL WITH SILT AND SAND	GP-GM	10.4		52.4	35.5	9.0	3.1	12.1				
HEN-B016	S-18	75.0'-76.5'	GRAYISH BROWN GRAVELLY SAND	SP	6.5										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B017	S-1	0.0'-1.5'	FILL: SILTY LEAN CLAY WITH SAND	CL	20.6										
HEN-B017	S-2	2.5'-4.0'	DARK BROWN SILTY SAND WITH CLAY	SM	24.1										
HEN-B017	S-3	5.0'-7.0'	VERY DARK GRAY LEAN CLAY WITH SAND	CL	36.7							39	21	18	
HEN-B017	S-4	7.5'-9.0'	GRAY TO BROWN ORGANIC CLAY	OL	35.4										
HEN-B017	S-5	10.0'-11.5'	GRAYISH BROWN LEAN CLAY - ORGANICS NOTED	CL	31.4										
HEN-B017	S-6	15.0'-17.0'	BROWN AND GRAY LEAN CLAY	CL	34.1							45	24	21	
HEN-B017	S-7	20.0'-21.5'	BROWN LEAN CLAY - ORGANICS NOTED	CL	34.8										
HEN-B017	S-8	25.0'-26.5'	BROWN AND GRAY LEAN CLAY	CL	31.7										
HEN-B017	S-9	30.0'-32.0'	DARK BROWNISH GRAY ORGANIC CLAY WITH SAND - SAND SEAMS AND SHELL NOTED	OL	50.0							60	35	25	
HEN-B017	S-10	35.0'-36.5'	GRAY LEAN CLAY	CL	41.8										
HEN-B017	S-11	40.5'-41.5'	GRAY CLAYEY SAND WITH SILT	SC	24.0										
HEN-B017	S-12	45.0'-46.5'	DARK GRAY SAND WITH SILT	SM	19.2		0.0	91.9	4.1	4.0	8.1				
HEN-B017	S-13	50.0'-51.5'	GRAY LEAN CLAY - ORGANICS NOTED	CL	46.8										
HEN-B017	S-14	55.0'-56.5'	GRAYISH BROWN LEAN CLAY - ORGANICS NOTED	CL	40.9										
HEN-B017	S-15	60.0'-61.5'	GRAY SILTY SAND WITH GRAVEL	SM	9.7										
HEN-B017	S-16	65.0'-66.5'	BROWN SILTY SAND WITH GRAVEL	SM	7.2										
HEN-B018	S-1	0.0'-1.5'	FILL: BROWN SILTY SAND WITH GRAVEL	SM	6.7										
HEN-B018	S-2A	2.5'-3.5'	BROWN SANDY LEAN CLAY	CL	10.2										
HEN-B018	S-2B	3.5'-4.0'	BROWN SILTY LEAN CLAY WITH GRAVEL	CL	9.7										
HEN-B018	S-3	5.0'-6.5'	BROWN, TAN AND GRAY SILT WITH CLAY AND GRAVEL	ML	9.3										2.7
HEN-B018	S-4	7.5'-9.0'	DARK GRAY FLY ASH WITH SAND		62.5										
HEN-B018	S-5	10.0'-12.0'	GRAY TO VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL		44.3										
HEN-B018	S-6	15.0'-16.5'	DARK GRAY ORGANIC CLAY	CL	41.1										
HEN-B018	S-7	20.0'-21.5'	GRAYISH BROWN LEAN CLAY	CL	30.0										
HEN-B018	S-8	25.0'-27.0'	DARK BROWNISH GRAY LEAN CLAY	CL	31.8							43	22	21	
HEN-B018	S-9	30.0'-31.5'	GRAYISH BROWN LEAN CLAY	CL	33.0										
HEN-B018	S-10	35.0'-36.5'	DARK BROWN ORGANIC CLAY	OL	58.1										
HEN-B018	S-11	40.0'-42.0'	DARK BROWN AND GRAY ORGANIC CLAY WITH SAND - SAND SEAMS AND SHELL NOTED	OL	40.5							27	20	7	
HEN-B018	S-12	45.0'-46.5'	DARK GRAY LEAN CLAY	CL	37.6										
HEN-B018	S-13	50.0'-51.5'	GRAY POORLY GRADED SAND	SP	21.5										
HEN-B018	S-14	55.0'-56.5'	GRAY AND BROWN SILTY SAND	SM	16.8		0.0	79.1			20.9				
HEN-B018	S-15	60.0'-61.5'	GRAYISH BROWN AND DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	49.2										
HEN-B018	S-16	65.0'-66.5'	BROWN AND GRAY SILTY SAND WITH GRAVEL	SM	10.5										
HEN-B018	S-17	70.0'-71.5'	GRAY SILTY SAND WITH GRAVEL	SM	10.6										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B019	S-1	4.0'-4.3'	GRAYISH BROWN GRAVELLY SAND	SP	9.9										
HEN-B019	S-1A	4.3'-5.8'	BROWN AND GRAY LEAN CLAY	CL	34.8										
HEN-B019	S-2	7.5'-9.5'	DARK BROWN LEAN CLAY WITH SAND	CL	33.0							41	22	19	
HEN-B019	S-3	10.0'-11.5'	BROWN LEAN CLAY	CL	35.5										
HEN-B019	S-4	12.5'-14.5'	GRAY AND BROWN LEAN CLAY	CL	34.5							45	24	21	
HEN-B019	S-5	14.5'-16.0'	BROWN TO GRAY LEAN CLAY	CL	31.1										
HEN-B019	S-6	20.0'-22.0'	BROWN AND GRAY LEAN CLAY	CL	33.9							38	22	16	
HEN-B019	S-7	25.0'-27.0'	VERY DARK GRAY ORGANIC SILT WITH SAND - SHELL NOTED	ML	44.5							34	26	8	
HEN-B019	S-8	30.0'-31.5'	DARK GRAY SANDY LEAN CLAY	CL	30.9										
HEN-B019	S-9	35.0'-36.0'	GRAY SANDY LEAN CLAY	CL	39.1										
HEN-B019	S-9A	36.0'-36.5'	GRAY CLAYEY SAND	SC	22.5										
HEN-B019	S-10	40.0'-41.5'	BROWN AND GRAY SILTY SAND	SM	20.2		0.5	76.1			23.4				
HEN-B019	S-11	45.0'-46.5'	BROWN TO GRAY LEAN CLAY	CL	42.6										
HEN-B019	S-12	50.0'-51.5'	GRAY LEAN CLAY WITH SILT	CL	43.7							46	29	17	
HEN-B019	S-13	54.0'-55.5'	GRAYISH BROWN GRAVELLY SAND	SP	12.6										
HEN-B020	S-1	0.0'-1.5'	BROWN AND DARK BROWN LEAN CLAY WITH SILT AND GRAVEL	CL	4.9							25	17	8	
HEN-B020	S-2	2.5'-4.0'	BROWN GRAVELLY SAND - CLAY LENSES NOTED	SP	5.5										
HEN-B020	S-3	5.0'-6.5'	BROWN SILT WITH CLAY, SAND AND GRAVEL	ML	12.6										2.672
HEN-B020	S-4	7.5'-9.0'	BROWN SANDY LEAN CLAY	CL	11.4										
HEN-B020	S-5	9.5'-11.5'	BROWN SANDY LEAN CLAY WITH GRAVEL	CL	14.2							30	17	13	
HEN-B020	S-6	15.0'-16.5'	BROWN GRAVEL	GP											
HEN-B020	S-7	20.0'-21.4'	BROWN AND REDDISH BROWN SILTY SAND WITH GRAVEL	SM	8.5		33.5	48.9	10.6	7.0	17.6				
HEN-B020	S-8	25.0'-26.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	9.1										
HEN-B020	S-9	30.0'-31.5'	BROWN AND LIGHT BROWN GRAVELLY SAND	SP	9.3										
HEN-B020	S-10	35.0'-36.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	10.8										
HEN-B020	S-11	40.0'-41.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	8.3										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B021	S-1	0.0'-0.5'	FILL: BROWN AND DARK BROWN SANDY LEAN CLAY WITH ROOT HAIRS	CL	7.3										
HEN-B021	S-2	2.5'-4.0'	BROWN SANDY LEAN CLAY	CL	16.5										
HEN-B021	S-3	5.0'-6.0'	BROWN LEAN CLAY WITH SAND AND GRAVEL	CL	15.7										
HEN-B021	S-4A	7.5'-8.3'	BROWN LEAN CLAY	CL	13.1										
HEN-B021	S-4B	8.3'-8.5'	BROWN SILTY SAND WITH GRAVEL	SM	2.9										
HEN-B021	S-5	10.0'-11.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	9.0										
HEN-B021	S-6	15.0'-16.5'	BROWN LEAN CLAY WITH SAND - ROOTS NOTED	CL	16.7							22	14	8	
HEN-B021	S-7	20.0'-21.5'	DARK GRAY FLY ASH		34.9										
HEN-B021	S-8	22.0'-24.0'	DARK GRAY VARVED FLY ASH		31.9		1.7	20.0	60.8	17.5	78.3				
HEN-B021	S-9	25.0'-26.5'	GRAY AND DARK GRAY FLY ASH		41.6										
HEN-B021	S-10	30.0'-31.5'	GRAY FLY ASH		48.8										
HEN-B021	S-11	35.0'-36.5'	DARK GRAY AND BLACK SILTY SAND WITH CLAY	SM	20.3		0.9	44.3	31.6	23.2	54.8				
HEN-B021	S-12	40.0'-41.5'	BROWN CLAYEY SAND	SC	17.1										
HEN-B022	S-1	0.0'-1.5'	GRAY FLY ASH		37.4										
HEN-B022	S-2	2.5'-4.5'	VERY DARK GRAY VARVED FLY ASH		26.8							36	42	NP	
HEN-B022	S-3A	5.0'-6.3'	GRAY FLY ASH		37.0										
HEN-B022	S-3B	6.3'-6.5'	GRAY FLY ASH		21.8										
HEN-B022	S-4	7.5'-9.0'	VERY DARK GRAY VARVED FLY ASH WITH SAND - SAND SEAMS NOTED		34.2		1.4	26.4	57.3	14.9	72.2				
HEN-B022	S-5	10.0'-11.5'	GRAY SILTY SAND	SM	31.5										
HEN-B022	S-6	15.0'-16.5'	FILL: BLACK POORLY GRADED SAND - CINDERS NOTED	SP-SM	7.2										
HEN-B022	S-7	20.0'-21.5'	REDDISH BROWN SANDY LEAN CLAY	CL	18.3							26	16	10	

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B023	S-1	0.0'-1.5'	FILL: BROWN AND DARK BROWN SILTY SAND WITH GRAVEL	SM	5.3										
HEN-B023	S-2	2.5'-4.0'	BROWN AND TAN SILTY SAND WITH GRAVEL	SM	6.5		31.7	44.3	12.2	11.8	24.0				
HEN-B023	S-3	5.0'-6.5'	FILL: BROWN AND DARK BROWN SILT WITH CLAY, SAND AND GRAVEL	ML	8.3										2.701
HEN-B023	S-5A	10.0'-11.0'	BROWN AND GRAY SILTY LEAN CLAY WITH SAND	CL	15.9										
HEN-B023	S-5B	11.0'-11.5'	POSSIBLE FILL: BROWN TO DARK BROWN LEAN CLAY	CL	21.6										
HEN-B023	S-6	15.0'-16.5'	BROWN SILTY SAND WITH GRAVEL - SILT POCKETS NOTED	SM	3.3										
HEN-B023	S-7	20.0'-21.5'	DARK GRAY AND BLACK SILTY SAND AND FLY ASH - CINDERS NOTED	SM	25.5		7.2	44.9	39.9	8.0	47.9				
HEN-B023	S-8	25.0'-26.5'	GRAY FLY ASH		38.9										
HEN-B023	S-9	27.0'-29.0'	VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL		27.1										
HEN-B023	S-10	30.0'-31.5'	DARK GRAY FLY ASH		35.6										
HEN-B023	S-11	35.0'-36.5'	DARK GRAY FLY ASH WITH SAND AND CINDERS		18.6		23.3	51.4	20.6	4.7	25.3				
HEN-B023	S-12	40.0'-41.5'	DARK GRAY SILTY SAND	SM	14.4										
HEN-B023	S-13	45.0'-46.5'	BROWN AND GRAY LEAN CLAY	CL	19.8										
HEN-B023	S-14	50.0'-51.0'	LIGHT BROWN POORLY GRADED GRAVEL WITH SAND AND SILT	GP-GM	10.2		48.7	38.5	7.8	5.0	12.8				
HEN-B023	S-15	55.0'-56.5'	BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP-SM	15.2										
HEN-B023	S-16	60.0'-61.5'	BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP-SM	9.7										
HEN-B023	S-17	65.0'-66.5'	BROWN SILTY SAND	SM	15.1										
HEN-B023	S-18	70.0'-71.5'	BROWN SILTY SAND WITH CLAY	SM	19.3										
HEN-B023	S-19	75.0'-76.5'	BROWN SILTY SAND WITH GRAVEL	SM	9.6										
HEN-B023	S-4	7.5'-9.0'	BROWN POORLY GRADED GRAVEL WITH SAND AND CLAY	GP-GC	8.0										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B024	S-1	0.0'-1.5'	FILL: GRAYISH BROWN SILTY SAND WITH GRAVEL - ASPHALT AND CONCRETE NOTED	SM	6.2										
HEN-B024	S-2	2.5'-4.0'	BROWN AND GRAY SAND WITH SILT, CLAY AND GRAVEL	SM	6.7										2.756
HEN-B024	S-3A	5.0'-5.8'	BROWN SILTY SAND WITH CLAY	SM	9.9										
HEN-B024	S-3B	5.8'-6.5'	BROWN LEAN CLAY WITH SAND AND GRAVEL	CL	8.5										
HEN-B024	S-4	7.0'-8.5'	DARK BROWN SANDY LEAN CLAY	CL	11.3										
HEN-B024	S-4	7.5'-9.0'	BROWN SILTY SAND WITH GRAVEL	SM	7.5										
HEN-B024	S-5	10.0'-11.5'	BROWN LEAN CLAY WITH GRAVEL	CL	10.0										
HEN-B024	S-6	15.0'-16.5'	BLACK FLY ASH WITH CINCERS AND SAND		16.4		14.8	62.8	19.4	3.0	22.4				
HEN-B024	S-7	20.0'-20.3'	DARK GRAY CLAYEY SAND	SC	16.3										
HEN-B024	S-8	25.0'-26.5'	BROWN CLAYEY SILT	CL-ML	47.3										
HEN-B024	S-9	26.5'-28.5'	DARK GRAY ORGANIC CLAY WITH SAND	OH	48.2							58	23	35	
HEN-B024	S-10	30.0'-31.5'	GRAY LEAN CLAY	CL	53.6										
HEN-B024	S-11	35.0'-36.5'	GRAY FLY ASH		47.4										
HEN-B024	S-12	40.0'-41.5'	BROWN AND GRAY CLAYEY SAND WITH GRAVEL	SC	13.0										
HEN-B024	S-13	45.0'-46.5'	BROWN AND DARK BROWN SILTY GRAVEL WITH SAND	GM	11.0		48.6	34.4	11.1	5.9	17.0				
HEN-B024	S-14	50.0-51.5	BROWN AND DARK BROWN LEAN CLAY WITH SAND AND GRAVEL	CL	11.2										
HEN-B024	S-16	60.0'-61.5'	BROWN POORLY GRADED SAND	SP	15.7										
HEN-B024	S-17	62.5'-62.7'	BROWN AND GRAY GRAVELLY SAND	SP	2.9										
HEN-B025	S-1	0.0'-1.5'	FILL: BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP	6.2										
HEN-B025	S-2	2.5'-4.0'	BROWN LEAN CLAY WITH SILT AND SAND	CL	10.1										2.708
HEN-B025	S-3	5.0'-6.5'	BROWN AND GRAY SILTY GRAVEL WITH SAND	GM	4.3		37.3	35.4	18.6	8.7	27.3				
HEN-B025	S-4	7.5'-9.0'	GRAY FLY ASH		22.6										
HEN-B025	S-5	10.0'-11.5'	GRAY LEAN CLAYEY SILT WITH SAND AND GRAVEL	CL-ML	31.1										
HEN-B025	S-6	11.5'-14.0'	VERY DARK GRAY FLY ASH WITH SAND		31.9		16.8	10.7	52.3	20.2	72.5	38	38	NP	
HEN-B025	S-7	15.0'-16.5'	GRAY FLY ASH		31.1										
HEN-B025	S-8	20.0'-21.5'	GRAY SILTY LEAN CLAY WITH SAND	CL	46.7										
HEN-B025	S-9	25.0'-27.0'	VERY DARK GRAY TO GRAY FLY ASH WITH SAND		36.1							32	34	NP	
HEN-B025	S-10	27.0'-28.5'	GRAY CLAYEY SILT	CL-ML	38.9										
HEN-B025	S-11	30.0'-31.5'	GRAY CLAYEY SILT	CL-ML	44.8										
HEN-B025	S-12	35.0'-36.5'	GRAY FLY ASH - CLAY LENSES NOTED		38.3										
HEN-B025	S-13	40.0'-41.5'	GRAY FLY ASH WITH CLAY		42.9										
HEN-B025	S-14	45.0'-46.5'	GRAY FLY ASH		58.6										
HEN-B025	S-15	50.0'-51.5'	GRAY FLY ASH		66.7										
HEN-B025	S-16	55.0'-56.5'	GRAY SANDY LEAN CLAY	CL	19.1										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B026	S-1	4.0'-4.5'	GRAY POORLY GRADED SAND	SP	13.7										
HEN-B026	S-1A	4.5'-5.5'	GRAY AND GRAYISH BROWN SANDY LEAN CLAY	CL	15.5										
HEN-B026	S-2	7.5'-9.0'	GRAYISH BROWN LEAN CLAY WITH GRAVEL	CL	24.0										
HEN-B026A	S-1	10.0'-11.5'	BROWN TO GRAY SANDY LEAN CLAY WITH GRAVEL	CL	11.1										
HEN-B026A	S-2	13.5'-15.0'	BROWN SILTY SAND WITH GRAVEL	SM	19.2		32.6	33.8	18.4	15.2	33.6				
HEN-B026A	S-3	16.5'-18.5'	BROWN SANDY LEAN CLAY WITH GRAVEL	CL	11.9										
HEN-B026A	S-4	20.0'-21.5'	BROWN CLAYEY GRAVEL WITH SAND	GC	10.6										
HEN-B026A	S-5	25.0'-26.5'	BROWN SANDY GRAVEL WITH SILT	GP-GM	17.2										
HEN-B027	S-1	7.0'-7.5'	BROWN SANDY GRAVEL WITH SILT	GP-GM	15.7										
HEN-B027	S-1A	7.5'-9.0'	DARK GRAY LEAN CLAY - ORGANICS NOTED	CL	41.5										
HEN-B027	S-2	10.0'-12.0'	GRAY LEAN CLAY WITH SAND AND GRAVEL	CL	36.3										
HEN-B027	S-3	12.0'-13.5'	GRAYISH BROWN LEAN CLAY WITH SAND AND GRAVEL	CL	16.3										
HEN-B027	S-4	15.0'-16.5'	BROWN LEAN CLAY WITH GRAVEL	CL	26.4										
HEN-B027	S-5	20.0'-21.5'	BROWN LEAN CLAY WITH GRAVEL	CL	13.2										
HEN-B027	S-6	25.0'-26.5'	BROWN TO GREENISH GRAY SILTY LEAN CLAY WITH SAND	CL	9.7										
HEN-B027	S-7	30.0'-31.5'	BROWN SANDY GRAVEL WITH SILT	GP-GM	11.2										
HEN-B029	S-1	0.0'-1.5'	BROWN POORLY GRADED SAND	SP	4.7										
HEN-B029	S-2	2.5'-4.0'	DARK BROWN SANDY LEAN CLAY	CL	14.7										
HEN-B029	S-3	5.0'-7.0'	BROWN LEAN CLAY WITH SAND AND GRAVEL	CL	10.8							22	15	7	
HEN-B029	S-4	7.0'-8.5'	DARK BROWN LEAN CLAY	CL	14.8										
HEN-B029	S-5	10.0'-12.0'	VERY DARK BROWN AND GRAY SLIGHTLY ORGANIC LEAN CLAY WITH SAND AND GRAVEL	CL	16.7							31	17	14	
HEN-B029	S-6	15.0'-16.5'	POSSIBLE FILL: BROWN TO DARK BROWN LEAN CLAY	CL	21.7										
HEN-B029	S-7	20.0'-21.5'	BROWN TO GRAY SILTY LEAN CLAY	CL	11.5										
HEN-B029	S-8	25.0'-26.5'	BROWN SILTY LEAN CLAY WITH SAND	CL	8.8										
HEN-B029	S-9	30.0'-30.9'	BROWN SILTY LEAN CLAY WITH SAND	CL	12.7										
HEN-B029	S-10	35.0'-36.5'	LIGHT BROWN POORLY GRADED GRAVEL WITH SAND AND CLAY	GP-GC	13.8		61.0	26.0			13.0				
HEN-B029	S-11	40.0'-41.5'	BROWN SILTY SAND WITH CLAY	SM	4.6										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

PROJECT NUMBER: MR155233

CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B030	S-1A	0.0'-1.5'	FILL: DARK BROWN AND BROWN SANDY LEAN CLAY WITH GRAVEL	CL	7.0										
HEN-B030	S-2	2.5'-4.0'	BROWN AND LIGHT BROWN SILTY SAND WITH GRAVEL	SM	6.4		34.0	45.7	11.0	9.3	20.3				
HEN-B030	S-3	5.0'-6.5'	FILL: BROWN AND GRAY LEAN CLAY WITH SILT, SAND AND GRAVEL	CL	11.5										2.746
HEN-B030	S-4	7.5'-9.0'	BROWN LEAN CLAY	CL	17.1										
HEN-B030	S-5	10.0'-11.0'	DARK BROWNISH GRAY FLY ASH AND LEAN CLAY MIXTURE WITH SAND		18.1										
HEN-B030	S-6	15.0'-16.5'	LIGHT BROWN AND TAN WELL GRADED GRAVEL WITH SAND	GW	17.6		81.4	14.8			3.8				
HEN-B030	S-7	21.5'	DARK BROWN AND BLACK ORGANIC CLAY WITH GRAVEL - WOOD NOTED	OL	23.9										
HEN-B030	S-8	25.0'-26.5'	BROWN SILTY SAND WITH GRAVEL	SM	11.2										
HEN-B030	S-10	35.0'-36.5'	BROWN CLAYEY SAND WITH GRAVEL	SC	8.9										
HEN-B030	S-11	40.0'-41.5'	BROWN CLAYEY SAND	SC	9.0										
HEN-B032	S-1A	0.0'-1.0'	BROWN AND GRAYISH BROWN CLAYEY SAND	SC	2.7										
HEN-B032	S-1B	1.0'-1.5'	FILL: BROWN SANDY LEAN CLAY	CL	7.9										
HEN-B032	S-2	2.5'-4.0'	FILL: DARK BROWN SANDY LEAN CLAY	SC	9.7										
HEN-B032	S-3	5.0'-7.0'	DARK BROWNISH GRAY LEAN CLAY WITH SAND AND GRAVEL	CL	14.0							35	18	17	
HEN-B032	S-4	7.5'-9.0'	DARK BROWN LEAN CLAY	CL	16.7										
HEN-B032	S-5	10.0'-11.5'	DARK BROWN AND DARK GRAY LEAN CLAY WITH GRAVEL	CL	16.2										
HEN-B032	S-6	15.0'-16.5'	BROWN AND GRAYISH BROWN SILTY SAND WITH GRAVEL	SM	8.2										
HEN-B032	S-7	20.0'-21.5'	BROWN SILTY SAND WITH GRAVEL	SM	11.1		30.5	43.6	13.4	12.5	25.9				
HEN-B032	S-8	25.0'-26.5'	BROWN SILTY SAND WITH GRAVEL AND CLAY	SM	9.1										
HEN-B032	S-9	30.0'-31.5'	BROWN LEAN CLAY WITH SAND AND GRAVEL	CL	10.6										
HEN-B032	S-10	35.0'-36.5'	BROWN SILTY SAND WITH GRAVEL	SM	5.5										
HEN-B032	S-11	40.0'-41.3'	BROWN AND GRAYISH BROWN SILTY LEAN CLAY WITH SAND AND GRAVEL	CL	10.9										
HEN-B034	S-1A	0.0'-0.5'	BROWN SILTY SAND WITH GRAVEL	SM	4.2										
HEN-B034	S-1B	0.5'-1.5'	POSSIBLE FILL: DARK BROWN LEAN CLAY	CL	9.1										
HEN-B034	S-2	2.5'-4.0'	DARK BROWN LEAN CLAY WITH SILT AND SAND	CL	14.2										2.704
HEN-B034	S-3A	5.0'-5.5'	BROWN SILTY SAND	SM	15.9										
HEN-B034	S-3B	5.5'-6.5'	BROWN GRAVELLY SAND	SP	1.4										
HEN-B034	S-4	7.5'-9.0'	BROWN AND GRAYISH BROWN SILTY SAND WITH GRAVEL	SM	2.5										
HEN-B034	S-5	10.0'-11.5'	BROWN AND LIGHT BROWN POORLY GRADED GRAVEL WITH SILT AND	GP-GM	11.2		60.1	27.0	7.7	5.2	12.9				
HEN-B034	S-6	15.0'-16.5'	BROWN AND LIGHT BROWN POORLY GRADED GRAVEL WITH CLAY AND	GP-GC	9.1										2.808
HEN-B034	S-7	20.0'-21.5'	LIGHT BROWN SILTY SAND WITH GRAVEL	SM	12.5										
HEN-B034	S-9	30.0'-31.5'	BROWN, GRAY AND PINKISH BROWN POORLY GRADED GRAVEL	GP	13.6										
HEN-B034	S-10	35.0'-36.5'	LIGHT BROWN AND TAN POORLY GRADED GRAVEL WITH SAND AND SILT	GP-GM	10.9		82.8	11.3			5.9				
HEN-B034	S-11	40.0'-41.5'	BROWN POORLY GRADED GRAVEL WITH SILT AND SAND	GP-GM	1.5										

LABORATORY TESTING SUMMARY



PROJECT NAME: Dynergy - Hennepin Site

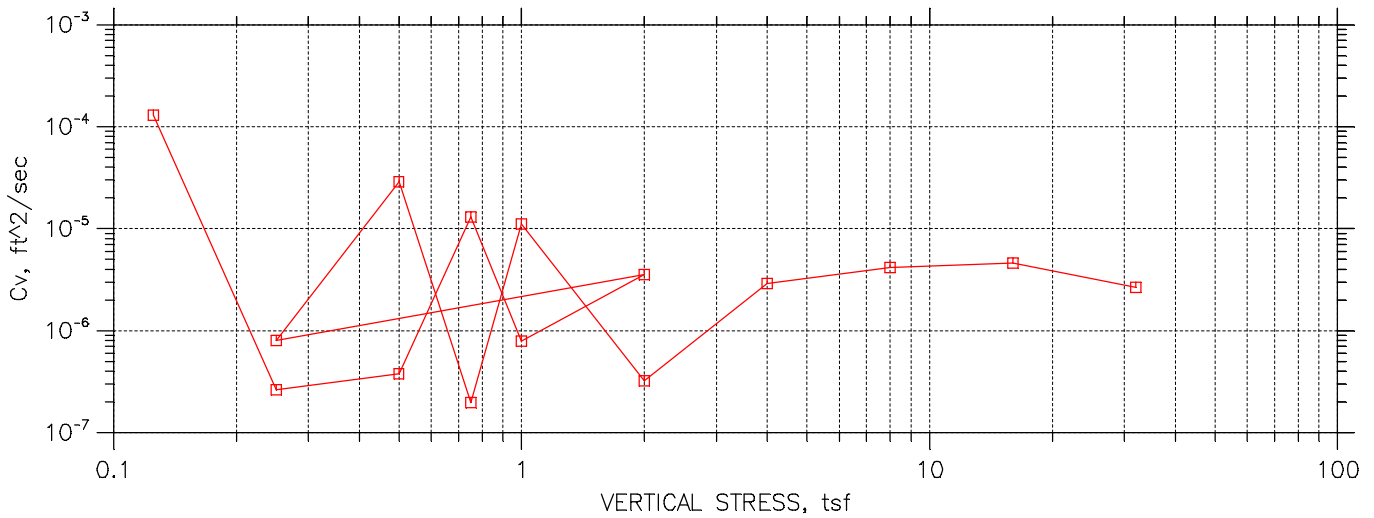
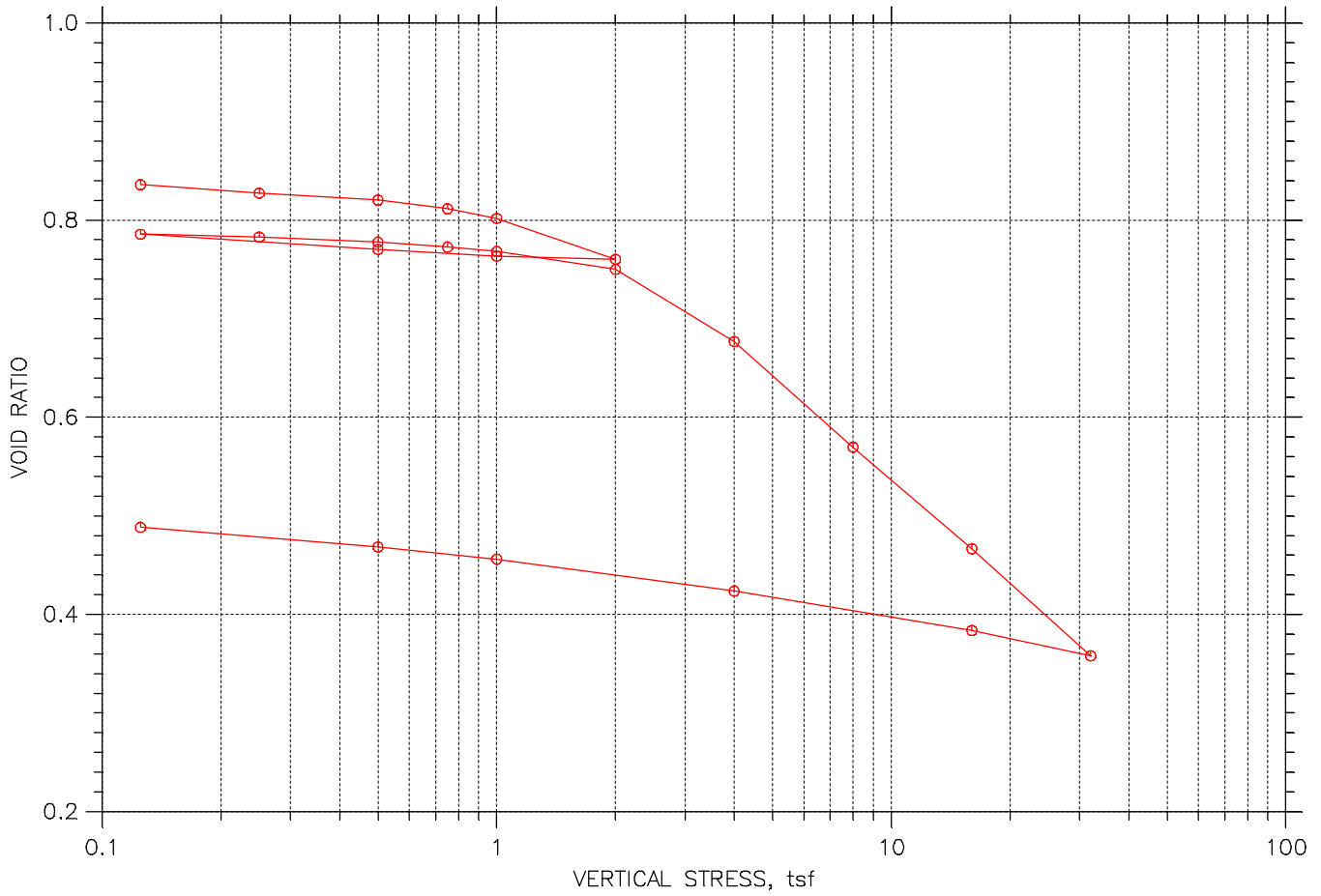
PROJECT NUMBER: MR155233


CLIENT: AECOM

Boring Number	Sample Number	Depth	Description	USCS	WC %	Qp (tsf)	% Gravel	% Sand	% Silt	% Clay	% Fines	LL	PL	PI	Specific Gravity
HEN-B037	S-1	0.0'-1.5'	DARK BROWN POORLY GRADED SAND	SP	3.2										
HEN-B037	S-2	2.5'-4.0'	BROWN POORLY GRADED SAND WITH SILT AND GRAVEL	SP-SM	4.6										2.685
HEN-B037	S-3	5.0'-6.5'	BROWN AND DARK BROWN SILTY SAND WITH GRAVEL	SM	4.0		41.3	51.0			7.7				
HEN-B037	S-4A	7.5'-8.0'	DARK BROWN CLAYEY SAND	SC	4.8										
HEN-B037	S-4B	8.0'-9.0'	DARK BROWN LEAN CLAY	CL	15.4										
HEN-B037	S-5	10.0'-11.5'	BROWN SILTY SAND WITH GRAVEL - CLAY LENSES NOTED	SM	9.3										
HEN-B037	S-6	15.0'-16.5'	BROWN AND LIGHT BROWN CLAYEY GRAVEL WIRTH SAND	GC	9.6		34.1	26.5	16.2	23.2	39.4				
HEN-B037	S-7	20.0'-21.5'	BROWN AND GRAYISH BROWN SILTY LEAN CLAY WITH SAND	CL	9.5										
HEN-B037	S-8	25.0'-26.5'	BROWN SILTY SAND WITH GRAVEL	SM	12.1										
HEN-B037	S-9A	30.0'-30.5'	LIGHT BROWN SILTY SAND WITH GRAVEL	SM	14.1										
HEN-B037	S-9B	30.5'-31.5'	BROWN SILTY LEAN CLAY	CL	20.5										
HEN-B037	S-10	35.0'-36.5'	BROWN SILTY SAND WITH GRAVEL	SM	7.6										
HEN-B037	S-11	40.0'-41.5'	BROWN SILTY GRAVEL	GM	14.2										
HEN-B038	S-1	0.0'-1.5'	FILL: BROWN SILTY SAND	SM	7.0										
HEN-B038	S-2A	2.5'-3.0'	BROWN SANDY LEAN CLAY	CL	9.8										
HEN-B038	S-2B	3.0'-4.0'	LIGHT BROWN SILTY SAND WITH GRAVEL	SM	2.7										
HEN-B038	S-3	5.0'-6.5'	TAN POORLY GRADED SAND WITH GRAVEL AND SILT	SP-SM	2.3		30.1	61.6	4.4	3.9	8.3				
HEN-B038	S-4A	8.1'-8.6'	FILL: BROWN LEAN CLAY WITH SAND	CL	44.1										
HEN-B038	S-4B	8.6'-9.0'	BROWN SILTY SAND WITH GRAVEL	SM	6.0										
HEN-B038	S-5A	10.0'-10.5'	BROWN SANDY LEAN CLAY	CL	4.5										
HEN-B038	S-5B	10.5'-11.5'	GREENISH GRAY FAT CLAY	CH	18.8							55	23	32	
HEN-B038	S-6	15.0'-16.5'	BROWN POORLY GRADED GRAVEL WITH CLAY AND SILT	GP-GC	6.5										2.763
HEN-B038	S-7	20.0'-21.5'	BROWN AND GRAY GRAVELLY SAND	SP	4.6										

One-Dimensional Consolidation Tests ASTM D 2435

ONE DIMENSIONAL CONSOLIDATION TEST ASTM D2435



	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
219			

CONSOLIDATION TEST DATA

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S-7
 Sample No.: S-7
 Test No.: HENB016S7

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/13/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 30.0'-22.0'
 Elevation: ----



Soil Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL
 Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435

Estimated Specific Gravity: 2.72
 Initial Void Ratio: 0.84
 Final Void Ratio: 0.49

Liquid Limit: 38
 Plastic Limit: 21
 Plasticity Index: 17

Initial Height: 0.74 in
 Specimen Diameter: 2.50 in

Container ID	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
	X-11	RING	RING	X-19
Wt. Container + Wet Soil, gm	310.43	192.3	183.59	145.61
Wt. Container + Dry Soil, gm	249.7	167.91	167.91	130.41
Wt. Container, gm	44.46	79.89	79.89	45.08
Wt. Dry Soil, gm	205.24	88.021	88.021	85.33
Water Content, %	29.59	27.71	17.81	17.81
Void Ratio	---	0.84	0.49	---
Degree of Saturation, %	---	89.65	99.22	---
Dry Unit Weight, pcf	---	92.25	114.09	---

CONSOLIDATION TEST DATA

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S-7
 Sample No.: S-7
 Test No.: HENB016S7

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/13/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 30.0'-22.0'
 Elevation: ----



Soil Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL
 Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435

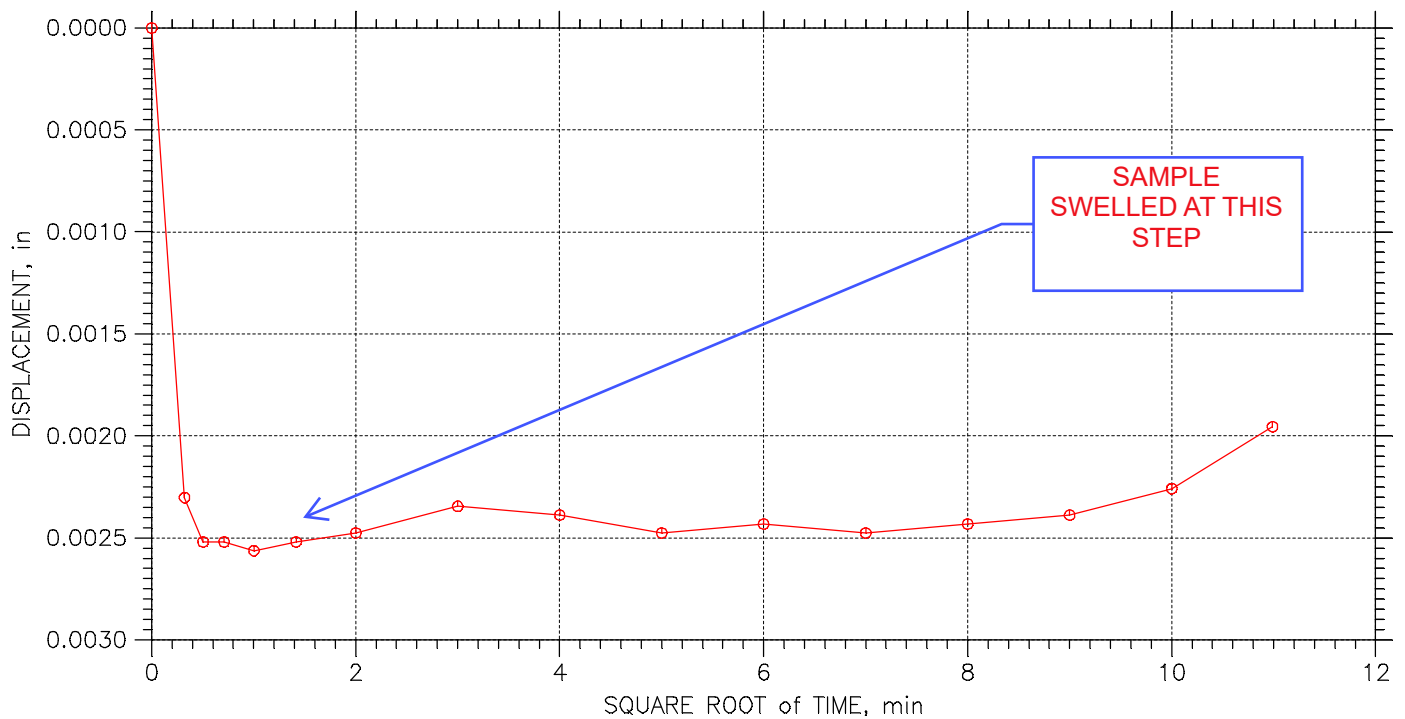
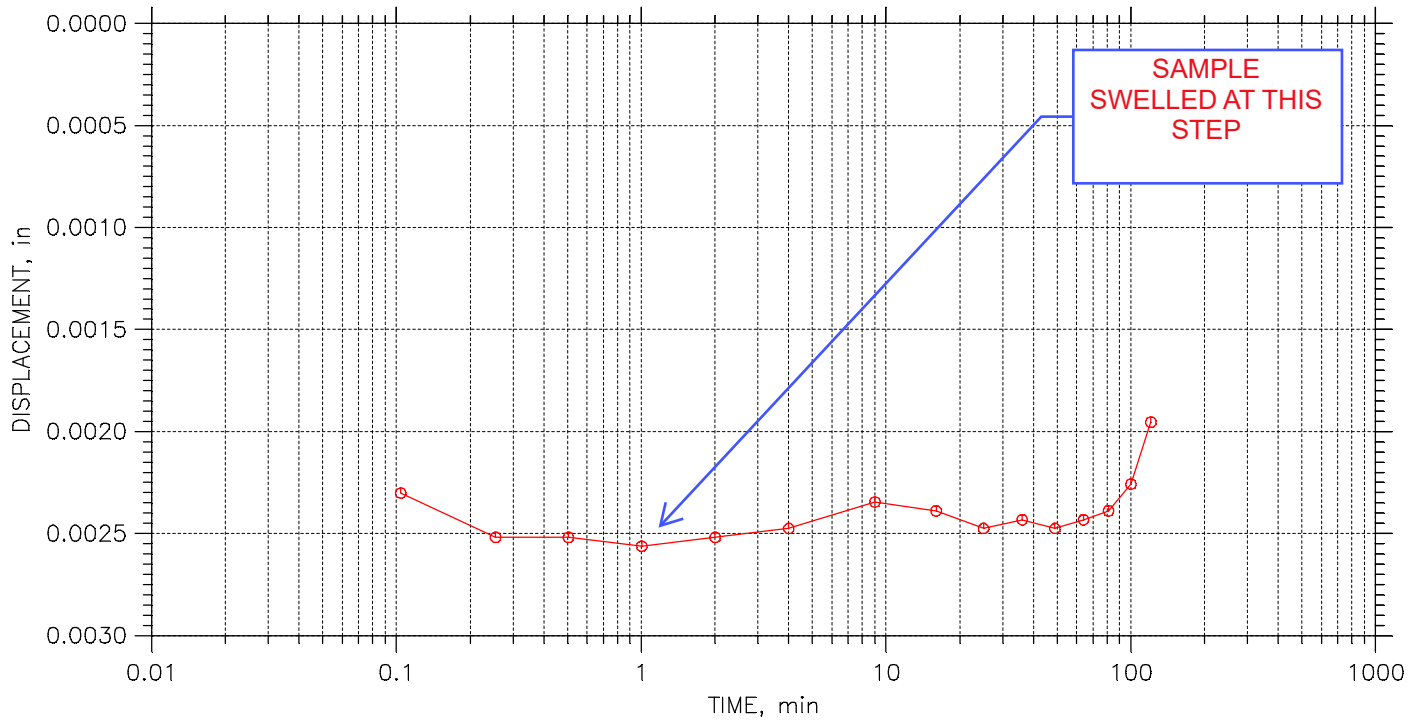
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting		Coefficient of Consolidation		
					Sq.Rt. min	Log min	Sq.Rt. ft ² /sec	Log ft ² /sec	Ave. ft ² /sec
1	0.125	0.001955	0.836	0.26	0.0	0.0	1.29e-004	0.00e+000	1.29e-004
2	0.25	0.005429	0.827	0.73	11.9	0.0	2.63e-007	0.00e+000	2.63e-007
3	0.5	0.008253	0.820	1.11	8.2	0.0	3.77e-007	0.00e+000	3.77e-007
4	0.75	0.01181	0.811	1.59	0.2	0.0	1.30e-005	0.00e+000	1.30e-005
5	1	0.01581	0.802	2.13	3.8	0.0	7.94e-007	0.00e+000	7.94e-007
6	2	0.03249	0.760	4.37	1.5	0.2	2.00e-006	1.60e-005	3.56e-006
7	1	0.03123	0.763	4.20	0.1	0.0	2.83e-005	0.00e+000	2.83e-005
8	0.5	0.02849	0.770	3.83	0.1	0.0	3.01e-005	0.00e+000	3.01e-005
9	0.125	0.02224	0.786	2.99	3.6	0.0	8.17e-007	0.00e+000	8.17e-007
10	0.25	0.02341	0.783	3.15	3.7	0.0	8.03e-007	0.00e+000	8.03e-007
11	0.5	0.0255	0.778	3.43	0.1	0.0	2.87e-005	0.00e+000	2.87e-005
12	0.75	0.02754	0.772	3.70	14.9	0.0	1.96e-007	0.00e+000	1.96e-007
13	1	0.02932	0.768	3.94	0.3	0.0	1.11e-005	0.00e+000	1.11e-005
14	2	0.03666	0.750	4.93	8.9	0.0	3.24e-007	0.00e+000	3.24e-007
15	4	0.06615	0.677	8.90	0.9	0.0	2.90e-006	0.00e+000	2.90e-006
16	8	0.1094	0.570	14.72	1.0	0.2	2.54e-006	1.12e-005	4.14e-006
17	16	0.151	0.467	20.32	0.5	0.5	4.59e-006	4.58e-006	4.58e-006
18	32	0.1949	0.358	26.23	1.0	0.4	1.95e-006	4.19e-006	2.66e-006
19	16	0.1845	0.384	24.82	0.1	0.0	1.70e-005	0.00e+000	1.70e-005
20	4	0.1684	0.424	22.66	0.2	0.0	8.35e-006	0.00e+000	8.35e-006
21	1	0.1553	0.456	20.89	3.7	0.0	5.18e-007	0.00e+000	5.18e-007
22	0.5	0.1504	0.468	20.23	19.6	12.7	1.01e-007	1.57e-007	1.23e-007
23	0.125	0.1423	0.488	19.14	14.5	0.0	1.40e-007	0.00e+000	1.40e-007


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 23

Stress: 0.125 tsf



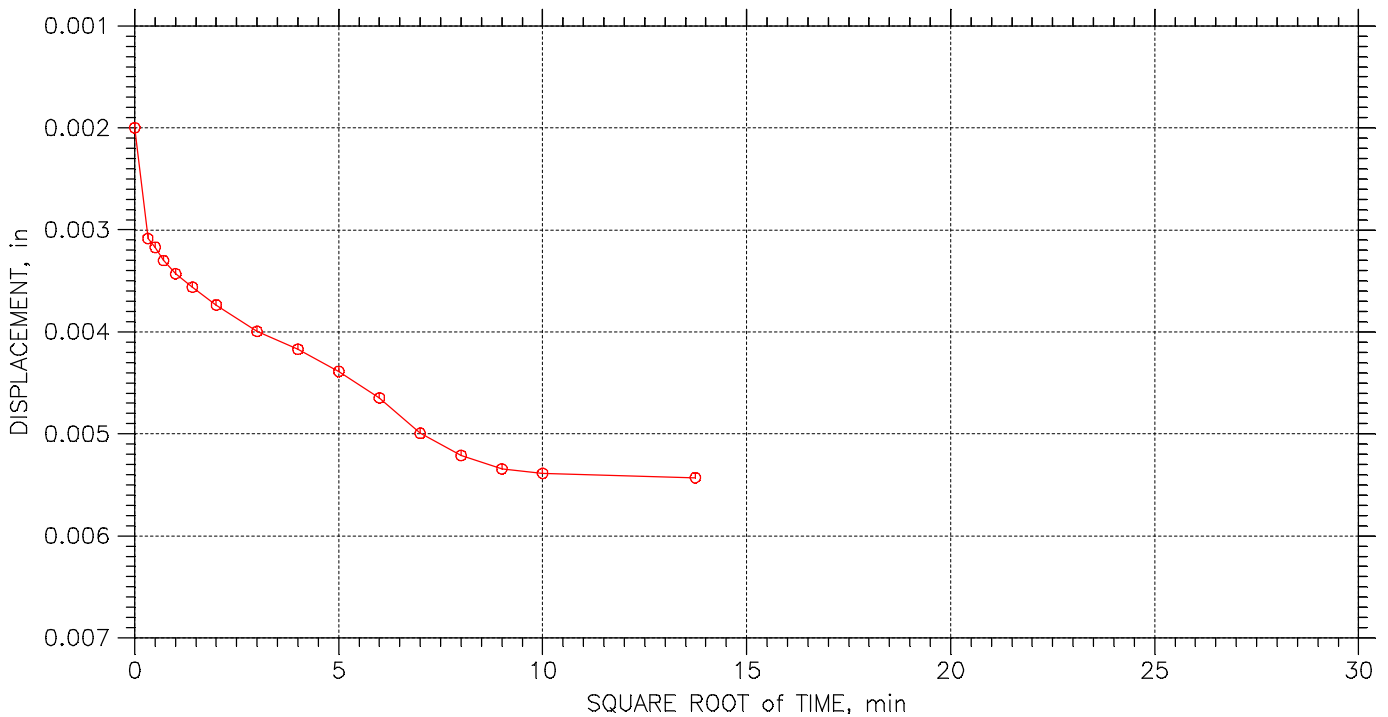
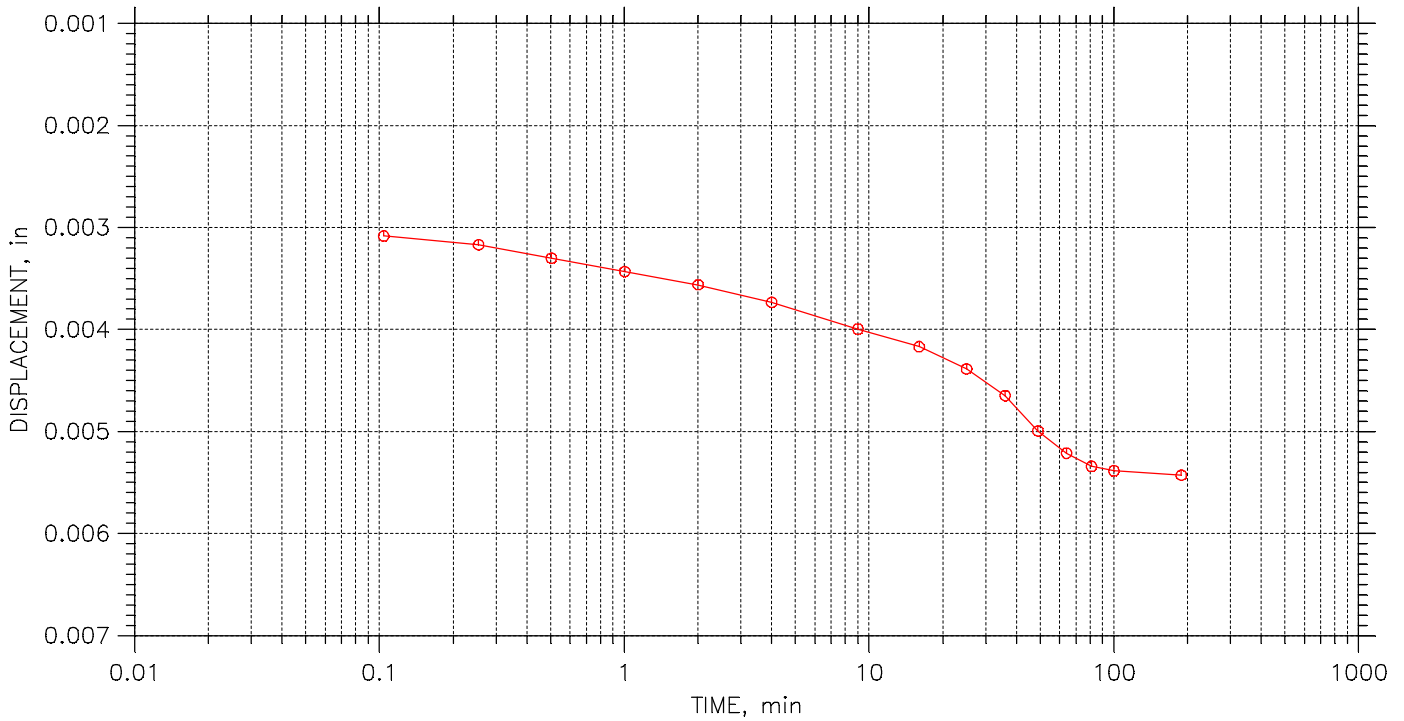
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
222			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 23

Stress: 0.25 tsf



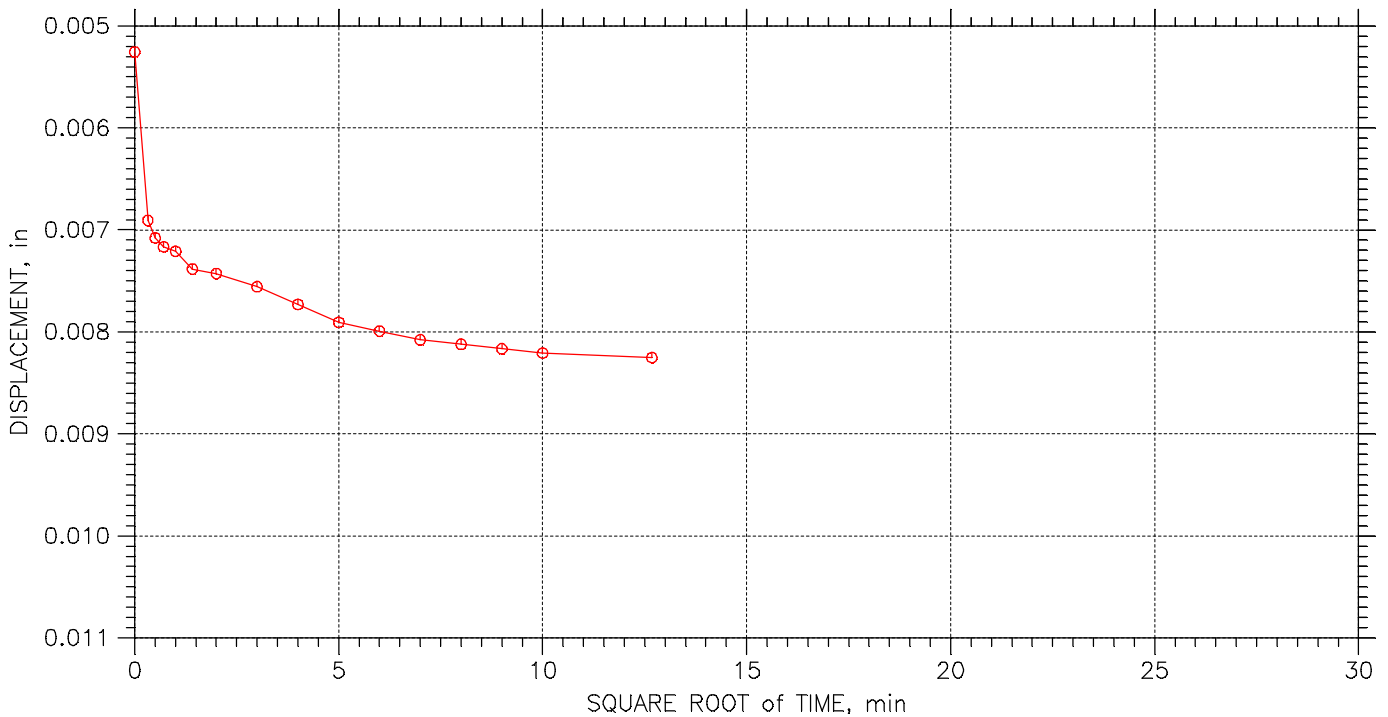
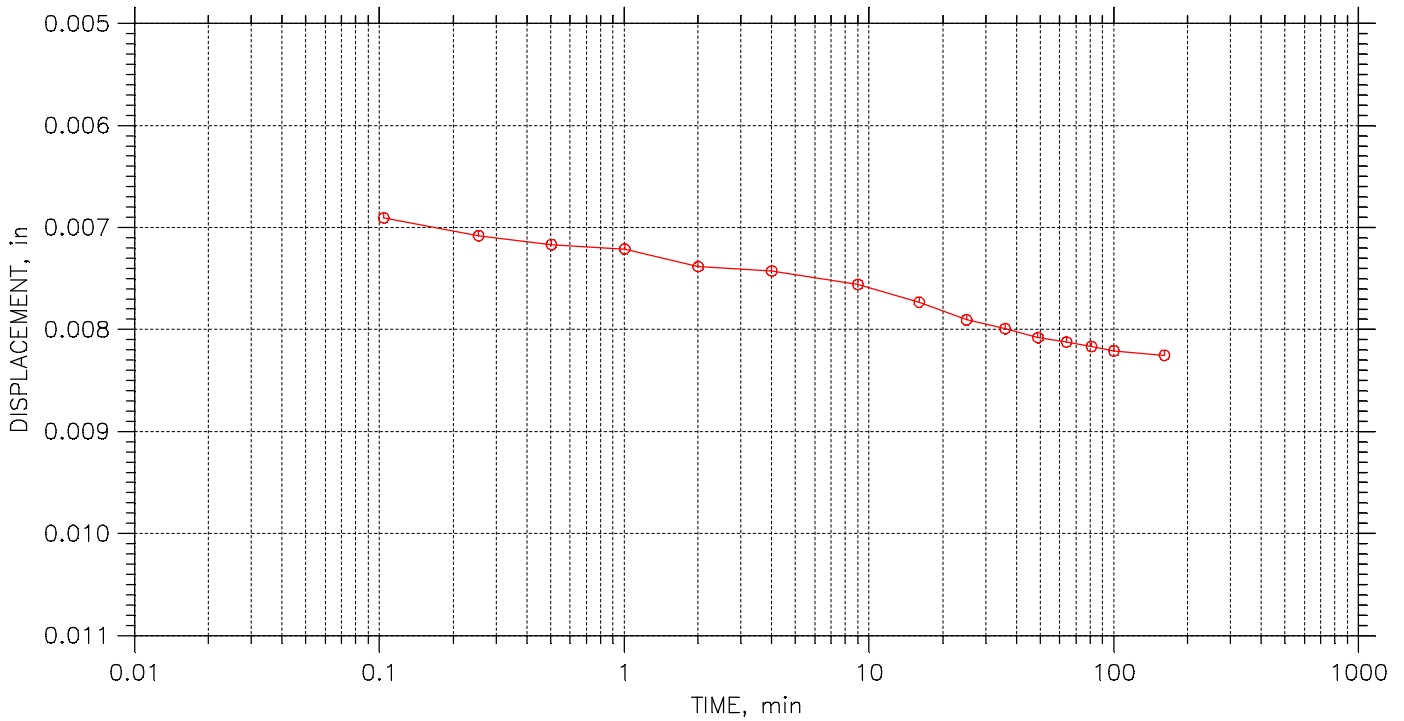
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
223			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 23

Stress: 0.5 tsf



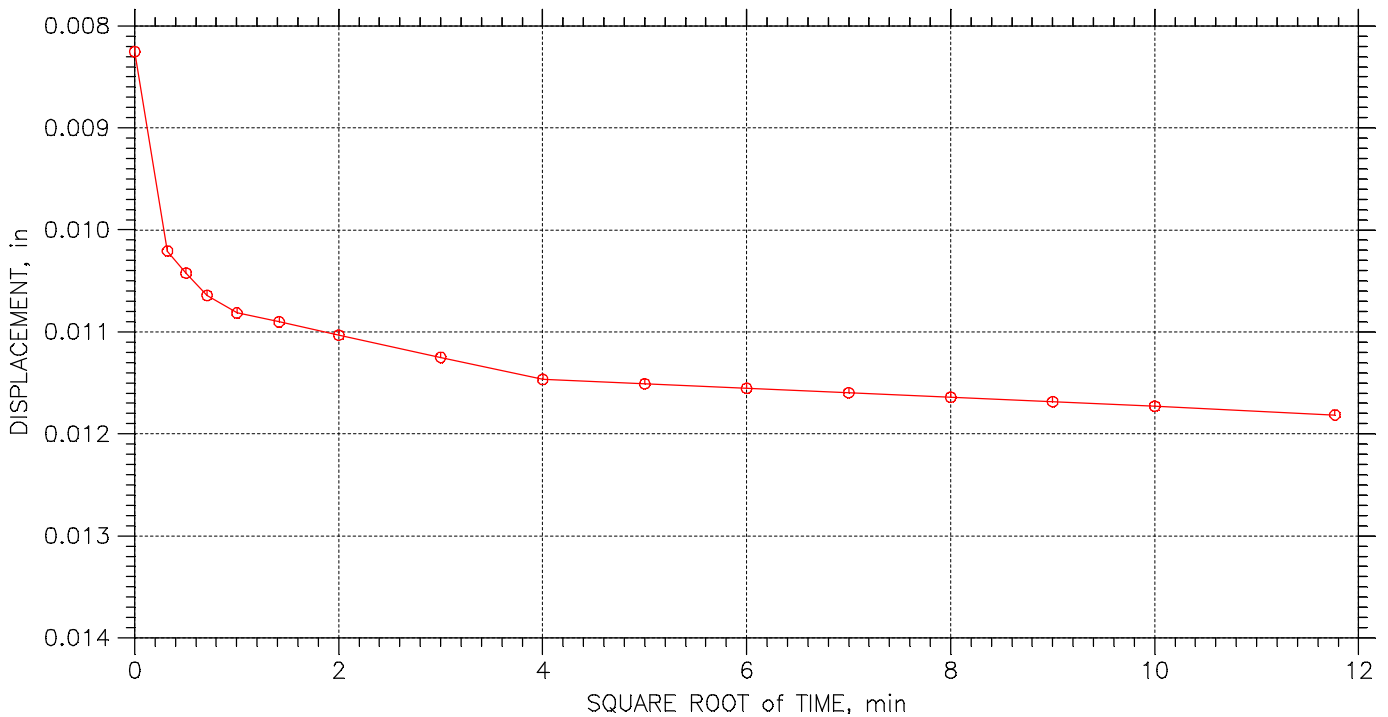
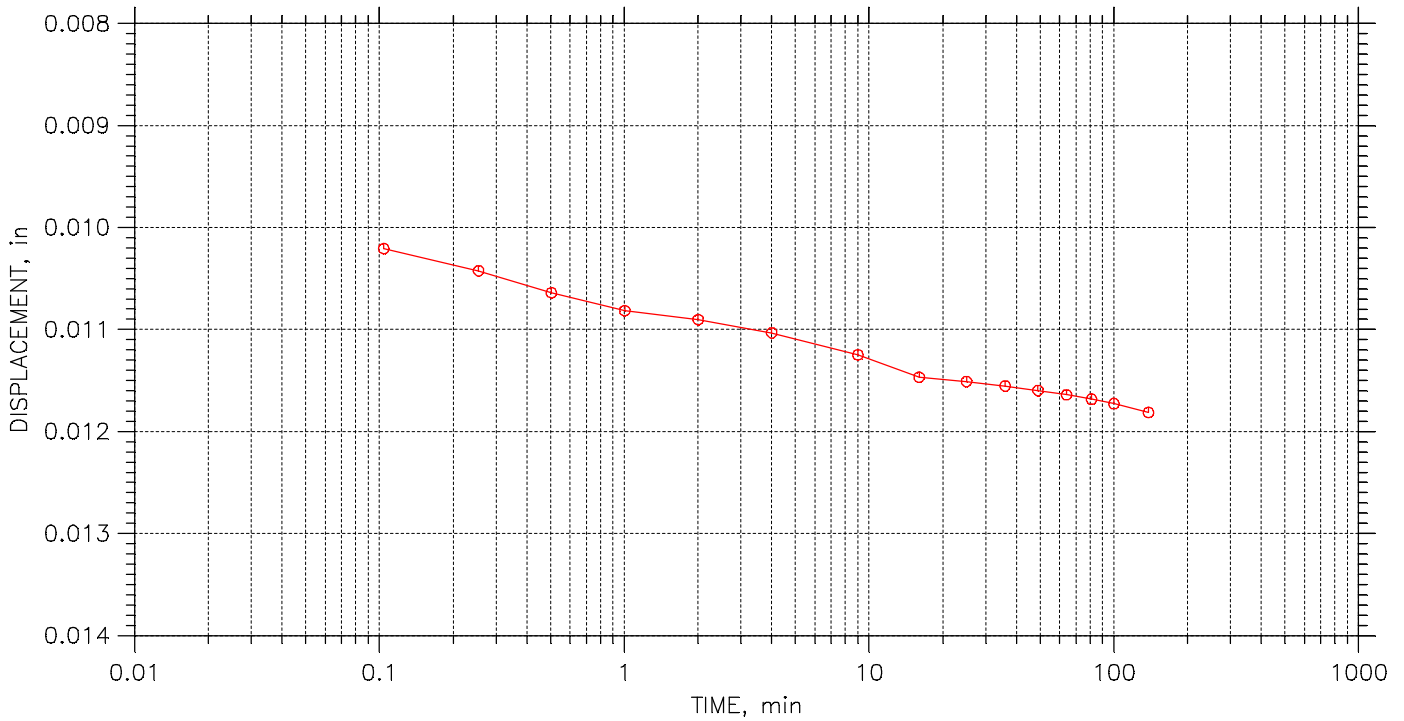
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	224		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 23

Stress: 0.75 tsf



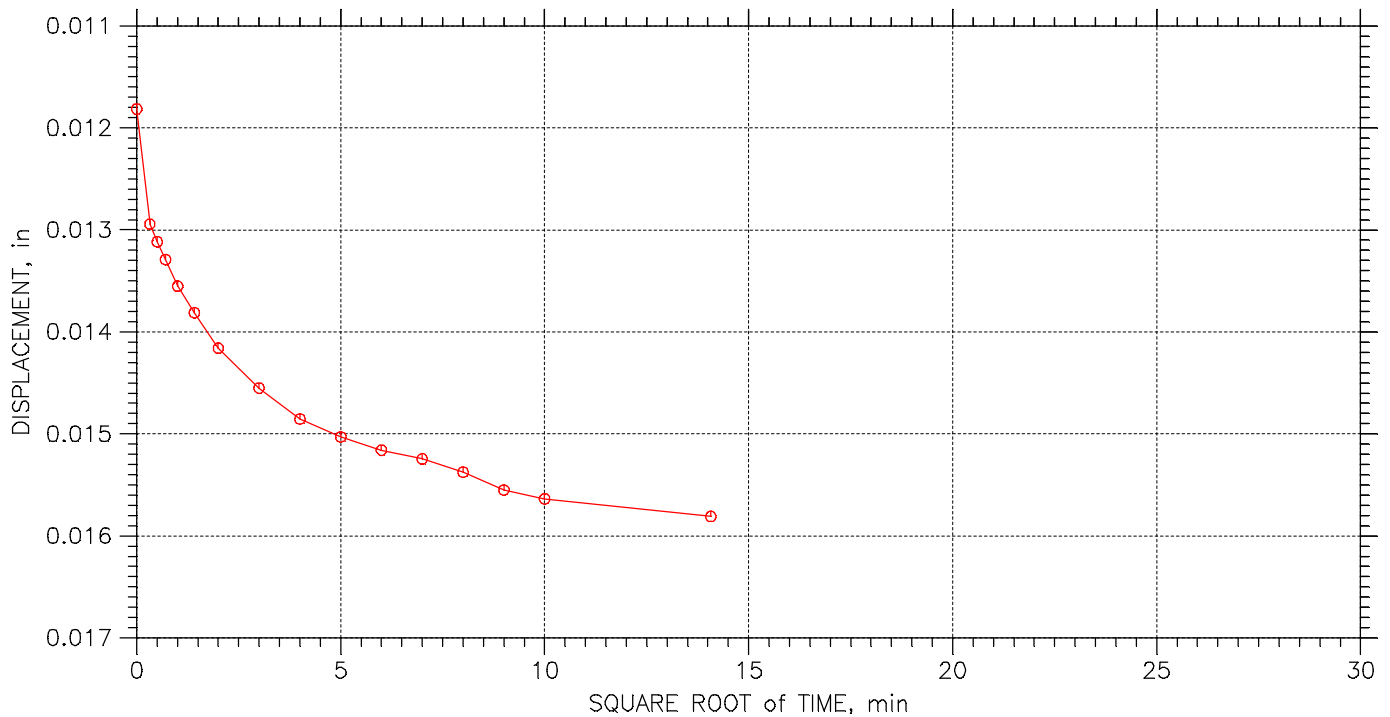
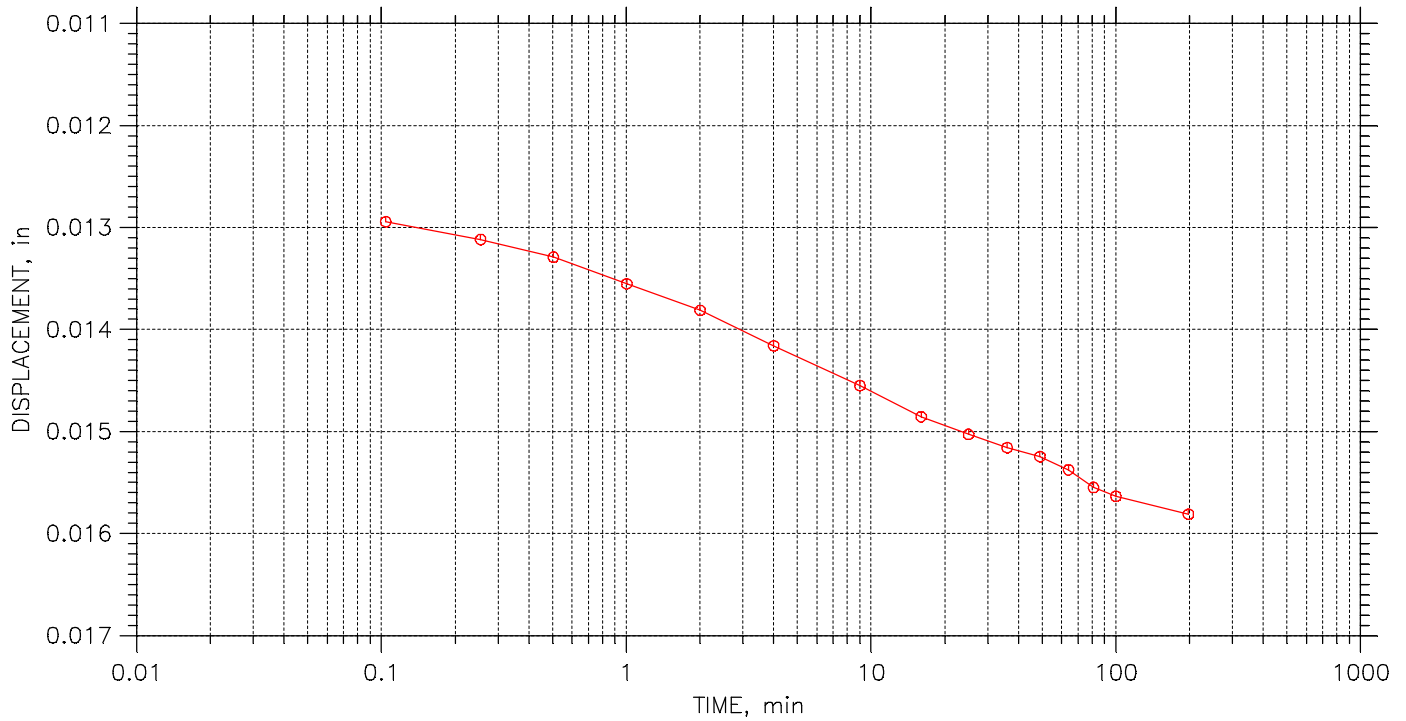
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	225		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 23

Stress: 1. tsf



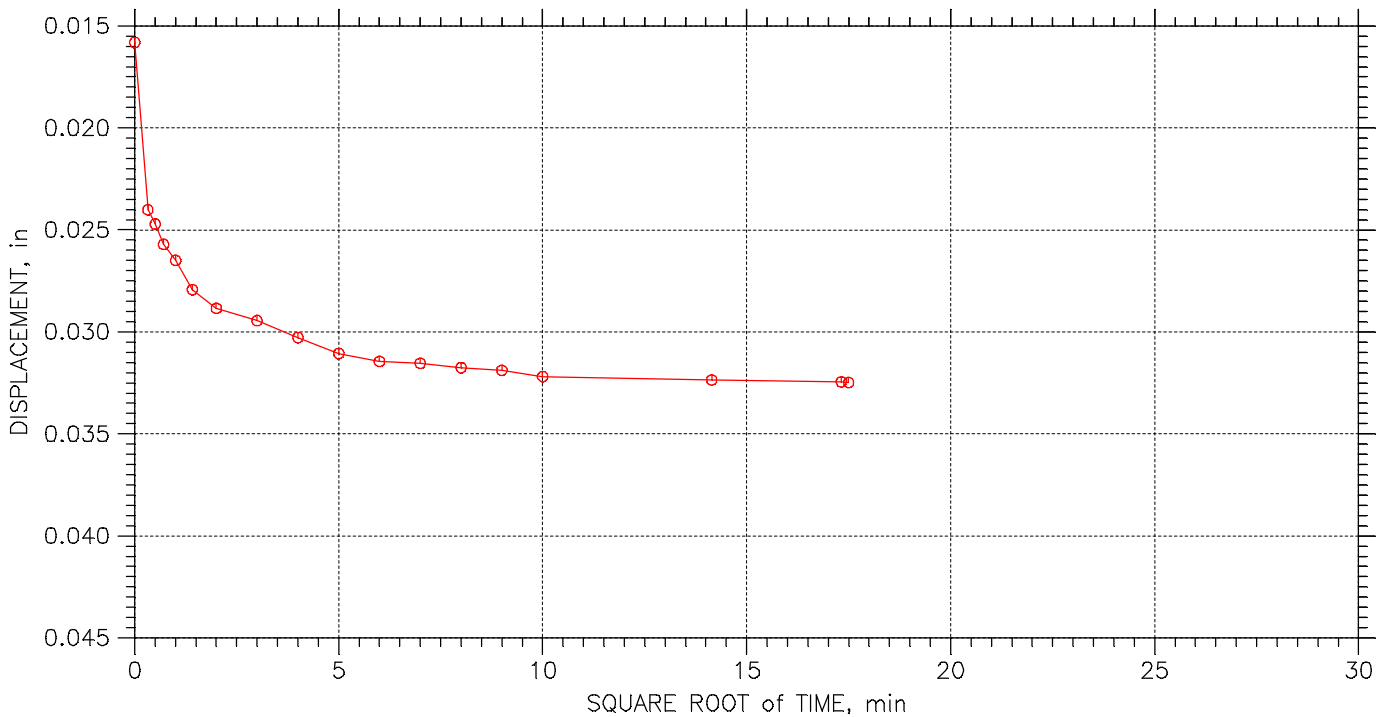
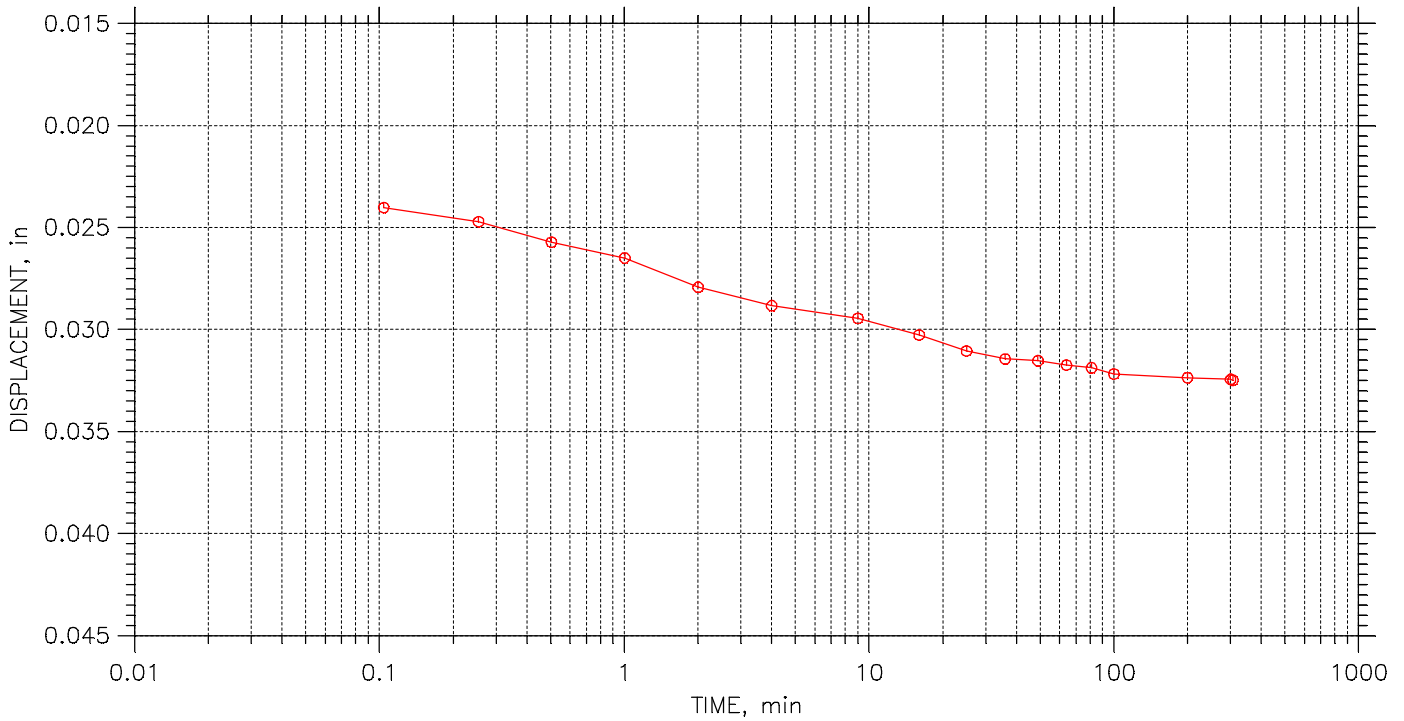
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	226		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 23

Stress: 2. tsf



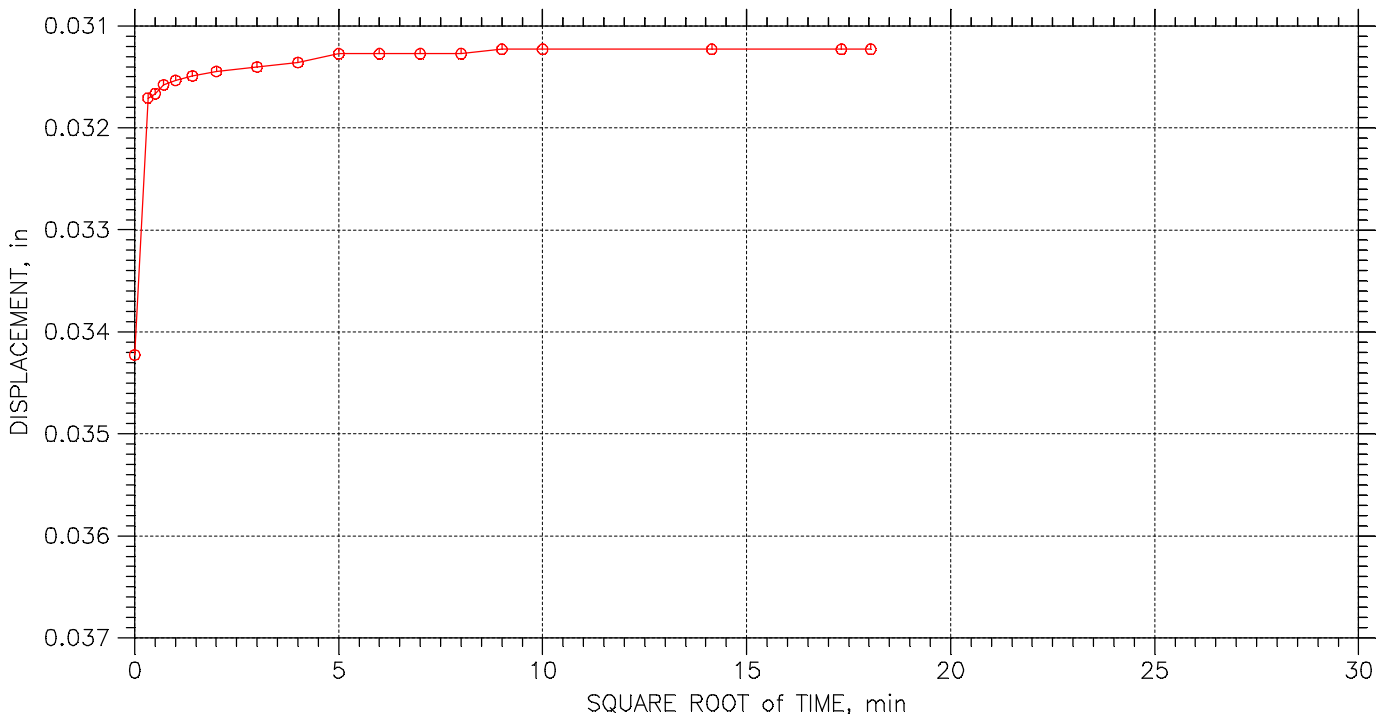
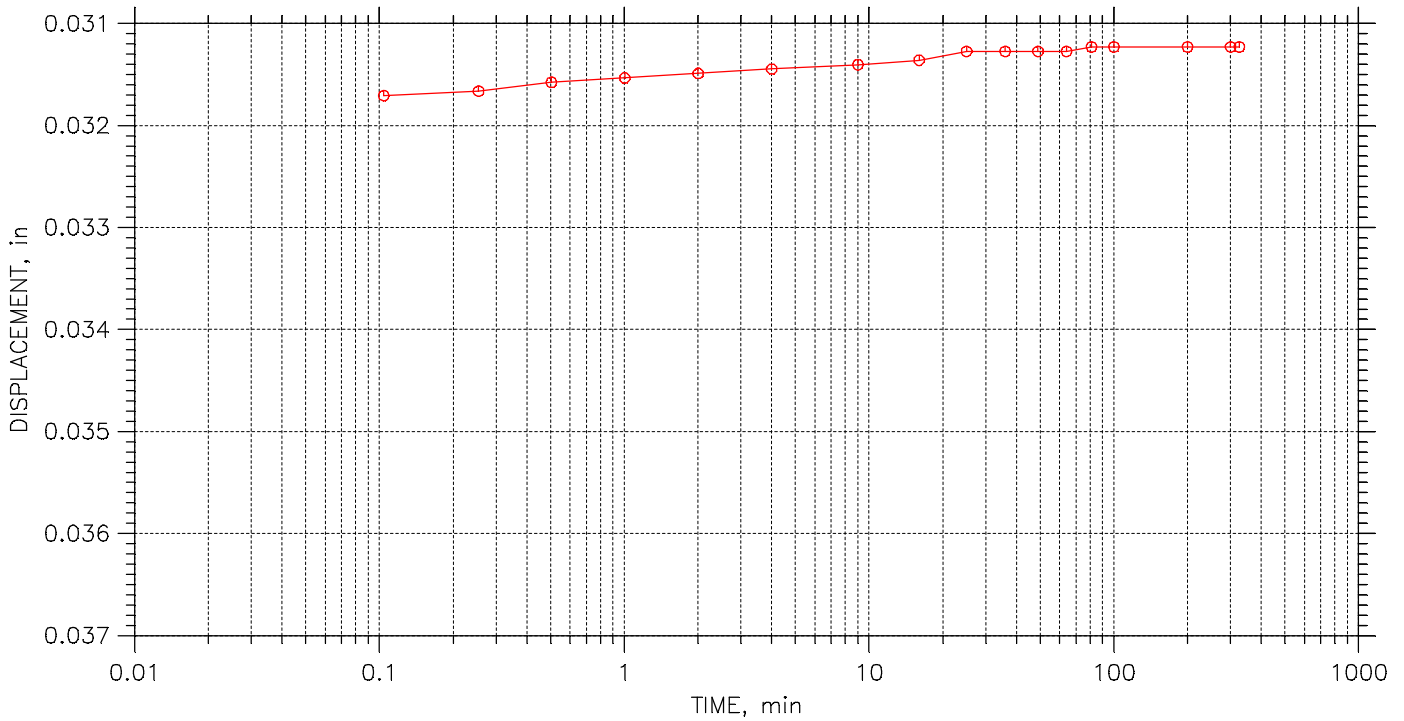
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	227		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 23

Stress: 1. tsf



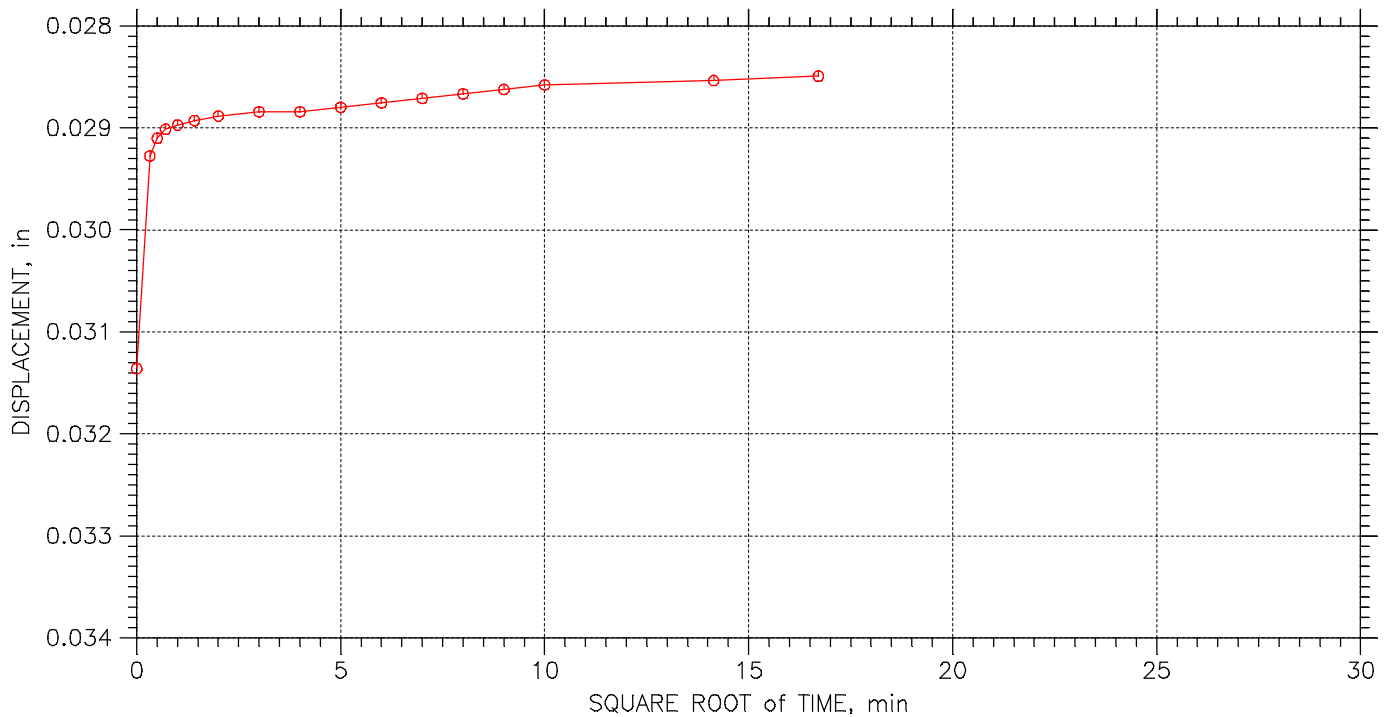
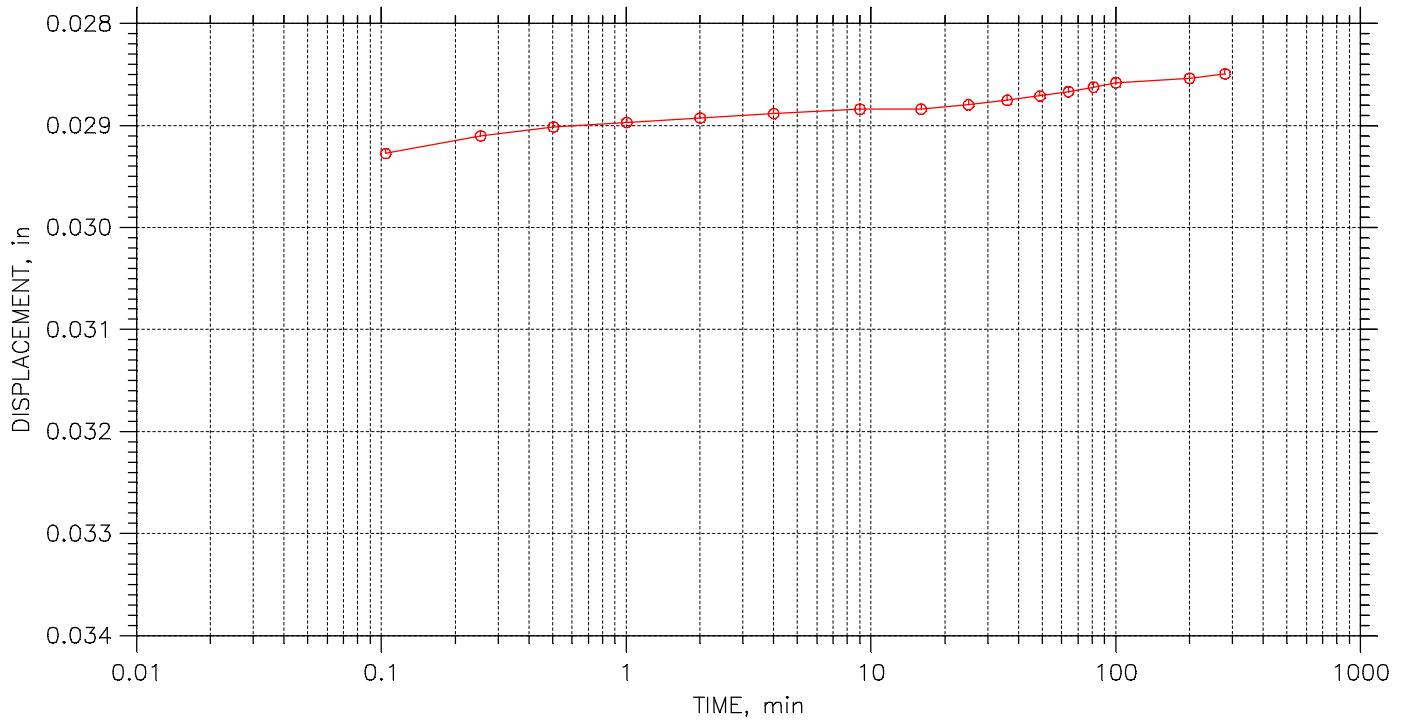
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	228		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 23

Stress: 0.5 tsf



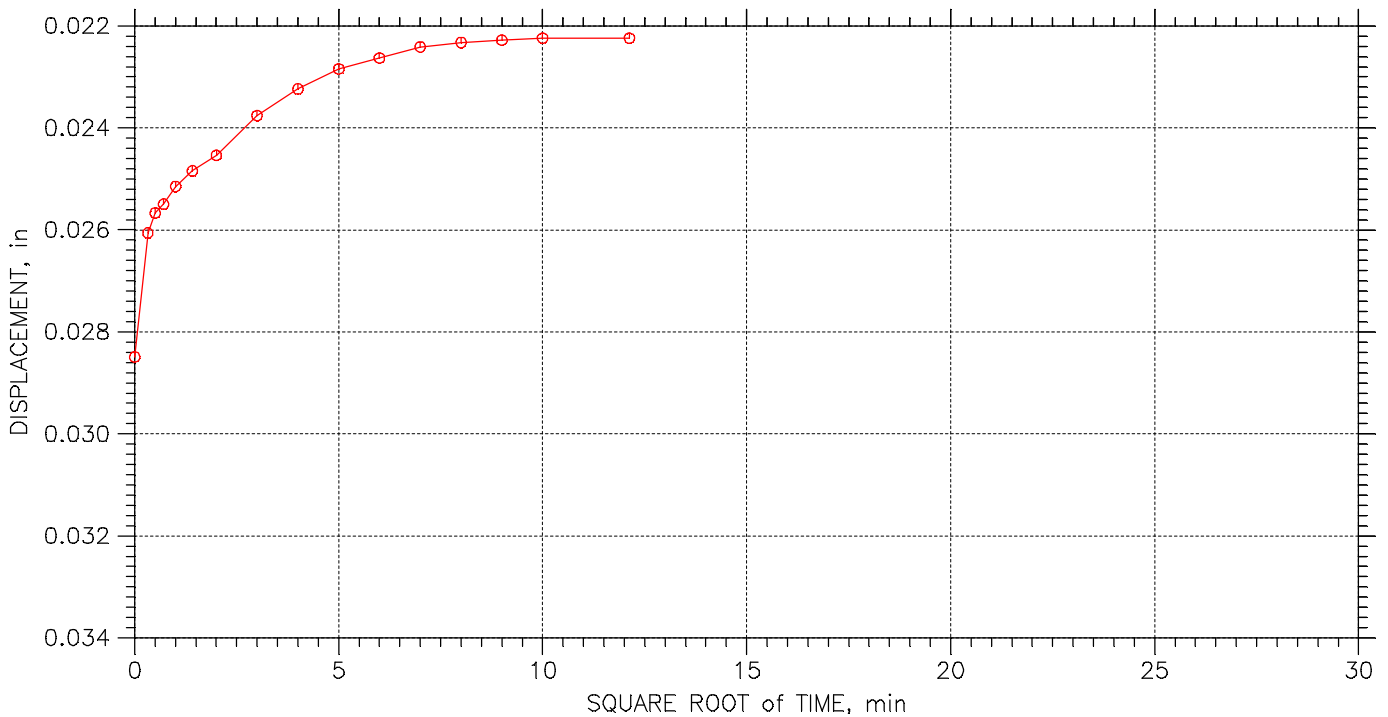
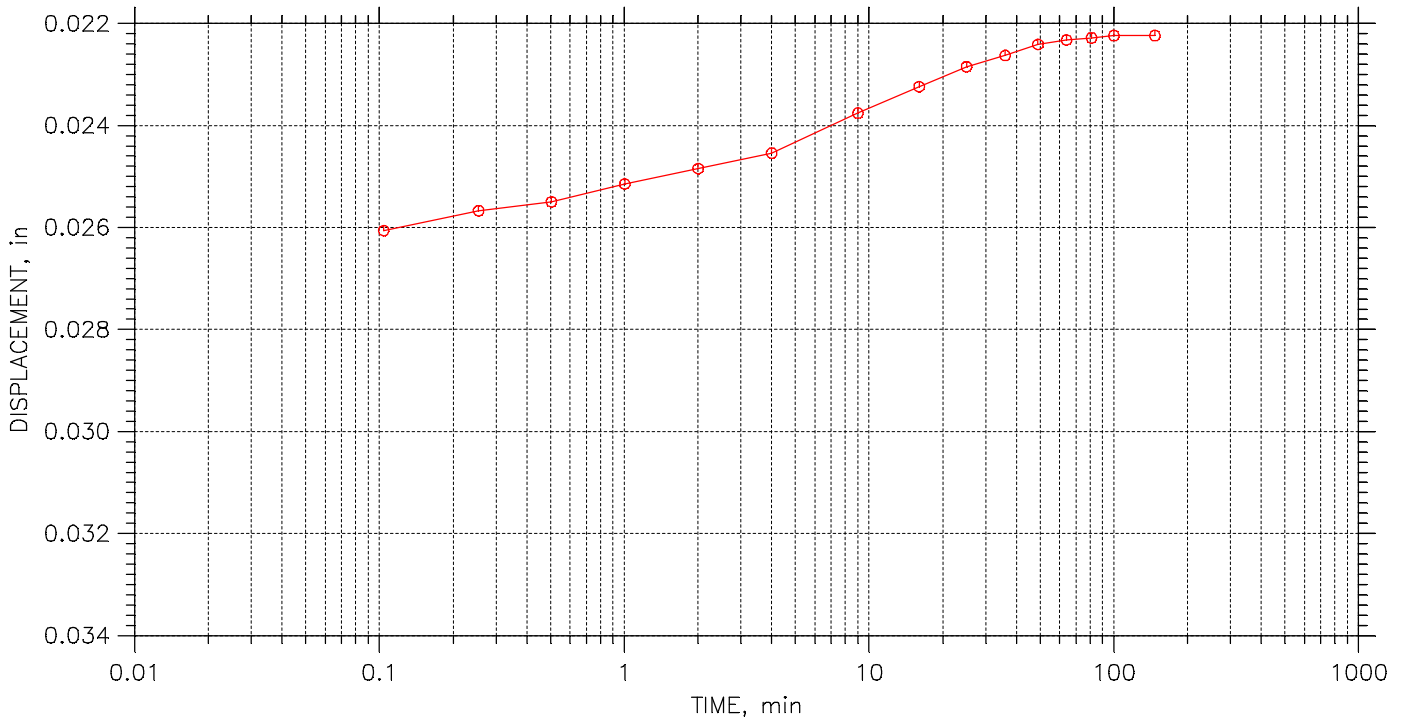
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	229		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 23

Stress: 0.125 tsf



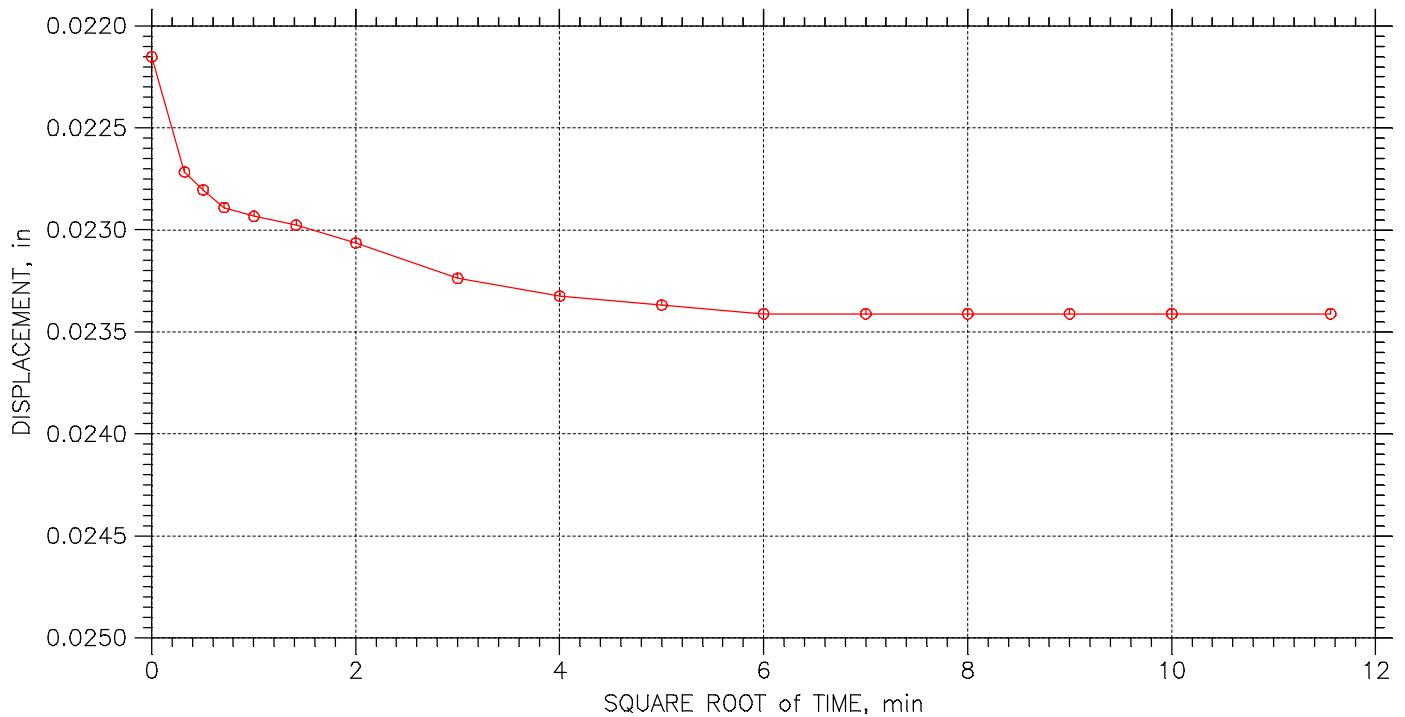
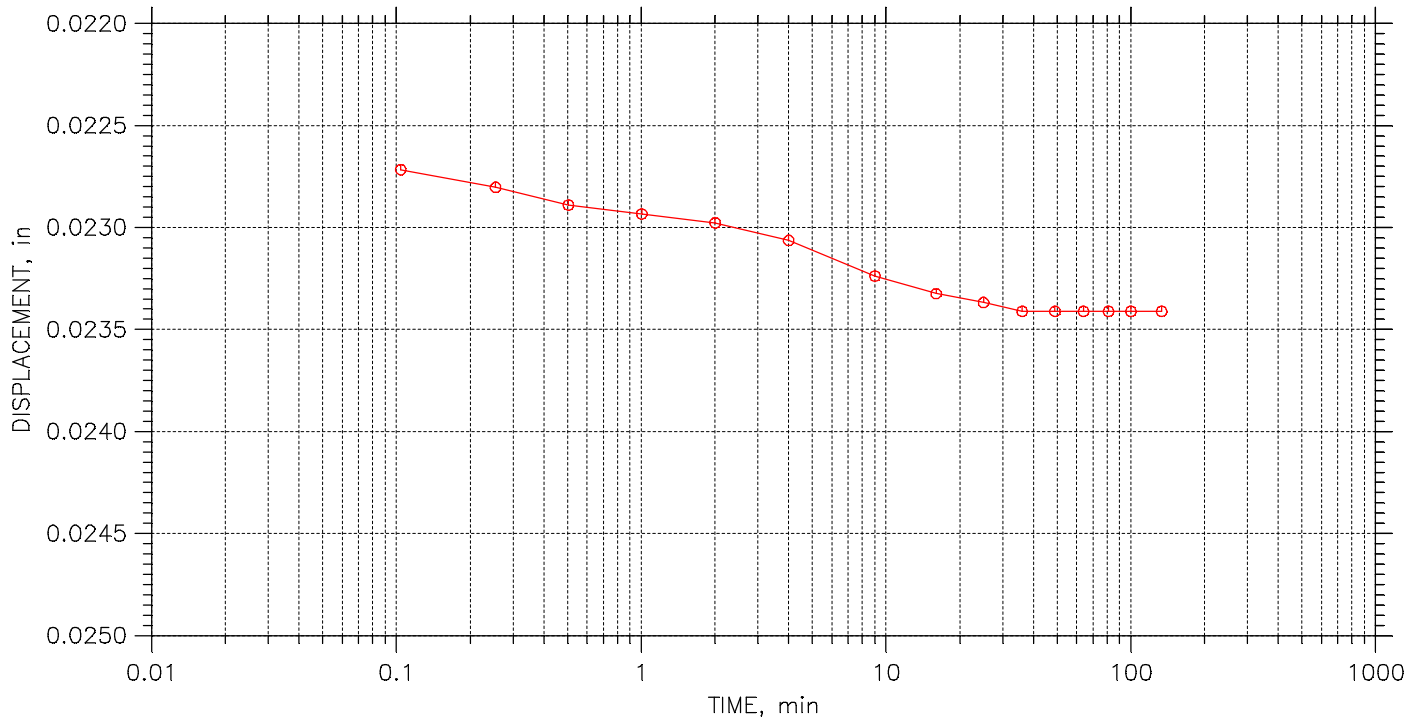
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	230		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 23

Stress: 0.25 tsf



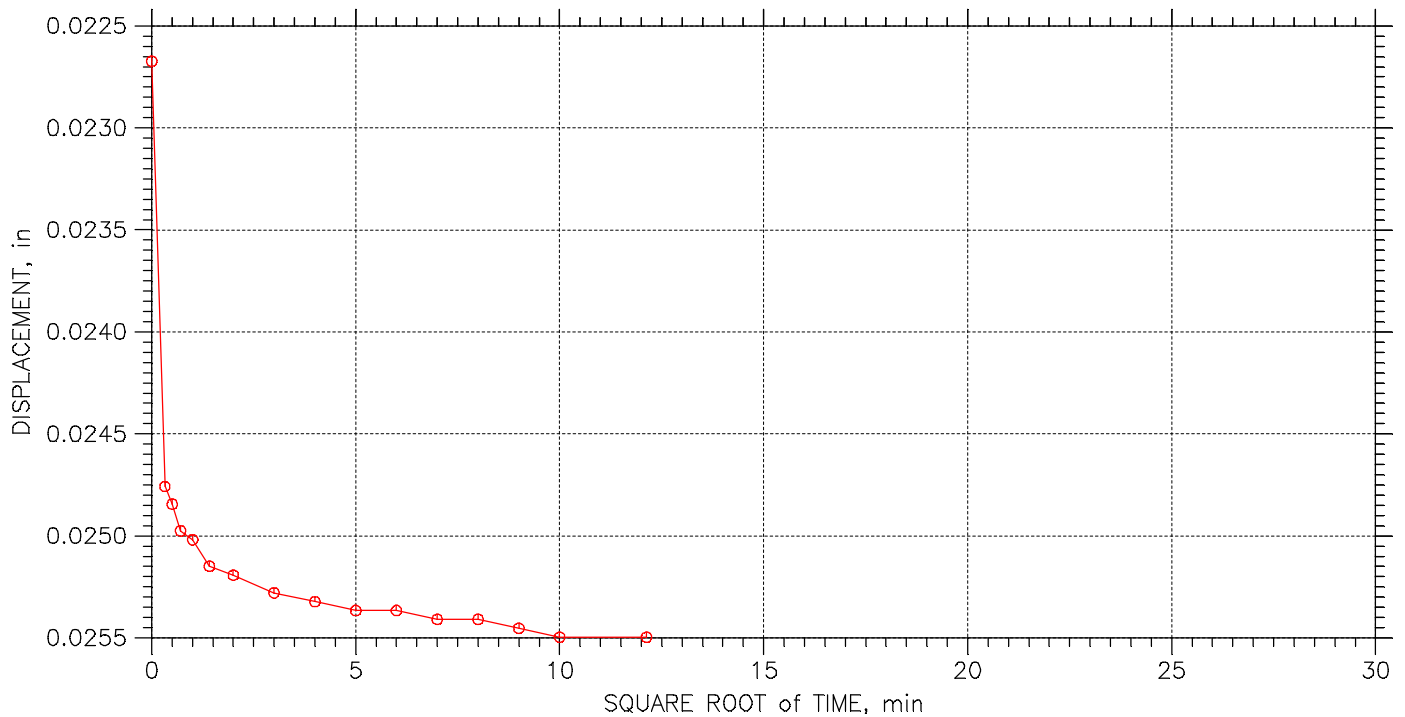
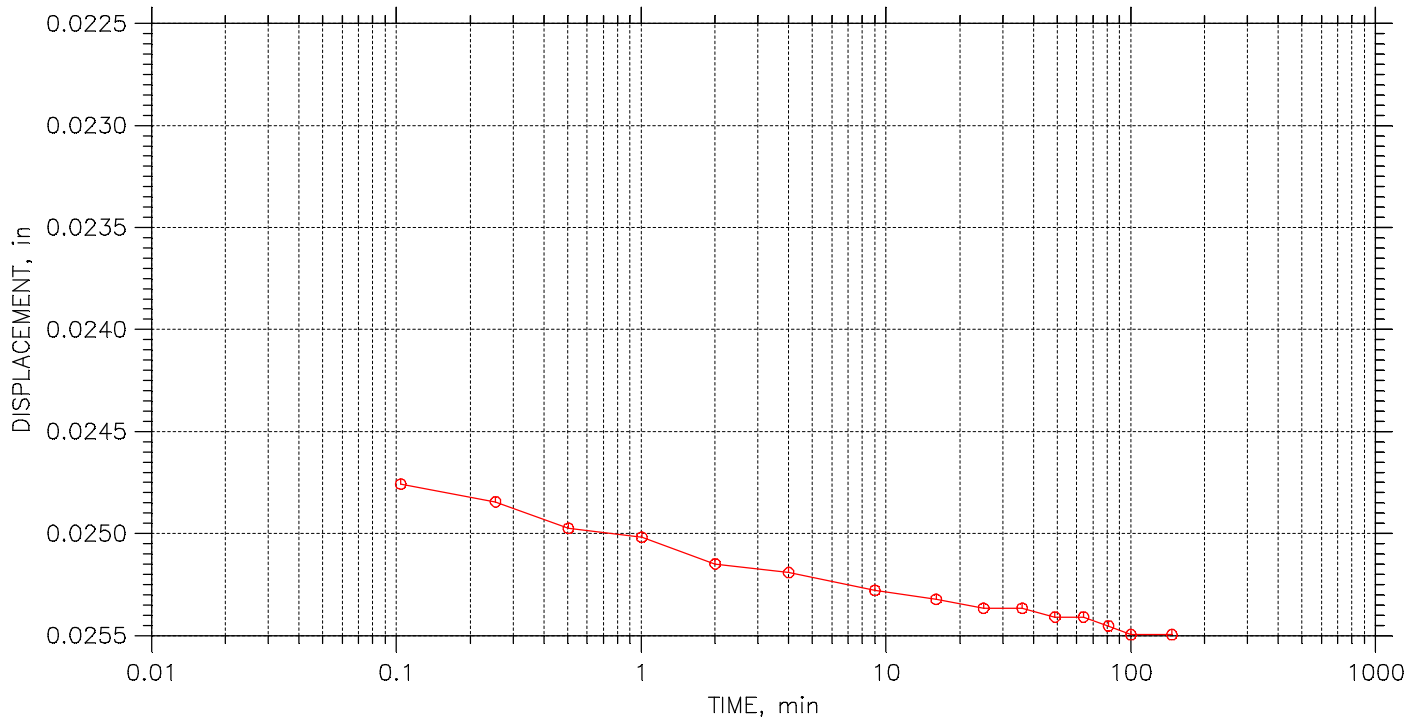
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
231			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 23

Stress: 0.5 tsf



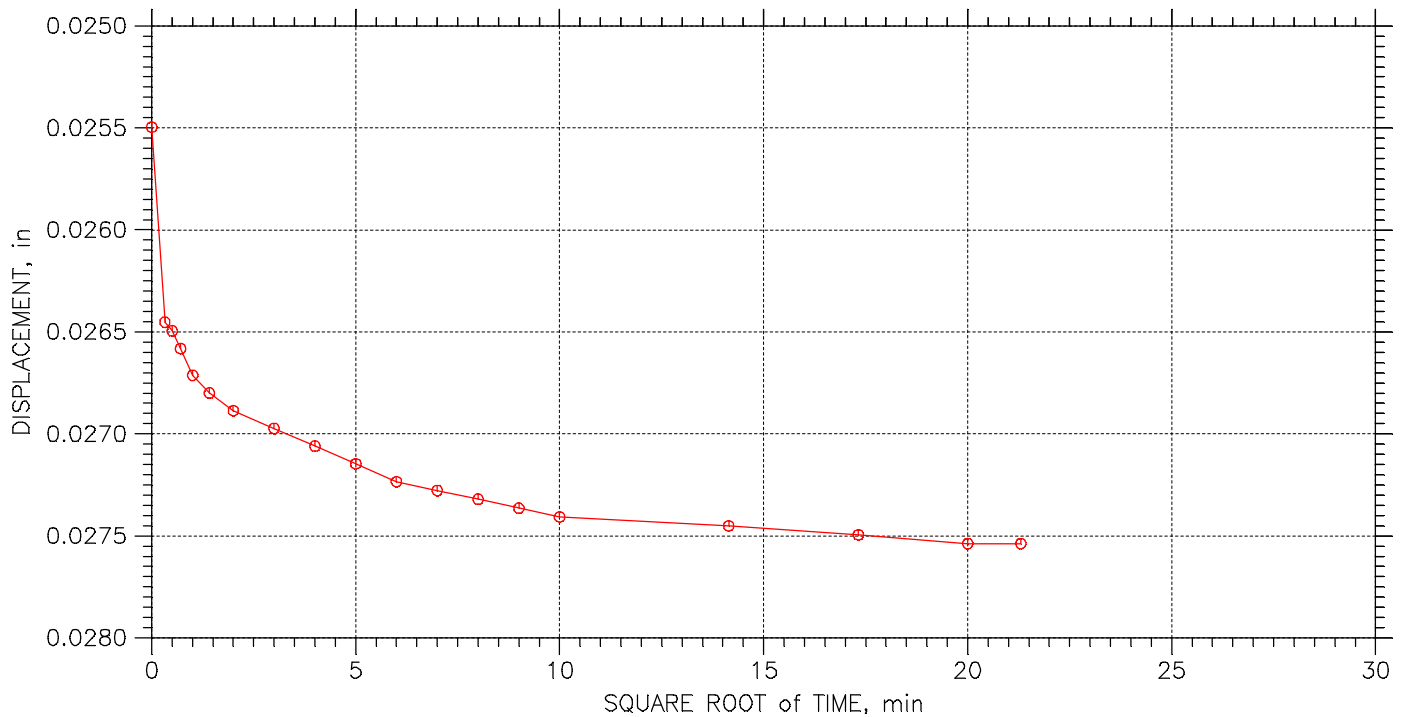
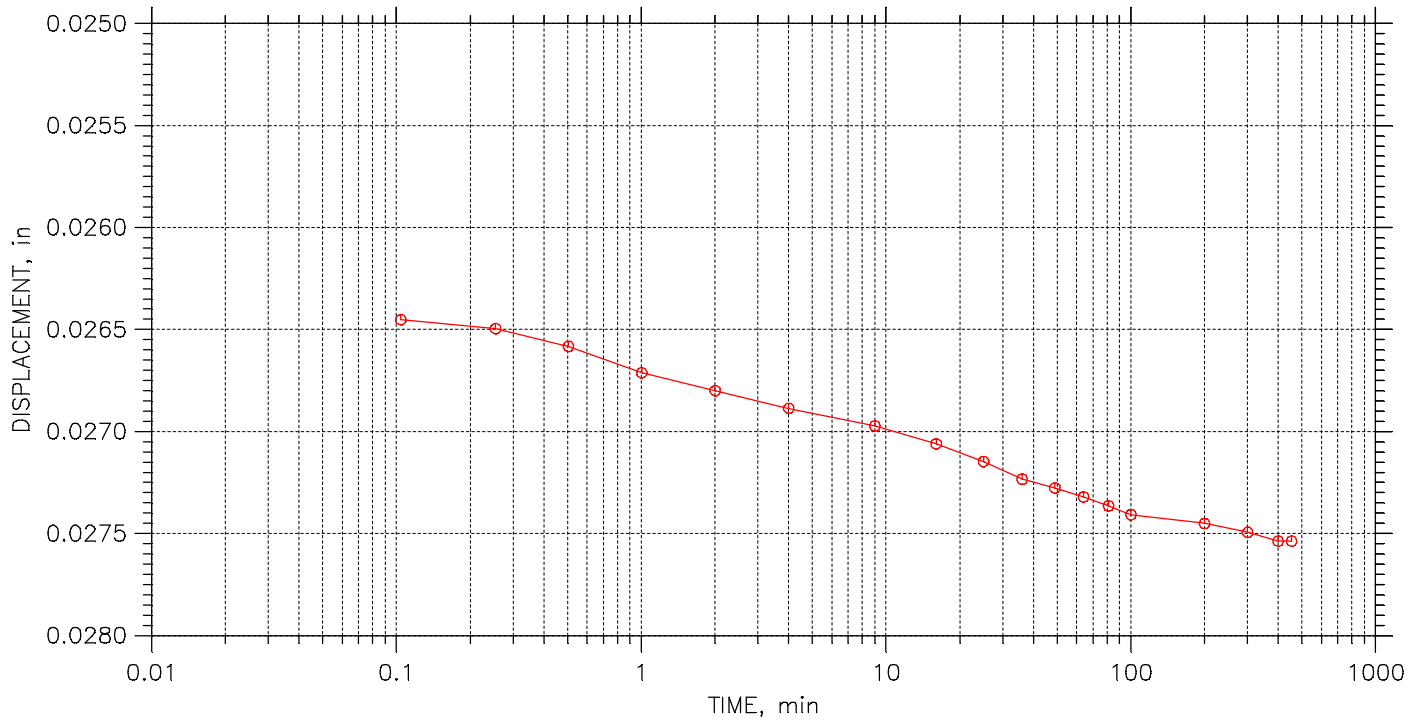
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
232			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 23

Stress: 0.75 tsf



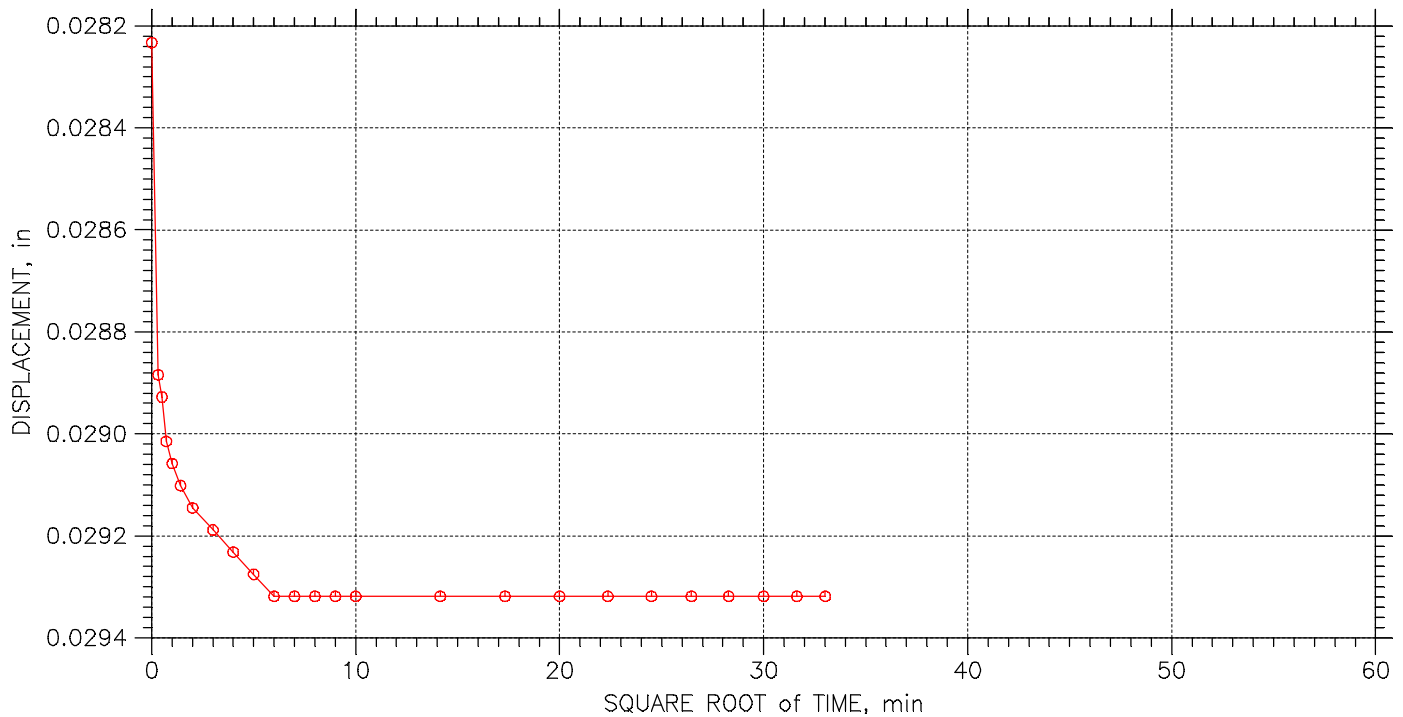
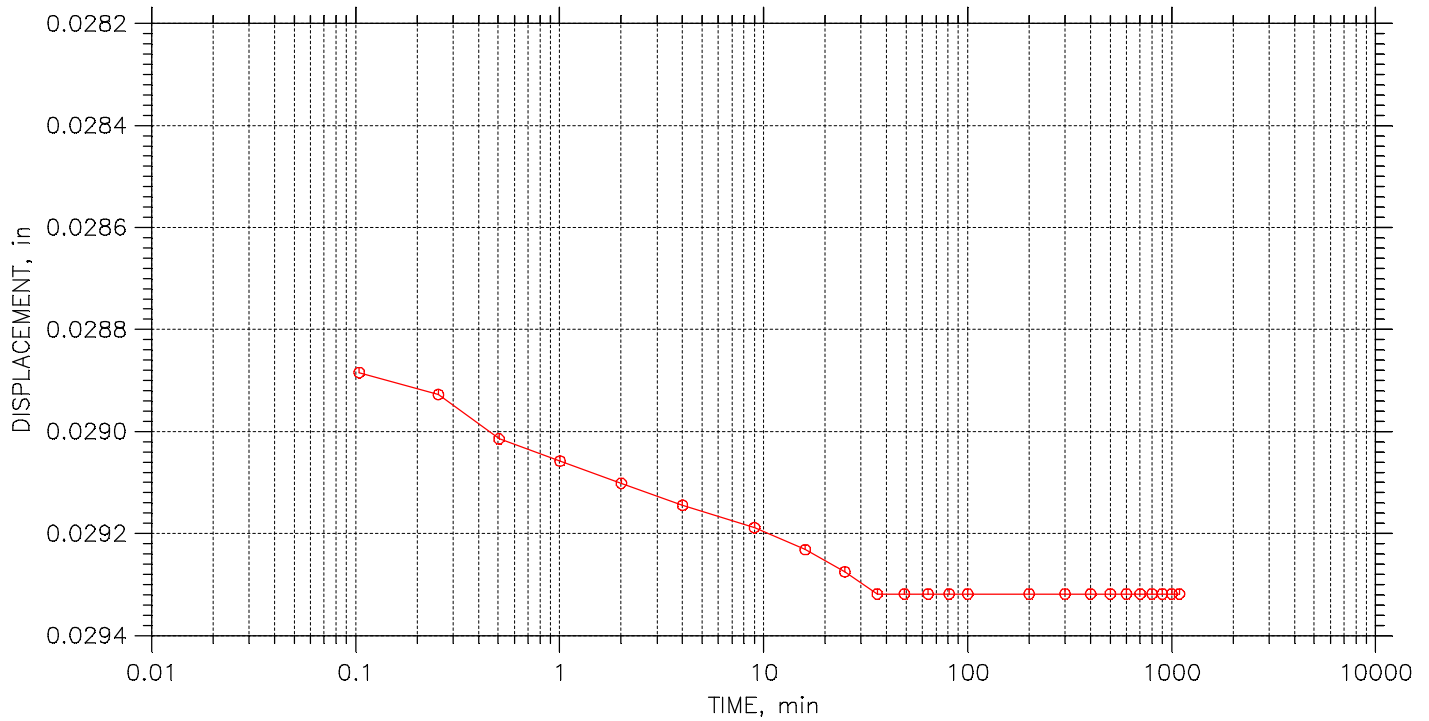
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
233			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 23

Stress: 1. tsf



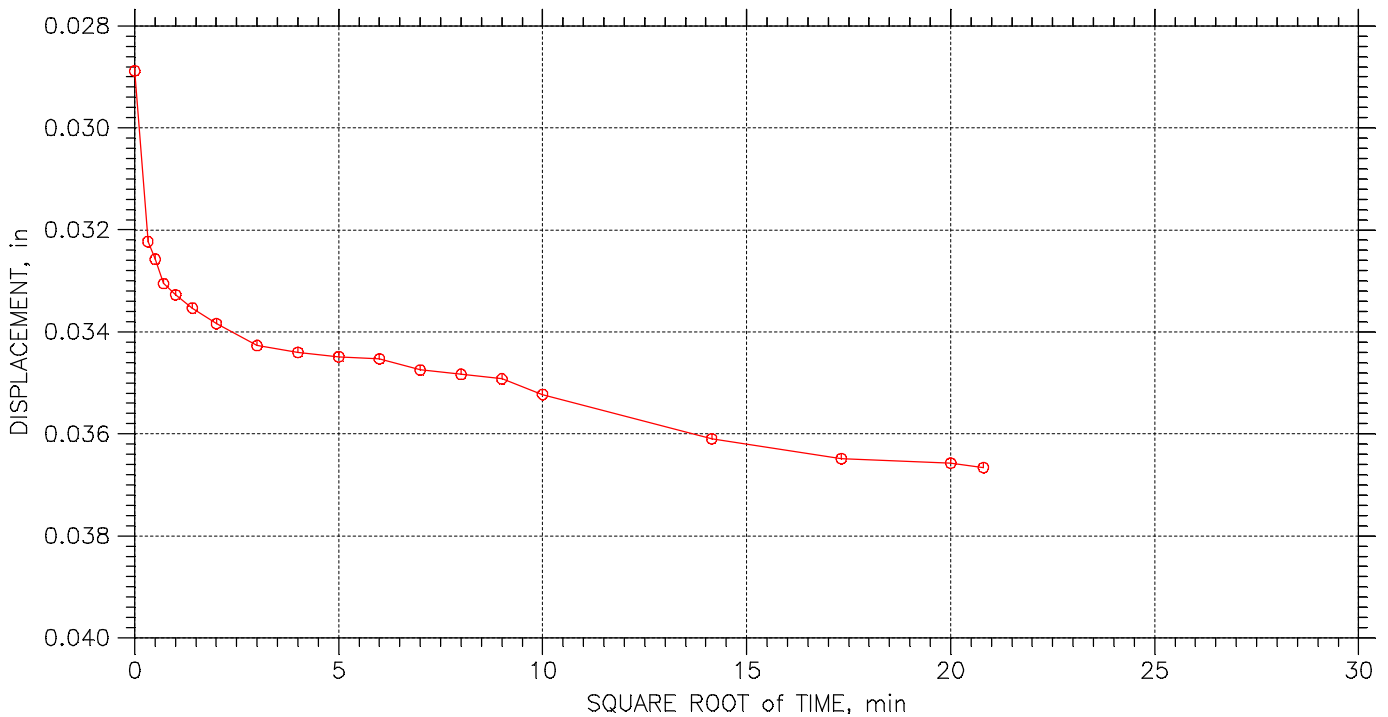
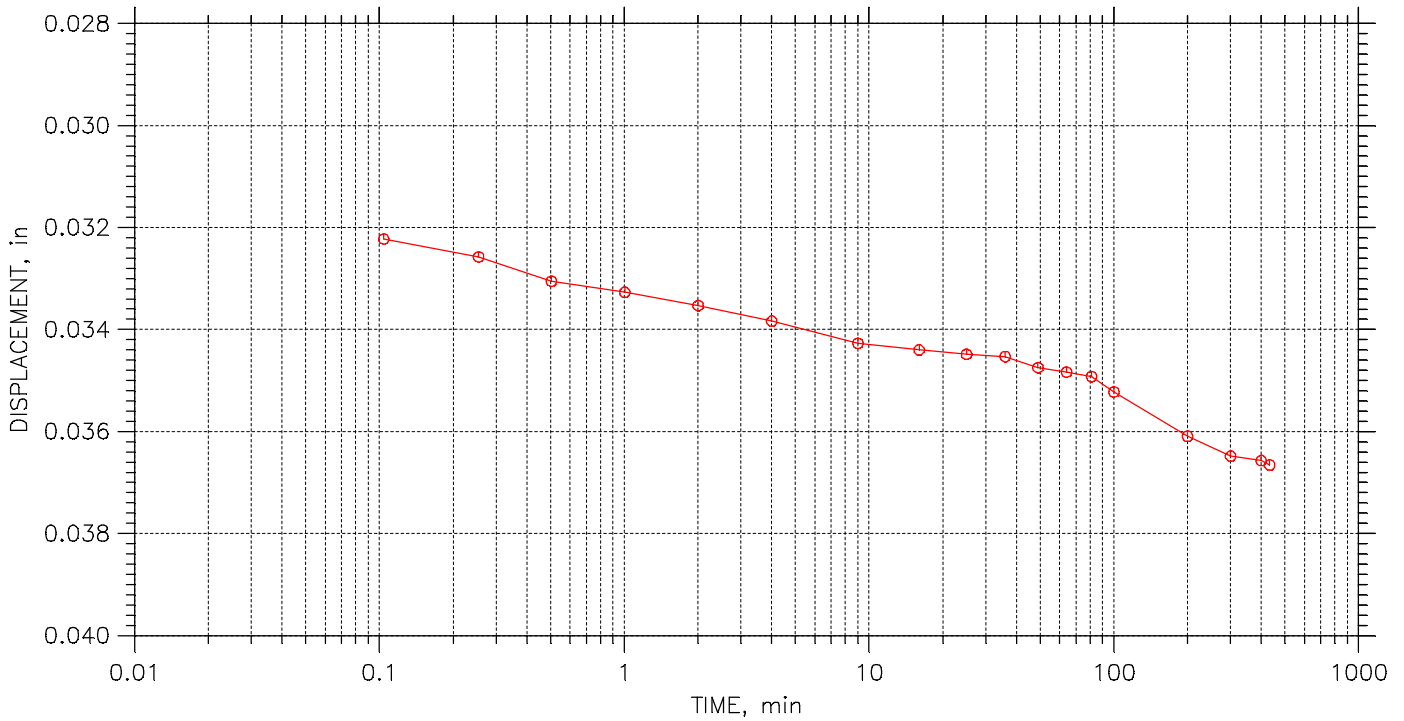
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	234		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 14 of 23

Stress: 2. tsf



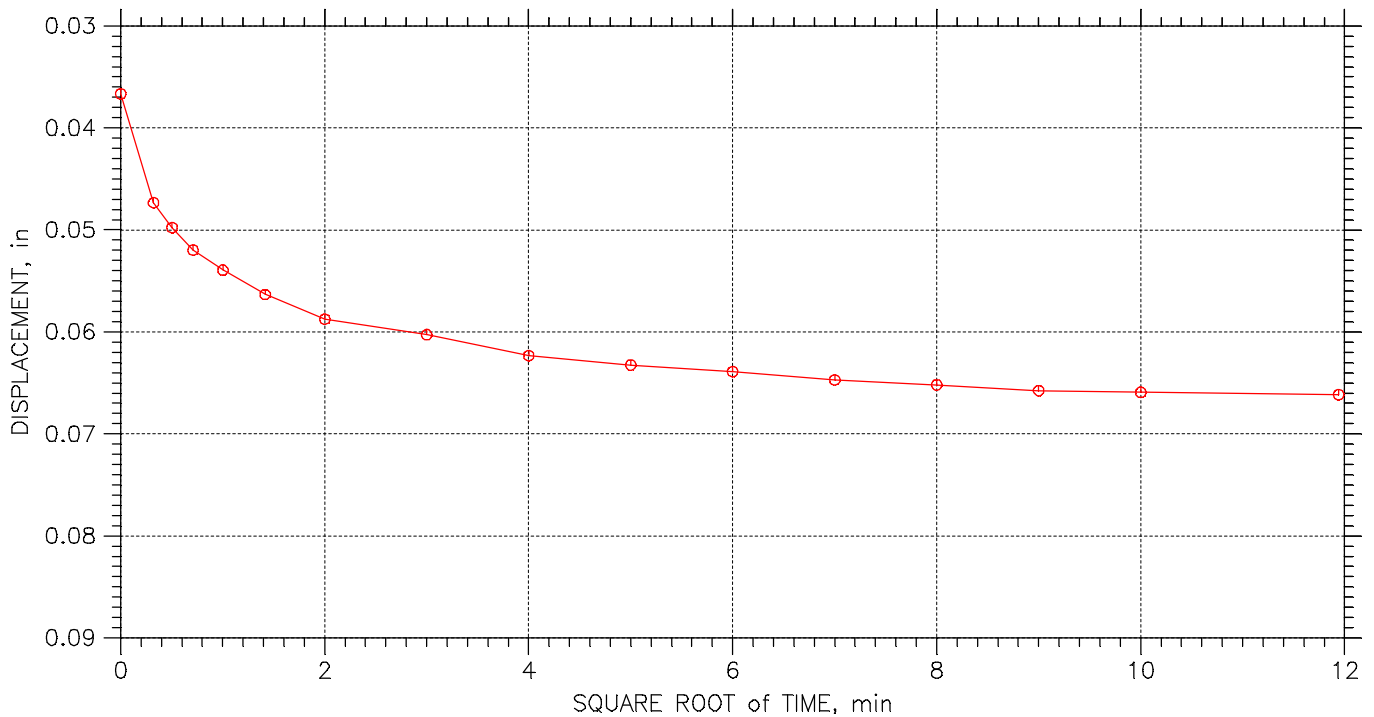
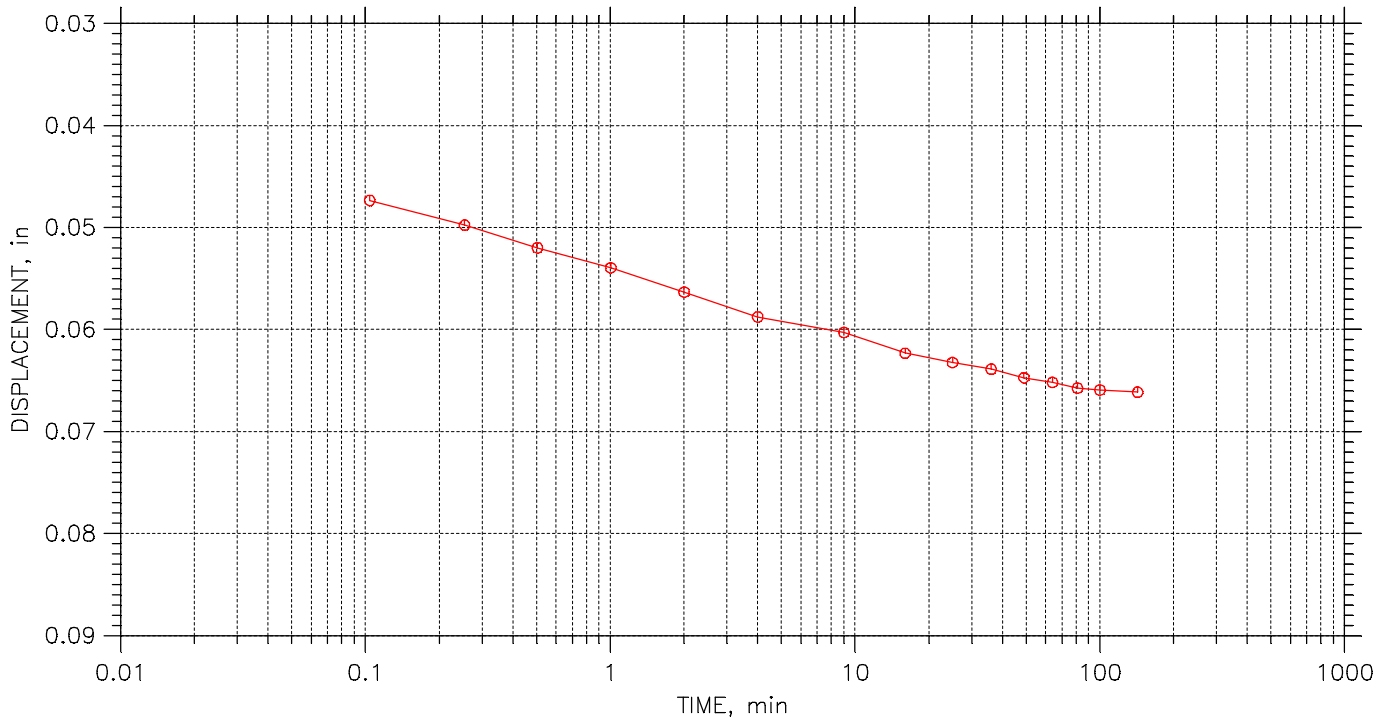
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	235		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 15 of 23

Stress: 4. tsf



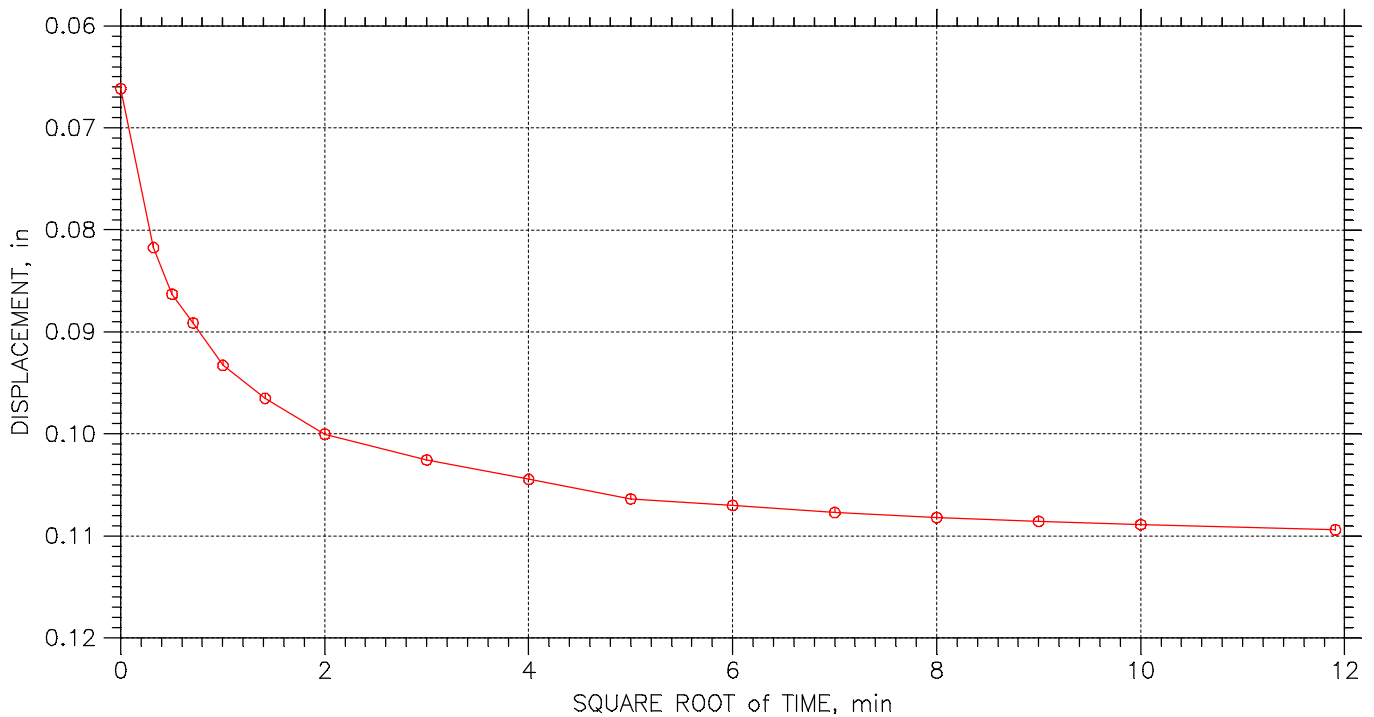
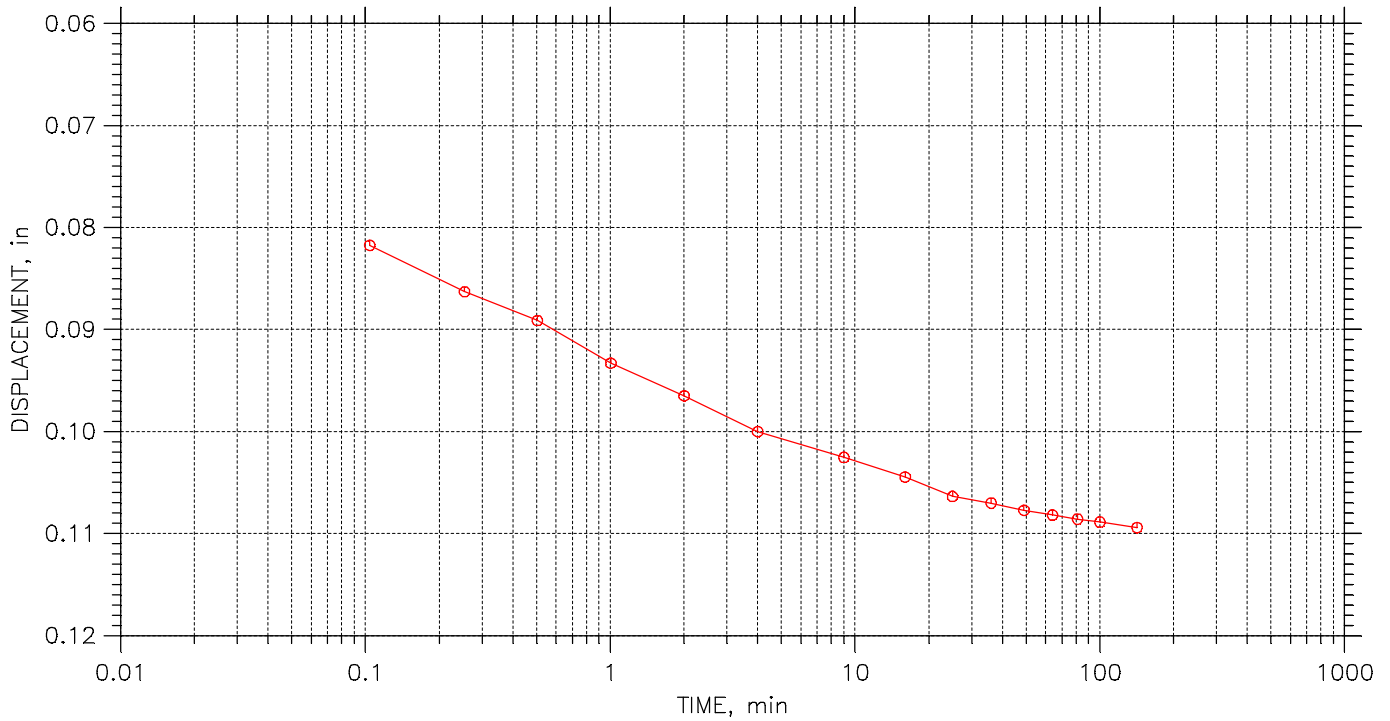
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	236		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 16 of 23

Stress: 8. tsf



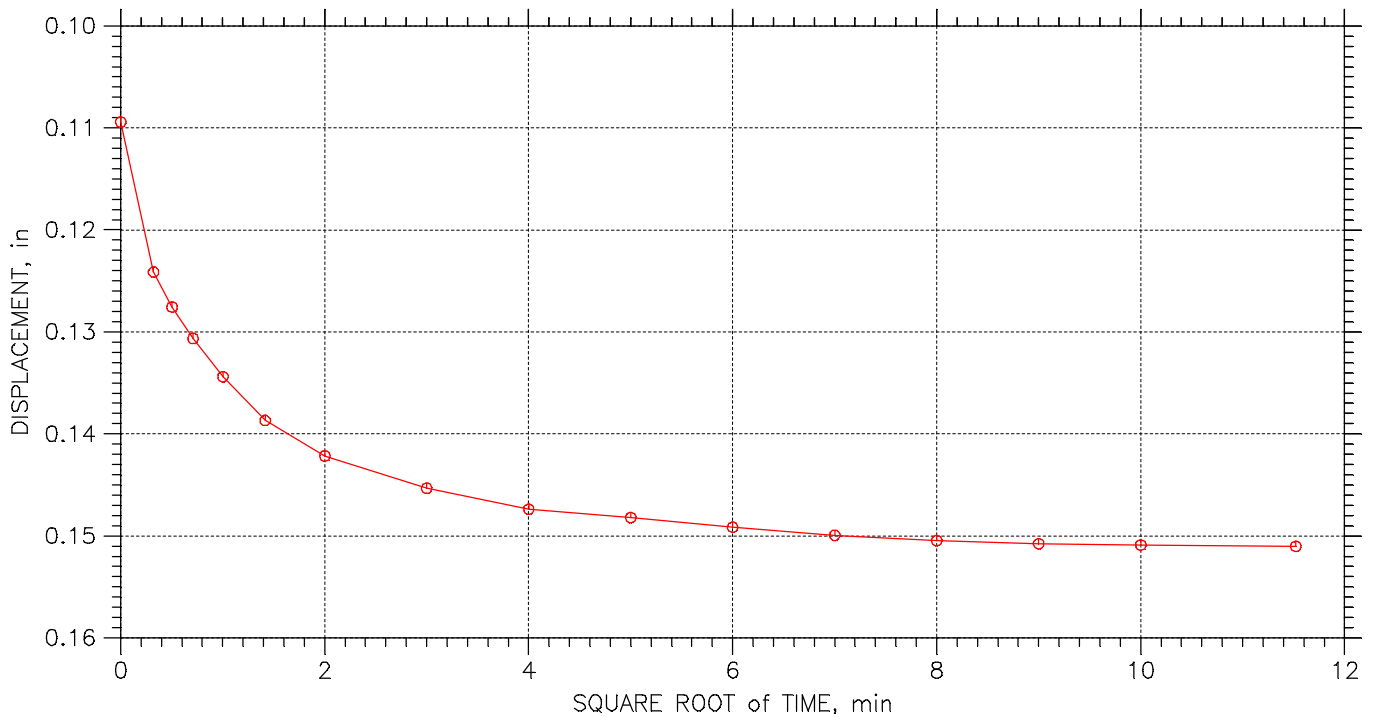
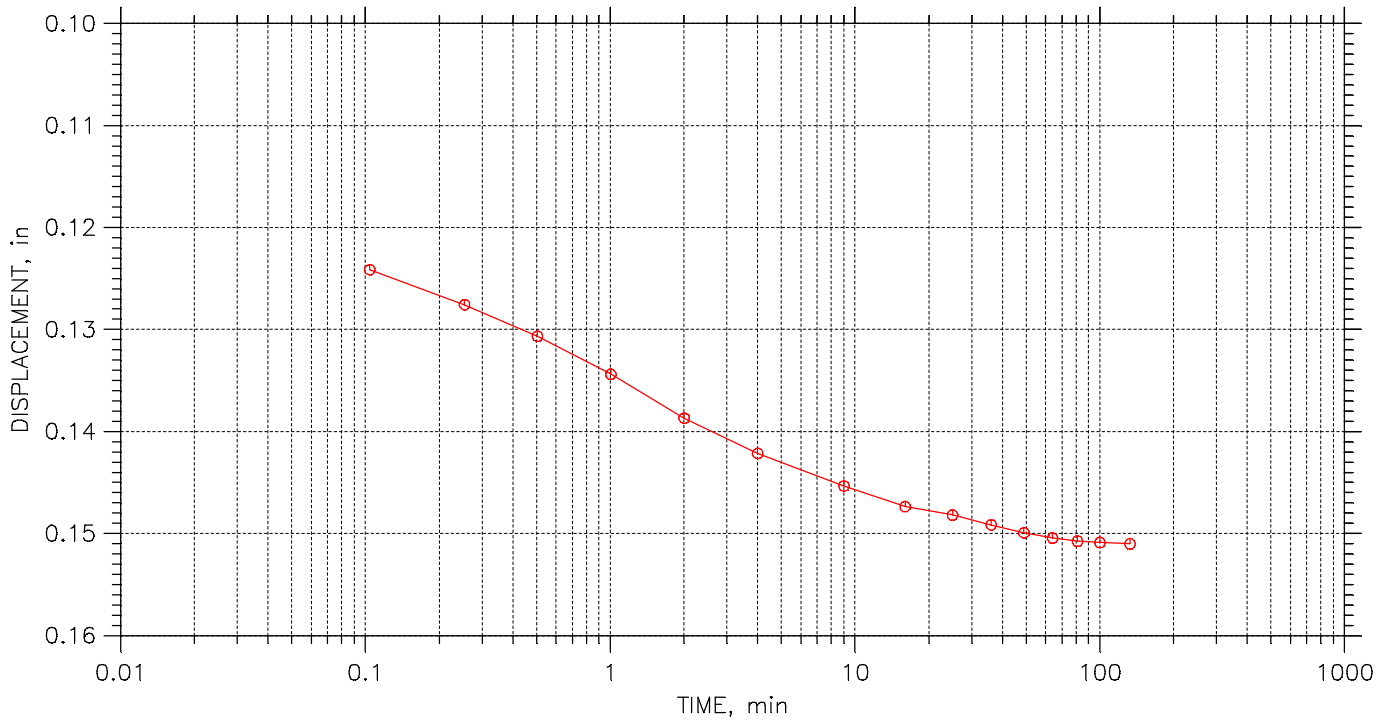
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	237		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 17 of 23

Stress: 16. tsf



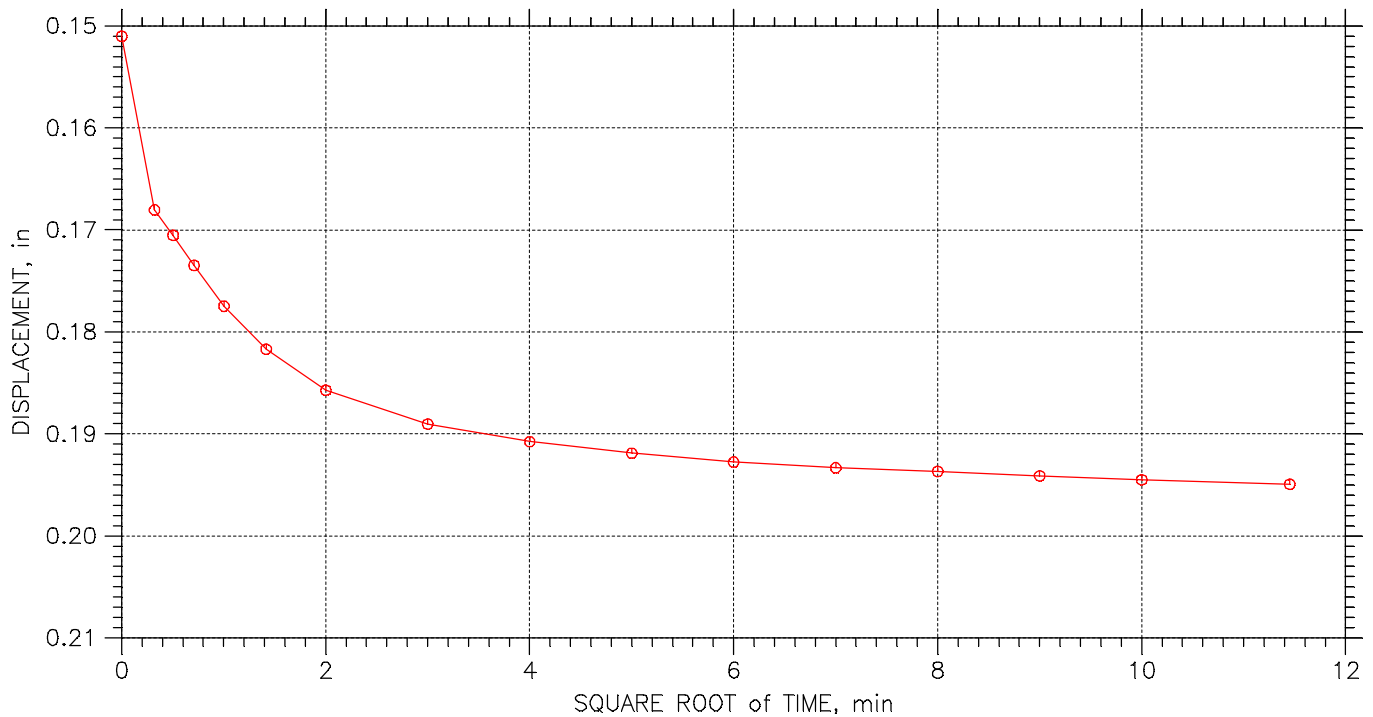
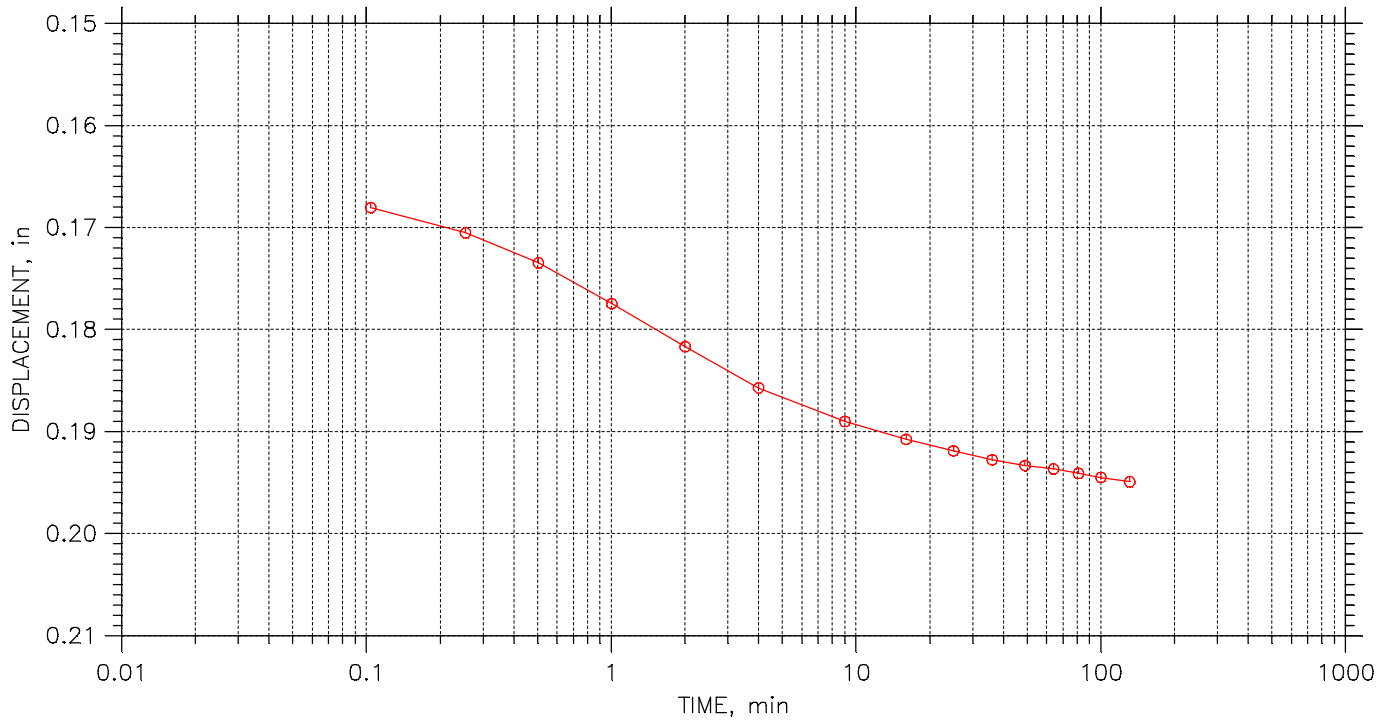
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
238			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 18 of 23

Stress: 32. tsf



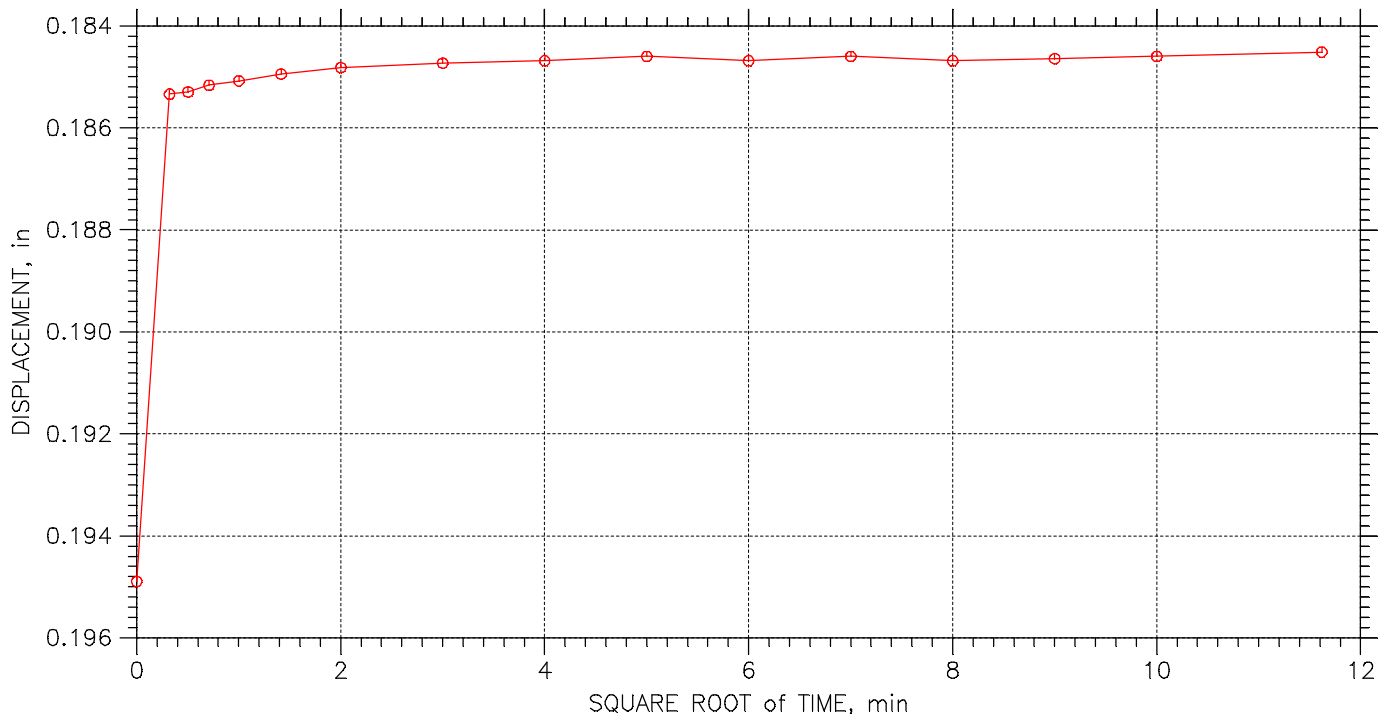
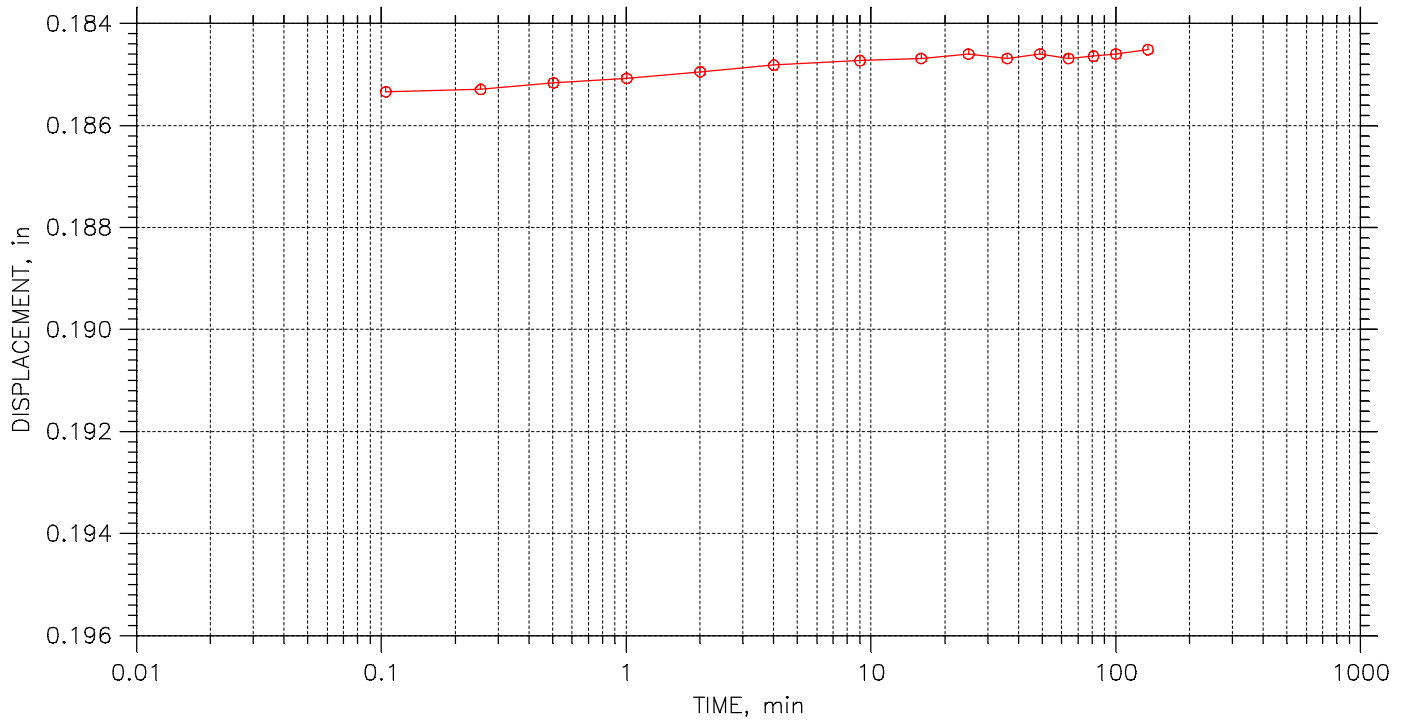
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
239			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 19 of 23

Stress: 16. tsf



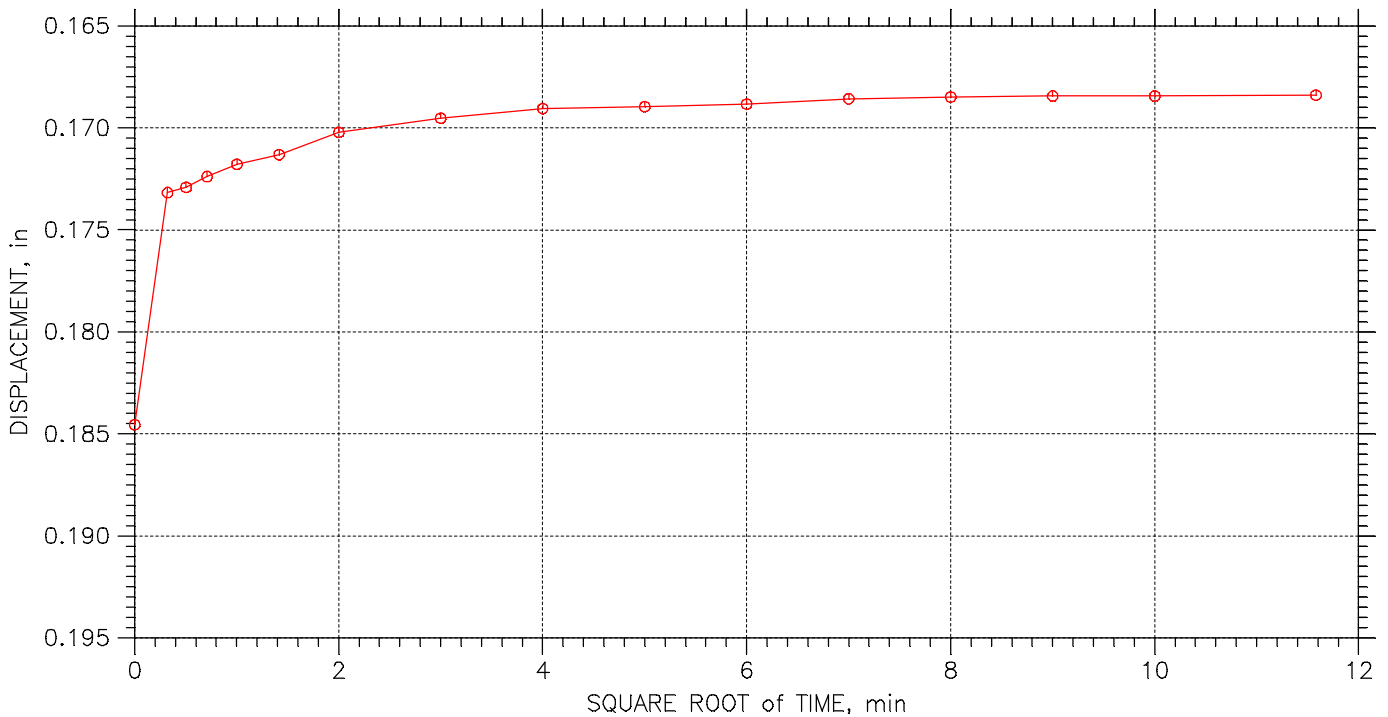
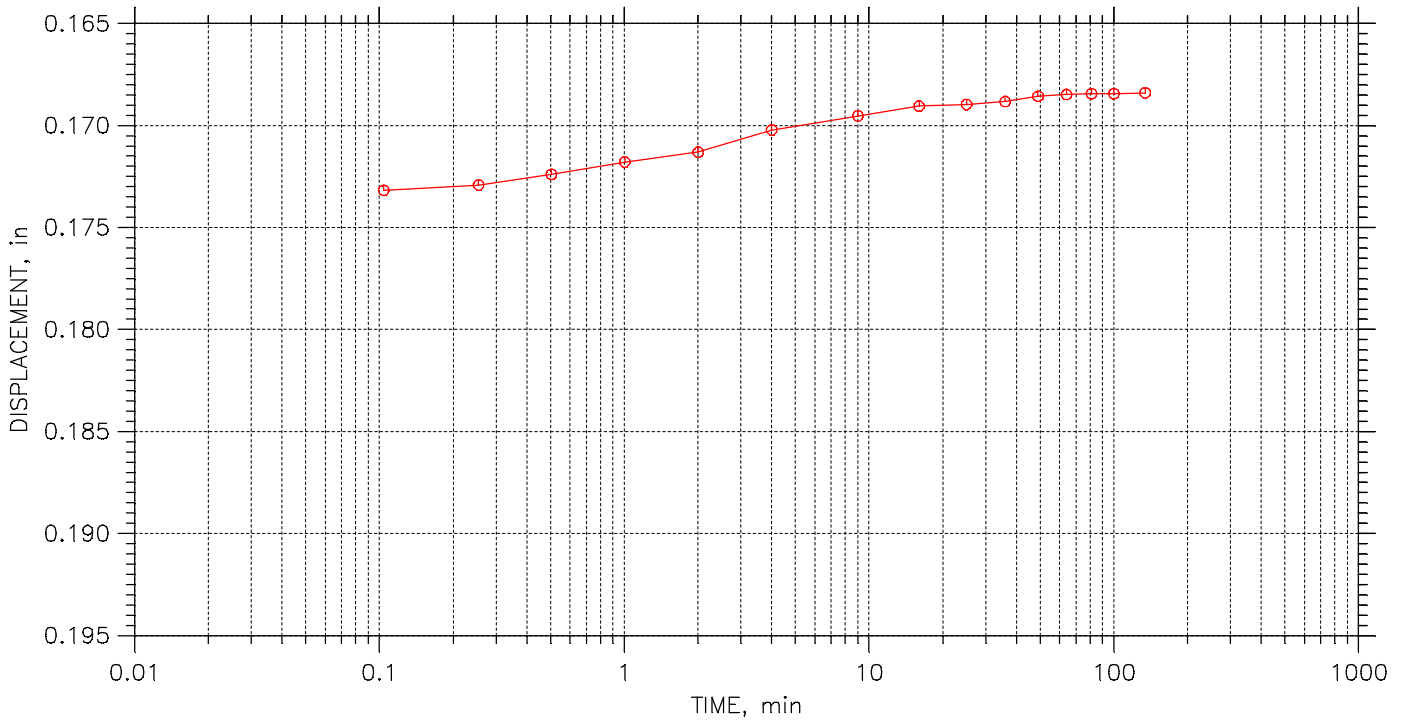
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	240		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 20 of 23

Stress: 4. tsf



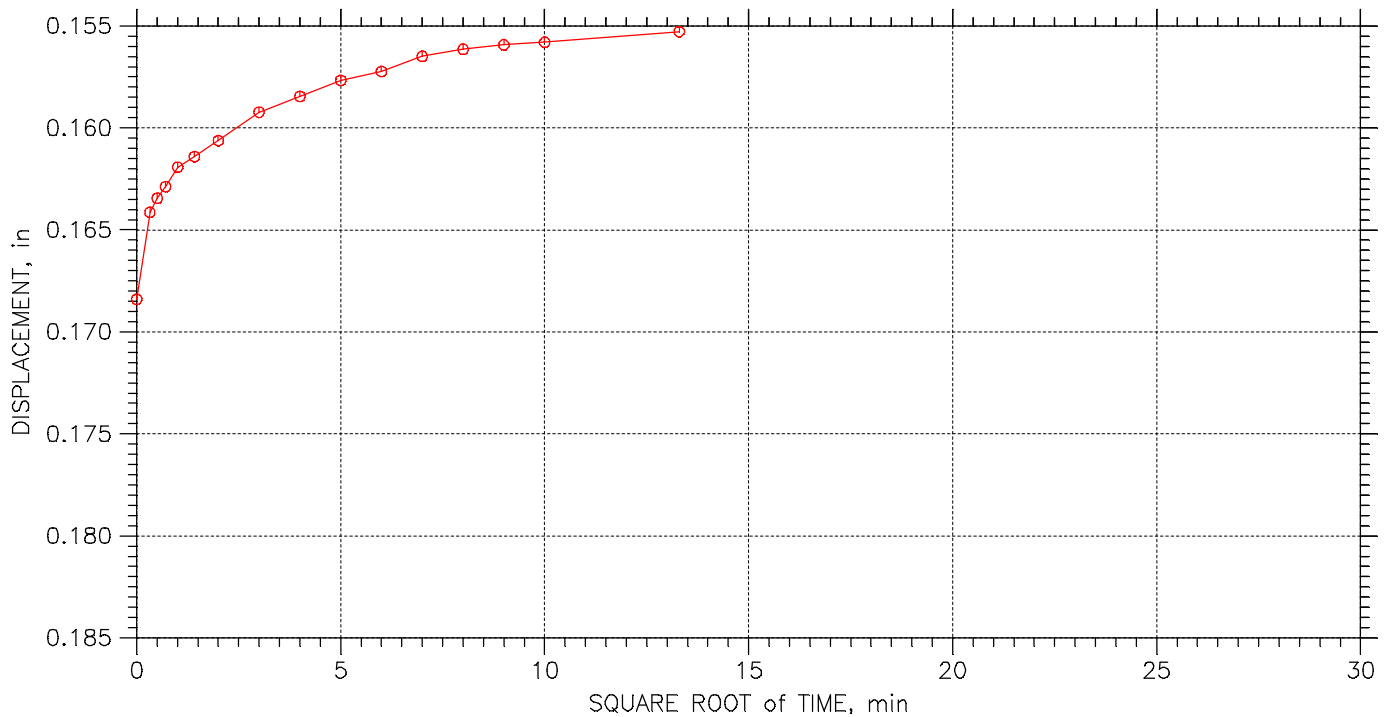
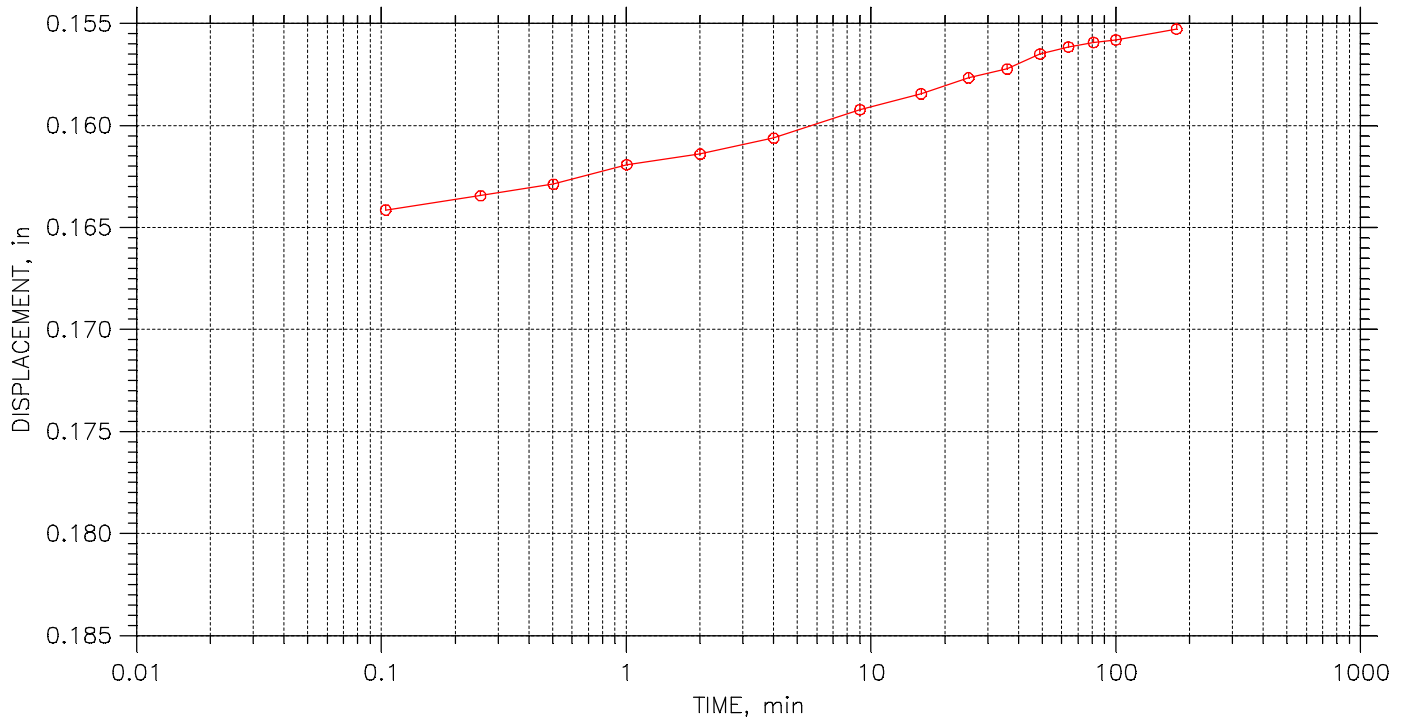
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
241			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 21 of 23

Stress: 1. tsf



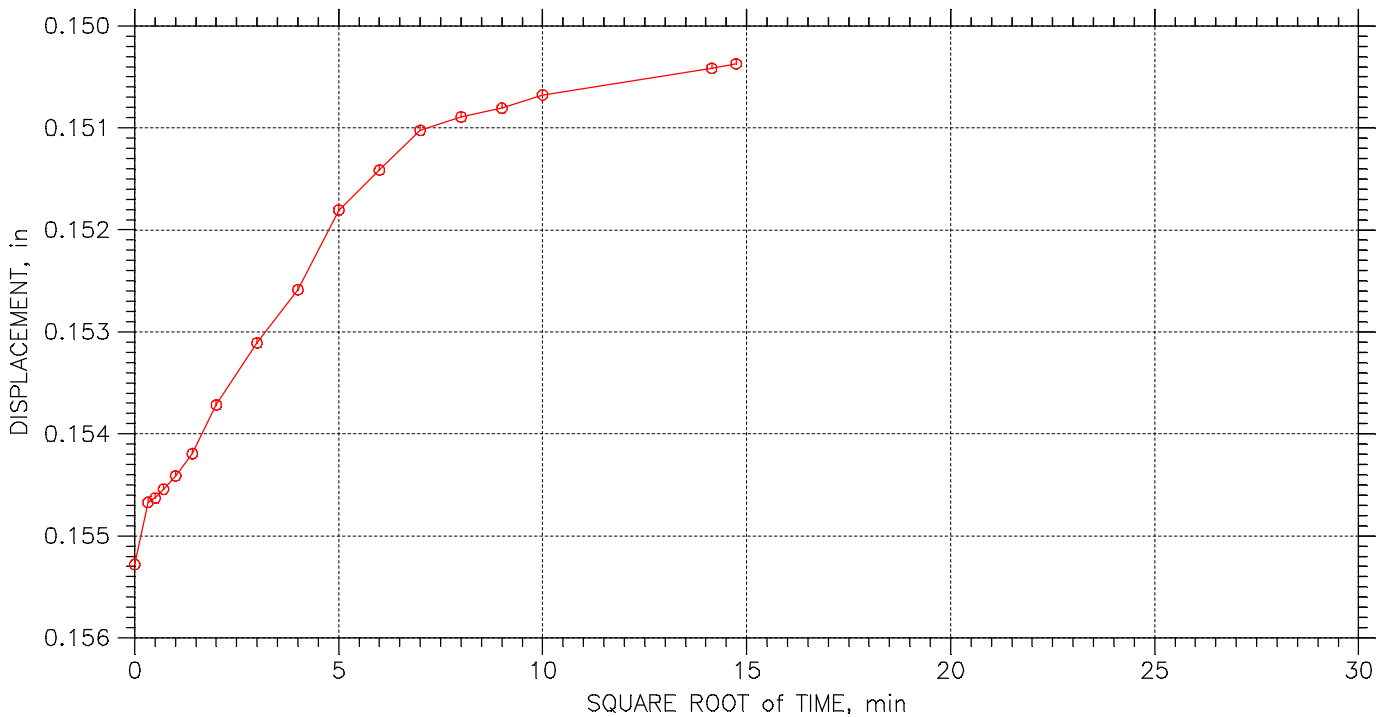
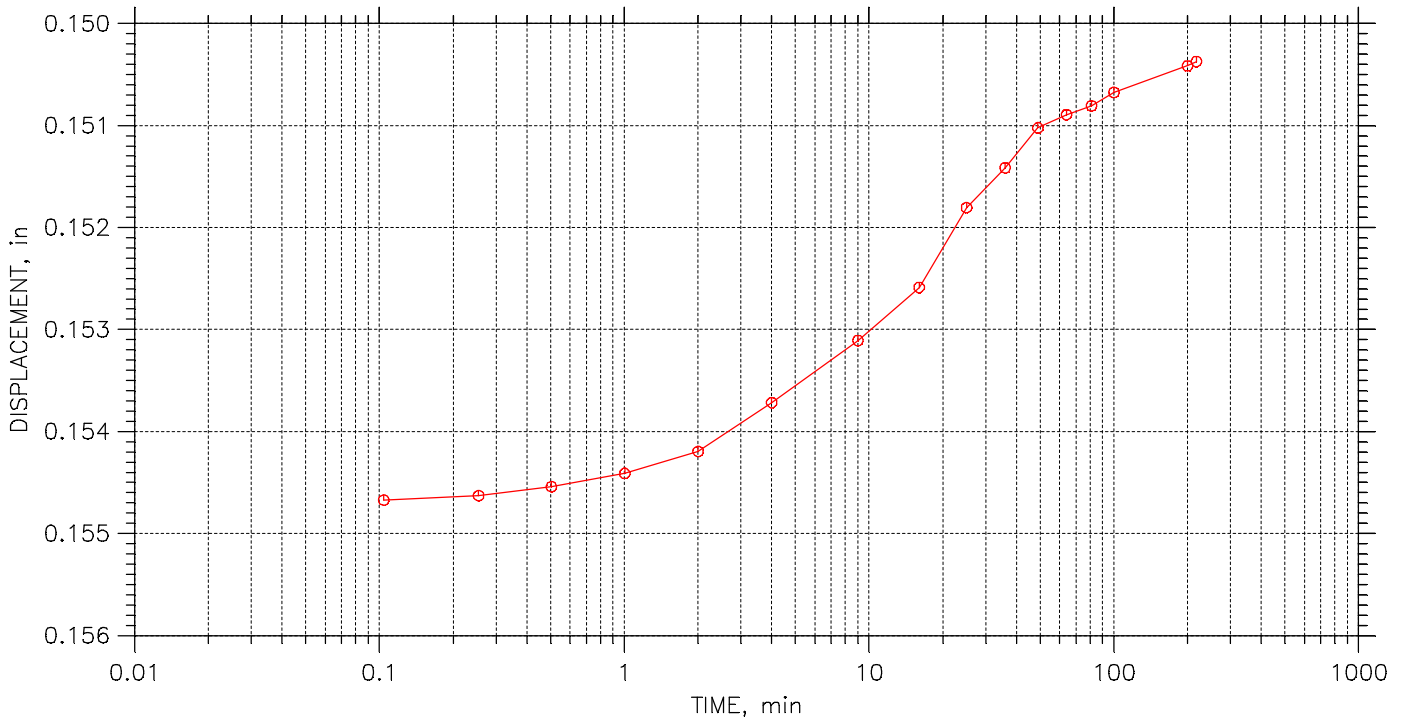
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	242		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 22 of 23

Stress: 0.5 tsf



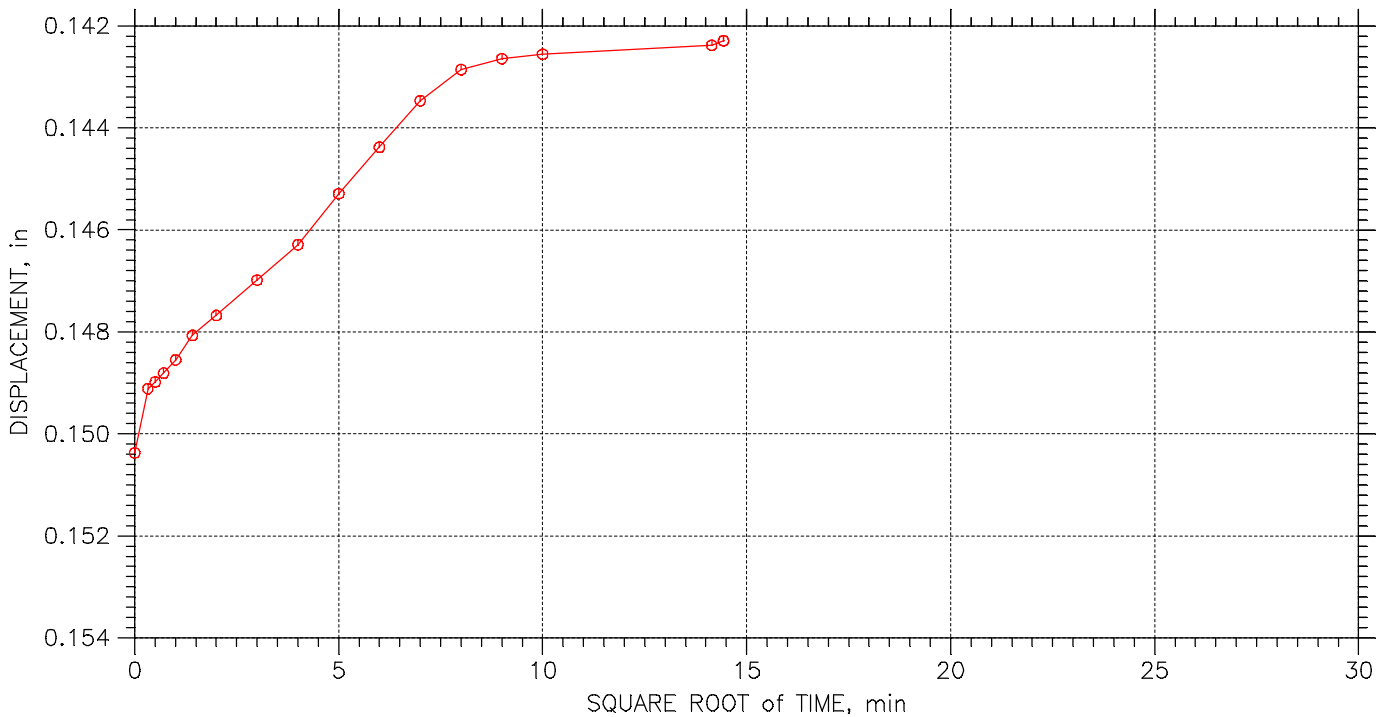
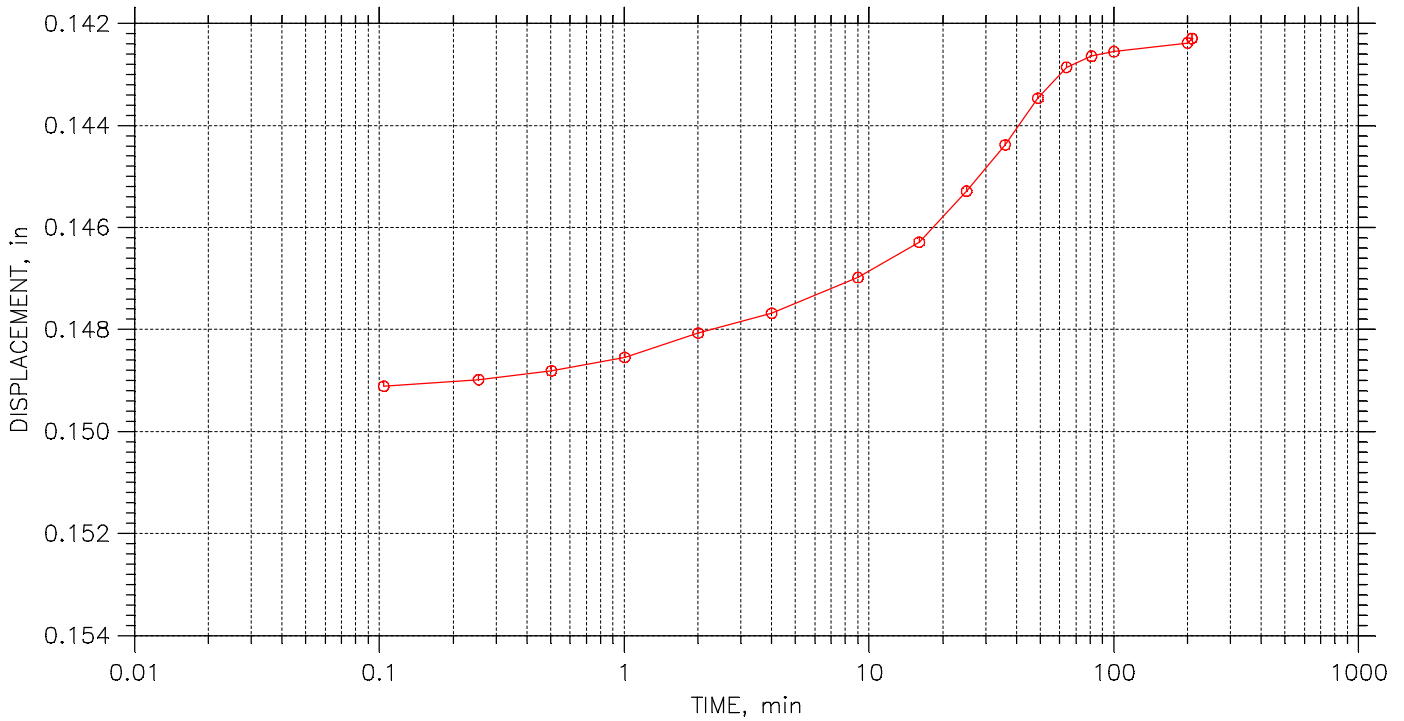
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
243			


CONSOLIDATION TEST DATA

TIME CURVES

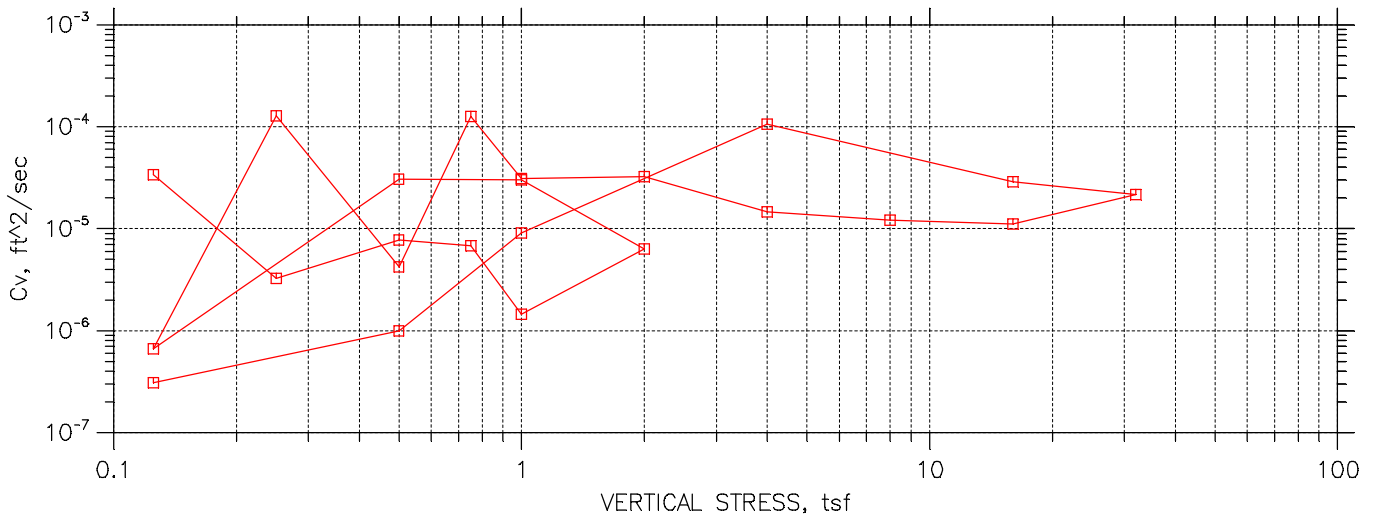
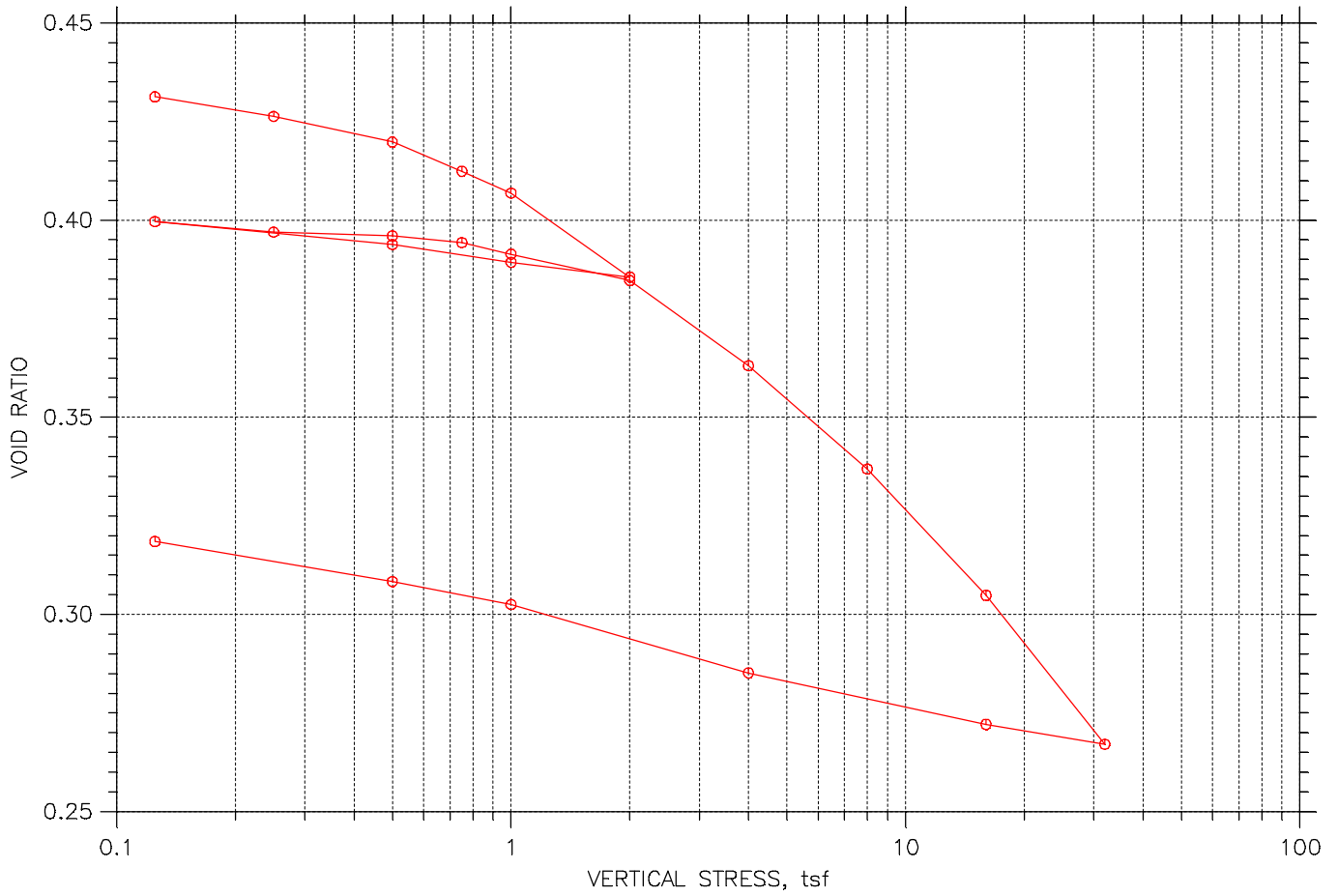
Constant Load Step: 23 of 23


Stress: 0.125 tsf



	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-016 S-7	Tested By: HP	Checked By: BCM
	Sample No.: S-7	Test Date: 12/13/15	Depth: 30.0'-22.0'
	Test No.: HENB016S7	Sample Type: 3.0" ST	Elevation: ----
	Description: VERY DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL		
	Remarks: Pc = 2.1 tsf Cc = 0.235 Ccr = 0.056 TEST PERFORMED AS PER ASTM D 2435		
	244		

ONE DIMENSIONAL CONSOLIDATION TEST ASTM D2435



	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	245		

CONSOLIDATION TEST DATA

Project: DYNERGY HENNEPIN
 Boring No.: HEN B020
 Sample No.: S-5
 Test No.: HENB020

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 9.5'-11.5'
 Elevation: -----



Soil Description: BROWN SANDY LEAN CLAY AND GRAVEL
 Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435

Estimated Specific Gravity: 2.72
 Initial Void Ratio: 0.44
 Final Void Ratio: 0.32

Liquid Limit: 0
 Plastic Limit: 0
 Plasticity Index: 0

Initial Height: 0.75 in
 Specimen Diameter: 2.50 in

Container ID	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
	X-1	RING	RING	X-9
Wt. Container + Wet Soil, gm	111.2	202.4	200.77	169.91
Wt. Container + Dry Soil, gm	102.93	187.19	187.19	152.25
Wt. Container, gm	44.86	73.34	73.34	4.21
Wt. Dry Soil, gm	58.07	113.85	113.85	148.04
Water Content, %	14.24	13.36	11.93	11.93
Void Ratio	---	0.44	0.32	---
Degree of Saturation, %	---	82.94	101.88	---
Dry Unit Weight, pcf	---	118.07	128.79	---

CONSOLIDATION TEST DATA

Project: DYNERGY HENNEPIN
 Boring No.: HEN B020
 Sample No.: S-5
 Test No.: HENB020

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 9.5'-11.5'
 Elevation: -----



Soil Description: BROWN SANDY LEAN CLAY AND GRAVEL
 Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435

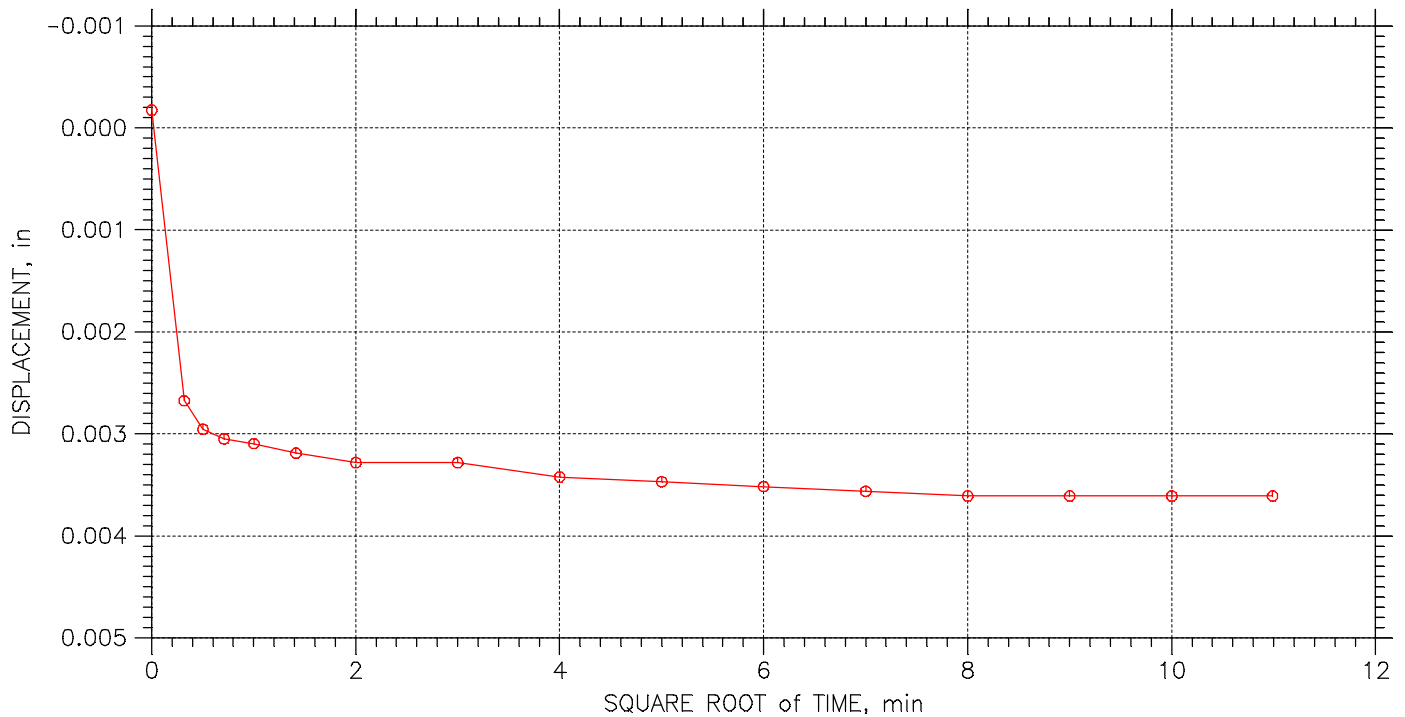
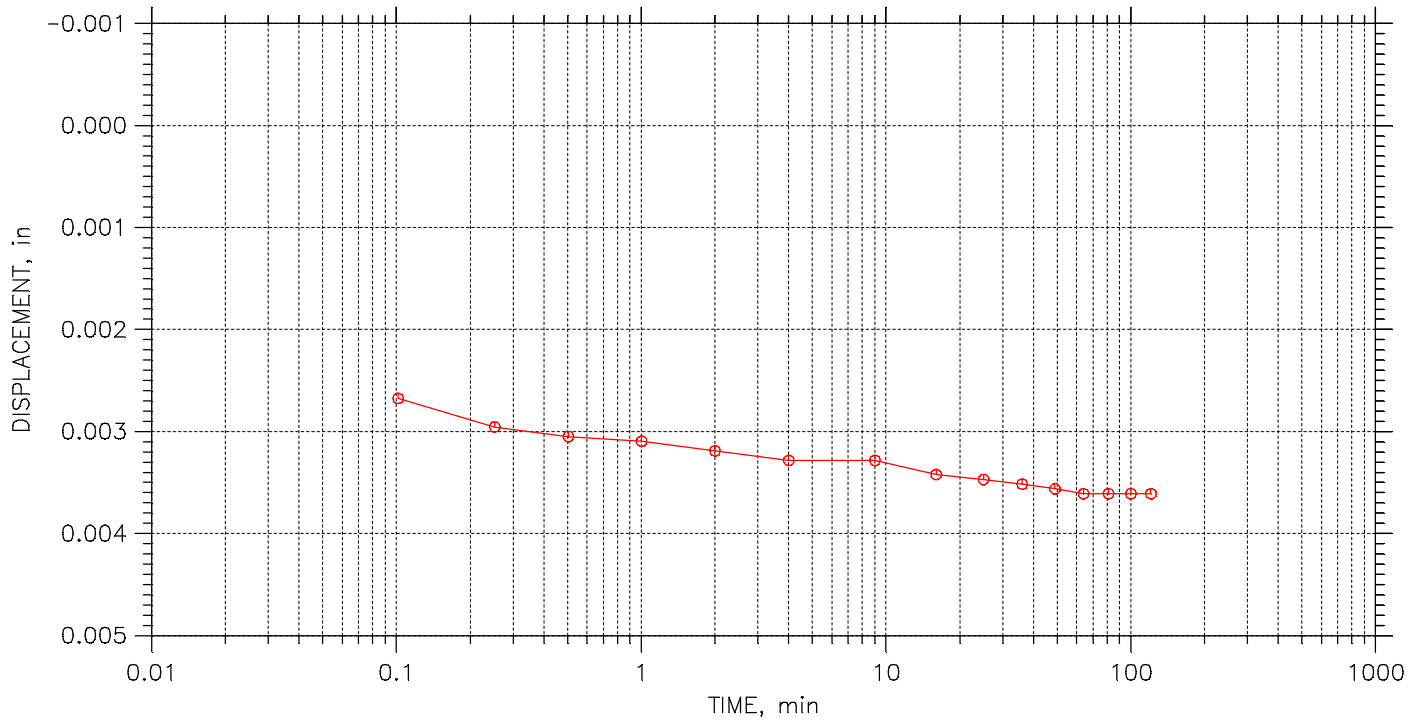
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting		Coefficient of Consolidation		
					Sq.Rt. min	Log min	Sq.Rt. ft^2/sec	Log ft^2/sec	Ave. ft^2/sec
1	0.125	0.00361	0.431	0.48	0.1	0.0	3.40e-005	0.00e+000	3.40e-005
2	0.25	0.006166	0.426	0.82	1.0	0.0	3.26e-006	0.00e+000	3.26e-006
3	0.5	0.009553	0.420	1.28	0.4	0.0	7.74e-006	0.00e+000	7.74e-006
4	0.75	0.01341	0.412	1.79	0.5	0.0	6.84e-006	0.00e+000	6.84e-006
5	1	0.01633	0.407	2.18	2.1	0.5	1.46e-006	6.72e-006	2.40e-006
6	2	0.02736	0.386	3.66	0.5	0.0	6.30e-006	0.00e+000	6.30e-006
7	1	0.02531	0.389	3.39	0.1	0.0	3.04e-005	0.00e+000	3.04e-005
8	0.5	0.02311	0.394	3.09	0.1	0.0	3.06e-005	0.00e+000	3.06e-005
9	0.125	0.02032	0.399	2.72	0.9	0.0	3.23e-006	0.00e+000	3.23e-006
10	0.25	0.02154	0.397	2.88	0.1	0.0	3.18e-005	0.00e+000	3.18e-005
11	0.5	0.02194	0.396	2.94	0.2	0.0	1.52e-005	0.00e+000	1.52e-005
12	0.75	0.02305	0.394	3.08	0.1	0.0	3.12e-005	0.00e+000	3.12e-005
13	1	0.02438	0.391	3.26	0.1	0.0	2.54e-005	0.00e+000	2.54e-005
14	2	0.02792	0.384	3.73	0.1	0.0	3.25e-005	0.00e+000	3.25e-005
15	4	0.03906	0.363	5.22	0.2	0.0	1.45e-005	0.00e+000	1.45e-005
16	8	0.05266	0.337	7.04	0.2	0.0	1.22e-005	0.00e+000	1.22e-005
17	16	0.06932	0.305	9.27	0.2	0.0	1.11e-005	0.00e+000	1.11e-005
18	32	0.08893	0.267	11.90	0.1	0.0	2.17e-005	0.00e+000	2.17e-005
19	16	0.08627	0.272	11.54	0.1	0.0	2.47e-005	0.00e+000	2.47e-005
20	4	0.07955	0.285	10.64	0.0	0.0	1.06e-004	0.00e+000	1.06e-004
21	1	0.07068	0.302	9.45	0.3	0.0	9.06e-006	0.00e+000	9.06e-006
22	0.5	0.06777	0.308	9.07	9.7	0.0	2.72e-007	0.00e+000	2.72e-007
23	0.125	0.06223	0.318	8.32	8.3	8.9	3.20e-007	3.00e-007	3.10e-007


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 23

Stress: 0.125 tsf



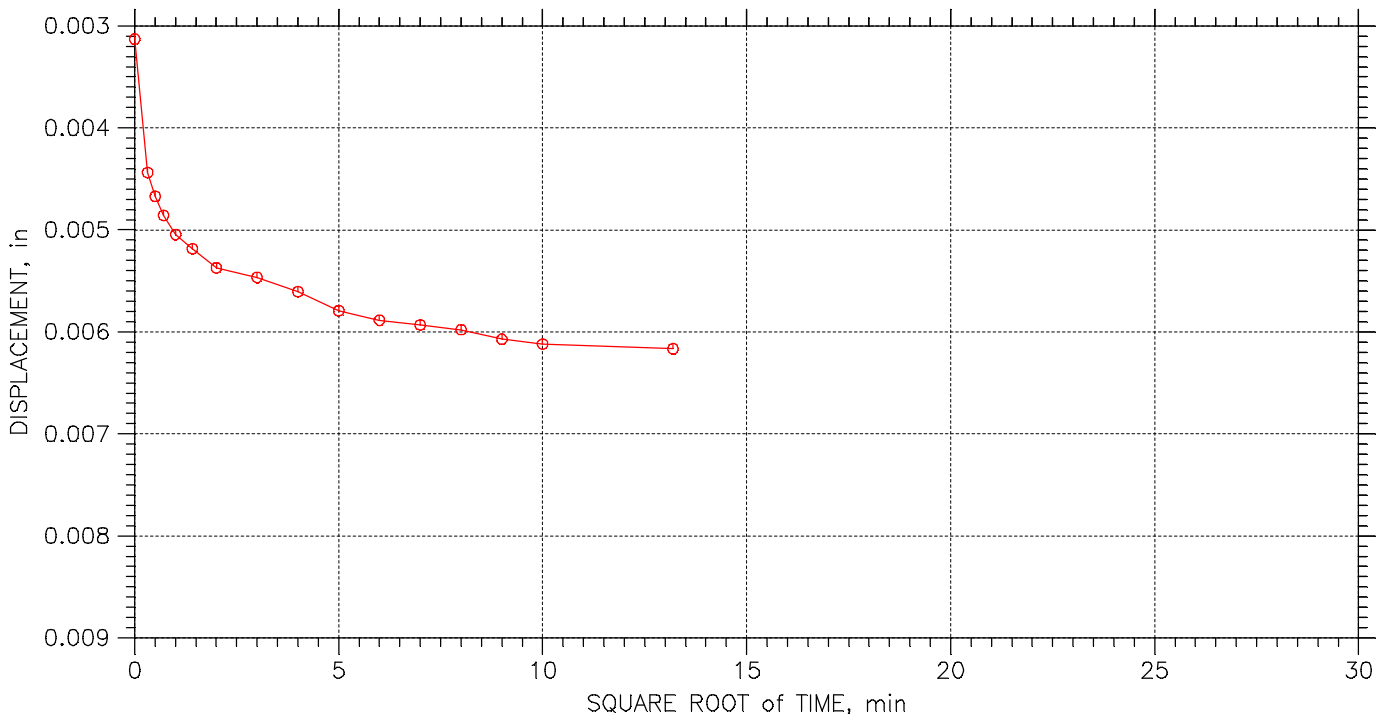
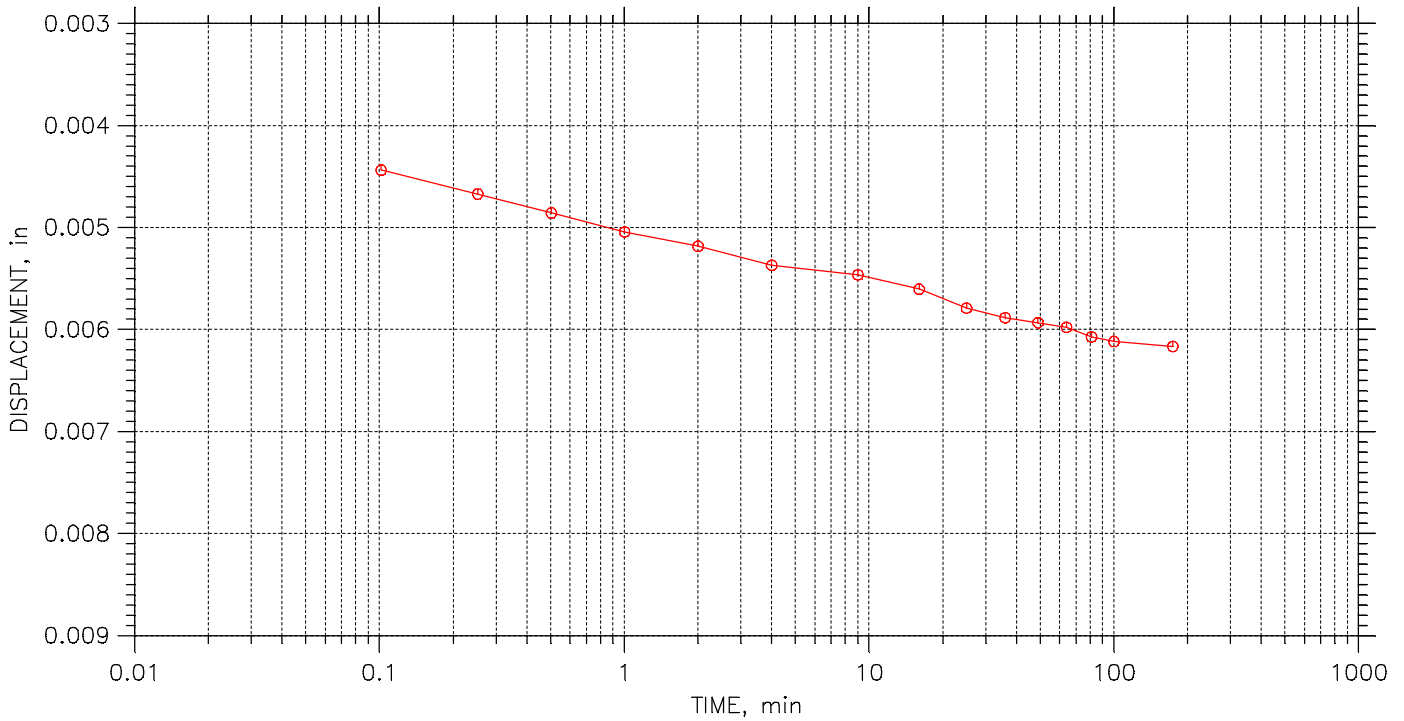
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	248		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 23

Stress: 0.25 tsf



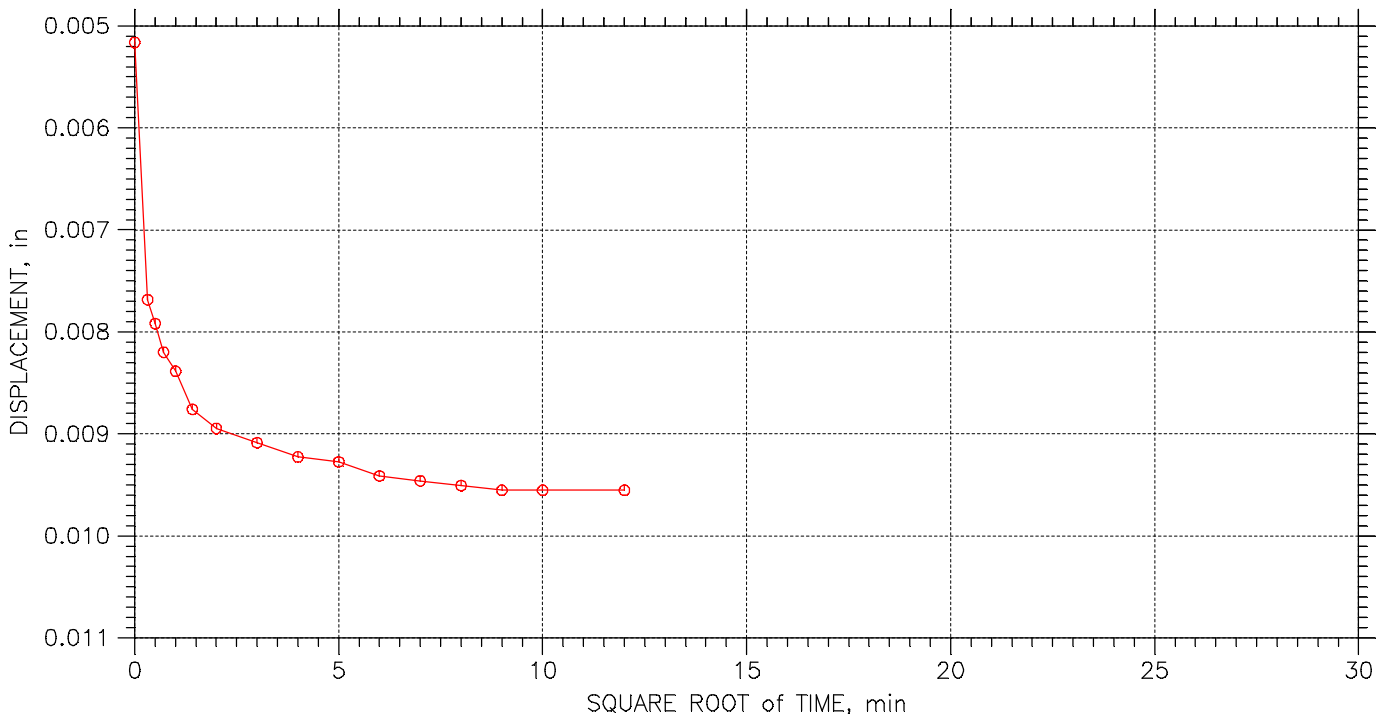
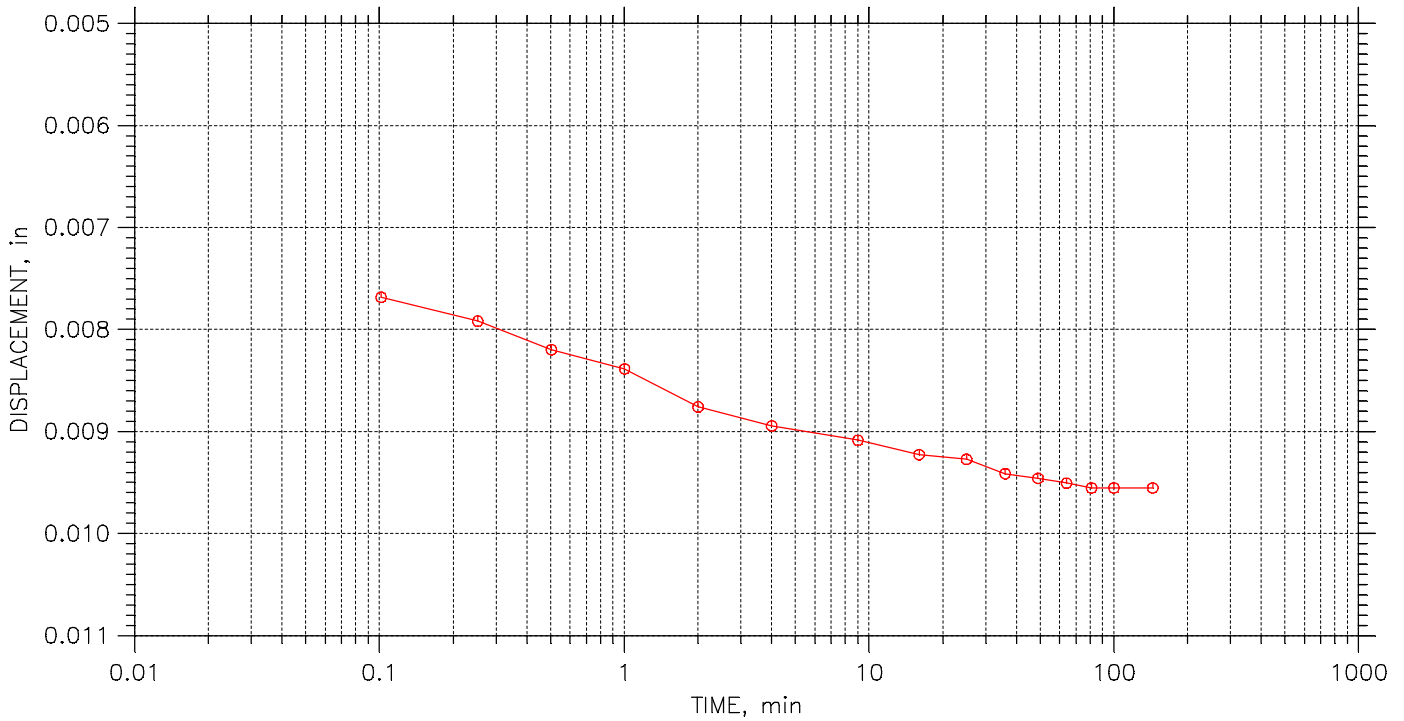
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	249		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 23

Stress: 0.5 tsf



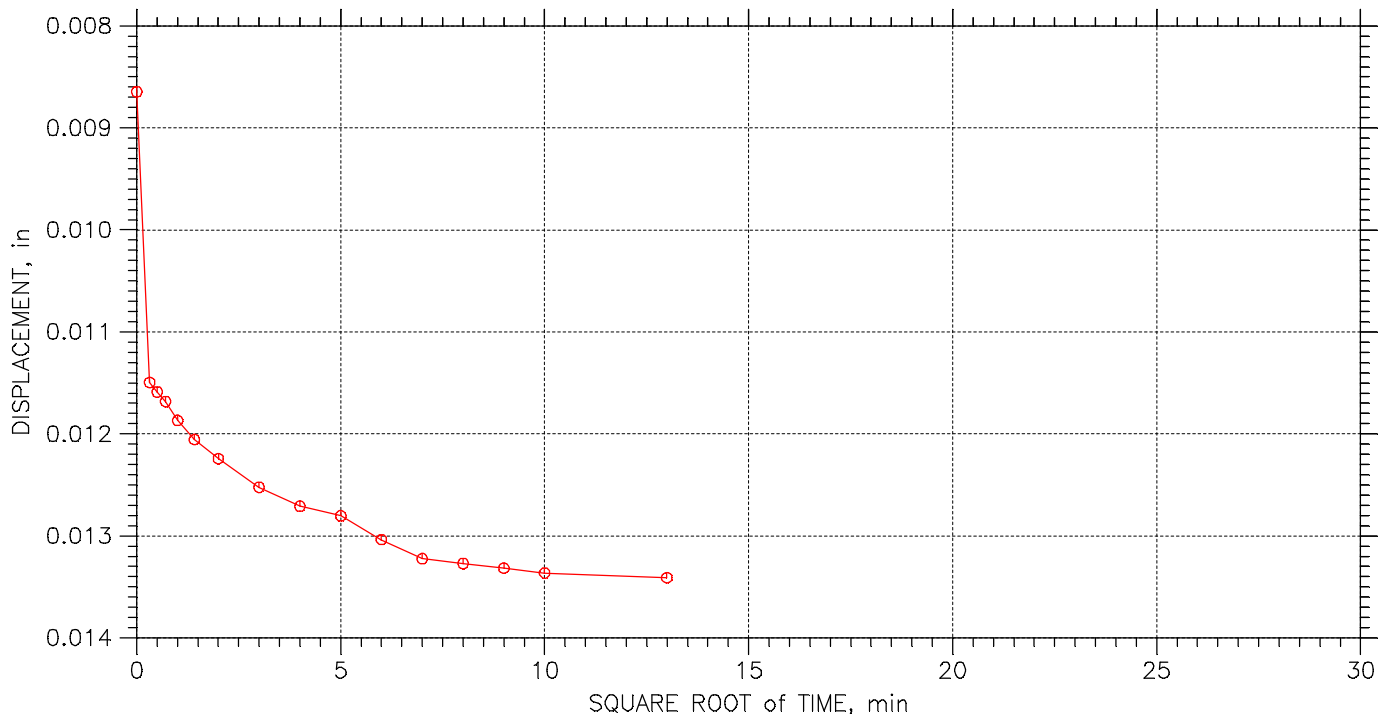
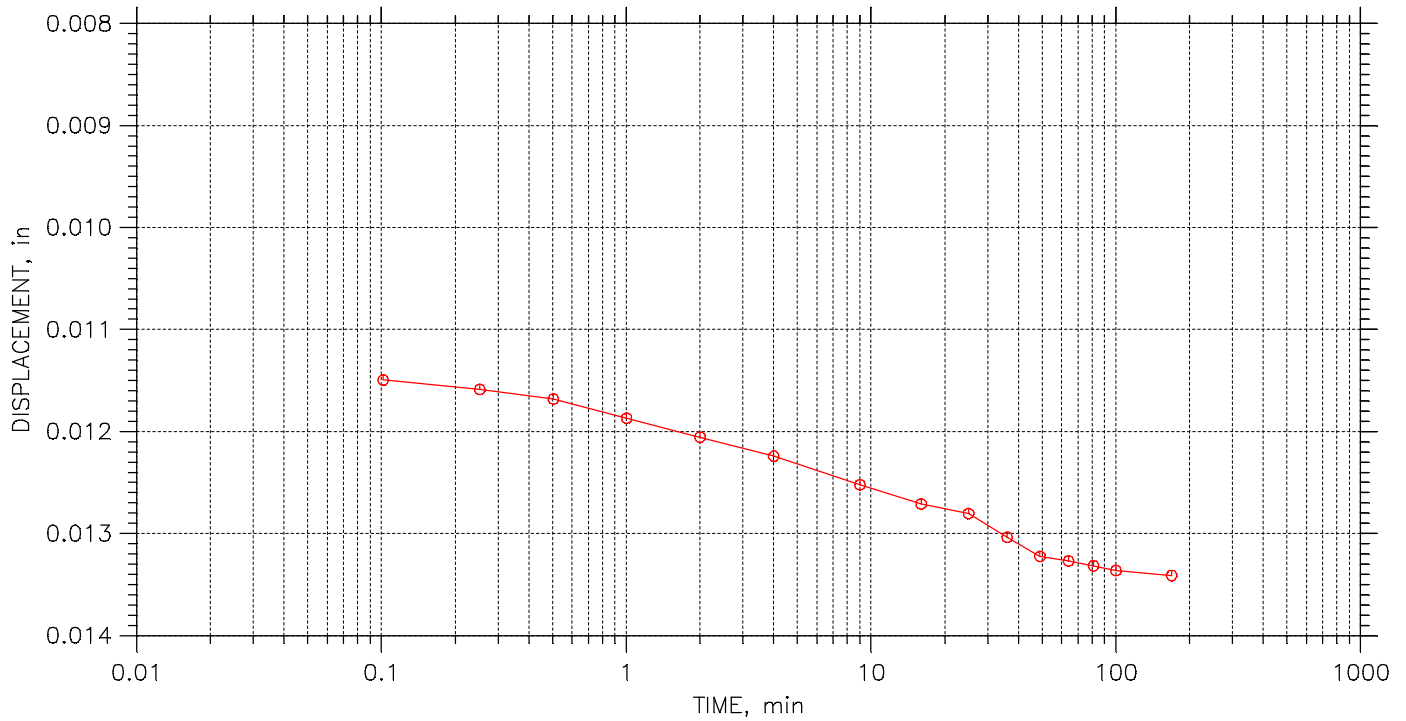
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	250		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 23

Stress: 0.75 tsf



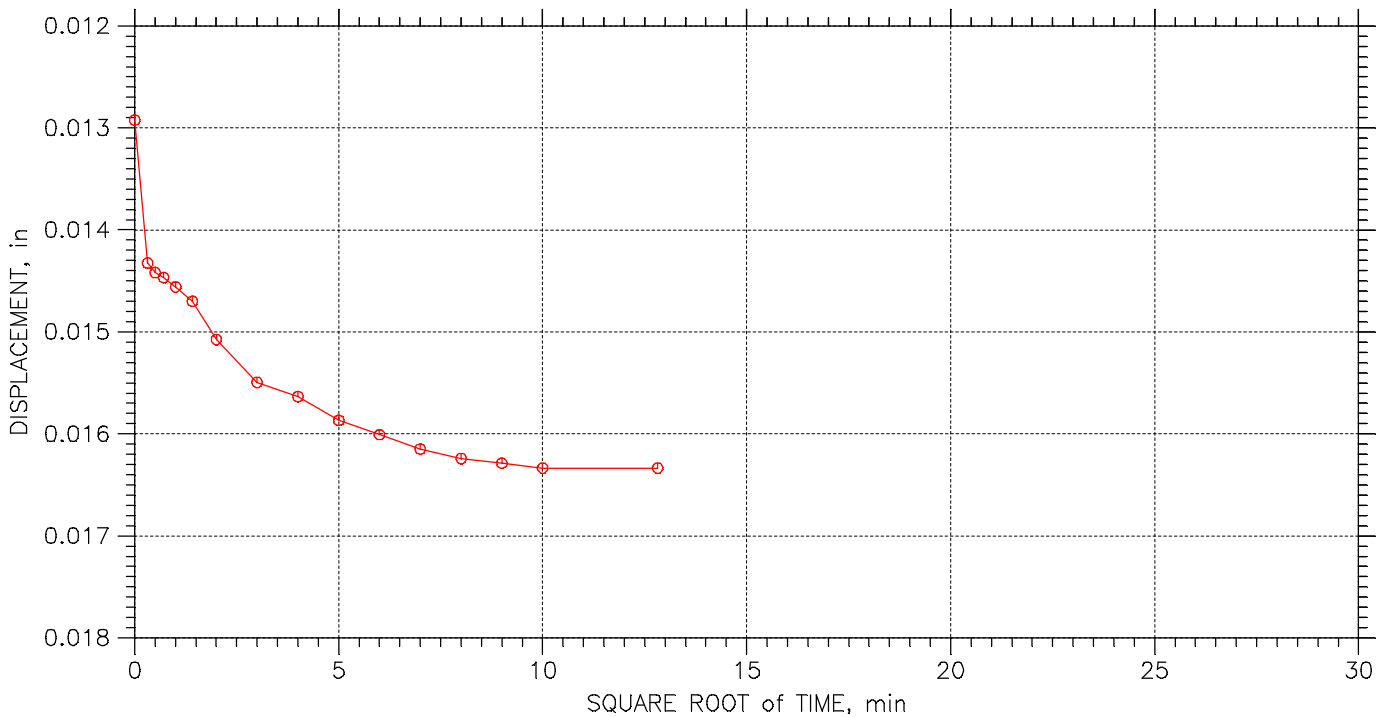
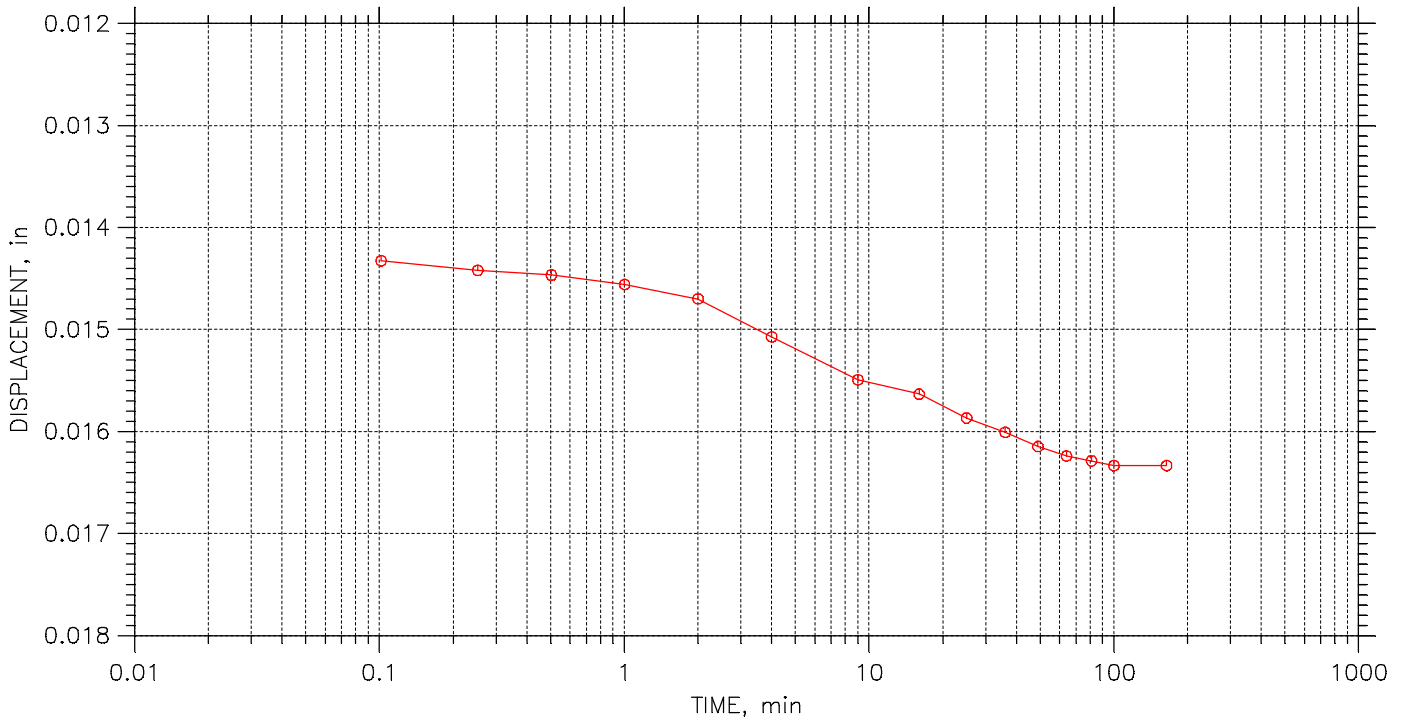
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
251			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 23

Stress: 1. tsf



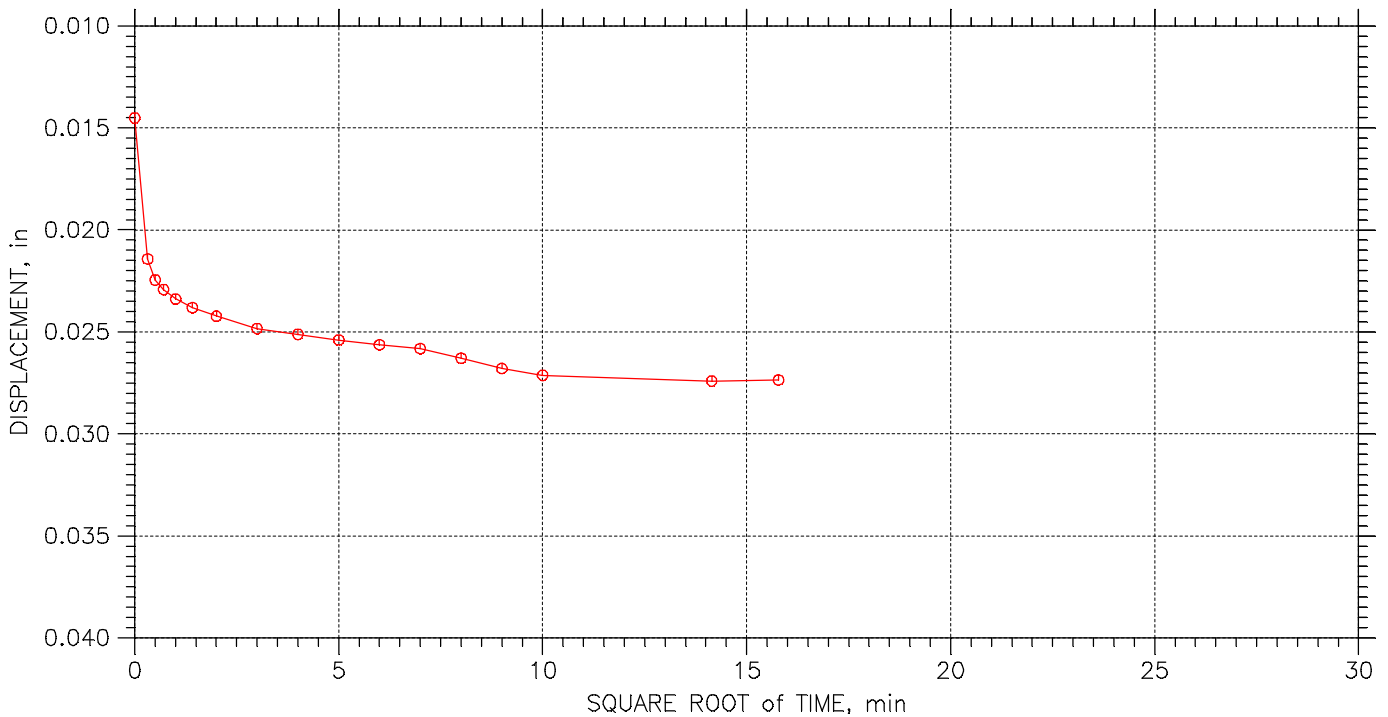
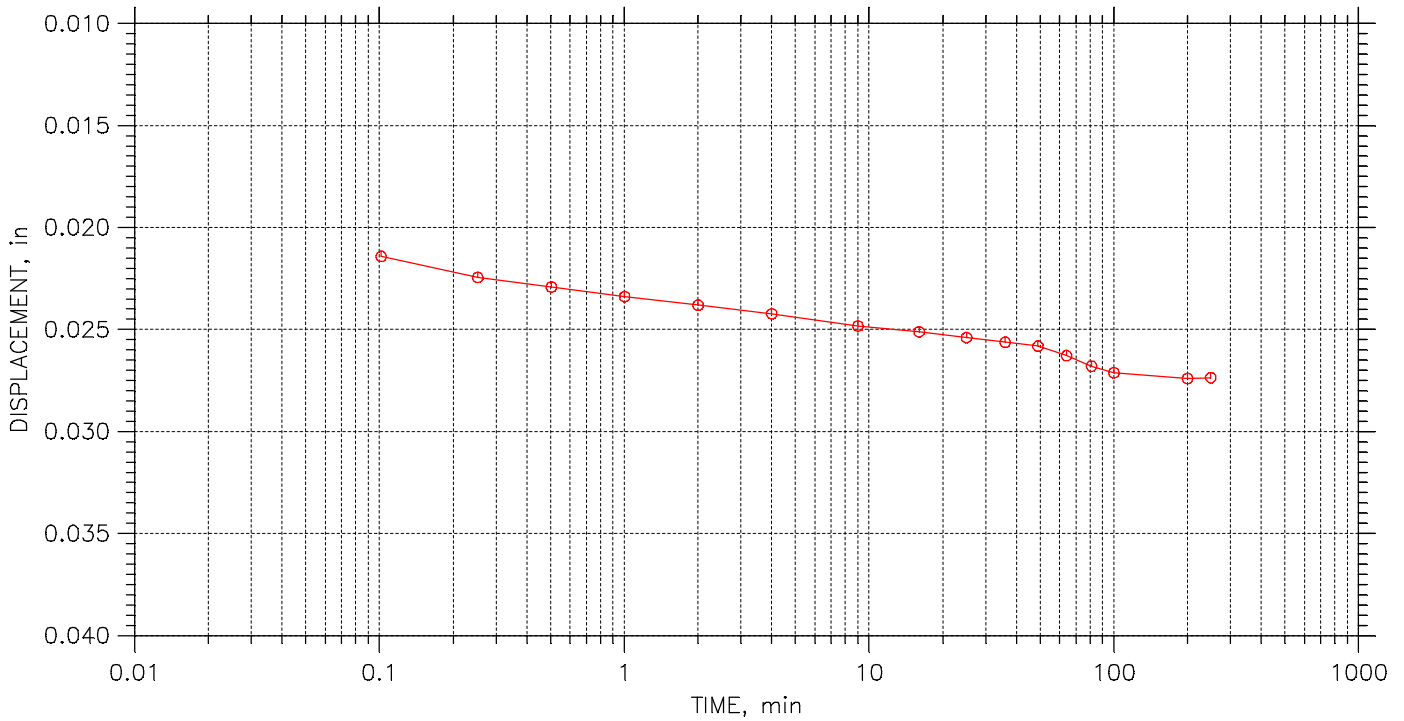
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
252			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 23

Stress: 2. tsf



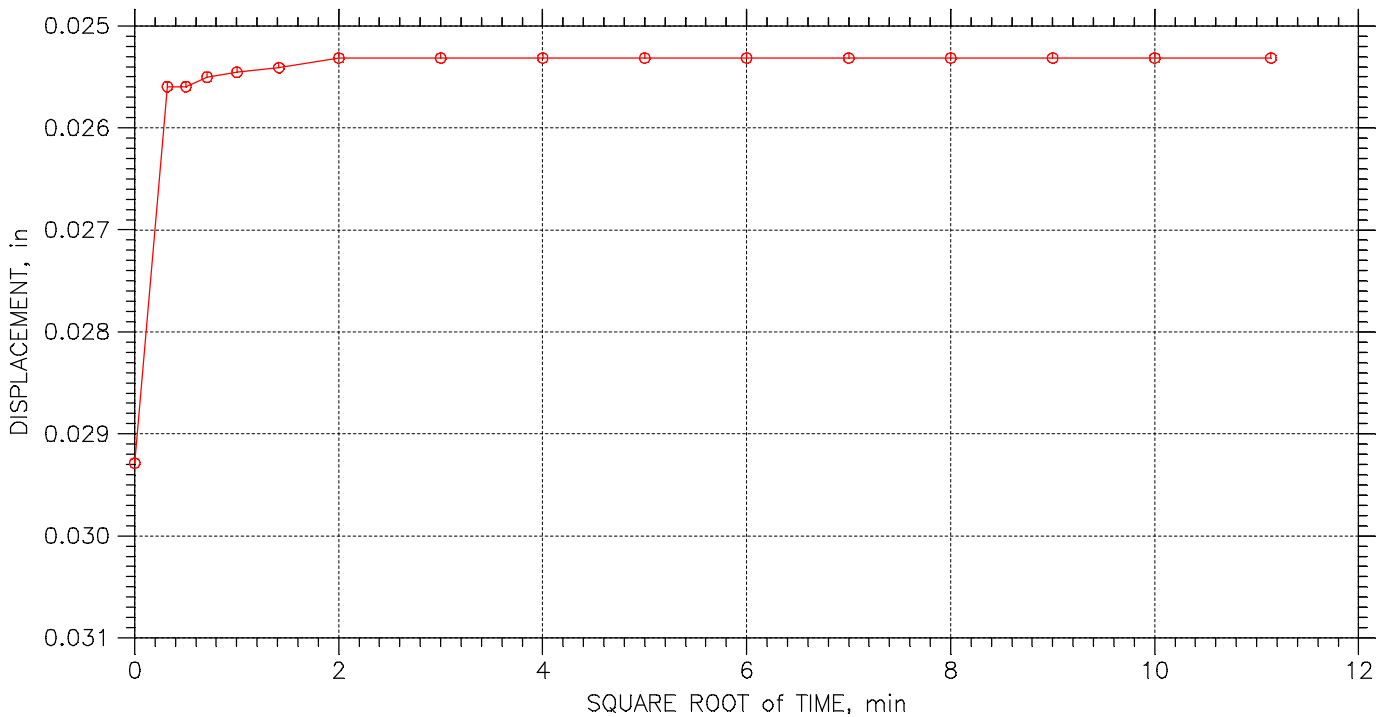
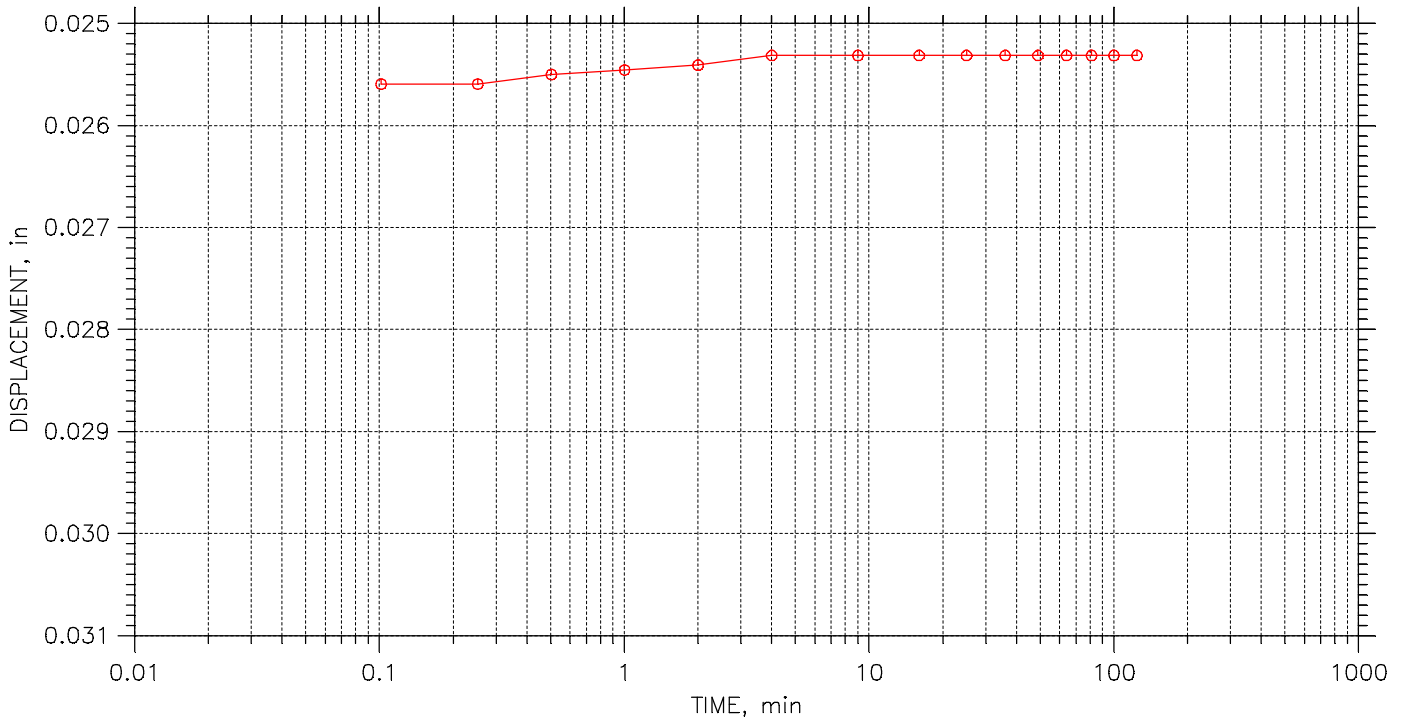
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	253		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 23

Stress: 1. tsf



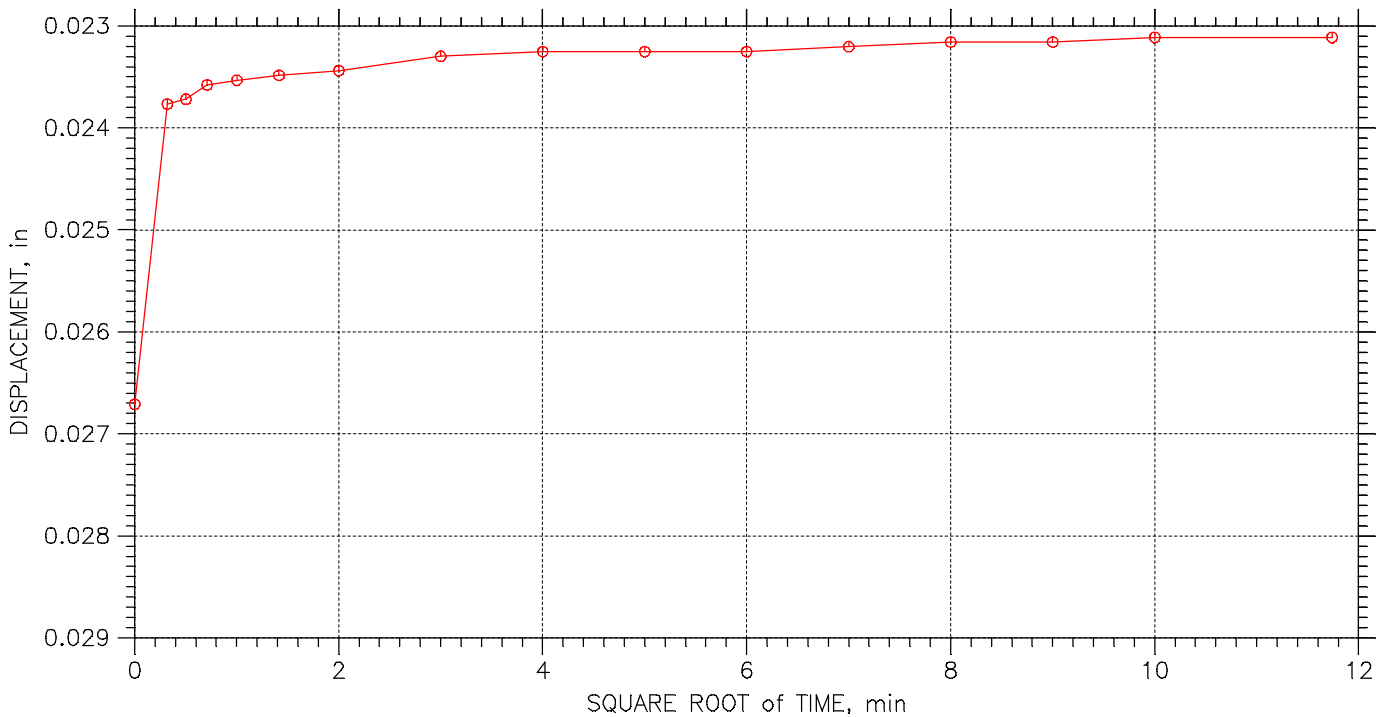
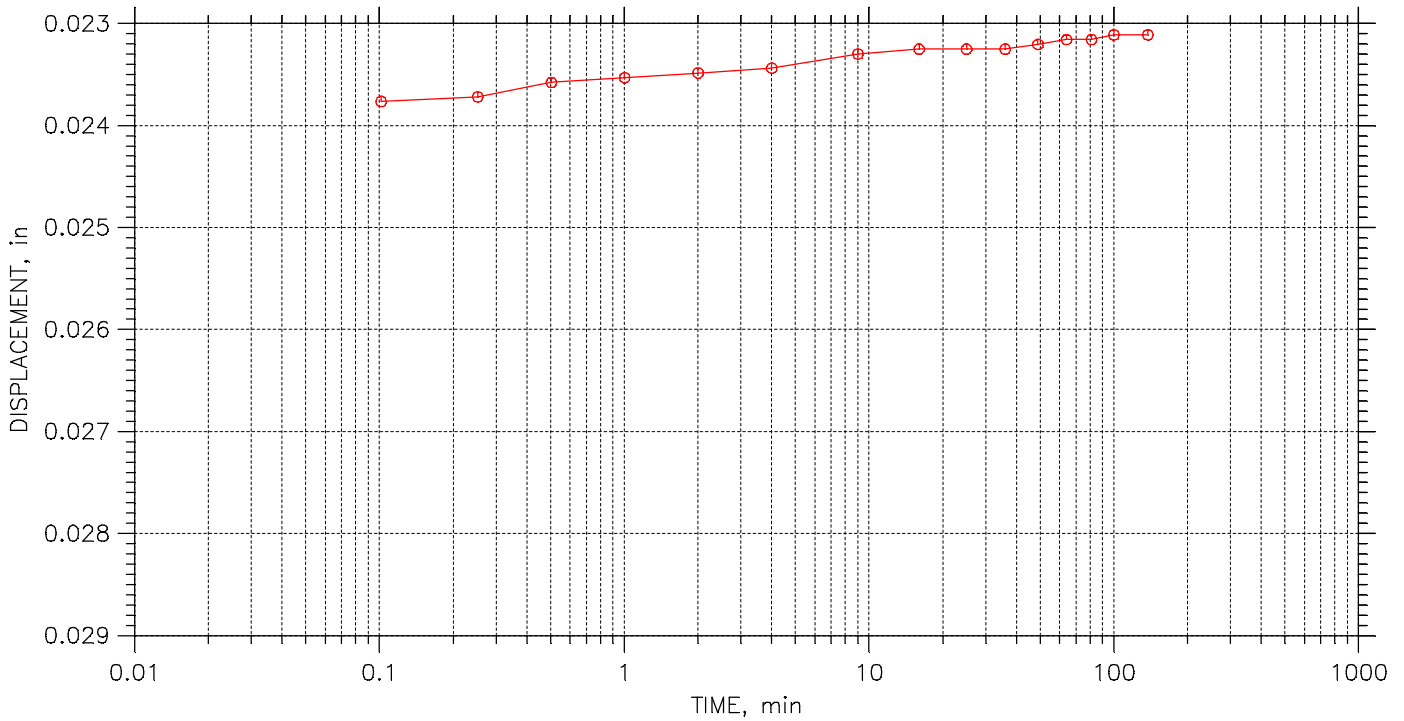
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	254		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 23

Stress: 0.5 tsf



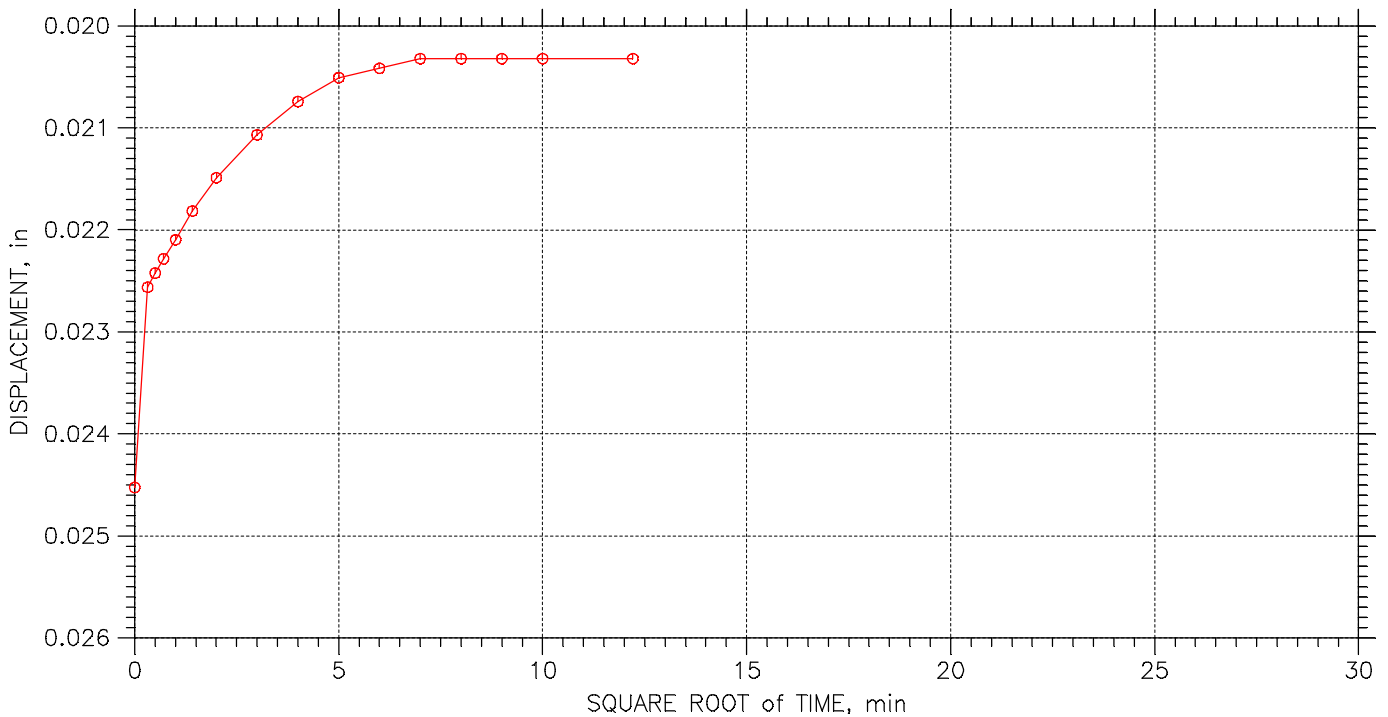
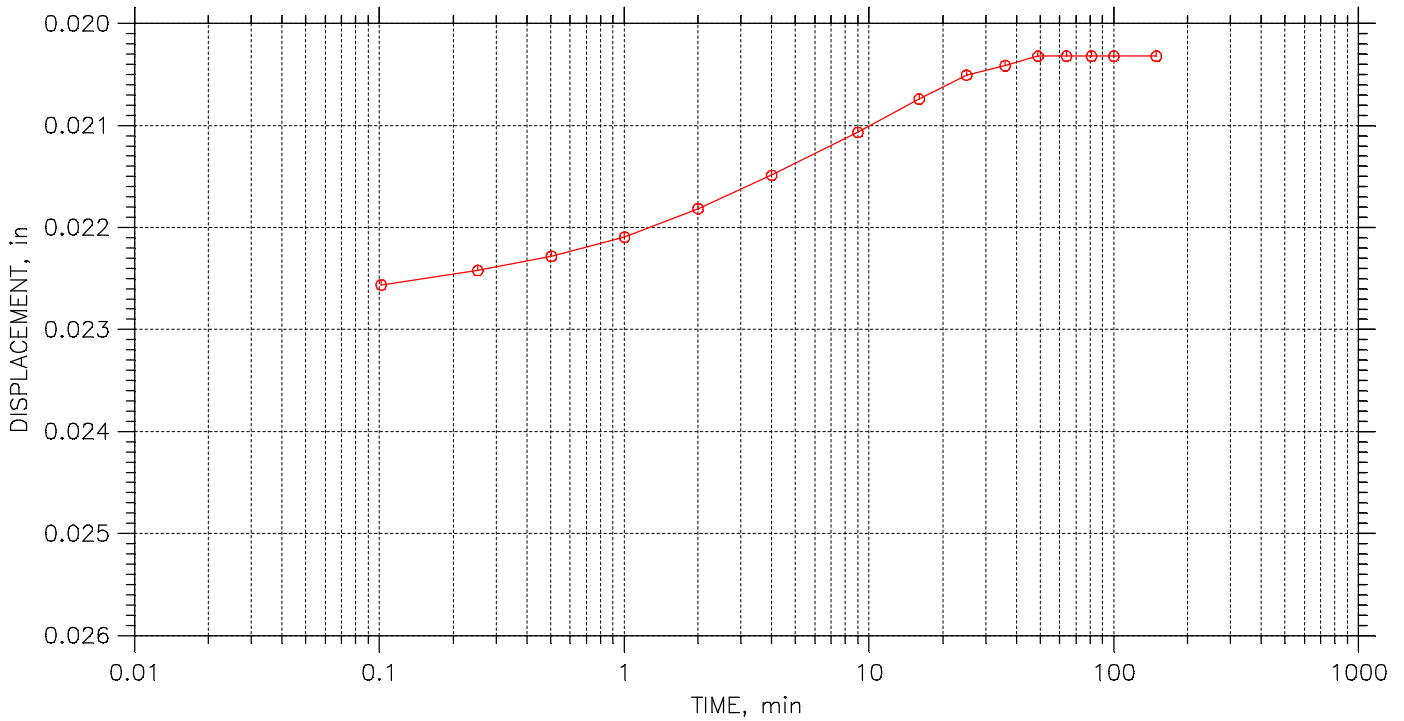
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	255		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 23

Stress: 0.125 tsf



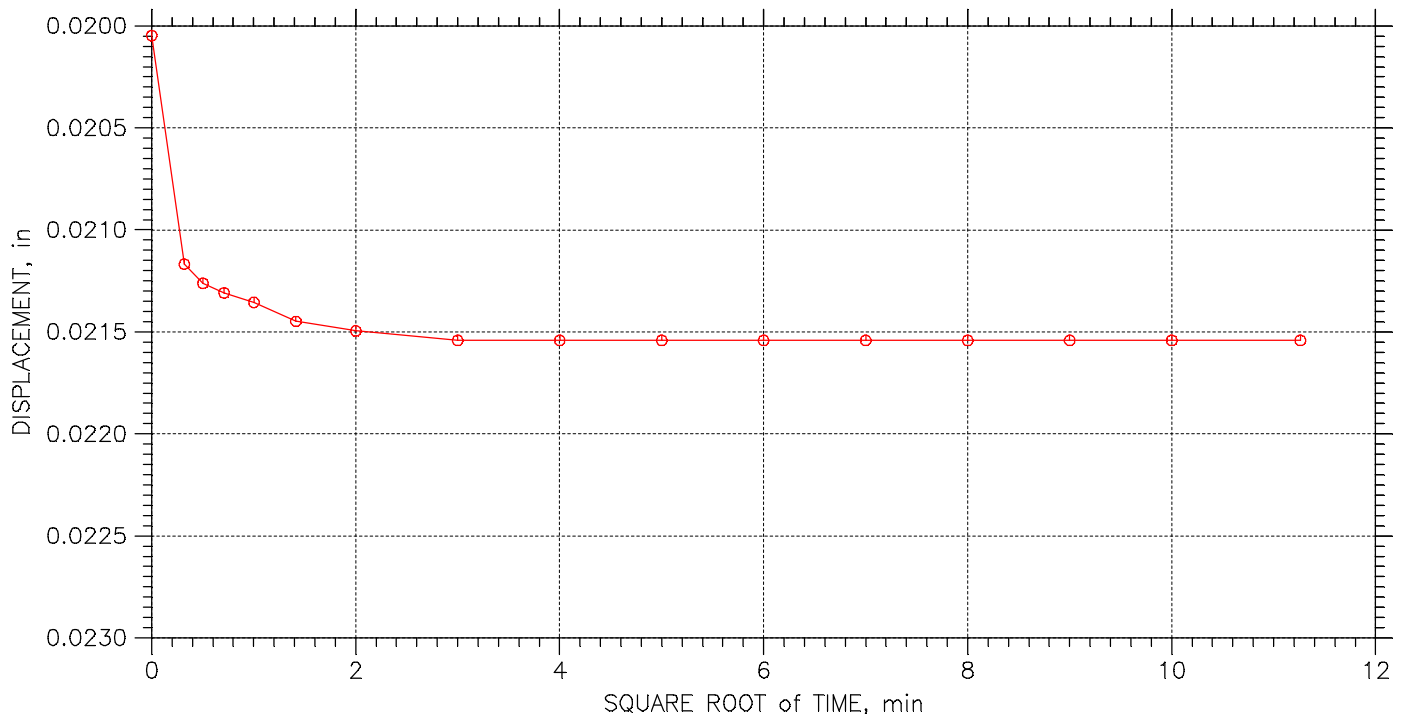
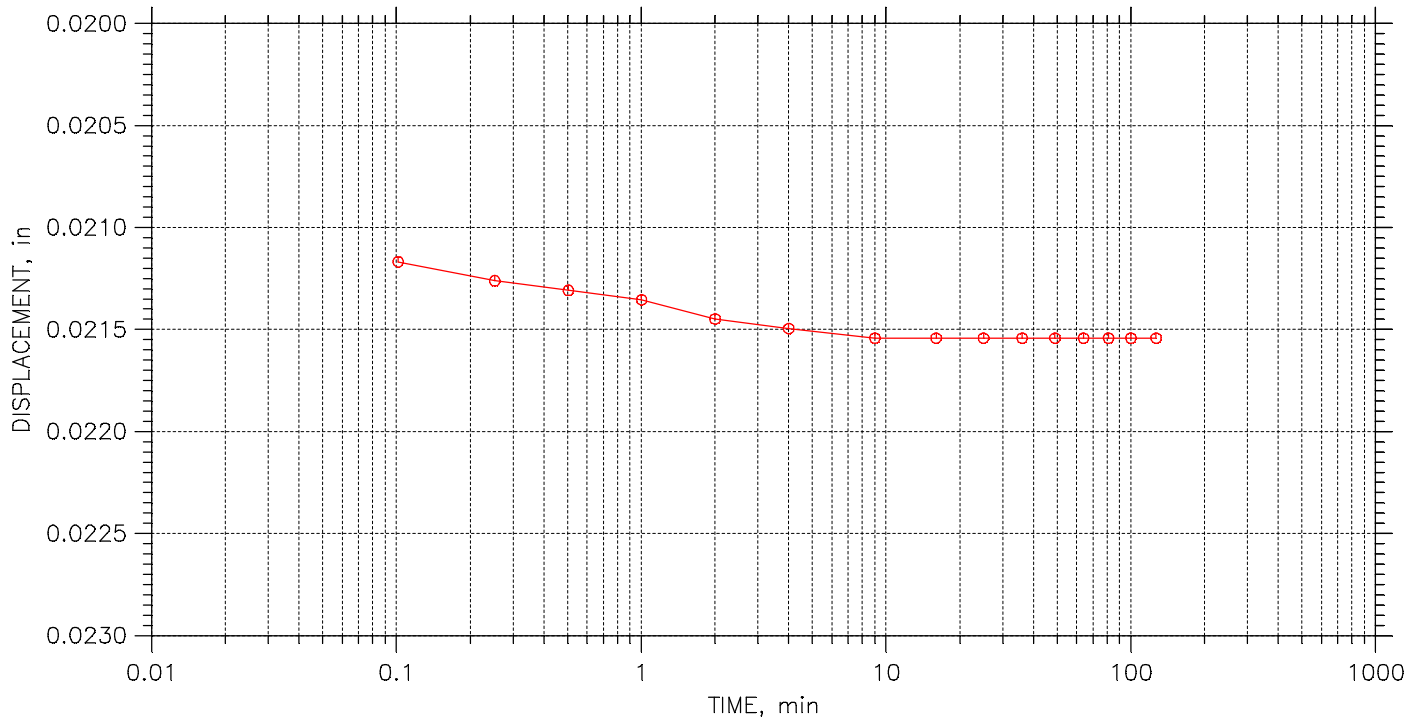
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	256		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 23

Stress: 0.25 tsf



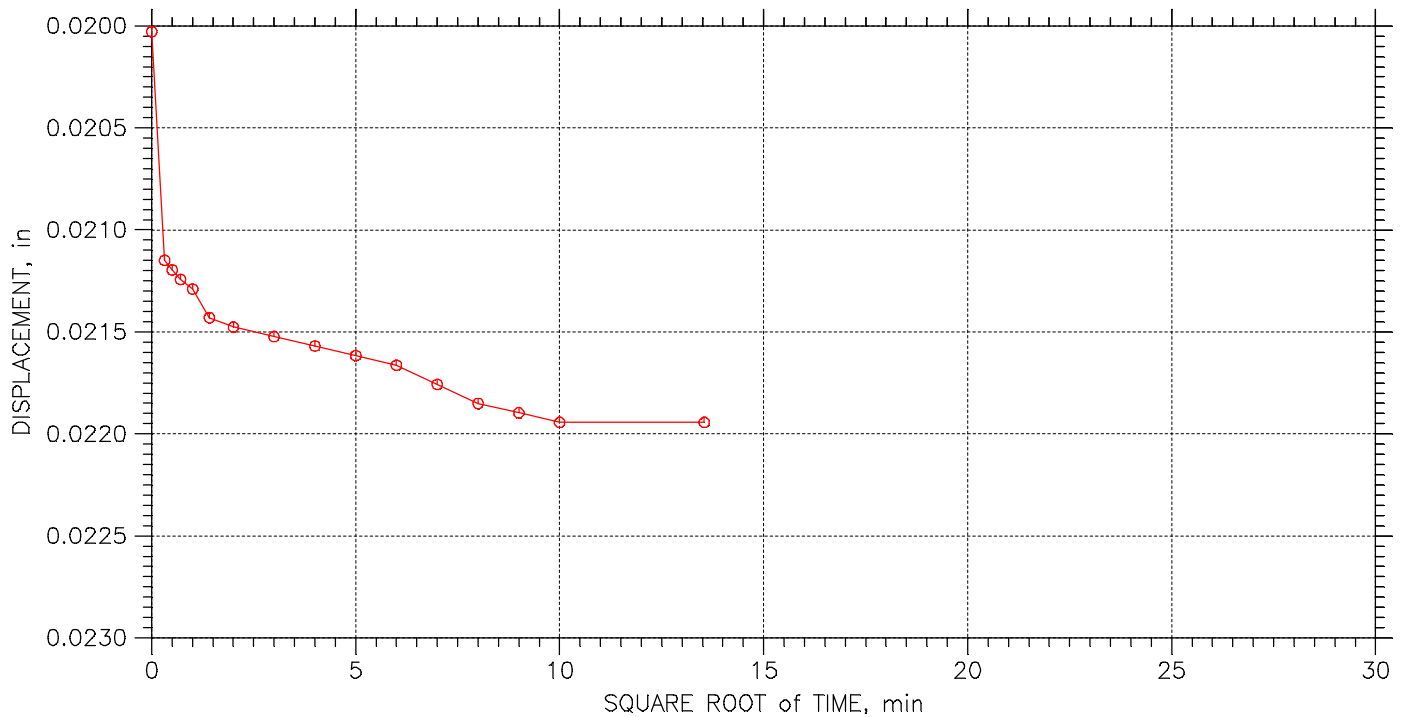
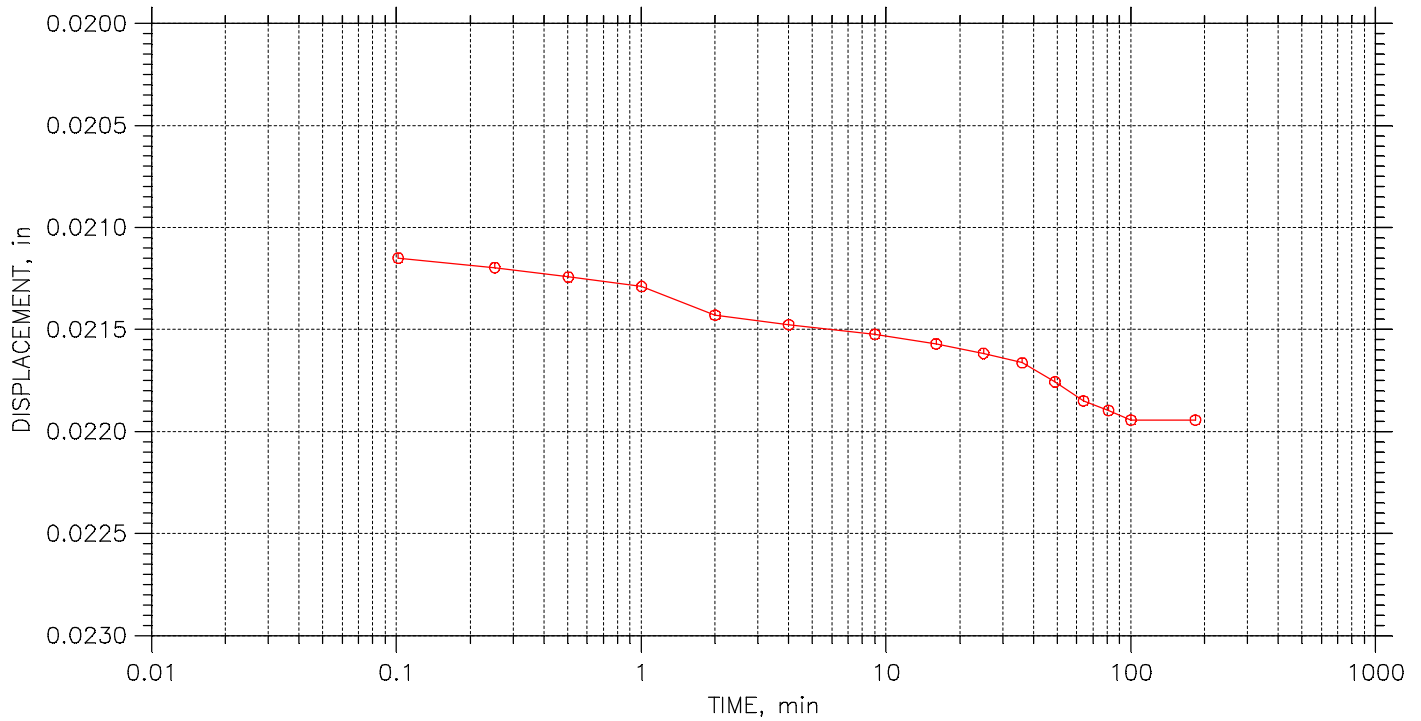
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	257		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 23

Stress: 0.5 tsf



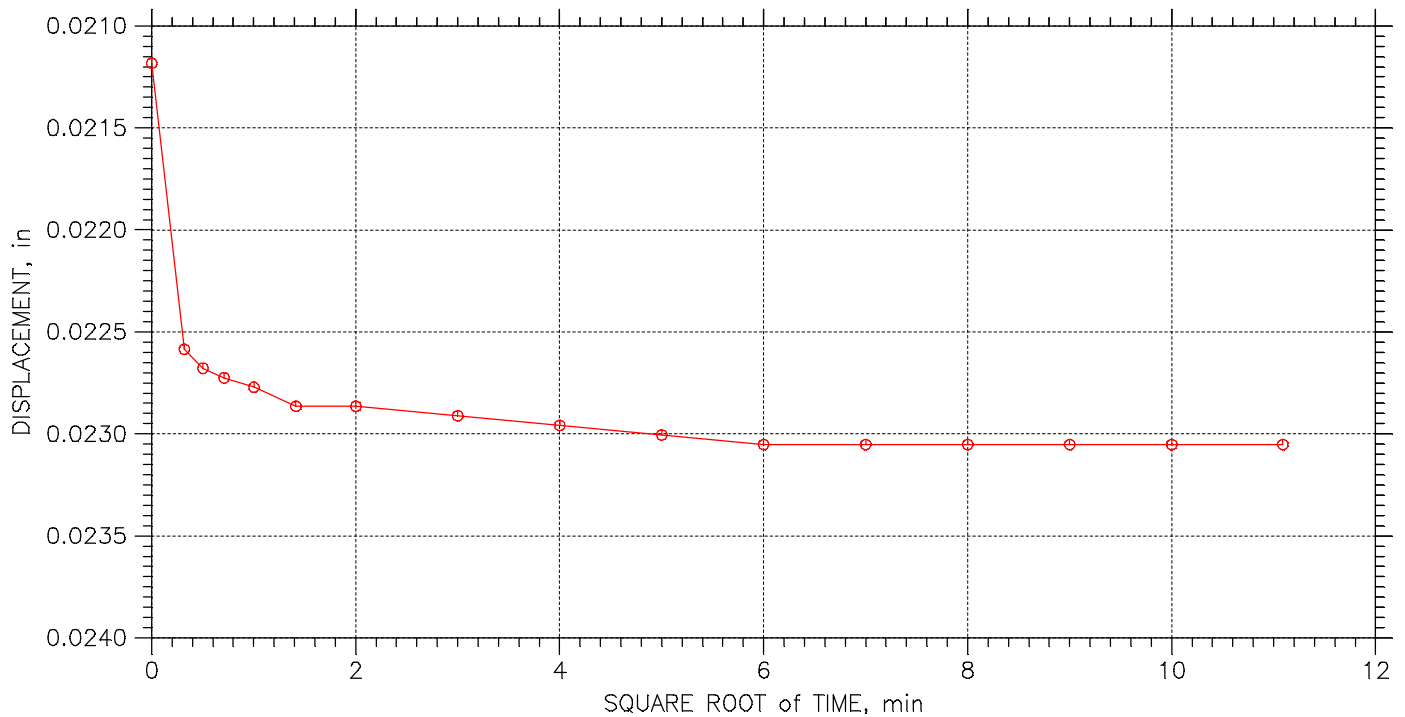
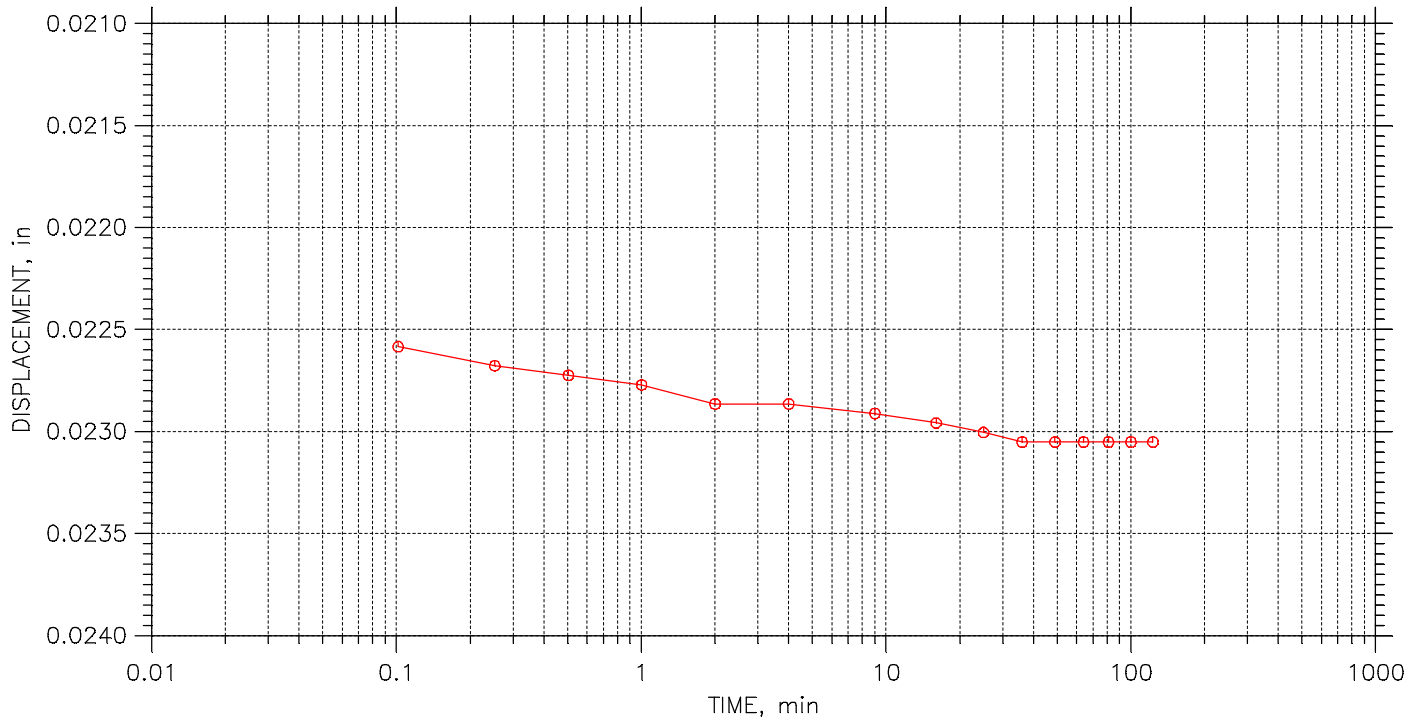
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	258		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 23

Stress: 0.75 tsf



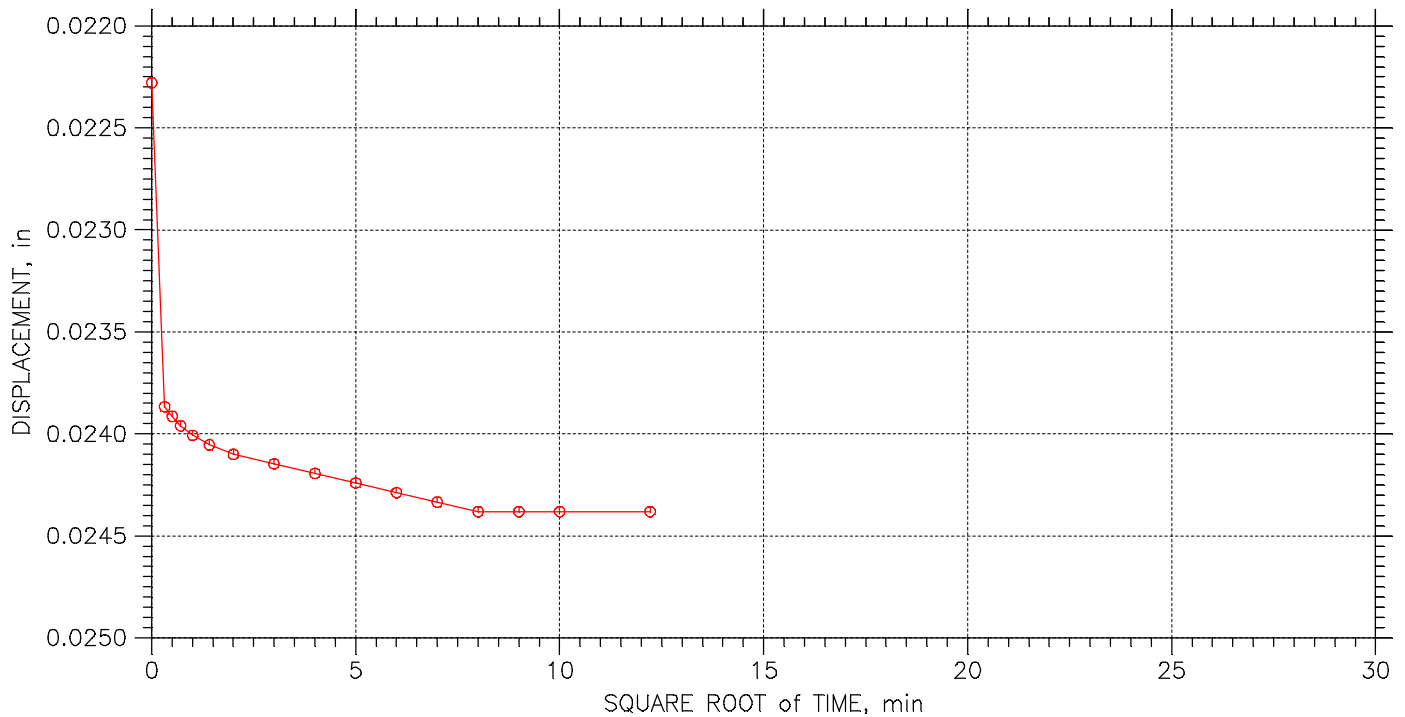
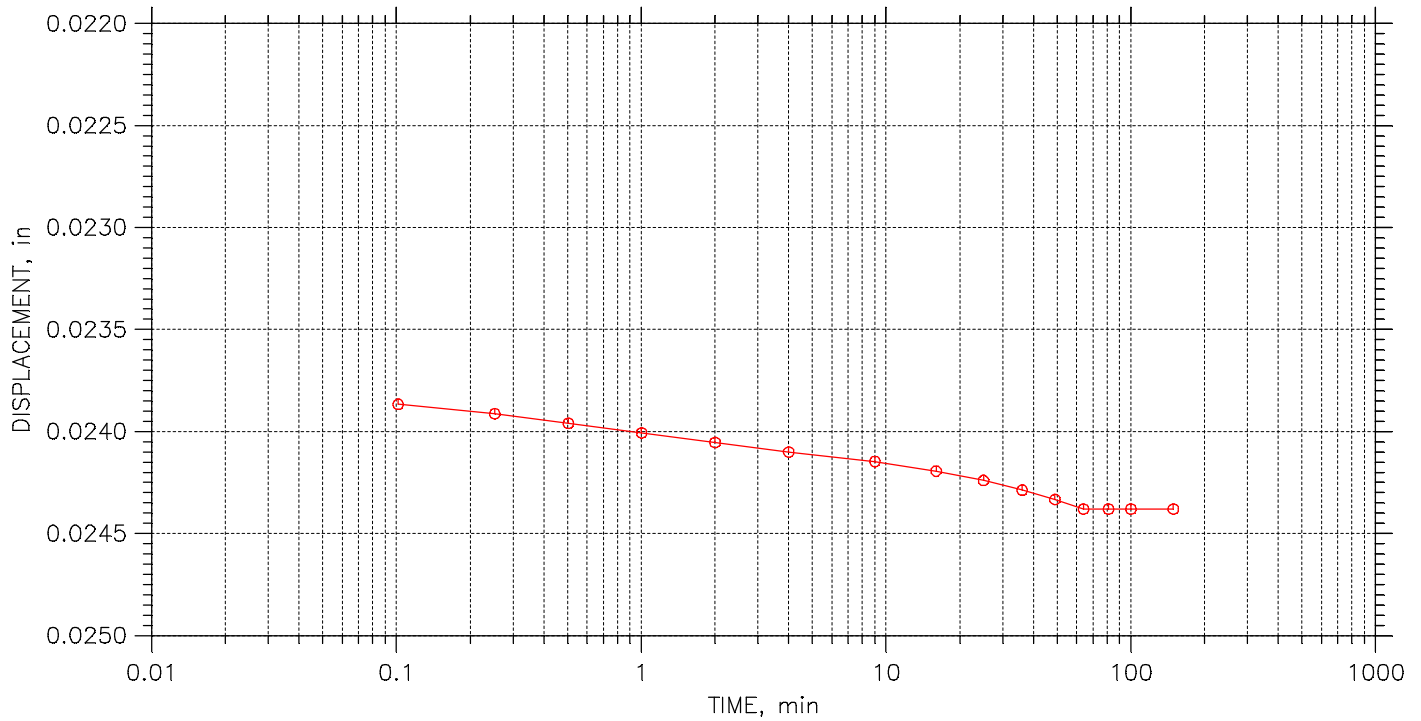
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	259		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 23

Stress: 1. tsf



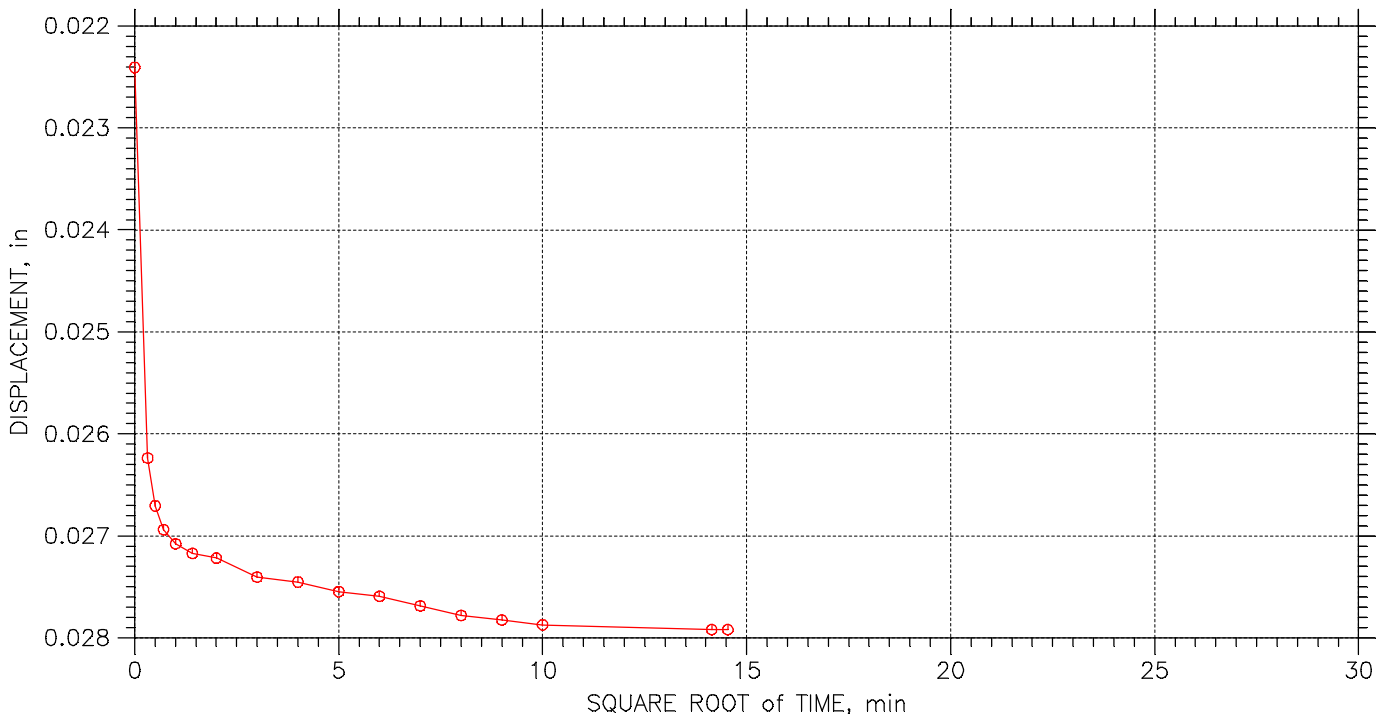
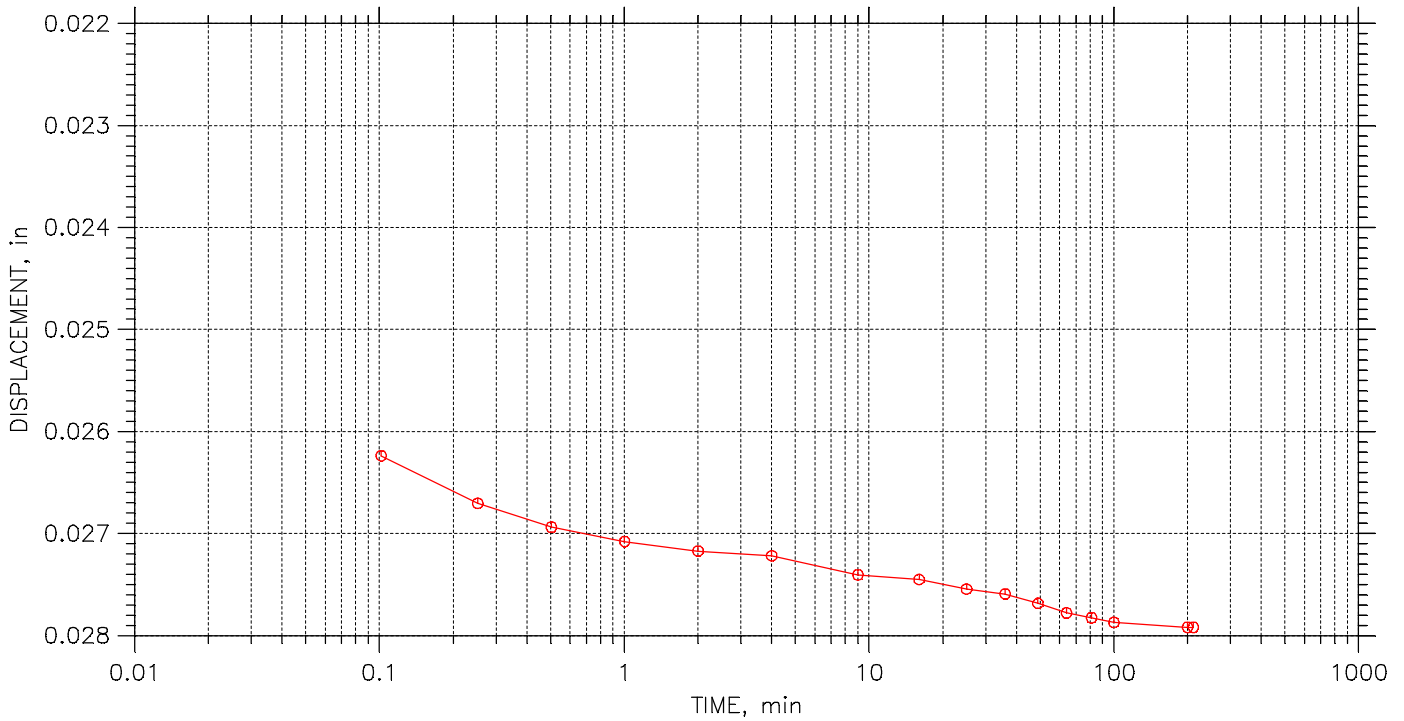
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	260		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 14 of 23

Stress: 2. tsf



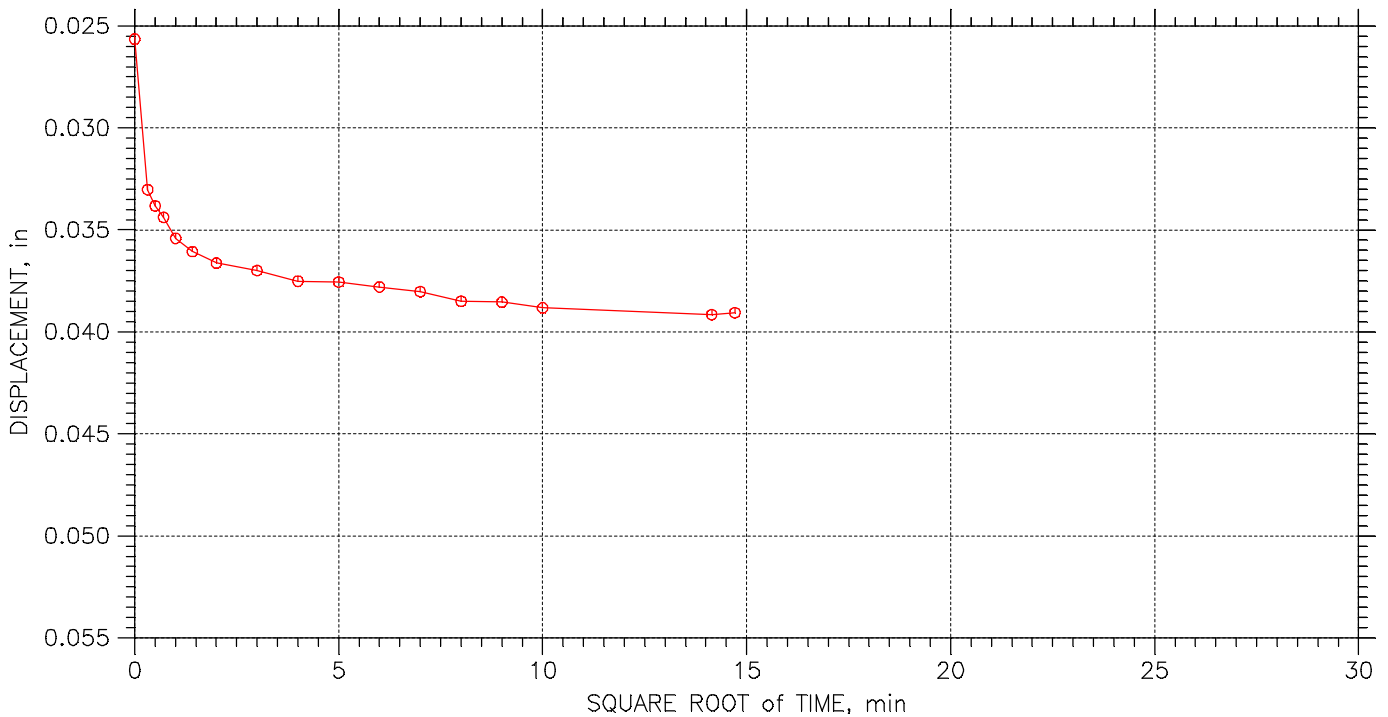
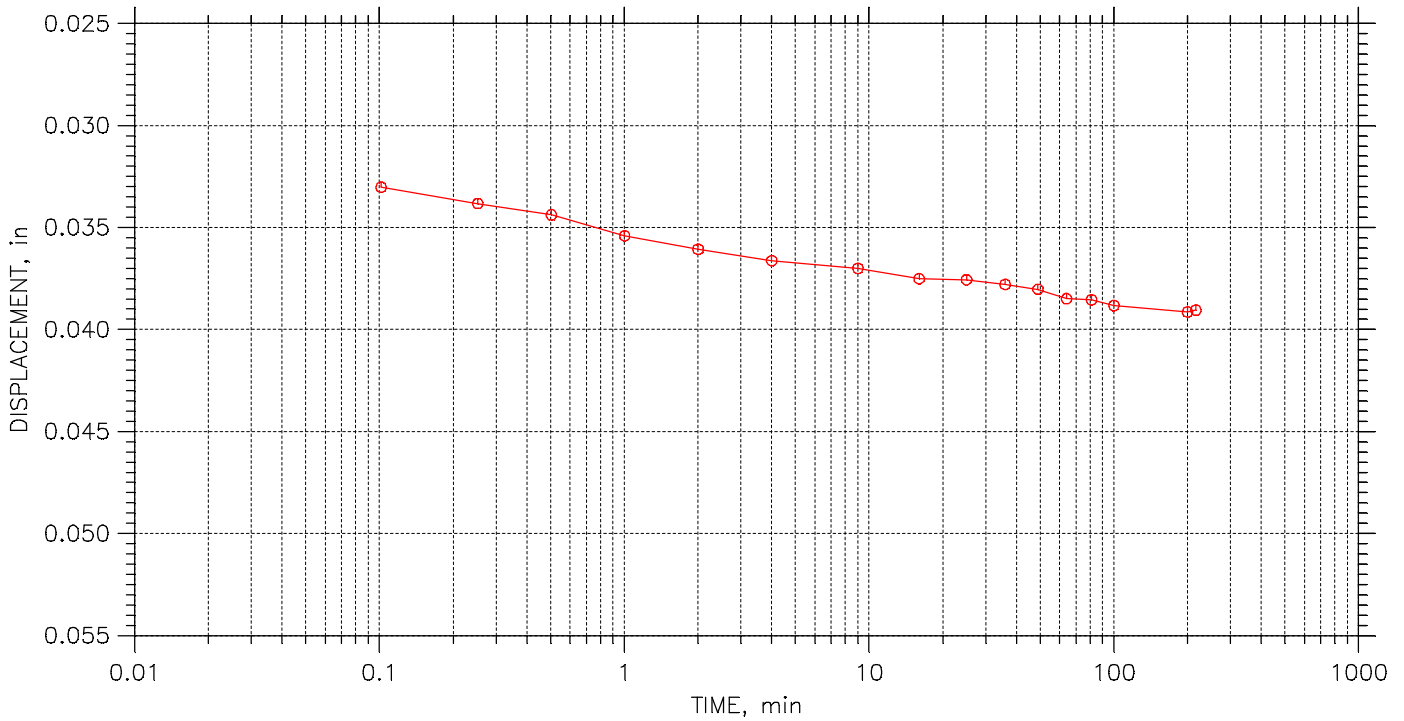
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	261		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 15 of 23

Stress: 4. tsf



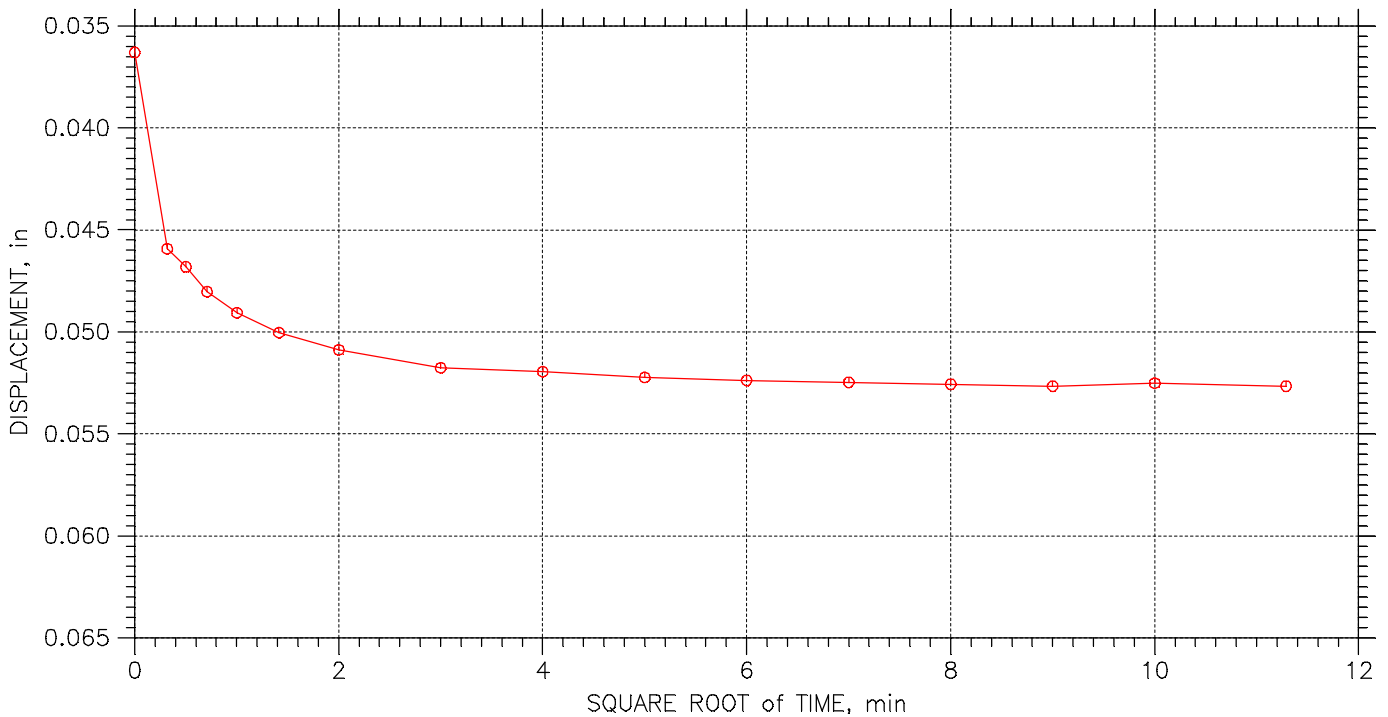
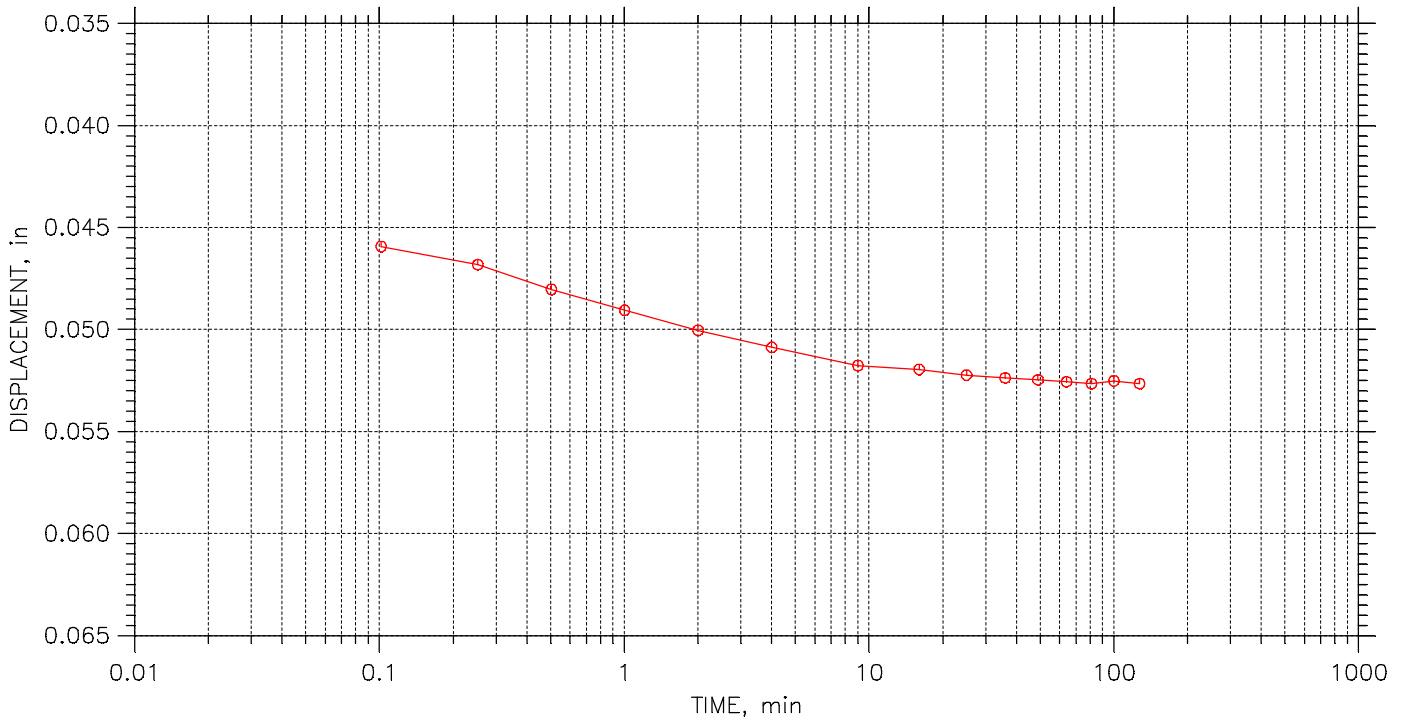
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	262		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 16 of 23

Stress: 8. tsf



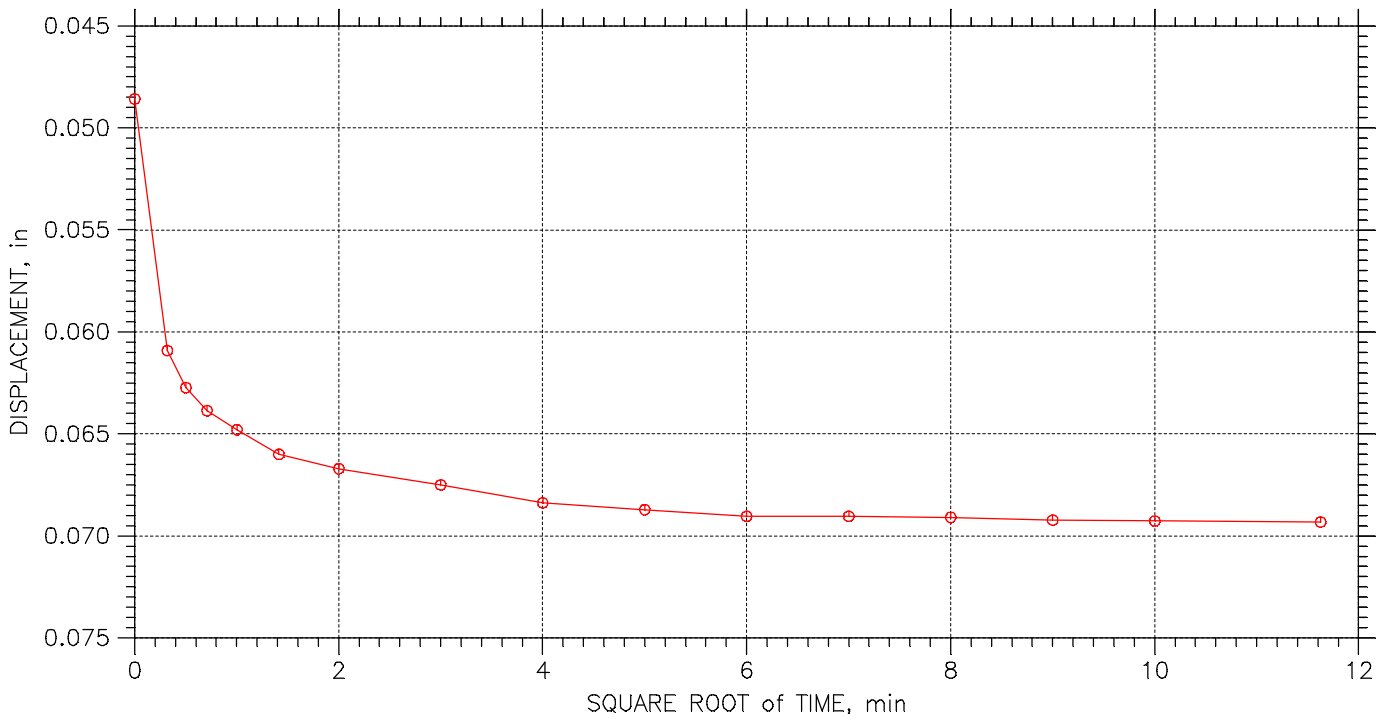
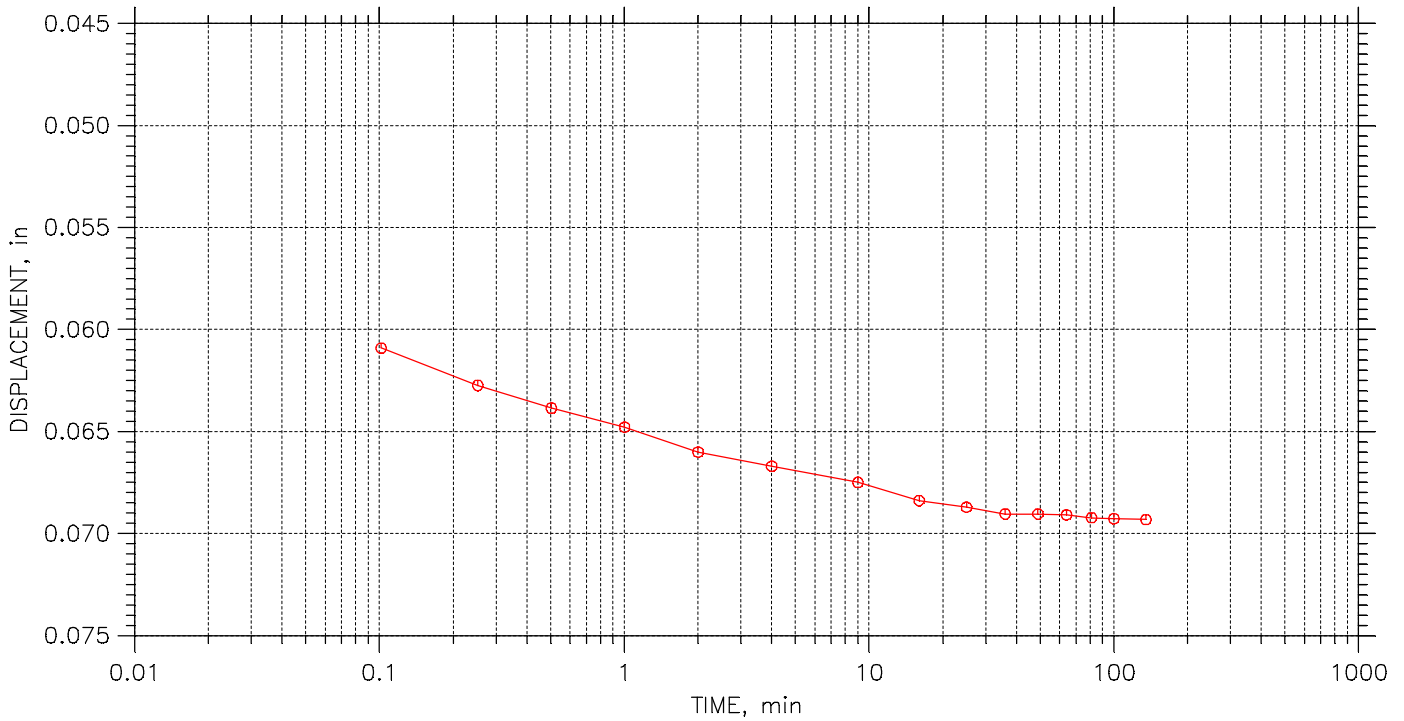
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	263		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 17 of 23

Stress: 16. tsf



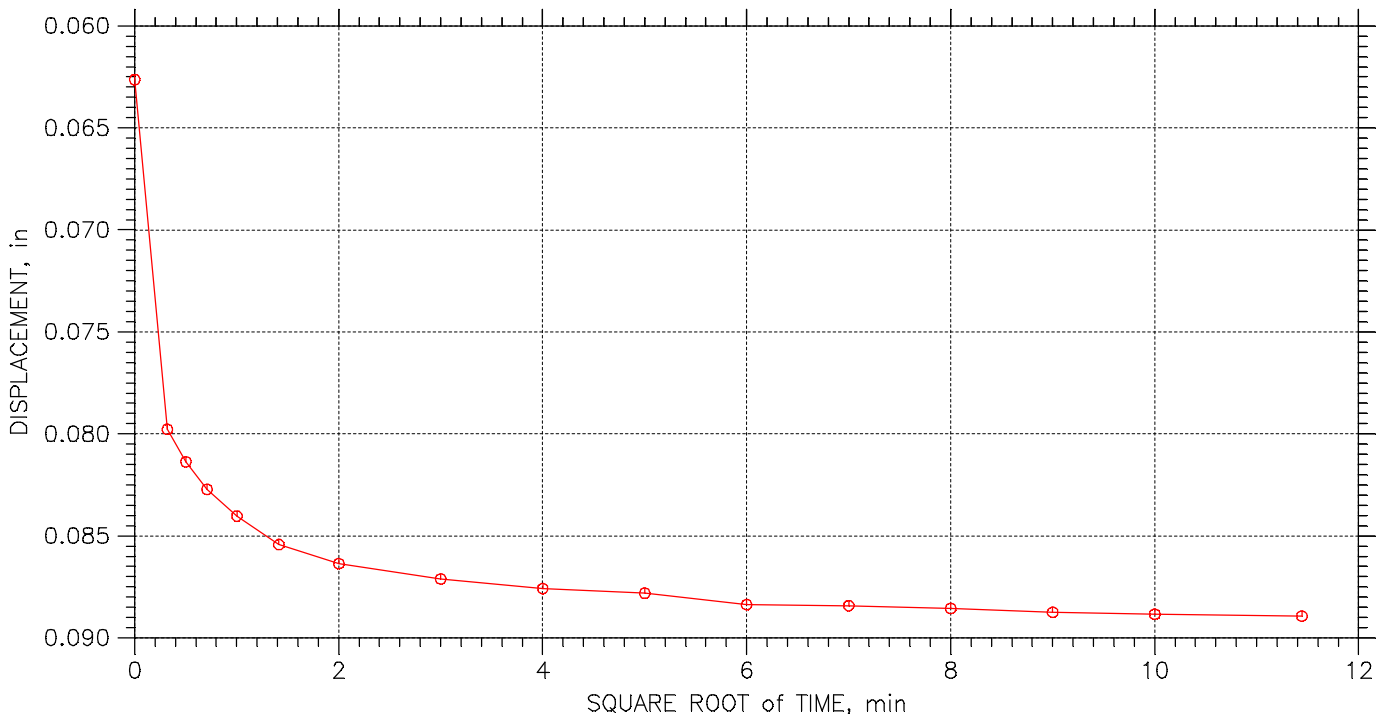
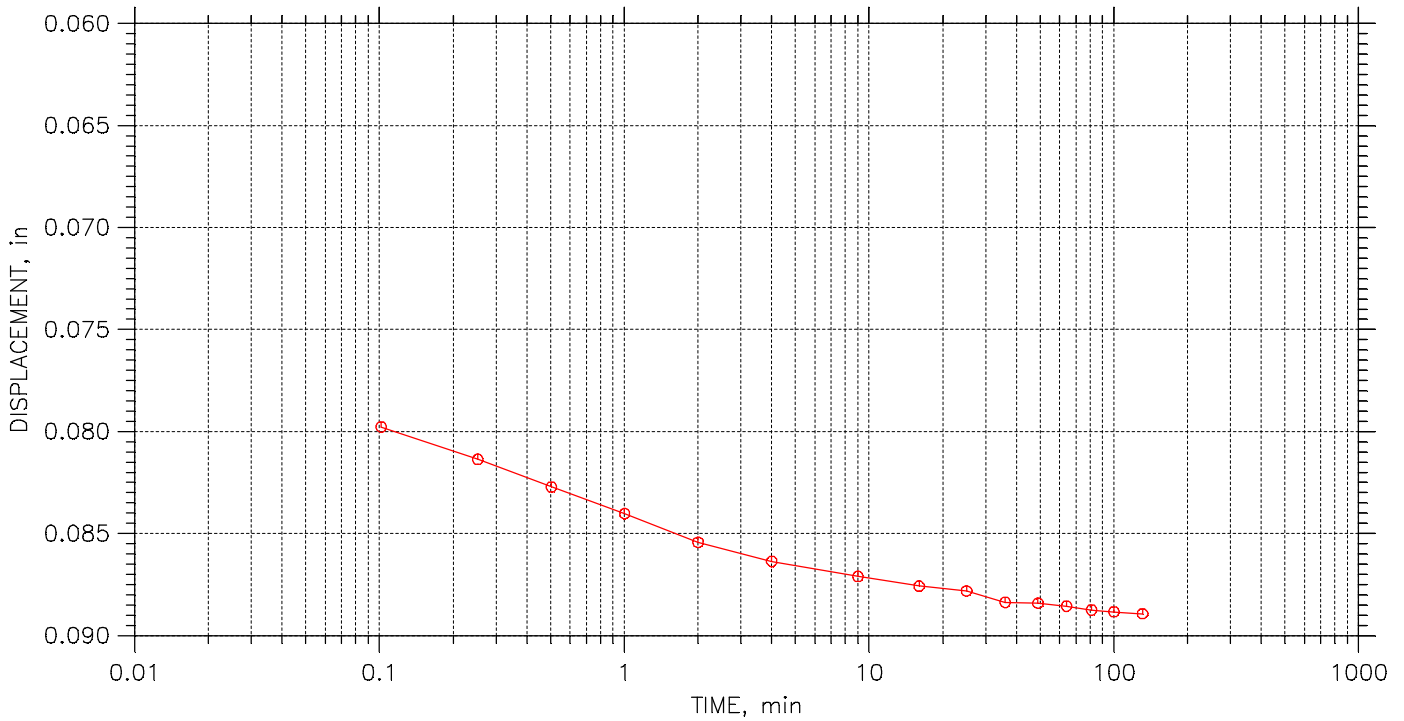
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	264		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 18 of 23

Stress: 32. tsf



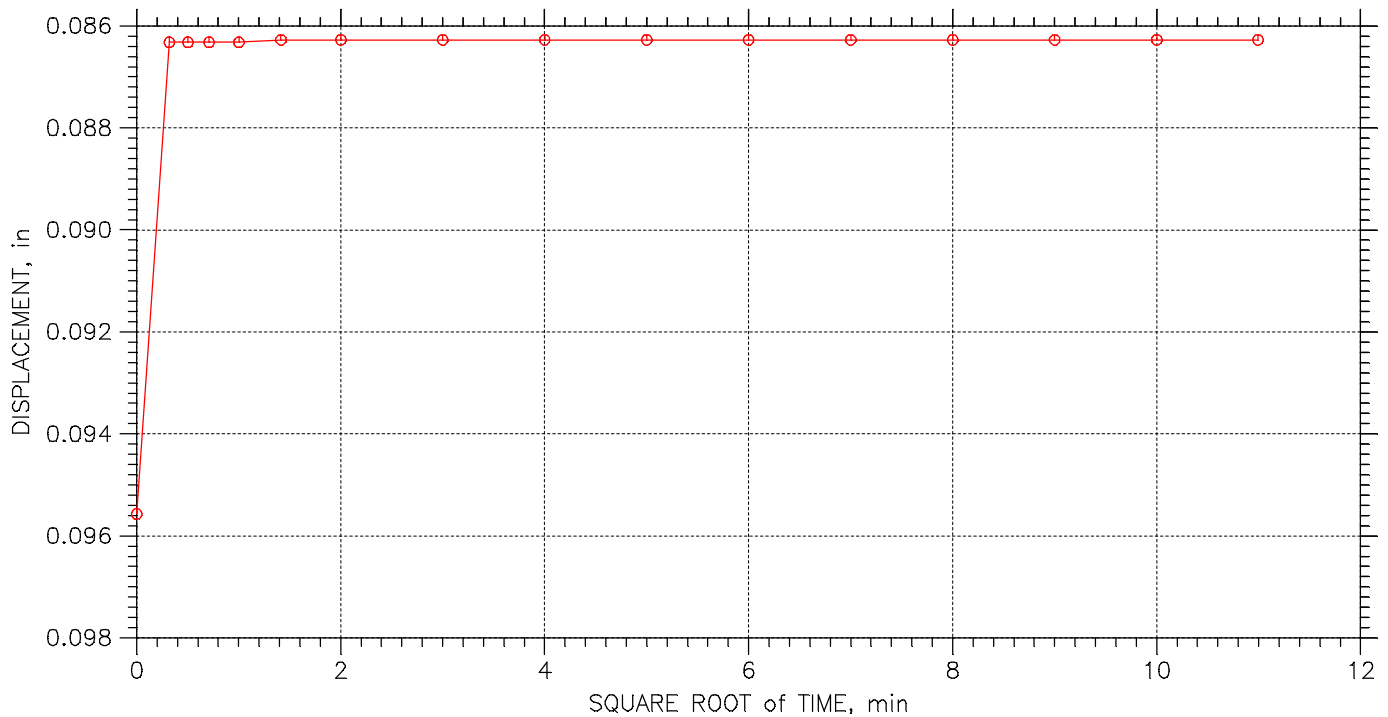
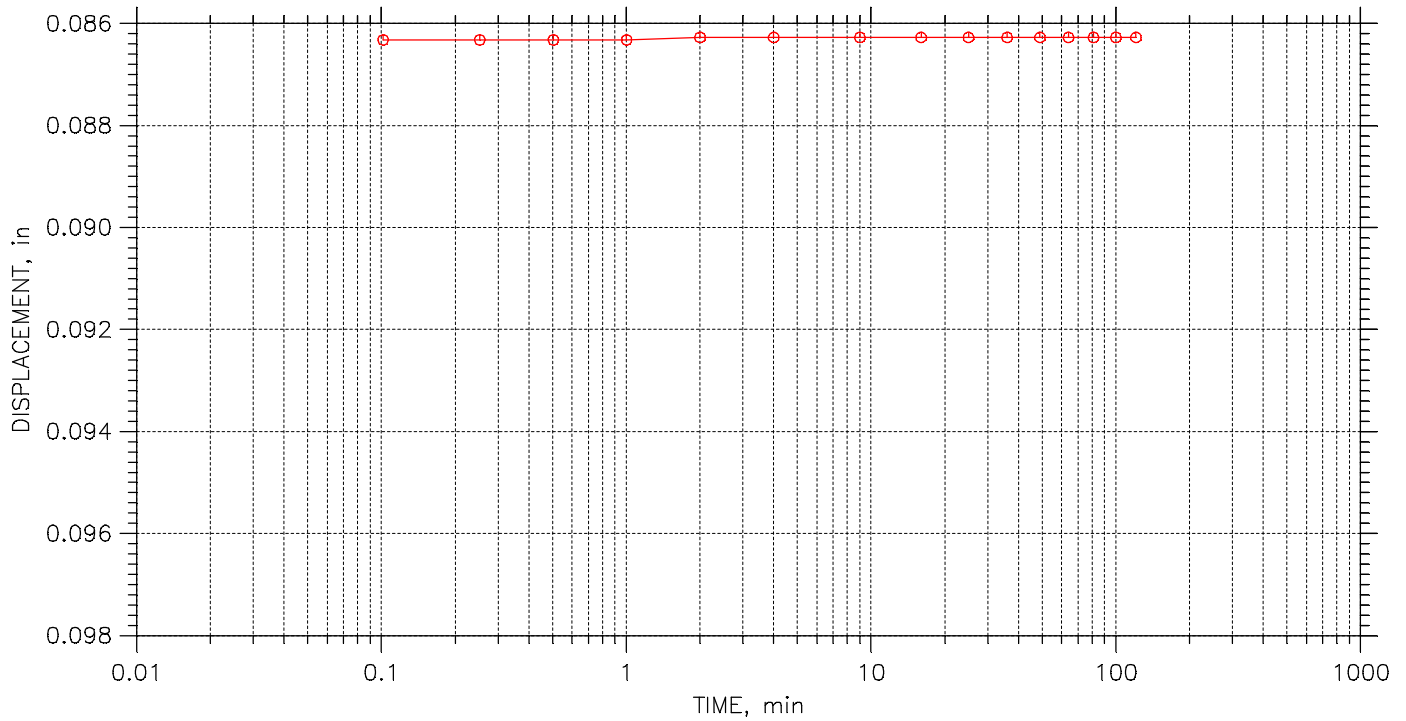
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	265		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 19 of 23

Stress: 16. tsf



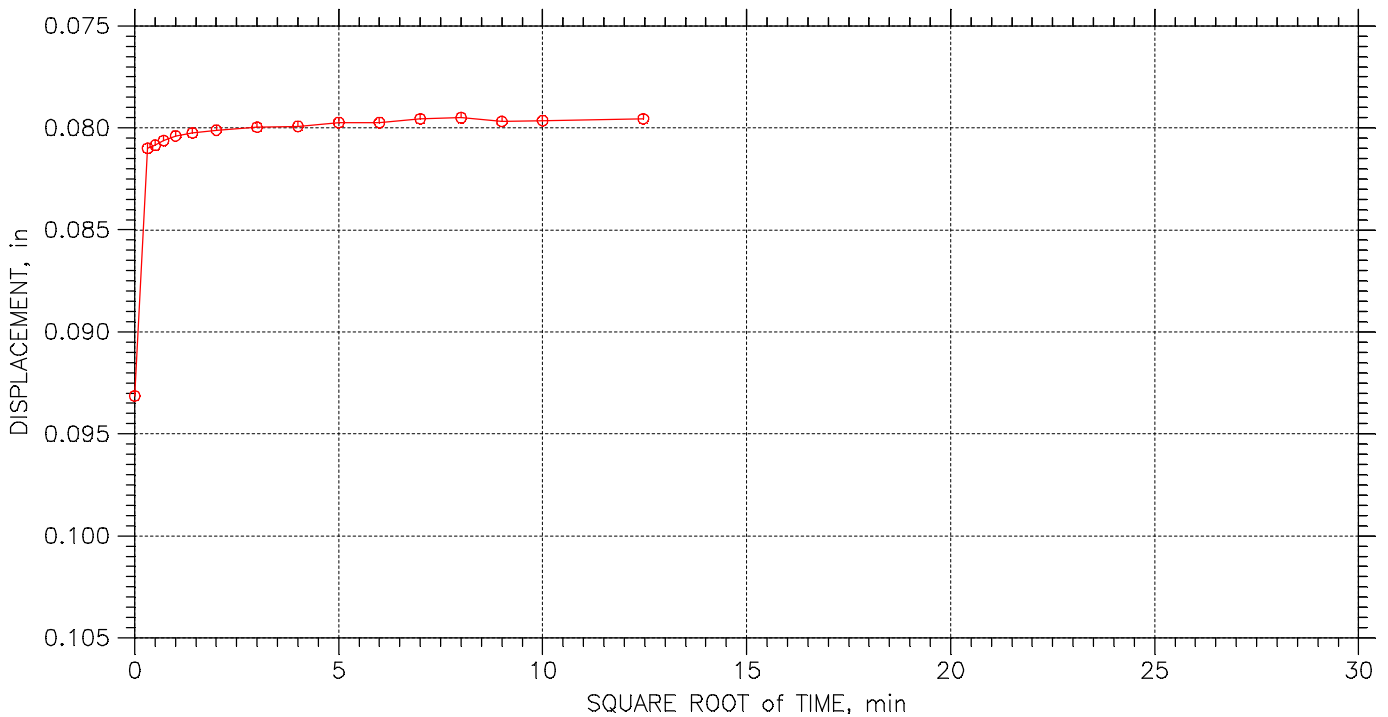
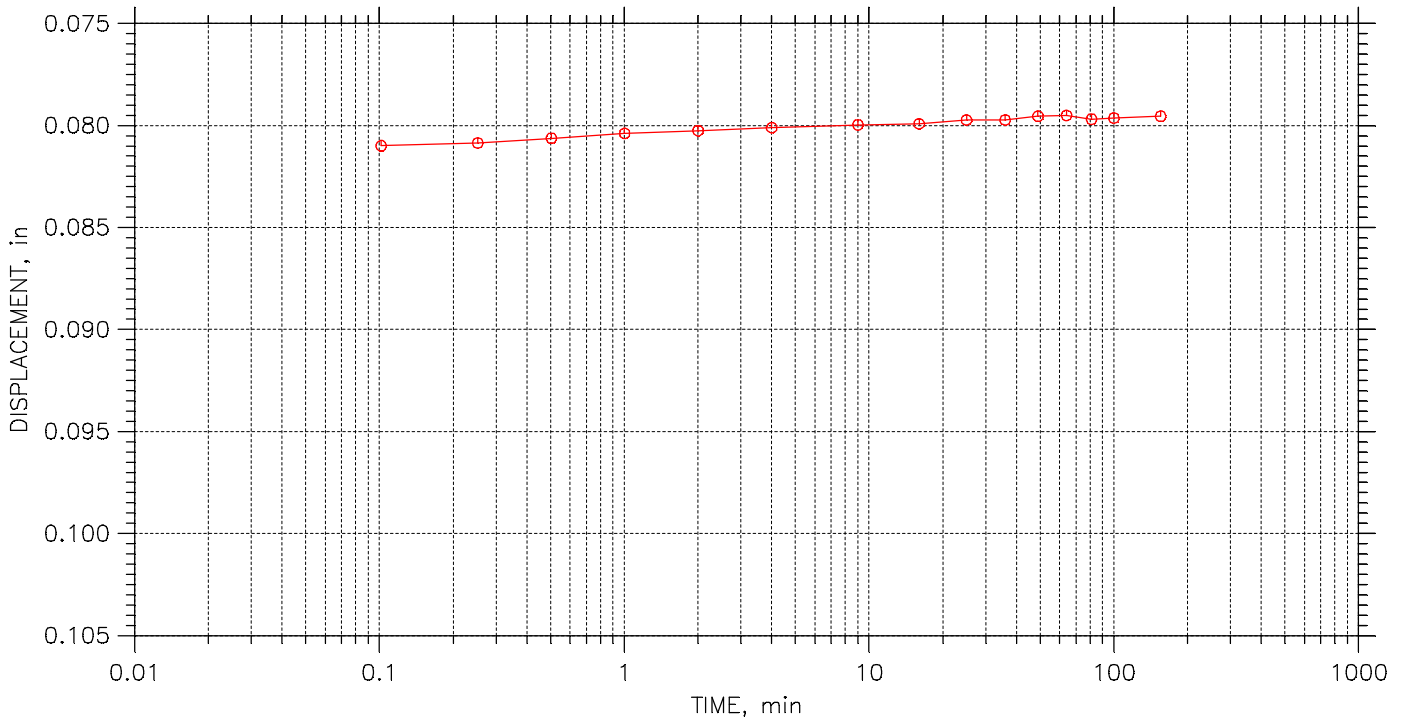
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	266		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 20 of 23

Stress: 4. tsf



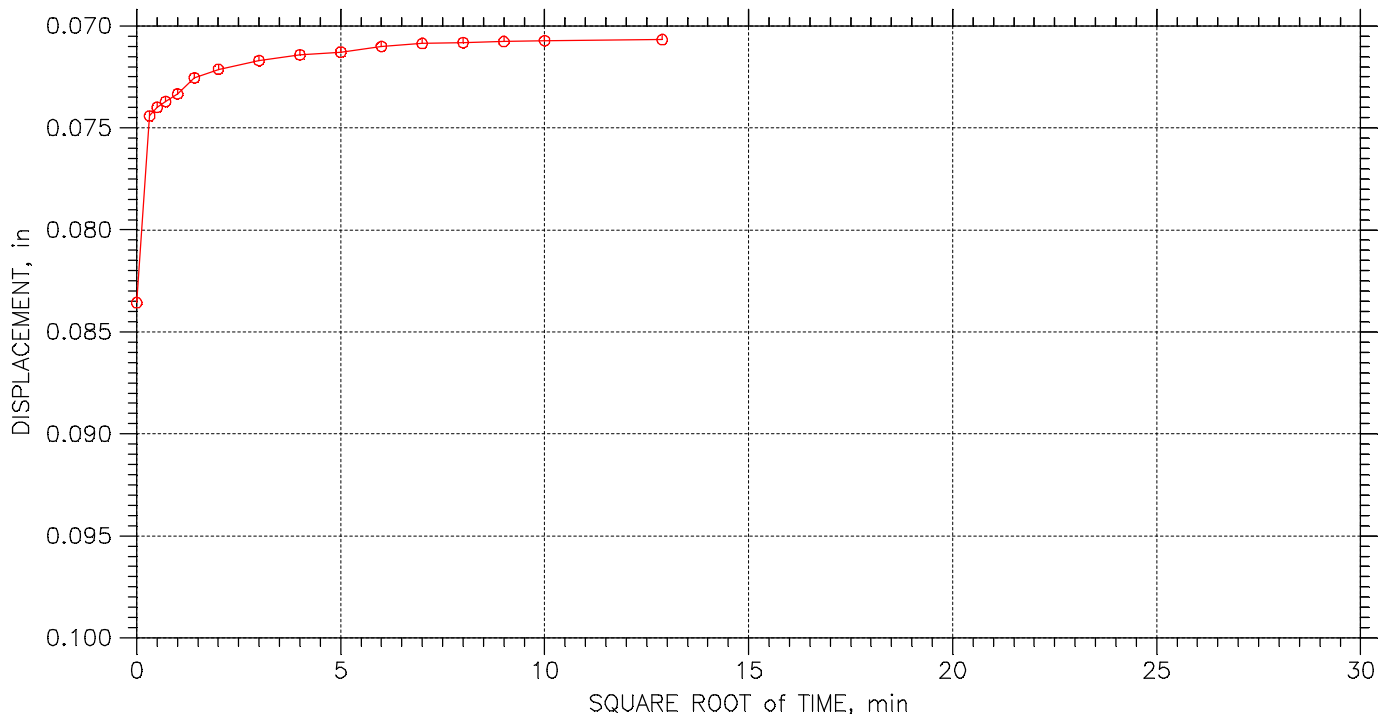
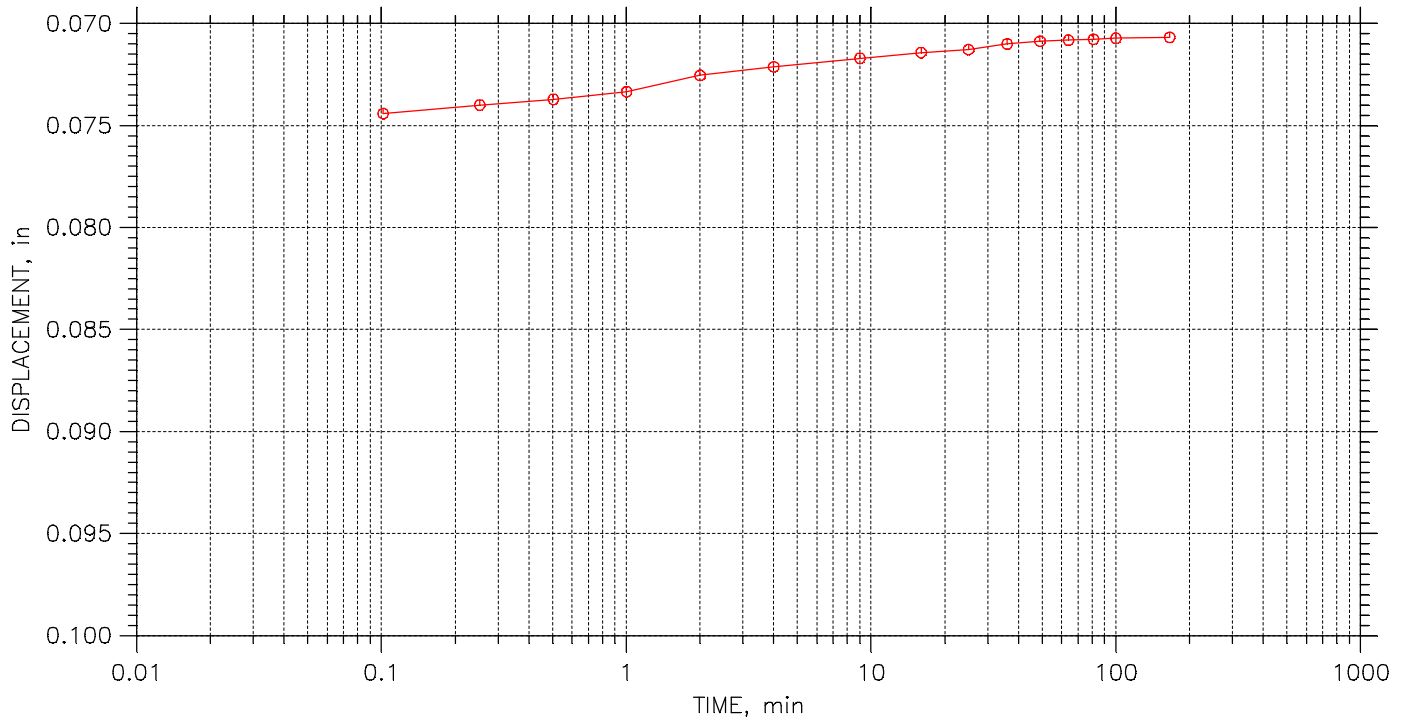
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
267			


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 21 of 23

Stress: 1. tsf



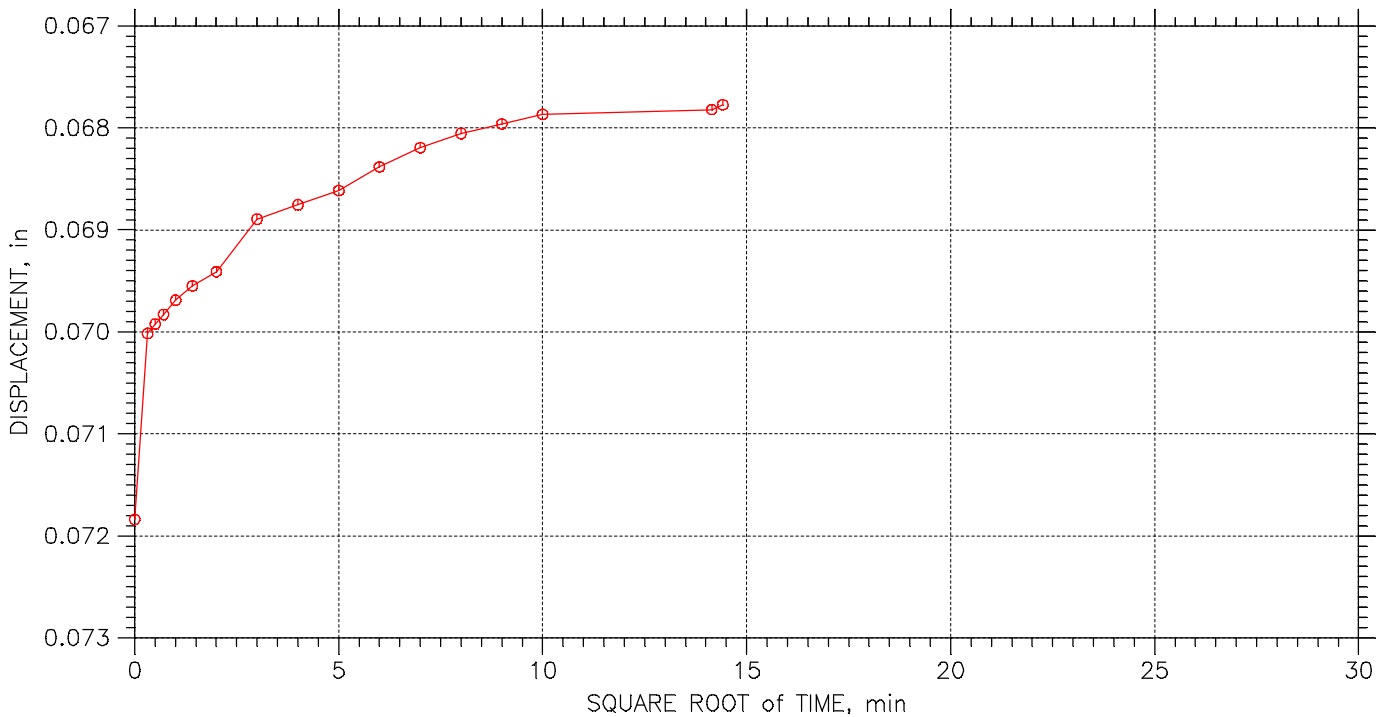
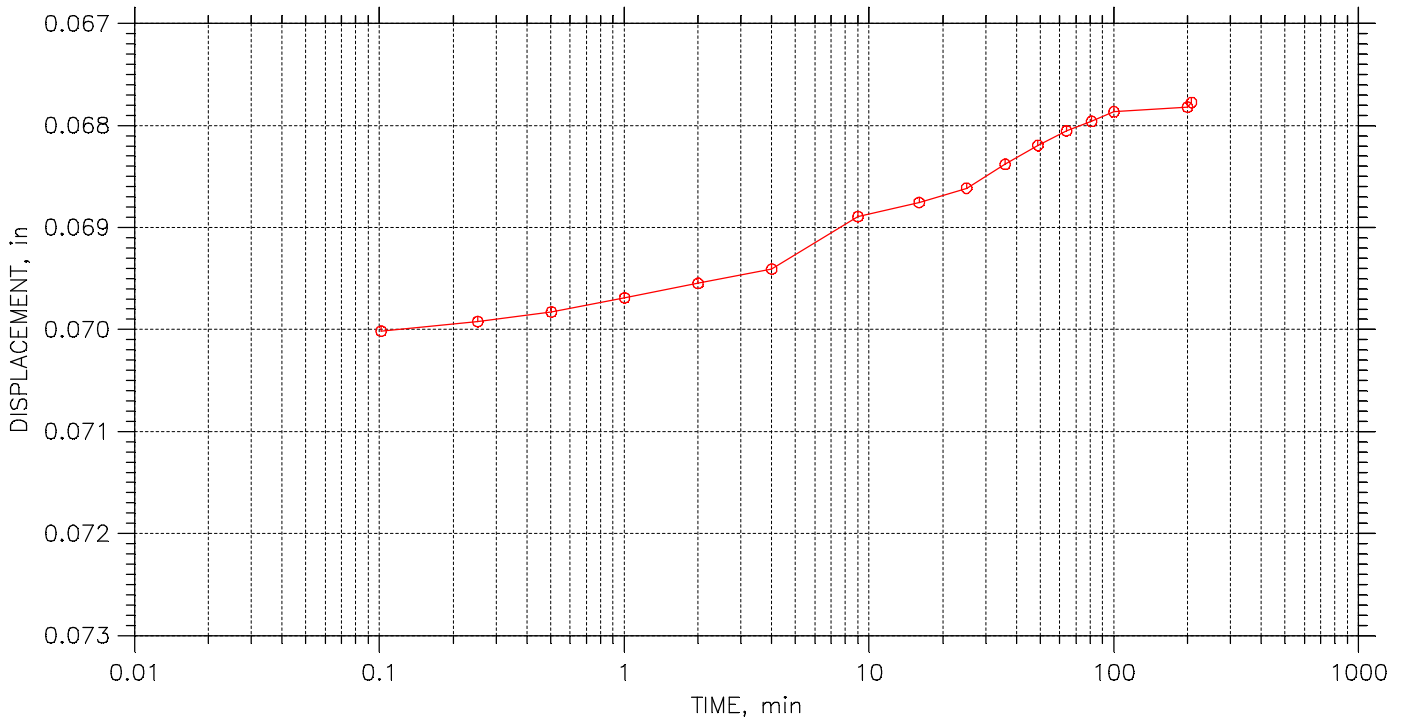
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	268		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 22 of 23

Stress: 0.5 tsf



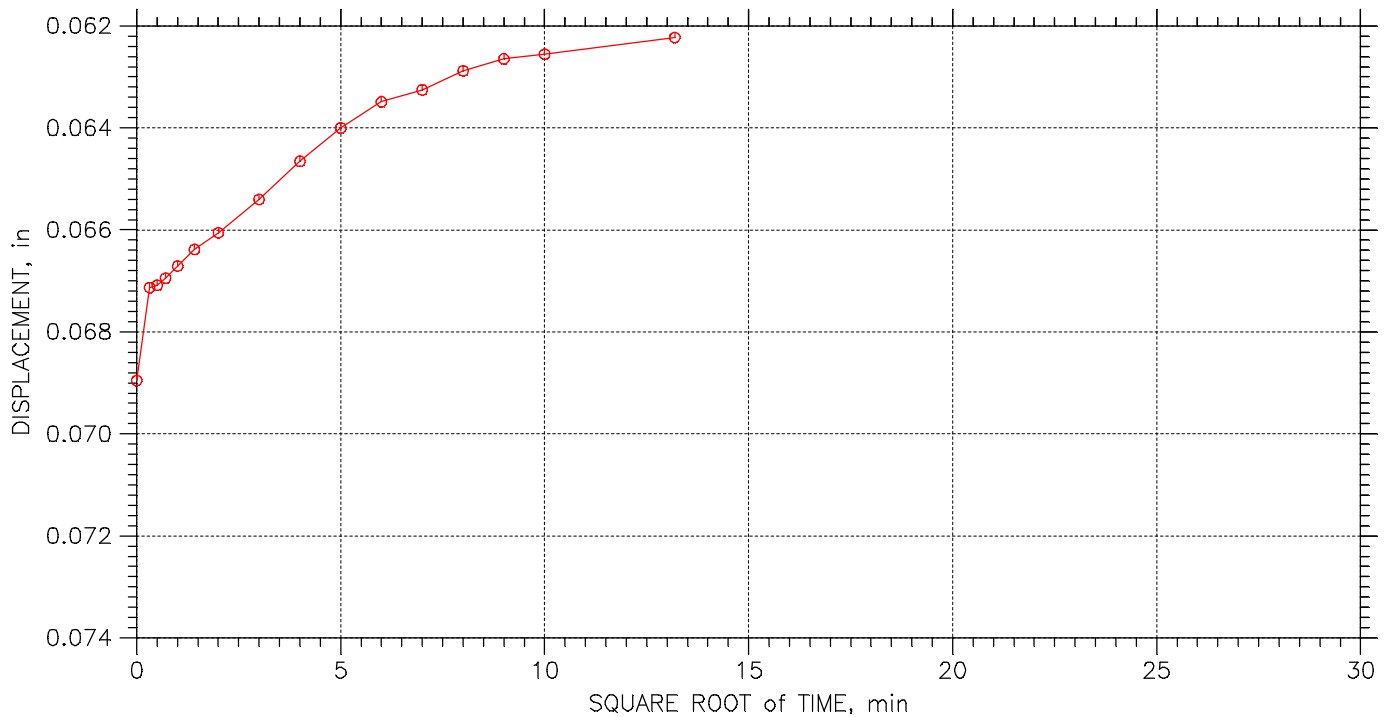
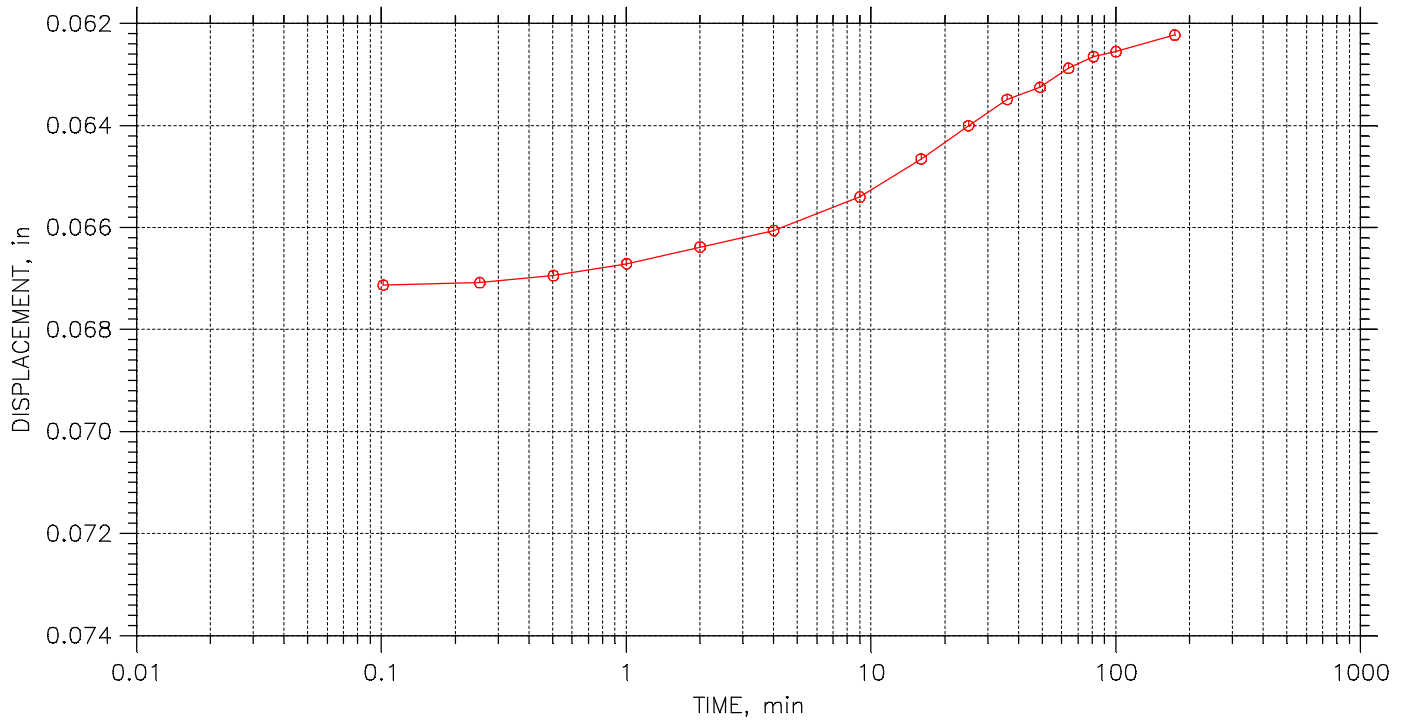
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	269		


CONSOLIDATION TEST DATA

TIME CURVES

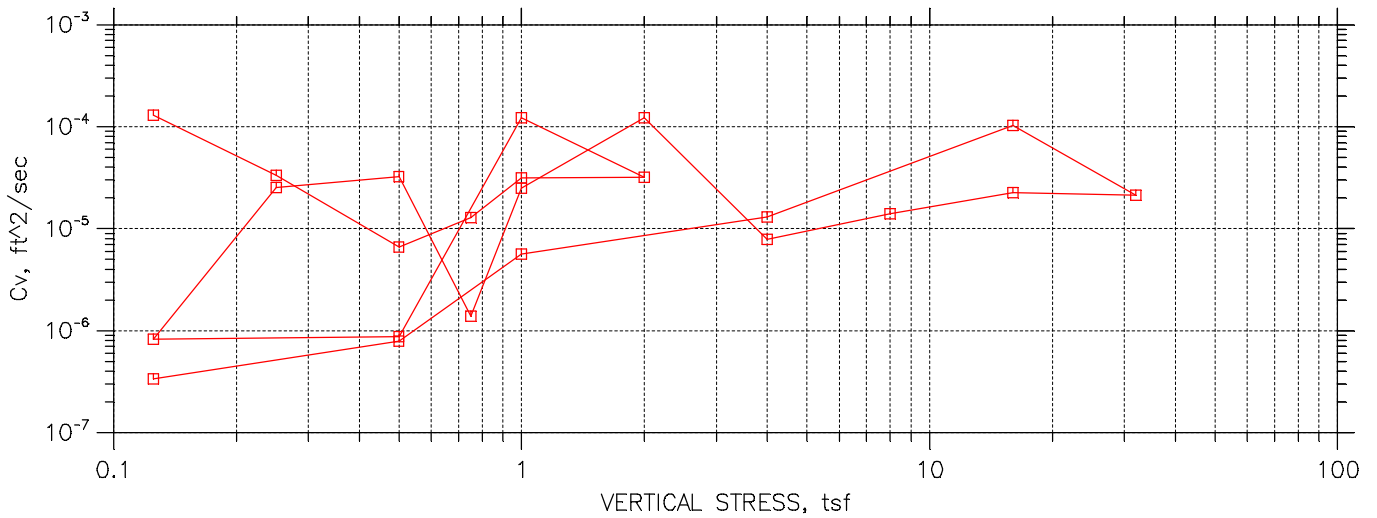
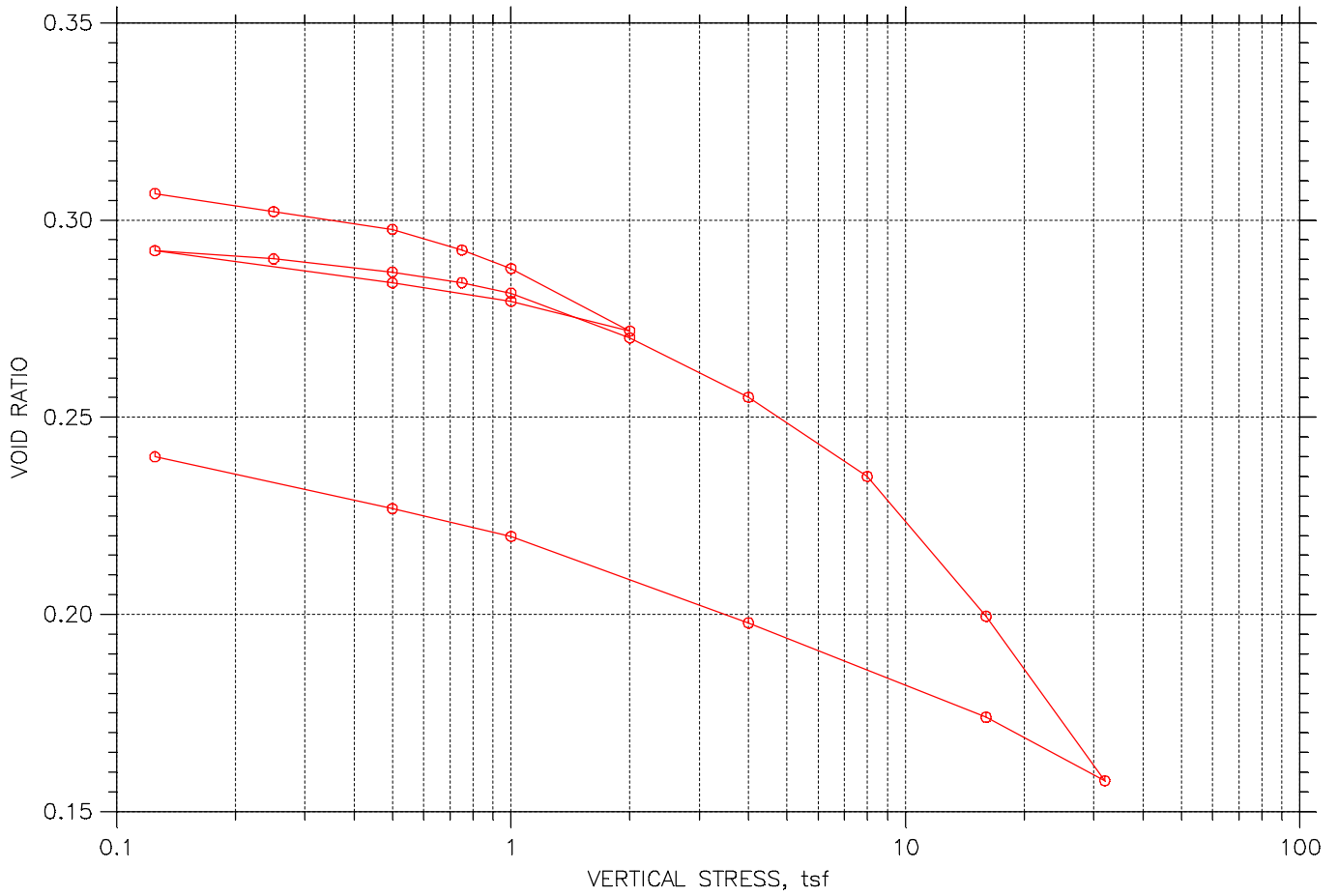
Constant Load Step: 23 of 23


Stress: 0.125 tsf



	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN B020	Tested By: HP	Checked By: BCM
	Sample No.: S-5	Test Date: 12/14/15	Depth: 9.5'-11.5'
	Test No.: HENB020	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN SANDY LEAN CLAY AND GRAVEL		
	Remarks: Pc = 1.8 tsf Cc = 0.116 Ccr = 0.021 TEST PERFORMED AS PER ASTM D2435		
	270		

ONE DIMENSIONAL CONSOLIDATION TEST ASTM D2435



	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	271		

CONSOLIDATION TEST DATA

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: HENB029S3

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 5.0'-7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435

Estimated Specific Gravity: 2.72
 Initial Void Ratio: 0.31
 Final Void Ratio: 0.24

Liquid Limit: 22
 Plastic Limit: 15
 Plasticity Index: 7

Initial Height: 0.74 in
 Specimen Diameter: 2.49 in

Container ID	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
	X-7	RING	RING	118
Wt. Container + Wet Soil, gm	167.52	207.79	207.7	156.24
Wt. Container + Dry Soil, gm	155.54	196.84	196.84	145.48
Wt. Container, gm	44.63	74.87	74.87	24.64
Wt. Dry Soil, gm	110.91	121.97	121.97	120.84
Water Content, %	10.80	8.98	8.90	8.90
Void Ratio	---	0.31	0.24	---
Degree of Saturation, %	---	77.94	100.93	---
Dry Unit Weight, pcf	---	129.29	136.94	---

CONSOLIDATION TEST DATA

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: HENB029S3

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 5.0'-7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435

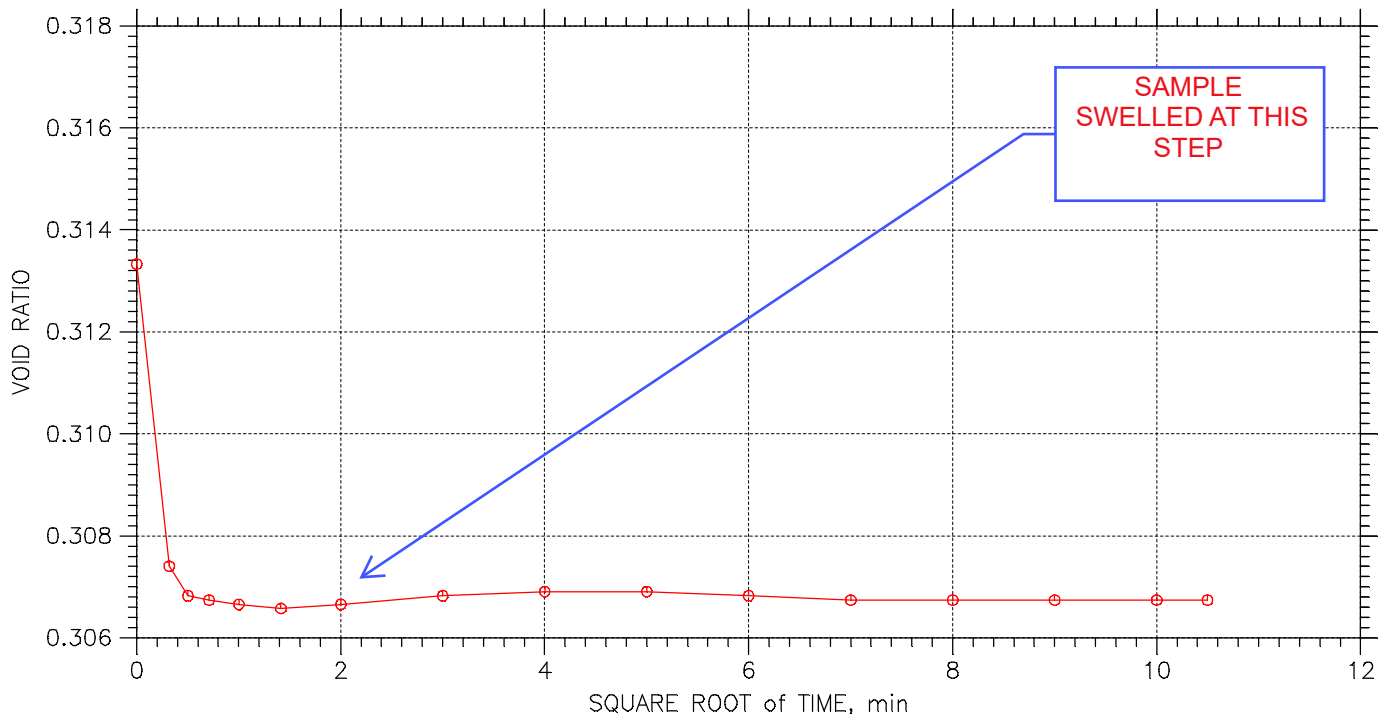
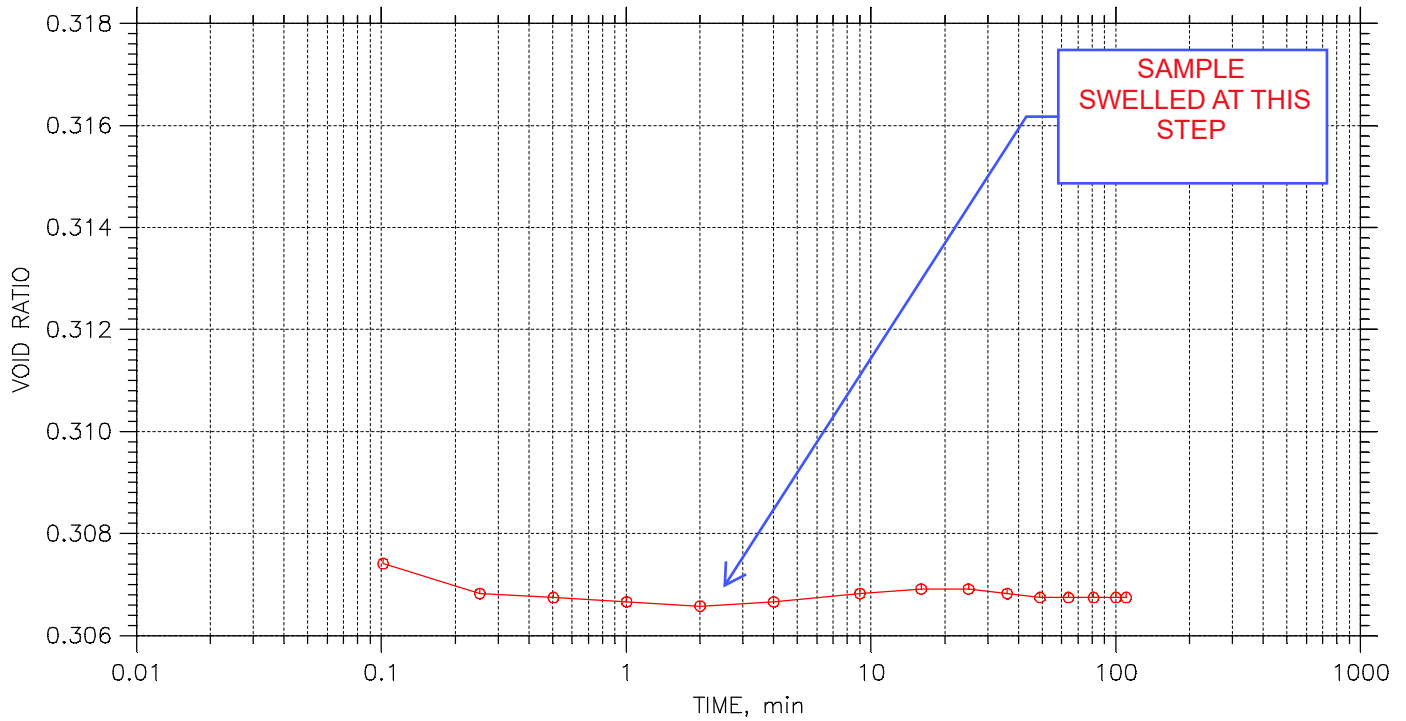
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting		Coefficient of Consolidation		
					Sq.Rt. min	Log min	Sq.Rt. ft ² /sec	Log ft ² /sec	Ave. ft ² /sec
1	0.125	0.00369	0.307	0.50	0.0	0.0	1.30e-004	0.00e+000	1.30e-004
2	0.25	0.006259	0.302	0.85	0.1	0.0	3.32e-005	0.00e+000	3.32e-005
3	0.5	0.008782	0.298	1.19	0.5	0.0	6.59e-006	0.00e+000	6.59e-006
4	0.75	0.01172	0.292	1.59	0.2	0.0	1.28e-005	0.00e+000	1.28e-005
5	1	0.01434	0.288	1.95	0.1	0.0	3.13e-005	0.00e+000	3.13e-005
6	2	0.02322	0.272	3.16	0.1	0.0	3.18e-005	0.00e+000	3.18e-005
7	1	0.01901	0.279	2.58	0.0	0.0	1.23e-004	0.00e+000	1.23e-004
8	0.5	0.0164	0.284	2.23	3.4	0.0	8.69e-007	0.00e+000	8.69e-007
9	0.125	0.01182	0.292	1.61	3.6	0.0	8.29e-007	0.00e+000	8.29e-007
10	0.25	0.01299	0.290	1.76	0.1	0.0	2.54e-005	0.00e+000	2.54e-005
11	0.5	0.01485	0.287	2.02	0.1	0.0	3.22e-005	0.00e+000	3.22e-005
12	0.75	0.01635	0.284	2.22	2.1	0.0	1.38e-006	0.00e+000	1.38e-006
13	1	0.01784	0.281	2.43	0.1	0.0	2.51e-005	0.00e+000	2.51e-005
14	2	0.0242	0.270	3.29	0.0	0.0	1.23e-004	0.00e+000	1.23e-004
15	4	0.03265	0.255	4.44	0.4	0.0	7.87e-006	0.00e+000	7.87e-006
16	8	0.04391	0.235	5.97	0.2	0.0	1.39e-005	0.00e+000	1.39e-005
17	16	0.06376	0.200	8.67	0.1	0.0	2.26e-005	0.00e+000	2.26e-005
18	32	0.08712	0.158	11.84	0.1	0.0	2.12e-005	0.00e+000	2.12e-005
19	16	0.0781	0.174	10.61	0.0	0.0	1.03e-004	0.00e+000	1.03e-004
20	4	0.0647	0.198	8.79	0.2	0.0	1.30e-005	0.00e+000	1.30e-005
21	1	0.05241	0.220	7.12	0.5	0.0	5.63e-006	0.00e+000	5.63e-006
22	0.5	0.04844	0.227	6.58	3.4	0.0	7.92e-007	0.00e+000	7.92e-007
23	0.125	0.04111	0.240	5.59	8.1	0.0	3.37e-007	0.00e+000	3.37e-007


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 23

Stress: 0.125 tsf



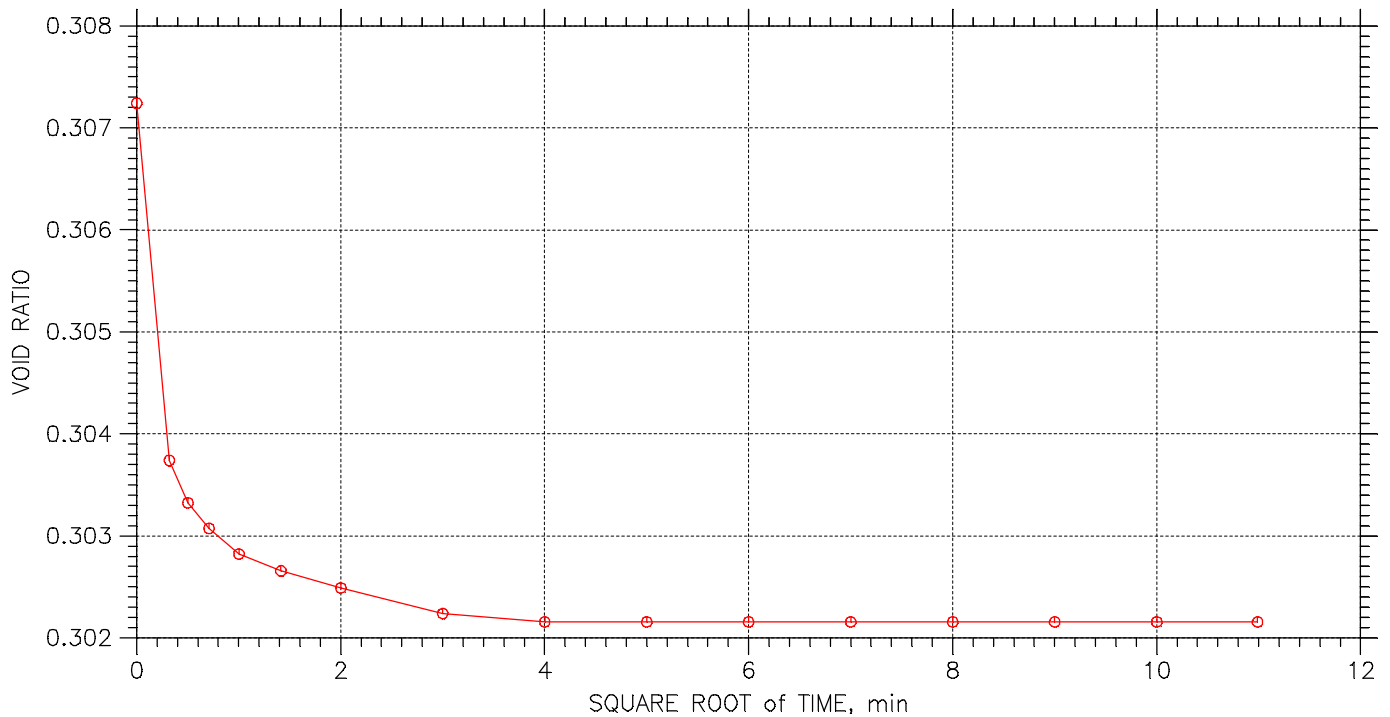
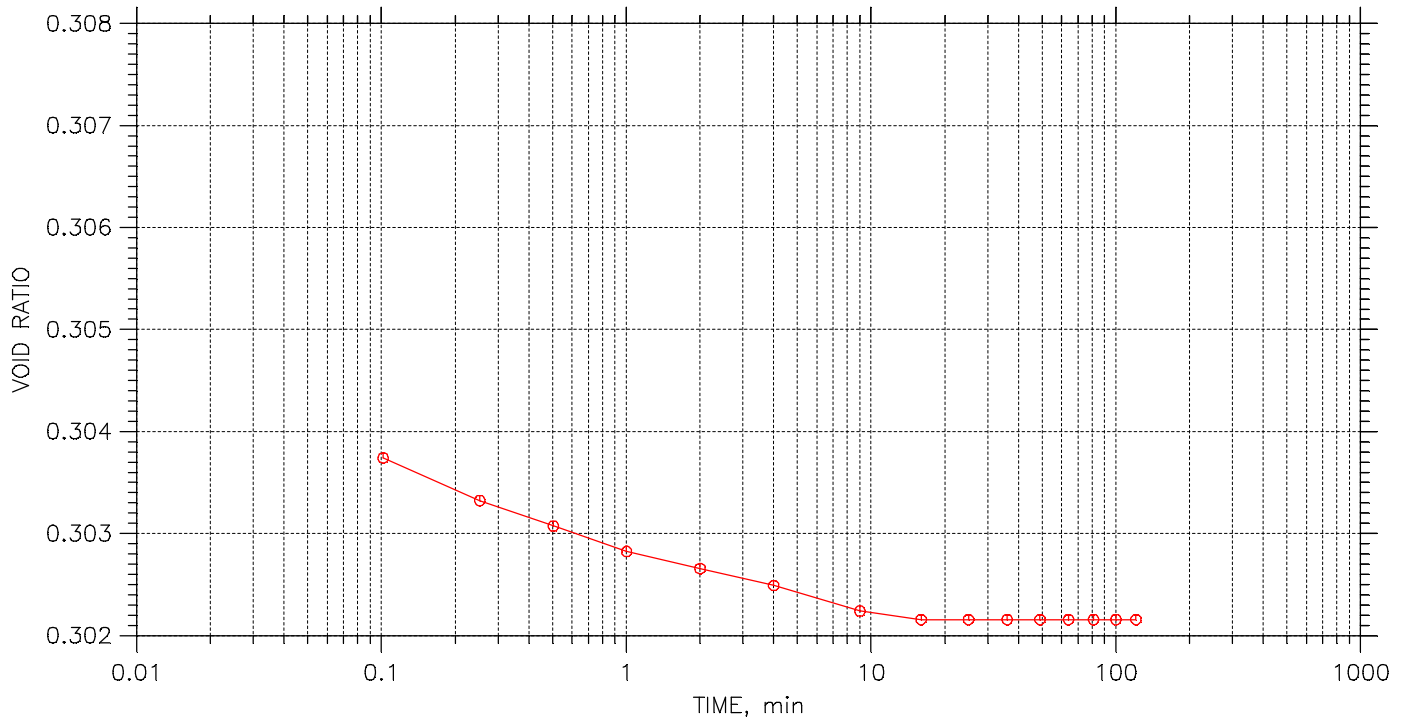
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	274		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 23

Stress: 0.25 tsf



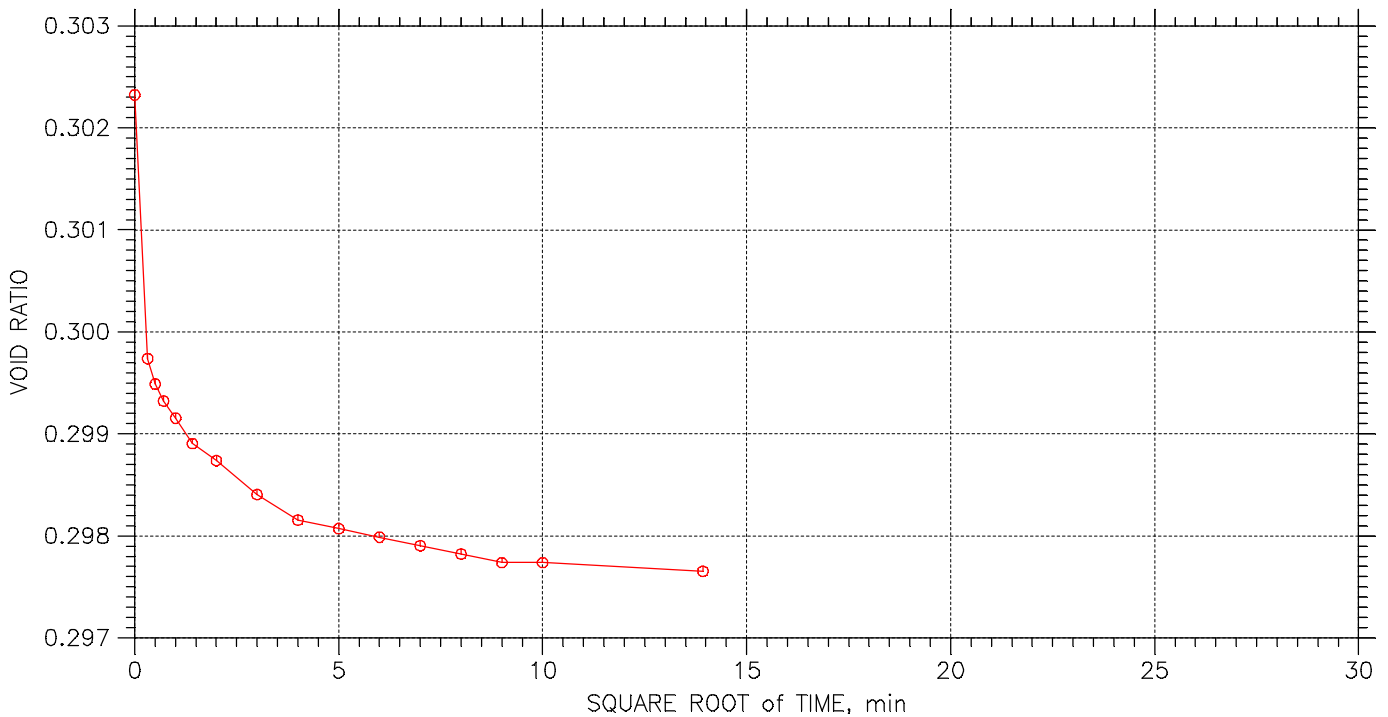
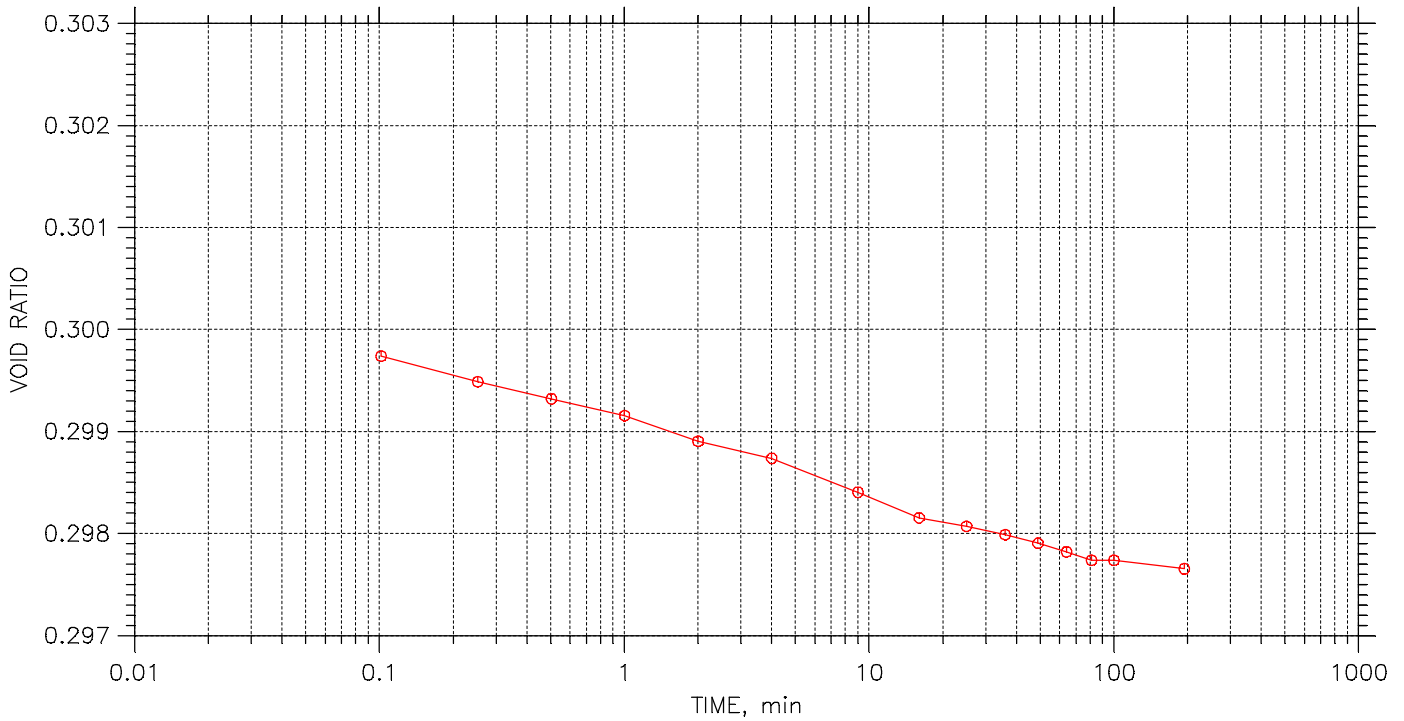
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	275		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 23

Stress: 0.5 tsf



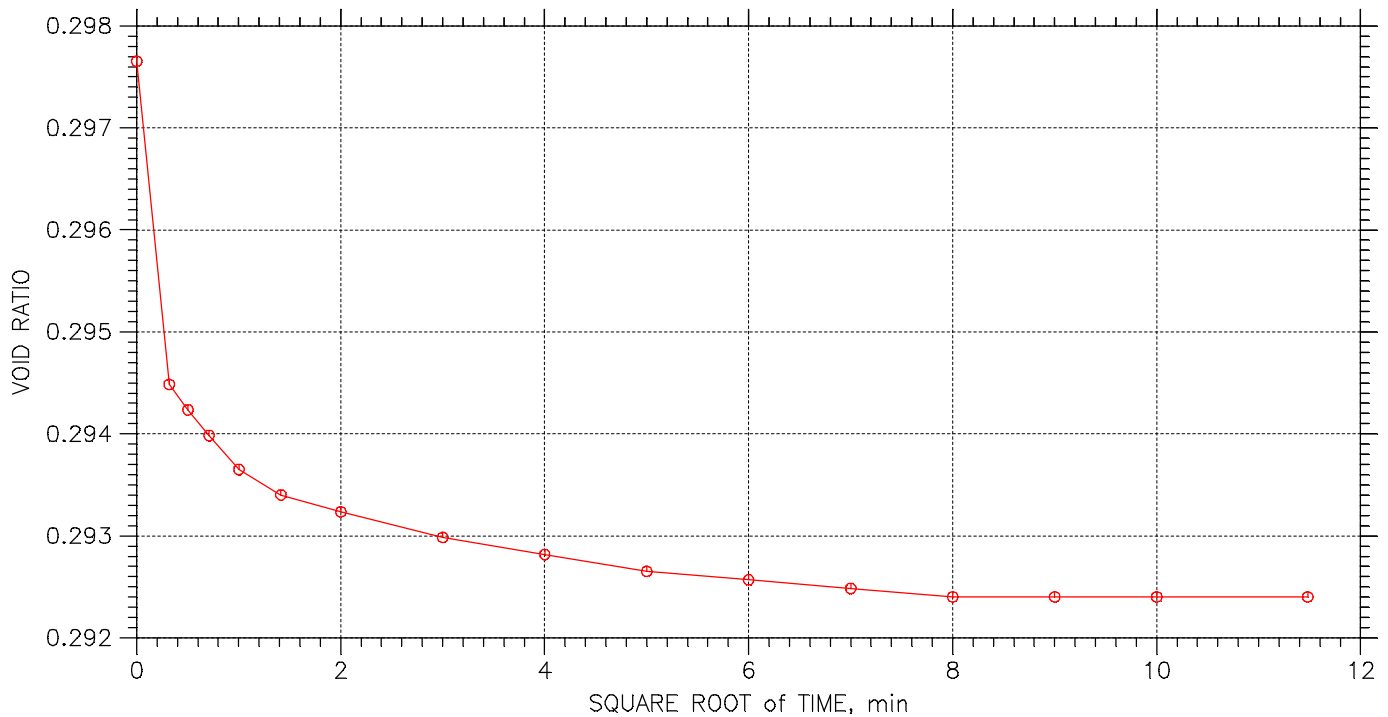
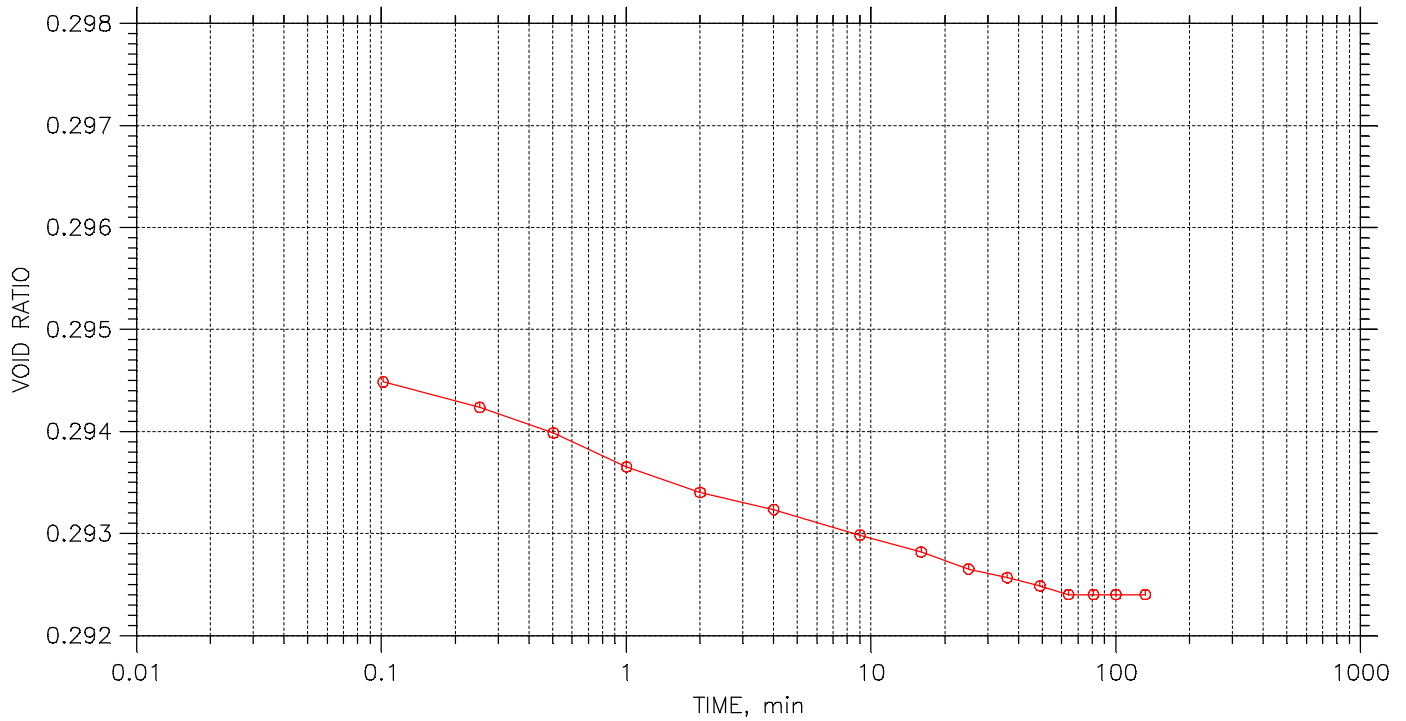
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	276		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 23

Stress: 0.75 tsf



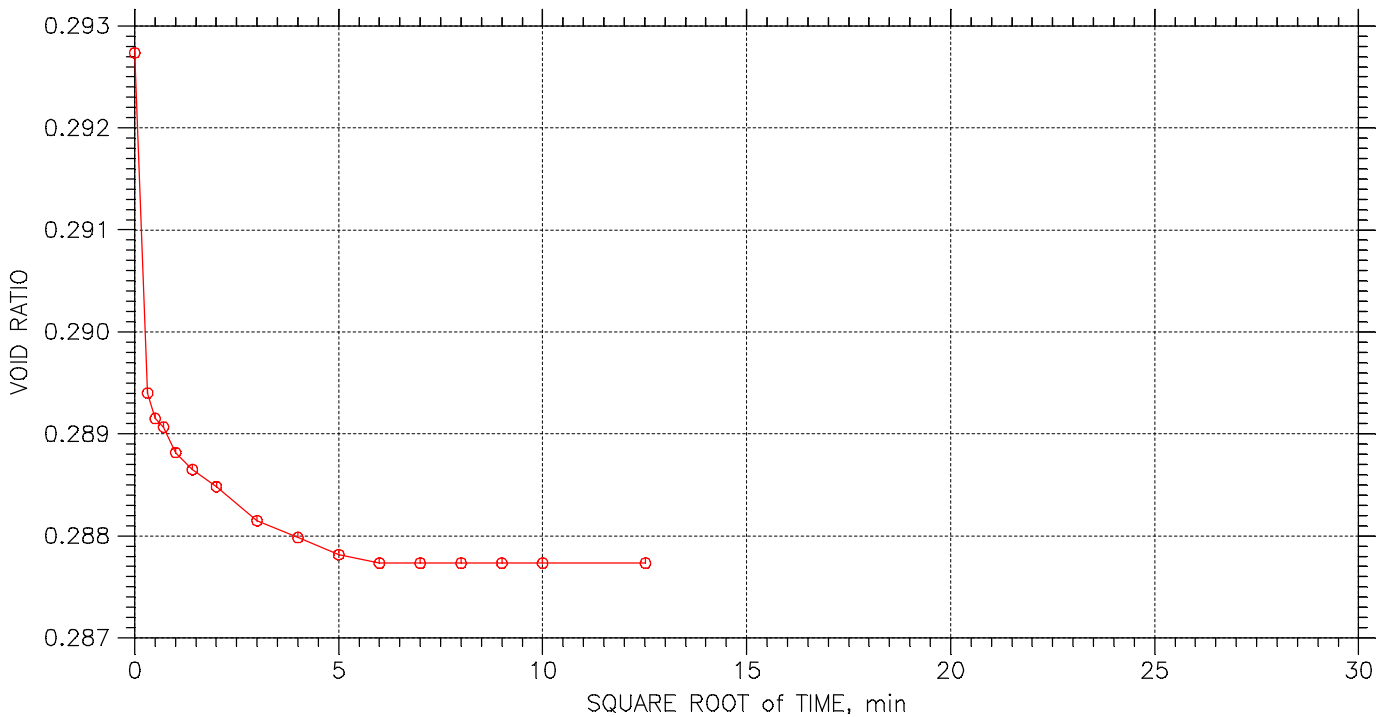
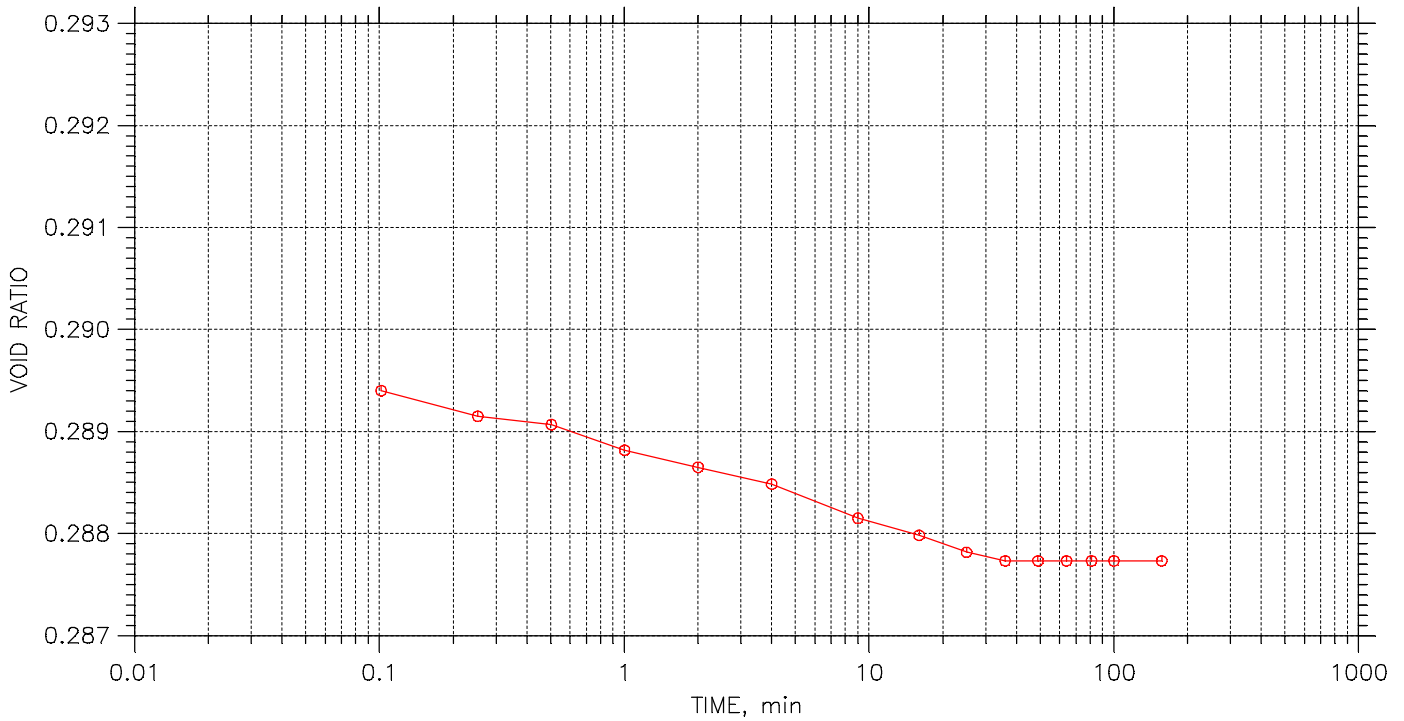
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	277		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 23

Stress: 1. tsf



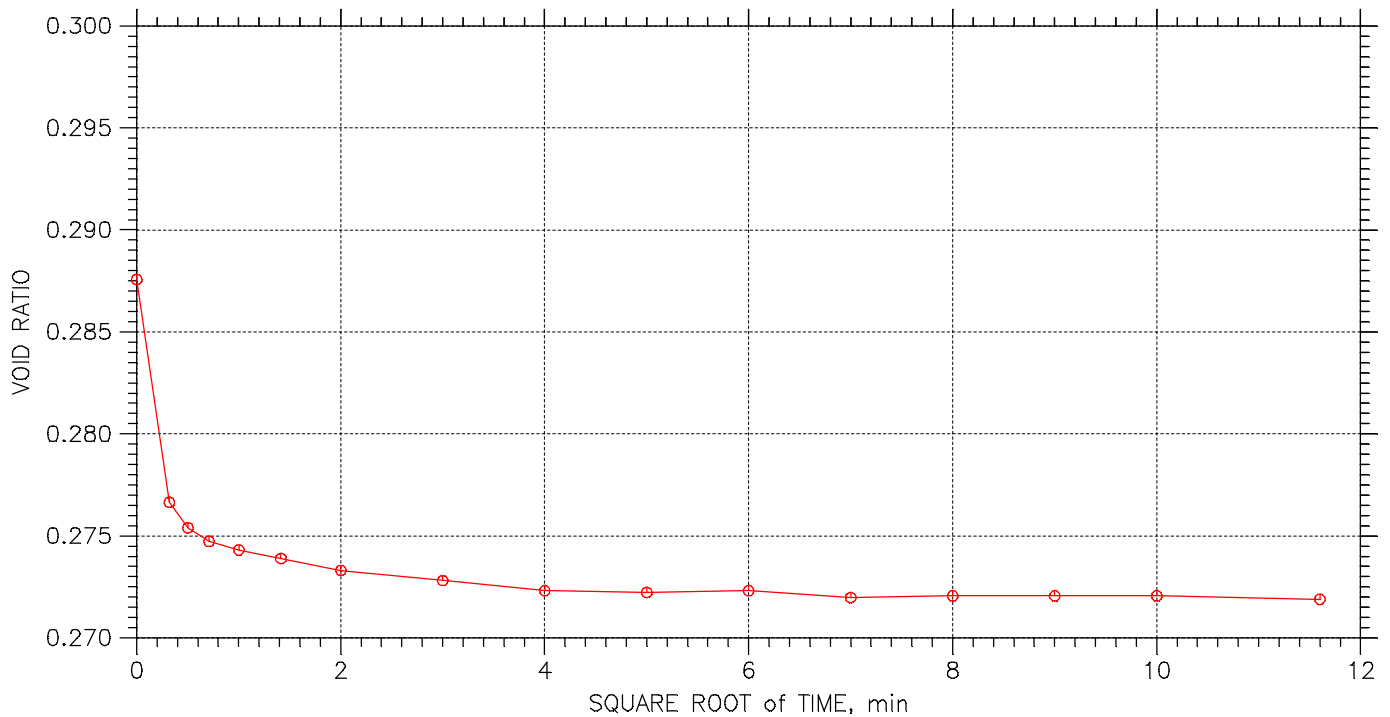
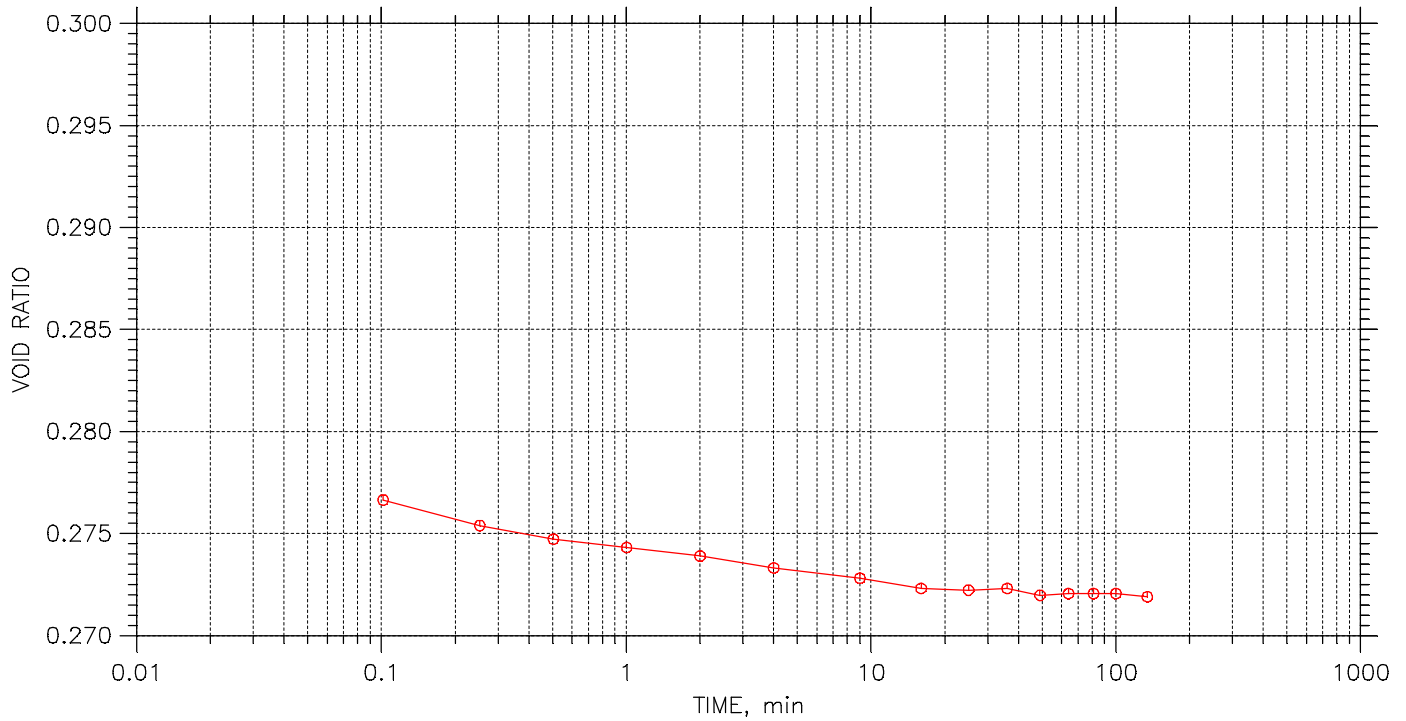
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	278		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 23

Stress: 2. tsf



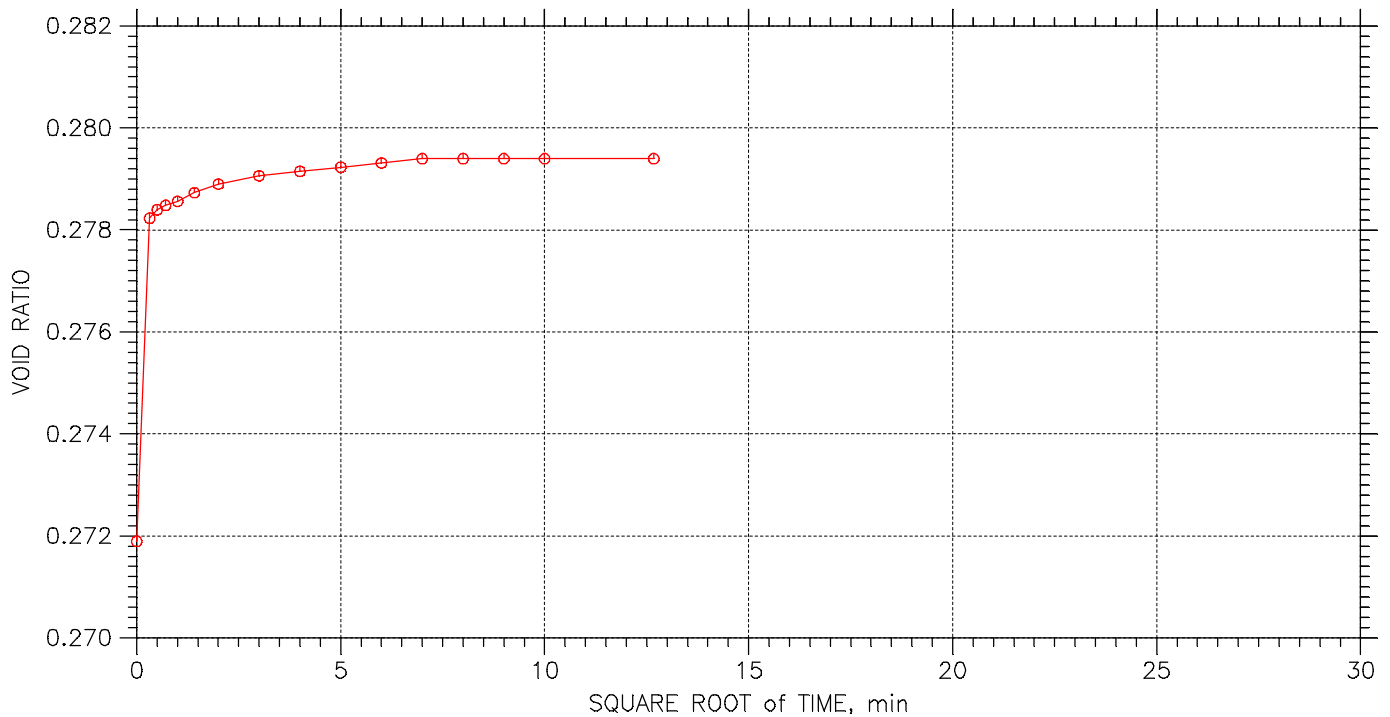
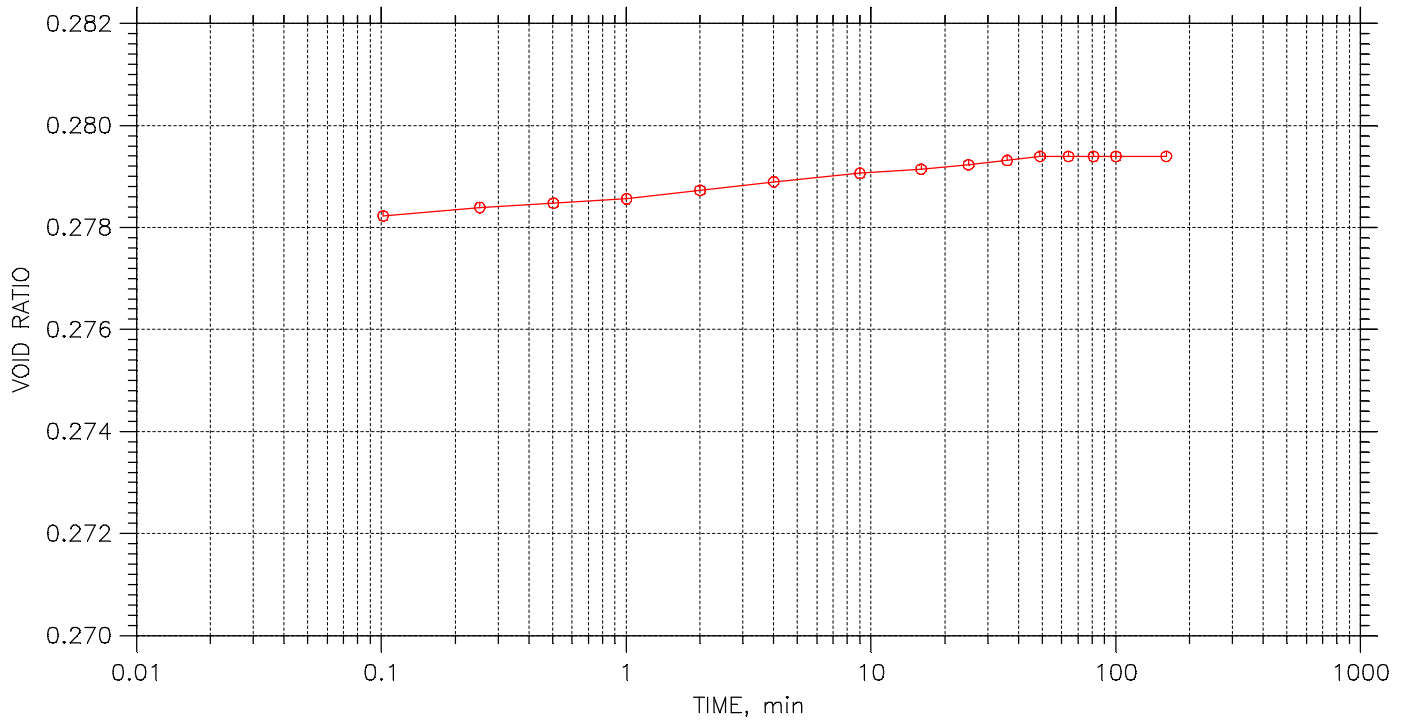
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	279		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 23

Stress: 1. tsf



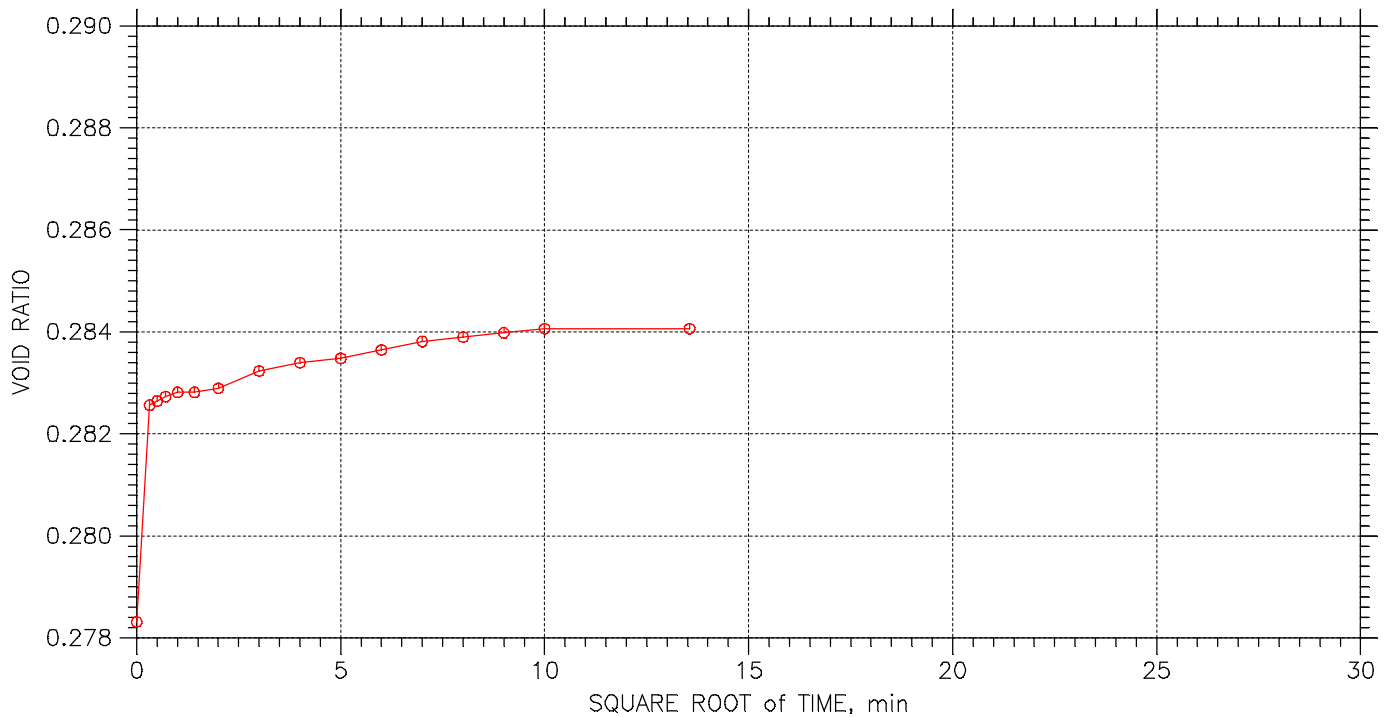
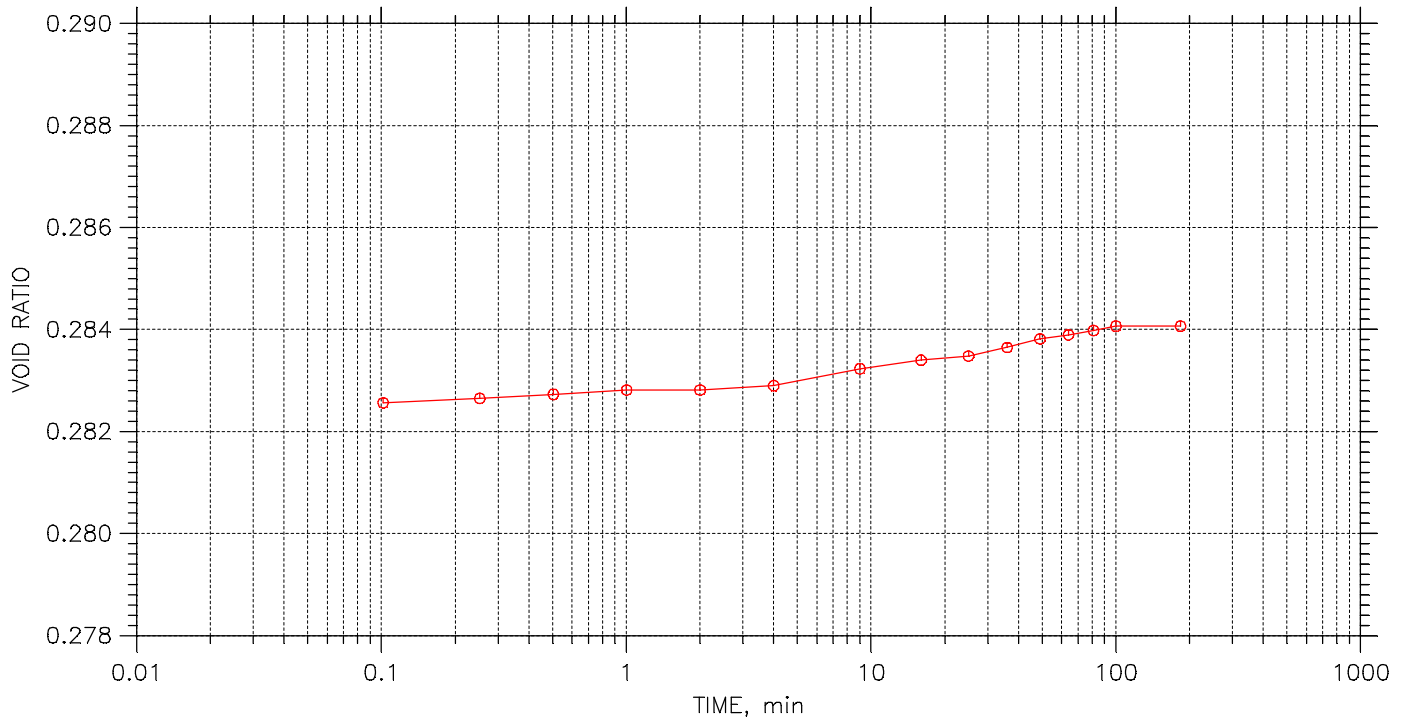
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	280		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 23

Stress: 0.5 tsf



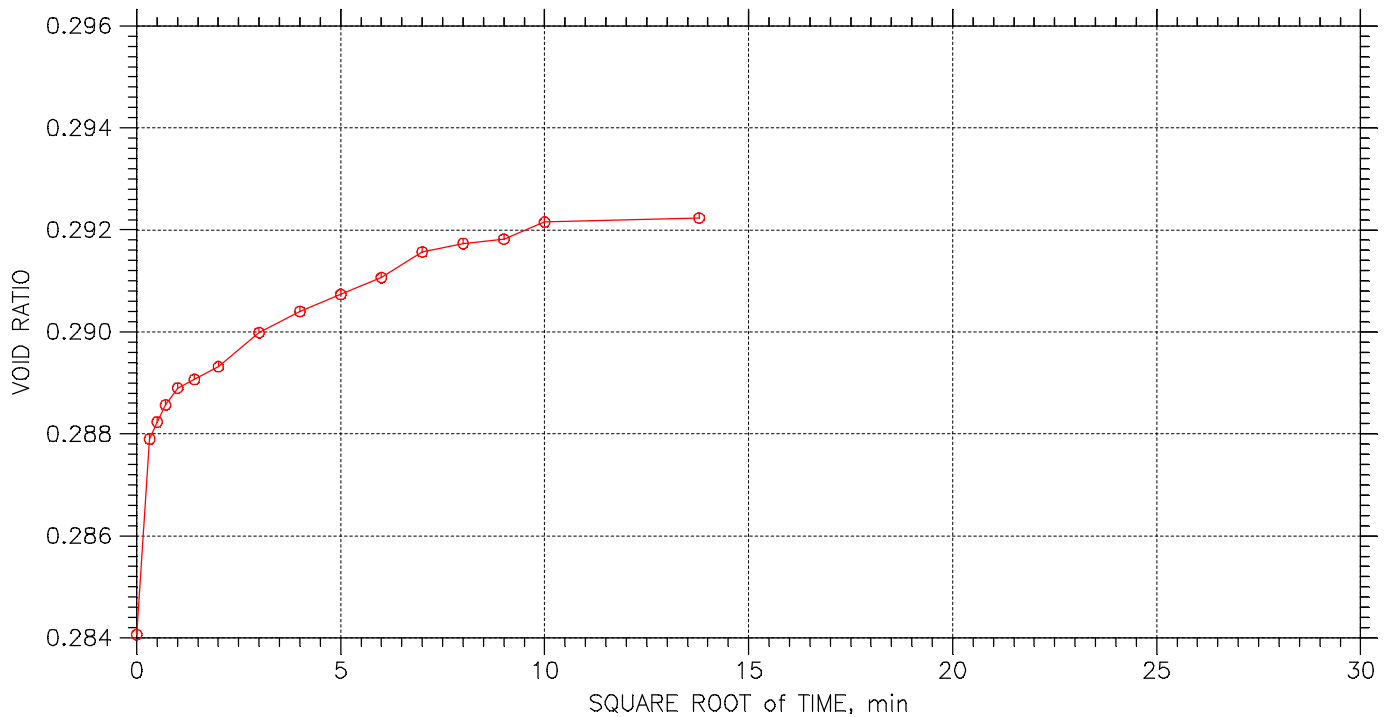
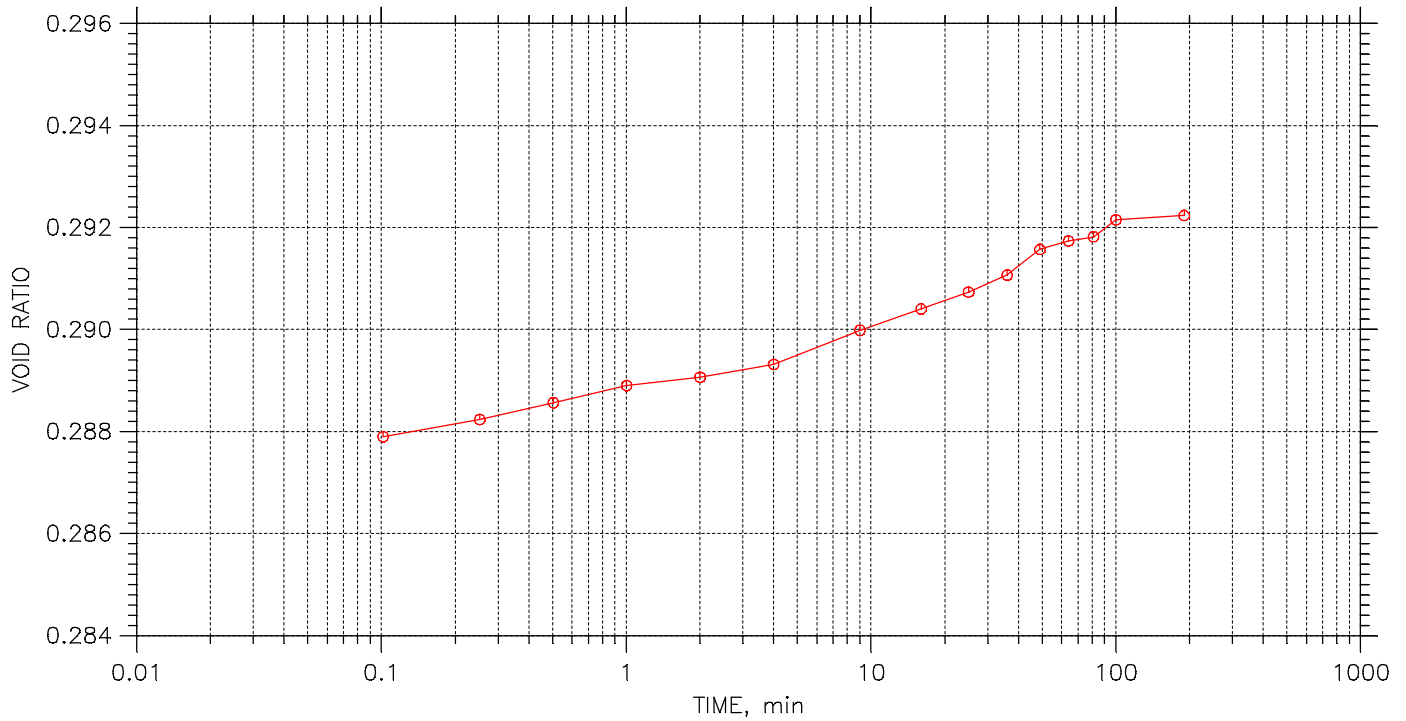
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	281		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 23

Stress: 0.125 tsf



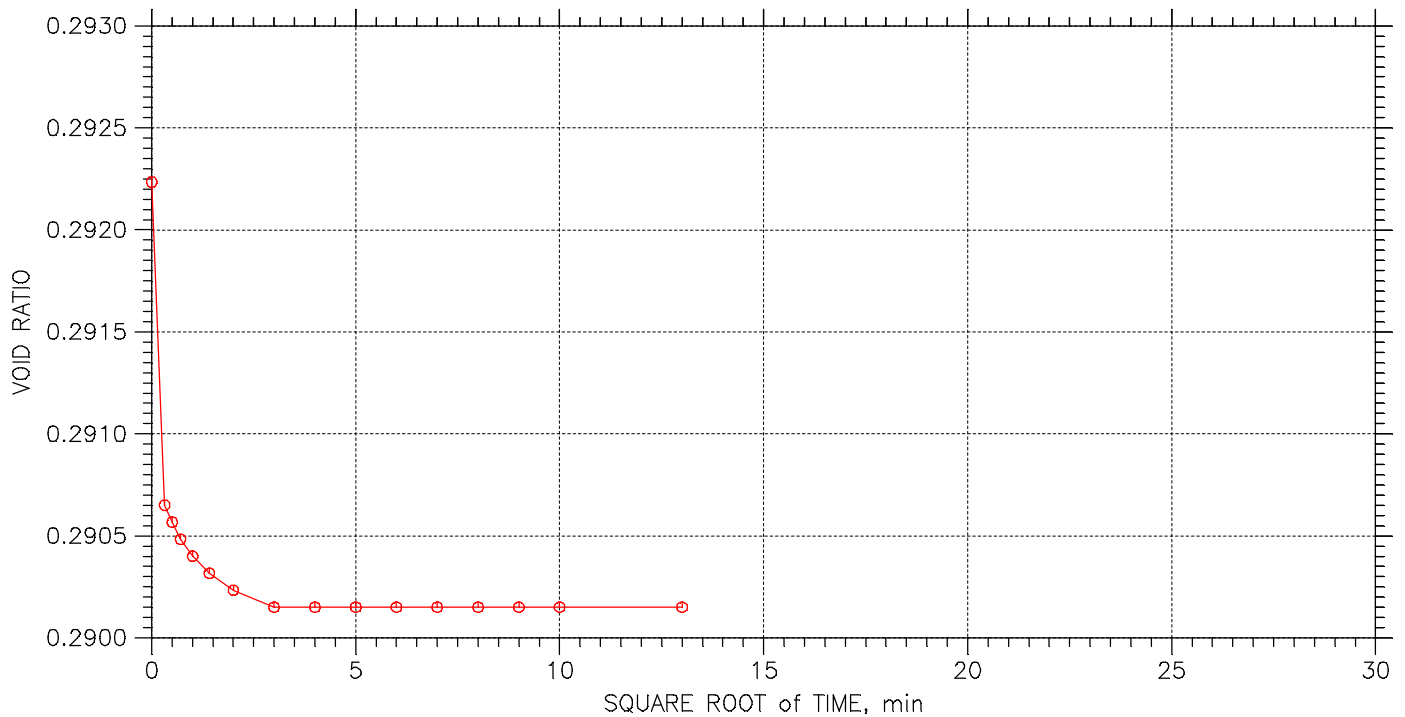
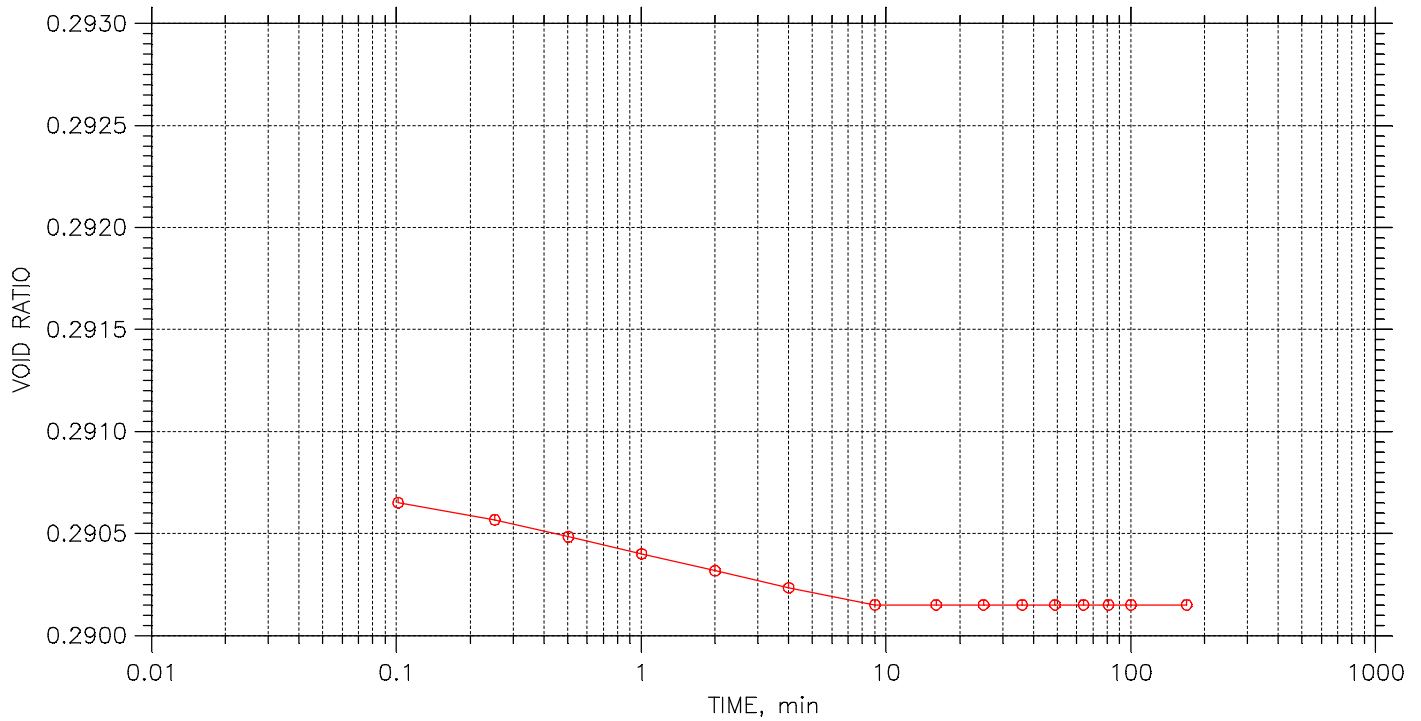
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	282		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 23

Stress: 0.25 tsf



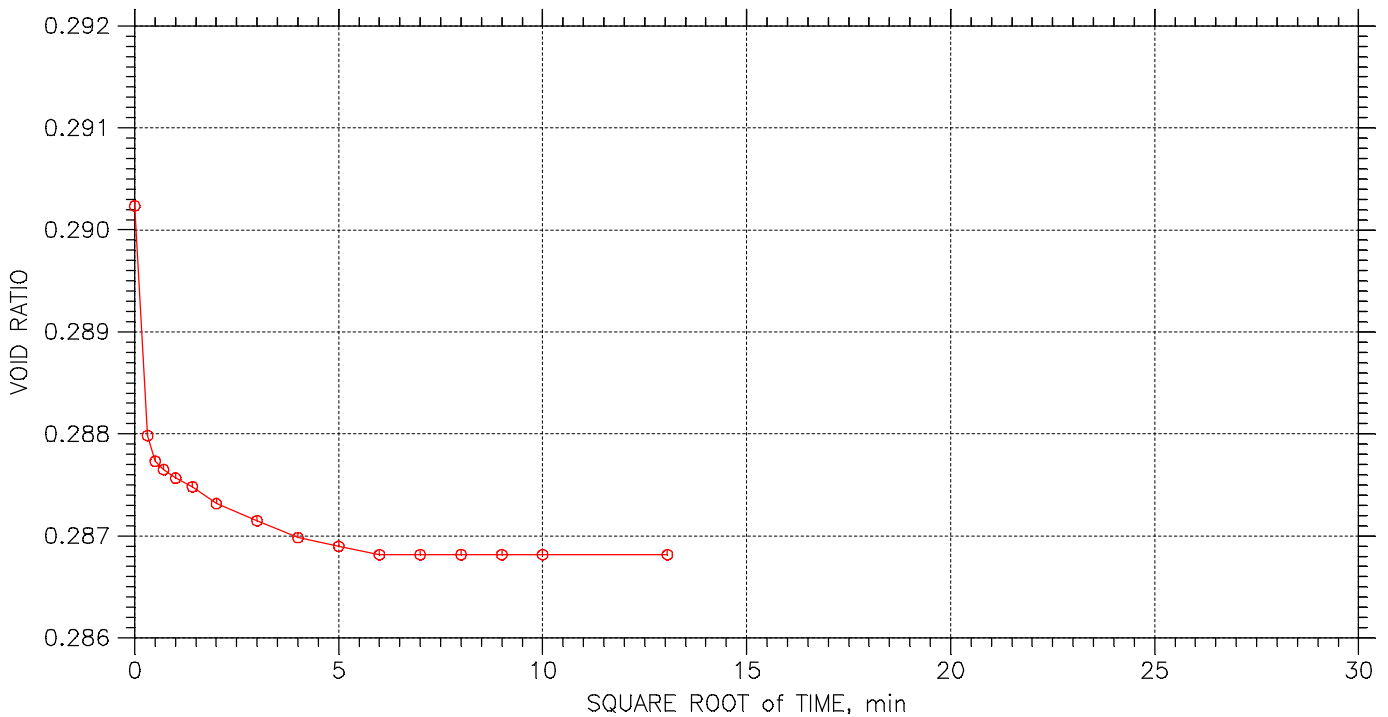
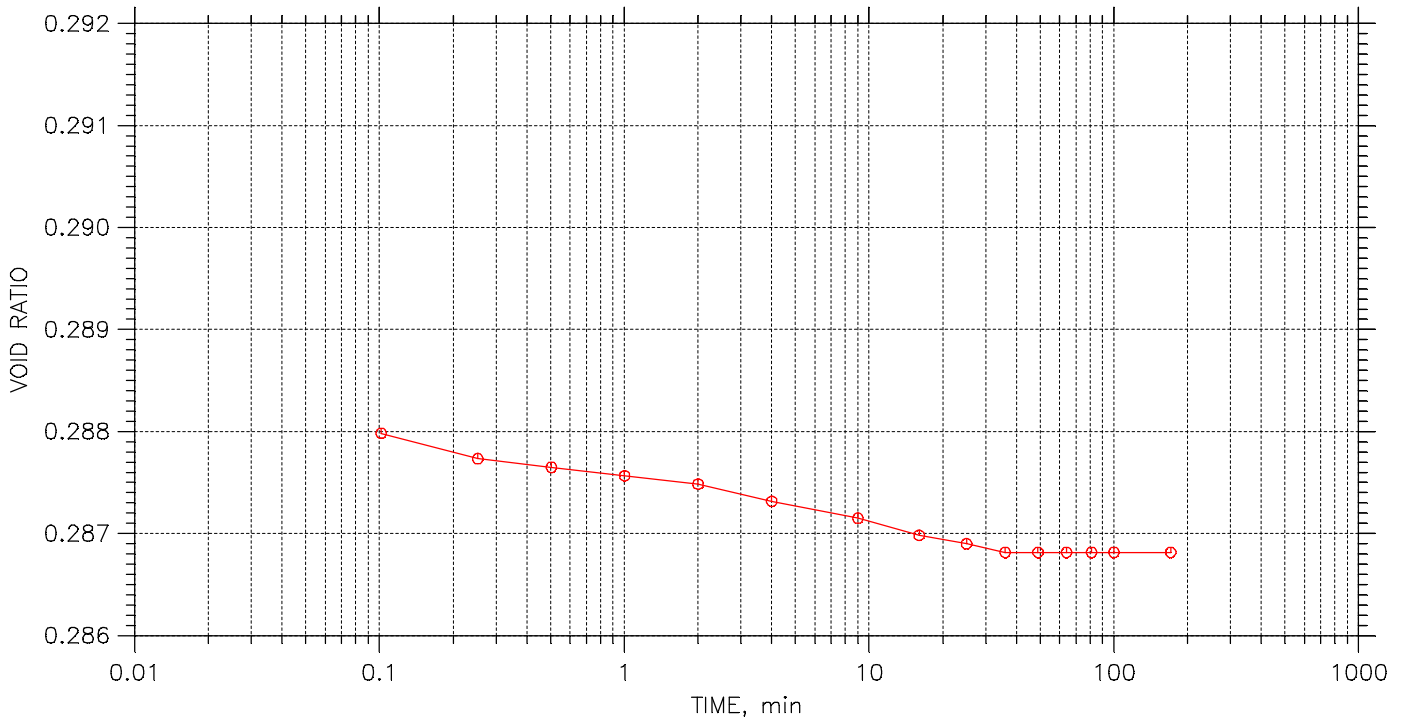
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	283		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 23

Stress: 0.5 tsf



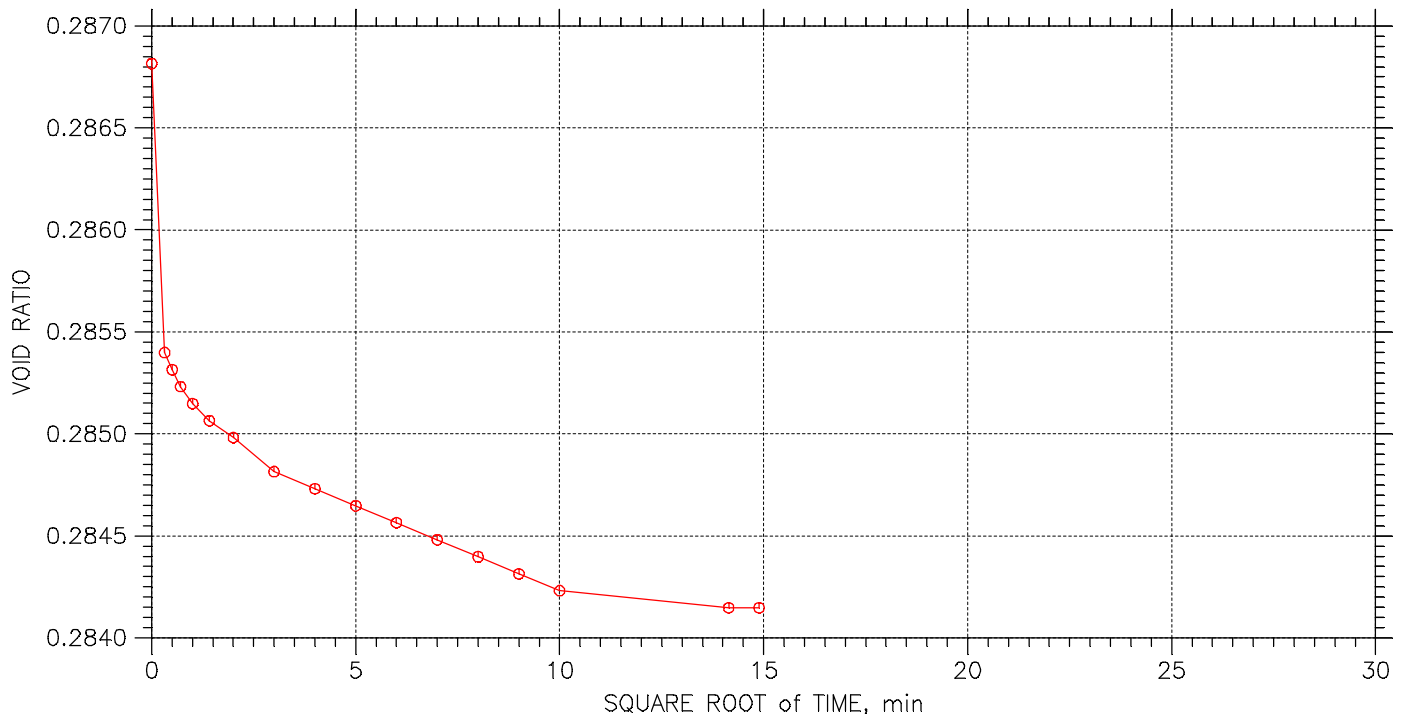
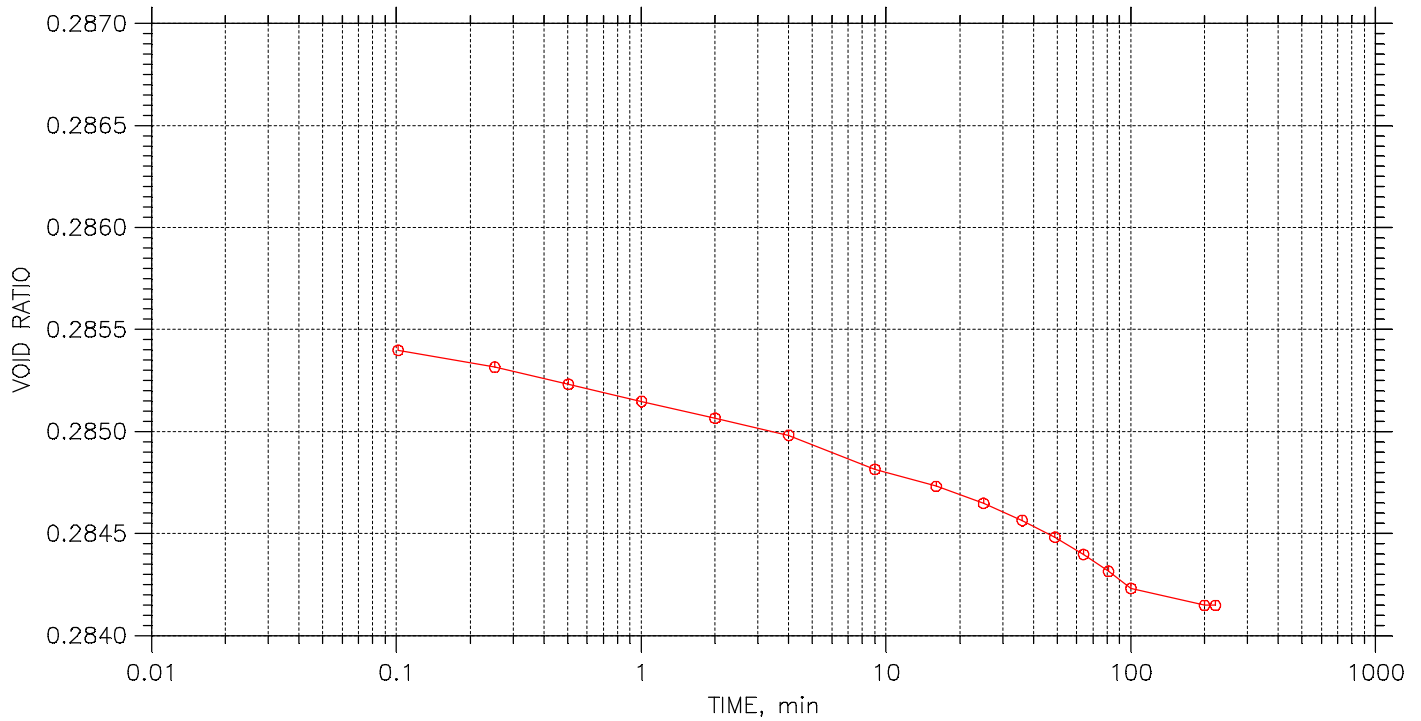
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	284		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 23

Stress: 0.75 tsf



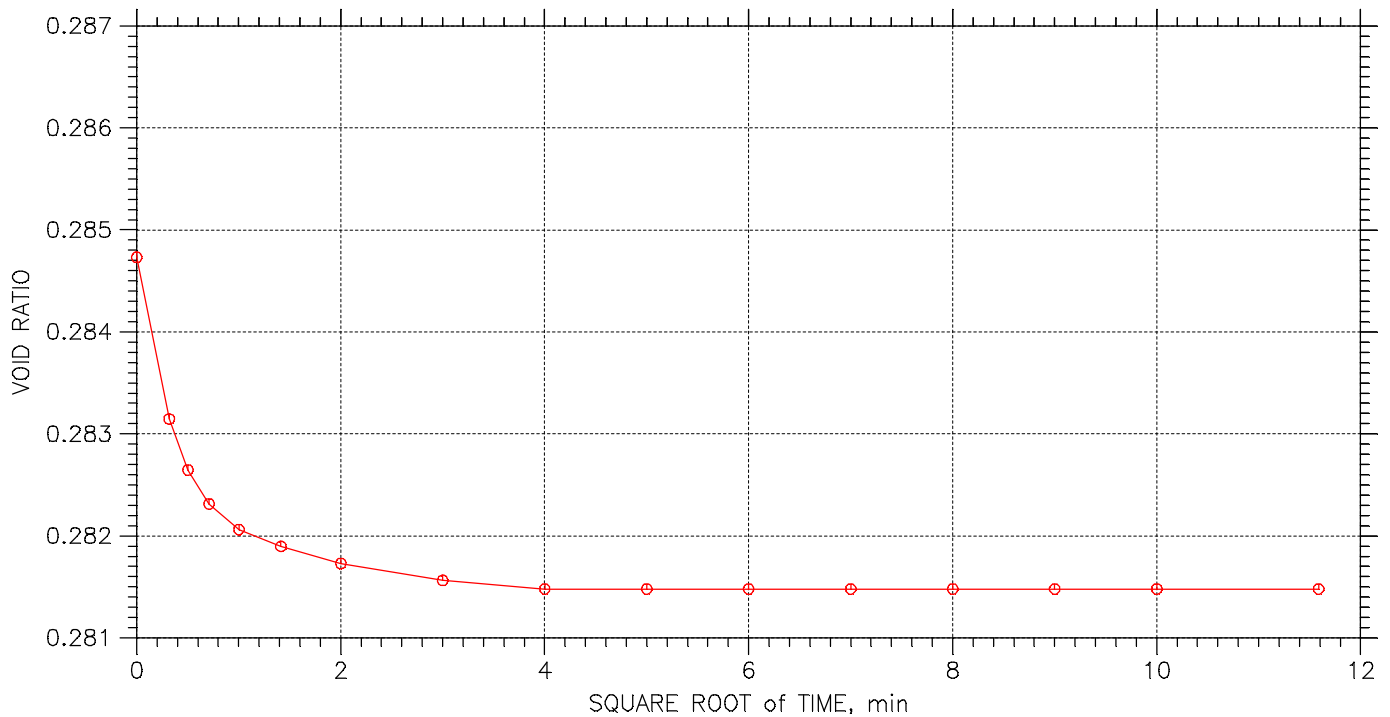
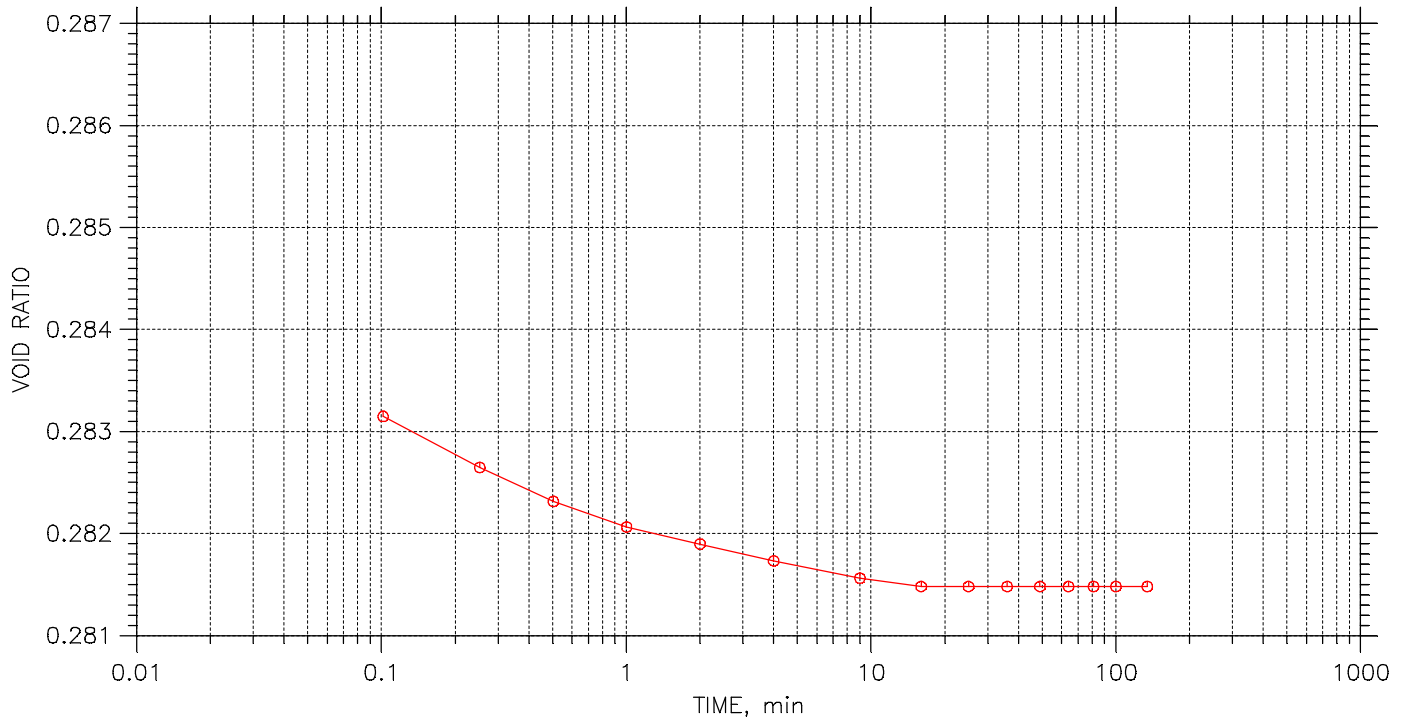
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	285		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 23

Stress: 1. tsf



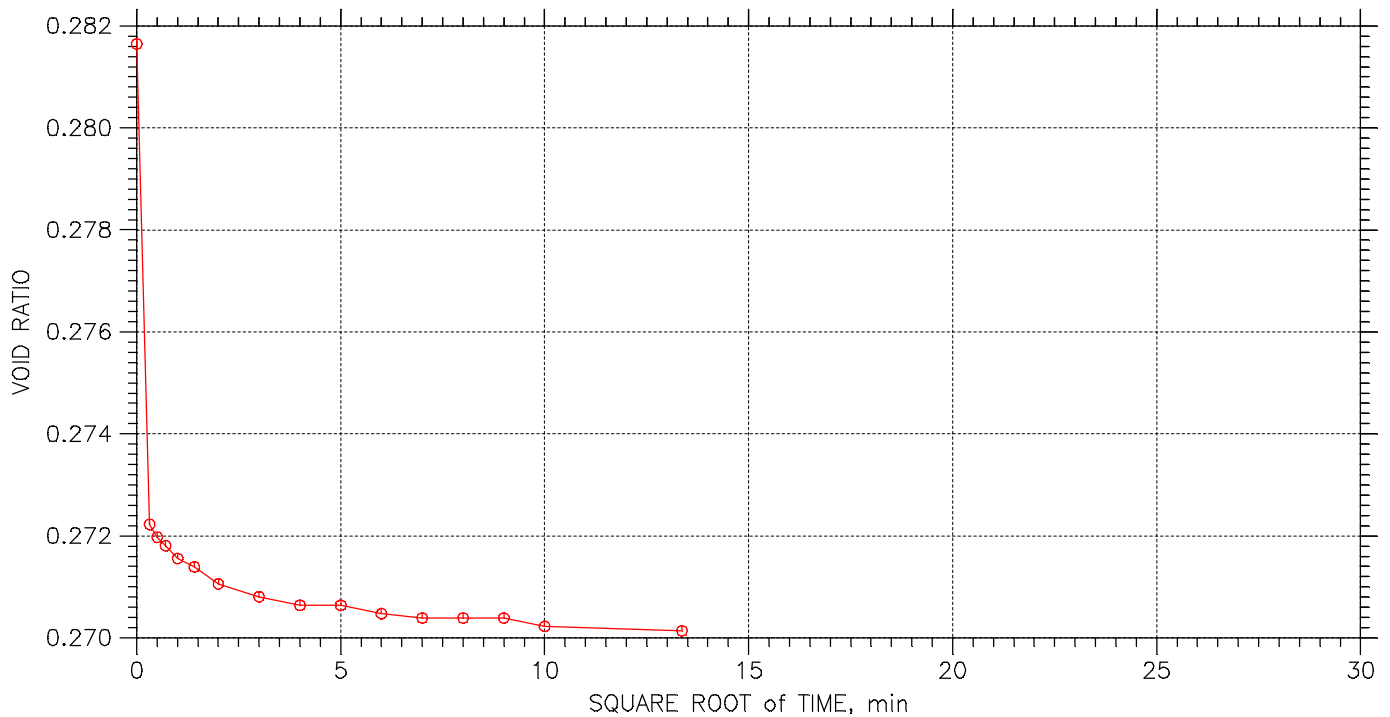
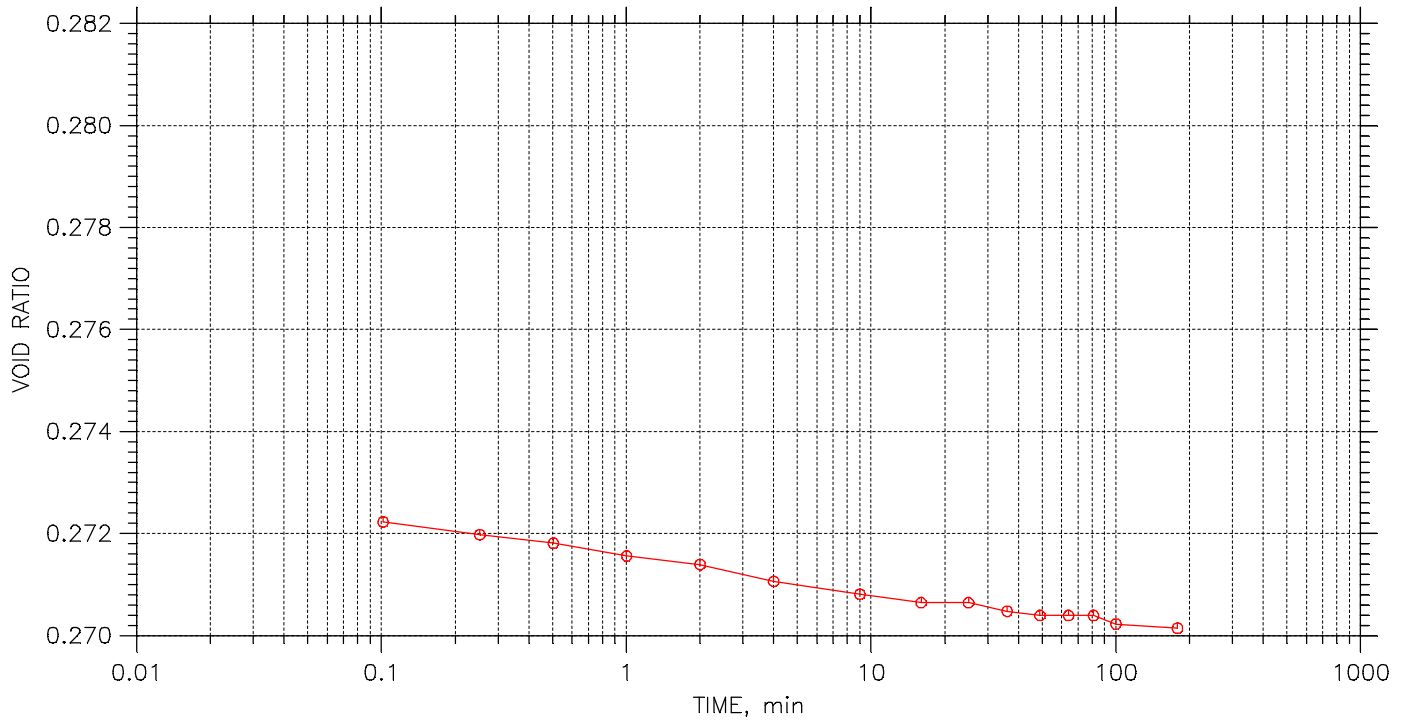
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	286		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 14 of 23

Stress: 2. tsf



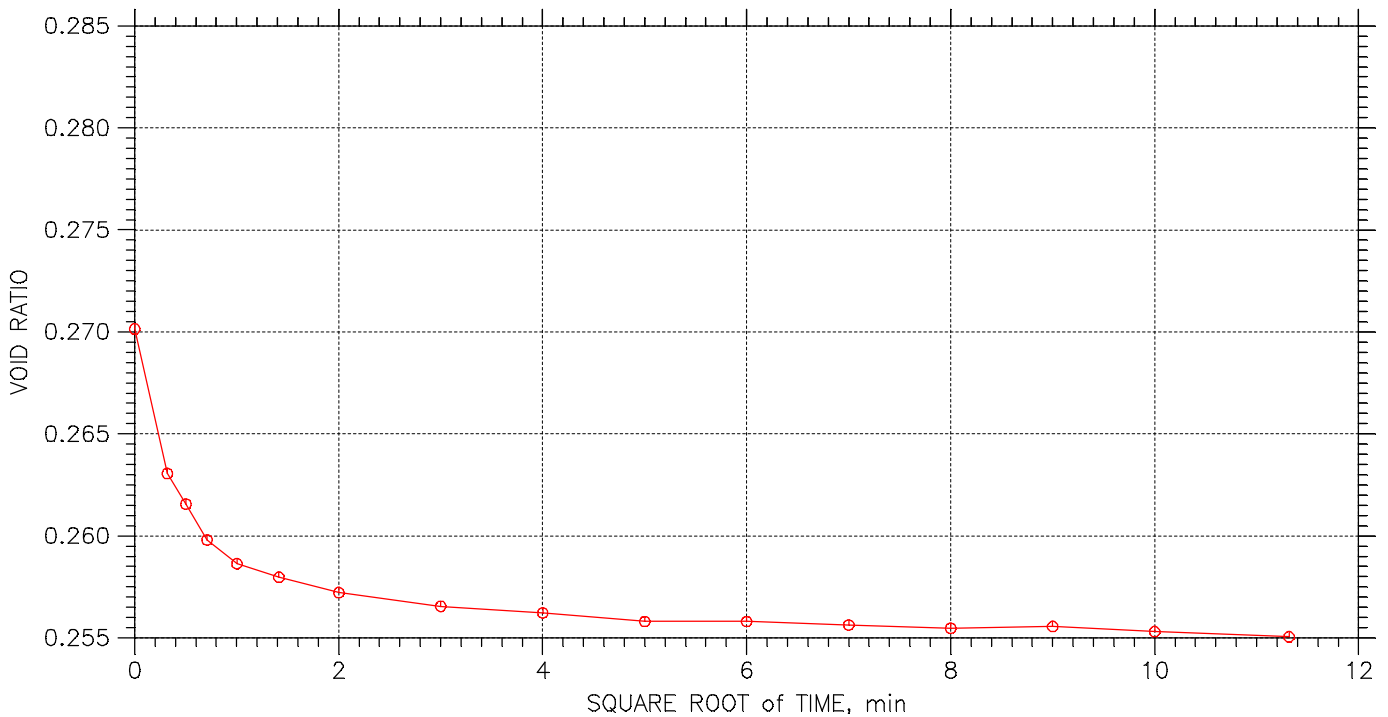
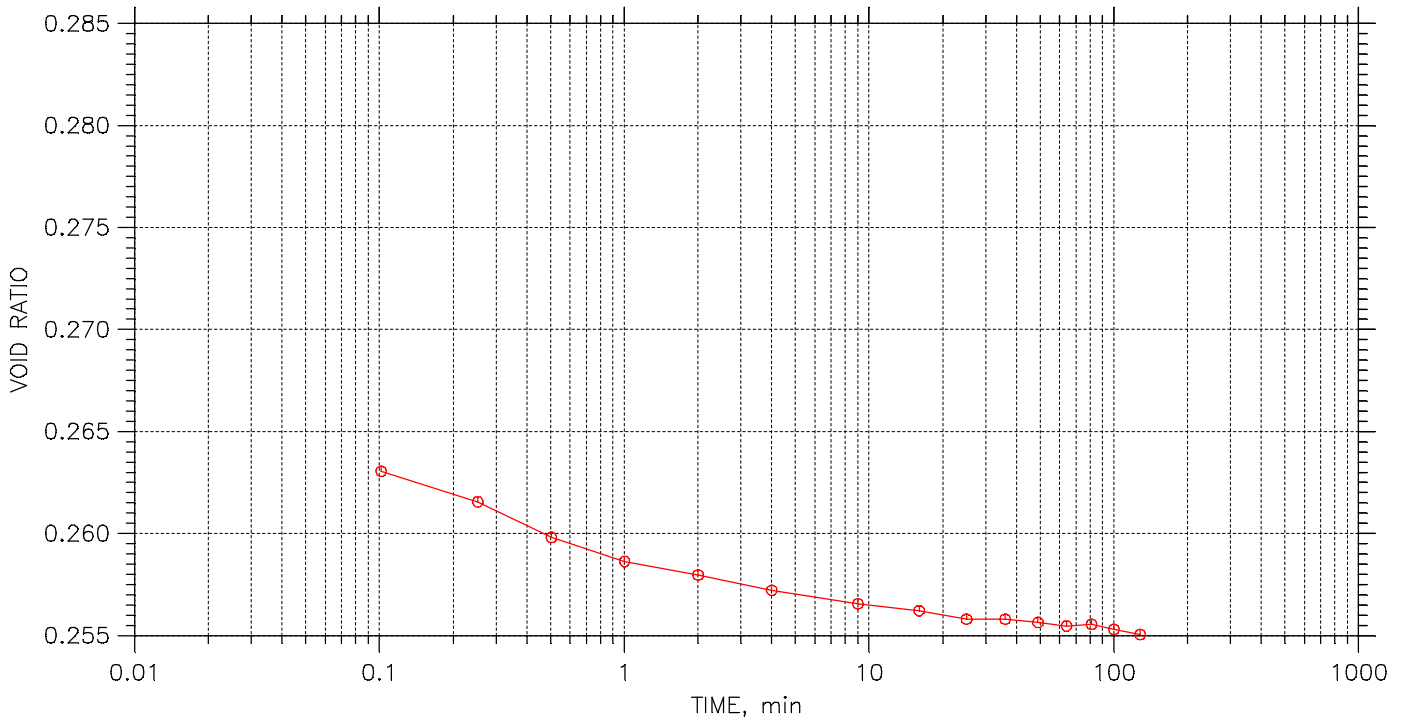
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	287		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 15 of 23

Stress: 4. tsf



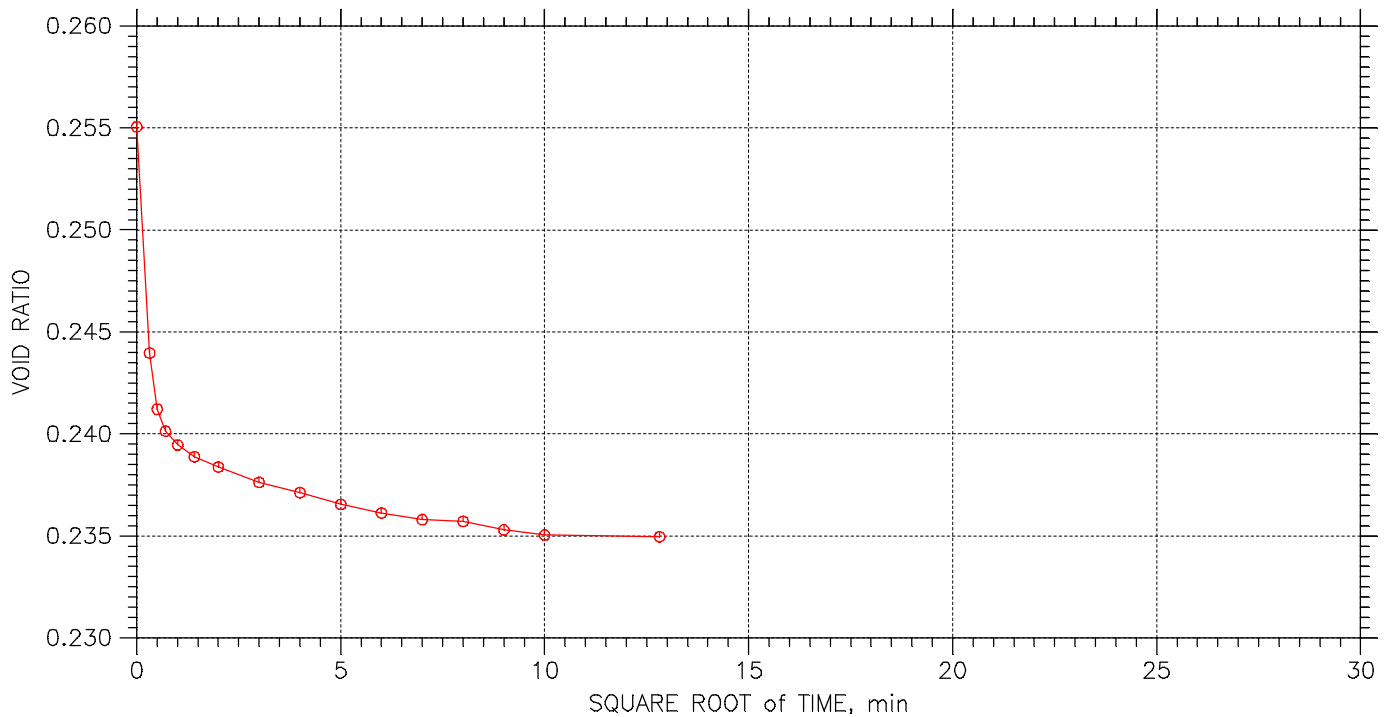
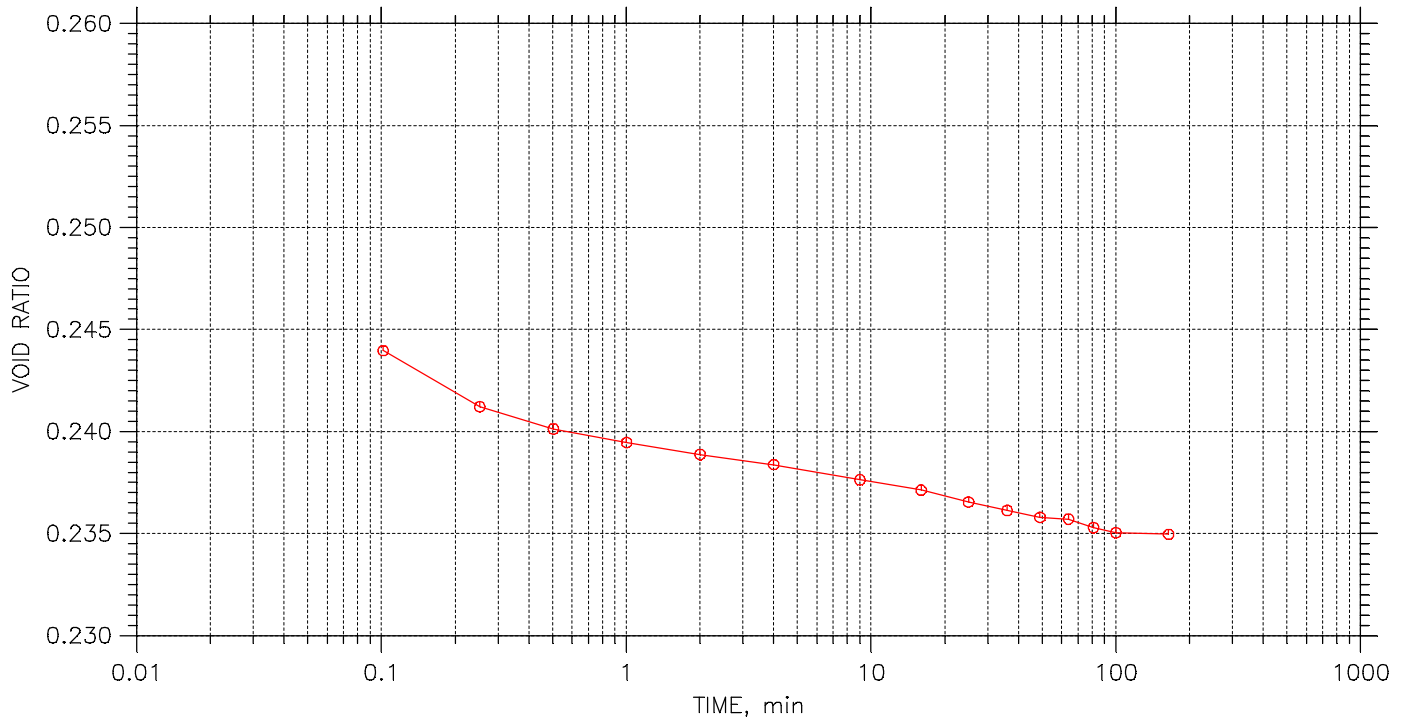
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	288		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 16 of 23

Stress: 8. tsf



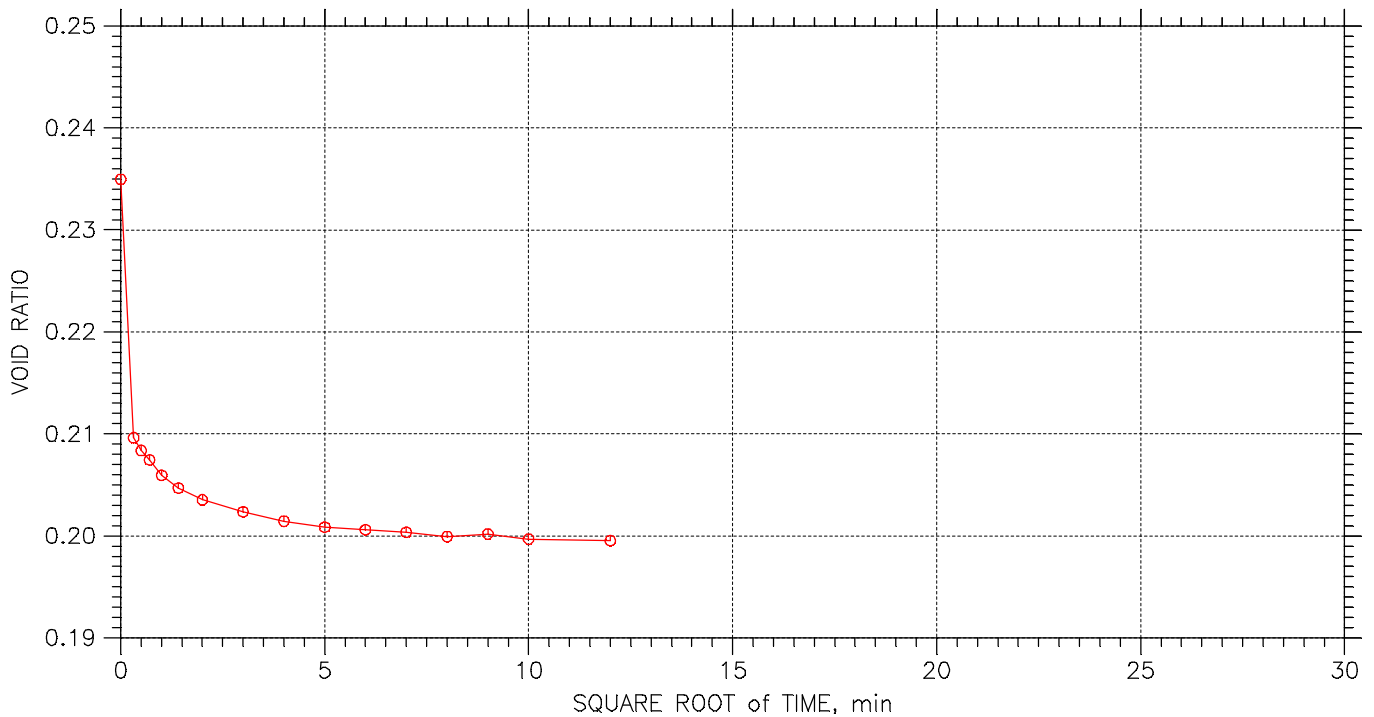
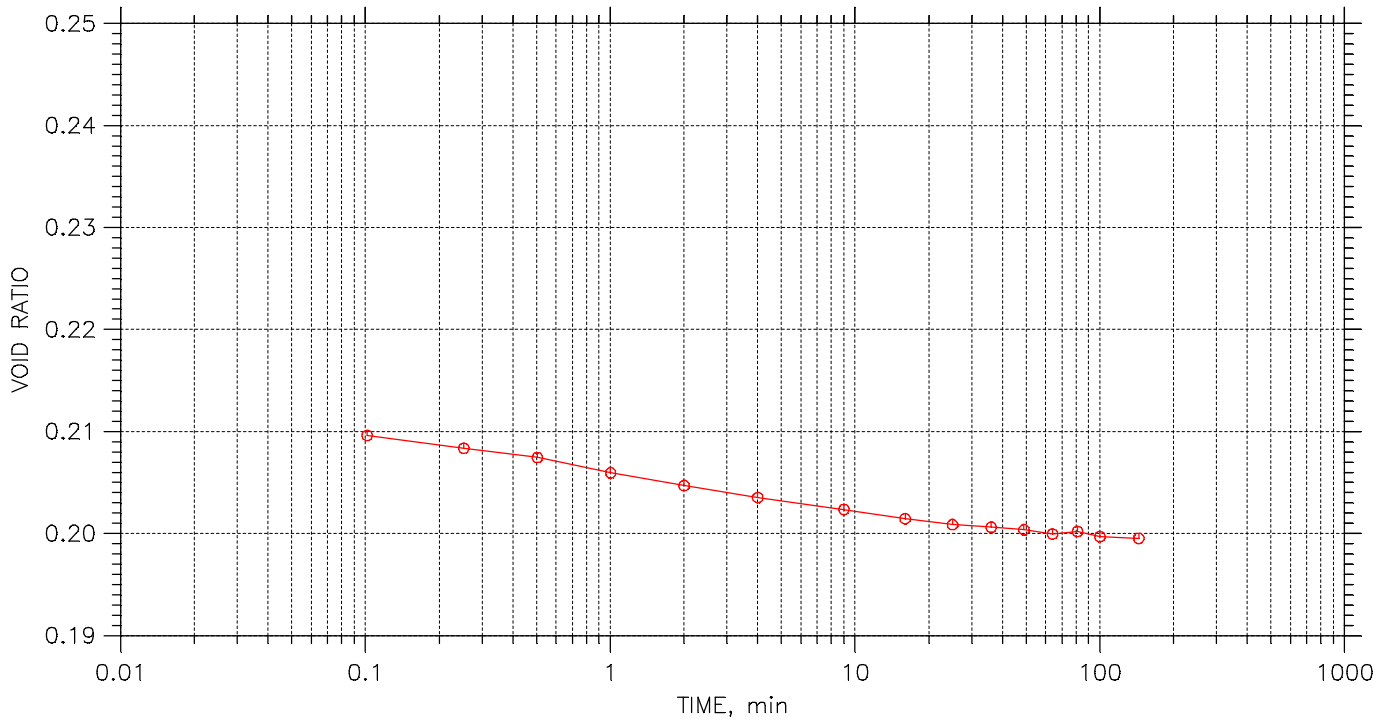
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	289		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 17 of 23

Stress: 16. tsf



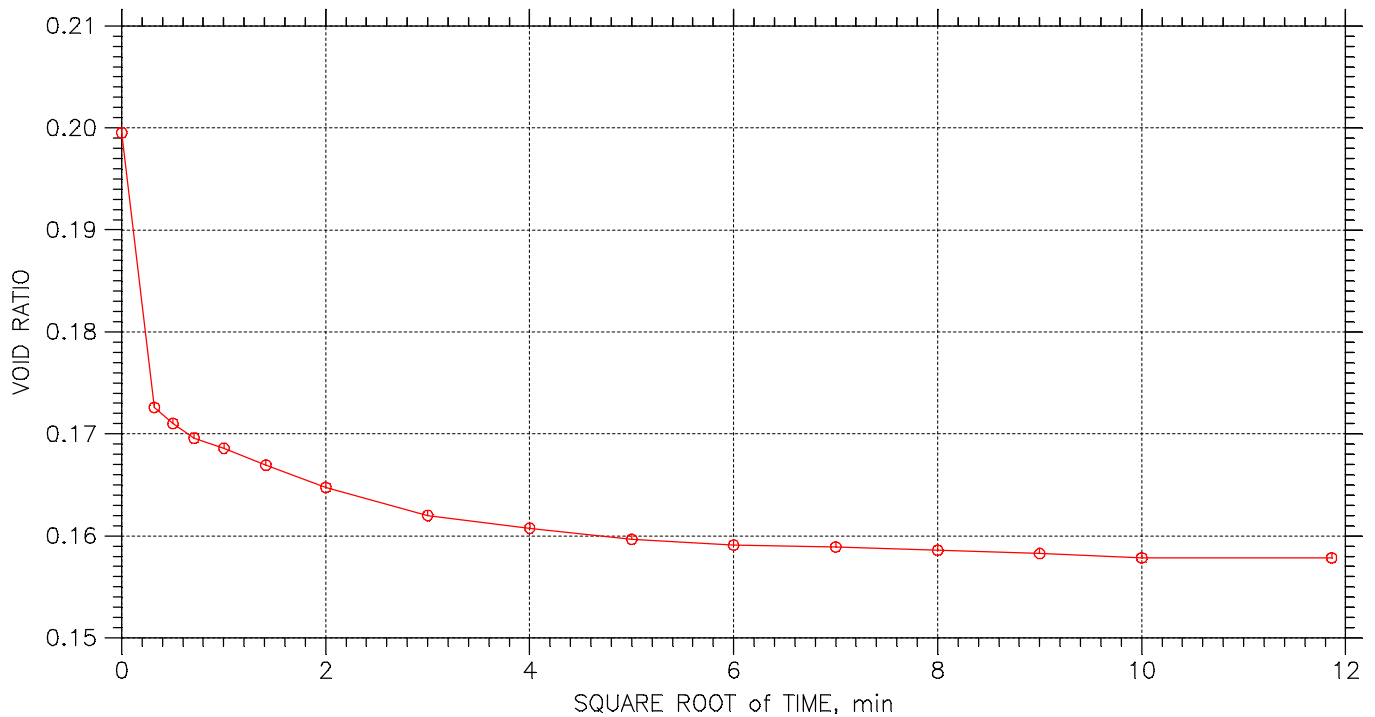
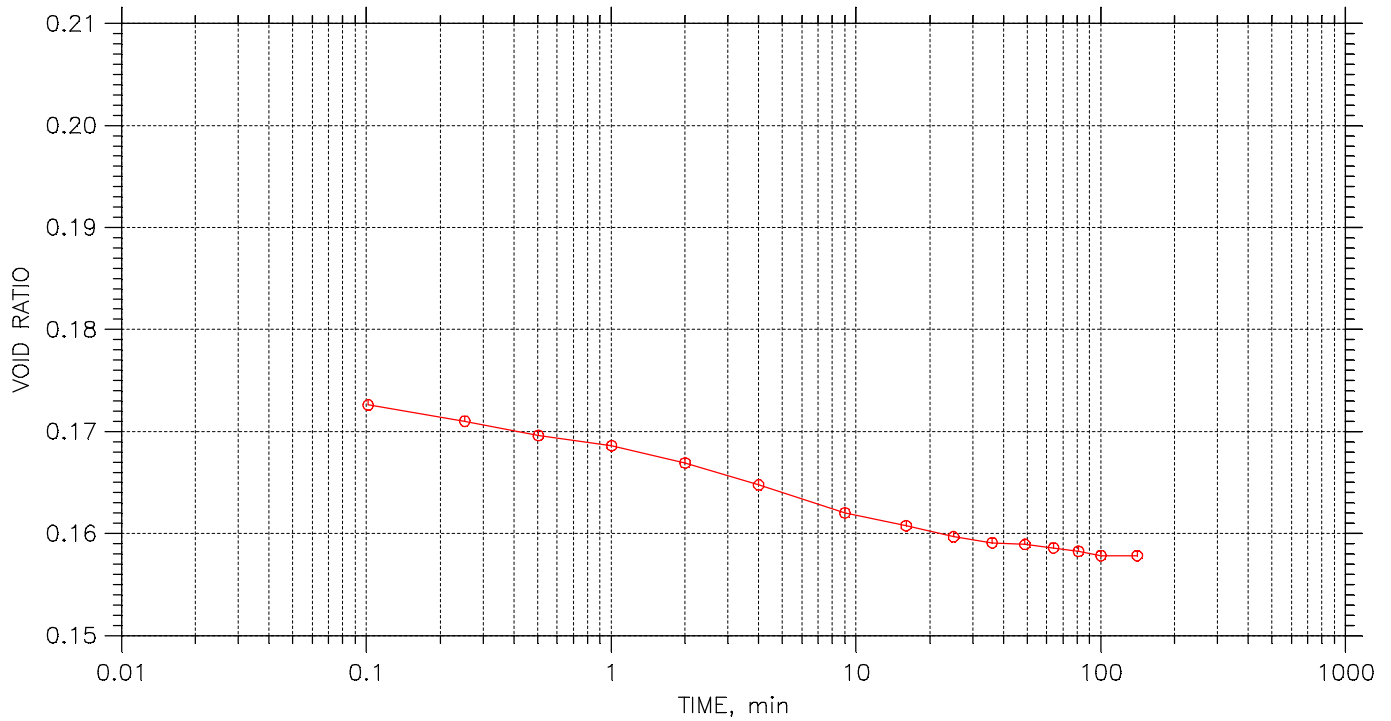
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	290		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 18 of 23

Stress: 32. tsf



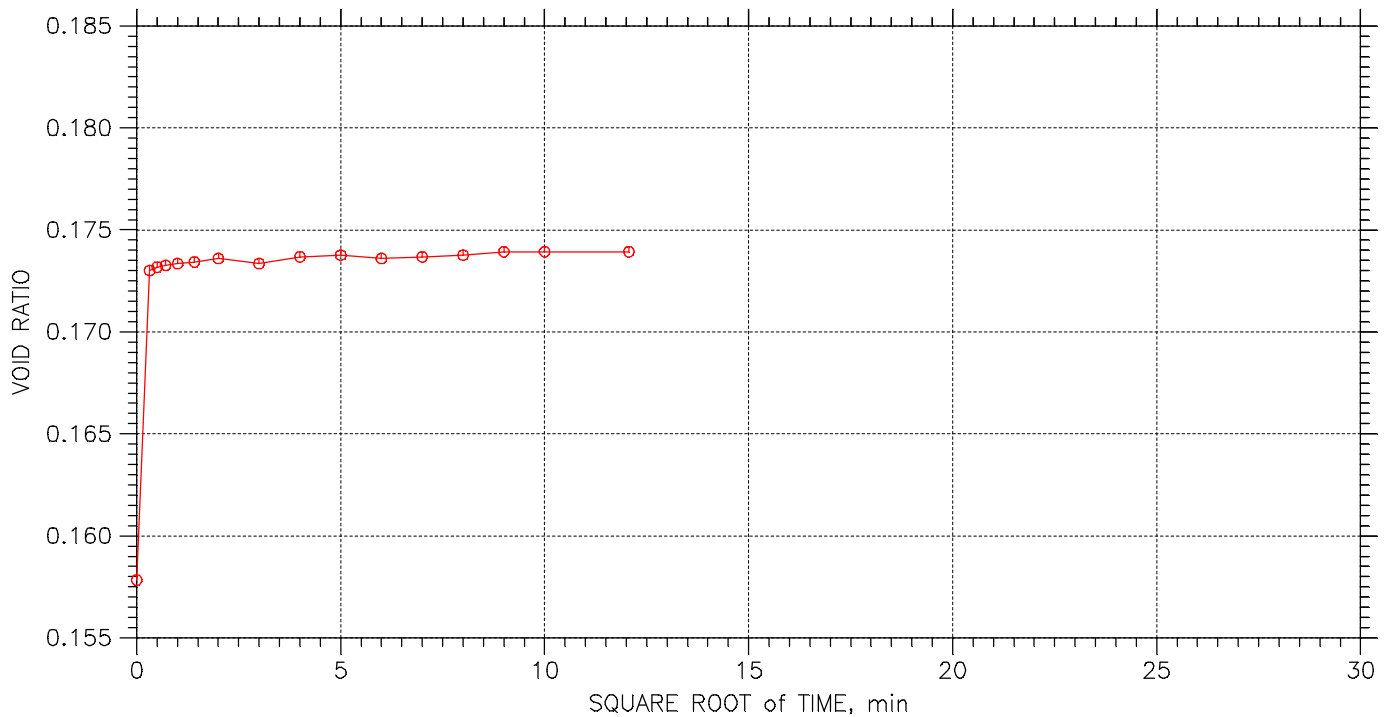
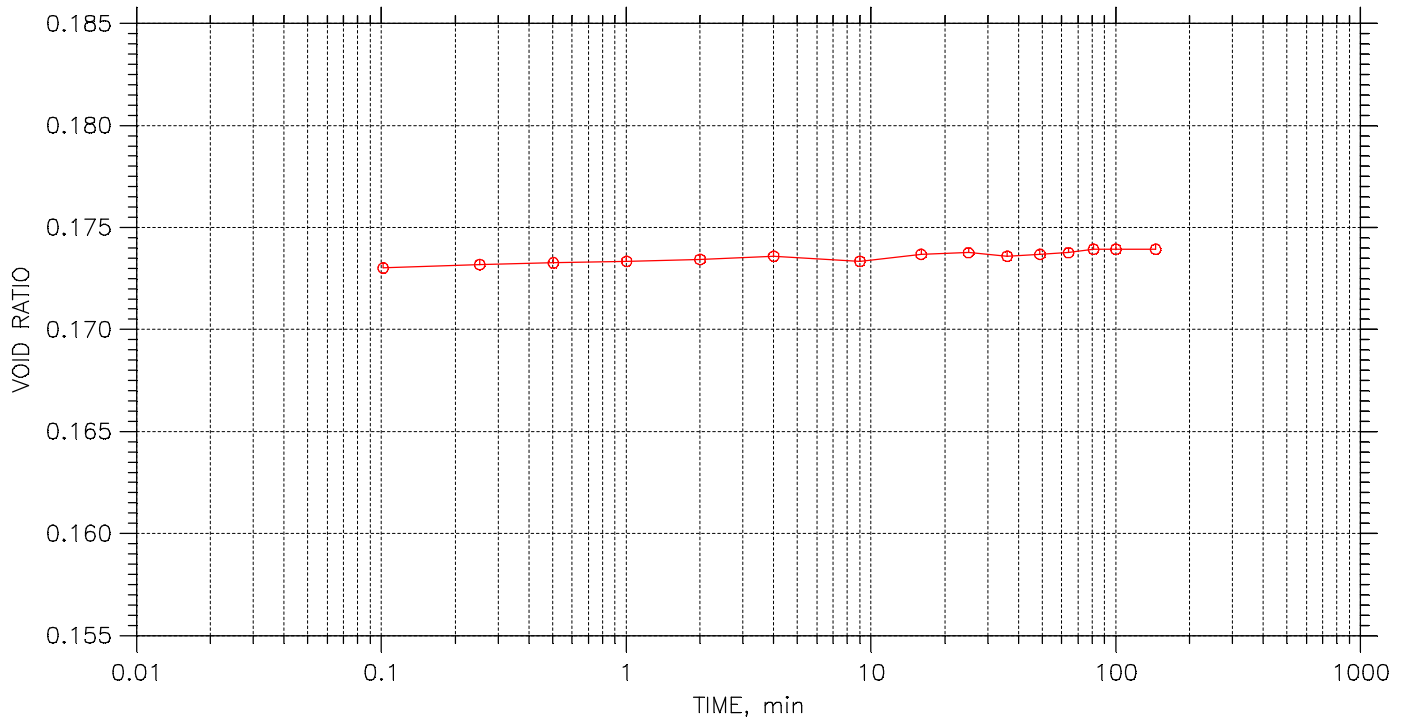
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	291		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 19 of 23

Stress: 16. tsf



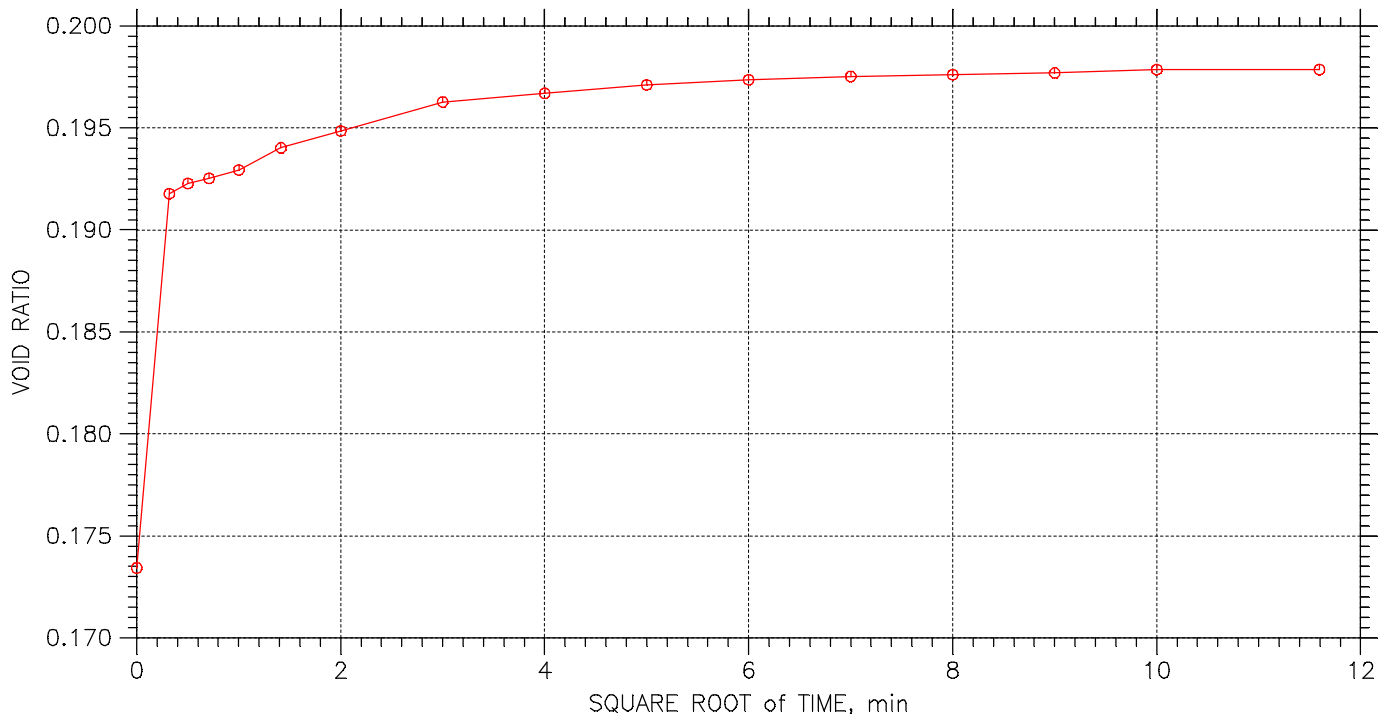
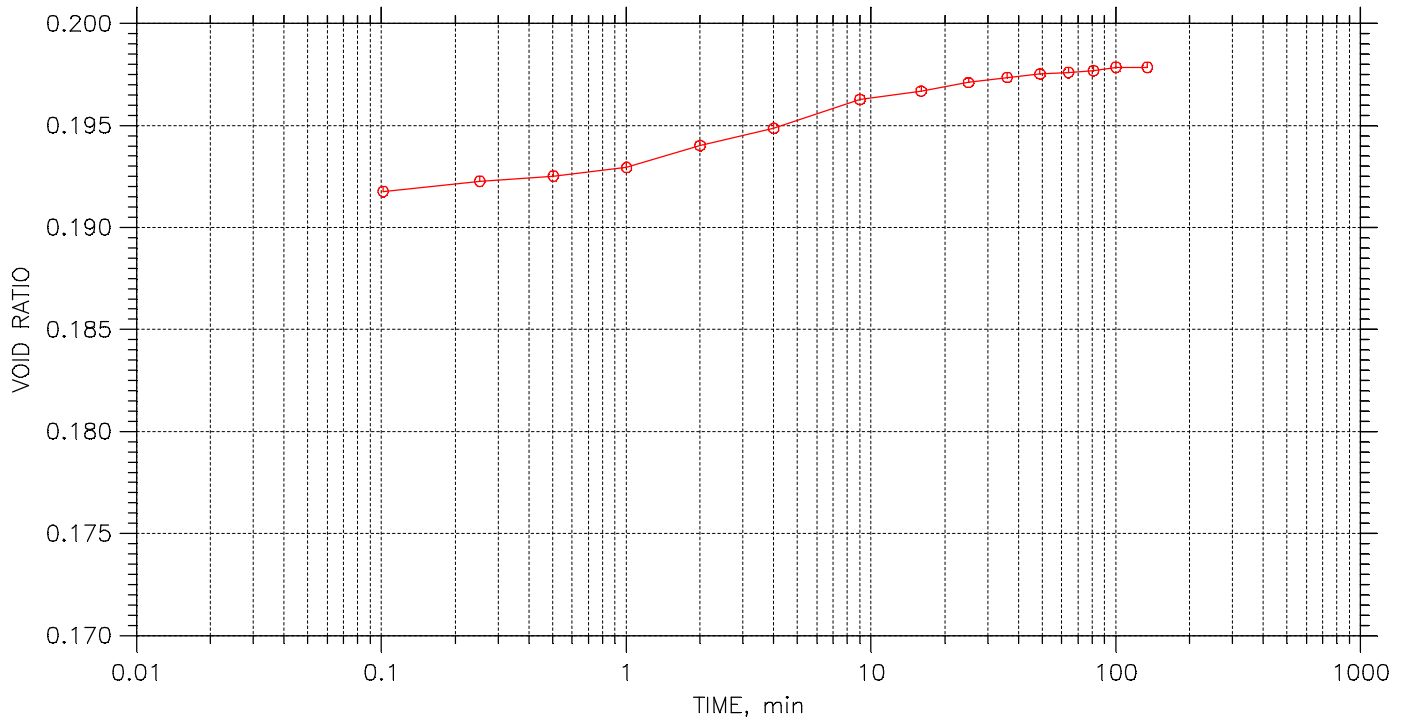
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	292		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 20 of 23

Stress: 4. tsf



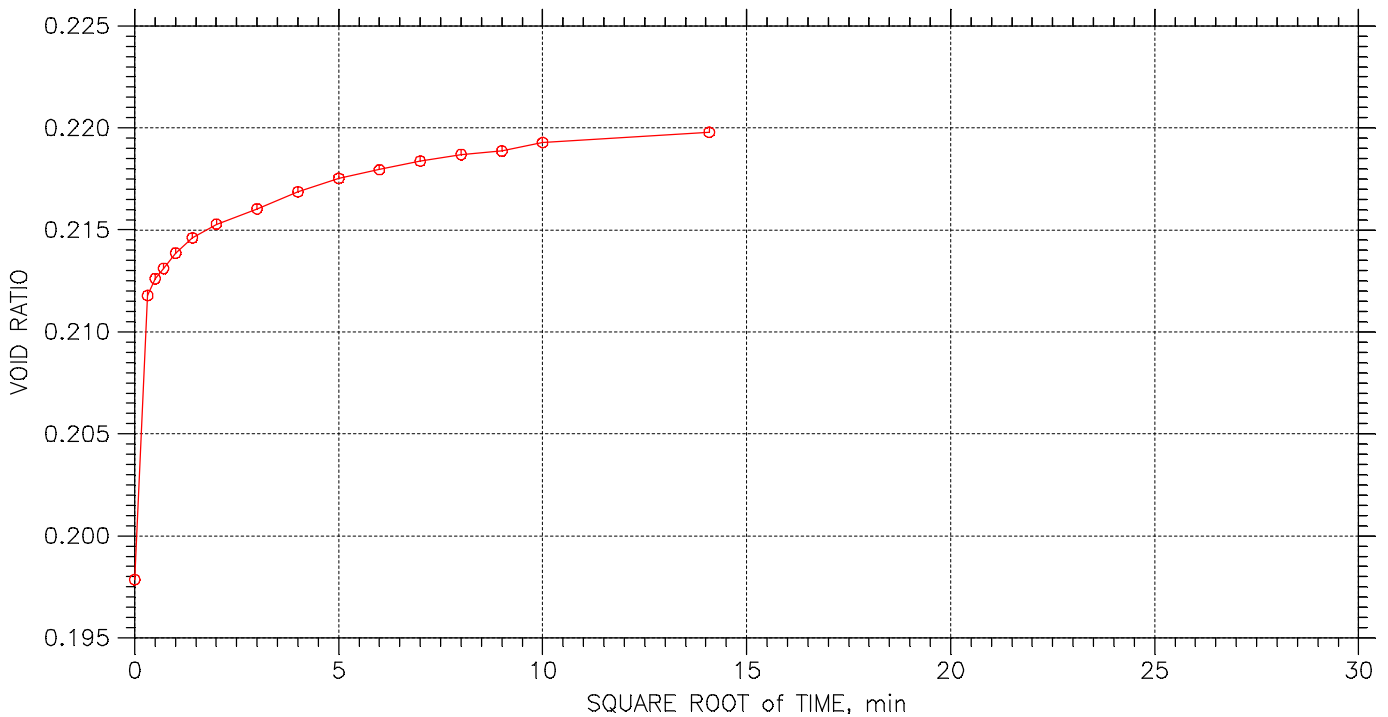
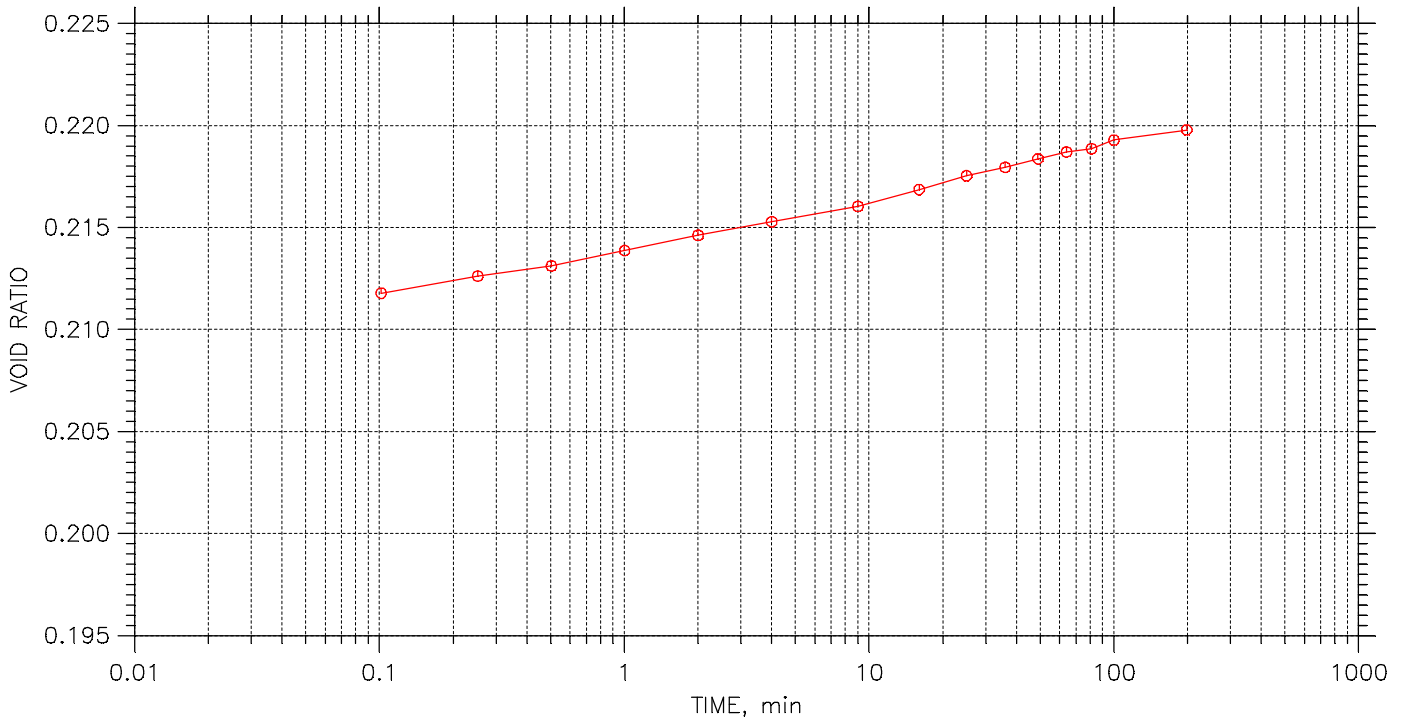
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	293		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 21 of 23

Stress: 1. tsf



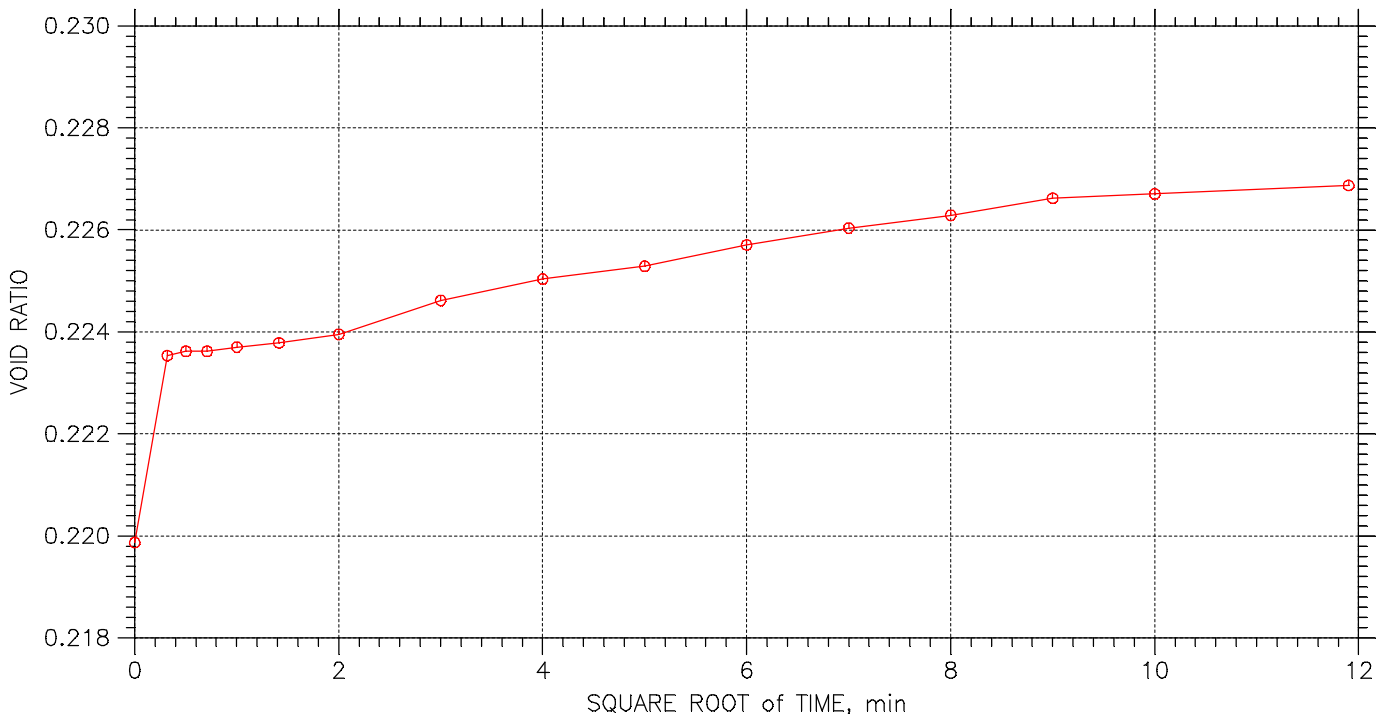
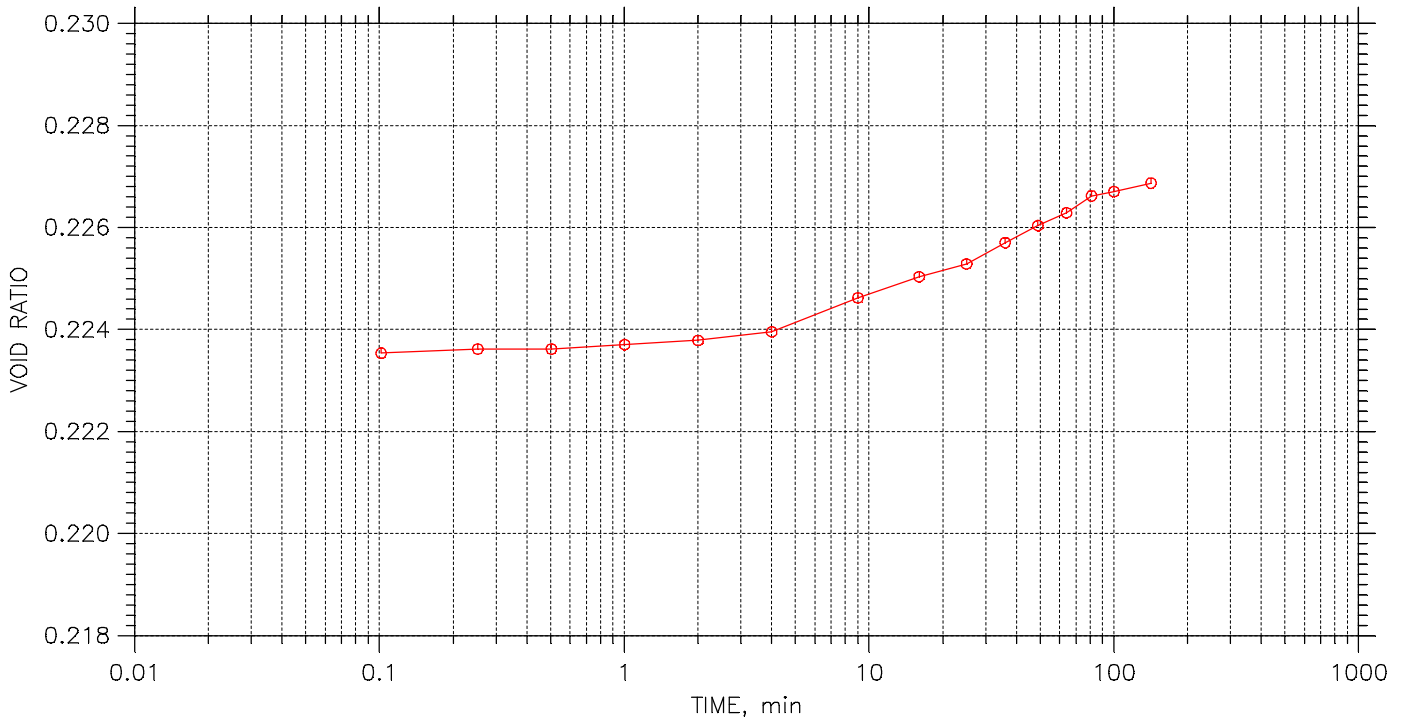
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	294		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 22 of 23

Stress: 0.5 tsf



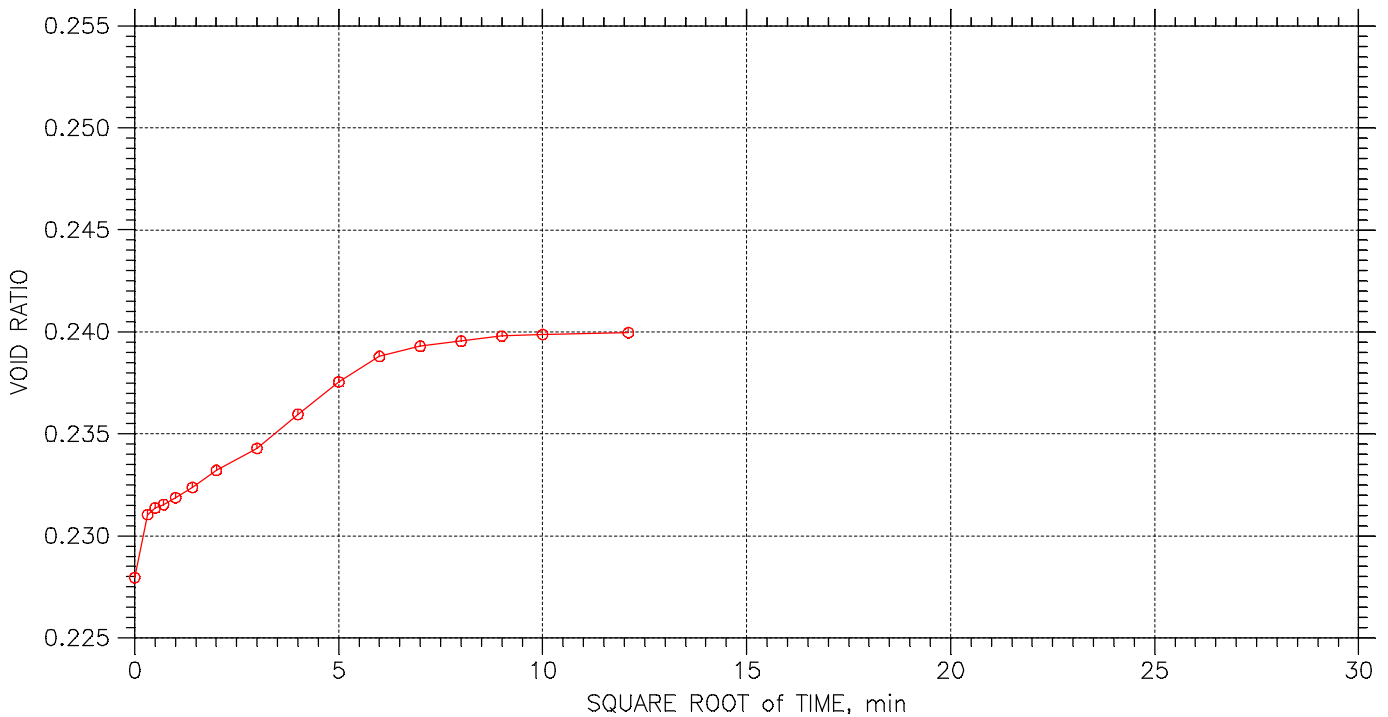
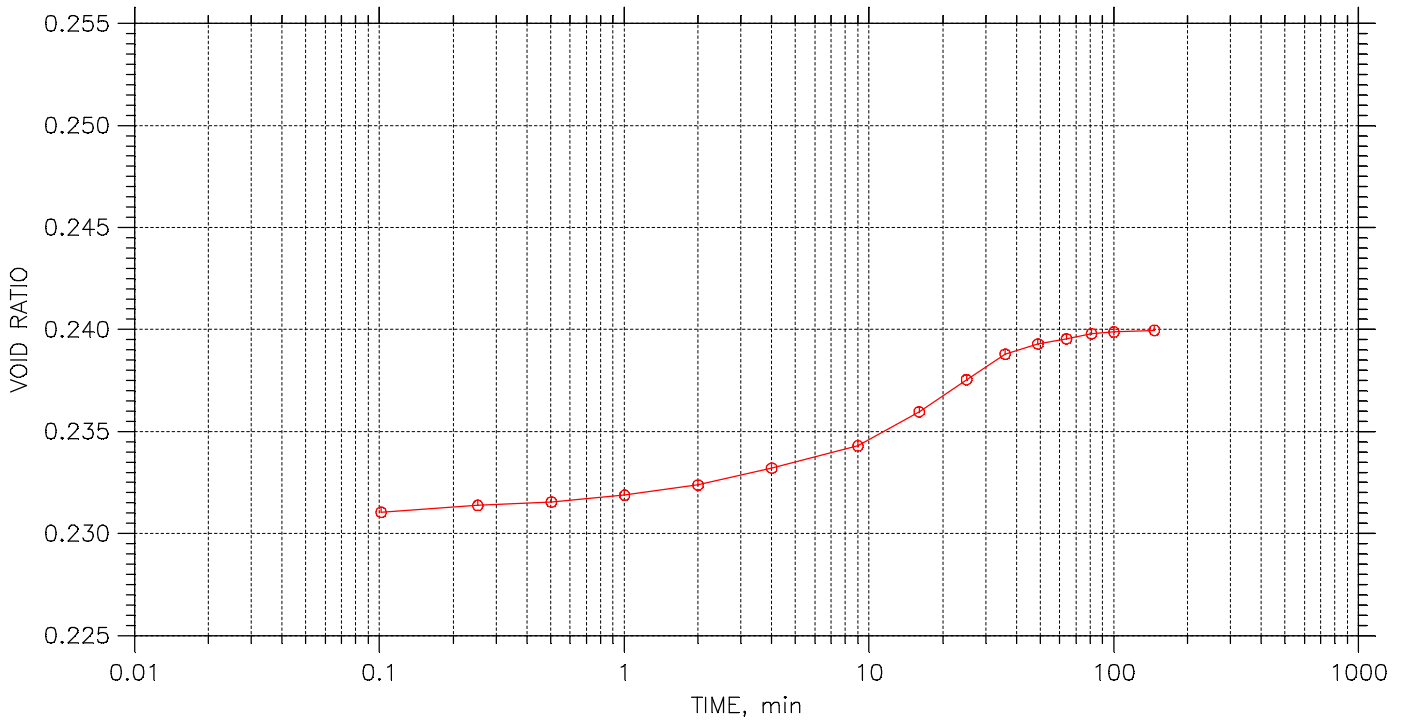
	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	295		


CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 23 of 23

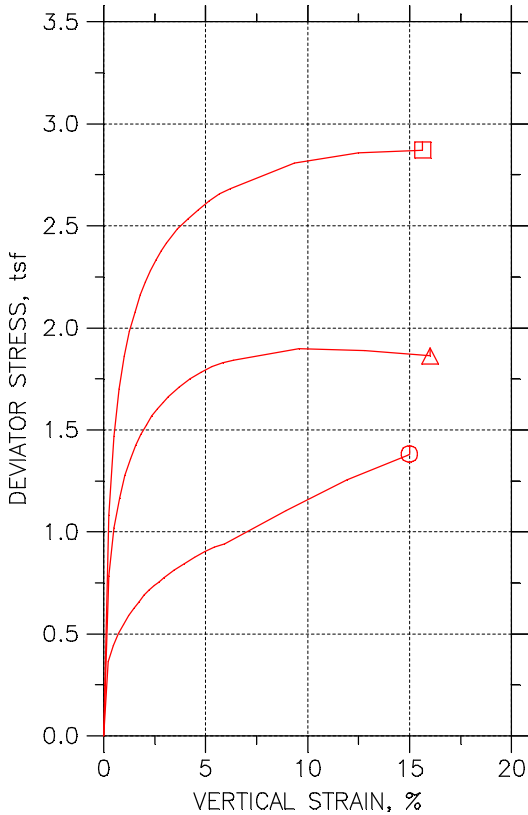
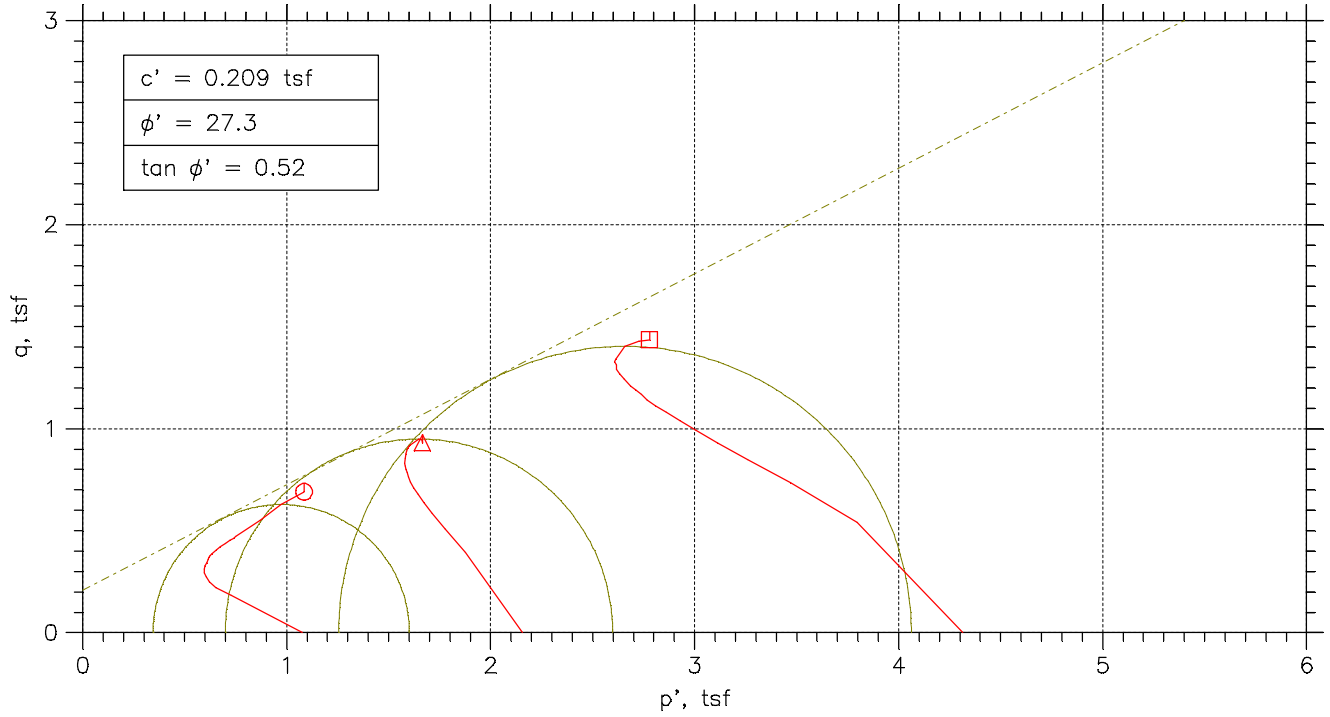
Stress: 0.125 tsf





	Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
	Boring No.: HEN-029 S-3	Tested By: HP	Checked By: BCM
	Sample No.: S-3	Test Date: 12/14/15	Depth: 5.0'-7.0'
	Test No.: HENB029S3	Sample Type: 3.0" ST	Elevation: -----
	Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
	Remarks: Pc = 3.1 tsf Cc = 0.128 Ccr = 0.034 TEST PERFORMED AS PER ASTM D2435		
	296		

Consolidated Undrained Triaxial Compression Tests ASTM D 4767

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



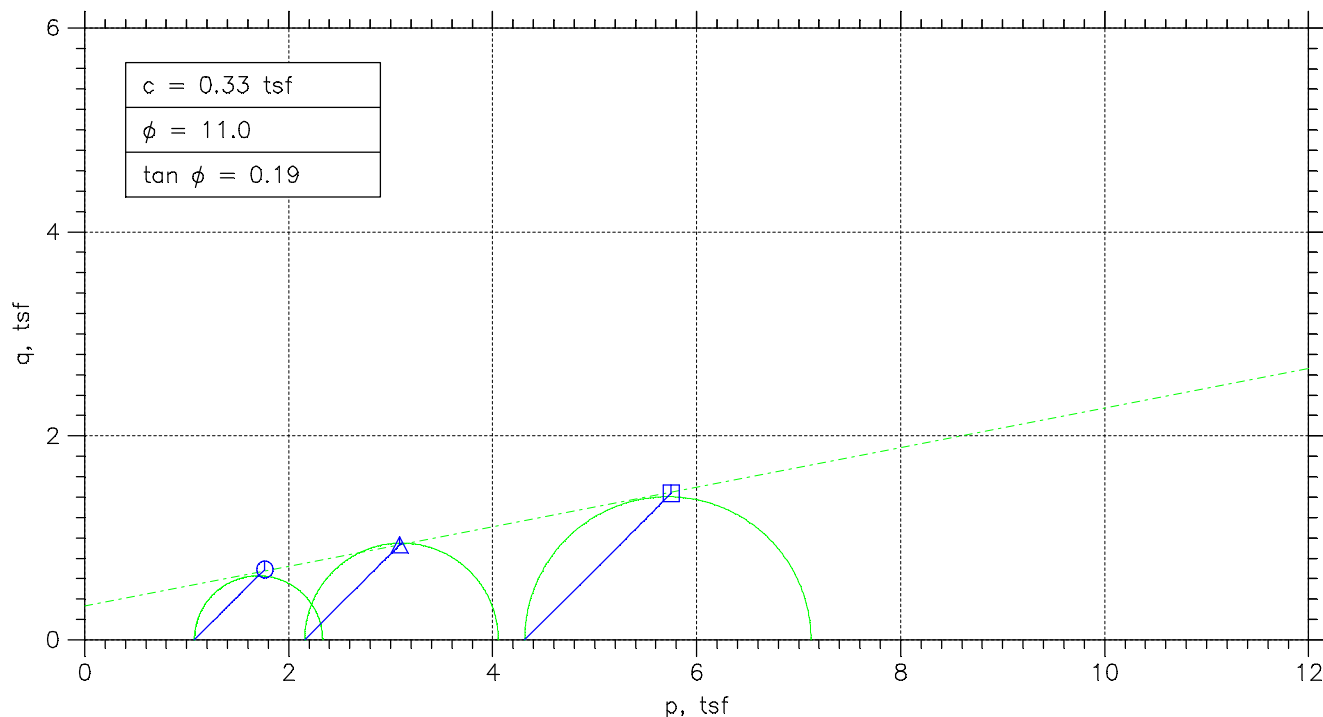
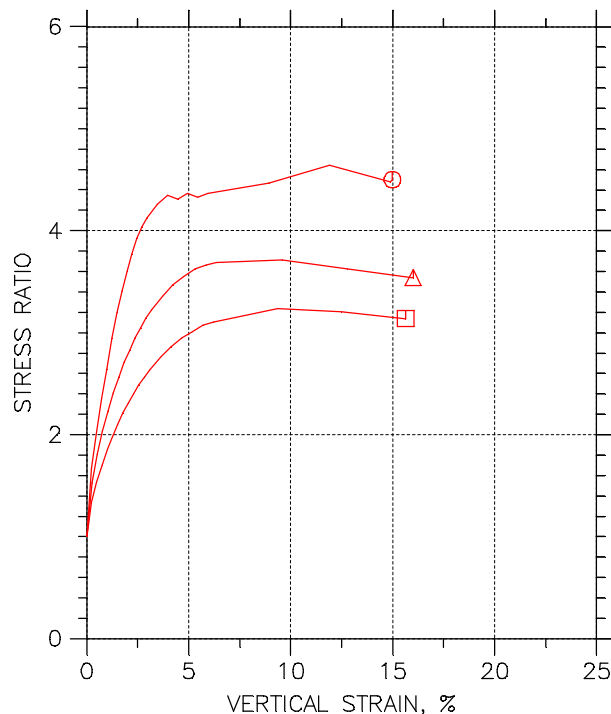
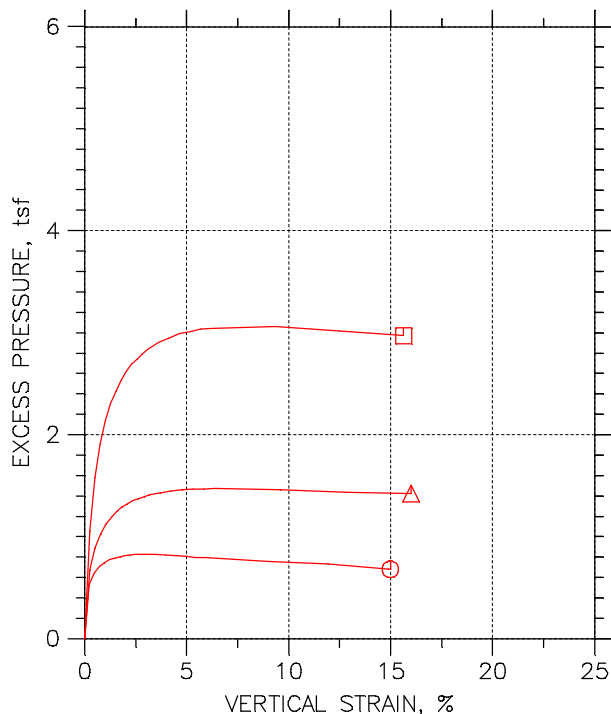
Symbol	⊙	△	□	
Test No.	15.0 PSI	30.0 PSI	60.0 PSI	
Initial	Diameter, in	2.8094	2.7933	2.8169
	Height, in	5.8933	5.7862	5.9791
	Water Content, %	18.24	19.46	31.44
	Dry Density, pcf	113.4	98.63	90.07
	Saturation, %	99.86	73.35	96.60
Before Shear	Void Ratio	0.49693	0.72163	0.88521
	Water Content, %	17.26	23.33	24.34
	Dry Density, pcf	115.6	103.9	102.2
	Saturation, %	100.00	100.00	100.00
	Void Ratio	0.46942	0.63453	0.66201
	Back Press., tsf	5.0445	5.0434	5.0461
Minor Prin. Stress, tsf	1.0755	2.1566	4.3139	
Max. Dev. Stress, tsf	1.3812	1.8986	2.8714	
Time to Failure, min	302.24	180	300	
Strain Rate, %/min	0.02	0.02	0.02	
B-Value	0.99	0.97	0.97	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	41	41	41	
Plastic Limit	23	23	23	
Plasticity Index	18	18	18	
Failure Sketch	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> NOTE: SAMPLE TRANSITIONS INTO FLY ASH </div>			
				

Project: DYNERGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-002 S8
Sample Type: 3.0" ST

Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
Boring No.: HEN-002 S8	Tested By: BCM	Checked By: WPQ
Sample No.: S-8	Test Date: 12/16/15	Depth: 25.0'-27.0'
Test No.: HEN-002 S8	Sample Type: 3.0" ST	Elevation: -----
Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED		
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767		

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-002 S8
 Sample No.: S-8
 Test No.: 15.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: -----



Soil Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

Specimen Height: 5.89 in
 Specimen Area: 6.20 in²
 Specimen Volume: 36.53 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.1991	0	0	5.0445	6.12	6.12
2	5.0042	0.23264	6.2136	31.483	0.36481	5.574	6.12	6.4848
3	10	0.47992	6.229	38.274	0.4424	5.6893	6.12	6.5624
4	15	0.72426	6.2444	43.434	0.50081	5.7504	6.12	6.6208
5	20	0.973	6.2601	47.488	0.54618	5.787	6.12	6.6662
6	25	1.2247	6.276	51.331	0.58888	5.8179	6.12	6.7089
7	30	1.4763	6.292	54.49	0.62353	5.8365	6.12	6.7435
8	35	1.7265	6.3081	57.333	0.65439	5.8487	6.12	6.7744
9	40	1.9782	6.3243	60.544	0.68928	5.8557	6.12	6.8093
10	45	2.224	6.3402	62.966	0.71505	5.8621	6.12	6.8351
11	50	2.4683	6.356	65.019	0.73652	5.8685	6.12	6.8565
12	55	2.7112	6.3719	66.651	0.75313	5.872	6.12	6.8731
13	60	2.9556	6.388	68.704	0.77438	5.8726	6.12	6.8944
14	70	3.4516	6.4208	72.39	0.81175	5.8708	6.12	6.9317
15	80	3.9564	6.4545	75.759	0.84509	5.8673	6.12	6.9651
16	90	4.4568	6.4883	78.76	0.87399	5.8557	6.12	6.994
17	100	4.9455	6.5217	81.866	0.90381	5.8516	6.12	7.0238
18	110	5.4371	6.5556	84.183	0.92458	5.8423	6.12	7.0446
19	120	5.9375	6.5905	86.288	0.94269	5.84	6.12	7.0627
20	180	8.9296	6.807	104.29	1.1032	5.8016	6.12	7.2232
21	240	11.909	7.0372	122.77	1.2561	5.7748	6.12	7.3761
22	300	14.874	7.2824	138.94	1.3736	5.7248	6.12	7.4936
23	302.24	14.986	7.2919	139.88	1.3812	5.7253	6.12	7.5012

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-002 S8
 Sample No.: S-8
 Test No.: 15.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: -----



Soil Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

Specimen Height: 5.89 in
 Specimen Area: 6.20 in²
 Specimen Volume: 36.53 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	6.12	6.12	0	0.000	1.0755	1.0755	1.000	1.0755	0
2	0.23	6.4848	6.12	0.52953	1.452	0.91076	0.54595	1.668	0.72836	0.1824
3	0.48	6.5624	6.12	0.64475	1.457	0.87314	0.43074	2.027	0.65194	0.2212
4	0.72	6.6208	6.12	0.70585	1.409	0.87045	0.36964	2.355	0.62004	0.2504
5	0.97	6.6662	6.12	0.74251	1.359	0.87916	0.33298	2.640	0.60607	0.27309
6	1.22	6.7089	6.12	0.77335	1.313	0.89102	0.30214	2.949	0.59658	0.29444
7	1.48	6.7435	6.12	0.79197	1.270	0.90704	0.28352	3.199	0.59528	0.31176
8	1.73	6.7744	6.12	0.80419	1.229	0.92569	0.2713	3.412	0.59849	0.3272
9	1.98	6.8093	6.12	0.81117	1.177	0.95359	0.26431	3.608	0.60895	0.34464
10	2.22	6.8351	6.12	0.81757	1.143	0.97296	0.25791	3.772	0.61544	0.35753
11	2.47	6.8565	6.12	0.82397	1.119	0.98803	0.25151	3.928	0.61977	0.36826
12	2.71	6.8731	6.12	0.82747	1.099	1.0012	0.24802	4.037	0.62459	0.37657
13	2.96	6.8944	6.12	0.82805	1.069	1.0218	0.24744	4.130	0.63463	0.38719
14	3.45	6.9317	6.12	0.8263	1.018	1.0609	0.24918	4.258	0.65506	0.40587
15	3.96	6.9651	6.12	0.82281	0.974	1.0978	0.25268	4.345	0.67522	0.42255
16	4.46	6.994	6.12	0.81117	0.928	1.1383	0.26431	4.307	0.70131	0.43699
17	4.95	7.0238	6.12	0.8071	0.893	1.1722	0.26839	4.368	0.72029	0.45191
18	5.44	7.0446	6.12	0.79779	0.863	1.2023	0.2777	4.329	0.73999	0.46229
19	5.94	7.0627	6.12	0.79546	0.844	1.2227	0.28002	4.366	0.75137	0.47135
20	8.93	7.2232	6.12	0.75706	0.686	1.4216	0.31843	4.464	0.87001	0.55158
21	11.91	7.3761	6.12	0.73029	0.581	1.6013	0.3452	4.639	0.97326	0.62807
22	14.87	7.4936	6.12	0.68024	0.495	1.7689	0.39524	4.475	1.0821	0.68682
23	14.99	7.5012	6.12	0.68083	0.493	1.7759	0.39466	4.500	1.0853	0.6906

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-002 S8
 Sample No.: S8
 Test No.: 30.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.79 in
 Specimen Area: 6.13 in²
 Specimen Volume: 35.46 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Devi ator Load lb	Devi ator Stress tsf	Pore Pressure tsf	Hori zontal Stress tsf	Vertical Stress tsf
1	0	0	6.1281	0	0	5.0434	7.2	7.2
2	5.0038	0.25301	6.1437	66.941	0.7845	5.7164	7.2	7.9845
3	10.004	0.51759	6.16	87.336	1.0208	5.9351	7.2	8.2208
4	15.004	0.77886	6.1762	100.19	1.1679	6.0704	7.2	8.3679
5	20.004	1.0451	6.1928	109.71	1.2756	6.1648	7.2	8.4756
6	25.004	1.3064	6.2092	117.13	1.3582	6.236	7.2	8.5582
7	30.004	1.5693	6.2258	123.08	1.4233	6.2908	7.2	8.6233
8	35.004	1.8322	6.2425	128.19	1.4785	6.3334	7.2	8.6785
9	40.004	2.1001	6.2596	132.6	1.5252	6.3666	7.2	8.7252
10	45.004	2.368	6.2768	136.69	1.568	6.394	7.2	8.768
11	50.004	2.6376	6.2941	140.15	1.6032	6.4168	7.2	8.8032
12	55.004	2.9071	6.3116	143.34	1.6352	6.436	7.2	8.8352
13	60.004	3.1766	6.3292	146.09	1.6619	6.4518	7.2	8.8619
14	70.004	3.7025	6.3637	151.14	1.7101	6.4739	7.2	8.9101
15	80.004	4.2283	6.3987	155.56	1.7504	6.4908	7.2	8.9504
16	90	4.7641	6.4347	159.14	1.7806	6.5013	7.2	8.9806
17	100	5.3032	6.4713	162.59	1.809	6.5101	7.2	9.009
18	110	5.839	6.5081	165.27	1.8284	6.513	7.2	9.0284
19	120	6.3665	6.5448	167.45	1.8421	6.5147	7.2	9.0421
20	180	9.5729	6.7769	178.7	1.8986	6.5007	7.2	9.0986
21	240	12.794	7.0272	184.33	1.8886	6.4803	7.2	9.0886
22	300	15.999	7.2953	188.74	1.8627	6.4663	7.2	9.0627

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-002 S8
 Sample No.: S8
 Test No.: 30.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.79 in
 Specimen Area: 6.13 in²
 Specimen Volume: 35.46 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	7.2	7.2	0	0.000	2.1566	2.1566	1.000	2.1566	0
2	0.25	7.9845	7.2	0.67299	0.858	2.2681	1.4836	1.529	1.8759	0.39225
3	0.52	8.2208	7.2	0.89169	0.874	2.2857	1.2649	1.807	1.7753	0.51041
4	0.78	8.3679	7.2	1.027	0.879	2.2976	1.1296	2.034	1.7136	0.58397
5	1.05	8.4756	7.2	1.1215	0.879	2.3107	1.0352	2.232	1.6729	0.63778
6	1.31	8.5582	7.2	1.1926	0.878	2.3222	0.96402	2.409	1.6431	0.6791
7	1.57	8.6233	7.2	1.2474	0.876	2.3325	0.9092	2.565	1.6209	0.71167
8	1.83	8.6785	7.2	1.29	0.872	2.3452	0.86662	2.706	1.6059	0.73927
9	2.10	8.7252	7.2	1.3232	0.868	2.3586	0.83338	2.830	1.596	0.76262
10	2.37	8.768	7.2	1.3507	0.861	2.374	0.80597	2.945	1.59	0.784
11	2.64	8.8032	7.2	1.3734	0.857	2.3864	0.78323	3.047	1.5848	0.80159
12	2.91	8.8352	7.2	1.3926	0.852	2.3992	0.76398	3.140	1.5816	0.8176
13	3.18	8.8619	7.2	1.4084	0.847	2.4102	0.74824	3.221	1.5792	0.83097
14	3.70	8.9101	7.2	1.4305	0.837	2.4361	0.72608	3.355	1.5811	0.85503
15	4.23	8.9504	7.2	1.4475	0.827	2.4595	0.70916	3.468	1.5843	0.87518
16	4.76	8.9806	7.2	1.458	0.819	2.4793	0.69867	3.549	1.589	0.89031
17	5.30	9.009	7.2	1.4667	0.811	2.4989	0.68992	3.622	1.5944	0.90448
18	5.84	9.0284	7.2	1.4696	0.804	2.5154	0.687	3.661	1.6012	0.91422
19	6.37	9.0421	7.2	1.4714	0.799	2.5274	0.68525	3.688	1.6063	0.92105
20	9.57	9.0986	7.2	1.4574	0.768	2.5978	0.69925	3.715	1.6485	0.94929
21	12.79	9.0886	7.2	1.437	0.761	2.6083	0.71966	3.624	1.664	0.9443
22	16.00	9.0627	7.2	1.423	0.764	2.5964	0.73366	3.539	1.665	0.93136

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-002 S8
 Sample No.: S-8
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.98 in
 Specimen Area: 6.23 in²
 Specimen Volume: 37.26 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.2322	0	0	5.0461	9.36	9.36
2	5.004	0.24293	6.2474	93.936	1.0826	6.1049	9.36	10.443
3	10.004	0.49961	6.2635	127.82	1.4693	6.625	9.36	10.829
4	15.004	0.75323	6.2795	148.22	1.6995	6.9512	9.36	11.059
5	20.004	1.0084	6.2957	162.75	1.8613	7.1795	9.36	11.221
6	25.004	1.2666	6.3122	173.87	1.9832	7.3449	9.36	11.343
7	30.004	1.5248	6.3287	182.68	2.0783	7.4724	9.36	11.438
8	35.004	1.7845	6.3454	190.5	2.1615	7.5784	9.36	11.521
9	40.004	2.0427	6.3622	196.63	2.2253	7.6646	9.36	11.585
10	45.004	2.304	6.3792	202.14	2.2815	7.7345	9.36	11.641
11	50.004	2.5668	6.3964	207.49	2.3356	7.7887	9.36	11.696
12	55.004	2.8281	6.4136	211.79	2.3776	7.8388	9.36	11.738
13	60.004	3.0909	6.431	215.83	2.4164	7.8825	9.36	11.776
14	70.004	3.6118	6.4657	223.22	2.4857	7.9477	9.36	11.846
15	80.004	4.1328	6.5009	228.94	2.5356	7.9954	9.36	11.896
16	90.004	4.6508	6.5362	234.24	2.5803	8.0345	9.36	11.94
17	100	5.1748	6.5723	239.48	2.6235	8.0554	9.36	11.984
18	110	5.6958	6.6086	243.78	2.656	8.0793	9.36	12.016
19	120	6.2184	6.6454	247.51	2.6816	8.0863	9.36	12.042
20	180	9.352	6.8752	268.01	2.8068	8.1049	9.36	12.167
21	240	12.498	7.1223	282.81	2.8589	8.0642	9.36	12.219
22	300	15.636	7.3873	294.61	2.8714	8.017	9.36	12.231

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-002 S8
 Sample No.: S-8
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: DARK GRAY LEAN CLAY WITH SAND AND GRAVEL CL - FLY ASH NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.98 in
 Specimen Area: 6.23 in²
 Specimen Volume: 37.26 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

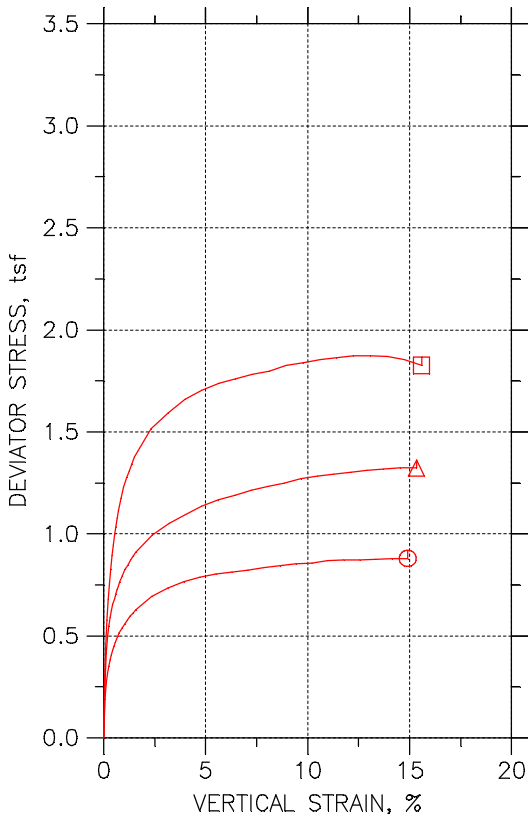
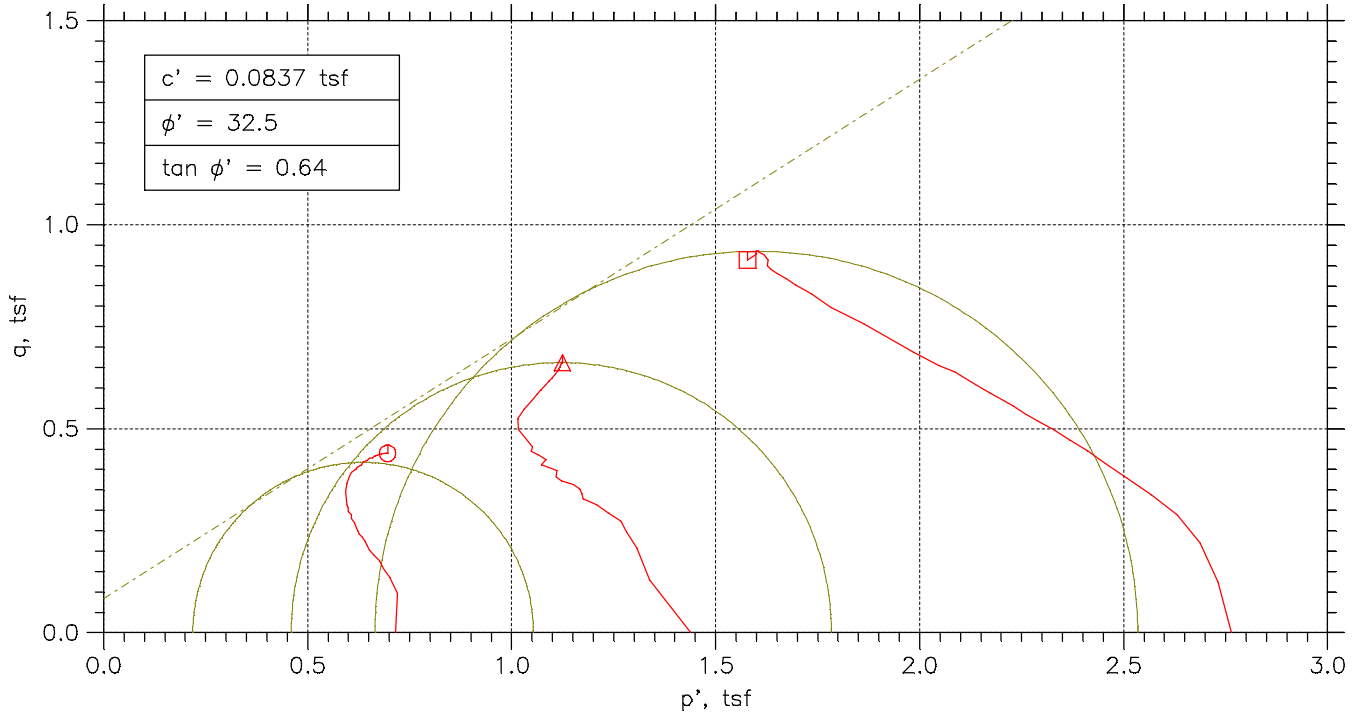
Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	9.36	9.36	0	0.000	4.3139	4.3139	1.000	4.3139	0
2	0.24	10.443	9.36	1.0588	0.978	4.3377	3.2551	1.333	3.7964	0.5413
3	0.50	10.829	9.36	1.5789	1.075	4.2043	2.735	1.537	3.4696	0.73465
4	0.75	11.059	9.36	1.9051	1.121	4.1083	2.4088	1.706	3.2586	0.84974
5	1.01	11.221	9.36	2.1334	1.146	4.0418	2.1805	1.854	3.1112	0.93063
6	1.27	11.343	9.36	2.2988	1.159	3.9984	2.0151	1.984	3.0067	0.99162
7	1.52	11.438	9.36	2.4264	1.167	3.9659	1.8876	2.101	2.9267	1.0392
8	1.78	11.521	9.36	2.5324	1.172	3.9431	1.7816	2.213	2.8623	1.0807
9	2.04	11.585	9.36	2.6186	1.177	3.9206	1.6954	2.313	2.808	1.1126
10	2.30	11.641	9.36	2.6884	1.178	3.907	1.6255	2.404	2.7662	1.1407
11	2.57	11.696	9.36	2.7426	1.174	3.9069	1.5713	2.486	2.7391	1.1678
12	2.83	11.738	9.36	2.7927	1.175	3.8988	1.5212	2.563	2.71	1.1888
13	3.09	11.776	9.36	2.8364	1.174	3.8939	1.4775	2.635	2.6857	1.2082
14	3.61	11.846	9.36	2.9016	1.167	3.898	1.4123	2.760	2.6552	1.2429
15	4.13	11.896	9.36	2.9494	1.163	3.9002	1.3646	2.858	2.6324	1.2678
16	4.65	11.94	9.36	2.9884	1.158	3.9058	1.3255	2.947	2.6157	1.2901
17	5.17	11.984	9.36	3.0094	1.147	3.9281	1.3046	3.011	2.6163	1.3118
18	5.70	12.016	9.36	3.0332	1.142	3.9367	1.2807	3.074	2.6087	1.328
19	6.22	12.042	9.36	3.0402	1.134	3.9553	1.2737	3.105	2.6145	1.3408
20	9.35	12.167	9.36	3.0589	1.090	4.0618	1.2551	3.236	2.6584	1.4034
21	12.50	12.219	9.36	3.0181	1.056	4.1547	1.2958	3.206	2.7253	1.4294
22	15.64	12.231	9.36	2.9709	1.035	4.2144	1.343	3.138	2.7787	1.4357

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767

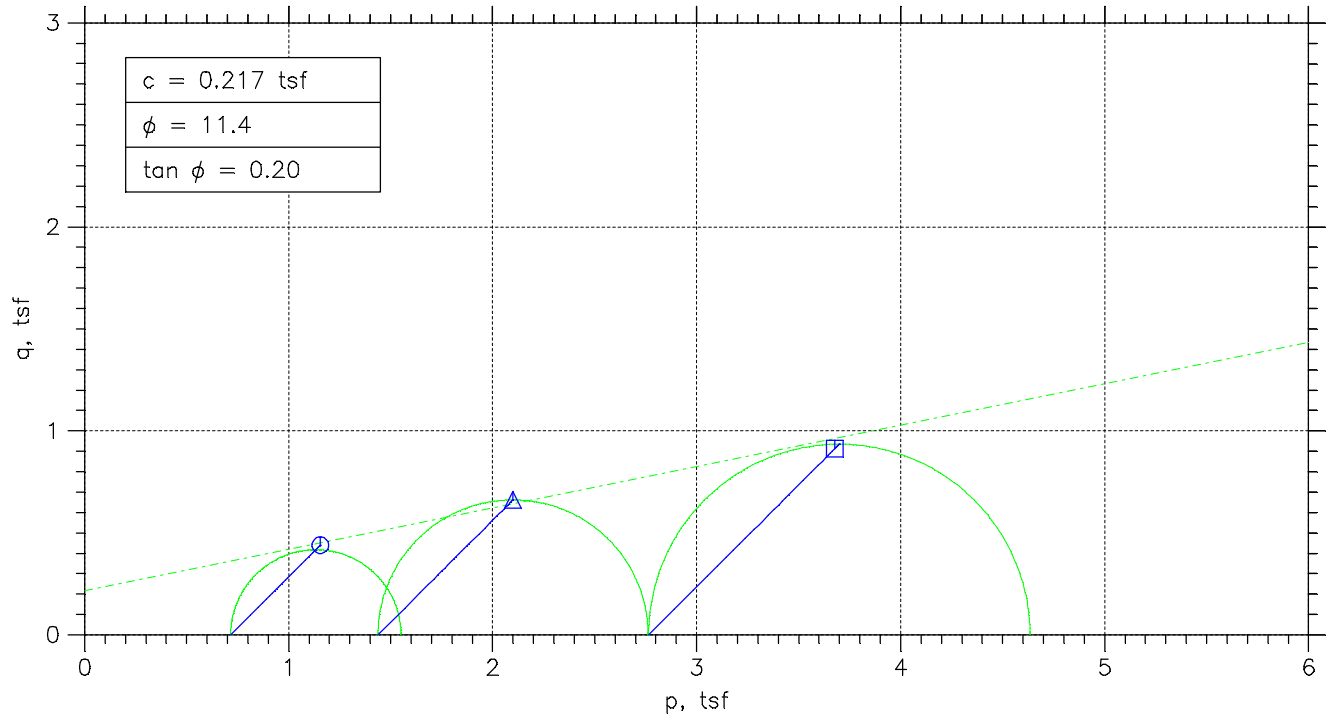
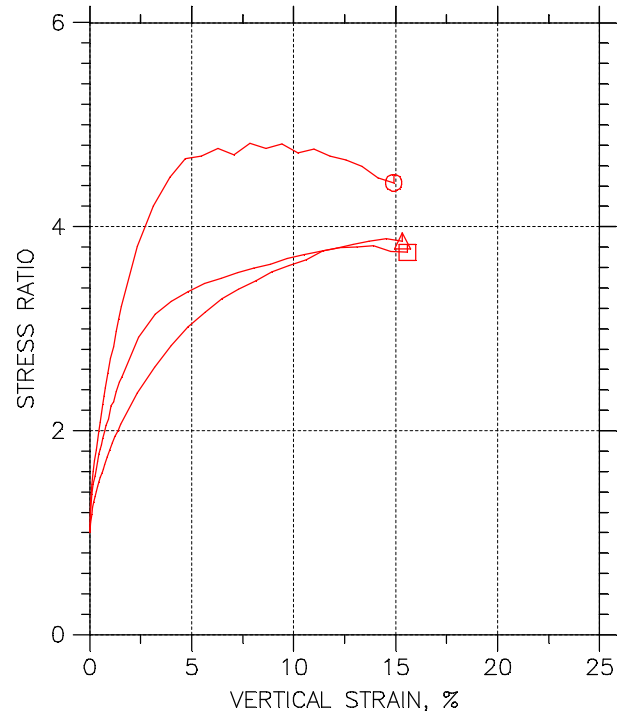
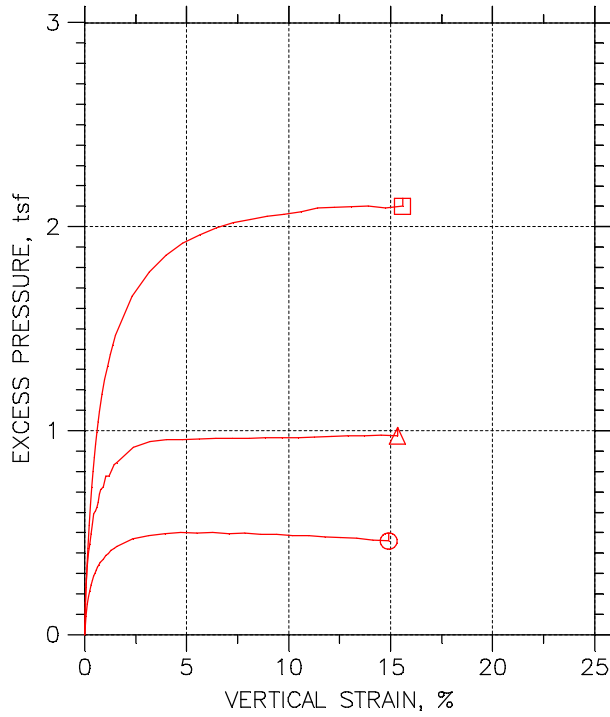


Symbol	⊙	△	□	
Test No.	10.0 PSI	20.0 PSI	40.0 PSI	
Initial	Diameter, in	2.8071	2.7992	2.802
	Height, in	5.9681	6.1213	6.0421
	Water Content, %	34.07	34.53	33.55
	Dry Density, pcf	86.29	87.22	79.75
	Saturation, %	95.76	99.18	80.83
Before Shear	Void Ratio	0.96775	0.94695	1.1292
	Water Content, %	32.71	29.92	32.67
	Dry Density, pcf	89.86	93.61	89.91
	Saturation, %	100.00	100.00	100.00
	Void Ratio	0.88973	0.81387	0.8885
	Back Press., tsf	5.0445	5.0422	5.1556
Minor Prin. Stress, tsf	0.71549	1.4378	2.7644	
Max. Dev. Stress, tsf	0.87949	1.3239	1.8718	
Time to Failure, min	1080	1080	900	
Strain Rate, %/min	0.02	0.02	0.02	
B-Value	0.97	0.95	0.99	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	38	38	38	
Plastic Limit	21	21	21	
Plasticity Index	17	17	17	

Project: DYNERGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-016 S7
Sample Type: 3.0" ST

Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED	Failure Sketch
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767	

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
Boring No.: HEN-016 S7	Tested By: BCM	Checked By: WPQ
Sample No.: S-7	Test Date: 12/16/15	Depth: 20.0'-22.0'
Test No.: HEN-016 S7	Sample Type: 3.0" ST	Elevation: -----
Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED		
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767		

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S7
 Sample No.: S-7
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: -----



Soil Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

Specimen Height: 5.97 in
 Specimen Area: 6.19 in²
 Specimen Volume: 36.94 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 38

Plastic Limit: 21

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.1887	0	0	5.0445	5.76	5.76
2	5	0.057793	6.1923	16.531	0.19221	5.1359	5.76	5.9522
3	10	0.12136	6.1962	23.217	0.26978	5.1929	5.76	6.0298
4	15	0.18494	6.2002	27.218	0.31608	5.2319	5.76	6.0761
5	20	0.24851	6.2041	30.325	0.35192	5.2604	5.76	6.1119
6	25	0.31208	6.2081	32.904	0.38162	5.2895	5.76	6.1416
7	30	0.3771	6.2122	35.063	0.40639	5.3116	5.76	6.1664
8	35	0.44211	6.2162	37.116	0.4299	5.3308	5.76	6.1899
9	40	0.50713	6.2203	38.853	0.44973	5.3454	5.76	6.2097
10	45	0.57215	6.2243	40.433	0.46771	5.3593	5.76	6.2277
11	50	0.63716	6.2284	41.907	0.48444	5.3756	5.76	6.2444
12	55	0.70363	6.2326	43.223	0.49932	5.3873	5.76	6.2593
13	60	0.76864	6.2367	44.487	0.51358	5.3977	5.76	6.2736
14	70	0.90012	6.2449	46.751	0.539	5.4152	5.76	6.299
15	80	1.033	6.2533	48.593	0.5595	5.4326	5.76	6.3195
16	90	1.1645	6.2616	50.331	0.57873	5.442	5.76	6.3387
17	100	1.2974	6.2701	51.805	0.59488	5.4588	5.76	6.3549
18	110	1.4318	6.2786	53.437	0.61278	5.4676	5.76	6.3728
19	120	1.5647	6.2871	54.753	0.62703	5.4775	5.76	6.387
20	180	2.3464	6.3374	60.965	0.69263	5.5135	5.76	6.4526
21	240	3.128	6.3886	65.019	0.73277	5.531	5.76	6.4928
22	300	3.9256	6.4416	68.546	0.76617	5.5403	5.76	6.5262
23	360	4.7029	6.4941	70.968	0.78682	5.5455	5.76	6.5468
24	420	5.4845	6.5478	72.969	0.80236	5.5426	5.76	6.5624
25	480	6.2806	6.6035	74.443	0.81168	5.5444	5.76	6.5717
26	540	7.0637	6.6591	76.022	0.82197	5.538	5.76	6.582
27	600	7.8468	6.7157	77.865	0.8348	5.5415	5.76	6.5948
28	660	8.6386	6.7739	79.497	0.84498	5.5356	5.76	6.605
29	720	9.4144	6.8319	80.971	0.85334	5.5362	5.76	6.6133
30	780	10.195	6.8913	82.077	0.85754	5.5298	5.76	6.6175
31	840	10.991	6.9529	83.814	0.86793	5.5292	5.76	6.6279
32	900	11.769	7.0143	84.867	0.87114	5.524	5.76	6.6311
33	960	12.555	7.0773	85.762	0.87249	5.5211	5.76	6.6325
34	1020	13.35	7.1422	86.815	0.87517	5.5164	5.76	6.6352
35	1080	14.12	7.2063	88.026	0.87949	5.5071	5.76	6.6395
36	1140	14.906	7.2728	88.815	0.87926	5.5036	5.76	6.6393

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S7
 Sample No.: S-7
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: -----



Soil Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

Specimen Height: 5.97 in
 Specimen Area: 6.19 in²
 Specimen Volume: 36.94 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 38

Plastic Limit: 21

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	5.76	5.76	0	0.000	0.71549	0.71549	1.000	0.71549	0
2	0.06	5.9522	5.76	0.091359	0.475	0.81634	0.62413	1.308	0.72023	0.096107
3	0.12	6.0298	5.76	0.14839	0.550	0.83688	0.5671	1.476	0.70199	0.13489
4	0.18	6.0761	5.76	0.18737	0.593	0.84419	0.52811	1.599	0.68615	0.15804
5	0.25	6.1119	5.76	0.21589	0.613	0.85152	0.4996	1.704	0.67556	0.17596
6	0.31	6.1416	5.76	0.24498	0.642	0.85212	0.4705	1.811	0.66131	0.19081
7	0.38	6.1664	5.76	0.26709	0.657	0.85478	0.44839	1.906	0.65158	0.20319
8	0.44	6.1899	5.76	0.2863	0.666	0.85909	0.42919	2.002	0.64414	0.21495
9	0.51	6.2097	5.76	0.30084	0.669	0.86437	0.41464	2.085	0.63951	0.22487
10	0.57	6.2277	5.76	0.31481	0.673	0.86838	0.40068	2.167	0.63453	0.23385
11	0.64	6.2444	5.76	0.3311	0.683	0.86882	0.38438	2.260	0.6266	0.24222
12	0.70	6.2593	5.76	0.34274	0.686	0.87207	0.37274	2.340	0.62241	0.24966
13	0.77	6.2736	5.76	0.35321	0.688	0.87585	0.36227	2.418	0.61906	0.25679
14	0.90	6.299	5.76	0.37067	0.688	0.88382	0.34481	2.563	0.61431	0.2695
15	1.03	6.3195	5.76	0.38813	0.694	0.88685	0.32736	2.709	0.6071	0.27975
16	1.16	6.3387	5.76	0.39744	0.687	0.89678	0.31805	2.820	0.60741	0.28936
17	1.30	6.3549	5.76	0.41431	0.696	0.89605	0.30117	2.975	0.59861	0.29744
18	1.43	6.3728	5.76	0.42304	0.690	0.90523	0.29244	3.095	0.59883	0.30639
19	1.56	6.387	5.76	0.43294	0.690	0.90958	0.28255	3.219	0.59607	0.31352
20	2.35	6.4526	5.76	0.46901	0.677	0.9391	0.24647	3.810	0.59279	0.34632
21	3.13	6.4928	5.76	0.48647	0.664	0.96179	0.22901	4.200	0.5954	0.36639
22	3.93	6.5262	5.76	0.49578	0.647	0.98587	0.2197	4.487	0.60279	0.38308
23	4.70	6.5468	5.76	0.50102	0.637	1.0013	0.21447	4.669	0.60788	0.39341
24	5.48	6.5624	5.76	0.49811	0.621	1.0197	0.21738	4.691	0.61856	0.40118
25	6.28	6.5717	5.76	0.49985	0.616	1.0273	0.21563	4.764	0.62147	0.40584
26	7.06	6.582	5.76	0.49345	0.600	1.044	0.22203	4.702	0.63302	0.41099
27	7.85	6.5948	5.76	0.49694	0.595	1.0533	0.21854	4.820	0.63594	0.4174
28	8.64	6.605	5.76	0.49113	0.581	1.0693	0.22436	4.766	0.64685	0.42249
29	9.41	6.6133	5.76	0.49171	0.576	1.0771	0.22378	4.813	0.65045	0.42667
30	10.19	6.6175	5.76	0.48531	0.566	1.0877	0.23018	4.726	0.65895	0.42877
31	10.99	6.6279	5.76	0.48472	0.558	1.0987	0.23076	4.761	0.66472	0.43396
32	11.77	6.6311	5.76	0.47949	0.550	1.1071	0.236	4.691	0.67157	0.43557
33	12.56	6.6325	5.76	0.47658	0.546	1.1114	0.23891	4.652	0.67515	0.43624
34	13.35	6.6352	5.76	0.47192	0.539	1.1187	0.24356	4.593	0.68115	0.43759
35	14.12	6.6395	5.76	0.46261	0.526	1.1324	0.25287	4.478	0.69262	0.43975
36	14.91	6.6393	5.76	0.45912	0.522	1.1356	0.25636	4.430	0.69599	0.43963

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S7
 Sample No.: S-7
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: ----



Soil Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.12 in
 Specimen Area: 6.15 in²
 Specimen Volume: 37.67 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 38

Plastic Limit: 21

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.1541	0	0	5.0422	6.48	6.48
2	5.0039	0.051583	6.1572	22.233	0.25998	5.2726	6.48	6.74
3	10.004	0.11723	6.1613	35.573	0.4157	5.3816	6.48	6.8957
4	15.004	0.18289	6.1653	42.348	0.49455	5.4452	6.48	6.9746
5	20.004	0.2501	6.1695	47.007	0.54859	5.486	6.48	7.0286
6	25.004	0.31731	6.1736	50.448	0.58834	5.5379	6.48	7.0683
7	30.004	0.38453	6.1778	53.571	0.62435	5.5828	6.48	7.1043
8	35.004	0.45174	6.182	56.271	0.65537	5.633	6.48	7.1354
9	40.004	0.52052	6.1863	58.547	0.68141	5.6487	6.48	7.1614
10	45.004	0.58617	6.1903	60.558	0.70435	5.6645	6.48	7.1844
11	50.004	0.65495	6.1946	62.517	0.72663	5.6919	6.48	7.2066
12	55.004	0.72216	6.1988	64.105	0.74459	5.7309	6.48	7.2246
13	60.004	0.78782	6.2029	65.852	0.76437	5.7537	6.48	7.2444
14	70	0.91756	6.211	68.605	0.79528	5.7665	6.48	7.2753
15	80	1.0504	6.2194	71.145	0.82363	5.819	6.48	7.3036
16	90	1.1817	6.2277	73.316	0.84763	5.8202	6.48	7.3276
17	100	1.313	6.2359	75.433	0.87095	5.8488	6.48	7.351
18	110	1.4459	6.2443	77.18	0.88992	5.8767	6.48	7.3699
19	120	1.5803	6.2529	78.98	0.90943	5.8843	6.48	7.3894
20	180	2.3947	6.305	87.079	0.99439	5.9607	6.48	7.4744
21	240	3.2075	6.358	92.69	1.0497	5.9899	6.48	7.5297
22	300	4.0032	6.4107	97.613	1.0963	5.9969	6.48	7.5763
23	360	4.816	6.4654	101.85	1.1342	5.9992	6.48	7.6142
24	420	5.6319	6.5213	105.82	1.1683	6.0015	6.48	7.6483
25	480	6.4323	6.5771	108.68	1.1897	6.0033	6.48	7.6697
26	540	7.2467	6.6349	111.8	1.2132	6.0039	6.48	7.6932
27	600	8.0579	6.6934	114.61	1.2328	6.005	6.48	7.7128
28	660	8.8551	6.752	116.99	1.2475	6.0062	6.48	7.7275
29	720	9.6695	6.8128	120.16	1.2699	6.0074	6.48	7.7499
30	780	10.479	6.8744	122.44	1.2824	6.0091	6.48	7.7624
31	840	11.28	6.9365	124.56	1.2929	6.0115	6.48	7.7729
32	900	12.1	7.0012	126.67	1.3027	6.0132	6.48	7.7827
33	960	12.91	7.0663	128.85	1.3128	6.0155	6.48	7.7928
34	1020	13.702	7.1312	130.65	1.3191	6.0185	6.48	7.7991
35	1080	14.526	7.1999	132.39	1.3239	6.0202	6.48	7.8039
36	1140	15.334	7.2687	133.56	1.323	6.0173	6.48	7.803

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S7
 Sample No.: S-7
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: ----



Soil Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.12 in
 Specimen Area: 6.15 in²
 Specimen Volume: 37.67 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 38

Plastic Limit: 21

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	6.48	6.48	0	0.000	1.4378	1.4378	1.000	1.4378	0
2	0.05	6.74	6.48	0.23036	0.886	1.4674	1.2074	1.215	1.3374	0.12999
3	0.12	6.8957	6.48	0.33941	0.816	1.5141	1.0984	1.378	1.3062	0.20785
4	0.18	6.9746	6.48	0.40298	0.815	1.5294	1.0348	1.478	1.2821	0.24728
5	0.25	7.0286	6.48	0.4438	0.809	1.5426	0.99399	1.552	1.2683	0.27429
6	0.32	7.0683	6.48	0.49571	0.843	1.5304	0.94209	1.625	1.2363	0.29417
7	0.38	7.1043	6.48	0.54061	0.866	1.5215	0.89718	1.696	1.2094	0.31217
8	0.45	7.1354	6.48	0.59077	0.901	1.5024	0.84703	1.774	1.1747	0.32768
9	0.52	7.1614	6.48	0.60651	0.890	1.5127	0.83128	1.820	1.172	0.3407
10	0.59	7.1844	6.48	0.62226	0.883	1.5199	0.81554	1.864	1.1677	0.35218
11	0.65	7.2066	6.48	0.64967	0.894	1.5148	0.78813	1.922	1.1514	0.36332
12	0.72	7.2246	6.48	0.68874	0.925	1.4936	0.74905	1.994	1.1213	0.37229
13	0.79	7.2444	6.48	0.71148	0.931	1.4907	0.72631	2.052	1.1085	0.38219
14	0.92	7.2753	6.48	0.72431	0.911	1.5088	0.71348	2.115	1.1111	0.39764
15	1.05	7.3036	6.48	0.7768	0.943	1.4846	0.66099	2.246	1.0728	0.41181
16	1.18	7.3276	6.48	0.77797	0.918	1.5075	0.65983	2.285	1.0836	0.42381
17	1.31	7.351	6.48	0.80654	0.926	1.5022	0.63125	2.380	1.0667	0.43548
18	1.45	7.3699	6.48	0.83454	0.938	1.4932	0.60326	2.475	1.0482	0.44496
19	1.58	7.3894	6.48	0.84212	0.926	1.5051	0.59568	2.527	1.0504	0.45472
20	2.39	7.4744	6.48	0.91851	0.924	1.5137	0.51928	2.915	1.0165	0.4972
21	3.21	7.5297	6.48	0.94767	0.903	1.5398	0.49012	3.142	1.0149	0.52483
22	4.00	7.5763	6.48	0.95467	0.871	1.5794	0.48312	3.269	1.0313	0.54816
23	4.82	7.6142	6.48	0.957	0.844	1.615	0.48079	3.359	1.0479	0.5671
24	5.63	7.6483	6.48	0.95934	0.821	1.6468	0.47846	3.442	1.0626	0.58415
25	6.43	7.6697	6.48	0.96109	0.808	1.6664	0.47671	3.496	1.0716	0.59484
26	7.25	7.6932	6.48	0.96167	0.793	1.6894	0.47612	3.548	1.0827	0.60661
27	8.06	7.7128	6.48	0.96284	0.781	1.7078	0.47496	3.596	1.0914	0.6164
28	8.86	7.7275	6.48	0.964	0.773	1.7213	0.47379	3.633	1.0975	0.62375
29	9.67	7.7499	6.48	0.96517	0.760	1.7426	0.47262	3.687	1.1076	0.63496
30	10.48	7.7624	6.48	0.96692	0.754	1.7533	0.47087	3.723	1.1121	0.64119
31	11.28	7.7729	6.48	0.96925	0.750	1.7614	0.46854	3.759	1.115	0.64645
32	12.10	7.7827	6.48	0.971	0.745	1.7695	0.46679	3.791	1.1181	0.65136
33	12.91	7.7928	6.48	0.97333	0.741	1.7773	0.46446	3.827	1.1209	0.65641
34	13.70	7.7991	6.48	0.97625	0.740	1.7806	0.46154	3.858	1.1211	0.65953
35	14.53	7.8039	6.48	0.978	0.739	1.7837	0.45979	3.879	1.1218	0.66197
36	15.33	7.803	6.48	0.97508	0.737	1.7857	0.46271	3.859	1.1242	0.66148

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S7
 Sample No.: S-7
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: ----



Soil Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.04 in
 Specimen Area: 6.17 in²
 Specimen Volume: 37.26 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 38

Plastic Limit: 21

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.1662	0	0	5.1556	7.92	7.92
2	5.0003	0.042334	6.1688	21.452	0.25038	5.314	7.92	8.1704
3	10	0.093739	6.172	37.711	0.43992	5.4532	7.92	8.3599
4	15	0.15119	6.1755	49.512	0.57726	5.5784	7.92	8.4973
5	20	0.21167	6.1793	58.061	0.67652	5.6902	7.92	8.5965
6	25	0.27366	6.1831	65.037	0.75733	5.7904	7.92	8.6773
7	30	0.33716	6.187	71.173	0.82826	5.8784	7.92	8.7483
8	35	0.40066	6.191	76.785	0.893	5.9558	7.92	8.813
9	40	0.46567	6.195	81.296	0.94484	6.0245	7.92	8.8648
10	45.001	0.52917	6.199	85.702	0.99541	6.0898	7.92	8.9154
11	50.001	0.59419	6.203	89.216	1.0355	6.1474	7.92	8.9555
12	55.001	0.6592	6.2071	92.73	1.0756	6.2004	7.92	8.9956
13	60.001	0.72421	6.2112	96.034	1.1132	6.2482	7.92	9.0332
14	70.001	0.85575	6.2194	101.38	1.1737	6.3344	7.92	9.0937
15	80.001	0.98729	6.2277	106.31	1.2291	6.4078	7.92	9.1491
16	90.001	1.1203	6.236	110.56	1.2765	6.4718	7.92	9.1965
17	100	1.2519	6.2444	113.55	1.3093	6.5278	7.92	9.2293
18	110	1.3849	6.2528	116.65	1.3432	6.5767	7.92	9.2632
19	120	1.518	6.2612	119.64	1.3757	6.6233	7.92	9.2957
20	180	2.3344	6.3136	132.8	1.5145	6.8143	7.92	9.4345
21	240	3.169	6.368	141.04	1.5946	6.9349	7.92	9.5146
22	300	3.987	6.4222	148.06	1.66	7.0152	7.92	9.58
23	360	4.8125	6.4779	153.26	1.7034	7.0752	7.92	9.6234
24	420	5.6486	6.5353	157.66	1.737	7.116	7.92	9.657
25	480	6.462	6.5922	161.28	1.7615	7.1509	7.92	9.6815
26	540	7.2875	6.6509	164.48	1.7806	7.1742	7.92	9.7006
27	600	8.1266	6.7116	167.63	1.7983	7.1923	7.92	9.7183
28	660	8.9355	6.7712	171.82	1.827	7.2051	7.92	9.747
29	720	9.7625	6.8333	174.6	1.8397	7.2168	7.92	9.7597
30	780	10.606	6.8978	177.54	1.8532	7.2272	7.92	9.7732
31	840	11.424	6.9615	180.22	1.8639	7.2459	7.92	9.7839
32	900	12.251	7.0271	182.68	1.8718	7.2505	7.92	9.7918
33	960	13.09	7.0949	184.41	1.8714	7.2523	7.92	9.7914
34	1020	13.905	7.1621	185.98	1.8697	7.2552	7.92	9.7897
35	1080	14.744	7.2326	186.35	1.8551	7.2476	7.92	9.7751
36	1140	15.58	7.3042	185.3	1.8266	7.2552	7.92	9.7466

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S7
 Sample No.: S-7
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: ----



Soil Description: VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.04 in
 Specimen Area: 6.17 in²
 Specimen Volume: 37.26 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

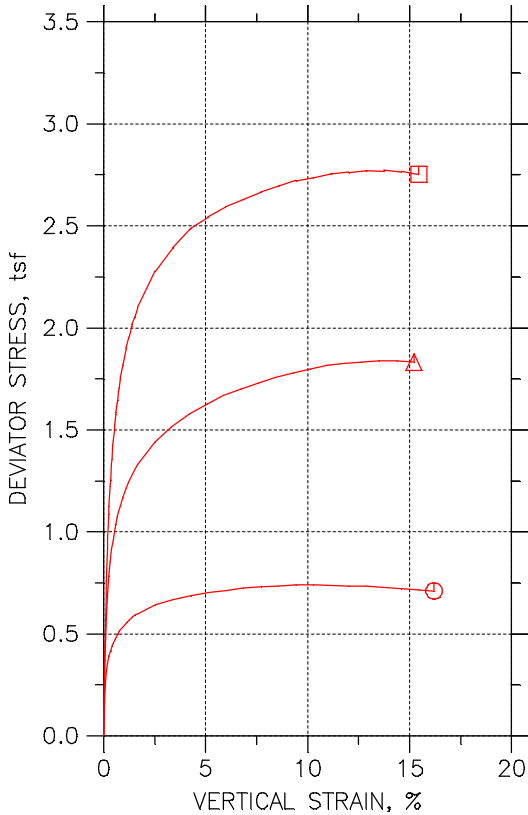
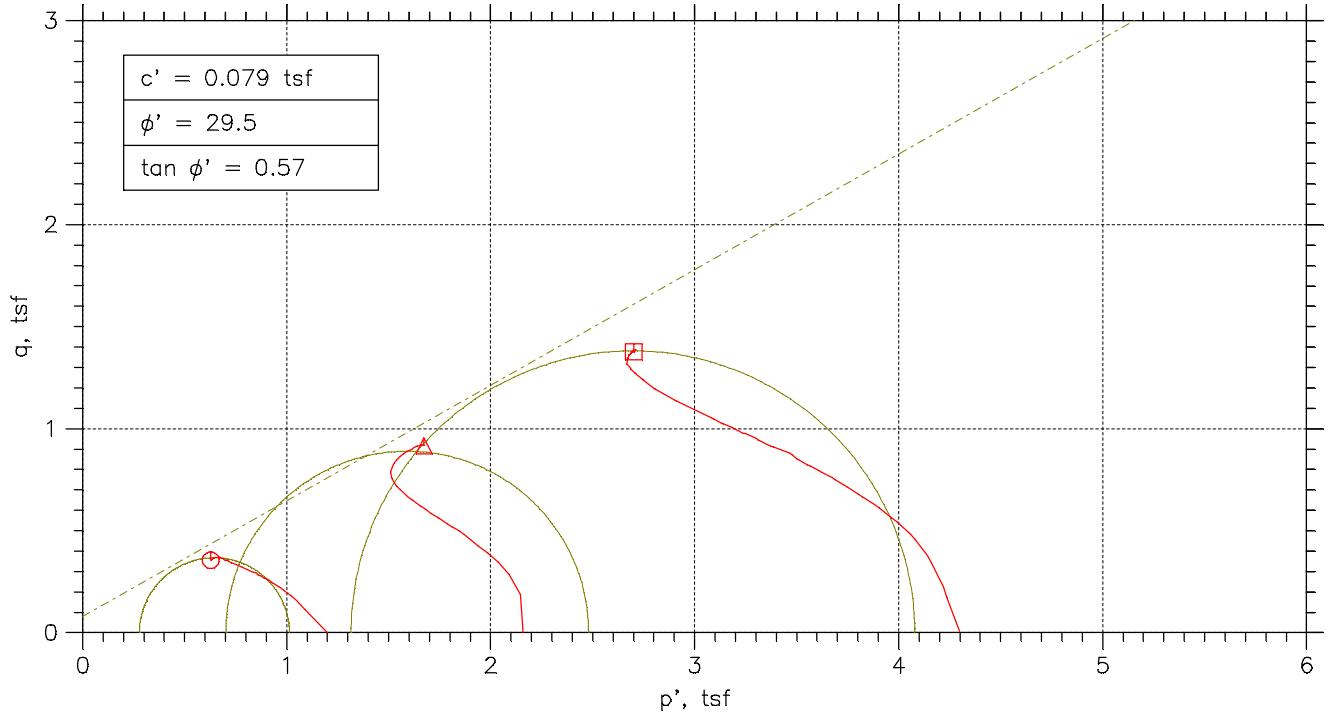
Liquid Limit: 38

Plastic Limit: 21

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	7.92	7.92	0	0.000	2.7644	2.7644	1.000	2.7644	0
2	0.04	8.1704	7.92	0.15842	0.633	2.8564	2.606	1.096	2.7312	0.12519
3	0.09	8.3599	7.92	0.29762	0.677	2.9067	2.4668	1.178	2.6868	0.21996
4	0.15	8.4973	7.92	0.42284	0.732	2.9188	2.3416	1.247	2.6302	0.28863
5	0.21	8.5965	7.92	0.53466	0.790	2.9063	2.2298	1.303	2.568	0.33826
6	0.27	8.6773	7.92	0.63484	0.838	2.8869	2.1296	1.356	2.5083	0.37867
7	0.34	8.7483	7.92	0.72278	0.873	2.8699	2.0416	1.406	2.4558	0.41413
8	0.40	8.813	7.92	0.80024	0.896	2.8572	1.9642	1.455	2.4107	0.4465
9	0.47	8.8648	7.92	0.86897	0.920	2.8403	1.8955	1.498	2.3679	0.47242
10	0.53	8.9154	7.92	0.9342	0.939	2.8256	1.8302	1.544	2.3279	0.4977
11	0.59	8.9555	7.92	0.99186	0.958	2.8081	1.7726	1.584	2.2903	0.51777
12	0.66	8.9956	7.92	1.0449	0.971	2.7952	1.7196	1.626	2.2574	0.53782
13	0.72	9.0332	7.92	1.0926	0.981	2.785	1.6718	1.666	2.2284	0.55662
14	0.86	9.0937	7.92	1.1788	1.004	2.7593	1.5856	1.740	2.1725	0.58685
15	0.99	9.1491	7.92	1.2522	1.019	2.7414	1.5122	1.813	2.1268	0.61457
16	1.12	9.1965	7.92	1.3163	1.031	2.7247	1.4482	1.881	2.0864	0.63827
17	1.25	9.2293	7.92	1.3722	1.048	2.7016	1.3922	1.940	2.0469	0.65465
18	1.38	9.2632	7.92	1.4211	1.058	2.6865	1.3433	2.000	2.0149	0.67159
19	1.52	9.2957	7.92	1.4677	1.067	2.6725	1.2967	2.061	1.9846	0.68787
20	2.33	9.4345	7.92	1.6587	1.095	2.6202	1.1057	2.370	1.8629	0.75723
21	3.17	9.5146	7.92	1.7793	1.116	2.5798	0.98514	2.619	1.7824	0.79731
22	3.99	9.58	7.92	1.8597	1.120	2.5647	0.90476	2.835	1.7347	0.82998
23	4.81	9.6234	7.92	1.9197	1.127	2.5482	0.84477	3.016	1.6965	0.8517
24	5.65	9.657	7.92	1.9604	1.129	2.541	0.804	3.160	1.6725	0.86848
25	6.46	9.6815	7.92	1.9954	1.133	2.5306	0.76906	3.290	1.6498	0.88076
26	7.29	9.7006	7.92	2.0187	1.134	2.5264	0.74576	3.388	1.6361	0.8903
27	8.13	9.7183	7.92	2.0367	1.133	2.526	0.72771	3.471	1.6268	0.89913
28	8.94	9.747	7.92	2.0495	1.122	2.5419	0.71489	3.556	1.6284	0.91352
29	9.76	9.7597	7.92	2.0612	1.120	2.543	0.70324	3.616	1.6231	0.91987
30	10.61	9.7732	7.92	2.0717	1.118	2.546	0.69276	3.675	1.6194	0.9266
31	11.42	9.7839	7.92	2.0903	1.121	2.538	0.67412	3.765	1.6061	0.93195
32	12.25	9.7918	7.92	2.095	1.119	2.5412	0.66946	3.796	1.6053	0.93588
33	13.09	9.7914	7.92	2.0967	1.120	2.5391	0.66772	3.803	1.6034	0.93571
34	13.91	9.7897	7.92	2.0996	1.123	2.5345	0.66481	3.812	1.5997	0.93485
35	14.74	9.7751	7.92	2.092	1.128	2.5275	0.67238	3.759	1.5999	0.92756
36	15.58	9.7466	7.92	2.0996	1.149	2.4914	0.66481	3.748	1.5781	0.91329

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



Symbol	⊙	△	□	
Test No.	15.0 PSI	30.0 PSI	60.0 PSI	
Initial	Diameter, in	2.828	2.8043	2.7835
	Height, in	5.7787	5.8472	5.7602
	Water Content, %	23.57	23.55	25.59
	Dry Density, pcf	92.14	96.79	92.12
	Saturation, %	76.04	84.91	82.54
Before Shear	Void Ratio	0.84297	0.75427	0.84321
	Water Content, %	26.53	21.69	21.75
	Dry Density, pcf	98.64	106.8	106.7
	Saturation, %	100.00	100.00	100.00
	Void Ratio	0.72151	0.59007	0.59162
	Back Press., tsf	5.0451	5.0416	5.0706
Minor Prin. Stress, tsf	1.1973	2.1584	4.2894	
Max. Dev. Stress, tsf	0.73973	1.8396	2.773	
Time to Failure, min	660	1020	960	
Strain Rate, %/min	0.02	0.02	0.02	
B-Value	0.99	0.97	0.98	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	41	41	41	
Plastic Limit	23	23	23	
Plasticity Index	18	18	18	

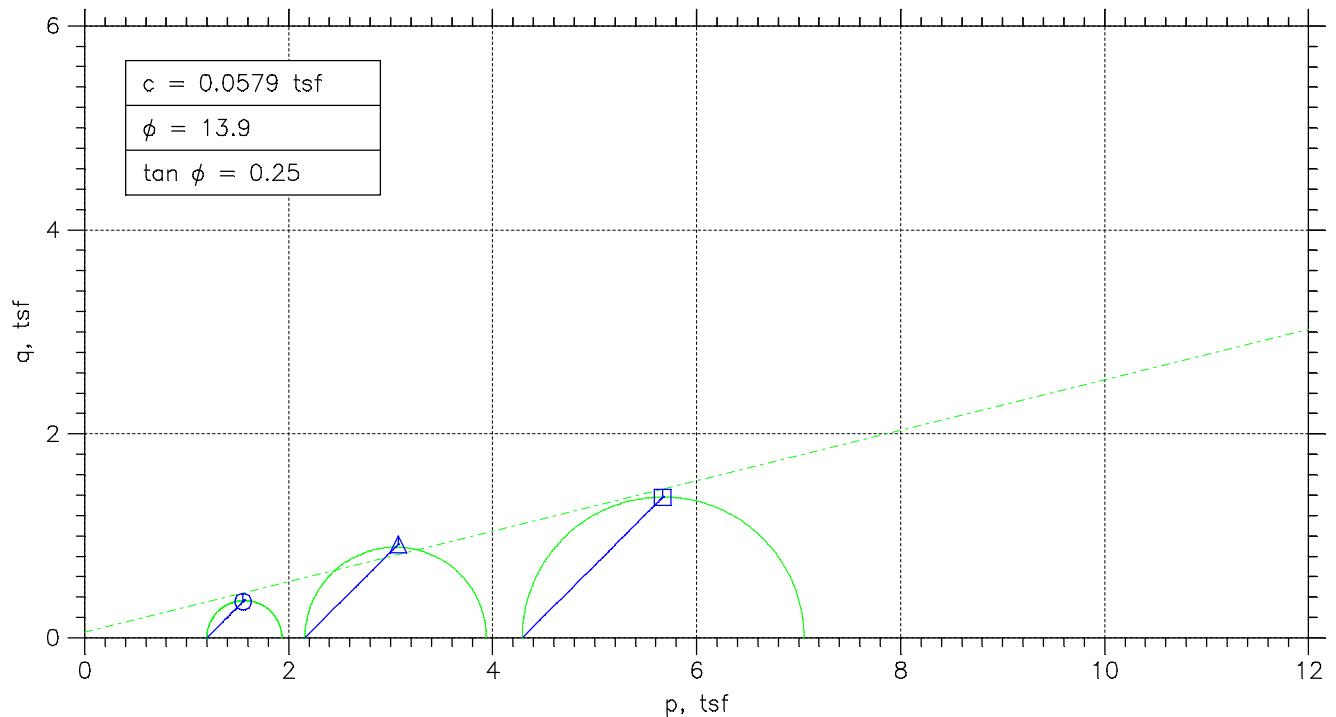
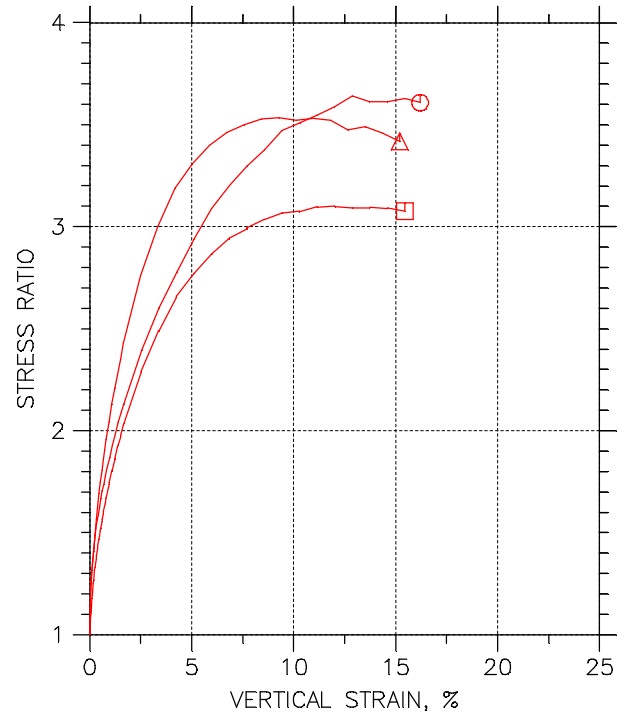
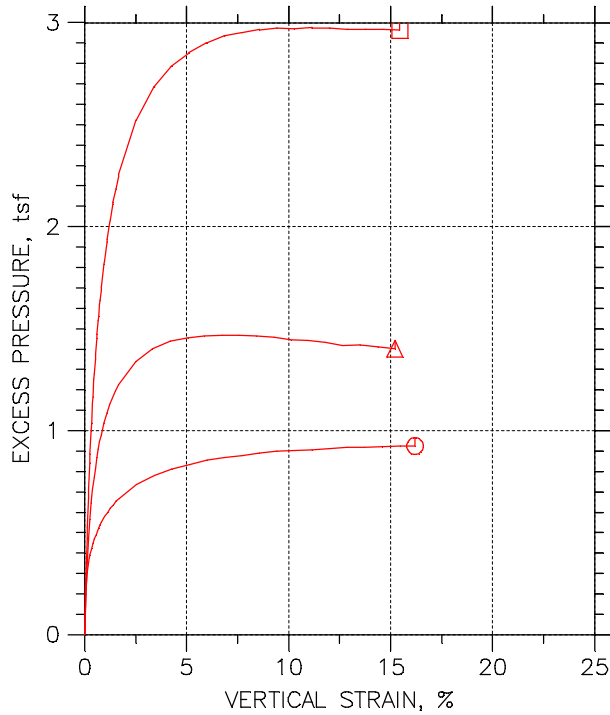
Project: DYNERGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-016 S10
Sample Type: 3 "ST

Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS ~~34710~~ TEST PERFORMED AS PER ASTM D 4767



CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
Boring No.: HEN-016 S10	Tested By: BCM	Checked By: WPQ
Sample No.: S-10	Test Date: 12/16/15	Depth: 35.0'-37.0'
Test No.: HEN-016 S10	Sample Type: 3 "ST	Elevation: ----
Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED		
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D 4767		
315		

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S10
 Sample No.: S-10
 Test No.: 15.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3 "ST

Project No.: MR155233
 Checked By: WPO
 Depth: 35.0' -37.0'
 Elevation: ----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D 4767

Specimen Height: 5.78 in
 Specimen Area: 6.28 in²
 Specimen Volume: 36.30 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.2811	0	0	5.0451	6.2424	6.2424
2	5.0001	0.054641	6.2845	19.902	0.22801	5.2685	6.2424	6.4704
3	10	0.12584	6.289	27.345	0.31307	5.3507	6.2424	6.5555
4	15	0.19373	6.2933	31.283	0.3579	5.3997	6.2424	6.6003
5	20	0.26658	6.2979	34.249	0.39155	5.4364	6.2424	6.634
6	25	0.33778	6.3024	36.622	0.41838	5.4673	6.2424	6.6608
7	30	0.40732	6.3068	38.456	0.43903	5.4918	6.2424	6.6814
8	35	0.48018	6.3114	39.912	0.45532	5.514	6.2424	6.6977
9	40.001	0.55137	6.3159	41.476	0.47282	5.5332	6.2424	6.7152
10	45.001	0.62257	6.3204	42.609	0.48539	5.5525	6.2424	6.7278
11	50.001	0.69377	6.325	43.742	0.49793	5.5694	6.2424	6.7403
12	55.001	0.76166	6.3293	45.036	0.51232	5.5834	6.2424	6.7547
13	60.001	0.83286	6.3338	45.899	0.52176	5.5968	6.2424	6.7642
14	70.001	0.97525	6.3429	47.355	0.53754	5.6242	6.2424	6.7799
15	80.001	1.1176	6.3521	48.92	0.5545	5.6446	6.2424	6.7969
16	90.001	1.26	6.3612	50.214	0.56835	5.6662	6.2424	6.8108
17	100	1.4008	6.3703	51.616	0.58339	5.6825	6.2424	6.8258
18	110	1.5448	6.3796	52.479	0.59228	5.6995	6.2424	6.8347
19	120	1.6889	6.389	53.234	0.59992	5.7129	6.2424	6.8423
20	180	2.5532	6.4456	57.495	0.64224	5.7817	6.2424	6.8846
21	240	3.4126	6.503	60.462	0.66942	5.8248	6.2424	6.9118
22	300	4.2653	6.5609	62.511	0.686	5.8563	6.2424	6.9284
23	360	5.1329	6.6209	64.615	0.70266	5.8802	6.2424	6.9451
24	420	5.9889	6.6812	66.125	0.7126	5.9012	6.2424	6.955
25	480	6.8466	6.7427	67.851	0.72452	5.9135	6.2424	6.9669
26	540	7.7093	6.8058	69.092	0.73094	5.924	6.2424	6.9733
27	600	8.5637	6.8693	70.008	0.73378	5.9339	6.2424	6.9762
28	660	9.428	6.9349	71.249	0.73973	5.9432	6.2424	6.9821
29	720	10.292	7.0017	71.896	0.73932	5.9479	6.2424	6.9817
30	780	11.145	7.0689	72.436	0.73779	5.9526	6.2424	6.9802
31	840	12.008	7.1382	72.813	0.73443	5.9584	6.2424	6.9768
32	900	12.874	7.2092	73.568	0.73475	5.9642	6.2424	6.9771
33	960	13.726	7.2804	73.676	0.72862	5.9636	6.2424	6.971
34	1020	14.596	7.3545	73.73	0.72181	5.966	6.2424	6.9642
35	1080	15.46	7.4297	73.892	0.71607	5.9701	6.2424	6.9585
36	1131.9	16.195	7.4949	73.946	0.71036	5.9701	6.2424	6.9528

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S10
 Sample No.: S-10
 Test No.: 15.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3 "ST

Project No.: MR155233
 Checked By: WPO
 Depth: 35.0' -37.0'
 Elevation: ----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D 4767

Specimen Height: 5.78 in
 Specimen Area: 6.28 in²
 Specimen Volume: 36.30 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	6.2424	6.2424	0	0.000	1.1973	1.1973	1.000	1.1973	0
2	0.05	6.4704	6.2424	0.22336	0.980	1.2019	0.97392	1.234	1.0879	0.11401
3	0.13	6.5555	6.2424	0.30559	0.976	1.2048	0.89169	1.351	1.0482	0.15653
4	0.19	6.6003	6.2424	0.35458	0.991	1.2006	0.8427	1.425	1.0217	0.17895
5	0.27	6.634	6.2424	0.39132	0.999	1.1975	0.80596	1.486	1.0017	0.19578
6	0.34	6.6608	6.2424	0.42223	1.009	1.1934	0.77505	1.540	0.98424	0.20919
7	0.41	6.6814	6.2424	0.44672	1.018	1.1896	0.75056	1.585	0.97007	0.21951
8	0.48	6.6977	6.2424	0.46888	1.030	1.1837	0.7284	1.625	0.95606	0.22766
9	0.55	6.7152	6.2424	0.48812	1.032	1.182	0.70915	1.667	0.94556	0.23641
10	0.62	6.7278	6.2424	0.50737	1.045	1.1753	0.68991	1.704	0.9326	0.24269
11	0.69	6.7403	6.2424	0.52428	1.053	1.1709	0.67299	1.740	0.92196	0.24897
12	0.76	6.7547	6.2424	0.53828	1.051	1.1713	0.659	1.777	0.91516	0.25616
13	0.83	6.7642	6.2424	0.55169	1.057	1.1673	0.64559	1.808	0.90647	0.26088
14	0.98	6.7799	6.2424	0.5791	1.077	1.1557	0.61818	1.870	0.88695	0.26877
15	1.12	6.7969	6.2424	0.59951	1.081	1.1523	0.59776	1.928	0.87501	0.27725
16	1.26	6.8108	6.2424	0.62109	1.093	1.1445	0.57619	1.986	0.86036	0.28418
17	1.40	6.8258	6.2424	0.63742	1.093	1.1432	0.55986	2.042	0.85155	0.2917
18	1.54	6.8347	6.2424	0.65433	1.105	1.1352	0.54294	2.091	0.83908	0.29614
19	1.69	6.8423	6.2424	0.66775	1.113	1.1295	0.52953	2.133	0.82949	0.29996
20	2.55	6.8846	6.2424	0.73656	1.147	1.103	0.46072	2.394	0.78184	0.32112
21	3.41	6.9118	6.2424	0.77972	1.165	1.087	0.41756	2.603	0.75227	0.33471
22	4.27	6.9284	6.2424	0.81121	1.183	1.0721	0.38607	2.777	0.72907	0.343
23	5.13	6.9451	6.2424	0.83512	1.189	1.0648	0.36216	2.940	0.71349	0.35133
24	5.99	6.955	6.2424	0.85611	1.201	1.0538	0.34116	3.089	0.69746	0.3563
25	6.85	6.9669	6.2424	0.86836	1.199	1.0534	0.32892	3.203	0.69118	0.36226
26	7.71	6.9733	6.2424	0.87886	1.202	1.0494	0.31842	3.296	0.68389	0.36547
27	8.56	6.9762	6.2424	0.88877	1.211	1.0423	0.30851	3.379	0.6754	0.36689
28	9.43	6.9821	6.2424	0.8981	1.214	1.0389	0.29917	3.473	0.66904	0.36986
29	10.29	6.9817	6.2424	0.90277	1.221	1.0338	0.29451	3.510	0.66417	0.36966
30	11.15	6.9802	6.2424	0.90743	1.230	1.0276	0.28984	3.545	0.65874	0.36889
31	12.01	6.9768	6.2424	0.91327	1.243	1.0184	0.28401	3.586	0.65123	0.36722
32	12.87	6.9771	6.2424	0.9191	1.251	1.0129	0.27818	3.641	0.64555	0.36737
33	13.73	6.971	6.2424	0.91851	1.261	1.0074	0.27876	3.614	0.64307	0.36431
34	14.60	6.9642	6.2424	0.92085	1.276	0.99824	0.27643	3.611	0.63733	0.3609
35	15.46	6.9585	6.2424	0.92493	1.292	0.98842	0.27235	3.629	0.63038	0.35804
36	16.20	6.9528	6.2424	0.92493	1.302	0.98271	0.27235	3.608	0.62753	0.35518

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S10
 Sample No.: S-10
 Test No.: 30.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -37.0'
 Elevation: ----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.85 in
 Specimen Area: 6.18 in²
 Specimen Volume: 36.12 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.1766	0	0	5.0416	7.2	7.2
2	5.0037	0.054	6.1799	31.761	0.37004	5.2399	7.2	7.57
3	10.004	0.11946	6.184	49.071	0.57134	5.3956	7.2	7.7713
4	15.004	0.18655	6.1881	59.764	0.69537	5.5105	7.2	7.8954
5	20.004	0.25528	6.1924	67.387	0.78352	5.605	7.2	7.9835
6	25.004	0.32237	6.1966	73.369	0.8525	5.686	7.2	8.0525
7	30.004	0.39109	6.2008	78.503	0.91153	5.7543	7.2	8.1115
8	35.004	0.45982	6.2051	82.844	0.96127	5.812	7.2	8.1613
9	40.004	0.52855	6.2094	86.444	1.0023	5.8575	7.2	8.2023
10	45.004	0.60055	6.2139	89.726	1.0396	5.9088	7.2	8.2396
11	50.004	0.66764	6.2181	92.584	1.072	5.9508	7.2	8.272
12	55.004	0.73473	6.2223	95.019	1.0995	5.9875	7.2	8.2995
13	60.004	0.80837	6.2269	97.507	1.1274	6.019	7.2	8.3274
14	70.004	0.94583	6.2356	101.48	1.1717	6.0791	7.2	8.3717
15	80.004	1.0882	6.2445	105.18	1.2128	6.1287	7.2	8.4128
16	90.004	1.2306	6.2535	108.25	1.2464	6.1695	7.2	8.4464
17	110	1.5153	6.2716	113.44	1.3023	6.2366	7.2	8.5023
18	120	1.6577	6.2807	115.93	1.329	6.2681	7.2	8.529
19	180	2.5037	6.3352	126.62	1.4391	6.3818	7.2	8.6391
20	240	3.3431	6.3902	134.46	1.515	6.443	7.2	8.715
21	300	4.2006	6.4474	141.18	1.5766	6.4798	7.2	8.7766
22	360	5.04	6.5044	146.84	1.6255	6.4955	7.2	8.8255
23	420	5.8779	6.5623	152.03	1.668	6.5048	7.2	8.868
24	480	6.7321	6.6224	156.32	1.6995	6.5095	7.2	8.8995
25	540	7.5781	6.683	160.45	1.7286	6.5083	7.2	8.9286
26	600	8.4224	6.7446	164.47	1.7557	6.5054	7.2	8.9557
27	660	9.2734	6.8079	168.18	1.7786	6.4984	7.2	8.9786
28	720	10.116	6.8717	171.56	1.7976	6.4868	7.2	8.9976
29	780	10.964	6.9372	174.9	1.8153	6.4827	7.2	9.0153
30	840	11.811	7.0038	177.7	1.8268	6.4757	7.2	9.0268
31	900	12.661	7.0719	179.98	1.8324	6.4599	7.2	9.0324
32	960	13.502	7.1407	182.42	1.8393	6.4611	7.2	9.0393
33	1020	14.359	7.2122	184.27	1.8396	6.4518	7.2	9.0396
34	1080	15.204	7.284	185.33	1.8319	6.4424	7.2	9.0319

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S10
 Sample No.: S-10
 Test No.: 30.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -37.0'
 Elevation: ----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.85 in
 Specimen Area: 6.18 in²
 Specimen Volume: 36.12 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	7.2	7.2	0	0.000	2.1584	2.1584	1.000	2.1584	0
2	0.05	7.57	7.2	0.19828	0.536	2.3301	1.9601	1.189	2.1451	0.18502
3	0.12	7.7713	7.2	0.35399	0.620	2.3757	1.8044	1.317	2.0901	0.28567
4	0.19	7.8954	7.2	0.46888	0.674	2.3849	1.6895	1.412	2.0372	0.34768
5	0.26	7.9835	7.2	0.56336	0.719	2.3785	1.595	1.491	1.9868	0.39176
6	0.32	8.0525	7.2	0.64442	0.756	2.3665	1.514	1.563	1.9402	0.42625
7	0.39	8.1115	7.2	0.71265	0.782	2.3573	1.4457	1.631	1.9015	0.45577
8	0.46	8.1613	7.2	0.77039	0.801	2.3493	1.388	1.693	1.8686	0.48063
9	0.53	8.2023	7.2	0.81587	0.814	2.3448	1.3425	1.747	1.8437	0.50117
10	0.60	8.2396	7.2	0.86719	0.834	2.3308	1.2912	1.805	1.811	0.51982
11	0.67	8.272	7.2	0.90918	0.848	2.3212	1.2492	1.858	1.7852	0.53602
12	0.73	8.2995	7.2	0.94592	0.860	2.3119	1.2125	1.907	1.7622	0.54975
13	0.81	8.3274	7.2	0.97742	0.867	2.3084	1.181	1.955	1.7447	0.56372
14	0.95	8.3717	7.2	1.0375	0.885	2.2926	1.1209	2.045	1.7068	0.58586
15	1.09	8.4128	7.2	1.0871	0.896	2.2841	1.0713	2.132	1.6777	0.60638
16	1.23	8.4464	7.2	1.1279	0.905	2.2769	1.0305	2.209	1.6537	0.62319
17	1.52	8.5023	7.2	1.1949	0.918	2.2658	0.96343	2.352	1.6146	0.65117
18	1.66	8.529	7.2	1.2264	0.923	2.2609	0.93194	2.426	1.5964	0.66449
19	2.50	8.6391	7.2	1.3402	0.931	2.2573	0.81822	2.759	1.5378	0.71953
20	3.34	8.715	7.2	1.4014	0.925	2.2719	0.75699	3.001	1.5145	0.75748
21	4.20	8.7766	7.2	1.4381	0.912	2.2968	0.72025	3.189	1.5085	0.78829
22	5.04	8.8255	7.2	1.4539	0.894	2.33	0.7045	3.307	1.5172	0.81273
23	5.88	8.868	7.2	1.4632	0.877	2.3632	0.69517	3.399	1.5292	0.83402
24	6.73	8.8995	7.2	1.4679	0.864	2.39	0.6905	3.461	1.5403	0.84976
25	7.58	8.9286	7.2	1.4667	0.848	2.4203	0.69167	3.499	1.556	0.8643
26	8.42	8.9557	7.2	1.4638	0.834	2.4503	0.69458	3.528	1.5725	0.87787
27	9.27	8.9786	7.2	1.4568	0.819	2.4802	0.70158	3.535	1.5909	0.88931
28	10.12	8.9976	7.2	1.4451	0.804	2.5108	0.71325	3.520	1.612	0.8988
29	10.96	9.0153	7.2	1.441	0.794	2.5326	0.71733	3.531	1.625	0.90763
30	11.81	9.0268	7.2	1.434	0.785	2.5511	0.72433	3.522	1.6377	0.91341
31	12.66	9.0324	7.2	1.4183	0.774	2.5725	0.74007	3.476	1.6563	0.9162
32	13.50	9.0393	7.2	1.4195	0.772	2.5782	0.73891	3.489	1.6586	0.91965
33	14.36	9.0396	7.2	1.4101	0.767	2.5878	0.74824	3.459	1.668	0.91979
34	15.20	9.0319	7.2	1.4008	0.765	2.5895	0.75757	3.418	1.6735	0.91595

Project: DYNERGY HENNEPIN
 Boring No.: HEN-016 S10
 Sample No.: S-10
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 35.0' -37.0'
 Elevation: ----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.76 in
 Specimen Area: 6.09 in²
 Specimen Volume: 35.05 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 41

Plastic Limit: 23

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.085	1.2705	0.015032	5.0706	9.36	9.375
2	5.0035	0.047279	6.0879	29.485	0.34871	5.2986	9.36	9.7087
3	5.0001	0.063039	6.0888	37.849	0.44756	5.3655	9.36	9.8076
4	10.004	0.11189	6.0918	57.964	0.68509	5.5412	9.36	10.045
5	10	0.12923	6.0929	64.052	0.75691	5.5964	9.36	10.117
6	15.004	0.17966	6.096	77.815	0.91908	5.7401	9.36	10.279
7	15	0.197	6.097	81.838	0.96643	5.7855	9.36	10.326
8	20.004	0.24585	6.1	92.214	1.0884	5.9146	9.36	10.448
9	20	0.26476	6.1012	95.39	1.1257	5.9576	9.36	10.486
10	25.004	0.31519	6.1042	103.81	1.2244	6.0699	9.36	10.584
11	25	0.3341	6.1054	106.51	1.256	6.1071	9.36	10.616
12	30.004	0.38611	6.1086	113.02	1.3321	6.2054	9.36	10.692
13	30	0.40345	6.1097	115.03	1.3556	6.2368	9.36	10.716
14	35.004	0.45545	6.1129	120.9	1.4241	6.3229	9.36	10.784
15	35	0.47279	6.1139	122.97	1.4481	6.3496	9.36	10.808
16	40.004	0.52322	6.117	127.42	1.4997	6.4229	9.36	10.86
17	40	0.54213	6.1182	129.32	1.5219	6.4485	9.36	10.882
18	45.004	0.59572	6.1215	133.82	1.574	6.5218	9.36	10.934
19	45	0.61305	6.1225	134.93	1.5868	6.5451	9.36	10.947
20	50.004	0.66506	6.1257	138.9	1.6326	6.6096	9.36	10.993
21	50	0.68397	6.1269	140.17	1.6472	6.6317	9.36	11.007
22	55.004	0.73598	6.1301	143.67	1.6874	6.6899	9.36	11.047
23	55	0.75331	6.1312	145.15	1.7045	6.7097	9.36	11.065
24	60.004	0.80374	6.1343	148.85	1.7471	6.7574	9.36	11.107
25	60	0.82108	6.1354	149.81	1.758	6.7731	9.36	11.118
26	70.004	0.94558	6.1431	155.37	1.821	6.8865	9.36	11.181
27	70	0.96449	6.1443	156.27	1.8312	6.9033	9.36	11.191
28	80.004	1.0874	6.1519	161.82	1.8939	6.997	9.36	11.254
29	80	1.1063	6.1531	162.78	1.9047	7.0086	9.36	11.265
30	90.004	1.2277	6.1606	167.06	1.9525	7.0889	9.36	11.313
31	90	1.2466	6.1618	167.44	1.9565	7.1017	9.36	11.316
32	100	1.3727	6.1697	172.09	2.0083	7.1802	9.36	11.368
33	100	1.39	6.1708	172.78	2.016	7.1907	9.36	11.376
34	110	1.5145	6.1786	175.85	2.0492	7.243	9.36	11.409
35	110	1.5334	6.1798	176.43	2.0556	7.2552	9.36	11.416
36	120	1.6563	6.1875	180.19	2.0968	7.3175	9.36	11.457
37	120	1.6753	6.1887	180.72	2.1025	7.3274	9.36	11.463
38	180	2.5168	6.2421	197.34	2.2763	7.5908	9.36	11.636
39	180	2.5357	6.2433	197.56	2.2783	7.5961	9.36	11.638
40	240	3.3789	6.2978	209.2	2.3917	7.7543	9.36	11.752
41	240	3.3978	6.299	209.36	2.3931	7.7549	9.36	11.753
42	300	4.2409	6.3545	219.21	2.4837	7.8566	9.36	11.844
43	300	4.2598	6.3558	219.52	2.4868	7.8601	9.36	11.847
44	360	5.103	6.4122	226.41	2.5422	7.9229	9.36	11.902
45	360	5.1235	6.4136	226.62	2.544	7.9253	9.36	11.904
46	420	5.9698	6.4713	232.81	2.5903	7.9706	9.36	11.95
47	420	5.9871	6.4725	233.13	2.5933	7.9712	9.36	11.953
48	480	6.8271	6.5309	238.42	2.6285	8.0055	9.36	11.988
49	480	6.8444	6.5321	238.63	2.6303	8.0073	9.36	11.99
50	540	7.686	6.5916	243.77	2.6627	8.0207	9.36	12.023
51	540	7.7049	6.593	244.14	2.6662	8.023	9.36	12.026
52	600	8.5543	6.6542	249.06	2.6949	8.0364	9.36	12.055
53	600	8.5733	6.6556	249.11	2.6949	8.0352	9.36	12.055
54	660	9.4117	6.7172	253.99	2.7224	8.0433	9.36	12.082
55	660	9.4306	6.7186	253.77	2.7196	8.0433	9.36	12.08
56	720	10.267	6.7813	257.8	2.7371	8.041	9.36	12.097
57	720	10.286	6.7827	257.64	2.7349	8.0416	9.36	12.095
58	780	11.136	6.8475	262.03	2.7552	8.0474	9.36	12.115
59	780	11.153	6.8489	261.93	2.7535	8.0451	9.36	12.114
60	840	11.998	6.9146	265.37	2.7632	8.0445	9.36	12.123
61	840	12.017	6.9161	265.26	2.7615	8.0439	9.36	12.121
62	900	12.861	6.9831	268.54	2.7688	8.0364	9.36	12.129
63	900	12.88	6.9847	268.6	2.7688	8.0364	9.36	12.129
64	960	13.731	7.0536	270.98	2.766	8.0375	9.36	12.126
65	960	13.75	7.0551	271.72	2.773	8.0369	9.36	12.133
66	1020	14.592	7.1246	273.41	2.763	8.0369	9.36	12.123
67	1020	14.611	7.1262	273.73	2.7656	8.0381	9.36	12.126
68	1080	15.451	7.197	275.11	2.7522	8.0346	9.36	12.112

Project: DYNERGY HENNEPIN
Boring No.: HEN-016 S10
Sample No.: S-10
Test No.: 60.0 PSI

Location: HENNEPIN, IL
Tested By: BCM
Test Date: 12/17/15
Sample Type: 3.0" ST

Project No.: MR155233
Checked By: WPO
Depth: 35.0' -37.0'
Elevation: ----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND CL FLY ASH AND SHELL NOTED
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.76 in
Specimen Area: 6.09 in²
Specimen Volume: 35.05 in³

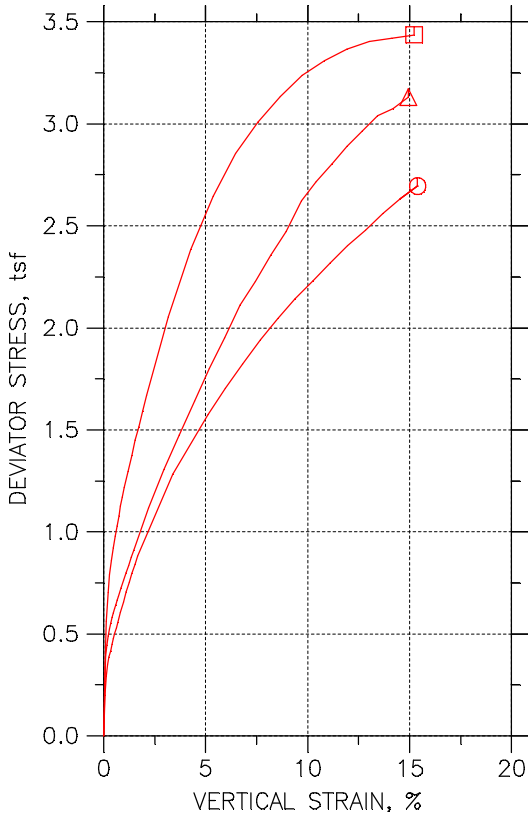
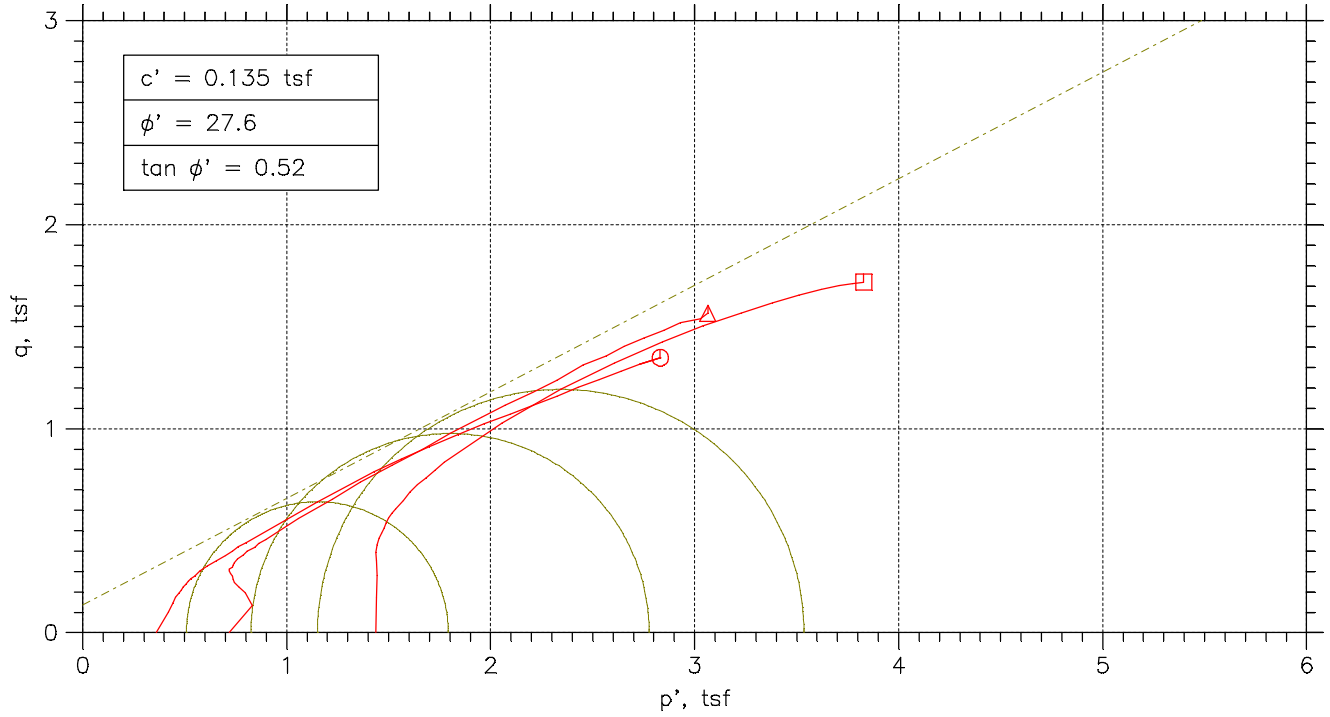
Piston Area: 0.00 in²
Piston Friction: 0.00 lb
Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
Membrane Correction: 0.00 lb/in
Correction Type: Uni form

Liquid Limit: 41 Plastic Limit: 23 Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	9.375	9.36	0	0.000	4.3044	4.2894	1.004	4.2969	0.0075162
2	0.05	9.7087	9.36	0.228	0.683	4.4101	4.0614	1.086	4.2357	0.17436
3	0.06	9.8076	9.36	0.29489	0.682	4.442	3.9945	1.112	4.2183	0.22378
4	0.11	10.045	9.36	0.47054	0.702	4.5039	3.8188	1.179	4.1614	0.34254
5	0.13	10.117	9.36	0.52579	0.709	4.5205	3.7636	1.201	4.142	0.37845
6	0.18	10.279	9.36	0.66945	0.741	4.539	3.6199	1.254	4.0795	0.45954
7	0.20	10.326	9.36	0.71482	0.751	4.541	3.5745	1.270	4.0578	0.48322
8	0.25	10.448	9.36	0.84394	0.786	4.5338	3.4454	1.316	3.9896	0.54421
9	0.26	10.486	9.36	0.88698	0.799	4.5281	3.4024	1.331	3.9652	0.56285
10	0.32	10.584	9.36	0.99924	0.826	4.5145	3.2901	1.372	3.9023	0.6122
11	0.33	10.616	9.36	1.0365	0.835	4.5089	3.2529	1.386	3.8809	0.62801
12	0.39	10.692	9.36	1.1348	0.862	4.4867	3.1546	1.422	3.8207	0.66605
13	0.40	10.716	9.36	1.1662	0.870	4.4788	3.1232	1.434	3.801	0.67779
14	0.46	10.784	9.36	1.2522	0.889	4.4612	3.0371	1.469	3.7492	0.71204
15	0.47	10.808	9.36	1.279	0.892	4.4585	3.0104	1.481	3.7344	0.72407
16	0.52	10.86	9.36	1.3523	0.911	4.4368	2.9371	1.511	3.6869	0.74987
17	0.54	10.882	9.36	1.3779	0.914	4.4334	2.9115	1.523	3.6724	0.76094
18	0.60	10.934	9.36	1.4512	0.931	4.4122	2.8382	1.555	3.6252	0.78699
19	0.61	10.947	9.36	1.4744	0.938	4.4017	2.8149	1.564	3.6083	0.79339
20	0.67	10.993	9.36	1.539	0.951	4.383	2.7504	1.594	3.5667	0.81631
21	0.68	11.007	9.36	1.5611	0.956	4.3755	2.7283	1.604	3.5519	0.82362
22	0.74	11.047	9.36	1.6193	0.968	4.3575	2.6701	1.632	3.5138	0.84371
23	0.75	11.065	9.36	1.639	0.970	4.3549	2.6503	1.643	3.5026	0.85226
24	0.80	11.107	9.36	1.6867	0.974	4.3498	2.6026	1.671	3.4762	0.87357
25	0.82	11.118	9.36	1.7024	0.977	4.345	2.5869	1.680	3.4659	0.87901
26	0.95	11.181	9.36	1.8158	1.005	4.2945	2.4735	1.736	3.384	0.91048
27	0.96	11.191	9.36	1.8327	1.009	4.2878	2.4567	1.745	3.3722	0.91558
28	1.09	11.254	9.36	1.9264	1.025	4.2569	2.363	1.801	3.31	0.94697
29	1.11	11.265	9.36	1.938	1.026	4.2561	2.3514	1.810	3.3037	0.95236
30	1.23	11.313	9.36	2.0183	1.042	4.2236	2.2711	1.860	3.2474	0.97625
31	1.25	11.316	9.36	2.031	1.046	4.2148	2.2583	1.866	3.2365	0.97823
32	1.37	11.368	9.36	2.1096	1.058	4.1881	2.1798	1.921	3.184	1.0042
33	1.39	11.376	9.36	2.12	1.060	4.1853	2.1693	1.929	3.1773	1.008
34	1.51	11.409	9.36	2.1724	1.068	4.1662	2.117	1.968	3.1416	1.0246
35	1.53	11.416	9.36	2.1846	1.071	4.1604	2.1048	1.977	3.1326	1.0278
36	1.66	11.457	9.36	2.2468	1.079	4.1393	2.0425	2.027	3.0909	1.0484
37	1.68	11.463	9.36	2.2567	1.081	4.1352	2.0326	2.034	3.0839	1.0513
38	2.52	11.636	9.36	2.5202	1.115	4.0454	1.7692	2.287	2.9073	1.1381
39	2.54	11.638	9.36	2.5254	1.116	4.0422	1.7639	2.292	2.9031	1.1391
40	3.38	11.752	9.36	2.6836	1.129	3.9974	1.6057	2.489	2.8016	1.1959
41	3.40	11.753	9.36	2.6842	1.129	3.9982	1.6051	2.491	2.8017	1.1965
42	4.24	11.844	9.36	2.786	1.129	3.9871	1.5034	2.652	2.7452	1.2419
43	4.26	11.847	9.36	2.7895	1.129	3.9867	1.4999	2.658	2.7433	1.2434
44	5.10	11.902	9.36	2.8523	1.129	3.9793	1.4371	2.769	2.7082	1.2711
45	5.12	11.904	9.36	2.8546	1.129	3.9788	1.4347	2.773	2.7067	1.272
46	5.97	11.95	9.36	2.9	1.126	3.9796	1.3894	2.864	2.6845	1.2951
47	5.99	11.953	9.36	2.9006	1.125	3.9821	1.3888	2.867	2.6854	1.2967
48	6.83	11.988	9.36	2.9349	1.123	3.983	1.3545	2.941	2.6687	1.3142
49	6.84	11.99	9.36	2.9366	1.123	3.9831	1.3527	2.944	2.6679	1.3152
50	7.69	12.023	9.36	2.95	1.114	4.002	1.3393	2.988	2.6707	1.3313
51	7.70	12.026	9.36	2.9523	1.114	4.0032	1.337	2.994	2.6701	1.3331
52	8.55	12.055	9.36	2.9657	1.107	4.0185	1.3236	3.036	2.6711	1.3474
53	8.57	12.055	9.36	2.9646	1.106	4.0197	1.3248	3.034	2.6723	1.3475
54	9.41	12.082	9.36	2.9727	1.098	4.0391	1.3167	3.068	2.6779	1.3612
55	9.43	12.08	9.36	2.9727	1.099	4.0362	1.3167	3.065	2.6764	1.3598
56	10.27	12.097	9.36	2.9704	1.091	4.0561	1.319	3.075	2.6876	1.3686
57	10.29	12.095	9.36	2.971	1.092	4.0533	1.3184	3.074	2.6858	1.3674
58	11.14	12.115	9.36	2.9768	1.086	4.0678	1.3126	3.099	2.6902	1.3776
59	11.15	12.114	9.36	2.9744	1.086	4.0685	1.3149	3.094	2.6917	1.3768
60	12.00	12.123	9.36	2.9739	1.082	4.0787	1.3155	3.100	2.6971	1.3816
61	12.02	12.121	9.36	2.9733	1.083	4.0776	1.3161	3.098	2.6968	1.3807
62	12.86	12.129	9.36	2.9657	1.077	4.0925	1.3236	3.092	2.708	1.3844
63	12.88	12.129	9.36	2.9657	1.077	4.0924	1.3236	3.092	2.708	1.3844
64	13.73	12.126	9.36	2.9669	1.078	4.0885	1.3225	3.092	2.7055	1.383
65	13.75	12.133	9.36	2.9663	1.076	4.096	1.3231	3.096	2.7096	1.3865
66	14.59	12.123	9.36	2.9663	1.079	4.0861	1.3231	3.088	2.7046	1.3815
67	14.61	12.126	9.36	2.9675	1.079	4.0875	1.3219	3.092	2.7047	1.3828
68	15.45	12.112	9.36	2.964	1.083	4.0776	1.3254	3.077	2.7015	1.3761

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767

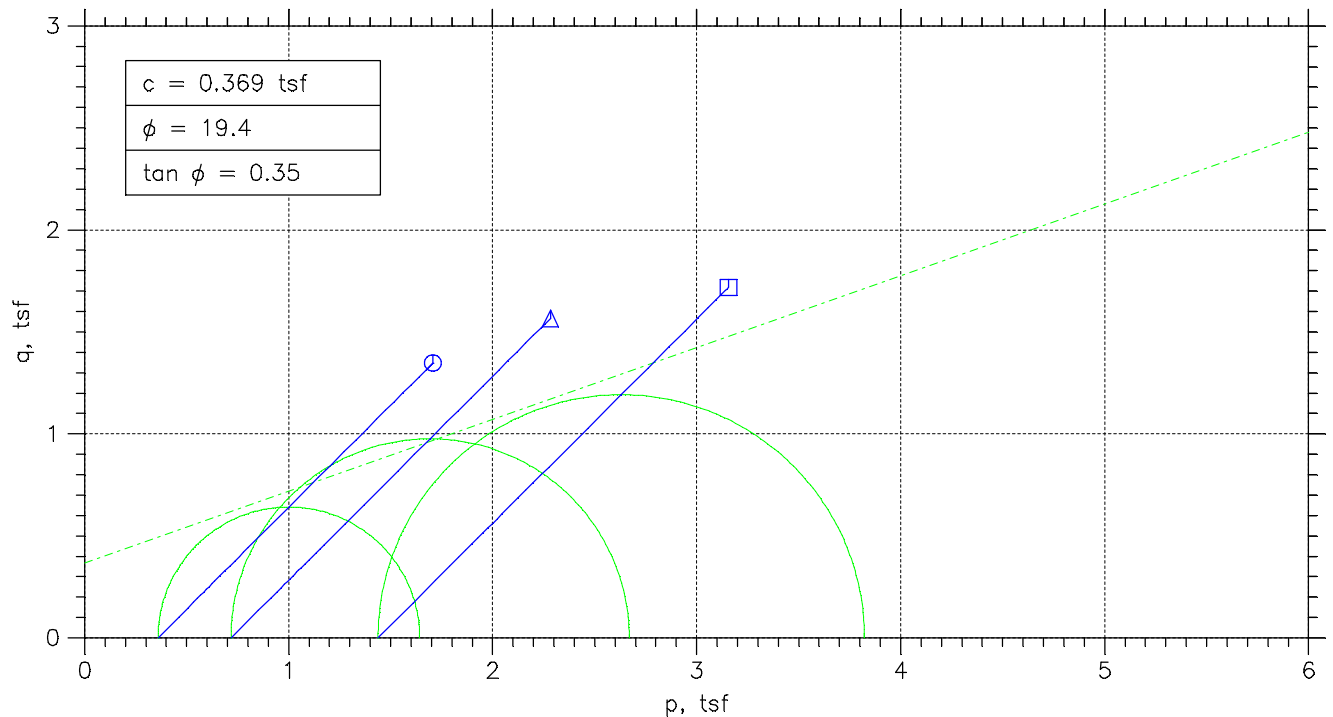
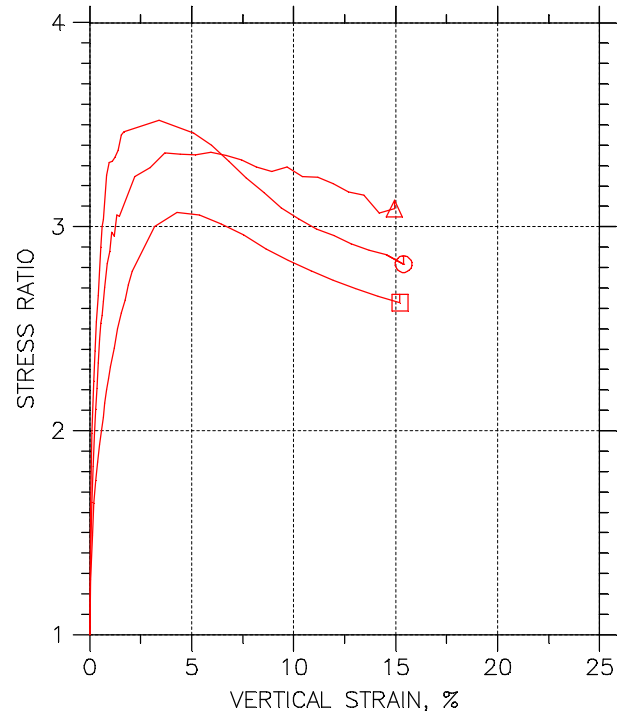
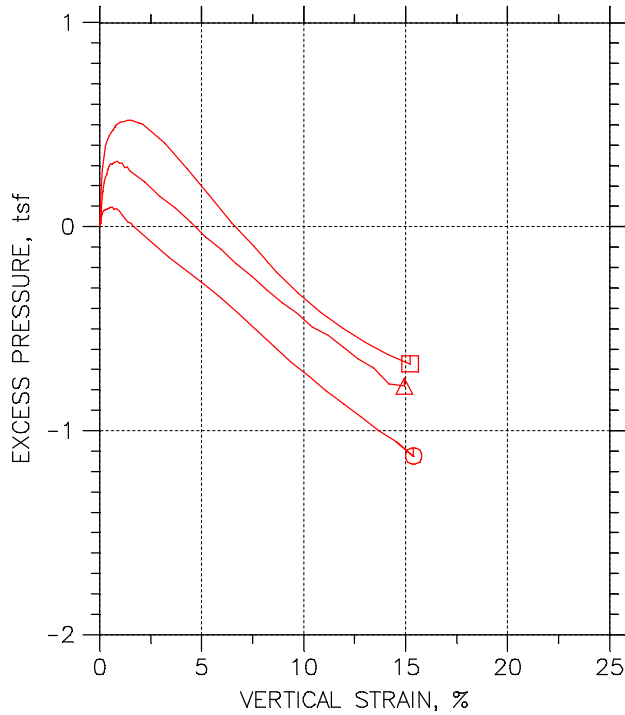


Symbol	⊙	△	□	
Test No.	5.0 PSI	10.0 PSI	20.0 PSI	
Initial	Diameter, in	2.8799	2.8646	2.8394
	Height, in	5.9846	5.9776	5.9764
	Water Content, %	45.39	45.24	43.38
	Dry Density, pcf	69.73	70.52	76.64
	Saturation, %	98.57	100.41	114.22
Before Shear	Void Ratio	1.0592	1.0362	0.87359
	Water Content, %	45.39	45.24	43.38
	Dry Density, pcf	70.25	70.37	71.87
	Saturation, %	100.00	100.00	100.00
	Void Ratio	1.044	1.0404	0.99783
	Back Press., tsf	5.0405	5.0425	5.0416
Minor Prin. Stress, tsf	0.35947	0.71748	1.4384	
Max. Dev. Stress, tsf	2.6948	3.1306	3.4366	
Time to Failure, min	1080	1200	840	
Strain Rate, %/min	0.02	0.02	0.02	
B-Value	0.98	0.99	0.96	
Estimated Specific Gravity	2.30	2.30	2.30	
Liquid Limit	NP	NP	NP	
Plastic Limit	NP	NP	NP	
Plasticity Index	NP	NP	NP	
Failure Sketch				

Project: DYNERGY HENNEPIN
 Location: HENNEPIN, IL
 Project No.: MR155233
 Boring No.: HEN-018 S-5
 Sample Type: 3.0" ST
 Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
Boring No.: HEN-018 S-5	Tested By: BCM	Checked By: WPQ
Sample No.: S-5	Test Date: 12/16/15	Depth: 10.0'-12.0'
Test No.: HEN-018 S-5	Sample Type: 3.0" ST	Elevation: ----
Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL		
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.		

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-018 S-5
 Sample No.: S-5
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: ----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.98 in
 Specimen Area: 6.51 in²
 Specimen Volume: 38.98 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: NP

Plastic Limit: NP

Estimated Specific Gravity: 2.30

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.5141	0	0	5.0405	5.4	5.4
2	5.001	0.052041	6.5174	18.3	0.20216	5.0794	5.4	5.6022
3	10.001	0.12301	6.5221	26.427	0.29174	5.1044	5.4	5.6917
4	15.001	0.19239	6.5266	31.613	0.34875	5.1201	5.4	5.7487
5	20.001	0.26336	6.5313	35.053	0.38643	5.1224	5.4	5.7864
6	25.001	0.33432	6.5359	37.995	0.41856	5.1271	5.4	5.8186
7	30.001	0.40687	6.5407	40.738	0.44844	5.13	5.4	5.8484
8	35.001	0.47625	6.5452	43.231	0.47556	5.1334	5.4	5.8756
9	40.001	0.54722	6.5499	45.774	0.50317	5.1352	5.4	5.9032
10	45.001	0.61818	6.5546	48.267	0.5302	5.1352	5.4	5.9302
11	50.001	0.68757	6.5591	50.611	0.55555	5.1271	5.4	5.9556
12	60.002	0.82793	6.5684	55.348	0.60669	5.1305	5.4	6.0067
13	70.002	0.96828	6.5777	59.935	0.65605	5.1166	5.4	6.056
14	80.002	1.1086	6.5871	64.522	0.70526	5.0963	5.4	6.1053
15	90.002	1.2506	6.5965	69.06	0.75377	5.0777	5.4	6.1538
16	100	1.3925	6.606	73.149	0.79726	5.0643	5.4	6.1973
17	110	1.536	6.6157	77.237	0.84059	5.0568	5.4	6.2406
18	120	1.6779	6.6252	81.226	0.88273	5.0417	5.4	6.2827
19	240	3.4	6.7433	120.17	1.2831	4.8913	5.4	6.6831
20	360	5.1095	6.8648	150.09	1.5742	4.76	5.4	6.9742
21	420	5.9674	6.9274	163.85	1.703	4.6898	5.4	7.103
22	480	6.8205	6.9909	177.11	1.8241	4.6143	5.4	7.2241
23	540	7.6753	7.0556	190.18	1.9407	4.533	5.4	7.3407
24	600	8.5395	7.1223	202.49	2.047	4.4552	5.4	7.447
25	660	9.391	7.1892	213.96	2.1428	4.3762	5.4	7.5428
26	720	10.252	7.2582	224.88	2.2308	4.3059	5.4	7.6308
27	780	11.108	7.3281	235.9	2.3178	4.2345	5.4	7.7178
28	840	11.958	7.3988	246.92	2.4028	4.1718	5.4	7.8028
29	900	12.826	7.4724	257.29	2.4791	4.1062	5.4	7.8791
30	960	13.68	7.5464	268.41	2.5609	4.0417	5.4	7.9609
31	1020	14.53	7.6215	278.53	2.6313	3.9871	5.4	8.0313
32	1080	15.39	7.6989	288.16	2.6948	3.9163	5.4	8.0948
33	1020	14.53	7.6215	278.53	2.6313	3.9871	5.4	8.0313
34	1080	15.39	7.6989	288.16	2.6948	3.9163	5.4	8.0948
35	1080	15.39	7.6989	288.16	2.6948	3.9163	5.4	8.0948

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-018 S-5
 Sample No.: S-5
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: ----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.98 in
 Specimen Area: 6.51 in²
 Specimen Volume: 38.98 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: NP

Plastic Limit: NP

Estimated Specific Gravity: 2.30

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	5.4	5.4	0	0.000	0.35947	0.35947	1.000	0.35947	0
2	0.05	5.6022	5.4	0.038907	0.192	0.52273	0.32057	1.631	0.42165	0.10108
3	0.12	5.6917	5.4	0.063878	0.219	0.58734	0.2956	1.987	0.44147	0.14587
4	0.19	5.7487	5.4	0.079557	0.228	0.62866	0.27992	2.246	0.45429	0.17437
5	0.26	5.7864	5.4	0.08188	0.212	0.66402	0.27759	2.392	0.47081	0.19321
6	0.33	5.8186	5.4	0.086525	0.207	0.69151	0.27295	2.533	0.48223	0.20928
7	0.41	5.8484	5.4	0.089429	0.199	0.71849	0.27004	2.661	0.49427	0.22422
8	0.48	5.8756	5.4	0.092913	0.195	0.74212	0.26656	2.784	0.50434	0.23778
9	0.55	5.9032	5.4	0.094655	0.188	0.76799	0.26482	2.900	0.5164	0.25159
10	0.62	5.9302	5.4	0.094655	0.179	0.79502	0.26482	3.002	0.52992	0.2651
11	0.69	5.9556	5.4	0.086525	0.156	0.8285	0.27295	3.035	0.55072	0.27778
12	0.83	6.0067	5.4	0.090009	0.148	0.87616	0.26946	3.251	0.57281	0.30335
13	0.97	6.056	5.4	0.076072	0.116	0.93945	0.2834	3.315	0.61142	0.32802
14	1.11	6.1053	5.4	0.055748	0.079	1.009	0.30373	3.322	0.65636	0.35263
15	1.25	6.1538	5.4	0.037165	0.049	1.0761	0.32231	3.339	0.69919	0.37689
16	1.39	6.1973	5.4	0.023809	0.030	1.1329	0.33566	3.375	0.73429	0.39863
17	1.54	6.2406	5.4	0.01626	0.019	1.1838	0.34321	3.449	0.76351	0.4203
18	1.68	6.2827	5.4	0.0011614	0.001	1.241	0.35831	3.464	0.79968	0.44137
19	3.40	6.6831	5.4	-0.14924	-0.116	1.7918	0.50871	3.522	1.1503	0.64154
20	5.11	6.9742	5.4	-0.28048	-0.178	2.2141	0.63995	3.460	1.427	0.78708
21	5.97	7.103	5.4	-0.35075	-0.206	2.4132	0.71022	3.398	1.5617	0.85148
22	6.82	7.2241	5.4	-0.42624	-0.234	2.6098	0.78571	3.322	1.6978	0.91205
23	7.68	7.3407	5.4	-0.50754	-0.262	2.8077	0.86701	3.238	1.8374	0.97034
24	8.54	7.447	5.4	-0.58535	-0.286	2.9919	0.94482	3.167	1.9683	1.0235
25	9.39	7.5428	5.4	-0.66433	-0.310	3.1666	1.0238	3.093	2.0952	1.0714
26	10.25	7.6308	5.4	-0.73459	-0.329	3.3249	1.0941	3.039	2.2095	1.1154
27	11.11	7.7178	5.4	-0.80602	-0.348	3.4833	1.1655	2.989	2.3244	1.1589
28	11.96	7.8028	5.4	-0.86874	-0.362	3.6311	1.2282	2.956	2.4296	1.2014
29	12.83	7.8791	5.4	-0.93436	-0.377	3.7729	1.2938	2.916	2.5334	1.2396
30	13.68	7.9609	5.4	-0.99881	-0.390	3.9192	1.3583	2.885	2.6387	1.2804
31	14.53	8.0313	5.4	-1.0534	-0.400	4.0442	1.4129	2.862	2.7285	1.3156
32	15.39	8.0948	5.4	-1.1242	-0.417	4.1786	1.4837	2.816	2.8311	1.3474
33	14.53	8.0313	5.4	-1.0534	-0.400	4.0442	1.4129	2.862	2.7285	1.3156
34	15.39	8.0948	5.4	-1.1242	-0.417	4.1786	1.4837	2.816	2.8311	1.3474
35	15.39	8.0948	5.4	-1.1242	-0.417	4.1786	1.4837	2.816	2.8311	1.3474

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-018 S-5
 Sample No.: S-5
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: -----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D 4767

Specimen Height: 5.98 in
 Specimen Area: 6.44 in²
 Specimen Volume: 38.52 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: NP

Plastic Limit: NP

Estimated Specific Gravity: 2.30

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.4448	0	0	5.0425	5.76	5.76
2	5.0003	0.049768	6.448	23.994	0.26792	5.0618	5.76	6.0279
3	10.001	0.11059	6.4519	35.036	0.39099	5.1571	5.76	6.151
4	15.001	0.17142	6.4558	40.066	0.44685	5.2185	5.76	6.2068
5	20.001	0.23225	6.4598	43.94	0.48975	5.2612	5.76	6.2498
6	25.001	0.29308	6.4637	47.12	0.52487	5.2851	5.76	6.2849
7	30.001	0.35667	6.4678	49.722	0.5535	5.3009	5.76	6.3135
8	35.001	0.42026	6.472	52.15	0.58016	5.3243	5.76	6.3402
9	40.001	0.48109	6.4759	54.289	0.60359	5.3424	5.76	6.3636
10	45.001	0.54191	6.4799	56.139	0.62378	5.3518	5.76	6.3838
11	50.001	0.60274	6.4839	58.047	0.64459	5.3483	5.76	6.4046
12	55.001	0.66633	6.488	59.84	0.66406	5.3535	5.76	6.4241
13	60.001	0.72716	6.492	61.69	0.68418	5.3582	5.76	6.4442
14	70.001	0.84881	6.4999	65.332	0.72368	5.3623	5.76	6.4837
15	80.002	0.97323	6.5081	68.859	0.76179	5.3541	5.76	6.5218
16	90.002	1.0949	6.5161	72.386	0.79983	5.3547	5.76	6.5598
17	100	1.2193	6.5243	75.739	0.83583	5.3325	5.76	6.5958
18	110	1.341	6.5324	79.324	0.87431	5.3348	5.76	6.6343
19	120	1.4626	6.5404	82.677	0.91014	5.3161	5.76	6.6701
20	180	2.2091	6.5904	102.22	1.1167	5.2623	5.76	6.8767
21	240	2.9529	6.6409	120.37	1.3051	5.1898	5.76	7.0651
22	300	3.6939	6.692	137.14	1.4755	5.1355	5.76	7.2355
23	360	4.4487	6.7448	153.62	1.6398	5.0642	5.76	7.3998
24	420	5.1869	6.7973	169.86	1.7993	4.9946	5.76	7.5593
25	480	5.9306	6.8511	185.76	1.9522	4.9349	5.76	7.7122
26	540	6.6882	6.9067	202.59	2.1119	4.8613	5.76	7.8719
27	600	7.4403	6.9628	215.48	2.2282	4.8022	5.76	7.9882
28	660	8.1785	7.0188	229.65	2.3557	4.7327	5.76	8.1157
29	720	8.9361	7.0772	243.12	2.4733	4.6707	5.76	8.2333
30	780	9.6881	7.1361	259.94	2.6227	4.6163	5.76	8.3827
31	840	10.432	7.1954	271.39	2.7156	4.5508	5.76	8.4756
32	900	11.189	7.2568	282.66	2.8045	4.5093	5.76	8.5645
33	960	11.933	7.3181	293.71	2.8897	4.4532	5.76	8.6497
34	1020	12.677	7.3804	303.94	2.9651	4.3942	5.76	8.7251
35	1080	13.443	7.4457	314.29	3.0392	4.3497	5.76	8.7992
36	1140	14.189	7.5105	320.82	3.0756	4.2708	5.76	8.8356
37	1200	14.939	7.5766	329.44	3.1306	4.2609	5.76	8.8906

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-018 S-5
 Sample No.: S-5
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: -----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D 4767

Specimen Height: 5.98 in
 Specimen Area: 6.44 in²
 Specimen Volume: 38.52 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: NP

Plastic Limit: NP

Estimated Specific Gravity: 2.30

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	5.76	5.76	0	0.000	0.71748	0.71748	1.000	0.71748	0
2	0.05	6.0279	5.76	0.019293	0.072	0.96611	0.69819	1.384	0.83215	0.13396
3	0.11	6.151	5.76	0.11459	0.293	0.99388	0.60289	1.649	0.79839	0.19549
4	0.17	6.2068	5.76	0.17598	0.394	0.98835	0.5415	1.825	0.76493	0.22342
5	0.23	6.2498	5.76	0.21866	0.446	0.98858	0.49882	1.982	0.7437	0.24488
6	0.29	6.2849	5.76	0.24263	0.462	0.99973	0.47485	2.105	0.73729	0.26244
7	0.36	6.3135	5.76	0.25841	0.467	1.0126	0.45907	2.206	0.73582	0.27675
8	0.42	6.3402	5.76	0.2818	0.486	1.0158	0.43568	2.332	0.72577	0.29008
9	0.48	6.3636	5.76	0.29992	0.497	1.0212	0.41756	2.446	0.71936	0.3018
10	0.54	6.3838	5.76	0.30927	0.496	1.032	0.40821	2.528	0.7201	0.31189
11	0.60	6.4046	5.76	0.30577	0.474	1.0563	0.41171	2.566	0.73401	0.32229
12	0.67	6.4241	5.76	0.31103	0.468	1.0705	0.40645	2.634	0.73848	0.33203
13	0.73	6.4442	5.76	0.31571	0.461	1.0859	0.40177	2.703	0.74386	0.34209
14	0.85	6.4837	5.76	0.3198	0.442	1.1214	0.39768	2.820	0.75952	0.36184
15	0.97	6.5218	5.76	0.31161	0.409	1.1677	0.40587	2.877	0.78676	0.3809
16	1.09	6.5598	5.76	0.3122	0.390	1.2051	0.40528	2.974	0.8052	0.39991
17	1.22	6.5958	5.76	0.28998	0.347	1.2633	0.4275	2.955	0.84541	0.41791
18	1.34	6.6343	5.76	0.29232	0.334	1.2995	0.42516	3.056	0.86231	0.43715
19	1.46	6.6701	5.76	0.27361	0.301	1.354	0.44387	3.050	0.89894	0.45507
20	2.21	6.8767	5.76	0.21982	0.197	1.6144	0.49766	3.244	1.056	0.55837
21	2.95	7.0651	5.76	0.14733	0.113	1.8752	0.57015	3.289	1.2227	0.65254
22	3.69	7.2355	5.76	0.092958	0.063	2.1	0.62452	3.363	1.3623	0.73775
23	4.45	7.3998	5.76	0.021632	0.013	2.3357	0.69585	3.357	1.5158	0.81992
24	5.19	7.5593	5.76	-0.04794	-0.027	2.5647	0.76542	3.351	1.665	0.89963
25	5.93	7.7122	5.76	-0.10757	-0.055	2.7773	0.82505	3.366	1.8012	0.97612
26	6.69	7.8719	5.76	-0.18124	-0.086	3.0106	0.89872	3.350	1.9547	1.0559
27	7.44	7.9882	5.76	-0.24029	-0.108	3.186	0.95777	3.326	2.0719	1.1141
28	8.18	8.1157	5.76	-0.30986	-0.132	3.3831	1.0273	3.293	2.2052	1.1779
29	8.94	8.2333	5.76	-0.37183	-0.150	3.5627	1.0893	3.271	2.326	1.2367
30	9.69	8.3827	5.76	-0.4262	-0.163	3.7664	1.1437	3.293	2.455	1.3113
31	10.43	8.4756	5.76	-0.49168	-0.181	3.9248	1.2092	3.246	2.567	1.3578
32	11.19	8.5645	5.76	-0.53319	-0.190	4.0552	1.2507	3.242	2.6529	1.4023
33	11.93	8.6497	5.76	-0.58932	-0.204	4.1965	1.3068	3.211	2.7516	1.4448
34	12.68	8.7251	5.76	-0.64837	-0.219	4.3309	1.3658	3.171	2.8484	1.4826
35	13.44	8.7992	5.76	-0.6928	-0.228	4.4495	1.4103	3.155	2.9299	1.5196
36	14.19	8.8356	5.76	-0.77172	-0.251	4.5648	1.4892	3.065	3.027	1.5378
37	14.94	8.8906	5.76	-0.78166	-0.250	4.6297	1.4991	3.088	3.0644	1.5653

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-018 S-5
 Sample No.: S-5
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: ----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

Specimen Height: 5.98 in
 Specimen Area: 6.33 in²
 Specimen Volume: 37.84 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: NP

Plastic Limit: NP

Estimated Specific Gravity: 2.30

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.3319	0	0	5.0416	6.48	6.48
2	5.0042	0.056979	6.3355	29.948	0.34034	5.2096	6.48	6.8203
3	10	0.13295	6.3403	49.51	0.56223	5.3192	6.48	7.0422
4	15	0.21525	6.3456	61.928	0.70267	5.3921	6.48	7.1827
5	20	0.29756	6.3508	69.621	0.78931	5.4364	6.48	7.2693
6	25.001	0.38619	6.3564	75.886	0.85956	5.4656	6.48	7.3396
7	30.001	0.47483	6.3621	81.545	0.92285	5.4878	6.48	7.4028
8	35.001	0.56557	6.3679	86.436	0.9773	5.5041	6.48	7.4573
9	40.001	0.65843	6.3739	90.997	1.0279	5.5169	6.48	7.5079
10	45.001	0.74495	6.3794	95.503	1.0779	5.5315	6.48	7.5579
11	50.001	0.83147	6.385	99.844	1.1259	5.542	6.48	7.6059
12	55.001	0.92011	6.3907	103.8	1.1694	5.5484	6.48	7.6494
13	60.001	1.0109	6.3966	108.03	1.216	5.5542	6.48	7.696
14	70.001	1.1902	6.4082	115.39	1.2965	5.5577	6.48	7.7765
15	80.001	1.3675	6.4197	122.54	1.3743	5.5636	6.48	7.8543
16	90.001	1.549	6.4315	129.41	1.4487	5.5618	6.48	7.9287
17	100	1.7305	6.4434	135.73	1.5166	5.5554	6.48	7.9966
18	110	1.9077	6.455	142.76	1.5923	5.5513	6.48	8.0723
19	120	2.0892	6.467	149.96	1.6695	5.5432	6.48	8.1495
20	180	3.1824	6.54	186.55	2.0538	5.4534	6.48	8.5338
21	240	4.2755	6.6147	219.03	2.3841	5.3286	6.48	8.8641
22	300	5.3666	6.691	245.68	2.6437	5.1956	6.48	9.1237
23	360	6.4598	6.7692	268.26	2.8534	5.0626	6.48	9.3334
24	420	7.5571	6.8495	286.18	3.0082	4.9442	6.48	9.4882
25	480	8.6482	6.9313	301.84	3.1354	4.8206	6.48	9.6154
26	540	9.7392	7.0151	315.3	3.2361	4.7168	6.48	9.7161
27	600	10.837	7.1015	326.51	3.3104	4.6235	6.48	9.7904
28	660	11.93	7.1896	336.18	3.3667	4.5436	6.48	9.8467
29	720	13.031	7.2807	344.26	3.4045	4.4736	6.48	9.8845
30	780	14.125	7.3733	350.25	3.4202	4.4165	6.48	9.9002
31	840	15.213	7.468	356.46	3.4366	4.3692	6.48	9.9166

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-018 S-5
 Sample No.: S-5
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: ----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND AND GRAVEL
 Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767

Specimen Height: 5.98 in
 Specimen Area: 6.33 in²
 Specimen Volume: 37.84 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

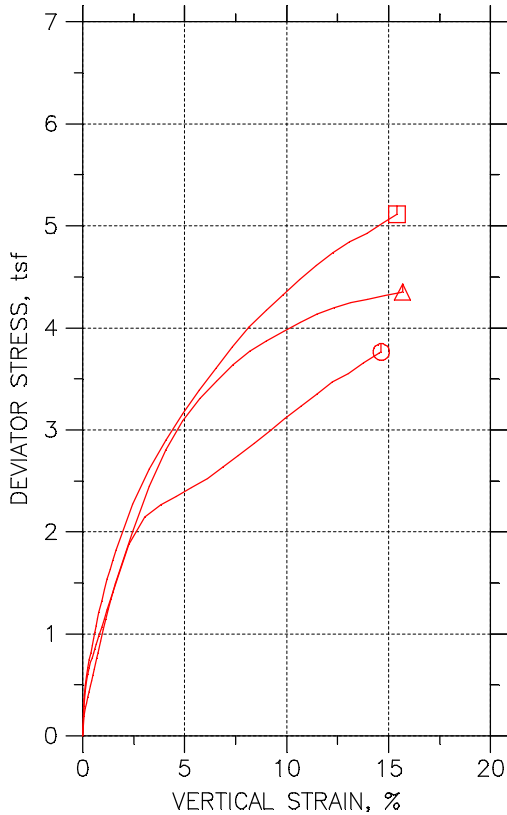
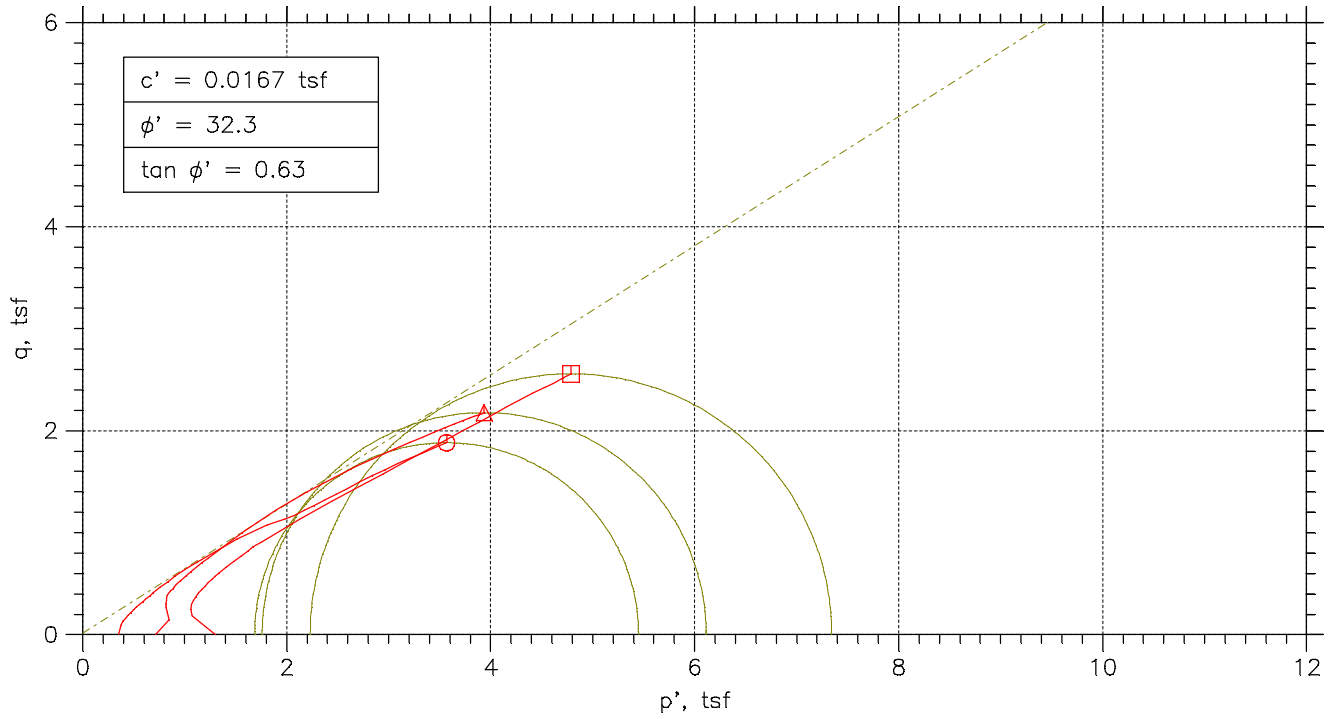
Liquid Limit: NP

Plastic Limit: NP

Estimated Specific Gravity: 2.30

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	6.48	6.48	0	0.000	1.4384	1.4384	1.000	1.4384	0
2	0.06	6.8203	6.48	0.16796	0.493	1.6108	1.2704	1.268	1.4406	0.17017
3	0.13	7.0422	6.48	0.2776	0.494	1.723	1.1608	1.484	1.4419	0.28111
4	0.22	7.1827	6.48	0.35049	0.499	1.7906	1.0879	1.646	1.4392	0.35134
5	0.30	7.2693	6.48	0.39482	0.500	1.8329	1.0436	1.756	1.4382	0.39465
6	0.39	7.3396	6.48	0.42397	0.493	1.874	1.0144	1.847	1.4442	0.42978
7	0.47	7.4028	6.48	0.44614	0.483	1.9151	0.99224	1.930	1.4537	0.46142
8	0.57	7.4573	6.48	0.46246	0.473	1.9532	0.97591	2.001	1.4646	0.48865
9	0.66	7.5079	6.48	0.47529	0.462	1.991	0.96308	2.067	1.477	0.51396
10	0.74	7.5579	6.48	0.48987	0.454	2.0264	0.9485	2.136	1.4874	0.53893
11	0.83	7.6059	6.48	0.50037	0.444	2.0639	0.938	2.200	1.5009	0.56294
12	0.92	7.6494	6.48	0.50679	0.433	2.101	0.93159	2.255	1.5163	0.58472
13	1.01	7.696	6.48	0.51262	0.422	2.1418	0.92576	2.314	1.5338	0.608
14	1.19	7.7765	6.48	0.51612	0.398	2.2188	0.92226	2.406	1.5705	0.64827
15	1.37	7.8543	6.48	0.52195	0.380	2.2907	0.91643	2.500	1.6036	0.68716
16	1.55	7.9287	6.48	0.5202	0.359	2.3669	0.91818	2.578	1.6425	0.72434
17	1.73	7.9966	6.48	0.51378	0.339	2.4412	0.92459	2.640	1.6829	0.75832
18	1.91	8.0723	6.48	0.5097	0.320	2.521	0.92867	2.715	1.7248	0.79617
19	2.09	8.1495	6.48	0.50154	0.300	2.6064	0.93684	2.782	1.7716	0.83477
20	3.18	8.5338	6.48	0.41173	0.200	3.0804	1.0266	3.000	2.0535	1.0269
21	4.28	8.8641	6.48	0.28693	0.120	3.5355	1.1514	3.071	2.3435	1.192
22	5.37	9.1237	6.48	0.15396	0.058	3.9281	1.2844	3.058	2.6063	1.3219
23	6.46	9.3334	6.48	0.020995	0.007	4.2708	1.4174	3.013	2.8441	1.4267
24	7.56	9.4882	6.48	-0.097392	-0.032	4.544	1.5358	2.959	3.0399	1.5041
25	8.65	9.6154	6.48	-0.22103	-0.070	4.7948	1.6594	2.889	3.2271	1.5677
26	9.74	9.7161	6.48	-0.32483	-0.100	4.9993	1.7632	2.835	3.3813	1.6181
27	10.84	9.7904	6.48	-0.41814	-0.126	5.1669	1.8565	2.783	3.5117	1.6552
28	11.93	9.8467	6.48	-0.49804	-0.148	5.3031	1.9364	2.739	3.6198	1.6833
29	13.03	9.8845	6.48	-0.56802	-0.167	5.4109	2.0064	2.697	3.7086	1.7022
30	14.12	9.9002	6.48	-0.62517	-0.183	5.4837	2.0635	2.657	3.7736	1.7101
31	15.21	9.9166	6.48	-0.67241	-0.196	5.5474	2.1108	2.628	3.8291	1.7183

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



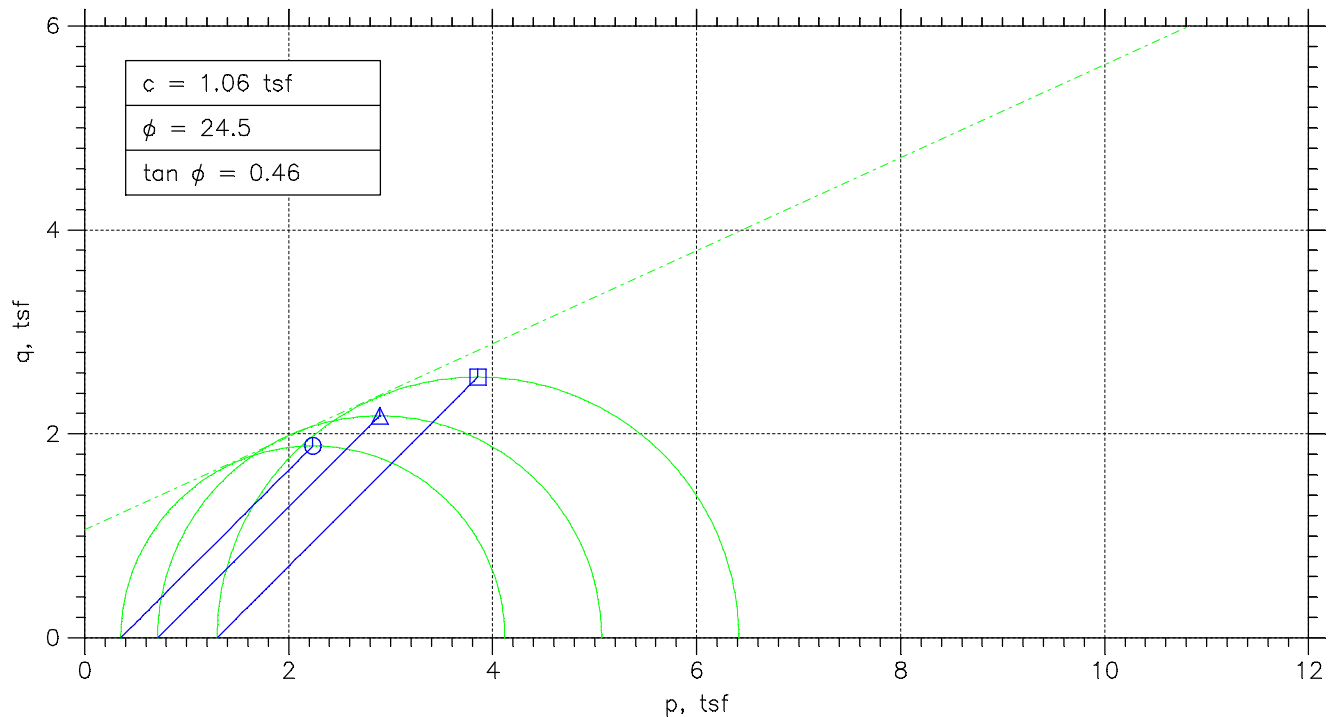
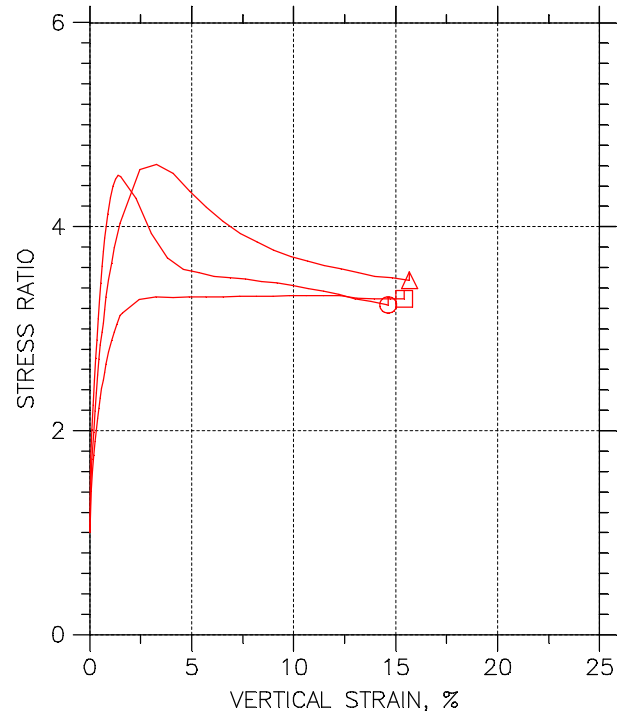
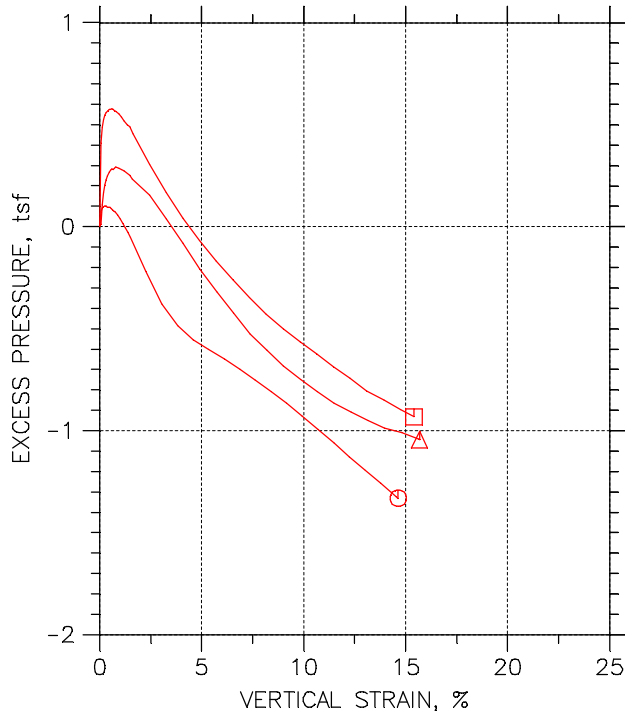
Symbol	⊙	△	□	
Test No.	5.0 PSI	10.0 PSI	20.0 PSI	
Initial	Diameter, in	2.813	2.7921	2.8256
	Height, in	6.0902	5.9878	6.0303
	Water Content, %	8.98	11.83	8.88
	Dry Density, pcf	128.2	127.1	126.
	Saturation, %	75.28	95.64	69.49
Before Shear	Void Ratio	0.32442	0.33638	0.34747
	Water Content, %	13.14	12.04	11.49
	Dry Density, pcf	125.1	127.9	129.4
	Saturation, %	100.00	100.00	100.00
	Void Ratio	0.35748	0.32749	0.31248
Back Press., tsf	5.0458	5.0445	5.1811	
Minor Prin. Stress, tsf	0.35425	0.71546	1.2989	
Max. Dev. Stress, tsf	3.764	4.3529	5.114	
Time to Failure, min	1147.2	1143.8	1128.7	
Strain Rate, %/min	0.02	0.02	0.02	
B-Value	0.95	0.97	0.95	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	22	22	22	
Plastic Limit	15	15	15	
Plasticity Index	7	7	7	
Failure Sketch				

Project: DYNERGY HENNEPIN
 Location: HENNEPIN, IL
 Project No.: MR155233
 Boring No.: HEN-029 S-3
 Sample Type: 3.0" ST

Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST ASTM D4767



Project: DYNERGY HENNEPIN	Location: HENNEPIN, IL	Project No.: MR155233
Boring No.: HEN-029 S-3	Tested By: BCM	Checked By: WPQ
Sample No.: S-3	Test Date: 12/17/15	Depth: 5.0'-7.0'
Test No.: HEN-029 S-3	Sample Type: 3.0" ST	Elevation: ----
Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL		
Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.		

TRI AXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.09 in
 Specimen Area: 6.21 in²
 Specimen Volume: 37.85 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 22

Plastic Limit: 15

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.2148	0	0	5.0458	5.4	5.4
2	5.0035	0.055219	6.2182	17.005	0.1969	5.1201	5.4	5.5969
3	10.003	0.11893	6.2222	23.059	0.26683	5.1363	5.4	5.6668
4	15.003	0.17981	6.226	27.85	0.32207	5.1427	5.4	5.7221
5	20.003	0.24353	6.23	32.852	0.37967	5.1462	5.4	5.7797
6	25.003	0.30866	6.234	37.643	0.43475	5.1462	5.4	5.8348
7	30.003	0.37237	6.238	42.276	0.48795	5.1422	5.4	5.8879
8	35.003	0.43609	6.242	46.961	0.54168	5.1422	5.4	5.9417
9	40.003	0.49838	6.2459	51.752	0.59657	5.1392	5.4	5.9966
10	45.003	0.5621	6.2499	56.385	0.64956	5.1346	5.4	6.0496
11	50.003	0.6244	6.2538	61.386	0.70674	5.1294	5.4	6.1067
12	55.003	0.68811	6.2579	66.335	0.76322	5.123	5.4	6.1632
13	60.003	0.75041	6.2618	71.126	0.81783	5.1172	5.4	6.2178
14	70.003	0.87784	6.2698	80.918	0.92923	5.1027	5.4	6.3292
15	80.003	1.0067	6.278	90.553	1.0385	5.0835	5.4	6.4385
16	90.003	1.1341	6.2861	99.661	1.1415	5.0638	5.4	6.5415
17	100	1.2601	6.2941	108.72	1.2436	5.0411	5.4	6.6436
18	110	1.3904	6.3024	117.14	1.3382	5.0179	5.4	6.7382
19	120	1.5164	6.3105	124.88	1.4248	4.9917	5.4	6.8248
20	180	2.271	6.3592	165.63	1.8753	4.828	5.4	7.2753
21	240	3.037	6.4095	191.27	2.1486	4.6677	5.4	7.5486
22	300	3.8158	6.4613	203.48	2.2674	4.5591	5.4	7.6674
23	360	4.5789	6.513	212.11	2.3449	4.4923	5.4	7.7449
24	420	5.3421	6.5655	222.17	2.4364	4.4447	5.4	7.8364
25	480	6.1095	6.6192	231.96	2.5232	4.3959	5.4	7.9232
26	540	6.874	6.6735	244.18	2.6344	4.346	5.4	8.0344
27	600	7.6386	6.7288	257.13	2.7513	4.2926	5.4	8.1513
28	660	8.4116	6.7856	270.03	2.8652	4.2357	5.4	8.2652
29	720	9.1663	6.842	283.82	2.9867	4.1793	5.4	8.3867
30	780	9.9295	6.8999	298.25	3.1122	4.1172	5.4	8.5122
31	840	10.708	6.9601	312.3	3.2307	4.051	5.4	8.6307
32	900	11.471	7.0201	326.83	3.3521	3.986	5.4	8.7521
33	960	12.232	7.0809	340.94	3.4668	3.9169	5.4	8.8668
34	1020	13.009	7.1442	352.31	3.5507	3.8512	5.4	8.9507
35	1080	13.774	7.2075	366.11	3.6572	3.7891	5.4	9.0572
36	1140	14.538	7.272	379.11	3.7536	3.7217	5.4	9.1536
37	1147.2	14.632	7.28	380.59	3.764	3.7142	5.4	9.164

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.09 in
 Specimen Area: 6.21 in²
 Specimen Volume: 37.85 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 22

Plastic Limit: 15

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	5.4	5.4	0	0.000	0.35425	0.35425	1.000	0.35425	0
2	0.06	5.5969	5.4	0.07433	0.378	0.47681	0.27992	1.703	0.37837	0.098449
3	0.12	5.6668	5.4	0.09059	0.340	0.53049	0.26366	2.012	0.39707	0.13342
4	0.18	5.7221	5.4	0.096978	0.301	0.57934	0.25727	2.252	0.4183	0.16104
5	0.24	5.7797	5.4	0.10046	0.265	0.63345	0.25378	2.496	0.44362	0.18983
6	0.31	5.8348	5.4	0.10046	0.231	0.68854	0.25378	2.713	0.47116	0.21738
7	0.37	5.8879	5.4	0.096397	0.198	0.7458	0.25785	2.892	0.50182	0.24397
8	0.44	5.9417	5.4	0.096397	0.178	0.79953	0.25785	3.101	0.52869	0.27084
9	0.50	5.9966	5.4	0.093494	0.157	0.85732	0.26075	3.288	0.55904	0.29829
10	0.56	6.0496	5.4	0.088848	0.137	0.91496	0.2654	3.447	0.59018	0.32478
11	0.62	6.1067	5.4	0.083622	0.118	0.97736	0.27062	3.611	0.62399	0.35337
12	0.69	6.1632	5.4	0.077234	0.101	1.0402	0.27701	3.755	0.65862	0.38161
13	0.75	6.2178	5.4	0.071427	0.087	1.1007	0.28282	3.892	0.69173	0.40892
14	0.88	6.3292	5.4	0.056909	0.061	1.2266	0.29734	4.125	0.76195	0.46462
15	1.01	6.4385	5.4	0.037746	0.036	1.355	0.3165	4.281	0.83576	0.51926
16	1.13	6.5415	5.4	0.018002	0.016	1.4777	0.33624	4.395	0.907	0.57075
17	1.26	6.6436	5.4	-0.0046456	-0.004	1.6025	0.35889	4.465	0.98071	0.62182
18	1.39	6.7382	5.4	-0.027874	-0.021	1.7203	0.38212	4.502	1.0512	0.66911
19	1.52	6.8248	5.4	-0.054006	-0.038	1.8331	0.40825	4.490	1.1207	0.71241
20	2.27	7.2753	5.4	-0.21776	-0.116	2.4473	0.57201	4.278	1.5096	0.93763
21	3.04	7.5486	5.4	-0.37804	-0.176	2.8809	0.73229	3.934	1.8066	1.0743
22	3.82	7.6674	5.4	-0.48663	-0.215	3.1083	0.84088	3.696	1.9746	1.1337
23	4.58	7.7449	5.4	-0.55341	-0.236	3.2525	0.90766	3.583	2.0801	1.1724
24	5.34	7.8364	5.4	-0.60103	-0.247	3.3917	0.95528	3.550	2.1735	1.2182
25	6.11	7.9232	5.4	-0.64981	-0.258	3.5272	1.0041	3.513	2.2656	1.2616
26	6.87	8.0344	5.4	-0.69975	-0.266	3.6884	1.054	3.499	2.3712	1.3172
27	7.64	8.1513	5.4	-0.75318	-0.274	3.8588	1.1074	3.484	2.4831	1.3757
28	8.41	8.2652	5.4	-0.81008	-0.283	4.0295	1.1643	3.461	2.5969	1.4326
29	9.17	8.3867	5.4	-0.86641	-0.290	4.2074	1.2207	3.447	2.714	1.4934
30	9.93	8.5122	5.4	-0.92855	-0.298	4.395	1.2828	3.426	2.8389	1.5561
31	10.71	8.6307	5.4	-0.99475	-0.308	4.5797	1.349	3.395	2.9643	1.6153
32	11.47	8.7521	5.4	-1.0598	-0.316	4.7661	1.414	3.371	3.0901	1.676
33	12.23	8.8668	5.4	-1.1289	-0.326	4.9499	1.4831	3.337	3.2165	1.7334
34	13.01	8.9507	5.4	-1.1945	-0.336	5.0994	1.5488	3.293	3.3241	1.7753
35	13.77	9.0572	5.4	-1.2566	-0.344	5.2681	1.6109	3.270	3.4395	1.8286
36	14.54	9.1536	5.4	-1.324	-0.353	5.4318	1.6783	3.237	3.555	1.8768
37	14.63	9.164	5.4	-1.3316	-0.354	5.4499	1.6858	3.233	3.5678	1.882

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.99 in
 Specimen Area: 6.12 in²
 Specimen Volume: 36.66 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 22

Plastic Limit: 15

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.1229	0	0	5.0445	5.76	5.76
2	5.0033	0.057527	6.1265	25.039	0.29426	5.058	5.76	6.0543
3	10.003	0.12145	6.1304	37.584	0.44142	5.1518	5.76	6.2014
4	15.003	0.19176	6.1347	45.895	0.53865	5.2102	5.76	6.2986
5	20.003	0.25727	6.1387	52.089	0.61094	5.2487	5.76	6.3709
6	25.003	0.32599	6.143	57.012	0.66822	5.2731	5.76	6.4282
7	30.003	0.3931	6.1471	61.458	0.71985	5.2947	5.76	6.4799
8	35.003	0.46021	6.1512	65.375	0.76522	5.3111	5.76	6.5252
9	40.003	0.52573	6.1553	69.134	0.80868	5.321	5.76	6.5687
10	45.003	0.59444	6.1596	72.945	0.85267	5.3262	5.76	6.6127
11	50.003	0.66316	6.1638	76.651	0.89536	5.3239	5.76	6.6554
12	55.003	0.72867	6.1679	80.356	0.93803	5.3315	5.76	6.698
13	60.003	0.79898	6.1723	84.009	0.97997	5.3355	5.76	6.74
14	70.003	0.93481	6.1807	91.314	1.0637	5.3309	5.76	6.8237
15	80.003	1.0674	6.189	98.884	1.1504	5.3251	5.76	6.9104
16	90.003	1.2049	6.1976	106.24	1.2343	5.3186	5.76	6.9943
17	110	1.4781	6.2148	121.28	1.405	5.2971	5.76	7.165
18	120	1.6155	6.2235	129.06	1.4931	5.2784	5.76	7.2531
19	180	2.4465	6.2765	174.42	2.0009	5.1979	5.76	7.7609
20	240	3.2615	6.3294	215.08	2.4466	5.0819	5.76	8.2066
21	300	4.0812	6.3835	248.9	2.8074	4.9623	5.76	8.5674
22	360	4.909	6.439	275.85	3.0845	4.8381	5.76	8.8445
23	420	5.7319	6.4952	298.08	3.3042	4.7238	5.76	9.0642
24	480	6.5549	6.5524	316.61	3.479	4.6206	5.76	9.239
25	540	7.3826	6.611	334.34	3.6413	4.5173	5.76	9.4013
26	600	8.1976	6.6697	349.06	3.7681	4.4392	5.76	9.5281
27	660	9.0189	6.7299	362.08	3.8737	4.3628	5.76	9.6337
28	720	9.8547	6.7923	374.04	3.9649	4.2946	5.76	9.7249
29	780	10.668	6.8541	386.11	4.056	4.2374	5.76	9.816
30	840	11.485	6.9174	397.49	4.1373	4.1808	5.76	9.8973
31	900	12.324	6.9836	407.45	4.2007	4.1354	5.76	9.9607
32	960	13.15	7.05	415.97	4.2482	4.0945	5.76	10.008
33	1020	13.976	7.1177	423.01	4.279	4.0578	5.76	10.039
34	1080	14.808	7.1873	430.74	4.315	4.0345	5.76	10.075
35	1140	15.625	7.2568	438.47	4.3503	4.003	5.76	10.11
36	1143.8	15.678	7.2613	438.99	4.3529	4.0001	5.76	10.113

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 5.99 in
 Specimen Area: 6.12 in²
 Specimen Volume: 36.66 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 22

Plastic Limit: 15

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	5.76	5.76	0	0.000	0.71546	0.71546	1.000	0.71546	0
2	0.06	6.0543	5.76	0.013413	0.046	0.99631	0.70205	1.419	0.84918	0.14713
3	0.12	6.2014	5.76	0.10731	0.243	1.0496	0.60815	1.726	0.82886	0.22071
4	0.19	6.2986	5.76	0.16562	0.307	1.0885	0.54984	1.980	0.81916	0.26932
5	0.26	6.3709	5.76	0.20411	0.334	1.1223	0.51135	2.195	0.81681	0.30547
6	0.33	6.4282	5.76	0.22861	0.342	1.1551	0.48685	2.373	0.82096	0.33411
7	0.39	6.4799	5.76	0.25019	0.348	1.1851	0.46527	2.547	0.8252	0.35993
8	0.46	6.5252	5.76	0.26651	0.348	1.2142	0.44895	2.704	0.83155	0.38261
9	0.53	6.5687	5.76	0.27643	0.342	1.2477	0.43903	2.842	0.84337	0.40434
10	0.59	6.6127	5.76	0.28168	0.330	1.2865	0.43378	2.966	0.86012	0.42633
11	0.66	6.6554	5.76	0.27935	0.312	1.3315	0.43612	3.053	0.8838	0.44768
12	0.73	6.698	5.76	0.28693	0.306	1.3666	0.42853	3.189	0.89755	0.46901
13	0.80	6.74	5.76	0.29101	0.297	1.4044	0.42445	3.309	0.91444	0.48999
14	0.93	6.8237	5.76	0.28634	0.269	1.4928	0.42912	3.479	0.96098	0.53186
15	1.07	6.9104	5.76	0.28051	0.244	1.5853	0.43495	3.645	1.0101	0.57518
16	1.20	6.9943	5.76	0.2741	0.222	1.6756	0.44136	3.796	1.0585	0.61713
17	1.48	7.165	5.76	0.25252	0.180	1.8679	0.46294	4.035	1.1654	0.7025
18	1.62	7.2531	5.76	0.23386	0.157	1.9747	0.4816	4.100	1.2281	0.74654
19	2.45	7.7609	5.76	0.15338	0.077	2.563	0.56208	4.560	1.5625	1.0004
20	3.26	8.2066	5.76	0.037324	0.015	3.1248	0.67814	4.608	1.9014	1.2233
21	4.08	8.5674	5.76	-0.082229	-0.029	3.6051	0.79769	4.519	2.2014	1.4037
22	4.91	8.8445	5.76	-0.20645	-0.067	4.0064	0.92191	4.346	2.4641	1.5422
23	5.73	9.0642	5.76	-0.32075	-0.097	4.3404	1.0362	4.189	2.6883	1.6521
24	6.55	9.239	5.76	-0.42397	-0.122	4.6184	1.1394	4.053	2.8789	1.7395
25	7.38	9.4013	5.76	-0.5272	-0.145	4.8839	1.2427	3.930	3.0633	1.8206
26	8.20	9.5281	5.76	-0.60534	-0.161	5.0889	1.3208	3.853	3.2049	1.8841
27	9.02	9.6337	5.76	-0.68174	-0.176	5.2709	1.3972	3.772	3.3341	1.9369
28	9.85	9.7249	5.76	-0.74997	-0.189	5.4304	1.4654	3.706	3.4479	1.9825
29	10.67	9.816	5.76	-0.80713	-0.199	5.5785	1.5226	3.664	3.5506	2.028
30	11.48	9.8973	5.76	-0.8637	-0.209	5.7165	1.5792	3.620	3.6478	2.0687
31	12.32	9.9607	5.76	-0.90918	-0.216	5.8254	1.6246	3.586	3.725	2.1004
32	13.15	10.008	5.76	-0.95001	-0.224	5.9137	1.6655	3.551	3.7896	2.1241
33	13.98	10.039	5.76	-0.98675	-0.231	5.9812	1.7022	3.514	3.8417	2.1395
34	14.81	10.075	5.76	-1.0101	-0.234	6.0405	1.7255	3.501	3.883	2.1575
35	15.62	10.11	5.76	-1.0416	-0.239	6.1074	1.757	3.476	3.9322	2.1752
36	15.68	10.113	5.76	-1.0445	-0.240	6.1128	1.7599	3.473	3.9364	2.1764

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.03 in
 Specimen Area: 6.27 in²
 Specimen Volume: 37.81 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

Liquid Limit: 22

Plastic Limit: 15

Estimated Specific Gravity: 2.72

	Time min	Vertical Strain %	Corrected Area in ²	Deviator Load lb	Deviator Stress tsf	Pore Pressure tsf	Horizontal Stress tsf	Vertical Stress tsf
1	0	0	6.2706	0	0	5.1811	6.48	6.48
2	5.0002	0.061721	6.2745	31.946	0.36658	5.5924	6.48	6.8466
3	10	0.12796	6.2786	43.274	0.49624	5.6668	6.48	6.9762
4	15	0.19419	6.2828	51.605	0.59138	5.7058	6.48	7.0714
5	20	0.26043	6.287	58.557	0.67061	5.7267	6.48	7.1506
6	25	0.32817	6.2912	65.03	0.74424	5.7413	6.48	7.2242
7	30	0.39441	6.2954	71.383	0.8164	5.7511	6.48	7.2964
8	35	0.45914	6.2995	77.257	0.88301	5.7558	6.48	7.363
9	40	0.52538	6.3037	83.31	0.95156	5.7575	6.48	7.4316
10	45	0.59312	6.308	89.244	1.0186	5.7587	6.48	7.4986
11	50	0.66086	6.3123	94.878	1.0822	5.7558	6.48	7.5622
12	55	0.72861	6.3166	100.57	1.1464	5.7511	6.48	7.6264
13	60	0.79635	6.3209	106.15	1.2091	5.7477	6.48	7.6891
14	70	0.93334	6.3297	116.22	1.3219	5.7337	6.48	7.8019
15	80.001	1.0688	6.3383	126.22	1.4338	5.718	6.48	7.9138
16	90.001	1.2043	6.347	135.51	1.5373	5.6994	6.48	8.0173
17	100	1.3428	6.3559	144.26	1.6342	5.6796	6.48	8.1142
18	110	1.4798	6.3648	152.18	1.7215	5.6726	6.48	8.2015
19	120	1.6183	6.3737	160.81	1.8165	5.6371	6.48	8.2965
20	180	2.4372	6.4272	202.52	2.2687	5.4865	6.48	8.7487
21	240	3.2501	6.4812	235.37	2.6147	5.3475	6.48	9.0947
22	300	4.0781	6.5372	263.42	2.9013	5.2224	6.48	9.3813
23	360	4.8865	6.5927	289.19	3.1583	5.1119	6.48	9.6383
24	420	5.7054	6.65	313.16	3.3906	5.0119	6.48	9.8706
25	480	6.5349	6.709	335.88	3.6046	4.92	6.48	10.085
26	540	7.3478	6.7679	358.41	3.813	4.8328	6.48	10.293
27	600	8.1637	6.828	379.99	4.0069	4.7525	6.48	10.487
28	660	8.9992	6.8907	399.41	4.1734	4.6792	6.48	10.653
29	720	9.8151	6.953	417.75	4.3259	4.6164	6.48	10.806
30	780	10.631	7.0165	435.67	4.4706	4.5565	6.48	10.951
31	840	11.459	7.0821	453.83	4.6139	4.4954	6.48	11.094
32	900	12.269	7.1475	470.55	4.7401	4.4396	6.48	11.22
33	960	13.094	7.2154	485.54	4.8451	4.3744	6.48	11.325
34	1020	13.928	7.2853	498.42	4.9259	4.3314	6.48	11.406
35	1080	14.742	7.3549	513.89	5.0307	4.2854	6.48	11.511
36	1128.7	15.412	7.4131	526.53	5.114	4.2494	6.48	11.594

TRIAXIAL TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN-029 S-3
 Sample No.: S-3
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/17/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL

Remarks: FAILURE CRITERIA = MAXIMUM EFFECTIVE STRESS RATIO TEST PERFORMED AS PER ASTM D4767.

Specimen Height: 6.03 in
 Specimen Area: 6.27 in²
 Specimen Volume: 37.81 in³

Piston Area: 0.00 in²
 Piston Friction: 0.00 lb
 Piston Weight: 0.00 lb

Filter Strip Correction: 0.00 tsf
 Membrane Correction: 0.00 lb/in
 Correction Type: Uni form

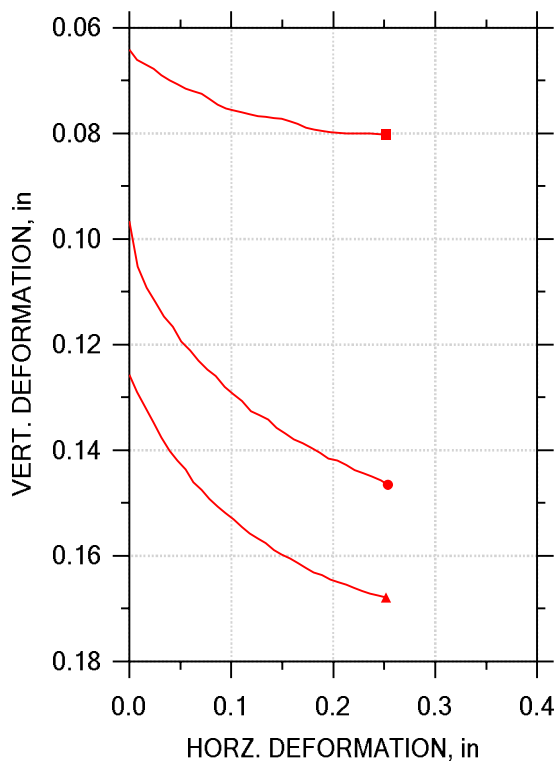
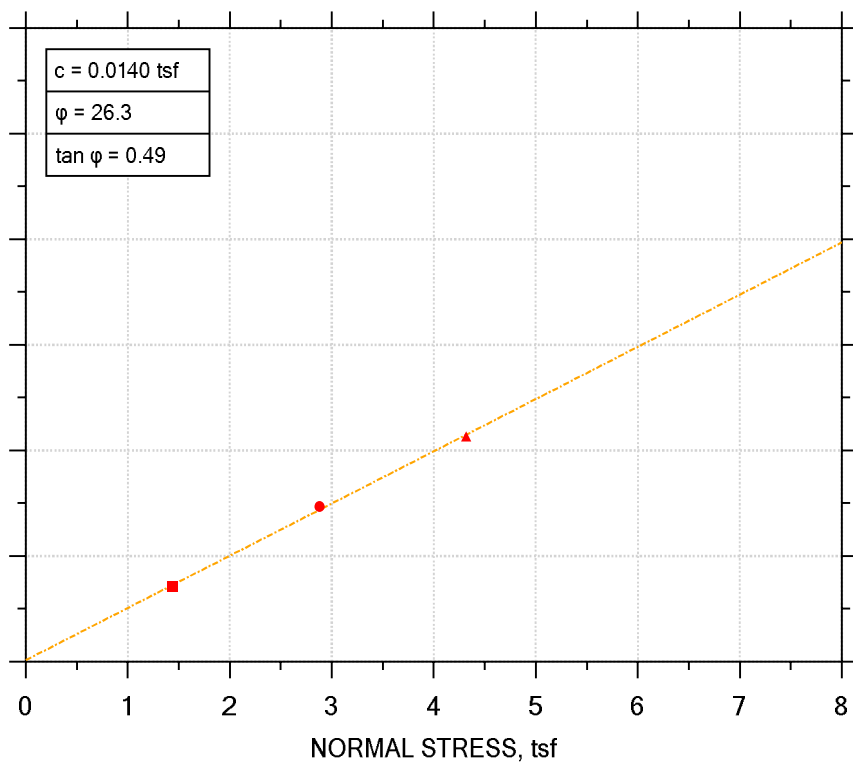
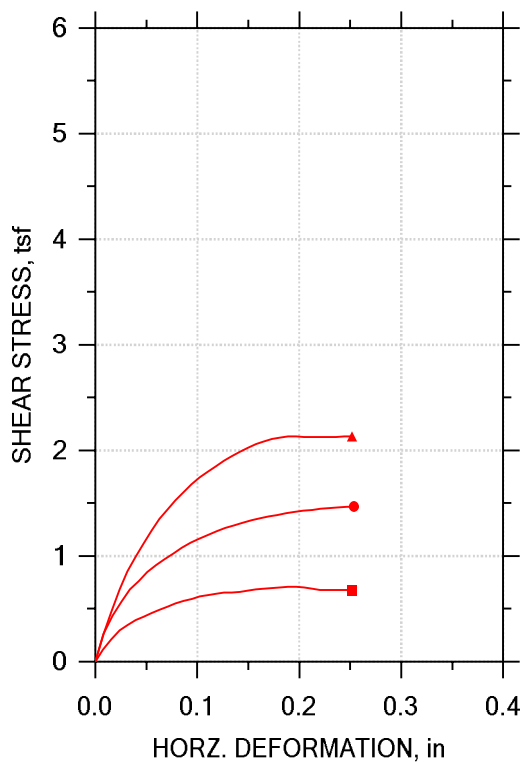
Liquid Limit: 22

Plastic Limit: 15

Estimated Specific Gravity: 2.72

	Vertical Strain %	Total Vertical Stress tsf	Total Horizontal Stress tsf	Excess Pore Pressure tsf	A Parameter	Effective Vertical Stress tsf	Effective Horizontal Stress tsf	Stress Ratio	Effective p tsf	q tsf
1	0.00	6.48	6.48	0	0.000	1.2989	1.2989	1.000	1.2989	0
2	0.06	6.8466	6.48	0.41121	1.122	1.2542	0.88764	1.413	1.0709	0.18329
3	0.13	6.9762	6.48	0.48566	0.979	1.3094	0.81319	1.610	1.0613	0.24812
4	0.19	7.0714	6.48	0.52463	0.887	1.3656	0.77423	1.764	1.0699	0.29569
5	0.26	7.1506	6.48	0.54557	0.814	1.4239	0.75329	1.890	1.0886	0.33531
6	0.33	7.2242	6.48	0.56011	0.753	1.483	0.73875	2.007	1.1109	0.37212
7	0.39	7.2964	6.48	0.57	0.698	1.5453	0.72886	2.120	1.1371	0.4082
8	0.46	7.363	6.48	0.57465	0.651	1.6072	0.72421	2.219	1.1657	0.4415
9	0.53	7.4316	6.48	0.57639	0.606	1.674	0.72246	2.317	1.1982	0.47578
10	0.59	7.4986	6.48	0.57756	0.567	1.7399	0.7213	2.412	1.2306	0.50932
11	0.66	7.5622	6.48	0.57465	0.531	1.8064	0.72421	2.494	1.2653	0.5411
12	0.73	7.6264	6.48	0.57	0.497	1.8752	0.72886	2.573	1.302	0.57319
13	0.80	7.6891	6.48	0.56651	0.469	1.9414	0.73235	2.651	1.3369	0.60454
14	0.93	7.8019	6.48	0.55255	0.418	2.0683	0.74631	2.771	1.4073	0.66097
15	1.07	7.9138	6.48	0.53684	0.374	2.1959	0.76201	2.882	1.4789	0.71692
16	1.20	8.0173	6.48	0.51823	0.337	2.3179	0.78062	2.969	1.5493	0.76863
17	1.34	8.1142	6.48	0.49846	0.305	2.4346	0.8004	3.042	1.6175	0.81712
18	1.48	8.2015	6.48	0.49148	0.285	2.5288	0.80738	3.132	1.6681	0.86073
19	1.62	8.2965	6.48	0.456	0.251	2.6594	0.84286	3.155	1.7511	0.90827
20	2.44	8.7487	6.48	0.30535	0.135	3.2622	0.9935	3.284	2.1279	1.1344
21	3.25	9.0947	6.48	0.16635	0.064	3.7472	1.1325	3.309	2.4399	1.3073
22	4.08	9.3813	6.48	0.041296	0.014	4.1588	1.2576	3.307	2.7082	1.4506
23	4.89	9.6383	6.48	-0.069214	-0.022	4.5263	1.3681	3.309	2.9472	1.5791
24	5.71	9.8706	6.48	-0.16925	-0.050	4.8588	1.4681	3.310	3.1634	1.6953
25	6.53	10.085	6.48	-0.26115	-0.072	5.1646	1.56	3.311	3.3623	1.8023
26	7.35	10.293	6.48	-0.3484	-0.091	5.4602	1.6472	3.315	3.5537	1.9065
27	8.16	10.487	6.48	-0.42866	-0.107	5.7345	1.7275	3.319	3.731	2.0035
28	9.00	10.653	6.48	-0.50195	-0.120	5.9742	1.8008	3.318	3.8875	2.0867
29	9.82	10.806	6.48	-0.56476	-0.131	6.1895	1.8636	3.321	4.0266	2.1629
30	10.63	10.951	6.48	-0.62467	-0.140	6.3942	1.9235	3.324	4.1588	2.2353
31	11.46	11.094	6.48	-0.68574	-0.149	6.5985	1.9846	3.325	4.2915	2.3069
32	12.27	11.22	6.48	-0.74158	-0.156	6.7805	2.0404	3.323	4.4105	2.3701
33	13.09	11.325	6.48	-0.80672	-0.167	6.9506	2.1056	3.301	4.5281	2.4225
34	13.93	11.406	6.48	-0.84976	-0.173	7.0745	2.1486	3.293	4.6116	2.463
35	14.74	11.511	6.48	-0.89571	-0.178	7.2252	2.1946	3.292	4.7099	2.5153
36	15.41	11.594	6.48	-0.93177	-0.182	7.3446	2.2306	3.293	4.7876	2.557

Drained Direct Shear Tests ASTM D 3080



Symbol	■	●	▲	
Test No.	20.0 PSI	40.0 PSI	60.0 PSI	
Sample No.	S-10	S-10	S-10	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5008	2.4941	2.4941
	Area, in ²	4.9118	4.8856	4.8856
	Height, in	0.99488	0.99134	0.99134
	Water Content, %	31.89	31.11	31.27
	Dry Density, pcf	90.09	91.18	91.04
	Saturation, %	98.03	98.12	98.32
	Void Ratio	0.88489	0.8623	0.86515
Consol. Height, in	0.9307	0.89469	0.86562	
Consol. Void Ratio	0.76329	0.68073	0.62862	
Final	Water Content, %	26.56	21.67	19.99
	Dry Density, pcf	97.99	107.0	109.6
	Saturation, %	98.57	100.41	98.99
	Void Ratio	0.73289	0.58702	0.5493
Normal Stress, tsf	1.4397	2.8796	4.3197	
Max. Shear Stress, tsf	0.7101	1.4695	2.1341	
Ult. Shear Stress, tsf	0.67742	1.4695	2.1332	
Time to Failure, min	3213.2	1360.9	976.75	
Disp. Rate, in/min	5.9055e-05	0.00020472	0.00020472	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	46	46	46	
Plastic Limit	21	21	21	
Plasticity Index	25	25	25	

Project: DYNEGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-002 S-10
Sample Type: TRIMMED
Description: GRAY LEAN CLAY CL
Remarks:

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-002 S-10
 Sample No.: S-10
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/22/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: GRAY LEAN CLAY CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.06418	0.000	0.0000	0.0000
2	131.60	1.44	0.06602	0.118	0.007867	0.007867
3	254.56	1.44	0.06694	0.209	0.01577	0.01577
4	403.13	1.44	0.06782	0.298	0.02364	0.02364
5	547.67	1.44	0.06897	0.348	0.03150	0.03150
6	674.90	1.44	0.06998	0.392	0.03937	0.03937
7	808.72	1.44	0.07065	0.423	0.04724	0.04724
8	938.15	1.44	0.07157	0.460	0.05514	0.05514
9	1062.33	1.44	0.07200	0.493	0.06300	0.06300
10	1186.07	1.44	0.07247	0.522	0.07087	0.07087
11	1319.95	1.44	0.07342	0.551	0.07874	0.07874
12	1456.77	1.44	0.07454	0.576	0.08660	0.08660
13	1592.98	1.44	0.07522	0.595	0.09451	0.09451
14	1735.33	1.44	0.07565	0.616	0.1024	0.1024
15	1877.85	1.44	0.07603	0.633	0.1102	0.1102
16	2020.47	1.44	0.07634	0.644	0.1181	0.1181
17	2150.55	1.44	0.07672	0.655	0.1260	0.1260
18	2262.37	1.44	0.07684	0.654	0.1339	0.1339
19	2385.54	1.44	0.07709	0.660	0.1417	0.1417
20	2525.44	1.44	0.07726	0.671	0.1496	0.1496
21	2675.94	1.44	0.07772	0.682	0.1575	0.1575
22	2805.55	1.44	0.07819	0.690	0.1653	0.1653
23	2942.54	1.44	0.07888	0.696	0.1732	0.1732
24	3076.86	1.44	0.07922	0.705	0.1811	0.1811
25	3213.20	1.44	0.07954	0.710	0.1890	0.1890
26	3343.01	1.44	0.07974	0.710	0.1968	0.1968
27	3473.34	1.44	0.07985	0.704	0.2047	0.2047
28	3608.85	1.44	0.07996	0.692	0.2126	0.2126
29	3746.25	1.44	0.07996	0.681	0.2205	0.2205
30	3883.52	1.44	0.08005	0.680	0.2283	0.2283
31	4012.40	1.44	0.08003	0.681	0.2362	0.2362
32	4135.33	1.44	0.08007	0.677	0.2441	0.2441
33	4281.23	1.44	0.08023	0.677	0.2520	0.2520



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-002 S-10
 Sample No.: S-10
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/28/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: GRAY LEAN CLAY CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.09665	0.000	0.0000	0.0000
2	63.01	2.88	0.1053	0.266	0.008527	0.008527
3	113.06	2.88	0.1093	0.435	0.01702	0.01702
4	161.97	2.88	0.1120	0.572	0.02551	0.02551
5	207.04	2.88	0.1147	0.682	0.03400	0.03400
6	246.29	2.88	0.1166	0.766	0.04252	0.04252
7	290.78	2.88	0.1194	0.846	0.05101	0.05101
8	336.22	2.88	0.1211	0.914	0.05950	0.05950
9	381.75	2.88	0.1231	0.971	0.06799	0.06799
10	427.55	2.88	0.1247	1.02	0.07648	0.07648
11	476.78	2.88	0.1260	1.08	0.08505	0.08505
12	524.26	2.88	0.1281	1.12	0.09350	0.09350
13	568.33	2.88	0.1294	1.16	0.1020	0.1020
14	609.05	2.88	0.1306	1.20	0.1105	0.1105
15	655.39	2.88	0.1326	1.24	0.1190	0.1190
16	700.01	2.88	0.1334	1.27	0.1275	0.1275
17	744.02	2.88	0.1342	1.29	0.1360	0.1360
18	791.88	2.88	0.1358	1.32	0.1445	0.1445
19	840.22	2.88	0.1369	1.34	0.1530	0.1530
20	881.51	2.88	0.1380	1.36	0.1615	0.1615
21	924.69	2.88	0.1387	1.37	0.1700	0.1700
22	970.07	2.88	0.1395	1.39	0.1785	0.1785
23	1012.97	2.88	0.1404	1.40	0.1870	0.1870
24	1060.61	2.88	0.1416	1.42	0.1954	0.1954
25	1102.24	2.88	0.1419	1.43	0.2039	0.2039
26	1147.68	2.88	0.1428	1.44	0.2125	0.2125
27	1193.57	2.88	0.1438	1.45	0.2210	0.2210
28	1237.05	2.88	0.1444	1.46	0.2294	0.2294
29	1282.41	2.88	0.1449	1.46	0.2380	0.2380
30	1326.10	2.88	0.1457	1.47	0.2464	0.2464
31	1360.88	2.88	0.1465	1.47	0.2535	0.2535



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-002 S-10
 Sample No.: S-10
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/29/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

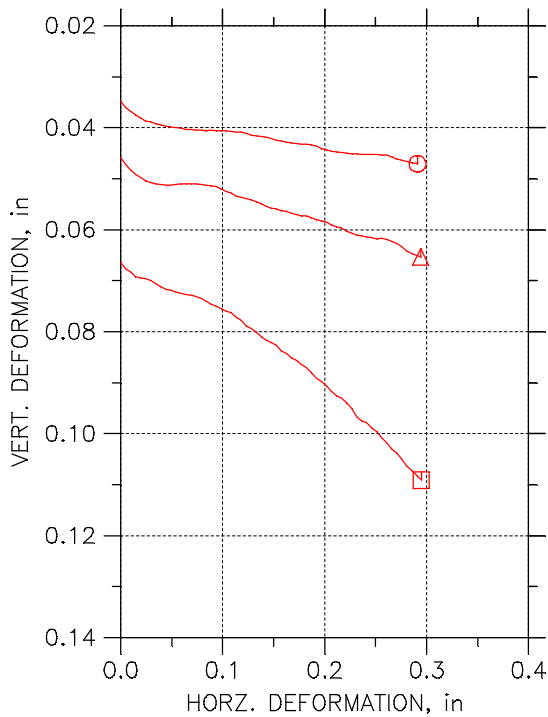
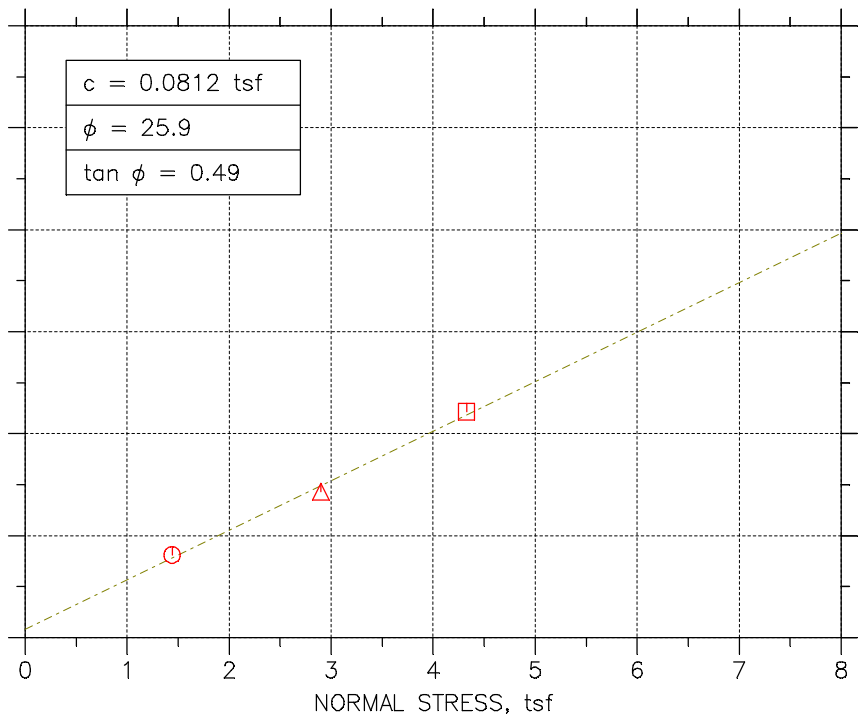
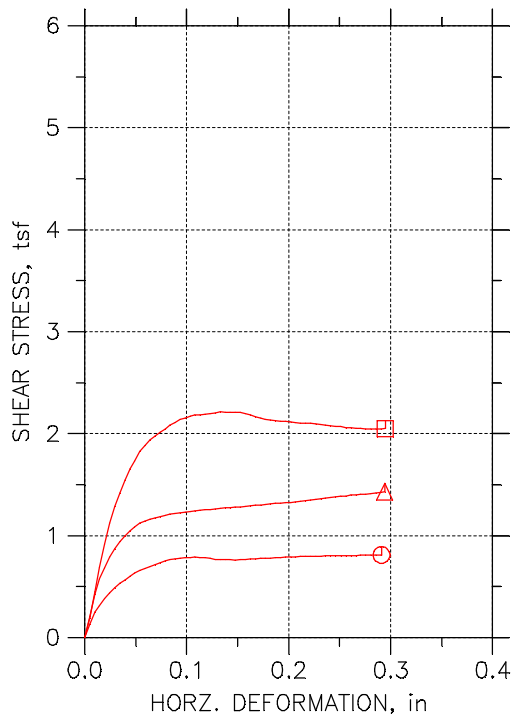
Soil Description: GRAY LEAN CLAY CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	4.32	0.1257	0.000	0.0000	0.0000
2	36.45	4.32	0.1290	0.248	0.007867	0.007867
3	76.38	4.32	0.1319	0.473	0.01573	0.01573
4	117.56	4.32	0.1348	0.683	0.02360	0.02360
5	158.10	4.32	0.1376	0.854	0.03150	0.03150
6	195.04	4.32	0.1402	0.991	0.03937	0.03937
7	234.81	4.32	0.1419	1.12	0.04724	0.04724
8	276.54	4.32	0.1437	1.24	0.05510	0.05510
9	317.01	4.32	0.1460	1.35	0.06297	0.06297
10	354.77	4.32	0.1475	1.44	0.07087	0.07087
11	393.79	4.32	0.1492	1.53	0.07874	0.07874
12	432.98	4.32	0.1507	1.61	0.08660	0.08660
13	471.79	4.32	0.1519	1.68	0.09447	0.09447
14	510.07	4.32	0.1530	1.74	0.1023	0.1023
15	550.12	4.32	0.1546	1.80	0.1102	0.1102
16	586.12	4.32	0.1558	1.85	0.1181	0.1181
17	626.51	4.32	0.1567	1.90	0.1260	0.1260
18	667.00	4.32	0.1576	1.95	0.1338	0.1338
19	705.99	4.32	0.1589	1.99	0.1417	0.1417
20	740.73	4.32	0.1598	2.02	0.1496	0.1496
21	783.69	4.32	0.1604	2.06	0.1575	0.1575
22	822.45	4.32	0.1613	2.09	0.1654	0.1654
23	862.70	4.32	0.1624	2.11	0.1732	0.1732
24	899.50	4.32	0.1631	2.12	0.1811	0.1811
25	938.61	4.32	0.1637	2.13	0.1890	0.1890
26	976.75	4.32	0.1645	2.13	0.1968	0.1968
27	1016.13	4.32	0.1649	2.13	0.2047	0.2047
28	1052.08	4.32	0.1654	2.12	0.2126	0.2126
29	1090.23	4.32	0.1661	2.13	0.2204	0.2204
30	1128.98	4.32	0.1666	2.13	0.2283	0.2283
31	1166.56	4.32	0.1671	2.13	0.2362	0.2362
32	1203.36	4.32	0.1675	2.13	0.2441	0.2441
33	1242.33	4.32	0.1679	2.13	0.2519	0.2519



DIRECT SHEAR TEST REPORT



Symbol	⊙	△	□	
Test No.	20.0 PSI	40.0 PSI	60.0 PSI	
Sample No.	S-8	S-8	S-8	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4961	2.4961	2.4965
	Area, in ²	4.8933	4.8933	4.8948
	Height, in	1.0122	1.0122	1.0039
	Water Content, %	32.17	32.73	32.51
	Dry Density, pcf	87.418	87.479	87.762
	Saturation, %	92.85	94.60	94.59
	Void Ratio	0.94243	0.94108	0.93482
Consol. Height, in	0.97952	0.97134	0.94117	
Consol. Void Ratio	0.87971	0.86272	0.81385	
Final	Water Content, %	31.22	30.03	26.52
	Dry Density, pcf	91.684	93.514	98.465
	Saturation, %	99.66	100.12	99.56
	Void Ratio	0.85205	0.81582	0.72452
Normal Stress, tsf	1.4402	2.8996	4.3279	
Max. Shear Stress, tsf	0.8107	1.4297	2.2144	
Ult. Shear Stress, tsf	0.8107	1.4297	2.0494	
Time to Failure, min	1757.8	1807.9	847.22	
Disp. Rate, in/min	0.000173	0.000173	0.000173	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	45	45	45	
Plastic Limit	21	21	21	
Plasticity Index	24	24	24	

Project: DYNEGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-003 S-8
Sample Type: 3" ST
Description: DARK GRAY LEAN CLAY
Remarks: TEST PERFORMED AS PER ASTM D 3080

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-003 S-8
 Sample No.: S-8
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/30/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 25.0'-27.5'
 Elevation: ----

Soil Description: DARK GRAY LEAN CLAY
 Remarks: TEST PERFORMED AS PER ASTM D 3080

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	1.439	0.03483	0	0
2	96.13	1.44	0.03603	0.1338	0.004953
3	131.38	1.439	0.03684	0.2532	0.00986
4	155.73	1.44	0.03749	0.3118	0.01477
5	187.84	1.44	0.03813	0.3833	0.01972
6	217.18	1.441	0.03869	0.4396	0.02463
7	243.52	1.44	0.0389	0.4875	0.02953
8	275.52	1.44	0.03916	0.5354	0.03449
9	300.06	1.439	0.0395	0.5673	0.03939
10	328.84	1.44	0.03976	0.6016	0.0443
11	357.41	1.44	0.03985	0.6312	0.04925
12	389.00	1.44	0.03993	0.6594	0.05416
13	412.41	1.44	0.0401	0.6799	0.05907
14	439.26	1.44	0.04036	0.6997	0.06402
15	469.45	1.44	0.0404	0.7187	0.06892
16	492.76	1.44	0.04049	0.7347	0.07383
17	525.42	1.44	0.04053	0.7521	0.07878
18	555.92	1.44	0.04058	0.7651	0.08369
19	584.60	1.44	0.04053	0.7734	0.0886
20	614.13	1.44	0.04062	0.7788	0.0935
21	638.65	1.44	0.04062	0.7826	0.09846
22	668.06	1.44	0.04066	0.7871	0.1034
23	694.56	1.44	0.04075	0.7886	0.1083
24	724.56	1.44	0.04083	0.7818	0.1132
25	753.15	1.44	0.04088	0.7833	0.1181
26	781.97	1.44	0.04105	0.7772	0.123
27	808.98	1.439	0.04143	0.7666	0.128
28	836.74	1.44	0.04161	0.7658	0.1329
29	867.05	1.439	0.04173	0.7628	0.1378
30	895.41	1.44	0.04186	0.7674	0.1428
31	924.95	1.44	0.04212	0.7605	0.1477
32	952.02	1.44	0.04246	0.7628	0.1526
33	982.73	1.44	0.04255	0.7674	0.1575
34	1008.92	1.44	0.04289	0.7704	0.1624
35	1040.42	1.44	0.04294	0.7742	0.1673
36	1068.99	1.439	0.04306	0.7772	0.1723
37	1097.71	1.44	0.04319	0.7795	0.1772
38	1125.56	1.44	0.04319	0.781	0.1821
39	1153.88	1.439	0.04332	0.7848	0.187
40	1182.79	1.44	0.04366	0.7871	0.192
41	1213.01	1.44	0.04409	0.7902	0.1969
42	1239.85	1.44	0.04435	0.7924	0.2018
43	1267.40	1.44	0.04457	0.7932	0.2067
44	1295.23	1.44	0.04478	0.7955	0.2116
45	1327.06	1.44	0.04491	0.7955	0.2165
46	1353.95	1.44	0.04499	0.7978	0.2215
47	1384.41	1.44	0.04517	0.7993	0.2264
48	1411.93	1.44	0.04517	0.7993	0.2313
49	1440.51	1.44	0.04525	0.8008	0.2363
50	1467.72	1.44	0.04529	0.8023	0.2412
51	1497.01	1.44	0.04525	0.8023	0.2461
52	1527.85	1.44	0.04529	0.8031	0.251
53	1553.35	1.44	0.04534	0.8039	0.2559
54	1581.68	1.44	0.04538	0.8054	0.2608
55	1611.88	1.44	0.04581	0.8061	0.2658
56	1640.02	1.44	0.04607	0.8069	0.2707
57	1670.18	1.44	0.04641	0.8084	0.2756
58	1699.23	1.44	0.04667	0.8077	0.2805
59	1723.65	1.44	0.04684	0.8077	0.2855
60	1753.88	1.44	0.04705	0.8107	0.2904
61	1757.84	1.44	0.0471	0.8107	0.291



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-003 S-8
 Sample No.: S-8
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/30/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 25.0'-27.5'
 Elevation: ----

Soil Description: DARK GRAY LEAN CLAY
 Remarks: TEST PERFORMED AS PER ASTM D 3080

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	2.897	0.04584	0	0
2	114.87	2.9	0.04725	0.2106	0.004953
3	145.95	2.9	0.04841	0.4274	0.00986
4	176.59	2.9	0.04916	0.58	0.01477
5	202.41	2.9	0.04974	0.6846	0.01972
6	232.48	2.9	0.0504	0.7905	0.02463
7	261.87	2.9	0.05081	0.8712	0.02953
8	290.11	2.9	0.05106	0.9393	0.03449
9	321.20	2.9	0.05114	0.9985	0.03939
10	352.66	2.9	0.05123	1.046	0.0443
11	382.71	2.9	0.05123	1.086	0.04925
12	414.39	2.9	0.05114	1.122	0.05416
13	438.31	2.9	0.05106	1.144	0.05907
14	468.23	2.897	0.05098	1.164	0.06402
15	494.07	2.9	0.05098	1.175	0.06892
16	525.08	2.9	0.05106	1.189	0.07383
17	555.16	2.9	0.05114	1.202	0.07878
18	584.30	2.9	0.05131	1.212	0.08369
19	613.31	2.9	0.05139	1.22	0.0886
20	638.98	2.9	0.05156	1.225	0.0935
21	665.57	2.9	0.05206	1.232	0.09846
22	698.58	2.9	0.05247	1.237	0.1034
23	723.48	2.9	0.0528	1.243	0.1083
24	754.38	2.9	0.05347	1.249	0.1132
25	779.70	2.9	0.05371	1.253	0.1181
26	807.48	2.9	0.05396	1.256	0.123
27	835.84	2.9	0.05421	1.261	0.128
28	866.30	2.9	0.05454	1.268	0.1329
29	897.54	2.9	0.05496	1.275	0.1378
30	923.22	2.9	0.05546	1.277	0.1428
31	948.87	2.897	0.05579	1.281	0.1477
32	977.74	2.9	0.05595	1.283	0.1526
33	1008.50	2.9	0.05628	1.287	0.1575
34	1036.20	2.9	0.05645	1.292	0.1624
35	1065.14	2.9	0.05678	1.299	0.1673
36	1090.22	2.9	0.05703	1.301	0.1723
37	1121.83	2.9	0.05728	1.307	0.1772
38	1150.05	2.9	0.05728	1.309	0.1821
39	1179.40	2.9	0.05769	1.315	0.187
40	1211.30	2.9	0.05802	1.32	0.192
41	1235.54	2.9	0.05836	1.321	0.1969
42	1267.50	2.9	0.05861	1.326	0.2018
43	1295.04	2.9	0.05902	1.333	0.2067
44	1325.43	2.9	0.05943	1.339	0.2116
45	1350.23	2.897	0.05968	1.345	0.2165
46	1376.84	2.9	0.06026	1.35	0.2215
47	1410.97	2.9	0.06068	1.355	0.2264
48	1438.72	2.902	0.06109	1.36	0.2313
49	1465.83	2.9	0.06117	1.368	0.2363
50	1495.50	2.9	0.06142	1.376	0.2412
51	1524.98	2.897	0.06159	1.378	0.2461
52	1553.26	2.9	0.06184	1.386	0.251
53	1581.27	2.9	0.06167	1.389	0.2559
54	1612.55	2.9	0.06192	1.397	0.2608
55	1641.33	2.9	0.06234	1.401	0.2658
56	1668.07	2.9	0.06275	1.406	0.2707
57	1694.82	2.897	0.06333	1.406	0.2756
58	1722.63	2.9	0.06416	1.411	0.2805
59	1752.47	2.9	0.06466	1.418	0.2855
60	1780.46	2.9	0.06507	1.425	0.2904
61	1807.89	2.9	0.06532	1.43	0.2941



DIRECT SHEAR TEST DATA

Project: FERMILAB
 Boring No.: HEN-003 S-8
 Sample No.: S-8
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/30/15
 Sample Type: 3" ST

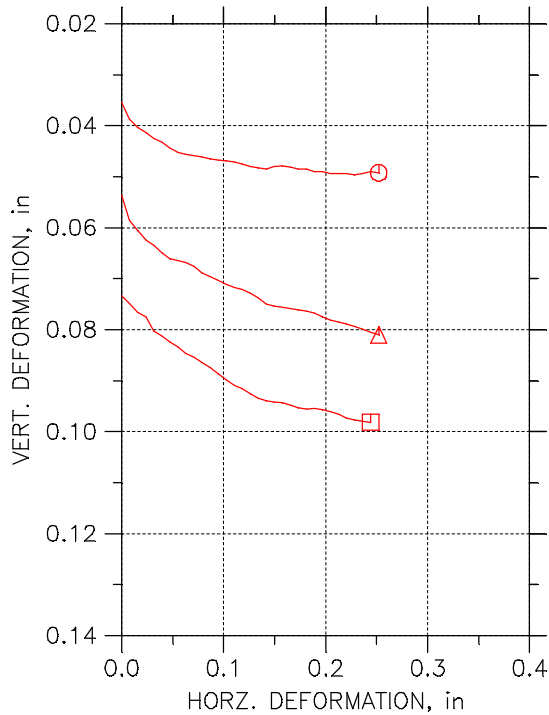
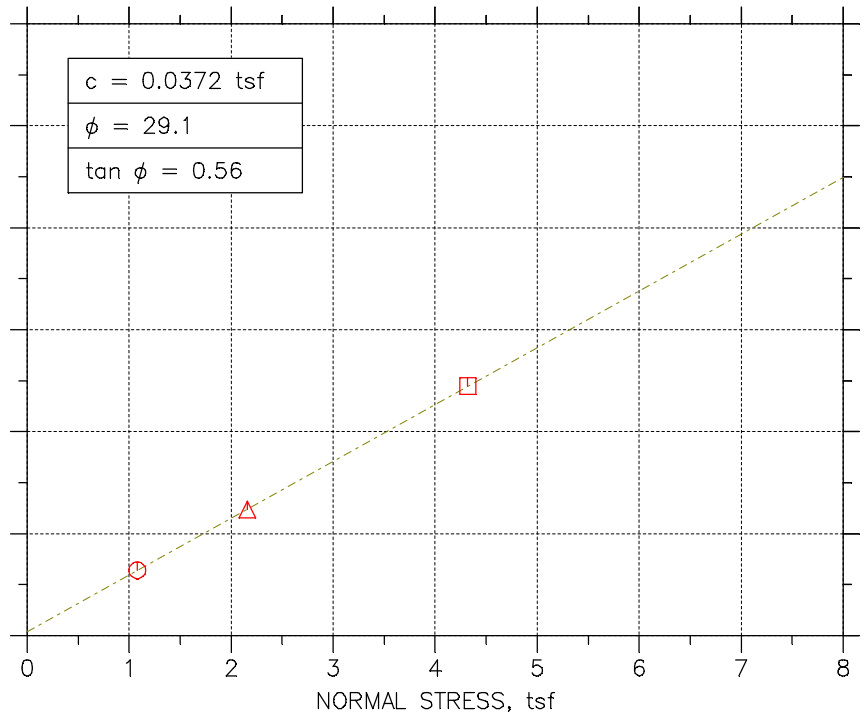
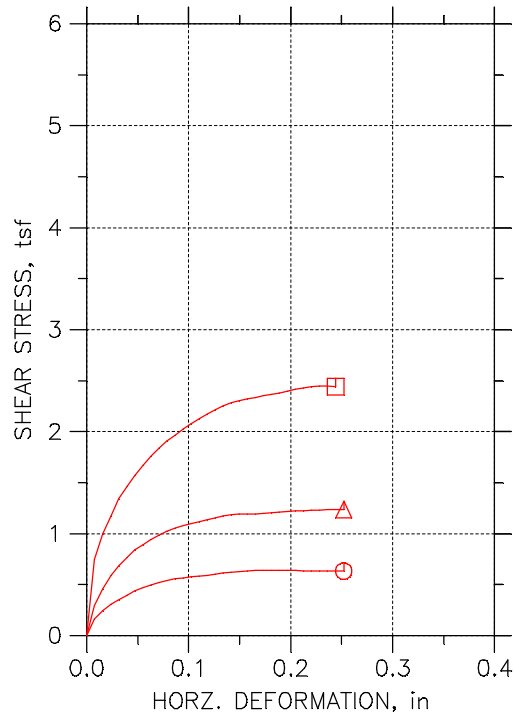
Project No.: MR155233
 Checked By: WPQ
 Depth: 25.0'-27.5'
 Elevation: ----

Soil Description: DARK GRAY LEAN CLAY
 Remarks: TEST PERFORMED AS PER ASTM D 3080

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	4.327	0.06641	0	0
2	86.54	4.328	0.06774	0.1957	0.004953
3	113.71	4.328	0.06836	0.4534	0.00986
4	146.70	4.328	0.06918	0.6917	0.01477
5	178.06	4.328	0.0695	0.9147	0.01972
6	210.27	4.327	0.06956	1.123	0.02463
7	240.13	4.329	0.06994	1.287	0.02953
8	268.05	4.328	0.07057	1.421	0.03449
9	298.27	4.328	0.07126	1.546	0.03939
10	328.20	4.329	0.0717	1.656	0.0443
11	354.47	4.328	0.07189	1.735	0.04925
12	388.91	4.328	0.0722	1.825	0.05416
13	415.00	4.328	0.07245	1.883	0.05907
14	444.61	4.329	0.07277	1.938	0.06402
15	472.16	4.328	0.07289	1.98	0.06892
16	499.33	4.328	0.07314	2.013	0.07383
17	533.88	4.328	0.07352	2.048	0.07878
18	565.33	4.328	0.07402	2.082	0.08369
19	592.80	4.328	0.07459	2.109	0.0886
20	623.55	4.328	0.07497	2.139	0.0935
21	648.04	4.328	0.07553	2.155	0.09846
22	676.07	4.328	0.07604	2.172	0.1034
23	703.78	4.328	0.07629	2.181	0.1083
24	734.95	4.328	0.07711	2.187	0.1132
25	764.15	4.328	0.0778	2.191	0.1181
26	793.49	4.327	0.07887	2.194	0.123
27	819.91	4.328	0.07943	2.204	0.128
28	847.22	4.328	0.08019	2.214	0.1329
29	876.38	4.328	0.08101	2.207	0.1378
30	904.29	4.327	0.0817	2.211	0.1428
31	933.31	4.328	0.0822	2.209	0.1477
32	960.71	4.328	0.0827	2.207	0.1526
33	989.71	4.328	0.08371	2.198	0.1575
34	1016.16	4.328	0.08421	2.184	0.1624
35	1046.73	4.328	0.08509	2.167	0.1673
36	1075.11	4.328	0.0856	2.149	0.1723
37	1100.97	4.327	0.08641	2.139	0.1772
38	1129.39	4.328	0.08698	2.135	0.1821
39	1159.96	4.328	0.08805	2.128	0.187
40	1187.52	4.328	0.08918	2.123	0.192
41	1218.23	4.328	0.08981	2.12	0.1969
42	1245.98	4.328	0.09069	2.115	0.2018
43	1274.07	4.328	0.0917	2.11	0.2067
44	1302.20	4.327	0.09258	2.103	0.2116
45	1333.73	4.327	0.09302	2.104	0.2165
46	1360.22	4.327	0.09396	2.103	0.2215
47	1391.01	4.327	0.09503	2.098	0.2264
48	1419.79	4.328	0.09667	2.09	0.2313
49	1447.73	4.328	0.09742	2.086	0.2363
50	1475.92	4.327	0.0978	2.08	0.2412
51	1504.97	4.329	0.09887	2.07	0.2461
52	1534.21	4.327	0.09962	2.068	0.251
53	1561.65	4.328	0.1008	2.061	0.2559
54	1590.39	4.328	0.1018	2.057	0.2608
55	1620.96	4.328	0.1031	2.054	0.2658
56	1648.88	4.328	0.1038	2.054	0.2707
57	1679.49	4.327	0.105	2.048	0.2756
58	1708.47	4.327	0.1064	2.045	0.2805
59	1733.25	4.328	0.1072	2.045	0.2855
60	1763.44	4.328	0.1082	2.045	0.2904
61	1786.77	4.328	0.1091	2.049	0.2947



DIRECT SHEAR TEST by ASTM D3080



Symbol	⊖	△	□	
Test No.	15 PSI	30 PSI	60 PSI	
Sample No.	S-7	S-7	S-7	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5709	2.4937	2.4854
	Area, in ²	5.191	4.884	4.8517
	Height, in	0.99843	0.98228	0.9622
	Water Content, %	29.74	29.77	29.48
	Dry Density, pcf	82.742	90.834	92.776
	Saturation, %	76.89	93.13	96.59
	Void Ratio	1.0522	0.86938	0.83025
	Consol. Height, in	0.963	0.93324	0.89292
	Consol. Void Ratio	0.9794	0.77604	0.69847
Final	Water Content, %	34.40	26.34	23.67
	Dry Density, pcf	87.034	98.998	103.32
	Saturation, %	98.39	100.17	100.04
	Void Ratio	0.95102	0.71522	0.64355
	Normal Stress, tsf	1.0798	2.1597	4.3201
	Max. Shear Stress, tsf	0.64126	1.2376	2.446
	Ult. Shear Stress, tsf	0.63334	1.2376	2.4421
	Time to Failure, min	895.63	1225.4	1252
	Disp. Rate, in/min	0.000207	0.000207	0.000207
	Estimated Specific Gravity	2.72	2.72	2.72
	Liquid Limit	45	45	45
	Plastic Limit	23	23	23
	Plasticity Index	22	22	22

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-004 S7	
Sample Type: 3.0" ST	
Description: VERY DARK GRAY LEAN CLAY CL- ORGANICS NOTED	
Remarks: TEST PERFORMED AS PER ASTM D3080.	347

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-004 S7
 Sample No.: S-7
 Test No.: 15 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/6/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 20.0'-22.0'
 Elevation: ----

Soil Description: VERY DARK GRAY LEAN CLAY CL- ORGANICS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	1.079	0.03543	0	0
2	52.87	1.08	0.03877	0.1643	0.007876
3	92.18	1.08	0.04041	0.2425	0.01575
4	132.36	1.079	0.04135	0.3092	0.02363
5	171.72	1.08	0.04249	0.3538	0.0315
6	207.28	1.08	0.04325	0.3968	0.03938
7	247.73	1.08	0.04438	0.4399	0.04725
8	286.40	1.08	0.04526	0.472	0.05513
9	322.72	1.08	0.04558	0.4953	0.06301
10	362.86	1.08	0.04583	0.5181	0.07088
11	402.61	1.08	0.04615	0.5388	0.07876
12	441.62	1.08	0.04646	0.5562	0.08663
13	477.07	1.08	0.04671	0.568	0.09451
14	515.28	1.08	0.0469	0.5774	0.1024
15	554.10	1.08	0.04709	0.5853	0.1103
16	589.91	1.08	0.04747	0.5933	0.1181
17	631.34	1.08	0.04797	0.6051	0.126
18	664.33	1.08	0.04829	0.6145	0.1339
19	703.46	1.08	0.04848	0.6234	0.1418
20	745.35	1.08	0.04804	0.6289	0.1496
21	783.16	1.08	0.04791	0.6328	0.1575
22	820.22	1.08	0.04816	0.6373	0.1654
23	858.73	1.08	0.04854	0.6393	0.1733
24	895.63	1.08	0.04848	0.6413	0.1811
25	935.53	1.08	0.04898	0.6403	0.189
26	971.85	1.079	0.04905	0.6393	0.1969
27	1012.19	1.08	0.04936	0.6373	0.2048
28	1048.66	1.081	0.04942	0.6363	0.2126
29	1085.79	1.08	0.04942	0.6348	0.2205
30	1123.47	1.08	0.04961	0.6328	0.2284
31	1162.13	1.08	0.04942	0.6333	0.2362
32	1199.13	1.079	0.04905	0.6324	0.2441
33	1236.88	1.08	0.04923	0.6333	0.252



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-004 S7
 Sample No.: S-7
 Test No.: 30 PSI

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/6/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 20.0'-22.0'
 Elevation: ----

Soil Description: VERY DARK GRAY LEAN CLAY CL- ORGANICS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	2.158	0.05365	0	0
2	44.38	2.16	0.05856	0.2976	0.007876
3	84.25	2.16	0.06058	0.4585	0.01575
4	125.18	2.159	0.06241	0.5878	0.02363
5	162.47	2.16	0.06348	0.6841	0.0315
6	197.93	2.16	0.06493	0.7629	0.03938
7	240.57	2.16	0.06613	0.8389	0.04725
8	274.16	2.16	0.06644	0.8908	0.05513
9	313.67	2.159	0.06689	0.942	0.06301
10	351.00	2.16	0.06764	0.9844	0.07088
11	389.72	2.159	0.06878	1.023	0.07876
12	427.42	2.159	0.06953	1.056	0.08663
13	466.41	2.159	0.07029	1.082	0.09451
14	502.85	2.16	0.07111	1.102	0.1024
15	538.11	2.16	0.07168	1.119	0.1103
16	576.81	2.16	0.07212	1.138	0.1181
17	619.31	2.16	0.07287	1.157	0.126
18	652.41	2.159	0.07376	1.171	0.1339
19	693.77	2.159	0.07496	1.184	0.1418
20	731.23	2.16	0.0754	1.19	0.1496
21	767.99	2.16	0.07565	1.19	0.1575
22	806.68	2.16	0.0759	1.192	0.1654
23	843.01	2.16	0.07609	1.196	0.1733
24	882.66	2.16	0.07634	1.203	0.1811
25	918.72	2.16	0.07672	1.211	0.189
26	955.92	2.16	0.07748	1.218	0.1969
27	995.76	2.16	0.07817	1.221	0.2048
28	1033.70	2.16	0.07849	1.226	0.2126
29	1073.13	2.16	0.07893	1.229	0.2205
30	1108.90	2.16	0.07937	1.231	0.2284
31	1147.19	2.16	0.07987	1.234	0.2362
32	1185.23	2.16	0.0805	1.236	0.2441
33	1225.37	2.16	0.08101	1.238	0.252



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-004 S7
 Sample No.: S-7
 Test No.: 60 PSI

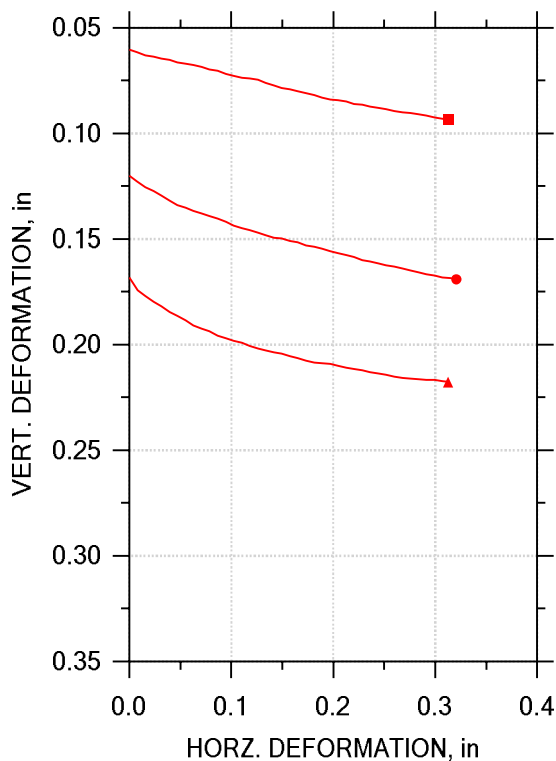
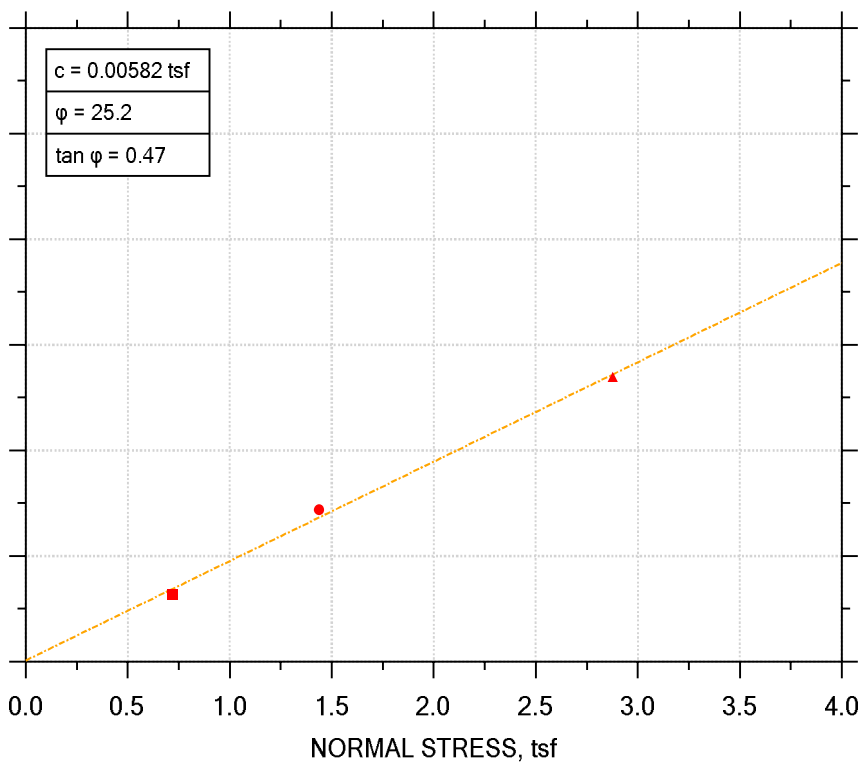
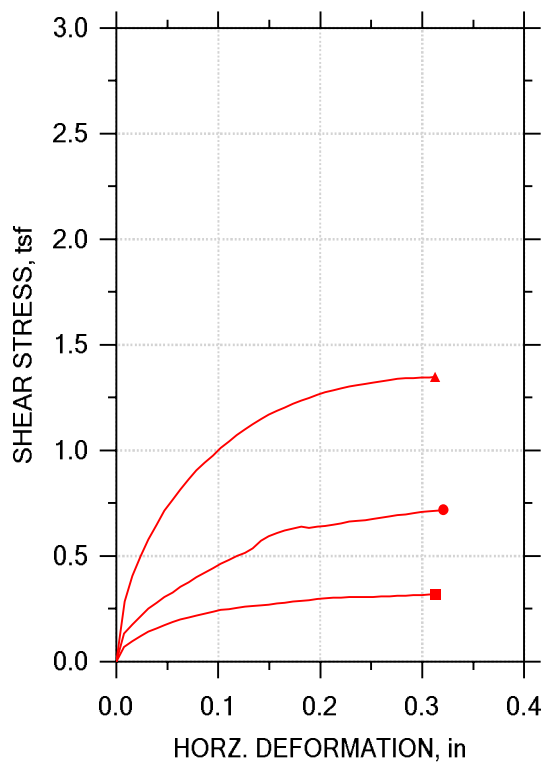
Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/6/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 20.0'-22.0'
 Elevation: ----

Soil Description: VERY DARK GRAY LEAN CLAY CL- ORGANICS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	4.319	0.07332	0	0
2	141.08	4.319	0.07483	0.744	0.007876
3	182.59	4.319	0.07659	1.001	0.01575
4	219.18	4.318	0.07754	1.176	0.02363
5	259.25	4.318	0.08025	1.34	0.0315
6	297.64	4.319	0.08126	1.465	0.03938
7	335.60	4.319	0.08233	1.571	0.04725
8	374.97	4.319	0.08334	1.67	0.05513
9	411.17	4.319	0.08466	1.754	0.06301
10	453.03	4.319	0.08536	1.841	0.07088
11	491.17	4.319	0.08637	1.907	0.07876
12	528.00	4.319	0.08744	1.966	0.08663
13	567.37	4.319	0.08863	2.025	0.09451
14	604.60	4.319	0.08977	2.075	0.1024
15	643.89	4.319	0.0909	2.128	0.1103
16	680.77	4.319	0.0916	2.174	0.1181
17	717.15	4.319	0.09261	2.214	0.126
18	754.96	4.318	0.09349	2.254	0.1339
19	791.57	4.319	0.09393	2.282	0.1418
20	831.59	4.319	0.09425	2.306	0.1496
21	873.07	4.319	0.09437	2.323	0.1575
22	908.73	4.318	0.09488	2.335	0.1654
23	946.00	4.319	0.09538	2.351	0.1733
24	984.76	4.319	0.09557	2.366	0.1811
25	1022.43	4.319	0.09544	2.377	0.189
26	1061.30	4.319	0.0957	2.395	0.1969
27	1100.41	4.319	0.09607	2.414	0.2048
28	1137.14	4.319	0.09658	2.428	0.2126
29	1175.39	4.319	0.09733	2.443	0.2205
30	1213.75	4.319	0.09771	2.446	0.2284
31	1251.96	4.32	0.0979	2.446	0.2362
32	1288.97	4.319	0.09815	2.442	0.2441





Symbol	■	●	▲	
Test No.	10 PSI	20 PSI	40 PSI	
Sample No.	S-4	S-4	S-4	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4823	2.4862	2.4819
	Area, in ²	4.8394	4.8548	4.8379
	Height, in	1.002	0.98622	1.0028
	Water Content, %	53.29	53.23	53.48
	Dry Density, pcf	68.32	67.84	67.67
	Saturation, %	98.07	96.80	96.84
	Void Ratio	1.4671	1.4847	1.4909
Consol. Height, in	0.94176	0.86607	0.83469	
Consol. Void Ratio	1.3189	1.182	1.0734	
Final	Water Content, %	45.63	39.25	34.99
	Dry Density, pcf	75.33	81.87	86.43
	Saturation, %	99.55	100.09	99.42
	Void Ratio	1.2376	1.0587	0.9502
Normal Stress, tsf	0.71768	1.4381	2.8781	
Max. Shear Stress, tsf	0.3191	0.71924	1.348	
Ult. Shear Stress, tsf	0.3191	0.71924	1.348	
Time to Failure, min	80.5	80.604	81.975	
Disp. Rate, in/min	0.0039961	0.0039961	0.0039961	
Estimated Specific Gravity	2.70	2.70	2.70	
Liquid Limit	43	43	43	
Plastic Limit	24	24	24	
Plasticity Index	19	19	19	

Project: DYNEGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-005 S4
Sample Type: 3.0" ST
Description: DARK GRAY LEAN CLAY WITH SAND AND FLY ASH
Remarks: TEST PERFORMED AS PER ASTM D3080.

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-005 S4
 Sample No.: S-4
 Test No.: 10 PSI

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/30/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 12.5'-14.5'
 Elevation: ----

Soil Description: DARK GRAY LEAN CLAY WITH SAND AND FLY ASH
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.718	0.06020	0.000	0.0000	0.0000
2	4.00	0.718	0.06153	0.0683	0.007876	0.007876
3	6.06	0.717	0.06310	0.0981	0.01575	0.01575
4	8.07	0.718	0.06380	0.121	0.02363	0.02363
5	10.15	0.718	0.06449	0.141	0.03150	0.03150
6	11.97	0.718	0.06531	0.157	0.03938	0.03938
7	13.94	0.718	0.06632	0.173	0.04725	0.04725
8	15.92	0.718	0.06689	0.187	0.05513	0.05513
9	17.78	0.717	0.06764	0.199	0.06301	0.06301
10	19.76	0.718	0.06859	0.209	0.07088	0.07088
11	21.79	0.718	0.06985	0.219	0.07876	0.07876
12	23.83	0.718	0.07042	0.228	0.08663	0.08663
13	25.79	0.718	0.07168	0.237	0.09451	0.09451
14	27.77	0.717	0.07281	0.244	0.1024	0.1024
15	29.83	0.718	0.07357	0.250	0.1103	0.1103
16	31.69	0.718	0.07395	0.255	0.1182	0.1182
17	33.69	0.718	0.07451	0.259	0.1260	0.1260
18	35.65	0.717	0.07596	0.264	0.1339	0.1339
19	37.72	0.717	0.07729	0.267	0.1418	0.1418
20	39.63	0.718	0.07842	0.271	0.1496	0.1496
21	41.54	0.718	0.07905	0.275	0.1575	0.1575
22	43.63	0.718	0.07987	0.279	0.1654	0.1654
23	45.58	0.717	0.08094	0.284	0.1733	0.1733
24	47.50	0.718	0.08189	0.288	0.1811	0.1811
25	49.57	0.718	0.08315	0.292	0.1890	0.1890
26	51.56	0.718	0.08391	0.296	0.1969	0.1969
27	53.48	0.718	0.08435	0.299	0.2048	0.2048
28	55.29	0.718	0.08485	0.302	0.2126	0.2126
29	57.40	0.718	0.08592	0.304	0.2205	0.2205
30	59.23	0.718	0.08649	0.305	0.2284	0.2284
31	61.35	0.718	0.08725	0.306	0.2362	0.2362
32	63.17	0.718	0.08788	0.307	0.2441	0.2441
33	65.13	0.718	0.08838	0.307	0.2520	0.2520
34	67.13	0.718	0.08933	0.308	0.2599	0.2599
35	69.22	0.718	0.09002	0.309	0.2677	0.2677
36	71.18	0.718	0.09046	0.311	0.2756	0.2756
37	73.11	0.718	0.09097	0.313	0.2835	0.2835
38	75.10	0.718	0.09153	0.315	0.2914	0.2914
39	77.07	0.718	0.09242	0.317	0.2992	0.2992
40	78.86	0.718	0.09298	0.318	0.3071	0.3071
41	80.50	0.718	0.09324	0.319	0.3129	0.3129



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-005 S4
 Sample No.: S-4
 Test No.: 20 PSI

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/30/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 12.5'-14.5'
 Elevation: ----

Soil Description: DARK GRAY LEAN CLAY WITH SAND AND FLY ASH
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.43	0.1202	0.000	0.0000	0.0000
2	2.29	1.43	0.1228	0.133	0.007876	0.007876
3	4.23	1.43	0.1253	0.176	0.01575	0.01575
4	6.22	1.44	0.1272	0.215	0.02363	0.02363
5	8.28	1.44	0.1295	0.250	0.03150	0.03150
6	10.27	1.44	0.1319	0.279	0.03938	0.03938
7	12.30	1.44	0.1338	0.306	0.04725	0.04725
8	14.12	1.44	0.1352	0.329	0.05513	0.05513
9	16.11	1.44	0.1365	0.354	0.06301	0.06301
10	18.07	1.44	0.1380	0.377	0.07088	0.07088
11	19.97	1.44	0.1391	0.399	0.07876	0.07876
12	21.95	1.44	0.1404	0.421	0.08663	0.08663
13	23.99	1.44	0.1420	0.443	0.09451	0.09451
14	26.02	1.44	0.1436	0.463	0.1024	0.1024
15	27.95	1.44	0.1449	0.482	0.1103	0.1103
16	29.93	1.44	0.1457	0.499	0.1181	0.1181
17	31.99	1.44	0.1471	0.514	0.1260	0.1260
18	33.87	1.44	0.1482	0.535	0.1339	0.1339
19	35.86	1.44	0.1493	0.574	0.1418	0.1418
20	37.86	1.44	0.1498	0.594	0.1496	0.1496
21	39.90	1.44	0.1510	0.610	0.1575	0.1575
22	41.78	1.44	0.1517	0.620	0.1654	0.1654
23	43.73	1.44	0.1530	0.630	0.1733	0.1733
24	45.75	1.44	0.1538	0.638	0.1811	0.1811
25	47.75	1.44	0.1545	0.633	0.1890	0.1890
26	49.63	1.44	0.1559	0.638	0.1969	0.1969
27	51.74	1.44	0.1567	0.644	0.2048	0.2048
28	53.71	1.44	0.1577	0.650	0.2126	0.2126
29	55.61	1.44	0.1585	0.656	0.2205	0.2205
30	57.47	1.44	0.1599	0.662	0.2284	0.2284
31	59.60	1.44	0.1606	0.667	0.2362	0.2362
32	61.41	1.44	0.1615	0.670	0.2441	0.2441
33	63.52	1.44	0.1625	0.677	0.2520	0.2520
34	65.33	1.44	0.1631	0.683	0.2599	0.2599
35	67.28	1.44	0.1640	0.688	0.2677	0.2677
36	69.30	1.44	0.1649	0.693	0.2756	0.2756
37	71.37	1.44	0.1657	0.698	0.2835	0.2835
38	73.34	1.44	0.1666	0.703	0.2914	0.2914
39	75.29	1.44	0.1674	0.708	0.2993	0.2993
40	77.30	1.44	0.1682	0.711	0.3071	0.3071
41	79.27	1.44	0.1686	0.715	0.3150	0.3150
42	80.60	1.44	0.1691	0.719	0.3205	0.3205



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-005 S4
 Sample No.: S-4
 Test No.: 40 PSI

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/30/15
 Sample Type: 3.0" ST

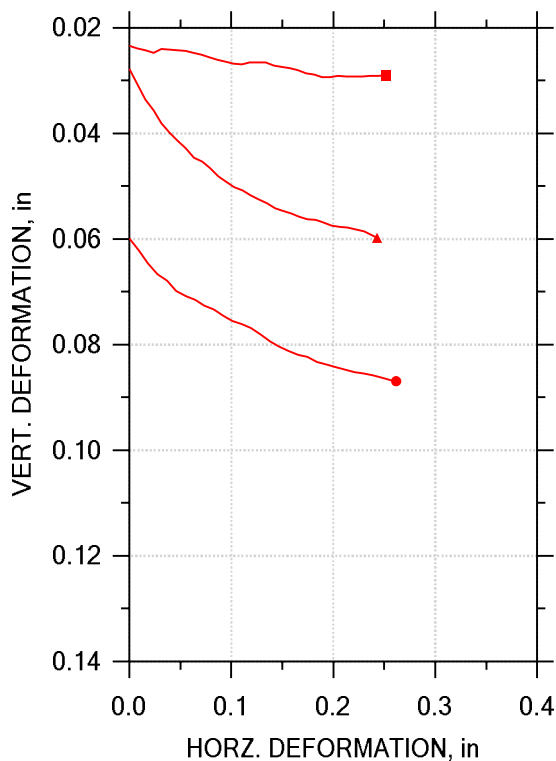
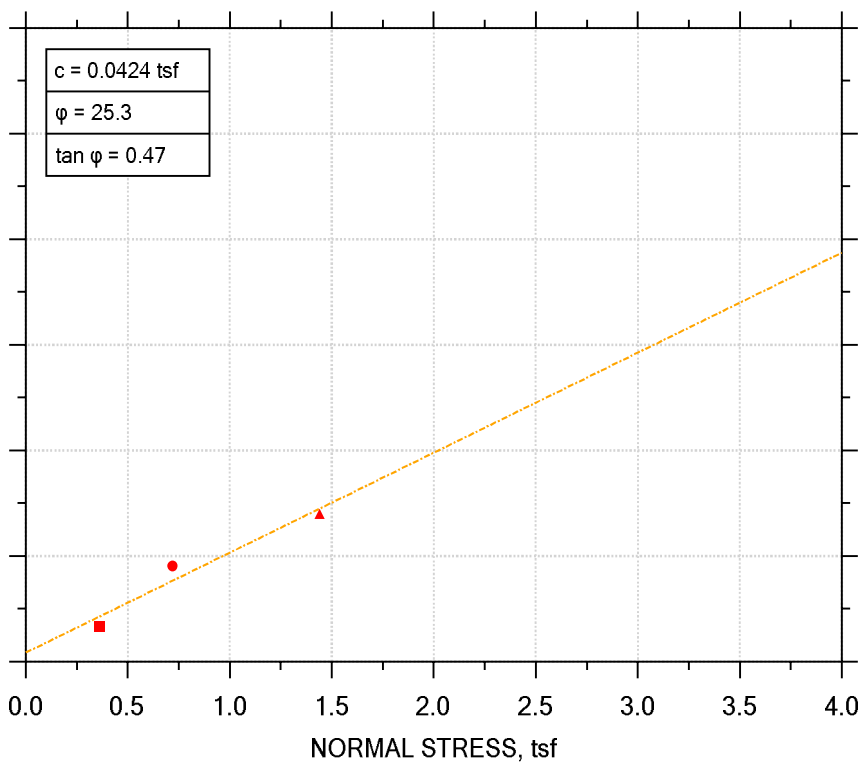
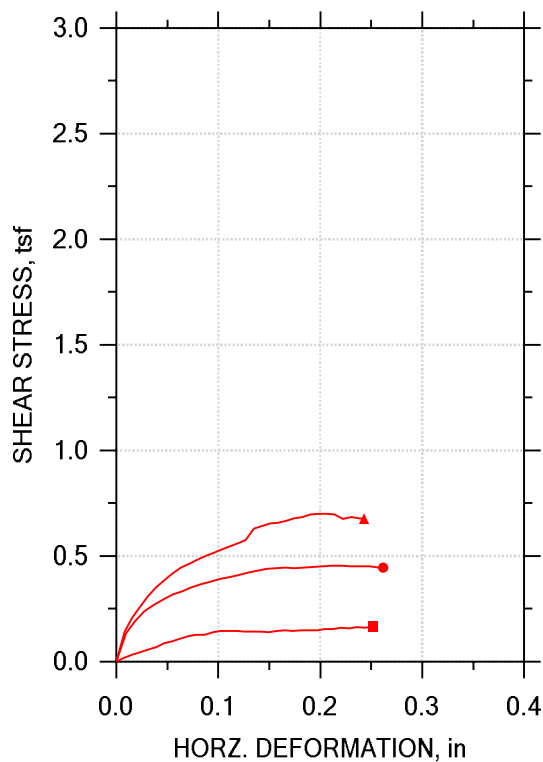
Project No.: MR155233
 Checked By: BCM
 Depth: 12.5'-14.5'
 Elevation: ----

Soil Description: DARK GRAY LEAN CLAY WITH SAND AND FLY ASH
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.1681	0.000	0.0000	0.0000
2	5.35	2.87	0.1742	0.285	0.007923	0.007923
3	7.35	2.87	0.1768	0.407	0.01575	0.01575
4	9.37	2.88	0.1797	0.499	0.02363	0.02363
5	11.37	2.88	0.1819	0.577	0.03150	0.03150
6	13.39	2.88	0.1845	0.648	0.03938	0.03938
7	15.49	2.88	0.1865	0.714	0.04725	0.04725
8	17.43	2.88	0.1886	0.766	0.05513	0.05513
9	19.35	2.88	0.1908	0.815	0.06301	0.06301
10	21.38	2.88	0.1925	0.863	0.07088	0.07088
11	23.40	2.88	0.1937	0.905	0.07876	0.07876
12	25.34	2.88	0.1957	0.943	0.08663	0.08663
13	27.19	2.88	0.1971	0.976	0.09451	0.09451
14	29.19	2.88	0.1981	1.01	0.1024	0.1024
15	31.08	2.88	0.1992	1.04	0.1103	0.1103
16	33.09	2.88	0.2007	1.07	0.1181	0.1181
17	35.10	2.88	0.2018	1.10	0.1260	0.1260
18	37.22	2.88	0.2029	1.12	0.1339	0.1339
19	39.11	2.88	0.2037	1.15	0.1418	0.1418
20	41.16	2.88	0.2044	1.17	0.1496	0.1496
21	43.03	2.88	0.2054	1.19	0.1575	0.1575
22	45.09	2.88	0.2064	1.20	0.1654	0.1654
23	47.11	2.88	0.2077	1.22	0.1733	0.1733
24	49.03	2.88	0.2085	1.24	0.1811	0.1811
25	51.03	2.88	0.2089	1.25	0.1890	0.1890
26	52.98	2.88	0.2092	1.26	0.1969	0.1969
27	54.99	2.88	0.2100	1.28	0.2048	0.2048
28	56.80	2.88	0.2108	1.29	0.2126	0.2126
29	58.83	2.88	0.2116	1.29	0.2205	0.2205
30	60.98	2.88	0.2122	1.30	0.2284	0.2284
31	62.85	2.88	0.2131	1.31	0.2362	0.2362
32	64.77	2.88	0.2137	1.32	0.2441	0.2441
33	66.81	2.88	0.2144	1.32	0.2520	0.2520
34	68.70	2.88	0.2153	1.33	0.2599	0.2599
35	70.65	2.88	0.2157	1.33	0.2677	0.2677
36	72.65	2.88	0.2161	1.34	0.2756	0.2756
37	74.82	2.88	0.2164	1.34	0.2835	0.2835
38	76.70	2.88	0.2165	1.34	0.2914	0.2914
39	78.62	2.88	0.2167	1.35	0.2992	0.2992
40	80.39	2.88	0.2172	1.35	0.3071	0.3071
41	81.97	2.88	0.2177	1.35	0.3126	0.3126





Symbol	■	●	▲	
Test No.	5.0 PSI	10.0 PSI	20.0 PSI	
Sample No.	S-4	S-4	S-4	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5744	2.5728	2.5728
	Area, in ²	5.2053	5.1989	5.1989
	Height, in	0.99685	0.99134	0.99134
	Water Content, %	43.92	43.72	43.94
	Dry Density, pcf	68.44	68.81	69.02
	Saturation, %	81.69	82.05	82.92
	Void Ratio	1.4355	1.4225	1.415
Consol. Height, in	0.97344	0.93151	0.9636	
Consol. Void Ratio	1.3783	1.2763	1.3474	
Final	Water Content, %	49.94	45.37	46.75
	Dry Density, pcf	70.49	75.42	73.45
	Saturation, %	97.71	100.11	98.33
	Void Ratio	1.3647	1.2101	1.2694
Normal Stress, tsf	0.3602	0.71979	1.4396	
Max. Shear Stress, tsf	0.16591	0.45364	0.70049	
Ult. Shear Stress, tsf	0.16591	0.44507	0.67713	
Time to Failure, min	4266.5	1139.6	1013.5	

Project: DYNEGY HENNEPIN	Disp. Rate, in/min	5.9055e-05	0.00020472	0.00020472
Location: HENNEPIN, IL	Estimated Specific Gravity	2.67	2.67	2.67
Project No.: MR155233	Liquid Limit	NP	NP	NP
Boring No.: HEN-008 S4	Plastic Limit	NP	NP	NP
Sample Type: 3.0" ST	Plasticity Index	NP	NP	NP
Description: FLY ASH / LEAN CLAY WITH SAND MIX SAMPLE TAKEN FROM THE FLY ASH STRATA				
Remarks: TEST PERFORMED AS PER ASTM D3080.				

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-008 S4
 Sample No.: S-4
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: FLY ASH / LEAN CLAY WITH SAND MIX SAMPLE TAKEN FROM THE FLY ASH STRATA
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.359	0.02341	0.000	0.0000	0.0000
2	130.95	0.359	0.02385	0.0182	0.007876	0.007876
3	252.94	0.359	0.02424	0.0338	0.01575	0.01575
4	379.00	0.360	0.02471	0.0446	0.02363	0.02363
5	526.83	0.359	0.02406	0.0578	0.03150	0.03150
6	657.29	0.359	0.02411	0.0702	0.03938	0.03938
7	817.53	0.359	0.02428	0.0875	0.04725	0.04725
8	933.21	0.359	0.02437	0.0982	0.05513	0.05513
9	1068.43	0.359	0.02476	0.110	0.06301	0.06301
10	1213.40	0.359	0.02510	0.121	0.07088	0.07088
11	1339.35	0.359	0.02558	0.128	0.07876	0.07876
12	1469.39	0.359	0.02601	0.127	0.08663	0.08663
13	1605.55	0.359	0.02645	0.139	0.09451	0.09451
14	1727.16	0.359	0.02679	0.146	0.1024	0.1024
15	1864.59	0.359	0.02697	0.144	0.1103	0.1103
16	1999.57	0.359	0.02649	0.144	0.1181	0.1181
17	2145.44	0.359	0.02653	0.141	0.1260	0.1260
18	2273.92	0.359	0.02658	0.142	0.1339	0.1339
19	2405.83	0.359	0.02710	0.143	0.1418	0.1418
20	2539.29	0.359	0.02740	0.140	0.1496	0.1496
21	2670.74	0.359	0.02762	0.146	0.1575	0.1575
22	2795.67	0.359	0.02796	0.147	0.1654	0.1654
23	2917.16	0.359	0.02857	0.146	0.1733	0.1733
24	3055.69	0.359	0.02887	0.149	0.1811	0.1811
25	3181.49	0.359	0.02931	0.149	0.1890	0.1890
26	3308.15	0.359	0.02939	0.149	0.1968	0.1968
27	3445.58	0.359	0.02909	0.155	0.2047	0.2047
28	3579.69	0.359	0.02922	0.155	0.2126	0.2126
29	3731.12	0.359	0.02918	0.159	0.2205	0.2205
30	3860.05	0.359	0.02922	0.157	0.2284	0.2284
31	3999.46	0.359	0.02909	0.164	0.2362	0.2362
32	4141.08	0.359	0.02905	0.162	0.2441	0.2441
33	4266.47	0.360	0.02900	0.166	0.2520	0.2520



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-008 S4
 Sample No.: S-4
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/28/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: FLY ASH / LEAN CLAY WITH SAND MIX SAMPLE TAKEN FROM THE FLY ASH STRATA
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.719	0.05983	0.000	0.0000	0.0000
2	158.45	0.719	0.06222	0.132	0.009199	0.009199
3	205.56	0.720	0.06455	0.191	0.01840	0.01840
4	254.95	0.720	0.06663	0.238	0.02760	0.02760
5	299.15	0.719	0.06783	0.270	0.03679	0.03679
6	341.39	0.720	0.06979	0.295	0.04599	0.04599
7	391.35	0.720	0.07073	0.319	0.05519	0.05519
8	431.04	0.720	0.07155	0.335	0.06439	0.06439
9	476.57	0.720	0.07262	0.352	0.07359	0.07359
10	520.20	0.720	0.07332	0.365	0.08279	0.08279
11	563.92	0.720	0.07458	0.379	0.09199	0.09199
12	606.27	0.720	0.07546	0.390	0.1012	0.1012
13	652.13	0.720	0.07615	0.400	0.1104	0.1104
14	695.38	0.720	0.07691	0.410	0.1196	0.1196
15	736.80	0.719	0.07811	0.423	0.1288	0.1288
16	782.53	0.720	0.07937	0.431	0.1380	0.1380
17	831.29	0.720	0.08038	0.440	0.1472	0.1472
18	870.18	0.720	0.08120	0.443	0.1564	0.1564
19	918.37	0.720	0.08189	0.444	0.1656	0.1656
20	962.28	0.720	0.08233	0.443	0.1748	0.1748
21	1005.17	0.720	0.08328	0.446	0.1840	0.1840
22	1050.60	0.720	0.08378	0.450	0.1932	0.1932
23	1091.31	0.720	0.08429	0.453	0.2024	0.2024
24	1139.63	0.720	0.08479	0.454	0.2116	0.2116
25	1181.83	0.720	0.08517	0.453	0.2208	0.2208
26	1225.69	0.719	0.08542	0.452	0.2300	0.2300
27	1272.35	0.720	0.08580	0.451	0.2392	0.2392
28	1316.66	0.720	0.08630	0.450	0.2483	0.2483
29	1362.97	0.720	0.08674	0.445	0.2575	0.2575
30	1382.74	0.720	0.08693	0.445	0.2614	0.2614



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-008 S4
 Sample No.: S-4
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/29/15
 Sample Type: 3.0" ST

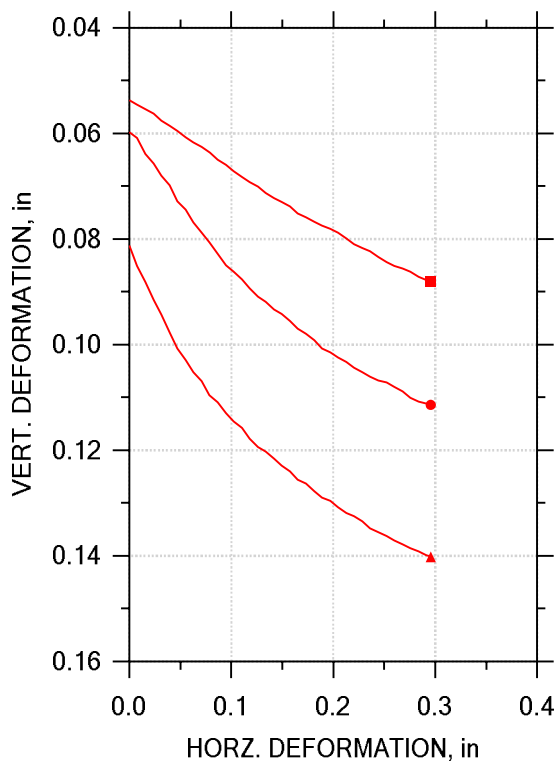
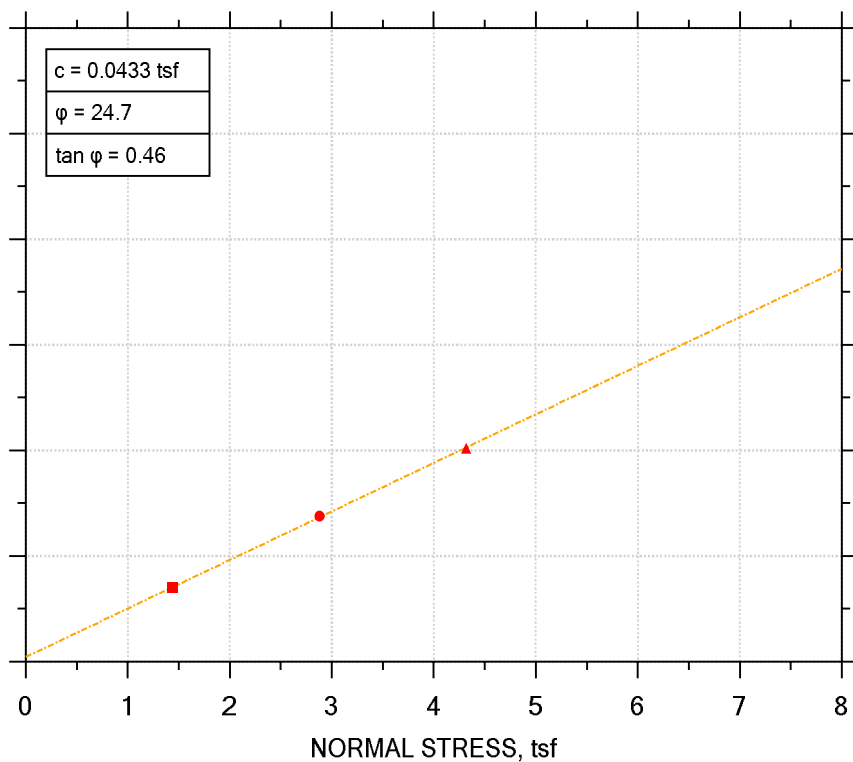
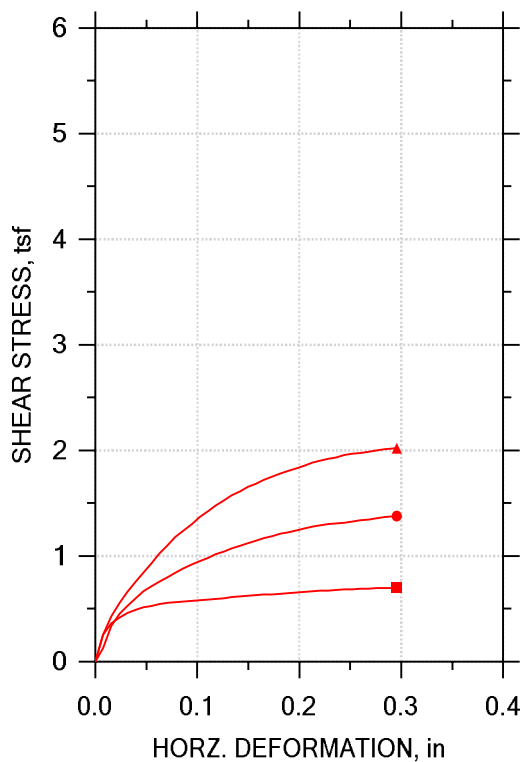
Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: FLY ASH / LEAN CLAY WITH SAND MIX SAMPLE TAKEN FROM THE FLY ASH STRATA
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.02774	0.000	0.0000	0.0000
2	84.76	1.44	0.03083	0.143	0.007935	0.007935
3	122.53	1.44	0.03360	0.209	0.01587	0.01587
4	160.70	1.44	0.03562	0.264	0.02381	0.02381
5	200.90	1.44	0.03808	0.314	0.03174	0.03174
6	240.99	1.44	0.03990	0.354	0.03968	0.03968
7	279.87	1.44	0.04142	0.388	0.04761	0.04761
8	319.42	1.44	0.04274	0.418	0.05555	0.05555
9	357.55	1.44	0.04457	0.444	0.06348	0.06348
10	393.06	1.44	0.04533	0.464	0.07142	0.07142
11	433.53	1.44	0.04652	0.482	0.07935	0.07935
12	471.68	1.44	0.04816	0.499	0.08729	0.08729
13	508.29	1.44	0.04917	0.515	0.09522	0.09522
14	548.55	1.44	0.05018	0.531	0.1032	0.1032
15	588.53	1.44	0.05075	0.545	0.1111	0.1111
16	627.66	1.44	0.05176	0.559	0.1190	0.1190
17	663.82	1.44	0.05245	0.575	0.1270	0.1270
18	703.53	1.44	0.05321	0.630	0.1349	0.1349
19	742.80	1.44	0.05415	0.641	0.1428	0.1428
20	779.75	1.44	0.05472	0.655	0.1508	0.1508
21	821.94	1.44	0.05510	0.657	0.1587	0.1587
22	855.16	1.44	0.05579	0.666	0.1666	0.1666
23	894.84	1.44	0.05630	0.680	0.1746	0.1746
24	937.49	1.44	0.05636	0.685	0.1825	0.1825
25	975.40	1.44	0.05686	0.698	0.1904	0.1904
26	1013.53	1.44	0.05743	0.700	0.1984	0.1984
27	1052.23	1.44	0.05775	0.700	0.2063	0.2063
28	1089.85	1.44	0.05787	0.698	0.2142	0.2142
29	1130.18	1.44	0.05819	0.676	0.2221	0.2221
30	1166.99	1.44	0.05856	0.684	0.2301	0.2301
31	1208.40	1.44	0.05926	0.680	0.2380	0.2380
32	1235.66	1.44	0.05976	0.677	0.2431	0.2431





Symbol	■	●	▲	
Test No.	20.0 PSI	40.0 PSI	60.0 PSI	
Sample No.	S-9	S-9	S-9	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.498	2.4992	2.5059
	Area, in ²	4.901	4.9056	4.932
	Height, in	0.99213	0.99961	0.99291
	Water Content, %	26.32	26.88	27.01
	Dry Density, pcf	99.41	98.96	97.46
	Saturation, %	101.09	102.13	98.98
	Void Ratio	0.70807	0.71592	0.74226
Consol. Height, in	0.93839	0.93984	0.91168	
Consol. Void Ratio	0.61555	0.61332	0.59971	
Final	Water Content, %	20.28	18.96	17.91
	Dry Density, pcf	109.1	111.4	113.5
	Saturation, %	99.11	98.29	98.16
	Void Ratio	0.55655	0.52466	0.49629
Normal Stress, tsf	1.4387	2.8784	4.3182	
Max. Shear Stress, tsf	0.69878	1.3783	2.0224	
Ult. Shear Stress, tsf	0.69878	1.3783	2.0224	
Time to Failure, min	74.891	75.103	74.824	
Disp. Rate, in/min	0.0039823	0.0039823	0.0039823	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	30	30	30	
Plastic Limit	15	15	15	
Plasticity Index	15	15	15	

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-012 S-9	
Sample Type: TRIMMED	
Description: BROWN AND GRAYISH BROWN LEAN CLAY WITH SAND CL 359	
Remarks:	

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
Boring No.: HEN-012 S-9
Sample No.: S-9
Test No.: 20.0 PSI

Location: HENNEPIN, IL
Tested By: HP
Test Date: 12/30/15
Sample Type: TRIMMED

Project No.: MR155233
Checked By: BCM
Depth: 30.0'-32.0'
Elevation: ----

Soil Description: BROWN AND GRAYISH BROWN LEAN CLAY WITH SAND CL
Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.05374	0.000	0.0000	0.0000
2	2.36	1.44	0.05449	0.255	0.007902	0.007902
3	4.41	1.44	0.05541	0.361	0.01580	0.01580
4	6.20	1.44	0.05620	0.419	0.02364	0.02364
5	8.36	1.44	0.05759	0.461	0.03154	0.03154
6	10.28	1.44	0.05849	0.491	0.03940	0.03940
7	12.21	1.44	0.05946	0.514	0.04727	0.04727
8	14.37	1.44	0.06072	0.530	0.05514	0.05514
9	16.51	1.44	0.06170	0.545	0.06300	0.06300
10	18.51	1.44	0.06253	0.557	0.07087	0.07087
11	20.48	1.44	0.06368	0.563	0.07884	0.07884
12	22.37	1.44	0.06492	0.571	0.08664	0.08664
13	24.20	1.44	0.06593	0.574	0.09451	0.09451
14	26.24	1.44	0.06710	0.580	0.1024	0.1024
15	28.30	1.44	0.06820	0.586	0.1102	0.1102
16	30.30	1.44	0.06917	0.594	0.1181	0.1181
17	32.31	1.44	0.07004	0.603	0.1260	0.1260
18	34.44	1.44	0.07130	0.612	0.1339	0.1339
19	36.46	1.44	0.07221	0.620	0.1417	0.1417
20	38.12	1.44	0.07295	0.626	0.1497	0.1497
21	40.00	1.44	0.07385	0.630	0.1575	0.1575
22	42.18	1.44	0.07515	0.634	0.1654	0.1654
23	44.09	1.44	0.07589	0.638	0.1732	0.1732
24	46.27	1.44	0.07673	0.645	0.1811	0.1811
25	48.21	1.44	0.07745	0.650	0.1890	0.1890
26	50.13	1.44	0.07809	0.656	0.1969	0.1969
27	52.19	1.44	0.07879	0.662	0.2048	0.2048
28	54.02	1.44	0.07987	0.668	0.2126	0.2126
29	55.82	1.44	0.08097	0.671	0.2205	0.2205
30	57.85	1.44	0.08169	0.675	0.2283	0.2283
31	59.94	1.44	0.08230	0.678	0.2362	0.2362
32	61.95	1.44	0.08334	0.682	0.2441	0.2441
33	64.02	1.44	0.08442	0.687	0.2520	0.2520
34	65.84	1.44	0.08511	0.689	0.2598	0.2598
35	68.00	1.44	0.08554	0.692	0.2678	0.2678
36	69.87	1.44	0.08624	0.695	0.2757	0.2757
37	71.73	1.44	0.08714	0.696	0.2835	0.2835
38	73.67	1.44	0.08770	0.697	0.2914	0.2914
39	74.89	1.44	0.08801	0.699	0.2959	0.2959



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-012 S-9
 Sample No.: S-9
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: HP
 Test Date: 12/30/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: BCM
 Depth: 30.0'-32.0'
 Elevation: ----

Soil Description: BROWN AND GRAYISH BROWN LEAN CLAY WITH SAND CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.05977	0.000	0.0000	0.0000
2	2.06	2.88	0.06089	0.127	0.007902	0.007902
3	4.31	2.88	0.06384	0.341	0.01577	0.01577
4	6.41	2.88	0.06564	0.452	0.02364	0.02364
5	8.28	2.88	0.06802	0.530	0.03150	0.03150
6	10.21	2.88	0.06982	0.600	0.03947	0.03947
7	12.15	2.88	0.07283	0.663	0.04727	0.04727
8	14.13	2.88	0.07441	0.714	0.05514	0.05514
9	16.14	2.88	0.07686	0.757	0.06300	0.06300
10	18.27	2.88	0.07875	0.799	0.07087	0.07087
11	20.38	2.88	0.08055	0.841	0.07877	0.07877
12	22.34	2.88	0.08280	0.882	0.08664	0.08664
13	24.49	2.88	0.08496	0.920	0.09451	0.09451
14	26.26	2.88	0.08615	0.954	0.1024	0.1024
15	28.11	2.88	0.08759	0.985	0.1102	0.1102
16	30.15	2.88	0.08930	1.02	0.1181	0.1181
17	32.26	2.88	0.09089	1.04	0.1260	0.1260
18	34.35	2.88	0.09193	1.07	0.1339	0.1339
19	36.34	2.88	0.09330	1.10	0.1417	0.1417
20	38.37	2.88	0.09418	1.12	0.1496	0.1496
21	40.32	2.88	0.09548	1.15	0.1575	0.1575
22	42.32	2.88	0.09696	1.17	0.1654	0.1654
23	44.13	2.88	0.09798	1.19	0.1732	0.1732
24	46.14	2.88	0.09912	1.21	0.1811	0.1811
25	48.23	2.88	0.1007	1.23	0.1890	0.1890
26	50.29	2.88	0.1015	1.24	0.1969	0.1969
27	52.22	2.88	0.1025	1.26	0.2047	0.2047
28	54.25	2.88	0.1032	1.28	0.2126	0.2126
29	56.19	2.88	0.1044	1.29	0.2205	0.2205
30	58.34	2.88	0.1053	1.30	0.2283	0.2283
31	59.96	2.88	0.1060	1.31	0.2362	0.2362
32	61.98	2.88	0.1068	1.32	0.2441	0.2441
33	64.03	2.88	0.1072	1.33	0.2520	0.2520
34	66.11	2.88	0.1080	1.34	0.2598	0.2598
35	68.11	2.88	0.1089	1.35	0.2678	0.2678
36	70.11	2.88	0.1101	1.36	0.2757	0.2757
37	72.14	2.88	0.1108	1.37	0.2835	0.2835
38	74.07	2.88	0.1112	1.38	0.2914	0.2914
39	75.10	2.88	0.1114	1.38	0.2953	0.2953



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-012 S-9
 Sample No.: S-9
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/29/15
 Sample Type: TRIMMED

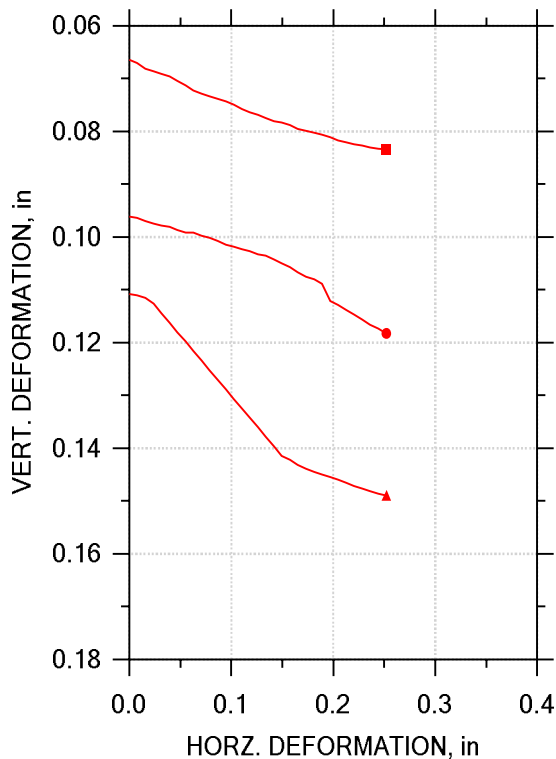
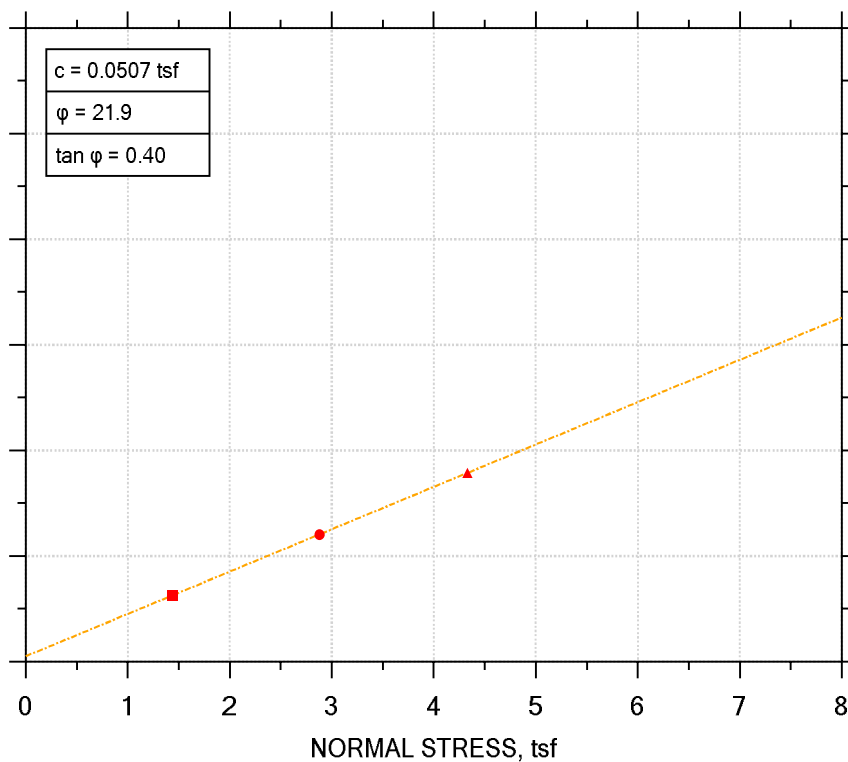
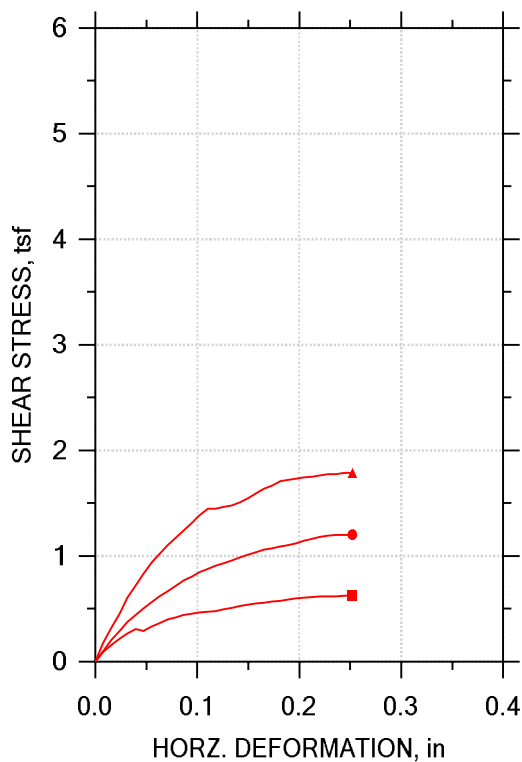
Project No.: MR155233
 Checked By: WPQ
 Depth: 30.0'-32.0'
 Elevation: ----

Soil Description: BROWN AND GRAYISH BROWN LEAN CLAY WITH SAND CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	4.31	0.08124	0.000	0.0000	0.0000
2	2.11	4.31	0.08504	0.255	0.007902	0.007902
3	3.99	4.31	0.08810	0.430	0.01587	0.01587
4	5.99	4.31	0.09148	0.557	0.02364	0.02364
5	8.00	4.31	0.09436	0.659	0.03150	0.03150
6	10.07	4.31	0.09768	0.755	0.03944	0.03944
7	12.06	4.32	0.1007	0.842	0.04727	0.04727
8	14.23	4.32	0.1029	0.931	0.05514	0.05514
9	16.27	4.32	0.1053	1.02	0.06300	0.06300
10	18.25	4.32	0.1070	1.10	0.07087	0.07087
11	20.40	4.32	0.1095	1.18	0.07877	0.07877
12	22.17	4.32	0.1109	1.24	0.08664	0.08664
13	24.09	4.32	0.1130	1.30	0.09451	0.09451
14	26.17	4.32	0.1145	1.37	0.1024	0.1024
15	28.27	4.32	0.1158	1.42	0.1103	0.1103
16	30.44	4.32	0.1178	1.48	0.1181	0.1181
17	32.30	4.32	0.1194	1.53	0.1260	0.1260
18	34.32	4.32	0.1202	1.58	0.1339	0.1339
19	36.24	4.32	0.1216	1.61	0.1417	0.1417
20	38.28	4.32	0.1229	1.66	0.1496	0.1496
21	40.11	4.32	0.1240	1.69	0.1575	0.1575
22	42.17	4.32	0.1256	1.72	0.1654	0.1654
23	44.24	4.32	0.1263	1.75	0.1732	0.1732
24	46.21	4.32	0.1278	1.78	0.1811	0.1811
25	48.15	4.32	0.1289	1.81	0.1890	0.1890
26	50.11	4.32	0.1296	1.83	0.1969	0.1969
27	52.12	4.32	0.1308	1.86	0.2047	0.2047
28	54.28	4.32	0.1319	1.89	0.2126	0.2126
29	55.96	4.32	0.1325	1.90	0.2205	0.2205
30	57.96	4.32	0.1335	1.92	0.2283	0.2283
31	60.01	4.32	0.1348	1.94	0.2362	0.2362
32	62.07	4.32	0.1355	1.96	0.2441	0.2441
33	64.02	4.32	0.1362	1.97	0.2520	0.2520
34	65.98	4.32	0.1370	1.98	0.2598	0.2598
35	68.04	4.32	0.1379	1.99	0.2678	0.2678
36	70.01	4.32	0.1386	2.00	0.2756	0.2756
37	72.03	4.32	0.1392	2.01	0.2835	0.2835
38	73.88	4.32	0.1399	2.02	0.2914	0.2914
39	74.82	4.32	0.1402	2.02	0.2953	0.2953





Symbol	■	●	▲	
Test No.	20.0 PSI	40.0 PSI	60.0 PSI	
Sample No.	S-10	S-10	S-10	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5004	2.4969	2.4925
	Area, in ²	4.9103	4.8964	4.8794
	Height, in	0.98937	0.99173	0.9937
	Water Content, %	63.41	63.89	63.12
	Dry Density, pcf	59.35	58.29	59.56
	Saturation, %	92.67	90.85	92.76
	Void Ratio	1.8612	1.9129	1.8508
Consol. Height, in	0.92292	0.89565	0.88288	
Consol. Void Ratio	1.669	1.6307	1.5329	
Final	Water Content, %	59.75	57.69	52.17
	Dry Density, pcf	64.81	66.19	70.06
	Saturation, %	100.32	100.23	99.68
	Void Ratio	1.62	1.5655	1.4235
Normal Stress, tsf	1.4387	2.8788	4.328	
Max. Shear Stress, tsf	0.62916	1.2024	1.788	
Ult. Shear Stress, tsf	0.62916	1.2019	1.788	
Time to Failure, min	63.266	61.596	63.531	
Disp. Rate, in/min	0.004	0.004	0.004	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	70	70	70	
Plastic Limit	38	38	38	
Plasticity Index	32	32	32	

Project: DYNEGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-014 S-10
Sample Type: TRIMMED
Description: VERY DARK BROWNISH GRAY ORGANIC SILT MH
Remarks:

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-014 S-10
 Sample No.: S-10
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: VERY DARK BROWNISH GRAY ORGANIC SILT MH
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.06645	0.000	0.0000	0.0000
2	1.99	1.44	0.06706	0.0884	0.007867	0.007867
3	3.95	1.44	0.06811	0.159	0.01577	0.01577
4	5.72	1.44	0.06858	0.215	0.02364	0.02364
5	7.78	1.44	0.06906	0.268	0.03150	0.03150
6	9.71	1.44	0.06958	0.306	0.03937	0.03937
7	11.55	1.44	0.07038	0.293	0.04724	0.04724
8	13.80	1.44	0.07126	0.333	0.05514	0.05514
9	15.82	1.44	0.07223	0.366	0.06300	0.06300
10	17.89	1.44	0.07286	0.397	0.07087	0.07087
11	19.81	1.44	0.07329	0.420	0.07874	0.07874
12	21.66	1.44	0.07380	0.443	0.08664	0.08664
13	23.47	1.44	0.07425	0.455	0.09451	0.09451
14	25.50	1.44	0.07490	0.466	0.1024	0.1024
15	27.62	1.44	0.07571	0.470	0.1103	0.1103
16	29.65	1.44	0.07641	0.477	0.1181	0.1181
17	31.63	1.44	0.07682	0.494	0.1260	0.1260
18	33.73	1.44	0.07749	0.511	0.1339	0.1339
19	35.77	1.44	0.07807	0.528	0.1418	0.1418
20	37.40	1.44	0.07832	0.541	0.1496	0.1496
21	39.24	1.44	0.07877	0.552	0.1575	0.1575
22	41.37	1.44	0.07947	0.560	0.1654	0.1654
23	43.43	1.44	0.07990	0.569	0.1732	0.1732
24	45.55	1.44	0.08028	0.575	0.1811	0.1811
25	47.50	1.44	0.08061	0.586	0.1890	0.1890
26	49.45	1.44	0.08111	0.597	0.1968	0.1968
27	51.42	1.44	0.08169	0.605	0.2047	0.2047
28	53.26	1.44	0.08205	0.612	0.2126	0.2126
29	55.04	1.44	0.08241	0.617	0.2205	0.2205
30	57.01	1.44	0.08271	0.619	0.2283	0.2283
31	59.20	1.44	0.08306	0.620	0.2362	0.2362
32	61.20	1.44	0.08324	0.626	0.2441	0.2441
33	63.27	1.44	0.08342	0.629	0.2520	0.2520



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-014 S-10
 Sample No.: S-10
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: VERY DARK BROWNISH GRAY ORGANIC SILT MH
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.09608	0.000	0.0000	0.0000
2	2.14	2.88	0.09638	0.0973	0.007867	0.007867
3	4.46	2.88	0.09696	0.206	0.01577	0.01577
4	6.38	2.88	0.09744	0.291	0.02364	0.02364
5	8.47	2.88	0.09783	0.374	0.03150	0.03150
6	10.24	2.88	0.09812	0.442	0.03937	0.03937
7	12.06	2.88	0.09869	0.505	0.04724	0.04724
8	14.09	2.88	0.09913	0.564	0.05517	0.05517
9	16.18	2.88	0.09922	0.616	0.06300	0.06300
10	18.35	2.88	0.09981	0.664	0.07087	0.07087
11	20.32	2.88	0.1001	0.716	0.07874	0.07874
12	22.33	2.88	0.1008	0.768	0.08660	0.08660
13	24.20	2.88	0.1014	0.807	0.09451	0.09451
14	26.17	2.88	0.1018	0.850	0.1024	0.1024
15	27.99	2.88	0.1023	0.881	0.1102	0.1102
16	29.96	2.88	0.1027	0.908	0.1181	0.1181
17	32.02	2.88	0.1033	0.934	0.1260	0.1260
18	34.18	2.88	0.1035	0.958	0.1339	0.1339
19	36.19	2.88	0.1043	0.988	0.1417	0.1417
20	38.09	2.88	0.1050	1.01	0.1496	0.1496
21	40.08	2.88	0.1058	1.04	0.1575	0.1575
22	42.07	2.88	0.1066	1.06	0.1653	0.1653
23	43.72	2.88	0.1075	1.07	0.1732	0.1732
24	45.68	2.88	0.1080	1.09	0.1811	0.1811
25	47.72	2.88	0.1088	1.10	0.1890	0.1890
26	49.91	2.88	0.1121	1.12	0.1969	0.1969
27	51.97	2.88	0.1128	1.14	0.2047	0.2047
28	53.89	2.88	0.1138	1.16	0.2126	0.2126
29	55.91	2.88	0.1147	1.18	0.2205	0.2205
30	57.81	2.88	0.1156	1.20	0.2283	0.2283
31	59.72	2.88	0.1166	1.20	0.2362	0.2362
32	61.60	2.88	0.1174	1.20	0.2441	0.2441
33	63.64	2.88	0.1183	1.20	0.2520	0.2520



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-014 S-10
 Sample No.: S-10
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

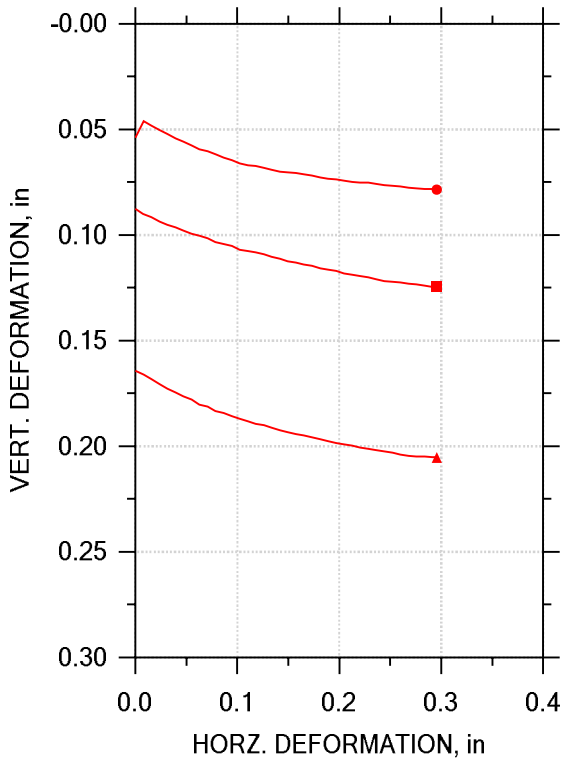
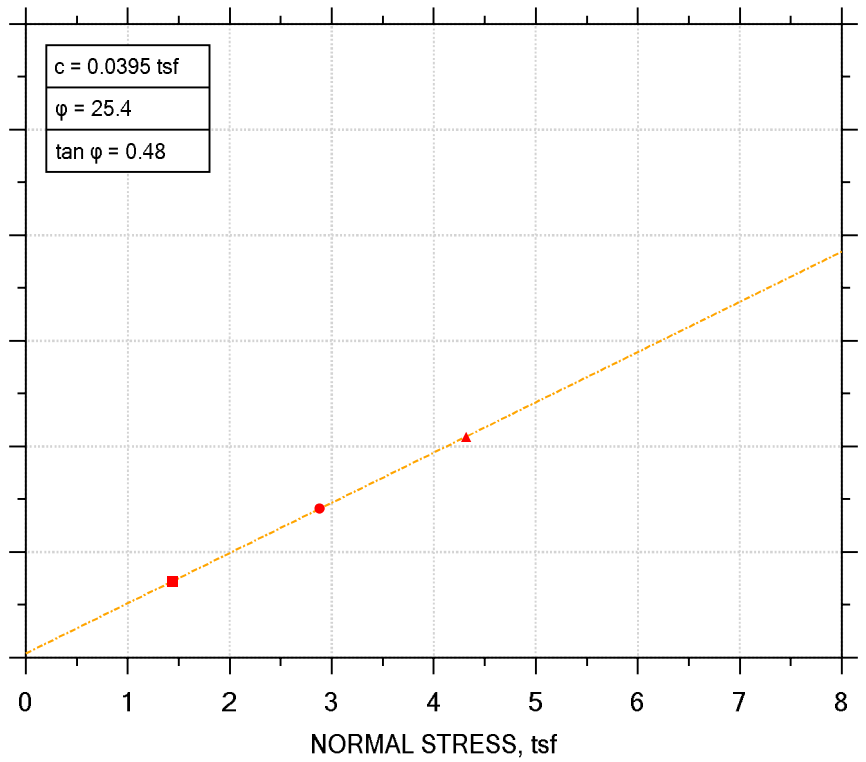
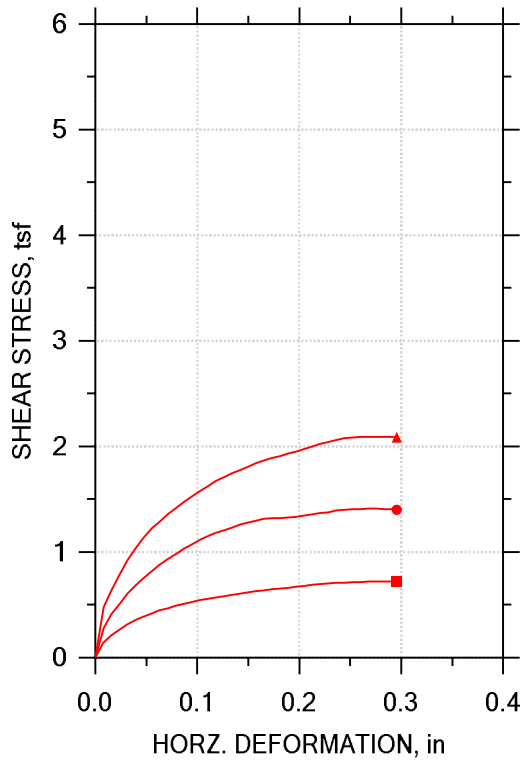
Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: VERY DARK BROWNISH GRAY ORGANIC SILT MH
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	4.32	0.1108	0.000	0.0000	0.0000
2	1.96	4.32	0.1110	0.174	0.007867	0.007867
3	3.96	4.32	0.1115	0.324	0.01577	0.01577
4	6.07	4.32	0.1126	0.454	0.02364	0.02364
5	8.38	4.32	0.1144	0.603	0.03150	0.03150
6	10.29	4.33	0.1162	0.722	0.03937	0.03937
7	12.37	4.32	0.1180	0.833	0.04724	0.04724
8	14.20	4.32	0.1198	0.936	0.05514	0.05514
9	15.96	4.33	0.1216	1.02	0.06304	0.06304
10	17.98	4.33	0.1234	1.10	0.07087	0.07087
11	20.04	4.33	0.1252	1.17	0.07874	0.07874
12	22.18	4.33	0.1270	1.24	0.08660	0.08660
13	24.18	4.33	0.1288	1.31	0.09451	0.09451
14	26.19	4.33	0.1307	1.39	0.1024	0.1024
15	28.05	4.33	0.1325	1.45	0.1102	0.1102
16	30.04	4.33	0.1342	1.45	0.1181	0.1181
17	31.83	4.33	0.1361	1.47	0.1260	0.1260
18	33.83	4.33	0.1378	1.48	0.1339	0.1339
19	35.92	4.33	0.1396	1.51	0.1417	0.1417
20	37.97	4.33	0.1414	1.54	0.1496	0.1496
21	39.90	4.33	0.1421	1.59	0.1575	0.1575
22	41.91	4.33	0.1432	1.64	0.1653	0.1653
23	43.88	4.33	0.1439	1.67	0.1732	0.1732
24	45.98	4.33	0.1445	1.71	0.1811	0.1811
25	47.55	4.33	0.1449	1.72	0.1890	0.1890
26	49.50	4.33	0.1454	1.73	0.1968	0.1968
27	51.56	4.33	0.1460	1.74	0.2047	0.2047
28	53.71	4.33	0.1466	1.75	0.2126	0.2126
29	55.70	4.33	0.1472	1.76	0.2205	0.2205
30	57.68	4.33	0.1476	1.77	0.2283	0.2283
31	59.68	4.33	0.1481	1.78	0.2362	0.2362
32	61.60	4.33	0.1487	1.79	0.2441	0.2441
33	63.53	4.33	0.1489	1.79	0.2520	0.2520





Symbol	■	●	▲	
Test No.	20.0 PSI	40.0 PSI	60.0 PSI	
Sample No.	S-9	S-10	S-10	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4988	2.4925	2.4949
	Area, in ²	4.9041	4.8794	4.8887
	Height, in	0.99685	0.9937	0.99921
	Water Content, %	50.74	50.66	50.36
	Dry Density, pcf	63.80	64.49	64.25
	Saturation, %	83.06	84.38	83.37
	Void Ratio	1.6615	1.6331	1.6429
Consol. Height, in	0.90913	0.93973	0.83483	
Consol. Void Ratio	1.4273	1.4901	1.2081	
Final	Water Content, %	47.61	52.20	40.38
	Dry Density, pcf	72.91	70.02	80.86
	Saturation, %	97.45	99.63	99.86
	Void Ratio	1.3288	1.4251	1.0999
Normal Stress, tsf	1.4387	2.8787	4.3188	
Max. Shear Stress, tsf	0.72169	1.4131	2.0916	
Ult. Shear Stress, tsf	0.72113	1.4013	2.0888	
Time to Failure, min	73.304	70.325	72.709	
Disp. Rate, in/min	0.004	0.004	0.004	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	60	60	60	
Plastic Limit	35	35	35	
Plasticity Index	25	25	25	

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-017 S-9	
Sample Type: TRIMMED	
Description: DARK BROWNISH GRAY ORGANIC CLAY WITH SAND OL- SAND SEAMS AND SHELL NOTED	
Remarks:	

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-017 S-9
 Sample No.: S-9
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 30.0'-32.0'
 Elevation: ----

Soil Description: DARK BROWNISH GRAY ORGANIC CLAY WITH SAND OL- SAND SEAMS AND SHELL NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.08772	0.000	0.0000	0.0000
2	2.20	1.44	0.08988	0.137	0.007902	0.007902
3	4.24	1.44	0.09150	0.210	0.01577	0.01577
4	6.12	1.44	0.09370	0.266	0.02374	0.02374
5	8.04	1.44	0.09516	0.314	0.03150	0.03150
6	10.02	1.44	0.09638	0.355	0.03940	0.03940
7	11.96	1.44	0.09802	0.391	0.04727	0.04727
8	13.90	1.44	0.09928	0.419	0.05517	0.05517
9	16.08	1.44	0.1002	0.446	0.06300	0.06300
10	18.20	1.44	0.1016	0.468	0.07091	0.07091
11	20.21	1.44	0.1033	0.491	0.07877	0.07877
12	22.29	1.44	0.1041	0.511	0.08664	0.08664
13	24.05	1.44	0.1051	0.528	0.09451	0.09451
14	25.85	1.44	0.1068	0.544	0.1024	0.1024
15	27.87	1.44	0.1076	0.557	0.1102	0.1102
16	29.97	1.44	0.1082	0.569	0.1182	0.1182
17	32.12	1.44	0.1092	0.582	0.1260	0.1260
18	34.05	1.44	0.1103	0.593	0.1339	0.1339
19	36.06	1.44	0.1112	0.606	0.1417	0.1417
20	38.04	1.44	0.1126	0.617	0.1496	0.1496
21	39.95	1.44	0.1131	0.628	0.1575	0.1575
22	41.73	1.44	0.1139	0.637	0.1654	0.1654
23	43.68	1.44	0.1147	0.646	0.1732	0.1732
24	45.76	1.44	0.1158	0.655	0.1811	0.1811
25	47.81	1.44	0.1163	0.663	0.1890	0.1890
26	49.83	1.44	0.1171	0.672	0.1969	0.1969
27	51.86	1.44	0.1181	0.681	0.2047	0.2047
28	53.73	1.44	0.1188	0.688	0.2126	0.2126
29	55.82	1.44	0.1195	0.698	0.2205	0.2205
30	57.41	1.44	0.1200	0.702	0.2283	0.2283
31	59.37	1.44	0.1210	0.707	0.2362	0.2362
32	61.47	1.44	0.1219	0.710	0.2441	0.2441
33	63.59	1.44	0.1222	0.713	0.2520	0.2520
34	65.57	1.44	0.1224	0.717	0.2598	0.2598
35	67.56	1.44	0.1230	0.718	0.2678	0.2678
36	69.58	1.44	0.1235	0.720	0.2756	0.2756
37	71.39	1.44	0.1240	0.721	0.2835	0.2835
38	73.30	1.44	0.1245	0.722	0.2914	0.2914
39	74.33	1.44	0.1246	0.721	0.2958	0.2958



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-014 S-10
 Sample No.: S-10
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

Soil Description: DARK BROWNISH GRAY ORGANIC CLAY WITH SAND OL- SAND SEAMS AND SHELL NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.05397	0.000	0.0000	0.0000
2	2.48	2.88	0.04592	0.281	0.007936	0.007936
3	4.74	2.88	0.04821	0.415	0.01577	0.01577
4	6.92	2.88	0.05017	0.508	0.02364	0.02364
5	9.08	2.88	0.05215	0.604	0.03154	0.03154
6	11.02	2.88	0.05413	0.684	0.03940	0.03940
7	12.91	2.88	0.05577	0.754	0.04727	0.04727
8	14.79	2.88	0.05759	0.819	0.05514	0.05514
9	16.83	2.88	0.05936	0.881	0.06300	0.06300
10	18.90	2.88	0.06031	0.936	0.07091	0.07091
11	20.98	2.88	0.06175	0.984	0.07881	0.07881
12	22.90	2.88	0.06337	1.03	0.08664	0.08664
13	24.97	2.88	0.06458	1.08	0.09451	0.09451
14	27.05	2.88	0.06620	1.12	0.1024	0.1024
15	28.75	2.88	0.06688	1.15	0.1102	0.1102
16	30.65	2.88	0.06735	1.18	0.1181	0.1181
17	32.80	2.88	0.06820	1.21	0.1260	0.1260
18	34.81	2.88	0.06915	1.23	0.1339	0.1339
19	36.91	2.88	0.07005	1.26	0.1417	0.1417
20	38.79	2.88	0.07031	1.28	0.1496	0.1496
21	40.72	2.88	0.07061	1.30	0.1575	0.1575
22	42.75	2.88	0.07131	1.31	0.1654	0.1654
23	44.66	2.88	0.07191	1.32	0.1733	0.1733
24	46.49	2.88	0.07265	1.32	0.1811	0.1811
25	48.46	2.88	0.07326	1.33	0.1890	0.1890
26	50.53	2.88	0.07373	1.34	0.1969	0.1969
27	52.55	2.88	0.07427	1.35	0.2047	0.2047
28	54.57	2.88	0.07474	1.36	0.2126	0.2126
29	56.40	2.88	0.07513	1.37	0.2205	0.2205
30	58.54	2.88	0.07531	1.38	0.2283	0.2283
31	60.49	2.88	0.07567	1.39	0.2362	0.2362
32	62.38	2.88	0.07632	1.40	0.2441	0.2441
33	64.23	2.88	0.07663	1.40	0.2520	0.2520
34	66.35	2.88	0.07711	1.41	0.2598	0.2598
35	68.36	2.88	0.07753	1.41	0.2678	0.2678
36	70.32	2.88	0.07787	1.41	0.2756	0.2756
37	72.11	2.88	0.07805	1.41	0.2835	0.2835
38	74.02	2.88	0.07830	1.41	0.2914	0.2914
39	75.19	2.88	0.07850	1.40	0.2954	0.2954



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-014 S-10
 Sample No.: S-10
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 35.0'-37.0'
 Elevation: ----

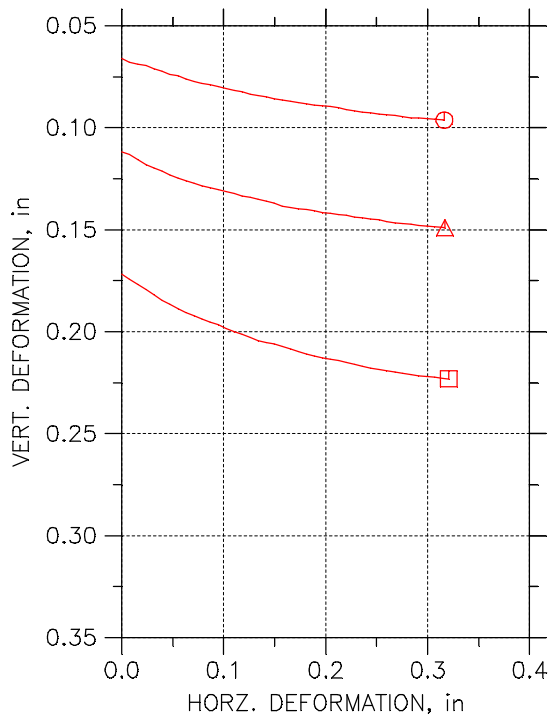
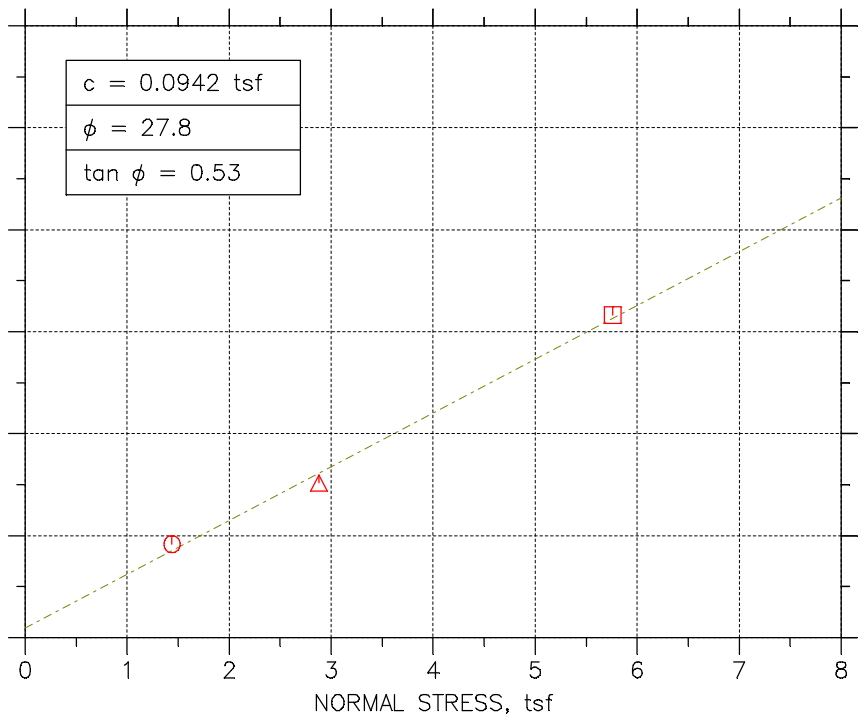
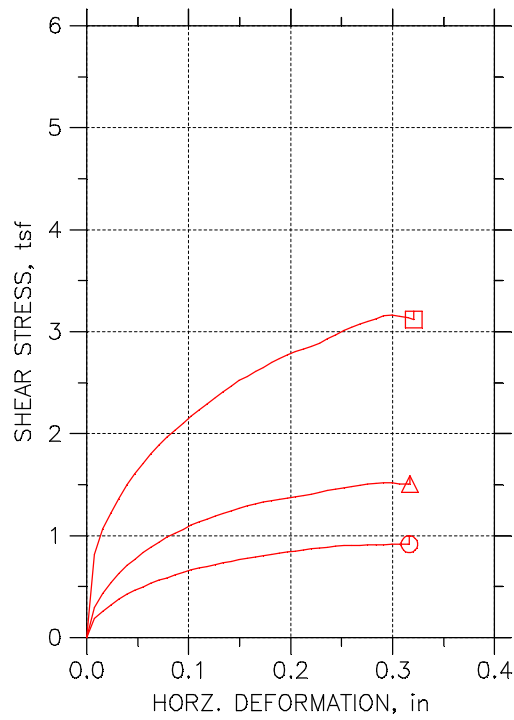
Soil Description: DARK BROWNISH GRAY ORGANIC CLAY WITH SAND OL- SAND SEAMS AND SHELL NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	4.32	0.1644	0.000	0.0000	0.0000
2	2.87	4.32	0.1661	0.476	0.007936	0.007936
3	5.02	4.32	0.1683	0.638	0.01580	0.01580
4	7.32	4.32	0.1706	0.785	0.02364	0.02364
5	9.43	4.32	0.1726	0.920	0.03150	0.03150
6	11.41	4.32	0.1746	1.04	0.03944	0.03944
7	13.32	4.32	0.1764	1.13	0.04727	0.04727
8	15.31	4.32	0.1780	1.23	0.05514	0.05514
9	17.28	4.32	0.1802	1.29	0.06304	0.06304
10	19.26	4.32	0.1812	1.36	0.07087	0.07087
11	21.42	4.32	0.1833	1.41	0.07877	0.07877
12	23.30	4.32	0.1844	1.47	0.08664	0.08664
13	25.32	4.32	0.1857	1.53	0.09454	0.09454
14	27.14	4.32	0.1869	1.58	0.1024	0.1024
15	29.28	4.32	0.1881	1.63	0.1102	0.1102
16	31.25	4.32	0.1893	1.67	0.1181	0.1181
17	33.23	4.32	0.1901	1.71	0.1260	0.1260
18	35.24	4.32	0.1913	1.75	0.1339	0.1339
19	37.22	4.32	0.1924	1.78	0.1417	0.1417
20	39.18	4.32	0.1934	1.81	0.1496	0.1496
21	41.14	4.32	0.1942	1.84	0.1575	0.1575
22	43.17	4.32	0.1948	1.87	0.1654	0.1654
23	45.13	4.32	0.1957	1.89	0.1732	0.1732
24	47.14	4.32	0.1966	1.91	0.1811	0.1811
25	49.12	4.32	0.1976	1.93	0.1890	0.1890
26	51.15	4.32	0.1984	1.95	0.1969	0.1969
27	53.20	4.32	0.1991	1.98	0.2048	0.2048
28	55.12	4.32	0.1997	2.00	0.2126	0.2126
29	56.93	4.32	0.2007	2.02	0.2205	0.2205
30	58.94	4.32	0.2012	2.04	0.2283	0.2283
31	61.01	4.32	0.2019	2.06	0.2362	0.2362
32	63.11	4.32	0.2025	2.08	0.2441	0.2441
33	64.90	4.32	0.2031	2.09	0.2520	0.2520
34	66.86	4.32	0.2039	2.09	0.2598	0.2598
35	68.95	4.32	0.2046	2.09	0.2678	0.2678
36	70.84	4.32	0.2048	2.09	0.2756	0.2756
37	72.71	4.32	0.2050	2.09	0.2835	0.2835
38	74.61	4.32	0.2052	2.09	0.2914	0.2914
39	75.80	4.32	0.2053	2.09	0.2956	0.2956



DIRECT SHEAR TEST by ASTM D3080



Symbol	○	△	□	
Test No.	20 PSI	40 PSI	80 PSI	
Sample No.	S-11	S-11	S-11	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5783	2.574	2.5764
	Area, in ²	5.2212	5.2037	5.2133
	Height, in	0.99882	0.99055	0.99331
	Water Content, %	40.96	40.97	40.38
	Dry Density, pcf	71.698	72.342	72.172
	Saturation, %	81.42	82.71	81.20
	Void Ratio	1.3683	1.3472	1.3528
Consol. Height, in		0.93345	0.88036	0.82222
Consol. Void Ratio		1.2133	1.0861	0.94751
Final	Water Content, %	42.12	36.41	30.26
	Dry Density, pcf	79.345	85.159	93.078
	Saturation, %	100.49	99.64	99.85
	Void Ratio	1.1401	0.99396	0.82432
Normal Stress, tsf		1.4387	2.8788	5.7589
Max. Shear Stress, tsf		0.91675	1.517	3.1636
Ult. Shear Stress, tsf		0.91675	1.5068	3.1176
Time to Failure, min		80.291	75.783	79.062
Disp. Rate, in/min		0.004	0.004	0.004
Estimated Specific Gravity		2.72	2.72	2.72
Liquid Limit		27	27	27
Plastic Limit		20	20	20
Plasticity Index		7	7	7

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-018 S11	
Sample Type: 3.0" ST	
Description: DARK BROWN AND GRAY ORGANIC CLAY WITH SAND OL - SAND SEAMS AND SHELL NOTED	
Remarks: TEST PERFORMED AS PER ASTM D3080.	

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-018 S11
 Sample No.: S-11
 Test No.: 20 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 40.0'-42.0'
 Elevation: ----

Soil Description: DARK BROWN AND GRAY ORGANIC CLAY WITH SAND OL - SAND SEAMS AND SHELL NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	1.439	0.066	0	0
2	2.61	1.437	0.06783	0.1909	0.007876
3	4.60	1.438	0.06884	0.2576	0.01575
4	6.53	1.436	0.06966	0.3184	0.02363
5	8.61	1.436	0.07117	0.3765	0.0315
6	10.63	1.436	0.07243	0.4272	0.03938
7	12.62	1.437	0.07376	0.4666	0.04725
8	14.54	1.437	0.07464	0.4992	0.05513
9	16.54	1.439	0.07622	0.5322	0.06301
10	18.52	1.439	0.07748	0.5621	0.07088
11	20.46	1.438	0.07823	0.5861	0.07876
12	22.45	1.438	0.07893	0.6149	0.08663
13	24.59	1.438	0.07994	0.64	0.09451
14	26.43	1.439	0.08075	0.6634	0.1024
15	28.43	1.439	0.0817	0.6837	0.1103
16	30.42	1.437	0.08227	0.6986	0.1181
17	32.47	1.438	0.08353	0.7173	0.126
18	34.56	1.438	0.08435	0.7354	0.1339
19	36.52	1.438	0.08492	0.7498	0.1418
20	38.29	1.438	0.08567	0.7674	0.1496
21	40.39	1.438	0.0863	0.7808	0.1575
22	42.43	1.438	0.087	0.793	0.1654
23	44.32	1.439	0.08769	0.8048	0.1733
24	46.47	1.438	0.08826	0.8186	0.1811
25	48.52	1.438	0.08901	0.8293	0.189
26	50.45	1.439	0.08927	0.8394	0.1969
27	52.21	1.439	0.08952	0.8495	0.2048
28	54.25	1.439	0.09034	0.857	0.2126
29	56.31	1.438	0.09116	0.8719	0.2205
30	58.23	1.439	0.09185	0.8805	0.2284
31	60.23	1.439	0.09242	0.8863	0.2362
32	62.18	1.439	0.0928	0.8991	0.2441
33	64.11	1.439	0.09336	0.9013	0.252
34	66.08	1.439	0.0938	0.9055	0.2599
35	68.01	1.439	0.09412	0.9061	0.2677
36	70.08	1.438	0.09462	0.9087	0.2756
37	71.98	1.439	0.09513	0.9125	0.2835
38	74.07	1.439	0.09538	0.9103	0.2914
39	76.00	1.439	0.0957	0.9141	0.2992
40	77.97	1.439	0.09595	0.9135	0.3071
41	79.91	1.439	0.0962	0.9162	0.315
42	80.29	1.439	0.09626	0.9167	0.3163



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-018 S11
 Sample No.: S-11
 Test No.: 40 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 40.0'-42.0'
 Elevation: ----

Soil Description: DARK BROWN AND GRAY ORGANIC CLAY WITH SAND OL - SAND SEAMS AND SHELL NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	2.88	0.1118	0	0
2	2.24	2.874	0.1132	0.2943	0.007876
3	4.45	2.877	0.1156	0.4329	0.01575
4	6.47	2.879	0.1181	0.5399	0.02363
5	8.39	2.879	0.1197	0.625	0.0315
6	10.46	2.878	0.1212	0.7069	0.03938
7	12.43	2.878	0.1232	0.7647	0.04725
8	14.48	2.877	0.1248	0.8326	0.05513
9	16.38	2.877	0.126	0.8856	0.06301
10	18.29	2.879	0.1272	0.9343	0.07088
11	20.31	2.878	0.1284	0.9867	0.07876
12	22.28	2.877	0.1295	1.025	0.08663
13	24.27	2.878	0.1303	1.061	0.09451
14	26.47	2.879	0.1313	1.103	0.1024
15	28.29	2.878	0.1323	1.135	0.1103
16	30.33	2.878	0.1334	1.164	0.1181
17	32.24	2.878	0.1343	1.19	0.126
18	34.28	2.878	0.1352	1.218	0.1339
19	36.38	2.878	0.1362	1.245	0.1418
20	38.30	2.878	0.137	1.267	0.1496
21	40.17	2.879	0.1384	1.291	0.1575
22	42.16	2.877	0.1391	1.312	0.1654
23	44.26	2.879	0.1396	1.332	0.1733
24	46.14	2.879	0.14	1.343	0.1811
25	48.19	2.879	0.1408	1.355	0.189
26	50.33	2.879	0.1415	1.368	0.1969
27	52.21	2.879	0.142	1.382	0.2048
28	54.03	2.879	0.1425	1.394	0.2126
29	56.02	2.878	0.143	1.407	0.2205
30	58.15	2.879	0.1439	1.426	0.2284
31	60.05	2.879	0.1441	1.441	0.2362
32	62.00	2.879	0.1447	1.454	0.2441
33	64.00	2.879	0.1452	1.468	0.252
34	65.90	2.879	0.1461	1.481	0.2599
35	67.88	2.878	0.1467	1.493	0.2677
36	69.83	2.879	0.1471	1.504	0.2756
37	71.65	2.879	0.1475	1.512	0.2835
38	73.83	2.879	0.1481	1.516	0.2914
39	75.78	2.879	0.1484	1.517	0.2992
40	77.73	2.879	0.1486	1.508	0.3071
41	79.68	2.879	0.149	1.506	0.315
42	80.15	2.879	0.1491	1.507	0.317



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-018 S11
 Sample No.: S-11
 Test No.: 80 PSI

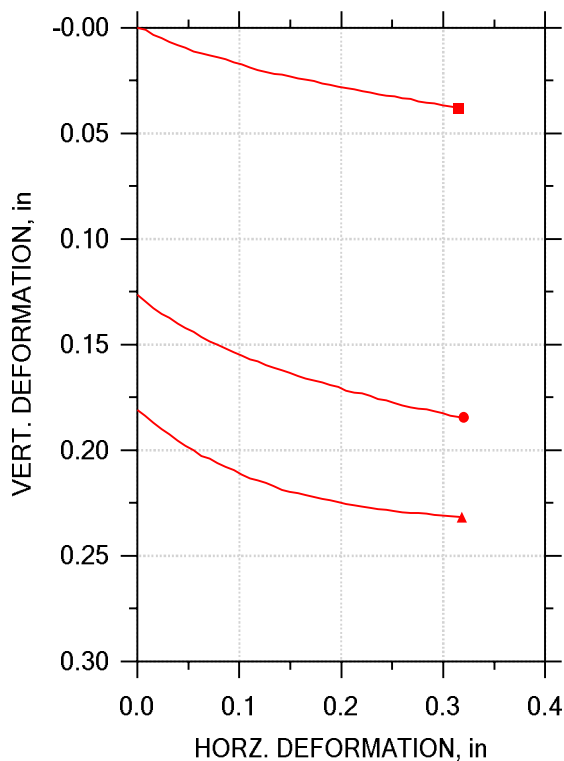
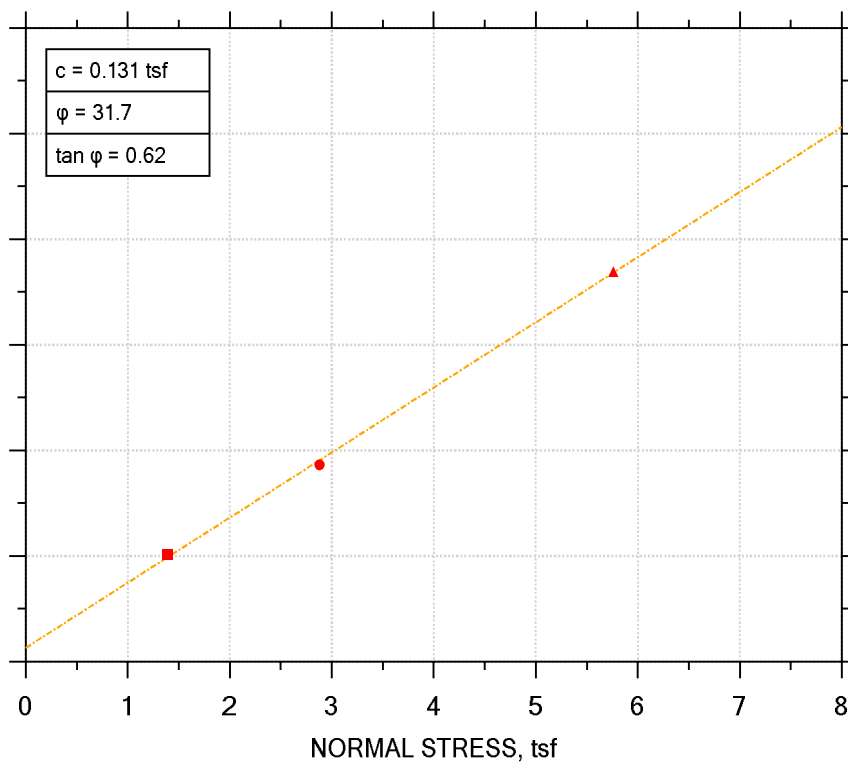
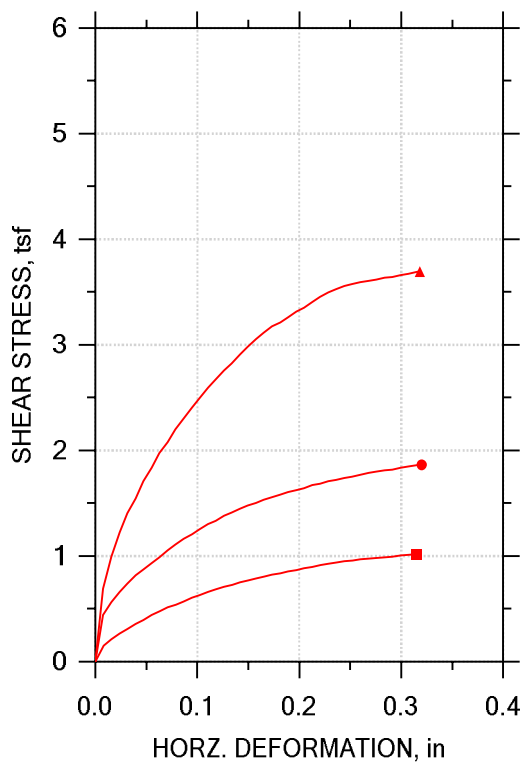
Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 40.0'-42.0'
 Elevation: ----

Soil Description: DARK BROWN AND GRAY ORGANIC CLAY WITH SAND OL - SAND SEAMS AND SHELL NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	5.76	0.1718	0	0
2	5.76	5.758	0.1742	0.814	0.007876
3	7.82	5.758	0.1767	1.067	0.01575
4	9.78	5.755	0.1792	1.227	0.02363
5	11.79	5.756	0.1819	1.362	0.0315
6	13.84	5.757	0.1845	1.498	0.03938
7	15.81	5.754	0.1865	1.604	0.04725
8	17.73	5.754	0.1887	1.704	0.05518
9	19.75	5.759	0.1906	1.799	0.06301
10	21.92	5.757	0.1921	1.888	0.07088
11	23.73	5.757	0.1936	1.961	0.07876
12	25.77	5.758	0.1953	2.033	0.08663
13	27.88	5.759	0.1966	2.103	0.09451
14	29.82	5.758	0.1983	2.17	0.1024
15	31.77	5.756	0.2	2.236	0.1103
16	33.65	5.758	0.2012	2.29	0.1181
17	35.80	5.757	0.2029	2.354	0.126
18	37.75	5.759	0.2044	2.412	0.1339
19	39.72	5.756	0.2053	2.465	0.1418
20	41.79	5.757	0.2059	2.522	0.1496
21	43.76	5.757	0.2073	2.563	0.1575
22	45.75	5.757	0.2084	2.611	0.1654
23	47.50	5.759	0.2097	2.651	0.1733
24	49.59	5.759	0.211	2.697	0.1811
25	51.43	5.758	0.2118	2.737	0.189
26	53.61	5.758	0.2128	2.776	0.1969
27	55.44	5.759	0.2134	2.805	0.2048
28	57.33	5.759	0.2141	2.829	0.2126
29	59.33	5.758	0.215	2.856	0.2205
30	61.41	5.758	0.216	2.89	0.2284
31	63.37	5.759	0.2169	2.929	0.2362
32	65.33	5.759	0.2179	2.969	0.2441
33	67.37	5.758	0.2184	3.009	0.252
34	69.38	5.759	0.2192	3.047	0.2599
35	71.19	5.759	0.2197	3.075	0.2677
36	73.46	5.759	0.2205	3.1	0.2756
37	75.20	5.758	0.2211	3.128	0.2835
38	77.32	5.757	0.2218	3.156	0.2914
39	79.06	5.759	0.222	3.164	0.2992
40	81.22	5.759	0.2224	3.151	0.3071
41	83.02	5.759	0.2228	3.139	0.315
42	84.64	5.759	0.2231	3.118	0.3208





Symbol	■	●	▲	
Test No.	20 PSI	40 PSI	80 PSI	
Sample No.	S-7	S-7	S-7	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5748	2.576	2.5783
	Area, in ²	5.2069	5.2117	5.2212
	Height, in	0.99449	0.99252	0.99488
	Water Content, %	44.55	44.66	44.88
	Dry Density, pcf	67.26	67.42	67.10
	Saturation, %	80.27	80.78	80.53
	Void Ratio	1.4873	1.4816	1.4935
Consol. Height, in	0.99449	0.86625	0.81402	
Consol. Void Ratio	1.4873	1.1659	1.0402	
Final	Water Content, %	50.59	40.33	34.75
	Dry Density, pcf	69.94	82.81	87.47
	Saturation, %	97.38	105.92	102.03
	Void Ratio	1.3922	1.0204	0.91268
Normal Stress, tsf	1.3947	2.8789	5.7584	
Max. Shear Stress, tsf	1.0185	1.8642	3.695	
Ult. Shear Stress, tsf	1.0185	1.8642	3.695	
Time to Failure, min	79.017	81.05	81.167	
Disp. Rate, in/min	0.004	0.004	0.004	
Estimated Specific Gravity	2.68	2.68	2.68	
Liquid Limit	34	34	34	
Plastic Limit	28	28	26	
Plasticity Index	6	6	8	

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-019 S-7	
Sample Type: TRIMMED	
Description: VERY DARK GRAY ORGANIC SILT WITH SAND OL SHELLS NOTED	
Remarks: TEST PERFORMED AS PER ASTM D3080.	

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-019 S-7
 Sample No.: S-7
 Test No.: 20 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 25.0'-27.0'
 Elevation: ----

Soil Description: VERY DARK GRAY ORGANIC SILT WITH SAND OL SHELLS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.40	0.0000	0.000	0.0000	0.0000
2	2.24	1.40	0.001009	0.150	0.008016	0.008016
3	4.21	1.39	0.003278	0.211	0.01589	0.01589
4	6.13	1.39	0.004728	0.264	0.02377	0.02377
5	8.15	1.39	0.006556	0.309	0.03164	0.03164
6	10.27	1.39	0.008132	0.356	0.03952	0.03952
7	12.08	1.39	0.009456	0.397	0.04740	0.04740
8	14.17	1.40	0.01122	0.442	0.05527	0.05527
9	16.22	1.39	0.01204	0.480	0.06315	0.06315
10	18.14	1.40	0.01292	0.512	0.07102	0.07102
11	20.08	1.39	0.01399	0.542	0.07890	0.07890
12	21.96	1.39	0.01488	0.567	0.08677	0.08677
13	24.13	1.39	0.01645	0.604	0.09465	0.09465
14	26.03	1.40	0.01734	0.632	0.1025	0.1025
15	27.97	1.40	0.01885	0.658	0.1104	0.1104
16	30.04	1.39	0.01992	0.683	0.1183	0.1183
17	32.00	1.39	0.02093	0.707	0.1262	0.1262
18	34.07	1.40	0.02169	0.730	0.1340	0.1340
19	35.81	1.39	0.02219	0.749	0.1419	0.1419
20	37.86	1.39	0.02307	0.767	0.1498	0.1498
21	39.69	1.39	0.02389	0.785	0.1577	0.1577
22	41.87	1.39	0.02465	0.806	0.1655	0.1655
23	43.68	1.39	0.02515	0.821	0.1734	0.1734
24	45.61	1.40	0.02622	0.838	0.1813	0.1813
25	47.58	1.39	0.02711	0.853	0.1892	0.1892
26	49.70	1.40	0.02774	0.869	0.1970	0.1970
27	51.63	1.39	0.02843	0.883	0.2049	0.2049
28	53.53	1.39	0.02912	0.898	0.2127	0.2127
29	55.49	1.39	0.03001	0.913	0.2206	0.2206
30	57.46	1.40	0.03076	0.927	0.2285	0.2285
31	59.32	1.40	0.03152	0.939	0.2364	0.2364
32	61.60	1.39	0.03221	0.952	0.2442	0.2442
33	63.33	1.40	0.03247	0.960	0.2521	0.2521
34	65.38	1.40	0.03322	0.970	0.2600	0.2600
35	67.15	1.40	0.03379	0.977	0.2679	0.2679
36	69.28	1.39	0.03486	0.983	0.2757	0.2757
37	71.08	1.40	0.03537	0.989	0.2836	0.2836
38	73.09	1.40	0.03587	0.994	0.2915	0.2915
39	75.11	1.39	0.03656	1.00	0.2994	0.2994
40	76.98	1.39	0.03713	1.01	0.3072	0.3072
41	79.02	1.39	0.03801	1.02	0.3151	0.3151



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-019 S-7
 Sample No.: S-7
 Test No.: 40 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 25.0'-27.0'
 Elevation: ----

Soil Description: VERY DARK GRAY ORGANIC SILT WITH SAND OL SHELLS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.1263	0.000	0.0000	0.0000
2	2.71	2.88	0.1295	0.442	0.007876	0.007876
3	4.72	2.87	0.1327	0.566	0.01575	0.01575
4	6.72	2.87	0.1353	0.662	0.02363	0.02363
5	8.56	2.88	0.1374	0.742	0.03150	0.03150
6	10.61	2.88	0.1401	0.819	0.03938	0.03938
7	12.63	2.88	0.1420	0.871	0.04730	0.04730
8	14.64	2.88	0.1440	0.936	0.05513	0.05513
9	16.63	2.87	0.1464	0.990	0.06301	0.06301
10	18.60	2.88	0.1484	1.05	0.07088	0.07088
11	20.62	2.88	0.1499	1.11	0.07876	0.07876
12	22.64	2.88	0.1518	1.16	0.08663	0.08663
13	24.58	2.88	0.1536	1.21	0.09451	0.09451
14	26.52	2.88	0.1553	1.25	0.1024	0.1024
15	28.53	2.88	0.1568	1.30	0.1103	0.1103
16	30.56	2.88	0.1579	1.34	0.1181	0.1181
17	32.49	2.88	0.1596	1.38	0.1260	0.1260
18	34.47	2.88	0.1611	1.41	0.1339	0.1339
19	36.51	2.88	0.1621	1.45	0.1418	0.1418
20	38.44	2.88	0.1633	1.48	0.1496	0.1496
21	40.29	2.88	0.1647	1.50	0.1575	0.1575
22	42.52	2.88	0.1661	1.53	0.1654	0.1654
23	44.32	2.88	0.1671	1.56	0.1733	0.1733
24	46.34	2.88	0.1679	1.58	0.1811	0.1811
25	48.43	2.88	0.1690	1.60	0.1890	0.1890
26	50.30	2.88	0.1701	1.63	0.1969	0.1969
27	52.25	2.88	0.1718	1.64	0.2048	0.2048
28	54.26	2.88	0.1727	1.67	0.2126	0.2126
29	56.18	2.88	0.1732	1.68	0.2205	0.2205
30	58.19	2.88	0.1742	1.71	0.2284	0.2284
31	60.23	2.88	0.1757	1.72	0.2362	0.2362
32	62.17	2.88	0.1765	1.74	0.2441	0.2441
33	63.89	2.88	0.1776	1.75	0.2520	0.2520
34	66.05	2.88	0.1787	1.77	0.2599	0.2599
35	68.20	2.88	0.1798	1.79	0.2677	0.2677
36	69.90	2.88	0.1802	1.80	0.2756	0.2756
37	71.94	2.88	0.1807	1.81	0.2835	0.2835
38	73.80	2.88	0.1814	1.82	0.2914	0.2914
39	76.05	2.88	0.1826	1.84	0.2992	0.2992
40	77.78	2.88	0.1836	1.85	0.3071	0.3071
41	79.97	2.88	0.1842	1.86	0.3150	0.3150
42	81.05	2.88	0.1845	1.86	0.3199	0.3199



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-019 S-7
 Sample No.: S-7
 Test No.: 80 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 25.0'-27.0'
 Elevation: ----

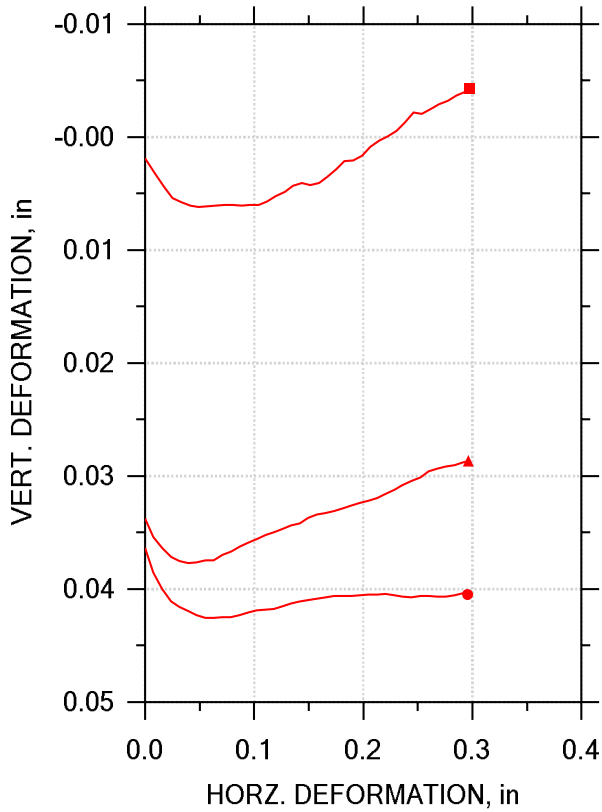
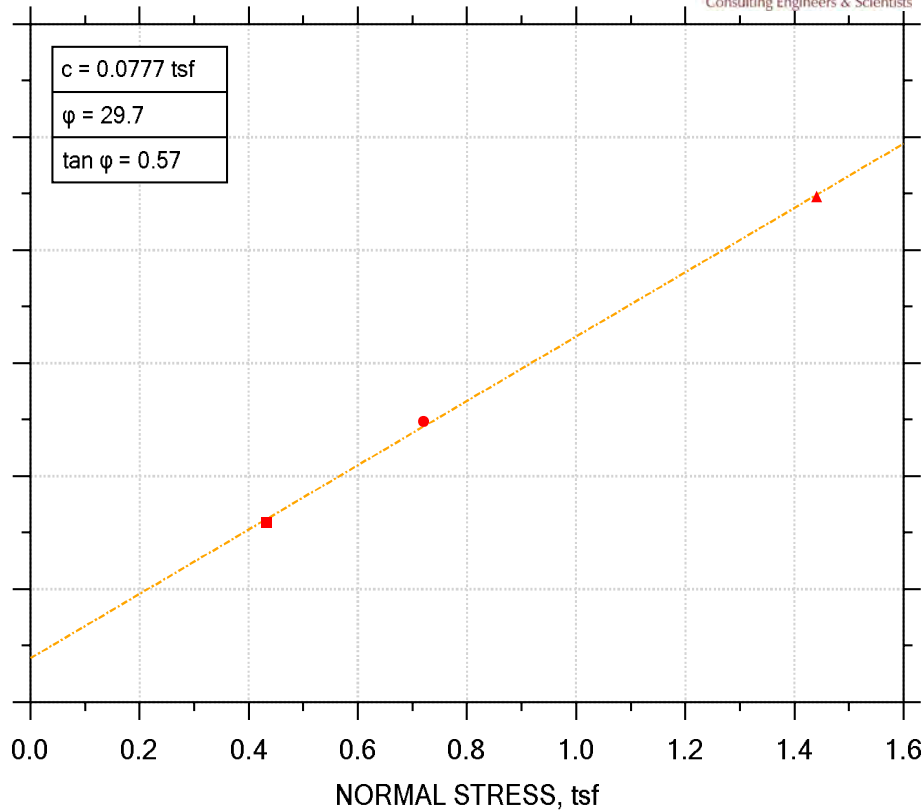
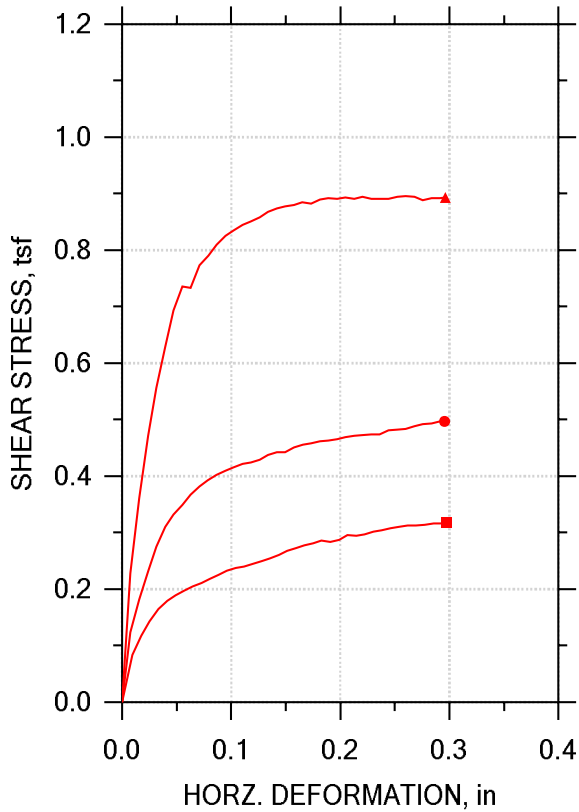
Soil Description: VERY DARK GRAY ORGANIC SILT WITH SAND OL SHELLS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D3080.

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	5.76	0.1809	0.000	0.0000	0.0000
2	2.41	5.76	0.1838	0.693	0.007876	0.007876
3	4.56	5.76	0.1870	0.997	0.01575	0.01575
4	6.61	5.76	0.1899	1.23	0.02363	0.02363
5	8.66	5.76	0.1925	1.41	0.03150	0.03150
6	10.62	5.76	0.1954	1.55	0.03938	0.03938
7	12.67	5.75	0.1979	1.71	0.04725	0.04725
8	14.51	5.75	0.1999	1.84	0.05513	0.05513
9	16.84	5.76	0.2026	1.98	0.06301	0.06301
10	18.58	5.76	0.2041	2.08	0.07088	0.07088
11	20.61	5.76	0.2060	2.20	0.07876	0.07876
12	22.73	5.76	0.2080	2.30	0.08663	0.08663
13	24.64	5.76	0.2093	2.41	0.09451	0.09451
14	26.56	5.76	0.2116	2.50	0.1024	0.1024
15	28.75	5.76	0.2133	2.59	0.1103	0.1103
16	30.58	5.76	0.2143	2.67	0.1181	0.1181
17	32.68	5.76	0.2153	2.75	0.1260	0.1260
18	34.61	5.76	0.2171	2.83	0.1339	0.1339
19	36.73	5.76	0.2189	2.91	0.1418	0.1418
20	38.64	5.76	0.2196	2.98	0.1496	0.1496
21	40.62	5.76	0.2203	3.05	0.1575	0.1575
22	42.63	5.76	0.2213	3.11	0.1654	0.1654
23	44.66	5.76	0.2222	3.17	0.1733	0.1733
24	46.52	5.76	0.2229	3.21	0.1811	0.1811
25	48.51	5.76	0.2236	3.26	0.1890	0.1890
26	50.66	5.76	0.2246	3.32	0.1969	0.1969
27	52.51	5.76	0.2254	3.35	0.2048	0.2048
28	54.78	5.76	0.2261	3.41	0.2126	0.2126
29	56.49	5.76	0.2268	3.45	0.2205	0.2205
30	58.44	5.76	0.2273	3.50	0.2284	0.2284
31	60.62	5.76	0.2279	3.53	0.2362	0.2362
32	62.60	5.76	0.2283	3.55	0.2441	0.2441
33	64.58	5.76	0.2288	3.58	0.2520	0.2520
34	66.59	5.76	0.2295	3.59	0.2599	0.2599
35	68.47	5.76	0.2297	3.61	0.2677	0.2677
36	70.58	5.76	0.2298	3.62	0.2756	0.2756
37	72.44	5.76	0.2302	3.64	0.2835	0.2835
38	74.36	5.76	0.2306	3.65	0.2914	0.2914
39	76.49	5.76	0.2308	3.66	0.2992	0.2992
40	78.50	5.76	0.2312	3.67	0.3071	0.3071
41	80.37	5.76	0.2316	3.69	0.3150	0.3150
42	81.17	5.76	0.2317	3.70	0.3180	0.3180



DIRECT SHEAR TEST by ASTM D3080



Symbol	■	●	▲	
Test No.	5.0 PSI	10.0 PSI	20.0 PSI	
Sample No.	S-5	S-5	S-5	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4835	2.4835	2.4874
	Area, in ²	4.844	4.844	4.8594
	Height, in	0.98504	0.98504	0.99016
	Water Content, %	13.68	12.08	13.15
	Dry Density, pcf	115.5	116.2	119.6
	Saturation, %	79.15	71.31	85.21
	Void Ratio	0.47011	0.46082	0.41964
Consol. Height, in	0.98315	0.94868	0.95639	
Consol. Void Ratio	0.46729	0.4069	0.37123	
Final	Water Content, %	17.58	15.01	14.23
	Dry Density, pcf	115.0	121.2	123.2
	Saturation, %	100.38	101.90	102.21
	Void Ratio	0.47651	0.40079	0.37856
Normal Stress, tsf	0.4329	0.71995	1.4404	
Max. Shear Stress, tsf	0.31754	0.49691	0.89517	
Ult. Shear Stress, tsf	0.31754	0.49691	0.89342	
Time to Failure, min	70.449	70.931	63.315	

Project: DYNERGY HENNEPIN	Disp. Rate, in/min	0.0041764	0.0041764	0.0041764
Location: HENNEPIN, IL	Estimated Specific Gravity	2.72	2.72	2.72
Project No.: MR155233	Liquid Limit	30	30	30
Boring No.: HEN-020 S-5	Plastic Limit	17	17	17
Sample Type: TRIMMED	379 Plasticity Index	13	13	13
Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL				

Project: DYNERGY HENNEPIN
 Boring No.: HEN-020 S-5
 Sample No.: S-5
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 9.5'-11.5'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.432	0.001891	0.000	0.0000	0.0000
2	2.06	0.431	0.003260	0.0842	0.009677	0.009677
3	3.96	0.431	0.004430	0.118	0.01754	0.01754
4	5.72	0.430	0.005385	0.143	0.02541	0.02541
5	7.48	0.432	0.005763	0.164	0.03328	0.03328
6	9.24	0.432	0.006051	0.180	0.04118	0.04118
7	11.16	0.432	0.006177	0.189	0.04905	0.04905
8	13.18	0.432	0.006141	0.198	0.05691	0.05691
9	15.12	0.432	0.006069	0.204	0.06481	0.06481
10	17.19	0.432	0.006015	0.211	0.07265	0.07265
11	19.08	0.432	0.006015	0.218	0.08055	0.08055
12	20.84	0.432	0.006051	0.225	0.08845	0.08845
13	22.43	0.432	0.006015	0.232	0.09628	0.09628
14	24.24	0.432	0.005979	0.237	0.1041	0.1041
15	26.28	0.433	0.005691	0.240	0.1120	0.1120
16	28.23	0.433	0.005222	0.245	0.1199	0.1199
17	30.17	0.432	0.004880	0.249	0.1278	0.1278
18	32.38	0.432	0.004286	0.255	0.1357	0.1357
19	34.18	0.432	0.004034	0.261	0.1435	0.1435
20	35.99	0.432	0.004268	0.268	0.1514	0.1514
21	37.60	0.433	0.004070	0.273	0.1593	0.1593
22	39.35	0.432	0.003494	0.277	0.1672	0.1672
23	41.44	0.432	0.002827	0.281	0.1750	0.1750
24	43.46	0.432	0.002143	0.286	0.1829	0.1829
25	45.45	0.432	0.002035	0.284	0.1908	0.1908
26	47.34	0.432	0.001621	0.287	0.1987	0.1987
27	49.26	0.432	0.0008464	0.296	0.2065	0.2065
28	50.99	0.432	0.0002881	0.295	0.2145	0.2145
29	52.78	0.432	-7.203e-05	0.297	0.2223	0.2223
30	54.50	0.433	-0.0005403	0.301	0.2301	0.2301
31	56.44	0.433	-0.001261	0.305	0.2380	0.2380
32	58.49	0.431	-0.002197	0.307	0.2459	0.2459
33	60.44	0.432	-0.002089	0.310	0.2538	0.2538
34	62.35	0.433	-0.002467	0.313	0.2616	0.2616
35	64.33	0.433	-0.002935	0.313	0.2695	0.2695
36	65.99	0.432	-0.003206	0.314	0.2774	0.2774
37	67.90	0.433	-0.003692	0.316	0.2853	0.2853
38	69.45	0.433	-0.004016	0.317	0.2932	0.2932
39	70.45	0.433	-0.004286	0.318	0.2972	0.2972



Project: DYNERGY HENNEPIN
 Boring No.: HEN-020 S-5
 Sample No.: S-5
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 9.5'-11.5'
 Elevation: ----



Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.720	0.03636	0.000	0.0000	0.0000
2	2.62	0.719	0.03857	0.124	0.007902	0.007902
3	4.55	0.720	0.04001	0.181	0.01577	0.01577
4	6.74	0.719	0.04108	0.232	0.02364	0.02364
5	8.83	0.719	0.04156	0.275	0.03150	0.03150
6	10.79	0.720	0.04192	0.310	0.03940	0.03940
7	12.32	0.719	0.04232	0.332	0.04727	0.04727
8	14.21	0.720	0.04254	0.349	0.05514	0.05514
9	15.98	0.720	0.04257	0.367	0.06300	0.06300
10	18.03	0.720	0.04246	0.382	0.07091	0.07091
11	19.96	0.720	0.04248	0.392	0.07877	0.07877
12	21.84	0.720	0.04228	0.402	0.08664	0.08664
13	23.80	0.720	0.04207	0.410	0.09454	0.09454
14	25.80	0.720	0.04189	0.415	0.1024	0.1024
15	27.44	0.720	0.04183	0.421	0.1102	0.1102
16	29.16	0.720	0.04174	0.424	0.1181	0.1181
17	31.06	0.720	0.04155	0.428	0.1260	0.1260
18	33.15	0.721	0.04128	0.438	0.1339	0.1339
19	35.08	0.720	0.04110	0.442	0.1418	0.1418
20	37.03	0.720	0.04099	0.442	0.1496	0.1496
21	38.86	0.720	0.04086	0.451	0.1575	0.1575
22	40.95	0.720	0.04074	0.456	0.1654	0.1654
23	42.69	0.720	0.04061	0.458	0.1732	0.1732
24	44.32	0.720	0.04059	0.462	0.1811	0.1811
25	46.09	0.720	0.04063	0.463	0.1890	0.1890
26	48.19	0.720	0.04056	0.466	0.1969	0.1969
27	50.25	0.720	0.04047	0.469	0.2047	0.2047
28	52.21	0.720	0.04047	0.472	0.2126	0.2126
29	54.11	0.719	0.04045	0.473	0.2205	0.2205
30	55.96	0.720	0.04052	0.474	0.2283	0.2283
31	57.73	0.720	0.04066	0.474	0.2363	0.2363
32	59.49	0.720	0.04075	0.481	0.2441	0.2441
33	61.13	0.720	0.04063	0.483	0.2520	0.2520
34	63.17	0.720	0.04063	0.484	0.2599	0.2599
35	65.27	0.720	0.04068	0.489	0.2678	0.2678
36	67.26	0.720	0.04065	0.492	0.2756	0.2756
37	69.25	0.720	0.04054	0.494	0.2835	0.2835
38	70.93	0.720	0.04038	0.497	0.2914	0.2914
39	71.92	0.720	0.04048	0.497	0.2955	0.2955



Project: DYNERGY HENNEPIN
 Boring No.: HEN=020 S-5
 Sample No.: S-5
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 9.5'-11.5'
 Elevation: ----

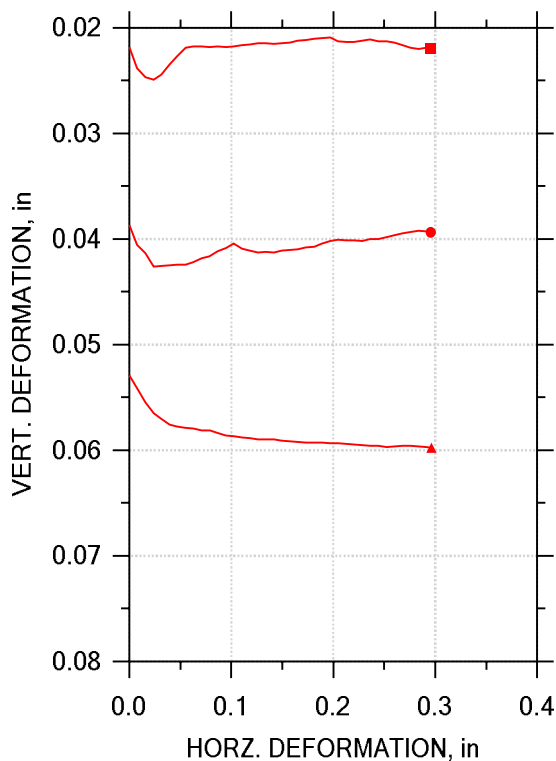
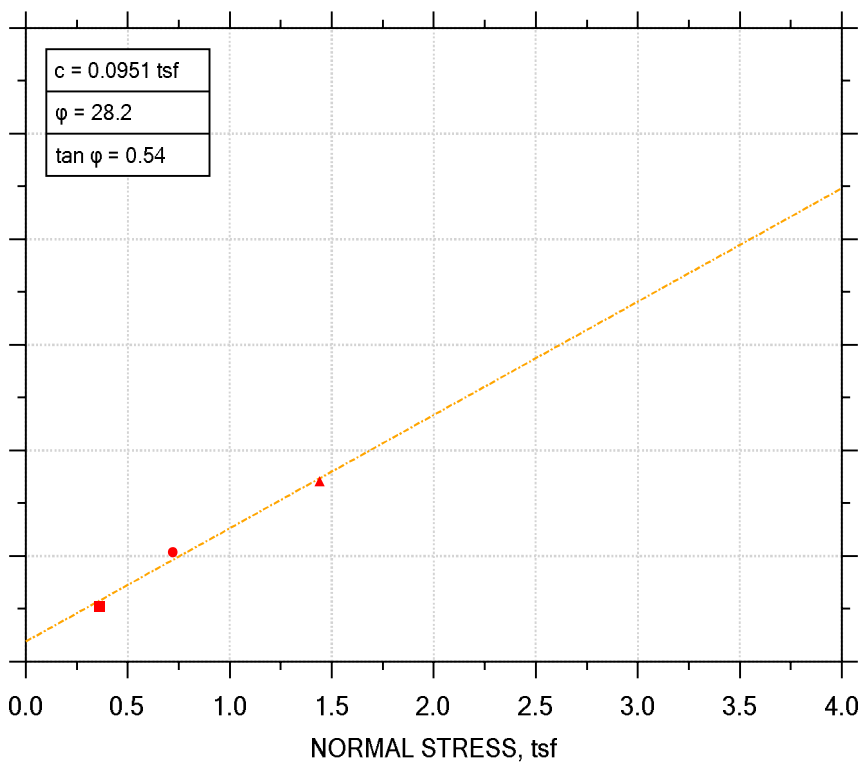
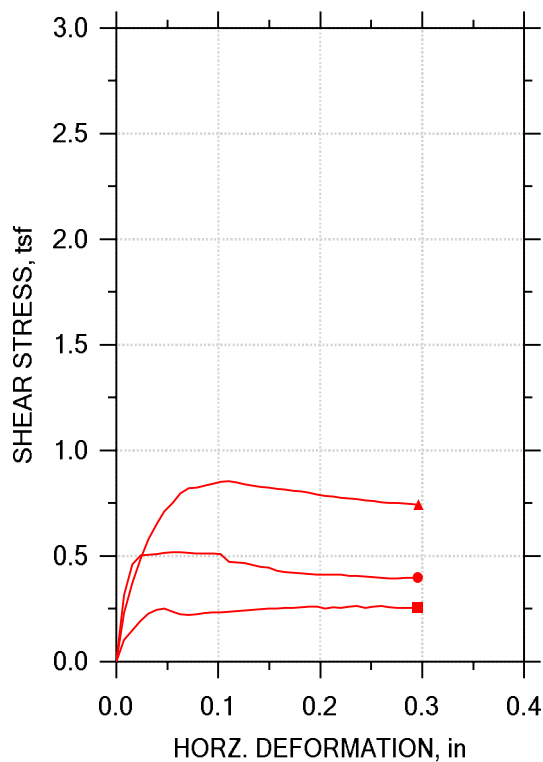


Soil Description: BROWN LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.03377	0.000	0.0000	0.0000
2	2.66	1.44	0.03542	0.228	0.007902	0.007902
3	4.70	1.44	0.03638	0.361	0.01577	0.01577
4	6.57	1.44	0.03717	0.472	0.02364	0.02364
5	8.27	1.44	0.03751	0.556	0.03154	0.03154
6	10.21	1.44	0.03773	0.628	0.03940	0.03940
7	12.14	1.44	0.03766	0.693	0.04731	0.04731
8	13.96	1.44	0.03746	0.736	0.05514	0.05514
9	15.73	1.44	0.03746	0.734	0.06300	0.06300
10	17.91	1.44	0.03695	0.774	0.07087	0.07087
11	19.88	1.44	0.03667	0.790	0.07881	0.07881
12	21.69	1.44	0.03625	0.810	0.08664	0.08664
13	23.58	1.44	0.03587	0.825	0.09454	0.09454
14	25.36	1.44	0.03555	0.835	0.1024	0.1024
15	27.29	1.44	0.03524	0.845	0.1102	0.1102
16	28.99	1.44	0.03497	0.851	0.1182	0.1182
17	31.07	1.44	0.03468	0.858	0.1260	0.1260
18	33.08	1.44	0.03438	0.868	0.1339	0.1339
19	34.88	1.44	0.03418	0.873	0.1417	0.1417
20	36.71	1.44	0.03369	0.877	0.1496	0.1496
21	38.55	1.44	0.03341	0.880	0.1575	0.1575
22	40.35	1.44	0.03326	0.885	0.1654	0.1654
23	42.34	1.44	0.03306	0.883	0.1732	0.1732
24	44.20	1.44	0.03285	0.890	0.1811	0.1811
25	46.28	1.44	0.03260	0.892	0.1890	0.1890
26	48.11	1.44	0.03236	0.891	0.1969	0.1969
27	50.08	1.44	0.03216	0.894	0.2047	0.2047
28	51.90	1.44	0.03191	0.891	0.2126	0.2126
29	53.75	1.44	0.03159	0.894	0.2205	0.2205
30	55.52	1.44	0.03123	0.891	0.2283	0.2283
31	57.38	1.44	0.03078	0.891	0.2362	0.2362
32	59.35	1.44	0.03045	0.891	0.2441	0.2441
33	61.35	1.44	0.03011	0.894	0.2520	0.2520
34	63.31	1.44	0.02955	0.895	0.2599	0.2599
35	65.06	1.44	0.02932	0.894	0.2678	0.2678
36	66.95	1.44	0.02917	0.889	0.2756	0.2756
37	68.86	1.44	0.02901	0.892	0.2835	0.2835
38	70.72	1.44	0.02880	0.892	0.2914	0.2914
39	71.60	1.44	0.02865	0.893	0.2960	0.2960





Symbol	■	●	▲	
Test No.	5.0 PSI	10 PSI	20 PSI	
Sample No.	S-4	S-4	S-4	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4878	2.4917	2.4929
	Area, in ²	4.8609	4.8763	4.8809
	Height, in	0.99252	0.99409	0.99567
	Water Content, %	34.29	34.23	32.70
	Dry Density, pcf	74.65	74.24	73.55
	Saturation, %	85.41	84.30	78.99
	Void Ratio	0.92338	0.93397	0.95221
Consol. Height, in	0.97073	0.95541	0.94274	
Consol. Void Ratio	0.88115	0.85871	0.84844	
Final	Water Content, %	37.77	37.64	36.21
	Dry Density, pcf	76.34	77.30	78.25
	Saturation, %	98.62	100.97	99.73
	Void Ratio	0.88087	0.8574	0.83505
Normal Stress, tsf	0.35988	0.72024	1.4391	
Max. Shear Stress, tsf	0.26345	0.51869	0.85481	
Ult. Shear Stress, tsf	0.25625	0.39908	0.74345	
Time to Failure, min	58.762	15.262	25.728	
Disp. Rate, in/min	0.0044283	0.0044283	0.0044283	
Estimated Specific Gravity	2.30	2.30	2.30	
Liquid Limit	NP	NP	NP	
Plastic Limit	NP	NP	NP	
Plasticity Index	NP	NP	NP	

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-022 S-4	
Sample Type: TRIMMED	
Description: VERY DARK GRAY VARVED FLY ASH WITH SAND - SAND SEAMS NOTED	
Remarks:	

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-022 S-4
 Sample No.: S-4
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5'-9.0'
 Elevation: ----

Soil Description: VERY DARK GRAY VARVED FLY ASH WITH SAND - SAND SEAMS NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.360	0.02179	0.000	0.0000	0.0000
2	1.82	0.358	0.02383	0.102	0.007902	0.007902
3	3.38	0.360	0.02467	0.149	0.01577	0.01577
4	5.29	0.360	0.02492	0.195	0.02364	0.02364
5	6.98	0.361	0.02444	0.227	0.03150	0.03150
6	8.88	0.360	0.02348	0.245	0.03940	0.03940
7	10.59	0.360	0.02265	0.251	0.04727	0.04727
8	12.59	0.360	0.02186	0.237	0.05514	0.05514
9	14.44	0.359	0.02177	0.224	0.06300	0.06300
10	16.23	0.360	0.02177	0.222	0.07087	0.07087
11	17.90	0.360	0.02181	0.226	0.07877	0.07877
12	19.57	0.360	0.02177	0.229	0.08664	0.08664
13	21.32	0.360	0.02179	0.232	0.09454	0.09454
14	23.06	0.360	0.02175	0.234	0.1024	0.1024
15	24.91	0.360	0.02165	0.237	0.1102	0.1102
16	26.82	0.360	0.02159	0.239	0.1182	0.1182
17	28.76	0.360	0.02148	0.242	0.1260	0.1260
18	30.35	0.360	0.02145	0.244	0.1339	0.1339
19	31.96	0.361	0.02154	0.248	0.1417	0.1417
20	33.58	0.360	0.02145	0.250	0.1496	0.1496
21	35.60	0.360	0.02139	0.252	0.1575	0.1575
22	37.49	0.360	0.02121	0.253	0.1654	0.1654
23	39.23	0.360	0.02114	0.255	0.1732	0.1732
24	41.08	0.360	0.02105	0.258	0.1811	0.1811
25	42.93	0.360	0.02094	0.260	0.1890	0.1890
26	44.61	0.360	0.02093	0.261	0.1969	0.1969
27	46.36	0.360	0.02130	0.252	0.2047	0.2047
28	47.82	0.360	0.02136	0.257	0.2126	0.2126
29	49.66	0.360	0.02132	0.255	0.2205	0.2205
30	51.62	0.360	0.02120	0.259	0.2283	0.2283
31	53.54	0.360	0.02111	0.263	0.2362	0.2362
32	55.38	0.360	0.02129	0.255	0.2441	0.2441
33	57.05	0.360	0.02130	0.260	0.2520	0.2520
34	58.76	0.360	0.02139	0.263	0.2599	0.2599
35	60.45	0.360	0.02165	0.259	0.2678	0.2678
36	62.07	0.360	0.02188	0.256	0.2756	0.2756
37	63.81	0.360	0.02202	0.254	0.2835	0.2835
38	65.75	0.360	0.02190	0.255	0.2914	0.2914
39	66.77	0.359	0.02193	0.256	0.2956	0.2956



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-022 S-4
 Sample No.: S-4
 Test No.: 10 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5'-9.0'
 Elevation: ----

Soil Description: VERY DARK GRAY VARVED FLY ASH WITH SAND - SAND SEAMS NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.719	0.03869	0.000	0.0000	0.0000
2	2.62	0.719	0.04054	0.316	0.007902	0.007902
3	4.32	0.719	0.04135	0.461	0.01577	0.01577
4	6.40	0.719	0.04260	0.502	0.02364	0.02364
5	8.11	0.720	0.04257	0.505	0.03150	0.03150
6	9.82	0.720	0.04247	0.510	0.03940	0.03940
7	11.45	0.720	0.04240	0.516	0.04727	0.04727
8	13.23	0.720	0.04243	0.518	0.05514	0.05514
9	15.26	0.720	0.04220	0.519	0.06300	0.06300
10	16.97	0.720	0.04182	0.515	0.07087	0.07087
11	18.82	0.720	0.04162	0.512	0.07877	0.07877
12	20.59	0.720	0.04118	0.513	0.08664	0.08664
13	22.44	0.720	0.04088	0.511	0.09451	0.09451
14	24.17	0.720	0.04044	0.509	0.1024	0.1024
15	25.70	0.719	0.04091	0.474	0.1102	0.1102
16	27.41	0.720	0.04112	0.471	0.1181	0.1181
17	29.20	0.720	0.04125	0.466	0.1260	0.1260
18	31.17	0.720	0.04122	0.457	0.1339	0.1339
19	32.93	0.720	0.04125	0.450	0.1417	0.1417
20	34.76	0.720	0.04108	0.446	0.1497	0.1497
21	36.49	0.720	0.04101	0.429	0.1575	0.1575
22	38.19	0.720	0.04098	0.425	0.1654	0.1654
23	39.89	0.720	0.04081	0.421	0.1732	0.1732
24	41.41	0.720	0.04071	0.418	0.1811	0.1811
25	43.24	0.720	0.04041	0.415	0.1890	0.1890
26	45.33	0.720	0.04020	0.413	0.1969	0.1969
27	47.18	0.720	0.04004	0.413	0.2047	0.2047
28	48.98	0.720	0.04014	0.413	0.2126	0.2126
29	50.59	0.720	0.04014	0.411	0.2205	0.2205
30	52.50	0.720	0.04017	0.406	0.2283	0.2283
31	54.10	0.720	0.04000	0.405	0.2362	0.2362
32	55.71	0.720	0.04000	0.404	0.2441	0.2441
33	57.50	0.720	0.03983	0.401	0.2520	0.2520
34	59.41	0.720	0.03966	0.398	0.2598	0.2598
35	61.36	0.720	0.03943	0.395	0.2678	0.2678
36	63.21	0.720	0.03933	0.394	0.2756	0.2756
37	64.91	0.719	0.03919	0.396	0.2835	0.2835
38	66.55	0.720	0.03929	0.398	0.2914	0.2914
39	67.46	0.720	0.03936	0.399	0.2955	0.2955



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-022 S-4
 Sample No.: S-4
 Test No.: 20 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5'-9.0'
 Elevation: ----

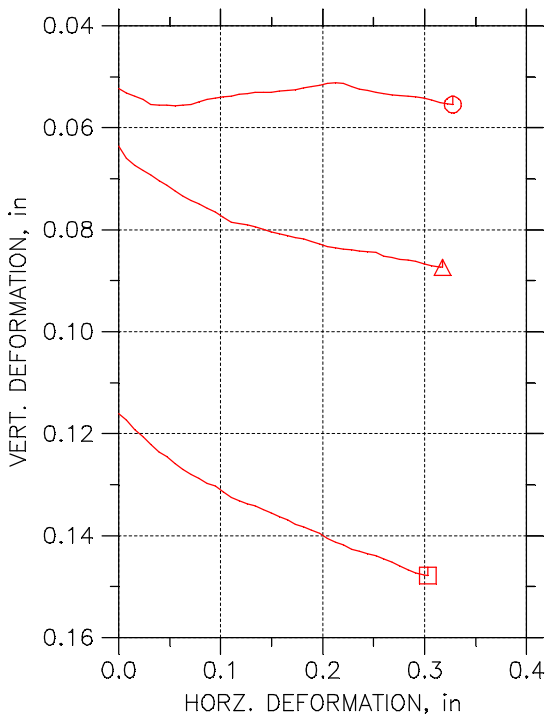
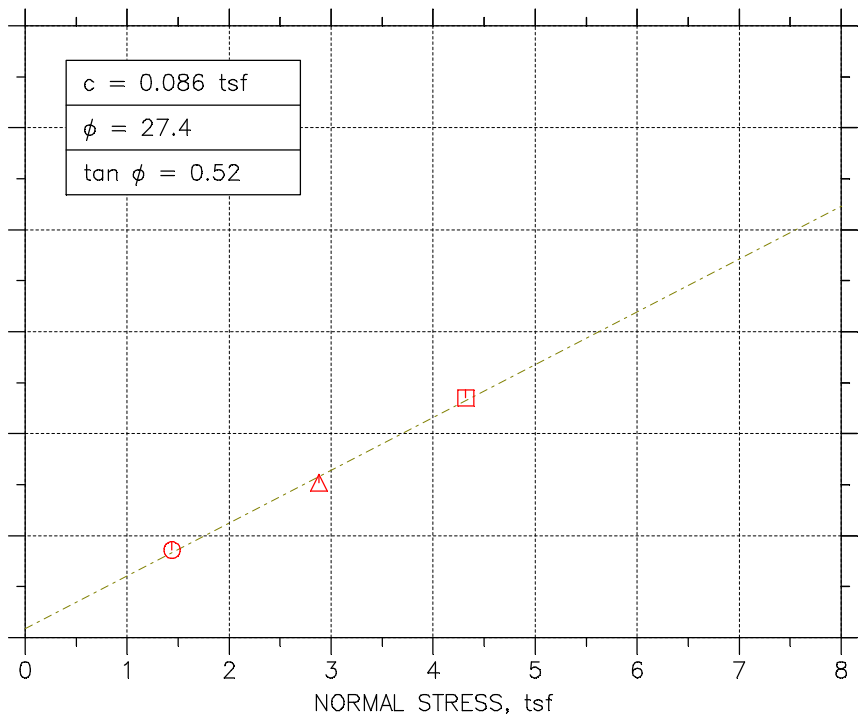
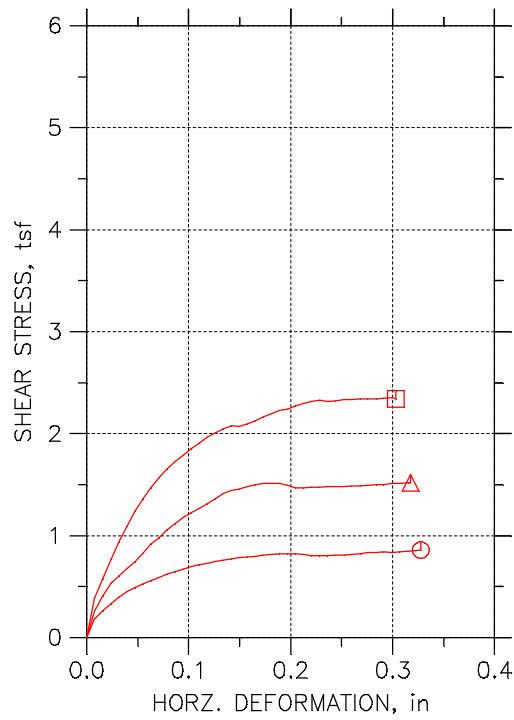
Soil Description: VERY DARK GRAY VARVED FLY ASH WITH SAND - SAND SEAMS NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.05293	0.000	0.0000	0.0000
2	2.34	1.44	0.05415	0.230	0.007902	0.007902
3	4.34	1.44	0.05548	0.372	0.01577	0.01577
4	6.32	1.44	0.05646	0.488	0.02364	0.02364
5	8.15	1.44	0.05703	0.579	0.03161	0.03161
6	9.79	1.44	0.05757	0.653	0.03940	0.03940
7	11.59	1.44	0.05779	0.712	0.04727	0.04727
8	13.24	1.44	0.05790	0.753	0.05524	0.05524
9	15.17	1.44	0.05797	0.798	0.06300	0.06300
10	17.06	1.44	0.05811	0.821	0.07087	0.07087
11	18.69	1.44	0.05811	0.824	0.07884	0.07884
12	20.66	1.44	0.05837	0.834	0.08664	0.08664
13	22.39	1.44	0.05858	0.842	0.09451	0.09451
14	24.07	1.44	0.05865	0.851	0.1024	0.1024
15	25.73	1.44	0.05880	0.855	0.1102	0.1102
16	27.50	1.44	0.05887	0.850	0.1181	0.1181
17	29.48	1.44	0.05896	0.838	0.1260	0.1260
18	31.22	1.44	0.05896	0.833	0.1339	0.1339
19	33.08	1.44	0.05900	0.829	0.1418	0.1418
20	34.82	1.44	0.05907	0.824	0.1496	0.1496
21	36.71	1.44	0.05914	0.818	0.1575	0.1575
22	38.43	1.44	0.05919	0.814	0.1654	0.1654
23	40.07	1.44	0.05925	0.809	0.1732	0.1732
24	41.68	1.44	0.05930	0.806	0.1811	0.1811
25	43.49	1.44	0.05928	0.800	0.1890	0.1890
26	45.57	1.44	0.05936	0.792	0.1969	0.1969
27	47.30	1.44	0.05936	0.786	0.2047	0.2047
28	49.13	1.44	0.05937	0.781	0.2126	0.2126
29	50.86	1.44	0.05945	0.777	0.2205	0.2205
30	52.57	1.44	0.05952	0.773	0.2283	0.2283
31	54.32	1.44	0.05955	0.769	0.2362	0.2362
32	55.87	1.44	0.05955	0.765	0.2441	0.2441
33	57.62	1.44	0.05968	0.761	0.2520	0.2520
34	59.71	1.44	0.05961	0.755	0.2598	0.2598
35	61.58	1.44	0.05959	0.752	0.2678	0.2678
36	63.36	1.44	0.05959	0.750	0.2757	0.2757
37	64.97	1.44	0.05961	0.748	0.2835	0.2835
38	66.90	1.44	0.05972	0.746	0.2914	0.2914
39	67.87	1.44	0.05975	0.743	0.2961	0.2961



DIRECT SHEAR TEST by ASTM D3080



Symbol	⊙	△	□	
Test No.	20 PSI	40 PSI	60 PSI	
Sample No.	S-9	S-9	S-9	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.5803	2.5787	2.578
	Area, in ²	5.2292	5.2228	5.2196
	Height, in	0.99646	0.99882	1.0004
	Water Content, %	27.10	27.49	27.75
	Dry Density, pcf	82.685	82.862	81.487
	Saturation, %	84.62	86.28	83.76
	Void Ratio	0.73653	0.73281	0.76205
	Consol. Height, in	0.9488	0.93496	0.88478
	Consol. Void Ratio	0.65348	0.62203	0.55841
Final	Water Content, %	27.69	24.38	21.54
	Dry Density, pcf	87.559	90.805	95.616
	Saturation, %	99.53	96.47	98.75
	Void Ratio	0.63985	0.58123	0.50167
	Normal Stress, tsf	1.4387	2.8787	4.3188
	Max. Shear Stress, tsf	0.85913	1.5203	2.3505
	Ult. Shear Stress, tsf	0.85913	1.5203	2.3401
	Time to Failure, min	82.679	84.196	80.075
	Disp. Rate, in/min	0.004	0.004	0.004
	Estimated Specific Gravity	2.30	2.30	2.30
	Liquid Limit	---	---	---
	Plastic Limit	---	---	---
	Plasticity Index	---	---	---

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-023 S1	
Sample Type: 3.0" ST	
Description: VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL	
Remarks: TEST PERFORMED AS PER ASTM D3080.	387

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-023 S1
 Sample No.: S-9
 Test No.: 20 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 27.0'-29.0'
 Elevation: ----

Soil Description: VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	1.437	0.05232	0	0
2	2.57	1.439	0.05321	0.1845	0.007876
3	4.37	1.439	0.05384	0.262	0.01575
4	6.49	1.438	0.05447	0.3348	0.02363
5	8.64	1.439	0.05541	0.3987	0.0315
6	10.60	1.439	0.05554	0.4493	0.03938
7	12.60	1.439	0.0556	0.4929	0.04725
8	14.66	1.44	0.05566	0.5295	0.05513
9	16.62	1.44	0.05554	0.5601	0.06301
10	18.58	1.441	0.05541	0.5898	0.07088
11	20.52	1.44	0.05497	0.6213	0.07876
12	22.48	1.44	0.0544	0.6477	0.08663
13	24.33	1.44	0.05415	0.6723	0.09451
14	26.65	1.44	0.0539	0.6982	0.1024
15	28.33	1.44	0.05377	0.7149	0.1103
16	30.29	1.44	0.05346	0.7312	0.1181
17	32.44	1.44	0.05327	0.7446	0.126
18	34.34	1.44	0.05308	0.7604	0.1339
19	36.25	1.44	0.05302	0.7747	0.1418
20	38.33	1.44	0.05302	0.7854	0.1496
21	40.21	1.44	0.05276	0.7919	0.1576
22	42.27	1.44	0.05264	0.7998	0.1654
23	44.18	1.44	0.05251	0.81	0.1733
24	46.26	1.44	0.0522	0.8174	0.1811
25	48.13	1.44	0.05195	0.8211	0.189
26	50.09	1.439	0.05169	0.823	0.1969
27	52.06	1.439	0.05138	0.8202	0.2048
28	54.03	1.439	0.05125	0.8179	0.2126
29	55.86	1.439	0.05131	0.8049	0.2205
30	57.76	1.438	0.05195	0.8021	0.2284
31	59.91	1.438	0.05239	0.8021	0.2362
32	61.73	1.439	0.05264	0.81	0.2441
33	63.96	1.439	0.05302	0.8086	0.252
34	65.73	1.439	0.05327	0.8174	0.2599
35	67.59	1.439	0.05352	0.8225	0.2677
36	69.70	1.439	0.05371	0.8327	0.2756
37	71.64	1.439	0.05384	0.8364	0.2835
38	73.60	1.439	0.05396	0.8392	0.2914
39	75.59	1.439	0.05415	0.8373	0.2992
40	77.45	1.439	0.05453	0.8383	0.3071
41	79.47	1.439	0.05503	0.8462	0.315
42	81.41	1.439	0.05529	0.8526	0.3229
43	82.68	1.439	0.05548	0.8591	0.3275



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-023 S1
 Sample No.: S-9
 Test No.: 40 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 27.0'-29.0'
 Elevation: ----

Soil Description: VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	2.879	0.06367	0	0
2	5.50	2.879	0.066	0.2558	0.007876
3	7.58	2.876	0.06739	0.4071	0.01575
4	9.71	2.879	0.0684	0.5366	0.02363
5	11.73	2.878	0.06928	0.6049	0.0315
6	13.68	2.878	0.07042	0.6796	0.03938
7	15.64	2.877	0.0713	0.7404	0.04725
8	17.61	2.877	0.07243	0.8268	0.05513
9	19.78	2.878	0.07344	0.914	0.06301
10	21.88	2.878	0.07432	0.9795	0.07088
11	23.89	2.878	0.07496	1.051	0.07876
12	25.89	2.879	0.07584	1.118	0.08663
13	27.97	2.876	0.07659	1.179	0.09451
14	29.98	2.879	0.0776	1.222	0.1024
15	31.97	2.878	0.07855	1.269	0.1103
16	34.06	2.878	0.0788	1.313	0.1181
17	36.03	2.878	0.07905	1.361	0.126
18	38.01	2.879	0.07943	1.411	0.1339
19	40.08	2.878	0.07987	1.443	0.1418
20	42.02	2.878	0.08038	1.453	0.1496
21	43.98	2.878	0.08082	1.483	0.1575
22	45.99	2.879	0.08113	1.499	0.1654
23	48.06	2.879	0.08157	1.516	0.1733
24	49.93	2.879	0.08183	1.51	0.1811
25	51.88	2.879	0.08233	1.512	0.189
26	54.00	2.879	0.08284	1.492	0.1969
27	55.79	2.879	0.08328	1.472	0.2048
28	57.64	2.879	0.08353	1.466	0.2126
29	59.87	2.879	0.08378	1.473	0.2205
30	61.83	2.878	0.08397	1.477	0.2284
31	63.72	2.879	0.08416	1.481	0.2362
32	65.75	2.879	0.08429	1.479	0.2441
33	67.56	2.879	0.08441	1.482	0.252
34	69.63	2.879	0.08523	1.486	0.2599
35	71.57	2.879	0.08548	1.49	0.2677
36	73.66	2.879	0.0858	1.494	0.2756
37	75.62	2.879	0.08599	1.499	0.2835
38	77.53	2.879	0.08624	1.502	0.2914
39	79.64	2.879	0.08668	1.51	0.2992
40	81.55	2.879	0.08712	1.514	0.3072
41	83.43	2.879	0.08737	1.518	0.315
42	84.20	2.879	0.08737	1.52	0.3176



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-023 S1
 Sample No.: S-9
 Test No.: 60 PSI

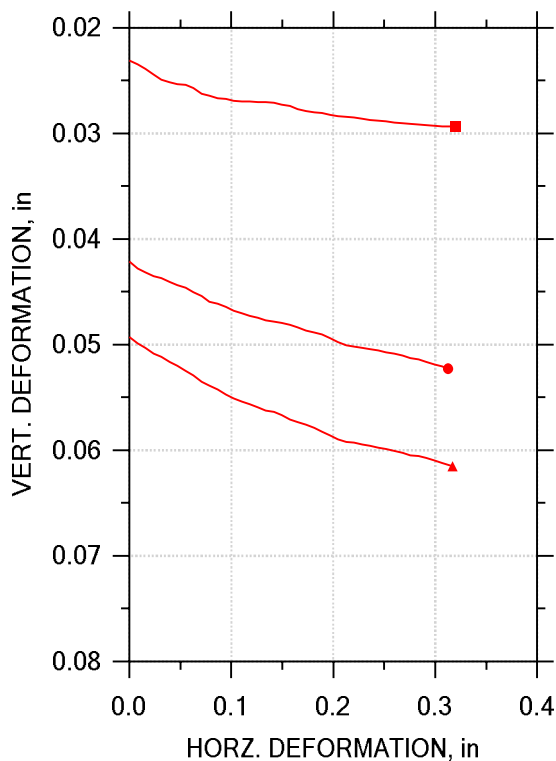
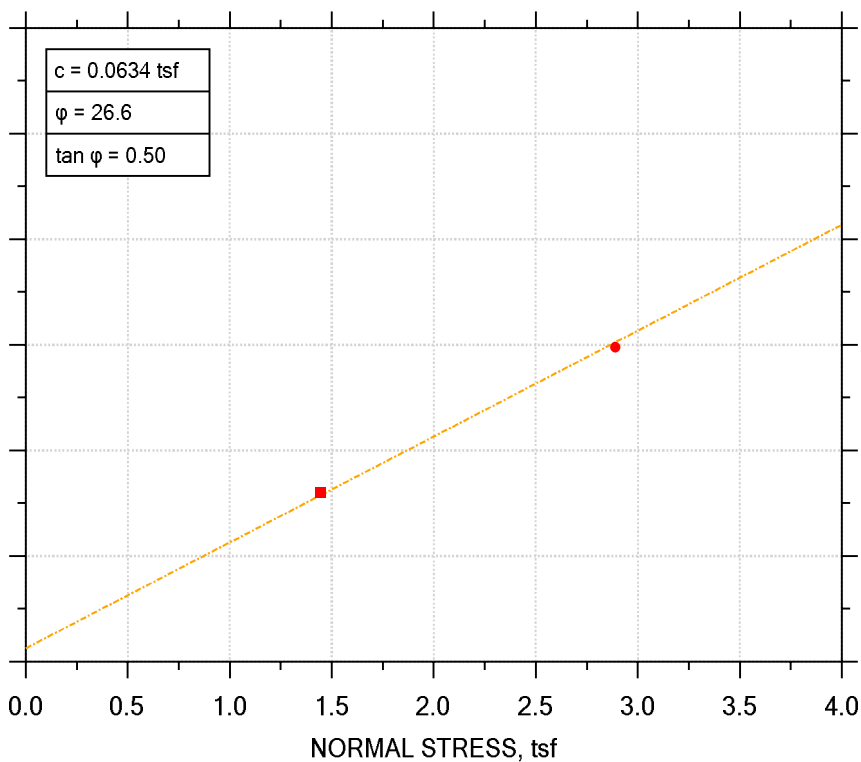
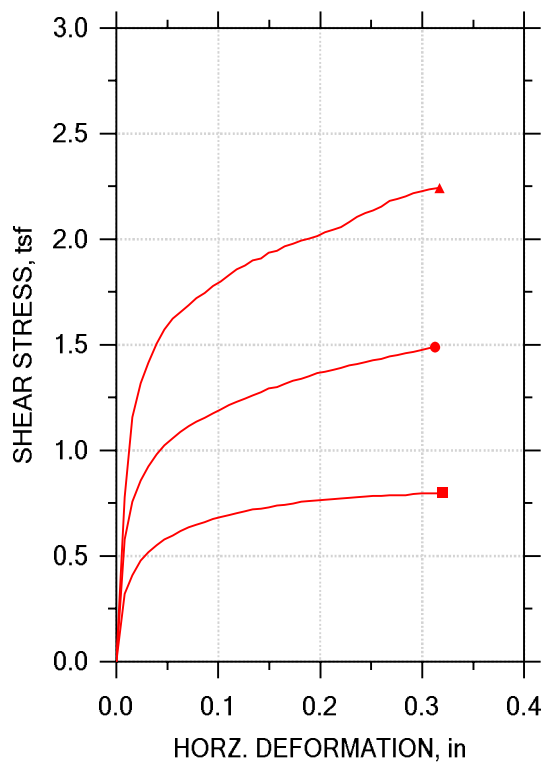
Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/146/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 27.0'-29.0'
 Elevation: ----

Soil Description: VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL
 Remarks: TEST PERFORMED AS PER ASTM D3080.

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in
1	0.00	4.319	0.1161	0	0
2	6.63	4.317	0.1173	0.3858	0.007876
3	8.64	4.317	0.1192	0.5763	0.01575
4	10.67	4.319	0.1206	0.7651	0.02363
5	12.61	4.319	0.1221	0.938	0.0315
6	14.65	4.316	0.1236	1.092	0.03938
7	16.80	4.318	0.1244	1.238	0.04725
8	18.85	4.319	0.1259	1.362	0.05513
9	20.70	4.319	0.127	1.466	0.06301
10	22.72	4.317	0.128	1.566	0.07088
11	24.69	4.318	0.1288	1.652	0.07876
12	26.74	4.319	0.1297	1.728	0.08663
13	28.73	4.318	0.1303	1.792	0.09451
14	30.64	4.318	0.1314	1.849	0.1024
15	32.69	4.318	0.1325	1.908	0.1103
16	34.81	4.318	0.1331	1.962	0.1181
17	36.79	4.319	0.1337	2.006	0.126
18	38.68	4.317	0.1342	2.046	0.1339
19	40.54	4.318	0.1348	2.078	0.1418
20	42.61	4.319	0.1355	2.073	0.1496
21	44.59	4.317	0.1363	2.095	0.1575
22	46.53	4.318	0.1369	2.126	0.1654
23	48.62	4.318	0.1377	2.162	0.1733
24	50.61	4.318	0.1382	2.198	0.1811
25	52.53	4.319	0.1389	2.227	0.189
26	54.34	4.318	0.1395	2.24	0.1969
27	56.45	4.319	0.1406	2.273	0.2048
28	58.39	4.318	0.1413	2.297	0.2126
29	60.26	4.318	0.1418	2.315	0.2205
30	62.40	4.318	0.1427	2.325	0.2284
31	64.27	4.318	0.1431	2.315	0.2362
32	66.19	4.318	0.1435	2.324	0.2441
33	68.09	4.319	0.1439	2.334	0.252
34	70.02	4.319	0.1446	2.335	0.2599
35	72.17	4.318	0.1452	2.338	0.2677
36	74.03	4.318	0.1459	2.342	0.2756
37	76.23	4.318	0.1466	2.343	0.2835
38	78.15	4.319	0.1473	2.348	0.2914
39	80.07	4.319	0.1476	2.35	0.2992
40	81.07	4.318	0.1478	2.34	0.3032





Symbol	■	●	▲	
Test No.	20.0 PSI	40.0 PSI	60.0 PSI	
Sample No.	S-9	S-9	S-9	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4996	2.4996	2.5035
	Area, in ²	4.9072	4.9072	4.9227
	Height, in	1.0012	1.0043	1.0063
	Water Content, %	48.30	48.74	48.73
	Dry Density, pcf	73.27	74.93	74.29
	Saturation, %	103.35	108.66	106.94
	Void Ratio	1.2152	1.1662	1.1848
Consol. Height, in	0.97808	0.96221	0.95704	
Consol. Void Ratio	1.1641	1.0754	1.0779	
Final	Water Content, %	43.69	39.99	40.37
	Dry Density, pcf	75.49	79.04	79.13
	Saturation, %	98.76	98.70	99.84
	Void Ratio	1.1502	1.0534	1.0513
Normal Stress, tsf	1.4455	2.8899	4.3244	
Max. Shear Stress, tsf	0.7992	1.4892	2.2422	
Ult. Shear Stress, tsf	0.7992	1.4892	2.2422	
Time to Failure, min	78.896	78.246	79.775	
Disp. Rate, in/min	0.004	0.004	0.004	
Estimated Specific Gravity	2.60	2.60	2.60	
Liquid Limit	58	58	58	
Plastic Limit	23	23	23	
Plasticity Index	35	35	35	

Project: DYNEGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-024 S-9
Sample Type: 3" ST
Description: DARK GRAY ORGANIC CLAY WITH SAND OH
Remarks: TEST PERFORMED AS PER ASTM D3080

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-024 S-9
 Sample No.: S-9
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: WPQ
 Test Date: 12/16/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 26.5'-28.5'
 Elevation: ----

Soil Description: DARK GRAY ORGANIC CLAY WITH SAND OH
 Remarks: TEST PERFORMED AS PER ASTM D3080

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.45	0.02310	0.000	0.0000	0.0000
2	2.83	1.44	0.02346	0.322	0.007916	0.007916
3	4.68	1.44	0.02391	0.410	0.01578	0.01578
4	6.60	1.44	0.02445	0.478	0.02365	0.02365
5	8.62	1.44	0.02490	0.519	0.03152	0.03152
6	10.54	1.44	0.02516	0.550	0.03939	0.03939
7	12.47	1.44	0.02535	0.577	0.04726	0.04726
8	14.35	1.44	0.02542	0.598	0.05512	0.05512
9	16.24	1.44	0.02568	0.617	0.06299	0.06299
10	18.42	1.44	0.02622	0.636	0.07091	0.07091
11	20.09	1.44	0.02645	0.648	0.07878	0.07878
12	21.99	1.44	0.02667	0.661	0.08665	0.08665
13	24.07	1.44	0.02674	0.674	0.09451	0.09451
14	25.98	1.44	0.02690	0.685	0.1024	0.1024
15	27.86	1.44	0.02696	0.695	0.1102	0.1102
16	29.65	1.44	0.02699	0.703	0.1181	0.1181
17	31.66	1.44	0.02703	0.712	0.1260	0.1260
18	33.60	1.44	0.02706	0.720	0.1339	0.1339
19	35.46	1.44	0.02709	0.725	0.1418	0.1418
20	37.49	1.44	0.02728	0.732	0.1496	0.1496
21	39.55	1.44	0.02741	0.738	0.1575	0.1575
22	41.43	1.44	0.02770	0.744	0.1654	0.1654
23	43.16	1.44	0.02790	0.750	0.1732	0.1732
24	45.07	1.45	0.02799	0.756	0.1811	0.1811
25	47.14	1.44	0.02809	0.761	0.1890	0.1890
26	48.89	1.44	0.02825	0.765	0.1969	0.1969
27	50.73	1.44	0.02835	0.767	0.2048	0.2048
28	52.81	1.45	0.02844	0.770	0.2126	0.2126
29	54.81	1.44	0.02847	0.774	0.2205	0.2205
30	56.58	1.44	0.02864	0.775	0.2284	0.2284
31	58.54	1.45	0.02870	0.779	0.2362	0.2362
32	60.26	1.45	0.02876	0.782	0.2441	0.2441
33	62.26	1.45	0.02886	0.784	0.2520	0.2520
34	64.13	1.45	0.02896	0.786	0.2599	0.2599
35	66.07	1.45	0.02905	0.787	0.2678	0.2678
36	68.20	1.44	0.02912	0.788	0.2756	0.2756
37	69.92	1.45	0.02918	0.787	0.2835	0.2835
38	71.92	1.45	0.02921	0.792	0.2914	0.2914
39	73.61	1.44	0.02928	0.796	0.2992	0.2992
40	75.77	1.44	0.02931	0.798	0.3071	0.3071
41	77.51	1.44	0.02934	0.797	0.3150	0.3150
42	78.90	1.45	0.02938	0.799	0.3202	0.3202



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-024 S-9
 Sample No.: S-9
 Test No.: 40.0 PSI

Location: HENNEPIN, IL
 Tested By: WPQ
 Test Date: 12/16/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: BCM
 Depth: 26.5'-28.5'
 Elevation: ----

Soil Description: DARK GRAY ORGANIC CLAY WITH SAND OH
 Remarks: TEST PERFORMED AS PER ASTM D3080

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.89	0.04212	0.000	0.0000	0.0000
2	4.33	2.89	0.04276	0.579	0.007916	0.007916
3	6.24	2.89	0.04315	0.759	0.01578	0.01578
4	8.26	2.89	0.04350	0.856	0.02365	0.02365
5	10.18	2.89	0.04373	0.923	0.03152	0.03152
6	12.02	2.89	0.04405	0.981	0.03939	0.03939
7	13.99	2.89	0.04434	1.02	0.04726	0.04726
8	15.82	2.89	0.04463	1.06	0.05512	0.05512
9	17.65	2.89	0.04504	1.09	0.06299	0.06299
10	19.62	2.89	0.04540	1.11	0.07091	0.07091
11	21.62	2.89	0.04591	1.14	0.07878	0.07878
12	23.51	2.89	0.04614	1.15	0.08665	0.08665
13	25.43	2.89	0.04640	1.18	0.09451	0.09451
14	27.27	2.89	0.04678	1.20	0.1024	0.1024
15	29.24	2.89	0.04704	1.22	0.1102	0.1102
16	31.09	2.89	0.04730	1.23	0.1181	0.1181
17	33.03	2.89	0.04746	1.25	0.1260	0.1260
18	35.12	2.89	0.04768	1.26	0.1339	0.1339
19	36.86	2.89	0.04784	1.28	0.1418	0.1418
20	38.90	2.89	0.04794	1.30	0.1496	0.1496
21	40.73	2.89	0.04813	1.30	0.1575	0.1575
22	42.66	2.89	0.04839	1.32	0.1654	0.1654
23	44.59	2.89	0.04868	1.33	0.1732	0.1732
24	46.52	2.89	0.04887	1.34	0.1811	0.1811
25	48.24	2.89	0.04903	1.35	0.1890	0.1890
26	50.32	2.89	0.04942	1.37	0.1969	0.1969
27	52.25	2.89	0.04974	1.37	0.2048	0.2048
28	54.15	2.89	0.05006	1.38	0.2126	0.2126
29	56.03	2.89	0.05019	1.39	0.2205	0.2205
30	58.01	2.89	0.05029	1.40	0.2284	0.2284
31	59.88	2.89	0.05042	1.41	0.2362	0.2362
32	61.69	2.89	0.05055	1.42	0.2441	0.2441
33	63.69	2.89	0.05071	1.43	0.2520	0.2520
34	65.33	2.89	0.05087	1.43	0.2599	0.2599
35	67.31	2.89	0.05106	1.44	0.2678	0.2678
36	69.14	2.89	0.05129	1.45	0.2756	0.2756
37	71.13	2.89	0.05138	1.46	0.2835	0.2835
38	73.21	2.89	0.05164	1.47	0.2914	0.2914
39	75.04	2.89	0.05187	1.48	0.2992	0.2992
40	76.93	2.89	0.05209	1.49	0.3071	0.3071
41	78.25	2.89	0.05228	1.49	0.3125	0.3125



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-024 S-9
 Sample No.: S-9
 Test No.: 60.0 PSI

Location: HENNEPIN, IL
 Tested By: WPQ
 Test Date: 12/16/15
 Sample Type: 3" ST

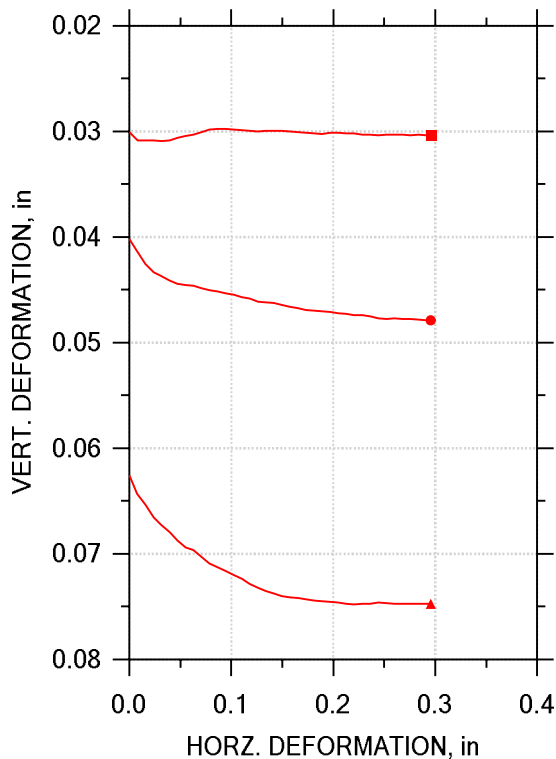
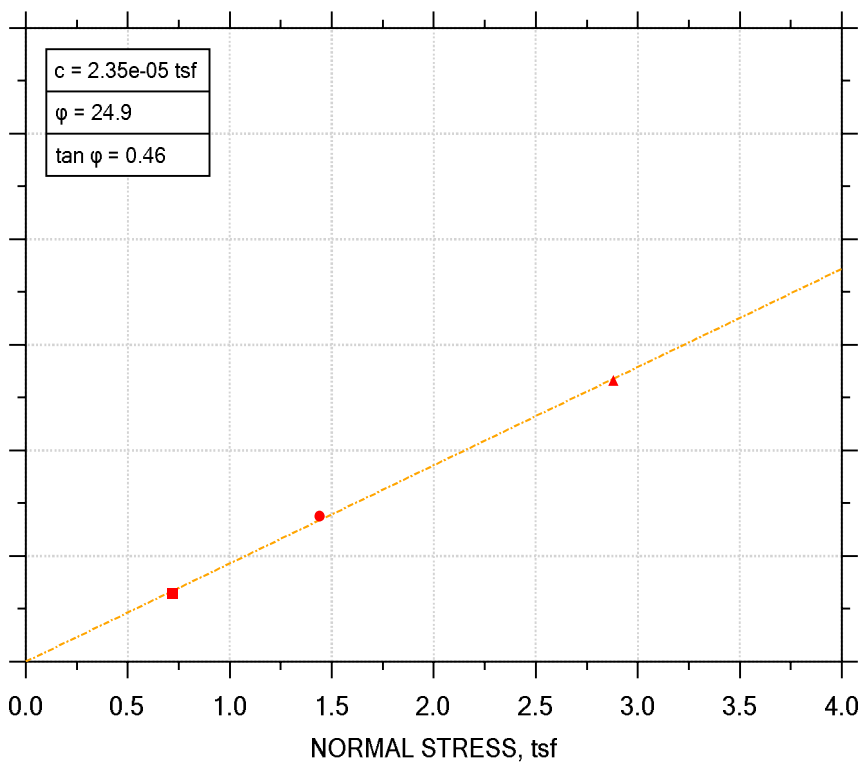
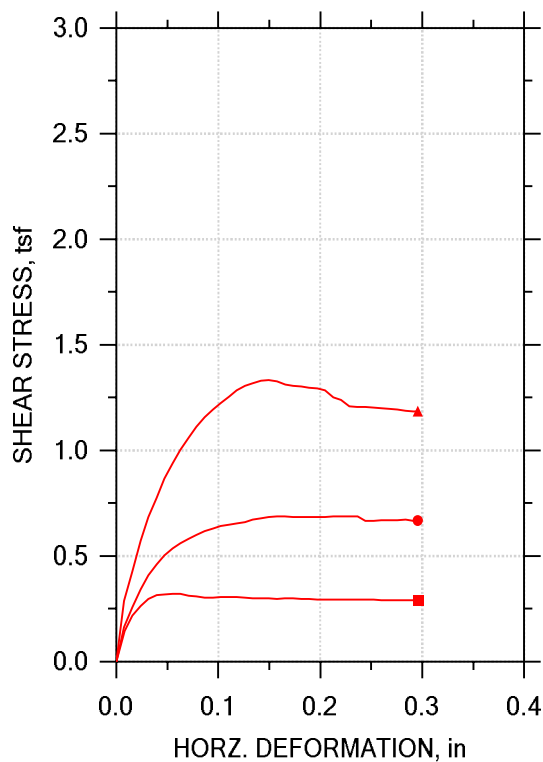
Project No.: MR155233
 Checked By: BCM
 Depth: 26.5'-28.5'
 Elevation: ----

Soil Description: DARK GRAY ORGANIC CLAY WITH SAND OH
 Remarks: TEST PERFORMED AS PER ASTM D3080

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	4.32	0.04926	0.000	0.0000	0.0000
2	4.54	4.32	0.04986	0.778	0.007916	0.007916
3	6.59	4.32	0.05030	1.16	0.01578	0.01578
4	8.54	4.32	0.05082	1.32	0.02365	0.02365
5	10.51	4.32	0.05114	1.42	0.03152	0.03152
6	12.34	4.32	0.05162	1.51	0.03939	0.03939
7	14.31	4.32	0.05202	1.57	0.04726	0.04726
8	16.21	4.32	0.05250	1.62	0.05512	0.05512
9	17.95	4.32	0.05290	1.66	0.06299	0.06299
10	19.92	4.32	0.05351	1.69	0.07091	0.07091
11	22.00	4.32	0.05391	1.72	0.07878	0.07878
12	23.87	4.32	0.05423	1.74	0.08665	0.08665
13	25.83	4.32	0.05471	1.78	0.09451	0.09451
14	27.73	4.32	0.05511	1.80	0.1024	0.1024
15	29.76	4.32	0.05539	1.83	0.1102	0.1102
16	31.70	4.32	0.05567	1.86	0.1181	0.1181
17	33.58	4.32	0.05595	1.88	0.1260	0.1260
18	35.51	4.32	0.05623	1.90	0.1339	0.1339
19	37.34	4.32	0.05639	1.91	0.1418	0.1418
20	39.30	4.32	0.05667	1.94	0.1496	0.1496
21	41.16	4.32	0.05707	1.95	0.1575	0.1575
22	43.16	4.32	0.05735	1.97	0.1654	0.1654
23	44.97	4.32	0.05755	1.98	0.1732	0.1732
24	46.86	4.32	0.05787	2.00	0.1811	0.1811
25	48.65	4.32	0.05827	2.00	0.1890	0.1890
26	50.79	4.32	0.05863	2.02	0.1969	0.1969
27	52.65	4.32	0.05899	2.03	0.2048	0.2048
28	54.53	4.32	0.05919	2.04	0.2126	0.2126
29	56.53	4.32	0.05927	2.06	0.2205	0.2205
30	58.38	4.32	0.05943	2.08	0.2284	0.2284
31	60.24	4.32	0.05959	2.11	0.2362	0.2362
32	62.16	4.32	0.05975	2.12	0.2441	0.2441
33	64.08	4.32	0.05987	2.14	0.2520	0.2520
34	65.85	4.32	0.06007	2.16	0.2599	0.2599
35	67.89	4.32	0.06023	2.18	0.2678	0.2678
36	69.71	4.32	0.06047	2.19	0.2756	0.2756
37	71.73	4.32	0.06055	2.20	0.2835	0.2835
38	73.61	4.32	0.06071	2.22	0.2914	0.2914
39	75.62	4.32	0.06095	2.23	0.2992	0.2992
40	77.34	4.32	0.06119	2.24	0.3071	0.3071
41	79.25	4.32	0.06148	2.24	0.3150	0.3150
42	79.77	4.32	0.06152	2.24	0.3167	0.3167





Symbol	■	●	▲	
Test No.	10 PSI	20 PSI	40 PSI	
Sample No.	S-6	S-6	S-6	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4969	2.4957	2.502
	Area, in ²	4.8964	4.8917	4.9165
	Height, in	1.0035	0.99685	0.99685
	Water Content, %	31.49	31.84	31.90
	Dry Density, pcf	74.23	74.44	73.95
	Saturation, %	77.52	78.85	77.93
	Void Ratio	0.93443	0.92878	0.94155
Consol. Height, in	0.97345	0.95666	0.93431	
Consol. Void Ratio	0.87642	0.851	0.81974	
Final	Water Content, %	37.75	35.63	34.57
	Dry Density, pcf	76.55	78.20	79.95
	Saturation, %	99.14	98.01	99.89
	Void Ratio	0.87576	0.83613	0.79599
Normal Stress, tsf	0.72004	1.4392	2.8793	
Max. Shear Stress, tsf	0.32137	0.68923	1.332	
Ult. Shear Stress, tsf	0.28956	0.66847	1.1862	
Time to Failure, min	13.317	52.872	34.55	
Disp. Rate, in/min	0.0044283	0.0044283	0.0044283	
Estimated Specific Gravity	2.30	2.30	2.30	
Liquid Limit	NP	NP	NP	
Plastic Limit	NP	NP	NP	
Plasticity Index	NP	NP	NP	

Project: DYNEGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-025 S-6
Sample Type: TRIMMED
Description: VERY DARK GRAY FLY ASH WITH SAND
Remarks:

DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-025 S-6
 Sample No.: S-6
 Test No.: 10 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 11.5'-13.5'
 Elevation: ----

Soil Description: VERY DARK GRAY FLY ASH WITH SAND
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.719	0.03009	0.000	0.0000	0.0000
2	2.49	0.719	0.03083	0.147	0.007971	0.007971
3	4.56	0.720	0.03083	0.219	0.01577	0.01577
4	6.40	0.720	0.03083	0.264	0.02364	0.02364
5	8.22	0.720	0.03090	0.298	0.03154	0.03154
6	9.89	0.720	0.03087	0.314	0.03944	0.03944
7	11.62	0.720	0.03061	0.319	0.04727	0.04727
8	13.32	0.720	0.03045	0.321	0.05514	0.05514
9	15.05	0.720	0.03029	0.320	0.06300	0.06300
10	16.89	0.720	0.03007	0.312	0.07087	0.07087
11	18.73	0.720	0.02984	0.310	0.07877	0.07877
12	20.76	0.719	0.02975	0.303	0.08664	0.08664
13	22.51	0.719	0.02979	0.304	0.09451	0.09451
14	24.15	0.720	0.02982	0.306	0.1024	0.1024
15	25.71	0.720	0.02986	0.306	0.1102	0.1102
16	27.59	0.720	0.02993	0.305	0.1181	0.1181
17	29.28	0.720	0.02998	0.302	0.1260	0.1260
18	31.01	0.720	0.02993	0.300	0.1339	0.1339
19	32.97	0.719	0.02995	0.300	0.1417	0.1417
20	34.86	0.720	0.02995	0.298	0.1496	0.1496
21	36.70	0.720	0.03000	0.298	0.1575	0.1575
22	38.37	0.720	0.03007	0.298	0.1654	0.1654
23	40.03	0.720	0.03011	0.298	0.1732	0.1732
24	41.67	0.720	0.03018	0.298	0.1811	0.1811
25	43.57	0.720	0.03022	0.296	0.1890	0.1890
26	45.47	0.720	0.03015	0.294	0.1969	0.1969
27	47.27	0.720	0.03015	0.294	0.2047	0.2047
28	49.05	0.720	0.03016	0.294	0.2126	0.2126
29	50.95	0.720	0.03018	0.294	0.2205	0.2205
30	52.72	0.720	0.03029	0.293	0.2283	0.2283
31	54.18	0.719	0.03033	0.294	0.2362	0.2362
32	55.82	0.720	0.03034	0.294	0.2441	0.2441
33	57.83	0.720	0.03029	0.294	0.2520	0.2520
34	59.65	0.720	0.03031	0.291	0.2598	0.2598
35	61.60	0.720	0.03031	0.291	0.2678	0.2678
36	63.38	0.720	0.03036	0.290	0.2756	0.2756
37	65.11	0.720	0.03031	0.290	0.2835	0.2835
38	66.87	0.720	0.03038	0.290	0.2914	0.2914
39	67.77	0.720	0.03043	0.290	0.2959	0.2959



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-025 S-6
 Sample No.: S-6
 Test No.: 20 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 11.5'-13.5'
 Elevation: ----

Soil Description: VERY DARK GRAY FLY ASH WITH SAND
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.04020	0.000	0.0000	0.0000
2	2.45	1.44	0.04135	0.162	0.007902	0.007902
3	4.38	1.44	0.04254	0.259	0.01577	0.01577
4	6.37	1.44	0.04333	0.343	0.02364	0.02364
5	8.17	1.44	0.04372	0.410	0.03154	0.03154
6	9.94	1.44	0.04414	0.461	0.03940	0.03940
7	11.65	1.44	0.04441	0.502	0.04731	0.04731
8	13.41	1.44	0.04452	0.537	0.05517	0.05517
9	15.14	1.44	0.04459	0.560	0.06300	0.06300
10	16.90	1.44	0.04482	0.582	0.07087	0.07087
11	18.84	1.44	0.04502	0.600	0.07877	0.07877
12	20.84	1.44	0.04513	0.618	0.08664	0.08664
13	22.56	1.44	0.04531	0.632	0.09451	0.09451
14	24.41	1.44	0.04544	0.643	0.1024	0.1024
15	26.03	1.44	0.04572	0.649	0.1102	0.1102
16	27.61	1.44	0.04585	0.654	0.1182	0.1182
17	29.43	1.44	0.04612	0.662	0.1260	0.1260
18	31.34	1.44	0.04617	0.671	0.1339	0.1339
19	33.28	1.44	0.04623	0.679	0.1417	0.1417
20	35.06	1.44	0.04643	0.684	0.1496	0.1496
21	36.88	1.44	0.04661	0.687	0.1575	0.1575
22	38.57	1.44	0.04675	0.687	0.1654	0.1654
23	40.34	1.44	0.04691	0.685	0.1732	0.1732
24	41.97	1.44	0.04697	0.684	0.1811	0.1811
25	43.74	1.44	0.04704	0.683	0.1890	0.1890
26	45.60	1.44	0.04711	0.684	0.1969	0.1969
27	47.52	1.44	0.04720	0.686	0.2048	0.2048
28	49.31	1.44	0.04725	0.687	0.2126	0.2126
29	51.07	1.44	0.04738	0.688	0.2205	0.2205
30	52.87	1.44	0.04738	0.689	0.2283	0.2283
31	54.66	1.44	0.04749	0.689	0.2363	0.2363
32	56.02	1.44	0.04772	0.667	0.2441	0.2441
33	57.82	1.44	0.04774	0.668	0.2520	0.2520
34	59.66	1.44	0.04770	0.669	0.2598	0.2598
35	61.64	1.44	0.04774	0.669	0.2678	0.2678
36	63.57	1.44	0.04776	0.669	0.2756	0.2756
37	65.29	1.44	0.04781	0.671	0.2835	0.2835
38	67.10	1.44	0.04787	0.666	0.2914	0.2914
39	67.98	1.44	0.04788	0.668	0.2953	0.2953



DIRECT SHEAR TEST DATA

Project: DYNEGY HENNEPIN
 Boring No.: HEN-025 S-6
 Sample No.: S-6
 Test No.: 40 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

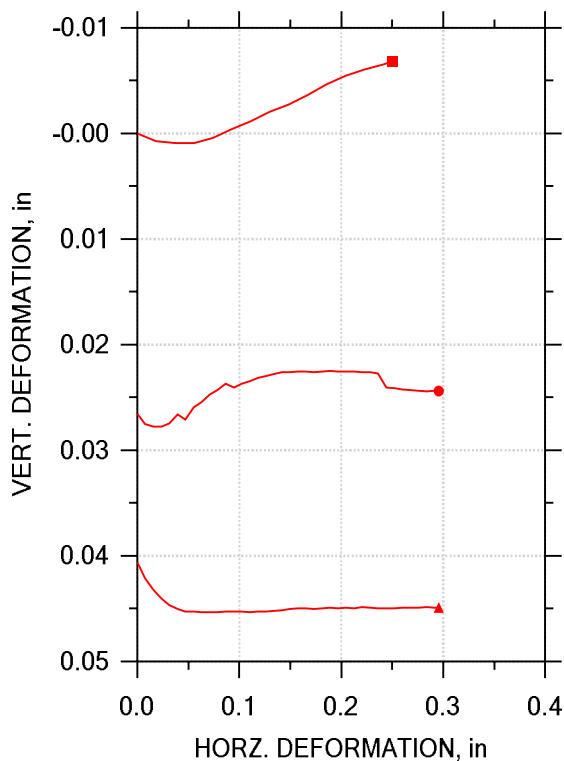
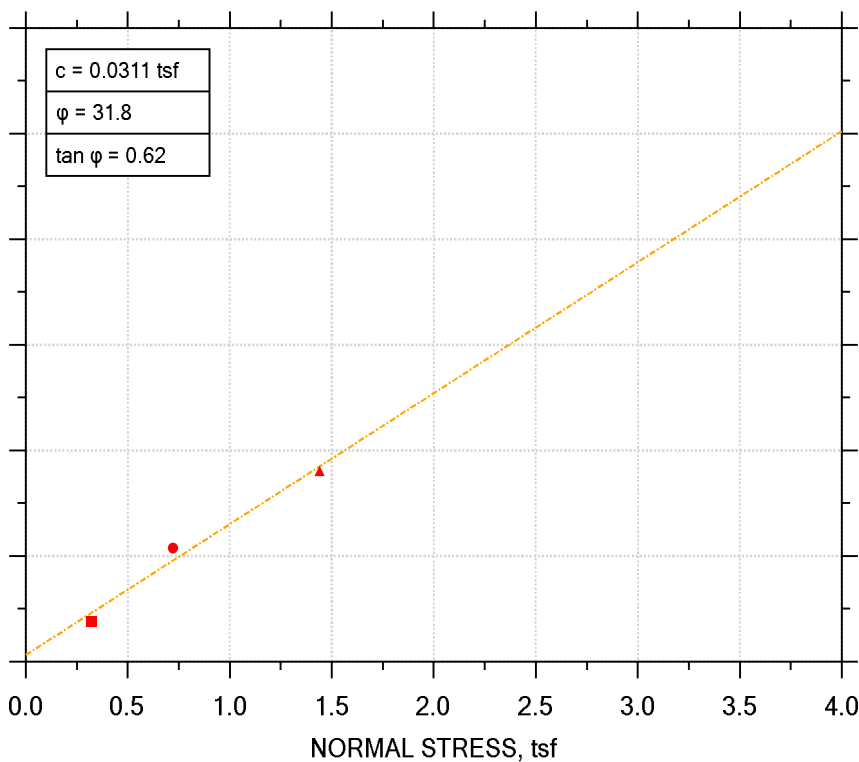
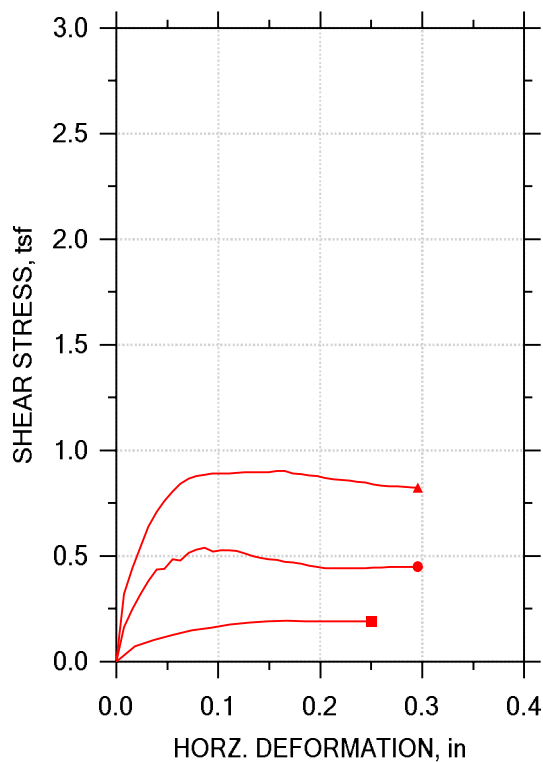
Project No.: MR155233
 Checked By: WPQ
 Depth: 11.5'-13.5'
 Elevation: ----

Soil Description: VERY DARK GRAY FLY ASH WITH SAND
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	2.88	0.06254	0.000	0.0000	0.0000
2	2.06	2.88	0.06431	0.288	0.007902	0.007902
3	3.73	2.88	0.06535	0.427	0.01577	0.01577
4	5.68	2.88	0.06656	0.572	0.02364	0.02364
5	7.41	2.88	0.06726	0.683	0.03150	0.03150
6	9.18	2.88	0.06796	0.775	0.03940	0.03940
7	11.28	2.88	0.06874	0.867	0.04731	0.04731
8	13.15	2.88	0.06937	0.941	0.05514	0.05514
9	14.96	2.88	0.06966	1.00	0.06300	0.06300
10	16.75	2.88	0.07029	1.06	0.07087	0.07087
11	18.48	2.88	0.07094	1.11	0.07877	0.07877
12	20.21	2.88	0.07126	1.16	0.08664	0.08664
13	22.02	2.88	0.07162	1.19	0.09451	0.09451
14	23.89	2.88	0.07200	1.22	0.1024	0.1024
15	25.71	2.88	0.07238	1.26	0.1103	0.1103
16	27.46	2.88	0.07284	1.28	0.1182	0.1182
17	29.34	2.88	0.07322	1.31	0.1260	0.1260
18	31.19	2.88	0.07355	1.32	0.1339	0.1339
19	32.76	2.88	0.07378	1.33	0.1417	0.1417
20	34.55	2.88	0.07400	1.33	0.1496	0.1496
21	36.46	2.88	0.07414	1.33	0.1575	0.1575
22	38.17	2.88	0.07421	1.31	0.1654	0.1654
23	40.09	2.88	0.07432	1.31	0.1732	0.1732
24	41.83	2.88	0.07443	1.30	0.1811	0.1811
25	43.52	2.88	0.07448	1.30	0.1890	0.1890
26	45.41	2.88	0.07454	1.29	0.1969	0.1969
27	47.13	2.88	0.07463	1.29	0.2047	0.2047
28	48.78	2.88	0.07475	1.25	0.2126	0.2126
29	50.52	2.88	0.07479	1.24	0.2205	0.2205
30	52.37	2.88	0.07472	1.21	0.2283	0.2283
31	54.21	2.88	0.07472	1.21	0.2363	0.2363
32	56.04	2.88	0.07463	1.21	0.2441	0.2441
33	57.71	2.88	0.07466	1.20	0.2520	0.2520
34	59.65	2.88	0.07472	1.20	0.2599	0.2599
35	61.38	2.88	0.07472	1.20	0.2678	0.2678
36	63.12	2.88	0.07470	1.19	0.2756	0.2756
37	64.78	2.88	0.07470	1.19	0.2835	0.2835
38	66.67	2.88	0.07472	1.19	0.2914	0.2914
39	67.75	2.88	0.07474	1.19	0.2958	0.2958





Symbol	■	●	▲	
Test No.	5.0 PSI	10.0 PSI	20.0 PSI	
Sample No.	S-5	S-5	S-5	
Shape	Circular	Circular	Circular	
Initial	Dimension, in	2.4913	2.4941	2.4976
	Area, in ²	4.8748	4.8856	4.8995
	Height, in	0.9878	0.99094	0.99252
	Water Content, %	16.30	16.70	16.83
	Dry Density, pcf	112.2	111.3	110.7
	Saturation, %	86.28	86.36	85.72
	Void Ratio	0.51397	0.52594	0.53408
Consol. Height, in	0.9878	0.9644	0.95193	
Consol. Void Ratio	0.51397	0.48506	0.47134	
Final	Water Content, %	19.67	18.05	17.75
	Dry Density, pcf	111.4	114.1	115.9
	Saturation, %	102.01	100.52	103.90
	Void Ratio	0.52446	0.48839	0.46469
Normal Stress, tsf	0.32343	0.72072	1.4396	
Max. Shear Stress, tsf	0.19271	0.53843	0.90226	
Ult. Shear Stress, tsf	0.19231	0.44946	0.82371	
Time to Failure, min	39.855	23.081	41.061	
Disp. Rate, in/min	0.047244	0.004	0.004	
Estimated Specific Gravity	2.72	2.72	2.72	
Liquid Limit	31	31	31	
Plastic Limit	17	17	17	
Plasticity Index	14	14	14	

Project: DYNEGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN-029 S-5	
Sample Type: TRIMMED	
Description: DARK BROWN AND GRAY SLIGHTLY ORGANIC CLAY CL SAND SOCKETS NOTED	
Remarks:	

Project: DYNEGY HENNEPIN
 Boring No.: HEN-029 S-5
 Sample No.: S-5
 Test No.: 5.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 10.0'-12.0'
 Elevation: ----



Soil Description: DARK BROWN AND GRAY SLIGHTLY ORGANIC CLAY CL SAND POCKETS NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.323	0.0000	0.000202	0.0000	0.0000
2	5.49	0.322	0.0007383	0.0717	0.01854	0.01854
3	10.36	0.323	0.0009004	0.104	0.03709	0.03709
4	15.03	0.323	0.0009004	0.128	0.05563	0.05563
5	19.38	0.323	0.0004142	0.147	0.07418	0.07418
6	23.15	0.323	-0.0003962	0.161	0.09280	0.09280
7	27.26	0.323	-0.001135	0.175	0.1113	0.1113
8	31.47	0.323	-0.002053	0.186	0.1299	0.1299
9	35.85	0.324	-0.002755	0.191	0.1484	0.1484
10	39.85	0.323	-0.003638	0.193	0.1670	0.1670
11	44.32	0.323	-0.004646	0.192	0.1856	0.1856
12	48.69	0.323	-0.005475	0.192	0.2041	0.2041
13	53.17	0.323	-0.006051	0.192	0.2228	0.2228
14	57.05	0.323	-0.006537	0.192	0.2413	0.2413
15	60.08	0.322	-0.006843	0.192	0.2506	0.2506



Project: DYNEGY HENNEPIN
 Boring No.: HEN-029 S-5
 Sample No.: S-5
 Test No.: 10.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 10.0'-12.0'
 Elevation: ----



Soil Description: DARK BROWN AND GRAY SLIGHTLY ORGANIC CLAY CL SAND POCKETS NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	0.719	0.02654	0.000	0.0000	0.0000
2	2.71	0.719	0.02752	0.165	0.007902	0.007902
3	4.89	0.719	0.02777	0.248	0.01580	0.01580
4	7.16	0.720	0.02779	0.321	0.02364	0.02364
5	9.14	0.721	0.02746	0.382	0.03150	0.03150
6	11.21	0.721	0.02662	0.436	0.03940	0.03940
7	12.99	0.722	0.02710	0.441	0.04727	0.04727
8	14.76	0.722	0.02597	0.484	0.05517	0.05517
9	16.83	0.722	0.02543	0.479	0.06300	0.06300
10	18.94	0.722	0.02471	0.516	0.07087	0.07087
11	21.09	0.721	0.02433	0.529	0.07877	0.07877
12	23.08	0.721	0.02372	0.538	0.08664	0.08664
13	25.09	0.720	0.02404	0.521	0.09451	0.09451
14	26.95	0.721	0.02370	0.527	0.1024	0.1024
15	28.84	0.720	0.02343	0.528	0.1102	0.1102
16	30.60	0.720	0.02318	0.523	0.1182	0.1182
17	32.68	0.720	0.02294	0.512	0.1260	0.1260
18	34.69	0.720	0.02280	0.499	0.1339	0.1339
19	36.76	0.720	0.02262	0.491	0.1417	0.1417
20	38.80	0.720	0.02258	0.485	0.1496	0.1496
21	40.72	0.720	0.02256	0.482	0.1575	0.1575
22	42.71	0.720	0.02253	0.474	0.1654	0.1654
23	44.65	0.720	0.02258	0.468	0.1732	0.1732
24	46.29	0.720	0.02255	0.463	0.1811	0.1811
25	48.27	0.720	0.02249	0.455	0.1890	0.1890
26	50.29	0.720	0.02255	0.448	0.1969	0.1969
27	52.42	0.720	0.02253	0.444	0.2047	0.2047
28	54.59	0.720	0.02253	0.441	0.2126	0.2126
29	56.45	0.720	0.02260	0.441	0.2205	0.2205
30	58.41	0.720	0.02264	0.441	0.2283	0.2283
31	60.25	0.720	0.02271	0.443	0.2362	0.2362
32	62.14	0.719	0.02408	0.443	0.2441	0.2441
33	64.05	0.720	0.02410	0.444	0.2520	0.2520
34	66.14	0.720	0.02424	0.447	0.2598	0.2598
35	68.26	0.719	0.02431	0.448	0.2678	0.2678
36	70.36	0.719	0.02438	0.449	0.2756	0.2756
37	72.12	0.719	0.02442	0.449	0.2835	0.2835
38	74.01	0.719	0.02437	0.449	0.2914	0.2914
39	75.01	0.719	0.02438	0.449	0.2953	0.2953



Project: DYNEGY HENNEPIN
 Boring No.: HEN-029 S-5
 Sample No.: S-5
 Test No.: 20.0 PSI

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/13/15
 Sample Type: TRIMMED

Project No.: MR155233
 Checked By: WPQ
 Depth: 10.0'-12.0'
 Elevation: ----



Soil Description: DARK BROWN AND GRAY SLIGHTLY ORGANIC CLAY CL SAND POCKETS NOTED
 Remarks:

Step: 1 of 1

	Elapsed Time min	Vertical Stress tsf	Vertical Displacement in	Horizontal Stress tsf	Horizontal Displacement in	Cumulative Displacement in
1	0.00	1.44	0.04059	0.000	0.0000	0.0000
2	2.82	1.44	0.04214	0.321	0.007867	0.007867
3	4.83	1.44	0.04324	0.444	0.01573	0.01573
4	7.10	1.44	0.04405	0.546	0.02360	0.02360
5	9.38	1.44	0.04470	0.641	0.03147	0.03147
6	11.33	1.44	0.04504	0.710	0.03937	0.03937
7	13.35	1.44	0.04526	0.759	0.04724	0.04724
8	15.20	1.44	0.04529	0.807	0.05510	0.05510
9	17.03	1.44	0.04533	0.841	0.06297	0.06297
10	19.00	1.44	0.04531	0.865	0.07087	0.07087
11	21.09	1.44	0.04531	0.877	0.07877	0.07877
12	23.26	1.44	0.04527	0.883	0.08660	0.08660
13	25.19	1.44	0.04529	0.890	0.09447	0.09447
14	27.24	1.44	0.04527	0.891	0.1023	0.1023
15	29.09	1.44	0.04533	0.890	0.1102	0.1102
16	30.98	1.44	0.04529	0.893	0.1181	0.1181
17	32.82	1.44	0.04526	0.896	0.1260	0.1260
18	34.93	1.44	0.04524	0.896	0.1338	0.1338
19	36.84	1.44	0.04513	0.895	0.1417	0.1417
20	39.05	1.44	0.04500	0.896	0.1496	0.1496
21	41.06	1.44	0.04499	0.902	0.1575	0.1575
22	42.87	1.44	0.04495	0.902	0.1653	0.1653
23	44.87	1.44	0.04502	0.889	0.1732	0.1732
24	46.86	1.44	0.04497	0.888	0.1811	0.1811
25	48.59	1.44	0.04493	0.883	0.1889	0.1889
26	50.54	1.44	0.04499	0.877	0.1968	0.1968
27	52.49	1.44	0.04493	0.869	0.2047	0.2047
28	54.68	1.44	0.04497	0.865	0.2126	0.2126
29	56.76	1.44	0.04488	0.862	0.2204	0.2204
30	58.63	1.44	0.04493	0.858	0.2283	0.2283
31	60.64	1.44	0.04497	0.850	0.2362	0.2362
32	62.54	1.44	0.04497	0.847	0.2441	0.2441
33	64.42	1.44	0.04499	0.840	0.2519	0.2519
34	66.26	1.44	0.04493	0.834	0.2598	0.2598
35	68.32	1.44	0.04493	0.831	0.2677	0.2677
36	70.44	1.44	0.04493	0.830	0.2756	0.2756
37	72.48	1.44	0.04488	0.828	0.2834	0.2834
38	74.27	1.44	0.04490	0.825	0.2913	0.2913
39	75.29	1.44	0.04490	0.824	0.2955	0.2955




Hydraulic Conductivity Tests ASTM D 5084

TERRACON PROJECT NO.: **MR155233**
PROJECT NAME: **DYNERGY - HENNEPIN SITE**
CLIENT: **AECOM**
LOCATION : **HENNEPIN, IL**

12/21/2015

SUMMARY OF TEST RESULTS

BORING NO. HEN-B010
SAMPLE NO. S-5
DEPTH: 10.0'-11.5'
CLASSIFICATION VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL

	<u>INITIAL</u>	<u>FINAL</u>	<u>SAMPLE PHOTO</u>
DRY UNIT WEIGHT (pcf)	86.6	93.3	
WATER CONTENT (%)	26.5	23.2	
DIAMETER (cm)	7.215	6.956	
LENGTH (cm)	4.527	4.521	
HYDRAULIC GRADIENT (MAXIMUM)	20.83		
PERCENT SATURATION	99.5		(Percent saturation calculation is based on final measurements and an estimated specific gravity.)
HYDRAULIC CONDUCTIVITY k (cm/sec)	1.16E-05		


Deaired water was used as the liquid permeant.

TERRACON PROJECT NO.: **MR155233**
PROJECT NAME: **DYNERGY - HENNEPIN SITE**
CLIENT: **AECOM**
LOCATION : **HENNEPIN, IL**

12/21/2015

SUMMARY OF TEST RESULTS

BORING NO. HEN-B017
SAMPLE NO. S-3
DEPTH: 5.0'-7.0'
CLASSIFICATION VERY DARK GRAY LEAN CLAY WITH SAND

	<u>INITIAL</u>	<u>FINAL</u>	<u>SAMPLE PHOTO</u>
DRY UNIT WEIGHT (pcf)	76.0	82.8	
WATER CONTENT (%)	36.7	38.2	
DIAMETER (cm)	6.929	6.692	
LENGTH (cm)	7.541	7.425	
HYDRAULIC GRADIENT (MAXIMUM)	26.49		
PERCENT SATURATION	99.3		(Percent saturation calculation is based on final measurements and an estimated specific gravity.)
HYDRAULIC CONDUCTIVITY k (cm/sec)	6.79E-07		


Deaired water was used as the liquid permeant.

TERRACON PROJECT NO.: **MR155233**
PROJECT NAME: **DYNERGY - HENNEPIN SITE**
CLIENT: **AECOM**
LOCATION : **HENNEPIN, IL**

12/21/2015

SUMMARY OF TEST RESULTS

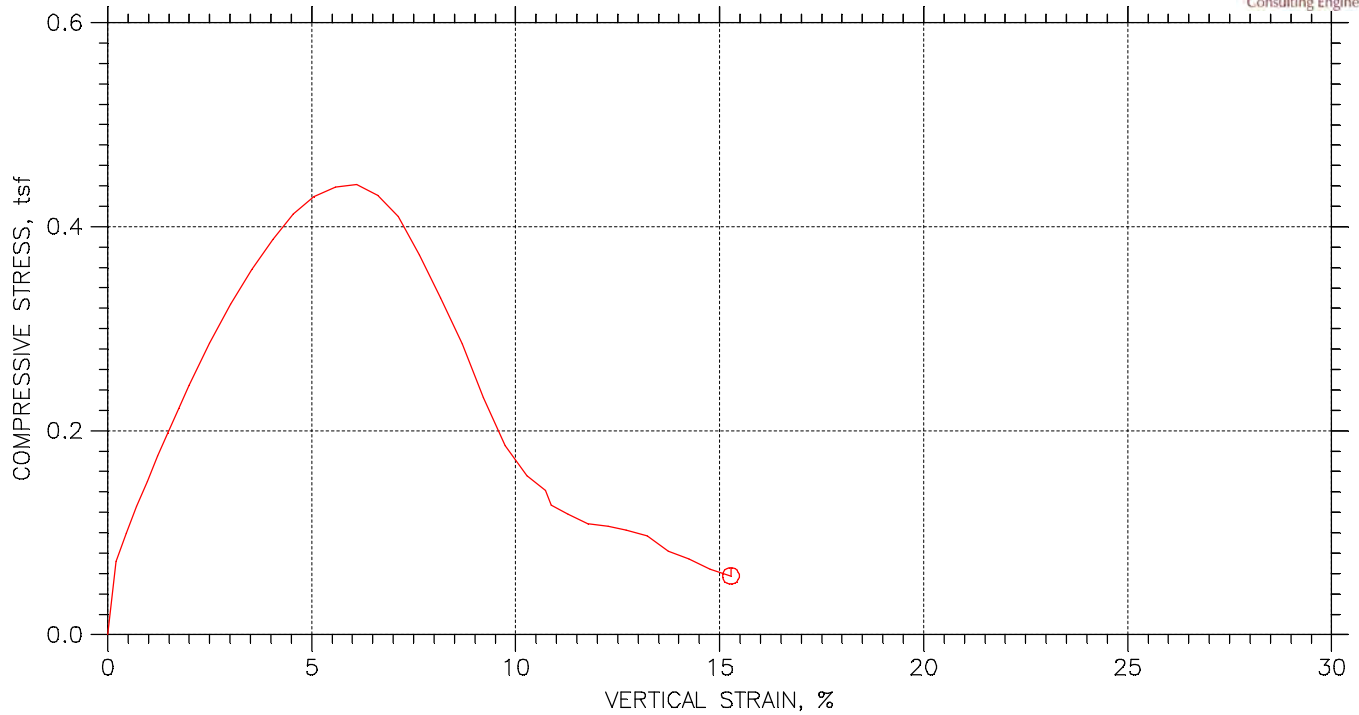
BORING NO. HEN-B023
SAMPLE NO. S-9
DEPTH: 27.0'-29.0'
CLASSIFICATION VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL



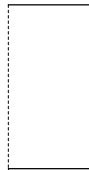
	<u>INITIAL</u>	<u>FINAL</u>	<u>SAMPLE PHOTO</u>
DRY UNIT WEIGHT (pcf)	81.8	83.2	
WATER CONTENT (%)	28.3	31.5	
DIAMETER (cm)	7.154	7.063	
LENGTH (cm)	5.432	5.479	
HYDRAULIC GRADIENT (MAXIMUM)	17.36		
PERCENT SATURATION	100.4		(Percent saturation calculation is based on final measurements and an estimated specific gravity.)
HYDRAULIC CONDUCTIVITY k (cm/sec)	1.00E-05		

Deaired water was used as the liquid permeant.

Unconfined Compression Tests ASTM D 2166

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB001S4		
Initial	Diameter, in	2.865		
	Height, in	6.0992		
	Water Content, %	17.60		
	Dry Density, pcf	108.4		
	Saturation, %	84.55		
	Void Ratio	0.56618		
Unconfined Compressive Strength, tsf		0.44114		
Undrained Shear Strength, tsf		0.22057		
Time to Failure, min		6.0041		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		21		
Plastic Limit		14		
Plasticity Index		7		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB001 S-4	
Sample Type: 3.0" ST	
Description: BROWN AND GRAY LEAN CLAY WITH SAND CL SAND SEAMS NOTED	
Remarks: TEST PERFORMED AS PER ASTM D2166.	408

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENB001 S-4
 Sample No.: ST-4
 Test No.: HENB001S4

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5' -9.5'
 Elevation: -----



Soil Description: BROWN AND GRAY LEAN CLAY WITH SAND CL SAND SEAMS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D2166.

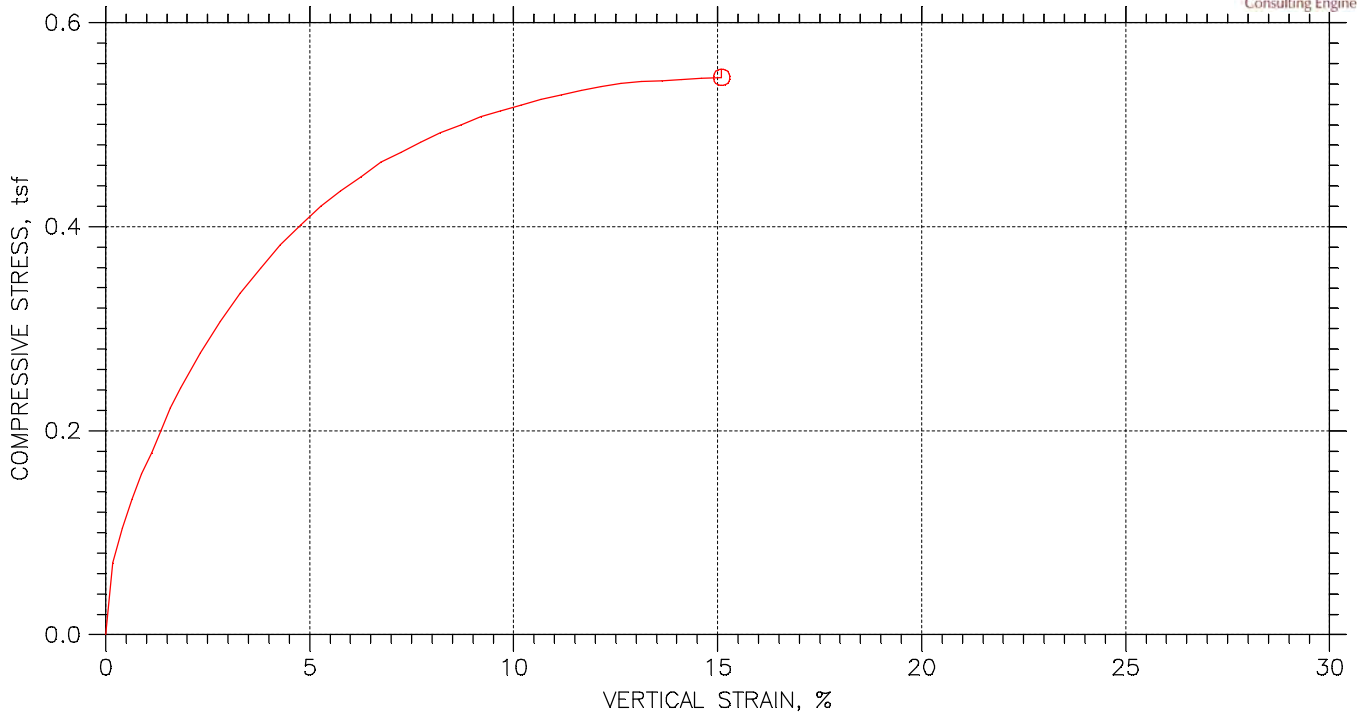
Specimen Height: 6.10 in
 Specimen Area: 6.45 in²
 Specimen Volume: 39.32 in³


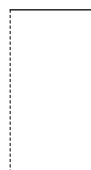
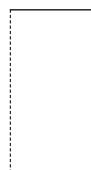
Liquid Limit: 21
 Plastic Limit: 14
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.4465	0	0
2	0.25412	0.012269	0.20115	6.4512	6.4595	0.071907	0.035954
3	0.50388	0.027674	0.45373	8.9163	6.4759	0.099133	0.049566
4	0.75412	0.043356	0.71085	11.329	6.4927	0.12563	0.062816
5	1.0041	0.05913	0.96947	13.584	6.5097	0.15025	0.075125
6	1.2541	0.074997	1.2296	15.892	6.5268	0.17531	0.087656
7	1.5041	0.090402	1.4822	17.99	6.5435	0.19795	0.098974
8	1.7541	0.1059	1.7363	20.193	6.5605	0.22161	0.11081
9	2.0041	0.1214	1.9904	22.291	6.5775	0.24401	0.122
10	2.5041	0.15221	2.4955	26.225	6.6115	0.28559	0.14279
11	3.0041	0.18348	3.0082	29.896	6.6465	0.32386	0.16193
12	3.5041	0.2153	3.53	33.2	6.6824	0.35772	0.17886
13	4.0041	0.24667	4.0443	36.137	6.7183	0.38729	0.19364
14	4.5041	0.27739	4.5479	38.707	6.7537	0.41265	0.20633
15	5.0041	0.30847	5.0576	40.491	6.79	0.42936	0.21468
16	5.5041	0.3403	5.5794	41.592	6.8275	0.43861	0.21931
17	6.0041	0.37212	6.1012	42.064	6.8654	0.44114	0.22057
18	6.5042	0.40349	6.6154	41.277	6.9032	0.43052	0.21526
19	7.0042	0.43439	7.1221	39.547	6.9409	0.41023	0.20511
20	7.5042	0.46603	7.6409	36.085	6.9799	0.37223	0.18612
21	8.0042	0.49776	8.1611	32.204	7.0194	0.33032	0.16516
22	8.5042	0.52996	8.689	27.955	7.06	0.2851	0.14255
23	9.0042	0.5616	9.2077	22.92	7.1003	0.23242	0.11621
24	9.5042	0.59398	9.7386	18.357	7.1421	0.18506	0.09253
25	10.004	0.62673	10.276	15.577	7.1848	0.1561	0.078051
26	10.504	0.65486	10.737	14.161	7.222	0.14118	0.070591
27	11.004	0.66279	10.867	12.745	7.2325	0.12688	0.063439
28	11.5	0.6877	11.275	11.906	7.2658	0.11798	0.058991
29	12	0.71722	11.759	11.014	7.3056	0.10855	0.054275
30	12.5	0.74775	12.26	10.857	7.3473	0.10639	0.053196
31	13	0.77515	12.709	10.542	7.3851	0.10278	0.05139
32	13.5	0.80652	13.223	9.9653	7.4289	0.096583	0.048291
33	14	0.83816	13.742	8.4968	7.4736	0.081857	0.040929
34	14.5	0.86897	14.247	7.7625	7.5176	0.074345	0.037173
35	15	0.89996	14.755	6.7659	7.5624	0.064417	0.032208
36	15.5	0.93169	15.276	6.0841	7.6088	0.057572	0.028786

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN001S7		
Initial	Diameter, in	2.8047		
	Height, in	6.0043		
	Water Content, %	37.23		
	Dry Density, pcf	81.96		
	Saturation, %	94.48		
	Void Ratio	1.0718		
Unconfined Compressive Strength, tsf		0.54628		
Undrained Shear Strength, tsf		0.27314		
Time to Failure, min		15.5		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		38		
Plastic Limit		22		
Plasticity Index		16		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN001 S7	
Sample Type: 3.0" ST	
Description: DARK GRAY ORGANIC LEAN CLAY OL SHELL NOTED	
Remarks: TEST PERFORMED AS PER ASTM D2166.	410

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN001 S7
 Sample No.: ST-7
 Test No.: HEN001S7

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: ----



Soil Description: DARK GRAY ORGANIC LEAN CLAY OL SHELL NOTED
 Remarks: TEST PERFORMED AS PER ASTM D2166.

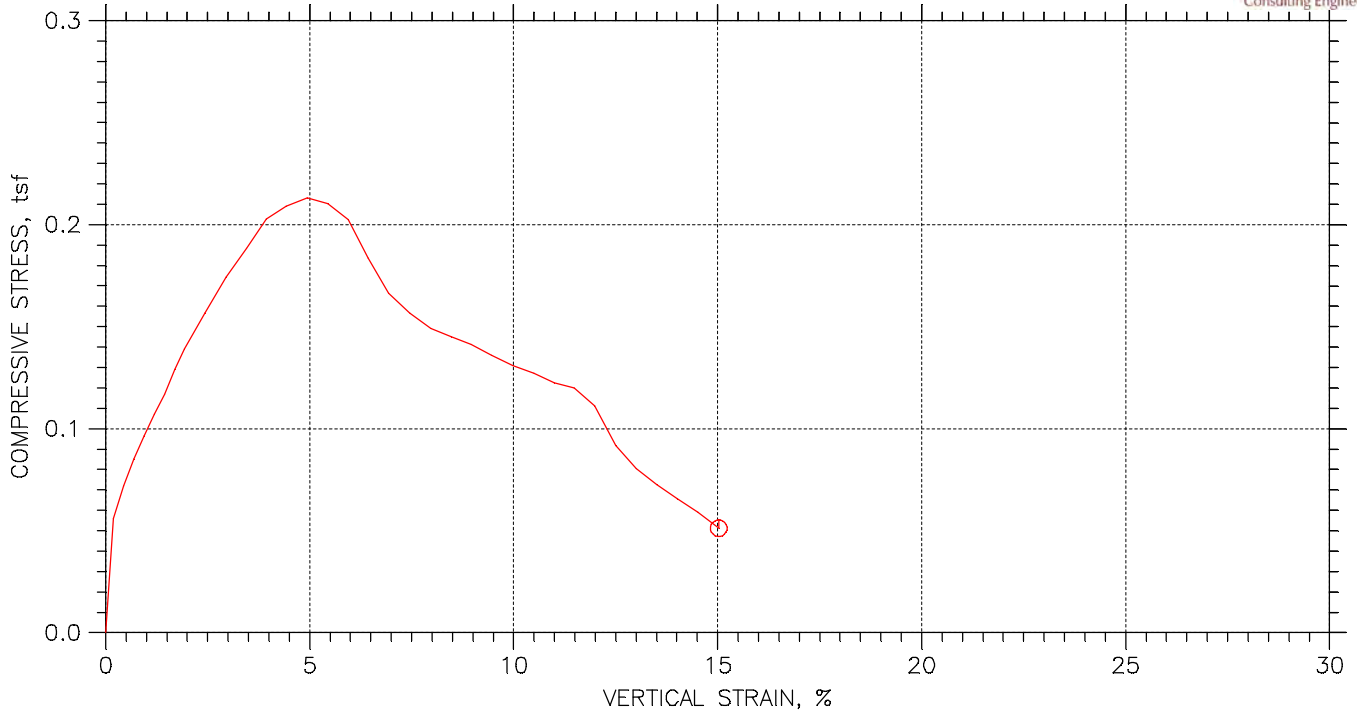
Specimen Height: 6.00 in
 Specimen Area: 6.18 in²
 Specimen Volume: 37.10 in³




Liquid Limit: 38
 Plastic Limit: 22
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.1783	0	0
2	0.25003	0.010322	0.1719	6.0347	6.189	0.070205	0.035102
3	0.50003	0.024571	0.40922	8.9991	6.2037	0.10444	0.052221
4	0.75003	0.038638	0.6435	11.434	6.2183	0.13239	0.066196
5	1	0.05307	0.88386	13.657	6.2334	0.15775	0.078876
6	1.25	0.067593	1.1257	15.51	6.2487	0.17871	0.089357
7	1.5	0.082299	1.3707	17.469	6.2642	0.20078	0.10039
8	1.75	0.095361	1.5882	19.374	6.278	0.2222	0.1111
9	2.0001	0.11007	1.8331	21.121	6.2937	0.24163	0.12081
10	2.5	0.13957	2.3245	24.297	6.3254	0.27657	0.13829
11	3	0.16862	2.8083	27.103	6.3568	0.30698	0.15349
12	3.5	0.19803	3.2981	29.697	6.389	0.33466	0.16733
13	4.0001	0.22781	3.7941	32.026	6.422	0.35906	0.17953
14	4.5	0.25759	4.29	34.302	6.4552	0.3826	0.1913
15	5.0001	0.28709	4.7814	36.208	6.4886	0.40178	0.20089
16	5.5001	0.31623	5.2666	38.061	6.5218	0.42019	0.21009
17	6.0001	0.34582	5.7595	39.596	6.5559	0.43486	0.21743
18	6.5001	0.3756	6.2555	41.078	6.5906	0.44876	0.22438
19	7.0001	0.40519	6.7484	42.613	6.6254	0.46309	0.23154
20	7.5001	0.43415	7.2306	43.725	6.6599	0.47271	0.23636
21	8.0001	0.46329	7.7159	44.889	6.6949	0.48276	0.24138
22	8.5001	0.49288	8.2088	46.001	6.7308	0.49207	0.24604
23	9.0001	0.52266	8.7047	46.954	6.7674	0.49955	0.24978
24	9.5001	0.55226	9.1976	48.013	6.8041	0.50806	0.25403
25	10	0.5813	9.6814	48.807	6.8406	0.51371	0.25686
26	10.5	0.6109	10.174	49.601	6.8781	0.51922	0.25961
27	11	0.64067	10.67	50.395	6.9163	0.52462	0.26231
28	11.5	0.67054	11.168	51.136	6.955	0.52937	0.26468
29	12	0.69996	11.658	51.824	6.9936	0.53353	0.26677
30	12.5	0.729	12.141	52.459	7.0321	0.53712	0.26856
31	13	0.7586	12.634	53.094	7.0718	0.54057	0.27029
32	13.5	0.78856	13.133	53.571	7.1124	0.54231	0.27115
33	14	0.81824	13.628	53.941	7.1531	0.54295	0.27147
34	14.5	0.84766	14.117	54.365	7.1939	0.54411	0.27205
35	15	0.8767	14.601	54.841	7.2347	0.54579	0.27289
36	15.5	0.90648	15.097	55.212	7.2769	0.54628	0.27314

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB003S5		
Initial	Diameter, in	2.8394		
	Height, in	6.2583		
	Water Content, %	38.47		
	Dry Density, pcf	68.88		
	Saturation, %	72.73		
	Void Ratio	1.4017		
Unconfined Compressive Strength, tsf		0.21317		
Undrained Shear Strength, tsf		0.10659		
Time to Failure, min		5.0039		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.65		
Liquid Limit		---		
Plastic Limit		---		
Plasticity Index		---		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB003 S-5	
Sample Type: 3.0" ST	
Description: BLACK ORGANIC CLAY WITH SAND OL WOOD NOTED	
Remarks: TEST PERFORMED AS PER ASTM D2166.	412

Project: DYNERGY HENNEPIN
 Boring No.: HENB003 S-5
 Sample No.: ST-5
 Test No.: HENB003S5

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: -----



Soil Description: BLACK ORGANIC CLAY WITH SAND OL WOOD NOTED
 Remarks: TEST PERFORMED AS PER ASTM D2166.

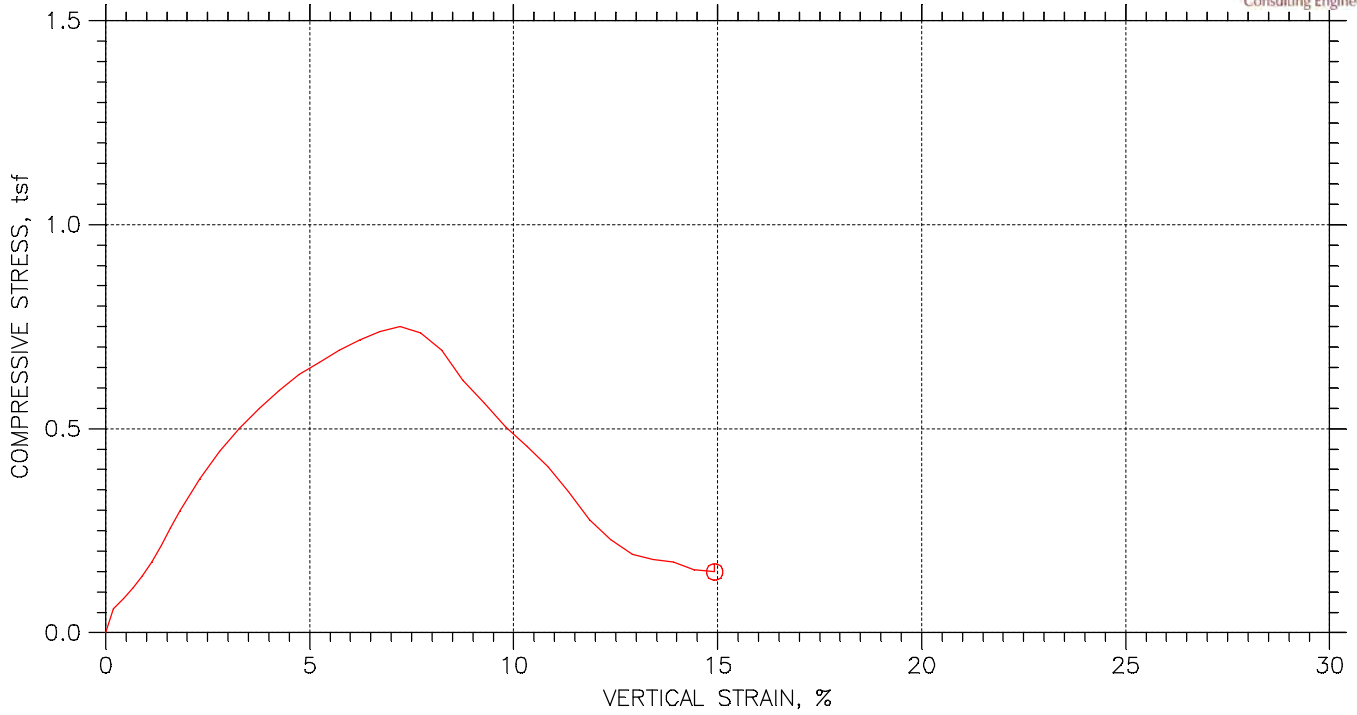
Specimen Height: 6.26 in
 Specimen Area: 6.33 in²
 Specimen Volume: 39.63 in³


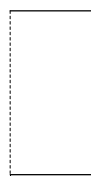
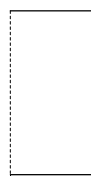
Liquid Limit: ---
 Plastic Limit: ---
 Estimated Specific Gravity: 2.65

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.3319	0	0
2	0.25412	0.011992	0.19162	4.9302	6.3441	0.055954	0.027977
3	0.50387	0.027951	0.44662	6.3463	6.3603	0.071842	0.035921
4	0.75387	0.043725	0.69868	7.5527	6.3764	0.085281	0.042641
5	1.0039	0.059407	0.94926	8.5492	6.3926	0.09629	0.048145
6	1.2539	0.074812	1.1954	9.5457	6.4085	0.10725	0.053623
7	1.5039	0.090125	1.4401	10.437	6.4244	0.11697	0.058487
8	1.7539	0.10562	1.6877	11.539	6.4406	0.12899	0.064497
9	2.0039	0.12121	1.9368	12.483	6.457	0.13919	0.069597
10	2.5039	0.15258	2.438	14.109	6.4901	0.15652	0.07826
11	3.0039	0.1844	2.9465	15.787	6.5241	0.17423	0.087113
12	3.5039	0.21567	3.4462	17.151	6.5579	0.1883	0.094151
13	4.0039	0.24621	3.9341	18.567	6.5912	0.20282	0.10141
14	4.5039	0.27729	4.4309	19.249	6.6255	0.20918	0.10459
15	5.0039	0.30903	4.9379	19.721	6.6608	0.21317	0.10659
16	5.5039	0.34085	5.4464	19.564	6.6966	0.21034	0.10517
17	6.0039	0.37194	5.9432	18.934	6.732	0.2025	0.10125
18	6.5039	0.40284	6.437	17.256	6.7675	0.18358	0.091792
19	7.0039	0.4343	6.9396	15.735	6.8041	0.1665	0.083252
20	7.5039	0.46659	7.4555	14.896	6.842	0.15675	0.078375
21	8.0039	0.49887	7.9714	14.266	6.8804	0.14929	0.074645
22	8.5039	0.52987	8.4667	13.951	6.9176	0.14521	0.072605
23	9.0039	0.56068	8.959	13.637	6.955	0.14117	0.070586
24	9.5039	0.59223	9.4631	13.217	6.9937	0.13607	0.068035
25	10.004	0.62451	9.979	12.798	7.0338	0.131	0.0655
26	10.504	0.65661	10.492	12.483	7.0741	0.12705	0.063525
27	11.004	0.68779	10.99	12.116	7.1137	0.12263	0.061314
28	11.504	0.71879	11.485	11.906	7.1535	0.11983	0.059917
29	12.004	0.75034	11.99	11.119	7.1945	0.11128	0.055639
30	12.504	0.78244	12.502	9.231	7.2367	0.091843	0.045921
31	13.004	0.81417	13.01	8.1296	7.2788	0.080416	0.040208
32	13.504	0.84517	13.505	7.3953	7.3205	0.072736	0.036368
33	14.004	0.87635	14.003	6.7135	7.3629	0.065649	0.032825
34	14.504	0.90817	14.512	6.0841	7.4067	0.059143	0.029571
35	15.004	0.94037	15.026	5.2974	7.4516	0.051185	0.025593

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN004S5		
Initial	Diameter, in	2.8673		
	Height, in	6.2728		
	Water Content, %	36.84		
	Dry Density, pcf	84.04		
	Saturation, %	98.19		
	Void Ratio	1.0205		
Unconfined Compressive Strength, tsf		0.75034		
Undrained Shear Strength, tsf		0.37517		
Time to Failure, min		7.5002		
Strain Rate, %/min		1.52		
Estimated Specific Gravity		2.72		
Liquid Limit		NP		
Plastic Limit		NP		
Plasticity Index		NP		
Failure Sketch				

Project: DYNERGY HENNEPIN,
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN-004 S5
Sample Type: 3" ST
Description: BROWN BLACK AND GRAY SANDY SILT WITH GRAVEL
Remarks: TEST PERFORMED AS PER ASTM D 2166. 414

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN,
 Boring No.: HEN-004 S5
 Sample No.: S-5
 Test No.: HEN004S5

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/16/15
 Sample Type: 3" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: -----



Soil Description: BROWN BLACK AND GRAY SANDY SILT WITH GRAVEL
 Remarks: TEST PERFORMED AS PER ASTM D 2166.

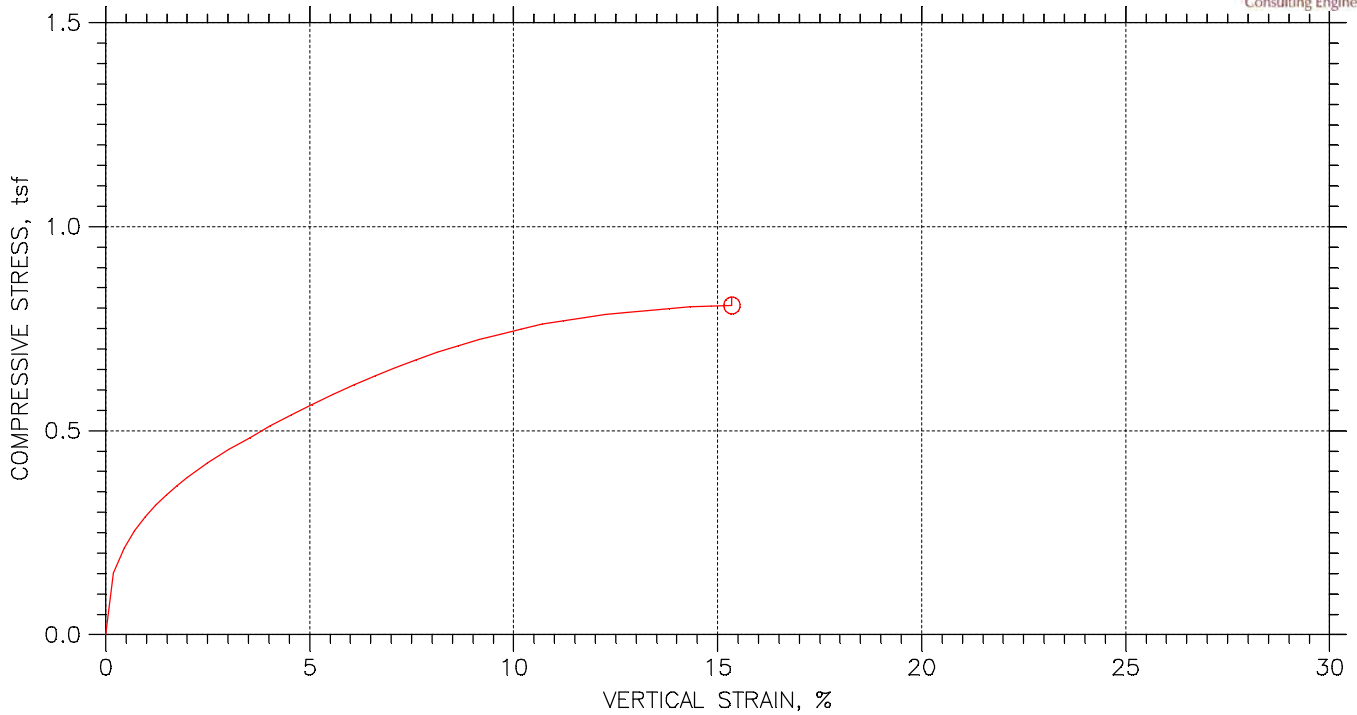
Specimen Height: 6.27 in
 Specimen Area: 6.46 in²
 Specimen Volume: 40.50 in³





Liquid Limit: NP
 Plastic Limit: NP
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.4572	0	0
2	0.25028	0.012177	0.19412	5.2238	6.4697	0.058134	0.029067
3	0.50028	0.027213	0.43382	7.5583	6.4853	0.083913	0.041956
4	0.75028	0.042065	0.67058	9.9187	6.5008	0.10986	0.054928
5	1.0003	0.05664	0.90294	12.595	6.516	0.13917	0.069586
6	1.2503	0.07103	1.1323	15.755	6.5311	0.17369	0.086843
7	1.5003	0.085328	1.3603	19.418	6.5462	0.21358	0.10679
8	1.7503	0.099811	1.5912	23.365	6.5616	0.25638	0.12819
9	2.0003	0.11439	1.8235	27.325	6.5771	0.29913	0.14956
10	2.5002	0.14446	2.3029	34.567	6.6094	0.37656	0.18828
11	3.0002	0.17527	2.7941	40.945	6.6428	0.4438	0.2219
12	3.5002	0.2059	3.2823	46.44	6.6763	0.50083	0.25041
13	4.0002	0.23634	3.7676	51.238	6.71	0.5498	0.2749
14	4.5002	0.26669	4.2514	55.585	6.7439	0.59344	0.29672
15	5.0002	0.29768	4.7456	59.525	6.7789	0.63223	0.31612
16	5.5002	0.32877	5.2411	62.756	6.8143	0.66308	0.33154
17	6.0002	0.35967	5.7338	65.903	6.8499	0.69271	0.34636
18	6.5002	0.39048	6.225	68.625	6.8858	0.71756	0.35878
19	7.0002	0.4212	6.7147	70.966	6.922	0.73816	0.36908
20	7.5002	0.45266	7.2161	72.527	6.9594	0.75034	0.37517
21	8.0002	0.48439	7.722	71.456	6.9975	0.73524	0.36762
22	8.5002	0.5164	8.2323	67.599	7.0364	0.69171	0.34585
23	9.0002	0.54878	8.7485	60.738	7.0762	0.618	0.309
24	9.5002	0.58153	9.2705	55.746	7.117	0.56396	0.28198
25	10	0.61492	9.8029	50.193	7.159	0.50481	0.25241
26	10.5	0.64785	10.328	45.66	7.2009	0.45654	0.22827
27	11	0.67986	10.838	40.855	7.2421	0.40618	0.20309
28	11.5	0.71141	11.341	34.915	7.2832	0.34517	0.17258
29	12	0.7437	11.856	28.086	7.3257	0.27604	0.13802
30	12.5	0.77681	12.384	23.378	7.3698	0.22839	0.1142
31	13	0.81021	12.916	19.773	7.4149	0.192	0.095999
32	13.5	0.84139	13.413	18.548	7.4575	0.17907	0.089536
33	14	0.87256	13.91	17.974	7.5005	0.17253	0.086267
34	14.5	0.9043	14.416	16.213	7.5449	0.15472	0.07736
35	15	0.93612	14.923	15.704	7.5898	0.14897	0.074485

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙			
Test No.		HEN004S9			
Initial	Diameter, in	2.7551			
	Height, in	6.0059			
	Water Content, %	33.62			
	Dry Density, pcf	85.2			
	Saturation, %	92.10			
	Void Ratio	0.99292			
Unconfined Compressive Strength, tsf		0.80682			
Undrained Shear Strength, tsf		0.40341			
Time to Failure, min		15.004			
Strain Rate, %/min		1.14			
Estimated Specific Gravity		2.72			
Liquid Limit		43			
Plastic Limit		22			
Plasticity Index		21			
Failure Sketch					

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN004 S-9	
Sample Type: 3.0" ST	
Description: BROWN AND GRAY LEAN CLAY CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	416

UNCONFIRMED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN004 S-9
 Sample No.: ST-9
 Test No.: HEN004S9

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 30.0' -32.0'
 Elevation: ----



Soil Description: BROWN AND GRAY LEAN CLAY CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

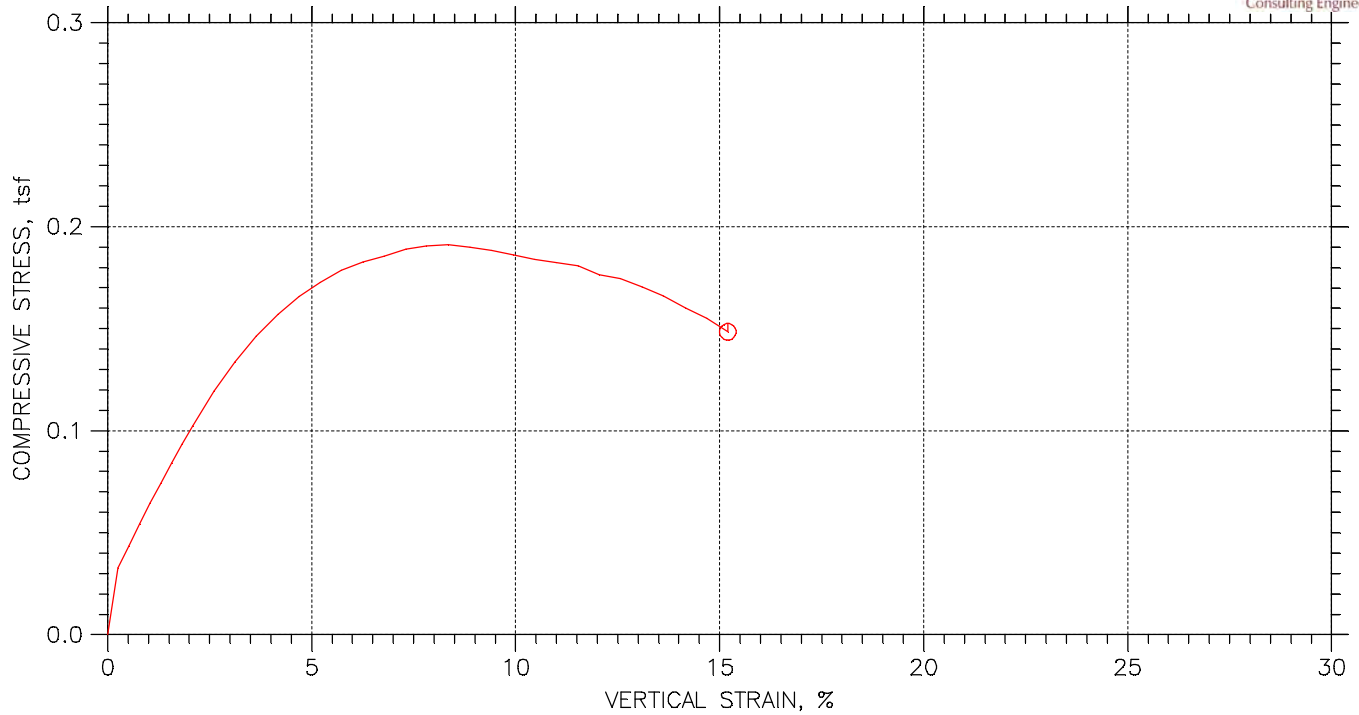
Specimen Height: 6.01 in
 Specimen Area: 5.96 in²
 Specimen Volume: 35.81 in³




Liquid Limit: 43
 Plastic Limit: 22
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	5.9617	0	0
2	0.25398	0.01157	0.19265	12.53	5.9732	0.15103	0.075517
3	0.50398	0.027058	0.45052	17.637	5.9887	0.21204	0.10602
4	0.75398	0.04291	0.71446	21.269	6.0046	0.25504	0.12752
5	1.004	0.058397	0.97233	24.165	6.0202	0.289	0.1445
6	1.254	0.073885	1.2302	26.639	6.036	0.31777	0.15888
7	1.504	0.089281	1.4866	28.798	6.0517	0.34262	0.17131
8	1.754	0.10477	1.7444	30.746	6.0675	0.36484	0.18242
9	2.004	0.11989	1.9962	32.483	6.0831	0.38447	0.19224
10	2.504	0.15005	2.4983	35.695	6.1145	0.42032	0.21016
11	3.004	0.18093	3.0126	38.696	6.1469	0.45325	0.22663
12	3.504	0.21163	3.5238	41.433	6.1795	0.48276	0.24138
13	4.004	0.24252	4.038	44.118	6.2126	0.5113	0.25565
14	4.504	0.27322	4.5492	46.698	6.2458	0.53832	0.26916
15	5.004	0.30374	5.0573	49.172	6.2793	0.56382	0.28191
16	5.504	0.33453	5.57	51.647	6.3134	0.589	0.2945
17	6.004	0.36542	6.0843	53.963	6.3479	0.61207	0.30603
18	6.504	0.3963	6.5985	56.174	6.3829	0.63366	0.31683
19	7.004	0.42691	7.1082	58.333	6.4179	0.65441	0.32721
20	7.504	0.45734	7.6148	60.386	6.4531	0.67375	0.33688
21	8.004	0.48831	8.1306	62.334	6.4893	0.69161	0.3458
22	8.504	0.51938	8.6478	64.124	6.5261	0.70746	0.35373
23	9.004	0.55045	9.1651	65.914	6.5632	0.72309	0.36155
24	9.504	0.58088	9.6717	67.546	6.6	0.73686	0.36843
25	10.004	0.6114	10.18	69.02	6.6374	0.74871	0.37435
26	10.504	0.64246	10.697	70.547	6.6758	0.76086	0.38043
27	11.004	0.67362	11.216	71.758	6.7148	0.76943	0.38471
28	11.504	0.70478	11.735	72.969	6.7543	0.77784	0.38892
29	12.004	0.73557	12.247	74.022	6.7938	0.78448	0.39224
30	12.504	0.76636	12.76	74.917	6.8337	0.78932	0.39466
31	13.004	0.79761	13.28	75.917	6.8747	0.79509	0.39755
32	13.504	0.82886	13.801	76.707	6.9162	0.79854	0.39927
33	14.004	0.86002	14.32	77.602	6.9581	0.803	0.4015
34	14.504	0.8909	14.834	78.339	7.0001	0.80576	0.40288
35	15.004	0.92178	15.348	78.918	7.0426	0.80682	0.40341

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB005S2		
Initial	Diameter, in	2.8366		
	Height, in	6.0217		
	Water Content, %	59.63		
	Dry Density, pcf	60.38		
	Saturation, %	91.85		
	Void Ratio	1.688		
Unconfined Compressive Strength, tsf		0.19114		
Undrained Shear Strength, tsf		0.095571		
Time to Failure, min		8.0034		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.60		
Liquid Limit		---		
Plastic Limit		---		
Plasticity Index		---		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB005 S-2	
Sample Type: 3.0" ST	
Description: BLACK TO VERY DARK GRAY ORGANIC CLAY OL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	418

Project: DYNERGY HENNEPIN
 Boring No.: HENB005 S-2
 Sample No.: ST-2
 Test No.: HENB005S2

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5' -9.5'
 Elevation: -----



Soil Description: BLACK TO VERY DARK GRAY ORGANIC CLAY OL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

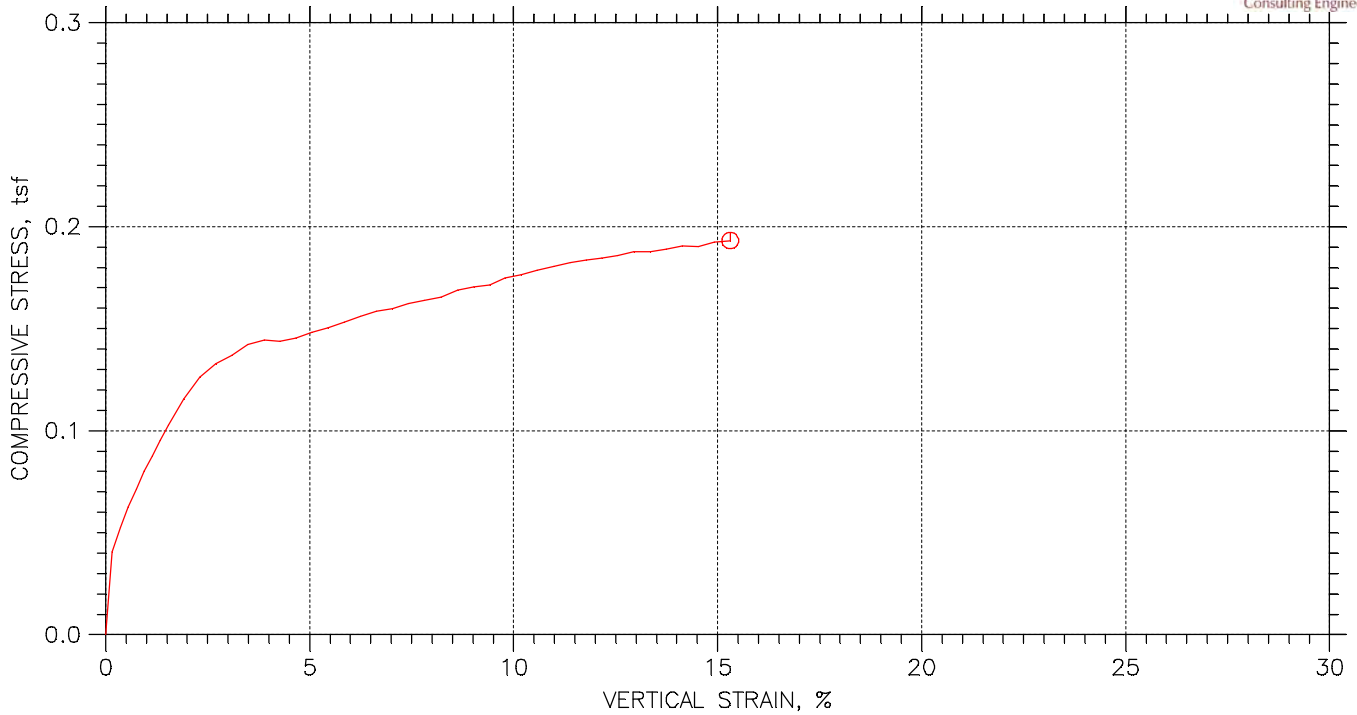
Specimen Height: 6.02 in
 Specimen Area: 6.32 in²
 Specimen Volume: 38.05 in³




Liquid Limit: ---
 Plastic Limit: ---
 Estimated Specific Gravity: 2.60

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.3196	0	0
2	0.25025	0.015497	0.25736	2.8847	6.3359	0.032781	0.016391
3	0.50417	0.031272	0.51932	3.8288	6.3526	0.043395	0.021698
4	0.75417	0.046861	0.77822	4.8253	6.3692	0.054548	0.027274
5	1	0.062267	1.034	5.717	6.3856	0.064446	0.03223
6	1.2539	0.078318	1.3006	6.6086	6.4029	0.074313	0.037157
7	1.5037	0.094092	1.5626	7.5002	6.4199	0.084116	0.042058
8	1.7534	0.10977	1.823	8.3394	6.437	0.09328	0.04664
9	2.0034	0.12555	2.0849	9.1786	6.4542	0.10239	0.051196
10	2.5034	0.15673	2.6027	10.752	6.4885	0.11931	0.059656
11	3.0034	0.18791	3.1205	12.116	6.5232	0.13373	0.066864
12	3.5034	0.21946	3.6444	13.322	6.5586	0.14625	0.073124
13	4.0034	0.25119	4.1714	14.371	6.5947	0.1569	0.078451
14	4.5034	0.28264	4.6938	15.263	6.6309	0.16573	0.082864
15	5.0034	0.31373	5.2101	15.997	6.667	0.17276	0.08638
16	5.5034	0.3451	5.7309	16.626	6.7038	0.17857	0.089285
17	6.0034	0.37674	6.2564	17.098	6.7414	0.18262	0.091308
18	6.5034	0.40847	6.7833	17.466	6.7795	0.18549	0.092744
19	7.0034	0.43983	7.3042	17.885	6.8176	0.18888	0.094442
20	7.5034	0.47092	7.8205	18.147	6.8558	0.19059	0.095293
21	8.0034	0.50256	8.3459	18.305	6.8951	0.19114	0.095571
22	8.5034	0.53494	8.8836	18.305	6.9358	0.19002	0.095011
23	9.0034	0.56713	9.4183	18.252	6.9767	0.18836	0.094182
24	9.5034	0.59878	9.9437	18.147	7.0174	0.1862	0.093098
25	10.003	0.63023	10.466	18.042	7.0583	0.18405	0.092023
26	10.503	0.66187	10.992	17.99	7.1	0.18243	0.091217
27	11.003	0.69416	11.528	17.938	7.143	0.18081	0.090403
28	11.503	0.7258	12.053	17.623	7.1857	0.17658	0.08829
29	12.003	0.75707	12.572	17.518	7.2284	0.17449	0.087246
30	12.503	0.78853	13.095	17.203	7.2719	0.17033	0.085167
31	13.003	0.82035	13.623	16.889	7.3163	0.1662	0.0831
32	13.503	0.85255	14.158	16.364	7.3619	0.16004	0.080021
33	14.003	0.8841	14.682	15.945	7.4071	0.15499	0.077493
34	14.503	0.91518	15.198	15.368	7.4522	0.14847	0.074237

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB012S7		
Initial	Diameter, in	2.8343		
	Height, in	6.0142		
	Water Content, %	38.30		
	Dry Density, pcf	73.56		
	Saturation, %	79.62		
	Void Ratio	1.3083		
Unconfined Compressive Strength, tsf		0.19314		
Undrained Shear Strength, tsf		0.09657		
Time to Failure, min		19.5		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		---		
Plastic Limit		---		
Plasticity Index		---		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB012 S-7	
Sample Type: 3.0" ST	
Description: VERY DARK GRAY LEAN CLAY CL ORGANICS NOTED	
Remarks: TEST PERFORMED AS PER ASTM D2166.	420

Project: DYNERGY HENNEPIN
 Boring No.: HENB012 S-7
 Sample No.: S-7
 Test No.: HENB012S7

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: -----



Soil Description: VERY DARK GRAY LEAN CLAY CL ORGANICS NOTED
 Remarks: TEST PERFORMED AS PER ASTM D2166.

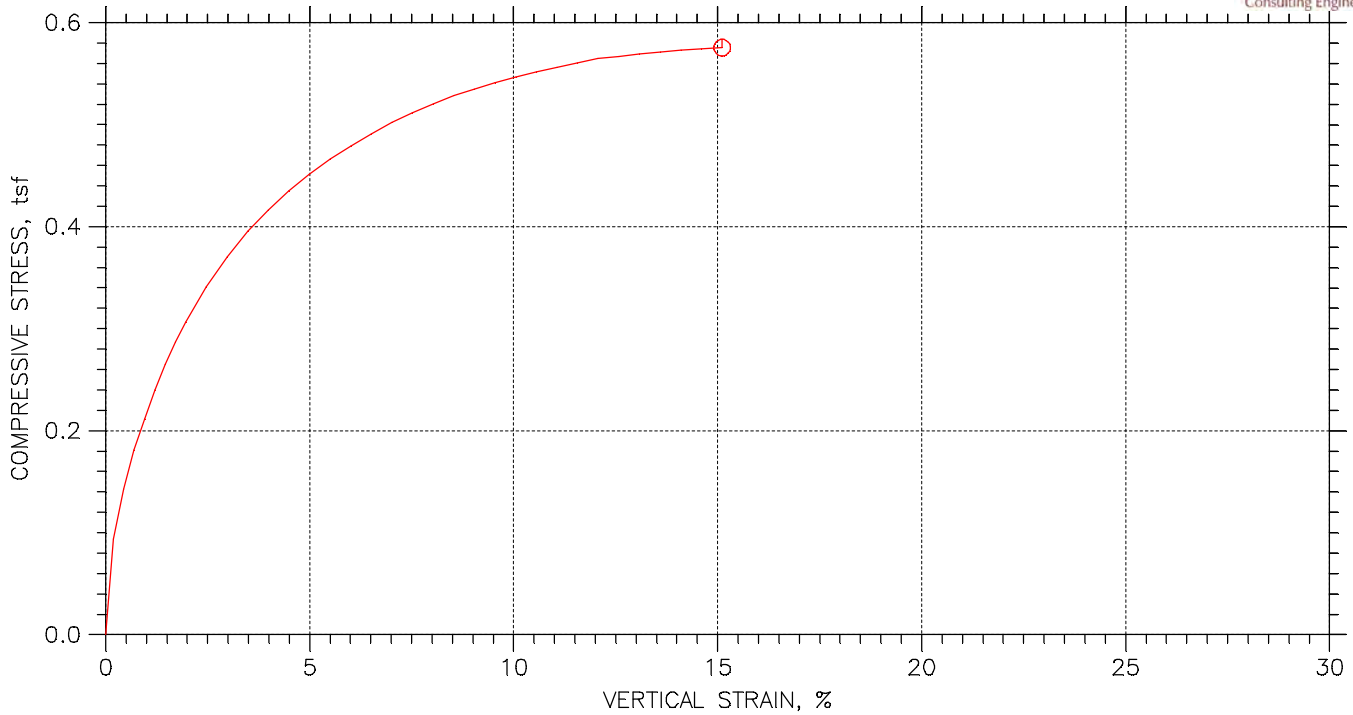
Specimen Height: 6.01 in
 Specimen Area: 6.31 in²
 Specimen Volume: 37.94 in³

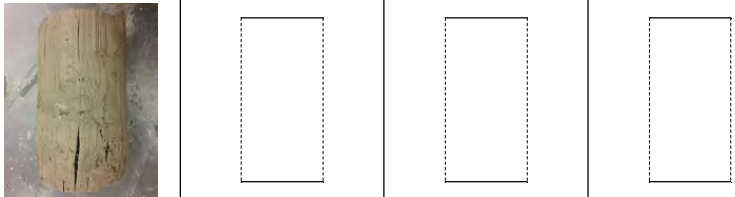
Liquid Limit: ---
 Plastic Limit: ---
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.3091	0	0
2	0.25005	0.0095937	0.15952	3.5665	6.3192	0.040637	0.020318
3	0.50007	0.021309	0.35431	4.6155	6.3315	0.052486	0.026243
4	0.75007	0.033117	0.55064	5.5072	6.344	0.062502	0.031251
5	1.0001	0.045017	0.74851	6.2939	6.3567	0.071289	0.035644
6	1.2501	0.056824	0.94484	7.0806	6.3693	0.080041	0.040021
7	1.5001	0.068724	1.1427	7.7625	6.382	0.087574	0.043787
8	1.7501	0.080532	1.339	8.4443	6.3947	0.095077	0.047538
9	2.0001	0.092247	1.5338	9.1261	6.4074	0.10255	0.051276
10	2.5001	0.1154	1.9188	10.332	6.4325	0.11565	0.057826
11	3.0001	0.13865	2.3053	11.329	6.458	0.12631	0.063154
12	3.5001	0.16208	2.6949	11.958	6.4838	0.13279	0.066396
13	4.0001	0.18579	3.0891	12.378	6.5102	0.1369	0.068448
14	4.5001	0.20977	3.4879	12.902	6.5371	0.14211	0.071054
15	5.0001	0.23366	3.8852	13.165	6.5641	0.1444	0.0722
16	5.5001	0.257	4.2732	13.165	6.5907	0.14382	0.071909
17	6.0001	0.28025	4.6598	13.375	6.6174	0.14552	0.07276
18	6.5001	0.30377	5.0509	13.689	6.6447	0.14833	0.074166
19	7.0001	0.32748	5.4451	13.951	6.6724	0.15055	0.075273
20	7.5001	0.35165	5.8469	14.266	6.7009	0.15329	0.076644
21	8.0001	0.37591	6.2503	14.581	6.7297	0.156	0.077999
22	8.5001	0.39952	6.643	14.896	6.758	0.1587	0.079349
23	9.0001	0.42277	7.0295	15.053	6.7861	0.15971	0.079855
24	9.5001	0.44611	7.4176	15.368	6.8146	0.16237	0.081184
25	10	0.46991	7.8133	15.577	6.8438	0.16388	0.08194
26	10.5	0.49417	8.2167	15.787	6.8739	0.16536	0.082681
27	11	0.51861	8.6232	16.207	6.9045	0.169	0.084502
28	11.5	0.54278	9.025	16.417	6.935	0.17044	0.08522
29	12	0.56594	9.41	16.574	6.9644	0.17134	0.085672
30	12.5	0.589	9.7935	16.994	6.9941	0.17494	0.08747
31	13	0.61252	10.185	17.203	7.0245	0.17633	0.088165
32	13.5	0.63632	10.58	17.518	7.0556	0.17877	0.089383
33	14	0.66058	10.984	17.78	7.0876	0.18062	0.090311
34	14.5	0.68466	11.384	18.042	7.1196	0.18246	0.091231
35	15	0.70827	11.777	18.252	7.1513	0.18377	0.091883
36	15.5	0.73133	12.16	18.41	7.1825	0.18455	0.092273
37	16	0.75467	12.548	18.619	7.2144	0.18582	0.092912
38	16.5	0.77847	12.944	18.882	7.2472	0.18759	0.093794
39	17	0.80264	13.346	18.987	7.2808	0.18776	0.09388
40	17.5	0.82681	13.748	19.196	7.3147	0.18895	0.094477
41	18	0.85043	14.14	19.459	7.3481	0.19066	0.095332
42	18.5	0.87367	14.527	19.511	7.3814	0.19032	0.095158
43	19	0.89701	14.915	19.826	7.415	0.19251	0.096254
44	19.5	0.92063	15.308	19.983	7.4494	0.19314	0.09657

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN014S8		
Initial	Diameter, in	2.8339		
	Height, in	6.0764		
	Water Content, %	32.54		
	Dry Density, pcf	89.48		
	Saturation, %	98.61		
	Void Ratio	0.89757		
Unconfined Compressive Strength, tsf		0.57547		
Undrained Shear Strength, tsf		0.28774		
Time to Failure, min		15		
Strain Rate, %/min		1.14		
Estimated Specific Gravity		2.72		
Liquid Limit		43		
Plastic Limit		20		
Plasticity Index		23		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN014 S-8	
Sample Type: 3.0" ST	
Description: BROWN AND GRAY LEAN CLAY CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	422

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN014 S-8
 Sample No.: ST-8
 Test No.: HEN014S8

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: BROWN AND GRAY LEAN CLAY CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

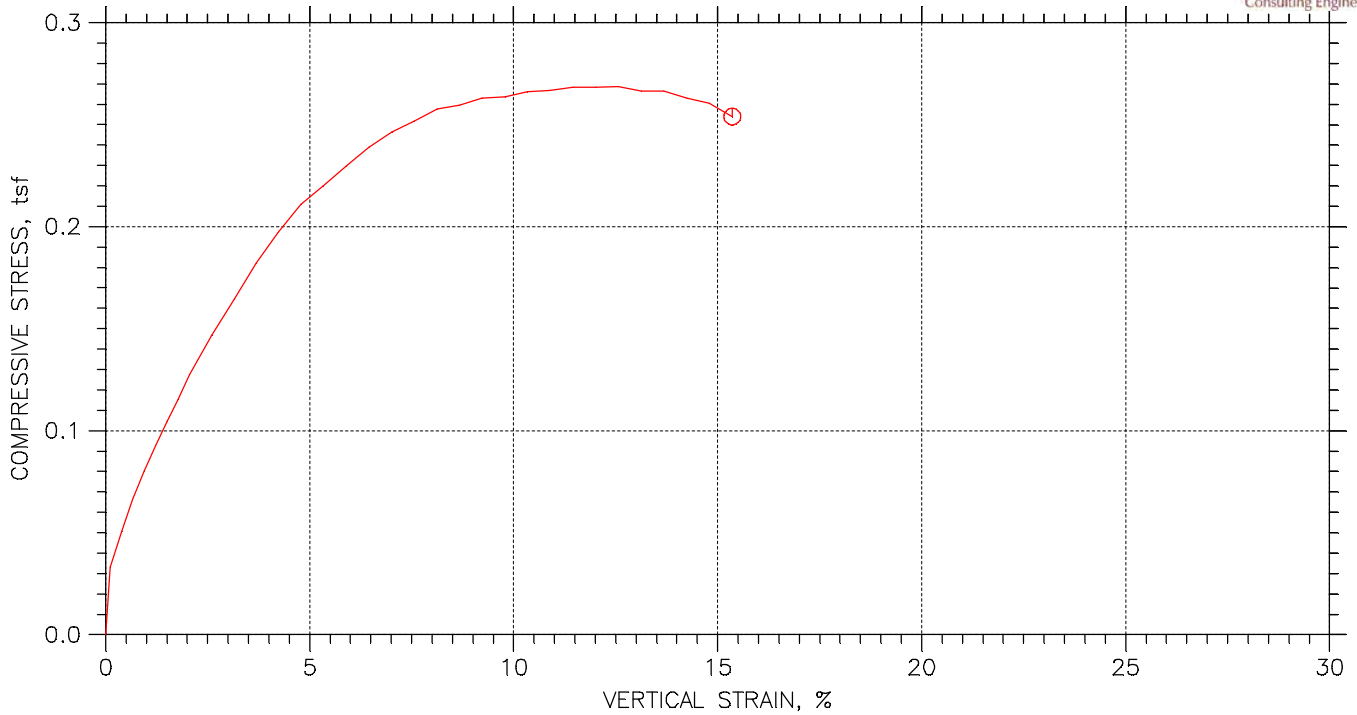
Specimen Height: 6.08 in
 Specimen Area: 6.31 in²
 Specimen Volume: 38.33 in³




Liquid Limit: 43
 Plastic Limit: 20
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.3073	0	0
2	0.25018	0.011388	0.18741	8.2129	6.3192	0.093577	0.046789
3	0.50018	0.026876	0.44229	12.53	6.3354	0.1424	0.0712
4	0.75018	0.042363	0.69718	15.952	6.3516	0.18083	0.090414
5	1.0002	0.057942	0.95356	18.742	6.3681	0.21191	0.10595
6	1.2502	0.073429	1.2084	21.269	6.3845	0.23986	0.11993
7	1.5002	0.088644	1.4588	23.533	6.4007	0.26472	0.13236
8	1.7502	0.10395	1.7107	25.586	6.4171	0.28708	0.14354
9	2.0002	0.11925	1.9626	27.376	6.4336	0.30638	0.15319
10	2.5002	0.15014	2.4709	30.641	6.4671	0.34113	0.17056
11	3.0002	0.18102	2.9791	33.431	6.501	0.37025	0.18513
12	3.5002	0.21209	3.4904	35.905	6.5355	0.39556	0.19778
13	4.0002	0.24243	3.9897	37.958	6.5694	0.41602	0.20801
14	4.5002	0.27285	4.4904	39.906	6.6039	0.43509	0.21754
15	5.0002	0.30347	4.9942	41.644	6.6389	0.45163	0.22582
16	5.5002	0.33417	5.4995	43.223	6.6744	0.46627	0.23314
17	6.0002	0.36487	6.0047	44.645	6.7103	0.47903	0.23951
18	6.5002	0.39566	6.5115	46.013	6.7466	0.49105	0.24553
19	7.0002	0.42627	7.0152	47.33	6.7832	0.50238	0.25119
20	7.5002	0.45707	7.522	48.435	6.8204	0.51131	0.25566
21	8.0002	0.48786	8.0288	49.541	6.8579	0.52012	0.26006
22	8.5002	0.51865	8.5355	50.594	6.8959	0.52825	0.26412
23	9.0002	0.54935	9.0408	51.489	6.9343	0.53462	0.26731
24	9.5002	0.57969	9.5401	52.384	6.9725	0.54093	0.27046
25	10	0.61058	10.048	53.226	7.0119	0.54654	0.27327
26	10.5	0.64128	10.554	54.068	7.0515	0.55207	0.27603
27	11	0.67189	11.057	54.806	7.0915	0.55644	0.27822
28	11.5	0.7025	11.561	55.543	7.1319	0.56073	0.28037
29	12	0.73311	12.065	56.28	7.1727	0.56494	0.28247
30	12.5	0.76408	12.575	56.806	7.2145	0.56692	0.28346
31	13	0.79506	13.084	57.385	7.2569	0.56936	0.28468
32	13.5	0.82603	13.594	57.912	7.2997	0.57121	0.2856
33	14	0.85665	14.098	58.438	7.3425	0.57304	0.28652
34	14.5	0.88717	14.6	58.912	7.3857	0.57431	0.28716
35	15	0.91814	15.11	59.386	7.43	0.57547	0.28774

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB015S4		
Initial	Diameter, in	2.7992		
	Height, in	5.6701		
	Water Content, %	131.90		
	Dry Density, pcf	50.83		
	Saturation, %	155.02		
	Void Ratio	2.2547		
Unconfined Compressive Strength, tsf		0.26878		
Undrained Shear Strength, tsf		0.13439		
Time to Failure, min		11.5		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.65		
Liquid Limit		48		
Plastic Limit		25		
Plasticity Index		23		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB015 S-4	
Sample Type: 3.0" ST	
Description: BLACK AND DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL OL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	424

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENB015 S-4
 Sample No.: ST-4
 Test No.: HENB015S4

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5' -9.5'
 Elevation: -----



Soil Description: BLACK AND DARK GRAY ORGANIC CLAY WITH SAND AND GRAVEL OL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

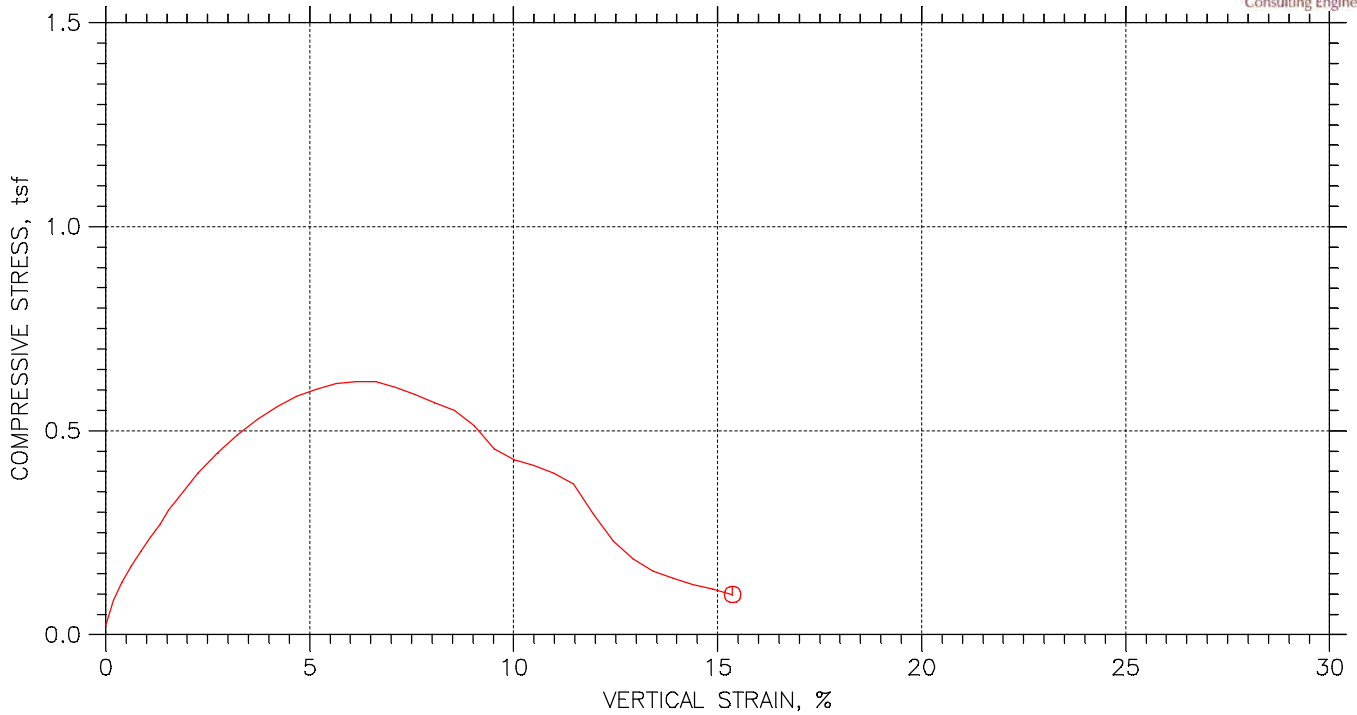
Specimen Height: 5.67 in
 Specimen Area: 6.15 in²
 Specimen Volume: 34.89 in³



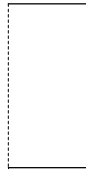
Liquid Limit: 48
 Plastic Limit: 25
 Estimated Specific Gravity: 2.65

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.1541	0	0
2	0.25005	0.006365	0.11226	2.8323	6.161	0.033099	0.016549
3	0.50005	0.022047	0.38883	4.3533	6.1781	0.050734	0.025367
4	0.75005	0.037821	0.66703	5.717	6.1954	0.06644	0.03322
5	1.0001	0.053503	0.94361	6.9233	6.2127	0.080235	0.040118
6	1.2501	0.069278	1.2218	8.0247	6.2302	0.092739	0.046369
7	1.5001	0.085144	1.5016	9.0737	6.2479	0.10456	0.052282
8	1.7501	0.10073	1.7766	10.018	6.2654	0.11512	0.057561
9	2.0001	0.11623	2.0499	11.119	6.2829	0.12742	0.063712
10	2.5001	0.14741	2.5998	12.902	6.3183	0.14703	0.073515
11	3.0001	0.17841	3.1464	14.528	6.354	0.16463	0.082314
12	3.5001	0.20912	3.6882	16.154	6.3897	0.18203	0.091014
13	4.0001	0.2404	4.2397	17.623	6.4265	0.19744	0.09872
14	4.5001	0.27158	4.7896	18.934	6.4636	0.21091	0.10546
15	5.0001	0.30285	5.3411	19.878	6.5013	0.22015	0.11007
16	5.5001	0.3343	5.8959	20.875	6.5396	0.22983	0.11491
17	6.0001	0.36567	6.4491	21.819	6.5783	0.23881	0.1194
18	6.5001	0.39722	7.0055	22.658	6.6177	0.24652	0.12326
19	7.0001	0.42886	7.5635	23.287	6.6576	0.25185	0.12592
20	7.5001	0.4604	8.1199	23.969	6.6979	0.25766	0.12883
21	8.0001	0.49186	8.6747	24.284	6.7386	0.25947	0.12973
22	8.5001	0.52323	9.2278	24.756	6.7797	0.26291	0.13145
23	9.0001	0.55468	9.7826	24.966	6.8214	0.26352	0.13176
24	9.5001	0.58605	10.336	25.385	6.8634	0.2663	0.13315
25	10	0.61769	10.894	25.595	6.9064	0.26683	0.13342
26	10.5	0.64942	11.453	25.91	6.9501	0.26842	0.13421
27	11	0.68124	12.015	26.067	6.9944	0.26833	0.13417
28	11.5	0.71279	12.571	26.277	7.0389	0.26878	0.13439
29	12	0.74416	13.124	26.225	7.0837	0.26655	0.13327
30	12.5	0.7758	13.682	26.382	7.1295	0.26643	0.13321
31	13	0.80744	14.24	26.225	7.1759	0.26312	0.13156
32	13.5	0.83917	14.8	26.12	7.2231	0.26036	0.13018
33	14	0.87081	15.358	25.648	7.2707	0.25398	0.12699

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN015S8		
Initial	Diameter, in	2.8402		
	Height, in	6.0898		
	Water Content, %	148.86		
	Dry Density, pcf	39.26		
	Saturation, %	121.79		
	Void Ratio	3.3248		
Unconfined Compressive Strength, tsf		0.62021		
Undrained Shear Strength, tsf		0.31011		
Time to Failure, min		7.0003		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		74		
Plastic Limit		37		
Plasticity Index		37		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN015 S8	
Sample Type: 3.0" ST	
Description: BLACK ORGANIC SILT WITH SAND OH	
Remarks: TEST PERFORMED AS PER ASTM D2166.	426

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN015 S8
 Sample No.: S-8
 Test No.: HEN015S8

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: BLACK ORGANIC SILT WITH SAND OH
 Remarks: TEST PERFORMED AS PER ASTM D2166.

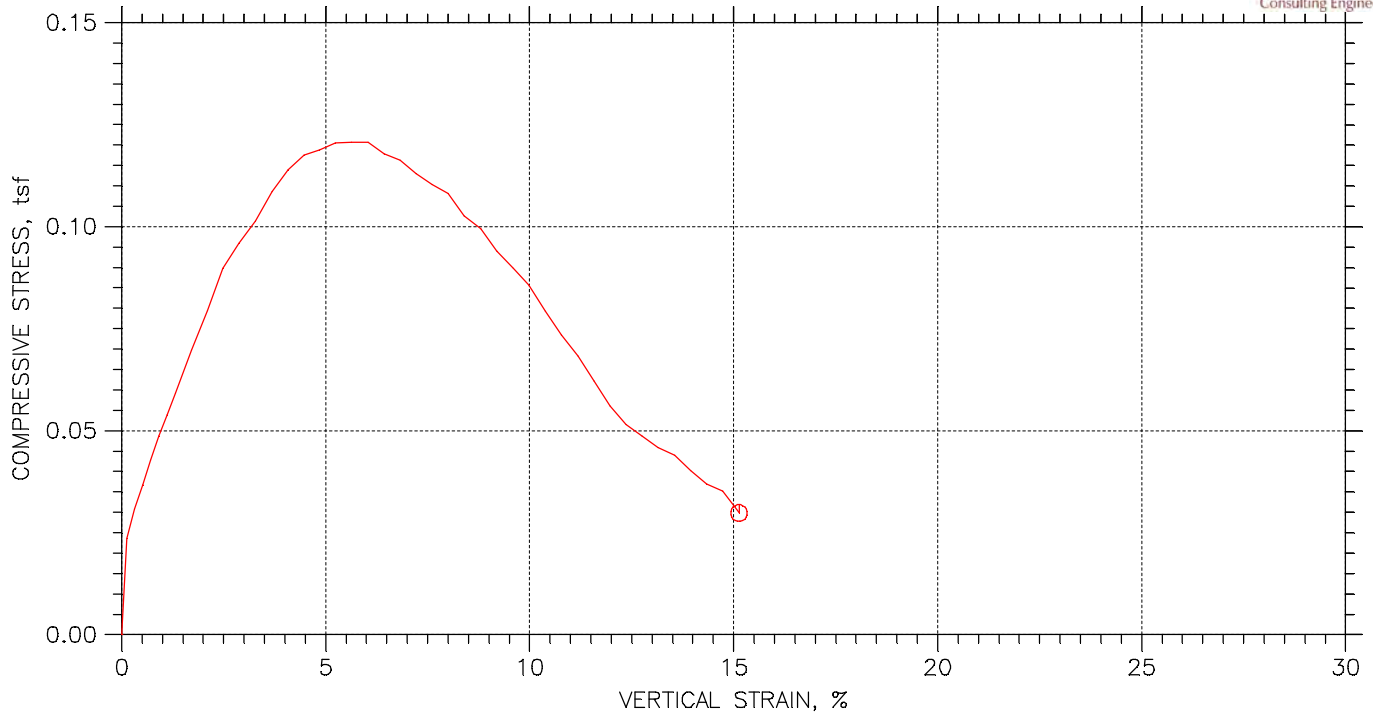
Specimen Height: 6.09 in
 Specimen Area: 6.34 in²
 Specimen Volume: 38.58 in³




Liquid Limit: 74
 Plastic Limit: 37
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	1.9586	6.3354	0.022259	0.01113
2	0.25022	0.011144	0.18299	7.358	6.347	0.083469	0.041734
3	0.50022	0.024023	0.39448	11.328	6.3605	0.12823	0.064117
4	0.75023	0.037907	0.62247	14.928	6.3751	0.16859	0.084297
5	1.0002	0.052156	0.85646	18.21	6.3901	0.20518	0.10259
6	1.2502	0.06668	1.0949	21.227	6.4055	0.2386	0.1193
7	1.5002	0.081021	1.3304	24.139	6.4208	0.27068	0.13534
8	1.7502	0.093991	1.5434	27.262	6.4347	0.30504	0.15252
9	2.0002	0.1087	1.7849	30.173	6.4505	0.33679	0.16839
10	2.5002	0.13793	2.2649	35.679	6.4822	0.39629	0.19815
11	3.0002	0.16725	2.7464	40.337	6.5143	0.44583	0.22291
12	3.5002	0.19684	3.2324	44.625	6.547	0.49075	0.24538
13	4.0002	0.22625	3.7153	48.224	6.5799	0.52769	0.26385
14	4.5002	0.25585	4.2013	51.295	6.6133	0.55846	0.27923
15	5.0002	0.28517	4.6828	53.941	6.6467	0.58432	0.29216
16	5.5002	0.31467	5.1673	55.847	6.6806	0.60189	0.30094
17	6.0002	0.34409	5.6502	57.329	6.7148	0.61472	0.30736
18	6.5003	0.37359	6.1347	58.123	6.7495	0.62003	0.31002
19	7.0003	0.403	6.6177	58.441	6.7844	0.62021	0.31011
20	7.5003	0.43241	7.1007	57.382	6.8197	0.60583	0.30291
21	8.0003	0.46183	7.5836	56.112	6.8553	0.58933	0.29467
22	8.5003	0.49115	8.0651	54.471	6.8912	0.56912	0.28456
23	9.0003	0.52065	8.5496	52.883	6.9277	0.54961	0.27481
24	9.5003	0.55025	9.0356	49.548	6.9647	0.51222	0.25611
25	10	0.57993	9.5231	44.36	7.0022	0.45613	0.22806
26	10.5	0.60953	10.009	41.925	7.0401	0.42878	0.21439
27	11	0.63885	10.491	40.707	7.0779	0.4141	0.20705
28	11.5	0.66863	10.979	39.066	7.1168	0.39523	0.19762
29	12	0.69804	11.462	36.631	7.1556	0.36859	0.18429
30	12.5	0.72763	11.948	29.538	7.1951	0.29558	0.14779
31	13	0.75741	12.437	23.08	7.2353	0.22967	0.11484
32	13.5	0.78728	12.928	18.686	7.2761	0.18491	0.092455
33	14	0.81706	13.417	15.828	7.3171	0.15574	0.077872
34	14.5	0.84656	13.901	14.134	7.3583	0.1383	0.069149
35	15	0.87634	14.39	12.705	7.4003	0.12361	0.061803
36	15.5	0.90602	14.878	11.646	7.4427	0.11266	0.05633
37	16	0.93562	15.364	10.217	7.4855	0.09827	0.049135

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB017S3		
Initial	Diameter, in	2.8169		
	Height, in	5.9768		
	Water Content, %	36.89		
	Dry Density, pcf	81.7		
	Saturation, %	93.06		
	Void Ratio	1.0783		
Unconfined Compressive Strength, tsf		0.1207		
Undrained Shear Strength, tsf		0.060351		
Time to Failure, min		8.004		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		39		
Plastic Limit		21		
Plasticity Index		18		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB017 S-3	
Sample Type: 3.0" ST	
Description: VERY DARK GRAY LEAN CLAY WITH SAND	
Remarks: TEST PERFORMED AS PER ASTM D2166.	428

Project: DYNERGY HENNEPIN
 Boring No.: HENB017 S-3
 Sample No.: ST-3
 Test No.: HENB017S3

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: -----



Soil Description: VERY DARK GRAY LEAN CLAY WITH SAND
 Remarks: TEST PERFORMED AS PER ASTM D2166.

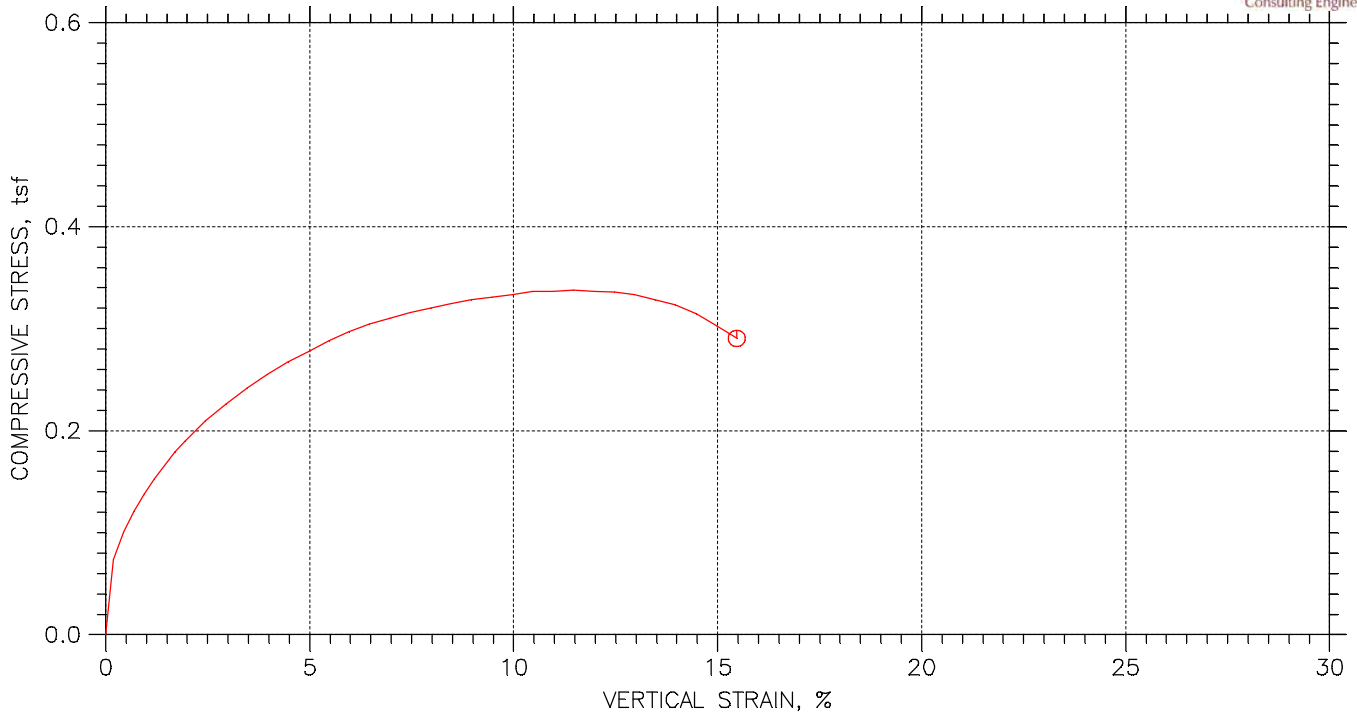
Specimen Height: 5.98 in
 Specimen Area: 6.23 in²
 Specimen Volume: 37.25 in³



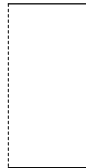
Liquid Limit: 39
 Plastic Limit: 21
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.2322	0	0
2	0.50395	0.0072875	0.12193	2.0455	6.2398	0.023603	0.011801
3	0.75395	0.019095	0.31949	2.6749	6.2522	0.030804	0.015402
4	1.004	0.030903	0.51705	3.1994	6.2646	0.036771	0.018386
5	1.254	0.04271	0.71461	3.7239	6.2771	0.042714	0.021357
6	1.504	0.054702	0.91525	4.2484	6.2898	0.048632	0.024316
7	1.754	0.066695	1.1159	4.7204	6.3025	0.053926	0.026963
8	2.004	0.078687	1.3165	5.1925	6.3153	0.059198	0.029599
9	2.504	0.10221	1.7101	6.1365	6.3406	0.069682	0.034841
10	3.004	0.12546	2.0991	7.0282	6.3658	0.079491	0.039746
11	3.504	0.14861	2.4865	7.9723	6.3911	0.089813	0.044906
12	4.004	0.17204	2.8785	8.5492	6.4169	0.095925	0.047963
13	4.504	0.19584	3.2767	9.0737	6.4433	0.10139	0.050696
14	5.004	0.22001	3.6811	9.7555	6.4704	0.10856	0.054278
15	5.504	0.24399	4.0824	10.28	6.4975	0.11392	0.056958
16	6.004	0.26724	4.4713	10.647	6.5239	0.11751	0.058753
17	6.504	0.29021	4.8556	10.805	6.5503	0.11876	0.059381
18	7.004	0.31336	5.243	11.014	6.577	0.12058	0.060288
19	7.504	0.33689	5.6366	11.067	6.6045	0.12065	0.060323
20	8.004	0.36087	6.0379	11.119	6.6327	0.1207	0.060351
21	8.504	0.38476	6.4376	10.909	6.661	0.11792	0.058961
22	9.004	0.40819	6.8297	10.805	6.689	0.1163	0.058149
23	9.504	0.43135	7.2171	10.542	6.717	0.113	0.056502
24	10.004	0.45459	7.606	10.332	6.7452	0.11029	0.055145
25	10.504	0.47802	7.998	10.175	6.774	0.10815	0.054075
26	11.004	0.50192	8.3978	9.7031	6.8036	0.10268	0.051342
27	11.504	0.5259	8.7991	9.4408	6.8335	0.099472	0.049736
28	12.004	0.54979	9.1988	8.9688	6.8636	0.094084	0.047042
29	12.504	0.57341	9.5939	8.6017	6.8936	0.08984	0.04492
30	13.004	0.59675	9.9844	8.2345	6.9235	0.085634	0.042817
31	13.504	0.62036	10.38	7.6576	6.954	0.079285	0.039642
32	14.004	0.64416	10.778	7.1331	6.985	0.073526	0.036763
33	14.504	0.66805	11.177	6.661	7.0165	0.068353	0.034176
34	15.004	0.69194	11.577	6.0841	7.0482	0.062151	0.031076
35	15.504	0.71547	11.971	5.5072	7.0797	0.056007	0.028004
36	16.004	0.73871	12.36	5.0876	7.1111	0.051511	0.025756
37	16.504	0.76224	12.753	4.8253	7.1432	0.048637	0.024318
38	17.004	0.78594	13.15	4.5631	7.1758	0.045784	0.022892
39	17.504	0.80984	13.55	4.4057	7.209	0.044002	0.022001
40	18.004	0.83373	13.949	4.0386	7.2425	0.040149	0.020074
41	18.504	0.85734	14.345	3.7239	7.2759	0.03685	0.018425
42	19.004	0.88077	14.737	3.5665	7.3094	0.035132	0.017566
43	19.504	0.90448	15.133	3.042	7.3435	0.029826	0.014913

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN017S6		
Initial	Diameter, in	2.7764		
	Height, in	6.1713		
	Water Content, %	34.15		
	Dry Density, pcf	88.		
	Saturation, %	99.92		
	Void Ratio	0.9296		
Unconfined Compressive Strength, tsf		0.33759		
Undrained Shear Strength, tsf		0.16879		
Time to Failure, min		11.504		
Strain Rate, %/min		1.14		
Estimated Specific Gravity		2.72		
Liquid Limit		45		
Plastic Limit		24		
Plasticity Index		21		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN017 S-6	
Sample Type: 3.0" ST	
Description: BROWN AND GRAY LEAN CLAY CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	430

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN017 S-6
 Sample No.: ST-6
 Test No.: HEN017S6

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 15.0' -17.0'
 Elevation: ----



Soil Description: BROWN AND GRAY LEAN CLAY CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

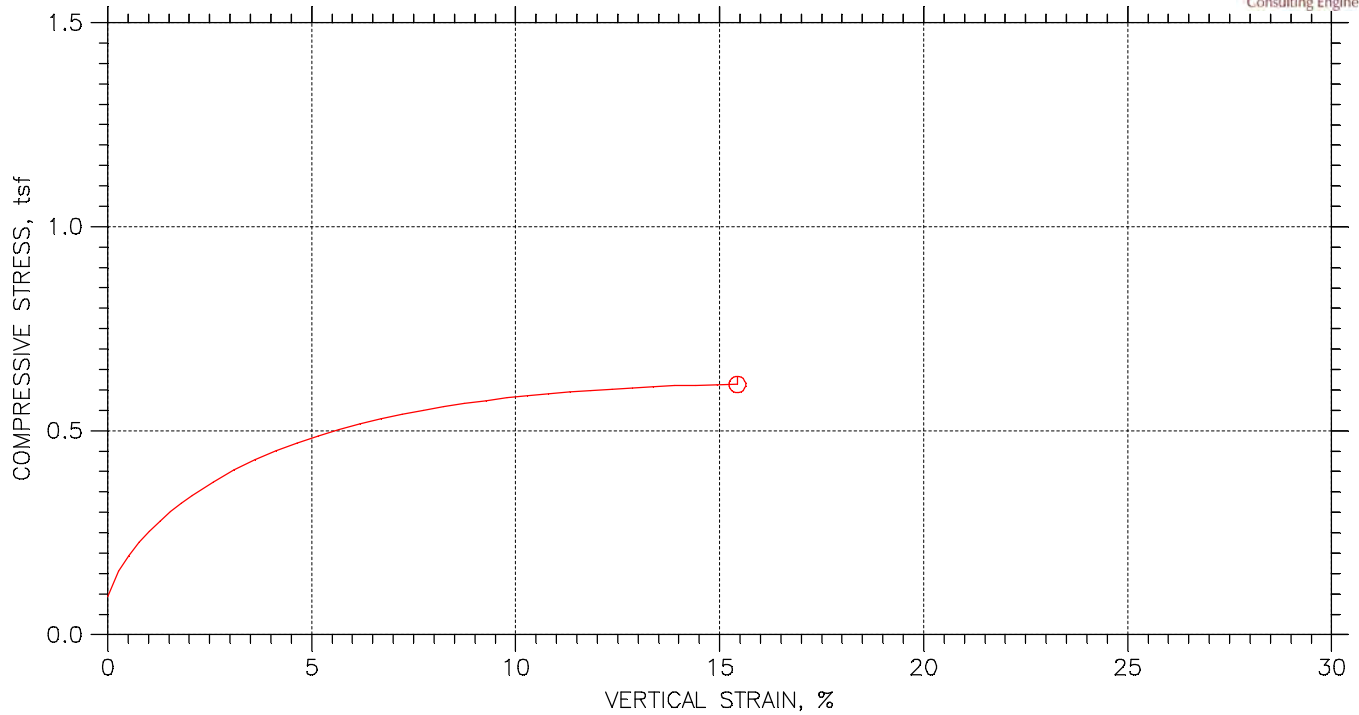
Specimen Height: 6.17 in
 Specimen Area: 6.05 in²
 Specimen Volume: 37.36 in³




Liquid Limit: 45
 Plastic Limit: 24
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.0541	0	0
2	0.25403	0.011661	0.18896	6.2123	6.0655	0.073743	0.036871
3	0.50403	0.02724	0.4414	8.4762	6.0809	0.10036	0.05018
4	0.75403	0.042636	0.69089	10.214	6.0962	0.12063	0.060314
5	1.004	0.057942	0.9389	11.688	6.1114	0.13769	0.068847
6	1.254	0.073429	1.1899	13.004	6.127	0.15281	0.076406
7	1.504	0.088735	1.4379	14.162	6.1424	0.16601	0.083003
8	1.754	0.10431	1.6903	15.32	6.1582	0.17912	0.089561
9	2.004	0.11998	1.9442	16.268	6.1741	0.18971	0.094855
10	2.504	0.15123	2.4506	18.058	6.2062	0.2095	0.10475
11	3.004	0.18248	2.9569	19.585	6.2385	0.22603	0.11302
12	3.504	0.21355	3.4603	21.059	6.2711	0.24178	0.12089
13	4.004	0.24443	3.9608	22.322	6.3037	0.25496	0.12748
14	4.5041	0.27559	4.4657	23.533	6.3371	0.26738	0.13369
15	5.0041	0.30665	4.9691	24.534	6.3706	0.27727	0.13864
16	5.5041	0.33754	5.4695	25.639	6.4044	0.28824	0.14412
17	6.0041	0.36815	5.9655	26.534	6.4381	0.29674	0.14837
18	6.5041	0.39903	6.466	27.376	6.4726	0.30453	0.15227
19	7.0041	0.43019	6.9709	28.061	6.5077	0.31046	0.15523
20	7.5041	0.46107	7.4713	28.693	6.5429	0.31574	0.15787
21	8.0041	0.49187	7.9703	29.272	6.5784	0.32038	0.16019
22	8.5041	0.52248	8.4663	29.798	6.614	0.32438	0.16219
23	9.0041	0.55327	8.9653	30.325	6.6503	0.32831	0.16416
24	9.5041	0.58443	9.4702	30.746	6.6874	0.33103	0.16551
25	10.004	0.6154	9.9721	31.167	6.7247	0.3337	0.16685
26	10.504	0.64592	10.467	31.588	6.7618	0.33635	0.16818
27	11.004	0.67663	10.964	31.799	6.7996	0.33671	0.16836
28	11.504	0.7076	11.466	32.062	6.8381	0.33759	0.16879
29	12.004	0.73876	11.971	32.167	6.8773	0.33676	0.16838
30	12.504	0.76955	12.47	32.273	6.9166	0.33595	0.16798
31	13.004	0.79998	12.963	32.22	6.9557	0.33351	0.16676
32	13.504	0.83086	13.463	31.904	6.996	0.32835	0.16417
33	14.004	0.86202	13.968	31.588	7.037	0.3232	0.1616
34	14.504	0.89336	14.476	30.956	7.0788	0.31486	0.15743
35	15.004	0.92406	14.974	29.956	7.1202	0.30292	0.15146
36	15.504	0.95449	15.467	28.903	7.1618	0.29058	0.14529

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN018S8		
Initial	Diameter, in	2.8083		
	Height, in	6.0094		
	Water Content, %	31.88		
	Dry Density, pcf	90.04		
	Saturation, %	97.88		
	Void Ratio	0.8859		
Unconfined Compressive Strength, tsf		0.61328		
Undrained Shear Strength, tsf		0.30664		
Time to Failure, min		15.004		
Strain Rate, %/min		1.14		
Estimated Specific Gravity		2.72		
Liquid Limit		43		
Plastic Limit		22		
Plasticity Index		21		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN018 S-8	
Sample Type: 3.0" ST	
Description: DARK BROWNISH GRAY LEAN CLAY CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	432

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN018 S-8
 Sample No.: ST-8
 Test No.: HEN018S8

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: DARK BROWNISH GRAY LEAN CLAY CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

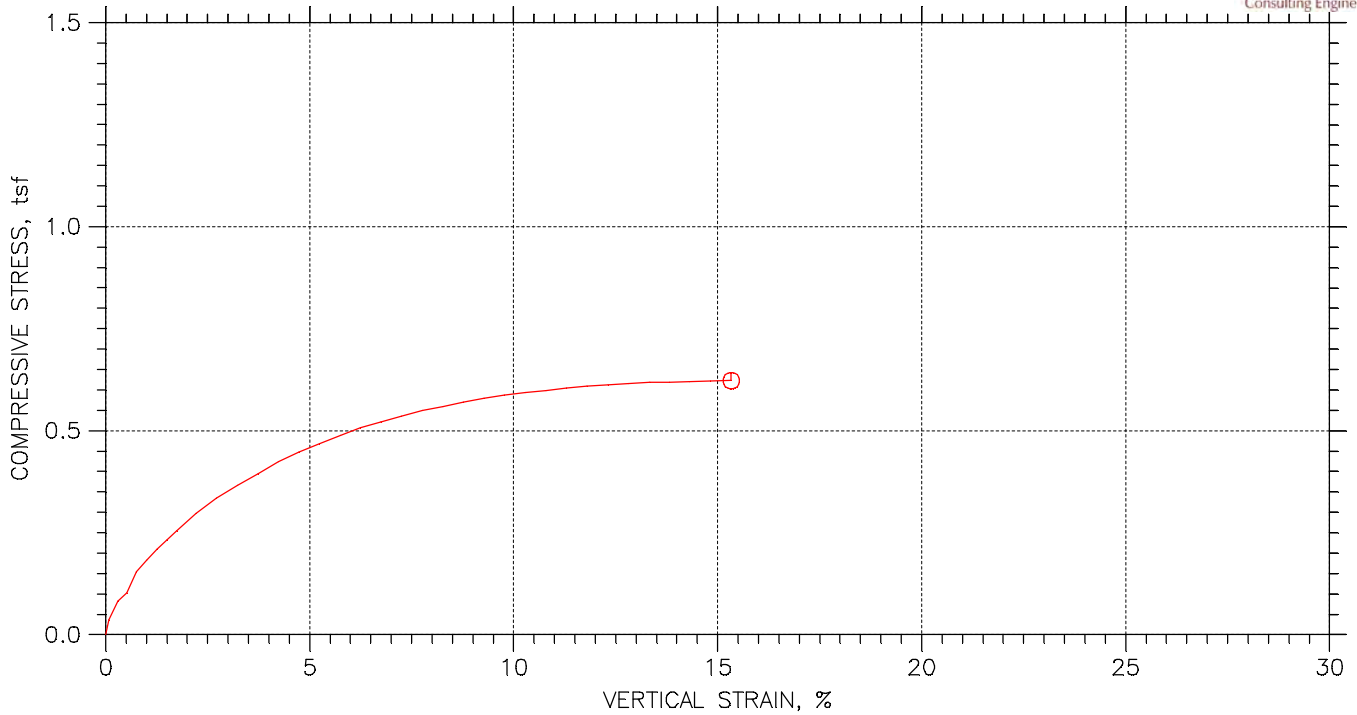
Specimen Height: 6.01 in
 Specimen Area: 6.19 in²
 Specimen Volume: 37.22 in³




Liquid Limit: 43
 Plastic Limit: 22
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	7.9497	6.1939	0.092409	0.046205
2	0.25402	0.015943	0.2653	13.478	6.2104	0.15625	0.078126
3	0.50403	0.031431	0.52302	16.794	6.2265	0.1942	0.097101
4	0.75403	0.046554	0.77468	19.585	6.2423	0.22589	0.11295
5	1.004	0.061768	1.0279	22.059	6.2583	0.25379	0.12689
6	1.254	0.077165	1.2841	24.27	6.2745	0.2785	0.13925
7	1.504	0.092743	1.5433	26.376	6.291	0.30187	0.15094
8	1.754	0.10841	1.804	28.219	6.3077	0.32211	0.16105
9	2.004	0.12408	2.0648	30.009	6.3245	0.34163	0.17081
10	2.504	0.15524	2.5833	33.062	6.3582	0.3744	0.1872
11	3.004	0.18594	3.0942	35.8	6.3917	0.40327	0.20164
12	3.504	0.21664	3.6051	38.274	6.4256	0.42887	0.21444
13	4.004	0.24807	4.1281	40.38	6.4606	0.45001	0.22501
14	4.504	0.27923	4.6465	42.328	6.4958	0.46917	0.23459
15	5.004	0.30993	5.1574	44.171	6.5308	0.48697	0.24349
16	5.5041	0.34027	5.6623	45.803	6.5657	0.50228	0.25114
17	6.0041	0.37116	6.1762	47.33	6.6017	0.51619	0.2581
18	6.5041	0.40268	6.7007	48.751	6.6388	0.52872	0.26436
19	7.0041	0.43402	7.2222	50.067	6.6761	0.53996	0.26998
20	7.5041	0.46435	7.7271	51.278	6.7126	0.55001	0.27501
21	8.0041	0.4946	8.2304	52.436	6.7494	0.55937	0.27968
22	8.5041	0.52539	8.7428	53.489	6.7873	0.56741	0.28371
23	9.0041	0.55701	9.2688	54.384	6.8267	0.57358	0.28679
24	9.5041	0.58825	9.7888	55.332	6.866	0.58023	0.29012
25	10.004	0.61887	10.298	56.122	6.905	0.58519	0.2926
26	10.504	0.64939	10.806	56.964	6.9443	0.59061	0.29531
27	11.004	0.68063	11.326	57.701	6.9851	0.59477	0.29738
28	11.504	0.71206	11.849	58.333	7.0265	0.59773	0.29887
29	12.004	0.74286	12.361	59.07	7.0676	0.60177	0.30088
30	12.504	0.77301	12.863	59.702	7.1083	0.60472	0.30236
31	13.004	0.80362	13.373	60.333	7.1501	0.60755	0.30377
32	13.504	0.83496	13.894	60.965	7.1934	0.61021	0.30511
33	14.004	0.86658	14.42	61.439	7.2376	0.6112	0.3056
34	14.504	0.89719	14.93	61.966	7.281	0.61277	0.30638
35	15.004	0.92743	15.433	62.387	7.3243	0.61328	0.30664

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN019S2		
Initial	Diameter, in	2.848		
	Height, in	5.8406		
	Water Content, %	33.10		
	Dry Density, pcf	89.03		
	Saturation, %	99.24		
	Void Ratio	0.90719		
Unconfined Compressive Strength, tsf		0.62255		
Undrained Shear Strength, tsf		0.31128		
Time to Failure, min		15.503		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		41		
Plastic Limit		22		
Plasticity Index		19		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN019 S2	
Sample Type: 3.0" ST	
Description: DARK BROWN LEAN CLAY WITH SAND CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	434

UNCONFIRMED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENO19 S2
 Sample No.: S-2
 Test No.: HENO19S2

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 7.5' -9.5'
 Elevation: ----



Soil Description: DARK BROWN LEAN CLAY WITH SAND CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

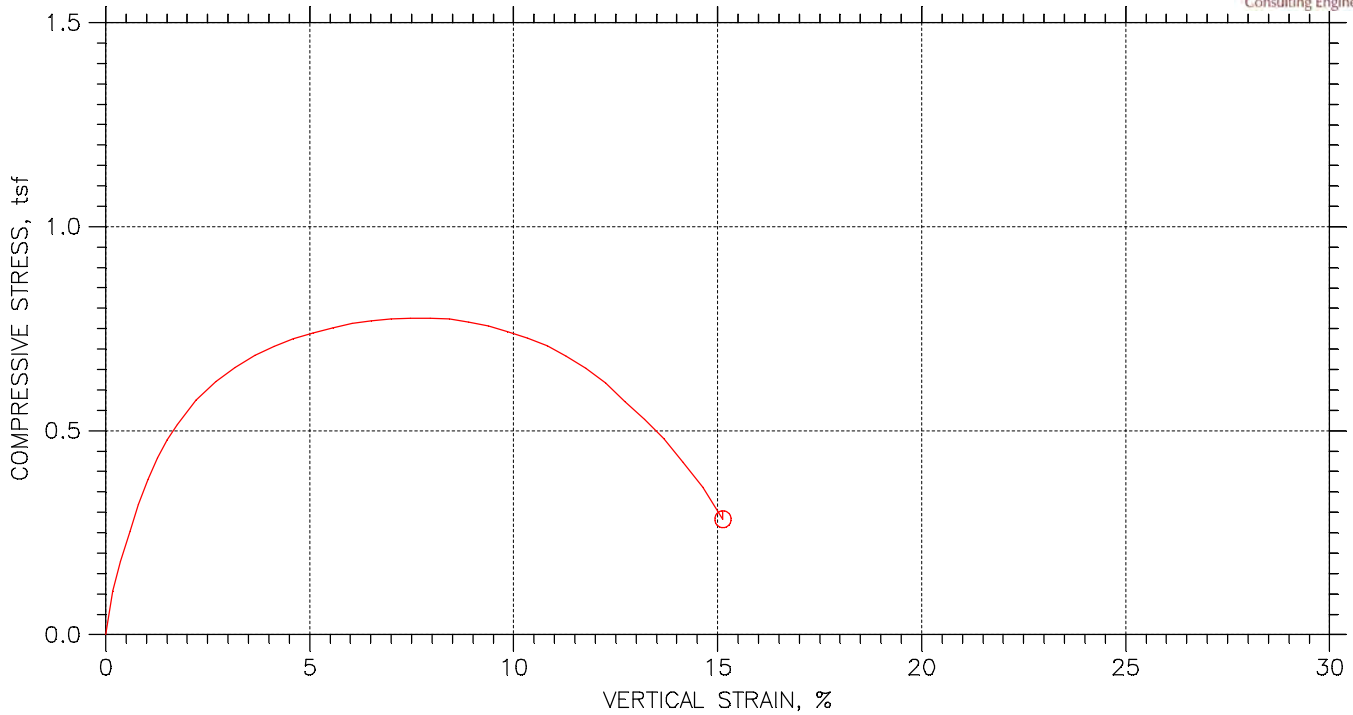
Specimen Height: 5.84 in
 Specimen Area: 6.37 in²
 Specimen Volume: 37.21 in³




Liquid Limit: 41
 Plastic Limit: 22
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.3706	0	0
2	0.25415	0.0046585	0.079761	3.282	6.3757	0.037063	0.018532
3	0.50415	0.01772	0.3034	7.358	6.39	0.082908	0.041454
4	0.75388	0.0306	0.52392	9.1049	6.4041	0.10236	0.051182
5	1.0039	0.044301	0.75851	13.816	6.4193	0.15497	0.077483
6	1.2534	0.058916	1.0087	16.357	6.4355	0.183	0.091501
7	1.5034	0.073439	1.2574	18.686	6.4517	0.20854	0.10427
8	1.7534	0.08778	1.5029	20.91	6.4678	0.23277	0.11638
9	2.0034	0.10203	1.7469	22.921	6.4839	0.25453	0.12726
10	2.5034	0.12925	2.213	26.891	6.5148	0.2972	0.1486
11	3.0034	0.15884	2.7197	30.385	6.5487	0.33407	0.16704
12	3.5034	0.18853	3.228	33.455	6.5831	0.3659	0.18295
13	4.0034	0.21803	3.7331	36.314	6.6176	0.3951	0.19755
14	4.5034	0.24717	4.232	39.172	6.6521	0.42399	0.21199
15	5.0034	0.27658	4.7356	41.554	6.6873	0.44741	0.2237
16	5.5034	0.30645	5.247	43.778	6.7234	0.46881	0.23441
17	6.0034	0.33605	5.7537	45.842	6.7595	0.4883	0.24415
18	6.5034	0.36509	6.251	47.854	6.7954	0.50703	0.25352
19	7.0034	0.39387	6.7437	49.495	6.8313	0.52166	0.26083
20	7.5034	0.42355	7.252	51.136	6.8687	0.53602	0.26801
21	8.0034	0.45351	7.7649	52.671	6.9069	0.54906	0.27453
22	8.5034	0.48293	8.2685	53.994	6.9448	0.55978	0.27989
23	9.0034	0.51206	8.7674	55.265	6.9828	0.56984	0.28492
24	9.5034	0.54111	9.2647	56.482	7.0211	0.57922	0.28961
25	10.003	0.5708	9.773	57.541	7.0606	0.58677	0.29338
26	10.503	0.60094	10.289	58.6	7.1012	0.59415	0.29707
27	11.003	0.63063	10.797	59.394	7.1417	0.59879	0.29939
28	11.503	0.65995	11.299	60.347	7.1821	0.60497	0.30248
29	12.003	0.68936	11.803	61.088	7.2231	0.60892	0.30446
30	12.503	0.71905	12.311	61.776	7.265	0.61223	0.30612
31	13.003	0.74901	12.824	62.464	7.3078	0.61543	0.30771
32	13.503	0.77842	13.328	63.152	7.3502	0.61862	0.30931
33	14.003	0.8071	13.819	63.576	7.3921	0.61924	0.30962
34	14.503	0.83596	14.313	64.052	7.4347	0.6203	0.31015
35	15.003	0.86592	14.826	64.581	7.4795	0.62168	0.31084
36	15.503	0.89543	15.331	65.058	7.5241	0.62255	0.31128

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HEN019S4		
Initial	Diameter, in	2.7374		
	Height, in	6.1728		
	Water Content, %	34.87		
	Dry Density, pcf	86.39		
	Saturation, %	98.22		
	Void Ratio	0.96564		
Unconfined Compressive Strength, tsf		0.77617		
Undrained Shear Strength, tsf		0.38809		
Time to Failure, min		8.5033		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		45		
Plastic Limit		24		
Plasticity Index		21		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN019 S4	
Sample Type: 3.0" ST	
Description: GRAY AND BROWN LEAN CLAY CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	436

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN019 S4
 Sample No.: ST-4
 Test No.: HEN019S4

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 12.5' -14.5'
 Elevation: ----



Soil Description: GRAY AND BROWN LEAN CLAY CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

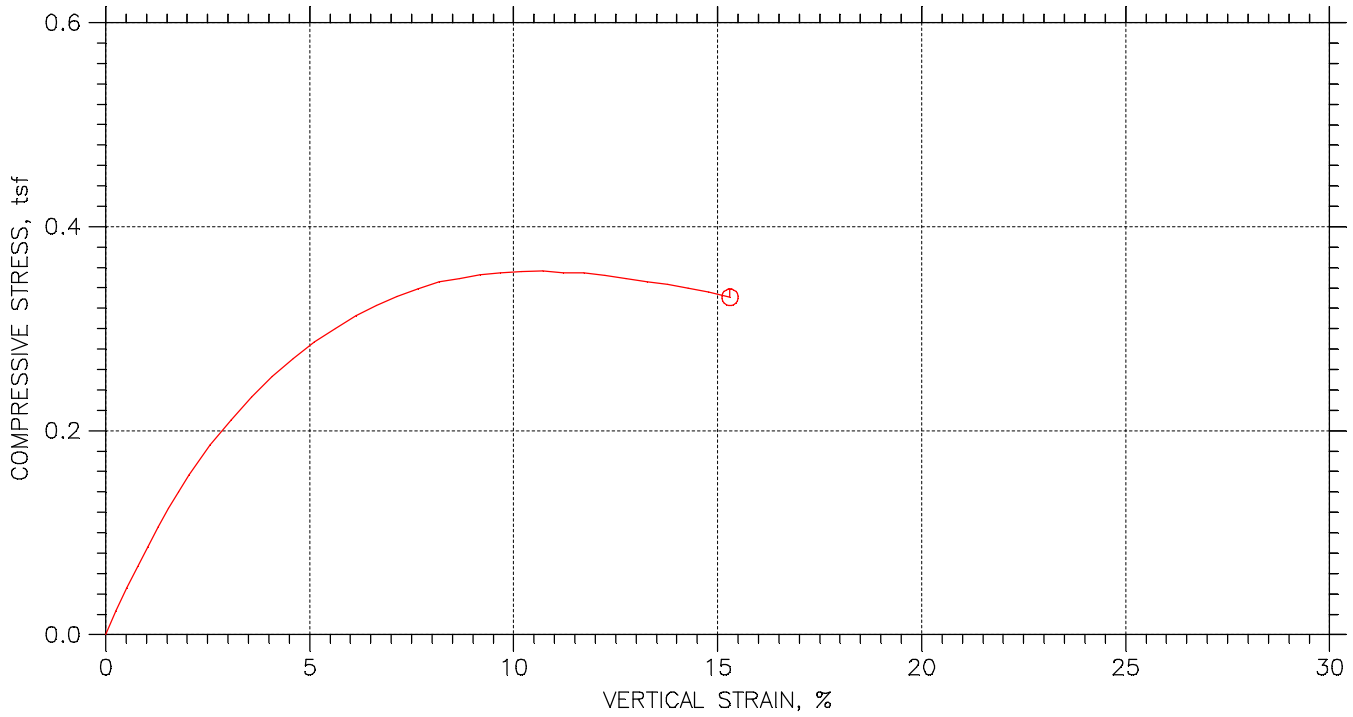
Specimen Height: 6.17 in
 Specimen Area: 5.89 in²
 Specimen Volume: 36.33 in³

Liquid Limit: 45
 Plastic Limit: 24
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	5.8853	0	0
2	0.25017	0.010413	0.16869	8.7873	5.8952	0.10732	0.053661
3	0.50018	0.022288	0.36106	14.716	5.9066	0.17939	0.089693
4	0.75357	0.036628	0.59338	20.751	5.9204	0.25236	0.12618
5	1.0033	0.049233	0.79758	26.309	5.9326	0.31929	0.15965
6	1.2533	0.06394	1.0358	31.391	5.9469	0.38005	0.19003
7	1.5033	0.078828	1.277	35.837	5.9614	0.43283	0.21642
8	1.7533	0.093443	1.5138	39.649	5.9757	0.47772	0.23886
9	2.0033	0.10806	1.7505	42.878	5.9901	0.51538	0.25769
10	2.5033	0.13701	2.2196	48.013	6.0189	0.57434	0.28717
11	3.0033	0.16633	2.6946	52.089	6.0483	0.62008	0.31004
12	3.5033	0.19593	3.1741	55.318	6.0782	0.65527	0.32764
13	4.0033	0.22562	3.655	58.07	6.1085	0.68446	0.34223
14	4.5033	0.25475	4.127	60.241	6.1386	0.70656	0.35328
15	5.0033	0.28407	4.602	62.199	6.1692	0.72592	0.36296
16	5.5033	0.31367	5.0814	63.629	6.2003	0.73887	0.36944
17	6.0033	0.34336	5.5624	65.111	6.2319	0.75225	0.37613
18	6.5033	0.37286	6.0403	66.328	6.2636	0.76244	0.38122
19	7.0033	0.40227	6.5168	67.281	6.2955	0.76947	0.38474
20	7.5033	0.4315	6.9903	67.969	6.3276	0.7734	0.3867
21	8.0033	0.461	7.4683	68.552	6.3603	0.77602	0.38801
22	8.5033	0.4906	7.9477	68.922	6.3934	0.77617	0.38809
23	9.0033	0.5201	8.4257	69.081	6.4268	0.77392	0.38696
24	9.5033	0.54942	8.9007	68.71	6.4603	0.76578	0.38289
25	10.003	0.57884	9.3771	68.287	6.4943	0.75708	0.37854
26	10.503	0.60852	9.8581	67.281	6.5289	0.74197	0.37098
27	11.003	0.63839	10.342	66.222	6.5641	0.72637	0.36319
28	11.503	0.66771	10.817	64.899	6.5991	0.70809	0.35404
29	12.003	0.69648	11.283	62.94	6.6338	0.68313	0.34156
30	12.503	0.72617	11.764	60.558	6.6699	0.65371	0.32686
31	13.003	0.75604	12.248	57.541	6.7067	0.61773	0.30887
32	13.503	0.78563	12.727	53.518	6.7435	0.5714	0.2857
33	14.003	0.81496	13.202	49.707	6.7805	0.52782	0.26391
34	14.503	0.844	13.673	45.472	6.8174	0.48024	0.24012
35	15.003	0.87369	14.154	40.284	6.8556	0.42308	0.21154
36	15.503	0.90392	14.644	34.567	6.8949	0.36096	0.18048
37	16.003	0.93379	15.127	27.262	6.9343	0.28307	0.14153

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB019S6		
Initial	Diameter, in	2.798		
	Height, in	6.1795		
	Water Content, %	33.84		
	Dry Density, pcf	86.79		
	Saturation, %	96.23		
	Void Ratio	0.9565		
Unconfined Compressive Strength, tsf		0.3564		
Undrained Shear Strength, tsf		0.1782		
Time to Failure, min		10.504		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		38		
Plastic Limit		22		
Plasticity Index		16		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB019 S-6	
Sample Type: 3.0" ST	
Description: BROWN AND GRAY LEAN CLAY CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	438

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENB019 S-6
 Sample No.: ST-6
 Test No.: HENB019S6

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 20.0' -22.0'
 Elevation: -----



Soil Description: BROWN AND GRAY LEAN CLAY CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

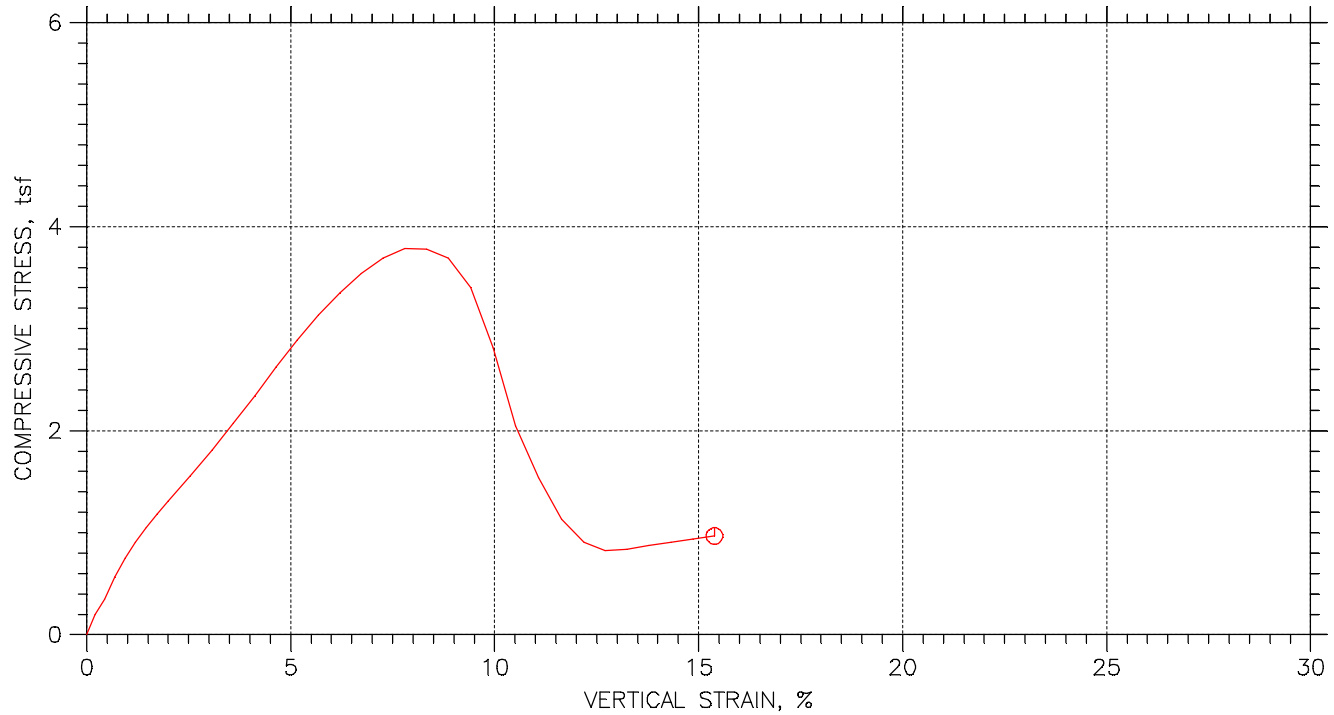
Specimen Height: 6.18 in
 Specimen Area: 6.15 in²
 Specimen Volume: 38.00 in³




Liquid Limit: 38
 Plastic Limit: 22
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.1489	0	0
2	0.25378	0.016051	0.25974	1.9931	6.1649	0.023277	0.011639
3	0.50378	0.032102	0.51949	3.9337	6.181	0.045822	0.022911
4	0.75378	0.048153	0.77923	5.7694	6.1972	0.06703	0.033515
5	1.0038	0.064019	1.036	7.4478	6.2132	0.086306	0.043153
6	1.2538	0.079517	1.2868	9.1261	6.229	0.10549	0.052744
7	1.5038	0.095014	1.5376	10.752	6.2449	0.12397	0.061983
8	1.7538	0.1106	1.7898	12.168	6.2609	0.13993	0.069966
9	2.0038	0.12619	2.0421	13.637	6.2771	0.15642	0.078209
10	2.5038	0.15783	2.5542	16.312	6.31	0.18612	0.093061
11	3.0038	0.18984	3.0722	18.567	6.3438	0.21073	0.10537
12	3.5038	0.22149	3.5842	20.665	6.3774	0.2333	0.11665
13	4.0038	0.25248	4.0858	22.553	6.4108	0.2533	0.12665
14	4.5038	0.28375	4.5918	24.231	6.4448	0.27071	0.13535
15	5.0038	0.31567	5.1083	25.805	6.4799	0.28673	0.14336
16	5.5038	0.34786	5.6293	27.169	6.5157	0.30022	0.15011
17	6.0038	0.37914	6.1353	28.427	6.5508	0.31245	0.15622
18	6.5038	0.40995	6.6339	29.529	6.5858	0.32283	0.16141
19	7.0038	0.44113	7.1385	30.473	6.6215	0.33135	0.16568
20	7.5038	0.47295	7.6535	31.365	6.6585	0.33915	0.16958
21	8.0038	0.50505	8.173	32.151	6.6961	0.34571	0.17285
22	8.5038	0.53632	8.679	32.623	6.7332	0.34885	0.17442
23	9.0038	0.56713	9.1776	33.2	6.7702	0.35308	0.17654
24	9.5038	0.59822	9.6807	33.515	6.8079	0.35445	0.17723
25	10.004	0.63032	10.2	33.882	6.8473	0.35627	0.17814
26	10.504	0.66252	10.721	34.092	6.8873	0.3564	0.1782
27	11.004	0.69351	11.223	34.144	6.9262	0.35494	0.17747
28	11.504	0.72442	11.723	34.302	6.9654	0.35457	0.17728
29	12.004	0.75587	12.232	34.302	7.0058	0.35253	0.17626
30	12.504	0.78788	12.75	34.197	7.0474	0.34937	0.17469
31	13.004	0.81998	13.269	34.039	7.0896	0.34569	0.17285
32	13.504	0.85079	13.768	33.987	7.1306	0.34318	0.17159
33	14.004	0.88188	14.271	33.83	7.1724	0.3396	0.1698
34	14.504	0.91361	14.785	33.672	7.2157	0.33599	0.168
35	15.004	0.94553	15.301	33.358	7.2597	0.33083	0.16542

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB021S3		
Initial	Diameter, in	2.8783		
	Height, in	5.8752		
	Water Content, %	15.80		
	Dry Density, pcf	116.7		
	Saturation, %	94.44		
	Void Ratio	0.45507		
Unconfined Compressive Strength, tsf		3.7833		
Undrained Shear Strength, tsf		1.8917		
Time to Failure, min		7.5002		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		---		
Plastic Limit		---		
Plasticity Index		---		
Failure Sketch				

Project: DYNERGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HENB021 S-3
Sample Type: 3.0" ST
Description: BROWN TO BROWNISH GRAY LEAN CLAY WITH SAND AND GRAVEL CL
Remarks: TEST PERFORMED AS PER ASTM D2166. 440

UNCONFIRMED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENB021 S-3
 Sample No.: ST-3
 Test No.: HENB021S3

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 5.0' -6.0'
 Elevation: -----



Soil Description: BROWN TO BROWNISH GRAY LEAND CLAY WITH SAND AND GRAVEL CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

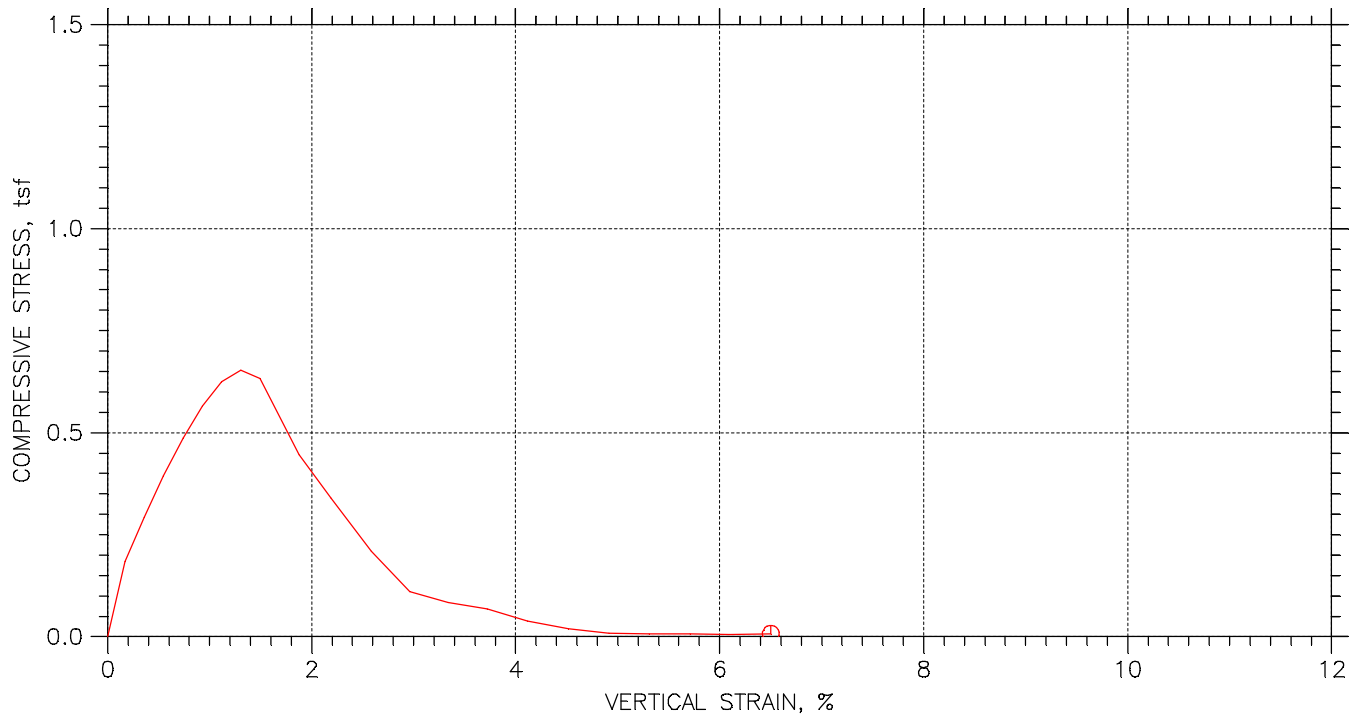
Specimen Height: 5.88 in
 Specimen Area: 6.51 in²
 Specimen Volume: 38.23 in³




Liquid Limit: ---
 Plastic Limit: ---
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.5069	0	0
2	0.2502	0.012177	0.20725	17.57	6.5204	0.19402	0.097008
3	0.5002	0.026198	0.44591	31.627	6.5361	0.34839	0.1742
4	0.7502	0.040496	0.68928	51.453	6.5521	0.56541	0.2827
5	1.0002	0.055625	0.94678	68.499	6.5691	0.75077	0.37538
6	1.2502	0.070384	1.198	82.607	6.5858	0.90311	0.45156
7	1.5002	0.085882	1.4618	96.192	6.6035	1.0488	0.52441
8	1.7502	0.10156	1.7287	108.52	6.6214	1.18	0.59
9	2.0002	0.11734	1.9972	120.58	6.6395	1.3076	0.6538
10	2.5002	0.14898	2.5357	144.34	6.6762	1.5566	0.77832
11	3.0002	0.18034	3.0696	168.57	6.713	1.808	0.904
12	3.5002	0.21125	3.5956	194.22	6.7496	2.0718	1.0359
13	4.0002	0.24206	4.12	221.02	6.7865	2.3449	1.1724
14	4.5002	0.27277	4.6428	248.71	6.8237	2.6243	1.3121
15	5.0002	0.30331	5.1625	275.1	6.8611	2.8868	1.4434
16	5.5002	0.33403	5.6854	300.38	6.8992	3.1347	1.5674
17	6.0002	0.36484	6.2098	322.93	6.9377	3.3514	1.6757
18	6.5002	0.39583	6.7373	343.07	6.977	3.5404	1.7702
19	7.0002	0.42683	7.2649	359.91	7.0167	3.6931	1.8465
20	7.5002	0.45791	7.794	370.82	7.0569	3.7833	1.8917
21	8.0002	0.48937	8.3294	372.39	7.0982	3.7773	1.8887
22	8.5002	0.5211	8.8695	366.3	7.1402	3.6937	1.8469
23	9.0002	0.55311	9.4144	339.24	7.1832	3.4004	1.7002
24	9.5002	0.58522	9.9608	282.54	7.2268	2.815	1.4075
25	10	0.6175	10.51	206.7	7.2711	2.0468	1.0234
26	10.5	0.65071	11.076	156.61	7.3174	1.541	0.77051
27	11	0.68355	11.635	115.91	7.3637	1.1334	0.56668
28	11.5	0.71584	12.184	93.15	7.4097	0.90513	0.45256
29	12	0.74665	12.708	85.282	7.4542	0.82373	0.41187
30	12.5	0.77792	13.241	87.013	7.5	0.83533	0.41766
31	13	0.80947	13.778	91.629	7.5467	0.87419	0.4371
32	13.5	0.84129	14.319	95.3	7.5944	0.90351	0.45175
33	14	0.87275	14.855	99.811	7.6422	0.94036	0.47018
34	14.5	0.90402	15.387	103.38	7.6902	0.96787	0.48394

UNCONFINED COMPRESSION TEST ASTM D2166



Symbol		⊙		
Test No.		HENB021S8		
Initial	Diameter, in	2.8717		
	Height, in	6.0697		
	Water Content, %	31.90		
	Dry Density, pcf	65.24		
	Saturation, %	61.09		
	Void Ratio	1.201		
Unconfined Compressive Strength, tsf		0.65256		
Undrained Shear Strength, tsf		0.32628		
Time to Failure, min		1.7542		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.30		
Liquid Limit		NP		
Plastic Limit		NP		
Plasticity Index		NP		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB021 S-8	
Sample Type: 3.0" ST	
Description: DARK GRAY VARVED FLY ASH	
Remarks: TEST PERFORMED AS PER ASTM D2166.	442

Project: DYNERGY HENNEPIN
 Boring No.: HENB021 S-8
 Sample No.: S-8
 Test No.: HENB021S8

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 22.0' -24.0'
 Elevation: -----



Soil Description: DARK GRAY VARVED FLY ASH
 Remarks: TEST PERFORMED AS PER ASTM D2166.

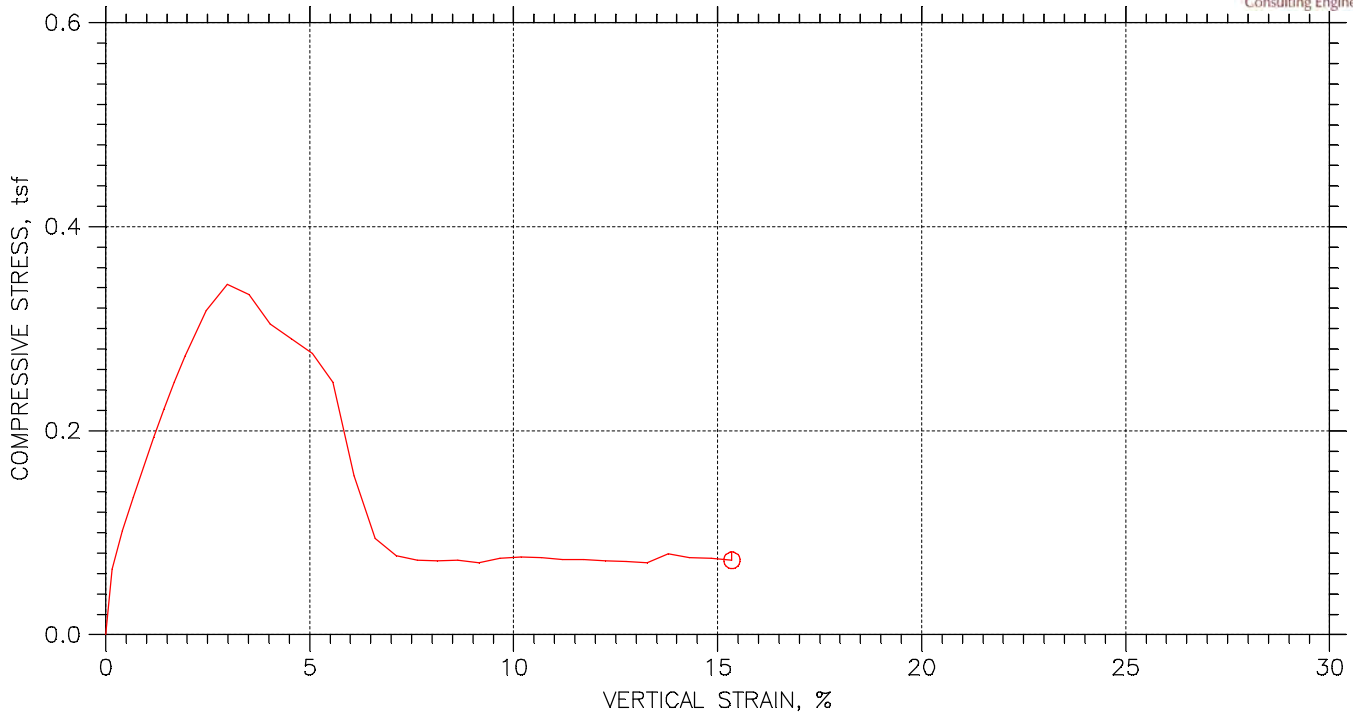
Specimen Height: 6.07 in
 Specimen Area: 6.48 in²
 Specimen Volume: 39.31 in³




Liquid Limit: NP
 Plastic Limit: NP
 Estimated Specific Gravity: 2.30

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.4767	0	0
2	0.25415	0.010239	0.1687	16.626	6.4876	0.18452	0.09226
3	0.50415	0.02177	0.35867	26.434	6.5	0.29281	0.14641
4	0.75415	0.033301	0.54865	35.665	6.5124	0.39431	0.19715
5	1.0042	0.044832	0.73862	44.11	6.5249	0.48674	0.24337
6	1.2542	0.056363	0.9286	51.348	6.5374	0.56552	0.28276
7	1.5042	0.067894	1.1186	56.802	6.55	0.6244	0.3122
8	1.7542	0.07924	1.3055	59.477	6.5624	0.65256	0.32628
9	2.0042	0.090587	1.4924	57.799	6.5748	0.63295	0.31647
10	2.5042	0.11402	1.8785	40.963	6.6007	0.44682	0.22341
11	3.0042	0.13311	2.1931	31.155	6.6219	0.33874	0.16937
12	3.5042	0.15691	2.5852	19.354	6.6486	0.20959	0.10479
13	4.0042	0.17988	2.9636	10.228	6.6745	0.11033	0.055164
14	4.5042	0.20276	3.3405	7.7625	6.7005	0.083411	0.041705
15	5	0.22591	3.722	6.2939	6.7271	0.067364	0.033682
16	5.5	0.24999	4.1187	3.5141	6.7549	0.037456	0.018728
17	6	0.27425	4.5184	1.8882	6.7832	0.020042	0.010021
18	6.5	0.29833	4.915	0.73429	6.8115	0.0077617	0.0038808
19	7	0.3224	5.3117	0.68184	6.84	0.0071772	0.0035886
20	7.5	0.34657	5.7099	0.62939	6.8689	0.0065973	0.0032986
21	8	0.3701	6.0974	0.47204	6.8973	0.0049276	0.0024638
22	8.5	0.39463	6.5017	0.73429	6.9271	0.0076322	0.0038161

UNCONFINED COMPRESSION TEST REPORT



Symbol		⊙		
Test No.		HENB022S2		
Initial	Diameter, in	2.8346		
	Height, in	6.0874		
	Water Content, %	26.87		
	Dry Density, pcf	84.39		
	Saturation, %	88.11		
	Void Ratio	0.70142		
Unconfined Compressive Strength, tsf		0.34367		
Undrained Shear Strength, tsf		0.17183		
Time to Failure, min		3.0002		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.30		
Liquid Limit		NP		
Plastic Limit		NP		
Plasticity Index		NP		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HENB022 S-2	
Sample Type: 3.0" ST	
Description: VERY DARK GRAY VARVED FLY ASH WITH SAND AND GRAVEL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	444

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENB022 S-2
 Sample No.: ST-2
 Test No.: HENB022S2

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/14/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPQ
 Depth: 2.5' -4.5'
 Elevation: -----



Soil Description: VERY DARK GRAY VARVED FLY ASH WITH SAND AND GRAVEL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

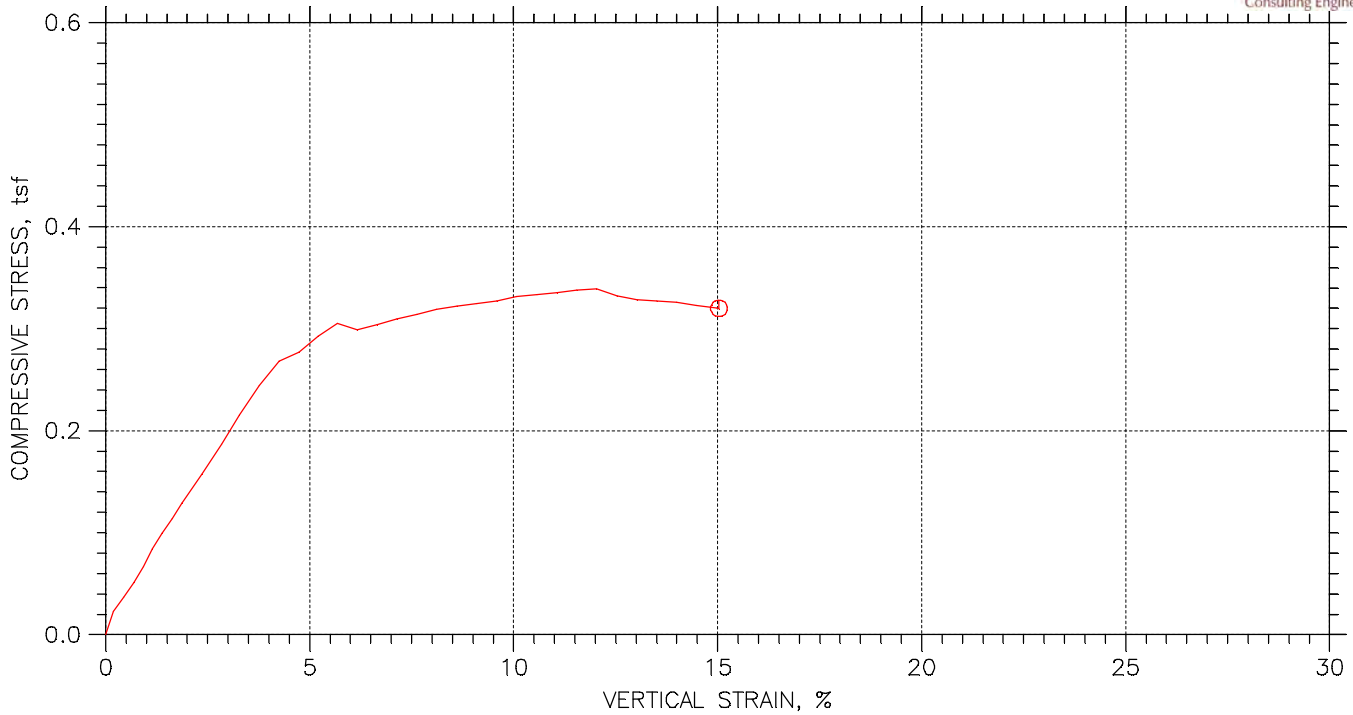
Specimen Height: 6.09 in
 Specimen Area: 6.31 in²
 Specimen Volume: 38.42 in³




Liquid Limit: NP
 Plastic Limit: NP
 Estimated Specific Gravity: 2.30

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.3108	0	0
2	0.2502	0.0095937	0.1576	5.6121	6.3208	0.063927	0.031963
3	0.5002	0.025183	0.4137	8.9688	6.3371	0.1019	0.050951
4	0.7502	0.040681	0.66828	11.853	6.3533	0.13433	0.067166
5	1.0002	0.056086	0.92135	14.528	6.3695	0.16423	0.082113
6	1.2502	0.071491	1.1744	17.151	6.3858	0.19337	0.096687
7	1.5002	0.086804	1.426	19.668	6.4021	0.2212	0.1106
8	1.7502	0.10267	1.6866	22.081	6.4191	0.24767	0.12384
9	2.0002	0.11854	1.9473	24.441	6.4362	0.27342	0.13671
10	2.5002	0.15027	2.4685	28.532	6.4706	0.31749	0.15874
11	3.0002	0.18182	2.9868	31.05	6.5051	0.34367	0.17183
12	3.5041	0.21392	3.5142	30.263	6.5407	0.33314	0.16657
13	4.0041	0.24547	4.0324	27.798	6.576	0.30436	0.15218
14	4.5041	0.27665	4.5446	26.644	6.6113	0.29017	0.14508
15	5.0041	0.30811	5.0614	25.438	6.6473	0.27553	0.13776
16	5.5041	0.3391	5.5705	22.973	6.6831	0.24749	0.12375
17	6.0041	0.37028	6.0827	14.528	6.7196	0.15567	0.077836
18	6.5041	0.40192	6.6025	8.8639	6.757	0.094451	0.047225
19	7.0041	0.43365	7.1238	7.2904	6.7949	0.077251	0.038625
20	7.5041	0.46465	7.6329	6.9233	6.8324	0.072958	0.036479
21	8.0041	0.49491	8.13	6.9233	6.8693	0.072566	0.036283
22	8.5041	0.52535	8.6301	6.9757	6.9069	0.072717	0.036359
23	9.0041	0.5568	9.1468	6.8184	6.9462	0.070675	0.035338
24	9.5041	0.58798	9.659	7.238	6.9856	0.074601	0.037301
25	10.004	0.61962	10.179	7.4478	7.026	0.076322	0.038161
26	10.504	0.65071	10.689	7.3953	7.0662	0.075354	0.037677
27	11.004	0.68189	11.202	7.2904	7.1069	0.073859	0.036929
28	11.504	0.71362	11.723	7.2904	7.1489	0.073425	0.036713
29	12.004	0.74554	12.247	7.238	7.1916	0.072464	0.036232
30	12.504	0.77681	12.761	7.238	7.234	0.07204	0.03602
31	13.004	0.8079	13.272	7.1331	7.2766	0.07058	0.03529
32	13.504	0.83917	13.785	8.0772	7.3199	0.079448	0.039724
33	14.004	0.87127	14.313	7.71	7.365	0.075373	0.037687
34	14.504	0.90328	14.839	7.71	7.4104	0.074911	0.037455
35	15.004	0.93437	15.349	7.5527	7.4552	0.072942	0.036471

UNCONFINED COMPRESSION TEST REPORT



Symbol		⊙		
Test No.		HEN025S9		
Initial	Diameter, in	2.8591		
	Height, in	6.0091		
	Water Content, %	36.14		
	Dry Density, pcf	75.78		
	Saturation, %	92.89		
	Void Ratio	0.89482		
Unconfined Compressive Strength, tsf		0.33892		
Undrained Shear Strength, tsf		0.16946		
Time to Failure, min		12.504		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.30		
Liquid Limit		NP		
Plastic Limit		NP		
Plasticity Index		NP		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN025 S9	
Sample Type: 3.0" ST	
Description: DARK GRAY TO GRAY FLY ASH WITH SAND	
Remarks: TEST PERFORMED AS PER ASTM D2166.	446

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HENO25 S9
 Sample No.: S-9
 Test No.: HENO25S9

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 25.0' -27.0'
 Elevation: ----



Soil Description: DARK GRAY TO GRAY FLY ASH WITH SAND
 Remarks: TEST PERFORMED AS PER ASTM D2166.

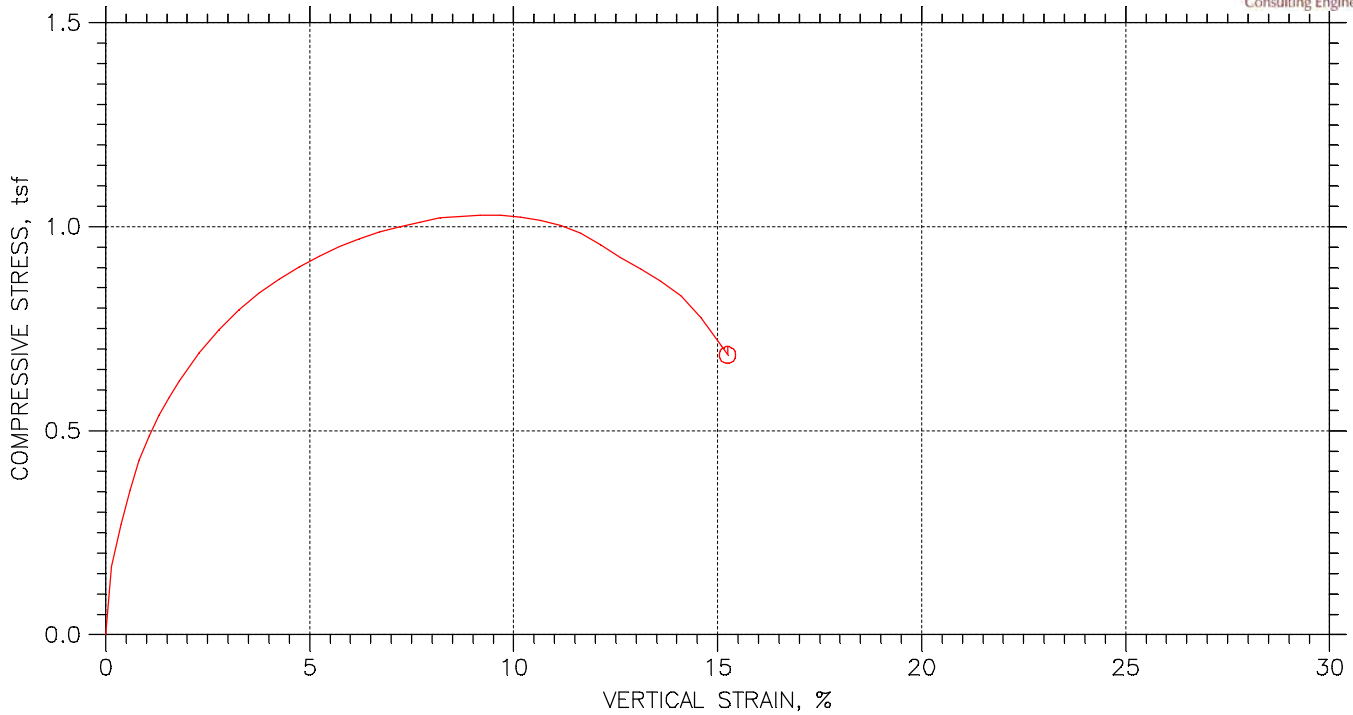
Specimen Height: 6.01 in
 Specimen Area: 6.42 in²
 Specimen Volume: 38.58 in³




Liquid Limit: NP
 Plastic Limit: NP
 Estimated Specific Gravity: 2.30

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.42	0	0
2	0.25405	0.011783	0.19609	2.0116	6.4326	0.022515	0.011258
3	0.50407	0.026307	0.43778	3.282	6.4482	0.036646	0.018323
4	0.75407	0.041104	0.68403	4.6054	6.4642	0.051296	0.025648
5	1.0041	0.055536	0.92421	6.0347	6.4799	0.067053	0.033526
6	1.2538	0.068507	1.1401	7.6227	6.494	0.084514	0.042257
7	1.5038	0.083304	1.3863	8.9991	6.5103	0.099525	0.049762
8	1.7538	0.097919	1.6295	10.322	6.5263	0.11388	0.05694
9	2.0038	0.11253	1.8727	11.699	6.5425	0.12874	0.064372
10	2.5038	0.14158	2.3561	14.346	6.5749	0.15709	0.078547
11	3.0038	0.17063	2.8395	17.151	6.6076	0.18689	0.093444
12	3.5038	0.19712	3.2803	19.851	6.6377	0.21532	0.10766
13	4.0038	0.22635	3.7667	22.656	6.6713	0.24452	0.12226
14	4.5038	0.25521	4.2471	24.986	6.7048	0.26831	0.13416
15	5.0038	0.28444	4.7335	25.938	6.739	0.27713	0.13856
16	5.5038	0.3134	5.2154	27.527	6.7732	0.29261	0.1463
17	6.0038	0.34116	5.6775	28.85	6.8064	0.30518	0.15259
18	6.5038	0.37048	6.1654	28.426	6.8418	0.29915	0.14957
19	7.0038	0.39971	6.6519	29.009	6.8775	0.30369	0.15185
20	7.5038	0.42885	7.1368	29.75	6.9134	0.30983	0.15492
21	8.0038	0.45836	7.6277	30.332	6.9501	0.31423	0.15711
22	8.5038	0.48777	8.1172	30.967	6.9872	0.31911	0.15955
23	9.0038	0.51736	8.6097	31.444	7.0248	0.32228	0.16114
24	9.5038	0.54687	9.1007	31.814	7.0628	0.32432	0.16216
25	10.004	0.576	9.5856	32.291	7.1006	0.32743	0.16371
26	10.504	0.60533	10.074	32.873	7.1392	0.33153	0.16577
27	11.004	0.63492	10.566	33.244	7.1785	0.33343	0.16672
28	11.504	0.66451	11.059	33.614	7.2182	0.33529	0.16765
29	12.004	0.69393	11.548	34.038	7.2582	0.33765	0.16882
30	12.504	0.72316	12.034	34.355	7.2983	0.33892	0.16946
31	13.004	0.75284	12.528	33.879	7.3395	0.33235	0.16617
32	13.504	0.78235	13.019	33.667	7.381	0.32842	0.16421
33	14.004	0.81158	13.506	33.72	7.4225	0.32709	0.16355
34	14.503	0.84099	13.995	33.773	7.4647	0.32575	0.16288
35	15.003	0.8704	14.485	33.667	7.5074	0.32288	0.16144
36	15.503	0.90009	14.979	33.561	7.5511	0.32001	0.16
37	15.558	0.90328	15.032	33.561	7.5558	0.31981	0.1599

UNCONFINED COMPRESSION TEST REPORT



Symbol		⊙		
Test No.		HEN027S2		
Initial	Diameter, in	2.8106		
	Height, in	5.9756		
	Water Content, %	36.30		
	Dry Density, pcf	84.59		
	Saturation, %	98.00		
	Void Ratio	1.0075		
Unconfined Compressive Strength, tsf		1.0288		
Undrained Shear Strength, tsf		0.51438		
Time to Failure, min		10		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.72		
Liquid Limit		---		
Plastic Limit		---		
Plasticity Index		---		
Failure Sketch				

Project: DYNERGY HENNEPIN	
Location: HENNEPIN, IL	
Project No.: MR155233	
Boring No.: HEN027 S2	
Sample Type: 3.0" ST	
Description: GRAY LEAN CLAY WITH SAND AND GRAVEL CL	
Remarks: TEST PERFORMED AS PER ASTM D2166.	448

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN027 S2
 Sample No.: ST-2
 Test No.: HEN027S2

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 10.0' -12.0'
 Elevation: ----



Soil Description: GRAY LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

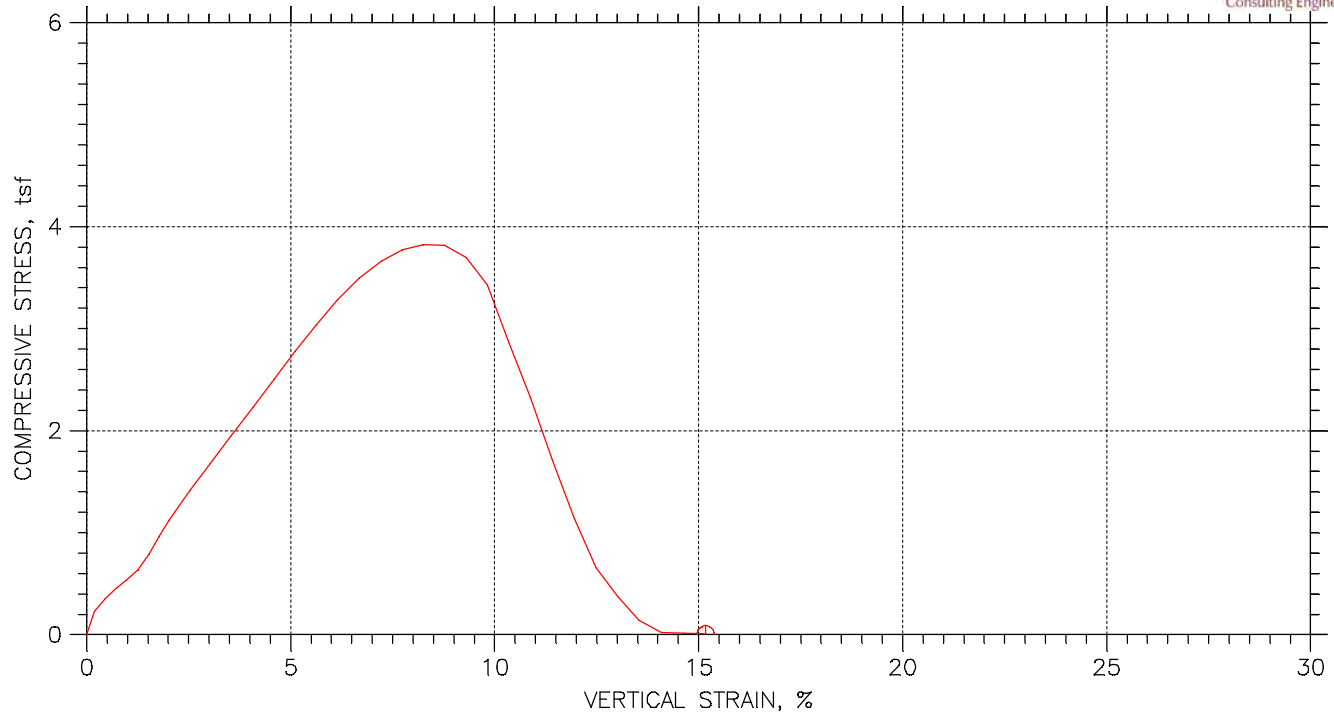
Specimen Height: 5.98 in
 Specimen Area: 6.20 in²
 Specimen Volume: 37.07 in³




Liquid Limit: ---
 Plastic Limit: ---
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.2044	0	0
2	0.2501	0.0081295	0.13604	14.346	6.2128	0.16625	0.083125
3	0.5001	0.022196	0.37145	23.345	6.2275	0.2699	0.13495
4	0.7501	0.035806	0.59921	30.597	6.2418	0.35294	0.17647
5	1.0001	0.048959	0.81932	37.055	6.2556	0.42649	0.21324
6	1.2501	0.063392	1.0608	42.348	6.2709	0.48623	0.24311
7	1.5001	0.078098	1.3069	46.954	6.2865	0.53777	0.26888
8	1.7501	0.092895	1.5546	50.871	6.3023	0.58117	0.29058
9	2.0001	0.1076	1.8007	54.63	6.3181	0.62255	0.31127
10	2.5001	0.13729	2.2975	60.876	6.3503	0.69022	0.34511
11	3.0001	0.16633	2.7836	66.222	6.382	0.7471	0.37355
12	3.5001	0.19529	3.2681	70.934	6.414	0.79626	0.39813
13	4.0001	0.22443	3.7557	74.851	6.4465	0.836	0.418
14	4.5001	0.25411	4.2525	78.451	6.4799	0.87168	0.43584
15	5.0001	0.28353	4.7447	81.574	6.5134	0.90173	0.45086
16	5.5001	0.31266	5.2324	84.326	6.5469	0.92738	0.46369
17	6.0001	0.34189	5.7215	86.867	6.5809	0.9504	0.4752
18	6.5001	0.37158	6.2183	89.144	6.6158	0.97016	0.48508
19	7.0001	0.40136	6.7166	91.155	6.6511	0.98678	0.49339
20	7.5001	0.43095	7.2119	92.849	6.6866	0.99978	0.49989
21	8.0001	0.46018	7.701	94.437	6.722	1.0115	0.50576
22	8.5001	0.48941	8.1902	95.972	6.7578	1.0225	0.51126
23	9.0001	0.51892	8.6839	96.66	6.7944	1.0243	0.51215
24	9.5001	0.54851	9.1792	97.56	6.8314	1.0282	0.51412
25	10	0.57801	9.6729	98.143	6.8688	1.0288	0.51438
26	10.5	0.60733	10.164	98.09	6.9063	1.0226	0.51131
27	11	0.63675	10.656	97.878	6.9443	1.0148	0.50741
28	11.5	0.66625	11.15	97.296	6.9829	1.0032	0.5016
29	12	0.69557	11.64	95.919	7.0217	0.98355	0.49177
30	12.5	0.72507	12.134	93.749	7.0612	0.95592	0.47796
31	13	0.75412	12.62	91.155	7.1004	0.92433	0.46217
32	13.5	0.78353	13.112	88.826	7.1407	0.89564	0.44782
33	14	0.81313	13.608	86.444	7.1816	0.86665	0.43333
34	14.5	0.84254	14.1	83.321	7.2227	0.83058	0.41529
35	15	0.87214	14.595	78.345	7.2646	0.77648	0.38824
36	15.504	0.90191	15.093	71.834	7.3073	0.70779	0.3539
37	15.654	0.91086	15.243	69.716	7.3202	0.68572	0.34286

UNCONFINED COMPRESSION TEST REPORT



Symbol		⊙		
Test No.		HEN032S3		
Initial	Diameter, in	2.8303		
	Height, in	5.85		
	Water Content, %	14.10		
	Dry Density, pcf	115.8		
	Saturation, %	82.27		
	Void Ratio	0.46619		
Unconfined Compressive Strength, tsf		3.8231		
Undrained Shear Strength, tsf		1.9116		
Time to Failure, min		8.0041		
Strain Rate, %/min		1.14		
Estimated Specific Gravity		2.72		
Liquid Limit		35		
Plastic Limit		18		
Plasticity Index		17		
Failure Sketch				

Project: DYNERGY HENNEPIN
Location: HENNEPIN, IL
Project No.: MR155233
Boring No.: HEN032 S-3
Sample Type: 3.0" ST
Description: DARK BROWNISH GRAY LEAN CLAY WITH SAND AND GRAVEL CL
Remarks: TEST PERFORMED AS PER ASTM D2166. 450

UNCONFINED COMPRESSION TEST

Project: DYNERGY HENNEPIN
 Boring No.: HEN032 S-3
 Sample No.: ST-3
 Test No.: HEN032S3

Location: HENNEPIN, IL
 Tested By: BCM
 Test Date: 12/15/15
 Sample Type: 3.0" ST

Project No.: MR155233
 Checked By: WPO
 Depth: 5.0' -7.0'
 Elevation: ----



Soil Description: DARK BROWNISH GRAY LEAN CLAY WITH SAND AND GRAVEL CL
 Remarks: TEST PERFORMED AS PER ASTM D2166.

Specimen Height: 5.85 in
 Specimen Area: 6.29 in²
 Specimen Volume: 36.81 in³

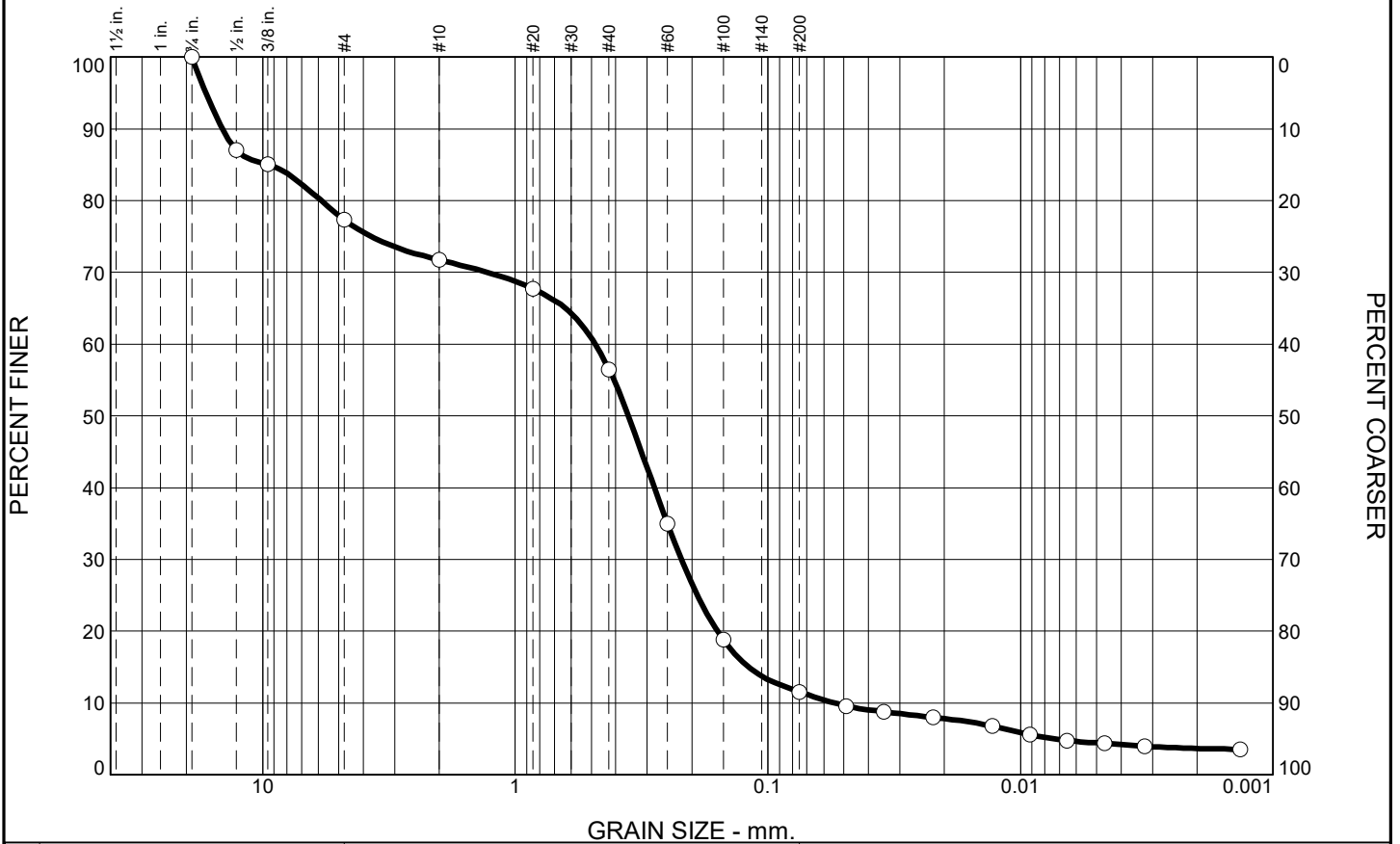
Liquid Limit: 35
 Plastic Limit: 18
 Estimated Specific Gravity: 2.72

Cap Mass: 0 gm

	Time min	Axial Displacement in	Axial Strain %	Load lb	Corrected Area in ²	Vertical Stress tsf	Shear Stress tsf
1	0	0	0	0	6.2916	0	0
2	0.25403	0.011115	0.18999	20.059	6.3036	0.22911	0.11456
3	0.50403	0.026602	0.45474	30.798	6.3203	0.35085	0.17543
4	0.75403	0.041999	0.71793	39.748	6.3371	0.45161	0.22581
5	1.004	0.057395	0.98111	47.382	6.3539	0.53692	0.26846
6	1.254	0.073065	1.249	56.543	6.3711	0.63899	0.31949
7	1.504	0.088735	1.5168	69.915	6.3885	0.78796	0.39398
8	1.7541	0.10358	1.7707	85.657	6.405	0.96289	0.48144
9	2.0041	0.11853	2.0261	100.35	6.4217	1.1251	0.56254
10	2.504	0.14841	2.5369	127.09	6.4553	1.4175	0.70875
11	3.004	0.17738	3.0321	151.41	6.4883	1.6802	0.8401
12	3.5041	0.20726	3.5429	176.95	6.5227	1.9532	0.97661
13	4.0041	0.23833	4.074	203.01	6.5588	2.2285	1.1143
14	4.5041	0.26903	4.5988	229.49	6.5949	2.5055	1.2527
15	5.0041	0.29937	5.1174	256.29	6.6309	2.7828	1.3914
16	5.5041	0.32943	5.6313	281.66	6.667	3.0418	1.5209
17	6.0041	0.36004	6.1545	305.56	6.7042	3.2816	1.6408
18	6.5041	0.39092	6.6825	327.41	6.7421	3.4965	1.7482
19	7.0041	0.42172	7.2089	344.52	6.7804	3.6584	1.8292
20	7.5041	0.45215	7.729	357.32	6.8186	3.773	1.8865
21	8.0041	0.48248	8.2476	364.11	6.8571	3.8231	1.9116
22	8.5041	0.51319	8.7724	365.79	6.8966	3.8189	1.9094
23	9.0041	0.54443	9.3066	356.58	6.9372	3.7009	1.8504
24	9.5041	0.57495	9.8283	332.2	6.9773	3.428	1.714
25	10.004	0.60556	10.352	278.29	7.0181	2.8551	1.4275
26	10.504	0.63636	10.878	228.38	7.0595	2.3293	1.1646
27	11.004	0.66724	11.406	169.79	7.1016	1.7214	0.8607
28	11.504	0.69895	11.948	113.14	7.1453	1.14	0.57002
29	12.004	0.73056	12.488	65.651	7.1894	0.65748	0.32874
30	12.504	0.76144	13.016	37.169	7.233	0.36999	0.185
31	13.004	0.79242	13.546	14.32	7.2773	0.14168	0.070839
32	13.504	0.82403	14.086	2.3165	7.3231	0.022775	0.011388
33	14.004	0.85619	14.636	1.5794	7.3703	0.015429	0.0077146
34	14.503	0.88735	15.168	0.7897	7.4165	0.0076665	0.0038332

Particle Size Analysis of Soils ASTM D 422

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	22.7	5.6	15.2	44.9	7.2	4.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	87.0		
.375	85.1		
#4	77.3		
#10	71.7		
#20	67.7		
#40	56.5		
#60	35.0		
#100	18.8		
#200	11.6		

BROWN POORLY GRADED SAND WITH SILT AND GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 14.4606 D₈₅= 9.3898 D₆₀= 0.4813
 D₅₀= 0.3560 D₃₀= 0.2199 D₁₅= 0.1189
 D₁₀= 0.0546 C_u= 8.82 C_c= 1.84

Classification
 USCS= SP-SM AASHTO=

Remarks
 F.M.=2.70

* (no specification provided)

Source of Sample: HEN-B002
 Sample Number: S-6

Depth: 15.0'-16.5'

Date: 12-4-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

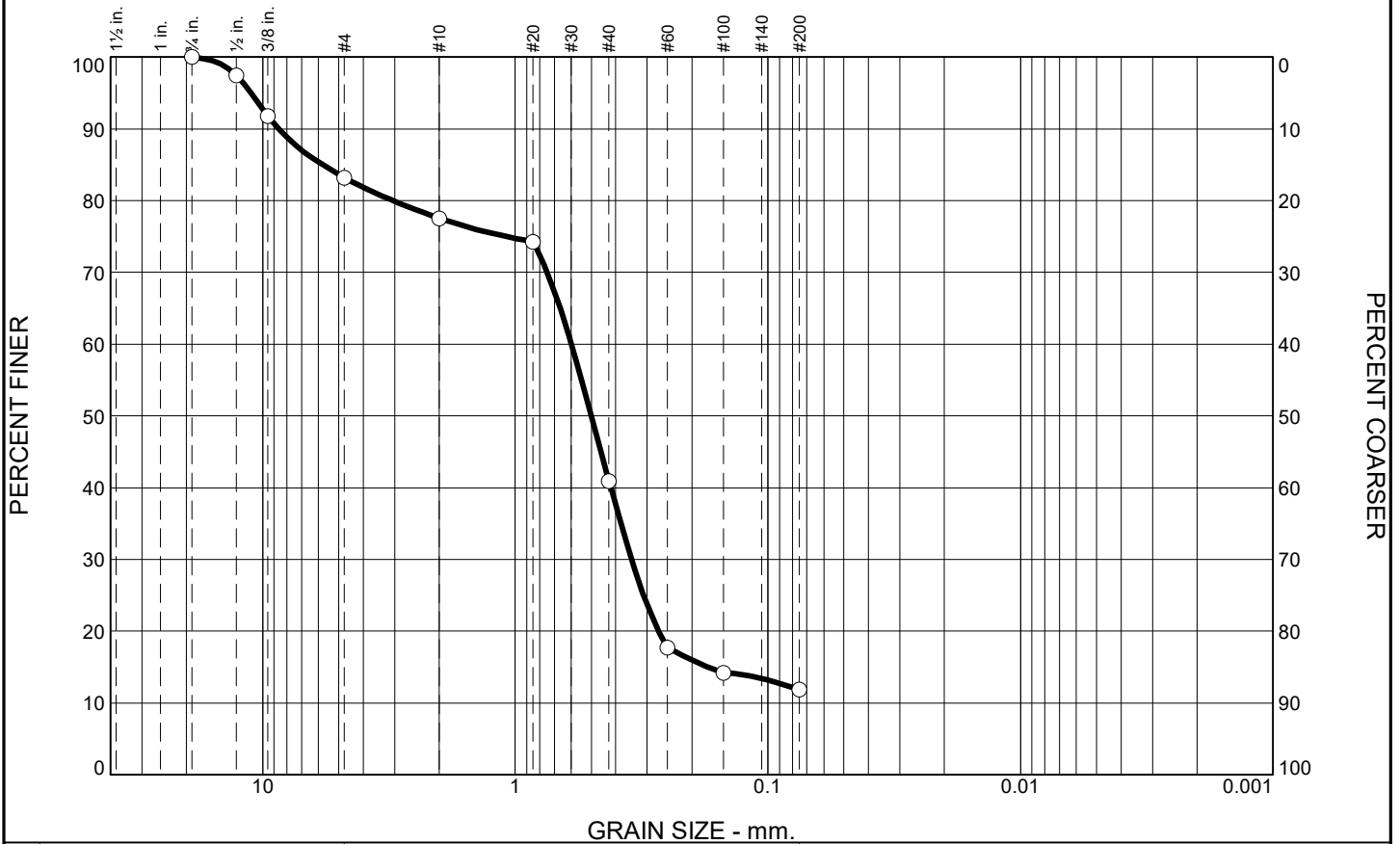
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 453

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.8	5.7	36.6	29.0		11.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.4		
.375	91.8		
#4	83.2		
#10	77.5		
#20	74.3		
#40	40.9		
#60	17.7		
#100	14.2		
#200	11.9		

BROWN POORLY GRADED SAND WITH SILT AND GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 8.6465 D₈₅= 5.7731 D₆₀= 0.6002
 D₅₀= 0.4992 D₃₀= 0.3457 D₁₅= 0.1731
 D₁₀= C_u= C_c=

Classification
 USCS= SP-SM AASHTO=

Remarks
 F.M.=2.74

* (no specification provided)

Source of Sample: HEN-B002
 Sample Number: S-14

Depth: 55.0'-56.5'

Date: 11-25-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

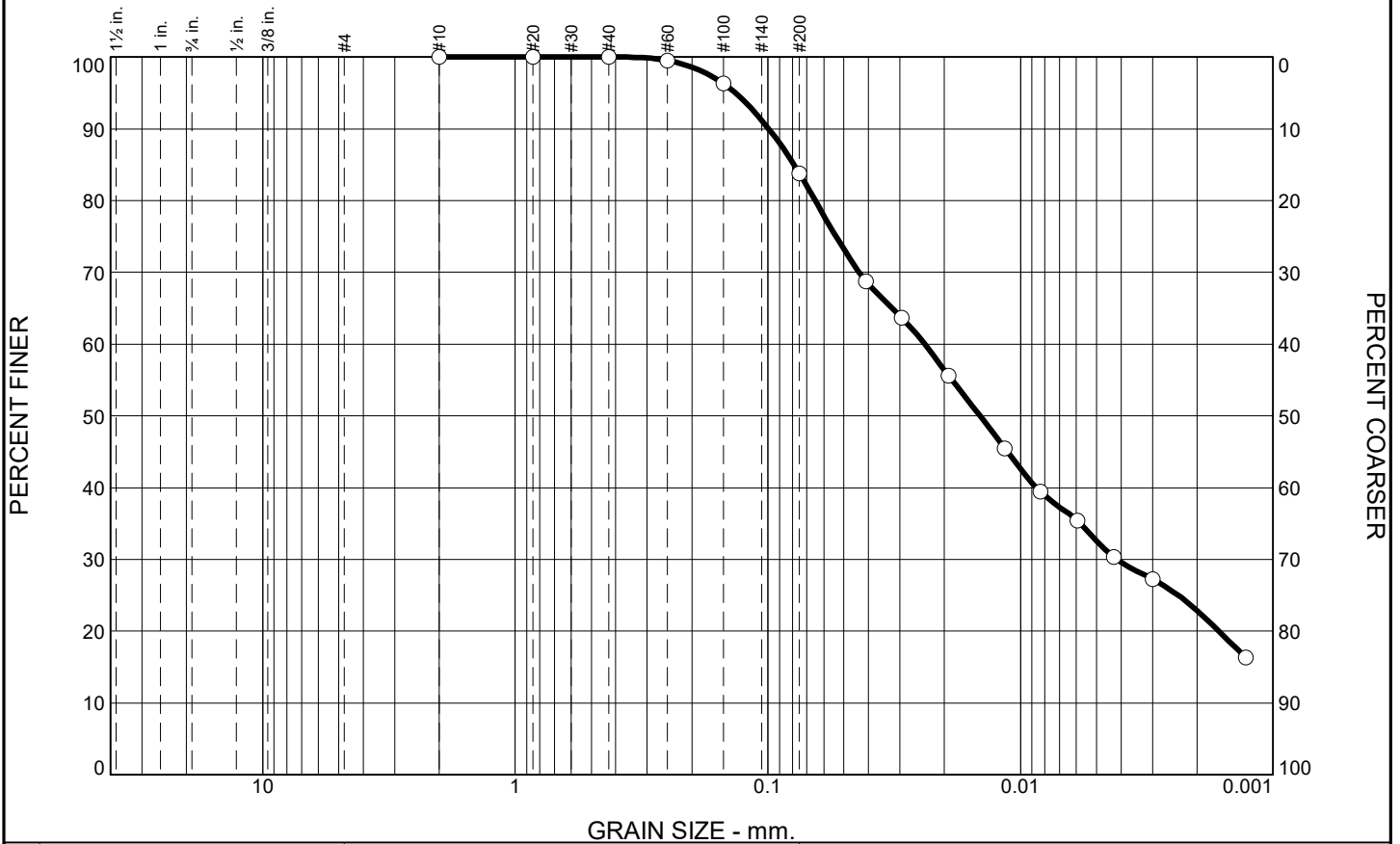
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 454

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	16.2	51.2	32.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	100.0		
#60	99.5		
#100	96.3		
#200	83.8		

DARK GRAY LEAN CLAY WITH SAND AND FLY ASH

Atterberg Limits
 PL= 24 LL= 43 PI= 19

Coefficients
 D₉₀= 0.0992 D₈₅= 0.0788 D₆₀= 0.0240
 D₅₀= 0.0145 D₃₀= 0.0042 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CL AASHTO= A-7-6(17)

Remarks
 F.M.=0.04

* (no specification provided)

Source of Sample: HEN-B005
 Sample Number: S-4

Depth: 12.5'-14.5'

Date: 12-17-15



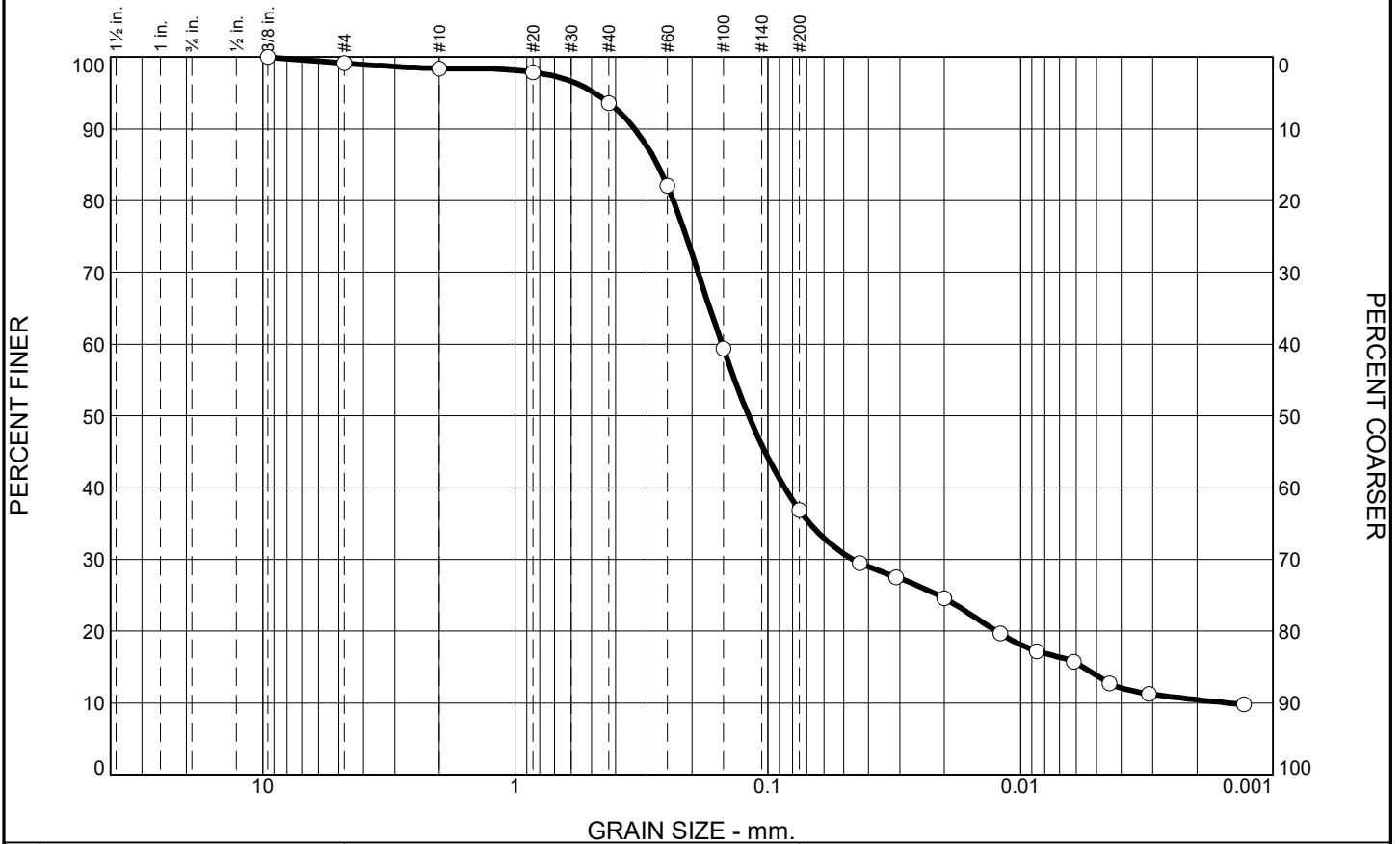
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 455

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.8	4.8	56.7	23.1	13.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.2		
#10	98.4		
#20	97.9		
#40	93.6		
#60	82.0		
#100	59.4		
#200	36.9		

BROWN SILTY SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.3360 D₈₅= 0.2738 D₆₀= 0.1522
 D₅₀= 0.1189 D₃₀= 0.0460 D₁₅= 0.0056
 D₁₀= 0.0015 C_u= 99.90 C_c= 9.12

Classification
 USCS= SM AASHTO=

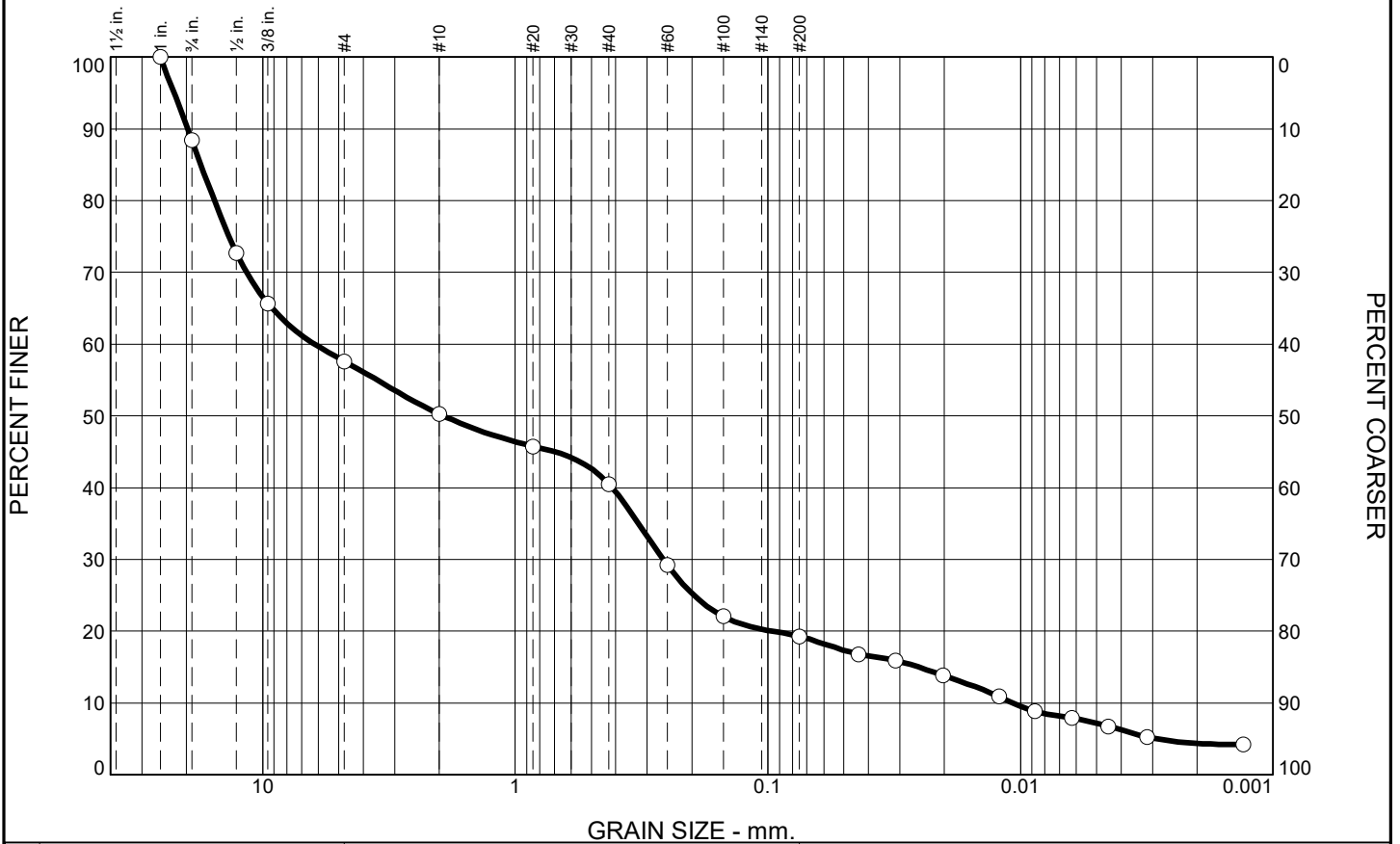
Remarks
 F.M.=0.61

* (no specification provided)

Source of Sample: HEN-B006 **Depth:** 15.0'-16.5' **Date:** 12-4-15
Sample Number: S-6

	Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233
Figure	

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.6	30.8	7.3	9.8	21.2	12.1	7.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	88.4		
.5	72.7		
.375	65.7		
#4	57.6		
#10	50.3		
#20	45.7		
#40	40.5		
#60	29.2		
#100	22.1		
#200	19.3		

LIGHT BROWN SILTY GRAVEL WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 19.7935 D₈₅= 17.5429 D₆₀= 6.2349
 D₅₀= 1.9279 D₃₀= 0.2598 D₁₅= 0.0252
 D₁₀= 0.0107 C_u= 583.74 C_c= 1.01

Classification
 USCS= GM AASHTO=

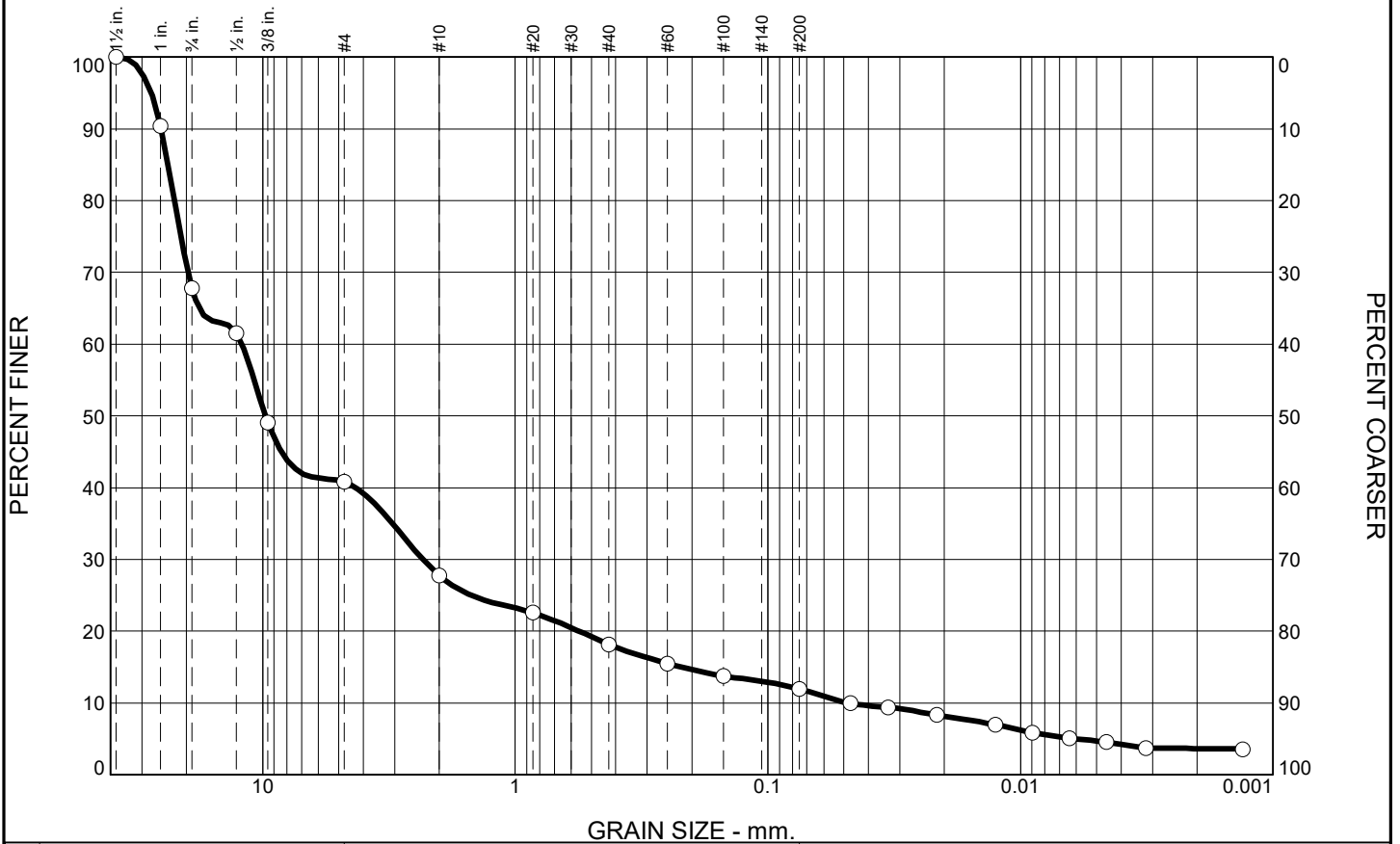
Remarks
 F.M.=3.90

* (no specification provided)

Source of Sample: HEN-B006 **Depth:** 30.0'-31.5' **Date:** 12-9-15
Sample Number: S-9

	Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233
Figure	

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	32.2	27.0	13.0	9.6	6.3	7.2	4.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.50	100.0		
1	90.4		
.75	67.8		
.5	61.5		
.375	49.0		
#4	40.8		
#10	27.8		
#20	22.6		
#40	18.2		
#60	15.5		
#100	13.8		
#200	11.9		

BROWN GRAVEL WITH POORLY GRADED SAND AND SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 25.2429 D₈₅= 23.6694 D₆₀= 12.0960
 D₅₀= 9.7410 D₃₀= 2.3148 D₁₅= 0.2213
 D₁₀= 0.0481 C_u= 251.61 C_c= 9.21

Classification
 USCS= GP AASHTO=

Remarks

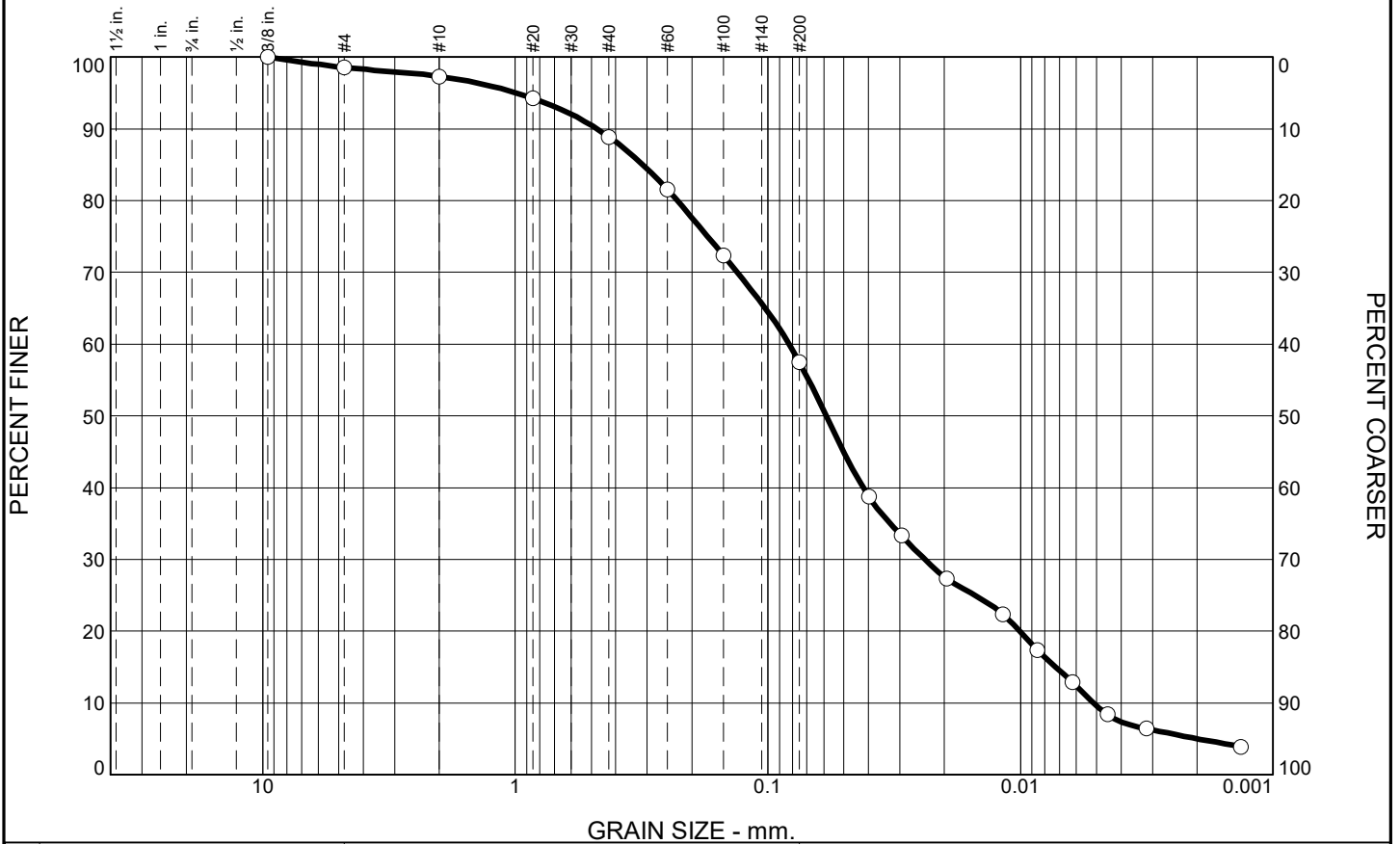
F.M.=5.38

* (no specification provided)

Source of Sample: HEN-B007 **Depth:** 15.0'-16.5' **Date:** 12-9-15
Sample Number: S-6

	<p>Client: AECOM</p> <p>Project: DYNERGY - HENNEPIN</p> <p>Project No: MR155233</p>
--	--

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	1.2	8.4	31.4	47.9	9.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.5		
#10	97.3		
#20	94.2		
#40	88.9		
#60	81.6		
#100	72.3		
#200	57.5		

DARK GRAY TO BLACK SANDY SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.4739 D₈₅= 0.3125 D₆₀= 0.0824
 D₅₀= 0.0587 D₃₀= 0.0239 D₁₅= 0.0073
 D₁₀= 0.0051 C_u= 16.02 C_c= 1.35

Classification
 USCS= ML AASHTO=

Remarks
 F.M.=0.59

* (no specification provided)

Source of Sample: HEN-B008
 Sample Number: S-3

Depth: 5.0'-6.5'

Date: 12-4-15



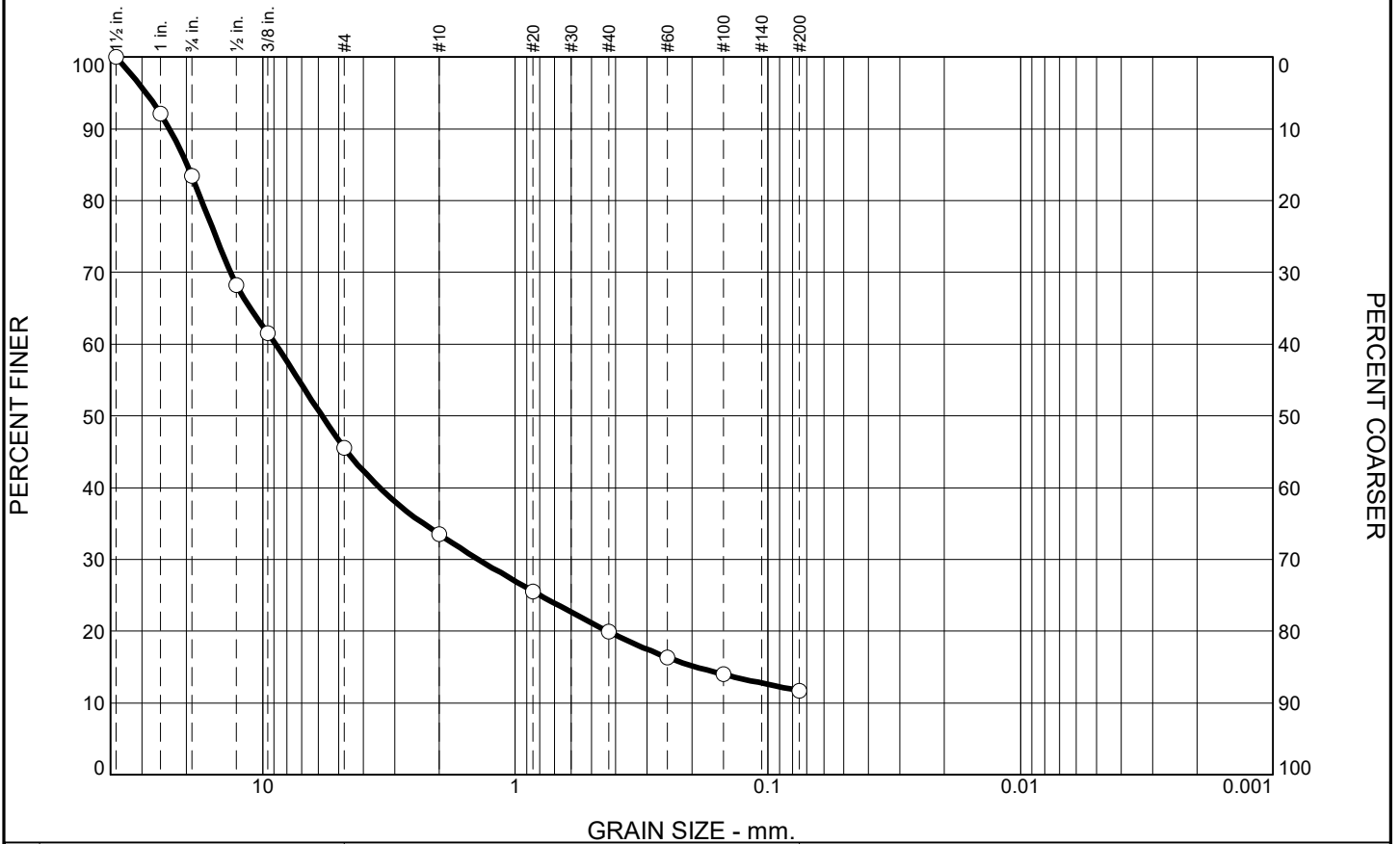
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 459

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.6	37.8	12.1	13.6	8.2	11.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.1		
.75	83.4		
.5	68.3		
.375	61.5		
#4	45.6		
#10	33.5		
#20	25.6		
#40	19.9		
#60	16.3		
#100	14.0		
#200	11.7		

BROWN POORLY GRADED GRAVEL WITH SILT AND SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 23.4043 D₈₅= 19.9202 D₆₀= 8.8946
 D₅₀= 5.8205 D₃₀= 1.3976 D₁₅= 0.1913
 D₁₀= C_u= C_c=

Classification
 USCS= GP-GM AASHTO=

Remarks

F.M.=4.92

* (no specification provided)

Source of Sample: HEN-B008
 Sample Number: S-7

Depth: 20.0'-21.5'

Date: 11-25-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

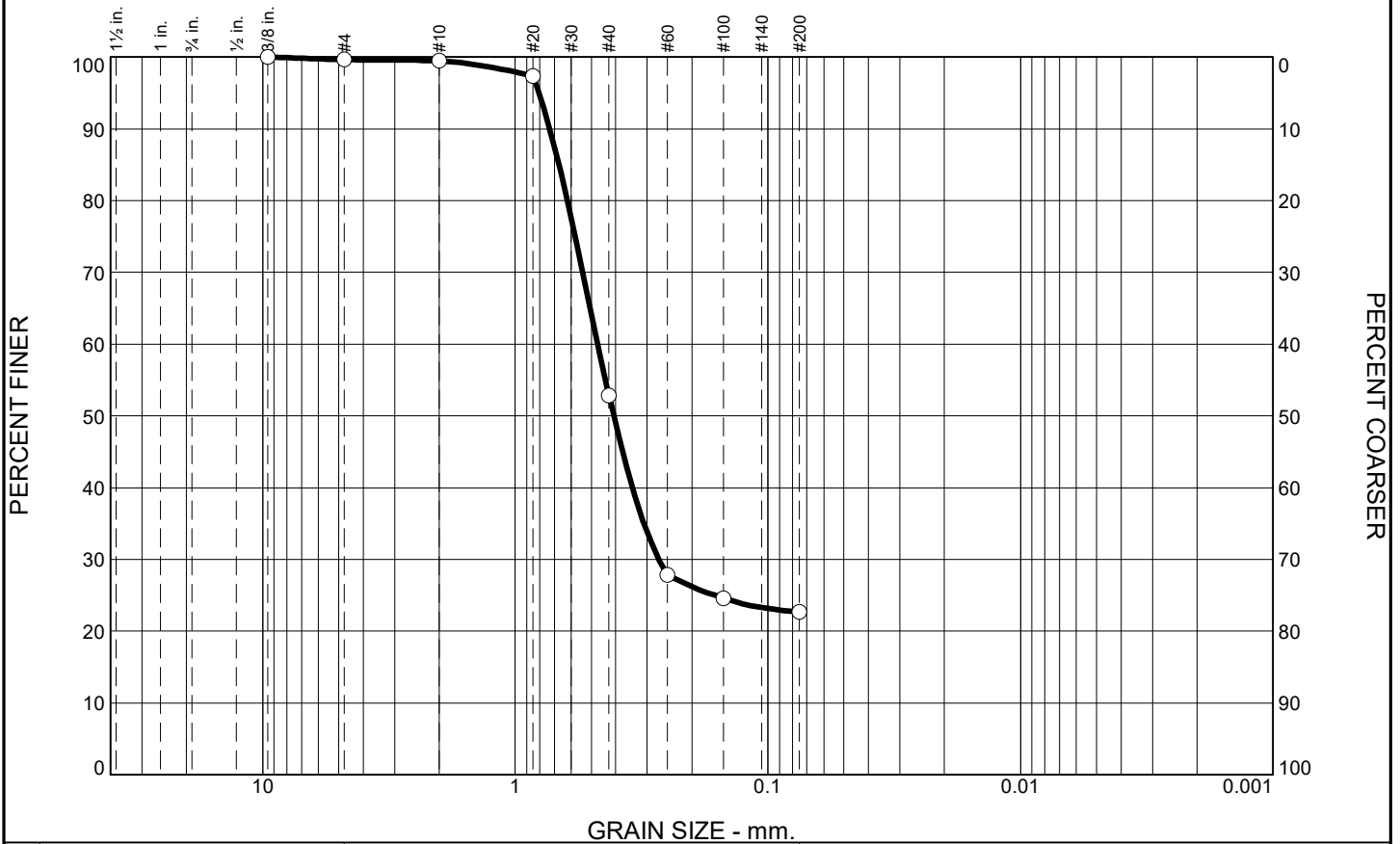
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 460

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.1	46.7	30.1		22.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.6		
#10	99.5		
#20	97.4		
#40	52.8		
#60	27.9		
#100	24.6		
#200	22.7		

BROWN SILTY SAND

PL= **Atterberg Limits** PI=

LL= **Coefficients** D₆₀= 0.4713

D₉₀= 0.7292 D₈₅= 0.6712 D₃₀= 0.2705 D₁₅=

D₅₀= 0.4071 C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

F.M.=1.67

* (no specification provided)

Source of Sample: HEN-B009
Sample Number: S-8

Depth: 25.0'-26.5'

Date: 11-25-15



Client: AECOM
Project: DYNERGY - HENNEPIN
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	1.3	68.8	29.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	99.5		
#40	98.5		
#60	95.9		
#100	48.3		
#200	29.7		

BROWN SILTY SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.2298 D₈₅= 0.2170 D₆₀= 0.1702
 D₅₀= 0.1531 D₃₀= 0.0759 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks

F.M.=0.56

* (no specification provided)

Source of Sample: HEN-B009
Sample Number: S-11

Depth: 40.0'-41.5'

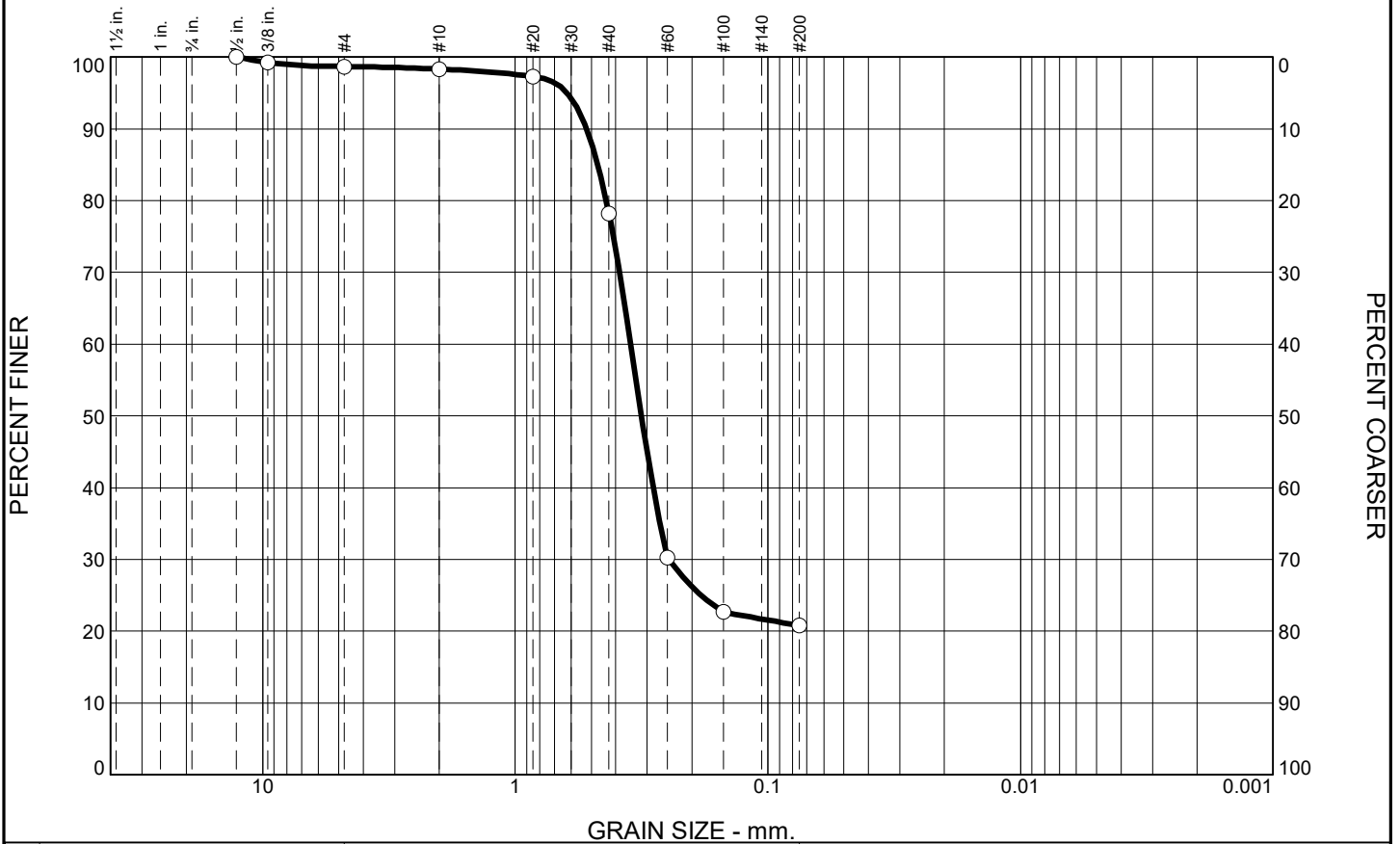
Date: 11-25-15

	Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233
Figure	

Tested By: SJH

Checked By: WPQ
462

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	0.4	20.1	57.4	20.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.50	100.0		
.375	99.2		
#4	98.7		
#10	98.3		
#20	97.3		
#40	78.2		
#60	30.2		
#100	22.7		
#200	20.8		

BROWN AND DARK BROWN SILTY SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.5217 D₈₅= 0.4703 D₆₀= 0.3489
 D₅₀= 0.3162 D₃₀= 0.2471 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks

F.M.=1.44

* (no specification provided)

Source of Sample: HEN-B010
 Sample Number: S-4

Depth: 7.5'-9.0'

Date: 11-25-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

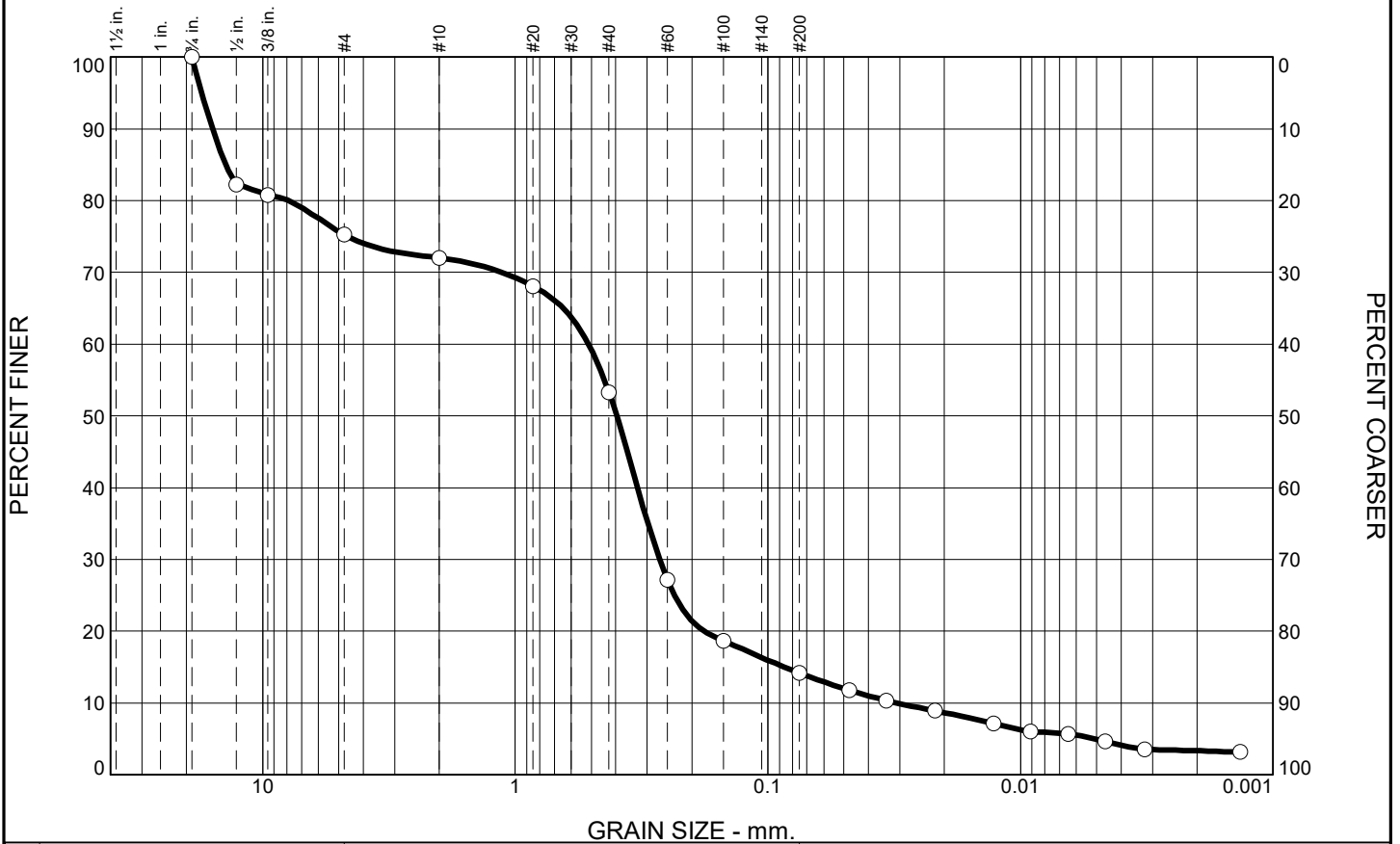
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 463

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	24.8	3.2	18.7	39.1	9.3	4.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	82.2		
.375	80.7		
#4	75.2		
#10	72.0		
#20	68.1		
#40	53.3		
#60	27.1		
#100	18.7		
#200	14.2		

BROWN TO DARK BROWN POORLY GRADED SAND WITH SILT AND GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 15.7800 D₈₅= 14.0146 D₆₀= 0.5125
 D₅₀= 0.3959 D₃₀= 0.2684 D₁₅= 0.0861
 D₁₀= 0.0310 C_u= 16.55 C_c= 4.54

Classification
 USCS= SP-SM AASHTO=

Remarks
 F.M.=2.84

* (no specification provided)

Source of Sample: HEN-B010
 Sample Number: S-7

Depth: 20.0'-21.5'

Date: 12-4-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

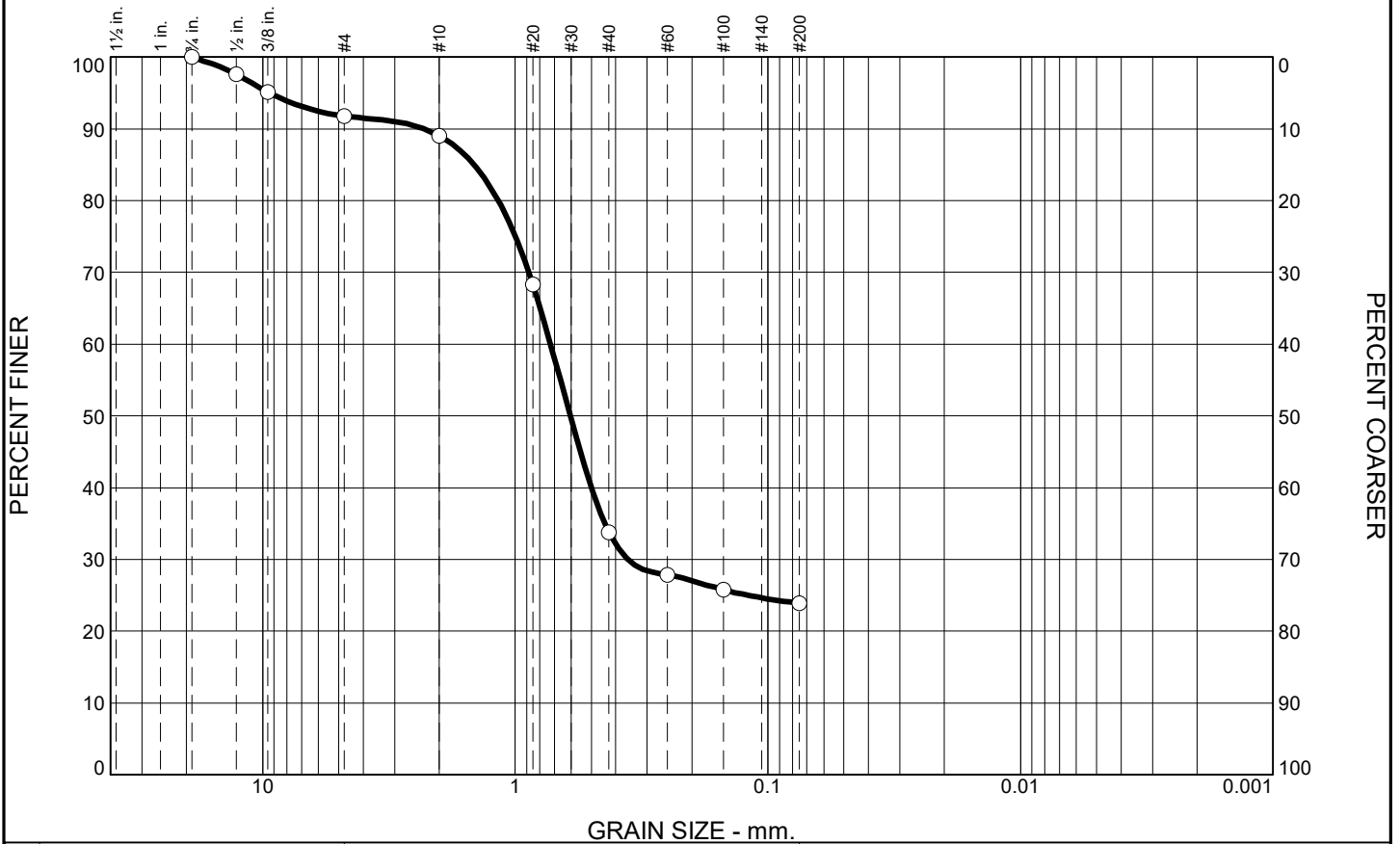
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 464

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.2	2.8	55.2	9.9	23.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.6		
.375	95.1		
#4	91.8		
#10	89.0		
#20	68.3		
#40	33.8		
#60	27.9		
#100	25.8		
#200	23.9		

BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 2.3059 D₈₅= 1.4549 D₆₀= 0.7240
 D₅₀= 0.6053 D₃₀= 0.3582 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks
 F.M.=2.39

* (no specification provided)

Source of Sample: HEN-B010
Sample Number: S-11

Depth: 40.0'-41.5'

Date: 11-25-15



Client: AECOM
Project: DYNERGY - HENNEPIN

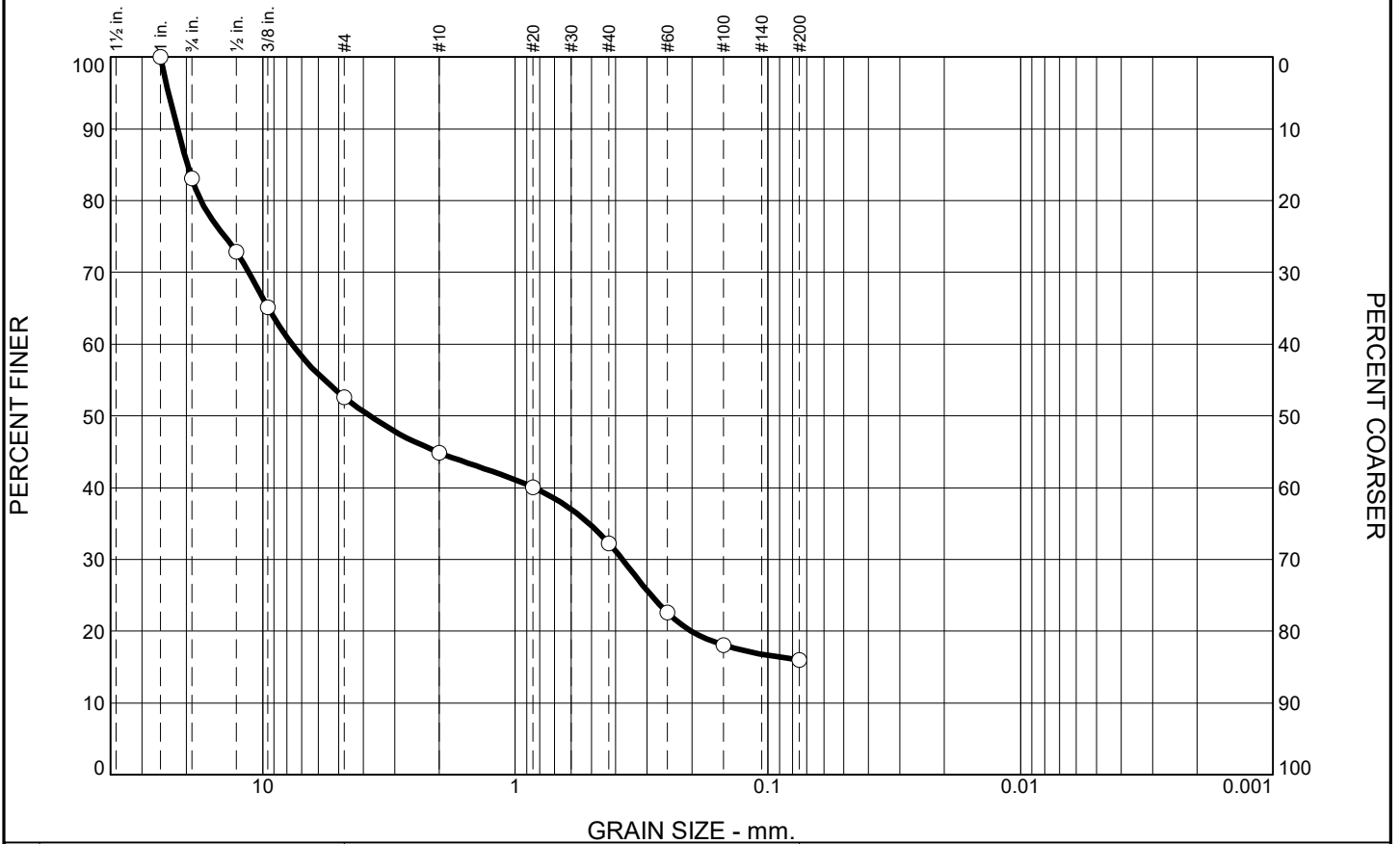
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
465

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.9	30.5	7.7	12.7	16.2		16.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	83.1		
.5	72.9		
.375	65.1		
#4	52.6		
#10	44.9		
#20	40.0		
#40	32.2		
#60	22.6		
#100	18.1		
#200	16.0		

BROWN SILTY GRAVEL WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 21.7378 D₈₅= 19.8442 D₆₀= 7.6494
 D₅₀= 3.7604 D₃₀= 0.3762 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= GM AASHTO=

Remarks
 F.M.=4.30

* (no specification provided)

Source of Sample: HEN-B011
Sample Number: S-6

Depth: 15.0'-16.5'

Date: 11-25-15



Client: AECOM
Project: DYNERGY - HENNEPIN

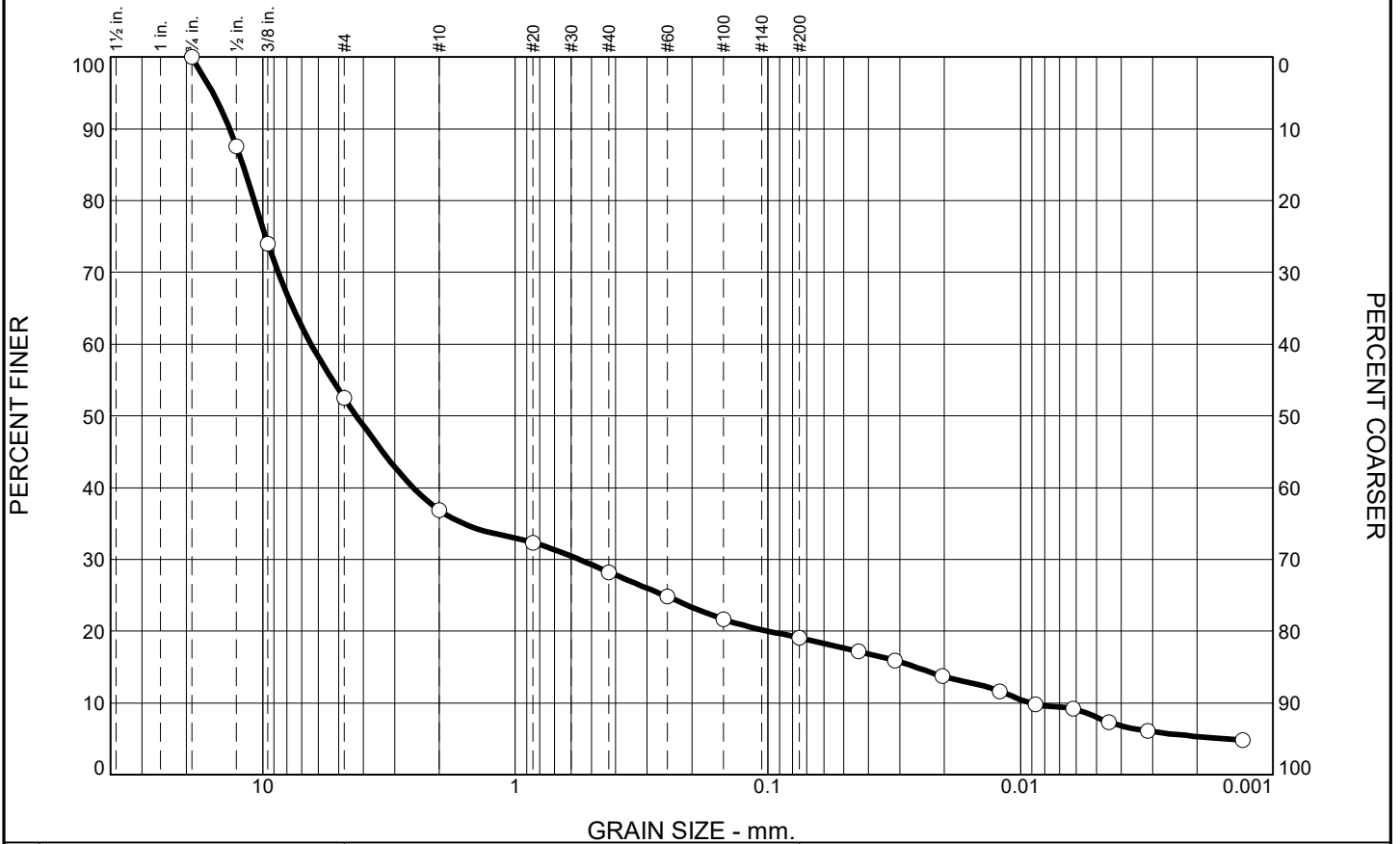
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	47.5	15.6	8.7	9.1	11.1	8.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	87.6		
.375	74.0		
#4	52.5		
#10	36.9		
#20	32.3		
#40	28.2		
#60	24.8		
#100	21.7		
#200	19.1		

LIGHT BROWN AND LIGHT GRAY SILTY GRAVEL WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 13.5067 D₈₅= 11.9845 D₆₀= 6.4325
 D₅₀= 4.2474 D₃₀= 0.5575 D₁₅= 0.0261
 D₁₀= 0.0092 C_u= 701.49 C_c= 5.27

Classification
 USCS= GM AASHTO=

Remarks
 F.M.=4.23

* (no specification provided)

Source of Sample: HEN-B012
 Sample Number: S-2

Depth: 2.5'-4.0'

Date: 12-4-15



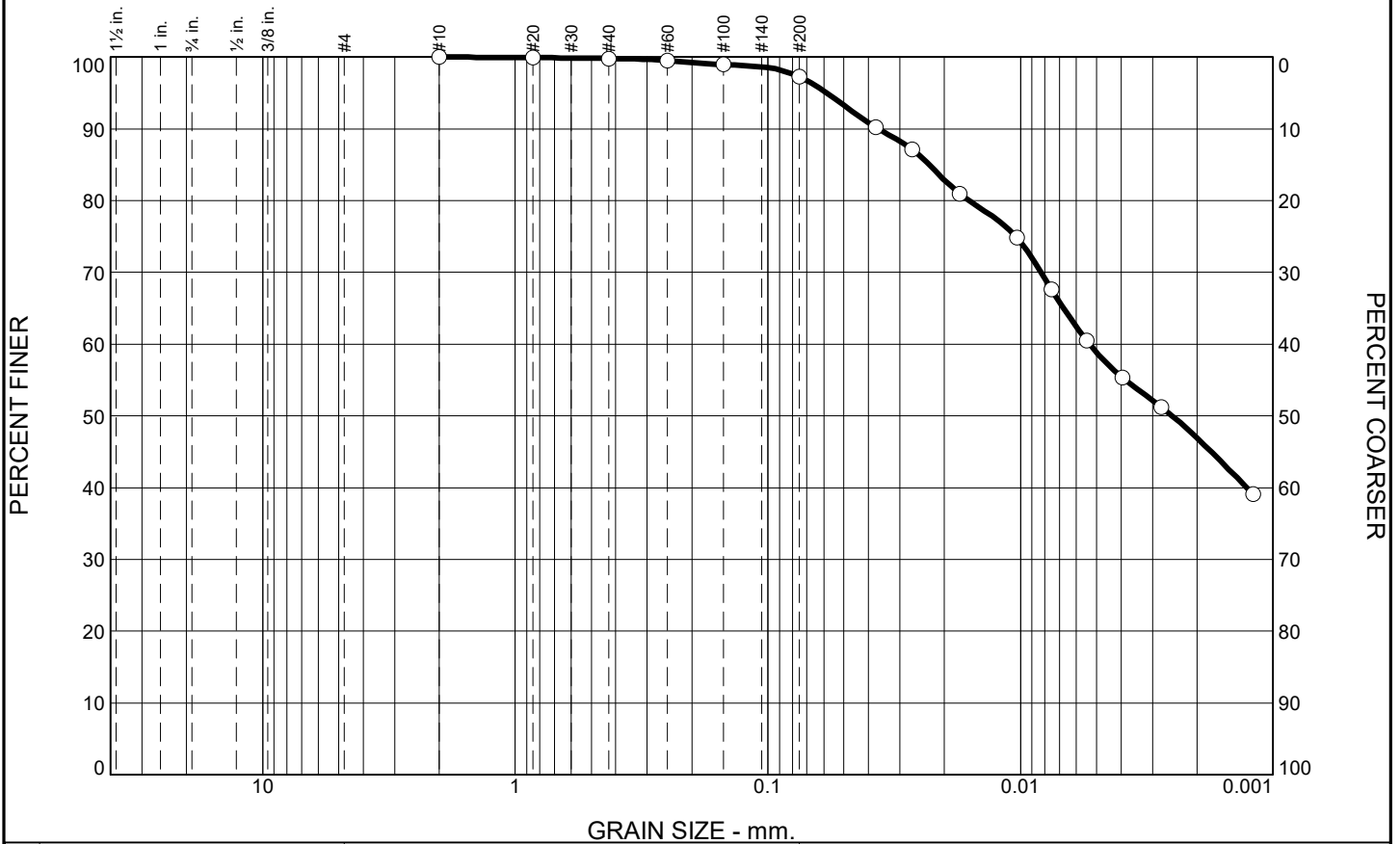
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 467

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	2.5	38.5	58.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.5		
#100	98.9		
#200	97.3		

VERY DARK GRAY LEAN CLAY - ORGANICS NOTED

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.0366 D₈₅= 0.0230 D₆₀= 0.0053
 D₅₀= 0.0025 D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CL AASHTO=

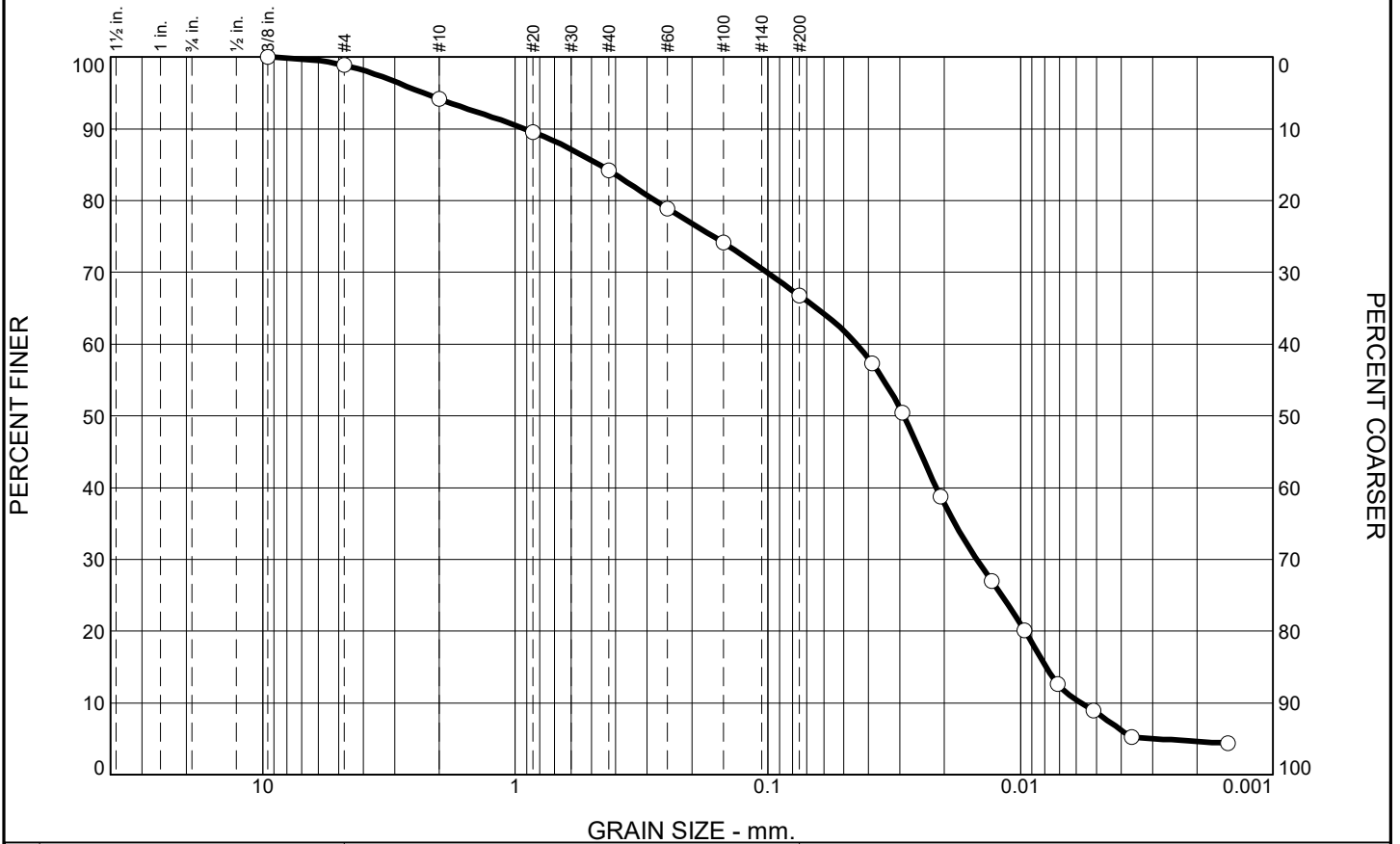
Remarks
 F.M.=0.02

* (no specification provided)

Source of Sample: HEN-B012 Depth: 20.0'-22.0' Date: 12-17-15
 Sample Number: S-7

	<p>Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233</p> <p style="text-align: right;">Figure</p>
--	--

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	4.7	10.0	17.4	58.1	8.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.9		
#10	94.2		
#20	89.5		
#40	84.2		
#60	78.9		
#100	74.1		
#200	66.8		

DARK GRAY FLY ASH

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.9160 D₈₅= 0.4652 D₆₀= 0.0445
 D₅₀= 0.0290 D₃₀= 0.0149 D₁₅= 0.0079
 D₁₀= 0.0058 C_u= 7.71 C_c= 0.86

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.73

* (no specification provided)

Source of Sample: HEN-B014
Sample Number: S-4

Depth: 7.5'-9.0'

Date: 12-9-15



Client: AECOM
Project: DYNERGY - HENNEPIN

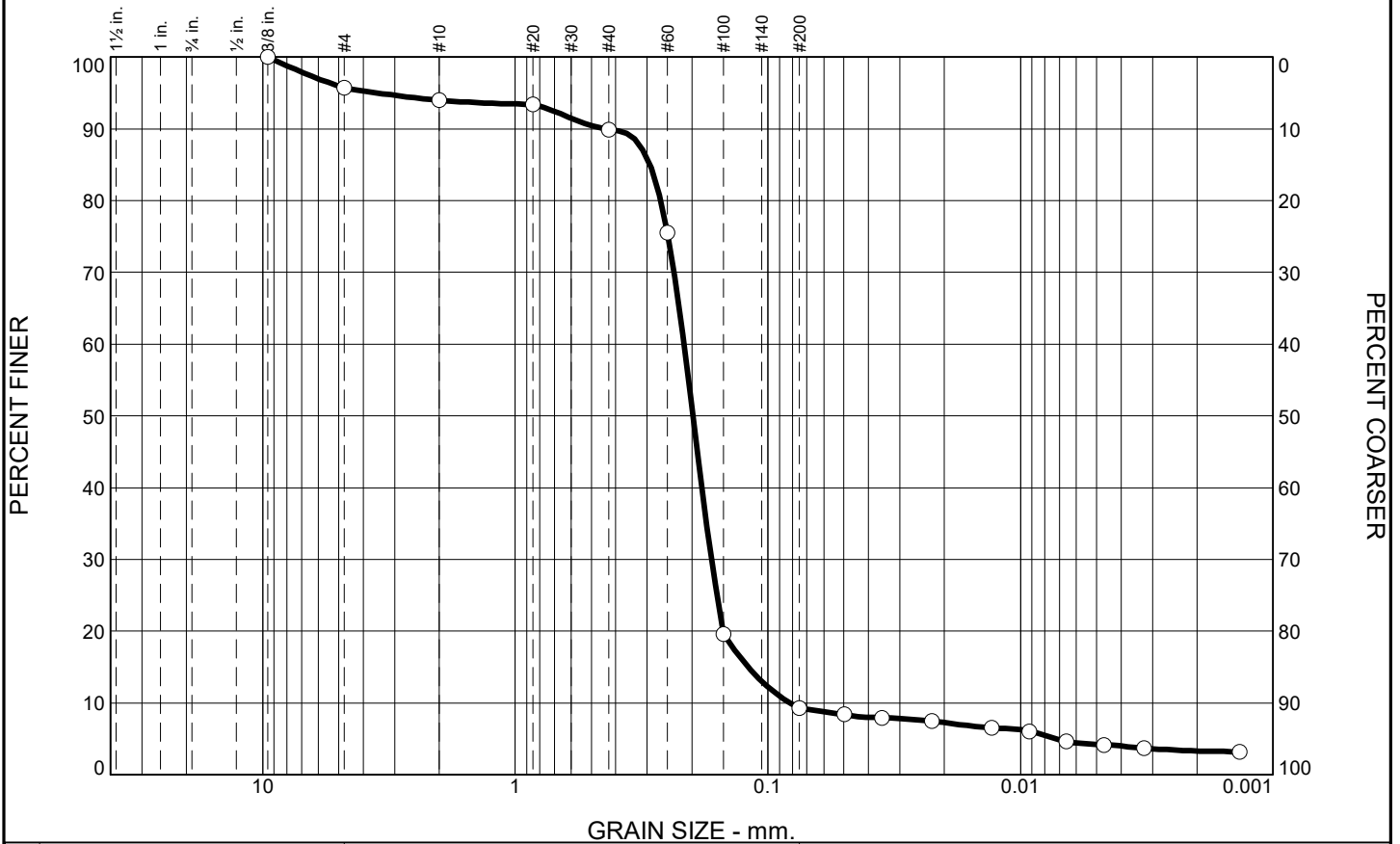
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
469

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.3	1.7	4.1	80.6	5.1	4.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	95.7		
#10	94.0		
#20	93.4		
#40	89.9		
#60	75.6		
#100	19.6		
#200	9.3		

GRAY POORLY GRADED SAND WITH SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.4408 D₈₅= 0.2931 D₆₀= 0.2146
 D₅₀= 0.1976 D₃₀= 0.1670 D₁₅= 0.1195
 D₁₀= 0.0819 C_u= 2.62 C_c= 1.59

Classification
 USCS= SP-SM AASHTO=

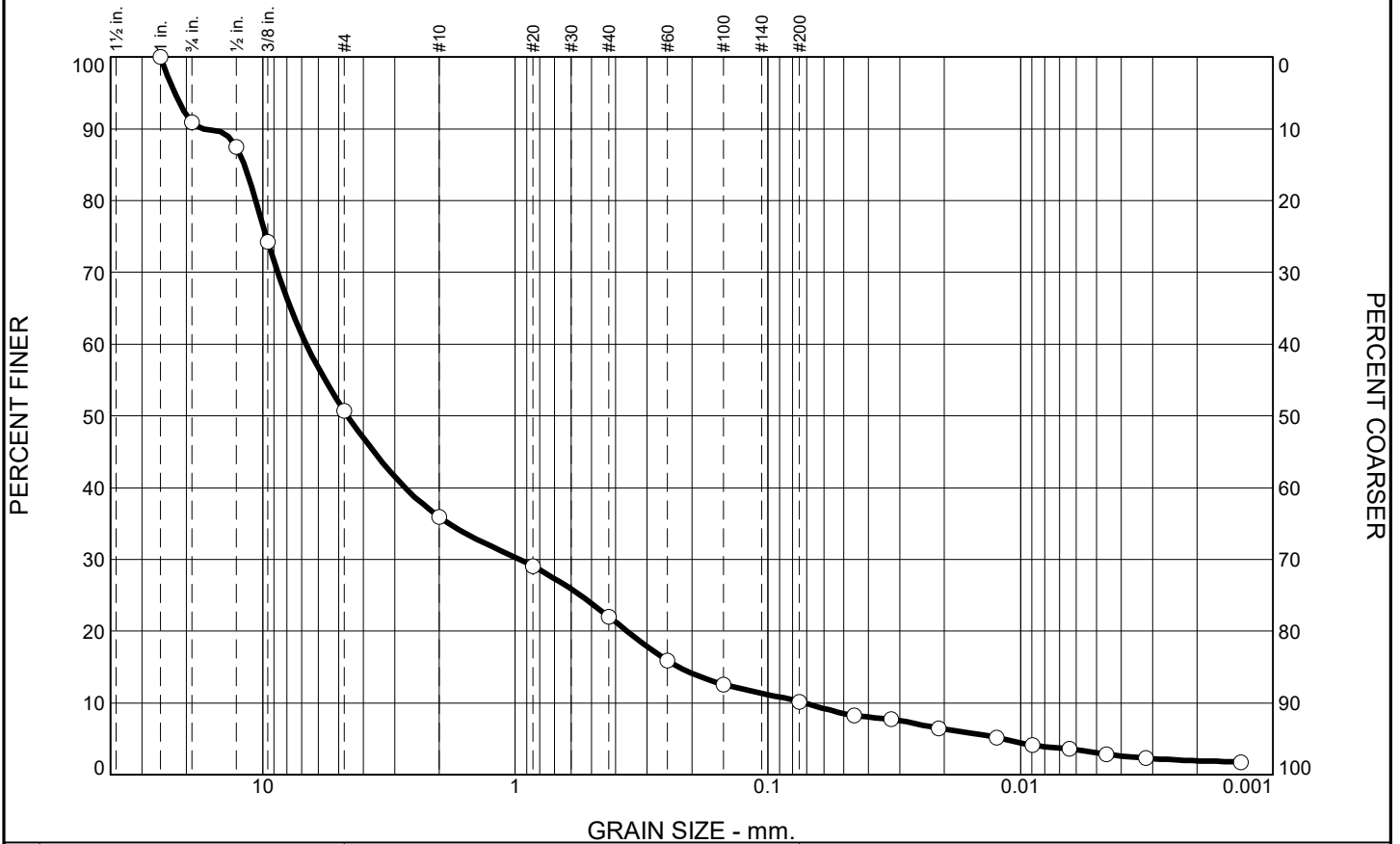
Remarks
 F.M.=1.20

* (no specification provided)

Source of Sample: HEN-B014 Depth: 45.0'-46.5' Date: 12-4-15
 Sample Number: S-12

	<p>Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233</p> <p style="text-align: right;">Figure</p>
--	--

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	9.1	40.2	14.8	13.9	11.8	7.1	3.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	90.9		
.5	87.5		
.375	74.2		
#4	50.7		
#10	35.9		
#20	29.1		
#40	22.0		
#60	15.9		
#100	12.6		
#200	10.2		

GRAY AND BROWN POORLY GRADED GRAVEL WITH SILT AND SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 17.2255 D₈₅= 11.8295 D₆₀= 6.7167
 D₅₀= 4.6068 D₃₀= 0.9599 D₁₅= 0.2250
 D₁₀= 0.0718 C_u= 93.58 C_c= 1.91

Classification
 USCS= GP-GM AASHTO=

Remarks
 F.M.=4.59

* (no specification provided)

Source of Sample: HEN-B015
 Sample Number: S-12

Depth: 45.0'-46.5'

Date: 12-4-15



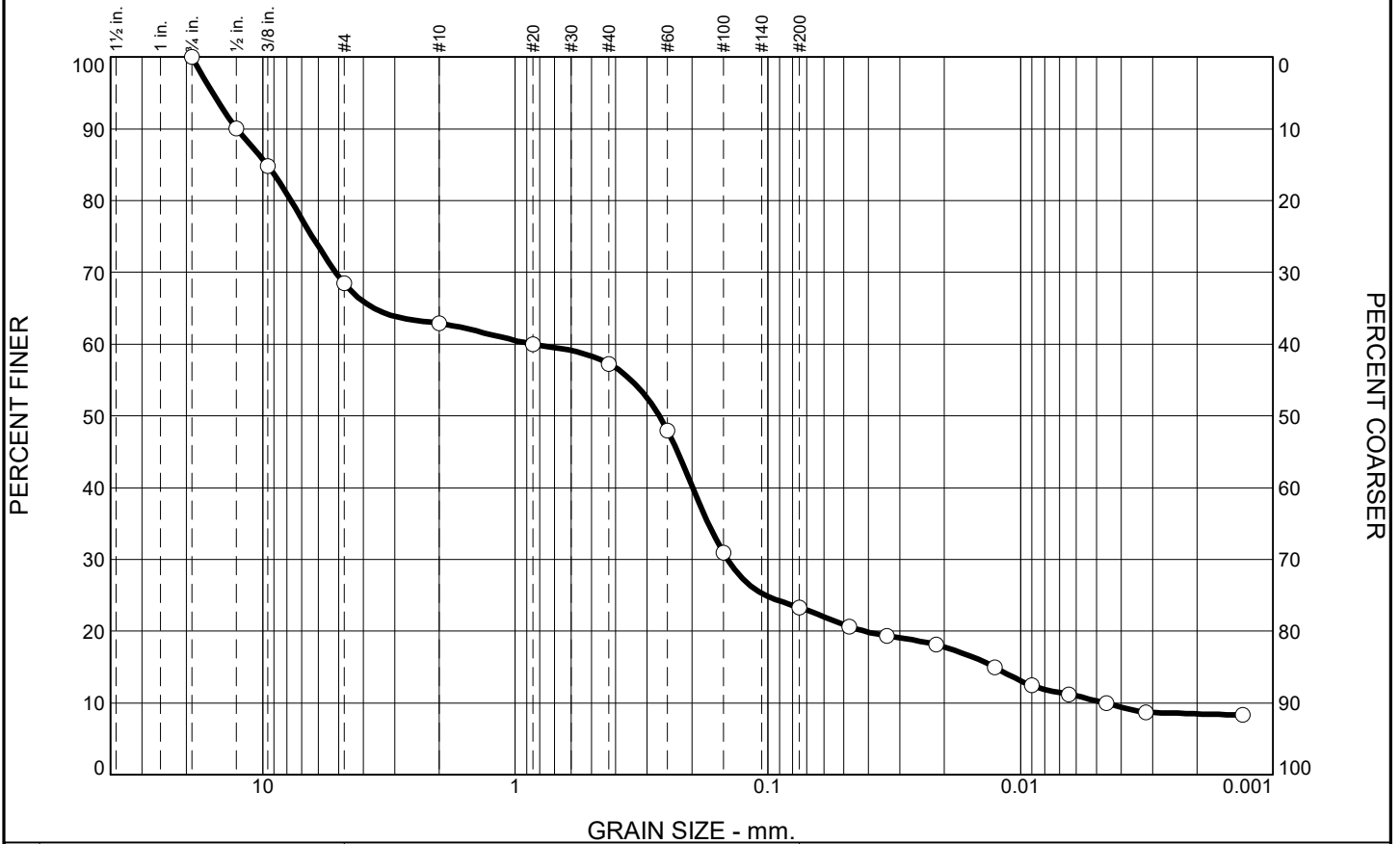
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 471

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	31.5	5.6	5.7	33.9	13.0	10.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	90.1		
.375	84.8		
#4	68.5		
#10	62.9		
#20	60.0		
#40	57.2		
#60	48.0		
#100	30.9		
#200	23.3		

DARK BROWN AND BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 12.6514 D₈₅= 9.6003 D₆₀= 0.8530
 D₅₀= 0.2690 D₃₀= 0.1447 D₁₅= 0.0127
 D₁₀= 0.0046 C_u= 183.51 C_c= 5.28

Classification
 USCS= AASHTO=

Remarks
 F.M.=2.80

* (no specification provided)

Source of Sample: HEN-B016
 Sample Number: S-3

Depth: 5.0'-6.5'

Date: 12-9-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

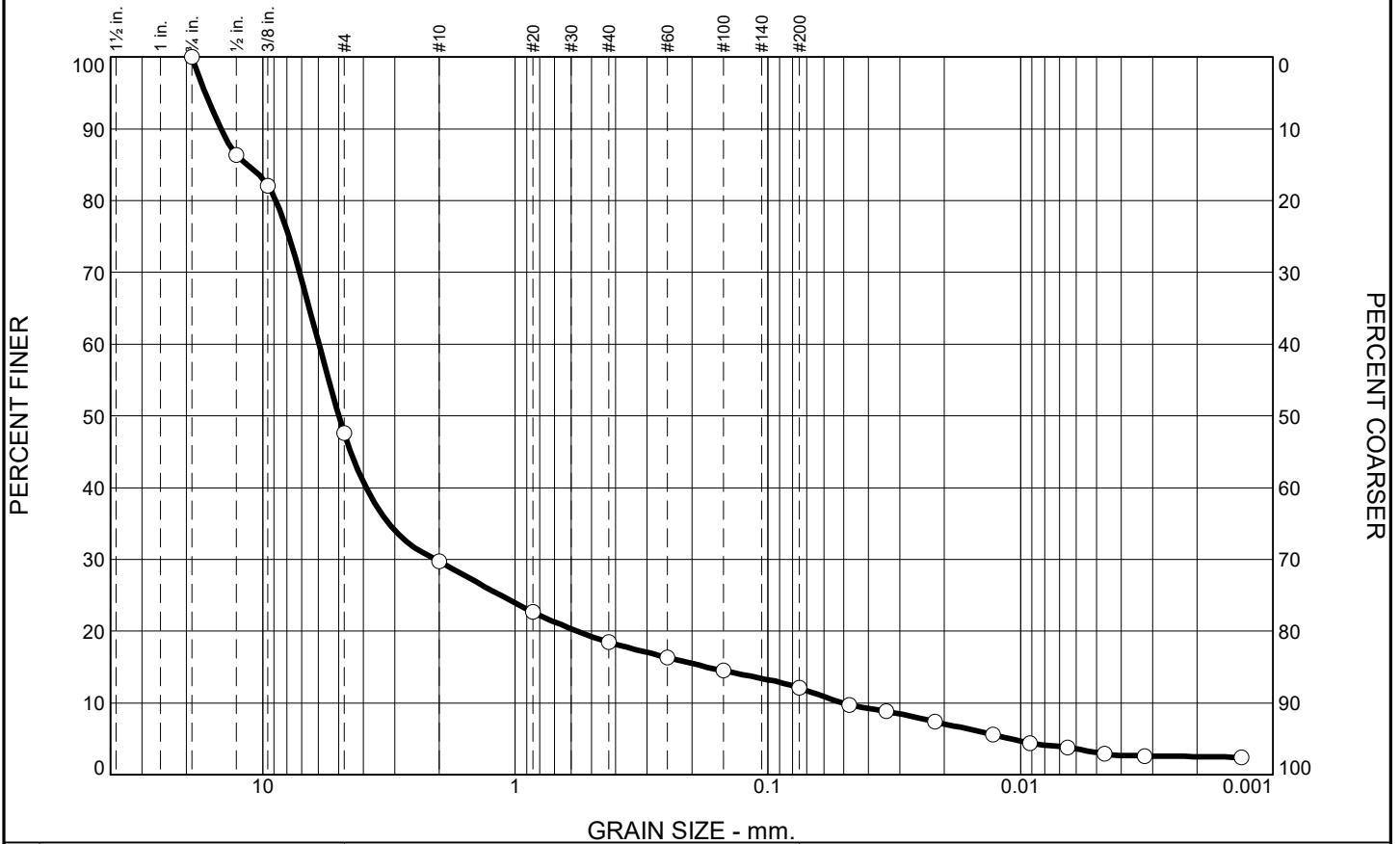
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 472

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	52.4	17.9	11.2	6.4	9.0	3.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	86.4		
.375	82.1		
#4	47.6		
#10	29.7		
#20	22.7		
#40	18.5		
#60	16.3		
#100	14.5		
#200	12.1		

BROWNISH GRAY GRAVEL WITH SILT AND SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 14.6414 D₈₅= 11.5354 D₆₀= 5.9837
 D₅₀= 4.9929 D₃₀= 2.0751 D₁₅= 0.1743
 D₁₀= 0.0507 C_u= 117.95 C_c= 14.19

Classification
 USCS= GP-GM AASHTO=

Remarks

F.M.=4.62

* (no specification provided)

Source of Sample: HEN-B016
Sample Number: S-17

Depth: 70.0'-71.5'

Date: 12-9-15



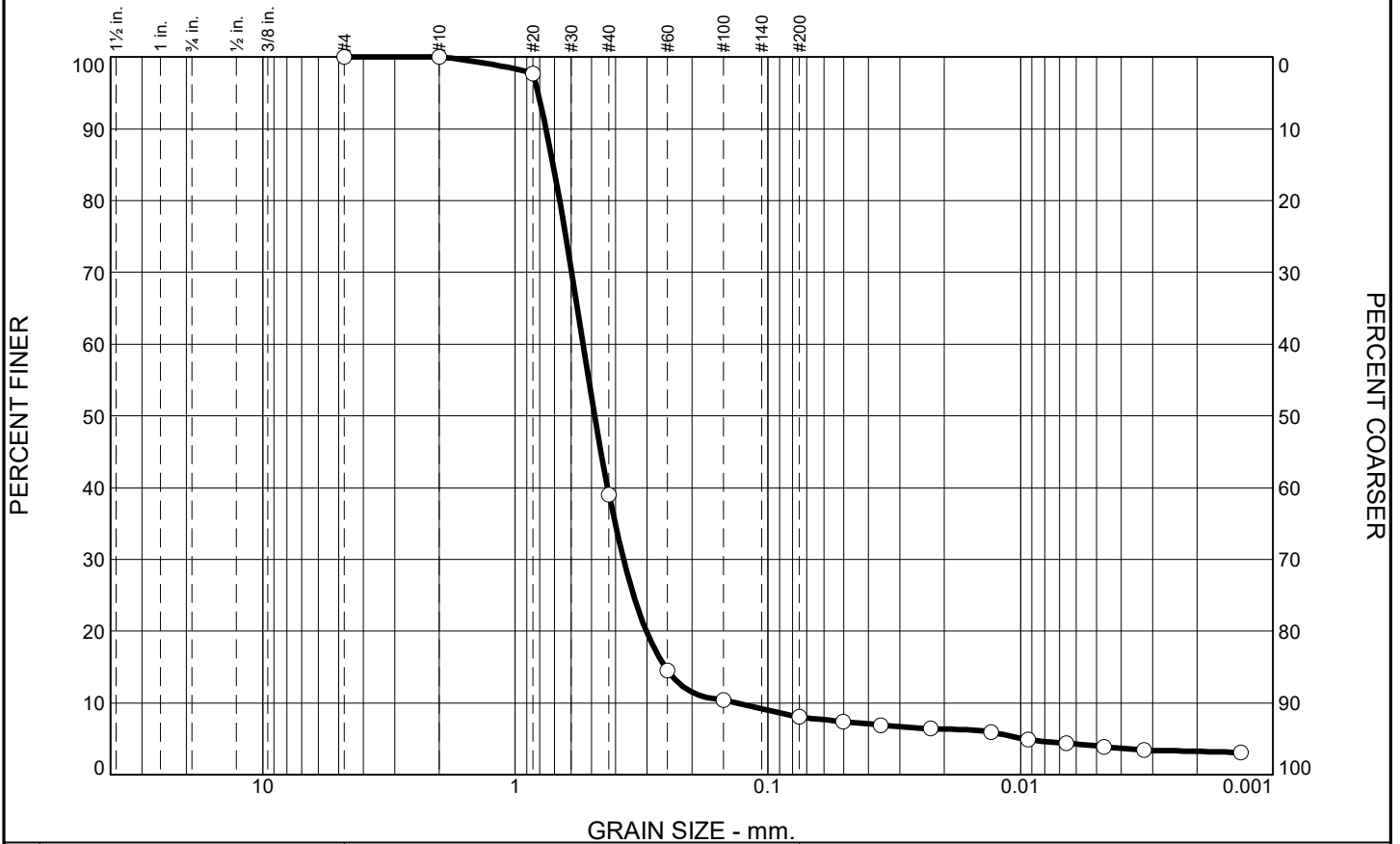
Client: AECOM
Project: DYNERGY - HENNEPIN
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
473

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	60.9	31.0	4.1	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	97.7		
#40	39.1		
#60	14.5		
#100	10.4		
#200	8.1		

DARK GRAY SAND WITH SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.7541 D₈₅= 0.7076 D₆₀= 0.5389
 D₅₀= 0.4840 D₃₀= 0.3721 D₁₅= 0.2553
 D₁₀= 0.1325 C_u= 4.07 C_c= 1.94

Classification
 USCS= SM AASHTO=

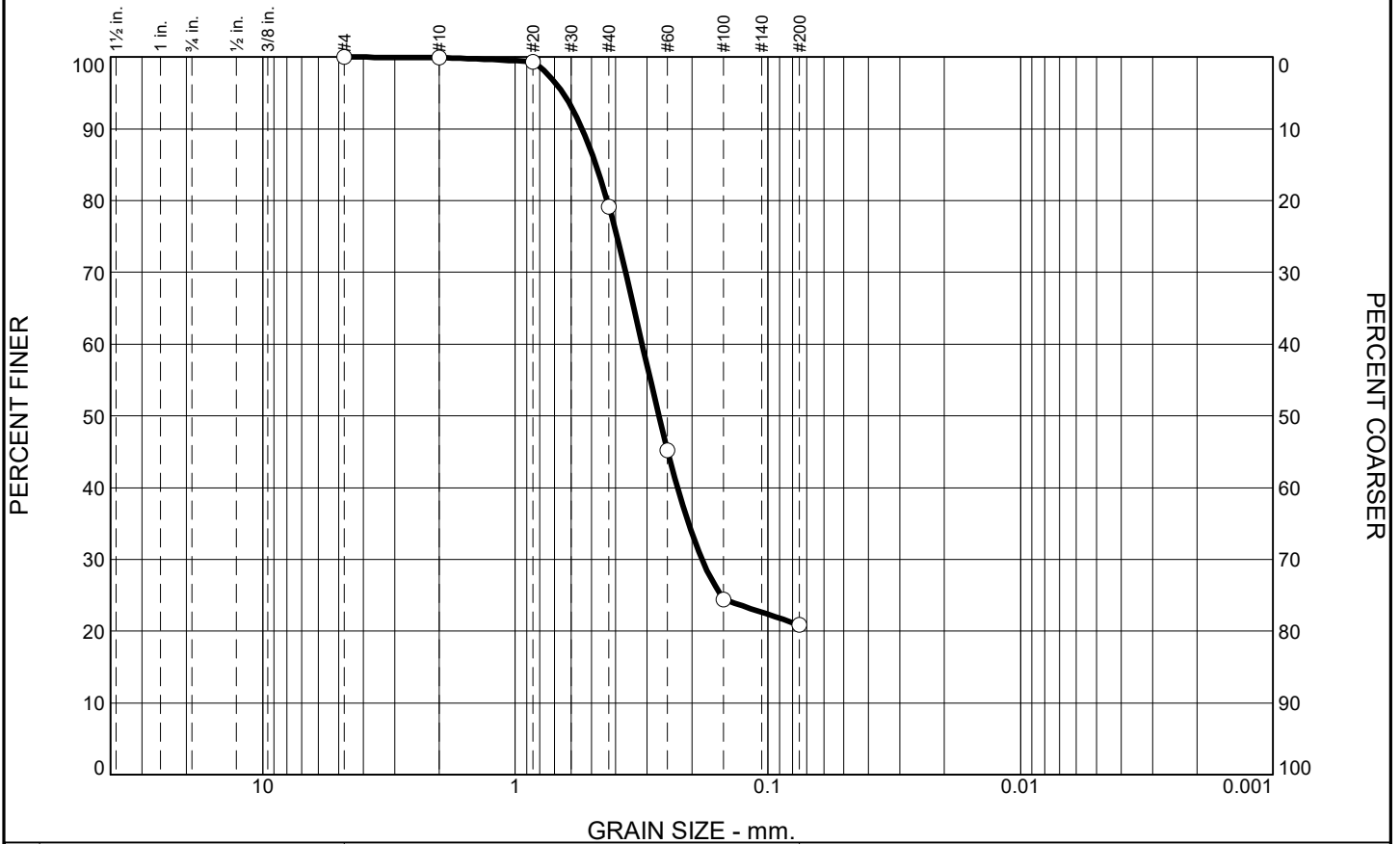
Remarks
 F.M.=2.01

* (no specification provided)

Source of Sample: HEN-B017 **Depth:** 45.0'-46.5' **Date:** 12-9-15
Sample Number: S-12

	Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233
Figure	

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	20.7	58.3	20.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.3		
#40	79.2		
#60	45.2		
#100	24.4		
#200	20.9		

GRAY AND BROWN SILTY SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.5438 D₈₅= 0.4786 D₆₀= 0.3142
 D₅₀= 0.2703 D₃₀= 0.1817 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks
 F.M.=1.26

* (no specification provided)

Source of Sample: HEN-B018
Sample Number: S-14

Depth: 55.0'-56.5'

Date: 12-7-15



Client: AECOM
Project: DYNERGY - HENNEPIN

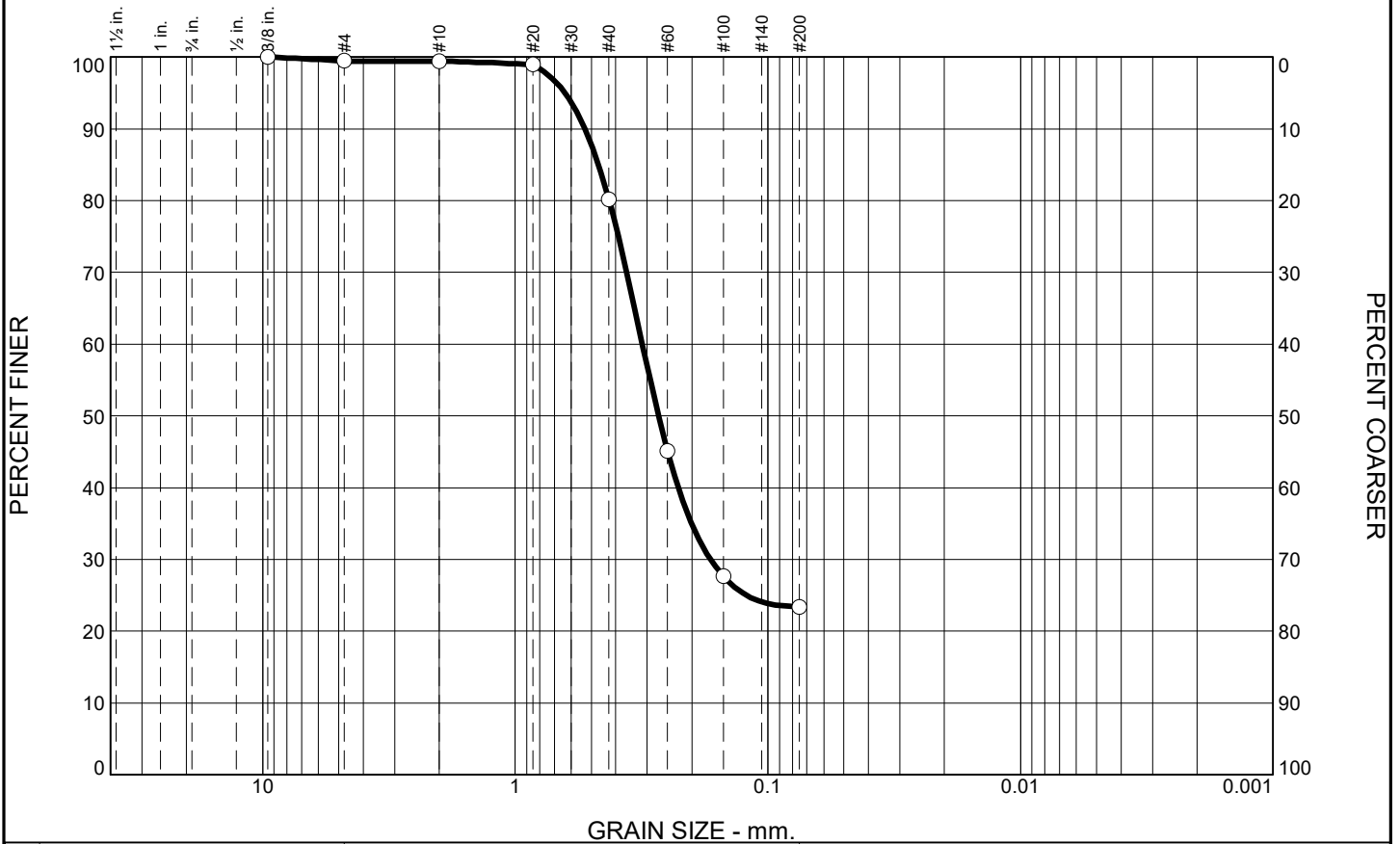
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
475

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.1	19.3	56.7	23.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.5		
#10	99.4		
#20	99.0		
#40	80.1		
#60	45.2		
#100	27.7		
#200	23.4		

BROWN AND GRAY SILTY SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.5299 D₈₅= 0.4677 D₆₀= 0.3138
 D₅₀= 0.2709 D₃₀= 0.1686 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks

F.M.=1.24

* (no specification provided)

Source of Sample: HEN-B019
Sample Number: S-10

Depth: 40.0'-41.5'

Date: 12-7-15



Client: AECOM
Project: DYNERGY - HENNEPIN

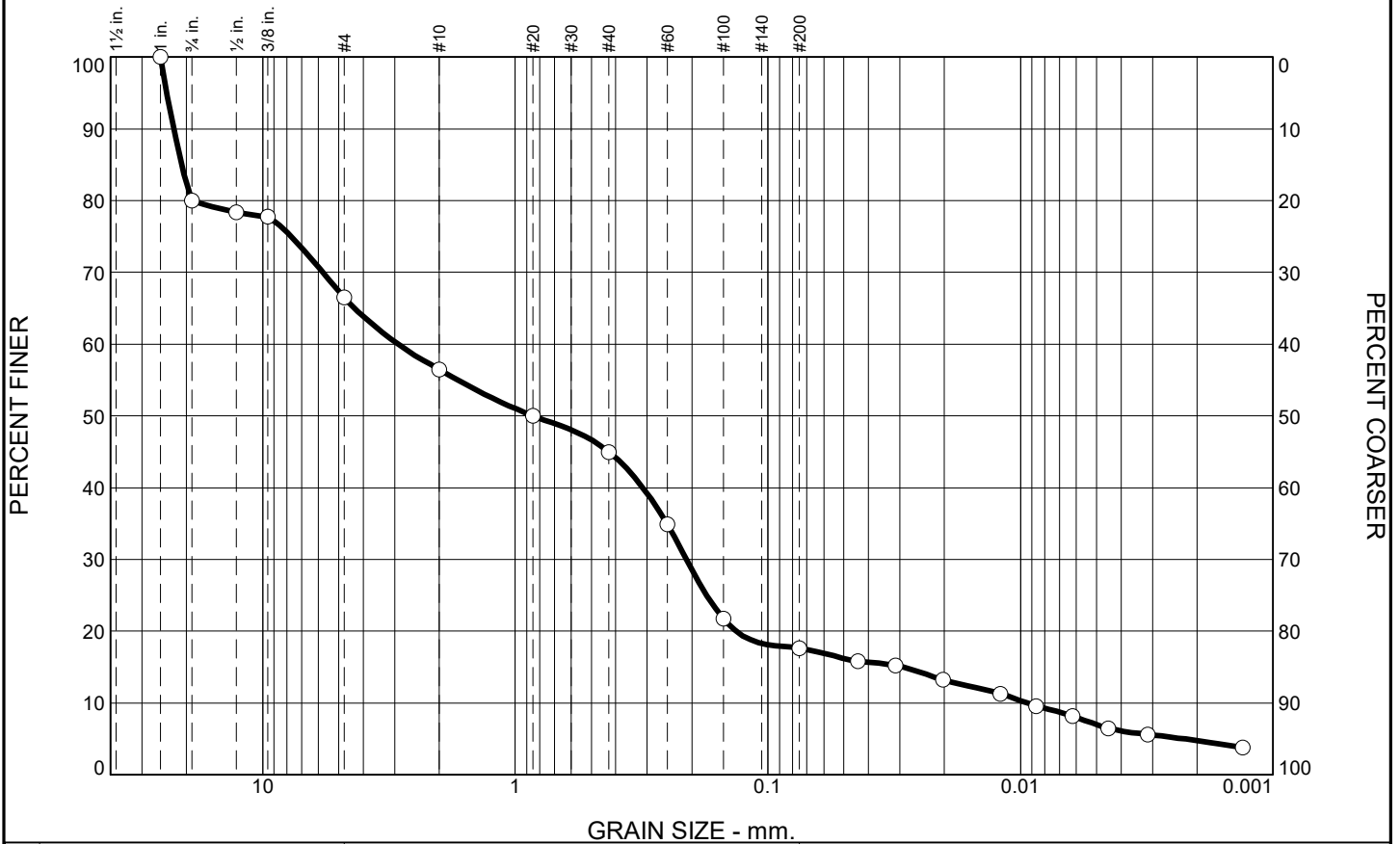
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
476

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.0	13.5	10.0	11.5	27.4	10.6	7.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	80.0		
.5	78.4		
.375	77.7		
#4	66.5		
#10	56.5		
#20	50.0		
#40	45.0		
#60	34.8		
#100	21.7		
#200	17.6		

BROWN AND REDDISH BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 22.4706 D₈₅= 20.9381 D₆₀= 2.9071
 D₅₀= 0.8484 D₃₀= 0.2097 D₁₅= 0.0290
 D₁₀= 0.0094 C_u= 309.22 C_c= 1.61

Classification
 USCS= SM AASHTO=

Remarks

F.M.=3.57

* (no specification provided)

Source of Sample: HEN-B020
Sample Number: S-7

Depth: 20.0'-21.4'

Date: 12-9-15



Client: AECOM
Project: DYNERGY - HENNEPIN

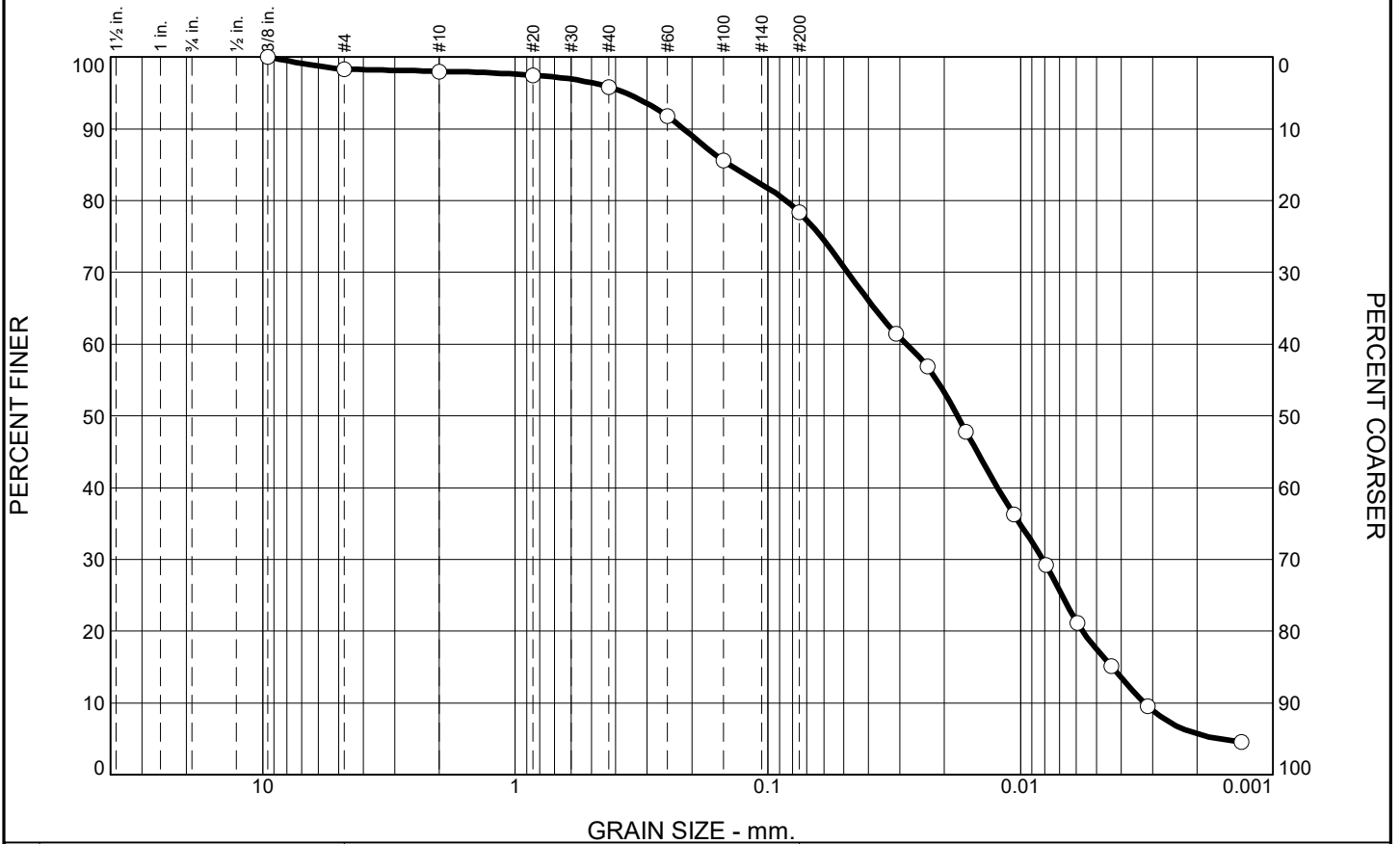
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
477

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	0.3	2.2	17.5	60.8	17.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.3		
#10	98.0		
#20	97.5		
#40	95.8		
#60	91.7		
#100	85.5		
#200	78.3		

DARK GRAY VARVED FLY ASH

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.2157 D₈₅= 0.1423 D₆₀= 0.0283
 D₅₀= 0.0178 D₃₀= 0.0082 D₁₅= 0.0043
 D₁₀= 0.0032 C_u= 8.74 C_c= 0.73

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.30

* (no specification provided)

Source of Sample: HEN-B021
Sample Number: S-8

Depth: 22.0'-24.0'

Date: 12-17-15



Client: AECOM
Project: DYNERGY - HENNEPIN

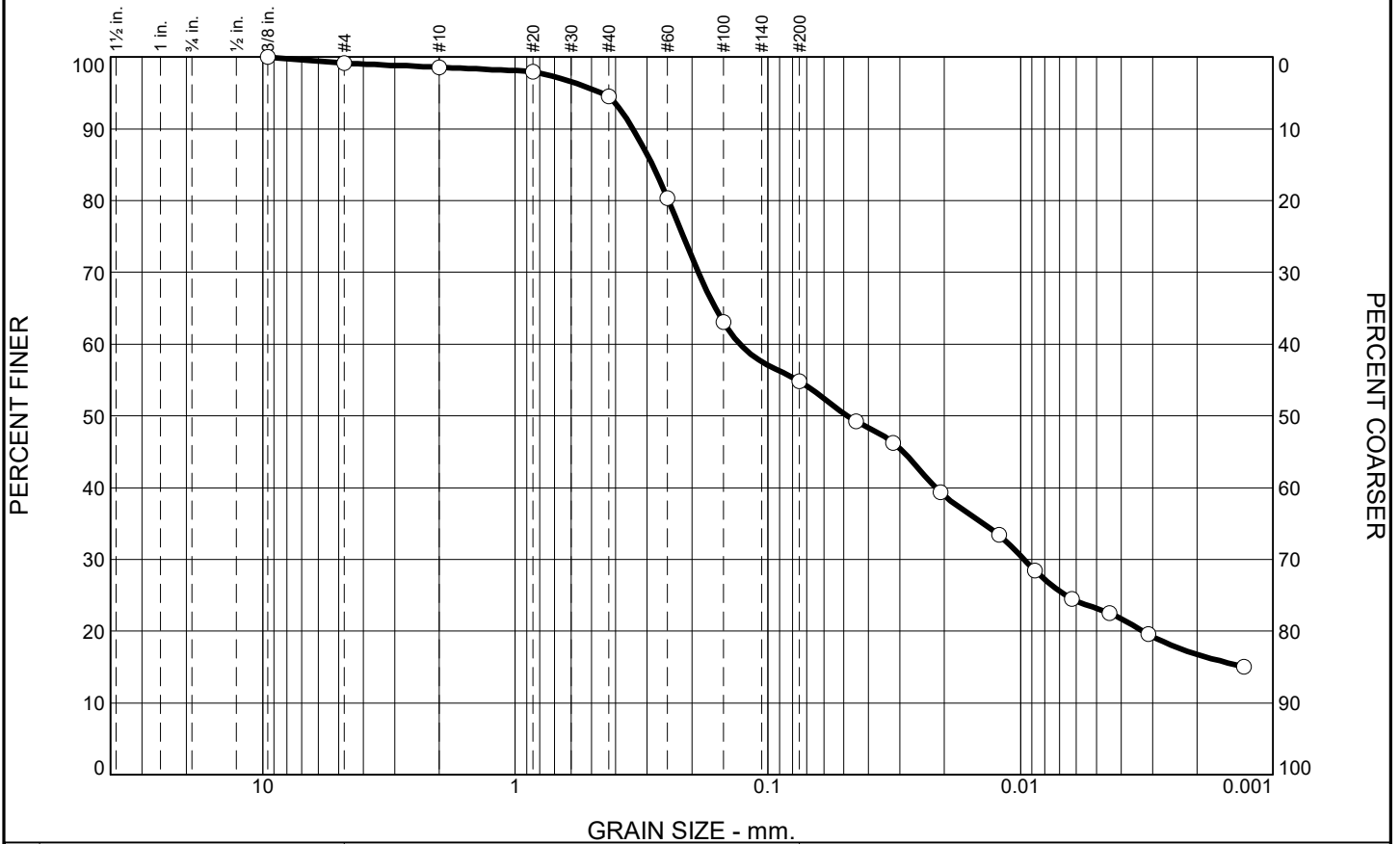
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
478

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	0.5	4.1	39.7	31.6	23.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.1		
#10	98.6		
#20	98.0		
#40	94.5		
#60	80.4		
#100	63.1		
#200	54.8		

DARK GRAY AND BLACK SILTY SAND WITH CLAY

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.3417 D₈₅= 0.2870 D₆₀= 0.1290
 D₅₀= 0.0484 D₃₀= 0.0097 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks
 F.M.=0.58

* (no specification provided)

Source of Sample: HEN-B021
Sample Number: S-11

Depth: 35.0'-36.5'

Date: 12-9-15



Client: AECOM
Project: DYNERGY - HENNEPIN

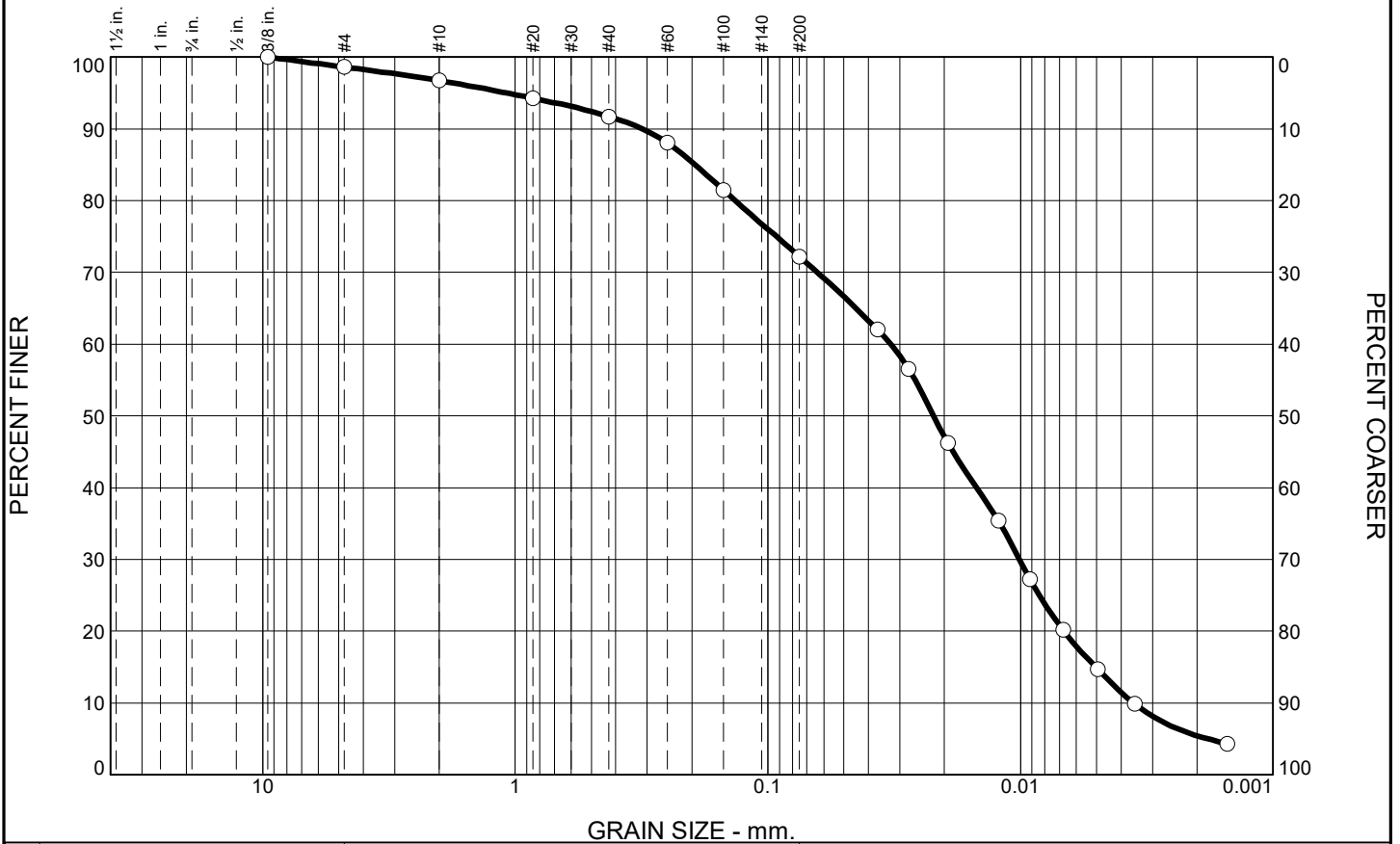
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
479

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	1.9	5.0	19.5	57.3	14.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.6		
#10	96.7		
#20	94.2		
#40	91.7		
#60	88.0		
#100	81.5		
#200	72.2		

VERY DARK GRAY VARVED FLY ASH WITH SAND - SAND SEAMS NOTED

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.3145 D₈₅= 0.1939 D₆₀= 0.0327
 D₅₀= 0.0221 D₃₀= 0.0101 D₁₅= 0.0050
 D₁₀= 0.0036 C_u= 9.15 C_c= 0.88

Classification
 USCS= AASHTO=

Remarks
 F.M.=0.45

* (no specification provided)

Source of Sample: HEN-B022
 Sample Number: S-4

Depth: 7.5'-9.0'

Date: 12-15-15



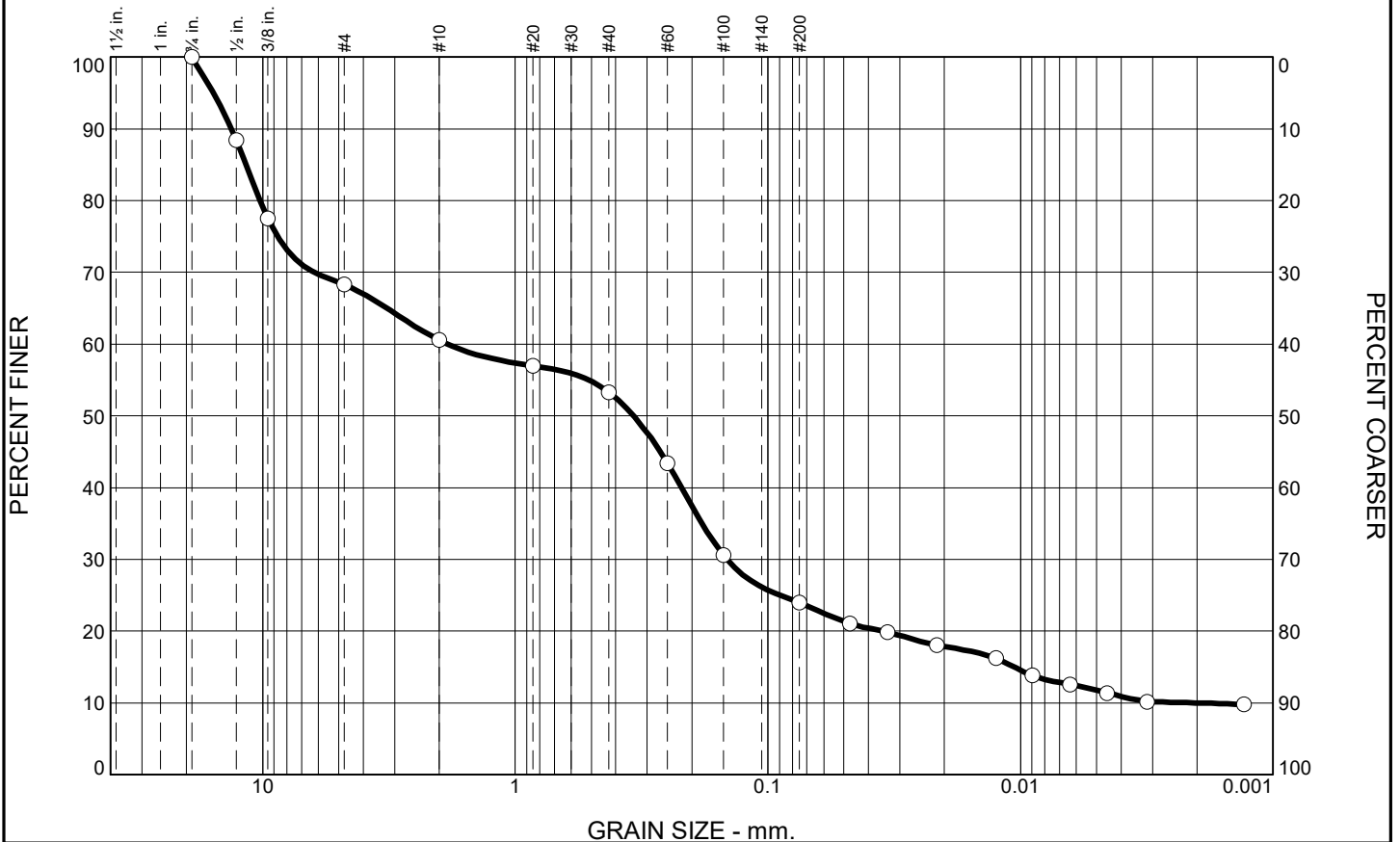
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 480

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	31.7	7.8	7.2	29.3	12.2	11.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	88.4		
.375	77.5		
#4	68.3		
#10	60.5		
#20	57.0		
#40	53.3		
#60	43.4		
#100	30.6		
#200	24.0		

BROWN AND TAN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= _____ LL= _____ PI= _____

Coefficients
 D₉₀= 13.2956 D₈₅= 11.6290 D₆₀= 1.8552
 D₅₀= 0.3396 D₃₀= 0.1452 D₁₅= 0.0106
 D₁₀= 0.0021 C_u= 894.27 C_c= 5.48

Classification
 USCS= SM AASHTO= _____

Remarks
 F.M.=3.00

* (no specification provided)

Source of Sample: HEN-B023
 Sample Number: S-2

Depth: 2.5'-4.0'

Date: 12-9-15



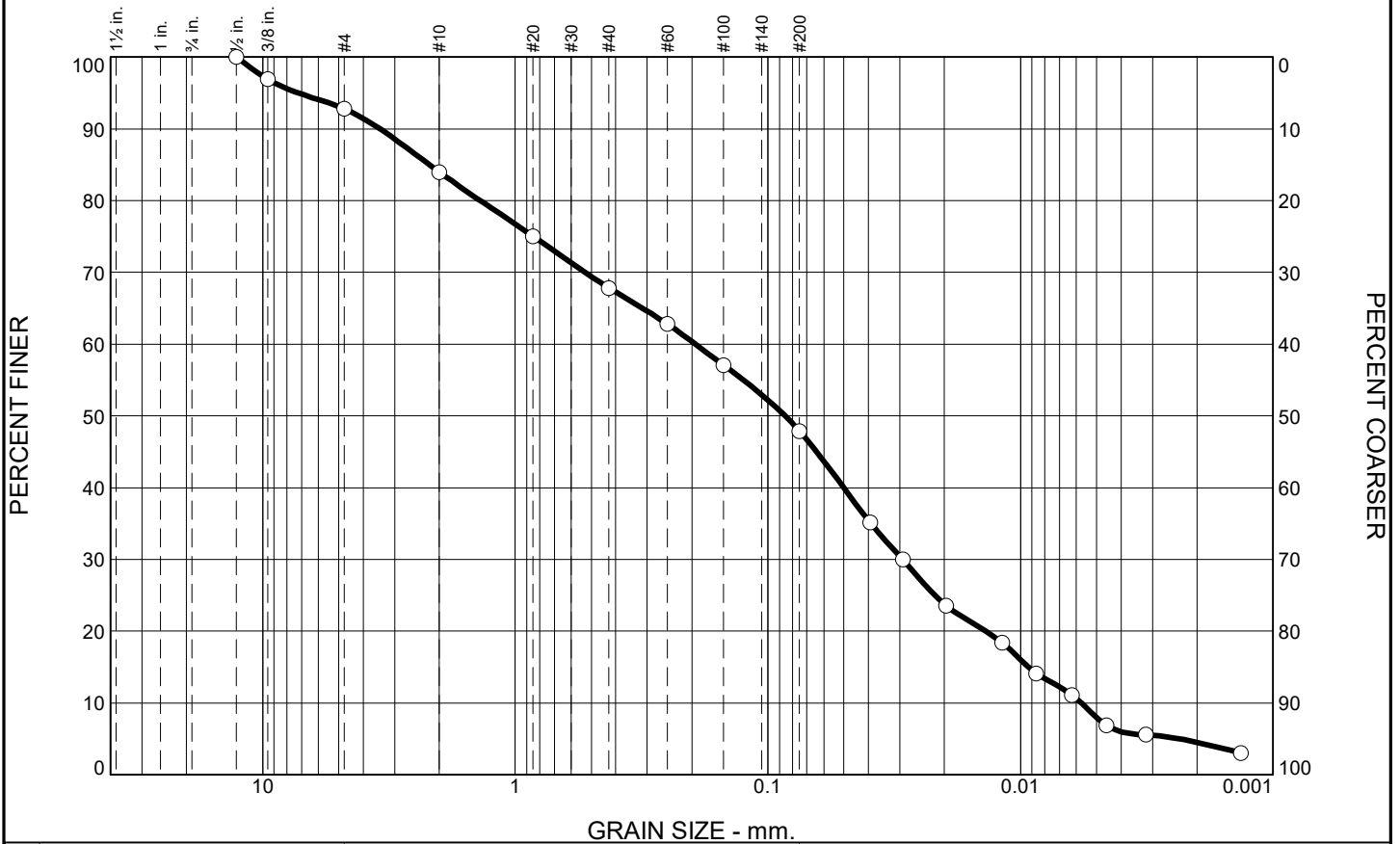
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	7.2	8.8	16.2	19.9	39.9	8.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5	100.0		
.375	96.9		
#4	92.8		
#10	84.0		
#20	75.0		
#40	67.8		
#60	62.8		
#100	57.1		
#200	47.9		

DARK GRAY AND BLACK SILTY SAND AND FLY ASH - CINDERS NOTED

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 3.4369 D₈₅= 2.1877 D₆₀= 0.1934
 D₅₀= 0.0854 D₃₀= 0.0293 D₁₅= 0.0093
 D₁₀= 0.0058 C_u= 33.63 C_c= 0.77

Classification
 USCS= SM AASHTO=

Remarks
 F.M.=1.53

* (no specification provided)

Source of Sample: HEN-B023
Sample Number: S-7

Depth: 20.0'-21.5'

Date: 12-17-15



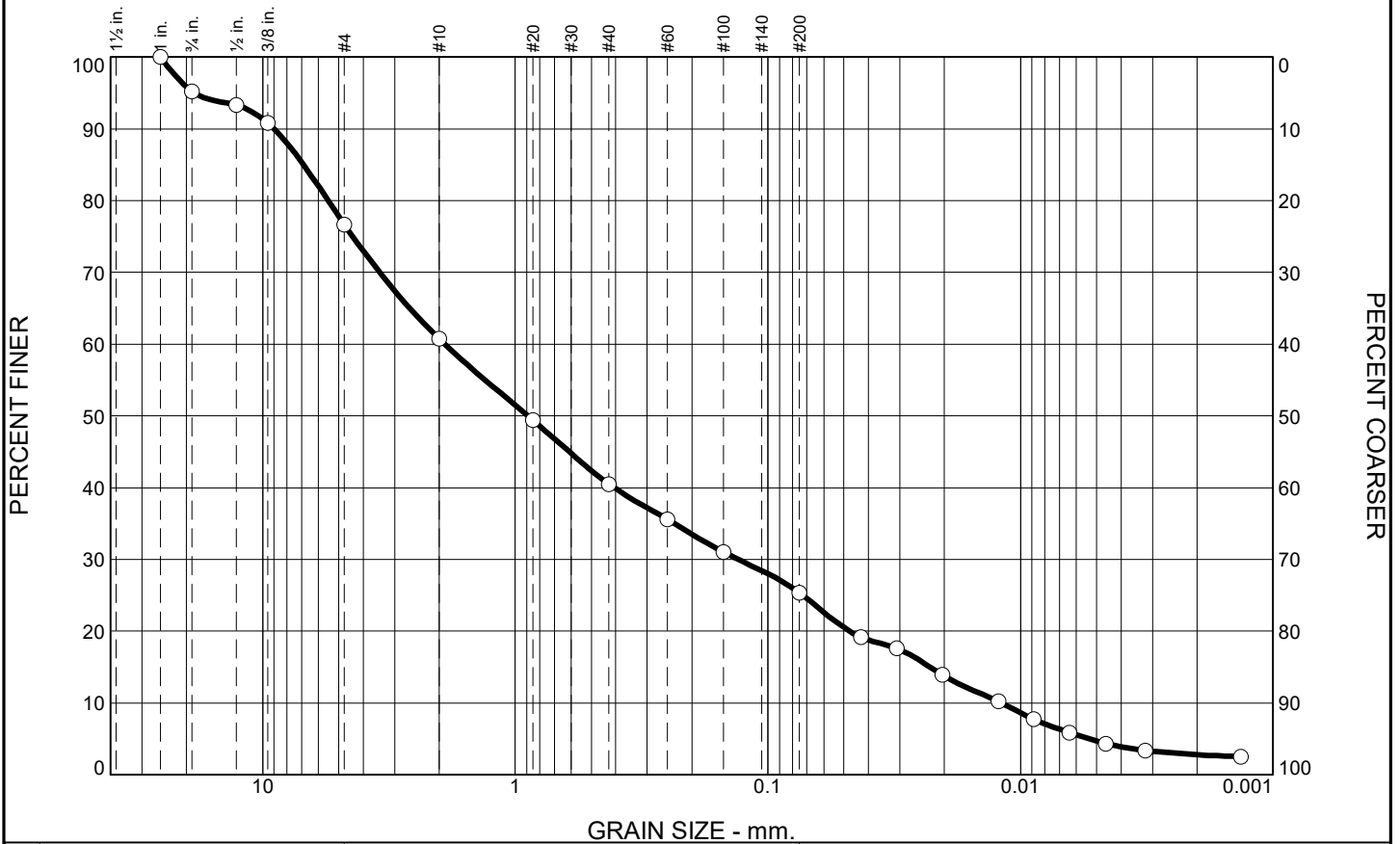
Client: AECOM
Project: DYNERGY - HENNEPIN
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 482

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.8	18.5	16.0	20.2	15.2	20.6	4.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.2		
.5	93.3		
.375	90.8		
#4	76.7		
#10	60.7		
#20	49.4		
#40	40.5		
#60	35.6		
#100	31.0		
#200	25.3		

DARK GRAY FLY ASH WITH SAND AND CINDERS

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 9.0077 D₈₅= 6.8824 D₆₀= 1.9019
 D₅₀= 0.8884 D₃₀= 0.1309 D₁₅= 0.0229
 D₁₀= 0.0119 C_u= 159.31 C_c= 0.75

Classification
 USCS= AASHTO=

Remarks
 F.M.=3.07

* (no specification provided)

Source of Sample: HEN-B023
 Sample Number: S-11

Depth: 35.0'-36.5'

Date: 12-17-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

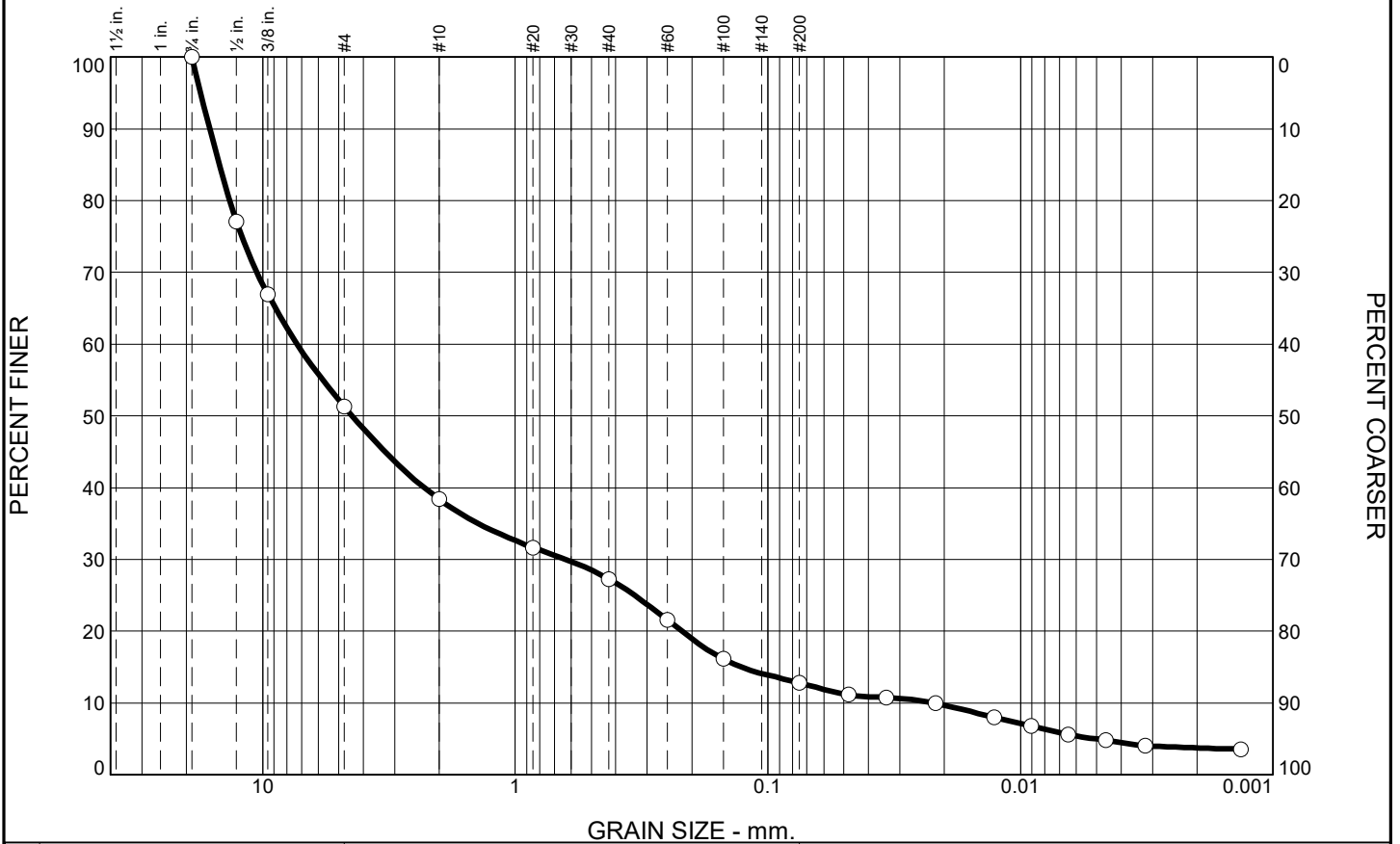
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 483

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	48.7	12.9	11.1	14.5	7.8	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	77.1		
.375	66.9		
#4	51.3		
#10	38.4		
#20	31.7		
#40	27.3		
#60	21.6		
#100	16.1		
#200	12.8		

LIGHT BROWN POORLY GRADED GRAVEL WITH SAND AND SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 16.1906 D₈₅= 14.8494 D₆₀= 7.2956
 D₅₀= 4.4253 D₃₀= 0.6301 D₁₅= 0.1271
 D₁₀= 0.0221 C_u= 330.63 C_c= 2.47

Classification
 USCS= GP-GM AASHTO=

Remarks
 F.M.=4.38

* (no specification provided)

Source of Sample: HEN-B023
 Sample Number: S-14

Depth: 50.0'-51.0'

Date: 12-15-15



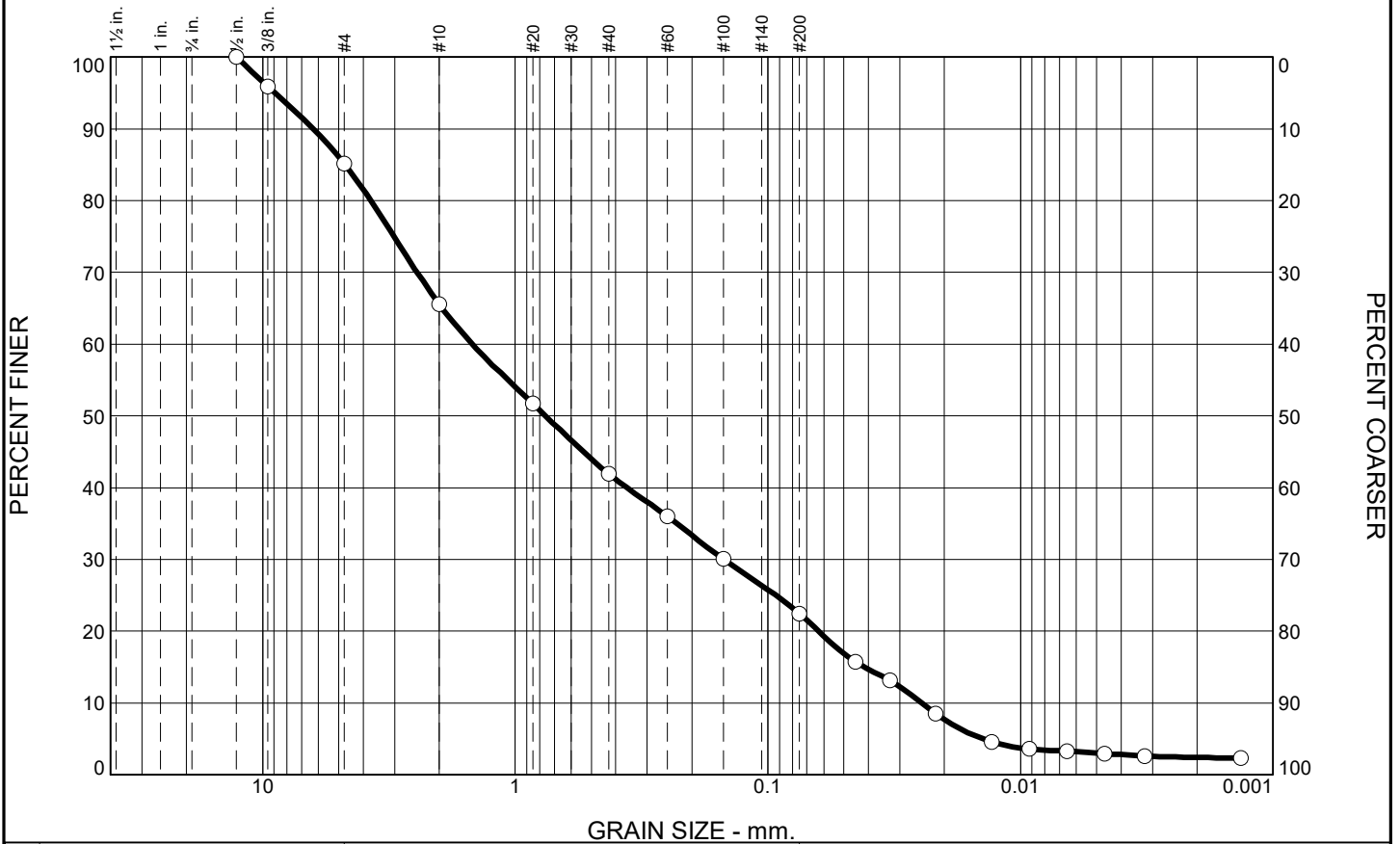
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 484

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	14.8	19.6	23.7	19.5	19.4	3.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.50	100.0		
.375	95.9		
#4	85.2		
#10	65.6		
#20	51.7		
#40	41.9		
#60	36.0		
#100	30.0		
#200	22.4		

BLACK FLY ASH WITH CINCERS AND SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 6.3009 D₈₅= 4.7122 D₆₀= 1.4780
 D₅₀= 0.7577 D₃₀= 0.1495 D₁₅= 0.0415
 D₁₀= 0.0247 C_u= 59.92 C_c= 0.61

Classification
 USCS= AASHTO=

Remarks
 F.M.=2.79

* (no specification provided)

Source of Sample: HEN-B024
 Sample Number: S-6

Depth: 15.0'-16.5'

Date: 12-17-15



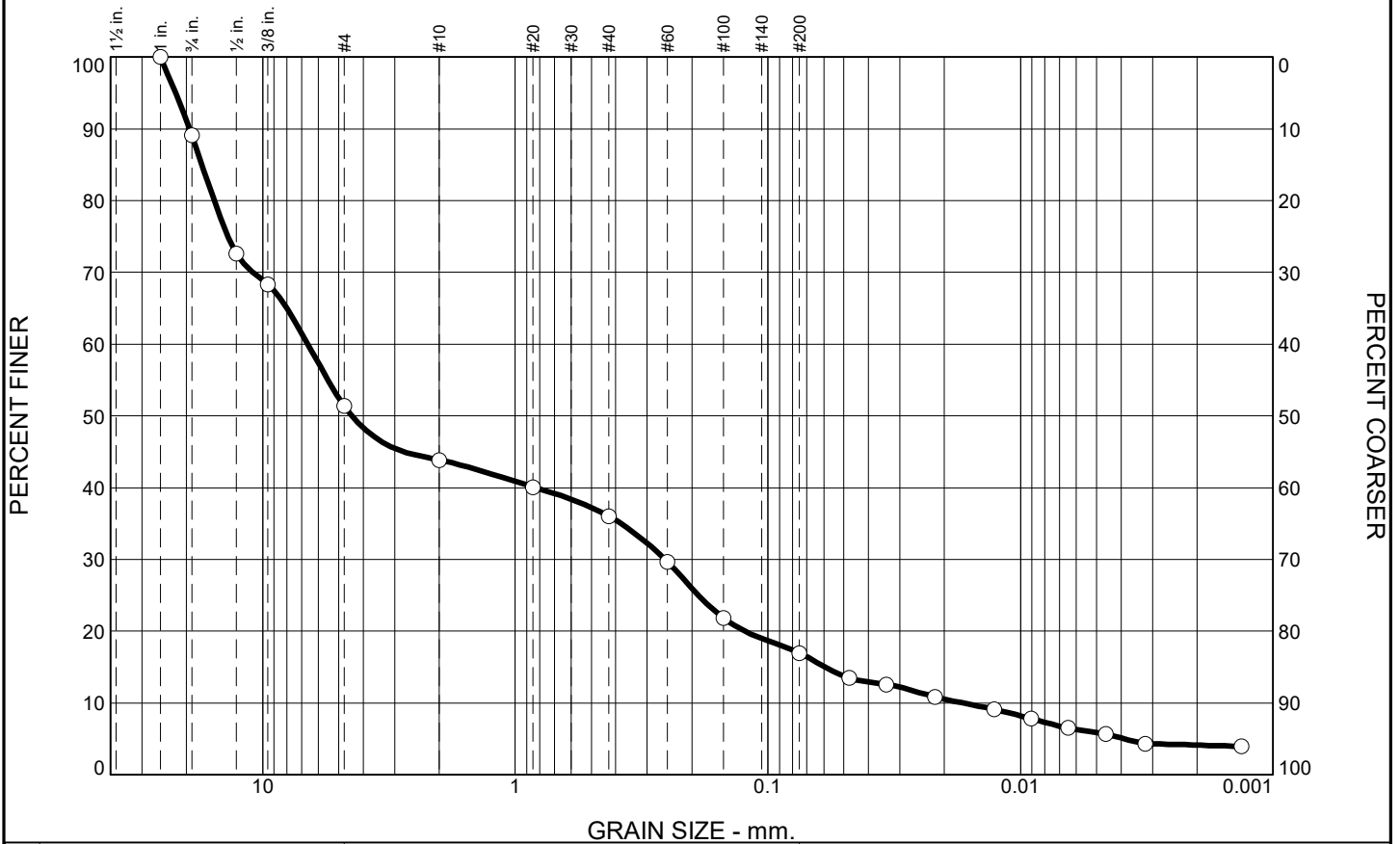
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ
 485

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.9	37.7	7.5	7.9	19.0	11.1	5.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	89.1		
.5	72.6		
.375	68.3		
#4	51.4		
#10	43.9		
#20	40.1		
#40	36.0		
#60	29.6		
#100	21.8		
#200	17.0		

BROWN AND DARK BROWN SILTY GRAVEL WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 19.4555 D₈₅= 17.3788 D₆₀= 6.6192
 D₅₀= 4.4334 D₃₀= 0.2558 D₁₅= 0.0594
 D₁₀= 0.0170 C_u= 390.47 C_c= 0.58

Classification
 USCS= GM AASHTO=

Remarks
 F.M.=4.13

* (no specification provided)

Source of Sample: HEN-B024
 Sample Number: S-13

Depth: 45.0'-46.5'

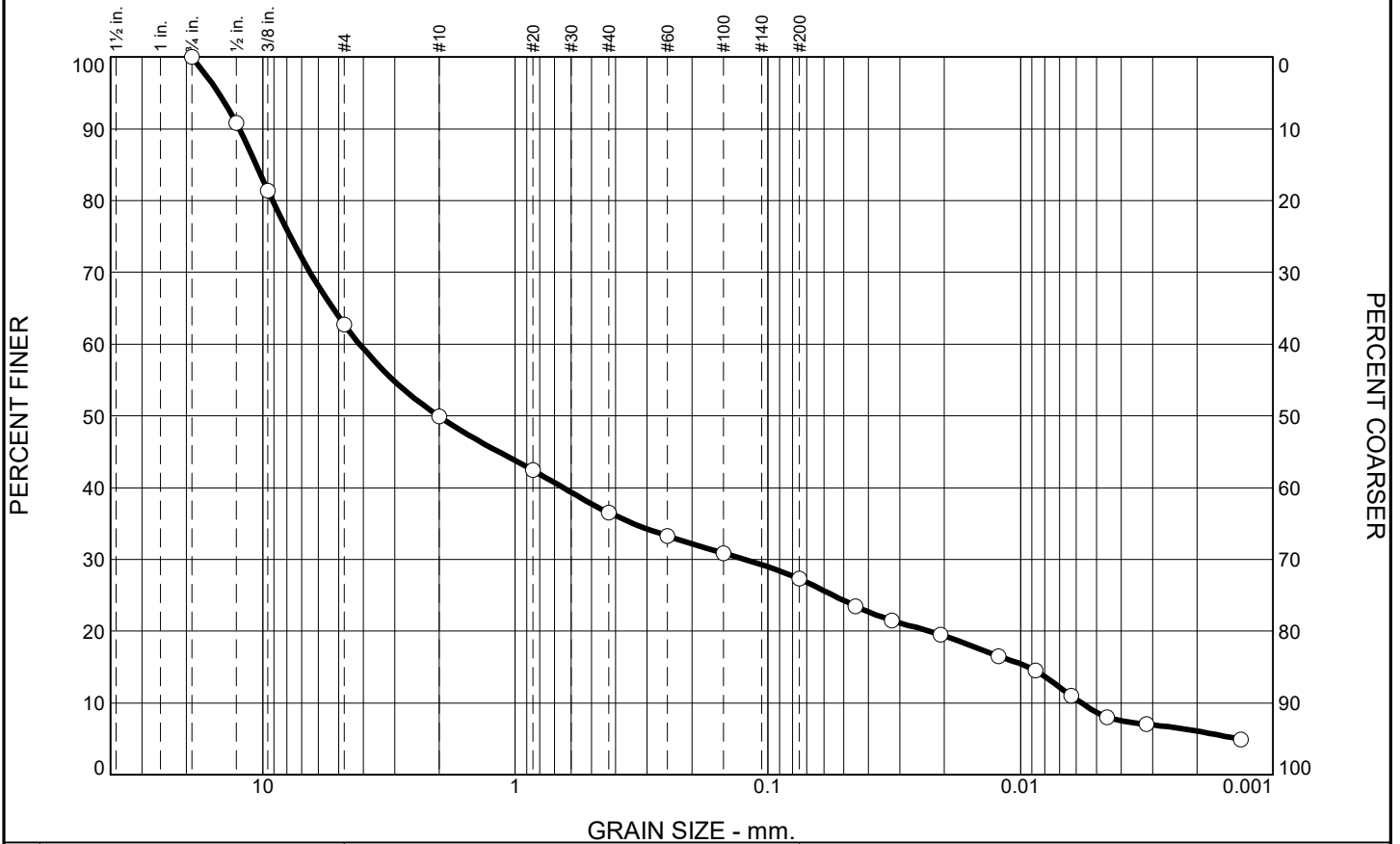
Date: 12-17-15

	Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233
Figure	

Tested By: SJH

Checked By: WPQ
 486

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	37.3	12.8	13.4	9.2	18.6	8.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	90.8		
.375	81.4		
#4	62.7		
#10	49.9		
#20	42.4		
#40	36.5		
#60	33.3		
#100	30.9		
#200	27.3		

BROWN AND GRAY SILTY GRAVEL WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 12.3694 D₈₅= 10.6049 D₆₀= 4.1296
 D₅₀= 2.0193 D₃₀= 0.1239 D₁₅= 0.0093
 D₁₀= 0.0057 C_u= 719.10 C_c= 0.65

Classification
 USCS= GM AASHTO=

Remarks
 F.M.=3.55

* (no specification provided)

Source of Sample: HEN-B025
 Sample Number: S-3

Depth: 5.0'-6.5'

Date: 12-15-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

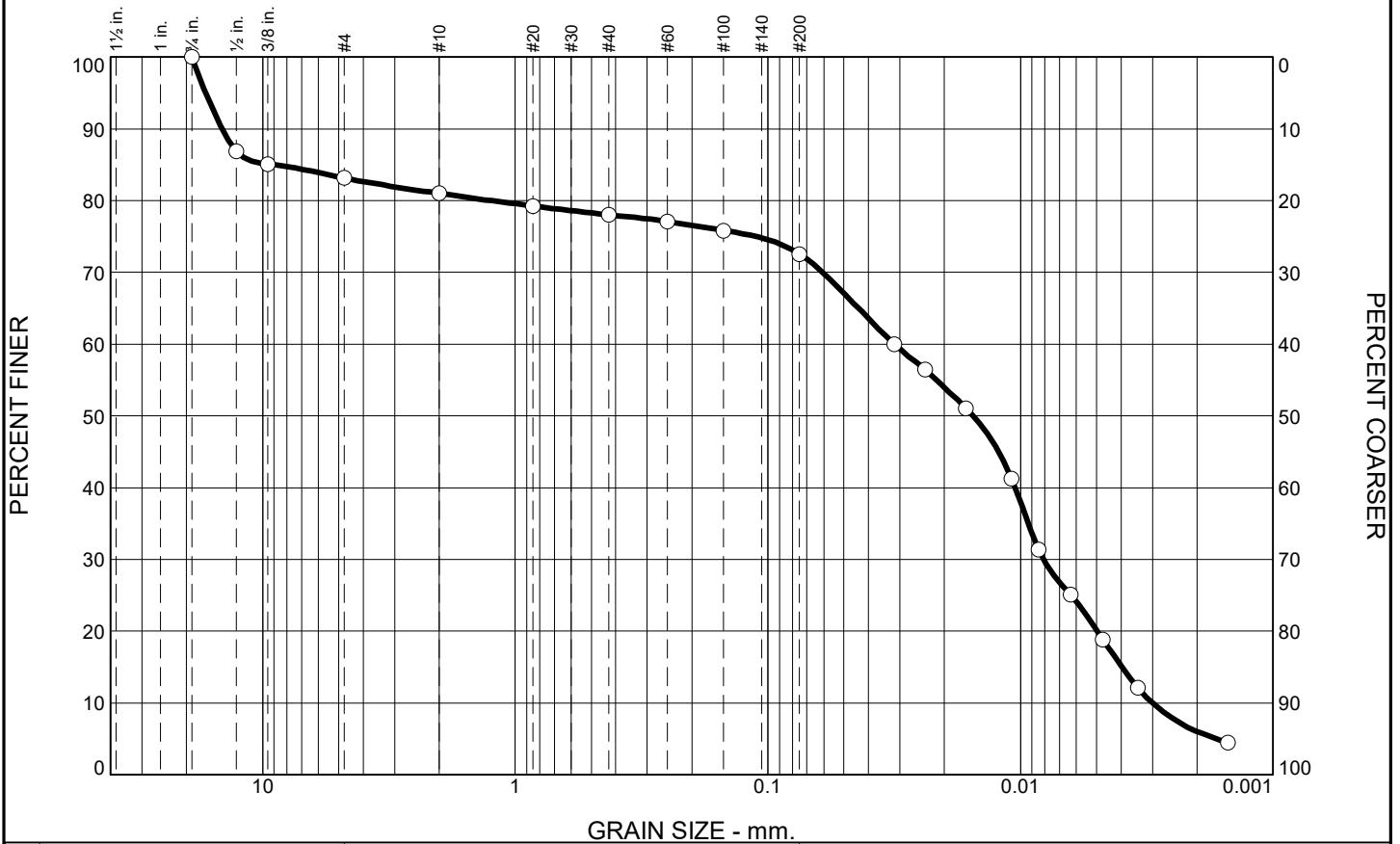
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.8	2.2	3.0	5.5	52.3	20.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	86.9		
.375	85.1		
#4	83.2		
#10	81.0		
#20	79.2		
#40	78.0		
#60	77.1		
#100	75.8		
#200	72.5		

VERY DARK GRAY FLY ASH WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 14.4848 D₈₅= 9.0363 D₆₀= 0.0315
 D₅₀= 0.0154 D₃₀= 0.0081 D₁₅= 0.0040
 D₁₀= 0.0030 C_u= 10.52 C_c= 0.70

Classification
 USCS= AASHTO=

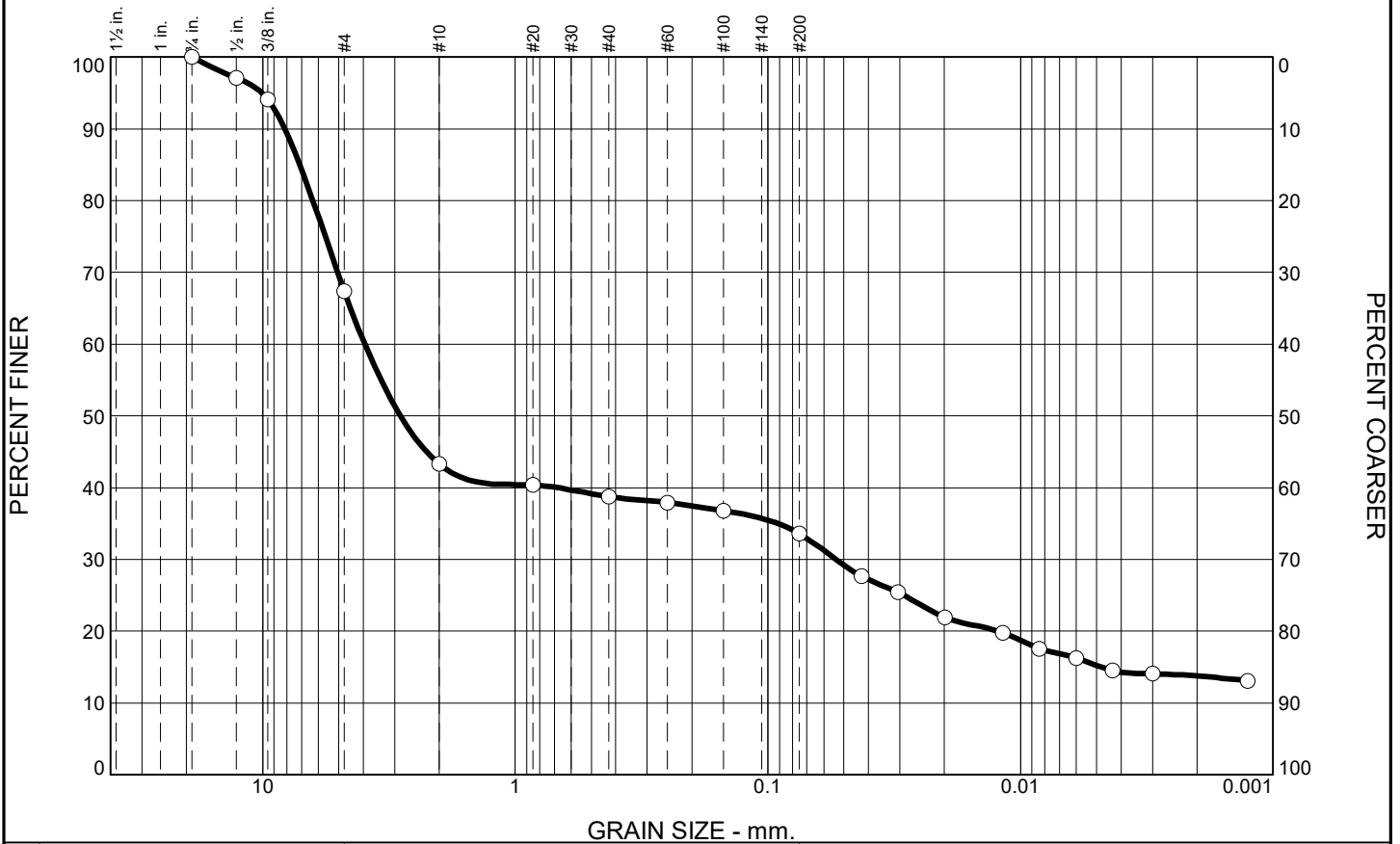
Remarks
 F.M.=1.39

* (no specification provided)

Source of Sample: HEN-B025 **Depth:** 11.5'-14.0' **Date:** 12-15-15
Sample Number: S-6

	Client: AECOM Project: DYNERGY - HENNEPIN Project No: MR155233
Figure	

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	32.6	24.1	4.6	5.1	18.4	15.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.1		
.375	94.1		
#4	67.4		
#10	43.3		
#20	40.4		
#40	38.7		
#60	37.9		
#100	36.8		
#200	33.6		

BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 8.1578 D₈₅= 7.1123 D₆₀= 3.9390
 D₅₀= 2.8475 D₃₀= 0.0538 D₁₅= 0.0048
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks
 F.M.=3.38

* (no specification provided)

Source of Sample: HEN-B026A
 Sample Number: S-2

Depth: 13.5'-15.0'

Date: 12-15-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

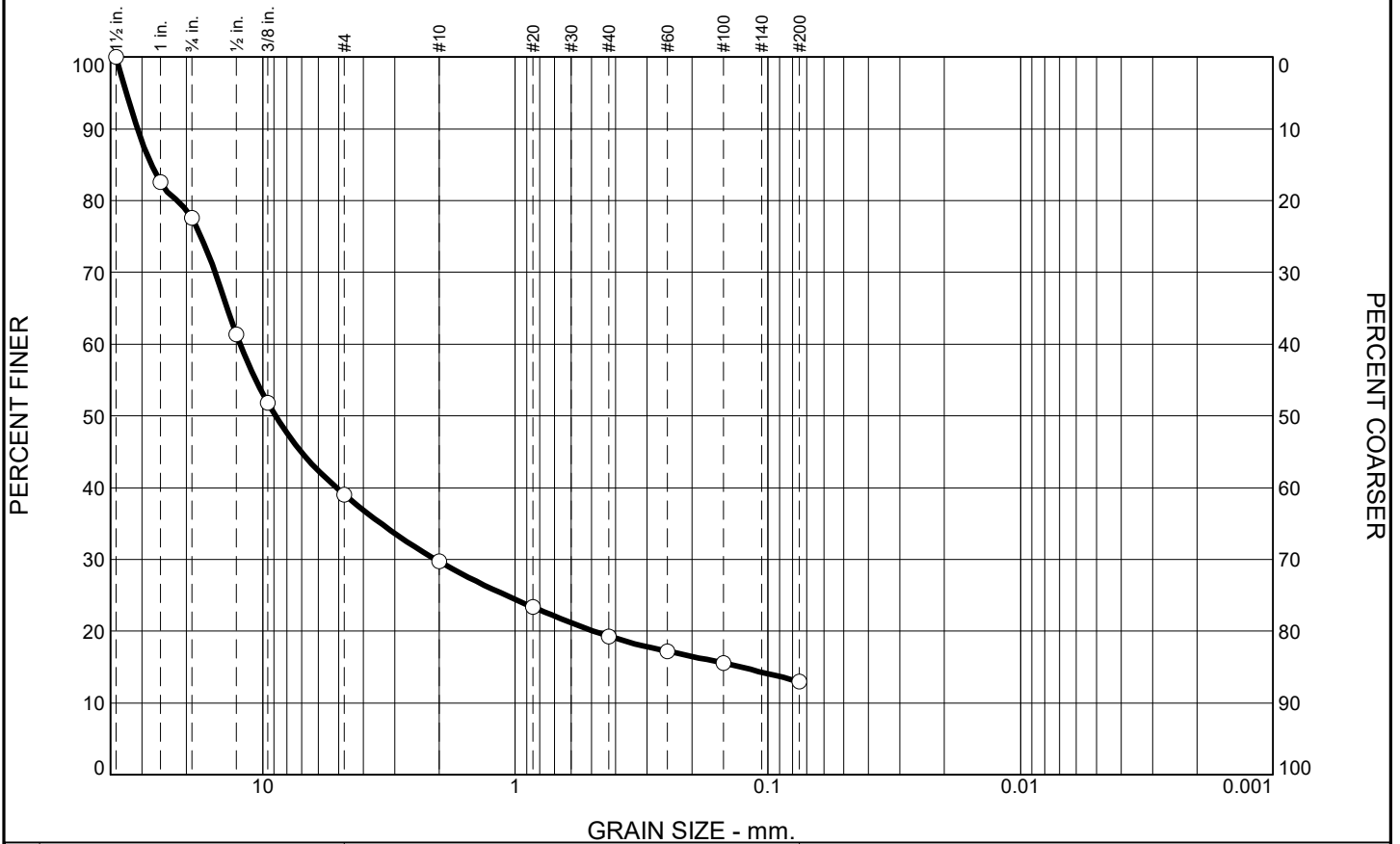
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	22.4	38.6	9.3	10.4	6.3		13.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	82.5		
.75	77.6		
.5	61.4		
.375	51.8		
#4	39.0		
#10	29.7		
#20	23.4		
#40	19.3		
#60	17.2		
#100	15.6		
#200	13.0		

LIGHT BROWN POORLY GRADED GRAVEL WITH SAND AND CLAY

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 31.2310 D₈₅= 27.6077 D₆₀= 12.2743
 D₅₀= 8.8861 D₃₀= 2.0649 D₁₅= 0.1281
 D₁₀= C_u= C_c=

Classification
 USCS= GP-GC AASHTO=

Remarks

F.M.=5.20

* (no specification provided)

Source of Sample: HEN-B029
 Sample Number: S-10

Depth: 35.0'-36.5'

Date: 12-10-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

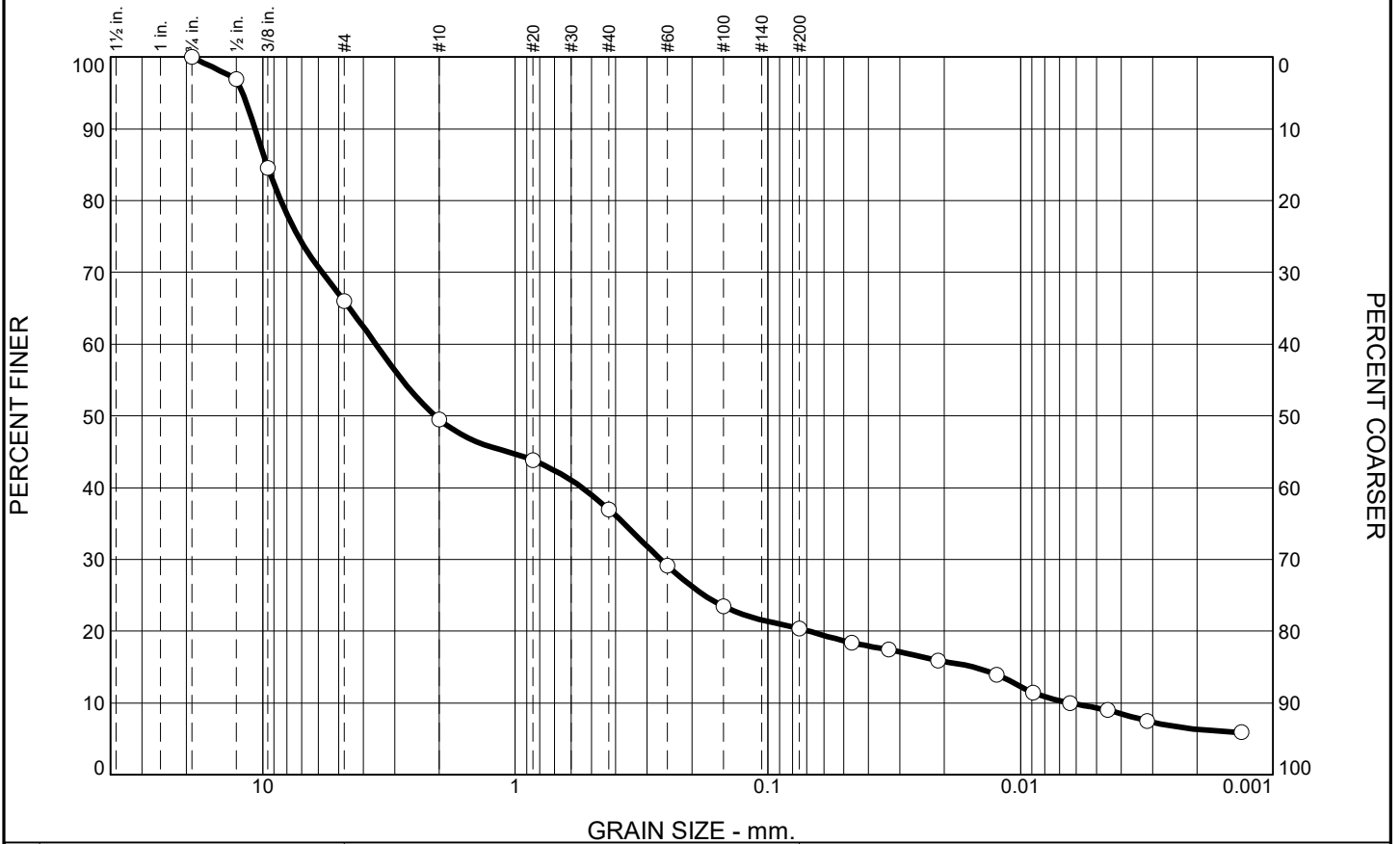
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	34.0	16.5	12.6	16.6	11.0	9.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.0		
.375	84.6		
#4	66.0		
#10	49.5		
#20	43.8		
#40	36.9		
#60	29.1		
#100	23.5		
#200	20.3		

BROWN AND LIGHT BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 10.7082 D₈₅= 9.6174 D₆₀= 3.5682
 D₅₀= 2.0785 D₃₀= 0.2659 D₁₅= 0.0154
 D₁₀= 0.0064 C_u= 557.69 C_c= 3.10

Classification
 USCS= SM AASHTO=

Remarks
 F.M.=3.56

* (no specification provided)

Source of Sample: HEN-B030
 Sample Number: S-2

Depth: 2.5'-4.0'

Date: 12-15-15



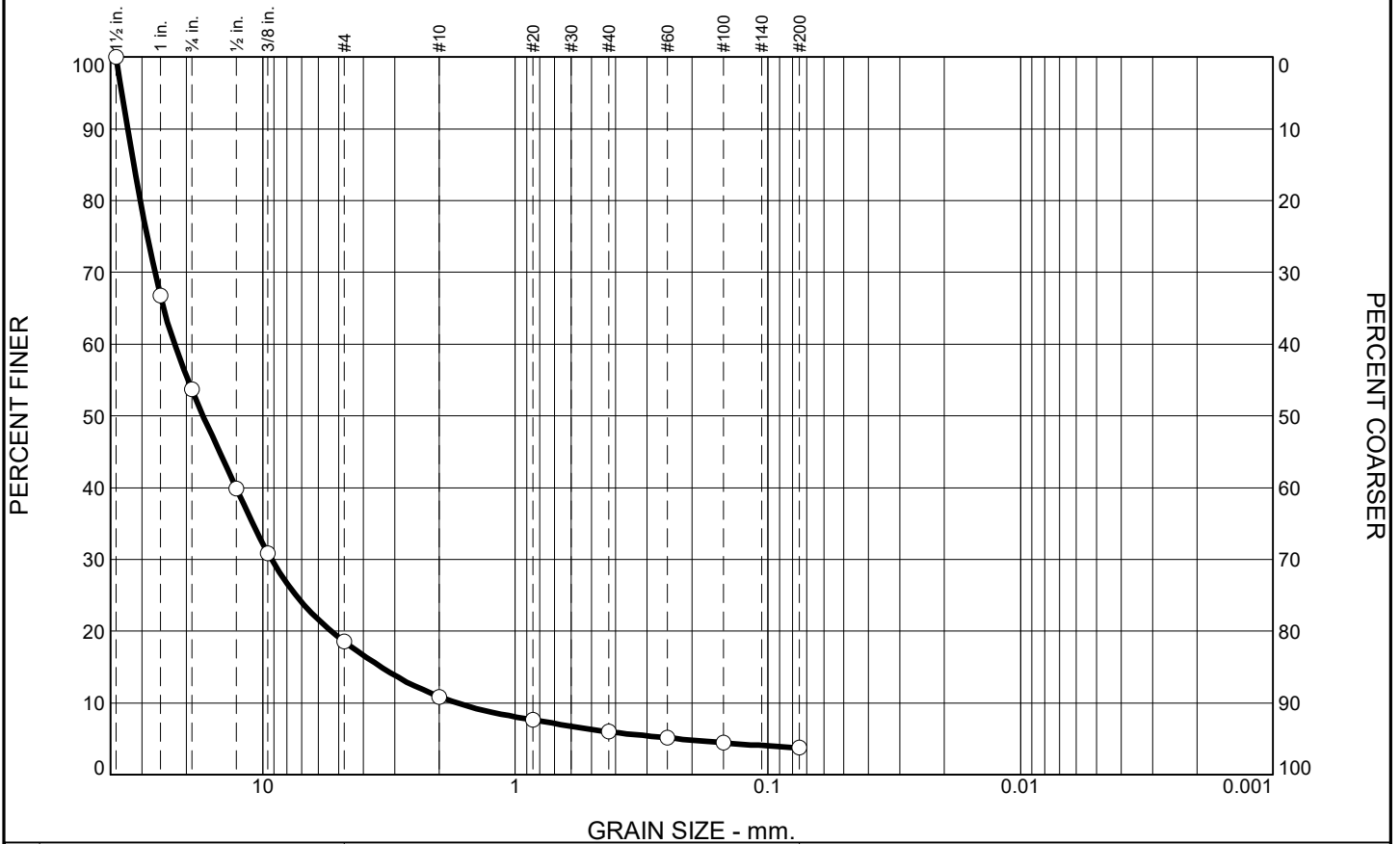
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	46.3	35.1	7.7	4.9	2.2	3.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	66.8		
.75	53.7		
.5	39.9		
.375	30.9		
#4	18.6		
#10	10.9		
#20	7.6		
#40	6.0		
#60	5.1		
#100	4.4		
#200	3.8		

LIGHT BROWN AND TAN WELL GRADED GRAVEL WITH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 34.1590 D₈₅= 32.2869 D₆₀= 22.3306
 D₅₀= 17.1780 D₃₀= 9.2189 D₁₅= 3.3953
 D₁₀= 1.7025 C_u= 13.12 C_c= 2.24

Classification
 USCS= GW AASHTO=

Remarks

F.M.=6.60

* (no specification provided)

Source of Sample: HEN-B030
Sample Number: S-6

Depth: 15.0'-16.5'

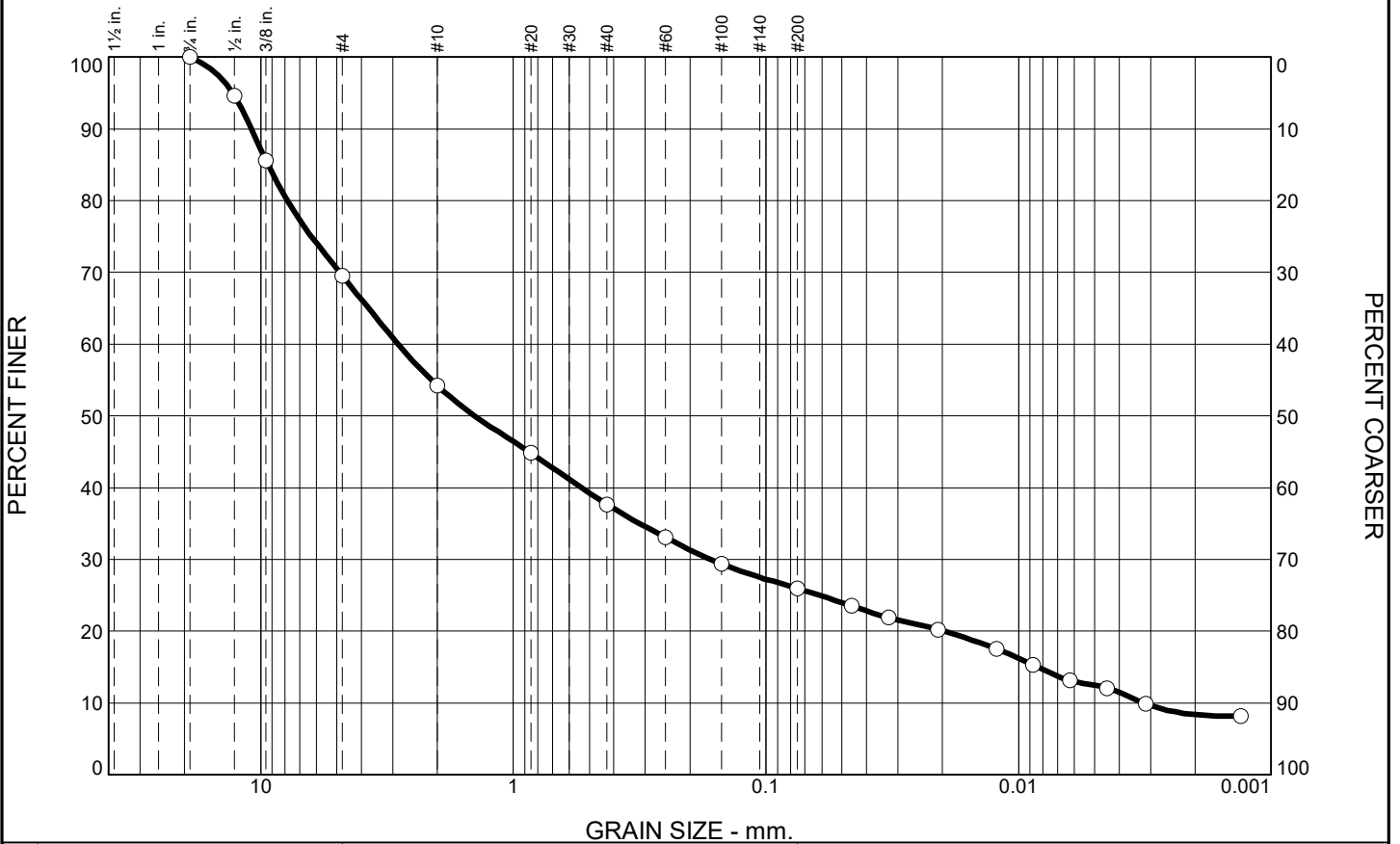
Date: 12-10-15

	<p>Client: AECOM</p> <p>Project: DYNERGY - HENNEPIN</p> <p>Project No: MR155233</p>
<p>Figure</p>	

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	30.5	15.3	16.5	11.8	13.4	12.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	94.6		
.375	85.6		
#4	69.5		
#10	54.2		
#20	44.8		
#40	37.7		
#60	33.1		
#100	29.4		
#200	25.9		

BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 10.8888 D₈₅= 9.3568 D₆₀= 2.8565
 D₅₀= 1.4206 D₃₀= 0.1654 D₁₅= 0.0084
 D₁₀= 0.0032 C_u= 894.95 C_c= 3.00

Classification
 USCS= SM AASHTO=

Remarks

F.M.=3.35

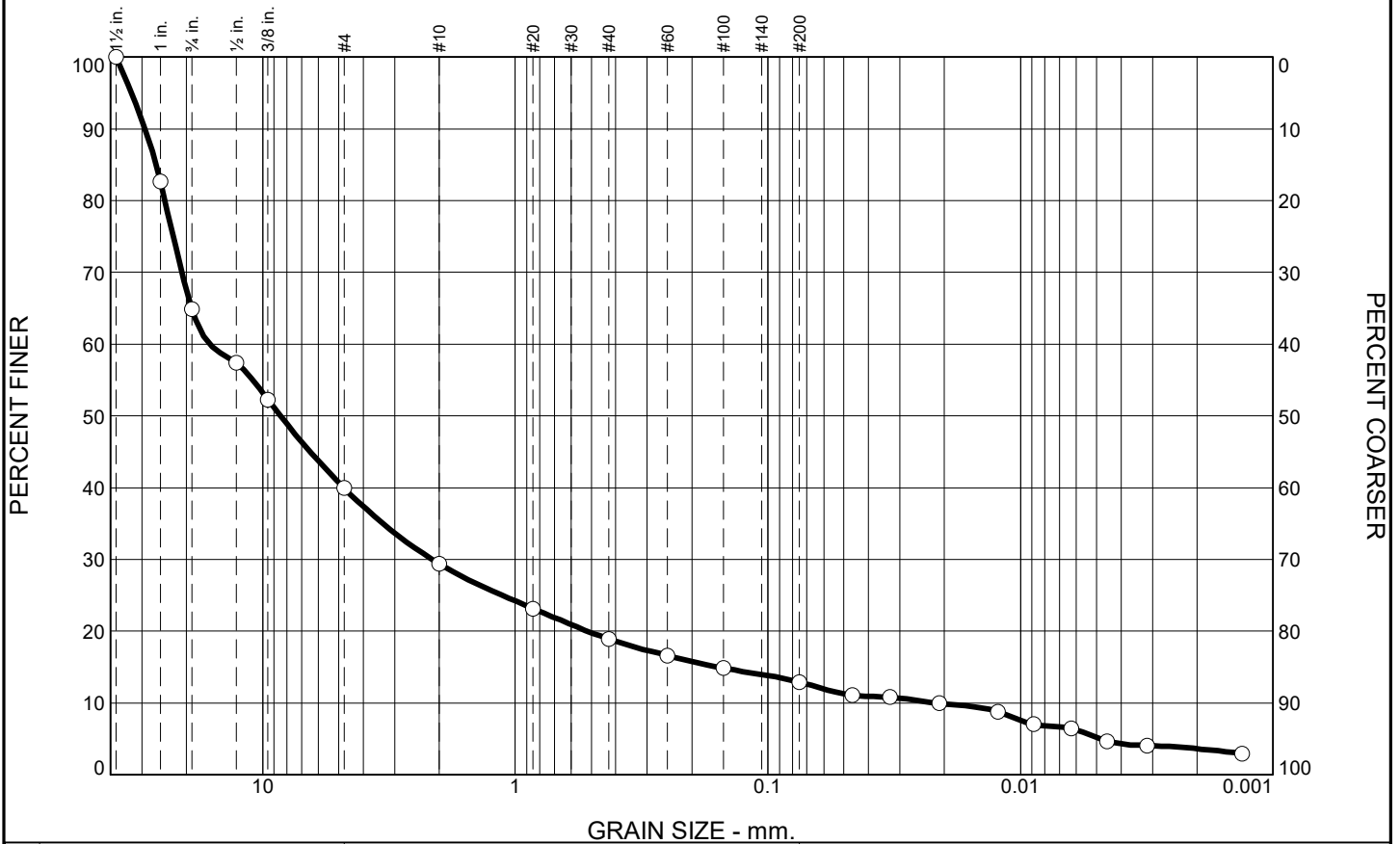
* (no specification provided)

Source of Sample: HEN-B032 **Depth:** 20.0'-21.5' **Date:** 12-15-15
Sample Number: S-7

	Client: AECOM Project: DYNERGY - HENNEPIN
	Project No: MR155233 Figure

Tested By: SJH **Checked By:** WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	35.1	25.0	10.5	10.5	6.0	7.7	5.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	82.7		
.75	64.9		
.5	57.4		
.375	52.3		
#4	39.9		
#10	29.4		
#20	23.2		
#40	18.9		
#60	16.6		
#100	14.8		
#200	12.9		

BROWN AND LIGHT BROWN POORLY GRADED GRAVEL WITH SILT AND SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 29.2016 D₈₅= 26.4297 D₆₀= 16.1803
 D₅₀= 8.4958 D₃₀= 2.1337 D₁₅= 0.1581
 D₁₀= 0.0218 C_u= 742.74 C_c= 12.92

Classification
 USCS= GP-GM AASHTO=

Remarks

F.M.=5.34

* (no specification provided)

Source of Sample: HEN-B034
 Sample Number: S-5

Depth: 10.0'-11.5'

Date: 12-17-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

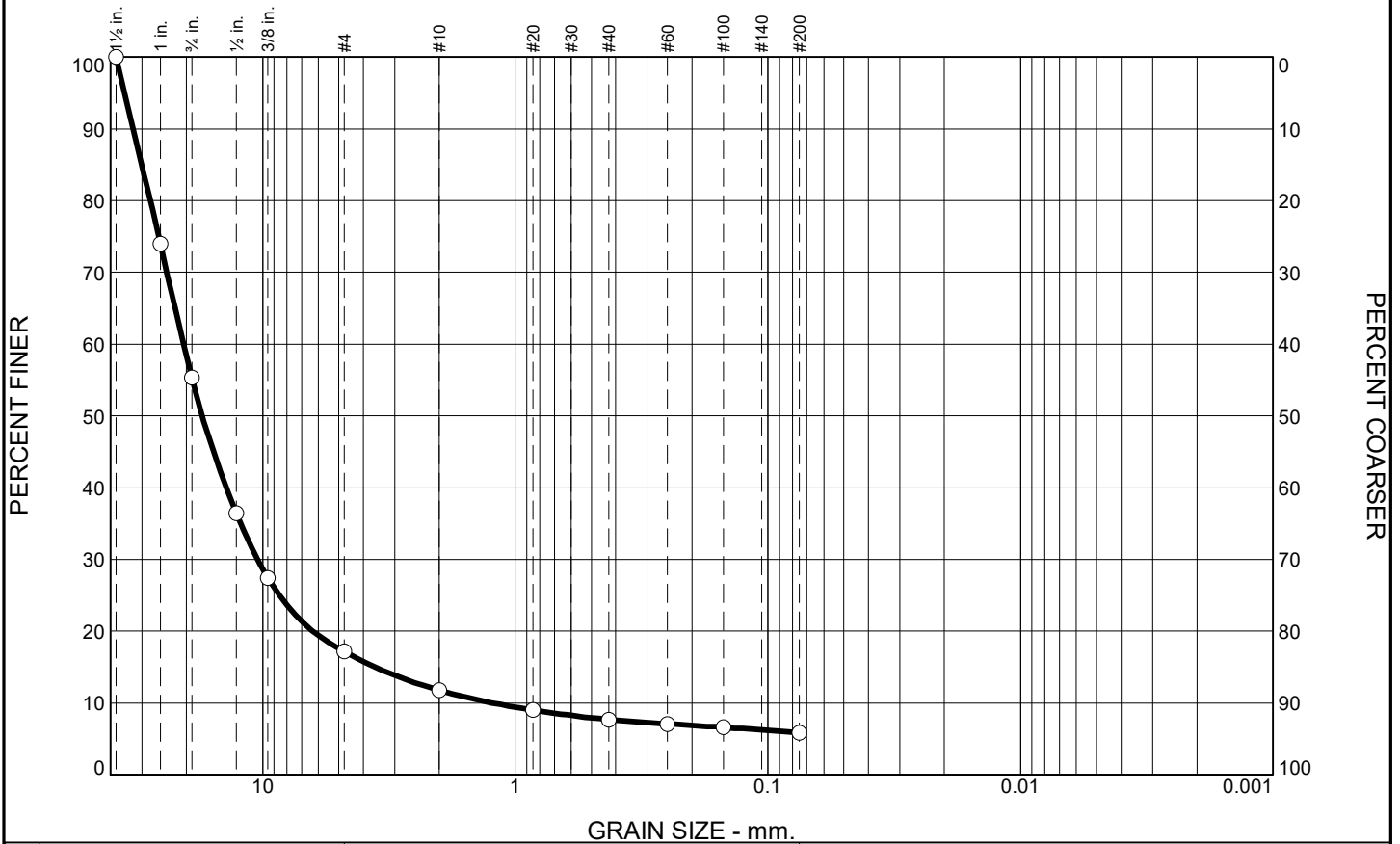
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	44.7	38.1	5.4	4.1	1.8	5.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	74.0		
.75	55.3		
.5	36.4		
.375	27.4		
#4	17.2		
#10	11.8		
#20	9.0		
#40	7.7		
#60	7.1		
#100	6.6		
#200	5.9		

LIGHT BROWN AND TAN POORLY GRADED GRAVEL WITH SAND AND SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 32.5083 D₈₅= 30.0560 D₆₀= 20.5658
 D₅₀= 17.3171 D₃₀= 10.4646 D₁₅= 3.5815
 D₁₀= 1.2300 C_u= 16.72 C_c= 4.33

Classification
 USCS= GP-GM AASHTO=

Remarks
 F.M.=6.56

* (no specification provided)

Source of Sample: HEN-B034
Sample Number: S-10

Depth: 35.0'-36.5'

Date: 12-10-15



Client: AECOM
Project: DYNERGY - HENNEPIN

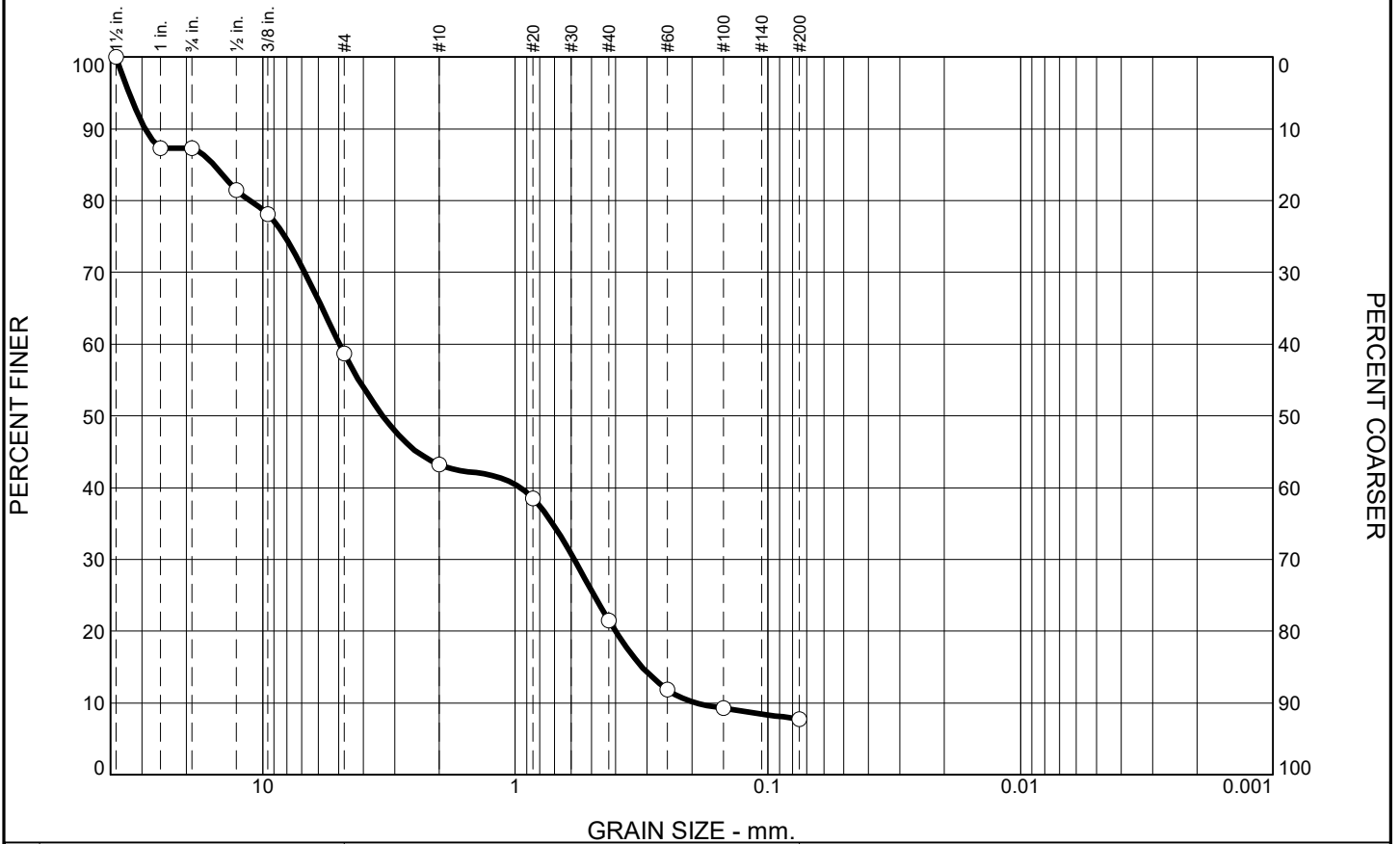
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.7	28.6	15.5	21.8	13.7	7.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.3		
.75	87.3		
.5	81.5		
.375	78.1		
#4	58.7		
#10	43.2		
#20	38.5		
#40	21.4		
#60	11.8		
#100	9.2		
#200	7.7		

BROWN AND DARK BROWN SILTY SAND WITH GRAVEL

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 29.1386 D₈₅= 15.6078 D₆₀= 4.9602
 D₅₀= 3.3485 D₃₀= 0.5840 D₁₅= 0.3138
 D₁₀= 0.1928 C_u= 25.73 C_c= 0.36

Classification
 USCS= SM AASHTO=

Remarks

F.M.=4.36

* (no specification provided)

Source of Sample: HEN-B037
 Sample Number: S-3

Depth: 5.0'-6.5'

Date: 12-10-15



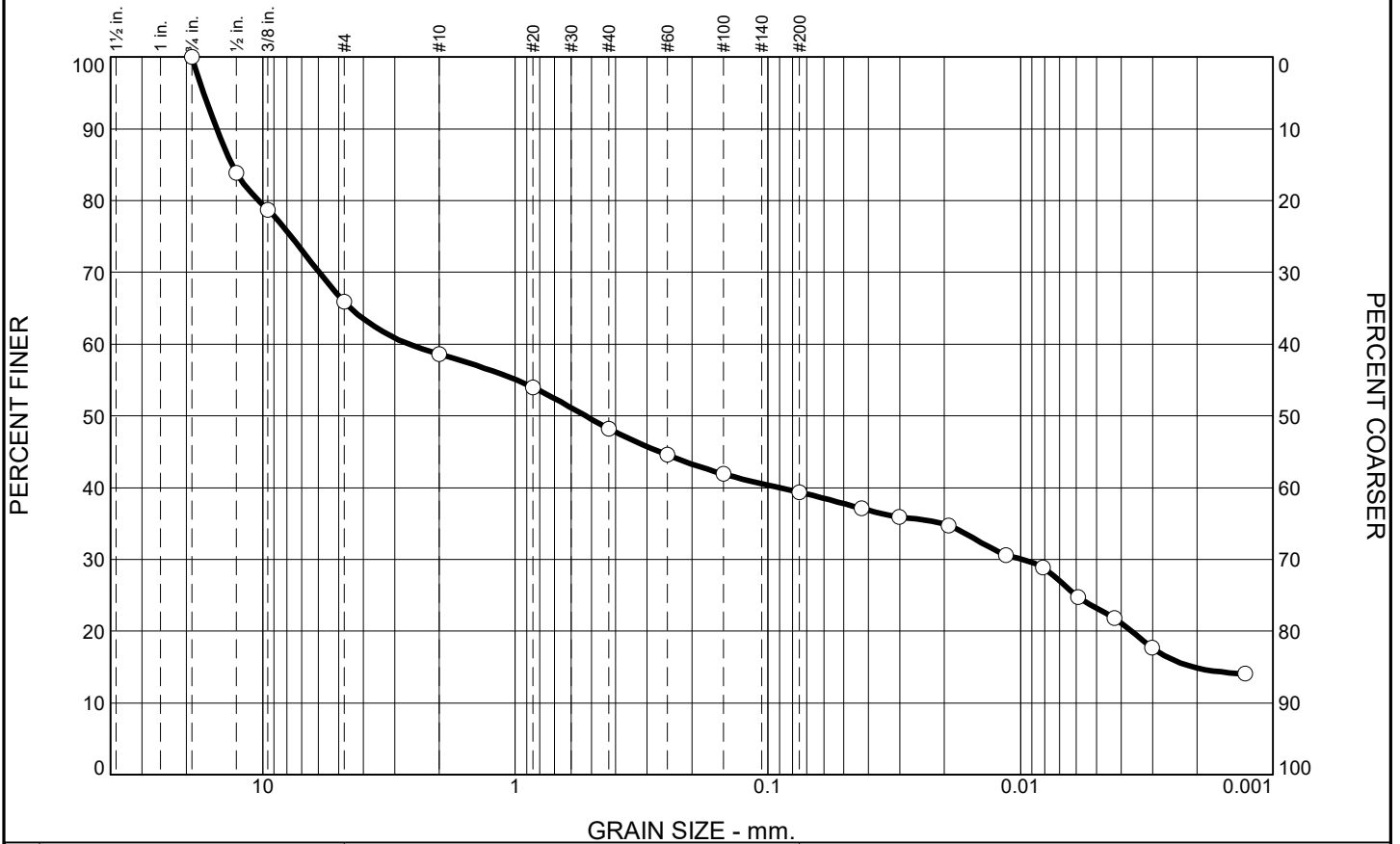
Client: AECOM
 Project: DYNERGY - HENNEPIN
 Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	34.1	7.3	10.4	8.8	16.2	23.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	83.9		
.375	78.7		
#4	65.9		
#10	58.6		
#20	54.0		
#40	48.2		
#60	44.6		
#100	41.9		
#200	39.4		

BROWN AND LIGHT BROWN CLAYEY GRAVEL WIRTH SAND

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 15.2090 D₈₅= 13.2128 D₆₀= 2.6302
 D₅₀= 0.5271 D₃₀= 0.0099 D₁₅= 0.0021
 D₁₀= C_u= C_c=

Classification
 USCS= GC AASHTO=

Remarks
 F.M.=3.01

* (no specification provided)

Source of Sample: HEN-B037
Sample Number: S-6

Depth: 15.0'-16.5'

Date: 12-15-15



Client: AECOM
Project: DYNERGY - HENNEPIN

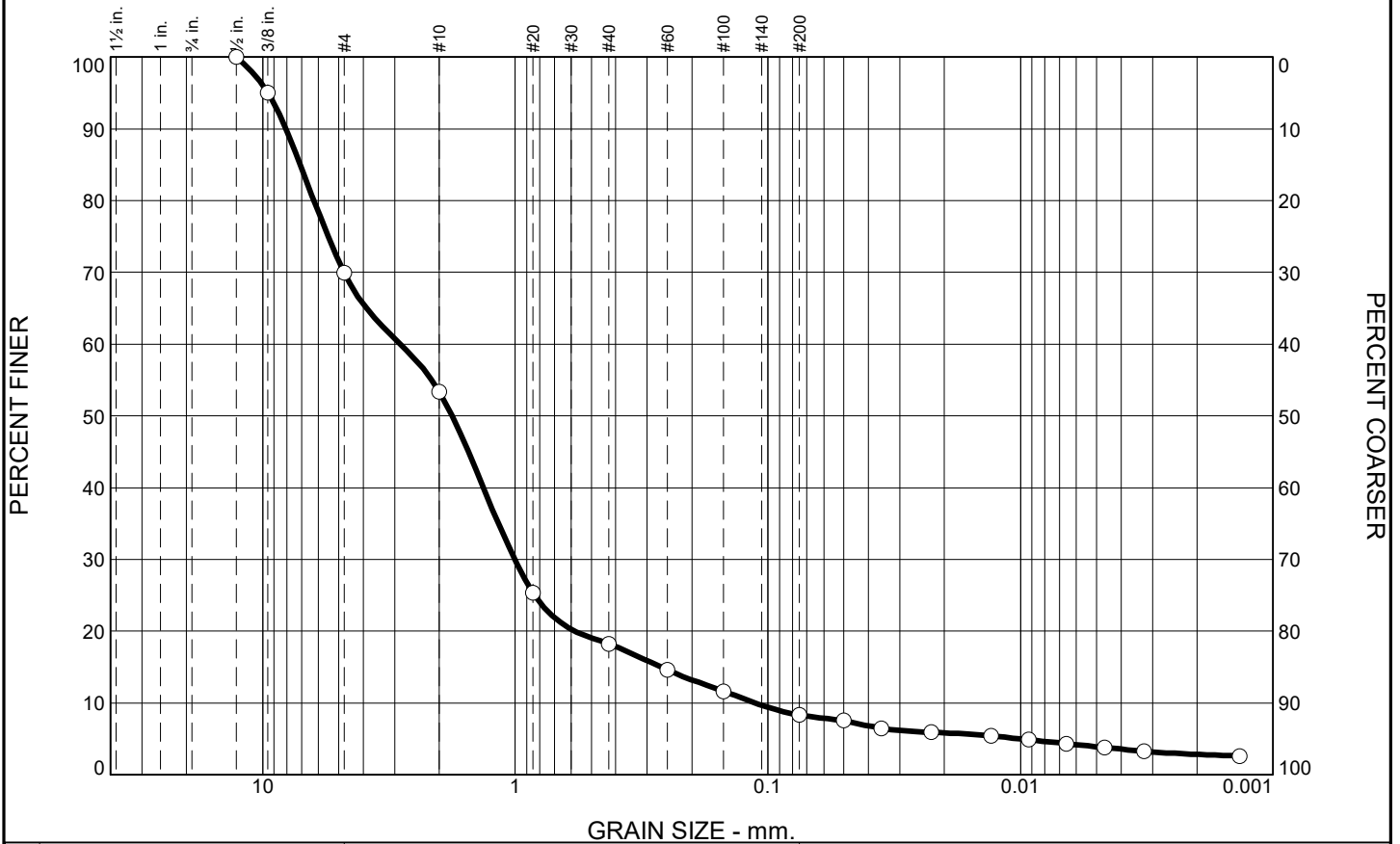
Project No: MR155233

Figure

Tested By: SJH

Checked By: WPQ

PARTICLE SIZE ANALYSIS OF SOILS ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	30.1	16.5	35.2	9.9	4.4	3.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.50	100.0		
.375	95.0		
#4	69.9		
#10	53.4		
#20	25.4		
#40	18.2		
#60	14.6		
#100	11.6		
#200	8.3		

TAN POORLY GRADED SAND WITH GRAVEL AND SILT

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 8.0898 D₈₅= 7.0874 D₆₀= 2.8508
 D₅₀= 1.7783 D₃₀= 1.0044 D₁₅= 0.2652
 D₁₀= 0.1120 C_u= 25.46 C_c= 3.16

Classification
 USCS= SP-SM AASHTO=

Remarks
 F.M.=3.95

* (no specification provided)

Source of Sample: HEN-B038
 Sample Number: S-3

Depth: 5.0'-5.9'

Date: 12-15-15



Client: AECOM
 Project: DYNERGY - HENNEPIN

Project No: MR155233

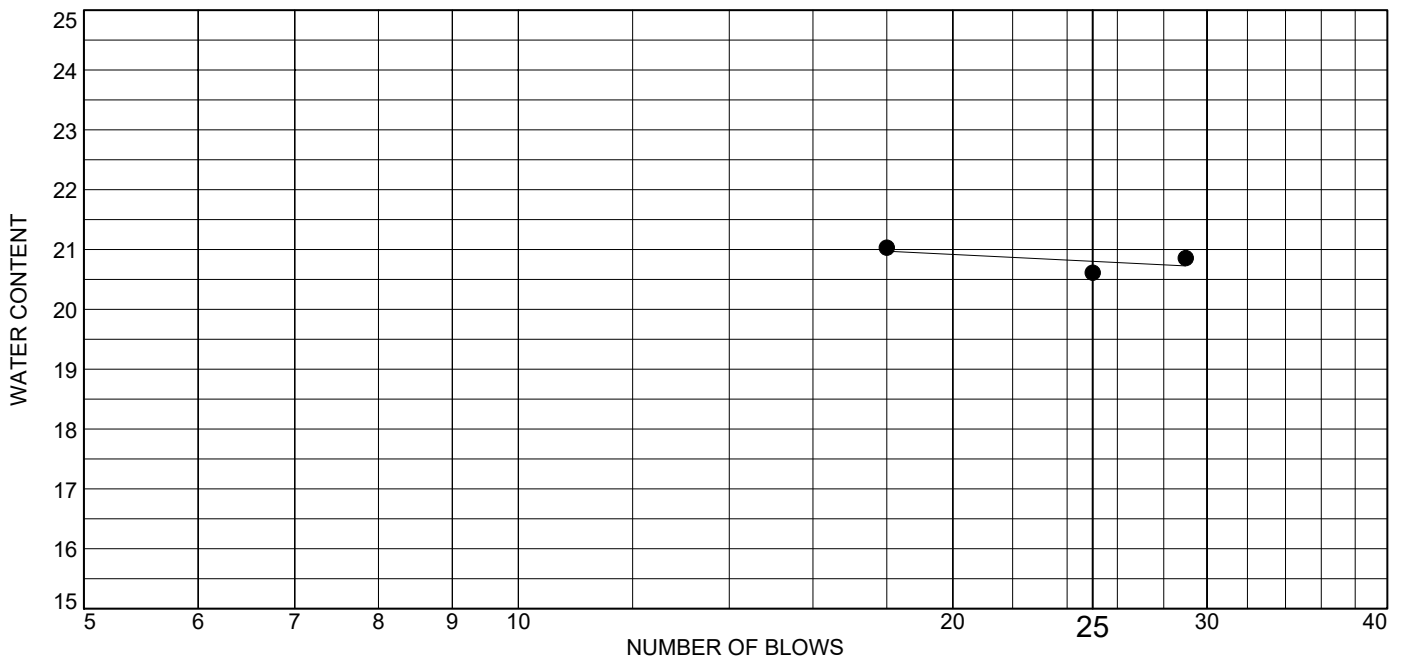
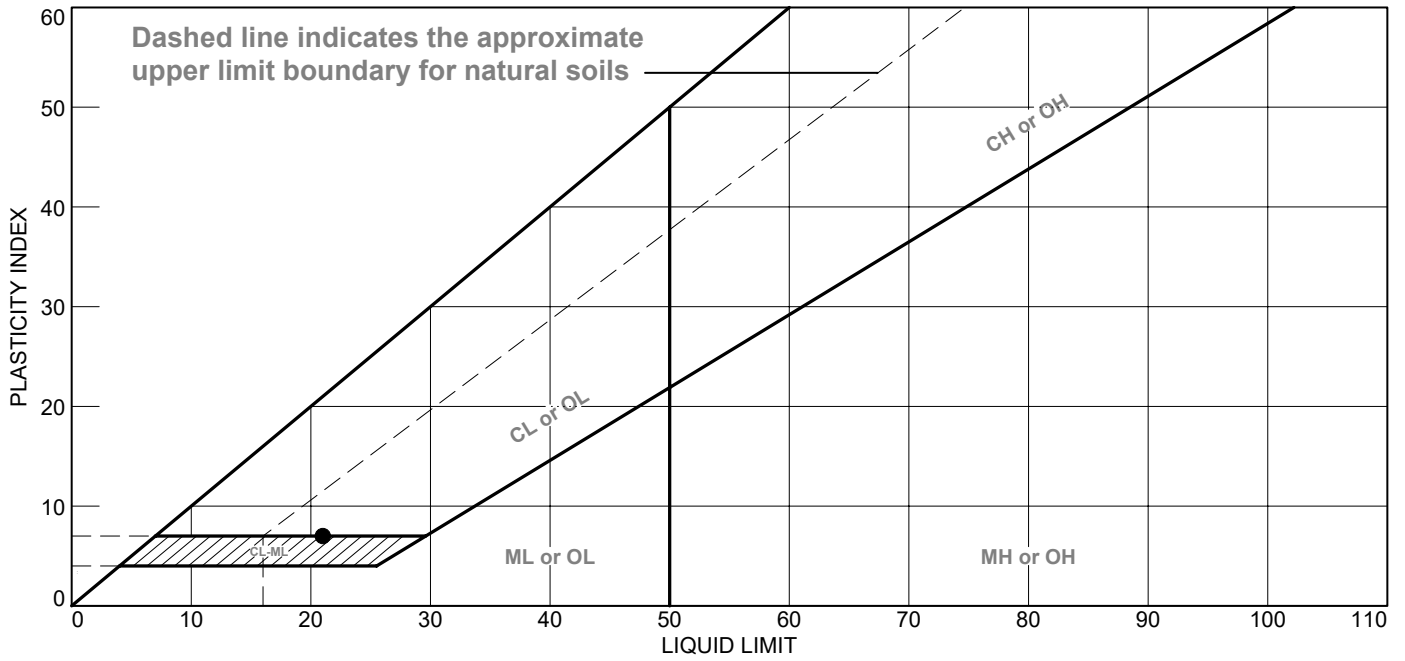
Figure

Tested By: SJH

Checked By: WPQ

Liquid Limit, Plastic Limit and Plasticity Index of Soils ASTM D 4318

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN AND GRAY LEAN CLAY WITH SAND - SAND SEAMS NOTED	21	14	7			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B001 **Depth:** 7.5'-9.5'
Sample Number: S-4

Remarks:

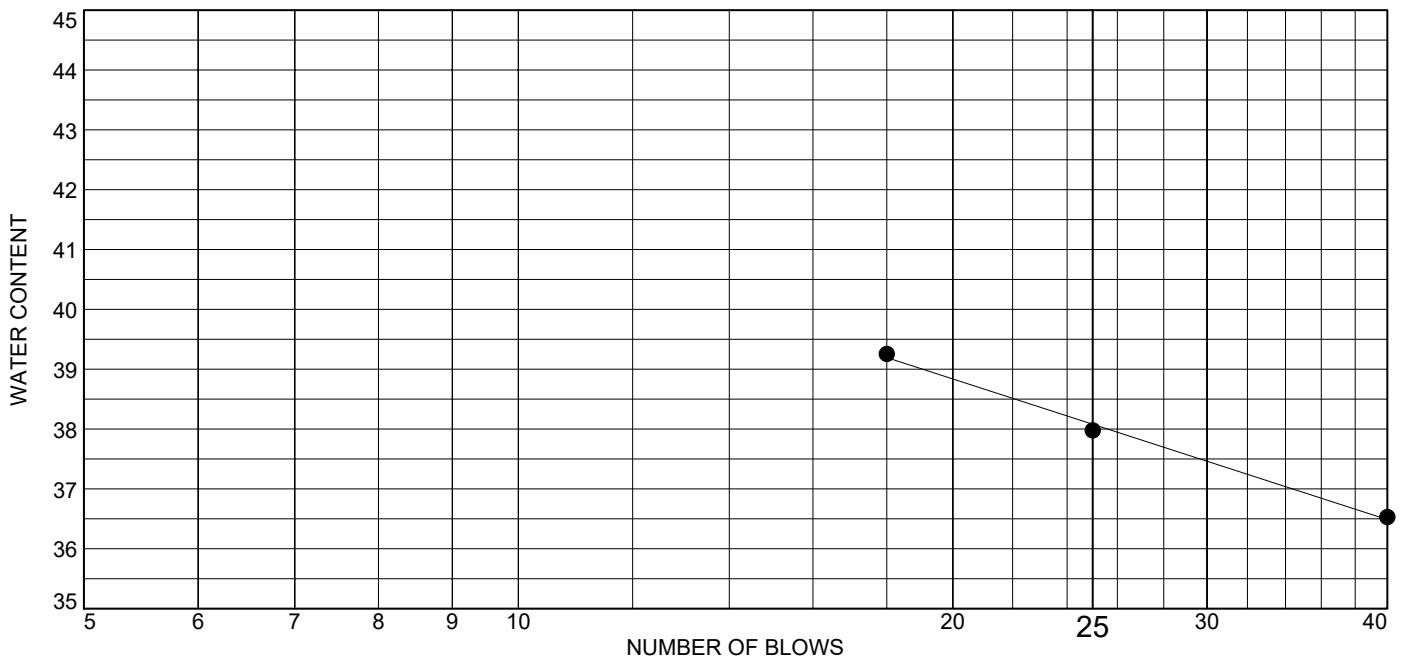
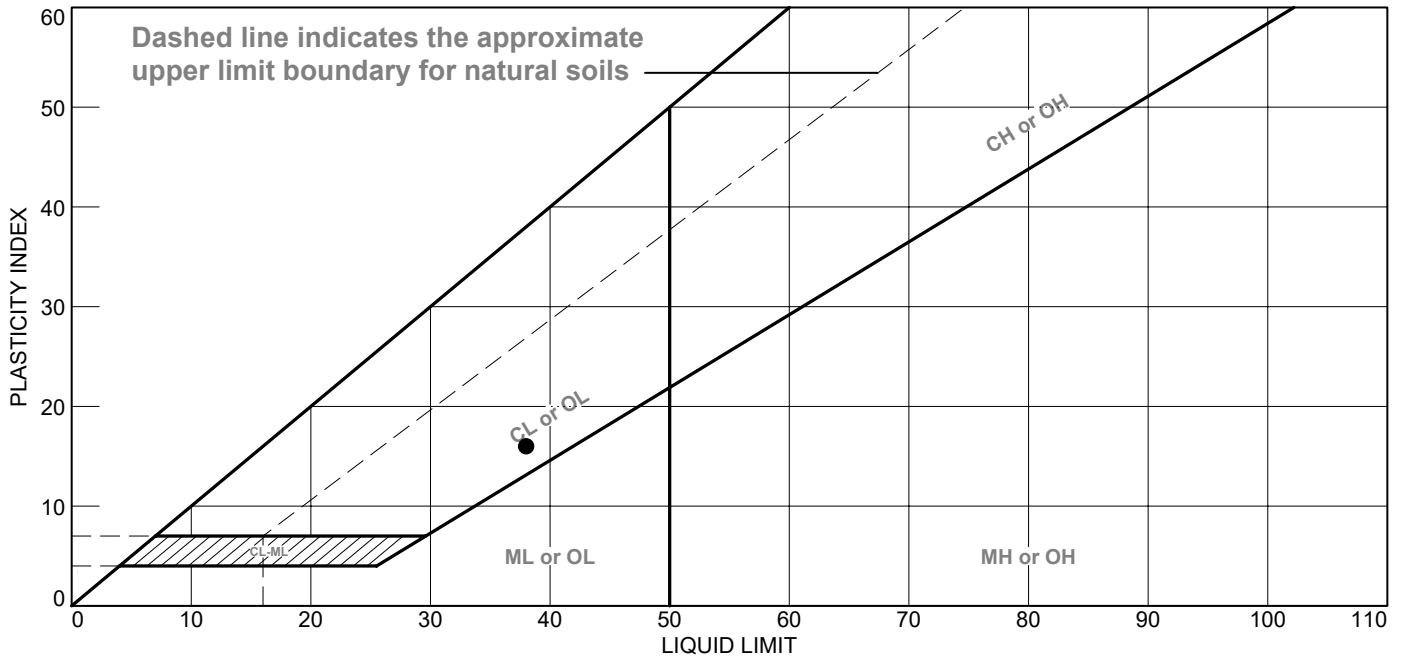


Figure

Tested By: BCM

Checked By: WPQ
500

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● GRAY ORGANIC LEAN CLAY - SHELL NOTED	38	22	16			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B001 **Depth:** 20.0'-22.0'
Sample Number: S-7

Remarks:

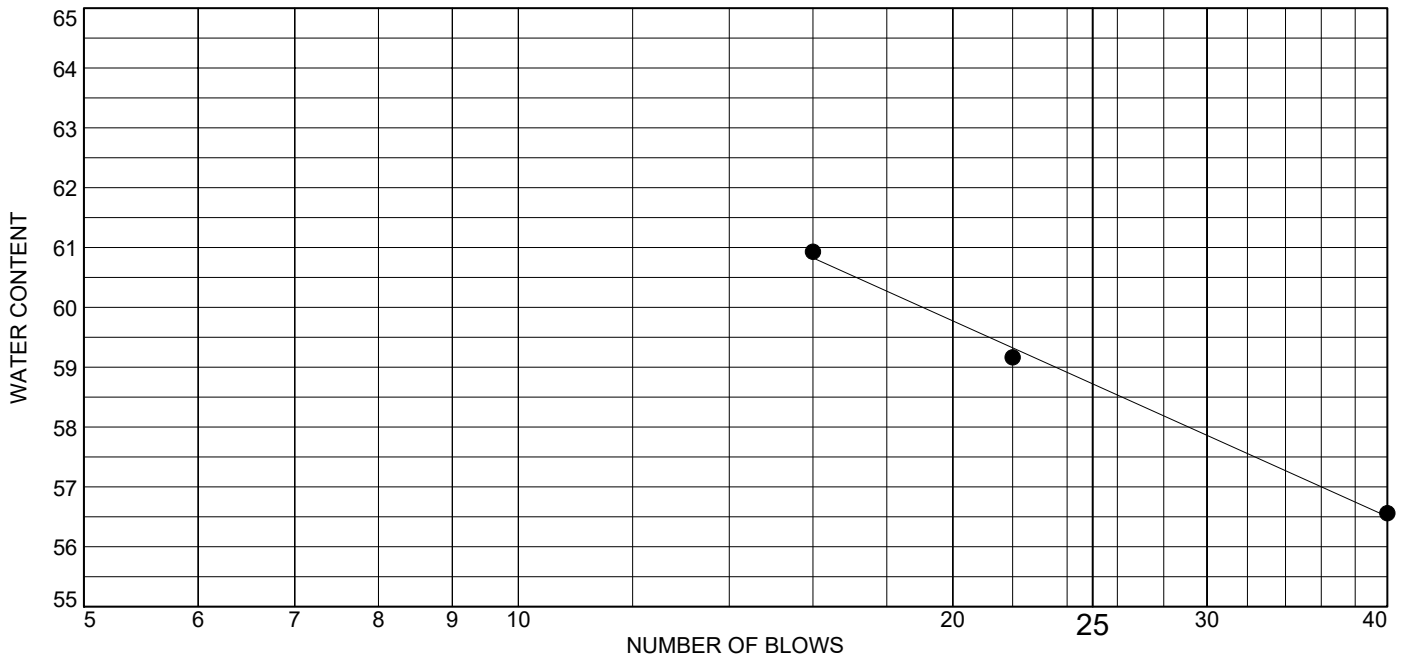
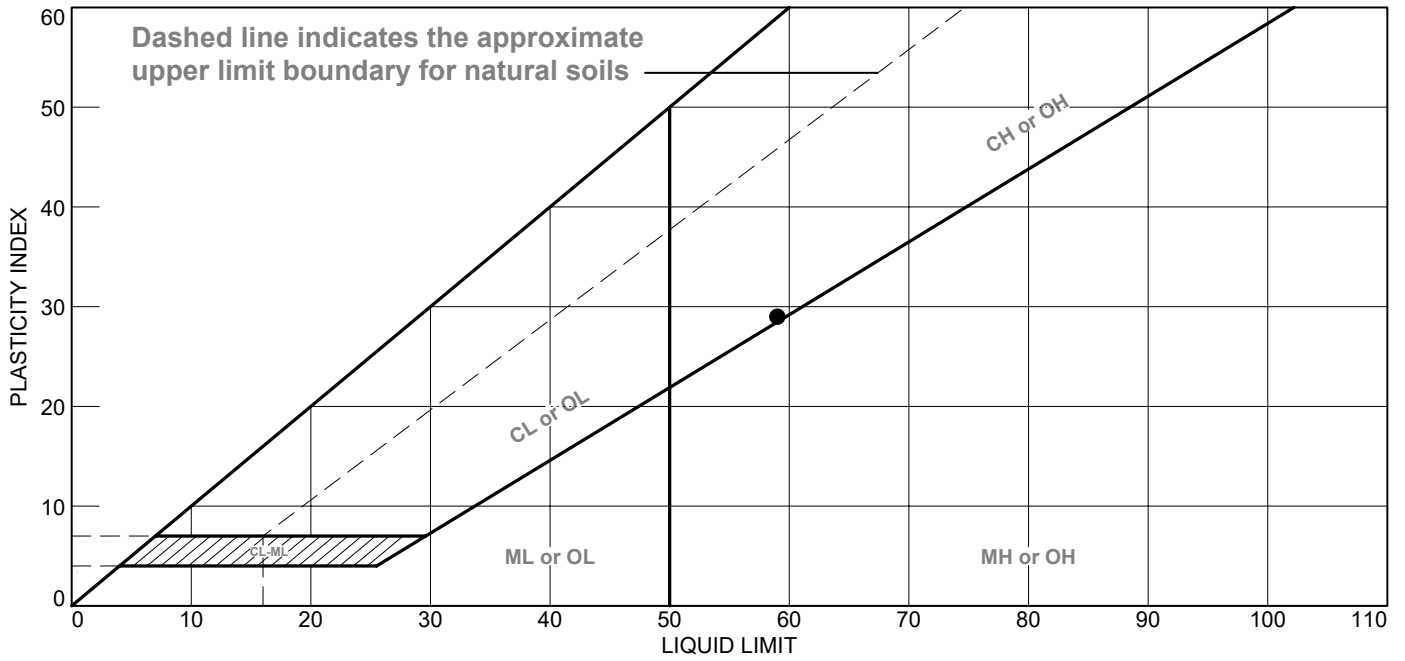


Figure

Tested By: HP

Checked By: WPQ
501

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• DARK GRAY FAT CLAY	59	30	29			CH

Project No. MR155233 Client: AECOM
 Project: DYNERGY - HENNEPIN
 Source of Sample: HEN-B001 Depth: 40.0'-41.5'
 Sample Number: S-11

Remarks:

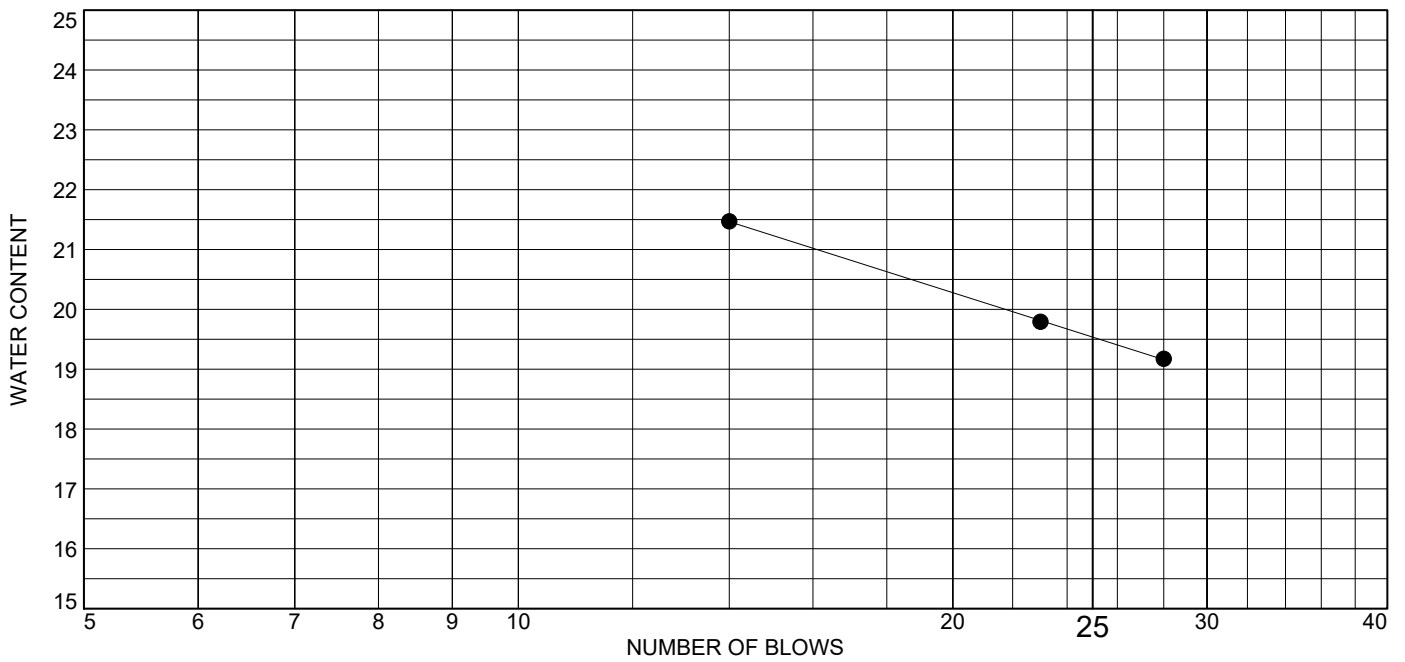
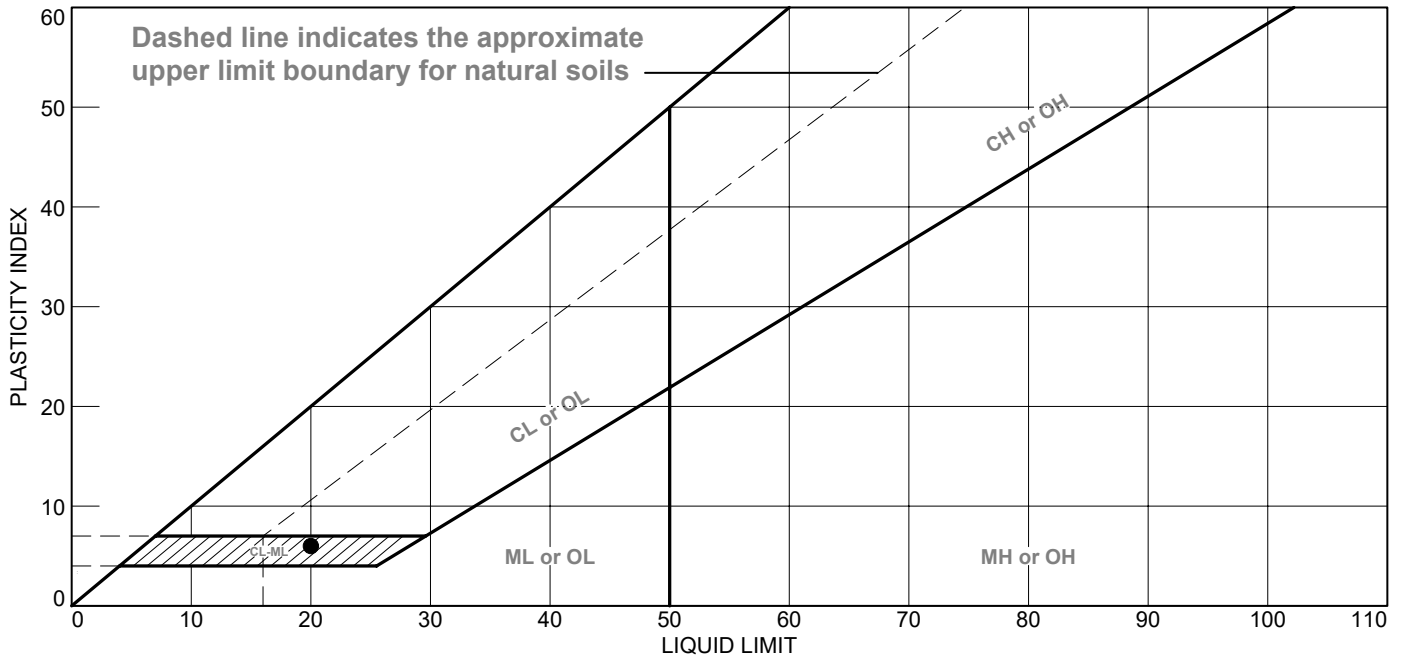


Figure

Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• BROWN SILT WITH CLAY	20	14	6			ML

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B002 **Depth:** 7.5'-9.0'
Sample Number: S-4

Remarks:

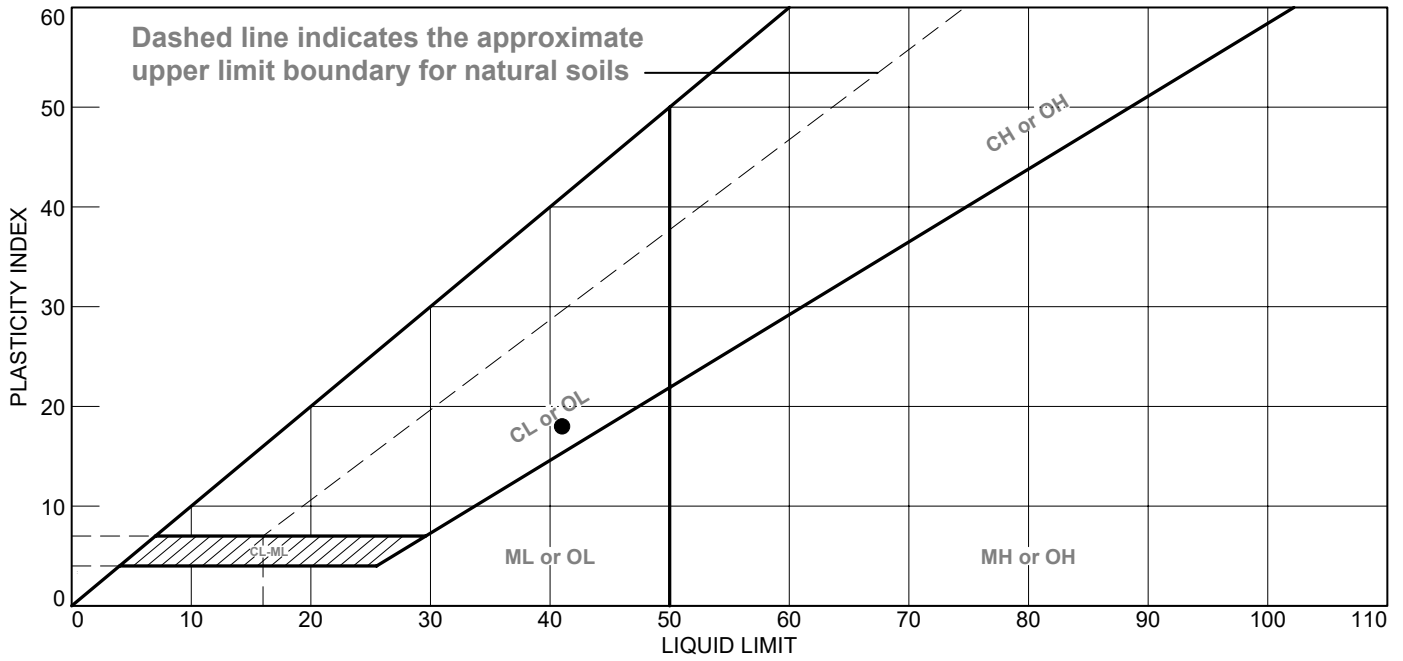


Figure

Tested By: DT

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK GRAY LEAN CLAY WITH SAND AND GRAVEL - FLY ASH NOTED	41	23	18			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B002 **Depth:** 25.0'-27.0'
Sample Number: S-8

Remarks:

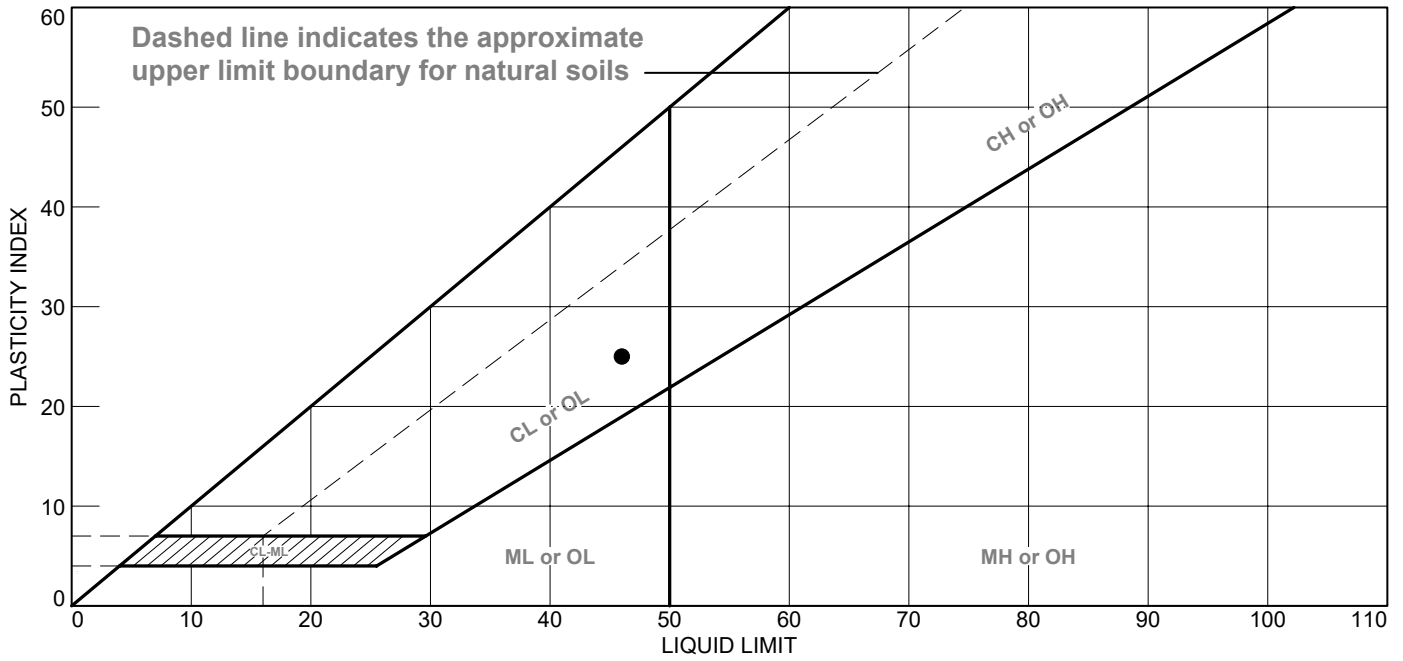


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● GRAY LEAN CLAY	46	21	25			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B002 **Depth:** 35.0'-37.0'
Sample Number: S-10

Remarks:

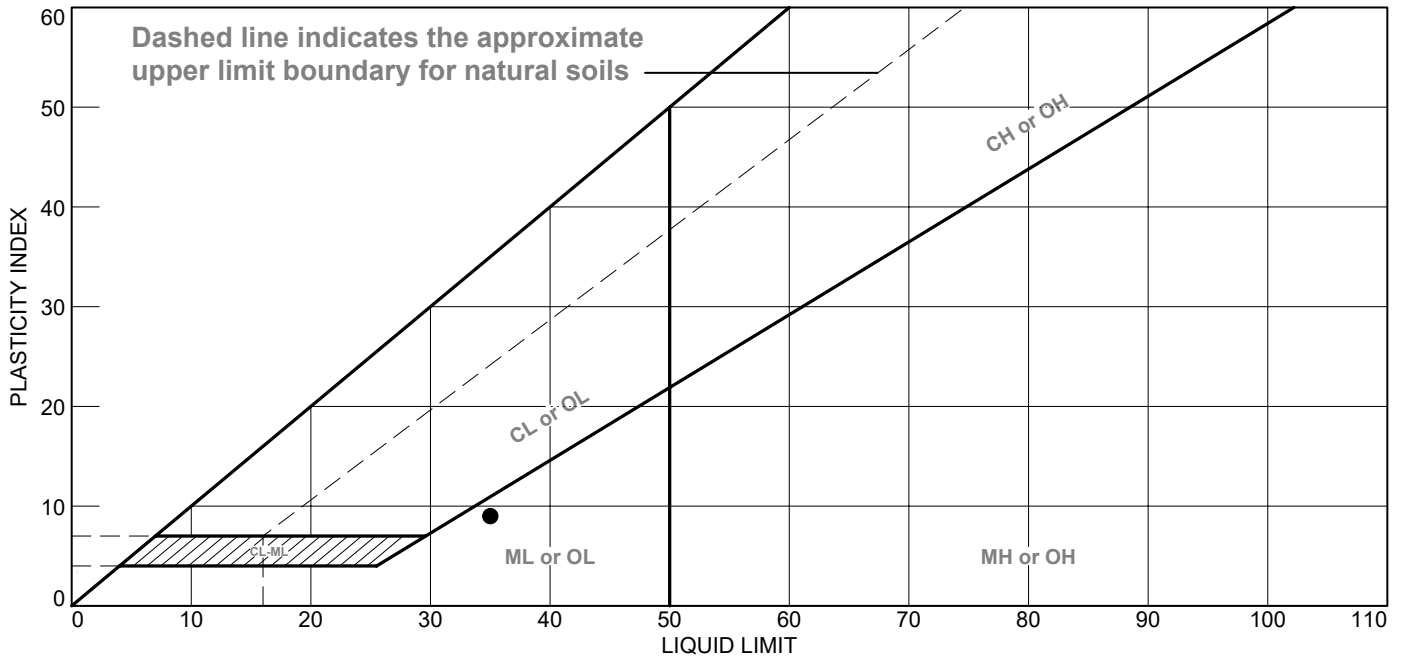


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BLACK ORGANIC CLAY WITH SAND - WOOD NOTED	35	26	9			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B003 **Depth:** 10.0'-12.0'
Sample Number: S-5

Remarks:

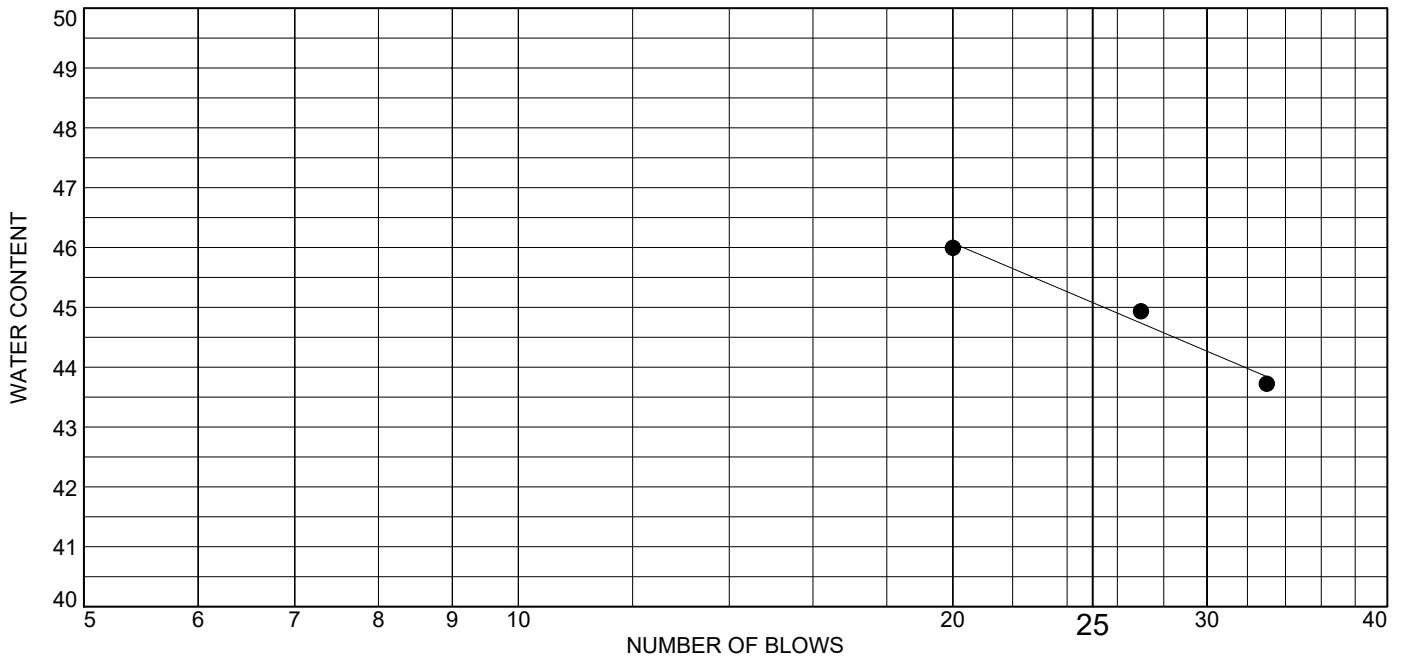
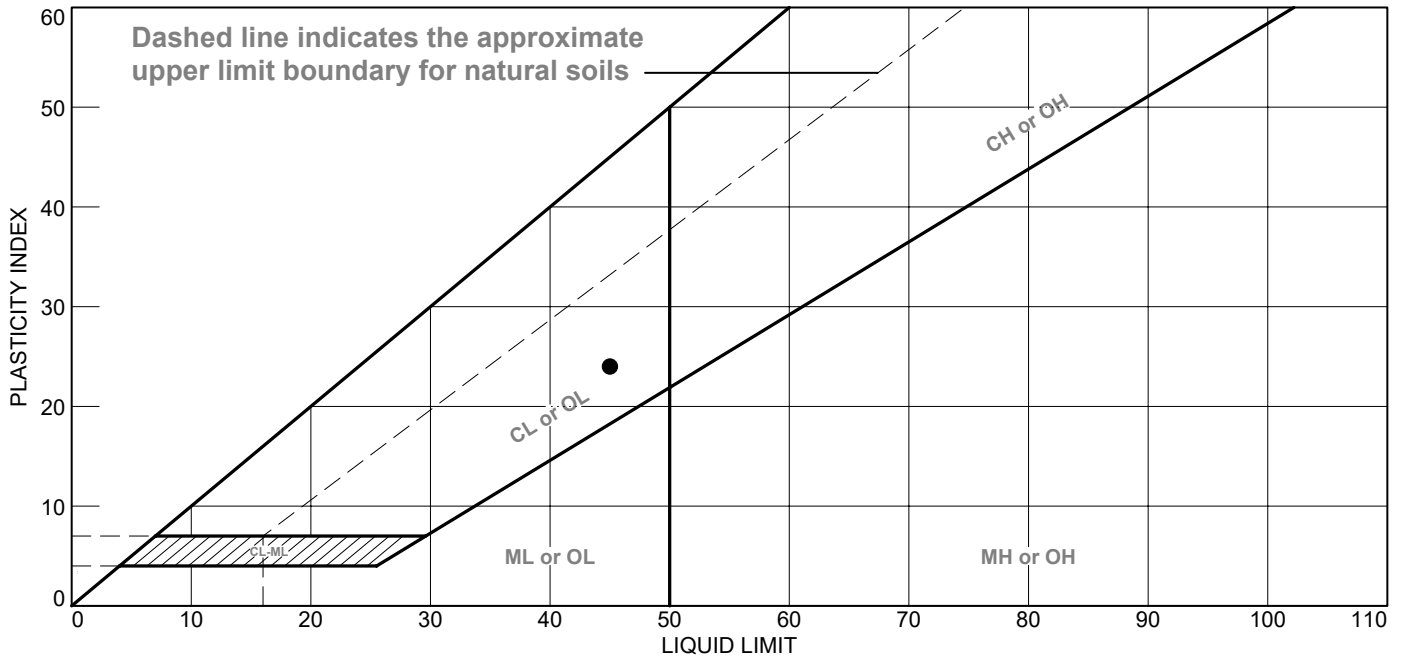


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK GRAY LEAN CLAY	45	21	24			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B003 **Depth:** 25.0'-27.5'
Sample Number: S-8

Remarks:

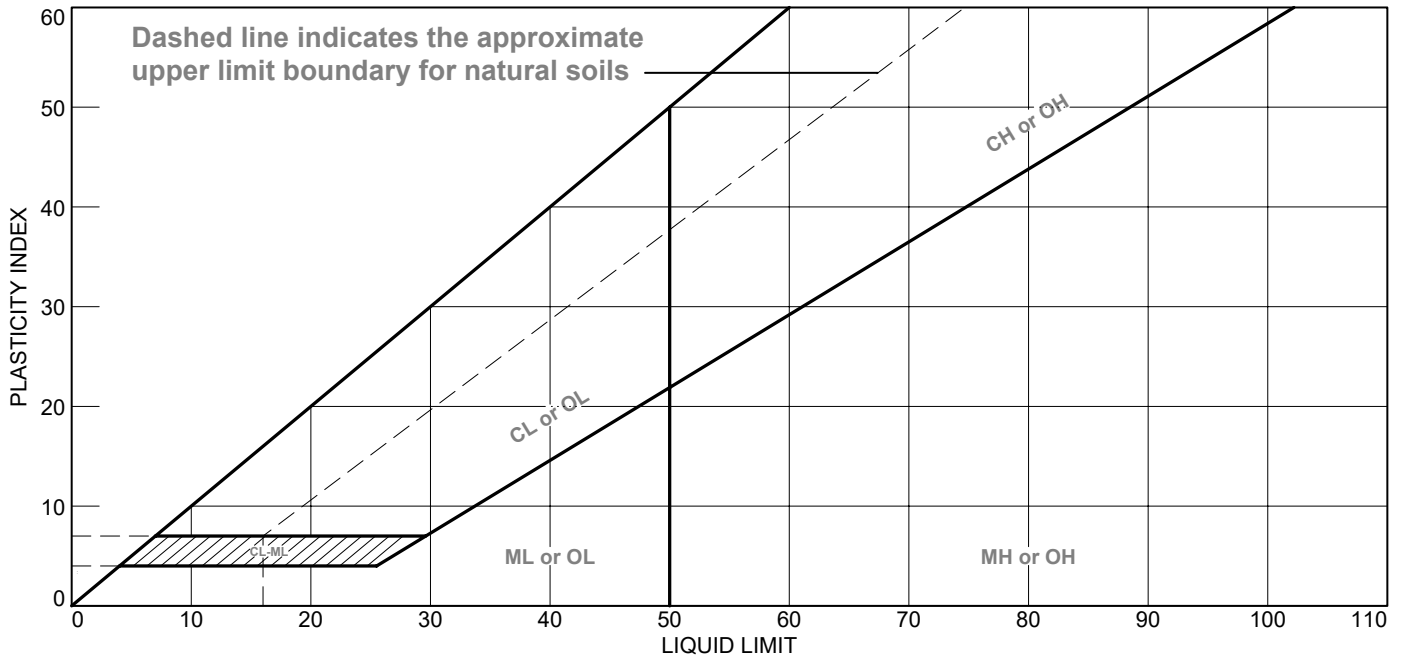


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN BLACK AND GRAY SANDY SILT WITH GRAVEL	32	35	NP			ML

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B004 **Depth:** 10.0'-12.0'
Sample Number: S-5

Remarks:
 ● A single point test was performed because of difficulty obtaining high blow counts due to type of material.

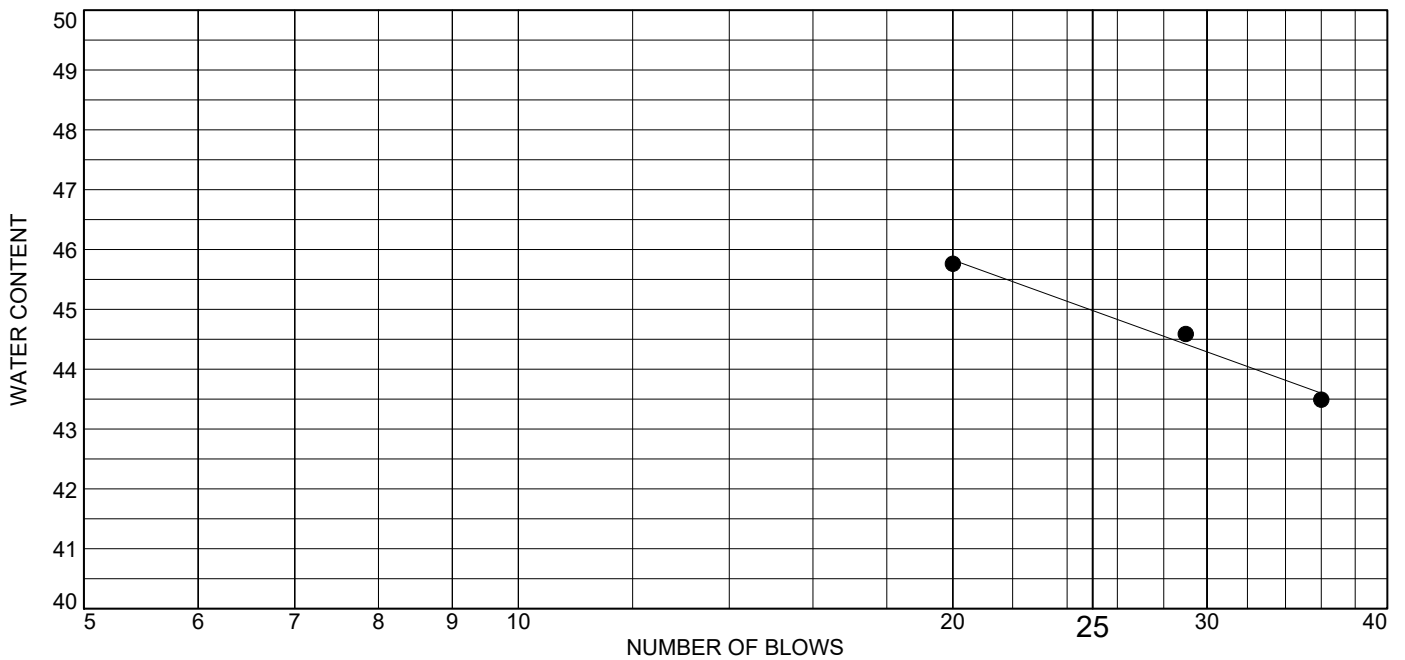
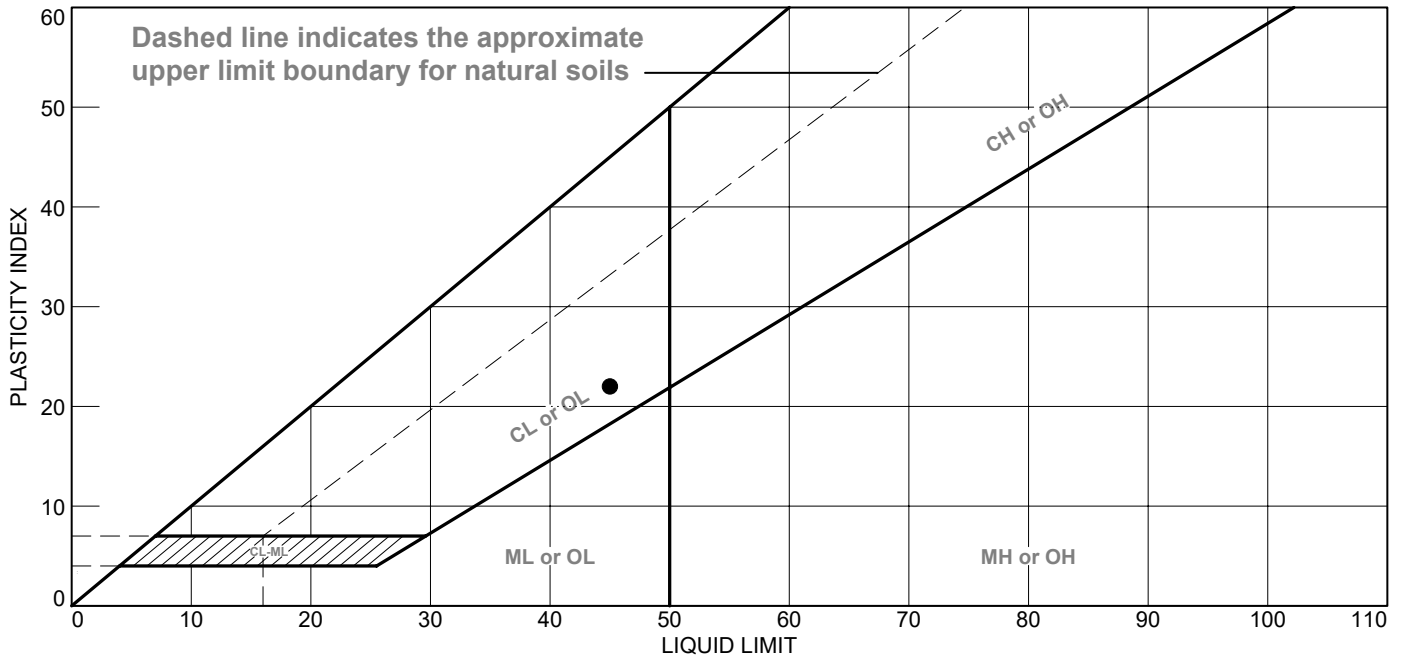


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• VERY DARK GRAY LEAN CLAY - ORGANICS NOTED	45	23	22			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B004 **Depth:** 20.0'-22.0'
Sample Number: S-7

Remarks:

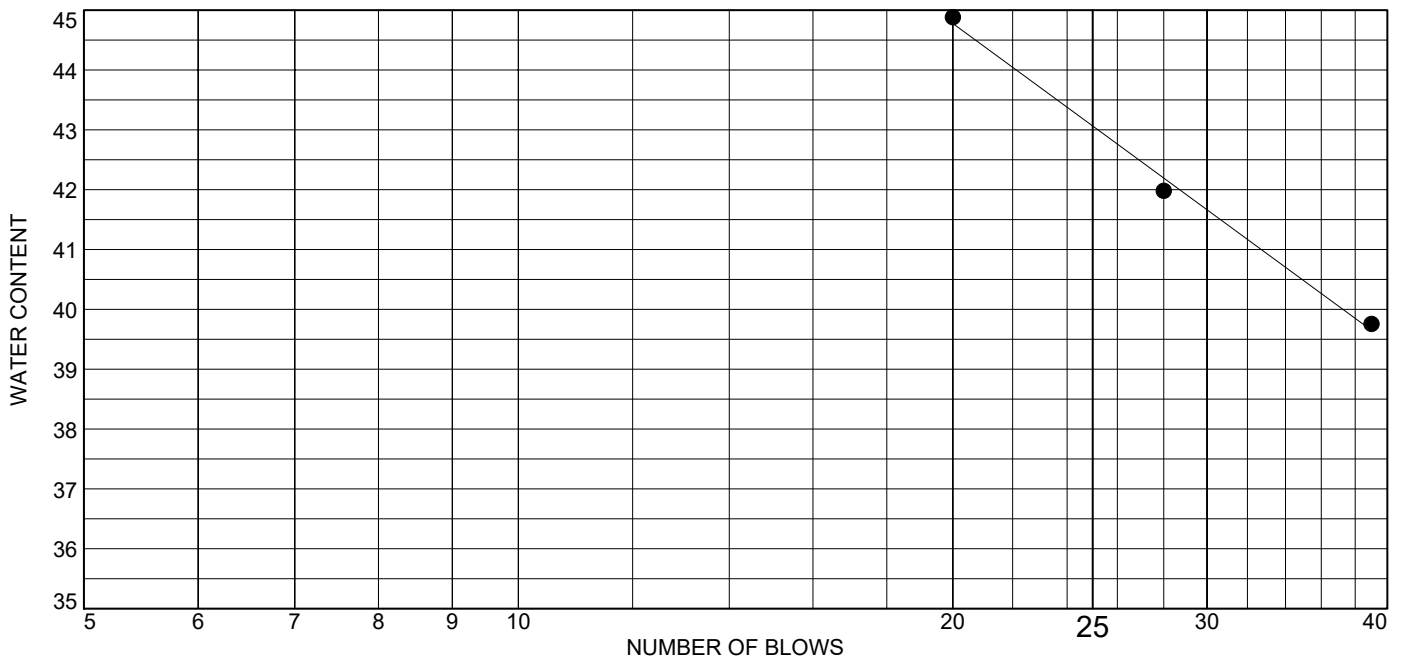
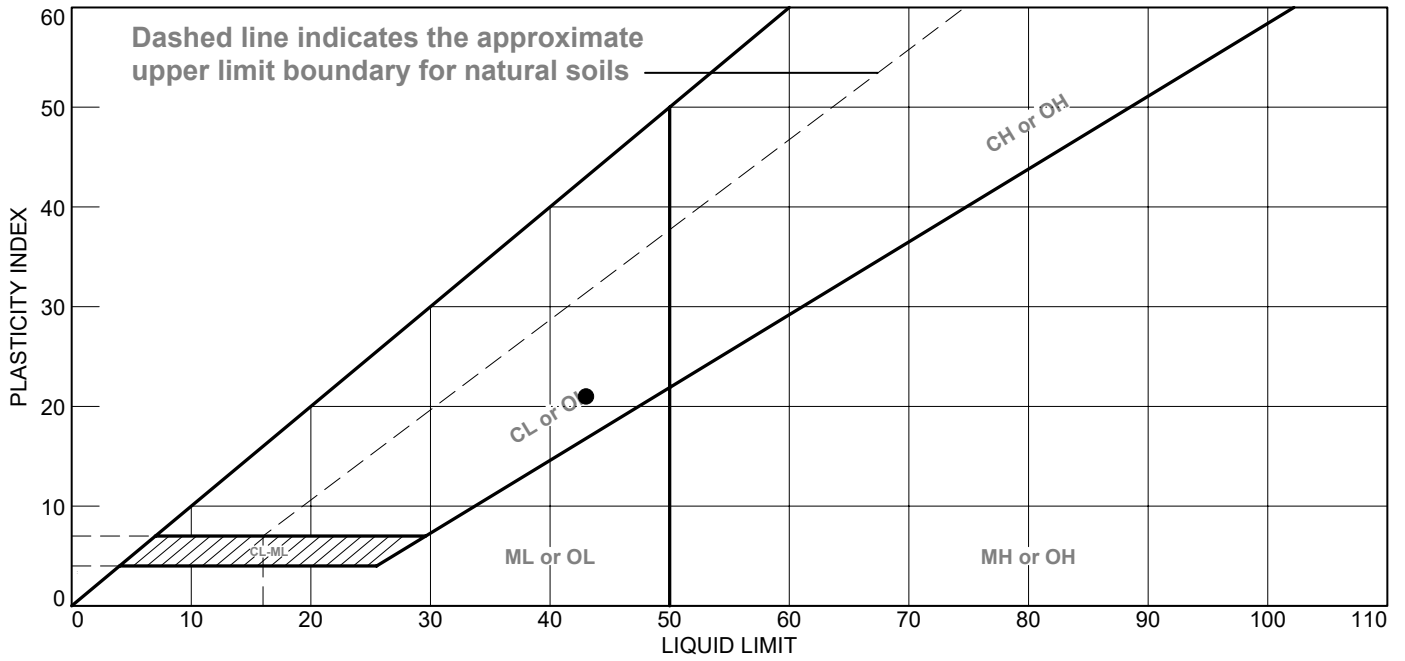


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN AND GRAY LEAN CLAY	43	22	21			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B004 **Depth:** 30.0'-32.0'
Sample Number: S-9

Remarks:

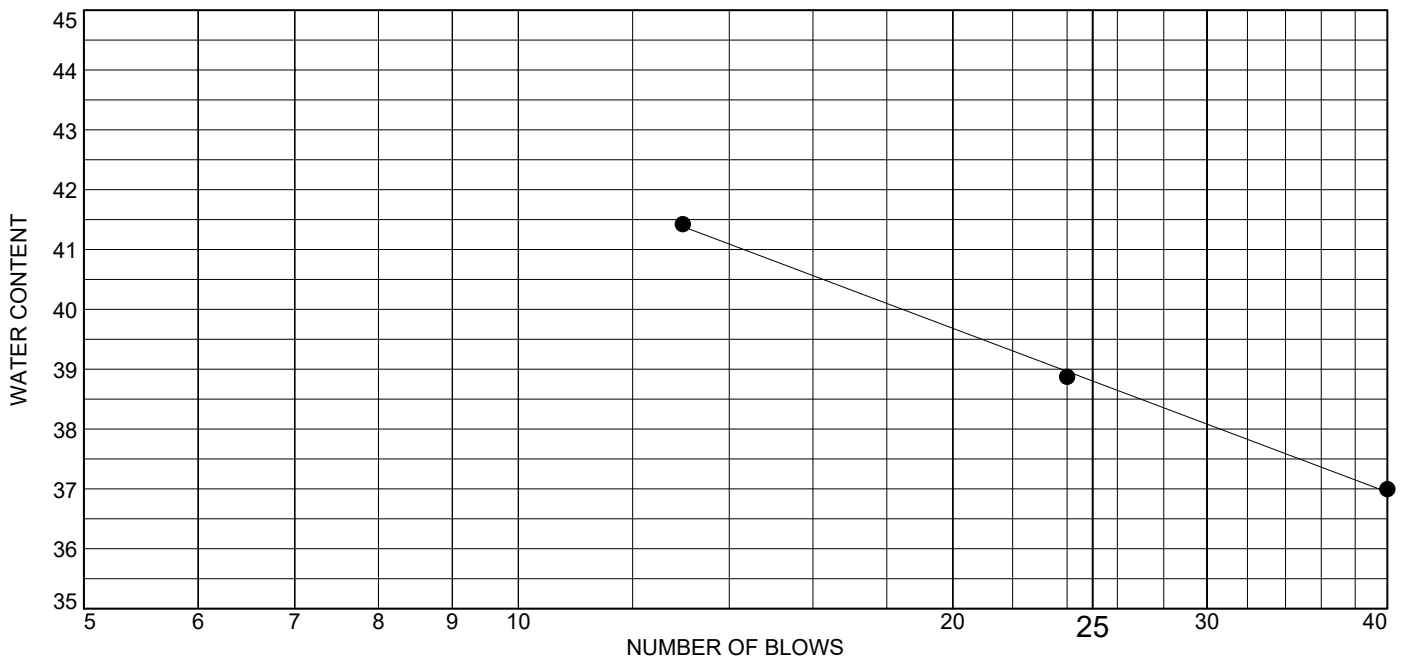
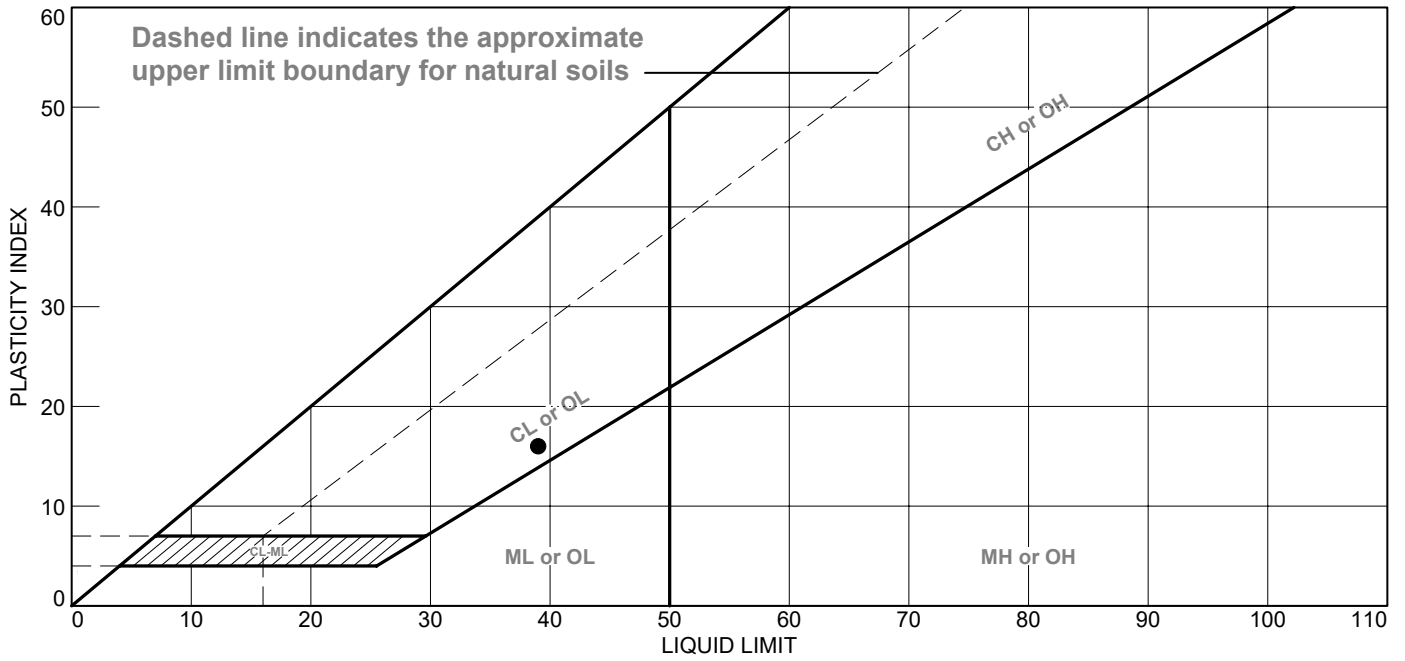


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BLACK TO VERY DARK GRAY ORGANIC CLAY	39	23	16			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B005 **Depth:** 7.5'-9.5'
Sample Number: S-2

Remarks:

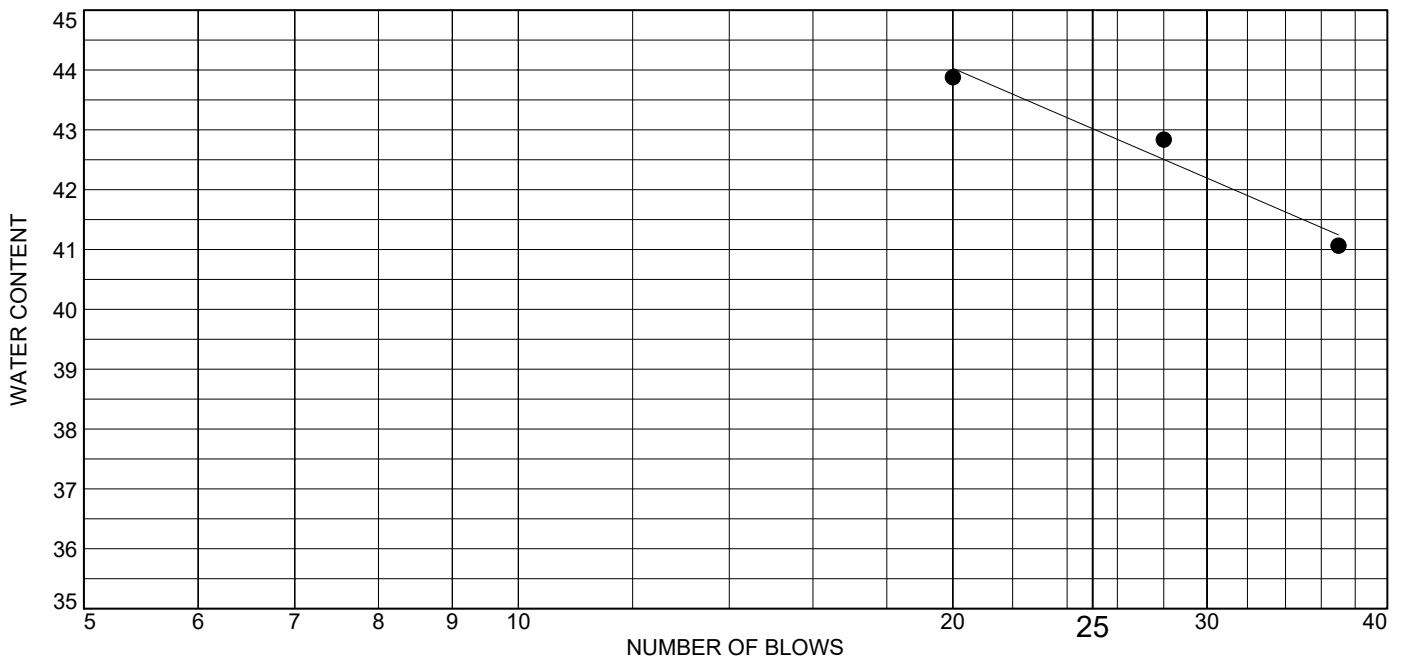
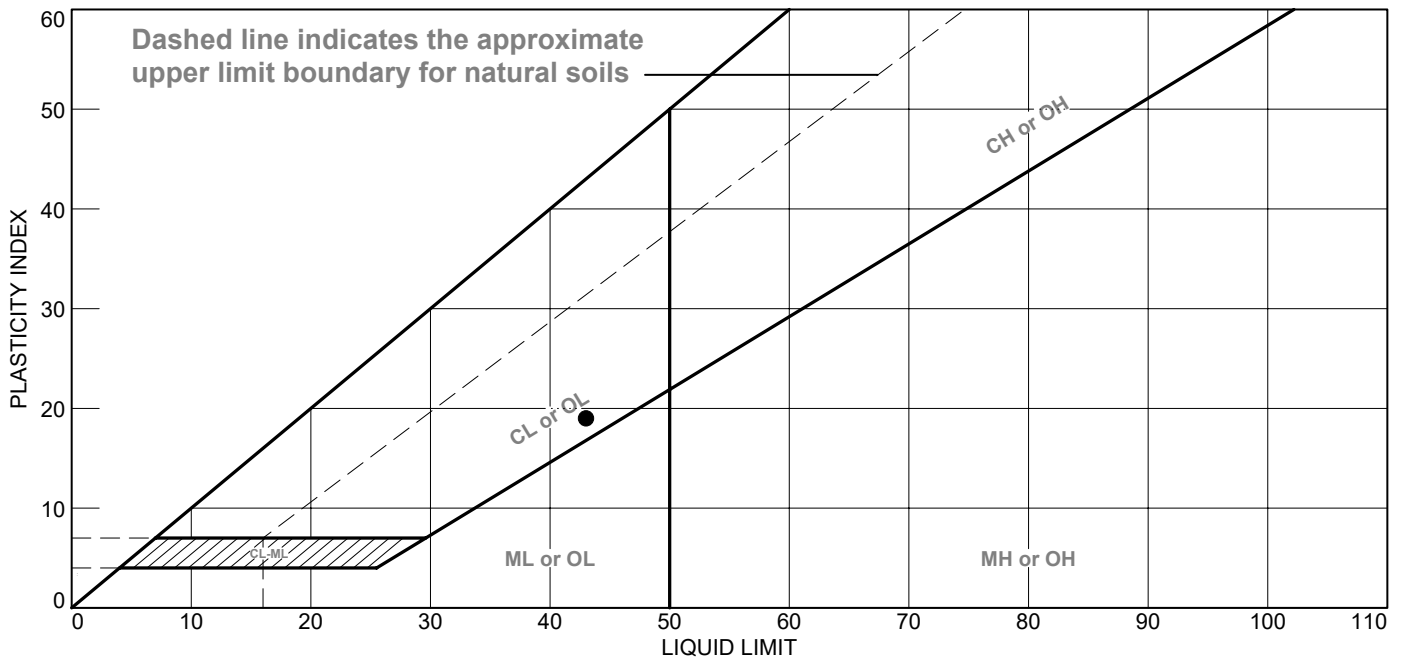


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



	LL	PL	PI	%<#40	%<#200	USCS
● DARK GRAY LEAN CLAY WITH SAND AND FLY ASH	43	24	19	100.0	83.8	CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B005 **Depth:** 12.5'-14.5'
Sample Number: S-4

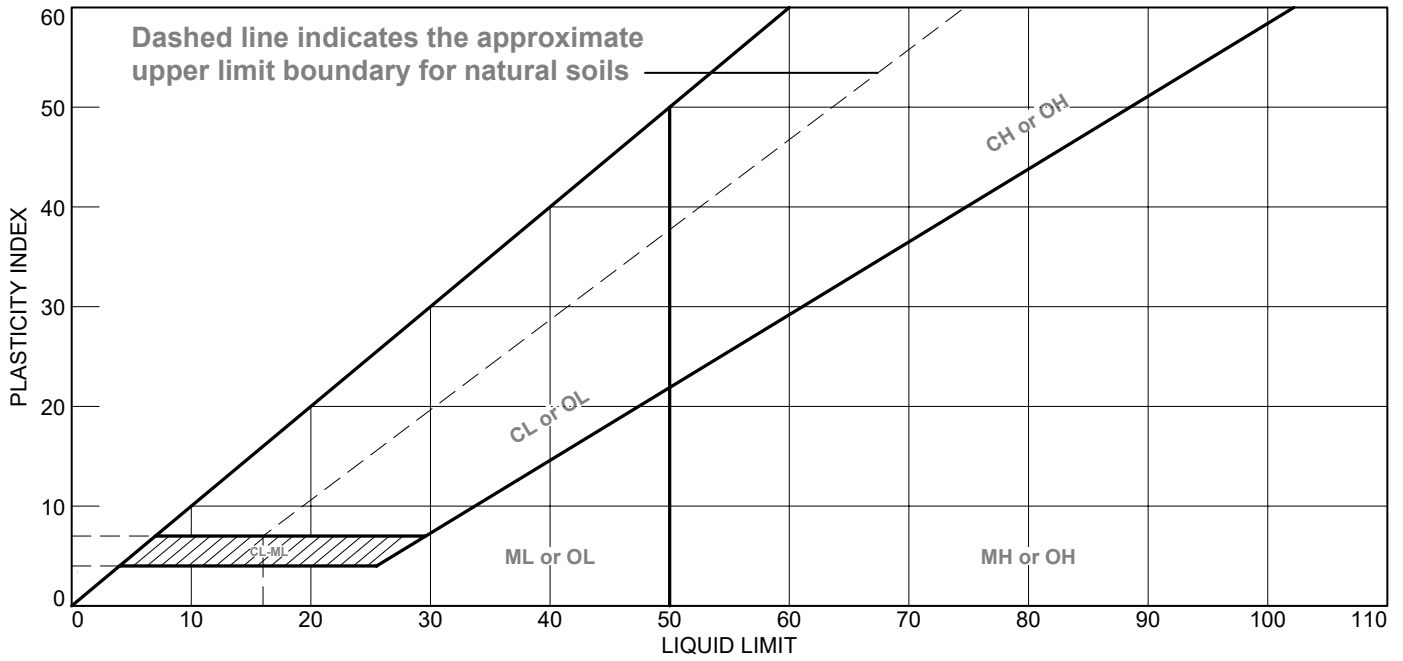
Remarks:



Figure

Tested By: DT Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• MULTI STRATA SAMPLE: TOP, FLY ASH - MIDDLE, FLY ASH LEAN CLAY WITH SAND MIX - BOTTOM, BROWN SANDY CLAY	25	28	NP			

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B008 **Depth:** 7.5'-9.5'
Sample Number: S-4

Remarks:

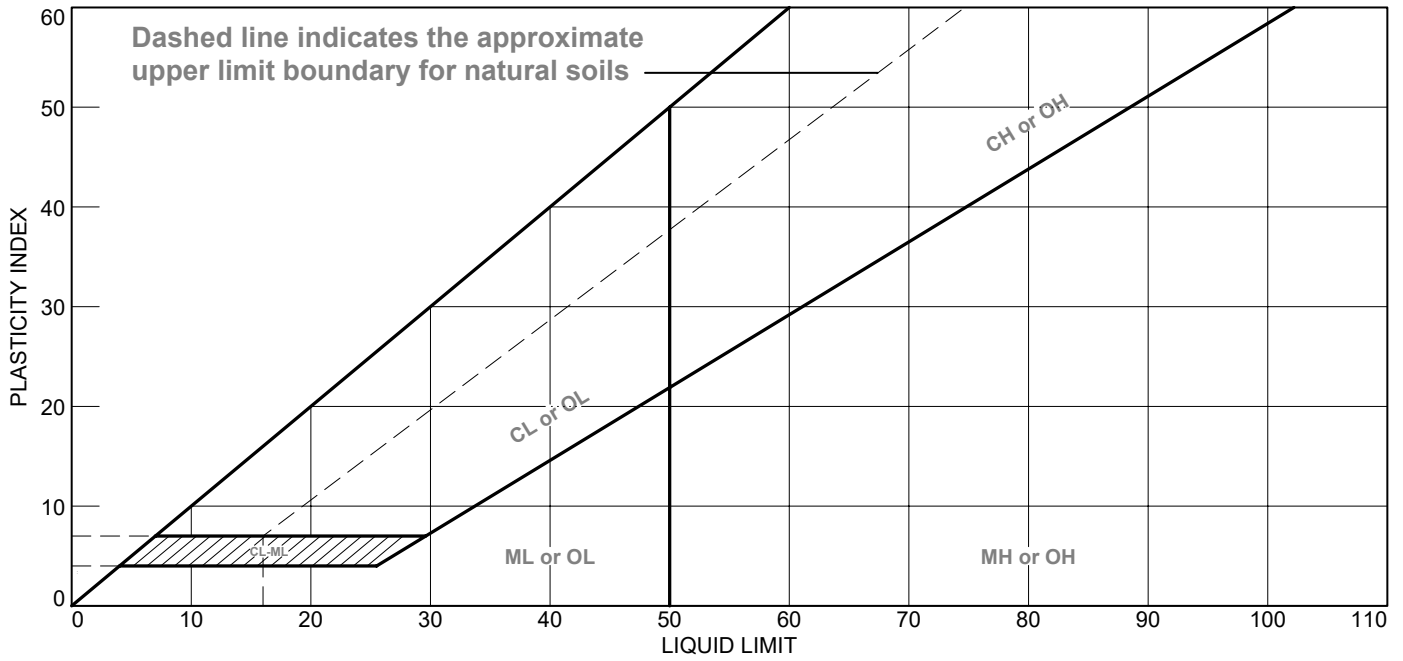


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● VERY DARK GRAY FLY ASH WITH SAND AND GRAVEL	29	33	NP			

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B010 **Depth:** 10.0'-11.5'
Sample Number: S-5

Remarks:
 ● A single point test was performed because of difficulty obtaining high blow counts due to type of material.

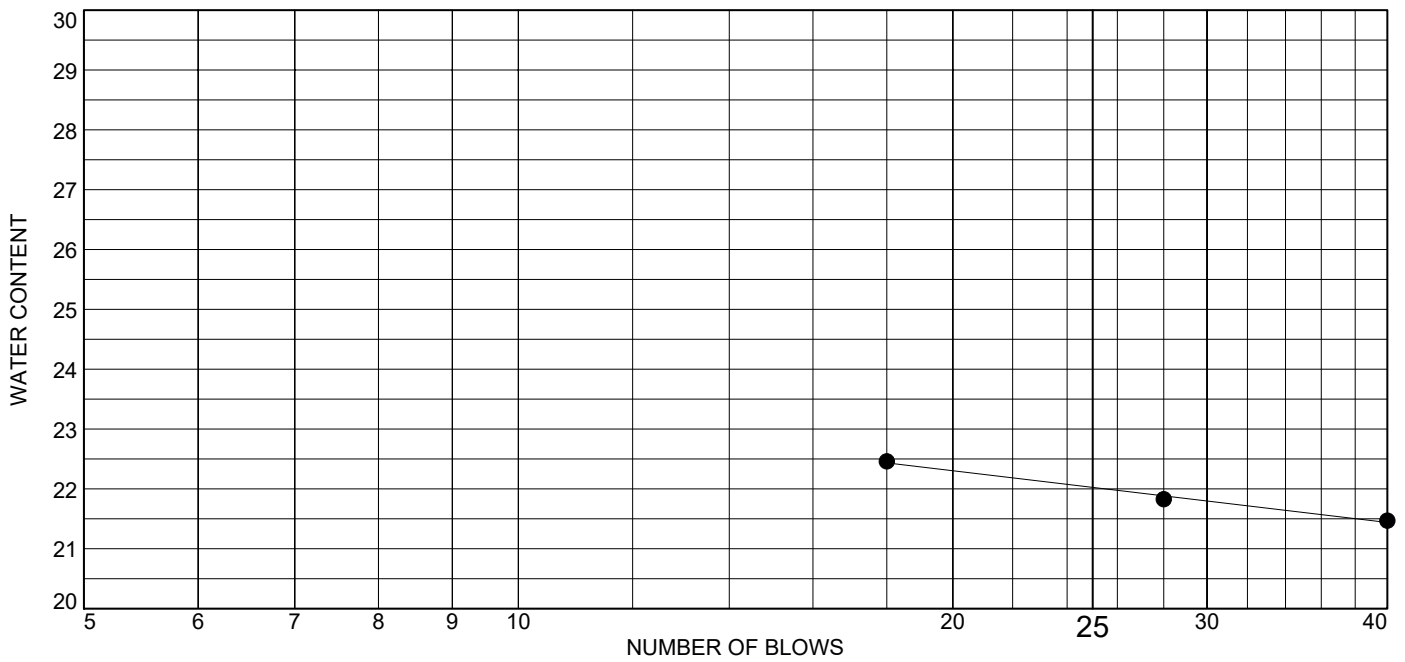
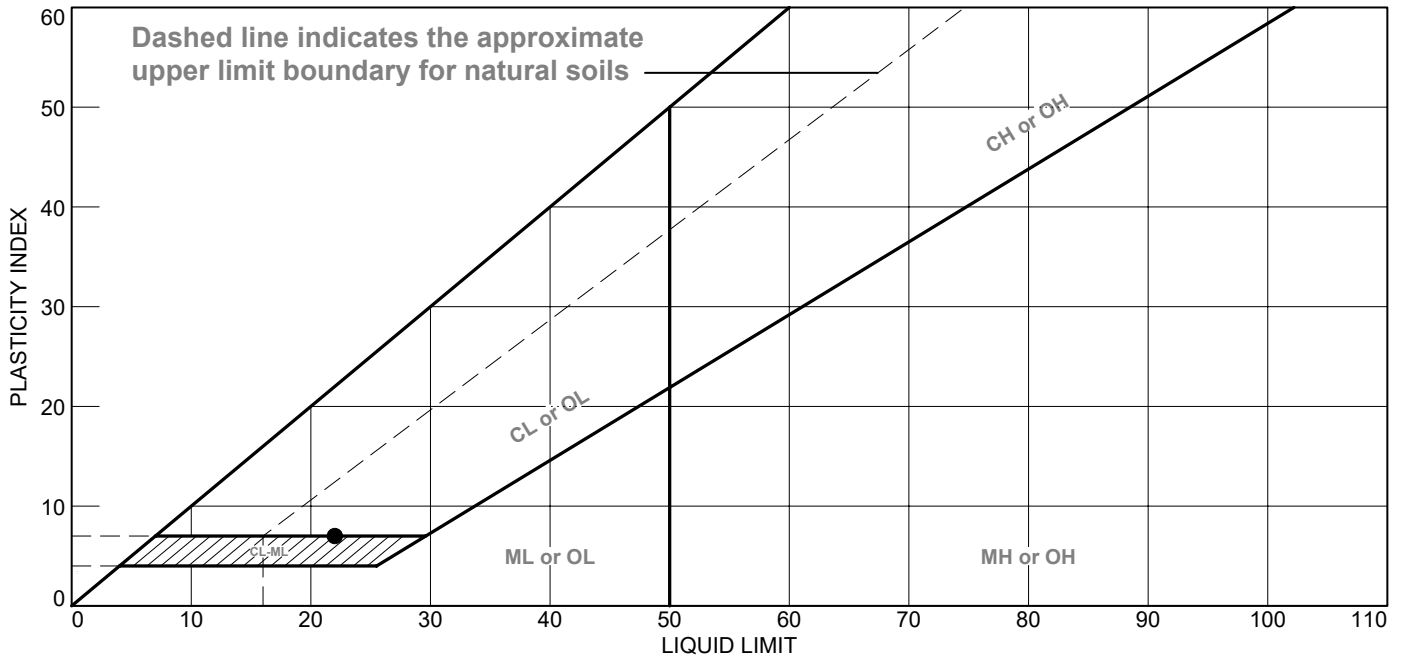


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● RUST BROWN SANDY LEAN CLAY	22	15	7			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B011 **Depth:** 2.5'-4.0'
Sample Number: S-2

Remarks:

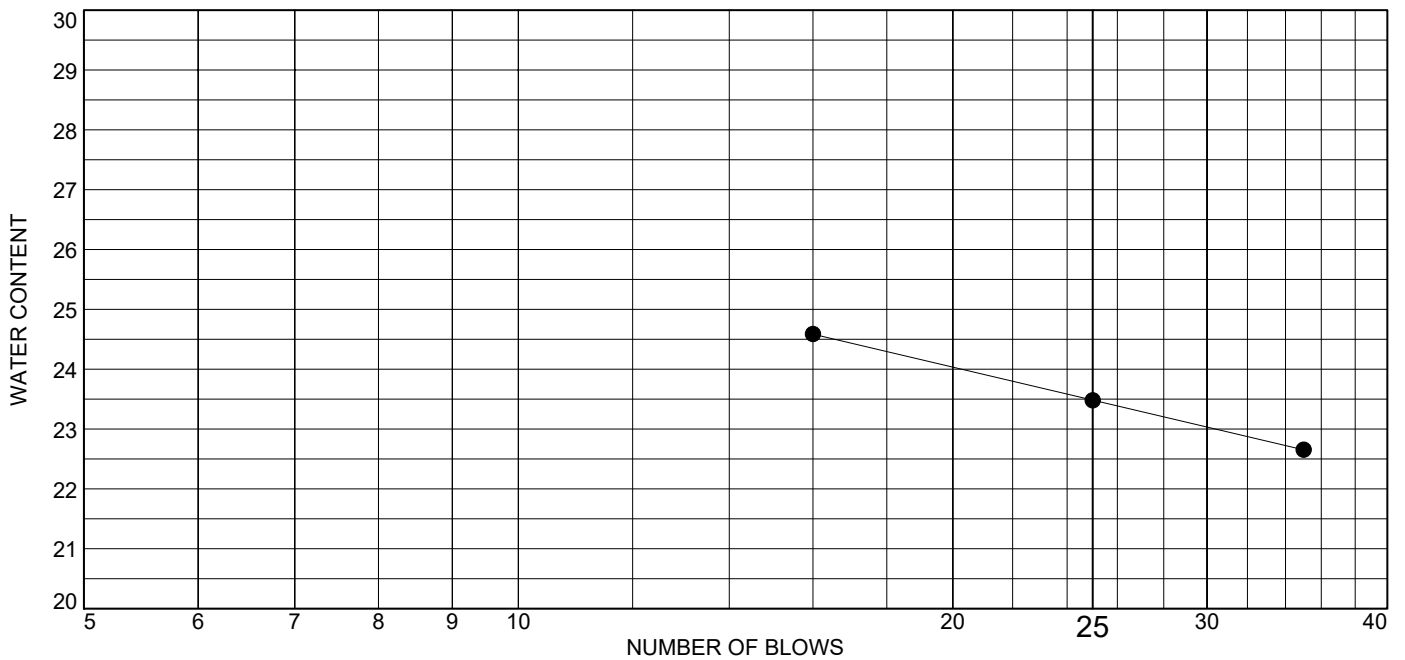
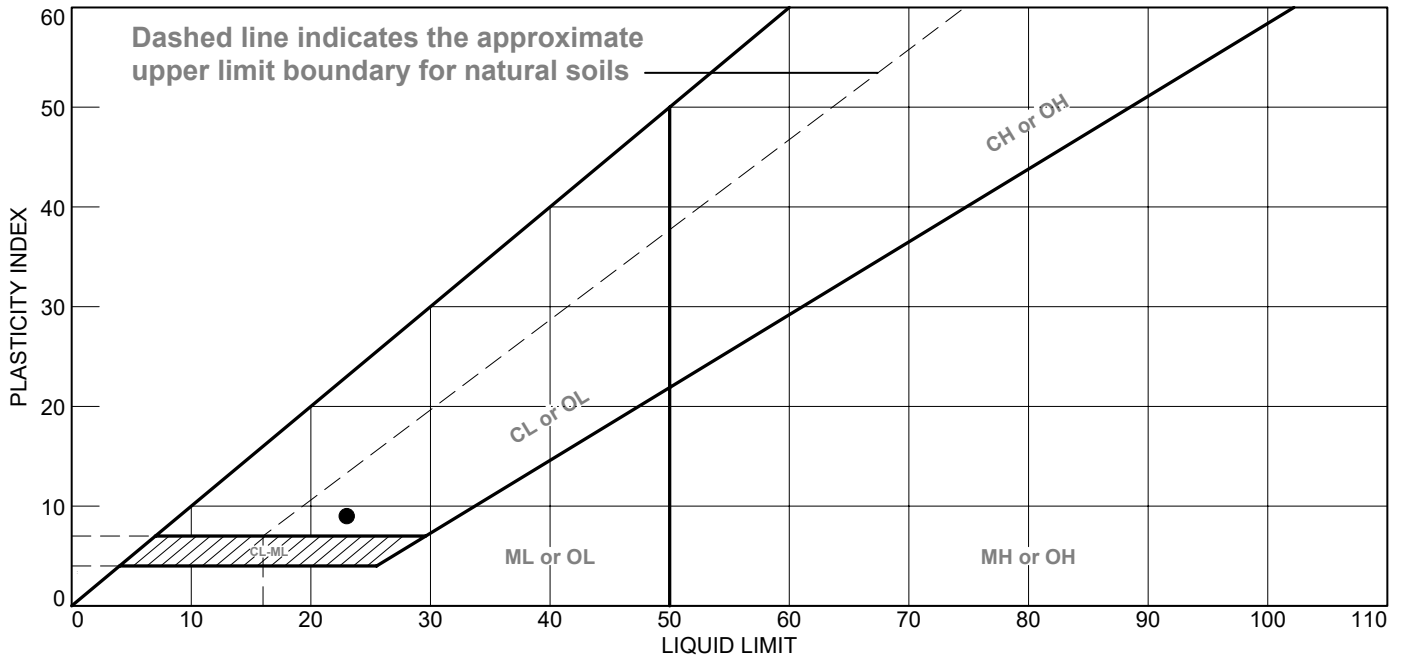


Figure

Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK BROWN LEAN CLAY WITH SILT AND SAND - SILT AND SAND SEAM NOTED	23	14	9			CL

Project No. MR155233 **Client:** AECOM

Project: DYNERGY - HENNEPIN

Source of Sample: HEN-B012 **Depth:** 10.0'-11.5'

Sample Number: S-5

Remarks:

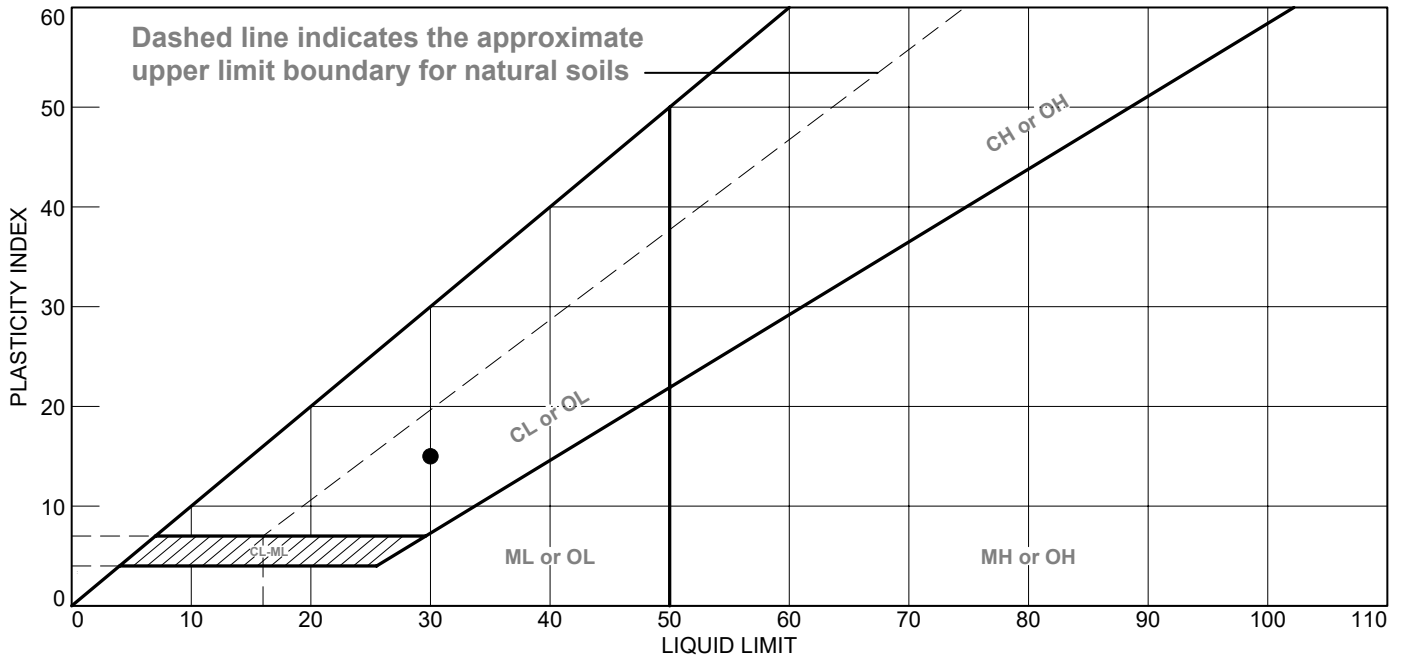


Figure

Tested By: DT

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN AND GRAYISH BROWN LEAN CLAY WITH SAND	30	15	15			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B012 **Depth:** 30.0'-32.0'
Sample Number: S-9

Remarks:

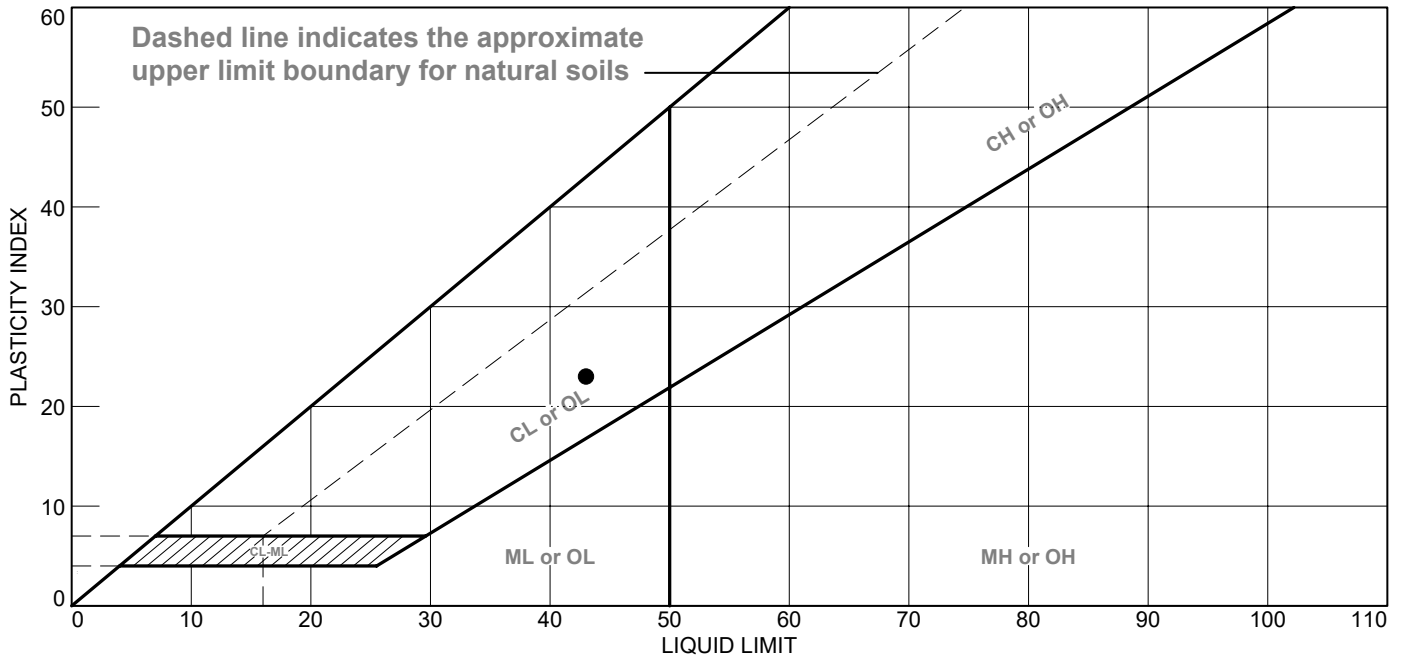


Figure

Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN AND GRAY LEAN CLAY	43	20	23			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B014 **Depth:** 25.0'-27.0'
Sample Number: S-8

Remarks:

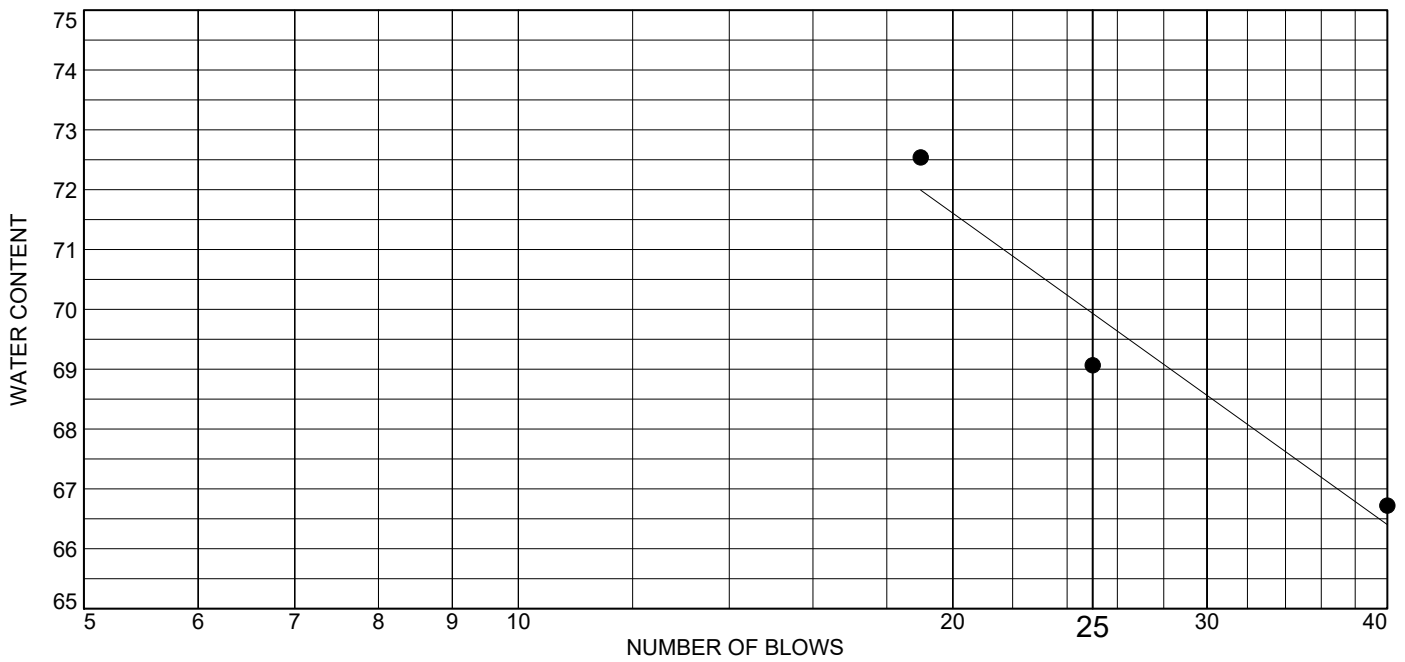
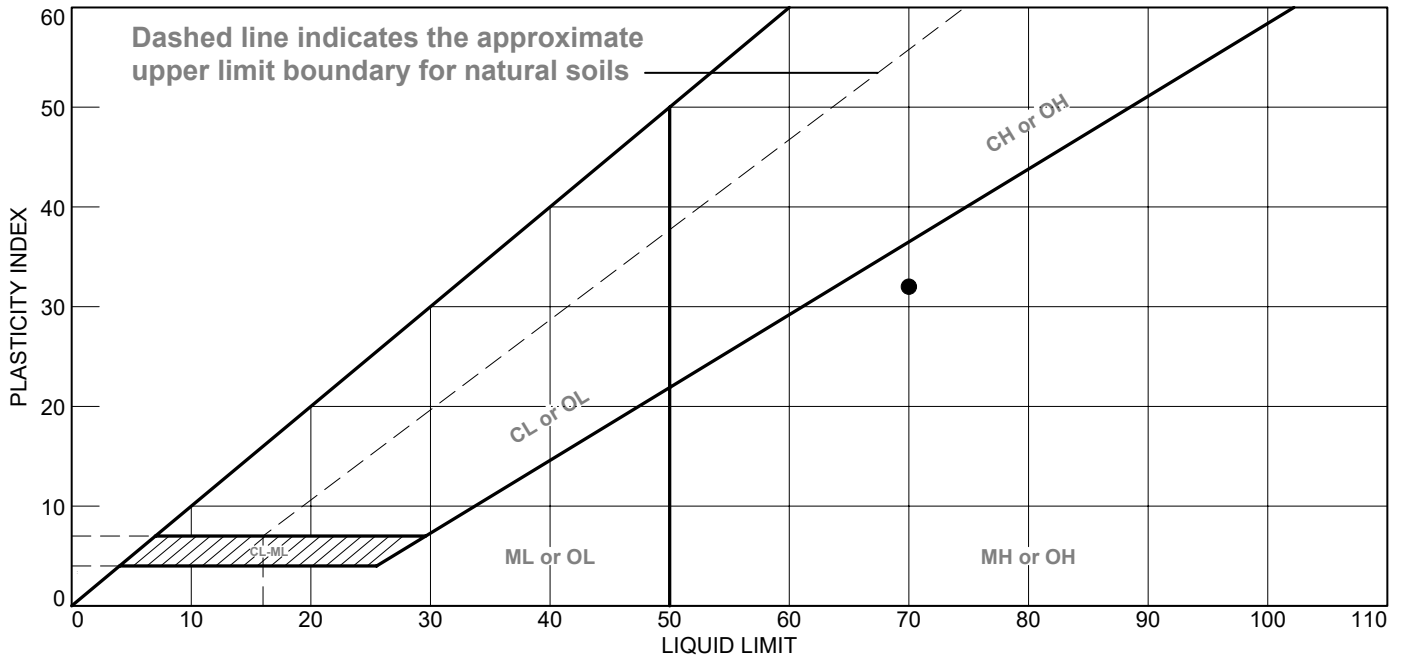


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● VERY DARK BROWNISH GRAY ORGANIC SILT	70	38	32			OH

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B014 **Depth:** 35.0'-37.0'
Sample Number: S-10

Remarks:

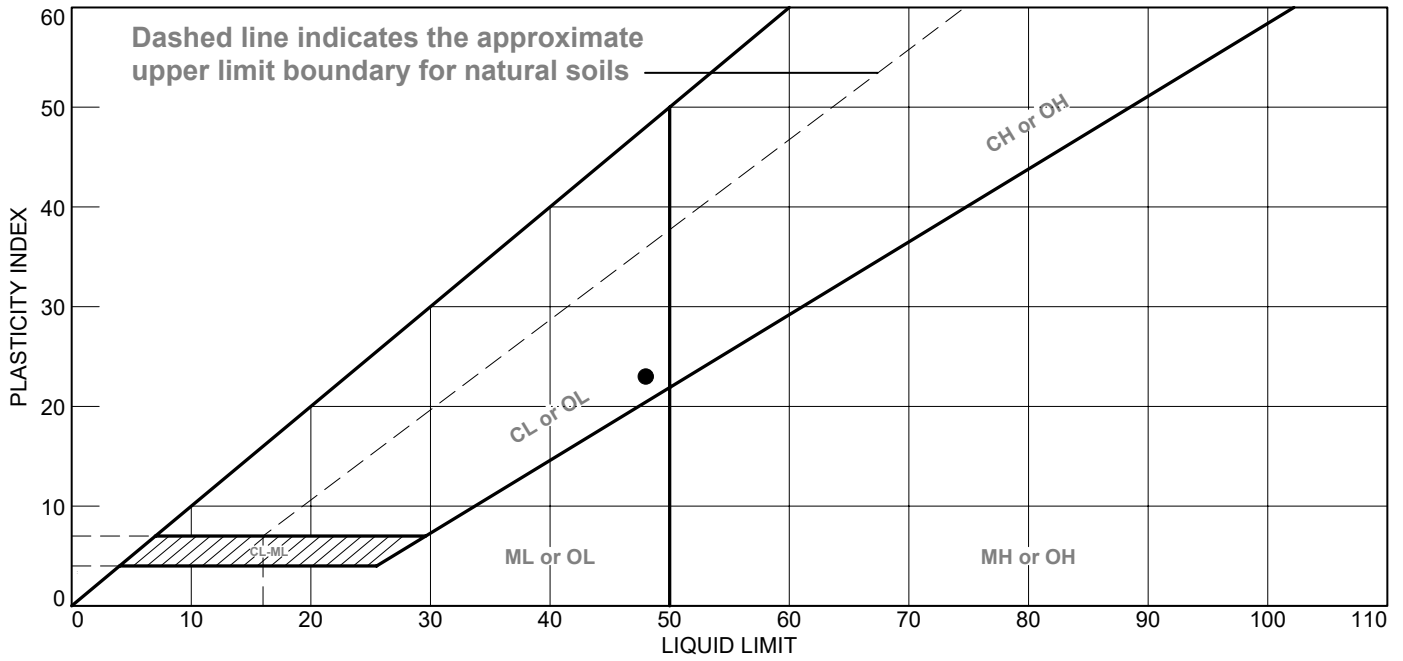


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BLACK AND DARK GRAY ORGANIC LEAN CLAY WITH SAND AND GRAVEL	48	25	23			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B015 **Depth:** 7.5'-9.5'
Sample Number: S-4

Remarks:

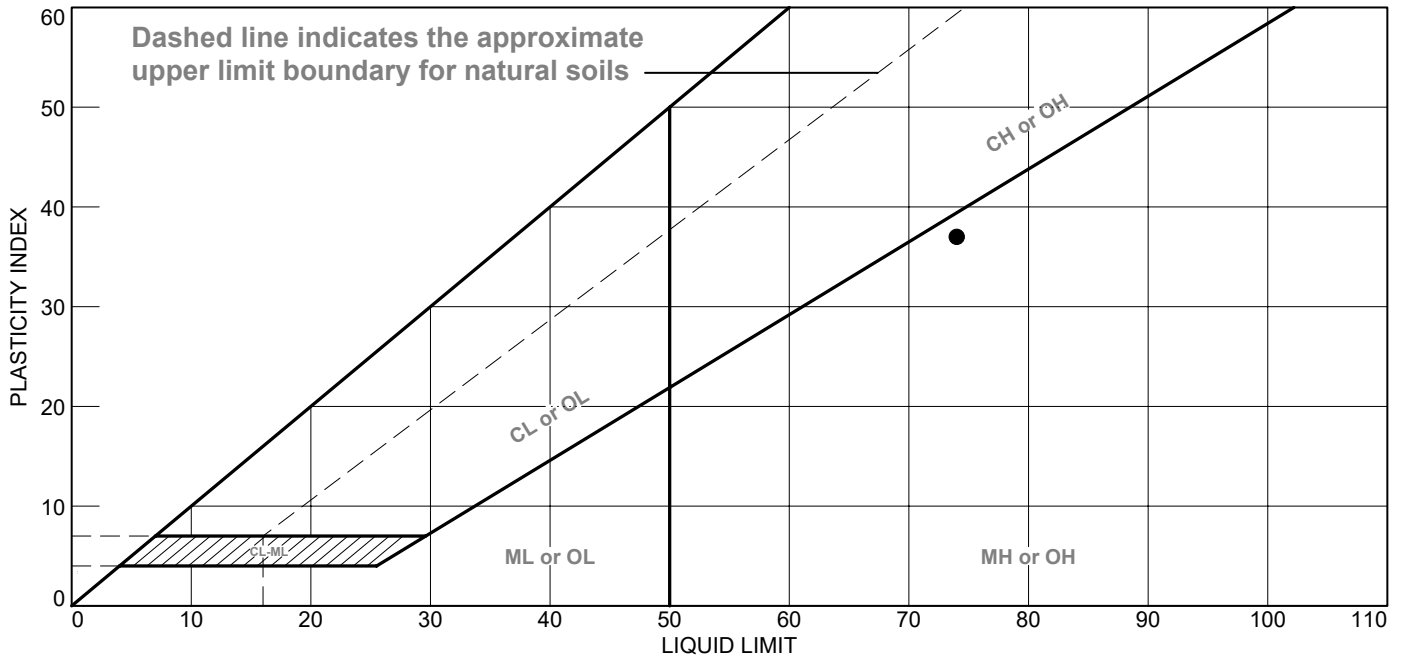


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BLACK ORGANIC SILT WITH SAND	74	37	37			OH

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B015 **Depth:** 25.0'-27.0'
Sample Number: S-8

Remarks:

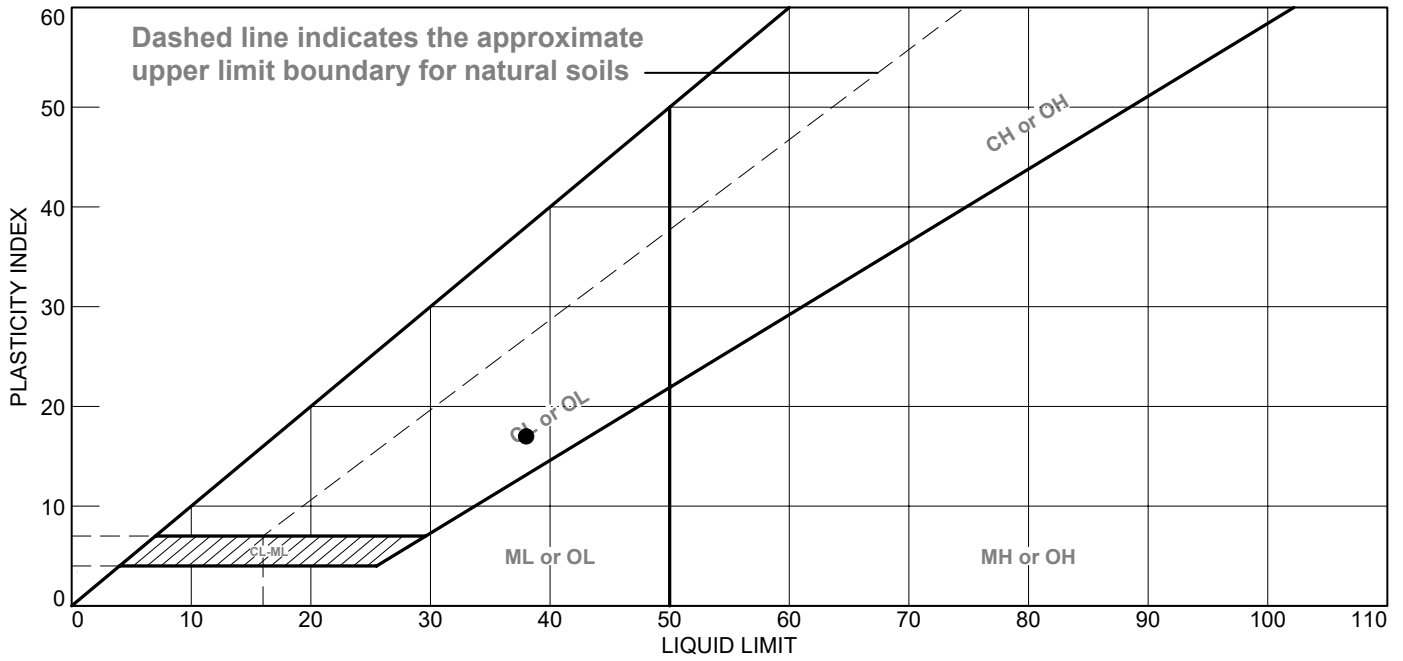


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• VERY DARK GRAY CLAY WITH SAND AND GRAVEL - ORGANICS AND ASH NOTED	38	21	17			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B016 **Depth:** 20.0'-22.0'
Sample Number: S-7

Remarks:

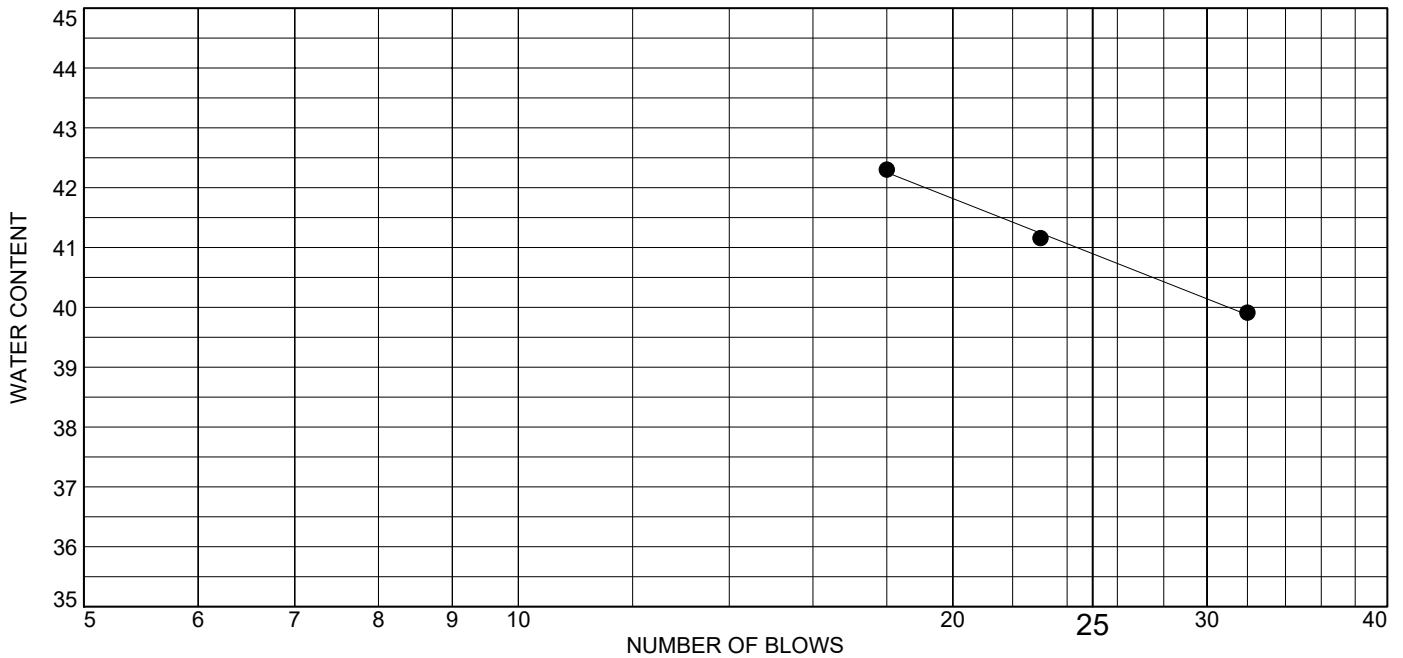
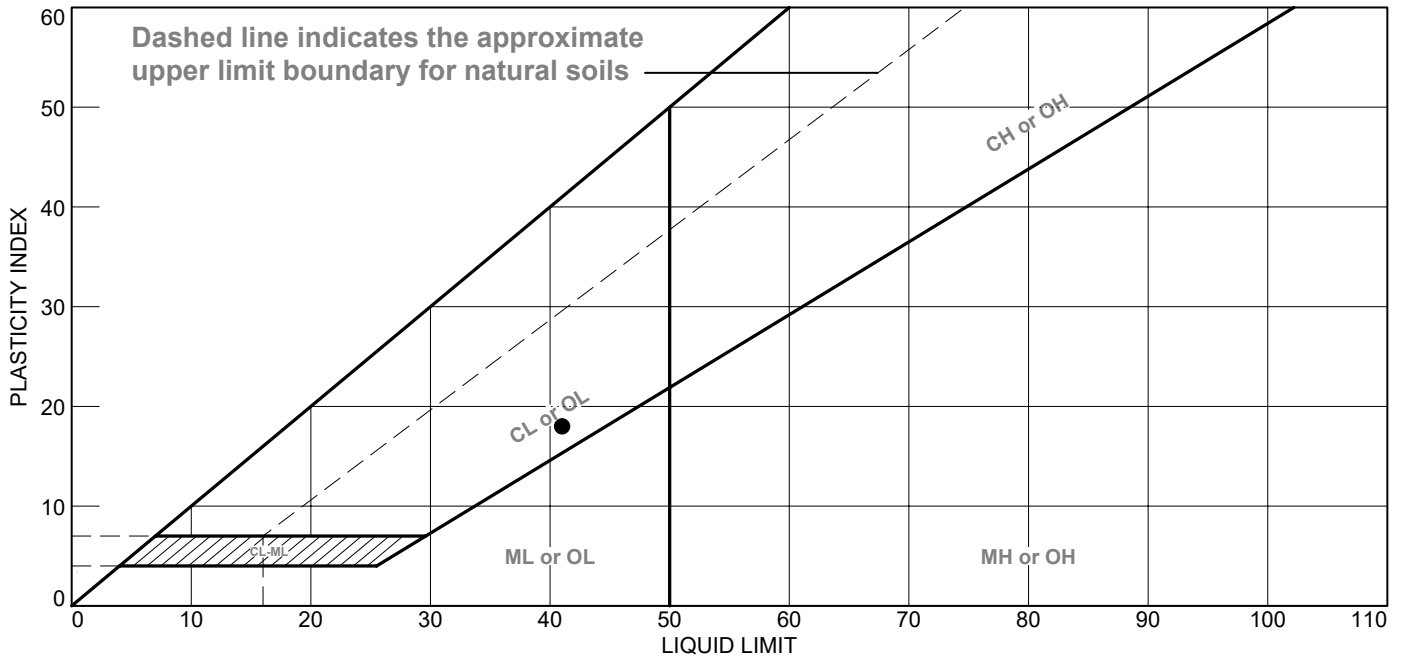


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK GRAY LEAN CLAY WITH SAND - FLY ASH AND ORGANICS NOTED	41	23	18			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B016 **Depth:** 35.0'-37.0'
Sample Number: S-10

Remarks:

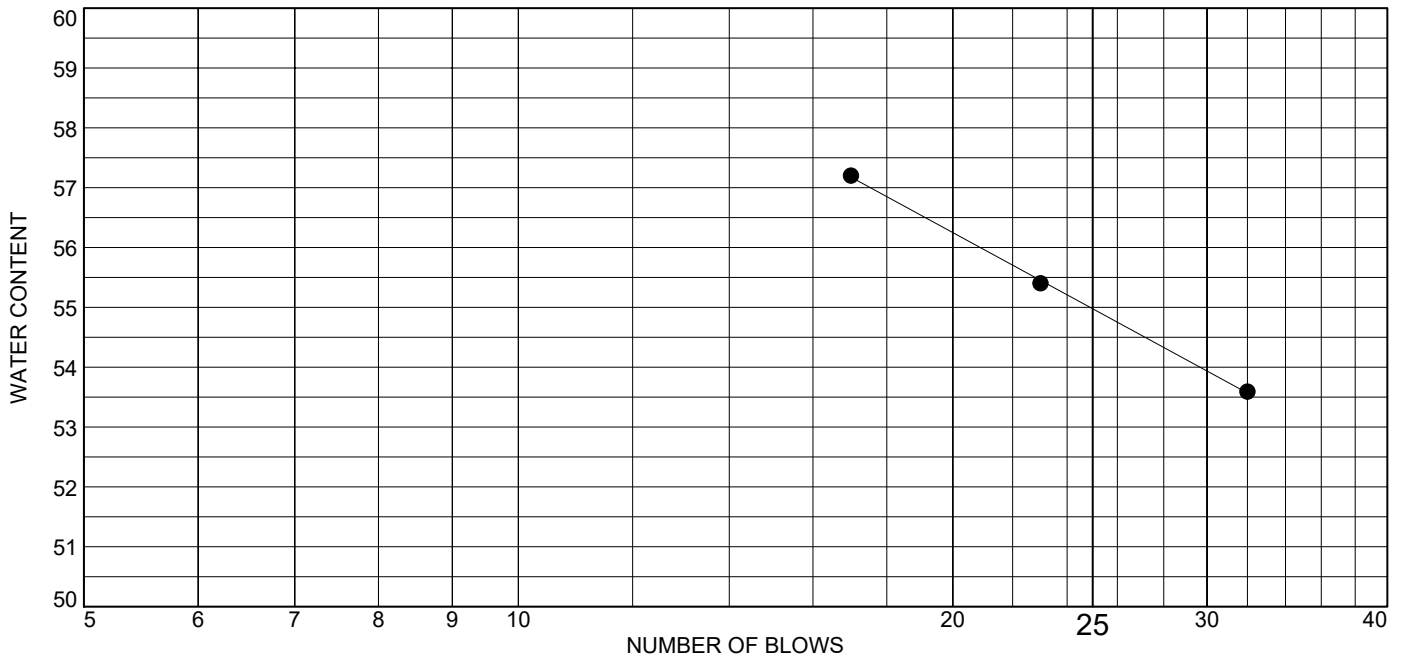
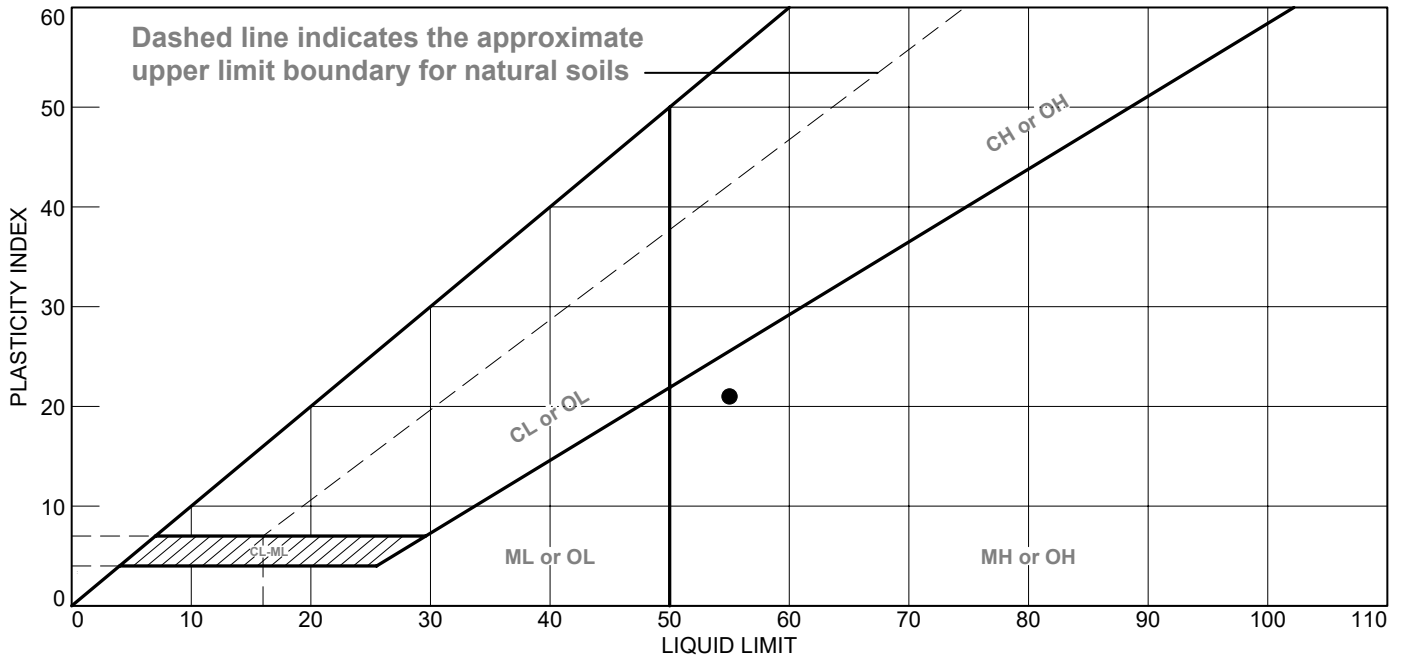
Figure



Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK GRAY LEAN CLAY WITH SILT	55	34	21			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B016 **Depth:** 60.0'-61.5'
Sample Number: S-15

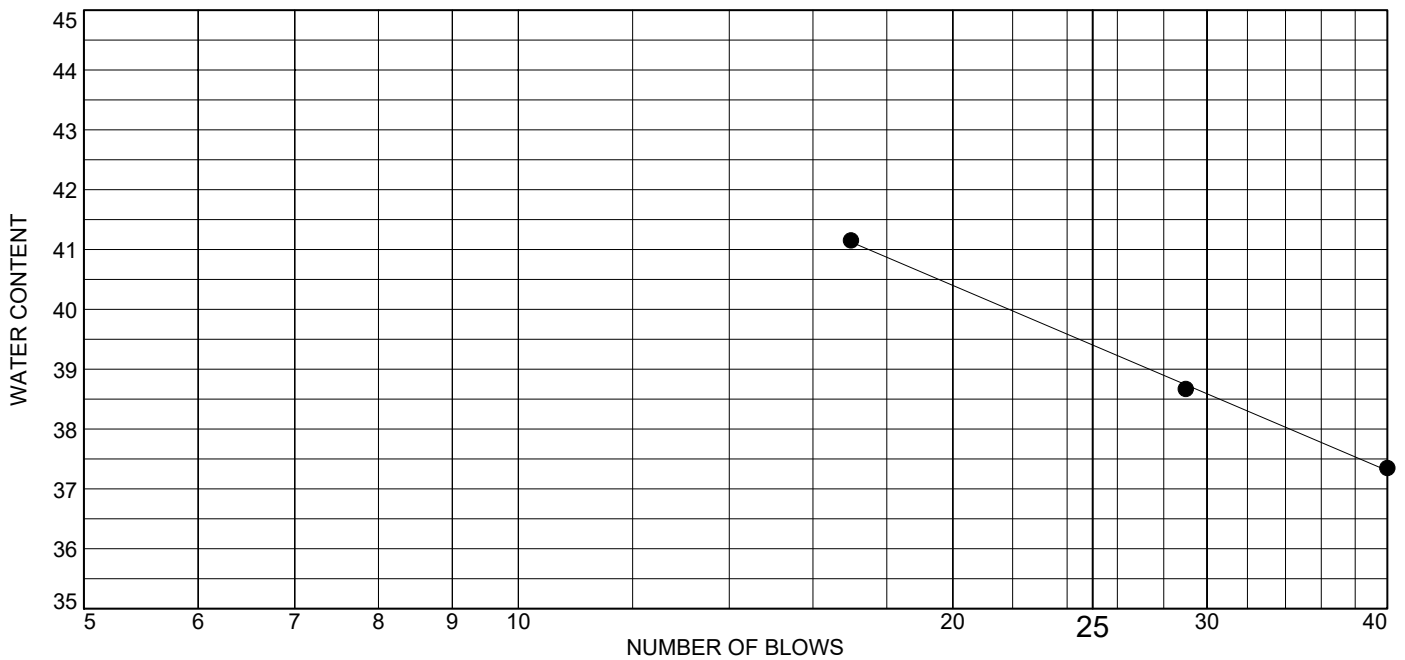
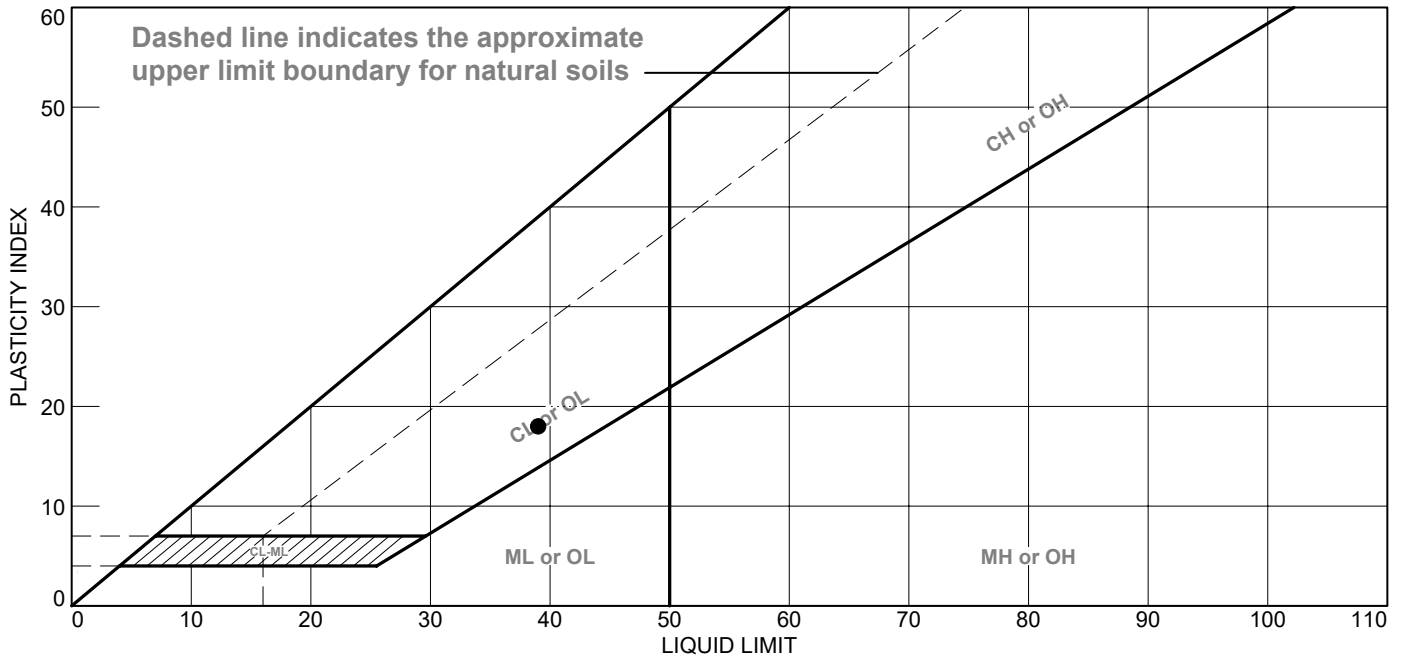
Remarks:



Figure

Tested By: HP **Checked By:** WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• VERY DARK GRAY LEAN CLAY WITH SAND	39	21	18			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B017 **Depth:** 5.0'-7.0'
Sample Number: S-3

Remarks:

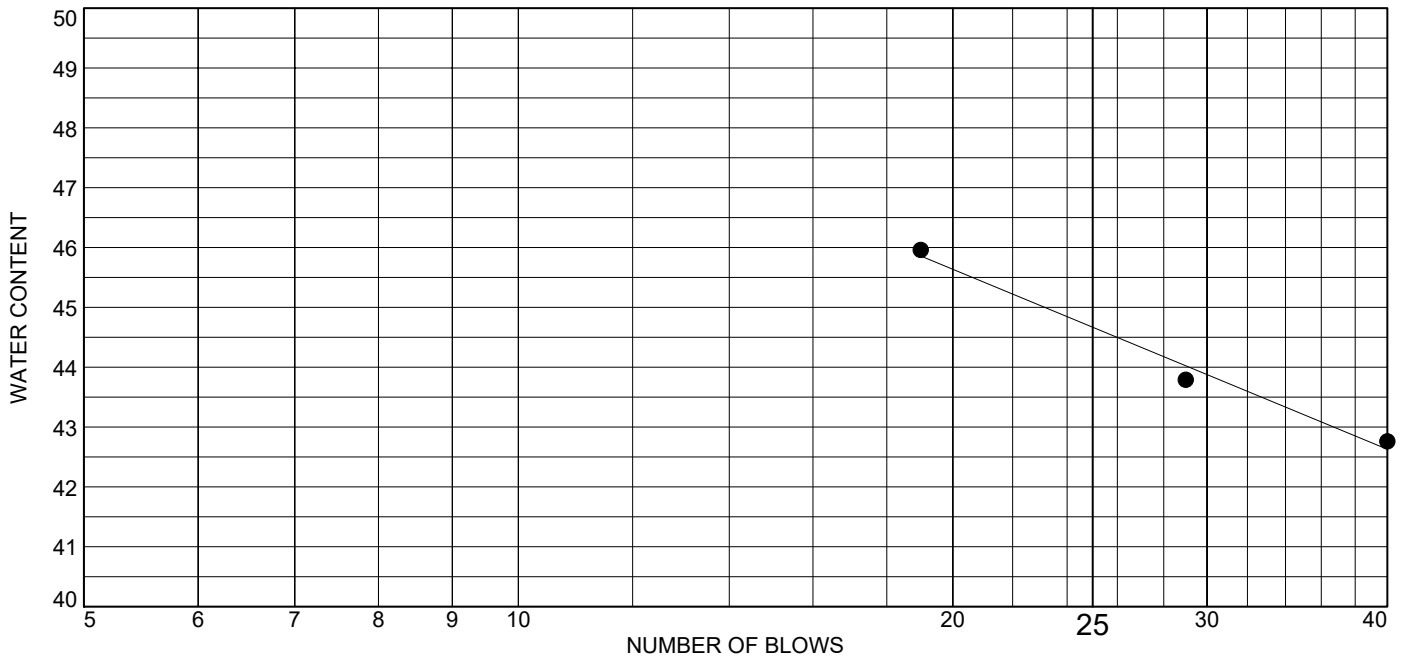
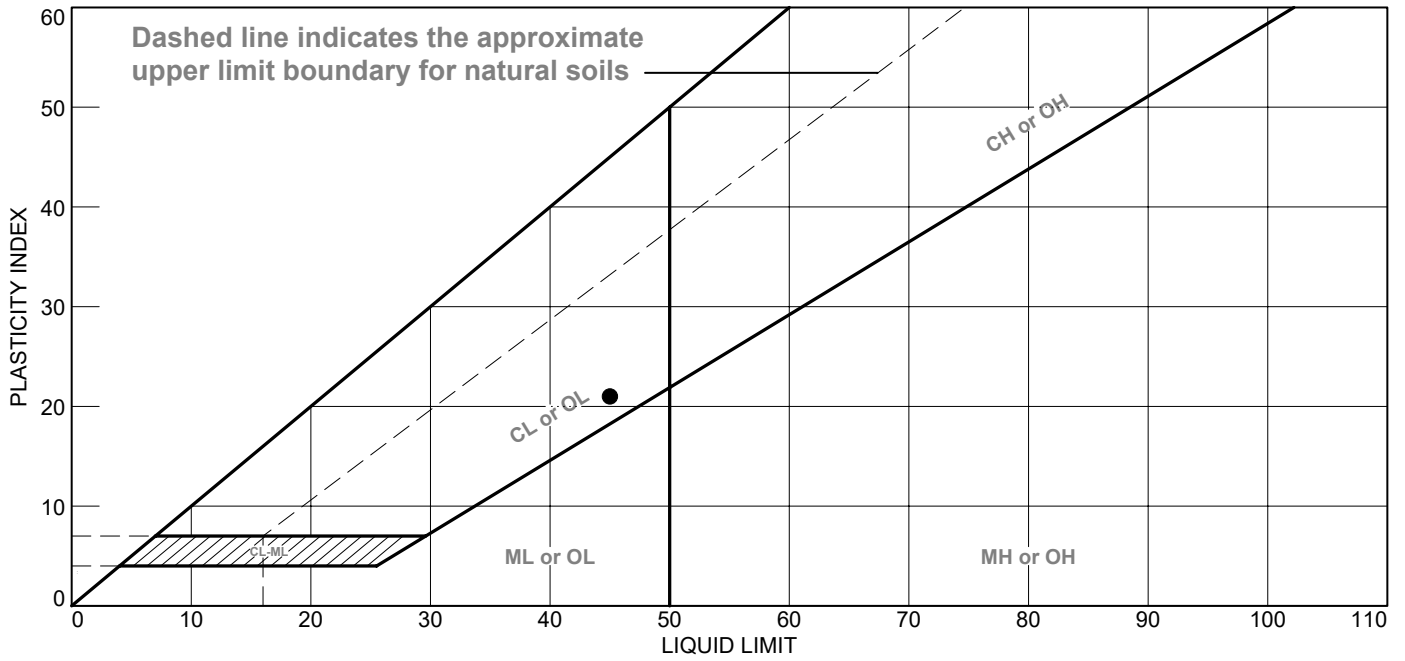


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• BROWN AND GRAY LEAN CLAY	45	24	21			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B017 **Depth:** 15.0'-17.0'
Sample Number: S-6

Remarks:

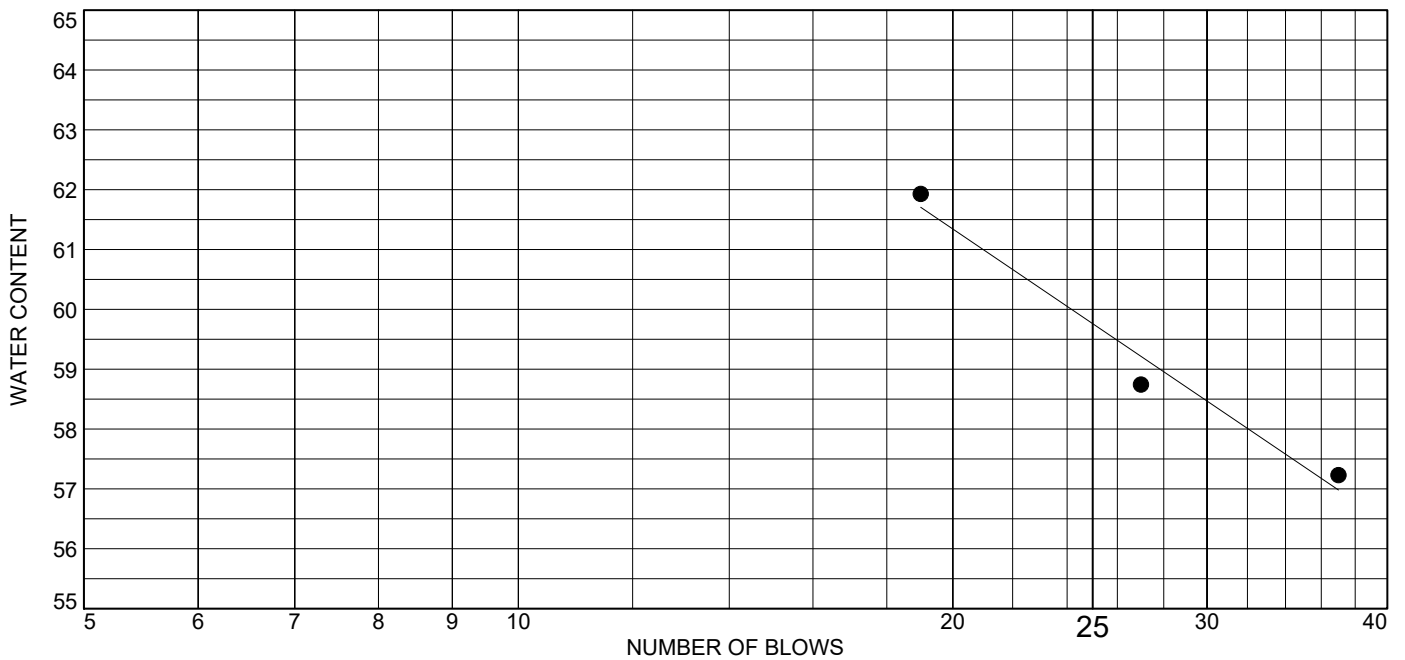
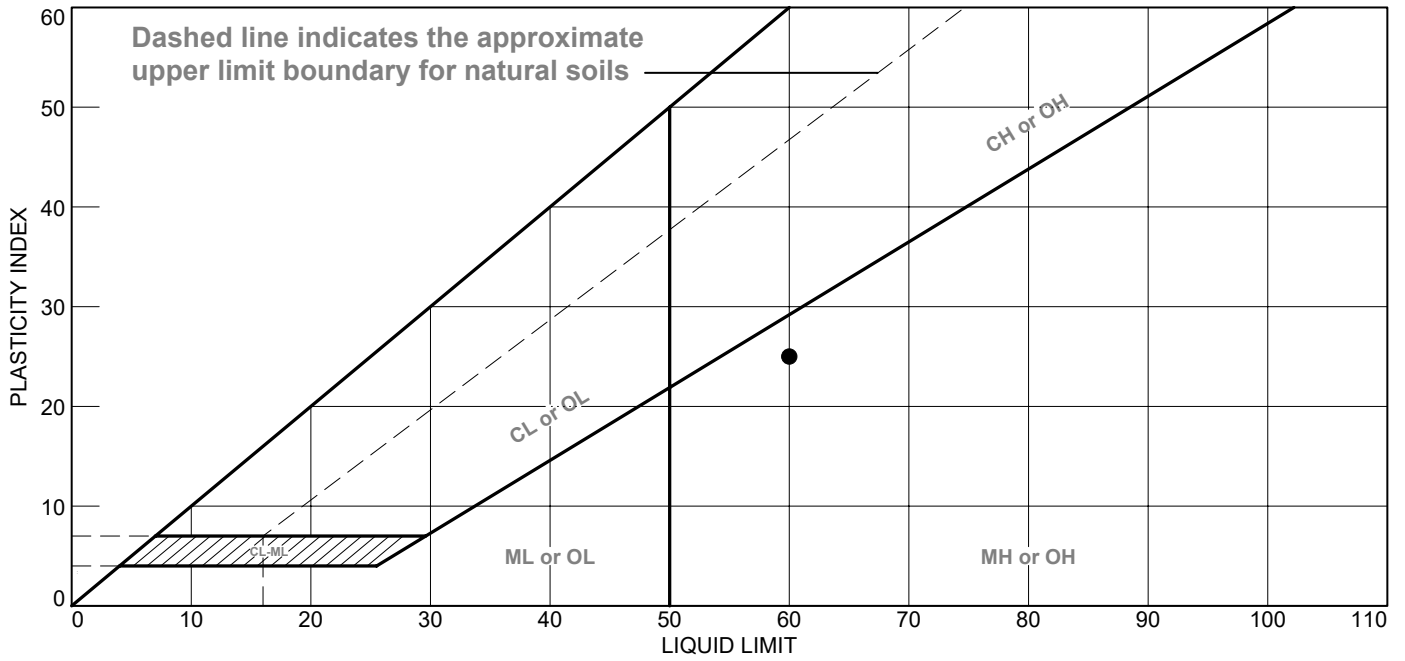
Figure



Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• DARK BROWNISH GRAY ORGANIC CLAY WITH SAND - SAND SEAMS AND SHELL NOTED	60	35	25			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B017 **Depth:** 30.0'-32.0'
Sample Number: S-9

Remarks:

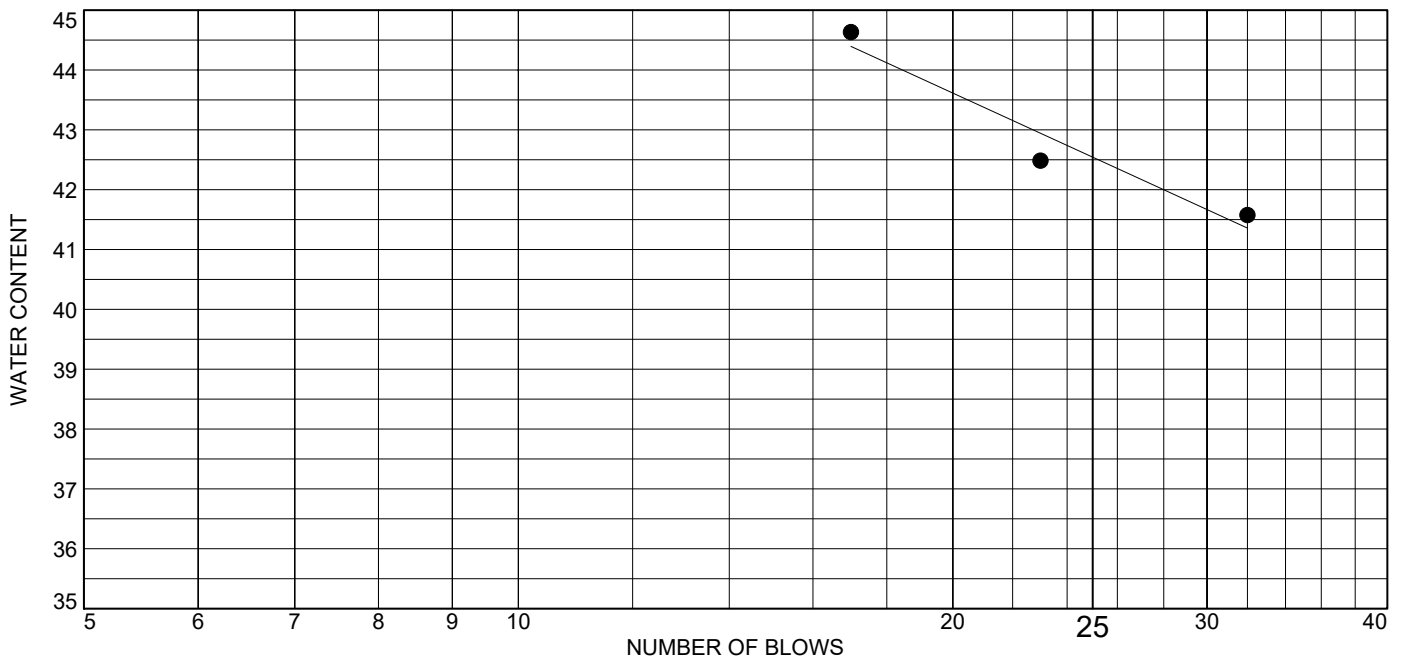
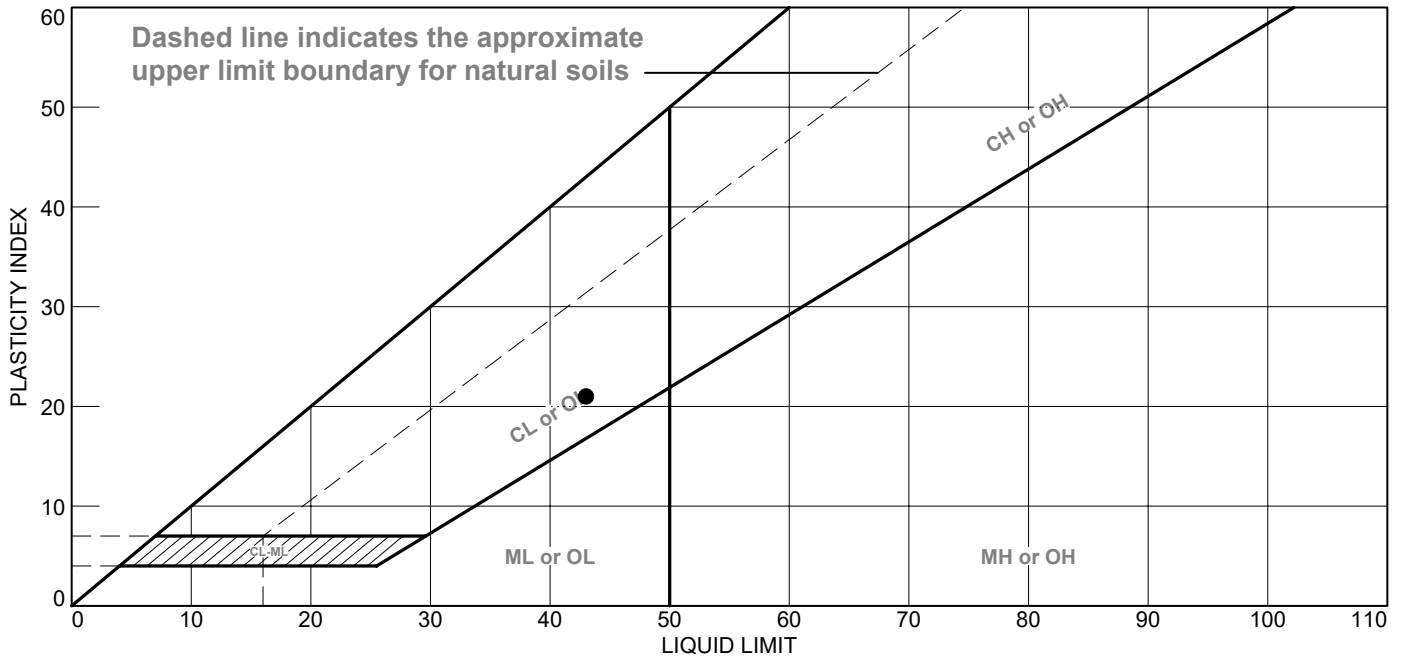
Figure



Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK BROWNISH GRAY LEAN CLAY	43	22	21			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B018 **Depth:** 25.0'-27.0'
Sample Number: S-8

Remarks:

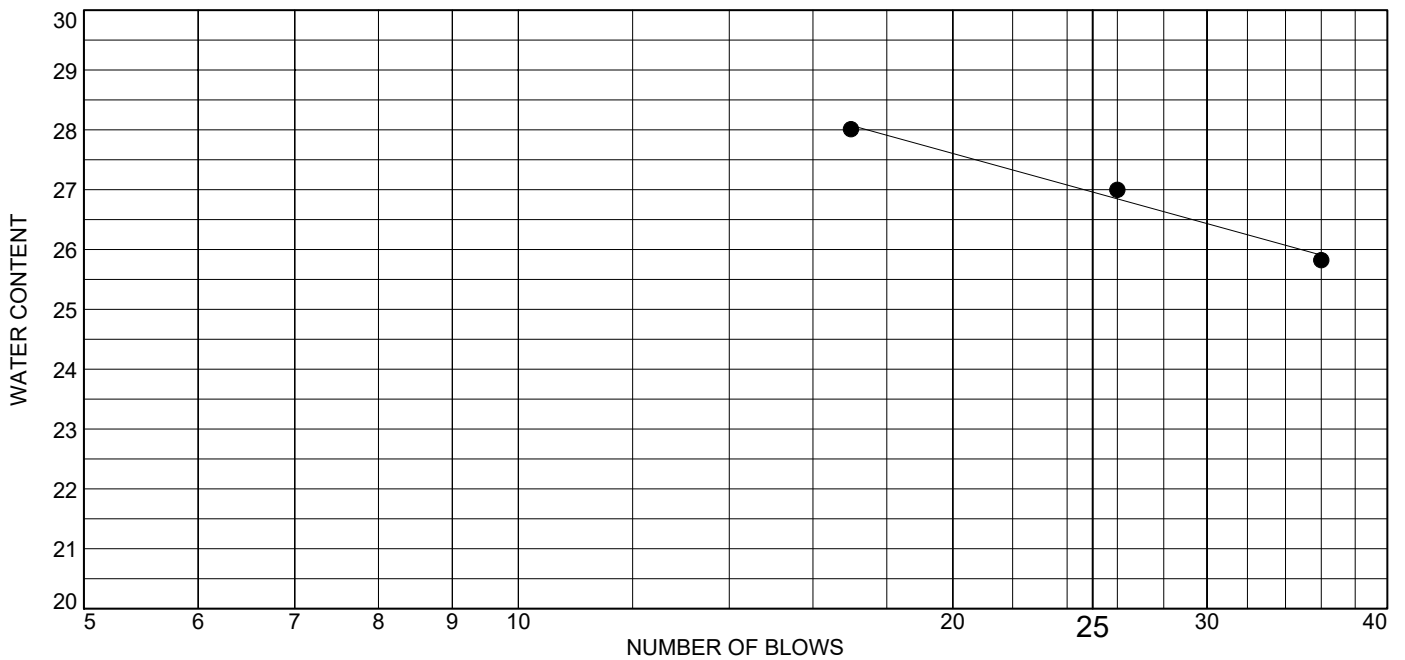
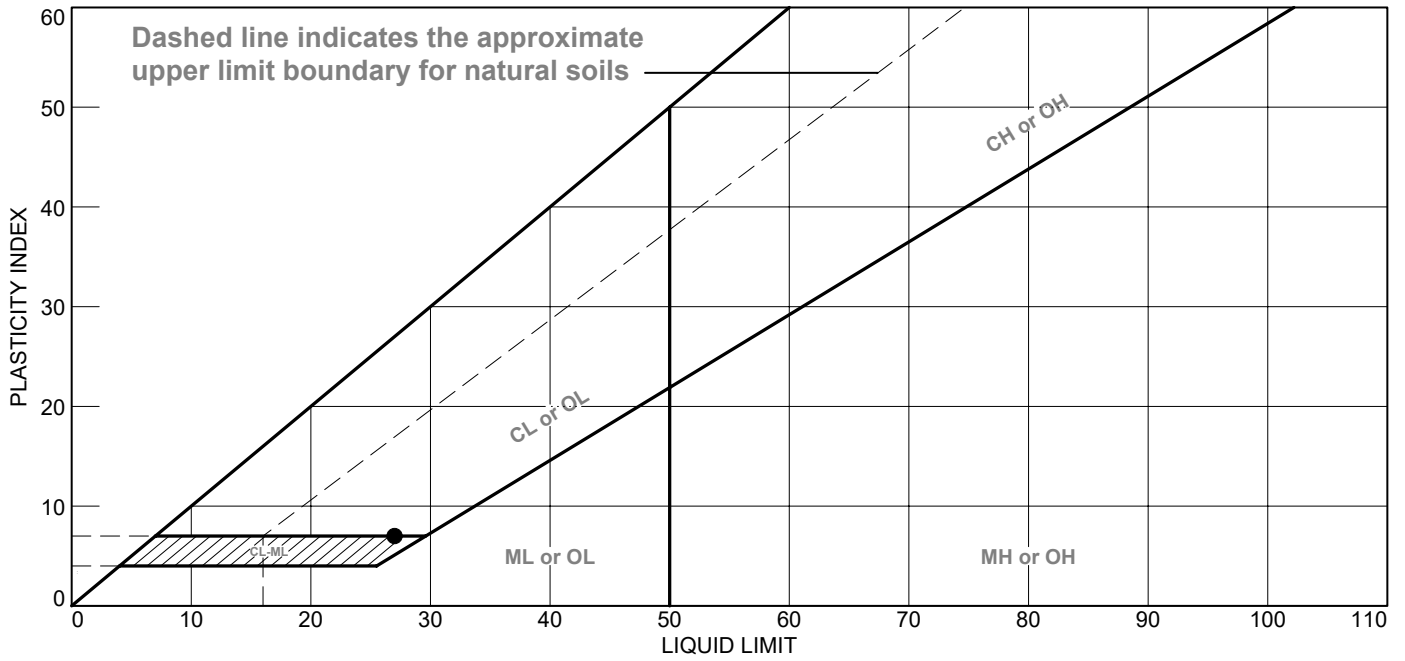


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• DARK BROWN AND GRAY ORGANIC CLAY WITH SAND - SAND SEAMS AND SHELL NOTED	27	20	7			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B018 **Depth:** 40.0'-42.0'
Sample Number: S-11

Remarks:

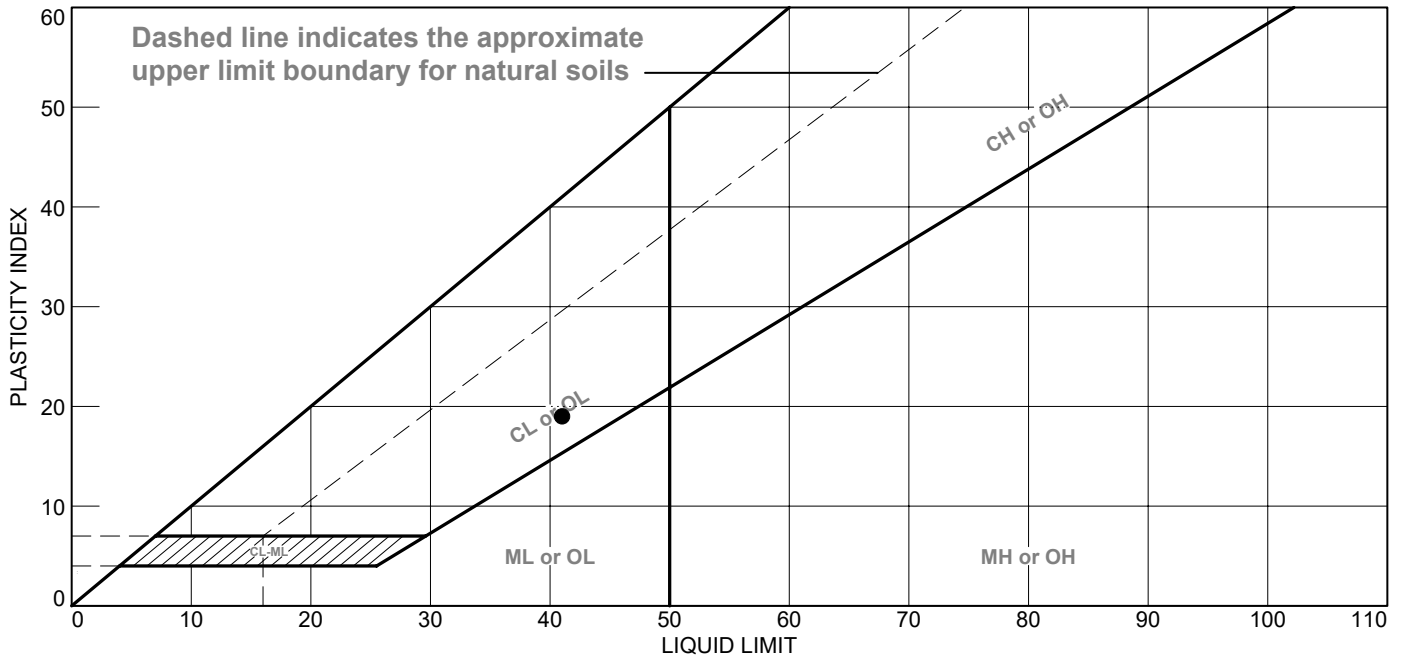


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• DARK BROWN LEAN CLAY WITH SAND	41	22	19			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B019 **Depth:** 7.5'-9.5'
Sample Number: S-2

Remarks:

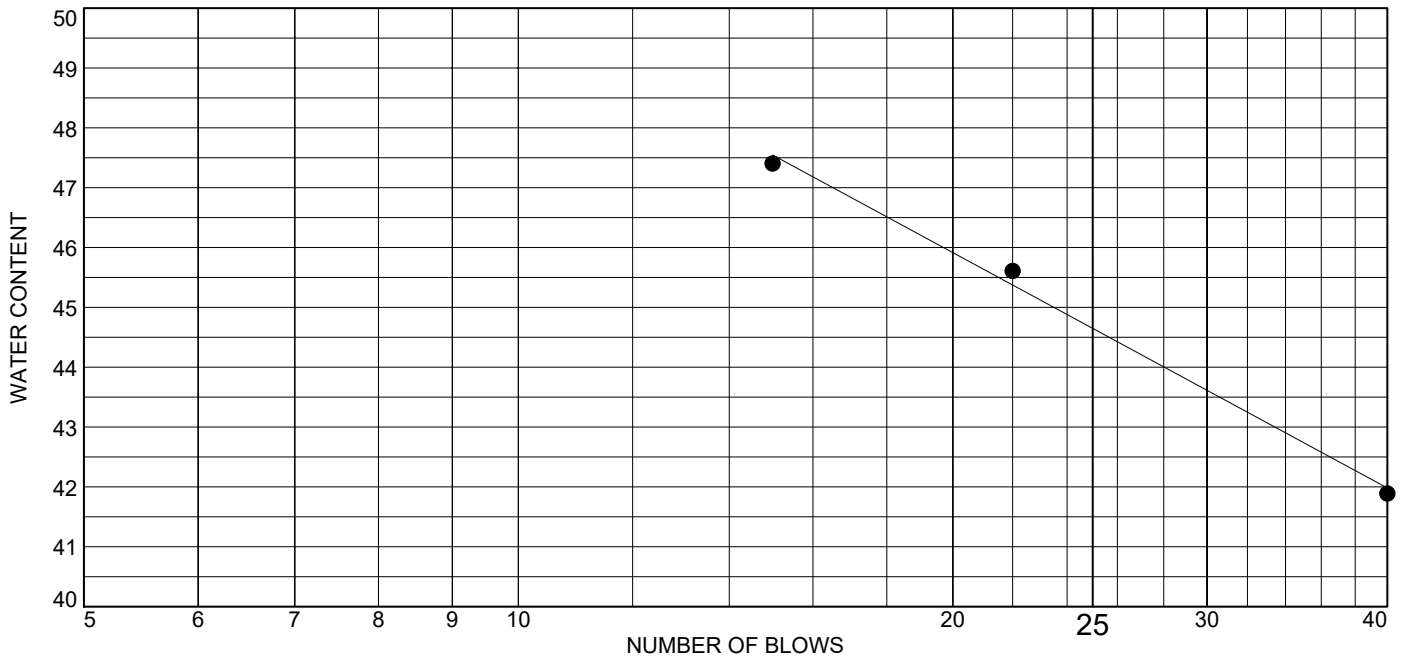
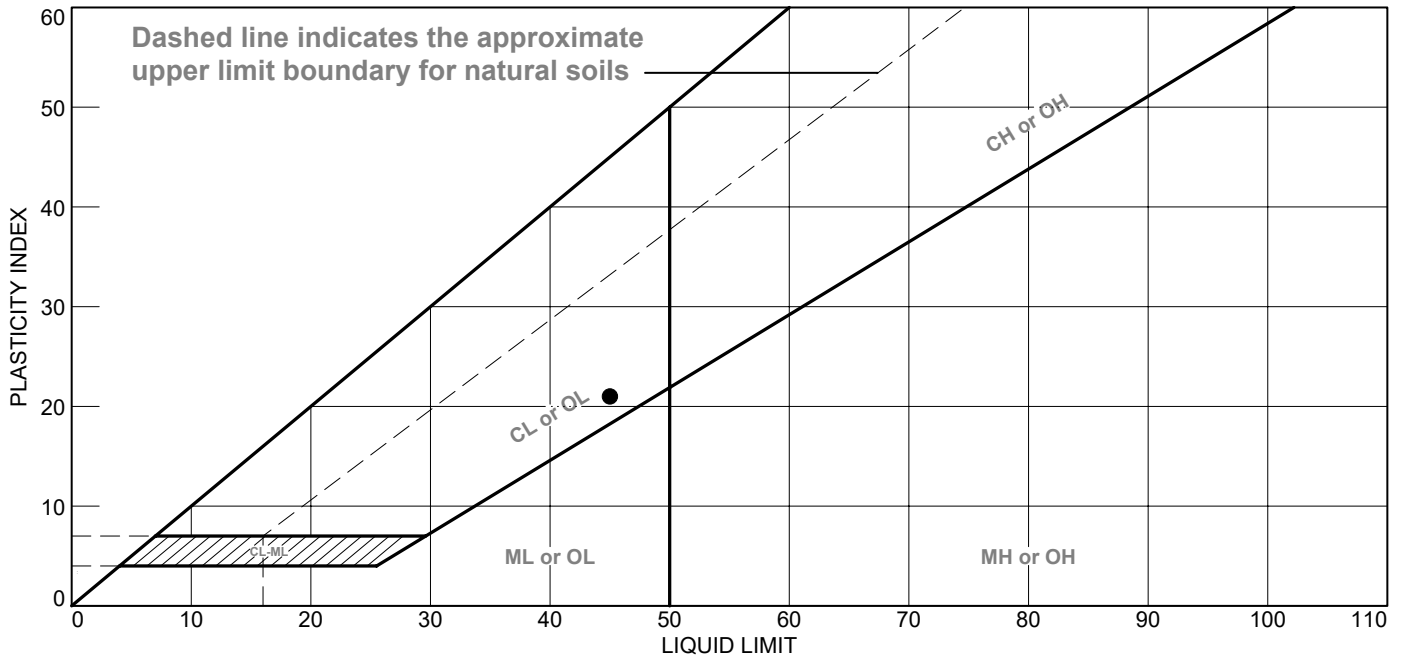


Figure

Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● GRAY AND BROWN LEAN CLAY	45	24	21			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B019 **Depth:** 12.5'-14.5'
Sample Number: S-4

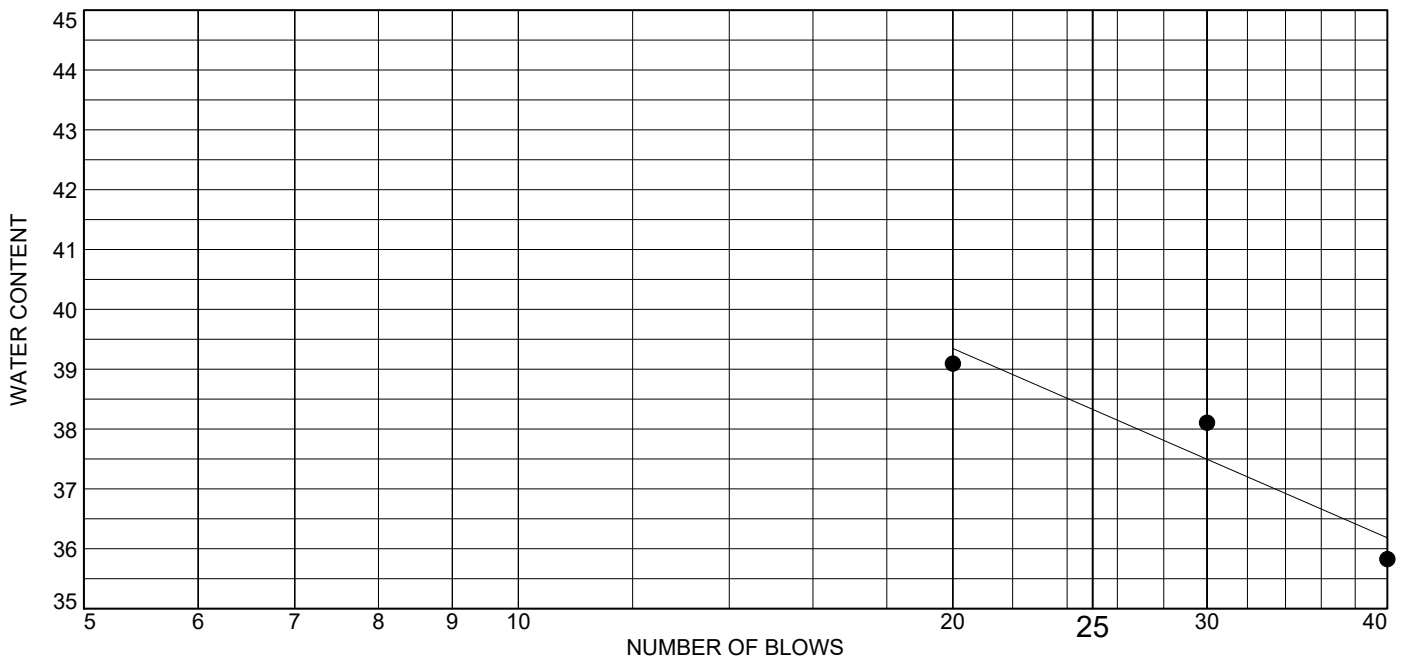
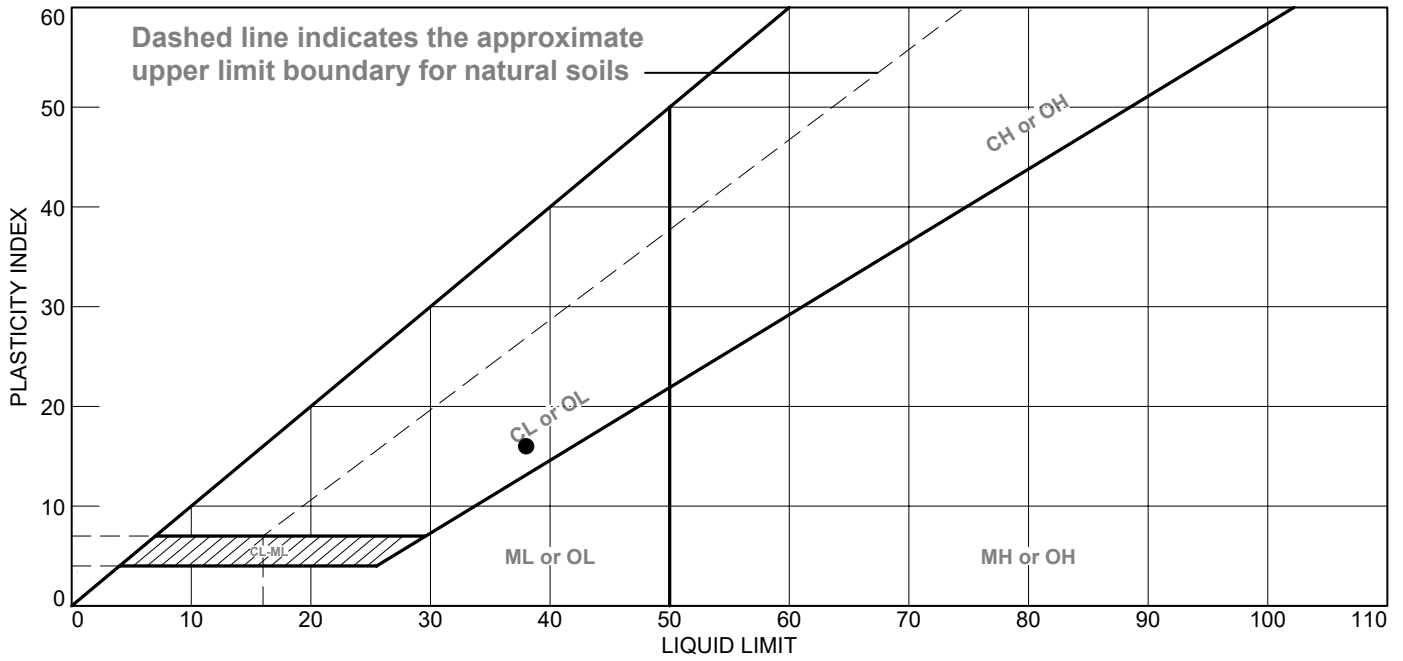
Remarks:



Figure

Tested By: HP **Checked By:** WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN AND GRAY LEAN CLAY	38	22	16			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B019 **Depth:** 20.0'-22.0'
Sample Number: S-6

Remarks:

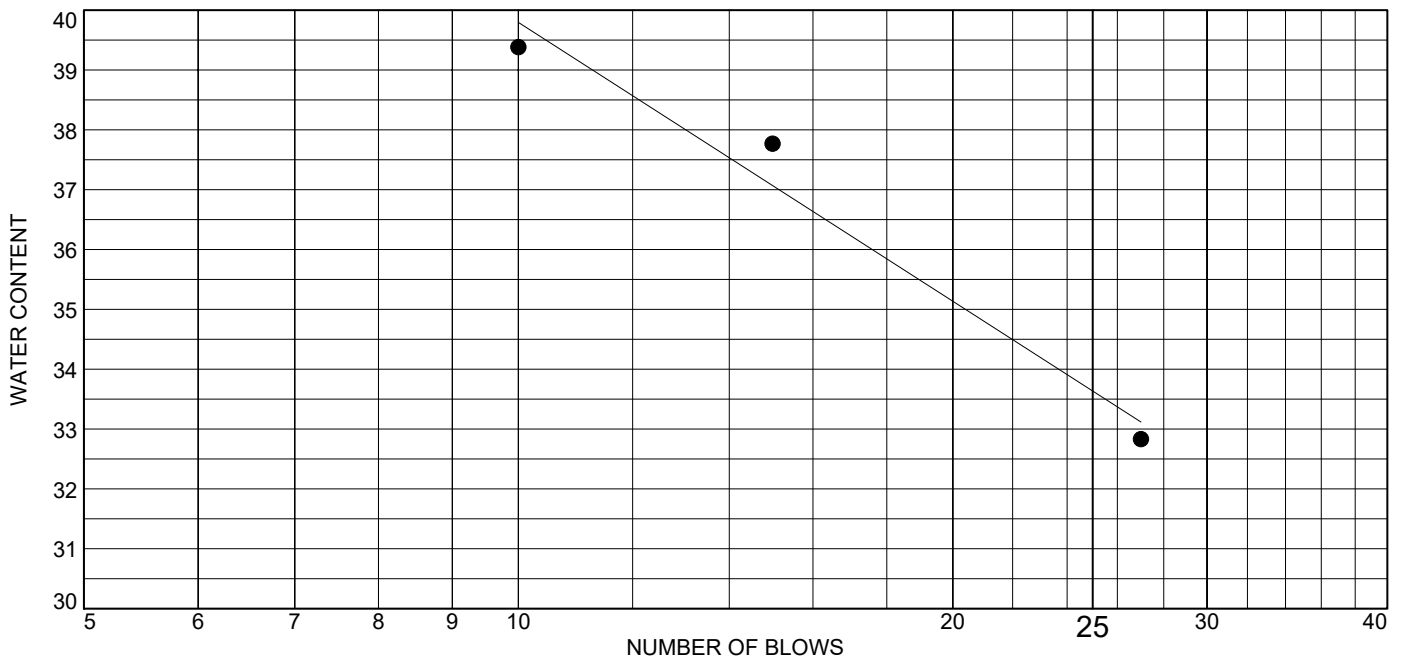
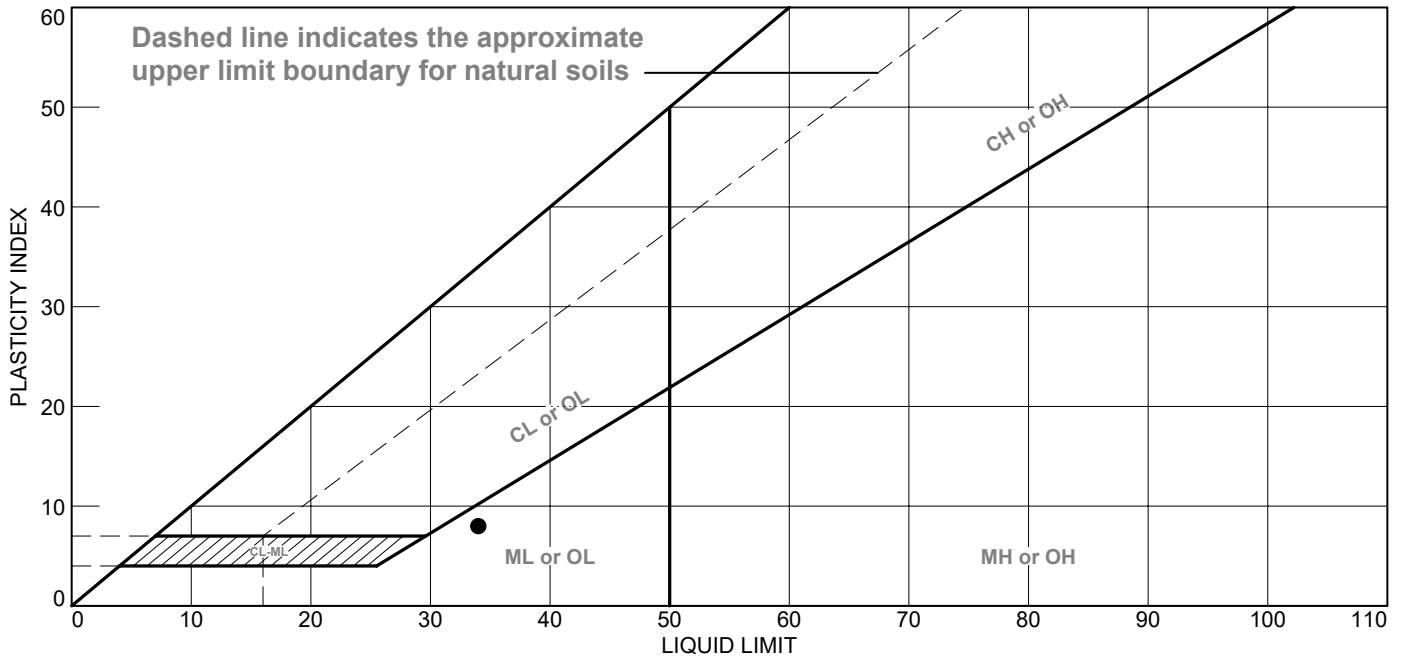
Figure



Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• VERY DARK GRAY ORGANIC SILT WITH SAND - SHELL NOTED	34	26	8			ML

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B019 **Depth:** 25.0'-27.0'
Sample Number: S-7

Remarks:

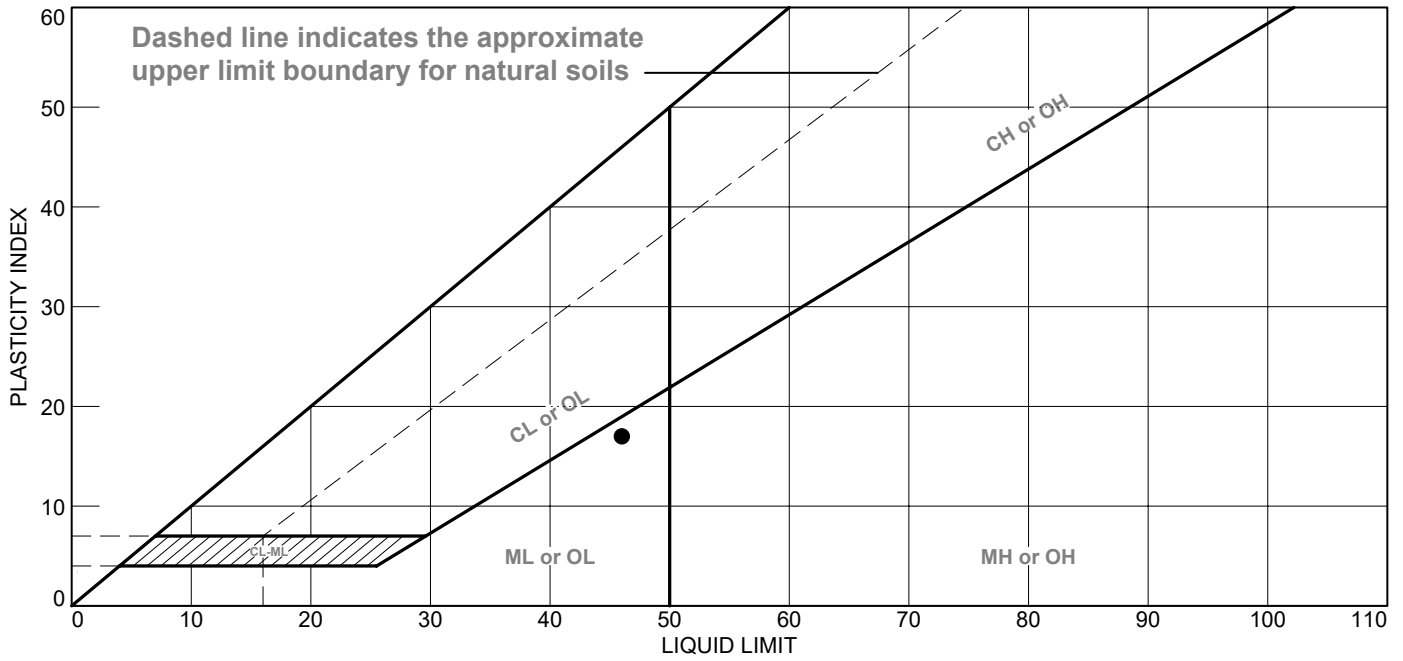


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● GRAY LEAN CLAY WITH SILT	46	29	17			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B019 **Depth:** 50.0'-51.5'
Sample Number: S-12

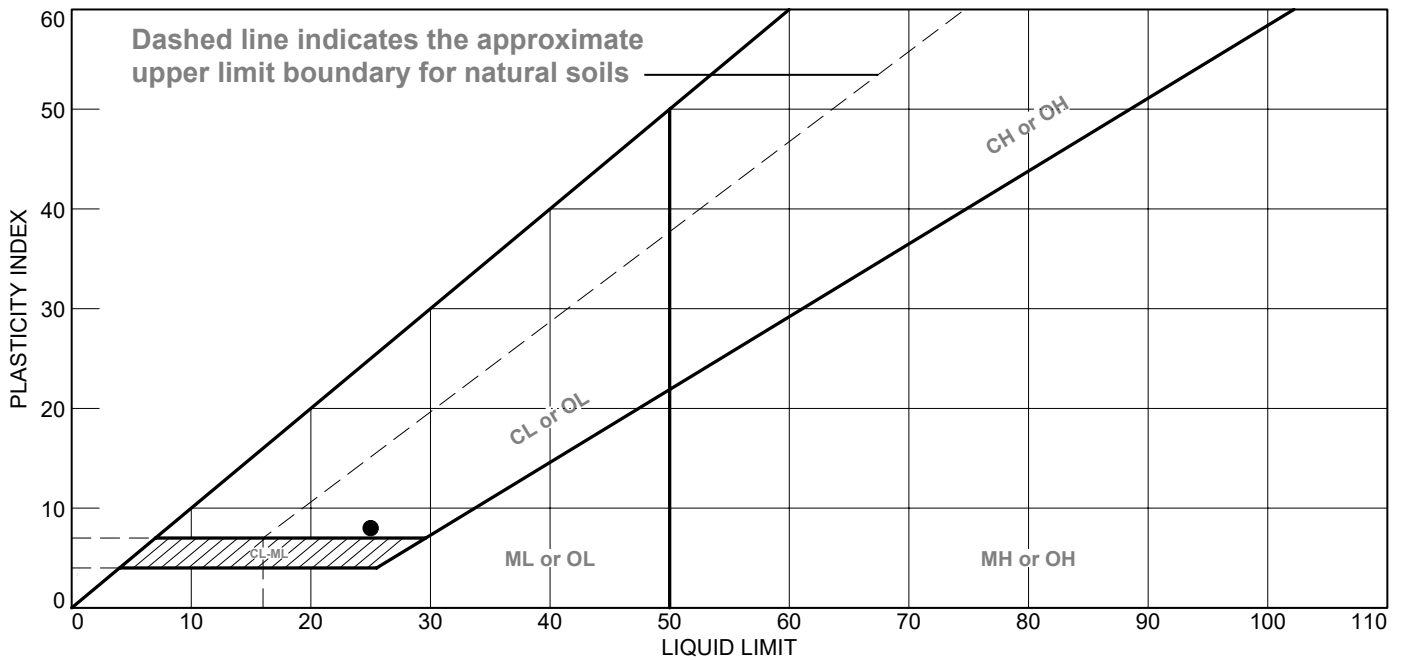
Remarks:



Figure

Tested By: HP **Checked By:** WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN AND DARK BROWN LEAN CLAY WITH SILT AND GRAVEL	25	17	8			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B020 **Depth:** 0.0'-1.5'
Sample Number: S-1

Remarks:

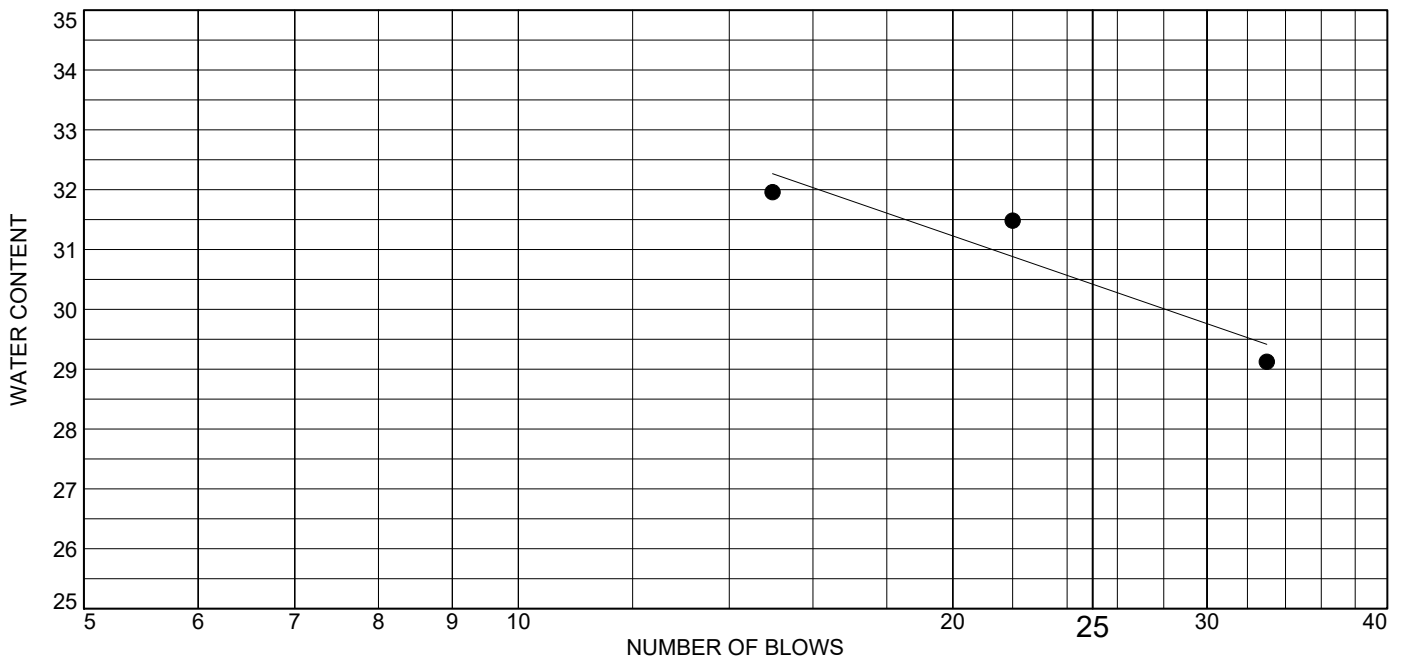
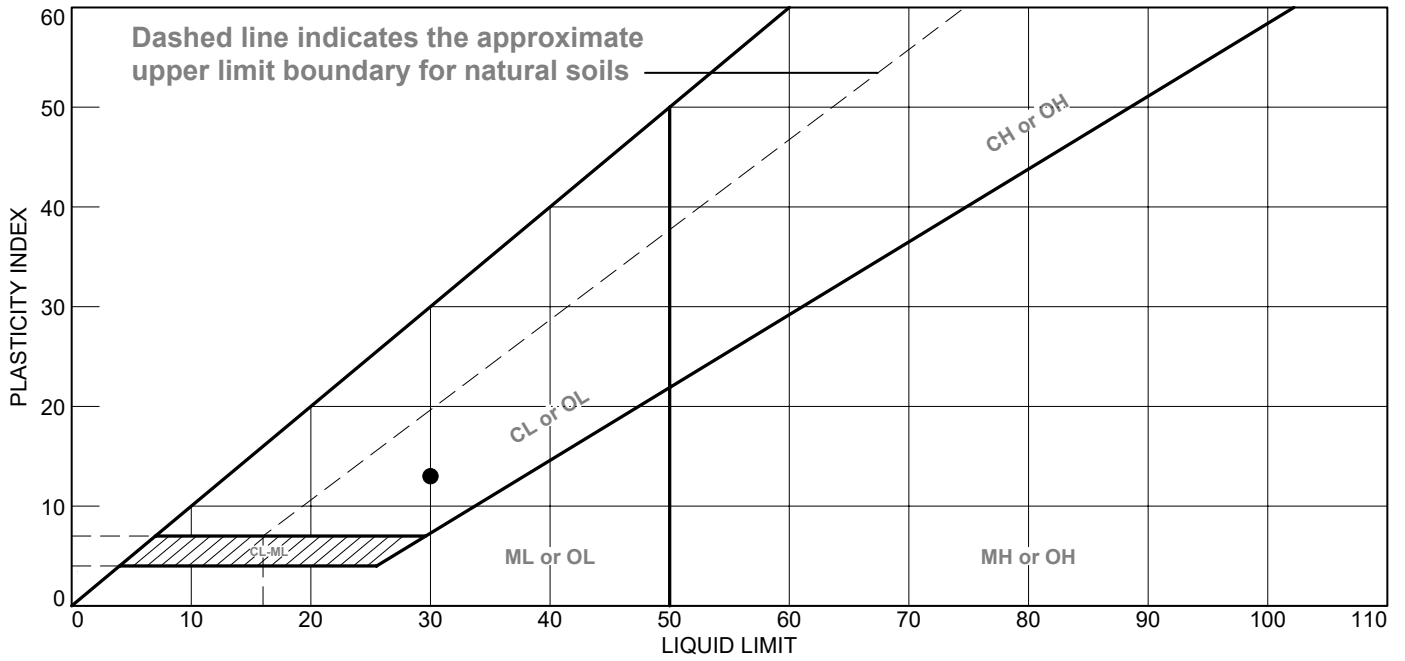


Figure

Tested By: DT

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN SANDY LEAN CLAY WITH GRAVEL	30	17	13			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B020 **Depth:** 9.5'-11.5'
Sample Number: S-5

Remarks:

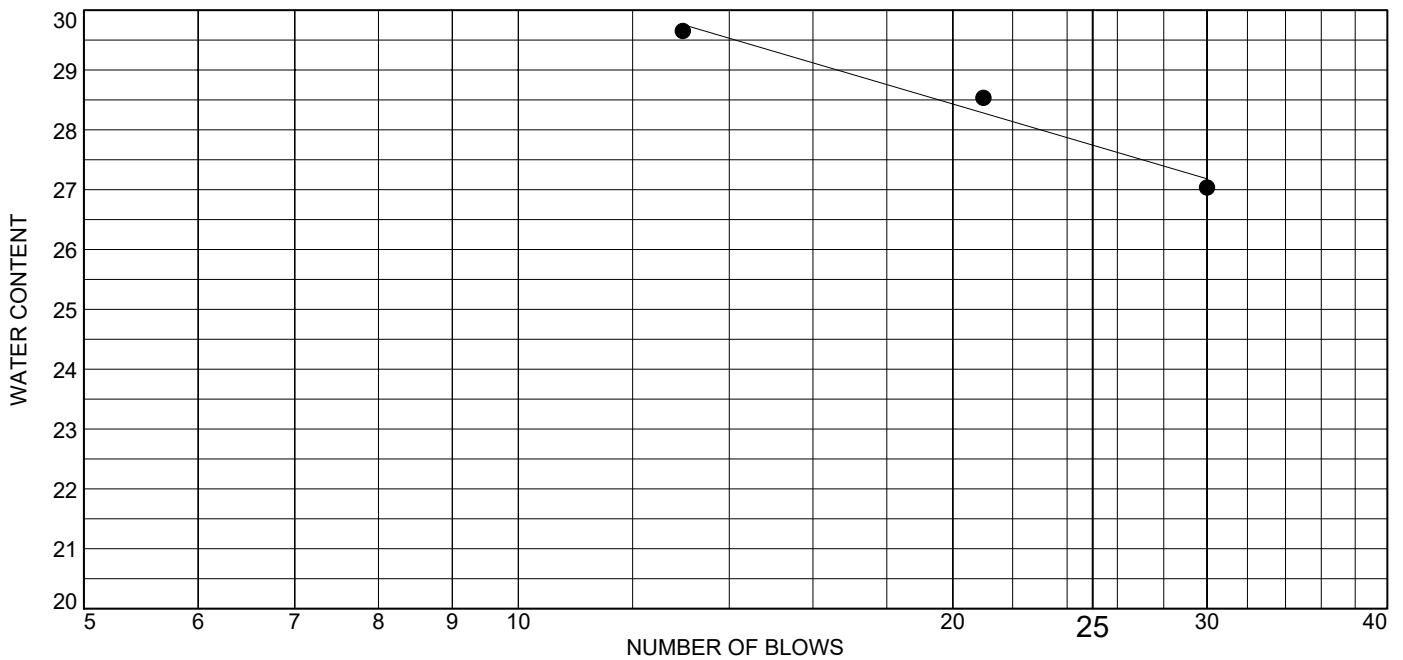
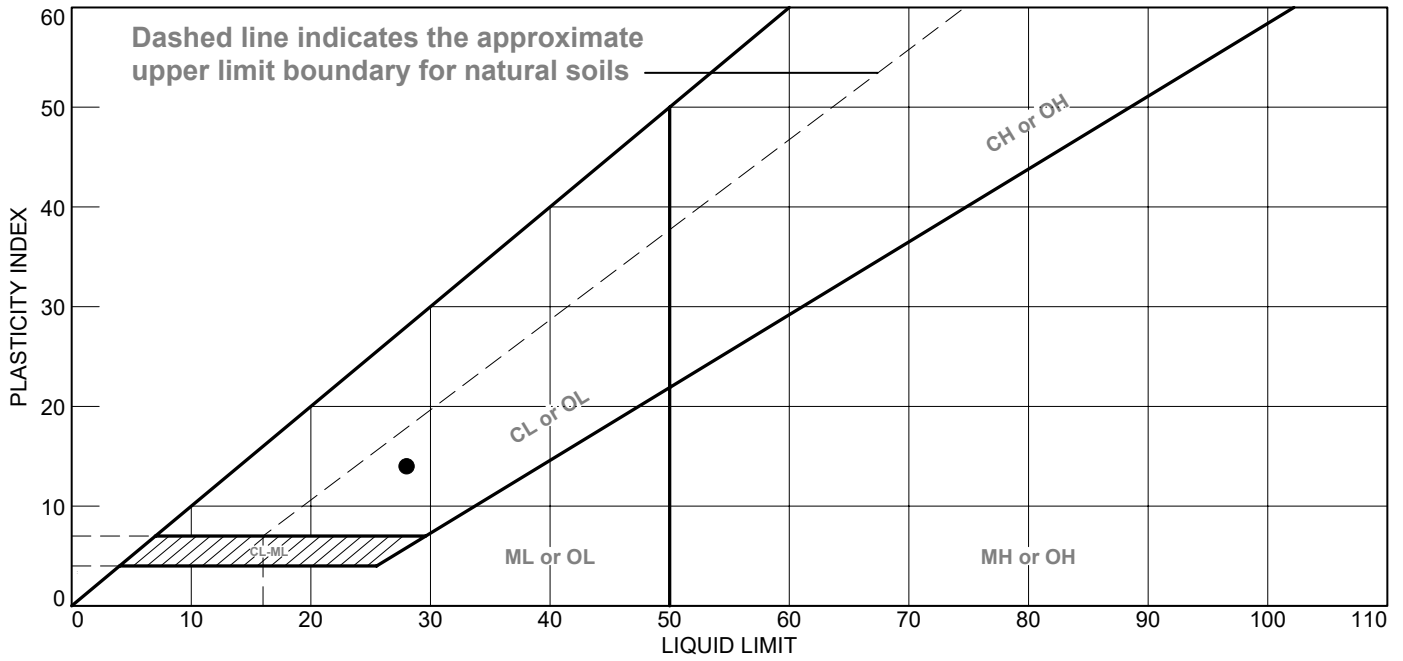


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN LEAN CLAY WITH SAND AND GRAVEL	28	14	14			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B021 **Depth:** 5.0'-6.0'
Sample Number: S-3

Remarks:

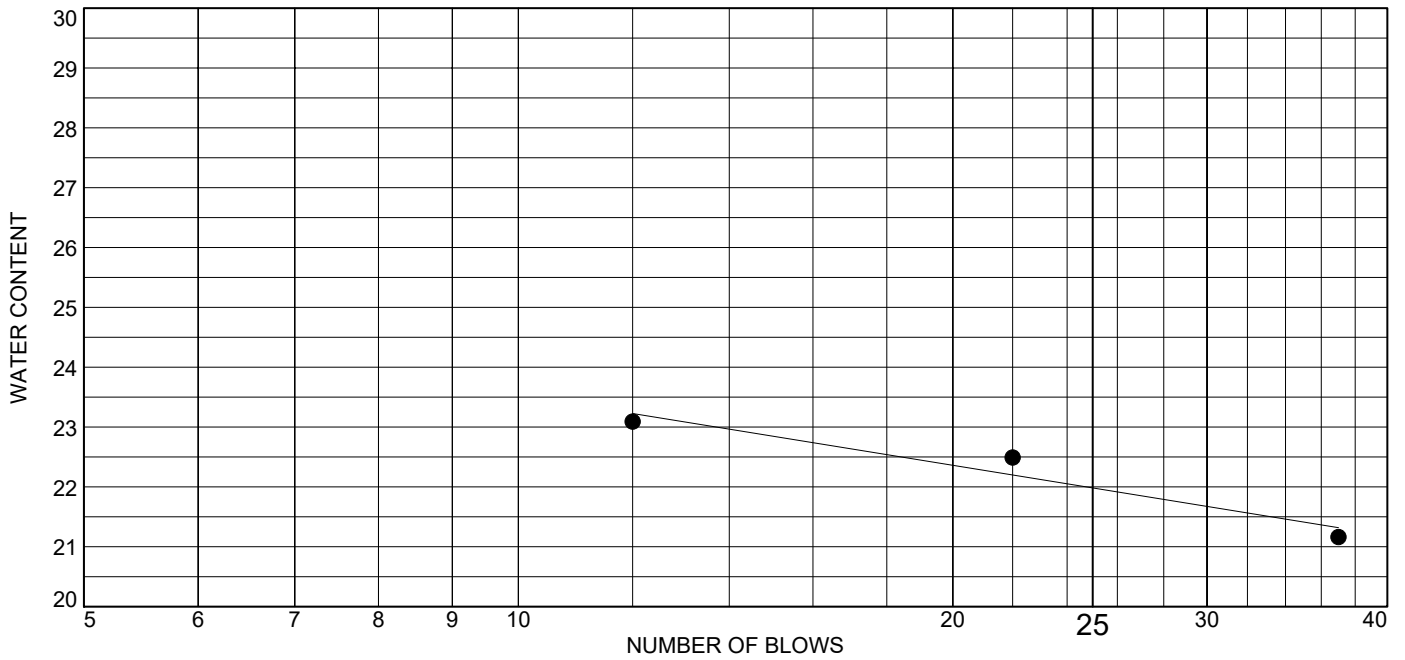
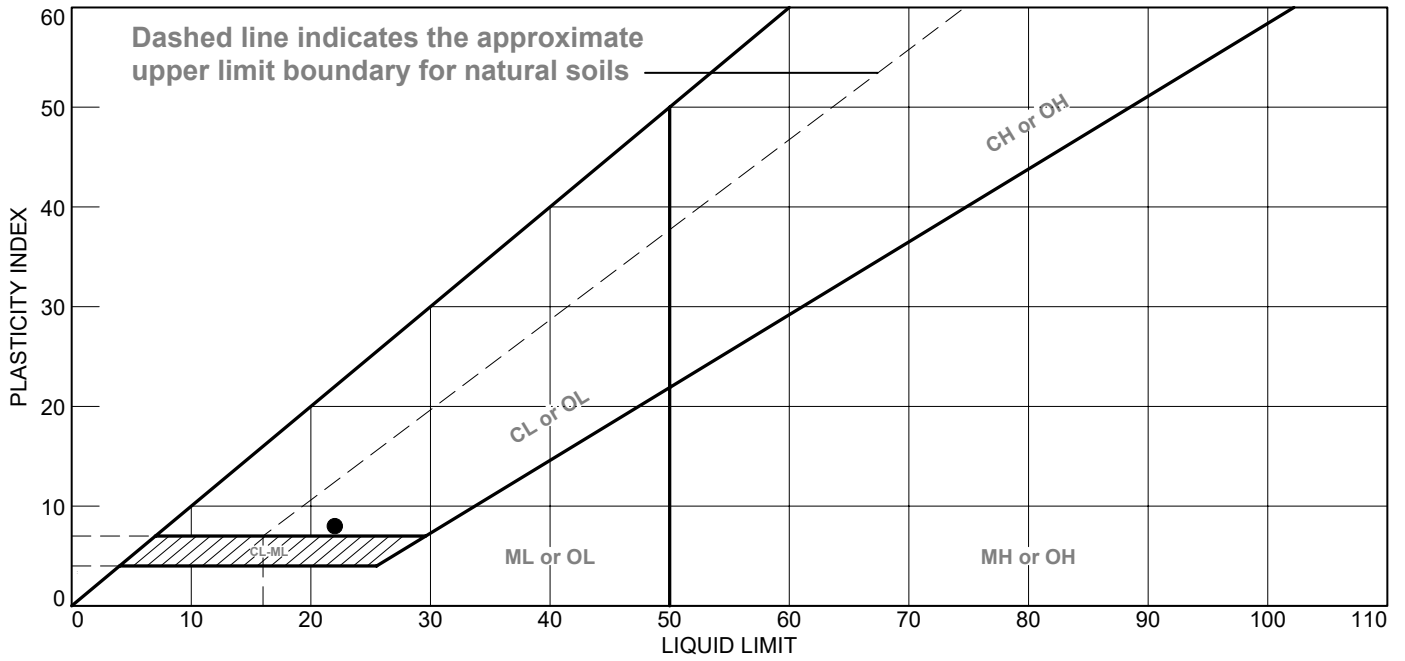


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN LEAN CLAY WITH SAND - ROOTS NOTED	22	14	8			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B021 **Depth:** 15.0'-16.5'
Sample Number: S-6

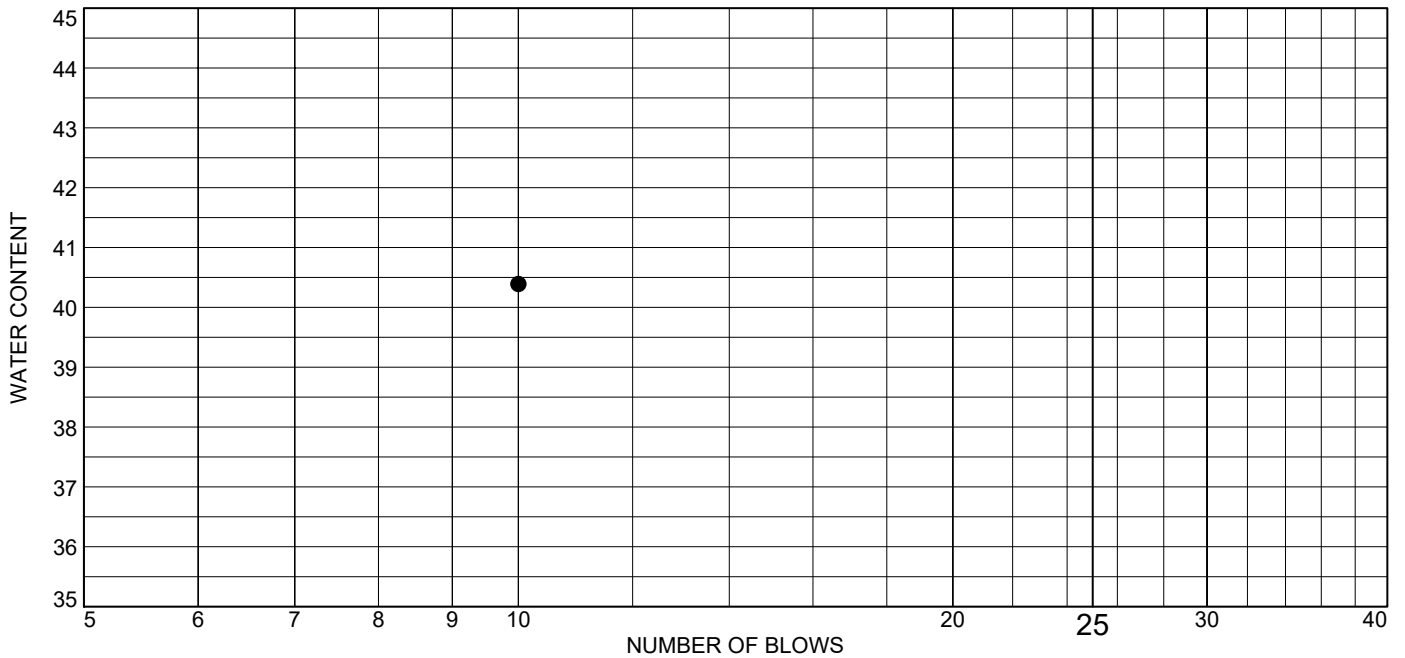
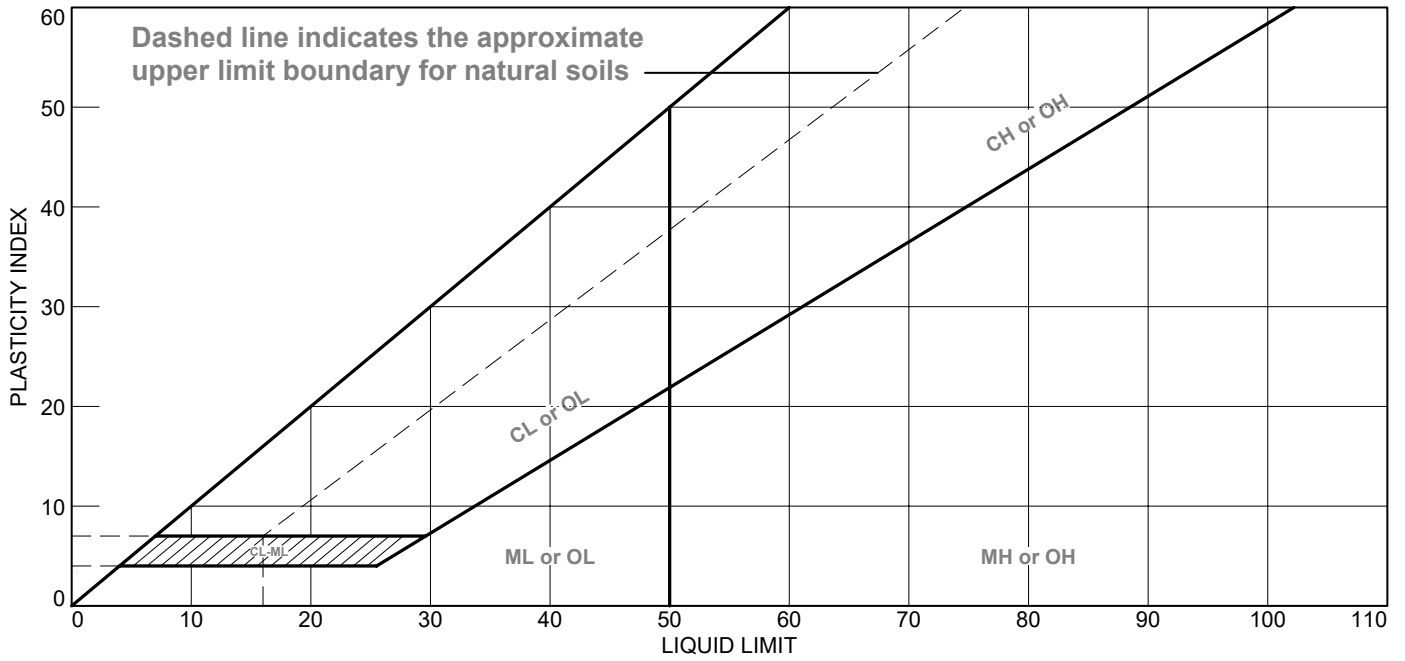
Remarks:

Figure



Tested By: HP **Checked By:** WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
•	VERY DARK GRAY VARVED FLY ASH	36	42	NP			

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B022 **Depth:** 2.5'-4.5'
Sample Number: S-2



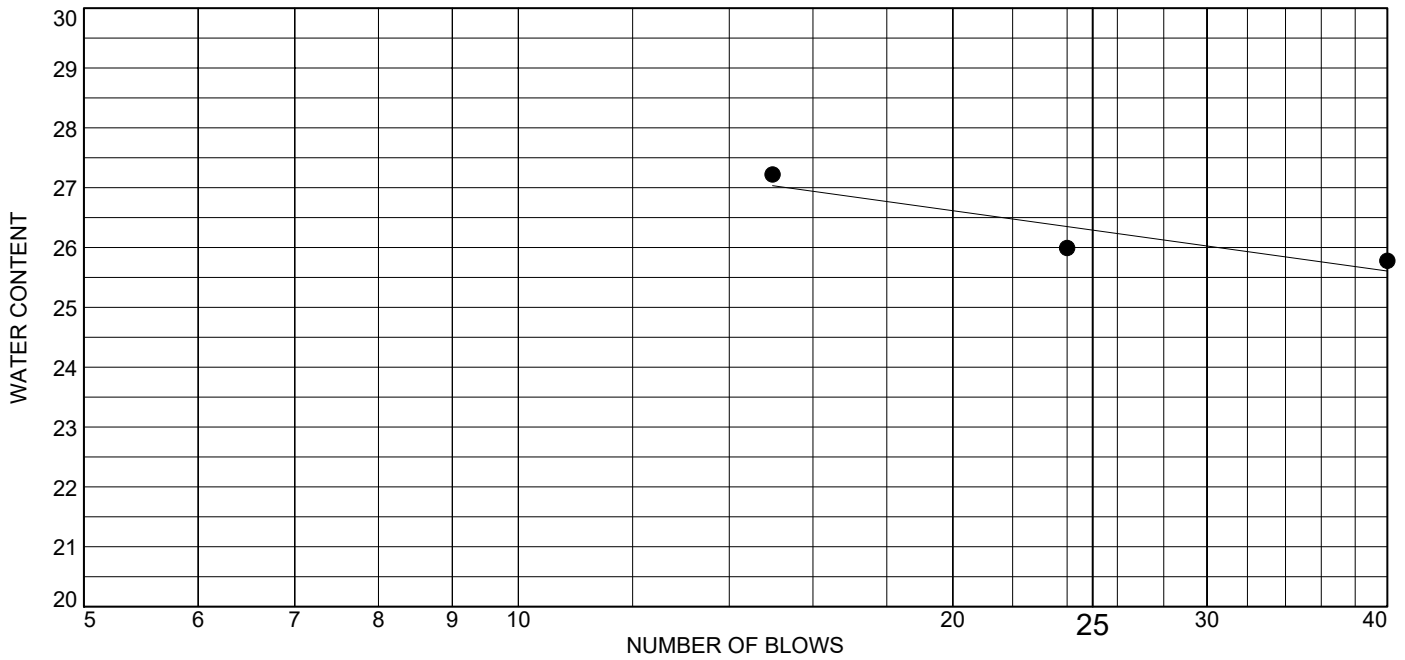
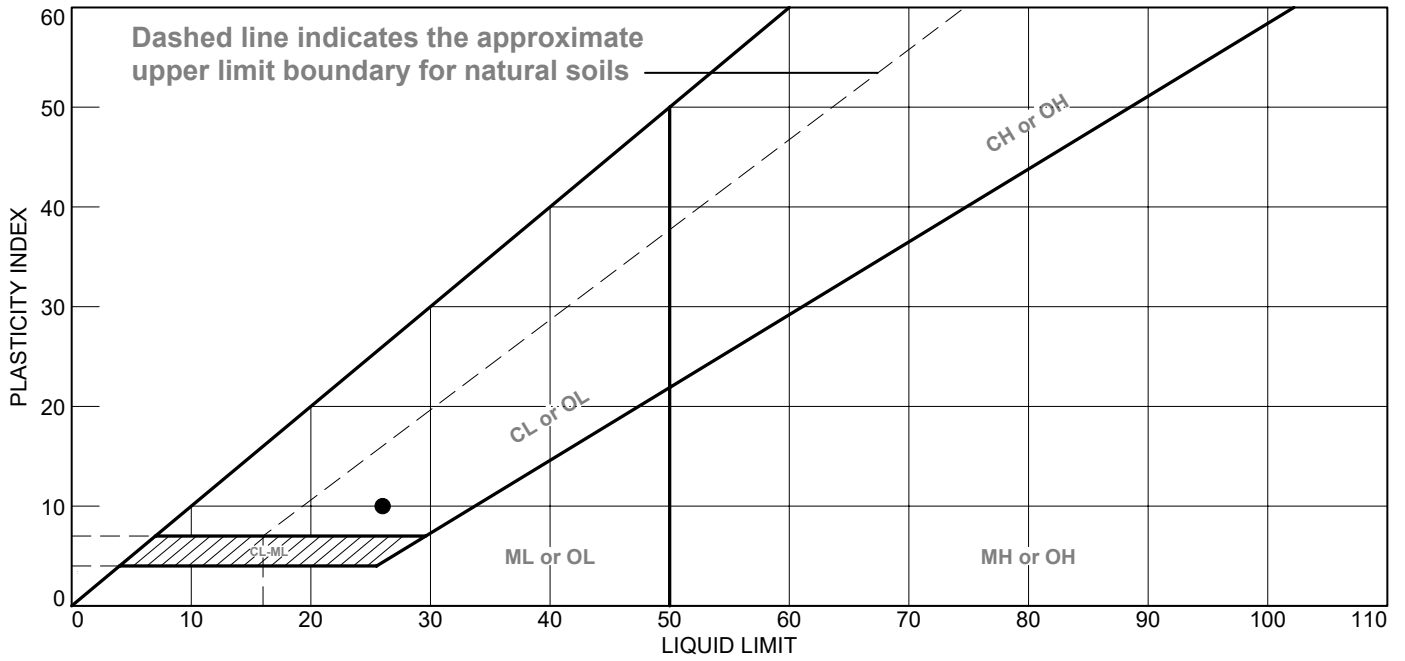
Remarks:
 • A single point test was performed because of difficulty obtaining high blow counts due to type of material.

Figure

Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



●	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
	REDDISH BROWN SANDY LEAN CLAY	26	16	10			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B022 **Depth:** 20.0'-21.5'
Sample Number: S-7

Remarks:

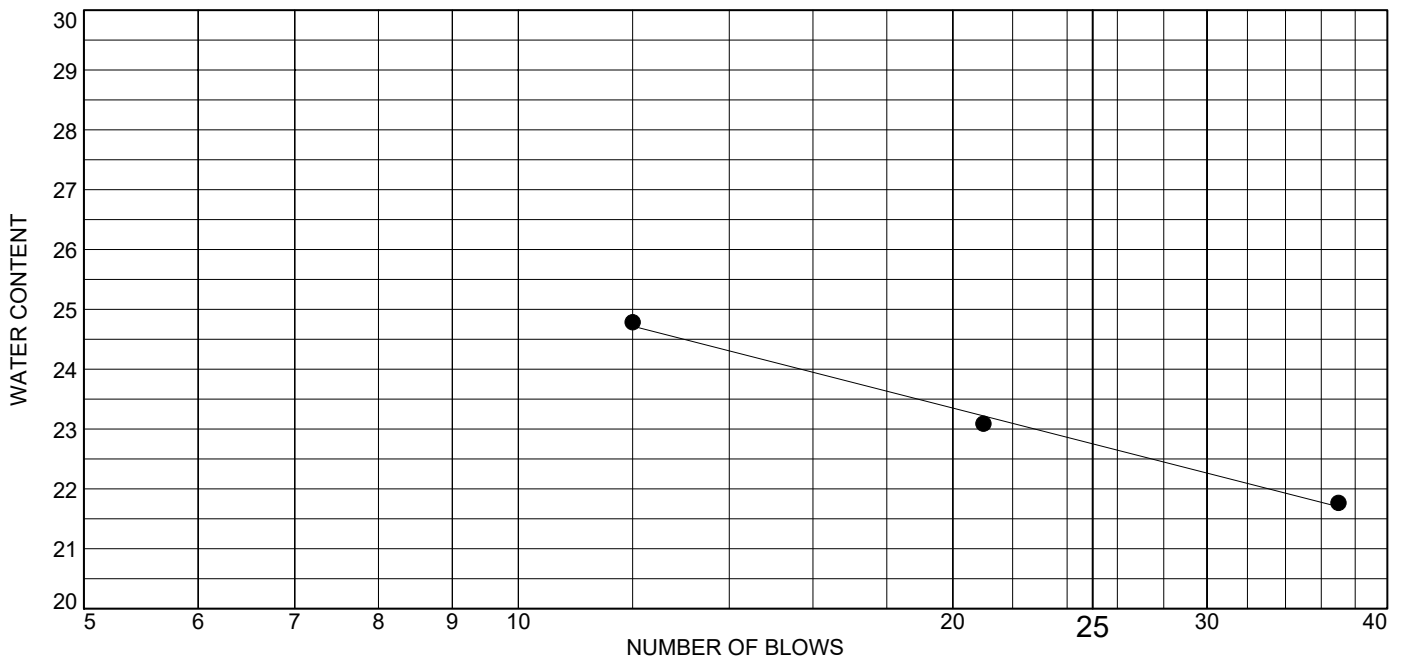
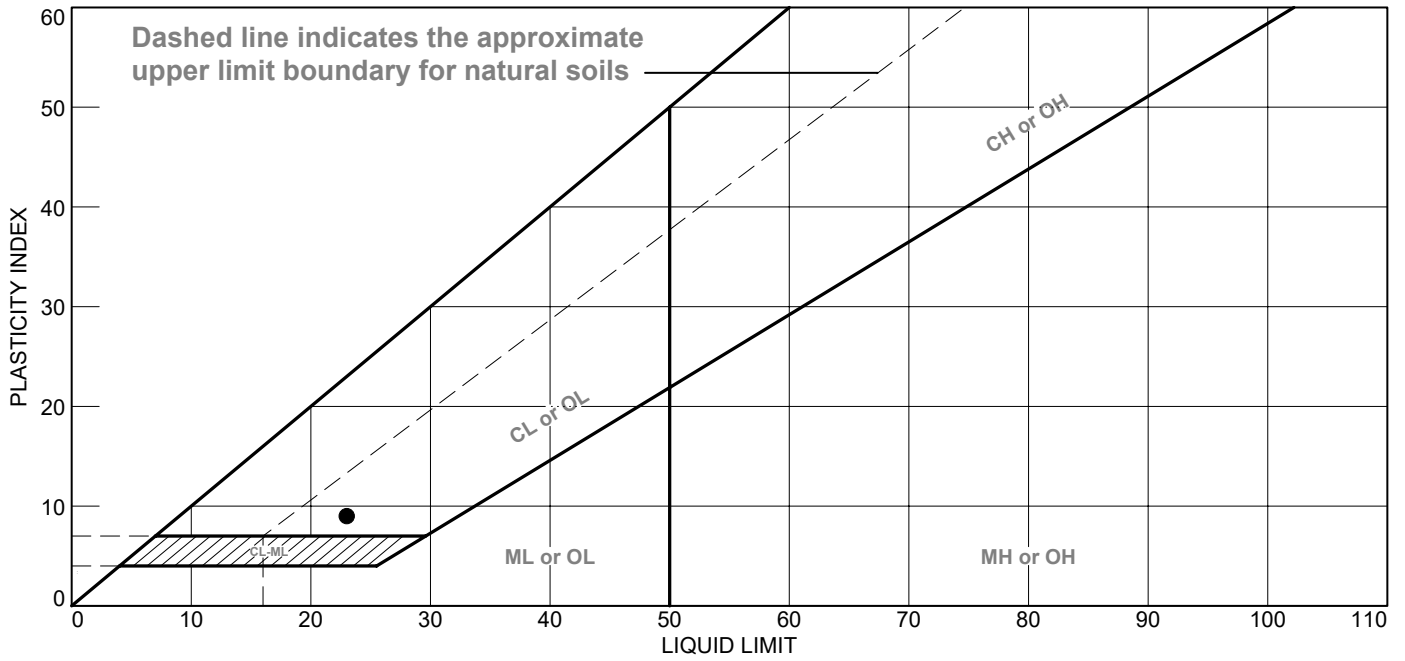
Figure



Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• BROWN LEAN CLAY WITH GRAVEL	23	14	9			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B024 **Depth:** 10.0'-11.5'
Sample Number: S-5

Remarks:

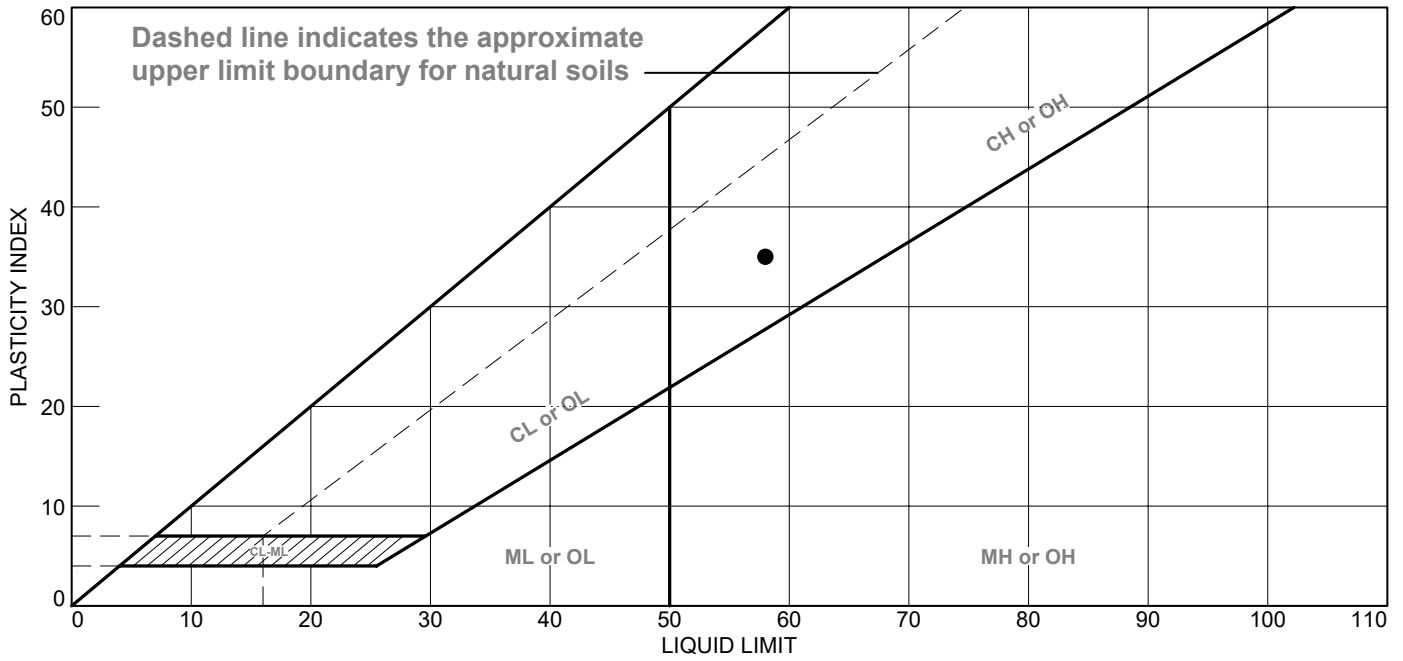


Figure

Tested By: SJH

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• DARK GRAY ORGANIC CLAY WITH SAND	58	23	35			OH

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B024 **Depth:** 26.5'-28.5'
Sample Number: S-9

Remarks:

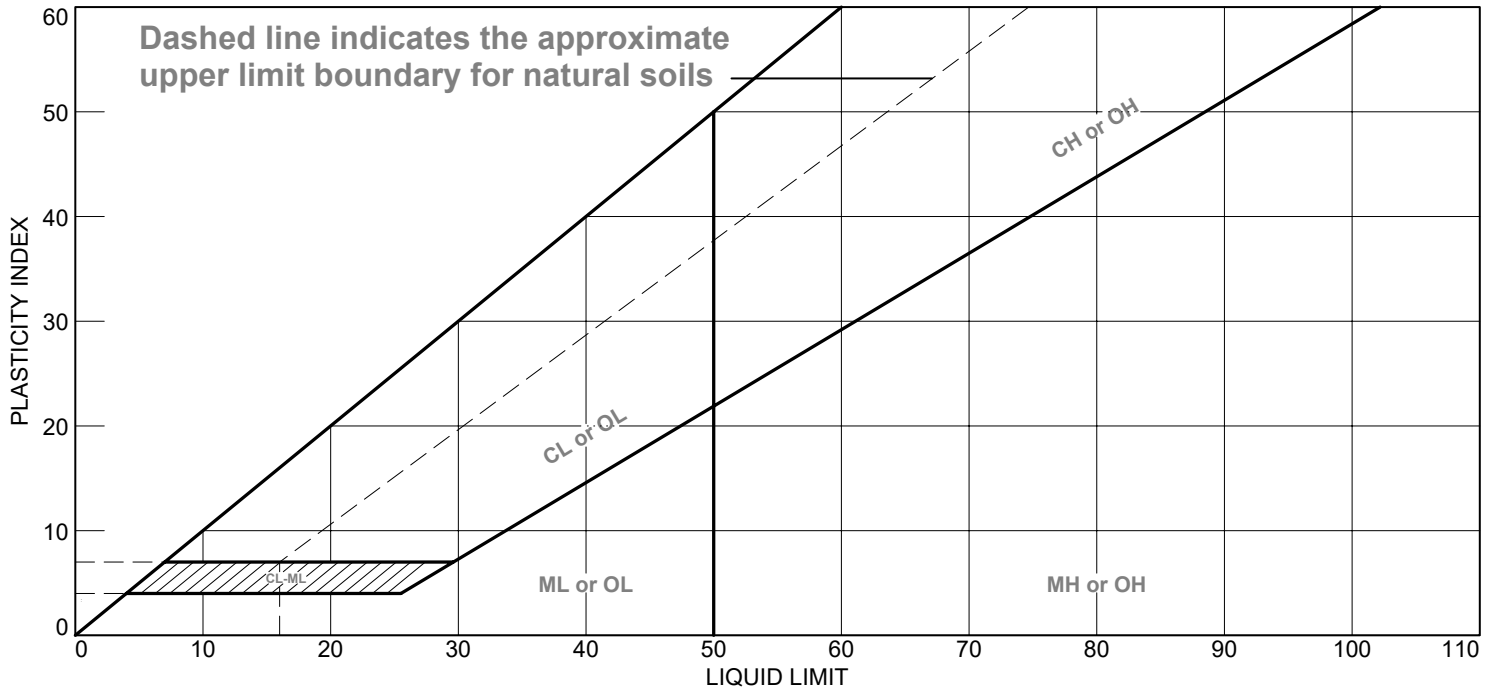


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● VERY DARK GRAY FLY ASH WITH SAND	38	38	NP	78.0	72.5	ML

Project No. MR155233 **Client:** AECOM

Project: DYNERGY - HENNEPIN

Source of Sample: HEN-B025 **Depth:** 11.5'-14.0'

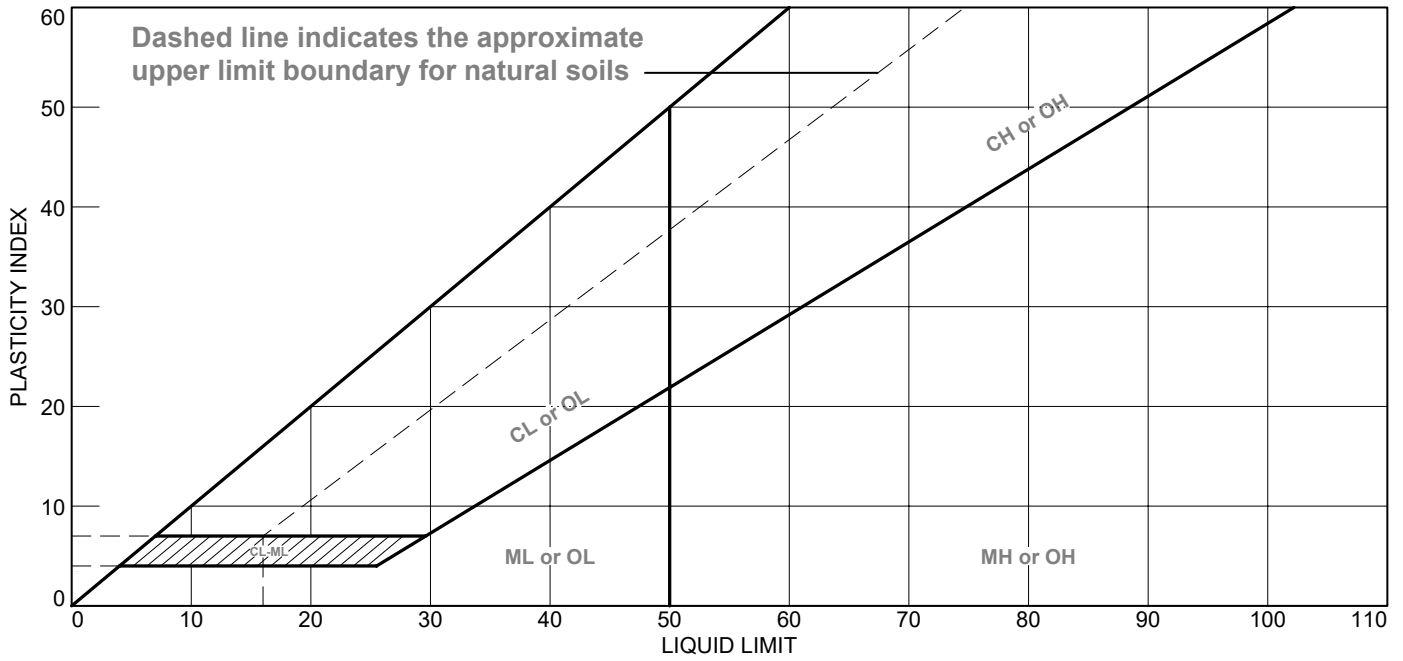
Sample Number: S-6

Remarks:



Figure

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● VERY DARK GRAY TO GRAY FLY ASH WITH SAND	32	34	NP			

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B025 **Depth:** 25.0'-27.0'
Sample Number: S-9

Remarks:
 ● A single point test was performed because of difficulty obtaining high blow counts due to type of material.

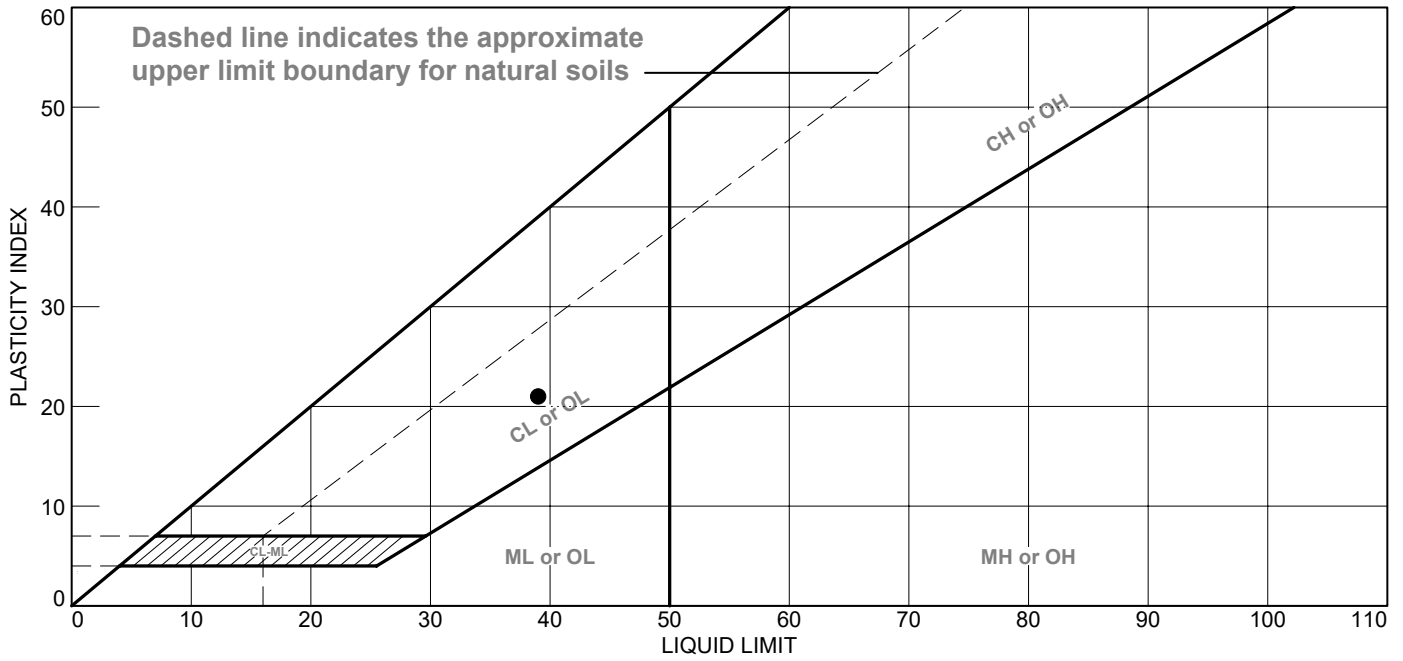


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN LEAN CLAY WITH GRAVEL	39	18	21			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B027 **Depth:** 15.0'-16.5'
Sample Number: S-4

Remarks:

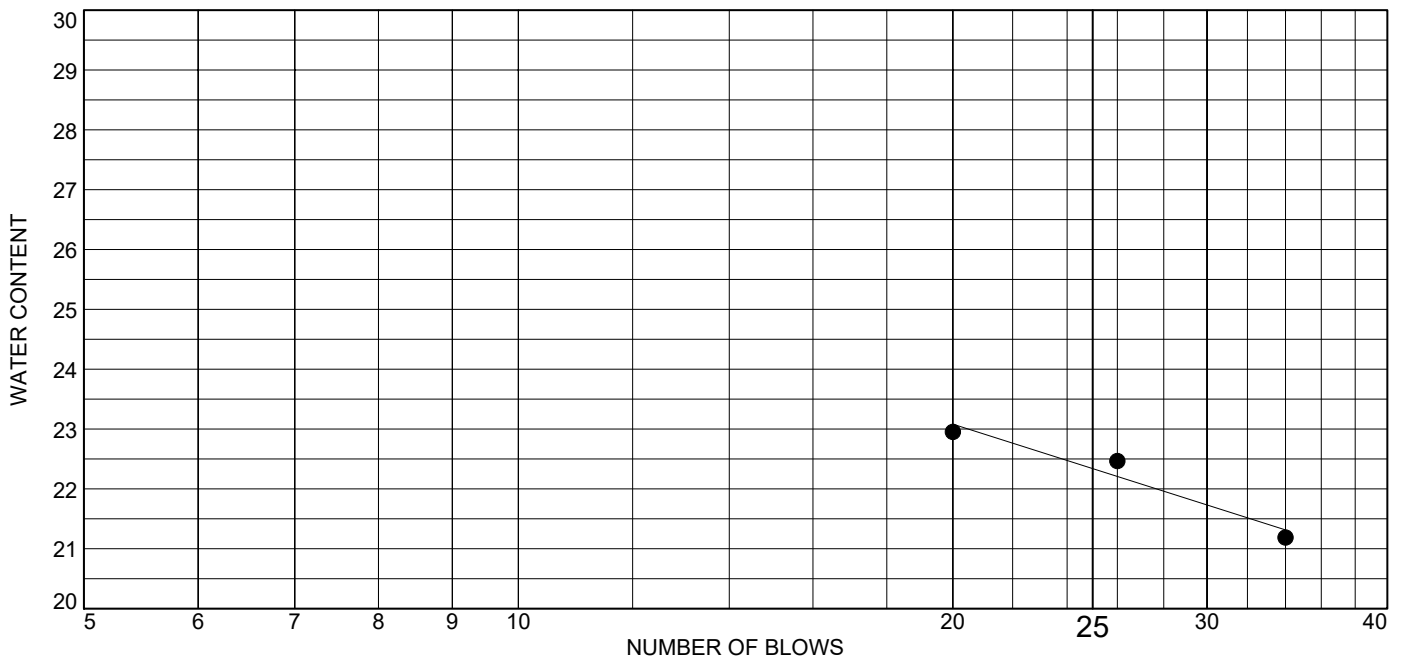
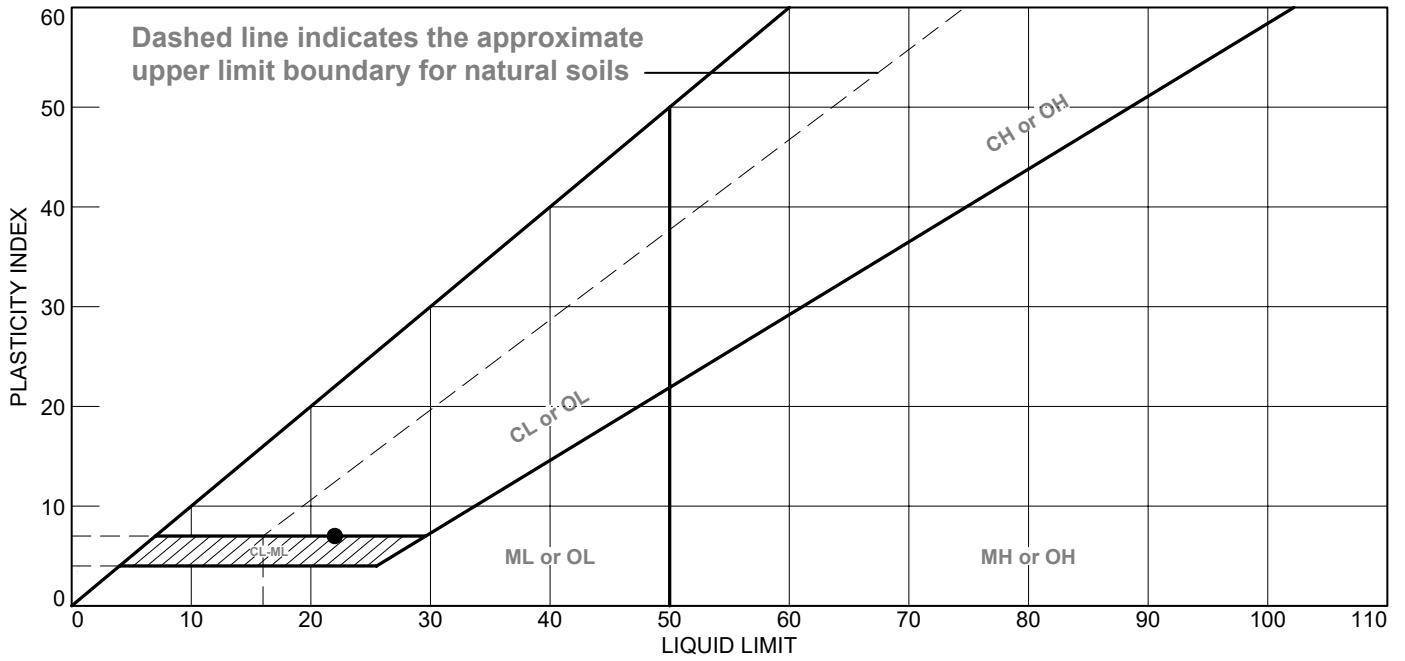
Figure



Tested By: SJH

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● BROWN LEAN CLAY WITH SAND AND GRAVEL	22	15	7			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B029 **Depth:** 5.0'-7.0'
Sample Number: S-3

Remarks:

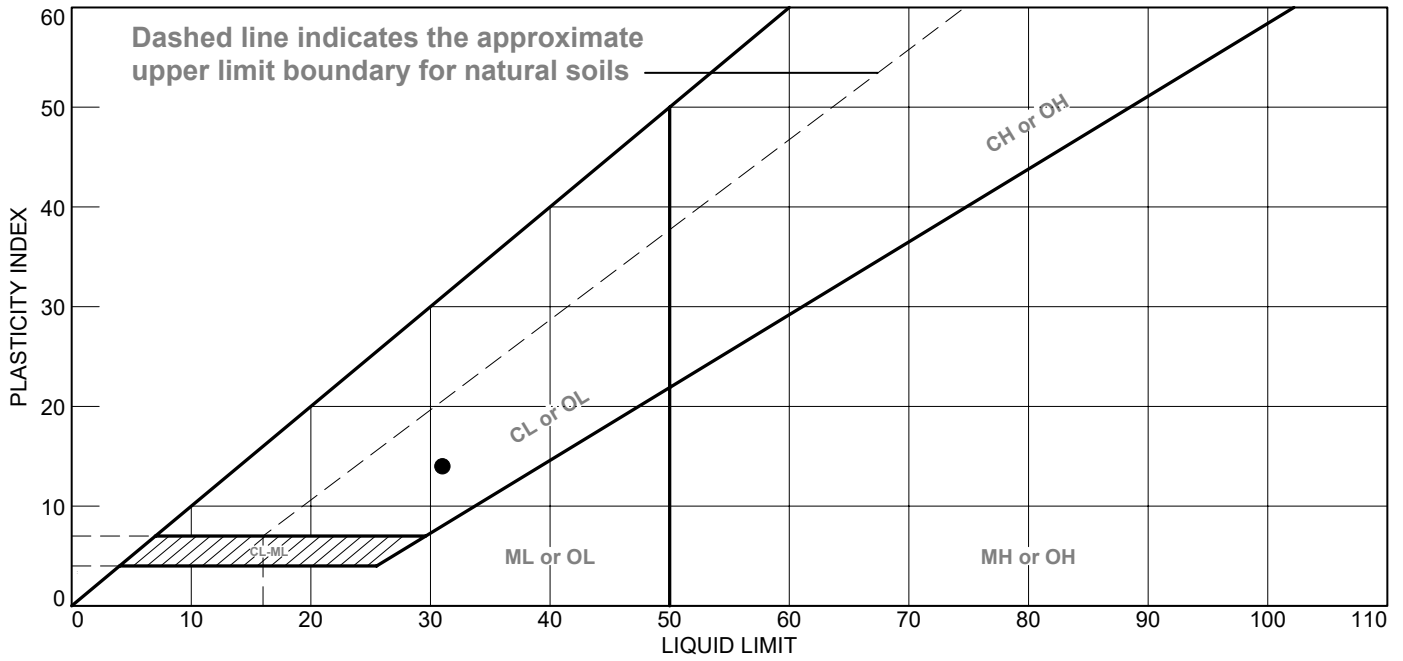


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
• VERY DARK BROWN AND GRAY SLIGHTLY ORGANIC LEAN CLAY WITH SAND AND GRAVEL	31	17	14			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B029 **Depth:** 10.0'-12.0'
Sample Number: S-5

Remarks:

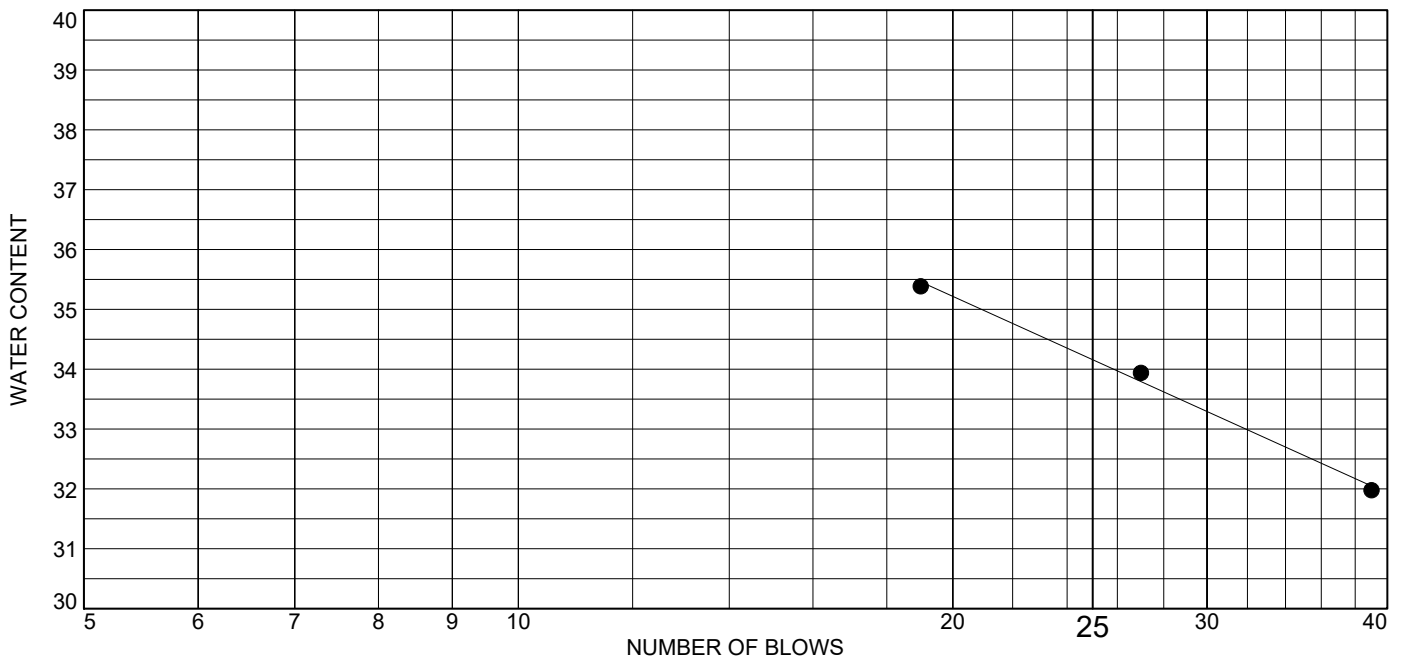
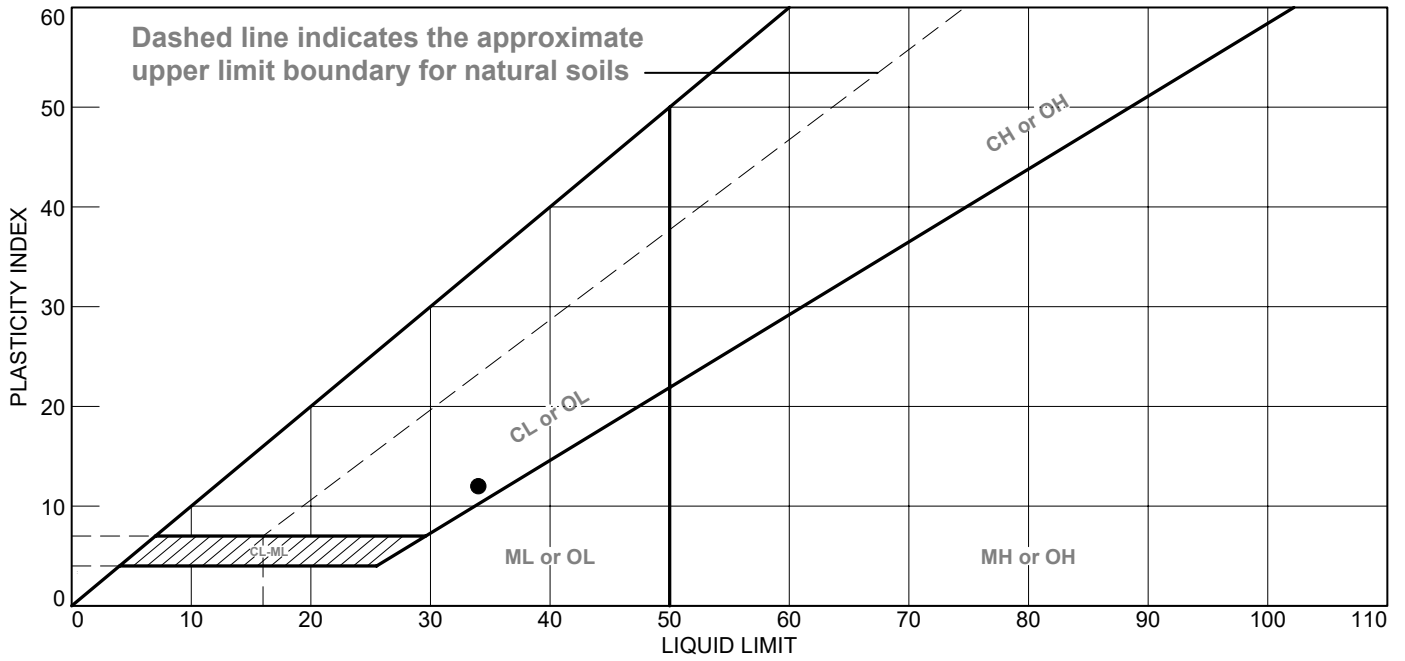


Figure

Tested By: BCM

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK BROWN AND BLACK ORGANIC CLAY WITH GRAVEL - WOOD NOTED	34	22	12			OL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B030 **Depth:** 21.5'
Sample Number: S-7

Remarks:

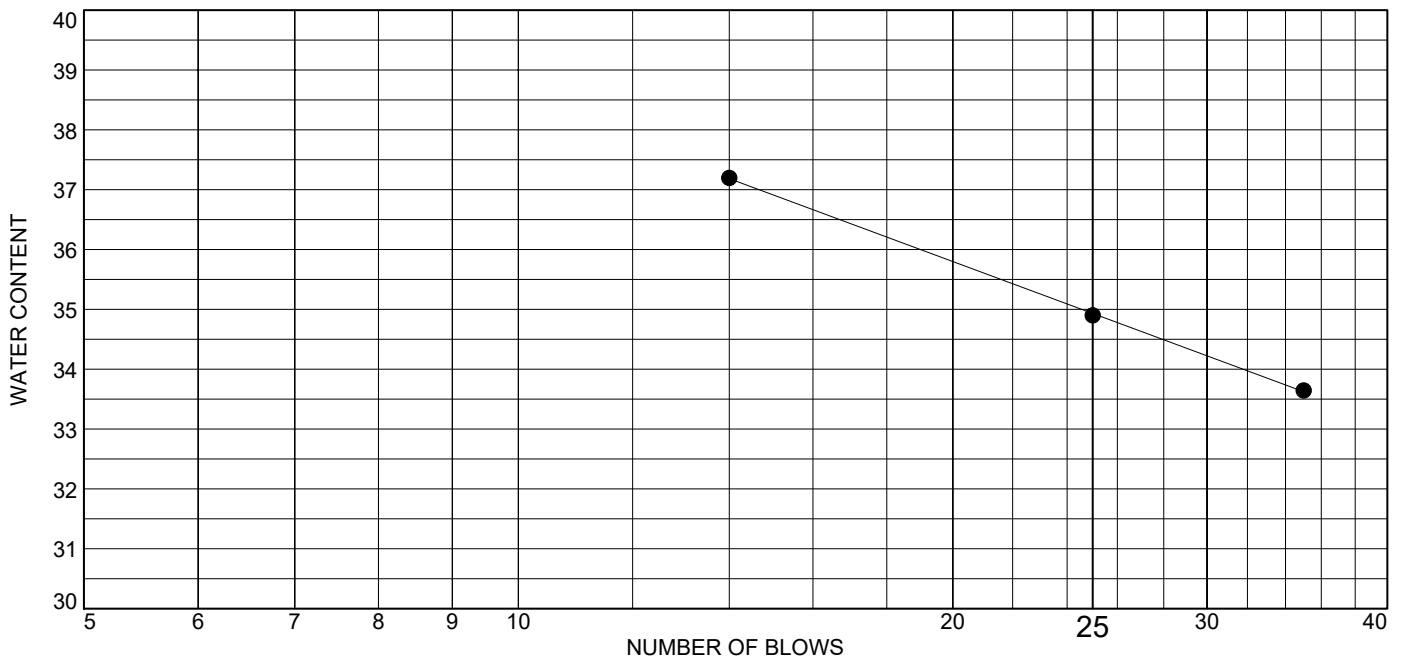
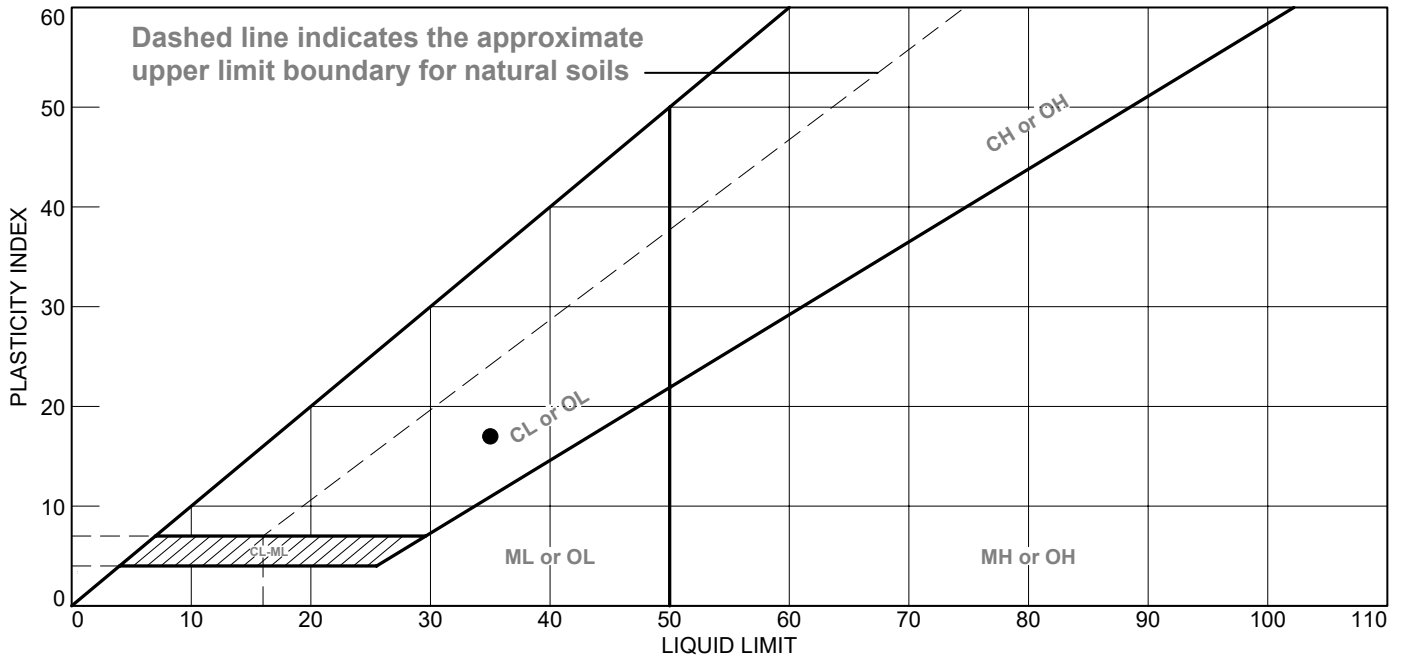


Figure

Tested By: SJH

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK BROWNISH GRAY LEAN CLAY WITH SAND AND GRAVEL	35	18	17			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B032 **Depth:** 5.0'-7.0'
Sample Number: S-3

Remarks:

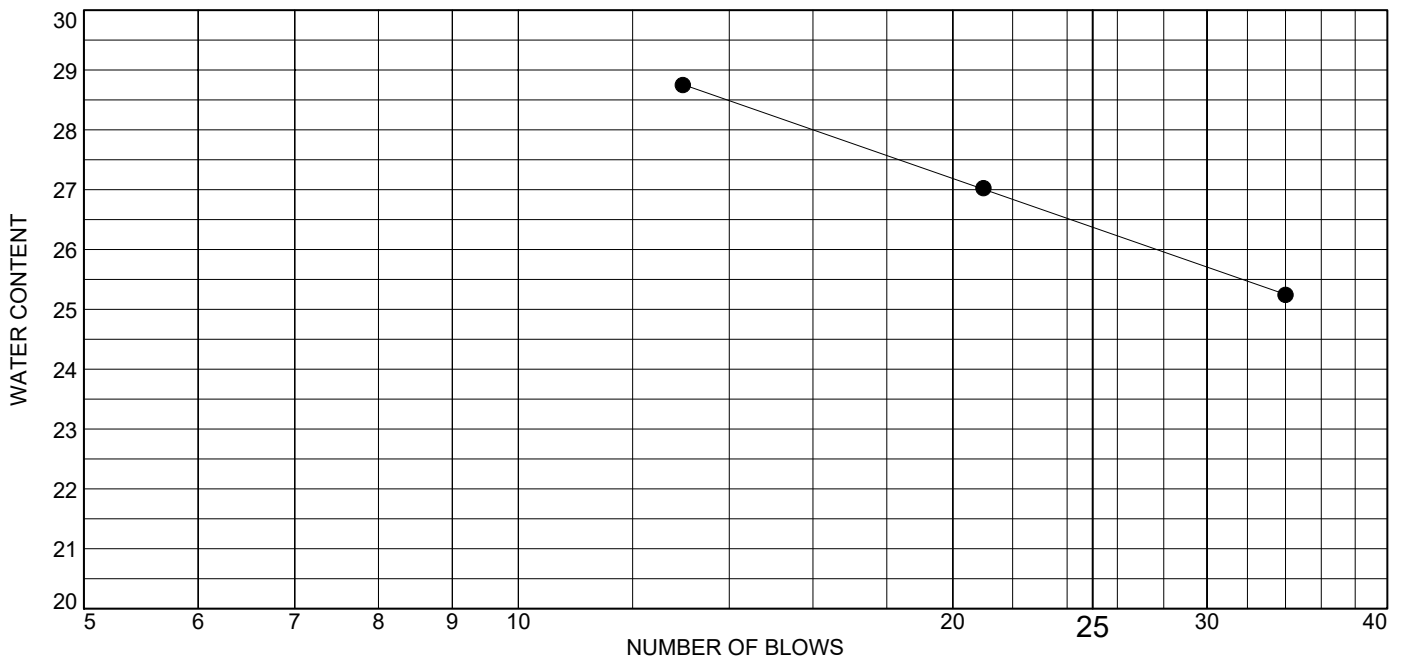
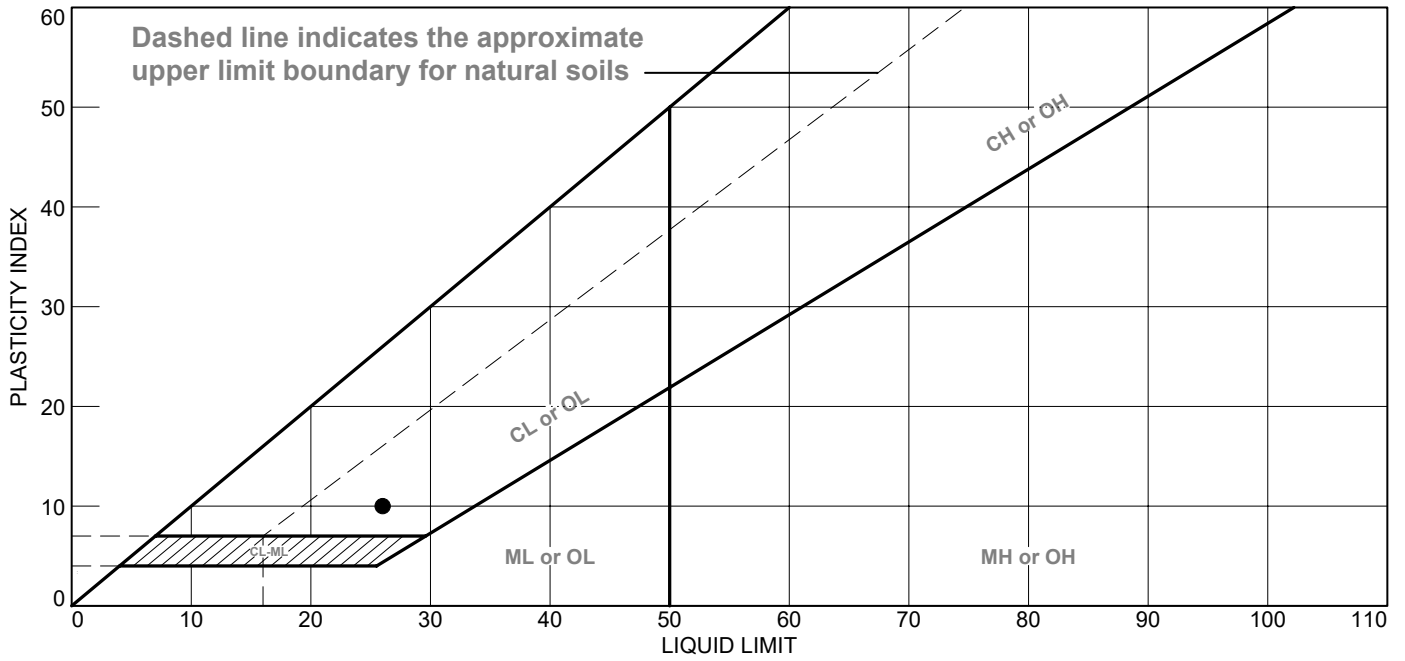


Figure

Tested By: HP

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● DARK BROWN AND DARK GRAY LEAN CLAY WITH GRAVEL	26	16	10			CL

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B032 **Depth:** 10.0'-11.5'
Sample Number: S-5

Remarks:

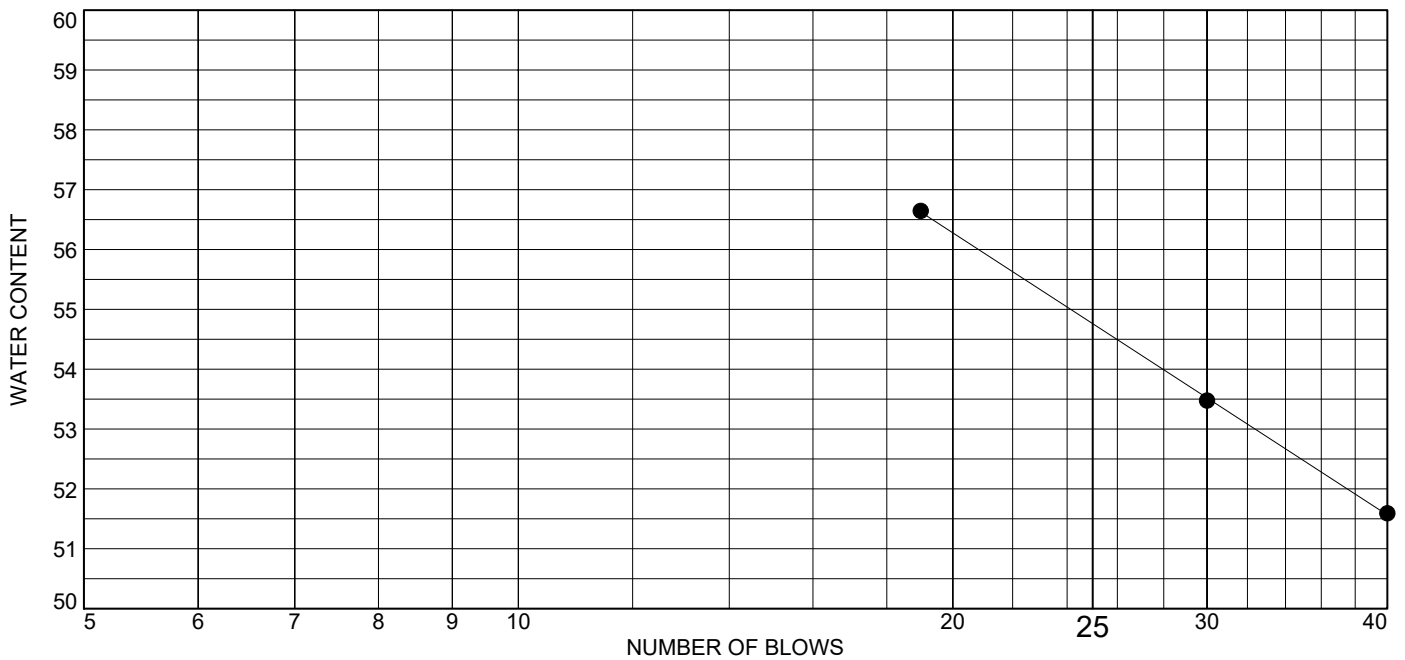
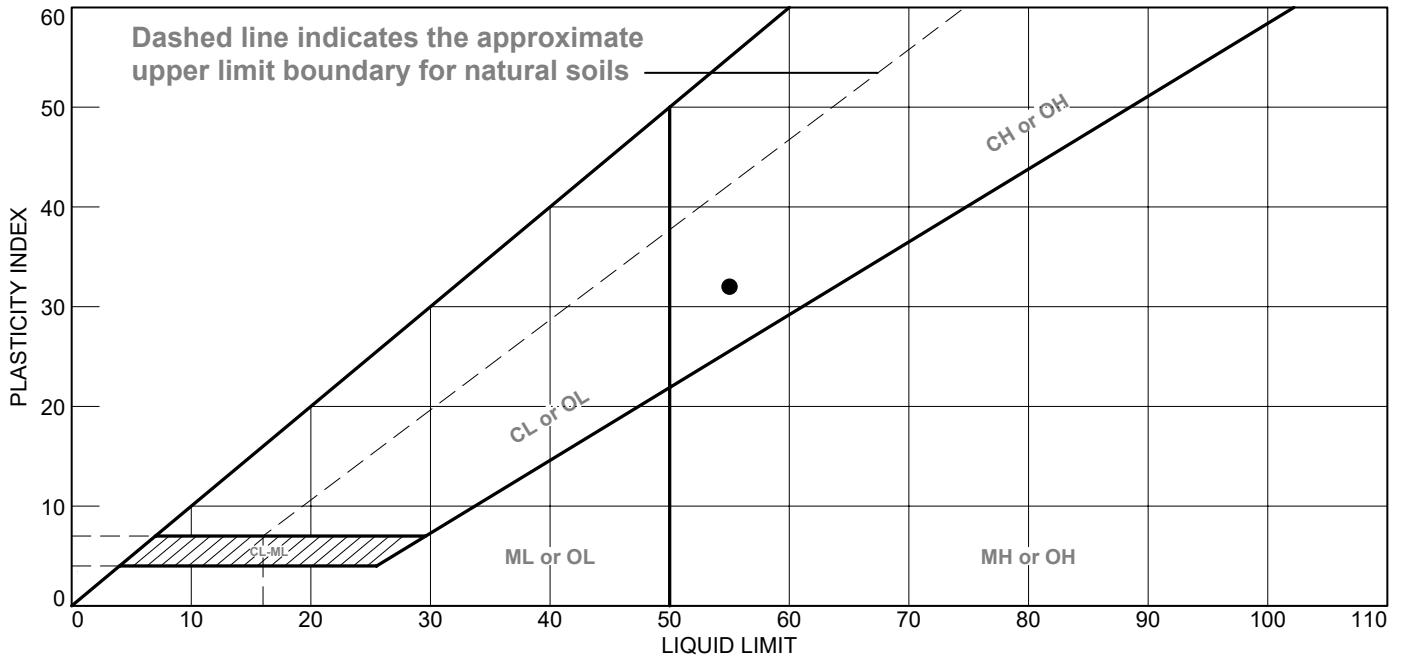


Figure

Tested By: SJH

Checked By: WPQ

LIQUID AND PLASTIC LIMITS ASTM D4318



MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
● GREENISH GRAY FAT CLAY	55	23	32			CH

Project No. MR155233 **Client:** AECOM
Project: DYNERGY - HENNEPIN
Source of Sample: HEN-B038 **Depth:** 10.5-11.5'
Sample Number: S-5B

Remarks:



Figure

Tested By: HP

Checked By: WPQ

Specific Gravity of Soils ASTM D 854

Project Number: MR155233
Project Name: Dynergy Hennepin
Test Date: 12/11/2015

Results Summary

Boring / Sample	Sample Description	USCS	Sample Number	Depth (ft)	Passing #4	Specific Gravity (Gs)
HEN-B002	BROWN SAND WITH CLAY	CL	S-2	2.50'-4.0'	100.00%	2.680
HEN-B004	BROWN, TAN AND GRAY GRAVEL WITH SAND	GP	S-2	2.5'-4.0'	100.00%	2.746
HEN-B006	BROWN AND LIGHT BROWN SAND WITH GRAVEL	SP	S-2	2.5'-4.0'	100.00%	2.665
HEN-B009	DARK BROWN SILT WITH SAND	ML	S-4	8.0'-9.0'	100.00%	2.672
HEN-B010	BROWN AND DARK BROWN SILTY SAND	SM	S-4	7.5'-9.0'	100.00%	2.723
HEN-B011	RUST BROWN SANDY LEAN CLAY	CL	S-2	2.5'-4.0'	100.00%	2.693
HEN-B018	BROWN, TAN AND GRAY SILT WITH CLAY AND GRAVEL	ML	S-3	5.0'-6.5'	100.00%	2.700
HEN-B020	BROWN SILT WITH CLAY, SAND AND GRAVEL	ML	S-3	5.0'-6.5'	100.00%	2.672
HEN-B023	FILL: BROWN AND DARK BROWN SILT WITH CLAY SAND AND GRAVEL	ML	S-3	5.0'-6.5'	100.00%	2.701
HEN-B024	BROWN AND GRAY SAND WITH SILT, CLAY AND GRAVEL	SM	S-2	2.5'-4.5'	100.00%	2.756
HEN-B025	BROWN LEAN CLAY WITH SILT AND SAND	CL	S-2	2.5'-4.5'	100.00%	2.708
HEN-B030	FILL: BROWN AND GRAY LEAN CLAY WITH SILT, SAND AND GRAVEL	CL	S-3	5.0'-6.5'	100.00%	2.746
HEN-B034	DARK BROWN LEAN CLAY WITH SILT AND SAND	CL	S-2	2.5'-4.0'	100.00%	2.704
HEN-B034	BROWN AND LIGHT BROWN GRAVEL WITH CLAY AND SAND	GP-GC	S-6	15.0'-16.5'	100.00%	2.808
HEN-B037	BROWN SAND WITH SILT AND GRAVEL	SP-SM	S-2	2.5'-4.0'	100.00%	2.685
HEN-B038	BROWN GRAVEL WITH CLAY AND SILT	GP-GC	S-6	15.0'-16.5'	100.00%	2.763

Corrosion Series of Tests
ASTM G 51
ASTM G 57
DIPRA Methods



Soil Resistivity ASTM G 57
 Soil pH ASTM G 51
 Soil REDOX DIPRA
 Soil Sulfides DIPRA
 Water Content ASTM D 2216

Laboratory Services 750 Corporate Woods Parkway Vernon Hills, Illinois 60061 Phone: (224) 352-7000 Fax: (224) 352-7024

Soil Corrosivity Indication Series

Project No.: MR155233
 Project Name: Dynegy Hennepin
 Client Name: AECOM
 Test Date: 12/15/2015

Boring / Sample No.	Resistivity Natural Soil Box (ohm-cm)	Resistivity Saturated Soil Box (ohm-cm)	pH Soil Water Slurry	REDOX Soil Water Slurry (mV)	Sulfides Reaction (pos/neg)	As Received WC (%)	Saturated WC (%)	Total Points
HEN-B003								
Sample 5 10.0'-12.0'	400,000	3680	9.22	70	NEG	2.1	45.7	
Points	-	0	3	3.5	0	-	-	6.5
HEN-B009								
Sample 2 2.5'-4.0'	16,000	4,400	8.39	65	NEG	11.0	28.5	
Points	-	0	0	3.5	0	-	-	3.5
HEN-B023								
Sample 4 7.5'-9.0'	13,600	3,940	8.19	80	NEG	8.0	24.7	
Points	-	0	0	3.5	0	-	-	3.5
HEN-B025								
Sample 2 2.5'-4.0'	10,600	3,680	8.26	85	NEG	9.3	22.5	
Points	-	0	0	3.5	0	-	-	3.5

Resistivity:	Points:	pH:	Points:	Redox:	Points:	Sulfides:	Points:	†
<1500 ohms	10	0.0-2.0	5	Negative	5	Positive	3.5	
1500-1800	8	2.0-4.0	3	0 - 50mV	4	Trace	2	
1800-2100	5	4.0-6.5	0	50 - 100mV	3.5	Negative	0	
2100-2500	2	6.5-7.5	0*	100mV+	0			
2500-3000	1	7.5-8.5	0					
3000+	0	8.5 +	3					

*- If Sulfides are present and a low or neg. ReDox, add 3 points

† - THIS SYSTEM IS BASED ON A 25.5 POINT CORROSIVITY RATING SYSTEM DEVELOPED BY THE AMERICAN NATIONAL STANDARDS FOR POLYETHYLENE ENCASEMENT AND DUCTILE-IRON PIPE SYSTEMS. IT SHOULD BE NOTED THAT THESE TEST RESULTS ARE AN INDICATION OF SOIL CHEMISTRY AND SHOULD BE USED AS AN INDICATION OF POSSIBLE CORROSIVE CONDITIONS. TERRACON IS NOT LIABLE FOR ANY REMEDIAL MEASURES TAKEN ON THE BASIS OF THESE RESULTS.

Tested by: WPQ

Checked By: BCM

Organic Content Test by Loss on Ignition ASTM D 2974 Method C

Project No.: MR155233
Project Name: DYNEGY HENNEPIN
Date Tested: 12/14/15

Sample Information

Boring / Source: HEN-B019
Sample No.: S-2
Depth (ft.): 7.5'-8.5'

Organic Content Test Data

Tare No.: F
Tare Wt. (gm): T 19.63
Wet Wt. + Tare (gm): A+T 59.14
Dry Wt. + Tare (gm): B+T 49.34

Moisture Content (%): **32.99**

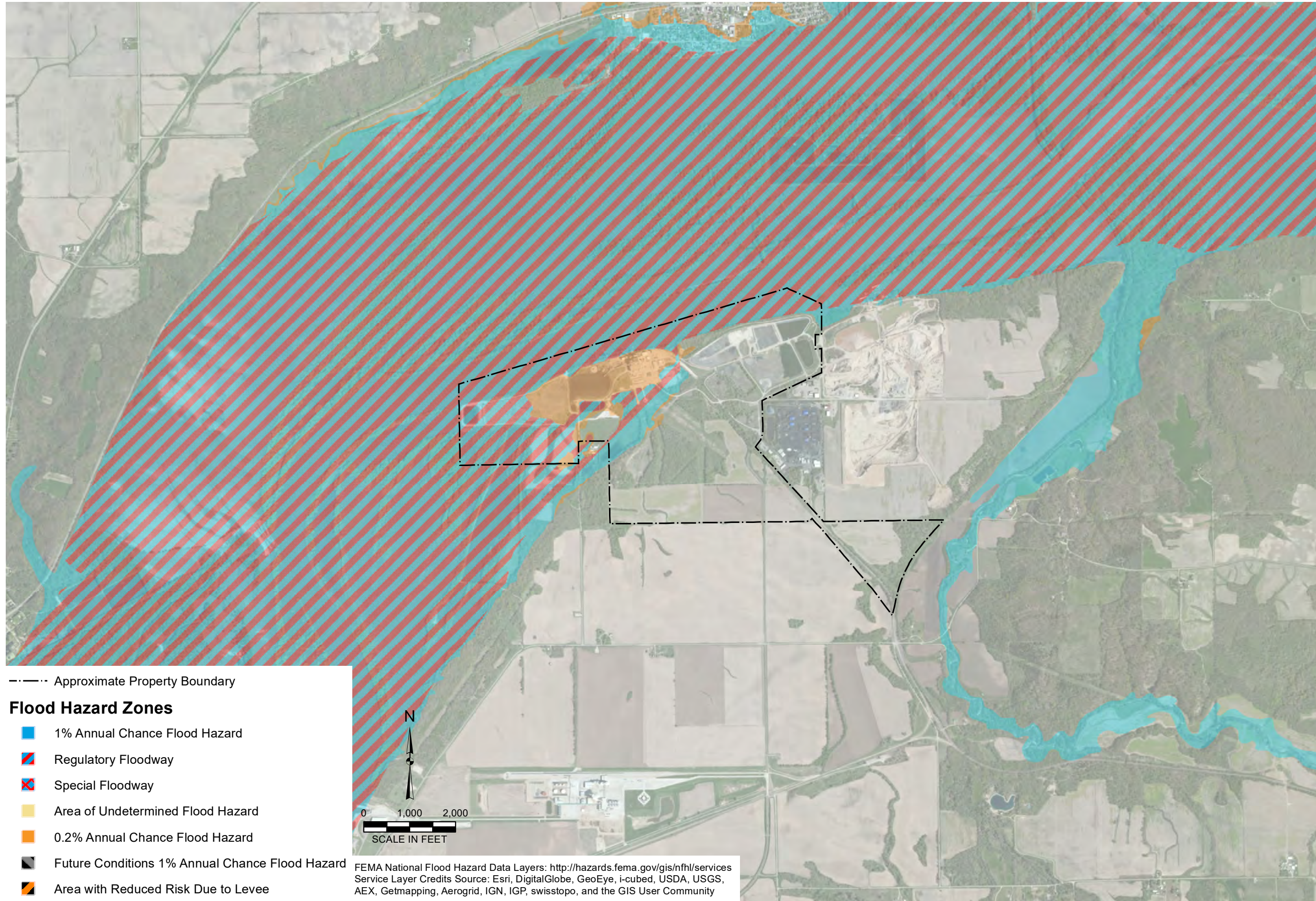
Wt. of Ash + Tare (gm): D+T 48.36
Percent Ash: $(D-T/B-T) \times 100 = E$ 96.70

Organic Content (%): **3.30**

** Note: Test performed by heating the sample to 440 degrees centigrade for a period of three hours.








Appendix E
FEMA National Flood
Hazard Map

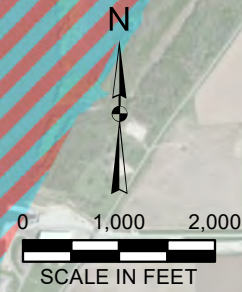
Y:\Mapping\Projects\2140\MXD\Appendix A_FEMA National Flood Hazard Map.mxd Author: nmejac Date/Time: 5/14/2014, 10:48:38 AM



--- Approximate Property Boundary

Flood Hazard Zones

-  1% Annual Chance Flood Hazard
-  Regulatory Floodway
-  Special Floodway
-  Area of Undetermined Flood Hazard
-  0.2% Annual Chance Flood Hazard
-  Future Conditions 1% Annual Chance Flood Hazard
-  Area with Reduced Risk Due to Levee




FEMA National Flood Hazard Data Layers: <http://hazards.fema.gov/gis/nfhl/services>
Service Layer Credits Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

DRAWN BY/DATE:
TDC 11/11/13
REVIEWED BY/DATE:
BRH 11/18/13
APPROVED BY/DATE:
SJC 5/14/14

FEMA NATIONAL FLOOD HAZARD MAP
HYDROGEOLOGICAL SUMMARY AND GROUNDWATER QUALITY ASSESSMENT
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2140
APPENDIX: A





Appendix F
Water Wells Survey
NRT/Kelron, June 3, 2009



Water Well Survey

Dynegy Midwest Generation
Hennepin Power Station
Hennepin, Illinois

June 3, 2009

Project No: 1957

TABLE OF CONTENTS

REPORT CERTIFICATION

1 OVERVIEW	1-1
2 WATER WELL DATABASE AND ALTERNATE SEARCH RESULTS	2-1
2.1 Illinois State Geological Survey (ISGS)	2-1
2.2 Illinois State Water Survey (ISWS)	2-2
2.3 Illinois Environmental Protection Agency (Illinois EPA)	2-2
2.4 Illinois Department of Public Health (IDPH)	2-4
2.5 Putnam County Health Department	2-4
2.6 Visual Survey	2-4
3 CONCLUSIONS	3-1

FIGURES

Figure 1	Water Well Location Map (1957-1-B01C)
Figure 2	Aerial Photograph with Water Wells (1957-1-B02C)

TABLES

Table 1	Water Well Records within 2,500 Foot Radius of Property Boundary
---------	--

APPENDICES

Appendix A:	Illinois State Geological Survey Well Locations and Data
Appendix B:	Illinois State Water Survey Private Well Database Well Data
Appendix C:	Illinois Environmental Protection Agency Web-Based GIS Files
Appendix D:	Record of Communications



REPORT CERTIFICATION

Certification of document preparation and supervision for the following:

Water Well Survey for Hennepin Power Station
Hennepin, Illinois

June 3, 2009

Professional Geologist Name: Stuart J. Cravens
License Number: 196-000108
Expiration Date: March 31, 2011

Illinois Licensed Professional Geologist

Signature: _____

Date: _____ (June 3, 2009)

Seal:

1 OVERVIEW

This report has been prepared for Dynegy Midwest Generation, Inc. (DMG) by Kelron Environmental and Natural Resource Technology, Inc. (NRT) and is intended to meet well survey procedures in relevant Illinois and federal regulations¹, including the “Right to Know” Potable Water Well Survey procedures of 35 Illinois Administrative Code 1600.210(b)(1) and 1600.210(b)(2). The purpose of this survey is to identify all existing water wells located within 2,500 feet of the property boundary of DMG’s Hennepin Power Station (HPS or Facility), located within the Village of Hennepin’s northern municipal limits in Putnam County, Illinois. The HPS property boundary (Figure 1) is located in:

- The north half of the southeast quarter and the south half of the northeast quarter of Section 27; and
- The north half of the northwest quarter of the southeast quarter; the north half of the northwest quarter of the southwest quarter; and, the north half of the northeast quarter of the southwest quarter of Section 26.

A non-community wellhead protection area (WHPA) has been designated by the Illinois Environmental Protection Agency (Illinois EPA) and Illinois Department of Public Health (IDPH) south of the East Ash Pond System and property boundary (Figures 1 and 2). A total of 11 water supply wells were identified within the search radius outside of the HPS property boundary using Illinois EPA, Illinois State Geological Survey (ISGS), Illinois State Water Survey (ISWS) information, and a visual survey. Additionally, four water wells owned by DMG are located within the HPS property boundary. Within the search radius, one well (Well #4) is located east of the Facility, one well (Well #3) is located west of the Facility, and nine wells are located south of the Facility (Well numbers 5 through 11, 14, and 15). One well (Well #7) is designated as a non-community water supply well (non-CWS). All these wells are either upgradient or side gradient from the active and out-of-service ash pond systems of the HPS.

¹ Leaking Underground Storage Tank regulations (35 Ill. Adm. Code 732); Leaking Underground Storage Tank regulations (35 Ill. Adm. Code 734); Site Remediation Program (35 Ill. Adm. Code 740.425(b)(2)(D)); RCRA Permit regulations (35 Ill. Adm. Code 703.183(s)(9); 35 Ill. Adm. Code 703.184(a)(3)); and the National Contingency Plan (40 CFR 300.430(d)).



2 WATER WELL DATABASE AND ALTERNATE SEARCH RESULTS

The following databases and sources of information were utilized in order to determine community water source and potable water well locations and construction in the vicinity of the HPS property boundary:

- Illinois State Geological Survey -Water Well Database Query;
- Illinois State Water Survey private well database;
- Illinois EPA web-based Geographic Information System (GIS) files;
- Illinois Department of Public Health;
- Putnam County Health Department; and
- Field observation of wells from visual survey.

2.1 Illinois State Geological Survey (ISGS)

The ISGS website provided an ArcIMS Viewer Map as well as a database query. According to the ISGS ArcIMS Viewer Map, 11 water wells are located within a 2,500-foot radius of the HPS property boundary (Figures 1 and 2). The wells are numbered 1, 2, 4 through 9, 12, and 13 on the map. Each map location number represents one well identification, with the exception of map Well #6, which appears to have two listings for the same well (Table 1). The ISGS database information, including any boring log and well construction information, is provided in Appendix A. Four mapped well numbers occur on the Facility property as follows:

- Well #1, located southwest of the main plant near the front entrance gate; and,
- Wells #2, #12, and #13 located south of the main plant and midway between the East and West Ash Pond Systems.

Well #1 was located incorrectly on the original driller's log and this error has been propagated through the ISGS (and ISWS and IEPA) databases. This well is used for irrigation of the coal pile and is not a potable source.

The depths of the wells in the ISGS database ranged from 64 to 128 feet deep. All wells, where lithology information is provided, obtain water from unconsolidated sand and gravel deposits. The ISGS water well database also contained test borings for DMG's Facility; none of these borings were for potable wells and were not included within the search results presented in this report.

2.2 Illinois State Water Survey (ISWS)

The ISWS database of well records included records for the wells identified in the ISGS database, with the exception of well numbers 4 and 12, for which there were no ISWS records. There were also two ISWS Private Well Database records that did not appear in any other databases: well numbers 3 and 14, both of which are very old wells with only approximate locations and unknown ownership. Wells #3 and #14 are dug wells with recorded construction dates of 1844 and 1922, respectively, and were most likely abandoned decades ago.

A number of well records from the ISWS contained minimal information for mapping; therefore, these wells are not included in this report as sufficient information was provided to determine the wells are not within the 2,500 feet search radius. A copy of the ISWS Private Well database records is included in Appendix B.

2.3 Illinois Environmental Protection Agency (Illinois EPA)

The Illinois EPA Database website provided ArcIMS Viewer Maps (Appendix C). The database provides information on community, non-community, and public water supply wells as defined on the Illinois EPA website:

- **Community Water Supply:** *a public water supply that serves or is intended to serve at least 15 service connections used by residents or regularly serves at least 25 residents.*
- **Non-community Water Supply:** *a public water supply that is not a community water supply.*
- **Public Water Supply:** *all mains, pipes and structures through which water is obtained and distributed to the public, including wells and well structures, intakes and cribs, pumping stations, treatment plants, reservoirs, storage tanks and appurtenances, collectively or severally, actually used or intended for use for the purpose of furnishing water for drinking or general domestic use and which serve at least 15 service connections or which regularly serve at least 25 persons at least 60 days per year. A public water supply is either a community water supply or a non-community water supply.*

Based on the Illinois EPA maps, community water systems (CWS) are not present within a 2,500 feet radius of the HPS property boundary. The nearest CWS wells and system details, included in Appendix C, are:

- Village of Depue (Facility Number 0110300) located approximately 1.5 miles north of the Facility;
- Village of Hennepin (Facility Number 1555100) located approximately 3 miles south of the Facility;
- Village of Bureau Junction (Facility Number 0110150) located approximately 3 miles southwest of the Facility; and
- Village of Granville (Facility Number 1550050) located approximately 3.5 miles southeast of the Facility.

According to Illinois EPA records, the HPS property boundary is located greater than 1-mile from the Minimum Setback Zones, Existing or Potential Maximum Setback Zones, and /or Recharge Areas for the CWS systems.

Based on the Illinois EPA maps, there is one non-community supply (non-CWS) well, 6 industrial / commercial wells, and 2 farm/domestic water wells located within the 2,500 feet radius of the HPS property boundary (Figures 1 and 2). All wells identified on Illinois EPA maps were also identified in ISGS and/or ISWS records. The non-CWS water supply system (Appendix C) is identified as the Exolon ESK System #0117408, which consists of one well (Map Well #7). The WHPA for this system lies within the 2,500-foot search radius (Figures 1 and 2) but south of the Hennepin Power Station's property boundary.

A wellhead protection area (WHPA) is the surface and subsurface area surrounding a water well or well field supplying a CWS or non-CWS water system through which contaminants from a source are theoretically likely to move and reach the water well or well field. All CWS and non-CWS systems utilizing groundwater in Illinois have a 1,000-foot wellhead / source water protection radius, also referred to as a Phase I WHPA.

2.4 Illinois Department of Public Health (IDPH)

The IDPH was contacted for confirmation information on the Exolon non-CWS system. J. Scott Bell with the IDPH confirmed the system is the only non-CWS within the search radius. Mr. Bell also stated the system is now identified as the Washington Mills non-CWS (Appendix D).

2.5 Putnam County Health Department

Personnel from the Bureau-Putnam County Health Department were not able to confirm or provide additional data on the non-CWS well system (Appendix D).

2.6 Visual Survey

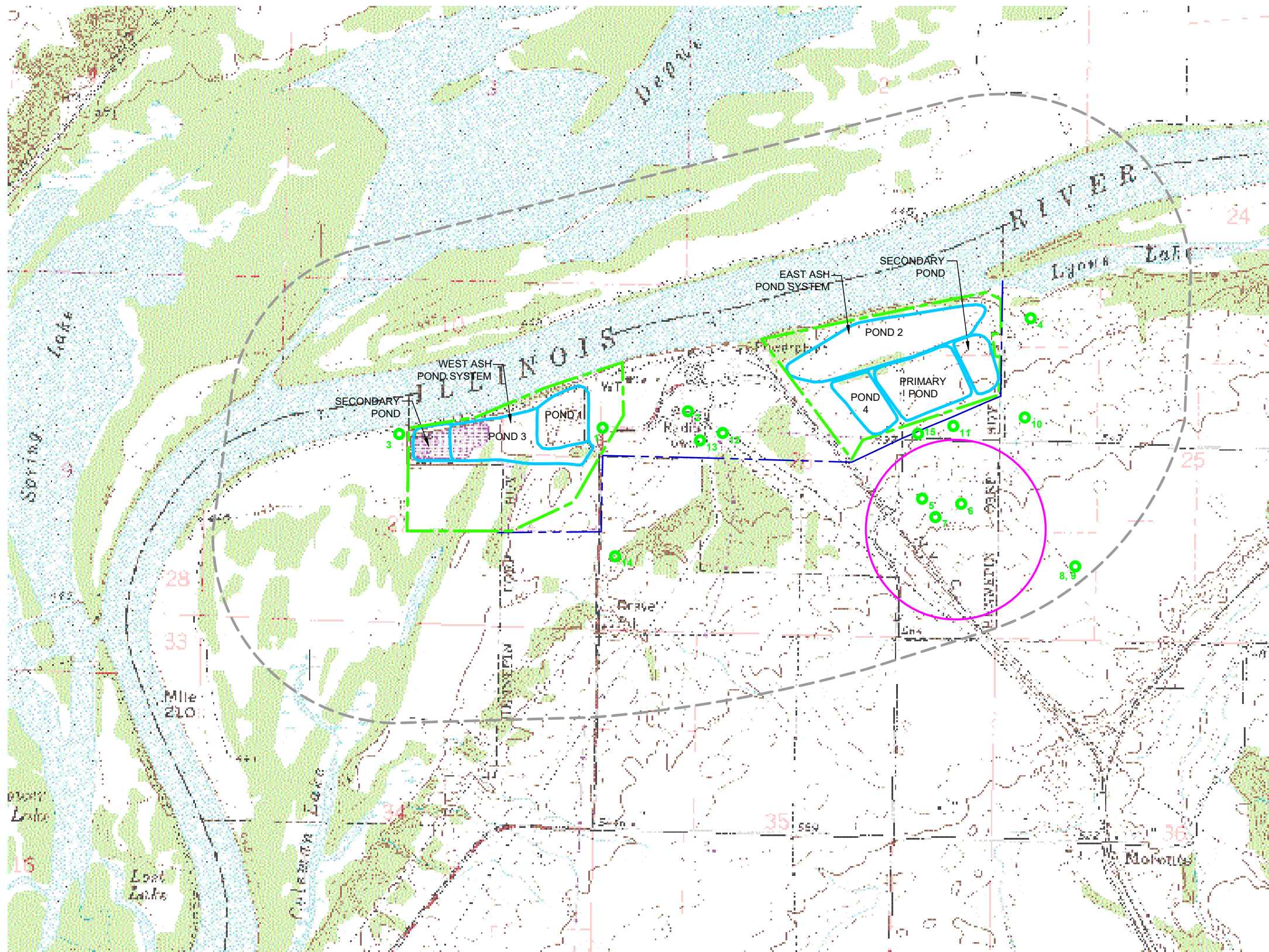
A visual survey, also referred to as a windshield survey, was conducted on April 14, 2009 to verify some well locations listed in the databases and also to locate wells not identified by ISGS, ISWS, Illinois EPA or DMG sources. Three wells were field identified (Table 1; Figures 1 and 2) that did not have corresponding well logs in any of the database sources: Well #10, located on property owned by Tri-Con Materials; and Wells #11 and #15, located on property that appears to be owned by Advanced Asphalt. All three of these wells are industrial-commercial wells with unknown operational status as to whether they are active or inactive.

3 CONCLUSIONS







According to database records of the ISGS, ISWS, and Illinois EPA, there are eight water wells (assumed to be potable) owned by private residences or companies within a 2,500 feet radius of the HPS property boundary and four water wells owned by DMG are located on the HPS property (Table 1). Three additional undocumented industrial-commercial wells were identified at locations south and southeast of the Facility during a visual (windshield) survey. A total of 15 water wells have been identified both on DMG's HPS property and within a 2,500-foot radius of the Facility property boundary.

In addition to the above sources of water well information provided by State agencies, Kelron obtained information from DMG personnel and the IDPH. Personnel with both these entities had no knowledge or information of any additional wells within a 2,500 feet radius of the HPS property boundary beyond those identified within the State databases.

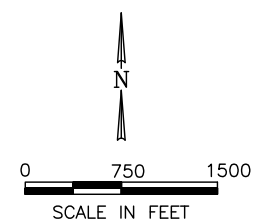
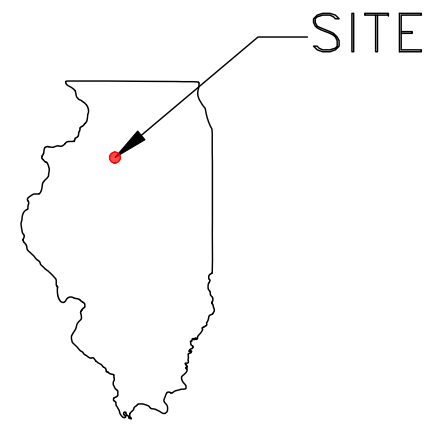
The results of the water well survey are provided in Appendices A through D for each of the sources of information contacted. Based on all of the well information acquired from the listed sources, water supply wells within at least 2,500 feet of the HPS property boundary were placed on a topographic map (Figure 1) and aerial photograph (Figure 2) and shown in relation to the HPS property boundary. The current status of some of these wells (i.e., operational, abandoned, or sealed) is not known.



LEGEND

-  WATER WELL LOCATION
-  ASH POND
-  APPROXIMATE PROPERTY BOUNDARY
-  GROUNDWATER MANAGEMENT ZONE
-  2,500 FOOT RADIUS FROM PROPERTY BOUNDARY
-  NON-CWS WELLHEAD PROTECTION AREA

SOURCE:
 USGS DIGITAL RASTER GRAPHICS FILES FROM ILLINOIS NATURAL RESOURCES GEOSPATIAL DATA CLEARINGHOUSE (<http://www.isgs.uiuc.edu>)
 ILLINOIS ENVIRONMENTAL PROTECTION AGENCY SOURCE WATER ASSESSMENT PROGRAM (SWAP) ArcIMS MAPPING TOOL (<http://maps.epa.state.il.us/website/swap/intro.html>).
 ILLINOIS STATE GEOLOGICAL SURVEY, DIGITAL WATER WELL RECORDS INTERACTIVE MAP (<http://www.isgs.illinois.edu/maps-data-pub/wfdb/wfdb.shtml>).
 2009 KELRON/NRT FIELD OBSERVATIONS.
 2009 DYNEGY MIDWEST GENERATION PERSONNEL CORRESPONDENCE.



DRAWN BY: RLH	DATE: 06/01/09
CHECKED BY: RJC	DATE: 06/01/09
APPROVED BY: RJC	DATE: 06/01/09
DRAWING NO: 1957-1-B01C	
REFERENCE: o41089c3.tiff	

WATER WELL LOCATION MAP
WATER WELL SURVEY
HENNEPIN POWER STATION
HENNEPIN, ILLINOIS



NATURAL RESOURCE TECHNOLOGY







PROJECT NO. 1957/1.0

FIGURE NO. 1

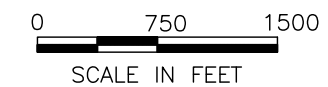
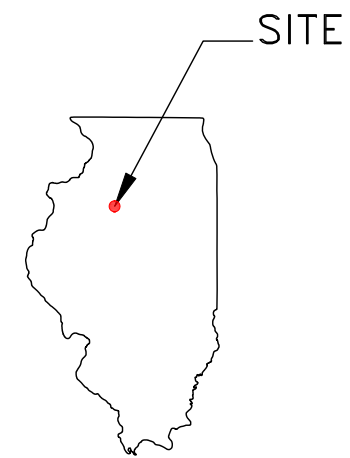




LEGEND

-  WATER WELL LOCATION
-  ASH POND
-  APPROXIMATE PROPERTY BOUNDARY
-  GROUNDWATER MANAGEMENT ZONE
-  2500 FT. RADIUS, FROM PROPERTY BOUNDARY
-  NON-CWS WELLHEAD PROTECTION AREA

SOURCE NOTES:
 2005 DIGITAL ORTHOPHOTO FROM ILLINOIS NATURAL RESOURCES GEOSPATIAL DATA CLEARINGHOUSE (<http://www.isgs.uiuc.edu>).
 ILLINOIS ENVIRONMENTAL PROTECTION AGENCY SOURCE WATER ASSESSMENT PROGRAM (SWAP) ArcIMS MAPPING TOOL (<http://maps.epa.state.il.us/website/swap/intro.html>).
 ILLINOIS STATE GEOLOGICAL SURVEY, DIGITAL WATER WELL RECORDS INTERACTIVE MAP (<http://www.isgs.illinois.edu/maps-data-pub/wddb/wddb.shtml>).
 2009 KELRON/NRT FIELD OBSERVATIONS. 2009 DYNEGY MIDWEST GENERATION PERSONNEL CORRESPONDENCE.



DRAWN BY:	RLH	DATE:	06/01/09
CHECKED BY:	RJC	DATE:	06/01/09
APPROVED BY:	RJC	DATE:	06/01/09
DRAWING NO: 1957-1-B02C			
REFERENCE: 41089c31.sid, 41089c32.sid, 41089c33.sid, 41089c34.sid			

AERIAL PHOTOGRAPH WITH WATER WELLS
 WATER WELL SURVEY
 HENNEPIN POWER STATION
 HENNEPIN, ILLINOIS



NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1957/1.0

FIGURE NO. 2



**Table 1. Water Well Records Within 2,500-Foot Radius of Property Boundary
Hennepin Power Station; Hennepin, Illinois**

Map Well #	Source of Well Information				Location Name at Time of Well Completion	Well Depth	County	Location				Year Drilled	Aquifer Type	Formation	Well Use
	ISGS	ISWS	IEPA	Other				Township	Range	Section	Subsection				
1*	121552070200	155-12-04	20702	DMG	Hennepin Power Station (DMG)	83	Putnam	33N	02W	27	SE/SE/NE	2004	Unconsolidated	Sand and Gravel	IC
2	121550012800	P403409	00128	DMG	Illinois Power Co., No. 5	113	Putnam	33N	02W	26	NE/NE/NW	1968	Unconsolidated	Sand and Gravel	IC
3	--	125917	--	--	--	30	Putnam	33N	02W	27	NE/NW/SW	1844	--	--	FD
4	121552045800	--	20458	--	Advanced Asphalt Co.	114	Putnam	33N	02W	25	SW/NW/NW	1995	Unconsolidated	Sand and Gravel	IC
5	121552029200	79101 P403400	20292	--	Exolon, Well No. 1	109	Putnam	33N	02W	26	SW/NE/SE	1978	Unconsolidated	Sand and Gravel	IC
6	121552049700 121552047700	155-011-96 P405443	20497 20477	--	Exolon, Well No. 3	124	Putnam	33N	02W	26	SE/NE/SE	1996	Unconsolidated	Sand and Gravel	IC
7	121552025800	76743	20258	SWA	Exolon, Well No. 2 (ID 15500143)	128	Putnam	33N	02W	26	SW/NE/SE	1978	Unconsolidated	Sand and Gravel	NCWS
8	121552051800	314693	20518	--	Kenneth Brown	72	Putnam	33N	02W	25	NE/SW/SW	1999	Unconsolidated	Sand and Gravel	FD
9	121552068500	359951	20685	--	Kenneth Brown	64	Putnam	33N	02W	25	NE/SW/SW	2002	Unconsolidated	Sand and Gravel	FD
10	--	--	--	Visual	Tri-Con Materials	--	Putnam	33N	02W	25	SW/SW/NW	--	--	--	IC
11	--	--	--	Visual	Potentially Advanced Asphalt	--	Putnam	33N	02W	26	SE/SW/NE	--	--	--	IC
12	121552043500	--	20435	DMG	Illinos Power Co., No. 1A/6	125	Putnam	33N	02W	26	NE/NE/NW	1993	Unconsolidated	Sand and Gravel	IC
13	121552059800	176545 P403406	20598	DMG	Illinois Power Co., No. 4	114	Putnam	33N	02W	26	NE/NE/NW	1969	Unconsolidated	Sand and Gravel	IC
14	--	125916	--	--	--	17	Putnam	33N	02W	26	NW/SW/SW	1922	Unconsolidated	Sand and Gravel	FD
15	--	--	--	Visual	Potentially Advanced Asphalt	--	Putnam	33N	02W	26	SW/SE/NE	--	--	--	IC

Sources of Information

DMG Dyngey Midwest Generation
 IEPA Illinois Environmental Protection Agency
 ISGS Illinois State Geological Survey
 ISWS Illinois State Water Survey
 SWA IEPA Source Water Assessment

Well Use

FD Farm and/or Domestic Water Well
 IC Industrial/Commercial Water Well
 CWS Community Water Supply
 NCWS Non-Community Water Supply

Notes

-- Not applicable or no information available.
 * Used for irrigation of coal pile only.

APPENDIX A

**ILLINOIS STATE GEOLOGICAL SURVEY WELL
LOCATIONS AND DATA**

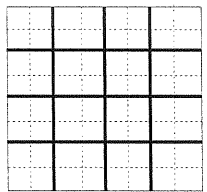
ILLINOIS STATE GEOLOGICAL SURVEY

Irrigation Well	Top	Bottom
gravel	0	4
gravel & boulders	4	18
12-25 slot sand	18	26
gravel & boulders	26	33
1/8" - 1" gravel, no fines	33	80
20-60 slot sand	80	83
shale at	83	83
Total Depth		83
Casing: 12" STEEL from 0' to 62' 12" STAINLESS STL SCREEN from 62' to 82'		
Screen: 20' of 12" diameter 80 slot		
Grout: BENTONITE from 0 to 20.		
Grout: #2 MUSCATINE from 20 to 82.		
Water from sand at 33' to 82'.		
Static level 13' below casing top which is 2' above GL		
Pumping level 20' when pumping at 50 gpm for 1 hour		
Permanent pump installed at 60'		
Address of well: same as above		
Location source: Location from permit		

MAP # 1
ISWS # 155-12-04
P 411819

Permit Date: August 9, 2004 Permit #:

COMPANY Harold Dean Albrecht
 FARM Dynegy Midwest-Hennepin Power
 DATE DRILLED August 11, 2004 NO.
 ELEVATION 0 COUNTY NO. 20702
 LOCATION NE NW SW
 LATITUDE 41.296294 LONGITUDE -89.335163
 COUNTY Putnam API 121552070200

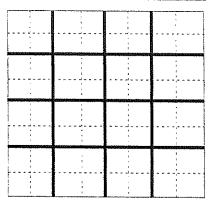


27 - 33N - 2W

Water Well	Top	Bottom
Total Depth Driller's Log filed		113
Permit Date:	Permit #:	

MAP #2
ISWS # P403409

COMPANY Layne Western Co., Inc.
 FARM Illinois Power
 DATE DRILLED September 1, 1968 NO. 5
 ELEVATION 0 COUNTY NO. 00128
 LOCATION NE NE NW
 LATITUDE 41.304882 LONGITUDE -89.31122
 COUNTY Putnam API 121550012800



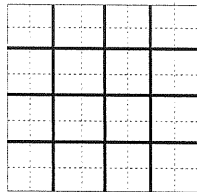
26 - 33N - 2W

ILLINOIS STATE GEOLOGICAL SURVEY

Semi-Private Water Well	Top	Bottom
yellow rocky sand & gravel	0	75
very fine Sankoty sand	75	114
blue shale at	114	114
Total Depth		114
Casing: 6" BLACK STEEL from 3' to 109'		
Screen: 4' of 6" diameter 10 slot		
Grout: BENTONITE from 0 to 90.		
Size hole below casing: 6"		
Water from Sankoty at 109' to 113'.		
Static level 75' below casing top which is 1' above GL		
Pumping level 105' when pumping at 10 gpm for 2 hours		
Permanent pump installed at 112' on June 29, 1995, with a capacity of 10 gpm		
Address of well: R.R. #1 Hennepin, IL		
Location source: Location from permit		
Permit Date: May 31, 1995		
Permit #:		

MAP #4

COMPANY Lutes, George W.
 FARM Advanced Asphalt Co.
 DATE DRILLED June 12, 1995 NO.
 ELEVATION 0 COUNTY NO. 20458
 LOCATION SW NW NW
 LATITUDE 41.30505 LONGITUDE -89.299075
 COUNTY Putnam API 121552045800



25 - 33N - 2W

ILLINOIS STATE GEOLOGICAL SURVEY

Water Well	Top	Bottom
Total Depth Driller's Log filed Sample set # 61998 (0' - 105') Received: June 15, 1979		109
Permit Date:		Permit #:

MAP # 5
 ISWS # 7910/
 P403400

COMPANY Layne Western Co., Inc.
 FARM Esk Corporation
 DATE DRILLED September 1, 1978 NO. 1
 ELEVATION 0 COUNTY NO. 20292
 LOCATION 1830'S line, 1070'E line of SE
 LATITUDE 41.298332 LONGITUDE -89.304115
 COUNTY Putnam API 121552029200

26 - 33N - 2W

ILLINOIS STATE GEOLOGICAL SURVEY

Noncommunity - Public Water Well	Top	Bottom
SS #68792 (0-120')	0	0
fine brown sand	0	4
gray clay	4	5
coarse sand & gravel with boulders	5	79
brown clay with gravel	79	81
fine sand with gravel	81	117
gray shale	117	124
Total Depth		124
Casing: 12" STEEL .375" from 0' to 102'		
Screen: 15' of 12" diameter .13 slot		
Grout: CEMENT from 0 to 20.		
Size hole below casing: 38"		
Water from sand & gravel at 102' to 117'.		
Sample set # 68792 (0' - 120') Received: March 6, 2000		
Location source: Location from permit		
Permit Date: September 5, 1996		
Permit #: 155-011		

MAP #6
 15WS # 155-011-96
 P 403400

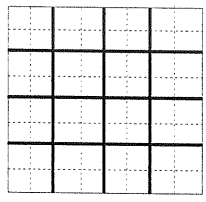
COMPANY Buffington, G.
 FARM Exolon - ESK Company
 DATE DRILLED October 1, 1997 NO. 3
 ELEVATION 0 COUNTY NO. 20497
 LOCATION 1775'N 550'W SE/c
 LATITUDE 41.298186 LONGITUDE -89.302211
 COUNTY Putnam API 121552049700

26 - 33N - 2W

MAP #6

Private Water Well	Top	Bottom
fine brown sand	0	4
gray clay	4	5
coarse sand & gravel	5	79
brown clay with gravel	79	81
fine sand with gravel	81	117
gray shale	117	124
Total Depth		124
Casing: 12" STEEL .375" from 0' to 102'		
Screen: 15' of 12" diameter .13 slot		
Grout: CEMENT from 0 to 20.		
Size hole below casing: 38"		
Water from sand & gravel at 102' to 117'.		
Permanent pump installed at 80' on , with a capacity of 300 gpm		
Location source: Location from permit		
Permit Date: September 5, 1996		Permit #:

COMPANY Buffington, G.
 FARM Exolon - ESK Company #3
 DATE DRILLED October 1, 1996 NO.
 ELEVATION 0 COUNTY NO. 20477
 LOCATION 1775'N 550'W SE/c SE
 LATITUDE 41.298186 LONGITUDE -89.302211
 COUNTY Putnam API 121552047700



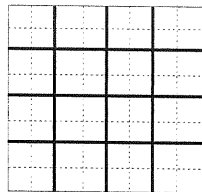
26 - 33N - 2W

ILLINOIS STATE GEOLOGICAL SURVEY

Water Well	Top	Bottom
Total Depth Driller's Log filed Sample set # 61999 (0' - 130') Received: June 15, 1979		128
Permit Date:		Permit #:

MAP # 7

COMPANY Layne Western Co., Inc.
 FARM Esk Corporation
 DATE DRILLED July 1, 1978 NO. 2
 ELEVATION 0 COUNTY NO. 20258
 LOCATION 1590'S line, 890'E line of SE
 LATITUDE 41.297672 LONGITUDE -89.303448
 COUNTY Putnam API 121552025800



26 - 33N - 2W

ILLINOIS STATE GEOLOGICAL SURVEY

MAP # 8

Private Water Well	Top	Bottom
dirty sand	0	8
gravel	8	18
clay	18	36
yellow gravel (a lot of water loss)	36	50
gray gravel (a lot of water loss)	50	72
shale at	72	72
Total Depth		72
Casing: 4" PVC SCH 40 from -1' to 51'		
Screen: 4' of 4" diameter 15 slot		
Grout: BENT GROUT MIX from 0 to 46.		
Water from sand & gravel at 0' to 0'.		
Static level 18' below casing top which is 1' above GL		
Pumping level 0' when pumping at 50 gpm for 3 hours		
Address of well: R.R. #1 Hennepin, IL		
Location source: Location from permit		
Permit Date: August 3, 1999		
Permit #:		

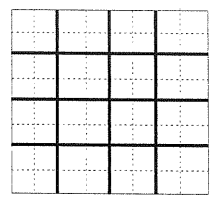
COMPANY Jet Hall
 FARM Brown, Kenneth
 DATE DRILLED August 25, 1999 NO.
 ELEVATION 0 COUNTY NO. 20518
 LOCATION NE SW SW
 LATITUDE 41.296001 LONGITUDE -89.296594
 COUNTY Putnam API 121552051800

25 - 33N - 2W

MAP # 9

Private Water Well	Top	Bottom
sandy brown clay	0	12
gravel	12	20
pinkish gray clay	20	28
yellow gravel (lots of water loss)	28	50
fine sand	50	64
Total Depth		64
Casing: 6" PVC from 0' to 42'		
6" SS SCREEN 18/20 SLOT from 42' to 50'		
Screen: 8' of 6" diameter slot		
Grout: BENT CLAY SLRY from 0 to 40.		
Grout: MUSCATINE #1 from 40 to 50.		
Water from sand & gravel at 28' to 64'.		
Static level 5' below casing top which is 1' above GL		
Pumping level 7' when pumping at 12 gpm for 2 hours		
Address of well: same as above		
Location source: Location from permit		
Permit Date: October 4, 2002		
Permit #:		

COMPANY Jet Hall/Lutes H2o Well Drlg.
 FARM Brown, Kenneth
 DATE DRILLED November 15, 2002 NO.
 ELEVATION 0 COUNTY NO. 20685
 LOCATION NE SW SW
 LATITUDE 41.296001 LONGITUDE -89.296594
 COUNTY Putnam API 121552068500



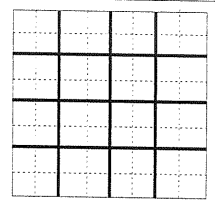
25 - 33N - 2W

ILLINOIS STATE GEOLOGICAL SURVEY

MAP # 12

Noncommunity - Public Water Well	Top	Bottom
SS #68242 (0'-120')	0	0
black topsoil	0	2
brown clay, a little clayey	2	7
yellow-brown coarse gravel & boulders	7	27
brown coarse sand to coarse gravel	27	41
gray & brown soft silty clay	41	43
brn med sand to coarse gravel & boulders	43	50
reddish brown coarse gravel & boulders	50	67
multi-colored boulders	67	73
conglomerate clay & boulders /trace lime	73	82
light gray silty clay	82	84
hard tight coarse gravel	84	86
brn med sand to coarse gravel & boulders	86	96
boulder	96	98
fn brn snd; coarse gravel w/finer layers	98	112
brown fine sand to medium gravel	112	118
firm gray shale	118	125
Total Depth		120
Casing: 36" STEEL from 12' to 62'		
18" STEEL 70.59#/FT. from -2' to 90'		
Screen: 25' of 18" diameter .1 slot		
Grout: CONCRETE from 0 to 20.		
Water from sand & gravel at 90' to 115'.		
Static level 17' below casing top which is 3' above GL		
Pumping level 31' when pumping at 1086 gpm for 8 hours		
Permanent pump installed at 50' on October 31, 1993, with a		
Permit Date: August 31, 1993	Permit #:	

COMPANY Buffington, G.
 FARM Illinois Power Co.
 DATE DRILLED September 30, 1993 NO. 1A/5
 ELEVATION 0 COUNTY NO. 20435
 LOCATION NE NE NW
 LATITUDE 41.304882 LONGITUDE -89.31122
 COUNTY Putnam API 121552043500



26 - 33N - 2W

MAP # 12
PAGE 2

capacity of 500 gpm

Sample set # 68242 (10' - 120') Received: July 14, 1994

Location source: Location from permit

Buffington, G.

Illinois Power Co. 1A/5

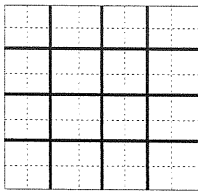
COUNTY Putnam

API 121552043500 26 - 33N - 2W

Water Well	Top	Bottom
<p>Total Depth Sample set # 56227 (65' - 114') Received: May 16, 1969</p> <p>Permit Date: _____ Permit #: _____</p>		114

MAP #13
ISWS#
176545
P403406

COMPANY Layne-Western Drlg
FARM Il. Power Co.
DATE DRILLED NO. 4
ELEVATION OGL COUNTY NO. 20598
LOCATION NE NE NW
LATITUDE 41.304882 LONGITUDE -89.31122
COUNTY Putnam API 121552059800



26 - 33N - 2W

APPENDIX B

**ILLINOIS STATE WATER SURVEY PRIVATE WELL
DATABASE WELL DATA**

**Illinois Department of Public Health
WATER WELL CONSTRUCTION REPORT**

Date 8-31-04

TYPE OR PRESS FIRMLY WITH BLACK INK PEN. COMPLETE WITHIN 30 DAYS OF WELL COMPLETION AND SEND TO THE APPROPRIATE HEALTH DEPARTMENT.

RECEIVED
11/17/04

Dynegy Midwest Gen - Hennepin Power
GEOLOGICAL AND WATER SURVEY WELL RECORD

1. Type of Well a. **Driven** Well Casing diam. _____ in. Depth _____ ft.
 b. **Bored** Well Buried Slab [] Yes [] No
 Hole Diameter _____ in. to _____ ft.; _____ in. to _____ ft.
 c. **Drilled** Well PVC casing Formation packer set at depth of _____ ft.
 Hole Diameter _____ in. to _____ ft. _____ in. to _____ ft.

14. Driller Harold D. Albrecht License # 102-002466
 15. Name of Drilling Co. Albrecht Well Drilling, Inc.
 16. Permit No. 155-12-04 Date Issued 8-9-04

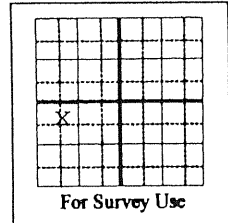
Type of Grout	# of Bags	Grout Weight	From (ft.)	To (ft.)	Tremie Depth (ft.)

17. Date Drilling Started August 10, 2004
 18. Well SITE address R.R. #1 Hennepin, IL
 19. Township Name Hennepin Land ID # 01-27-100-000
 20. Subdivision Name n/a Lot # n/a

- d. **Drilled** Well Steel Casing - - Mechanically Driven [] Yes [] No
 Hole Diameter 19 in. to 82 ft. _____ in. to _____ ft. _____ in. to _____ ft.

Type of Grout	# of Bags	Grout Weight	From (ft.)	To (ft.)	Tremie Depth (ft.)
<u> Bentonite </u>			<u> 0 </u>	<u> 20 </u>	<u> 20 </u>

21. Location a. County Putnam
 b. Township 33N Range 2W Section 27 7d
 c. NE Quarter NW Quarter SW Quarter
 d. Coordinates _____ Site Elevation _____ ft. (msl)



22. Casings, Liners* and Screen Information

Diam. (in.)	Material	Joint	Slot Size	From (ft.)	To (ft.)
<u> 12 </u>	<u> steel </u>			<u> 0 </u>	<u> 62 </u>
<u> 12" </u>	<u> SS </u>		<u> 80 </u>	<u> 62 </u>	<u> 82 </u>

(*) _____
 (List reason for liner, type of upper and lower seals installed)

- c. Well finished within [] Unconsolidated Materials [] Bedrock

Kind of Gravel Sand Pack	Grain Size/Supplier #	From (ft.)	To (ft.)
<u> #2 Muscatine </u>		<u> 20 </u>	<u> 82 </u>

- 2 Well Use [] Domestic [] Irrigation [] Commercial [] Livestock
 [] Monitoring [] Other

- 3 Date Well Completed 8-11-04 Well Disinfected [] Yes [] No
 Driller's estimated well yield 50 gpm w/air

- 4 Date Permanent Pump Installed 8-16-04
 5 Pump Capacity _____ gpm Set at (depth) 60 ft.

- 6 Pitless Adapter Model and Manufacturer _____

- 7 Well Cap Type and Manufacturer Weld-on Top Plate

- 8 Pressure Tank Working Cycle _____ gals. Captive Air [] Yes [] No

- 9 Pump System Disinfected [] Yes [] No

- 10 Name of Pump Company Albrecht Well Drilling, Inc,

- 11 Pump Installer Harold D. Albrecht License # 102-002466

- 12 Harold D. Albrecht License # 102-002466

Licensed Pump Contractor Signature

PICS 15534260, #7

P# 411819

Illinois Department of Public Health
 Division of Environmental Health
 525 W. Jefferson St.
 Springfield, IL 62761

DO NOT write on these lines

X11819

IMPORTANT NOTICE: This state agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Public Act 85-0863. **DISCLOSURE OF THIS INFORMATION IS MANDATORY.** This form has been approved by the Forms Management Center.

ISGS # 121552070200

(If dry hole, fill out log and indicate how hole was sealed.)

Harold D. Albrecht
 25. Licensed Water Well Contractor Signature

102-002466
 License Number

MAP #1

SEE REVERSE SIDE FOR ADDITIONAL INFORMATION)

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well

- a. Dug _____ Bored _____ Hole Diam. _____ in. Depth _____ ft.
Curb material _____ Buried Slab: Yes _____ No _____
- b. Driven _____ Drive Pipe Diam. _____ in. Depth _____ ft.
- c. Drilled Finished in Drift In Rock _____
Tubular _____ Gravel Packed
- d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
None		

2. Distance to Nearest:

- Building _____ Ft. Seepage Tile Field _____
Cess Pool _____ Sewer (non Cast iron) _____
Privy _____ Sewer (Cast iron) _____
Septic Tank _____ Barnyard _____
Leaching Pit _____ Manure Pile _____

3. Is water from this well to be used for human consumption?

Yes _____ No

4. Date well completed Aug 29, 68

5. Permanent Pump Installed? Yes No _____

Manufacturer Layne Type line shaft

Capacity 1000 gpm. Depth of setting 60 ft.

6. Well Top Sealed? Yes No _____

7. Pitless Adaptor Installed? Yes _____ No

8. Well Disinfected? Yes No _____

9. Water Sample Submitted? Yes _____ No

REMARKS:

PHOSPHOR

GEOLOGICAL WATER SURVEYS WATER WELL RECORD

10. Dept. Mines and Minerals permit No. 11-4409 Year 1968

11. Property owner Ill. Power Co. Well No. 5

Address Hennepin St

Driller Layne-Western Co License No. 92-14

12. Water from Drift 13. County Putnam

Formation _____ at depth 0 to 112 ft.

14. Screen: Diam. 18 in. Sec. 26.54

Length: 70 ft. Slot 0.070" Twp. 33N

Rng. 2W

Elev. _____

15. Casing and Liner Pipe

Diam. (In.)	Kind and Weight	From (Ft.)	To (Ft.)
30"	3/8" steel	0	63'-6"
18"	3/8" steel	0	63'-6"
18"	3/8" steel	73'-6"	73'-6"

SHOW LOCATION IN SECTION PL. NE NE NW

16. Size Hole below casing: 30 in.

17. Static level 13'4" ft. below casing top which is 0 ft. above ground level. Pumping level 33 ft. when pumping at 157 gpm for 6 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH O BOTTOM
Drift	112	112
Shale	?	?
(CONTINUE ON SEPARATE SHEET IF NECESSARY)		

SIGNED D. L. Elmer DATE Nov 2, 68

MAP # 2

ISGS # 121550012800

INSTRUCTION TO DRILLERS

White Copy -
Ill. Dept. of Public Health
Yellow Copy - Well Contractor
Blue Copy - Well Owner

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

GEOLOGICAL AND WATER SURVEYS WELL RECORD
(Industrial)

1. Type of Well

- a. Dug Bored Hole Diam. in. Depth 101 ft.
Curb material Buried Slab: Yes No
- b. Driven Drive Pipe Diam. in. Depth ft.
- c. Drilled Finished in Drift In Rock
Tubular Gravel Packed
- d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
ready mix	7	20

2. Distance to Nearest:

- Building Ft. Seepage Tile Field
- Cess Pool Sewer (non Cast iron)
- Privy Sewer (Cast iron)
- Septic Tank Barnyard
- Leaching Pit Manure Pile

3. Is water from this well to be used for human consumption?

Yes No

4. Date well completed 10/2/78

5. Permanent Pump Installed? Yes No

Manufacturer Type
Capacity gpm. Depth of setting ft.

6. Well Top Sealed? Yes No

7. Pitless Adaptor Installed? Yes No

8. Well Disinfected? Yes No

9. Water Sample Submitted? Yes No

REMARKS:

County # 20292

1565
121552029200

IDPH 4.065
10/68

P 403400

PLCS 15534255, #1

10. Property owner ESK Corporation Well No. 1

Address Hennepin IL

Driller Layne-Western Co. License No. 102-13

11. Permit No. 79101 Date 9/6/78

12. Water from drift Formation 13. County Putnam

at depth 89 to 104 ft. Sec. 26 WC

14. Screen: Diam. 12 in (Tele) Twp. 33N

Length: 15 ft. Slot 40 Rge. 2W

Elev.

15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
12	steel 0.330"	89	+2

SHOW LOCATION IN SECTION PLAT
18°30'N, 107°0'W,
SEC. (Industrial)

16. Size Hole below casing: 38 in.

17. Static level 72 ft. below casing top which is 2 ft. above ground level. Pumping level 85 ft. when pumping at 530 gpm for 8 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Fine sand to coarse gravel /boulders	0	6
Fine brown sand	6	8
Fine sand to coarse gravel /boulders	8	64
Fine to coarse sand	64	105
Fine sand to coarse gravel, boulders & traces of clay	105	109

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED D. G. Lohmeier DATE 10/3/78

D. G. Lohmeier, P.E.

MAP #5

White & Pink Copies:
 Ill. Dept. of Public Health
 Yellow Copy: Well Contractor
 Golden Copy: Well Owner

Well Construction Report

1566 #121552 049700 MAP #6

THIS FORM MUST BE COMPLETED WITHIN 30 DAYS
 OF WELL COMPLETION AND SENT TO
 THE ILLINOIS DEPARTMENT OF PUBLIC HEALTH
 DIVISION OF ENVIRONMENTAL HEALTH
 525 WEST JEFFERSON STREET
 SPRINGFIELD, ILLINOIS 62761

GEOLOGICAL AND WATER SURVEYS WELL RECORD
 Project Driller, MIKE RIFE & MARY MICHELS

9. Driller Layne-Western License No. 102-003241
 10. Well Site Address VIENNE PIN, ILL.
 11. Property Owner Exolon-ESK Well No. 3
 12. Permit No. 155-011-96 Date Issued 9/5/96
 13. Location: 550'W & 1775'N of S.E. corner County Putnam
 Sec. 26, 4c
 Twp. 33N
 Rge. 2W

1. Type of Well
 a. Bored Hole Diam. in. Depth ft
 Buried Slab: Yes No
 b. Driven Drive Pipe Diam. in. Depth ft
 c. Drilled Finished in Drift In Rock
 d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
cement	0	20

14. Water from sand & gravel at depth 102 ft
 to 117 ft
 15. Casing and Liner Pipe
 Diam. (in) 12 Kind and Weight steel-.375" From (ft) 0 To (ft) 102
 Show location in section plat
 SWNWSE

2. Well furnishes water for human consumption? Yes No
 3. Date well drilled October 1
 4. Permanent pump installed? Yes Date in future No
 Manufacturer Layne & Bowler Type VIP
 Location
 Capacity 300 gpm. Depth of setting 80 ft.
 5. Well top sealed? Yes No Type steel plate
 6. Pitless adapter installed? Yes No
 Manufacturer Model No.
 How attached to casing?
 7. Well disinfected? Yes No
 8. Pump and equipment disinfected Yes No

16. Screen: Diam. 12 in, Length 15' Slot Size .130"
 17. Size hole below casing 38 in. 18. Ground Elev. ft msl.
 19. Static level ft below casing top which is ft. above
 ground level. Pumping level ft, pumping gpm for hours.

20. Earth Materials Passed Through	Depth of	
	Top	Bottom
Fine brown sand	0	4
Gray clay	4	5
Coarse sand & gravel with boulders	5	79
Brown clay with gravel	79	81
Fine sand with gravel	81	117
Gray shale	117	124

IMPORTANT NOTICE
 This State Agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Public Act 85-0863. Disclosure of this information is mandatory. This form has been approved by the Forms Management Center.

PRESS FIRMLY WITH BLACK PEN OR TYPE
 P# 405443 Do Not Use Felt Pen
 CO#20497

Continue on separate sheet if necessary.
 Signed GREGORY D. BUFFINGTON, P.E. Date 11/5/96

INSTRUCTIONS TO DRILLERS

MAP # 7
1565 # 20258

White Copy -
Ill. Dept. of Public Health
Yellow Copy - Well Contractor
Blue Copy - Well Owner

FILL IN ALL PERTINENT INFORMATION REQUESTED AND MAIL ORIGINAL TO STATE DEPARTMENT OF PUBLIC HEALTH, ROOM 616, STATE OFFICE BUILDING, SPRINGFIELD, ILLINOIS, 62706. DO NOT DETACH GEOLOGICAL/WATER SURVEYS SECTION. BE SURE TO PROVIDE PROPER WELL LOCATION.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

GEOLOGICAL AND WATER SURVEYS WELL RECORD
(Potable)

1. Type of Well

- a. Dug Bored Hole Diam. in. Depth 128 ft.
Curb material Buried Slab: Yes No
- b. Driven Drive Pipe Diam. in. Depth ft.
- c. Drilled Finished in Drift In Rock
Tubular Gravel Packed
- d. Grout:

(KIND)	FROM (Ft.)	TO (Ft.)
Grout	7	20

2. Distance to Nearest:

- Building Ft. Seepage Tile Field
- Cess Pool Sewer (non Cast iron)
- Privy Sewer (Cast iron)
- Septic Tank Barnyard
- Leaching Pit Manure Pile

3. Is water from this well to be used for human consumption?

Yes No

4. Date well completed 8/15/78

5. Permanent Pump Installed? Yes No

Manufacturer Type
Capacity gpm. Depth of setting ft.

6. Well Top Sealed? Yes No

7. Pitless Adaptor Installed? Yes No

8. Well Disinfected? Yes No

9. Water Sample Submitted? Yes No

REMARKS:

County # 20258

IDPH 4.065
10/68

116
12
158

PICS 15524255 # 2 P403401

10. Property owner ESK Corporation Well No. 2

Address Hennepin, Illinois

Driller Layne-Western Co. Inc. License No. 102-13

11. Permit No. 76743 Date 7/12/78

12. Water from drift 13. County Putnam

at depth 116 to 128 ft. Sec. 26.2C

14. Screen: Diam. 12 in (Tele) Twp. 33N

Length: 12 ft. Slot 40 Rge. 2W

Elev.

15. Casing and Liner Pipe

Diam. (in.)	Kind and Weight	From (Ft.)	To (Ft.)
12	steel 0.330"	0	116

SHOW LOCATION IN SECTION PLAT
1590'W 890'W,
SE7C, (Industrial)

16. Size Hole below casing: 20 in.

17. Static level 90 ft. below casing top which is 2 ft. above ground level. Pumping level 112 ft. when pumping at 261 gpm for 8 hours.

18. FORMATIONS PASSED THROUGH	THICKNESS	DEPTH OF BOTTOM
Gravel, boulders	0	82
Brown clay	82	88
Med. sand, gravel, fine sand	88	128

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED D. G. Lohmeier DATE 10/3/78
D. G. Lohmeier, P.E.

Ch. 2000



WELL INFORMATION - DRIFT WELLS

MAP # 12
ISGS # 121552043500

Layne-Western Company, Inc.

PAGE 1

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone: 708/897-6941

Name of Job Illinois Power Company Date 10/05/93

City or Village Hennepin State IL

Well No.: 6 (Local 1A) Drillers: Glidewell, Will, Rife

Well Location: _____ ft. (____) and _____ ft. (____) of the _____ corner of

Section 26 SE, Twp. 33 (N), Range 2 (W) Putnam County.

Otherwise located as fractional section

Work Began: 8-24-93 Work Completed: 10-07-93 Well Depth: 115'

All measurements made from existing ground level at time well was drilled.

Casing Record:

Amount	Dia.	Wt. or Thickness	Material	with	Joints	from	to
<u>92'</u>	<u>18"</u>	<u>0.375"</u>	<u>Steel</u>	<u>Welded</u>		<u>90'</u>	<u>+2'</u>
<u>50'</u>	<u>36"</u>	<u>0.375'</u>	<u>Steel</u>	<u>Welded</u>		<u>12'</u>	<u>62'</u>

Screen Record: Type Houston

Amount	Dia.	Opening	Material	with	Joints	from	to
<u>25'</u>	<u>18"</u>	<u>0.100</u>	<u>S.Steel</u>	<u>Welded</u>		<u>115'</u>	<u>90'</u>
_____	_____	_____	_____	_____		_____	_____

Type of Seal at Bottom Stainless Steel Plate

Hole Record:

38" min. inch from 0 to 118'
_____ inch from _____ to _____

Gravel Pack Record:

Amount	Size	Source	From	To
<u>47 Tons</u>	<u>#3</u>	<u>Northern</u>	<u>118"</u>	<u>70'</u>
_____	_____	_____	_____	_____

Cementing Record: Ready Mix Concrete - 20' to 9'

Backfill Record: Bentonite Seat at 62 ft.
Backfill Sand 62 to 20

P 404906

WELL LOG

Feet	Feet	Description
0	to 2	Black topsoil
2	to 7	Brown sand, a little clayey
7	to 27	Yellow brown coarse gravel & boulders
27	to 41	Brown coarse sand to coarse gravel
41	to 43	Gray & brown soft silty clay
43	to 50	Brown medium sand to coarse gravel & boulders
50	to 67	Reddish brown coarse gravel & boulders
67	to 73	Multi-colored boulders
73	to 82	Conglomerate clay & boulders traces of weathered lime
82	to 84	Light gray silty clay
84	to 86	Hard tight coarse gravel
86	to 96	Brown jagged medium sand to coarse gravel & boulders
96	to 98	Boulder
98	to 112	Brown fine sand to coarse gravel with finer layers
112	to 118	Brown fine sand to medium gravel
118	to 125	Firm gray shale
	to	
	to	
	to	
	to	
	to	
	to	
	to	
	to	
	to	

Well Test Data: Static Level 17; pumping level 31' after 8 hours pumping at 1086 g.p.m.

Length of test 8 hrs. See Well Test Data Sheet Dated October 4, 1993

REMARKS:



WELL TEST DATA SHEET

Layne-Western Company

A Layne Company

MAP #12
PAGE 3

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone: 708/897-6941

Job Illinois Power Company Well No. 5⁶ Date Tested 10/4/93
 Location Hennepin, IL Tested By C. Glidewell
 Dia. of Well 18" Driver 671 Engine
 Depth of Well 115' from G.L. Pump Used: Column and Shaft 8 x 1-11/16"
 Length of Airline 85' Bowls _____
 Non-Pumping Level 17' Manufacturer Layne
 Orifice Size 10" x 8" Serial No. Test Pump

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (feet)	Pumping Level	Drawdown	Disch. Pressure		Total Pumping Head	Remarks
						Lbs.	Feet		
9:30		0	68	17'	SWL				
10:00	13.5	1086	56	29	12				Cloudy
10:30	13.5	1086	56	29					Clear
11:00	13.5	1086	56	29					No Sand
11:30	13.5	1086	56	29					
12:00	13.5	1086	54	31	14				
12:30	13.5	1086	54	31					
1:00	13.5	1086	54	31					
1:30	13.5	1086	54	31					
2:00	13.5	1086	54	31					
2:30	13.5	1086	54	31					
3:00	13.5	1086	54	31					
3:30	13.5	1086	54	31					
4:00	13.5	1086	54	31					
4:30	13.5	1086	54	31					
5:00	13.5	1086	54	31					
5:30	13.5	1086	54	31	14				
									Final Specific Capacity = 77.6 GAL/FT.



WELL TEST DATA SHEET

Layne-Western Company

A Layne Company

MAP #12
PAGE 2

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone: 708/897-6941

Job Illinois Power

Well No. #6 (1A)

Date Tested 10/27/93

Location Hennepin, IL.

Tested By Marvin Michelson

Dia. of Well 18"

Driver 60 HP Westinghouse

Depth of Well 115' (from G.L.)

Pump Used:

Column and Shaft 8"x1 11/16"x2 1/2"

Length of Airline 50'

Bowls 11 stage - 12 RKMC

Non-Pumping Level 29' (Direct)

Manufacturer Layne-Western

Orifice Size IP Tripod - 6 x 5

Serial No. 22200

Time	Piezometer Reading (in.)	G.P.M.	Air Gauge Reading (feet)	Pumping Level	Drawdown	Disch. Pressure		Total Pumping Head	Remarks
						Lbs.	Feet		
7:00		0	29						
1:15	14.3	466	35	35	6	120			cloudy 78/78/80
1:20	17.3	513	35	35	6	115			78/78/79
1:25	19	543	35	35	6	100			clear
	21	570	36	36	7	105			clear
	22.8	597	36	36	7	100			clear
	24.5	616	36	36	7	95			clear
	26.8	641	37	37	8	90			clear
	28.3	659	37	37	8	85			77/77/78
	30.3	682	37	37	8	80			77/77/78
	32.3	704	38	38	9	75			77/77/78
	34	726	38	38	9	70			77/77/78
	36	747	38	38	9	65			77/77/78
	37.3	757	38	38	9	60			77/77/78
	39.3	777	39	39	10	55			77/77/78
	41	797	39	39	10	50			77/77/78
1:40	43	816	40	40	11	45			77/77/78
	44.8	826	40	40	11	40			77/77/78
	46.5	849	40	40	11	35			77/77/78
	48	862	41	41	12	30			77/77/78
	49.8	876	42	42	13	25			Sp Q =67.4

ISGS # 121552059800 #4

MAR 1965

7/17/60
NO. 30545

City Hennepin County Putnam

Section 26 Twp. No. 33N Range 2W

Location (in feet from section corner) NE 1/4, NE 1/4, NW 1/4

Owner Illinois Power Co. Authority _____

Contractor Layne-Western Co. Address 721 West Illinois Ave., Aurora, Ill. 60502

Date drilled Aug 26, '69 Elev. above sea level top of well _____

Depth 116' 113.5

Log Sand and gravel

Were drill cuttings saved Yes Where filed State of Illinois

Size hole 30" If reduced, where and how much _____

Casing record 18" to 93'-6" ; 18" stainless screen to 116'

Distance to water when not pumping 13'-4" Distance to water is 24

feet after pumping at 1070 G. P. M. for 7 hours.

Reference point for above measurements Top of casing

Type of pump Test pump Distance to cylinder _____

Length of cylinder _____ Length of suction pipe below cylinder _____

Length stroke _____ Speed _____

Hours used per day _____ Type of power _____

Rating of motor _____ Rating of pump in G. P. M. _____

Can following be measured: (1) Static water level _____

(2) Pumping level _____ (3) Discharge _____

(4) Influence on other wells _____

Temperature of water _____ Was water sample collected Yes

Date _____ Effect of water on meters, hot water

coils, etc. _____

Date of Analysis _____ Analysis No. _____

Recorder _____

Date _____

April 1, 1969

WELL PRODUCTION TEST
ILLINOIS POWER COMPANY, WELL NO. 4
PUTNAM COUNTY
by

Layne-Western

*2 26.582
functional
section*
MAP #13
PAGE 2
ISGS #
121552059800

Owner: Illinois Power Company
Location: NE 1/4, NE 1/4, NW 1/4, Sec. 26, T. 33N.,
R. 2W.
Date of Test: 8/27/68
Date Completed: August 1968
Length of Test: 6 hours
Aquifer: Sand & gravel

WELL DATA

PUMPED WELL

Well No: 4
Driller: Layne-Western
Depth: 113.5
Hole Record: 48" 0-15'; 42" 15-30'; 34" 30-60'; 30" 60-113.5'
Casing Record: 30" 0-62'; 18" 0-63.5 and 73.5-93.5' (gravel
packed, 2-113.5')
Screen Record: 10' of 18" #6 slot S.S. 63.5-73.5'; 20' of 18"
#6 slot S. S. 93.5-113.5'
Pump and Power: Test pump; 100 hp motor
Measuring Point: 18" above GL, top of casing
Measuring Equipment: 10x8" orifice, steel tape
Static Level: 13'4"

P. 403404

MEASUREMENTS

PUMPED WELL

MAP #13

PAGE 3

Date 1968	Hour	Time (min)	Alt. gage (ft)	Depth to water (ft)	Draw- down (ft)	Piez. tube (in)	Pump. rate (gpm)	Remarks
8/27	7:50A		13.33					FPNR*
	8:45		17.58					Fire pump running (on at 8:37)
	8:59		13.58					FPNR*
	9:00	0				24.5	1543	Pump on
	9:15	15	31.17	31.17	17.82	25	1557	FPNR*
	9:30	30	33.42	33.42	20.08	25.5	1571	Fire pump running
	10:00	60	33.58	33.58	20.25	25.5	1571	Fire pump running
	10:30	90	33.58	33.58	20.25	25.5	1571	Fire pump running
	11:00	120	31.42	31.42	18.08	25.5	1571	Fire pump running
	11:30	150	33	33	19.67	25.5	1571	Fire pump running
	12:00N	180	33.33	33.33	20	25.5	1571	Fire pump running
	12:30P	210	33.08	33.08	19.75	25.5	1571	Fire pump running
	1:00	240	33.25	33.25	19.75	25.5	1571	Fire pump running
	1:30	270	33.82	33.82	20.50	25.5	1571	Fire pump running
	2:00	300	32.92	32.92	19.58	25.5	1571	Fire pump running
	2:30	330	33	33	19.67	25.5	1571	Fire pump running
	3:00	360	33	33	19.67	25.5	1571	Fire pump running
	3:05	365						Reduced capacity to 1080 gpm
	3:30	390	26.17	26.17	12.67	11	1080	Fire pump running
	4:00	420	24.08	24.08	10.75	11	1080	FPNR* (off at 3:33)
	4:30	450	24.08	24.08	10.75	11	1080	FPNR*
	5:00	480	24.08	24.08	10.75	11	1080	FPNR*
								End of Test

*FPNR=Fire pump not running

DRILLER'S LOG
WELL NO. 4

MAP #13
PAGE 4

<u>Formation</u>	<u>From</u>	<u>To</u>
Brown sandy soil	0'	8"
Brown med. sand to coarse gravel with boulders	8"	22 1/2'
Black silty soil	22 1/2'	23 1/2'
Brown med. sand to coarse gravel with trace of clay and silt	23 1/2'	26 1/2'
Light gray silty clay, soft	26 1/2'	28'
Brown med. sand	28'	29 1/2'
Multi-colored clay silt, soft, soft sandstone boulder at 30'	29 1/2'	32'
Brown med. sand to coarse gravel, trace of rusty colored sandy silt, some boulders	32'	49 1/2'
Gray sandy clay	49 1/2'	50 1/2'
Brown and gray med. sand to coarse gravel	50 1/2'	58'
Light gray silty clay	58'	59'
Med. sand to coarse gravel, multi-colored	59'	67'
Light gray silty clay	67'	67 1/2'
Med. sand to coarse gravel, multi-colored	67 1/2'	79'
Fine to med. sand, gray	79'	87'
Limestone boulder	87'	88'
Brown med. sand to coarse gravel	88'	97'
Brown fine to med. sand, trace of gravel	97'	106 1/2'
Brown med. sand to coarse gravel	106 1/2'	112 1/2'
Gray shale	112 1/2'	

Location

NE 1/4, NE 1/4, NW 1/4, S. 26

T. 33 N., R. 2 W.

P Number: **431044** **NEW** **SAVE** **CANCEL** **DELETE**
 Entered By:
 Data Set Location: **1 OF 9** **>** **>**
 Last User:

SUMMARY **POINT INFO** **IWIP INFO** **LOCATION VERIFICATION** **OBSERVATION** **PAPER FILES** **QA / QC**

Well Type: <input type="text"/>	Total Depth: <input type="text" value="44.00"/> (ft.)	AQ Code: <input type="text"/>	Static Level Below Casing Top: <input type="text"/> (ft.)
Aquifer Type: <input type="text"/>	Well Use: <input type="text" value="RE"/>	Date Completed: <input type="text" value="<1991"/>	Inches Casing Above Ground Level: <input type="text"/> (in.)
Owner: <input type="text" value="DYNEGY MIDWEST GEN - HENNEPIN POWER"/>	Facility Point Number: <input type="text" value="8"/>	IWIP Facility ID: <input type="text" value="15534260"/>	Pumping Level Below Casing Top: <input type="text"/> CALC
Driller: <input type="text"/>	Drilling Company: <input type="text"/>	Permit #: <input type="text"/>	Static Water Level: <input type="text"/> Pumping Level: <input type="text"/>
Address: <input type="text"/>	City: <input type="text"/>	State: <input type="text"/>	Pumping: <input type="text"/> gpm for <input type="text"/> hours
Land ID: <input type="text"/>	Subdivision: <input type="text"/>	Record Type: <input type="text"/>	General Remarks: <input type="text" value="USED 1991-1993 AS PART OF A LEAKING UNDERGROUND TANK REMEDIATION PER JOHN AUGSPOLS 10-31-07 TB."/>
FIPS: <input type="text" value="155"/>	TWN: <input type="text" value="33N"/>	RNG: <input type="text" value="02W"/>	Record Type Remarks: <input type="text"/>
PLSS Source: <input type="text" value="CR"/>	SEC: <input type="text" value="26"/>	QQQ: <input type="text" value="SE"/>	Previous Owners: <input type="text"/>
Latitude: N <input type="text" value="41.3032333"/>	Principal Meridian: <input type="text" value="3"/>	Plot: <input type="text" value="5G"/>	Date Sealed: <input type="text" value="08/16/2007"/>
Longitude: W <input type="text" value="39.3162167"/>	Lat-Lon Source: <input type="text" value="GPS"/>	Lambert X: <input type="text" value="3051710"/>	SGS Number: <input type="text"/>
LS Elevation: <input type="text"/> (ft.)	Elevation Method: <input type="text"/>	Lambert Y: <input type="text" value="3011702"/>	Lambert Method: <input type="text"/>
Casing Dia: <input type="text"/> (in.)	Casing Depth: <input type="text"/> (ft.)	Lambert Method Remarks: <input type="text"/>	Lambert Accuracy: <input type="text"/>
Screen Length: <input type="text"/> (ft.)	Water From: <input type="text"/> depth of: <input type="text"/> (ft.) to: <input type="text"/> (ft.)	Lambert Source: <input type="text"/>	Database Data
			Date Completed: <input type="text"/>
			Date Sealed: <input type="text" value="20070816"/>

NO MAP # TEST WELLS

P431044
Facility 15534260, #8

SCANNED

- REC'D FILTER
- FIND NUMBER
- VIEW PUMPAC
- VIEW SC
- VIEW FACILIT
- VIEW PERMI
- PRINT SCREE

Home	Highlights	Staff	Data	Information	Centers	Site Map	Search
ISWS	Private Well Database						Illinois State Water Survey Address / Phone Information

Records for Putnam county, 33N township, 01W range, 30 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125859	1G	119	RG	DO	~~	~~	00173
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		07/06/1973					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125860	2H	100	RG	DO	~~	~~	00127
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		10/15/1968					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125861	2H	100	RG	DO	~~	~~	
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		07/31/1969					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
314745	8A	170	RGCP	DO	DL	UN	20515
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
COUNTRY WELL & PUMP		10/02/1997					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
329423	5B	26	RGP	DO	BD	UN	20541
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
ROY THORNE		03/28/2000	13				

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
348053	3H	65	RGP	DO	BD	UN	20670
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
THORNE WELL DRILLING/MIKE DRYDEN		03/07/2003					

View the results in "Table Format" [Search for a different Section](#)

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

[Column headings link to data explanations.](#)

[| PWD Home](#) | [| Meta Data](#) | [| Location System](#) | [| Disclaimer](#) | [| Contact Us](#) | [| Help](#) |

Home	Highlights	Staff	Data	Information	Centers	Site Map	Search
ISWS Private Well Database Illinois State Water Survey Address / Phone Information							

Records for Putnam county, 33N township, 01W range, 31 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125862	1A	201	RG	DO	~~	~~	00180
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		06/12/1973					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125863	1F	200	RG	DO	~~	~~	20256
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
K & K WELL DRILLING		07/11/1977					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125864	2F	4	RG	DO	~~	~~	
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
		03/12/1934					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125865	5F	200	RG	DO	~~	~~	00164
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		11/17/1972					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
296155	8H	213	RG	DO	DL	UN	
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
KEITH THIERY		04/30/1997	134	136	20	2	

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
358239	8H	241	RG	DO	DL	UN	20698
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
COMPLETE WELL DRILLING/DARREL DOBER		06/19/2003	179	189	12	2	

View the results in "Table Format" [Search for a different Section](#)

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

Column headings link to data explanations.

[PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

[Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) | [Search](#)

ISWS **Private Well Database** Illinois State Water Survey
Address / Phone Information

Records for Putnam county, 33N township, 02W range, 24 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
343982	5D	303	RGP	DO	DL	UN	20622
Driller			Date Drilled		Static Level Pumping	Level Pumping GPM	Pumping Hours
LUTES H2O DRILLING/G.DELHOTEL			07/30/2001 229			30	2

View the results in "Table Format". [Search for a different Section](#)

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)
Column headings link to data explanations.

| [PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

| [Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) |



Illinois State Water Survey, Contact Information
University of Illinois at Urbana-Champaign

All files and information © 2009 Illinois State Water Survey. Terms of use.
Email the Web Administrator with questions or comments.
Last Modified: March 11, 2008

Private Well Database

Records for Putnam county, 33N township, 02W range, 25 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125915	3F	196	RG	DO	~~	~~	
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
EGART	1922						

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
314693	7B	72	RGCP	DO	DL	UN	20518
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
LUTES DRILLING	09/14/1999	17		50	3		

MAD

8

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
359951	7B	64	RG	DO	DL	UN	20685
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
LUTES H2O DRILLING/JET HALL	11/15/2002	4	6	12	2		

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
382144	1A	158	RG	DO	DL	UN	20747
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
LUTES H2O DRILLING/KEITH THIERRY	04/10/2006	100		15	1		

View the results in "Table Format" [Search for a different Section](#)

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

Column headings link to data explanations.



[Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) | [Search](#)

ISWS **Private Well Database** Illinois State Water Survey
Address / Phone Information

Records for Putnam county, 33N township, 02W range, 26 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125916	8B	17	RG	DO	~	~	
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
	1922						

MAP # 14

View the results in "Table Format" Search for a different Section

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

Column headings link to data explanations.

| [PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

| [Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) |



Illinois State Water Survey, Contact Information
University of Illinois at Urbana-Champaign

All files and information © 2009 Illinois State Water Survey. Terms of use.
Email the Web Administrator with questions or comments.
Last Modified: March 11, 2008

[Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) | [Search](#)

ISWS **Private Well Database** Illinois State Water Survey
Address / Phone Information

Records for Putnam county, 33N township, 02W range, 27 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125917	5D	30	RG	DO	~~	~~	
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
	1884						

OUT OF RADIUS

[View the results in "Table Format"](#) [Search for a different Section](#)

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

[Column headings link to data explanations.](#)

| [PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

| [Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) |



Illinois State Water Survey, Contact Information
University of Illinois at Urbana-Champaign

All files and information © 2009 Illinois State Water Survey. Terms of use.
Email the Web Administrator with questions or comments.
Last Modified: March 11, 2008

Home | Highlights | Staff | Data | Information | Centers | Site Map | Search

ISWS

Private Well Database

Illinois State Water Survey
Address / Phone Information

Records for Putnam county, 33N township, 02W range, 34 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125918	1D	300	RG	DO	~	~	
Driller	Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours		
	1848						

OUT OF RECORDS

View the results in "Table Format" Search for a different Section

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

Column headings link to data explanations.

| [PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

| [Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) |



Illinois State Water Survey, Contact Information
University of Illinois at Urbana-Champaign

All files and information © 2009 Illinois State Water Survey. Terms of use.
Email the Web Administrator with questions or comments.
Last Modified: March 11, 2008

Records for Putnam county, 33N township, 02W range, 35 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.				
125919	1E	127	RG	DO	~~	~~					
Driller		Date Drilled		Static Level		Pumping Level		Pumping GPM		Pumping Hours	
BICKERMAN		1909									

OUT OF RADIUS

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.				
125920	3A	75	RG	DO	~~	~~					
Driller		Date Drilled		Static Level		Pumping Level		Pumping GPM		Pumping Hours	
BICKERMAN		1895									

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.				
125921	7D	110	RG	DO	~~	~~					
Driller		Date Drilled		Static Level		Pumping Level		Pumping GPM		Pumping Hours	
		1904									

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.				
125922	8E	160	RG	DO	~~	~~					
Driller		Date Drilled		Static Level		Pumping Level		Pumping GPM		Pumping Hours	
BICKERMAN		1920									

View the results in "Table Format" Search for a different Section

If this page does not print correctly, change your browser's layout mode to landscape.

Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)

Column headings link to data explanations.

| [PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

| [Home](#) | [Highlights](#) | [Staff](#) | [Data](#) | [Information](#) | [Centers](#) | [Site Map](#) |



Illinois State Water Survey, Contact Information
University of Illinois at Urbana-Champaign

All files and information © 2009 Illinois State Water Survey. Terms of use.
Email the Web Administrator with questions or comments.
Last Modified: March 11, 2008

Home Highlights Staff Data Information Centers Site Map Search

ISWS

Private Well Database

Illinois State Water Survey
Address / Phone Information

Records for Putnam county, 33N township, 02W range, 36 section.

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125160	7A	155	RG	DO	~~	~~	00118
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		01/12/1968					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125923	1G	186	RG	DO	~~	~~	20286
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S D ALBRECHT		08/18/1977					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125924	1H	155	RG	DO	~~	~~	00107
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
S DEAN ALBRECHT		1966					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125925	5E	35	RG	DO	~~	~~	
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
		1874					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125926	6D	105	RG	DO	~~	~~	
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
BICKERMAN		1898					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
125927	8E	85	RG	DO	~~	~~	
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
		1874					

Well ID	Plot	Depth	Record Type	Well Use	Well Type	Aquifer Type	ISGS No.
359954	4E	67	RGP	DO	DL	UN	20688
Driller		Date Drilled	Static Level	Pumping Level	Pumping GPM	Pumping Hours	
LUTES H2O DRILLING/JET HALL		05/08/2003	19		50	2	

[View the results in "Table Format"](#) [Search for a different Section](#)

If this page does not print correctly, change your browser's layout mode to landscape.

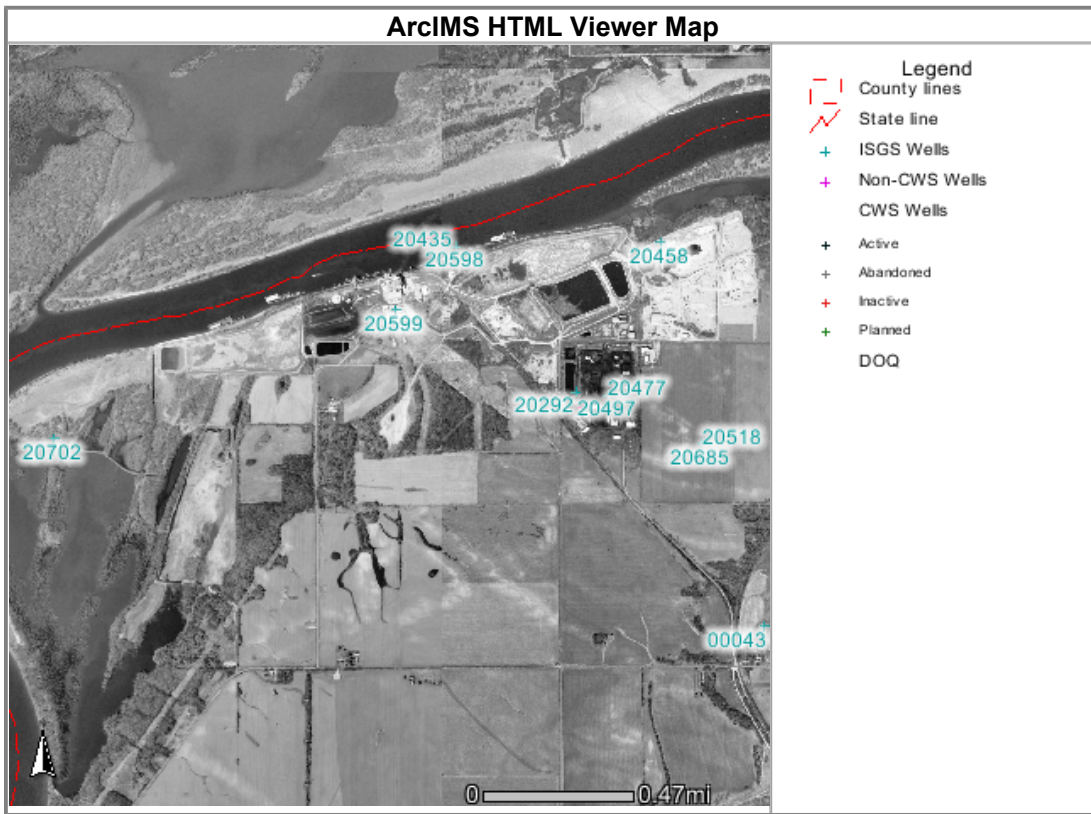
Please view our [Data Disclaimer](#), [Water Well Records Policies and Procedures](#), and [Plot Location System](#)
Column headings link to data explanations.

[PWD Home](#) | [Meta Data](#) | [Location System](#) | [Disclaimer](#) | [Contact Us](#) | [Help](#) |

APPENDIX C

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY WEB-BASED GIS FILES

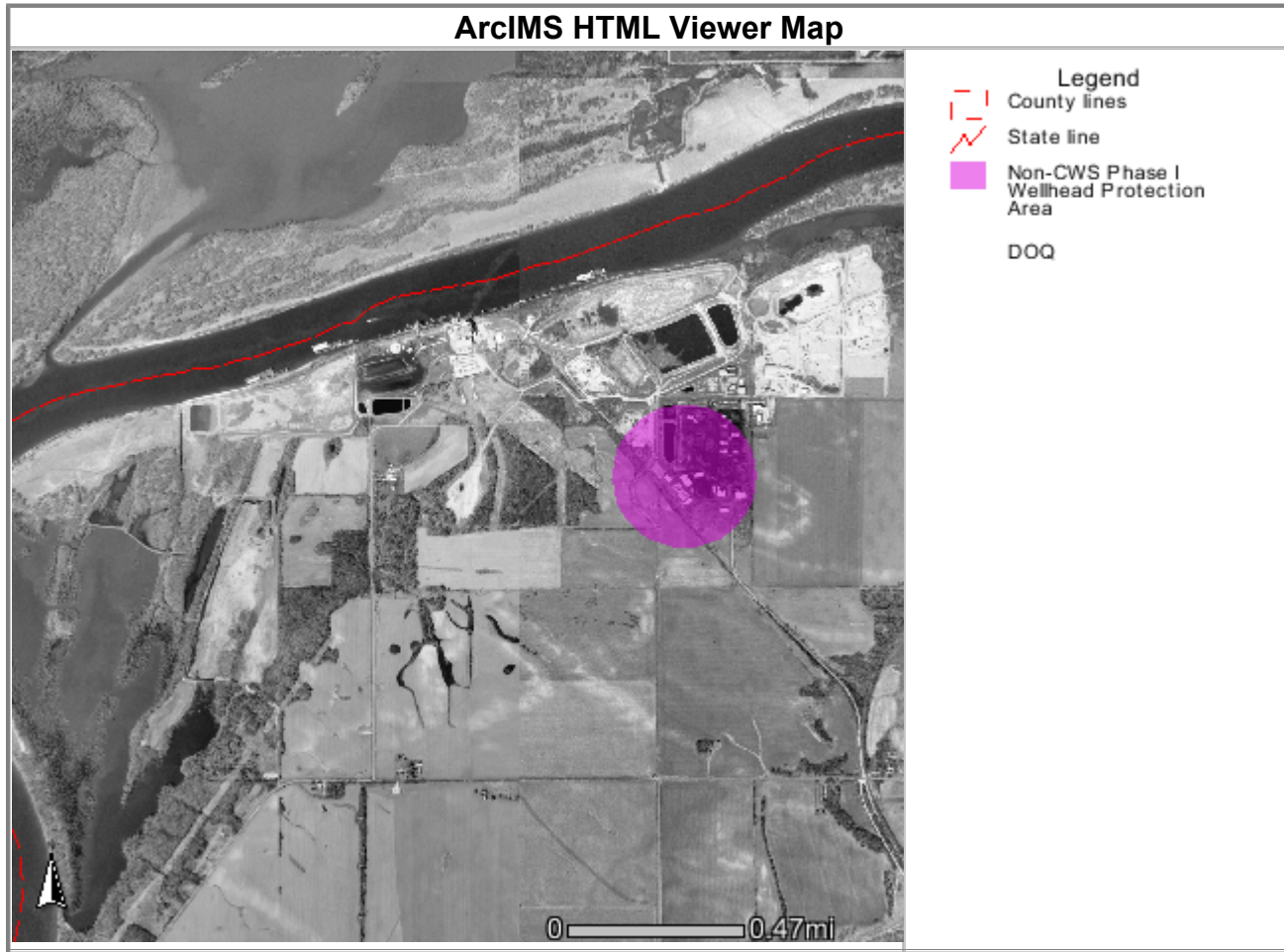
Information and data presented were obtained from various Federal, State, and local agencies and are subject to revision.



ISGS Wells

Rec	API_NUMBER	TOTAL_DEPT	FARM_NAME	ELEVATION	STATUS	LAM_X	LAM_Y	LATITUDE	LONGITUDE	COUNTY_NO
1	121552070200	83	Dynegy Midwest-Hennepin Power	0	WATER	3045102	3008480	41.296270	89.335096	20702

Information and data presented were obtained from various Federal, State, and local agencies and are subject to revision.



Non-CWS Phase I Wellhead Protection Area

Rec	area	perimeter	buff1000_	buff1000_i	inside
1	3125482.25000	6275.02881	1420	1419	100

Source Water Assessment Summary

0117408 - EXOLON ESK

Last Updated on 2/3/2006

Source of Groundwater

The Exolon Company water supply system consists of one well. The well draws its water supply from an unconfined aquifer, which consists of sand.

Source Water Quality

The well at the Exolon Company is sampled for bacteria, nitrate/nitrites and lead and copper. In addition the Exolon Company is also required to sample for inorganic compounds (IOC), volatile compounds (VOC), and synthetic compounds (SOC).

On review of the geological composition, land-use practices, and well construction it was found that the well is susceptible to VOC, SOC, IOC, nitrate/nitrites, and bacteria.

Construction/Treatment

The Exolon Company has a 12-inch drilled well with steel casing. The well has an estimated depth of 130 feet. The well has a turbine pump and a 1,000 pressurized storage tank. The well receives no treatment.

Finished Water Quality

A review of the Exolon Company water supply at this time shows that the system is in compliance with the groundwater quality standards established under 35 Illinois Administrative Code Part 620.

Potential Sources of Contamination

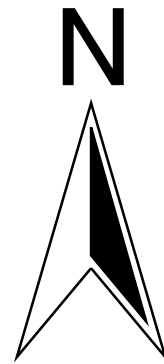
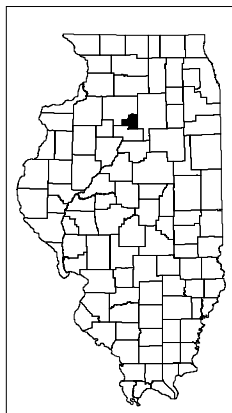
The following sites are listed as potential sources of contamination due to the nature of their activity and their geographic proximity (within a 1,000 foot buffer) to the source water protection area.

See Table on Topographic Map Coverage(Second Map)

Susceptibility to Contamination

The Illinois Department of Public Health has determined that the Exolon Company water supply has a high susceptibility to contamination. This determination is based on a number of criteria including: available geological data, land-use practices, and well depth.

Aerial Photograph Coverage Exolon Non-Community Well



1000 0 1000 Feet

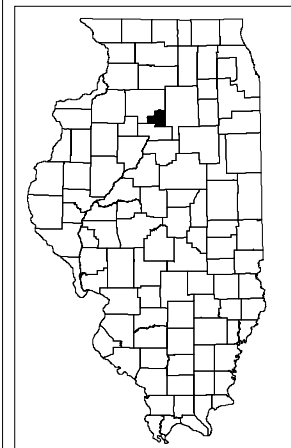
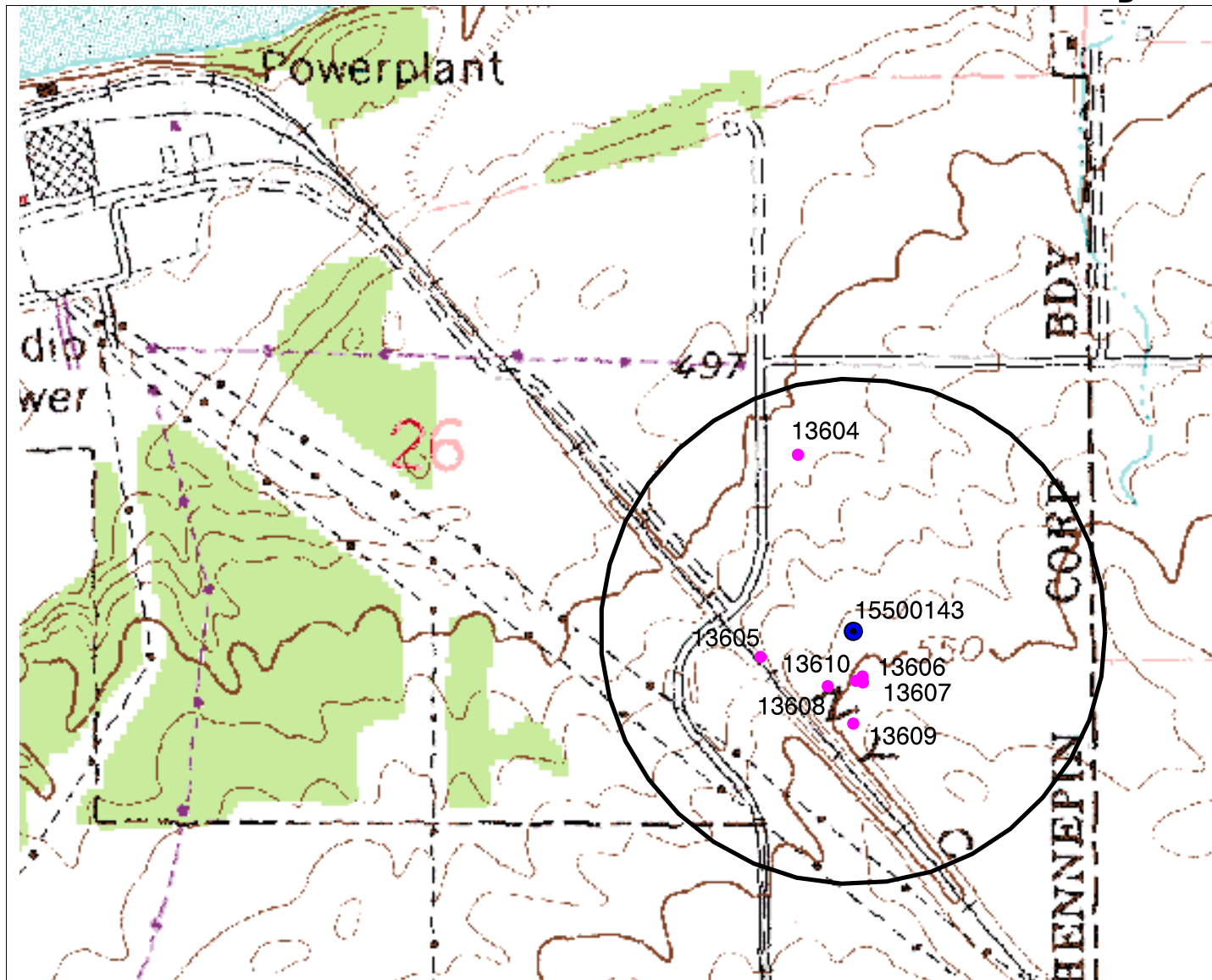
● Non-Community Water Supply Wells



Illinois Environmental Protection Agency
Division of Public Water Supplies
Groundwater Section

Illinois Department of
Public Health

Topographic Map Coverage Exolon Non-Community Well



Potential	Potential	Source_id
Exolon	Lagoon on-site	13604
Exolon	Single Unit Septic	13605
Exolon	A.G. L.P. < 25000 gal.	13606
Exolon	A.G. Pet Stor < 25000 gal.	13607
Exolon	Electrical Generator/Subs	13608
Exolon	A.G. Pet Stor	13609
Exolon	B.G. Pet Stor > 500 gal	13610

- Non-Community Water Supply Wells
- Potential Sources of Contamination

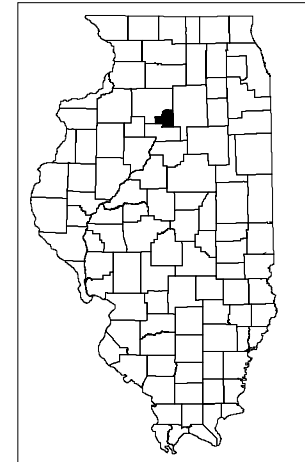


Illinois Environmental Protection Agency
Division of Public Water Supplies
Groundwater Section

Illinois Department of
Public Health



Nitrate Sensitivity Exolon Non-Community Well



Disclaimer: This nitrate sensitivity data is being used at a scale smaller than at which it was digitized. This may make features look angular or rasterized, or may make them appear to be out of place. This map should be used as a general reference only, and a smaller scale assessment should be performed for further evaluation of this site.

- Non-Community Water Supply Wells
- Nitrate Sensitivity
 - Excessive
 - High
 - Moderate
 - Somewhat Limited
 - Limited
 - Very Limited
 - Disturbed Land
 - Surface Water

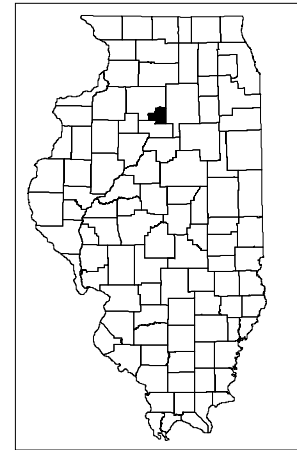
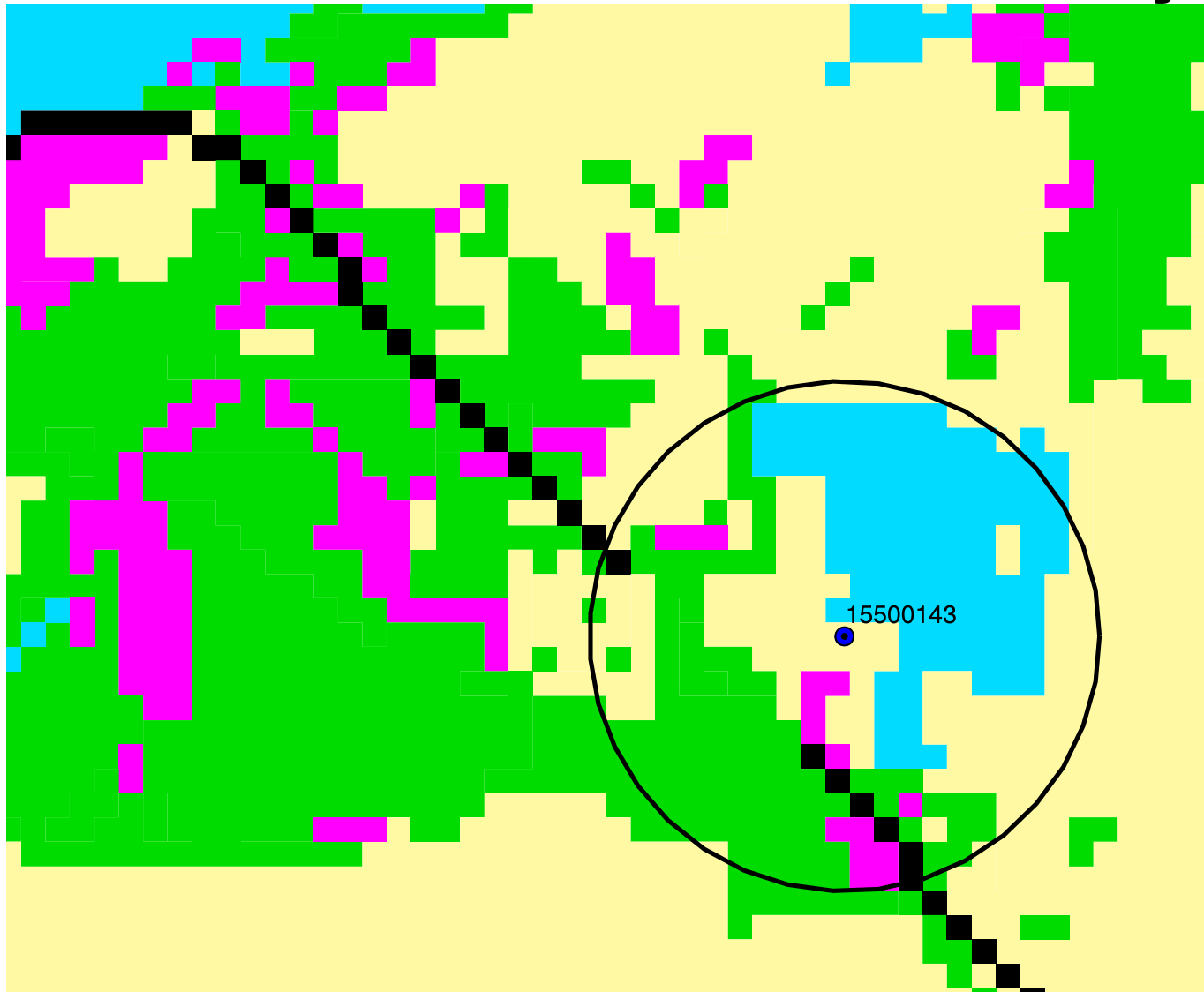
1000 0 1000 2000 3000 Feet



Illinois Department of
Public Health

Illinois Environmental Protection Agency
Division of Public Water Supplies
Groundwater Section

Land Use/Land Cover Exolon Non-Community Well

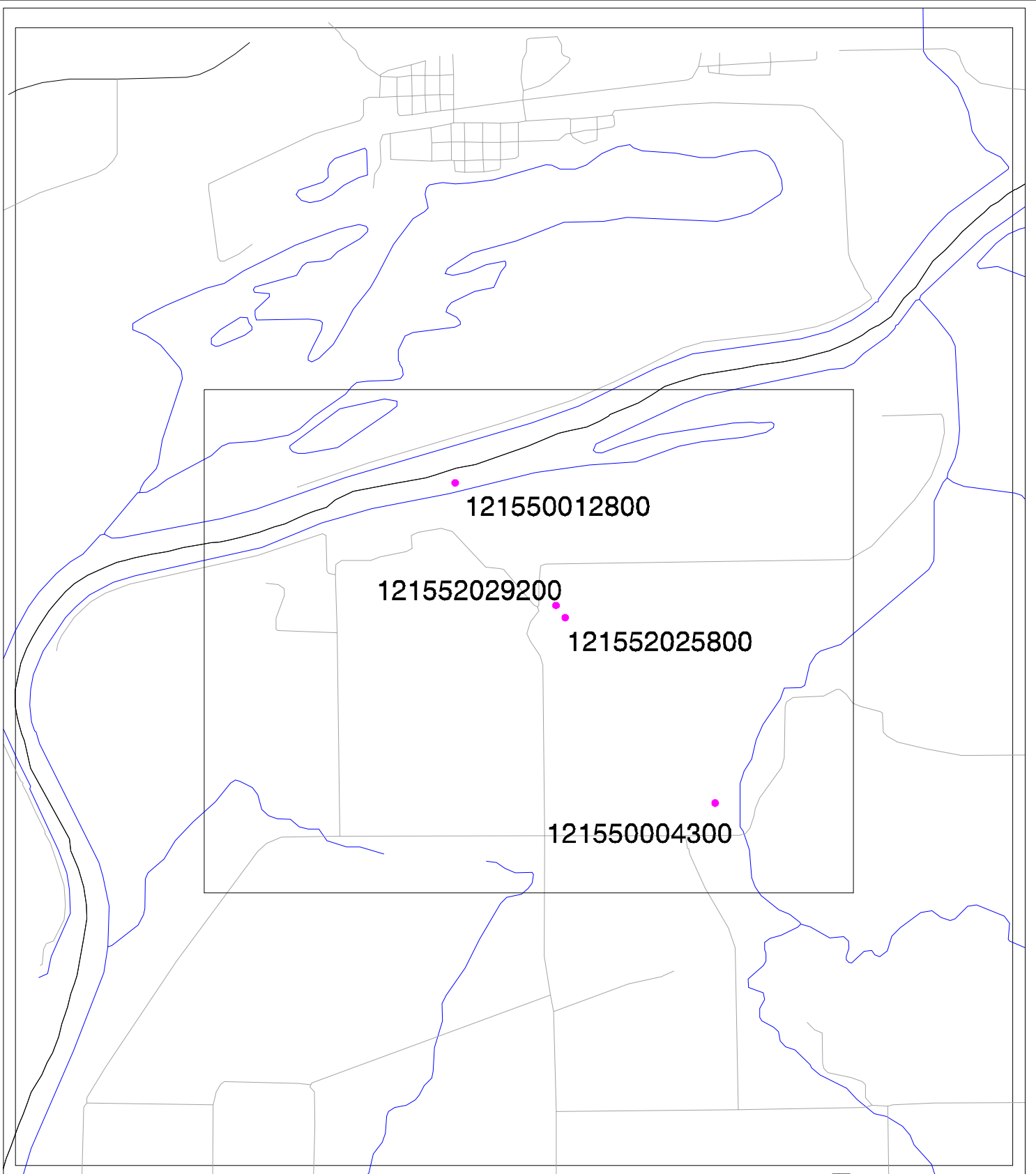


1000 0 1000 2000 3000 Feet



Illinois Environmental Protection Agency
Division of Public Water Supplies
Groundwater Section

Illinois Department of
Public Health



Illinois EPA
Division of Public Water Supplies
Groundwater Section



Scale
1:30011

**Illinois Geographic-Lithologic
Analysis Support System**



Use of this map is restricted to Illinois EPA Staff.
The IEPA is not liable for any misinterpretation of these data
by non-IEPA staff.
This map contains information derived from tabular and
spatial datasets obtained from the Illinois State Geological Survey,
the Illinois State Water Survey, the Illinois Department of
Natural Resources, and the United States Geological Survey.



Illinois Environmental Protection Agency



Source Water Assessment Program

FACT SHEET

DE PUE

BUREAU COUNTY

Prepared in cooperation with the U.S. Geological Survey.

Information and data used in the preparation of this Fact Sheet are provided by the Illinois EPA and are subject to revision.

IMPORTANCE OF SOURCE WATER:

The Village of DePue (Facility Number 0110300) has two public water supply wells. Wells #2 and #3 (IEPA #11336 and #11337) produce 176,300 gallons per day on average to an estimated population of 1729 through 710 service connections.

WATER SUPPLIES THAT OBTAIN SOURCE WATER FROM THIS FACILITY:

As of January 2001, no other facilities purchase water from this community water supply.

SOURCE OF WATER SUPPLY:

Wells #2 and #3 are located behind the waterworks on 2nd Street. Wells #2 and #3 pump 220 and 250 gallons per minute, respectively, and have a production capacity of 288,000 gallons per day. Wells #2 and #3 are 1487 and 1490 feet deep, respectively, and utilize a deep bedrock aquifer. The bedrock is overlain by permeable river deposits and impermeable bedrock. The aquifer utilized is considered confined by the Illinois EPA, therefore is not considered geologically sensitive.

WELL DATA FOR THIS FACILITY:

Well ID	Well Description	Status	Depth (Feet)	Min Setback (Feet)	Aquifer Description
11336	WELL 2	A	1487	200	DEEP BEDROCK
11337	WELL 3	A	1490	200	DEEP BEDROCK

SOURCE WATER QUALITY:

The public water supply wells at DePue were sampled as part of a Statewide Groundwater Monitoring Network on March 12, 1987. The well samples were analyzed for volatile organic compounds (VOC) and inorganic chemicals (IOC). The analyses detected no quantifiable levels of VOC in either well. The inorganic analyses performed found the water from both wells to meet all groundwater quality standards established in 35 Illinois Administrative Code Part 620.410.

FINISHED WATER QUALITY:

Finished water quality data tables of monitored parameters, contaminants detected, health advisory information, drinking water standards or maximum contaminant levels are available at <http://www.epa.gov/ogwdw>. Similar information is also available in the Consumer Confidence Report supplied by the water supply to its customers. A review of this information does not indicate levels of organic or inorganic compounds which exceed the drinking water quality standards. Radium and Alpha emitters were detected in radionuclide analyses done in 1999. Alpha emitters were detected at a level of 15 pCi/l and combined radium was detected at a level of 6.9 pCi/l, the maximum

contaminant levels (MCL) are 15 and 5 pCi/l respectively.

POTENTIAL SOURCES OF CONTAMINATION:

The site labeled on the Wellhead Protection Planning Map and described in the following table is considered a "potential" source of contamination. (Maps and tables are not available in the Visually Impaired version. However, the information presented in these maps and tables is summarized within the following text sections of this fact sheet.) The Illinois EPA performed a detailed well Site Survey in 1989 to identify potential sources of contamination to the village's wells. These sources are identified based on the nature of its activity, the availability of data in the electronic data bases, and its geographical proximity to the source water protection area. In addition, the Illinois EPA made use of its information from the its leaking underground storage tank database (<http://epadata.epa.state.il.us/land/ust/search.asp>) and site remediation program database (<http://epadata.epa.state.il.us/land/srp/search.asp>) to further assess potential sources of contamination to the community's source water. These databases include information from the Illinois EPA Division of Land Pollution Control (LPC) and the Illinois Emergency Management Agency (IEMA). The following list of facilities contained within these databases. As a result of multiple possible contamination sources, individual sites may be listed on the table more than once in relation to the wells.

IEMA #900361 - LPC #0110300003 - Mobil Chemical Company, Depot & Marquette Streets., Depue 61322

SITE DATA FOR THIS FACILITY:

Well ID	Map Code	Site Name	Site Description	Distance (Feet)
11336	02556	CASEY'S GENERAL STORE	BELOW GROUND STORAGE (PET	975
11337	02556	CASEY'S GENERAL STORE	BELOW GROUND STORAGE (PET	975

OTHER IDENTIFIED POTENTIAL SOURCES:

For this community water supply, no additional potential sources of contamination have been identified beyond those in Illinois EPA databases.

SUSCEPTIBILITY TO CONTAMINATION:

Based on information obtained in a Well Site Survey published in 1989 by the Illinois EPA, one "potential" source is located within 1,000 feet of the wells.

The Illinois EPA has determined that the Depue Community Water Supply's source water is not susceptible to contamination. This determination is based on a number of including: monitoring conducted at the wells; monitoring conducted at the entry point to the distribution system; available hydrogeologic data on the wells; and land use proximate to the wells.

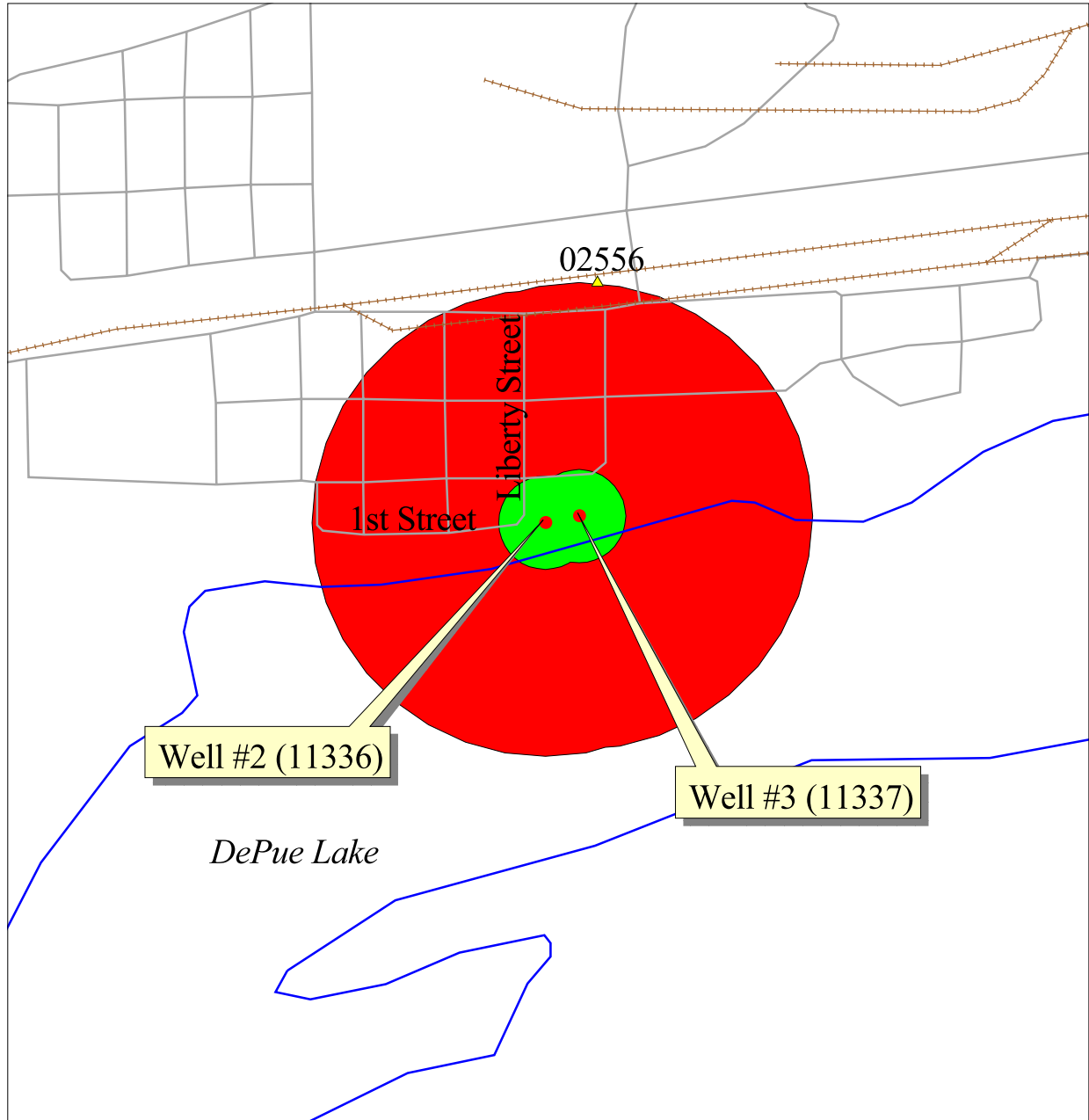
Furthermore, in anticipation of the U.S. EPA's proposed Ground Water Rule, the Illinois EPA has determined that the Depue Community Water Supply is not vulnerable to viral contamination. This determination is based upon the evaluation of the following criteria during the Vulnerability Waiver Process: the community's wells are properly constructed with sound integrity and proper siting conditions; a hydrogeologic barrier exists which should prevent pathogen movement; all potential routes and sanitary defects have been mitigated such that the source water is adequately protected; monitoring data did not indicate a history of disease outbreak; and the sanitary survey of the water supply did not indicate a viral contamination threat. Because the community's wells are constructed in a confined aquifer, which should prevent the movement of pathogens into the wells, well hydraulics was not considered to be a significant factor in the susceptibility determination.

SOURCE WATER PROTECTION EFFORTS:

The Illinois Environmental Protection Act provides minimum protection zones of 200 feet for your wells. These minimum protection zones are regulated by the Illinois EPA. To further reduce the risk to source water, the water supply has implemented a wellhead protection program which includes the proper abandonment of potential routes of groundwater contamination and correction of sanitary defects at the water treatment facility. This effort resulted in the community water supply receiving a special exception permit from the Illinois EPA which allows a reduction in monitoring. The outcome of this monitoring reduction has saved the community considerable laboratory analysis costs.

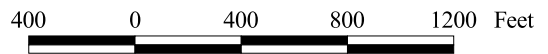
To further minimize the risk to the community's groundwater supply, the Illinois EPA recommends that three additional activities be assessed. First, the facility may wish to enact a "maximum setback zone" ordinance. These ordinances are authorized by the Illinois Environmental Protection Act and allow county and municipal officials the opportunity to provide additional protection up to a fixed distance, normally 1,000 feet from their wells. Second, the water supply staff may wish to revisit their contingency planning documents. Contingency planning documents are a primary means to ensure that, through emergency preparedness, a community will minimize their risk of being without safe and adequate water. Finally, the water supply staff is encouraged to review their cross connection control program to ensure that it remains current and viable. Cross connections to either the water treatment plant (for example, at bulk water loading stations) or in the distribution system may negate all source water protection initiatives provided by the community.

WELLHEAD PROTECTION PLANNING MAP FOR DEPUE (FACILITY #0110300)



Legend

- CWS Wells
- ▲ Potential Sources Of Contamination
- Rails
- Roads
- Streams
- Minimum Setback Zone
- Existing or Potential Maximum Setback Zone



FOR MORE INFORMATION CONTACT:

Groundwater Section, Bureau of Water
 Illinois Environmental Protection Agency
 1021 North Grand Avenue East
 Springfield, IL 62794-9276
 Ph# (217)785-4787

Source Information
 Roads, Rails, and Streams from Illinois DNR.
 CWS Wells and Potential Sources from Illinois EPA.
 Map compiled by Groundwater Section, Illinois EPA.



Illinois Environmental Protection Agency



Source Water Assessment Program

FACT SHEET

HENNEPIN PWD

PUTNAM COUNTY

Prepared in cooperation with the U.S. Geological Survey.

Information and data used in the preparation of this Fact Sheet are provided by the Illinois EPA and are subject to revision.

IMPORTANCE OF SOURCE WATER:

The Village of Hennepin (Facility Number 1555100) obtains its water from three active community water supply wells. Wells #3, #4, and #5 (Illinois EPA #11602, 11603, and 11604, respectively) supply an average of 149,600 gallons per day (gpd) to 312 services or a population of 750.

WATER SUPPLIES THAT OBTAIN SOURCE WATER FROM THIS FACILITY:

No connected water supplies existed at the time this Source Water Assessment fact sheet was completed.

SOURCE OF WATER SUPPLY:

Wells #3 and #4 are located at the central and southern end of Hennepin, respectively, and well #5 is located north of Hennepin. They produce 250, 400, and 650 gallons per minute (gpm), respectively and are operated for a combined maximum output of roughly 341,900 gpd. Wells #3, #4, and #5 are 100, 107, and 135 feet in depth, respectively. All three wells obtain their source water from a shallow, permeable sand and gravel aquifer overlain by materials of variable permeability. Permeability is a measure of the capability of a soil or sediment to transmit fluids. The Illinois EPA considers these wells to be geologically sensitive.

WELL DATA FOR THIS FACILITY:

Well ID	Well Description	Status	Depth (Feet)	Min Setback (Feet)	Aquifer Description
11602	WELL 3	A	100	400	Sand & Gravel
11603	WELL 4	A	107	400	Sand & Gravel
11604	WELL 5	A	135	400	Sand & Gravel

SOURCE WATER QUALITY:

Hennepin's wells have been sampled since January 20, 1981 for inorganic chemicals (IOC), volatile organic compounds (VOC), and synthetic organic compounds (SOC) as part of a Statewide Groundwater Monitoring Program. The VOC and SOC analyses did not detect quantifiable levels of any organic compounds. IOC analyses indicate that concentrations of these chemicals are consistent with other sand and gravel aquifers of similar character in Illinois. It is important to note that the IOC results were below the groundwater quality standards established under 35 Illinois Administrative Code Part 620.410, with the exception of manganese concentrations. Manganese concentrations range from 15 to 339 parts per billion (ppb). The groundwater quality standard for manganese, as established under Part 620.410, is 150 ppb. However, the Illinois EPA considers the elevated level of manganese to be the result of natural mineralization of the aquifer. Hence, the level of manganese is not considered a violation due to the stipulation in Part 620.410 that no violation occurs as a result of a natural occurrence of an IOC.

FINISHED WATER QUALITY:

As referenced in the Source Water Quality Section of this report, Hennepin has mineralized groundwater. Sampling performed after treatment indicates that levels of manganese in the source water have been reduced to below the drinking water standards. Further information on finished water quality data tables of monitored parameters, contaminants detected, health advisory information, drinking water standards and maximum contaminant levels are available at <http://www.epa.gov/ogwdw/>. Similar information is also available in the Consumer Confidence Report supplied by the Village of Hennepin to their customers.

POTENTIAL SOURCES OF CONTAMINATION:

The sites labeled on the Wellhead Protection Planning Map and described in the following tables are considered "potential" sources of contamination. (Maps and tables are not available in the Visually Impaired Accessible version. However, the information presented in the maps and tables is summarized within the following text sections of this fact sheet.) These sites are predominantly identified through the Illinois EPA's Well Site Survey program based on the nature of their activity, the availability of data in electronic databases, and their geographic proximity to the source water protection area. In addition, the Illinois EPA made use of the information from its leaking underground storage tank database (<http://epadata.epa.state.il.us/land/ust/search.asp>) and site remediation program database (<http://epadata.epa.state.il.us/land/srp/search.asp>) to further assess potential sources of contamination to the village's source water. These databases include information from the Illinois EPA Division of Land Pollution Control (LPC) and the Illinois Emergency Management Agency (IEMA). The following is a list of facilities contained within these databases. As a result of multiple possible contamination sources, individual sites may be listed in the table more than once in relation to a well.

IEMA # Site Name Street City ZIP Code

902789 Illinois Power Co. Power Station, 2 miles north of Hennepin 61327

921595 Putnam County C.U.S.D. #535 South 5th St., Elementary School Hennepin 61327

923676 Illinois Power Co. Power Plant Rd. Hennepin 61327

SITE DATA FOR THIS FACILITY:

Well ID	Map Code	Site Name	Site Description	Distance (Feet)
11602	23251	PUTNAM COUNTY SHERIFF'S OF	ABOVE GROUND STORAGE (PET	350
11602	23250	JUDD CONSTRUCTION COMPAN	ABOVE GROUND STORAGE (PET	1800
11602	23252	HENNEPIN MARINE	BOAT YARD	800
11602	23253	HENNEPIN HARDWARE	STORE/SALES	900
11602	23254	HENNEPIN BOAT MARKET	ABOVE GROUND STORAGE (PET	750
11603	23250	JUDD CONSTRUCTION COMPAN	ABOVE GROUND STORAGE (PET	1300
11603	23254	HENNEPIN BOAT MARKET	ABOVE GROUND STORAGE (PET	1650
11603	23251	PUTNAM COUNTY SHERIFF'S OF	ABOVE GROUND STORAGE (PET	800
11603	23252	HENNEPIN MARINE	BOAT YARD	1450
11603	23253	HENNEPIN HARDWARE	STORE/SALES	1750
11604	23255	MODERN HARD CHROME	MANUFACTURING PROCESS (e.g.	500
11604	23256	AIR PRODUCTS	CHEMICAL HANDLING (i.e. MANU	1400
11604	23249	INTERNATIONAL STEEL GROUP	WATER TREATMENT PLANT	1600
11604	23248	INTERNATIONAL STEEL GROUP	INJECTION WELL (ROUTE)	1200
11604	23247	INTERNATIONAL STREEL GROU	SLUDGE DISPOSAL ON-SITE	650
11604	01434	LTV STEEL CO	SLUDGE DISPOSAL ON-SITE	650
11604	01435	LTV STEEL CO	INJECTION WELL (ROUTE)	1200
11604	22477	LTV STEEL WWTP	WATER TREATMENT PLANT	1600

OTHER IDENTIFIED POTENTIAL SOURCES:

For this community water supply, no additional potential sources of contamination have been identified beyond those in Illinois EPA databases.

SUSCEPTIBILITY TO CONTAMINATION:

To determine Hennepin's susceptibility to groundwater contamination, the Illinois Rural Water Association conducted a well site survey in October, 2002. Based on the information obtained in this document, there are 13

potential sources of groundwater contamination that could pose a hazard to groundwater utilized by Hennepin's community water supply. These include 1 chemical handling facility, 1 manufacturing process, 1 boat yard, 1 sales store, 2 onsite sludge disposals, 2 injection wells, 2 water treatment plants, and 3 above ground fuel storage tanks. In addition, information provided by the Leaking Underground Storage Tank and Remedial Project Management Sections of the Illinois EPA indicated sites with on-going remediation that might be of concern.

According to the Hennepin PWD facility, LTV Steel Co. and the associated injection well and water treatment plant have been sold to the International Steel Group. However, the sludge disposal associated with this site is no longer active.

Based upon this information, the Illinois EPA has determined that the Hennepin Community Water Supply's source water is susceptible to contamination. As such, the Illinois EPA has provided 5-year recharge area calculations for the wells. The land use within the recharge areas of the wells was analyzed as part of this susceptibility determination. This land use includes residential, commercial and agricultural properties.

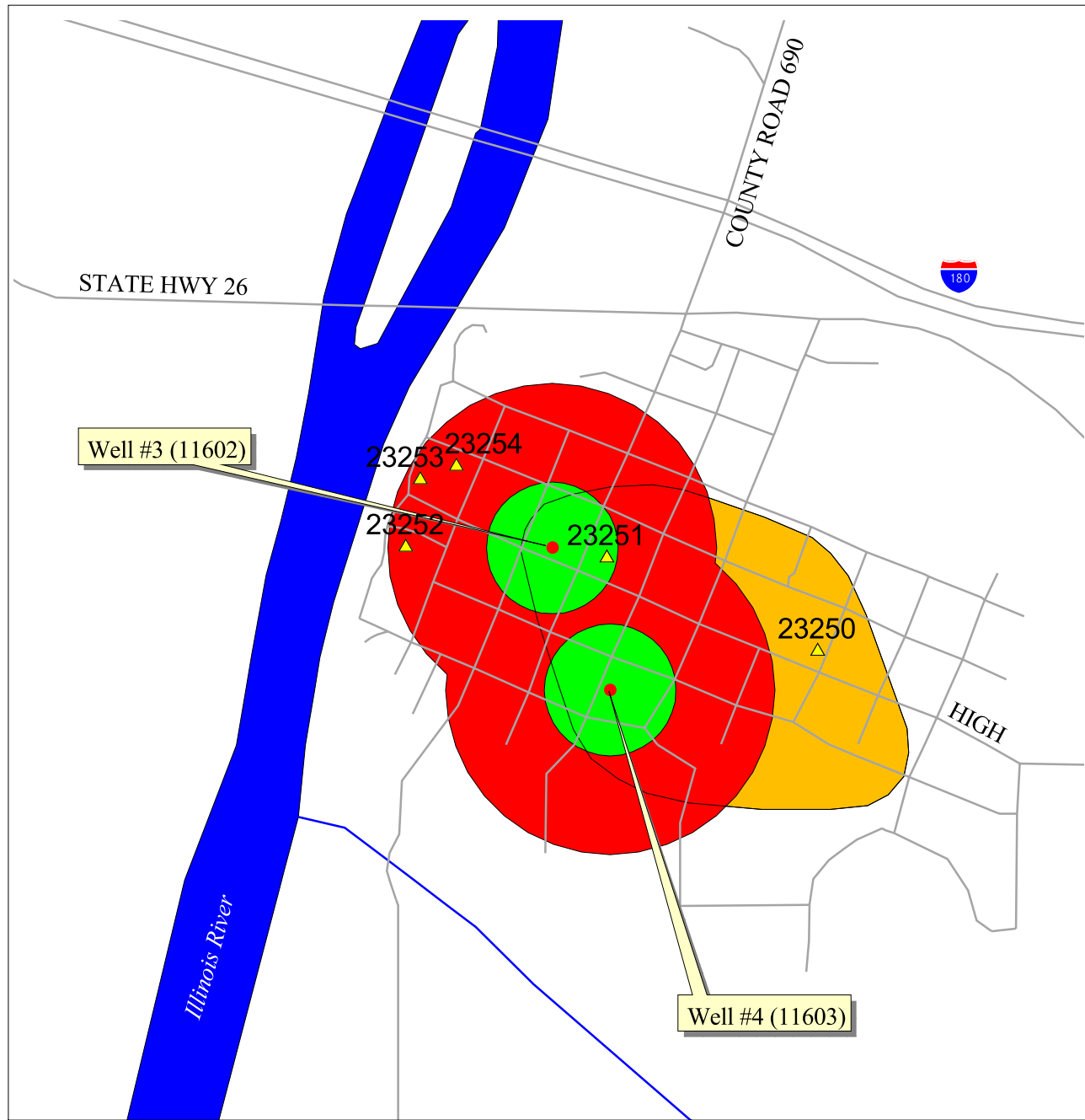
SOURCE WATER PROTECTION EFFORTS:

The Illinois Environmental Protection Act provides minimum protection zones of 400 feet for Hennepin's wells. These minimum protection zones are regulated by the Illinois EPA. To further reduce the risk to the source water, a maximum protection zone may be established, which is authorized by the Illinois Environmental Protection Act and allows county and municipal officials the opportunity to provide additional potential source prohibitions up to 1,000 feet from their wells.

To further minimize the risk to the village's groundwater supply, the Illinois EPA recommends the following additional activities be considered. First, the water supply staff may wish to conduct contingency planning. Contingency planning documents are a primary means to ensure that, through emergency preparedness, a community will minimize their risk of being without safe or adequate water. Second, the water supply staff is encouraged to conduct a biennial cross connection survey of the distribution system as outlined in the cross connection control ordinance [Section 18 of the Environmental Protection Act 415 ILCS 5/1 et seq. (Act); 35 Illinois Act Code, Sections 607.104d, 653.801c] and to review their cross connection control ordinance to ensure that it remains current and viable. Cross connections to either the water treatment plant (for example, at bulk water loading stations) or in the distribution system may negate all source water protection initiatives. Finally, the Illinois EPA recommends that the village investigate additional source water protection management options to address the land use activities within the wells' recharge area. Specifically, these management options should address potential impacts from non-point sources related to agricultural land uses.

To further reduce the risk to source water, Hennepin may wish to implement a wellhead protection program, which includes the proper abandonment of potential routes of groundwater contamination within the recharge area, management of potential sources of contamination and correction of any sanitary defects that might be present at the water treatment facility. This effort may result in the community water supply receiving a special exception permit from the Illinois EPA, which allows a reduction in monitoring and laboratory analysis costs.

FIGURE 1: WELLHEAD PROTECTION PLANNING MAP FOR HENNEPIN (FACILITY #1555100)



Legend

- CWS Wells
- ▲ Potential Sources Of Contamination
- Rails
- Roads
- Streams
- Minimum Setback Zone
- Existing or Potential Maximum Setback Zone
- Recharge Area

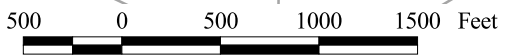
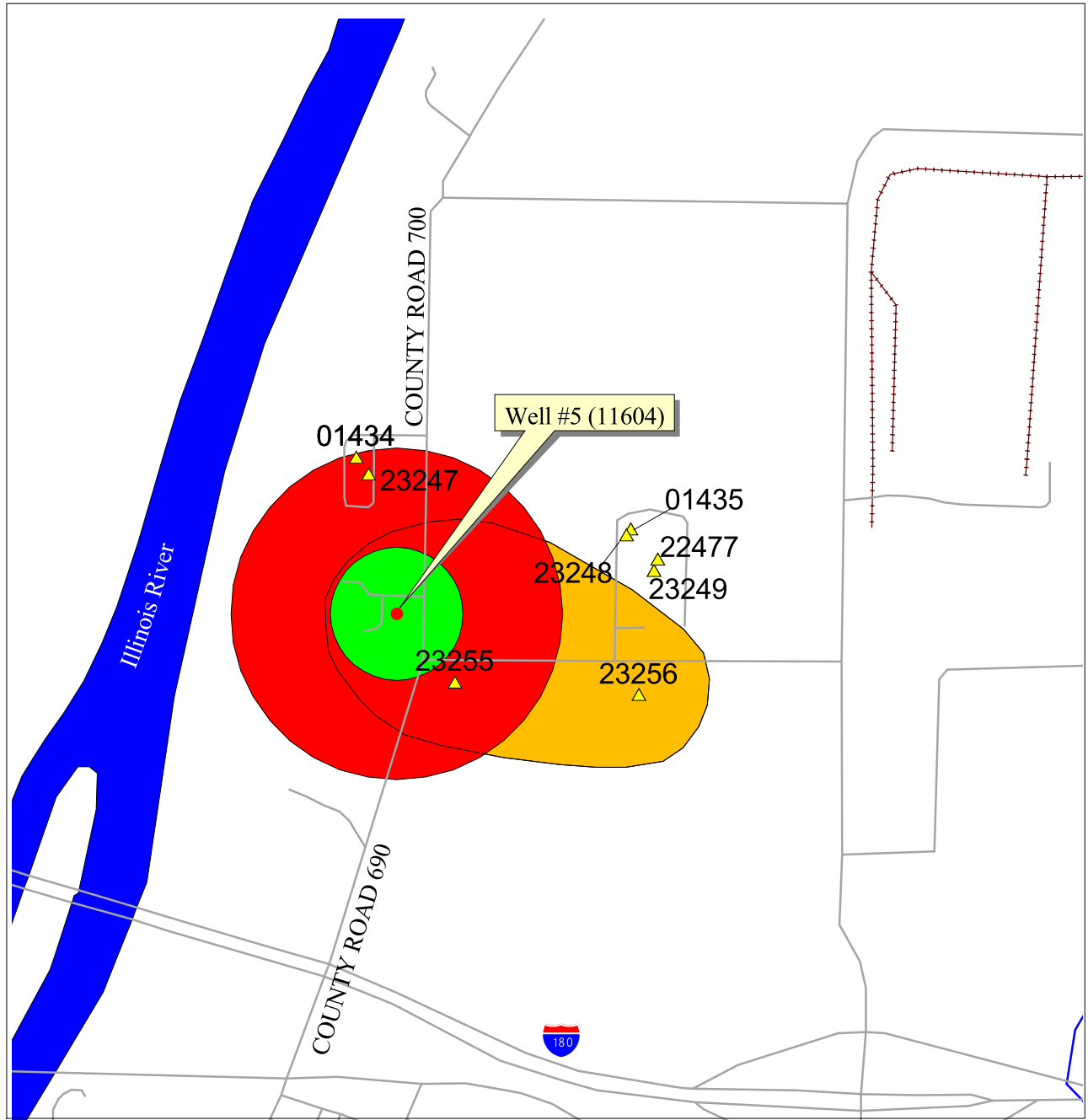
500 0 500 1000 1500 Feet

FOR MORE INFORMATION CONTACT:

Groundwater Section, Bureau of Water
 Illinois Environmental Protection Agency
 1021 North Grand Avenue East
 Springfield, IL 62794-9276
 Ph# (217)785-4787

Source Information
 Roads, Rails, and Streams from Illinois DNR.
 CWS Wells and Potential Sources from Illinois EPA.
 Map compiled by Groundwater Section, Illinois EPA.

FIGURE 2: WELLHEAD PROTECTION PLANNING MAP FOR HENNEPIN (FACILITY #1555100)



Legend

- CWS Wells
- ▲ Potential Sources Of Contamination
- ⋈ Rails
- Roads
- Streams
- Minimum Setback Zone
- Existing or Potential Maximum Setback Zone
- Recharge Area

FOR MORE INFORMATION CONTACT:

Groundwater Section, Bureau of Water
 Illinois Environmental Protection Agency
 1021 North Grand Avenue East
 Springfield, IL 62794-9276
 Ph# (217)785-4787

Source Information
 Roads, Rails, and Streams from Illinois DNR.
 CWS Wells and Potential Sources from Illinois EPA.
 Map compiled by Groundwater Section, Illinois EPA.



Illinois Environmental Protection Agency



Source Water Assessment Program

FACT SHEET

BUREAU JUNCTION

BUREAU COUNTY

Prepared in cooperation with the U.S. Geological Survey.

Information and data used in the preparation of this Fact Sheet are provided by the Illinois EPA and are subject to revision.

IMPORTANCE OF SOURCE WATER:

The Village of Bureau Junction (Facility Number 0110150) has two public water supply wells. Wells #4 (Illinois EPA #11327) and #5 (Illinois EPA #00729) produce 32,088 gallons per day on average to an estimated population of 340 through 131 service connections.

WATER SUPPLIES THAT OBTAIN SOURCE WATER FROM THIS FACILITY:

No connected water supplies existed at the time this Source Water Assessment fact sheet was completed.

SOURCE OF WATER SUPPLY:

Well #4 is located on Kansas Street between Miller and North Streets. Well #5 is located 300 feet northeast of Well #4. The water from both wells is blended and treated before distribution. Wells #4 and #5 pump 50 and 190 gallons per minute, respectively and the facility has a production capacity of 345,600 gallons per day. Well #4 is 334 feet deep and utilizes a shallow bedrock aquifer and Well #5 is 1,545 feet deep and utilizes a deep bedrock aquifer which are overlain by permeable alluvial deposits and bedrock formations of variable permeability. Permeability is the ability of a soil or sediment to transmit fluids. Permeability is a measure of the ability of a soil or sediment to transmit fluids. Both aquifers utilized are considered confined by the Illinois EPA, therefore are not considered geologically sensitive.

WELL DATA FOR THIS FACILITY:

Well ID	Well Description	Status	Depth (Feet)	Min Setback (Feet)	Aquifer Description
00729	WELL 5	A	1545	200	Cambrian/Ordovician
11326	WELL 2	B	305	400	Devonian/Silurian
11327	WELL 4	A	334	200	Devonian/Silurian

SOURCE WATER QUALITY:

The Well #4 at Bureau Junction has been sampled regularly as part of a Statewide Ambient Groundwater Monitoring Program since March 1, 1994. Well #5 was sampled in 1997. The samples were analyzed for volatile organic compounds (VOC) and inorganic chemicals (IOC). Well #4 has been sampled for synthetic organic chemical and pesticides (SOC). The VOC analyses detected no contaminants. The IOC analyses have indicated a elevated level of chlorides, which is naturally occurring. The IOC results show levels up to 796 part per billion (ppb) in Well #4, and 201 in Well #5, which is above the groundwater standard of 200 ppb. At this time there is no drinking water standard for chlorides established in 35 Illinois Administrative Code Part 620.410. The Illinois EPA considers these chlorides concentrations the result of natural mineralization in the aquifer.

FINISHED WATER QUALITY:

Further information on finished water quality, including data tables of monitored parameters, contaminants detected, health advisory information, drinking water standards and maximum contaminant levels is available at <http://www.epa.gov/ogwdw>. Similar information is also available in the Consumer Confidence Report supplied by the water supply to its customers. A review of this information does not indicate levels of organic compounds or inorganic chemicals which exceed the drinking water quality standards. Radium were detected in radio nuclide analyses done in 1999. Alpha emitters were detected at a levels ranging from 20 to 23 picoCuries per liter (pCi/l), the maximum contaminant levels (MCL) for combined Alpha emitters is 15 pCi/l. Combined radium was detected at a levels ranging from 4.7 to 8.8 picoCuries per liter (pCi/l), the maximum contaminant levels (MCL) for combined Radium is 5 pCi/l.

POTENTIAL SOURCES OF CONTAMINATION:

The sites labeled on the Wellhead Protection Planning Map and described in the following tables are considered "potential" sources of contamination. (Maps and tables are not available in the Visually Impaired Accessible version. However, the information presented in the maps and tables is summarized within the following text sections of this fact sheet.) The Illinois EPA performed a detailed Well Site Survey in 1994 to identify potential sources of contamination to the water supply's wells. These sources are identified based on the nature of their activity, the availability of data in electronic databases, and their geographic proximity to the source water protection area. In addition, the Illinois EPA made use of information from its leaking underground storage tank database (<http://epadata.epa.state.il.us/land/ust/search.asp>) and site remediation program database (<http://epadata.epa.state.il.us/land/srp/search.asp>) to further assess potential sources of contamination to the water supply's source water. These databases include information from the Illinois EPA Division of Land Pollution Control (LPC) and the Illinois Emergency Management Agency (IEMA). The following is a list of facilities contained within these databases. As a result of multiple possible contamination sources, individual sites may be listed in the table more than once in relation to a well.

IEMA # LPC # Site Name Address City ZIP Code
 920807 0118995005 Bureau, Village of 101 East Nebraska St. Bureau 61315
 992314 0118995011 Bureau Service Co. 107 North Main Bureau 61315

SITE DATA FOR THIS FACILITY:

Well ID	Map Code	Site Name	Site Description	Distance (Feet)
00729	02912	BILL'S GAS & GENERAL STORE	BELOW GROUND STORAGE (PET	650
00729	02913	VILLAGE OF BUREAU VILLAGE H	BELOW GROUND STORAGE (PET	550
00729	02914	UNKNOWN ABANDONED GAS ST	BELOW GROUND STORAGE (PET	750
11327	02913	VILLAGE OF BUREAU VILLAGE H	BELOW GROUND STORAGE (PET	700
11327	02914	UNKNOWN ABANDONED GAS ST	BELOW GROUND STORAGE (PET	850
11327	02912	BILL'S GAS & GENERAL STORE	BELOW GROUND STORAGE (PET	600

OTHER IDENTIFIED POTENTIAL SOURCES:

For this community water supply, no additional potential sources of contamination have been identified beyond those in Illinois EPA databases.

SUSCEPTIBILITY TO CONTAMINATION:

Based on information obtained in a Well Site Survey published in 1994 by the Illinois EPA, several potential secondary sources are located within 1,000 feet of the wells.

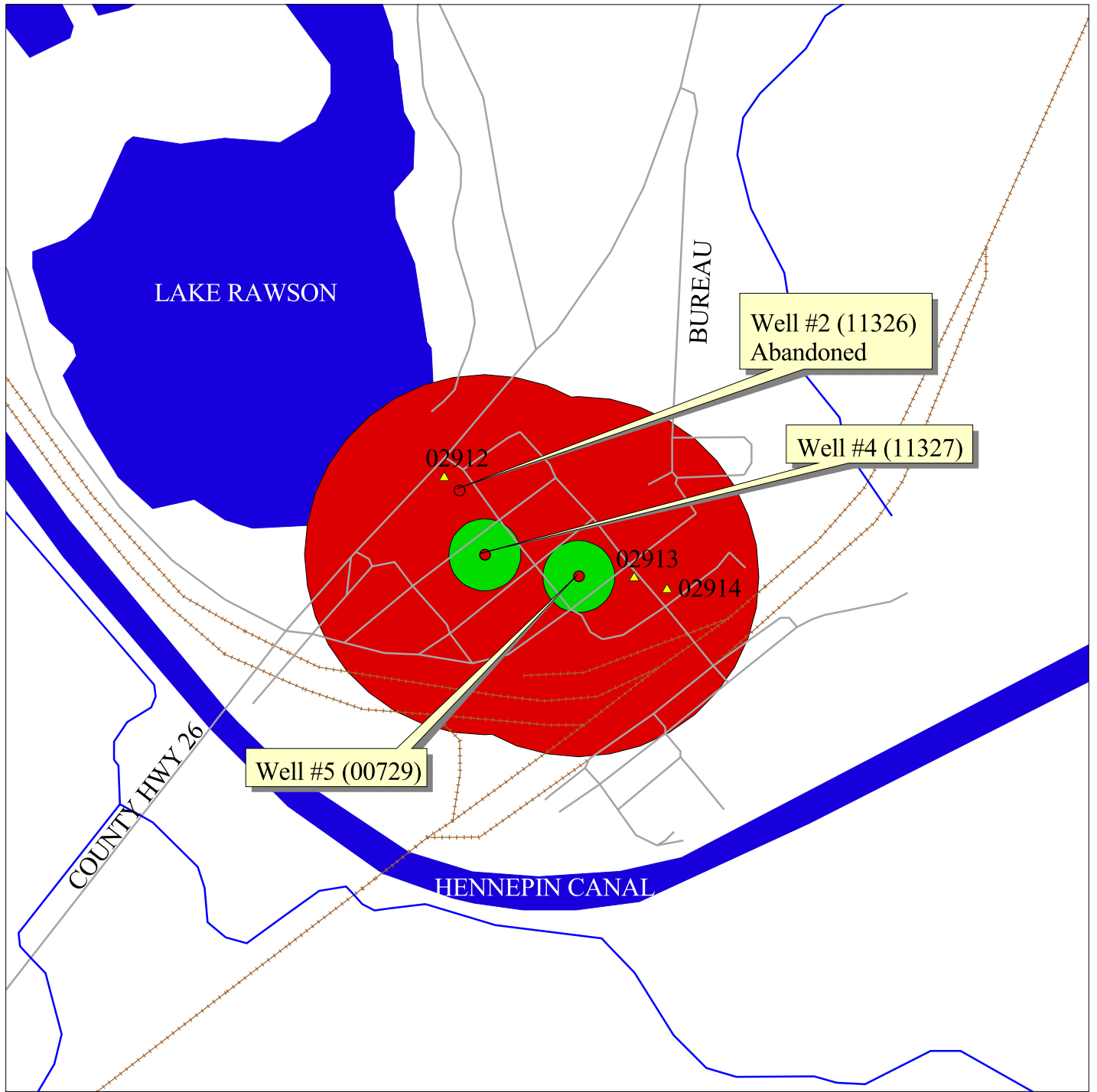
The Illinois EPA has determined that the Bureau Junction Community Water Supply's source water is not susceptible to contamination. This determination is based on a number of criteria including; monitoring conducted at the wells; monitoring conducted at the entry point to the distribution system; and available hydro geologic data on the wells.

SOURCE WATER PROTECTION EFFORTS:

The Illinois Environmental Protection Act provides minimum protection zones of 200 feet for Wells #4 and #5. These minimum protection zones are regulated by the Illinois EPA.

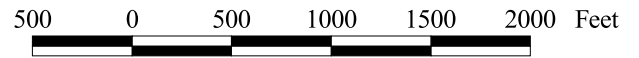
To further minimize the risk to the facility's groundwater supply, the Illinois EPA recommends that three additional activities be assessed. First, the water supply may wish to work with village officials to enact a "maximum setback zone" ordinance. These ordinances are authorized by the Illinois Environmental Protection Act and allow county and municipal officials the opportunity to provide additional protection up to a fixed distance, normally 1,000 feet from their wells. Second, the water supply staff may wish to revisit their contingency planning documents. Contingency planning documents are a primary means to ensure that, through emergency preparedness, a community will minimize their risk of being without safe and adequate water. Finally, the water supply staff is encouraged to review their cross connection control program to ensure that it remains current and viable. Cross connections to either the water treatment plant (for example, at bulk water loading stations) or in the distribution system may negate all source water protection initiatives provided by the community..

FIGURE 1: WELLHEAD PROTECTION PLANNING MAP FOR BUREAU JUNCTION (FACILITY #0110150)



Legend

- CWS Wells
- ▲ Potential Sources Of Contamination
- Rails
- Roads
- Streams
- Minimum Setback Zone
- Existing or Potential Maximum Setback Zone
- Recharge Area



FOR MORE INFORMATION CONTACT:

Groundwater Section, Bureau of Water
 Illinois Environmental Protection Agency
 1021 North Grand Avenue East
 Springfield, IL 62794-9276
 Ph# (217)785-4787

Source Information
 Roads, Rails, and Streams from Illinois DNR.
 CWS Wells and Potential Sources from Illinois EPA.
 Map compiled by Groundwater Section, Illinois EPA.



Illinois Environmental Protection Agency



Source Water Assessment Program

FACT SHEET

GRANVILLE

PUTNAM COUNTY

Prepared in cooperation with the U.S. Geological Survey.

Information and data used in the preparation of this Fact Sheet are provided by the Illinois EPA and are subject to revision.

IMPORTANCE OF SOURCE WATER:

The Village of Granville (Facility #1550050) has two public water supply wells. Well #1 (IEPA #11590) and Well #2 (IEPA #11591) produce 186,500 gallons per day to an estimated population of 1,402 through 644 service connections. The facility provides water to the Village of Mark and Oak Park Estates MHP.

WATER SUPPLIES THAT OBTAIN SOURCE WATER FROM THIS FACILITY:

Facility Number	Facility Name	Status	Population
1550010	OAK PARK ESTATES	A	150
1550250	MARK	A	500

SOURCE OF WATER SUPPLY:

Well #1 is located at the village garage at the southeast corner of Main and High Streets. Well #2 is located on the south of the intersection of Tomlinson and Colby Streets. Wells #1 and #2 pump 135 and 170 gallons per minute and have a production capacity of 439,200 gallons per day. The wells are 1,742 and 1,782 feet deep and utilize deep bedrock aquifer, which are overlain by relatively impermeable till interbedded within sand and gravel. Permeability is the ability of a soil or sediment to transmit fluids. The aquifer utilized is considered confined by the Illinois EPA, therefore is not considered geologically sensitive.

WELL DATA FOR THIS FACILITY:

Well ID	Well Description	Status	Depth (Feet)	Min Setback (Feet)	Aquifer Description
11590	WELL NO 1 IN CITY GARAGE	A	1742	200	DEEP BEDROCK
11591	WELL NO 2	A	1782	200	DEEP BEDROCK

SOURCE WATER QUALITY:

The public water supply wells at Granville were sampled as part of the Statewide Groundwater Monitoring Network on June 9, 1987. The well samples were analyzed for volatile organic compounds (VOC) and inorganic chemicals (IOC). The VOC analyses performed detected no quantifiable levels of organic chemicals in either well. The IOC analyses performed found the water from both wells to have an elevated level of total chlorides, which is naturally occurring. Total Chloride was detected at a level of 304 and 308 parts per billion (ppb), in Wells #1 and #2, respectively which is above the Groundwater Quality Standards of 200 ppb for chloride established in 35 Illinois Administrative Code Part 620.410.

FINISHED WATER QUALITY:

Finished water quality data tables of monitored parameters, contaminants detected, health advisory information,

drinking water standards or maximum contaminant levels are available at <http://www.epa.gov/ogwdw>. Similar information is also available in the Consumer Confidence Report supplied by the water supply to its customers. A review of this information does not indicate levels of organic or inorganic compounds which exceed the drinking water quality standards. Radium and Alpha emitters were detected in radionuclide analyses done in 1999. Alpha emitters were detected at a level of 39 picoCuries per liter (pCi/l) and combined radium was detected at a level of 12.2 pCi/l, the maximum contaminant levels (MCL) are 15 and 5 pCi/l respectively.

POTENTIAL SOURCES OF CONTAMINATION:

The sites labeled on the Wellhead Protection Planning Map and described in the following tables are considered "potential" sources of contamination. (Maps and tables are not available in the Visually Impaired Accessible version. However, the information presented in the maps and tables is summarized within the following text sections of this fact sheet.) The Illinois EPA performed a detailed Well Site Survey in 1992 to identify potential sources of contamination to the community's wells. These sources are identified based on the nature of their activity, the availability of data in electronic databases, and their geographic proximity to the source water protection area. In addition, the Illinois EPA made use of information from its leaking underground storage tank database (<http://epadata.epa.state.il.us/land/ust/search.asp>) and site remediation program database (<http://epadata.epa.state.il.us/land/srp/search.asp>) to further assess potential sources of contamination to the community's source water. These databases include information from the Illinois EPA Division of Land Pollution Control (LPC) and the Illinois Emergency Management Agency (IEMA). The following is a list of facilities contained within these databases. As a result of multiple possible contamination sources, individual sites may be listed in the table more than once in relation to a well.

IEMA # - LPC # - Site Name Address City ZIP Code
 20002181 - 1550055009 - Maupin Trucking & Excavating Rt. 71 Granville 61326
 901786 - 1550050001 - Salsman, Coy 102 McCoy St. Granville 61326
 921597 - 1550055002 - Putnam County C.U.S.D. #535 400 East Silverspoon St. Granville 61326
 930911 - 1550050001 - Salsman, Coy 101 South McCoy St. Granville 61326
 932022 - 1550055003 - Petro-Line Rt. 89, R.R. 1, Box 36 Granville 61326
 941345 - 1550055001 - Mid-American Growers Inc. R.R. 1, Rt. 89 Granville 61326
 972212 - 1550055007 - Toedter Oil Co. RFD Rt. 89 1 1/4 Mile South Spring Valley Granville 61326

SITE DATA FOR THIS FACILITY:

Well ID	Map Code	Site Name	Site Description	Distance (Feet)
11590	07317	COYE'S SUNOCO SERVICE	BELOW GROUND STORAGE (PET	350
11590	07318	DONALDSON BUSINESS FORMS	PRINTING	800
11590	07321	OSSOLA CONSTRUCTION CO.	PILES OF MATERIAL (e.g. SAND A	2300
11590	07320	UNKNOWN FORMER GAS STATI	BELOW GROUND STORAGE (PET	2100
11590	07319	UNKNOWN FORMER GAS STATI	BELOW GROUND STORAGE (PET	1000
11591	07318	DONALDSON BUSINESS FORMS	PRINTING	1500
11591	07321	OSSOLA CONSTRUCTION CO.	PILES OF MATERIAL (e.g. SAND A	300
11591	07320	UNKNOWN FORMER GAS STATI	BELOW GROUND STORAGE (PET	775
11591	07319	UNKNOWN FORMER GAS STATI	BELOW GROUND STORAGE (PET	1580
11591	07317	COYE'S SUNOCO SERVICE	BELOW GROUND STORAGE (PET	2000

OTHER IDENTIFIED POTENTIAL SOURCES:

For this community water supply, no additional potential sources of contamination have been identified beyond those in Illinois EPA databases.

SUSCEPTIBILITY TO CONTAMINATION:

Based on information obtained in a Well Site Survey published in 1992 by the Illinois EPA, several potential sources are located within 1,000 feet of the wells.

The Illinois EPA has determined that the Granville Community Water Supply's source water is not susceptible to contamination. This determination is based on a number of criteria including; monitoring conducted at the wells; monitoring conducted at the entry point to the distribution system; and available hydrogeologic data on the wells.

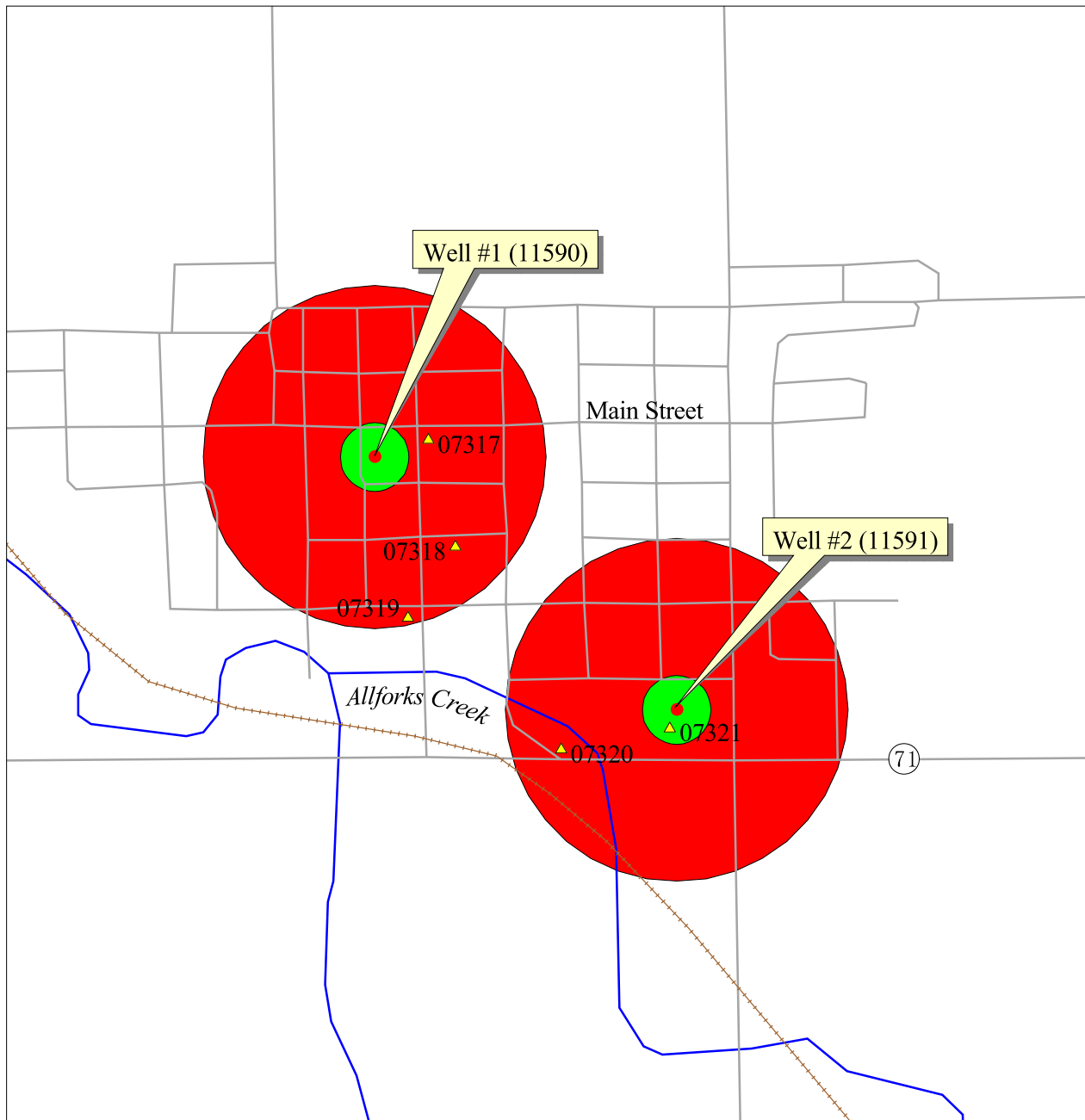
Furthermore, in anticipation of the U.S. EPA's proposed Ground Water Rule, the Illinois EPA has determined that the Granville Community Water Supply is not vulnerable to viral contamination. This determination is based upon the evaluation of the following criteria during the Vulnerability Waiver Process: the community's wells are properly constructed with sound integrity and proper siting conditions; a hydraulic barrier exists which should prevent pathogen movement; all potential routes and sanitary defects have been mitigated such that the source water is adequately protected; monitoring data did not indicate a history of disease outbreak; and the sanitary survey of the water supply did not indicate a viral contamination threat. Because the community's wells are constructed in a confined aquifer, which should prevent the movement of pathogens into the wells, well hydraulics were not considered to be a significant factor in the susceptibility determination. Hence, well hydraulics were not evaluated for this system ground water supply.

SOURCE WATER PROTECTION EFFORTS:

The Illinois Environmental Protection Act provides minimum protection zones of 200 feet for your wells. These minimum protection zones are regulated by the Illinois EPA. To further reduce the risk to source water, the Facility has implemented a wellhead protection program which includes the proper abandonment of potential routes of groundwater contamination and correction of sanitary defects at the water treatment facility. This effort resulted in the community water supply receiving a special exception permit from the Illinois EPA which allows a reduction in monitoring. The outcome of this monitoring reduction has saved the community considerable laboratory analysis costs.

To further minimize the risk to the facility's groundwater supply, the Illinois EPA recommends that three additional activities be assessed. First, the water supply may wish to enact a "maximum setback zone" ordinance. These ordinances are authorized by the Illinois Environmental Protection Act and allow county and municipal officials the opportunity to provide additional protection up to a fixed distance, normally 1,000 feet from their wells. Second, the water supply staff may wish to revisit their contingency planning documents. Contingency planning documents are a primary means to ensure that, through emergency preparedness, a community will minimize their risk of being without safe and adequate water. Finally, the water supply staff is encouraged to review their cross connection control program to ensure that it remains current and viable. Cross connections to either the water treatment plant (for example, at bulk water loading stations) or in the distribution system may negate all source water protection initiatives provided by the community.

WELLHEAD PROTECTION PLANNING MAP FOR GRANVILLE (FACILITY #1550050)



Legend

- CWS Wells
- ▲ Potential Sources Of Contamination
- Rails
- Roads
- Streams
- Minimum Setback Zone
- Existing or Potential Maximum Setback Zone

500 0 500 1000 1500 Feet

FOR MORE INFORMATION CONTACT:

Groundwater Section, Bureau of Water
 Illinois Environmental Protection Agency
 1021 North Grand Avenue East
 Springfield, IL 62794-9276
 Ph# (217)785-4787

Source Information
 Roads, Rails, and Streams from Illinois DNR.
 CWS Wells and Potential Sources from Illinois EPA.
 Map compiled by Groundwater Section, Illinois EPA.



Illinois Environmental Protection Agency



Source Water Assessment Program

FACT SHEET

MARK

PUTNAM COUNTY

Prepared in cooperation with the U.S. Geological Survey.

Information and data used in the preparation of this Fact Sheet are provided by the Illinois EPA and are subject to revision.

Illinois EPA PWS Number: 1550250

For the purpose of the Source Water Assessment Program (SWAP), this community water supply (CWS) purchases water from another CWS. The current procedure for a purchasing water supply indicates that the source water information for this CWS is presented in the SWAP Fact Sheet of the parent supply (the water supply from which the water originates). Therefore, please refer to the parent supply's SWAP Fact Sheet for an assessment of this CWS's source water. The parent CWS for the supply you requested is listed below with its source water type and county. Some CWSs that purchase their water have wells as back-up supplies; however, these wells are not the primary source of water supply and are not considered as part of this assessment program.

INFORMATION FOR THE SOURCE OF THIS FACILITY'S WATER

Parent IEPA Number: 1550050

Parent Name: GRANVILLE

Parent Water Type: GROUND

Parent Supply County: PUTNAM

APPENDIX D

RECORD OF COMMUNICATIONS

Stuart Cravens

From: "Bell, Scott S." <Scott.S.Bell@Illinois.gov>
To: <kelron@egix.net>
Cc: "Smet, John" <John.Smet@Illinois.gov>
Sent: Wednesday, March 18, 2009 12:18 PM
Subject: attn Stuart Cravens

According to our records, the only active NCPWS within one mile of Dynegy Hennepin Power Station is Washington Mills (fka Exolon, Esk).

J. Scott Bell, LEHP
Illinois Department of Public Health
Peoria Regional Office
5415 N. University
Peoria, IL 61614
309 693 5373
fax 309 693 5118
scott.s.bell@illinois.gov

Stuart Cravens

From: "Andrea Gress" <agress@bchealthdepartment.org>
To: "Stuart Cravens" <kelron@egix.net>
Sent: Tuesday, March 17, 2009 2:26 PM
Subject: RE: Community and Non-Community Water Supplies - Putnam County

Dear Stu,

As far as the non-communities we are responsible for at the local level, none of them are located in that area. However, the state also covers non-community wells in our area because they fall in a different category so I am forwarding this email to our Regional State Health Department in Peoria, IL. The contact is John Smet. Email: john.smet@illinois.gov. Hopefully he will get back to you regarding the non-community wells the state is responsible for.

Sincerely,

Andrea Gress

Andrea Gress, BS, LEHP, REHS/RS
Environmental Health Sanitarian
Bureau-Putnam County Health Department
526 Bureau Valley Parkway
Princeton, IL 61356
Phone: 815-872-5091
Fax: 815-872-5092

From: Stuart Cravens [<mailto:kelron@egix.net>]
Sent: Thursday, March 12, 2009 9:05 AM
To: Andrea Gress
Subject: Community and Non-Community Water Supplies - Putnam County

To: Bureau and Putnam County Health Department

As required by the IEPA, and on behalf of the Hennepin Power Station, located in Putnam County, Illinois (Township 33 North, Range, 2 West, Section 26) Kelron Environmental is conducting a water well survey of potable wells within 1 mile of the property.

I have done the web database searches and obtained information from the IEPA, ISGS, and ISWS and wanted to confirm that there are no community water supply wells within 1 mile of the Hennepin Power Station and the only non-community water supply well(s) are located at the Exolon Corporation in the southeast quarter of Section 26. The IEPA website showed there to be one non-community water supply well on Exolon property used for potable purposes, although there are apparently at least two other wells which may be active or inactive for industrial (non-potable) use.

I would appreciate it if you could confirm this information or provide me with a contact person in your office with whom I can communicate via mail or phone.

Thank you very much.

Stu Cravens, Senior Hydrogeologist

Stuart J. Cravens
Kelron Environmental
kelron@egix.net
217-390-1503 phone

3/17/2009

Stuart Cravens

From: "Stuart Cravens" <kelron@egix.net>
To: "John P Augspols" <john_augspols@dynegey.com>
Sent: Tuesday, February 03, 2009 3:12 PM
Attach: Hen Power Plant 2.jpg
Subject: Industrial Well locations

✓
In process!

John,

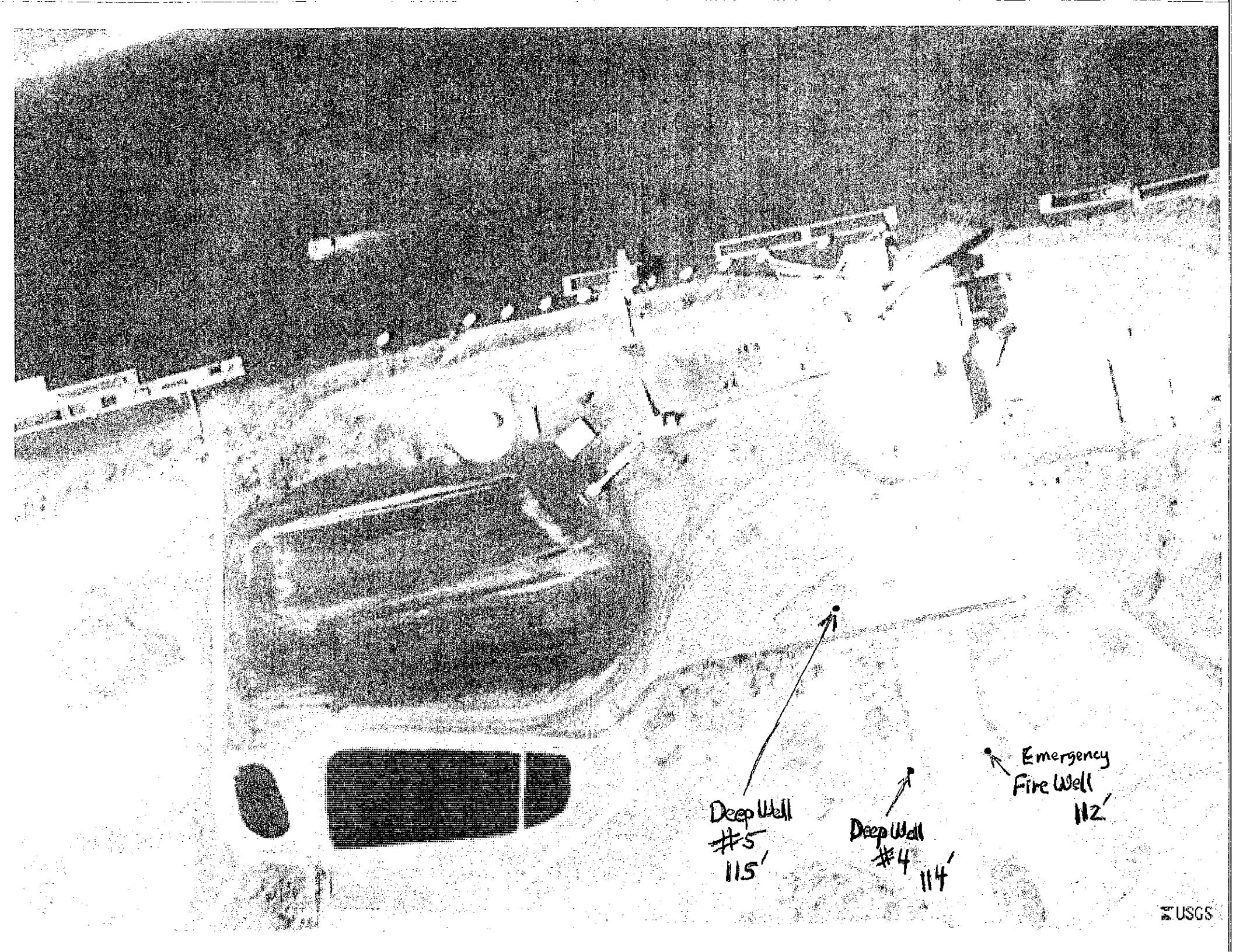
Are any of your industrial water wells at Hennepin active? Can you show on the attached jpeg map the locations of those wells and their designations? Call if this is a problem or any questions.

Thanks. Stu

Stuart J. Cravens
Kelron Environmental
kelron@egix.net
217-390-1503 phone




A = deep well #5 (115') #28
B = deep well #4 (114') #26
C = Firewell (112') ? #29??




Deep Well
#5
115'

Deep Well
#4
114'

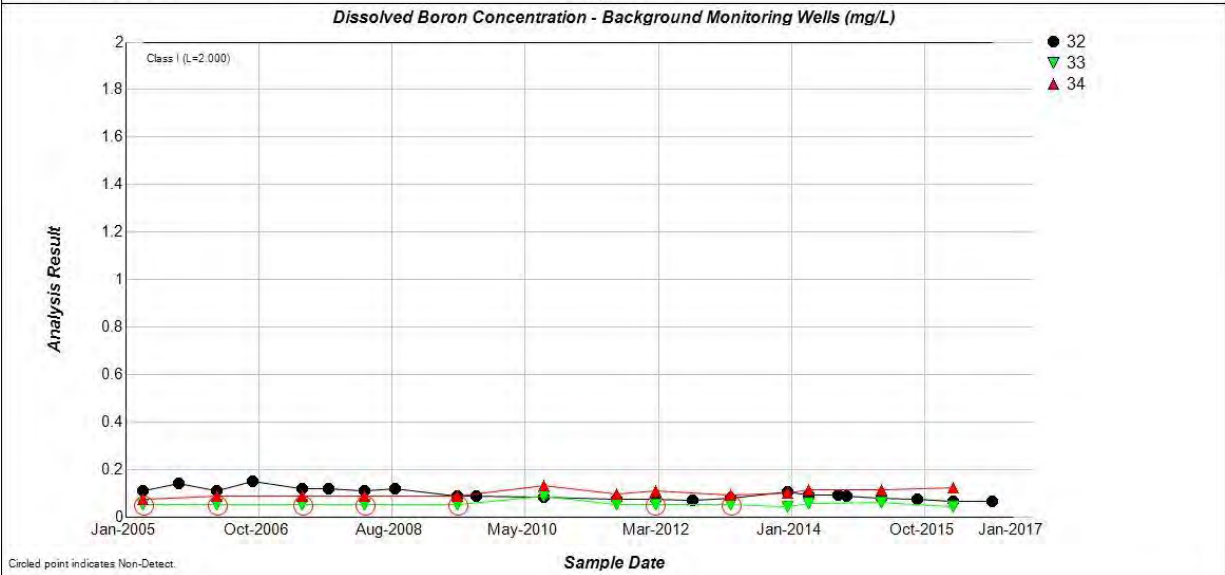
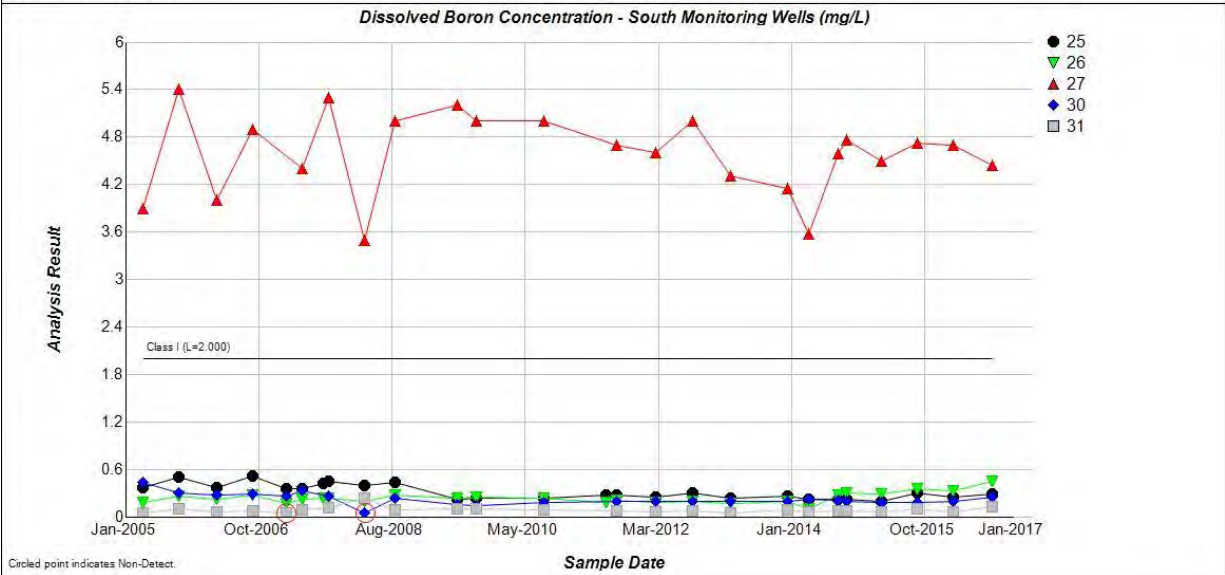
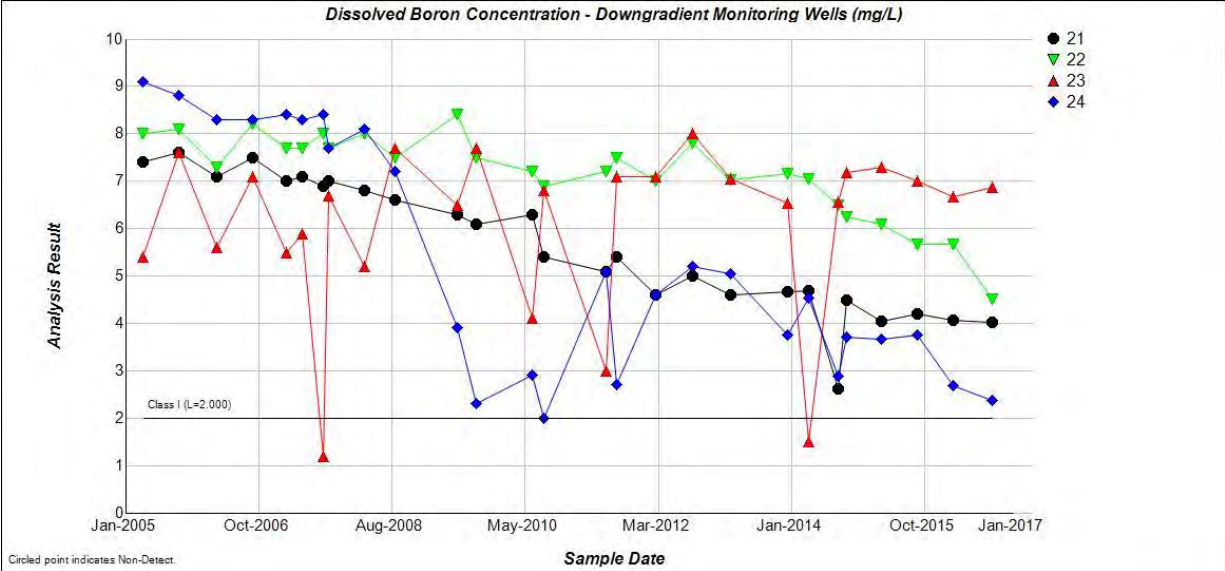
Emergency
Fire Well
112'

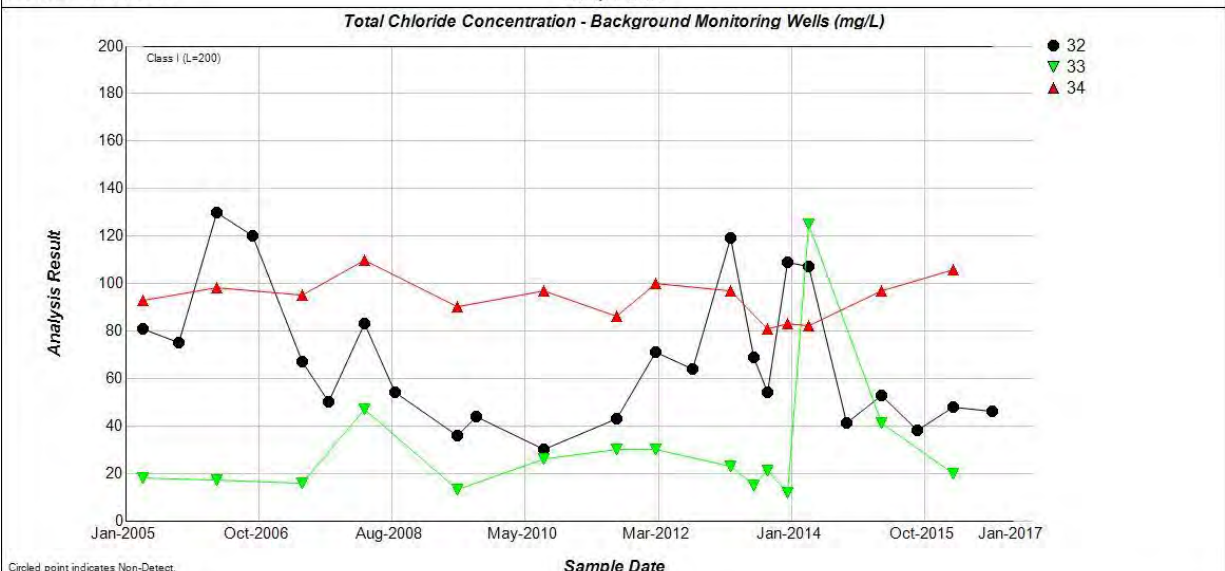
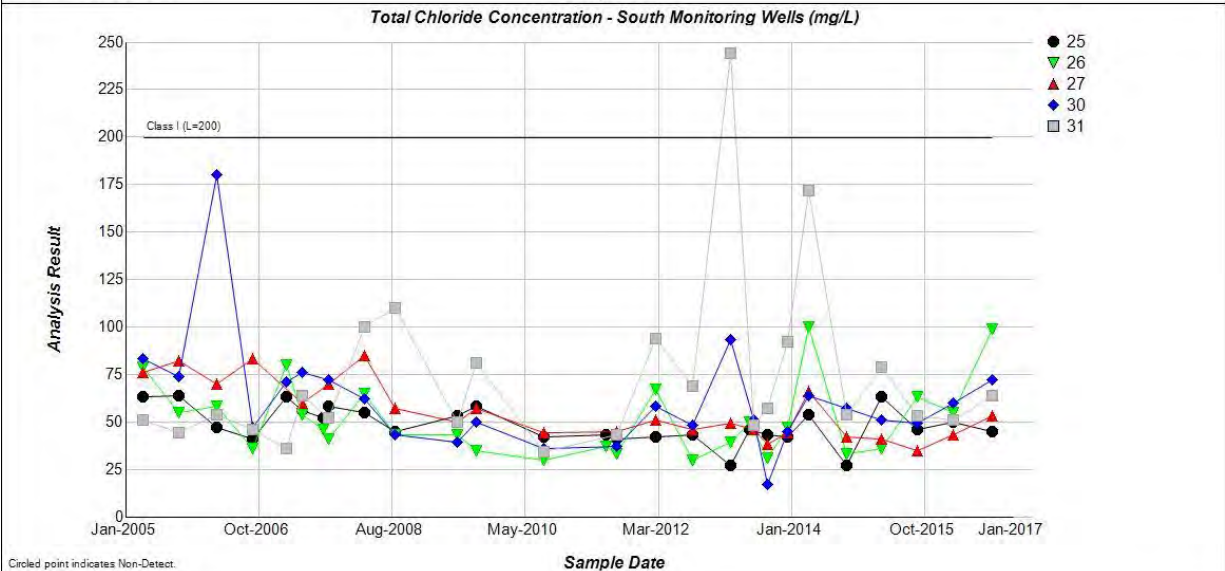
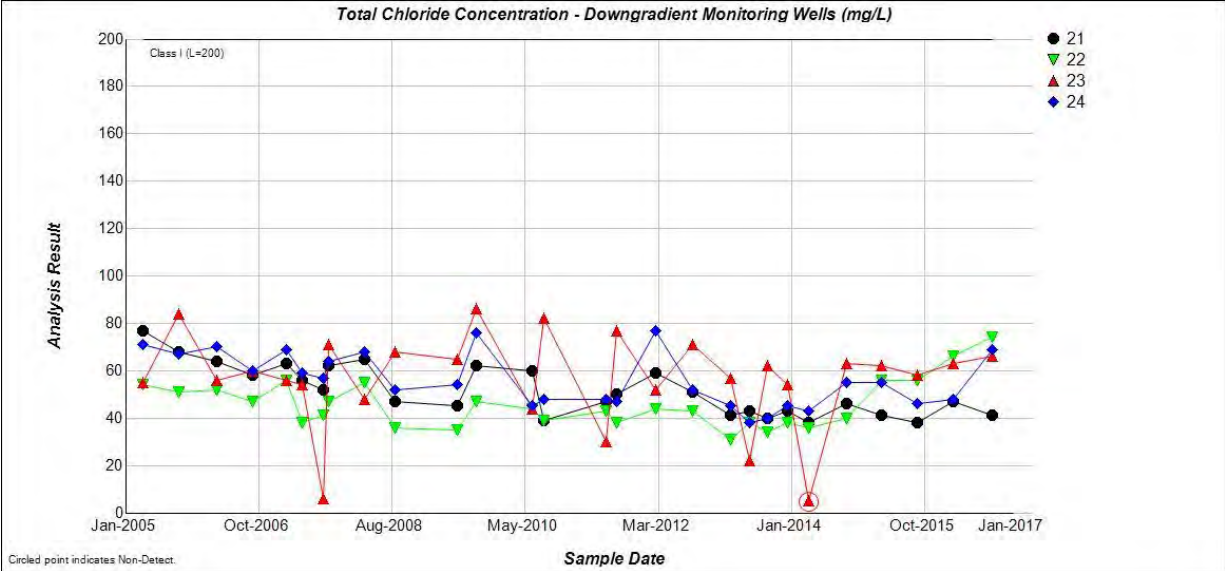


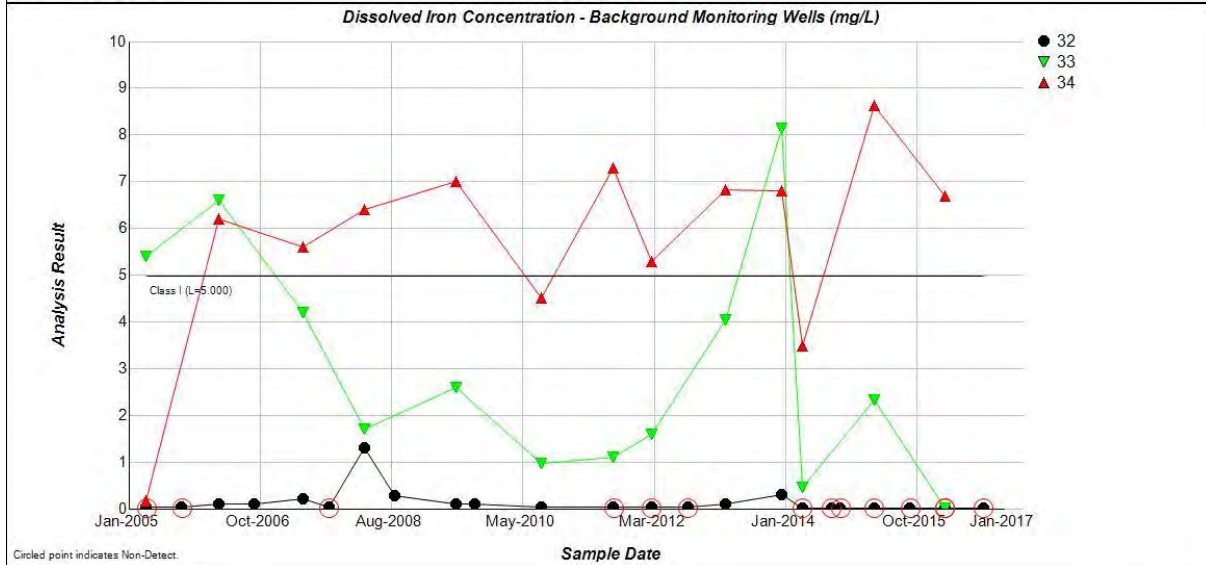
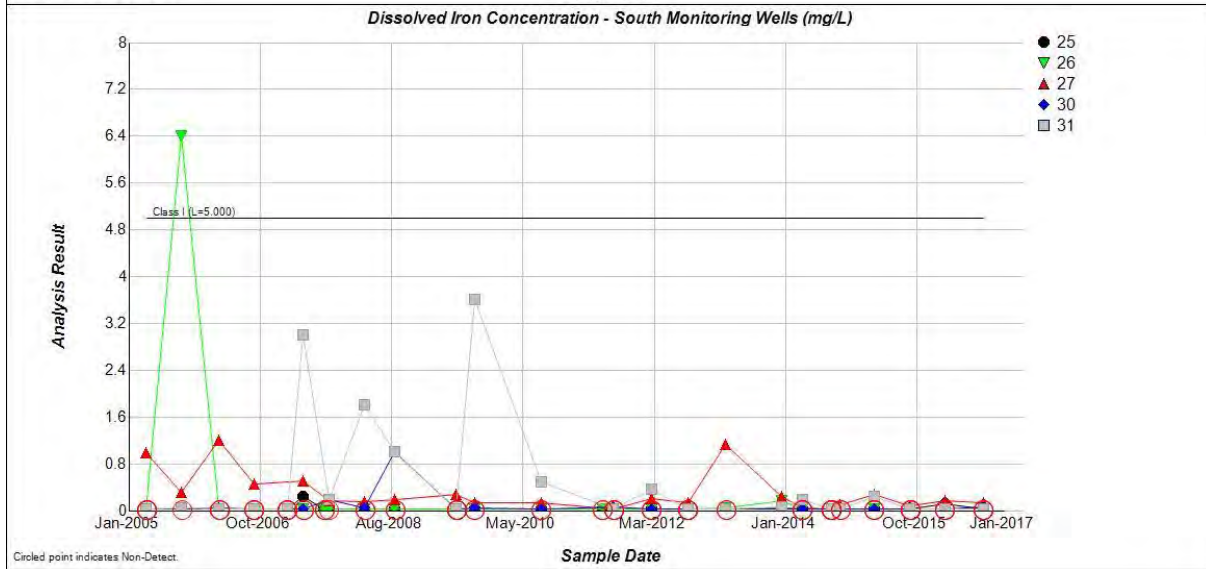
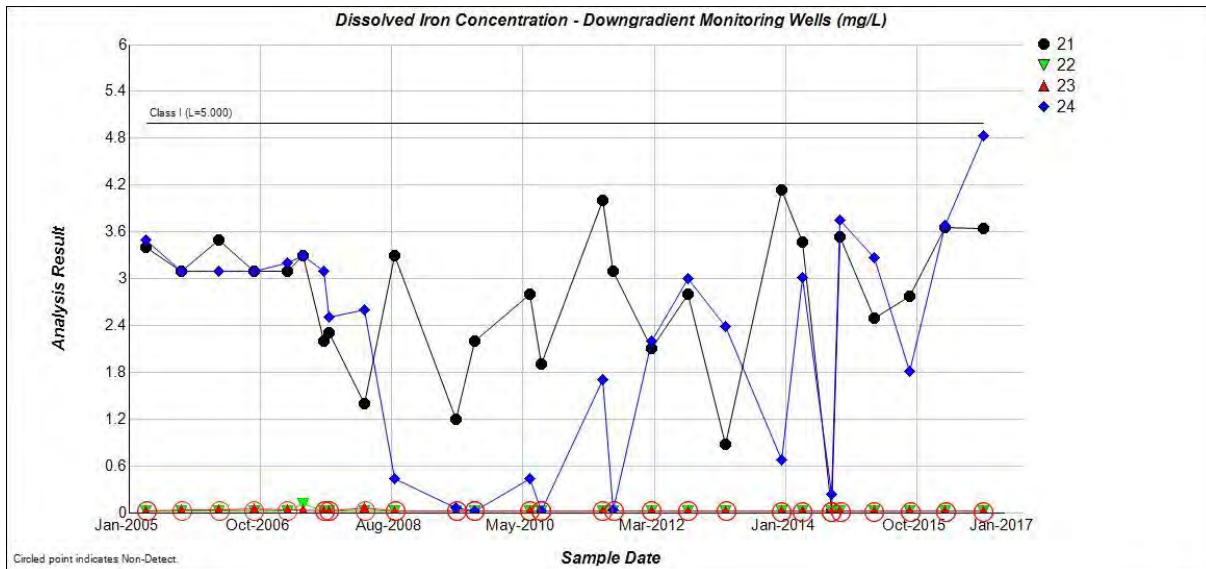
Appendix G
Groundwater Quality
Monitoring Data

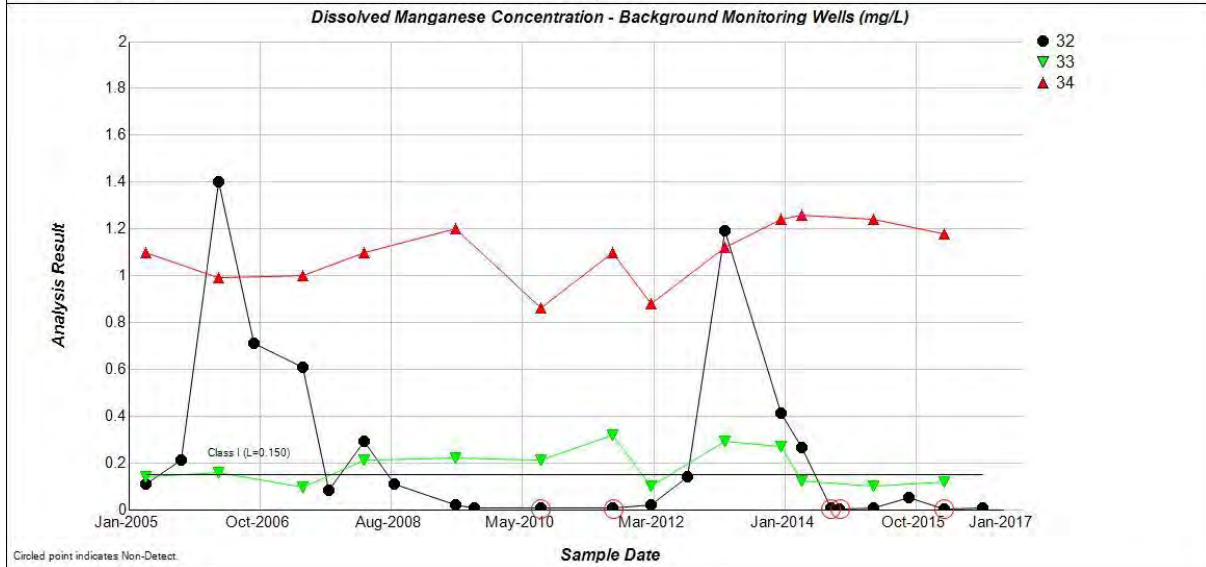
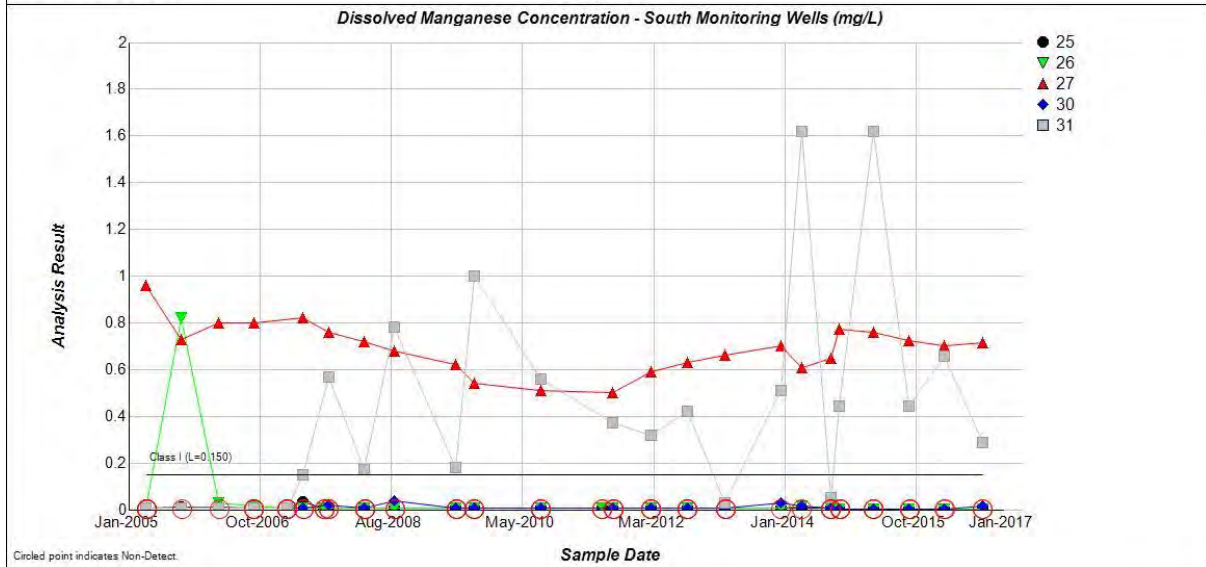
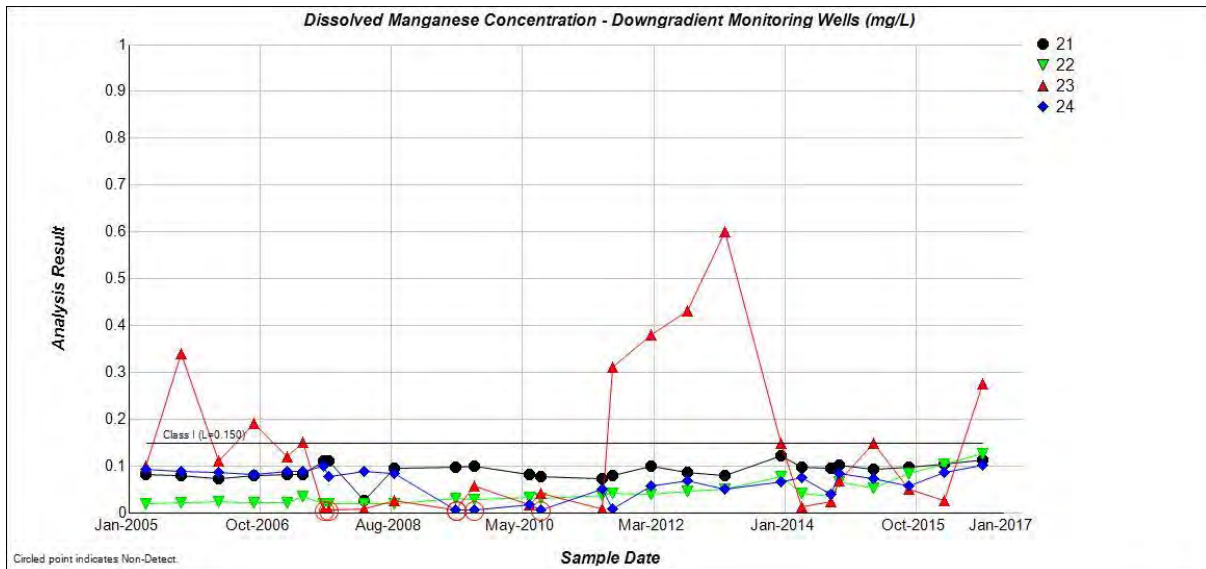


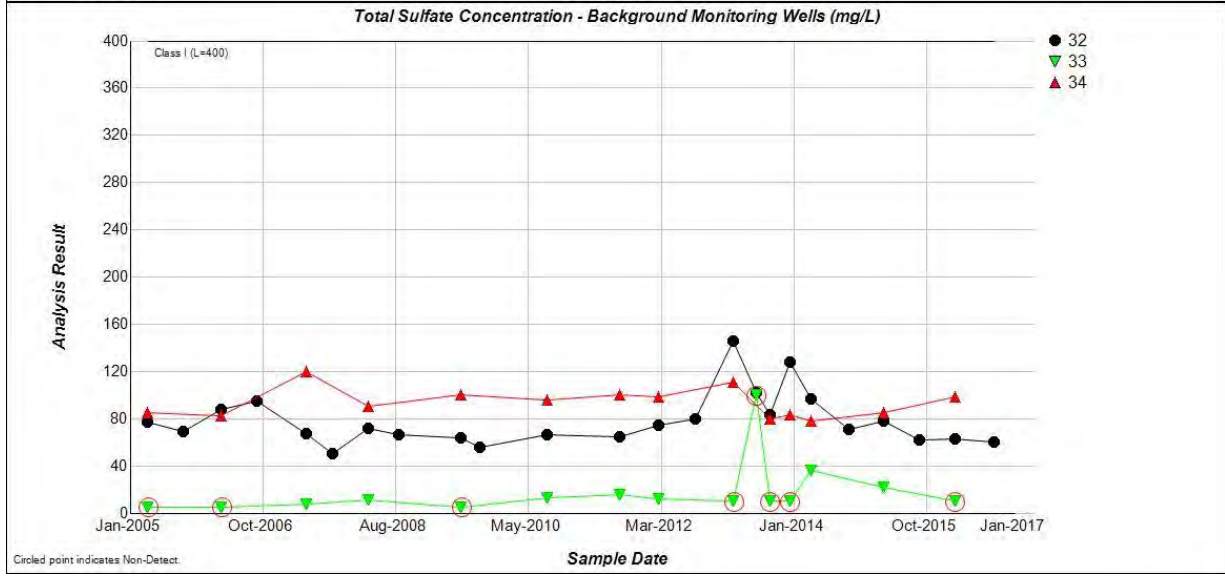
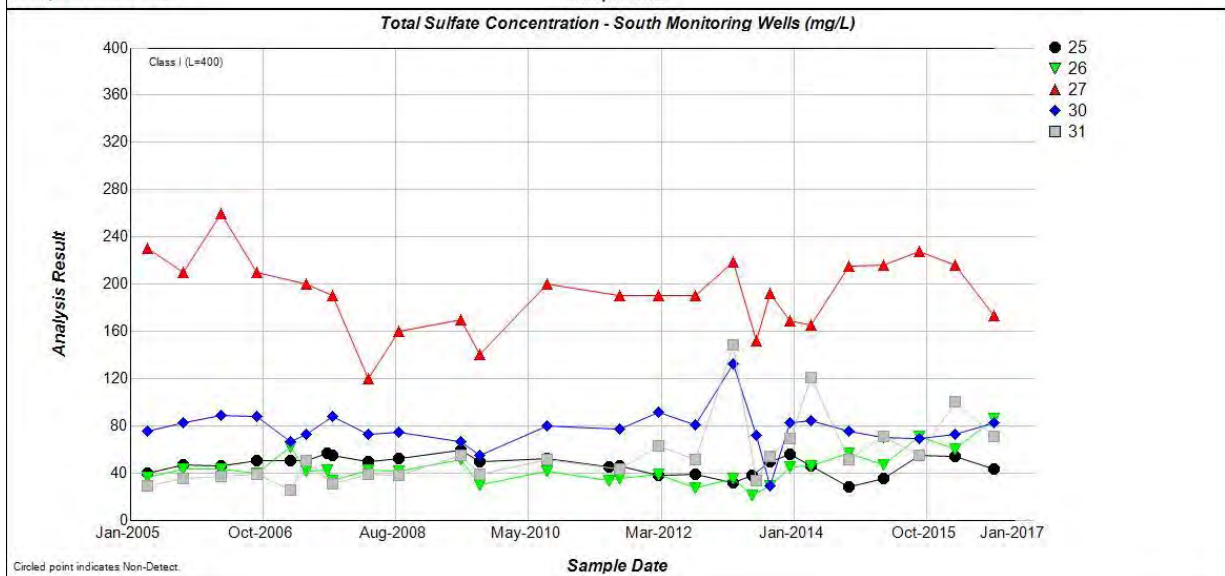
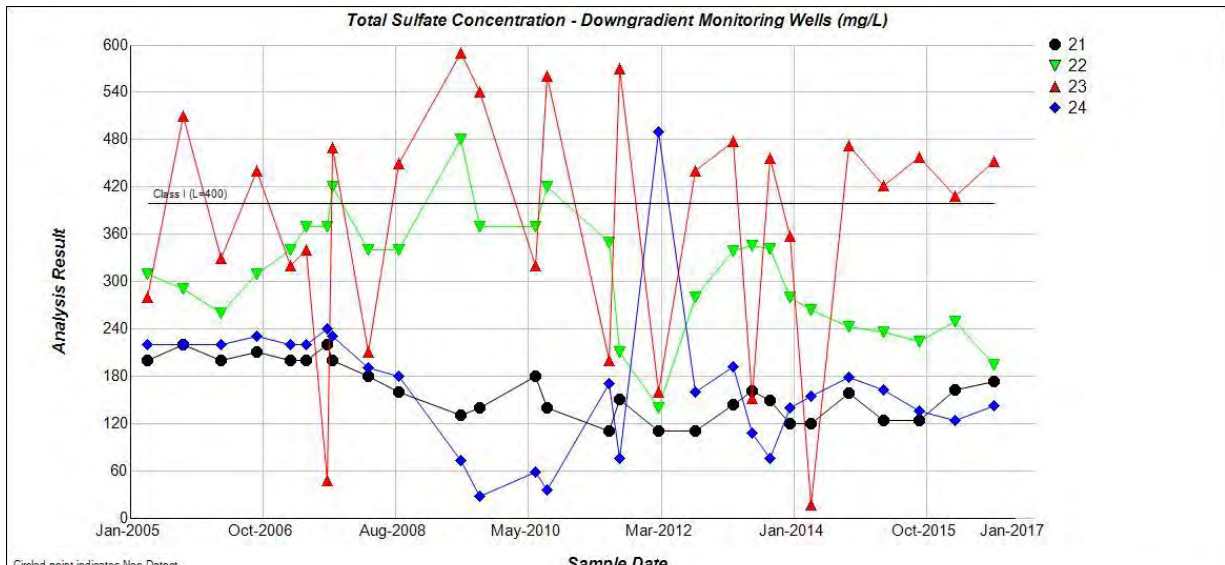
Appendix G1
Time Concentration Plots
2005 through 2016

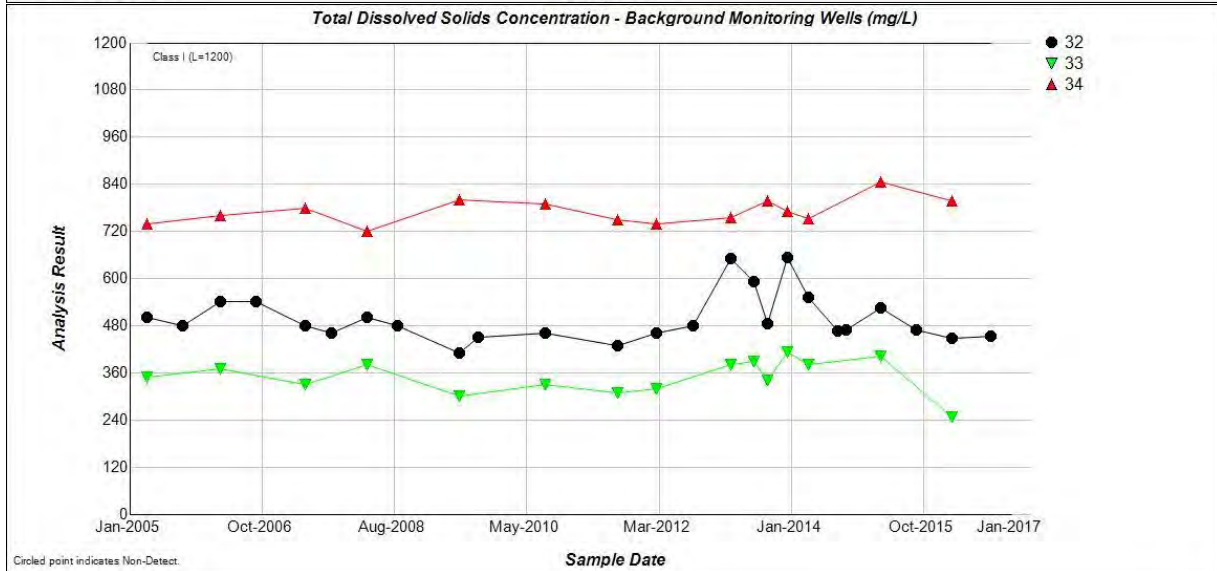
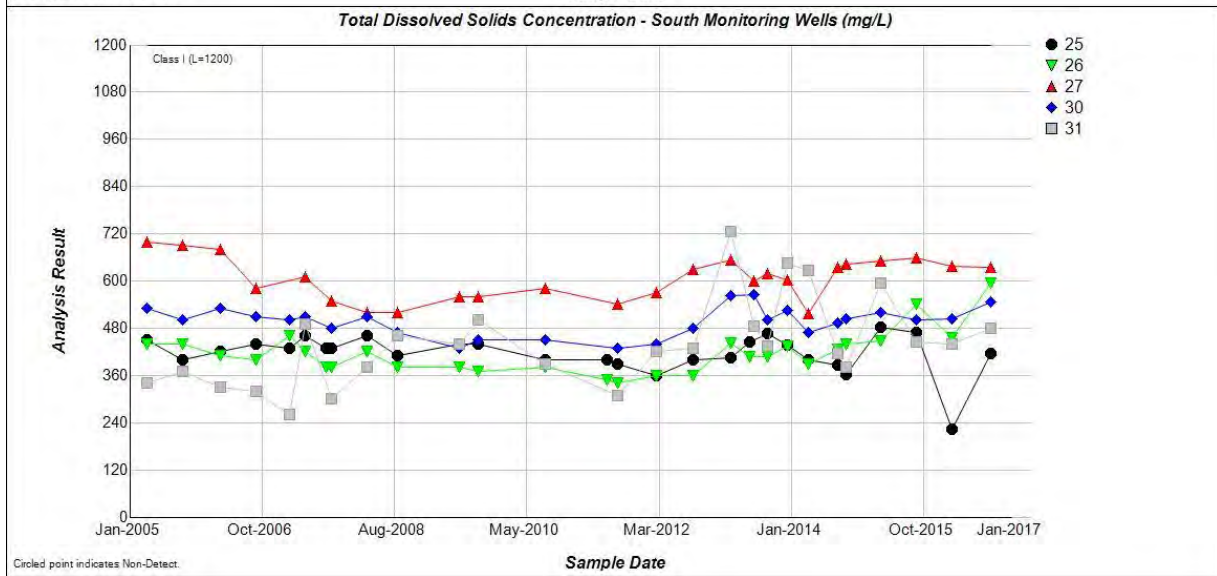
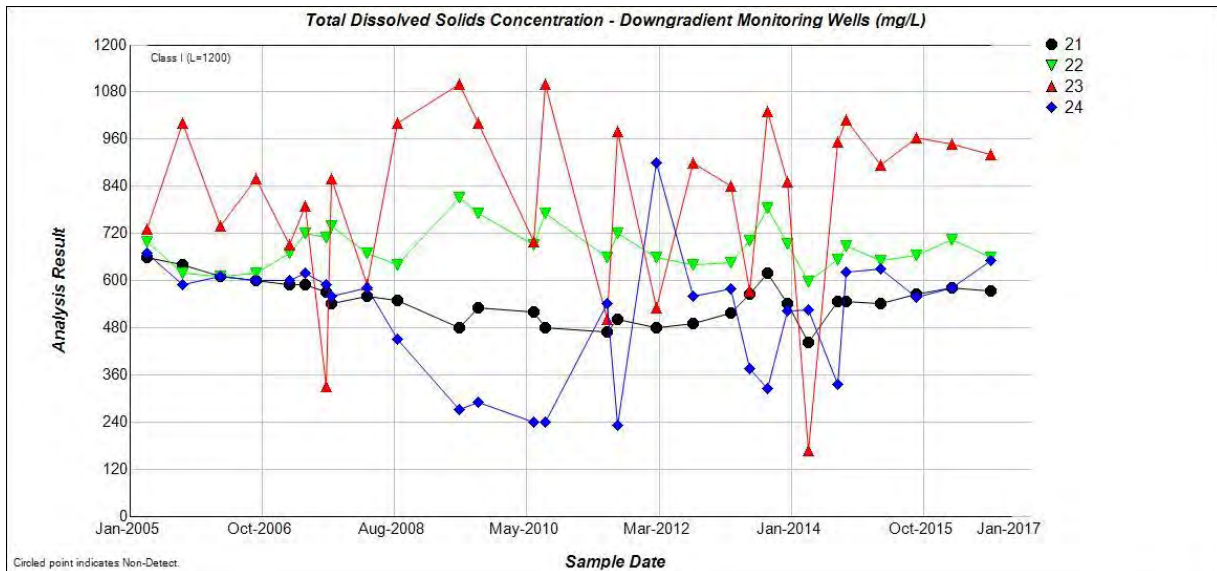


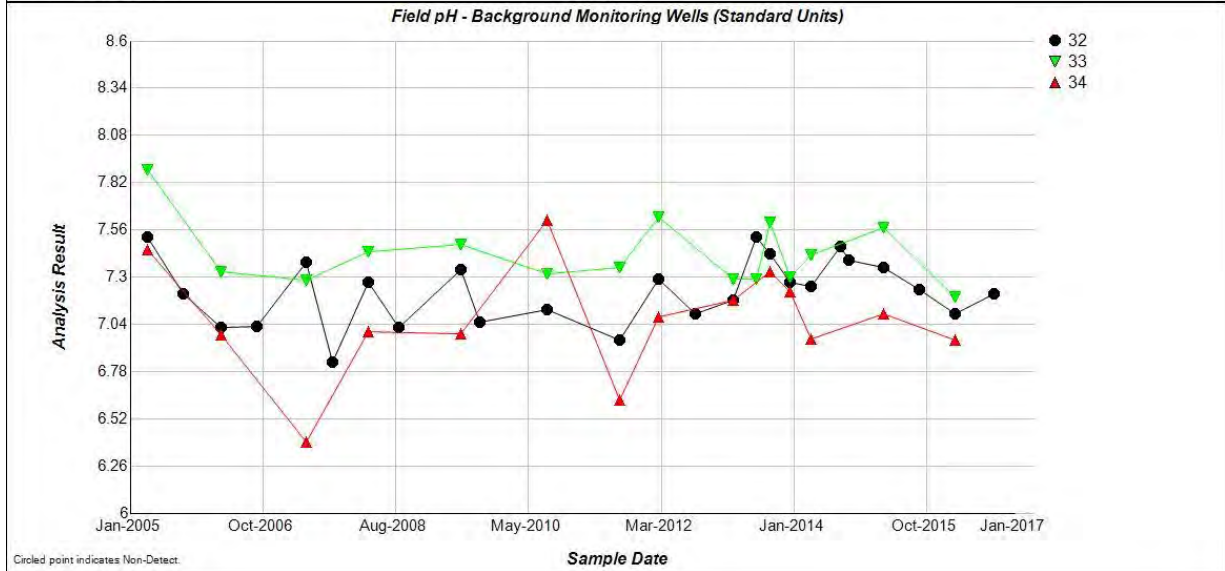
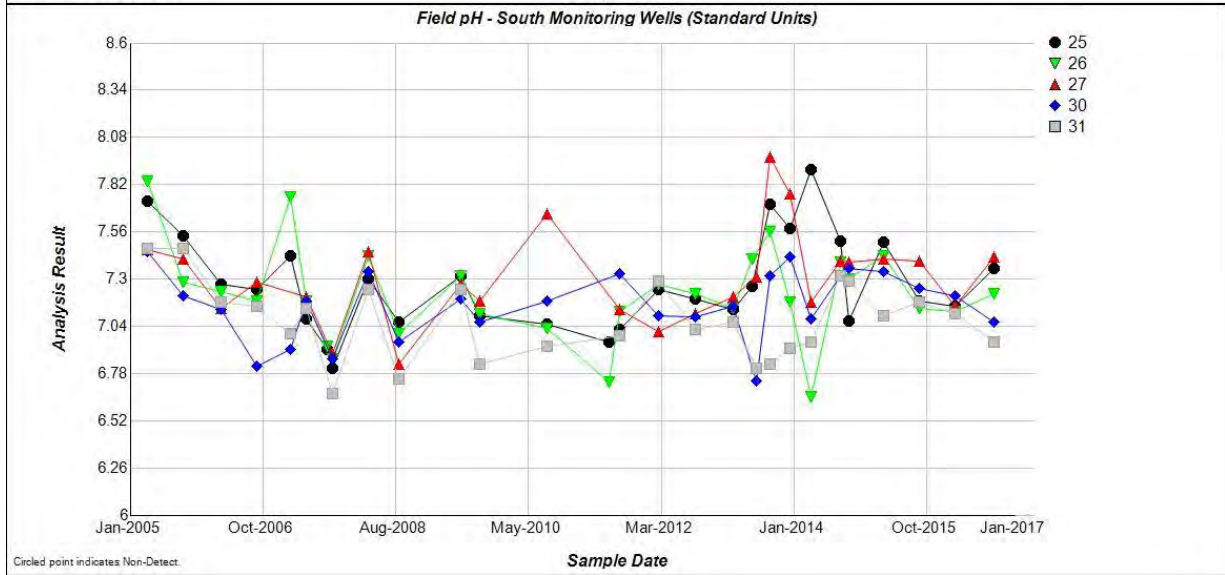
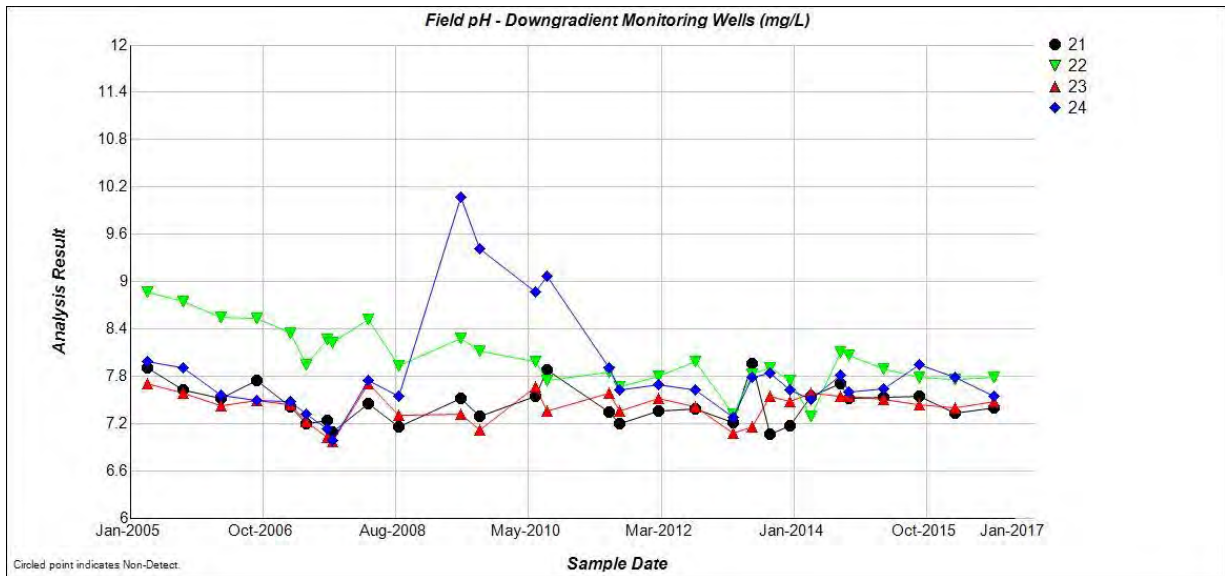


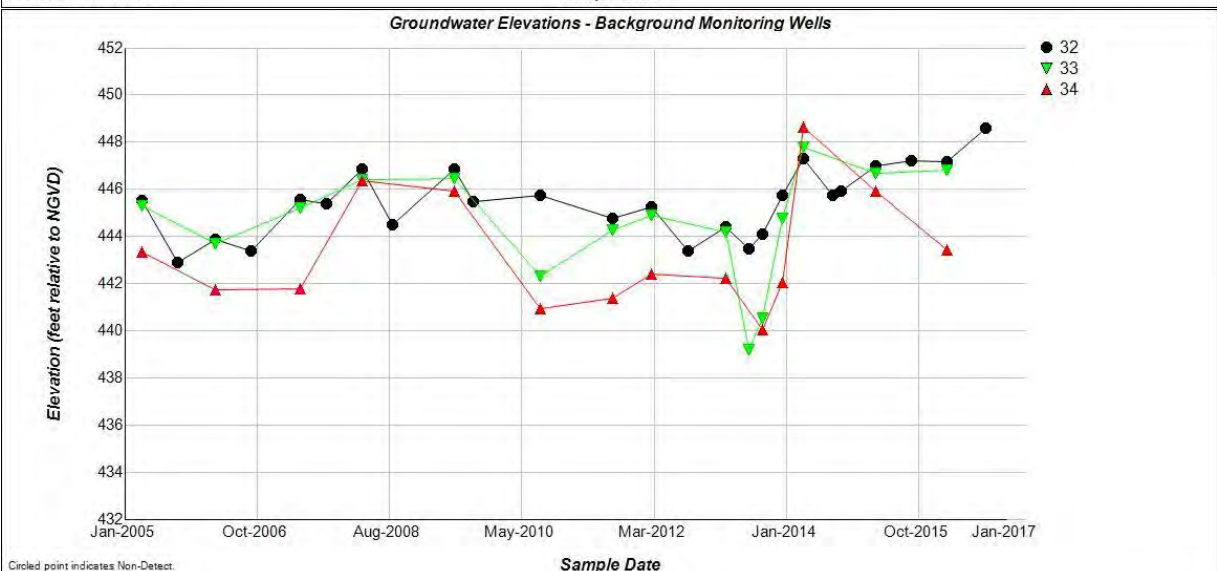
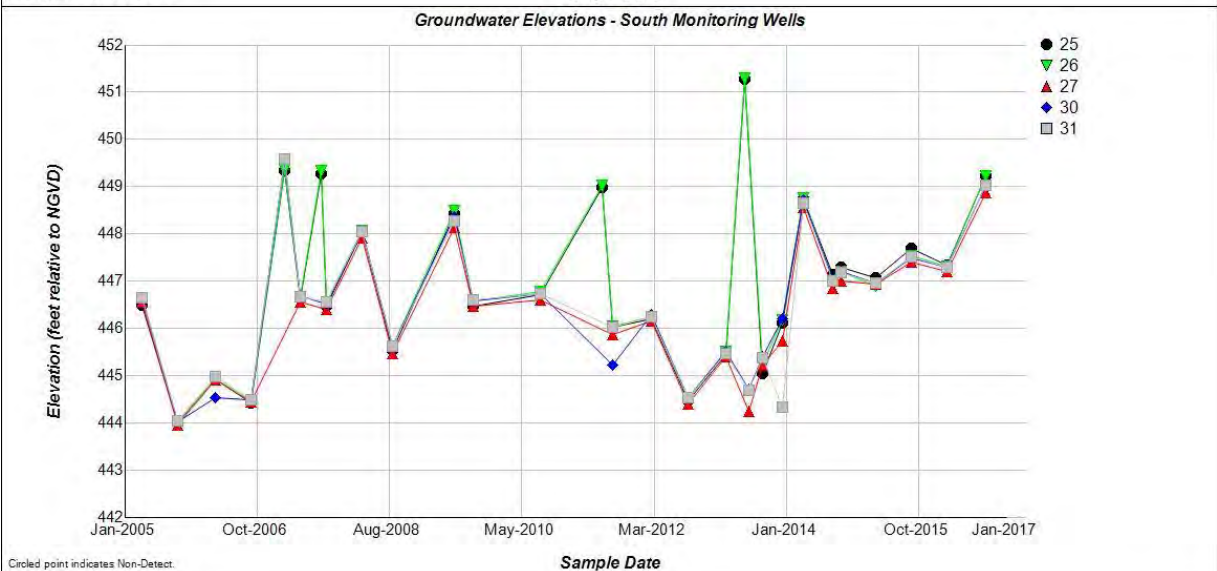
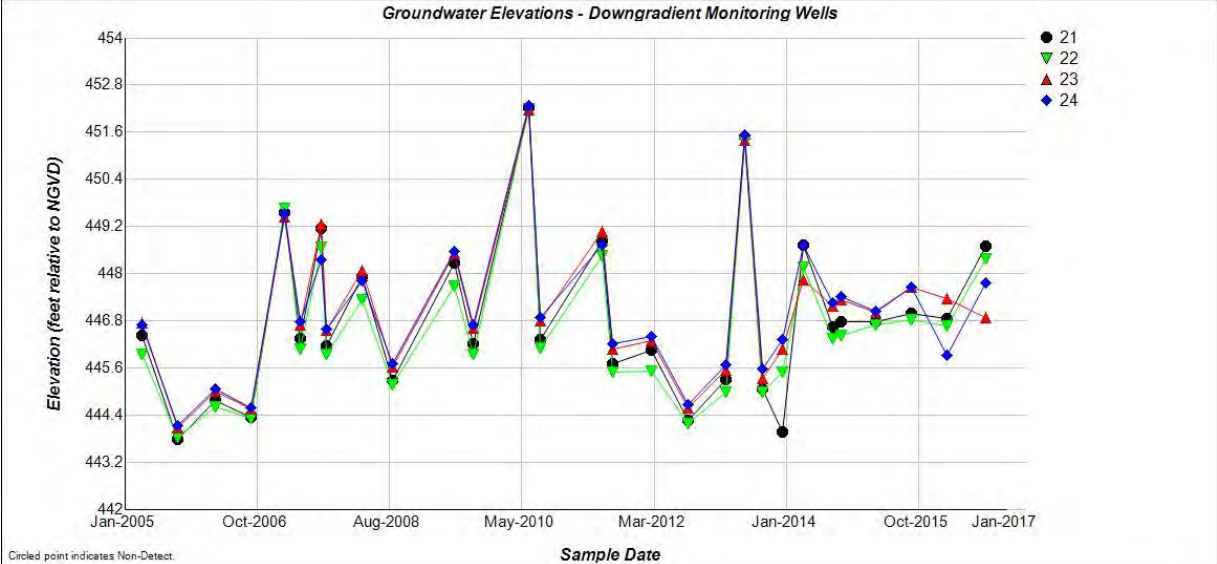














Appendix G2
Class I Groundwater
Quality Standards
Monitoring Results
Inorganic Parameters

Appendix G2: Inorganic Parameter Groundwater Quality Results June 2013 – March 2014
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 21				Well 22				Well 23			
				06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.96	7.06	7.17	7.55	7.83	7.91	7.75	7.29	7.15	7.55	7.48	7.58
GW Elevation	EWLI	ft.	--	451.48	445.07	443.97	448.73	451.34	444.98	445.50	448.17	451.40	445.32	446.07	447.85
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	556	571	526	633	946	884	1,000	634	640	1,140	925	526
Temp-field	SM 21st ed. 2550	C°	ns	15.1	16.8	10.3	10.3	13.6	13.6	10.1	10.5	12.7	14.3	9.9	10.4
Sulfate (d)	SM 21st ed. 4500-SO ₄ B	mg/L	400	161	149	121	127	346 S	341	269	254	152	456	329	17
Chloride (d)	ASTM D512-04 C	mg/L	200	43	40	43	37	38	34	38	35	22	62	54	<5.0
Fluoride (t)	EPA method 74	mg/L	4.0	0.22	0.17	0.18	0.12	0.22	0.17	0.18	0.14	0.24	0.17	0.19	0.18
Nitrate (t)	SM 21st ed. 4500-NO ₃ D	mg/L	10.0	0.034 J	0.205	0.17	0.39	6.42	5.95	5.56	5.52	0.15	<0.05	<0.05	1.91
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	<0.004	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	564	618	540	442	702	784	694	596	574	1,030	852	166
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	<0.007	<0.008	<0.007	<0.007	<0.007	<0.008	<0.007	<0.007	<0.008	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005 S	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	0.007	0.009	0.008	0.0104	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.20	0.18	0.18	0.15	0.06	0.07	0.06	0.05	0.12	0.05	0.04	0.03
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	5.18	5.09	4.66	4.68	7.66	7.51	7.16	7.05	2.88	7.43	6.54	1.51
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	3.18	3.88	4.13	3.47	0.12	0.07	<0.02	<0.02	0.46	0.16	<0.02	<0.02
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.118	0.112	0.121	0.090	0.142	0.093	0.078	0.040	0.096	0.068	0.148	0.010
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.021	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
EWLI - electronic water level indicator.

(d) dissolved -- Not applicable. ns No standard.
(t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
(t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit **0.42** Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix G2: Inorganic Parameter Groundwater Quality Results .
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 24				Well 25				Well 26			
				06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.78	7.84	7.63	7.50	7.26	7.71	7.58	7.90	7.41	7.56	7.17	6.65
GW Elevation	EWLI	ft.	--	451.53	445.56	446.32	448.73	451.27	445.05	446.10	448.74	451.30	445.24	446.17	448.76
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	567	507	527	856	689	696	649	738	754	627	736	874
Temp-field	SM 21st ed. 2550	C [*]	ns	13.2	15.3	9.9	10.2	13.5	13.1	10.6	8.9	12.0	15.0	10.4	5.8
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	108	75	138	164	38	49	41	41	21	29	41	44
Chloride (d)	ASTM D512-04 C	mg/L	200	38	40	45	46	46	43	42	51	50	31	47	90
Fluoride (t)	EPA method 74	mg/L	4.0	0.26	0.21	0.21	0.16	0.17	0.13	0.15	<0.10	0.20	0.16	0.18	0.12
Nitrate (t)	SM 21st ed. 4500-NO ₃ □	mg/L	10.0	.036 J	<0.05	0.07	<0.05	10.1	8.28	12.2	8.71	7.91	15.1	6.59	2.87
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	<0.004	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	376	324	522	526	444	466	436	400	408	408	434	390
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	0.008	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	0.009	0.009	0.023	0.030	<0.003	<0.003	<0.003 S	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.04	0.04	0.04	0.04	0.08	0.08	0.07	0.07	0.08	0.08	0.09	0.06
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	3.02	2.9	3.76	4.53	0.24	0.29	0.26	0.21	0.18	0.20	0.19	0.09
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	0.69	0.59	0.68	3.02	5.06	1.36	0.05	<0.02	0.58	0.90	0.17	<0.02
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	0.009	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.036	0.022	0.066	0.070	0.192	0.050	<0.005	0.005	0.029	0.040	0.009	0.010
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	0.0127	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	0.073	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	0.026	0.011	<0.01	<0.01	0.048	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
EWLI - electronic water level indicator.

(d) dissolved -- Not applicable. ns No standard.
(t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
(t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit **0.42** Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix G2: Inorganic Parameter Groundwater Quality Results .
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 27				Well 30				Well 31			
				06/26/13	09/03/13	12/10/13	03/25/14	06/26/13	09/03/13	12/10/13	03/25/14	06/26/13	09/03/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.31	7.97	7.77	7.17	6.74	7.32	7.42	7.08	6.81	6.83	6.92	6.95
GW Elevation	EWLI	ft.	--	444.23	445.22	445.74	448.56	444.70	445.40	446.20	448.71	444.69	445.38	444.32	448.65
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	840	863	930	851	881	761	831	851	873	741	751	780
Temp-field	SM 21st ed. 2550	C ^o	ns	12.8	12.9	10.0	9.9	12.3	12.9	10.0	10.6	12.7	15.1	15.2	10.4
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	152	192	184	151	72	29	78	74	33	54	64	110
Chloride (d)	ASTM D512-04 C	mg/L	200	46	38	44	54	51	17	45	56	48	57	92	105
Fluoride (t)	EPA method 74	mg/L	4.0	0.21	0.19	0.19	0.15	0.15	0.13	0.14	<0.01	0.28	0.26	0.23	0.21
Nitrate (t)	SM 21st ed. 4500-NO ₃ □	mg/L	10.0	0.632	<0.05	0.55	<0.05	4.13	7.73	5.49	3.03	0.552	0.506	<0.05	<0.05
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	<0.004	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	600	618	602	518	564	502	524	470	486	434	646	626
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.13	0.09	0.09	0.07	0.07	0.07	0.06	0.05	0.04	0.03	0.04	0.03
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	3.98	4.68	4.15	3.58	0.24	0.20	0.20	0.22	0.09	0.09	0.08	0.05
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	4.32	0.81	0.24	0.04	1.37	1.09	0.03	<0.02	0.95	0.19	0.06	0.18
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.544	0.723	0.702	0.600	0.058	0.038	0.030	0.010	0.123	0.191	0.51	1.62
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	0.023	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
EWLI - electronic water level indicator.

(d) dissolved -- Not applicable. ns No standard.
(t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
(t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit **0.42** Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix G2: Inorganic Parameter Groundwater Quality Results .
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 32				Well 33				Well 34			
				06/26/13	09/03/13	12/10/13	03/25/14	06/26/13	09/03/13	12/10/13	03/25/14	6/7;6/26/13	09/04/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.52	7.43	7.27	7.25	7.29	7.60	7.30	7.42	----	7.33	7.22	6.96
GW Elevation	EWLI	ft.	--	443.45	444.10	445.76	447.28	439.18	440.51	444.77	447.77	----	440.04	442.04	448.64
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	851	767	785	945	594	517	581	756	----	1,180	1,060	986
Temp-field	SM 21st ed. 2550	C ^o	ns	12.8	12.9	10.5	5.9	13.1	13.8	10.3	9.7	----	13.0	9.8	11.0
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	102	83	112	95	<100 S	<10	<10**	25	----	80	83**	73
Chloride (d)	ASTM D512-04 C	mg/L	200	69	54	109	87	15	21	12	81	----	81	83	71
Fluoride (t)	EPA method 74	mg/L	4.0	0.18	0.18	0.16	0.13	0.26	0.25	0.22	0.22	----	0.20	0.19	0.17
Nitrate (t)	SM 21st ed. 4500-NO ₃ D	mg/L	10.0	5.54	8.72	<0.05	1.04	0.139	<0.05	<0.05	2.26	----	<0.05	<0.05	<0.05
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	----	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	592	486	654	552	388	342	412	382	----	798	772	752
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	----	<0.007	<0.007	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	----	<0.005 S	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	<0.003	<0.003	<0.003	<0.003	0.008	0.007	0.017	<0.003	----	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.04	0.04	0.04	0.03	0.17	0.13	0.17	0.05	----	0.13	0.11	0.10
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	----	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.08	0.09	0.10	0.09	0.04	0.05	0.04	0.05	----	0.10	0.09	0.11
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	----	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	1.24	2.18	0.29	<0.02	4.92	2.59	8.13	0.45	----	7.97	6.81	3.49
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008	----	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.118	0.235	0.411	0.26	0.146	0.292	0.268	0.120	----	1.33	1.24	1.26
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	----	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	----	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	----	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	<0.01	0.011	<0.01	<0.01	0.010	0.014	<0.01	<0.01	----	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
EWLI - electronic water level indicator.

(d) dissolved -- Not applicable. ns No standard.
(t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
(t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit **0.42** Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)



Appendix G3
Class I Groundwater
Quality Standards
Monitoring Results
Organic Parameters

Appendix G3: Organic Parameter Groundwater Quality Results June 2013 – March 2014
 Hydrogeologic Site Characterization Report
 West Ash Pond System, Hennepin Power Station

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 21				Well 22			
			6/7/2013	9/3/2013	12/10/2013	3/25/2014	6/7/2013	9/3/2013	12/10/2013	3/25/2014
Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acetone	mg/L	6.3	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Alachlor	mg/L	0.002	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Aldicarb	mg/L	0.003	< 0.0004	< 0.0004	< 0.001	< 0.001	< 0.0004	< 0.0004	< 0.001	< 0.001
Anthracene	mg/L	2.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Atrazine	mg/L	0.003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzene	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Benzo(a)anthracene	mg/L	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(b)fluoranthene	mg/L	0.00018	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(k)fluoroanthene	mg/L	0.00017	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(a)pyrene	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzoic Acid	mg/L	28.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Butanone (MEK)	mg/L	4.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbofuran	mg/L	0.04	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Carbon Disulfide	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Carbon Tetrachloride	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlordane	mg/L	0.002	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Chloroform	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chrysene	mg/L	0.012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dalapon	mg/L	0.2	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013
Dibenzo(a,h)anthracene	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dicamba	mg/L	0.21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichlorodifluoromethane	mg/L	1.4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dichloromethane (Methylene Chloride)	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Di [bis](2-ethylhexyl)phthalate	mg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	0.005 J
Diethyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Di-n-butyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dinoseb	mg/L	0.007	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endothal	mg/L	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	mg/L	0.002	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Ethylene Dibromide [EDB] (1,2-Dibromoethane)	mg/L	0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Fluoranthene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluorene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L	0.004	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Heptachlor Epoxide	mg/L	0.0002	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Hexachlorocyclopentadiene	mg/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	mg/L	0.00043	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Isopropylbenzene (Cumene)	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lindane (Gamma-Hexachlorocyclohexasene)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
2,4-D	mg/L	0.07	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ortho-Dichlorobenzene	mg/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
para-Dichlorobenzene	mg/L	0.075	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dibromo-3-Chloropropane (DBCP)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
1,1-Dichloroethane	mg/L	1.4	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1-Dichloroethylene	mg/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
cis-1,2-Dichloroethylene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
trans-1,2-Dichloroethylene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloropropane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MCCP (Mecoprop)	mg/L	0.007	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	mg/L	0.04	< 0.01	< 0.01	< 0.00005	< 0.00005	< 0.01	< 0.01	< 0.00005	< 0.00005
2-Methylnaphthalene	mg/L	0.028	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol (o-cresol)	mg/L	0.35	< 0.005	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
MTBE (methyl tert-butyl ether)	mg/L	0.07	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene Chloride	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Monochlorobenzene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Naphthalene	mg/L	0.14	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
P-Dioxane (1,4-Dioxane)	mg/L	0.0077	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	< 0.001
Pentachlorophenol	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Phenol	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Picloram	mg/L	0.5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pyrene	mg/L	0.21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
PCBs*	mg/L	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
alpha-BHC (alpha-Benzene-hexachloride)	mg/L	0.00011	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
gamma-BHC	mg/L	--	< 0.0001	< 0.0001	< 0.00005	< 0.00005	< 0.0001	< 0.0001	< 0.00005	< 0.00005
Simazine	mg/L	0.004	< 0.0006	< 0.0006	< 0.00055	< 0.00055	< 0.0006	< 0.0006	< 0.00055	< 0.00055
Styrene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	mg/L	0.05	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toluene	mg/L	1.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toxaphene	mg/L	0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1,2-Trichloroethane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2,4-Trichlorobenzene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichlorofluoromethane	mg/L	2.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl Chloride	mg/L	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Xylenes	mg/L	10.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Notes:
 mg/L Milligrams per Liter. * PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.
 < ND - Not detected at the Reporting Limit.
 J Analyte detected below Reporting Limit.
 -- No Class I Groundwater Quality Standard for the listed constituent in IAC 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).
 Section 620.410, Chapter I, Subtitle F, Title 35.
 ---- Not sampled or insufficient groundwater for sampling and analysis.

Appendix G3: Organic Parameter Groundwater Quality Results June 2013 -
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 23				Well 24			
			6/7/2013	9/3/2013	12/10/2013	3/25/2014	6/7/2013	9/3/2013	12/10/2013	3/25/2014
Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acetone	mg/L	6.3	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.006 J	< 0.025	< 0.025
Alachlor	mg/L	0.002	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Aldicarb	mg/L	0.003	< 0.0004	< 0.0004	< 0.001	< 0.001	< 0.0004	< 0.0004	< 0.001	< 0.001
Anthracene	mg/L	2.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Atrazine	mg/L	0.003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzene	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Benzo(a)anthracene	mg/L	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(b)fluoranthene	mg/L	0.00018	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(k)fluoroanthene	mg/L	0.00017	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(a)pyrene	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzoic Acid	mg/L	28.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Butanone (MEK)	mg/L	4.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbofuran	mg/L	0.04	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Carbon Disulfide	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Carbon Tetrachloride	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlordane	mg/L	0.002	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Chloroform	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chrysene	mg/L	0.012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dalapon	mg/L	0.2	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013
Dibenzo(a,h)anthracene	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dicamba	mg/L	0.21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichlorodifluoromethane	mg/L	1.4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dichloromethane (Methylene Chloride)	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Di [bis](2-ethylhexyl)phthalate	mg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Diethyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Di-n-butyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dinoseb	mg/L	0.007	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endothall	mg/L	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	mg/L	0.002	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Ethylene Dibromide [EDB] (1,2-Dibromoethane)	mg/L	0.00005	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Fluoranthene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluorene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L	0.004	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Heptachlor Epoxide	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Hexachlorocyclopentadiene	mg/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	mg/L	0.00043	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Isopropylbenzene (Cumene)	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lindane (Gamma-Hexachlorocyclohexane)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
2,4-D	mg/L	0.07	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ortho-Dichlorobenzene	mg/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
para-Dichlorobenzene	mg/L	0.075	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dibromo-3-Chloropropane (DBCP)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
1,1-Dichloroethane	mg/L	1.4	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1-Dichloroethylene	mg/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
cis-1,2-Dichloroethylene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
trans-1,2-Dichloroethylene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloropropane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MCCP (Mecoprop)	mg/L	0.007	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	mg/L	0.04	< 0.01	< 0.01	< 0.0005	< 0.0005	< 0.01	< 0.01	< 0.0005	< 0.0005
2-Methylnaphthalene	mg/L	0.028	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol (o-cresol)	mg/L	0.35	< 0.005	< 0.005	< 0.01	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01
MTBE (methyl tert-butyl ether)	mg/L	0.07	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene Chloride	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Monochlorobenzene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Naphthalene	mg/L	0.14	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
P-Dioxane (1,4-Dioxane)	mg/L	0.0077	< 0.0001	< 0.0001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.001	0.00069 J
Pentachlorophenol	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Phenol	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.052	< 0.005	< 0.005
Picloram	mg/L	0.5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pyrene	mg/L	0.21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
PCBs*	mg/L	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
alpha-BHC (alpha-Benzene-hexachloride)	mg/L	0.00011	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
gamma-BHC	mg/L	--	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0005	< 0.0005
Simazine	mg/L	0.004	< 0.0006	< 0.0006	< 0.00055	< 0.00055	< 0.0006	< 0.0006	< 0.00055	< 0.00055
Styrene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	mg/L	0.05	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toluene	mg/L	1.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toxaphene	mg/L	0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.001 J	< 0.005	0.0084
1,1,2-Trichloroethane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2,4-Trichlorobenzene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichlorofluoromethane	mg/L	2.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.044 J
Vinyl Chloride	mg/L	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Xylenes	mg/L	10.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Notes:
mg/L Milligrams per Liter. * PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.
< ND - Not detected at the Reporting Limit.
J Analyte detected below Reporting Limit.
-- No Class I Groundwater Quality Standard for the listed constituent in IAC 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).
Section 620.410, Chapter I, Subtitle F, Title 35.
---- Not sampled or insufficient groundwater for sampling and analysis.

Appendix G3: Organic Parameter Groundwater Quality Results June 2013 -
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 25				Well 26			
			6/7/2013	9/3/2013	12/10/2013	3/25/2014	6/7/2013	9/3/2013	12/10/2013	3/25/2014
Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acetone	mg/L	6.3	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Alachlor	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldicarb	mg/L	0.003	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Anthracene	mg/L	2.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Atrazine	mg/L	0.003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0004	< 0.0001	0.00008 J	< 0.0001
Benzene	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.01	< 0.01
Benzo(a)anthracene	mg/L	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.025	< 0.025
Benzo(b)fluoranthene	mg/L	0.00018	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(k)fluoroanthene	mg/L	0.00017	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0004	< 0.0004
Benzo(a)pyrene	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.01	< 0.01
Benzoic Acid	mg/L	28.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Butanone (MEK)	mg/L	4.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbofuran	mg/L	0.04	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Carbon Disulfide	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Carbon Tetrachloride	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlordane	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chloroform	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chrysene	mg/L	0.012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dalapon	mg/L	0.2	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013
Dibenzo(a,h)anthracene	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dicamba	mg/L	0.21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichlorodifluoromethane	mg/L	1.4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dichloromethane (Methylene Chloride)	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Di [bis](2-ethylhexyl)phthalate	mg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Diethyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Di-n-butyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dinoseb	mg/L	0.007	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endothall	mg/L	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Ethylene Dibromide [EDB] (1,2-Dibromoethane)	mg/L	0.00005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluoranthene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluorene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L	0.004	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor Epoxide	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorocyclopentadiene	mg/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	mg/L	0.00043	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Isopropylbenzene (Cumene)	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lindane (Gamma-Hexachlorocyclohexasene)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
2,4-D	mg/L	0.07	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ortho-Dichlorobenzene	mg/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
para-Dichlorobenzene	mg/L	0.075	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dibromo-3-Chloropropane (DBCP)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,1-Dichloroethane	mg/L	1.4	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1-Dichloroethylene	mg/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
cis-1,2-Dichloroethylene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
trans-1,2-Dichloroethylene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloropropane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MCCP (Mecoprop)	mg/L	0.007	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	mg/L	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylnaphthalene	mg/L	0.028	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol (o-cresol)	mg/L	0.35	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MTBE (methyl tert-butyl ether)	mg/L	0.07	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene Chloride	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Monochlorobenzene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Naphthalene	mg/L	0.14	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
P-Dioxane (1,4-Dioxane)	mg/L	0.0077	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pentachlorophenol	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Phenol	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Picloram	mg/L	0.5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pyrene	mg/L	0.21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
PCBs*	mg/L	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
alpha-BHC (alpha-Benzene-hexachloride)	mg/L	0.00011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
gamma-BHC	mg/L	--	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Simazine	mg/L	0.004	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Styrene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	mg/L	0.05	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toluene	mg/L	1.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toxaphene	mg/L	0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1,2-Trichloroethane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2,4-Trichlorobenzene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichlorofluoromethane	mg/L	2.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl Chloride	mg/L	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Xylenes	mg/L	10.0	< 0.005	< 0.002	< 0.002	< 0.002	< 0.005	< 0.005	< 0.005	< 0.005

Notes:
mg/L Milligrams per Liter.
< ND - Not detected at the Reporting Limit.
J Analyte detected below Reporting Limit.
-- No Class I Groundwater Quality Standard for the listed constituent in IAC 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).
Section 620.410, Chapter I, Subtitle F, Title 35.
---- Not sampled or insufficient groundwater for sampling and analysis.

* PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.

Appendix G3: Organic Parameter Groundwater Quality Results June 2013 -
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 27				Well 30			
			6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/26/2013	9/3/2013	12/10/2013	3/25/2014
Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acetone	mg/L	6.3	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Alachlor	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldicarb	mg/L	0.003	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Anthracene	mg/L	2.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Atrazine	mg/L	0.003	0.0005	0.0001	0.00011	0.00008 J	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzene	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Benzo(a)anthracene	mg/L	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(b)fluoranthene	mg/L	0.00018	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(k)fluoroanthene	mg/L	0.00017	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(a)pyrene	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzoic Acid	mg/L	28.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2-Butanone (MEK)	mg/L	4.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbofuran	mg/L	0.04	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Carbon Disulfide	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Carbon Tetrachloride	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlordane	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chloroform	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chrysene	mg/L	0.012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dalapon	mg/L	0.2	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013
Dibenzo(a,h)anthracene	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dicamba	mg/L	0.21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichlorodifluoromethane	mg/L	1.4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dichloromethane (Methylene Chloride)	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Di [bis](2-ethylhexyl)phthalate	mg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Diethyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Di-n-butyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dinoseb	mg/L	0.007	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endothall	mg/L	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Ethylene Dibromide [EDB] (1,2-Dibromoethane)	mg/L	0.00005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluoranthene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluorene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L	0.004	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor Epoxide	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorocyclopentadiene	mg/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	mg/L	0.00043	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Isopropylbenzene (Cumene)	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lindane (Gamma-Hexachlorocyclohexane)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
2,4-D	mg/L	0.07	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ortho-Dichlorobenzene	mg/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
para-Dichlorobenzene	mg/L	0.075	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dibromo-3-Chloropropane (DBCP)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,1-Dichloroethane	mg/L	1.4	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1-Dichloroethylene	mg/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
cis-1,2-Dichloroethylene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
trans-1,2-Dichloroethylene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloropropane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MCCP (Mecoprop)	mg/L	0.007	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	mg/L	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylnaphthalene	mg/L	0.028	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol (o-cresol)	mg/L	0.35	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MTBE (methyl tert-butyl ether)	mg/L	0.07	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene Chloride	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Monochlorobenzene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Naphthalene	mg/L	0.14	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
P-Dioxane (1,4-Dioxane)	mg/L	0.0077	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pentachlorophenol	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Phenol	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Picloram	mg/L	0.5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pyrene	mg/L	0.21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
PCBs*	mg/L	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
alpha-BHC (alpha-Benzene-hexachloride)	mg/L	0.00011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
gamma-BHC	mg/L	--	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Simazine	mg/L	0.004	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Styrene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	mg/L	0.05	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toluene	mg/L	1.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toxaphene	mg/L	0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1,2-Trichloroethane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2,4-Trichlorobenzene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichlorofluoromethane	mg/L	2.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl Chloride	mg/L	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Xylenes	mg/L	10.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Notes:
mg/L Milligrams per Liter.
< ND - Not detected at the Reporting Limit.
J Analyte detected below Reporting Limit.
-- No Class I Groundwater Quality Standard for the listed constituent in IAC 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).
Section 620.410, Chapter I, Subtitle F, Title 35.
---- Not sampled or insufficient groundwater for sampling and analysis.

* PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.

Appendix G3: Organic Parameter Groundwater Quality Results June 2013 -
 Hydrogeologic Site Characterization Report
 West Ash Pond System, Hennepin Power Station

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 31				Well 32			
			6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/26/2013	9/3/2013	12/10/2013	3/25/2014
Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acetone	mg/L	6.3	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.007 J	< 0.025	< 0.025
Alachlor	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Aldicarb	mg/L	0.003	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Anthracene	mg/L	2.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Atrazine	mg/L	0.003	0.0002	< 0.0001	0.0001	< 0.0001	0.0001 J	< 0.0001	0.0006 J	< 0.0001
Benzene	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Benzo(a)anthracene	mg/L	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.025	< 0.025
Benzo(b)fluoranthene	mg/L	0.00018	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benzo(k)fluoroanthene	mg/L	0.00017	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0004	< 0.0004
Benzo(a)pyrene	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.01	< 0.01
Benzoic Acid	mg/L	28.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.0001	< 0.0001
2-Butanone (MEK)	mg/L	4.2	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Carbofuran	mg/L	0.04	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Carbon Disulfide	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Carbon Tetrachloride	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chlordane	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chloroform	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Chrysene	mg/L	0.012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dalapon	mg/L	0.2	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013	< 0.0013
Dibenzo(a,h)anthracene	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dicamba	mg/L	0.21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichlorodifluoromethane	mg/L	1.4	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dichloromethane (Methylene Chloride)	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Di [bis](2-ethylhexyl)phthalate	mg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
Diethyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Di-n-butyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dinoseb	mg/L	0.007	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Endothall	mg/L	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Ethylene Dibromide [EDB] (1,2-Dibromoethane)	mg/L	0.00005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluoranthene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fluorene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L	0.004	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Heptachlor Epoxide	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Hexachlorocyclopentadiene	mg/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	mg/L	0.00043	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Isopropylbenzene (Cumene)	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lindane (Gamma-Hexachlorocyclohexane)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
2,4-D	mg/L	0.07	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ortho-Dichlorobenzene	mg/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
para-Dichlorobenzene	mg/L	0.075	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dibromo-3-Chloropropane (DBCP)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
1,1-Dichloroethane	mg/L	1.4	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1-Dichloroethylene	mg/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
cis-1,2-Dichloroethylene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
trans-1,2-Dichloroethylene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloropropane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MCCP (Mecoprop)	mg/L	0.007	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	mg/L	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylnaphthalene	mg/L	0.028	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol (o-cresol)	mg/L	0.35	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
MTBE (methyl tert-butyl ether)	mg/L	0.07	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Methylene Chloride	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Monochlorobenzene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Naphthalene	mg/L	0.14	0.00011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00013	< 0.0001
P-Dioxane (1,4-Dioxane)	mg/L	0.0077	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	.00068 J
Pentachlorophenol	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Phenol	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Picloram	mg/L	0.5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pyrene	mg/L	0.21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
PCBs*	mg/L	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
alpha-BHC (alpha-Benzene-hexachloride)	mg/L	0.00011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
gamma-BHC	mg/L	--	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Simazine	mg/L	0.004	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Styrene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	mg/L	0.05	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toluene	mg/L	1.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Toxaphene	mg/L	0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,1,2-Trichloroethane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2,4-Trichlorobenzene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Trichlorofluoromethane	mg/L	2.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl Chloride	mg/L	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Xylenes	mg/L	10.0	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Notes:

- mg/L Milligrams per Liter.
- < ND - Not detected at the Reporting Limit.
- J Analyte detected below Reporting Limit.
- No Class I Groundwater Quality Standard for the listed constituent in IAC 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).
Section 620.410, Chapter I, Subtitle F, Title 35.
- Not sampled or insufficient groundwater for sampling and analysis.
- * PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.

**Appendix G3: Organic Parameter Groundwater Quality Results June 2013 -
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station**

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 33				Well 34			
			6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/7/13; 6/26/13	9/4/2013	12/10/2013	3/25/2014
Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Acetone	mg/L	6.3	< 0.025	0.007 J	< 0.025	< 0.025	----	0.007 J	< 0.025	< 0.025
Alachlor	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Aldicarb	mg/L	0.003	< 0.0004	< 0.0004	< 0.0004	< 0.0004	----	< 0.0004	< 0.0004	< 0.0004
Anthracene	mg/L	2.1	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Atrazine	mg/L	0.003	< 0.0001	0.0002	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Benzene	mg/L	0.005	< 0.002	< 0.002	< 0.002	< 0.002	----	< 0.002	< 0.002	< 0.002
Benzo(a)anthracene	mg/L	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Benzo(b)fluoranthene	mg/L	0.00018	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Benzo(k)fluoranthene	mg/L	0.00017	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Benzo(a)pyrene	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Benzoic Acid	mg/L	28.0	< 0.05	< 0.05	< 0.05	< 0.05	----	< 0.05	< 0.05	< 0.05
2-Butanone (MEK)	mg/L	4.2	< 0.025	< 0.025	< 0.025	< 0.025	----	< 0.025	< 0.025	< 0.025
Carbofuran	mg/L	0.04	< 0.0006	< 0.0006	< 0.0006	< 0.0006	----	< 0.0006	< 0.0006	< 0.0006
Carbon Disulfide	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Carbon Tetrachloride	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Chlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Chlordane	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Chloroform	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Chrysene	mg/L	0.012	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Dalapon	mg/L	0.2	< 0.0013	< 0.0013	< 0.0013	< 0.0013	----	< 0.0013	< 0.0013	< 0.0013
Dibenzo(a,h)anthracene	mg/L	0.0003	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Dicamba	mg/L	0.21	< 0.0002	< 0.0002	< 0.0002	< 0.0002	----	< 0.0002	< 0.0002	< 0.0002
Dichlorodifluoromethane	mg/L	1.4	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Dichloromethane (Methylene Chloride)	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Di [bis](2-ethylhexyl)phthalate	mg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	----	< 0.006	< 0.006	< 0.006
Diethyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Di-n-butyl phthalate	mg/L	--	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Dinoseb	mg/L	0.007	< 0.0002	< 0.0002	< 0.0002	< 0.0002	----	< 0.0002	< 0.0002	< 0.0002
Endothall	mg/L	0.1	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Endrin	mg/L	0.002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Ethylene Dibromide [EDB] (1,2-Dibromoethane)	mg/L	0.00005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Fluoranthene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Fluorene	mg/L	0.28	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Heptachlor	mg/L	0.004	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Heptachlor Epoxide	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Hexachlorocyclopentadiene	mg/L	0.1	< 0.02	< 0.02	< 0.02	< 0.02	----	< 0.02	< 0.02	< 0.02
Indeno(1,2,3-cd)pyrene	mg/L	0.00043	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Isopropylbenzene (Cumene)	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Lindane (Gamma-Hexachlorocyclohexane)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
2,4-D	mg/L	0.07	< 0.0002	< 0.0002	< 0.0002	0.000207	----	< 0.0002	< 0.0002	< 0.0002
ortho-Dichlorobenzene	mg/L	0.6	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
para-Dichlorobenzene	mg/L	0.075	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,2-Dibromo-3-Chloropropane (DBCP)	mg/L	0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
1,1-Dichloroethane	mg/L	1.4	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,1-Dichloroethylene	mg/L	0.007	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
cis-1,2-Dichloroethylene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
trans-1,2-Dichloroethylene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,2-Dichloropropane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Ethylbenzene	mg/L	0.7	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
MCCPP (Mecoprop)	mg/L	0.007	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
Methoxychlor	mg/L	0.04	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
2-Methylnaphthalene	mg/L	0.028	< 0.01	< 0.01	< 0.01	< 0.01	----	< 0.01	< 0.01	< 0.01
2-Methylphenol (o-cresol)	mg/L	0.35	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
MTBE (methyl tert-butyl ether)	mg/L	0.07	< 0.002	< 0.002	< 0.002	< 0.002	----	< 0.002	< 0.002	< 0.002
Methylene Chloride	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Monochlorobenzene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Naphthalene	mg/L	0.14	0.00011	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
P-Dioxane (1,4-Dioxane)	mg/L	0.0077	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	0.00076 J
Pentachlorophenol	mg/L	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Phenol	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Picloram	mg/L	0.5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	----	< 0.0002	< 0.0002	< 0.0002
Pyrene	mg/L	0.21	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
PCBs*	mg/L	0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	----	< 0.0005	< 0.0005	< 0.0005
alpha-BHC (alpha-Benzene-hexachloride)	mg/L	0.00011	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
gamma-BHC	mg/L	--	< 0.0001	< 0.0001	< 0.0001	< 0.0001	----	< 0.0001	< 0.0001	< 0.0001
Simazine	mg/L	0.004	< 0.0006	< 0.0006	< 0.0006	< 0.0006	----	< 0.0006	< 0.0006	< 0.0006
Styrene	mg/L	0.1	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	mg/L	0.05	< 0.0002	< 0.0002	< 0.0002	< 0.0002	----	< 0.0002	< 0.0002	< 0.0002
Tetrachloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Toluene	mg/L	1.0	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Toxaphene	mg/L	0.003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	----	< 0.0005	< 0.0005	< 0.0005
1,1,1-Trichloroethane	mg/L	0.2	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,1,2-Trichloroethane	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,2,4-Trichlorobenzene	mg/L	0.07	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,2-Dichlorobenzene	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	mg/L	--	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Trichloroethylene	mg/L	0.005	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Trichlorofluoromethane	mg/L	2.1	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005
Vinyl Chloride	mg/L	0.002	< 0.002	< 0.002	< 0.002	< 0.002	----	< 0.002	< 0.002	< 0.002
Xylenes	mg/L	10.0	< 0.005	< 0.005	< 0.005	< 0.005	----	< 0.005	< 0.005	< 0.005

Notes:
mg/L Milligrams per Liter. * PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.
< ND - Not detected at the Reporting Limit.
J Analyte detected below Reporting Limit.
-- No Class I Groundwater Quality Standard for the listed constituent in IAC 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).
Section 620.410, Chapter I, Subtitle F, Title 35.
---- Not sampled or insufficient groundwater for sampling and analysis.

OBG

THERE'S A WAY



ATTACHMENT I

Dynegy Midwest Generation, LLC
13498 East 800th Street
Hennepin, IL 61327

Groundwater Monitoring Plan Addendum for the West Ash Pond System
Hennepin Power Plant, Hennepin, IL

Ramboll Americas Engineering Solutions, Inc. (Ramboll) is providing the attached Addendum to the Groundwater Monitoring Plan (GMP) for inclusion in the Operating Permit Applications as required under Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.230 and allowed under 35 I.A.C. § 845.210(d)(1). The GMP was previously submitted to and approved by the Illinois Environmental Protection Agency (IEPA) as part of the *Closure and Post-Closure Care Plan, Old West Ash Pond, Old West Polishing Pond* (Closure Plan; Geosyntec Consultants, Inc. [Geosyntec], 2017) submitted for the Hennepin Power Plant (HPP) West Ash Pond System (WAPS; Vistra Identification [ID] Number [No.] 804; and National Inventory of Dams No. IL50698). The WAPS is comprised of the following two CCR units identified by IEPA:

- Old West Ash Pond (Pond No. 1 and Pond No. 3) (OWAP; IEPA ID No. W1550100002-01)
- Old West Polishing Pond (OWPP; IEPA ID No. W1550100002-03)

This Addendum to the HPP WAPS GMP (Attachment 1), modifies the existing monitoring program and network to align with Part 845. Upon issuance of the Operating Permit, groundwater monitoring will be performed as specified in the Addendum.

BACKGROUND

Geosyntec submitted the Closure Plan for the WAPS on December 20, 2017. Included in Appendix A of that report was a Hydrogeologic Site Characterization Report. IEPA provided comments on the Closure Plan in a letter dated May 2, 2018. A response to comment letter submitted by Dynegy Midwest Generation, LLC (DMG) dated May 31, 2018 included *Groundwater Monitoring Plan Revision 1* (Attachment 2), which defined groundwater monitoring for the WAPS following approval of the Closure Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2018). The Closure Plan was approved by IEPA in a letter dated June 19, 2018. Closure of the WAPS was completed on November 17, 2020.

On April 21, 2021 Part 845 became effective, and 35 I.A.C. § 845.100(i) provides the following with respect to certain CCR units closed prior to the effective date:

i) If a CCR surface impoundment has completed an Agency-approved closure before April 21, 2021, this Part does not require the owner or

October 25, 2021

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
www.ramboll.com

Ref. 1940100806-005

operator of the CCR surface impoundment to resubmit to the Agency any closure plan, closure report, or closure certification for that completed closure.

SUBMITTALS

The attached documents are being provided to address requirements of 35 I.A.C. § 845.230 as follows:

- Addendum to the HPP WAPS GMP (new submittal, Attachment 1). This Addendum includes revisions to the monitoring well network, analytical parameters, and statistical procedures included in the previously submitted Groundwater Monitoring Plan (NRT/OBG, 2018). These modifications are proposed to meet and fulfill the requirements in 35 I.A.C. § 845.630 and 35 I.A.C. § 845.640 (Groundwater Monitoring Systems and Statistical Procedures); and 35 I.A.C. § 845.650(b) (background samples). The proposed modifications were identified and developed using existing and previously approved documents, but additional information has been provided where necessary.
- Groundwater Monitoring Plan Revision 1, dated May 31, 2018. This attachment provides a copy of the existing groundwater monitoring plan as it was approved by IEPA.

Sincerely,



Eric Tlachac, PE
Senior Managing Engineer

D +1 414 837 3541
M +1 262 719 4526
eric.tlachac@ramboll.com



Brian G. Hennings, PG
Senior Managing Hydrogeologist

D +1 414 837 3524
M +1 262 719 4512
brian.hennings@ramboll.com

ATTACHMENTS

- Attachment 1 Addendum to the Groundwater Monitoring Plan
Attachment 2 Groundwater Monitoring Plan Revision 1, dated May 31, 2018

ATTACHMENT 1
ADDENDUM TO THE GROUNDWATER MONITORING PLAN

Intended for
Dynegy Midwest Generation, LLC

Date
October 25, 2021

Project No.
1940100806-005

ADDENDUM TO THE GROUNDWATER MONITORING PLAN

**WEST ASH POND SYSTEM
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS**

ADDENDUM TO THE GROUNDWATER MONITORING PLAN HENNEPIN POWER PLANT WEST ASH POND SYSTEM

Project Name **Hennepin Power Plant West Ash Pond System**
Project No. **1940100806-005**
Recipient **Dynegy Midwest Generation, LLC**
Document Type **Addendum to the Groundwater Monitoring Plan**
Revision **FINAL**
Date **October 25, 2021**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA


T 414-837-3607
F 414-837-3608
<https://ramboll.com>




Brian G. Hennings, PG
Senior Managing Hydrogeologist



Eric J. Tlachac, PE
Senior Managing Engineer



Nathaniel R. Keller
Senior Hydrogeologist

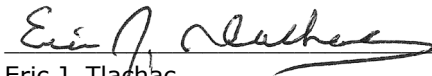


Chase J. Christenson, PG
Hydrogeologist

LICENSED PROFESSIONAL CERTIFICATIONS

35 I.A.C. § 845.630 Groundwater Monitoring Systems (PE)

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the groundwater monitoring system described in this document (Addendum to the Groundwater Monitoring Plan, Hennepin Power Plant, West Ash Pond System), meets the intent of 35 I.A.C. § 845.630. The monitoring system was developed based on information included in the IEPA approved Hydrogeologic Site Characterization Report submitted with the IEPA approved Closure and Post Closure Care Plan.



Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Date: October 25, 2021



35 I.A.C. § 845.630 Groundwater Monitoring Systems (PG)

I, Brian G. Hennings, a qualified professional geologist in good standing in the State of Illinois, certify that the groundwater monitoring system described in this document (Addendum to the Groundwater Monitoring Plan, Hennepin Power Plant, West Ash Pond System), meets the intent of 35 I.A.C. § 845.630. The monitoring system was developed based on information included in the IEPA approved Hydrogeologic Site Characterization Report submitted with the IEPA approved Closure and Post Closure Care Plan.



Brian G. Hennings
Professional Geologist
196.001482
Illinois
Date: October 25, 2021



CONTENTS

Licensed Professional Certifications	2
1. Introduction	6
1.1 Overview	6
1.2 Purpose and Scope	6
2. Groundwater Monitoring Systems	8
2.1 IEPA Closure Plan Monitoring Program	8
2.2 IEPA Water Pollution Control Permit Monitoring Program	9
2.3 40 C.F.R. § 257 Monitoring Program	9
2.4 Proposed Part 845 Monitoring Well Network	10
2.5 Well Abandonment	11
3. Applicable Groundwater Quality Standards	12
3.1 Groundwater Classification	12
3.2 Statistical Evaluation of Background Groundwater Data	12
3.3 Applicable Groundwater Quality Standards	12
4. Groundwater Monitoring Plan	14
4.1 Monitoring Networks and Parameters	14
4.1.1 IEPA Closure Plan Monitoring	14
4.1.2 Water Pollution Control Permit Monitoring	14
4.1.3 40 C.F.R. § 257 Monitoring	14
4.1.4 Part 845 Groundwater Monitoring	14
4.2 Sampling Schedule	15
4.3 Groundwater Sample Collection	16
4.4 Laboratory Analysis	16
4.5 Quality Assurance Program	17
4.6 Groundwater Monitoring System Maintenance Plan	17
4.7 Statistical Analysis	18
4.8 Data Reporting	18
4.9 Compliance with Applicable On-site Groundwater Quality Standards	18
4.10 Alternate Source Demonstrations	19
5. References	20

TABLES (IN TEXT)

Table A	IEPA Closure Plan Groundwater Monitoring Program Parameters
Table B	IEPA Water Pollution Control Permit Monitoring Program Parameters
Table C	40 C.F.R. § 257 Groundwater Monitoring Program Parameters
Table D	Proposed Part 845 Monitoring Well Network
Table E	Part 845 Groundwater Monitoring Program Parameters
Table F	Part 845 Sampling Schedule

TABLES (ATTACHED)

Table 2-1	Monitoring Well Locations and Construction Details
Table 3-1	Background Groundwater Quality and Standards
Table 4-1	Sampling and Analysis Summary
Table 4-2	Detection and Reporting Limits for Part 845 Parameters

FIGURES (ATTACHED)

Figure 1-1	Site Location Map
Figure 1-2	Site Map
Figure 2-1	Proposed Part 845 Groundwater Monitoring Well Network

APPENDICES

Appendix A	Statistical Analysis Plan
------------	---------------------------

ACRONYMS AND ABBREVIATIONS

§	Section
35 I.A.C.	Title 35 of the Illinois Administrative Code
77 I.A.C.	Title 77 of the Illinois Administrative Code
40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
bgs	below ground surface
CCR	coal combustion residuals
Closure Plan	<i>Closure and Post-Closure Care Plan, Old West Ash Pond, Old West Polishing Pond at DMG, Hennepin Power Station</i>
cm/s	centimeters per second
DMG	Dynegy Midwest Generation, LLC
Geosyntec	Geosyntec Consultants, Inc.
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HPP	Hennepin Power Plant
ID	identification
IEPA	Illinois Environmental Protection Agency
NID	National Inventory of Dams
No.	number
NRT	Natural Resource Technology, Inc.
NRT/OBG	Natural Resource Technology, an OBG Company
OWAP	Old West Ash Pond
OWPP	Old West Polishing Pond
Part 845	Residuals in Surface Impoundments: Title 35 of the Illinois Administrative Code § 845
QA/QC	quality assurance/quality control
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RL	reporting limit
SI	surface impoundment
TDS	total dissolved solids
UA	uppermost aquifer
USEPA	United States Environmental Protection Agency
WAPS	West Ash Pond System

1. INTRODUCTION

1.1 Overview

In accordance with requirements of the Standards for the Disposal of Coal Combustion Residuals (CCR) in Surface Impoundments (SIs): Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845 (Part 845) (Illinois Environmental Protection Agency [IEPA], April 15 2021), Ramboll Americas Engineering Solutions, Inc. (Ramboll) has prepared this Addendum to the Groundwater Monitoring Plan (GMP) on behalf of Hennepin Power Plant (HPP) (**Figure 1-1**), operated by Dynegy Midwest Generation, LLC (DMG). This Addendum applies specifically to the CCR Multi-Unit referred to as the West Ash Pond System (WAPS; Vistra identification [ID] number [No.] 804, and National Inventory of Dams [NID] No. IL50698). The WAPS CCR Multi-Unit includes the Old West Ash Pond (Pond No. 1 and Pond No. 3) (OWAP; IEPA ID No. W1550100002-01), and Old West Polishing Pond (OWPP; IEPA ID No. W1550100002-03) (**Figure 1-2**). The WAPS is a closed, unlined CCR SI that was previously used to manage CCR and non-CCR waste streams at the HPP.

Geosyntec Consultants, Inc., (Geosyntec) submitted the *Closure and Post-Closure Care Plan, Old West Ash Pond, Old West Polishing Pond at DMG, Hennepin Power Station* (Closure Plan) dated December 20, 2017, which was approved by IEPA on June 19, 2018. Groundwater Monitoring Plan Revision 1 (Natural Resource Technology, an OBG Company [NRT/OBG], 2018) defined groundwater monitoring for the WAPS following approval of the Closure Plan. Closure of the WAPS was completed on November 17, 2020.

On April 21, 2021, Part 845 became effective, and for CCR units closed prior to the effective date the following section was included (35 I.A.C. § 845.100(i)):

If a CCR surface impoundment has completed an Agency-approved closure before April 21, 2021, this Part does not require the owner or operator of the CCR surface impoundment to resubmit to the Agency any closure plan, closure report, or closure certification for that completed closure.

This Addendum includes modifications to the previously approved GMP to provide content required by 35 I.A.C. § 845.630 (Groundwater Monitoring System), 35 I.A.C. 845.640 (Groundwater Sampling and Analysis), and 35 I.A.C. 845.650 (Groundwater Monitoring Program) for the WAPS. Specifically, this Addendum incorporates additional monitoring wells and monitoring parameters specified in 35 I.A.C. § 845.600.

1.2 Purpose and Scope

The purpose of this Addendum is to provide updated GMP text, tables, and figures to incorporate modifications made to the existing monitoring program to comply with Part 845. Following issuance of the Part 845 Operating Permit, the application for which this Addendum is attached, groundwater monitoring at the WAPS will include the following:

- Monitoring required by Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257 Subpart D (pre-existing with no modifications)
- Part 845 Monitoring (proposed)

Details of the monitoring programs (schedules and parameters), monitoring well networks, and analysis (statistical methods) are included in this Addendum. No changes are proposed to the

monitoring networks utilized for the current 40 C.F.R. § 257 Subpart D monitoring; however, those details have been included for completeness. Additional information regarding the hydrogeology and groundwater quality were included with the Closure Plan and are not reproduced in this Addendum.

2. GROUNDWATER MONITORING SYSTEMS

The Part 845 groundwater monitoring network for the WAPS was developed to monitor post-closure groundwater quality and trends and demonstrate compliance with the applicable groundwater quality standards identified in **Section 3**. The existing and proposed groundwater monitoring well networks consist of a sufficient number of wells, installed at appropriate locations and depths, to monitor post-closure compliance with groundwater quality standards for 40 C.F.R. § 257 and 35 I.A.C. § 845.600.

The monitoring wells are designed and constructed in a manner consistent with the standards of 40 C.F.R. § 257 and Title 77 of the Illinois Administrative Code (77 I.A.C.) § 920.170, as required by 35 I.A.C. § 845.630(e), including the following:

- All monitoring wells are cased in a manner that maintains the integrity of the boreholes.
- Wells are screened to allow sampling only at the specified interval.
- All wells are covered with vented caps, unless located in flood-prone areas, and equipped with devices to protect against tampering and damage.

Consistent with applicable standards, the monitoring well networks described below fulfill the following goals:

- Enable the collection of groundwater samples that represent the quality of background water that has not been affected by the WAPS.
- Enable the collection of groundwater samples that represent the quality of downgradient groundwater.
- Include wells that are located within the stratigraphic unit(s) that may serve as potential chemical migration pathways.

Groundwater monitoring at the WAPS is currently being performed in accordance with the GMP that was approved in the Closure Plan and with Special Condition No. 4 of IEPA Water Pollution Control Permit 2020-EB-65026-1. The Closure Plan specified one monitoring network, that complies with both the IEPA Closure Plan monitoring requirements and the 40 C.F.R. § 257 monitoring requirements. This Addendum proposes additions to that network which were developed to comply with the requirements of Part 845. It is anticipated that upon acceptance and approval of the Operating Permit applications (and by extension the GMPs) for the HPP and upon acceptance and approval of Part 845 by the United States Environmental Protection Agency (USEPA) as a State CCR Permit Program, the Part 845 monitoring program will supersede the Closure Plan, IEPA Water Pollution Control Permit, and 40 C.F.R. § 257 monitoring program.

2.1 IEPA Closure Plan Monitoring Program

The IEPA Closure Plan monitoring well network consists of nine groundwater monitoring wells used to monitor the uppermost aquifer, including two background wells (32 and 34) and seven compliance wells (21R, 22, 23, 27, 35, 49, and 51). During remedial construction wells 21 and 24 identified in the approved GMP were abandoned and replaced with wells 21R and 51, respectively.

The GMP established a monitoring program that meets the requirements of 35 I.A.C. § 620.410 and groundwater samples are collected quarterly and analyzed for the parameters listed in **Table A** below.

Table A. IEPA Closure Plan Groundwater Monitoring Program Parameters

Field Parameters		
pH	Temperature	Turbidity
Dissolved Oxygen	Oxidation/Reduction Potential	Specific Conductance
Inorganics (total)		
Fluoride	Chloride	Sulfate
Total Dissolved Solids (TDS)		
Other (total)		
Radium 226 and 228 combined		
Metals (total)		
Antimony	Cadmium	Lithium
Arsenic	Calcium	Mercury
Barium	Chromium	Molybdenum
Beryllium	Cobalt	Selenium
Boron	Lead	Thallium

2.2 IEPA Water Pollution Control Permit Monitoring Program

The IEPA Water Pollution Control Permit monitoring network consists of eleven groundwater monitoring wells used to monitor the uppermost aquifer, including three background wells (27, 32, and 34) and eight compliance wells (21R, 22, 22D, 23, 35, 49, 50, and 51).

The compliance wells and background wells are sampled quarterly for the laboratory and field parameters as required by Special Condition No. 4 of IEPA Water Pollution Control Permit 2020-EB-65026-1 listed below in **Table B**. Results are submitted to IEPA within 60 days of each quarterly sampling event as required by the Water Pollution Control Permit.

Table B. IEPA Water Pollution Control Permit Monitoring Program Parameters

Field Parameters		
pH	Specific Conductance	Temperature
Laboratory Parameters		
Boron (dissolved)	Chloride (dissolved)	

2.3 40 C.F.R. § 257 Monitoring Program

The 40 C.F.R. § 257 monitoring well network consists of eight of the same groundwater monitoring wells used to monitor the uppermost aquifer, including two background wells (32 and 34), and six compliance wells (21R, 22, 23, 35, 49, and 51). This monitoring network also includes, two monitoring wells (22D and 50) installed to delineate groundwater impacts as required by 40 C.F.R. § 257.95(g)(1).

Assessment monitoring in accordance with 40 C.F.R. § 257.95 was initiated on April 9, 2018. Details on the procedures and techniques used to fulfill the groundwater sampling and analysis program requirements are found in the Sampling and Analysis Plan for AP2 (Natural Resource Technology, Inc. [NRT], 2017).

Groundwater samples are collected semi-annually and analyzed for the following laboratory and field parameters from Appendix III and IV of 40 C.F.R. § 257, summarized in **Table C** below.

Table C. 40 C.F.R. § 257 Groundwater Monitoring Program Parameters

Field Parameters¹			
Groundwater Elevation	pH		
Appendix III Parameters (Total, except TDS)			
Boron	Chloride	Sulfate	
Calcium	Fluoride	TDS	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lithium	Selenium
Arsenic	Chromium	Mercury	Thallium
Barium	Cobalt	Molybdenum	Radium 226 and 228 combined
Beryllium	Lead		

¹Dissolved oxygen, temperature, specific conductance, oxidation/reduction potential, and turbidity are recorded during sample collection.

Results and analysis of groundwater sampling are reported annually by January 31 of the following year and made available on the CCR public website as required by 40 C.F.R. § 257.

2.4 Proposed Part 845 Monitoring Well Network

The groundwater monitoring network proposed in this plan will include 11 wells screened in the uppermost aquifer (21R, 22, 22D, 23, 27, 32, 34, 35, 49, 50, and 51). The proposed network is summarized in **Table D** below and displayed on **Figure 2-1**. Eleven wells (two background and nine compliance) will be used to monitor groundwater concentrations within the uppermost aquifer.

The groundwater samples collected from the 11 wells will be used to monitor and evaluate groundwater quality and demonstrate compliance with the groundwater quality standards listed in 35 I.A.C. § 845.600(a). The proposed monitoring wells will yield groundwater samples that represent the quality of downgradient groundwater at the CCR boundary (as required in 35 I.A.C. § 845.630(a)(2)). Monitoring well depths and construction details are listed in **Table 2-1** and summarized in **Table D** below.

Table D. Proposed Part 845 Monitoring Well Network

Well ID	Monitored Unit	Well Screen Interval (feet bgs)	Well Type¹
21R	UA	37.6 – 47.6	Compliance
22	UA	24.4 – 34.4	Compliance
22D	UA	49.7 – 59.7	Compliance
23	UA	34.0 – 44.0	Compliance
27	UA	30.0 – 35.0	Compliance
32	UA	7.0 – 17.0	Background
34	UA	30.0 – 35.0	Background
35	UA	8.0 – 18.0	Compliance
49	UA	35.0 – 45.0	Compliance
50	UA	19.6 – 29.6	Compliance
51	UA	56.0 – 66.0	Compliance

¹ Well Type refers to the role of the well in the monitoring network.

bgs = below ground surface

UA = uppermost aquifer

2.5 Well Abandonment

No wells are currently proposed for abandonment.

3. APPLICABLE GROUNDWATER QUALITY STANDARDS

3.1 Groundwater Classification

The 35 I.A.C. § 620 groundwater classification at the WAPS was presented in the GMP (NRT/OBG, 2018) and is summarized here. Groundwater at the WAPS meets the definition of Class I – Potable Resource Groundwater (35 I.A.C. § 620.210) based on the following criteria:

- Field hydraulic conductivity tests performed on the outwash sand underlying the mixed alluvial deposits (clay, silt, and sand) report a geometric mean hydraulic conductivity of approximately 6.0×10^{-3} centimeters per second (cm/s).
- The thickness of the uppermost aquifer is greater than five feet.

3.2 Statistical Evaluation of Background Groundwater Data

A Statistical Analysis Plan (**Appendix A**) has been developed to describe procedures that will be used to establish background conditions and implement compliance monitoring as necessary and required by 35 I.A.C. § 845.640 and 35 I.A.C. § 845.650. The Statistical Analysis Plan was prepared in accordance with the requirements of 35 I.A.C. § 845.640(f), with reference to the acceptable statistical procedures provided in USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (Unified Guidance, March 2009)*, and is intended to provide a logical process and framework for conducting the statistical analysis of the data obtained during groundwater monitoring.

In accordance with 35 I.A.C. § 845.640(f)(1), the statistical method chosen for analysis of background groundwater quality was either the tolerance interval or the prediction interval procedure for each constituent listed in 35 I.A.C. § 845.600(a)(1) at this CCR unit per 35 I.A.C. § 845.640(f)(1)(C). A comparison of the statistical background concentrations and groundwater quality standards listed in 35 I.A.C. § 845.600(a)(1) and the resulting groundwater protection standards (GWPSs) are summarized in **Table 3-1**.

3.3 Applicable Groundwater Quality Standards

The applicable GWPS will be established in accordance with 35 I.A.C. § 845.600(a) (greater of the background concentration or numerical limit specified in 35 I.A.C. § 845.600(a)(1)). The results of the statistical analysis of background groundwater data (**Table 3-1**) indicate that background concentrations in the uppermost aquifer are less than the groundwater quality standards listed in 35 I.A.C. § 845.600(a)(1). Therefore, for these parameters, the groundwater quality standards listed in 35 I.A.C. § 845.600(a)(1) will be applied to the results from the proposed groundwater monitoring network.

Under most circumstances, the GWPS will be compared to the lower confidence limit for the observed concentrations for each constituent in each compliance well. Exceptions are when there are high percentages (greater than 50 percent) of non-detects in compliance well data, for which a future mean (for 50 to 70 percent non-detects) or median (for greater than 70 percent non-detects) will be compared to the GWPS. Consistent with the *Unified Guidance*, the same general statistical method of confidence interval testing against a fixed GWPS is recommended in compliance and corrective action programs. Confidence intervals provide a flexible and statistically accurate method to test how a parameter estimated from a single sample compares

to a fixed numerical limit. Confidence intervals explicitly account for variation and uncertainty in the sample data used to construct them.

Evaluation of the applicable standards will occur in conjunction with the analysis of groundwater quality results. Background calculations and the resulting concentrations may be updated as appropriate, in accordance with the Statistical Analysis Plan included in **Appendix A**.

4. GROUNDWATER MONITORING PLAN

The groundwater monitoring plan will monitor and evaluate groundwater quality to demonstrate compliance with the groundwater quality standards included in 40 C.F.R. § 257.94(e), 40 C.F.R. § 257.95(h), and 35 I.A.C. § 845.600. The groundwater monitoring program will include sampling and analysis procedures that are consistent and provide an accurate representation of groundwater quality at the background and compliance wells as required by 35 I.A.C. § 845.630. As discussed within **Section 2**, three monitoring programs specific to the WAPS exist, the Closure Plan monitoring program, the Water Pollution Control Permit monitoring program, and the 40 C.F.R. § 257 monitoring program. It is expected that upon acceptance and approval of the Operating Permit applications (and by extension the GMPs) for the HPP and upon acceptance and approval of Part 845 by the USEPA as a State CCR Permit Program, the proposed Part 845 monitoring program will supersede the Closure Plan, Water Pollution Control Permit, and 40 C.F.R. § 257 monitoring programs.

4.1 Monitoring Networks and Parameters

4.1.1 IEPA Closure Plan Monitoring

The existing Closure Plan monitoring program was discussed in detail in **Section 2.1**. Nine groundwater monitoring wells are used to monitor the uppermost aquifer, including two background wells (32 and 34) and seven compliance wells (21R, 22, 23, 27, 35, 49, and 51), and are sampled on a quarterly frequency for the parameters as listed in the GMP (NRT/OBG, 2018). Well locations and parameters will continue to be monitored and reported as required by the Closure Plan until IEPA approves the proposed Part 845 monitoring network.

4.1.2 Water Pollution Control Permit Monitoring

The existing Water Pollution Control Permit monitoring program was discussed in detail in **Section 2.2**. Eleven groundwater monitoring wells are used to monitor the uppermost aquifer, including three background wells (27, 32, and 34) and eight compliance wells (21R, 22, 22D, 23, 35, 49, 50, and 51), and are sampled on a quarterly frequency for the parameters listed in Special Condition No. 4 of IEPA Water Pollution Control Permit 2020-EB-65026-1. Well locations and parameters will continue to be monitored and reported until as required until IEPA approves an alternate schedule or removes Special Condition No. 4 from the Water Pollution Control Permit.

4.1.3 40 C.F.R. § 257 Monitoring

The existing 40 C.F.R. § 257 monitoring program was discussed in detail in **Section 2.3**. Ten groundwater monitoring wells, including two background wells (32 and 34), six compliance wells (21R, 22, 23, 35, 49, and 51), and two delineation wells (22D and 50) are sampled for Appendix III and Appendix IV parameters on a semi-annual frequency. Well locations and parameters will continue to be monitored and reported as required by 40 C.F.R. § 257 until USEPA approves Part 845.

4.1.4 Part 845 Groundwater Monitoring

The proposed Part 845 Monitoring Network will consist of 11 monitoring wells, two background monitoring wells (32 and 34) and nine compliance wells (21R, 22, 22D, 23, 27, 35, 49, 50, and 51) to monitor potential impacts from the WAPS (**Figure 2-1**). These monitoring wells are

screened within the uppermost aquifer along the perimeter of the WAPS. Groundwater samples will be collected and analyzed for the laboratory and field parameters summarized in **Table E** below.

Table E. Part 845 Groundwater Monitoring Program Parameters

Field Parameters¹			
Groundwater Elevation	pH	Turbidity	
Metals (Total)			
Antimony	Boron	Cobalt	Molybdenum
Arsenic	Cadmium	Lead	Selenium
Barium	Calcium	Lithium	Thallium
Beryllium	Chromium	Mercury	
Inorganics (Total)			
Fluoride	Sulfate	Chloride	TDS
Other (Total)			
Radium 226 and 228 combined			

¹ Dissolved oxygen, temperature, specific conductance, and oxidation/reduction potential will be recorded during sample collection.

4.2 Sampling Schedule

Groundwater sampling for the approved Closure Plan will be maintained until IEPA approval of the Part 845 GMP. Groundwater sampling for the Part 845 monitoring well network will initially be performed quarterly according to schedule below in **Table F**.

Table F. Part 845 Sampling Schedule

Frequency	Duration
Monthly (groundwater elevations only)	Begins: the quarter following approval of this plan and issuance of the Operating Permit. Ends: Following the 30-year post closure care period and following IEPA approval of documentation that groundwater concentrations are below standards in 35 I.A.C. § 845.600 and concentrations exceeding background are not increasing and meet requirements in 35 I.A.C. § 845.780 (c)(2)(B)(i) and (ii).
Quarterly (groundwater quality)	Begins: the quarter following approval of this plan and issuance of the Operating Permit. Ends: Following the 30-year post closure care period and following IEPA approval of documentation that groundwater concentrations are below standards in 35 I.A.C. § 845.600 and concentrations exceeding background are not increasing and meet requirements in 35 I.A.C. § 845.780 (c)(2)(B)(i) and (ii), or upon IEPA approval of an alternate schedule as allowed by 35 I.A.C. § 845.650(b)(4).
Semi-annual (groundwater quality)	Begins: Following 5 years of quarterly groundwater monitoring and IEPA approval of a demonstration that groundwater concentrations are below standards in 35 I.A.C. § 845.600 and not exhibiting statistically-significant increasing trends, monitoring effectiveness is not compromised by a semi-annual schedule, and sufficient data has been collected to characterize groundwater. Ends: Following detection of a statistically-significant increasing trend in groundwater concentrations or an exceedance of the standards in 35 I.A.C. § 845.600 (quarterly monitoring shall be resumed in these circumstances), or following the 30-year post closure care period and following IEPA approval of documentation that groundwater concentrations are below standards in 35 I.A.C. § 845.600 and concentrations exceeding background are not increasing and meet requirements in 35 I.A.C. § 845.780 (c)(2)(B)(i) and (ii).

Groundwater monitoring for the 40 C.F.R. § 257.94 well network will continue to follow a schedule in accordance with the requirements of 40 C.F.R. § 257.94 and 40 C.F.R. § 257.95. Upon USEPA approval of Part 845 as a State CCR Permit Program, the 40 C.F.R. § 257.94 monitoring will be discontinued, and replaced by the Part 845 monitoring.

4.3 Groundwater Sample Collection

Groundwater sampling procedures have been developed and the collection of groundwater samples is being implemented to meet the requirements of 35 I.A.C. § 845.640. In addition to groundwater well samples, quality assurance samples will be collected as described in **Section 4.5 (Table 4-1)**.

4.4 Laboratory Analysis

Laboratory analysis will be performed consistent with the requirements of 35 I.A.C. § 845.640(j) by a state-certified laboratory using methods approved by IEPA and USEPA. Laboratory methods may be modified based on laboratory equipment availability or procedures, but the Reporting Limit (RL) for all parameters analyzed, regardless of method, will be lower than the applicable groundwater quality standard. RLs for the applicable parameters are summarized in **Table 4-2**. Concentrations lower than the RL will be reported as less than the RL.

4.5 Quality Assurance Program

Consistent with the requirements of 35 I.A.C. § 845.640(a)(5), the sampling and analysis program includes procedures and techniques for quality assurance/quality control (QA/QC).

Additional quality assurance samples to be collected will include the following:

- Field duplicates will be collected at a frequency of one per group of ten or fewer investigative water samples.
- One equipment blank sample will be collected and analyzed for each day of sampling. If dedicated sampling equipment is used, then equipment blank samples will not be collected.

The duplicate and equipment blank quality assurance samples will be supplemented by the laboratory QA/QC program, which typically includes:

- Regular generation of instrument calibration curves to assure instrument reliability
- Laboratory control samples and/or quality control check standards that have been spiked, and analyses to monitor the performance of the analytical method
- Matrix spike/matrix spike duplicate analyses to determine percent recoveries and relative percent differences for each of the parameters detected
- Analysis of replicate samples to check the precision of the instrumentation and/or methodology employed for all analytical methods
- Analysis of method blanks to assure that the system is free of contamination

Water quality meters used to measure pH and turbidity will be calibrated according to manufacturer's specifications. At a minimum, it is recommended that calibration of pH occur daily prior to sampling and checked for accuracy at the end of each day. Unusual or suspect pH measurements during sampling events will be flagged, evaluated, and additional calibration may be performed throughout the sampling events. Turbidity meters will be checked daily, prior to and following sampling. Unusual measurements or erratic meter performance will be flagged and evaluated for overall effects on the data prior to reporting.

4.6 Groundwater Monitoring System Maintenance Plan

Consistent with the requirements of 35 I.A.C. § 845.630(e)(2), maintenance will be performed as needed to assure that the monitoring wells provide representative groundwater samples.

Monitoring wells will be inspected during each groundwater sampling event; inspections will consist of the following:

- Visual inspection, clearing of vegetation, replacement of markers, and painting of protective casings as needed to assure that monitoring wells are clearly marked and accessible.
- Visual inspection and repair or replacement of well aprons as needed to assure that they are intact, drain water away from the well, and have not heaved.
- Visual inspection and repair or replacement of protective casings as needed to assure that they are undamaged, and that locks are present and functional.
- Checks to assure that well caps are intact and vented, unless in flood-prone areas in which case caps will not be vented.

- Annual measurement of monitoring well depths to determine the degree of siltation within the wells. Wells will be redeveloped as needed to remove siltation from the screened interval if it impedes flow of water into the well.
- Checks to assure that wells are clear of internal obstructions, and flow freely.

If maintenance of a monitoring well cannot address an identified deficiency, a replacement well will be installed.

4.7 Statistical Analysis

Statistical analysis will be consistent with procedures listed in 35 I.A.C. § 845.640(f). A Statistical Analysis Plan, provided in **Appendix A**, has been developed to summarize the statistical procedures that will be used to evaluate the groundwater results.

4.8 Data Reporting

Data reporting for the 40 C.F.R. § 257 monitoring program will be consistent with recordkeeping, notification, and internet posting requirements described in 40 C.F.R. § 257.105 through 40 C.F.R. § 257.107.

Groundwater monitoring and analysis completed in accordance with the Part 845 monitoring under an approved monitoring program will be reported to IEPA within 60 days after completion of sampling and place the data in the facility's operating record as required by 35 I.A.C. § 845.610(b)(3)(D). Within 14 days of posting to the operating record, information will be posted to the publicly accessible internet site "Illinois CCR Rule Compliance Data and Information" as required by 35 I.A.C. § 845.810(d). Information will also be submitted to IEPA annually by January 31 as required by 35 I.A.C. § 845.550. The report will include the status of the groundwater monitoring and corrective action plan for the HPP WAPS in addition to other requirements detailed in 35 I.A.C. § 845.610(e).

4.9 Compliance with Applicable On-site Groundwater Quality Standards

In accordance with 35 I.A.C. § 845.600(a)(1), the groundwater protection standard at the waste boundary will be the higher of either the 35 I.A.C. § 845.600 standard or the concentration determined by background groundwater monitoring.

As provided in 35 I.A.C. § 845.780(c)(2), at the end of the 30-year post-closure care period, groundwater monitoring will continue to be conducted in post-closure care until the groundwater results show the concentrations are:

- Below the GWPS in 35 I.A.C. § 845.600; and
- Not increasing for those constituents over background, using the statistical procedures and performance standards in 35 I.A.C. § 845.640(f) and (g), provided that:
 - Concentrations have been reduced to the maximum extent feasible; and
 - Concentrations are protective of human health and the environment.

Following detection of an exceedance of the GWPS, an Alternate Source Demonstration (ASD) will be evaluated as described in **Section 4.10**.

4.10 Alternate Source Demonstrations

As allowed in 35 I.A.C. § 845.650(e), following detection of an exceedance of the GWPS, an ASD will be evaluated and, if completed, submitted to IEPA within 60 days. The ASD will provide lines of evidence that a source other than the WAPS caused the contamination and the WAPS did not contribute to the contamination, or that the exceedance of the GWPS resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction.

The ASD will include information and analysis that supports the conclusions and a certification of accuracy by a qualified professional engineer. Once the ASD is approved by IEPA, the Part 845 groundwater monitoring will continue as defined in **Section 4.1.3**.

If an ASD is not completed and submitted, or IEPA does not approve the ASD, a notification of the exceedance will be provided to IEPA and placed in the operating record. Additional actions will also be completed as required by 35 I.A.C § 845.650(d)(1) through (3), including initiation of an assessment of corrective measures under 35 I.A.C § 845.660. As allowed in 35 I.A.C § 845.650(e)(7), a petition for review of IEPA's non-concurrence under 35 I.A.C. § 105 may also be filed.

TABLES

TABLE 2-1. MONITORING WELL LOCATIONS AND CONSTRUCTION DETAILS

ADDENDUM TO THE GROUNDWATER MONITORING PLAN
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Well Number	Type	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft BGS)	Screen Bottom Depth (ft BGS)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft BGS)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
21R	C	UA	02/06/2020	452.05	452.05	Top of PVC	449.37	37.60	47.60	411.77	401.77	50.00	399.40	10	2	41.299866	-89.328914
22	C	UA	12/09/1982	464.45	464.45	Top of PVC	461.46	24.40	34.40	437.06	427.06	34.60	426.90	10	2	41.302032	-89.321512
22D	C	UA	08/07/2019	465.43	465.43	Top of PVC	461.83	49.70	59.70	412.16	402.16	59.67	401.80	10	2	41.302017	-89.321572
23	C	UA	12/10/1982	463.39	463.39	Top of PVC	460.88	34.00	44.00	426.88	416.88	45.20	415.70	10	2	41.300881	-89.325376
27	C	UA	09/11/1995	450.58	450.58	Top of PVC	448.21	30.00	35.00	418.21	413.21	36.30	412.00	5	2	41.296911	-89.328898
32	B	UA	08/21/1996	451.38	451.38	Top of PVC	448.75	7.00	17.00	441.75	431.75	17.30	431.40	10	2	41.292128	-89.328563
34	B	UA	08/22/1996	449.56	449.56	Top of PVC	448.23	30.00	35.00	418.23	413.23	35.00	413.20	5	2	41.299538	-89.33249
35	C	UA	09/08/1999	454.83	454.83	Top of PVC	451.51	8.00	18.00	443.51	433.51	17.60	433.90	10	2	41.29916	-89.324145
49	C	UA	07/06/2015	468.17	468.17	Top of PVC	465.76	35.00	45.00	430.76	420.76	45.00	420.80	10	2	41.301182	-89.32333
50	C	UA	08/07/2019	463.94	463.94	Top of PVC	460.59	19.60	29.60	440.99	430.99	29.60	430.60	10	2	41.302243	-89.320647
51	C	UA	02/04/2020	464.80	464.80	Top of PVC	461.50	56.00	66.00	405.50	395.50	66.30	394.50	10	2	41.300639	-89.326953

Notes:

All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A
 Type refers to the role of the well in the monitoring network: background (B), compliance (C), or water level measurements only (WLO)
 WLO wells are temporary pending implementation of impoundment closure per an approved Construction Permit application
 BGS = below ground surface
 ft = foot or feet
 HSU = Hydrostratigraphic Unit
 PVC = polyvinyl chloride
 UA = uppermost aquifer

generated 10/05/2021, 3:14:31 PM CDT

TABLE 3-1. BACKGROUND GROUNDWATER QUALITY AND STANDARDS
 ADDENDUM TO THE GROUNDWATER MONITORING PLAN
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Parameter	Background Concentration	845 Limit	Groundwater Protection Standard	Unit
Antimony, total	0.001	0.006	0.006	mg/L
Arsenic, total	0.001	0.010	0.010	mg/L
Barium, total	0.156	2.0	2.0	mg/L
Beryllium, total	0.001	0.004	0.004	mg/L
Boron, total	0.205	2	2	mg/L
Cadmium, total	0.001	0.005	0.005	mg/L
Chloride, total	108	200	200	mg/L
Chromium, total	0.0013	0.1	0.1	mg/L
Cobalt, total	0.0017	0.006	0.006	mg/L
Fluoride, total	0.17	4.0	4.0	mg/L
Lead, total	0.001	0.0075	0.0075	mg/L
Lithium, total	0.014	0.04	0.04	mg/L
Mercury, total	0.0002	0.002	0.002	mg/L
Molybdenum, total	0.002	0.1	0.1	mg/L
pH (field)	7.4 / 6.7	9.0 / 6.5	9.0 / 6.5	SU
Radium 226 and 228 combined	2.6	5	5	pCi/L
Selenium, total	0.0011	0.05	0.05	mg/L
Sulfate, total	117	400	400	mg/L
Thallium, total	0.001	0.002	0.002	mg/L
Total Dissolved Solids	830	1200	1200	mg/L

Notes:

For pH, the values presented are the upper / lower limits
 Groundwater protection standards for calcium and turbidity do not apply per 35 I.A.C. § 845.600(b)
 mg/L = milligrams per liter
 SU = standard units
 pCi/L = picocuries per liter

generated 10/07/2021, 6:49:07 AM CDT

TABLE 4-1. SAMPLING AND ANALYSIS SUMMARY
 ADDENDUM TO THE GROUNDWATER MONITORING PLAN
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Parameter	Analytical Method ¹	Number of Samples	Field Duplicates ²	Field Blanks ³	Equipment Blanks ³	MS/MSD ⁴	Total	Container Type	Minimum Volume ⁵	Preservation (Cool to 4 °C for all samples)	Sample Hold Time from Collection Date
Metals											
Metals ⁶	6020, Li - EPA 200.7	11	2	0	0	1	14	plastic	600 mL	HNO ₃ to pH<2	6 months
Mercury	7470A or 6020	11	2	0	0	1	14	plastic	400 mL	HNO ₃ to pH<2	28 days
Inorganic Parameters											
Fluoride	9214 or EPA 300	11	2	0	0	1	14	plastic	300 mL	Cool to 4 °C	28 days
Chloride	9251 or EPA 300	11	2	0	0	1	14	plastic	100 mL	Cool to 4 °C	28 days
Sulfate	9036 or EPA 300	11	2	0	0	1	14	plastic	50 mL	Cool to 4 °C	28 days
Total Dissolved Solids	SM 2540 C	11	2	0	0	1	14	plastic	200 mL	Cool to 4 °C	7 days
Radium											
Radium 226	9315 or EPA 903	11	0	0	0	0	11	plastic	1000 mL	HNO ₃ to pH<2	6 months
Radium 228	9320 or EPA 904	11	0	0	0	0	11	plastic	1000 mL	HNO ₃ to pH<2	6 months
Field Parameters											
pH	SM 4500-H+ B	11	NA	NA	NA	NA	11	flow-through cell	NA	none	immediately
Dissolved Oxygen ⁸	SM 4500-O/405.1	11	NA	NA	NA	NA	11	flow-through cell	NA	none	immediately
Temperature ⁸	SM 2550	11	NA	NA	NA	NA	11	flow-through cell	NA	none	immediately
Oxidation/Reduction Potential ⁸	SM 2580 B	11	NA	NA	NA	NA	11	flow-through cell	NA	none	immediately
Specific Conductance ⁸	SM 2510 B	11	NA	NA	NA	NA	11	flow-through cell	NA	none	immediately
Turbidity ⁷	SM 2130 B	11	NA	NA	NA	NA	11	flow-through cell or hand-held turbidity meter	NA	none	immediately

[O: CJC 08/18/21; C: LDC 08/31/21]

Notes:

- ¹ Analytical method numbers are from SW-846 unless otherwise indicated. Analytical methods may be updated with more recent versions as appropriate.
 - ² Field duplicates will be collected at a frequency of one per group of 10 or fewer investigative water samples. Field duplicates will not be collected for radium analysis.
 - ³ Field blanks will be collected at the discretion of the project manager; Equipment blanks will be collected at a rate of 1 per sampling event if non-dedicated equipment is used.
 - ⁴ Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected at a frequency of one per group of 20 or fewer investigative water samples per CCR unit/multi-unit. Additional volume to be determined by laboratory.
 - ⁵ Sample volume is estimated and will be determined by the laboratory.
 - ⁶ Metals = antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, lead, lithium, molybdenum, selenium, thallium. Metals may be analyzed via ICP/ ICP-MS USEPA methods 6010 or 6020 depending on laboratory instrument availability.
 - ⁷ If turbidity exceeds 10 NTUs, a duplicate sample filtered through a .45 micron filter may be collected for metals analysis in addition to the unfiltered sample. Both samples would be submitted for analysis.
 - ⁸ Parameter collected for quality assurance and quality control for field sampling purposes only; not required to be collected or reported under Part 845; collection of parameter may be discontinued without notification.
- < = less than
 °C = degrees Celsius
 HNO₃ = nitric acid
 mL = milliliter
 NA = not applicable
 NTU = nephelometric turbidity unit

TABLE 4-2. DETECTION AND REPORTING LIMITS FOR PART 845 PARAMETERS

ADDENDUM TO THE GROUNDWATER MONITORING PLAN

HENNEPIN POWER PLANT

WEST ASH POND SYSTEM

HENNEPIN, ILLINOIS

Constituent	CAS	Unit	Analytical Methods ¹	USEPA MCL ²	35 I.A.C. § 845.600	RL ^{4, 5}	MDL ⁵
Metals							
Antimony	7440-36-0	mg/L	6020	0.006	0.006	0.003	0.00036
Arsenic	7440-38-2	mg/L	6020	0.01	0.01	0.001	0.00013
Barium	7440-39-3	mg/L	6020	2	2	0.001	0.00028
Beryllium	7440-41-7	mg/L	6020	0.004	0.004	0.001	0.000017
Boron	7440-42-8	mg/L	6020	NS	2	0.01	0.0023
Cadmium	7440-43-9	mg/L	6020	0.005	0.005	0.001	0.000042
Calcium	7440-70-2	mg/L	6020	NS	NS	0.15	0.15
Chromium	7440-47-3	mg/L	6020	0.1	0.1	0.004	0.00027
Cobalt	7440-48-4	mg/L	6020	0.006	0.006	0.002	0.000017
Lead	7439-92-1	mg/L	6020	0.015	0.0075	0.001	0.000025
Lithium	7439-93-2	mg/L	6020 or EPA 200.7	0.04	0.04	0.02	0.0001
Mercury	7439-97-6	mg/L	6020 or 7470A	0.002	0.002	0.0002	0.000078
Molybdenum	7439-98-7	mg/L	6020	0.1	0.1	0.001	0.000063
Selenium	7782-49-2	mg/L	6020	0.05	0.05	0.001	0.00032
Thallium	7440-28-0	mg/L	6020	0.002	0.002	0.001	0.000062
Inorganics							
Fluoride	7681	mg/L	9214 or EPA 300	4	4	0.25	0.065
Chloride	16887-00-6	mg/L	9251 or EPA 300	250 ³	200	1	0.15
Sulfate	18785-72-3	mg/L	9036 or EPA 300	250 ³	400	1	0.24
Total Dissolved Solids	10052	mg/L	SM 2540C	500 ³	1200	17	--
Other							
Radium 226 and 226 combined	7440-14-4	pCi/L	9315/9320 or EPA 903/904	5	5	-- ⁶	-- ⁷

TABLE 4-2. DETECTION AND REPORTING LIMITS FOR PART 845 PARAMETERS

ADDENDUM TO THE GROUNDWATER MONITORING PLAN
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

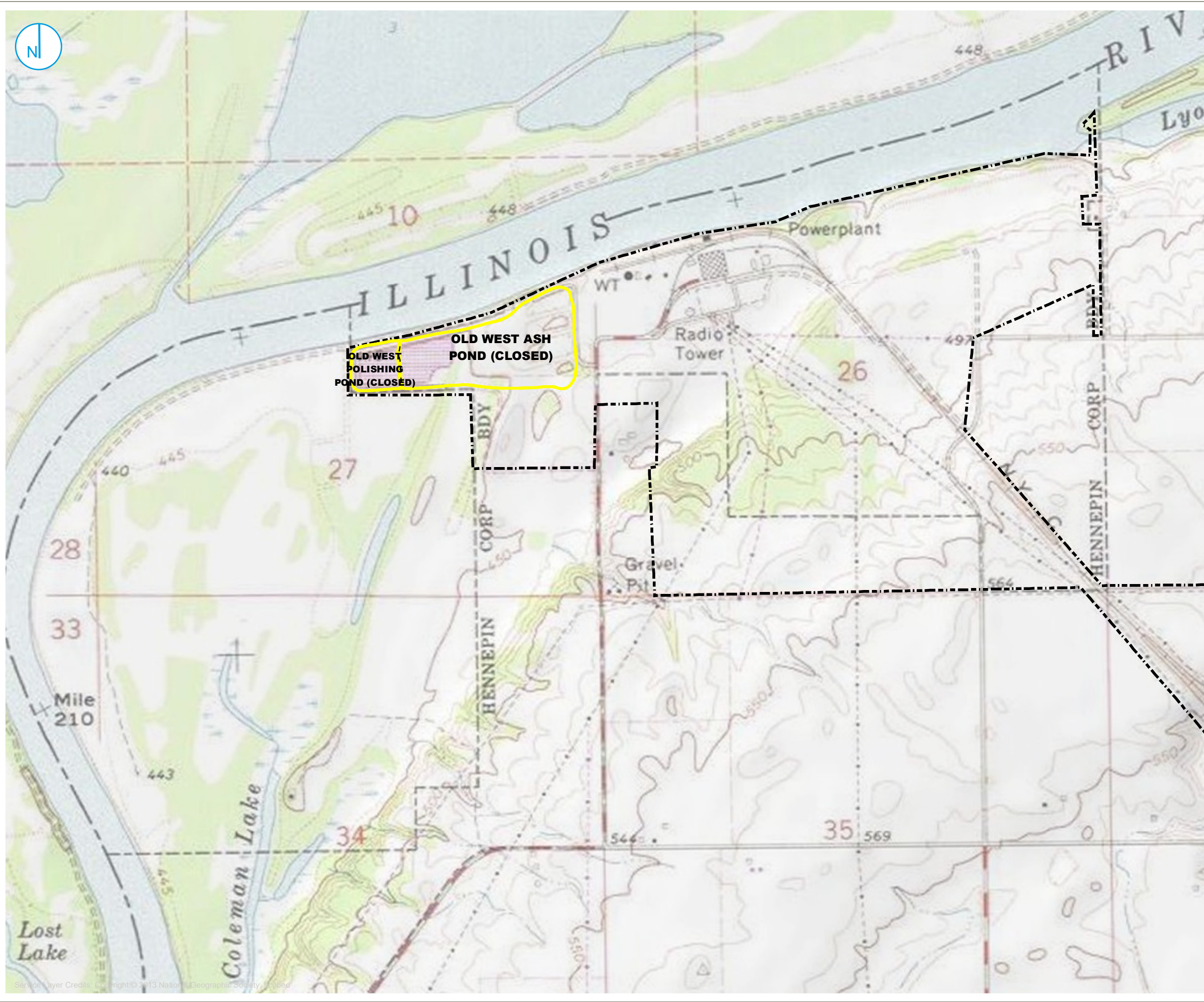
Constituent	CAS	Unit	Analytical Methods ¹	USEPA MCL ²	35 I.A.C. § 845.600	RL ^{4, 5}	MDL ⁵
Field							
pH	NA	SU	SM 4500-H+ B	NS	6.5-9.0	NA	NA
Oxidation/Reduction Potential	NA	mV	SM 2580 B	NS	NS	NA	NA
Dissolved Oxygen	NA	mg/L	SM 4500-O/405.1	NS	NS	NA	NA
Temperature	NA	°C	SM 2550	NS	NS	NA	NA
Specific Conductivity	NA	µS/cm	SM 2510 B	NS	NS	NA	NA
Turbidity	NA	NTU	SM 2130 B	NS	NS	NA	NA



[O: CJC 08/18/21; C: LDC 08/31/21]

Notes:

- ¹ Analytical method numbers are from SW-846 unless otherwise indicated. Metals will be analyzed via Method 6020 or 6010 depending on laboratory equipment availability. Selected method will ensure reporting limits (RL) are below Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.600 groundwater protection standards.
 - ² USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
 - ³ USEPA SMCL = United States Environmental Protection Agency Secondary Maximum Contaminant Level.
 - ⁴ RLs will be less than the 35 I.A.C. § 845.600 groundwater protection standards.
 - ⁵ RLs and method detection limits (MDL) will vary depending on the laboratory performing the work.
 - ⁶ All radium results will be reported (values may be positive or negative) and will include uncertainty and the calculated MDC.
 - ⁷ Laboratories calculate a minimum detectable concentration (MDC) based on the sample.
- °C = degrees Celsius
 µS/cm = microSiemens per centimeter
 CAS = Chemical Abstract Number
 MDL = Method detection limit as established by the laboratory
 mg/L = milligrams per liter
 mV = millivolts
 NA = Not applicable
 NS = No standard
 NTU = nephelometric turbidity unit
 pCi/L = picoCuries per liter
 RL = Reporting limit as established by the laboratory
 SM = Standard Methods for the Examination of Water and Wastewater
 SU = standard units

FIGURES



 PART 845 REGULATED UNIT (SUBJECT UNIT)
 PROPERTY BOUNDARY



SITE LOCATION MAP

**ADDENDUM TO THE
 GROUNDWATER MONITORING PLAN
 WEST ASH POND SYSTEM
 HENNEPIN POWER PLANT
 HENNEPIN, ILLINOIS**

FIGURE 1-1




Service Layer Credits: Copyright © 2013 National Geographic Society, Inc.



ILLINOIS RIVER

OLD WEST POLISHING POND(CLOSED)

OLD WEST ASH POND(CLOSED)

-  PART 845 REGULATED UNIT (SUBJECT UNIT)
-  LIMITS OF FINAL COVER
-  PROPERTY BOUNDARY

0 200 400 Feet

SITE MAP

ADDENDUM TO THE GROUNDWATER MONITORING PLAN WEST ASH POND SYSTEM HENNEPIN POWER PLANT HENNEPIN, ILLINOIS

FIGURE 1-2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.





- BACKGROUND WELL
- COMPLIANCE WELL
- PART 845 REGULATED UNIT (SUBJECT UNIT)
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY



**PROPOSED PART 845
GROUNDWATER MONITORING
WELL NETWORK**

ADDENDUM TO THE
GROUNDWATER MONITORING PLAN
WEST ASH POND SYSTEM
HENNEPIN POWER PLANT
HENNEPIN, ILLINOIS

FIGURE 2-1



**APPENDIX A
STATISTICAL ANALYSIS PLAN**

Prepared for
Dynegy Midwest Generation, LLC

Date
October 25, 2021

Project No.
1940100806-005

STATISTICAL ANALYSIS PLAN

WEST ASH POND SYSTEM

HENNEPIN POWER PLANT

HENNEPIN, ILLINOIS

STATISTICAL ANALYSIS PLAN HENNEPIN POWER PLANT WEST ASH POND SYSTEM

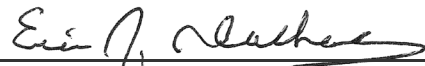
Project Name **Hennepin Power Plant West Ash Pond System**
Project No. **1940100806-005**
Recipient **Dynegy Midwest Generation, LLC**
Document Type **Statistical Analysis Plan**
Version **FINAL**
Date **October 25, 2021**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
<https://ramboll.com>



Brian G. Hennings, PG
Senior Managing Hydrogeologist



Eric J. Tlachac, PE
Senior Managing Engineer



Rachel A. Banoff, EIT
Project Statistician

LICENSED PROFESSIONAL CERTIFICATIONS

This certification is based on the description of the statistical methods selected to evaluate groundwater as presented in the following Statistical Analysis Plan; Hennepin Power Plant West Ash Pond System. The procedures described in the plan will be used to establish background conditions and implement compliance monitoring as necessary and required by 35 I.A.C. § 845.640 and 35 I.A.C. § 845.650. The Statistical Analysis Plan was prepared in accordance with the requirements of 35 I.A.C. § 845.640(f), with reference to the acceptable statistical procedures provided in the United States Environmental Protection Agency (USEPA)'s *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (Unified Guidance, March 2009)*, and is intended to provide a logical process and framework for conducting the statistical analysis of the data obtained during groundwater monitoring. In accordance with 35 I.A.C. § 845.640(f)(1), the statistical method chosen for analysis of background groundwater quality will be either the tolerance interval or the prediction interval procedure for each constituent listed in 35 I.A.C. § 845.600(a)(1) at this CCR unit per 35 I.A.C. § 845.640(f)(1)(C). Groundwater Protection Standards (GWPS) will be established in accordance with 35 I.A.C. § 845.600(a) (greater of the background concentration or numerical limit specified in 35 I.A.C. § 845.600(a)(1)). The GWPS will be compared to the lower confidence limit for the observed concentrations for each constituent in each compliance well. Consistent with the *Unified Guidance*, the same general statistical method of confidence interval testing against a fixed GWPS is recommended in compliance and corrective action programs. Confidence intervals provide a flexible and statistically accurate method to test how a parameter estimated from a single sample compares to a fixed numerical limit. Confidence intervals explicitly account for variation and uncertainty in the sample data used to construct them.

Description of the statistical methods chosen for analysis of groundwater monitoring data and application of these methods for determining exceedances of the GWPS identified in 35 I.A.C. § 845.600(a) is provided in this Statistical Analysis Plan.

35 I.A.C. § 845.640 Statistical Analysis (PE)

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the statistical methods summarized above and described in this document (Statistical Analysis Plan; Hennepin Power Plant West Ash Pond System) are appropriate for evaluating the groundwater monitoring data collected as described in the attached document and are in substantial compliance with 35 I.A.C. § 845.640.



Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Date: October 25, 2021



35 I.A.C. § 845.640 Statistical Analysis (PG)

I, Brian G. Hennings, a qualified professional geologist in good standing in the State of Illinois, certify that the statistical methods described in this document (Statistical Analysis Plan; Hennepin Power Plant West Ash Pond System) are appropriate for evaluating the groundwater monitoring data collected as described in the attached document and are in substantial compliance with 35 I.A.C. § 845.640.

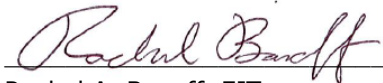


Brian G. Hennings
Professional Geologist
196.001482
Illinois
Date: October 25, 2021



35 I.A.C. § 845.640 Statistical Analysis

I, Rachel A. Banoff, a qualified professional, certify that the statistical methods described in this document (Statistical Analysis Plan; Hennepin Power Plant West Ash Pond System), are appropriate for evaluating the groundwater monitoring data collected as described in the attached document and are in substantial compliance with 35 I.A.C. § 845.640.



Rachel A. Banoff, EIT
Project Statistician
Date: October 25, 2021

CONTENTS

Licensed Professional Certifications	2
1. Introduction	6
1.1 Statistical Analysis Objectives	6
1.2 Statistical Analysis Plan Approach	6
2. Background Monitoring and Data Preparation	8
2.1 Sample Independence	8
2.2 Non-Detect Data Processing	9
2.3 Testing for Normality	9
2.4 Testing for Outliers	9
2.5 Trend Analysis	10
2.6 Spatial Variation	10
2.7 Temporal Variation	10
2.8 Updating Background	11
3. Compliance Monitoring	13
3.1 GWPS Establishment and Exceedance Determination	13
3.1.1 The Upper Tolerance Limit	14
3.1.2 Parametric Confidence Intervals around a Mean	16
3.1.3 Non-Parametric Confidence Intervals around a Median	16
3.1.4 The Upper Prediction Limit for a Future Mean	17
3.1.5 The Non-Parametric Upper Prediction Limit for a Future Median	17
3.1.6 Parametric Linear Regression and Confidence Band	18
3.1.7 Non-Parametric Thiel-Sen Trend Line and Confidence Band	20
3.2 Determination of Statistically Significant Increases over Background	21
4. References	22

TABLES (IN TEXT)

Table A	Statistical Calculations Used in Compliance Monitoring Procedures
---------	---

ACRONYMS AND ABBREVIATIONS

§	Section
35 I.A.C.	Title 35 of the Illinois Administrative Code
ANOVA	analysis of variance
CCR	coal combustion residuals
COC	constituents of concern
GWPS	groundwater protection standard
IEPA	Illinois Environmental Protection Agency
LCL	lower confidence limit
LTL	lower tolerance limit
MSE	mean squared error
P	probability
Part 845	Residuals in Surface Impoundments: Title 35 of the Illinois Administrative Code § 845
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
ROS	regression on order statistics
SI	surface impoundment
SSI	statistically significant increase
SWFPR	site-wide false positive rate
<i>Unified Guidance</i>	<i>Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (USEPA, 2009)</i>
UPL	upper prediction limit
USEPA	United States Environmental Protection Agency
UTL	upper tolerance limit

1. INTRODUCTION

In April 2021, the Illinois Environmental Protection Agency (IEPA) issued a final rule for the regulation and management of Coal Combustion Residuals (CCR) in surface impoundments (SIs) under the Standards for the Disposal of CCR in Surface Impoundments: Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845 (Part 845). Facilities regulated under Part 845 are required to develop and sample a groundwater monitoring well network to evaluate whether impounded CCR materials are impacting downgradient groundwater quality. The groundwater quality evaluation must include selection and certification by a qualified professional engineer of the statistical procedures to be used. The procedures described in the evaluation will be used to establish background conditions and implement compliance and corrective action monitoring as necessary and required by 35 I.A.C. § 845.640 and 35 I.A.C. § 845.650. This Statistical Analysis Plan was prepared in accordance with the requirements of 35 I.A.C. § 845.640(f), with reference to the acceptable statistical procedures provided in United States Environmental Protection Agency's (USEPA's) *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance (Unified Guidance)* (March 2009).

This Statistical Analysis Plan does not include procedures for groundwater sample collection and analysis, as these activities are conducted in accordance with the Sampling and Analysis Plan prepared for each CCR unit in accordance with 35 I.A.C. § 845.640. This Statistical Analysis Plan will be used as the primary reference for evaluating groundwater quality during operation and post-closure care.

1.1 Statistical Analysis Objectives

This Statistical Analysis Plan is intended to provide a logical process and framework for conducting the statistical analyses of data obtained during groundwater monitoring conducted in accordance with the Sampling and Analysis Plan for each CCR unit. The Statistical Analysis Plan will enable a qualified professional engineer to certify that the selected statistical methods are appropriate for evaluating the groundwater monitoring data for the applicable CCR unit(s).

1.2 Statistical Analysis Plan Approach

The main sections of this Statistical Analysis Plan should be viewed as a "generic" outline of statistical methods utilized for each CCR unit and constituent required to be monitored. The statistical analysis of the groundwater monitoring data, however, will be conducted on an individual-constituent or well basis, and may involve the use of appropriate statistical procedures depending on multiple factors such as detection frequency and normality distributions.

The CCR Rule outlines two phases of groundwater monitoring:

- Background Monitoring in accordance with 35 I.A.C. § 845.650(b)(1)
- Compliance Monitoring in accordance with 35 I.A.C. § 845.650

Each phase of the groundwater monitoring program requires specific statistical procedures to accomplish the intended purpose. During the background monitoring phase, background groundwater quality will be established utilizing upgradient and background wells and downgradient groundwater quality data will be collected to facilitate statistics in subsequent phases. Compliance Monitoring is then initiated through the evaluation of the downgradient

groundwater monitoring data for exceedances of the groundwater protection standard (GWPS) established by Part 845 (concentration specified in 35 I.A.C. § 845.600 or an IEPA-approved background concentration). The developed statistical analysis plan will be implemented for each monitoring phase and in accordance with the statistical procedures.

2. BACKGROUND MONITORING AND DATA PREPARATION

The background and compliance monitoring wells were sampled and analyzed for constituents, as listed in Part 845 (antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chloride, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, pH, radium 226 and 228 combined, selenium, sulfate, thallium, total dissolved solids, and turbidity), during the baseline phase of the groundwater monitoring program.

The background monitoring well(s) were placed upgradient of the CCR unit, or at an alternative background location, where they are not affected by potential leakage from the CCR unit. Compliance monitoring wells were placed at the waste boundary of the CCR unit, along the same groundwater flow path. As 35 I.A.C. § 845.630(a) specifies, the location of these wells ensures that background accurately represents the quality of unaffected groundwater, while compliance wells accurately represent groundwater quality at the waste boundary and monitor all potential contaminant pathways.

As required by 35 I.A.C. § 845.650(a)(1), eight sampling events were completed within 180 days of April 21, 2021. As outlined, groundwater sampling procedures included sampling of the background and compliance wells using low-flow sampling methods, collection of one field quality control sample per event, and groundwater samples were not field filtered before laboratory analysis of total recoverable metals.

Following completion of the eight sampling events, background groundwater quality was established for Part 845 constituents. Groundwater monitoring will be conducted quarterly for at least the first five years. In accordance with 35 I.A.C. § 845.650(b)(4), after the first five years, a request to reduce the monitoring frequency to semiannual may be submitted to IEPA if all of the following can be demonstrated:

- Groundwater monitoring effectiveness will not be compromised by the reduced frequency
- Sufficient data has been collected to characterize groundwater
- Monitoring to date does not show any statistically significant increasing trends
- The concentrations of monitored constituents at the compliance monitoring wells are below the applicable GWPSs established in 35 I.A.C. § 845.600

The following subsections outline the statistical tests and procedures (methods) that will be utilized to evaluate data collected for each constituent in both background and compliance wells for Background and Compliance Monitoring. When necessary and contingent upon equivalent statistical power, an alternative test not included in this Statistical Analysis Plan may be chosen due to site-specific data requirements.

2.1 Sample Independence

Independence of sample results is a major assumption for most statistical analyses. To ensure physical independence of groundwater sampling results, the minimum time between sampling events must be longer than the time required for groundwater to move through the monitoring well. The sampling schedules for both the baseline and compliance monitoring periods are specified in 35 I.A.C. § 845.650(b) and may conflict with the statistical assumption of independence of sample results.

2.2 Non-Detect Data Processing

The reporting limit (RL) will be used as the lower level for the reporting of non-detected groundwater quality data. For all summary statistics (box plots, timeseries, etc.), the RL will be substituted for concentrations reported below the RL, including non-detects. With professional judgement, analytical results between the RL and the method detection limit, *i.e.*, estimated values, typically identified with a "J" flag, may be utilized if provided by the laboratory.

For all statistical test procedures:

- If the frequency of non-detect data are less than or equal to 15 percent, half of the RL will be substituted for these data
- If the non-detect frequency is between 15 percent and 50 percent, either the Kaplan-Meier or robust regression on order statistics (ROS) will be used to estimate the mean and standard deviation adjusted for the presence of left-censored values
- If the non-detect frequency is greater than 50 percent, a non-parametric test will be used
- If only one background result is detected that value will be used as the non-parametric upper prediction limit (UPL)

2.3 Testing for Normality

Many statistical analyses assume that sample data are normally distributed (parametric). However, environmental data are frequently not normally distributed (nonparametric). 35 I.A.C. § 845.640(g) requires the knowledge of the background data distribution for comparison to compliance results. The *Unified Guidance* document recommends the Shapiro-Wilk normality test for sample sizes of 50 or less, and the Shapiro-Francia normality test for sample sizes greater than 50.

When possible, transformation of datasets to achieve normal distributions is preferred.

2.4 Testing for Outliers

Part 845 constituents will be screened for the existence of outliers using a method described by the *Unified Guidance*. Outliers are extreme data points that may represent an anomaly or erroneous data point. To test for outliers, one or more of the following outlier tests will be utilized:

- Dixon's test, for well-constituent pairs with less than 25 samples, assumes normally distributed data.
- Rosner's test, for well-constituent pairs with more than 20 samples, assumes normally distributed data.
- Grubb's test for well-constituent pairs with seven or more samples, assumes normally distributed data.
- Time series, box-whisker plots, and probability plots provide visual tools to identify potential outliers, and evaluation of seasonal, spatial, or temporal variability for both normally and non-normally distributed data.

Data quality control, groundwater geochemistry, and sampling procedures will be evaluated as potential sources of error leading to an outlier result. The outlier tests cannot be used alone to determine whether a value is a true outlier that should be excluded from future statistical

analysis. Corroborating evidence needed to exclude values includes a discrete data reporting or analytical error, or potential laboratory bias. Absent corroborating evidence, the flagged values are considered true, but extreme, values in the data set. Professional judgement will be used to exclude extreme outliers from further statistical analyses. Outliers will be retained in the database.

With professional judgement, a confirmatory sample may be collected to allow for the distinction between an outlier and a true representation of groundwater quality at the monitoring point. If re-sampling is conducted, this sample will be collected within 90 days following outlier identification. If the confirmatory sample indicates the original result as an outlier, it will be reported as such.

2.5 Trend Analysis

Statistical analyses supporting the lack of trend are a fundamental step to confirm the assumption that groundwater quality values are stationary or constant over time at a CCR unit. These analyses allow for evaluation of variation in the background and compliance data for each constituent over time. A statistically significant increasing trend in background data could indicate an existing release from the CCR unit or alternate source, requiring further investigation. In addition, statistically significant trending background data can result in increased standard deviation and, therefore, greater prediction or control limits. Consequently, the increased prediction or control limit will have less power or ability to identify a release from the CCR unit.

A linear regression, coupled with a t-test for slope significance at a 95 percent confidence level (0.05 significance level), may be used on datasets for each constituent with few non-detects and a normally distributed variance of the mean to evaluate time trends. The Theil-Sen trend line, coupled with the Mann-Kendall test for slope significance at a 95 percent confidence level (0.05 significance level), will be used for datasets with frequent non-detects or non-normal variance. Similarly, trend analyses could also be used on compliance data to evaluate a possible release from the CCR unit.

2.6 Spatial Variation

Spatial trends and/or variation between background wells could indicate an existing release from a CCR unit. If the spatial variability is not due to an existing release, intrawell comparisons in compliance wells may be used to account for spatial variability and monitor for a future release. However, the CCR unit being monitored was placed into service prior to the start of groundwater monitoring and it is unknown whether a previous release has occurred. Accordingly, intrawell comparisons in compliance wells cannot be used to determine the occurrence of a future release. Interwell comparisons between compliance wells and background wells will be used.

2.7 Temporal Variation

Time series plots can be used to identify temporal dependence. Potentially significant temporal components of variability can be identified by graphing single constituent data from multiple wells together on a time series plot. With temporal dependence, the time series plot as a pattern of parallel traces, in which the individual wells will tend to rise and fall together across the sequence of sampling dates. Time series plots can be helpful by plotting multiple constituents over time for the same well, or averaging values for each constituent across wells on each sampling event and then plotting the averages over time. In either case, the plots can signify whether the general concentration pattern over time is simultaneously observed for different

constituents. If so, it may indicate that a group of constituents is highly correlated in groundwater or that the same artifacts of sampling and/or lab analysis impacted the results of several monitoring parameters.

Hydrologic factors such as drought, recharge patterns or regular (*e.g.*, seasonal) water table fluctuations may be responsible for the temporal variation. In these cases, it may be useful to test for the presence of a significant temporal effect by first constructing a parallel time series plot and then running a formal one-way analysis of variance (ANOVA) ($\alpha = 0.05$) for temporal effects. A one-way ANOVA for temporal effects considers multiple well data sets for individual sampling events or seasons as the relevant statistical factor. If event-specific analytical differences or seasonality appear to be an important temporal factor, the one-way ANOVA for temporal effects can be used to formally identify seasonality, parallel trends, or changes in lab performance that affect other temporal effects. The one-way ANOVA for temporal effects assumes that the data groups are normally distributed with constant variance. It is also assumed that for each of a series of background wells, measurements are collected at each well on sampling events or dates common to all the wells. Results of the ANOVA can also be used to create temporally stationary residuals, where the temporal effect has been 'subtracted from' the original measurements. These stationary residuals may be used to replace the original data in subsequent statistical testing.

If the data cannot be normalized, a similar test for a temporal or seasonal effect can be performed using the Kruskal-Wallis test ($\alpha = 0.05$). Each sampling event should be treated as a separate 'well,' while each well is treated as a separate 'sampling event.' In this case, no residuals can be computed since the Kruskal-Wallis test employs ranks of the data rather than the measurements themselves.

Where both spatial and temporal variation occur, two-way ANOVA can be considered where both well location and sampling event/season are treated as statistical factors. This procedure is described in Davis (1994).

2.8 Updating Background

Updating the background dataset periodically by adding recent results to an existing background dataset can improve the statistical power and accuracy of the statistical analysis, especially for non-parametric prediction intervals. The *Unified Guidance* recommends updating statistical limits (background) when at least four to eight new measurements (every 1 to 2 years under a quarterly monitoring program), are available for comparison to historical data. Professional judgement will be used to evaluate whether any background data appear to be affected by a release and need to be excluded from a background update. A t-test for equal means (if normal data distribution) or appropriate non-parametric test (if non-normal data distribution) such as a Mann-Whitney (or Wilcoxon) rank-sum or box-whisker plots, will be conducted to evaluate whether the two groups of background sample populations are statistically different prior to updating any background datasets. A 0.05 significance level will be utilized when evaluating the two populations, with the null hypothesis that they are equivalent. In addition, time series graphs or other trend evaluation statistics will be conducted on the new background dataset to verify the absence of a release or changing groundwater quality. If the tests indicate that there are no statistical differences between the two background populations, the new data will be combined with the existing dataset. If the two populations are found to be different, the data will be reviewed to evaluate the cause of the difference. If the differences appear to be caused by a

release (if the new data are significantly higher, or lower for pH), then the previous background dataset may continue to be used. Furthermore, verified outliers will not be added to an existing background dataset. In accordance with the *Unified Guidance*, continual background updates will not be conducted due to the lack of sufficient samples for a statistical comparison.

3. COMPLIANCE MONITORING

Compliance monitoring is designed to monitor groundwater for evidence of a release by comparing Part 845 constituents in compliance wells to both background concentrations and the GWPS. Compliance Monitoring will begin the quarter following approval of this Addendum to the Groundwater Monitoring Plan and issuance of the Operating Permit. The selected Compliance Monitoring statistical method used to compare compliance groundwater quality data for each constituent to the GWPS will provide for adequate statistical power, error levels and individual test false positive rates, and be appropriate for the distribution and detection frequency of the background dataset. Statistical power is the ability of a statistical test to detect a true exceedance.

In accordance with 35 I.A.C. § 845.610(b)(3)(D), compliance monitoring statistical analyses will be completed and submitted to IEPA within 60 days after completion of sampling.

3.1 GWPS Establishment and Exceedance Determination

In accordance with 35 I.A.C. § 845.600(a), the GWPS will be the constituent concentrations specified in 35 I.A.C. § 845.600(a)(1) except for when the background concentration is greater, or no concentration is specified (*i.e.*, for calcium and turbidity), in which case the GWPS will be the background concentration. The GWPS based on background concentration will be calculated using a parametric upper tolerance limit (UTL), a parametric UPL for a future mean, or a non-parametric UPL for a future median.

Statistical calculations that will be utilized in Compliance Monitoring procedures are summarized in **Table A** below and listed in **Sections 3.1.1** through **3.1.7**. Depending on the distribution of the data and the percentage of non-detects, it may be more appropriate to use a parametric model over a non-parametric model. As necessary, other techniques as mentioned in the *Unified Guidance* and/or new methods will be implemented.

Table A. Statistical Calculations Used in Compliance Monitoring Procedures

Compliance Monitoring						
Significant Trend?	Background Data			Compliance Data		
	Percent Non-Detects	Distribution	GWPS Determination	Percent Non-Detects	Distribution	Method to Determine Exceedance
No	0 ≤ 50	Normal	35 I.A.C § 845.600(a)(1) constituent concentration or The Upper Tolerance Limit	≤75	Normal	Parametric Lower Confidence Limit around a Normal Mean
				≤75	Log-Normal	Parametric Lower Confidence Limit around a Lognormal Geometric Mean
				NA	Non-Normal	Non-Parametric Lower Confidence Limit around a Median
				>75	Unknown/ Cannot be determined	
	50 ≤ 70	Normal	The Upper Prediction Limit for a Future Mean	NA	NA	Future mean
	>70	Non-Normal	Upper Prediction Limit for a Future Median	NA	NA	Future median
100	Non-Normal	Double Quantification Rule	NA	NA	Individual Retesting Values	
Yes	0 ≤ 50	Normal	UCL of Confidence Band around Linear Regression	≤75	Residuals after subtracting trend are normal, equal variance	Lower Limit from Confidence Band around Linear Regression
	50 ≤ 100	Non-Normal	UCL of Confidence Band around Thiel-Sen trend line	≤75	Residuals not normal	Lower Limit from Confidence Band around Thiel-Sen

3.1.1 The Upper Tolerance Limit

The UTL will be used to calculate the GWPS when pooled background data are normally distributed, with a non-detect frequency of 50 percent or less. When non-detect frequency is 15 percent or less, half the RL will be substituted for non-detects. The *Unified Guidance* recommends 95 percent confidence level and 95 percent coverage (95/95 tolerance interval).

- When non-detect frequency is 15 percent or less, half the RL will be substituted for non-detects (simple substitution), and the normal mean and standard deviation will be calculated.

- The Kaplan-Meier or the ROS method will be used when the detection frequency is between 15 percent and 50 percent. The Kaplan-Meier method assesses the linearity of a censored probability plot to determine whether the background sample can be approximately normalized. If so, then the Kaplan-Meier method will be used to compute estimates of the mean and standard deviation adjusted for the presence of left-censored values. The Kaplan-Meier or ROS estimate of the mean and standard deviation will be substituted for the sample mean and standard deviation.
- If background normality cannot be achieved, non-parametric UTLs will not be calculated until a minimum of 60 background samples have been collected (to achieve 95 percent coverage).

The parametric UTL on a future mean will be calculated from the background dataset as follows:

$$UTL = \bar{x} + \kappa(n, \gamma, \alpha - 1) \cdot s$$

\bar{x} = background sample mean

s = background sample standard deviation

$\kappa(n, \gamma, \alpha - 1)$ = one-sided normal tolerance factor based on the chosen coverage (γ) and confidence level ($\alpha - 1$) and the size of the background dataset (n). Values are tabulated in Table 17-3 in Appendix D of the *Unified Guidance*. If exact values are not provided, then κ values can be estimated by linear interpolation.

If the UTL is constructed on the logarithms of original observations to achieve normality, where \bar{y} and s_y are the log-mean and log-standard deviation, the limit will be exponentiated for back-transformation to the concentration scale as follows:

$$UTL = \exp[\bar{y} + \kappa(n, \gamma, \alpha - 1) \cdot s_y]$$

\bar{y} = background sample log-mean

s_y = background sample log-standard deviation

When the GWPS is based on the 35 I.A.C. § 845.600(a)(1) constituent concentrations or a UTL derived from the background dataset, an exceedance in compliance wells relative to the GWPS will be evaluated using confidence intervals. A confidence interval defines the upper and lower bound of the true mean of a constituent concentration in groundwater within a specified confidence range.

- Non-detects in compliance data will be handled similarly to upgradient analyses, with half the RL substituted for non-detects when the frequency is 15 percent or less.
- The Kaplan-Meier, or the ROS method, will be used when the detection frequency is between 15 percent and 50 percent to compute estimates of the mean and standard deviation adjusted for the presence of left-censored values. These estimates will then be substituted for the sample mean and standard deviation.

Once the GWPS is established for background data using the UTL, either parametric or non-parametric confidence intervals will be computed for each constituent in compliance wells to identify GWPS exceedances.

3.1.2 Parametric Confidence Intervals around a Mean

If compliance data are approximately normal, one-sided parametric confidence intervals around a sample mean will be constructed for each constituent and well pair. The lower confidence limit (LCL) will be calculated as:

$$LCL_{1-\alpha} = \bar{x} - t_{1-\alpha, n-1} \cdot \frac{s}{\sqrt{n}}$$

\bar{x} = compliance sample mean

s = compliance sample standard deviation

n = compliance sample size

$t_{1-\alpha, n-1}$ = obtained from a Student's t-table with (n-1) degrees of freedom (Table 16-1 in Appendix D of the *Unified Guidance*)

The chosen t value will aim to achieve both a low false-positive rate, and high statistical power. Minimum α values are tabulated in Table 22-2 of Appendix D of the *Unified Guidance*. The selected minimum α value, from which the t value will be derived, will have at least 80 percent power ($1-\beta = 0.8$) when the underlying mean concentration is twice the GWPS.

If compliance data are distributed lognormally, the LCL will be computed around the lognormal geometric mean as:

$$LCL_{1-\alpha} = \exp\left(\bar{y} - t_{1-\alpha, n-1} \cdot \frac{s_y}{\sqrt{n}}\right)$$

\bar{y} = compliance sample log-mean

s_y = compliance sample log-standard deviation

3.1.3 Non-Parametric Confidence Intervals around a Median

Non-parametric confidence intervals around the median will be computed if the compliance data contain greater than 50 percent non-detects or are not normally distributed. The mathematical algorithm used to construct non-parametric confidence intervals is based on the probability (P) that any randomly selected measurement in a sample of n concentration measurements will be less than an unknown $P \times 100^{\text{th}}$ percentile of interest (where P is between 0 and 1). Then the probability that the measurement will exceed the $P \times 100^{\text{th}}$ percentile is $(1-P)$. The number of sample values falling below the $P \times 100^{\text{th}}$ percentile out of a set of n should follow a binomial distribution with parameters n and success probability P , where 'success' is defined as the event that a sample measurement is below the $P \times 100^{\text{th}}$ percentile. The probability that the interval formed by a given pair of order statistics will contain the percentile of interest will then be determined by a cumulative binomial distribution $Bin(x; n, p)$, representing the probability of x or fewer successes occurring in n trials with success probability p . P will be set to 0.50 for an interval around the median.

The sample size n will be ordered from least to greatest. Given $P = 0.50$, candidate interval endpoints will be chosen by ordered data values with ranks close to the product of $(n+1) \times 0.50$. If the result of $(n+1) \times 0.50$ is a fraction (for even-numbered sample sizes), the rank values immediately above and below will be selected as possible candidate endpoints. If the result of $(n+1) \times 0.50$ is an integer (for odd-numbered sample sizes), one will be added to and subtracted

from the result to get the upper and lower candidate endpoints. The ranks of the endpoints will be denoted L^* and U^* . For a one-sided LCL, the confidence level associated with endpoint L^* will be computed as:

$$1 - \alpha = \text{Bin}(L^* - 1; n, 0.50) = \sum_{x=L^*}^n \binom{n}{x} \left(\frac{1}{2}\right)^n$$

If the candidate endpoint(s) do not achieve the desired confidence level, new candidate endpoints (L^*-1) and (U^*+1) and achieved confidence levels will be calculated. If one candidate endpoint equals the data minimum or maximum, only the rank of the other endpoint will be changed. Achievable confidence levels are tabulated using these equations in Table 21-11 in Appendix D of the *Unified Guidance*.

Both parametric and non-parametric confidence limits will then be compared to the GWPS. The CCR unit is considered to be in compliance if the LCL is equal to or lower than the GWPS for all detected constituents at all compliance monitoring wells. A GWPS exceedance is determined if the LCL exceeds the GWPS.

3.1.4 The Upper Prediction Limit for a Future Mean

The parametric UPL for a future mean will be used to calculate the GWPS if the pooled background data contain 50 to 70 percent non-detects and normality can be achieved. The Kaplan-Meier or ROS methods will be used to estimate the mean and standard deviation. The non-parametric UPL for a future median will be calculated as the GWPS if background samples cannot be normalized or contain greater than 70 percent non-detects. The parametric UPL for a future mean will be calculated from the background dataset at follows:

$$UPL_{1-\alpha} = \bar{x} + \kappa s$$

\bar{x} = background sample mean

s = background standard deviation

κ = multiplier based on the order (p) of the future mean to be predicted, the number of compliance wells to be tested (w), the background sample size (n) the number (c) of constituents of concern (COCs), the "1-of- m " retesting scheme, and the evaluation schedule (annual, semi-annual, quarterly). Values are tabulated in 19-5 to 19-9 in Appendix D of the *Unified Guidance*.

The mean of order p will be computed for each well and compared against the UPL. For any compliance point mean that exceeds the limit, p additional resamples may be collected at that well for a 1-of-2 retesting scheme. Resample means will then be compared to the UPL. A GWPS exceedance has been deemed to occur at a compliance well when the initial mean and all resample means exceed the UPL.

3.1.5 The Non-Parametric Upper Prediction Limit for a Future Median

The non-parametric UPL for a future median will be used to calculate the GWPS if the pooled background data contain greater than 70 percent non-detects and normality cannot be achieved. Non-parametric methods assume that the data does not have an underlying distribution. To calculate the non-parametric UPL on a future value, the target per-constituent false positive rate (a_{const}) will be determined as follows:

$$\alpha_{const} = 1 - (1 - \alpha)^{1/c}$$

α = the site-wide false positive rate (SWFPR) of 0.10 recommended by the *Unified Guidance*

c = the number of monitoring constituents

The number of yearly statistical evaluation (nE) will be multiplied by the number of compliance wells (w) to determine the look-up table entry, w^* . The background sample size (n) and w^* will be used to select an achievable per-constituent false positive rate value in Table 19-24 of Appendix D in the *Unified Guidance*. The chosen achievable per-constituent false positive rate value will determine the type of non-parametric prediction limit (maximum or 2nd highest value in background) and a retesting scheme for a future median. The background data will be sorted in ascending order, and the upper prediction limit will be set to the appropriate order statistic previously determined by the achievable per-constituent false positive rate value in Table 19-24. If all constituent measurements in a background sample are non-detect, the Double Quantification rule will be used. The use of the Double Quantification rule in Compliance Monitoring will only be applicable if the RL is above the 35 I.A.C. § 845.600(a)(1) constituent concentration or a constituent concentration is not specified in § 845.600(a)(1). This scenario is highly unlikely. The constituent will also be removed from calculations identifying the target false positive rate.

Two initial measurements per compliance well will be collected. If both do not exceed the upper prediction limit, a third initial measurement will not be collected since the median of order 3 will also not exceed the limit. If both exceed the prediction limit, a third initial measurement will not be collected since the median will also exceed the limit. If one initial measurement is above and one below the limit, a third initial observation may be collected to determine the position of the median relative to the UPL. Up to three resamples will be collected in order to assess the resample median. In all cases, if two or more of the compliance point observations are non-detect, the median will be set equal to the RL. The median value for each compliance well will be compared to the UPL. For the 1-of-2 retesting scheme, if any compliance point median exceeds the limit, up to three additional resamples will may be collected from that well. The resample median will be computed and compared to the UPL. A GWPS exceedance has been deemed to occur at a compliance well when either the initial median, or both the initial median and resample median exceed the UPL.

If the concentrations of detected constituents are below the established GWPS, Compliance Monitoring will continue.

3.1.6 Parametric Linear Regression and Confidence Band

If the t-test detects a significant trend in the parametric linear regression line using either background or compliance data for a particular constituent, confidence bands accounting for trends will be constructed to account for the trend-induced variation. If this is not accounted for, a wider confidence interval will inevitably be calculated for a given confidence level and sample size (n). A wider confidence interval will result in less statistical power, or ability to demonstrate an exceedance or return to compliance. When a linear trend line has been estimated, a series of confidence intervals is estimated at each point along the trend. This creates a simultaneous confidence band that follows the trend line. As the underlying population mean increases or decreases, the confidence band does also to reflect this change at that point in time.

Linear regression will be used when background or compliance data are approximately normally distributed, with a constant sample variance around the mean, and the frequency of non-detects is low. The linear regression of concentration against sampling date (time) will be computed as follows:

$$\hat{b} = \sum_{i=1}^n (t_i - \bar{t}) \cdot x_i / (n - 1) \cdot s_t^2$$

x_i = i^{th} concentration value and

t_i = i^{th} sampling date

\bar{t} = sampling mean date

s_t^2 = variance of the sampling dates

This estimate leads to the following regression equation:

$$\hat{x} = \bar{x} + \hat{b} \cdot (t - \bar{t})$$

\bar{x} = mean concentration level

\hat{x} = estimated mean concentration at time t

The regression residuals will also be computed at each sampling event to ensure uniformity and lack of significant skewness. Regression residuals will be computed at each sampling event as follows:

$$r_i = x_i - \hat{x}_i$$

The estimated variance around the regression line, or mean squared error (MSE) will be computed as follows:

$$s_e^2 = \frac{1}{n - 2} \sum_{i=1}^n r_i^2$$

The confidence intervals around a linear regression trend line given confidence level $(1-\alpha)$ and a point in time (t_0), will be computed as follows:

$$LCL_{1-\alpha} = \hat{x}_0 - \sqrt{2s_e^2 \cdot F_{1-2\alpha, 2, n-1} \cdot \left[\frac{1}{n} + \frac{(t_0 - \bar{t})^2}{(n-1) \cdot s_t^2} \right]}$$

$$UCL_{1-\alpha} = \hat{x}_0 + \sqrt{2s_e^2 \cdot F_{1-2\alpha, 2, n-2} \cdot \left[\frac{1}{n} + \frac{(t_0 - \bar{t})^2}{(n-1) \cdot s_t^2} \right]}$$

\hat{x}_0 = estimated mean concentration from the regression equation at time t_0

$F_{1-2\alpha, 2, n-2}$ = upper $(1-2\alpha)^{\text{th}}$ percentage point from an F-distribution with 2 and $(n-2)$ degrees of freedom

For background data, the UCL around the linear regression line will be used as the GWPS for the trending constituent. For compliance data, confidence bands around the linear regression line will be compared to the GWPS. The CCR unit is considered to be in compliance if the LCL is equal to or lower than the GWPS for all detected constituents at all compliance wells. A GWPS exceedance is determined when the LCL based on the trend line first exceeds the GWPS.

3.1.7 Non-Parametric Thiel-Sen Trend Line and Confidence Band

If the Mann-Kendall test detects a significant trend in the non-parametric Thiel-Sen line using either background or compliance data for a particular constituent, confidence bands accounting for trends will be constructed to account for the trend-induced variation. The Thiel-Sen trend line will be used as a non-parametric alternative to linear regression when trend residuals cannot be normalized or if there are a higher percentage of non-detects in either background or compliance data. The Thiel-Sen trend line estimates the median concentration over time by combining the median pairwise slope with the median concentration value and the median sample date. To compute the Thiel-Sen line, the data will first be ordered by sampling event x_1, x_2, \dots, x_n . All possible distinct pairs of measurements (x_i, x_j) for $j > i$ will be considered and the simple pairwise slope estimate will be computed for each pair as follows:

$$m_{ij} = (x_j - x_i)/(j - i)$$

With a sample size of n , there will be a total of $N = n(n-1)/2$ pairwise estimates (m_{ij}) . If a given observation is a non-detect, half the RL will be substituted. The N pairwise slope estimates (m_{ij}) will be ordered from least to greatest (renamed $m(1), m(2), \dots, m(N)$). The Thiel-Sen estimate of slope (Q) will be calculated as the median value of the list depending on whether N is even or odd as follows:

$$Q = \begin{cases} m_{([N+1]/2)} & \text{if } N \text{ is odd} \\ (m_{(N/2)} + m_{([N+2]/2)})/2 & \text{if } N \text{ is even} \end{cases}$$

The sample concentration magnitude will be ordered from least to greatest, $x(1), x(2), \dots, x(n)$ and the median concentration will be calculated as follows:

$$\tilde{x} = \begin{cases} x_{([n+1]/2)} & \text{if } n \text{ is odd} \\ (x_{(n/2)} + x_{([n+2]/2)})/2 & \text{if } n \text{ is even} \end{cases}$$

The median sampling date (\tilde{t}) with ordered times ($t(1), t(2), \dots, t(n)$) will also be determined in this way. The Thiel-Sen trend line will then be computed for an estimate at any time (t) of the expected median concentration (x) as follows:

$$x = \tilde{x} + Q \cdot (t - \tilde{t}) = (\tilde{x} - Q \cdot \tilde{t}) + Q \cdot t$$

To construct a confidence band around the Thiel-Sen line, sample pairs (t_i, x_i) will be formed with a sample date (t_i) and the concentration measurement from that date (x_i). Bootstrap samples (B) will be formed by repeatedly sampling n pairs at random with replacement from the original sample pairs. This will be repeated 500 times. For each bootstrap sample, a Thiel-Sen trend line will be constructed using the equation above. A series of equally spaced time points (t_j) will be identified along the range of sampling dates represented in the original sample, $j = 1$ to m . The Thiel-Sen trend line associated with each bootstrap replicate will be used to compute an estimated concentration (\hat{x}_j^B) . An LCL will be constructed for the lower α^{th} percentile $\hat{x}_j^{[\alpha]}$ from the distribution of estimated concentrations at each time point (t_j). For a UCL, compute the upper $(1-\alpha)^{\text{th}}$ percentile, $\hat{x}_j^{[1-\alpha]}$ at each time point (t_j).

For background data, the UCL around the Thiel-Sen trend line will be used as the GWPS for the trending constituent. For compliance data, confidence bands around the Thiel-Sen trend line will be compared to the GWPS. The CCR unit is considered to be in compliance if the LCL is equal to or lower than the GWPS for all detected constituents at all compliance wells. A GWPS exceedance is confirmed when the LCL based on the trend line first exceeds the GWPS.

3.2 Determination of Statistically Significant Increases over Background

In accordance with 35 I.A.C. §§ 845.610(b)(3)(B) and 845.640(h), individual monitoring event concentrations for each constituent detected in the compliance monitoring wells during compliance monitoring sampling events will be compared to the background concentration as determined by the methods described above. An exceedance of the background concentration for any constituent measured at any compliance monitoring well, or constituent detection if not detected in the background samples, constitutes a Statistically Significant Increase (SSI). An exception to this method is pH, where two-sided (upper and lower) tolerance limits are established from the distribution of the background groundwater quality data. An exceedance of either the UTL or lower tolerance limit (LTL) would constitute an SSI for pH.

4. REFERENCES

Davis, C.B., 1994. *Environmental Regulatory Statistics*. In GP Patil & CR Rao (Eds.) *Handbook of Statistics, Volume 12: Environmental Statistics*, Chapter 26. New York: Elsevier Science B.V.

United States Environmental Protection Agency (USEPA), 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance*. EPA 530-R-09-007. March 2009.

**ATTACHMENT 2
GROUNDWATER MONITORING PLAN REVISION 1,
DATED MAY 31, 2018**



Dynergy Midwest Generation, LLC
Hennepin Power Station
13498 E. 800th Street
Hennepin, IL 61327
Putnam County

By UPS

May 31, 2018

William E. Buscher, P.G.
Manager, Hydrogeology and Compliance Unit
Groundwater Section, Division of Public Water Supplies, Bureau of Water
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, IL 62794

**Re: Hennepin Station
Inactive West Ash Pond System
Response to IEPA's May 2, 2018 Comments**

Mr. Buscher:

Enclosed please find two sets of documents which contain our responses to your May 2, 2018 comments on the Closure and Post Closure Care Plans submitted by Dynergy Midwest Generation's Hennepin Station on December 20, 2017. Each set contains three documents: (1) a May 18, 2018 letter from NRT to me which lists the specific responses to your comments, (2) a spiral bound revised GMZ Application report, and (3) a spiral-bound revised Groundwater Monitoring Plan report. The specific responses in each letter have been incorporated into the revised reports. The information in these reports supersedes the information in the original closure plans.

Please contact me (tel. no. 618-343-7794) if you have any questions regarding the submitted information.

Sincerely,

A handwritten signature in black ink, appearing to read 'Phil Morris', written in a cursive style.

Phil Morris
Senior Director – Environmental Compliance Group

bcc: A. Leskovsek – Houston Legal
V. Modeer/ M. Ballance - CCR Team Collinsville
J. Augspols – Hennepin Power Station
P. Morris – Collinsville Reading File



OBG | There's a way

May 18, 2018

Mr. Phil Morris
Managing Director – Environmental Compliance Group
Dynegy Operating Company
1500 Eastport Plaza Drive
Collinsville, IL 62234-6135

RE: Response to IEPA Comments – Hennepin Old West Ash Pond System Closure/Post-Closure Plan Closure and Post-Closure Care Plan Old West Ash Pond Old West Polishing Pond
NRT Project No. 2413

Dear Mr. Morris:

O' Brien & Gere (OBG) is providing this letter to Dynegy Operating Company (Dynegy) in response to comments received from the Illinois Environmental Protection Agency (IEPA) dated May 2, 2018 regarding *Closure and Post-Closure Care Plan Old West Ash Pond Old West Polishing Pond* (Closure Plan; Geosyntec, January, 2018) at Dynegy Midwest Generation, LLC Hennepin Power Station, in Hennepin, IL.

This Response to Comments will serve as Addendum 1 to the Closure Plan dated January 2018. For ease of review, IEPA comments are presented below in italics, followed by responses. Supplemental information to support the responses, when required, is included. This document provides responses to all IEPA comments numbered 1 - 19.

Comment 1- Section 1.2.2

The use of multiple storm water let down structures (discharge points) for the final OWAP cover system may have NPDES permit implications that should be addressed with the BOW Permit Section.

Response: Vistra Energy's Environmental Compliance Group in Collinsville, IL is aware of these NPDES permitting implications. That group will work with the IEPA Bureau of Water, Division of Water Pollution Control, Permitting Section, Industrial Unit to make certain all required discharge authorizations and modifications to NPDES Permit IL0001554 are obtained.

Comment 2- Section 4.1.1

There appears to be an incorrect reference to Appendices F2 and F3. The referenced monitoring data is located in the second appendix C, Appendices C2A, and C2B.

Response: The data is included in Appendix 2 (Appendices C2A and C2B), as noted in the comment, and Section 4.1.1 was revised. An updated document was not produced in response to this comment.

Comment 3- Section 2

The Agency notes that the new proposed GMZ will replace the existing GMZ upon Closure/Post-Closure approval.

Response: No response required.



Comment 4- Section 2.2

The Agency finds that the monitoring well network is acceptable.

Response: No response required.

Comment 5- Section 3.2

Please update Table 2 with the background values.

Response: Table 2 has been revised to reflect the completed background monitoring dataset as updated in Attachment 1 to this response letter. Background concentrations may be updated following completion of the cap to account for any changes in concentrations that may occur during the construction period.

Comment 6- Section 3.4

The parameters listed as being exempted in this Section are not listed in the monitored parameters list in Section 4.1, The agency notes that discussing their absence from the monitored list provides an explanation of the transition from groundwater monitoring under the 1996 Closure Work Plan and GMZ to the groundwater monitoring proposed in the 2017 Closure and Post-Closure Care Plan.

Response: This section was included to provide justification for removing parameters required for Class I Groundwater in IL 620. We propose to leave this section in as documentation for the reduced list. Additional text has been added to Section 3.4 to clarify the reasoning for incorporation of this section.

Comment 7- Section 4.1

The Agency finds that this set of parameters listed in the table in this section is adequate to characterize groundwater quality around the Old West Ash Pond (OWAP) system.

Response: No response required.

Comment 8- Section 4.1

The Agency does not have the authority to modify any analytical requirements of 40 CFR Part 257. Please clarify any request by Dynegy for Agency approval to modify the list of monitored parameters affects only reporting to the Agency.

Response: Additional statement(s) have been included in Section 4.1 of the revised document to indicate that monitoring and reporting changes approved by the Illinois EPA are applicable only to the Illinois EPA monitoring program and will not change the monitoring being performed under the USEPA CCR program.

Comment 9- Section 4.2

The Agency does not have the authority to modify any monitoring schedules included in 40 CFR Part 257. Please clarify that the proposed sampling frequency affects only reporting to the Agency.

Response: Additional statement(s) have been included in Section 4.2 of the revised document to indicate that changes in the frequency of monitoring and reporting approved by the Illinois EPA are applicable only to the Illinois EPA monitoring program and will not change the monitoring or reporting required under the federal CCR program.

Comment 10- Section 4.7

Please clarify how Sen's Estimate of Slope will be used to evaluate data during a semiannual or annual monitoring schedule.

Response: The text in Section 4.7 has been clarified to indicate that regardless of sampling frequency, at a minimum the most recent eight rounds will be used with a Mann-Kendal trend analysis to evaluate trends in sample results.

Comment 11- Table 3

The Agency does not have the authority to modify any analytical requirements of 40 CFR Part 257. Please clarify that any filtered samples collected and reported will be for interpretive purposes and will not be substituted for required monitoring pursuant to 40 CFR 257.

Response: Text has been added to Table 3 (see Note 5), included in Attachment 1, to clarify the use of filtered samples.

Comment 12- Table 4

Please confirm that the analytical methods listed may be used to analyze either filtered or unfiltered samples, particularly if both types of samples will be collected.

Response: Table 4 has been updated (see Note 1) to clarify the method applicability to filtered and unfiltered samples, and included in Attachment 1 to this response letter.

Comment 13- Appendix B

Please update and provide the applicable statistical evaluations referenced in this appendix.

Response: Appendix B has been updated and is included in Attachment 1 to this response letter.

Comment 14- Table 1a. HELP Input

Based on review of USEPA guidance materials, it is the Agency's understanding that the HELP Model can evaluate a maximum of nine layers. Under this assumption the Agency must question the validity of the HELP model outputs, since the native soils below the CCR are contained in the 11th layer. If the Agency's understanding of the HELP Model is incorrect, please provide a technical guidance reference and an explanation of the number of layers used.

Response: HELP Model Version 3.07 was used to simulate the effects of capping on the site. This version supports up to 20 soil layers, and 5 liner systems, as indicated in the HELP manual (excerpt below).

Version 3

3.9.2 Limits of Application

"The model can handle water routing through or storage in up to twenty soil or waste layers; as many as five liner systems may be employed. The simulation period can range from 1 to 100 years. The model cannot simulate a capillary break or unsaturated lateral drainage."

The number of layers used in the simulation is specified in Tables 1a and 1b of the Hydrostatic Modeling Report. Ash units were originally split into multiple layers to provide an opportunity to account for heterogeneity in the ash and provide flexibility to model different scenarios. However, modeling and data indicate the results were not sensitive to small scale heterogeneity; therefore, although the layers were ultimately treated as homogeneous by the model and given the same parameter inputs, the original multi-layer framework was retained. The multiple layers of ash do not affect the results of the HELP Model.

Comment 15- Sections 3.4.2 and 3.1

Dynegy indicates that the groundwater flow model and the transport model are sensitive to fluctuations in river stage. To simplify the model, river stage has been ignored. However, long term groundwater elevation monitoring shows that groundwater flow direction is affected by river stage. Please provide further explanation of any anticipated effect of the model simplification may have on long term plume concentration and location, and boron concentrations at monitoring wells.

Response: River stage is variable, but on a relatively short (i.e. transient) timeframe (days to weeks) relative to the long term steady state flow of groundwater via baseflow to the Illinois River. Relative to the long-term

timeline of the model (200 years), the transient effects of short periods of high river stage on groundwater elevations and quality should not significantly impact the extents or concentrations of the modeled boron plume. The flow and transport model was calibrated against long term observed groundwater elevations and boron concentrations in monitoring wells, along with an average river stage, and although there were significant transient river flood events that caused short-term deviations in groundwater elevations and boron concentrations, overall the calibrated model accounts for the longer term baseflow conditions to the Illinois River that control the extent and concentration of the modeled plume. It is therefore appropriate to use an average river stage for modeling the groundwater system.

Comment 16- Appendix F; Part I, 7a

The answer to the question is marked “no”, but a permit number is provided, please correct this apparent discrepancy.

Response: The appropriate box has been checked (Attachment 2 to this response letter).

Comment 17- Appendix F; Part II, 1

Please update this table appropriately if monitoring results indicate contaminants of concern in addition to those listed.

Response: The table has been updated and included in Attachment 2 to this response letter.

Comment 18- Appendix F; GMZ Introduction Section 1.5.2

The text of the last paragraph in this Section no longer reflects the current status of monitoring programs, and should be updated accordingly.

Response: The text has been updated and included in Attachment 2 to this response letter.

Comment 19- Appendix F; GMZ Introduction Section 2.1

Please update the table as necessary to reflect the results of current monitoring.

Response: The table has been updated and included in Attachment 2 to this response letter.

Very truly yours,
O'BRIEN & GERE ENGINEERS, INC.



Stuart J. Cravens PG
Technical Director | Hydrogeology



Nathaniel R. Keller
Senior Hydrogeologist

Attachments

- Attachment 1 Groundwater Monitoring Plan Revision 1
- Attachment 2 Groundwater Management Zone Application Revision 1



OBG

Groundwater Monitoring Plan Revision 1

**Hennepin West Ash Pond System
Hennepin, Illinois**

Dynegy Midwest Generation, LLC

**FINAL
May 18, 2018**



MAY 18, 2018 | FINAL | PROJECT #2413

Groundwater Monitoring Plan Revision 1

Hennepin West Ash Pond System
Hennepin, Illinois

Prepared for:

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, IL 62234



STUART J. CRAVENS, PG
Principal Hydrogeologist



ROBERT J KARNAUSKAS, PG, PH
Principal Hydrogeologist

TABLE OF CONTENTS

LIST OF TABLES	ii
LIST OF FIGURES.....	ii
LIST OF APPENDICES.....	ii
ACRONYMS AND ABBREVIATIONS.....	iii
1 INTRODUCTION.....	1
1.1 Overview.....	1
1.2 Site Location and Background.....	1
1.3 Conceptual Model.....	2
2 GROUNDWATER MONITORING	3
2.1 Existing Monitoring Well Network and Analysis.....	3
2.1.1 Illinois EPA Closure Work Plan Monitoring.....	3
2.1.2 40 CFR Part 257 Monitoring.....	4
2.2 Proposed Monitoring Network.....	5
2.3 Well Abandonment.....	6
3 APPLICABLE GROUNDWATER QUALITY STANDARDS	7
3.1 Groundwater Classification	7
3.2 Applicable Groundwater Quality Standards.....	7
3.3 Statistical Evaluation of Background Groundwater Data	7
3.4 Proposed Exceptions to the Groundwater Monitoring Parameters.....	7
4 GROUNDWATER MONITORING PLAN.....	9
4.1 Groundwater Monitoring.....	9
4.2 Sampling Schedule.....	10
4.3 Groundwater Sample Collection.....	10
4.4 Laboratory Analysis	11
4.5 Quality Assurance Program	11
4.6 Groundwater Monitoring System Maintenance Plan.....	11
4.7 Annual Statistical Analysis.....	12
4.8 Data Reporting	12
4.9 Compliance with Applicable On-Site Groundwater Quality Standards.....	12
4.10 Corrective Action	13
REFERENCES.....	14

LIST OF TABLES

Table 1	Monitoring Well Construction Summary
Table 2	Background Groundwater Quality and Applicable Groundwater Quality Standards
Table 3	Sampling and Analysis Summary
Table 4	Summary of Detection Limits for Proposed Class I Groundwater Standards Monitoring Program

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Monitoring Well Network
Figure 3	Water Table Contour Map – December 10, 2013
Figure 4	Water Table Contour Map – March 18, 2015
Figure 5	Proposed Monitoring Well Network and Abandonments

LIST OF APPENDICES

Appendix A	Monitoring Well Network Boring Logs and Monitoring Well Construction Reports
A1	MATHES Boring Logs and Well Details
A2	STMI Boring Logs and Well Details
A3	NRT Boring Logs and Well Details
Appendix B	Statistical Procedure for Calculation of Background
Appendix C	Groundwater Quality Monitoring Data
C1	Time Concentration Plots – 2005 through 2016
C2	Class I Groundwater Quality Standards Monitoring Results
Appendix D	Groundwater Sampling Protocol

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CCR	coal combustion residual
CFR	Code of Federal Regulations
cm/s	centimeters per second
DBCP	1,2-Dibromo-3-Chloropropane
DMG	Dynegy Midwest Generation, Inc.
EDB	Ethyl Dibromide
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ft	feet
IAC	Illinois Administrative Code
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
NRT	Natural Resource Technology, an OBG Company
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RL	Reporting Limit
S.U.	Standard Units
TDS	total dissolved solids
USEPA	United States Environmental Protection Agency

1 INTRODUCTION

1.1 OVERVIEW

This Groundwater Monitoring Plan was prepared by Natural Resource Technology, Inc., an OBG Company (NRT) in support of a Closure Plan for impoundments located at the Hennepin Power Station, Hennepin, Illinois which is owned by Dynegy Midwest Generation, LLC (DMG).

This plan and the Closure Plan will apply specifically to Coal Combustion Residuals (CCR) surface water impoundments associated with the West Ash Pond System which includes the following components:

- Old West Ash Pond (including Pond No. 1: 9.3 acres and Pond No. 3: 16.4 acres))
- Old West Polishing Pond: 4.7 acres

This plan describes the groundwater monitoring and reporting to be completed in support of the Closure Plan for the West Ash Pond System. In addition to this groundwater monitoring plan, a Groundwater Management Zone Application (NRT, 2017a) is being submitted under separate cover.

1.2 SITE LOCATION AND BACKGROUND

The West Ash Pond System is located in the northeast quarter of Section 27, Township 33 North, Range 2 West, Putnam County, Illinois and approximately three miles north-northeast of the Village of Hennepin (Figure 1). The impoundments are situated less than 200 feet south of the Illinois River and approximately one mile east of the Big Bend, where the river shifts course from predominantly west to predominantly south. The impoundment is bordered to the southeast by farm fields (i.e., corn and soybeans) with scattered clumps of rows or trees; to the southwest and west by low lying floodplains within the Donnelley Wildlife Management Area (Donnelley WMA) administered by the Illinois Department of Natural Resources (IDNR); and to the east by the power generating facility.

Ponds are maintained within the Donnelley WMA for migratory waterfowl. Water levels in these ponds are maintained by a system of pumps operated during migration season, with water pumped from the Illinois River through a channel that runs immediately west of the Old West Polishing Pond. The Donnelley WMA is predominantly a swampy area vegetated by grasses and trees.

The Hennepin Power Station had two coal-fired units constructed in 1953 and 1959. The coal source changed several times since the station was constructed; however, all coal ash disposed to the West Ash Pond System is derived from high-sulfur Illinois coal.

DMG operated the West Ash Pond System at the Hennepin Power Station from 1952 through 1996 (Figure 2). The West Ash Pond System consists of two ash ponds, all of which are now out-of-service. The Old West Ash Pond which includes Pond No. 1 at the eastern end of the impoundment, primarily consists of bottom ash and slag and Pond No. 3, in the central portion of the impoundment, contains mixed coal ash. The Old West Polishing Pond is located at the western end of the impoundment. All of the ponds are bermed. The berms, which are 15 feet above grade, were constructed from locally occurring sandy soils. The entire west impoundment covers an area of approximately 30.4 acres.

During operation, service water was used to sluice fly ash, bottom ash, and low-volume wastes to the impoundment. At the time the impoundment was removed from service in late 1996, there was no surface water discharge and all sluice water ex-filtrated via evapotranspiration, seepage through the berms, or leakage through the base of the ponds.

The west impoundment was not capped after it was removed from service in order to facilitate future mining and beneficial re-use of the ash. The impoundment is partially dewatered by gravity drainage, although pumps were used to complete the dewatering process in 1998. The ash is currently dry over most of the surface through most of the year with the exception of (i) the Old West Polishing Pond, which always contains water;

and, (ii) the western portion of the Old West Ash Pond (specifically the western end of Pond No. 3), where runoff water collects and is ponded most of the year.

Within the Old West Ash Pond the surface topography of ash in Pond No. 1 is uneven with no pronounced slope. The top of ash in Pond No. 3 slopes downward from the east, where the sluiced ash inlet was located, to the west. Top of ash elevation in all three ponds is lower than the surrounding berms, providing full containment. There are no controls to collect storm water so all runoff collects in the lowest portion of each pond, where it evaporates or infiltrates through the ash.

The Hennepin Old West Ash Pond will be closed by ash dewatering, relocating/reshaping the CCR to achieve acceptable grades and constructing a geomembrane cover system comprised of (from top to bottom) 6-inch vegetative layer to minimize long-term erosion, 18-inch protective soil layer, a 0.2-inch geocomposite drainage layer and a 40-mil geomembrane layer. CCR within the Old West Polishing Pond will be removed and the pond will be closed.

1.3 CONCEPTUAL MODEL

Significant site investigation has been completed at the Hennepin Power Plant to characterize the geology, hydrogeology and groundwater quality. Based on extensive investigation and monitoring, the West Ash Pond System has been well characterized and detailed in the Hydrogeologic Site Characterization Report (NRT, 2017b). A site conceptual model has been developed and is discussed below.

The four principal stratigraphic layers encountered at the West Ash Pond System and adjacent areas are:

- Fill - coal combustion residuals (CCRs) consisting primarily of fly ash with lesser amounts of bottom ash and slag. This layer also includes the constructed fill berms around the ash ponds, which contain variable admixtures of CCRs and re-worked native silt, clay and sand;
- Alluvial fine grained silts and clays, classified as Cahokia Alluvium;
- Alluvial fine to medium sands; and,
- Sand and gravel with boulders, deposited by glacial meltwaters and classified as Henry Formation

The river-laid deposits are classified as Cahokia Alluvium. The Henry Formation sands and gravels make up the upper and lower terraces, and fill the valley beneath the alluvium. The stratigraphy of unlithified materials underlying the Henry Formation is uncertain, but it is assumed based on nearby borings at the power plant, East Ash Pond System, and vicinity that the Henry Formation most likely sits directly on top of bedrock in the vicinity of the West Ash Pond System.

The West Ash Pond System lies over both glacial deposits (Henry Formation) and alluvium (Cahokia Alluvium). The Old West Ash Pond specifically Pond No. 1 lies on top of lower terrace glacial deposits, and the eastern portion of Pond No. 3 overlies alluvial sand, while the western portion of Pond No. 3 and the Old West Polishing Pond overlay silty clay alluvial channel fill deposits.

Groundwater is encountered in the sand and sand and gravel units, and occasionally in the fill when Illinois River water levels are high. The uppermost aquifer includes mixed alluvial deposits (clay, silt, and sand) which overlie coarser grained outwash sand and gravel deposits and is the primary groundwater transport pathway in the vicinity of the West Ash Pond System.

The groundwater elevations are significantly influenced by the Illinois River, flowing toward the river during normal river stages (Figure 3), and away from the rivers during flood events when river water recharges the groundwater (Figure 4). Groundwater flow occurs primarily in the alluvial sand and sand and gravel units.

The parameters observed in groundwater with exceedances of Class I standards during the most recent 2016 Closure Work Plan sampling event included boron, iron, manganese and sulfate. The exceedances of Class I groundwater quality standards for manganese and iron are attributable to variations in groundwater geochemistry rather than a release from the West Ash Pond System.

2 GROUNDWATER MONITORING

Currently, there are two monitoring programs for the Hennepin West Ash Pond System. Groundwater monitoring began in 1996 in accordance with the Closure Work Plan approved by the Illinois EPA on November 8, 1996. Groundwater monitoring results are reported to the Illinois EPA annually in accordance with the approved Closure Work Plan. The most recent data and analysis were submitted in the 2016 Closure Work Plan Annual Report (NRT, October 21, 2016). The IEPA monitoring program has been utilized since the Closure Plan in 1996 to evaluate post-closure groundwater quality and trends and to demonstrate compliance with the applicable groundwater quality standards identified in Section 3.2. Due to exceedances of Class I Groundwater Standards, the area around the West Ash Pond System is included in a Groundwater Management Zone (GMZ) which was approved by the IEPA in 1996. An updated GMZ application is included in the attached Closure and Post-Closure Care Plan, this GMZ will replace the existing GMZ upon approval of the Closure Plan.

In addition to the IEPA monitoring, a monitoring program has been established consistent with the requirements of 40 CFR Part 257 (CCR Rule). CCR Rule monitoring commenced in November 2015. Upon approval of the Closure Plan in which this document is attached, the monitoring network will consist of one program to comply with both Illinois EPA and CCR Rule requirements.

The proposed groundwater monitoring well network consists of a sufficient number of wells, installed at appropriate locations and depths, to monitor post-closure compliance with groundwater quality standards for Class I: Potable Resource Groundwater. The wells will monitor the mixed alluvial deposits (clay, silt, and sand) overlying coarser grained outwash sand and gravel deposits in the vicinity of the West Ash Pond System which have been designated the uppermost aquifer.

The monitoring wells are designed and constructed in accordance with applicable standards, including the following:

- All monitoring wells are cased in a manner that maintains the integrity of the boreholes
- Wells are screened to allow sampling only at the specified interval
- All wells are covered with vented caps, unless located in flood-prone areas, and equipped with devices to protect against tampering and damage

The monitoring well network described below fulfills the following goals:

- Enable the collection of groundwater samples that represent the quality of background water that has not been affected by the West Ash Complex
- Enable the collection of groundwater samples that represent the quality of downgradient groundwater
- Include wells that are located within the stratigraphic unit that may serve as potential chemical migration pathways

2.1 EXISTING MONITORING WELL NETWORK AND ANALYSIS

The existing well network for the West Ash Pond System is shown on Figure 2. Well construction details are summarized in Table 1. The monitoring network currently includes two leachate head wells and 14 monitoring wells. Boring logs and monitoring well construction reports for the groundwater monitoring system are provided in Appendix A.

2.1.1 Illinois EPA Closure Work Plan Monitoring

The monitoring program performed in compliance with the current Illinois EPA-approved Closure Plan (Dyneyg, 2016) consists of collecting samples from three background wells (32, 33, 34) and nine downgradient wells (21 through 27, 30, 31). Samples are collected semi-annually except for background wells 33 and 34 which are sampled annually. Groundwater samples are analyzed for the following parameters:

Field Parameters	
Ph	Temperature
Specific Conductivity	Groundwater Elevation (ft)

Laboratory Parameters		
Boron (Dissolved)	Iron (Dissolved)	Sulfate (Total)
Chloride (Total)	Manganese (Dissolved)	Total Dissolved Solids (TDS)

Time concentration plots showing the results of the above monitoring are provided in Appendix C1. Four additional monitoring wells (L3, L5, 35 and 36) are monitored for groundwater elevation only. All wells are screened in the sand units underlying and near the West Ash Pond System.

Groundwater monitoring results are reported to the Illinois EPA annually in accordance with the approved Closure Work Plan. The most recent data and analysis were submitted in *'2016 Closure Work Plan Annual Report* (NRT, October 21, 2016).

Additional groundwater monitoring was initiated for four quarters (June [Q2] 2013 through March [Q1] 2014) to assess compliance with the IAC 35 Part 620 Section 410 *Groundwater Quality Standards for Class I: Potable Resource Groundwater*. Sampling was conducted for an expanded list of parameters that included the following:

Field Parameters	
Ph	Temperature
Specific Conductivity	Turbidity

Laboratory Parameters			
Inorganics (Total)			
Chloride	Fluoride	Nitrite	Sulfate
Cyanide	Nitrate	Perchlorate	TDS
Metals (Total and Dissolved)			
Antimony	Cadmium	Lead	Silver
Arsenic	Chromium	Manganese	Thallium
Barium	Cobalt	Mercury	Vanadium
Beryllium	Copper	Nickel	Zinc
Boron	Iron	Selenium	
Organic Compounds			
Volatile Organic Compounds	Polychlorinated Biphenyls (PCBs)		
Semi-Volatile Organic Compounds	Specialized Organic Parameters: Endohall, Ethyl Dibromide (EDB) and		
Chlorinated Pesticides	1,2-Dibromo-3-Chloropropane (DBCP)		
Chlorinated Herbicides			

The groundwater quality results for the above field, inorganic and organic parameters listed in IAC 35 Part 620 Section 410 (except for Radium 224/226), for the four quarters of monitoring conducted are provided in Appendices C2 and C3, respectively.

2.1.2 40 CFR Part 257 Monitoring

Groundwater data collection under the CCR Rule was initiated in fourth quarter, 2015. The CCR Rule monitoring network consists of background/upgradient monitoring wells 32 and 34, and downgradient monitoring wells 21, 22, 23, 24, 35, and 49. Monitoring well 49 was installed by NRT in July, 2015 on the north berm of the Old West Ash Pond near Pond No. 1 to supplement the CCR Rule groundwater monitoring network. Monitoring of

this well commenced in 2016. Parameters tested under the initial CCR Rule groundwater monitoring requirements include Appendix III and Appendix IV parameters (see below). All existing groundwater monitoring wells are measured at least annually for groundwater elevation.

40 CFR Part 257 Monitoring			
Appendix III Parameters (Total, except TDS)			
Boron	Chloride	pH	TDS
Calcium	Fluoride	Sulfate	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lead	Selenium
Arsenic	Chromium	Lithium	Thallium
Barium	Cobalt	Mercury	Radium 226/228
Beryllium	Fluoride	Molybdenum	
Field Parameters			
Dissolved Oxygen	Specific Conductivity	Turbidity	pH

Data collected under the CCR Rule groundwater monitoring program will be available when CCR reporting begins in January 2018. Following the completion of eight quarterly sampling events, the monitoring program will be modified so that the analytical parameters and sampling frequency are appropriate to the objectives and requirements of the CCR Rule.

2.2 PROPOSED MONITORING NETWORK

This Closure Plan proposes a single groundwater monitoring program to meet the requirements of both 40 CFR 257, and 35 IAC Part 620.410, including the modifications previously approved by Illinois EPA. The proposed groundwater monitoring system will consist of two background monitoring wells (32 and 34) and seven compliance monitoring wells (21, 22, 23, 24, 27, 35 and 49) as follows:

Well Number	Groundwater Quality	Groundwater Elevation (ft, bgs)	Well Position Relative to the West Ash Pond System
21	X	X	Downgradient
22	X	X	Downgradient
23	X	X	Downgradient
24	X	X	Downgradient
25		X	Side-gradient
26		X	Side-gradient
27	X	X	Downgradient
30		X	Side-gradient
31		X	Side-gradient
32	X	X	Background
33		X	Background
34	X	X	Background
35	X	X	Downgradient
36		X	Upgradient
49	X	X	Downgradient

In addition, wells 25, 26, 30, 31, 33 and 36, south of the West Ash Pond System, will be monitored for elevation but not water quality. The proposed monitoring wells will yield groundwater samples that represent the quality of downgradient groundwater at the property boundary and within the proposed GMZ. Monitoring well depths and construction details are listed in Table 1 (and summarized below). The well locations are shown on Figure 5.

It may be necessary to abandon some wells adjacent to the West Ash Pond System during closure construction. If so, these wells will be replaced as close to the former location as possible, at the same screened interval as the former well, and utilizing the requirements for well construction as per Illinois Department of Health regulations (77 IAC Part 920.170).

2.3 WELL ABANDONMENT

The leachate head wells L1, -2, -3, -4, -5, LPZ -1, -3, -5, -13, -15, -17 and piezometers HEN-P001 through HEN-P003 will be abandoned prior to capping of the West Ash Pond System. The locations of the leachate wells and piezometers that will be abandoned are shown on Figure 5. Abandoned monitoring wells will be sealed in accordance with 77 IAC Part 920.120.

3 APPLICABLE GROUNDWATER QUALITY STANDARDS

3.1 GROUNDWATER CLASSIFICATION

The classification of groundwater at the West Ash Pond System has been evaluated and, based on the detailed geologic information for the mixed alluvial deposits (clay, silt, and sand) and underlying outwash sand and gravel deposits at the Site, can be classified as Class I - Potable Resource Groundwater, per the provisions of 35 IAC 620.210. The thickness of the uppermost aquifer is greater than 5 feet and field hydraulic conductivity tests performed on sand and sand and gravel units had a geometric mean hydraulic conductivity of 6.0×10^{-3} cm/s.

3.2 APPLICABLE GROUNDWATER QUALITY STANDARDS

The applicable groundwater quality standards for the proposed monitoring well network are Groundwater Quality Standards for Class I: Potable Resource Groundwater [35 IAC 620.410] or background concentrations based on statistical analyses, as proposed in Section 3.3.

Background groundwater quality for all parameters will be established through statistical evaluation following completion of eight quarters of groundwater sampling of background wells 32 and 34 that commenced in November 2015. The groundwater quality standard for these parameters at the proposed monitoring well network at the West Ash Pond System will be the greater of either the background concentration or the groundwater quality standard for Class I Potable Resource Groundwater. This is consistent with the methods outlined in 40 CFR Part 257. The current list of applicable groundwater quality standards for the monitoring well network is shown on Table 2.

3.3 STATISTICAL EVALUATION OF BACKGROUND GROUNDWATER DATA

A statistical evaluation will be performed to determine the maximum background concentrations likely to occur upgradient of the West Ash Pond System. The groundwater quality data collected from upgradient monitoring wells 32 and 34 will be evaluated using the Electric Power Research Institute (EPRI, March 2014) computer database and analysis program, MANAGES™ (Version 3.4.49 or 4.0 upon release). The statistical analysis procedures used here are consistent with procedures described in the document: 2009 Unified Guidance. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities—Unified Guidance," March 2009, EPA 530/R-09-2007 (USEPA, 2009).

The proposed statistical methodology is provided in Appendix B. Establishing the prediction limit(s) or tolerance interval(s) for the groundwater constituents will utilize either a parametric or non-parametric procedure based on the percentage of non-detects in the data sets and the distribution of the sample population. If the statistical data for a constituent has less than 50 percent non-detects and was normally or log-normally distributed, a parametric procedure will be used. If the data is not normally or log-normally distributed or has more than 50 percent non-detects, a non-parametric procedure will be used. Appendix B, Figure B-1 is a flow chart which illustrates the process to determine the appropriate statistical procedure to use for each constituent based on its statistical characteristics.

3.4 PROPOSED EXCEPTIONS TO THE GROUNDWATER MONITORING PARAMETERS

Based on the results of groundwater monitoring performed at the Hennepin West Ash Pond System to date and reductions to the closure monitoring program approved by the IEPA since the 1996 Closure Work Plan, the following exceptions to the above applicable Class I: Potable Resource Groundwater standards are proposed:

- Analytical results (Appendix C) indicate manganese and iron have historically exceeded the groundwater quality standards of Class I Potable Resource Groundwater inorganic constituents listed in 35 IAC 620.410(a)(1). However, based on extensive analysis, elevated metals concentrations have been attributed to reducing conditions and aquifer composition and are not prevalent in groundwater associated with the West Ash Pond System.

- Nitrate is included in the inorganic parameters for Class I Potable Resource Groundwater. Historical monitoring has not exhibited nitrate exceedances and nitrate is not prevalent in groundwater associated with the West Ash Pond System.
- Class I Potable Resource Groundwater requires monitoring the inorganic constituents copper, cyanide, nickel, silver, vanadium, and zinc listed in 35 IAC 620.410(a)(1). These constituents will not be monitored because they may be sensitive to the aquifer reducing conditions and are not expected to be associated with the chemical characteristics of the West Ash Pond System. Further, copper and silver were not detected in any of the monitoring system wells during the four consecutive quarterly samples in 2013 and 2014.
- Perchlorate is commonly used as an oxidizer in solid propellants, munitions, fireworks, airbag initiators for vehicles, matches and signal flares. It is also used in some electroplating operations and found in some disinfectants and herbicides (USEPA, 2014). Perchlorate is an inorganic constituent listed in 35 IAC 620.410(a)(1). Perchlorate will not be monitored because it was not detected during the June 2013 sampling event and is not associated with the chemical characteristics of CCR at the West Ash Pond System.

Following approval of this Closure Plan these parameters will not be monitored. The proposed groundwater monitoring parameters for the proposed monitoring well network are discussed further in Section 4.1.

4 GROUNDWATER MONITORING PLAN

The proposed groundwater monitoring program described in this document is consistent with the requirements of 35 IAC Part 620 and Illinois EPA-approved modifications as well as 40 CFR Part 257. The groundwater monitoring plan will monitor and evaluate groundwater quality to demonstrate compliance with the groundwater quality standards for Class I: Potable Resource Groundwater as well as USEPA MCLs or background exceedances, as appropriate.

4.1 GROUNDWATER MONITORING

As discussed in Section 2.2, the proposed post-closure Illinois EPA and CCR Rule groundwater sampling network consists of two background monitoring wells (32 and 34) and seven compliance monitoring wells (21, 22, 23, 24, 27, 35 and 49) installed in the alluvial and underlying outwash sand and gravel deposits adjacent to the West Ash Pond System (Figure 5). In addition, wells 25, 26, 30, 31, 33 and 36, south of the West Ash Pond System, will be monitored for elevation but not water quality. Groundwater samples at the background and compliance wells will be collected and analyzed for the following laboratory and field parameters:

Laboratory Parameters (Total)		
<i>Metals (totals)</i>		
Antimony	Cadmium	Lithium
Arsenic	Calcium	Mercury
Barium	Chromium	Molybdenum
Beryllium	Cobalt	Selenium
Boron	Lead	Thallium
<i>Inorganics (totals)</i>		
Fluoride	Sulfate	
Chloride	Total Dissolved Solids	
<i>Other (total)</i>		
Radium 226 and 228 combined		
Field Parameters		
pH	Temperature	
Oxidation/Reduction Potential	Specific Conductivity	
Dissolved Oxygen	Turbidity	

As discussed in Section 3.4, other inorganic constituents listed under 35 IAC 620 and/or 40 CFR Part 257 Appendix IV will not be monitored at the proposed monitoring well network because the groundwater monitoring results to date indicate the following:

- The constituent meets the Class I: Potable Resource Groundwater standards
- The constituent has not been consistently observed above detection limits in monitoring wells at the West Ash Pond System during previous sampling events.
- The constituent is not associated with the chemical characteristics of the West Ash Pond System, and/or
- The constituent is indicative of reducing conditions in the aquifer and are not prevalent in groundwater associated with the West Ash Pond System

All parameters listed above will be sampled a minimum of eight times by October 17, 2017 to establish background groundwater quality. Following the initial eight rounds of sampling, the parameters to be monitored and the frequency of monitoring will be in accordance with the requirements of 40 CFR Part 257.94 and 257.95 and this plan. Upon completion of a minimum eight rounds of sampling, analytical results will be reviewed and the proposed Appendix IV parameters to be monitored and reported to the Illinois EPA may be modified, with Illinois EPA approval. A reduction to the Appendix IV parameters that may be approved by the Illinois EPA will

not affect the groundwater monitoring and reporting completed in accordance with of 40 CFR Part 257.94 and 257.95, which will continue to be completed as required.

4.2 SAMPLING SCHEDULE

Groundwater sampling for the proposed monitoring well network will initially be performed quarterly according to the following schedule:

Frequency	Duration
Quarterly	Begins: the quarter following approval of this plan. <i>(All parameters with the exception of Radium 226/228, which will be sampled semiannually after the first 8 quarterly rounds of background sampling)</i> Ends: five years after completion of cap and upon demonstration that monitoring effectiveness is not compromised and that there are no increasing trends attributable to the West Ash Pond System.
Semiannual	Begins: after IEPA approves that quarterly monitoring requirements have been satisfied. Ends: five years after initiation of semiannual monitoring and upon demonstration that monitoring effectiveness is not compromised and that there are no increasing trends attributable to the West Ash Pond System.
Annual	Begins: after IEPA approves that semiannual monitoring requirements have been satisfied. Ends: upon IEPA approval of a certified post-closure care report, but no less than 30 years from the date of closure as specified in 40 CFR 257

Five years after approval of the Closure Plan, a request may be made to modify the post-closure care plan to reduce the frequency of groundwater monitoring to semi-annual sampling by demonstrating all of the following:

- Monitoring effectiveness will not be compromised by the reduced frequency of monitoring
- Sufficient data has been collected to characterize groundwater
- Concentrations of constituents monitored at the downgradient boundaries show no statistically significant increasing trends that can be attributed to the West Ash Pond System

If concentrations of parameters of concern at the downgradient wells of the site show no statistically significant increasing trends that can be attributed to the Hennepin West Ash Pond System for the five years after reducing the monitoring frequency to semi-annual, a request may be made to modify the post closure care plan to reduce monitoring parameters and/or monitoring frequency to annual sampling by demonstrating the same items above as for the reduction to semi-annual monitoring.

Groundwater monitoring may be discontinued upon Illinois EPA’s approval of a certified post-closure care report after a minimum 30 years of post-closure groundwater monitoring has been completed. Specifically, when no statistically significant increase is detected in the concentration of any constituent above that measured and recorded during the immediately preceding scheduled sampling for four consecutive years after changing to an annual monitoring frequency.

Any reduction in frequency of monitoring approved by the Illinois EPA is applicable only to monitoring and reporting of groundwater results to the Illinois EPA. Groundwater monitoring and reporting for the 40 CFR Part 257 well network will follow a schedule in accordance with the requirements of 40 CFR Part 257.94 and 257.95. Post-closure care groundwater monitoring will continue for a minimum of 30 years in accordance with 40 CFR Part 257.104.

4.3 GROUNDWATER SAMPLE COLLECTION

Groundwater samples will be collected consistent with the requirements of 35 IAC Part 620 and 40 CFR 257.93 as described in Appendix D. In addition to groundwater well samples, quality assurance samples will be collected as described in Section 4.5 (Table 3).

4.4 LABORATORY ANALYSIS

Laboratory analysis will be performed consistent with the requirements of 35 IAC Part 620 and 40 CFR 257.93 by a state-certified laboratory using methods approved by Illinois EPA and USEPA (Table 4). The reporting limits (RLs) for all parameters analyzed will be lower than the applicable groundwater quality standard. Concentrations lower than the RL will be reported as less than the RL. A list of these parameters and the required RLs are summarized in Table 4.

4.5 QUALITY ASSURANCE PROGRAM

Consistent with the requirements of 35 IAC Part 620 and 40 CFR 257.93, the sampling and analysis program includes procedures and techniques for quality assurance and quality control (Table 3). Additional quality assurance samples to be collected will include the following:

- Minimum of one blind duplicate groundwater sample from randomly selected monitoring wells
- One equipment blank sample will be collected and analyzed for each day of sampling. If dedicated sampling equipment is used, then equipment blank samples will not be collected

The duplicate and equipment blank quality assurance samples will be supplemented by the laboratory QA/QC program, which typically includes:

- Regular generation of instrument calibration curves to assure instrument reliability
- Laboratory control samples and/or quality control check standards that have been spiked, and analyses to monitor the performance of the analytical method
- Matrix spike/matrix spike duplicate analyses to determine percent recoveries and relative percent differences for each of the parameters detected
- Analysis of replicate samples to check the precision of the instrumentation and/or methodology employed for all analytical methods
- Analysis of method blanks to assure that the system is free of contamination

4.6 GROUNDWATER MONITORING SYSTEM MAINTENANCE PLAN

Consistent with the requirements of 35 IAC Part 620 and 40 CFR 257.91, maintenance will be performed as needed to assure that the monitoring wells provide representative groundwater samples. Monitoring wells will be inspected during each groundwater sampling event. Monitoring well inspections will consist of the following:

- Visual inspection, clearing of vegetation, replacement of markers, and painting of protective casings as needed to assure that monitoring wells are clearly marked and accessible
- Visual inspection and repair or replacement of well aprons as needed to assure that they are intact, drain water away from the well, and have not heaved
- Visual inspection and repair or replacement of protective casings as needed to assure that they are undamaged, and that locks are present and functional
- Checks to assure that well caps are intact and vented, unless in flood-prone areas in which case caps will not be vented
- Annual measurement of monitoring well depths to determine the degree of siltation within the wells. Wells will be redeveloped as needed to remove siltation from the screened interval if it impedes flow of water into the well
- Checks that wells are clear of internal obstructions, and flow freely

If maintenance of a monitoring well cannot address an identified deficiency, a replacement well will be installed.

4.7 ANNUAL STATISTICAL ANALYSIS

Trend analysis will be performed annually for each of the monitored parameters. A Mann- Kendall trend analysis will be applied to a Thiel-Sen line using a minimum of eight consecutive quarterly monitoring results. If a reduction in the frequency of monitoring is approved, the Mann-Kendall analysis will be applied to a minimum of the eight most recent monitoring results. If there are increasing trends during closure and post-closure care periods, they will be further investigated as described below.

- If the results of sampling and analysis show an increasing trend at any compliance monitoring well, a Mann-Kendall analysis will be performed at 95 percent confidence to determine whether or not the increasing trend is statistically significant.
- If a statistically significant increasing trend occurs during post-closure care, further investigation of monitored concentrations will be performed as well as more frequent inspections of the surface of the cover system.
- If the investigation attributes a statistically significant increasing trend to a source other than the West Ash Pond System, then the Illinois EPA will be notified in writing, stating the cause of the increasing trend and providing the rationale used in such a determination.
- If there is not an alternative source causing the statistically significant increasing concentration and the sampling frequency had been reduced to semi-annual or annual sampling, a quarterly sampling schedule will be reestablished. The frequency of sampling will return to either semi-annual or annual, once four consecutive quarterly samples show no statistically significant increasing trend.

Notifications concerning statistically significant increasing trends and revisions of the sampling frequency will be reported to Illinois EPA in writing within 30 days after making the determinations.

In addition, as required in 40 CFR Part 257.93, statistical analysis will be performed to determine whether or not a statistically significant increase over a background value has occurred for each constituent and at each well. Appropriate statistical methods will be chosen from the list of methods provided and the test chosen will be conducted separately for each constituent in each monitoring well. In addition, each statistical method chosen will comply with the performance standards, as appropriate, based on the test method used. If a statistically significant increase over background values is determined, procedures from 40 CFR Part 257 will be followed including: 1) establishing an assessment monitoring program; or 2) demonstrating that a source other than the West Ash Pond System caused the increase or demonstrating another plausible reason for the increase (error in sampling, etc.).

4.8 DATA REPORTING

Sampling and analysis data from quarterly, semi-annual and/or annual groundwater monitoring for the monitoring well network will be reported to Illinois EPA within 60 days after completion of sampling. Statistical analysis of the laboratory analytical data will be reported to Illinois EPA with the annual report for the facility, as described in the closure plan.

4.9 COMPLIANCE WITH APPLICABLE ON-SITE GROUNDWATER QUALITY STANDARDS

In accordance with IAC 620 Section 620.240, the compliance boundary is a lateral distance of 25 feet outward from the outermost edge of the Hennepin West Ash Pond System berms. Following completion of the corrective action, the groundwater standard at the compliance boundary will be in accordance with IAC 620 Section 450(a)(4) for groundwater quality restoration such that the standard for each released chemical constituent will be the higher of either the Class I groundwater standard or the concentration determined by groundwater monitoring at the compliance boundary.

Compliance with on-site groundwater quality standards, as measured at the proposed monitoring well network, and the termination of groundwater monitoring, will be achieved when there are no statistically significant increasing trends that are attributed to the West Ash System for parameters detected at the compliance

boundary after a minimum 30 years of post-closure groundwater monitoring has been completed. Evaluation of groundwater quality data under USEPA (2015) will be consistent with 40 CFR Part 257.93 and 257.94.

4.10 CORRECTIVE ACTION

If a statistically significant increasing trend is observed to continue over a period of two or more years in groundwater sampled at the well network, and a subsequent hydrogeologic site investigation demonstrates that such exceedances are due to a release from the West Ash Pond System and corrective actions are appropriate to mitigate such releases, a corrective action plan will be proposed as a modification to the post-closure care plan. A corrective action plan will be submitted to Illinois EPA within 180 days after completion of the investigation activities. The plan will propose corrective actions to be undertaken to mitigate the impacts associated with the constituents of concern which exceed applicable groundwater standards.

REFERENCES

AECOM, January 12, 2016. 30% Design Data Report for the Dynegy Hennepin Power Station; West Polishing Pond, West Ash Pond, East Ash Pond and Ash Pond No. 2 CCR Units.

Dynegy Midwest Generation, LLC, October 17, 2016. Closure Plan for Existing CCR Surface Impoundment, Ash Pond No. 2, Hennepin Power Station, Hennepin, Illinois (REV 2).

Natural Resource Technology, Inc., 2017a. Groundwater Management Zone Application. West Ash Pond System, Dynegy Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.

Natural Resource Technology, Inc. 2017b. Hydrogeologic Site Characterization Report, West Ash Pond System, Hennepin Power Station, Hennepin, Illinois

USEPA, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance. EPA 530/R-09/007, U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery, Washington, D.C., 554 p. + 4 app.

USEPA, January 2014. Technical Fact Sheet – Perchlorate

USEPA, April 17, 2015. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule

Tables

**Table 1. Monitoring Well Construction Summary
Groundwater Monitoring Plan
West Ash Pond System, Hennepin Power Station**

Current Well and/or Boring Designation ⁽¹⁾	Year Constructed	Driller	Well Top Elevation ⁽²⁾	Ground Elevation	Screen Top Depth (BGS)	Screen Bottom Depth (BGS)	Screen Top Elevation	Screen Bottom Elevation	Bottom of Well Elevation	Slotted Screen Length	Screen Diameter (Inches)	Formation Screened
21 (W-1)	Dec-1982	Mathes	459.34	459.8	49.0	59.0	410.8	400.8	400.2	10	2	sand
22 (W-2)	Dec-1982	Mathes	464.45	461.5	24.4	34.4	437.1	427.1	426.9	10	2	gravel
23 (W-3)	Dec-1982	Mathes	463.39	460.9	34.0	44.0	426.9	416.9	415.7	10	2	gravel
24 (W-4)	Dec-1982	Mathes	462.14	461.1	56.4	66.4	404.7	394.7	396.6	10	2	gravel
25 (W-5)	Dec-1982	Mathes	462.61	460.2	24.4	34.4	435.8	425.8	424.7	10	2	gravel
26	Aug-1995	STMI	462.70	459.4	11.0	21.0	448.4	438.4	433.7	10	2	gravel
27	Sep-1995	STMI	450.58	448.2	30.0	35.0	418.2	413.2	411.9	5	2	sand/gravel
30	Aug-1995	STMI	453.16	450.9	30.0	35.0	420.9	415.9	418.2	5	2	gravel
31	Aug-1995	STMI	453.13	450.9	5.0	15.0	445.9	435.9	435.2	10	2	sand
32	Aug-1996	STMI	451.38	448.7	7.0	17.0	441.7	431.7	431.4	10	2	sand/gravel
33	Aug-1996	STMI	449.71	447.8	37.5	42.5	410.3	405.3	406.2	5	2	sand
34	Aug-1996	STMI	449.56	448.2	30.0	35.0	418.2	413.2	413.2	5	2	sand
35	Sep-1999	NRT	454.83	451.5	8.0	18.0	443.5	433.5	433.9	10	2	sand
36	Sep-1999	NRT	462.02	459.7	18.0	28.0	441.7	431.7	431.8	10	2	sand/gravel
49	Jul-2015	NRT	468.17	465.8	35.0	45.0	430.8	420.8	420.8	10	2	sand/gravel
L1	Aug-1995	STMI	464.56	465.1	25.0	30.0	440.1	435.1	422.5	5	2	silt
L3	Sep-1995	STMI	462.18	459.3	7.5	12.5	451.8	446.8	433.3	5	2	ash
L4	Aug-1995	STMI	460.90	461.0	12.6	22.6	448.4	438.4	432.4	10	2	ash/silt
L5	Apr-2000	NRT	464.22	461.3	27.0	32.0	434.3	429.3	429.3	5	2	sand/gravel

Notes:

All depth and elevation measurements are in feet.

(1) Original well designations are in parentheses.

(2) Wells 25 through 33 were surveyed by Chastain (6/11/14); Other wells surveyed by IngenAE (11/21/16)

Mathes John Mathes and Associates, Inc.

NRT Natural Resource Technology, Inc.

STMI Science and Technology Management, Inc.

**Table 2. Background Groundwater Quality and Applicable Groundwater Quality Standards
Groundwater Monitoring Plan
West Ash Pond System, Hennepin Power Station**

Parameters (totals)	IL Class I Std ¹ (mg/L)	Background Concentration for IEPA (mg/L)	Background Concentration Determination	Applicable Groundwater Standard ² for IEPA (mg/L)	Maximum ³ (mg/L)	Minimum ³ (mg/L)
Antimony	0.006	0.001	IEPA Standard	0.006	<0.001	<0.001
Arsenic	0.01	0.001	IEPA Standard	0.01	0.034	<0.001
Barium	2.0	0.156	IEPA Standard	2.0	0.187	0.028
Beryllium	0.004	0.001	IEPA Standard	0.004	<0.001	<0.001
Boron	2.0	0.206	IEPA Standard	2.0	8.5	1.14
Calcium	NS	170	NPPI	170	211	91
Cadmium	0.005	0.001	IEPA Standard	0.005	0.0044	<0.001
Chloride	200	108	IEPA Standard	200	111	38
Chromium	0.1	0.0013	IEPA Standard	0.1	0.0018	<0.001
Cobalt	1.0, 0.002 ⁴	0.0017	IEPA Standard	0.002	0.0047	<0.001
Fluoride	4	0.17	IEPA Standard	4	0.22	0.14
Lead	0.0075	0.001	IEPA Standard	0.0075	0.003	<0.001
Lithium	NS	0.0135	NPPI	0.0135	0.064	0.0036
Mercury	0.002	0.0002	IEPA Standard	0.002	<0.0002	<0.0002
Molybdenum	NS	0.002	NPPI	0.002	0.206	0.0043
Selenium	0.05	0.0011	IEPA Standard	0.05	0.017	<0.001
Sulfate	400	117	IEPA Standard	400	500	96
Thallium	0.002	0.001	IEPA Standard	0.002	0.0014	<0.001
Total Dissolved Solids	1200	830	IEPA Standard	1,200	1,010	458
Field pH	6.5 / 9.0	6.72 / 7.33	IEPA Standard	6.5 / 9.0	8.15	6.96
Radium 226/228*	20/20, 5 ⁴	2.16	IEPA Standard	5	2.46	<1

Notes:

All parameters are totals unless noted. Standards apply to dissolved or total concentrations

Red = Exceeds Applicable Groundwater Standard

NS = No Class I Groundwater Standard

NPPI = Nonparametric Prediction Interval

¹ IAC Title 35, Part 620.410, Groundwater Quality Standards for Class I: Potable Resource Groundwater Standard

² Applicable Groundwater Standard is the higher of the Background Concentration and the Class I Groundwater Standard (or the lower if compared to the pH lower limit)

³ Concentrations measured between December 2015 and July 2017 at monitoring wells within IEPA Program

⁴ Standards listed are proposed changes to 35 Ill. Adm. Code Part 620 by Illinois EPA

* Radium 226 and 228 reported separately for Class I Groundwater Standard, although proposed changes include combined reporting. USEPA 40 CFR Part 257 requires combined reporting.

**Table 3. Sampling and Analysis Summary
Groundwater Monitoring Plan
West Ash Pond System, Hennepin Power Station**

Parameter	Analytical Method ⁵	Number of Samples	Field Duplicates ¹	Field Blanks ²	Equipment Blanks ²	MS/MSD ³	Total	Container Type	Minimum Volume ⁴	Preservation (Cool to 4 °C for all samples)	Sample Hold Time from Collection Date
Metals - Appendix III⁽¹⁾											
Boron	6020	9	1	0	0	1	11	plastic	600 mL	HNO ₃ to pH<2	6 months
Calcium	6020	9	1	0	0	1	11	plastic	600 mL	HNO ₃ to pH<3	6 months
Metals - Appendix IV⁽²⁾ and Additional Metals											
Other Metals ⁽³⁾	6020	9	1	0	0	1	11	plastic	600 mL	HNO ₃ to pH<2	6 months
Mercury	7470A or 6020	9	1	0	0	1	11	plastic	400 mL	HNO ₃ to pH<2	28 days
Inorganic Parameters - Appendix III⁽¹⁾											
Fluoride	9214	9	1	0	0	1	11	plastic	300 mL	Cool to 4 °C	28 days
Chloride	9251	9	1	0	0	1	11	plastic	100 mL	Cool to 4 °C	28 days
Sulfate	9036	9	1	0	0	1	11	plastic	50 mL	Cool to 4 °C	28 days
Total Dissolved Solids	SM 2540 C	9	1	0	0	1	11	plastic	200 mL	Cool to 4 °C	7 days
Radium - Appendix IV⁽²⁾											
Radium 226	9315 or EPA 903	9	0	0	0	1	10	plastic	1000 mL	HNO ₃ to pH<2	6 months
Radium 228	9320 or EPA 904	9	0	0	0	1	10	plastic	1000 mL	HNO ₃ to pH<2	6 months
Field Parameters											
pH ⁽¹⁾	SM 4500-H+ B	9	NA	NA	NA	NA	9	flow-through cell	NA	none	immediately
Dissolved Oxygen	SM 4500-O/405.1	9	NA	NA	NA	NA	9	flow-through cell	NA	none	immediately
Temperature	SM 2550	9	NA	NA	NA	NA	9	flow-through cell	NA	none	immediately
Specific Conductivity	SM 2510 B	9	NA	NA	NA	NA	9	flow-through cell	NA	none	immediately
Turbidity ⁽⁴⁾	SM 2130 B	9	NA	NA	NA	NA	9	flow-through cell or hand-held turbidity meter	NA	none	immediately

Notes:

⁽¹⁾ USEPA Appendix III Parameters (boron, calcium, chloride, fluoride, pH, sulfate, total dissolved solids (TDS))

⁽²⁾ USEPA Appendix IV Parameters

(antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium, radium 226 and 228 combined)

⁽³⁾ Other Metals = antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, molybdenum, selenium, thallium

⁽⁴⁾ If turbidity exceeds 10 NTUs, a duplicate sample filtered through a .45 micron filter may be collected for metals analysis in addition to the unfiltered sample. Both samples would be submitted for analysis.

NA = not applicable

°C = degrees Celsius

HNO₃ = nitric acid

mL = milliliter

1. Field duplicates will be collected at a frequency of one per group of 10 or fewer investigative water sample. Field duplicates will not be collected for radium analysis.

2. Field blanks will be collected at the discretion of the project manager; Equipment blanks will be collected at a rate of 1 per sampling event if non-dedicated equipment is used.

3. Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected at a frequency of one per group of 20 or fewer investigative water samples per CCR unit/multi-unit. Additional volume to be determined by laboratory.

4. Sample volume is estimated and will be determined by the laboratory.

5. Analytical method numbers are from SW-846 unless otherwise indicated. Analytical methods apply to both filtered and unfiltered samples and may be updated with more recent versions as appropriate.

Filtered samples will be reported to the Illinois EPA for evaluation purposes and will not substitute for samples required by 40 CFR Part 257.

**Table 4. Summary of Detection Limits for Proposed Class I Groundwater Standards Monitoring Program
Groundwater Monitoring Plan
West Ash Pond System, Hennepin Power Station**

Constituent	Unit	Analytical Methods ¹	USEPA MCL ²	IL Class I Std ⁷ (ug/L)	RL ⁴	MDL ⁴
Metals						
Antimony	µg/L	6020	6	6	1	0.25
Arsenic	µg/L	6020	10	10	1	0.25
Barium	µg/L	6020	2000	2000	1	0.4
Beryllium	µg/L	6020	4	4	1	0.5
Boron	µg/L	6020	NS	2000	25	10
Cadmium	µg/L	6020	5	5	1	0.25
Calcium	µg/L	6020	NS	NS	125	100
Chromium	µg/L	6020	100	100	1	0.3
Cobalt	µg/L	6020	NS	1000, 0.002	1	0.25
Lead	µg/L	6020	15	7.5	1	0.25
Lithium	µg/L	6020	NS	NS	1	0.5
Mercury	µg/L	6020 or 7470A	2	2	0.2	0.051
Molybdenum	µg/L	6020	NS	NS	1	0.25
Selenium	µg/L	6020	50	50	1	0.9
Thallium	µg/L	6020	2	2	1	0.25
Inorganics						
Fluoride	mg/L	9214	4	4	0.1	0.05
Chloride	mg/L	9251	250 ³	200	5	1
Sulfate	mg/L	9036	250 ³	400	10	5
Total Dissolved Solids	mg/L	SM 2540 C	500 ³	1200	20	10
Other						
Combined Radium 226/228	pCi/L	9315/9320 or EPA 903/904	5	20/20, 5	-- ⁵	-- ⁶
Field						
pH	SU	SM 4500-H+ B	NS	6.5-9.0	NA	NA
Dissolved Oxygen	mg/L	SM 4500-O/405.1	NS	NS	NA	NA
Temperature	°C	SM 2550	NS	NS	NA	NA
Specific Conductivity	µS/cm	SM 2510 B	NS	NS	NA	NA
Turbidity	NTU	SM 2130 B	NS	NS	NA	NA

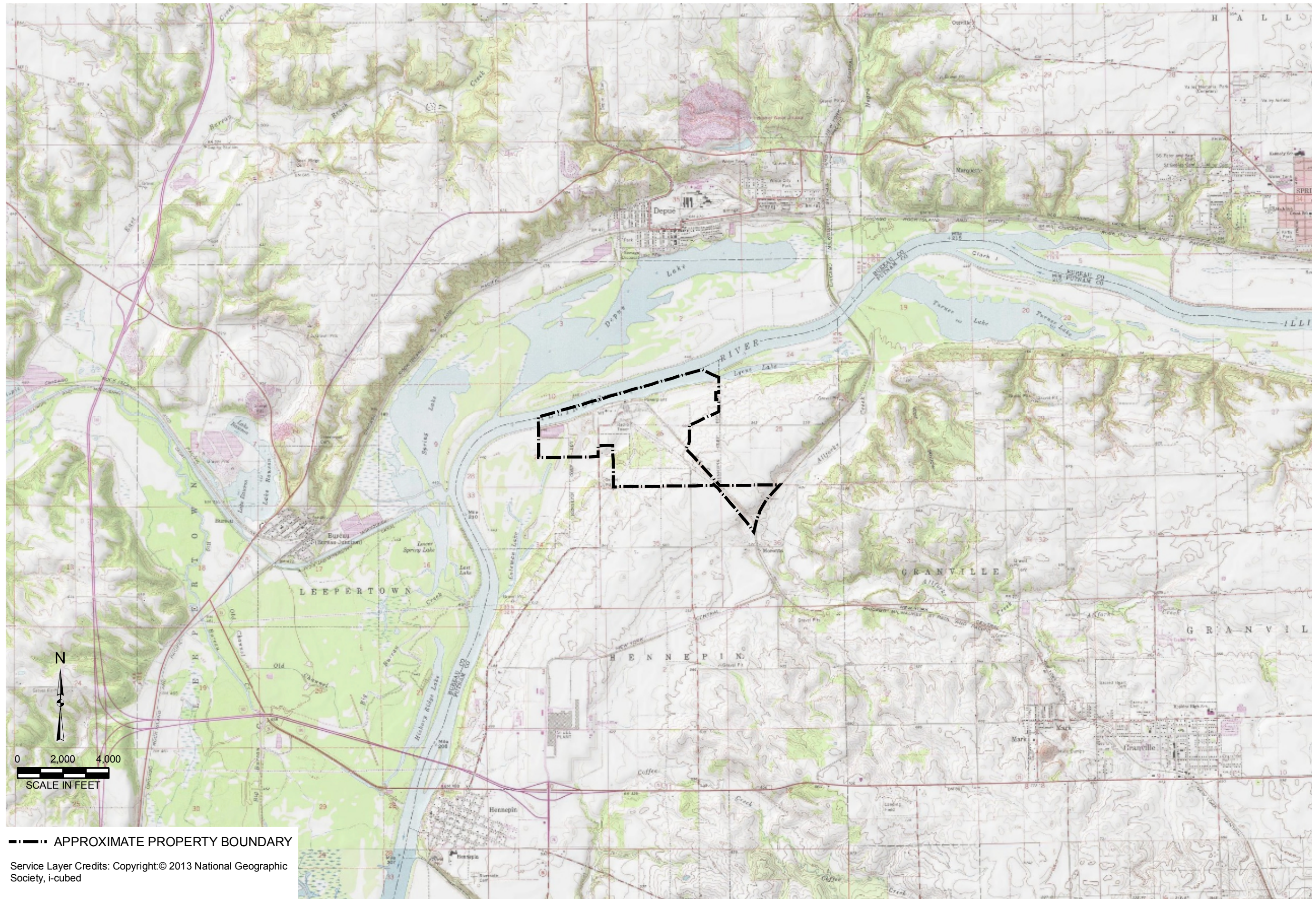
Notes:

NS = No standard
 RL = Reporting limit as established by the laboratory
 MDL = Method detection limit as established by the laboratory
 SM = Standard Methods for the Examination of Water and Wastewater
 µg/L = micrograms per liter
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter
 µS/cm = microSiemens per centimeter
 NTU = nephelometric turbidity unit
 (d) = dissolved analysis

- Analytical method numbers are from SW-846 unless otherwise indicated. Methods listed apply to both total and dissolved samples.
- USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
- USEPA SMCL = United States Environmental Protection Agency Secondary Maximum Contaminant Level.
- Reporting limits and method detection limits will vary depending on the laboratory performing the work.
- All radium results will be reported (values may be positive or negative) and will include uncertainty and the calculated MDC.
- Laboratories calculate a minimum detectable concentration (MDC) based on the sample.
- Standards listed include proposed changes to 35 Ill. Adm. Code Part 620 by Illinois EPA

Figures

Y:\Mapping\Projects\24124131\XMD\GWMPI\Figure 1_Site Location Map.mxd Author: stg/zsd Date/Time: 8/30/2017, 12:04:39 AM



--- APPROXIMATE PROPERTY BOUNDARY

Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/30/17

SITE LOCATION MAP

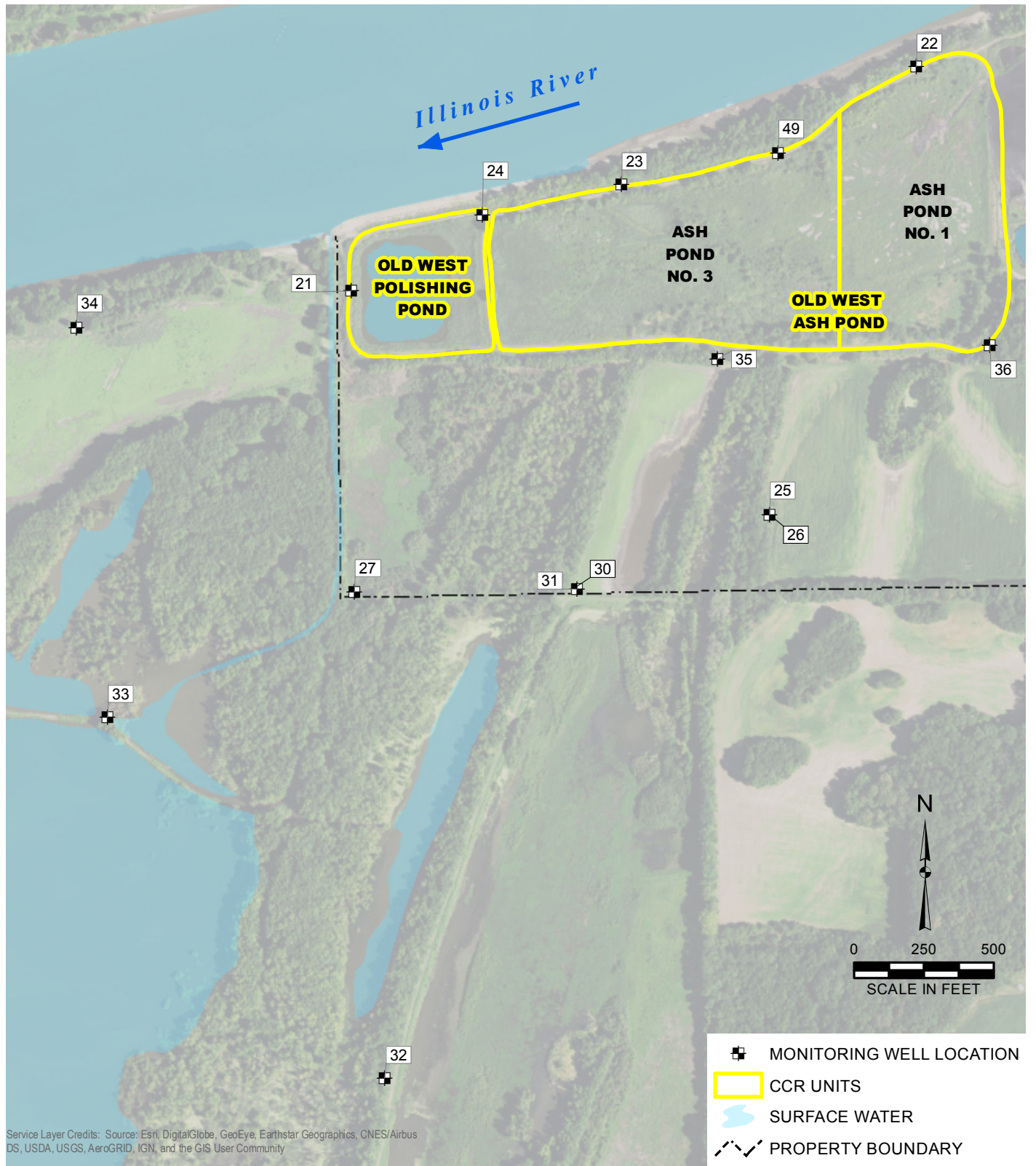
GROUNDWATER MONITORING PLAN
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413

FIGURE NO: 1



Y:\Mapping\Projects\2413\XID\GWM\PI\Figure 2_Monitoring Well Network.mxd - Author: slolzsd, Date/Time: 12/19/2017, 11:13:05 AM



MONITORING WELL NETWORK

GROUNDWATER MONITORING PLAN
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

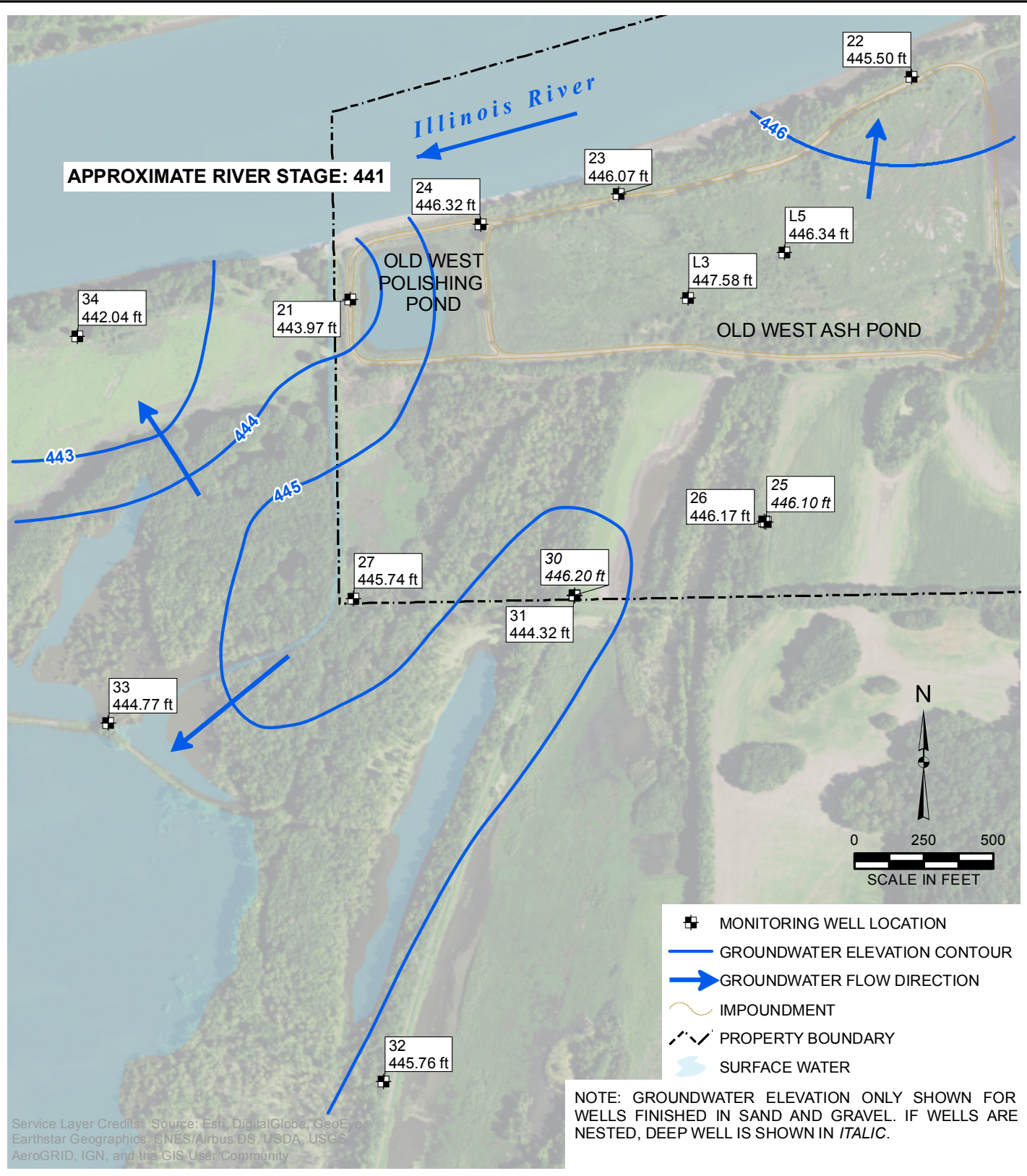
PROJECT NO: 2413

FIGURE NO: 2



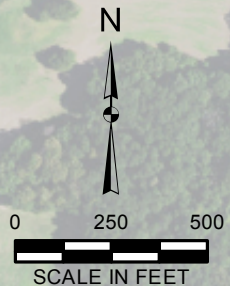
DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

Y:\Mapping\Projects\24124-13\MXD\GWM\PI\Figure 3_GW/E Contour Map_Dec 2013.mxd Author: stobzsd; Date/Time: 12/15/2017, 3:51:52 PM



NOTE: GROUNDWATER ELEVATION ONLY SHOWN FOR WELLS FINISHED IN SAND AND GRAVEL. IF WELLS ARE NESTED, DEEP WELL IS SHOWN IN *ITALIC*.

- MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR
- ➔ GROUNDWATER FLOW DIRECTION
- IMPOUNDMENT
- - - PROPERTY BOUNDARY
- ☁ SURFACE WATER



DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

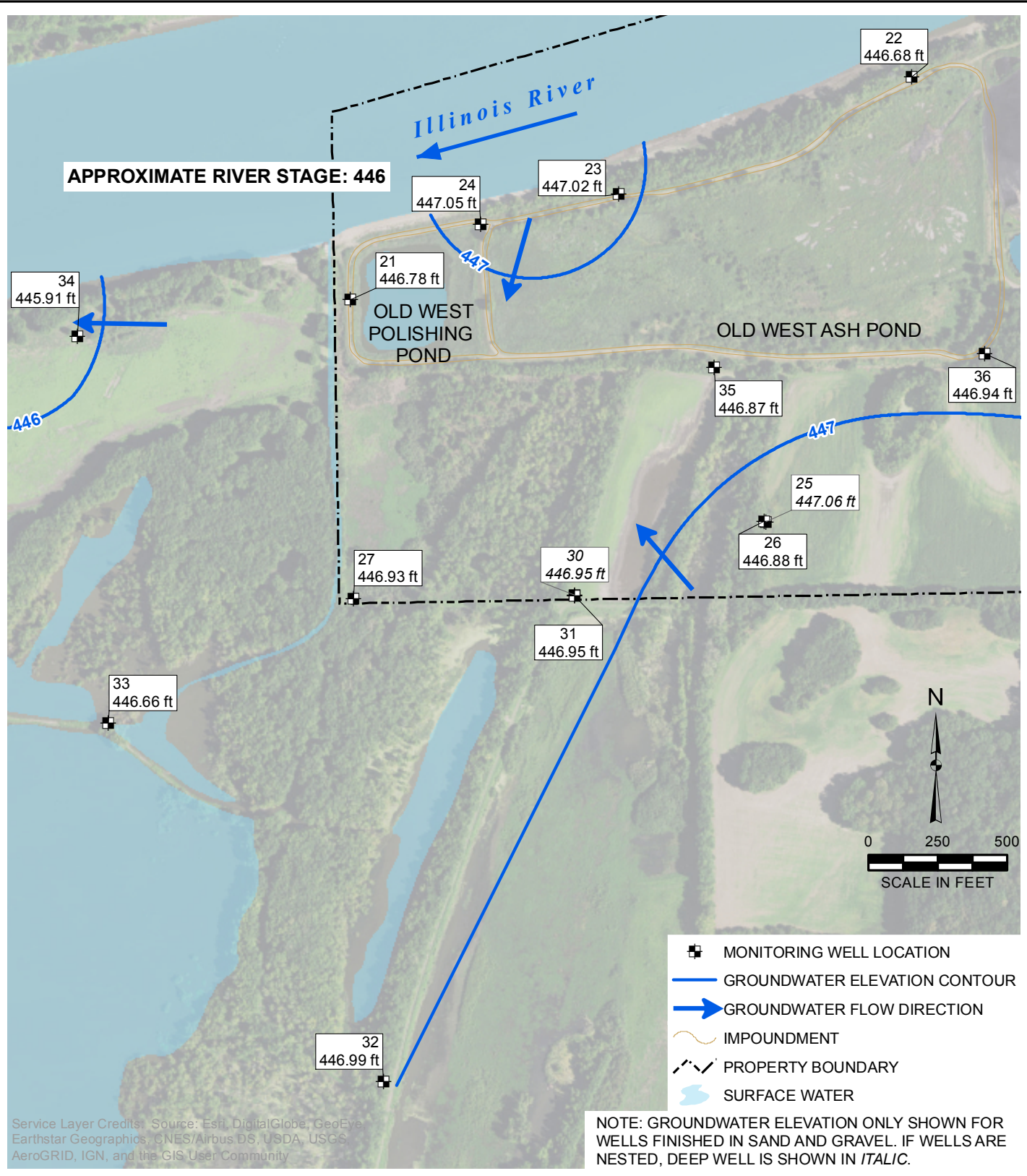
**WATER TABLE CONTOUR MAP
DECEMBER 10, 2013**

GROUNDWATER MONITORING PLAN
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413
FIGURE NO: 3



Y:\Mapping\Projects\24124-13\MXD\GWM\PI\Figure 4_GWE Contour Map_March 2015.mxd Author: stobzsdj Date/Time: 12/15/2017, 3:57:52 PM



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

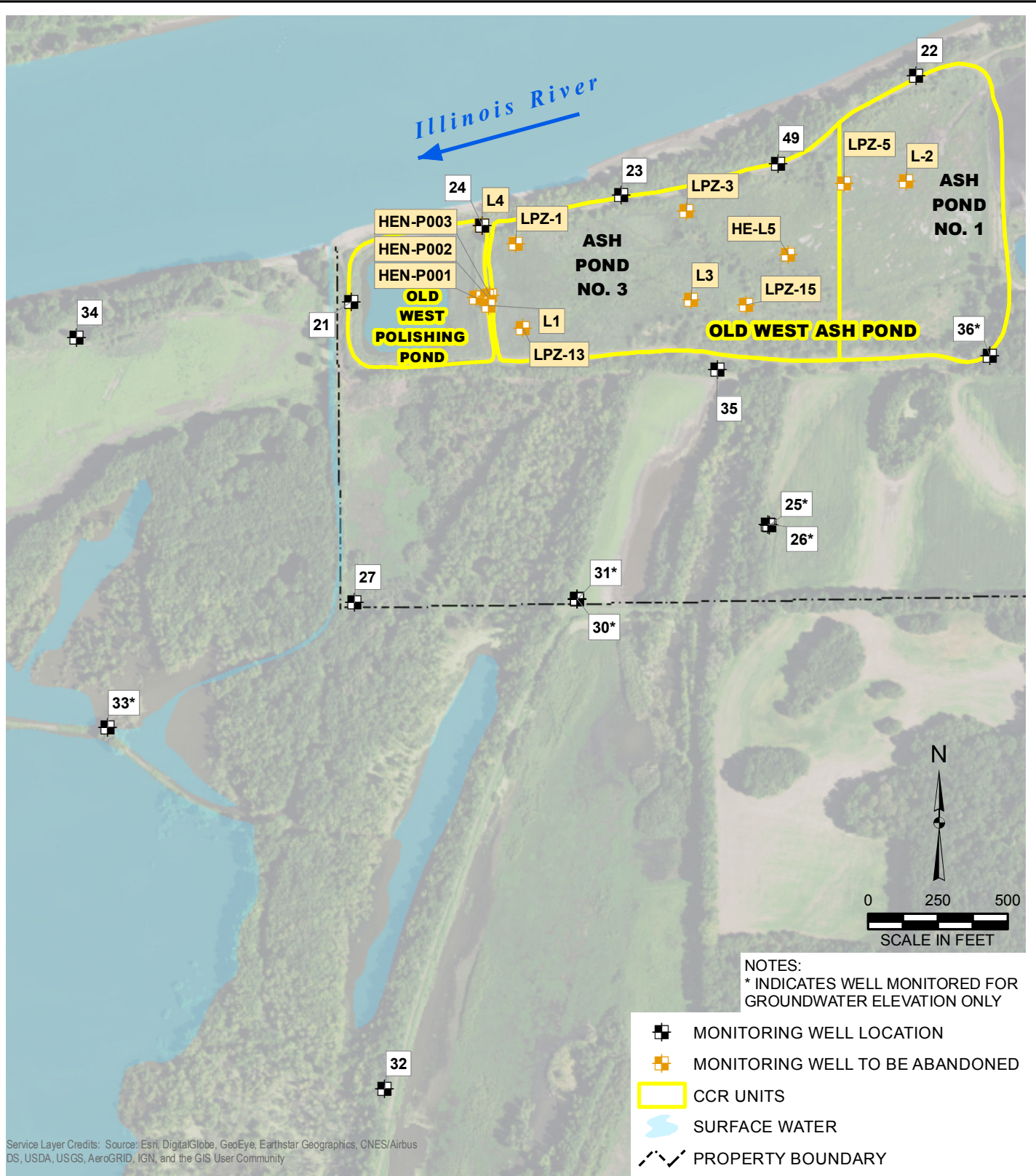
**WATER TABLE CONTOUR MAP
MARCH 18, 2015**

**GROUNDWATER MONITORING PLAN
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

PROJECT NO: 2413
FIGURE NO: 4



Y:\Mapping\Projects\24124-13M\XD\GWM\PI\Figure 5_Proposed Monitoring Well Network.mxd Author: stobzsd; Date/Time: 12/20/2017, 11:12:33 AM



**PROPOSED MONITORING WELL NETWORK
AND ABANDONMENTS**

**GROUNDWATER MONITORING PLAN
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS**

PROJECT NO: 2413


FIGURE NO: 5



DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17



Appendix A
Monitoring Well Network
Boring Logs and
Monitoring Well
Construction Reports



Appendix A1
MATHES Boring Logs and
Well Details

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-1
 SHEET 1 OF 2

21

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.0</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf			
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SVΔ	QP/2□	QU/2○	
	1A	AS			Brown Sandy CLAY w/Gravel, FILL, CL						
-5	1	SS	18/16		Dark Gray FLYASH w/Bottom Ash, FILL, ML	10-7-9					
0	2	SS	18/16			5-8-16					
-15		SS	18/17	1		7-8-3					
0	4	SS	18/14		Dark Gray-Brown Silty CLAY, CL	1-2-1					
25	5	SS	18/16			WH/9-1-2					
30	6	SS	18/17			WH-WH-2					
35	7	SS	18/17			WH/12"-2					

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/8, 9/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 COMEQUETER Yes

GROUNDWATER LEVELS

Encountered at - Feet
0 Hours after completion 3.0 Feet
6 Days after completion 6.3 Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-1
 SHEET 2 OF 2

21

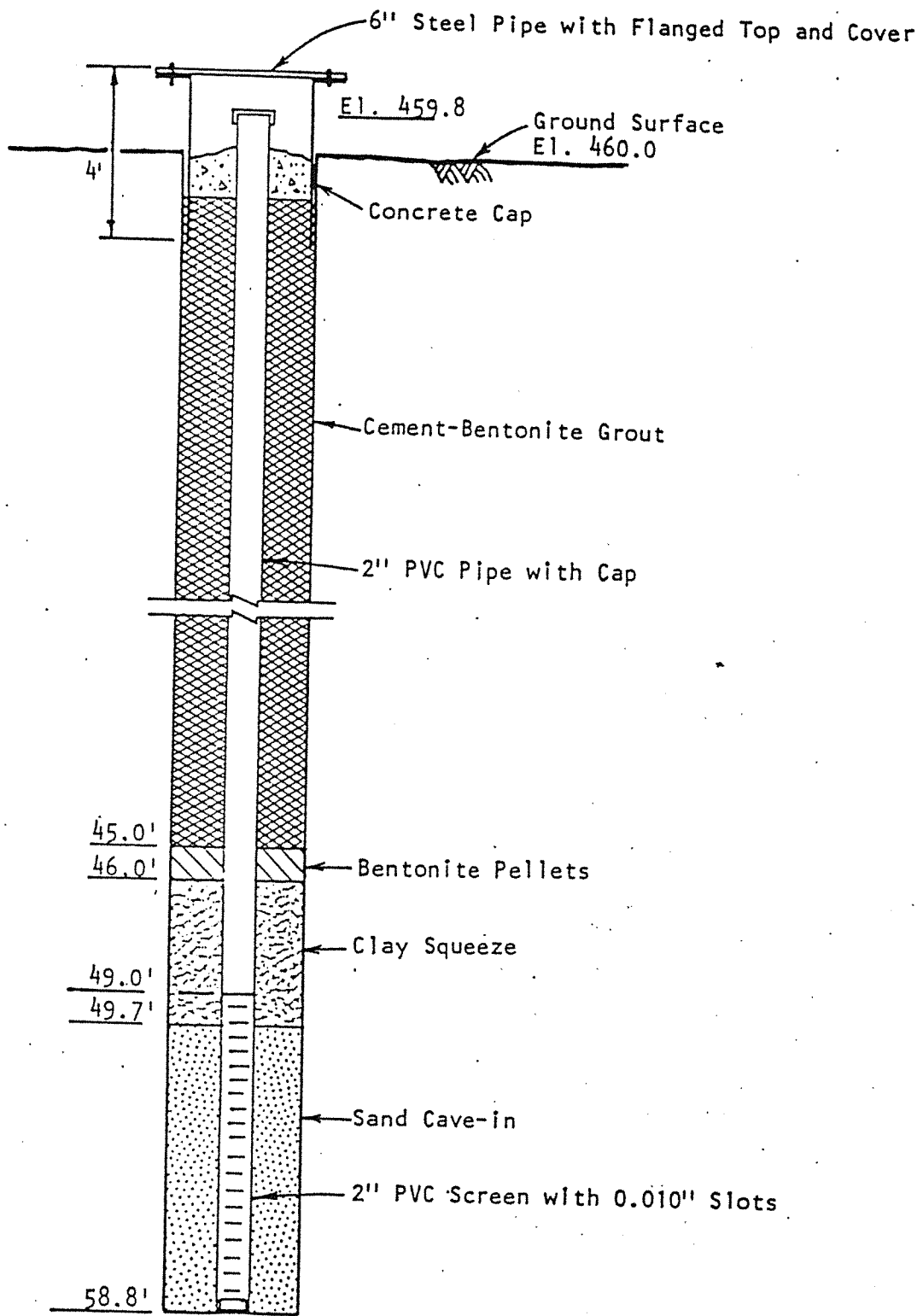
DEPTH (ft)	SAMPLE		SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.0'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf												
	NUMBER	INTERVAL AND TYPE					ADVANCED / RECOVERED (in)	SV Δ	QP/2 \square	QU/2O	PL	NMC	LL						
7	SS			Dark Gray-Brown Silty CLAY, CL															
40	8	SS	18/18	Dark Gray CLAY w/Silt, Sand, Shells, Organics, OH	WH-1-1														
45	9	SS	18/18		WH/12"-1														
50	10	SS	18/18		WH-1-3														
55	11	SS	18/6	Gray Fine - Medium SAND W/Shells Trace Silt, SP-SM	2-3-6														
60	12	SS	18/15	Dark Gray CLAY w/Silt Trace Sand, Shells, OH	WH-1-1														
				TOB															
				Remarks: 1. Dry hole approximately 15.0 - 50.0' 2. Water level in Auger rose to river level immediately after retrieving sample 10															

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/8, 9/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at - Feet
0 Hours after completion 3.0 Feet
6 Days after completion 6.3 Feet
- after completion - Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.





6" Borehole to Termination Depth

Not to Scale



John Mathes & Associates, Inc.

(21)

PIEZOMETER W-1

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-2
 SHEET 1 OF 1

22

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf											
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP/2 □	QU/2 O	PL	NMC	LL						
	1	AS			Brown Sandy CLAY, CL														
-5	2	SS	18/9		Gray - Brown Silty CLAY Trace Sand, CL	3-5-5													
-10	3	SS	18/16		Brown Fine SAND w/Silt Trace Gravel, SM	5-7-5													
-15	4	SS	18/16		Gray-Brown GRAVEL w/Sand Trace Clay, GP	19-20-28													
-20	5	SS	18/18			17-27-38													
-25	6	SS	18/13		-Coal @ 25.4'	23-18-12													
-30	7	SS	18/15		Brown Fine SAND, SP	6-11-11													
-35	8	SS	18/6		Brown GRAVEL w/Sand Trace Clay, GP-GC														
					TOB	0-4-6													

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/9/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

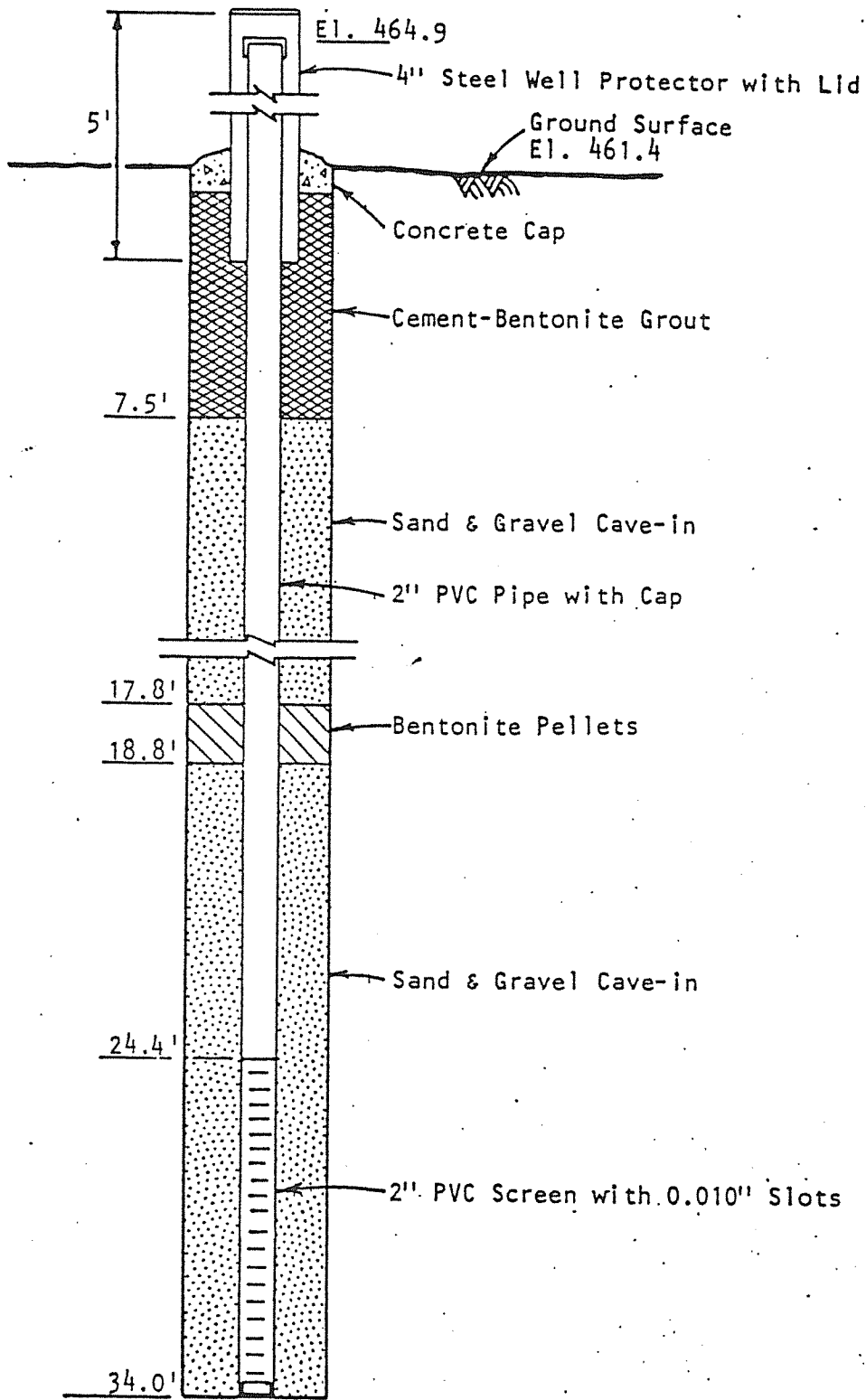
GROUNDWATER LEVELS

Encountered at 8.0 Feet
 _____ Hours after completion _____ Feet
6 Days after completion 8.0 Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.



6" Borehole to Termination Depth

Not to Scale



PIEZOMETER W-2

22

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-5
 SHEET 1 OF 2

23

DEPTH (ft)	SAMPLE		SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.2'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf		
	NUMBER	INTERVAL AND TYPE					ADVANCED / RECOVERED (in)	SV Δ	QP \square
	1	AG		Brown Sandy CLAY w/Gravel, Fill, CL					
-5	2	SS 18/18		Dark Gray FLYASH w/Bottom Ash, FILL, ML	7-9-8				
-10	3	SS 18/14		Dark Gray BOTTOM ASH, FILL, ML	7-17-16				
-15	4	SS 18/12		Dark Gray Silty CLAY, CL	7-7-5				
-20	5	SS 18/15			1-1-1				
-25	6	SS 18/16			WH-2-1				
-30	7	SS 18/18		Dark Gray CLAY w/Silt Trace Sand, Shells, OH	WH-2-2				
-35	8	SS 18/10		Brown GRAVEL w/Sand Trace Clay, GP-GC	8-19-16				

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/10/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at 18.4 Feet
0 Hours after completion 4.2 Feet
5 Days after completion 6.8 Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-3
 SHEET 2 OF 2

23

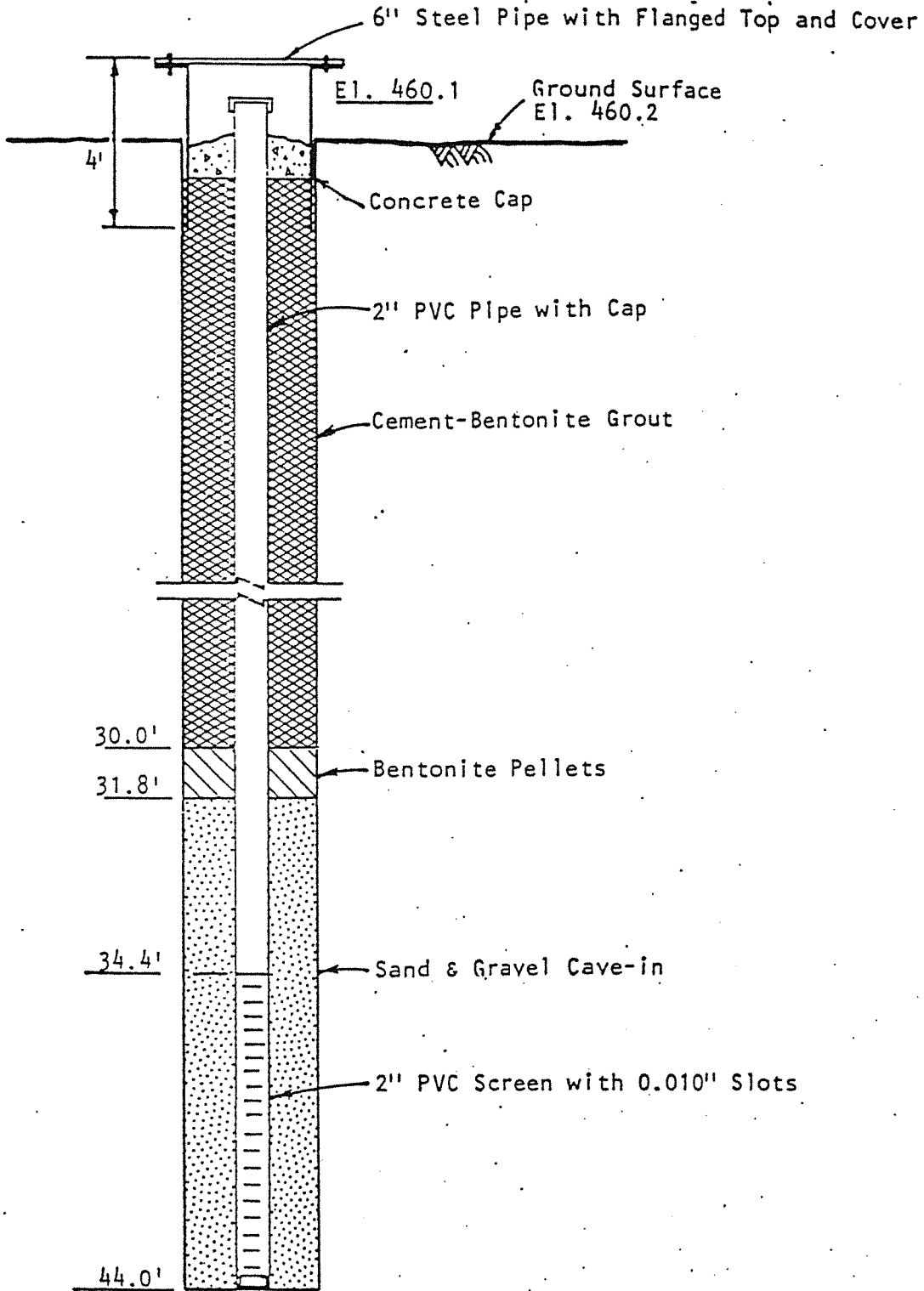
DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.2</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf			
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP/2 \square	QU/2 \circ	
					Brown GRAVEL w/Sand Trace Clay, GP-GC						
40	9	SS	18/18		Brown Sandy CLAY w/Gravel, CL	4-2-37					
45	10	SS	18/10		Brown GRAVEL w/Sand Trace Clay, GP-GC						
					TOB.	10-33-38					
50											

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/10/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at 18.9 Feet
 0 Hours after completion 4.2 Feet
 5 Days after completion 6.8 Feet
 after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.





6" Borehole to Termination Depth

Not to Scale



PIEZOMETER W-3

23

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-4
 SHEET 1 OF 2

24

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf											
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP/2 □	QU/2 ○	PL +	NMC •	LL x	Rock Quality Designation					
1	AS				Brown Sandy CLAY w/Gravel, CL														
5	2	SS	18/16		Dark Gray FLYASH w/Bottom Ash, ML	3-4-5													
10	3	SS	18/18			2-5-6													
15	4	SS	18/18		Dark Gray Silty CLAY, CL	1-2-3													
20	5	SS	18/9			1-1-2													
25	6	SS	18/18			WH-2-2													
30	7	SS	18/16			WH-2-3													
35	8	SS	18/18		Dark Gray CLAY w/Silt Trace Sand, OH	WH-1-2													

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/10, 13/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 66 Encountered at - Feet
66 Hours after completion 14.0 Feet
2 Days after completion 6.0 Feet
 after completion Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-4 24
 SHEET 2 OF 2

DEPTH (ft)	SAMPLE			SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification) Soil Classification System <u>Unified</u> Surface Elevation <u>460.6'</u>	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf												
	NUMBER	INTERVAL AND TYPE	ADVANCED / RECOVERED (in)					SV Δ	QP \square	QU \circ	PL	NMC	LL							
40	SS	18/18			Dark Gray CLAY w/Silt Trace Sand, OH	WH-WH-2														
45	10 SS	18/18				WH-2-1														
50	11 SS	18/12			Dark Gray Fine SAND w/Clay, SC	WH-3-8														
55	12 SS	18/4	1			1-4-7														
60	13 SS	18/18			Dark Gray Gravelly Fine SAND Trace Silt, SP-SM	8-15-5														
65	14 SS	18/16			Gray GRAVEL w/Sand Trace Clay, GP-GC	14-17-22														
70					TOB Remarks: 1. Water level approximately 6.0' appears same as river level.															

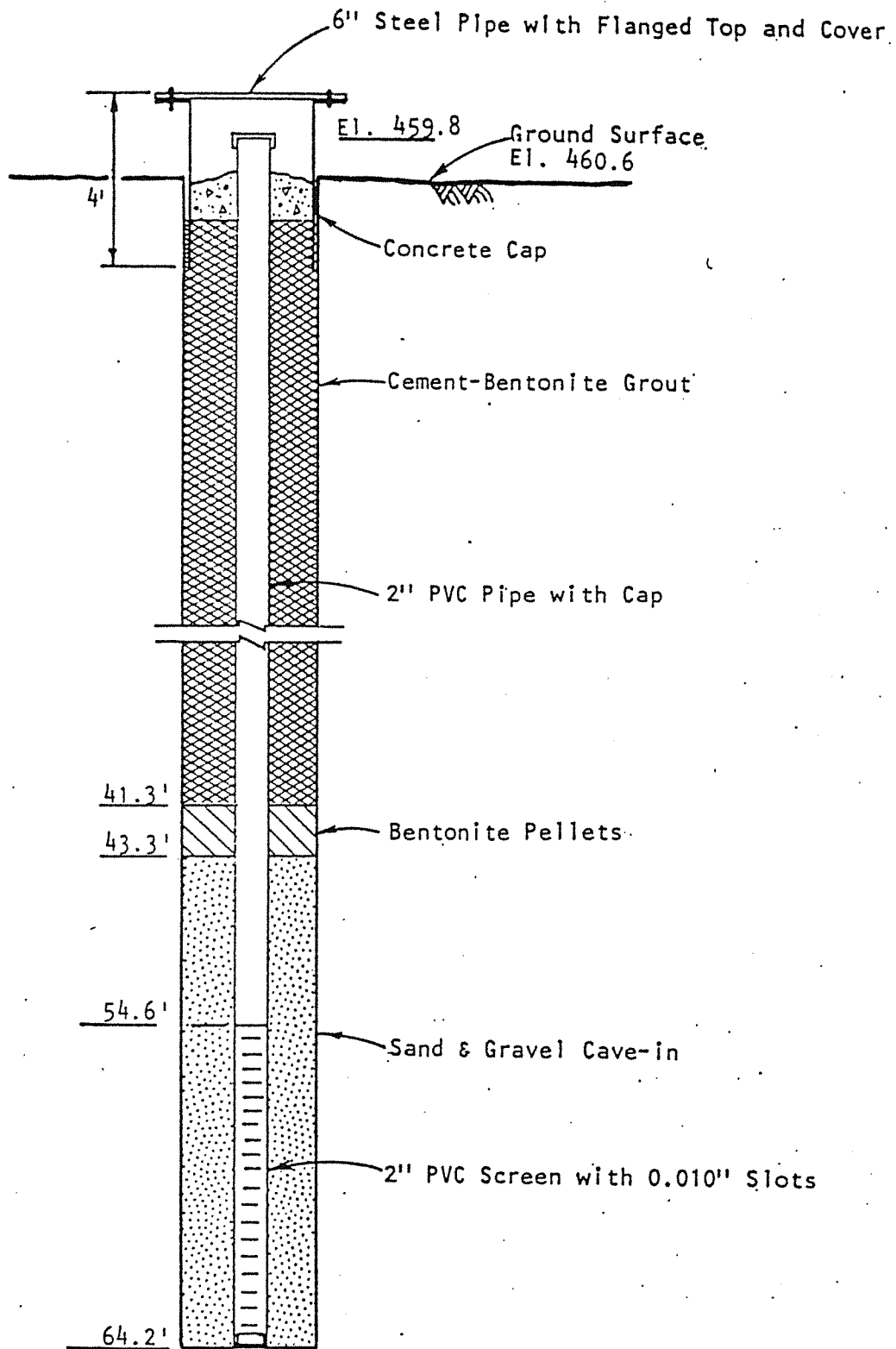
DRILLING METHOD Follow Auger
 DATE DRILLED 12/10, 13/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

GROUNDWATER LEVELS
 Encountered at - Feet
66 Hours after completion 14.0 Feet
2 Days after completion 6.7 Feet
- after completion - Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.



6" Borehole to Termination Depth

Not to Scale



PIEZOMETER W-4

24

RECORD OF SUBSURFACE EXPLORATION

PROJECT Hydrogeologic Study
Hennepin Power Plant
 JOB NO. 82-1293

BORING W-5
 SHEET 1 OF 1

25

DEPTH (ft)	SAMPLE		SEE REMARK #	DESCRIPTION OF MATERIALS (Color Modifier MATERIAL Classification)	BLOWS (per 6 in)	DRY UNIT WEIGHT (pcf)	Shear Strength, tsf							
	NUMBER	INTERVAL AND TYPE					ADVANCED / RECOVERED (in)	SV Δ	QP \square	QU \circ	LL	PL	NMC	
				Soil Classification System <u>Unified</u>			0	1/2	1	1 1/2	2	2 1/2		
				Surface Elevation <u>459.8'</u>			0		50		100			
							Rock Quality Designation							
							0		50		100			
5	1	SS	18/7	Dark Brown Sandy SILT Trace Clay, ML	4-10-14									
				Brown GRAVEL w/Sand Trace Silt, Clay, GP										
10	2	SS	18/13		6-12-17									
15	3	SS	18/13		7-12-16									
20	4	SS	18/18	Brown Fine SAND Trace Silt, SP	8-25-27									
25		SS	18/6	Brown Medium SAND w/Gravel, SP	4-7-7									
30	6	SS	18/9	Brown Gravelly SAND Trace Clay SP	6-12-10									
35	7	SS	18/6	TOB	7-8-13									

DRILLING METHOD Hollow Auger
 DATE DRILLED 12/14/82
 DRILLED BY Roberts
 LOGGED BY Maxeiner
 PIEZOMETER Yes

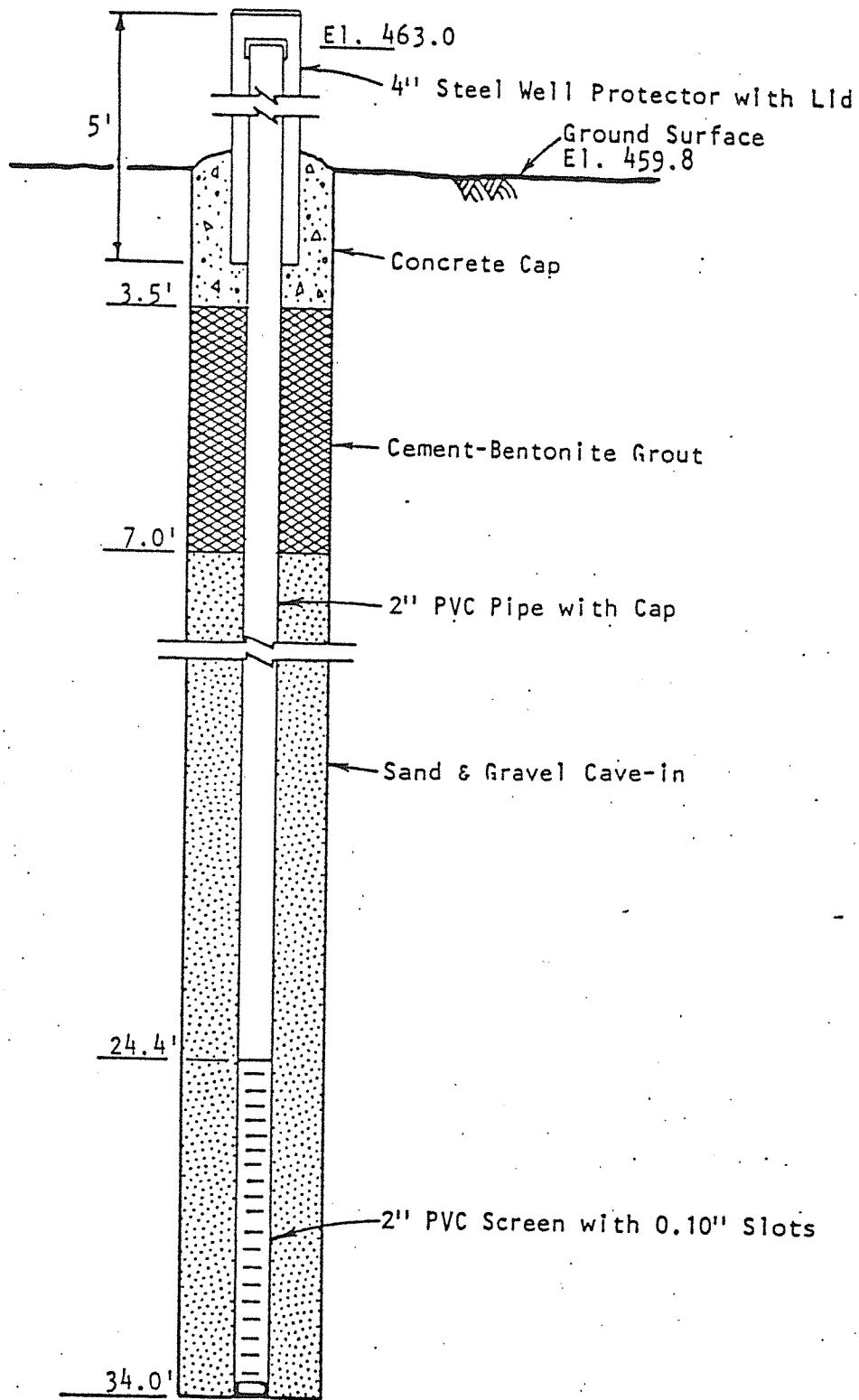
GROUNDWATER LEVELS

Encountered at 6.0 Feet
24 Hours after completion 5.8 Feet
 _____ after completion _____ Feet
 _____ after completion _____ Feet

NOTE: Refer to the attached GENERAL NOTES and NOTATION USED ON RECORDS OF SUBSURFACE EXPLORATION for abbreviations, explanations, and qualifications relative to this log.



John Mathes & Associates, Inc.



6" Borehole to Termination Depth

Not to Scale




John Mathes & Associates, Inc.

25

PIEZOMETER W-5

PLATE 19



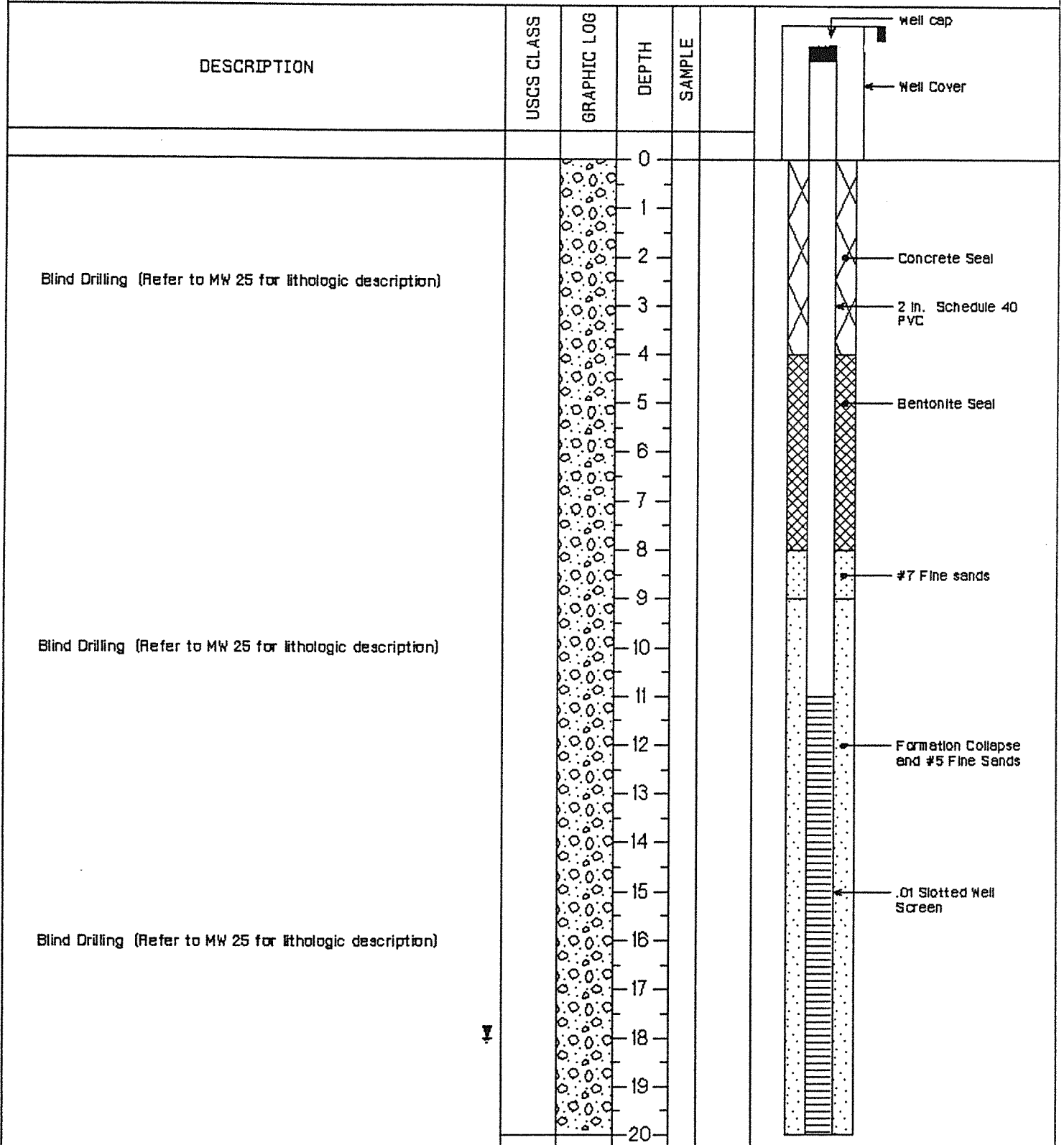
Appendix A2
STMI Boring Logs and Well
Details

Monitoring Well No. 26

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear ft.

DATE: 08-22-96
HOLE DIA.: 7 in.
FINAL GW: 18 ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split spoon
HOLE ELEV.: 460.66 ft. MSL



STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 2

Monitoring Well No. 26

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

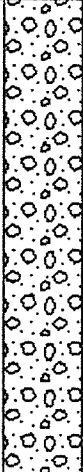
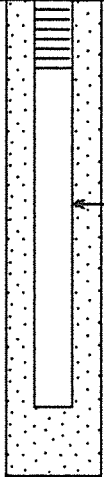
HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear ft.

FINAL GW: 18 ft.

HOLE ELEV.: 460.66 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Blind Drilling (Refer to MW 25 for lithologic description)			20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40		

STMI
2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 2

Monitoring Well No. 27

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 09-11-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

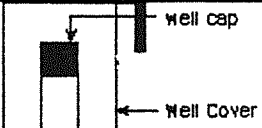
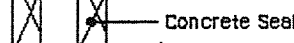
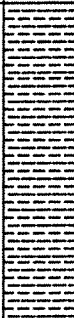
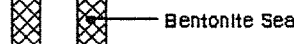
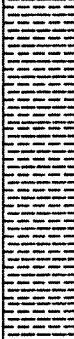
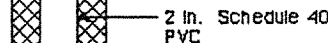
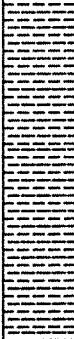
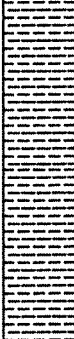
HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 3.88 ft.

HOLE ELEV: 447.94 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	Diagram
			0		
			1		
			2		
			3		
			4		
Dark gray, clayey silt, uniform, organic matter, soft, sticky			5		
			6		
			7		
			8		
			9		
Dark gray, clayey silt w/ some sand, roots, soft, uniform, wet			10	SS-1	
			11		
			12		
			13		
			14		
Same as above, except color changes to lighter gray at 16 ft.			15	SS-2	
			16		
			17		
			18		
Mottled gray, orange, uniform, clayey silt, soft, moist			19	1E-SS	
			20		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Page 1 of 2

Monitoring Well No. 27

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 09-11-95
HOLE DIA.: 7 in.
FINAL GW: 3.88 ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split spoon
HOLE ELEV.: 447.94 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Same as above		[Vertical line pattern]	20 21 22 23 24	SS-3	<p style="font-size: small;">2 in. Schedule 40 PVC</p> <p style="font-size: small;">Bentonite Seal</p> <p style="font-size: small;">#7 Fine Sand</p> <p style="font-size: small;">Formation Collapse and #5 Sand</p> <p style="font-size: small;">.01 Slotted Well Screen</p>
Uniform, brown grading to gray silty fine sand, wet, soft		[Vertical line pattern]	25 26 27 28	SS-4	
uniform gray silty fine sand, wet, soft		[Vertical line pattern]	29 30	SS-5	
uniform brown fine-medium sand, wet, soft		[Vertical line pattern]	31 32	SS-5	
Uniform brown fine-medium sand with pebbles (may be blown in)		[Vertical line pattern]	33	SS-6	
Poorly sorted brown coarse sand and gravel, wet (glacial)		[Vertical line pattern]	34 35	SS-6	
			36 37 38 39 40		

STMI

2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
 135-1.31

Monitoring Well No. 30

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

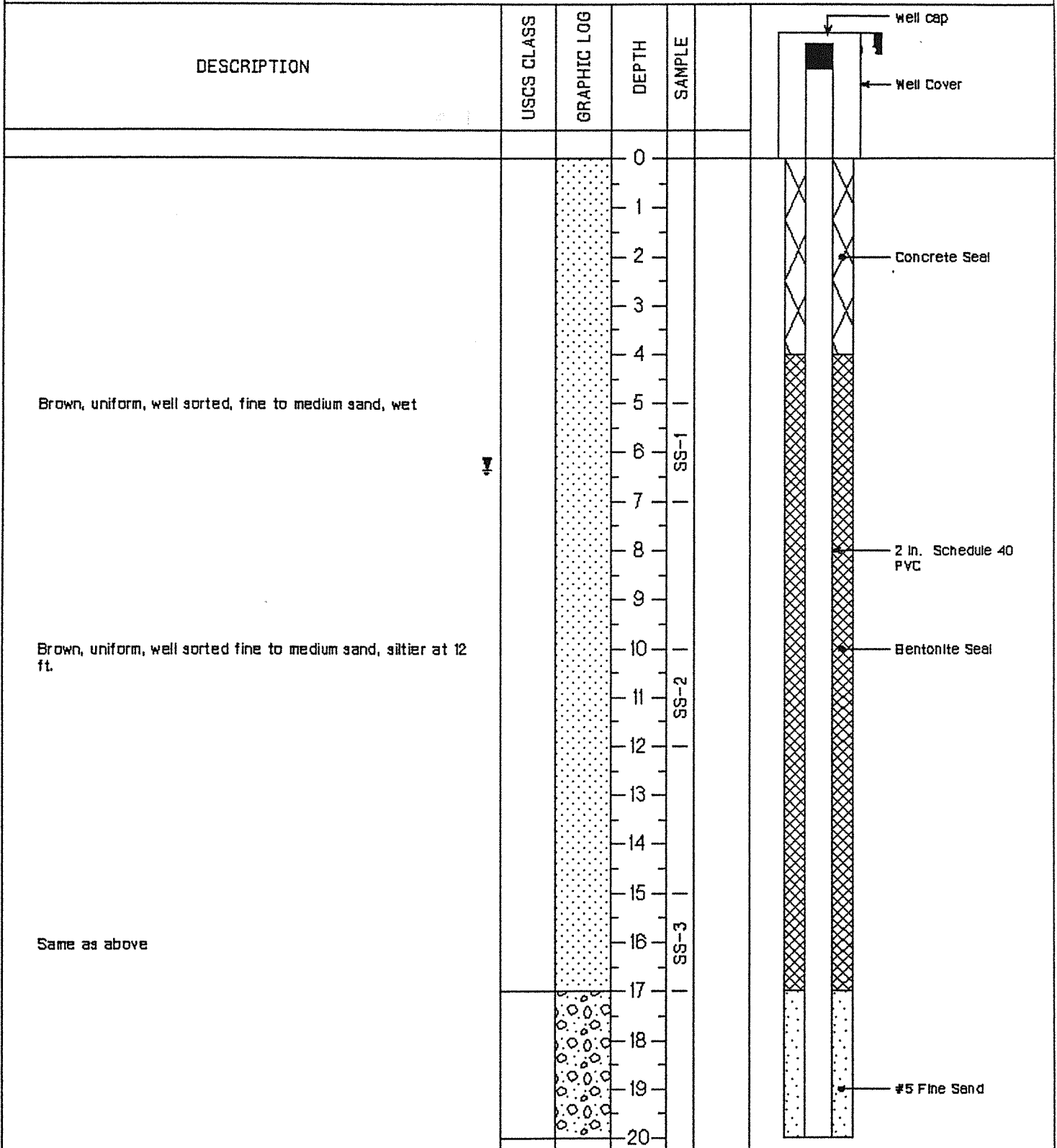
HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 6.36 ft.

HOLE ELEV.: 451.24 ft. MSL



STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:
 Sample numbers refer to saved samples

Project No.
 135-131
 Page 1 of 2

Monitoring Well No. 30

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger


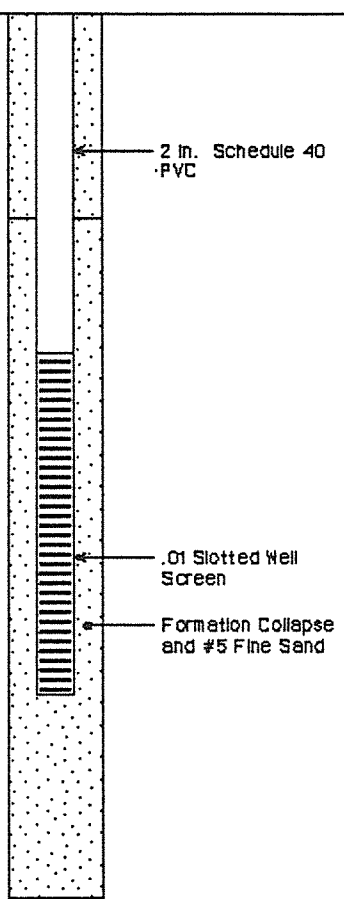
HOLE DIA.: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL BW: 6.36 ft.

HOLE ELEV.: 461.24 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
<p>Sand as above (probably blow-in), grading to silty sand with coarse gravel</p> <p>Silty sand with gravel, brown, poorly sorted, wet, like above</p>			<p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>26</p> <p>27</p> <p>28</p> <p>29</p> <p>30</p> <p>31</p> <p>32</p> <p>33</p> <p>34</p> <p>35</p> <p>36</p> <p>37</p> <p>38</p> <p>39</p> <p>40</p>	<p>SS-4</p> <p>SS-6</p>	 <p>2 in. Schedule 40 PVC</p> <p>.01 Slotted Well Screen</p> <p>Formation Collapse and #5 Fine Sand</p>

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:
Sample numbers refer to saved samples

Project No.
135-131

Page 2 of 2

Monitoring Well No. 31

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

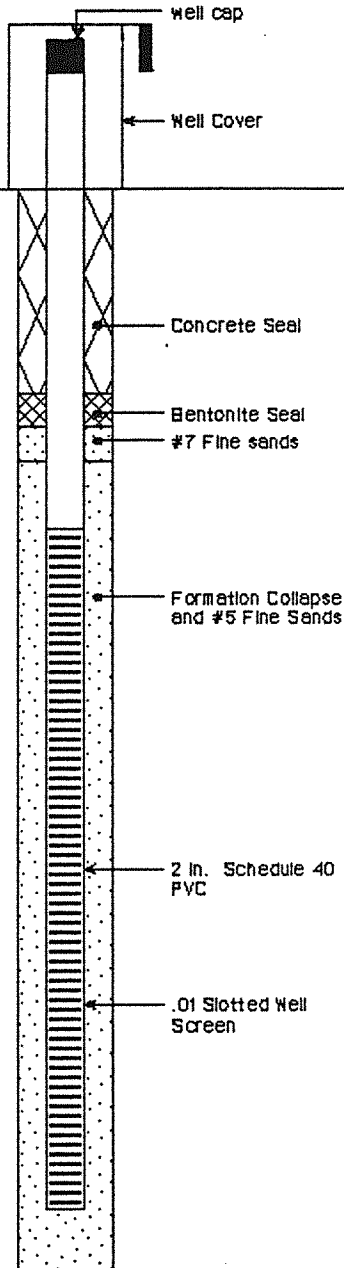
HOLE DIA: 7 in.

SAMPLER: Split spoon

DRILLER: Boart Longyear

FINAL GW: 6.30 ft.

HOLE ELEV: 461.24 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	
			0		
			1		
			2		
			3		
			4		
			5		
Blind Drilling (Refer to boring logs for MW 30 for lithologic description) ↓			6		
			7		
			8		
			9		
			10		
			11		
			12		
			13		
			14		
			15		
			16		
			17		
			18		
			19		
			20		

STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 1

Monitoring Well No. 32

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-21-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

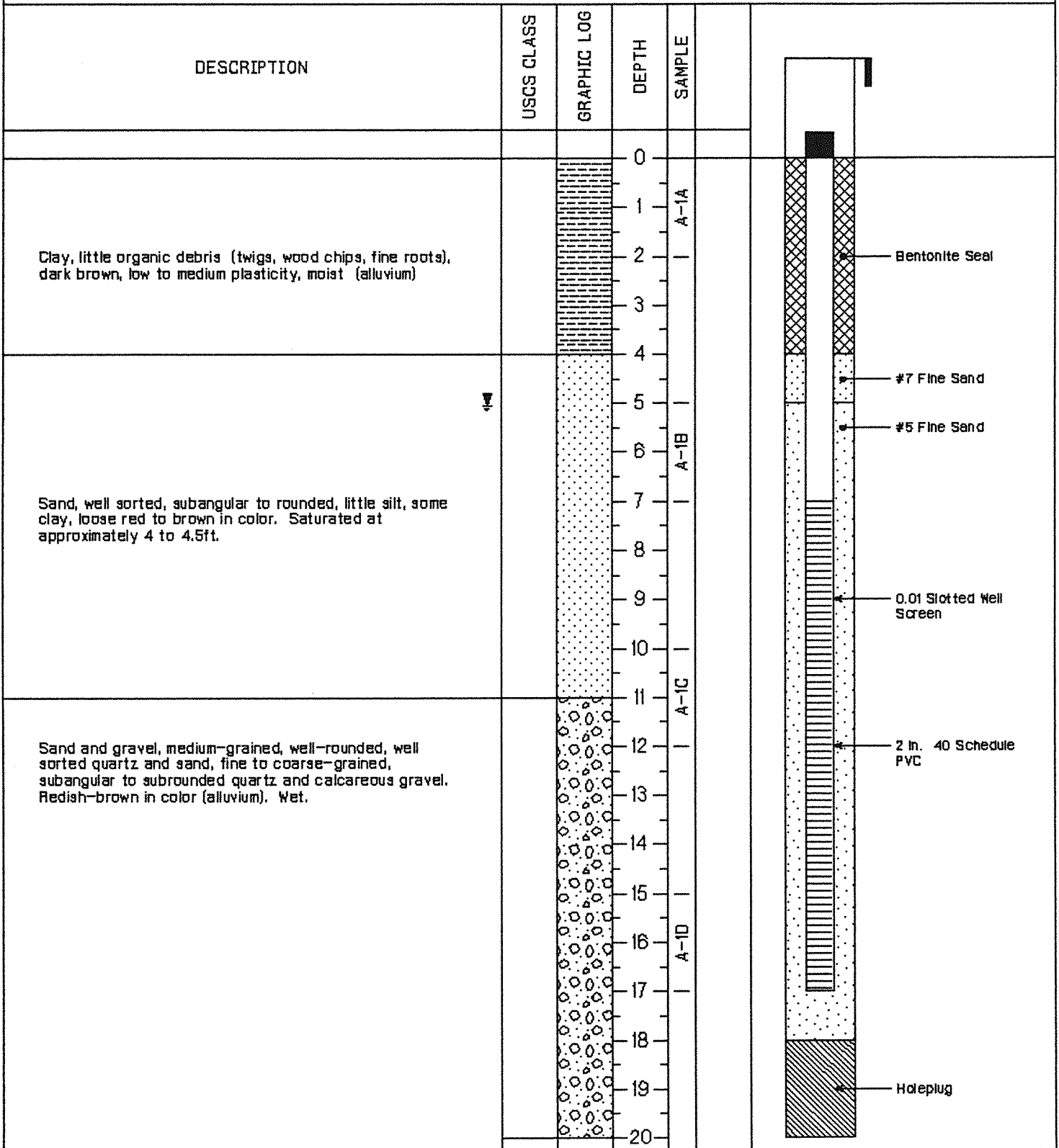
HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 6.06 ft.

HOLE ELEV: 451.35 ft. MSL



STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:
Discontinuously sampled every 5 feet. Sample numbers refer to saved samples

Project No.
135-131

Page 1 of 2

Monitoring Well No. 32

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-21-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger


HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 5.06 ft.

HOLE ELEV.: 451.35 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
			20		
Sandy clay, no plasticity, reddish brown in color, with rusty red laminations. Wet.		[Pattern]	21	A-1E	 <p style="margin-left: 20px;">← Hole plug</p>
		[Pattern]	22		
		[Pattern]	23		
		[Pattern]	24		
		[Pattern]	25		
		[Pattern]	26	A-1F	
		[Pattern]	27		
		[Pattern]	28		
		[Pattern]	29		
		[Pattern]	30		
Silty clay, trace coarse subangular sand, mixed lithologies, olive gray, no to low plasticity, hard, moist (till).		[Pattern]	31		
		[Pattern]	32		
		[Pattern]	33		
		[Pattern]	34		
		[Pattern]	35		
		[Pattern]	36	A-1G	
			37		
			38		
			39		
			40		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Discontinuously sampled every 5 feet. Sample numbers refer to saved samples

Project No.
135-131

Monitoring Well No. 33

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

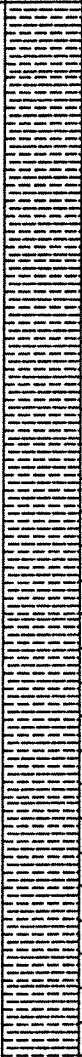
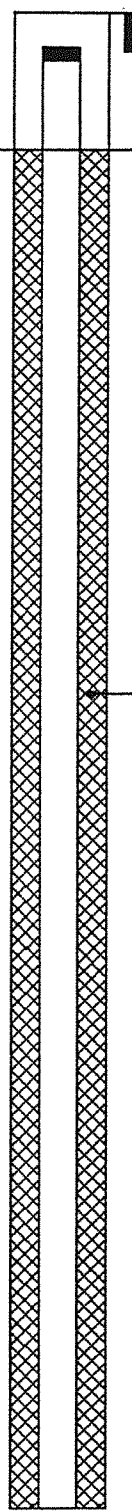


HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 4.38 ft.

HOLE ELEV.: 448.69 ft. MSL

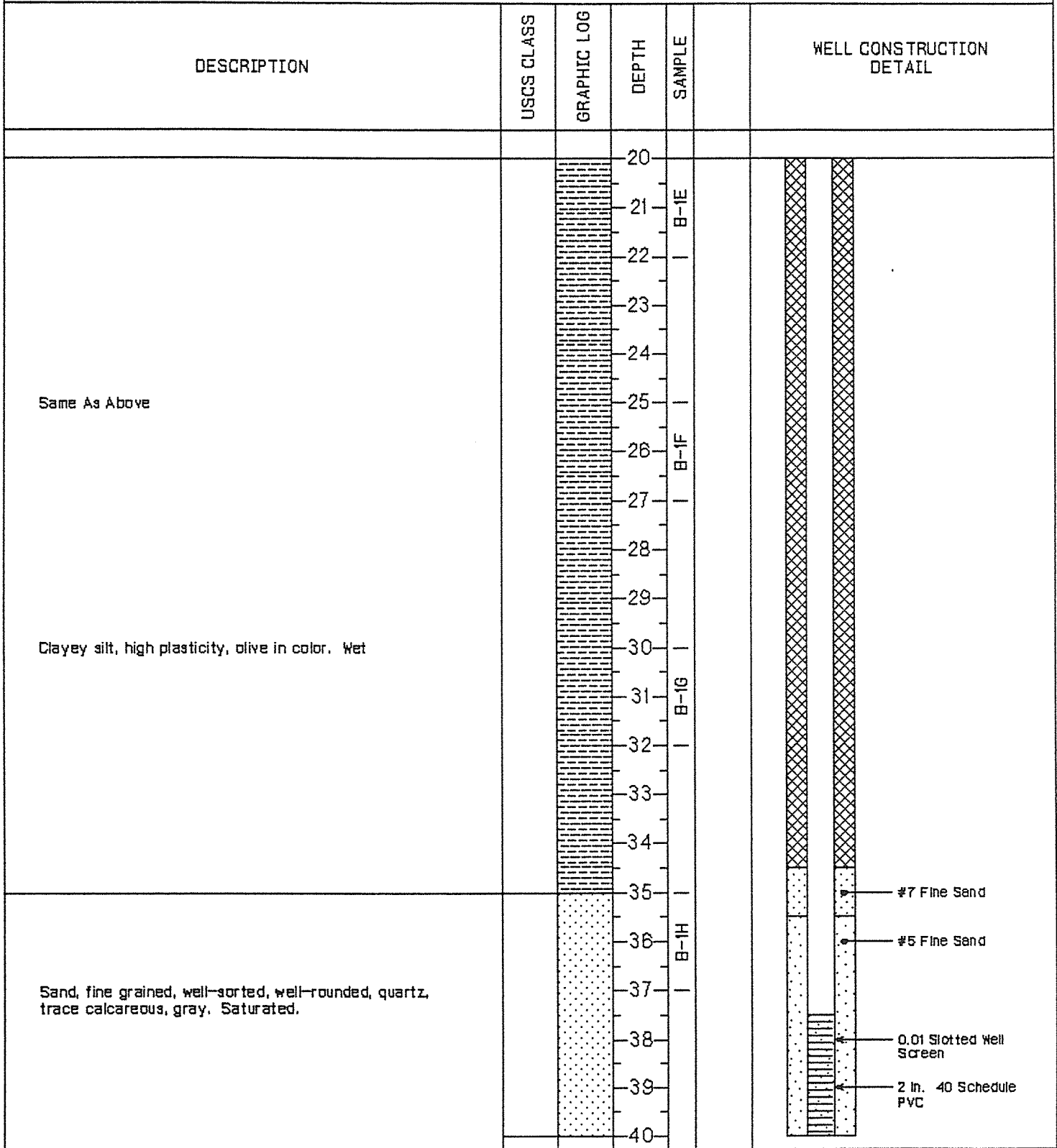
DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	
<p>Silty clay, trace of very fine-grained sand, trace of plant debris, dark brown, medium plasticity (alluvium). Wet. Stagnant swampy odor.</p>			0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	B-1A — — — — — B-1B — — — — — B-1C — — — — — B-1D — — — — —	 <p style="text-align: right; margin-right: 20px;">Bentonite Seal</p>
<p>Silty clay, trace fine to medium-grained sand, medium to high plasticity, dark gray in color. Wet</p>					
<p>Same as Above</p>					

Monitoring Well No. 33

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 8-22-96
HOLE DIA: 7 in.
FINAL GW: 4.38 ft.

LOGGED BY: Mueller/Tu
SAMPLER: Split Spoon
HOLE ELEV: 448.69 ft. MSL



STMI

2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Page 2 of 3

Monitoring Well No. 33

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

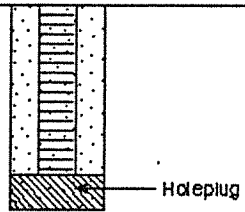
HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 4.38 ft.

HOLE ELEV.: 448.69 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
		40			
		41			
		42			
		43			
		44			
		45			
		46			
		47			
		48			
		49			
		50			
		51			
		52			
		53			
		54			
		55			
		56			
		57			
		58			
		59			
		60			

STMI

2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Monitoring Well No. 34

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 7.54 ft.

HOLE ELEV.: 448.19 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	
Silty clay, trace of plant debris, little fine-grained sand, very dark brown in color, medium to high plasticity (alluvium).		0	0		
		1	1	C-1A	
		2	2		
		3	3		
		4	4		
		5	5		
		6	6	C-1B	
		7	7		
		8	8		
		9	9		
		10	10		
		11	11	C-1C	
		12	12		
		13	13		
		14	14		
		15	15		
		16	16	C-1D	
		17	17		
		18	18		
		19	19		
		20	20		

STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 1 of 2

Monitoring Well No. 34

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 8-22-96

LOGGED BY: Mueller/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 7.54 ft.

HOLE ELEV.: 448.19 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL	
Clayey silt, trace to little fine-grained sand and shell fragments, soft, olive-gray. Wet.		20	C-1E			
		21				
		22				
		23				
		24				
		25				
Sand, fine-grained to medium-grained, well-sorted, quartz, trace of silt, loose. Yellowish brown color grades to olive gray below 31 ft.		26	C-1F			
		27				
		28				
		29				
		30				
		31		C-1G		
		32				
		33				
		34				
		35				
		36				
		37				
		38				
	39					
	40					

STMI
 2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 2

Monitoring Well No. L1

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 08-22-95
HOLE DIA.: 7 in.
FINAL GW: 12.75 ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split Spoon
HOLE ELEV.: 465.11 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
<p>Fill, consisting of dark brown uniform silty sand with gravels, grading to poorly sorted gravelly sand (Dry)</p> <p>Fill, consisting of dark grey silt with sand and gravel, mixed with fly ash, moist, very soft</p>			0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	SS-1 SS-2 SS-3	<p style="text-align: right;">Well Cap</p> <p style="text-align: right;">Cement Seal</p> <p style="text-align: right;">Bentonite Seal</p>
<p>Gray fly ash, silty, moist, well-sorted</p>			16 17 18 19 20	SS-3	

Monitoring Well No. L1

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 12.75 ft.

HOLE ELEV: 465.11 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
<p>Black silty flyash with some sand, wet (2 samples stored for lab)</p>			20 21 22 23 24	SS-4	<p style="text-align: right;">Fine Sand Pack</p> <p style="text-align: right;">#5 Fine Sand</p> <p style="text-align: right;">2 in. 40 Schedule PVC</p> <p style="text-align: right;">0.01 Slotted Well screen</p> <p style="text-align: right;">Holeplug</p>
<p>Black silty clay with shell fragments. Wet, firmer than above (2 samples stored for lab)</p>			25 26 27 28 29	SS-5	
<p>Silt, with dark brown mottles, uniform texture, shell fragments.</p>			30 31 32 33	SS-6	
<p>Black uniform silt, soft, more plastic than above</p>			34 35 36 37 38 39 40	SS-7	

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 3

Monitoring Well No. L1

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-22-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

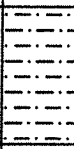

HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 12.76 ft.

HOLE ELEV.: 465.11 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Black silt with sand, uniform texture, numerous roots.			40 41 42	SS-S	
			43		
			44		
			45		
			46		
			47		
			48		
			49		
			50		
			51		
			52		
			53		
			54		
			55		
			56		
			57		
			58		
			59		
			60		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-1.31

Page 3 of 3

Monitoring Well No. L2

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 08-23-96
HOLE DIA: 7 in.
FINAL GW: Not Measured ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split Spoon
HOLE ELEV: 466.43 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
			0		
Black, coarse, dry bottom ash.			1		
			2		
			3		
			4		
Black, coarse, moist bottom ash			5		
			6	SS-1	
			7		
			8		
			9		
			10		
			11	SS-2	
Black, fine-silty sand, uniform			12		
			13		
			14		
Brown, poorly sorted, silty coarse sand & gravel, dry			15		
			16	SS-3	
			17		
			18		
			19		
			20		

Hole backfilled with bentonite chips and cuttings

Monitoring Well No. L2

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 08-23-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger


HOLE DIA.: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: Not Measured ft.

HOLE ELEV.: 466.43 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
			20		
Brown, poorly sorted silty sand & gravel, wet			21	SS-4	Hole backfilled with bentonite chips and cuttings
			22		
			23		
			24		
			25		
			26		
			27		
			28		
			29		
			30		
			31		
			32		
			33		
			34		
			35		
			36		
			37		
			38		
			39		
			40		

Monitoring Well No. L3

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 9-12-96

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

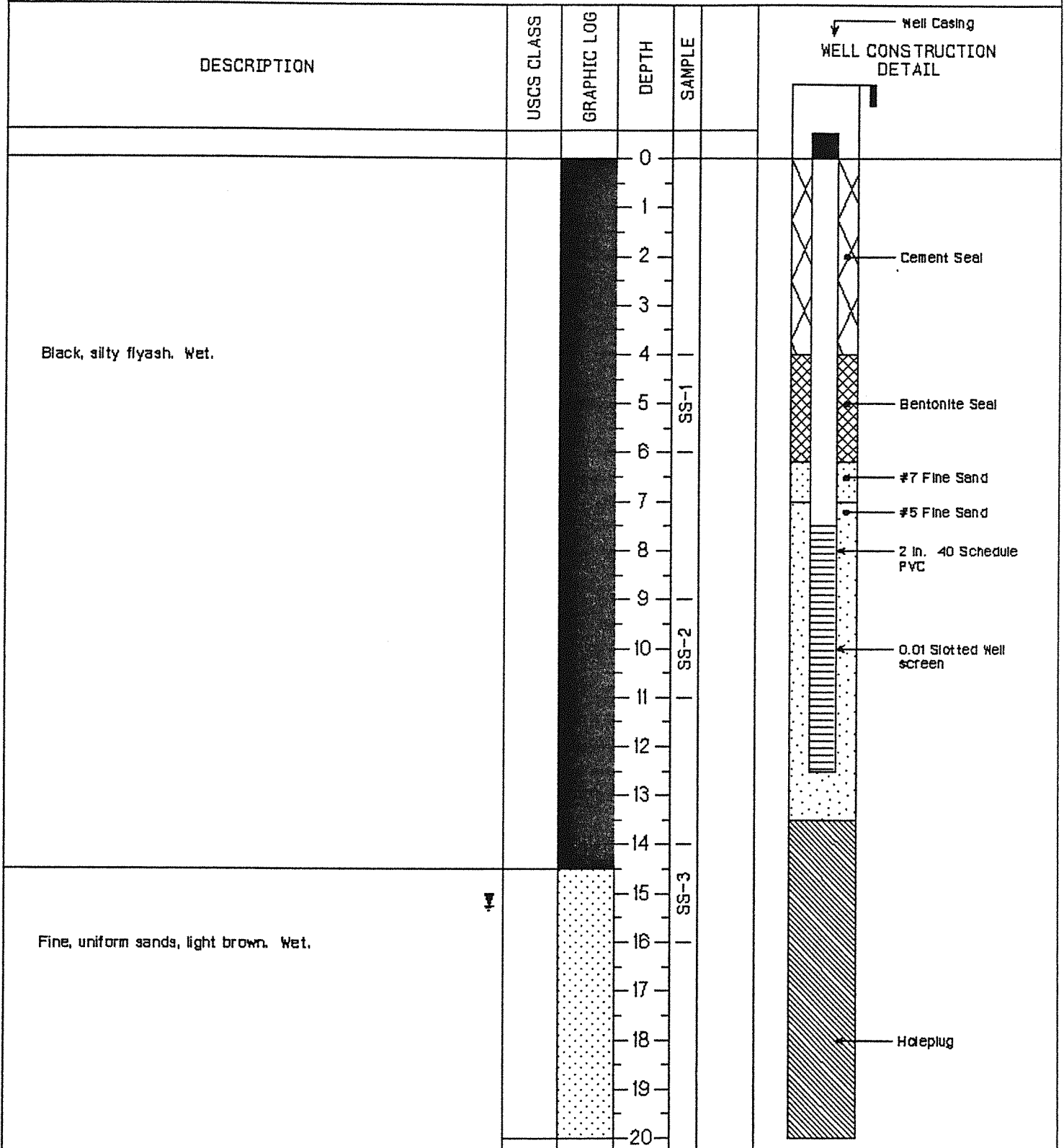
HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 16.26 ft.

HOLE ELEV: 459.26 ft. MSL



STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Continuously sampled bore-hole. Sample numbers refer to saved samples

Project No.
135-131

Monitoring Well No. L3

PROJECT TITLE: Hennepin West Ash Impoundment

DATE: 9-12-95

LOGGED BY: Hensel/Tu

DRILL RIG: Hollow Stem Auger

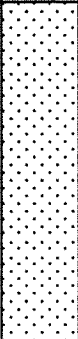
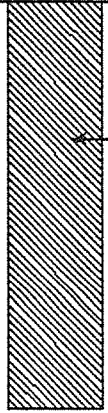

HOLE DIA: 7 in.

SAMPLER: Split Spoon

DRILLER: Boart Longyear

FINAL GW: 15.26 ft.

HOLE ELEV: 459.26 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Fine, uniform sand, light brown. Wet.			20 21 22 23 24 25 26	SS-4	 Holeplug
Fine to medium sand with gravels.			25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40		

STMI

2511 N. 124th St. Suite 205
Brookfield, Wisconsin 53005-8208

Notes:

Continuously sampled bore-hole. Sample numbers refer to saved samples

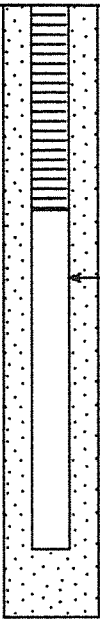
Project No.
135-1.31

Monitoring Well No. L4

PROJECT TITLE: Hennepin West Ash Impoundment
DRILL RIG: Hollow Stem Auger
DRILLER: Boart Longyear

DATE: 08-21-95
HOLE DIA.: 7 in.
FINAL GW: 13.25 ft.

LOGGED BY: Hensel/Tu
SAMPLER: Split spoon
HOLE ELEV.: 461.95 ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	WELL CONSTRUCTION DETAIL
Blind Drilling (Refer to boring log for MW 24 for lithologic description)		20			 <p style="text-align: right;">← Sediment Trap</p>
		21			
		22			
		23			
		24			
		25			
		26			
		27			
		28			
		29			
		30			
		31			
		32			
		33			
		34			
		35			
		36			
		37			
		38			
		39			
		40			


STMI

2511 N. 124th St. Suite 205
 Brookfield, Wisconsin 53005-8208

Notes:

Project No.
135-131

Page 2 of 2



Appendix A3
NRT Boring Logs and Well
Details

- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-235
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/03/00	Date Drilling Completed 04/03/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 457.8 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					ROD/ Comments	
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200		
			1	0'-15' DRILL WITHOUT SAMPLING, COAL ASH, fine to coarse	FILL										
			2												
			3												
			4												
			5												
			6												
			7												
			8												
			9												
			10												
HE-235 (10-12)	24	4	11	10'-16.5' COAL ASH, dark gray to black, fine to medium sand consistency, soft, slightly moist	FILL										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: *C. J. Robb* Firm: Natural Resource Technology, Inc.

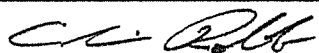
- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-A1
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/05/00	Date Drilling Completed 04/05/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 460.3 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample Number and Type	Length Att. & Recovered (ft)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1	0'-10' DRILL WITHOUT SAMPLING, COAL ASH	FILL									
			2											
			3											
			4											
			5											
			6											
			7											
			8											
			9											
			10											
HE-A1 (10-12)	24	12	11	10'-13.5' COAL ASH, fine grained, 10-15% coal cinders, stiff, dry									D	

I hereby certify that the information on this form is true and correct to the best of my knowledge.


Signature:  Firm: Natural Resource Technology, Inc.

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-A3
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/06/00	Date Drilling Completed 04/06/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 461.7 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1	0'-8' DRILL WITHOUT SAMPLING										
			2											
			3											
			4											
			5											
			6											
			7											
			8											
HE-A3 (8-10)	12	26	9	8'-18' COAL ASH, silt to fine grained sand consistency, coal cinders, very stiff, moist to dry								M/D		
HE-A3 (10-10)	8	12	11									W/D		

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
---	--

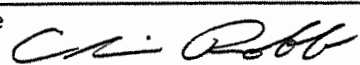
- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-L5
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Randy Radke			Date Drilling Started 04/06/00	Date Drilling Completed 04/06/00	Drilling Method 4.25" HSA
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation 461.3 Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

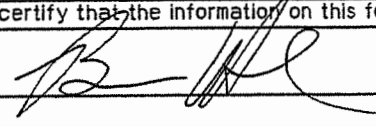
County Putnam	Civil Town/City/ or Village Hennepin, IL
-------------------------	--

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1 2 3 4 5 6 7	0'-8' DRILL WITHOUT SAMPLING, (COAL ASH)										
HE-L5 (8-10)	15	66/0.3	8 9 10	8'-12' COAL ASH, gray, silt to fine sand consistency, very dense, wet to dry at 9'								W/D		
HE-L5 (10-12)	--	50/0.2	11									D		

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
--	---

- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment				License/Permit/Monitoring Number				Boring Number HE-35						
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Bob Erickson				Date Drilling Started 9/28/99		Date Drilling Completed 9/28/99		Drilling Method HSA 4 1/4"						
Facility Well No.		Unique Well No.		Common Well Name		Final Static Water Level Feet MSL		Surface Elevation -- Feet MSL		Borehole Diameter 8.25 inches				
Boring Location State Plane				Feet N Feet E		Lat Long		Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W						
County Putnam				Civil Town/City/ or Village Hennepin, IL										
Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					ROD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1 2 3 4 5 6 7 8 9 10 11	0-7' Fill, brown sand and gravel.	FILL									
				7-12' Fill, black silt, uniform, dry, coal ash.	FILL									
I hereby certify that the information on this form is true and correct to the best of my knowledge.														
Signature 					Firm Natural Resource Technology, Inc.									

Route To:

- Solid Waste
- Emergency Response
- Wastewater
- Superfund
- Haz. Waste
- Underground Tanks
- Water Resources
- Other:

Form

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number WELL-35
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Bob Erickson			Date Drilling Started 9/28/99	Date Drilling Completed 9/28/99	Drilling Method HSA 4 1/4"
Facility Well No.	Unique Well No.	Common Well Name	Final Static Water Level -- Feet MSL	Surface Elevation Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane			Feet N	Feet E	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W
County Putnam			Civil Town/City/ or Village Hennepin, IL		

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1 2 3 4 5	0-5' Fill, white-grey, angular sandy gravel, dry.	FILL									
			6 7	5-7' Black silty sand, roots, small grey pebbles, dry.	SM									
			8 9 10 11	7-18' Brown medium sand, uniform texture.	SP									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature 	Firm Natural Resource Technology, Inc.
----------------------	--

- Route To:
- Solid Waste
 - Emergency Response
 - Wastewater
 - Superfund
 - Haz. Waste
 - Underground Tanks
 - Water Resources
 - Other:

Facility/Project Name DYNEGY - Hennepin Ash Impoundment			License/Permit/Monitoring Number		Boring Number HE-36
Boring Drilled By (Firm name and name of crew chief) Boart Longyear Bob Erickson			Date Drilling Started 9/28/99	Date Drilling Completed 9/28/99	Drilling Method HSA 4 1/4"
Facility Well No.	Unique Well No.	Common Well Name 36	Final Static Water Level -- Feet MSL	Surface Elevation Feet MSL	Borehole Diameter 8.25 inches
Boring Location State Plane		Feet N Feet E	Lat Long	Local Grid Location (if applicable) <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W	

County Putnam	Civil Town/City/ or Village Hennepin
-------------------------	--

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RGD/ Comments
									Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			1	0-4' Black silt, roots, topsoil.	ML									
			2											
			3											
			4											
			5	4-10' Red-brown unifrom fine sand, dry.	SP									
			6											
			7											
			8											
			9											
			10											
			11		GW									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm Natural Resource Technology, Inc.
-----------	---

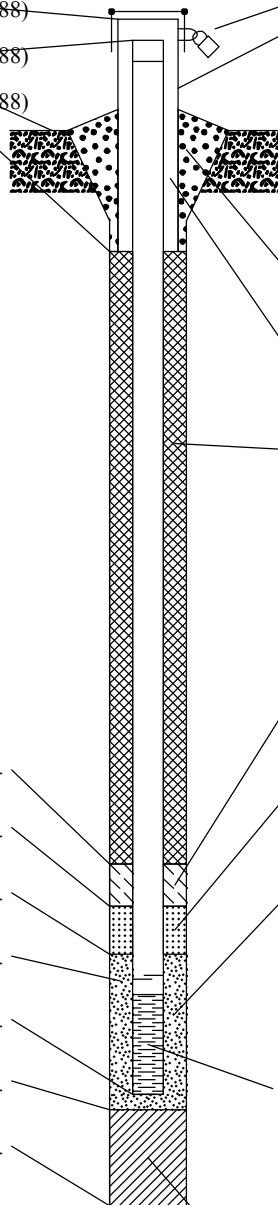
Facility/Project Name Hennepin Power Station		License/Permit/Monitoring Number		Boring Number 49	
Boring Drilled By: Name of crew chief (first, last) and Firm Chad Dutton Bulldog Drilling		Date Drilling Started 7/2/2015		Date Drilling Completed 7/6/2015	
Common Well Name 49		Final Static Water Level Feet (NAVD88)		Surface Elevation 465.76 Feet (NAVD88)	
				Borehole Diameter 8.3 inches	
Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/>) or Boring Location <input checked="" type="checkbox"/>		State Plane 1,689,022.19 N, 2,528,297.09 E E/W		Local Grid Location	
1/4 of 1/4 of Section , T N, R		Lat 41° 18' 4.255"		<input type="checkbox"/> N <input type="checkbox"/> E	
		Long -89° 19' 23.987"		<input type="checkbox"/> S <input type="checkbox"/> W	
Facility ID		County Putnam		State Illinois	
				Civil Town/City/ or Village Hennepin	

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	Soil Properties					RQD/ Comments
								Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
1 SS	24 13	3 4 7 10	1	0 - 5.3' FILL, SILT WITH GRAVEL: (ML)g , very dark grayish brown (10YR 3/2), trace sand and roots, rounded to subangular fine gravel, noncohesive, nonplastic, dry.									
2 SS	24 10.5	4 6 9 3	3	2.5' increase in gravel content and gravel size to fine to coarse, coarse sand (5-15%), dry.	(FILL) (ML)g								
3 SS	24 19	2 3 9 10	5	5' moist. 5.3 - 20.2' FILL, ASH (Coal): very dark gray (10YR 3/1), mostly silt sized particles, few interbedded sand sized layers, trace coarse ash, noncohesive, nonplastic, moist to wet.									
4 SS	24 22	5 27 30 50 for 5'	8	7.5' black (10YR 2/1). 8.2' mostly medium sand-sized particles with some coarse sand to fine gravel-sized ash.	(FILL)								
5 SS	24 24	5 11 20 50 for 5'	10	10' mostly silt sized particles, trace fine gravel to coarse sand sized ash, trace fine sand sized ash.									
6	24	4 22	13										

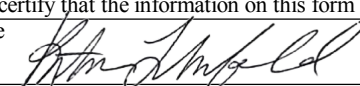
I hereby certify that the information on this form is true and correct to the best of my knowledge.


Signature 	Firm Natural Resource Technology 234 W. Florida St., Fifth Floor, Milwaukee, WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608
--	---	--

Facility/Project Name Hennepin Power Station		Local Grid Location of Well _____ ft. <input type="checkbox"/> N. _____ ft. <input type="checkbox"/> E. <input type="checkbox"/> S. _____ ft. <input type="checkbox"/> W.		Well Name 49	
Facility License, Permit or Monitoring No.		Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/>) or Well Location <input checked="" type="checkbox"/> Lat. <u>41° 18' 4.255"</u> Long. <u>-89° 19' 23.987"</u> or		Date Well Installed <u>07/06/2015</u>	
Facility ID		St. Plane <u>1,689,022.19</u> ft. N, <u>2,528,297.09</u> ft. E. E/W		Well Installed By: (Person's Name and Firm) <u>Chad Dutton</u>	
Type of Well mw		Section Location of Waste/Source _____ 1/4 of _____ 1/4 of Sec. _____, T. _____ N, R. _____ <input type="checkbox"/> E <input type="checkbox"/> W		Gov. Lot Number	
Distance from Waste/Source ft.		Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input checked="" type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known		Bulldog Drilling	
State Illinois					

<p>A. Protective pipe, top elevation _____ ft. (NAVD88)</p> <p>B. Well casing, top elevation <u>468.19</u> ft. (NAVD88)</p> <p>C. Land surface elevation <u>465.76</u> ft. (NAVD88)</p> <p>D. Surface seal, bottom <u>464.8</u> ft. (NAVD88) or <u>1.0</u> ft.</p> <div style="border: 1px solid black; padding: 5px;"> <p>12. USCS classification of soil near screen: GP <input type="checkbox"/> GM <input type="checkbox"/> GC <input type="checkbox"/> GW <input checked="" type="checkbox"/> SW <input checked="" type="checkbox"/> SP <input type="checkbox"/> SM <input type="checkbox"/> SC <input type="checkbox"/> ML <input type="checkbox"/> MH <input type="checkbox"/> CL <input type="checkbox"/> CH <input type="checkbox"/> Bedrock <input type="checkbox"/></p> <p>13. Sieve analysis attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>14. Drilling method used: Rotary <input type="checkbox"/> Hollow Stem Auger <input checked="" type="checkbox"/> _____ Other <input type="checkbox"/></p> <p>15. Drilling fluid used: Water <input checked="" type="checkbox"/> 0.2 Air <input type="checkbox"/> Drilling Mud <input type="checkbox"/> 0.3 None <input type="checkbox"/></p> <p>16. Drilling additives used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Describe _____</p> <p>17. Source of water (attach analysis, if required): _____ Onsite Potable Well</p> </div> <p>E. Bentonite seal, top <u>435.8</u> ft. (NAVD88) or <u>30.0</u> ft.</p> <p>F. Fine sand, top _____ ft. (NAVD88) or _____ ft.</p> <p>G. Filter pack, top <u>430.8</u> ft. (NAVD88) or <u>35.0</u> ft.</p> <p>H. Screen joint, top <u>430.8</u> ft. (NAVD88) or <u>35.0</u> ft.</p> <p>I. Well bottom <u>420.8</u> ft. (NAVD88) or <u>45.0</u> ft.</p> <p>J. Filter pack, bottom <u>420.8</u> ft. (NAVD88) or <u>45.0</u> ft.</p> <p>K. Borehole, bottom <u>420.8</u> ft. (NAVD88) or <u>45.0</u> ft.</p> <p>L. Borehole, diameter <u>8.3</u> in.</p> <p>M. O.D. well casing <u>2.38</u> in.</p> <p>N. I.D. well casing <u>2.07</u> in.</p>	 <p>1. Cap and lock? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>2. Protective cover pipe: a. Inside diameter: <u>4.0</u> in. b. Length: <u>5.0</u> ft. c. Material: Steel <input checked="" type="checkbox"/> _____ Other <input type="checkbox"/> d. Additional protection? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe: <u>Three steel bollards</u></p> <p>3. Surface seal: Bentonite <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> _____ Other <input type="checkbox"/></p> <p>4. Material between well casing and protective pipe: Bentonite <input checked="" type="checkbox"/> Sand _____ Other <input checked="" type="checkbox"/></p> <p>5. Annular space seal: a. Granular/Chipped Bentonite <input checked="" type="checkbox"/> b. _____ Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> c. _____ Lbs/gal mud weight . . . Bentonite slurry <input type="checkbox"/> d. <u>30</u> % Bentonite . . . Bentonite-cement grout <input checked="" type="checkbox"/> e. _____ Ft³ volume added for any of the above f. How installed: Tremie <input type="checkbox"/> Tremie pumped <input checked="" type="checkbox"/> Gravity <input type="checkbox"/></p> <p>6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> b. <input type="checkbox"/> 1/4 in. <input type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite chips <input type="checkbox"/> c. _____ Prepacked bentonite riser _____ Other <input checked="" type="checkbox"/></p> <p>7. Fine sand material: Manufacturer, product name & mesh size a. _____ b. Volume added _____ ft³</p> <p>8. Filter pack material: Manufacturer, product name & mesh size a. _____ Sand prepacked screen. b. Volume added _____ ft³</p> <p>9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> Flush threaded PVC schedule 80 <input type="checkbox"/> _____ Other <input type="checkbox"/></p> <p>10. Screen material: <u>Schedule 40 PVC</u> a. Screen Type: Factory cut <input type="checkbox"/> Continuous slot <input type="checkbox"/> Sand prepacked screen _____ Other <input checked="" type="checkbox"/> b. Manufacturer _____ c. Slot size: <u>0.010</u> in. d. Slotted length: <u>10.0</u> ft.</p> <p>11. Backfill material (below filter pack): None <input checked="" type="checkbox"/> _____ Other <input type="checkbox"/></p>
---	--

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 11/4/2015

Signature 	Firm Natural Resource Technology 234 W. Florida Street, Floor 5, Milwaukee, WI 53204	Tel: (414) 837-3607 Fax: (414) 837-3608
--	--	--



Appendix B
Statistical Procedure for
Background

APPENDIX B
STATISTICAL PROCEDURE FOR CALCULATION OF BACKGROUND
Hennepin West Ash Pond System
Groundwater Monitoring Plan
Hennepin Power Station, Putnam County, IL

Introduction

The purpose of the statistical calculations documented in this appendix is to define the procedure used to determine the maximum background concentrations likely to occur upgradient of the West Ash Pond System within sand and gravel aquifer. High predicted background concentrations relative to the Illinois Class I groundwater quality standards may suggest that downgradient concentrations for those parameters in groundwater are due to a background source.

The statistical analysis procedures used here are consistent with procedures described in the document: 2009 Unified Guidance. "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities—Unified Guidance," March 2009, EPA 530/R-09-2007 (USEPA, 2009).

Compliance Data Operations - Limit Calculations

Background concentrations were calculated using either a parametric upper tolerance limit (UTL), a parametric upper prediction limit (UPL) for a mean, or a non-parametric UPL for a median. Each statistical method chosen complies with the performance standards, as appropriate, based on the test method used. Table B-1 outlines the logic for calculation of limits.

As required in 40 CFR Part 257.93, statistical analyses were performed to determine whether a statistically significant increase over a background value has occurred for each constituent and at each well. Groundwater standards were determined for each parameter detected in the downgradient monitoring wells. Groundwater Standards used to determine exceedances in downgradient wells are located in the IAC Title 35, Part 620.410, Groundwater Quality Standards for Class I: Potable Resource Groundwater Standard unless: 1) the background concentration is greater than the established IEPA Standard or 2) the constituent does not have an established IEPA Standard, such as for calcium, lithium, and molybdenum. For these exceptions, the background concentrations were used to determine the applicable groundwater standard by using either a parametric upper tolerance limit (UTL), a parametric upper prediction limit (UPL) for a mean, or a non-parametric UPL for a median.

The UTL was used to calculate the groundwater standard when pooled background data were normally distributed, with a non-detect frequency of 15% or less. When non-detect frequency was 15% or less, half the RL was substituted for non-detects. The Unified Guidance recommends 95% confidence level and 95% coverage (95/95 tolerance interval). The non-detect data were replaced (simple substitution) with half the reporting limit (RL), and the normal mean and standard deviation were calculated. When the GWPS is based on an established IEPA Groundwater Standard, or a UTL derived from the background dataset, the confirmation of an exceedance in downgradient compliance wells relative to the GWPS will be determined using confidence intervals. A confidence interval defines the upper and lower bound of the true mean of a constituent concentration in groundwater within a specified confidence range. Non-detects in downgradient data will be handled similarly to upgradient analyses, with half the RL substituted

for non-detects when the frequency is 15% or less. The Kaplan-Meier method will be used when the detection frequency is between 15% and 50% to compute estimates of the mean and standard deviation adjusted for the presence of left-censored values. These estimates will then be substituted for the sample mean and standard deviation. Once the groundwater standard is established for pooled background data, either parametric or non-parametric confidence intervals will be computed for each constituent in downgradient wells to determine an exceedance.

The parametric UPL for a mean was used to calculate the groundwater standard if the pooled background data contain 50-70% non-detects, and normality could be achieved. The Kaplan-Meier or ROS methods were used to estimate the mean and standard deviation. An exceedance was deemed to have occurred at a compliance well when the *mean* calculated using the last three sampling events exceeded the UPL.

The non-parametric UPL for a median was used to calculate the groundwater standard if the pooled background data contain greater than 70% non-detects, and normality could not be achieved. An exceedance was deemed to have occurred at a compliance well when the *median* calculated using the last three sampling events exceeded the UPL. The last RL was used when for parameters with 100 percent non-detects in the background dataset.

If a significant trend was detected, in either background or downgradient data for a constituent, confidence bands accounting for trends were constructed to account for the trend-induced variation. Linear regression was used when background or downgradient data were approximately normally distributed, with a constant sample variance around the mean, and the frequency of non-detects was low. For background data, the upper confidence band (UCB) around the linear regression line was used as the groundwater standard for the trending constituent. And exceedance was confirmed when the lower confidence band (LCB) around the trend line in the downgradient data exceeded the background UCB used as the groundwater standard. The confidence bands around the Thiel-Sen trend line were similarly used as a non-parametric alternative to linear regression when trend residuals could not be normalized, or if there was a higher percentage of non-detects in either background or downgradient data.

Statistical Data Evaluation and Results

The input dataset for background calculations includes the monitoring data from monitoring wells 32 and 34 following collection of 8 rounds, for a subset of the inorganic parameters listed in 35 IAC 620.410(a), as described in Section 4.1 of the Groundwater Monitoring Plan to which this Appendix is attached. All water quality data was stored, prepared, and statistically analyzed using MANAGES™ Version 4.0 software (EPRI, 2017).

Downgradient concentration results from future groundwater sampling will be compared to these background values to determine if exceedances of the groundwater standard occurred. The full statistical summary of downgradient well exceedances is attached, as well as a summary of the background water quality data for wells 32 and 34.

Table B-1. Statistical Analysis Flowchart

Significant Trend?	Background			Downgradient		
	% NDs	Distribution	GWPS Determination	% NDs	Distribution	Test to Determine SSL
No	0 ≤ 50%	Normal	MCL or The Upper Tolerance Limit	≤75%	Normal	Parametric Lower Confidence Interval around a Normal Mean
				≤75%	Log-Normal	Parametric Lower Confidence Interval around a Lognormal Geometric Mean
				NA	Non-Normal	Non-Parametric Lower Confidence Interval around a Median
				>75%	Unknown/Cannot be determined	
	50 ≤ 70%	Normal	The Upper Prediction Limit for a Mean	NA	NA	Mean of last 3 samples
	>70%	Non-Normal	Upper Prediction Limit for a Median	NA	NA	Median of last 3 samples
	100%	Non-Normal	Last reporting limit	NA	NA	Median of last 3 samples
Yes	0 ≤ 50%	Normal	UCL of Confidence Band around Linear Regression	≤75%	Residuals after subtracting trend are normal, equal variance	Lower Confidence Band around Linear Regression
	50 ≤ 100%	Non-Normal	UCL of Confidence Band around Thiel-Sen trend line	≤75%	Residuals not normal	Lower Confidence Band around Thiel-Sen

Hennepin Statistical Summary for Pooled Locations

User Supplied Information

Date Range: 12/08/2015 to 10/01/2017

Option for LT Pts:

x 1.00

Pooled Locations: 32,34

Parameter	Units	Count	Mean	Median	Maximum	Minimum	Std Dev	Sen Slope Units/yr	Normal / Log Normal	% of Non-Detects
As, tot	mg/L	16	0.0010	0.0010	0.0010	0.0010	0.0000	0.0000	No / No	100.00
B, tot	mg/L	16	0.1192	0.1190	0.1900	0.0681	0.0342	0.0159	Yes / Yes	0.00
Ba, tot	mg/L	16	0.0766	0.0687	0.1560	0.0290	0.0461	0.0135	No / No	0.00
Be, tot	mg/L	16	0.001	0.001	0.001	0.001	0.000	0.000	No / No	100.00
Ca, tot	mg/L	16	127.538	122.000	170.000	84.900	34.733	6.425	No / No	0.00
Cd,tot	mg/L	16	0.0010	0.0010	0.0010	0.0010	0.0000	0.0000	No / No	100.00
Cl, tot	mg/L	16	74.938	69.500	108.000	42.000	29.151	7.232	No / No	0.00
Co, tot	mg/L	16	0.0011	0.0010	0.0017	0.0010	0.0002	0.0000	No / No	75.00
Cr, tot	mg/L	16	0.0010	0.0010	0.0013	0.0010	0.0001	0.0000	No / No	93.75
F, tot	mg/L	16	0.140	0.140	0.160	0.120	0.013	0.000	No / No	0.00
Hg, tot	mg/L	16	0.0002	0.0002	0.0002	0.0002	0.0000	0.0000	No / No	100.00
Li, tot	mg/L	16	0.0076	0.0077	0.0135	0.0022	0.0050	0.0013	No / No	0.00
Mo, tot	mg/L	16	0.0013	0.0012	0.0020	0.0010	0.0003	0.0000	No / No	50.00
Pb, tot	mg/L	16	0.0010	0.0010	0.0010	0.0010	0.0000	0.0000	No / No	100.00
pH (field)	STD	16	7.063	7.070	7.340	6.810	0.136	-0.036	Yes / Yes	0.00
Ra-226,228,	pCi/L	16	0.868	0.900	2.160	0.000	0.700	0.000	No / No	0.00
Sb, tot	mg/L	16	0.0010	0.0010	0.0010	0.0010	0.0000	0.0000	No / No	100.00
Se, tot	mg/L	16	0.0010	0.0010	0.0011	0.0010	0.0000	0.0000	No / No	81.25
SO4, tot	mg/L	16	84.313	80.000	117.000	57.000	25.355	8.690	No / No	0.00
TDS	mg/L	16	625.125	624.000	830.000	450.000	159.952	20.608	No / No	0.00
Tl, tot	mg/L	16	0.0010	0.0010	0.0010	0.0010	0.0000	0.0000	No / No	100.00

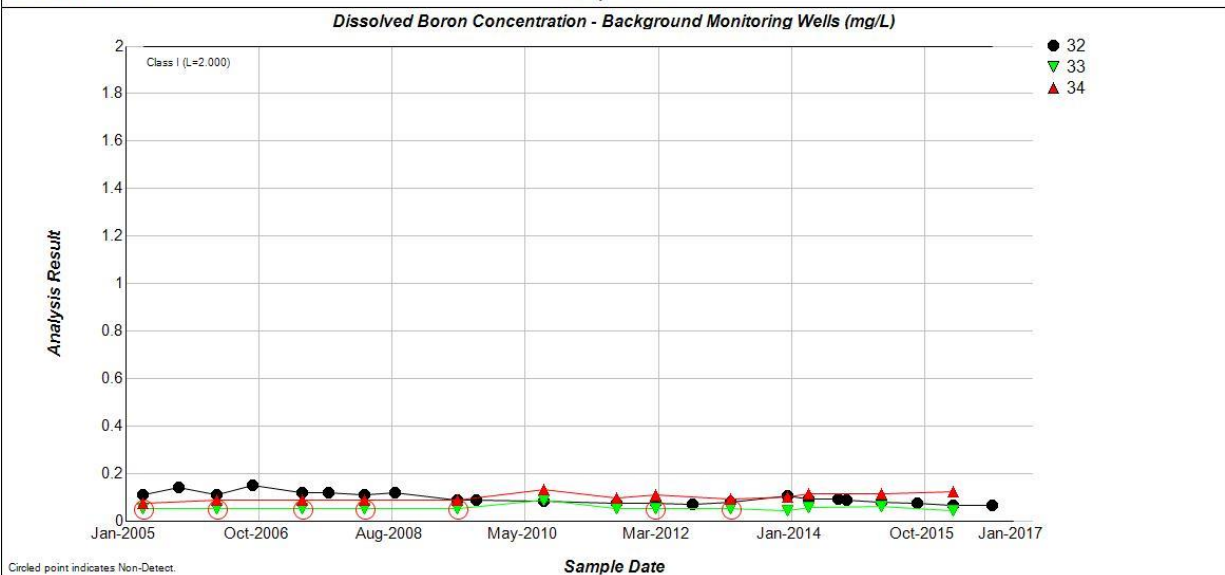
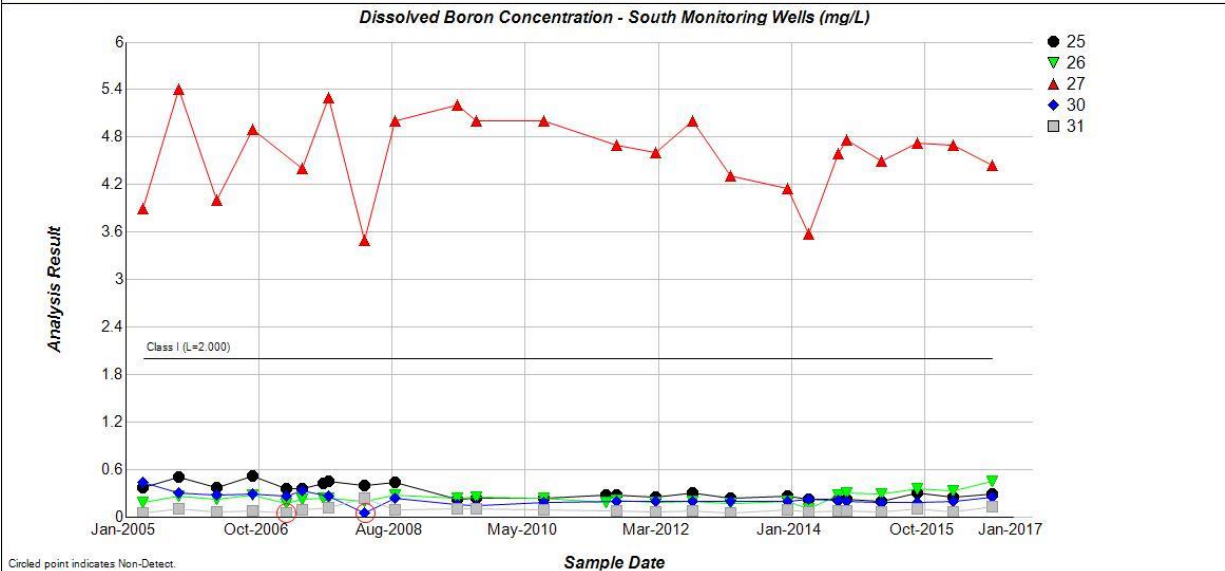
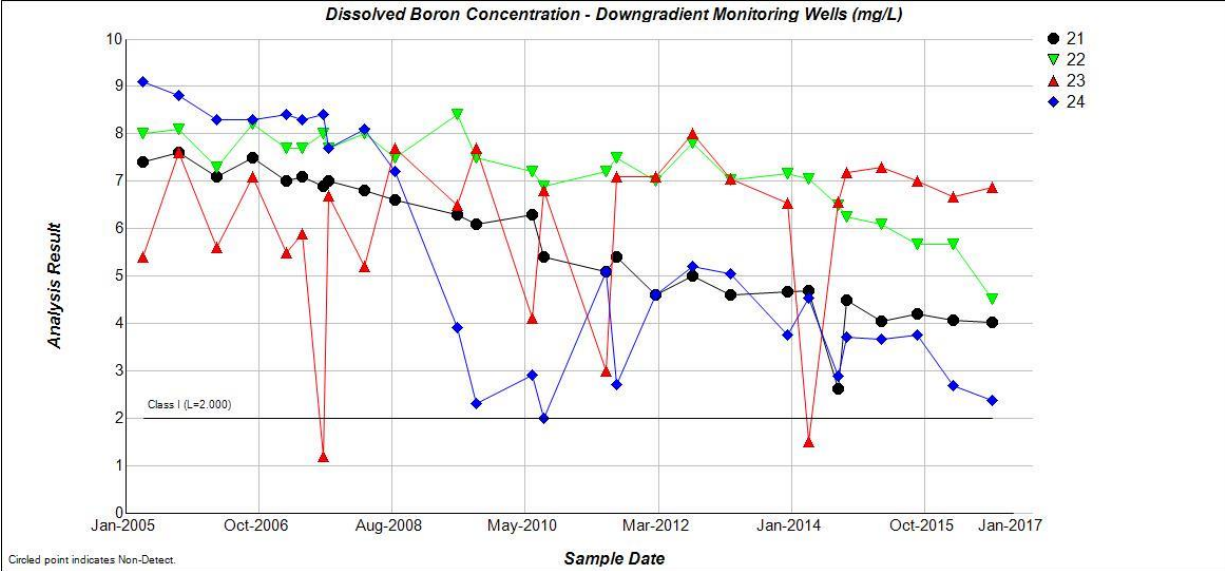
Shapiro-Wilk Normality test performed at 0.05 significance level.

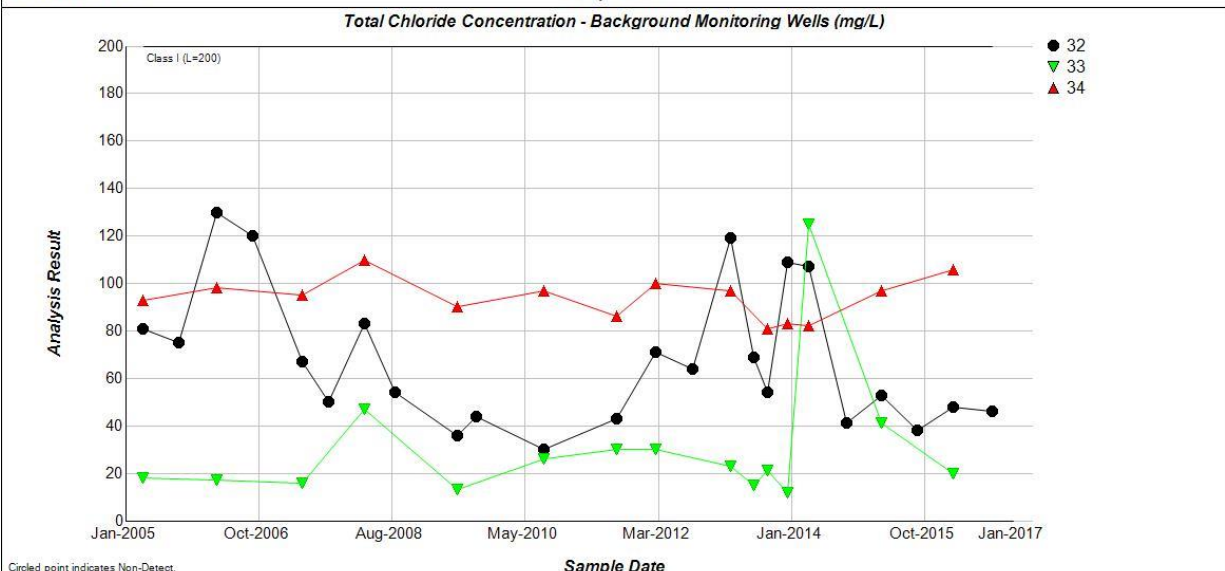
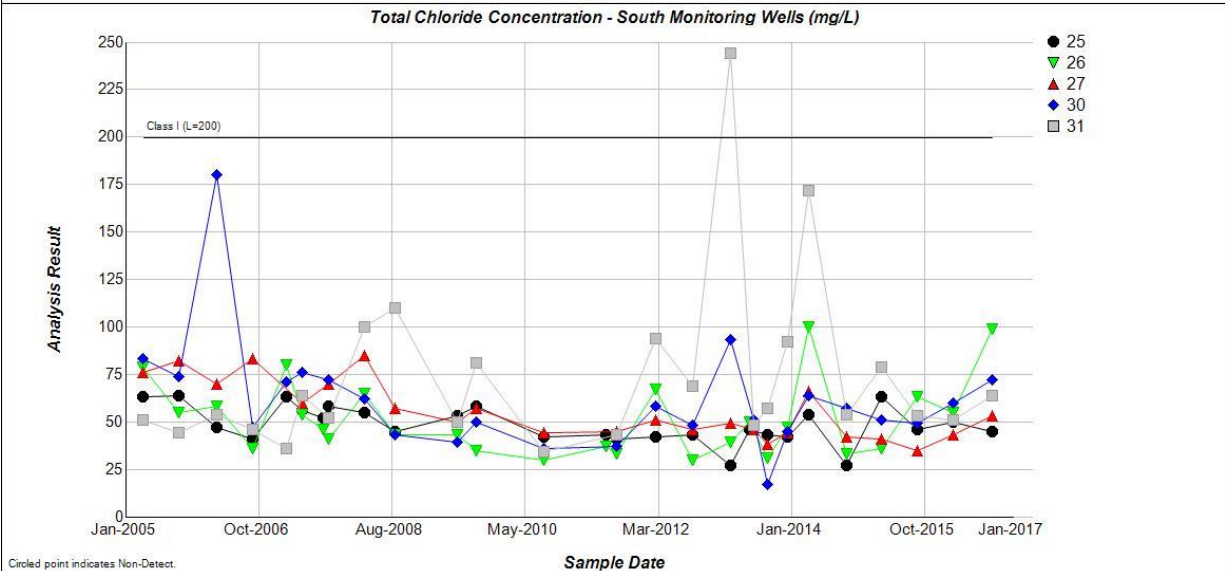
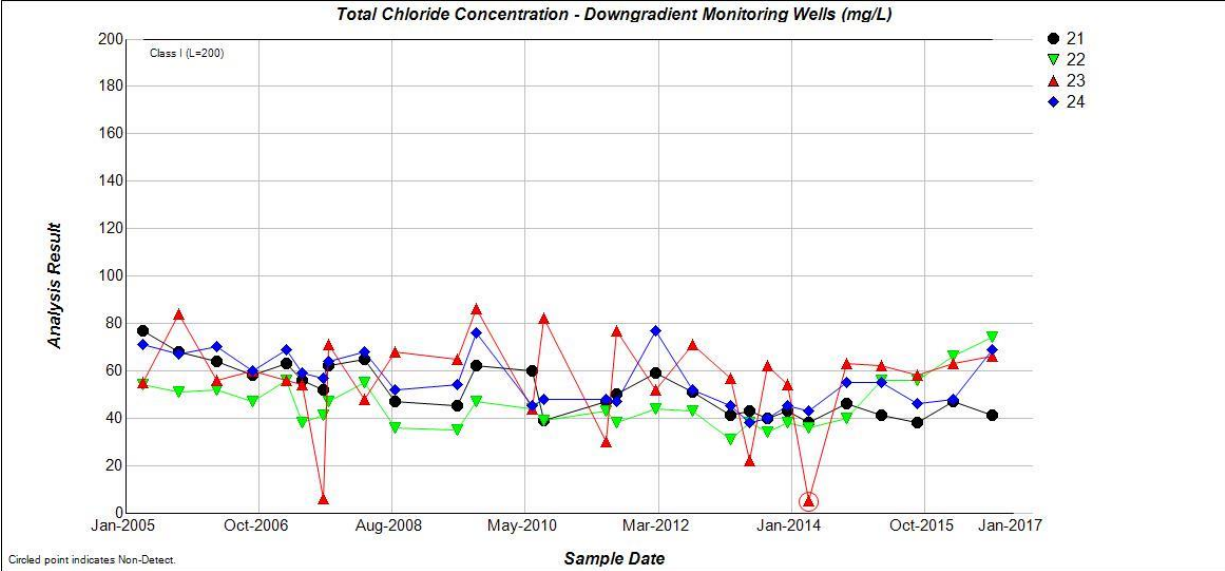


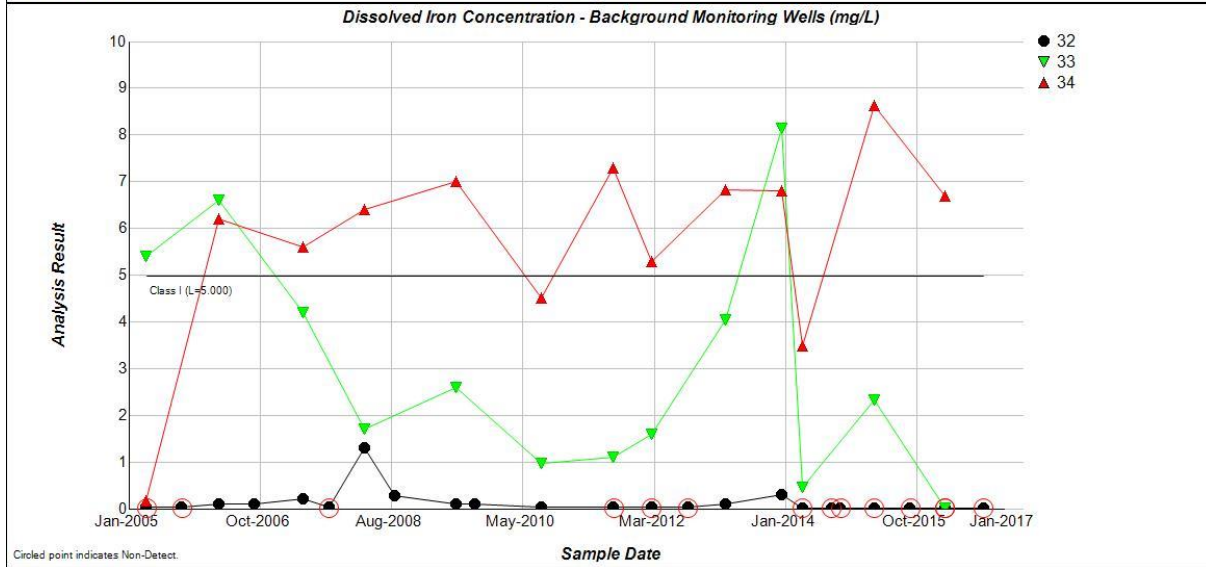
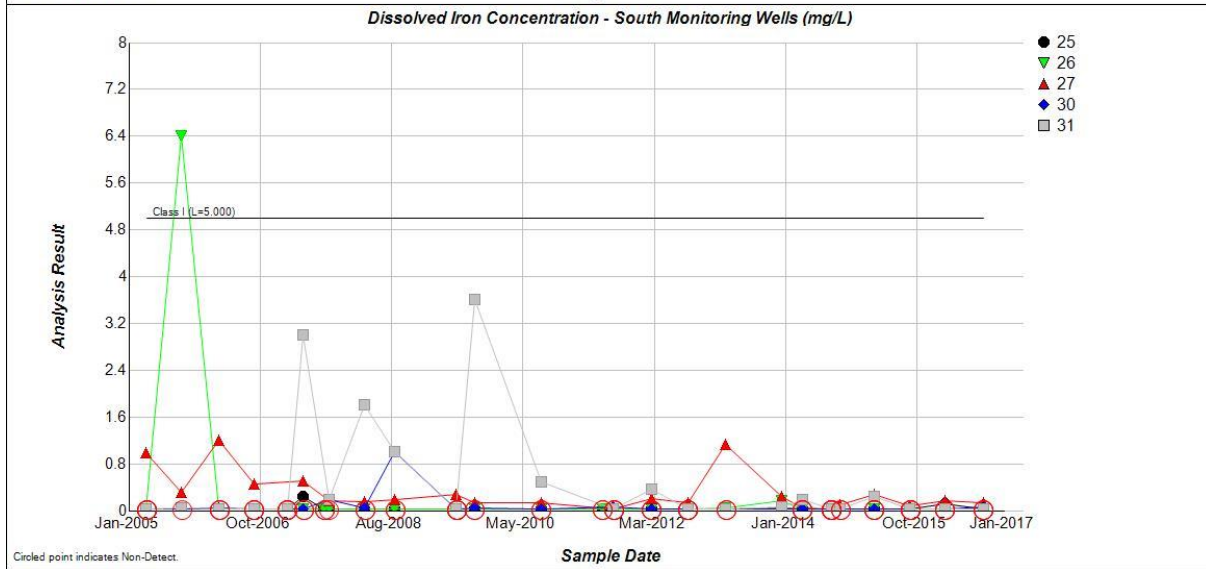
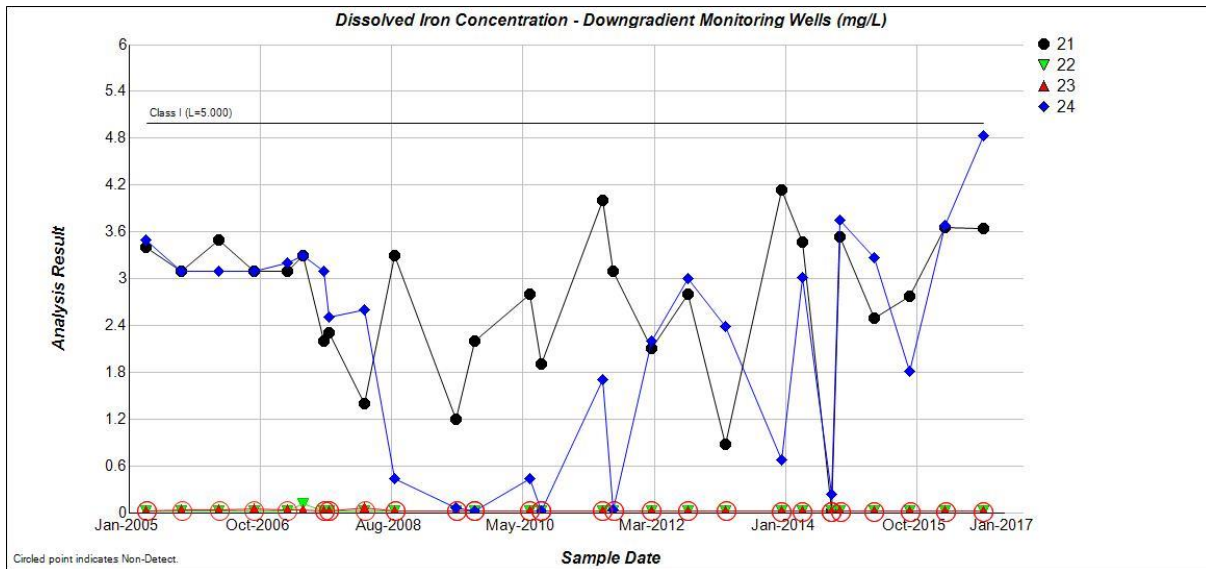
Appendix C
Groundwater Quality
Monitoring Data

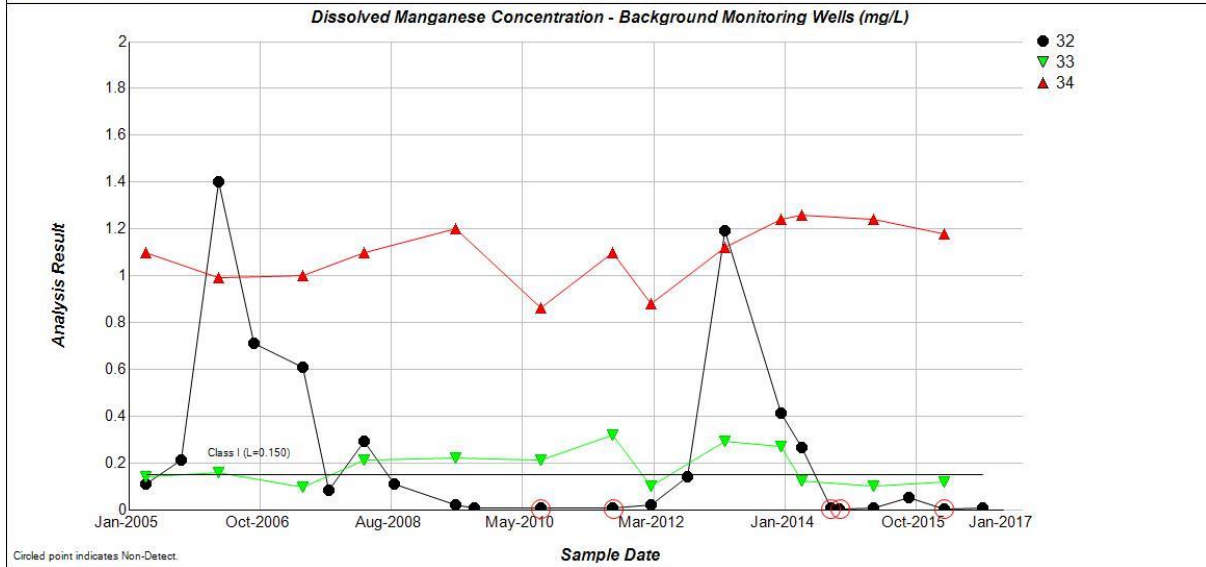
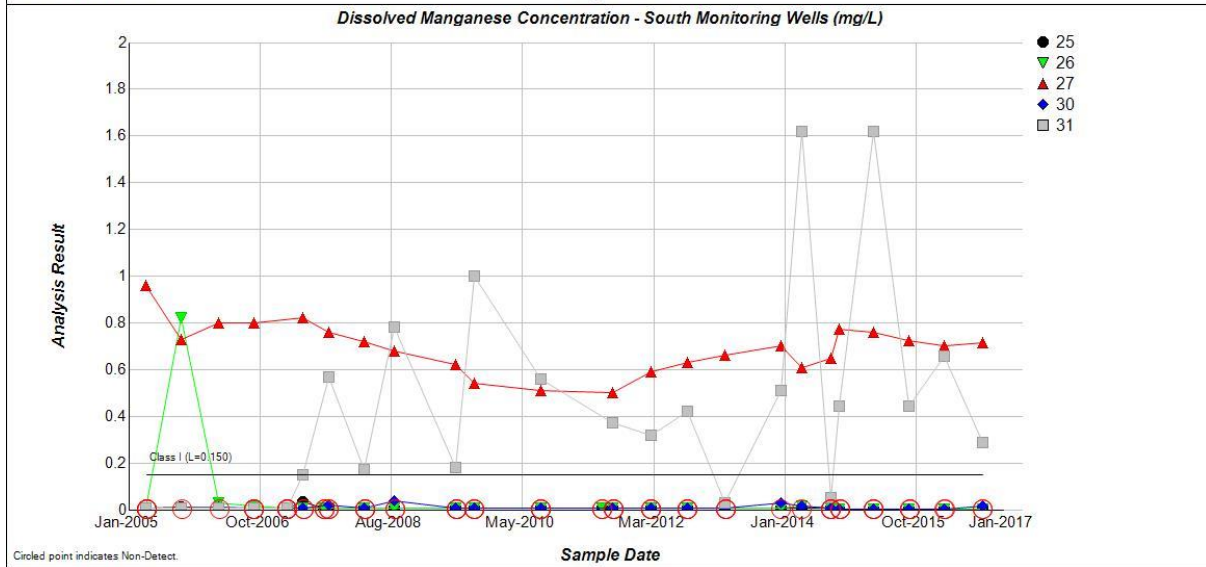
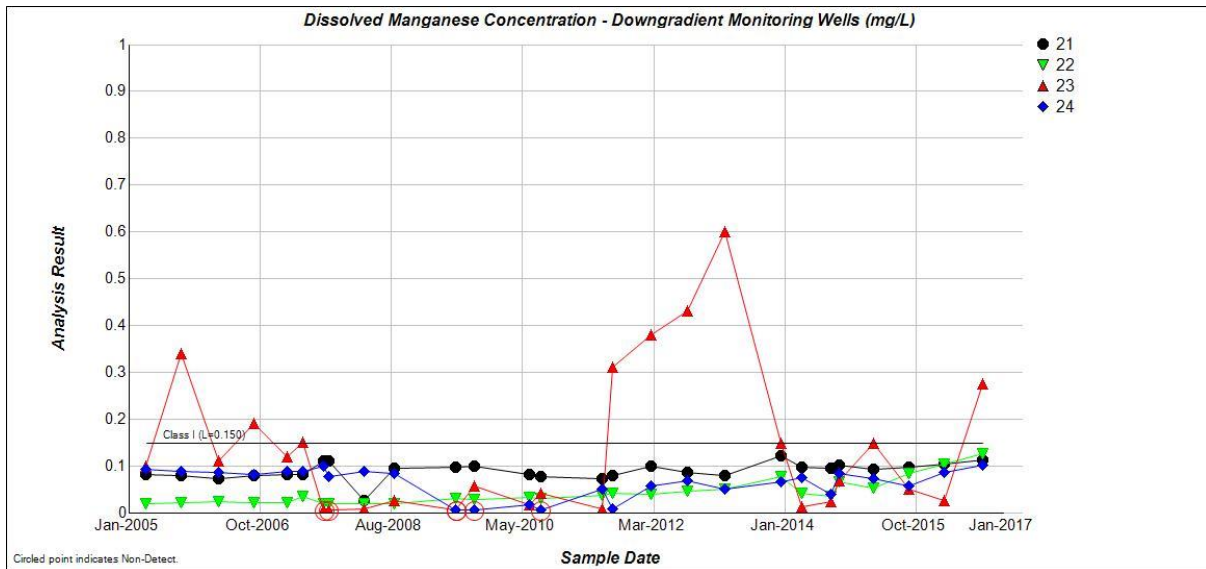


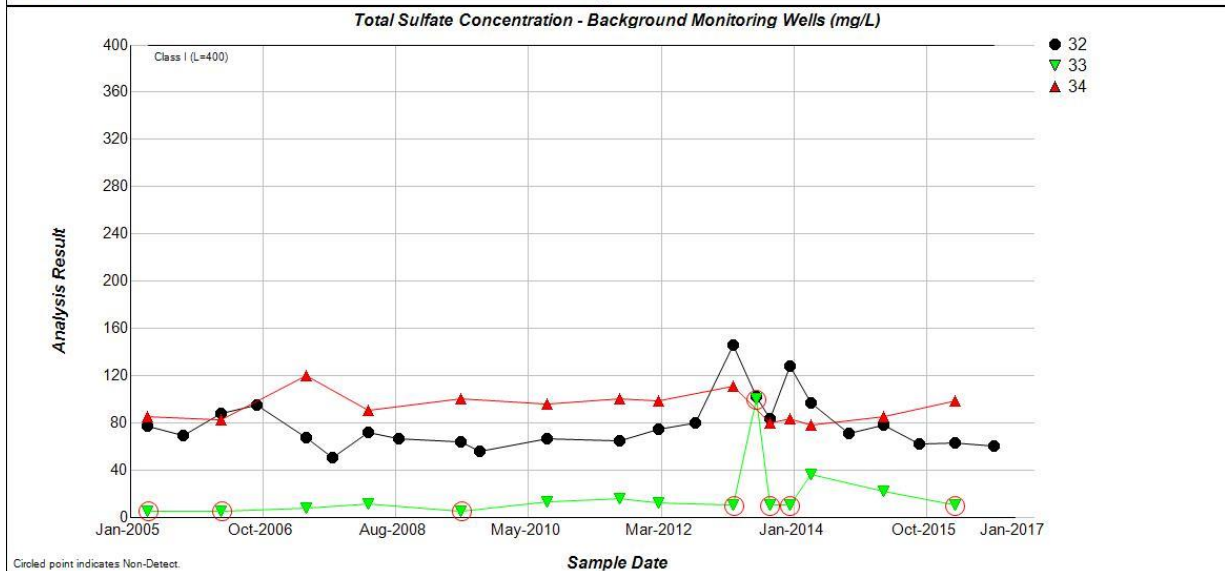
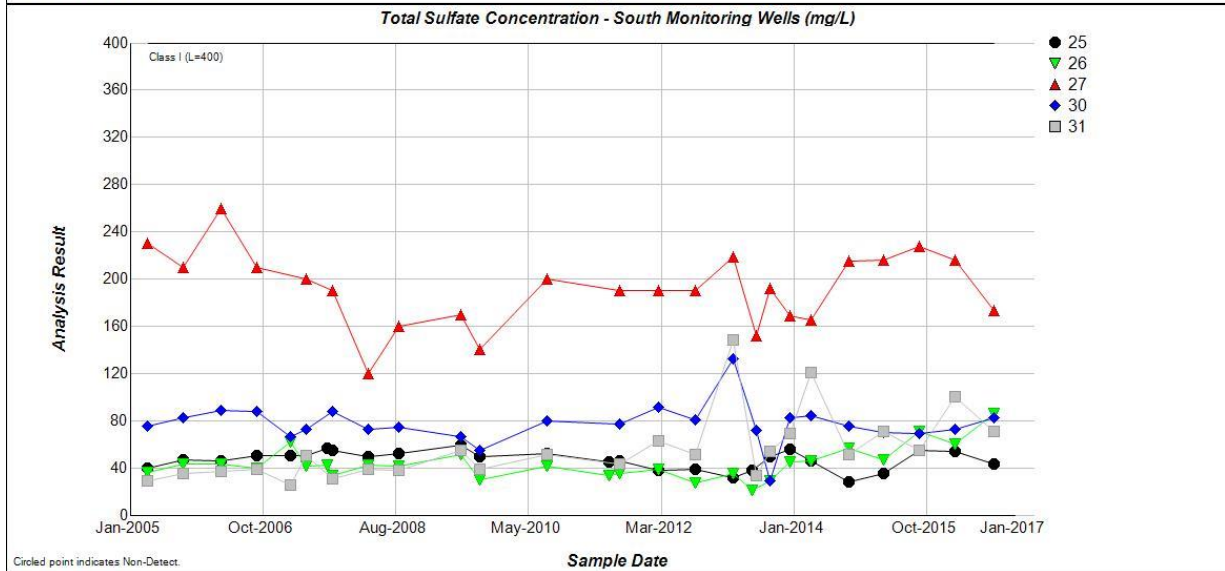
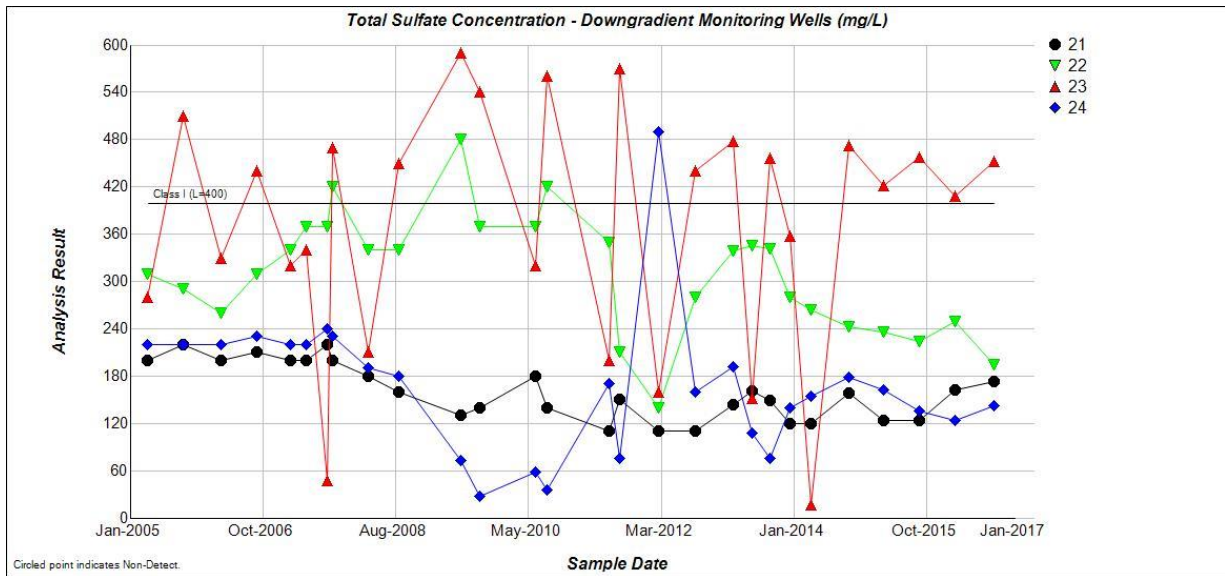
Appendix C1
Time Concentration Plots
2005 through 2016

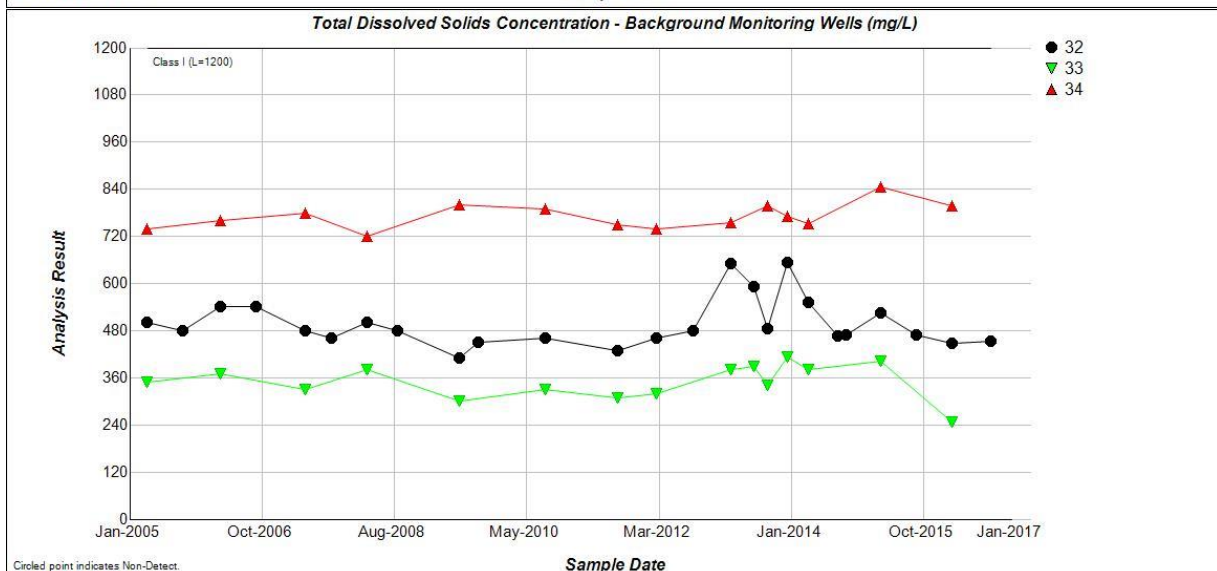
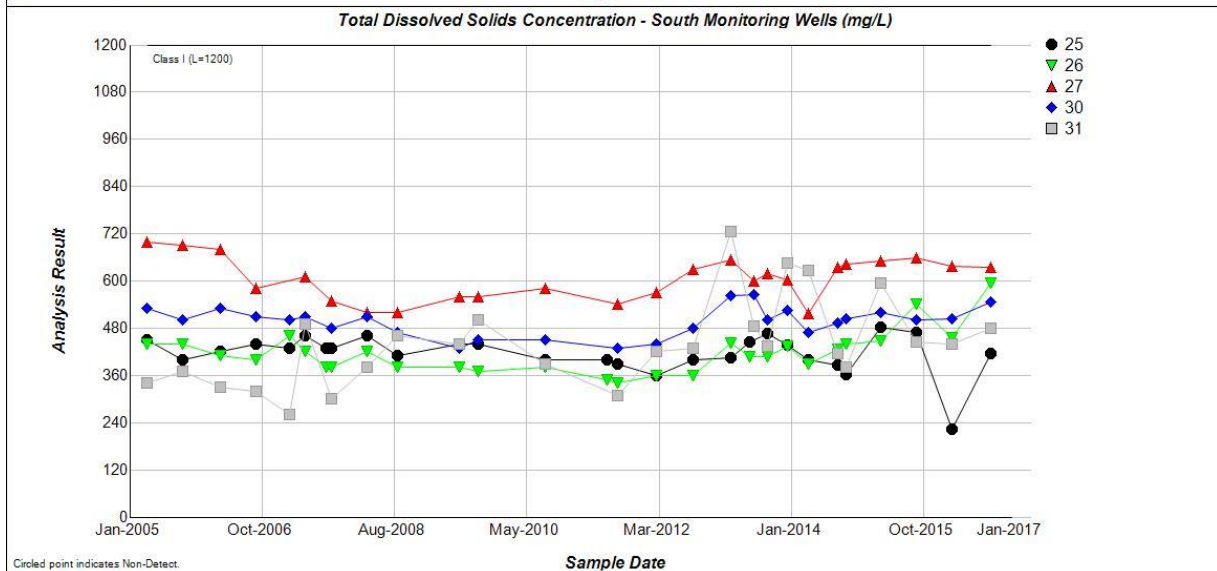
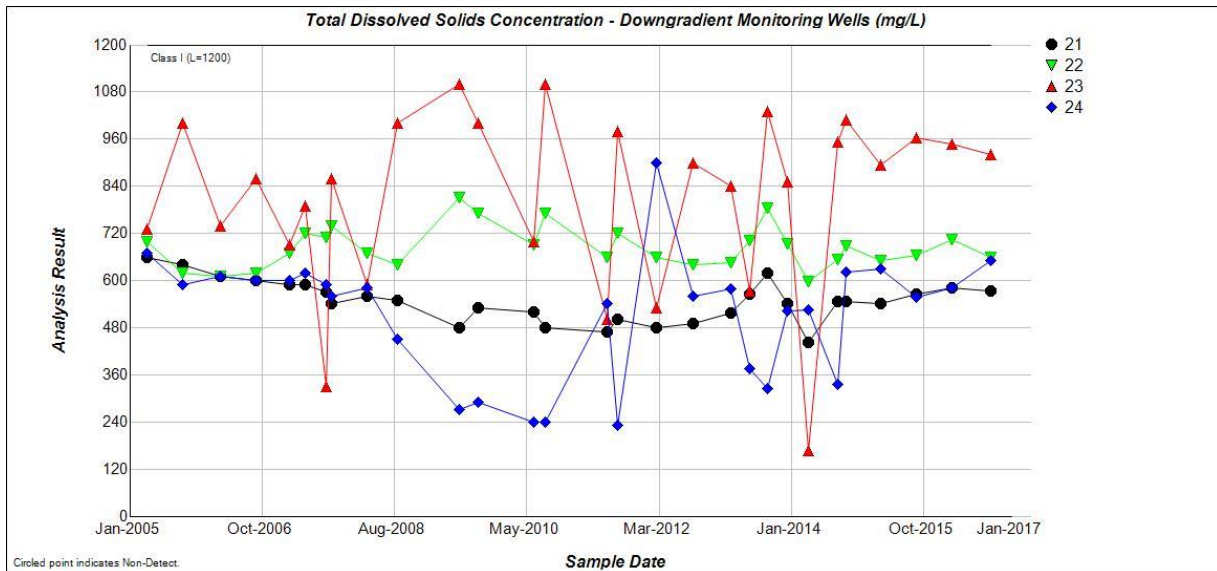


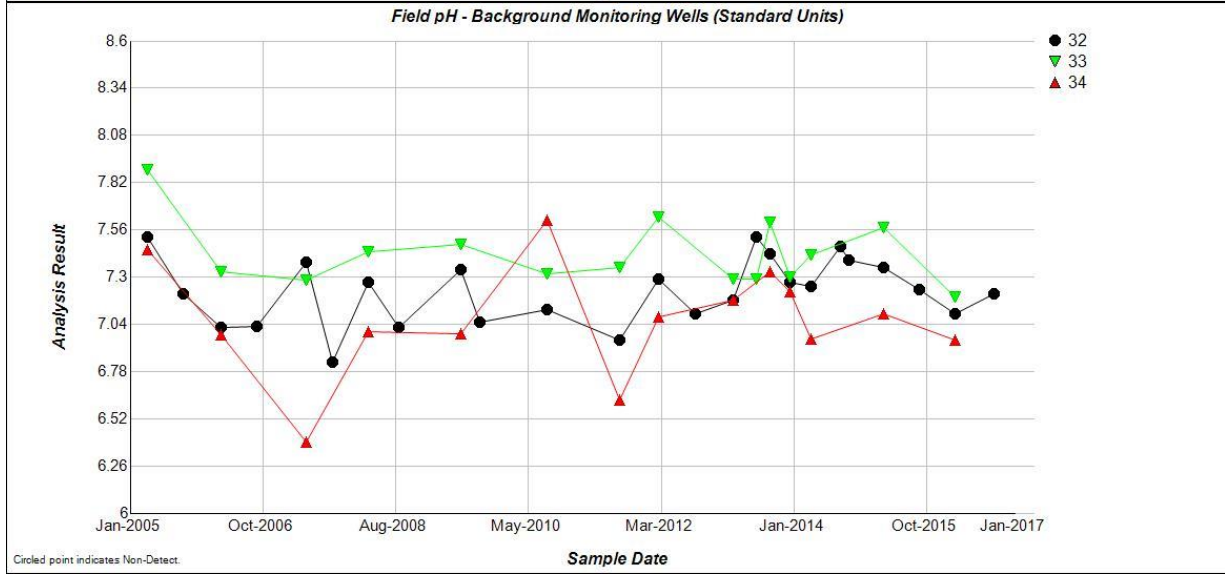
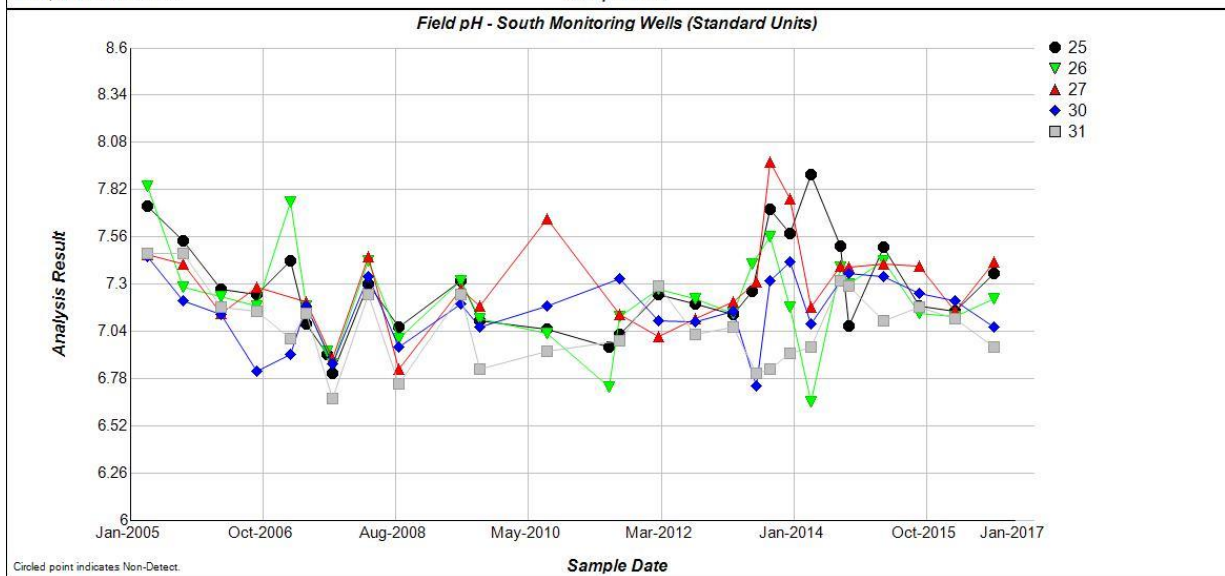
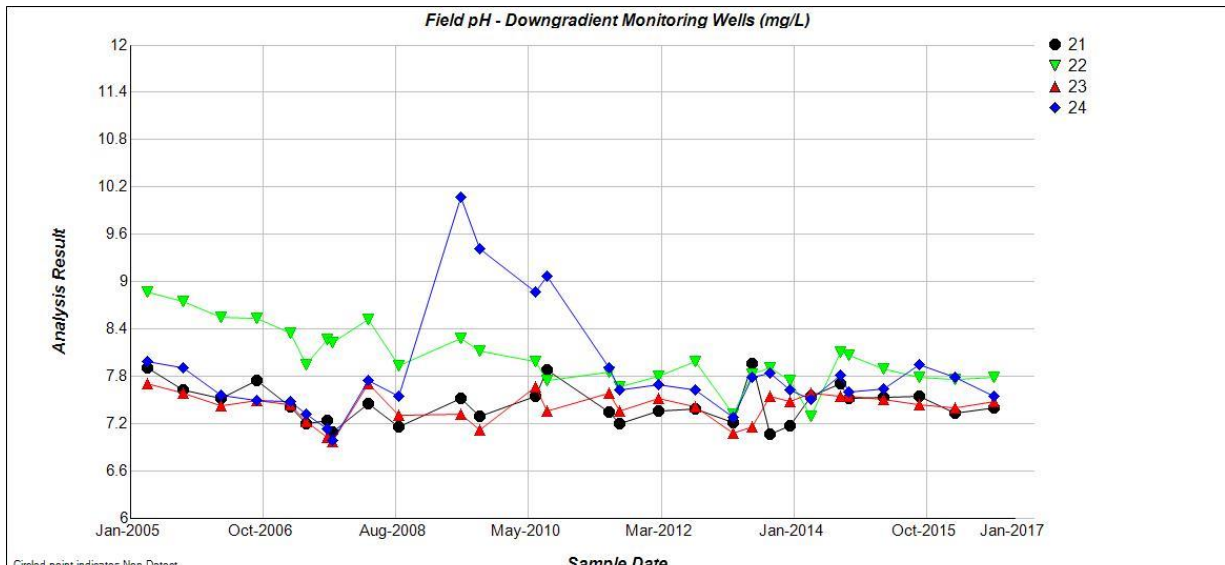


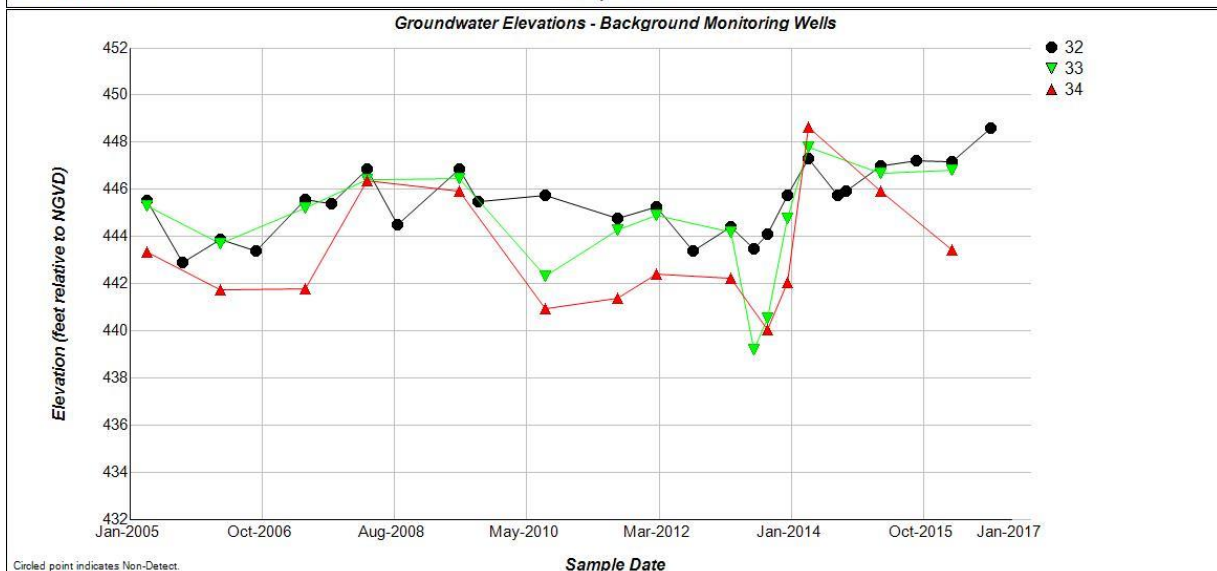
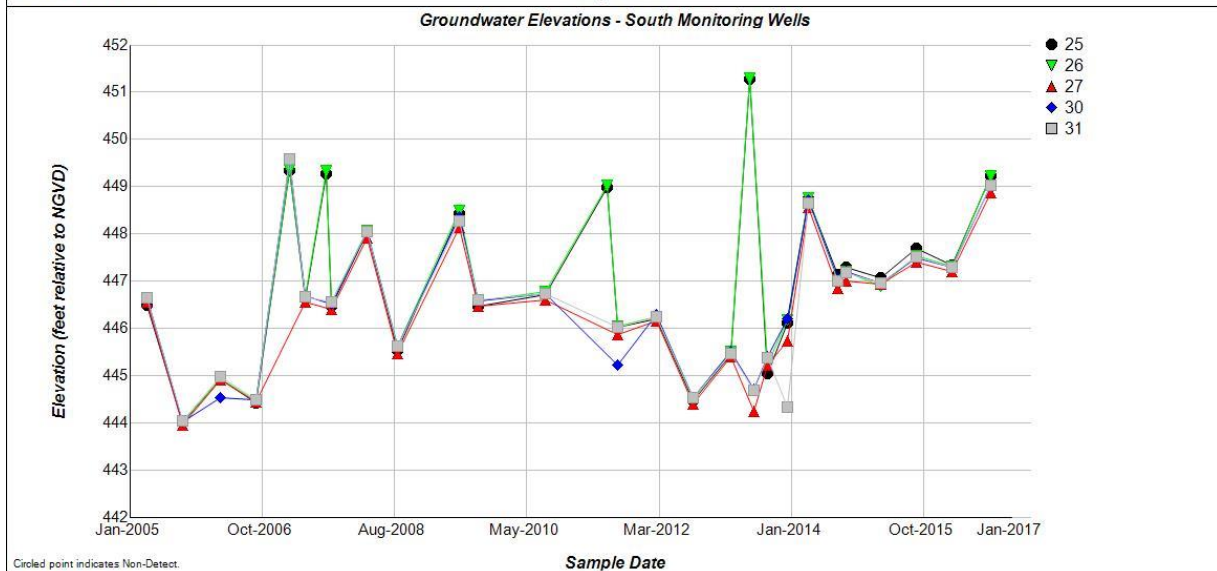
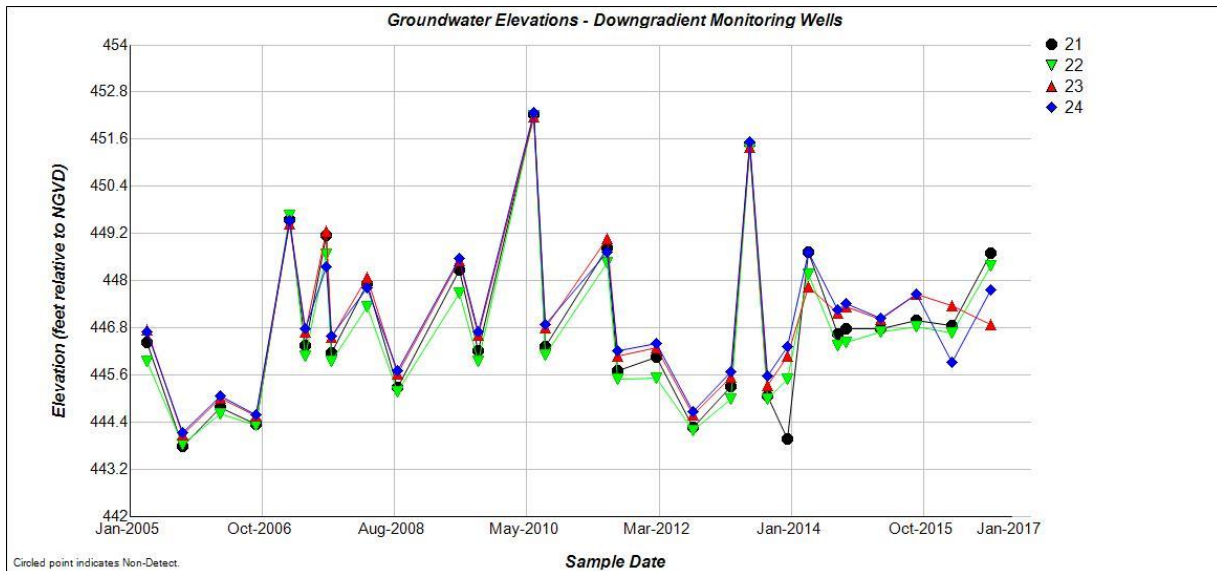














Appendix C2
Class I Groundwater
Quality Standards
Monitoring Results

Appendix C2A: Inorganic Parameter Groundwater Quality Results June 2013 – March 2014
 Hydrogeologic Site Characterization Report
 West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 21				Well 22				Well 23			
				06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.96	7.06	7.17	7.55	7.83	7.91	7.75	7.29	7.15	7.55	7.48	7.58
GW Elevation	EWLI	ft.	--	451.48	445.07	443.97	448.73	451.34	444.98	445.50	448.17	451.40	445.32	446.07	447.85
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	556	571	526	633	946	884	1,000	634	640	1,140	925	526
Temp-field	SM 21st ed. 2550	C°	ns	15.1	16.8	10.3	10.3	13.6	13.6	10.1	10.5	12.7	14.3	9.9	10.4
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	161	149	121	127	346 S	341	269	254	152	456	329	17
Chloride (d)	ASTM D512-04 C	mg/L	200	43	40	43	37	38	34	38	35	22	62	54	<5.0
Fluoride (t)	EPA method 74	mg/L	4.0	0.22	0.17	0.18	0.12	0.22	0.17	0.18	0.14	0.24	0.17	0.19	0.18
Nitrate (t)	SM 21st ed. 4500-NO ₃ D	mg/L	10.0	0.034 J	0.205	0.17	0.39	6.42	5.95	5.56	5.52	0.15	<0.05	<0.05	1.91
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	<0.004	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	564	618	540	442	702	784	694	596	574	1,030	852	166
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	<0.007	<0.008	<0.007	<0.007	<0.007	<0.008	<0.007	<0.007	<0.008	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005 S	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	0.007	0.009	0.008	0.0104	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.20	0.18	0.18	0.15	0.06	0.07	0.06	0.05	0.12	0.05	0.04	0.03
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	5.18	5.09	4.66	4.68	7.66	7.51	7.16	7.05	2.88	7.43	6.54	1.51
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	3.18	3.88	4.13	3.47	0.12	0.07	<0.02	<0.02	0.46	0.16	<0.02	<0.02
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.118	0.112	0.121	0.090	0.142	0.093	0.078	0.040	0.096	0.068	0.148	0.010
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.021	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
 EWLI - electronic water level indicator.

- (d) dissolved
- (t) total
- (t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
- ** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.
- Not applicable.
- Not sampled or insufficient groundwater for sampling and/or analysis.
- ns No standard.

< ND - Not detected at the Reporting Limit 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix C2A: Inorganic Parameter Groundwater Quality Results
 Hydrogeologic Site Characterization Report
 West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 24				Well 25				Well 26			
				06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14	06/07/13	09/03/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.78	7.84	7.63	7.50	7.26	7.71	7.58	7.90	7.41	7.56	7.17	6.65
GW Elevation	EWLI	ft.	--	451.53	445.56	446.32	448.73	451.27	445.05	446.10	448.74	451.30	445.24	446.17	448.76
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	567	507	527	856	689	696	649	738	754	627	736	874
Temp-field	SM 21st ed. 2550	C°	ns	13.2	15.3	9.9	10.2	13.5	13.1	10.6	8.9	12.0	15.0	10.4	5.8
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	108	75	138	164	38	49	41	41	21	29	41	44
Chloride (d)	ASTM D512-04 C	mg/L	200	38	40	45	46	46	43	42	51	50	31	47	90
Fluoride (t)	EPA method 74	mg/L	4.0	0.26	0.21	0.21	0.16	0.17	0.13	0.15	<0.10	0.20	0.16	0.18	0.12
Nitrate (t)	SM 21st ed. 4500-NO ₃ D	mg/L	10.0	.036 J	<0.05	0.07	<0.05	10.1	8.28	12.2	8.71	7.91	15.1	6.59	2.87
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	<0.004	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	376	324	522	526	444	466	436	400	408	408	434	390
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	0.008	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	0.009	0.009	0.023	0.030	<0.003	<0.003	<0.003 S	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.04	0.04	0.04	0.04	0.08	0.08	0.07	0.07	0.08	0.08	0.09	0.06
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	3.02	2.9	3.76	4.53	0.24	0.29	0.26	0.21	0.18	0.20	0.19	0.09
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	0.69	0.59	0.68	3.02	5.06	1.36	0.05	<0.02	0.58	0.90	0.17	<0.02
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	0.009	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.036	0.022	0.066	0.070	0.192	0.050	<0.005	0.005	0.029	0.040	0.009	0.010
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	0.0127	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	0.073	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	0.026	0.011	<0.01	<0.01	0.048	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request. (d) dissolved -- Not applicable. ns No standard.
 EWLI - electronic water level indicator. (t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
 (t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
 ** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit 0.42 Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix C2A: Inorganic Parameter Groundwater Quality Results:
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 27				Well 30				Well 31			
				06/26/13	09/03/13	12/10/13	03/25/14	06/26/13	09/03/13	12/10/13	03/25/14	06/26/13	09/03/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.31	7.97	7.77	7.17	6.74	7.32	7.42	7.08	6.81	6.83	6.92	6.95
GW Elevation	EWLI	ft.	--	444.23	445.22	445.74	448.56	444.70	445.40	446.20	448.71	444.69	445.38	444.32	448.65
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	840	863	930	851	881	761	831	851	873	741	751	780
Temp-field	SM 21st ed. 2550	C°	ns	12.8	12.9	10.0	9.9	12.3	12.9	10.0	10.6	12.7	15.1	15.2	10.4
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	152	192	184	151	72	29	78	74	33	54	64	110
Chloride (d)	ASTM D512-04 C	mg/L	200	46	38	44	54	51	17	45	56	48	57	92	105
Fluoride (t)	EPA method 74	mg/L	4.0	0.21	0.19	0.19	0.15	0.15	0.13	0.14	<0.01	0.28	0.26	0.23	0.21
Nitrate (t)	SM 21st ed. 4500-NO ₃ D	mg/L	10.0	0.632	<0.05	0.55	<0.05	4.13	7.73	5.49	3.03	0.552	0.506	<0.05	<0.05
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	<0.004	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	600	618	602	518	564	502	524	470	486	434	646	626
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.13	0.09	0.09	0.07	0.07	0.07	0.06	0.05	0.04	0.03	0.04	0.03
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	3.98	4.68	4.15	3.58	0.24	0.20	0.20	0.22	0.09	0.09	0.08	0.05
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	4.32	0.81	0.24	0.04	1.37	1.09	0.03	<0.02	0.95	0.19	0.06	0.18
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.544	0.723	0.702	0.600	0.058	0.038	0.030	0.010	0.123	0.191	0.51	1.62
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	0.023	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
EWLI - electronic water level indicator.

(d) dissolved -- Not applicable. ns No standard.
(t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
(t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit **0.42** Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix C2A: Inorganic Parameter Groundwater Quality Results
Hydrogeologic Site Characterization Report
West Ash Pond System, Hennepin Power Station

Parameter	Method Used	Units	Standard Limit	Well 32				Well 33				Well 34			
				06/26/13	09/03/13	12/10/13	03/25/14	06/26/13	09/03/13	12/10/13	03/25/14	6/7:6/26/13	09/04/13	12/10/13	03/25/14
pH-field	SM 21st ed. 4500-H ⁺	s.u.	6.5-9.0	7.52	7.43	7.27	7.25	7.29	7.60	7.30	7.42	----	7.33	7.22	6.96
GW Elevation	EWLI	ft.	--	443.45	444.10	445.76	447.28	439.18	440.51	444.77	447.77	----	440.04	442.04	448.64
Spec Cond-field	SM 21st ed. 2520-B	micromhos/cm	ns	851	767	785	945	594	517	581	756	----	1,180	1,060	986
Temp-field	SM 21st ed. 2550	C°	ns	12.8	12.9	10.5	5.9	13.1	13.8	10.3	9.7	----	13.0	9.8	11.0
Sulfate (d)	SM 21st ed. 4500-SO ₄ E	mg/L	400	102	83	112	95	<100 S	<10	<10**	25	----	80	83**	73
Chloride (d)	ASTM D512-04 C	mg/L	200	69	54	109	87	15	21	12	81	----	81	83	71
Fluoride (t)	EPA method 74	mg/L	4.0	0.18	0.18	0.16	0.13	0.26	0.25	0.22	0.22	----	0.20	0.19	0.17
Nitrate (t)	SM 21st ed. 4500-NO ₃ D	mg/L	10.0	5.54	8.72	<0.05	1.04	0.139	<0.05	<0.05	2.26	----	<0.05	<0.05	<0.05
Perchlorate (t)	EPA 314.0	mg/L	0.0049	<0.004	----	----	----	<0.004	----	----	----	----	----	----	----
TDS	SM 21st ed 2540 C	mg/L	1,200	592	486	654	552	388	342	412	382	----	798	772	752
Cyanide (t)	SW-846 9012A	mg/L	0.2	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	----	<0.007	<0.007	<0.007
Antimony (t/d)*	SW-846 3020A	mg/L	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	----	<0.005 S	<0.005	<0.005
Arsenic (t/d)*	SW-846 3005A, 6010B	mg/L	0.01	<0.003	<0.003	<0.003	<0.003	0.008	0.007	0.017	<0.003	----	<0.003	<0.003	<0.003
Barium (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.04	0.04	0.04	0.03	0.17	0.13	0.17	0.05	----	0.13	0.11	0.10
Beryllium (t/d)*	SW-846 3005A, 6010B	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	----	<0.001	<0.001	<0.001
Boron (t/d)*	SW-846 3005A, 6010B	mg/L	2.0	0.08	0.09	0.10	0.09	0.04	0.05	0.04	0.05	----	0.10	0.09	0.11
Cadmium (t/d)*	SW-846 3005A, 6010B	mg/L	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	----	<0.002	<0.002	<0.002
Chromium (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Cobalt (t/d)*	SW-846 3005A, 6010B	mg/L	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Copper (t/d)*	SW-846 3005A, 6010B	mg/L	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Iron (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	1.24	2.18	0.29	<0.02	4.92	2.59	8.13	0.45	----	7.97	6.81	3.49
Lead (t/d)*	SW-846 3020A	mg/L	0.0075	<0.0075	<0.0075	<0.0075	<0.008	<0.0075	<0.0075	<0.0075	<0.008	----	<0.0075	<0.0075	<0.008
Manganese (t/d)*	SW-846 3005A, 6010B	mg/L	0.15	0.118	0.235	0.411	0.26	0.146	0.292	0.268	0.120	----	1.33	1.24	1.26
Mercury (t/d)*	SW-846 7470A	mg/L	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	----	<0.0002	<0.0002	<0.0002
Nickel (t/d)*	SW-846 3005A, 6010B	mg/L	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Selenium (t/d)*	SW-846 3020A	mg/L	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	----	<0.04	<0.04	<0.04
Silver (t/d)*	SW-846 3005A, 6010B	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Thallium (t/d)*	SW-846 3020A	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	----	<0.002	<0.002	<0.002
Vanadium (t/d)*	SW-846 3020A	mg/L	0.049	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	----	<0.01	<0.01	<0.01
Zinc (t/d)*	SW-846 3005A, 6010B	mg/L	5.0	<0.01	0.011	<0.01	<0.01	0.010	0.014	<0.01	<0.01	----	<0.01	<0.01	<0.01

Notes:

Data do not include Field Replicates. Available upon request.
EWLI - electronic water level indicator.

(d) dissolved -- Not applicable. ns No standard.
(t) total ---- Not sampled or insufficient groundwater for sampling and/or analysis.
(t/d)* Total analyses Quarter's 2 and 3, 2013; dissolved analyses Quarter 4, 2013 and Quarter 1, 2014.
** Sulfate measured as total in samples from wells 33 and 34 during Quarter 4, 2013.

< ND - Not detected at the Reporting Limit **0.42** Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410)

Appendix C2-B: Organic Parameter Groundwater Quality Results June 2013
 Hydrogeologic Site Characterization Report
 West Ash Pond System, Hennepin Power Station

Parameter (Organic Chemicals)	Units	Standard Limit (Class I: Potable Resource Groundwater)	Well 27				Well 30				Well 31				Well 32				Well 33				Well 34				
			6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/26/2013	9/3/2013	12/10/2013	3/25/2014	6/7/13; 6/26/13	9/4/2013	12/10/2013	3/25/2014	
			Acenaphthene	mg/L	0.42	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Notes:
 mg/L - Milligrams per Liter.
 < - ND - Not detected at the Reporting Limit.
 J - Analyte detected below Reporting Limit.
 -- - No Class I Groundwater Quality Standard for the listed constituent in IAC Section 620.410, Chapter 1, Subtitle F, Title 35.
 ---- - Not sampled or insufficient groundwater for sampling and analysis.

* PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.


* PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.

* PCBs - Polychlorinated Biphenyls. Individual PCB compounds (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are each <0.0005 mg/L.

0.42 - Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).

0.42 - Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).

0.42 - Parameter concentration exceeds Class I groundwater standard (IAC Part 620 Section 410).



Appendix D
Groundwater Sampling
Protocol

Groundwater Sampling Protocol

The following procedures shall be used in sampling groundwater at the site. This sampling protocol shall apply to the routine quarterly (or modified semi-annual or annual) sampling events. A sample collector's worksheet, comparable to the one located in Exhibit 1, may be used for noting relevant information in regard to each well.

Water Levels

Water levels shall be taken in each well prior to purging and/or sampling. Water levels should be taken as close together as practical, to prevent any time distortion of the water surface data. The following steps shall be followed to obtain accurate water level readings:

1. Note the general condition of the monitoring well on the worksheet. This shall include, but is not limited to the condition of the casing, the lock, evidence of tampering, condition of the pad, and any standing water.
2. Remove the lock and open the monitoring well. Note the condition of the interior of the casing and the condition of the well cap and riser. Open the cap, taking care not to allow dirt or foreign material into the monitoring well.
3. The technician shall rinse the probe and cable of the water level meter with decon water.
4. Slowly lower the probe into the monitoring well until the meter indicates the water surface has been reached.
5. Note the depth to water (to the nearest 0.01 ft) and the time on the worksheet.
6. Lower the probe to the bottom of well. (If a dedicated pump is installed in the well, skip this step). Note the well depth on the worksheet. The depth of the well will be measured on an annual basis, at wells that do not contain dedicated pumps. The depth of wells with dedicated pumps will be measured at least once every 5 years, or whenever the pump is removed.
7. Slowly remove the probe from the well. Rinse the probe and line with decon water.
8. Replace cap. Close and lock the well. Proceed to the next well, and repeat.

Purging of Monitoring Well – Pump Method

After all water level measurements have been taken, the monitoring wells shall be purged to provide a representative sample. Each groundwater monitoring well shall be purged by using a dedicated pump. The pump construction shall consist of inert materials consistent with the monitoring well construction (e.g., stainless steel pump bodies installed in stainless steel wells).

Purging shall be conducted utilizing a "low-flow" or minimal drawdown technique. Flow rates for this technique will typically fall below 0.5 liters/minutes, with an overall goal of not reducing the water level in the monitoring well by more than 0.3 ft during purging. Water levels should be checked frequently to ensure that the drawdown in the well does not exceed the 0.3-ft limits. Every 3 minutes to 5 minutes, readings shall be taken on the following water quality indicators to determine if a representative water sample is available.

- pH (in SU),
- Specific Conductance (in $\mu\text{mhos/cm}$ or $\mu\text{S/cm}$),
- Temperature (in $^{\circ}\text{F}$),
- And, it is suggested, at least one of the following:
 - Redox Potential (in mV);
 - Dissolved Oxygen (in mg/L); and/or
 - Turbidity (in NTU).

The water quality indicators will be considered stabilized when the following tolerances are reached after three consecutive readings:

- pH..... ±0.05 SU
- Specific Conductance ±5 percent
- Temperature..... ±0.5°F
- Redox Potential ±10 percent
- Dissolved Oxygen..... ±10 percent
- Turbidity..... ±10 percent

Slow recovering wells require special consideration. If a well is dry, or is purged below the bottom of the pump intake, the well will be allowed to recharge for at least 12 hours. Samples shall be collected until all sample containers have been filled or the well becomes dry. Notes shall be kept on the worksheet with regard to water levels, times, volume of water removed, and any other parameters considered to be relevant.

Purging of Monitoring Well – Bailer Method

Purging and sample collection with a bailer shall be performed in the event of a non-functioning pump or from a well that does not have a dedicated pump installed. A sample shall be collected utilizing a factory packaged, clean, disposable bailer with an appropriate length of new, clean rope attached.

Calculate the number of bailer volumes of water needed to remove one (1) well volume of water.

Well Volume Calculations (2-inch well):

Schedule 40 PVC has an inside diameter of 2.067 inches.

$$\therefore ((2.067 \text{ inches}/12 \text{ inches}/\text{ft})/2)^2 \cdot \pi \cdot 1 \text{ ft of water} = 0.0233 \text{ ft}^3/\text{ft of water.}$$

$$0.0233 \text{ ft}^3/\text{ft} \cdot 7.48 \text{ gallons}/\text{ft}^3 = 0.174 \text{ gallon}/\text{ft}$$

Schedule 5 Stainless Steel (304 or 316) has an inside diameter of 2.245 inches.

$$\therefore ((2.245 \text{ inches}/12 \text{ inches}/\text{ft})/2)^2 \cdot \pi \cdot 1 \text{ ft of water} = 0.0275 \text{ ft}^3/\text{ft of water.}$$

$$0.0275 \text{ ft}^3/\text{ft} \cdot 7.48 \text{ gallons}/\text{ft}^3 = 0.206 \text{ gallon}/\text{ft}$$

Volume of well (in gallons) = well type gallon/ft • (DTB - DTW); where,
DTB ≡ depth to bottom of well (from measuring point), and
DTW ≡ depth to water (from measuring point)

Bailer Volumes:

Disposable bailer volumes will vary by type and manufacturer. Volume information should be obtained before going to the site. For comparison, a 3 ft stainless steel bailer has a volume of approximately 1220 cc or 0.322 gallon and a 5 ft PVC bailer of approximately 1085 cc or 0.287 gallon.

Open monitoring well, being careful that no potential contaminant enters the well.

Remove one (1) bailer volume of water from the monitoring well. Test pH, specific conductance and temperature. Note values on worksheet. (Turbidity, redox potential and dissolved oxygen will vary considerably due to the agitation a bailer will cause in the well. Testing for these parameters is not recommended with this method.)

Remove one-half (½) gallon of water from the monitoring well. Test pH, specific conductance and temperature. Note values on worksheet.

Remove ½ to 1 gallon of water. Test pH, specific conductance and temperature. Record data on worksheet.

Repeat until pH, specific conductance and temperature stabilize or three (3) well volumes of water have been removed.

If the monitoring well becomes dry, or there is insufficient water to obtain all necessary samples, the monitoring well will be allowed to recharge for 24 hours. Samples shall be collected until all sample containers are filled or the well becomes dry. Notes shall be kept on the worksheet regarding water levels, times, volume of water removed, and any other parameters considered by the technician to be relevant.

If there is sufficient water volume in the monitoring well to obtain all samples, sample collection shall begin at this time.

Sample Collection Order

Samples shall be collected starting at the monitoring well with the least likelihood for contamination. Sampling shall proceed from the well with the lowest potential for contamination to the well with the highest potential for contamination.

Field Measurements

General

Upon arrival at each groundwater monitoring well, the technician shall note on the sampler's worksheet or in a field notebook the date, time, ambient air temperature, general weather conditions, and individuals present, including sample team members and any observers. (Note: Any observers shall need at a minimum, the same personal protective gear as the members of the sample team.)

Establish a "clean area" near the monitoring well where the sample containers and equipment can be stored while not in use. Every effort should be made to keep the sampling equipment and containers from contacting the ground surface. If necessary, a disposable, plastic tarp can be used as a ground cover to prevent potential contamination of the sample containers and equipment. Typically, the back of the field vehicle will be used as the "clean area".

Any non-dedicated sampling equipment (meter probes, thermometers, etc.) shall be washed in a commercial, laboratory cleaner (Alconox®, Liquinox®, or equivalent), and thoroughly rinsed in decon water before each use. Calibration shall be performed at each new monitoring location after the initial decontamination. After use, each device shall be powered down (if necessary) decontaminated, and stored in its manufacturer-approved container.

Temperature

Obtain a water sample from the well. Place the sample aliquot in a disposable container, insert the thermometer (or electronic probe), wait until the readings have stabilized, and record the temperature on the worksheet. Temperature for a glass thermometer should be noted to the nearest degree Fahrenheit (1°F). For electronic thermometers (thermocouples), temperature should be noted to the nearest tenth degree Fahrenheit (0.1°F). The thermometer or probe shall be cleaned and rinsed with decon water after use.

pH

Confirm calibration of the instrument by comparing with an appropriate buffer solution. Adjust for temperature compensation (if meter is not self-compensating). Rinse probe with decon water. Obtain a sample from the well and place the probe in sample aliquot. Note the pH and record on the sample worksheet. Note pH readings to the nearest tenth unit (0.1).

Specific Conductance

Confirm calibration of the instrument by comparing against an appropriate buffer solution. Adjust for temperature compensation (if meter is not self-compensating). Rinse the probe with decon water. Obtain a sample from the well and place the probe in sample aliquot. Note the specific conductance and record on the sample worksheet. Specific conductance should be noted to the nearest micromhos per centimeter ($\mu\text{mhos/cm}$) or microSiemens per centimeter ($\mu\text{S/cm}$).

Sample Collection Procedures

Jars and vials may ship pre-labeled from the laboratory, identifying the analysis and preservative for each type of sample. Dependent upon circumstances, sample containers may be prepared by non-laboratory personnel. If so, this should be noted on the sample worksheet or in the field notebook.

A technician shall remove a sample container from the cooler, affix a label, and in indelible, waterproof ink write the well number and/or sample I.D., the facility name, the sample collection date and time, the type of sample in the container, and the sample collector's name. A technician shall organize the containers in the following sampling order:

- Filtered, non-preserved samples (sulfate, TDS, fluoride, chloride, etc.)
- Filtered, preserved samples (combined Radium 226/228 and metals)
- Non-filtered, non-preserved samples (sulfate, TDS, fluoride, chloride, etc.)
- Non-filtered, preserved samples Cyanides (combined Radium 226/228 and metals)

Dissolved parameters include dissolved metals and minerals, total dissolved solids (TDS), and nitrogen should be field filtered. Samples should be filtered using a 0.45-micron filter attached to the sample pump line. Other filter apparatus may be utilized as long as Illinois EPA guidelines are followed. Filters should be replaced no less frequently than at each new well, and may need to be replaced more often if flow is restricted due to particulate matter in the sample water.

Transportation of Monitoring Samples

Sample Preservation Techniques

The preservation techniques utilized in the groundwater samples will typically adhere to those listed in *Handbook for Sampling and Sample Preservation of Water and Wastewater*, U.S. EPA, EPA-600/4-82-029, September 1982 and/or *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*, EPA/530/SW-846, 3rd Edition, Final Update IV (January 2008).

Transportation of Samples

Samples shall be transported to the laboratory in sealed, insulated shipping containers, ice chests, or coolers. The shipping containers should be sturdy, and if samples are contained in glass bottles, dividers and/or bubble wrap should be used to restrict potential breakage. All samples will be packed in ice or a packaged refrigerant as necessary for proper preservation. Samples should be packed to maintain sample temperatures as close to 4°C (degrees Celsius) or 39°F as possible from the time the samples are collected to the time the samples are received by the laboratory. The samples should be shipped/delivered to the laboratory as soon as practical, preferably within 24 hours of sample collection.

All samples shall be accompanied by a chain-of-custody record. The sampler shall retain a copy of the record and forward the original with the samples to the analytical laboratory. Once the laboratory has received the samples, a representative from the laboratory is to complete the record, retain the original and return a copy with the chemical analysis reports to the sampler. The chain-of-custody shall contain the facility name, the wells sampled, time and date of sampling, members of the sampling party, type of samples (i.e. water, soil, leachate, etc.), number of sample bottles, requested analysis, overnight courier, etc. A sample chain-of-custody record is provided in Exhibit 2.

Attachments

Exhibit 1: Groundwater Sampling Worksheet

Exhibit 2: Example Chain-of-Custody Record

OBG

THERE'S A WAY



OBG

**Groundwater Management Zone Application
Revision 1**

**Hennepin West Ash Pond System
Hennepin, Illinois**

Dynegy Midwest Generation, LLC

**FINAL
May 18, 2018**



TITLE 35, ILLINOIS ADMIN. CODE, PART 620 – APPENDIX D

CONFIRMATION OF AN ADEQUATE CORRECTIVE ACTION PURSUANT TO 35 ILL. ADM. CODE 620.250(A)(2)

Pursuant to 35 Ill. Adm. Code 620.250(a) if an owner or operator provides a written confirmation to the Agency that an adequate corrective action, equivalent to a corrective action process approved by the Agency, is being undertaken in a timely and appropriate manner, then a groundwater management zone may be established as a three-dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site. This document provides the form in which the written confirmation is to be submitted to the Agency.

- Note 1. Parts I and II are to be submitted to IEPA at the time that the facility claims the alternative groundwater standards. Part III is to be submitted at the completion of the site investigation. At the completion of the corrective process, a final report is to be filed which includes the confirmation statement included in Part IV.
- Note 2. The issuance of a permit by IEPA's Division of Air Pollution Control or Water Pollution Control for a treatment system does not imply that the Agency has approved the corrective action process.
- Note 3. If the facility is conducting a cleanup of a unit which is subject to the requirements of the Resource Conservation and Recovery Act (RCRA) or the 35 Ill. Adm. Code 731 regulations for Underground Storage Tanks, this confirmation process is not applicable and cannot be used.
- Note 4. If the answers to any of these questions require explanation or clarification, provide such in an attachment to this document.

Information provided in the following technical documents is referenced within this form:

- Geosyntec Consultants (Geosyntec), 2017. 30% Closure Design Package for the West Ash Pond System, Dynege Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.
- Natural Resource Technology, Inc. (NRT), 2017a. Hydrogeologic Characterization Report. West Ash Pond System, Dynege Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.
- Natural Resource Technology, Inc., 2017b. Groundwater Monitoring Plan. West Ash Pond System, Dynege Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.
- Natural Resource Technology, Inc., 2017c. Groundwater Model Report. West Ash Pond System, Dynege Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.
- Natural Resource Technology, Inc., 2017d. Hydrostatic Modeling Report. West Ash Pond System, Dynege Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.

A legal description and map of the proposed GMZ is provided in Appendix A of this GMZ Application. The GMZ will extend vertically through all water-bearing strata to the top of the shale bedrock that underlies the unlithified glacial and alluvial deposits at the site. Upon approval of the Closure Plan to which this application is attached this GMZ will become effective and replace the existing GMZ approved in 1996.

PART I. FACILITY INFORMATION

Facility Name Hennepin Power Station

Facility Address 1 Power Plant Road, Hennepin, IL 61327

County Putnam

Standard Industrial Code (SIC) 4911

1. Provide a general description of the type of industry, products manufactured, raw materials used, location and size of the facility. ***Electric power generation and coal combustion residual (CCR) disposal. The West Ash Pond System encompasses approximately 30.4 acres within the Hennepin Power Station property.***
2. What specific units (operating or closed) are present at the facility which are or were used to manage waste, hazardous waste, hazardous substances or petroleum?

	<u>YES</u>	<u>NO</u>
Landfill	<u>X</u>	_____
Surface Impoundment	<u>X</u>	_____
Land Treatment	_____	<u>X</u>
Spray Irrigation	_____	<u>X</u>
Waste Pile	_____	<u>X</u>
Incinerator	_____	<u>X</u>
Storage Tank (above ground)	<u>X</u>	_____
Storage Tank (underground)	<u>X</u>	_____
Container Storage Area	<u>X</u>	_____
Injection Well	_____	<u>X</u>
Water Treatment Units	<u>X</u>	_____
Septic Tanks	<u>X</u>	_____
French Drains	<u>X</u>	_____
Transfer Station	_____	<u>X</u>
Other Units (please describe)		

3. Provide an extract from a USGS topographic or county map showing the location of the site and a more detailed scaled map of the facility with each waste management unit identified in Question 2 or known/suspected source clearly identified. Map scale must be specified and the location of the facility must be provided with respect to Township, Range and Section. ***Facility is located in the northeast quarter of Section 27, Township 33 North, Range 2 West, Putnam County, Illinois and approximately 3 miles north-northeast of the Village of Hennepin. Figure 1 shows the facility location on a USGS topographic map (7½ minute).***

4. Has the facility ever conducted operations which involved the generation, manufacture, processing, transportation, treatment, storage or handling of "hazardous substances" as defined by the Illinois Environmental Protection Act? Yes No
If the answer to this question is "yes" generally describe these operations. **Storage and handling of anhydrous ammonia, sulfuric acid, 50% sodium hydroxide, chlorine gas and sodium hypochlorite.**
5. Has the facility generated, stored or treated hazardous waste as defined by the Resource Conservation and Recovery Act? Yes No
If the answer to this question is "yes" generally describe these operations. **Small quantity generator.**
6. Has the facility conducted operations which involved the processing, storage or handling of petroleum? Yes No If the answer to this question is "yes" generally describe these operations. **Store, load, and unload diesel fuel, kerosene, transformers, turbine oil and other oil containing equipment.**
7. Has the facility ever held any of the following permits?
- a. Permits for any waste storage, waste treatment or waste disposal operation. Yes No
If the answer to this question is "yes", identify the IEPA permit numbers. # IL0001554
- b. Interim Status under the Resources Conservation and Recovery Act (filing of a RCRA Part A application). Yes No
If the answer to this question is "yes", attach a copy of the last approved Part A application.
- c. RCRA Part B Permits. Yes No
If the answer to this question is "yes", identify the permit log number.
8. Has the facility ever conducted the closure of a RCRA hazardous waste management unit? Yes No
9. Have any of the following State or federal government actions taken place for a release at the facility?
- a. Written notification regarding known, suspected or alleged contamination on or emanating from the property (e.g., a Notice pursuant to Section 4(q) of the Environment Protection Act)? Yes No
If the to this question is "yes", identify the caption and date of issuance.
- b. Consent Decree or Order under RCRA, CERCLA, EPA Section 22.2 (State Superfund), or EPA Section 21(f) (State RCRA). Yes No
Consent Decree 89-CH-5 (dated March 2, 1989) required closure of the Hennepin West Ash Pond System and the Order Modifying Consent Decree (dated January 3, 1996) allowed for the establishment of the current Groundwater Management Zone.
- c. If either of Items a. or b. were answered by checking "yes", is the notice, order or decree still in effect? Yes No
10. What groundwater classification will the facility be subject to at the completion of the remediation?
Class I Class II Class III Class IV
If more than one Class applies, please explain.
11. Describe the circumstances which the release to groundwater was identified. **Groundwater sampling at the West Ash Pond System was initiated in 1983. Parameters that are attributable to the West Ash Pond System exceeding Class I Potable Resource Groundwater standards in monitoring wells during the most recent 2016 Closure Work Plan sampling event included boron and sulfate.**

Based on my inquiry of those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true and accurate.

Hennepin Power Station

Facility Name

1 Power Plant Road, Hennepin, IL 61327

Location of Facility

170000137769

Illinois EPA Identification Number

Signature of Owner/Operator

Dynegy Midwest Generation, LLC

Name of Owner/Operator

Date

PART II: RELEASE INFORMATION

1. Identify the chemical constituents release to the groundwater. Attach additional documents as necessary.

A narrative summary of the results of groundwater monitoring is discussed in the Hydrogeologic Characterization Report Section 4: Groundwater Quality (NRT, 2017a). Chemical constituents released to the groundwater and potentially attributed to CCR and the West Ash Pond System include the following:

<u>Chemical Description</u>	<u>Chemical Abstract No.</u>
<i>Arsenic</i>	<i>7440-38-2</i>
<i>Boron</i>	<i>7440-42-8</i>
<i>Lithium</i>	<i>7439-93-2</i>
<i>Molybdenum</i>	<i>7439-98-7</i>
<i>Sulfate</i>	<i>14808-79-8</i>

2. Describe how the site will be investigated to determine the source or sources of the release. *The West Ash Pond System has been investigated as described in the Hydrogeologic Characterization Report (Natural Resource Technology, Inc. [NRT], 2017a).*
3. Describe how groundwater will be monitored to determine the rate and extent of the release. *The monitoring network to monitor the rate and extent of the release is described in the Groundwater Monitoring Plan (NRT, 2017b).*
4. Has the release been contained on-site at the facility? *The release is contained within the facility boundary and low lying floodplains to the southwest and west within the Donnelley Wildlife Management Area. Migration of CCR constituents is limited by the Illinois River and adjacent floodplains which act as groundwater discharge areas and hydraulic barriers.*
5. Describe the groundwater monitoring network and groundwater and soil sampling protocols in place at the facility. *The groundwater monitoring network and sampling protocols are described in the Groundwater Monitoring Plan (NRT, 2017b).*
6. Provide the schedule for investigation and monitoring. *The site investigation is complete and groundwater monitoring will continue for the required/permitted frequency and monitoring period as described in the Groundwater Monitoring Plan Section 4.2: Sampling Schedule (NRT, 2017b).*
7. Describe the laboratory quality assurance program utilized for the investigation. *Laboratory quality assurance is described in the Groundwater Monitoring Plan Sections 4.4: Laboratory Analysis and 4.5: Quality Assurance (NRT, 2017b). The quality assurance/quality control procedures described in the Groundwater Monitoring Plan will be supplemented by the selected Illinois EPA-approved laboratory's QA Manual.*

8. Provide a summary of the results of available soil testing and groundwater monitoring associated with the release at the facility. The summary or results should provide the following information: dates of sampling; types of samples taken (soil or water); locations and depths of samples; sampling and analytical methods; analytical laboratories used; chemical constituents for which analyses were performed; analytical detection limits; and concentrations of chemical constituents in ppm (levels below detection should be identified as "ND"). ***A narrative summary of the results of groundwater monitoring is discussed in the Hydrogeologic Characterization Report Section 4: Groundwater Quality (NRT, 2017a). Analytical data summary tables and graphs are available in the Hydrogeologic Characterization Report Appendix H: Groundwater Quality Monitoring Results (NRT, 2017a). Analytical laboratory reports for all monitoring events have previously been submitted to the Agency.***

Based on my inquiry of those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of knowledge and belief, true and accurate and confirm that the actions identified herein will be undertaken in accordance with the schedule set forth herein.

Hennepin Power Station

Facility Name

1 Power Plant Road, Hennepin, IL 61327

Location of Facility

170000137769

Illinois EPA Identification Number

Signature of Owner/Operator

Dynergy Midwest Generation, LLC

Name of Owner/Operator

Date

Part III: Remedy Selection Information

1. Describe the selected remedy. ***CCR within the Old West Polishing Pond will be removed and the pond will be closed. The remedy for Pond Nos. 1 and 3 includes ash dewatering, relocating/reshaping the CCR to achieve acceptable grades, construction of a geomembrane cover system comprised of (from top to bottom) 6-inch vegetative layer to minimize long-term erosion, 18-inch protective soil layer, a 0.2-inch geocomposite drainage layer and a 40-mil geomembrane layer.***
2. Describe other remedies which were considered and why they were rejected ***Removal of CCR material from the Old West Polishing Pond is the most conservative option and additional evaluation of remedial options is not necessary for this portion of the West Ash Pond System. For the Old West Ash Pond, previous experience at similar sites developing and evaluating remedial alternatives and costs indicate capping is often the most cost effective and cost-efficient. Therefore, dewatering and capping were initially evaluated. Based on the results of the evaluation and modeling, the selected remedy successfully mitigates groundwater impacts. If the selected remedy is not shown successful through collection of data and comparison to predictive values, then other remedial options will be evaluated.***
3. Will waste, contaminated soil or contaminated groundwater be removed from the site in the course of this remediation? Yes No
If the answer to this question is "yes", where will the contaminated material be taken?
4. Describe how the selected remedy will accomplish the maximum practical restoration of beneficial use of groundwater. ***The installation of a geomembrane cover system will control the potential for water infiltration into the closed CCR unit and will allow drainage of surface water off of the cover system. These actions will reduce leachate generation and migration and groundwater quality will improve over time, as described in the Groundwater Model Report (NRT, 2017c).***
5. Describe how the selected remedy will minimize any threat to public health or the environment. ***The currently defined extent of the release does not threaten public health. As discussed in the Hydrogeologic Characterization Report Section 3.5 (NRT, 2017a), there are currently no impairments to groundwater usage on the Hennepin Power Station property or surrounding properties associated with the West Ash Pond System. No impairments to groundwater usage resulting from establishment of the proposed GMZ are anticipated. CCR dewatering and the geomembrane cover system will reduce leachate generation and migration from the West Ash Pond System and minimize CCR constituents entering the environment, as described in the Groundwater Model Report (NRT, 2017c).***
6. Describe how the selected remedy will result in compliance with the applicable groundwater standards. ***The in-place closure of the West Ash Pond System, as proposed, will result in a reduction of leachate production, decreasing CCR constituent concentrations and contraction of the groundwater plume. The Groundwater Model Report (NRT, 2017c) suggests that the geosynthetic cover system will reduce recharge and subsequent leachate generation resulting from surface water infiltration within the limits of the Site and reduce concentrations of boron below Class I standards. Concentration reductions are expected to begin approximately one year after completion of the cover system.***
7. Provide a schedule for design, construction and operation of the remedy, including dates for the start and completion. ***A schedule for implementing the remedies is included in Section 1.3: Post-Closure Care Plan (Geosyntec, 2017).***
8. Describe how the remedy will be operated and maintained. ***The operation and maintenance of the remedy is described in Section 3: Post-Closure Care Plan (Geosyntec, 2017).***

9. Have any of the following permits been issued for the remediation?
- a. Construction or Operating permit from the Division of Water Pollution Control. Yes No
 - b. Land treatment permit from the Division of Water Pollution Control. Yes No
If the answer to this question is "yes", identify the permit number.
 - c. Construction or Operating permit from the Division of Air Pollution Control. Yes No
If the answer to this question is "yes", identify the permit number.

10. How will groundwater at the facility be monitored following completion of the remedy to ensure that the groundwater standards have been attained? ***Groundwater monitoring procedures are described in Section 4 of the Groundwater Monitoring Plan (NRT, 2017b).***

Based on my inquiry of those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true and accurate and confirm that the actions identified herein will be undertaken in accordance with the schedule set forth herein.

Hennepin Power Station

Facility Name

1 Power Plant Road, Hennepin, IL 61327

Location of Facility

170000137769

Illinois EPA Identification Number

Signature of Owner/Operator

Dynergy Midwest Generation, LLC

Name of Owner/Operator

Date

PART IV: COMPLETION CERTIFICATION

This certification must accompany documentation which includes soil and groundwater monitoring data demonstrating successful completion of the corrective process described in Parts I-III.

Facility Name _____

Facility Address _____

County _____

Standard Industrial Code (SIC) _____

Date _____

Based on my inquiry of those persons directly responsible for gathering the information, I certify that an adequate corrective action, equivalent to a corrective action process approved by the Agency, has been undertaken and that the following restoration concentrations are being met:

<u>Chemical Name</u>	<u>Chemical Abstract No.</u>	<u>Concentration (mg/L)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Hennepin Power Station

 Facility Name
1 Power Plant Road, Hennepin, IL 61327

 Location of Facility
170000137769

 Illinois EPA Identification Number

 Signature of Owner/Operator
Dynergy Midwest Generation, LLC

 Name of Owner/Operator

 Date

MAY 18, 2018 | FINAL | PROJECT #2413

Groundwater Management Zone Application Revision 1

Hennepin West Ash Pond System
Hennepin, Illinois

Prepared for:

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, IL 62234



STUART J. CRAVENS, PG
Principal Hydrogeologist



ROBERT J KARNAUSKAS, PG, PH
Principal Hydrogeologist

TABLE OF CONTENTS

LIST OF FIGURES.....	ii
LIST OF APPENDICES.....	ii
ACRONYMS AND ABBREVIATIONS.....	iii
1 INTRODUCTION.....	1
1.1 Overview.....	1
1.2 Technical Support Documents.....	1
1.3 Site Location and Background.....	2
1.4 Geologic and Hydrogeologic Summaries.....	3
1.4.1 Geology.....	3
1.4.2 Hydrogeology.....	4
1.5 Groundwater Monitoring Activities.....	4
1.5.1 Groundwater Monitoring – Illinois EPA Closure Work Plan.....	4
1.5.2 40 CFR Part 257 Monitoring.....	5
2 GROUNDWATER IMPAIRMENTS AND CONTROL OPTIONS.....	7
2.1 Extent of Groundwater Impairments Associated with the West Ash Pond System.....	7
2.2 Impairments to Groundwater Usage.....	8
2.3 Closure of the West Ash Pond System.....	8
3 APPLICATION FOR GROUNDWATER MANAGEMENT ZONE.....	9
3.1 Environmental Impact of Proposed Groundwater Management Zone.....	9
3.2 Proposed Groundwater Management Zone.....	9
3.3 Compliance with Applicable On-Site Groundwater Quality Standards.....	9
4 PROPOSED GROUNDWATER MONITORING PLAN.....	10
5 LICENSED PROFESSIONAL ACKNOWLEDGEMENT.....	11
REFERENCES.....	12

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Monitoring Well Network and Boron Concentrations in Groundwater - September 15, 2016
Figure 3	Site Closure Plan

LIST OF APPENDICES

Appendix A	Groundwater Management Zone Map and Legal Description
------------	---

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CCR	coal combustion residual
CEC	Civil & Environmental Consultants, Inc.
CFR	Code of Federal Regulations
cm/s	centimeters per second
CWS	Community Water Supply
DBCP	1,2-Dibromo-3-Chloropropane
DMG	Dynegy Midwest Generation, Inc.
EDB	Ethyl Dibromide
ft	feet
ft MSL	feet above Mean Sea Level
GMZ	Groundwater Management Zone
IAC	Illinois Administrative Code
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
ISGS	Illinois State Geological Survey
ISWS	Illinois State Water Survey
mg/L	milligram per liter
NRT	Natural Resource Technology, an OBG Company
PCB	Polychlorinated Biphenyl
PWS	Public Water Supply
TDS	total dissolved solids
USGS	United States Geological Survey
WHPA	Well Head Protection Area

1 INTRODUCTION

1.1 OVERVIEW

This Groundwater Management Zone Application was prepared by Natural Resource Technology, an OBG Company (NRT) in support of the Closure Plan for the West Ash Pond System located at the Hennepin Power Station which is owned by Dynegy Midwest Generation, LLC (DMG). This application is submitted pursuant to Illinois Administrative Code Title 35, Part 620: Groundwater Quality (35 IAC Part 620).

DMG requests establishment of a Groundwater Management Zone (GMZ) pursuant to 35 IAC 620.250(a)(2) as a three-dimensional region containing groundwater being managed to mitigate a potential release of Coal Combustion Residuals (CCR) constituents from the West Ash Pond System. The Hennepin West Ash Pond System includes the following components:

- Old West Ash Pond (including Pond No. 1: 9.3 acres and Pond No. 3: 16.4 acres)
- Old West Polishing Pond: 4.7 acres

A legal description and map of the proposed GMZ is provided in Appendix A. The GMZ will extend vertically through all water-bearing strata to the top of the shale bedrock that underlies the unlithified glacial and alluvial deposits at the site.

1.2 TECHNICAL SUPPORT DOCUMENTS

Technical documents in support of the Hennepin West Ash Pond System include, but are not limited to, the following:

- **Hydrogeologic Study, Existing Ash Ponds, Hennepin Power Plant, Illinois Power Company, Hennepin, Illinois. John Mathes & Associates, Inc.; April 19, 1983.** Five monitoring wells were installed, currently designated as wells 21 through 25. Monitoring wells 21 through 24 are downgradient of the West Ash Pond System and well 25 is an upgradient well located south of the impoundment. Grain size analyses were performed on soil samples.
- **Investigation of Site Closure Options at Illinois Power Company's West Ash Impoundment. Report No. STMI/135/97-01. Science & Technology Management, Inc.; September, 1997.** A supplemental hydrogeologic characterization was conducted to further characterize the West Ash Pond System, develop a groundwater flow and transport model and evaluate three alternative closure options using the model. Seven new permanent monitoring wells (26, 27, 30, 31, 32, 33, 34) and three new temporary leachate wells (L1, L3, L4) were installed around and within the impoundment. Field permeability tests were conducted on seven wells.
- **Model Recalibration and Prediction of Closure Options for the West Ash Impoundment; Hennepin Power Station Putnam County, Illinois. Natural Resource Technology, Inc.; October, 2002.** NRT drilled four soil borings within the ash impoundment (A1, A3, 23S, L5), installed monitoring well 35 along the south berm of Pond No. 3, well 36 south of Pond No. 1, and installed one leachate well L5 within the east end of Pond No. 3 in support of a groundwater flow and transport model for predicting future boron concentrations. The principal objective of the additional boring and well installation was to better define the depth of the ash ponds and determine the thickness of saturated ash. Additional groundwater quality data within the impoundment and along the south side of the Old West Ash Pond was collected from the new wells for recalibrating the 1997 STMI groundwater model.
- **Water Well Survey, Dynegy Midwest Generation, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology and Kelron Environmental; June 3, 2009.** A water well survey was performed in accordance with the "Right to Know" Potable Water Well Survey procedures of 35 Illinois Administrative Code 1600.210(b)(1) and 1600.210(b)(2). The purpose of this survey was to identify water wells located within 2,500 feet of DMG's Hennepin Power Station property boundary.

- **Assessment of Potential for Groundwater Impact on Identified Water Wells, Dynegy Midwest Generation, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology and Kelron Environmental; August 26, 2009.** An assessment of the potential for impact of the ash impoundment on water quality of potable water wells identified in the water well survey.
- **Hydrogeologic Summary and Groundwater Quality Assessment, West Ash Pond System, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology, Inc., July 24, 2014.** The summary, including four quarters of groundwater quality monitoring, was conducted to develop information necessary to recalibrate the existing groundwater model of the West Ash Pond System and evaluate closure alternatives for the impoundment. This report is a compendium and reanalysis of information from three previous reports prepared for the West Ash Pond System along with an assessment of the most recent groundwater data collected from a network of 16 wells (14 monitoring wells and 2 leachate wells) in 2013 and 2014.
- **Closure Alternatives Evaluation, West Ash Pond System, Hennepin Power Station, Hennepin, Illinois. Natural Resource Technology, Inc., July 24, 2014.** This evaluation documented alternatives for closure of the West Ash Pond System, based on their effectiveness, implementation feasibility, and construction and maintenance costs. Groundwater transport modeling was completed to assess the effects of alternatives on surrounding groundwater quality. Implementation feasibility and costs were presented along with a recommended alternative.
- **Monitoring Well 49 Installation. Natural Resource Technology, Inc., July 6, 2015.** Documents the installation of CCR monitoring network Well 49.
- **30% Design Data Report for Dynegy Hennepin Power Station; West Polishing Pond, West Ash Pond, East Ash Pond and Ash Pond No. 2 CCR Units. AECOM, January 12, 2016.** The data package included summary tables, geotechnical laboratory data and exploratory logs for 32 auger borings, 38 CPT soundings and 7 standpipe piezometers installed at selected locations around the West Ash Pond System.
- **Old West Polishing Pond Subsurface Investigation, Hennepin Power Station, Hennepin, Illinois. Civil & Environmental Consultants, Inc. (CEC), April 1, 2016.** Data package included logs for 9 piston sampling and push probe borings along with two impoundment cross-sections within the Polishing Pond of the West Ash Pond System.
- **Closure Work Plan Annual Report, Hennepin Power Station, West Ash Pond System: Nos. 1 and 3. Dynegy Operating Company. Natural Resource Technology, Inc., October 21, 2016.** In accordance with the Closure Work Plan approved by the Illinois EPA (November 8, 1996), DMG is required to perform groundwater monitoring and prepare annual reports for the Old West Ash Pond System. These annual reports have been submitted to the Illinois EPA from October 2000 through October 2016. Although the number of monitoring wells, sampling frequency, and water quality parameters has changed, these annual reports have documented the groundwater levels, flow, and water quality at the West Ash Pond System for all of the monitoring events conducted over a 16 year period.
- **Subsurface Investigation Within West Ash Ponds 1 and 3. CEC, March 2017.** Data package included boring logs for 20 auger borings, four impoundment cross-sections, well construction logs for 6 ash leachate wells and leachate elevations within the West Ash Pond System.

Groundwater flow and transport predictive models have been developed to evaluate the effect of closure of the West Ash Pond System on groundwater quality and to predict the fate and transport of CCR leachate components (NRT, 2017c). Additional groundwater modeling has been conducted to enable estimation of the time required for hydrostatic equilibrium of groundwater beneath the unit and is being submitted under separate cover (NRT, 2017d).

1.3 SITE LOCATION AND BACKGROUND

The West Ash Pond System is located in the northeast quarter of Section 27, Township 33 North, Range 2 West, Putnam County, Illinois and approximately three miles north-northeast of the Village of Hennepin (Figure 1). The impoundments are situated less than 200 feet south of the Illinois River and approximately one mile east of

the Big Bend, where the river shifts course from predominantly west to predominantly south. The impoundment is bordered to the southeast by farm fields (i.e., corn and soybeans) with scattered clumps of rows or trees; to the southwest and west by low lying floodplains within the Donnelley Wildlife Management Area (Donnelley WMA) administered by the Illinois Department of Natural Resources (IDNR); and to the east by the power generating facility.

Ponds are maintained within the Donnelley WMA for migratory waterfowl. Water levels in these ponds are maintained by a system of pumps operated during migration season, with water pumped from the Illinois River through a channel that runs immediately west of the Old West Polishing Pond. The Donnelley WMA is predominantly a swampy area vegetated by grasses and trees.

The Hennepin Power Station had two coal-fired units constructed in 1953 and 1959. The coal source changed several times since the station was constructed; however, all coal ash disposed to the West Ash Pond System is derived from high-sulfur Illinois coal.

DMG operated the West Ash Pond System at the Hennepin Power Station from 1952 through 1996 (Figure 2). The West Ash Pond System consists of two ash ponds, all of which are now out-of-service. The Old West Ash Pond which includes Pond No. 1 at the eastern end of the impoundment, which primarily consists of bottom ash and slag and Pond No. 3, in the central portion of the impoundment, contains mixed coal ash. The Old West Polishing Pond is located at the western end of the impoundment. All of the ponds are bermed. The berms, which are 15 feet above grade, were constructed from locally occurring sandy soils. The entire west impoundment covers an area of approximately 30.4 acres.

During operation, service water was used to sluice fly ash, bottom ash, and low-volume wastes to the impoundment. At the time the impoundment was removed from service in late 1996, there was no surface water discharge and all sluice water ex-filtrated via evapotranspiration, seepage through the berms, or leakage through the base of the ponds.

The west impoundment was not capped after it was removed from service in order to facilitate future mining and beneficial re-use of the ash. The impoundment is partially dewatered by gravity drainage, although pumps were used to complete the dewatering process in 1998. The ash is currently dry over most of the surface through most of the year with the exception of (i) the Old West Polishing Pond, which always contains water; and, (ii) the western end of the Old West Ash Pond (specifically the western end of Pond No. 3), where runoff water collects and is ponded most of the year.

Within the Old West Ash Pond the surface topography of ash in Pond No. 1 is uneven with no pronounced slope and the top of ash in Pond No. 3 slopes downward from the east, where the sluiced ash inlet was located, to the west. Top of ash elevation in both ponds is lower than the surrounding berms, providing full containment. There are no controls to collect storm water so all runoff collects in the lowest portion of each pond, where it evaporates or infiltrates through the ash.

The Hennepin West Ash Pond Nos. 1 and 3 will be closed by ash dewatering, relocating/reshaping the CCR to achieve acceptable grades and constructing a geomembrane cover system comprised of (from top to bottom) 6-inch vegetative layer to minimize long-term erosion, 18-inch protective soil layer, a 0.2-inch geocomposite drainage layer and a 40-mil geomembrane layer. CCR within the Old West Polishing Pond will be removed and the pond will be closed.

1.4 GEOLOGIC AND HYDROGEOLOGIC SUMMARIES

1.4.1 Geology

The geology has been extensively evaluated during previous hydrogeologic investigations, groundwater quality assessments, and modeling since the first borings and monitoring wells were installed. The unlithified geologic deposits covering bedrock in the region surrounding the West Ash Pond System are derived from recent river deposition (alluvium), glacial outwash, and glacial till deposits. Total unlithified (drift) thickness ranges from 50 to 200 feet, generally becoming thicker with distance from the Illinois River southward from the impoundment.

The unconsolidated deposits which occur at the West Ash Pond System include the following units (beginning at the ground surface):

- Fill Unit, the uppermost unit, is comprised of CCRs – fly ash, bottom ash, and minor slag. In some areas, such as constructed berms, the Fill Unit has CCRs mixed with sand, silt, and clay. CCRs of the Fill Unit are found in all three ponds – Pond No. 1, Pond No. 3 and the Old West Polishing Pond.
- Uppermost Aquifer Unit is comprised of mixed alluvial deposits (clay, silt, and sand) which overlie coarser grained outwash sand and gravel deposits. This unit is the uppermost aquifer and primary groundwater transport pathway in the vicinity of the West Ash Pond System.
- Bedrock Confining Unit is defined by Pennsylvanian age shale with minor layers of limestone, sandstone, and coal. This low permeability unit defines the lower boundary of the Uppermost Aquifer.

The river-laid deposits are classified as Cahokia Alluvium. The Henry Formation sands and gravels make up the upper and lower terraces, and fill the valley beneath the alluvium. The West Ash Pond System lies over both glacial deposits (Henry Formation) and alluvium (Cahokia Alluvium). Pond No. 1 lies on top of lower terrace glacial deposits. The eastern portion of Pond No. 3 overlies alluvial sand, while the western portion of Pond No. 3 and the Old West Polishing Pond overlay silty clay alluvial channel fill deposits.

1.4.2 Hydrogeology

The Illinois River is the local and regional groundwater discharge area under normal river stage. River stage is usually lowest during the months of August through October. During normal river stage, a slight groundwater mound occurs within the West Ash Pond System with radial flow north toward the river as well as flow to the southwest that eventually discharges into the river west of the impoundments. Surface water elevations are managed within the conservation area (Donnelley WMA) located west and southwest of the impoundment.

The river basin experiences annual spring flooding during the months of March, April, May, and sometimes June, while lesser flooding occasionally occurs during autumn. River stage during high precipitation and/or flood events seasonally rises above adjacent groundwater elevations and in low lying areas of the floodplain, particularly within the Donnelley WMA. During these events, the river temporarily recharges the aquifer and groundwater flow direction close to the river reverses. Horizontal gradients across the Site become flat. These groundwater flow reversals are limited in duration and extent.

The CCR within Pond No. 1 (eastern portion of the Old West Ash Pond) is typically not saturated, based on the maximum observed groundwater elevations. Ash within the eastern portions of Pond No. 3 (central portion of the Old West Ash Pond) may be seasonally saturated. The western portion of Pond No. 3 (western portion of the Old West Ash Pond) is typically saturated to depths ranging from about 6 to 11 feet.

Based on the field permeability tests in wells at the West Ash Pond System, hydraulic conductivity ranges from 1.2×10^{-2} centimeters/second (cm/s) for the most permeable gravel deposits of the Henry Formation to 1.3×10^{-4} cm/s for the alluvial silt deposits of the of the Cahokia Alluvium. Per 35 IAC 620.210, groundwater within the Uppermost Aquifer at the West Ash Pond System meets the definition of a Class I, Potable Resource Groundwater.

1.5 GROUNDWATER MONITORING ACTIVITIES

The monitoring network currently includes two leachate head wells and 14 monitoring wells. Monitoring well 49 was installed by NRT in July, 2015 on the north berm of Pond 1 to supplement the 40 CFR Part 257 (CCR Rule) groundwater monitoring network. Monitoring of this well commenced in 2016 and data will be available when CCR reporting begins in January 2018.

1.5.1 Groundwater Monitoring – Illinois EPA Closure Work Plan

The monitoring program performed in compliance with the current Illinois EPA-approved Closure Plan (NRT, 2016) consists of collecting samples from three background wells (32, 33, 34) and nine downgradient wells (21

through 27, 30, 31). Samples are collected semi-annually except for background wells 33 and 34, which are sampled annually. Groundwater samples are analyzed for the following parameters:

Field Parameters	
Ph	Temperature
Specific Conductivity	Groundwater Elevation (ft)

Laboratory Parameters		
Boron (Dissolved)	Iron (Dissolved)	Sulfate (Total)
Chloride (Total)	Manganese (Dissolved)	Total Dissolved Solids (TDS)

Four additional monitoring wells (L3, L5, 35 and 36) are monitored for groundwater elevation only. All wells are screened in the sand units underlying and near the West Ash Pond System.

Groundwater monitoring results are reported to the Illinois EPA annually in accordance with the approved Closure Work Plan. The most recent data and analysis were submitted in '2016 Closure Work Plan Annual Report (NRT, October 21, 2016).

Additional groundwater monitoring was initiated for four quarters (June [Q2] 2013 through March [Q1] 2014) to assess compliance with the IAC 35 Part 620 Section 410 *Groundwater Quality Standards for Class I: Potable Resource Groundwater*. Sampling was conducted for an expanded list of parameters that included the following:

Field Parameters	
Ph	Temperature
Specific Conductivity	Turbidity

Laboratory Parameters			
Inorganics (Total)			
Chloride	Fluoride	Nitrite	Sulfate
Cyanide	Nitrate	Perchlorate	TDS
Metals (Total and Dissolved)			
Antimony	Cadmium	Lead	Silver
Arsenic	Chromium	Manganese	Thallium
Barium	Cobalt	Mercury	Vanadium
Beryllium	Copper	Nickel	Zinc
Boron	Iron	Selenium	
Organic Compounds			
Volatile Organic Compounds	Polychlorinated Biphenyls (PCBs)		
Semi-Volatile Organic Compounds	Specialized Organic Parameters: Endohall, Ethyl Dibromide (EDB) and		
Chlorinated Pesticides	1,2-Dibromo-3-Chloropropane (DBCP)		
Chlorinated Herbicides			

1.5.2 40 CFR Part 257 Monitoring

Groundwater data collection under the CCR Rule was initiated in fourth quarter, 2015. The CCR Rule monitoring network consists of background/upgradient monitoring wells 32 and 34, and downgradient monitoring wells 21, 22, 23, 24, 35, and 49. Monitoring well 49 was installed by NRT in July, 2015 on the north berm of Pond 1 to supplement the CCR Rule groundwater monitoring network. Monitoring of this well commenced in 2016. Parameters tested under the initial CCR Rule groundwater monitoring requirements include Appendix III and Appendix IV parameters (see below). All existing groundwater monitoring wells are measured at least annually for groundwater elevation.

40 CFR Part 257 Monitoring			
Appendix III Parameters (Total, except TDS)			
Boron	Chloride	pH	TDS
Calcium	Fluoride	Sulfate	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lead	Selenium
Arsenic	Chromium	Lithium	Thallium
Barium	Cobalt	Mercury	Radium 226/228
Beryllium	Fluoride	Molybdenum	
Field Parameters			
Dissolved Oxygen	Specific Conductivity	Turbidity	pH

Data collected under the CCR Rule groundwater monitoring program was included in the 2017 Annual Report (NRT, 2018). The monitoring program will continue so that the analytical parameters and sampling frequency are appropriate to the objectives and requirements of the CCR Rule.

2 GROUNDWATER IMPAIRMENTS AND CONTROL OPTIONS

2.1 EXTENT OF GROUNDWATER IMPAIRMENTS ASSOCIATED WITH THE WEST ASH POND SYSTEM

Concentrations of boron, manganese, TDS, and pH exceeded Class I groundwater quality standards during the January 2010 through December 2017 monitoring period at the following locations (Figure 3):

Monitoring Wells Exceeding Class I Groundwater Quality Standards							
Well Number	Location	Arsenic	Boron	Calcium*	Lithium*	Molybdenum*	Sulfate
21	Downgradient		X		X	X	
22	Downgradient		X		X	X	
23	Downgradient		X			X	X
24	Downgradient	X	X		X	X	
25	Side-gradient						
26	Side-gradient						
27	Downgradient		X			X	
30	Side-gradient						
31	Side-gradient					X	
32	Background						
33	Background						
34	Background				X	X	
35	Downgradient		X	X	X	X	
49	Downgradient		X		X	X	

*No Class I Standard, concentrations exceed background limit

Boron and sulfate are key indicator parameters of the presence of CCR constituents in groundwater and were observed in five monitoring wells adjacent to and downgradient of the West Ash Pond System. Boron concentrations in these wells have been trending downward since the impoundment was removed from service in 1996. Variable concentrations of iron and manganese do not correlate to the CCR leachate indicator parameters (i.e. boron, sulfate) and are controlled by variations in groundwater geochemistry rather than a release from the West Ash Pond System.

Occasional detections of arsenic (wells 21, 24 and background well 33) and nitrate (wells 25 and 26) above Class I standards are naturally occurring or attributed to a nonpoint source of contamination, respectively. In addition, single, isolated detections of lead and selenium slightly above their detection limits indicate these parameters are also not constituents of concern.

A three-dimensional groundwater flow and transport model was established to evaluate the effectiveness of the proposed closure plan on the Hennepin West Ash Pond System. The proposed closure configuration includes clean closure of the Old West Polishing Pond and capping the remaining impoundments in place by a geosynthetic cover, which consists of a 6-inch surface soil layer, a 18-inch soil layer, a geocomposite drainage layer and a geosynthetic layer. The model was developed based on an existing 2014 model with incorporation of new field and laboratory measurements and was recalibrated to fit additional monitoring data. The results of the modeling are summarized as:

- If no action is taken, boron concentrations exceeding groundwater protection standards will not be contained within the property boundary. Boron concentrations become asymptotic after approximately 50 years (Year 2067) and no further reduction is expected with time.
- Significant reduction in groundwater impacts are expected under the proposed closure scenario. Boron concentrations in most wells will meet the groundwater protection standards in 50 years (Year 2067) upon cap completion and all wells will meet the standards in 200 years (Year 2217).

Remaining groundwater impacts after 50 years are attributed to lower permeability silty/clay material beneath the western portion of the pond, which results in slower release/attenuation of the impacts as compared to other portions of the site which are underlain by higher permeability sands. After 200 years (Year 2217), groundwater impacts are nearly removed and only isolated areas of impacts remain. The proposed closure configuration effectively consolidates the long-term groundwater impacts to the silty/clay material and the saturated ash beneath the west portion of the pond.

2.2 IMPAIRMENTS TO GROUNDWATER USAGE

A comprehensive water well survey was conducted by NRT and Kelron (2009a) for a 2,500-foot radius around the entire Hennepin Power Station property boundary, inclusive of the West Ash Pond System. Based on State of Illinois records obtained from the Illinois EPA, Illinois State Geological Survey (ISGS), and Illinois State Water Survey (ISWS) there are only two wells located outside of the Hennepin Power Station property boundary and within 2,500 feet of the West Ash Pond System. Neither of the two wells, which according to State of Illinois records were constructed in 1844 and 1922 to depths of 30 and 17 feet bgs, respectively, have been verified and were most likely abandoned decades ago. There are no homes, farms or other potential users present at the two locations. There are also no public water supply (PWS), community water supply (CWS) or non-CWS wells or wellhead protection areas (WHPAs) within 2,500 feet of the West Ash Pond System. The closest PWS, CWS, or non-CWS well is a non-CWS well owned by Washington Mills and located approximately 4,350 feet east-southeast of the West Ash Pond System.

Within the plant property boundary, and within 2,500 feet of the West Ash Pond System, there are four wells owned by DMG, all of which are non-potable and non-contact industrial wells.

An assessment of potential for groundwater impact to water wells, as identified in the water well survey, was conducted by NRT and Kelron (2009b). The assessment demonstrated that there are no existing off-site water wells, potable or non-potable, that are likely to be impacted by groundwater from the West Ash Pond System or the Hennepin Power Station.

2.3 CLOSURE OF THE WEST ASH POND SYSTEM

The Closure Plan and Post-Closure Care Plan for the West Ash Pond System are being submitted under separate cover (Geosyntec, 2017). Because the pond is inactive, the CCR Rule deadline for completing closure of this pond is November 2020.

The Closure Plan includes the following corrective action elements, with the excavation and capped areas shown on Figure 3:

- The minimal volume of CCR within the Old West Polishing Pond will be removed and consolidated with Pond Nos. 1 and 3.
- CCR will not be removed from the Old West Ash Pond (Pond Nos. 1 and 3). The geometry of the final cover will be graded to convey storm water runoff to drainage channels.
- The overall footprint and configuration of the Old West Ash Pond (Pond Nos. 1 and 3) will remain unchanged.
- The geomembrane cover system design will meet the requirements of the CCR Rule such that the permeability shall be less than or equal to the permeability of the existing bottom liner or subsoils present below the CCR material, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less. The geomembrane cover system will be constructed in direct contact with the graded CCR and existing soil cover material and will consist of, from bottom to top, a 40-mil LLDPE geomembrane membrane, a geocomposite drainage layer, and a minimum 18-inch protective cover soil layer. An erosion layer consisting of earthen material capable of sustaining native plant growth will be placed on top of the protective cover soil layer.

The proposed corrective action will lower pond leachate levels, establish hydrostatic equilibrium within the ponds and will decrease migration of CCR constituents spatially and temporally.

3 APPLICATION FOR GROUNDWATER MANAGEMENT ZONE

3.1 ENVIRONMENTAL IMPACT OF PROPOSED GROUNDWATER MANAGEMENT ZONE

Establishment of this GMZ will have a positive environmental impact. The fate and transport modeling (NRT, 2017c) predicted boron concentrations will eventually decrease to levels lower than the Class I standard at most perimeter monitoring wells screened in the uppermost aquifer inside of the proposed GMZ boundary within approximately 50 years following completion of closure activities. Under the worst-case no action scenario, the boron concentrations exceeding groundwater protection standards become asymptotic after approximately 50 years (Year 2067) and no further reduction is expected with time. The geomembrane cover system overlying the Old West Ash Pond (Pond Nos. 1 and 3) will significantly reduce the extent of boron impacts compared to the no action model scenario.

3.2 PROPOSED GROUNDWATER MANAGEMENT ZONE

The proposed GMZ incorporates the area currently exhibiting constituents in groundwater that are attributable to the West Ash Pond System, as measured in the on-site groundwater monitoring well network, as well as the area within the Hennepin Power Station property boundary that has model-predicted boron concentrations above the Class I groundwater standard (Figure 2). A legal description and map depicting the proposed groundwater management zone is provided in Appendix A. The GMZ will extend vertically through all water-bearing strata to the top of the shale bedrock that underlies the unlithified glacial and alluvial deposits at the site. The GMZ does not extend beyond the Hennepin Power Station property boundaries.

3.3 COMPLIANCE WITH APPLICABLE ON-SITE GROUNDWATER QUALITY STANDARDS

In accordance with IAC 620 Section 620.240, the compliance boundary is a lateral distance of 25 feet outward from the outermost edge of the West Ash Pond System berms. Following completion of the corrective action, the groundwater standard at the compliance boundary will be in accordance with IAC 620 Section 450(a)(4) for groundwater quality restoration such that the standard for each released chemical constituent will be the higher of either the Class I groundwater standard or the concentration determined by groundwater monitoring at the compliance boundary.

Compliance with on-site groundwater quality standards, as measured at the proposed monitoring well network, and the termination of groundwater monitoring, will be achieved when there are no statistically significant increasing trends that are attributed to the West Ash Pond System for parameters detected at the compliance boundary after a minimum 30 years of post-closure groundwater monitoring has been completed.

Evaluation of groundwater quality data under USEPA (2015) will be consistent with 40 CFR Part 257.93 and 257.94 requirements.

4 PROPOSED GROUNDWATER MONITORING PLAN

Groundwater monitoring will be performed in accordance with the groundwater monitoring plan, incorporated by reference, in the accompanying report:

- Natural Resource Technology, Inc., 2017b. Groundwater Monitoring Plan. West Ash Pond System, Dynegy Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL. (NRT, 2017b).

The elements of the groundwater monitoring plan include:

- Groundwater monitoring system with designation of background and compliance monitoring wells along with monitoring well depths and construction.
- Groundwater monitoring parameters.
- Groundwater monitoring frequency and sampling schedule, along with statistical basis for reduction of monitoring frequency.
- Groundwater sample collection protocol with standard operating procedures.
- Laboratory analysis by a state-certified laboratory and listing of methods and reporting limits.
- Quality Assurance Program for field collection of samples and laboratory analysis of samples.
- Groundwater monitoring system maintenance, including schedule of inspections and methods for inspection of monitoring wells.
- Data reporting schedule and content of reports.
- Demonstration of compliance. Statistical methods for evaluating groundwater quality data.
- A notification schedule with actions to be taken in cases of non-compliance.

5 LICENSED PROFESSIONAL ACKNOWLEDGEMENT

The geological work product contained in this document has been prepared under my personal supervision and has been prepared and administered in accordance with the standards of reasonable professional skill and diligence.

Stuart J. Cravens, PG Principal Hydrogeologist Natural Resource Technology, an OBG Company 2422 E. Washington Street, Suite 104 Bloomington, Illinois 61704 217-390-1503 Registration No. 196000108	Seal:  Expires: 03/31/2019
 Signature	<u>12/20/2017</u> Date

REFERENCES

Geosyntec, 2017. Closure and Post Closure Care Plan, West Ash Pond System, Illinois Power Generating Company Hennepin Power Station, 1 Power Plant Road, Hennepin, IL 61327.

Natural Resource Technology, Inc., 2017a. Hydrogeologic Characterization Report. West Ash Pond System, Dynegy Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.

Natural Resource Technology, Inc., 2017b. Groundwater Monitoring Plan. West Ash Pond System, Dynegy Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.

Natural Resource Technology, Inc., 2017c. Groundwater Model Report. West Ash Pond System, Dynegy Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.

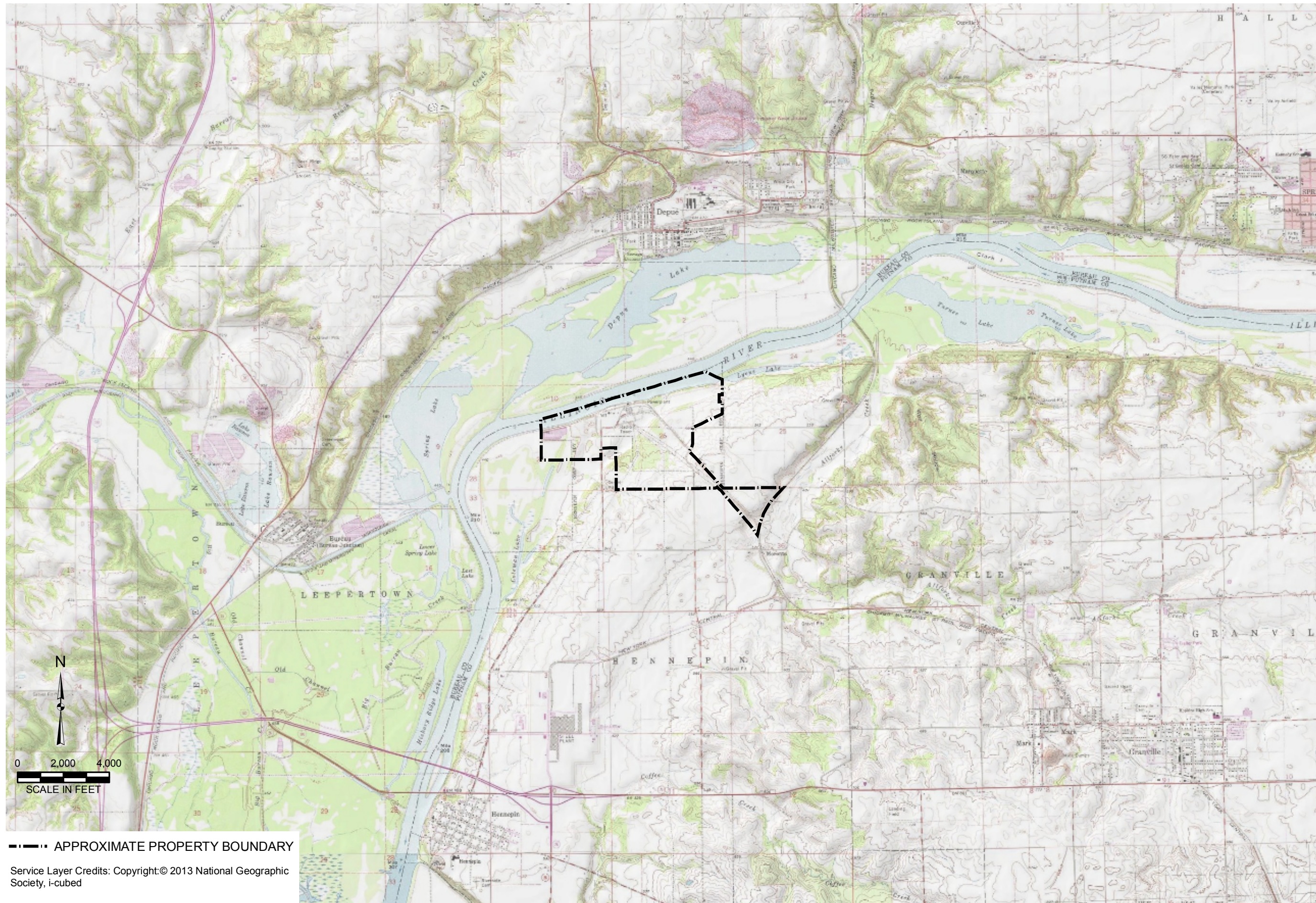
Natural Resource Technology, Inc., 2017d. Hydrostatic Modeling Report. West Ash Pond System, Dynegy Midwest Generation, LLC, Hennepin Power Station, Hennepin, IL.

Natural Resource Technology, Inc. and Kelron Environmental, June 3, 2009. Water Well Survey, Dynegy Midwest Generation, Hennepin Power Station, Hennepin, Illinois.

USEPA, April 17, 2015. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule

Figures

Y:\Mapping\Projects\24124131\XMD\GMA\Figure 1_Site Location Map.mxd Author: slolizsd Date/Time: 8/30/2017 1:21:10 AM



--- APPROXIMATE PROPERTY BOUNDARY

Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/30/17

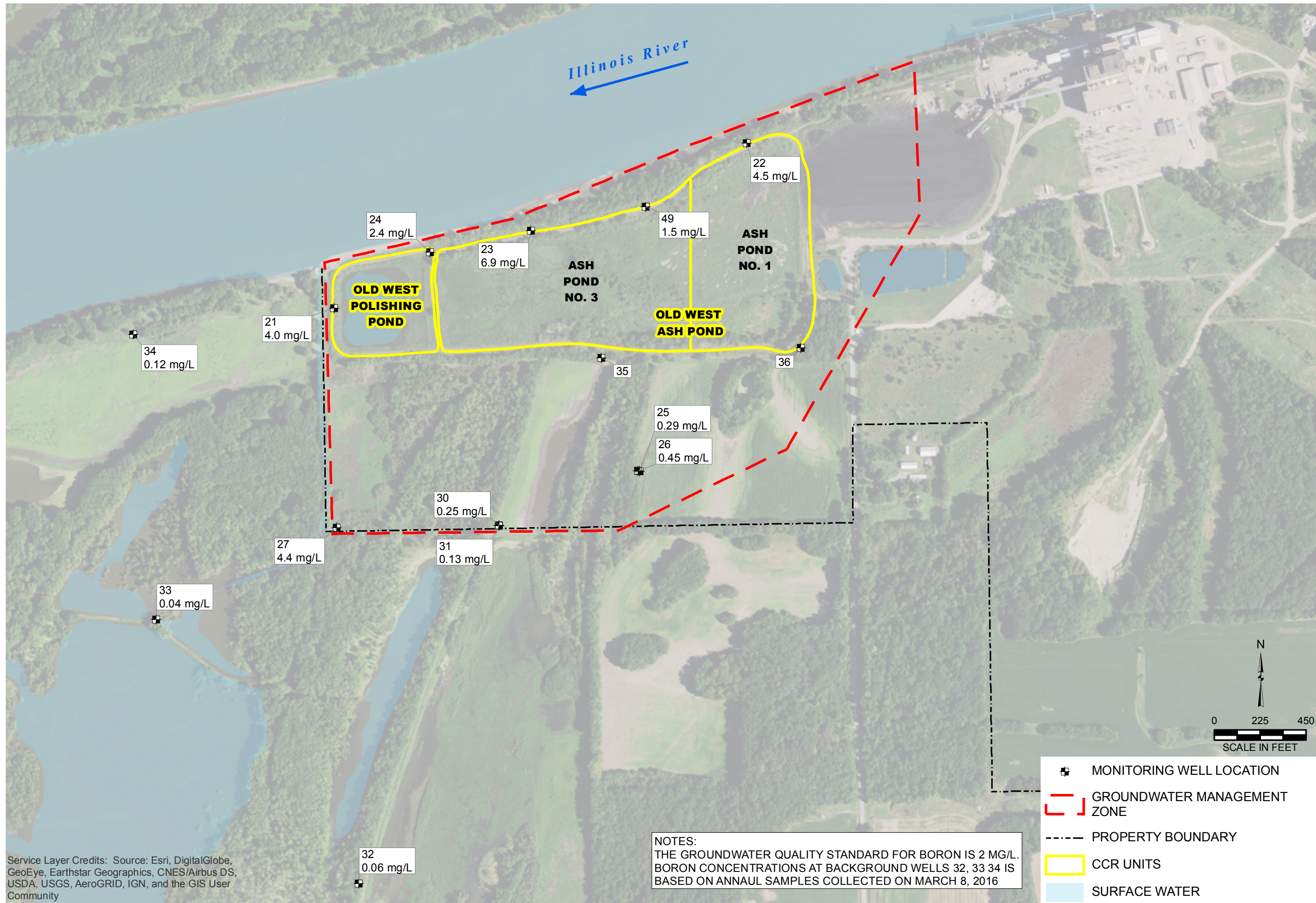
SITE LOCATION MAP
GROUNDWATER MANAGEMENT ZONE APPLICATION
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO: 2413

FIGURE NO: 1



Y:\Mapping\Projects\2412413\MXD\IGMZA\Figure 2_MW Network and Boron.mxd Author: stolzsd Date/Time: 12/19/2017, 11:17:01 AM



NOTES:
 THE GROUNDWATER QUALITY STANDARD FOR BORON IS 2 MG/L.
 BORON CONCENTRATIONS AT BACKGROUND WELLS 32, 33 34 IS
 BASED ON ANNAUL SAMPLES COLLECTED ON MARCH 8, 2016

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DRAWN BY/DATE:
 SDS 8/29/17
 REVIEWED BY/DATE:
 RJK 8/30/17
 APPROVED BY/DATE:
 SJC 8/30/17

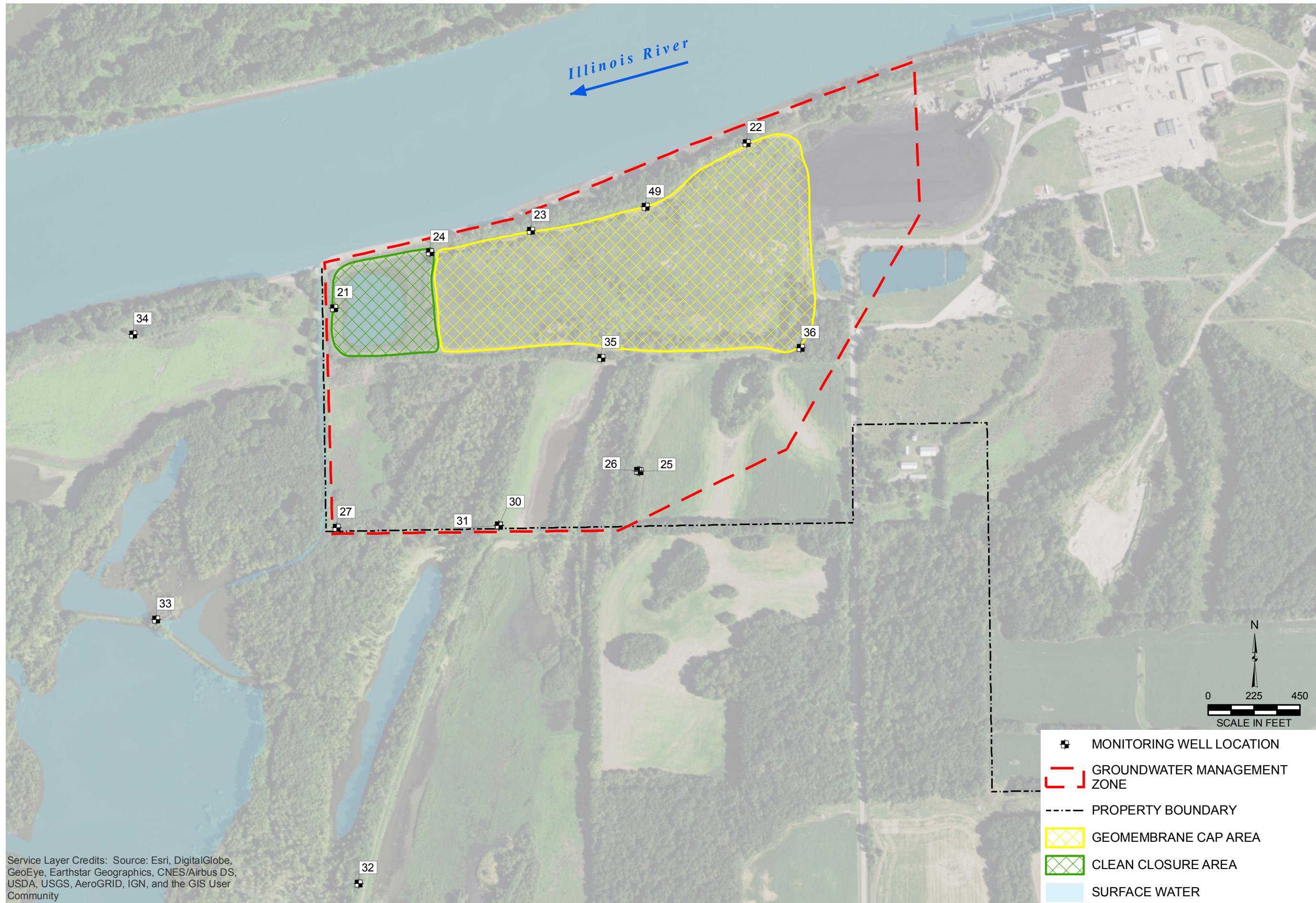
MONITORING WELL NETWORK AND BORON CONCENTRATIONS
 IN GROUNDWATER - SEPTEMBER 15, 2016

GROUNDWATER MANAGEMENT ZONE APPLICATION
 WEST ASH POND SYSTEM
 DYNEGY MIDWEST GENERATION, LLC
 HENNEPIN POWER STATION, HENNEPIN, ILLINOIS







PROJECT NO. 2413
 FIGURE NO. 2

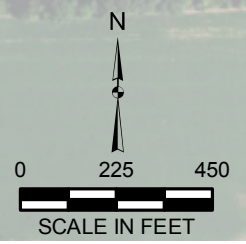


Y:\Mapping\Projects\2412413\MXD\IGMZA\Figure 3_Site Closure Plan.mxd Author: stolzsch Date/Time: 12/20/2017, 11:24:25 AM



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

-  MONITORING WELL LOCATION
-  GROUNDWATER MANAGEMENT ZONE
-  PROPERTY BOUNDARY
-  GEOMEMBRANE CAP AREA
-  CLEAN CLOSURE AREA
-  SURFACE WATER



DRAWN BY/DATE:
SDS 8/29/17
REVIEWED BY/DATE:
RJK 8/30/17
APPROVED BY/DATE:
SJC 8/31/17

SITE CLOSURE PLAN

GROUNDWATER MANAGEMENT ZONE APPLICATION
WEST ASH POND SYSTEM
DYNEGY MIDWEST GENERATION, LLC
HENNEPIN POWER STATION, HENNEPIN, ILLINOIS

PROJECT NO. 2413

FIGURE NO. 3





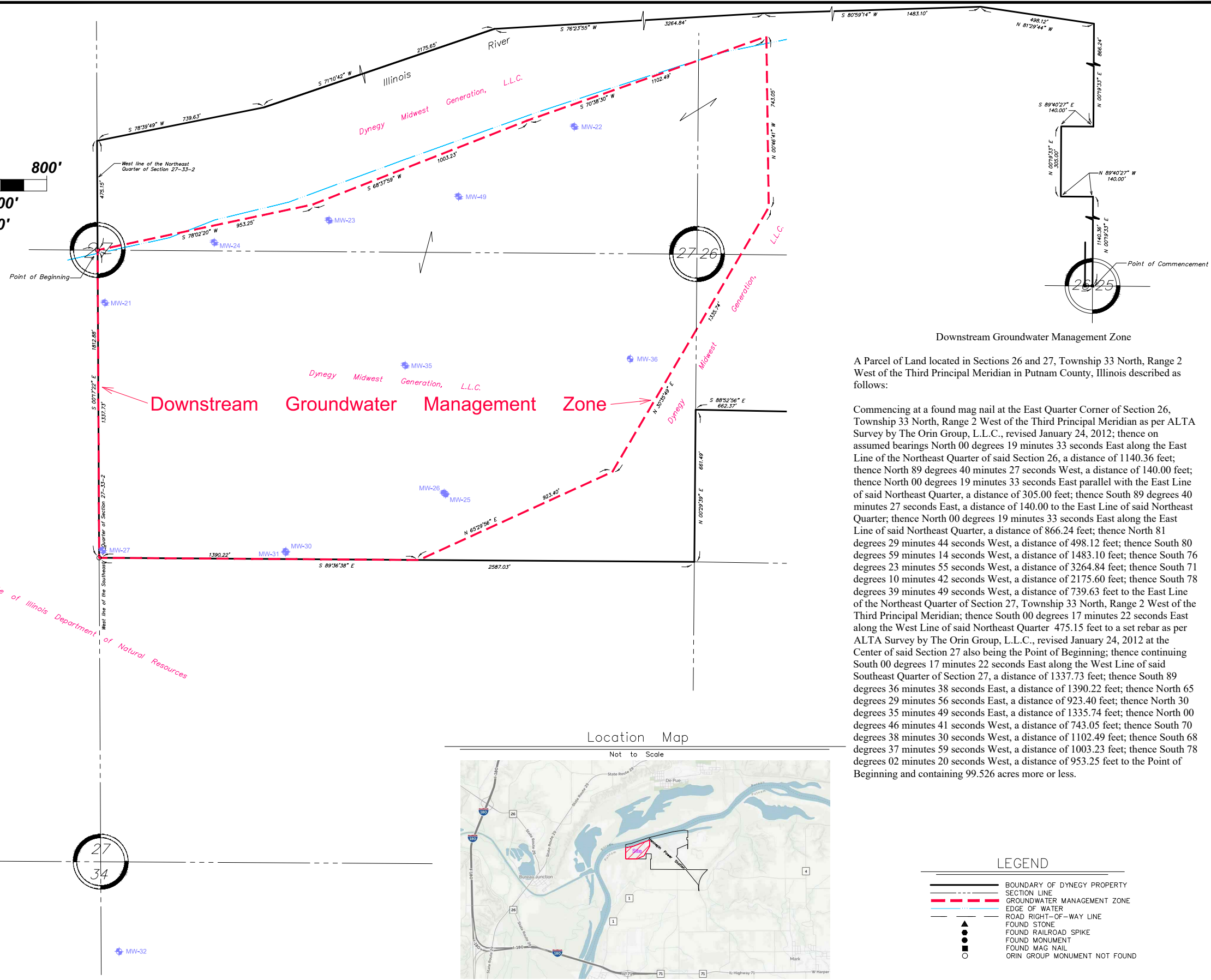
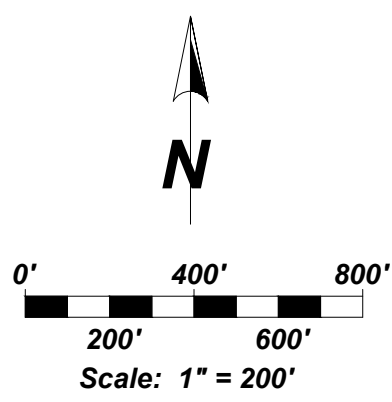
Appendix A
Groundwater
Management Zone Map
and Legal Description



Downstream Groundwater Management Zone

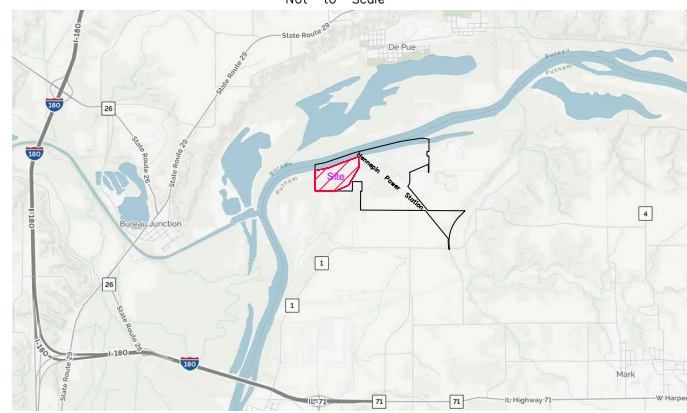
A Parcel of Land located in Sections 26 and 27, Township 33 North, Range 2 West of the Third Principal Meridian in Putnam County, Illinois described as follows:

Commencing at a found mag nail at the East Quarter Corner of Section 26, Township 33 North, Range 2 West of the Third Principal Meridian as per ALTA Survey by The Orin Group, L.L.C., revised January 24, 2012; thence on assumed bearings North 00 degrees 19 minutes 33 seconds East along the East Line of the Northeast Quarter of said Section 26, a distance of 1140.36 feet; thence North 89 degrees 40 minutes 27 seconds West, a distance of 140.00 feet; thence North 00 degrees 19 minutes 33 seconds East parallel with the East Line of said Northeast Quarter, a distance of 305.00 feet; thence South 89 degrees 40 minutes 27 seconds East, a distance of 140.00 to the East Line of said Northeast Quarter; thence North 00 degrees 19 minutes 33 seconds East along the East Line of said Northeast Quarter, a distance of 866.24 feet; thence North 81 degrees 29 minutes 44 seconds West, a distance of 498.12 feet; thence South 80 degrees 59 minutes 14 seconds West, a distance of 1483.10 feet; thence South 76 degrees 23 minutes 55 seconds West, a distance of 3264.84 feet; thence South 71 degrees 10 minutes 42 seconds West, a distance of 2175.60 feet; thence South 78 degrees 39 minutes 49 seconds West, a distance of 739.63 feet to the East Line of the Northeast Quarter of Section 27, Township 33 North, Range 2 West of the Third Principal Meridian; thence South 00 degrees 17 minutes 22 seconds East along the West Line of said Northeast Quarter 475.15 feet to a set rebar as per ALTA Survey by The Orin Group, L.L.C., revised January 24, 2012 at the Center of said Section 27 also being the Point of Beginning; thence continuing South 00 degrees 17 minutes 22 seconds East along the West Line of said Southeast Quarter of Section 27, a distance of 1337.73 feet; thence South 89 degrees 36 minutes 38 seconds East, a distance of 1390.22 feet; thence North 65 degrees 29 minutes 56 seconds East, a distance of 923.40 feet; thence North 30 degrees 35 minutes 49 seconds East, a distance of 1335.74 feet; thence North 00 degrees 46 minutes 41 seconds West, a distance of 743.05 feet; thence South 70 degrees 38 minutes 30 seconds West, a distance of 1102.49 feet; thence South 68 degrees 37 minutes 59 seconds West, a distance of 1003.23 feet; thence South 78 degrees 02 minutes 20 seconds West, a distance of 953.25 feet to the Point of Beginning and containing 99.526 acres more or less.



State of Illinois Department of Natural Resources

Location Map



Downstream Groundwater Management Zone

A Parcel of Land located in Sections 26 and 27, Township 33 North, Range 2 West of the Third Principal Meridian in Putnam County, Illinois described as follows:

Commencing at a found mag nail at the East Quarter Corner of Section 26, Township 33 North, Range 2 West of the Third Principal Meridian as per ALTA Survey by The Orin Group, L.L.C., revised January 24, 2012; thence on assumed bearings North 00 degrees 19 minutes 33 seconds East along the East Line of the Northeast Quarter of said Section 26, a distance of 1140.36 feet; thence North 89 degrees 40 minutes 27 seconds West, a distance of 140.00 feet; thence North 00 degrees 19 minutes 33 seconds East parallel with the East Line of said Northeast Quarter, a distance of 305.00 feet; thence South 89 degrees 40 minutes 27 seconds East, a distance of 140.00 to the East Line of said Northeast Quarter; thence North 00 degrees 19 minutes 33 seconds East along the East Line of said Northeast Quarter, a distance of 866.24 feet; thence North 81 degrees 29 minutes 44 seconds West, a distance of 498.12 feet; thence South 80 degrees 59 minutes 14 seconds West, a distance of 1483.10 feet; thence South 71 degrees 10 minutes 42 seconds West, a distance of 2175.60 feet; thence South 78 degrees 39 minutes 49 seconds West, a distance of 739.63 feet to the East Line of the Northeast Quarter of Section 27, Township 33 North, Range 2 West of the Third Principal Meridian; thence South 00 degrees 17 minutes 22 seconds East along the West Line of said Northeast Quarter 475.15 feet to a set rebar as per ALTA Survey by The Orin Group, L.L.C., revised January 24, 2012 at the Center of said Section 27 also being the Point of Beginning; thence continuing South 00 degrees 17 minutes 22 seconds East along the West Line of said Southeast Quarter of Section 27, a distance of 1337.73 feet; thence South 89 degrees 36 minutes 38 seconds East, a distance of 1390.22 feet; thence North 65 degrees 29 minutes 56 seconds East, a distance of 923.40 feet; thence North 30 degrees 35 minutes 49 seconds East, a distance of 1335.74 feet; thence North 00 degrees 46 minutes 41 seconds West, a distance of 743.05 feet; thence South 78 degrees 38 minutes 30 seconds West, a distance of 1102.49 feet; thence South 68 degrees 37 minutes 59 seconds West, a distance of 1003.23 feet; thence South 78 degrees 02 minutes 20 seconds West, a distance of 953.25 feet to the Point of Beginning and containing 99.526 acres more or less.

LEGEND

	BOUNDARY OF DYNEGY PROPERTY
	SECTION LINE
	GROUNDWATER MANAGEMENT ZONE
	EDGE OF WATER
	ROAD RIGHT-OF-WAY LINE
	FOUND STONE
	FOUND RAILROAD SPIKE
	FOUND MONUMENT
	FOUND MAG NAIL
	ORIN GROUP MONUMENT NOT FOUND

IngenAE
 514 Earth City Plaza
 Earth City, MO 63045
 www.ingenae.com

Mark T. Zies

Submissions / Revisions:	Date:
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

DYNEGY

Project Name & Location:

Hennepin Power Station
 Downstream Groundwater Management Zone

Copyright © 2017
 IngenAE, LLC
 www.ingenae.com

DO NOT SCALE PLANS
 Copying, Printing, Software and other processes required to produce these prints can stretch or shrink the actual paper or layout. Therefore, scaling of this drawing may be inaccurate. Contact IngenAE with any need for additional dimensions or clarifications.

Drawing Name:

Hennepin Downstream GMZ Exhibit

Date:	8-07-17	Project No.	
Type:	x	Drawing No.	2
Drawn By:	MTZ		OF 2
Approved By:	x		
Scale:	1"=200'		

OBG

THERE'S A WAY



ATTACHMENT J

Memorandum



Date: 25 October 2021

Subject: 35 I.A.C. Section 845.430 – Slope Maintenance Documentation for West Ash Pond System at Hennepin Power Plant

Dynegy Midwest Generation, LLC (DMG) operates the coal-fired Hennepin Power Plant located in Putnam County, Illinois. The West Ash Pond System is a closed inactive surface impoundment storing coal combustion residuals (CCR). The requirements for the Hennepin West Ash Pond System are found in 35 Ill. Admin. Code Part 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (Part 845).

Pursuant to Part 845, Section 845.230(d)(3)(C), the initial operating permit application for inactive closed CCR surface impoundments that have completed an Agency approved closure before prior to July 30, 2021, must contain documentation that the CCR surface impoundment, if not incised, will be operated, and maintained with one of the forms of slope protection specified in Section 845.430. This statement addresses the requirements of Part 845, Section 845.430 Slope Maintenance, which states:

Section 845.430: The slopes and pertinent surrounding areas of the CCR surface impoundment must be designed, constructed, operated, and maintained with one of the forms of slope protection specified in subsection (a) that meets all the performance standards of subsection (b).

Section 845.430(a): Slope protection must consist of one of the following: 1) A vegetative cover consisting of grassy vegetation; 2) An engineered cover consisting of a single form or combination of forms of engineered slope protection measures; or 3) A combination of the forms of cover specified in subsections (a)(1) or (a)(2).

Section 845.430(b): Any form of cover for slope protection must meet the following performance standards: 1) The cover must be installed and maintained on the slopes and pertinent surrounding areas of the CCR surface impoundment; 2) The cover must provide protection against surface erosion, wave action, and adverse effects of rapid drawdown; 3) The cover must be maintained to allow for the observation of, and access to, the slopes and pertinent surrounding areas during routine and emergency events; 4) Woody vegetation must be removed from the slopes or pertinent surrounding areas. Any removal of woody vegetation with a diameter greater than 1/2 inch must be directed by a person familiar with the design and operation of the CCR surface impoundment and in consideration of the complexities of removal of a tree or a shrubbery, who must ensure the removal does not create a risk of destabilizing the CCR surface impoundment or otherwise adversely affect the stability and safety of the CCR surface impoundment or

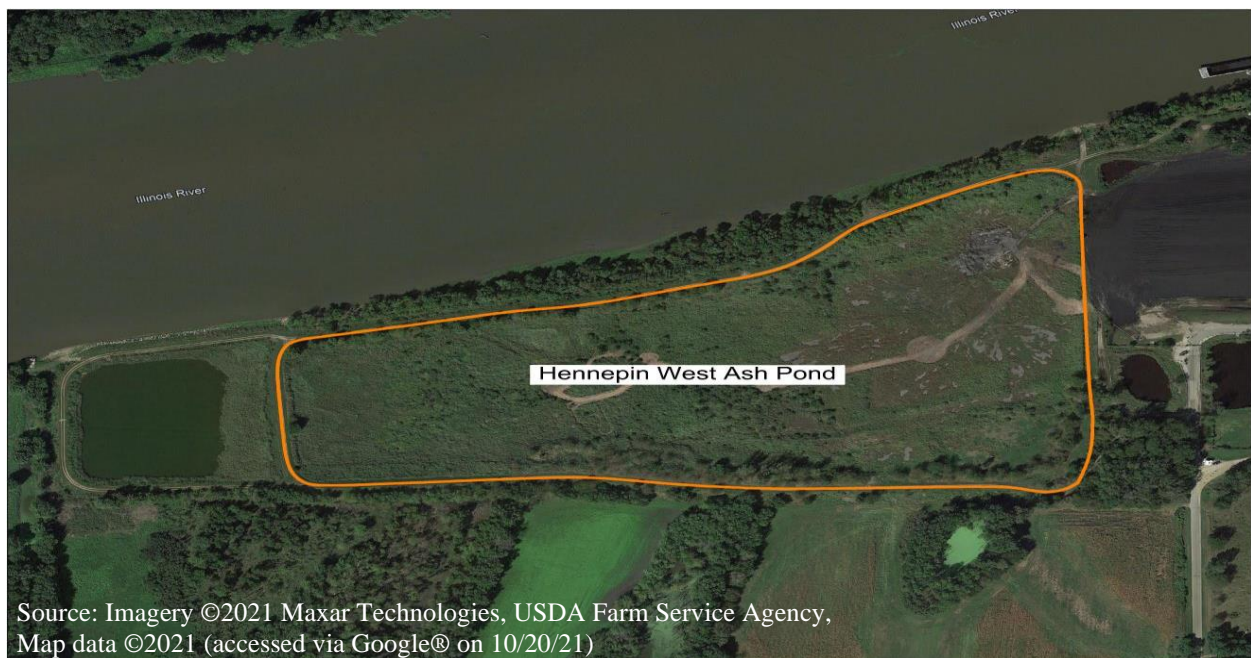
I.A.C. 35 Part 845 – Slope Maintenance Documentation for West Ash Pond System at Hennepin Power Plant

25 October 2021

Page 2

personnel undertaking the removal; and 5) The height of vegetation must not exceed 12 inches.

Slope protection, consisting of vegetative cover, was installed on the slopes and pertinent surrounding areas of the Hennepin West Ash Pond System, and is inspected, maintained, and repaired as needed. Based on observations from weekly inspections conducted in accordance with Section 845.540(a), and the 2020 annual inspections conducted by Hanson Professional Services Inc., the vegetative cover is described to be in good working condition with a maximum vegetation height of 12 inches. The owner's Operations and Maintenance Plan (O&M Plan) provides details for maintaining grass and removing woody vegetation and addressing erosion features on the slopes. Based on a review of the documentation described above, the owner is implementing the O&M Plan, including the completion of repairs and maintenance as needed and when issues are identified during weekly and/or annual inspections. The slope maintenance portion of the O&M Plan and the Annual Inspection performed by Hanson in 2020 are included in Attachment J. The surface impoundment slope protection (vegetative cover) installed and maintained on the slopes and pertinent areas around the slopes is depicted in the aerial photograph provided below.



Excerpt from the Hennepin WAP Operations and Maintenance Manual

1.0 MAINTENANCE

1.1 Vegetation

Dikes shall be maintained to protect the structural integrity of the disposal facility. Damaged and barren areas shall be repaired as soon as appropriate after being discovered. Damaged areas shall be filled with topsoil. Limed, fertilized, and seeded with appropriate vegetation. Trees and shrubs observed during periodic inspections shall be cut and removed from the dikes and discharge channel. This shall be done as frequently as is necessary to ensure that no tree reaches a size where the root structure would require removal and filling. Woody vegetation, shrubs, and trees shall be removed during the early stages of growth before reaching a three-inch diameter.

Low growing vegetation shall be planted and maintained to facilitate inspections.

1.2 Discharge Structure

The discharge structure shall be inspected periodically for significant corrosion, spalling, and cracking. Any defects discovered shall be promptly repaired.

1.3 Animal Damage and Repairs

Animal burrows discovered during inspections shall be promptly repaired by filling with grout.

1.4 Restriction of Unauthorized Vehicles

Facility approaches shall be posted with signs restricting unauthorized travel on the roadways and slopes.

1.5 Inspections/Remedial Measures

1.5.1 Weekly Inspections

Weekly inspections of the perimeter berms shall be conducted, looking for seepage and slumping, and unusual seepage at and/or blockage of the outfall structures in each cell. All findings shall be entered into the weekly inspection checklist, discussed in Section 4.0. Maintenance activities shall be initiated, if required. Refer to Section 4.0 for the recommended inspection checklist to be used for the weekly inspections.

1.5.2 Quarterly Inspections

Inspections shall be made quarterly by Station personnel to determine the general condition of the dam and embankments. During these inspections, embankment erosion, tree growth, and embankment seepage shall be monitored. Seepage shall be observed for change in quantity and coloration. Refer to Section 4.0, for the recommended inspection checklist to be used for documenting the quarterly inspections.

1.5.3 Five-Year Inspections

Every five years, an inspection shall be made by a licensed professional engineer. This inspection shall follow the Illinois Department of Natural Resources (IDNR) *Guidelines and Forms for Inspection of Illinois Dams* and shall be followed by verbal and written reports by the consulting engineer. Based on the findings of the inspection, the Station Manager shall implement corrective action as required to promote dam safety. Procedures and methods for corrective action shall be performed in accordance with recommendations of the consulting engineer and as outlined above. Copies of the engineer's report, along with corrective action taken, shall be reported to the IDNR.

1.6 Annual Statement

An annual statement on forms furnished by IDNR, certifying compliance with this maintenance plan, shall be submitted to IDNR.

Dam Inspection Report

Name of Dam Hennepin West Ash Pond Dam ID No. N.A.

Permit Number N.A. Class of Dam N.A.

Location NE 1/4 Section 27 Township 33N Range 2W

Owner Dynegy Midwest Generation 815-339-9210
Name Telephone Number (Day)

RR1, Box 200AA 815-339-9215
Street Telephone Number (Night)

Hennepin 61327 County Putnam
City Zip Code

Type of Dam Earth embankment

Type of Spillway Drop structure

Date(s) Inspected 11-Nov-20

Weather When Inspected Pt. Cloudy

Temperature When Inspected 38 F

Pool Elevation When Inspected N.A.

Tailwater Elevation When Inspected N.A.

Inspection Personnel:

James P. Knutelski, P.E. Geotechnical Engineer

Name Title

Jason Campbell, P.E. Dynegy

Name Title

Paul Mauer IDNR/OWR

Name Title

Name Title



J. Knutelski 12/30/2020

Professional Engineer's Seal

Exp 11/30/21

CONDITION CODES

- NE - No evidence of a problem
- GC - Good condition
- MM - Item needing minor maintenance and/or repairs within the year, the safety or integrity of the item is not yet imperiled
- IM - Item needing immediate maintenance to restore or ensure its safety or integrity
- EC - Emergency condition which if not immediately repaired or other appropriate measures taken could lead to failure of the dam
- OB - Condition requires regular observation to ensure that the condition does not become worse
- NA - Not applicable to this dam
- NI - Not inspected - list the reason for non-inspection under deficiencies

EARTH EMBANKMENT

ITEM	CONDITION CODE	DEFICIENCIES	RECOMMENDED REMEDIAL MEASURES AND IMPLEMENTATION SCHEDULE
Surface Cracks	NE		
Vertical and Horizontal Alignment of Crest	GC		
Unusual Movement or Cracking At or Beyond Toe	NE		
Sloughing or Erosion of Embankment and Abutment Slopes	NE		
Upstream Face Slope Protection	NE		
Seepage	NE		
Filter and Filter Drains	NA		

EARTH EMBANKMENT

(Continued)

ITEM	CONDITION CODE	DEFICIENCIES	RECOMMENDED REMEDIAL MEASURES AND IMPLEMENTATION SCHEDULE
Animal Damage	NE		
Embankment Drainage Ditches	NE		
Vegetative Cover	NE		
Other (Name)			
Other			
Other			
Other			

PRINCIPAL SPILLWAY

Drop Inlet Spillway

Armored Drop Structures/Ditches

Gated

ITEM	CONDITION CODE	DEFICIENCIES	RECOMMENDED REMEDIAL MEASURES AND IMPLEMENTATION SCHEDULE
Erosion, Spalling, Cavitation	NA		
Structure to Embankment Junction	NA		
Drains	NA		
Seepage Around or Into Structure	NA		
Surface Cracks	NA		
Structural Cracks	NA		

IF THE SPILLWAY IS GATED FILL OUT THE GATES SECTION

PRINCIPAL SPILLWAY

(Continued)

Drop Inlet Spillway

Armored Drop Structures/Ditches

Gated

ITEM	CONDITION CODE	DEFICIENCIES	RECOMMENDED REMEDIAL MEASURES AND IMPLEMENTATION SCHEDULE
Alignment of Abutment Walls	NA		
Construction Joints	NA		
Filter and Filter Drains	NA		
Trash Racks	NA		
Bridge and Piers	NA		
Differential Settlement	NA		
Riprap Slope Protection	NE		

IF THE SPILLWAY IS GATED FILL OUT THE GATES SECTION

PRINCIPAL SPILLWAY

(Continued)

Conduits at Polishing Pond

Gated

ITEM	CONDITION CODE	DEFICIENCIES	RECOMMENDED REMEDIAL MEASURES AND IMPLEMENTATION SCHEDULE
Erosion, Spalling, Cavitation	NI	Underground	
Joint Separation	NE	Underground	
Seepage Around of Into Conduit	NI	Underground	
Surface Cracks	NI	Underground	
Structural Cracks	NI	Underground	
Trash Racks	NA		
Differential Settlement	NE	Underground	
Alignment	NE	Underground	
Outlet structure	NE		

IF THE SPILLWAY IS GATED FILL OUT THE GATES SECTION

SUMMARY OF MAINTENANCE DONE AND/OR
REPAIRS MADE SINCE THE LAST INSPECTION

DATE OF PRESENT INSPECTION 11-Nov-20

DATE OF LAST INSPECTION 6-Nov-19

1. EARTH EMBANKMENT DAMS
Slopes and interior regraded and reseeded. Polishing pond partaily breached.

2. CONCRETE MASONRY DAMS
NA

3. PRINCIPAL SPILLWAY
None

4. OUTLET WORKS
None.

5. EMERGENCY SPILLWAY
NA



Pond interior



Pond interior



Pond interior



Pond interior



South exterior slope



South exterior slope



North exterior slope



North exterior slope

ATTACHMENT K

POST-CLOSURE PLAN FOR EXISTING CCR SURFACE IMPOUNDMENT
40 CFR 257.104 and 35 I.A.C. 845.780
REV 0 – 10/30/2021

SITE INFORMATION

Site Name / Address	Hennepin Power Plant / 13498 East 800 th Street, Hennepin, IL 61327		
Owner Name / Address	Dynergy Midwest Generation, LLC 6555 Sierra Drive Irving, Texas 75039		
CCR Unit	West Ash Pond System	Closure Method and Final Cover Type	Closed In-Place Clayey Soil with Vegetation

POST-CLOSURE PLAN DESCRIPTION

40 C.F.R. § 257.104(c)(1) and 35 I.A.C. 845.780(c)(1) – Length of post-closure care period.	Post-closure care will be conducted for a period of 30 years as required by 40 C.F.R. § 257.104(c)(1) and 35 I.A.C. 845.780(c)(1), except as provided by 40 C.F.R. § 257.104(c)(2) and 35 I.A.C. 845.780(c)(2).
40 C.F.R. § 257.104 (c)(2) and 35 I.A.C. 845.780(c)(2) – Circumstances extending the post closure care period.at the end of the post-closure care period.	<p>If at the end of the post-closure care period the CCR unit is operating under assessment monitoring in accordance with §257.95, the post-closure care as described in this plan will continue until returning to detection monitoring in accordance with §257.95.</p> <p>Under 35 I.A.C. 845.780(c)(2), the post-closure care period will be extended until groundwater monitoring data demonstrate that concentrations are below the groundwater protection standards in Section 845.600 and are not increasing for those constituents over background, using the statistical procedures and performance standards in Section 845.640(f) and (g), provided that concentrations have been reduced to the maximum extent feasible and concentrations are protective of human health and the environment.</p>
40 C.F.R. § 257.104(d)(1)(i) and 35 I.A.C. 845.780(d)(1)(A) – A description of the monitoring and maintenance activities required in 40 C.F.R. § 257.104(b) and 35 I.A.C. 845.780(b), and the frequency at which these activities will be performed, to maintain the integrity and effectiveness of the final cover system, maintain the groundwater monitoring system and monitor the groundwater.	<p>Pursuant to § 257.104(b)(1) and 35 I.A.C. 845.780(b)(1), throughout the post-closure care period, periodic visual observations of the final cover system and stormwater management system will be performed at least annually for evidence of settlement, subsidence, erosion, or other damage that may adversely affect the integrity and effectiveness of the final cover system. When practical, visual observations of the final cover will be made concurrent with groundwater monitoring activities.</p> <p>Noted evidence of damage, such as rills, surface cracks and settlement, will be repaired to maintain the integrity and effectiveness of the final cover system. Vegetation will be established and maintained on the final cover system, including storm drainage areas, where appropriate, to provide long-term erosion control. Established vegetation and the slope design of the final cover system will prevent potential erosion and damage that may be caused by run-on and run-off.</p> <p>Repair activities may include, but are not limited to, replacing and compacting soil cover, repairing drainage channels that have been eroded, filling in depressions with soil, regrading, and reseeding areas of failed vegetation, as necessary.</p> <p>Pursuant to § 257.104(b)(3) and 35 I.A.C. 845.780(b)(3), the groundwater monitoring system will be maintained, and groundwater will be</p>

	<p>monitored as required by 40 C.F.R. § 257.90 through 40 C.F.R. § 257.98 and 35 I.A.C. 845.600 through 35 I.A.C. 845.680. Monitoring wells will be inspected during each groundwater sampling event. Monitoring wells and associated instrumentation will be maintained so that they perform to the design specifications throughout the life of the monitoring program. Groundwater monitoring frequency will be at least quarterly, except as provided in 40 C.F.R. § 257.94(d) and 35 I.A.C. 845.650(b)(4).</p>
<p>40 C.F.R. § 257.104(d)(1)(ii) and 35 I.A.C. 845.780(d)(1)(B) – The name, address,</p>	<p>Dynegy Midwest Generation, LLC 6555 Sierra Drive Irving, Texas 75039 800.633.4704 ccr@dynegy.com</p>
<p>40 C.F.R. § 257.104(d)(1)(iii) and 35 I.A.C. 845.780(d)(1)(C) – A description of the planned uses of the property during the post-closure period.</p>	<p>The CCR unit is located at a retired electric generation facility. Planned uses of the property during the post-closure period are currently unknown, except for post-closure care of the CCR unit.</p> <p>Post-closure use of the property will not disturb the integrity of the final cover system or other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements of 40 C.F.R. Part § 257, Subpart D and 35 I.A.C. Part 845. Any other disturbance will be conducted following a demonstration that it will not increase the potential threat to human health or the environment, as required by 40 C.F.R. § 257.104(d)(1)(iii) and 35 I.A.C. 845.780 (d)(1)(C). The demonstration will be certified by a qualified professional engineer and submitted to the Illinois Environmental Protection Agency (IEPA). Per 40 C.F.R. § 257.104(d)(1)(iii) notification shall be provided to the State Director that the demonstration has been placed in the operating record and on the owners or operator's publicly accessible internet site.</p> <p>This CCR unit is closed. A notation on the deed to the property, or some other instrument that is normally examined during title search, will be recorded in accordance with 40 C.F.R. § 257.102(i) and 35 I.A.C. 845.760(h). The notation will notify potential purchasers of the property that the land has been used as a CCR unit and its use is restricted under the post-closure care requirements in 40 C.F.R. § 257.104(d)(1)(iii) and 35 I.A.C. 845.780(d)(1)(C) or groundwater monitoring requirements per 35 I.A.C. 845.740(b). Within 30 days of recording the deed notation, a notification stating that the notation has been recorded will be placed in the facility's operating record per 35 I.A.C. 845.760(h)(3). The notification will be submitted to the IEPA and placed on the owner or operator's publicly accessible CCR Web site in accordance with 40 C.F.R. § 257.107(i)(9) and 35 I.A.C. 845.810(e) and placed in the facility's operating record as required by 35 I.A.C. 845.800(d)(26) and §257.105(i)(9).</p>

<p>40 C.F.R. § 257.104(d)(3) and 35 I.A.C. 845.780(d)(3) – Amendments to the initial or subsequent written post-closure plan.</p>	<p>Pursuant to 40 C.F.R. § 257.104(d), the initial post closure care plan for the Hennepin West Ash Pond System was prepared on October 17, 2016. That plan is being amended pursuant to 40 C.F.R. § 257.104(d)(3)(i). This plan also serves as the initial post-closure care plan, prepared in accordance with 35 I.A.C. 845.780(d).</p> <p>Pursuant to § 257.104(d)(3) and 35 I.A.C. 845.780(d)(3), an operating permit modification application to amend the initial or any subsequent written post-closure care plan developed under 35 I.A.C. 845.780 (d)(1) and § 257.104(d)(1) will be submitted to IEPA. The written post-closure care plan will be amended whenever there is a change in the operation of the CCR surface impoundment that would substantially affect the written post-closure care plan in effect; or unanticipated events necessitate a revision of the written post-closure care plan, after post-closure activities have started.</p> <p>The written post-closure care plan will be amended at least 60 days before a planned change in the operation of the facility or CCR surface impoundment, or within 60 days after an unanticipated event requires the need to revise the existing plan. If the plan is revised after post-closure activities have started, a request to modify the operating permit, including an amended written post-closure care plan, will be submitted to the IEPA within 30 days following the triggering event.</p>
<p>40 C.F.R. § 257.104(d)(4) and 35 I.A.C. 845.780(d)(4) – Qualified professional engineering certification.</p>	<p>Certification by a qualified professional engineer will be appended to this plan and any amendment of this plan.</p>
<p>35 I.A.C. 845.780(e) – Termination of post-closure care</p>	<p>Upon completion of the post-closure period, a request to terminate post-closure care will be submitted to the IEPA. The request will include a certification by a qualified professional engineer verifying that post-closure care has been completed in accordance with the post-closure care plan specified in 35 I.A.C. 845.780(d) and the requirements of 35 I.A.C. 845.780.</p>
<p>40 C.F.R. § 257.104(e) and 35 I.A.C. 845.780(f) – Notification of completion of the post-closure care period.</p>	<p>A notification of completion of post-closure care will be prepared and placed in the facility’s operating record within 30 days after IEPA approval of the request to terminate post-closure care. The notification will be placed in the facility's operating record in accordance with 35 I.A.C. 845.800(d)(31) and § 257.105(i)(13).</p> <p>The notification will be placed on the owner or operator's publicly accessible CCR Internet site in accordance with the requirements of § 257.107(i)(13) and 35 I.A.C. 845.810(e). The IEPA will be notified when the notification has been placed in the operating record and on the owner or operator's publicly accessible Internet site in accordance with the requirements of § 257.106(i)(13).</p>

Certification Statement 40 CFR § 257.104 (d)(4) and 35 I.A.C. 845.780(d)(4) – Amended/Initial Written Post Closure Plan for a CCR Surface Impoundment

CCR Unit: Dynegy Midwest Generation, LLC; Hennepin Power Plant; West Ash Pond System

I, John R. Hesemann, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering I certify, for the above referenced CCR Unit, that the information contained in the amended/initial written post closure plan, dated October 30, 2021, meets the requirements of 40 C.F.R. § 257.104 and 35 I.A.C. 845.780.

John R. Hesemann
Printed Name

9/28/2021
Date



11/30/2021

ATTACHMENT M

HISTORY OF POTENTIAL EXCEEDANCES

This presentation of the History of Potential Exceedances, and any corrective action taken to remediate groundwater, is provided to meet the requirements of Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845.230(d)(3)(G) for the Hennepin Power Plant West Ash Pond System, Illinois Environmental Protection Agency (IEPA) ID Nos. W1550100002-01 and W1550100002-03.

Note

Groundwater concentrations observed from 2015 to 2021 in monitoring wells included in an existing groundwater monitoring program have been evaluated and summarized in the following tables. These concentrations are considered potential exceedances because the methodology used to determine them is proposed in the Statistical Analysis Plan (Appendix A to Groundwater Monitoring Plan [GMP]), which has not been reviewed or approved by IEPA at the time of submittal of the 35 I.A.C. § 845 Operating Permit application.

Alternate sources for potential exceedances as allowed by 35 I.A.C. § 845.650(e) have not yet been evaluated. These will be evaluated and presented in future submittals to IEPA as appropriate.

Table 1 summarizes how the potential exceedances were determined. Table 2 is a summary of all potential exceedances.

Background Concentrations

Background monitoring wells identified in the GMP include 32 and 34.

Background concentrations calculated from sampling events in 2015-2017 were compared to the standards identified in 35 I.A.C. § 845.600(a)(1). For constituents with calculated background concentrations in 2015-2017 greater than the standards in 35 I.A.C. § 845.600(a)(1), those calculated background concentrations were used as Groundwater Protection Standards (GWPSs) for comparing to statistical calculation results for each compliance well to determine potential exceedances. Compliance well statistical calculations consider concentrations from all sampling events in 2015-2021.

Corrective Action

A Corrective Measures Assessment (CMA) was completed to address statistically significant levels of total arsenic, total lithium, and total molybdenum, as required by 40 C.F.R. § 257.96. The CMA indicated the source control measure consists of closure in place with a geomembrane cover system in accordance with the Closure and Post Closure Care Plan submitted to the IEPA in January 2018 and approved on June 19, 2018. Closure construction began in August of 2019 and was completed in November of 2020.

Activities completed associated with the selection of a groundwater remedy include review of existing groundwater and source water data, and collection of additional samples to support analysis of natural attenuation mechanisms, rates, and aquifer capacity. Preliminary results indicate that site-specific conditions are favorable for implementation of monitored natural attenuation (MNA) in combination with the recently completed closure referenced above.

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
21/21R	UA	Antimony, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
21/21R	UA	Arsenic, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.00719	0.010	0.001	0.01	Standard
21/21R	UA	Barium, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.26	2.0	0.16	2	Standard
21/21R	UA	Beryllium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
21/21R	UA	Boron, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	2.8	2.0	0.20	2	Standard
21/21R	UA	Cadmium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
21/21R	UA	Chloride, total	mg/L	03/18/2015 - 06/23/2021	CB around linear reg	67	200	108	200	Standard
21/21R	UA	Chromium, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.001	0.10	0.0013	0.1	Standard
21/21R	UA	Cobalt, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.001	0.006	0.0017	0.006	Standard
21/21R	UA	Fluoride, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.14	4.0	0.17	4	Standard
21/21R	UA	Lead, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.001	0.0075	0.001	0.0075	Standard
21/21R	UA	Lithium, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.015	0.040	0.014	0.04	Standard
21/21R	UA	Mercury, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
21/21R	UA	Molybdenum, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.006	0.10	0.002	0.1	Standard
21/21R	UA	pH (field)	SU	03/18/2015 - 06/23/2021	CI around median	7.4	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
21/21R	UA	Radium-226 + Radium 228, tot	pCi/L	12/10/2015 - 06/23/2021	CI around mean	0.54	5.0	2.6	5	Standard
21/21R	UA	Selenium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
21/21R	UA	Sulfate, total	mg/L	03/18/2015 - 06/23/2021	CB around linear reg	56	400	117	400	Standard
21/21R	UA	Thallium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
21/21R	UA	Total Dissolved Solids	mg/L	03/18/2015 - 06/23/2021	CI around median	542	1200	830	1200	Standard
22	UA	Antimony, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.001	0.006	0.001	0.006	Standard
22	UA	Arsenic, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.001	0.010	0.001	0.01	Standard
22	UA	Barium, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.066	2.0	0.16	2	Standard
22	UA	Beryllium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
22	UA	Boron, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	3.3	2.0	0.20	2	Standard
22	UA	Cadmium, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.00586	0.005	0.001	0.005	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
22	UA	Chloride, total	mg/L	03/18/2015 - 06/23/2021	CB around linear reg	86	200	108	200	Standard
22	UA	Chromium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.0015	0.10	0.0013	0.1	Standard
22	UA	Cobalt, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.00231	0.006	0.0017	0.006	Standard
22	UA	Fluoride, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.14	4.0	0.17	4	Standard
22	UA	Lead, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.0075	0.001	0.0075	Standard
22	UA	Lithium, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.054	0.040	0.014	0.04	Standard
22	UA	Mercury, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
22	UA	Molybdenum, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.103	0.10	0.002	0.1	Standard
22	UA	pH (field)	SU	03/18/2015 - 06/23/2021	CI around mean	7.6	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
22	UA	Radium-226 + Radium 228, tot	pCi/L	12/10/2015 - 06/23/2021	CI around mean	0.29	5.0	2.6	5	Standard
22	UA	Selenium, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.012	0.050	0.0011	0.05	Standard
22	UA	Sulfate, total	mg/L	03/18/2015 - 06/23/2021	CB around linear reg	143	400	117	400	Standard
22	UA	Thallium, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.002	0.002	0.001	0.002	Standard
22	UA	Total Dissolved Solids	mg/L	03/18/2015 - 06/23/2021	CI around mean	677	1200	830	1200	Standard
22D	UA	Antimony, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
22D	UA	Arsenic, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	0.00116	0.010	0.001	0.01	Standard
22D	UA	Barium, total	mg/L	09/17/2019 - 06/23/2021	CB around T-S line	0.066	2.0	0.16	2	Standard
22D	UA	Beryllium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
22D	UA	Boron, total	mg/L	09/17/2019 - 06/23/2021	CB around linear reg	1.4	2.0	0.20	2	Standard
22D	UA	Cadmium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
22D	UA	Chloride, total	mg/L	09/17/2019 - 06/23/2021	CB around linear reg	93	200	108	200	Standard
22D	UA	Chromium, total	mg/L	09/17/2019 - 06/23/2021	CI around median	0.0015	0.10	0.0013	0.1	Standard
22D	UA	Cobalt, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.006	0.0017	0.006	Standard
22D	UA	Fluoride, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	0.11	4.0	0.17	4	Standard
22D	UA	Lead, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.0075	0.001	0.0075	Standard
22D	UA	Lithium, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	0.015	0.040	0.014	0.04	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
22D	UA	Mercury, total	mg/L	12/11/2019 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
22D	UA	Molybdenum, total	mg/L	09/17/2019 - 06/23/2021	CI around median	0.007	0.10	0.002	0.1	Standard
22D	UA	pH (field)	SU	09/17/2019 - 06/23/2021	CI around mean	7.2	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
22D	UA	Radium-226 + Radium 228, tot	pCi/L	09/17/2019 - 06/23/2021	CI around mean	0.20	5.0	2.6	5	Standard
22D	UA	Selenium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
22D	UA	Sulfate, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	103	400	117	400	Standard
22D	UA	Thallium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
22D	UA	Total Dissolved Solids	mg/L	09/17/2019 - 06/23/2021	CI around mean	580	1200	830	1200	Standard
23	UA	Antimony, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
23	UA	Arsenic, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
23	UA	Barium, total	mg/L	12/10/2015 - 06/24/2021	CI around median	0.032	2.0	0.16	2	Standard
23	UA	Beryllium, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
23	UA	Boron, total	mg/L	12/10/2015 - 06/24/2021	CI around mean	7.8	2.0	0.20	2	Standard
23	UA	Cadmium, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
23	UA	Chloride, total	mg/L	03/18/2015 - 06/24/2021	CI around mean	59	200	108	200	Standard
23	UA	Chromium, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.0015	0.10	0.0013	0.1	Standard
23	UA	Cobalt, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.006	0.0017	0.006	Standard
23	UA	Fluoride, total	mg/L	12/10/2015 - 06/24/2021	CI around median	0.15	4.0	0.17	4	Standard
23	UA	Lead, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.0075	0.001	0.0075	Standard
23	UA	Lithium, total	mg/L	12/10/2015 - 06/24/2021	CI around mean	0.00465	0.040	0.014	0.04	Standard
23	UA	Mercury, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
23	UA	Molybdenum, total	mg/L	12/10/2015 - 06/24/2021	CI around median	0.014	0.10	0.002	0.1	Standard
23	UA	pH (field)	SU	03/18/2015 - 06/24/2021	CI around mean	7.4	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
23	UA	Radium-226 + Radium 228, tot	pCi/L	12/10/2015 - 06/24/2021	CI around mean	0.18	5.0	2.6	5	Standard
23	UA	Selenium, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
23	UA	Sulfate, total	mg/L	03/18/2015 - 06/24/2021	CI around mean	419	400	117	400	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
23	UA	Thallium, total	mg/L	12/10/2015 - 06/24/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
23	UA	Total Dissolved Solids	mg/L	03/18/2015 - 06/24/2021	CI around mean	888	1200	830	1200	Standard
24/51	UA	Antimony, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
24/51	UA	Arsenic, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.020	0.010	0.001	0.01	Standard
24/51	UA	Barium, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.10	2.0	0.16	2	Standard
24/51	UA	Beryllium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
24/51	UA	Boron, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	2.0	2.0	0.20	2	Standard
24/51	UA	Cadmium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
24/51	UA	Chloride, total	mg/L	03/18/2015 - 06/23/2021	CB around linear reg	98	200	108	200	Standard
24/51	UA	Chromium, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.00197	0.10	0.0013	0.1	Standard
24/51	UA	Cobalt, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.001	0.006	0.0017	0.006	Standard
24/51	UA	Fluoride, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.13	4.0	0.17	4	Standard
24/51	UA	Lead, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.001	0.0075	0.001	0.0075	Standard
24/51	UA	Lithium, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.022	0.040	0.014	0.04	Standard
24/51	UA	Mercury, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
24/51	UA	Molybdenum, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.010	0.10	0.002	0.1	Standard
24/51	UA	pH (field)	SU	03/18/2015 - 06/23/2021	CB around linear reg	7.2	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
24/51	UA	Radium-226 + Radium 228, tot	pCi/L	12/10/2015 - 06/23/2021	CI around mean	0.51	5.0	2.6	5	Standard
24/51	UA	Selenium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
24/51	UA	Sulfate, total	mg/L	03/18/2015 - 06/23/2021	CB around linear reg	96	400	117	400	Standard
24/51	UA	Thallium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
24/51	UA	Total Dissolved Solids	mg/L	03/18/2015 - 06/23/2021	CI around mean	611	1200	830	1200	Standard
27	UA	Antimony, total	mg/L	09/12/2018 - 06/24/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
27	UA	Arsenic, total	mg/L	09/12/2018 - 06/24/2021	CI around median	0.001	0.010	0.001	0.01	Standard
27	UA	Barium, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	0.083	2.0	0.16	2	Standard
27	UA	Beryllium, total	mg/L	09/12/2018 - 06/24/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
27	UA	Boron, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	2.3	2.0	0.20	2	Standard
27	UA	Cadmium, total	mg/L	09/12/2018 - 06/24/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
27	UA	Chloride, total	mg/L	03/18/2015 - 06/24/2021	CB around linear reg	103	200	108	200	Standard
27	UA	Chromium, total	mg/L	09/12/2018 - 06/24/2021	CI around median	0.0015	0.10	0.0013	0.1	Standard
27	UA	Cobalt, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	0.00145	0.006	0.0017	0.006	Standard
27	UA	Fluoride, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	0.12	4.0	0.17	4	Standard
27	UA	Lead, total	mg/L	09/12/2018 - 06/24/2021	CI around median	0.001	0.0075	0.001	0.0075	Standard
27	UA	Lithium, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	0.022	0.040	0.014	0.04	Standard
27	UA	Mercury, total	mg/L	09/12/2018 - 06/24/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
27	UA	Molybdenum, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	0.004	0.10	0.002	0.1	Standard
27	UA	pH (field)	SU	03/18/2015 - 06/24/2021	CI around mean	7.2	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
27	UA	Radium-226 + Radium 228, tot	pCi/L	09/12/2018 - 06/24/2021	CI around mean	-0.0969	5.0	2.6	5	Standard
27	UA	Selenium, total	mg/L	09/12/2018 - 06/24/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
27	UA	Sulfate, total	mg/L	03/18/2015 - 06/24/2021	CB around linear reg	76	400	117	400	Standard
27	UA	Thallium, total	mg/L	09/12/2018 - 06/24/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
27	UA	Total Dissolved Solids	mg/L	03/18/2015 - 06/24/2021	CI around median	642	1200	830	1200	Standard
35	UA	Antimony, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
35	UA	Arsenic, total	mg/L	12/09/2015 - 06/23/2021	CI around median	0.001	0.010	0.001	0.01	Standard
35	UA	Barium, total	mg/L	12/09/2015 - 06/23/2021	CI around geomean	0.037	2.0	0.16	2	Standard
35	UA	Beryllium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
35	UA	Boron, total	mg/L	12/09/2015 - 06/23/2021	CB around linear reg	10	2.0	0.20	2	Standard
35	UA	Cadmium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.005	0.001	0.005	Standard
35	UA	Chloride, total	mg/L	12/09/2015 - 06/23/2021	CI around mean	41	200	108	200	Standard
35	UA	Chromium, total	mg/L	12/09/2015 - 06/23/2021	CB around T-S line	0.00138	0.10	0.0013	0.1	Standard
35	UA	Cobalt, total	mg/L	12/09/2015 - 06/23/2021	CB around T-S line	0.001	0.006	0.0017	0.006	Standard
35	UA	Fluoride, total	mg/L	12/09/2015 - 06/23/2021	CI around mean	0.18	4.0	0.17	4	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
35	UA	Lead, total	mg/L	12/09/2015 - 06/23/2021	CI around median	0.001	0.0075	0.001	0.0075	Standard
35	UA	Lithium, total	mg/L	12/09/2015 - 06/23/2021	CI around mean	0.025	0.040	0.014	0.04	Standard
35	UA	Mercury, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
35	UA	Molybdenum, total	mg/L	12/09/2015 - 06/23/2021	CI around mean	0.066	0.10	0.002	0.1	Standard
35	UA	pH (field)	SU	12/09/2015 - 06/23/2021	CI around mean	7.0	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
35	UA	Radium-226 + Radium 228, tot	pCi/L	12/09/2015 - 06/23/2021	CI around mean	0.34	5.0	2.6	5	Standard
35	UA	Selenium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
35	UA	Sulfate, total	mg/L	12/09/2015 - 06/23/2021	CB around linear reg	466	400	117	400	Standard
35	UA	Thallium, total	mg/L	12/09/2015 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
35	UA	Total Dissolved Solids	mg/L	12/09/2015 - 06/23/2021	CB around linear reg	1050	1200	830	1200	Standard
49	UA	Antimony, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
49	UA	Arsenic, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.001	0.010	0.001	0.01	Standard
49	UA	Barium, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.057	2.0	0.16	2	Standard
49	UA	Beryllium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
49	UA	Boron, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.56	2.0	0.20	2	Standard
49	UA	Cadmium, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.00164	0.005	0.001	0.005	Standard
49	UA	Chloride, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	97	200	108	200	Standard
49	UA	Chromium, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.001	0.10	0.0013	0.1	Standard
49	UA	Cobalt, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	0.00528	0.006	0.0017	0.006	Standard
49	UA	Fluoride, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.15	4.0	0.17	4	Standard
49	UA	Lead, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.0075	0.001	0.0075	Standard
49	UA	Lithium, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.025	0.040	0.014	0.04	Standard
49	UA	Mercury, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
49	UA	Molybdenum, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.030	0.10	0.002	0.1	Standard
49	UA	pH (field)	SU	12/10/2015 - 06/23/2021	CI around mean	7.1	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
49	UA	Radium-226 + Radium 228, tot	pCi/L	12/10/2015 - 06/23/2021	CI around mean	0.30	5.0	2.6	5	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
49	UA	Selenium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
49	UA	Sulfate, total	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	68	400	117	400	Standard
49	UA	Thallium, total	mg/L	12/10/2015 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
49	UA	Total Dissolved Solids	mg/L	12/10/2015 - 06/23/2021	CB around linear reg	585	1200	830	1200	Standard
50	UA	Antimony, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.006	0.001	0.006	Standard
50	UA	Arsenic, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.010	0.001	0.01	Standard
50	UA	Barium, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	0.085	2.0	0.16	2	Standard
50	UA	Beryllium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.004	0.001	0.004	Standard
50	UA	Boron, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	0.73	2.0	0.20	2	Standard
50	UA	Cadmium, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	0.0012	0.005	0.001	0.005	Standard
50	UA	Chloride, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	87	200	108	200	Standard
50	UA	Chromium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.0015	0.10	0.0013	0.1	Standard
50	UA	Cobalt, total	mg/L	09/17/2019 - 06/23/2021	CB around linear reg	0.00192	0.006	0.0017	0.006	Standard
50	UA	Fluoride, total	mg/L	09/17/2019 - 06/23/2021	CB around linear reg	0.11	4.0	0.17	4	Standard
50	UA	Lead, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.0075	0.001	0.0075	Standard
50	UA	Lithium, total	mg/L	09/17/2019 - 06/23/2021	CI around median	0.018	0.040	0.014	0.04	Standard
50	UA	Mercury, total	mg/L	12/11/2019 - 06/23/2021	All ND - Last	0.0002	0.002	0.0002	0.002	Standard
50	UA	Molybdenum, total	mg/L	09/17/2019 - 06/23/2021	CB around linear reg	0.038	0.10	0.002	0.1	Standard
50	UA	pH (field)	SU	09/17/2019 - 06/23/2021	CI around mean	7.1	6.5/9.0	6.8/7.4	6.5/9	Standard/Standard
50	UA	Radium-226 + Radium 228, tot	pCi/L	09/17/2019 - 06/23/2021	CI around mean	0.082	5.0	2.6	5	Standard
50	UA	Selenium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.001	0.050	0.0011	0.05	Standard
50	UA	Sulfate, total	mg/L	09/17/2019 - 06/23/2021	CI around mean	83	400	117	400	Standard
50	UA	Thallium, total	mg/L	09/17/2019 - 06/23/2021	All ND - Last	0.002	0.002	0.001	0.002	Standard
50	UA	Total Dissolved Solids	mg/L	09/17/2019 - 06/23/2021	CI around mean	614	1200	830	1200	Standard

TABLE 1. DETERMINATION OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
HENNEPIN POWER PLANT
WEST ASH POND SYSTEM
HENNEPIN, ILLINOIS

Notes:

Potential exceedance of GWPS

HSU = hydrostratigraphic unit:

UA = uppermost aquifer

mg/L = milligrams per liter

pCi/L = picocuries per liter

SU = standard units

Statistical Calculation = method used to calculate the statistical result:

All ND - Last = All results were below the reporting limit, and the last determined reporting limit is shown

CB around linear reg = Confidence band around linear regression

CB around T-S line = Confidence band around Thiel-Sen line

CI around geomean = Confidence interval around the geometric mean

CI around mean = Confidence interval around the mean

CI around median = Confidence interval around the median

Statistical Result = calculated in accordance with Statistical Analysis Plan using constituent concentrations observed at monitoring well during all sampling events within the specified date range

For pH, the values presented are the lower / upper limits

GWPS = Groundwater Protection Standard

GWPS Source:

Standard = standard specified in 35 I.A.C. § 845.600(a)(1)

Background = background concentration (see cover page for additional information)

TABLE 2. SUMMARY OF POTENTIAL EXCEEDANCES

HISTORY OF POTENTIAL EXCEEDANCES
 HENNEPIN POWER PLANT
 WEST ASH POND SYSTEM
 HENNEPIN, ILLINOIS

Sample Location	HSU	Constituent	Result Unit	Sample Date Range	Statistical Calculation	Statistical Result	GWPS	Background	Part 845 Standard	GWPS Source
21/21R	UA	Boron, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	2.8	2.0	0.20	2	Standard
22	UA	Boron, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	3.3	2.0	0.20	2	Standard
22	UA	Cadmium, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.00586	0.005	0.001	0.005	Standard
22	UA	Lithium, total	mg/L	12/10/2015 - 06/23/2021	CI around median	0.054	0.040	0.014	0.04	Standard
22	UA	Molybdenum, total	mg/L	12/10/2015 - 06/23/2021	CB around T-S line	0.103	0.10	0.002	0.1	Standard
23	UA	Boron, total	mg/L	12/10/2015 - 06/24/2021	CI around mean	7.8	2.0	0.20	2	Standard
23	UA	Sulfate, total	mg/L	03/18/2015 - 06/24/2021	CI around mean	419	400	117	400	Standard
24/51	UA	Arsenic, total	mg/L	12/10/2015 - 06/23/2021	CI around mean	0.020	0.010	0.001	0.01	Standard
27	UA	Boron, total	mg/L	09/12/2018 - 06/24/2021	CI around mean	2.3	2.0	0.20	2	Standard
35	UA	Boron, total	mg/L	12/09/2015 - 06/23/2021	CB around linear reg	10	2.0	0.20	2	Standard
35	UA	Sulfate, total	mg/L	12/09/2015 - 06/23/2021	CB around linear reg	466	400	117	400	Standard

Notes:

HSU = hydrostratigraphic unit:

UA = uppermost aquifer

mg/L = milligrams per liter

pCi/L = picocuries per liter

SU = standard units

Statistical Calculation = method used to calculate the statistical result:

CB around linear reg = Confidence band around linear regression

CB around T-S line = Confidence band around Thiel-Sen line

CI around mean = Confidence interval around the mean

CI around median = Confidence interval around the median

Statistical Result = calculated in accordance with Statistical Analysis Plan using constituent concentrations observed at monitoring well during all sampling events within the specified date range

For pH, the values presented are the lower / upper limits

GWPS = Groundwater Protection Standard

GWPS Source:

Standard = standard specified in 35 I.A.C. § 845.600(a)(1)

Background = background concentration (see cover page for additional information)

ATTACHMENT N

Certification of Financial Assurance Requirements

On June 17, 2021, Dynegy Midwest Generation, LLC provided financial assurance in the form of performance bonds to the Illinois Environmental Protection Agency in the amount of \$ 9,382,670 for the West Ash Pond System, East Ash Pond 2, East New Primary Pond, and East Pond 4 at the Hennepin Power Plant.¹

I, Matthew A. Goering, Senior Vice President of Dynegy Midwest Generation, LLC, do hereby certify to the best of my knowledge for the above referenced CCR Units that the financial assurance instruments satisfy the requirements of 35 I.A.C. Part 845, Subpart I.



Matthew A. Goering
Senior Vice President
Dynegy Midwest Generation, LLC

¹ In the operating permit applications, the West Ash Pond System is referred to as the Old West Ash Pond (Pond No. 1 and No. 3) and Old West Polishing Pond, the East Ash Pond 2 and East Pond 4 are referred to as Ash Ponds 2 & 4, and the East New Primary Pond is referred to as the East Ash Pond.

