

Report of Soils Investigation

Energy Solutions

Zion Nuclear Power Plant

**Independent Spent Fuel
Storage Installation**

Sargent & Lundy

October 30, 2007

L - 69,729

REPORT OF SOILS EXPLORATION
ENERGY SOLUTIONS
ZION NUCLEAR POWER PLANT
INDEPENDENT SPENT FUEL STORAGE INSTALLATION

PREPARED FOR:
SARGENT & LUNDY
55 EAST MONROE, SUITE 3100
CHICAGO, ILLINOIS

PREPARED BY:
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REPORT OF SOILS EXPLORATION
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INDEPENDENT SPENT FUEL STORAGE INSTALLATION

1.0 INTRODUCTION

Presented in this report are the results of the soils investigation performed to determine the general subsurface conditions for the proposed construction of an Independent Spent Fuel Storage facility. The proposed structure will be constructed at the Zion Nuclear Power Plant in Zion, IL.

This work was performed in general accordance with Technical Specification Subsurface Investigation Specification Z-5700 prepared by Sargent and Lundy and dated July 27, 2007.

2.0 FIELD WORK

A total of eleven (11) soil borings were performed for this project including four (4) at 100 feet, one (1) at 104 feet, one (1) at 65 feet, four (4) at 10 feet and one (1) hand auger boring to approximately 2 feet. Additionally, three (3) boreholes were drilled and completed with 3" PVC casing for cross hole seismic testing.

All of the borings were drilled at the locations provided to us and indicated on the Soil Boring Location Plans (ARCADIS Figures 1 through 5). Borings I-1 and I-5 were eliminated. Upon completion of the drilling and testing, ground surface elevations were determined for the locations outside of the restricted area (I-2,3,4,6,7 and 8) by GPS methods.

The boreholes were advanced by auger methods for the total depth of the shallow borings and to the ground water table in the deeper borings. The deep borings were completed by rotary wash methods using bentonite and potable water in accordance with ASTM D5783. Upon completion, each of the boreholes were sealed with cement-bentonite grout.

In general, soil samples were collected on 2.5 foot intervals for the first 10 feet and on 5.0 foot intervals thereafter using standard split spoon procedures. At location I-3 soil samples were collected on a continuous 2.0 foot interval. Standard Penetration Tests (SPT) - N Values (ASTM D-1586), were determined using a rope and cat head with a 140 pound hammer with a 30 inch drop. Since granular soils and/or very stiff clays predominated the site, Shelby tube sampling was not possible.

Dynamic energy measurements were made on our drill rig (Gus Pech 7500) in 2002 by GRL Engineers, Inc. A Pile Driving Analyzer (PDA) was used to process dynamic measurements of strain and acceleration between the safety hammer and drill string. The results of this testing indicated an Average Energy Transfer Ratio of 55% or 195 ft-lbs. of torque.

The soil types were logged in the field by the drill crew and representative portions of each sample were contained in glass jars per ASTM D-4220 and brought back to our laboratory. A Boring Log defining the soil lithology and ground water observations is included in the Appendix of this report.

3.0 GEOPHYSICAL TESTING

Geophysical testing consisting of a Cross Hole Seismic Investigation, was performed at location I-6. Prior to the testing, three (3) boreholes were advanced using a 6" tri-cone roller bit and cased with 3" PVC riser to a depth of 100 feet. The casing was sealed with cement-bentonite grout and allowed to set up for a minimum of 48 hours.

The Cross Hole testing was performed by Geotechnology, Inc. In general conformance with Section 4.31 of ASTM D4428. A copy of the report prepared by Geotechnology, Inc. Summarizing the test results is included in the Appendix of this report.

4.0 LABORATORY TESTING

The soil samples obtained from the borings were examined in our laboratory and visually classified according to the Unified Soils Classification System (ASTM D 2488). Cohesive soils were measured for moisture content (ASTM D-2216) and unconfined compressive strength (ASTM D-2166). Additional testing including grain size distribution (ASTM D-422, D-1140), Atterberg Limits (ASTM D-4318), pH (ASTM G-51) and dry unit weight determinations (EM-1110-2-19) were performed on samples selected by Sargent and Lundy. The results of this testing has been summarized and incorporated into the Soil Test data Sheets included in the Appendix.

Five (5) soil samples selected by the client were analyzed for soluble chlorides (Method 4500CL,C) and soluble sulfates (Method 4500SO₄, E) by First Environmental Laboratories. A copy of their report is Appended.

5.0 CLOSURE

The data and results presented in this report are based upon the conditions encountered at the eleven (11) locations investigated as indicated on the Soil boring Location Plan. This report does not reflect any variations that may occur between these locations, the nature and extent of which may not become evident until the construction phase of the project.

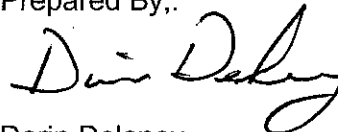
We are appreciative of the opportunity to assist you with this project and look forward to working with you in the future. Please call if you have any questions or are in need of further information.

Respectfully Submitted,



Charles DuBose
Vice President
Registered Professional Engineer
Illinois No. 062-041049

Prepared By..



Darin Delaney
Project Geologist

APPENDIX

UNIFIED CLASSIFICATION CHART

LEGEND FOR BORING LOGS

TEN (10) BORING LOGS
(21 pages total)

BORING LOCATION PLANS
(5 pages)

GEOPHYSICAL DATA REPORT
Geotechnology, Inc.
(16 pages)

SOIL DATA SHEETS
(20 pages)

TWO (2) ANALYTICAL REPORTS
First Environmental Laboratories, Inc.
(9 pages total)

**TESTING SERVICE CORPORATION
UNIFIED CLASSIFICATION CHART**

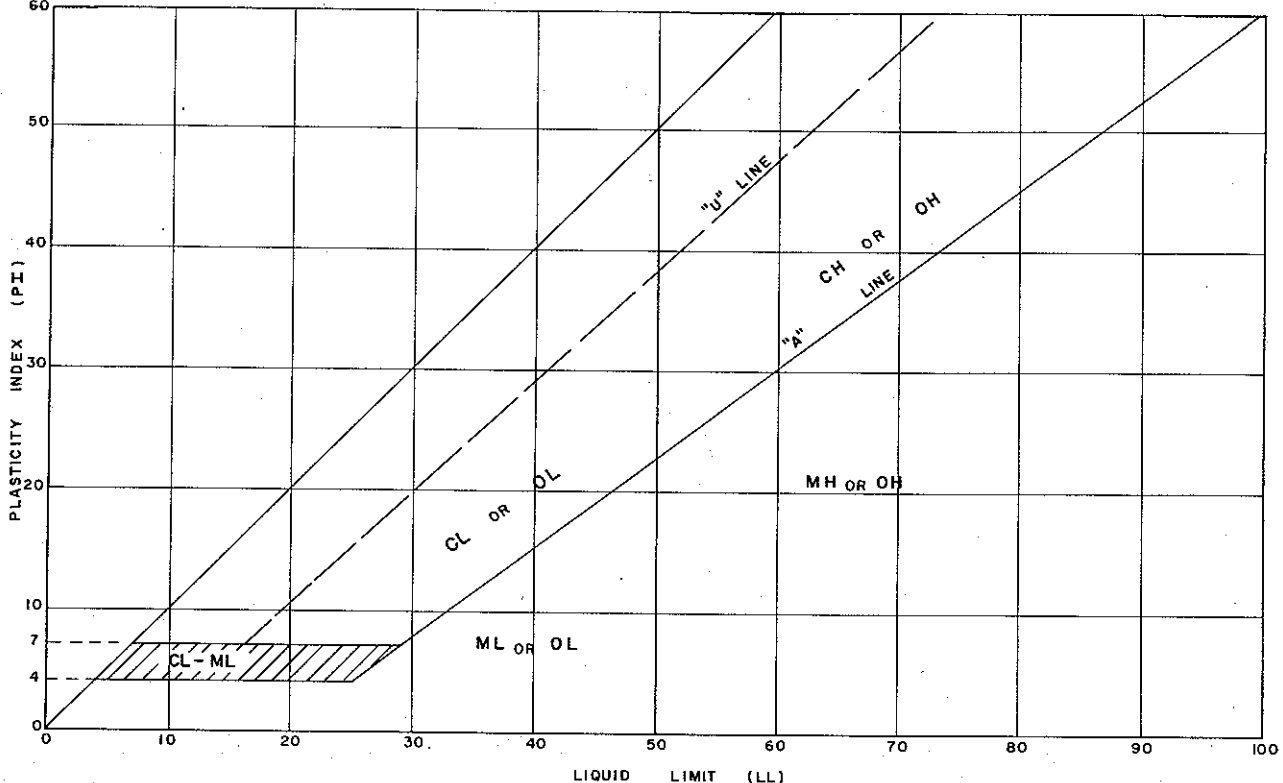
CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS ^a					SOIL CLASSIFICATION	
					GROUP SYMBOL	GROUP NAME ^b
COARSE-GRAINED SOILS more than 50 % retained on No. 200 sieve	GRAVELS More than 50 % of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS Less than 5 % fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$ ^e	GW	Well graded gravel ^f	
			$C_u < 4$ and/or $1 > C_c > 3$ ^e	GP	Poorly graded gravel ^f	
		GRAVELS WITH FINES More than 12 % fines ^c	Fines classify as ML or MH	GM	Silty gravel f,g,h	
			Fines classify as CL or CH	GC	Clayey gravel f,g,h	
	SANDS 50 % or more of coarse fraction passes No. 4 sieve	CLEAN SANDS Less than 5 % fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$ ^e	SW	Well-graded sand ⁱ	
			$C_u < 6$ and/or $1 > C_c > 3$ ^e	SP	Poorly graded sand ⁱ	
		SANDS WITH FINES More than 12 % fines ^d	Fines classify as ML or MH	SM	Silty sand g,h,f	
			Fines classify as CL or CH	SC	Clayey sand g,h,f	
FINE-GRAINED SOILS 50 % or more passed the No. 200 sieve	SILTS & CLAYS Liquid limit less than 50 %	Inorganic	PI ≥ 7 and plots on or above "A" line j	CL	Lean clay k,l,m	
			PI < 4 or plots below "A" line j	ML	Silt k,l,m	
		Organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} \geq 0.75$	OL	Organic clay k,l,m,n Organic silt k,l,m,o	
	SILTS & CLAYS Liquid limit 50 % or more	Inorganic	PI plots on or above "A" line	CH	Fat clay k,l,m	
			PI plots below "A" line	MH	Elastic silt k,l,m	
		Organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	OH	Organic clay k,l,m,p Organic silt k,l,m,q	
Highly organic soils		Primarily organic matter, dark in color, and organic odor			PT	Peat

- a. Based on the material passing the 3-in (75-mm) sieve.
b. If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name.
c. Gravels with 5 to 12% fines require dual symbols
GW-GM well graded gravel with silt
GW-GC well graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
d. Sands with 5% to 12% fines require dual symbols
SW-SM well graded sand with silt
SW-SC well graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

e. $C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

- f. If soil contains $\geq 15\%$ sand, add "with sand" to group name.
g. If fines classify as CL-ML, use dual symbol GC-GM, SC-SM.
h. If fines are organic, add "with organic fines" to group name.
i. If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

- j. If Atterberg Limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI ≥ 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



TESTING SERVICE CORPORATION

LEGEND FOR BORING LOGS



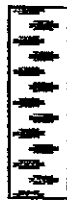
FILL



TOPSOIL



PEAT



GRAVEL



SAND



SILT



CLAY



DOLOMITE

SAMPLE TYPE:

SS = Split Spoon
ST = Thin-Walled Tube
A = Auger

FIELD AND LABORATORY TEST DATA:

N = Standard Penetration Resistance in Blows per Foot
Wc = In-Situ Water Content
Qu = Unconfined Compressive Strength in Tons per Square Foot
* Pocket Penetrometer Measurement; Maximum Reading = 4.5 tsf
γD = Dry Unit Weight in Pounds per Cubic Foot

WATER LEVELS:

▽ While Drilling
▽ End of Boring
▼ 24 Hours

SOIL DESCRIPTION:

MATERIAL

BOULDER
COBBLE
Coarse GRAVEL
Small GRAVEL
Coarse SAND
Medium SAND
Fine SAND
SILT and CLAY

PARTICLE SIZE RANGE

Over 12 inches
12 inches to 3 inches
3 inches to ¾ inch
¾ inch to No. 4 Sieve
No. 4 Sieve to No. 10 Sieve
No. 10 Sieve to No. 40 Sieve
No. 40 Sieve to No. 200 Sieve
Passing No. 200 Sieve

COHESIVE SOILS

CONSISTENCY

Very Soft	Less than 0.3
Soft	0.3 to 0.6
Stiff	0.6 to 1.0
Tough	1.0 to 2.0
Very Tough	2.0 to 4.0
Hard	4.0 and over

COHESIONLESS SOILS

RELATIVE DENSITY

Very Loose	0 - 4
Loose	4 - 10
Firm	10 - 30
Dense	30 - 50
Very Dense	50 and over

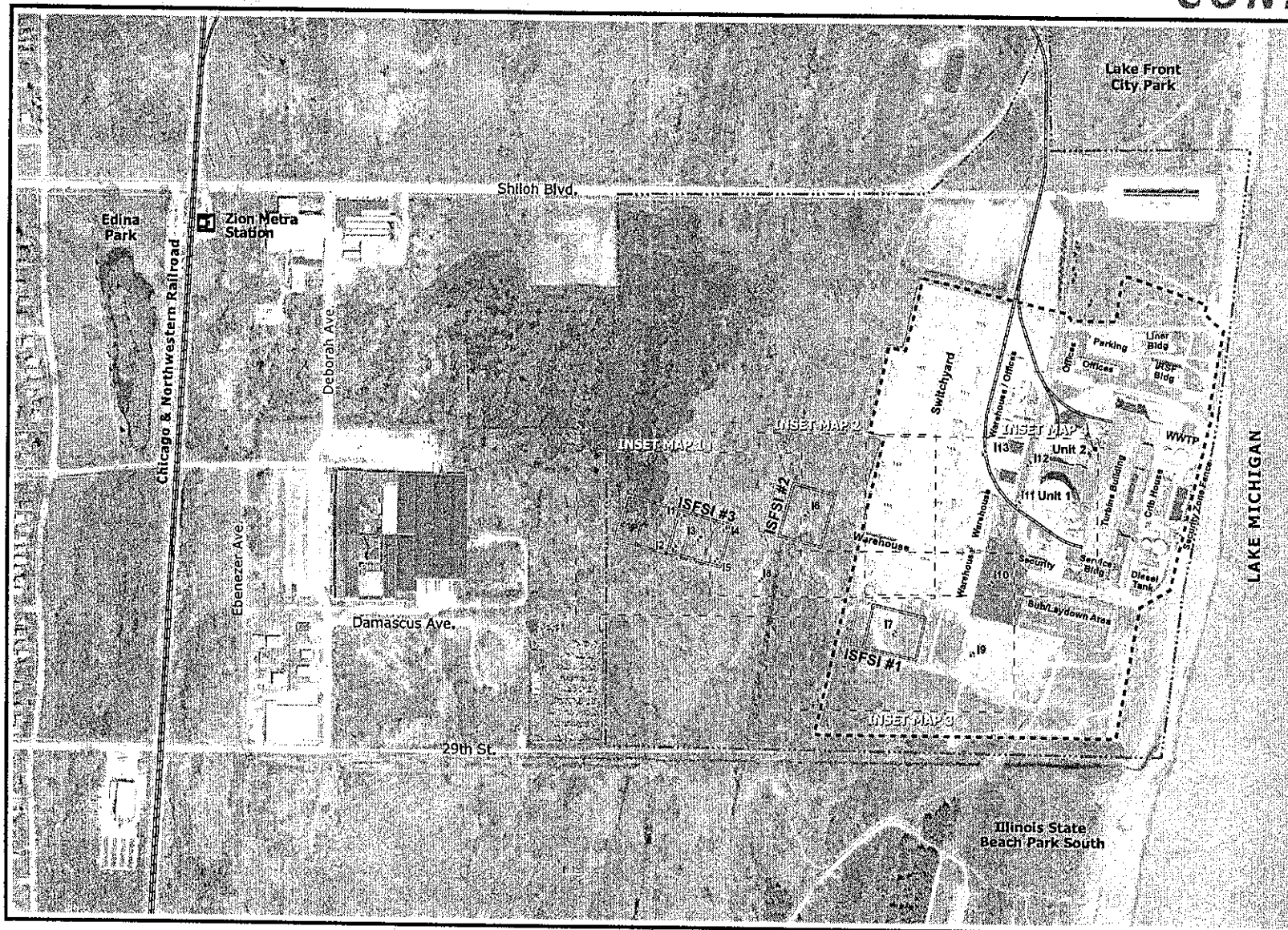
MODIFYING TERM

Trace
Little
Some

PERCENT BY WEIGHT

1 - 10
10 - 20
20 - 35

CONFIDENTIAL



Legend

- Proposed Soil Boring Location
- Metra Station
- Fence
- Railroad
- Property Line
- Potential Independent Spent Fuel Storage Installation (ISFSI)

Name	Existing (ft.)	Northing (ft.)
I1	1125604.4	2105395.0
I2	1125565.0	2105251.0
I3	1125661.2	2105295.2
I4	1125797.5	2105340.8
I5	1125757.9	2105196.8
I6	1126175.9	2105418.5
I7	1126584.2	2104867.8
I8	1125968.3	2105104.8
I9	1126843.9	2104774.8
I10	1127030.0	2105100.2
I11	1127154.0	2105476.1
I12	1127204.4	2105661.7
I13	1126997.1	2105708.8

*Coordinates are in State Plane Illinois East NAD 83



0 125 250 500 750 1,000 Feet

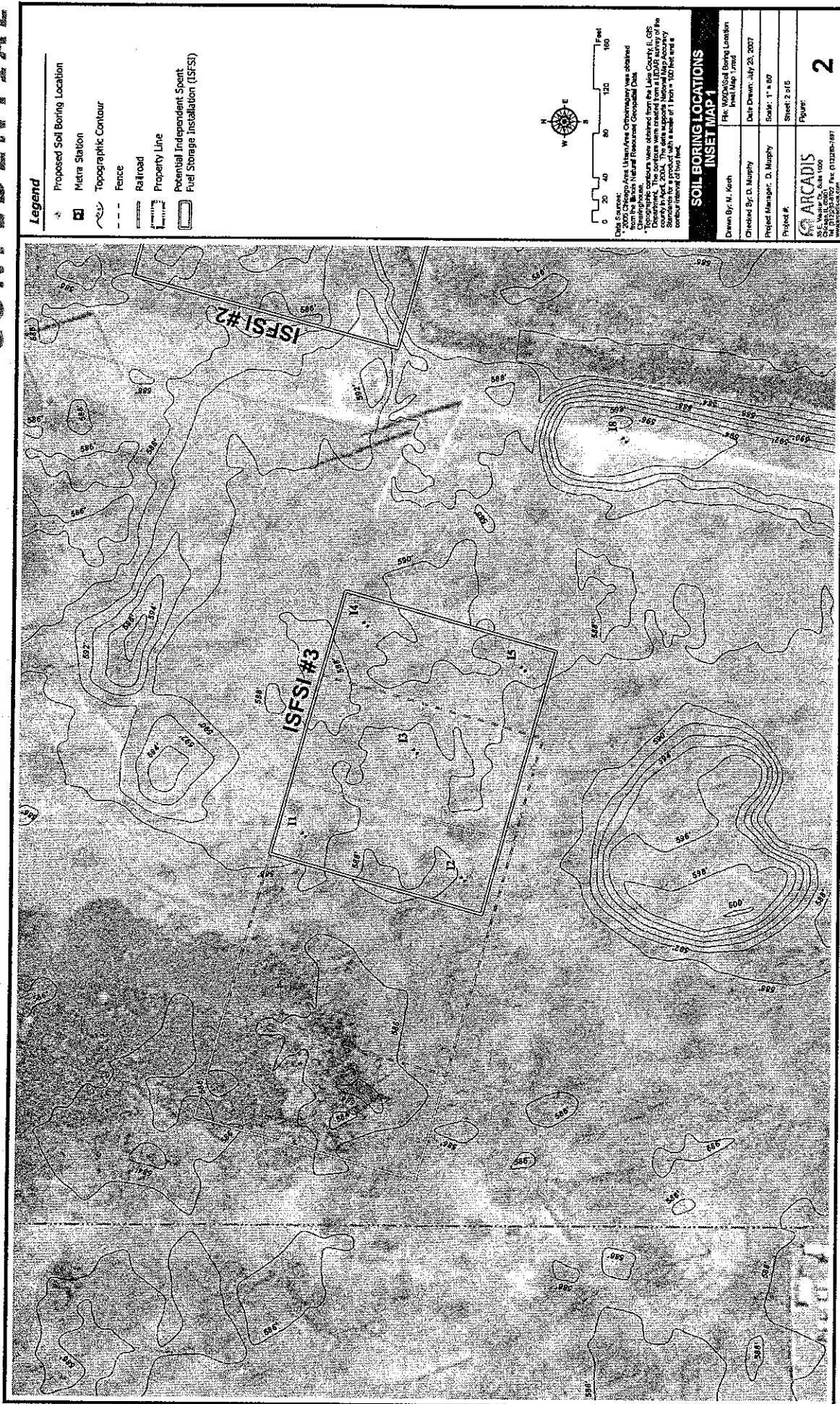
Data Sources:
2005 Chicago Area Urban Area Orthorectified Imagery was obtained from the Illinois Natural Resources Conservation Data Clearinghouse.

SOIL BORING LOCATIONS

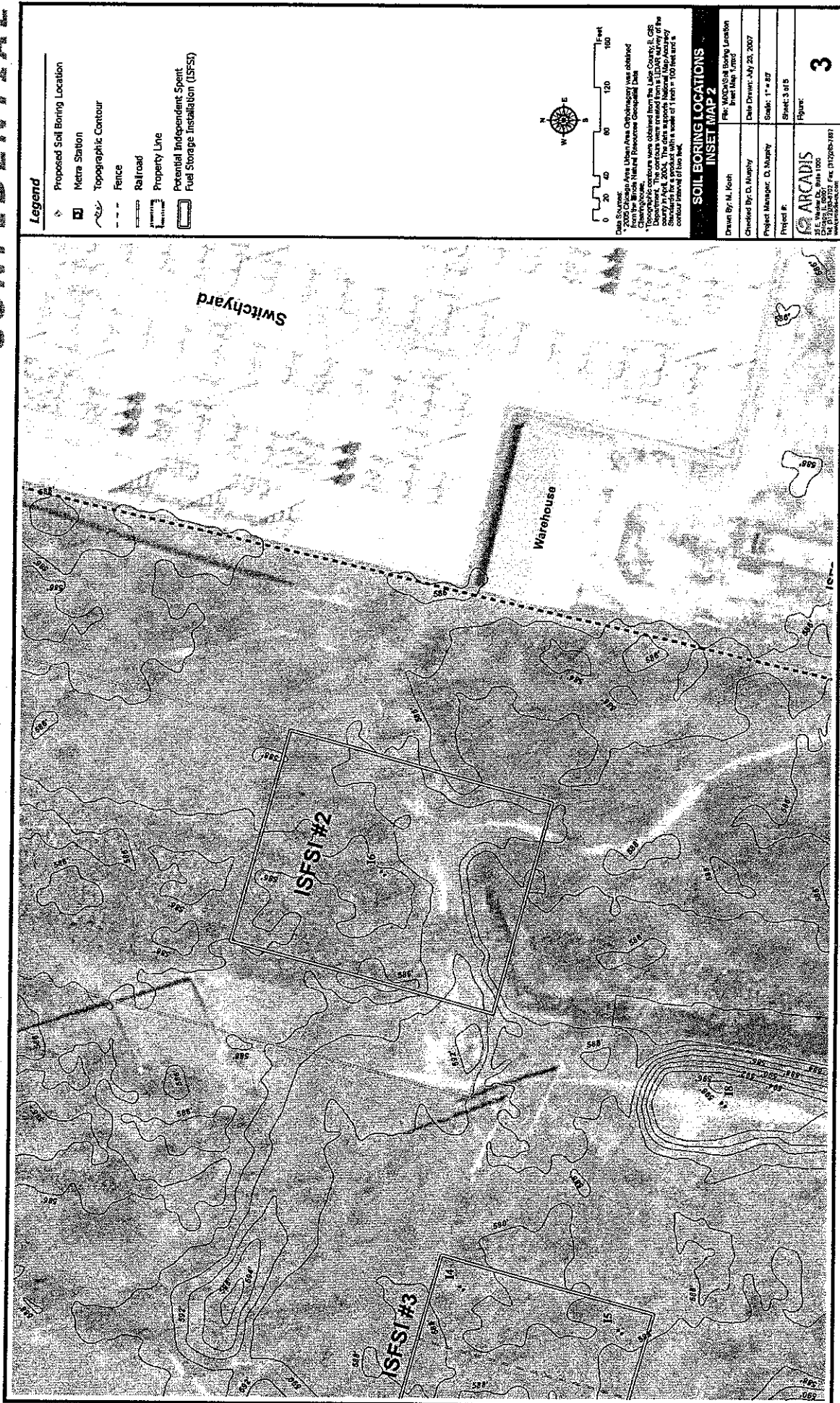
Drawn By: M. Koch	File: WDDsSoil Boring Location Overview Map.mxd
Checked By: D. Murphy	Date Drawn: July 23, 2007
Project Manager: D. Murphy	Scale: 1" = 450'
Project #:	Sheet: 1 of 5
Figure:	1

ARCADIS
35 E. Wacker Dr., Suite 1200
Chicago, IL 60601
Tel: (312) 545-7000 Fax: (312) 545-7187
www.arcadisusa.com

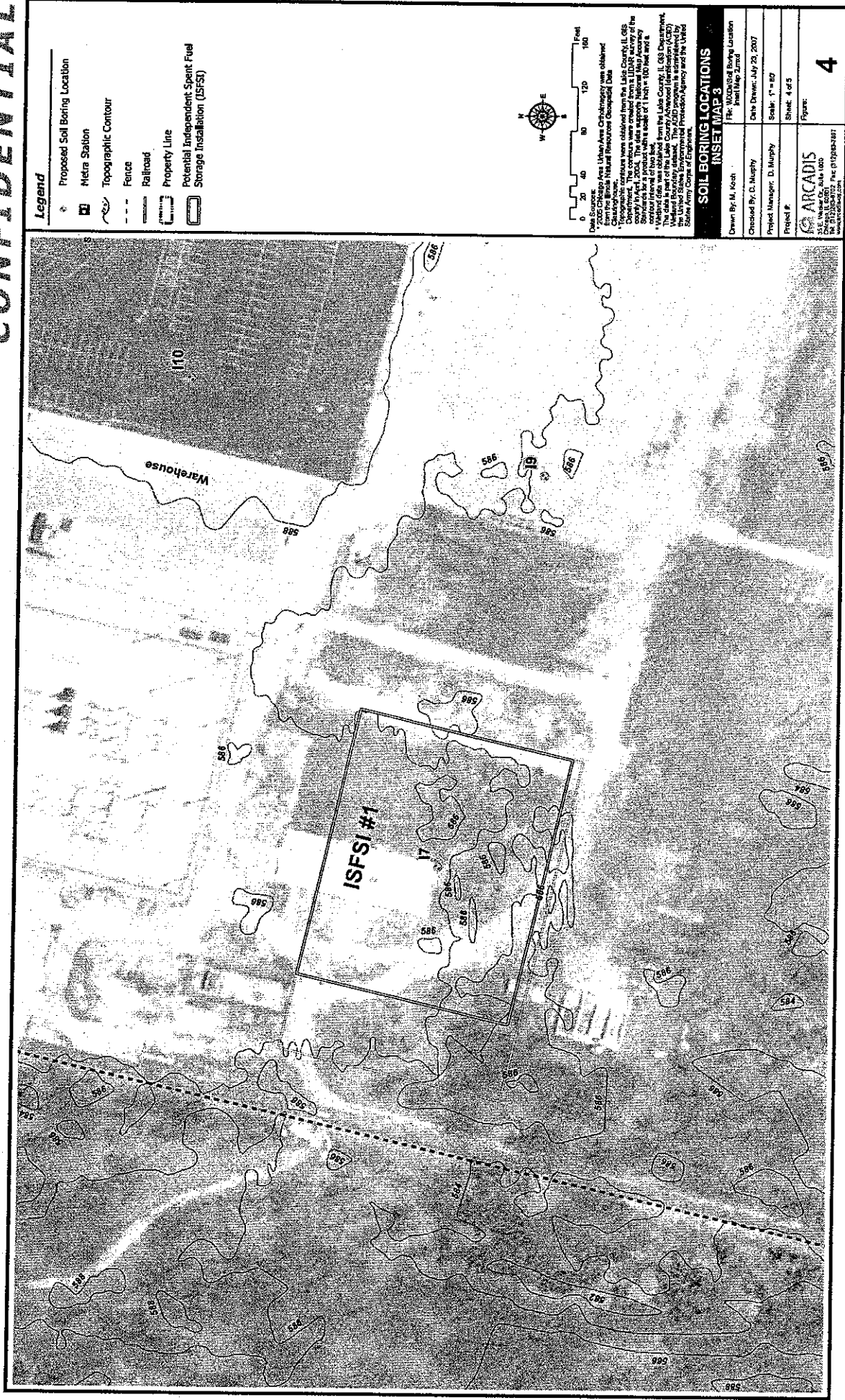
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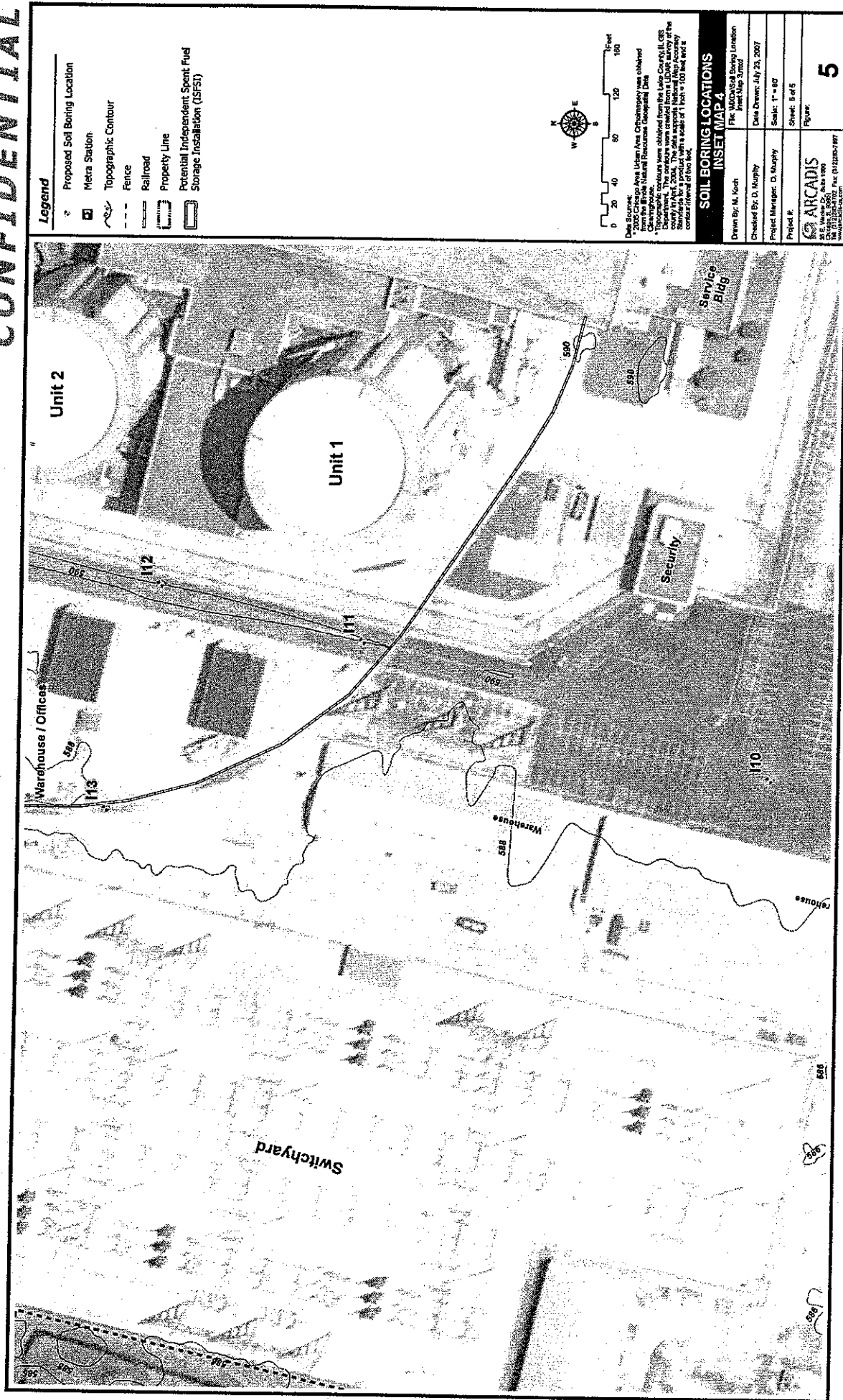
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PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-2**DATE STARTED **9-18-07**DATE COMPLETED **9-20-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **588.1**END OF BORING **488.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS	9	11.2					S-2: pH = 6.89 FILL - Brown to dark brown fine to medium SAND, trace gravel, roots, damp (SP)
5		2	SS	16	21.6			5.5	582.6	S-2: Soluble Chloride = <50 mg/kg Soluble Sulfate = 350 mg/kg
		3	AUGER 100/0"		12.5			8.0	580.1	FILL - Brown fine to medium SAND, trace gravel, occasional Cobbles, saturated (SP)
10		4	SS	28	24.7			12.0	576.1	Firm brown fine to medium SAND, trace gravel, saturated (SP)
15		5	SS	23	16.3					S-5: % Gravel = 28, % Sand = 69, % Silt and Clay = 3
20		6	SS	31	23.3					Dense brown fine to medium SAND, some gravel, saturated (SP)
25		7	SS	46	22.4					
30		8	SS	87	14.2			28.0	560.1	Dense brownish-gray SILT, trace sand, very moist (ML)
35		9	SS	90	14.2	4.5+*		32.0	556.1	Very tough to hard gray very silty CLAY, trace sand, occasional silt seams, moist (CL-ML)
40		10	SS	126	1.3	4.5+*	131.8	37.0	551.1	Very tough to hard gray silty CLAY, little sand seams, trace gravel, moist (CL)

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-2**DATE STARTED **9-18-07**DATE COMPLETED **9-20-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **588.1**END OF BORING **488.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
40										S-10: % Gravel = 10, % Sand = 19, % Silt = 57, % Clay = 14 LL = 23, PL = 12, PI = 11 Very tough to hard gray silty CLAY, little sand seams, trace gravel, moist (CL)
45		11	SS	58	11.6	4.13				
50		12	SS	52	16.9	5.57				
55		13	SS	67	13.9	5.32				Dense gray fine to medium SAND, saturated (SP)
60		14	SS	79	15.5			57.0	531.1	
65		15	SS	80/9"	18.8			62.0	526.1	Dense gray silty fine SAND, trace gravel, saturated (SM)
70		16	SS	100/3"	13.0	4.5+*		67.0	521.1	
75		17	SS	100	13.8	2.68				Very tough to hard gray very silty CLAY with silt seams, trace sand, moist (CL-ML) S-18: % Gravel = 0, % Sand = 6, % Silt = 82, % Clay = 12 LL = 21, PL = 10, PI = 11
80		18	SS	50/5"	12.4	4.5+*	126.2			

Division lines between deposits represent
approximate boundaries between soil types;
in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-2**DATE STARTED **9-18-07**DATE COMPLETED **9-20-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **588.1**END OF BORING **488.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
80		19	SS	100/3"						Very tough to hard gray very silty CLAY with silt seams, trace sand, moist (CL-ML)
		20	SS	80/4"	12.1	5.32		82.0	506.1	
85		21	SS	50/4"	13.4	1.89				Very tough to hard brown very silty CLAY with silt seams, trace sand (CL-ML)
		22	SS	85	12.5			88.0	500.1	
90										Dense brown silty fine SAND, saturated (SM)
		23	SS	86	7.4					
95										Dense brown SAND and GRAVEL, saturated (SP-GP)
		24	SS	100/10"	7.5			92.0	496.1	
100										End of Boring at 100.0'
105										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
110										Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer
115										
120										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 69729.GPJ TSC_ALL.GDT 10/17/07

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-3**DATE STARTED **8-28-07**DATE COMPLETED **8-31-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **588.9**END OF BORING **484.9**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **4.0'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS	4	5.5					S-3: pH = 7.21
		2	SS	9	8.6					FILL - Brown fine to medium SAND, trace gravel, paper and wire, damp (SP)
5		3	SS	20	23.0			6.0	582.9	S-3: Soluble Chloride = <50 mg/kg Soluble Sulfate = <250 mg/kg
		4	SS	6	21.6			8.0	580.9	Loose brown fine to medium SAND, trace gravel, saturated (SP)
10		5	SS	26	14.4					Firm brown SAND, some gravel, saturated (SP/GP)
		6	SS	23	15.3					S-5: % Gravel = 31, % Sand = 65, % Silt and Clay = 4
15		7	SS	31	11.7			14.0	574.9	
		8	SS	29	22.4					Firm to dense brown SAND, little gravel, saturated (SP)
20		9	SS	33	18.4					S-9: % Gravel = 10, % Sand = 84 % Silt and Clay = 6
		10	SS	41	18.5			20.0	568.9	
25		11	SS	40	25.7					Dense brownish-gray fine SAND, trace gravel, saturated (SP)
		12	SS	36	25.0			24.0	564.9	
30		13	SS	32	15.3	6.40				S-14: LL = 28, PL = 10, PI = 18
		14	SS	31	15.1	5.90	119.7			Hard gray very silty CLAY, trace sand, occasional silt seams, moist (CL-ML)
35		15	SS	37	15.6	4.73				S-14: %Gravel = 0, % Sand = 1, % Silt = 68, % Clay = 31
		16	SS	83	13.1	2.15		30.0	558.9	
40		17	SS	47	37.7	2.61				Very tough gray very silty CLAY interbedded with clayey SILT, trace gravel, moist (CL-ML)
		18	SS	53	10.6			34.0	554.9	
		19	SS	55	9.8			36.0	552.9	Dense gray SILT, trace sand, moist (ML)
		20	SS	54	10.6	4.0		38.0	550.9	Dense gray fine to medium SAND, trace gravel, saturated (SP)
										Hard gray very silty CLAY, little sand, trace gravel, moist (CL)

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-3**DATE STARTED **8-28-07**DATE COMPLETED **8-31-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **588.9**END OF BORING **484.9**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **4.0'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
40		21	SS	45	11.0	5.32				S-24: % Gravel = 3, % Sand = 7, % Silt = 47, % Clay = 47 LL = 38, PL = 11, PI = 27 Hard gray very silty CLAY, little sand, trace gravel, moist (CL)
		22	SS	61	12.9	4.07				
45		23	SS	42	12.6	4.33				
		24	SS	56	18.5	4.0	112.4			
		25	SS	46	18.8	4.40				
50		26	SS	50						Dense gray SAND, little to some gravel, saturated (SP-GP)
		27	SS	31	19.8	3.21				
55		28	SS	69	8.4	4.26		56.0	532.9	
		29	SS	69	11.7					
		30	SS	79	13.5					
60		31	SS	77	11.9			62.0	526.9	Dense gray fine to medium SAND, some gravel, saturated (SP-GP)
		32	SS	100/4"	8.0			64.0	524.9	
65		33	SS	72	6.1					Dense gray SAND and GRAVEL, saturated (SP-GP)
		34	SS	100/8"	6.2			68.0	520.9	
70		35	SS	100/6"	10.2					Dense gray SILT, trace sand, moist (ML)
		36	SS	100/9"	11.3					
		37	SS	100/9"	11.4					
75		38	SS	100/10'	10.5			74.0	514.9	Hard gray very silty CLAY, little sand, trace gravel, moist (CL)
		39	SS	100/9"	15.2					
80		40	SS	100/10'	10.6	9.20				

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

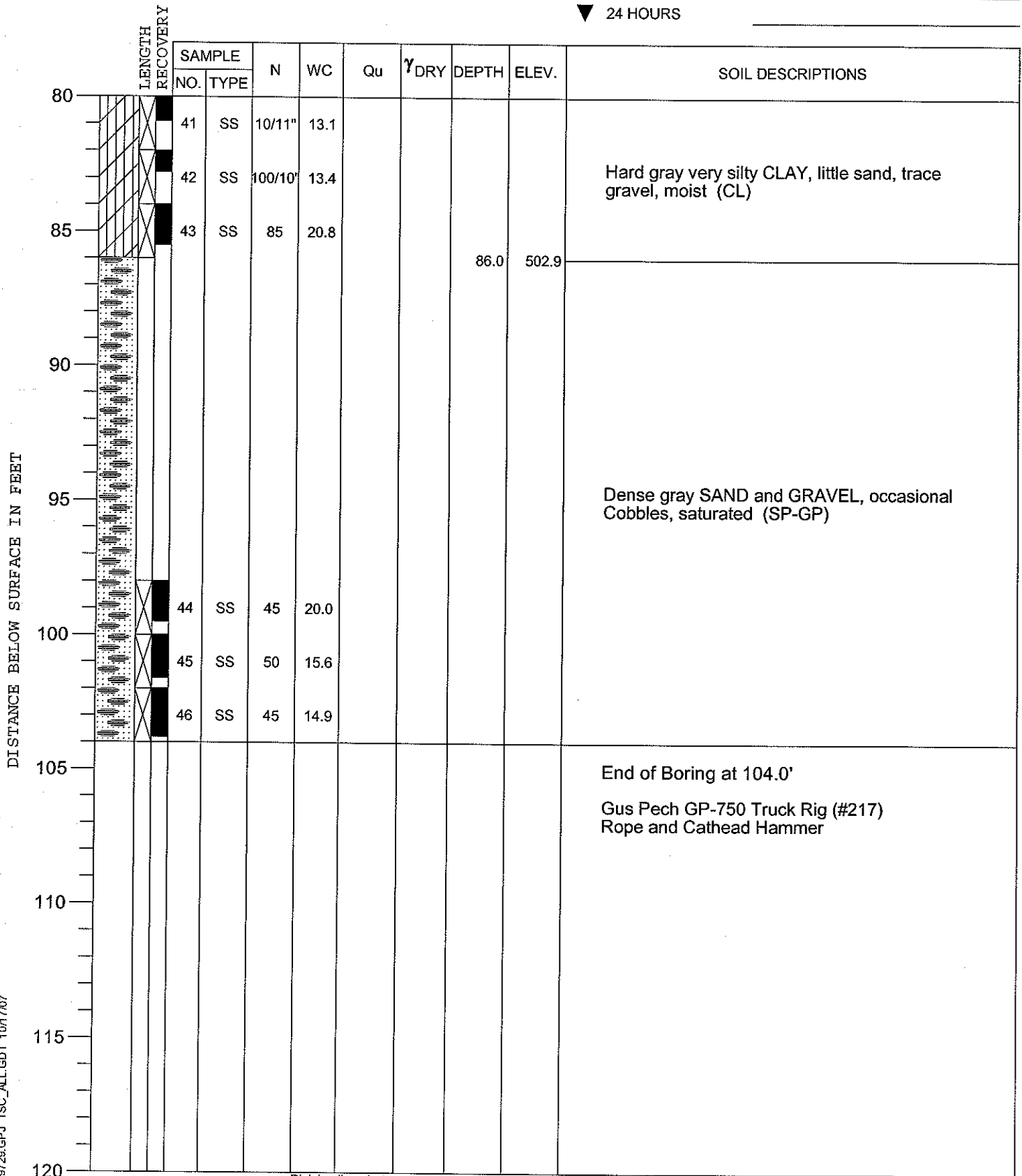
PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-3** DATE STARTED **8-28-07** DATE COMPLETED **8-31-07** JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **588.9**
END OF BORING **484.9**

WATER LEVEL OBSERVATIONS

▽ WHILE DRILLING **4.0'**
 ▽ AT END OF BORING **Rotary Wash**
 ▼ 24 HOURS



TSC 69/28.GPJ TSC_ALL.GDT 10/17/07

DRILL RIG NO. **217**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-4**DATE STARTED **9-17-07**DATE COMPLETED **9-17-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **590.1**END OF BORING **525.1**

WATER LEVEL OBSERVATIONS

▽ WHILE DRILLING **5.5'**▽ AT END OF BORING **Rotary Wash**

▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS	10	16.7					S-2: pH = 7.08 FILL - Brown and black fine to medium SAND, trace gravel, damp (SP)
5		2	SS	13	17.3			5.5	584.6	S-2: Soluble Chlorides = <50 mg/kg Soluble Sulfates = 310 mg/kg
		3	SS	13	27.2			8.0	582.1	FILL - Gray and black fine to medium SAND, little gravel, saturated (SP)
10		4	SS	17	21.4			12.0	578.1	Firm gray fine to medium SAND, saturated (SP) S-4: % Gravel = 0, % Sand = 98 % Silt and Clay = 2
15		5	SS	49	7.5					Dense gray SAND and GRAVEL, saturated (SP/GP)
20		6	SS	50/3"	17.4			22.0	568.1	
25		7	SS	50	25.8			27.0	563.1	Dense gray SAND, little gravel, saturated (SP)
30		8	SS	61	15.1	6.90		32.0	558.1	Very tough to hard gray very silty CLAY, little sand seams, occasional silt seams, moist (CL-ML)
35		9	SS	82	23.9					Dense gray clayey SILT, trace sand, very moist (ML)
40		10	SS	82	12.0	5.90		37.0	553.1	Very tough to hard brownish-gray silty CLAY, little sand, trace gravel, moist (CL)

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-4**DATE STARTED **9-17-07**DATE COMPLETED **9-17-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **590.1**END OF BORING **525.1**

WATER LEVEL OBSERVATIONS

▽ WHILE DRILLING **5.5'**▽ AT END OF BORING **Rotary Wash**

▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
40										S-11: % Gravel = 3, % Sand = 19, % Silt = 61, % Clay = 17 LL = 24, PL = 12, PI = 12
45		11	SS	88	12.3	5.90	126.5			Very tough to hard brownish-gray silty CLAY, little sand, trace gravel, moist (CL)
50		12	SS	77	13.6	5.06				
55		13	SS	81	12.9	6.23				
57.0								57.0	533.1	Dense gray clayey GRAVEL, saturated (GC)
60		14	SS	50/2"	9.4					
62.0								62.0	528.1	Dense SAND and GRAVEL, trace gravel (SP-GP)
65		15	SS	50/2"	7.0					
70										End of Boring at 65.0'
75										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
80										Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer

Division lines between deposits represent
approximate boundaries between soil types;
in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-6**DATE STARTED **8-31-07**DATE COMPLETED **9-4-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **590.7**END OF BORING **490.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS	29	7.8					S-2: pH = 7.57 FILL - Brown fine to medium SAND, little sand and gravel, damp (SP)
5		2	SS	31	6.4			5.5	585.2	S-2: Soluble Chlorides = <50 mg/kg Soluble Sulfates = <250 mg/kg
		3	SS	12	15.4			8.0	582.7	Firm brown SAND, little gravel, damp (SP)
10		4	SS	16	6.1			10.5	580.2	Firm brown SAND and GRAVEL, saturated (SP-GP)
15		5	SS	25	15.7					
20		6	SS	54	19.2					Dense brown SAND, trace gravel, saturated (SP)
25		7	SS	43	23.0					S-6: % Gravel = 8, % Sand = 88 % Silt and Clay = 4
30		8	SS	50/4"	10.7	11.54		27.0	563.7	Hard gray silty CLAY, little sand, trace gravel, moist (CL)
35		9	SS	50	17.8	3.8	113.8	32.0	558.7	S-9: % Gravel = 0, % Sand = 0, % Silt = 62, % Clay = 38 Very tough to hard gray very silty CLAY, occasional silt seams, moist (CL-ML) LL = 31, PI = 13, PI = 18
40		10	SS	50/4"	9.3	4.5+*		37.0	553.7	Hard gray very silty CLAY, little sand, trace gravel, moist (CL)

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-6**DATE STARTED **8-31-07**DATE COMPLETED **9-4-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **590.7**END OF BORING **490.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
40										
45		11	SS	99	9.4	11.21				
50		12	SS	80	10.0	11.54				Hard gray very silty CLAY, little sand, trace gravel, moist (CL)
55		13	SS	90	13.0	7.23				
60		14	SS	70	18.3	6.23				
62.0								62.0	528.7	
65		15	SS	50	18.6	4.0				Very tough to hard gray very silty CLAY, Black clayey TOPSOIL (OL) occasional silt seams, moist (CL-ML)
67.0								67.0	523.7	
70		16	SS	48	12.3					Dark gray SILT, trace sand, moist (ML)
73.0								73.0	517.7	
75		17	SS	61	8.2	4.5+*				Very tough to hard gray sandy CLAY, little gravel, moist (CL)
77.0								77.0	513.7	
80		18	SS	50/4"	12.2	11.54				Hard gray very silty CLAY, little sand seams, occasional silt seams, moist (CL-ML)

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-6**DATE STARTED **8-31-07**DATE COMPLETED **9-4-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **590.7**END OF BORING **490.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
80										
85		19	SS	50/3"	13.1	8.89				Hard gray very silty CLAY, little sand seams, occasional silt seams, moist (CL-ML)
90		20	SS	50/3"	12.6	4.5*				
95		22	SS	50/3"	11.2			92.0	498.7	Very dense gray SILT, trace sand, moist (ML)
100		23	SS	55	13.7	4.79		97.0	493.7	Hard gray very silty CLAY, trace sand, occasional silt seams, moist (CL-ML)
105										End of Boring at 100.0'
110										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
115										Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer
120										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**Page **3 of 3**

TSC 69729.GPJ TSC_ALL.GDT 10/17/07

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-7**DATE STARTED **9-4-07**DATE COMPLETED **9-5-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING

5.5'

▼ AT END OF BORING

Rotary Wash

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	AUGER	100/1"	6.9					FILL - Brown SAND and GRAVEL, occasional Cobbles, damp (SP-GP)
3.0		2	SS	100/6"	9.6					S-2: pH = 6.96 FILL - Brown silty fine SAND, trace gravel, damp (SM) ▼ S-2: Soluble Chlorides = <50 mg/kg Soluble Sulfates = 600 mg/kg
5.5		3	SS	18	22.0					
10		4	SS	18	16.2					Firm brown fine to medium SAND, little gravel, saturated (SP) S-4: % Gravel = 18, % Sand = 80 % Silt and Clay = 2
12.0		5	SS	44	21.5					
15		6	SS	50/5"	16.5					Dense brown fine to medium SAND, trace to little gravel, saturated (SP)
20		7	SS	43						S-7: % Gravel = 0, % Sand = 90, % Silt and Clay = 10
22.0		8	SS	30	30.4					Firm to dense brown fine SAND, trace to little silt, saturated (SP)
25		9	SS	34	14.7	4.13				
30		10	SS	50/3"	13.7					Hard gray silty CLAY, little sand, trace gravel, moist (CL)
32.0										
35										Very dense gray fine SAND, little gravel, saturated (SM)
37.0										
40										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-7**DATE STARTED **9-4-07**DATE COMPLETED **9-5-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS _____

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
40										Very dense gray fine SAND, little gravel, saturated (SM)
45		11	SS	80	10.7	7.56		42.0		
50		12	SS	58	10.5	5.90	131.3			Hard gray silty CLAY, little sand, trace gravel, moist (CL)
55		13	SS	62	11.2	7.23		57.0		S-12: % Gravel = 6, % Sand = 21, % Silt = 47, % Clay = 26 LL = 23, PL = 11, PI = 12
60		14	SS	47	13.3	4.5+*				Hard gray very silty CLAY, little sand, occasional silt seams, moist (CL-ML)
65		15	SS	51	9.8	4.5+*		67.0		
70		16	SS	42	8.5	4.5+*		72.0		Hard gray silty CLAY, little sand and gravel, moist (CL)
75		17	SS	100/5"	13.7	6.23				Hard gray very silty CLAY, little to some sand,, trace gravel, occasional silt seams, moist (CL-ML)
80		18	SS	93	8.3	7.56				

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**Page **2 of 3**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-7** DATE STARTED **9-4-07** DATE COMPLETED **9-5-07** JOB **L-69,729**

ELEVATIONS

WATER LEVEL OBSERVATIONS

GROUND SURFACE _____

▼ WHILE DRILLING **5.5'**

END OF BORING _____

▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS _____

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
80								82.0		Hard gray very silty CLAY, little to some sand,, trace gravel, occasional silt seams, moist (CL-ML)
85		19	SS	99	8.8					Very dense gray SILT, little sand seams, moist (ML)
90		20	SS	50/3"	10.4			92.0		
95		22	SS	50/5"	12.9					Very dense gray sandy SILT, occasional layers, moist (ML)
97.0										
100		22	SS	43	13.8	4.79				Hard brownish-gray very silty CLAY, trace sand, moist (CL)
105										End of Boring at 100.0'
110										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
115										Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer
120										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

Page 3 of 3

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-8**DATE STARTED **9-14-07**DATE COMPLETED **9-14-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE **590.6**END OF BORING **490.6**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5'**▼ AT END OF BORING **Rotary Wash**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0								0.2	590.4	FILL - Black clayey TOPSOIL, moist (OL)
		1	SS	18	6.1					FILL - Brown to dark brown fine to medium SAND, trace gravel, damp (SP)
5		2	SS	22	12.7			5.5	585.1	▼ S-3: % Gravel = 1, % Sand = 95, % Silt and Clay = 4
		3	SS	5	31.9					FILL - Dark brown SAND, trace metal debris, saturated (SP)
10		4	SS	5	36.9					
		5	SS	17	22.9			13.0	577.6	Firm brown and gray fine to medium SAND, trace gravel, saturated (SP)
15								17.0	573.6	
		6	SS	44	18.5					Dense brown fine to medium SAND, trace gravel, saturated (SP)
20										
		7	SS	55	20.9					
25								27.0	563.6	S-8: % Gravel = 30, % Sand = 34, % Silt = 29, % Clay = 7
		8	SS	56	9.0		131.9			Dense brown clayey SAND and GRAVEL, saturated (SC-GC)
30								32.0	558.6	LL = 20, PL = 10, PI = 10
		9	SS	61	19.8					Dense brownish-gray clayey SILT, trace sand, very moist (ML)
35								37.0	553.6	S-10: % Gravel = 24, % Sand = 43, % Silt = 33, % Clay = 0, LL = 14, PL = 10, PI = 4
		10	SS	89/10"	12.0		127.3			Dense gray silty SAND and GRAVEL, saturated (SM-GM)
40										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**Page **1 of 3**

PROJECT Energy Solutions, Zion Nuclear Power PlantCLIENT Sargent & Lundy, LLCBORING I-8DATE STARTED 9-14-07DATE COMPLETED 9-14-07JOB L-69,729

ELEVATIONS

GROUND SURFACE 590.6END OF BORING 490.6

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING 5.5'▼ AT END OF BORING Rotary Wash

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
40								42.0	548.6	Dense gray silty SAND and GRAVEL, saturated (SM-GM)
45		11	SS	94	11.1	4.0				
50		12	SS	70	10.2	4.40				
55		13	SS	52	14.2	4.79	121.8			Very tough to hard gray silty CLAY, little sand, trace gravel, moist (CL) S-13: % Gravel = 4, % Sand = 11, % Silt = 57, % Clay = 28 LL = 30, PL = 13, PI = 17
60		14	SS	79	16.3	2.48				
65		15	SS	50/3"	8.0			62.0	528.6	Dense gray SAND and GRAVEL, saturated (SP/GP)
70		16	SS	90	7.9			72.0	518.6	
75		17	SS	50/3"	10.9	4.5+*				Very tough to hard gray very silty CLAY, little sand, occasional silt seams, moist (CL-ML)
80		18	SS	100/2"	12.6			77.0	513.6	Dense gray clayey SILT, little sand, moist (ML)

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 69729.GPJ TSC_ALL.GDT 10/17/07

DRILL RIG NO. 217

Page 2 of 3

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-8**DATE STARTED **9-14-07**DATE COMPLETED **9-14-07**JOB **L-69,729**

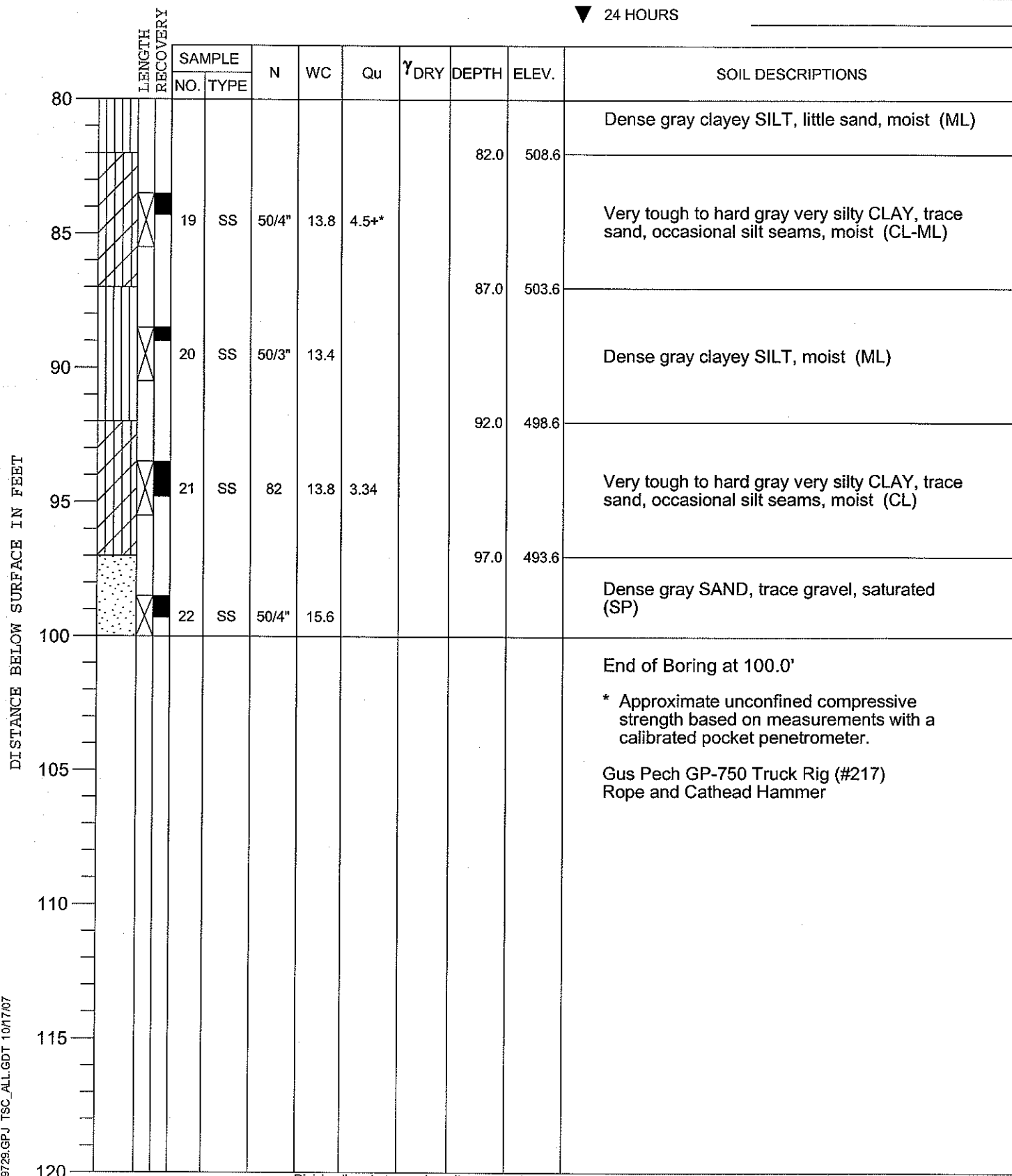
ELEVATIONS

GROUND SURFACE **590.6**END OF BORING **490.6**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5'**▽ AT END OF BORING **Rotary Wash**

▼ 24 HOURS



TSC 69729.GPJ TSC_ALL.GDT 10/17/07

DRILL RIG NO. **217**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-9** DATE STARTED **9-5-07** DATE COMPLETED **9-5-07** JOB **L-69,729**

ELEVATIONS

WATER LEVEL OBSERVATIONS

GROUND SURFACE _____

▼ WHILE DRILLING **3.0'**

END OF BORING _____

▼ AT END OF BORING **4.0'**

▼ 24 HOURS _____

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS	20	7.1					▼ FILL - Dark brown to brown fine SAND, trace silt, saturated @ 3' (SP) ▼ S-2: % Gravel = 0, % Sand = 96, % Silt and Clay = 4
5		2	SS	13	19.4			5.5		
		3	SS	16	21.8					Loose to firm brown SAND, trace gravel, saturated (SP)
10		4	SS	9	18.9					
15										End of Boring at 10.0'
20										
25										Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer
30										
35										
40										

DRILL RIG NO. **217**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-10**DATE STARTED **9-5-07**DATE COMPLETED **9-5-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0'**▼ AT END OF BORING **7.0'**

▼ 24 HOURS _____

LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	NO.	TYPE							
0							0.3		Asphaltic Concrete
							1.3		FILL - Crushed Limestone Gravel, damp (GP)
	1	SS	32	12.6					
	2	SS	39	5.4					FILL - Brown fine to medium SAND, trace to little gravel, damp (SP)
5							5.5		
	3	SS	44	12.6					▼ Dense brown fine to medium SAND, trace gravel, saturated @ 8.0' (SP)
	4	SS	47	19.1					
10									End of Boring at 10.0'
									Gus Pech GP-750 Truck Rig (#217)
									Rope and Cathead Hammer
15									
20									
25									
30									
35									
40									

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

DISTANCE BELOW SURFACE IN FEET

TSC 69729.GPJ TSC_ALL.GDT 10/4/07

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-12**DATE STARTED **9-5-07**DATE COMPLETED **9-5-07**JOB **L-69,729**

ELEVATIONS

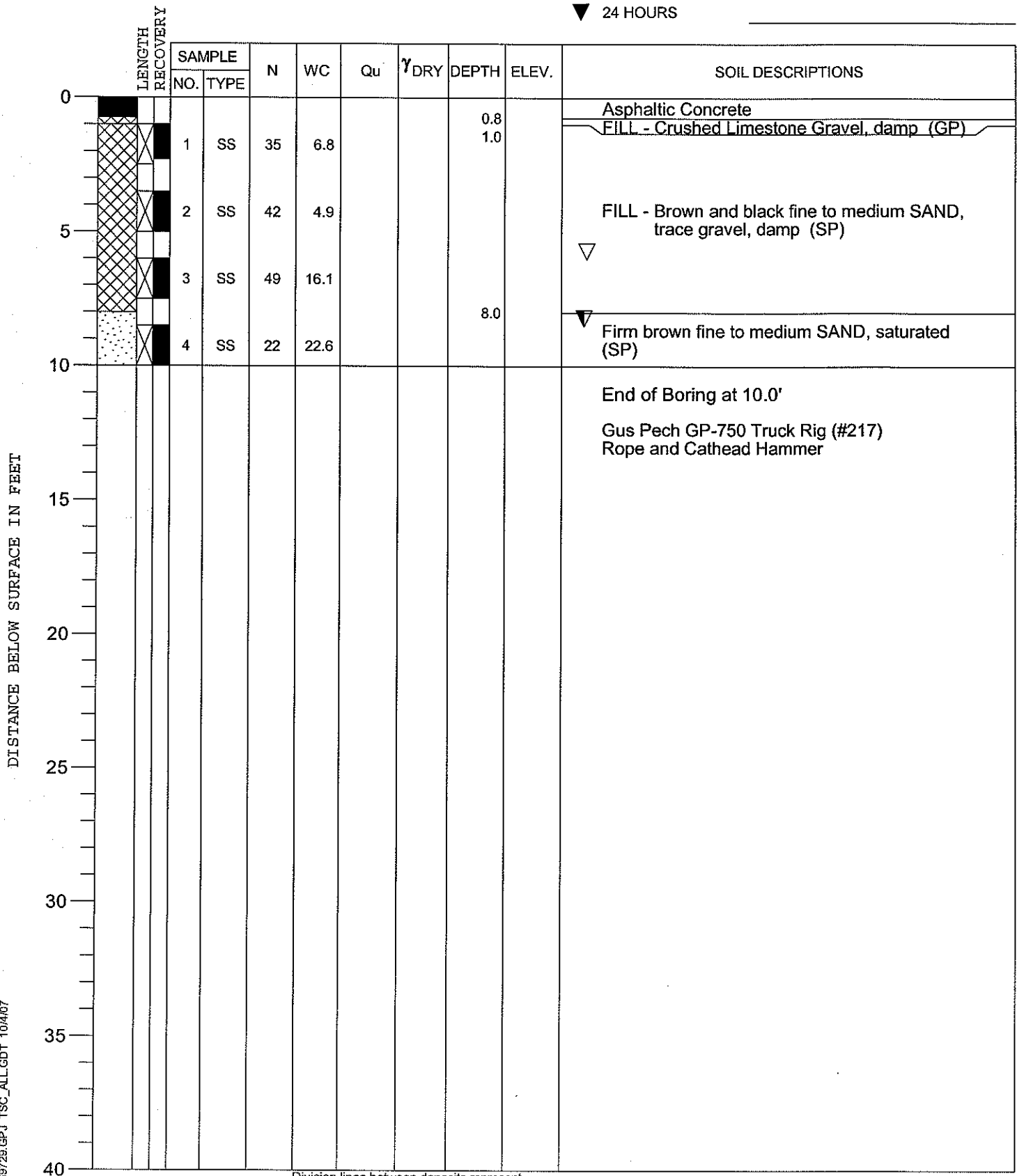
GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.5'**▽ AT END OF BORING **6.0'**

▼ 24 HOURS _____



DISTANCE BELOW SURFACE IN FEET

TSC 69729.GPJ TSC_ALL.GDT 10/4/07

DRILL RIG NO. **217**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-13**DATE STARTED **9-6-07**DATE COMPLETED **9-6-07**JOB **L-69,729**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **3.0'**▼ AT END OF BORING **8.0'**

▼ 24 HOURS _____

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0								0.9		FILL - Crushed Limestone Gravel, damp (GP)
		1	SS	46	5.8					▼ FILL - fine to medium silty SAND, little gravel, saturated @ 3.0' (SM) S-2: % Gravel = 12, % Sand = 76, % Silt and Clay = 12
5		2	SS	49	10.0			5.5		
		3	SS	51	22.0					▼ Dense brown fine to medium SAND, trace gravel, saturated (SP)
10		4	SS	50	21.5					
15										End of Boring at 10.0' Gus Pech GP-750 Truck Rig (#217) Rope and Cathead Hammer
20										
25										
30										
35										
40										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **217**

PROJECT **Energy Solutions, Zion Nuclear Power Plant**CLIENT **Sargent & Lundy, LLC**BORING **I-11**DATE STARTED **10-17-07**DATE COMPLETED **10-17-07**JOB **L-69,729**

ELEVATIONS


GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**▼ AT END OF BORING **Dry**

▼ 24 HOURS _____

	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS					0.5 0.9		Asphaltic Concrete FILL - Crushed Limestone Gravel, damp (GP) FILL - Brown SAND, little gravel, damp (SP)
5										End of Boring at 2.0'
10										
15										End of Boring at 2.0'
20										
25										End of Boring at 2.0'
30										
35										End of Boring at 2.0'
40										

DISTANCE BELOW SURFACE IN FEET

TSC 69729.GPJ TSC_ALL.GDT 10/17/07

DRILL RIG NO. **Hand Auger**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

**GEOPHYSICAL DATA REPORT
CROSSHOLE SEISMIC RESULTS
ZION NUCLEAR POWER PLANT
ZION, ILLINOIS**

Prepared for:

TESTING SERVICE CORPORATION
Carol Stream, Illinois

Prepared by:

GEOTECHNOLOGY, INC.
St. Louis, Missouri

Geotechnology, Inc. Report No. 0979801.75IS

October 3, 2007



GEOTECHNOLOGY, INC.
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS • COLLINSVILLE • KANSAS CITY

0979801.75IS

October 3, 2007

Mr. Darin Delaney
Testing Service Corporation
457 East Gundersen Drive
Carol Stream, Illinois 60188

Reference: Geophysical Data Report
Crosshole Seismic Results
Zion Nuclear Power Plant
Zion, Illinois

Dear Mr. Delaney:

Presented herein are the results of the crosshole seismic test for the referenced site. This work was conducted in general accordance with proposal P13655.00.75IS dated August 2, 2007. Presented in this report is a description of the geophysical method and data plots.

It is a pleasure to be of service to you on this project. If you have any questions or comments, please contact the undersigned at (314) 997-7440.

Very truly yours,

GEOTECHNOLOGY, INC.

Glen L. Adams
Senior Geophysicist

GLA/MSR:gla/ddc

Copies Submitted: (2)

Rick Pershall
Industrial Market Team Leader



0979801.75IS

GEOPHYSICAL DATA REPORT
CROSSHOLE SEISMIC RESULTS
ZION POWER STATION
ZION, ILLINOIS

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APPENDIX

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1.0 INTRODUCTION

1.2 Scope of Work. The scope of work included mobilizing geophysical equipment and personnel to the site, conducting a crosshole seismic test, and processing/interpreting the data. The seismic data were processed, and shear and compressional wave velocities were calculated to determine dynamic soil properties. The seismic data were plotted and the results are presented in this report. Any engineering analysis or recommendations based on this data are outside our scope of work.

The crosshole seismic testing method involves generating compressional (P) and shear (S) wave seismic energy at periodic depth intervals within a borehole and measuring the seismic wave travel-times at geophones situated at the source depth between two adjacent boreholes (per ASTM Standard D4428). The seismic wave arrivals at the geophones are transmitted through cables to the seismograph for digital recording. The data are interpreted by analyzing the differences in elapsed travel-time from the source to geophones. P- and S-wave velocities can be calculated for each depth interval by analyzing the travel-time data. The distance between boreholes may vary with depth; therefore borehole deviation logging is conducted to adjust the borehole separation distance with depth for the velocity calculations.

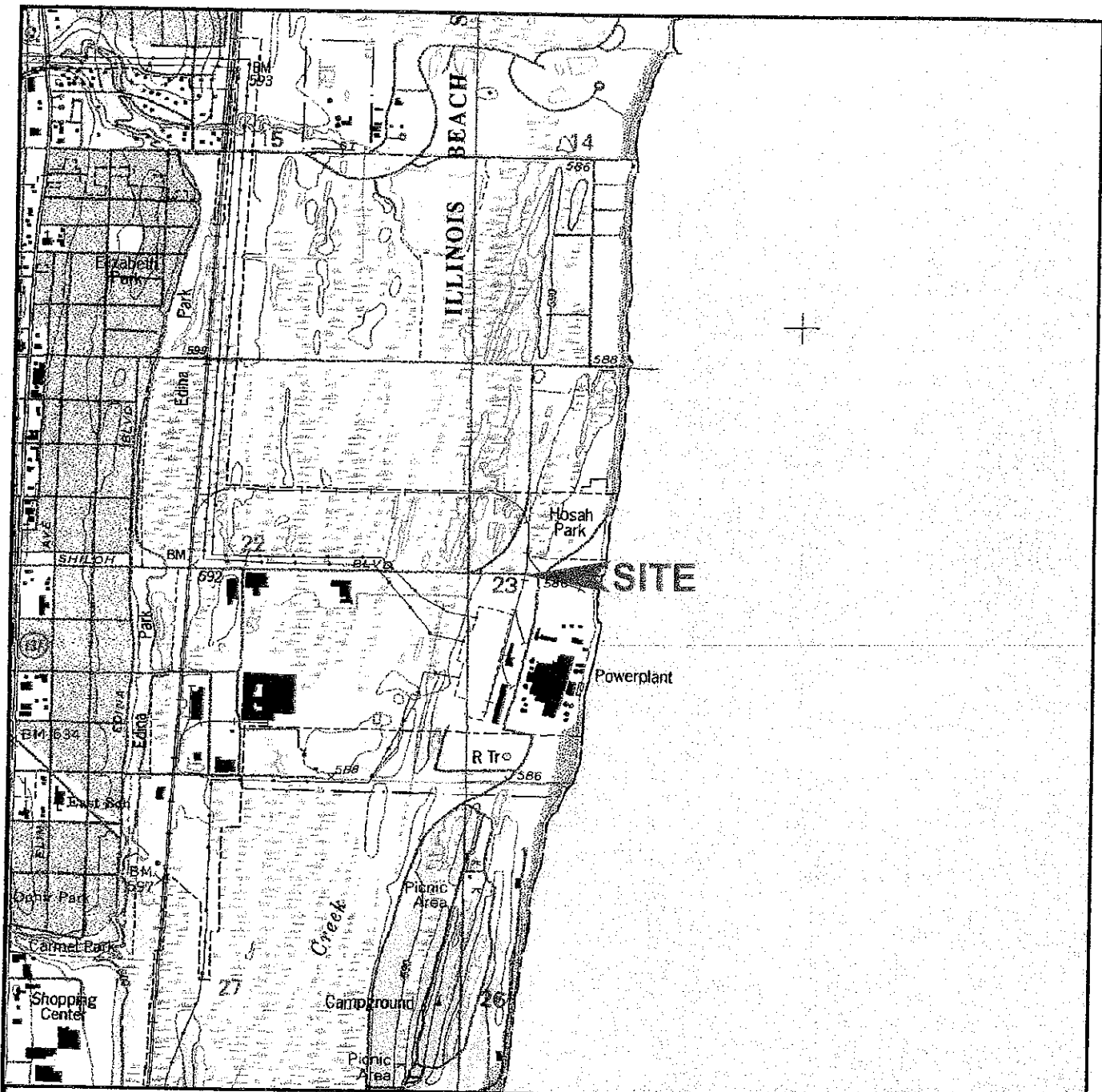
Crosshole seismic testing was conducted between sample boring I-6 and two adjacent receiver (geophone) borings as shown on Plate 3. Crosshole data were plotted as point data at the depth of each record. Seismic velocities calculated between the source boring and the two geophone borings are presented on Plates 4 and 5. A table of all tabulated values and velocities is



Testing Service Corporation
October 3, 2007
Page 2

0979801.75IS


presented on Plate 6. Plates 7 through 9 represent a plot of the deviation from vertical for the three borings used for the crosshole test. Due to the inherent noise in the earth and lateral variation in soil velocities between the test borings, some variations in velocities were calculated between the two receiver holes. An average velocity is plotted on the crosshole data plots that will allow a smoother line fit to the data. Due to a physical limitation of the crosshole equipment, data could only be collected to a depth of 97-feet from the surface (the borings were cased at approximately 99-feet, and the tool requires approximately 2-feet from the bottom of the casing to collect data within the deepest desired interval). Densities used for the moduli calculations were based on lab values provided by the client as wet unit weights.



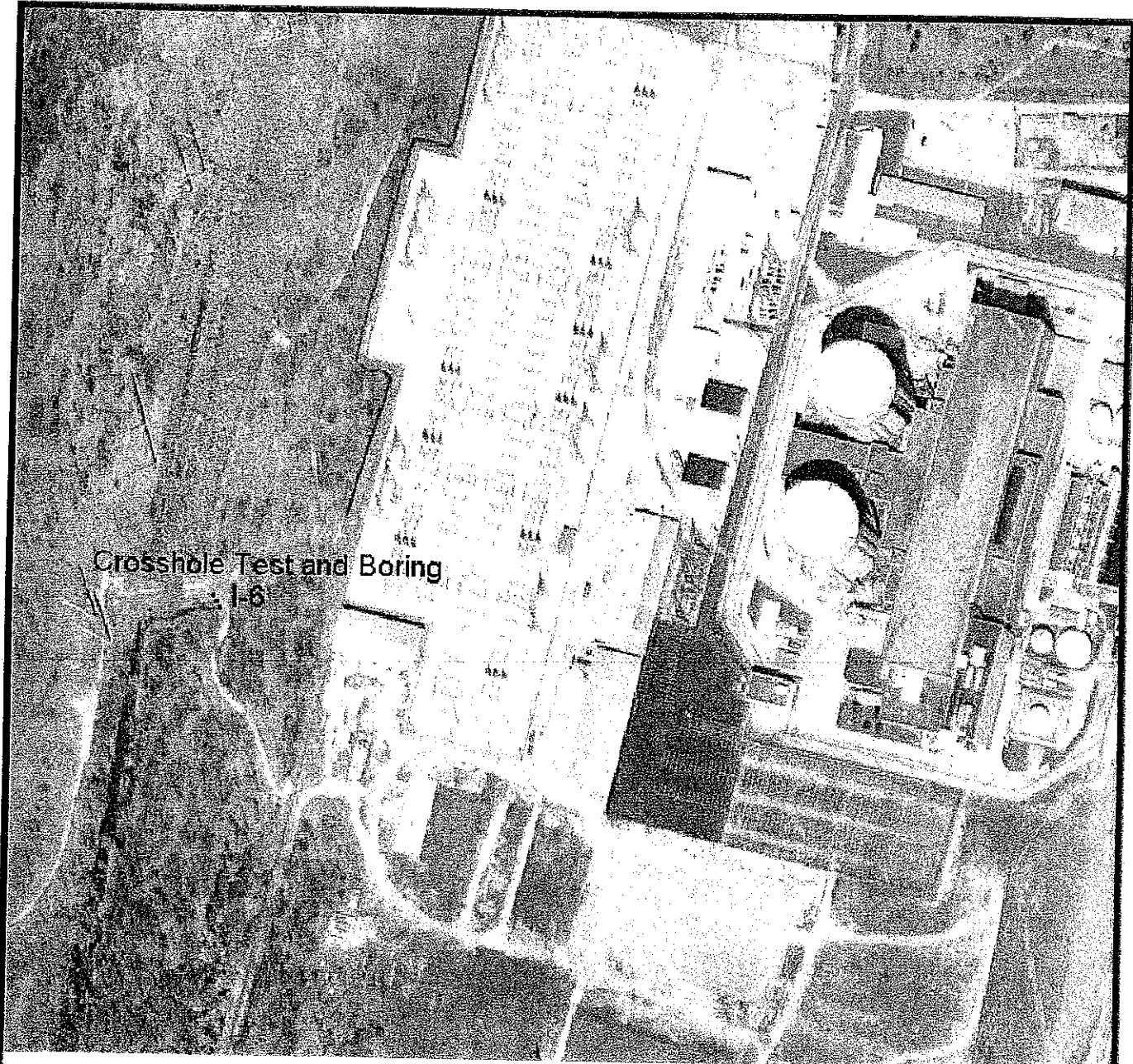
NOTES

Plan adapted from a 7.5 minute U.S.G.S. map for Zion, Illinois Quadrangle, last revised in 1993.



Drawn By: SLC	Ck'd By: <i>SLC</i>	App'vd By: <i>RSP</i>
Date: 10-01-07	Date: <i>10-2-07</i>	Date: <i>10-2-07</i>
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
SITE LOCATION AND TOPOGRAPHY		
Project Number 0979801.75IS		PLATE 1



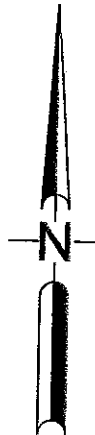



NOTES

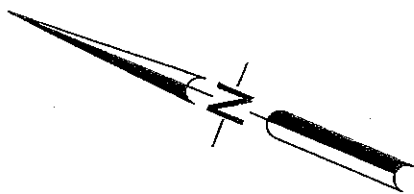
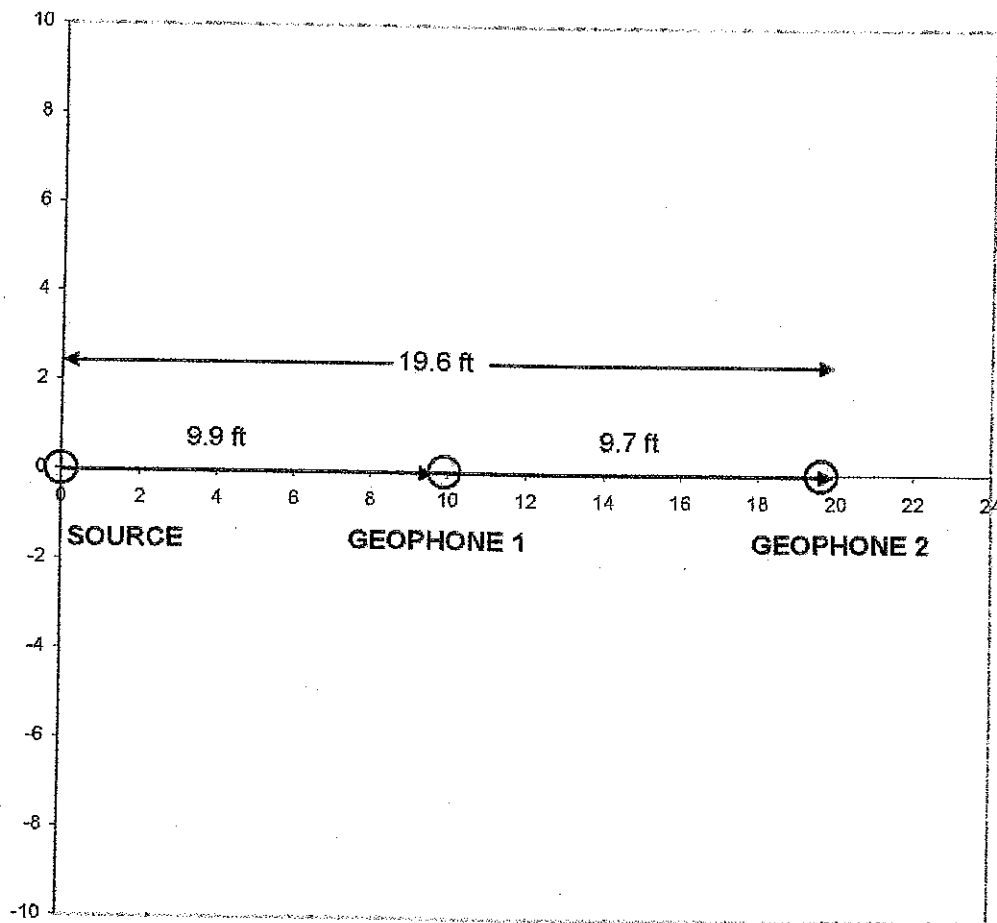
1. Plan adapted from an aerial photograph courtesy of U.S.G.S.


LEGEND

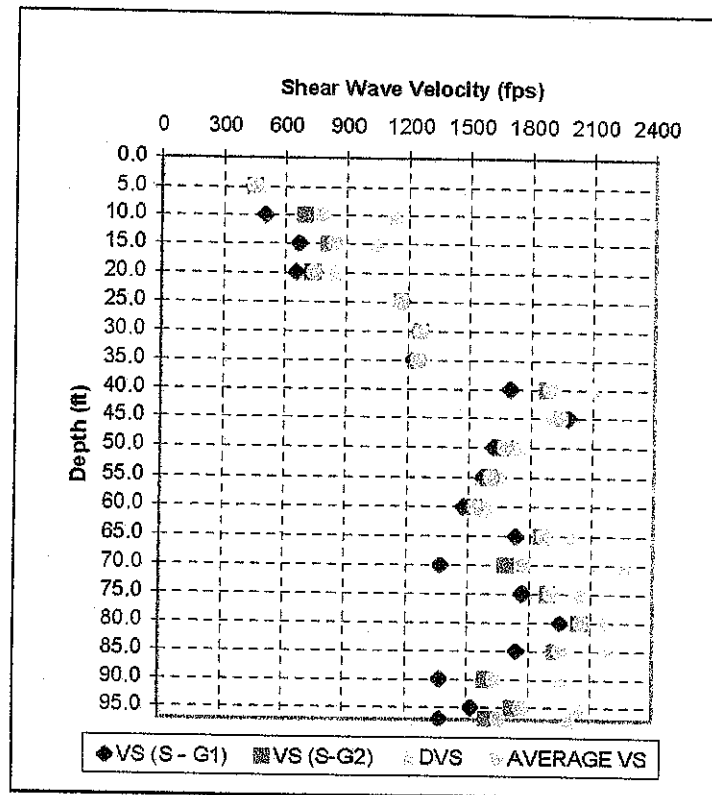
- Boring Location



Drawn By: SLC	Ck'd By: <i>ELA</i>	App'vd By: <i>RSP</i>
Date: 10-01-07	Date: <i>10-2-07</i>	Date: <i>10/2/07</i>
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
PLAN OF SITE AND BORING LOCATIONS		
Project Number 0979801.75IS		PLATE 2



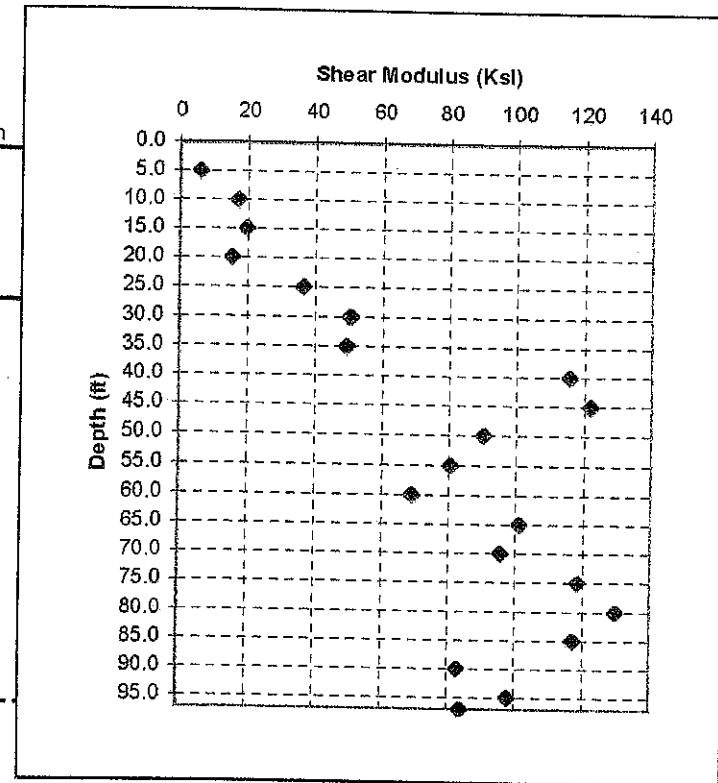
Drawn By: SLC	Ck'd By: <i>SLA</i>	App'vd By: <i>RBP</i>
Date: 10-01-07	Date: 10-2-07	Date: 10-2-07
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
RELATIVE BOREHOLE LOCATIONS		
Project Number 0979801.75IS		PLATE 3




Soil
Description

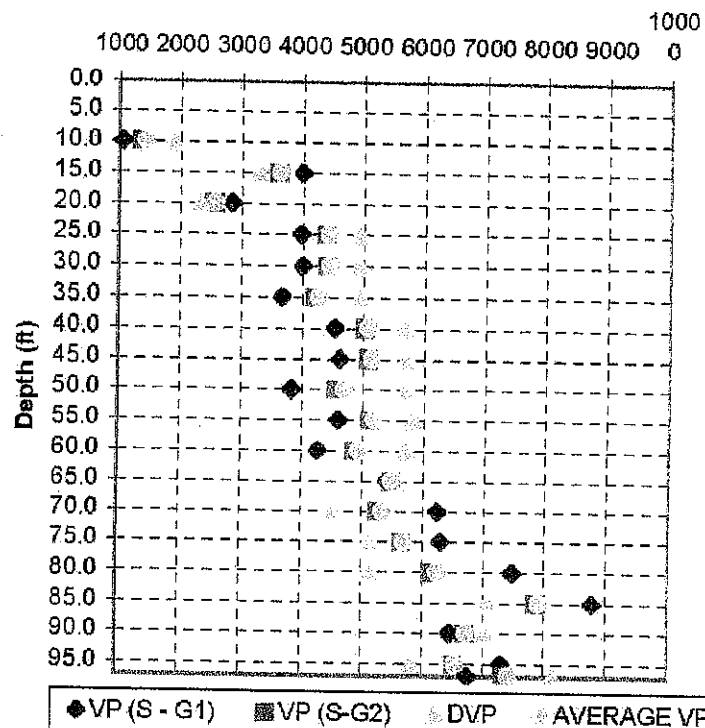
Sand

Silt Clay



Drawn By: SLC	Ck'd By: GLA	App'd By: RBP
Date: 10-01-07	Date: 10-2-07	Date: 10-2-07
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
SHEAR (S) WAVE VELOCITY AND SHEAR MODULUS VS DEPTH		
Project Number 0979801.75IS		PLATE 4

COMPRESSION (P) Wave Velocity (fps)

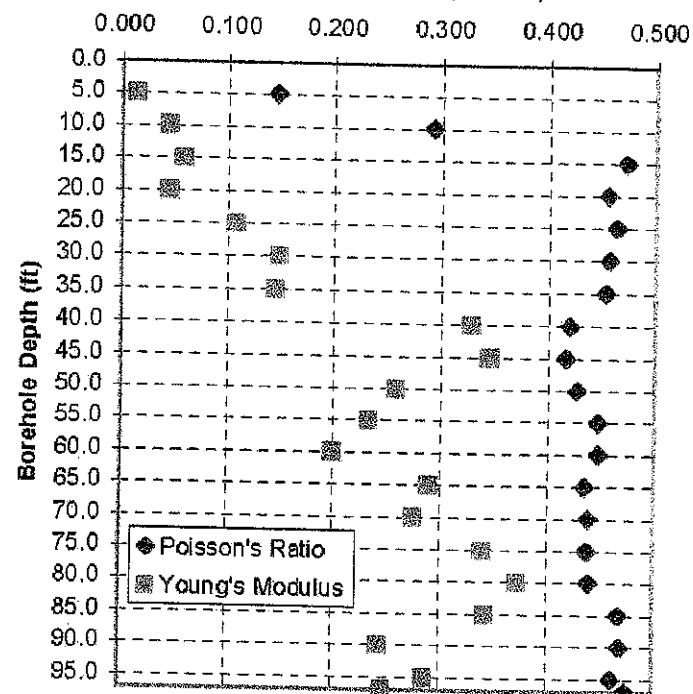


Soil
Description

Sand

Silt Clay

Poisson's Ratio and Young's Modulus (1e3 ksi)



Drawn By: SLC

Ck'd By: *GLA*

App'vd By: *MBP*

Date: 10-01-07

Date: *10-2-07*

Date: *10-2-07*



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Zion Nuclear Power Plant
Zion, Illinois

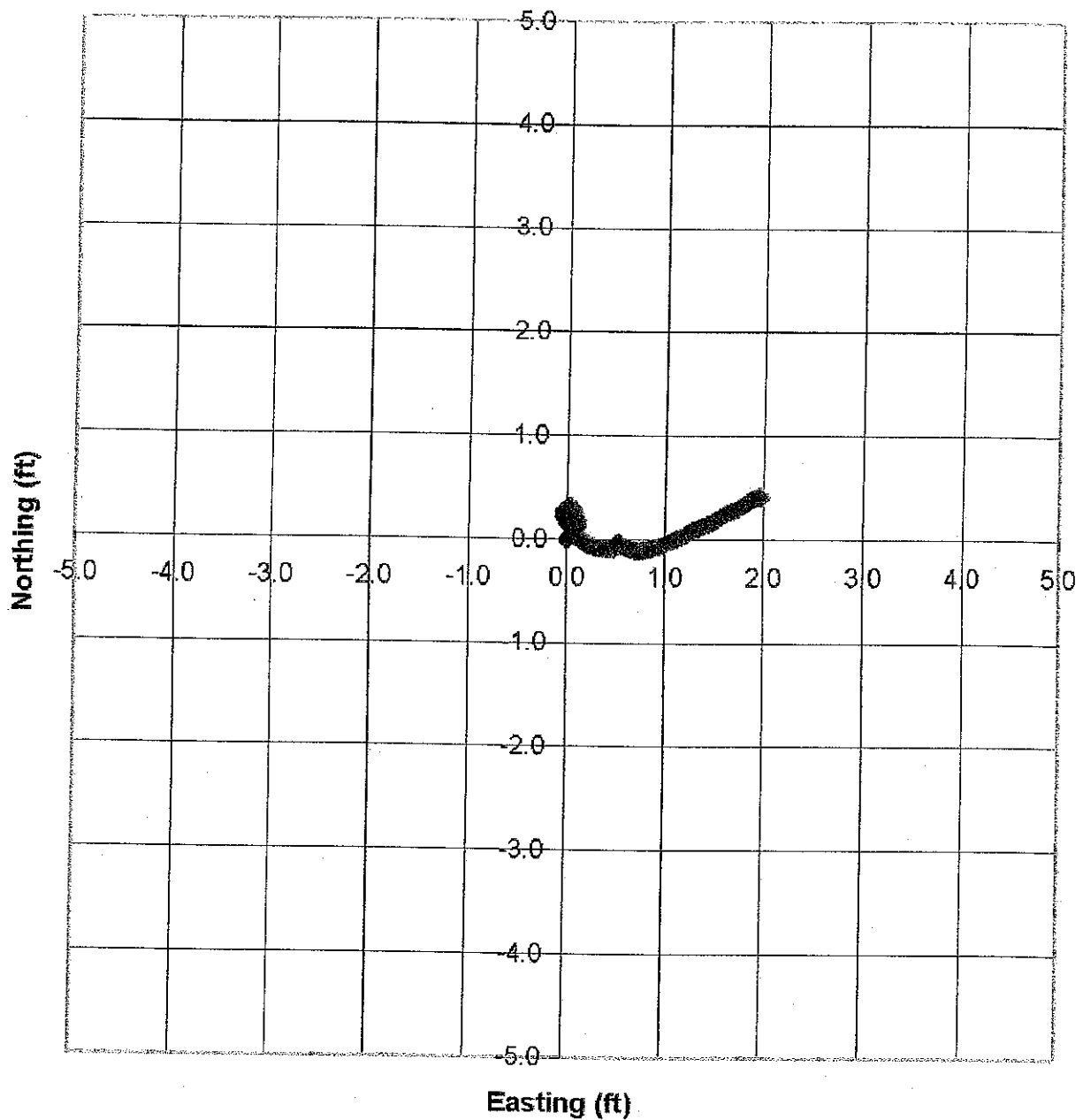
COMPRESSIONAL (P) WAVE VELOCITY, POISSON'S
RATIO, AND YOUNG'S MODULUS VS DEPTH


Project Number
0979801.751S

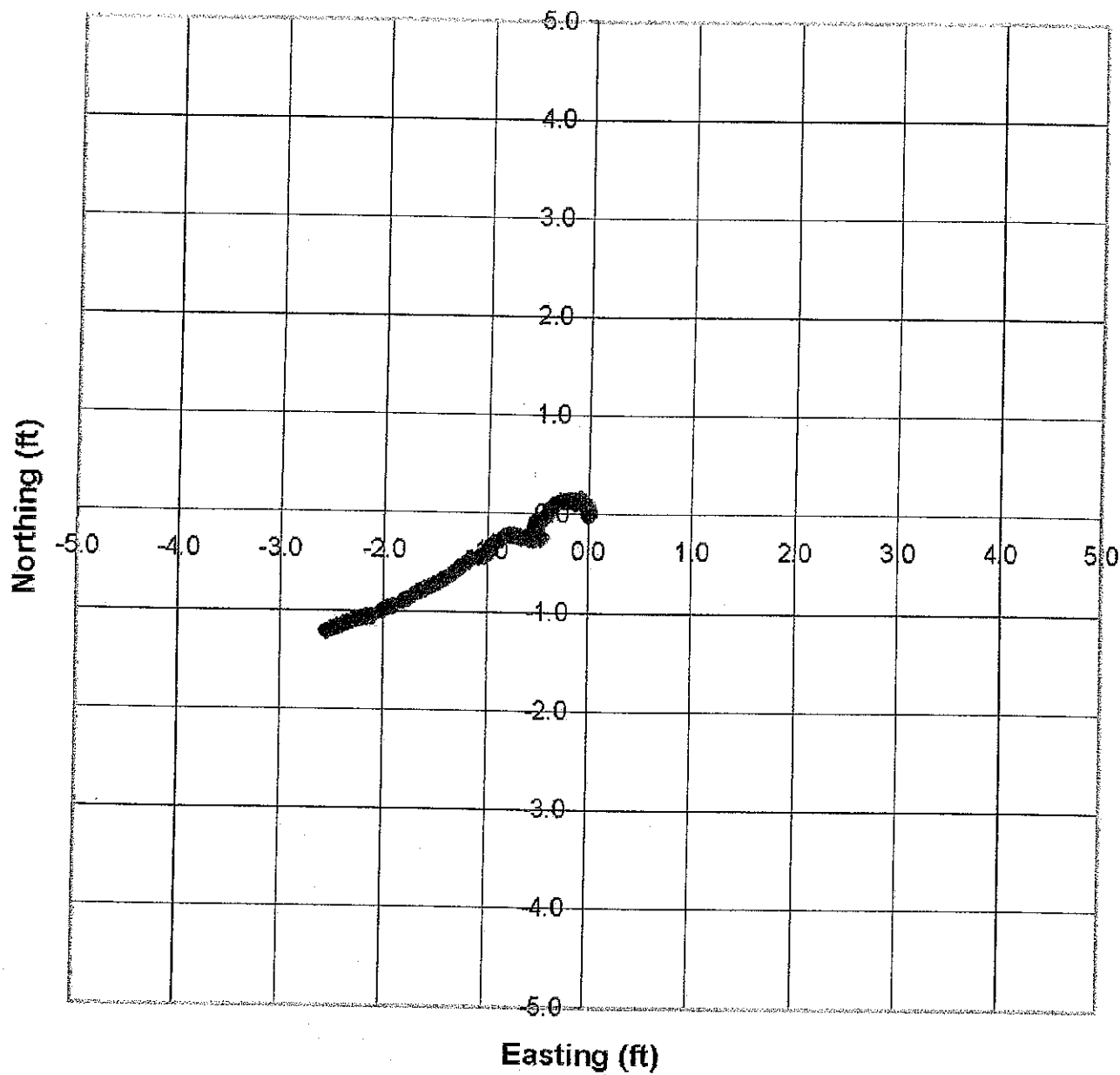
PLATE 5


DEPTH (FT)	SHEAR VELOCITY (AVERAGE, FT/SEC)	P-WAVE VELOCITY (AVERAGE, FT/SEC)	UNIT WEIGHT (LB/CU FT)	SHEAR MODULUS (KSI)	POISSON RATIO	YOUNG'S MODULUS (KSI)
5	449	696	128	5.59	0.14	12.80
10	773	1427	131	17.00	0.29	43.92
15	838	3630	128	19.51	0.47	57.43
20	741	2570	128	15.16	0.45	44.10
25	1163	4427	124	36.38	0.46	106.43
30	1260	4443	146	50.28	0.46	146.44
35	1248	4268	146	49.31	0.45	143.32
40	1889	5083	149	115.37	0.42	327.62
45	1940	5138	149	121.71	0.42	344.89
50	1677	4696	148	90.29	0.43	257.67
55	1609	5185	143	80.36	0.45	232.51
60	1533	4944	135	68.86	0.45	199.26
65	1864	5492	134	101.06	0.43	290.02
70	1768	5336	141	95.61	0.44	275.05
75	1900	5696	151	118.31	0.44	340.13
80	2051	6245	142	129.67	0.44	373.32
85	1949	7904	142	117.00	0.47	343.43
90	1634	6740	143	82.82	0.47	243.29
95	1764	6546	145	97.92	0.46	286.08
97	1654	7411	141	83.74	0.47	246.82

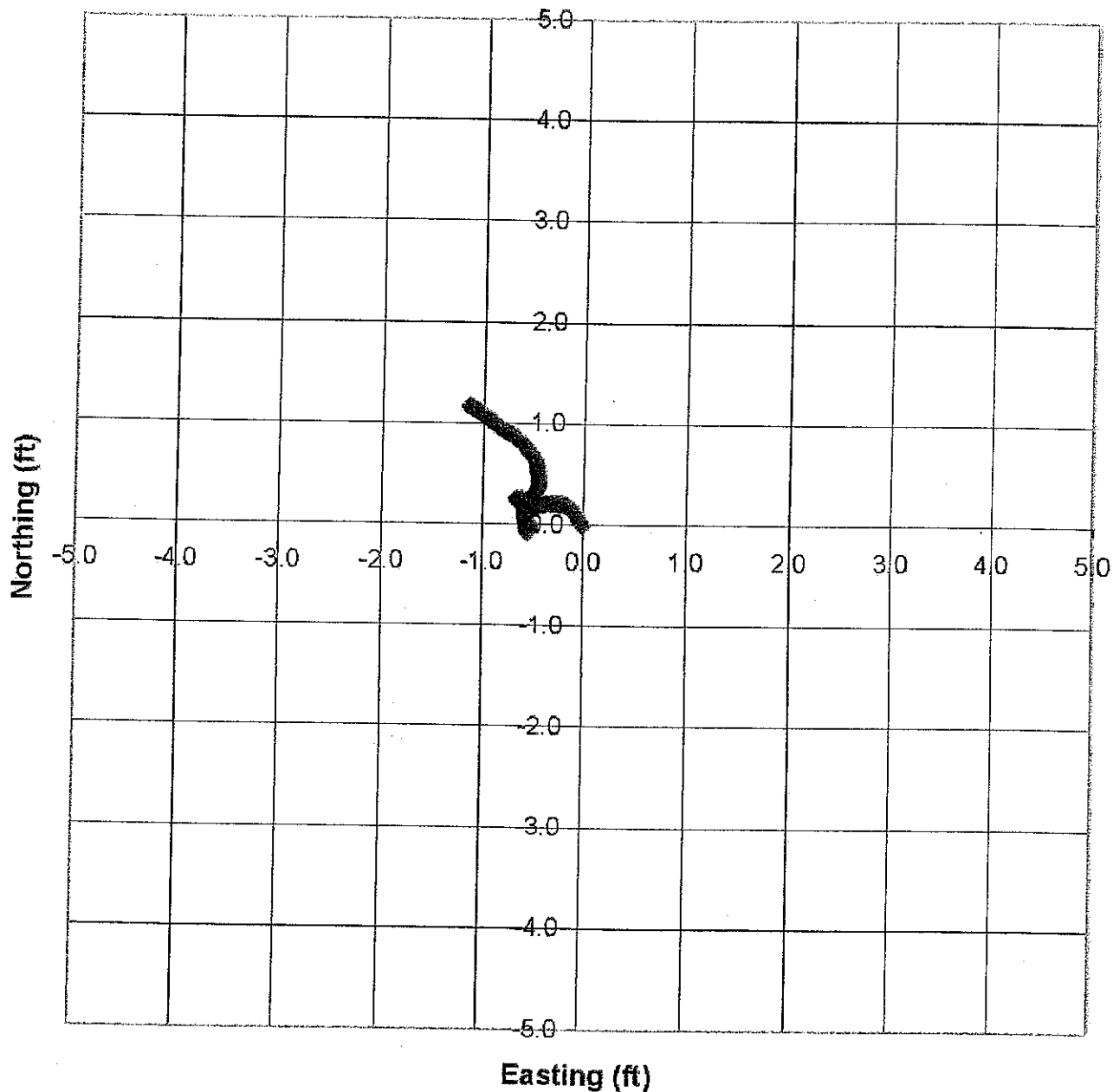
Drawn By: SLC	Ch'd By: <i>GLA</i>	App'vd By: <i>RSP</i>
Date: 10-01-07	Date: <i>10-2-07</i>	Date: <i>10-2-07</i>
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
SUMMARY TABLE - CROSSHOLE RESULTS		
Project Number 0979801.75IS		PLATE 6




Drawn By: SLC	Ck'd By: <i>GLA</i>	App'vd By: <i>RBT</i>
Date: 10-01-07	Date: <i>10-2-07</i>	Date: 10-2-07
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
SOURCE BORING DEVIATION		
Project Number 0979801.75IS		PLATE 7



Drawn By: SLC	Ck'd By: <i>GLA</i>	App'vd By: <i>KBY</i>
Date: 10-01-07	Date: <i>10-2-07</i>	Date: <i>10-2-07</i>
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
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GEOPHONE BORING 1 DEVIATION		
Project Number 0979801.75IS		PLATE 8



Drawn By: SLC	Ck'd By: <i>GLA</i>	App'vd By: <i>RBI</i>
Date: 10-01-07	Date: <i>10-2-07</i>	Date: <i>10-2-07</i>
 GEOTECHNOLOGY INC. ENGINEERING AND ENVIRONMENTAL SERVICES ST. LOUIS • COLLINSVILLE • KANSAS CITY		
Zion Nuclear Power Plant Zion, Illinois		
GEOPHONE BORING 2 DEVIATION		
Project Number 0979801.75IS		PLATE 9

APPENDIX A

LIMITATIONS OF REPORT

GEOPHYSICAL SERVICES **LIMITATIONS OF REPORT**

1. This report was prepared for the exclusive use of the owner, architect, and engineer for evaluating the project as it relates to the technical aspects discussed herein. It can be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions included in this report. Unless other contractual agreements were made, the services described in this report were carried out in accordance with the Terms for Geotechnology's Services which were attached to the proposal.
2. Geotechnology endeavored to perform the crosshole seismic geophysical survey in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. The findings and conclusions stated herein must be considered not as scientific certainties, but rather as professional opinions concerning the significance of the limited data gathered during the course of the survey. No warranty, express or implied, is made.
3. The geophysical analyses and conclusions contained in this report are based on the site conditions, project layout, sampling interval, geophysical data, and interpretive procedures described herein. Geotechnology can make no interpretation of underground conditions beyond the test location. Geophysical exploration methods are indirect and potentially influenced by a variety of natural or man-made conditions. The resulting interpretations are based on the quality of the recorded data as limited by site conditions

TESTING SERVICE CORPORATION

457 East Gundersen Drive

Carol Stream, Illinois

CLIENT: Sargent & Lundy
55 E. Monroe, Suite 3100
Chicago, Illinois 60603

TSC Job No. L - 69,729
October 17, 2007

PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER	I-2	I-2	I-2	I-2	
SAMPLE NUMBER	2	5	10	18	
DEPTH IN FEET	3.5-5.0	13.5-15.0	38.5-40.0	78.5-80.0	
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION	SP	SP	CL	CL-ML	
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %		28	10	0	
SAND %		69	19	6	
SILT %		3 (silt and clay)	57	82	
CLAY % (<0.002 MM)			14	12	
LIQUID LIMIT %			23	21	
PLASTIC LIMIT %			12	10	
PLASTICITY INDEX %			11	11	
NATURAL MOISTURE CONTENT %			10.3	12.4	
Dry Density			131.8	126.2	
pH	6.89				
Soluble Chlorides	<50 mg/kg				
Soluble Sulfates	350 mg/kg				
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				

TESTING SERVICE CORPORATION

457 East Gundersen Drive
Carol Stream, Illinois

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55 E. Monroe, Suite 3100
Chicago, Illinois 60603

TSC Job No. L - 69,729
October 16, 2007

PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER	I-3	I-3	I-3	I-3	I-3
SAMPLE NUMBER	3	5	9	14	24
DEPTH IN FEET	4.0-6.0	8.0-10.0	16.0-18.0	26.0-28.0	46.0-48.0
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION	SP	SP/GP	SP	CL-ML	CL
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %		31	10	0	3
SAND %		65	84	1	7
SILT %		4 (silt and clay)	6 (silt and clay)	68	43
CLAY % (<0.002 MM)				31	47
LIQUID LIMIT %				28	38
PLASTIC LIMIT %				10	11
PLASTICITY INDEX %				18	27
NATURAL MOISTURE CONTENT %				15.1	18.5
Dry Density				119.7	112.4
pH	7.21				
Soluble Chlorides	<50 mg/kg				
Soluble Sulfates	<250 mg/kg				
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				

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Carol Stream, Illinois

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Chicago, Illinois 60603

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October 16, 2007

PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER	I-4	I-4	I-4		
SAMPLE NUMBER	2	4	11		
DEPTH IN FEET	3.5-5.0	8.5-10.0	43.5-45.0		
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION	SP	SP	CL		
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %		0	3		
SAND %		98	19		
SILT %		2 (silt and clay)	61		
CLAY % (<0.002 MM)			17		
LIQUID LIMIT %			24		
PLASTIC LIMIT %			12		
PLASTICITY INDEX %			12		
NATURAL MOISTURE CONTENT %			12.3		
Dry Density			126.5		
pH	7.08				
Soluble Chlorides	<50 mg/kg				
Soluble Sulfates	310 mg/kg				
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				

TESTING SERVICE CORPORATION

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Chicago, Illinois 60603

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October 16, 2007

PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER	I-6	I-6	I-6		
SAMPLE NUMBER	2	6	9		
DEPTH IN FEET	3.5-5.0	18.5-20.0	33.5-35.0		
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION	SP	SP	CL-ML		
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %		8	0		
SAND %		88	0		
SILT %		4 (silt and clay)	62		
CLAY % (<0.002 MM)			38		
LIQUID LIMIT %			31		
PLASTIC LIMIT %			13		
PLASTICITY INDEX %			18		
NATURAL MOISTURE CONTENT %			17.8		
Dry Density			113.8		
pH	7.57				
Soluble Chlorides	<50 mg/kg				
Soluble Sulfates	<250 mg/kg				
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				

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PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER	I-7	I-7	I-7	I-7	
SAMPLE NUMBER	2	4	7	12	
DEPTH IN FEET	3.5-5.0	8.5-10.0	23.5-25.0	48.5-50.0	
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION	SM	SP	SP	CL	
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %		18	0	6	
SAND %		80	90	21	
SILT %		2 (silt and clay)	10 (silt and clay)	47	
CLAY % (<0.002 MM)				26	
LIQUID LIMIT %				23	
PLASTIC LIMIT %				11	
PLASTICITY INDEX %				12	
NATURAL MOISTURE CONTENT %				10.5	
Dry Density				131.3	
pH	6.96				
Soluble Chlorides	<50 mg/kg				
Soluble Sulfates	600 mg/kg				
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				

TESTING SERVICE CORPORATION

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PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER		I-8	I-8	I-8	I-9
SAMPLE NUMBER		3	8	10	13
DEPTH IN FEET		6.0-7.5	28.5-30.0	38.5-40.0	53.5-55.0
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION		SP	SC-GC	SM-GM	CL
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %		1	30	24	4
SAND %		95	34	43	11
SILT %		4 (silt and clay)	29	33	57
CLAY % (<0.002 MM)			7	0	28
LIQUID LIMIT %			20	14	30
PLASTIC LIMIT %			10	10	13
PLASTICITY INDEX %			10	4	17
NATURAL MOISTURE CONTENT %			9.0	112.0	14.2
Dry Density			131.9	127.3	121.8
pH					
Soluble Chlorides					
Soluble Sulfates					
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				

TESTING SERVICE CORPORATION

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Carol Stream, Illinois

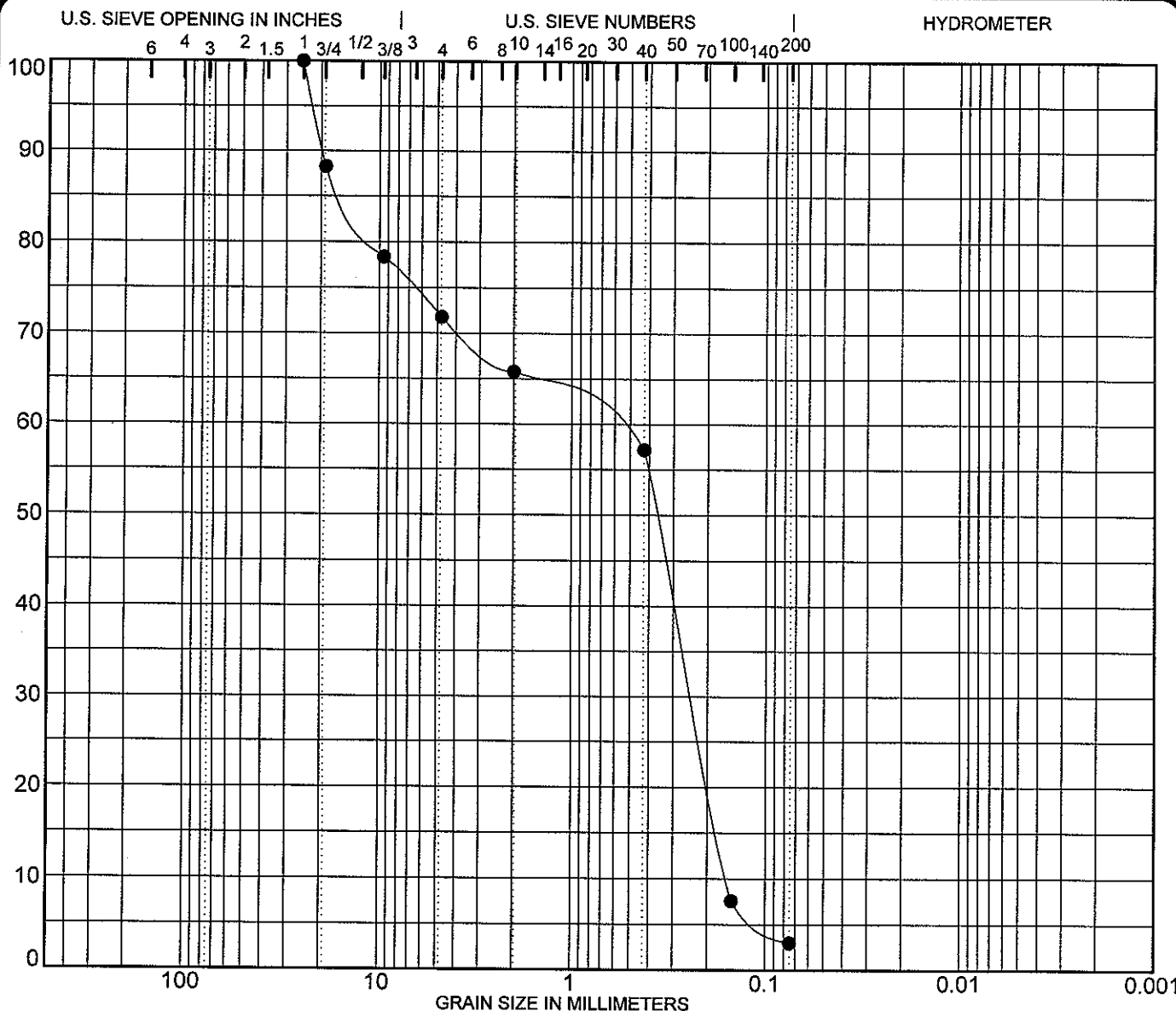
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55 E. Monroe, Suite 3100
Chicago, Illinois 60603

TSC Job No. L - 69,729
October 16, 2007

PROJECT: Zion Nuclear Power Plant
Zion, IL

SOIL TEST DATA

LOCATION					
BORING NUMBER	I-13				
SAMPLE NUMBER	2				
DEPTH IN FEET	3.5-5.0				
HRB CLASSIFICATION & GROUP INDEX					
UNIFIED CLASSIFICATION	SP				
GRAIN SIZE CLASSIFICATION					
GRADATION - PASSING 1" SIEVE %					
GRADATION - PASSING 3/4" SIEVE %					
GRADATION - PASSING 3/8" SIEVE %					
GRADATION - PASSING # 4 SIEVE %					
GRADATION - PASSING # 10 SIEVE %					
GRADATION - PASSING # 40 SIEVE %					
GRADATION - PASSING # 100 SIEVE %					
GRADATION - PASSING # 200 SIEVE %					
GRAVEL %	12				
SAND %	76				
SILT %	12 (silt and clay)				
CLAY % (<0.002 MM)					
LIQUID LIMIT %					
PLASTIC LIMIT %					
PLASTICITY INDEX %					
NATURAL MOISTURE CONTENT %					
Dry Density					
pH					
Soluble Chlorides					
Soluble Sulfates					
ORGANIC CONTENT	L-O-I %				
	WET COMBUSTION %				



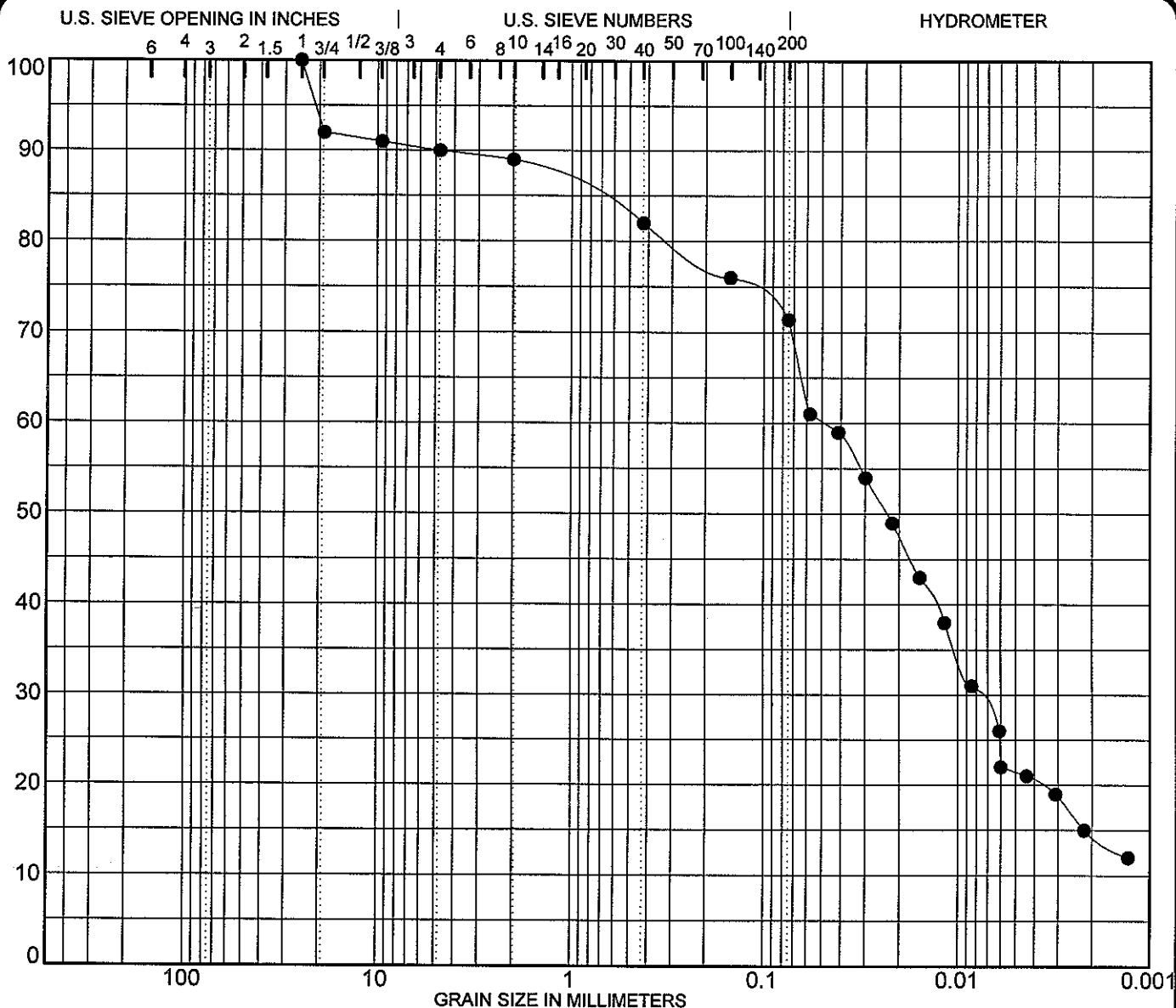
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION		SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-2		3 inch	100	Brown SAND, some gravel, trace silt and clay (SP)			
Sample: SS-5		2	100				
		1 1/2	100				
		1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:		3/4	88	28	69	(3% Combined)	
		3/8	78				
		#4	72				
		#10	66				
		#40	57				
		#100	8				
		#200	3				

PROJECT LOCATION Energy Solutions, Zion Nuclear Power Plant
Zion, Illinois

JOB NO. L-69,729
 DATE September 28, 2007

SOIL DATA SHEET
 Testing Service Corporation
 Carol Stream, IL 60188



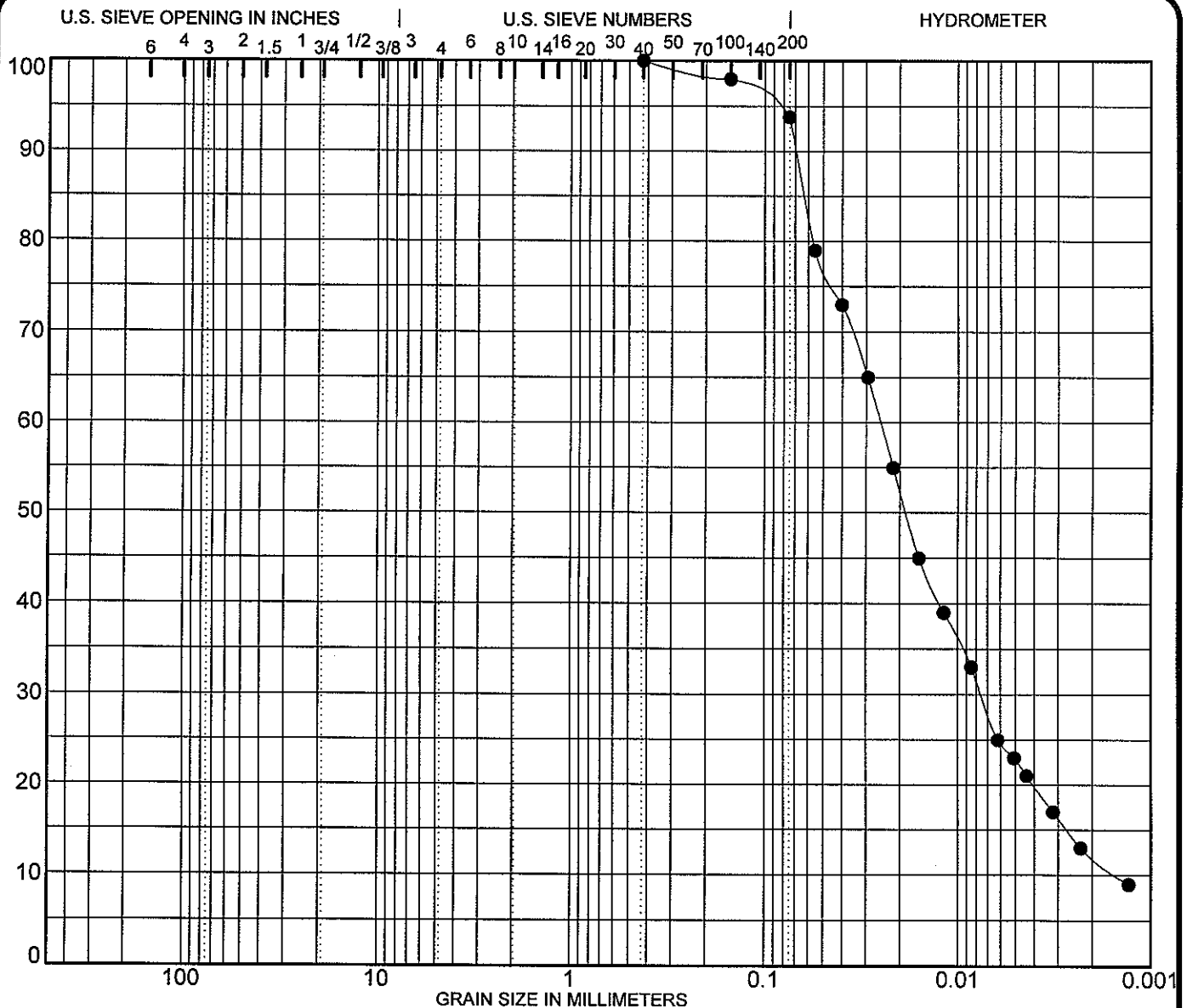
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

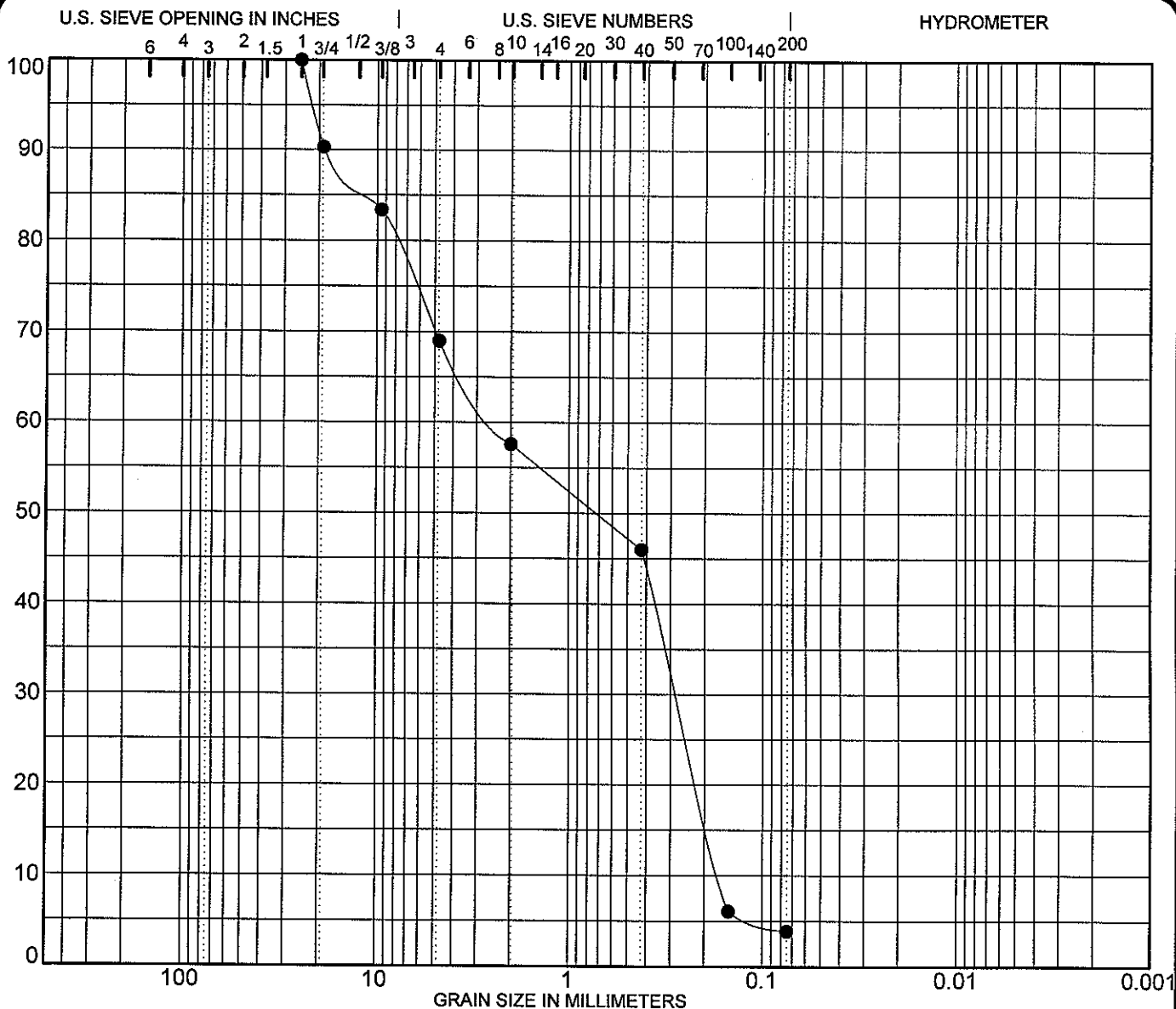
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION				
Boring: I-2	3 inch	100	Gray silty CLAY, little sand, trace gravel				
Sample: SS-10	2	100	(CL)				
	1 1/2	100					
	1	100	%GRAVEL	%SAND	%SILT	%CLAY	
NOTES:	3/4	92	10	19	57	14	
	3/8	91					
	# 4	90	MC%	γ dry (pcf)	LL	PL	PI
	# 10	89	10.3	131.8	23	12	11
	# 40	82					
	# 100	76					
	# 200	71					

PROJECT LOCATION: Energy Solutions, Zion Nuclear Power Plant
Zion, Illinois

JOB NO. L-69,729
DATE: September 28, 2007

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188





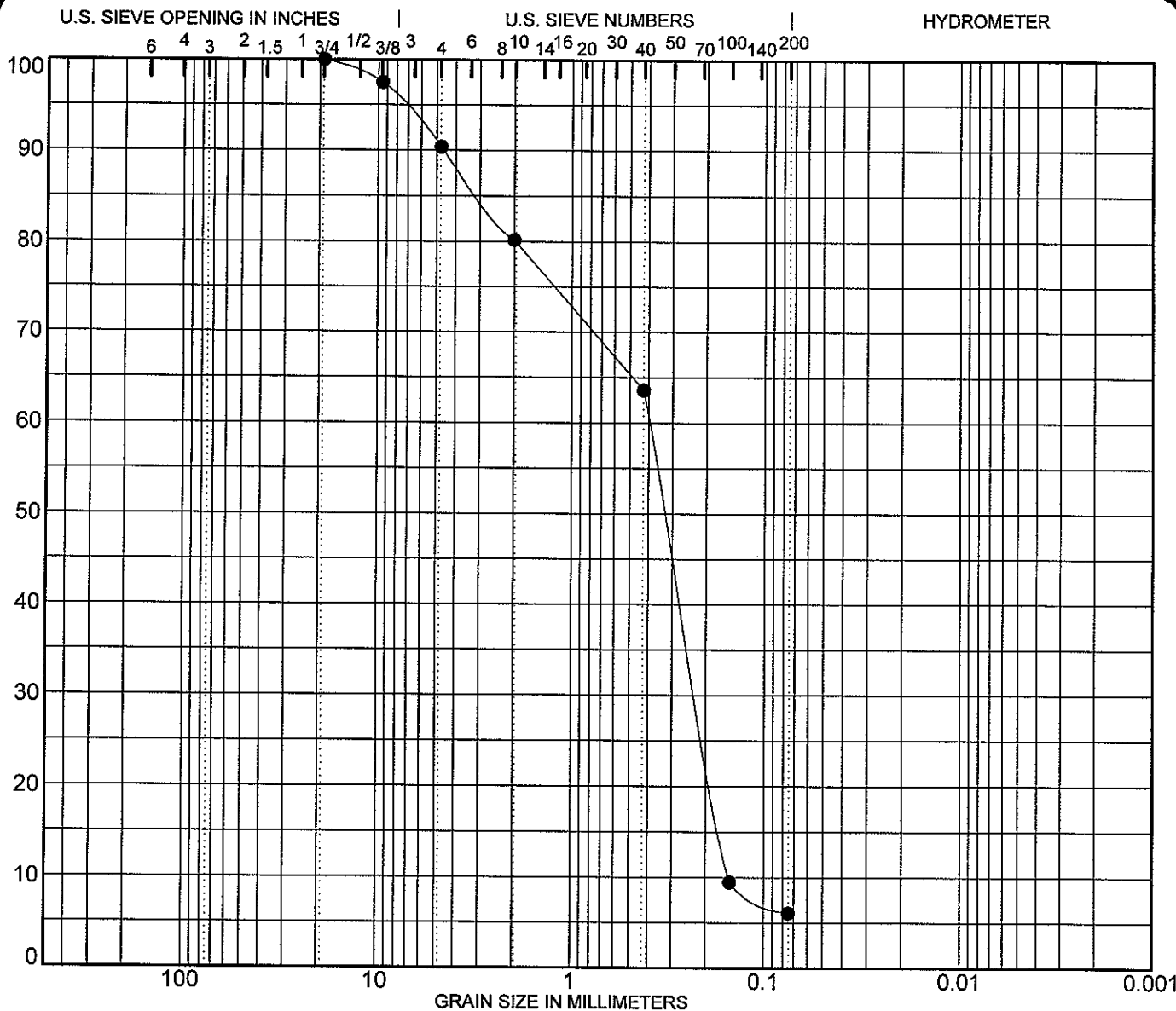
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION		SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-3		3 inch	100	Brown SAND, some gravel, trace silt and clay (SP)			
Sample: SS-5		2	100				
		1 1/2	100				
		1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:		3/4	90	31	65	(4% Combined)	
		3/8	83				
		#4	69				
		#10	58				
		#40	46				
		#100	6				
		#200	4				

PROJECT Energy Solutions, Zion Nuclear Power Plant
LOCATION Zion, Illinois

JOB NO. L-69,729
DATE September 28, 2007

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188



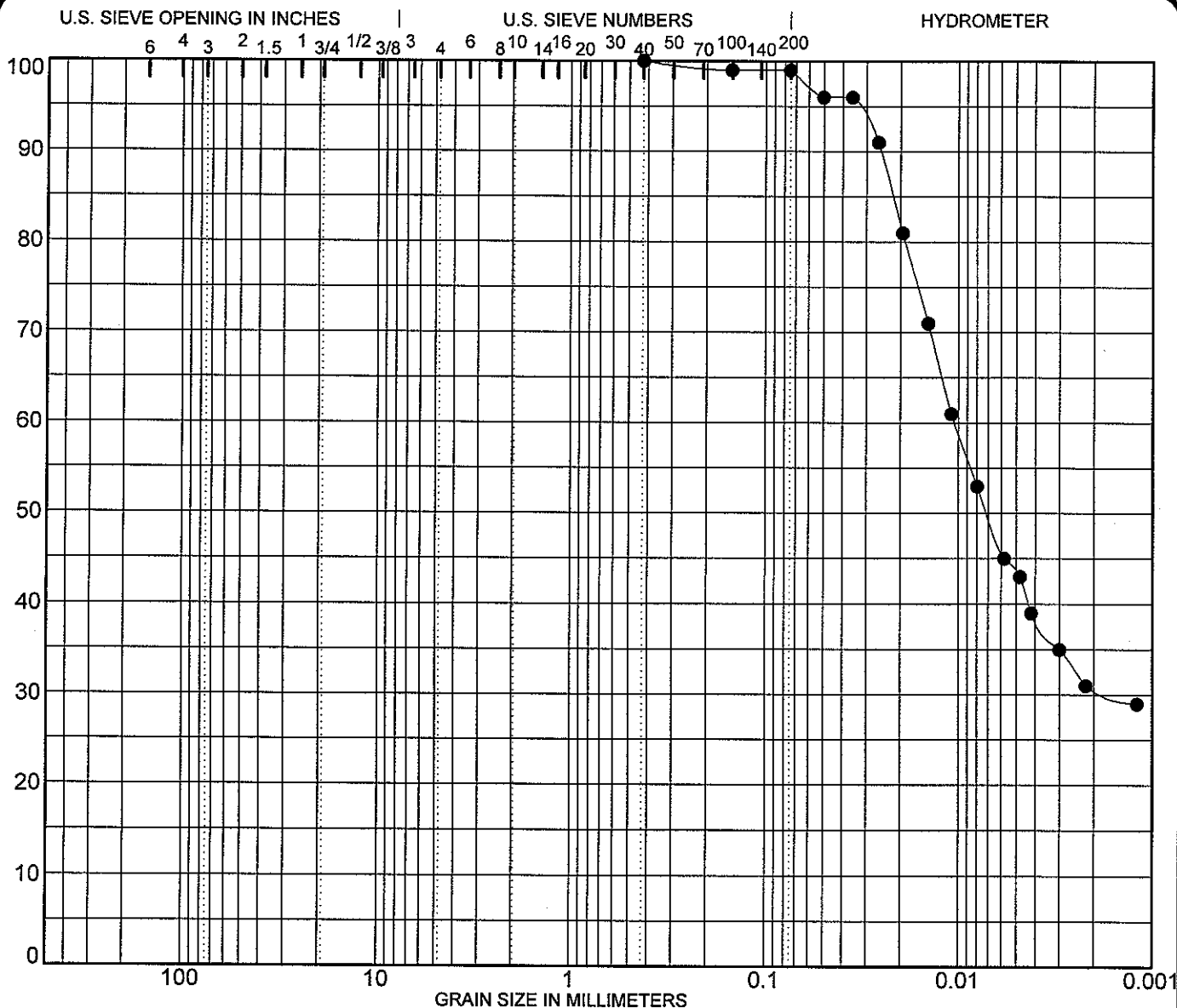
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

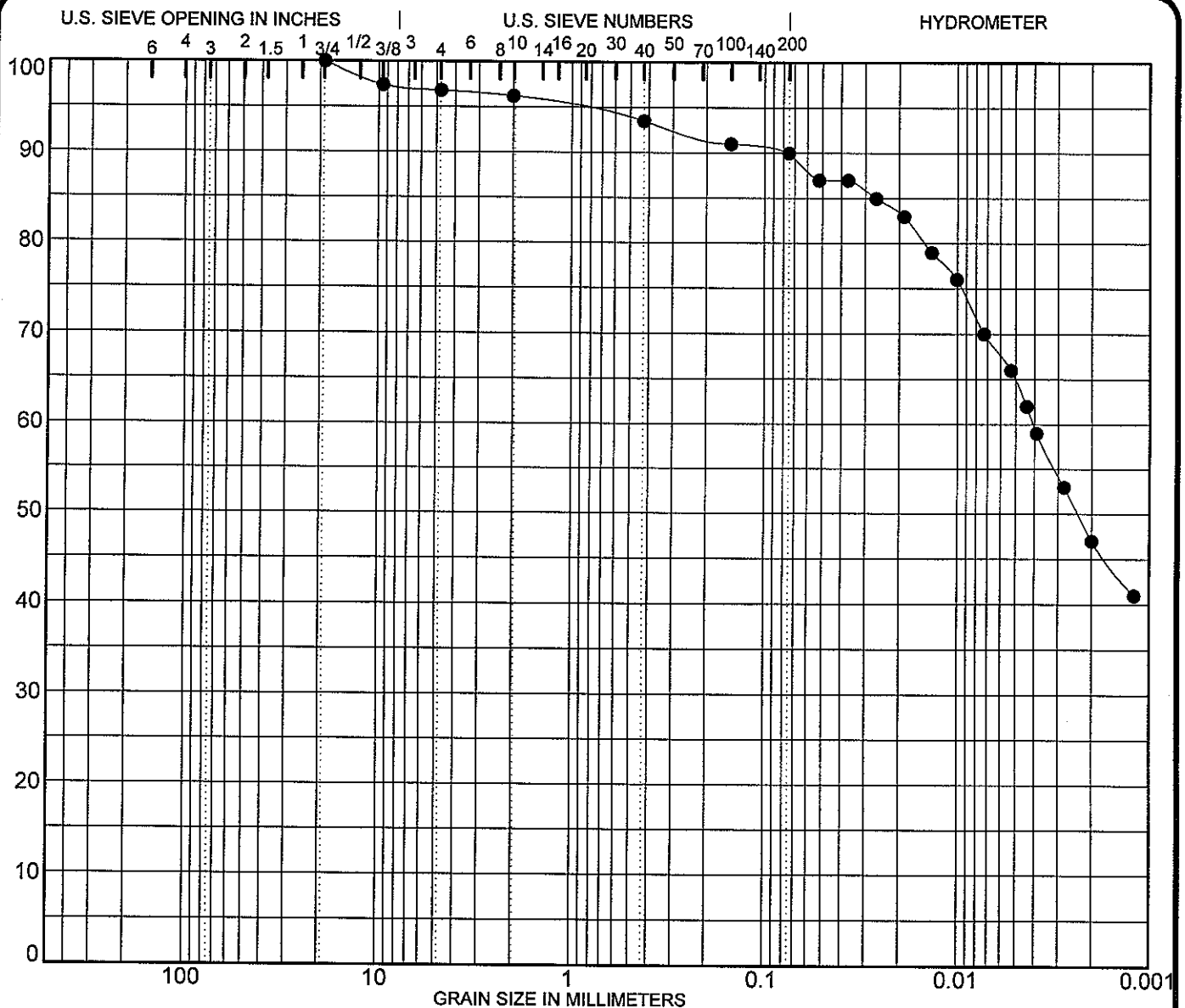
SPECIMEN IDENTIFICATION		SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-3		3 inch	100	Brown SAND, trace silt, clay and gravel			
Sample: SS-9		2	100	(SP)			
		1 1/2	100				
		1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:		3/4	100	10	84	(6% Combined)	
		3/8	98				
		# 4	90				
		# 10	80				
		# 40	64				
		# 100	10				
		# 200	6				

PROJECT LOCATION: Energy Solutions, Zion Nuclear Power Plant
Zion, Illinois

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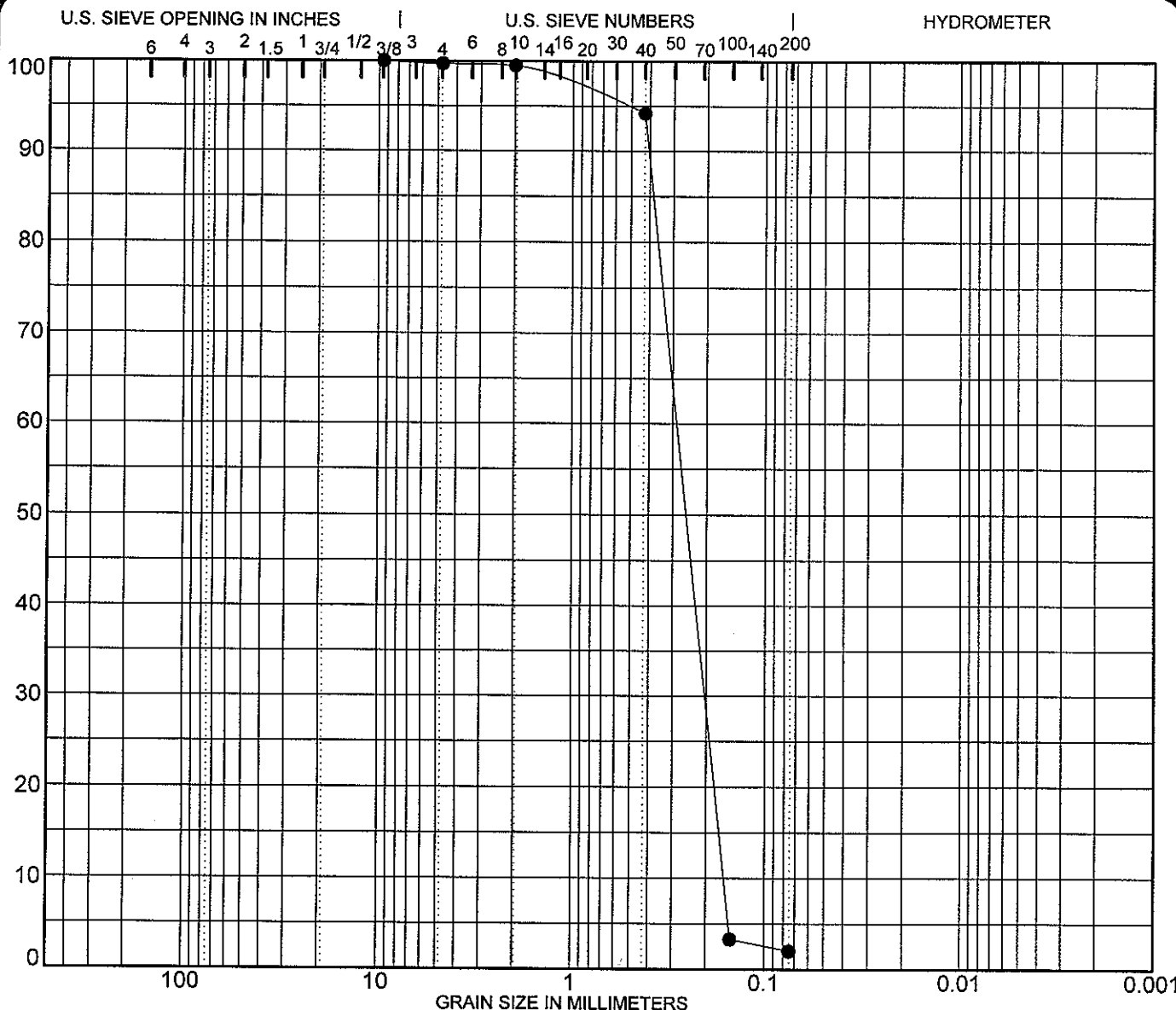
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION		SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-3		3 inch	100	Gray silty CLAY, trace sand and gravel			
Sample: SS-24		2	100	(CL)			
		1 1/2	100				
		1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:		3/4	100	3	7	43	47
		3/8	97				
		# 4	97	MC%	% dry (pcf)	LL	PL
		# 10	96	18.5	112.4	38	11
		# 40	94				
		# 100	91				
		# 200	90				

PROJECT LOCATION **Energy Solutions, Zion Nuclear Power Plant**
Zion, Illinois

JOB NO. **L-69,729**
DATE **September 28, 2007**

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188



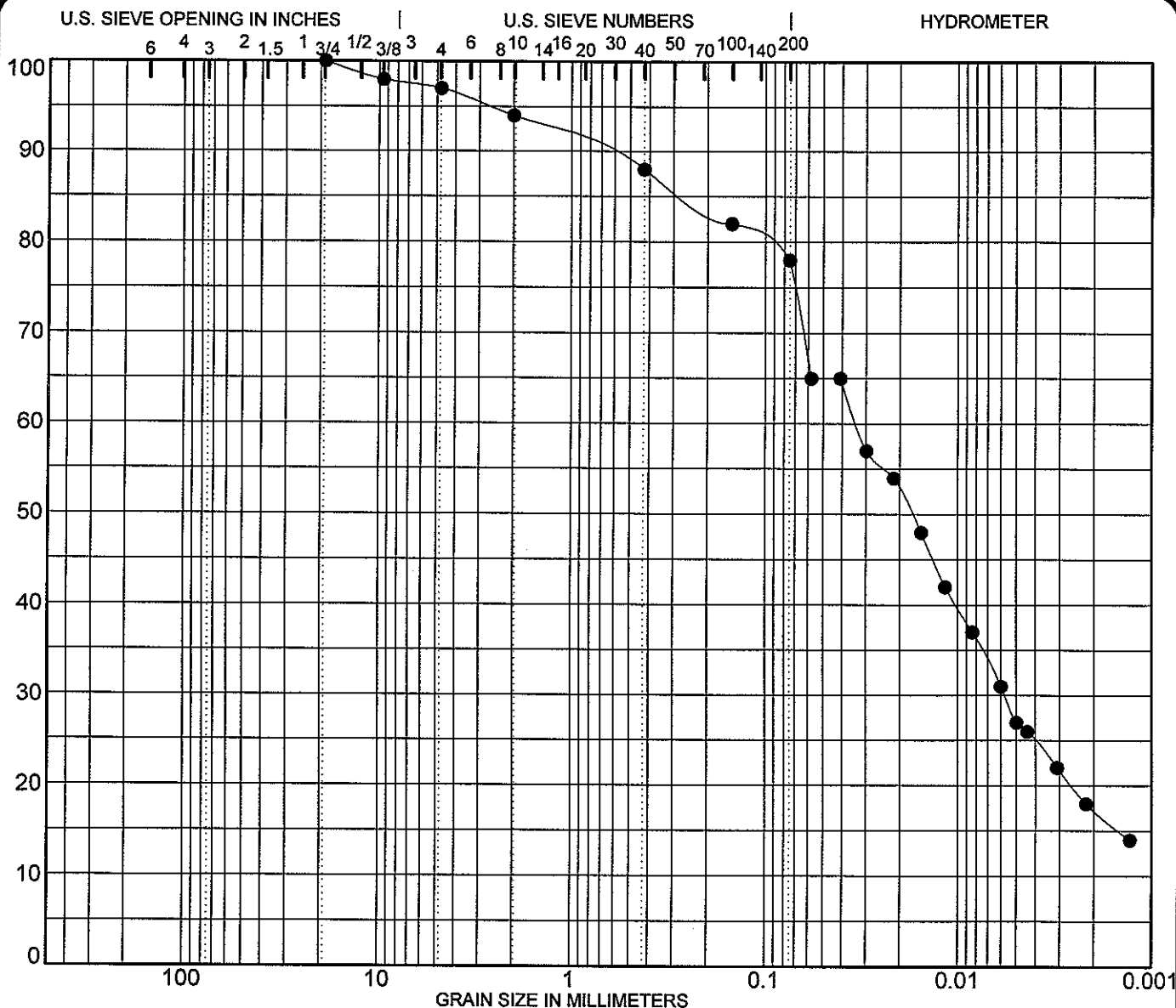
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

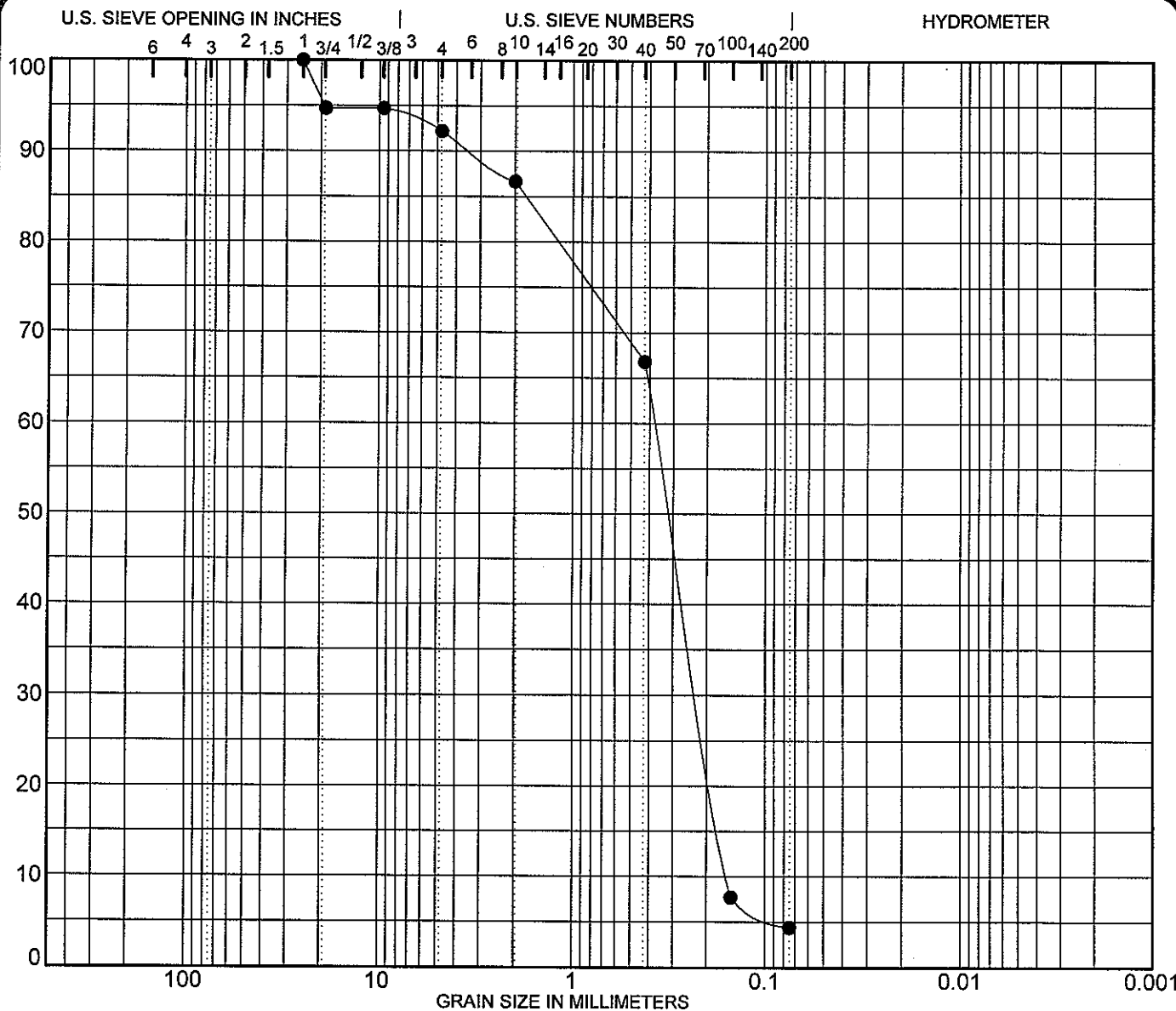
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-4	3 inch	100	Brown SAND, trace silt and clay (SP)			
Sample: SS-4	2	100				
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	98	(2% Combined)	
	3/8	100				
	# 4	100				
	# 10	100				
	# 40	94				
	# 100	3				
	# 200	2				

PROJECT Energy Solutions, Zion Nuclear Power Plant
LOCATION Zion, Illinois

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SOIL DATA SHEET
Testing Service Corporation
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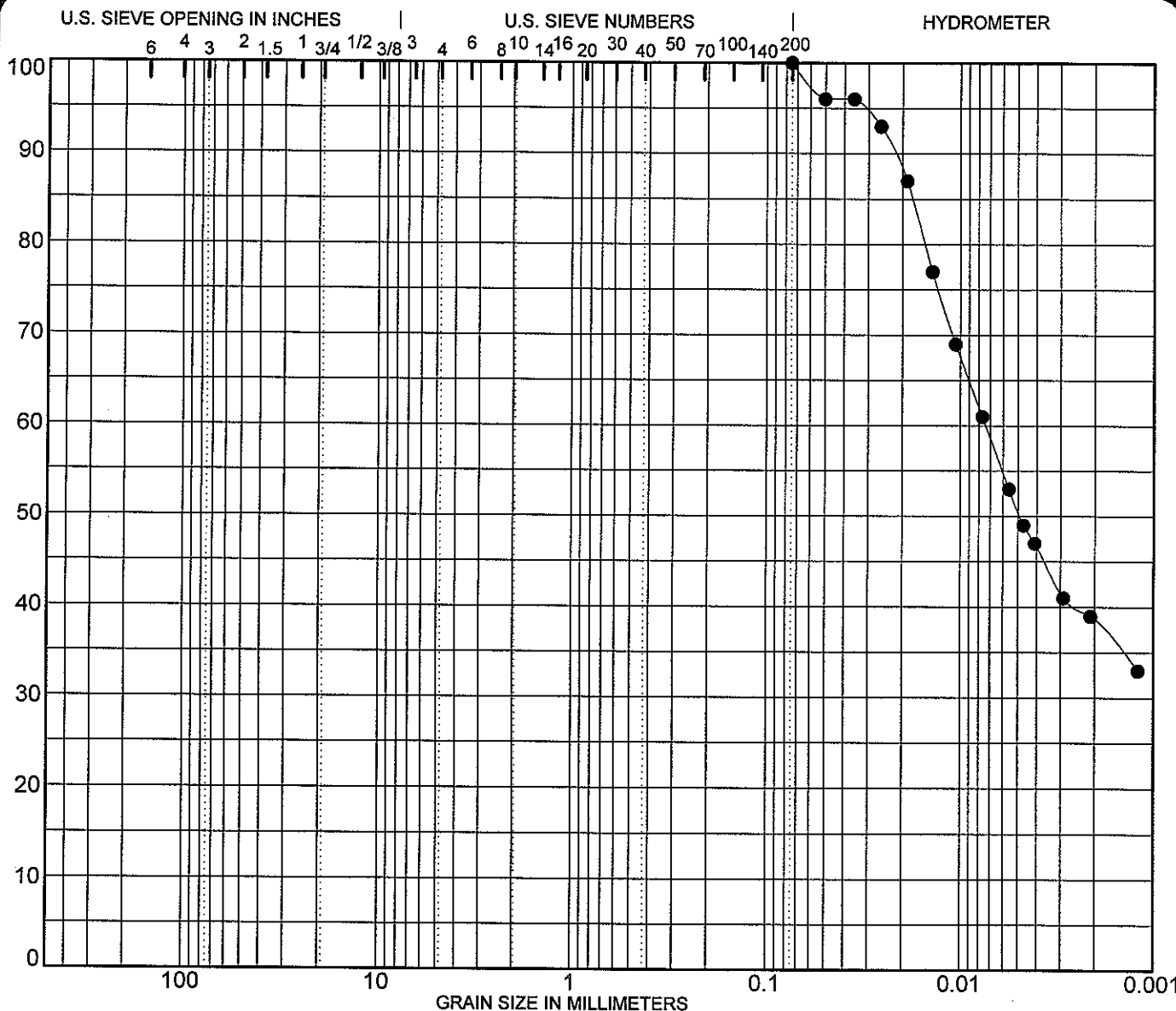
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-6	3 inch	100	Brown SAND, trace silt, clay and gravel			
Sample: SS-6	2	100	(SP)			
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	95	8	88	(4% Combined)	
	3/8	95				
	# 4	92				
	# 10	87				
	# 40	67				
	# 100	8				
	# 200	4				

PROJECT Energy Solutions, Zion Nuclear Power Plant
LOCATION Zion, Illinois

JOB NO. L-69,729
DATE September 28, 2007

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188



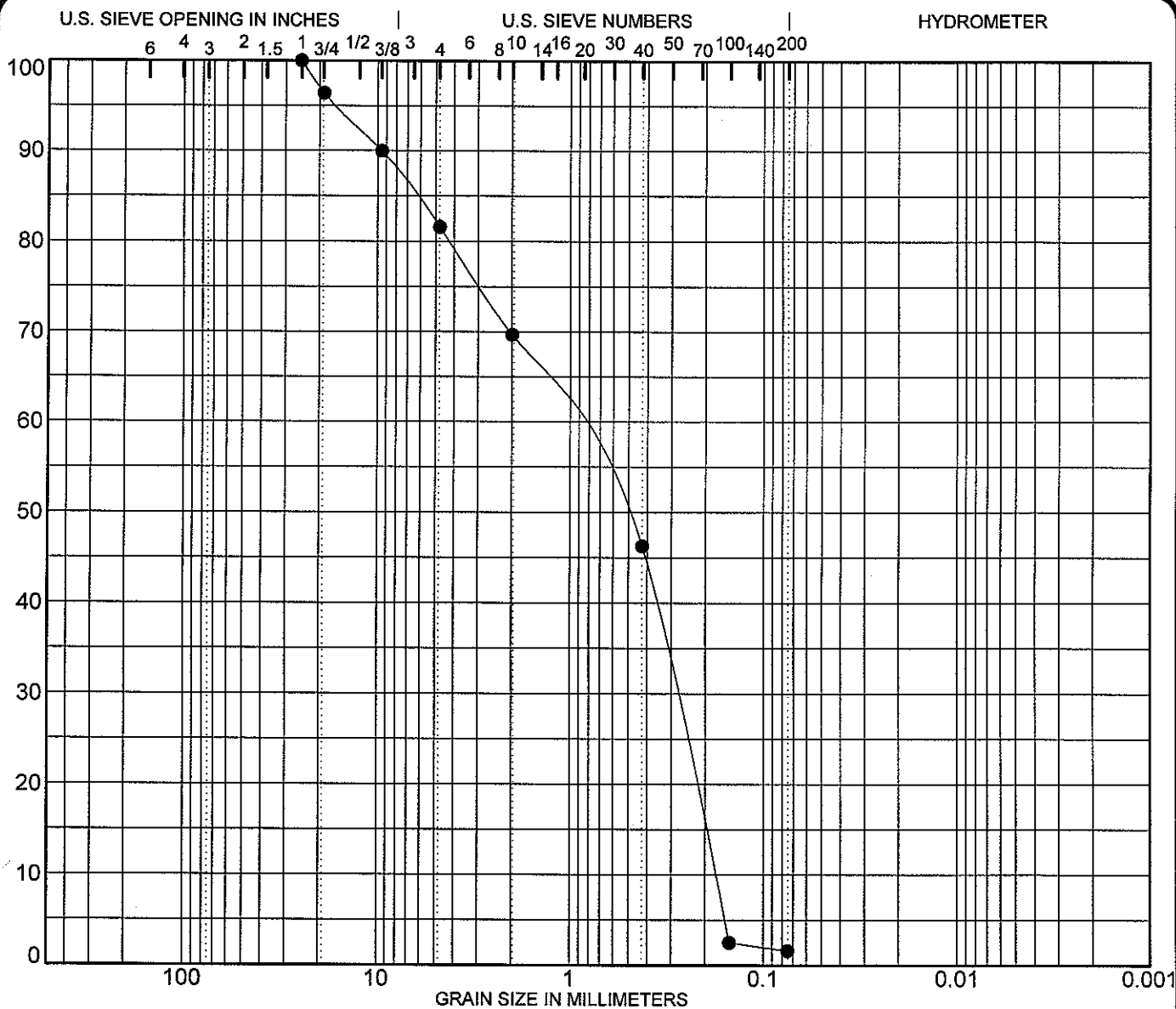
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION		SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-6		3 inch	100	Brown silty CLAY (CL)			
Sample: SS-9		2	100				
		1 1/2	100				
		1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:		3/4	100	0	0	62	38
		3/8	100				
		# 4	100	MC%	% dry (pcf)	LL	PL
		# 10	100	17.8	113.8	31	13
		# 40	100				
		# 100	100				
		# 200	100				

PROJECT LOCATION Energy Solutions, Zion Nuclear Power Plant
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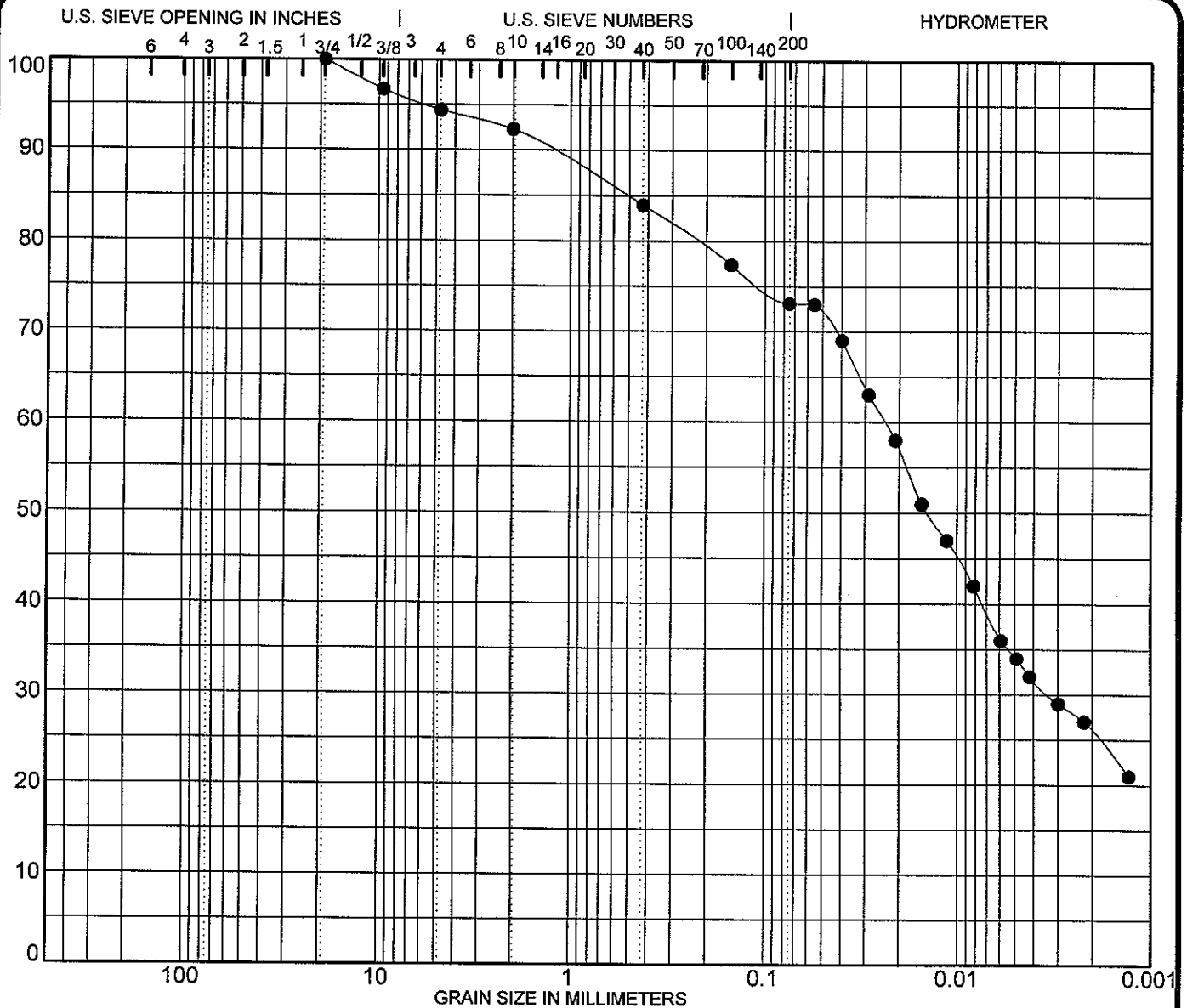
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-7	3 inch	100	Brown SAND, little gravel, trace silt and clay (SP)			
Sample: SS-4	2	100				
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	96	18	80	(2% Combined)	
	3/8	90				
	# 4	82				
	# 10	70				
	# 40	46				
	# 100	3				
	# 200	2				

PROJECT LOCATION Energy Solutions, Zion Nuclear Power Plant
Zion, Illinois

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 Testing Service Corporation
 Carol Stream, IL 60188



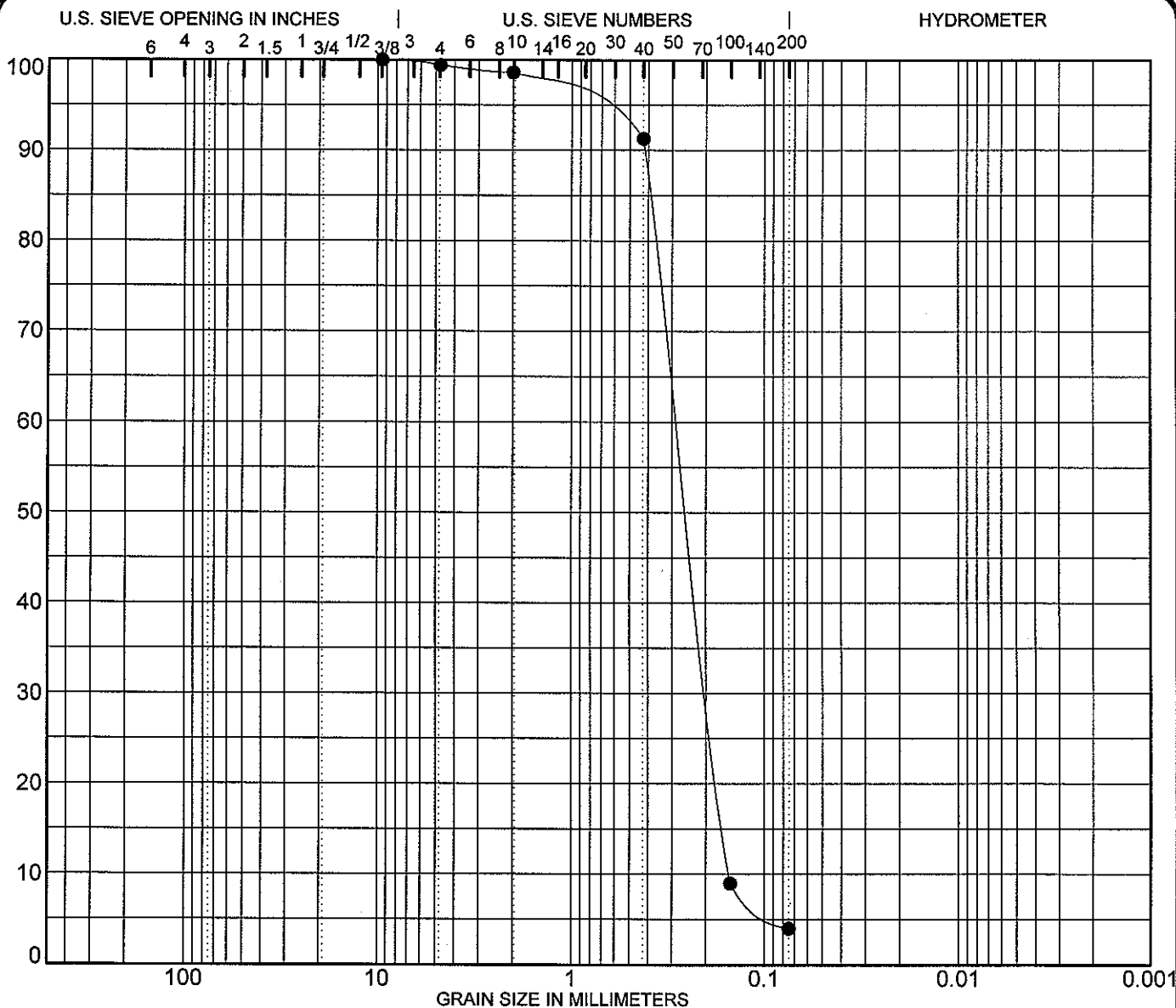
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION		SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-7		3 inch	100	Brownish gray silty CLAY, some sand, trace gravel (CL)			
Sample: SS-12		2	100				
		1 1/2	100				
		1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:		3/4	100	6	21	47	26
		3/8	97				
		#4	94	MC%	δ dry (pcf)	LL	PL
		#10	92	10.5	131.3	23	11
		#40	84				
		#100	77				
		#200	73				

PROJECT LOCATION Energy Solutions, Zion Nuclear Power Plant
Zion, Illinois

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COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

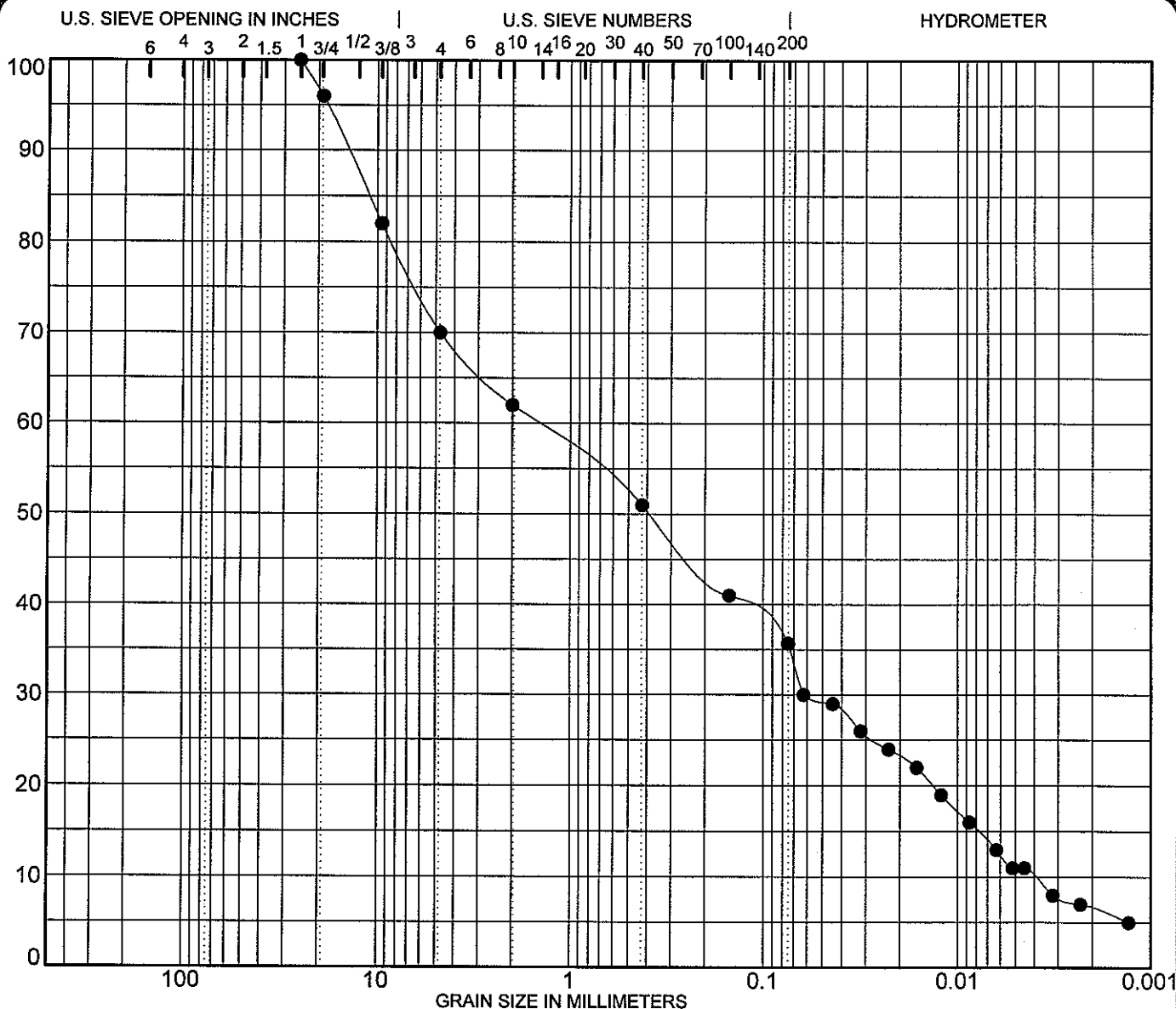
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-8	3 inch	100	Black SAND, trace silt, clay and gravel			
Sample: SS-3	2	100	(SP)			
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	1	95	(4% Combined)	
	3/8	100				
	# 4	99				
	# 10	99				
	# 40	91				
	# 100	9				
	# 200	4				

PROJECT Energy Solutions, Zion Nuclear Power Plant
LOCATION Zion, Illinois

JOB NO. L-69,729
DATE September 28, 2007

I-8

SOIL DATA SHEET
Testing Service Corporation
Carol Stream, IL 60188



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

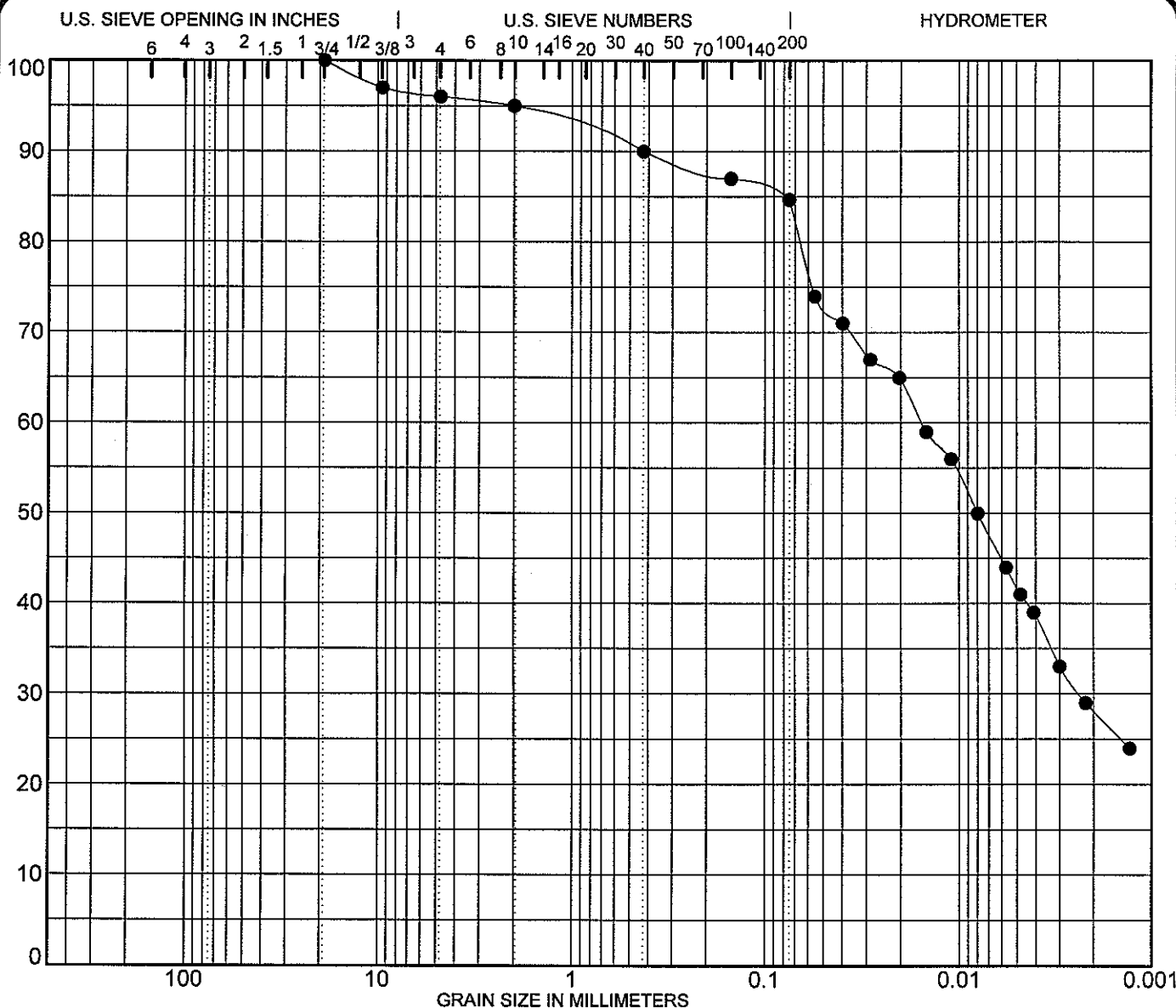
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION				
Boring: I-8	3 inch	100	Brown clayey SAND, some silt and gravel				
Sample: SS-8	2	100	(SC)				
	1 1/2	100					
	1	100	%GRAVEL	%SAND	%SILT	%CLAY	
NOTES:	3/4	96	30	34	29	7	
	3/8	82					
	# 4	70	MC%	% dry (pcf)	LL	PL	PI
	# 10	62	9.0	131.9	20	10	10
	# 40	51					
	# 100	41					
	# 200	36					

PROJECT LOCATION Energy Solutions, Zion Nuclear Power Plant
Zion, Illinois

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 DATE September 28, 2007

I-8

SOIL DATA SHEET
 Testing Service Corporation
 Carol Stream, IL 60188



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

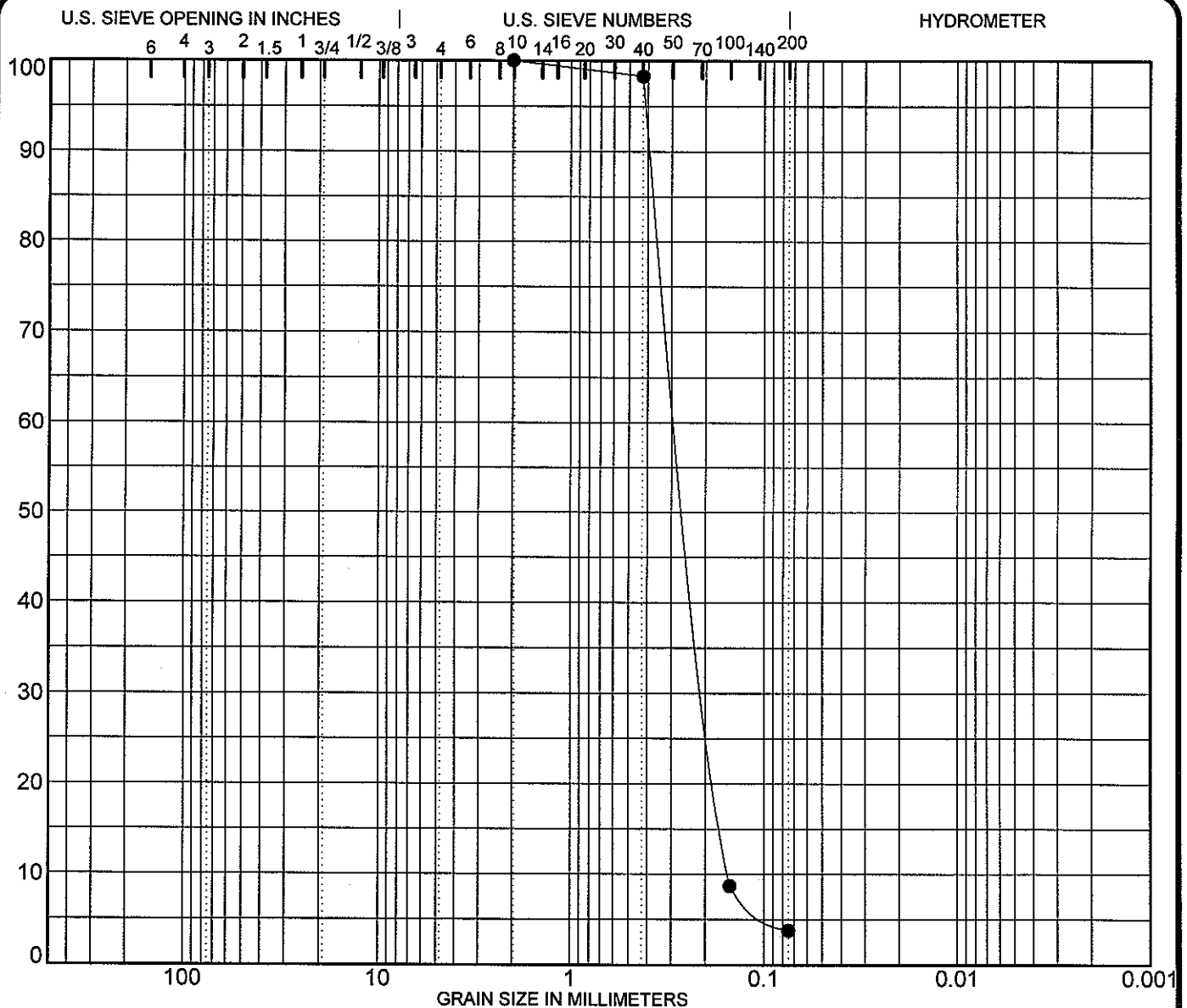
SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION				
Boring: I-8	3 inch	100	Gray silty CLAY, little sand, trace gravel				
Sample: SS-13	2	100	(CL)				
	1 1/2	100					
	1	100	%GRAVEL	%SAND	%SILT	%CLAY	
NOTES:	3/4	100	4	11	57	28	
	3/8	97					
	# 4	96	MC%	γ dry (pcf)	LL	PL	PI
	# 10	95	14.2	121.8	30	13	17
	# 40	90					
	# 100	87					
	# 200	85					

PROJECT Energy Solutions, Zion Nuclear Power Plant
LOCATION Zion, Illinois

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I-8

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Carol Stream, IL 60188



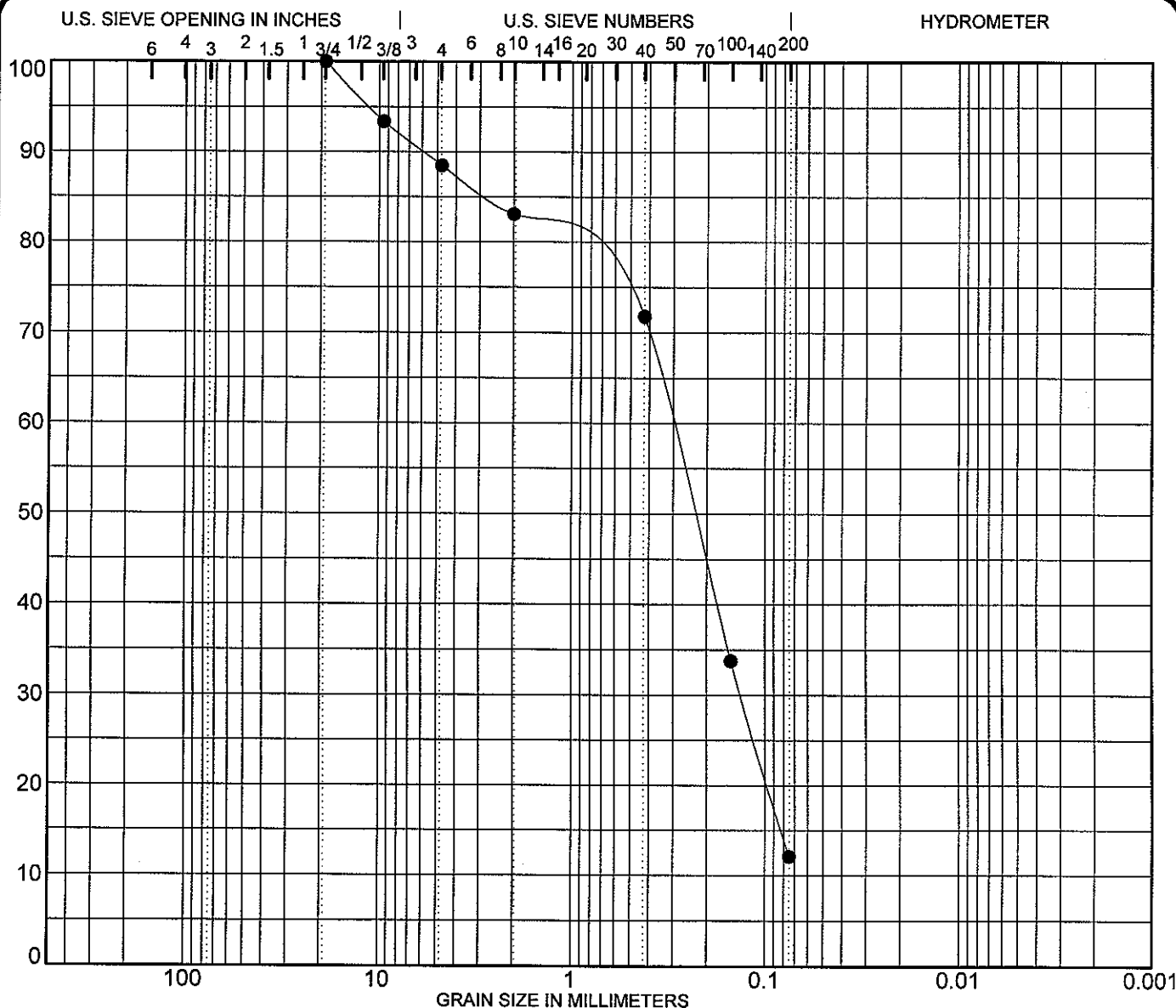
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-9	3 inch	100	Brown SAND, trace silt and clay (SP)			
Sample: SS-2	2	100				
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	0	96	(4% Combined)	
	3/8	100				
	# 4	100				
	# 10	100				
	# 40	98				
	# 100	9				
	# 200	4				

PROJECT	Energy Solutions, Zion Nuclear Power Plant
LOCATION	Zion, Illinois

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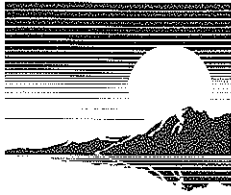
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SPECIMEN IDENTIFICATION	SIEVE	% PASS	SOIL CLASSIFICATION			
Boring: I-13	3 inch	100	Brown SAND, little silt, clay and gravel (SP)			
Sample: SS-2	2	100				
	1 1/2	100				
	1	100	%GRAVEL	%SAND	%SILT	%CLAY
NOTES:	3/4	100	12	76	(12% Combined)	
	3/8	93				
	# 4	89				
	# 10	83				
	# 40	72				
	# 100	34				
	# 200	12				

PROJECT LOCATION **Energy Solutions, Zion Nuclear Power Plant**
Zion, Illinois

JOB NO. **L-69,729**
 DATE **September 28, 2007**

SOIL DATA SHEET
Testing Service Corporation
 Carol Stream, IL 60188



**First
Environmental
Laboratories, Inc.**

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

September 25, 2007

Mr. Darin Delaney
TESTING SERVICE CORP.
360 So. Main Place
Carol Stream, IL 60188

Project ID: Not Provided
First Environmental File ID: 7-4213
Date Received: September 24, 2007

Dear Mr. Darin Delaney:

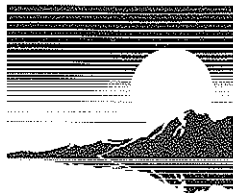
The above referenced project was analyzed as directed on the enclosed chain of custody record.

All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our accreditation number is 100292 and our current certificate is number 001767: effective 06/11/07 through 02/28/08.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

William Mottashed
Project Manager



**First
Environmental
Laboratories, Inc.**

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Case Narrative

TESTING SERVICE CORP.

Project ID: **Not Provided**

First Environmental File ID: **7-4213**

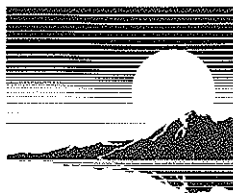
Date Received: **September 24, 2007**

Flag	Description	Flag	Description
<	Analyte not detected at or above the reporting limit.	L+	LCS recovery outside control limits; high bias.
B	Analyte detected in associated method blank.	L-	LCS recovery outside control limits; low bias.
C	Identification confirmed by GC/MS.	M	MS recovery outside control limits; LCS acceptable.
D	Surrogates diluted out; recovery not available.	M+	MS recovery outside control limits high bias; LCS acceptable.
E	Estimated result; concentration exceeds calibration range.	M-	MS recovery outside control limits low bias; LCS acceptable.
F	Field measurement.	N	Analyte is not part of our NELAC accreditation.
		ND	Analyte was not detected using a library search routine; No calibration standard was analyzed.
G	Surrogate recovery outside control limits; matrix effect.	P	Chemical preservation pH adjusted in lab.
H	Analysis or extraction holding time exceeded.	Q	The analyte was determined by a GC/MS database search.
J	Estimated result; concentration is less than calib range.	S	Analyte was sub-contracted to another laboratory for analysis.
K	RPD outside control limits.	T	Sample temperature upon receipt exceeded 0-6°C
RL	Routine Reporting Limit (Lowest amount that can be detected when routine weights/volumes are used without dilution.)	W	Reporting limit elevated due to sample matrix.

All quality control criteria, as outlined in the methods, have been met except as noted below or on the following analytical report.

Sample Batch Comments:

Sample(s) was (were) received outside temperature compliance.



**First
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Analytical Report

Client: TESTING SERVICE CORP.

Date Collected: 09/21/07

Project ID: Not Provided

Time Collected: 10:00

Sample ID: I-3 4'-6'

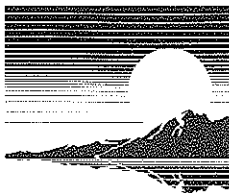
Date Received: 09/24/07

Sample No: 7-4213-001

Date Reported: 09/25/07

Results are reported on an "as received" basis.

Analyte	Result	R.L.	Units	Flags
Chloride, Soluble Analysis Date: 09/25/07 Chloride, Soluble	Method: 4500CL,C < 50	50	mg/kg	
Sulfate, Soluble Analysis Date: 09/25/07 Sulfate, Soluble	Method: 4500SO4,E < 250	250	mg/kg	



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Analytical Report

Client: TESTING SERVICE CORP.

Date Collected: 09/21/07

Project ID: Not Provided

Time Collected: 10:00

Sample ID: I-6 3.5'-5'

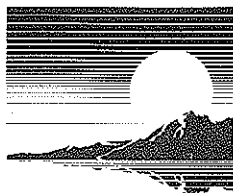
Date Received: 09/24/07

Sample No: 7-4213-002

Date Reported: 09/25/07

Results are reported on an "as received" basis.

Analyte	Result	R.L.	Units	Flags
Chloride, Soluble Analysis Date: 09/25/07	Method: 4500CL,C			
Chloride, Soluble	< 50	50	mg/kg	
Sulfate, Soluble Analysis Date: 09/25/07	Method: 4500SO4,E			
Sulfate, Soluble	< 250	250	mg/kg	



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Analytical Report

Client: TESTING SERVICE CORP.

Date Collected: 09/21/07

Project ID: Not Provided

Time Collected: 10:00

Sample ID: I-7 3.5'-5'

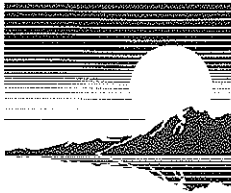
Date Received: 09/24/07

Sample No: 7-4213-003

Date Reported: 09/25/07

Results are reported on an "as received" basis.

Analyte	Result	R.L.	Units	Flags
Chloride, Soluble Analysis Date: 09/25/07	Method: 4500CL,C			
Chloride, Soluble	< 50	50	mg/kg	
Sulfate, Soluble Analysis Date: 09/25/07	Method: 4500SO4,E			
Sulfate, Soluble	600	250	mg/kg	



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IL ELAP / NELAC Accreditation # 100292

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September 27, 2007

Mr. Darin Delaney
TESTING SERVICE CORP.
360 So. Main Place
Carol Stream, IL 60188

Project ID: 69729
First Environmental File ID: 7-4258
Date Received: September 26, 2007

Dear Mr. Darin Delaney:

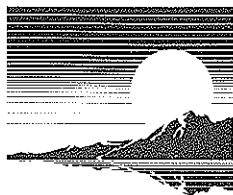
The above referenced project was analyzed as directed on the enclosed chain of custody record.

All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. QA/QC documentation and raw data will remain on file for future reference. Our accreditation number is 100292 and our current certificate is number 001767: effective 06/11/07 through 02/28/08.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

William Mottashed
Project Manager



**First
Environmental
Laboratories, Inc.**

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Case Narrative

TESTING SERVICE CORP.

Project ID: 69729

First Environmental File ID: 7-4258

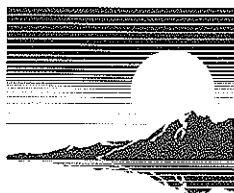
Date Received: September 26, 2007

Flag	Description	Flag	Description
<	Analyte not detected at or above the reporting limit.	L+	LCS recovery outside control limits; high bias.
B	Analyte detected in associated method blank.	L-	LCS recovery outside control limits; low bias.
C	Identification confirmed by GC/MS.	M	MS recovery outside control limits; LCS acceptable.
D	Surrogates diluted out; recovery not available.	M+	MS recovery outside control limits high bias; LCS acceptable.
E	Estimated result; concentration exceeds calibration range.	M-	MS recovery outside control limits low bias; LCS acceptable.
F	Field measurement.	N	Analyte is not part of our NELAC accreditation.
		ND	Analyte was not detected using a library search routine; No calibration standard was analyzed.
G	Surrogate recovery outside control limits; matrix effect.	P	Chemical preservation pH adjusted in lab.
H	Analysis or extraction holding time exceeded.	Q	The analyte was determined by a GC/MS database search.
J	Estimated result; concentration is less than calib range.	S	Analyte was sub-contracted to another laboratory for analysis.
K	RPD outside control limits.	T	Sample temperature upon receipt exceeded 0-6°C
RL	Routine Reporting Limit (Lowest amount that can be detected when routine weights/volumes are used without dilution.)	W	Reporting limit elevated due to sample matrix.

All quality control criteria, as outlined in the methods, have been met except as noted below or on the following analytical report.

Sample Batch Comments:

Sample(s) was (were) received outside temperature compliance.



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Analytical Report

Client: TESTING SERVICE CORP.

Project ID: 69729

Sample ID: I2 3.5-5'

Sample No: 7-4258-001

Date Collected: 09/18/07

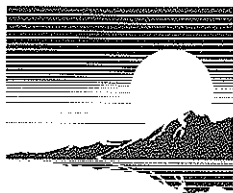
Time Collected: 9:00

Date Received: 09/26/07

Date Reported: 09/27/07

Results are reported on an "as received" basis.

Analyte	Result	R.L.	Units	Flags
Chloride, Soluble Analysis Date: 09/27/07	Method: 4500CL,C			
Chloride, Soluble	< 50	50	mg/kg	
Sulfate, Soluble Analysis Date: 09/26/07	Method: 4500SO4,E			
Sulfate, Soluble	350	250	mg/kg	



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Analytical Report

Client: TESTING SERVICE CORP.

Project ID: 69729

Sample ID: I4 3.5-5'

Sample No: 7-4258-002

Date Collected: 09/17/07

Time Collected: 9:00

Date Received: 09/26/07

Date Reported: 09/27/07

Results are reported on an "as received" basis.

Analyte	Result	R.L.	Units	Flags
Chloride, Soluble Analysis Date: 09/27/07	Method: 4500CL,C			
Chloride, Soluble	< 50	50	mg/kg	
Sulfate, Soluble Analysis Date: 09/26/07	Method: 4500SO4,E			
Sulfate, Soluble	310	250	mg/kg	