Geotechnical Verification Work
Report of Results

Vogtle Electric Generating Plant

August 1985

Geology Group
San Francisco

Geotechnical Verification Work
Report of Results

Vogtle Electric Generating Plant

August 1985

Geology Group
San Francisco

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

GEOTECHNICAL VERIFICATION WORK

REPORT OF RESULTS

1.0 INTRODUCTION

A program of geotechnical verification work was conducted at Plant Vogtle during the summer of 1985 to resolve several licensing issues and to acquire supplementary data on site characteristics. The work consisted of Standard Penetration Testing of the backfill, core drilling and in situ permeability testing of the marl, observation well installation, and laboratory testing.

Standard Penetration Testing was performed to verify the backfill compaction with respect to liquefaction potential.

Core drilling of the marl underlying the plant facilities (the foundation bearing stratum) was conducted to resolve the Open Item discussed in Section 2.5.4.1.3 of the Draft Site Evaluation Report (DSER). Observation wells were installed, both in the marl and the water table aquifer, and permeability testing was conducted in the marl to resolve the Open Item on ground water monitoring discussed in Section 2.5.4.5 of the DSER. Continuous recorders were installed on two observation wells to resolve Open Item on hydrostatic loading discussed in Section 2.4.12.5 of the DSER. Laboratory tests included measurement of marl permeability, and measurement of the cation exchange capacity and distribution coefficient of the backfill. The tests were conducted to supplement existing data.

This report discusses the results of these studies, with the exception of the Standard Penetration Testing in the backfill. That information has been submitted in a report entitled, "Standard Penetration Test Results", and for compieteness is submitted as Appendix A.

2.0 SCOPE OF STUDIES

The marl was cored in two areas adjacent to the powerblock, designated as well clusters A and B on Figure 1. A series of 3 wells were installed at each cluster to monitor hydrostatic pore pressure at representative depths in the marl. In situ (packer) permeability tests were conducted in these cored holes.

Six observation wells were installed in the water table aquifer to allow monitoring in the powerblock backfill and in the area northwest of the powerblock. Two of these replace wells damaged from construction activities. Continuous water-level recorders were installed on two water-table observation wells for determining magnitude and frequency of diurnal fluctuations of the water table.

The drilling, coring, in situ permeability testing and observation well installation was performed by Law Engineering Testing Co., under the supervision of a Bechtel Engineering Geologist.

Laboratory permeability tests on ten marl samples from the 900 series holes were conducted by Harding Lawson Associates. The distribution coefficients (Kd) of four backfill samples was done by Battelle Pacific

Northwest Laboratories. Cation exchange capacity measurements on ten backfill samples were made by Soil and Plant Laboratory, Inc. These laboratory tests were conducted to supplement and verify data from previous investigations.

3.0 SUMMARY OF RESULTS

The results of the geotechnical verification work supports the previous data on site characteristics of Vogtle.

- Core drilling of marl: The very high core recovery; lack of voids, altered zones, or fractures; and drilling rate results verify that the marl is a fine-grained, competent and firm material without secondary openings. The core from the holes confirm the results of the many marl core holes drilled previously in the powerblock area.

- Peameability testing of marl: Both the in situ (packer) tests and the laboratory tests of the marl support results of previous studies. Of the fifteen intervals tested for in situ permeability, none showed any water takes. The laboratory tests show the marl to be consistently very low to practically impermeable, ranging from 1.4×10^{-6} to $5.0 \times 10.^{-9}$ cm/sec. These data show that the marl is nearly impermeable.

- Observation well installation: The observation wells installed in the water table aquifer and the marl aquiclude during this study provide additional monitoring points in the immediate vicinity of the plant facilities. The initial water levels recorded in the new wells are consistent with previous data. Continued monitoring of those wells is part of the VEGP ground water monitoring program.

- Distribution coefficient (Kd) of backfill: In the SER, June, 1986, the NRC assumed Kd values of 5 ml/g for strontium and 49 ml/g for cesium. These assumed values are stated by the NRC as being conservatively low, based on the literature. The results of the laboratory measurements confirm that assumption. The measured values are approximately an order of magnitude greater than the assumed values.

4.0 CONDITIONS IN THE BLUE BLUFF MARL

The integrity of the marl as a foundation layer and a barrier to ground water movement was questioned. To provide data on the structure, lithology, and permeability of the marl, the following program was conducted.

4.1 Core Drilling

Two clusters of three wells each, were constructed on the southeast and northwest sides of the power block (Figure 1). The marl was core drilled for visual inspection to determine the integrity of the marl. The wells

designated 900, 901, and 902 are located to the southeast, inside the power block excavation and the wells designated 903, 904B, 905 are located to the northwest, outside the excavation, as shown on Figure 1. The geologic logs for these holes are included in Appendix B. From inspection of the core, zones to be monitored by the wells were selected.

4.2 Well Cluster A (wells 900, 901, and 902)

The first well drilled was 900. A hole, 9-7/8 inches in diameter, was drilled through the backfill to the top of the marl, using a tricone rock-bit and revert/water as the circulating fluid. The top 10 feet, from a depth of 92.6 ft to 102.6 ft. was cored using a 5-1/2 inch OD double tube, ball-bearing, swivel-type, split core barrel with a bottom (face) discharge bit. Clear water was used as the circulating fluid. The hole was then reamed to 9-7/8 inches diameter and 6-inch steel casing was installed to a depth of 102.6 ft. The casing was cemented in place using a tremie pipe, 1-1/4-inches diameter inserted outside the casing to a depth of 102.6 ft, and a grout mix of one part cement to one part water (by volume).

After allowing cement to set for four days, the casing was flushed with clean water, and coring was continued to a depth of 142.6 ft. (Approximately 5 feet above the base of the marl, based on data contained in the FSAR). After being logged by an engineering geologist, the core was boxed, photographed, placed in plastic sleeves for moisture

preservation, and stored. Permeability tests, in situ, were conducted in ten foot intervals as drilling progressed from 102.6 ft (bottom of casing) to 142.6 ft (bottom of hole). The data obtained from well 900 were used to locate, core, test and complete wells 901 and 902. Both of these wells were drilled, cored, and tested in the same manner and using the same equipment as well 900.

Well 901 was drilled with a tricone bit to a depth of 91.6 ft and cored from 91.6 ft to 128 ft (bottom of hole). Casing was cemented in place at a depth of 102 ft and a permeability test was conducted in the bottom ten feet (118-128 ft).

Well 902 was drilled with a tricone bit to a depth of 91.5 ft and cored from 91.5 ft to 108 ft (bottom of hole). Casing was cemented in place at a depth of 100 ft and a permeability test was conducted in the bottom eight feet (100-108 ft).

4.3 Well Cluster B (Wells 903, 904B, and 905)

The first well drilled at this location was well 903. A hole 9-7/8 inches in diameter was drilled through the Barnwell sediments with a tricone rockbit to the top of the marl. The hole was drilled, cored, and tested in the same manner and with the same or equivalent equipment used to drill wells 900, 901 and 902.

The top of the marl was encountered at a depth of 78 ft. The hole was cored from 78 to 133 ft (approximately 10 ft above the base of the marl). Steel casing, 6 inches in diameter was cemented by the tremie method at a depth of 85 ft.

Permeability tests were conducted, as drilling progressed, in ten foot intervals from 85 to 133 ft.

The data obtained from well 903 were used to locate, core, test, and complete wells 904B and 905. Holes 904 and 904A had to be abandoned due to split casing and encountering buried utilities, respectively, the logs for these holes are included in Appendix B.

Well 904B was drilled with a rockbit to a depth of 68.5 ft and cored from 68.5 ft to 96.7 ft (bottom of hole). Casing was cemented in place at a depth of 85 ft and a permeability test was conducted in the bottom 11.7 ft (85 - 96.7 ft).

Well 905 was drilled with a rockbit to a depth of 77 ft and cored from 77 ft to 116 ft (bottom of hole). Casing was cemented in place at a depth of 88.5 ft and permeability tests were conducted in the bottom 27.5 ft.

Following the in situ permeability tests, porous tube (Casagrande) piezometers were installed in each of these holes. The well construction details are discussed in Section 6.2.

5.0 PERMEABILITY TESTING

5.1 In Situ Permeability Testing

Permeability testing (in situ) was conducted in holes 900 through 905 using the single packer method according to procedures in designation E-18 of the U.S. Bureau Reclamation "Earth Manual" and in general compliance with the Corps of Engineers, RTH-381-80. (The latter reference was recommended by the NRC staff).

The validity of some of the previous in situ permeability tests conducted during site exploration (1971-1973) was questioned by NRC, since some of these holes were drilled with bentonite as the circulating fluid. The NRC was concerned that bentonite could have caused some plugging of permeable zones, thereby reducing the amount of water being injected, resulting in calculated permeabilities lower than actually existed. In order to alleviate this concern, all of the holes were drilled with a biodegradable drilling additive (Revert) and water when drilling in sediments above the marl, and only clear water was used as drilling in the marl.

When drilling holes that penetrated the marl, a 6-inch diameter casing was cemented 8 to 10 ft below the top of the marl. After allowing the cement to set a minimum of 48 hours, the Revert was broken down with chlorine and the casing flushed with clean water. The holes were cored using only potable water as the circulating fluid in the marl after casing was set.

The method of testing was as follows:

At each well cluster, the deep core hole (900 and 903) was advanced in 10 foot intervals and a permeability test was conducted at each interval. This drilling/testing procedure was followed until the total depth of hole was reached. The interval being tested (bottom 10 foot) was isolated from the remainder of the hole by a pneumatic inflatible packer.

In the remaining wells, (901, 902, 904B, and 905), the hole was advanced to total depth, which was predetermined from well 900 or 903 data, and the bottom interval tested. The interval being tested was isolated in the same manner.

Each permeability test was conducted for a total period of 40 or 50 minutes, as follows: After the packer was seated, water was pumped into the test section at a minimum pressure (i.e. 40 psi) and held for 8 or 10 minutes, while recording water meter readings. The pressure was increased to an intermediate pressure (i.e. 50 psi) and held for another 8 or 10 minute period, while recording water meter readings. The pressure was then increased to the maximum (i.e. 60 psi) and held for 8 or 10 minutes. The test was continued by decreasing pressure back to the intermediate and minimum pressures at the same time intervals.

In all of the tests conducted, the water takes were zero indicating an apparent permeability of zero. The permeability test data are shown on Table 2.

5.2 Laboratory Permeability Testing

In situ (packer) permeability tests cannot be used to quantify the permeability of materials with very low values, due to mechanical and control limitations. Packer tests at Vogtle in fresh marl have consistently shown no water take, implying the marl is impermeable. In order to quantify the permeability of the marl laboratory measurements were made. During coring, ten samples of the core were collected, wrapped in foil and sealed with wax for permeability testing in the laboratory. The laboratory tests were performed by Harding Lawson Associates. The results are summarized on Table 2, with the data included in Appendix C.

The range of permeability measurements is from 1.41×10^{-6} to 5.01×10^{-9} cm/sec. These data, combined with the in situ tests confirm that the marl is nearly impermeable.

6.0 OBSERVATION WELL INSTALLATION

In Section 2.5.4.5 of the Draft SER, NRC requested additional monitoring wells and more frequent measurements of the ground water levels. In order to develop a ground water monitoring plan to meet these concerns, the number and location of existing observation wells was first reviewed. This review revealed an adequate number and location of observation wells existed to monitor the confined aquifers. However, the

data indicated that for complete coverage of the water table aquifer, additional wells were required. Therefore, two additional observation wells were installed to monitor water levels in the Barnwell sediments, to the north and west of the power block, and two additional wells were installed to monitor water levels in the backfill to the east and south of the power block. These additions to the existing observation wells were incorporated in the proposed monitoring plan submitted to NRC on May 21, 1985. Also, three existing observation wells were found to be damaged. These were to be grouted, and two were to be replaced. NRC staff found the proposed plan acceptable, as stated in Section 2.4.12.7 of the Final SER.

Three piezometers in each of two well clusters were installed at various depths within the marl. These piezometers are installed at the request of the NRC to monitor distribution of hydrostatic pore pressure within the marl.

The location of all observation wells are shown on Figure 1. These wells are currently being used to monitor ground water conditions at Plant Vogtle.

6.1 Water Table Aquifer Wells

The NRC requested that two water table aquifer wells be equipped with automatic water level recorders, one in the backfill and the other in adjacent Barnwell sediments. Well 808 was chosen as the Barnwell monitoring well and well LT-13 as the backfill well for continuous

monitoring. To better accommodate installation of an automatic recorder these two wells were constructed with 4-inch diameter well casing and screen. The remaining wells were constructed with 2-inch diameter well casing and screen.

6.1.1 Wells 808 and 809

Wells 808 and 809 were drilled and completed as observation wells to monitor water levels in the Barnwell sediments. Well 809, located west of the power block was drilled with a 7-7/8-inch diameter, tricone rock bit, using Revert and water as the circulating fluid. The well was drilled to a depth of 90 ft, one foot below top of marl. The well was constructed by installing a 2-inch diameter PVC screen, 10 ft long with .020 inch slot size. The screen is located from 74.5 to 84.5 ft below ground level and gravel packed to a depth of 69.35 ft. A bentonite seal 2.5 ft thick, was installed above the gravel pack and the remainder of the annulus between the hole and 2-inch casing was grouted to ground surface with a 1:1 mixture of cement and water.

Well 808, located north of the power block, was drilled with a 6-7/8 inch diameter, tricone rockbit, using Revert and water as the circulating fluid. The well was drilled to a depth of 68 ft, 1.7 ft below top of marl. Well 808 was constructed by installation of 4-inch diameter PVC casing and screen. The well screen, 10 ft long with slot size of .020-inch is located between 50.5 and 60.5 ft depth and gravel packed to

a depth of 45.5 ft. A bentonite seal, 2 ft thick was installed above the gravel pack and the remainder of the annulus between the 4-inch casing and the hole was grouted to land surface with a 1:1 mixture of cement and water.

6.1.2 Wells LT-12 and LT-13

Wells LT-12 and LT-13 were drilled and completed as observation wells to monitor water levels in the backfill. Well LT-12, located south of the power block, was drilled with a 6 7/8-inch diameter tricone bit using Revert and water as the circulating fluid. The well was drilled to a depth of 79ft, top of marl. The well was constructed by installing a 2-inch diameter casing/screen assembly. The screen is 10 ft. in length with a .020-inch slot size, located from 63.1 to 73.1ft. below ground surface and is a gravel packed to a depth of 58.15 ft. A bentonite seal, 1.65 ft. thick, was installed above the gravel pack and the remainder of the annulus between the 2-inch casing and the hole was grouted to ground surface with a 1:1 mixture of cement and water.

Well LT-13, located near the east end of the turbine building, was drilled with a 7 7/8-inch diameter, tricone rockbit to a depth of 89 ft, top of marl. The well was constructed by installation of 4-inch diameter PVC casing and screen. The screen is 10ft long, with a slot size of .020-inch located from 73.55 to 83.55 ft. depth and is gravel packed to a depth of 68.10 ft. A bentonite seal, 2.27ft. thick, was installed above

the gravel pack and the remainder of the annulus between the 4-inch casing and the hole was grouted to land surface with a 1:1 mixture of cement and water.

In construction of all observation wells, the Revert was broken down with chlorine after casing/screen installation and before installation of gravel pack. Clean water was pumped through the PVC casing, exiting through the screen and returning to land surface through the well annulus during installation of the gravel pack. All of the wells were developed by washing with clean water followed by pumping with air.

6.1.3 Wells LT-1A, LT-7, and STA.

During backfilling of the powerblock excavation it was necessary to maintain the water table far enough below grade to assure design compaction. Several observation wells were installed around the powerblock to monitor this water level. As backfill operations progressed and eventually advanced several feet above the water table, all of the observation wells were grouted and abandoned, except three. Of the three wells, STA is no longer needed and LT-1A and LT-7 were made a part of the long term ground water monitoring program.

As backfilling advanced, these wells were damaged and could not be utilized as observation wells. All three of these wells were abandoned as part of this work by grouting from the bottom up, using a 1 1/2 inch diameter hose as a tremie with a 1:1 mixture of cement and water.

As stated above wells LT-1A and LT-7 were included in the long term ground water monitoring program, therefore they were replaced. Well LT-1A was replaced with well LT-1B located 4 ft. due east. The hole was drilled with a 5 7/8-inch diameter, tricone rockbit using Revert and water as the circulating fluid. The hole was drilled to a depth of 84.65 ft. which is 1.35 ft. below the top of the marl. The well was completed by installing a 2-inch diameter PVC casing/screen assembly to a depth of 84.65 ft. The screen is 10 ft. in length with .020-inch slot size, located between 72.65 and 82.65 ft. and gravel packed to a depth of 65.17 ft. A bentonite seal 2.17 ft. thich was installed on top of the gravel pack and the remainder of the annulus between the 2-inch casing and the hole was grouted with a 1:1 mixture of cement and water.

Well IT-7 was replaced with well LT-7A, located 7 1/2 ft. west. The hole was drilled with a 5 1/8-inch diameter, tricone rock bit using Revert and water as the circulating fluid. The hole was drilled to a depth of 87 ft, which is top of marl. The well was completed by installing a 2-inch diameter, PVC casing/screen assembly to a depth of 87 ft. The screen is 10 ft. in length with .020-inch slot size, located between 75 and 85 ft. and gravel packed to a depth of 65 ft. A bentonite seal, 2-ft thick, was installed on top of the gravel pack and the remainder of the annulus between the 2-inch casing and the hole was grouted with a 1:1 mixture of cement and water.

6.2 Marl Observation Wells (Piezometers)

Each of the holes cored in the marl (900 through 905) was completed by installation of a porous stone piezometer to measure hydrostatic pore pressure within the marl confining layer.

The porous stones are 2 1/2 inches diameter and 2 1/2-ft. overall length, with a 2 ft. length of 60-micron porous stone. The riser casing is 1-inch diameter schedule 80 PVC.

The sand used for the filter pack is "Ottawa 10-30" which is clean and well graded from No. 10 to No. 30 mesh, United States standard sieve sizes. This gradation was selected to match the 60-micron porous stones and prevent movement into the stone of fines in the clay. The sand pack and stone are much more permeable than the marl.

All of the piezometers were installed in accordance with Designation E-28, U.S. Bru. Rec. "Earth Manual", as follows. Upon completion of drilling, the bottom of the 5 1/2-inch diameter core hole was sounded. The bottom 2 ft of hole was filled with Ottawa sand through a tremie, and tamped. The porous stone, having been soaked in water from 24 to 48 hrs., was lowered to the top of the sand. A centralizer was attached to the stand pipe about 6-inches above the stone. Additional Ottawa sand was installed by tremie to fill the annulus between the stone and the hole and to cover the stone a minimum of 1.85 ft., followed by tamping.

A bentonite seal, minimum thickness of 2 ft, was placed on top of the filter and the remainder of the annulus between the 1-inch standpipe and the 5 1/2 inch hole and/or the 6-inch casing, was filled with a 1:1 mixture of cement and water. Details of the piezometer installations are on Table 1 and are shown schematically on Figures 2 and 3.

TABLE 1 - SUMMARY OF OBSERVATION WELLS

WELL NO.	COORDINATES N	E	GROUND ELEV.	TOP OF WELL ELEV.	DEPTH TO MARL	OPEN INTERVAL
808	9625	9300	207.0	216.47	66.3	45.5-68
809	8320	7860	222.8	224.23	89.0	69.35-90
900	7538	10119.5	216.3	218.05	92.6	113.8-140.7
901	7538	10104.5	215.58	220.75	91.6	122-128
902	7543.5	10110.5	215.97	221.11	91.0	101.5-108
903	8480	8900	215.75	216.73	78.0	127-133
904B	8464	8885	215.75	216.31	78.8	90-96
905	8450	8900	215.75	216.71	77.3	109.8-116
LT-1B	8388	9304	213.18	215.47	83.3	65.17-84.65
LT-7A	8151.3	9317.5	215.92	221.17	87.0	65-87
LT-12	7775	9600	209.0	219.27	79.0	58.15-79
LT-13	8135	10110	219.0	221.2	89.0	68.1-90

TABLE 2 - PERMEABILITY TESTS

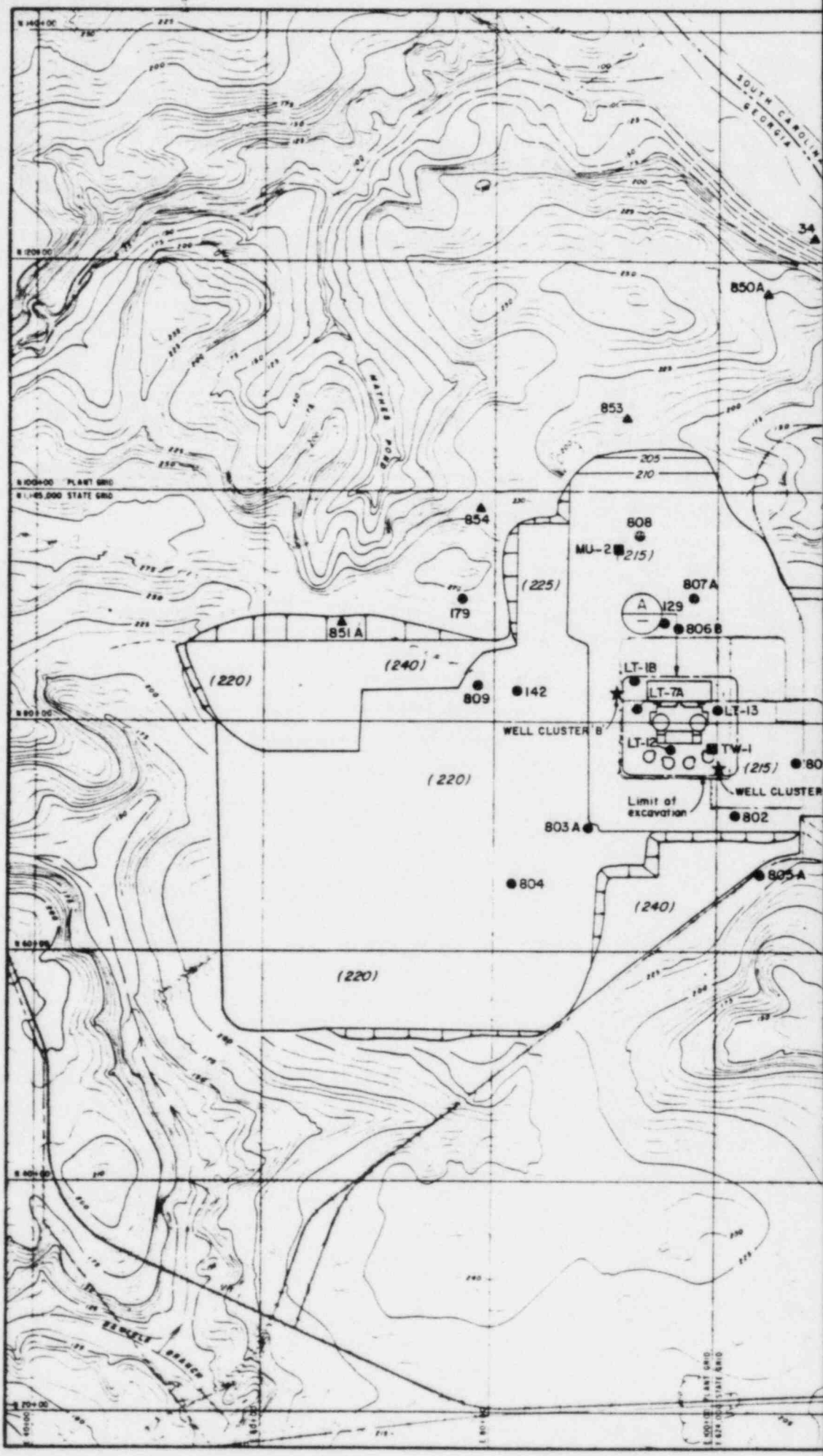
IN SITU PERMEABILITY TESTS

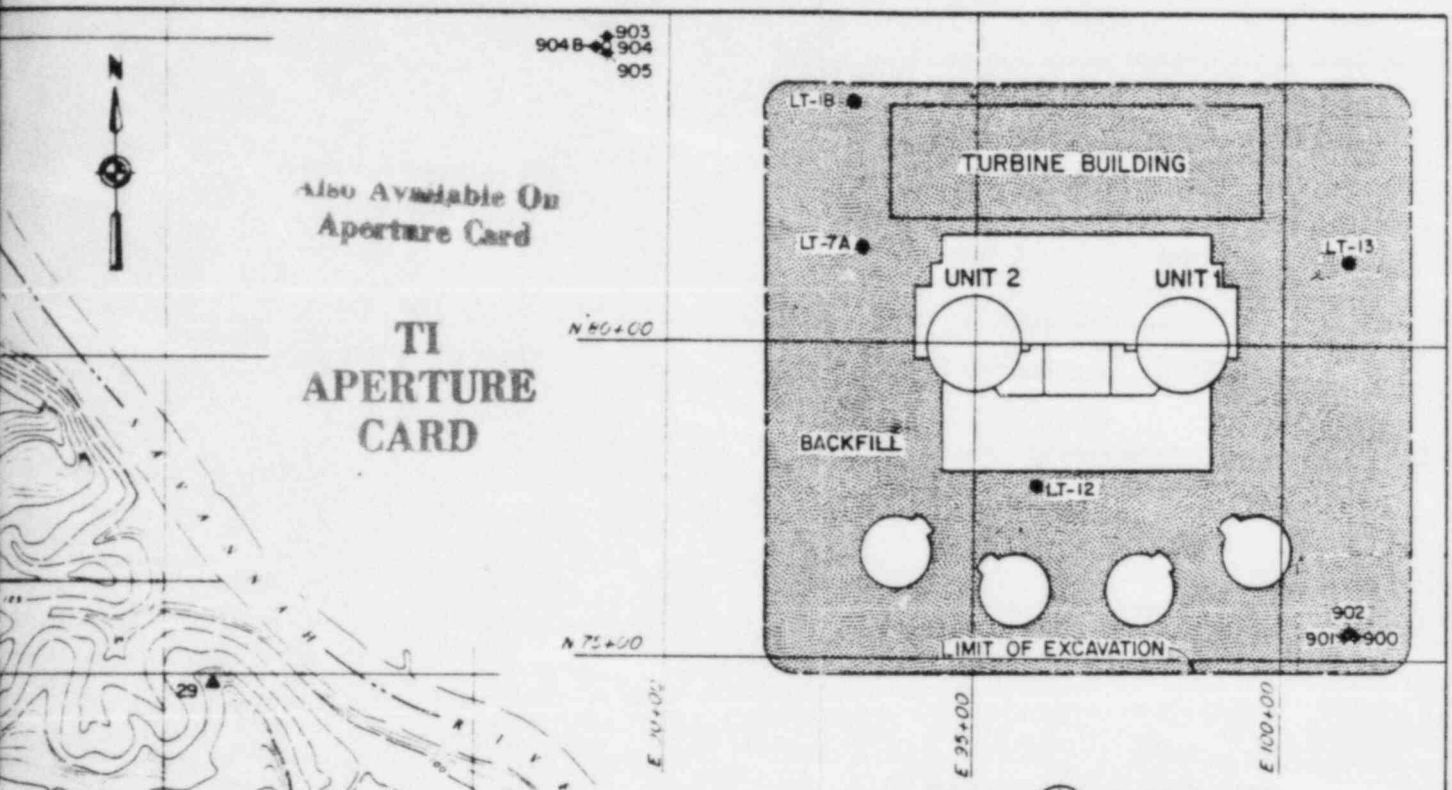
HOLE NO.	INTERVAL TESTED (FT.)	QUANTITY OF WATER INJECTED (GALS.)	PERMEABILITY (CALCULATED)
900	104.6-112.6	0	0
	112.6-122.6	0	0
	122.6-132.6	0	0
	132.6-142.6	0	0
	122.6-142.6	0	0
901	118-128	0	0
902	100-108	0	0
903	85-96	0	0
	96-106	0	0
	106-116	0	0
	116-126	0	0
	126-133	0	0
904B	85-96.7	0	0
905	88.5-102.5	0	0
	102.5-116	0	0

LABORATORY PERMEABILITY TESTS *

HOLE NO.	DEPTH (FT).	PERMEABILITY (CM/SEC)
901	119.0	5.01×10^{-9}
902	104.2	1.95×10^{-6}
903	108.2	1.94×10^{-7}
903	112.7	4.99×10^{-7}
903	128.4	2.06×10^{-6}
904B	92.3	2.42×10^{-6}
905	91.6	1.41×10^{-6}
905	96.7	8.49×10^{-6}
905	107.5	1.39×10^{-7}
905	114.0	7.81×10^{-8}

* - Tests were performed by Harding Lawson Associates (See Appendix B)


SOUTH CAROLINA
GEORGIA
34
850A
853
854
808
MU-2
(215)
807A
(225)
179
129
806 B
851 A
(240)
(220)
809
142
LT-1B
LT-7A
LT-13
WELL CLUSTER B
LT-12
TW-1
(215)
WELL CLUSTER
Limit of excavation
803 A
802
804
805 A
(240)
(220)
(220)
205
210
MATHEWS ROAD
BEAUFORT DRAINAGE



DETAIL (A) PLANT SITE

100 0 100 200
SCALE IN FEET

EXPLANATION

- ★ Marl aquiclude well clusters.
- 900 ◆ Marl aquiclude observation well.
- 801 ● Unconfined aquifer observation well.
- 29 ▲ Confined (Tertiary) aquifer observation well.
- TW-1 ■ Confined (Cretaceous) aquifer observation well.

NOTE:

Site grading generalized from DWG. NO. CX2D46V003. Within graded area, approximate elevations shown in parentheses (215).

REFERENCE:

Hancock Landing Project topographic map prepared by Clyde N. Eldridge Aerial Surveys, Feb 25/71

400 0 400 800 1200
SCALE IN FEET

Contour intervals 5 ft and 25 ft

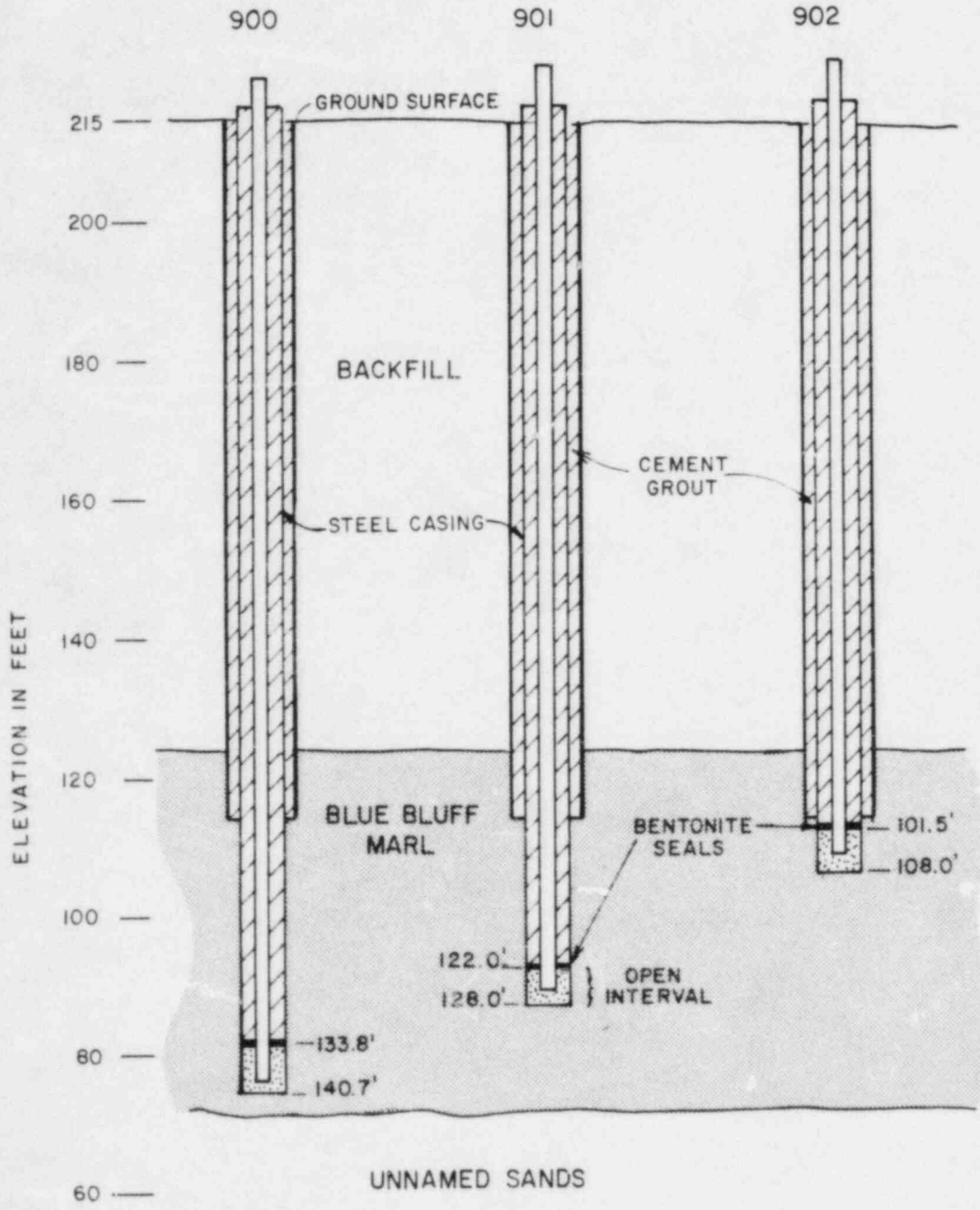
BECHTEL
LOS ANGELES

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

MONITORING PROGRAM
WELL LOCATIONS

SCALE SHOWN | DRAWING NO. | REV

JOB NO 9548 | FIGURE 1



NOTES:

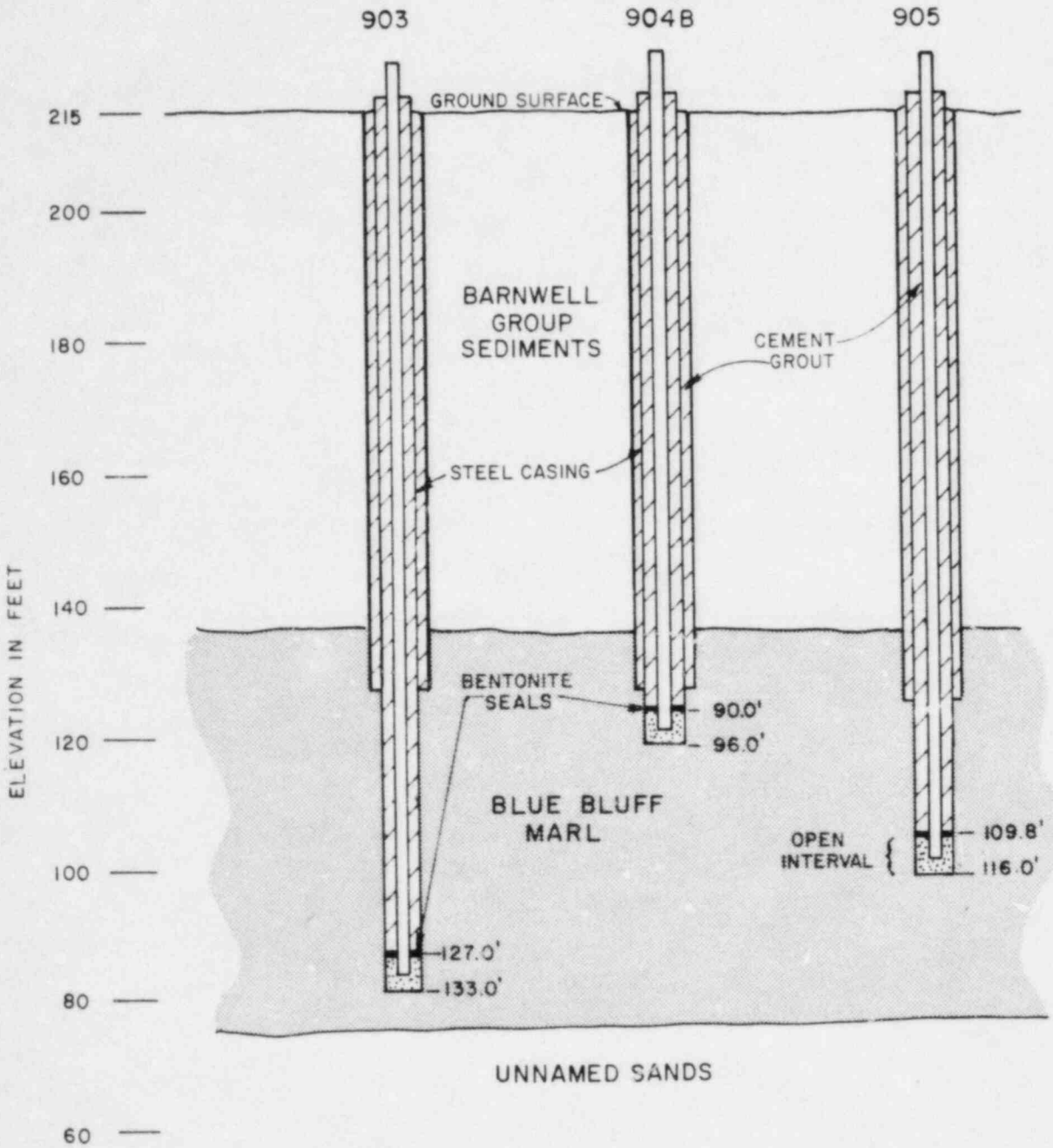
1. NO HORIZONTAL SCALE WAS USED, SCHEMATIC TO ILLUSTRATE WELL CONSTRUCTION.
2. SEE TEXT FOR DETAILS OF WELL CONSTRUCTION.

BECHTEL
SAN FRANCISCO

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

OBSERVATION WELL CLUSTER A
SCHEMATIC SECTION

JOB No.	DRAWING No.	REV.
9510	FIGURE 2	



NOTES:

1. NO HORIZONTAL SCALE USED, SCHEMATIC TO ILLUSTRATE WELL CONSTRUCTION.
2. SEE TEXT FOR DETAILS OF WELL CONSTRUCTION.

BECHTEL
SAN FRANCISCO

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

OBSERVATION WELL CLUSTER B
SCHEMATIC SECTION

JOB No.	DRAWING No.	REV.
9510	FIGURE 3	

APPENDIX A

STANDARD PENETRATION TESTS

H. Bolton Seed, Inc.
623 CROSSRIDGE TERRACE. ORINDA. CALIFORNIA 94563 (415) 254-3036

July 3, 1985

Walter R. Ferris
106 Paseo Way
Greenbrae, CA 94904

Dear Mr. Ferris,

I have received from Zia Yazdani the results of the standard penetration test program carried out at the site of the Vogtle Nuclear Project. Ten SPT borings were drilled at locations distributed across the site and all show very high penetration resistance values in the compacted backfill.

My evaluation of the results indicates the following:

Top 10 ft. of fill : N-values range from about 30 to 97 with a conservative average value of about 50

Depth range 10 to 30 ft. : N-values range from about 62 to 200 with a conservative average value of about 100

Depth range 30 to 80 ft. : N-values range from about 100 to 200 with a conservative average value of 150.

I note that the SPT tests were carried out using a safety hammer and a rope and pulley technique, so that the procedure can be expected to deliver about 60% of the theoretical free-fall energy to the drill-stem (i.e. the Energy Ratio is about 60%).

Based on the above I interpret the results as follows:

Depth	Average N_{60} value	Effective Overburden Pressure	C_N	$(N_1)_{60}$
5 ft.	50	650 psf	1.6	80
20 ft.	100	2650 psf	0.87	87
60 ft.	150	7800 psf	0.53	80

Thus the $(N_1)_{60}$-values are reasonably consistent as would be expected for a reasonably uniform fill.

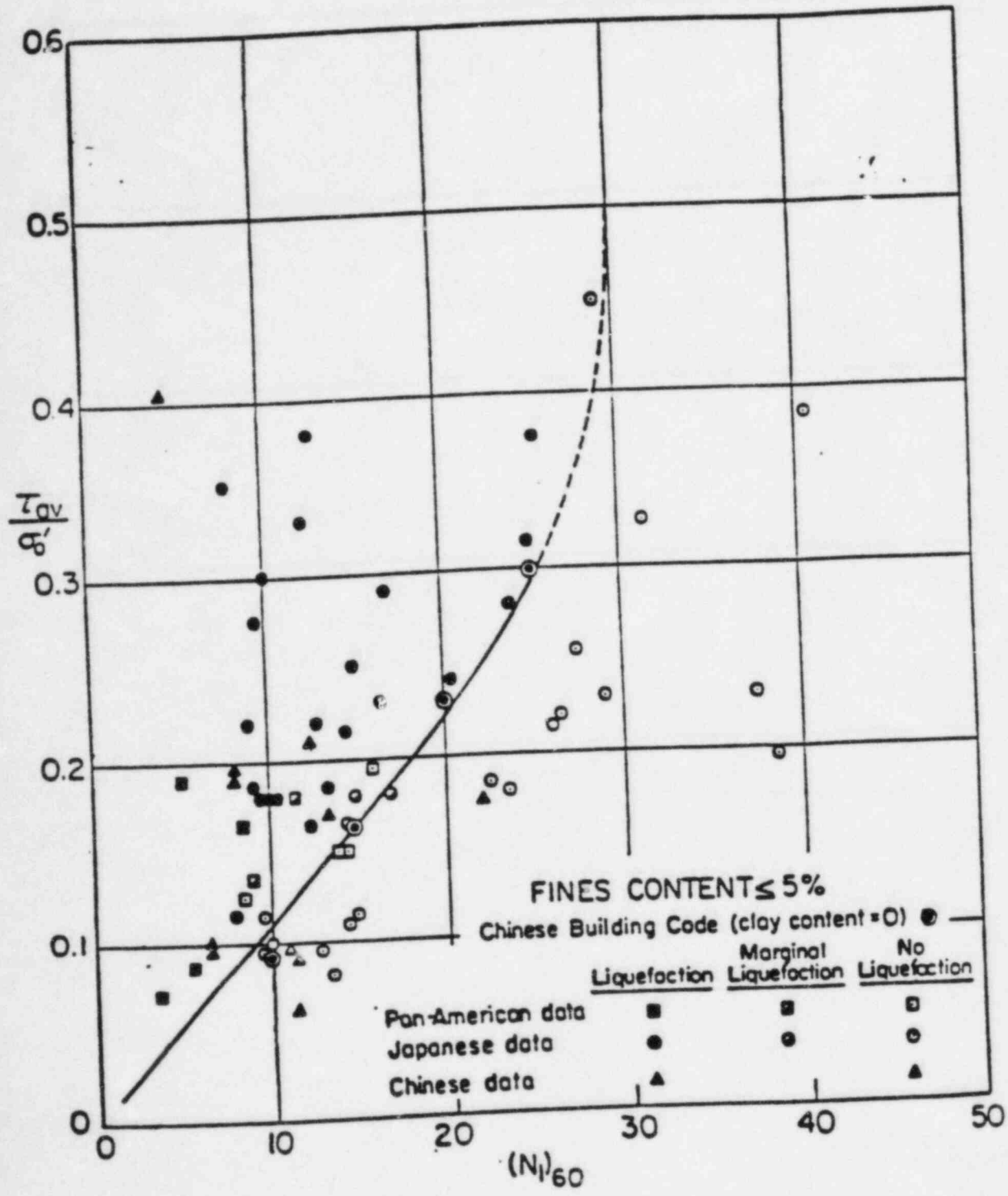
The field performance of sites which have and have not liquefied during earthquakes with Magnitude 7½, summarized on the attached figure, shows clearly that there is no possibility of

liquefaction occurring in this soil for any level of ground acceleration that may develop at the Vogtle site. In fact liquefaction is simply not a credible mode of failure for this fill.

Sincerely yours,

H. Bolton Seed

H. Bolton Seed



RELATIONSHIP BETWEEN STRESS RATIOS CAUSING LIQUEFACTION AND N_1-VALUES FOR CLEAN SANDS FOR M = 7-1/2 EARTHQUAKES

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

July 26, 1985

GEOTECHNICAL SERVICES
NORWALK
JOB 9510
DATE 7/31/85
FILE 2.1, 5.1
M. PEROVICH

Southern Company Services, Inc.
P.O. Box 2625
Birmingham, Alabama 35202

Attention: Mr. J. A. Bailey

Subject: Standard Penetration Soil Test Borings
For Category I Backfill
Vogtle Electrical Generating Plant
LETCo Job Number 7429

Gentlemen:

Law Engineering is pleased to submit boring logs for the soil test borings performed in Category I Backfill at Plant Alvin W. Vogtle.

The purpose of this exploration was to obtain specific subsurface data relative to backfill consistency and depth for Bechtel. Additional borings, testing and installation of piezometers were performed for Bechtel Power Corporation in accordance with their specification documents No. X2A P01, Division C2, Sections No. 18 and No. 19. However, since they are preparing a separate report, their data has not been included.

All drilling and sampling in the soil test borings was conducted according to applicable ASTM specifications and was performed by LETCo driller, Hezzie Collins.

Law Engineering's responsibilities in this work were limited to the execution of the requested drilling, laboratory testing and providing the necessary field engineering supervision so that the quality of work could be maintained.

Laboratory grain size testing of soil samples from the borings has been assigned by Bechtel and is presently underway in the laboratory.

We have enjoyed assisting Georgia Power in this work, and look forward to providing our services as the project continues. If you have any questions, do not hesitate to contact us.

Very truly yours,

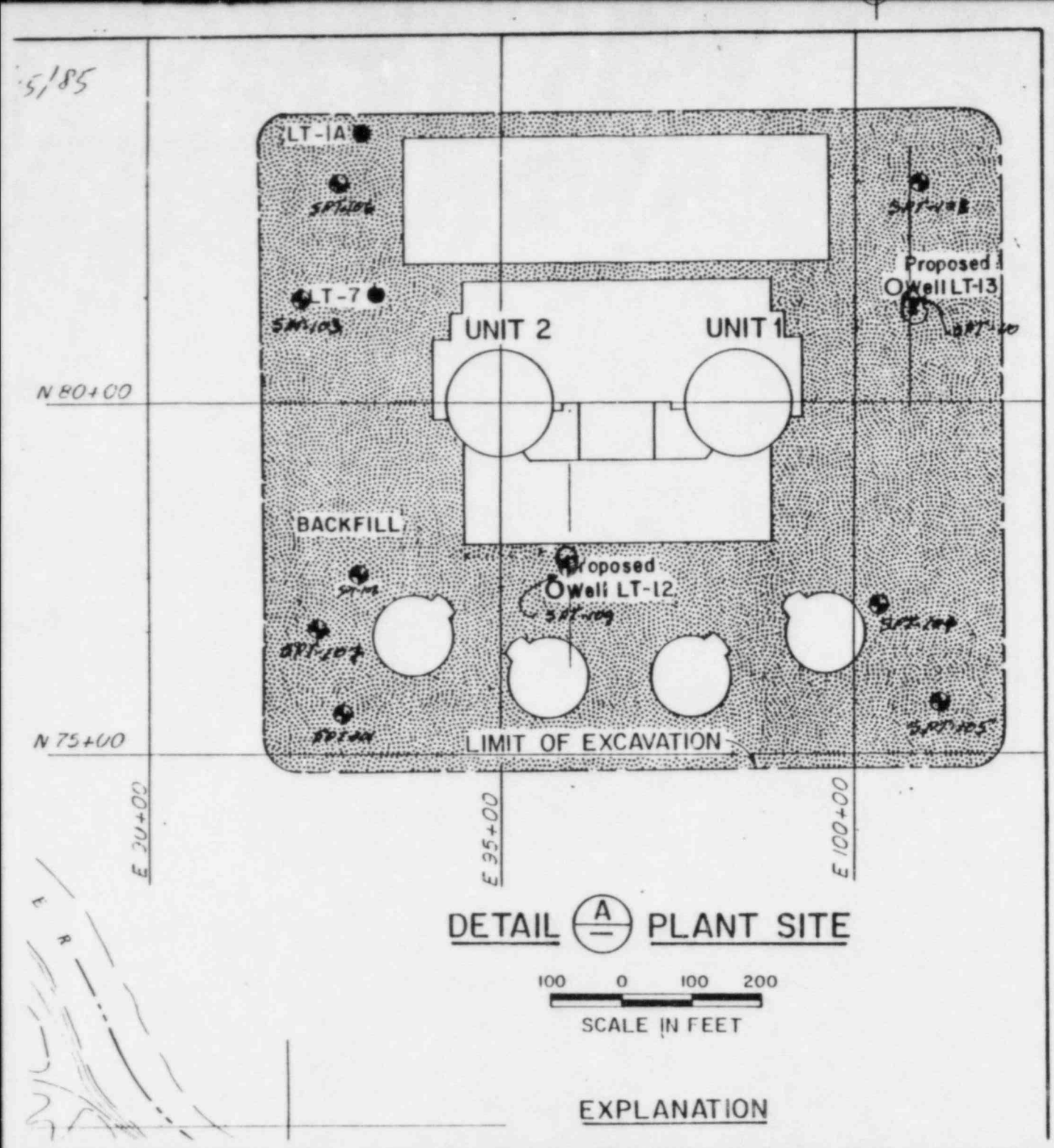
LAW ENGINEERING TESTING COMPANY

Jose Perez
Geotechnical Engineer

William Allen Lancaster
Civil Engineer
Registered Georgia 7075

/cll

cc: Bechtel Power Corporation
Zia Yazdani

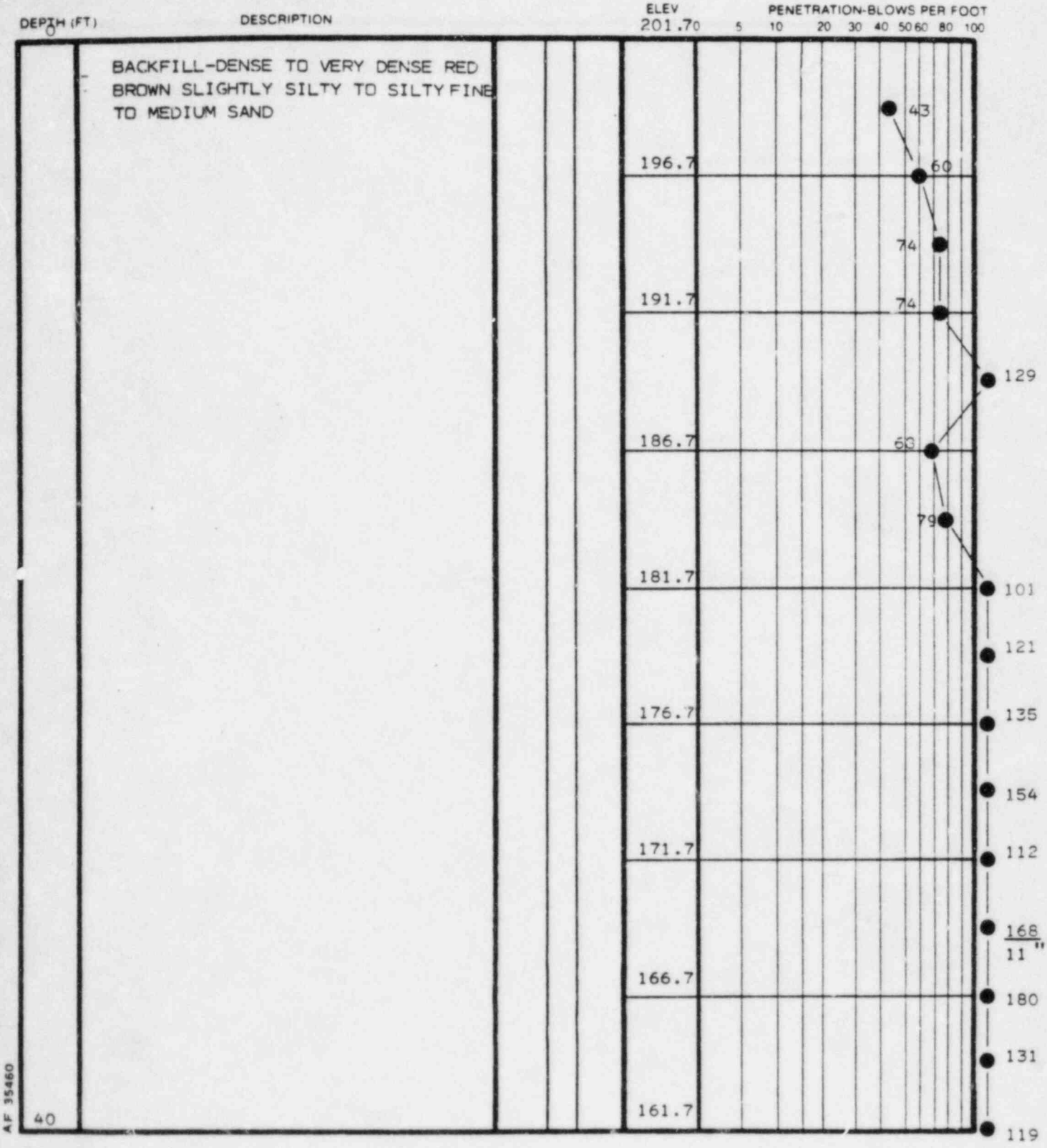

5/85
LT-1A
LT-7
UNIT 2
UNIT 1
Proposed
OWell LT-13
BACKFILL
Proposed
OWell LT-12
LIMIT OF EXCAVATION
N 80+00
N 75+00
E 30+00
E 35+00
E 100+00
DETAIL A PLANT SITE
100 0 100 200
SCALE IN FEET
EXPLANATION

Law Engineering Testing Company

BORING COORINATES
N: 75 + 50
E: 92 + 75

BORING NUMBER SPT-101
DATE DRILLED 6-4,5,&6-85
JOB NUMBER 7429
PAGE 1 OF 2

Soil Test Boring Record



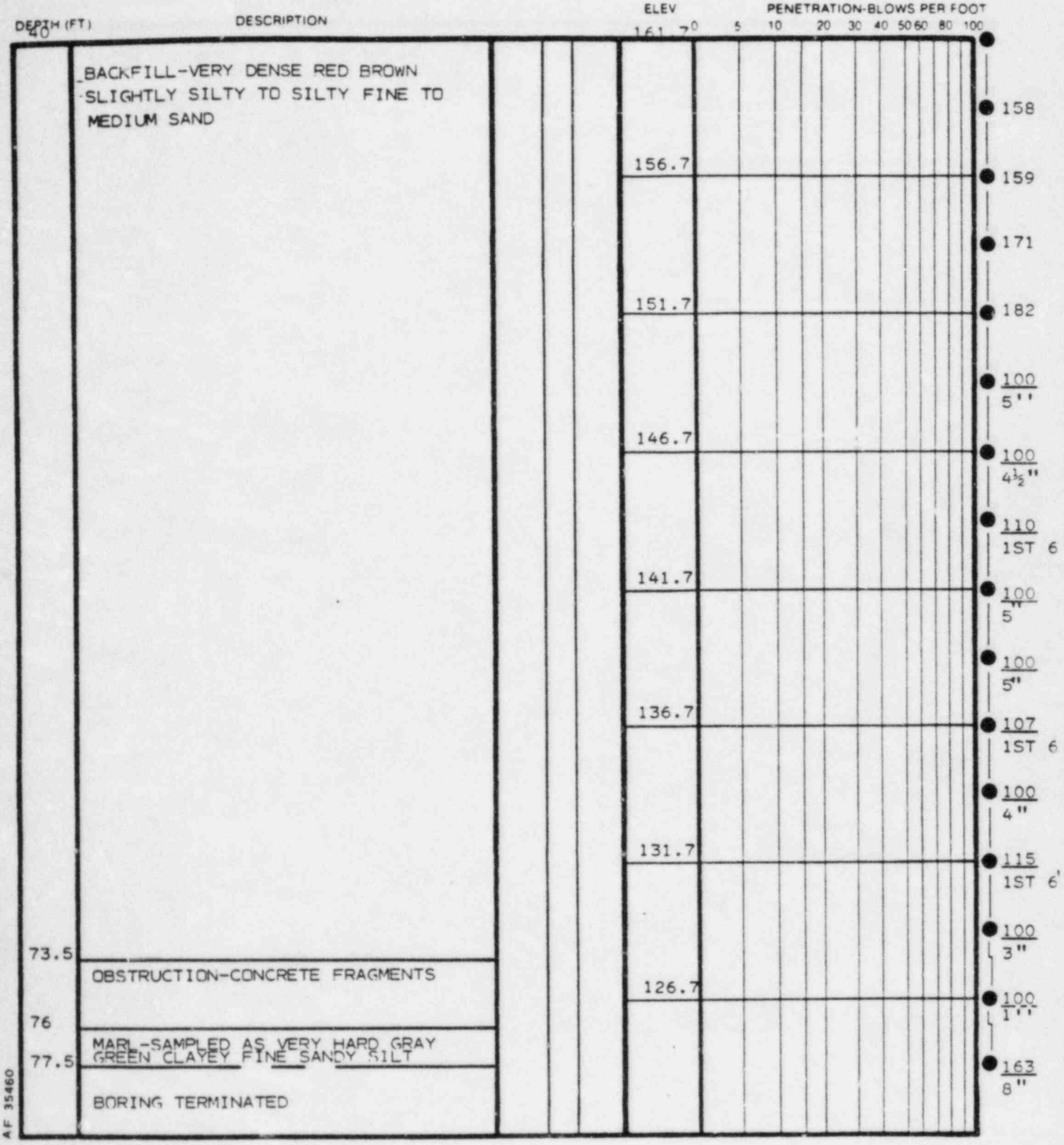
AF 35460

REMARKS:

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-101
DATE DRILLED 6-4,5,&6-85
JOB NUMBER 7429
PAGE 2 OF 2



AF 35460

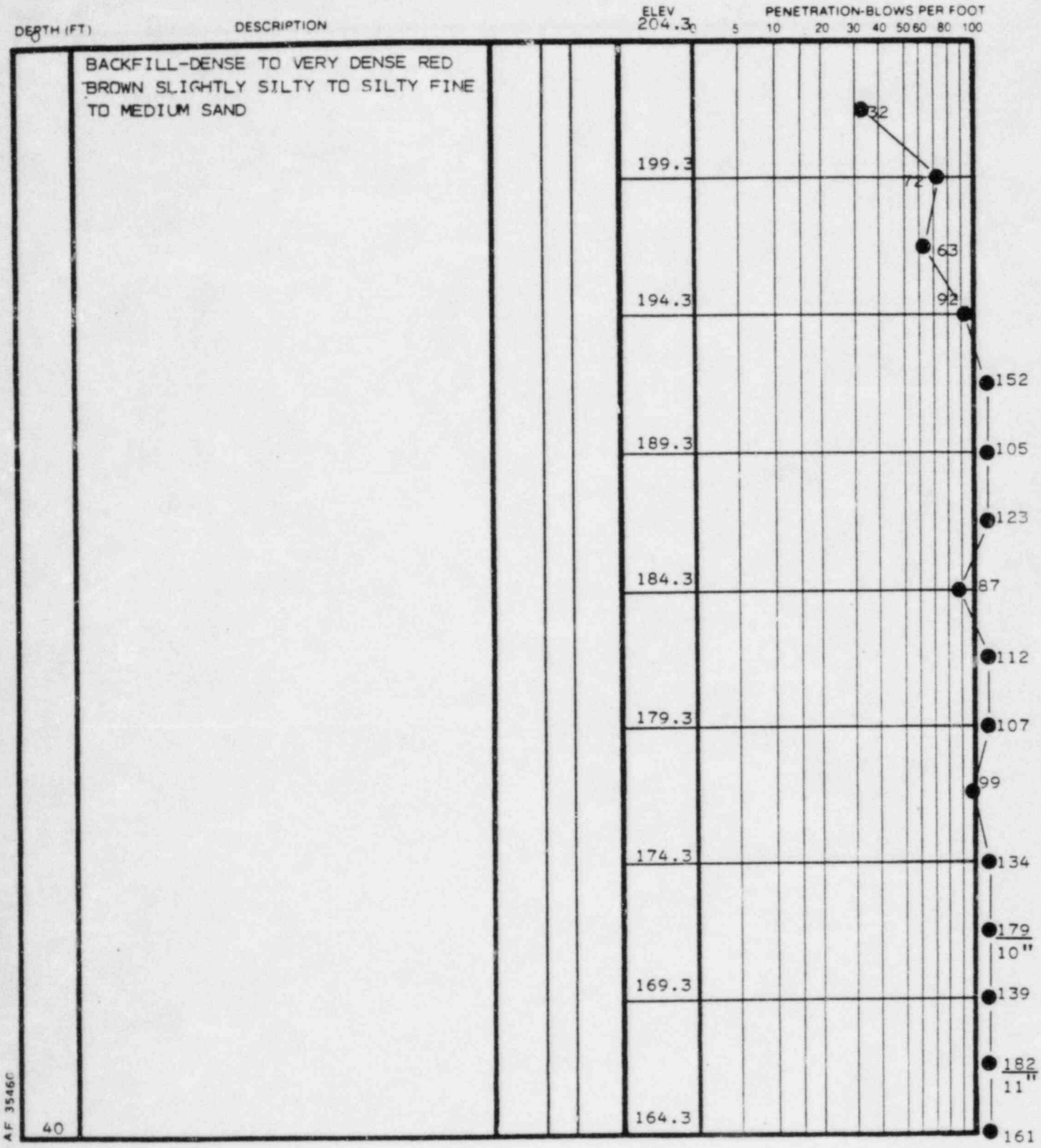
REMARKS:

Law Engineering Testing Company

BORING COORDINATES
N: 77 + 55
E: 93 + 00

BORING NUMBER SPT-102
DATE DRILLED 6-8&9-85
JOB NUMBER 7429
PAGE 1 OF 2

Soil Test Boring Record



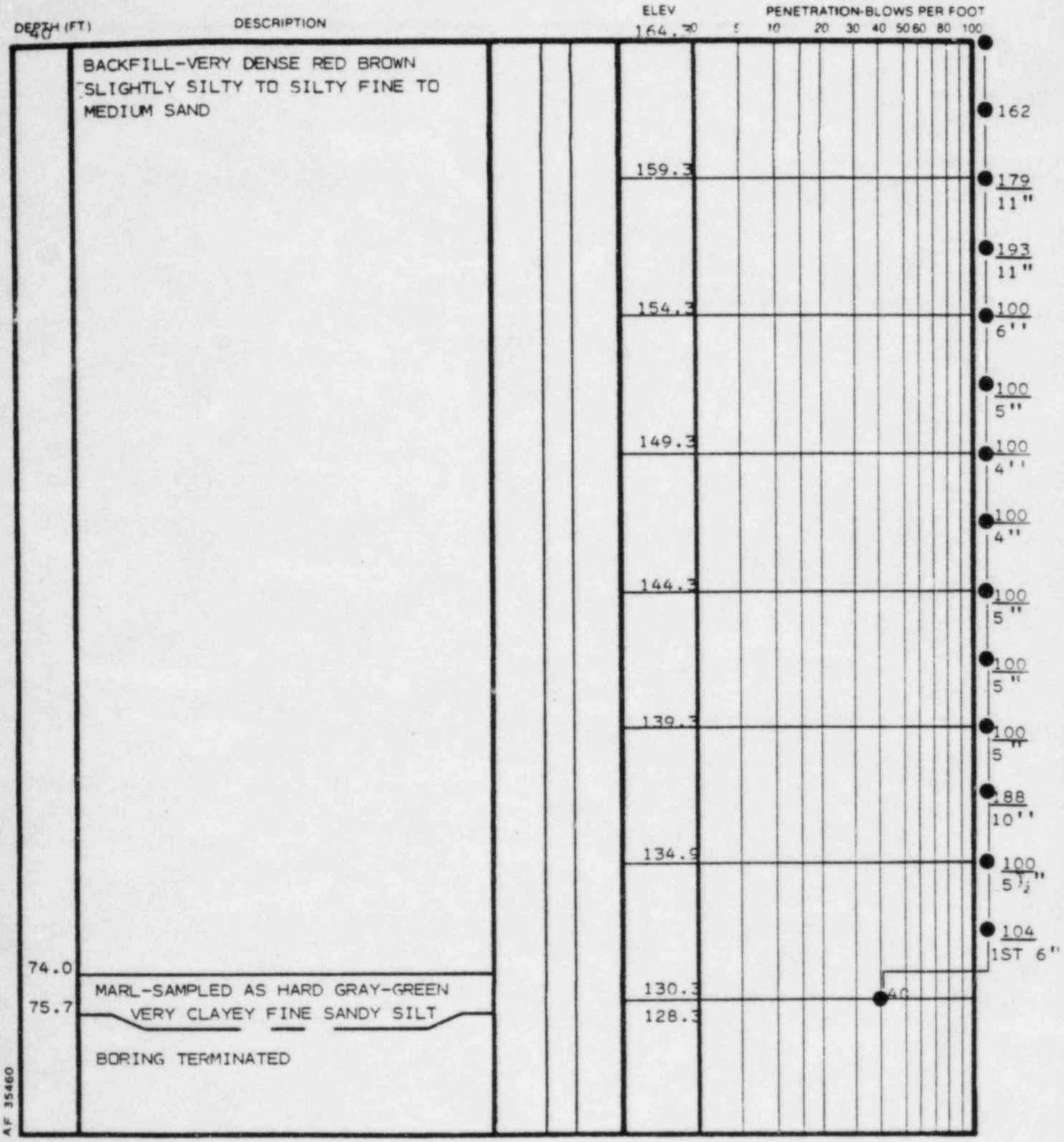
AF 3546C

REMARKS:

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-102
DATE DRILLED 6-8&9-85
JOB NUMBER 7429
PAGE 2 OF 2



AF 35460

REMARKS:

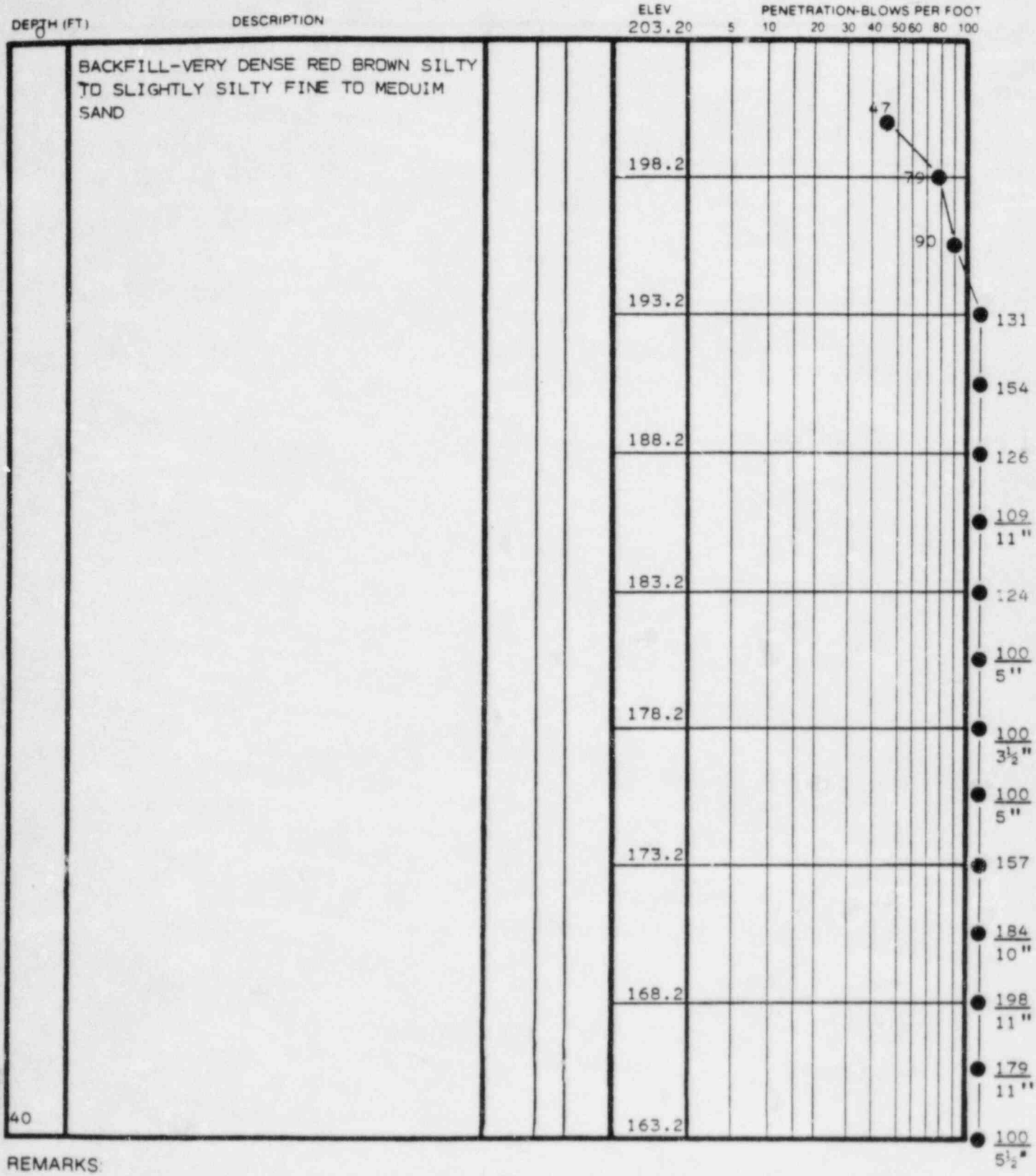
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

BORING COORDINATES
N: 81 + 50
E: 92 + 15

BORING NUMBER SPT-103
DATE DRILLED 5-26&27-85
JOB NUMBER 7429
PAGE 1 OF 2

Soil Test Boring Record



AF 3-460

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-103
DATE DRILLED 5-26&27-85
JOB NUMBER 7429
PAGE 2 OF 2

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
		163.2	
	BACKFILL-VERY DENSE RED BROWN -SLIGHTLY SILTY TO SILTY FINE TO MEDUIM SAND		100 3"
		158.2	100 4"
			120 1ST 6"
		153.2	100 6"
			100 4"
		148.2	100 3"
			130 1ST 6"
		143.2	161 1ST 6"
			136 1ST 6"
		138.2	131 1ST 6"
			100 5"
		133.2	131 1ST 6"
72.0			104
73.0	MARL-SAMPLED AS VERY HARD *		
	BORING TERMINATED	128.2	

AF 35460

REMARKS:

* GRAY-GREEN VERY CLAYEY FINE SANDY SILTY OR VERY SILTY FINE SANDY CLAY

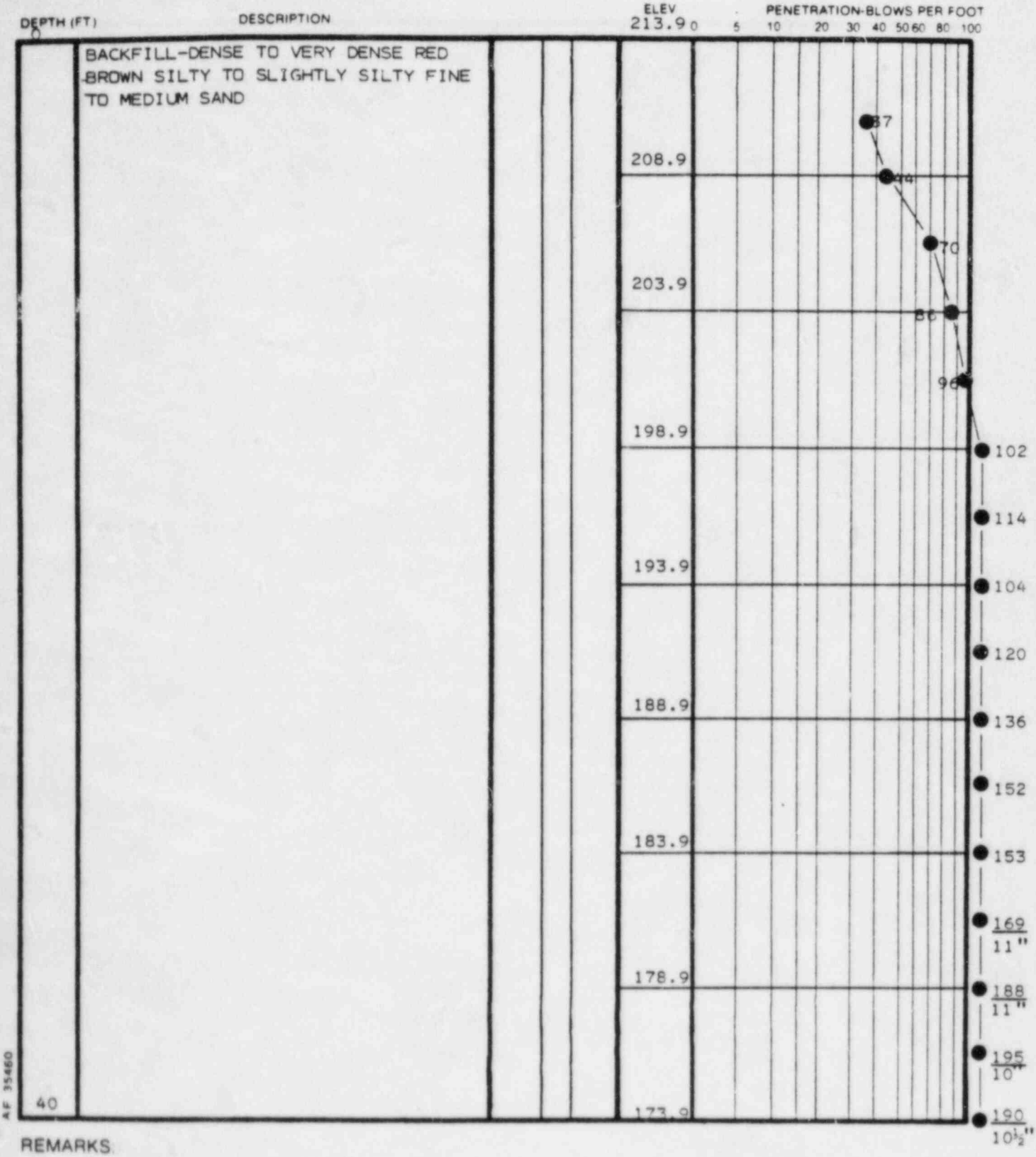
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING COORDINATES
N: 77 + 00
E: 100 + 35

BORING NUMBER SPT-104
DATE DRILLED 6-10&11-85
JOB NUMBER 7429
PAGE 1 OF 3



AF 35460

REMARKS

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-104
DATE DRILLED 6-10&11-85
JOB NUMBER 7429
PAGE 2 OF 3

DEPTH (FT.)	DESCRIPTION	ELEV 173.9	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
0	BACKFILL-VERY DENSE RED BROWN SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND		100 / 5 1/2'
		168.9	100 / 5"
			100 / 5 1/2"
		163.9	100 / 5 1/2"
			185 / 11"
		158.9	100 / 6"
			100 / 6"
		153.9	100 / 5 1/2"
			100 / 5 1/2"
		148.9	100 / 3"
			100 / 4"
		143.9	100 / 4"
			100 / 5"
		138.9	100 / 3 1/2'
			100 / 5"
80		133.9	100 / 4"

AF 35460

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-104
DATE DRILLED 5-10&11-85
JOB NUMBER 7429
PAGE 3 OF 3

DEPTH (FT.)	DESCRIPTION	ELEV 133.90
0	BACKFILL-VERY DENSE SILTY TO SLIGHTLY SILTY IFNE TO MEDIUM SAND	
85		128.9
	CEMENT-PROBABLY LEAN FILL FOR LEVELING-LOW AREAS	
88		
89.5	MARL-SAMPLED AS VERY HARD GRAY*	123.9
	BORING TERMINATED	

PENETRATION-BLOWS PER FOOT
5 10 20 30 40 50 60 80 100

100/5"
100/5 1/2"
62

AF 3546D

REMARKS:

*GREEN VERY CLAYEY FINE SANDY SILT

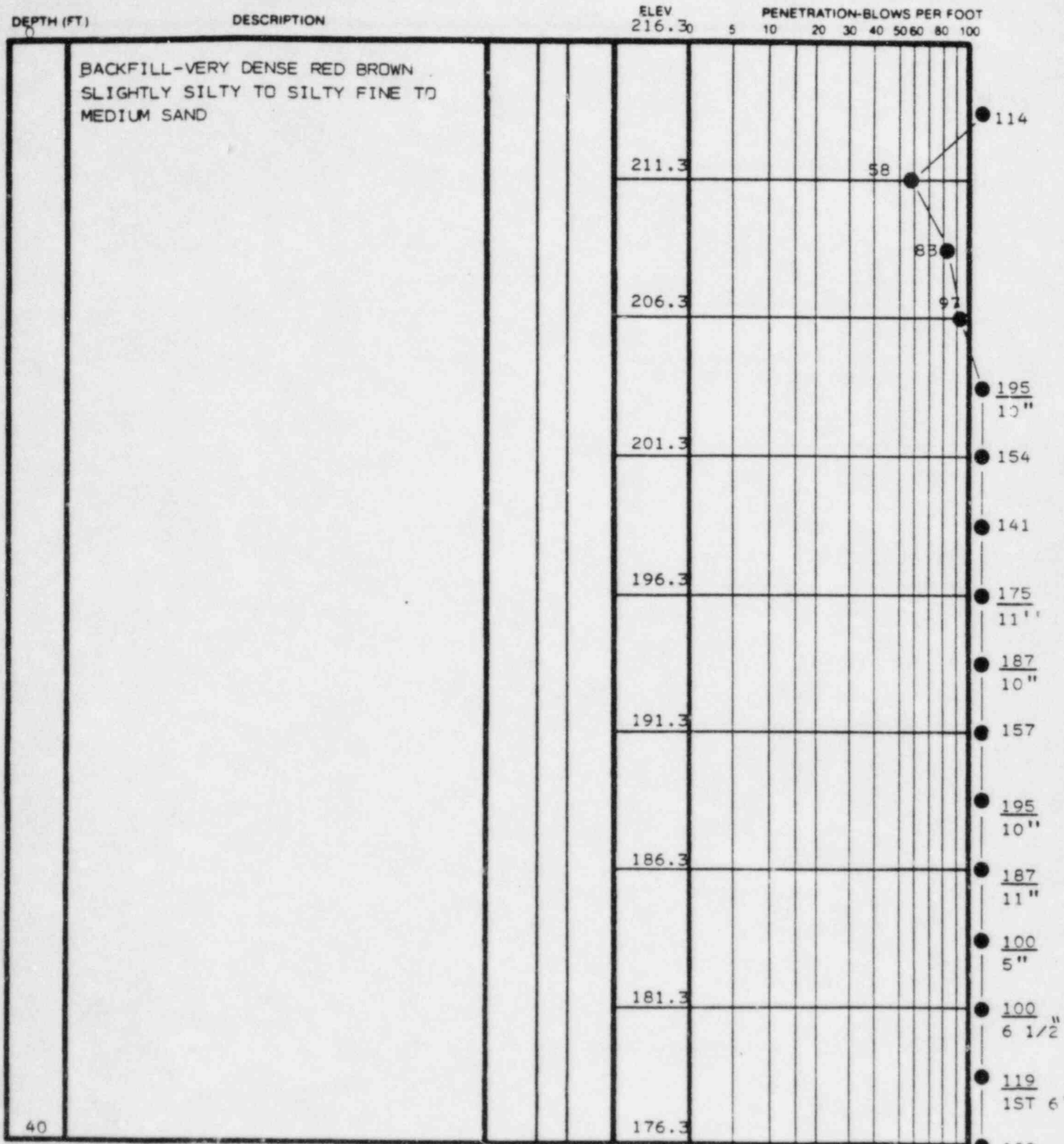
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

BORING COORDINATES
N: 75 + 60
E: 101 + 20

BORING NUMBER SPT-105
DATE DRILLED 5-27,28&29-85
JOB NUMBER 7429
PAGE 1 OF 3

Soil Test Boring Record



AF 35460

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-105
DATE DRILLED 5-27,28&29-85
JOB NUMBER 7429
PAGE 2 OF 3

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (5 10 20 30 40 50 60 80 100)
40	BACKFILL-VERY DENSE RED BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND	176.3	
			100 / 4"
		171.3	
			185 / 11"
			100 / 4"
		166.3	
			100 / 5"
			175
		161.3	
			100 / 1ST 6
			193 / 9"
		156.3	
			100 / 1ST 6
			100 / 5
		151.3	
			104* / 1ST 6
			110* / 1ST 6
		146.3	
			112* / 1ST 6
			130* / 1ST 6
		141.3	
			200* / 1ST 5
			110* / 1ST 6
80		136.3	147* / 1ST 6

AF 35460

REMARKS: *BLOWS IN EXCESS OF 100 WERE DELIVERED FOR ADVANCING THE SPLIT-SPOON SAMPLER THE FULL 6" OF THE FIRST SAMPLING INTERVAL IN ORDER TO OBTAIN SUFFICIENT RECOVERY TO PERMIT VISUAL INSPECTION OF THE SOIL

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-105
DATE DRILLED 5-27,28,29-85
JOB NUMBER 7429
PAGE 3 OF 3

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
80.0	BACKFILL-VERY DENSE LIGHT BROWN SILTY FINE TO MEDIUM SAND	136.3	134* 1ST 6
		131.3	130* 1ST 6
			138* 1ST 6
		126.3	178* 1ST 6
91.0	MARL-SAMPLED AS GRAY GREEN VERY SILTY FINE SANDY CLAY WITH SEAMS*		
93.0	BORING TERMINATED		149 11"

AF 33460

REMARKS: ** CEMENTED FINE SAND
* BLOWS IN EXCESS OF 100 WERE DELIVERED FOR ADVANCING THE SPLIT-SPOON SAMPLER THE FULL 6" OF THE FIRST SAMPLING INTERVAL IN ORDER TO OBTAIN SUFFICIENT RECOVERY TO PERMIT VISUAL INSPECTION OF THE SOIL.

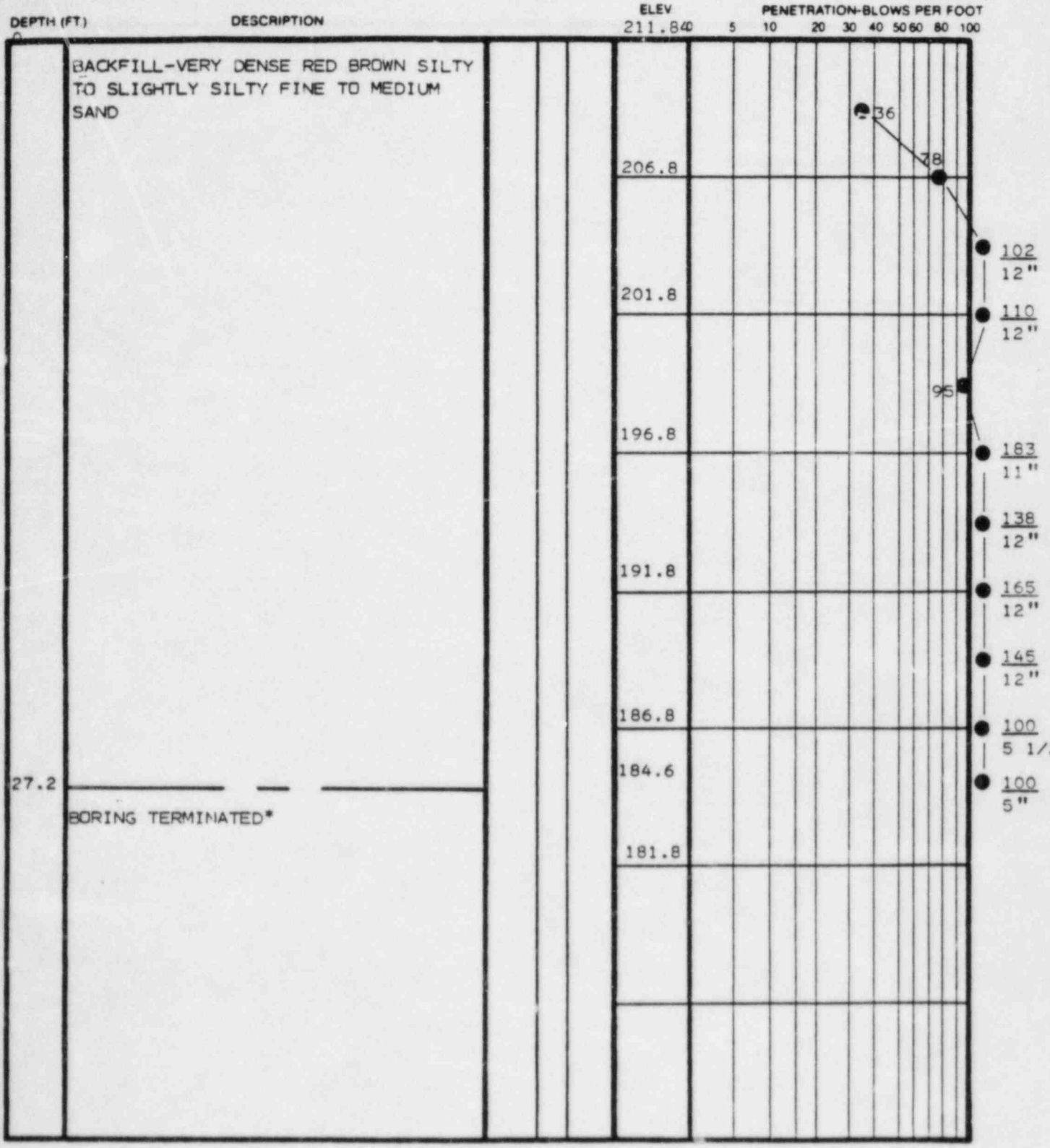
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

BORING COORDINATES:
N: 83 + 10
E: 92 + 70

BORING NUMBER SPT-106
DATE DRILLED 5-24-85
JOB NUMBER 7429
PAGE 1 OF 1

Soil Test Boring Record



AF 3546D

REMARKS: *BORING TERMINATED DUE TO PRESENCE OF MECHANICAL DUCTS. BOREHOLE WAS GROUTED WITH 3 BAGS OF CEMENT AND 22.5 GALS OF WATER.

Law Engineering Testing Company

Soil Test Boring Record

BORING COORDINATES
N: 83 + 26.25
E: 92 + 82

BORING NUMBER SPT-106A
DATE DRILLED 5-24,25-85
JOB NUMBER 7429
PAGE 1 OF 3

DEPTH (FT)	DESCRIPTION	ELEV
0		210.7
	WASH BORING FROM 0 - 31.5 FEET	
		205.7
		200.7
		195.7
		190.7
		185.7
		180.7
31.5	BACKFILL-VERY DENSE RED BROWN SLIGHTLY TO SILTY FINE TO MEDIUM SAND	175.7
40.0		170.7

PENETRATION-BLOWS PER FOOT
0 5 10 20 30 40 50 60 80 100

- 188 / 10½"
- 100 / 5"
- 100 / 4.5"
- 100 / 3"

AF 35460

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-106A
DATE DRILLED 5-24,25-85
JOB NUMBER 7429
PAGE 2 OF 3

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
40.0	BACKFILL-VERY DENSE RED BROWN SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND	170.7	
			100 / 3"
		165.7	100 / 5 1/2"
			100 / 5"
		160.7	100 / 5"
			100 / 3"
		155.7	167 / 6"
			100 / 4"
		150.7	100 / 4"
			100 / 3"
		145.7	100 / 5"
			100 / 3 1/2"
		140.7	100 / 4"
			100 / 3"
		135.7	150 / 6"
			130 / 6"
80.0		130.7	131 / 6"

AF 3546D

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-106A
DATE DRILLED 5-24,25-85
JOB NUMBER 7429
PAGE 3 OF 3

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
80.0		130.7	
81.0	BACKFILL-VERY DENSE RED BROWN*		
	MARL-SAMPLED AS VERY HARD GRAY GREEN VERY CLAYEY F-NE SANDY**		● 67
83.0	BORING TERMINATED	125.7	

REMARKS: *TO SLIGHTLY SILTY FINE TO MEDIUM SAND
**SILT OR VERY SILTY FINE SANDY CLAY

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

AF 3546D

Law Engineering Testing Company

BORING COORDINATES
N: 76 + 70
E: 92 + 40

BORING NUMBER SPT-107
DATE DRILLED 5-21,22,23-85
JOB NUMBER 7429
PAGE 1 OF 2

Soil Test Boring Record

DEPTH (FT)	DESCRIPTION	ELEV
0	BACKFILL - VERY DENSE RED BROWN SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND	202.0
		197.0
		192.0
		187.0
		182.0
		177.0
		172.0
		167.0
40.0		162.0

PENETRATION-BLOWS PER FOOT
0 5 10 20 30 40 50 60 80 100

56
74
114
103
144
84
87
173 / 9"
187 / 11"
179 / 10"
138
195 / 10"
100 / 5 1/2"
100 / 4"
100 / 6"
170

AF 354E(1)

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING COORDINATES
N: 76 + 70
E: 92 + 40

BORING NUMBER SPT-107
DATE DRILLED 5-21,22,23-85
JOB NUMBER 7429
PAGE 2 OF 2

DEPTH (FT.)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
40.0	BACKFILL-VERY DENSE SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND	162.0	
		157.2	100 / 4 1/2
			100 / 5"
		152.2	100 / 5"
			100 / 5"
		147.2	100 / 5"
			100 / 4"
		142.2	100 / 4"
			100 / 3 1/2'
		137.2	100 / 3 1/2'
			100 / 5 1/2'
		132.2	100 / 5"
			100 / 5"
		127.2	100 / 5"
76.0			100 / 5 1/2
77.0	MARL-SAMPLED AS GRAY GREEN VERY*		
	BORING TERMINATED	125.2	185 / 10 1/2

AF 33460

REMARKS: *CLAYEY FINE SANDY SILT

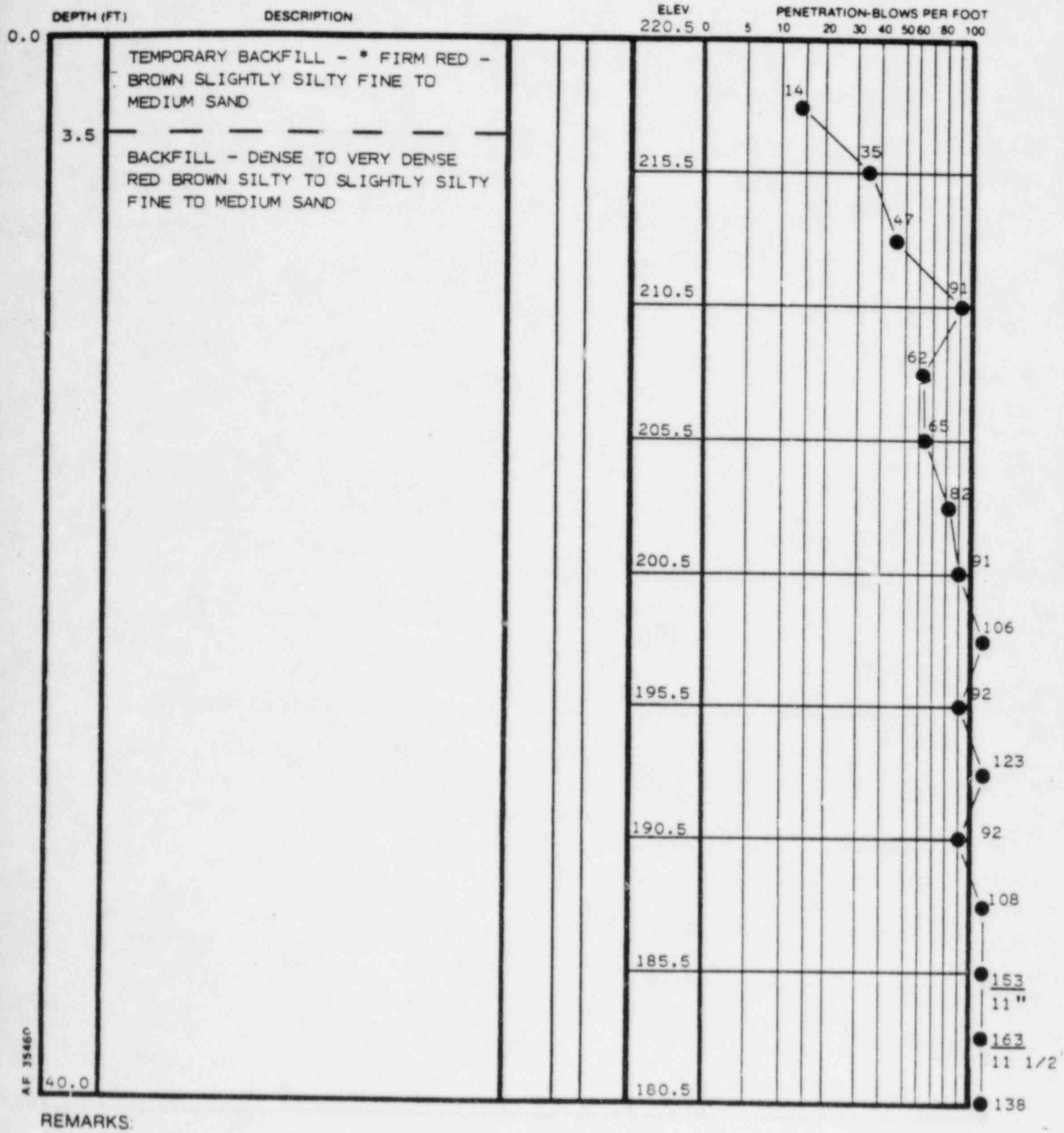
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING COORDINATES
N: 83 + 10
E: 101 + 00

BORING NUMBER SPT-108
DATE DRILLED 6-12 & 13-85
JOB NUMBER 7429
PAGE 1 OF 3



AF 35460

REMARKS:

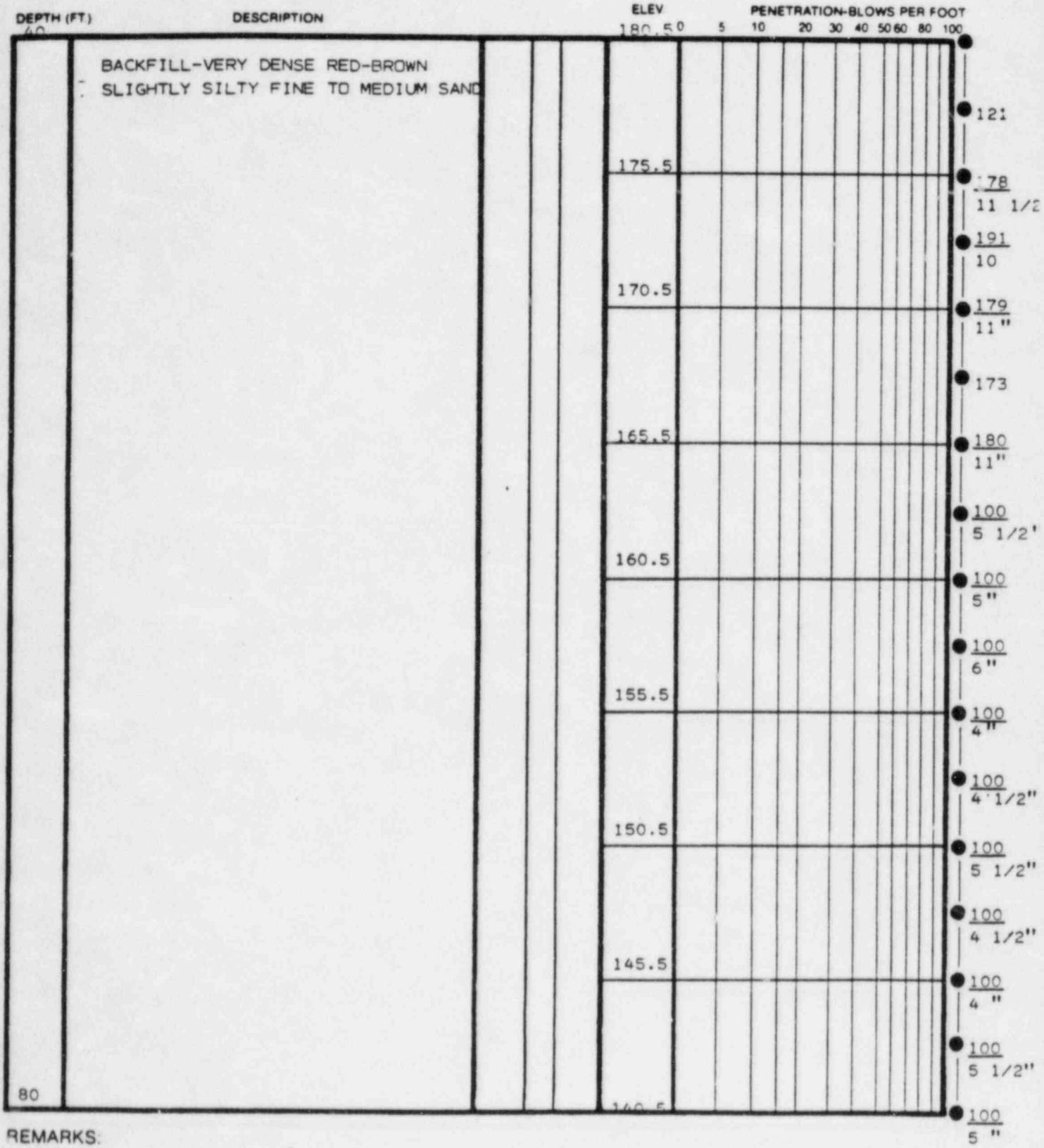
* PLACED TO PROVIDE ACCESS TO BORING

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-108
DATE DRILLED 6-12&13-85
JOB NUMBER 7429
PAGE 2 OF 3



AF 35460

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-108
DATE DRILLED 6-12&13-85
JOB NUMBER 7429
PAGE 3 OF 3

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
80		140.5	
	BACKFILL-VERY DENSE RED-BROWN SLIGHTLY SILTY FINE TO MEDIUM SAND		100/4"
		135.5	100/5"
59.3			100/4"
	MARL-SAMPLED AS VERY HARD GRAY GREEN VERY SILTY FINE SANDY CLAY	130.5	58
90.5	BORING TERMINATED		

AF 3548C

REMARKS:

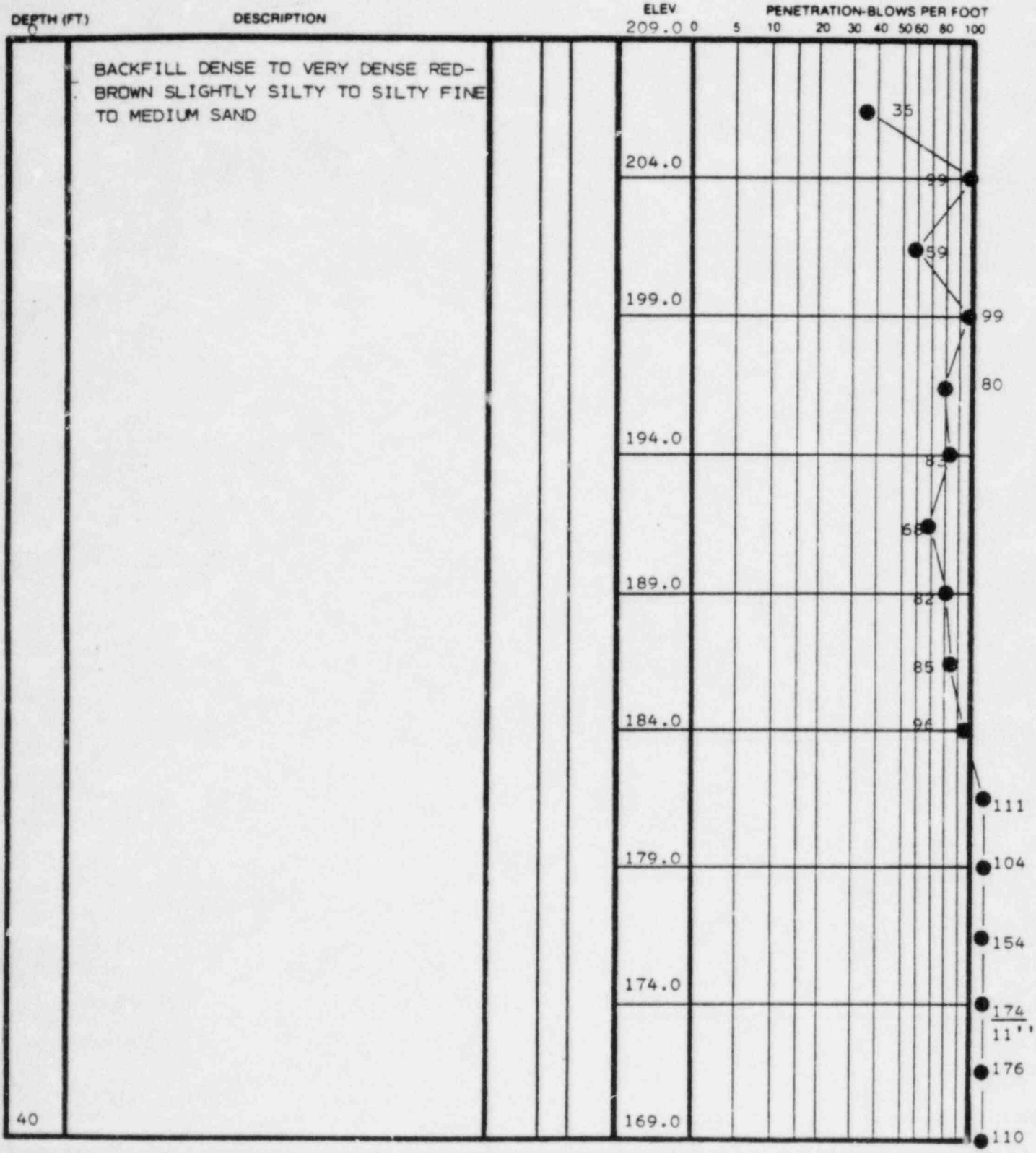
SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

BORING COODINATES
N: 77 + 65
E: 96 + 100

BORING NUMBER SPT-109
DATE DRILLED 6-6,7&8-85
JOB NUMBER 7429
PAGE 1 OF 2

Soil Test Boring Record



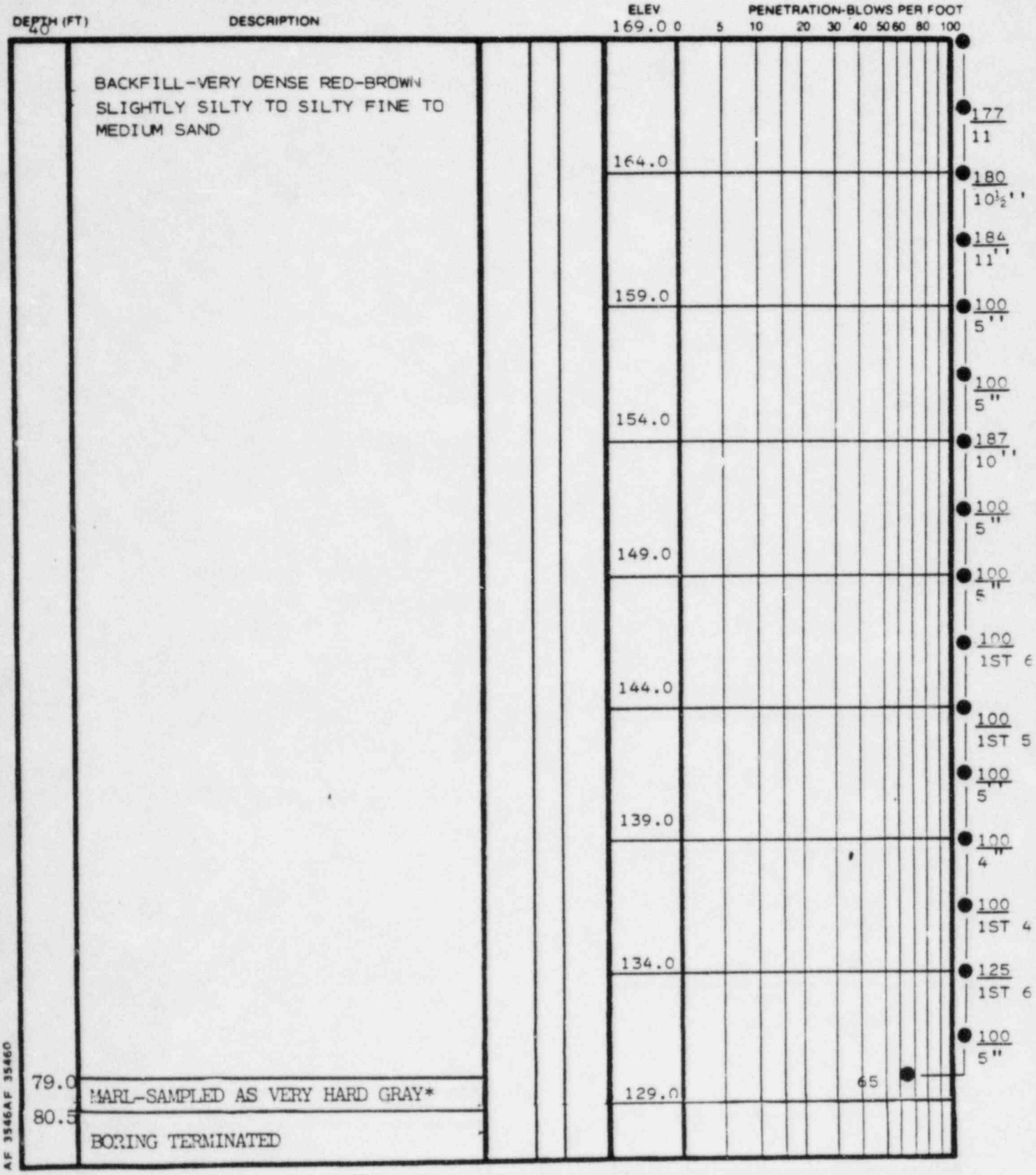
AF 3546D

REMARKS:

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-109
DATE DRILLED 6-6,7&8-85
JOB NUMBER 7429
PAGE 2 OF 2



AF 3546AF 3546D

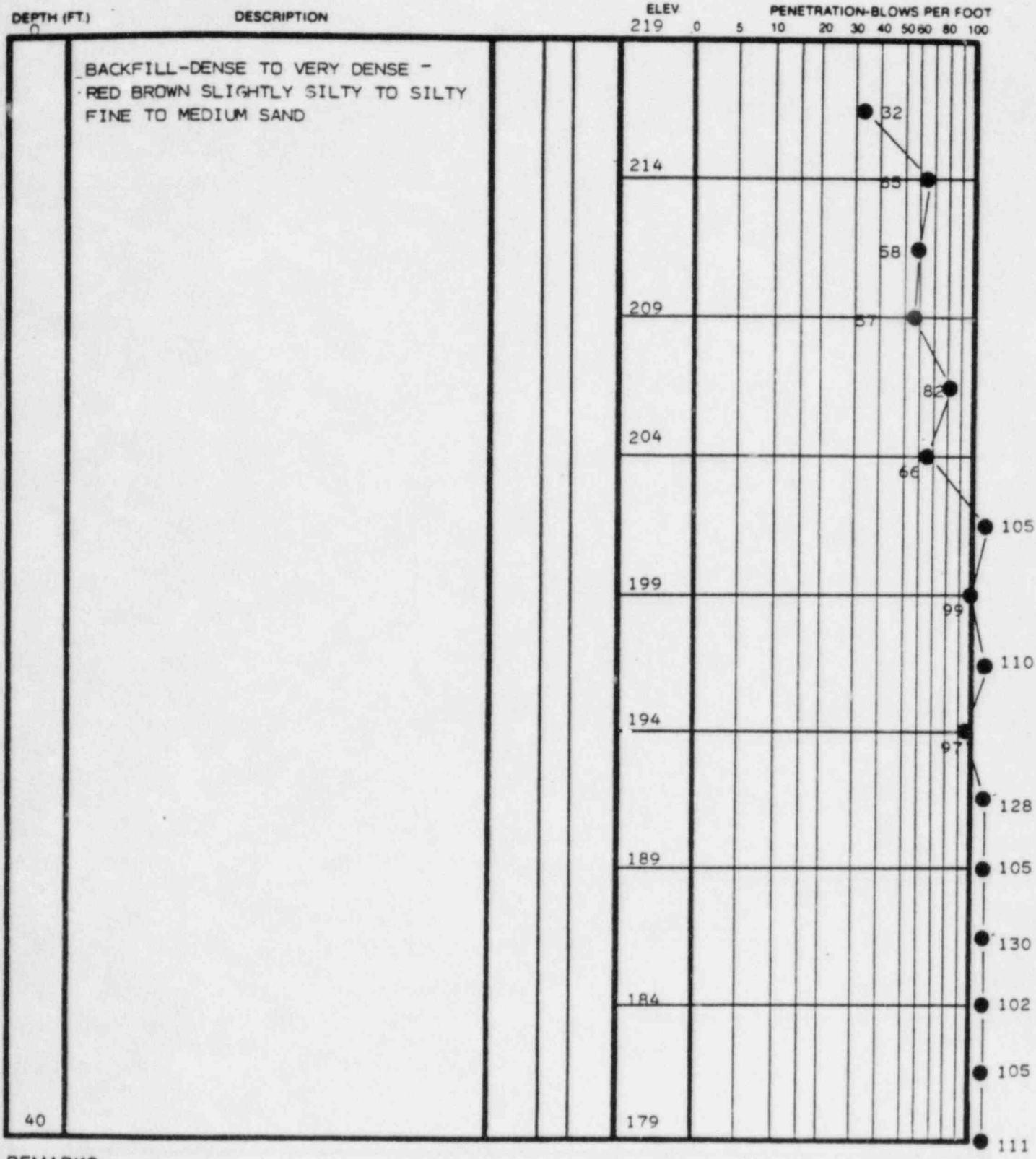
REMARKS: *Green very clayey fine sandy silt.

Law Engineering Testing Company

Soil Test Boring Record

BORING COORDINATES
N: 81 + 45
E: 100 + 80

BORING NUMBER SPT-110
DATE DRILLED 6-3&4-85
JOB NUMBER 7429
PAGE 1 OF 3



REMARKS:

AF 35460

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-110
DATE DRILLED 6-3-&4-85
JOB NUMBER 7429
PAGE 2 OF 3

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
40	BACKFILL-VERY DENSE RED BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND	179	
			123
		174	154
			190 / 11
		169	156
			146
		164	159
			100 / 5"
		159	172 / 10½"
			100 / 4"
		154	195 / 11"
			115 / 1ST 6"
		149	167
			120 / 1ST 6"
		144	100 / 4"
			100 / 4"
80		139	100 / 5"

AF 35460

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-110
DATE DRILLED 6-3&4-85
JOB NUMBER 7429
PAGE 3 OF 3

DEPTH (FT.)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT (0 5 10 20 30 40 50 60 80 100)
80		139	
	BACKFILL-VERY DENSE RED BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND		100 / 4½"
		134	100 / 4½"
89.0			100 / 4"
90.0	MARL SAMPLED AS VERY HARD GRAY *	129	100 / 2"
	BORING TERMINATED AT 90.0 FEET		

REMARKS: * GREEN VERY CLAYEY FINE SANDY OF VERY CLAYEY FINE SANDY SILT

AF 3548D

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

APPENDIX B

GEOLOGIC DRILL LOGS

900	808	LT-1B
901	809	LT-7A
902		LT-12
903		LT-13
904		
904A		
904B		
905		

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 2	900

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
SOUTHEAST OF POWER BLOCK	N 7538 E 10119.5	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
6/6/85	6/20/85	KEN THAMES/LAW ENGINEERING	FAILING 1500	9 7/8 IN.	92.6 FT.	50 FT.	142.6 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
49.5/99%	8		218.05 FT.	216.3 FT.	100.96 FT./117.20 FT. (7/16/85)	92.6 FT./123.7 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9 7/8 INCH ROCKBIT								210	5			0.0 - 92.6 FT. BACKFILL: SEE LOG OF SPT-105	ROCKBIT DRILLING WITH REVERT/WATER DRILLING FLUID
4-INCH CORE WITH 5 1/2 INCH OD BIT	5.0	2.0*	40%	7.0				123.7	90			92.6 - 142.6 FT. MARL: DARK BLUE GRAY, SILTY CALCAREOUS CLAY, FIRM TO MODERATELY HARD, LOCALLY FINE SANDY CLAY; THICK LIMESTONE NODULES AND LENSES, LOCAL OYSTERSHELL ZONES.	CORE DRILLING WITH CLEAR WATER AS DRILLING FLUID
				11.0									
				9.0									
				6.0									
				6.0									
	2.0	4.6*	230%	2.5				120	95			94.5 AND 96-97.2 FT. OYSTER SHELLS	
				1.3									
	3.0	3.4*	101%	5.5					100			100.0 - 100.8 FT. LARGE OYSTER SHELL FRACTURED FROM DRILLING 94.2 FT. AND 97.05 FT.	CEMENTED 6 IN. STEEL CASING TO DEPTH OF 102.6 FT.
				2.7									
				2.4								102.6 - 103.5 FT. HARD SANDY LIMESTONE	
				6.6								103.5 - 104.0 FT. FINE SANDY MARL	
				6.1								104.0 - 108 FT. MODERATELY SOFT MARL OYSTER SHELL CLAY - BROKEN ON REMOVAL FROM CORE BARREL	
	5.0	3.5*	70%	11.3	0	20	8	110	105				
				9.7	0	30	8						
				27.2	0	40	8						
				5.7								108 - 109 FT. LIMESTONE, HARD, SANDY FRACTURED DUE TO CORING AT 108 FT., 109 FT., 109.8 FT. AND 110 FT.	
	3.0	3.0*	127%	5.9					110				
				5.8									
				3.0								112 - 112.6 FT. SANDY LIMESTONE CORING FRACTURES AT 111 FT. AND 111.6 FT.	
	2.0	1.7*	85%	2.8									

*APPARENT CORE RECOVERY, CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 2	900

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
4 INCH CORE - 5 1/2 INCH OD BIT	5.0	5.3*	106%	1.5 2.7 2.9 3.1 3.3	0 0	40 50	10 10	100	115			LIMESTONE AT 114 FT., 114.4 FT., 115.5 FT., 116 - 117.2 FT. FRACTURES FROM CORING 118 FT., 119 FT., 119.3 FT., AND 119.4 - 123.2 FT. 118.2 FT. - 119.2 FT. LIMESTONE NODULES	
	5.0	5.0	100%	2.9 3.0 3.8 4.6 3.4	0	60	10		120			121.8 - 122.2 FT. LIMESTONE 123.4 - 123.5 FT. SILTY, HARD MARL 124 - 125.5 FT. LIMESTONE	
	5.0	5.0	100%	4.8 4.5 4.9 3.6 3.3	0 0	50 60	8 8	90	125			127.6 - 128 FT. SILTY, HARD MARL 128 - 129.7 FT. LIMEY	
	5.0	5.0	100%	2.9 4.5 1.8 1.1 2.9	0	70	8		130			129.7 - 130.6 FT. SOFT PLASTIC 130.6 - 132.6 FT. SILTY MARL 132.6 - 137.6 FT. FIRM, SANDY	
	5.0	4.8*	96%	1.6 2.7 1.5 1.6 1.5	0 0	50 60	10 10	80	135			LIMEY AT 133.4 FT., 134.5 - 135 FT. 137.6 - 142.6 FT. FIRM, SILTY	
	5.0	5.4*	108%	1.4 1.3 1.8 1.9 2.5	0	70	10	73.7	140				
												BOTTOM OF HOLE 142.6 FEET POROUS STONE (CASAGRANDE) PIEZOMETER INSTALLED IN HOLE, OPEN INTERVAL 133.8 FEET - 140.7 FEET.	

* APPARENT CORE RECOVERY, CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

SITE: SOUTHEAST OF POWERBLOCK

HOLE NO. 900

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 2	901

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
SE OF POWER BLOCK	N 7538 E 10104.5	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
6/21/85	7/7/85	H. COLLINS/LAW ENGINEERING	MOBILE 53	9-7/8 IN.	91.62 FT.	37.4 FT.	128.0 FT.

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
33.8/93%	5		220.75 FT.	215.58 FT.	101.57 FT./119.18 FT. (7/16/85)	91.62/123.96 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE; DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE/LENGTH CORE RUN	SAMPLE RECOVERY/CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 IN. TRICONE BIT									85			0.0 - 91.62 FT. BACKFILL: SEE LOG OF SPT-105	ROCKBIT DRILLING WITH REVERT/WATER DRILLING FLUID.
									90				
5.5 IN. CORE BIT	2.5	2.2*	88%	3.0 5.2 14.7								91.62 - 128.0 FT. MARL: BLUE GRAY, SILTY, CALCAREOUS CLAY, FIRM TO MODERATELY HARD; LOCAL LIMESTONE NODULES AND LENSES. 93.15 - 94.1 FT. LIMESTONE, GRAY, HARD.	CORE DRILLING WITH CLEAR WATER AS DRILLING FLUID.
	5.0	4.8*	96%	2.8 5.5 2.0 2.3 2.3					95			95.25 - 95.75 FT. SANDY CLAY, CALCAREOUS, HARD. 95.75 - 99.1 FT. OYSTER SHELLS.	
	2.9	3.2*	110%	5.0 4.0 3.1					100			99.6 - 100.3 FT. LIMESTONE NODULES. SMALL LIMESTONE NODULE AT 100.5 FT. 100.5 - 102.0 FT. OYSTER SHELLS. LIMESTONE NODULE AT 102.5 FT. OYSTER SHELLS AT 103.0 FT.	CEMENTED 6 IN. STEEL CASING TO DEPTH OF 102.7 FT.
	3.0	1.4*	47%	7.5 3.1 .0									
	1.0	0.8*	80%	10.5					105			105.0 - 106.5 FT. SOFT, PLASTIC. 105.0 - 105.3 FT. SILTY 107.3 - 107.9 FT. LIMESTONE, SILTY AT TOP AND BOTTOM. 109.0 - 109.6 FT. LIMESTONE NODULES SHELLS AT 109.6 FT.	
	4.0	4.4*	110%	2.2 9.8 2.7 5.1									
	5.0	5.0	100%	2.0 3.1					110			110.0 - 110.35 FT. SILTY LIMESTONE NODULE AT 110.7, 111.4, 111.7, 112.0 - 112.4. LIMESTONE 112.9 - 113.2 FT. LIMESTONE TO 114.8 FT.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: SE OF POWER BLOCK

HOLE NO. 901

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 2	901

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
5.5 INCH BIT - 4 INCH CORE				4.7									
				4.3									
				2.4					115			115.0 - 115.4 FT. LIMESTONE NODULES	
	4.0	4.0	100%	2.0								115.4 - 117.0 FT. LIMEY AND SILTY NODULE AT 117.0 FT. AND 118.6 FT.	
				2.6									
				2.3									
				6.6	0	40	10					119.0 - 120.5 FT. LIMESTONE, HARD, SOLID	
				13.2					120			SILTY - 121.0 - 122.2 FT.	
				7.3								PLASTIC - 122.2 - 123.0 FT.	
	5.0	5.0	100%	2.1	0	50	10					SILTY - 123.5 - 124.0 FT.	
				2.0								LIMESTONE NODULE AT 124.2 FT.	
				3.2	0	60	10						
				3.7					125			HARD SANDY LIMESTONE 125.0 - 126.0 FT.	
	4.0	3.8	95%	7.5								SOFT TO SILTY - 127.0 - 128.0 FT.	
				8.3									
				3.4									
												BOTTOM OF HOLE 128.0 FT.	
												POROUS STONE (CASAGRANDE) PIEZOMETER INSTALLED IN HOLE. OPEN INTERVAL 122.0 - 128.0 FT.	

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: SE OF POWER BLOCK

HOLE NO. 901

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	902

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
SE OF POWER BLOCK	N 7543.5 E 10110.5	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
6/23/85	7/3/85	H. COLLINS/LAW ENGINEERING	MOBILE 53	9-7/8 IN.	91.0 FT.	17.0 FT.	108.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
15.6/95%	2		221.11 FT.	215.97 FT.	94.85 FT./126.26 FT. (7/16/85)	91/124.97

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 IN. TRICONE ROCK BIT								215.97	5			0.0 - 91.0 FT. BACKFILL: SEE LOG OF SPT-105.	DRILLED WITH ROCK BIT AND REVERT/ WATER DRILLING FLUID.
									90				
5.5 IN. CORE BIT, 4 IN. CORE	5.0	4.7	94%	6.7 5.8 12.3 3.0 6.0				124.47	95			91.5 - 108.0 FT. MARL: BLUE GRAY, SILTY CALCAREOUS CLAY, FIRM TO MODERATELY HARD; LOCAL LIMESTONE NODULES AND LENSES. 93.4 - 95.0 FT. LIMESTONE, SANDY. 95.0 - 95.2 FT. CLAYEY, PLASTIC, FEW OYSTER SHELLS. 95.2 - 96.5 FT. FIRM, SANDY CLAY WITH ABUNDANT OYSTER SHELLS. 96.5 - 98.3 FT. HARD, ABUNDANT SHELLS. HIGHLY FRACTURED BY CORING. 98.7 - 100.0 FT. SOFT, PLASTIC.	CORE DRILLING WITH CLEAR WATER AS DRILLING FLUID. LEFT 1.3 FT. IN HOLE. PICKED UP ON SECOND TRY.
	3.5	2.9	83%	5.0 6.3 7.1 11.7									CEMENTED 6 IN. STEEL CASING TO DEPTH OF 100.0 FT.
	5.0	5.0	100%	2.4 2.0 9.3 3.0 2.0	0 0 0	40 50 60	10 10 10		100			100.0 - 100.3 FT. SILTY CLAY. PLASTIC TO 102.25. 102.25 - 103.0 FT. LIMESTONE, SILTY CLAY. 103.0 - 105.0 FT. PLASTIC WITH ABUNDANT SHELLS. 105.0 - 105.2 FT. HARD SANDY CLAY. 105.2 - 108.0 FT. PLASTIC WITH SHELLS.	
	3.0	3.0	100%	2.6 2.8 3.0				107.97	105				
												BOTTOM OF HOLE 108.0 FEET. POROUS STONE PIEZOMETER INSTALLED IN HOLE. OPEN INTERVAL 101.5 FEET - 108.0 FEET.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 4	903

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NORTHWEST OF POWER BLOCK	N 8480 E 9900	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)MARL	TOTAL DEPTH
6/10/85	6/23/85	KEN THAMES/LAW ENGINEERING	FAILING 1500	9 7/8 IN.	78.0 FT.	55.0 FT.	133 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
56.0/100% (MARL)	8	4	216.73 FT.	215.75	109.61 FT./107.12 FT. (7/16/85)	78 FT./137.75 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST/J.C. ISHAM

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE/LENGTH CORE RUN	SAMPLE RECOVERY/CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 - INCH TRICONE ROCK BIT								215.75	0 5 10 15 20 25 30 35			0.0 - 15.0 FT. SAND (SM): BROWN TO YELLOW BROWN, SILTY, MEDIUM TO COARSE SAND, SUBANGULAR. HARD DRILLING AT 6.9 FT. 0.0 - 10.0 FT. MEDIUM GRAIN SIZE 10.0 - 15.0 FT. MEDIUM TO COARSE GRAINED 0.0 - 12.0 FT. BROWN 12.0 - 15.0 FT. YELLOW BROWN 15.0 - 23.0 FT. CLAY (SC): TAN, SANDY CLAY, FINE TO MEDIUM SUBANGULAR SANDS. TRACE OF OYSTER SHELLS. 23.0 - 30.0 FT. SAND (SM): BROWN, SILTY, MEDIUM TO COARSE SAND, SUBANGULAR GRAINS. 1% OYSTER SHELLS. 30.0 - FT. SAND (SM-SC): TAN, SILTY CLAYEY SAND.	REVERT MIXED WITH WATER USED AS A DRILLING FLUID IN UPPER SANDS. LITHOLOGIC DESCRIPTION FROM 0.0 TO 35.0 FT. BASED ON WASH CUTTINGS. LOST 100% CIRCULATION AT 35.0 FT.

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE	HOLE NO.
NORTHWEST OF POWER BLOCK	903

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 4	903

SAMPLE TYPE AND DIAMETER: 5.5-INCH OD/4.0 ID SPLIT TUBE CORE BARREL

SAMPLER ADVANCE / LENGTH CORE RUN

SAMPLE RECOVERY / CORE RECOVERY

PERCENT CORE RECOVERY

DRILLING TIME (MIN.)

WATER PRESSURE TESTS: LOSS IN G.P.M. | PRESSURE P.S.I. | TIME IN MINUTES

ELEVATION

DEPTH

GRAPHIC LOG

SAMPLE

DESCRIPTION AND CLASSIFICATION

NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

DRILLED WITHOUT CIRCULATION 35.0 - 78.0 FT. LITHOLOGIC DESCRIPTIONS ARE BASED ON HOLE 905. CONTACTS ARE APPROXIMATE.

44.5 - 77.3 FT. LIMESTONE; TAN TO CREAM, FOSSILIFEROUS (COQUINA), HARD TO VERY HARD, SOME SUBROUNDED, FINE TO MEDIUM GRAINED CEMENTED SAND.

57.0 - 58.0 FT. GRAYISH BLACK HARD SHALE.

62.2 - 62.0 FT. VERY HARD CEMENTED SANDSTONE LENSE.

62.0 - 77.3 FT. INTERBEDDED LIMESTONE AND SANDSTONE; 1 - 3 IN. LAYERS OF VERY HARD CEMENTED SANDS INTERBEDDED WITH 6 IN. - 1 FT. LAYERS OF HARD FOSSILIFEROUS LIMESTONE (SHELLS).

* APPARENT CORE RECOVERY, CORE SLIPPED THROUGH SITE CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUN.

NORTHWEST OF POWER BLOCK

HOLE NO. 903

GEOLOGIC DRILL LOG

PROJECT: VOGTLE ELECTRIC GENERATING PLANT | JOB NO. 9510 | SHEET NO. 3 OF 4 | HOLE NO. 903

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE/LENGTH CORE RUN	SAMPLE RECOVERY/CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
												TOP OF MARL	
4-INCH SPLIT TUBE CORE BARREL/5.5-INCH OD	5.0	4.5*	90%	3.5				137.75				78.0 - 137.0 FT. MARL: BLUISH GREENISH GRAY, FIRM TO HARD, CALCAREOUS CLAY, UNFRACTURED, SOME FINE SANDY CLAY ZONES, LOCAL LIMESTONE NODULES AND LENSES, TRACE OF DARK BROWN ORGANIC MATTER, SOME OYSTER SHELLS.	CLEAR WATER USED AS DRILLING FLUID IN MARL.
				5.0									
				4.0									
				5.5									
				4.0									
	3.0	3.5*	117%	3.0								82.5 - 84.5 FT. SOFT, MEDIUM GRAINED SANDY CLAY, TRACE OF SHELLS.	
				8.0									
				13.0									
				9.0					85			85.0 - 87.7 FT. 5% TO 10% SHELLS.	6 IN. STEEL CASING CEMENTED TO A DEPTH OF 85 FT.
	5.0	3.8*	76%	10.0	0	30	8					LIMESTONE NODULES AT 86.8 FT AND 87.78 FT.	
				6.0	0	40	8						
				13.0	0	50	8					LIMESTONE LENSES 88.2 - 88.8 FT.	
				4.0	0	40	8					88.8 - 90.0 FT. 10% TO 20% SHELLS.	
				12.0	0	30	8		90			90.0 - 91.9 FT. SEVERAL LIMESTONE NODULES.	
	4.0	3.1*	78%	11.0								91.9 - 94.8 FT. MORE CLAYEY, 10% TO 20% SHELLS.	
				4.0									
				6.0									
	1.0	0*	0%	5.0								94.8 - 95.4 FT. SANDIER, LESS THAN 5% SHELLS.	
	1.0	4.1*	410%	30.0					95			95.4 - 95.7 FT. LIMESTONE LENSE.	
				5.0								95.7 - 96.0 FT. SEVERAL LIMESTONE NODULES.	
	5.0	5.0	100%	15.0	0	35	8					LIMESTONE LENSES AT 96.1 - 96.4 FT., 97.9 - 98.25 FT., 99.7 - 100.1 FT., AND 100.5 - 100.6 FT.	
				7.0	0	45	8						
				15.0	0	55	8		100			LIMESTONE NODULES AT 97.2 FT., 97.5 FT., 101.1 FT., 101.3 FT., 101.8 FT., 102.5 FT., 102.9 FT., 103.4 - 103.9 FT.	
				7.0	0	45	8						
				7.0	0	35	8						
	5.0	5.0	100%	8.0									
				7.0									
				9.0									
				10.0					105				
				14.0									WAXED CORE SAMPLE #1 100.2 - 109.2
	5.0	3.2*	64%	9.0	0	40	8						
				20.0	0	50	8						
				13.0	0	61	8		110				
				12.0	0	50	8						
				8.0	0	40	8						
	3.0	3.4*	113%	10.0									WAXED CORE SAMPLE #2 112.7 - 113.7 FT.
				12.0									
	2.8	3.4*	178%	11.0					115				

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

SITE: NORTHWEST OF POWER BLOCK

HOLE NO. 903

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	4 OF 4	903

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
5.5 IN. SPLIT TUBE	2.0	3.4*	170%	9.0	TEST	*3						LIMESTONE NODULES AT 104.9 FT., 105.7 FT., 106.0 - 109.2 FT. ABUNDANT LIMESTONE NODULES (20%).	
	5.0	5.0	100%	3.0	0	45	8					106.0 - 116.0 FT. LESS THAN 5% SHELLS.	
				8.0	0	55	8					LIMESTONE NODULES AT 109.5 - 109.9 FT.; 110.8 - 111.1 FT., 111.8 - 112.1 FT., 112.5 - 112.7 FT., 113.0 - 113.5 FT.; AND 114.7 - 115.0 FT.	
				5.0	0	66	8						
				5.0	0	55	8		120			CALCAREOUS ZONE 113.9 - 115.6 FT	
				9.0	0	45	8						
5.5 IN. SOLID TUBE BARREL	5.0	5.0	100%	6.0								116.0 - 133.0 FT. HARD CALCAREOUS ZONE	WAXED CORE SAMPLE *3 128.4 - 129.4 FT. 500 GRAMS IN GLASS JAR SAMPLE *4 FROM 131 FT.
				3.0									
				2.0					125				
				3.0									
				3.0									
	5.0	5.0	100%	3.0		48	8						DEEP GOUGES (1/2 IN.) CAUSED BY THE CORE CATCHER FROM 121.0 - 131.0 FT.
				4.0		58	8						
				2.0		68	8				X		
				1.5		50	8		130				
				1.5		48	8						
	2.0	2.0	100%	2.0									
				2.0				82.75					
												BOTTOM OF HOLE 133.0 FEET.	
												POROUS STONE PIEZOMETER PLACED TO A DEPTH OF 131 FEET. SEE OBSERVATION WELL REPORT. OPEN INTERVAL FROM 133 FEET TO 127 FEET.	

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

SITE: NORTHWEST OF POWER BLOCK

HOLE NO. 903

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 3	904

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NW OF POWER BLOCK	N 8465 E 8900	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.) (MARL)	TOTAL DEPTH
7/2/85	7/9/85	K. THAMES/LAW ENGINEERING	FAILING 1500	9-7/8 IN.	78.8 FT.	9.2 FT.	88.0 FT.

CORE REC'Y&FT./%D	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
9.2/100% (MARL)	2	0	--	215.75 FT.	--	78.8 FT./136.95 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	J.C. ISHAM

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 INCH TRICONE ROCK BIT									5 10 15 20 25 30			0.0 - 5.0 FT. SAND (SM): RED, SILTY, SUBROUNDED, FINE GRAINED SAND (SM). 5.0 - 15.0 FT. SAND (SM): TAN, SILTY, SUBROUNDED, FINE TO MEDIUM GRAINED SAND (SM). 15.0 - 35.5 FT. CLAY (SC): TAN, SANDY CLAY, SUBROUND, MEDIUM TO COARSE GRAINED SANDS.	WATER MIXED WITH REVERT USED AS A DRILLING MUD FROM 0.0 - 88.0 FT. LITHOLOGIC DESCRIPTION FROM 0.0 - 77.0 FT. BASED ON WASH SAMPLES.

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 3	904

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE, LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 INCH TRICONE ROCK BIT									40 45 50 55 60 65 70			35.5 @ 46.0 FT. SAND (SM); TAN, SILTY, FINE TO MEDIUM, SOME COARSE GRAINED SAND; TRACE OF SHELLS. 46.0 - 78.0 FT. LIMESTONE; TAN TO CREAM, FOSSILIFEROUS (COQUINA), HARD TO VERY HARD, SOME SUBROUNDED FINE TO MEDIUM GRAINED CEMENTED SAND. VERY HARD, CEMENTED CALCAREOUS SANDSTONE FROM 62.0 - 78.8 FT.	DRILL CHATTER 62.0 - 78.8 FT. VERY HARD DRILLING. LOST ALL CIRCULATION FROM 67.0 - 88.0 FT. EXTREMELY HARD DRILLING 70.0 - 71.0 FT. SOFT ZONE 71.0 - 71.5 FT.

* APPARENT CORE RECOVERY, CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 904

GEOLOGIC DRILL LOG

PROJECT: VOGTLE ELECTRIC GENERATING PLANT | JOB NO. 9510 | SHEET NO. 3 OF 3

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN GPM	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION
5.5 INCH O.D., 4.5 INCH I.D. SPLIT TUBE CORE BARREL	2.0	0.4	20%	24.0				134.95				78.6 - 78.8 FT. VERY HARD LIMESTONE LENSE.
	0.3	0.3	100%	37.0								
				10.0								
				11.0								
	4.7	4.5	96%	16.0					80			78.8 - 88.0 FT. MARL; BLUE GRAY, SILTY CALCAREOUS CLAY, FIRM TO MODERATELY HARD, LIMESTONE NODULES AND LENSES.
				10.0								78.8 - 79.0 FT. TAN, SILTY CALCAREOUS CLAY, HARD, UNFRACTURED, TRACE OF DARK BROWN ORGANICS.
				1.0								79.0 - 88.0 FT. GREENISH BLUISH GRAY.
				6.0								
				4.0					85			81.8 - 82.0 FT. SEVERAL 1/4-IN. DIAMETER PYRITE CRYSTALS.
	4.0	4.2*	105%	3.0								83.2 - 84.4 FT. 10% SHELLS.
				4.0								
				5.0				127.75				
									90			BOTTOM OF HOLE 88.0 FEET.
												HOLE GROUTED.

CEM STE DEP CAS AT 78.8 HOL DON GRC OUT TO ON INJ OF WAT GEC FOR

* APPARENT CORE RECOVERY, CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

GEOLOGIC DRILL LOG

PROJECT: VOGTLE ELECTRIC GENERATING PLANT | JOB NO. 9518 | SHEET NO. 3 OF 3 | HOLE NO. 984

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE, LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN GPM	WATER PRESSURE TESTS: PRESSURE PSI	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
8.5 INCH O.D., 4.5 INCH I.D. SPLIT TUBE CORE BARREL	2.8	8.4	20%	24.0 37.0				134.95				78.6 - 78.8 FT. VERY HARD LIMESTONE LENSE.	CEMENTED 6 IN. STEEL CASING TO A DEPTH OF 88.0 FT. CASING SEPARATED AT A DEPTH OF 78.8 FT. CAUSING HOLE TO BE ABANDONED. GROUTED INSIDE AND OUTSIDE OF CASING TO GROUND SURFACE ON 7/9/85. INJECTED 28 CU. FT. OF 1:1 CEMENT/WATER GROUT. SEE GEOLOGIC LOG 984B FOR CONTINUATION.
	0.1	0.1	100%	10.0									
	4.7	4.5	96%	11.0 16.0 10.0 1.0 6.0					80			78.8 - 79.0 FT. MARL: BLUE GRAY, SILTY, CALCAREOUS CLAY, FIRM TO MODERATELY HARD, LIMESTONE NODULES AND LENSES. 78.8 - 79.0 FT. TAN, SILTY CALCAREOUS CLAY, HARD, UNFRACTURED, TRACE OF DARK BROWN ORGANICS. 79.0 - 88.0 FT. GREENISH BLUISH GRAY. 81.8 - 82.0 FT. SEVERAL 1/4-IN. DIAMETER PYRITE CRYSTALS. 83.2 - 84.4 FT. 10% SHELLS.	
	4.0	4.2*	105%	4.0 3.0 4.0 5.0				127.75	85				
									90			BOTTOM OF HOLE 88.0 FEET. HOLE GROUTED.	

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 984

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	904A

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NW OF POWER BLOCK	N 8465 E 8890	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
7/10/85	7/10/85	H. COLLINS/LAW ENGINEERING	MOBILE 53	9-7/8 IN.	15.0 FT.	--	15.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	--	215.75 F.T	--	--

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	NONE	J.C. ISHAM

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN)	WATER PRESSURE TESTS: LOSS IN GPM	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9 7/8-INCH TRICONE ROCK BIT									5			0.0 - 5.0 FT. SAND (SM); RED, SILTY, SUBROUNDED, FINE GRAINED.	WATER MIXED WITH REVERT USED AS A DRILLING MUD.
									10			5.0 - 15.0 FT. SAND (SM); TAN, SILTY, SUBROUNDED, FINE TO MEDIUM GRAINED.	ENCOUNTERED SEWER LINE AT A DEPTH OF 15.0 FT. HOLE ABANDONED, MOVED 5.0 FT. WEST AND STARTED HOLE 904B. SEE 904B FOR CONTINUATION.
								200.75	15			BOTTOM OF HOLE 15.0 FEET. HOLE GROUTED	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 904A

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 2	984B

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NW OF POWER BLOCK	N 8464 E 8885	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.) MARL	TOTAL DEPTH
7/10/85	7/14/85	M. COLLINS/LAW ENGINEERING	MOBILE 53	9-7/8 IN.	76.5 FT.	20.2 FT.	96.7 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
14.7/100% (MARL)	3	5	--	215.75 FT.	93.0 FT./122.43 FT. (7/16/85)	76/5 FT./139.25 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE; DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	J.C. ISHAM

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME MIN.	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING ETC.
ROCK BIT									0			0.0 - 5.0 FT. SAND (SM); RED.	TRICONE DRILLING USING WATER MIXED WITH REVERT AS A DRILLING FLUID FROM 0.0 - 85.0 FT.
									5			5.0 - 15.0 FT. SAND (SM); TAN.	
												15.0 - 35.5 FT. CLAY (SC); TAN, SANDY.	
												35.5 - 46.0 FT. SAND (SM); TAN.	
												46.0 - 76.5 FT. LIMESTONE; TAN, FOSSILIFEROUS (COQUINA).	
9-7/8 IN.									65				
4.5 IN. I.D. CORE BARREL, 5.5 IN. O.D.	5.0	2.4	48%	2.3								62.0 - 76.5 FT. CEMENTED CALCAREOUS SANDSTONE, VERY HARD.	67.0 FT. LOST CIRCULATION, VERY HARD DRILLING.
				10.0									
				2.2									
				2.3									
				6.0									
	1.5	1.0	67%	34.0					70			69.5 - 70.3 FT. VERY HARD LIMESTONE LENSE.	
				36.0									
				10.0								74.5 - 75.0 FT. TAN SILTSTONE LENSE, HARD.	
	4.5	3.2	71%	4.8					75				
				5.7				139.25				76.5 - 96.0 FT. MARL; SILTY, CALCAREOUS CLAY, HARD, UNFRACTURED, SOME WHITE SHELLS.	
				4.0									
9-7/8 IN. ROCK BIT									80			76.5 - 78.8 FT. TAN.	
												78.8 - 96.7 FT. GREENISH, BLUISH GRAY.	CEMENTED 6 IN. STEEL CASING TO A DEPTH OF 85.0 FT. WATER USED AS A DRILLING FLUID FROM 85.0 - 96.7 FT.
4.5 IN. I.D. CORE BARREL	5.0	3.6*	72%	5.9	0	30	0		85				
				3.8	0	40	0					87.6 - 88.3 FT. LIMESTONE NODULE.	
				5.6	0	50	0						
				3.8	0	40	0						
				2.3	0	30	0						

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 2	904B

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
5.5 IN. O.D. CORE BARREL	3.0	4.4*	147%	4.4									MARL SAMPLES:
				4.7								91.2 - 91.5 FT. LIMESTONE NODULE.	*1 92.3 (JAR)
				2.3									*2 92.3 - 93.0
	3.7	3.7	100%	7.0					95				*3 94.0 (JAR)
				5.2								94.7 - 95.5 FT. LIMESTONE NODULE.	*4 94.7 (JAR)
				3.1				119.05					*5 96.0 (JAR)
												BOTTOM OF HOLE 96.7 FEET.	
												POROUS STONE PIEZOMETER PLACED TO A DEPTH OF 94.7 FEET. OPEN INTERVAL FROM 90.0 FEET TO 96.7 FEET.	

* APPARENT CORE RECOVERY, CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 904B

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 4	905

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NW OF POWER BLOCK	N 8450 E 8900	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.) MARL	TOTAL DEPTH
6/23/85	7/9/85	H. COLLINS/LAW ENGINEERING	FAILING 1500	9-7/8 IN.	77.3 FT.	38.7 FT.	116.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
37.6/96%	5	8	--	215.75 FT.	106.21 FT./110.5 FT. (7/16/85)	77.3 FT./138.45 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	J.C. ISHAM

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 IN. TRICONE ROCK BIT								215.75					
									5			0.0 - 5.0 FT. SAND (SM): RED, SILTY, SUBROUNDED, FINE GRAINED.	WATER MIXED WITH REVERT USED AS A DRILLING FLUID FROM 0.0 - 77.0 FT.
								210.75				5.0 - 15.0 FT. SAND (SM): TAN, SILTY, SUBROUNDED, FINE TO MEDIUM GRAINED.	
									10				
								200.75	15			15.0 - 30.0 FT. CLAY (SC): TAN, SANDY, SUBROUNDED MEDIUM SAND GRAINS.	LITHOLOGIC DESCRIPTION FROM 0.0 TO 77.0 FT. BASED ON WASH SAMPLES.
									20				
									25				
								185.75	30			30.0 - 44.5 FT. SAND (SM): TAN, SILTY, SUBROUNDED, FINE TO MEDIUM GRAINED.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 905

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 4	905

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
9-7/8 IN. TRICONE ROCK BIT								171.25	40 45 50 55 60 65 70			44.5 - 77.3 FT. LIMESTONE; TAN TO CREAM, FOSSILIFEROUS (COQUINA), HARD TO VERY HARD, SOME SUBROUNDED, FINE TO MEDIUM GRAINED CEMENTED SAND. 57.0 - 58.0 FT. GRAYISH BLACK HARD SHALE. 62.2 - 62.8 FT. VERY HARD CEMENTED SANDSTONE LENSE. 62.8 - 77.3 FT. INTERBEDDED LIMESTONE AND SANDSTONE; 1 - 3 IN. LAYERS OF VERY HARD CEMENTED SANDS INTERBEDDED WITH 6 IN. - 1 FT. LAYERS OF HARD FOSSILIFEROUS LIMESTONE (SHELLS).	44.5 - 61.0 FT. FLUID LOSS APPROXIMATELY 5 GAL./FT. OF DRILL ADVANCEMENT. 1 HOUR DRILLING TIME FOR SANDSTONE LENSE. 61.0 - 71.0 FT. FLUID LOSS APPROXIMATELY 10 GAL./FT. OF DRILL ADVANCEMENT. LOST ALL CIRCULATION AT 72.5 FT.

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 905

GEOLOGIC DRILL LOG

PROJECT: VOGTLE ELECTRIC GENERATING PLANT | JOB NO. 9510 | SHEET NO. 3 OF 4 | HOLE NO. 905

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
													USED WATER AS DRILLING FLUID FROM 77.0 - 116.0 FT.
4.5 IN. I.D. SPLIT TUBE CORE BARREL, 5.5 IN. O.D.	5.0	4.8	96%	8.0 6.0 4.0 3.0 4.0				138.45	80			77.3 - 116.0 FT. MARL; SILTY CALCAREOUS CLAY, HARD, UNFRACTURED, TRACE OF DARK BROWN ORGANICS. 77.3 - 78.3 FT. TAN. 78.3 - 116.0 FT. GREENISH BLUISH GRAY. 82.6 - 84.6 FT. 10% SHELLS. 84.6 - 88.5 FT. INTERBEDDED SILTY CALCAREOUS CLAY AND SILTY SANDY CALCAREOUS CLAY.	
	5.0	4.4	88%	14.0 7.0 3.0 3.0 3.0					85				
	1.5	1.2	80%	3.0 1.0								88.5 - 91.15 FT. 10% SHELLS.	6 IN. STEEL CASING CEMENTED IN PLACE TO A DEPTH OF 88.5 FT.
	5.0	4.3*	86%	1.9 1.8 3.7 4.8 2.1	0 0 0 0 0	30 40 50 40 30	8 8 8 8 8		90			91.15 - 91.5 FT. LIMESTONE LENSE. 91.5 - 92.4 FT. SEVERAL LIMESTONE NODULES. 92.4 - 93.9 FT. 10% SHELLS.	SAMPLE #1 91.65 - 92.8 FT.
	4.0	4.7*	118%	2.7 2.0 6.0 3.8					95			95.6 - 96.3 FT. LIMESTONE LENSE. 97.5 - 98.0 FT. LIMESTONE LENSE.	SAMPLE #2 96.7 - 97.5 FT.
	5.0	4.3*	86%	4.8 3.5 3.3 3.7 2.5					100			98.0 - 103.8 FT. SEVERAL LIMESTONE NODULES.	SAMPLE #3 99.5 FT. (JAR)
	4.0	4.7*	118%	2.3 3.0 2.3 3.7	0 0 0 0	40 50 60 50	8 8 8 8		105			103.8 - 105.6 FT. CLAYEY. 105.6 - 112.0 FT. SEVERAL LIMESTONE NODULES.	SAMPLE #4 106.5 FT. (JAR)
	5.0	4.6*	92%	3.0 4.2 3.3 4.0 4.6	0	40	8		110				SAMPLE #5 107.5 - 108.4 FT.
	4.5	4.9*	109%	3.7 2.9 3.3 2.0									SAMPLE #6 113.3 FT. (JAR) SAMPLE #8 114.0 - 115.0 FT.

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 905

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	4 OF 4	905

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY*	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
5.5 IN.	4.5	4.9*	109%	2.0 / 1.9				99.75	116				SAMPLE #7 116.0 FT. (JAR)
												BOTTOM OF HOLE 116.0 FEET.	
												POROUS STONE PIEZOMETER PLACED TO A DEPTH OF 114.0 FEET. OPEN INTERVAL FROM 109.8 FEET - 116.0 FEET.	

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 905

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	808

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
SWITCH YARD	N 9625 E 9300	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.) MARL	TOTAL DEPTH
5/27/85	5/28/85	KEN THAMES/LAW ENGINEERING	FAILING 1500	6-7/8 IN.	66.3 FT.	1.7 FT.	68.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	216.40 FT.	207.0 FT.	57.16 FT./159.24 FT. (7/16/85)	66.3 FT./140.7 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER: 6-7/8 IN. TRICONE ROCK BIT

SAMPLER ADVANCE LENGTH CORE RUN

SAMPLE RECOVERY / CORE RECOVERY

PERCENT CORE RECOVERY

DRILLING TIME (MIN.)

WATER PRESSURE TESTS: LOSS IN G.P.M. | PRESSURE P.S.I | TIME IN MINUTES

ELEVATION

DEPTH

GRAPHIC LOG

SAMPLE

ELEVATION	DEPTH	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
207.0	0	0.0 - 5.0 FT. SILTY CLAY: BROWN AND RED, 3% SMALL GRAVEL, BLACK.	LOG FROM DITCH SAMPLES DRILLED WITH E-Z MUD. COMPLETED AS OBSERVATION WELL. 4-IN. PVC CASING AND SCREEN.
200	10	5.0 - 15.0 FT. SILTY CLAY: RED, TRACE BROWN; 1% SAND, FINE GRAINED.	
		15.0 - 20.0 FT. SILTY SAND: TAN, FINE GRAINED, 10% LIMESTONE, WHITE, WEATHERED.	
	20	20.0 - 28.0 FT. CLAY: TAN, PLASTIC, 10% OYSTER SHELLS.	
180		25.0 FT. INCREASE IN OYSTER SHELLS.	
	30	28.0 - 35.0 FT. SAND: FINE GRAINED, 40 - 50% OYSTER SHELLS.	
		35.0 - 36.0 FT. CLAY: PLASTIC, TAN, SANDY; 30% OYSTER SHELLS.	
	40	36.0 - 45.0 FT. OYSTER SHELLS: TRACE CLAY, TAN, SHELLS CAVING FROM 40.0 - 42.0 FT.	
		45.0 - 46.0 FT. SILTY SAND: TAN TO BROWN, OYSTER SHELLS (FROM ABOVE).	
160		46.0 - 50.0 FT. SAND: SILTY - DECREASE IN OYSTER SHELLS.	
	50	50.0 - 60.0 FT. SAND: SILTY, FINE GRAINED; 1% OYSTER SHELLS.	
		58.5 FT. SILT, TAN	
	60	60.0 - 66.3 FT. SILTY SAND: BROWN WITH BLACK SPECKS, 10% OYSTER SHELLS.	
140.7		66.3 FT.- 68.0 FT. MARL: GREEN, CALCAREOUS CLAY, FIRM.	OBSERVATION WELL INSTALLED IN HOLE. OPEN INTERVAL 45.5 TO 68.0 FT.
139.0		BOTTOM OF HOLE 68.0 FEET.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: SWITCH YARD

HOLE NO. 808

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 2	809

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NW OF POWER BLOCK	N 8320 E7860	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
5/24/85	5/26/85	KEN THOMAS/LAW ENGINEERING	FAILING 1500	7-7/8 IN.	89.0 FT.	1.0 FT.	90.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	225.25 FT.	222.8 FT.	72.51 FT./152.74 FT. (7/16/85)	89.0 FT./133.8 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
7-7/8 IN. TRICONE ROCK BIT								222.8				0.0 - 10.0 FT. SAND: SILTY, VERY FINE GRAINED, RED 5.0 - 7.0 FT. CHANGE TO TAN, INCREASE IN SILT.	DRILLING WITH REVERT/WATER DRILLING FLUID.
									10			10.0 - 20.0 FT. SILTY SAND: FINE GRAINED, RED.	
								200	20			20.0 - 37.0 FT. SAND: SILTY, MEDIUM GRAINED, QUARTZ, TAN. 25.0 FT. MEDIUM TO COARSE GRAINED. HARD ZONE AT 26.5 FT.	
									30			35.0 FT. TRACE LIMESTONE, WHITE AND BLACK.	
												37.0 - 40.0 FT. GRAVEL: SMALL, SUBROUNDED, QUARTZ, LIMESTONE, WHITE AND BLACK, 40% CLAY, TAN.	WATER LEVEL ON 5/25 - 38.0 FT.
								180	40			40.0 - 55.0 FT. CLAY: PLASTIC, TAN, 5% GRAVEL, SMALL, SUB-ROUNDED, QUARTZ AND LIMESTONE.	
									50				
												55.0 - 60.0 FT. SANDY CLAY: BROWN, SAND IS FINE GRAINED, QUARTZ WITH 3 - 5% LIMESTONE, WHITE.	
									60				HARD DRILLING.
								160				60.0 - 77.0 FT. SILTY SAND: QUARTZ, FINE GRAINED, SUBROUNDED, TRACE LIMESTONE, WHITE.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 809

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	2 OF 2	809

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
7-7/8 IN. TRICONE ROCK BIT								145.8	80			77.0 - 89.0 FT. LIMESTONE; WEATHERED, ORANGE AND BROWN.	100% WATER LOSS AT 77.0 FT. 40% WATER RETURN AT 80.0 FT.
								131.8 132.8	90			89.0 - 90.0 FT. MARL; BOTTOM OF HOLE 90.0 FEET.	COMPLETED AS OBSERVATION WELL. WATER TABLE AQUIFER. OPEN INTERVAL 69.35 TO 90.0 FT.

* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NW OF POWER BLOCK

HOLE NO. 809

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	LT-1B

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
NORTHWEST OF UNIT 2 TURBINE	N 8388 E 9304	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
7/5/85	7/5/85	H. COLLINS/LAW ENGINEERING	MOBILE 53	5-7/8 IN.	83.3 FT.	1.35 FT.	84.65 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	215.47 FT.	213.18 FT.	60.3 FT./155.16 FT. (7/16/85)	83.3 FT./129.88 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL RECORD	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
5-7/8 IN. TRICONE BIT								200 150	10 20 30 40 50 60 70 80			0.0 - 84.65 FT. BACKFILL: SAND, RED BROWN, SILGHTLY SILTY TO SILTY, FINE TO MEDIUM GRAINED.	DRILLED TO REPLACE HOLE LT-1A. DRILLED WITH REVERT/WATER DRILLING FLUID.
												BOTTOM OF HOLE 84.65 FEET. INSTALLED OBSERVATION WELL OPEN INTERVAL 65.17 TO 84.65 FEET.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: NORTHWEST OF UNIT 2 TURBINE BUILDING

HOLE NO. LT-1B

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	LT-7A

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
SOUTHWEST OF UNIT 2 TURBINE BLDG.	N 8151.3 E 9317.5	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
7/7/85	7/7/85	H. COLLINS/LAW ENGINEERING	MOBILE 53	5-1/8 IN.	87.0 FT.	0	87.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	221.17 FT.	215.92 FT.	63.19 FT./157.98 FT. (7/16/85)	87.0 FT./128.92 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE/LENGTH CORE RUN	SAMPLE RECOVERY/CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
DRILLED WITH 5-1/8 INCH TRICONE BIT								200 150	10 20 30 40 50 60 70 80			0.0 - 87.0 FT. BACKFILL: SAND, RED BROWN, SLIGHTLY SILTY TO SILTY, FINE TO MEDIUM GRAINED.	DRILLED TO REPLACE WELL LT-7. DRILLED WITH REVERT/WATER DRILLING FLUID.
												BOTTOM OF HOLE 87.0 FEET. INSTALLED OBSERVATION WELL OPEN INTERVAL 65.0 TO 87.0 FEET.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: SOUTHWEST OF UNIT 2 TURBINE BUILDING

HOLE NO. LT-7A

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	LT-12

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
SOUTH OF AUXILIARY BLDG.	N 7775 E 9600	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
6/3/85	6/3/85	KEN THOMAS/LAW ENGINEERING	FAILING 1500	6-7/8 IN.	79.0 FT.	0	79.0 FT.

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	219.27 FT.	209.9 FT.	59.10 FT./160.17 FT. (7/16/85)	79.0 FT./130 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE; DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
DRILLED WITH 6-7/8 INCH TRICONE BIT								200 150	10 20 30 40 50 60 70			0.0 - 79.0 FT. BACKFILL: SAND, RED BROWN, VERY DENSE, SLIGHTLY SILTY TO SILTY, FINE TO MEDIUM GRAINED.	DRILLED WITH REVERT/WATER DRILLING FLUID.
												BOTTOM OF HOLE 79.0 FEET. INSTALLED OBSERVATION WELL OPEN INTERVAL 58.15 - 79.0 FEET.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

SITE: SOUTH OF AUXILIARY BUILDING

HOLE NO. LT-12

GEOLOGIC DRILL LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
VOGTLE ELECTRIC GENERATING PLANT	9510	1 OF 1	LT-13

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
EAST OF UNIT 1	N 8135 E 10110	90°	

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH
5/28/85	5/28/85	KEN THOMAS/LAW ENGINEERING	FAILING 1500	7-7/8 IN.	89.0 FT.	1.0 FT.	90.0 FT.

CORE RECOVERY(FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING	GROUND EL.	DEPTH/EL. GROUND WATER	DEPTH/EL. TOP OF ROCK (MARL)
--	--	--	220.61 FT.	219.0 FT.	63.08 FT./157.53 FT. (7/16/85)	89.0 FT./130.0 FT.

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
--	SEE OBSERVATION WELL REPORT	L.R. WEST

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS: LOSS IN G.P.M.	WATER PRESSURE TESTS: PRESSURE P.S.I.	WATER PRESSURE TESTS: TIME IN MINUTES	ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
7-7/8 IN. TRICONE ROCK BIT								200 150	10 20 30 40 50 60 70 80 90			0.0 - 90.0 FT. BACKFILL: SAND, RED BROWN, DENSE TO VERY DENSE, SLIGHTLY SILTY TO SILTY, FINE TO MEDIUM GRAINED.	DRILLED WITH REVERT/WATER DRILLING FLUID.
												BOTTOM OF HOLE 90.0 FEET. INSTALLED OBSERVATION WELL OPEN INTERVAL 68.1 TO 90.0 FEET.	

*APPARENT CORE RECOVERY. CORE SLIPPED THROUGH CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.

APPENDIX C

LABORATORY TESTS

Permeability Tests	-	Harding-Lawson Assoc.
Cation Exchange Capacity	-	Soils and Plant Laboratory Inc.
Distribution Coefficient	-	Battelle Pacific Northwest Laboratories

Harding Lawson Associates

August 12, 1985

3854,085.01

Bechtel Civil & Minerals, Inc.
P.O. Box 3965
San Francisco, California 94119

Attention: Mr. Thomas Crosby

Gentlemen:

Laboratory Testing Results
Vogtle Electric Generating Project
Contract No. 9510-091-SF-06

This letter presents the results of laboratory testing performed on samples of rock and soil received from Bechtel Civil & Minerals (BCM) from the Vogtle Electric Generating Plant. Harding Lawson Associates (HLA) work on this project was performed under Contract No. 9510-SF-06 dated May 9, 1985.

The samples were delivered to our Novato, California laboratory by a Bechtel carrier on July 3, 8, 15, and August 15, 1985. Selection of the tests was performed by BCM personnel and transmitted to HLA with the samples. During the course of the laboratory work, we communicated with Mr. Thomas Crosby regarding the testing and progress of the work.

The testing was done in accordance with the Specifications for Laboratory Testing and in accordance with the data transmitted in the above-mentioned letter. All of the work was performed using properly calibrated equipment under the supervision of the HLA laboratory manager or the laboratory director. The original data sheets and computations are available in HLA's files for review. These records will be retained for at least one year from the date of this report.

Permeability Tests

Ten falling head permeability tests were run in accordance with the procedure presented in the Department of Army Manual EM 1110-2-1906. The

test equipment consists of permeameter chambers manufactured by Karol Warner, Incorporated and modified by HLA

Each 4-inch-diameter soil/rock core was trimmed, placed in a chamber, confining fluid was placed in the chamber surrounding the rubber membrane covered sample, and a seating pressure of 2 psi applied to the chamber fluid. The sample was then seepage-saturated and followed by back-pressure saturation until a "B" value of .95 or greater was obtained. (All saturation water is distilled and was de-aired before testing.) The test specimen was then consolidated to the required pressure. After consolidation was completed, the permeability test was run.

The permeability test results for the 10 samples area as follows:

Sample No.	Depth (ft)	Permeability (cm/sec)	Initial Conditions	
			Water Content %	Dry Density (pcf)
901	119.0	5.01×10^{-9}	2.9	160.9
902	104.2	1.95×10^{-6}	38.6	78.1
903	108.2	1.94×10^{-7}	21.3	103.6
903	112.7	4.99×10^{-7}	26.0	97.5
903	128.4	2.06×10^{-6}	23.0	99.7
904	92.3	2.42×10^{-6}	65.1	66.4
905	91.6	1.41×10^{-6}	24.1	102.0
905	96.7	8.49×10^{-6}	25.7	99.9
905	107.5	1.39×10^{-7}	38.9	81.2
905	114.0	7.81×10^{-8}	24.8	98.3

Cation exchange capacity tests were performed by Soil and Plant Laboratory, Inc., of Santa Clara, California. The results are attached to this letter.

Yours very truly,

HARDING LAWSON ASSOCIATES

Lyle E. Lewis By DL

Lyle E. Lewis,
Civil Engineer - 16360

DMS/LEL/dm

Attachment: Cation Exchange Test Results

4 copies submitted

SOIL AND PLANT LABORATORY, INC.
Member of The California Association of Agricultural Laboratories

SANTA CLARA OFFICE
July 11, 1985
Lab No. 78035

HARDING LAWSON ASSOCIATES
P O Box 578
Novato, CA 94948

RE: SAMPLES REC'D : 6-27-85

Sample No.	Cation exchange capacity meq/100	Description
1	0.9	SS#1
2	1.3	SS#2
3	1.1	SS#3
4	1.1	SS#4
5	1.5	SS#5
6	1.3	SS#6
7	0.7	SS#7
8	0.9	13293
9	1.3	13298
10	1.3	13308

Data are supplied without recommendation or comment.

LORI LITTLEFORD
Analytical Laboratory Director

P.O. Box 11744, Santa Ana, California 92711 (714) 558-8333 Telex Number: IRIN 678401
P.O. Box 153, Santa Clara, California 95052 (408) 727-0330
P.O. Box 1648, Bellevue, Washington 98009 (206) 746-6665

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509)
Telex 15-2874

July 16, 1985

Mr. Cliff R. Farrell
Bechtel Civil and Minerals, Inc.
P.O. Box 3965
San Francisco, CA 94119

Dear Mr. Farrell:

Subject: Final Letter Report for Vogtle Nuclear Power Plant Sediment Sorption Tests - Contract No. 23112/07049

In mid-June 1985, four sediment samples (designated 13293, 13298, 13308 and 11755) and one well water sample from the Vogtle Nuclear Power Plant (Georgia) were received. The four sediment samples were air dried in our laboratory, then gently disaggregated and each sample was well mixed. The well water was filtered through 0.45 μm membrane filters to remove suspended material. The pH and Eh of the filtered water were pH = 7.42 and Eh = 373 mv vs SHE.

Triplicate one-gram samples of each of the four air dried sediments were placed in individual 50 ml polycarbonate centrifuge tubes. Next, 30.0 mls of the filtered ground water that had been spiked with 15.6 μCi/ℓ ^{85}Sr and 242 μCi/ℓ ^{137}Cs were contacted with the sediments for 7 days. The slurries were continually gently agitated on a linear shaker. In addition, three blank centrifuge tubes were treated in a similar fashion excepting that they contained only the radionuclide traced well water. These samples were used to correct for any container adsorption.

After the 7-day contact period, the samples were centrifuged and the supernatant solution was filtered through 0.45 m membranes. Exactly 15.0 mls of the filtered samples were radiocounted on a Ge(Li) detector for the characteristic gamma-rays 514 kev (^{85}Sr) and 662 kev (^{137}Cs).

The distribution coefficient, Kd, for Sr and Cs was then calculated from the observed counts for the blank solutions and the supernatant solutions from the sediment samples using equation 1.

$$Kd = \left(\frac{Co-Ce}{Ce}\right)\frac{V}{W} \qquad \text{Eq. 1}$$

where

Co = counts/min in blank sample (average of three blanks)
Ce = counts/min in each supernatant solution
V = volume of solution (30.0 mls)
W = weight of sediment (1.0g)

Table 1 is a summary of the radiocounting data and Table 2 is a summary of the individual Kd values. The variability in the observed replicates is similar to past experience for Sr and perhaps a little higher for the Cs values on sediments 13293 and 11755.

Perhaps the Georgia sediments contain a mineral very specific to cesium adsorption that is present in small amounts such that one gram samples are not truly homogeneous. That is, one sample such as Sample B for sediment 11755 might contain more of this selective mineral than the other two replicates.

In general, the trend for greater Cs adsorption than Sr adsorption is typical of sediments I've worked with and the absolute range Cs (400 to 2100 mls/g) and Sr (40-95 mls/g) are typical of predominantly sand-sized sediments as the Georgia samples appear to be.

Sincerely yours,

Jeff Serne

R. Jeff Serne
Staff Scientist
Geochemistry Section
Earth Sciences Department

RJS:dw

Attach.

cc: Mr. Ken Abbot (Bechtel)

Table 2
Kd Data (units mls/g)

	^{137}Cs	^{85}Sr
Sediment 13293		
A	409	36.5
B	509	47.3
C	237	38.6
Ave.	385 ± 138	Ave. 40.8 ± 6
Sediment 13298		
A	915	99.6
B	1233	97.5
C	1046	86.9
Ave.	1065 ± 160	Ave. 94.7 ± 6.8
Sediment 13308		
A	512	80.0
B	554	67.9
C	493	80.1
Ave.	520 ± 31	Ave. 76.0 ± 7.0
Sediment 11755		
A	1843	34.0
B	2812	73.8
C	1748	60.7
Ave.	2134 ± 589	Ave. 56.2 ± 20.3