

Geotechnical Verification Work Report of Results

Vogtle Electric Generating Plant
August 1985



Geology Group
San Francisco

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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 completeness 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 (K_d) 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 5.0×10^{-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 inflatable 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. 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.

Well LT-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		GROUND ELEV.	TOP OF WELL ELEV.	DEPTH TO MARL	OPEN INTERVAL
	N	E				
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	7536	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

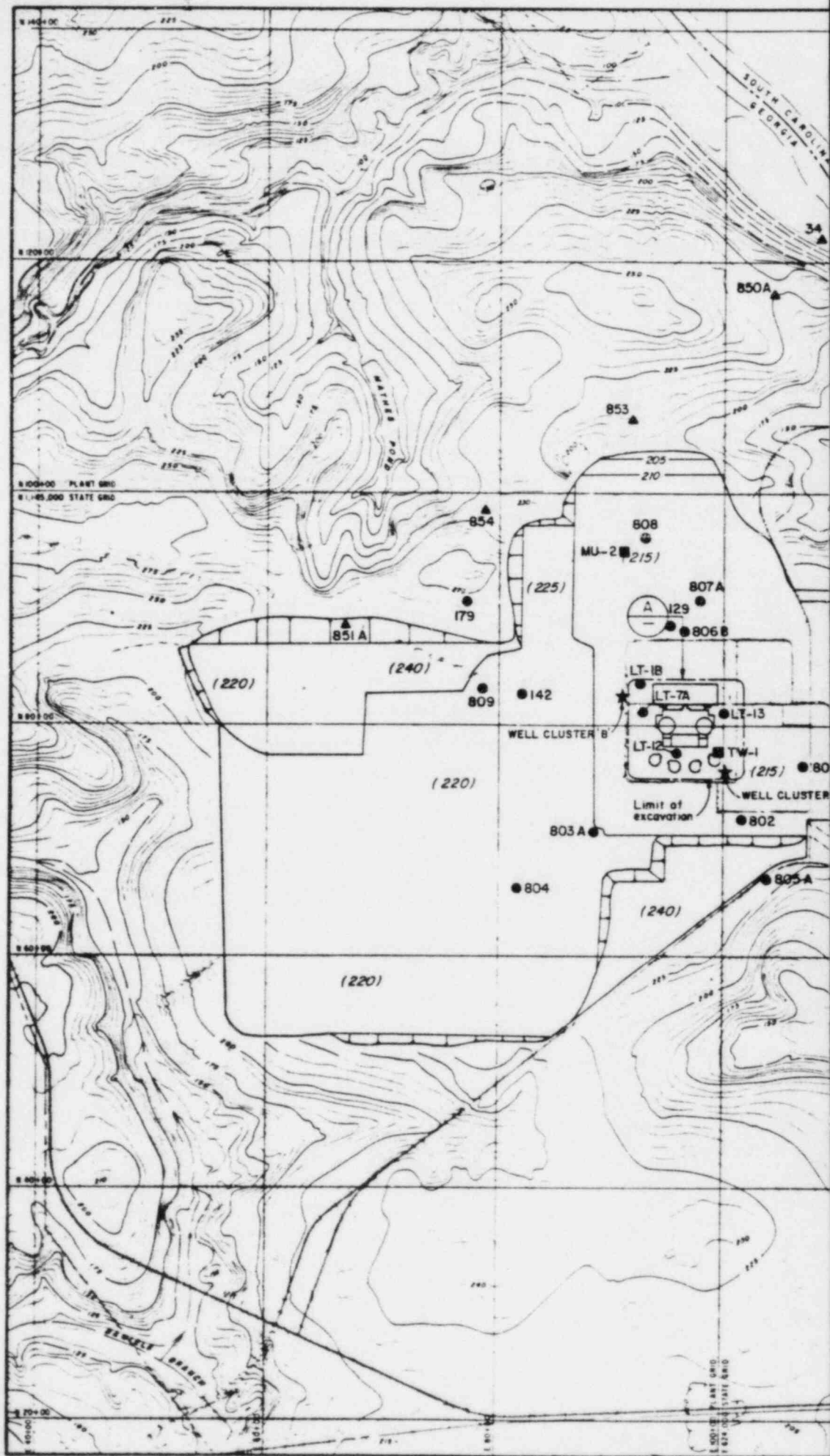
IN SITU PERMEABILITY TESTS

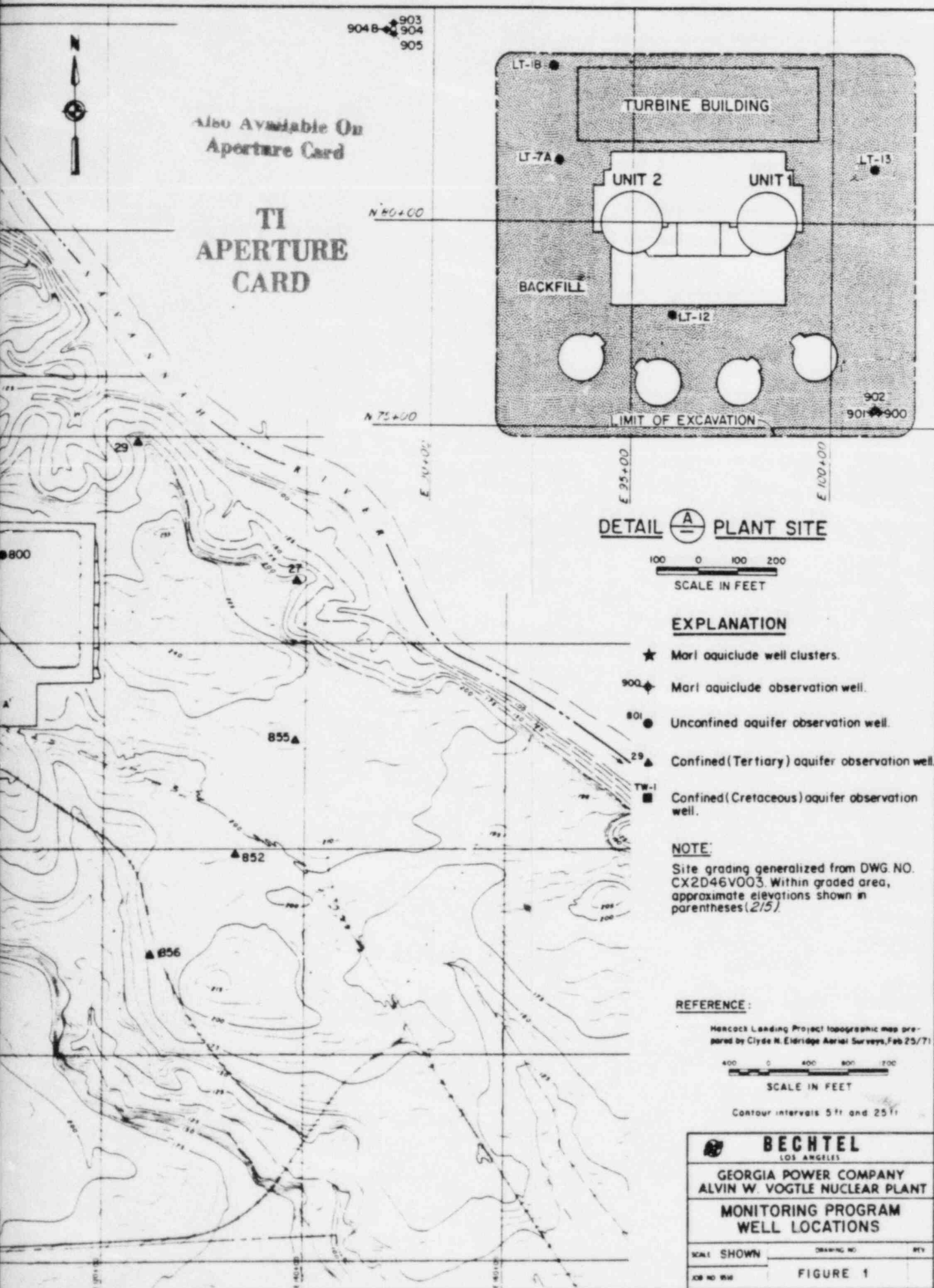
<u>HOLE NO.</u>	<u>INTERVAL TESTED (FT.)</u>	<u>QUANTITY OF WATER INJECTED (GALS.)</u>	<u>PERMEABILITY (CALCULATED)</u>
900	104.6-112.6	0	0
	112.6-122.6	0	0
	122.6-132.6	0	0
	132.6-142.6	0	0
	122.6-142.6	0	0
901	118-128	0	0
902	100-108	0	0
903	85-96	0	0
	96-106	0	0
	106-116	0	0
	116-126	0	0
	126-133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

LABORATORY PERMEABILITY TESTS *

<u>HOLE NO.</u>	<u>DEPTH (FT.)</u>	<u>PERMEABILITY (CM/SEC)</u>
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}

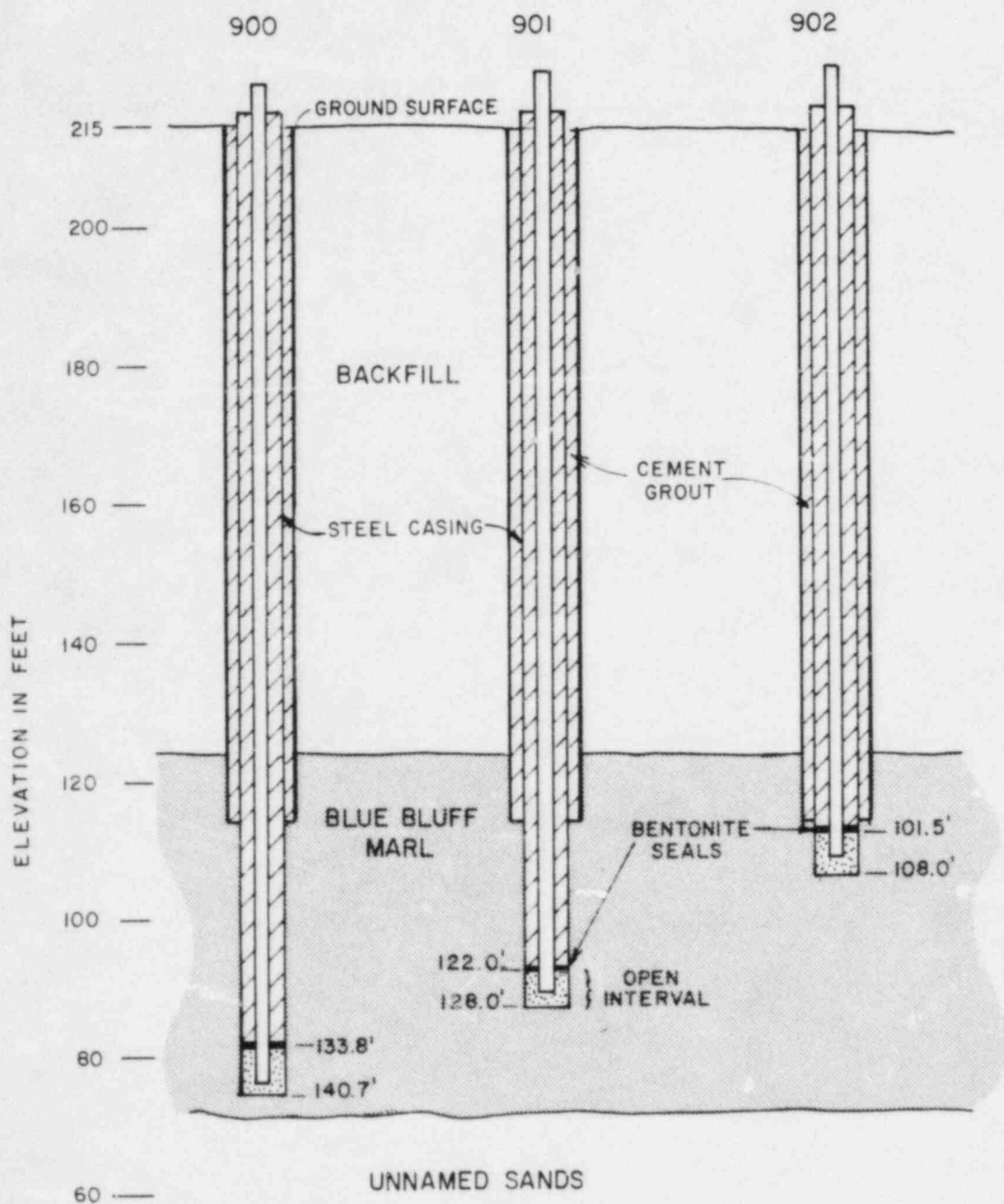
* - Tests were performed by Harding Lawson Associates
(See Appendix B)





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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

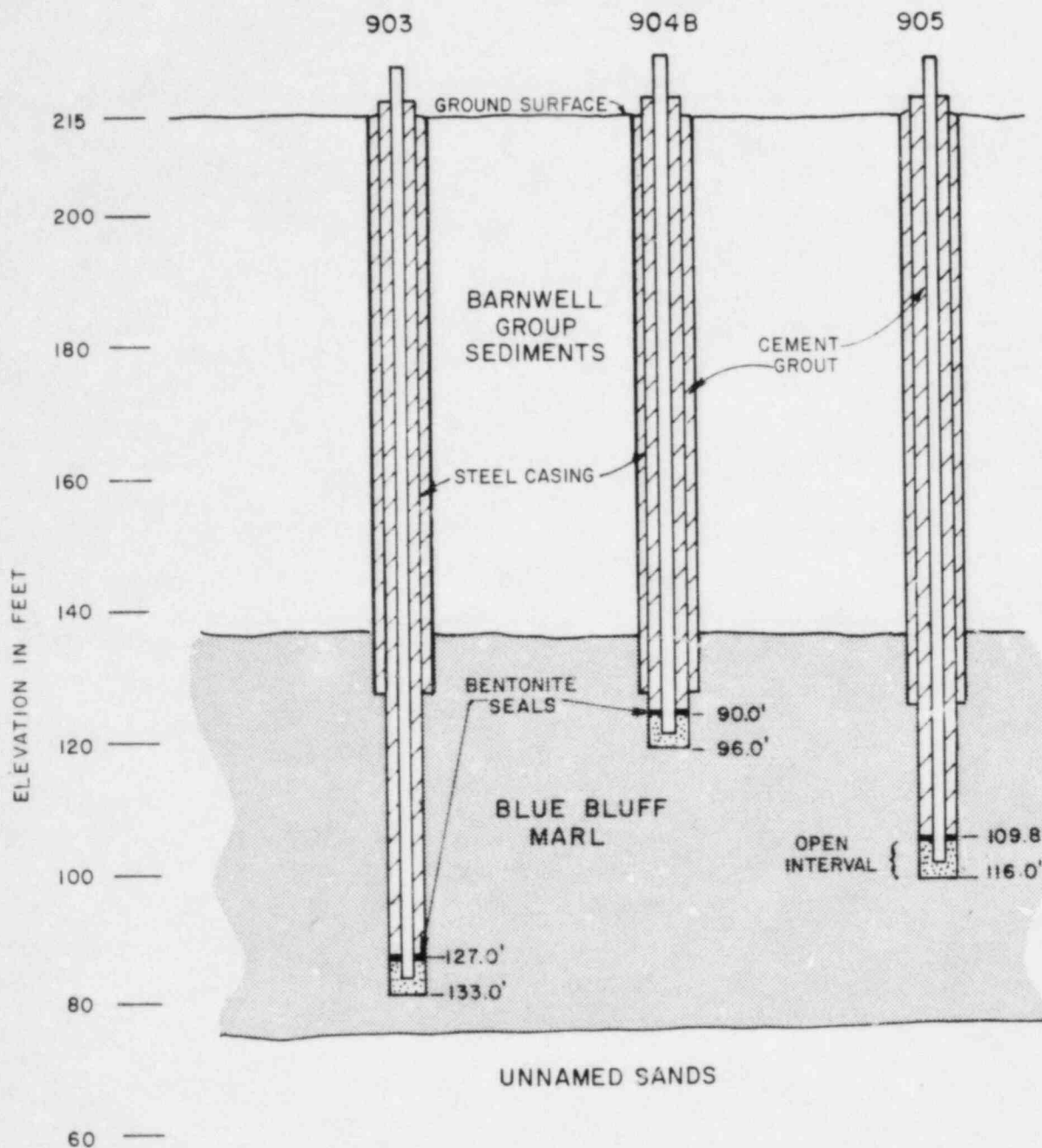
OBSERVATION WELL CLUSTER A
SCHEMATIC SECTION



JOB No.
9510

DRAWING No.
FIGURE 2

REV.



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.

823 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.

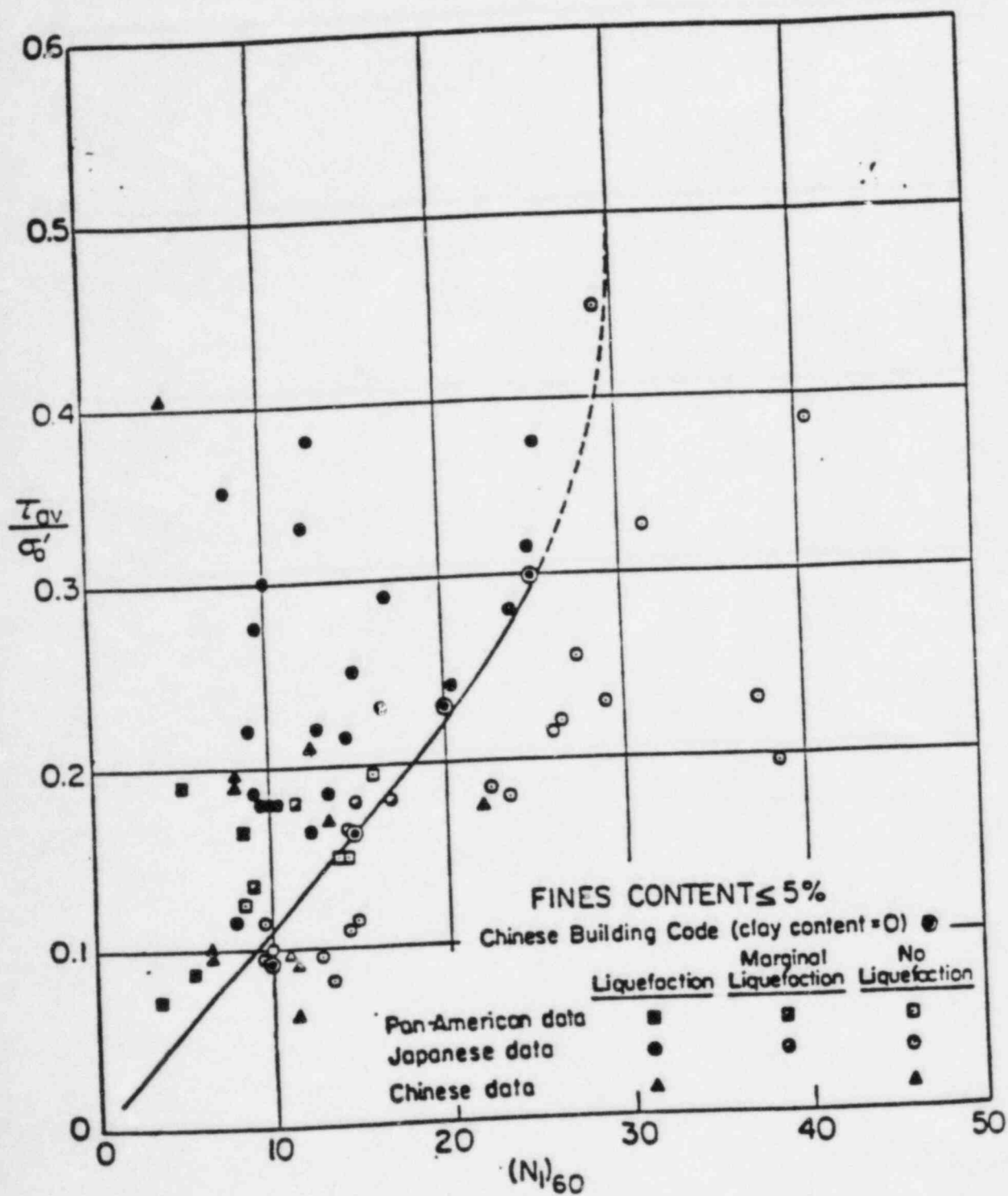
The field performance of sites which have and have not liquefied during earthquakes with Magnitude $7\frac{1}{2}$, summarized on the attached figure, shows clearly that there is no possibility of

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.

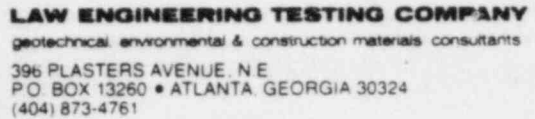
Sincerely yours,

H. Bolton Seed

H. Bolton Seed



RELATIONSHIP BETWEEN STRESS RATIOS CAUSING LIQUEFACTION AND N_1 -VALUES FOR CLEAN SANDS FOR $M = 7\frac{1}{2}$ EARTHQUAKES



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

[illegible]

Southern Company Services, Inc.

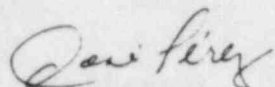
Page 2

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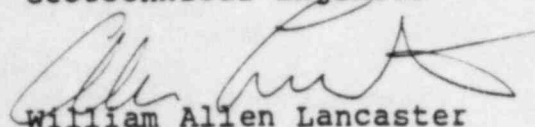
We have enjoyed assisting Georgia Power in this work, and look forward to providing our services as the project continues. If you have any questions, do not hesitate to contact us.

Very truly yours,

LAW ENGINEERING TESTING COMPANY



Jose Perez
Geotechnical Engineer



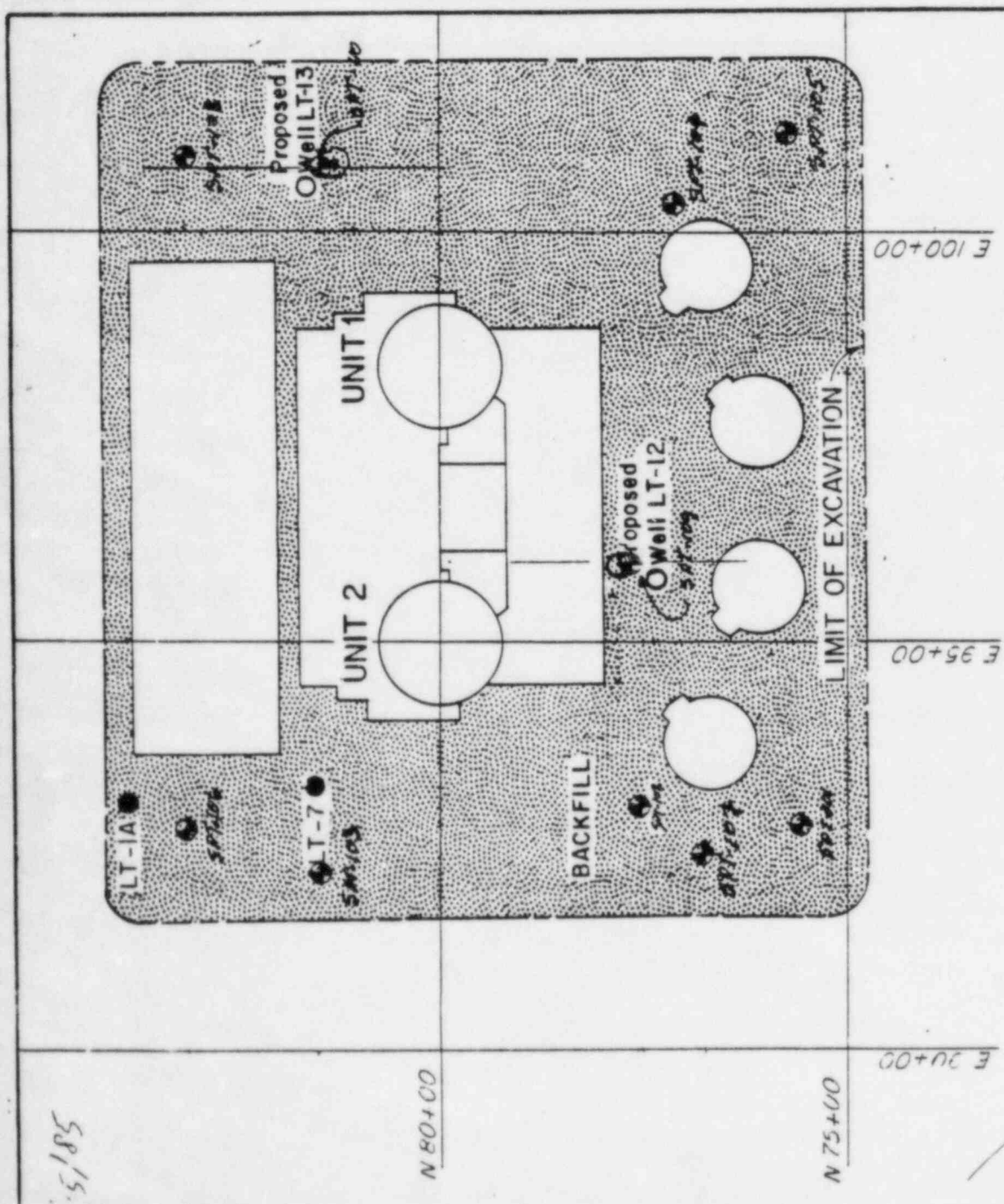
William Allen Lancaster
Civil Engineer
Registered Georgia 7075

/cll

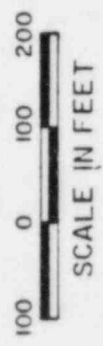
cc: Bechtel Power Corporation
Zia Yazdani



5/85



DETAIL A PLANT SITE



EXPLANATION



Law Engineering Testing Company

BORING COORINATES

N: 75 + 50

E: 92 + 75

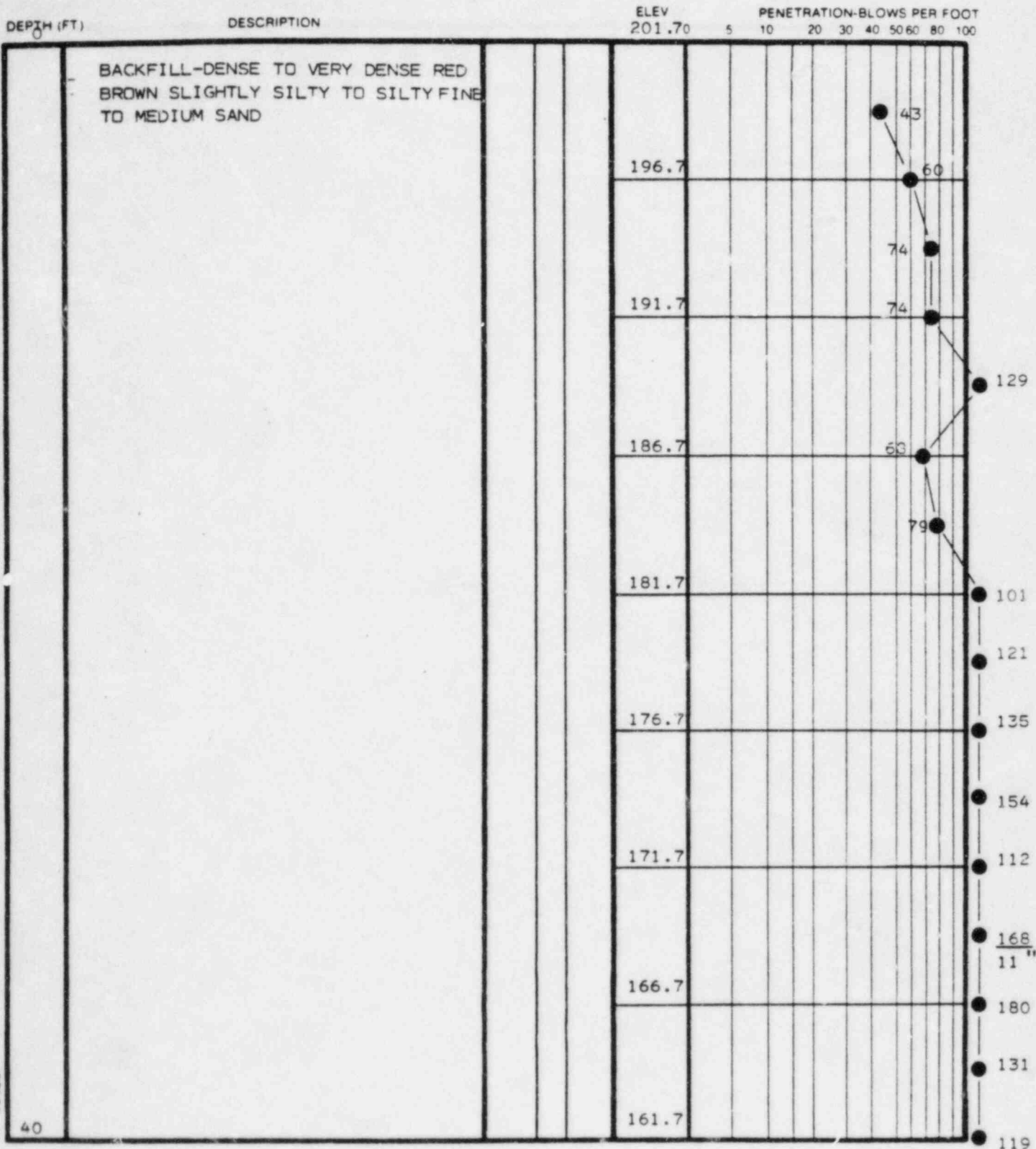
BORING NUMBER SPT-101

DATE DRILLED 6-4, 5, & 6-85

JOB NUMBER 7429

PAGE 1 OF 2

Soil Test Boring Record



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

DEPTH (FT)	DESCRIPTION	PENETRATION-BLOWS PER FOOT										
		ELEV	0	5	10	20	30	40	50	60	80	100
161.7												
156.7												
151.7												
146.7												
141.7												
136.7												
131.7												
126.7												
73.5	OBSTRUCTION-CONCRETE FRAGMENTS											
76	MARL-SAMPLED AS VERY HARD GRAY											
77.5	GREEN CLAYEY FINE SANDY SILT											
	BORING TERMINATED											

REMARKS:

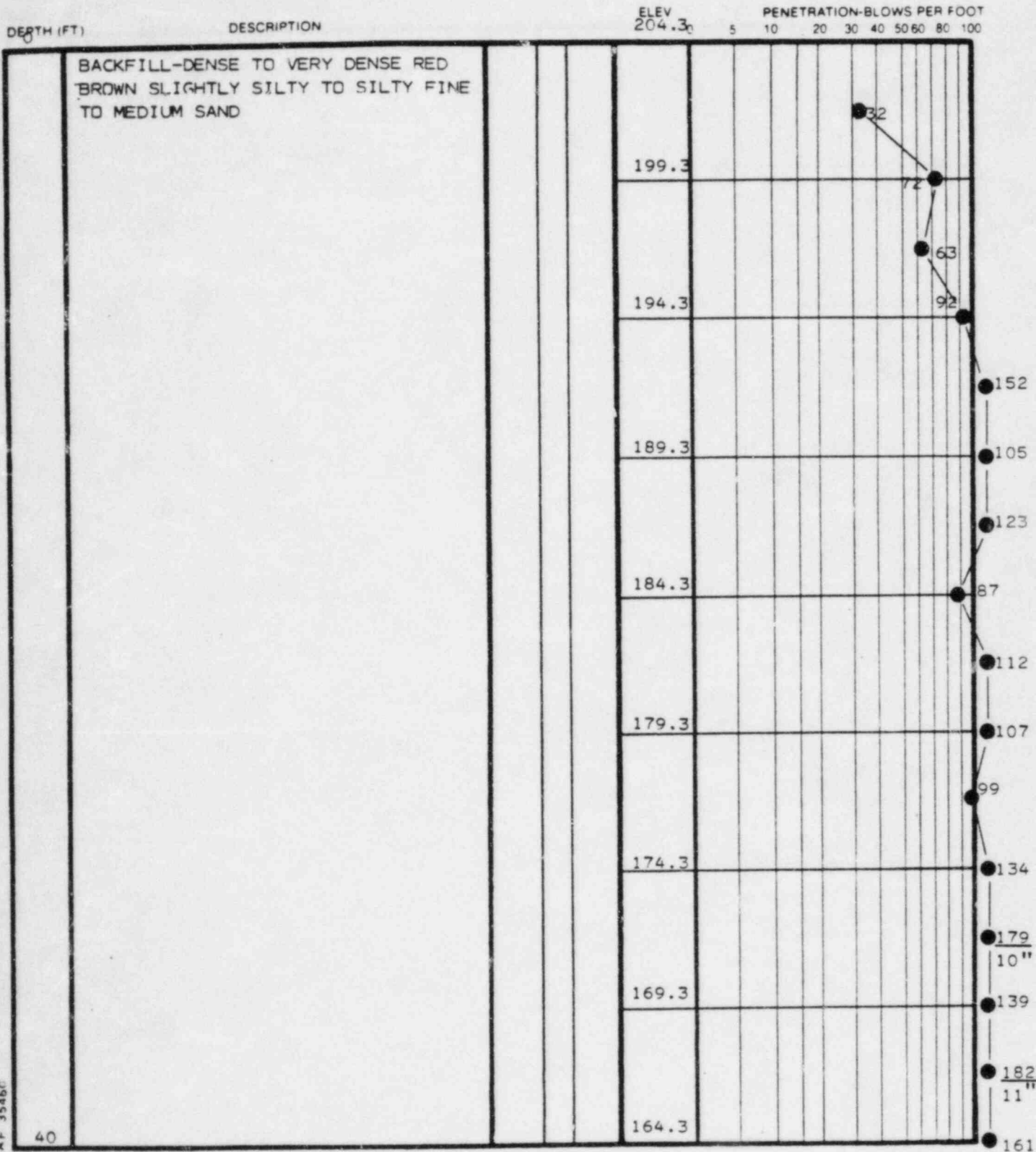


Law Engineering Testing Company

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

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

Soil Test Boring Record



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

DEPTH (FT)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT											
40		164.70	5	10	20	30	40	50	60	80	100			
	BACKFILL-VERY DENSE RED BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND													162
		159.3												179 11"
														193 11"
		154.3												100 6"
														100 5"
		149.3												100 4"
														100 4"
		144.3												100 5"
														100 5"
		139.3												100 5"
														88 10"
		134.9												100 5 1/2"
74.0	MARL-SAMPLED AS HARD GRAY-GREEN	130.3												104 1ST 6"
75.7	VERY CLAYEY FINE SANDY SILT	128.3												
	BORING TERMINATED													

REMARKS:



Law Engineering Testing Company

BORING COORDINATES

N: 81 + 50

E: 92 + 15

BORING NUMBER SPT-103

DATE DRILLED 5-26-85

JOB NUMBER 7429

PAGE 1 OF 2

Soil Test Boring Record

DEPTH (FT)

DESCRIPTION

ELEV

PENETRATION-BLOWS PER FOOT

203.20 5 10 20 30 40 50 60 80 100

BACKFILL-VERY DENSE RED BROWN SILTY
TO SLIGHTLY SILTY FINE TO MEDIUM
SAND

198.2

47

79

90

193.2

131

154

188.2

126

109

11"

183.2

124

100

5"

178.2

100

3 1/2"

100

5"

173.2

157

184

10"

168.2

198

11"

179

11"

163.2

100

5 1/2"

REMARKS:

AF 35460

40



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

[illegible]

REMARKS:

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



Law Engineering Testing Company

BORING COORDINATES

N: 77 + 00

E: 100 + 35

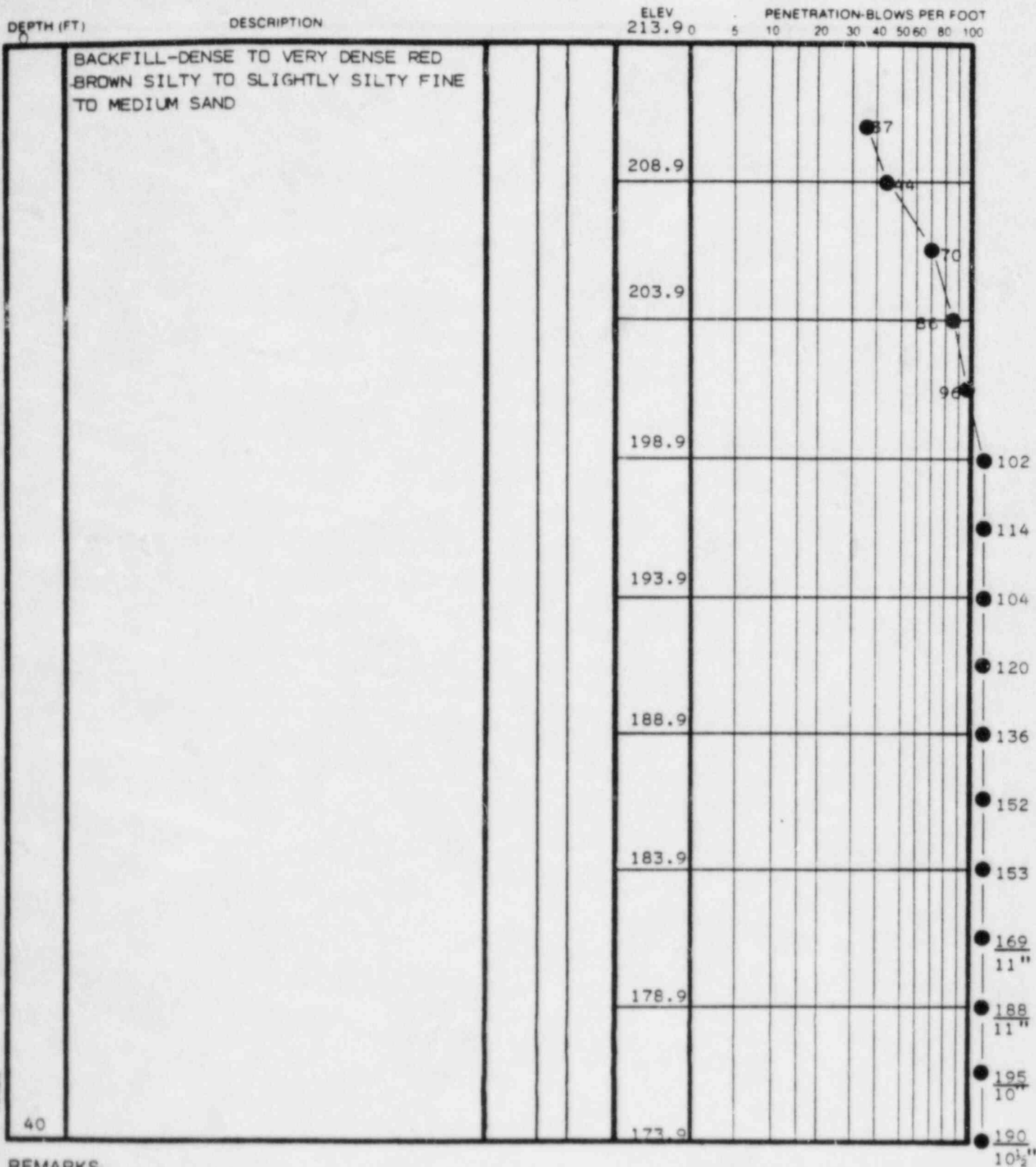
BORING NUMBER SPT-104

DATE DRILLED 6-10-85

JOB NUMBER 7429

PAGE 1 OF 3

Soil Test Boring Record



REMARKS:

Law Engineering Testing Company

Soll Test Boring Record

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

DEPTH (FT.)	DESCRIPTION	ELEV.	PENETRATION-BLOWS PER FOOT											
		173.90	5	10	20	30	40	50	60	80	100			
	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"
		133.9												100 4"

REMARKS:



E: 101 + 20

PAGE 1 OF 3

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	PENETRATION-BLOWS PER FOOT											ELEV	
		5	10	20	30	40	50	60	80	100				
	BACKFILL-VERY DENSE RED BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND												176.30	
													171.3	100 4"
													166.3	185 11"
													161.3	100 4"
													156.3	100 5"
													151.3	175
													146.3	100 1ST €
													141.3	193 9"
													136.3	100 1ST €
														100 5
														104*
														110*
														112*
														130*
														200*
														110*
														147*

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



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

DEPTH (FT.)	DESCRIPTION	ELEV	PENETRATION-BLOWS PER FOOT										
		211.840	5	10	20	30	40	50	60	80	100		
	BACKFILL-VERY DENSE RED BROWN SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND												
		206.8										36	
												78	
		201.8											102 12"
													110 12"
		196.8										95	
													183 11"
		191.8											138 12"
													165 12"
		186.8											145 12"
		184.6											100 5 1/2'
27.2	BORING TERMINATED*	181.8											100 5"

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

AF 35460



L2w Engineering Testing Company

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

Soil Test Boring Record

DEPTH (FT.)

DESCRIPTION

ELEV

PENETRATION-BLOWS PER FOOT

210.7 0 5 10 20 30 40 50 60 80 100

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

170.7

188
10 1/2"

100
5"

100
4.5"

100
3"

REMARKS:



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	0	5	10	20	30	40	50	60	80	100	
170.8	BACKFILL-VERY DENSE RED BROWN SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND	170.7											100 3"
		165.7											100 5 1/2"
		160.7											100 5"
		155.7											100 3"
		150.7											100 4"
		145.7											100 3"
		140.7											100 5"
		135.7											100 3 1/2"
		130.7											100 4"
													100 3"
													150 6"
													130 6"
													131 6"

REMARKS:



Law Engineering Testing Company

BORING COORDINATES

N: 76 + 70

E: 92 + 40

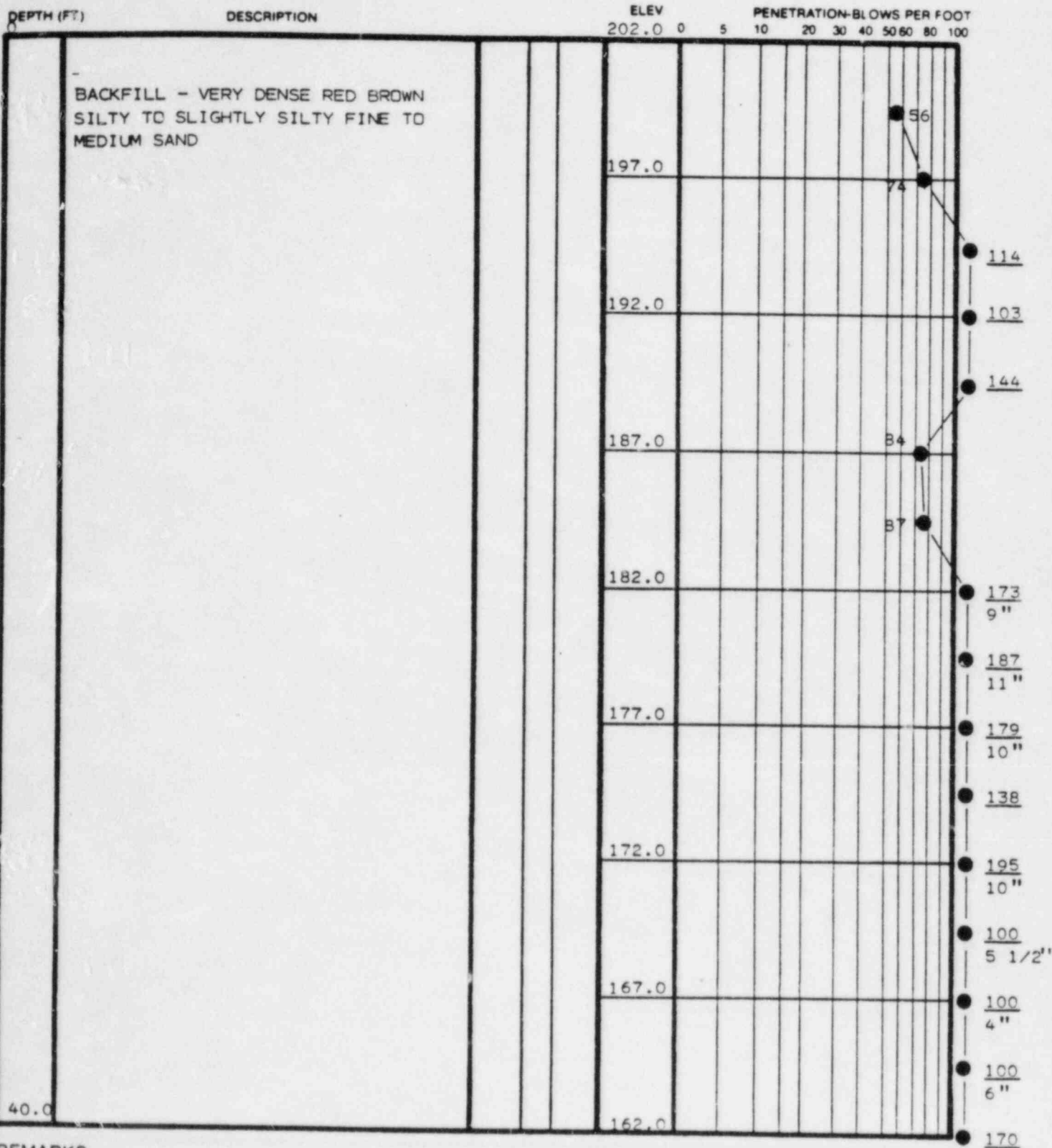
BORING NUMBER SPT-107

DATE DRILLED 5-21, 22, 23-85

JOB NUMBER 7429

PAGE 1 OF 2

Soil Test Boring Record



REMARKS:



Law Engineering Testing Company

BORING COORDINATES

N: 76 + 70

E: 92 + 40

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

Soil Test Boring Record

DEPTH (FT.)	DESCRIPTION	ELEV	10	20	30	40	50	60	80	100	PENETRATION-BLOWS PER FOOT
162.0		0	5								
	BACKFILL-VERY DENSE SILTY TO SLIGHTLY SILTY FINE TO MEDIUM SAND										
		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	MARL-SAMPLED AS GRAY GREEN VERY*										100 5 1/2
77.0	BORING TERMINATED										185 10 1/2'
		125.2									

REMARKS: *CLAYEY FINE SANDY SILT



Law Engineering Testing Company

BORING COORDINATES

N: 83 + 10

E: 101 + 00

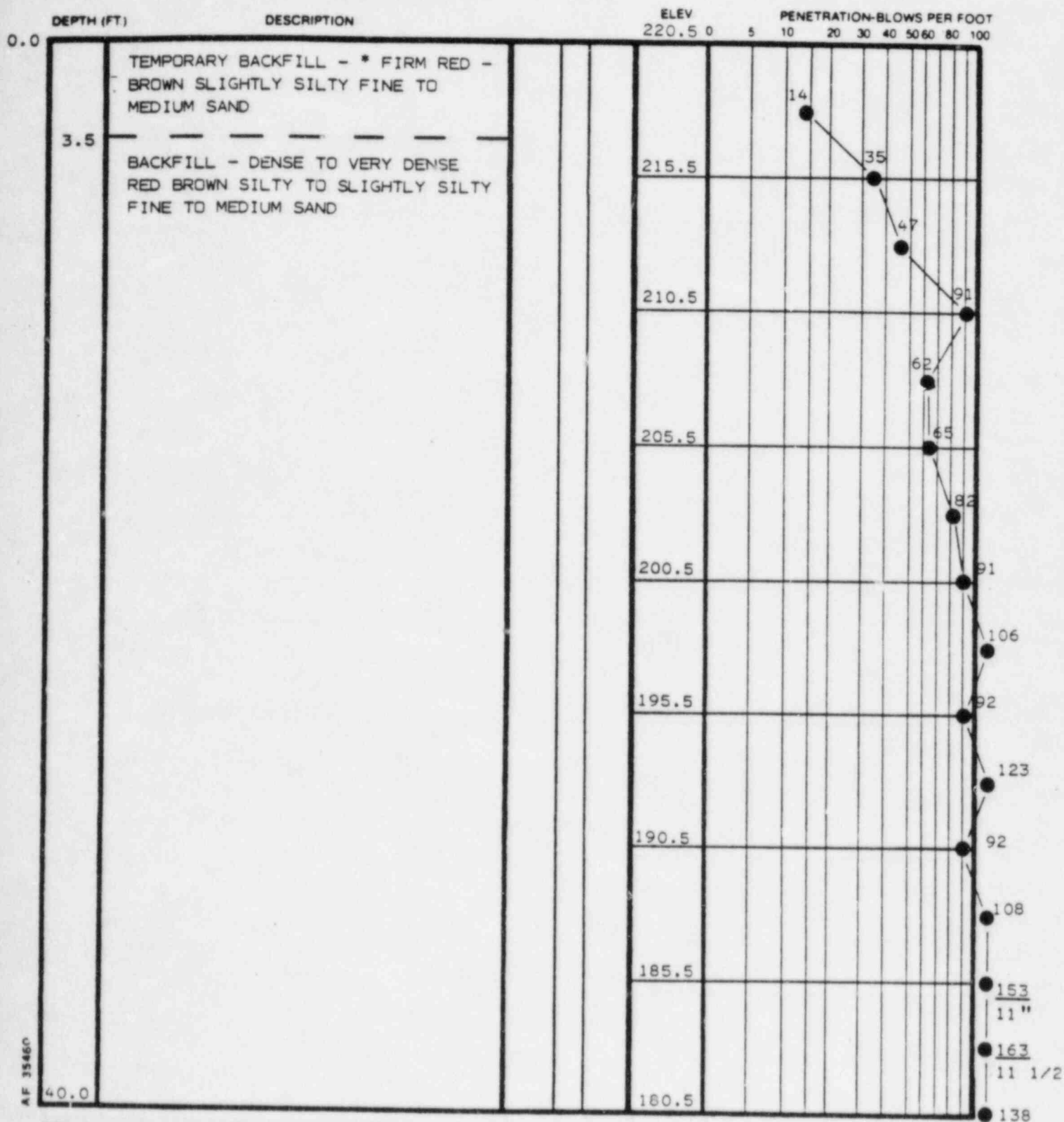
BORING NUMBER SPT-108

DATE DRILLED 6-12 & 13-85

JOB NUMBER 7429

PAGE 1 OF 3

Soil Test Boring Record



REMARKS:

* PLACED TO PROVIDE ACCESS TO BORING



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

DEPTH (FT)	DESCRIPTION	ELEV											PENETRATION-BLOWS PER FOOT										
		180.50	5	10	20	30	40	50	60	80	100												
40	BACKFILL-VERY DENSE RED-BROWN SLIGHTLY SILTY FINE TO MEDIUM SAND																				121		
		175.5																			178		
																					11 1/2		
																					191		
																					10		
		170.5																			179		
																					11"		
																					173		
																					180		
																					11"		
																					100		
																					5 1/2'		
																			100				
																			5"				
																				100			
																				6"			
																				100			
																				4"			
																				100			
																				4 1/2"			
																				100			
																				5 1/2"			
																				100			
																				4 1/2"			
																				100			
																				4"			
																				100			
																				5 1/2"			
																				100			
																				5"			

REMARKS:

REMARKS:

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												
		140.5	0	5	10	20	30	40	50	60	80	100				
	BACKFILL-VERY DENSE RED-BROWN SLIGHTLY SILTY FINE TO MEDIUM SAND															100 4
		135.5														100 5
59.3	MARL-SAMPLED AS VERY HARD GRAY															100 4
90.5	GREEN VERY SILTY FINE SANDY CLAY	130.5														58
	BORING TERMINATED															

REMARKS:



Law Engineering Testing Company

BORING COORDINATES

N: 77 + 65

E: 96 + 100

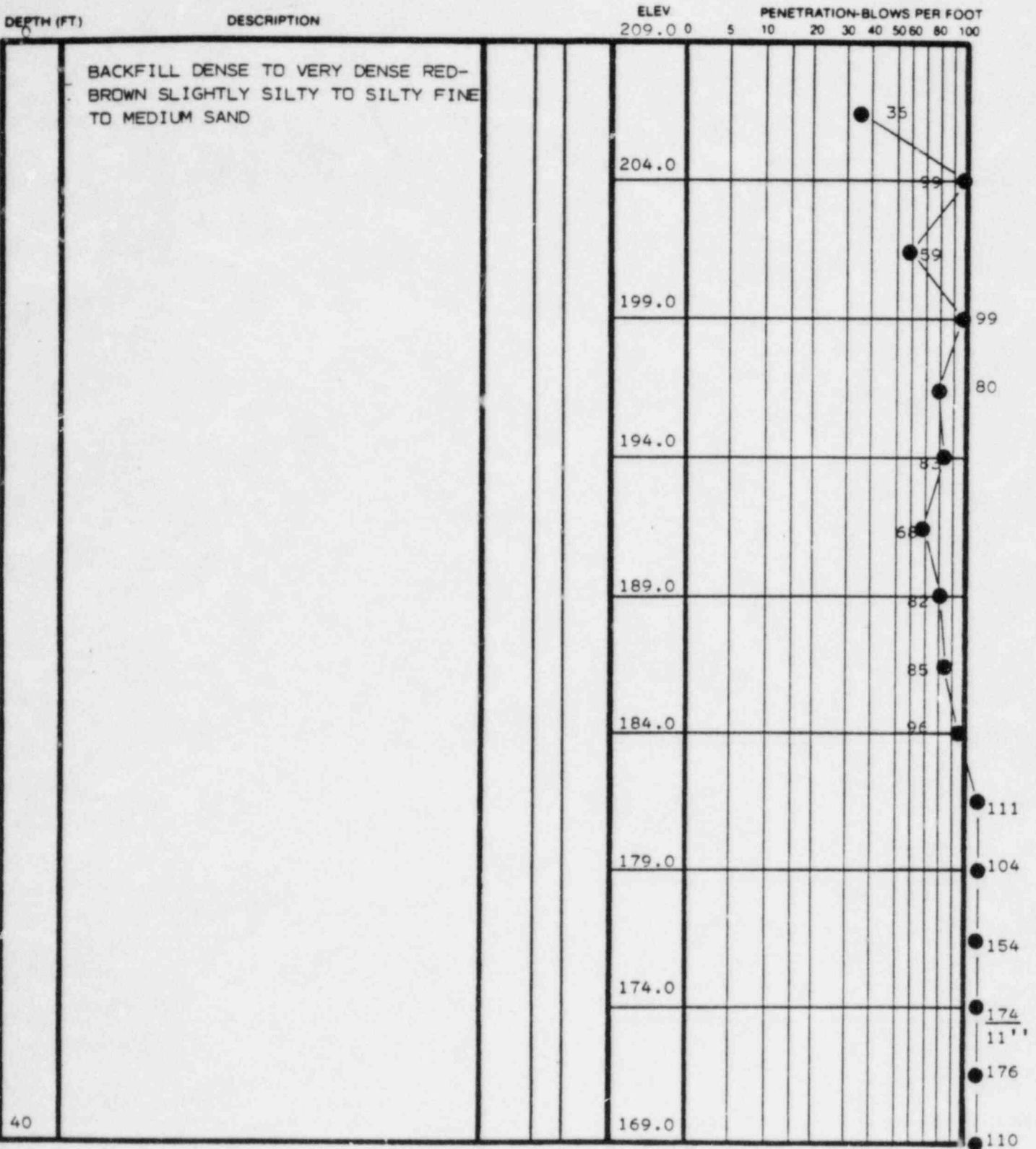
BORING NUMBER SPT-109

DATE DRILLED 6-6, 7&8-85

JOB NUMBER 7429

PAGE 1 OF 2

Soil Test Boring Record



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

DEPTH (FT)	DESCRIPTION	ELEV											PENETRATION-BLOWS PER FOOT											
		169.0	0	5	10	20	30	40	50	60	80	100												
	BACKFILL-VERY DENSE RED-BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND																							177 11
		164.0																						180 10 1/2'
																								184 11'
		159.0																						100 5"
																								100 5"
		154.0																						187 10'
																								100 5"
		149.0																						100 5"
																								100 1ST 6
		144.0																						100 1ST 5
																								100 5"
		139.0																						100 4"
																								100 1ST 4
		134.0																						125 1ST 6
																								100 5"
		129.0																						65
79.0	MARL-SAMPLED AS VERY HARD GRAY*																							
80.5	BORING TERMINATED																							

AF 3546AF 35460

REMARKS: *Green very clayey fine sandy silt.

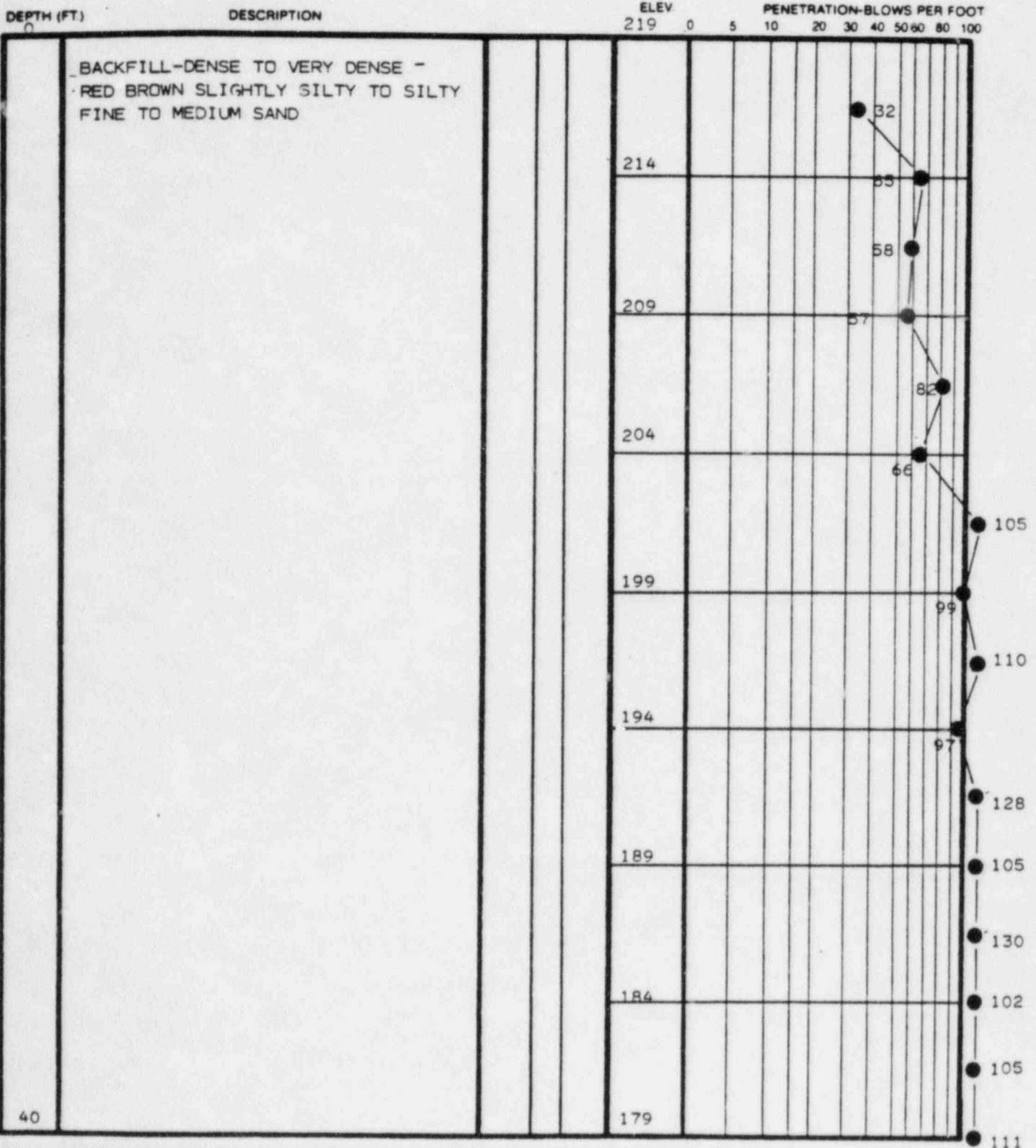


Law Engineering Testing Company

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

Soil Test Boring Record



REMARKS:



Law Engineering Testing Company

Soil Test Boring Record

BORING NUMBER SPT-110
DATE DRILLED 6-3-84-85
JOB NUMBER 7429
PAGE 2 OF 3

DEPTH (FT)	DESCRIPTION	ELEV		PENETRATION-BLOWS PER FOOT											
		179	0	5	10	20	30	40	50	60	80	100			
80	BACKFILL-VERY DENSE RED BROWN SLIGHTLY SILTY TO SILTY FINE TO MEDIUM SAND														123
		174													154
															190
		169													11
															156
															146
		164													159
															100
		159													5"
															172
															10 1/2"
		154													100
														4"	
		149												195	
														11"	
														115	
		144												1ST 6"	
														167	
														120	
														1ST 6"	
		139												100	
													4"		
														100	
														4"	
														100	
														5"	

REMARKS:

REMARKS:



BORING NUMBER SPT-110
DATE DRILLED 6-30-85
JOB NUMBER 7429
PAGE 3 OF 3

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

APPENDIX 3
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 VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 2	HOLE NO. 900	
SITE SOUTHEAST OF POWER BLOCK					COORDINATES N 7530 E 10119.5					ANGLE FROM HORIZ. 90°		BEARING ---			
BEGIN 6/6/85		COMPLETED 6/20/85		DRILLER KEN THAMES/LAW ENGINEERING		DRILL MAKE AND MODEL FAIRING 1500		HOLE SIZE 9 7/8 IN.		OVERBURDEN (FT.) 92.6 FT.		ROCK (FT.) 50 FT.		TOTAL DEPTH 142.6 FT.	
CORE RECOVERY (FT./%) 49.5/99%		CORE BOXES 8		SAMPLES		EL. TOP OF CASING 218.05 FT.		GROUND EL. 216.3 FT.		DEPTH/EL. GROUND WATER 100.96 FT./117.20 FT. (7/16/85)		DEPTH/EL. TOP OF ROCK (MARL) 92.6 FT./123.7 FT.			
SAMPLE HAMMER WEIGHT/FALL ---					CASING LEFT IN HOLE: DIA./LENGTH SEE OBSERVATION WELL REPORT					LOGGED BY: 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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.		
					LOSS IN G.P.A.	PRESSURE P.S.I.	TIME IN MINUTES								
9 7/8 INCH ROCKBIT									218			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				7.0					123.7			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											
	5.0	2.0*	40%	9.0					120			94.5 AND 96-97.2 FT. OYSTER SHELLS			
				6.0											
				6.0											
				2.5											
	2.0	4.6*	230%	1.3											
				5.5											
	3.0	3.4*	101%	2.7											
				2.4											
			6.6												
			6.1												
			11.3												
	5.0	3.5*	70%	9.7	0	20	8		110						
				27.2	0	30	8								
				5.7	0	40	8								
	3.0	3.0*	127%	5.9											
				5.0											
	2.0	1.7*	85%	3.0											
				2.8											
												100.0 - 100.0 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.		
												102.6 - 103.5 FT. HARD SANDY LIMESTONE			
												103.5 - 104.0 FT. FINE SANDY MARL			
												104.0 - 108 FT. MODERATELY SOFT MARL OYSTER SHELL CLAY - BROKEN ON REMOVAL FROM CORE BARREL			
												108 - 109 FT. LIMESTONE, HARD, SANDY FRACTURED DUE TO CORING AT 108 FT., 109 FT., 109.8 FT. AND 110 FT.			
												112 - 112.6 FT. SANDY LIMESTONE CORING FRACTURES AT 111 FT. AND 111.6 FT.			

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

SOUTHEAST OF POWER BLOCK

HOLE NO. 900



GEOLOGIC DRILL LOG										PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 2 OF 2	HOLE NO. 900
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES							
4 INCH CORE - 5 1/2 INCH OD BIT	5.0	5.3 [*]	106%	1.5				100	115			LIMESTONE AT 114 FT., 114.4 FT., 115.5 FT., 116 - 117.2 FT.		
				2.7										
				2.9										
				3.1	0	40	10							
					3.3	0	50	10				FRACTURES FROM CORING 118 FT., 119 FT., 119.3 FT., AND 119.4 - 123.2 FT. 118.2 FT. - 119.2 FT. LIMESTONE NODULES		
					2.9	0	60	10						
					3.0									
					3.8									
	5.0	5.0	100%	3.8				90	120			121.8 - 122.2 FT. LIMESTONE 123.4 - 123.5 FT. SILTY, HARD MARL 124 - 125.5 FT. LIMESTONE		
				4.6										
				3.4										
				4.8										
					4.5					125			127.6 - 128 FT. SILTY, HARD MARL 128 - 129.7 FT. LIMEY 129.7 - 130.6 FT. SOFT PLASTIC 130.6 - 132.6 FT. SILTY MARL	
					4.9									
					3.6	0	50	8						
					3.3	0	60	8						
					2.9	0	70	8		130			132.6 - 137.6 FT. FIRM, SANDY LIMEY AT 133.4 FT., 134.5 - 135 FT.	
					4.5									
					1.8									
					1.1									
					2.9					135			137.6 - 142.6 FT. FIRM, SILTY	
					1.6									
					2.7									
					1.5	0	50	10						
	5.0	4.8 [*]	96%	1.6	0	60	10	80				POROUS STONE (CASAGRANDE) PIEZOMETER INSTALLED IN HOLE, OPEN INTERVAL 133.8 FEET - 140.7 FEET.		
				1.5	0	70	10							
				1.4	0									
				1.3										
					1.8				73.7	140			BOTTOM OF HOLE 142.6 FEET	
					1.9									
					2.5									

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

SOUTHEAST OF POWERBLOCK

HOLE NO. 900

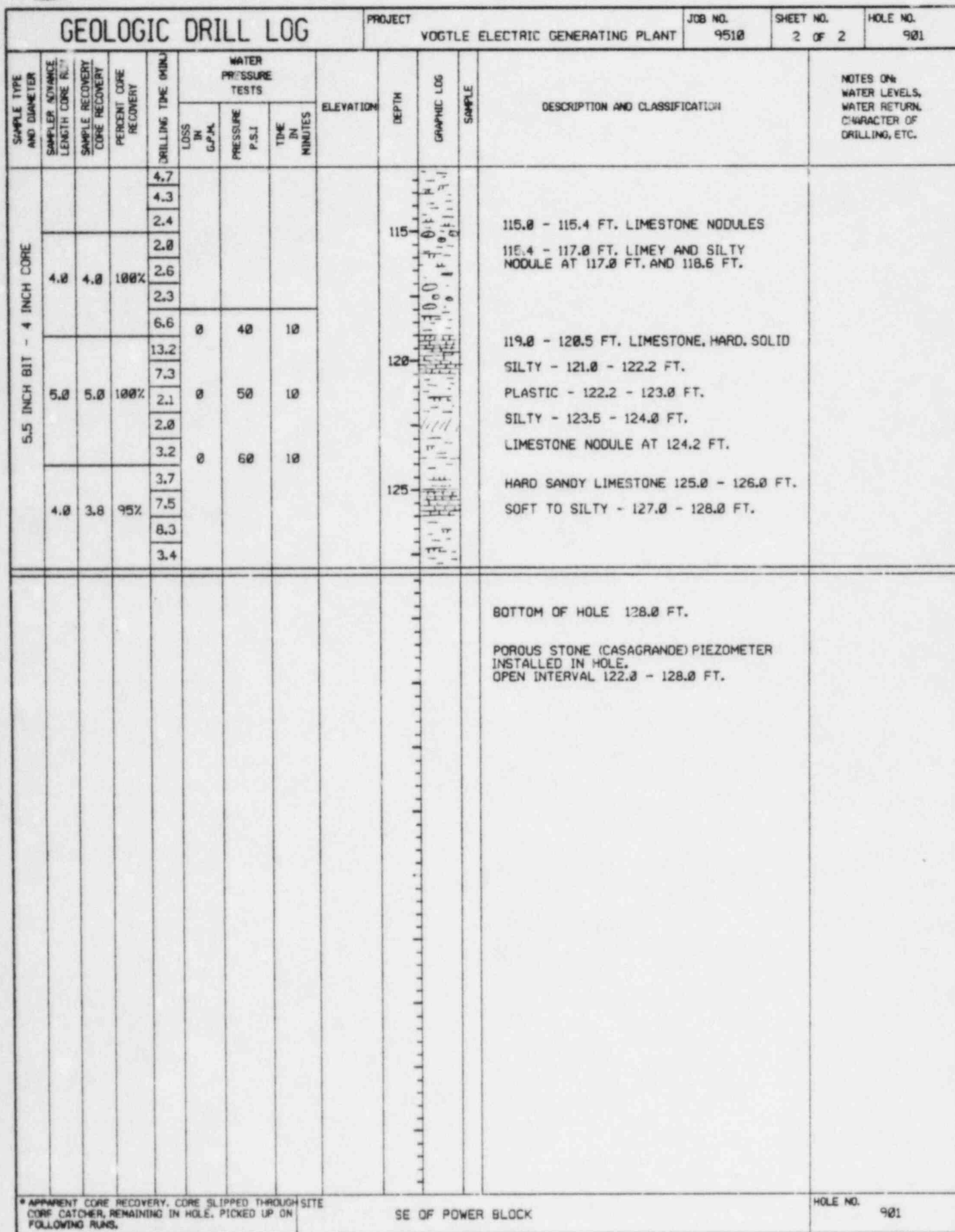


GEOLOGIC DRILL LOG				PROJECT VOOTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 2	HOLE NO. 901					
SITE SE OF POWER BLOCK			COORDINATES N 7538 E 10104.5			ANGLE FROM HORIZ. 90°		BEARING ---					
BEGIN 6/21/85	COMPLETED 7/7/85	DRILLER H. COLLINS/LAW ENGINEERING	DRILL MAKE AND MODEL MOBILE 53		HOLE SIZE 9-7/8 IN.	OVERBURDEN (FT.) 91.62 FT.	ROCK (FT.) 37.4 FT.	TOTAL DEPTH 128.0 FT.					
CORE RECOVERY (FT./%) 33.8/93%		CORE BOXES 5	SAMPLES	EL. TOP OF CASING 220.75 FT.	GROUND EL. 215.58 FT.	DEPTH/EL. GROUND WATER 101.57 FT./119.18 FT. (7/16/85)		DEPTH/EL. TOP OF ROCK (MARL) 91.62/123.96 FT.					
SAMPLE HAMMER WEIGHT/FALL ---		CASING LEFT IN HOLE: DIA./LENGTH SEE OBSERVATION WELL REPORT			LOGGED BY: 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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES						
9-7/8 IN. TRICONE BIT												0.0 - 91.62 FT. BACKFILL: SEE LOG OF SPT-105	ROCKBIT DRILLING WITH REVERT/WATER DRILLING FLUID.
5.5 IN. CORE BIT	2.5	2.2*	88%	3.0								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.
				5.2								95.25 - 95.75 FT. SANDY CLAY, CALCAREOUS, HARD.	
				14.7								95.75 - 99.1 FT. OYSTER SHELLS.	
				2.8									
				5.5									
	5.0	4.8*	96%	2.8									
				2.3									
				2.3									
				5.0									
				4.8									
			3.1										
			7.5										
			3.1										
			.8										
			10.5										
			1.2										
			9.8										
			2.7										
			5.1										
			2.0										
			3.1										
	5.0	5.0	100%										

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

SE OF POWER BLOCK

HOLE NO.
901



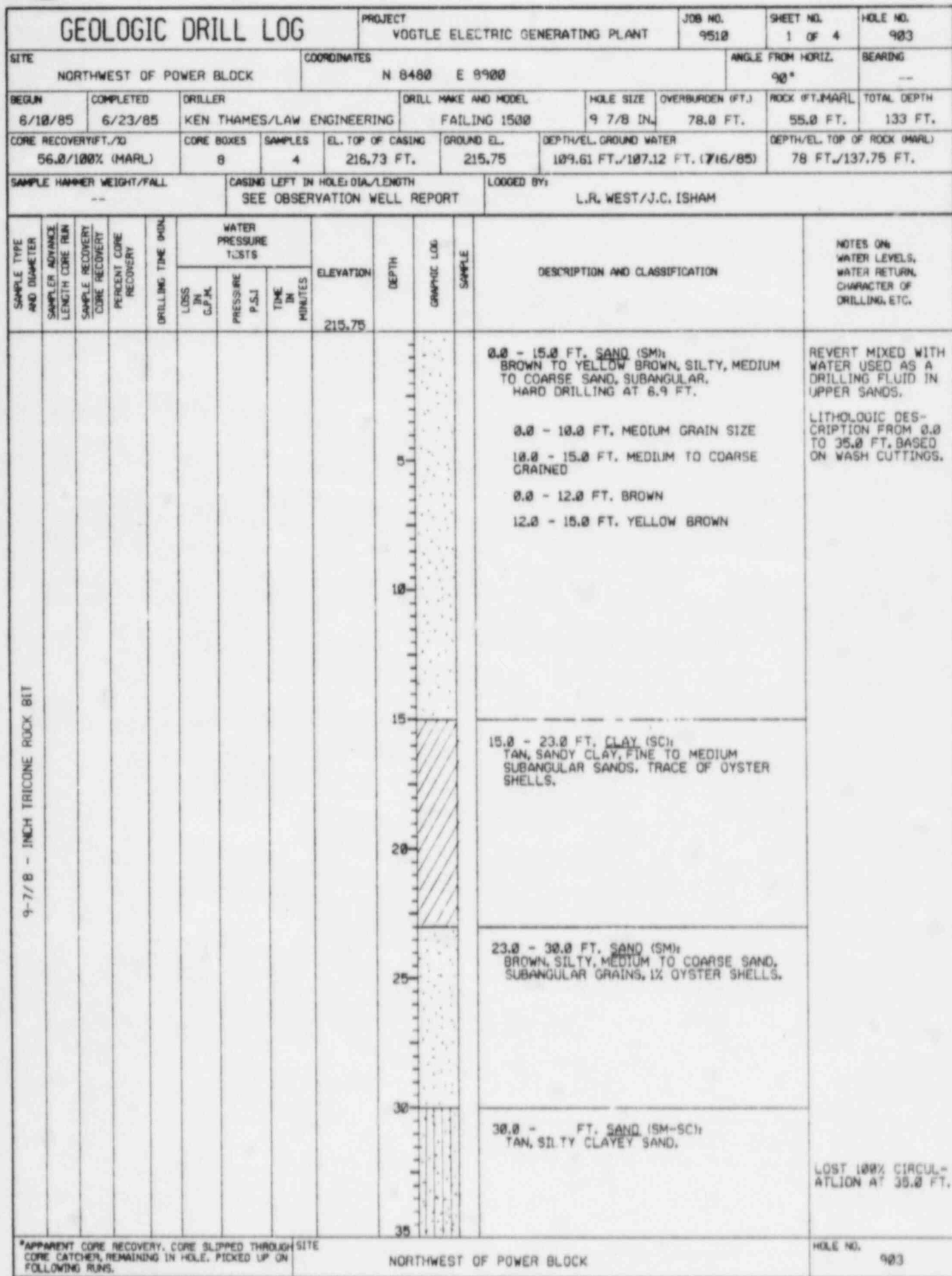


GEOLOGIC DRILL LOG				PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 1	HOLE NO. 902					
SITE SE OF POWER BLOCK		COORDINATES N 7543.5 E 10110.5				ANGLE FROM HORIZ. 90°		BEARING ---					
BEGIN 6/23/85	COMPLETED 7/3/85	DRILLER H. COLLINS/LAW ENGINEERING		DRILL MAKE AND MODEL MOBILE 53		HOLE SIZE 9-7/8 IN.	OVERBURDEN (FT.) 91.0 FT.	ROCK (FT.) 17.0 FT.	TOTAL DEPTH 108.0 FT.				
CORE RECOVERY(FT./%) 15.6/95%		CORE BOXES 2	SAMPLES	EL. TOP OF CASING 221.11 FT.	GROUND EL. 215.97 FT.	DEPTH/EL. GROUND WATER 94.05 FT./126.26 FT. (7/16/85)		DEPTH/EL. TOP OF ROCK (MARL) 91/124.97					
SAMPLE HAMMER WEIGHT/FALL		CASING LEFT IN HOLE: DIA./LENGTH SEE OBSERVATION WELL REPORT				LOGGED BY: 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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES						
9-7/8 IN. TRICONE ROCK BIT								215.97				0.0 - 91.0 FT. BACKFILL; SEE LOG OF SPT-105.	DRILLED WITH ROCK BIT AND REVERT/ WATER DRILLING FLUID.
5.5 IN. CORE BIT, 4 IN. CORE	5.0	4.7	94%	6.7								91.5 - 108.0 FT. MARL; BLUE GRAY, SILTY CALCAREOUS CLAY, FIRM TO MODERATELY HARD; LOCAL LIMESTONE NODULES AND LENSES.	CORE DRILLING WITH CLEAR WATER AS DRILLING FLUID.
				5.8								93.4 - 95.0 FT. LIMESTONE, SANDY.	LEFT 1.3 FT. IN HOLE, PICKED UP ON SECOND TRY.
				12.3								95.0 - 95.2 FT. CLAYEY, PLASTIC, FEW OYSTER SHELLS.	
				3.0								95.2 - 96.5 FT. FIRM, SANDY CLAY WITH ABUNDANT OYSTER SHELLS.	
				6.0								96.5 - 98.3 FT. HARD, ABUNDANT SHELLS. HIGHLY FRACTURED BY CORING.	
	3.5	2.9	83%	5.0								98.7 - 100.0 FT. SOFT, PLASTIC.	
				6.3									
				7.1									
				11.7									
				2.4									
	5.0	5.0	100%	2.0	0	40	10					100.0 - 100.3 FT. SILTY CLAY, PLASTIC TO 102.25.	
				9.3								102.25 - 103.0 FT. LIMESTONE, SILTY CLAY.	
				3.0	0	50	10					103.0 - 105.0 FT. PLASTIC WITH ABUNDANT SHELLS.	
				2.0	0	60	10					105.0 - 105.2 FT. HARD SANDY CLAY.	
				2.6								105.2 - 108.0 FT. PLASTIC WITH SHELLS.	
	3.0	3.0	100%	2.8									
				3.0									
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 SITE
CORE CATCHER, REMAINING IN HOLE. PICKED UP ON
FOLLOWING RUNS.

SE OF POWER BLOCK

HOLE NO. 902





GEOLOGIC DRILL LOG										PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9518	SHEET NO. 2 OF 4	HOLE NO. 983
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (HOURS)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES							
5.5-INCH OD/4.0 ID SPLIT TUBE CORE BARREL													DRILLED WITHOUT CIRCULATION 35.0 - 78.0 FT. LITHOLOGIC DESCRIPTIONS ARE BASED ON HOLE 985. CONTACTS ARE APPROXIMATE.	
									40					
									45			44.5 - 77.3 FT. LIMESTONE; TAN TO CREAM, FOSSILIFEROUS (COQUINA), HARD TO VERY HARD, SOME SUBROUNDED, FINE TO MEDIUM GRAINED CEMENTED SAND.		
									50					
									55			57.0 - 58.0 FT. GRAYISH BLACK HARD SHALE.		
									60					
									62			62.2 - 62.0 FT. VERY HARD CEMENTED SANDSTONE LENSE.		
									64			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).		
									70					
								75						

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

NORTHWEST OF POWER BLOCK

HOLE NO. 983



GEOLOGIC DRILL LOG										PROJECT	JOB NO.	SHEET NO.	HOLE NO.	
										VOGTLE ELECTRIC GENERATING PLANT	9518	3 OF 4	983	
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
					LOSS IN G.P.A.	PRESSURE P.S.I.	TIME IN MINUTES							
4-INCH SPLIT TUBE CORE BARREL/5.5-INCH ID				3.5				137.75				TOP OF MARL	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	4.5	90%	5.0										
				4.0										
				5.5										
				4.0										
				3.0										
	3.0	3.5	117%	8.0										
				13.0										
				9.0										
	5.0	3.0	76%	10.0	0	30	8							
				6.0	0	40	8							
				13.0	0	50	8							
				4.0	0	40	8							
	4.0	3.1	78%	12.0	0	30	8							
				11.0										
				4.0										
				6.0										
	1.0	0	0%	5.0										
	1.0	4.1	410%	30.0										
				5.0										
	5.0	5.0	100%	15.0	0	35	8							
				7.0	0	45	8							
				15.0	0	55	8							
				7.0	0	45	8							
				7.0	0	35	8							
	5.0	5.0	100%	8.0										
				7.0										
				9.0										
				10.0										
				14.0										
	5.0	3.2	64%	9.0	0	40	8							
				20.0	0	50	8							
				13.0	0	61	8							
				12.0	0	50	8							
				8.0	0	40	8							
	3.0	3.4	113%	10.0										
				12.0										
	2.0	3.4	170%	11.0										
* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH SITE CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUN.													HOLE NO. 983	
NORTHWEST OF POWER BLOCK														

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

GEOLOGIC DRILL LOG								PROJECT VOOTLE ELECTRIC GENERATING PLANT	JOB NO. 9510	SHEET NO. 4 OF 4	HOLE NO. 903			
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRIILING TIME (MIN.)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN CHARACTER OF DRILLING, ETC.	
	2.0	3.4*	170%	9.0	LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES							
5.5 IN. SPLIT TUBE				TEST #3								LIMESTONE NODULES AT 104.9 FT., 105.7 FT., 106.0 - 109.2 FT. ABUNDANT LIMESTONE NODULES (20%).		
					8	45	8						106.0 - 116.0 FT. LESS THAN 5% SHELLS.	
					8	55	8							
					8	66	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.	
					8	55	8						CALCAREOUS ZONE 113.9 - 115.6 FT	
					8	45	8						116.0 - 133.0 FT. HARD CALCAREOUS ZONE	
5.5 IN. SOLID TUBE BARREL				6.0									WAXED CORE SAMPLE #3 128.4 - 129.4 FT. 500 GRAMS IN GLASS JAR SAMPLE #4 FROM 131 FT. DEEP GOUGES (1/2 IN.) CAUSED BY THE CORE CATCHER FROM 121.0 - 131.0 FT.	
				3.0										
				2.0										
				3.0										
				3.0										
				3.0										
				3.0										
				4.1		48	8							
				2.0		58	8							
				2.0		68	8							
5.5 IN. SOLID TUBE BARREL				1.5		50	8							
				1.5		48	8							
				2.0										
				2.0										
				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 SITE CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUNS.

NORTHWEST OF POWER BLOCK



GEOLOGIC DRILL LOG				PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 3	HOLE NO. 904				
SITE NW OF POWER BLOCK		COORDINATES N 8465 E 8900				ANGLE FROM HORIZ. 90°		BEARING --				
BEGIN 7/2/85	COMPLETED 7/9/85	DRILLER K. THAMES/LAW ENGINEERING		DRILL MAKE AND MODEL FAILING 1500		HOLE SIZE 9-7/8 IN.	OVERBURDEN (FT.) 78.8 FT.	ROCK (FT.) (MARL) 9.2 FT.	TOTAL DEPTH 88.0 FT.			
CORE REC. VELOCITY (FT./MIN) 9.2/100% (MARL)		CORE BOXES 2	SAMPLES 8	EL. TOP OF CASING --	GROUND EL. 215.75 FT.	DEPTH/VEL. GROUND WATER --		DEPTH/EL. TOP OF ROCK (MARL) 78.8 FT./136.95 FT.				
SAMPLE HAMMER WEIGHT/FALL --		CASING LEFT IN HOLE: DIA./LENGTH SEE OBSERVATION WELL REPORT				LOGGED BY: 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		ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN C.F./A.	PRESSURE P.S.I.						
9-7/8 INCH TRICONE ROCK BIT											0.0 - 5.0 FT. SAND (SM): RED, SILTY, SUBROUNDED, FINE GRAINED SAND (SM).	WATER MIXED WITH REVERT USED AS A DRILLING MUD FROM 0.0 - 88.0 FT. LITHOLOGIC DES- SCRIPTION FROM 0.0 - 77.0 FT. BASED ON WASH SAMPLES.
										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.	

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

NW OF POWER BLOCK

HOLE NO. 904

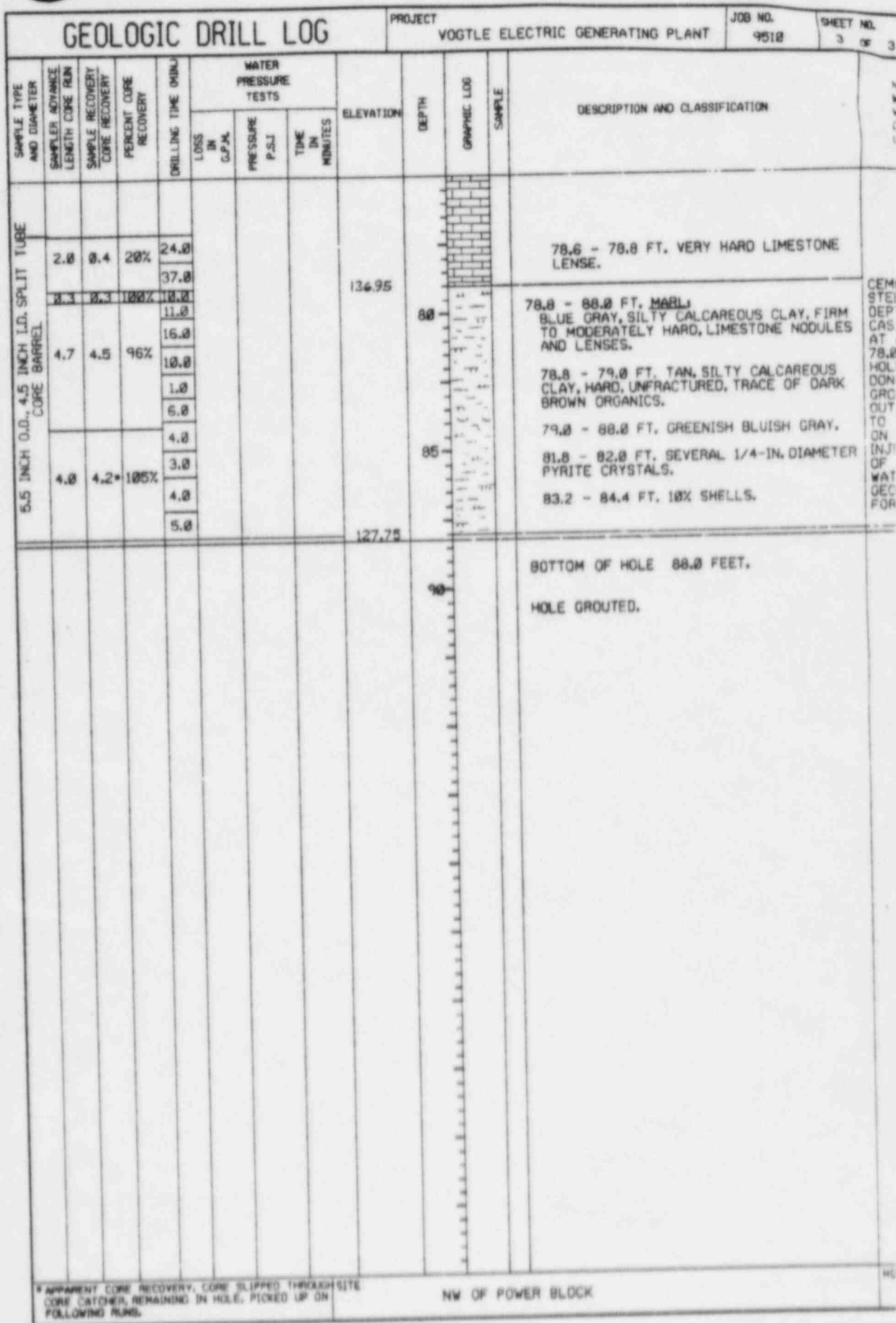


GEOLOGIC DRILL LOG										PROJECT		JOB NO.	SHEET NO.	HOLE NO.
										VOGTLE ELECTRIC GENERATING PLANT		9510	2 OF 3	904
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES							
9-7/8 INCH TRICONE ROCK BIT												35.5 - 46.0 FT. SAND (SM); TAN, SILTY, FINE TO MEDIUM, SOME COARSE GRAINED SAND; TRACE OF SHELLS.		
									40					
									45					
									50			46.0 - 78.0 FT. LIMESTONE; TAN TO CREAM, FOSSILIFEROUS (COQUINA), HARD TO VERY HARD, SOME SUBROUNDED FINE TO MEDIUM GRAINED CEMENTED SAND.		
									55					
									60					
									65			VERY HARD, CEMENTED CALCAREOUS SANDSTONE FROM 62.0 - 78.0 FT.	DRILL CHATTER 62.0 - 78.0 FT. VERY HARD DRILLING.	
									70					
									75					
									78				LOST ALL CIRCULATION FROM 67.0 - 88.0 FT. EXTREMELY HARD DRILLING 70.0 - 71.0 FT. SOFT ZONE 71.0 - 71.3 FT.	

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

NW OF POWER BLOCK

HOLE NO. 904





GEOLOGIC DRILL LOG										PROJECT	JOB NO.	SHEET NO.	HOLE NO.			
										VOGTLE ELECTRIC GENERATING PLANT				9518	3 OF 3	984
SAMPLE TYPE AND DIAMETER	SAMPLE ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (HOURS)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.			
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES									
8.5 INCH O.D., 4.5 INCH I.D. SPLIT TUBE CORE BARREL	2.8	8.4	28%	24.0				134.95	88			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 78.0 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.			
	3.8	11.7	100%	18.0												
	4.7	4.5	96%	10.0												
				1.0												
				6.8												
				4.0												
				3.0												
				4.0												
				5.0												
														127.75		
												81.0 - 82.0 FT. SEVERAL 1/4-IN. DIAMETER PYRITE CRYSTALS.				
												79.0 - 80.0 FT. GREENISH BLuish GRAY.				
												78.0 - 79.0 FT. TAN, SILTY CALCAREOUS CLAY, HARD, UNFRACTURED, TRACE OF DARK BROWN ORGANICS.				
												78.0 - 88.0 FT. MARL BLUE GRAY, SILTY CALCAREOUS CLAY, FIRM TO MODERATELY HARD, LIMESTONE NODULES AND LENSES.				
BOTTOM OF HOLE 88.0 FEET.																
HOLE GROUTED.																
APPARENT CORE RECOVERY, CORE SLIPPED THROUGH SITE CORE CATCHER, REMAINING IN HOLE, PICKED UP ON FOLLOWING RUN.																
NW OF POWER BLOCK																
													HOLE NO. 984			



GEOLOGIC DRILL LOG										PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 1	HOLE NO. 984A	
SITE NW OF POWER BLOCK					COORDINATES N 8465 E 8890					ANGLE FROM HORIZ. 90°		BEARING ---			
BEGIN 7/10/85		COMPLETED 7/10/85		DRILLER H. COLLINS/LAW ENGINEERING		DRILL MAKE AND MODEL MOBILE 53		HOLE SIZE 9-7/8 IN.		OVERBURDEN (FT.) 15.0 FT.		ROCK (FT.) ---		TOTAL DEPTH 15.0 FT.	
CORE RECOVERY (FT./10) ---			CORE BOXES ---		SAMPLES ---		EL. TOP OF CASING ---		GROUND EL. 215.75 F.T.		DEPTH/EL. GROUND WATER ---			DEPTH/EL. TOP OF ROCK (MARL) ---	
SAMPLE HAMMER WEIGHT/FALL ---					CASING LEFT IN HOLE: DIA./LENGTH NONE					LOGGED BY: J.C. ISHAM					
SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (HOUR)	WATER PRESSURE TESTS			ELEVATION	DEPTH	CASING LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.		
					LOSS IN C.F.A.	PRESSURE P.S.I.	TIME IN MINUTES								
9 7/8-INCH TRUCONE ROCK BIT									5			0.0 - 5.0 FT. SAND (SM); RED, SILTY, SUBROUNDED, FINE GRAINED.	WATER MIXED WITH REVERT USED AS A DRILLING MUD. ENCOUNTERED SEWER LINE AT A DEPTH OF 15.0 FT. HOLE ABANDONED, MOVED 5.0 FT. WEST AND STARTED HOLE 984B. SEE 984B FOR CON- TINUATION.		
								10			5.0 - 15.0 FT. SAND (SM); TAN, SILTY, SUBROUNDED, FINE TO MEDIUM GRAINED.				
								215.75	15			BOTTOM OF HOLE 15.0 FEET. HOLE GROUTED			

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

NW OF POWER BLOCK

HOLE NO.
984A



GEOLOGIC DRILL LOG				PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 2	HOLE NO. 9848					
SITE NW OF POWER BLOCK		COORDINATES N 8464 E 8885				ANGLE FROM HORIZ. 90°		BEARING ---					
BEGIN 7/10/85	COMPLETED 7/14/85	DRILLER H. COLLINS/LAW ENGINEERING	DRILL MAKE AND MODEL MOBILE 53		HOLE SIZE 9-7/8 IN.	OVERBURDEN (FT.) 76.5 FT.	ROCK (FT.) MARL 20.2 FT.	TOTAL DEPTH 96.7 FT.					
CORE RECOVERY (FT./%) 14.7/100% (MARL)	CORE BOXES 3	SAMPLES 5	EL. TOP OF CASING ---	GROUND EL. 215.75 FT.	DEPTH/EL. GROUND WATER 93.8 FT./122.43 FT. (7/16/85)		DEPTH/EL. TOP OF ROCK (MARL) 76/5 FT./139.25 FT.						
SAMPLE HAMMER WEIGHT/FALL ---		CASING LEFT IN HOLE/DIA./LENGTH SEE OBSERVATION WELL REPORT			LOGGED BY: 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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOGS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES						
ROCK BIT												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.
												5.0 - 15.0 FT. SAND (SM); TAN.	
												15.0 - 35.5 FT. CLAY (SC); TAN, SANDY.	
												35.5 - 46.0 FT. SAND (SM); TAN.	
9-7/8 IN.												46.0 - 76.5 FT. LIMESTONE; TAN, FOSSILIFEROUS (COQUINA).	67.0 FT. LOST CIRCULATION, VERY HARD DRILLING.
												62.0 - 76.5 FT. CEMENTED CALCAREOUS SANDSTONE, VERY HARD.	
												69.5 - 78.3 FT. VERY HARD LIMESTONE LENSE.	
												74.5 - 75.0 FT. TAN SILTSTONE LENSE, HARD.	
4.5 IN. I.D. CORE BARREL, 5.5 IN. O.D.	5.0	2.4	48%	2.3								76.5 - 96.0 FT. MARL; SILTY, CALCAREOUS CLAY, HARD, UNFRAC- TURED, SOME WHITE SHELLS.	CEMENTED 6 IN. STEEL CASING TO A DEPTH OF 85.0 FT. WATER USED AS A DRILLING FLUID FROM 85.0 - 96.7 FT.
				10.0								76.5 - 78.0 FT. TAN.	
	1.5	1.0	67%	2.2								78.0 - 96.7 FT. GREENISH, BLuish GRAY.	
				2.3									
9-7/8 IN. ROCK BIT				6.0									
				34.0									
				36.0									
				18.0									
4.5 IN. I.D. CORE BARREL	4.5	3.2	71%	4.0								87.6 - 88.3 FT. LIMESTONE NODULE.	
				5.7									
				4.0									
				5.9	0	30	0						
4.5 IN. I.D. CORE BARREL	5.0	3.6	72%	3.0	0	40	0						
				5.6	0	50	0						
				3.0	0	40	0						
				2.3	0	30	0						

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

NW OF POWER BLOCK

HOLE NO. 9848



GEOLOGIC DRILL LOG

PROJECT

VOGTLE ELECTRIC GENERATING PLANT

JOB NO.
9518

SHEET NO.
2 OF 2

HOLE NO.
984B

SAMPLE TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN.)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES						
5.5 IN. O.D. CORE BARREL	3.8	4.4*	147%	4.4								91.2 - 91.5 FT. LIMESTONE NODULE.	MARL SAMPLES:
				4.7									#1 92.3 (JAR)
				2.3									#2 92.3 - 93.0
				7.8								94.7 - 95.5 FT. LIMESTONE NODULE.	#3 94.0 (JAR)
	3.7	3.7	100%	5.2					95				#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 SITE
CORE CATCHER, REMAINING IN HOLE. PICKED UP ON
FOLLOWING RUNS.

NW OF POWER BLOCK

HOLE NO.
984B



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°		--				
BEGIN	COMPLETED	DRILLER	DRILL MAKE AND MODEL		HOLE SIZE	OVERBURDEN (FT.)	ROCK (FT.)	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. (7/15/85)		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		ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.A.	PRESSURE P.S.I.	TIME IN MINUTES	215.75				
								210.75	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.
									10		5.0 - 15.0 FT. SAND (SM): TAN, SILTY, SUBROUNDED, FINE TO MEDIUM GRAINED.	
								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.	

9-7/8 IN. TRICONE ROCK BIT

*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 (HRS)	WATER PRESSURE TESTS		ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.M.	PRESSURE P.S.I.						
9-7/8 IN. TRICONE ROCK BIT							171.25	40				
								45			44.5 - 77.3 FT. LIMESTONE; TAN TO CREAM, FOSSILIFEROUS (COQUINA), HARD TO VERY HARD, SOME SUBROUNDED, FINE TO MEDIUM GRAINED CEMENTED SAND.	44.5 - 61.0 FT. FLUID LOSS APPROXIMATELY 5 GAL./FT. OF DRILL ADVANCEMENT.
								50				
								55			57.0 - 58.0 FT. GRAYISH BLACK HARD SHALE.	
								60				
								65			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).	1 HOUR DRILLING TIME FOR SANDSTONE LENSE. 61.0 - 71.0 FT. FLUID LOSS APPROXIMATELY 10 GAL./FT. OF DRILL ADVANCEMENT.
								70				

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

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	SAMPLE ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (HOURS)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES						
4.5 IN. I.D. SPLIT TUBE CORE BARREL, 5.5 IN. O.D.				8.0				138.45					USED WATER AS DRILLING FLUID FROM 77.0 - 116.0 FT.
				6.0									
	5.0	4.8	96%	4.0						80			77.3 - 116.0 FT. MARL SILTY CALCAREOUS CLAY, HARD, UNFRAC- TURED, TRACE OF DARK BROWN ORGANICS.
				3.0									77.3 - 78.3 FT. TAN.
				4.0									78.3 - 116.0 FT. GREENISH BLuish GRAY.
				14.0									82.6 - 84.6 FT. 10% SHELLS.
	5.0	4.4	88%	7.0						85			84.6 - 88.5 FT. INTERBEDDED SILTY CALCAREOUS CLAY AND SILTY SANDY CAL- CAREOUS CLAY.
				3.0									
				3.0									
	1.5	1.2	80%	3.0									88.5 - 91.15 FT. 10% SHELLS.
				1.0									
				1.9	0	30	8						
	5.0	4.3	86%	1.8	0	40	8			90			91.15 - 91.5 FT. LIMESTONE LENSE.
				3.7	0	50	8						91.5 - 92.4 FT. SEVERAL LIMESTONE NODULES.
				4.8	0	40	8						92.4 - 93.9 FT. 10% SHELLS.
				2.1	0	30	8						
	4.0	4.7	118%	2.7						95			95.6 - 96.3 FT. LIMESTONE LENSE.
				2.0									
				6.0									
				3.8									97.5 - 98.0 FT. LIMESTONE LENSE.
	5.0	4.3	86%	4.8						100			98.0 - 103.8 FT. SEVERAL LIMESTONE NODULES.
				3.5									
				3.3									
				3.7									
				2.5									
	4.0	4.7	118%	2.3	0	40	8			105			103.8 - 105.6 FT. CLAYEY.
				3.0	0	50	8						
				2.3	0	60	8						105.6 - 112.0 FT. SEVERAL LIMESTONE NODULES.
				3.7	0	50	8						
	5.0	4.6	92%	3.0	0	40	8			110			
				4.2									
				3.3									
				4.0									
				4.6									
				3.7									
	4.5	4.9	109%	2.9									
				3.3									
				2.0									
* APPARENT CORE RECOVERY. CORE SLIPPED THROUGH SITE CORE CATCHER, REMAINING IN HOLE. PICKED UP ON FOLLOWING RUNS.					SITE			NW OF POWER BLOCK					HOLE NO. 905

HOLE NO.	905
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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°		---					
BEGIN		COMPLETED		DRILLER		DRILL MAKE AND MODEL		HOLE SIZE		OVERBURDEN (FT.)		ROCK (FT.)		TOTAL DEPTH	
5/27/85		5/28/85		KEN THAMES/LAW ENGINEERING		FAILING 1500		6-7/8 IN.		66.3 FT.		MARL 1.7 FT.		68.0 FT.	
CORE RECOVERY (FT./10)		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	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY CORE RECOVERY	PERCENT CORE RECOVERY	DRILLING TIME (MIN)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.		
					LOSS IN G.P.A.L.	PRESSURE P.S.I.	TIME IN MINUTES								
6-7/8 IN. TRICONE ROCK BIT								207.0				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				5.0 - 15.0 FT. SILTY CLAY; RED, TRACE BROWN, 1% SAND, FINE GRAINED.			
								180				15.0 - 20.0 FT. SILTY SAND; TAN, FINE GRAINED, 10% LIMESTONE, WHITE, WEATHERED.			
												20.0 - 28.0 FT. CLAY; TAN, PLASTIC, 10% OYSTER SHELLS. 25.0 FT. INCREASE IN OYSTER SHELLS.			
												28.0 - 35.0 FT. SAND; FINE GRAINED, 40 - 50% OYSTER SHELLS.			
												35.0 - 36.0 FT. CLAY; PLASTIC, TAN, SANDY, 30% OYSTER SHELLS.			
												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).			
												46.0 - 50.0 FT. SAND; SILTY - DECREASE IN OYSTER SHELLS.			
												50.0 - 60.0 FT. SAND; SILTY, FINE GRAINED, 1% OYSTER SHELLS.			
												58.5 FT. SILT, TAN			
												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.			
								139.0				BOTTOM OF HOLE 68.0 FEET.			

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

SWITCH YARD

HOLE NO.

808



GEOLOGIC DRILL LOG				PROJECT		JOB NO.	SHEET NO.	HOLE NO.					
				VOGTE ELECTRIC GENERATING PLANT		9510	1 OF 2	809					
SITE		COORDINATES				ANGLE FROM HORIZ.		BEARING					
NW OF POWER BLOCK		N 8320 E 7860				90°		--					
BEGIN	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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN C.F.M.	PRESSURE P.S.I.	TIME IN MINUTES						
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. WATER LEVEL ON 5/25 - 38.0 FT. HARD DRILLING.
								10			10.0 - 20.0 FT. SILTY SAND: FINE GRAINED, RED.		
								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.		
								40			37.0 - 40.0 FT. GRAVEL: SMALL, SUBROUNDED, QUARTZ, LIMESTONE, WHITE AND BLACK, 40% CLAY, TAN.		
								180			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			60.0 - 77.0 FT. SILTY SAND: QUARTZ, FINE GRAINED, SUBROUNDED, TRACE LIMESTONE, WHITE.		
								160					

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

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 (HOURS)	WATER PRESSURE TESTS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES							
7-7/8 IN. TRICONE ROCK BIT								145.8						
								131.8	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.	
								132.8	90			89.0 - 90.0 FT. MARL		
												BOTTOM OF HOLE 90.0 FEET.	COMPLETED AS OB- SERVATION 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°		--					
BEGIN	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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES						
5-7/8 IN. TRICONE BIT													
								200	10			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.
									20				
									30				
									40				
									50				
									60				
									70				
									80				
												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

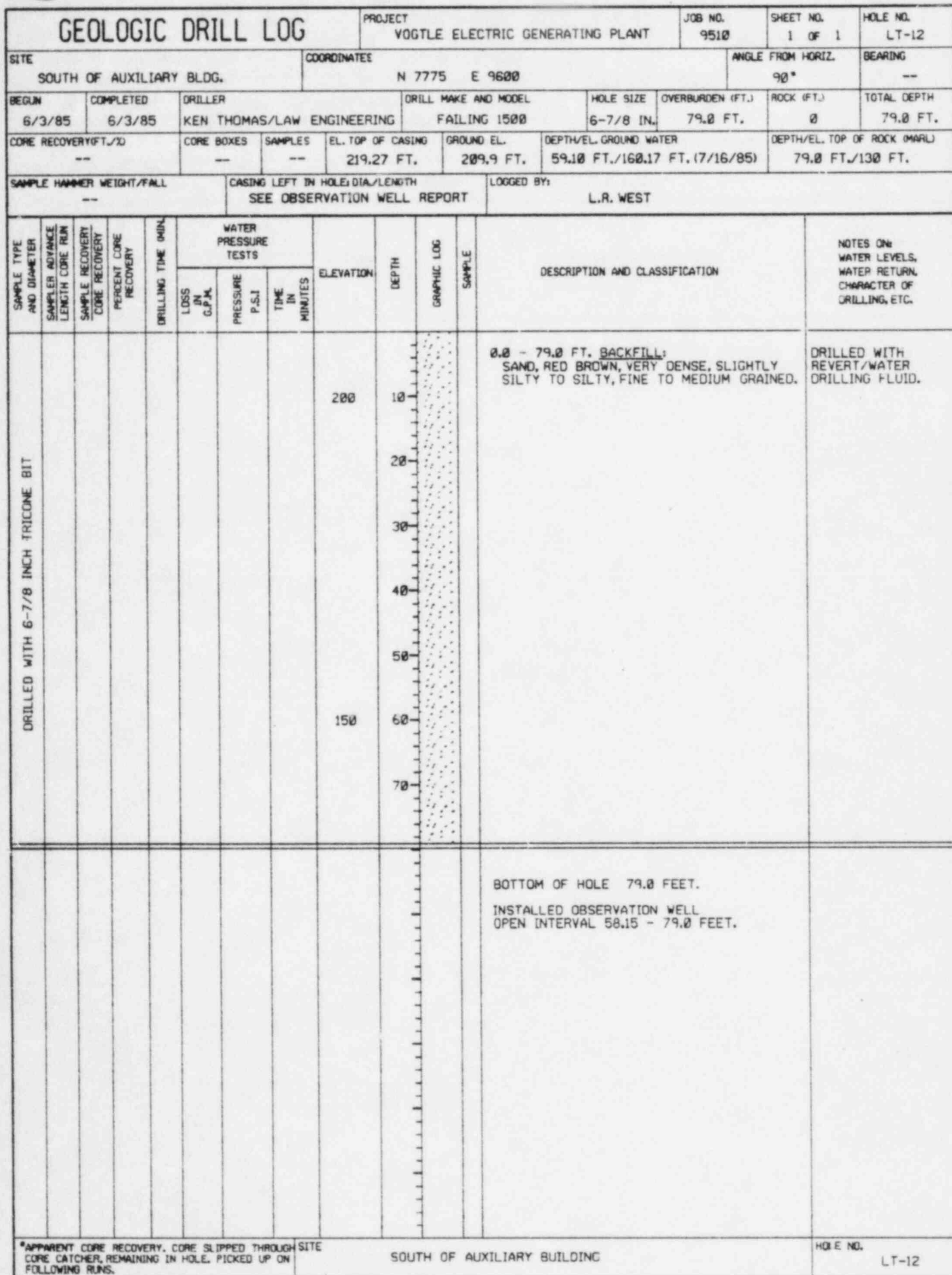


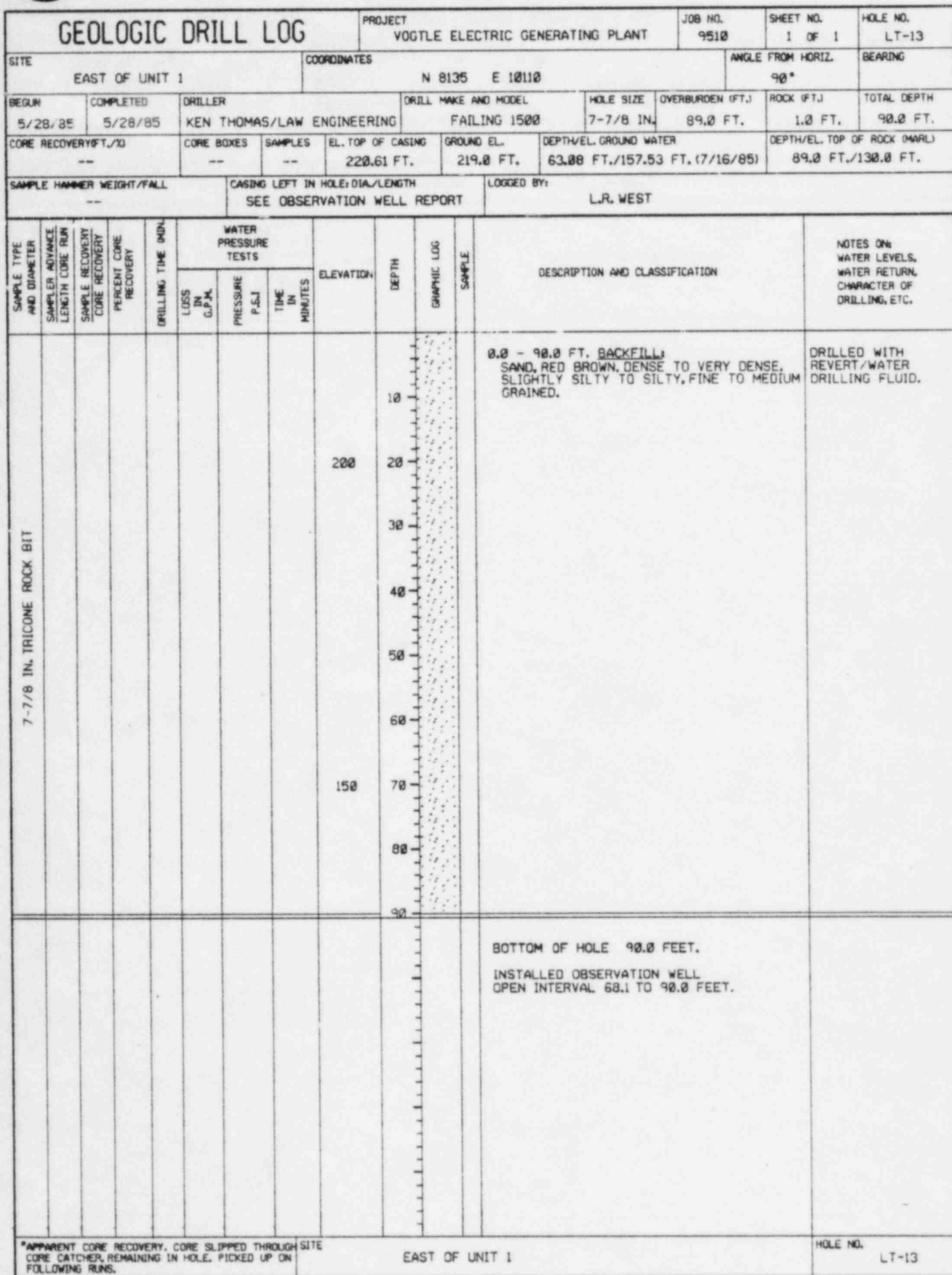
GEOLOGIC DRILL LOG										PROJECT VOGTLE ELECTRIC GENERATING PLANT		JOB NO. 9510	SHEET NO. 1 OF 1	HOLE NO. LT-7A
SITE SOUTHWEST OF UNIT 2 TURBINE BLDG.					COORDINATES N 8151.3 E 9317.5					ANGLE FROM HORIZ. 90°		BEARING --		
BEGIN 7/7/85		COMPLETED 7/7/85		DRILLER H. COLLINS/LAW ENGINEERING		DRILL MAKE AND MODEL MOBILE 53		HOLE SIZE 5-1/8 IN.	OVERBURDEN (FT.) 87.0 FT.	ROCK (FT.) 0	TOTAL DEPTH 87.0 FT.			
CORE RECOVERY (FT./%) --		CORE BOXES --		SAMPLES --		EL. TOP OF CASING 221.17 FT.		GROUND EL. 215.92 FT.		DEPTH/EL. GROUND WATER 63.19 FT./157.98 FT. (7/16/85)		DEPTH/EL. TOP OF ROCK (MARL) 87.0 FT./128.92 FT.		
SAMPLE HAMMER WEIGHT/FALL					CASING LEFT IN HOLE DIA./LENGTH SEE OBSERVATION WELL REPORT					LOGGED BY: 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			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	
					LOSS IN G.P.M.	PRESSURE P.S.I.	TIME IN MINUTES							
DRILLED WITH 5-1/8 INCH TRICONE BIT								200	10			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.	
								20						
								30						
								40						
								50						
								60						
								70						
								80						
												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.

SOUTHWEST OF UNIT 2 TURBINE BUILDING

HOLE NO.
LT-7A





APPENDIX C
LABORATORY TESTS

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



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

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Page 2

Harding Lawson Associates

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 *LL*

Lyle E. Lewis,
Civil Engineer - 16360

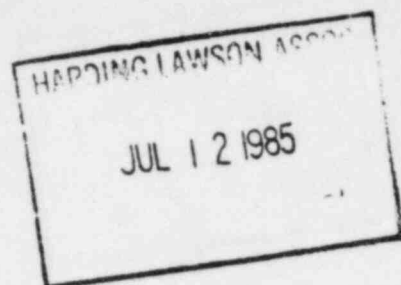
DMS/LEL/dm

Attachment: Cation Exchange Test Results

4 copies submitted



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



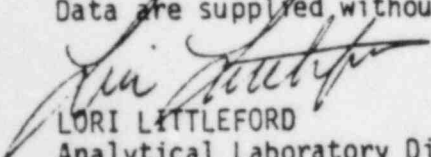
SANTA CLARA OFFICE
July 11, 1985
Lab No. 78035

HARDING LAWSON ASSOCIATES
P O Box 578
Novato, CA 94948

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

<u>Sample No.</u>	<u>Cation exchange capacity meq/100</u>	<u>Description</u>
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

July 16, 1985



Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509)

Telex 15-2874

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 μ m 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 μ Ci/l 85 Sr and 242 μ Ci/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 μ 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.

$$K_d = \left(\frac{C_o - C_e}{C_e} \right) \frac{V}{W} \quad \text{Eq. 1}$$

where

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



Mr. Cliff R. Farrell
July 16, 1985
page 2 -

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)

	<u>^{137}Cs</u>	<u>^{85}Sr</u>
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