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Georgia Power
the southern electric system

D. O. Foster
Vice President and General Manager
Vogtle Project

October 27, 1983

Director of Nuclear Reactor Regulation
Attention: Ms. Elinor G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

File: X2BE02
Log: GN-269

REFERENCES: (1) GN-248 dated August 5, 1983
(2) GN-252 dated August 19, 1983
(3) GN-255 dated September 8, 1983

NRC DOCKET NUMBERS 50-~~425~~ 424 AND 50-425
CONSTRUCTION PERMIT NUMBERS CPPR-108 AND CPPR-109
VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
COMPACTION AROUND PIPES IN CATEGORY 1 BACKFILL

Dear Ms. Adensam:

Pursuant to our conversation with your M. Miller, L. Hiller, J. Kane and D. Gupta on August 30, 1983, we have performed additional testing between and beneath buried piping backfilled by the vibrated sand method. As a result of the additional testing performed and a review of our procedures, it is our intention to use the following two methods for backfilling pipes and similar conduits in category 1 backfill areas:

METHOD 1 - SAFETY RELATED PIPING IN CATEGORY 1 BACKFILL

Safety related piping will be backfilled by placing lean concrete to the bottom of pipe to provide continuous support, and backfilling with Category 1 backfill using wooden tampers, hand held power tampers and hand held vibratory compactors. Use of these methods will produce an average compaction of 97% of the maximum dry density determined in accordance with ASTM D 1557 which is our present licensing commitment. Recent field testing has demonstrated that the wooden tamper method can be used with minimal damage to coatings. Coatings which are inadvertently damaged will be repaired. Non-safety related piping may also be placed using this method. Refer to figure 1.

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METHOD 2 - NON-SAFETY RELATED PIPING IN CATEGORY 1 BACKFILL

Non-safety related piping in category 1 backfill will typically be backfilled using the vibrated sand method to compact concrete sand to an average of 95% of the maximum density determined by ASTM D 1557 with no tests below 93% and not more than 10% of the tests between 93% and 95%. The majority of piping buried in Category 1 backfill is non-safety related piping. Refer to figure 2.

Attached is the Law Engineering Test Company report on backfill for piping dated October 5, 1983. This additional test fill program was performed to evaluate the degree of compaction in material between and below the piping. Material between the pipes was evaluated using a hand held static cone penetrometer. The piping was carefully removed and the penetrometer was then used to evaluate the material directly below the pipes. In addition, standard sand cone tests were taken directly below the pipes once they had been removed as well as beside and above the pipes. The resulting data demonstrates that the compaction above, between, and below the pipes meets the proposed criteria. The attached photographs showing the backfill subsequent to removal of the pipes indicates how well the compacted backfill conforms to the shape of the pipe.

While the sand cone tests cannot typically be used between or beneath the pipes on a production basis due to constrained access, the static cone penetrometer can be used to provide an indication of good compaction in these instances. A reading of 200 or above will indicate that the proposed criteria has been met. Together with the previously transmitted data, we have demonstrated our ability to provide excellent support on all sides of buried piping while maintaining a quality backfilling program in accordance with our proposed criteria. The vibrated sand method will enable us to use a rapid, economical, quality method for installing Category 2 piping in Category 1 backfill.

It should be noted that a second test trench was installed to evaluate a third method of backfilling where concrete was poured to the bottom of the pipes and concrete sand was vibrated above and between the pipes. While tests taken above the pipes produced acceptable results, insufficient data was presented to verify the compaction between the pipes. Use of this method was abandoned.

If you have any questions, please contact us.

Yours truly,

D. O. Foster

D. O. Foster

DOF/sw
Attachments
xc: List attached.

xc: R. A. Thomas
O. Batum
M. Malcom
L. T. Gucwa
H. H. Gregory, III
J. A. Bailey
M. A. Miller
J. P. O'Reilly
W. F. Sanders
G. F. Trowbridge, Esquire

(D1)

LAW ENGINEERING TESTING COMPANY
geotechnical, environmental & construction materials consultants
396 PLASTERS AVENUE, N.E.
P.O. BOX 13260 • ATLANTA, GEORGIA 30324
(404) 873-4761

October 5, 1983

CPM	SURVEY
ACPM-FO	P&S
ACPM-ADM	ESS
ACPM-'A'	MCS
ACPM-'B'	CSS
ACPM-'C'	SS
MQC	CS
AMQC	DSS
CQCSS	SAO
MQCSS	FOS
EQCSS	SHRS
DRS	CWS
CPSS	SDS
MPSS	SES
EPSS	SAFETY
SFC	QA
BRE	TRG

Georgia Power Company
Plant Alvin W. Vogtle
P.O. Box 282
Waynesboro, Georgia 30830

Attention: Mr. Jim Belcher

Subject: Report of Test Fill Program
Backfill for Piping
Plant Vogtle
Waynesboro, Georgia
Job Number 7429

Gentlemen:

Law Engineering Testing Company is pleased to present this report of a Test Fill Program which was performed at Plant Vogtle between September 19th and 25th, 1983. This report describes the procedures used during fill construction, discusses testing techniques and presents the data obtained.

The purpose of the test fill procedure was to determine the adequacy of field placement techniques to meet the project specificationrequirements. Similar Test Fill Programs have been performed at the site in the recent past. This program was intended to determine the degree of fill compaction attained in material surrounding and below utility pipes. In addition, an effort was made to evaluate the usefulness of a hand held static cone penetrometer for estimating degree of fill compaction in areas which are unable to be tested physically, such as between and beneth pipes. Also, during filling of test Trench No.2, tests were performed at the fill interface with Trench No. 1 to determine the degree of compaction at a fill connection.

TEST TRENCHES

Two test trenches were prepared in an area east of the plant. Trench bottoms consist of a concrete mud mat approximately 6 inches thick. Sand bags are placed at trench ends to retain fill and water used during the filling procedure. Trench dimensions were approximately 17 feet long by 6 1/2 feet wide at the bottom of Trench No. 1 and approximately 25 feet long by 6 1/2 to 8 feet wide at the bottom of Trench No. 2. Slopes of the trench sides were at approximately 1(H) to 1(V) slope. Three or four steel pipes ranging in diameter from approximately 3 1/2 to 8 3/4 inches were placed in the trenches. In Trench No. 1 four pipes were supported by angle frames with the pipe inverts approximately 1 to 1 1/2 feet above the trench bottom. In Trench No.2, three pipes were bedded in approximately 1/2 to 1 inch of sand-cement grout.

Sand backfill was placed in each test trench in accordance with field change request CB-7022. This fill placement procedure is attached in the Appendix.

The test procedure involves the use of concrete sand as a backfill material placed in approximately 12 inch thick loose layers. Compaction is achieved by a combination of saturation with water and internal vibration using concrete vibrators. The procedure requires that sand cone density tests be performed as outlined in ASTM D1556. The project specification requires soils to be compacted to an average of 97% of the maximum laboratory dry density as determined by the modified Proctor method (ASTM D1557). Average compaction is to be evaluated on each 20 tests made in the area of the plant backfill. In addition, no test results shall be below 93% compaction and not more than 10% of the test results shall fall below 95%.

TEST TRENCH 1

Test Trench No.1 was filled, compacted and partially excavated during the period September 19-24,1983 utilizing the procedures referenced in the Appendix.

Density of backfill placed in Test Trench No.1 was determined (1) during filling with surface tests or (2) through the use of test pits penetrating one lift of compacted fill in order to test the underlying lift. Following filling of 3 lifts over the pipe crowns, the fill was excavated. Tests were then run in the lifts during excavation including the bottom lift underlying the pipes following removal of the pipes. Pipe beddings were inspected closely after removal of pipes.

Cone penetrometer tests were performed in accordance with the specification X2AP01 Section C 2.2, Pgh. C2.2.7,13. The procedures involve manually advancing a 1/2 square inch cross-sectional area steel cone into the soil at a steady rate to the desired depth of measurement. A proving ring dial is read and the reading is recorded along with test location and depth. The results of the cone penetrometer testing are attached in the Appendix.At each density test location, a series of cone Penetrometer Readings were recorded. These are shown with an average reading for a density test location along with the degree of modified compaction at the test location. Average readings between pipes are also shown.

LAW ENGINEERING TESTING COMPANY

TEST TRENCH NO.2

Backfilling of Test Trench No.2 took place during the period September 24-25, 1983. Placement of backfill was in accordance with the method of trench backfilling CB-7022. Three lifts of fill were placed and tested for density. Cone penetrometer data was recorded at each test location. Lift No.1 was tested in test pits excavated through Lift No.2. The remaining tests were surface tests. The results of the field testing are shown in the Appendix. Average density in Test Trench No.2 is significantly higher than in Trench No.1. This may have been due to the use of larger vibration equipment and a familiarity of Technique by the workers. The compaction metods used a pass of 2 parallel 4 inch-diameter vibrators followed by 2 parallel 2-inch diameter vibrators. Density Tests Nos. 43 and 46 were located to determine degree of compaction attained at a connection between existing and new fills in a trench.

LABORATORY TESTS

During fill placement and testing, six bulk samples of the fill materials were obtained and returned to our Atlanta soil laboratory for testing. Modified proctor and grain size tests were performed. The laboratory compaction tests are shown in Table No. 1. The results of the testing indicated that the modified proctor maximum dry density parameters for the six samples tested varied within a very limited range. Therefore, fill average compaction parameters were used in evaluation of the densities. The average maximum dry weight of 113.8 pounds per cubic foot (pcf) used during the field operations which was based on previous laboratory test results. The average maximum dry unit weight for the six current samples is 114.4pcf. Field Percent of compaction results shown in the Appendix have been revised based on the six current samples and the current laboratory density testing.

DISCUSSION

Results of the field and laboratory testing are presented in Table No.1 through No.6 in the Appendix. The degree of compaction achieved in Trench No. 1 varied from an average of 93.0 to 97.9 percent in 5 lifts. Recompaction and retesting was performed for tests below 95 percent except for Lift No.5. In Trench No.2 average degree of compaction varied from 100.1 to 103.1 percent in the 3 lifts. Average percent of compaction in the lifts below and surrounding the pipes did not differ significantly from the lifts immediately above the pipes.

The cone penetrometer also indicated that the resistance of fill below and between the pipes was similar to the remainder of the fill mass.

(04)

CONCLUSIONS

1) The filling procedure utilized is capable of providing the required degree of compaction in sand backfill.

2) The degree of compaction in mass fill appears to be a good indication of compaction surrounding and below pipes based on cone penetrometer data and compaction test data.

3) Density of compacted fill at a fill connection was not measurably different from density in adjacent fill based on the compaction test data and penetrometer data.

Very truly yours,
LAW ENGINEERING AND TESTING COMPANY

James E Ringo | William Allen Lancaster, P.E. (jaw)

James E. Ringo, P.E.
Geotechnical Engineer

William Allen Lancaster
Civil Engineer

LAW ENGINEERING TESTING COMPANY

APPENDIX

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1. Concrete sand meeting the gradation requirements given below shall be used for backfill in pipe trenches adjacent to and between piping.

U.S. SIEVE SIZES	PERCENT PASSING BY WEIGHT
3/8"	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-15

2. The sand shall be placed in the trench in loose lifts not exceeding 12 inches. The surface of the sand placed shall be reasonably level prior to moisture conditioning and compaction. This may be achieved by means of rakes and/or shovels.

3. After placement, the sand shall be simultaneously saturated and internally vibrated to achieve densification.

4. Saturation shall be achieved by providing barriers such as sand bags, forms, or any other acceptable material at both ends of the trench so as to prevent rapid drainage of water. Water pressure shall be controlled to reduce displacement of sand particles and disturbance in conpacted areas.

5. The sand will be internally vibrated using concrete vibrators or other suitable equipment. The vibrating frequency of the vibrator in sand shall be in the range of 7000-11,000 cycles per minute. The vibrator shall penetrate to the full depth of the loose lift. Vibration of the fill shall commence after the moisture is at a state such that the vibrator will move the material to achieve densification.

6. Vibration shall be done uniformly along the entire surface of the loose lift. The vibration shall be performed in a regular pattern on either side of the piping using 2 of more vibrators. Each 150 square feet of surface area shall be vibrated a minimum of 10 minutes. A longer period of vibration may be required if visual observation show that inadequate compaction has been achieved.

7. After the first lift of fill has been placed and compacted, successive lifts of fill shall be placed and compacted in a similar manner.

8. No testing shall be performed until the backfilled trench has drained of all standing water. To aid drainage, perforated pipes may be used. These pipe shall be capped on the trench side of the pipe so as to prevent flow of sand backfill. The diameter and number of perforated pipe will depend on the length of trench to be backfilled.

9. Sand cone density tests shall be performed in accordance with ASTM-D-1556. At least three tests at varying elevations shall be made for each 300 feet of trench backfilled. Sand cone density tests shall be performed using a 6 inch sand cone. The use of a nuclear device will not be permitted.

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TEST PROCEDURES

FIELD DENSITY TESTS

Sand Cone Method. This method of density testing involves digging a hole and weighing the material obtained. The volume of the hole is measured using uniformly graded sand with a known density. After determining the weight of the soil and the volume of the hole the density can be calculated.

This test was performed in substantial accordance with ASTM D1556, Density of Soil in Place by the Sand-Cone Method. This specification calls for a minimum test hole volume of 0.025 ft3.

The loose density of the uniformly graded sand used in the test procedure was calibrated prior to testing. The weight of sand contained in the ring and cone was determined in a similar manner, on a flat surface.

Care was exercised during calibration of the sad and while performing each test; to assure that no vibration caused erratic densities in this sand. Vibration during either of these processes will cause higher densities in clean uniform sand.

Wet sand was never used; it was either discarded or oven dried Use of wet sand will cause erroneous results due to inconsistent flow properties.

The soil removed from the fill during each density test was sampled for its moisture content. A representative moist sample was weighed and placed into a pan placed on a portable gas stove. The sample was heated until all moisture was evaporated from the sample. Since the soil being tested is a clean inert primarry silica sand, only free water within the sample is available for evaluation. Water bound in the soil chemical makeup is not available to be driven out. After evaporation of all water the dry weight of the sample was performed. The weights thus obtained the dry weight of soil and weight of water lost during drying are determined and the moisture content, expressed as a percentage of dry soil weight, is calculated.

LABORATORY MODIFIED PROCTOR TESTS

Laboratory modified Proctor tests were performed at each test trench location. These tests were performed manually in the Law Engineering - Atlanta office. Each test was performed in accordance with ASTM D1557, Moisture-Density Relations of Soils Using 10 Pound Rammer and 18 inch Drop. The tests were performed in a 4.0 inch diameter mold.

The material was mixed and dampened and placed in the mold in five separate layers. Each layer was compacted with 25 blows with hammer falling 18 inches. The hammer weight was 10 pounds. After compaction the unit weight is determined and a sample is obtained for moisture content determination. Next, the unit dry weight is determined. The test is then repeated for a new sample with a different moisture content. The results for each sample are plotted on the compaction test curves attached. The curves graphically depict the moisture content vs. dry unit weight, and include a sample identificaton, classification and method of test. T maximum dry unit weight and optimum moisture content can then be determined.

GRAIN SIZE DISTRIBUTION TESTS

Mechanical Method. The soil sample was initially washed through a number 200 sieve. The weight loss due to washing was recorded. The washed sample was then oven dried. The test continued by taking the dry soil and passing it through a series of sieves with the weight obtained on each sieve recorded. The distribution of weights is then computed in the percent passing as plotted for display as on the attached Grain Size Distribution Sheets. All mechanical grain size determinations were performed in the Atlanta branch laboratory in accordance with ASTM Specification D-422, Particle-Size Analysis of Soils.

TABLE NO.1
LABORATORY PROCTOR COMPACTION TESTS
ASTM D 1557

PROCTOR NUMBER	PERCENT OF OPTIMUM MOISTURE	MAX DRY DENSITY (PCF)
1	14.5	115.5
2	14.8	114.4
3	15.2	114.2
4	14.3	113.8
5	15.3	113.0
6	14.1	115.5
Average	14.7	114.4
Std. Deviation	0.5	1.0

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TABLE NO. 2
SUMMARY COMPACTIONS BY LIFTS

TEST TRENCH NO.	LIFT NO.	PERCENT OF MAXIMUM DRY DENSITY
1	1	96.9
1	2	97.0
1	3	97.3
1	4	97.9
1	5	93.0
2	1	100.1
2	2	103.1
2	3	101.6

*AVERAGE PERCENT OF MAXIMUM DRY DENSITY FOR LIFT AFTER RETESTS.

TABLE NO. 3
FIELD DENSITY TEST RESULTS
ASTM D 1556
TEST TRENCH NO.1

DENSITY TEST NO.	TEST PIT DEPTH (INCHES)	LIFT NO.	DRY DENSITY PCF	MOISTURE CONTENT PERCENT	MODIFIED COMPACTION (PERCENT)
1	12	1	108.8	12.0	95.1
3	12	1	109.8	12.7	96.0
4	14	1	109.7	12.2	95.9
5	12	1	112.3	11.4	98.2
6	12	2	101.6	7.6	88.8
7	12	2	103.6	13.3	90.6
8	12	2	108.4	9.6	94.8
9	12	2	108.1	10.7	94.4
13	4	3	106.6	11.3	93.2
14	2	3	105.8	13.8	92.5

TABLE NO. 3
FIELD DENSITY TEST RESULTS
ASTM D 1556
TEST TRENCH NO.1

DENSITY TEST NO.	TEST PIT DEPTH	LIFT NO.	DRY DENSITY PCF	MOISTURE CONTENT PERCENT	MODIFIED COMPACTION (PERCENT)
15	2	3	109.5	8.5	95.7
16 (6A) RETEST	12	2	112.3	12.3	98.2
17 (7A) RETEST	12	2	108.0	12.8	94.4
18 (13A) RETEST	2	3	110.6	15.8	96.7
19 (14A) RETEST	2	3	111.5	12.8	97.5
20	2	4	111.5	8.8	97.5
21	2	4	117.9	8.8	103.1
22	2	4	111.4	9.7	97.4
23	2	5	104.2	13.3	91.1
24	2	5	104.4	12.0	91.3
25	2	5	109.0	14.9	95.3
26 (23A) RETEST	2	5	105.7	16.4	92.4

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TABLE NO. 4
FIELD DENSITY TEST RESULTS
PERFORMED AFTER EXCAVATION OF OVERLYING LIFTS
TEST TRENCH NO.1

DENSITY TEST NO.	TEST PIT DEPTH (INCHES)	LIFT NO.	DRY DENSITY PCF	MOISTURE CONTENT PERCENT	MODIFIED COMPACTION (PERCENT)
27	12	4	113.5	13.0	99.2
28	12	4	109.1	12.7	95.4
29	12	4	108.6	14.3	94.9
30	3	3	105.8	12.8	92.5
31	4	3	111.8	12.0	97.7
32	3	3	118.9	8.4	103.9
33	2	2	112.9	8.5	98.7
34	2	2	116.7	10.3	102.0
35	2	2	110.6	5.3	96.7
36*	2	1	106.4	11.1	93.0
37*	2	1	116.1	12.7	101.5
38*	2	1	109.3	10.0	95.5
39*	2	1	109.8	10.8	96.0
40*	2	1	115.9	9.9	101.3

*TESTS PERFORMED BELOW PIPES AFTER REMOVAL OF PIPES

TABLE NO. 5
FIELD DENSITY TEST RESULTS
TEST TRENCH NO.2

DENSITY TEST NO.	TEST PIT DEPTH	LIFT NO.	DRY DENSITY PCF	MOISTURE CONTENT PERCENT	MODIFIED COMPACTION (PERCENT)
41	2	2	119.0	12.4	104.0
42	2	2	116.0	12.7	101.4
43	2	2	119.0	12.5	104.0
44	12	1	117.2	15.3	102.4
45	12	1	110.2	14.4	96.3
46	12	1	116.7	13.0	101.7
47	2	3	116.7	12.4	102.0
48	2	3	115.5	12.5	101.0
49	2	3	116.3	11.6	101.7

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TABLE NO. 6

CONE PENETROMETER RESISTANCE

TEST TRENCH NO. 1

LIFT NO.	ADJACENT TO DENSITY TEST NO.	DEPTH OF CONE BELOW SURFACE (INCHES)	NUMBER OF CONE READINGS	AVERAGE CONE RESISTANCE PSI	REMARKS
1	36	2-4	7	217	NOTE 1
1	37	2-4	6	223	NOTE 1
1	38	2-4	6	208	NOTE 1
1	39	2-4	6	226	NOTE 1
1	40	2-4	6	238	NOTE 1
2	16	2-4	4	204	NOTE 2
2	17	2-4	4	172	NOTE 2
2	33	2-4	4	217	NOTE 2
2	34	2-4	4	253	NOTE 2
2	35	2-4	4	226	NOTE 2
2	-	2-4	6	223	NOTE 3
2	-	2-4	6	223	NOTE 3
2	-	2-4	6	220	NOTE 3
2	-	2-4	7	225	NOTE 3
2	-	2-4	7	228	NOTE 3
2	-	2-4	7	220	NOTE 3

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TABLE NO.6

CONE PENETROMETER RESISTANCE

TEST TRENCH NO. 1

LIFT NO.	ADJACENT TO DENSITY TEST NO.	DEPTH OF CONE BELOW SURFACE (INCHES)	NUMBER OF CONE READINGS	AVERAGE CONE RESISTANCE PSI	REMARKS
3	15	3-6	6	143	
3	18	4-9	7	209	
3	19	3-6	7	202	
3	30	2-4	4	222	NOTE 4
3	31	2-4	4	244	NOTE 4
3	32	2-4	4	260	NOTE 4
4	20	3-8	7	154	
4	21	3-6	8	147	
4	22	3-6	8	156	
4	27	2-4	4	203	NOTE 5
4	28	3-4	4	195	NOTE 5
4	29	3-4	4	231	NOTE 5
5	23	3-6	8	149	
5	24	3-6	8	149	
5	25	3-7	8	167	
5	26	3-7	8	179	

TABLE NO.6

CONE PENETROMETER RESISTANCE

TEST TRENCH NO. 2

LIFT NO.	ADJACENT TO DENSITY TEST NO.	DEPTH OF CONE BELOW SURFACE (INCHES)	NUMBER OF CONE READINGS	AVERAGE CONE RESISTANCE PSI	REMARKS
1	44	2-4	4	240	TESTS IN 12 INCH PIT BOTTOMS
1	45	2-4	4	226	
1	46	2-4	5	224	
2	41	3-4	4	135	
2	42	3-4	4	136	
2	43	2-4	4	181	
3	47	2-4	4	199	
3	48	2-4	4	199	
3	49	2-4	4	163	

NOTE 1: Below pipes after removal

NOTE 2: Adjacent to pipes before and after removal

NOTE 3: Between pipes prior to removal

NOTE 4: After excavation of lifts 4 and 5

NOTE 5: Tests in 12-inch deep pit bottoms

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COMPACTION TEST

LAW ENGINEERING TESTING COMPANY.

JOB NAME PLANT VOGTLE

JOB NUMBER 7429

CLIENT GEORGIA POWER COMPANY

CONTRACTOR

BORING NUMBER TEST TRENCH #1

SAMPLE NUMBER 1

DEPTH STOCKPILE

LOCATION

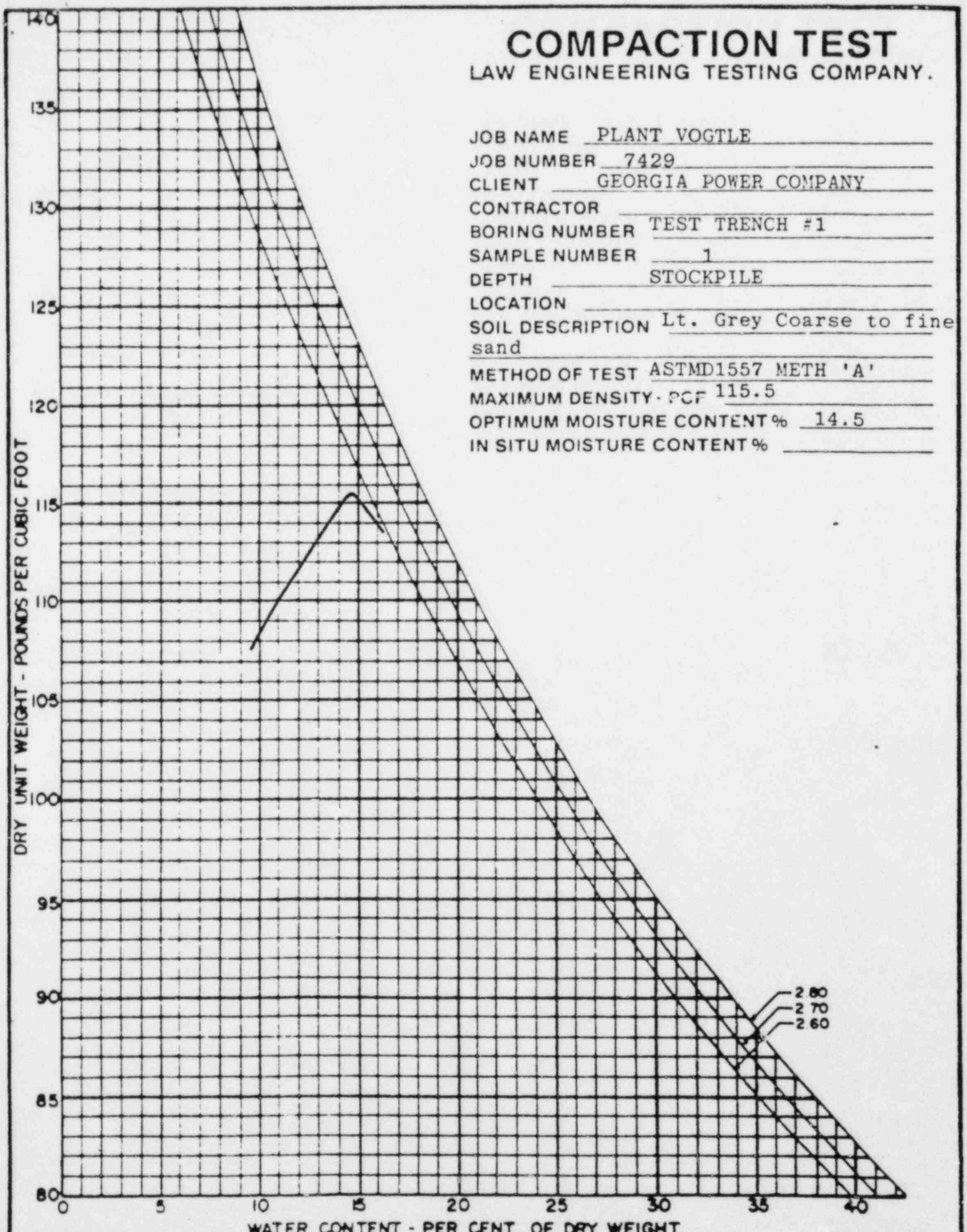
SOIL DESCRIPTION Lt. Grey Coarse to fine sand

METHOD OF TEST ASTMD1557 METH 'A'

MAXIMUM DENSITY - PCF 115.5

OPTIMUM MOISTURE CONTENT % 14.5

IN SITU MOISTURE CONTENT %



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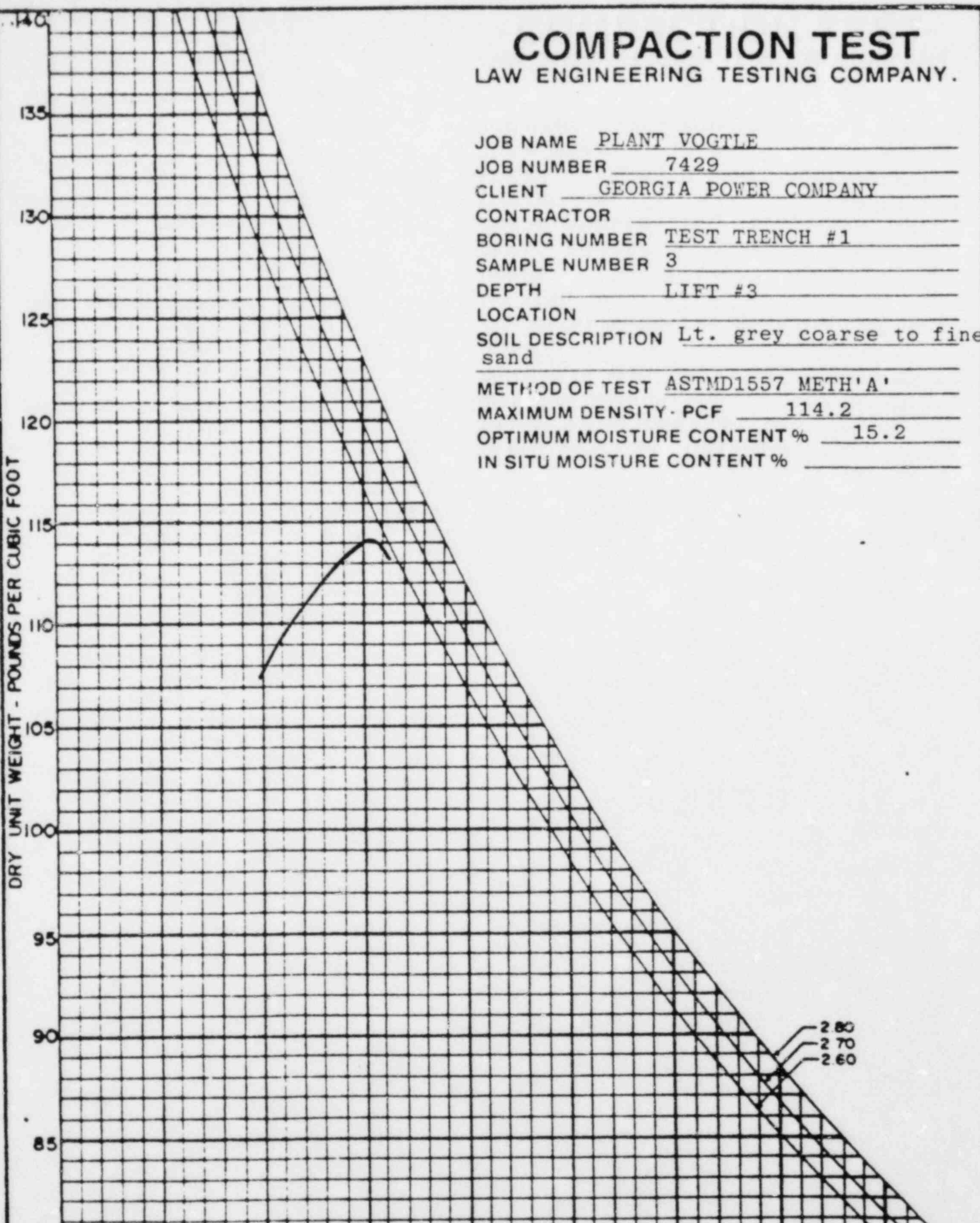
COMPACTION TEST

LAW ENGINEERING TESTING COMPANY.

JOB NAME: PLANT VOGTLE
JOB NUMBER: 7429
CLIENT: GEORGIA POWER COMPANY
CONTRACTOR:
BORING NUMBER: TEST TRENCH #1
SAMPLE NUMBER: 3
DEPTH: LIFT #3
LOCATION:
SOIL DESCRIPTION: Lt. grey coarse to fine sand
METHOD OF TEST: ASTMD1557 METH'A'
MAXIMUM DENSITY - PCF: 114.2
OPTIMUM MOISTURE CONTENT %: 15.2
IN SITU MOISTURE CONTENT %:



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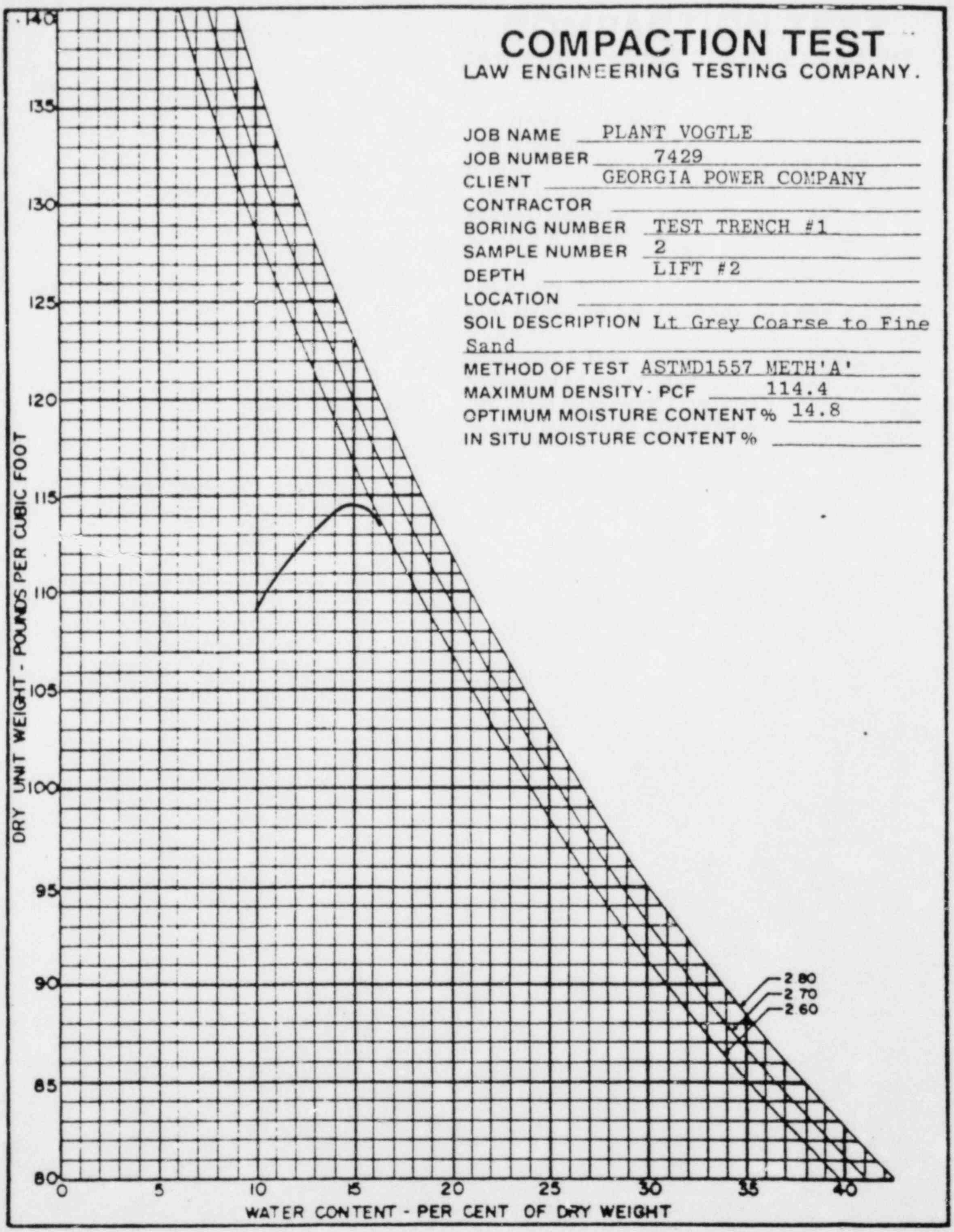
COMPACTION TEST

LAW ENGINEERING TESTING COMPANY.

JOB NAME PLANT VOGTLE
JOB NUMBER 7429
CLIENT GEORGIA POWER COMPANY
CONTRACTOR
BORING NUMBER TEST TRENCH #1
SAMPLE NUMBER 2
DEPTH LIFT #2
LOCATION
SOIL DESCRIPTION Lt Grey Coarse to Fine Sand
METHOD OF TEST ASTMD1557 METH'A'
MAXIMUM DENSITY - PCF 114.4
OPTIMUM MOISTURE CONTENT % 14.8
IN SITU MOISTURE CONTENT %



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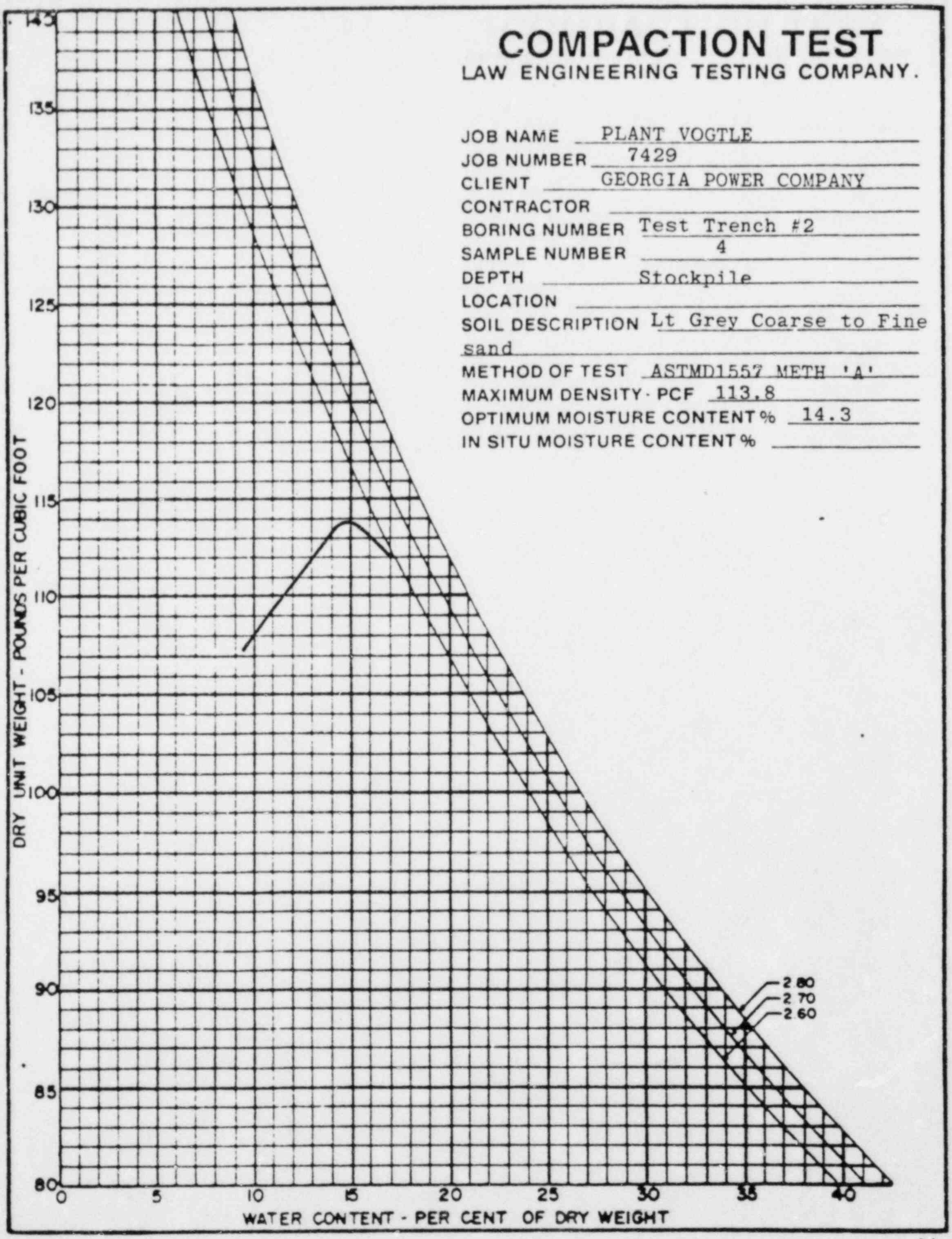


COMPACTION TEST

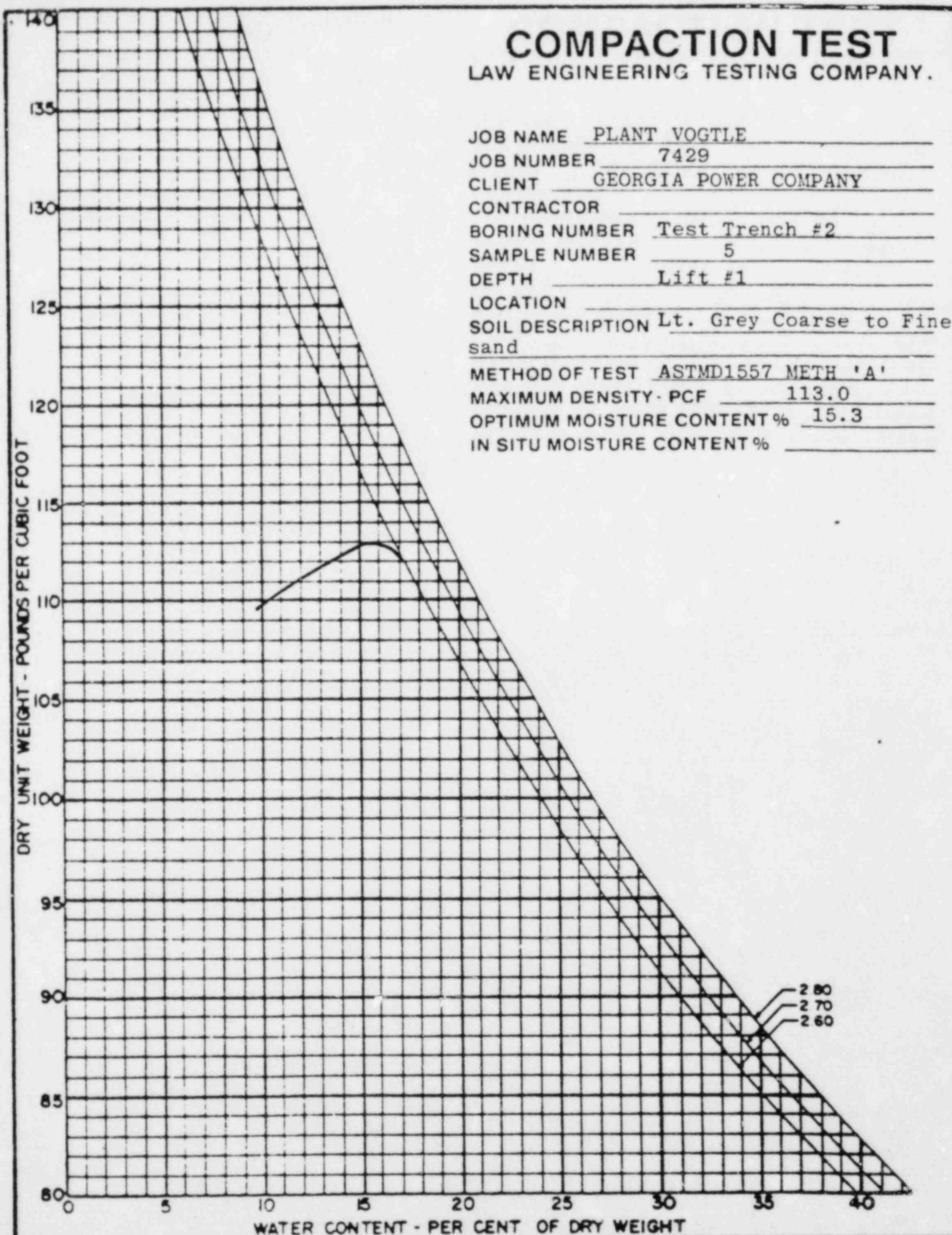
LAW ENGINEERING TESTING COMPANY.

JOB NAME PLANT VOGTLE
JOB NUMBER 7429
CLIENT GEORGIA POWER COMPANY
CONTRACTOR
BORING NUMBER Test Trench #2
SAMPLE NUMBER 4
DEPTH Stockpile
LOCATION
SOIL DESCRIPTION Lt Grey Coarse to Fine sand
METHOD OF TEST ASTMD1557 METH 'A'
MAXIMUM DENSITY · PCF 113.8
OPTIMUM MOISTURE CONTENT % 14.3
IN SITU MOISTURE CONTENT %

COMPACTION TEST

LAW ENGINEERING TESTING COMPANY.

JOB NAME PLANT VOGTLE
JOB NUMBER 7429
CLIENT GEORGIA POWER COMPANY
CONTRACTOR
BORING NUMBER Test Trench #2
SAMPLE NUMBER 5
DEPTH Lift #1
LOCATION
SOIL DESCRIPTION Lt. Grey Coarse to Fine sand
METHOD OF TEST ASTMD1557 METH 'A'
MAXIMUM DENSITY - PCF 113.0
OPTIMUM MOISTURE CONTENT % 15.3
IN SITU MOISTURE CONTENT %



A-1

(D24)

COMPACTION TEST

LAW ENGINEERING TESTING COMPANY.

JOB NAME PLANT VOGTLE

JOB NUMBER 7429

CLIENT GEORGIA POWER COMPANY

CONTRACTOR

BORING NUMBER TEST TRENCH #2

SAMPLE NUMBER 6

DEPTH Lift #3

LOCATION

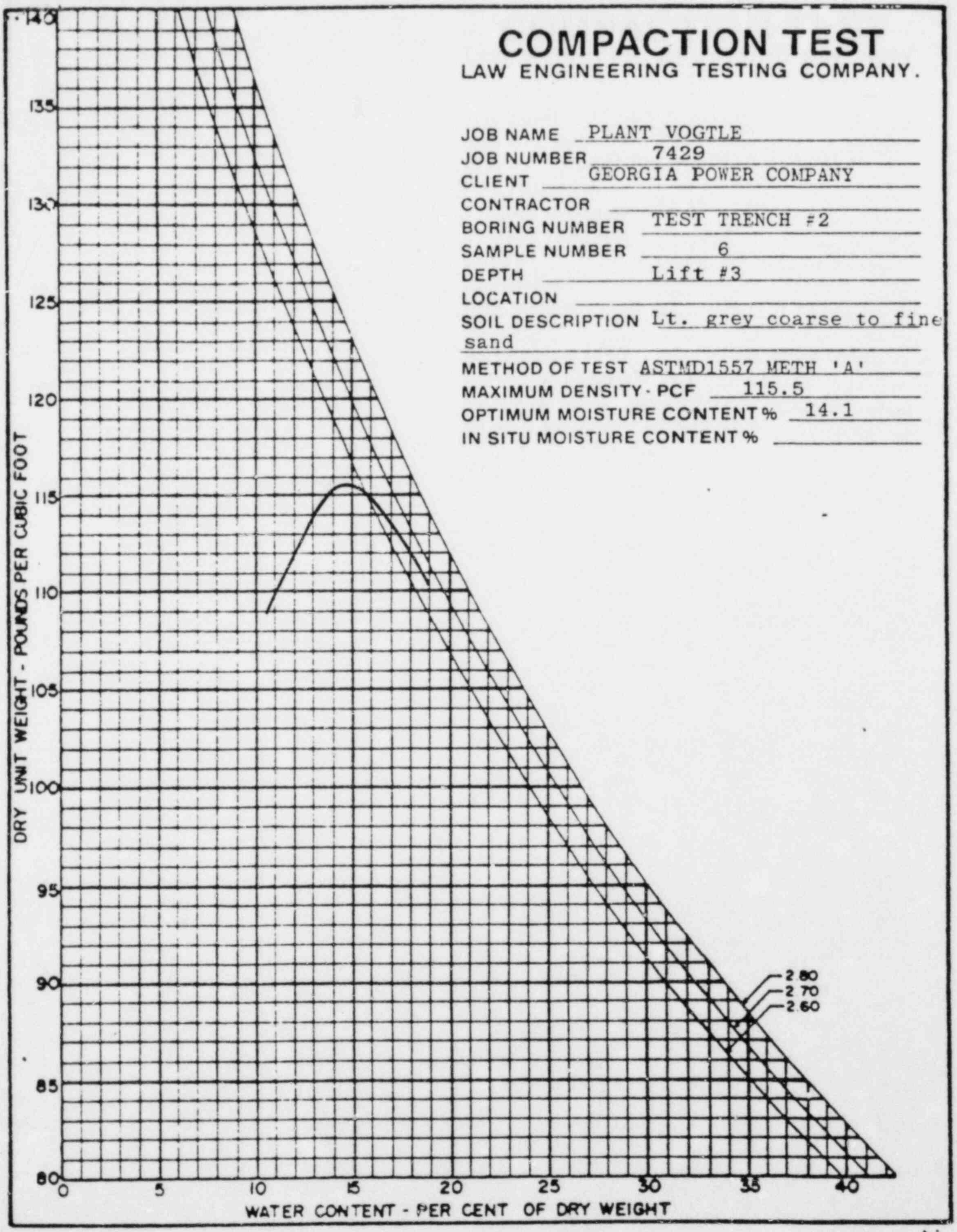
SOIL DESCRIPTION Lt. grey coarse to fine sand

METHOD OF TEST ASTMD1557 METH 'A'

MAXIMUM DENSITY - PCF 115.5

OPTIMUM MOISTURE CONTENT % 14.1

IN SITU MOISTURE CONTENT %



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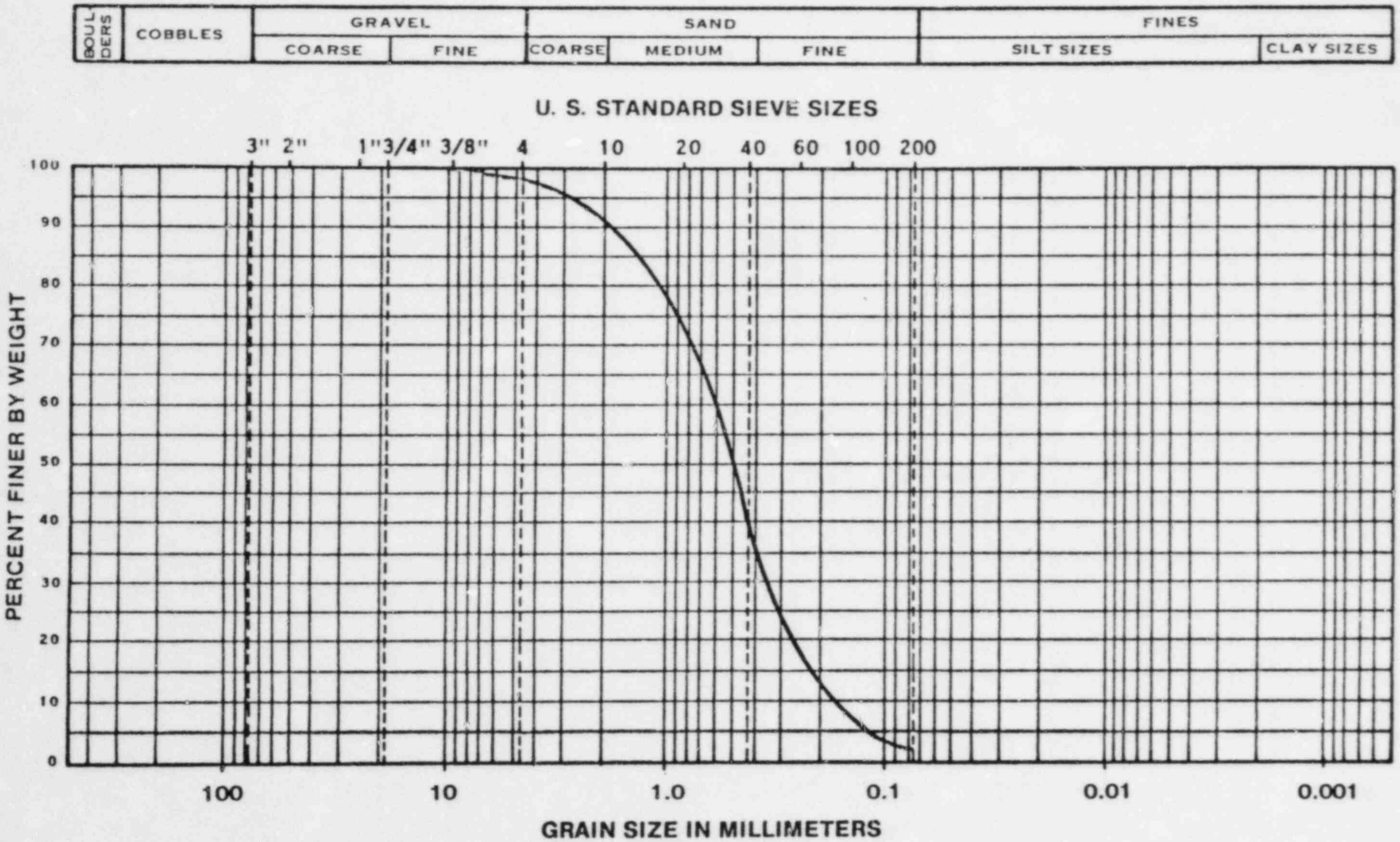
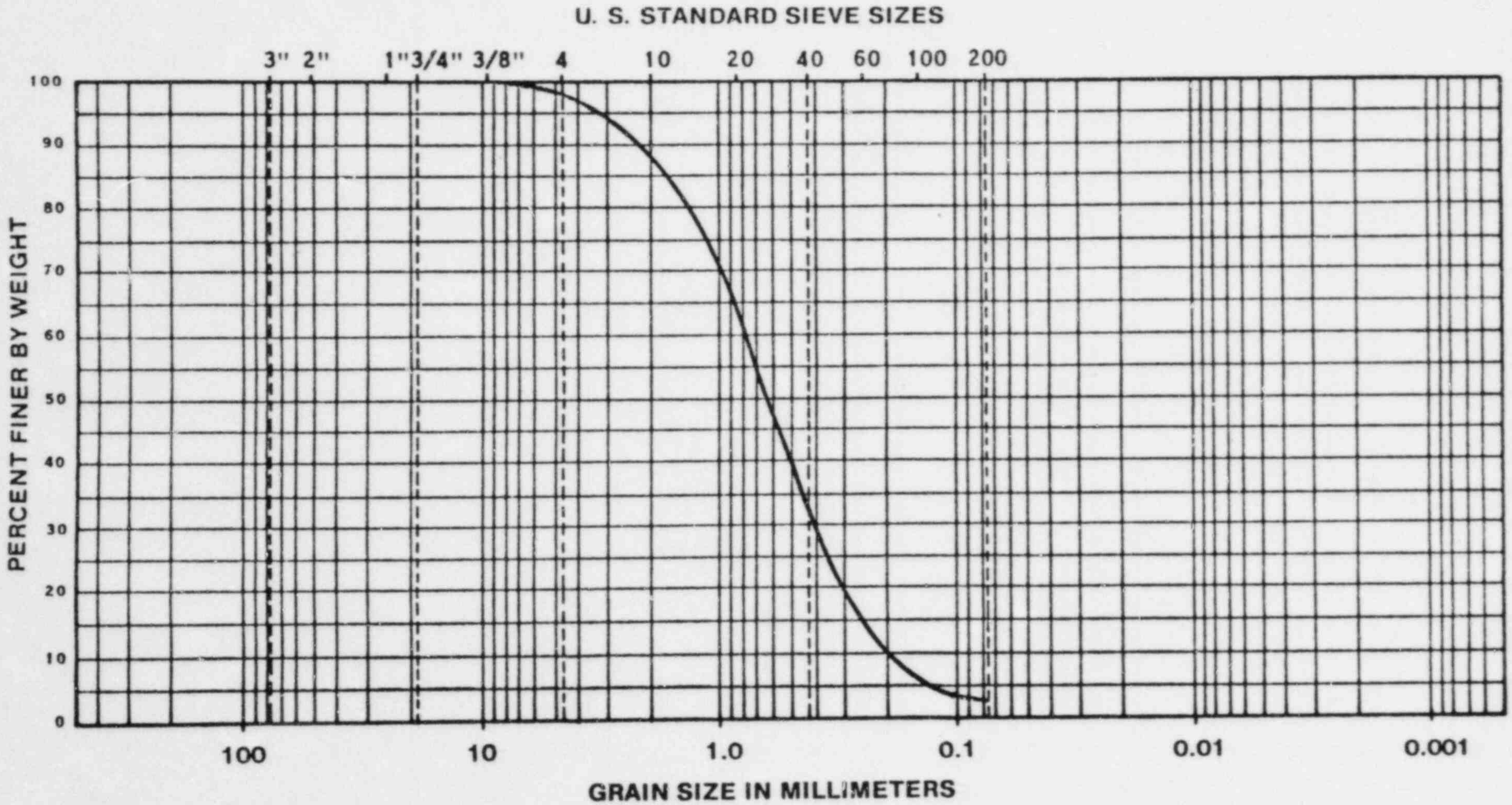


	BORING NO.	DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
Law Engineering Testing Company	Trench 1						LIGHT GREY FINE TO COARSE SAND
Grain Size Distribution	JOB NO. 7429	STOCK PILE					

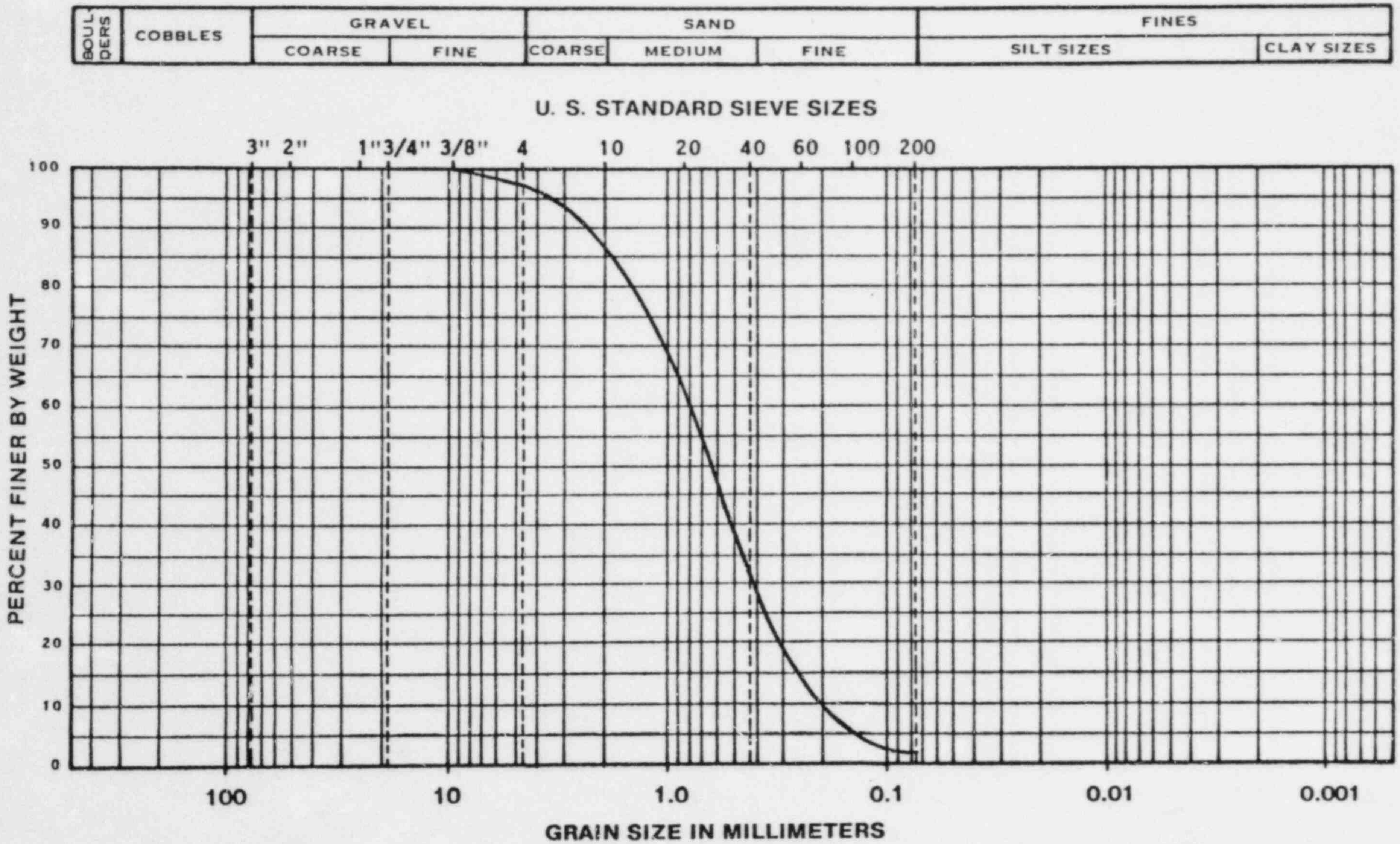
BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES



Law Engineering Testing Company

Grain Size Distribution

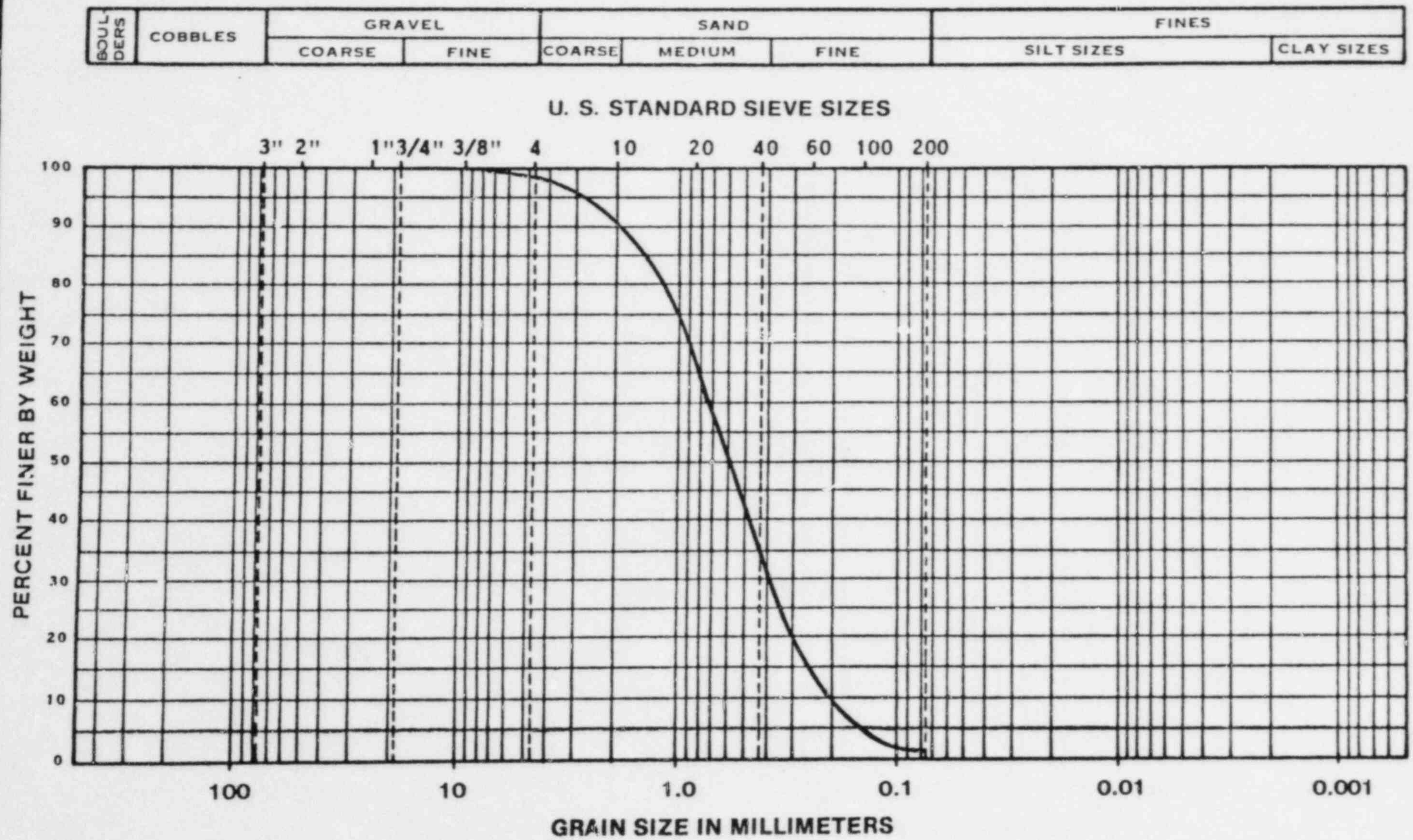
BORING NO.	DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
TRENCH 1	LIFT 2					LIGHT GREY FINE TO COARSE SAND
JOB NO. 7429						



Law Engineering Testing Company

Grain Size Distribution

BORING NO.	DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
TRENCH 1	LIFT 3					LIGHT GREY FINE TO COARSE SAND
JOB NO. 7429						

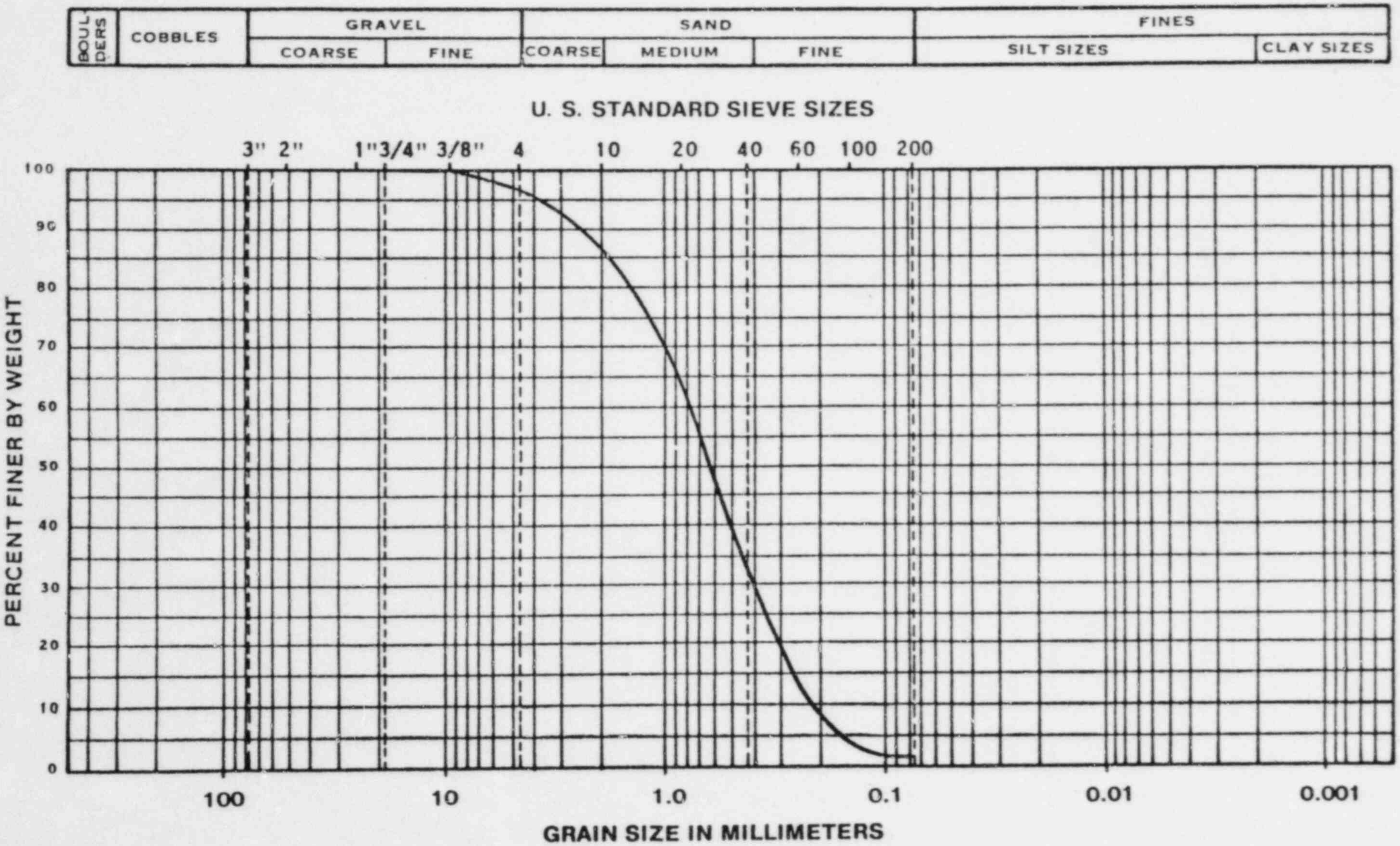


Law Engineering Testing Company

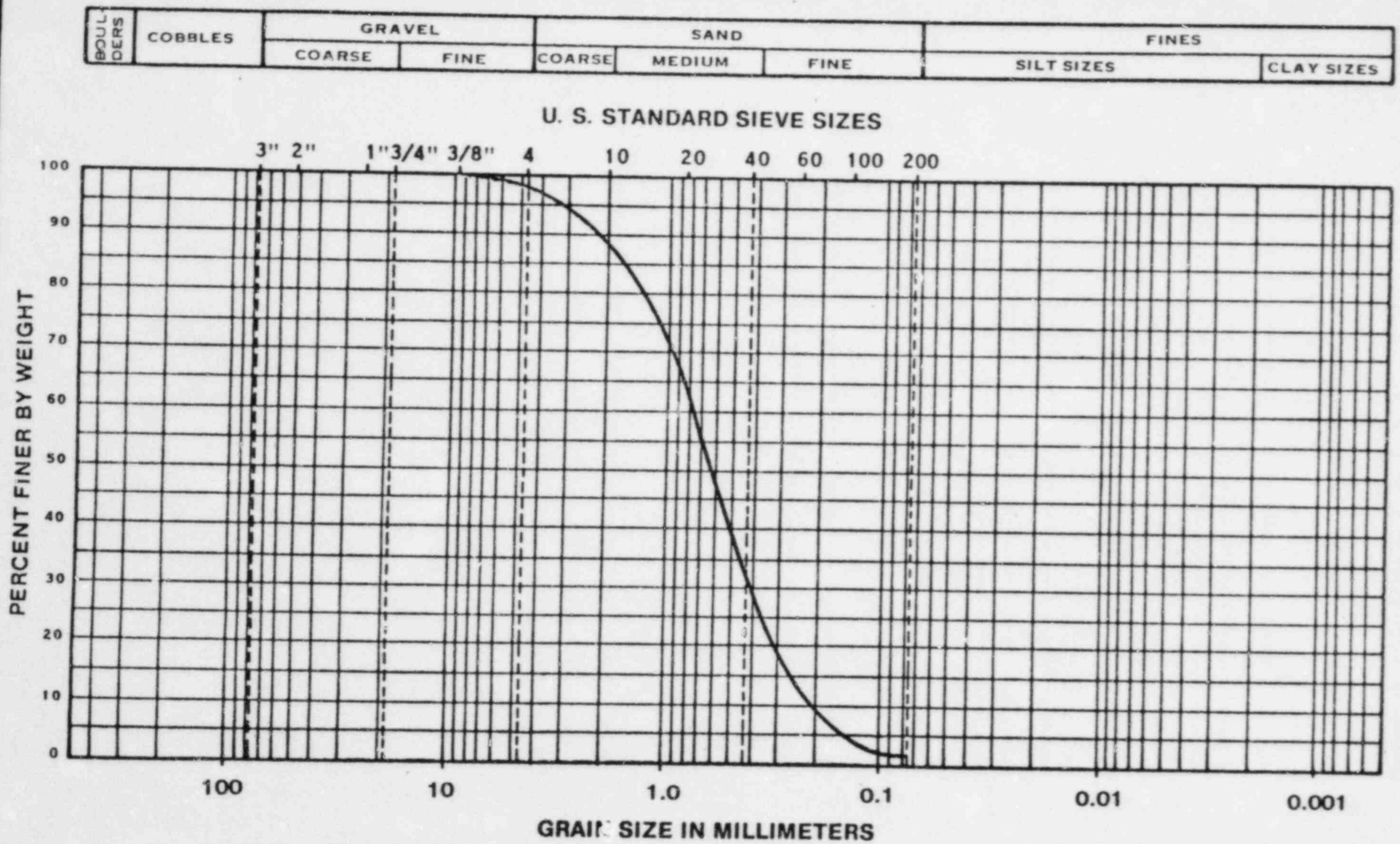
Grain Size Distribution

BORING NO.	DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
TRENCH 2	STOCKPILE					LIGHT GREY FINE TO COARSE SAND
JOB NO.						
7429						

(828)



Law Engineering Testing Company — Grain Size Distribution	BORING NO.	DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
	TRENCH 2	LIFT 1					LIGHT GREY FINE TO COARSE SAND
	JOB NO.						
	7429						

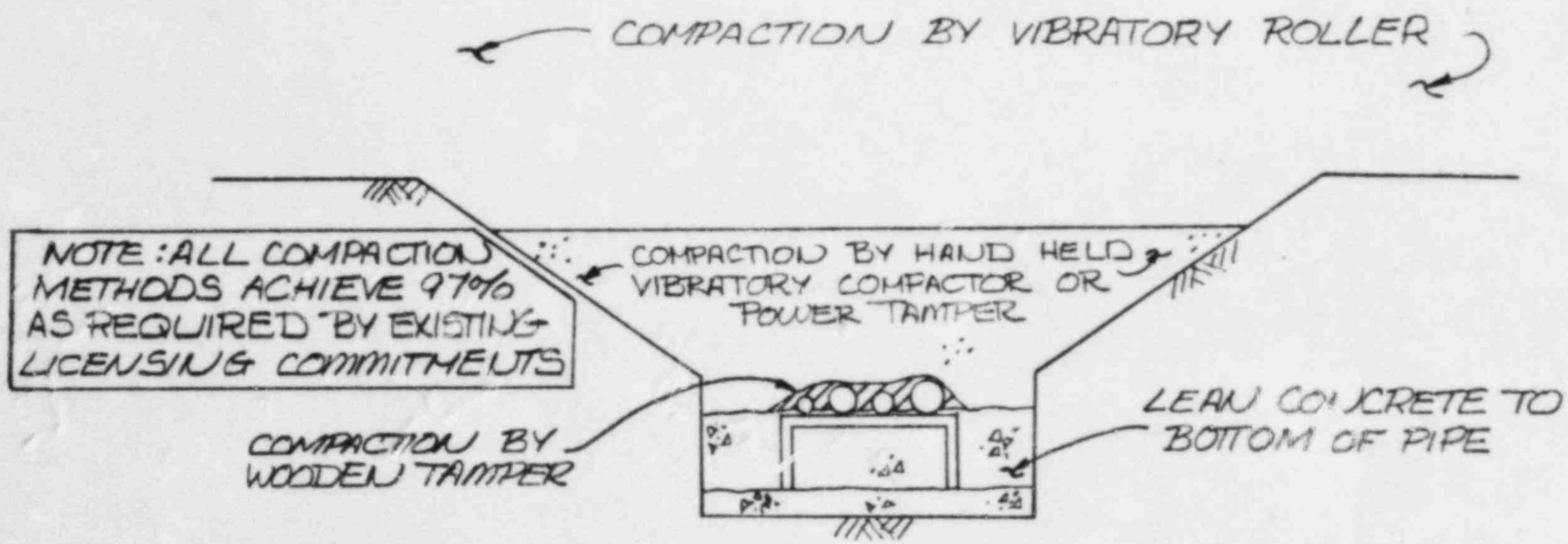


Law Engineering Testing Company

Grain Size Distribution

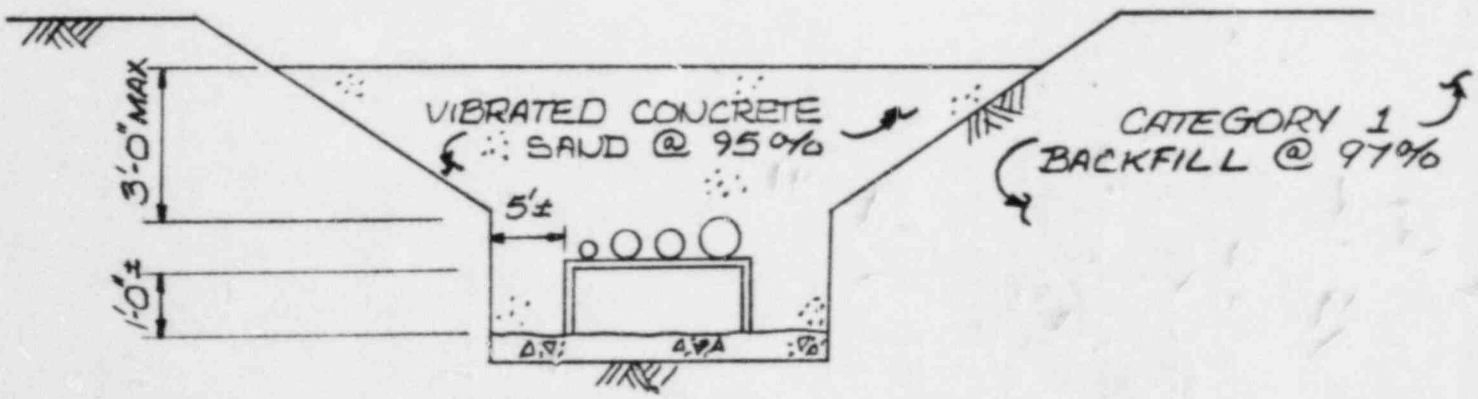
BORING NO.	DEPTH	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
TRENCH 2	LIFT 3					LIGHT GREY FINE TO COARSE SAND
JOB NO. 7429						

D30



WOODEN TAMPER METHOD

FIGURE 1

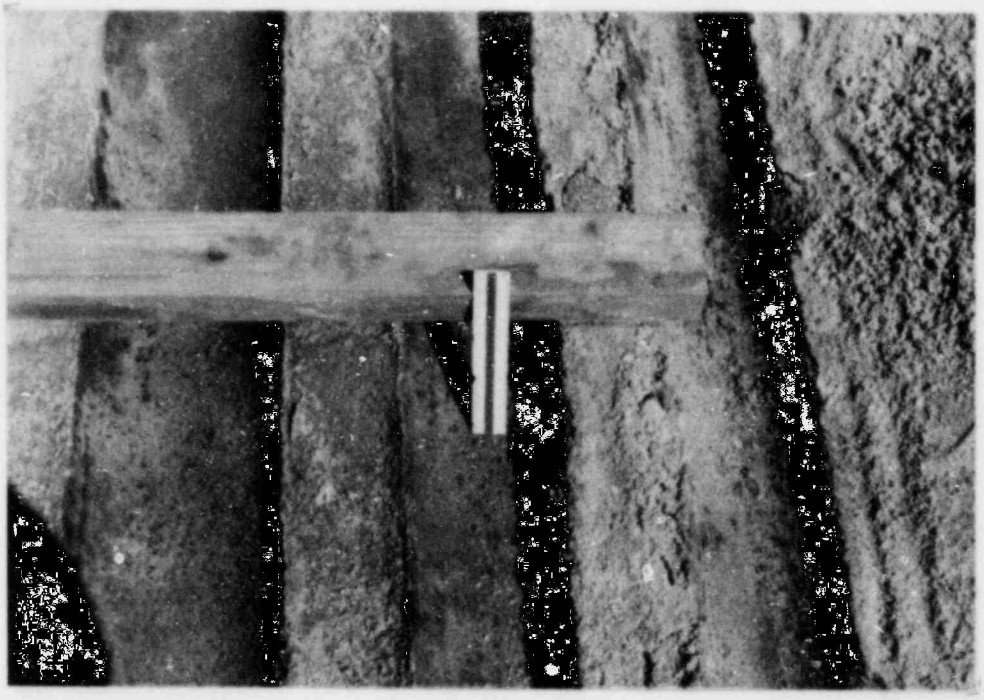


VIBRATED SAND METHOD

FIGURE 2

TEST TRENCH PRIOR TO BACKFILLING

BACKFILL BETWEEN AND BENEATH PIPES
SUBSEQENT TO PIPE REMOVAL



BACKFILL BETWEEN AND BENEATH PIPES SUBSEQUENT TO PIPE REMOVAL

BACKFILL BETWEEN AND BENEATH PIPES SUBSEQUENT TO PIPE REMOVAL