HARD HAT SERVICES™
Engineering, Construction and Management Solutions

932 N. Wright Street, Suite 160, Naperville, IL 60563
Phone (877) 630-7428
www.hardhatinc.com

VIA EMAIL

October 30, 2020

Mr. Jeffrey Maxted
Alliant Energy – Environmental Services Manager
4902 North Biltmore Lane
Madison, WI 53718-2148

Re: Unstable Areas Determination CCR Surface Impoundments - §257.64
Interstate Power and Light Company (IPL)
Burlington Generating Station
Burlington, Iowa

Mr. Jeffrey Maxted,

This Unstable Areas Determination has been prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual (CCR) from Electric Utilities (40 CFR Parts 257 and 261, also known as the CCR Rule) published on April 17, 2015 (effective October 19, 2015) and subsequent amendments. This letter assesses the factors of four CCR units at Interstate Power and Light Company (IPL), Burlington Generating Station (BGS) in Burlington, Iowa in accordance with the CCR Rule §257.64 Unstable Areas. For purposes of this Report, "CCR unit" refers to an existing or inactive CCR surface impoundment.

Background Information

In accordance with the requirements set forth in §257.64 of the CCR Rule a CCR unit must not be located in an unstable area. The owner or operator must consider all the following factors:

- On-site or local soil conditions that may result in significant differential settling,
- On-site or local geologic or geomorphologic features; and,
- On-site or local human-made features or events (both surface and subsurface).

Facility Specific Information

BGS is located at 4282 Sullivan Slough Road, Burlington, Iowa 52601. Figure 1 provides both a topographic map and an aerial of the BGS facility location, with the approximate property

boundary of the facility identified. Figure 2 identifies each CCR Unit. BGS has four existing CCR surface impoundments, which are identified as follows:

- BGS Ash Seal Pond (existing)
- BGS Main Ash Pond (existing)
- BGS Economizer Ash Pond (existing)
- BGS Upper Ash Pond (existing)

Differential Settling

BGS is constructed on a natural levee deposit on the west bank of the Mississippi River at River Mile 399. Numerous soil borings were installed for construction activities at the plant in 1962 and in 2008 for construction of a proposed baghouse, Figure 2. The borings are presented in Exhibit A and indicate bedrock at elevation 450, very dense sand and gravel to elevation 470, and medium dense sand to elevation 510. Above 510 the plant area and BGS Ash Seal Pond have loose layers of silt and silty sand with compacted fill to bring the site grade to elevation 534.

In 2011, geoprobe borings, soil samples and cone penetrometer borings were collected for strength/density measurements for BGS Main Ash Pond, BGS Economizer Ash Pond, and BGS Upper Ash Pond. The sample locations are shown on Figure 2 with the geoprobe boring logs in Exhibit B and the cone penetrometer results in Exhibit C. Soil samples from the geoprobe borings were tested to determine water content, Atterberg limits, and grain size of the soils found above the medium dense sand layer at elevation 510. The laboratory test results are in Exhibit D.

The 2011 results located a natural clay layer below the embankments of the ash ponds with plastic index greater than 20% and natural water content greater than 25%. The soil is a low plasticity clay deposited during river flooding in the backwater areas west of the plant site. The natural clay layer is not susceptible to liquefaction or settlement from earthquakes originating on the Madrid fault system downriver from Burlington. The embankments of the BGS Main Ash Pond and the BGS Upper Ash Pond are constructed of clayey silt that was compacted over the natural clay deposit. From an interview with a long-time staff member at the facility, it is understood that the clay borrow site was a rock quarry just west of BGS. The surface soil in the Burlington Iowa area is loess with a glacial till found between the loess and limestone bedrock. The observed properties of the clay embankments confirm that loess is the likely source soil. In the BGS Economizer Pond, the imported clayey silt is found in the embankments constructed to raise the BGS Economizer Pond above the BGS Upper Ash Pond on the south, east, and west sides and on the western half of the north side. However, the eastern half of the north side embankment contains no imported clay and is CCR constructed on top of CCR in the BGS Upper Ash Pond.

The CPT data results for clay layers are assigned an undrained shear strength (cohesion) based on the procedure recommended by Robertson[1]. The undrained shear strength is:

$$Su = (qc - \alpha 0) / Nk$$

[1] Robertson, P.K. and Campanella, R.G., 1986, "Guidelines for Use, Interpretation and Application of the CPT and CPTU, "UBC, Soil Mechanics Series No. 105, Civil Engineering Department, Vancouver BC, V6T 1W5

Where: Su = undrained shear strength
qc = cone penetration pressure
α0 = total vertical overburden stress
Nk = a constant varying from 11 to 19 (15 recommended for normally consolidated clay)

The friction angle for cohesionless soil is related to the cone penetration value empirically as a variation on effective confining stress. The method is shown in Robertson and on Figure 19.5 of Terzaghi[2]. The figure from Terzaghi is included in Exhibit C.

The results indicate the native clay cohesion ranges from 600 to 1,200 pounds per square foot (psf). For the CCR, friction angle ranges from 30 to 34 degrees and for the imported clayey silt embankment soil the cohesion ranges from 700 to 1,950 psf.

Based on the known geotechnical information, BGS impoundments are not susceptible to significant differential settlement. Additionally, annual inspections of the embankments for the last 4 years have indicated no observable areas of differential settlement on the embankments.

Geologic and Geomorphologic Features

The Bedrock Geologic Map of Iowa (Exhibit E) shows that the site contains two types of bedrock formations including the Kinderhookian and the Famennian Formations. The formations are comprised of dolomite, limestone, shale, and siltstone. The Bedrock Topography of Southeast Iowa by Robert. E Hansen from 1973 shows that the elevation of the bedrock in the general area of the facility varies between 450 and 500 feet, which has been confirmed from the borings in Exhibit A.

While there are karst formations known to exist in Iowa, they are predominately in the northeast part of the state, see Exhibit F. Additionally, an Iowa Department of Natural Resources map of known and potential karst terrain and/or paleosinks (sinkholes) near BGS has also been included in Exhibit F. This map shows that the BGS is located just outside of an area potentially susceptible to karst formations. Additionally, this map confirms that there are no known or historical paleosinks on BGS property.

Several figures and tables have been included in Exhibit G which have been provided by SCS Engineers. These figures show that the local groundwater direction is generally east toward the Mississippi River. Additionally, the nested well water elevation data for MW-302, MW-307, MW-310, and MW-313 suggests that there is little to no downward gradient. Additionally, water recharging this area is likely at or above a pH of 7. As result, there is little risk for the formation of paleosinks.

[2] Terzaghi, Karl, Ralph Peck and Gholamreza Mesri, "Soil Mechanics in Engineering Practice", Third Edition, John Wiley and Sons, 1996.

Human-made Features or Events

Generally, man-made risks to the stability of CCR impoundments can include such events as: large dam failure, failure due to improper cut and fill during construction, excessive drawdown of groundwater, extreme fluctuations in flooding from human-made changes, or failure due to underground mining.

The most significant risk of an anthropogenic event at the BGS is from extreme flooding of the Mississippi River, which has the greatest potential to affect he BGS Ash Seal Pond. In 2017, armor stone was placed along the condenser discharge channel. This work was designed and constructed to protect against extreme flooding events. Based on the information provided herein, the BGS Ash Seal Pond, BGS Main Ash Pond, BGS Economizer Pond and BGS Upper Ash Pond are not susceptible to anthropogenic activities.

Unstable Areas Determination

After review of the reasonably and readily available documentation, we determine that the following CCR Units are not located in unstable areas:

- BGS Ash Seal Pond
- BGS Main Ash Pond
- BGS Economizer Pond
- BGS Upper Ash Pond

Qualified Professional Engineer Certification

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer attesting that the documentation as to whether a CCR unit meets the requirements 40 CFR 257.64(b).

To meet the requirements of 40 CFR 257.64(c), I Mark W. Loerop hereby certify that I am a licensed Professional Engineer in the State of Iowa; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.64.

By: _____

Name: MARK LOEROP

Date: Oct 30, 2020

cc: Tony Morse, Alliant Energy
Robert Solak, Hard Hat Services

att: Figure 1 – Site Location
Figure 2 – Soil Boring Locations
Exhibit A – Deep Soil Borings
Exhibit B – Geoprobe Borings
Exhibit C – CPT Soil Probes
Exhibit D – Laboratory Testing
Exhibit E – Bedrock Maps
Exhibit F – Karst Formation Maps
Exhibit G – Groundwater Information Provided by SCS Engineers

MWL/tjh/MWL
Z:\Shared\Projects\154 - Alliant Energy\154.018 - CCR Projects\023 - 2020 LAN and BGS UCD\001 - BGS UAD\Unstable Area Determination\BGS Unstable Areas - FINAL.doc

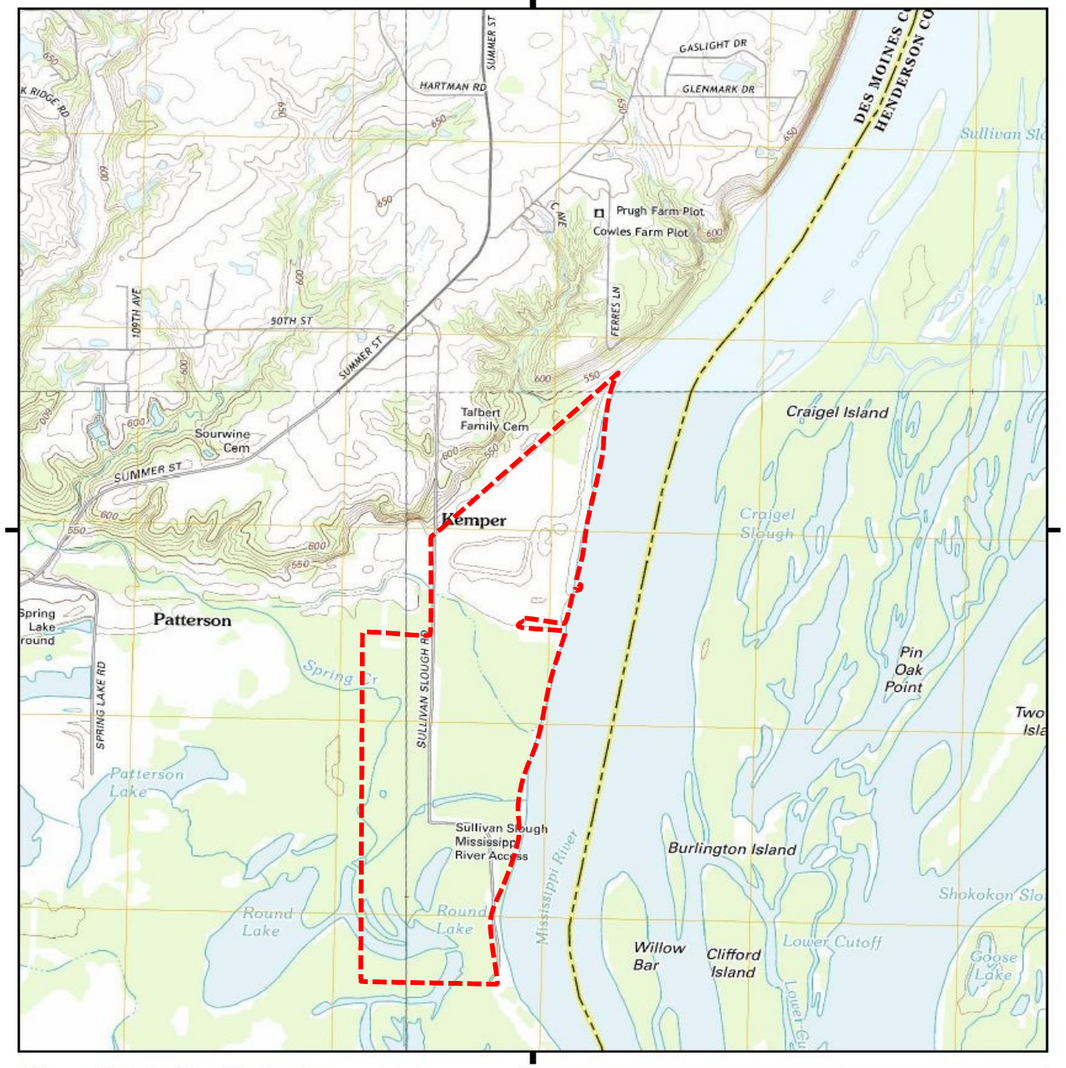
FIGURES

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination
- Figure 1 – Site Location
- Figure 2 – Soil Boring Locations

Historical Topo Map

2012, 2013



This report includes information from the following map sheet(s).

Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

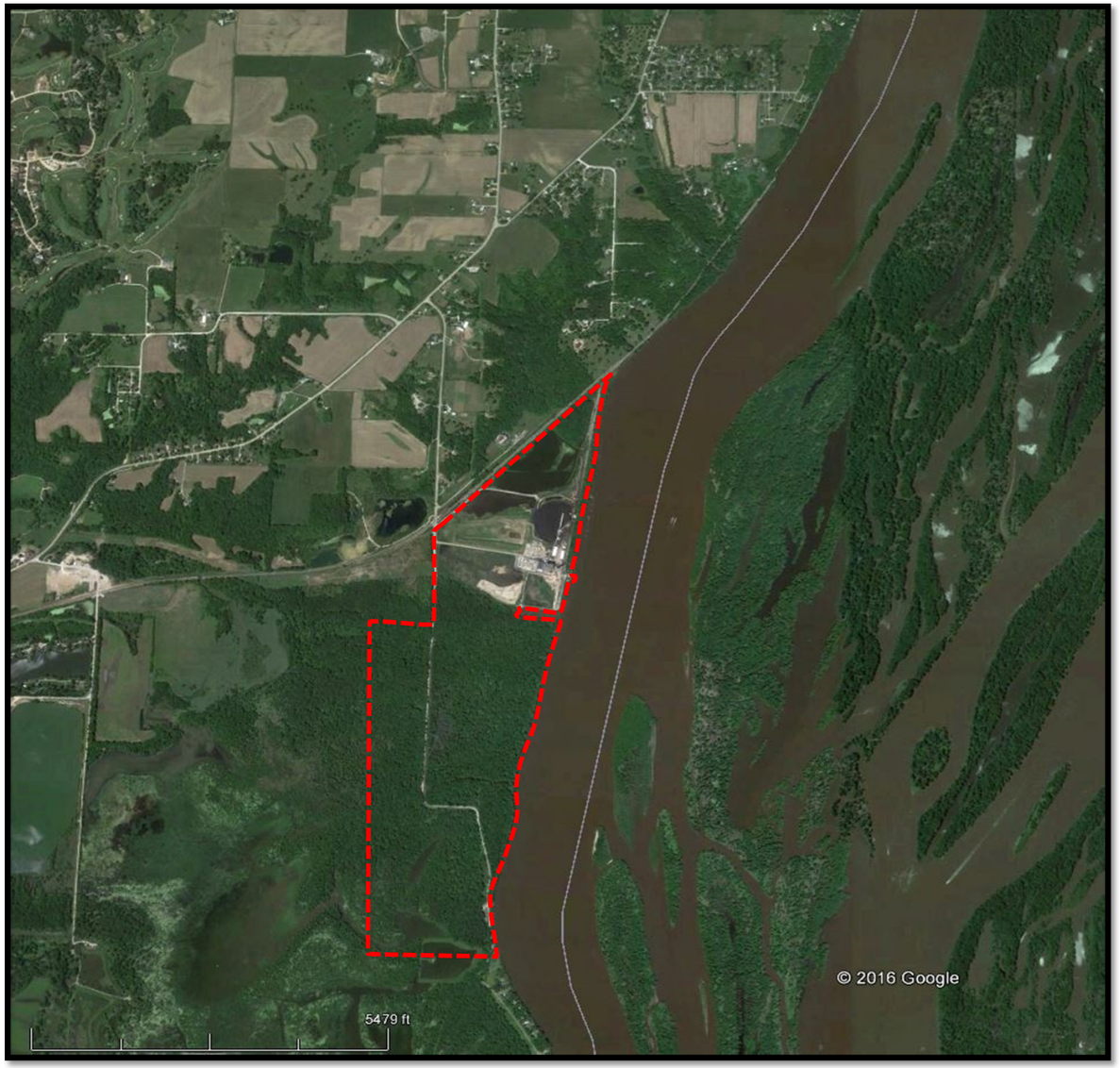
TP, Lomax, 2012, 7.5-minute
NE, Burlington, 2013, 7.5-minute
SW, Dallas City, 2012, 7.5-minute
NW, West Burlington, 2013, 7.5-minute

SITE NAME: Burlington Generating Station
ADDRESS: 4282 Sullivan Slough Road
Burlington, IA 52601
CLIENT: Environmental Site Assessors

N

4555570 - 3 page 4

Historical Aerial Photo 6/12/2014



Approximate Property Boundary

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

Site Location
Burlington Generating Station
Intersate Power and Light Company

Drawing
Figure 1

Date
5/25/2016

LEGEND:

- APPROXIMATE CONE PENETROMETER TEST (CPT) LOCATION
- APPROXIMATE SOIL BORING (SB) LOCATION
- APPROXIMATE SOIL BORING (SB) LOCATION (SAMPLE COLLECTED)
- 2008 SOIL BORINGS BY RDnP DRILLING
- 1962 SOIL BORINGS BY RAYMOND CONCRETE PILE COMPANY
- SLOPE STABILITY ANALYSIS CROSS SECTION LOCATION

SOURCE:
2008 TOPOGRAPHY WITH 2011 TOPOGRAPHY FOR ECONOMIZER POND.

BGS MAIN ASH POND
BGS ECONOMIZER POND
BGS UPPER ASH POND
LOWER POND
BGS ASH SEAL POND
BOTTOM ASH HANDLING POND
WEST POND
PLANT AREA
COAL PILE
E-W BASELINE
ROAD
BURLINGTON NORTHERN & SANTA FE RAILROAD
Mississippi River

N

SCALE
300 0 300 FEET

REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

SCALE: AS SHOWN | DATE: 5-13-16
DRAWN BY: JFD | CHECKED BY: TJH | APPROVED BY: MWL

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

CLIENT / LOCATION
ALLIANT ENERGY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

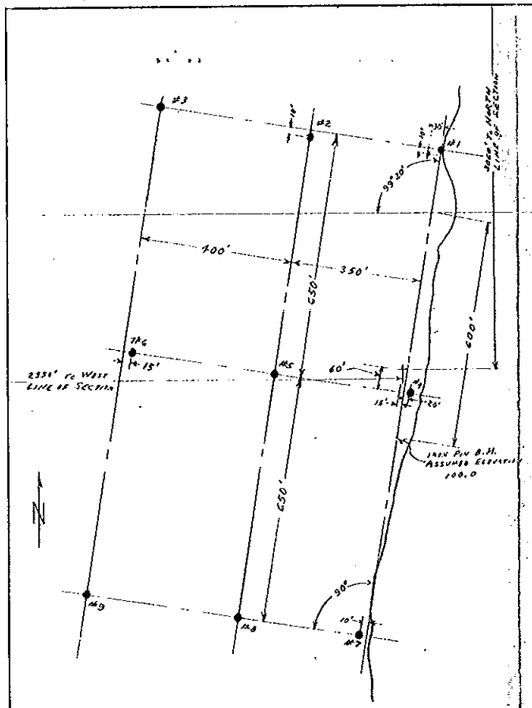
DRAWING DESCRIPTION
SOIL BORINGS, CPT, AND SLOPE STABILITY CROSS SECTION LOCATIONS

JOB 154.018.012.001
SHT. FIGURE 2
DWG. 154.018.012.001-D2

EXHIBIT A – DEEP SOIL BORINGS

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination



No. 1

Ground Surface — Elev. 99.8

Brown and Grey Silt and Clay	11		3'0"
Brown Silty Fine Sand	10		
	2		8'0"
Brown & Grey Silty Clay	4		11'0"
Grey Fine And Medium Sand	8		
	4		22'0"
Grey Fine And Medium To Coarse Sand Trace Small Gravel	4		
	3		33'0"
Same	13		
More	11		
	16		98'0"
Grey Fine To Medium Sand	3		
	3		33'6"
Brown Fine Medium To Coarse Sand	6		
	11		65'0"
Brown Fine Medium And Coarse Sand Trace Small Gravel	11		
	35		68'0"
Brown Dense Fine To Medium Sand	35		12'6"
Brown Coarse Sand Trace Fine To Medium Sand	11		
	17		92'6"
Brown Compact Fine Medium To Coarse Sand Trace Small Gravel	34		84'6"
Compact Silt With Small Gravel	52		88'0"
Same	100		
More			
Dense	100/0		96'10"

Used 86' of 2-1/2" Casing

Water Level 4' on Completion

1/25/62

No. 2

Ground Surface — Elev. 99.7

Grey Silty Clay	3		0'0"
	2		
	2		
	2		12'0"
Grey Fine Medium To Coarse Sand	8		17'0"
Grey Fine Sand	6		23'6"
Grey Fine Medium To Coarse Sand Trace Small Gravel	3		
	6		
	9		
	9		42'6"
Grey Fine To Medium Sand	12		48'0"
Grey Fine Sand	16		
	9		55'0"
Brown Fine Medium To Coarse Sand Trace Small Gravel	9		
	8		
Same More Dense	15		70'0"
	73		74'6"
Grey Compact Silty Fine Sand With Small Seams Of Fine Sand	100/11		
	102		86'0"

Used 88' of 2-1/2" Casing

Water Level 2' on Completion

1/27/62

No. 3

Ground Surface — Elev. 98.4

Brown Silty Clay	3		3'0"
	4		7'0"
Grey And Brown Soft Fine Sand	4		8'0"
Brown Silty Fine Sand	11		13'0"
Grey And Brown Fine Medium To Coarse Sand Trace Small Gravel	6		17'0"
Brown Fine Medium To Coarse Sand Trace Small Gravel	9		
	6		21'6"
Brown Silty Fine Sand	11		33'0"
Brown Fine Medium To Coarse Sand	6		
	6		43'6"
Brown Fine To Medium Sand	3		46'0"
Brown Fine To Medium Sand	7		
	15		
	20		
	41		68'0"
Brown And Grey Compact Silty Fine Medium To Coarse Sand Trace Small Gravel	110		79'0"
Grey Compact Silty Fine To Medium Sand	100		
	100/8		80'2"

Used 78' of 2-1/2" Casing

Water Level 3' on Completion

1/31/62

No. 4

Ground Surface — Elev. 99.1

Silt	2		2'0"
Fine Grey Sand Some Silt	2		
	5		Sandy Silt 3'6"
Coarse Br. Sand Some Silt To Medium Gravel	22		13'0"
Fine	5		
	15		
To	16		
	13		
Coarse	16		
Grey	14		
	13		
	15		
Sand	17		
	18		
	13		61'0"
Fine Grey Sand	23		
Fine to Coarse Gr. Sand Some Fine Gravel	91/6		72'6"

Used 73' of 2-1/2" Casing

Water Level 7' on Completion

1/10/62

No. 5

Ground Surface — Elev. 98.7

Grey Silty Clay	5		0'0"
	6		
	1		
	3		11'6"
Grey Fine And Medium To Coarse Sand	10		
	3		
	6		
	5		
Sand Trace Small Gravel	19		
	13		
	6		43'6"
Grey Silty Fine Sand	7		53'0"
Grey Fine To Medium Sand Trace Small Gravel	5		
	11		
	13		
	14		
Grey Compact Silt And Fine Sand	48		75'5"
Grey Compact Silty Fine To Medium Sand Trace Clay Trace Small Gravel	97		77'6"
			85'0"
Grey Compact Fine To Medium Sand Trace Clay	55		90'0"
Gray Compact Fine To Medium Sand Trace Coarse Sand & Gravel	100/11		
	100/0		103'2"

Used 93'6" of 2-1/2" Casing

Water Level 3' Below Ground Surface

1/15/62

No. 6

Ground Surface — Elev. 97.4

Grey Silty Clay	2		0'0"
	2		
	2		
	2		10'6"
Grey Fine To Coarse Sand	5		
	5		
	11		
	10		
Sand Trace Small Gravel	2		
	5		
	6		52'0"
Grey Fine Medium To Coarse Sand	10		58'0"
Grey Fine Medium To Coarse Sand Trace Small Gravel	8		
	5		69'0"
Grey Fine Medium To Coarse Sand Trace Limestone Fragments	50		74'6"
Compact Silt With Some Sand	70		78'0"
Grey Compact Silty Fine Sand Trace Medium Sand	100/10		80'11"

Used 75' of 2-1/2" Casing

Water Level 3' Below Ground Surface

1/22/62

No. 7

Ground Surface — Elev. 100.4

Brown Silty Trace Clay	5		0'0"
	6		6'0"
Grey Silty Clay	4		9'0"
Brown Silty Fine And Medium Sand	17		13'0"
Brown Silty Fine Sand	11		17'0"
Grey Fine To Medium Sand Trace Clay	9		
	15		
	3		33'0"
Grey Silty Fine Sand Trace Mica	8		37'0"
Grey Silty Fine Medium & Coarse Sand	11		43'6"
Grey And Brown Fine To Coarse Sand	11		
	8		
	5		
Sand Trace Small Gravel	4		
	13		
	15		63'6"
Grey Compact Silty Fine Medium And Coarse Sand Trace Small Gravel, Trace Clay	31		75'6"
Same Trace Dense	100/11		80'0"
See Note A	91		82'0"

Used 78' of 2-1/2" Casing

Used 82' of 70' Casing

Water Level 1'6" Below Ground Surface

Note A — Grey Compact Fine To Medium Sand Trace Coarse Sand & Silt

2/1/62

No. 8

Ground Surface — Elev. 98.1

Brown Silty Clay	3		0'0"
	3		3'0"
Gray & Brown Silty Clay	2		
	2		7'0"
Brown Fine Medium And Coarse Sand	11		12'0"
Brown & Grey Fine To Coarse Medium Sand Trace Silt	3		17'6"
Grey Fine To Coarse Sand Trace Silt	8		
	6		
	3		
	3		
	6		37'0"
Grey Fine To Medium Sand, Trace Coarse Sand	4		43'0"
Grey Fine Sand	10		
	6		
	6		
	9		69'0"
Grey Compact Fine Sand And Silt Fa. Medium Gravel	100/9		68'0"
Grey Compact Fine Sand	65		70'6"
Grey Compact Fine Sand And Silt Trace Medium To Coarse Sand	100/9		75'0"

Used 75' of 70' Casing

Used 70' of 2-1/2" Casing

Water Level 3'6" Below Ground Surface

2/2/62

No. 9

Ground Surface — Elev. 98.1

Brown Silty Clay	2		0'0"
	2		7'6"
Bk. Str. If Sand	2		8'6"
Sand More Dense	8		
	9		17'6"
Grey Silty Fine To Medium Sand Trace Mica	2		
	3		23'0"
Grey Silty Fine Sand, Trace Medium Sd. & Dec. Wood	5		33'0"
Grey Fine Medium To Coarse Sand Fa. Sm. Gravel	5		38'0"
Grey Fine And Medium Sand	9		42'0"
Grey Fine To Medium Sand	6		48'0"
Grey Fine Medium To Coarse Sand Fa. Sm. Gravel	3		53'0"
Same	11		
More	24		
Dense	26		67'0"
Grey Compact Medium To Coarse Sand Trace Small Gravel	100/6		73'10"

Used 73'10" of 70' Casing

Used 10' of 2-1/2" Casing

Water Level 2'6" Below Ground Surface

2/5/62

Figures in right hand column shown as fractions — Numerator = No. of Blows / Denominator = Penetration in Inches

† Indicates Wash Sample Recovered

Classifications are made by visual inspection. Figures in right hand column indicate number of blows required to drive 2" O.D. sampling pipe one foot, using 140-lb. weight falling 30 inches.

References:
See D-467 For Boring Locations.
Test Boring Report - February 13, 1962, By Raymond Concrete Pile Company, Soil Division, Job No. CB-948-KC Sheets 1 through 4

			IOWA SOUTHERN UTILITIES CO. CENTERVILLE, IOWA
			Proposed Burlington Plant Site Test Boring Reports
			SCALE 1"=8' VERTICAL DATE 3-15-62
			SKETCH DRAWN BY TRCD LL CHKD
			D-484 APPROVED

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-2**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.13
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/11/2008 FINISH 12/12/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
													CL	Frozen ground
	SS-1	2.0	4.0	2	3	4	4	14.0		0.75	4'3"	529.88		Black and brown mottled SILTY CLAY, little fine to medium sand, medium plasticity, medium stiff, wet
5	SS-2	4.0	6.0	1	6	5	3	17.0					ML	Grey SILT, trace fine sand, medium dense, moist
	SS-3	6.0	8.0	1	8	15	7	17.5						medium dense
	SS-4	8.0	10.0	1	6	50/5		18.0						very dense
10														
	SS-5	13.0	15.0	1	1	1	1	13.0	49	0.75	13'5"	520.71	CH	Dark brown and black mottled CLAY, trace silt, high plasticity, medium stiff, wet
15														
	SS-6	18.0	20.0	2	2	3	3	15.0	48	0.25 0.50				soft (LL=52, PI=27)
20														
	SS-7	23.0	25.0	4	5	7	12	20.0			23'6"	510.63	SP	Brown fine to medium SAND, medium dense, wet
25														
	SS-8	28.0	30.0	3	12	17	18	9.0						brownish-grey
30														
	SS-9	33.0	35.0	8	10	11	12	11.5						
35														
	SS-10	38.0	40.0	7	7	10	12	10.0						some coarse sand and wood pieces
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-2**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.13
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/11/2008 FINISH 12/12/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Brownish-grey fine to medium sand, some coarse sand, medium dense, wet (cont.)
	SS-11	43.0	45.0	3	6	12	14	15.5					SP	2" of black silt at 44'1"
45											46'6"	487.63		
	SS-12	48.0	50.0	6	7	8	12	16.0						Brownish-grey fine to coarse SAND, medium dense, wet
50														
	SS-13	53.0	55.0	10	11	12	19	21.0					SW	
55														
	SS-14	58.0	60.0	15	22	32	42	24.0						medium to coarse sand, trace fine sand and fine gravel, very dense
60											60'	474.13		EOB 60' - Sand was causing hole to collapse and would have needed to be cased to 60' to continue.
65														
70														
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

BORING LOG

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

PROJECT No. 154.002.008.001
BORING No. BH-B-1 **(BH-3)**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
DRILLER RDnP Drilling - Chris DATE: START 7/15/2008 FINISH 7/21/2008

DEPTH	SAMPLE No.	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	USCS SOIL TYPE	SOIL DESCRIPTION
	SS-1	0.0	2.0	5	10	10	12	12	23	2.0		FILL	Brown and black silty clay FILL, medium dense, dry
	SS-2	2.0	4.0	10	11	11	15	9.5		4.0			Coarse sand and fine gravel FILL, trace grey fines, medium dense, dry
5	SS-3	4.0	6.0	5	10	2	2	10	14				some silt
	SS-4	6.0	8.0	1	10	16	12	22		6.0			Grey-black sand and gravel FILL with silt, medium dense wet.
	SS-5	8.0	10.0	6	10	22	32	24	24		10.0		
10	SS-6	10.0	12.0	3	8	3	2	14					Grey sandy SILT, trace coarse sand, loose, saturated
	SS-7	12.0	14.0	1	0	1	0	18	50				Grey SILT, little fine sand, very loose, saturated
15	SS-8	14.0	16.0	Rod Weight				17				ML	
	SS-9	18.0	20.0	1	1	1	1	16	33				trace low plasticity clay, trace fine sand
20											22'6"		
	SS-10	23.0	25.0	1	2	2	1	18				CL	Dark grey SILTY CLAY, trace fine sand, medium to high plasticity, soft, wet
25											26.5		
	SS-11	28.0	30.0	1	0	0	0	3	18				Grey fine to medium grained SAND, trace coarse sand, very loose, saturated
30													
	SS-12	33.0	35.0	5	8	12	14	11				SP	medium dense
35													
	SS-13	38.0	40.0	8	10	11	12	11	13				
40													

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

BORING LOG

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

PROJECT No. 154.002.008.001
BORING No. BH-B-1 **(BH-3)**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa
DRILLER RDnP Drilling - Chris DATE: START 7/15/2008 FINISH 7/21/2008

DEPTH	SAMPLE No.	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0"-6"	6"-12"	12"-18"	18"-24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	USCS SOIL TYPE	SOIL DESCRIPTION
													Grey fine to medium SAND, trace coarse sand, medium dense, saturated
	SS-14	43.0	45.0	5	10	14	22	11					
45													
	SS-15	48.0	50.0	9	14	16	16	12	15				
50													
	SS-16	53.0	55.0	8	12	14	15	11				SP	
55													
	SS-17	58.0	60.0	10	11	18	24	10	13				several pieces of coarse grained gravel at 58.5'
60													
	SS-18	63.0	65.0	15	24	26	36	10					dense
65											66.5		
	SS-19	68.0	70.0	32	32	38		12	9				Grey fine to coarse SAND and fine grained gravel, very dense, saturated
70												SW	
	SS-20	73.0	75.0	32	75/3			4					
75											76.5		
	SS-21	78.0	80.0	50	100/3			4	8		79.5	GP	Fine GRAVEL with fine to coarse sand, very dense, saturated Spoon bounced at 79.5'
80													EOB at 80'

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-4**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.43
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/2/2008 FINISH 12/3/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNTS 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	3	4	5	15	16.0					FILL	Black and brown silty clay FILL, some fine sand, dry
5	SS-2	4.0	6.0	9	8	11	12	17.0						Black and brown fine to coarse sand and fine gravel FILL, trace fines, wet
	SS-3	6.0	8.0	10	5	12	15	20.0			6'6"	527.93		
	SS-4	8.0	10.0	2	2	3	20	24.0					ML	Grey SILT, little fine sand, medium dense, saturated loose 4" fine sand seam at 9'6"
10											11'6"	522.93		
	SS-5	13.0	15.0	2	2	3	4	14.0	50	2.00			CL	Grey SILTY-CLAY, trace fine sand, medium plasticity, soft, moist to wet
15														
	SS-6	18.0	20.0	7	9	8	11	15.0			18'4"	516.10		
20														Grey-brown fine to coarse SAND, medium dense, wet
	SS-7	23.0	25.0	10	11	15	15	12.0	18					
25													SP	
	SS-8	28.0	30.0	6	10	12	14	11.0						
30														
	SS-9	33.0	35.0	6	7	9	11	11.0	19					trace fine gravel
35											36'6"	497.93		
	SS-10	38.0	40.0	7	9	7	10	10.0					SW	Brown fine to coarse SAND, little fine gravel, trace silt, medium dense, wet
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-4**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.43
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/2/2008 FINISH 12/3/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														(cont.) Brown fine to coarse SAND, little fine gravel, medium dense, wet
	SS-11	43.0	45.0	5	6	6	8	11.0	14					
45														
	SS-12	48.0	50.0	12	12	16	19	10.0						
50														
	SS-13	53.0	55.0	8	9	11	14	12.0	13				SW	
55														
	SS-14	58.0	60.0	10	8	10	13	12.0						
60														
	SS-15	63.0	65.0	18	21	32	50/5	16.0	11					very dense
65											64'6"	469.93		
														Grey silty CLAY, trace fine sand, medium plasticity, hard, wet
	SS-16	68.0	70.0	21	32	42	44	24.0		+4.5				
70													CL	
	SS-17	73.0	75.0	10	17	22	23	20.0	25					
75											75'	459.43		EOB 75'
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-5**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.71
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	15	19	22	23	12.0						Black and brown sand and gravel FILL, some fines, wet
5	SS-2	4.0	6.0	10	19	34	50/3	16.0					FILL	
	SS-3	6.0	8.0	32	32	22	8	18.0						Brown-grey silt with sand FILL
	SS-4	8.0	10.0	9	12	23	14	20.0						6" brown-red fine to coarse sand FILL
10											10'	524.71		
	SS-5	10.0	12.0	1	2	4	1	24.0					ML	Grey SILT, little fine sand, loose, wet
											13'	521.71		
	SS-6	13.0	15.0	1	1	2	3	21.0	36					Mottled green, black, and light grey SILTY CLAY, little fine sand, trace silt and wood pieces, medium stiff, wet
15														
	SS-7	18.0	20.0	2	2	3	3	13.0	34	1.00			CL	
20														
	SS-8	23.0	25.0	5	7	7	9	14.5			23'2"	511.54		
25														Black and brown fine to medium SAND, trace coarse sand, medium dense, wet 23'7" grey
	SS-9	28.0	30.0	3	4	6	7	13.0	19					
30														
	SS-10	33.0	35.0	7	7	9	11	12.0					SP	
35														
	SS-11	38.0	40.0	7	10	11	14	14.0	22					5" fine sand seam 2" coarse sand and fine gravel seam
40														

Drilled with Dietrich -120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-5**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.71
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														(cont.) Grey fine to medium SAND, trace coarse sand, wet
	SS-12	43.0	45.0	12	15	22	26	13.5						dense
45														
	SS-13	48.0	50.0	10	12	12	15	12	17				SP	medium dense
50														
	SS-14	53.0	55.0	5	15	21	15	13						dense, 53'6" - 1" gravel piece
55														
	SS-15	58.0	60.0	6	8	11	15	10	12		58'7"	476.13		medium dense
60														Grey fine to coarse SAND, some fine gravel, very dense
	SS-16	63.0	65.0	50/0				0					SW	
65														(rig was grinding heavily to get from 65' to 68')
	SS-17	68.0	70.0	50/4				4						
70											70'	464.71		EOB 70'
75														
80														

Drilled with Dietrich -120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-6**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.33
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	10	11	15	17	17.0						Brown silty sand FILL, trace medium sand, medium dense
5	SS-2	4.0	6.0	1	3	5	11	13.0					FILL	
	SS-3	6.0	8.0	50/5				7.5						(possibly gravel inhibiting sampling)
	SS-4	8.0	10.0	41	50/3			5.5						
10											10'	524.33		
	SS-5	10.0	12.0	3	2	1	4	20.0	49					Brownish-grey SILT, trace fine sand, very loose, saturated
	SS-6	13.0	15.0	3	4	4	5	24.0	53				ML	loose
15											16'6"	517.83		
	SS-7	18.0	20.0	1	1	1	2	17.0	49	0.50			CL	Brownish-grey SILTY CLAY, trace fine sand, soft, wet
20														
	SS-8	23.0	25.0	1	3	4	5	16.0			24'	510.33		
25														Brown fine to medium SAND, trace coarse sand, medium dense, wet
	SS-9	28.0	30.0	6	7	9	11	15.5	18					
30													SP	
	SS-10	33.0	35.0	10	11	14	14	12.0						
35											36'6"	497.83		
	SS-11	38.0	40.0	6	8	9	12	12.5	9				SW	Brown fine to coarse SAND, little fine gravel, medium dense, wet
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-6**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa SURFACE ELEVATION 534.33
DRILLER RDnP Drilling - Kris Norwick DATE: START 12/4/2008 FINISH 12/5/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
											42'6"	491.83	SW	Brown fine to coarse SAND, little fine gravel, medium dense, wet (cont.)
	SS-12	43.0	45.0	8	10	14	17	12.0						Brown fine to medium sand, trace fine sand, medium dense to dense, wet (cont.)
45														
	SS-13	48.0	50.0	8	9	12	14	12.0	14					little coarse sand
50													SP	
	SS-14	53.0	55.0	10	17	17	15	12.5						
55														
	SS-15	58.0	60.0	10	12	14	14	10.0	14					
60											62' 6"	472.00		
	SS-16	63.0	65.0	17	31	36	42	22.0	14	4.5+ 4.5+			CL	Grey SILTY CLAY, little fine to medium sand, medium plasticity, hard, wet 1" fine to medium sand seam at 63'6" 1" gravel piece at 6'8"
65														
	SS-17	68.0	70.0	21	50/3			9.0		4.5+				
70											70'	464.33		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-7**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 536.51
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/5/2008 FINISH 12/8/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	6	7	10	12	22.5		1.00			FILL	Black sand, gravel, and silt FILL 6" alternating brown and black fine sand and silt at 3' 6"grey clay, medium stiff, moist at 4'
5	SS-2	4.0	6.0	1	3	10	14	15.0		0.75				
	SS-3	6.0	8.0	10	31	21	33	18.0			6'	530.51		Dark grey SILT, some fine sand, very dense, wet
	SS-4	8.0	10.0	15	21	18	15	17.0						
10	SS-5	10.0	12.0	10	22	32	44	21.0					ML	trace fine sand
	SS-6	13.0	15.0	3	4	1	5	23.0	67					loose
15														
											16'6"	520.01		
	SS-7	18.0	20.0	1	2	1	2	24.0					CL	Grey SILTY CLAY, trace fine sand, very soft, wet
20														
											23'6"	513.01		
	SS-8	23.0	25.0	1	2	4	12	16.0	19				SP-SC	Grey fine to medium SAND with clay, loose, wet
25														
											26'6"	510.01		
	SS-9	28.0	30.0	2	5	8	8	18.0						Grey fine to medium SAND, medium dense, wet
30														
	SS-10	33.0	35.0	8	14	16	15	12.0	17				SP	trace coarse sand
35														
	SS-11	38.0	40.0	8	14	10	8	12.0						medium dense
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-7**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 536.51
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/5/2008 FINISH 12/8/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Grey fine to medium SAND, trace coarse sand medium dense, wet
	SS-12	43.0	45.0	5	8	10	11	12.0	15					
45														
	SS-13	48.0	50.0	8	10	15	18	14.0					SP	
50														
	SS-14	53.0	55.0	10	12	15	16	10.0	15					
55											56'6"	480.01		
	SS-15	58.0	60.0	8	11	15	17	24.0						Brown fine to coarse SAND, trace fine gravel, medium dense, wet
60													SW	
	SS-16	63.0	65.0	18	23	50/4		10.0	7					very dense
65											65'	471.51		EOB 65'
70														
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-8**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.72
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/15/2008 FINISH 12/17/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	8	12	10	12	18.0						Brown and grey mottled silty clay FILL, little fine to coarse sand, medium dense, frozen
5	SS-2	4.0	6.0	3	4	6	6	16.0		1.75			FILL	
	SS-3	6.0	8.0	3	5	7	10	10.0						fine gravel pieces mixed in clay
	SS-4	8.0	10.0	3	4	6	9	15.0	17	2.50				
10	SS-5	10.0	12.0	4	5	7	4	14.0	23	3.00	10'6"	524.22		Grey SILT, trace fine sand, medium dense to loose, wet
	SS-6	13.0	15.0	2	3	3	3	8.0	26				ML	alternating silt and brown silty clay, stiff
15											16'6	518.22		
	SS-7	18.0	20.0	1	2	3	2	10.0	34	1.25			CL	Grey SILTY CLAY, medium plasticity, medium stiff, mois to wet (LL=46, PI=24)
20														
											23'3"	511.47		
	SS-8	23.0	25.0	5	6	7	7	12.0						Brown fine to medium SAND, loose, wet
25														
	SS-9	28.0	30.0	2	5	4	5	24.0	20					
30													SP	
	SS-10	33.0	35.0	2	3	4	5	12.0						trace coarse sand
35														
	SS-11	38.0	40.0	4	5	5	7	11.5	12					
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-8**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.72
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/15/2008 FINISH 12/17/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Brown fine to medium SAND, trace coarse sand, medium dense, wet (cont.)
	SS-12	43.0	45.0	9	10	11	15	11.0						
45													SP	
	SS-13	48.0	50.0	14	17	9	7	13.0	16					
50														
											49'6"	485.22		
	SS-14	53.0	55.0	4	8	7	6	13.0						Brown fine to coarse SAND, trace fine gravel, medium dense, wet
55														
	SS-15	58.0	60.0	8	15	19	22	15.0	8					dense
60													SW	
	SS-16	63.0	65.0	5	15	24	26	17.0						little fine gravel
65														
											66'6"	468.22		
	SS-17	68.0	70.0	48	50/4			13.0	14				CL	Grey sandy SILTY CLAY, hard, moist to wet
70											70'	464.72		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-9**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 534.67
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/17/2008 FINISH 12/18/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	3	4	2	2	14.0		2.50				Grey and brown mottled silty clay FILL, some fine to medium sand, very stiff, moist
5	SS-2	4.0	6.0	3	4	6	5	17.0		4.00			FILL	
	SS-3	6.0	8.0	4	5	5	8	17.0		2.50				Alternating grey, brown, and orange clay and silt
	SS-4	8.0	10.0	4	5	10	10	17.0		2.00	8'11"	525.75		
10	SS-5	10.0	12.0	5	7	9	12	16.0		4.00			CL	Grey SILTY CLAY, trace fine sand, medium plasticity, very stiff, moist
											13'	521.67		
	SS-6	13.0	15.0	3	4	6	6	21.0						Dark grey CLAY, high plasticity, stiff, wet
15														
	SS-7	18.0	20.0	3	3	4	5	21.0	51	1.00				(LL=64, PI=34)
20													CH	
	SS-8	23.0	25.0	5	6	8	9	0.0						
25														(hole is taking a lot of water)
											24'6"	510.17		
	SS-9	28.0	30.0	8	10	12	14	10.0	25					Grey fine to medium SAND, medium dense, wet
30														
	SS-10	33.0	35.0	8	15	19	22	16.0						trace coarse sand, dense
35													SP	
	SS-11	38.0	40.0	10	16	17	19	11.0	18					
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-9**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa SURFACE ELEVATION
DRILLER RDnP Drilling - Kris Norwick DATE: START 12/17/2008 FINISH 12/18/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Grey fine to medium SAND, trace coarse sand, dense, wet
	SS-12	43.0	45.0	10	17	24	29	8.0						trace fine gravel
45														
	SS-13	48.0	50.0	8	16	20	21	12.0	17				SP	
50														
	SS-14	53.0	55.0	9	11	15	19	13.0						
55														
											56'6"	478.17		Grey-brown fine to coarse SAND, trace fine gravel, dense, wet
	SS-15	58.0	60.0	10	12	18	17	16.0	17					
60													SW	
	SS-16	63.0	65.0	12	15	24	26	15.0						dense
65														
											66'6"	468.17		
	SS-17	68.0	70.0	37	50/4			10.0					CL	Grey CLAY, little fine to medium sand, medium plasticity, hard, moist to wet
70											70'	464.67		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES ™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-10**
LOGGED BY LES
PAGE No. 1 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa SURFACE ELEVATION 531.92
DRILLER RDnP Drilling - Kris Norwick DATE: START 12/12/2008 FINISH 12/15/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Frozen ground
	SS-1	2.0	4.0	4	5	5	4	13.0	17	2.00				Grey and brown mottled SILTY CLAY, trace fine sand, medium plasticity, stiff, moist
5	SS-2	4.0	6.0	3	4	5	6	15.0	15	2.50				little fine to coarse sand, very stiff
	SS-3	6.0	8.0	4	4	5	6	15.0	13	2.50			CL	
	SS-4	8.0	10.0	3	6	8	8	15.0	24	2.50 1.50				Brown, silt content increasing, thin brown silt seams
10														
	SS-5	13.0	15.0	1	2	3	4	15.0		0.75 1.00	13'	518.92		Dark grey CLAY, high plasticity, medium stiff, wet
15														
	SS-6	18.0	20.0	4	6	5	7	13.5		1.25				stiff
20													CH	
	SS-7	23.0	25.0	3	4	5	5	6.0		1.00				
25														
	SS-8	28.0	30.0	8	9	11	12	0.0			29'	502.92		Grey-brown fine to medium SAND, medium dense, wet
30														
	SS-9	33.0	35.0	6	8	5	5	10.0						
35														
	SS-10	38.0	40.0	8	9	11	12	11.0						trace coarse sand
40														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

BORING LOG

PROJECT No. 154.002.008.001
BORING No. **BH-10**
LOGGED BY LES
PAGE No. 2 of 2

PROJECT NAME Alliant Energy - December 2008 Baghouse Geotechnical Investigation
BORING LOCATION Burlington, Iowa — SURFACE ELEVATION 531.92
DRILLER RDnP Drilling - Kris Norwick — DATE: START 12/12/2008 FINISH 12/15/2008

DEPTH	SAMPLE No.	INTERVAL (ft) FROM	TO	BLOW COUNT 0" to 6"	6" to 12"	12" to 18"	18" to 24"	REC (in)	WC (%)	qu (TSF)	CONTACT DEPTH	ELEV. (MSL)	USCS SOIL TYPE	SOIL DESCRIPTION
														Grey-brown fine to medium SAND, trace coarse sand, medium dense, wet (cont.)
	SS-11	43.0	45.0	3	6	9	15	15.0						
45														dense
	SS-12	48.0	50.0	8	15	21	30	15.0						
50													SP	
	SS-13	53.0	55.0	50/0				0.0						(spoon bouncing, possibly on a cobble or boulder)
55														trace fine gravel
	SS-14	58.0	60.0	14	17	17	15	16.0						
60														
	SS-15	63.0	65.0	50/1				0.0			64'	467.92		Grey CLAY, little fine sand, hard, moist to wet
65													CL	
	SS-16	68.0	70.0	32	50/3			10.0		4.5+				(spoon bouncing)
70											70'	461.92		EOB 70'
75														
80														

Drilled with Dietrich-120
Method: auger and mud rotary
Hole was backfilled with bentonite slurry

EXHIBIT B – Geoprobe Borings

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination

Boring Log Legend

Sample
No: (Number) Soil samples are numbered consecutively from the ground surface. Core samples are numbered consecutively from the first core run.

Type: A= Auger Cuttings CR= Core Run MS= Modified Spoon PB= Pitcher Barrel
PT= Piston Tube ST= Shelby Tube SS= Split Spoon (2" O.D.) WC= Wash Cuttings

Interval: The depth of sampling interval in feet below ground surface

Blow Count
The number of blows required to drive a 2-inch O.D. split-spoon sampler with a 140 pound hammer falling 30-inches. When appropriate, the sampler is driven 18 inches and blow counts are reported for each 6-inch interval. The sum of blow counts for the last two 6-inch intervals is designated as the standard penetration resistance (N) expressed as blows per foot.

Recovery in Inches
The length of sample recovered by the sampling device.

U.S.C.S. Soil Type
The Unified Soil Classification System symbol for recovered soil samples determined by visual examination or laboratory tests. Refer to ASTM D2487-69 for a detailed description of procedure and symbols. Underlined symbols denote classifications based on laboratory tests (i.e. ML), all others are based on visual classification only.

Percent Moisture
Natural moisture content of sample expressed as percent of dry weight.

q_u TSF
Unconfined compressive strength in tons per square foot obtained by hand penetrometer. Laboratory compression test values are indicated by underlining.

Contact Depth
The contact depth between soil layers is interpreted from significant changes in recovered samples and observations during drilling. Actual changes between soil layers often occur gradually and the contact depths shown on the boring logs should be considered as approximate.

Soil Description and Remarks
Soil descriptions include consistency or density, color, predominant soil types and modifying constituents.

Cohesive Soils			Cohesionless Soils	
Consistency	q_u (TSF)	Blows/ft.	Density	Blows/ft.
Very Soft	less than 0.25	0-1	Very Loose	4 or less
Soft	0.25 to 0.50	2-4	Loose	5 to 10
Medium Stiff	0.50 to 1.00	5-8	Medium Dense	11 to 30
Stiff	1.00 to 2.00	9-15	Dense	30 to 50
Very Stiff	2.00 to 4.00	15-30	Very Dense	Over 50
Hard	more than 4.00	Over 30		

Particle Size Description

Boulder =	Larger than 12 inches
Cobble =	3 to 12 inches
Gravel =	0.187 to 3 inches
Sand =	0.074 to 4.76 mm
Silt and Clay =	smaller than 0.074 mm

Definition of Terms

Trace =	5 to 12 percent by weight
Some =	12 to 30 percent by weight
And =	Approximately equal fractions
( ) =	Driller's observation

Piezo.
(Piezometer) Screened interval of the piezometer installation is denoted by cross-hatching.

General Note
The boring log and related information depicted subsurface conditions only at the specified locations and date indicated. Soil conditions and water levels at other locations may differ from conditions occurring at these boring locations. Also the passage of time may result in a change in the conditions at these boring locations.

Soil Test Boring Refusal
Defined as any material causing a blow count greater that 50 blows/6 inches. Such material may include bedrock, "floating" rock slabs, boulders, dense gravel seams, hard pan clay, or cemented soils. Refusal is usually indicated in fractional notation showing number of blows as the numerator and inches of penetration as the denominator.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB1 (CPT1)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	2.5'/5'				0		ASH; brown; poorly graded; fine grained; moist. (Fill)
	SP2	5'/5'				-5		
	SP3	5'/5'				-10		
	SP4	5'/5'				-15		@ 14' grades dark gray to black.
	SP5	0'/5'				-20		Clayey SILT; black to gray; non-plastic to low plasticity; moist to wet; some organic matter. (OL) @ too soft for pocket penn from 19.5' to 31', no hammer required to push sampler.
	SP6	5'/5'				-25		
	SP7	1.5'/5'		2.75 2.75 3.25 3.75 1.5		-30		CLAY; gray to black; high plasticity; soft to firm; moist; trace organic. (OH)
	SP8	5'/5'				-35		Sandy SILT; gray; non-plastic; wet. (ML)
						-40		SAND; gray; well graded; fine to coarse grained; rounded to sub-rounded; wet. (SW)
						-45		Bottom of boring @ 40' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB2 (CPT7)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	5'/5'		4.0 3.5 3.25 2.5 2.5 2.5		0 -5		Clayey SILT; brown to gray; non-plastic; firm to stiff; dry to moist; trace roots/organic matter. (Fill)
	SP2	5'/5'		1.75 1.75 3.5 4.0 3.0		-10		
	SP3	5'/5'		2.5 2.5		-15		ASH; black; non-plastic; moist. (FILL)
	SP4	4'/5'						Clayey SILT; gray to black; non-plastic; trace organic matter/shells. (OL)
	SP5	4'/5'				-20		SILT; gray; non-plastic; wet. (ML)
	SP6	5'/5'		0.75 0.75 0.75 0.75 0.5 0.5		-25 -30		CLAY; gray to black; soft; high plasticity; moist; trace to some organic matter. (OH)
	SP7	4'/5'				-35		SAND; gray; poorly graded; medium grained; wet. (SP)
						-40		Bottom of boring @ 35' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* / *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB3 (CPT10)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	3.5'/5'		2.25 2.25 2.25 2.25 2.25 2.0		0 -5		ASH; brown; non-plastic; moist. (FILL) Clayey SILT; brown to gray; non-plastic; firm to stiff; dry to moist; trace roots/organic matter. (Fill)
	SP2	5'/5'		0.75 1.25 1.0 2.75		-10		
	SP3	5'/5'		1.5 2.0 2.0		-15		ASH; gray; non-plastic; moist. (FILL) Silty SAND; dark gray to light gray; poorly graded; fine grained; wet. (SP)
	SP4	5'/5'				-20		
	SP5	5'/5'				-25		SILT; gray; non-plastic; wet. (ML)
	SP6	5'/5'		2.0 2.5 0.5 0.5		-30		Silty CLAY; gray to black; soft; low plasticity; moist; trace to some organic matter. (OH)
	SP7	5'/5'		0.75 1.0 1.0 1.25		-35		
	SP8	5'/5'		1.0 1.0 1.0		-40		SAND; gray; poorly graded; fine grained; wet. (SP) Bottom of boring @ 40' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB4 (CPT6)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-11-11*
DATE FINISHED: *05-11-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
	SP1	4.5'/5'		2.25 3.25 3.0		0		Clayey SILT; brown to gray; non-plastic; firm to stiff; dry to moist; trace roots/organic matter. (Fill)
	SP2	5'/5'				-5		ASH; gray; non-plastic; moist. (FILL)
	SP3	5'/5'				-10		
	SP4	5'/5'				-15		
▽	SP5	3.5'/5'				-20		
	SP6	4'/5'				-25		SILT; gray; non-plastic; wet. (ML)
	SP7	5'/5'		1.25 1.25 1.25 1.25		-30		CLAY; gray to black; low to high plasticity; wet; some organic matter. (OL/OH)
						-35		SAND; gray; poorly graded; fine grained; wet. (SP)
						-40		Bottom of boring @ 35' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-11-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB5 (cpt19)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	5'/5'		1.25 2.75 2.75		0 -5		SILT; brown; non-plastic; dry to moist; trace organic matter. (Fill) @ 5' grades Clayey SILT; low plasticity; firm to stiff.
	SP2	5'/5'		1.5 1.25 0.5 1.75 2.0		-10		
	SP3	4'/5'				-15		Sandy CLAY; black to dark gray; non-plastic to low plasticity; moist. (CL)
	SP4	4'/5'		0.5 1.25 1.5 1.25		-20		CLAY; black to dark gray; low to high plasticity; moist; trace organic matter. (CL)
	SP5	3.5'/5'		1.5 1.25 1.25 1.25 1.25		-25		
	SP6	3.5'/5'		1.25 1.5 1.25		-30		Sandy CLAY; dark gray; low to high plasticity; wet; trace silt. (CL) @ 33' grades several thin sand seams.
	SP7	3'/5'				-35		SAND; gray; poorly graded; coarse grained; wet. (SP) Bottom of boring @ 35' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB6 (cpt18)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	5'/5'		2.5		0		SILT; brown; non-plastic; dry to moist; trace organic matter (FILL)
				2.0		-5		@ 5' grades Clayey SILT; low plasticity; very stiff.
	SP2	5'/5'		3.5				
				3.5				
				4.0		-10		CLAY; gray to olive; low to high plasticity; stiff to very stiff; moist; trace organic matter (Fill)
				2.25				
				2.25				
	SP3	5'/5'		2.5				
				2.5				
				2.5		-15		Clayey SAND; gray; poorly graded; medium grained; wet. (SP)
				2.5				
				1.5				
	SP4	4.5'/5'		0.5				CLAY; gray to olive; high plasticity; very soft to firm; moist to wet. (CL)
				1.5		-20		@ 19' is a thin 1" sand seam, wet.
				2.25				
				1.25				
				1.25				
	SP5	2.5'/5'		1.0				
				0.5		-25		
				1.5				
				1.0				
	SP6	3.8'/5'		0				
				0				
				0		-30		SAND; gray; well graded; fine to coarse grained; wet. (SW)
	SP7	2.5'/2.5'						
						-35		Bottom of boring @ 32.5'
								Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.
						-40		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB7 (cpt15)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
	SP1	3.8'/5'		2.5		0		ASH; gray; fine grained; moist. (Fill)
				3.75		-5		CLAY; black; low plasticity; stiff to very stiff; moist; trace organic matter (Fill)
	SP2	5'/5'		>4.5				
				1.75				
				1.5		-10		
				1.25				
				1.75				
	SP3	5'/5'		4.0				
				4.25				
				4.5		-15		
				4.5				
				>4.5				
	SP4	5'/5'		3.0				
⊻				2.0				@ 18' grades (OH)
				3.0				@ 19' is a 6-inch SAND seam; fine grained; wet.
				3.5		-20		@ 20' grades high plasticity.
								SAND; gray; poorly graded; fine grained; wet. (SW)
	SP5	3'/5'				-25		Bottom of boring @ 25'
								Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.
						-30		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB8 (cpt13)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
	SP1	4'/5'				0		SILT; brown; non-plastic; dry to moist; trace to some gravel, sand & ash. (Fill)
▽	SP2	4'/5'		2.75 3.5		-5		SAND; gray; fine grained; poorly graded; wet.(SP)
						-10		CLAY; gray; low to high plasticity; stiff; moist. (CL)
	SP3	5'/5'		3.0 4.5				SAND; gray to black; fine grained; poorly graded; wet. (SP)
								CLAY; gray; low to high plasticity; stiff; moist. (CL)
				1.75		-15		SAND; gray; well graded; fine to coarse grained; wet. (SW)
				1.75				CLAY; dark gray; high plasticity; firm to stiff; moist; trace organic matter. (OH)
	SP4	4'/5'		1.0 2.25				
				2.0		-20		SAND; gray to black; poorly graded; fine grained; wet. (SP)
	SP5	4.5'/5'				-25		Bottom of boring @ 25'
						-30		Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

BORING LOG

CABENO
Environmental Field Services, LLC

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB9 (cpt21)*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
	SP1	2.5'/5'		1.5		0		SILT; brown; non-plastic; dry to moist; trace organic matter. (Fill)
				1.5		-5		CLAY:gray to olive; low to high plasticity; moist; trace organics. (OH)
	SP2	4'/5'		1.75				
				1.5		-10		
				1.5				
				1.75				
	SP3	4.5'/5'		1.25				
				1.0				
				1.25		-15		
				1.5				
				1.0				
	SP4	5'/5'		1.25				
				1.5		-20		
				1.0				
				0.75				
				0.75				
▽	SP5	3.5'/5'		0.5		-25		SAND; gray; fine grained; poorly graded; wet. (SP)
				0.5				Bottom of boring @ 25'
						-30		Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB10*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	2.5'/5'		>4.5 3.5 3.25 1.25 1.75		0 -5		Silty CLAY; brown; low plasticity; firm to very stiff; moist; trace organics and gravels. (CL - OH)
	SP2	4'/5'		2.0 2.0 1.75 1.5		-10		
	SP3	4.5'/5'		2.75 2.5 2.0 2.5 1.75		-15		
	SP4	5'/5'		0.5 1.0 2.5 2.25 2.75		-20		
	SP5	3.5'/5'		3.25 2.5 2.5 2.25		-25		SAND; gray to brown; well graded; fine to coarse grained; wet. (SW) CLAY; gray; high plasticity; moist. (CL) LIMESTONE; gray; thinly bedded; highly weathered. (Bedrock) Bottom of boring @ 25' Boring advanced W/ Geoprobe Model 6610DT using
	SP6	2'/3'				-30		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB11*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
▽	SP1	2.5'/5'		2.25		0		Gravely SILT; brown; non-plastic; dry to moist. (Fill)
				2.5		-5		CLAY; brown; high plasticity; moist; stiff to soft; trace sand & gravel. (CL)
	SP2	4'/5'		2.5				
				1.75				
				1.25		-10		
				2.0				@ 11.5' grades black to gray, trace organics. (OH)
	SP3	4.5'/5'		1.25				
				1.0				
				0.5		-15		@ 14.5' are several thin, 1-inch, fine grained sand seams; wet.
				0.75				
				1.5				
	SP4	5'/5'		0.5				
				1.25		-20		SAND; gray; poorly graded; fine grained; wet. (SP)
				1.0				Bottom of boring @ 20'
						-25		Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.
						-30		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Burlington, IA

BORING NO.: *SB12*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *05-16-11*
DATE FINISHED: *05-16-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
	SP1	2.5'/5'		2.5		0		Gravely SILT; brown; non-plastic; dry to moist. (Fill)
				2.75		-5		CLAY; brown; high plasticity; moist; stiff to soft; trace sand & gravel. (CL)
	SP2	5'/5'		1.75				
				1.25		-10		
				1.25				
				1.75				
	SP3	5'/5'		1.5				
				1.25				
				0.75		-15		@ 14' grades dark gray to black; trace organics. (OH)
				0.75				
				1.25				
	SP4	4.5'/5'		1.0				
				0.75		-20		
				1.25				
				1.5				
				1.0				
	SP5	5'/5'		0.75				
▽				0.5		-25		SAND; black to dark gray; poorly graded; fine grained; wet. (SP)
								Bottom of boring @ 25'
						-30		Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 05-16-11.

EXHIBIT C – CPT SOIL PROBES

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination

CONE PENETROMETER TEST (CPT)

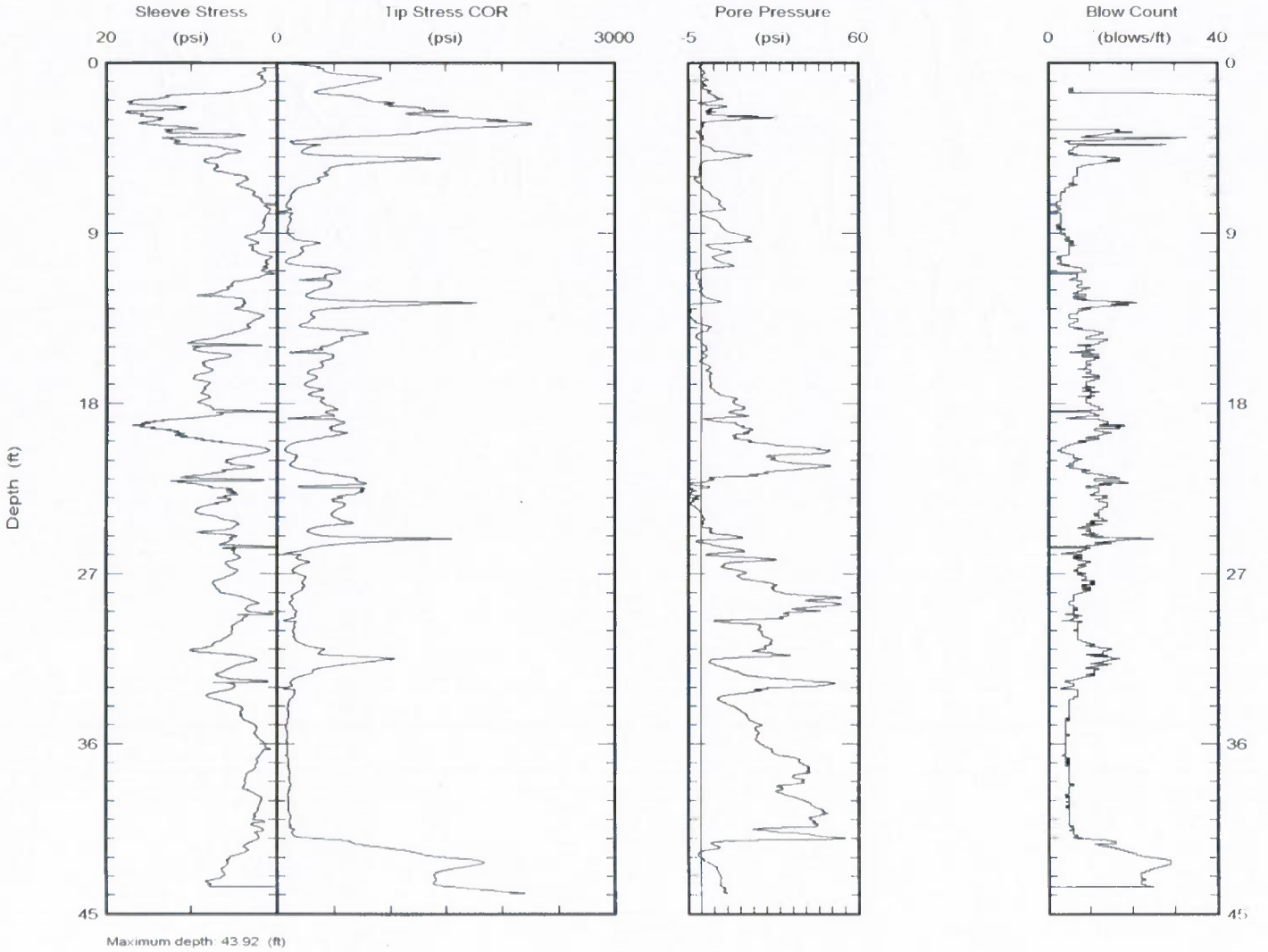
CPT I.D.	LOCATION	GROUND ELEVATION (FT)
CPT-1	Economizer Ash Pond	548.78
CPT-2	Economizer Ash Pond	550.34
CPT-3	Economizer Ash Pond	549.91
CPT-4	Economizer Ash Pond	549.65
CPT-5	Economizer Ash Pond	549.74
CPT-6	Economizer Ash Pond	550.57
CPT-7	Economizer Ash Pond	545.78
CPT-8	Economizer Ash Pond	546.26
CPT-9	Economizer Ash Pond	549.48
CPT-10	Economizer Ash Pond	549.42
CPT-11	Economizer Ash Pond	547.86
CPT-12	Economizer Ash Pond	548.25
CPT-13	Ash Seal Water Pond	534.22
CPT-14	Ash Seal Water Pond	533.67
CPT-15	Main Ash Pond	536.75
CPT-16	Main Ash Pond	534.84
CPT-17	Main Ash Pond	534.52
CPT-18	Main Ash Pond	533.89
CPT-19	Main Ash Pond	535.32
CPT-20	Upper Ash Pond	530.47
CPT-21	Upper Ash Pond	530.42

Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:
Easting:
Elevation:

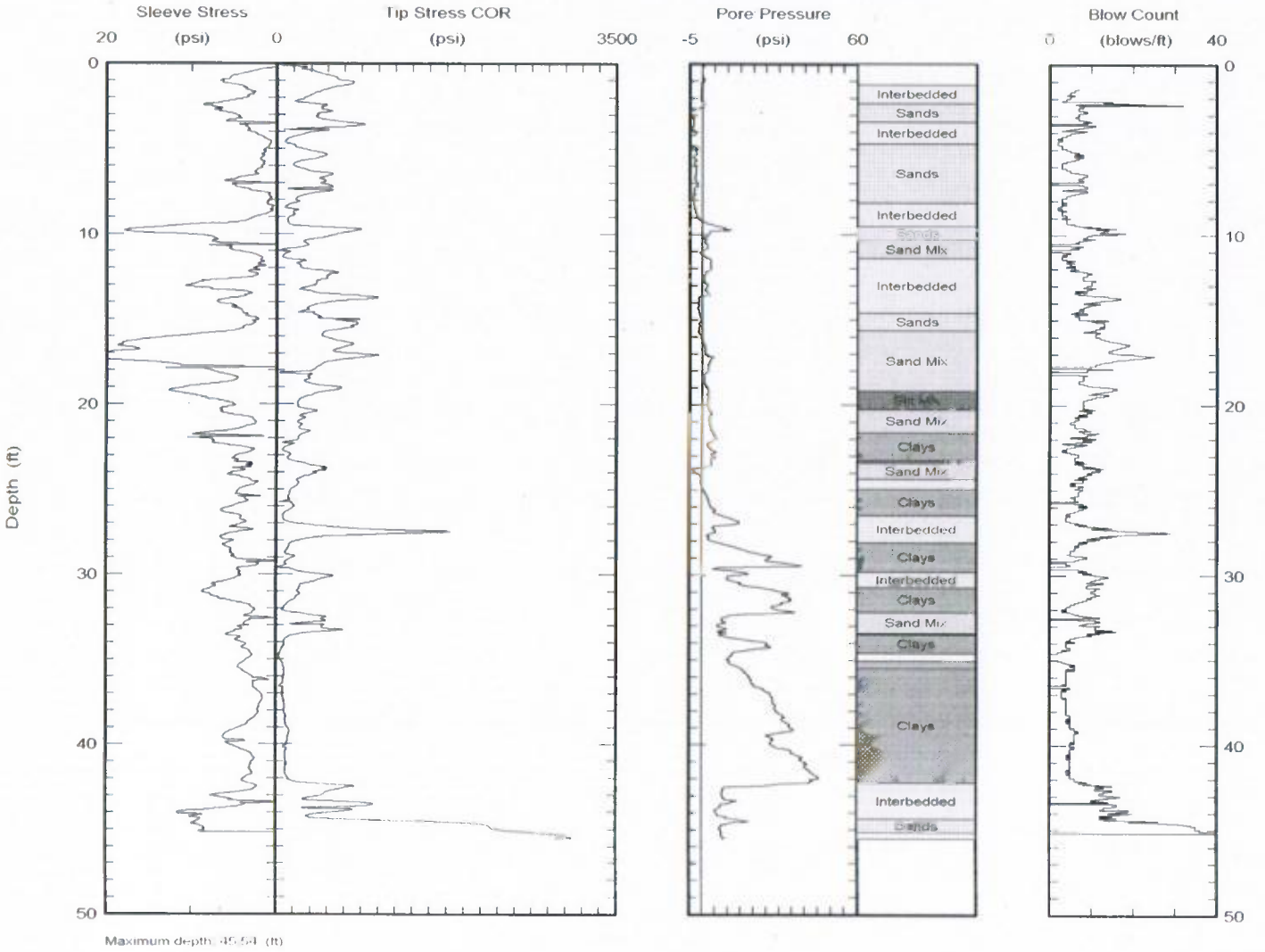
Date: 09/May/2011
Test ID: cpt1
Project: Alliant

Client: Aetherdbs
Job Site: Burlington



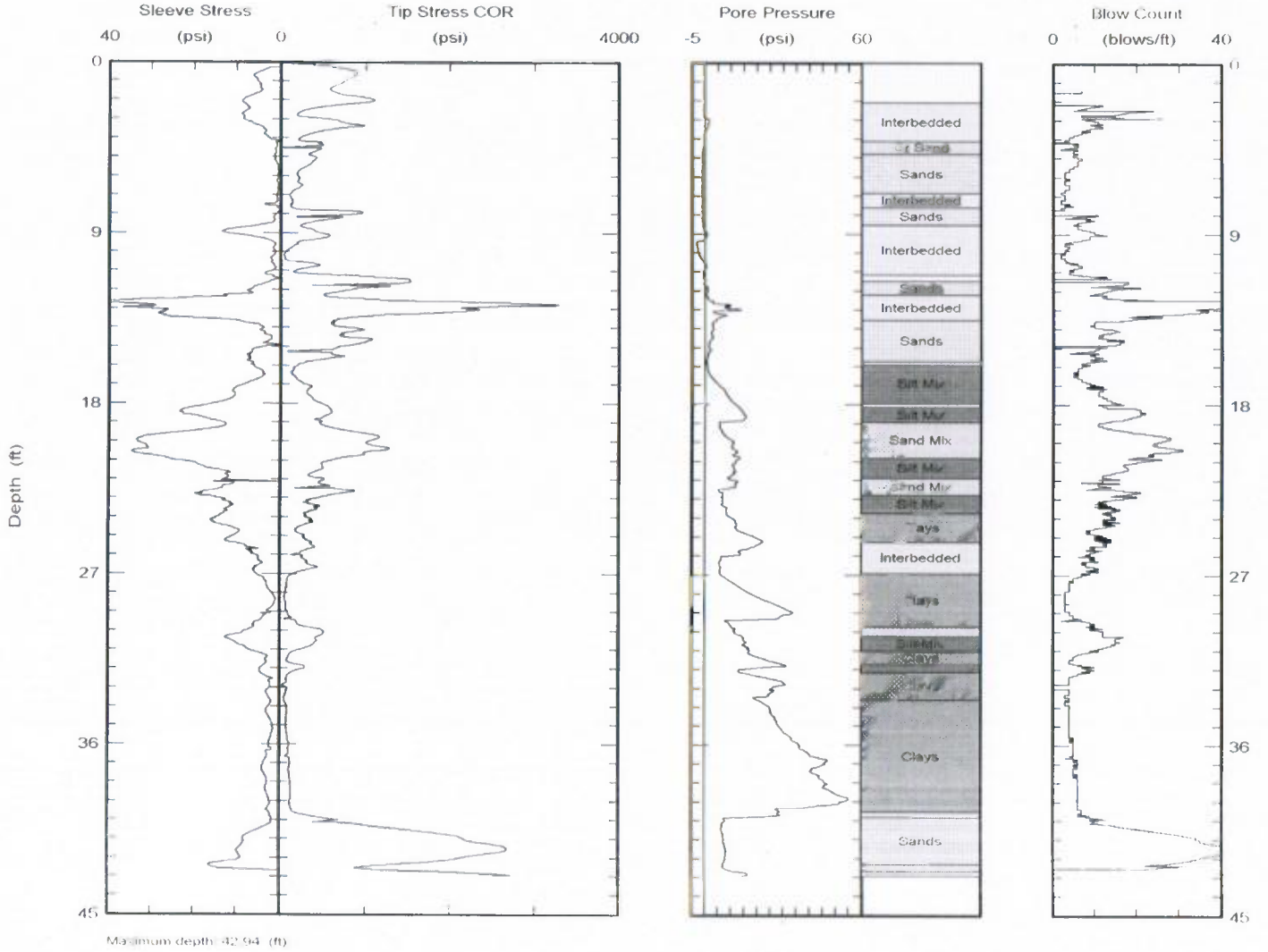
Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:	Date: 09/May/2011
Easting:	Test ID: cpt2
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	



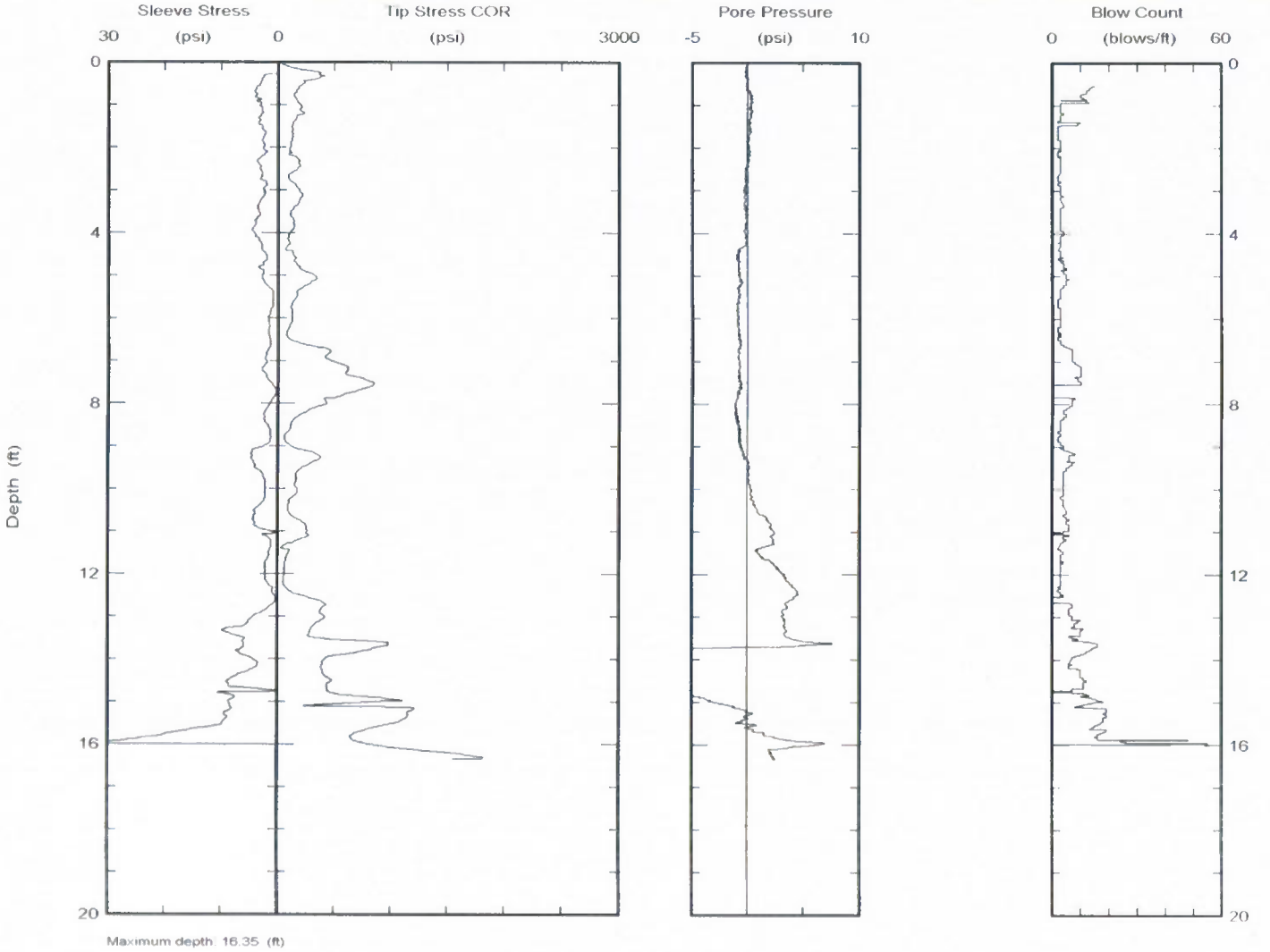
Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:	Date: 09/May/2011
Easting:	Test ID: cpt3
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	

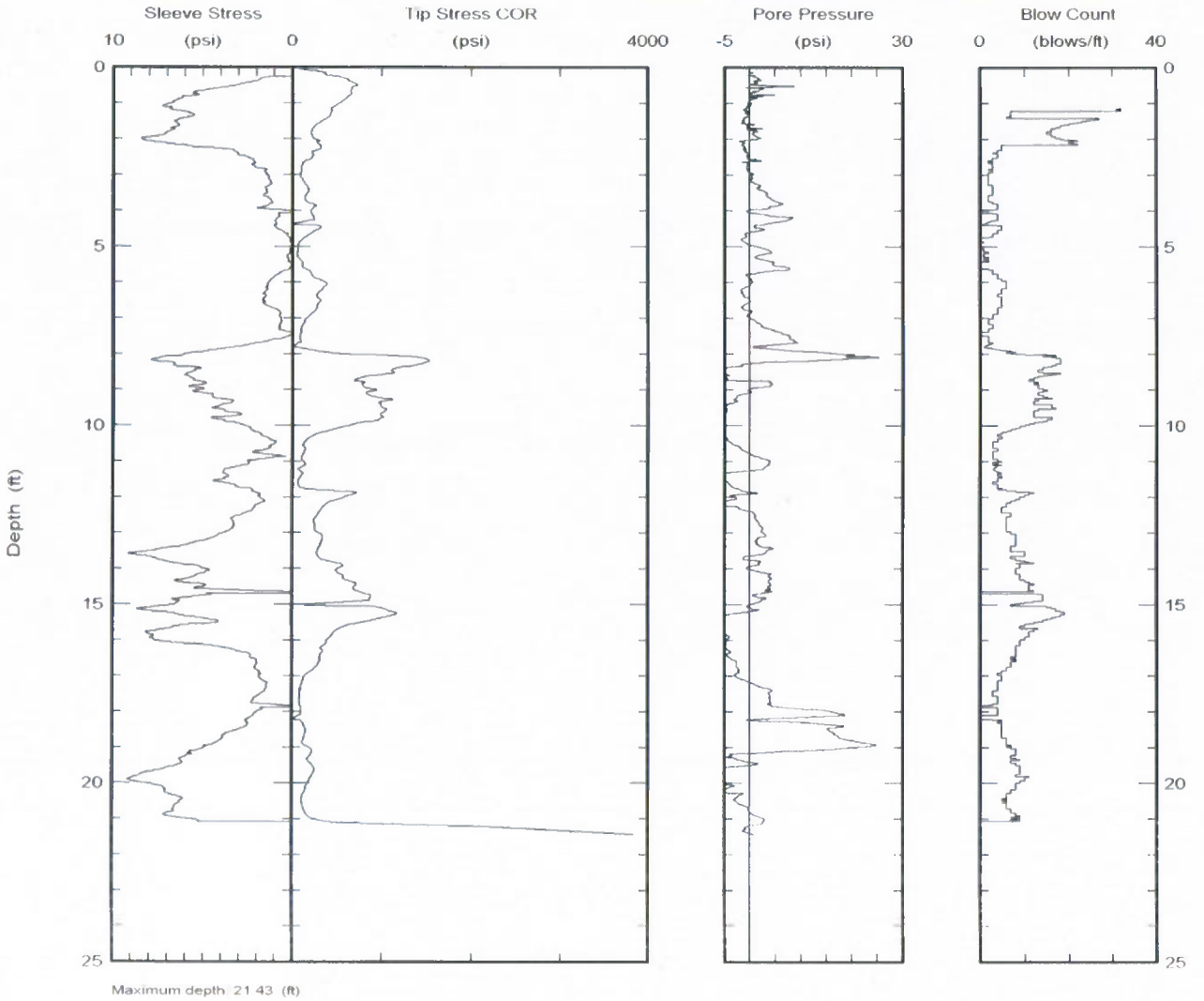


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:	Date: 09/May/2011
Easting:	Test ID: cpt4
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	

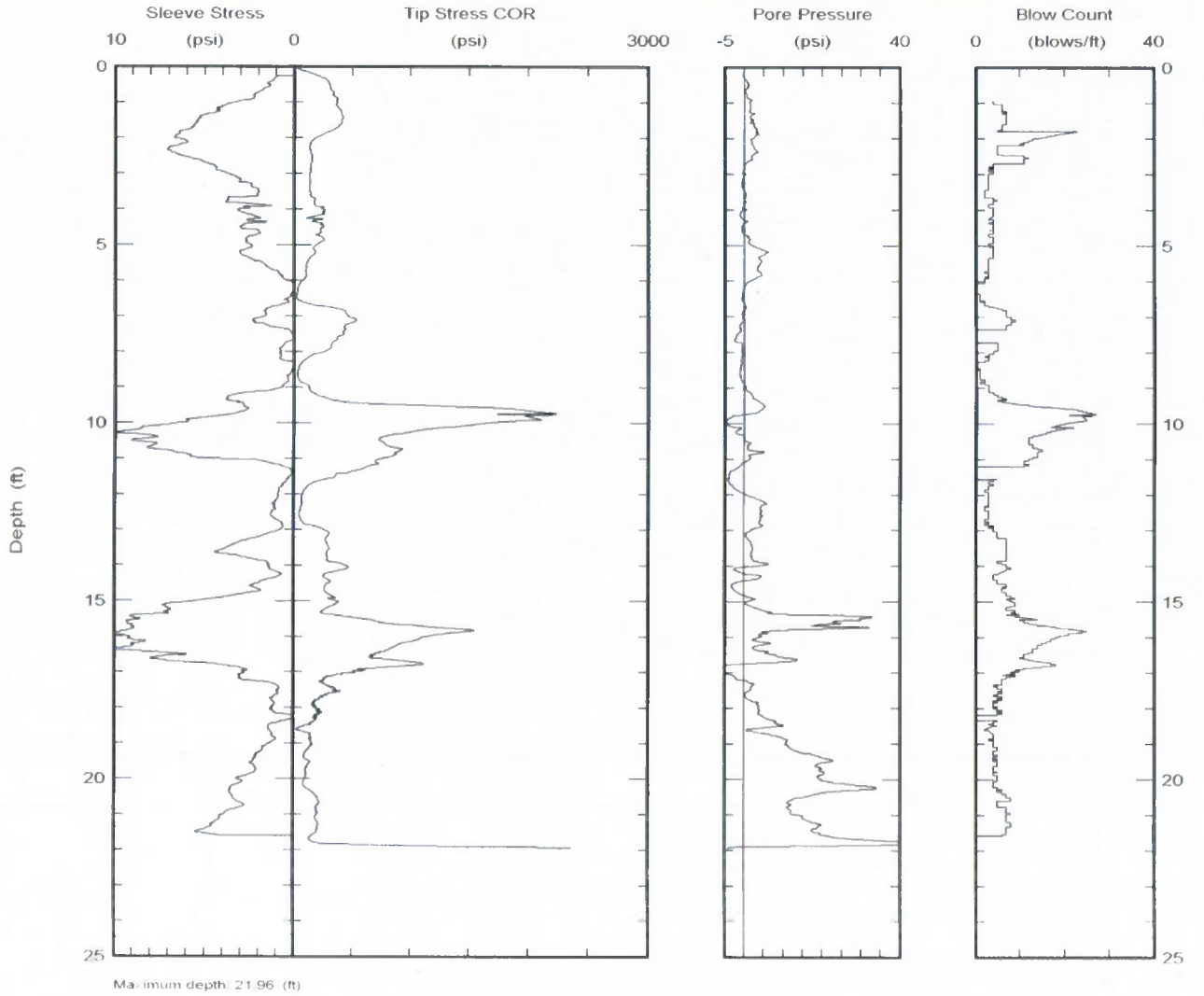


Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt5 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

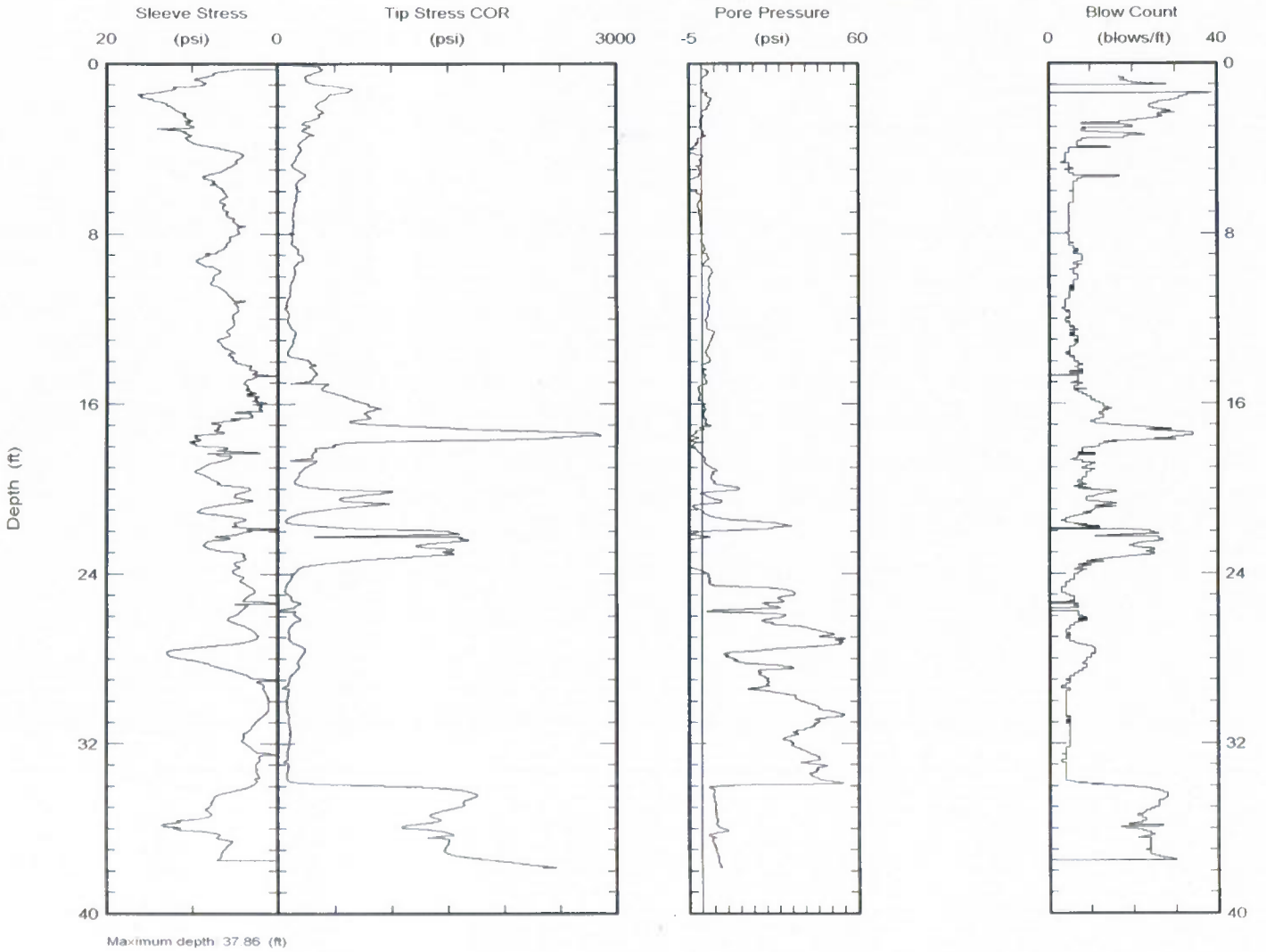


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

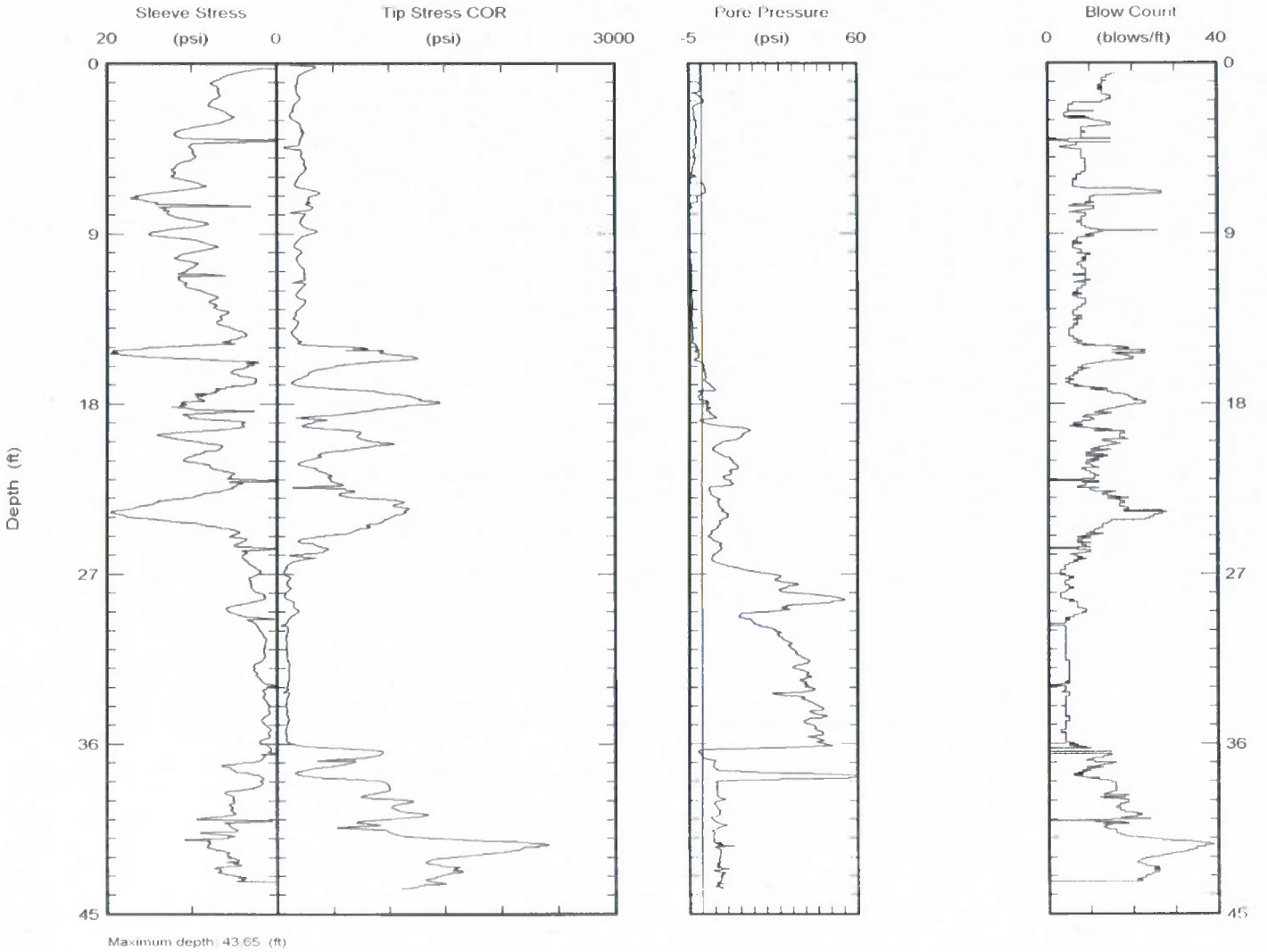
Northing:	Date: 10/May/2011
Easting:	Test ID: cpt6
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	



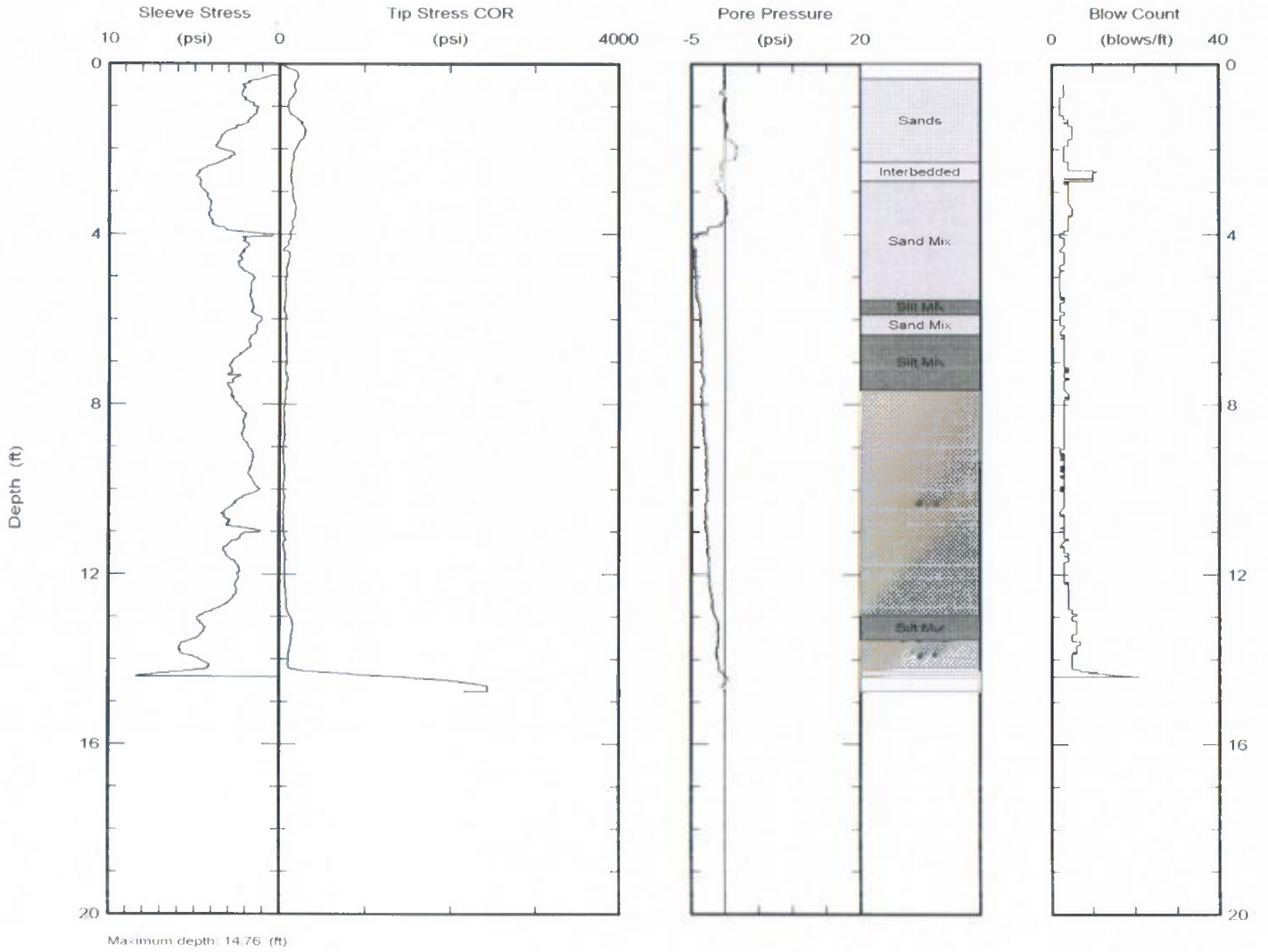
Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt7 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt8 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

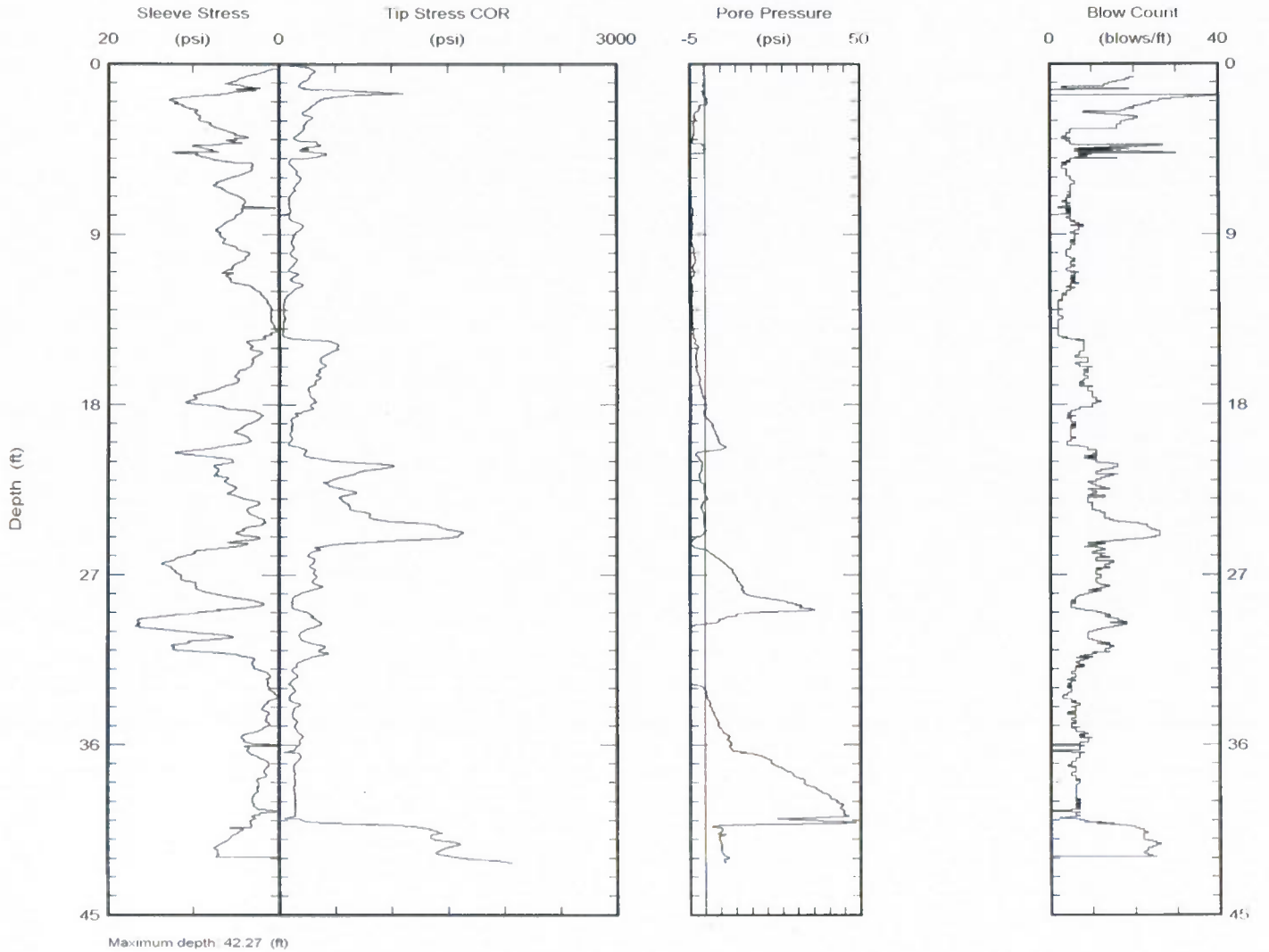


Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt9 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

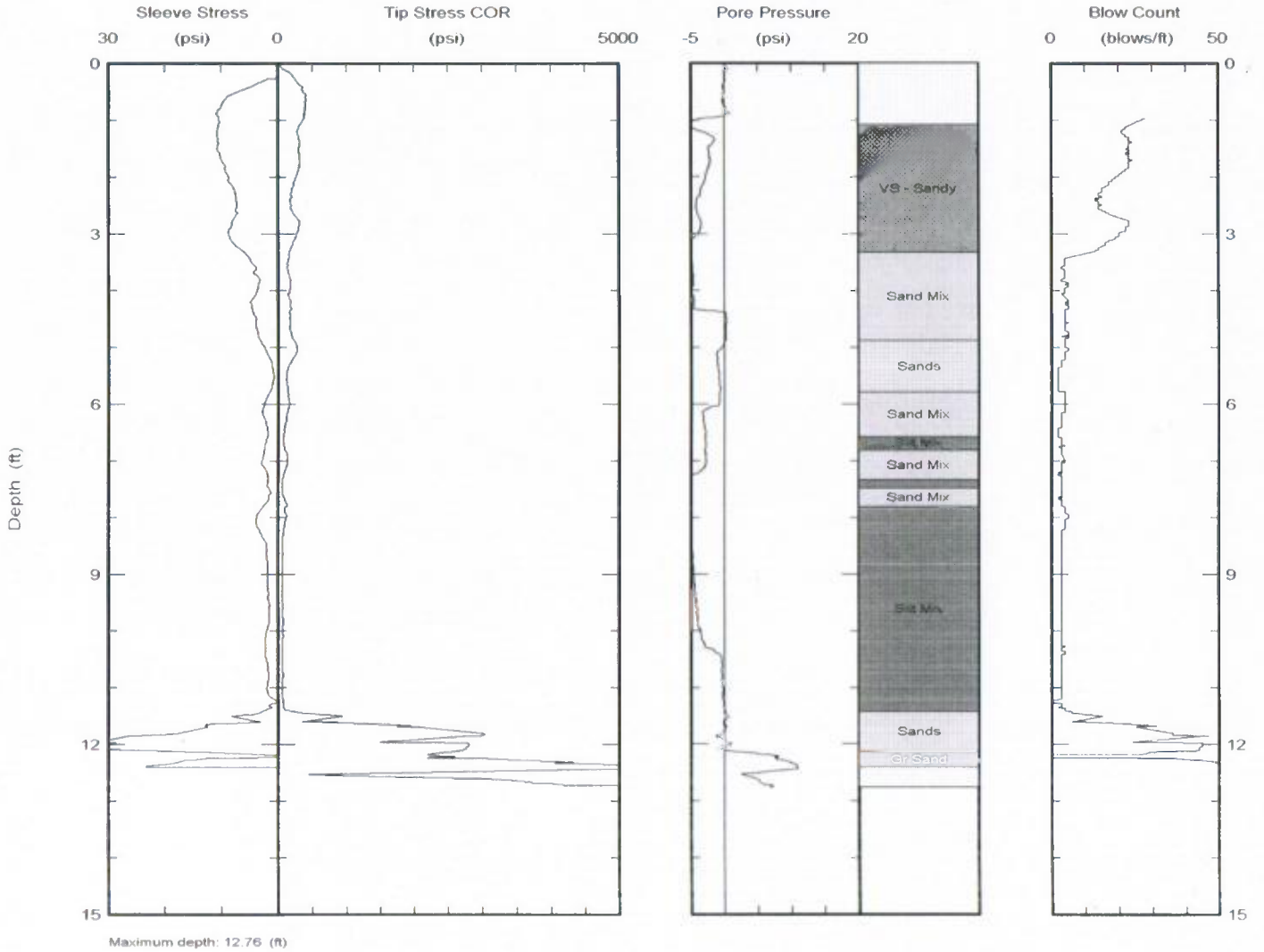


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:	Date: 10/May/2011
Easting:	Test ID: cpt10
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	



Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt11 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

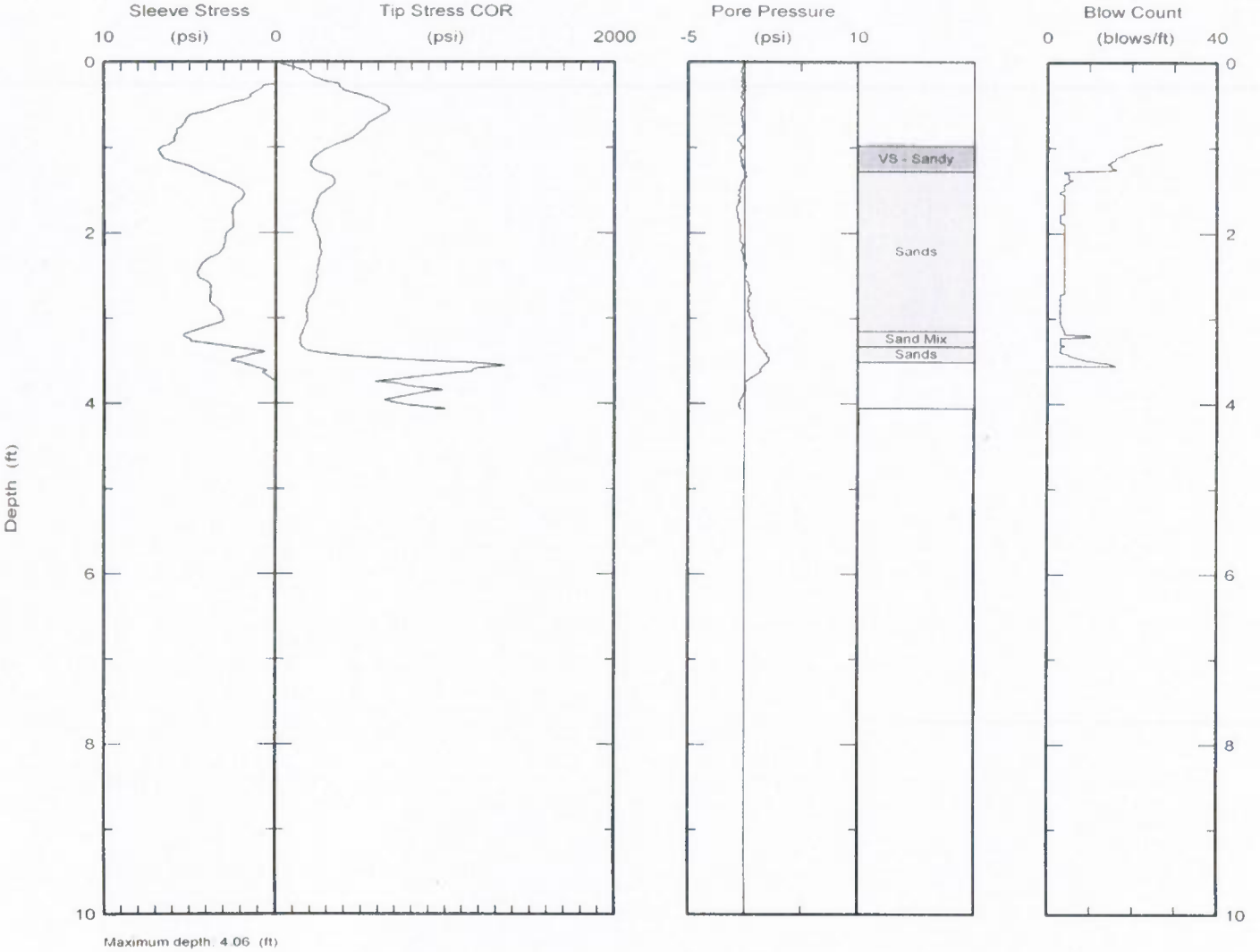


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

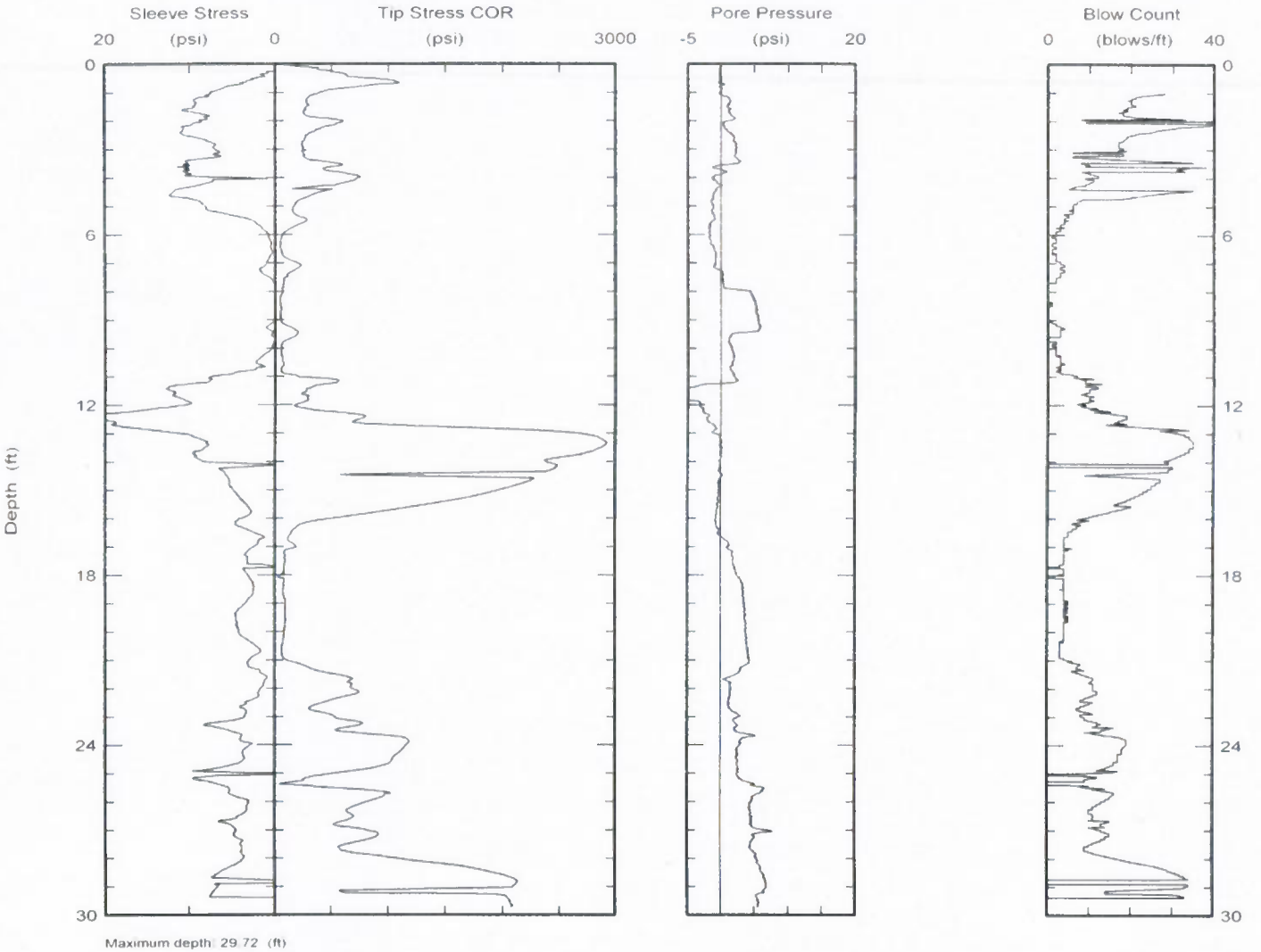
Northing:
Easting:
Elevation:

Date: 10/May/2011
Test ID: cpt12
Project: Alliant

Client: Aetherdbs
Job Site: Burlington

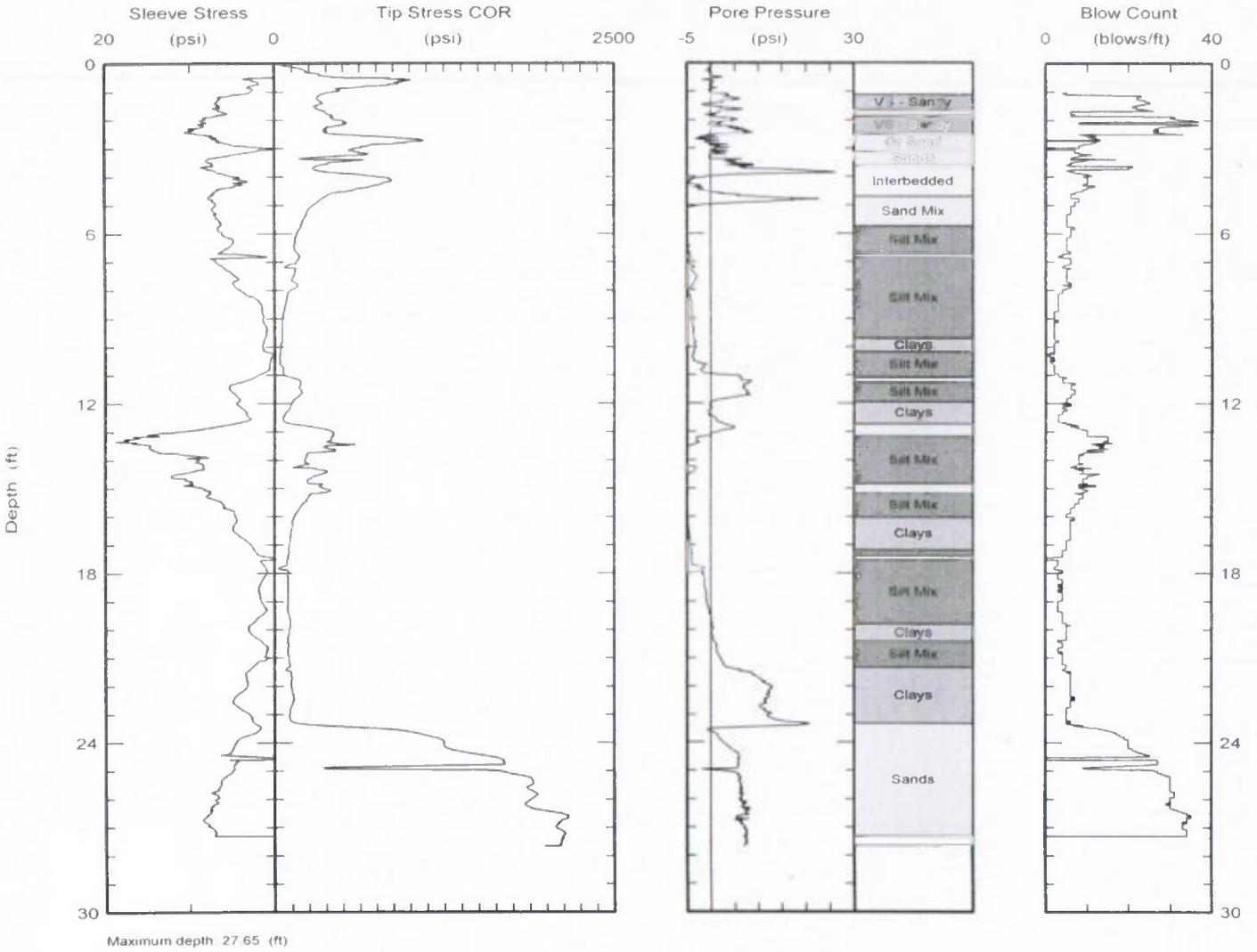


Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 10/May/2011 Test ID: cpt13 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

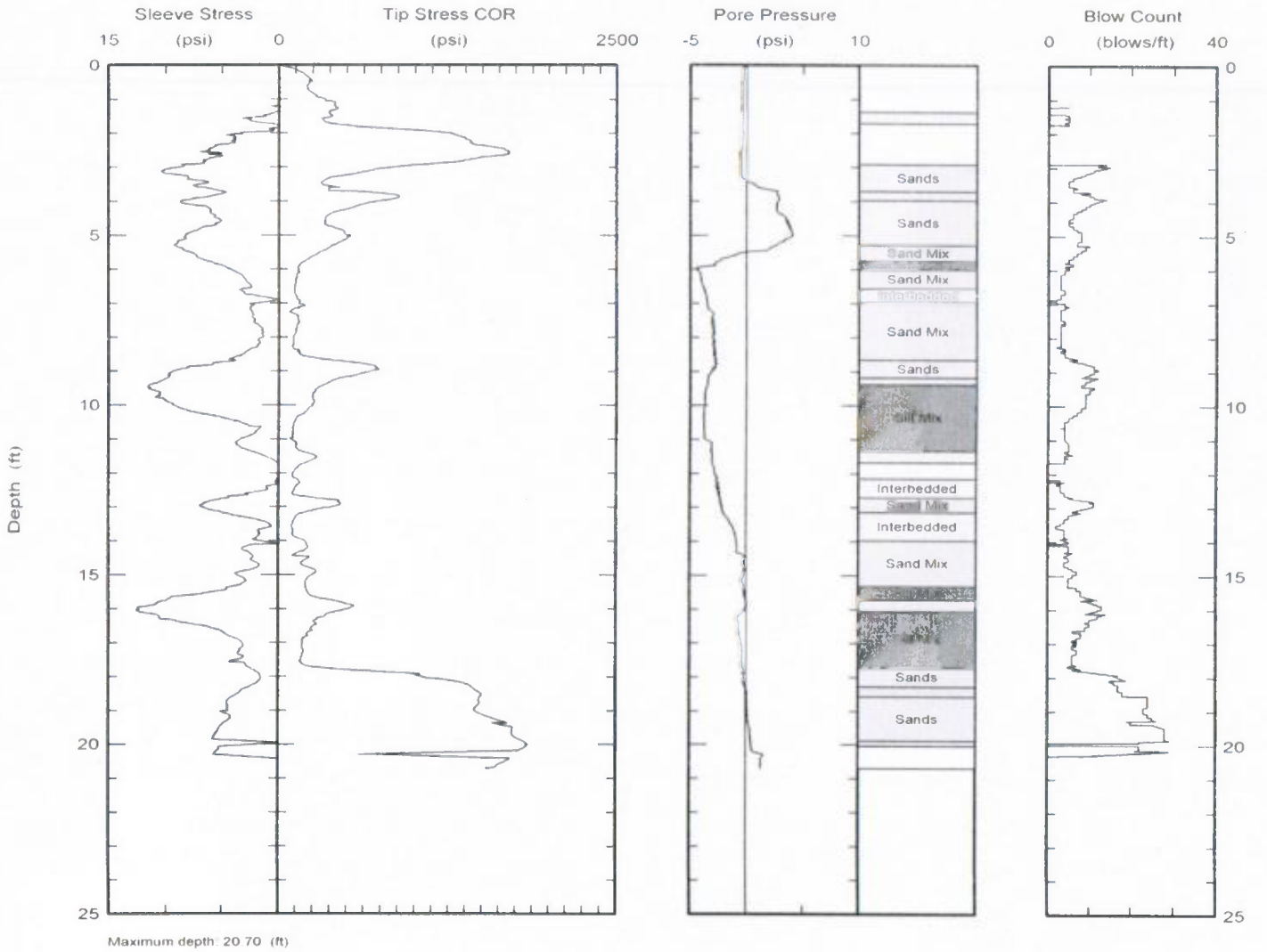


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:	Date: 15/May/2011
Easting:	Test ID: cpt14
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	



Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 15/May/2011 Test ID: cpt15 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	

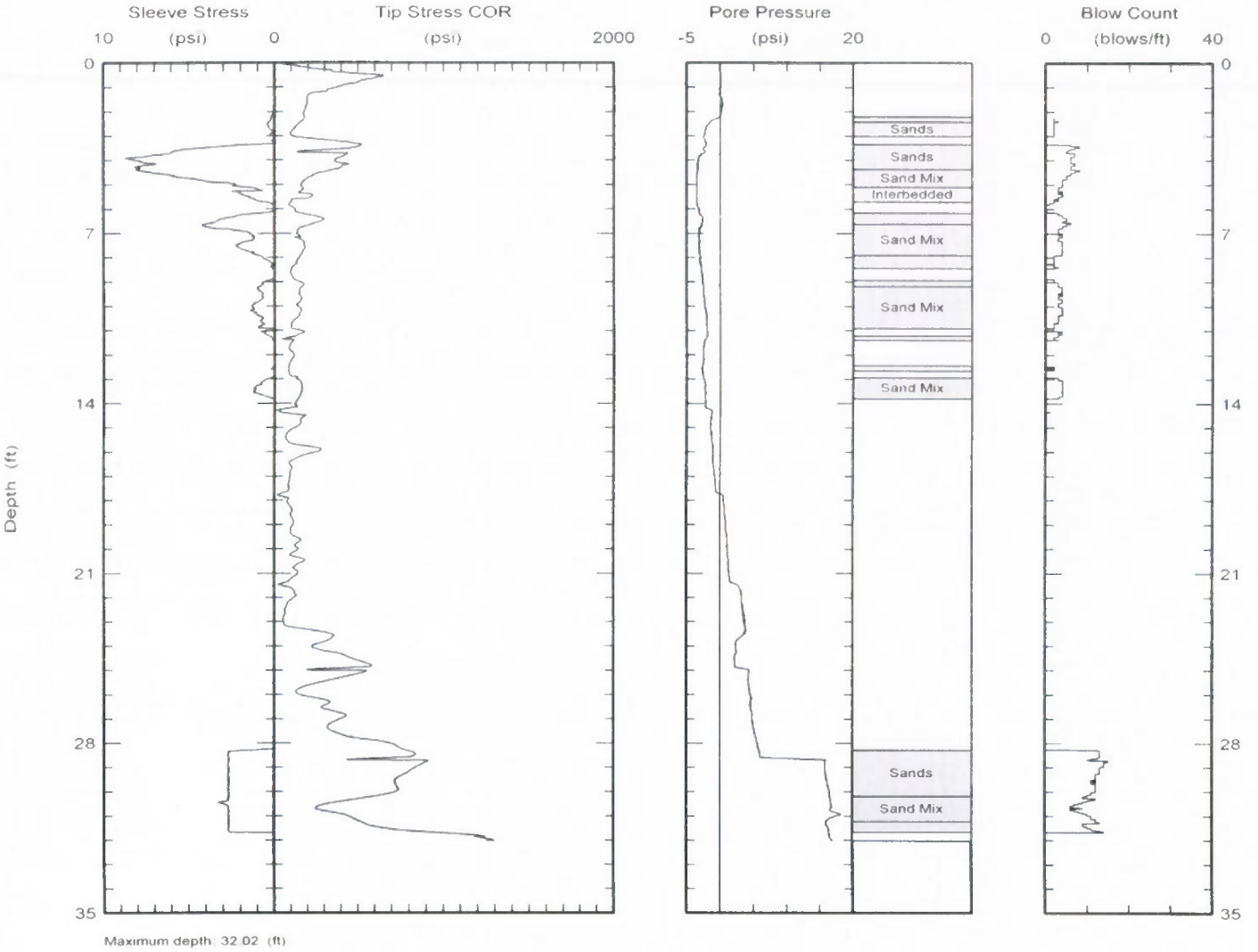


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:
Easting:
Elevation:

Date: 15/May/2011
Test ID: cpt16
Project: Alliant

Client: Aetherdbs
Job Site: Burlington

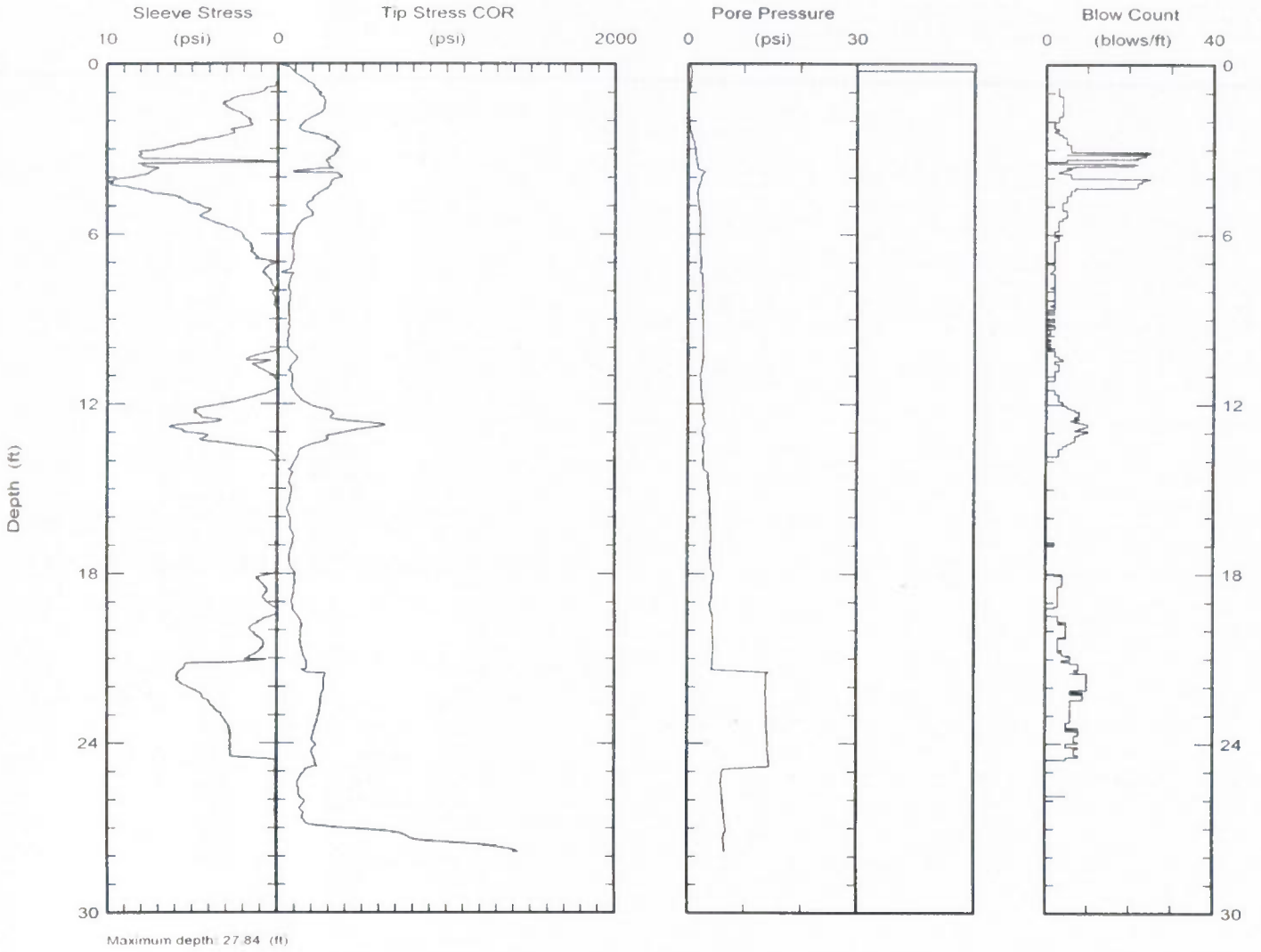


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:
Easting:
Elevation:

Date: 15/May/2011
Test ID: cpt17
Project: Alliant

Client: Aetherdbs
Job Site: Burlington

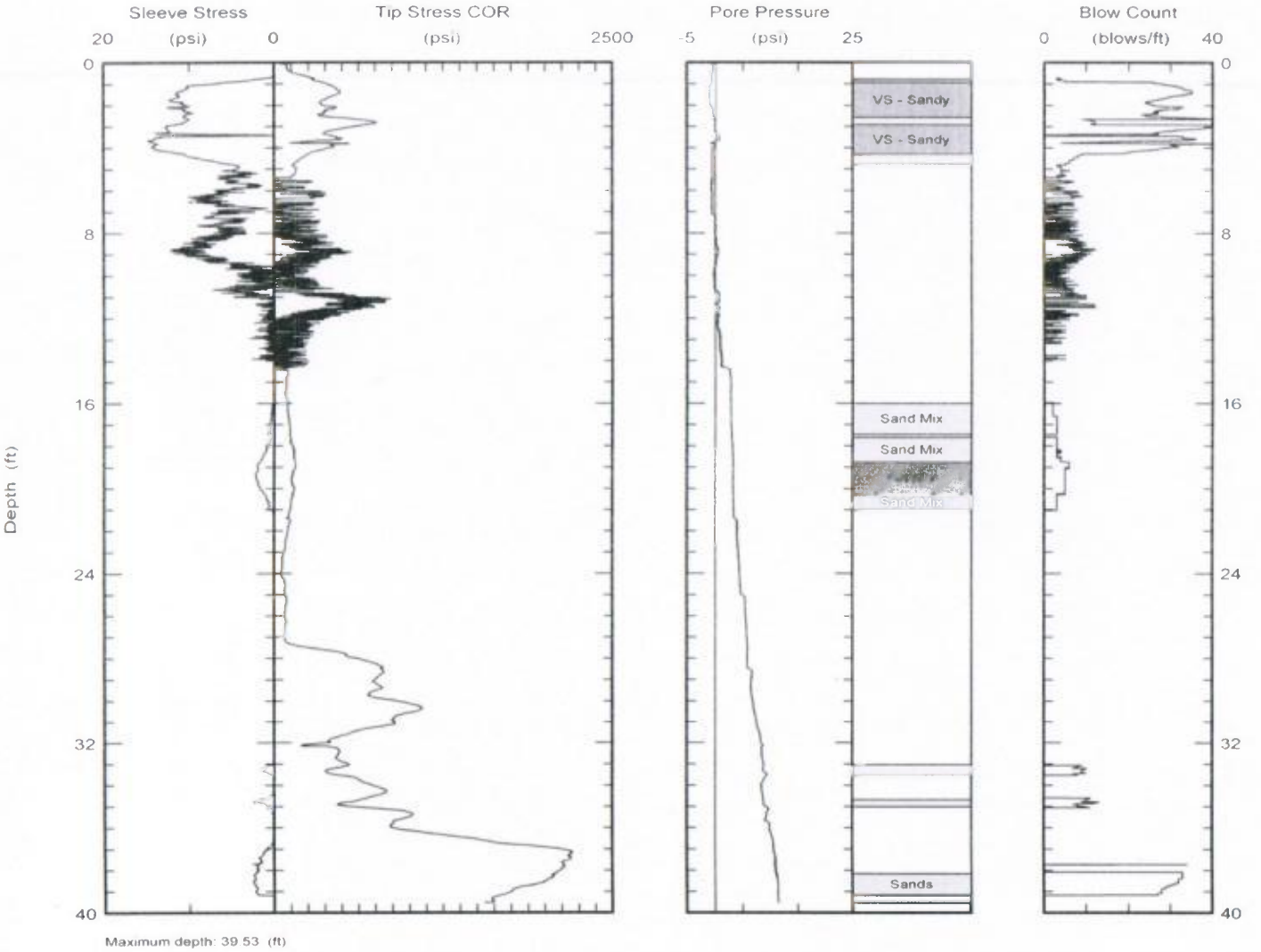


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

Northing:
Easting:
Elevation:

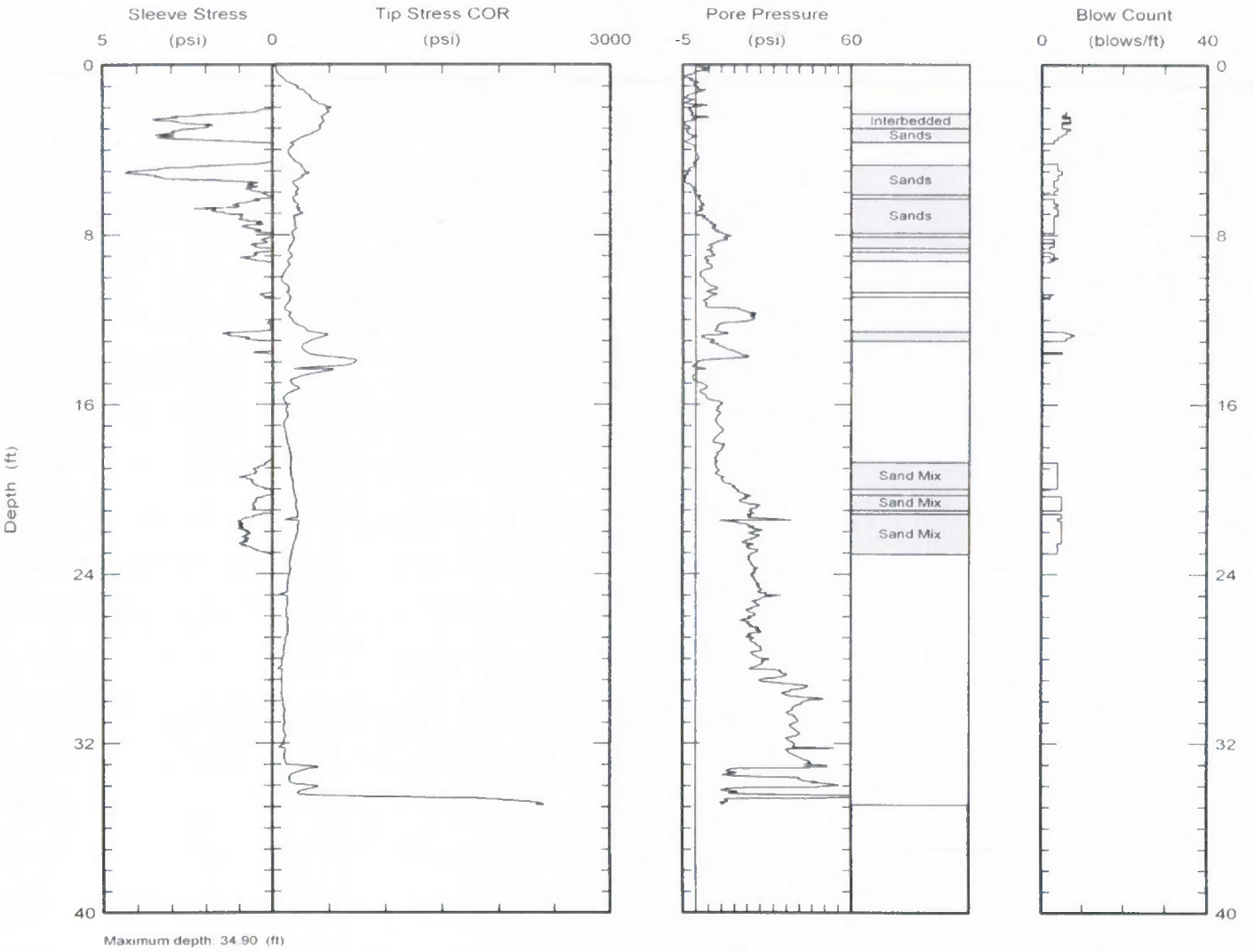
Date: 15/May/2011
Test ID: cpt18
Project: Alliant

Client: Aetherdbs
Job Site: Burlington

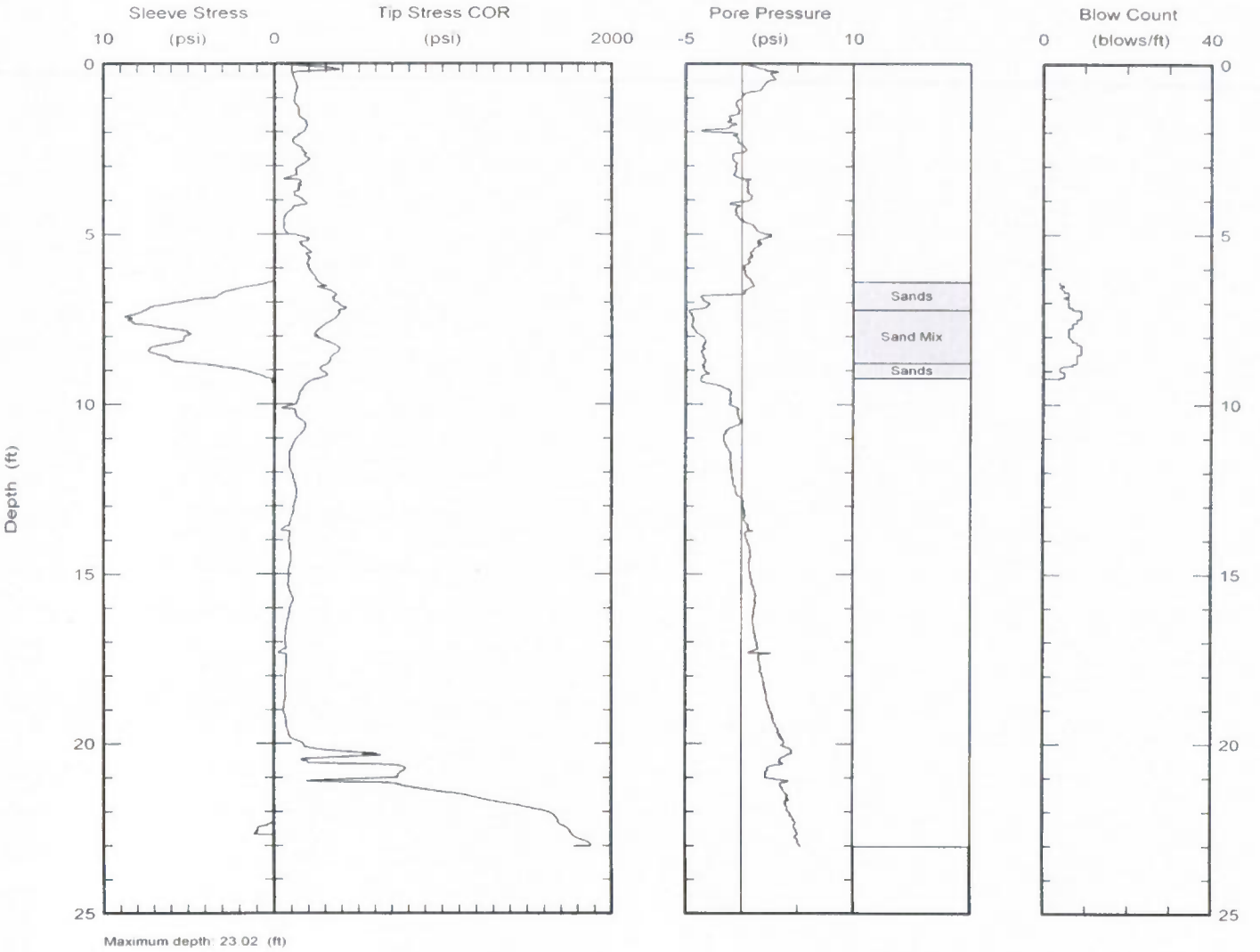


Applied Research Associates, Inc.
South Royalton, VT 05068
802-763-8348
cpt@ned.ara.com
www.ara.com

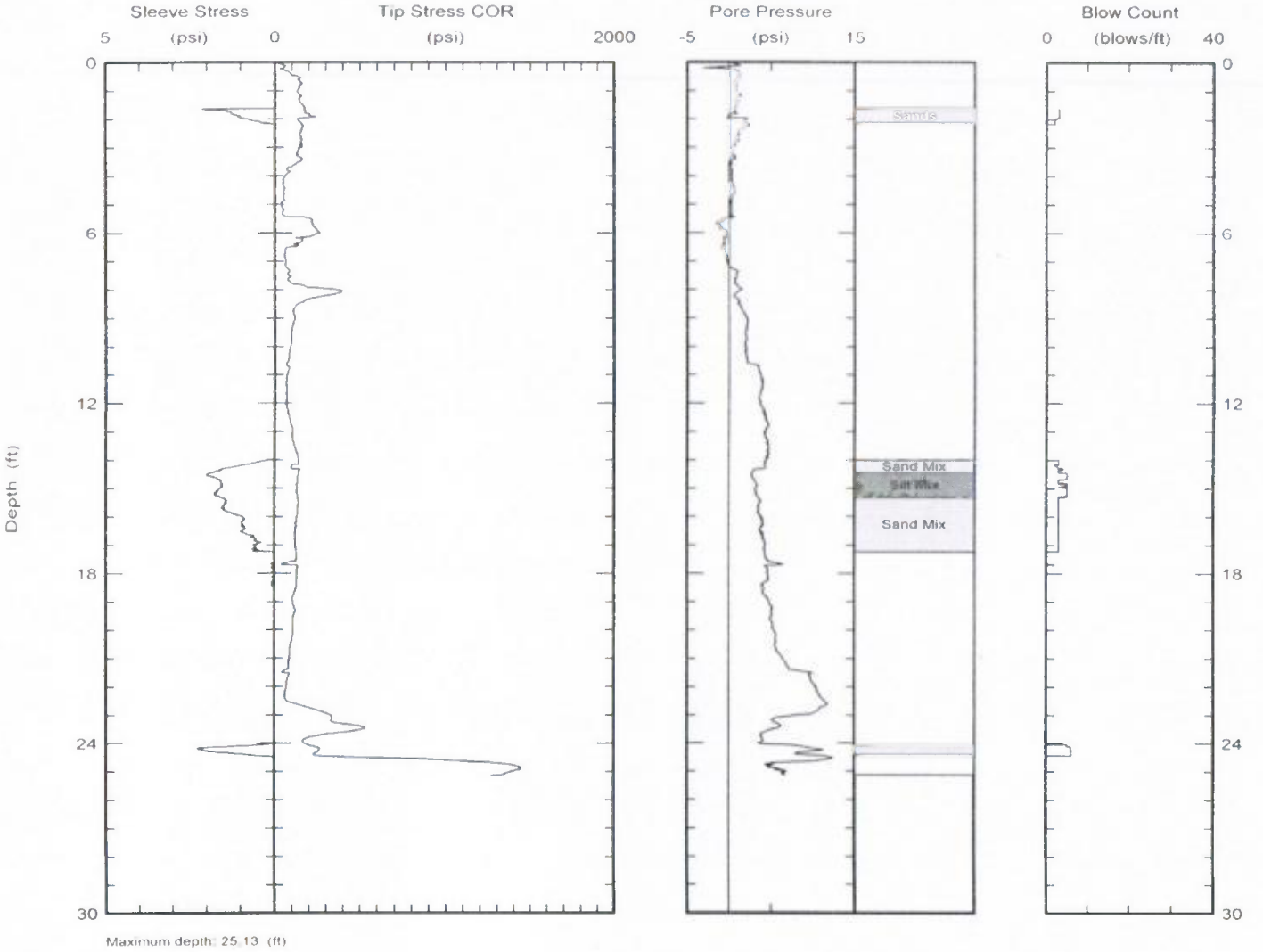
Northing:	Date: 16/May/2011
Easting:	Test ID: cpt19
Elevation:	Project: Alliant
Client: Aetherdbs	
Job Site: Burlington	

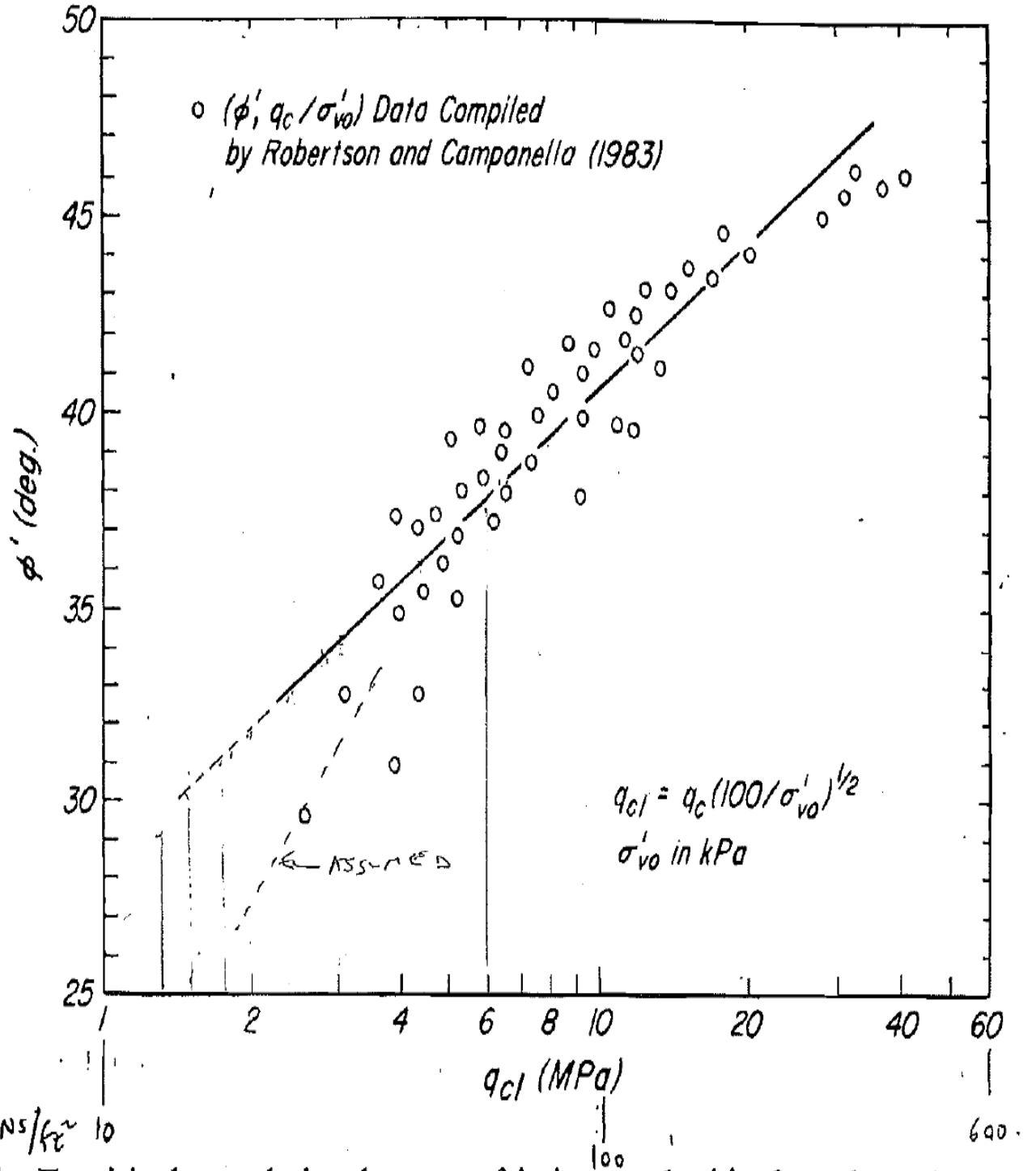


Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 16/May/2011 Test ID: cpt20 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	



Applied Research Associates, Inc. South Royalton, VT 05068 802-763-8348 cpt@ned.ara.com www.ara.com	Northing: Easting: Elevation:	Date: 16/May/2011 Test ID: cpt21 Project: Alliant
	Client: Aetherdbs Job Site: Burlington	





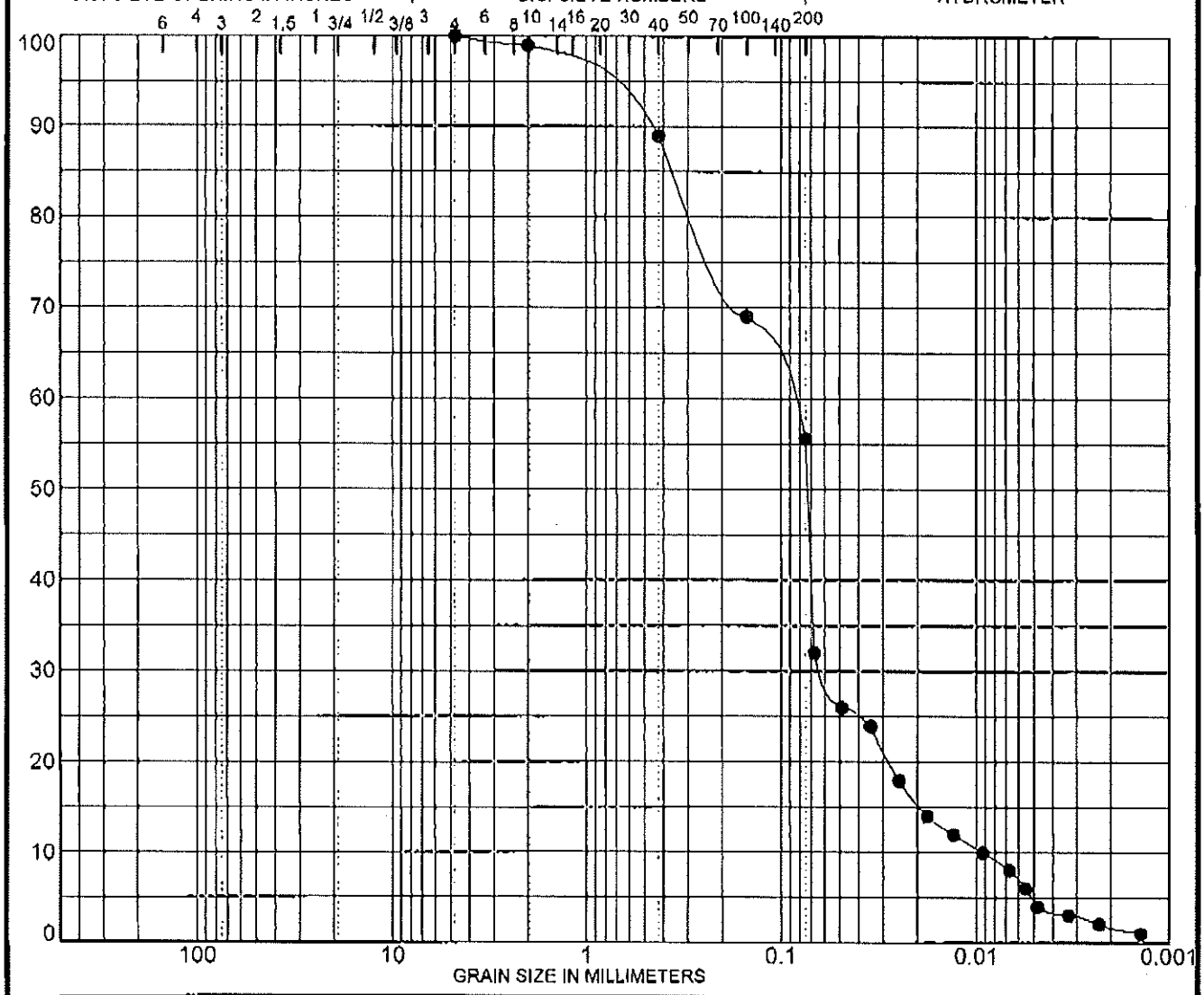
19.5 Empirical correlation between friction angle ϕ' of sands and norma penetration resistance.

Re: TERZAGHI PECK & MESRI (1996), SOIL MECHANICS IN ENG. PRACTICE, 3RD ED., JOHN WILEY & SONS, INC

EXHIBIT D – LABORATORY TESTING

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Broing: SB-1	3 inch	100
Sample: Ash	2	100
	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	99
	# 40	89
	# 100	69
	# 200	56

SOIL CLASSIFICATION: Brown ASH

%GRAVEL	%SAND	%SILT	%CLAY
0	44	54	2

MC%		LL	PL	PI
44.0		NP	NP	NP

PROJECT LOCATION: Geotechnical Testing

JOB NO.: L - 76,757

DATE: May 20, 2011

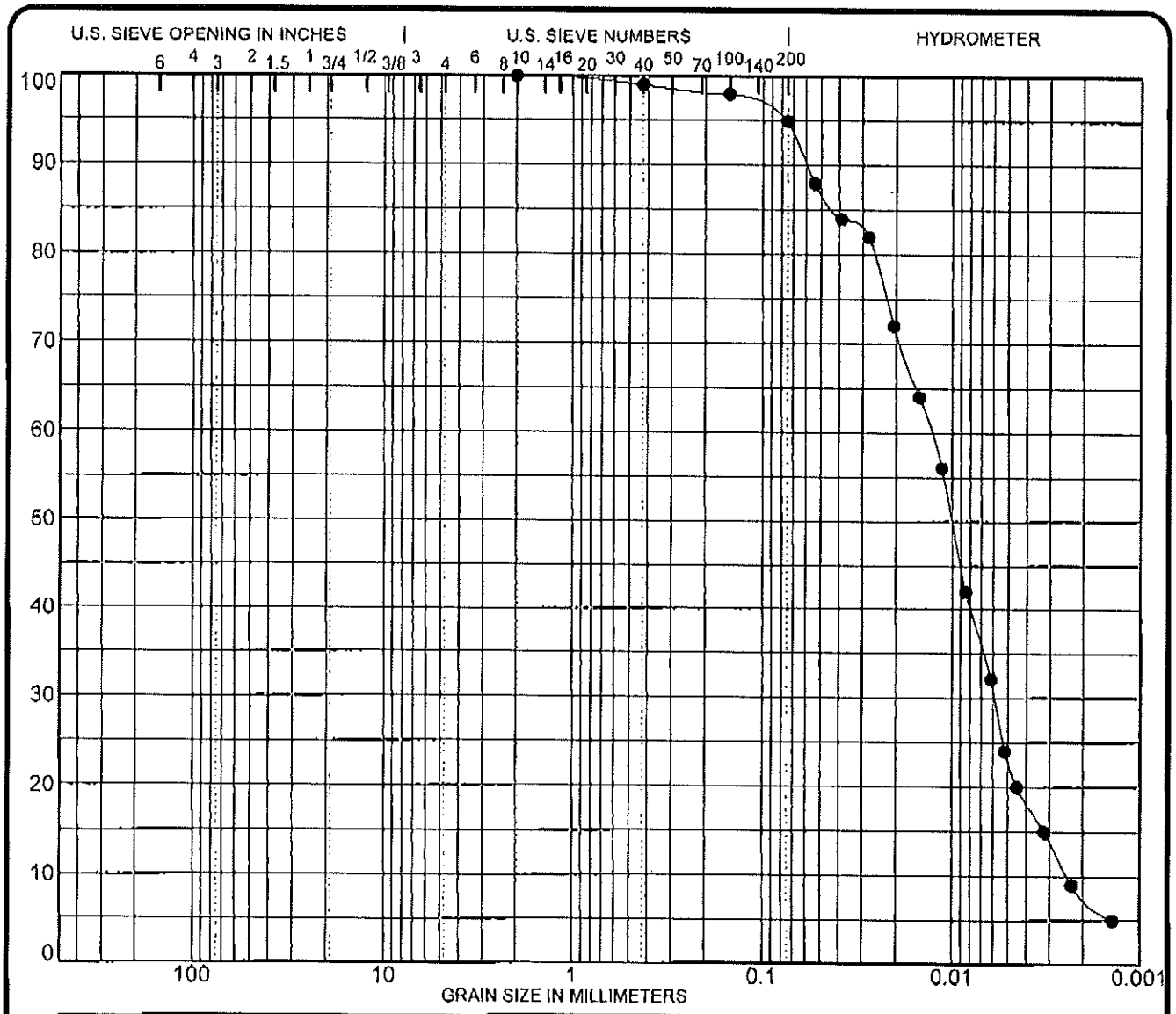
SB1

SOIL DATA SHEET

Testing Service Corporation

Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-1	3 inch	100
Sample: A	2	100
Depth: 25.0'-26.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	99
	# 100	96
	# 200	95

SOIL CLASSIFICATION: Gray clayey SILT, trace sand (ML)

%GRAVEL	%SAND	%SILT	%CLAY
0	5	87	8

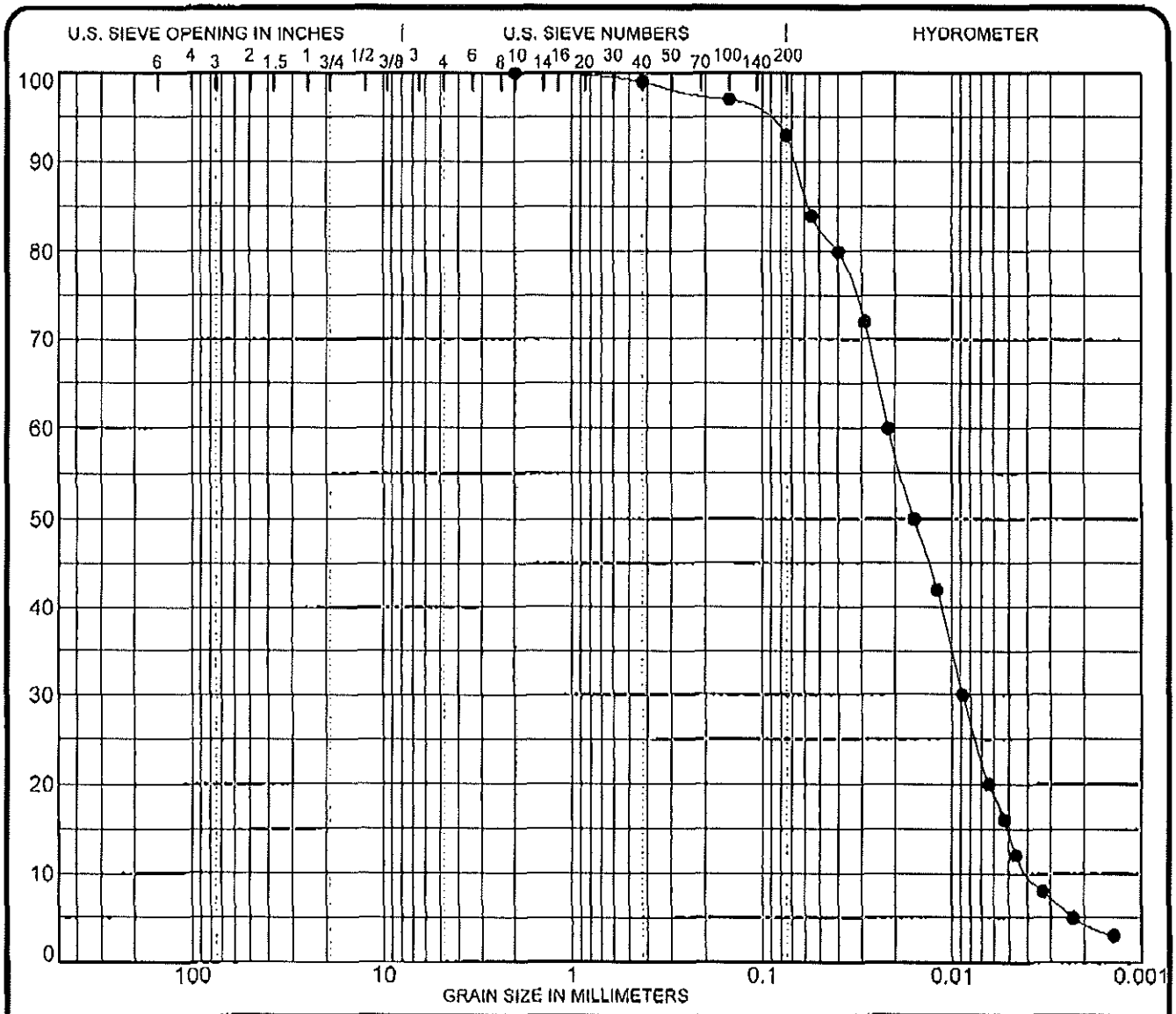
MC%		LL	PL	PI
69.4		36	31	5

PROJECT Geotechnical Testing
LOCATION ,
SB1

JOB NO. L - 76,757
DATE May 20, 2011

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-1	3 inch	100
Sample: B	2	100
Depth: 29.0'-30.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	99
	# 100	97
	# 200	93

SOIL CLASSIFICATION: Gray clayey SILT, trace sand (ML)

%GRAVEL	%SAND	%SILT	%CLAY
0	7	89	4

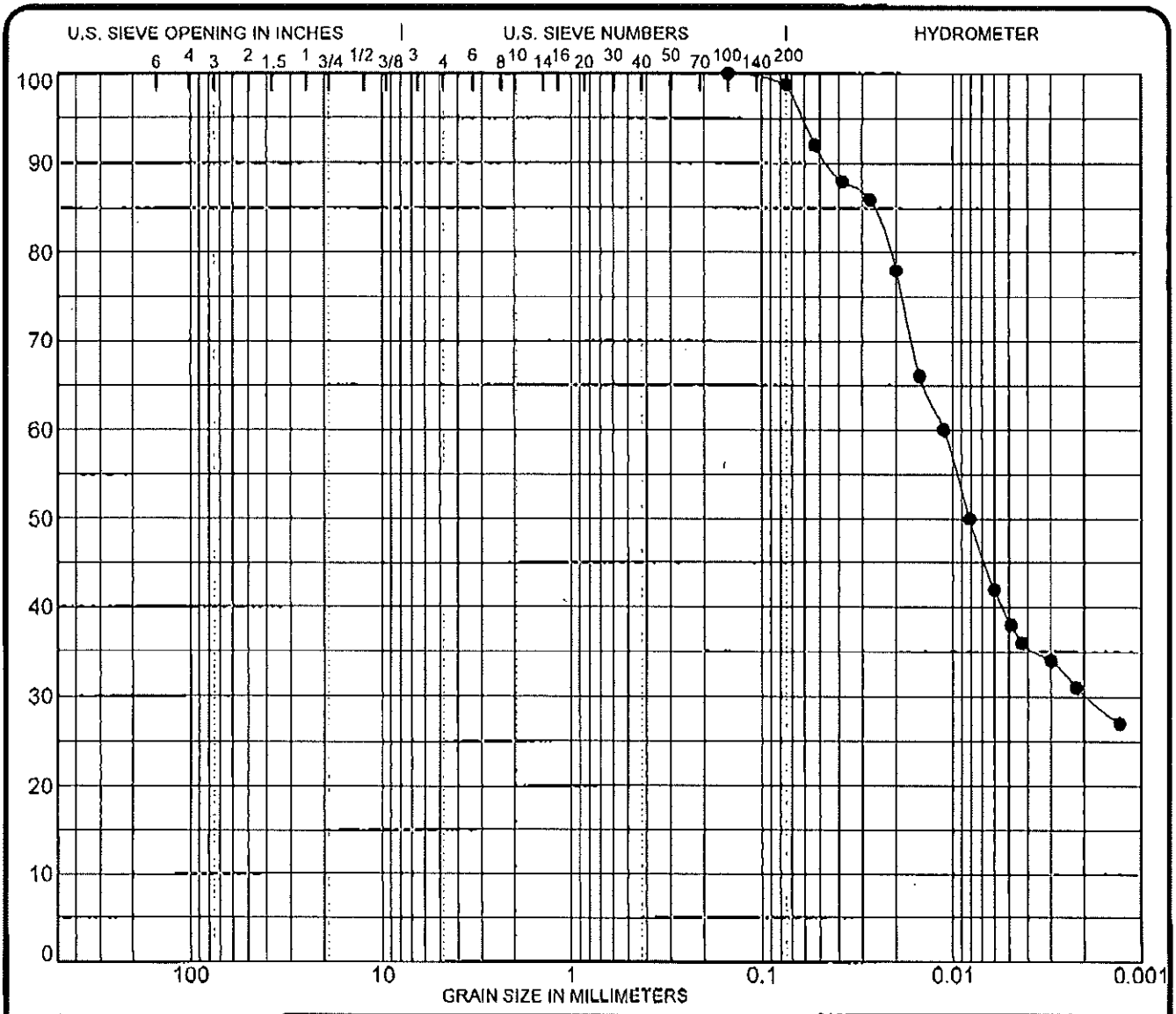
MC%		LL	PL	PI
58.6		40	37	3

PROJECT Geotechnical Testing
LOCATION SB1
JOB NO. L - 76,757
DATE May 20, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-1	3 inch	100
Sample: C	2	100
Depth: 34.0'-35.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	100
	# 100	100
	# 200	99

SOIL CLASSIFICATION

Gray silty CLAY, trace sand (CH)

%GRAVEL	%SAND	%SILT	%CLAY
0	1	69	30

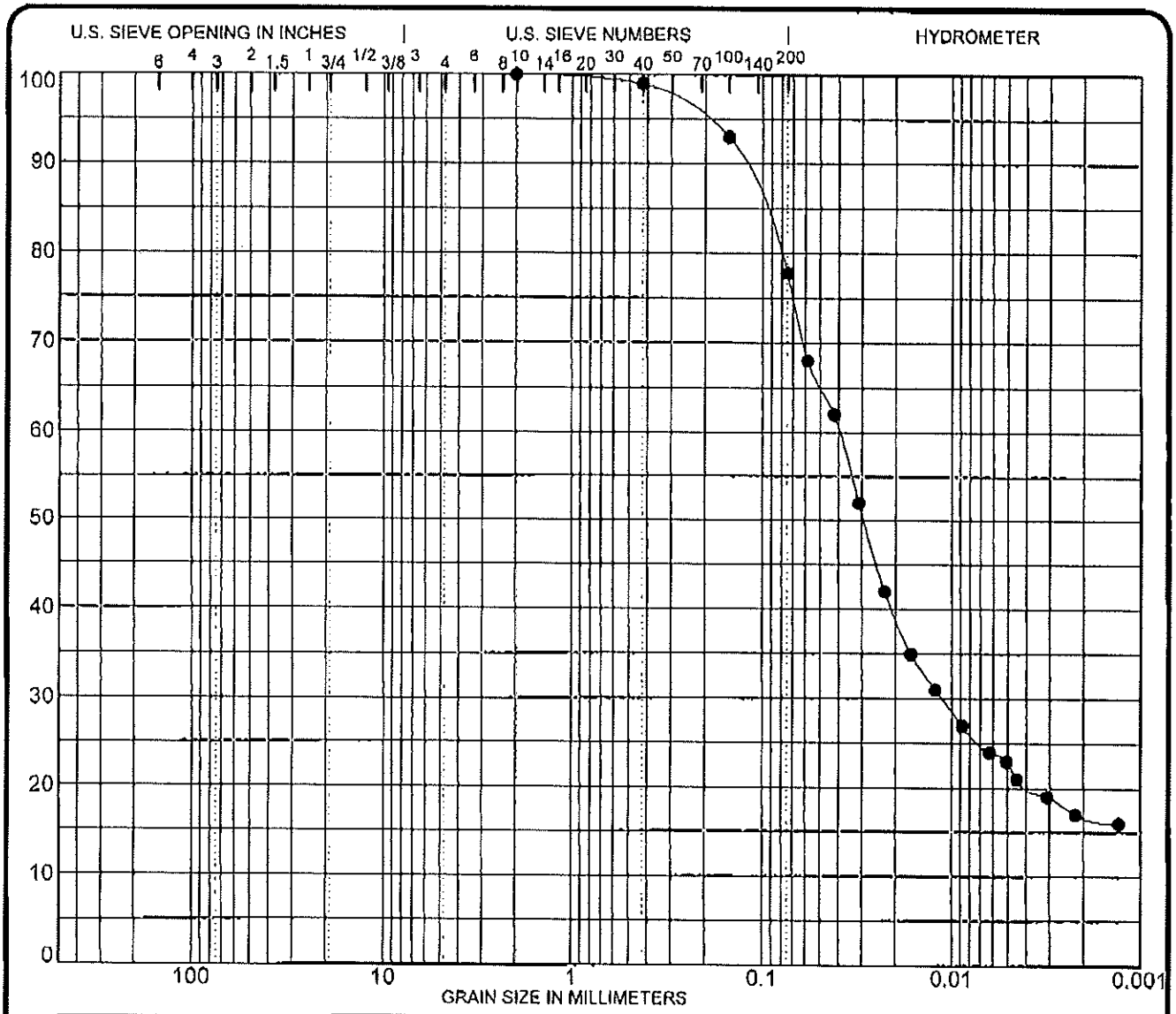
MC%		LL	PL	PI
31.3		52	17	35

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB1

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-1	3 inch	100	Gray very silty CLAY, some sand (CL)
Sample: D	2	100	
Depth: 36.0'-37.0'	1 1/2	100	
	1	100	
NOTES:	3/4	100	
	3/8	100	
	# 4	100	
	# 10	100	
	# 40	99	
	# 100	93	
	# 200	78	

%GRAVEL	%SAND	%SILT	%CLAY
0	22	61	17

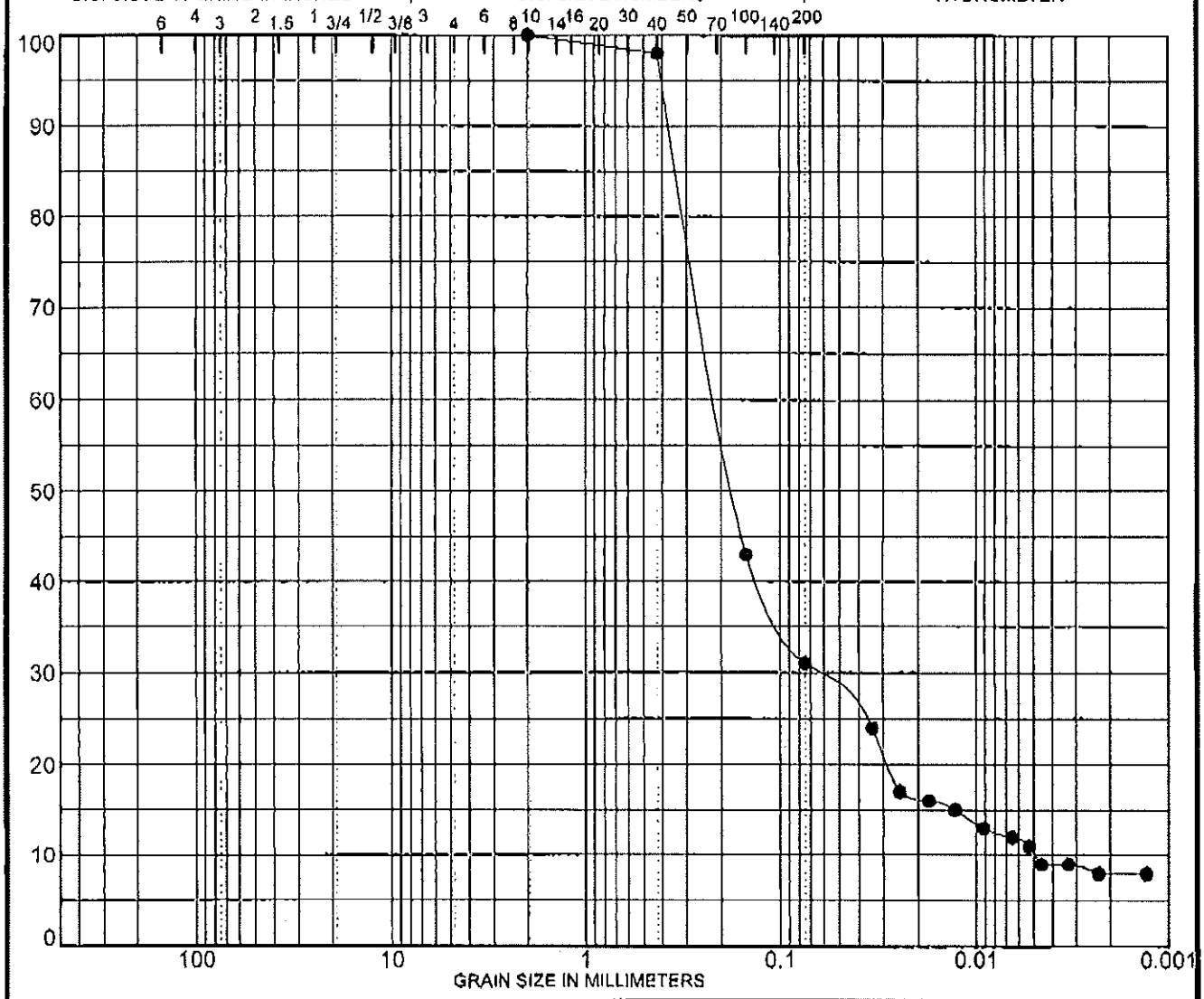
MC%		LL	PL	PI
29.1		36	16	20

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB1

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-1	3 inch	100
Sample: E	2	100
Depth: 37.0'-38.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	98
	# 100	43
	# 200	31

SOIL CLASSIFICATION: Gray clayay SAND (SC)

%GRAVEL	%SAND	%SILT	%CLAY
0	69	23	8

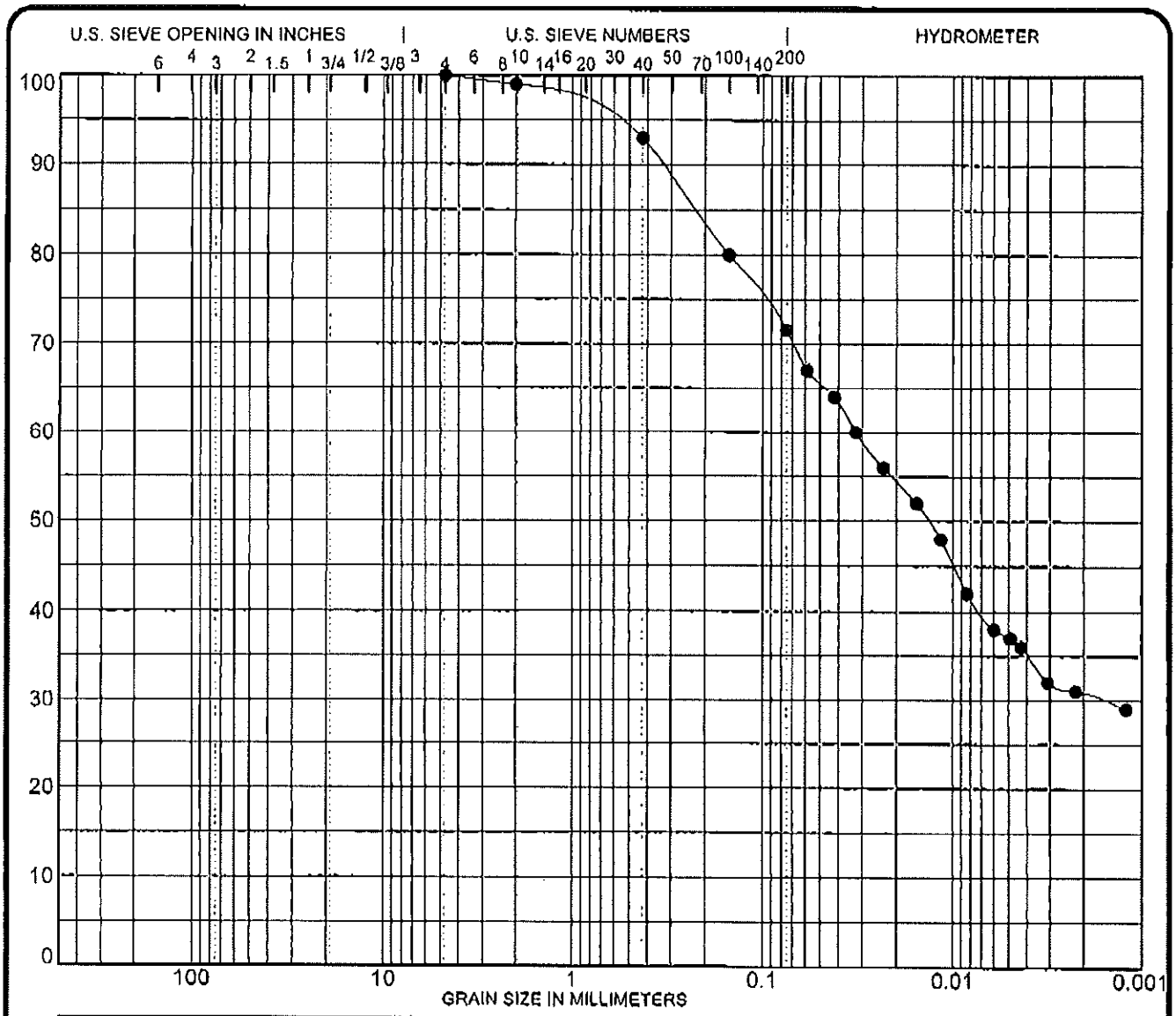
MC%		LL	PL	PI
30.4		22	14	8

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB1

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 7675?.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

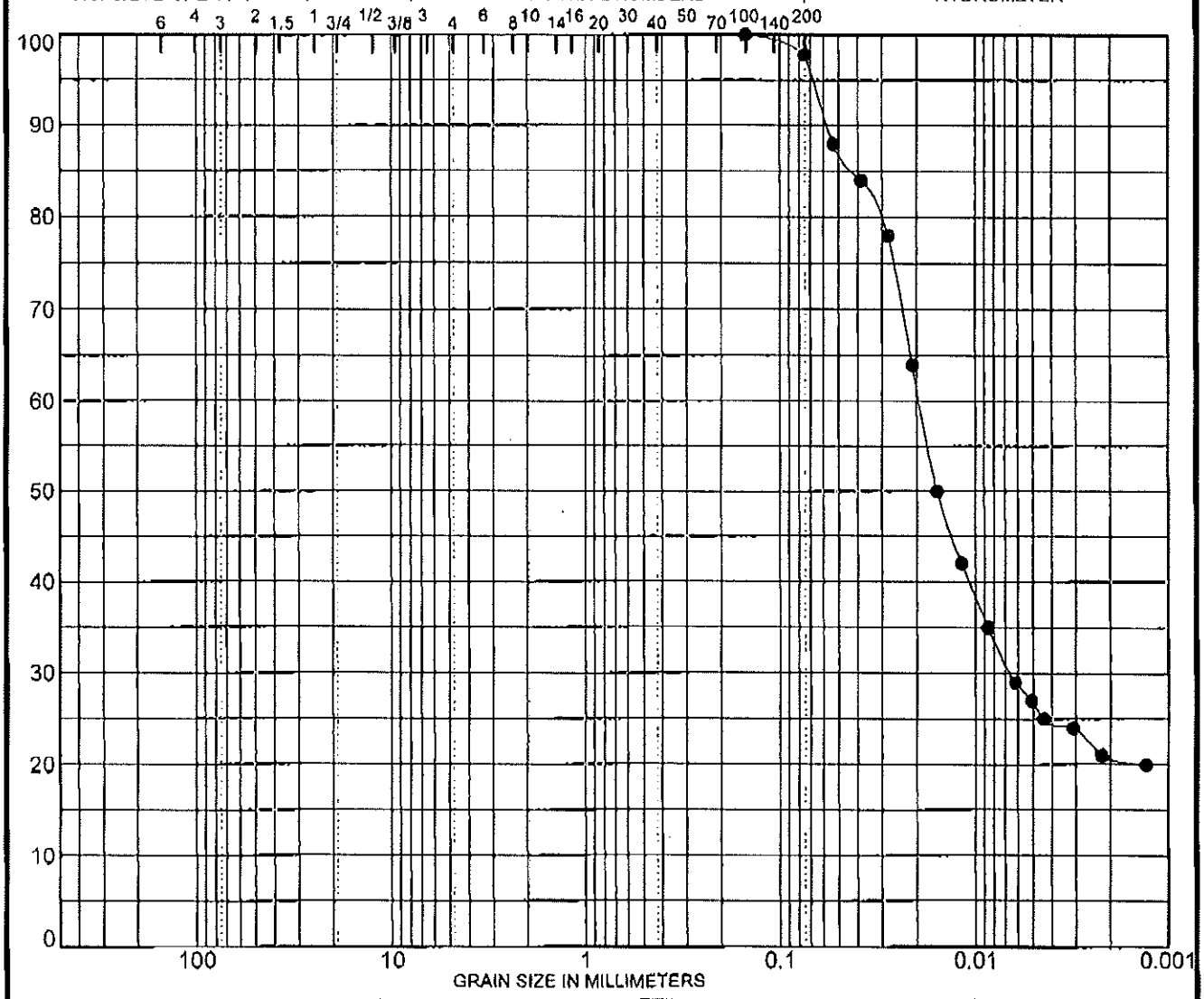
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-2	3 inch	100	Brownish gray silty CLAY, some sand
Sample: A	2	100	(CL)
Depth: 8.0'-9.0'	1 1/2	100	
	1	100	%GRAVEL: 0 | %SAND: 28 | %SILT: 41 | %CLAY: 31
NOTES:	3/4	100	
	3/8	100	
	# 4	100	MC%: 15.7 | LL: 46 | PL: 12 | PI: 34
	# 10	99	
	# 40	93	
	# 100	80	
	# 200	72	

PROJECT Geotechnical Testing
LOCATION ,
SB2

JOB NO. L - 76,757
DATE May 20, 2011

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGEN3 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-2	3 inch	100
Sample: B	2	100
Depth: 28.0'-29.0	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	100
	# 100	100
	# 200	98

SOIL CLASSIFICATION

Dark gray very silty CLAY, trace sand

(CL)

%GRAVEL	%SAND	%SILT	%CLAY
0	2	77	21

MC%		LL	PL	PI
35.1		42	18	24

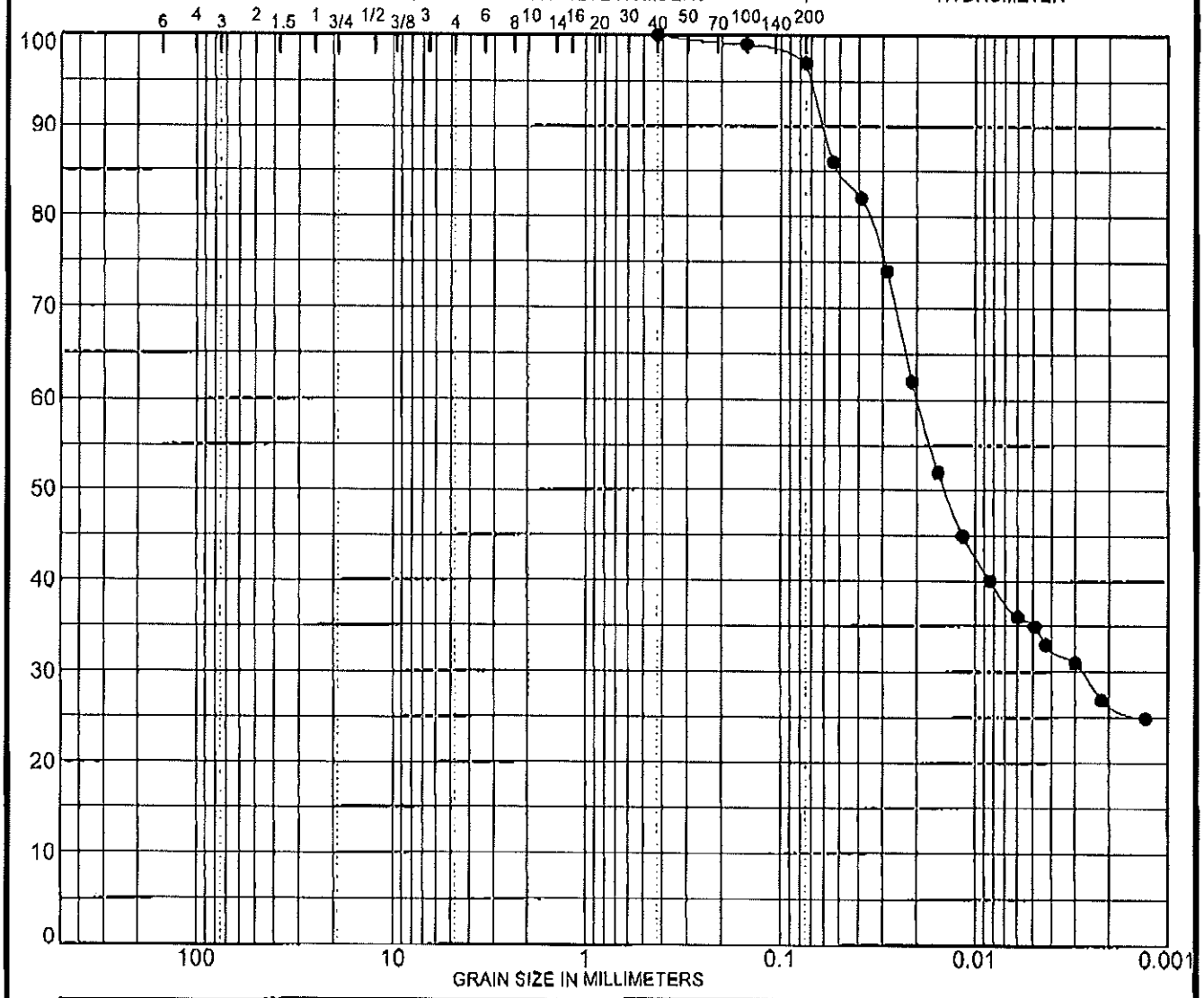
PROJECT Geotechnical Testing
LOCATION
SB2

JOB NO. L - 76,757
DATE May 20, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

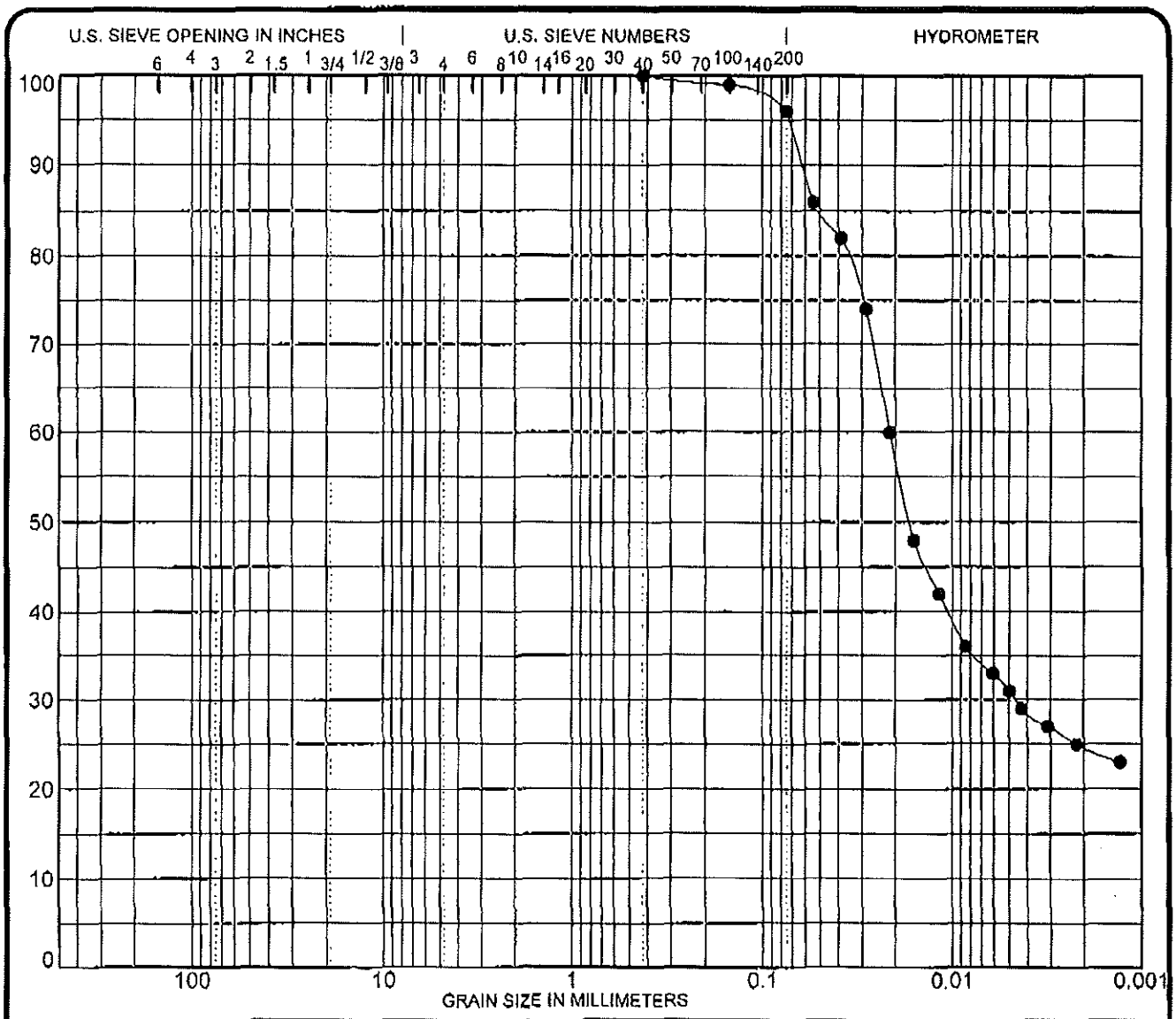
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-2	3 inch	100	Dark gray silty CLAY, trace sand (CH)
Sample: C	2	100	
Depth: 32.0'	1 1/2	100	
	1	100	%GRAVEL: 0 | %SAND: 3 | %SILT: 70 | %CLAY: 27
NOTES:	3/4	100	
	3/8	100	
	# 4	100	MC%: 32.9 | LL: 51 | PL: 16 | PI: 35
	# 10	100	
	# 40	100	
	# 100	99	
	# 200	97	

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB2

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILSENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-3	3 inch	100	Dark gray very silty CLAY, trace sand
Sample: A	2	100	(CL)
Depth: 38.0'	1 1/2	100	
	1	100	%GRAVEL: 0 | %SAND: 4 | %SILT: 71 | %CLAY: 25
NOTES:	3/4	100	
	3/8	100	
	# 4	100	MC%: 34.4 | LL: 46 | PL: 15 | PI: 31
	# 10	100	
	# 40	100	
	# 100	99	
	# 200	96	

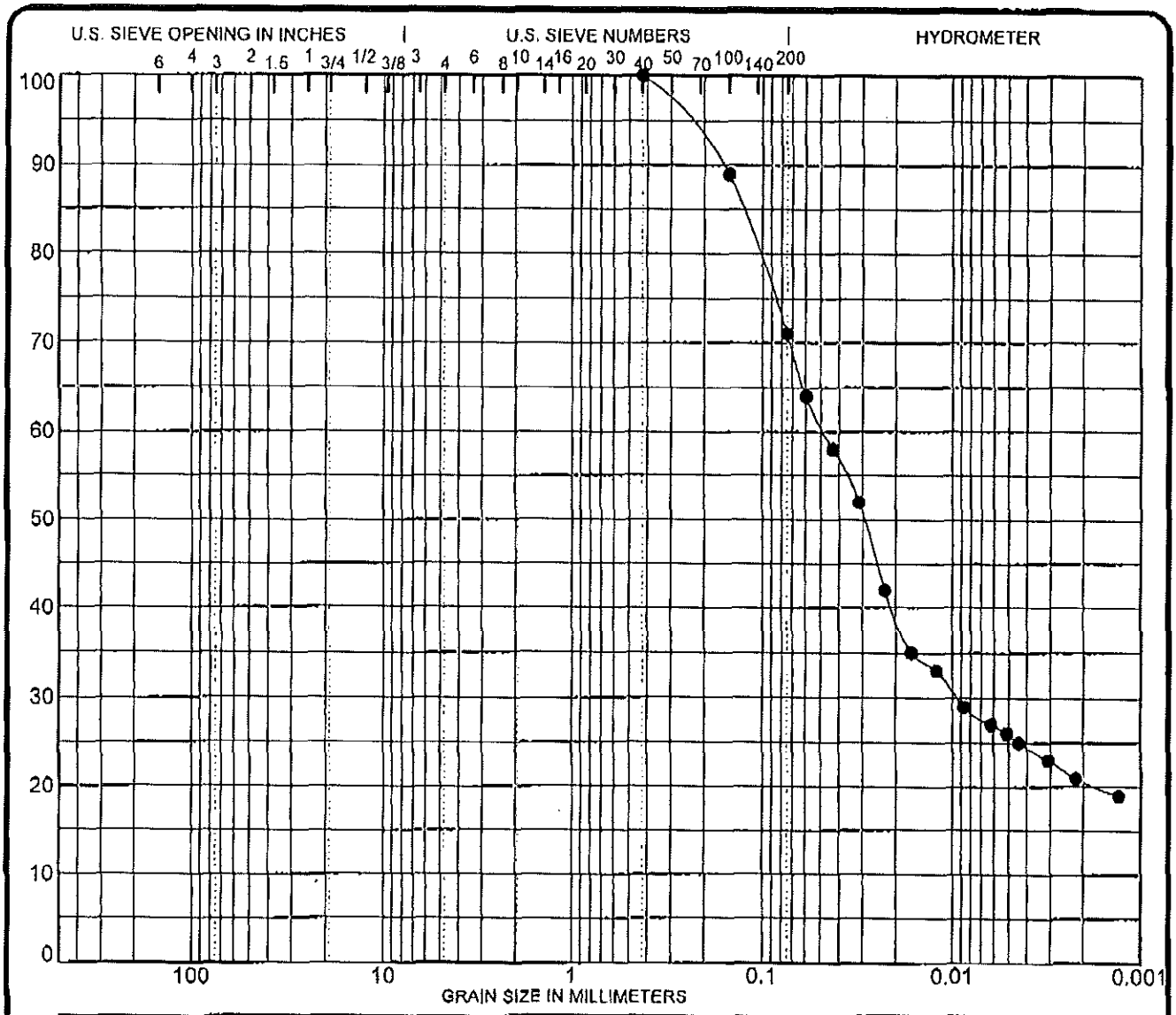
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 20, 2011

SB3

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGEN|R 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

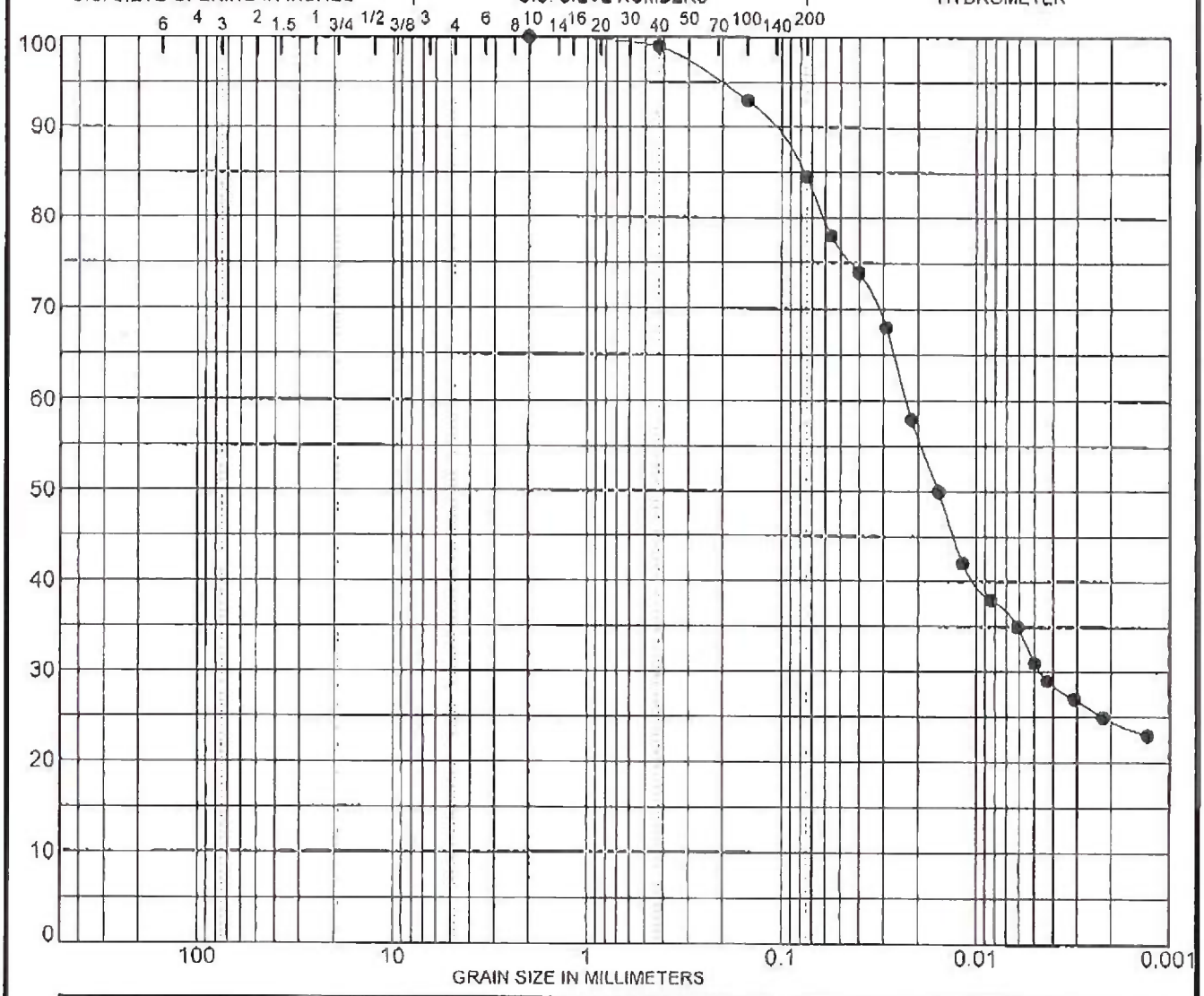
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-4	3 inch	100	Dark gray silty CLAY, some sand (CL)
Sample: A	2	100	
Depth: 34.0'	1 1/2	100	
	1	100	%GRAVEL: 0 | %SAND: 29 | %SILT: 50 | %CLAY: 21
NOTES:	3/4	100	
	3/8	100	
	# 4	100	MC%: 24.1 | LL: 41 | PL: 12 | PI: 29
	# 10	100	
	# 40	100	
	# 100	89	
	# 200	71	

PROJECT Geotechnical Testing
LOCATION ,
SB4

JOB NO. L - 76,757
DATE May 20, 2011

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/20/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-5	3 inch	100	Gray very silty CLAY, little sand (CL)
Sample: A	2	100	
Depth: 34.0'	1 1/2	100	
	1	100	
NOTES:	3/4	100	
	3/8	100	
	# 4	100	
	# 10	100	
	# 40	99	
	# 100	93	
	# 200	85	

%GRAVEL	%SAND	%SILT	%CLAY
0	15	60	25

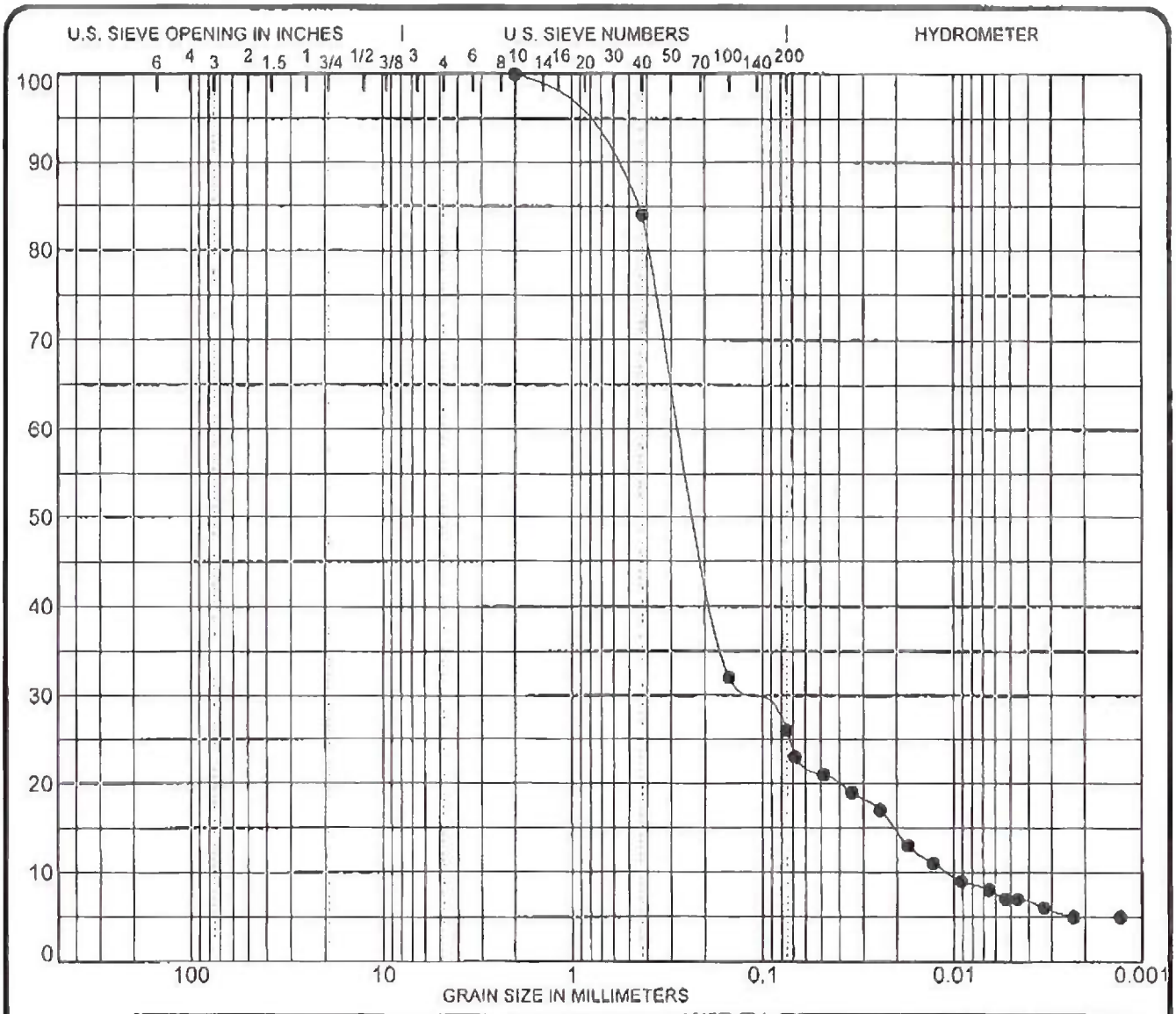
MC%		LL	PL	PI
23.3		43	16	27

PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB5

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-6	3 inch	100
Sample: A	2	100
Depth: 16.0'-17.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	84
	# 100	32
	# 200	26

SOIL CLASSIFICATION: Gray clayey SAND (SC)

%GRAVEL	%SAND	%SILT	%CLAY
0	74	21	5

MC%		LL	PL	PI
24.6		16	13	3

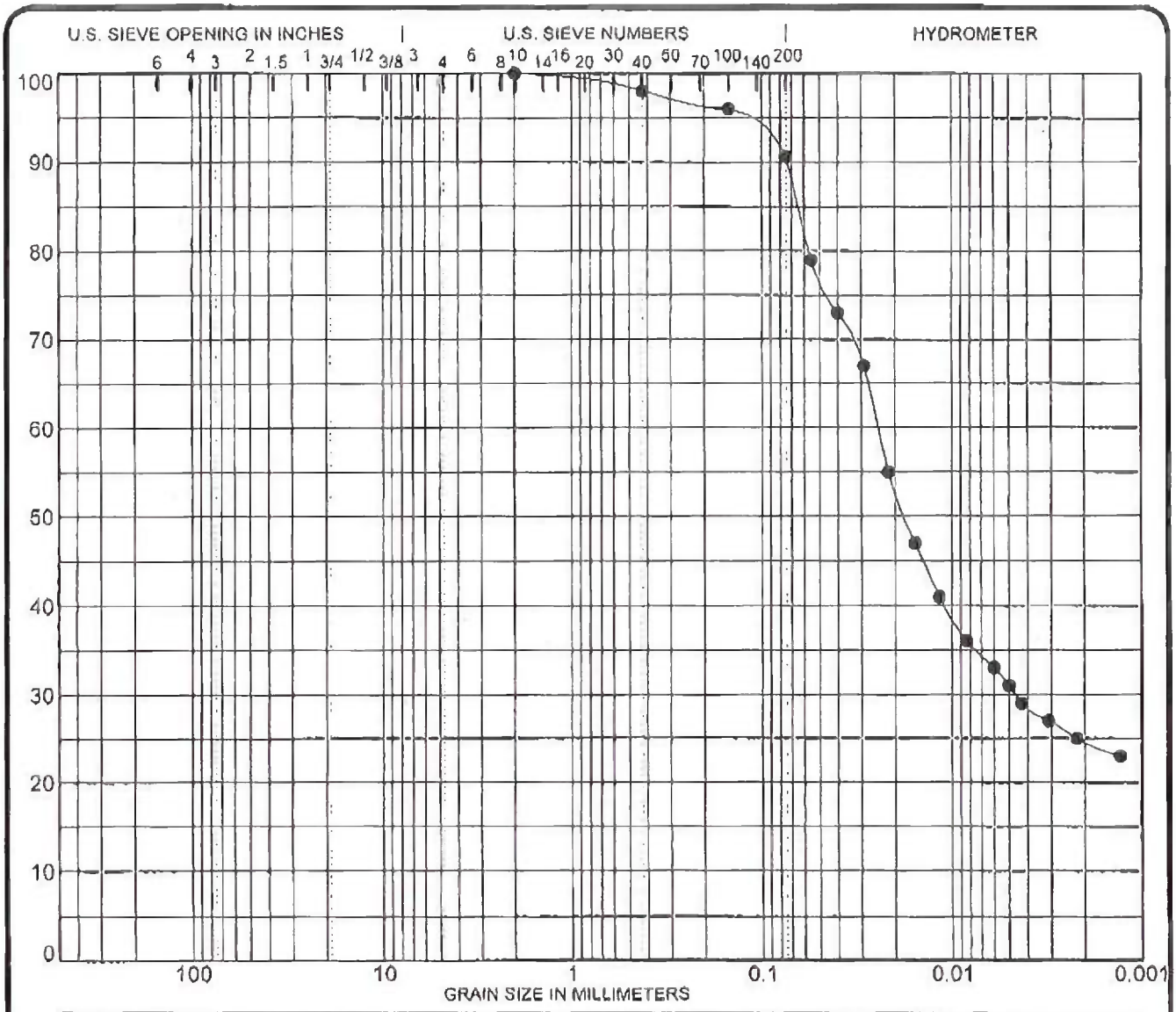
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB6

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-6	3 inch	100
Sample: B	2	100
Depth: 28.0'-29.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	98
	# 100	96
	# 200	91

SOIL CLASSIFICATION: Brownish gray very silty CLAY, trace sand (CL)

%GRAVEL	%SAND	%SILT	%CLAY
0	9	66	25

MC%		LL	PL	PI
28.3		43	13	30

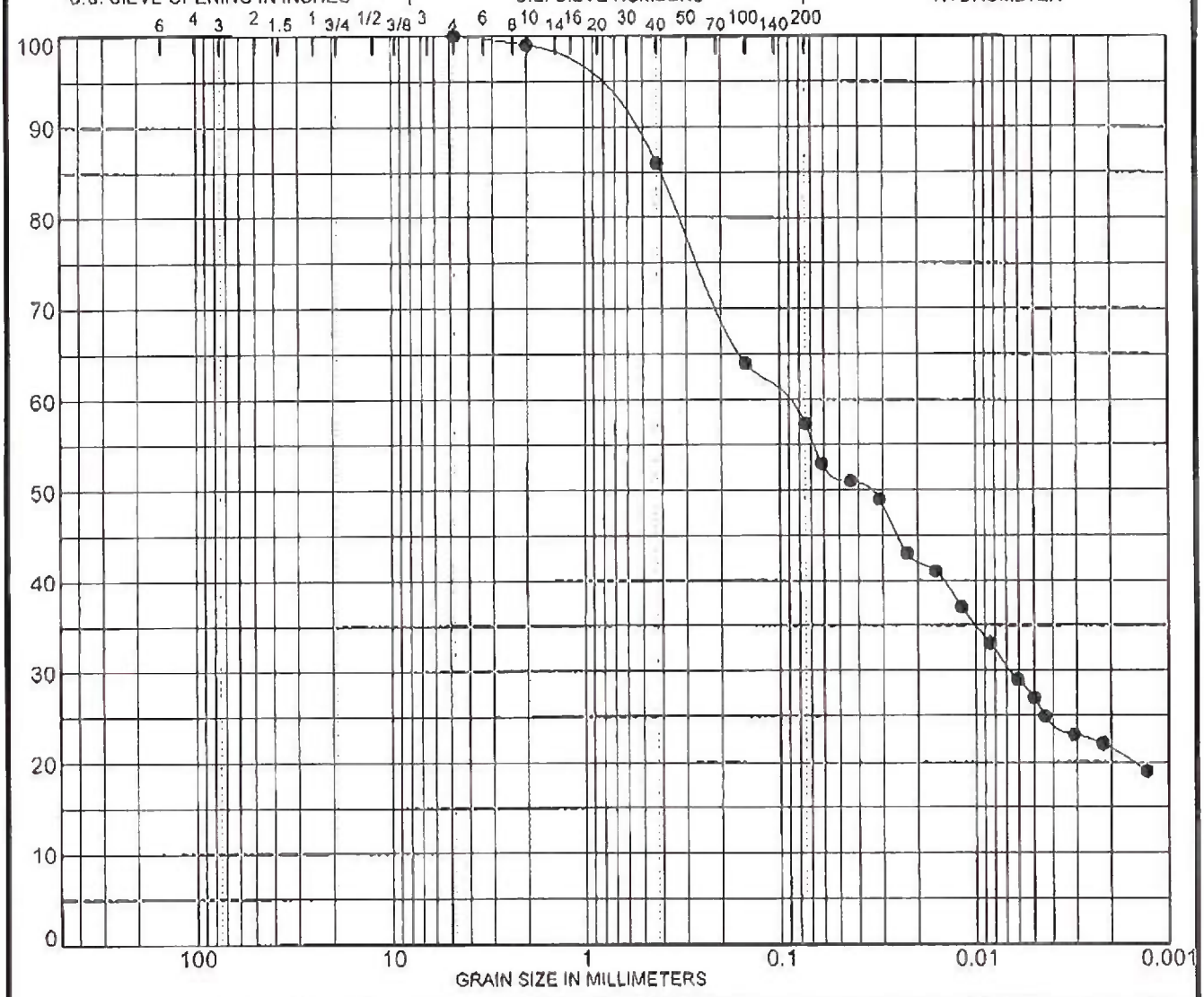
PROJECT Geotechnical Testing
LOCATION ,
SB6

JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-8	3 inch	100
Sample: A	2	100
Depth: 10.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	99
	# 40	86
	# 100	64
	# 200	57

SOIL CLASSIFICATION: Gray sandy CLAY (CL)

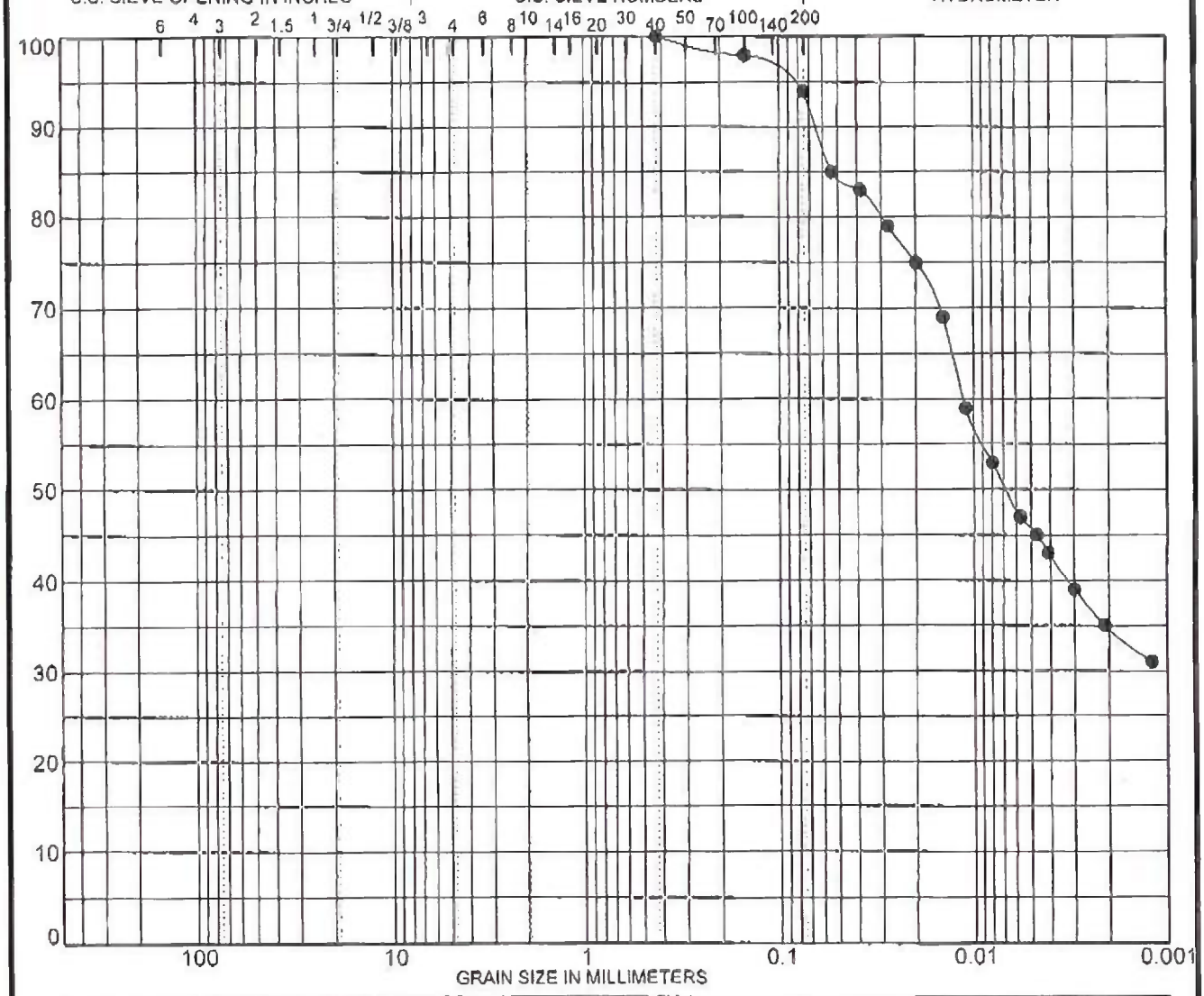
%GRAVEL	%SAND	%SILT	%CLAY
0	43	36	21

MC%		LL	PL	PI
21.6		36	12	24

PROJECT Geotechnical Testing
LOCATION SB8
JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757 GPJ TSC_ALL GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-8	3 inch	100
Sample: 8	2	100
Depth: 20.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	100
	# 100	98
	# 200	94

SOIL CLASSIFICATION: Gray very silty CLAY, trace sand (CL)

%GRAVEL	%SAND	%SILT	%CLAY
0	6	59	35

MC%		LL	PL	PI
31.1		56	19	37

PROJECT LOCATION: Geotechnical Testing , SB8

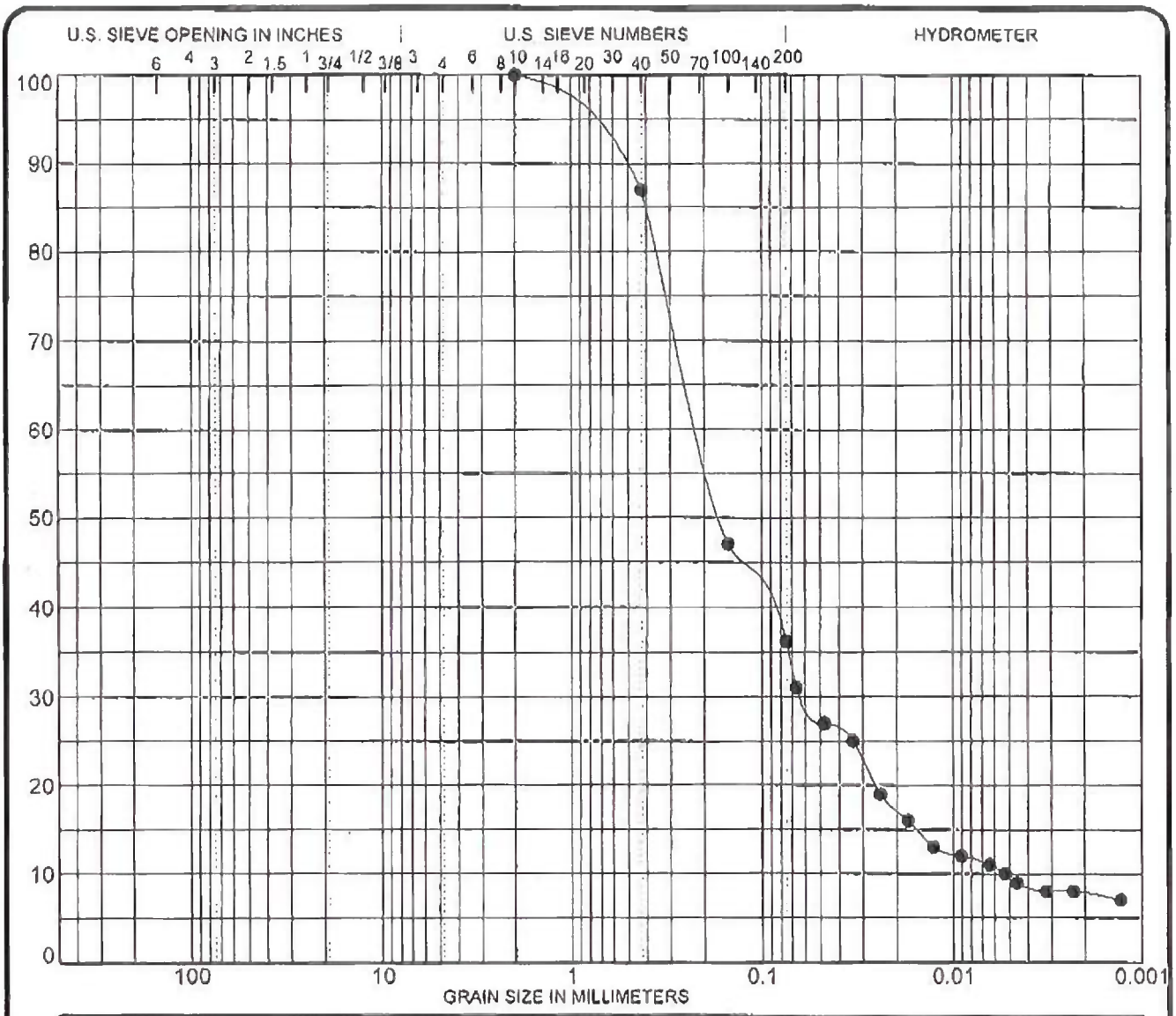
JOB NO. L - 76,757

DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION
Boring: SB-8	3 inch	100	Gray clayey SAND (SC)
Sample: C	2	100	
Depth: 22.0'	1 1/2	100	
	1	100	%GRAVEL: 0 | %SAND: 64 | %SILT: 28 | %CLAY: 8
NOTES:	3/4	100	
	3/8	100	
	# 4	100	MC%: 26.9 | LL: 21 | PL: 13 | PI: 8
	# 10	100	
	# 40	87	
	# 100	47	
	# 200	36	

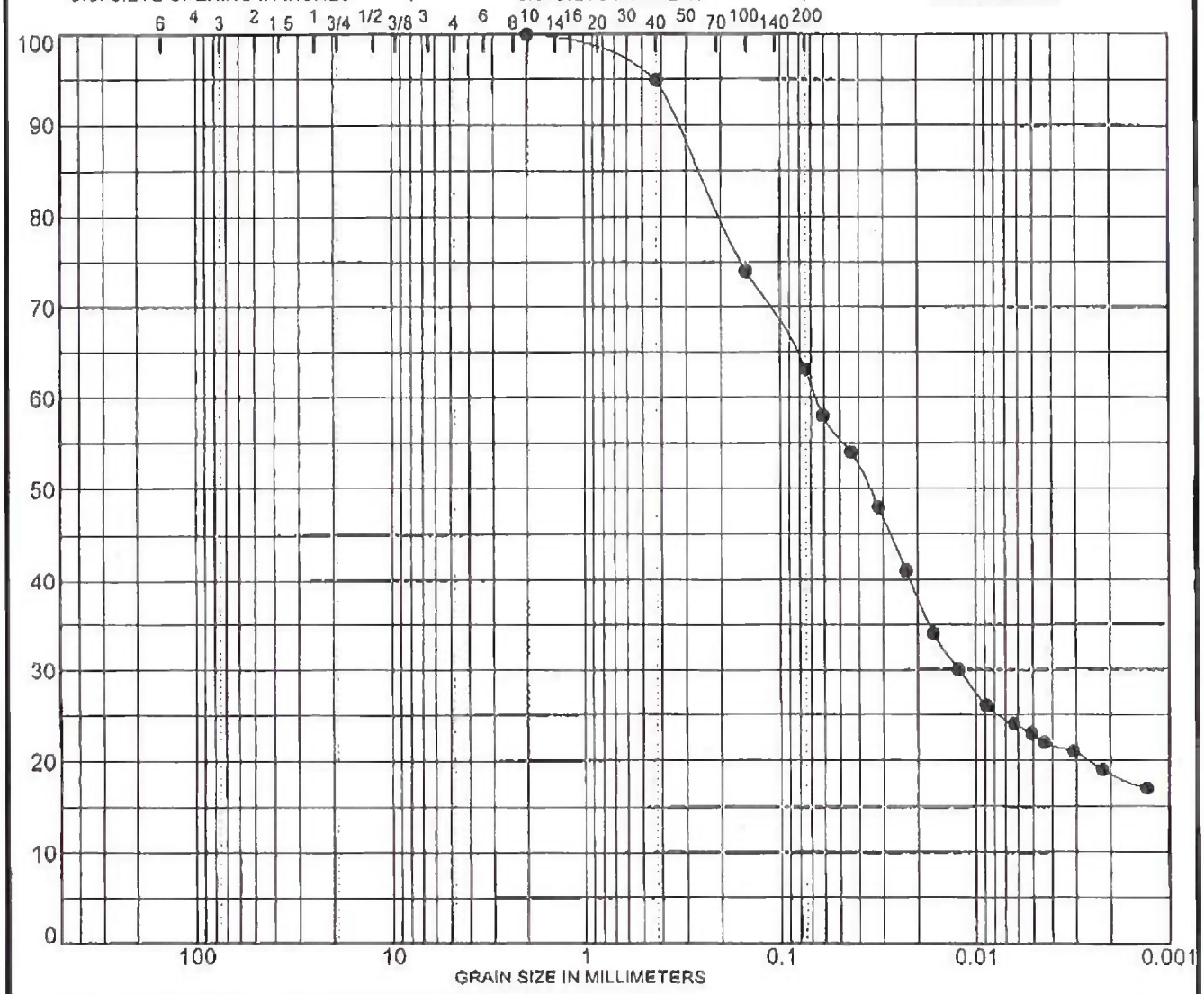
PROJECT Geotechnical Testing
LOCATION ,
SB8

JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-9	3 inch	100
Sample: A	2	100
Depth: 18.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	95
	# 100	74
	# 200	63

SOIL CLASSIFICATION: Brownish gray sandy CLAY (CL)

%GRAVEL	%SAND	%SILT	%CLAY
0	37	44	19

MC%		LL	PL	PI
34.0		35	13	22

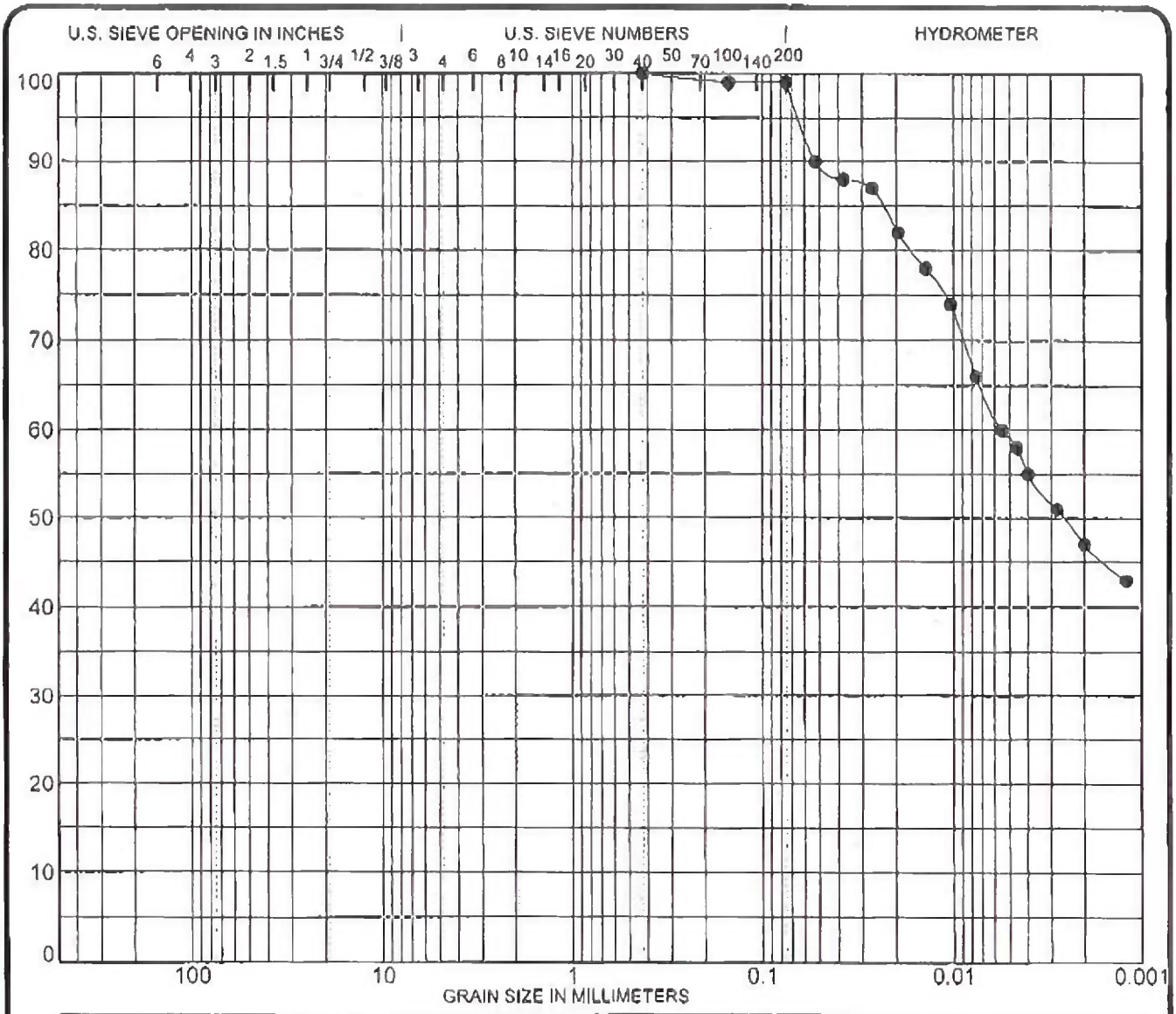
PROJECT Geotechnical Testing
LOCATION ,
JOB NO. L - 76,757
DATE May 23, 2011

SB9

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-10	3 inch	100
Sample: A	2	100
Depth: 20.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	100
	# 4	100
	# 10	100
	# 40	100
	# 100	99
	# 200	99

SOIL CLASSIFICATION

Brownish gray silty CLAY, trace sand

(CH)

%GRAVEL	%SAND	%SILT	%CLAY
0	1	52	47

MC%		LL	PL	PI
26.9		74	15	59

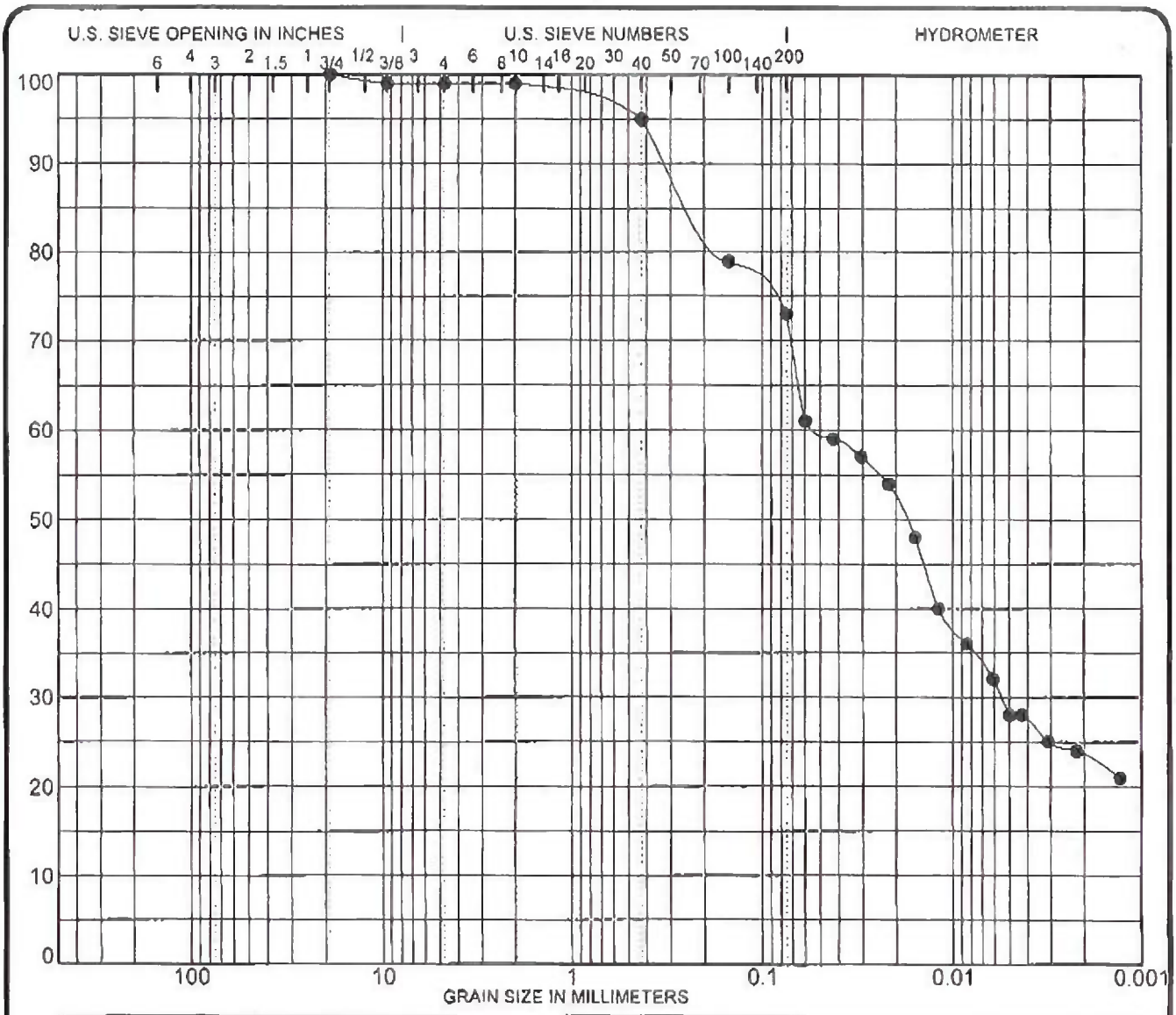
PROJECT Geotechnical Testing
LOCATION ,
SB10

JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC ALLCOT 5/23/11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS
Boring: SB-12	3 inch	100
Sample: A	2	100
Depth: 23.0'-24.0'	1 1/2	100
	1	100
NOTES:	3/4	100
	3/8	99
	# 4	99
	# 10	99
	# 40	95
	# 100	79
	# 200	73

SOIL CLASSIFICATION

Gray silty CLAY, some sand, trace gravel

(CL)

%GRAVEL	%SAND	%SILT	%CLAY
1	26	50	23

MC%		LL	PL	PI
35.9		42	16	26

PROJECT Geotechnical Testing
LOCATION ,
SB12

JOB NO. L - 76,757
DATE May 23, 2011

SOIL DATA SHEET

Testing Service Corporation
Carol Stream, IL 60188

SOILGENR 76757.GPJ TSC_ALL.GDT 5/23/11

EXHIBIT E – BEDROCK MAPS

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination


BEDROCK GEOLOGIC MAP OF IOWA
1:500,000
Iowa Geological and Water Survey
Open File Map OFM-2010-01
March 2010
Primary Map Compilation By
Brian J. Witzke, Raymond R. Anderson and John P. Pope
Iowa Geological and Water Survey, Iowa City, Iowa
Iowa Geological and Water Survey
Robert D. Libra, State Geologist
Iowa Department of Natural Resources
Richard Leopold, Director
ACKNOWLEDGEMENTS
Recognized for significant contributions to the map's production: Bill J. Bunker, James D. Giglierano, Greg A. Ludvigson, Robert M. McKay, Huaibao P. Liu, and Thomas R. Marshall.
Supported in part with funding from the U.S. Geological Survey - National Cooperative Geologic Mapping Program.
EXPLANATION
CRETACEOUS
Kmt
Manson Impact Structure, Terrace Terrane (breccia)
Kmm
Manson Impact Structure, Crater Moat (shaly breccia)
Kmc
Manson Impact Structure, Central Peak (breccia; basement-rock megabreccia)
Kn
Niobrara Formation (shale)
Kf
Fort Benton Group (shale, chalk)
Kd
Dakota and Windrow Formations (sandstone, shale)
JURASSIC
Jf
Fort Dodge Formation (gypsum, redbeds)
PENNSYLVANIAN
Pw
Wabaunsee Group (shale, limestone)
Ps
Shawnee Group (limestone, shale)
Pd
Douglas Group (shale, limestone, sandstone)
Pl
Lansing Group (limestone, shale)
Pk
Kansas City Group (limestone, shale)
Pb
Bronson Group (limestone, shale)
Pm
Marmaton Group (shale, limestone)
Pcu
Upper Cherokee Group (shale, sandstone, limestone)
Pcl
Lower Cherokee Group and Raccoon Creek Group (shale, sandstone)
MISSISSIPPIAN
Ms
"St. Louis" and Pella Formations (dolomite, limestone, sandstone)
Ma
Augusta Group (dolomite, limestone, chert)
Mg
Gilmore City Formation (limestone, dolomite)
Mk
Kinderhookian Formations (dolomite, limestone, siltstone)
DEVONIAN
Df
Famennian Formations (shale, siltstone, dolomite)
Dl
Lime Creek and Sweetland Creek Formations (shale, limestone)
Dc
Cedar Valley Group (dolomite, limestone)
Dw
Wapsipinicon Group (dolomite, limestone, anhydrite)
SILURIAN
Sg
Gower Formation (dolomite)
Ss
Scotch Grove Formation (dolomite, chert)
Sh
Hopkinton, Blanding, Tete des Morts, Mosalem Formations (dolomite, chert)
Sl
LaPorte City Formation (limestone, chert)
Sw
Waucoma Formation (limestone)
ORDOVICIAN
Om
Maquoketa Formation (shale, dolomite)
Og
Galena Group and Platteville Formation (dolomite, shale, chert)
Op
Prairie du Chien Group and St. Peter Sandstone (dolomite, sandstone)
CAMBRIAN
Cj
Jordan Sandstone, St. Lawrence and Lone Rock Formations (sandstone, dolomite)
Cw
Wonewoc Formation (sandstone)
Ce
Eau Claire Formation (sandstone, shale)
Cm
Mt. Simon Sandstone (sandstone)
PRECAMBRIAN
Xs
Sioux Quartzite (quartzite)
U
D
fault (U - upside, D - downside)
fault buried by Kd
Transparent shades of gray show the bedrock surface as it would be illuminated by an artificial light source coming from the NW direction.
Bedrock Formations Surrounding Burlington Generating Station
Burlington Generating Station
MINNESOTA
SOUTH DAKOTA
NEBRASKA
MISSOURI
ILLINOIS
Manson Impact Structure
Thurman-Redfield Fault Zone
Plum River Fault Zone
Iowa City-Hills Fault Zone
1:500,000
0 5 10 20 30 40 50 60 Miles
0 5 10 20 30 40 50 60 Kilometers

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
IOWA GEOLOGICAL SURVEY

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-808 (SHEET 2 OF 2)

Approximate Location of the Burlington Generating Station

EXPLANATION

Log data
Bedrock penetrated

Log data
Bedrock not penetrated

X
Quarry or outcrop

500
Bedrock contours
Show altitude of bedrock surface. Dashed where approximately located. Contour interval is 50 feet. Datum is mean sea level

Base from U.S. Geological Survey 1:250,000
Centerville, and Des Moines, 1954;
Burlington and Davenport, 1958
Roads as of 1969

SCALE 1:125 000
2 0 2 4 6 8 10 MILES
2 0 2 4 6 8 10 KILOMETERS

BEDROCK TOPOGRAPHY OF SOUTHEAST IOWA

By
Robert E. Hansen
1973

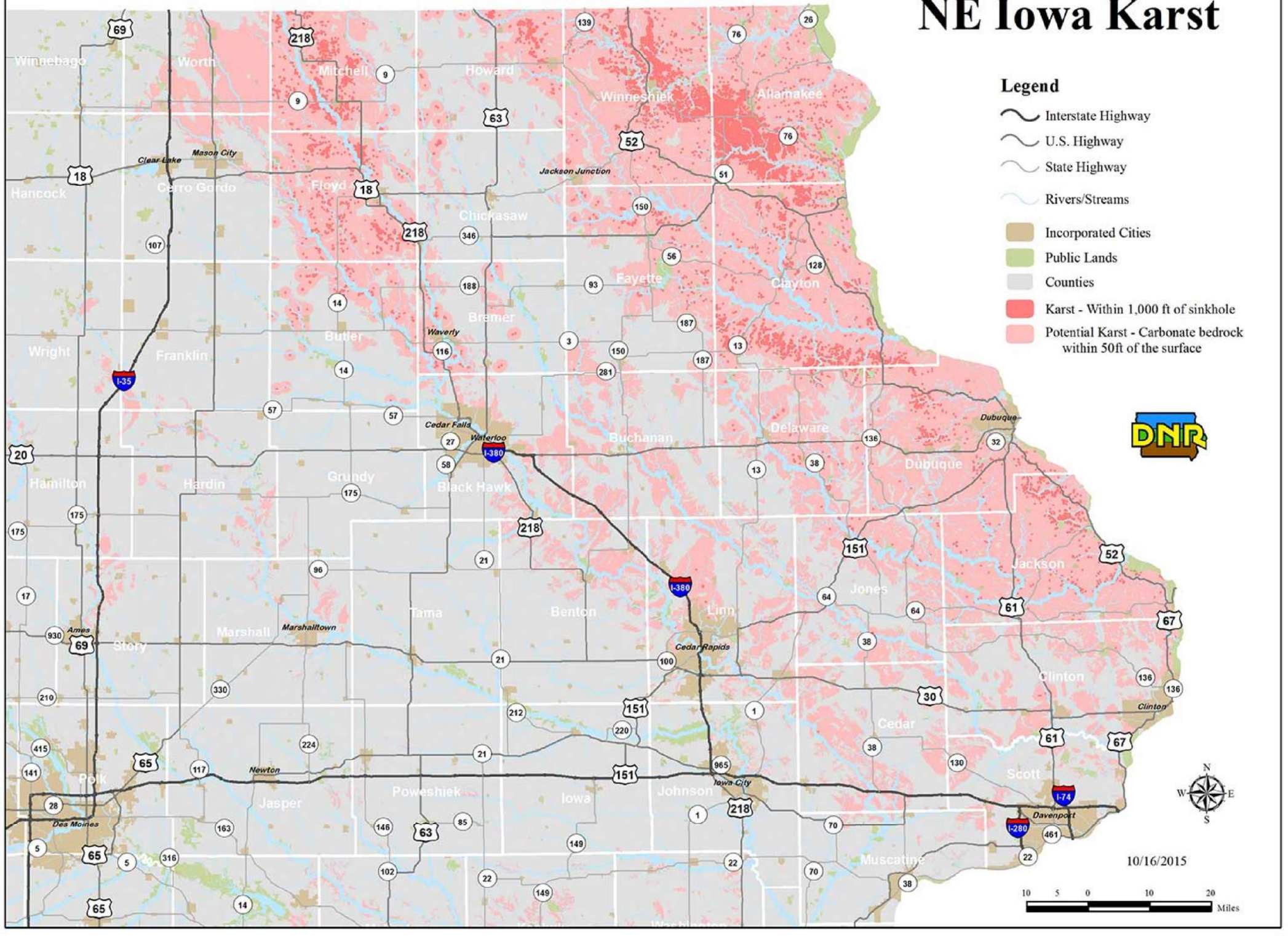
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1973—W73081

EXHIBIT F – KARST FORMATION MAPS

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination

NE Iowa Karst



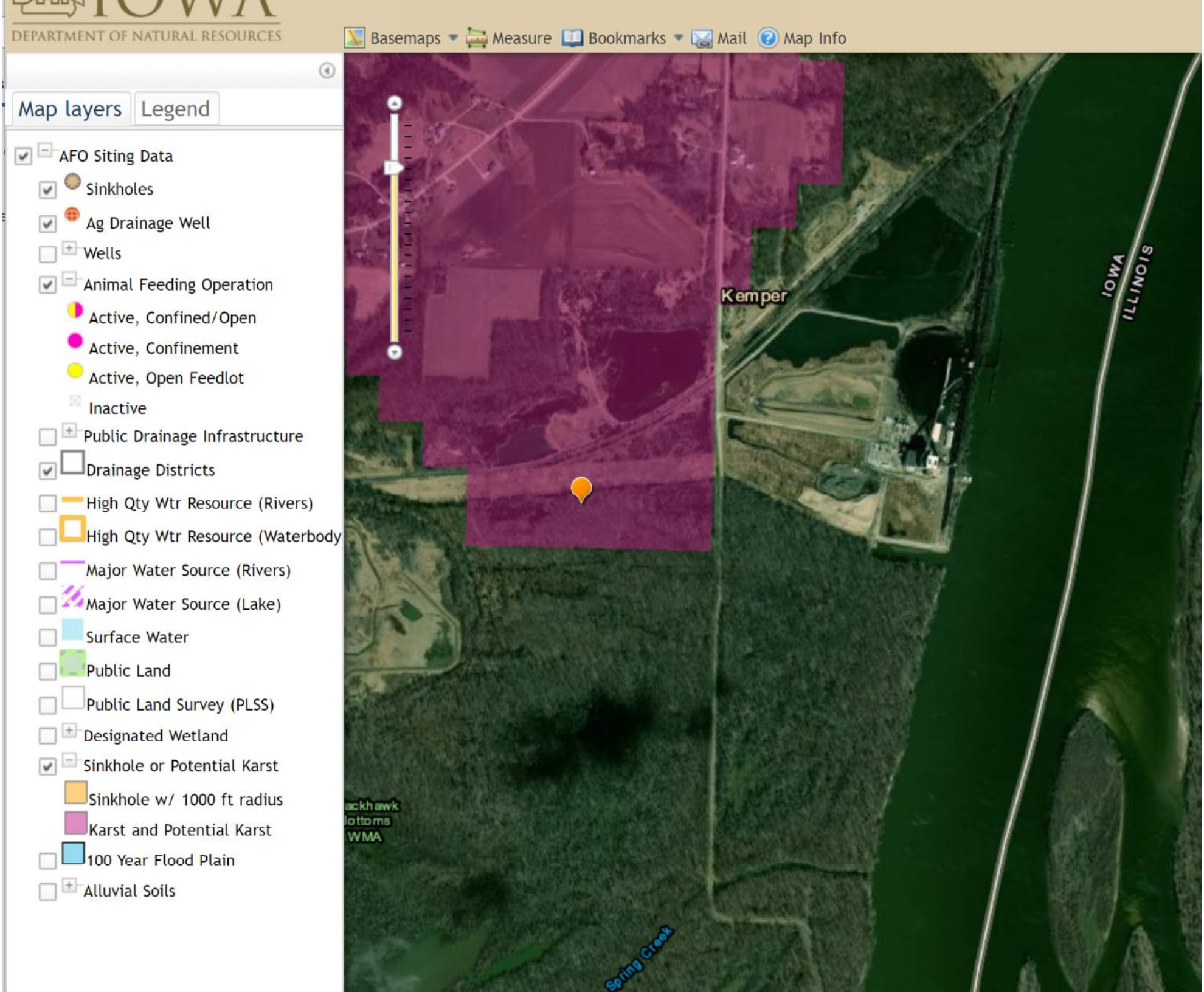

DEPARTMENT OF NATURAL RESOURCES
Basemaps
Measure
Bookmarks
Mail
Map Info
Map layers
Legend
AFO Siting Data
Sinkholes
Ag Drainage Well
Wells
Animal Feeding Operation
Active, Confined/Open
Active, Confinement
Active, Open Feedlot
Inactive
Public Drainage Infrastructure
Drainage Districts
High Qty Wtr Resource (Rivers)
High Qty Wtr Resource (Waterbody
Major Water Source (Rivers)
Major Water Source (Lake)
Surface Water
Public Land
Public Land Survey (PLSS)
Designated Wetland
Sinkhole or Potential Karst
Sinkhole w/ 1000 ft radius
Karst and Potential Karst
100 Year Flood Plain
Alluvial Soils
Kemper
IOWA
ILLINOIS
WMA
Spring Creek

EXHIBIT F – LOCAL GROUNDWATER INFO FROM SCS ENGINEERS

Alliant Energy
Interstate Power and Light Company
Burlington Generating Station
Burlington, Iowa

Unstable Area Determination

LEGEND

- EXISTING CCR RULE MONITORING WELL
- EXISTING CCR RULE PIEZOMETER
- CCR UNITS

NOTES:

1. MONITORING WELLS MW-303 THROUGH MW-308 WERE INSTALLED BY CASCADE DRILLING, LLP. UNDER THE SUPERVISION OF SCS ENGINEERS ON DECEMBER 15-17, 2015.
2. MONITORING WELLS MW-301, MW-302, AND MW-309 THROUGH MW-311 WERE INSTALLED BY DIRECT PUSH ANALYTICAL SERVICES CORP. UNDER THE SUPERVISION OF SCS ENGINEERS FROM FEBRUARY 29, 2016 TO MARCH 1, 2016.
3. MONITORING WELLS MW-312 AND MW-313 WERE INSTALLED BY ROBERTS ENVIRONMENTAL DRILLING IN MAY 2019.
4. 2018 AERIAL PHOTOGRAPH SOURCES: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA FSA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY.

N

300 0 300

SCALE: 1" = 300'

PROJECT NO.	25220066.00	DRAWN BY:	RJG
DRAWN:	11/14/2019	CHECKED BY:	MDB
REVISED:	10/16/20	APPROVED BY:	

ENGINEER

SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT

ALLIANT ENERGY
4902 N. BILTMORE LANE, #1000
MADISON, WI 53718

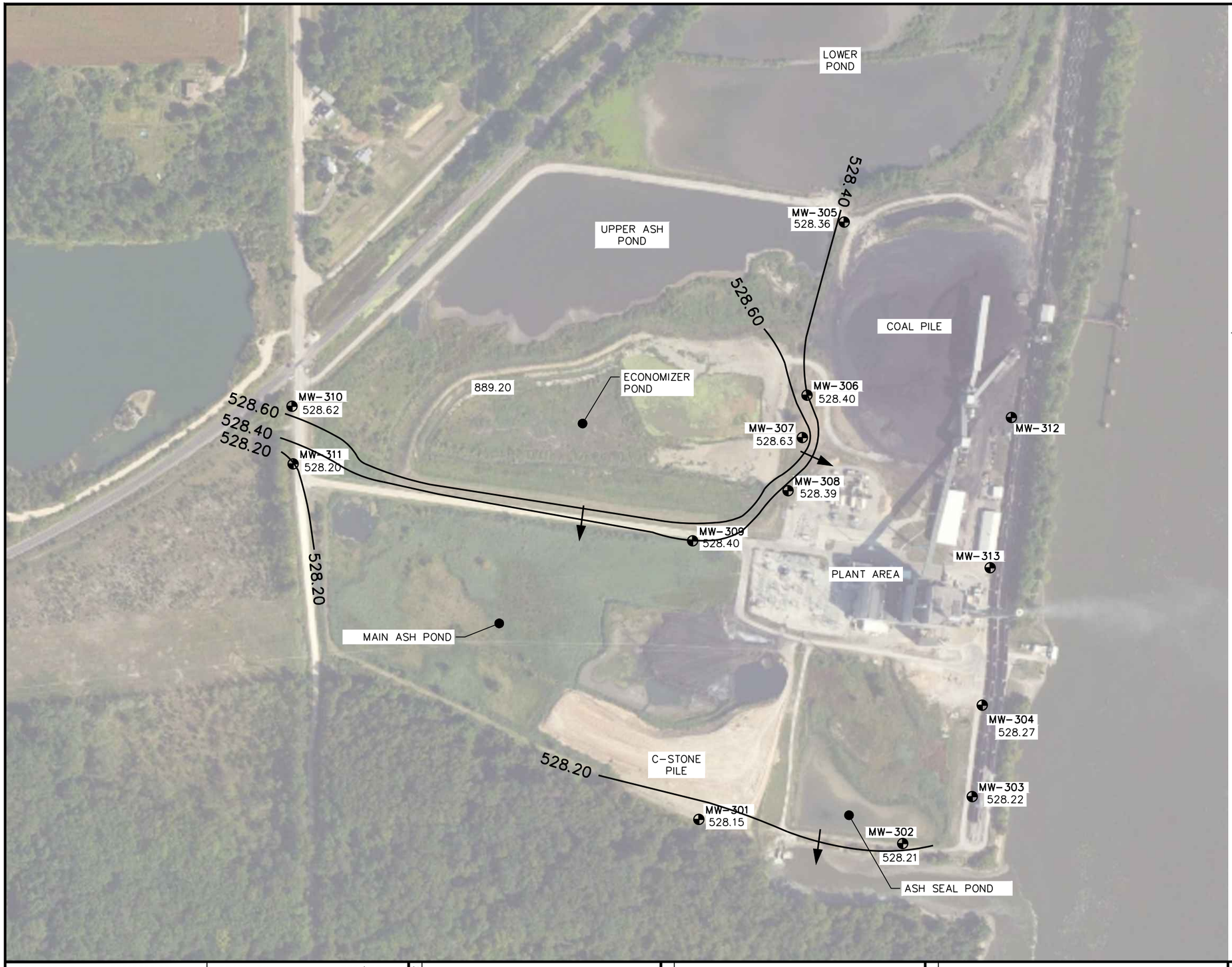
SITE

ALLIANT ENERGY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25220066.00\Drawings\Site Plan and Monitoring Well Locations.dwg, 10/16/2020 11:21:16 AM



LEGEND

- EXISTING MONITORING WELL LOCATION
- WATER TABLE ELEVATION CONTOUR
- APPROXIMATE FLOW DIRECTION

NOTES:

1. MONITORING WELLS MW-303 THROUGH MW-308 WERE INSTALLED BY CASCADE DRILLING, LLP. UNDER THE SUPERVISION OF SCS ENGINEERS ON DECEMBER 15-17, 2015.
2. MONITORING WELLS MW301, MW302, AND MW309-MW311 WERE INSTALLED BY DIRECT PUSH ANALYTICAL SERVICES CORP. UNDER THE SUPERVISION OF SCS ENGINEERS FROM FEBRUARY 29, 2016 TO MARCH 1, 2016.
3. MONITORING WELLS MW-301 THROUGH MW-311 WERE SURVEYED BY FRENCH-RENEKER ASSOCIATES OF FRANKLIN, IA ON MARCH 16, 2016.
4. MONITORING WELLS MW-312 AND MW-313 WERE INSTALLED BY ROBERTS ENVIRONMENTAL DRILLING IN MAY 2019.
5. WATER TABLE ELEVATION ESTIMATED BASED ON MONITORING WELLS SCREENED BELOW THE WATER TABLE IN THE SAND UNIT.

N

300 0 300

SCALE: 1" = 300'

PROJECT NO.	25219066.00	DRAWN BY:	BSS/LEC
DRAWN:	06/18/19	CHECKED BY:	NK
REVISED:	07/17/19	APPROVED BY:	TK 09/10/19

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY
4902 N. BILTMORE LANE, #1000
MADISON, WI 53718

SITE: ALLIANT ENERGY
BURLINGTON GENERATING STATION
BURLINGTON, IOWA

WATER TABLE MAP
APRIL 3, 2019

FIGURE
3

I:\25219066.00\Drawings\WTBL Map.dwg, 9/10/2019 11:53:52 AM

Table 1. Groundwater Elevation Summary
Burlington Generating Station / SCS Engineers Project #25220066.00

Well Number	MW-301	MW-302	MW-302A	MW-303	MW-304	MW-305	MW-306	MW-307	MW-307A	MW-308	MW-309	MW-310	MW-310A	MW-311	MW-312	MW-313	MW-313A
Top of Casing Elevation (feet amsl)	538.38	535.69	535.89	533.60	534.42	533.28	536.92	536.96	536.22	537.20	536.42	531.99	532.53	532.32	536.43	535.82	536.03
Screen Length (ft)		5.00	5					5.00	5				5			5	5
Total Depth (ft from top of casing)	31.90	29.95	62.55	28.59	25.27	29.43	34.41	28.64	61.93	30.31	27.31	18.76	48.8	22.63	27.70	32.97	63.38
Top of Well Screen Elevation (ft)	511.48	510.74	478.34	510.01	514.15	508.85	507.51	513.32	479.29	511.89	514.11	518.23	488.73	514.69	513.80	507.85	477.65
Measurement Date																	
April 20, 2016	522.63	521.91	NI	521.76	521.78	521.96	521.74	522.38	NI	521.93	522.09	525.43	NI	523.72	NM	NM	NI
June 6 & 7, 2016	521.07	521.21	NI	521.26	521.28	521.48	521.43	521.75	NI	521.43	521.39	524.13	NI	521.80	NM	NM	NI
August 16 & 17, 2016	521.81	521.35	NI	521.31	521.37	521.46	521.53	521.91	NI	521.56	521.70	524.84	NI	522.92	NM	NM	NI
October 3, 2016	527.48	527.54	NI	527.57	527.57	527.71	527.67	527.81	NI	527.62	527.57	527.58	NI	527.34	NM	NM	NI
January 9 & 10, 2017	525.38	525.50	NI	525.56	525.62	525.74	525.67	525.81	NI	525.65	525.57	525.78	NI	525.16	NM	NM	NI
April 3 & 4, 2017	523.08	522.84	NI	522.81	522.87	523.03	523.07	523.14	NI	523.07	523.10	525.52	NI	524.01	NM	NM	NI
June 12 & 13, 2017	523.21	522.84	NI	522.80	522.90	522.78	522.87	523.17	NI	522.90	522.91	524.94	NI	523.55	NM	NM	NI
August 15 & 16, 2017	519.96	519.39	NI	519.30	519.23	519.93	519.82	520.16	NI	519.80	519.93	523.89	NI	521.12	NM	NM	NI
October 16, 2017	522.13	522.20	NI	522.23	522.32	522.48	522.72	522.55	NI	522.46	522.67	525.49	NI	523.44	NM	NM	NI
May 8 & 9, 2018	525.51	525.81	NI	525.80	525.85	526.06	526.00	526.06	NI	525.62	525.54	525.79	NI	525.08	NM	NM	NI
August 13 & 14, 2018	520.19	519.87	NI	519.78	519.81	520.29	520.14	520.46	NI	520.22	520.22	523.69	NI	521.06	NM	NM	NI
October 9 &10, 2018	528.01	528.08	NI	528.78	528.82	528.97	528.95	529.08	NI	528.98	528.93	529.00	NI	528.49	NM	NM	NI
March 11, 2019	523.38	522.83	NI	522.74	522.80	NM	523.21	523.49	NI	523.13	NM	NM	NI	NM	NM	NM	NI
April 3, 2019	528.15	528.21	NI	528.22	528.27	528.36	528.40	528.63	NI	528.39	528.40	528.62	NI	528.20	NM	NM	NI
June 6, 2019	530.70	531.02	NI	531.00	531.04	TOC	531.19	531.38	NI	531.15	531.08	531.48	NI	531.07	531.08	531.05	NI
October 10 & 11, 2019	526.80	526.88	NI	526.87	526.97	527.03	527.22	527.45	NI	527.08	527.02	526.25	NI	526.68	526.97	526.97	NI
June 2-4, 2020	523.94	523.98	NI	523.97	524.02	524.12	524.45	524.62	NI	524.10	524.06	525.36	NI	524.05	524.05	524.02	NI
September 9, 2020	519.90	519.79	519.71	519.73	519.83	520.00	520.14	520.41	519.97	520.11	520.13	524.13	509.16	520.87	519.85	519.83	519.76
Ocober 19, 2020		518.94	518.79					519.33	519.00			523.81	514.13			518.70	518.61
Bottom of Well Elevation (ft)	506.48	505.74	473.34	505.01	509.15	503.85	502.51	508.32	474.29	506.89	509.11	513.23	483.73	509.69	508.73	502.85	472.65

Notes:
NM = not measured
TOC = top of casing
NI = not installed

Created by: KAK Date: 6/15/2016
Last revision by: TK Date: 10/23/2020
Checked by: NDK Date: 10/23/2020

\\Mad-fs01\data\Projects\25220066.00\Data and Calculations\Tables\[wlstat_BGS.xls]levels

Table 2. Vertical Hydraulic Gradient Summary
Burlington Generating Station / SCS Engineers Project #25220066.00

Vertical Hydraulic Gradients	MW302/MW302A		MW307/MW307A		MW310/MW310A		MW313/MW313A	
Higher Well (water table well)	MW302		MW307		MW310		MW313	
screen bottom (feet amsl)	505.74		508.32		518.23		502.85	
Lower Well (piezometer)	MW302A		MW307A		MW310A		MW313A	
screen midpoint (feet amsl)	475.84		476.79		486.23		475.15	
Measurement Date	**Distance between midpoints (feet)**	**Vertical Gradient (ft/ft)**	**Distance between midpoints (feet)**	**Vertical Gradient (ft/ft)**	**Distance between midpoints (feet)**	**Vertical Gradient (ft/ft)**	**Distance between midpoints (feet)**	**Vertical Gradient (ft/ft)**
September 9, 2020	36.9	0.000	37.6	-0.001	35.0	-0.031	36.2	0.000
October 19, 2020	36.5	0.000	37.0	-0.001	34.8	-0.020	35.6	0.000

Notes:
1: A positive vertical gradient indicates upward groundwater flow. A negative gradient indicates downward flow.
2: The screen midpoint for water table wells is calculated as the midpoint between the water table elevation and screen bottom elevation.
NM: Not Measured
NI: Not Installed

Created by:	TK	Date:	10/23/2020
Last revision by:	TK	Date:	10/23/2020
Checked by:	NDK	Date:	10/23/2020

I:\25220066.00\Data and Calculations\Tables\[wlstat_BGS.xls]gradient