TEST REPORT

RANDOM ROCKFILL MATERIAL

TEST VR-24-4-2

SHEARON HARRIS NUCLEAR POWER PLANT

Prepared by

Power Plant Construction Department

TABLE OF CONTENTS

I. Introduction

This report contains the results of test fill VR-24-4-2 which includes two large volume in-place density tests and grain size distribution tests performed before and after the test fill was completed. Also field permeability tests were performed on the test fill in-place. All these tests were conducted by Power Plant Construction Department personnel in the field and in the site laboratory.

II. Objective

There were three objectives in performing this test program:

A. To satisfy CP&L's commitment to NRC for defining the properties of rockfill material to be used in Class I dams and the west auxiliary dike.

B. To assure CP&L that the engineering properties assumed for the random rockfill material in the design were consistent with the actual compacted in-place material properties.

C. To determine if the test results are consistent with previous test fill properties which have already been deemed acceptable by the design engineer.

III. Procedure

Due to the fact that random rockfill material for Class I dams and dikes may be in short supply, it was determined that the blasted rock from the west auxiliary spillway should be used if possible. In order to determine that the blasted rock material was suitable, an in-place test fill section was constructed on site to simulate the actual hauling, dumping, spreading and compaction process of the dam random rockfill construction. From this test fill in-place properties such as gradation, density, permeability, and settlement due to rolling were determined.

A. Description of test fill - Test fill section designated VR-24-4-2 was constructed at station 8+00 in the west auxiliary spillway. The area selected was free of excessive surface water and was reasonably level. The area was staked out and graded and then proof rolled with a vibratory roller until no appreciable settlement was detected. The test fill was conducted in accordance with PPCD - SHPP Technical Procedure

TP-1. The test section was approximately 40 feet by 55 feet with 24 settlement points. Also a ramp was constructed with a 5 H to 1 V slope. The sides of the test section were maintained at approximately 1.5 H to 1 V. The material was end dumped, spread in approximately 24 inch thickness and was compacted with 10 passes of a Rascal 600-A roller. The roller produces a dynamic force of 45,000 pounds operating force with a vibration frequency between 1100 and 1500 VPM at a maximum speed of 3 mph. The test fill section consisted of four lifts. The number and thickness of the lifts placed, number and speed of roller passes, type and operation requirements of the compaction equipment, and the methods of spreading and compaction were determined from previous test fills.

B. Material - The material used was blasted random rockfill removed from the west auxiliary spillway. All the material came from approximately El. 220 and station 16+00. The material consisted of coarse brown silty sandstone. Maximum particle size allowed for the test fill section was 22 inches 90 percent of the lift thickness.

C. Settlement Measurement - Prior to placement of the first lift, initial readings were recorded for each of the 24 settlement points. A system of offset control was used to assure the settlement points were relocated in the same place after each lift placement. The rockfill material was then end dumped by Euclid R 50 trucks and spread in approximately 24 inch lifts by a Caterpillar D 8 dozer. The method and operating time utilized by both types of equipment simulated anticipated field conditions. The surface of the lift after spreading was marked with paint sprayed directly on the lift surface for each settlement point. Level readings were recorded for each of the points and averaged to determine the initial lift thickness. The vibratory roller then made one pass over the entire surface of the lift and level readings were taken to determine the degree of settlement. The procedure was then repeated for a total of 10 passes for the first 3 lifts. The settlement points were repainted as necessary. After completion of the

first lift, settlement data was collected in the same manner for the second and third lifts. The final level readings recorded from a previous lift were used as the initial readings in determination of the thickness of the next lift. An examination of the settlement plots for the first three lifts revealed that approximately 6 passes of the roller produced an optimum amount of settlement per compaction effort. The fourth lift was rolled with only 6 passes.

D. In-Place Density Determination - After the final layer was compacted and all settlement data was recorded, two (2) in-place density tests were performed on the test fill. The following procedure was used to conduct the test:

1. A wood frame measuring 8 feet x 8 feet x 7 inches high was placed over the test area and held in-place by stakes.
2. Level readings of all four corners at the frame were recorded from a nearby established bench mark.
3. One sheet of polyethylene was laid loosely over the frame so that they were in as close contact as possible with the inside of the frame rock surface.
4. The depression in the slack membrane was filled with water via a calibrated barrel to within 3 or 4 inches of the top of the frame.
5. The volume of water added and the distance from the top of the frame to the water surface was measured and recorded.
6. The water was removed without disturbing the ring or damaging the membrane.
7. The polyethylene sheet was removed and checked for leaks.
8. The material within the frame was then carefully excavated and placed into a truck.
9. The hole was then hand-cleaned to remove all loose or sharp material in the sides and bottom.
10. The weight of the total sample excavated was determined by weighing the truck full and empty.

11. The polyethylene sheet was again placed loosely over the excavated hole and frame.
12. The hole was filled with water to the same level as in step 4.
13. Level readings were again taken at all four corners of the frame to assure the frame had not moved.
14. The volume of water added was recorded.
15. Steps 6 and 7 were repeated.

E. Grain Size Distribution Test - A before and after gradation analysis was performed on the random rockfill used in the test fill. One gradation sample was loaded on a flat bed truck directly from the point of blast production. This sample appeared to be representative of the type and size of material that was being excavated from the west auxiliary spillway. The sample was taken directly to an enclosed area, spread out on a concrete floor, and heated with space heaters to remove the moisture. The material was graded by hand to remove all large rocks in the 12" to 24" range, then the 8" to 12" range, then the 4" to 8" range. The sample was then reduced by quartering and graded down to the #8 sieve using a Gilson Sieve Shaker. A Ro-Tap Sieve Shaker was used to determine particle size down to the #100 sieve. The weights retained on each sieve were carefully measured and the Percent Passing Total was determined for each sieve ranging from 24" down to #100.

The after compaction gradation sample was obtained from the in-place density test to determine the amount of particle breakup. The sample was dried and graded in the same manner as the before compaction test sample. The Percent Passing Total was computed for each sieve size and recorded.

Utilizing the above data the two gradation curves were plotted to obtain a visual aid in determining which sizes broke down the most. Most of the breakdown occurred in the 4" to 16" gradation range. There was not an appreciable increase in the amount passing the #100 sieve. However, the after

compaction sample was, on the whole, finer than the before compaction sample due to rock breakdown.

F. Permeability Test - Two field permeability tests were performed on the test fill in-place. A constant head method was used to determine the coefficient of permeability of the random rockfill material. A brief discussion of the perculation tests will follow and the procedure used:

1. Two in-place permeability tests were performed on the test fill in accordance with the Bureau of Reclamation Department of the Interior, Field Permeability Test (Well Permeameter Method) Designation E-19. The procedure used is as follows:
   a. Two holes were hand dug in the top surface of the test fill. These holes were approximately 2' deep.
   b. The sides of the well were scarified and all loose material was removed from the bottom of the holes.
   c. The well was filled to the top with Ottawa sand of known density.
   d. The volume of the well is then determined as is the radius of the well.
   e. Water is added through a float valve which assures a constant head in the well.
   f. Water was allowed to flow into the well for approximately 2 hours to saturate the area adjacent to the well.
   g. Measurements were then begun in 30 minutes intervals to measure the quantity of water that flowed into the well. This was continued until sufficient data was collected. An average flow rate was then calculated.
   h. All the data was compiled and entered into a formula to yield the permeability of the test fill.
   i. These two well permeability tests were designated as VR-24-4-2-PF-1 and VR-24-4-2-PF-2 respectively.

IV. Tabulated Results

A. Gradation Analysis

1. Before - the percentage of fines passing the 1/4" screen is 23%.

2. After - the percentage of fines passing the 1/4" screen is 32%.

B. In-Place Density

1. Test #1

a. Wet Density - 154.86#/ft^3

b. Dry Density - 146.34#/ft^3

c. Moisture Content - 5.8%

2. Test #2

a. Wet Density - 144.44#/ft^3

b. Dry Density - 136.8#/ft^3

c. Moisture Content - 5.6%

C. Settlement Test - optimum number of 6 passes produced 1.6% settlement.

D. Permeability Field Test - constant head:

1. $K = 1.05 \times 10^{-3}$

2. $K = 3.07 \times 10^{-4}$

V. Discussion of Results

A. Settlement of Test Fill - Test results indicate that an adequate amount of compaction is produced by 6 passes of a Rascal 600-A vibratory roller. The settlement curves which were drawn for each of the 4 lifts in the test fill began to flatten out at approximately 6 passes of the roller. Further rolling did result in additional compaction, but the greatest amount of compaction came in the first 6 passes of the roller. The approximate percentage settlement in 6 passes of the roller was 1.6%.

B. Particle Gradation - A particle gradation was performed before roller compaction. The results are shown in the data section of this report. There was an evident breakdown in particles due to the roller passes. The breakdown occurred over the entire spectrum of particle sizes but most notibly in the 4" to #16 sieve sizes. The after compaction gradation for this test fill compared favorably with previous test fill VR-24-4-1 using material from the cooling tower makeup water channel. It was observed however, that

test fill VR-24-4-2 had slightly coarser material than test fill VR-24-4-1.

C. In-Place Density Test - Two in-place density tests were performed on the material taken from the test fill section. The first in-place density test performed on the roller compacted test fill revealed that a dry density of 146.34#/ft^3 was obtained. This is an unusually high value and it was noted that of the material excavated and weighed for the in-place density test, one large rock having dimensions of 22" x 34" x 24" was included. The volume of this rock relative to the volume of the density hole would result in a slightly higher density. Since this test value seemed high, another density test was performed. This second density test gave a dry density of 136.8#/ft^3. This density was nearly identical to the dry density obtained from test fill VR-24-4-1 utilizing material from the cooling tower makeup water channel.

D. Permeability Tests - Two in-place constant head perculation tests were performed on the test fill. The first test marked VR-24-4-2-PF-1 gave a coefficient of permeability, K = 1.05 x 10^{-3} cm/sec. The second test gave a coefficient of permeability, K = 3.07 x 10^{-4}. It is designated VR-24-4-2-PF-2.

These values indicated a greater permeability than was obtained on test fill VR-24-4-1 on material taken from the cooling tower make-up channel. The reason for this greater permeability is to be due to the fact that the gradation indicates that test fill VR-24-4-2 has coarser material than test fill VR-24-4-1. Also, the density of this test fill was slightly lower than the previous test fill designated VR-24-4-1.

E. Examination of Test Fill After Compaction

This cross section appears to be nearly identical in consistency, amount of voids, and bonding between layers when compared to test fill VR-24-4-1. After the test fill was completed, a D-8 dozer cut a path through the area so as to examine the cross-section of the test fill. The material was generally firmly compacted and there was good bond between horizontal layers. There were very few noticeable areas of loose compaction or voids. These voids

were mostly limited to areas underneath larger rocks that were placed directly on top of the previous lift. These few areas had voids of about 1" width underneath the large rocks. Only 2 or 3 such areas were noted. A few other places did not have voids but contained loosely compacted material underneath larger rocks lying directly on top of the previous lift. On the whole, the test fill appeared to be well compacted. A good estimate would be that over 95% of the cross section did not contain noticeable voids and areas of loose compaction.

VI. Recommended Method of Placement and Compaction

Based on the data collected and observations made during the process of constructing the test fill, the following are recommended methods of placement of random rockfill in Class I dams and dikes:

A. A blast pattern of 8' x 10' should be used during production as this is the same blast pattern that was used on material in the test fill.

B. Material will be end dumped from Euclid R-50 trucks in the random rockfill zone of the dam or dike as close as possible to its final resting position.

C. D-8 dozers will spread the material in approximately horizontal lifts of 2 foot thickness.

D. All rocks larger than 90% of the lift thickness shall be removed from the random rockfill zone.

E. A minimum of 6 passes of a Rascal 600-A vibratory roller having a minimum dynamic force of 45,000 lbs. will be performed on each 2' thick lift. The roller shall not exceed 3 mph and passes shall overlap one foot.

For more in-depth information, see Ebasco Specification CAR-SH-CH-4, Rev.6.

TEST FILL EMBANKMENT

SETTLEMENT DATA

Test Fill No. VR-24-4-2 Date 12/20/78

Lift No. 1 By: D. CLARK

Required Thickness 24"

Type Compaction Equipment RAY-GO RASCAL VIBRATING DRUM ROLLER

Material Description BLASTED ROCK (RANDOM FILL)

BROWN CLAYEY SILTSTONE

Settlement Point	Initial Level Reading	Initial Lift Reading	Final Reading N=1	Final Reading N=2	Final Reading N=3	Final Reading N=4	Final Reading N=5	Final Reading N=6	Final Reading N=7	Final Reading N=8	Final Reading N=9	Final Reading N=10
1/13	244.77 / 244.70	247.14 / 247.13	247.11 / 247.10	247.08 / 247.10	247.07 / 247.08	247.08 / 247.07	247.08 / 247.03	247.08 / 247.02	247.08 / 247.01	247.08 / 247.01	247.08 / 247.07	247.09 / 247.1
2/14	244.72 / 244.64	247.07 / 247.14	247.04 / 247.12	247.05 / 247.11	247.05 / 247.11	247.04 / 247.11	247.04 / 247.10	247.04 / 247.10	247.04 / 247.10	247.04 / 247.10	247.03 / 247.10	247.02 / 247.1
3/15	244.75 / 244.71	247.01 / 247.11	247.01 / 247.08	247.02 / 247.08	247.03 / 247.06	247.02 / 247.06	247.02 / 247.04	247.02 / 247.05	247.02 / 247.05	247.02 / 247.05	247.02 / 247.05	247.01 / 247.5
4/16	244.77 / 244.82	247.03 / 247.13	247.03 / 247.01	247.01 / 247.01	247.01 / 247.06	247.00 / 247.05	246.97 / 247.05	246.97 / 247.05	246.99 / 247.01	246.98 / 247.01	246.98 / 247.01	246.98 / 247.
5/17	244.70 / 244.71	247.04 / 247.05	247.01 / 247.01	247.01 / 247.02	247.00 / 247.01	246.97 / 247.01	246.98 / 247.01	246.98 / 247.04	246.98 / 247.05	246.98 / 247.06	246.97 / 247.05	246.97 / 247.04
6/18	244.69 / 244.69	246.97 / 247.17	246.87 / 247.16	246.88 / 247.15	246.87 / 247.14	246.88 / 247.14	246.87 / 247.14	246.87 / 247.14	246.87 / 247.14	246.90 / 247.14	246.91 / 247.15	246.90 / 247.14
7/19	244.71 / 244.76	247.07 / 247.13	247.00 / 247.10	246.99 / 247.10	246.98 / 247.01	246.98 / 247.01	246.97 / 247.01	246.97 / 247.03	246.96 / 247.03	246.96 / 247.03	246.96 / 247.08	246.96 / 247.05
8/20	244.77 / 244.90	247.01 / 247.13	246.92 / 247.13	246.90 / 247.12	246.90 / 247.12	246.89 / 247.12	246.81 / 247.11	246.88 / 247.11	246.88 / 247.11	246.85 / 247.11	246.87 / 247.11	246.87 / 247.11
9/21	244.69 / 244.69	246.97 / 247.11	246.96 / 247.11	246.96 / 247.11	246.96 / 247.11	246.93 / 247.10	246.95 / 247.10	246.95 / 247.10	246.94 / 247.10	246.94 / 247.10	246.94 / 247.10	246.94 / 247.10
10/22	244.64 / 244.66	246.93 / 247.16	246.98 / 247.15	246.97 / 247.14	246.96 / 247.14	246.96 / 247.14	246.96 / 247.13	246.95 / 247.13	246.96 / 247.13	246.95 / 247.13	246.95 / 247.13	246.95 / 247.13
11/23	244.71 / 244.78	246.94 / 247.15	246.95 / 247.17	246.95 / 247.17	246.94 / 247.17	246.94 / 247.18	246.94 / 247.18	246.93 / 247.18	246.93 / 247.18	246.93 / 247.18	246.93 / 247.17	246.93 / 247.18
12/24	244.78 / 244.93	247.08 / 247.31	247.06 / 247.30	247.05 / 247.29	247.03 / 247.27	247.03 / 247.29	247.02 / 247.28	247.02 / 247.28	247.02 / 247.28	247.01 / 247.27	247.01 / 247.27	247.01 / 247.27
Avg.	244.74	247.08	247.07	247.06	247.05	247.05	247.05	247.05	247.04	247.04	247.04	247.04
Avg. Thickness		2.34	2.33	2.32	2.21	2.31	2.31	2.31	2.30	2.30	2.30	2.30
Percent Settlement			0.43	0.85	1.28	1.28	1.28	1.28	1.71	1.71	1.71	1.71

COMMENTS:

TEST FILL PROGRAM - RANDOM FILL

SETTLEMENT CURVE

CP&L - HARRIS SITE

Test Fill No VR-24-4-2 Date 1/19/79

Lift No 1 By Pridgen

Required Thickness 24"

Type Compaction Equipment Ray-Go 600-A Vibratory Roller

Remarks Blasted Random Rockfill

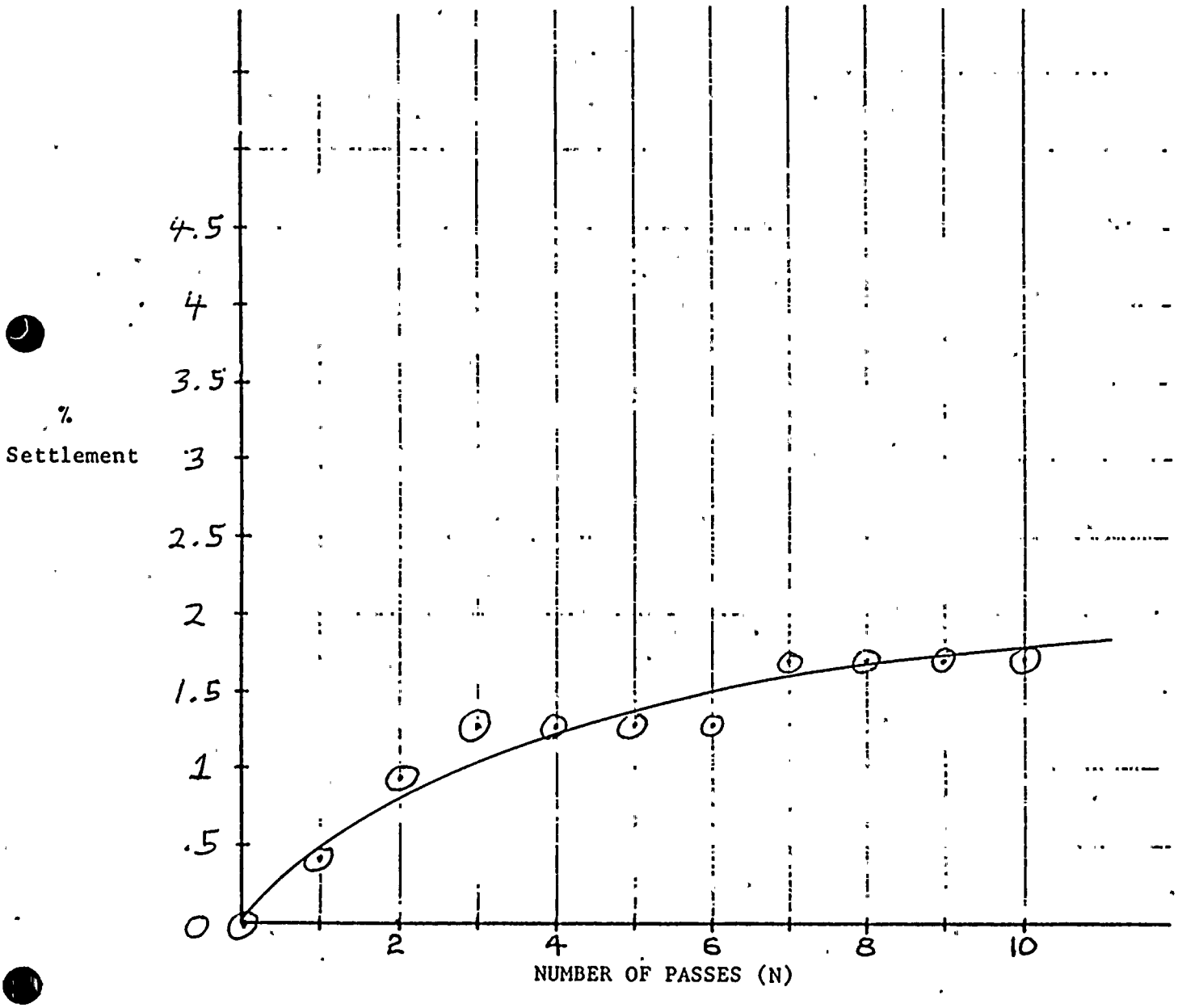


EXHIBIT 2
CI-01

TEST FILL PROGRAM

SETTLEMENT DATA

Test Fill No. VR-24-4-2 Date 12/20/78

Lift No. 2 By D. CLARK

Required Thickness

Type Compaction Equipment RAY-GO RASCAL VIBRATING DRUM ROLLER

Material Description BLASTED ROCK (RANDOM FILL)

RED BROWN CLAYEY SILTSTONE

Settlement Point	Initial Level Reading	Initial Lift Reading	Final Reading N=1	Final Reading N=2	Final Reading N=3	Final Reading N=4	Final Reading N=5	Final Reading N=6	Final Reading N=7	Final Reading N=8	Final Reading N=9	Final Reading N=10
1/13	247.08 / 247.06	248.71 / 248.19	248.92 / 248.77	248.92 / 248.78	248.91 / 248.78	248.92 / 248.77	248.91 / 248.77	248.90 / 248.77	248.91 / 248.76	248.91 / 248.76	248.90 / 248.76	248.91 / 248.76
2/14	247.03 / 247.10	248.97 / 248.88	248.87 / 248.88	248.87 / 248.88	248.88 / 248.87	248.87 / 248.87	248.88 / 248.87	248.87 / 248.87	248.88 / 248.87	248.88 / 248.85	248.88 / 248.85	248.88 / 248.85
3/15	247.01 / 247.05	247.04 / 247.03	249.03 / 249.00	249.02 / 248.99	249.02 / 248.99	249.01 / 248.98	249.01 / 248.98	249.01 / 248.97	249.00 / 248.96	249.00 / 248.96	249.00 / 248.97	249.00 / 248.97
4/16	246.98 / 247.04	247.09 / 247.03	249.06 / 249.01	249.05 / 249.00	249.04 / 248.99	249.03 / 248.98	249.03 / 248.97	249.03 / 248.97	249.02 / 248.97	249.01 / 248.96	249.01 / 248.96	249.01 / 248.96
5/17	246.97 / 247.06	248.80 / 248.78	248.81 / 248.78	248.80 / 248.78	248.80 / 248.78	248.77 / 248.77	248.79 / 248.78	248.79 / 248.76	248.79 / 248.77	248.79 / 248.77	248.78 / 248.77	248.78 / 248.76
6/18	246.90 / 247.14	248.83 / 248.35	248.86 / 248.86	248.84 / 248.87	248.83 / 248.87	248.83 / 248.87	248.83 / 248.87	248.82 / 248.87	248.83 / 248.87	248.82 / 248.86	248.82 / 248.87	248.82 / 248.87
7/19	246.96 / 247.08	249.05 / 249.06	249.01 / 249.06	249.03 / 249.05	249.03 / 249.05	249.02 / 249.04	249.02 / 249.01	249.01 / 247.03	249.01 / 249.03	249.01 / 247.03	249.01 / 249.03	249.01 / 247.04
8/20	246.87 / 247.11	249.06 / 249.05	249.01 / 249.07	249.00 / 249.06	248.99 / 249.05	248.98 / 248.95	248.97 / 247.04	248.96 / 247.04	248.96 / 247.03	248.95 / 248.93	248.95 / 249.02	248.95 / 249.02
9/21	246.94 / 247.10	248.86 / 248.77	248.84 / 248.78	248.83 / 248.78	248.83 / 248.77	248.82 / 248.77	248.82 / 248.76	248.82 / 248.77	248.82 / 248.76	248.81 / 248.75	248.81 / 248.76	248.81 / 248.76
10/22	246.95 / 247.13	248.71 / 248.74	248.92 / 248.74	248.91 / 248.93	248.91 / 248.93	248.91 / 248.93	248.90 / 248.93	248.90 / 248.93	248.90 / 248.92	248.90 / 248.92	248.90 / 248.92	248.91 / 248.92
11/23	246.93 / 247.18	247.05 / 249.11	249.02 / 249.06	249.01 / 249.06	249.00 / 249.05	249.00 / 249.04	248.99 / 249.04	248.99 / 249.04	248.99 / 249.04	248.99 / 249.03	248.99 / 249.03	248.99 / 249.03
12/24	247.01 / 247.27	249.12 / 249.04	249.10 / 249.07	249.08 / 249.05	249.08 / 249.05	249.07 / 249.04	249.07 / 249.03	249.07 / 249.03	249.06 / 249.02	249.06 / 249.02	249.06 / 249.02	249.03 / 249.05
Avg.	247.04	248.95	248.95	248.94	248.94	248.93	248.93	248.93	248.92	248.92	248.92	248.92
Avg. Thickness		1.91	1.91	1.90	1.90	1.89	1.89	1.89	1.88	1.88	1.88	1.88
Percent Settlement			0	0.52	0.52	1.05	1.05	1.05	1.57	1.57	1.57	1.57

COMMENTS:

TEST FILL PROGRAM - RANDOM FILL

SETTLEMENT CURVE

CP&L - HARRIS SITE

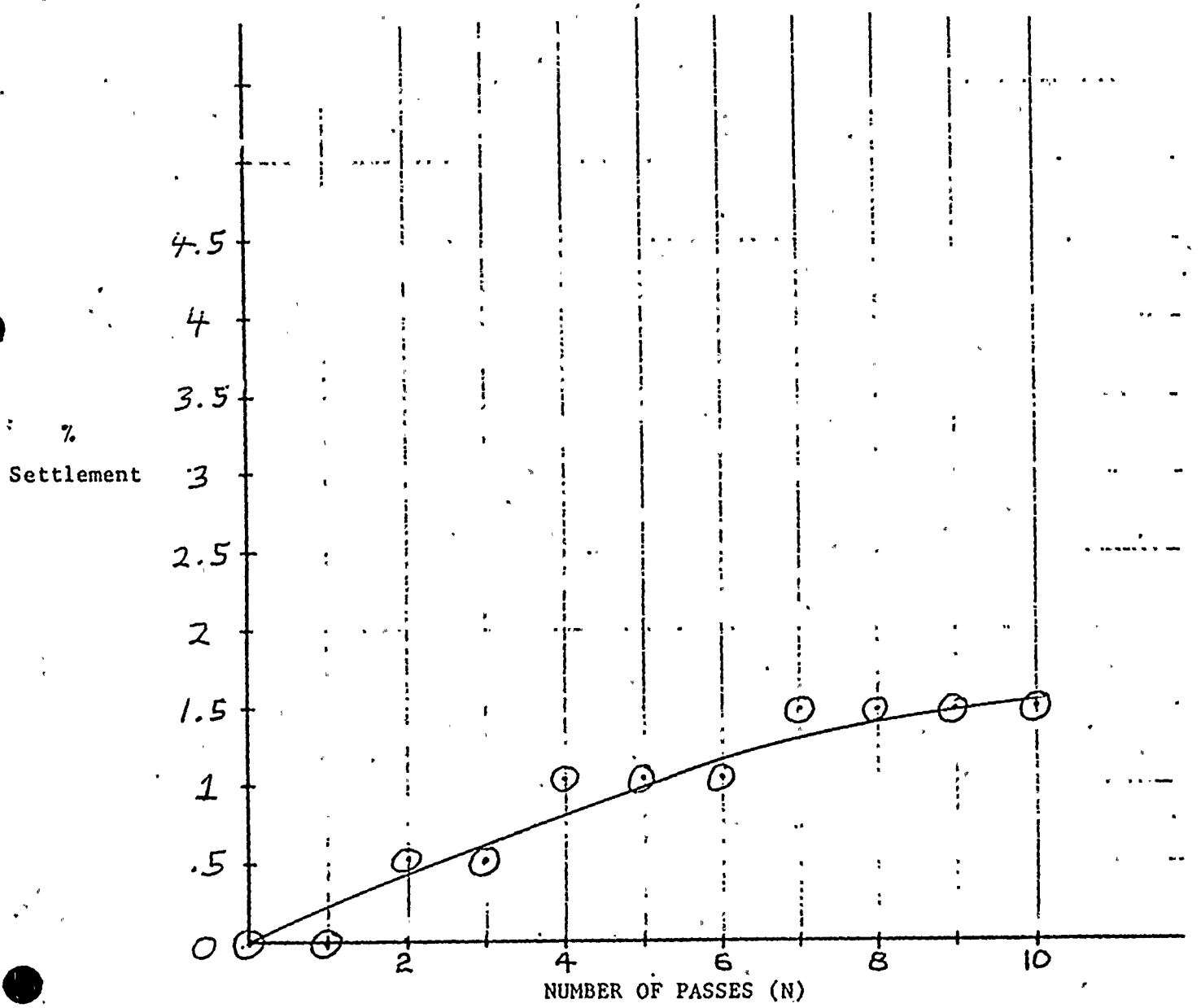
Test Fill No VR-24-4-2 Date 1/19/79

Lift No 2 By Pridgen

Required Thickness 24"

Type Compaction Equipment Ray-Go 600-A Vibratory Roller

Remarks Blasted Random Rockfill



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TEST FILL PROGRAM

SETTLEMENT DATA

Test Fill No. VR-24-4-2 Date 12/21/78

Lift No. 3 By D. CLARK

Required Thickness 24"

Type Compaction Equipment RAY-GO RASCAL VIBRATING DRUM ROLLER

Material Description DARK BROWN SILTSTONE & COARSE RED BROWN SHALY SANDSTONE BLASTED ROCK (RANDOM FILL)

Settlement Point	Initial Level Reading	Initial Lift Reading	Final Reading N=1	Final Reading N=2	Final Reading N=3	Final Reading N=4	Final Reading N=5	Final Reading N=6	Final Reading N=7	Final Reading N=8	Final Reading N=9
1/13	248.91 / 248.76	250.31 / 250.51	250.30 / 250.48	250.30 / 250.46	250.27 / 250.45	250.27 / 250.45	250.27 / 250.45	250.28 / 250.44	250.28 / 250.41	250.28 / 250.43	250.28 / 250.44
(2/14)	248.88 / 248.82	250.47 / 250.64	250.47 / 250.61	250.46 / 250.63	250.45 / 250.63	250.45 / 250.62	250.44 / 250.62	250.41 / 250.62	250.41 / 250.62	250.44 / 250.62	250.47 / 250.62
3/15	249.00 / 248.76	250.58 / 250.69	250.56 / 250.71	250.55 / 250.70	250.54 / 250.68	250.51 / 250.67	250.53 / 250.68	250.53 / 250.68	250.52 / 250.66	250.53 / 250.67	250.52 / 250.68
4/16	249.01 / 248.85	250.53 / 250.61	250.51 / 250.57	250.50 / 250.60	250.49 / 250.57	250.49 / 250.59	250.49 / 250.58	250.48 / 250.58	250.48 / 250.58	250.48 / 250.57	250.48 / 250.57
5/17	248.78 / 248.76	250.32 / 250.60	250.32 / 250.58	250.32 / 250.58	250.30 / 250.58	250.29 / 250.58	250.29 / 250.58	250.29 / 250.57	250.27 / 250.58	250.29 / 250.57	250.28 / 250.57
6/18	248.82 / 248.86	250.50 / 250.67	250.50 / 250.61	250.50 / 250.63	250.49 / 250.70	250.49 / 250.71	250.49 / 250.71	250.48 / 250.71	250.48 / 250.70	250.48 / 250.70	250.48 / 250.70
7/19	249.01 / 249.02	250.45 / 250.61	250.42 / 250.78	250.42 / 250.78	250.41 / 250.78	250.41 / 250.77	250.41 / 250.77	250.41 / 250.77	250.40 / 250.77	250.41 / 250.77	250.41 / 250.78
8/20	248.75 / 248.92	250.59 / 250.77	250.54 / 250.77	250.57 / 250.77	250.57 / 250.76	250.57 / 250.75	250.56 / 250.75	250.56 / 250.74	250.55 / 250.74	250.55 / 250.74	250.55 / 250.74
9/21	248.81 / 248.76	250.45 / 250.61	250.43 / 250.61	250.42 / 250.61	250.42 / 250.61	250.40 / 250.60	250.41 / 250.61	250.41 / 250.60	250.40 / 250.60	250.40 / 250.60	250.39 / 250.60
10/22	248.71 / 248.82	250.46 / 250.74	250.62 / 250.74	250.61 / 250.75	250.60 / 250.74	250.60 / 250.74	250.60 / 250.74	250.60 / 250.75	250.59 / 250.74	250.60 / 250.75	250.60 / 250.75
11/23	248.77 / 249.02	250.48 / 250.90	250.68 / 250.88	250.67 / 250.87	250.67 / 250.87	250.67 / 250.86	250.67 / 250.86	250.67 / 250.86	250.68 / 250.86	250.68 / 250.86	250.68 / 250.87
12/24	249.05 / 249.01	250.60 / 250.81	250.51 / 250.81	250.57 / 250.82	250.57 / 250.81	250.59 / 250.82	250.57 / 250.82	250.56 / 250.82	250.57 / 250.82	250.57 / 250.82	250.57 / 250.82
Avg.	248.92	250.62	250.60	250.60	250.59	250.59	250.59	250.59	250.58	250.58	250.58
Avg. Thickness		1.70	1.64	1.64	1.67	1.67	1.67	1.67	1.66	1.66	1.66
Percent Settlement			1.18	1.18	1.76	1.76	1.76	1.76	2.35	2.35	2.35

COMMENTS:

EXHIBIT 1
C3-01

TEST FILL PROGRAM

SETTLEMENT DATA

Test Fill No. VR-24-4-2 Date 12/21/78

Lift No. 3 " By D. CLARK

Required Thickness 24."

Type Compaction Equipment RAY-GO RASCAL VIBRATING DRUM ROLLER

Material Description DARK BROWN SILTSTONE & COARSE RED BROWN SHALY SANDSTONE BLASTED ROCK (RANDOM FILL)

Settlement Point	Initial Level Reading	Initial Lift Reading	Final Reading N=1	Final Reading N=2	Final Reading N=3	Final Reading N=4	Final Reading N=5	Final Reading N=6	Final Reading N=7	Final Reading N=8	Final Reading N=9	Fin...
1/13	248.91 / 248.76	250.21 / 250.21	250.30 / 250.48	250.30 / 250.46	250.27 / 250.45	250.27 / 250.45	250.27 / 250.45	250.28 / 250.44	250.28 / 250.44	250.28 / 250.43	250.28 / 250.44	250.27 / 250.
2/14	248.98 / 248.86	250.41 / 250.41	250.47 / 250.41	250.46 / 250.43	250.45 / 250.62	250.45 / 250.62	250.44 / 250.62	250.41 / 250.62	250.44 / 250.62	250.44 / 250.62	250.41 / 250.62	250. / 250.
3/15	249.00 / 248.76	250.58 / 250.69	250.56 / 250.71	250.55 / 250.70	250.54 / 250.61	250.54 / 250.61	250.53 / 250.68	250.53 / 250.69	250.52 / 250.68	250.53 / 250.67	250.52 / 250.68	250.5 / 250.
4/16	247.01 / 248.75	250.53 / 250.61	250.51 / 250.51	250.50 / 250.46	250.49 / 250.51	250.49 / 250.59	250.49 / 250.52	250.49 / 250.53	250.48 / 250.58	250.48 / 250.57	250.48 / 250.57	250.48 / 250.
5/17	248.18 / 248.16	250.32 / 250.60	250.32 / 250.58	250.30 / 250.58	250.30 / 250.58	250.29 / 250.58	250.29 / 250.58	250.29 / 250.51	250.29 / 250.58	250.29 / 250.57	250.28 / 250.57	250.28 / 250.
6/18	248.82 / 248.86	250.50 / 250.67	250.50 / 250.63	250.50 / 250.60	250.49 / 250.70	250.49 / 250.71	250.49 / 250.71	250.48 / 250.71	250.48 / 250.70	250.48 / 250.70	250.48 / 250.70	250.48 / 250.
7/19	249.01 / 249.02	250.45 / 250.58	250.63 / 250.78	250.62 / 250.78	250.61 / 250.78	250.61 / 250.77	250.61 / 250.77	250.61 / 250.77	250.60 / 250.77	250.61 / 250.77	250.61 / 250.78	250.6 / 250.
8/20	248.95 / 248.82	250.39 / 250.77	250.59 / 250.77	250.57 / 250.77	250.57 / 250.76	250.57 / 250.75	250.56 / 250.75	250.56 / 250.74	250.55 / 250.74	250.55 / 250.74	250.55 / 250.74	250.55 / 250.7
9/21	248.81 / 248.76	250.45 / 250.61	250.43 / 250.61	250.42 / 250.61	250.42 / 250.61	250.40 / 250.60	250.41 / 250.61	250.41 / 250.60	250.40 / 250.60	250.40 / 250.60	250.39 / 250.60	250.39 / 250.
10/22	248.71 / 248.82	250.64 / 250.74	250.62 / 250.74	250.61 / 250.75	250.60 / 250.71	250.60 / 250.74	250.60 / 250.74	250.60 / 250.75	250.59 / 250.74	250.60 / 250.75	250.60 / 250.75	250.59 / 250.
11/23	248.79 / 249.03	250.43 / 250.90	250.68 / 250.88	250.61 / 250.81	250.67 / 250.81	250.67 / 250.86	250.67 / 250.86	250.67 / 250.86	250.68 / 250.86	250.68 / 250.86	250.68 / 250.87	250.68 / 250.
12/24	249.05 / 249.01	250.60 / 250.81	250.51 / 250.81	250.57 / 250.82	250.57 / 250.8	250.59 / 250.82	250.57 / 250.82	250.56 / 250.82	250.57 / 250.82	250.57 / 250.82	250.57 / 250.87	250.57 / 250.8
Avg.	248.92	250.62	250.60	250.60	250.59	250.59	250.59	250.59	250.58	250.58	250.58	250.5
Avg. Thickness		1.70	1.64	1.64	1.67	1.67	1.67	1.67	1.66	1.66	1.66	1.66
Percent Settlement			1.18	1.18	1.76	1.76	1.76	1.76	2.35	2.35	2.35	2.35

COMMENTS:

TEST FILL PROGRAM - RANDOM FILL
SETTLEMENT CURVE
CP&L - HARRIS SITE

Test Fill No VR-24-4-2

Lift No 3

Required Thickness 24"

Type Compaction Equipment Ray-Go 600-A Vibratory Roller

Remarks- Blasted Random Rockfill

Date 1/19/7

By Pridgen

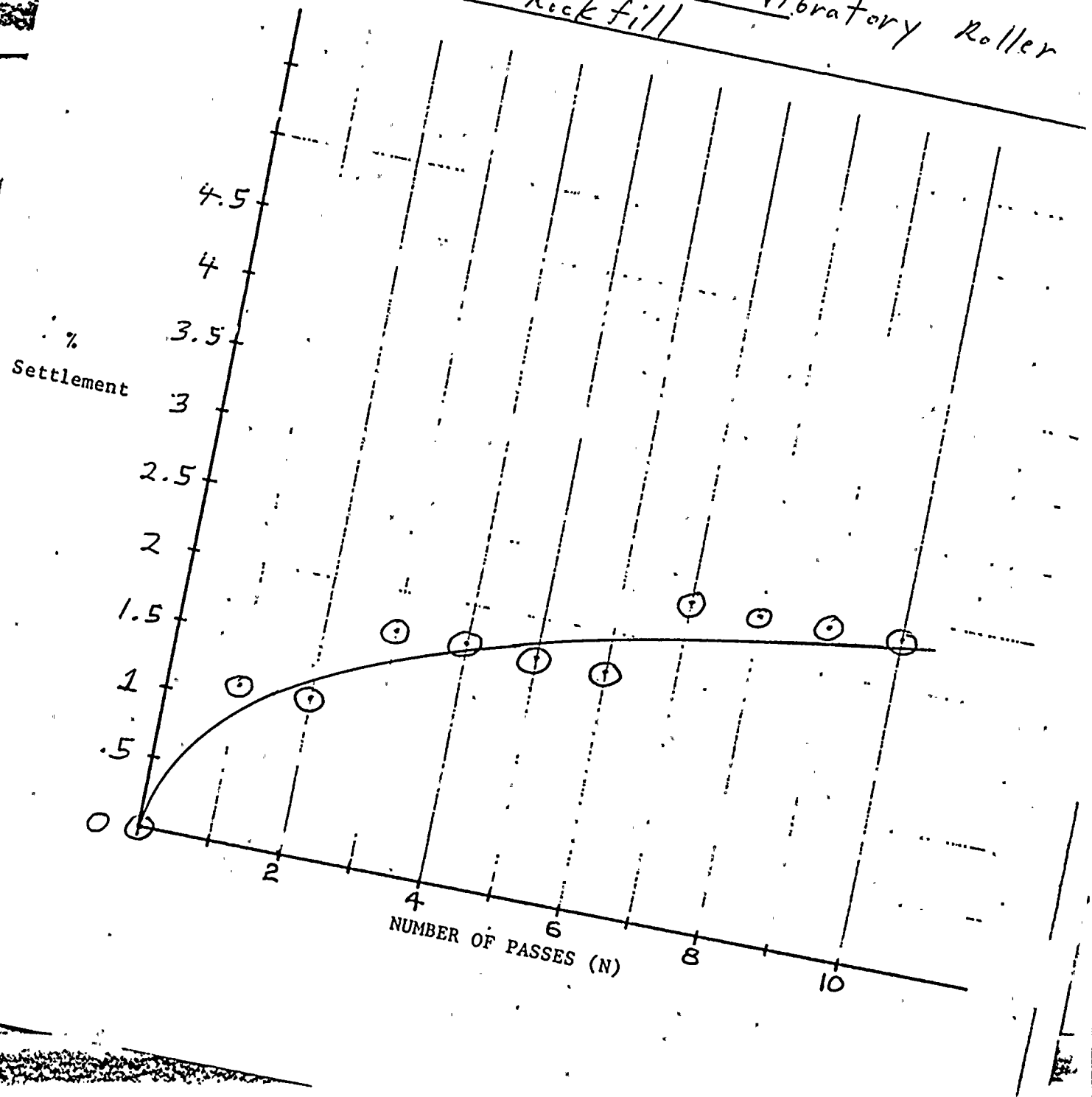


Exhibit 2
31-01

TEST FILL PROGRAM

SETTLEMENT DATA

Test Fill No. VR-24-4-2 Date 12/22/78

Lift No. " 4 By D. CLARK

Required Thickness 24"

Type Compaction Equipment RAY-GO RASCAL VIBRATING DRUM ROLLER

Material Description REDDISH-BROWN SHALY SANDSTONE w/ LARGE FRAGMENTS OF DARK BROWN SILTSTONE, BLASTED ROCK (RANDOM FILL)

Settlement Point	Initial Level Reading	Initial Lift Reading	Final Reading N=1	Final Reading N=2	Final Reading N=3	Final Reading N=4	Final Reading N=5	Final Reading N=6	Final Reading N=7	Final Reading N=8	Final Reading N=9	Final Reading N=10
1/13	250.27 / 250.43	252.05 / 252.54	252.02 / 252.57	252.00 / 252.50	251.98 / 252.49	251.98 / 252.48	251.97 / 252.48	251.96 / 252.47				
2/14	250.41 / 250.62	252.16 / 252.71	252.15 / 252.50	252.15 / 252.50	252.14 / 252.50	252.14 / 252.49	252.14 / 252.50	252.14 / 252.47				
3/15	250.52 / 250.69	252.27 / 252.43	252.22 / 252.48	252.21 / 252.48	252.21 / 252.47	252.21 / 252.48	252.20 / 252.48	252.21 / 252.41				
4/16	250.48 / 250.57	252.05 / 252.51	252.06 / 252.41	252.06 / 252.55	252.07 / 252.55	252.06 / 252.54	252.06 / 252.51	252.05 / 252.54				
5/17	250.48 / 250.51	252.19 / 252.61	252.13 / 252.55	252.12 / 252.54	252.10 / 252.53	252.10 / 252.52	252.10 / 252.52	252.09 / 252.51				
6/18	250.48 / 250.70	252.23 / 252.47	252.23 / 252.50	252.22 / 252.47	252.21 / 252.49	252.21 / 252.48	252.21 / 252.48	252.20 / 252.48				
7/19	250.49 / 250.71	252.33 / 252.55	252.33 / 252.52	252.32 / 252.51	252.32 / 252.54	252.32 / 252.53	252.31 / 252.53	252.31 / 252.53				
8/20	250.55 / 250.73	252.21 / 252.45	252.23 / 252.45	252.23 / 252.43	252.22 / 252.42	252.22 / 252.42	252.22 / 252.41	252.21 / 252.40				
9/21	250.31 / 250.61	252.27 / 252.53	252.27 / 252.51	252.26 / 252.51	252.24 / 252.51	252.24 / 252.51	252.24 / 252.51	252.23 / 252.52				
10/22	250.51 / 250.75	252.21 / 252.51	252.21 / 252.50	252.20 / 252.51	252.38 / 252.51	252.37 / 252.50	252.37 / 252.50	252.37 / 252.50				
11/23	250.52 / 250.81	252.47 / 252.62	252.41 / 252.63	252.48 / 252.64	252.47 / 252.62	252.48 / 252.62	252.47 / 252.62	252.47 / 252.62				
12/24	250.57 / 250.82	252.44 / 252.61	252.41 / 252.51	252.41 / 252.52	252.31 / 252.50	252.39 / 252.50	252.38 / 252.50	252.38 / 252.50				
Avg.	250.56	252.40	252.39	252.38	252.38	252.38	252.37	252.36				
Avg. Thickness		1.82	1.81	1.80	1.80	1.80	1.79	1.78				
Percent Settlement			0.55	1.10	1.10	1.10	1.65	2.20				

COMMENTS:

TEST FILL PROGRAM - RANDOM FILL

SETTLEMENT CURVE

CP&L - HARRIS SITE

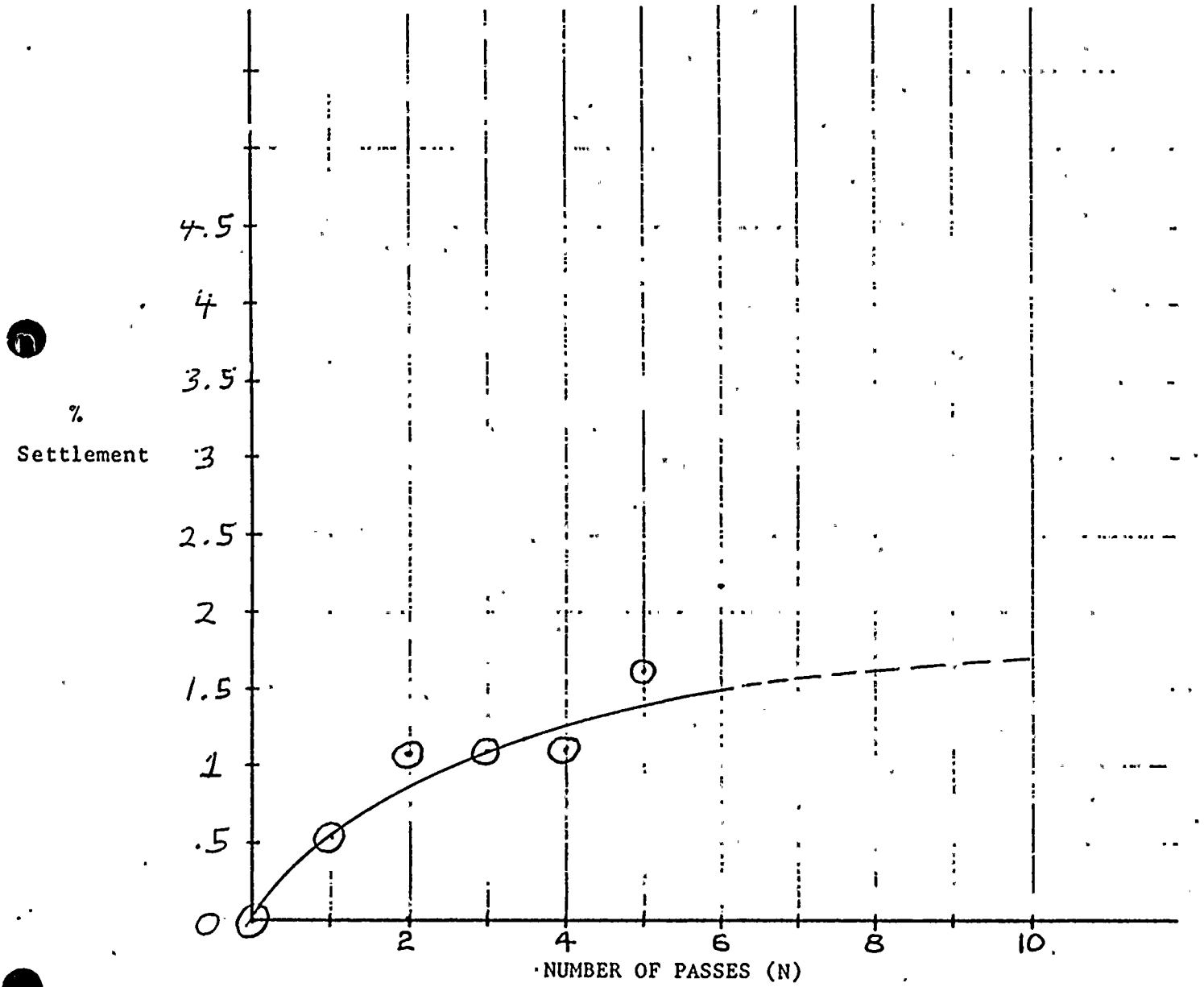
Test Fill No VR-24-4-2 Date 1/19/79

Lift No 4 By Pridgen

Required Thickness 24"

Type Compaction Equipment Ray-Go 600-A Vibratory Roller

Remarks Blasted Random Rockfill



CAROLINA POWER & LIGHT

SIEVE ANALYSIS
(Large Scale Gradation)

SAMPLE NUMBER SR-24-4-2 DATE 12-28-78

LOCATION D. Aux Dam - Spillway TEST METHOD ASTM D 422

DESCRIPTION Random Rockfill - Before Compaction

Note : Total Wgt = 5325 lbs

Sieve No./ Size	Accumulative Weight Retained	Percent Retained	Percent Passing Subtotal	Percent Passing Subtotal	Percent Passing Total
24"	0.0	0.0			100.0
12"	403.0	7.57			92.43
8"	952.0	17.88			82.12
4"	1628.0	30.57			69.43
2"	2664.0	50.03			49.97
Pan	2661.0	—			—
1½"	1.01	12.35	87.65		43.80
3/4"	2.38	29.10	70.90		35.43
3/8"	3.77	46.09	53.91		26.94
#4	4.98	60.88	39.12		19.55
Pan	8.18	—	—		—
#8	41.20	20.60		79.40	15.53
#16	74.60	37.30		62.70	12.26
#30	103.80	51.90		48.10	9.40
#50	132.30	66.00		34.00	6.65
#100	153.00	76.50		24.50	4.79
#200	167.00	83.50		16.50	3.23
# Pan	200.00	—			—

Calibrated Equipment Used:
Tool ID Number CPL-499364

Inspector Stephen M. Brown

Checked _____

QA Review _____

CAROLINA POWER & LIGHT

SIEVE ANALYSIS
(Large Scale Gradation)

SAMPLE NUMBER VR-24-4-2 DATE 12-28-78

LOCATION W. Aux Dam Spillway TEST METHOD ASTM D-422 C-33

DESCRIPTION Random Rockfill - After Compaction

NOTE: Sample Weight Totalled 4014.0 lbs

Sieve No./ Size	Accumulative Weight Retained	Percent Retained	Percent Passing Subtotal	Percent Passing Subtotal	Percent Passing Total
24"	0.0	.0.0			100.0
12"	495.9	12.35			87.65
8"	781.5	19.47			80.53
4"	1272.0	31.69			68.31
2"	1736.6	43.26			56.74
PAN	2277.4	56.00			—
1½	0.0	0.0	100.0		56.74
¾	1.76	18.37	81.63		46.32
⅜	3.48	36.33	63.67		36.13
#4	4.83	50.42	49.58		28.13
PAN	9.58	49.58	-		—
#8	37.0 g	18.5		81.5	22.93
#16	72.4 g	36.2		63.8	17.95
#30	104.5 g	52.3		47.7	13.42
#50	134.2 g	67.1		32.9	9.25
#100	154.6 g	77.3		22.7	6.39
#200	167.3 g	83.7		16.3	4.59
PAN	200.0 g	-			—

Calibrated Equipment Used:
Tool ID Number CPL-C-499364

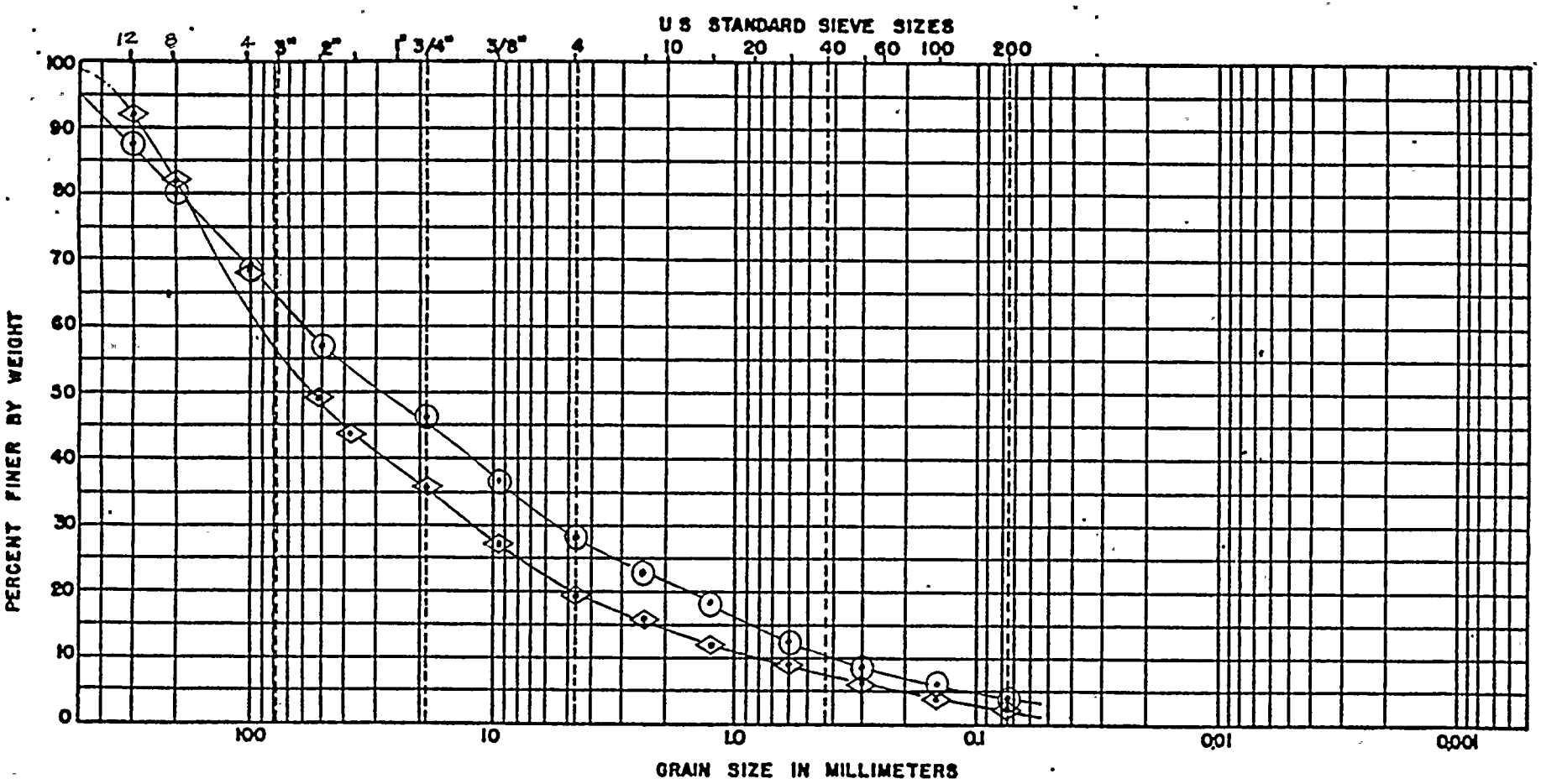
Inspector Stephen M. Brown

Checked

QA Review

CAROLINA POWER & LIGHT CO.

HARRIS SITE



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

SAMPLE NO.	LOCATION	NAT WC	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
VR-24-4-2	W. AUX DAM SPILLWAY	~	N/A	~		TEST FILL VR-24-4-2 RANDOM ROCKFILL SAMPLE FROM SPILLWAY ◇ BEFORE COMPACTION ⊙ AFTER COMPACTION

GRAIN SIZE DISTRIBUTION

DATE: 12-28-78

INSPECTOR S.M. BROWN

CHECKED

Q/A REVIEW

TEST FILL PROGRAM
COMPACTION OF RANDOM FILL
CP&L - HARRIS SITE

Test Fill No. VR-24-4-2 TEST #1 Date 12-28-78

Layer Thickness ~ 24" By S.M. Brown

Number Layers 4

Type Compaction Equip. RAYGO RASCAL VIBRATORY ROLLER

Material Description BLASTED ROCK (RANDOM FILL)

DENSITY

1.	Volume of water for surface measurement	3.0 ~~BARREL Gal.~~	18.0 Ft.^{3}
2.	Top of water to top of frame	4.19	In.
3.	Weight of truck empty	10440	Lb.
4.	Weight of truck filled	19360	Lb.
5.	Sample weight	8920	Lb.
6.	Volume of water for hole measurement	12.6 BARRELS ~~Gal.~~	75.6 Ft.^{3}
7.	Volume of hole	9.6 BARRELS =	57.6 Ft.^{3}
8.	Wet density of material	154.86	Lb/Ft.^{3}
9.	Dry density of material	146.34	Lb/Ft.^{3}

MOISTURE CONTENT

10.	Weight wet moisture sample + container	200.0 g	~~Lb.~~
11.	Weight dry moisture sample + container	189.0 g	~~Lb.~~
12.	Weight water	11.0 g	~~Lb.~~
13.	Weight container	N/A	~~Lb.~~
14.	Weight dry material	189.0 g	~~Lb.~~
15.	Moisture content	5.82 %	~~%~~

Calibration CP&L 499364

FORM 906

N. C. DEPT. OF MOTOR VEHICLES

WEIGHT STATION #2

Date VR-24-4-2

OWNER

STREET #1-IPDT

CITY

10440 TARE

06280 1

13080 2 or 2 & 3

17360 3 or 3 & 4

4 or 4 & 5

Weigher SMB

45

6Q1771R

The Baltimore Business Forms Co., Winston-Salem, N. C.

MANIFOLD—PAT'D—

TEST FILL PROGRAM
COMPACTION OF RANDOM FILL
CP&L - HARRIS SITE

Test Fill No. VR-24-4-2 TEST #2 Date 1-11-78

Layer Thickness Approx 24" By Bullock

Number Layers 4

Type Compaction Equip. Ray-Go Rascal Vibratory roller

Material Description Blasted Rock (Random Fill)

DENSITY

1. Volume of water for surface measurement 3 barrels Gal. 18.0 Ft.^{3}
2. Top of water to top of frame 4 inches In.
3. Weight of truck empty 10,620 lbs Lb.
4. Weight of truck filled 23,620 lbs Lb.
5. Sample weight 13,000 Lb.
6. Volume of water for hole measurement 18 barrels Gal. 108 Ft.^{3}
7. Volume of hole 15 barrels = 90 Ft.^{3}
8. Wet density of material 144.44 Lb/Ft.^{3}
9. Dry density of material 136.8 Lb/Ft.^{3}

MOISTURE CONTENT

10. Weight wet moisture sample + container 200.00 g Lb.
11. Weight dry moisture sample + container 189.43 g Lb.
12. Weight water 10.57 g Lb.
13. Weight container -0- Lb.
14. Weight dry material 189.43 g Lb.
15. Moisture content 5.6 %

calibration - CP+L 499364

FORM 906

N. C. DEPT. OF MOTOR VEHICLES

WEIGHT STATION APEX, W. T. S.TA.

Date 1-11-79

OWNER C.P.&L. BH-1410

STREET

CITY NEW HILL, N.C.

YR-24-4-2
#2 IDOT

Truck # 6447

07540	1
16080	2 or 2 & 3
23,620	3 or 3 & 4
	4 or 4 & 5

Weigher C.A. LANGSTON

6017718 The Baltimore Business Forms Co., Winston-Salem, N. C.

LOCATION West Aux Spillway Station 8+00

TESTED BY Bullock / Brown

OBSERVATION HOLE

STRATA DEPTH (ft.) FROM SURFACE	TO	SOIL CLASSIFICATION
	1.67	Brown silty sandstone

1. DEPTH (ft.) TO WATER TABLE: N/A
2. DEPTH (ft.) TO GROUND SURFACE: N/A
3. DEPTH (ft.) TO BOTTOM OF WELL: 1.42
4. DEPTH (ft.) TO TOP OF SAND: 0.0
5. DEPTH (ft.) OF SAND (3) -(4): 1.42
6. DEPTH (ft.) TO WATER SURFACE IN WELL: 0.67
7. DEPTH (ft.) OF WATER IN WELL h=(3) -(6): 0.75
8. DENSITY (pcf) OF STANDARD SAND: 95.4
9. WEIGHT (lb) OF SAND + CONTAINER BEFORE FILLING WELL: 55.80
10. WEIGHT (lb) OF SAND + CONTAINER AFTER FILLING WELL: 31.53
11. WEIGHT (lb) OF SAND USED (9)-(10): 14.27
12. VOLUME (cu. ft.) OF WELL (11)÷(8): .1496
13. RADIUS (ft.) OF WELL $r = \sqrt{\frac{(12)}{(5)\pi}}$: 0.183

TOOL ID _____

$Q = .00667$
$Q = .00646$
$Q_{avg} = .00657$ cu.ft./MIN.

$h = 0.75$
$r = 0.183$

$$K = \frac{525{,}600\left[\sinh^{-1}\left(\frac{h}{r}\right)-1\right]\frac{Q}{2\pi}}{h^2}$$

$$= \frac{525{,}600\left[\sinh^{-1}(4.098)-1\right].00104}{.5625}$$

$$= \frac{525{,}600\left[2.12-1\right].00104}{.5625}$$

$$= \frac{525{,}600(1.12).00104}{.5625}$$

$$= 1088 \text{ ft/yr.} = 1.052 \times 10^{-3} \text{ cm/sec}$$

SHNPP

WELL PERMEAMETER TEST

VR-24-4-2-PF-1

TIME		WATER VOLUME						
		DRUM NUMBER		DRUM NUMBER		TOTAL	ACCUM.	TEMPERATURE
CLOCK	ACCUM. (MIN.)	READING	DIFFERENCE	READING	DIFFERENCE	DIFFERENCE	FLOW	
2:15	0	1.80						
			0.10			0.10	0.10	
2:30	15	1.70						
			0.30			0.30	0.40	
3:15	60	1.40						
			0.570			0.570	0.970	
4:45	150	.830						

VR-24-4-2-PF-2

LOCATION W. Auxiliary Spillway Station 8+00

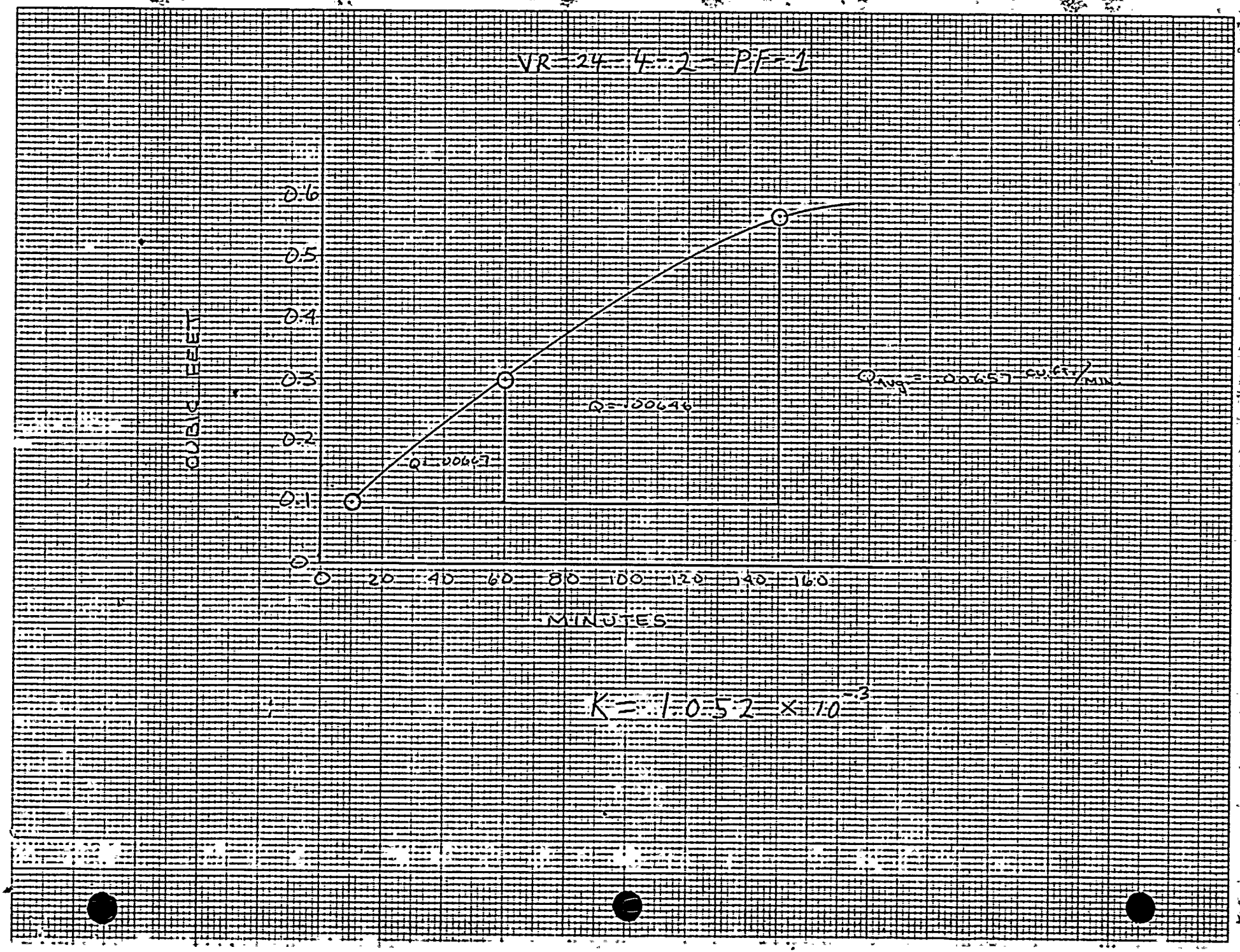
TESTED BY Brown / Burack

OBSERVATION HOLE

STRATA DEPTH (ft.) FROM	TO	SOIL CLASSIFICATION
Surface	1.67	Brown silty sandstone

1. DEPTH (ft.) TO WATER TABLE: N/A
2. DEPTH (ft.) TO GROUND SURFACE N/A
3. DEPTH (ft.) TO BOTTOM OF WELL: 1.90
4. DEPTH (ft.) TO TOP OF SAND: 0.917
5. DEPTH (ft.) OF SAND (3) -(4) 1.90
6. DEPTH (ft.) TO WATER SURFACE IN WELL: 0.33
7. DEPTH (ft.) OF WATER IN WELL h=(3) -(6): 1.57
8. DENSITY (pcf) OF STANDARD SAND 95.8
9. WEIGHT (lb) OF SAND + CONTAINER BEFORE FILLING WELL: N/A
10. WEIGHT (lb) OF SAND + CONTAINER AFTER FILLING WELL: N/A
11. WEIGHT (lb) OF SAND USED(9)-(10): 86.5
12. VOLUME (cu. ft.) OF WELL (11)÷(8) : 0.903
13. RADIUS (ft.) OF WELL $r = \sqrt{\frac{(12)}{(5)\pi}}$ 0.389

TOOL ID CPL-C-4366



$K = 1.052 \times 10^{-3}$

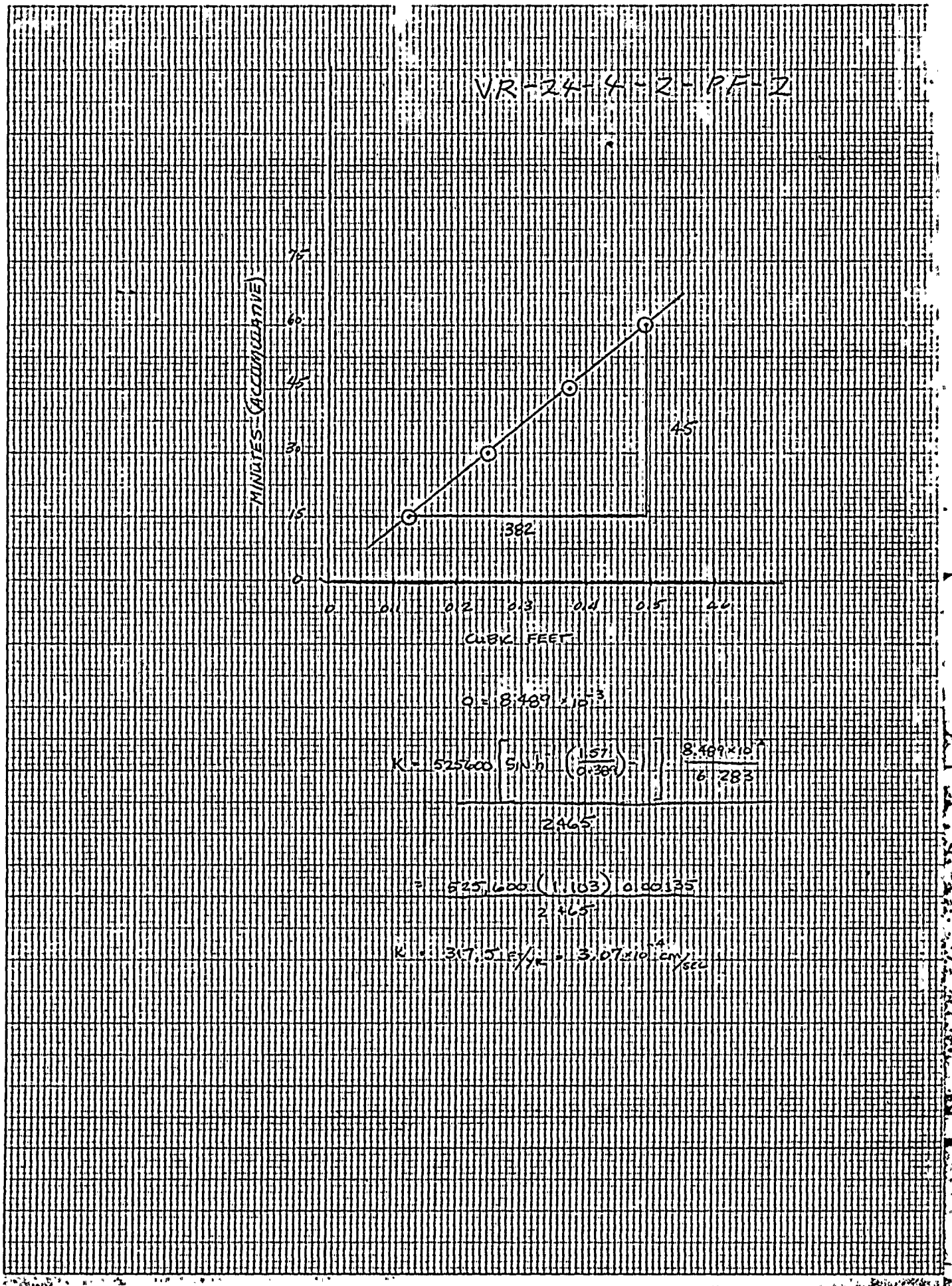
SHNPP

WELL PERMEAMETER TEST

VR-24-4-2-PF2

TIME		WATER VOLUME						
		DRUM NUMBER		DRUM NUMBER				
CLOCK	ACCUM. (MIN.)	READING	DIFFERENCE	READING	DIFFERENCE	TOTAL DIFFERENCE	ACCUM. FLOW	TEMPERATURE
4:32	0	1.275						
4:47	15	1.151				0.124	0.124	
5:02	30	1.028				0.124	0.248	
5:17	45	0.904				0.124	0.372	
5:32	60	0.780				0.124	0.496	

VR-24-4-2-PF-2



$$Q = 8.489 \times 10^{-3}$$

$$K = 525600 \left[\sin^{-1} \left(\frac{1.571}{0.384} \right) - \frac{8.489 \times 10^{-3}}{6.283} \right] \Big/ 2.465$$

$$= 525,600 \left(1.103 \right) 0.00135 \Big/ 2.465$$

$$K = 317.5 \text{ ft/yr} = 3.07 \times 10^{-4} \text{ cm/sec}$$

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 12-18-78 Spec. No. Car-Sh-CH-4 & TP-01

Location Spillway West Aux. Dam Inspector S.A. Brown

Elevation N/A Shift Day

Weather Cloudy & cool

COMMENT

Today an area was selected in the spillway of the West Aux. Dam, for the test fill to be set up. this area was staked out by Smith & Smith surveyors of Apex, and was approx. 135' x 60'. Nello Teer graded and leveled the test fill area with a motor grader prior to the start of the test fill.

A representative sample was taken from the blast area for a gradation analysis by the QC. soils dept., and placed in the #6 warehouse for drying and testing.

INSPECTOR Warren B. Boland for S.A. Brown

Q A REVIEW

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 12-19-78 Spec. No. Car-Sh-CH-A & TP-01

Location Spillway West Aux. Dam Inspector S.A. Brown

Elevation N/A Shift Day

Weather

COMMENT

Before any settlement points were set today, the entire area within the boundaries of the test section, was proof rolled by a Raygo vibratory roller, To insure an adequate foundation for the test fill.

Upon proof rolling it was discovered the the surface was unsuitable for a test fill to begin. Therefore 8 in. of material was removed and releveled. this area was then rerolled and was found to be suitable for the test fill to begin.

The 1st lift was began at approx. (2 oclock). today. Wells Tear furnished 1 Wabco end dump truck, 1 983 track loader, 1 D-8 dozer, and 1 Raygo vibratory roller. throughout the placement of the first lift, the material consisted of dark brown siltstone with large amounts of rock. All material 22" of larger were removed. A D-8 dozer bladed the material in order to level the surface. Settlement points were placed according to test fill criteria.

INSPECTOR Sharon B. Brown for S.A. Brown

Q A REVIEW

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 12-20-78 TESTFILL VR-24-4-2 Spec. No. CH-4 & 5 TP-01

Location West Auxiliary Dam Spillway Inspector S. M. Brown

Elevation N/A Shift Day

Weather Cloudy & Cool

COMMENT

THE SECOND LIFT OF THE TESTFILL (VR-24-1-2) CONSISTED OF A REDDISH-BROWN CLAYEY SILTSTONE MIXED WITH CHUNKY SANDSTONE. IT WAS SPREAD INTO 24 INCH LIFTS BY A D-8 DOZER AS SUGGESTED IN TP-01 (TEST FILL PROCEDURE) WITH AS LITTLE TRAVEL AS POSSIBLE. AFTER BACKDRAGGING, SETTLEMENT POINTS WERE PAINTED ON AND ELEVATIONS TAKEN. AS IN THE PREVIOUS LIFT, THE VIBRATORY ROLLER MADE TEN PASSES WITH SETTLEMENT READINGS BEING TAKEN AFTER EACH PASS. AFTER THE SEVENTH PASS, THE FILL HAD A VISUALLY SMOOTH SURFACE.

THE THIRD LIFT CONSISTED OF A DARK BROWN SILTSTONE MIXED WITH REDDISH BROWN SHALEY SANDSTONE. THE SAME PROCEDURES FOLLOWED AS IN THE TWO PREVIOUS LIFTS (SPREADING INTO 24" LIFTS, 10 PASSES W/ SETTLEMENT RECORDED BETWEEN EACH, ETC.)

AFTER COMPLETION, THE FILL (3 LIFTS) WERE COVERED W/ POLYETHYLENE DUE TO PREDICTED RAIN

INSPECTOR Stephen Mark Brown

Q A REVIEW

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 12-21-78 Spec. No. CH-4 CH-8 & ~~CH-8~~ TP-01

Location West Auxiliary Dam Spillway Inspector S. M. Brown

Elevation N/A Shift Day

Weather Ptly Cloudy

COMMENT

Due to overnight rains, one corner of the fill was wet. Progress was held up until it dried somewhat (afternoon) The fourth (4th) lift, consisting of brown silty fine-grained sandstone, was placed in a 2 foot lift and backdragged with D-8 Dozer. Settlement points were set and painted and the vibratory roller made its passes. Between each pass elevations were taken to moniter settlement. This lift, only six (6) passes were made since on the previous lifts all major settlement had taken place. This is in accordance w/ TP-01.

Tomorrow, an in place density test (also in TP01) will be taken on the forth (4th) lift to see if six (6) passes will suffice for compaction requirements.

INSPECTOR Stephen M. Brown

Q A REVIEW _____

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 12-22-78 Spec. No. CH-4, CH-8, + TP-01

Location Test Fill at W.A. Dam Spillway Inspector Brown

Elevation N/A Shift Day

Weather Prtly cldy + windy

COMMENT

An in place density test (large scale) was performed at the area mentioned above. The frame was placed and calibrated before actual testing began. The test hole was dug by a Gradall supplied by Hello Teer and the soil was loaded in a weighed flatbed truck. The hole was then lined with plastic and filled with water to the same mark as the frame as made when calibrated. After the test was completed the water was pumped out and hole was checked for wetness (in case plastic leaked), no wetness was evident. All procedures were done in accordance with TP-01. Results of this test are accompanied with this report

INSPECTOR Warren B. Ballard for S.A. Brown

Q A REVIEW

EBASCO SERVICES
INCORPORATED
ENGINEERS - CONSTRUCTORS - CONSULTANTS
TWO RECTOR STREET
NEW YORK, N.Y. 10006
CABLE ADDRESS: EBASCO

BB-C-08006
File: 6-D-1.2
6-D-1.5

Mr. M F Thompson, Jr., Manager
Project Engineering
Carolina Power & Light Company
P.O. Box 1551
Raleigh, North Carolina 27602

50-400/401/402/403
Ltr dtd 2-2-79
7902220066

Dear Mr. Thompson:

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT
WEST AUXILIARY DAM AND DIKE
RANDOM ROCK TESTFILL #'S
VR-24-4-1 AND VR-24-4-2

We have reviewed the subject reports, made a comparison of the rockfill properties with the West Auxiliary Dam and Dike design criteria for random rock material and find the contents conform to the design requirements. We also find that the results show good correlation with those results obtained from the previous (1974) test fill designated VR-24-3. Based on the test fill results, we concur that the best method of compaction is six passes from a vibratory roller imparting 45,000 lbs of dynamic force on 24-inch lifts.

The gradation and density of the test fill material are in close agreement with that obtained in the VR-24-3 test fill, see attached figure; therefore, large-diameter triaxial shear strength test results from the earlier test fill are considered to be indicative of the strength of this material. The measured shear strength is 40-degree friction angle and zero cohesion as compared with the conservatively selected design shear strength of 30-degree friction angle and zero cohesion. Due to the close similarity of gradation and density for all test fills and the conservative design shear strength assumption, it is our opinion that no additional large-diameter triaxial shear strength tests are required.

Results of the permeability tests indicate that the material has good drainage characteristics and is suitable as pervious random rock material for use in the dam/dike shells. Permeability measurements varied from 3×10^{-3} cm/sec to 3×10^{-4} cm/sec. The lower range of measured permeability is believed to be on the conservative side for this material. The higher measured results are in close agreement — within half an order of magnitude — with permeability measurements made by the Army Corps of Engineers on the earlier test fill material. In any event, all permeability measurements indicate that the material is free draining for use in the random rock zones.

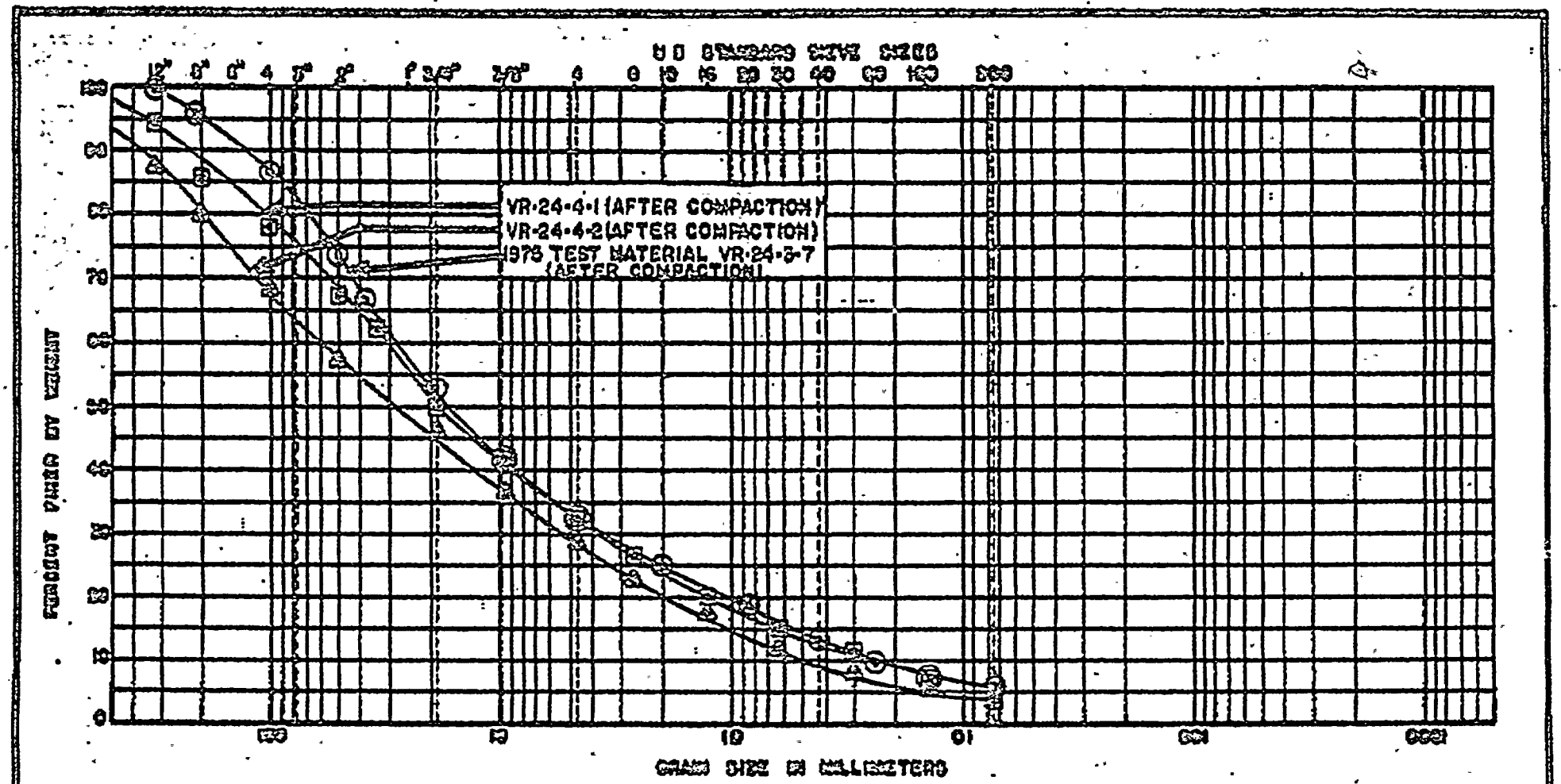
In summary, the materials tested conform to our design criteria for density gradation and shear strength. Permeability test results, which varied within one order of magnitude, indicate that the material is free draining and suitable as pervious shell material. The overall content and extent of work performed for the test fill program is considered to be satisfactory in defining the material properties and we do not envision the need for any additional testing unless the density and/or gradation of the shell fill material varies as the work proceeds.

Very truly yours,

I. V Thierwechter
Project Manager

MP:lh

cc: M F Thompson, Jr.
C H Moseley
R M Conts
T H Wyllie
Plant Manager c/o H R Banks
R M Parsons
S D Smith
G L Forehand
N J Chiangi
R Black



USCS / AASHO	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZED	CLAY SIZES

SAMPLE NO.	ELEV OR DEPTH	% dry	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
VR-24-4-1	SAMPLED FROM TEST FILLS	138.8 #/ft³	—	—	—	RANDOM ROCKFILL MATERIAL SAMPLED AFTER COMPACTION
VR-24-4-2		136.8 #/ft³				
VR-24-3-7		135.0 #/ft³				

GRAIN SIZE DISTRIBUTION

DATE N.A. M. Pavone

INSPECTOR

CHECKED

QA REVIEW

1736/6-73

Uncontrolled Copy

FOR INFORMATION ONLY

Project Identification No. CAR-SH-CH-8

NORTH CAROLINA REGISTERED SEAL 6498 ENGINEER MURRAY WEBER

EBASCO SERVICES INCORPORATED

EBASCO SPECIFICATION

EXCAVATION, BACKFILL, FILLING & GRADING

(This specification is applicable to Seismic Category I and Non-Seismic Structures. For classification see applicable drawings)

DOCUMENT CONTROL
RECEIVED
APR 5 1979
SHEARON HARRIS N. P. P.

PURCHASER:

OWNER: CAROLINA POWER & LIGHT COMPANY

OPERATING COMPANY: CAROLINA POWER & LIGHT COMPANY

PROJECT: SHEARON HARRIS NUCLEAR POWER PLANT

UNIT NO.: 1,2,3&4 NOMINAL KW 900,000 KW PER UNIT

LOCATION: WAKE COUNTY, NORTH CAROLINA

SELLER:

"THIS DOCUMENT IS DELIVERED IN ACCORDANCE WITH AND IS SUBJECT TO THE PROVISIONS OF SECTION X OF THE CONTRACT BETWEEN CAROLINA POWER & LIGHT COMPANY AND EBASCO SERVICES INCORPORATED DATED SEPTEMBER 1, 1970, AS AMENDED."

Prepared under the supervision of A. A. Ferlito, NC PE NO. 4935
Andrew A Ferlito
Murray Weber NC PE NO. 6498

Spec. Status	Date	Prepared By:	Reviewed By:	Pages Affected	CP&L Approval Date
Original	9/12/73	M M Kamble MK JSS	J L Ehasz JLE M. Weber 4/1/74		July 18, 197
R1	12/10/73	S N Goyal SNG	J L Ehasz JLE M. Weber 12/10/73	2, 5, 10 &11	12/5/73
R2	5/22/74	S N Goyal SNG	J L Ehasz JLE M. Weber 4/15/74	2,7,8,9,10,11 & 12	5/8/74
R3	11/5/74	S N Goyal SNG E.M.M.	J L Ehasz M. Weber	2.8,9,11 & 12	10/3/74
R4	10/18/77	S N Goyal SNG E.M.M.	J L Ehasz JLE	8	10/3/77

Ebasco Specification
Excavation, Backfill, Filling and Grading

Project Identification
No. CAR-SH-CH-8

Spec. Status	Date	Prepared By:	Reviewed By:	Pages Affected	CP&L Approval Date
R5	1/10/78	S N Goyal	J L Ehasz	1,8,&9	12/30/77
R6	4/4/78	S N Goyal	J L Ehasz	11	3/28/78
R7	1/8/79	S N Goyal	J L Ehasz	Cover	12/14/78
R8	4-3-79	M Pavone	J L Ehasz	2,9,11,13	3-1-79

EBASCO SERVICES INCORPORATED

EBASCO SPECIFICATION
EXCAVATION, BACKFILL, FILLING & GRADING

CONTENTS

R5

Ebasco Specification
Excavation, Backfill, Filling and Grading

Project Identification
No. CAR-SH-CH-8

1. SCOPE

This specification covers the excavation, foundation preparation and backfilling for plant area buildings, all reservoir concrete structures and filling and grading in the plant area as shown on the drawings.

In addition, the work under this specification shall also include:

a - Grubbing, removal and disposal of stumps, roots and organic material

b - Storage or disposal of all earth, sand, gravel, rock, boulders, debris and/or other materials at the locations shown on the drawings or approved by the Owner

c - The maintenance of all excavations during construction

d - Providing, installing, maintaining and removing any necessary sheet piling, sheeting, bracing and/or shoring

e - Erecting and maintaining substantial barricades around excavations where required for safety

f - Backfilling of all unauthorized over-excavations

g - Care and removal of all surface water, rain water or ground water seeping and flowing into the excavations by means of ditching, damming, pumping or other suitable means approved by the Owner

h - The foundation preparation in advance of concrete placement under the plant buildings and all concrete structures in the reservoir area

In addition to the general requirements of this specification, all additional specific requirements pertaining to excavation as defined in Specifications CAR-SH-CH-4, "Embankments, Dams, Dikes and Channels" and CAR-SH-CH-3,"Clearing and Grubbing" shall also apply.

2. STANDARDS AND DEFINITIONS

2.1 Standards

Equipment and/or services furnished in accordance with this specification shall comply with all Federal and State laws and local ordinances of the place of installation and with the following codes to the extent referenced herein. Unless otherwise noted, the document with addenda, amendments and revisions in effect on the date of the contract will apply. Later editions may be used by mutual consent in writing between the Contractor and Owner.

a - ASTM D2049, "Relative Density of Cohesionless Soils"

b - ASTM D698, "Moisture-Density Relations of Soils using 5.5 lb Rammer and 12 in. Drop" R2

c - ASTM D2216 "Laboratory Determination of Moisture Content of Soil" R5

d - ASTM D3017 "Moisture Content of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)

2. STANDARDS AND DEFINITIONS (Cont'd)

.1 Standards (Cont'd)

e - ASTM D1556 "Density of Soil in Place by Sand Cone Method" R1

f - ASTM D2167 "Density of Soil in Place by the Rubber-Balloon Method"

g - ASTM D2937 "Density of Soil in Place by the Drive-Cylinder Method"

h - ASTM D2922 "Determining the Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)" R3

i - ASTM C88, "Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate" R2

j - ASTM C131, "Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine"

k - Ebasco Specifications CAR-SH-CH-3, "Clearing and Grubbing"
CAR-SH-CH-4, "Embankments, Dams, Dikes and Channels"
CAR-SH-CH-6, "Concrete"
CAR-SH-CH 18, "Soil Cement" R8

.2 Definitions

a - Owner

In these specifications, the word "Owner" shall mean the individual appointed by the Owner and charged with technical acceptance of the work for the Owner, or his authorized agents, engineers, assistants and inspectors acting severally within the scope of the particular duties and authorities delegated to them.

b - Engineer

In this specification, the word "Engineer" shall mean the Design Engineer, Ebasco Services Incorporated.

3. EXCAVATION - GENERAL

Stumps remaining from clearing operations shall be cut flush or removed as directed by the Owner. All stump holes shall be filled and the area rough graded. All debris shall be disposed of as specified in Paragraph 4 of Specification CAR-SH-CH-3 "Clearing and Grubbing." Burying of debris shall not be permitted within 1000 ft of the area grubbed.

During the course of all excavation work located in areas beyond the clearing and grubbing lines shown on the drawings, extreme care shall be exercised by the Contractor to preserve and avoid damage to trees, shrubs and all other vegetation which does not directly hamper work progress. The Contractor's plans for the dimensions and routes of required access roads shall be subject to the approval of the Owner and he shall not enter any designated picnic, camping or recreational areas, except with written permission of the Owner. The discharge into natural streams or ponds of gasoline, oil or any other waste material is prohibited.

In rock excavation where the drawings show or the Owner directs that structures are to be founded on compacted crushed rock and random or concrete fill, the foundation shall be over-excavated to provide for a minimum of 6 in. of such material, unless otherwise noted on the drawings.

3. EXCAVATION - GENERAL (Cont'd)

Adequate barricades shall be erected and maintained around excavations where required for safety.

4. CLASSIFICATION OF EXCAVATION

All excavation shall be considered to fall within the following two classifications:

a - Unclassified

Unclassified excavation shall consist of the removal, storage and/or disposal of all materials required to be removed such as topsoil, clay, sand, gravel, rock fragments, boulders, soft and disintegrated rock or any other material that can be effectively removed by a D9 Caterpillar Tractor or equal equipped with a single tooth ripper.

b - Rock

Rock excavation shall consist of the removal, storage and/or disposal of such bedrock formations which require continuous drilling and blasting.

5. VARIATION IN EXCAVATION

It is likely that fissures, cracks, joints, cavities, overhangs or other irregularities in the rock surface may be encountered that will require excavation in excess of the foundation lines and grades initially shown on the drawings or specified. The right is reserved by the Owner to vary the depth, width and length of excavation and to increase or decrease the slopes of the excavations for the purpose of obtaining the most stable or economical foundation or the most desirable final result. The right is also reserved by the Owner to require that additional excavation be performed after excavation has been commenced or has been completed to the lines and/or grades shown on the drawings, previously specified, ordered, or staked on the ground.

.1 Variations of depth, width and length of excavation or increase and decrease of excavation slopes from those shown on the drawings or established by the Engineer which are required by the Contractor for any reason shall be approved by the Owner before such changes are made.

6. DISPOSITION OF EXCAVATED MATERIAL

.1 Topsoil

Immediately after grubbing and stump removal operations and before general excavation commences, topsoil shall be removed where and to such a depth as may be directed by the Owner. Topsoil is defined as the loamy dark surface or top layer of soil including fine roots, the herbaceous vegetation and overlying grass and is characterized by the presence of organic matter.

The topsoil to be reused shall be stockpiled at convenient approved locations. Compaction of this soil shall be accomplished by two or three passages of hauling and spreading equipment. Stockpiles shall be smoothed to a measurable outline and shall be constructed as directed and approved by the Owner.

6. DISPOSITION OF EXCAVATED MATERIAL (Cont'd)

.2 Suitable Excavated Material

Insofar as it is practicable, all suitable materials resulting from open cut excavations shall be used for permanent construction.

The Contractor's blasting and other operations in the excavations shall be such that the materials excavated shall yield as much required suitable material as practicable, and shall be subject to the approval of the Owner. Where practicable, materials suitable for use for construction shall be excavated separately from materials to be wasted. Suitable material shall be segregated by loads during the excavation and shall be placed in temporary stockpiles and later placed in the designated final locations in accordance with the appropriate drawings.

.3 Unsuitable Excavated Material

Excavated materials which are unsuitable for use in accordance with this specification and Specification CAR-SH-CH-4, "Embankments, Dams, Dikes and Channels" and the appropriate drawings or which are waste or excess material not required for construction of dams, dikes, backfill for plant area buildings or fill for the plant area or reservoir embankment shall be disposed of in waste disposal areas shown on the drawings or designated by the Owner.

All waste or excess material shall be disposed of in a manner which will avoid the necessity of rehandling or the interference with other work. It shall be spread and graded in uniform layers and compacted by two passages of crawler-type tractors, smooth rollers or other equipment approved by the Owner. If disposed of in benches, precautions shall be taken, to the Owner's satisfaction, to prevent material from rolling downhill. Waste piles shall be shaped to insure drainage.

In particular, the sandy silty alluvium, located in the existing streambed areas of the plant area shall be removed and if suitable, shall be placed elsewhere as random fill and compacted as hereinafter specified.

7. PRESPLITTING

Presplitting of in-situ rock, either competent or weathered, shall be performed where required by the Owner to obtain final specified open cut excavation surfaces for the plant area buildings, spillway-channels and other structures.

7. PRESPLITTING (Cont'd)

.1 Drilling and blasting for presplitting may proceed well in advance of general blasting. Alternately, all blasting may be performed at once if the presplitting holes are detonated first, using delay techniques.

.2 All drill holes for presplitting shall be a minimum of 2-1/2 in. in diameter with center to center spacing no closer than 2 ft. Holes may be percussion drilled along the lines and to the inclinations indicated on the drawings and established by the Owner. Every effort should be made to secure precise location and strict parallelism of all presplit holes to provide a continuous split.

8. BLASTING

The Contractor shall obtain all necessary blasting permits from the regulatory agencies before proceeding with the work. It shall be the obligation of the Contractor to select explosives which will produce the desired work of excavation with maximum safety and overall project economy. The Contractor's proposed plans for transportation, unloading, storage, magazine location and distribution of explosives from storage to the blast area shall be submitted to the Owner for his approval prior to the commencement of the work of excavation. As a minimum, the handling and storage of all explosives and blasting supplies, at all stages of their existence, shall comply with procedures as outlined in the "Blaster's Handbook" published by E I Du Pont de Nemours and Company Inc, of Wilmington, Delaware. Existing North Carolina or Federal governmental laws or regulations embodying more stringent requirements than outlined in the "Blaster's Handbook" shall be considered as superseding the applicable portions of the Handbook and shall be complied with in all respects.

.1 All necessary precautions shall be taken to preserve the rock beyond and below the lines of excavation in a sound condition. Heavy R1
blasting will not be permitted closer than 3 ft to the rock which will form the final foundation of concrete structures. In excavations for Class I structures this 3 ft may be increased by the Owner as necessary to ensure complete soundness of the final excavated foundation rock. As an excavation approaches its final lines, the depth of holes for blasting and the amount of explosive used per hole shall be reduced progressively such that in the opinion of the Owner light blasting is used to remove the material effectively. R1
Where presplitting techniques as outlined in Section 7 are not used, and in the opinion of the Owner, satisfactory results will not be obtained through light blasting closer than 3 ft to the final required rock face, excavation of the foundation shall then continue by barring, wedging, picking or other suitable means approved by the Owner. Damage done to surfaces by blasting, including the shattering of the material beyond the required excavation lines, shall be repaired by removal of the damaged materials and backfilling with concrete or other selected materials as set forth in Section 9 of this specification.

8. BLASTING (Cont'd)

.2 Before the start of any large scale rock excavation, various arrangements of blasting charges, hole diameters and hole spacing shall be tested for all types of blasting to determine those which will produce the desired results with maximum economy.

.3 The spacing and size of drill holes may be varied with the approval or at the direction of the Owner to suit the material encountered during construction so that a smooth face, reasonably free of loose rock is produced. It shall be the Contractor's responsibility to drill as many holes as are required to satisfactorily complete the work.

.4 No blasting shall be performed in any excavation until the size and pattern of blast holes and the amount and distribution of blasting charges has been reviewed by the Owner. Each and every blast will be prerecorded and the Owner will sign off each blast prior to the firing.

.5 When blasting is being done within 500 feet of concrete structures, whether newly placed or existing, a careful and documented monitoring program of velocity measurements must be conducted with calibrated instrumentation. Generally no blasting shall be performed for first 24 hours after concrete placement. If blasting must be done during the first 24 hours then the powder and distance relationships must be controlled to limit the peak particle velocities at the newly placed concrete to the following limits; the first 12 hours shall be limited to less than 0.2 inches per second, 12 to 24 hours shall be limited to 0.6 inches per second at 12 hours and allowed to increase linearly at the rate of 0.3 inches per second per hour. The limiting peak particle velocity after 24 hours shall be 4 inches per second. The Contractor shall submit to the Owner for approval prior to blasting the drilling pattern, ignition pattern, charge and other details of the operations and any calculations used to establish that the existing structures will not be damaged by blasting.

9. OVER-EXCAVATION

.1 If unclassified materials are excavated excessively beyond the lines shown on the drawings or established by the Owner, the Owner may direct that such over-excavation be backfilled. The backfill shall be a selected backfill material, as hereinafter specified, placed in layers not more than 6 in. thick, if hand compacted, or 9 in. thick, if machine compacted, moistened and thoroughly compacted by tamping or rolling to the degree of compaction specified on the drawings or in the specifications.

9. OVER-EXCAVATION (Cont'd)

.2 In all rock excavations where concrete is to be placed upon or against rock surfaces, over-excavation beyond the lines shown on the drawings or lines established by the Owner shall be backfilled with concrete. It shall be the same class as that of the concrete to be placed in contact with the rock.

10. FOUNDATION PREPARATION

All rock foundations which will be in contact with masonry shall be suitably prepared by washing, or blowing by compressed air in advance of concrete placement. All soil, muck, small rock fragments and other foreign materials shall be removed. In any area where the nature of the rock is such that it would be softened by washing with water, blow pipes and compressed air shall be used and a concrete seal mat shall immediately be placed by the Contractor. Any water and debris collecting in the low spots shall be removed.

The preparation of foundation rock surfaces under dams, dikes and embankments shall be performed in accordance with the appropriate section of Specification CAR-SH-CH-4, "Embankments, Dams, Dikes and Channels."

11. BACKFILL GENERAL

Backfill material around masonry structures shall not be placed until released by the Owner after consideration of curing and strength requirements for the concrete.

.1 Care shall be taken to place backfill symmetrically, and in uniform layers, to prevent harmful eccentric loading on a structure or foundation.

.2 Where a large number of lifts are required to complete a backfill operation and the elapsed time between placement is large, the surface of each lift should be sloped slightly to facilitate drainage and prevent ponding on the fill.

.3 All necessary processing, including raking, crushing, removal of oversize materials, mixing and watering or aerating shall be performed in the stockpile or borrow pit. Only minor adjustments in water content will be permitted on the fill after it has been placed. However, adding water to increase water content in fill during placement may be permitted by the Owner where sheepsfoot/wedgefoot roller is used for compaction. R2

.4 Unless otherwise specified or directed by the Owner, heavy hauling or compacting equipment shall be permitted no closer than three feet to any structure or foundation during backfilling. In all areas closer than three feet,

11. BACKFILL GENERAL (Cont'd)

.4 (Cont'd)

or where work space is limited, portable equipment such as vibratory plates, rammers, or pneumatic tampers shall be used. The equipment and procedures used shall be subject to the approval of the Owner.

.5 In-place density of backfill shall be determined by either one of the following four methods ASTM D 1556, D 2167, D 2937 or D 2922 - Method B as designated by the Owner. To calculate dry density from wet density determined according to ASTM D 2922, moisture content shall be determined by ASTM D 2216 or D 3017. If ASTM D 3017 is used to determine moisture content, one calibration test for the equipment shall be performed after every 10 tests by comparison with moisture content by ASTM D 2216. If the calibration test indicates a deviation of more than ± 2% moisture content the use of nuclear method shall be discontinued. If ASTM D 2922 is used to determine in place density, one calibration test for the equipment shall be performed after every ten tests by comparison with in-place density test by ASTM D 1556, D 2167 or D 2937 as designated by the Owner. The calibration test shall be performed on a similar material for which the equipment is used in the field. The calibration test frequency may be reduced by the Owner from one in ten to one in 25 after a review of the performance of the equipment after at least 10 calibration tests (i.e. 100 tests) for each piece of equipment have been performed and the deviation of moisture content when compared with ASTM D 2216 or density when compared with ASTM D 1556, D 2167 or D 2937 is not more than ± 2%. R5 R5

12. BACKFILL OR FILL MATERIAL

The backfill or fill materials used at any location shall be those called for on the drawings, specified herein or designated and approved by the Owner and shall conform to the following requirements:

.1 Random Fill

The materials used for random fill may be any excavated unclassified material or rock and shall be free of stumps, roots, brush, rubbish, organic topsoil and other objectionable material. While no specific requirements covering type, gradation or size limitation for this material are presented herein, sources shall be subject to the approval of the Owner.

.2 Selected Backfill

Selected backfill shall be used around pipes and at places shown or called for on the drawings. Selected backfill shall be soil overburden material with the maximum size of stones not more than 3 in. obtained from local overburden excavation at the site. Selected backfill around plant buildings shall be clayey and silty residual soils, predominantly (over 90%) derived from claystones and siltstones, obtained from excavations or borrow areas from and the vicinity of plant, auxiliary dam and spillway, and auxiliary dike areas, and shall be free of stones larger than 3 in. and 95% of the material shall pass thru 3/4 in. screen. Select backfill around class I electrical duct banks shall be clayey and silty soil, free of stones larger than, 1 in. with 95% of the material passing thru a ½ inch screen. R5 R8

.3 Riprap

Rip materials shall consist of sandstone, conglomerate or granitic rock fragments that are dense blocky, resistant to abrasion and free of cracks, seams and other defects that would tend to increase their destruction by water and frost actions. To determine the suitability of riprap materials, Los Angeles Abrasion Test in accordance with the provisions of ASTM C131, Sodium Sulfate Soundness Test in accordance with the provisions of ASTM C88, and Accelerated Expansion Test in accordance with the procedure described herein shall be performed on the riprap materials.

Procedure for Accelerated Expansion Test: Soak 10-12 lb of rock fragments grading 3 to 3/4 inch in ethylene glycol in a plastic or glass container at room temperature. Examine the rock pieces daily for a maximum period of 15 days for any signs of deterioration. Rocks withstanding this test for the "full period of the test will be acceptable".

12. BACKFILL OR FILL MATERIAL (Cont'd)

.3 Riprap (Cont'd)

Riprap shall be classified as Type A, Type B and Type C riprap, and shall be well graded as specified below:

Type A riprap shall have seventy percent of rock ranging in size from 24 inches to 48 inches. The average size shall not be less than 30 inches and the dimension in any direction shall not be less than 18 inches.

Type B riprap shall have seventy percent of the rock ranging in size from 12 inches to 24 inches. The average size shall not be less than 16 inches and the dimension in any direction shall not be less than 10 inches.

Type C riprap shall have seventy percent of rock ranging from 8 inches to 16 inches. The average size shall not be less than 10 inches and the dimension in any direction shall not be less than 6 inches. R2

In all types of riprap mentioned above, slabs or rock slivers with maximum dimensions larger than twice the respective specified average dimension will not be accepted.

.4 Crushed Rock

Crushed rock for drainage layer, bedding or road base shall be used at the following locations:

a - Behind retaining walls shown on the drawings to serve as a drainage layer or as fill material as shown on the drawings.

b - As bedding material for pipes, conduits, electrical conduits, cable trenches or other structures where required in rock excavations. R3

c - As a filter blanket or bedding beneath riprap slope protection where specified.

d - As road base where specified.

e - Elsewhere as directed by the Owner or shown on the drawings.

The crushed rock shall consist of hard, durable rock such as granite, sandstone or conglomerate and may be obtained from structure rock excavation or quarry and shall meet the following gradation requirements:

Size	Percent Finer when used as Drainage Layer, Filter Blanket, or Fill-Material as shown on Drawings	Percent Finer when used as Bedding for Pipe, etc	Percent Finer when used as Road Base
3 in.	95-100	-	-
1-1/2 in.	55-80	-	80-100

R2

12. BACKFILL OR FILL MATERIAL (Cont'd)

.4 Crushed Rock (Cont'd)

Size	Percent Finer when used as Drainage Layer, Filter Blanket, or Fill-Material as shown on Drawings	Percent Finer when used as Bedding for Pipe, etc	Percent Finer when used as Road Base
3/4 in.	30-55	-	68-100
1/2 in.	-	100	55-100
3/8 in.	5-20	-	-
No. 4	0-10	83-100	35-80
No. 40	-	36-54	14-45
No. 200	-	0-15	5-25 R6

The road base material given above is same as "Soil Type Base Course 910.5 (Type B)" of standard specifications for roads and structures, North Carolina State Highway Commission.

Crushed rock used as bedding beneath various types of riprap shall meet the following gradation requirements:

Size	Percentage By Weight Passing: Bedding Type A for Riprap Type A	Bedding Type B for Riprap Type B	Bedding Type C for Riprap Type C R2
12 in.	100	-	-
6 in.	83-100	100	-
3 in.	66-81	78-100	100
1-1/2 in.	50-66	56-76	76-90
3/4 in.	32-49	34-50	50-65
3/8 in.	16-32	17-34	25-40
No. 4	0-16	0-17	12-22
No. 8	-	-	0-10

.5 Soil - Cement

Soil - cement shall be as specified in Specification CAR-SH-EH-18. R8

13. PLACEMENT OF BACKFILL OR FILL

.1 Random Fill

Random fill as specified in Section 12.1 shall be placed in the area and to the lines and grades shown on the drawings or as directed by the Owner.

Before placement of any random fill, a test fill section shall be constructed using a vibratory roller having a dynamic force of not less than 40,000 lb, or a sheepsfoot/wedgefoot roller having an operation weight of not less than 4000 lb per linear foot or a 50-ton rubber tired roller compactor. Various combinations of layer thickness and roller passes shall be tried. For each layer thickness tested, either settlement readings shall be taken after each pass at a number of points on the fill and the average plotted against layer thickness or density tests shall be performed after each pass at a number of points in the fill when the size of material is small enough to conduct in-place density tests by the Sand Cone Method. The final choice of layer thickness and number of passes will be determined by the Engineer and the Owner based upon these results as well as appearance and response to rolling. R2 R2 R1

If 90 percent of the random material passes 3/4 in. screen, construction of test section shall not be required. It shall be compacted in layers not more than 8 in. compacted thickness to 95 percent of the maximum density obtained in Standard Proctor Compaction Test (ASTM D698-Method A,B,C or D to be used shall be determined by the Owner). In-place density shall be determined as specified in Paragraph 11.5. Layers up to 12 inches compacted thickness may be permitted by the Owner when found satisfactory by testfill program performed on a similar material. R3 R1 R2

The random fill shall be placed carefully so as not to injure structures or piping or disturb previously placed backfill of any type.

Where random fill is placed in conjunction with drainage layers, both materials shall be placed at the same rate. Care shall be taken to prevent mixing of material which would hamper the effectiveness of the drainage layer.

All materials shall be deposited and graded so that cobbles, gravel and boulders will be well distributed and not concentrated in pockets or in any one layer. The fill material shall not be placed while frozen nor shall it be placed on frozen surfaces.

Prior to placing random fill, any soft and unsuitable material in foundation shall be removed and such removals shall be filled back with the same material or with random fill and compacted to required density according to the specification.

Where random fill is to be placed over firm ground other than rock, a series of open furrows shall be formed not less than 8 in. deep below the ground at intervals of not more than 3 ft and compaction of the existing ground will not be required prior to the placement of random fill.

13. PLACEMENT OF BACKFILL OR FILL (Cont'd)

.2 Selected Backfill

Selected backfill shall be hand or machine compacted in layers not more than 6 in. compacted thickness to a density not less than 95 percent Standard Proctor Density and in-place density shall be determined as specified in Paragraph 11.5. R1 R3

.3 Riprap

Rock for riprap shall be placed on the crushed rock bedding in such a manner as to ensure that the individual sections will be interlocked and form a rough surface so that the completed riprap is stable, without tendency to slide and with no unreasonably large protrusions from or hollows in the surface or unfilled spaces within the riprap. The inclusion of rock spalls or gravel in the mass in an amount not in excess of that required to fill voids in the riprap will be permitted. Riprap may be placed concurrently with the placement of the random fill or, in a single operation after all random fill has been placed to final lines and grades. R2

If the riprap is placed in a single operation, it shall be placed to its full slope thickness as indicated on the drawings in one operation and in such a manner as to avoid displacing the underlying materials. Placing dumped riprap in sloping layers will not be permitted. The individual sections must be carefully placed so that the riprap will be interlocked and form a rough surface.

.4 Crushed Rock

Crushed rock materials except when used as a bedding for riprap may be compacted by the passage of dozers or by surface vibrators, smooth rollers, power tampers or other equipment approved by the Owner. R2

The relative density of the compacted material shall be not less than 70 percent as determined from tests conducted in accordance with the provisions of ASTM D2049, "Relative Density of Cohesionless Soils." In-place density shall be determined as specified in Paragraph 11.5. R1 R3

Where compaction of crushed rock backfill is performed by hand portable equipment, the material shall be deposited in horizontal layers, which, after compaction, are not more than 6 in. thick. Where compaction is performed using dozers, rollers or other similar equipment, the material may be deposited in layers which, after compaction, are not more than 12 in. thick.

During the compaction of crushed rock, the material shall be wetted thoroughly throughout the entire layer being compacted.

.5 Soil - Cement

Soil - cement shall be placed in the areas as shown on Ebasco drawings in accordance with applicable provisions of Specification CAR-SH-CH-6 and CAR-SH-CH-18. R8

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

TECHNICAL PROCEDURE
TP-02

MAY 1 1979 REV. 8
3 1979 REV. 7
OCT 17 1979 - Rev. 6
Rev 5

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MAR 10 1978
SHEARON HARRIS N. P. P.

Rev.	Description		Approvers	Date
0	Issue for Use	Originator	James F. Averill	4/6/74
			Robert M. Reynolds	4/16/74
			J C James PE	4/16/74
1	Revision to 5.1.1.3	Originator	J. F. Averill	4/15/74
			Robert M. Reynolds	4/15/74
			J C James PE	4/15/74
2	Deleted 5.1.2.5. Added 5.1.3 and 5.1.3.1 to comply with test fill program	Originator	J F Averill	4/25/74
			Robert M Reynolds	4/25/74
			J C James PE	4/25/74
3	Deleted field test for material with 90% passing a 3/4" screen. All random fill to be placed in accordance with test fill program.	Originator	James F. Averill	5/1/74
			Robert M. Reynolds	5/1/74
			Calvin C James PE	5/1/74
4	Added field test for placement of material. Added appendix A to include Flow chard and sample data sheet	Originator	James F. Averill	6/6/74
			Robert M. Reynolds	6/13/74
			J C James PE	6/13/74

CAROLINA POWER AND LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

TECHNICAL PROCEDURE

TP-02

Rev.	Description	Approvals		Date
5	General Revisions as Noted.	Originator	James F. Fifield	3/6/78
		Constructor	W. D. Goodman	3-6-78
		CP&L	A M Lucas	3-9-78
6	Revised as noted.	Originator	James F. Fifield	10/15/78
		Constructor	W. D. Goodman	10/16/78
		CP&L	A M Lucas	10/16/78
7	Revised as Noted.	Originator	J. F. Fifield	4/23/79
		Constructor	W. D. Goodman	4-23-79
		CP&L	A M Lucas	4-23-79
8	Revised as Noted.	Originator	J. F. Fifield	5-1-79
		Constructor	W. D. Goodman	5-1-79
		CP&L	A M Lucas	5-1-79
		Originator		
		Constructor		
		CP&L		

1.0 SCOPE

The purpose of this procedure is to define and establish the methods, standards and documentation procedures used to ensure the fill operations are performed in accordance with the design requirements and specifications and to establish the responsibility for implementing this Soils Control Program. This procedure covers fill and backfill for the general plant area, plant area buildings, and reservoir concrete structures.

2.0 REFERENCES

2.1 Ebasco Specification CAR-SH-CH-8, "Excavation and Backfill"

2.2 PSAR

2.3 TP-01, Test Fill Program - Random Fill, Random Rockfill, and Rockfill

2.4 TP-04, Calibration of Controlled Tools

2.5 TP-14, Training and Qualification of Civil Construction Inspection Personnel

2.6 TP-11, Gradation Analysis of Riprap

2.7 TP-17, Construction Inspection Non-Conformance Control

2.8 Ebasco Specification CAR-SH-CH-4, Embankments, Dams, Dikes and Channels R8

3.0 GENERAL

3.1 Responsibility

1. The testing of all compacted fill and fill material shall be the responsibility of the Construction Inspection Supervisor or qualified personnel.
2. All inspections and tests shall be performed as required and in accordance with References 2.1 and 2.2, and as required herein unless directed otherwise by Ebasco Services, Inc. Required inspection and test results shall be transmitted to QA after completion, for permanent records.

3. The forms used for test and inspection results shall be developed prior to the start of work. Samples of the forms to be used may be found in Section 5.0.
4. QA shall review all documentation submitted and develop the QA record file.
5. Before starting work all cognizant personnel shall familiarize themselves with the requirements of the referenced documents of this procedure. and shall meet requirements of Reference 2.5.

3.2 Inspection and testing as required by this procedure shall be documented in sufficient detail to provide adequate records to permit a thorough review of the quality and adequacy of the work. All test results and inspection reports shall be recorded and transmitted to QA as illustrated in the attached Documentation Flow Chart (Appendix A). R7

3.3 The format of the forms to be used for collection of test data shall contain the tool identification number when calibrated equipment is to be used. R7

4.0 PROCEDURE

4.1 Construction requirements for placement of backfill and fill material for the plant area, plant building, and reservoir structures shall be as specified in Reference 2.1 and 2.2 of this procedure.

1. FREQUENCY of soil tests as required for placement of random fill shall be as follows:
   1. Random fill placement shall be in accordance with requirements established during the test fill program of Reference 2.3 of this procedure.
   2. An inspector shall monitor the placement of random fill and maintain an accurate account of the compaction to assure the method used complies with the criteria

established during the test fill program.

3. Moisture content checks (Exhibit 3) shall be performed periodically each day as necessary to ensure that moisture content of the random fill during compaction is within the limits established during the test fill program.
4. A daily inspection report (Exhibit 1) shall be completed by the inspector to verify compliance with or identify deviation from the requirements established during the test fill program. The report shall also contain descriptive information pertaining to material types, placement and compaction procedures, and field control used if other than test fill criteria.
5. The test fill program shall be continued as necessary to assure the established method of placement and compaction will result in satisfactory density in case of material change. R6

2. FREQUENCY of soil test as required for material placement (including random fill) when a test fill program is not used shall be as follows:
   1. Optimum moisture - density data shall be determined in accordance with ASTM D-698 prior to the start of the fill operation and shall be checked for approximately each 25,000 cubic yards placed or as required by changes in material or sources of material.
   2. Relative density data shall be determined in accordance with ASTM D-2049 prior to the start of the fill operation and shall be checked for approximately each 25,000 cubic yards placed or as required by changes in material or sources of material.

3. The field density control tests shall be performed in accordance with ASTM D-1556, D-2167, or D-2937. The moisture and density of the field compacted fill material shall be determined at the following frequency:
   1. In large work areas (more than 20,000 square feet) where machine operation and compaction is performed, at least one test (water content and density) shall be made for each 20,000 square feet of compacted fill in each lift.
   2. In small work areas (less than 20,000 square feet) where machine operation and compaction is performed, at least one test shall be made for each 250 cubic yards of fill, but not less than one (1) test for every other layer.
   3. In smaller manually compacted areas, at least one (1) test shall be made for every third layer.
4. Moisture contents as required by tests described in Sections 4.1.1.3 and 4.1.2.3 above may be determined by the use of a speedy moisture meter, microwave, field stove or other suitable rapid methods. An initial comparison relationship for the rapid moisture determination method shall be established with ASTM D-2216 and periodically checked.
5. Moisture content of materials from the borrow or stockpile area to be used as fill shall be determined by ASTM D-2216 or D-3017 (nuclear gauge). If D-3017 is used, calibration tests shall be performed as required by reference 2.1. Rapid methods may be used for moisture content determination if calibration tests are performed with ASTM D-2216 as described in paragraph 10.5 of reference 2.8 and paragraph 4.2.3 of this procedure. R8

1. Limits of deviation from the calibration curves (paragraph 4.2.7) based on 90% confidence level shall be applied to reduce the moisture tolerance of field tested material to assure material is within the tolerance specified in reference 2.1 paragraph 10.5. See exhibit 14.
2. Periodic calibration check tests as required by reference 2.1 paragraph 10.5 shall be reviewed and documented to assure repeatability as determined in 4.1.1.4.1. See exhibit 15.
3. Care shall be taken to assure samples taken for rapid method moisture determination are representative of the total quantity of fill to be tested. R8

6. Visual description shall be used to compare moisture content and density determination with the maximum density and optimum moisture of the moisture-density relation curves. However, "one point proctor" checks shall be completed in accordance with ASTM D-698 using a rapid method for moisture determination to verify proper selection of moisture-density relation curves.
   1. Comparison of the "one point proctor" to the selected curve shall be based on limits of deviation with 90% confidence level as determined by tests on similar material.
   2. To verify curve selection for moisture control and density the "one point proctor" frequency shall be at the inspectors discretion.
7. Field permeability tests shall be completed in accordance with the Bureau of Reclamation Department of the interior test procedure designation E-19 in

the areas and frequencies established in references 2.1 and 2.8.

8. Visual description where used on field or laboratory reports for the soils will be generally to procedures described in ASTM D-2488. R8

9. Inspection of riprap shall be completed daily during placement in accordance with Reference 2.6. R8

10. Crushed rock furnished by a quarry shall be tested for gradation requirements in accordance with the QA program developed by that quarry, and testing data shall be regularly submitted to CP&L for documentation.

3. CONTROL and CORRECTION as required by applicable soil tests and field inspections shall be as follows: R8

1. When the density or moisture test indicates that a fill area does not meet the specification requirements or a random fill area does not comply to test fill criteria, the earthwork contractor shall be notified by the soils inspector and the questionable area clearly marked in the fill, if required, so that placement of fill in that area will be suspended until corrective action and further testing is completed.

2. References 2.1 and 2.2 specify allowable tolerances and absolute minimum values for the various material tests.

3. If the density or the moisture content is below the required percentage, the test results shall be considered a failure. When a failure occurs, either of two courses of action can be followed: R8

1. Make one retest in the near vicinity of the

failing test. If the retest passes, a noncompliance has not occurred and the area shall be accepted. If the retest fails, the compaction of the area shall be considered a nonconformance.

Note: The failing test shall then be controlled by allowable tolerance and absolute minimum values.

2. The area shall be reworked by the contractor, or the fill material shall be taken out and replaced with suitable material, until a passing test is achieved. The responsible contractor shall correct the deficiency by methods acceptable with the specifications.

4. The inspector shall monitor the compaction effort performed between density determinations to assure uniform density (e.g., equipment, lift thickness, number of passes, roller speed) of material.

5. Control of moisture content shall be in the fill areas just prior to compaction and moisture content determined after compaction to compute density shall also satisfy moisture content tolerance required by reference 2.1 paragraph 13.2. R8

6. If the thickness of any fill layer is more than specified, the area represented by the check shall be considered unacceptable and shall be brought to the proper thickness.

7. If discrepancies are discovered where routine corrective action is impossible or delyaed by the contractor, a Nonconformance Report shall be initiated in accordance with the procedure outlined in Reference 2.7.

8. Field or laboratory tests performed shall be recorded on the applicable form which shall include a unique test number, location with respect to a well defined grid system and elevation at which the test was performed. R8

9. Material samples shall be periodically sent to an independent soils testing lab for a comparison chech with CP&L lab results. R8

4.2 Control of calibrated equipment shall be as required by Reference 2.4.

1. Test molds, constant volume containers and constant weight equipment shall be calibrated prior to initial use in accordance with applicable ASTM standards or other approved procedures. Recalibration shall be completed if the equipment is suspected to be in error or damage has occured.

2. Field scales and lab scales shall be calibrated every three months by the North Carolina Department of Agriculture, Division of Weights and Measures, by the calibration laboratory or by site personnel in accordance with approved calibration procedures. Calibration dates and recalibration due dates shall be labeled on applicable equipment.

3. Prior to the use of devices for rapid moisture content determination, calibration curves shall be developed for each piece of equipment or method relative to the moisture determined by ASTM D-2216. The curve shall be developed initially and periodically checked in the field as specified in paragraph 4.1.1.4.2. R8

5.0 EXHIBITS AND APPENDICES

5.1 Exhibit 1 - Field Inspection Report (Rev. 0-4/79)

5.2 Exhibit 2 - Moisture Content Determination (Rev. 0-4/79)

5.3 Exhibit 3 - "Speedy" Moisture Content Determination (Rev. 0-4/79)

5.4 Exhibit 4 - Field Density Test - Sand Cone Method (Rev. 0-4/79)

5.5 Exhibit 5 - Field Density Test - Drive Cylinder Method (Rev. 0-4/79)

5.6 Exhibit 6 - Field Density Test - Rubber Balloon Method (Rev. 0-4/79)

5.7 Exhibit 7 - Compaction Test (Rev. 0-4/79)

5.8 Exhibit 8 - Compaction Test Curve (max. 100 lb/ft3) (Rev. 0-4/79)

5.9 Exhibit 9 - Compaction Test Curve (max. 120 lb/ft3) (Rev. 0-4/79)

5.10 Exhibit 10 - Compaction Test Curve (max. 140 lb/ft3) (Rev. 0-4/79)

5.11 Exhibit 11 - Relative Density (Rev. 0-4/79)

5.12 Exhibit 12 - Sieve Analysis (Rev. 0-4/79)

5.13 Exhibit 13 - Field Permeability Test (Rev. 0-4/79)

4.14 Exhibit 14 - Rapid Moisture Method - ASTM D-2216 Comparison (Rev. 0-4/79)

5.15 Exhibit 15 - Calibration Curve Check Tests (Rev. 0-4/79) R8

5.16 Appendix A - Documentation Flow Chart (Rev. 0-4/79)

Rev. 0.
4-78

Exhibit 1
TP-02

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date _____ Spec. No. _____

Location _____ Inspector _____

Elevation _____ Shift _____

Weather _____

COMMENT

INSPECTOR _____

Q A REVIEW _____

Rev. 0
4/79

Exhibit 2
T-2

CAROLINA POWER & LIGHT

SHEARON HARRIS NUCLEAR POWER PLANT

MOISTURE CONTENT DETERMINATION

DATE _____

SAMPLE NUMBER								
N.S.								
SAMPLE LOCATION E.W.								
SAMPLE ELEVATION								
WT CONT & WET SOIL (g)								
WT CONT & DRY SOIL (g)								
WT WATER (g)								
WT CONTAINER (g)								
WT DRY SOIL (g)								
MOISTURE CONTENT (%)								

SAMPLE

Calibrated Equipment Used:

Tool ID Number _____

COMPUTED BY _____

CHECKED BY _____

Comments _____

_____

_____

Rev. 0
4/79

Exhibit 3
TP-02

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

MOISTURE CONTENT DETERMINATION
"SPEEDY" MOISTURE METER
TO SUPPLEMENT FIELD INSPECTION REPORT

Date: _____

Shift: _____

LOCATION	ELEV	TIME	"SPEEDY" READING	PERCENT MOISTURE

REMARKS: _____

INSPECTOR _____

QA REVIEW _____

Rev. 0
4/79

Exhibit 4
TP-(2

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
FIELD DENSITY TEST - SAND CONE METHOD
ASTM D 1556

Date: _____

FIELD TEST NO.				
LOCATION & STATION				
ELEVATION				
COLOR & TEXTURE				
PROCTOR CURVE NO.				
MAX DRY WT				
OPTIMUM MOISTURE				
1. WT FILLED WITH SAND				
2. WT WITH REMAINING SAND				
3. WT SAND USED (1-2)				
4. WT IN CONE & PLATE (Calib Sht)				
5. WT SAND IN HOLE (3-4)				
6. BULK DENSITY OF SAND (Calib Sht)				
7. VOLUME OF TEST HOLE (5/6)				
8. WT MOIST SOIL & CAN				
9. WT OF CAN (No. ___)				
10. WT MOIST SOIL				
11. WT DENSITY (10/7)				
12. WT WET SOIL & CONT				
13. WT DRY SOIL & CONT				
14. WT WATER (12-13)				
15. WT OF CONTAINER				
16. WT DRY SOIL (13-15)				
17. MOISTURE CONTENT (14/16)				
DRY DENSITY (11/1.0 + 17)				
PERCENT COMPACTION				

LOCATION
LIME
DENSITY
MOISTURE

Calibrated Equipment Used:

Tool ID Number _____

Tool ID Number _____

INSPECTOR _____

CHECKED _____

QA REVIEW _____

REMARKS _____

Exhibit 5
TP-C2

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

FIELD DENSITY-DRIVE CYLINDER METHOD
ASTM D-2937

Date: _____

LOCATION	FIELD TEST NO.					
	LOCATION & STATION					
	ELEVATION					
	COLOR & TEXTURE					
	CYLINDER VOLUME					
	PROCTOR CURVE NO.					
	MAX DRY DENSITY					
	OPTIMUM MOISTURE					
MOISTURE	WT WET SOIL & CONT.					
	WT DRY SOIL & CONT.					
	WT CONTAINER					
	WT WATER					
	WT DRY SOIL					
	MOISTURE CONTENT %					
COMPACTION	WT WET SAMPLE & CYL					
	WT CYLINDER					
	WT WET SAMPLE					
	WT DRY SAMPLE					
	DRY DENSITY					
	COMPACTION %					

SAMPLE

REMARKS _____

_____

Calibrated Equipment Used:

Tool ID Number _____

Tool ID Number _____

INSPECTOR: _____

CHECKED: _____

QA REVIEW _____

Rev. 0
4/79

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
FIELD DENSITY - RUBBER BALLOON METHOD ASTM D-2167

Exhibit 6
TP-02

	FIELD TEST NO.					
LOCATION	LOCATION & STATION					
	ELEVATION					
	COLOR & TEXTURE					
	PROCTOR CURVE NO.					
	MAX DRY DENSITY					
	OPTIMUM MOISTURE					
VOLUME	INITIAL VOLUME					
	FINAL VOLUME					
	VOLUME HOLE					
DENSITY	WT WET SOIL & CAN					
	WT OF CAN (NO.)					
	WT WET SOIL					
	WET DENSITY					
MOISTURE	WT WET SOIL & TARE					
	WT DRY SOIL & TARE					
	WT WATER					
	WT OF TARE					
	WT DRY SOIL					
	MOISTURE CONTENT					
	DRY DENSITY					
	% COMPACTION					

SAMPLE

Calibrated Equipment Used:

Tool ID Number _____

Tool ID Number _____

REMARKS _____

Date of Test _____

Inspector _____

Checked _____

QA Review _____

Rev. 0
4/79

Exhibit 7
TP-11

CAROLINA POWER & LIGHT

HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location _____

Sample Elevation _____ Date _____

Sample No. _____ Type Test _____

Soil Description _____

_____

DENSITY

Determination Number	1	2	3	4	5	6	7	
Wt Mold + Compacted Soil (Lbs)								
Wt Mold (Lbs)								
Wt Compacted Soil (Lbs)								
Wt Density (Lbs/ft)								
Dry Density 'Lbs/ft)								

WATER CONTENT

Determination Number								
Container No.								
Wt Container + Wet Soil (g)								
Wt Container + Dry Soil (g)								
Wt Container (g)								
Wt Water (g)								
Wt Dry Soil (g)								
Water Content %								

SAMPLE

Calibrated Equipment Used:

Tool ID Number _____

Tool ID Number _____

Tool ID Number _____

Inspector _____

Checked _____

Q A Review _____

Rev. 4/79

Exhibit 8
TP-02

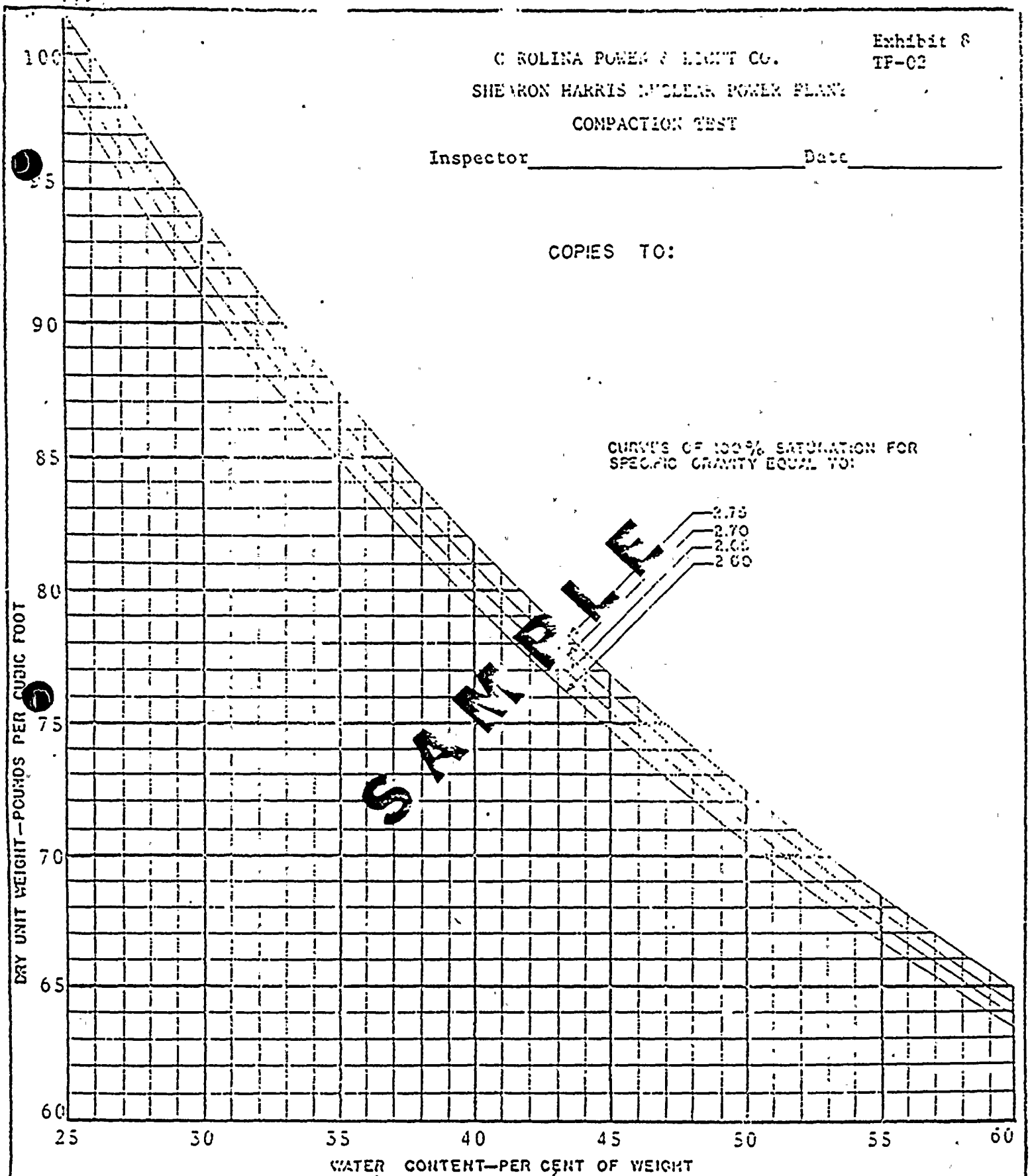
CAROLINA POWER & LIGHT CO.

SHEARON HARRIS NUCLEAR POWER PLANT

COMPACTION TEST

Inspector _____ Date _____

COPIES TO:



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION

Rev. 0 4/73

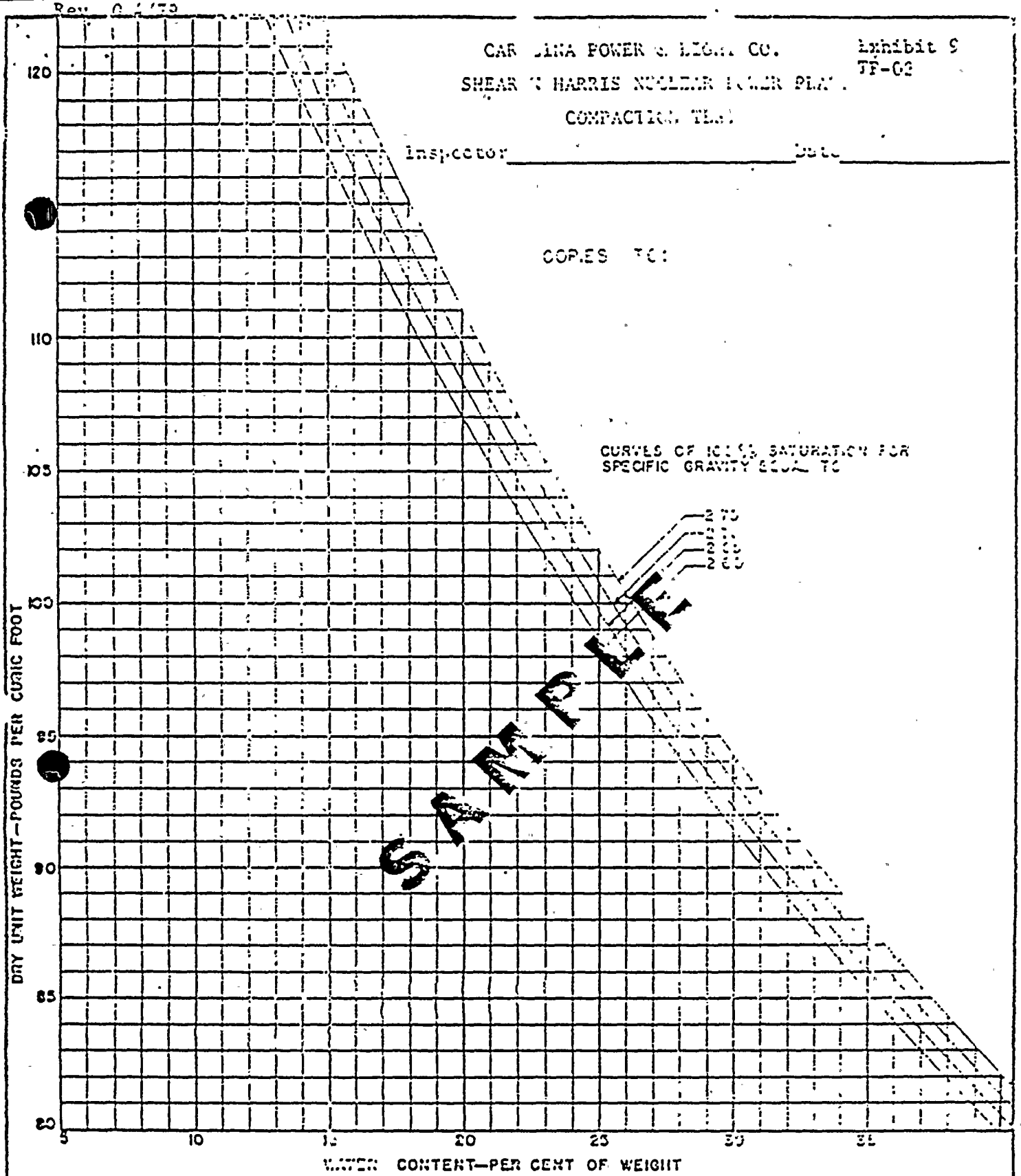
CAR LINA POWER & LIGHT CO. Exhibit 9
TF-02

SHEAR T HARRIS NUCLEAR POWER PLA .

COMPACTION TES.

Inspector _____ Date _____

COPIES TO:



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION

Rev. 0 4/79

Exhibit 10
TF-02

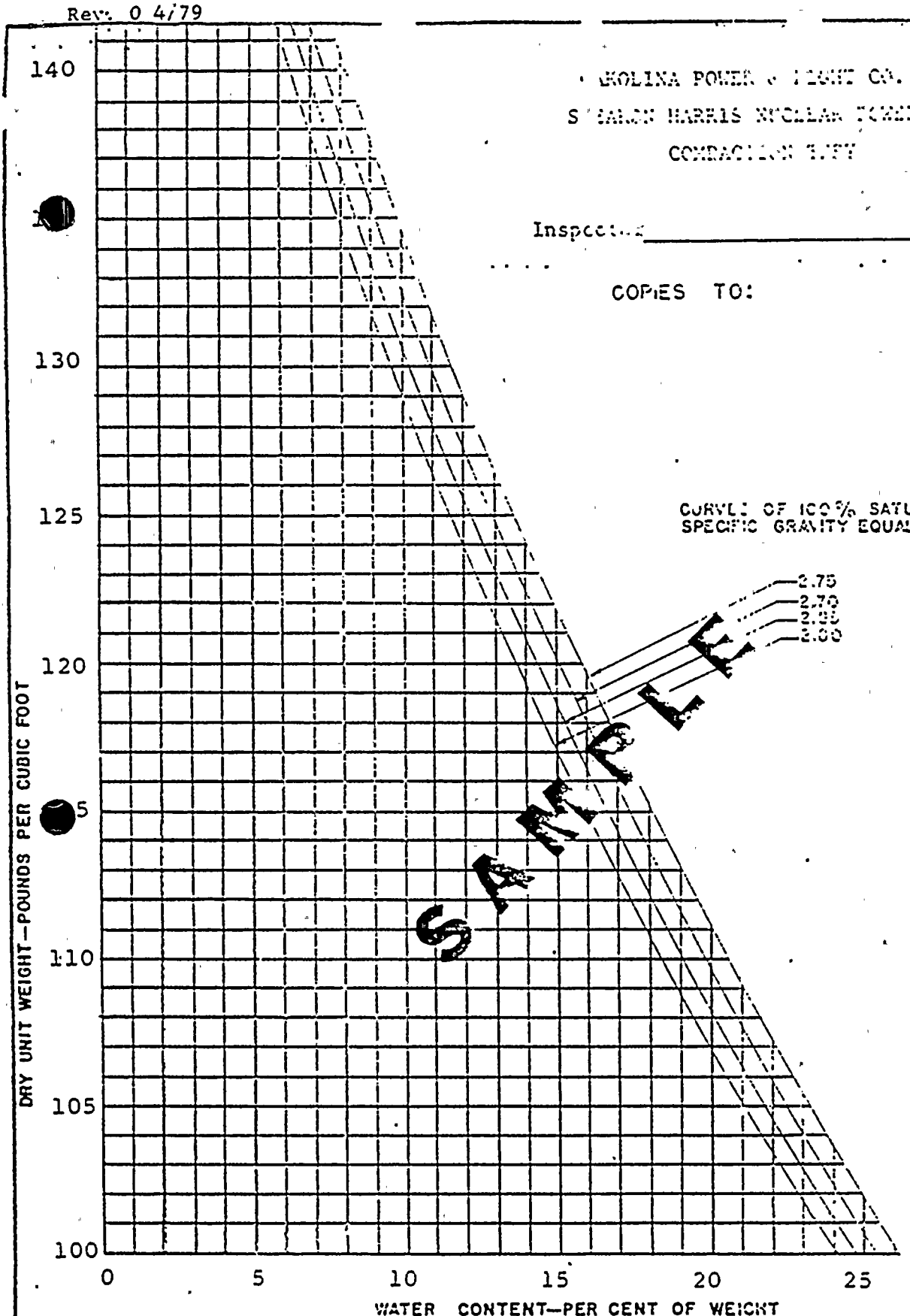
CAROLINA POWER & LIGHT CO.

SHEARON HARRIS NUCLEAR POWER PLANT

COMPACTION TEST

Inspector _____ Date _____

COPIES TO:



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
●				

C-3

Re... (
79

Exhibit 11
TP-02

CAROLINA POWER & LIGHT COMP...
SHEARON HARRIS NUCLEAR POWER PLANT
RELATIVE DENSITY ASTM D-20...

Calibrated Equipment Used:	DATE:
Tool ID Number _____	LOCATION:
Tool ID Number _____	ELEVATION:
	SAMPLE NO.:
	TESTED BY:

SOIL DESCRIPTION:

...	in. diam. mold	...
...	...	...

MINIMUM DRY DENS...

TRIAL			1	2	3	4	5	6
Weight in lb.	Soil plus ...	W						
	...	W_w						
	Soil	W_s						
Min. dry density = ...s/... (lb/cu ft)		γ_d						
Min. dry density (avg) (lb/cu ft)								

MAXIMUM DRY DENSITY
(FORY TABLE METHOD)

			DRY METHOD			WET METHOD		
TRIAL			1	2	3	1	2	3
Reading in in.	Left dial	h_L						
	Right dial	h_R						
	Average dial, $\frac{h_L + h_R}{2}$	h_{avg}						
	Initial dial (Average)	h_o						
	Height difference, $h_o - h_{avg} = \Delta h$	Δh						
Vol cu ft	Volume difference, $(\Delta h/12) \times A$	ΔV						
	Volume of soil, $V - \Delta V$	V_1						
Weight in lb.	Mold plus soil (dry)	W						
	Mold	W_M						
	Soil	W_s						
Max dry density = W_s/V_1								
Max Dry Density (avg) (lb/cu. ft.)								

Remarks: _____

INSPECTOR: _____
CHECKED: _____
QA REVIEW: _____

Rev. 0
4/79

Exhibit 12
TI-02

CAROLINA POWER & LIGHT - HARRIS SITE

SIEVE ANALYSIS

SAMPLE NO._____ DATE_____

LOCATION_____

DESCRIPTION_____

_____

SIEVE -- NO./SIZE	WEIGHT SIEVE	WT. SEIVE PLUS SOIL	WEIGHT RETAINED	% RETAINED	% PASSING

SAMPLE

Calibrated Equipment Used:

Tool ID Number _____

INSPECTOR_____

CHECKED_____

Q A REVIEW_____

CAROLINA POWER & LIGHT

SHEARON HARRIS NUCLEAR POWER PLANT

FIELD PERMEABILITY TEST

TEST NUMBER _____ DATE _____

LOCATION _____

_____

OBSERVATION HOLE

STRATA DEPTH (ft.) FROM	TO	SOIL CLASSIFICATION
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

1. DEPTH (ft.) TO WATER TABLE: _____
2. DEPTH (ft.) TO GROUND SURFACE _____
3. DEPTH (ft.) TO BOTTOM OF WELL: _____
4. DEPTH (ft.) TO TOP OF SAND: _____
5. DEPTH (ft.) OF SAND (3) -(4): _____
6. DEPTH (ft.) TO WATER SURFACE IN WELL: _____
7. DEPTH (ft.) OF WATER IN WELL h= (5) -(6): _____
8. DENSITY (pcf) OF STANDARD SAND: _____
9. WEIGHT (lb) OF SAND + CONTAINER BEFORE FILLING WELL: _____
10. WEIGHT (lb) OF SAND + CONTAINER AFTER FILLING WELL: _____
11. WEIGHT (lb) OF SAND USED (9)-(10): _____
12. VOLUME (cu. ft.) OF WELL (11) ÷ (8): _____
13. RADIUS (ft.) OF WELL $r = \sqrt{\frac{(12)}{(5)\pi}}$ _____

TOTAL LB _____

_____

TESTED BY: _____

QA REVIEW: _____

CAROLINA POWER & LIGHT

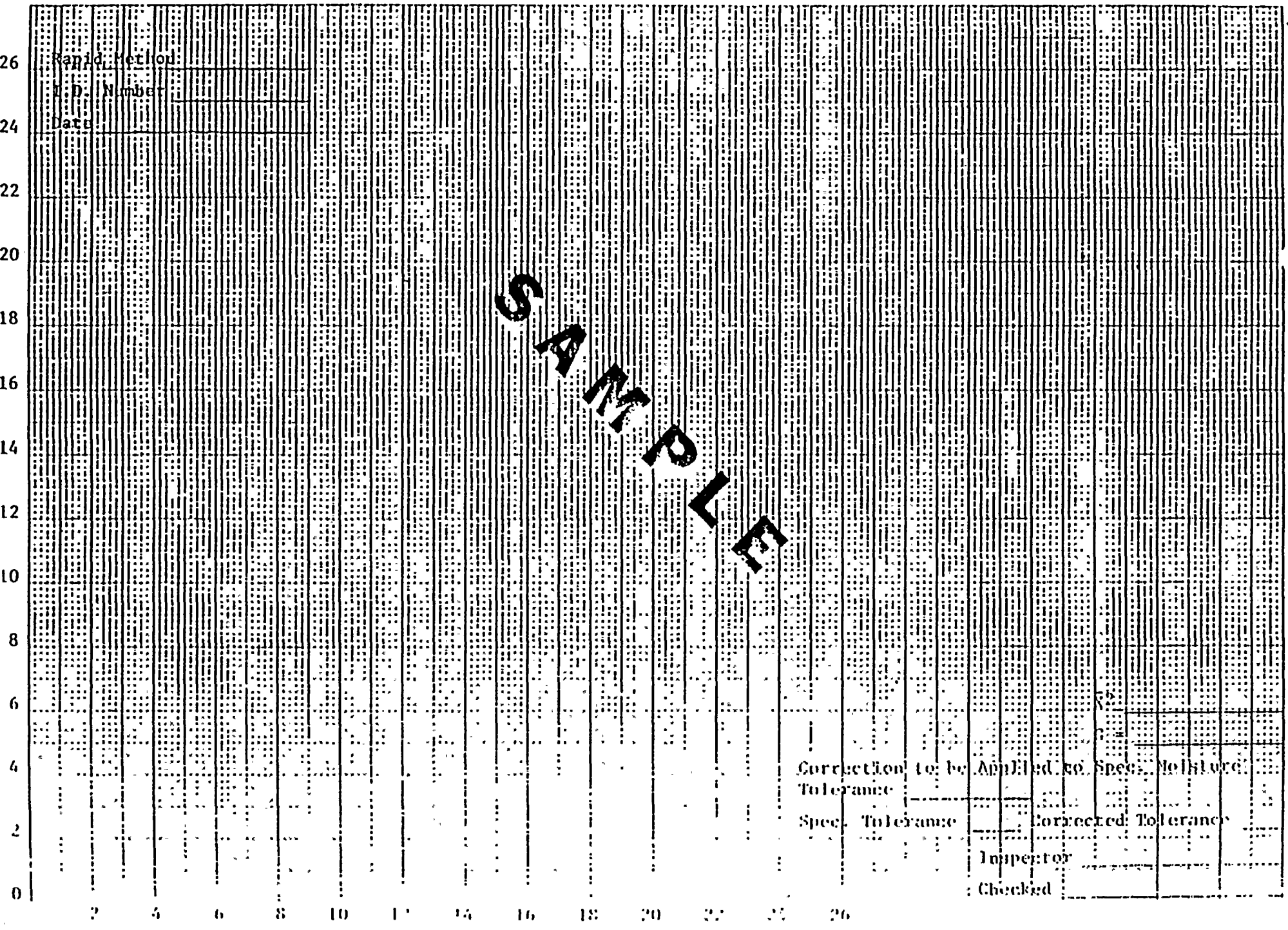
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD PERMEABILITY TEST

TIME		WATER VOLUME							TEMPERATURE
		DRUM NUMBER		DRUM NUMBER		TOTAL DIFFERENCE	ACCUM. FLOW		
CLOCK	ACCUM. (MIN.)	READING	DIFFERENCE	READING	DIFFERENCE				

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

RAPID MOISTURE METHOD - ASTM D-2216 COMPARISON



CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

CALIBRATION CURVE CHECK TESTS

Rapid Method _____ I.D. Number _____

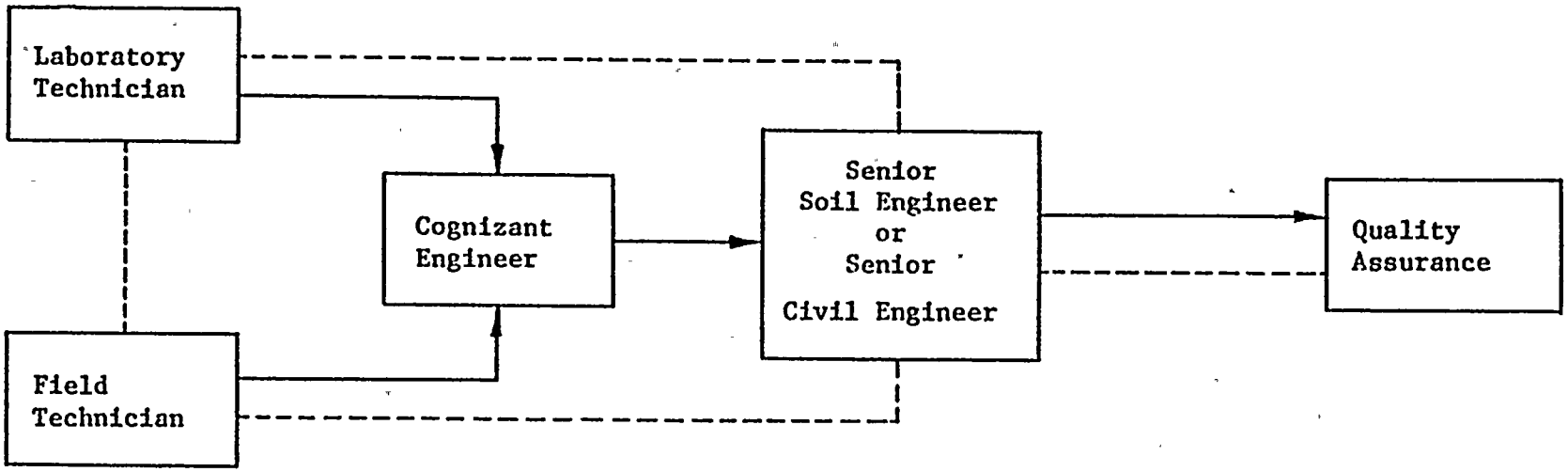
Note: Record field test number each time device is used and submit identical sample to laboratory for comparison check at required frequency.

1 _____	21 _____	41 _____	61 _____
2 _____	22 _____	42 _____	62 _____
3 _____	23 _____	43 _____	63 _____
4 _____	24 _____	44 _____	64 _____
5 _____	25 _____	45 _____	65 _____
6 _____	26 _____	46 _____	66 _____
7 _____	27 _____	47 _____	67 _____
8 _____	28 _____	48 _____	68 _____
9 _____	29 _____	49 _____	69 _____
10 _____	30 _____	50 _____	70 _____
ASTM D-2216 _____	ASTM D-2216 _____	ASTM D-2216 _____	ASTM D-2216 _____
11 _____	31 _____	51 _____	71 _____
12 _____	32 _____	52 _____	72 _____
13 _____	33 _____	53 _____	73 _____
14 _____	34 _____	54 _____	74 _____
15 _____	35 _____	55 _____	75 _____
16 _____	36 _____	56 _____	76 _____
17 _____	37 _____	57 _____	77 _____
18 _____	38 _____	58 _____	78 _____
19 _____	39 _____	59 _____	79 _____
20 _____	40 _____	60 _____	80 _____
ASTM D-2216 _____	ASTM D-2216 _____	ASTM D-2216 _____	ASTM D-2216 _____

Inspector _____ Date _____

Checked _____

QA Review _____



Lines of Documentation

Lines of Communication

DOCUMENTATION FLOW CHART

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location N1580 W100 Date 4/25/74
Test Elevation 211 Tested By L. Garner
Test No. FPA-103 Computed By L. Garner
Soil Description Brown Clayey Silt. Checked By [signature]

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	71.60	Lbs
2	Wt of Apparatus & Remaining Sand	-	43.49	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	28.11	Lbs
4	Wt of Sand in Cone & Plate	(12) Calib Sheet	14.31	Lbs
5	Wt of Sand in Hole	(3) - (4)	13.8	Lbs
6	Bulk Density of Sand	(9) Calib Sheet	96.1	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.144	Ft^3
8	Wt of Moist Soil and Can (No.)	-	20.64	Lbs
9	Wt of Can (No.)	-	3.20	Lbs
10	Wt of Moist Soil	(8) - (9)	17.44	Lbs
11	Wet Density	(10)/(7)	121.1	Lb/ft^3
12	Wt of Wet Sample + Container	-	273.8	gms
13	Wt of Dry Sample + Container	-	260.0	gms
14	Wt of Water in Sample	(12)-(13)	13.8	gms
15	Wt of Container No.	-	73.8	gms
16	Wt of Dry Soil	(13)-(15)	186.2	gms
17	Moisture Content	$\frac{(14)}{(16)} \times 100$	7.4	%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$	113	Lb/ft^3
19	Maximum Dry Density PA-21	-	118.6	Lb/ft^3
20	Percent Compaction	$\frac{(18)}{(19)} \times 100$	95	%

Remarks:

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location N 400 W 2050 Date 5-16-74

Test Elevation 257 Tested By S. Radford & D. Smith

Test No. FPA 112 Computed By S. Radford

Soil Description Brown clayey silt with some yellow silty clay & small amount of gray sandy silt Checked By D. Smith

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	14.29	Lbs
2	Wt of Apparatus & Remaining Sand	-	6.57	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	7.72	Lbs
4	Wt of Sand in Cone & Plate	Calib (12) Sheet	3.62	Lbs
5	Wt of Sand in Hole	(3) - (4)	4.10	Lbs
6	Bulk Density of Sand	Calib (9) Sheet	98.8	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.0415	Ft^3
8	Wt of Moist Soil and Can (No.)	-	8.56	Lbs
9	Wt of Can (No.)	-	3.37	Lbs
10	Wt of Moist Soil	(8) - (9)	5.19	Lbs
11	Wet Density	(10)/(7)	125.1	Lb/ft^3
12	Wt of Wet Sample + Container	-		gms
13	Wt of Dry Sample + Container	-		gms
14	Wt of Water in Sample	(12)-(13)		gms
15	Wt of Container No.	-		gms
16	Wt of Dry Soil	(13)-(15)		gms
17	Moisture Content Speedy Moisture	$\frac{(14)}{(16)} \times 100$	11.6	%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$	112.1	Lb/ft^3
19	Maximum Dry Density PA-46	-	113	Lb/ft^3
	Percent Compaction	$\frac{(18)}{(19)} \times 100$	99.2	%

Remarks

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location N 500 W 18+50 (~~20+60~~)
Date 5-15-74
Test Elevation 258
Tested By S. Ratford & D. Smith
Test No. FPA-106
Computed By S. Ratford
Soil Description Brown clayey ~~sandy~~ silt and yellow silty clay layers
Checked By D. Smith

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	17.15	Lbs
2	Wt of Apparatus & Remaining Sand	-	10.01	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	7.14	Lbs
4	Wt of Sand in Cone & Plate	Calib (12) Sheet	3.62	Lbs
5	Wt of Sand in Hole	(3) - (4)	3.52	Lbs
6	Bulk Density of Sand	Calib (9) Sheet	98.8	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.0356	Ft^3
8	Wt of Moist Soil and Can (No.)	-	8.03	Lbs
9	Wt of Can (No.)	-	3.51	Lbs
10	Wt of Moist Soil	(8) - (9)	4.52	Lbs
11	Wet Density	(10)/(7)	127.0	Lb/ft^3
12	Wt of Wet Sample + Container	-		gms
13	Wt of Dry Sample + Container	-		gms
14	Wt of Water in Sample	(12)-(13)		gms
15	Wt of Container No.	-		gms
16	Wt of Dry Soil	(13)-(15)		gms
17	Moisture Content Speedy Moisture	$\frac{(14)}{(16)} \times 100$	19.3	%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$	106.5	Lb/ft^3
19	Maximum Dry Density FA-28	-	109.8	Lb/ft^3
20	Percent Compaction	$\frac{(18)}{(19)} \times 100$	97	%

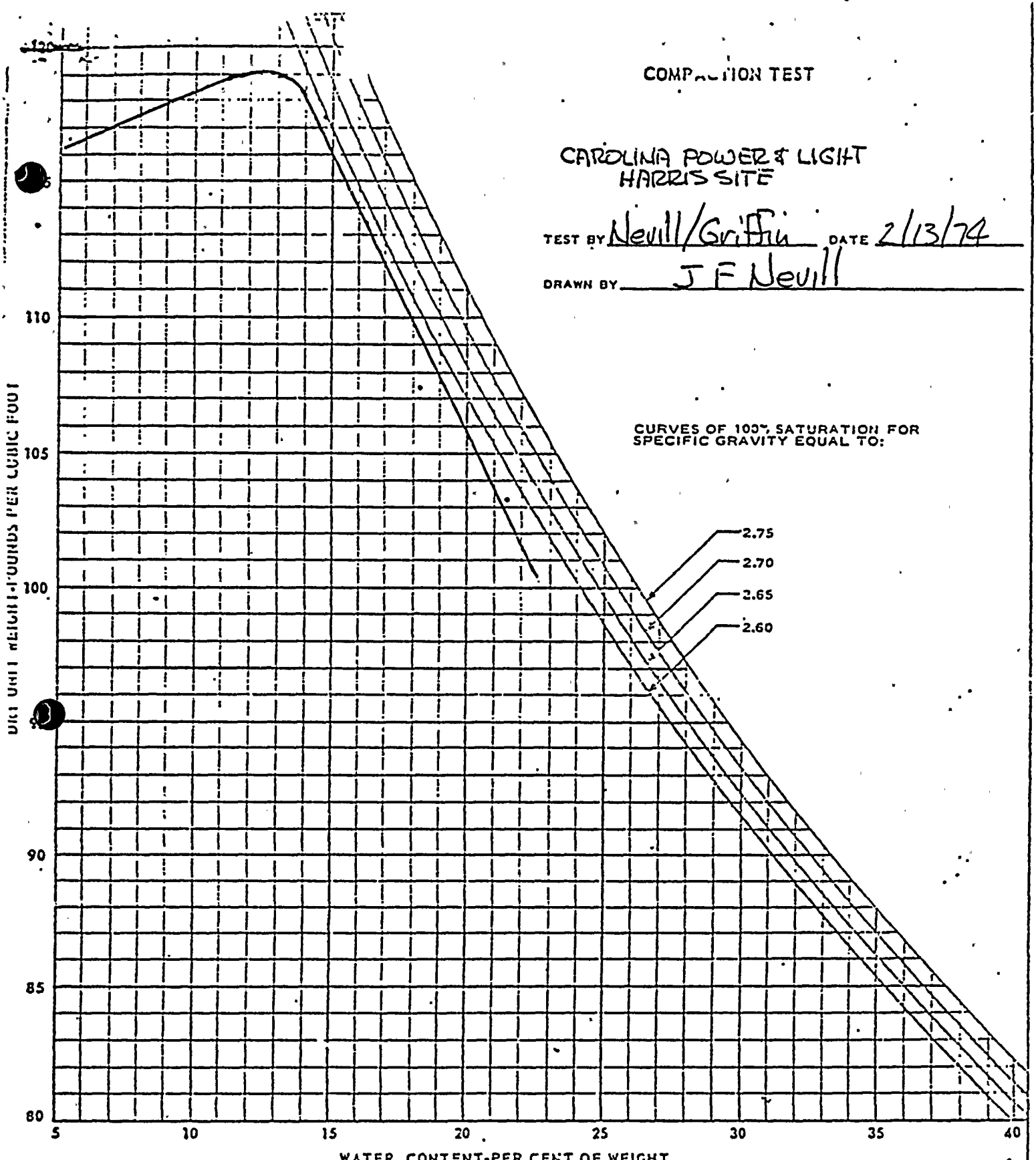
Remarks Speedy Moisture Test was used to determine moisture content

COMPACTION TEST

CAROLINA POWER & LIGHT
HARRIS SITE

TEST BY Nevill/Griffin DATE 2/13/74

DRAWN BY J F Nevill



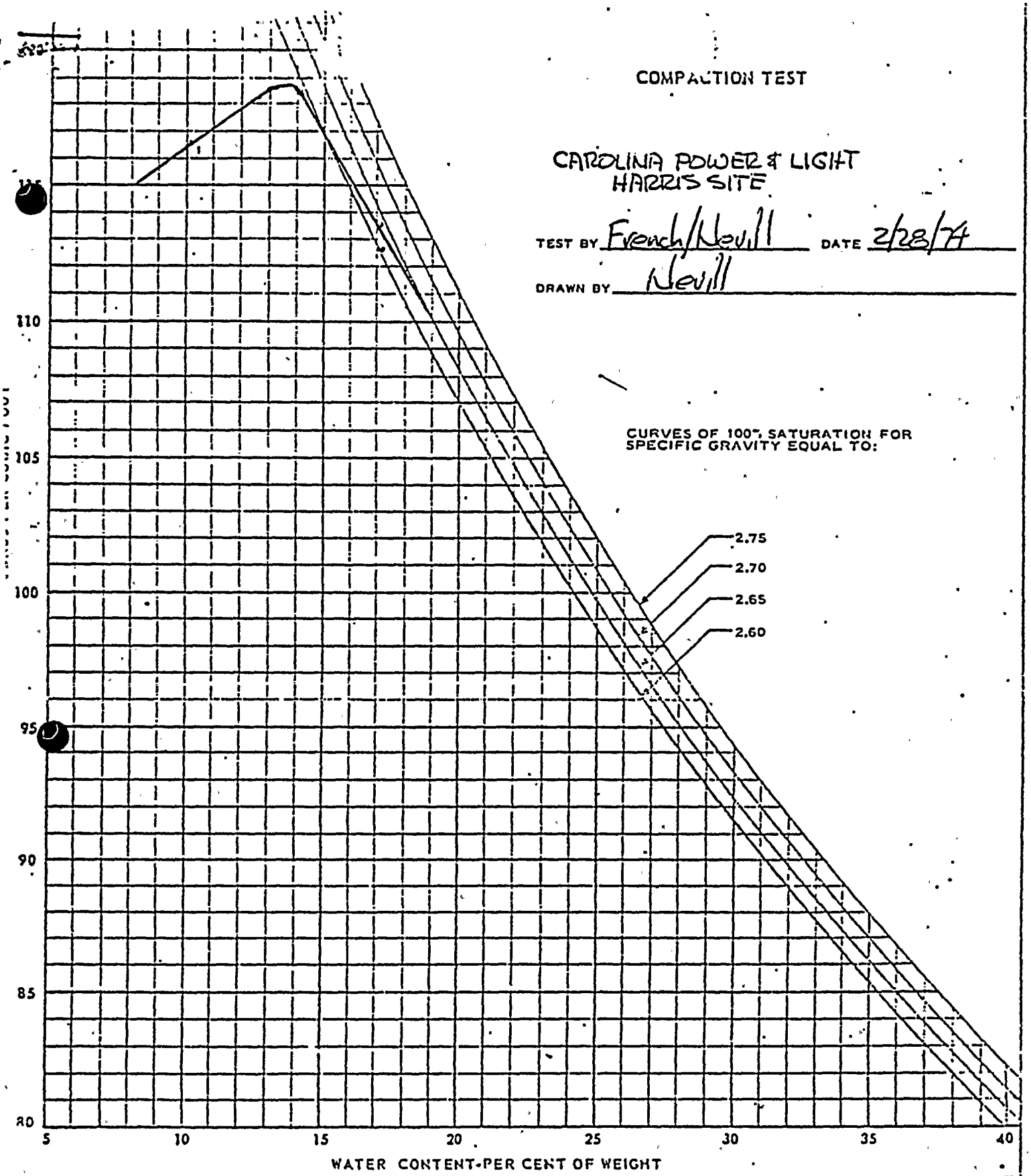
TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
●B-3	ASTM-698 METHOD A STANDARD PROCTOR	119.0	12.5%	Very fine dark red brown clayey silt

COMPACTION TEST

CAROLINA POWER & LIGHT
HARRIS SITE

TEST BY French/Nevill DATE 2/28/74

DRAWN BY Nevill



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT%	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
7-1	ASTM-698 METHOD A STANDARD PROCTOR	118.6	13.6	brown clayey silt

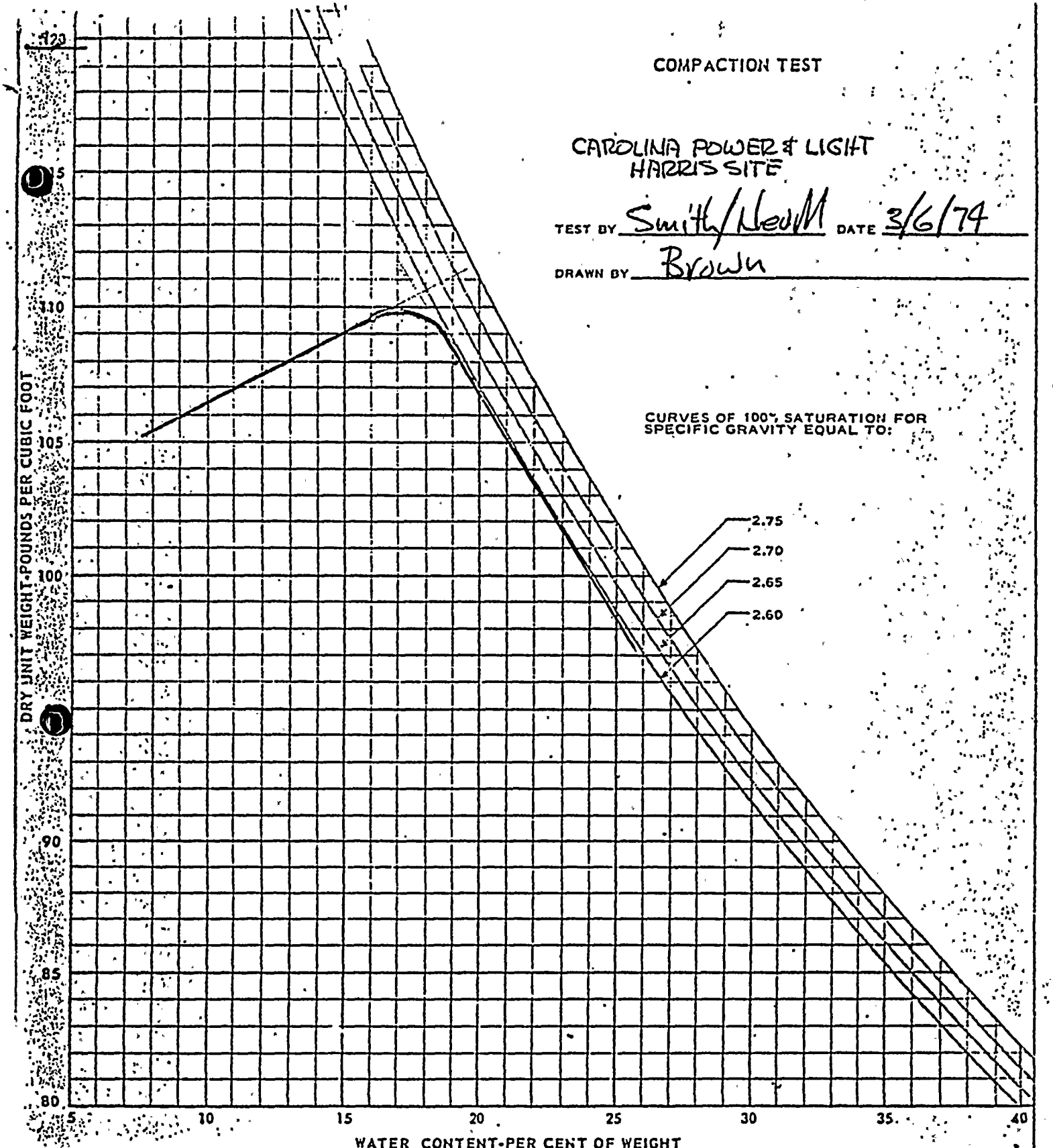
PA-21

COMPACTION TEST

CAROLINA POWER & LIGHT
HARRIS SITE

TEST BY Smith/NeuM DATE 3/6/74

DRAWN BY Brown



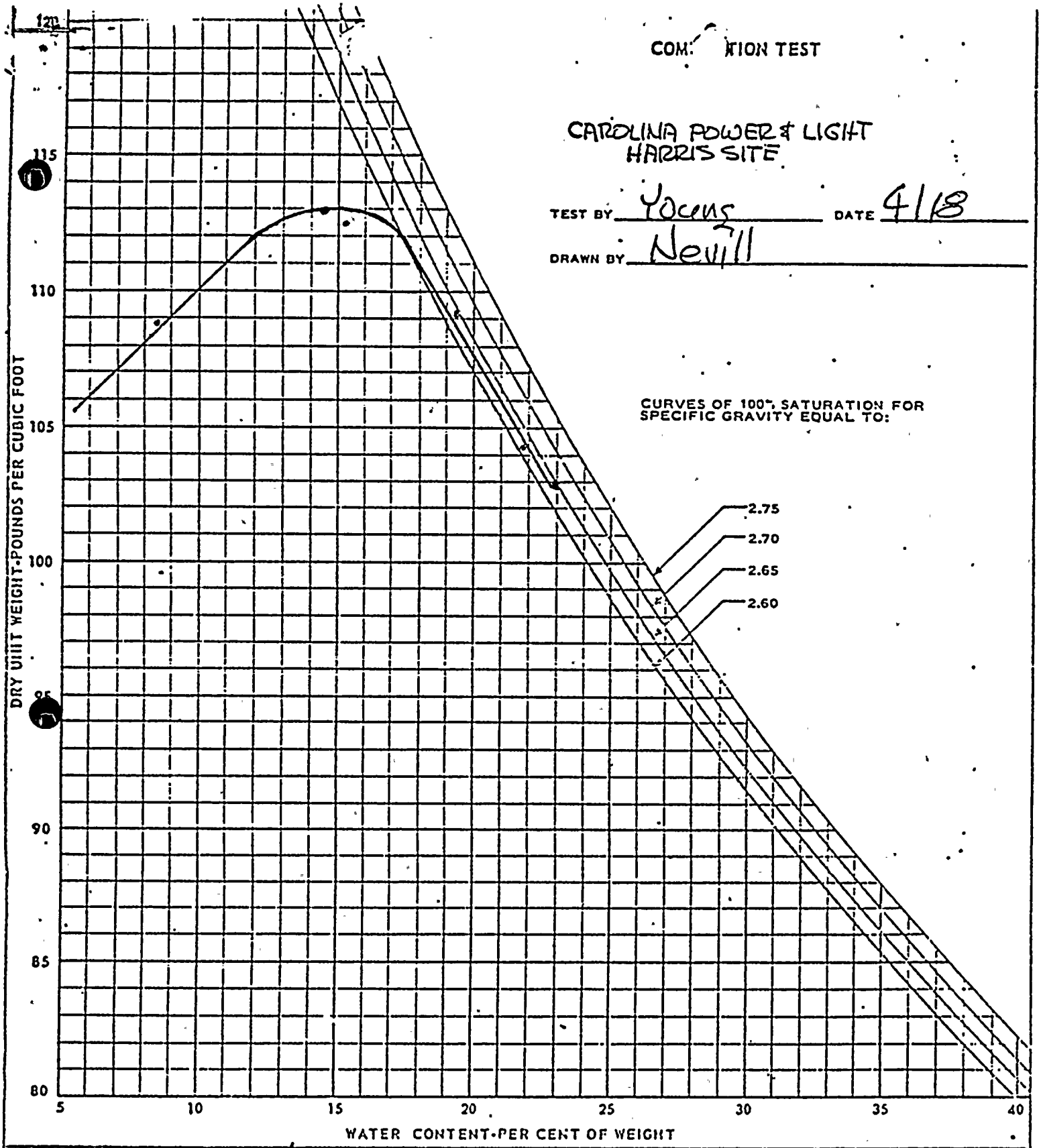
TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
PA-38	ASTM-698 METHOD A STANDARD PROCTOR	109.8	17.2	brown clayey silt with yellow silty clay layers

COMPACTION TEST

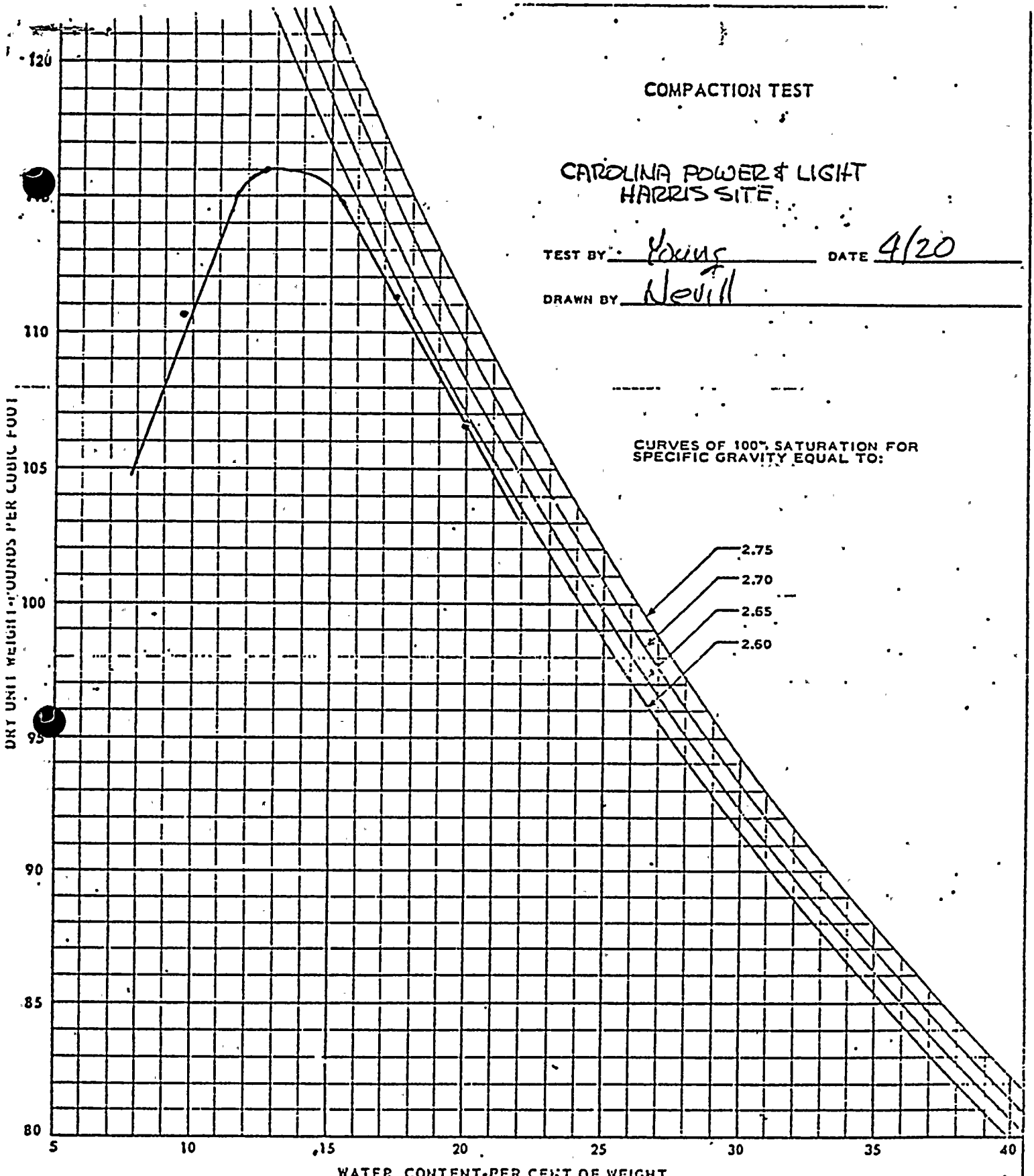
CAROLINA POWER & LIGHT
HARRIS SITE

TEST BY Young DATE 4/18

DRAWN BY Nevill



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
PA-4	ASTM-C698 METHOD A STANDARD PROCTOR	113.0	14.8	Brown clayey silt with some yellow silty clay and small amount of gray sandy silt



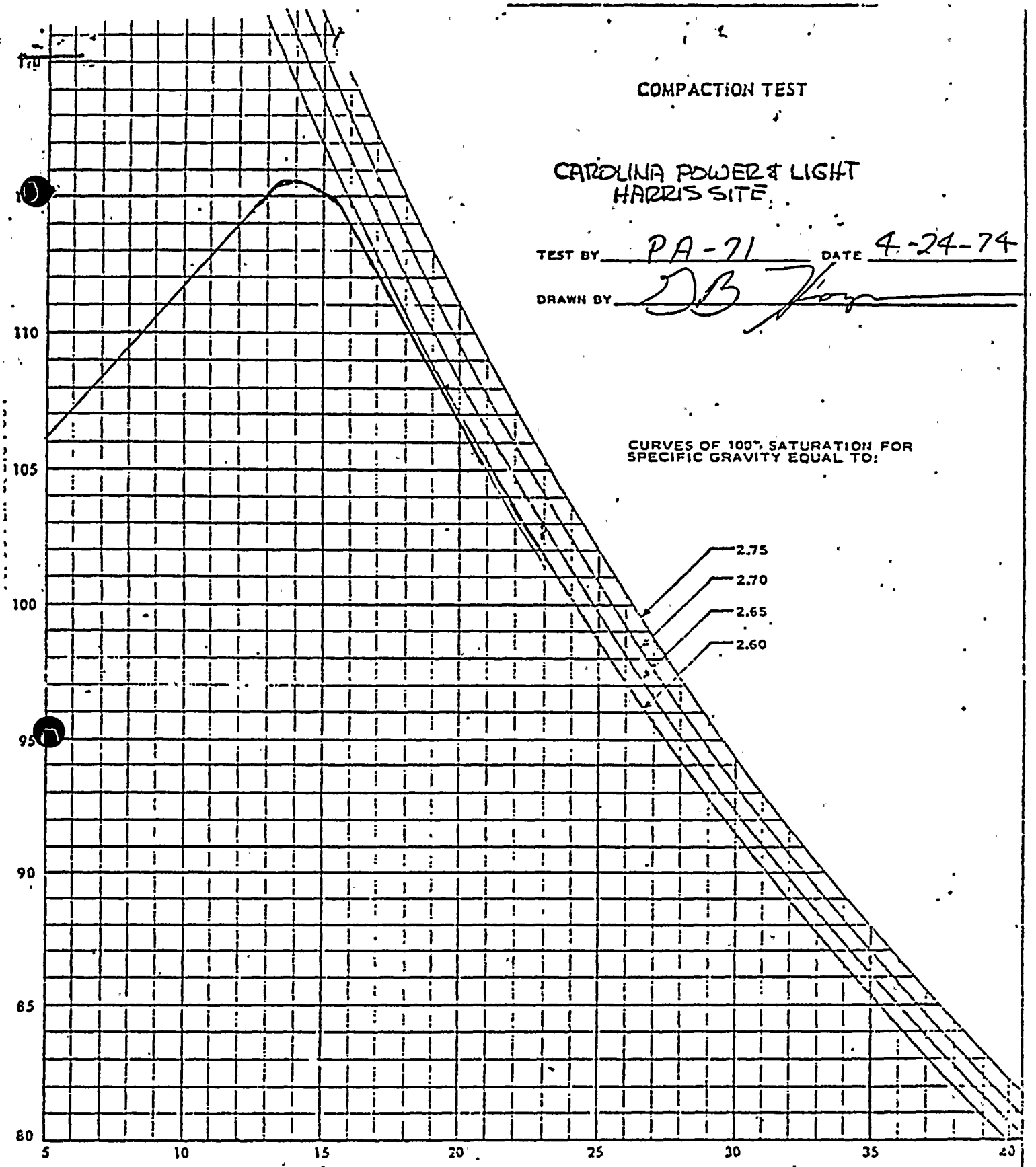
TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
PD 52	ASTM-C-698 METHOD A STANDARD PROCTOR	116	13.0	Brown clayey silt with yellow silty clay and small amount of gray sandy silt

COMPACTION TEST

CAROLINA POWER & LIGHT
HARRIS SITE

TEST BY PA-71 DATE 4-24-74

DRAWN BY DB



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY P.C.F.	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
P-1	ASTM-D698 METHOD A STANDARD PROCTOR	115.5	14.0%	Brown clayey silt with yellow silty clay and some gray sandy silt

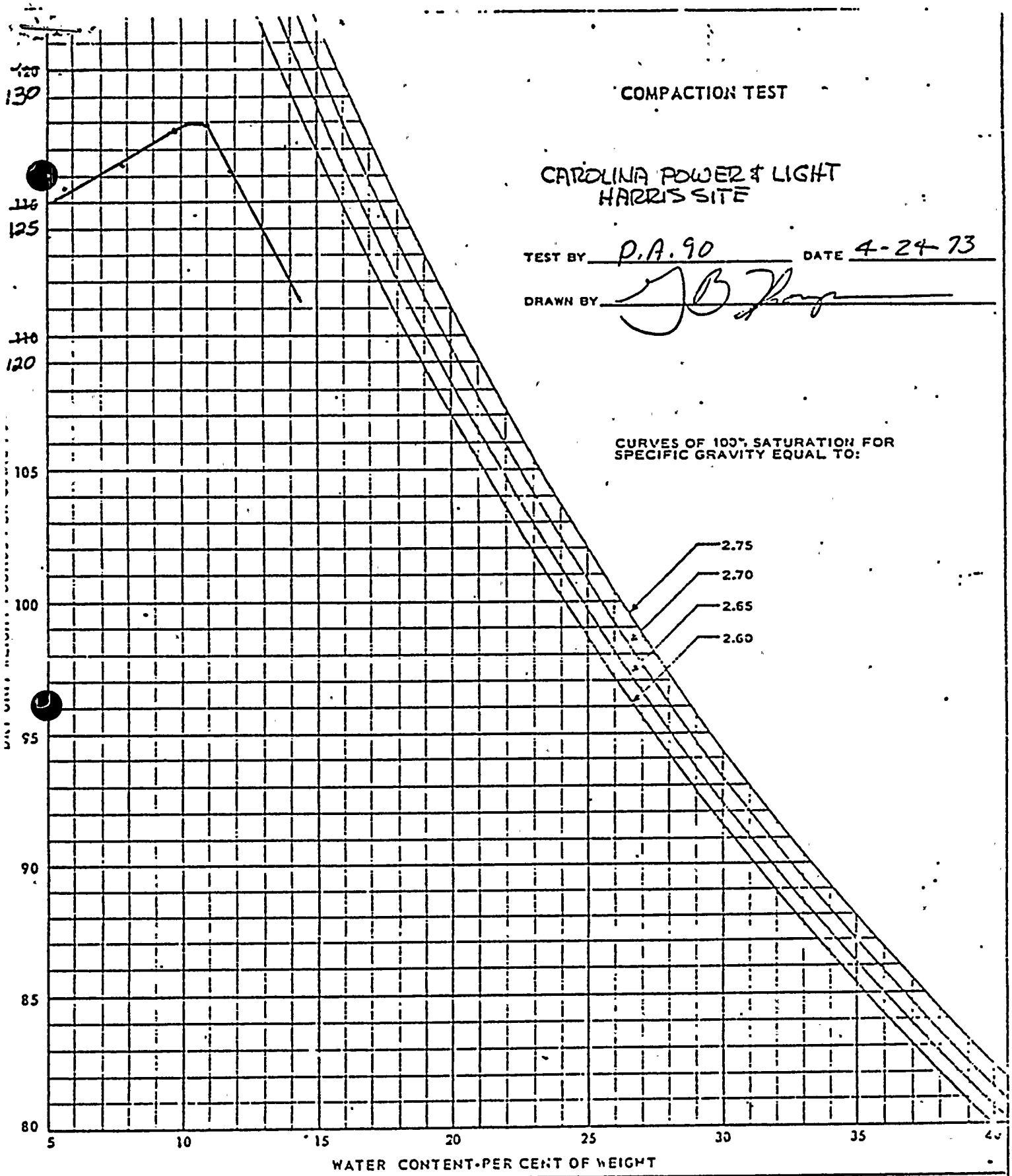
PA-71

COMPACTION TEST

CAROLINA POWER & LIGHT
HARRIS SITE

TEST BY P.A. 90 DATE 4-24-73

DRAWN BY JB Thompson



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY P.C.F.	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
P.A-95-90	ASTM-D698 METHOD A STANDARD PROCTOR	128	10.5	Brown clayey silt with siltstone and small amount sandstone

:OLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 4/30/74

Location N20 W1780 - N2080 W1780 - N1080 W2050 - N20 W2050

Elevation 258 - 252

Spec. No. CAR-SH-CH-8

Inspector L. Garner

Shift Day 6:30 - 5:00

Weather Clear, Hot, Dry

COMMENT

Area In Above Location And Elevation Was Scarified Before Filling Began. At Least 6 Passes Were Made Over The Material With An 825 B Sheepfoot Roller And 8 Wheel Wobble To Break Up Stone. Stone In Excess Of 90% Of Lift Thickness Were Removed From Fill After 8 Passes. A Test Fill Was Conducted And Test FTF-11 Ran And Proctor Sample TF-11 Sent To Lab. McBride Checks Were Made And These Ran From 7.4% To 8.6%. One Moisture Content On Test FTF-11 Ran 5.7%. A Retest Was Made At N100 - W1900 Elev. 248 Of Test No. FTF-8. D-8 Dozer Removed Fill + Elev. Was Determined By Level. The Fill Was Wet Before, During + After Each Lift Whenever Possible To Keep Moisture Content Above 6.0%. Mike Willett Counted Passes In Area N700 W1900 - N1000 W1850 - N1000 W1750 - N400 W1750 And Moisture Check Here Was 8.9%. All Work Was Done According To Technical Procedure TP-10-02 And Spec No. CAR-SH-CH-8.

INSPECTOR L. Garner

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 5/6/74 & 5/7/74 | Spec. No. CAR-SH-CH-8
Location [illegible] | Inspector S. Radford / D. Smith
Elevation El. 232 & 235 | Shift Night 5:30 to 6:00
Weather Cool, Cloudy, Wet

COMMENT

Filling Operations were carried out in the above noted area and Elevation. Prior to any filling, the entire fill area was scarified. A moisture check was taken before filling was begun and found to be 10.9%, therefore it was not necessary for the area to be wetted before filling began. This high moisture content was due to the large rains that had occurred the previous two days. An in-field density test (which was a retest of FTF-13) was taken at coordinates N1500 + 11500. The results of this test were a moisture content of 7.5% and a dry density of 117.6 lb/ft³. Moisture checks were ran throughout the shift and all tests results were above the minimum allowed 6% moisture content, therefore predic wetting of the fill material was not required. Large rock which would not break up to 90% or less of the lift thickness were removed after 2 passes of the 825 B Sheepsfoot roller. All of the fill area received a minimum of 6 passes from the 825B Sheepsfoot Roller. Filling Operations were carried out in accordance to Spec No. CAR-SH-CH-8 and Technical Procedure TP-II-02.

INSPECTOR [illegible signature]

CLINTON POWER & LIGHT COMPANY
SHARON SPRINGS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 4/20/74 Spec. No. CAR-SH-CH-8

Location Plant Area N3200 W650 Inspector J F Llewill

Elevation 258 Shift Day

Weather Clear-Temp 70's

COMMENT

On 4/20/74 a test fill was completed in accordance with technical procedure TP-IV-01 revision 3. Two sections were completed - one with 4 passes on each layer, the other with 6 passes on each layer.

The material placed was a brown clayey and sandy silt with sandstone (gray) and siltstone to approximately 14" in diameter. Before spreading or compaction was accomplished ~~the~~ it visually appeared about 30-50% would pass a 3/4" screen. After 6 passes the maximum size surface material was 4"-6" in diameter and appeared to be well graded. On 4/19/74 the same material was placed in 12 inch lifts and received up to 6 passes with the Sheepsfoot roller in accordance with TP-IV-01 revision 2. Two approximately 70 lb samples of that material was used to determine

INSPECTOR _____

SHT 1/3

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date _____ Spec. No. CAR-SH-CH-8

Location _____ Inspector _____

Elevation _____ Shift _____

Weather: _____

COMMENT

that 71.8% and 83.4% would pass a 3/4" screen after 4 and 8 passes, respectively. The test fill completed on 4/19/74 was used as the base for the test of 4/20/74 to simulate conditions that will exist in the field.

Two sand cone densities were performed on the section which received 6 passes and a proctor curve was developed from the material taken from the sand cone holes. The holes were 0.312 and 0.316 cubic feet in volume, and the material removed appeared well graded with fine material being well compacted around the pieces of siltstone. The largest material removed from either hole was approximately 2"-2 1/2" in diameter. The results of these two density tests was an average dry density of 124.7 pcf which is 98.9% of the maximum dry density at optimum moisture from

INSPECTOR _____

SHT 2/3

AROLINA POWER & LIGHT COMPANY
S. ARON HARRIS NUCLEAR POWER PLAN.

FIELD INSPECTION REPORT

Date _____ Spec. No. CAR-SH-CH-8

Location _____ Inspector _____

Elevation _____ Shift _____

Weather _____

COMMENT

the proctor curve. Samples approximately 2500 grams were taken from the density holes to determine the moisture contents of 4.5% and 6.0%.

Two sand cone densities were also started on the section which received 4 passes. However the holes ~~first~~ did not appear to be as well compacted and the average wet density was 120.3 pcf as compared to the average wet density of 131.2 pcf after 6 passes. The moisture content determination or proctor curve were not completed.

INSPECTOR James F. Jarrell

SHT 3/3

CAROLINA POWER & LIGHT
HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location TF [illegible] SR-2-12 N=6 2 layers

Sample Elevation 258

Sample No. TF-1

Soil Description Brown clayey (sandy) silt with siltstone and some sandstone

Date 4/20/74

Tested By R.L. YOUNG

Type Test ASTM-698 METH A C STANDARD PROCTOR

DENSITY

Determination Number	1	2	3	4	5	6	7	8
Wt Mold + Compacted Soil (Lbs)	6.225 lb.	6.308	6.380	6.300				
Wt Mold (Lbs)	4.255 lb.	4.255	4.255	4.255				
Wt Compacted Soil (Lbs)	4.33 lb	4.51	4.67	4.50				
Wt Density (Lbs/ft^3)	130.0	135.4	140.3	134.9				
Dry Density (Lbs/ft^3)	124.3	125.3	125.9	117.2				

WATER CONTENT

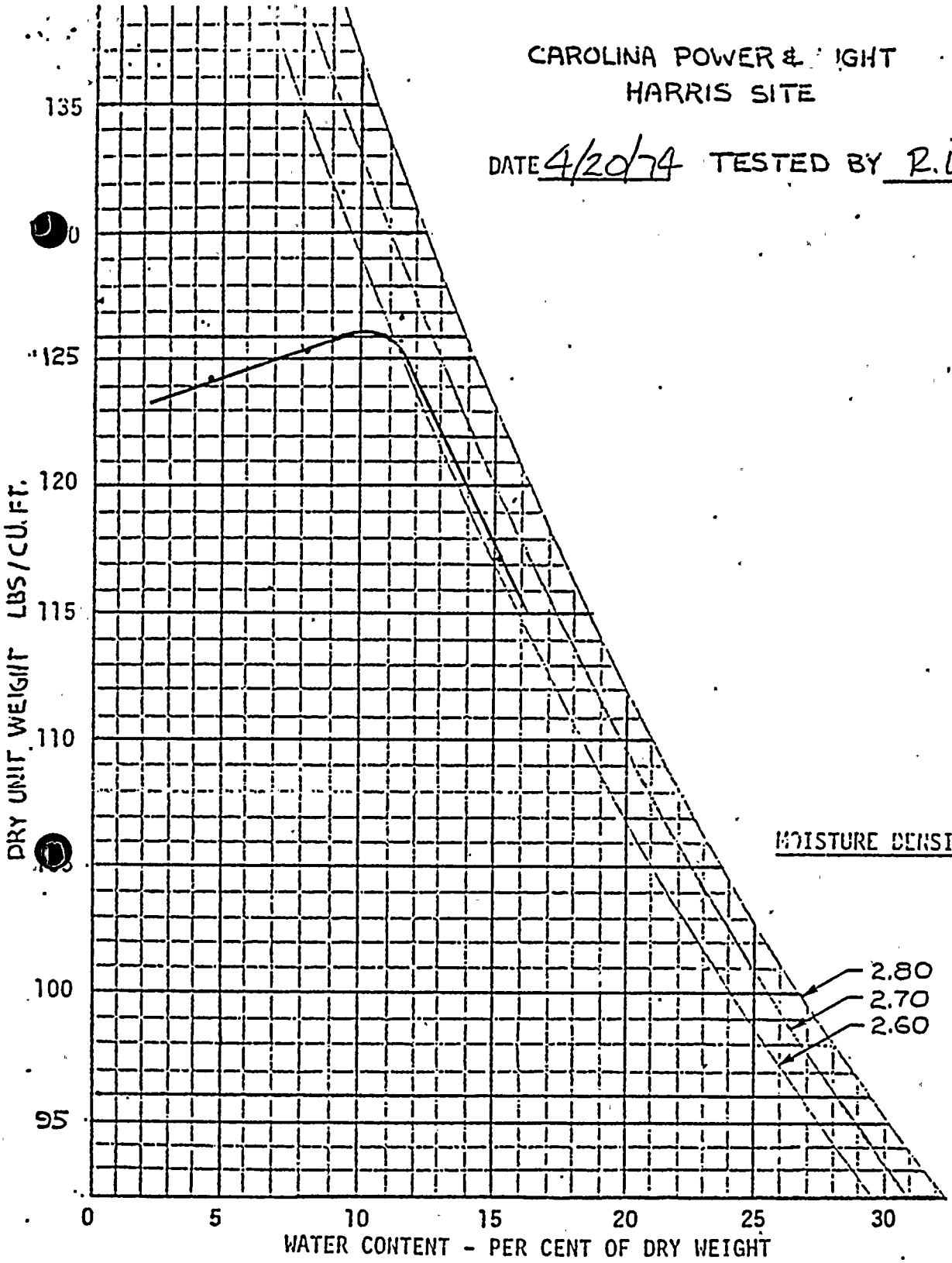
Determination Number	1	2	3	4	5	6	7	8
Container No.	C204	C26	C202	C206				
Wt Container + Wet Soil (g)	122.8	125.7	127.0	120.5				
Wt Container + Dry Soil (g)	118.4	117.9	116.1	107.4				
Wt. Container (g)	22.2	21.3	20.6	20.5				
Wt. Water (g)	4.4	7.8	10.9	13.1				
Wt Dry Soil (g)	96.2	96.6	95.5	86.9				
Water Content %	4.6	8.1	11.4	15.1				

Computed By J F Merrill

Checked By Robert M. Reynolds

CAROLINA POWER & LIGHT
HARRIS SITE

DATE 4/20/74 TESTED BY R.L. YOUNG



MOISTURE DENSITY TEST DATA

TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
TF-1	ASTM-C698 STANDARD PROCTOR	126.1	10.0%	Brown clayey (sandy) silt with siltstone and some sandstone

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location TEST FILL SR-2-12 N=6 2 layers Date 4/20/74

Test Elevation 258 Tested By J F Neill

Test No. FTF-2 Computed By J F Neill

Soil Description Brown clayey (sandy) silt with siltstone and sandstone Checked By [illegible]

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	94.67	Lbs
2	Wt of Apparatus & Remaining Sand	-	50.39	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	44.28	Lbs
4	Wt of Sand in Cone & Plate	Calib (12) Sheet	14.31	Lbs
5	Wt of Sand in Hole	(3) - (4)	29.97	Lbs
6	Bulk Density of Sand	Calib (9) Sheet	96.1	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.312	ft^3
8	Wt of Moist Soil and Can (No.)	-	44.09	Lbs
9	Wt of Can (No.)	-	3.31	Lbs
10	Wt of Moist Soil	(8) - (9)	40.78	Lbs
11	Wet Density	(10)/(7)	130.7	Lb/ft^3
12	Wt of Wet Sample + Container	-	2489.0	gms
13	Wt of Dry Sample + Container	-	2365.0	gms
14	Wt of Water in Sample	(12)-(13)	124.0	gms
15	Wt of Container No.	-	315.8	gms
16	Wt of Dry Soil	(13)-(15)	2049.2	gms
17	Moisture Content	$\frac{(14)}{(16)} \times 100$	6.0	%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$	123.3	Lb/ft^3
19	Maximum Dry Density PROCTOR CURVE: TF-1	-	126.1	Lb/ft^3
20	Percent Compaction	$\frac{(18)}{(19)} \times 100$	97.8	%

Remarks

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location TEST FILL SR-2-12 N=6 2 layers Date 4/20/74
Test Elevation 258 Tested By J F Nevill
Test No. FTF-3 Computed By J F Nevill
Soil Description Brown clayey (sandy) silt with siltstone and some sandstone Checked By RM Simmons

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	77.18	Lbs
2	Wt of Apparatus & Remaining Sand	-	32.47	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	44.71	Lbs
4	Wt of Sand in Cone & Plate	Calib (12) Sheet	14.31	Lbs
5	Wt of Sand in Hole	(3) - (4)	30.40	Lbs
6	Bulk Density of Sand	Calib (9) Sheet	96.1	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.316	ft^3
8	Wt of Moist Soil and Can (No.)	-	44.97	Lbs
9	Wt of Can (No.)	-	3.33	Lbs
10	Wt of Moist Soil	(8) - (9)	41.64	Lbs
11	Wet Density	(10)/(7)	131.8	Lb/ft^3
12	Wt of Wet Sample + Container	-	3450.0	gms
13	Wt of Dry Sample + Container	-	3315.0	gms
14	Wt of Water in Sample	(12)-(13)	135.0	gms
15	Wt of Container No.	-	315.8	gms
16	Wt of Dry Soil	(13)-(15)	2999.2	gms
17	Moisture Content	$\frac{(14)}{(16)} \times 100$	4.5	%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$	126.1	Lb/ft^3
19	Maximum Dry Density PROCTOR CURVE: TF-1	-	126.1	Lb/ft^3
20	Percent Compaction	$\frac{(18)}{(19)} \times 100$	100.0	%

Remarks

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location TEST FILL SR-2-12 N=4 2 layers Date 4/20/74

Test Elevation 258 Tested By NEVILL

Test No. FTF-4 Computed By JFM

Soil Description Brown clayey (sandy) silt with siltstone and some sandstone Checked By RMK

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	79.93	Lbs
2	Wt of Apparatus & Remaining Sand	-	40.53	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	39.40	Lbs
4	Wt of Sand in Cone & Plate	Calib (12) Sheet	14.31	Lbs
5	Wt of Sand in Hole	(3) - (4)	25.09	Lbs
6	Bulk Density of Sand	Calib (9) Sheet	96.1	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.261	Ft^3
8	Wt of Moist Soil and Can (No.)	-	37.21	Lbs
9	Wt of Can (No.)	-	3.31	Lbs
10	Wt of Moist Soil	(8) - (9)	33.90	Lbs
11	Wet Density	(10)/(7)	129.9	Lb/ft^3
12	Wt of Wet Sample + Container	-		gms
13	Wt of Dry Sample + Container	-		gms
14	Wt of Water in Sample	(12)-(13)		gms
15	Wt of Container No.	-		gms
16	Wt of Dry Soil	(13)-(15)		gms
17	Moisture Content	$\frac{(14)}{(16)} \times 100$		%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$		Lb/ft^3
19	Maximum Dry Density	-		Lb/ft^3
20	Percent Compaction	$\frac{(18)}{(19)} \times 100$		%

NO MOISTURE DETERMINED

Remarks

CAROLINA POWER & LIGHT
HARRIS SITE

FIELD DENSITY TEST - SAND CONE METHOD

Test Location TEST FILL SR-2-12 N=4 2 layers Date 4/20/74

Test Elevation 258 Tested By NEVILL

Test No. FTF-5 Computed By [signature]

Soil Description Brown clayey (Sandy) silt with siltstone and some sandstone Checked By Robert M. Kupec

NO.	IDENTIFICATION	Computation Index	Numerical Index	Units
1	Wt of Apparatus Filled with Sand	-	76.49	Lbs
2	Wt of Apparatus & Remaining Sand	-	42.35	Lbs
3	Wt of Sand in Hole, Plate, & Cone	(1) - (2)	34.14	Lbs
4	Wt of Sand in Cone & Plate	Calib (12) Sheet	14.31	Lbs
5	Wt of Sand in Hole	(3) - (4)	19.83	Lbs
6	Bulk Density of Sand	Calib (9) Sheet	96.1	Lb/ft^3
7	Volume of Test Hole	(5)/(6)	0.206	ft^3
8	Wt of Moist Soil and Can (No.)	-	26.15	Lbs
9	Wt of Can (No.)	-	3.33	Lbs
10	Wt of Moist Soil	(8) - (9)	22.82	Lbs
11	Wet Density	(10)/(7)	110.8	Lb/ft^3
12	Wt of Wet Sample + Container	-		gms
13	Wt of Dry Sample + Container	-		gms
14	Wt of Water in Sample	(12)-(13)		gms
15	Wt of Container No.	-		gms
16	Wt of Dry Soil	(13)-(15)		gms
17	Moisture Content	$\frac{(14)}{(16)} \times 100$		%
18	Dry Density	$\frac{(11)}{1.0 + (17)}$		Lb/ft^3
19	Maximum Dry Density	-		Lb/ft^3
20	Percent Compaction	$\frac{(18)}{(19)} \times 100$		%

NO MOISTURE DETERMINED

Remarks

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6-5-74 Spec. No. CAR-SH-CH-8

Location N1880 W550 / N2100 W1300 Inspector L. Garner

Elevation 245 - 260 Shift 6:30 A.M. - 5:00 P.M.

Weather Hot, Cloudy, Breezy

COMMENT

Fill Operations Were Conducted In The Above Area And Elev. Using Fine Material Placed In The Fill Area By Scrapers, And Rolled With An 825B Sheepfoot Roller. The Material Was Placed In A One Foot Lift And At Least 8 Passes Were Made Over The Entire Lift Area, Before Another Lift Was Placed On The Material. The Fill Material Is A Brown Clayey Silt With Some Gray Sand And Yellow To Orange Silty Clay Excavated From The East Side Of The RR At N3600 W2000 Approximately. Fill From The Same Area Was Placed At N250 W1300 N500 W1400 In The Same Method As Described Above. All Work Was Done According To Spec. No CAR-SH-CH-8 And Technical Procedure TP IV-01 Rev. 3.

Two Test Fill Densities FTF 21 & FTF-22 Were Taken To Verify 8 Passes With The Sheepfoot And Proctor Samples TF-21 & TF-22 Were Sent To Lab.

INSPECTOR L. Garner 6-5-74

Q A REVIEW _____

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6-7-74
Location N1580 W600 / N2050 W1300
Elevation 245-260

Spec. No. CAR-SH-CH-8
Inspector L. Garner
Shift 6:30 A.M. - 5:00 P.M.
Weather Cloudy, Windy, Warm

COMMENT

Fill-Operations Were Conducted At The Above Location And Elev. Using Brown Clayey Silt Material With Some Yellow Clay And A Little Clay Sand. The Material Was Excavated From The 500 KV Switchyard And West Of The RR Tracks By Scrapers And Dumped In The Fill Area In One-Foot Lifts. Two 825B Sheepfoot Rollers Spread And Rolled The Material With At Least 8 Passes Over The Entire Lift. The Moisture Content Was Checked In The Morning And Was Found To Be 15.7%. Visual Appearance Showed The Material To Be Of Sufficient Moisture For Filling The Rest Of The Day. Smoothe Areas Were Scarified Before Filling Began When Necessary. All Work Was Done According To CAR-SH-CH-8 And TP IE 01 Rev. 3.

INSPECTOR L. Garner 6-7-74

Q A REVIEW _____

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 5/21/74 Spec. No. Spec CAR-SH-CH-8

Location N250 W1550 Inspector J F Nevill

Elevation 230 Shift day

Weather cloudy - Cool

COMMENT

A test fill was completed in accordance with technical procedure TP-III-01 revision 3. The material received 8 passes on a 12" layer. The material placed was brown clayey silt with yellow silty clay layers which by visual appearance was greater than 90% passing a 3/4" screen. The speed of the Sheepsfoot Roller (825B) was about 4 mph.

A sand cone density test (FTF-19) was performed on the test fill and the material removed from the density hole was used for the compaction test. The material appeared well compacted with no loose or void areas.

INSPECTOR J F Nevill

Q A REVIEW

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6/5/74 Spec. No. CAR-SH-CH-8

Location N1950-2000 W1150 Inspector J F Nevill

Elevation 255 Shift day

Weather Cloudy - Hot

COMMENT

Two test fills were completed in coordance with TP-TV-01 revision 3. The material placed was fine material (greater than 90% passing a 3/4" screen by visual inspection) and compacted with 8 passes of a sheepsfoot 825 B roller on 12" layers.

The first section was brown sandy clayey silt with some siltstone and some yellow clay. The density test was numbered FTF-21. The material appeared well ~~graded~~ compacted with no loose or void areas.

The second section was composed of brown to dark brown clayey silt with light yellow to orange clay and some gray silty clay and a little gray sand. The density test was numbered FTF-22. The material appeared well compacted with no loose or void areas

INSPECTOR James F Nevill

Q A REVIEW _____

CAROLINA POWER & LIGHT COMPANY
HARRIS SITE
FIELD DENSITY TEST - SAND CONE METHOD
ASTM D 1556

DATE May 21, 74

LOCATION	FIELD TEST No.	FTF - 19			
	STATION N. S.	N 250			
	STATION E. W.	W 1550			
	ELEVATION	248			
	COLOR & TEXTURE	Brown Clayey Silt With Yellow Silty Clay Layers			
	PROCTOR CURVE No.	~~PA - 28~~ TF-19			
	MAX DRY WT	~~109.8~~ 113.4			
	OPTIMUM MOISTURE	~~17.2~~ 13.2			
VOLUME	1. WT FILLED WITH SAND	81.12			
	2. WT WITH REMAINING SAND	37.30			
	3. WT SAND USED (1-2)	43.82			
	4. WT IN CONE & PLATE (Calib Sht)	14.32			
	5. WT SAND IN HOLE (3-4)	29.50			
	6. BULK DENSITY OF SAND (Calib Sht)	98.80			
	7. VOLUME OF TEST HOLE (5/6)	0.2986			
	8. WT MOIST SOIL & CAN	41.31			
	9. WT OF CAN (No. ___)	3.34			
	10. WT MOIST SOIL	37.97			
	11. WT DENSITY (10/7)	127.16			
	12. WT WET SOIL & CONT	273.95			
	13. WT DRY SOIL & CONT	246.10			
	14. WT WATER (12-13)	27.95			
	15. WT OF CONTAINER	73.95			
	16. WT DRY SOIL (13-15)	172.15			
	17. MOISTURE CONTENT (14/16)	16.18			
	DRY DENSITY (11/1.0 + 17)	109.45			
	PERCENT COMPACTION	96.5% ~~99.7%~~			

REMARKS Fine material (greater than 90% passing 3/4" screen by visual inspection) placed in 12" lift and rolled with 8 passes of sheepsfoot roller

INSPECTOR [signature]
CHECKED [signature]
QA REVIEWED ______

CAROLINA POWER & LIGHT
HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location N 250 W 1550
Sample Elevation 248
Sample No. TF-19
Soil Description BROWN CLAYEY SILT with SOME YELLOW SILTY CLAY

Date 22 MAY 74
Tested By Dudley, J. F.
Type Test ASTM-698 METH A STANDARD PROCTOR

DENSITY

	DRY	50ml	100ml	150ml	200ml	OVEN DRIED	OVEN DRIED+50ml	150ml
Determination Number	1	2	3	4	5	6	7	8
Wt Mold + Compacted Soil (Lbs)	8.62	8.72	8.64	8.60	8.56	7.65	8.02	8.40
Wt Mold (Lbs)	4.38	4.38	4.38	4.38	4.38	4.38	4.38	4.38
Wt Compacted Soil (Lbs)	4.24	4.34	4.26	4.22	4.18	3.27	3.64	4.02
Wt Density (Lbs/ft^3)	127.2	130.2	127.8	126.6	125.4	90.81	109.2	120.6
Dry Density (Lbs/ft^3)	111.5	113.5	110.4	108.0	105.4	90.0	105.8	110.3

WATER CONTENT

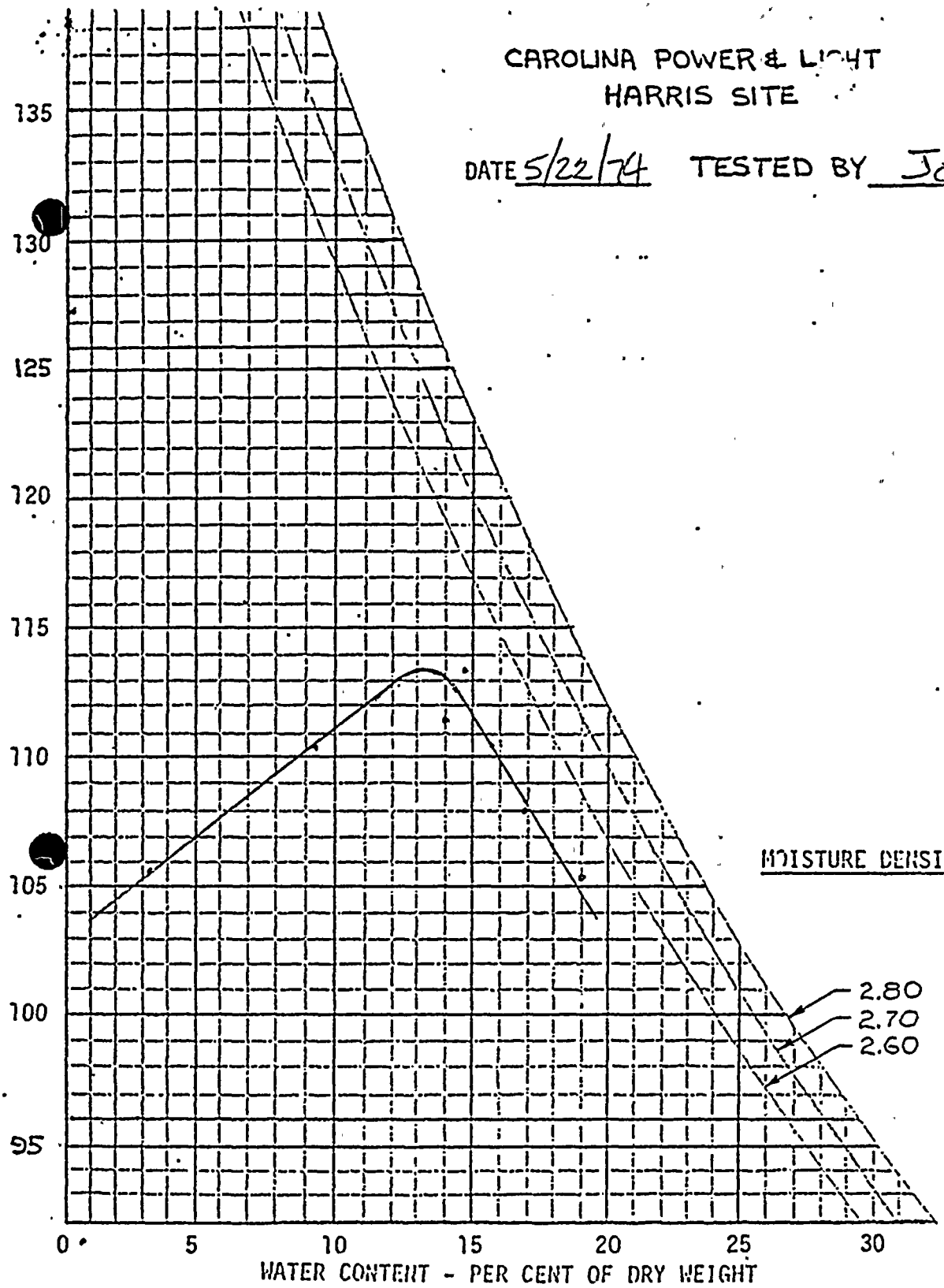
Determination Number	1	2	3	4	5	6	7	8
Container No.	#14	#1	#10	#402	#2	#3	#14	304
Wt Container + Wet Soil (g)	170.8	171.8	171.5	170.8	171.1	170.7	170.8	171.9
Wt Container + Dry Soil (g)	152.4	152.6	151.2	149.1	147.2	169.3	166.1	159.0
Wt. Container (g)	20.8	21.8	21.5	20.8	21.1	20.7	20.8	20.9 ~~H03~~
Wt. Water (g)	18.4	19.2	20.3	21.7	23.9	1.4	4.7	12.7
Wt Dry Soil (g)	131.6	130.8	129.7	128.3	126.1	14.86	145.3	138.1 ~~H03~~
Water Content %	14.0	14.7	15.7	16.9	19.0	0.9	3.2	9.3

Computed By John Dudley

Checked By James Lowell 5/24

CAROLINA POWER & LIGHT
HARRIS SITE

DATE 5/22/74 TESTED BY John Dudley



MOISTURE DENSITY TEST DATA

TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
TF-19	ASTM-C698 STANDARD PROCTOR	113.4	13.2	Brown clayey silt with some yellow silty clay

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
FIELD DENSITY TEST - SAND CONE METHOD
ASTM D 1556

Date: 6-5-74

FIELD TEST NO.	FTF-21			
LOCATION & STATION	N 2000 W 1150	[illegible]		
ELEVATION	255			
COLOR & TEXTURE	Brown Sandy Clay Silt With Some Siltstone And Some Yellow Clay			
PROCTOR CURVE NO.	TF-21			
MAX DRY WT	119.3			
OPTIMUM MOISTURE	13.0			
1. WT FILLED WITH SAND	78.55			
2. WT WITH REMAINING SAND	37.60			
3. WT SAND USED (1-2)	40.95			
4. WT IN CONE & PLATE (Calib Sht)	14.32			
5. WT SAND IN HOLE (3-4)	26.63			
6. BULK DENSITY OF SAND (Calib Sht)	98.80			
7. VOLUME OF TEST HOLE (5/6)	0.2695			
8. WT MOIST SOIL & CAN	40.04			
9. WT OF CAN (No. ___)	3.50			
10. WT MOIST SOIL	36.54			
11. WT DENSITY (10/7)	135.58			
12. WT WET SOIL & CONT	273.95			
13. WT DRY SOIL & CONT	251.50			
14. WT WATER (12-13)	22.45			
15. WT OF CONTAINER	73.95			
16. WT DRY SOIL (13-15)	177.55			
17. MOISTURE CONTENT (14/16)	12.64			
DRY DENSITY (11/1.0 + 17)	120.37			
PERCENT COMPACTION	100.9%			

REMARKS * Method and calculations witnessed and verified in field by R.L. Young QA
R.L. Young QA 6/5/74

INSPECTOR [illegible] 6-5-74
CHECKED [illegible] 6-5-74
QA REVIEW

Fine material, 12" lift, 8 passes Sheepsfoot Roller

CAROLINA POWER & LIGHT
HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location N 2000 W 1150

Sample Elevation ≈ 260

Sample No. TF-21

Soil Description Brown Sandy Clay Silt with Some Siltstone and Some Yellow Clay

Date 6-5-74

Tested By Dan C. Hinkle

Type Test ASTM-698 Meth A Standard Proctor

DENSITY — Damp | 100 ml | 200 ml | 85 ml | 150 ml

Determination Number	1	2	3	4	5	6	7	8
Wt Mold + Compacted Soil (Lbs)	8.53	8.79	8.75	8.72	8.85			
Wt Mold (Lbs)	4.38	4.38	4.38	4.38	4.38			
Wt Compacted Soil (Lbs)	4.15	4.41	4.37	4.34	4.47			
Wt Density (Lbs/ft^3)	124.5	132.3	131.1	130.2	134.1			
Dry Density (Lbs/ft^3)	115.29	118.68	111.41	117.18	116.40			

WATER CONTENT

Determination Number	1	2	3	4	5	6	7	8
Container No.	206	14	8	6	213			
Wt Container + Wet Soil (g)	120.8	120.9	120.7	121.8	121.7			
Wt Container + Dry Soil (g)	113.4	110.6	105.7	111.8	108.5			
Wt. Container (g)	20.8	20.9	20.7	21.8	21.7			
Wt. Water (g)	7.4	10.3	15.0	10.0	13.2			
Wt Dry Soil (g)	92.6	89.7	85.0	90.0	86.8			
Water Content %	7.99	11.48	17.67	11.11	15.21			

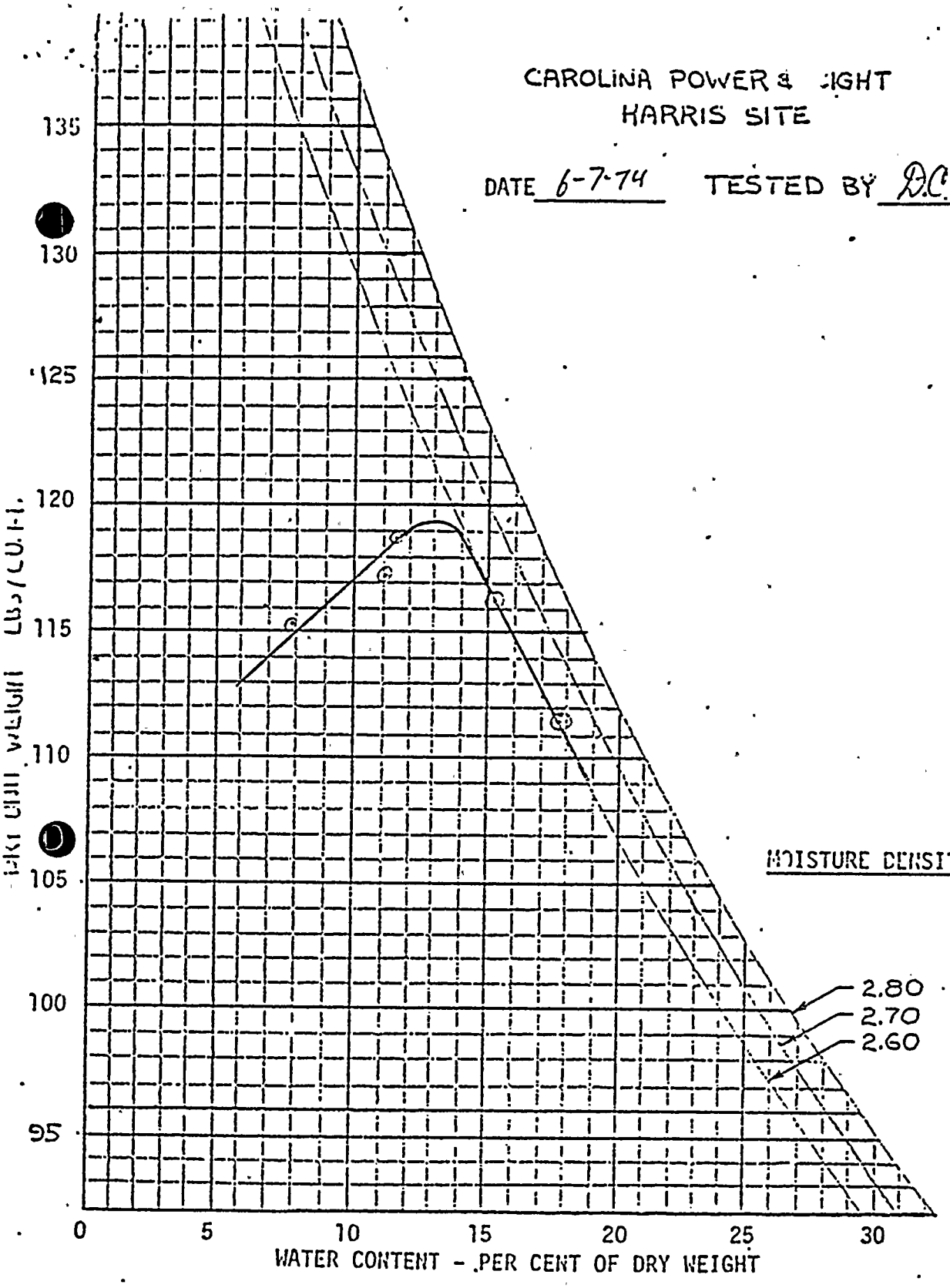
$$\frac{124.5}{1+.0799}$$

Computed By Dan C. Hinkle

Checked By James F. Spruill 6/7

CAROLINA POWER & LIGHT
HARRIS SITE

DATE 6-7-74 TESTED BY D.C. Hicks



MOISTURE DENSITY TEST DATA

TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
TF-21	ASTM-C698 STANDARD PROCTOR	119.3	13.0	BROWN SANDY CLAY SILT WITH SOME SILTSTONE AND SOME YELLOW CLAY. Location: N-2000, W-1150 Elev ± 260'

ROLINA POWER & LIGHT COMPANY
HARRIS SITE
FIELD DENSITY TEST - SAND CONE METHOD
ASTM D 1556

DATE 6-5-74

FIELD TEST No.	FTF-22			
STATION N. S.	N1950			
STATION E. W.	W1150			
ELEVATION	255			
COLOR & TEXTURE	Brown to dark brown clayey silt with light yellow to orange clay and some gray silty clay and a little gray sand.			
PROCTOR CURVE No.	TF-22			
MAX DRY WT	108.7			
OPTIMUM MOISTURE	18.5			
1. WT FILLED WITH SAND	77.00			
2. WT WITH REMAINING SAND	38.99			
3. WT SAND USED (1-2)	38.01			
4. WT IN CONE & PLATE (Calib Sht)	14.32			
5. WT SAND IN HOLE (3-4)	23.69			
6. BULK DENSITY OF SAND (Calib Sht)	98.8			
7. VOLUME OF TEST HOLE (5/6)	0.2398			
8. WT MOIST SOIL & CAN	33.43			
9. WT OF CAN (No. ___)	3.34			
0. WT MOIST SOIL	30.09			
1. WT DENSITY (10/7)	125.48			
2. WT WET SOIL & CONT	273.95			
3. WT DRY SOIL & CONT	243.50			
→. WT WATER (12-13)	30.45			
5. WT OF CONTAINER	73.95			
ↄ. WT DRY SOIL (13-15)	169.55			
7. MOISTURE CONTENT (14/16)	17.96			
DRY DENSITY (11/1.0 + 17)	106.38			
PERCENT COMPACTION	97.9%			

REMARKS Fine Material 12" lift
8 Passes Sheepsfoot Roller

INSPECTOR [signature] 6-5-74
CHECKED [signature] 6-5-74
REVIEWED ____________

CAROLINA POWER & LIGHT
HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location R.A. N 1950 - W1150

Sample Elevation 256

Sample No. TF -22

Soil Description Brown to Dk. Brown clayey silt with lt. yellow to orange clay & some gray silty clay & a little gray sand.

Date 6-6-74

Tested By SHIELDS

Type Test ASTM-698 METH A STANDARD PROCTOR

DENSITY DAMP 100 200 250 133 166

Determination Number	1	2	3	4	5	6	7	8
Wt Mold + Compacted Soil (Lbs)	8.15	8.37	8.66	8.645	8.52	8.63		
Wt Mold (Lbs)	4.38	4.38	4.38	4.38	4.38	4.38		
Wt Compacted Soil (Lbs)	3.77	3.99	4.28	4.265	4.14	4.25		
Wt Density (Lbs/ft^3)	113.1	119.7	128.4	127.95	124.2	127.5		
Dry Density (Lbs/ft^3)	102.92	105.16	107.34	104.92	107.19	107.30		

WATER CONTENT

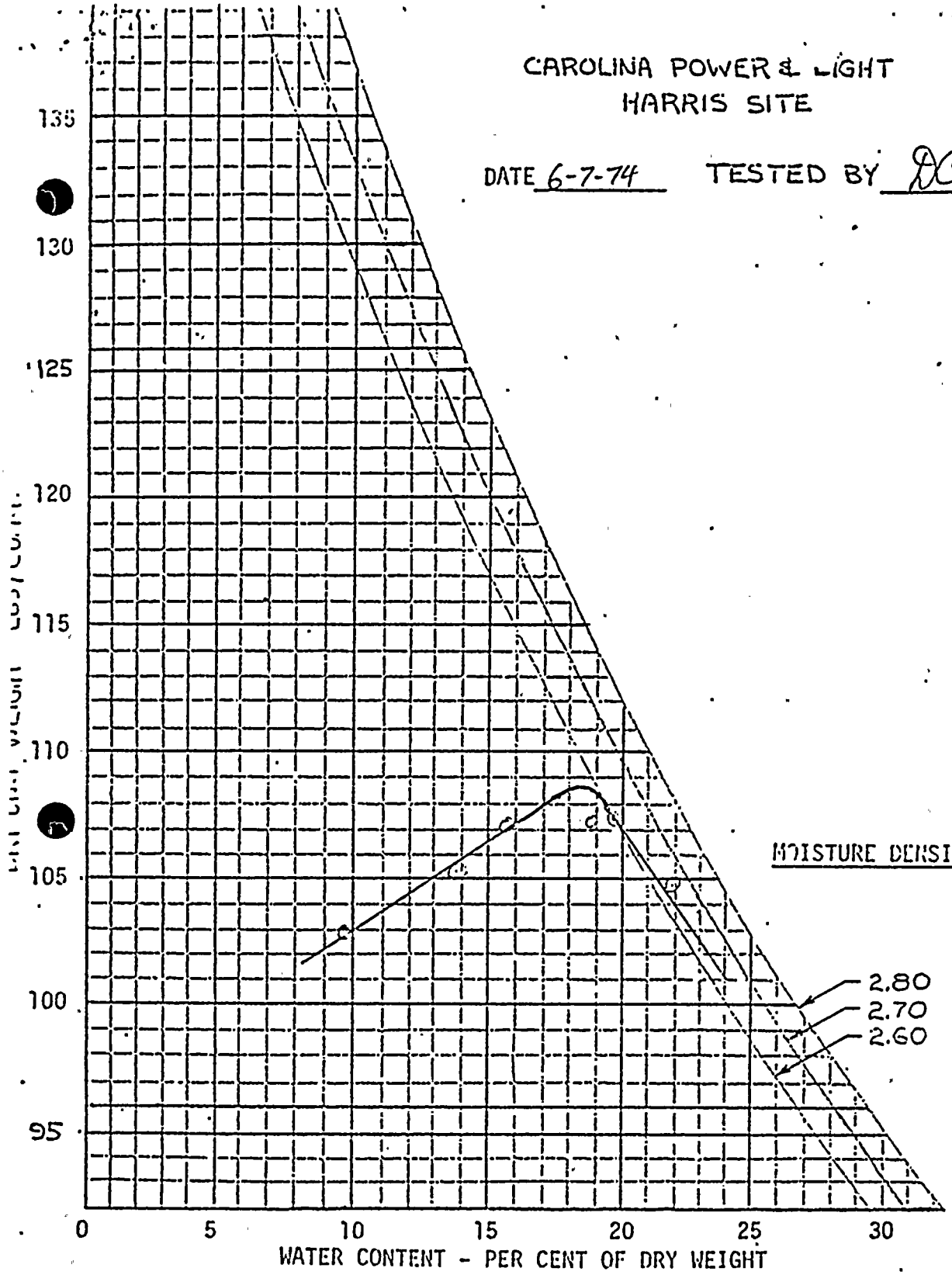
Determination Number	1	2	3	4	5	6	7	8
Container No.	# 10	# 204	# 205*	# 301	# 304	# 1		
Wt Container + Wet Soil (g)	121.5	122.2	121.2	121.5	121.3	121.7		
Wt Container + Dry Soil (g)	112.5	110.05	104.8	103.5	107.6	105.85		
Wt. Container (g)	21.5	22.2	21.2	21.5	21.3	21.7		
Wt. Water (g)	9.0	12.15	16.4	18.0	13.7	15.85		
Wt Dry Soil (g)	91	87.85	83.6	82	86.3	84.15		
Water Content %	9.89	13.83	19.62	21.95	15.87	18.83		

Computed By Tom C. Shields

Checked By James L. ... 6/7

CAROLINA POWER & LIGHT
HARRIS SITE

DATE 6-7-74 TESTED BY DC Hinkle



MOISTURE DENSITY TEST DATA

TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
TF-22	ASTM-D698 STANDARD PROCTOR	108.7	18.5	Brown to Dark Brown Clayey Silt With Light Yellow to Orange Clay & Some Gray Silty Clay & a little gray Sand. Location: N - 1950, W-1150 Elev: 256

OLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 5-7-74

Location N 1480 - N 1800, W 00 - W 900

Elevation 219 - 215

Spec. No. CAR-SH-CH-8

Inspector L. Garner

Shift 6:30 - 5:00

Weather Clear, Warm, Sunny

COMMENT

All Fill In Above Coordinates And Elev. Was Rolled With At Least 8 Passes With An 825B Sheepsfoot Roller. Fill Area Was Scarified Before Fill Operations Began. It Was Concluded From Densities + Proctors That 6 Passes Were No Longer Sufficient Because Rock Fill Was Too Large So 8 Passes Are To Be Used Instead Of 6. Above Noted Area Was Cross-Sectioned In Order To Accurately Control Amount Of Fill Done With 8 Passes. All Rocks Not Broken Up After Passes Were Removed From Fill. Moisture Checks Were Made With "Speedy" And The Average Moisture Content Was Found To Be 7.9%. A Re-Test Of Density No. FTF-11 Was Made @ N175 W1950 And It Passed. A Test Fill Was Made @ N 1490 W 150 And 8 Passes Were Used On Two One Foot Lifts. Moisture Content Here Was 6.0% Proctor Sample TF-16 Sent To Lab.

Fill Put In Area N1480 W700 Was Pumping And Is To Be Taken Out Before Further Filling.

INSPECTOR ______________________

CAROLINA POWER & LIGHT COMPANY
CARON HARRIS NUCLEAR POWER PL

FIELD INSPECTION REPORT

Date 5/15/74 & 5/16/74 Spec. No. CAR-SH-CH-B

Location N1900 to N2100 & W450 to 550 Inspector S. Talbert / D. Smith

Elevation 238-242 Shift Night 5:30 to 4:00

Weather Cool, Clear, Damp

COMMENT

Rock Fill Operations were conducted in the above noted area and elevations. Smooth drop in this fill were scarified before being filled upon. This Rock Fill was done in lifts of approximately 1 ft. All lifts received a minimum of 8 passes from the CS56 Sheepsfoot Roller and large rock which would not break-up to 90% or less of the lift thickness were removed after 8 passes. Material was wetted during each lift and moisture checks were taken throughout the shift to insure a minimum moisture content of 6% or better. Fill Operations were also carried out in the following area: N2000 to N2150 & W1850 to W2100 at elevation 257-260. The fill material was fine soils which contained only small particles of rock or no rock at all. Instead of counting passes in this area, sand-cone and drive-cylinder density test were ran to insure adequate compaction. At least one test was ran for each 20,000 sq. ft during each lift of approximately 1 ft. These tests were compared to the appropriate proctor curves to insure a density of 95% of the proctor. All tests, except one,

INSPECTOR _____

(cont)

ROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 5/8/74 Spec. No. CAR-SH-CH-8

Location N1400 W300 Inspector J F Nevill

Elevation 230 Shift Day

Weather Clear - Temp 70's

COMMENT

A test fill was completed in accordance with technical procedure TP-III-01 Revision 3. The material received 8 passes on each of two 12" layers.
The material placed was a brown clayey silt with siltstone to approximately 21" in diameter. Before compaction was ~~co~~ started it visually appeared approximately 30 % would pass a 3/4" screen. After 8 passes the maximum size surface material was 4" and appeared to be well graded. A sand cone density test ~~was~~ performed on the test fill and a proctor curve was developed from the material. The data sheet was numbered FTF-17. The material removed from the hole was well compacted with no loose material around the rock.

INSPECTOR James F Nevill

ROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 5/7/74 Spec. No. CAR-SH-CH-8

Location N1490 W150 Inspector J F Nevill

Elevation _____ Shift Day

Weather Clear - Temp 70's

COMMENT

A test fill was completed in accordance with technical procedure TP-III-01 revision 3. The material received 8 passes on each of two 12" ~~24~~" layers.

The material placed was brown clayey silt with siltstone to approximately 18" in diameter. Before compaction was started it visually appeared 40% would pass a 3/4" screen. After 8 passes the maximum size surface material was 3"-4" and appeared to be well graded. A sand cone density test was performed on the test fill and a proctor curve was developed from the material. The data sheet was numbered FTF-16. The material removed from the hole was well compacted with no loose material around the rock.

INSPECTOR James F Nevill

CAROLINA POWER & LIGHT COMPANY
HARRIS SITE
FIELD DENSITY TEST - SAND CONE METHOD
ASTM D 1556

DATE May 7

	FIELD TEST No.	~~FTF-16~~	FTF-16		
	STATION N. S.		N1490		
	STATION E. W.		W150		
	ELEVATION		220		
	COLOR & TEXTURE		Brown clayey silt with piece of siltstone		
	PROCTOR CURVE No.	~~TF-16~~	TF-16		
	MAX DRY WT		132.0		
	OPTIMUM MOISTURE	~~10.13~~	8.5		
1.	WT FILLED WITH SAND	~~89.99~~	90.13		
2.	WT WITH REMAINING SAND	~~54.85~~	54.76		
3.	WT SAND USED (1-2)		35.37		
4.	WT IN CONE & PLATE (Calib Sht)		14.32		
5.	WT SAND IN HOLE (3-4)		21.05		
6.	BULK DENSITY OF SAND (Calib Sht)		96.3		
7.	VOLUME OF TEST HOLE (5/6)		0.219		
	WT MOIST SOIL & CAN	~~33.43~~	33.43		
9.	WT OF CAN (No. ___)	~~4.05~~	4.05		
10.	WT MOIST SOIL		29.38		
11.	WT DENSITY (10/7)		134.2		
12.	WT WET SOIL & CONT		273.8		
13.	WT DRY SOIL & CONT		262.5		
14.	WT WATER (12-13)		11.3		
15.	WT OF CONTAINER		73.8		
16.	WT DRY SOIL (13-15)		188.7		
17.	MOISTURE CONTENT (14/16)		6.0		
	DRY DENSITY (11/1.0 + 17)		126.6		
	PERCENT COMPACTION		~~95.9~~		

REMARKS The material for this test fill received 8 passes with one foot lifts instead of 6.

INSPECTOR Garner / Thompson
CHECKED [signature]
REVIEWED Robert M. Reynolds

CAROLINA POWER & LIGHT COMPANY
HARRIS SITE
FIELD DENSITY TEST - SAND CONE METHOD
ASTM D 1556

DATE 5-8-79

LOCATION	FIELD TEST No.	FTF-17			
	STATION N. S.	N 1400			
	STATION E. W.	W 300			
	ELEVATION	230			
	COLOR & TEXTURE	BROWN CLAYEY SILT WITH SOME PIECES OF SILTSTONE			
	PROCTOR CURVE No.	TF-17			
	MAX DRY WT	128.9			
	OPTIMUM MOISTURE	8.9			
1.	WT FILLED WITH SAND	89.86			
2.	WT WITH REMAINING SAND	53.60			
3.	WT SAND USED (1-2)	36.26			
4.	WT IN CONE & PLATE (Calib Sht)	14.32			
5.	WT SAND IN HOLE (3-4)	21.94			
6.	BULK DENSITY OF SAND (Calib Sht)	96.3			
7.	VOLUME OF TEST HOLE (5/6)	0.2278			
8.	WT MOIST SOIL & CAN	33.47			
9.	WT OF CAN (No. ___)	3.37			
10.	WT MOIST SOIL	30.10			
11.	WT DENSITY (10/7)	132.13			
12.	WT WET SOIL & CONT	273.8			
13.	WT DRY SOIL & CONT	262.3			
14.	WT WATER (12-13)	11.5			
15.	WT OF CONTAINER	73.8			
16.	WT DRY SOIL (13-15)	188.5			
17.	MOISTURE CONTENT (14/16)	6.1			
	DRY DENSITY (11/1.0 + 17)	124.53			
	PERCENT COMPACTION	95.8			

REMARKS This test fill received 8 passes with the sheepsfoot roller

INSPECTOR T. Gannon
CHECKED T. Gannon
~~REVIEWED~~ computed

CAROLINA POWER & LIGHT
HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location N1490 W150

Sample Elevation 220

Sample No. TF-16

Soil Description Brown clayey silt with pieces of siltstone

Date 5/8/74

Tested By J F Nevill

Type Test ASTM-698 METH A & C STANDARD PROCTOR

DENSITY — dump 50 ml 100 150 75

Determination Number	1	2	3	4	5	6	7	8
Wt Mold + Compacted Soil (Lbs)	4.059	4.085	4.155	4.199	4.102	4.045		
Wt Mold (Lbs)	4.365 lb	4.365 lb	4.365	4.365	4.365	4.365		
Wt Compacted Soil (Lbs)	4.56 lb	4.62 lb	4.78 lb	4.76	4.66	4.53		
Wt Density (Lbs/ft^3)	136.9	138.7	143.3	142.9	139.8	136.0		
Dry Density (Lbs/ft^3)	130.6	130.8	131.9	129.1	129.6	128.9		

WATER CONTENT

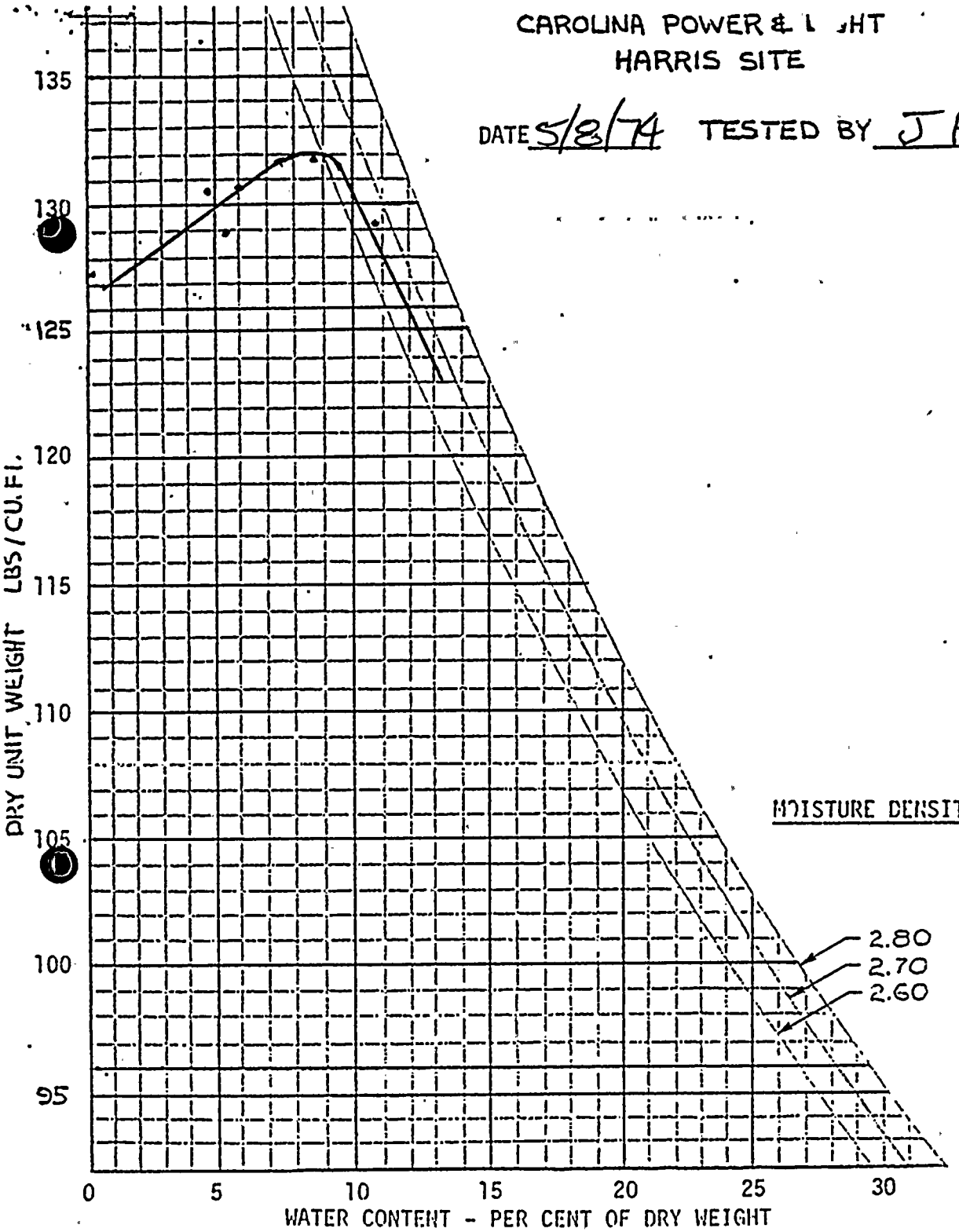
Determination Number	1	2	3	4	5	6	7	8
Container No.	1	3	4	5	12	1		
Wt Container + Wet Soil (g)	121.8	120.7	120.7	122.0	121.2	~~220.6~~ ~~189.8~~		
Wt Container + Dry Soil (g)	117.2	115.0	112.8	112.3	113.9	221.8 211.4		
Wt. Container (g)	21.8	20.7	20.7	22.0	21.2	~~21.8~~ ~~21.8~~		
Wt. Water (g)	4.6	5.7	~~8.4~~ 7.9	9.7	7.3	10.4		
Wt Dry Soil (g)	95.4	94.3	92.1	90.3	92.7	189.6		
Water Content %	4.8	6.0	~~12.7~~ 8.6	10.7	7.9	5.5		

Computed By J F Nevill

Checked By Robert M. Reynolds

CAROLINA POWER & L JHT
HARRIS SITE

DATE 5/8/74 TESTED BY J F Nevill



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
TF-16	ASTM-C698 STANDARD PROCTOR	132	8.5	Brown clayey silt with pieces of siltstone

CAROLINA POWER & LIGHT
HARRIS SITE

COMPACTION TEST

DATA SHEET

Sample Location N1400 W300

Sample Elevation 230

Sample No. ~~TF-17~~ TF-17

Soil Description Brown Clay Silt - Pieces of Silt Stone

Date 10 May 74

Tested By Dudley

Type Test ASTM-698 METH C STANDARD PROCTOR

DENSITY (Sun Dried) DRY 50ml (H_2O) 100 ml

Determination Number	1	2	3	4	5	6	7	8
Wt Mold + Compacted Soil (Lbs)	8.81 lb.	8.91 lb	9.03 lb.	9.08 lb	9.13	9.11		
Wt Mold (Lbs)	4.38 lb.	4.38 lb.	4.38 lb.	4.38 lb.	4.38 lb.	4.38		
Wt Compacted Soil (Lbs)	4.43 lb	4.53 lb	4.65 lb	4.70 lb.	4.75	4.73		
Wt Density (Lbs/ft^3)	132.9	135.9	139.5	141.0	142.5	141.9		
Dry Density (Lbs/ft^3)	128.0	127.2	128.1	126.2	125.2	121.9		

WATER CONTENT

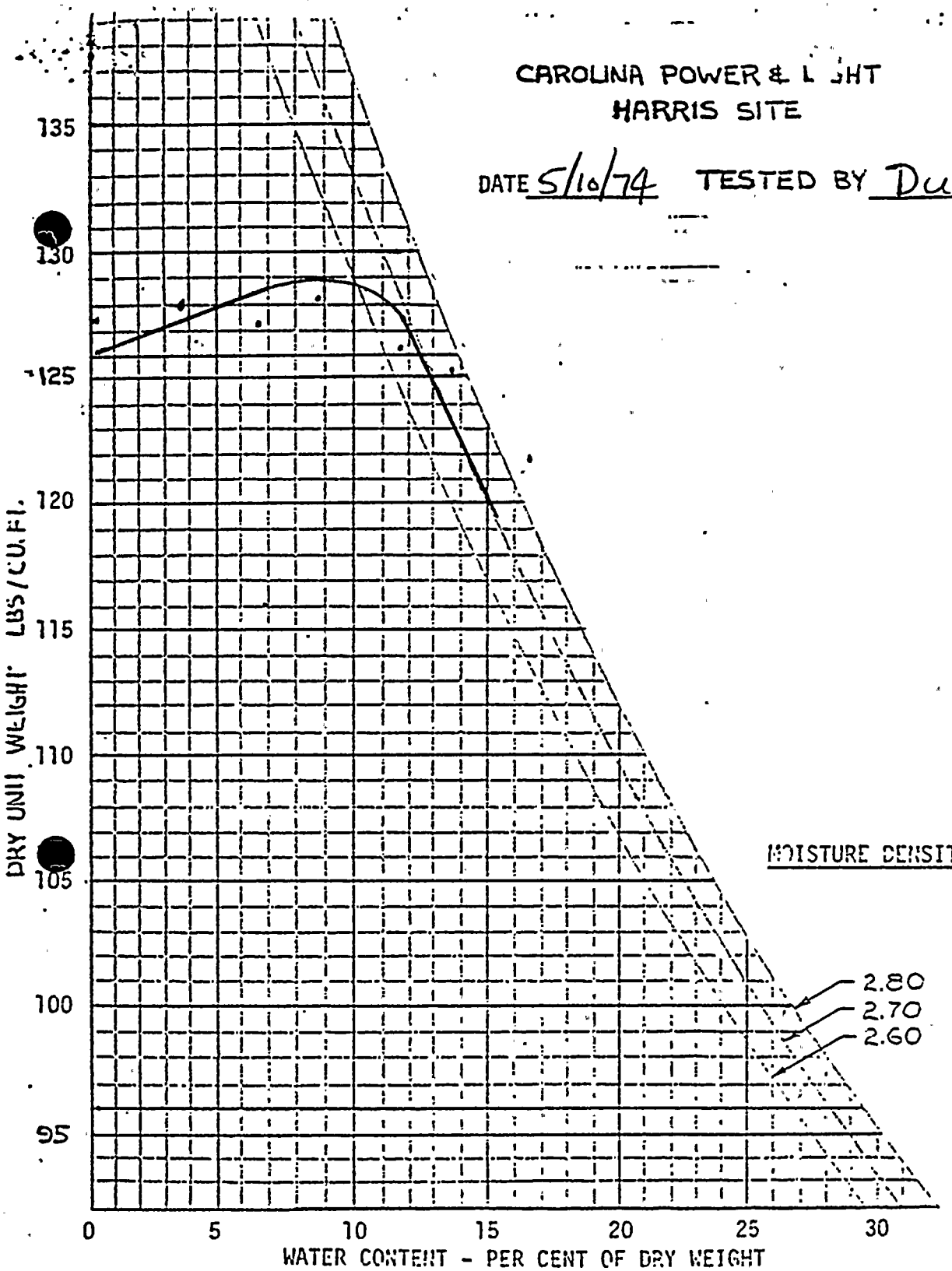
Determination Number	1	2	3	4	5	6	7	8
Container No.	#8	#9	#10	#11	#12	#5		
Wt Container + Wet Soil (g)	220.4g	220.6g	221.4	220.5g	220.6g	221.7g		
Wt Container + Dry Soil (g)	213.0	208.0	205.0	198.6g	196.4g	193.1g		
Wt. Container (g)	20.4g	20.6g	21.4g	20.5g	20.6g	21.7g		
Wt. Water (g)	7.4	12.6	16.4	20.9g	24.2g	28.6g		
Wt Dry Soil (g)	92.6	187.4	183.6	179.1	175.8	171.4		
Water Content %	3.8	6.7	8.9	11.7	13.8	16.4		

Computed By John Dudley

Checked By J Fatzell

CAROLINA POWER & LIGHT
HARRIS SITE

DATE 5/10/74 TESTED BY Dudley



TEST NO.	METHOD OF TEST	MAX. DRY DENSITY PCF	OPTIMUM MOISTURE CONTENT %	SOIL DESCRIPTION OR CLASSIFICATION AND SAMPLE LOCATION
TF-17	ASTM-698 Meth C STANDARD PROCTOR	128.9	8.9%	Brown clayey silt with pieces of siltstone

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6-13-74 Spec. No. CAR-SH-CH-8

Location N 1400 TO N 1700 W 200 TO E 75 Inspector E. W. Radford

Elevation 237 Shift Day 6:30 To 5:00

Weather Cloudy, Hot, Dry

COMMENT

Fill operations were carried out in the above noted Elev. & Location using "Shot Rock". The rock was End dumped using Euclid R-50's and spread with 2 D-8 dozers. The Field received at least 6 passes with A vibratory roller. All rock larger than 90% of the LIFT Thickness was pushed out and broken up with A crane and a headache ball. All work was done in Accordance with Spec CAR-SH-CH-8 and Tech. Prodedure TP IE-01 Rev 4.

The test Field was also started today using shot rock. Location N 1450 W 250.

The unsuitable material was removed from station N 100 TO N 500 W 600 TO W 800 by Bollingen. This Area will be ready to back Fill by the end of the First Shift.

Night Shift is directed too stay Clear Test Field.

INSPECTOR Samuel W Radford

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6-21-74

Location N1200 W200
N1650 W50

Elevation ~243-246

Spec. No. CAR-SH-CH-8

Inspector J. Johnson

Shift 3:30 PM - 4:00 AM

Weather Cloudy & Warm

COMMENT

Rock fill operations were conducted in the referenced location using shot rock from the "hole" and dumped into the fill area by R-50 Euclids and spread into a two foot rock lift by D-8 dozers. All material was broken down to 90% of the lift thickness or smaller by a headache ball. The area received at least 6 passes with a vibratory with speed not exceeding 3 mph & drum vibrates of 1100-1500 vpm. All work was done according to CAR-SH-CH-8 and TP II A.1 of Rev. 5.

At 7:30 PM the tower lights powered by the diesel generator went out.

INSPECTOR J. Johnson

GEORGIA POWER & LIGHT COMPANY
SIDNEY W. HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6/18/74 Spec. No. CAR-SH-CH-8

Location N 1750 W 100 Inspector J F Neuill

Elevation 245 Shift Day

Weather Sunny - warm

COMMENT

Two new test fills were started to replace the test fills VR-24-3-3 and VR-24-3-4 started on 6/13/74. Both test fills will be laid out on one large test section. The number of settlement points has been increased to 18 and there will be an 83 foot wide lane of unrolled material on the lift to separate the two test fills. This lane between the two will eliminate the roller vibration on one test affecting the other.

Test Fill VR-24-3-6 will use the vibratory roller at 3 Omph on 24" lifts and will be used for field control. Test Fill VR-24-3-5 will use the vibratory roller at 1.5 mph on 24" lifts and will be used as a comparison to VR-24-3-6 in order to determine if roller speed will significantly effect settlement. All procedure will be in accordance with TP-IV-01 revision 5.

Eudid D-60's were used to place the

INSPECTOR _____

Q A REVIEW _____

slt 1/2

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6/10/74

Location N1750 W180

Elevation 245

Spec. No. CAR-SH-CH-8

Inspector J F Newill

Shift day

Weather Sunny-warm

COMMENT

material and a D8 will be used to spread.
The material placed on the first lift was brown siltstone, same appeared shaley, and a small amount of gray sandstone. There were a few large rocks pushed out of the fill. The majority of the rock averages about 10 to 12 inches. There was enough fine material to easily fill all voids. All material was blasted at elev 220.
The speed was periodically checked with a stop watch to assure 1.5 and 3.0 mph. The vibrations per minute were also periodically checked to assure compliance to TP-III-01 rev 5 (1100 to 1500 vpm).
The vibratory roller used is a Rascal 600-A (dynamic force 45,000 lb)

INSPECTOR: [signature]

sht 2/2

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6/15/79
Location 41750 W100
Elevation 247

Spec. No. CAR-SH-CH-8
Inspector J F Neill
Shift day
Weather Sunny - calm

COMMENT

Test fills VR-24-3-5 and VR-24-3-6 were continued. All equipment and procedures were the same as that used for first lift.

The material placed on the second lift was the same as that on the first - brown siltstone (some apparent shale) with a small amount of gray sandstone. The size of rock was about the same as the first lift.

The settlement curve was plotted from data collected from the first and second lifts to determine the number of passes to be used on the third lift. The third layer will receive only 6 passes of the roller.

Material placed on the third layer was brown siltstone with some brown shaly siltstone and only a very small amount of gray sandstone. The size of rock was about the same as the previous two lifts.

Roller speed was periodically checked to assure 1.5 and 3.0 mph. The vibration gauge

INSPECTOR

Q A REVIEW

sht 1/2

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6/6/84 Spec. No. CAR-SH-CH-8

Location AUXD 0100 Inspector J F Neuill

Elevation 247 Shift day

Weather Sunny-warm

COMMENT

was also checked and the vibrations were found to be between 1100 and 1500 rpm as required by TP-TU-01 revision 5.

All the blasted material for the test fills was removed from the power block excavation at approximately elevation 220.

On each lift, the lane of material between the two settlement areas received 6 pass of the vibratory roller.

INSPECTOR [signature]

Q A REVIEW [signature]

sht 2/2

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT

FIELD INSPECTION REPORT

Date 6/21/79 Spec. No. CAR-SH-CH-8

Location N1050 W100 Inspector J F Neuill

Elevation 209 Shift day

Weather partly cloudy - hot

COMMENT

The density test was completed on test fill VP-24-3-6. The material removed from the hole was brown siltstone, some appeared brown shaley siltstone, and a very small amount of gray sandstone. The material appeared well graded and was sent to the lab for a gradation and proctor. There was one large rock about 15" in diameter and 24" long removed from the density hole. A backhoe was used to remove the bulk of the material, the finer material was hand dug. The material seemed well compacted with no void areas.

The cross section was cut into the settlement area as required by TP-III-01 rev 5 by a D-8 dozer. The compacted material appeared firm with no voids or loose pockets. Fine material was well compacted around the larger rock. No distinction between layers could be determined except for a slight color & difference in material.

INSPECTOR J F Neuill

Q A REVIEW

TEST FILL PROGRAM - RANDOM FILL

SETTLEMENT CURVE

CP&L - HARRIS SITE

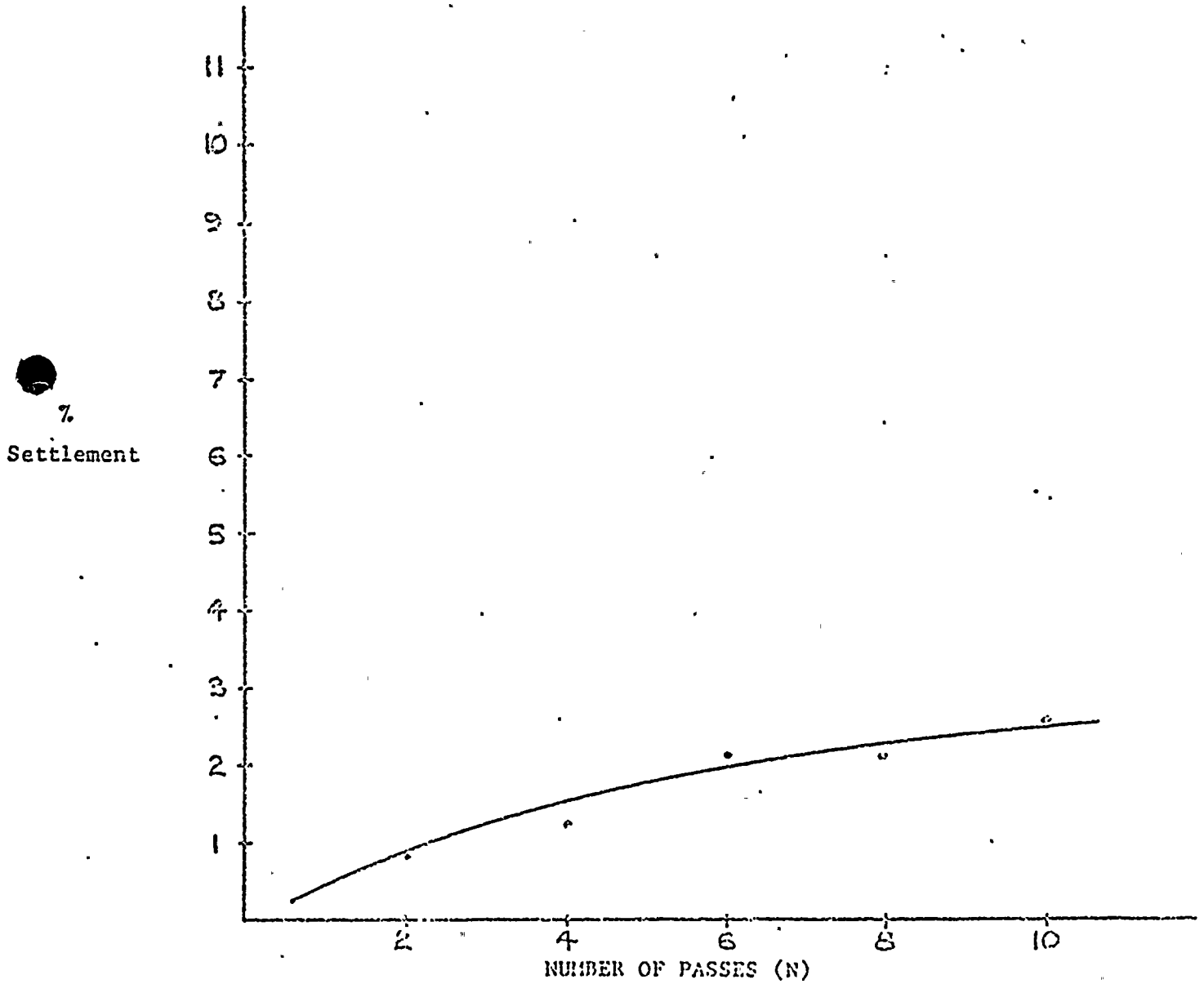
Test Fill No VR-3-24-6 Date 6/18/74

Lift No 1 By C. S. French
J. F. Nevill

Required Thickness 24"

Type Compaction Equipment Vibratory roller

Remarks roller speed 3.0 mph



TEST FILL PROGRAM - RANDOM FILL

SETTLEMENT CURVE

CP&L - HARRIS SITE

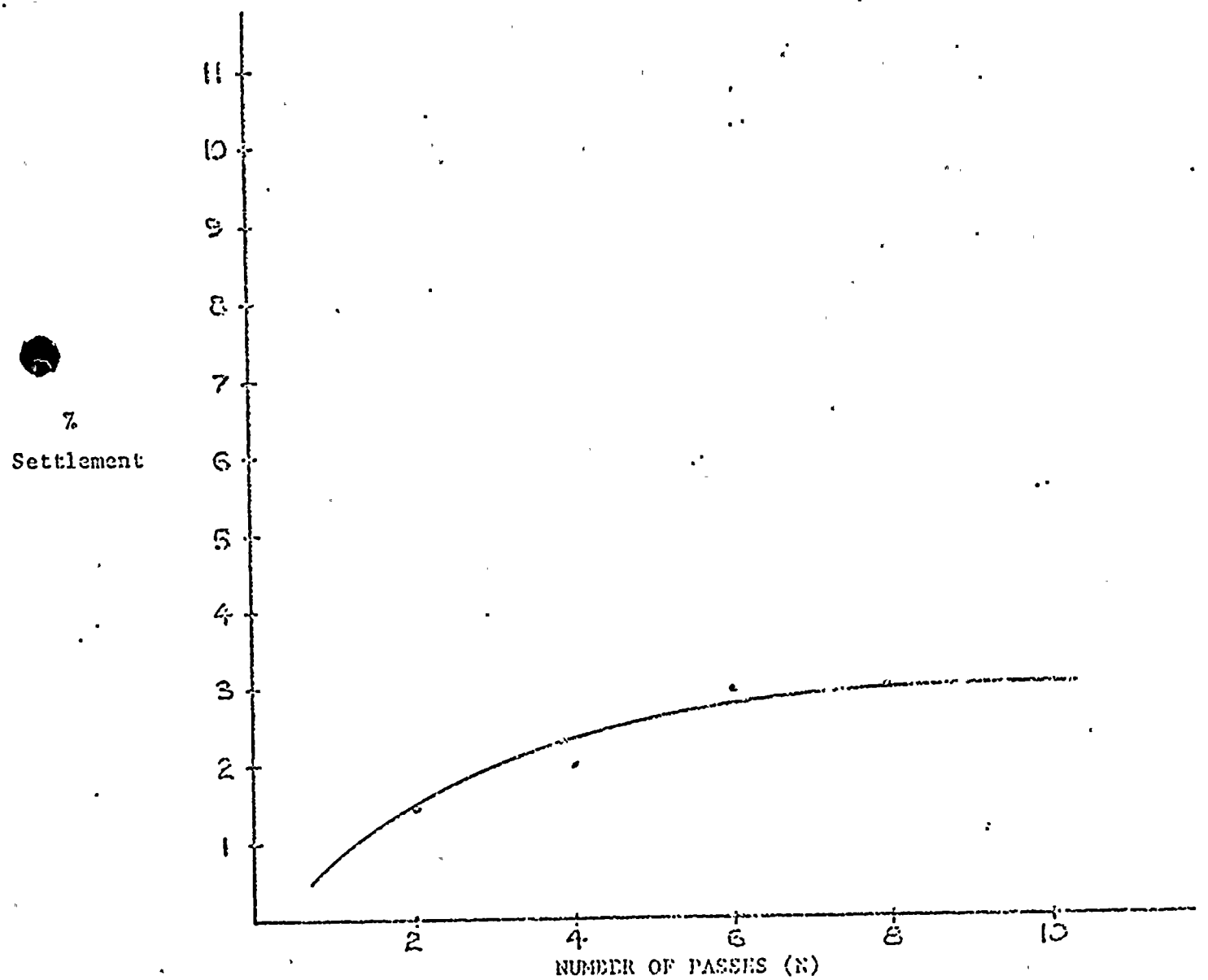
Test Fill No HR-3-21-6 Date 6/19/74

Lift No 2 By C. S. French
J. F. Neuill

Required Thickness 24"

Type Compaction Equipment Vibratory roller

Remarks roller speed 3.0 mph



TEST FILL PROGRAM - RANDOM FILL

SETTLEMENT CURVE

CP&L - HARRIS SITE

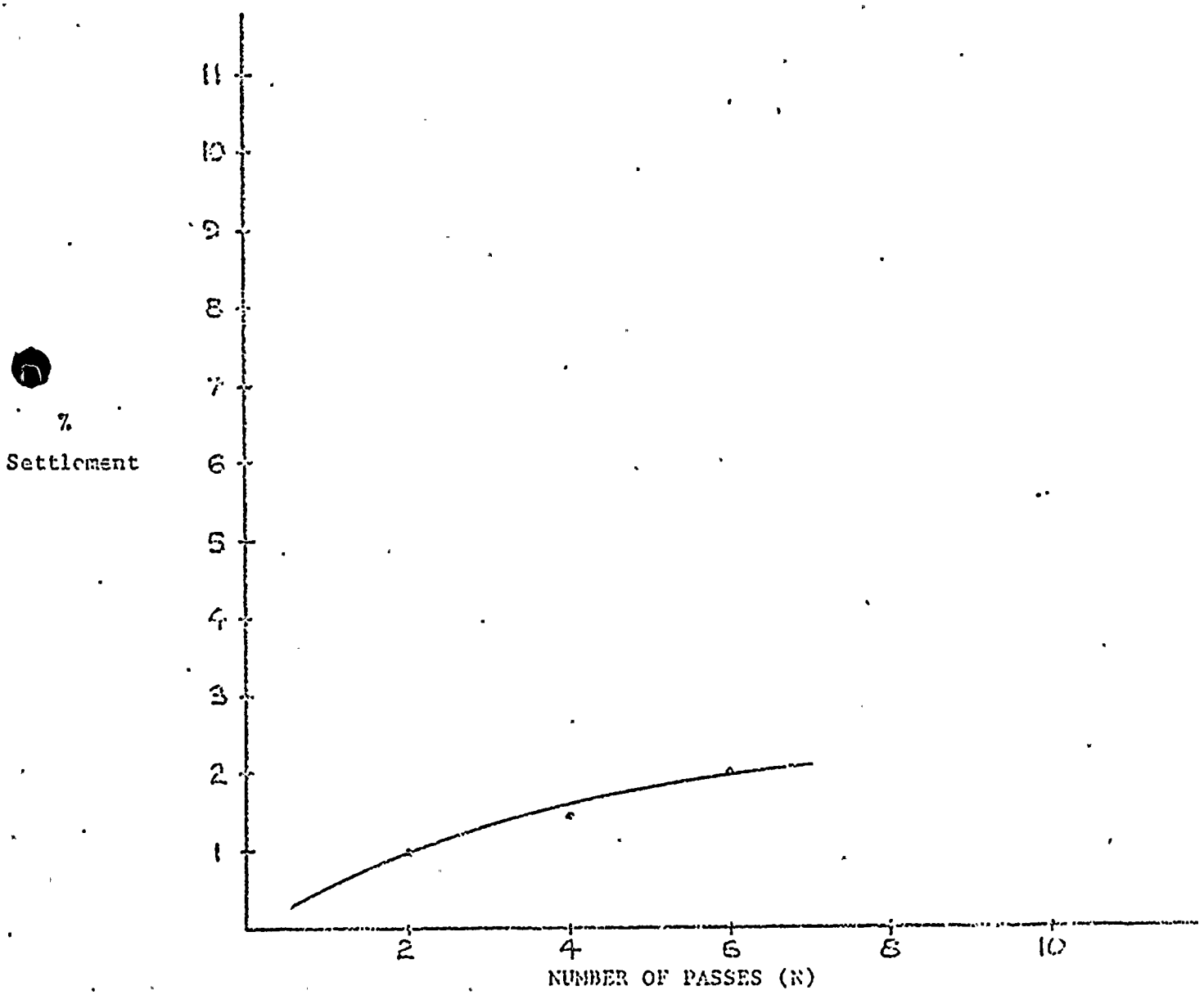
Test Fill No VB-3-24-6 Date 6/10/79

Lift No 3 By C.S. French

Required Thickness 24"

Type Compaction Equipment Vibratory roller

Remarks Roller speed - 3.0 mph



TEST FILL PROGRAM
OPERATION OF SANITARY FILL
GOAL - HARRIS SITE

t Fill No. VP-24-3-6 Date 6/21/74

er Thickness 24" By JF Howell
Larry Garner
GB Thompson

ber Layers 3

e Compaction Equip. Vibratory roller

erial Description Brown siltstone with some brown shaley siltstone and a small amount of gray sandstone

DENSITY

Volume of water for surface measurement	Gal	14.0	Ft^3
Top of water to top of frame	East 3 3/16", South 2 7/16", West 4 7/8"		In
Weight can (X No of times filled)		18915	Lb
Weight can filled (total)		32720	Lb
Sample weight (4-3)		13805	Lb
Weight of sand mortar - before	None used		Lb
Volume of sand mortar bucket - before		—	Ft^3
Density of sand mortar (6/7)		—	Lb/Ft^3
Weight of sand mortar - after		—	Lb
Weight of sand mortar in hole (6-9)		—	Lb
Volume of sand mortar in hole (10/8)		—	Ft^3
Volume of water for hole measurement	Gal	110.9	Ft^3
Volume of hole (12 -1+ 11)		96.9	Ft^3
Wet density of material (5/13)		142.5	Lb/Ft^3
Dry density of material (14/one + 21)		136.4	Lb/Ft^3

MOISTURE CONTENT

Weight wet moisture sample + container	62.3	Lb
Weight dry moisture sample + container	60.0	Lb
[illegible] (16-17)	2.3	
[illegible]	9.2	
[illegible]	50.8	
[illegible]	4.5	

CAROLINA POWER & LIGHT - HARRIS SITE

SIEVE ANALYSIS

SAMPLE NO. VB-24-3-6 DATE 6-26-74.

LOCATION N1750 W100

DESCRIPTION: Brown siltstone with some brown shaley siltstone and a small amount of gray sandstone

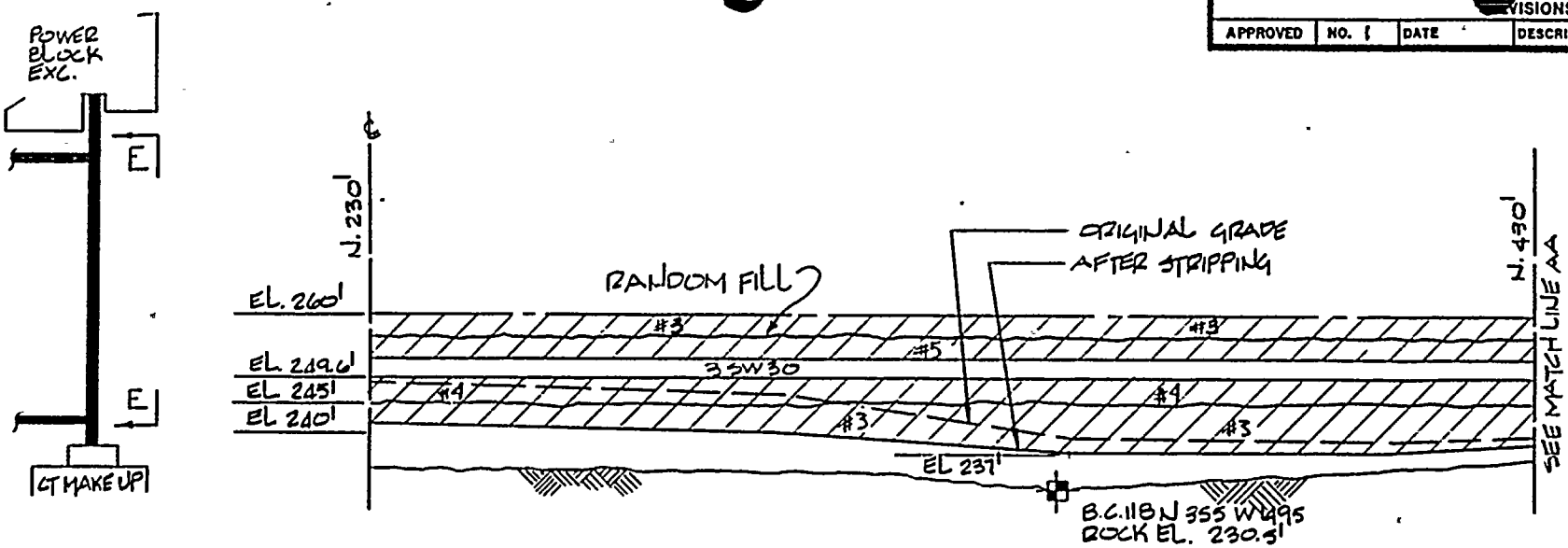
SIEVE -- NO./SIZE	WEIGHT SIEVE	WT. SEIVE PLUS SOIL	WEIGHT RETAINED	% RETAINED	% PASSING
12"	0	136.82	136.82	11.52 %	88.48
8"	0	177.71	177.71	14.96 %	73.52
"	5.76	73.40	67.64	5.69 %	67.83
"	5.78	112.97	107.21	9.03 %	58.80
1½"	5.81	54.43	48.62	4.09 %	54.71
¾"	5.48	130.7	125.02	10.52 %	44.19
⅜"	5.71	113.45	107.64	9.06 %	35.13
#4	5.77	294.23	88.46	7.45 %	27.68
PAN	5.76	334.55	328.79	27.68 %	0
		Total	1187.91	100 %	0

INSPECTOR D. C. 7/1/74

CHECKED

Q A REVIEW

REVISIONS			
APPROVED	NO.	DATE	DESCRIPTION

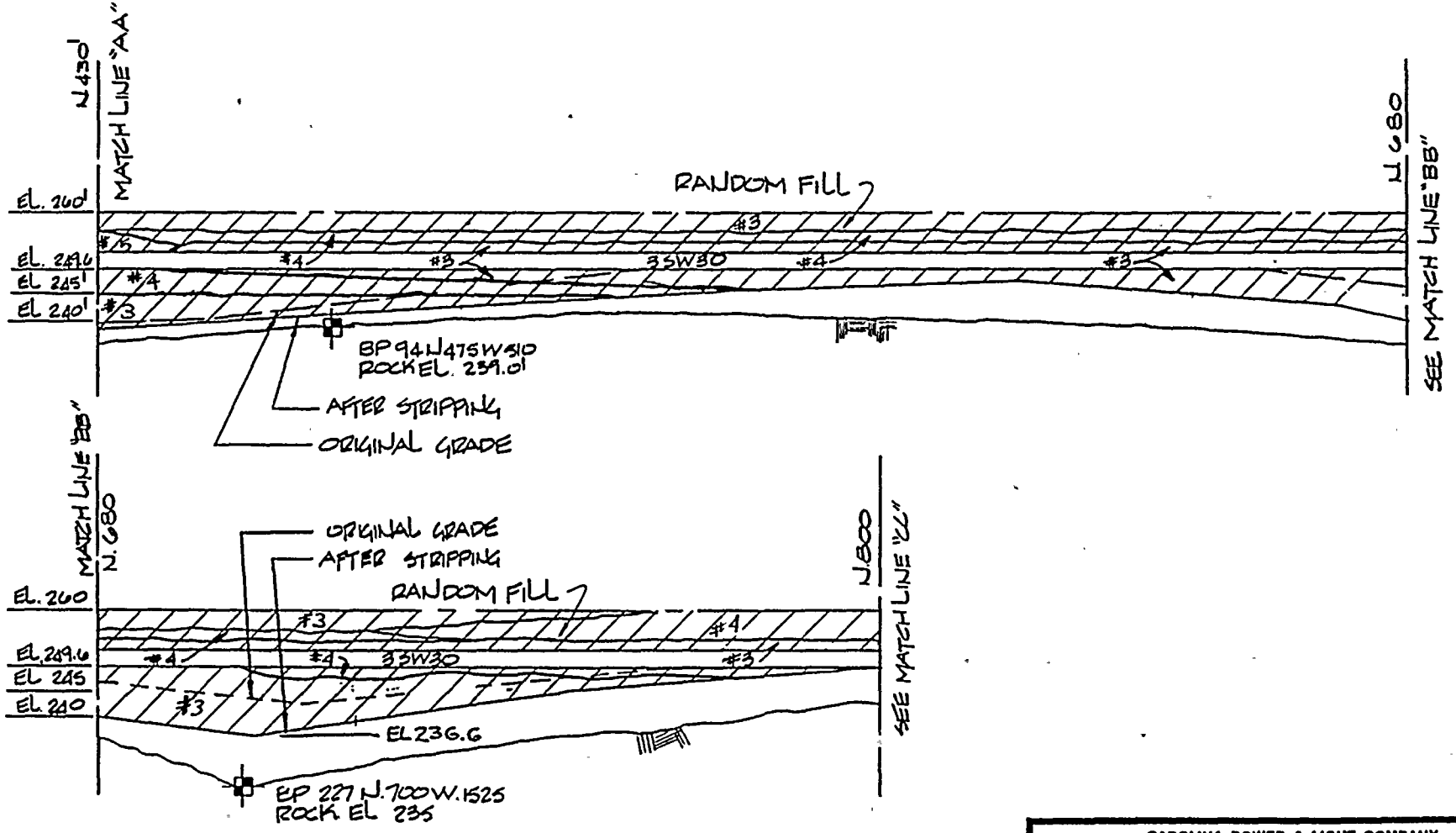


SECTION EE

SCALE 1" = 20' VERT.
1" = 20' HORIZ.

CAROLINA POWER & LIGHT COMPANY SHEARON HARRIS NUCLEAR POWER PLANT 900 MW UNITS NO. 1, 2, 3, AND 4				
PROFILE OF SERVICE WATER INTAKE				
DRAWN BY: JLEVY:JW	DATE: 5-31-79	CHK. BY:	APPVD. BY	DRAWING NO.:

REVISIONS			
APPROVED	NO.	DATE	DESCRIPTION



SECTION EE

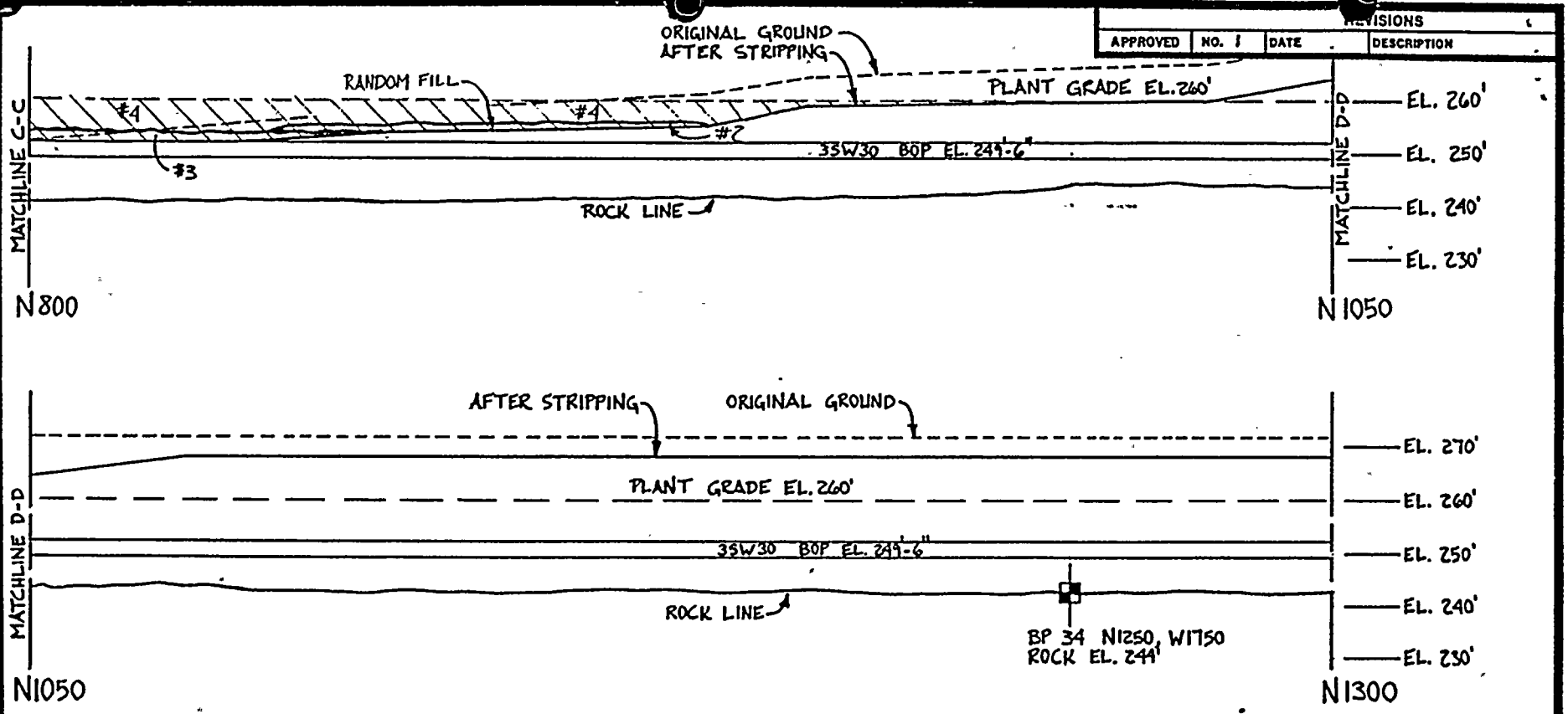
SCALE 1" = 20' VERT.
1" = 20' HORZ.

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
900 MW UNITS NO. 1, 2, 3, AND 4

PROFILE OF SERVICE WATER INTAKE

DRAWN BY:	DATE:	CHK. BY:	APPVD. BY	DRAWING NO.:
JLEVELOW	5-31-79			

DUNCAN-PARNELL, INC., RALEIGH 1176



SECTION E-E

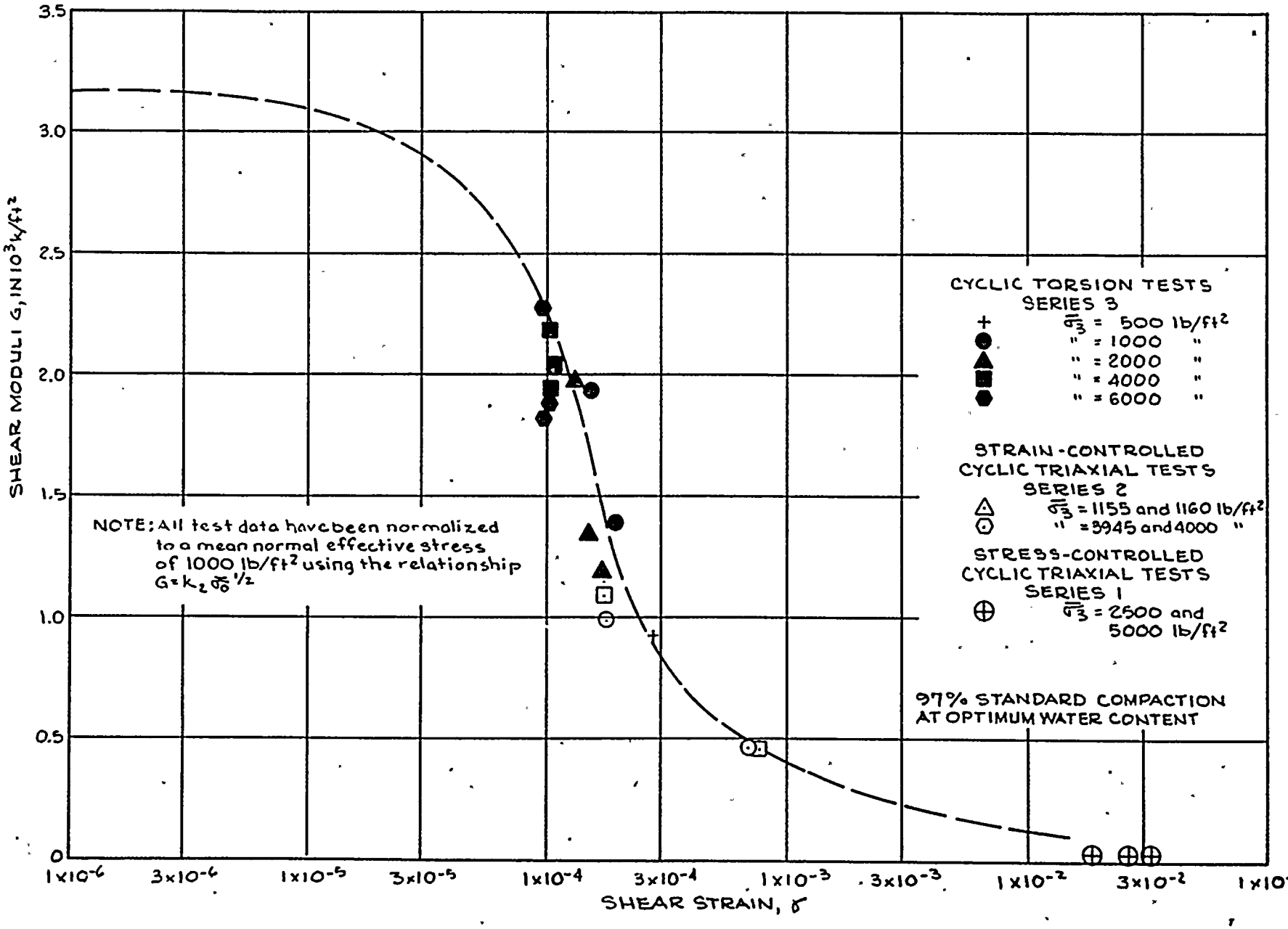
SCALE 1"=20'

REVISIONS			
APPROVED	NO.	DATE	DESCRIPTION

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
900 MW UNITS NO. 1, 2, 3, AND 4

PROFILE OF SERVICE WATER INTAKE

DRAWN BY:	DATE:	CHK. BY:	APPVD. BY	DRAWING NO.:
WFV	5-31-79			



MATERIAL Z, SHEAR MODULI AT MEAN NORMAL EFFECTIVE STRESS OF 1000 LB/FT².

Fig. 2E-B.19

250 was assigned (a parametric variation of approx 40% above the basic value). As was done for the filters, the assigned damping ratio in the rockfill was reduced by 20% in parametric studies.

2E-F.3.5 Random Rockfill

A value of $K_{2,max}$ equal to 90 was selected for the random rockfill of the auxiliary dam and auxiliary dike based on field seismic geophysical measurements in similar rockfills of dams; see App 2E-C. The compacted random rockfill may be somewhat stiffer than the rockfills in which measurements were obtained; therefore, a value of $K_{2,max}$ equal to 150 (67% greater than the basic value) was used in the parametric studies. Damping ratio was varied as described for the rockfill of the main dam.

2E-F.3.6 In-Situ Residual Soil

As described in App 2E-D, values of $K_{2,max}$ in the residual soil at the auxiliary dam and auxiliary dike were determined based on geophysical measurements. The effect of increased modulus (plus 28%) and decreased damping ratio (minus 20%) was studied in parametric variations made for the auxiliary dike; see Table 2E-F.4.

2E-F.3.7 In-Situ Weathered Rock

The values of $K_{2,max}$ assigned to the weathered rock at the main dam and auxiliary dam were assigned based on field geophysical measurements; see App 2E-D. In order to study the effect of modulus changes in the rock and the response of the overlying materials, the value of $K_{2,max}$ was reduced from 700 to 250 in parametric variations for section A-44 of the auxiliary dam; see Table 2E-F.3.

Material	Unit Weight lb/ft^3 Moist	Unit Weight lb/ft^3 Saturated	$\overline{K_o}$*	Poisson's Ratio μ	Shear Modulus Parameter $K_{2,max}$**	Damping Ratio λ
Main Dam Rockfill	130	145	0.6	0.30	180	***
Auxiliary Dam & Dike Random Rockfill	130	140	0.6	0.30	90	***

*$\overline{K_o}$ = ratio of horizontal effective stress to vertical effective stress

**$G_{max} = K_{2,max}\ \bar{\sigma}_o^{\frac{1}{2}}$

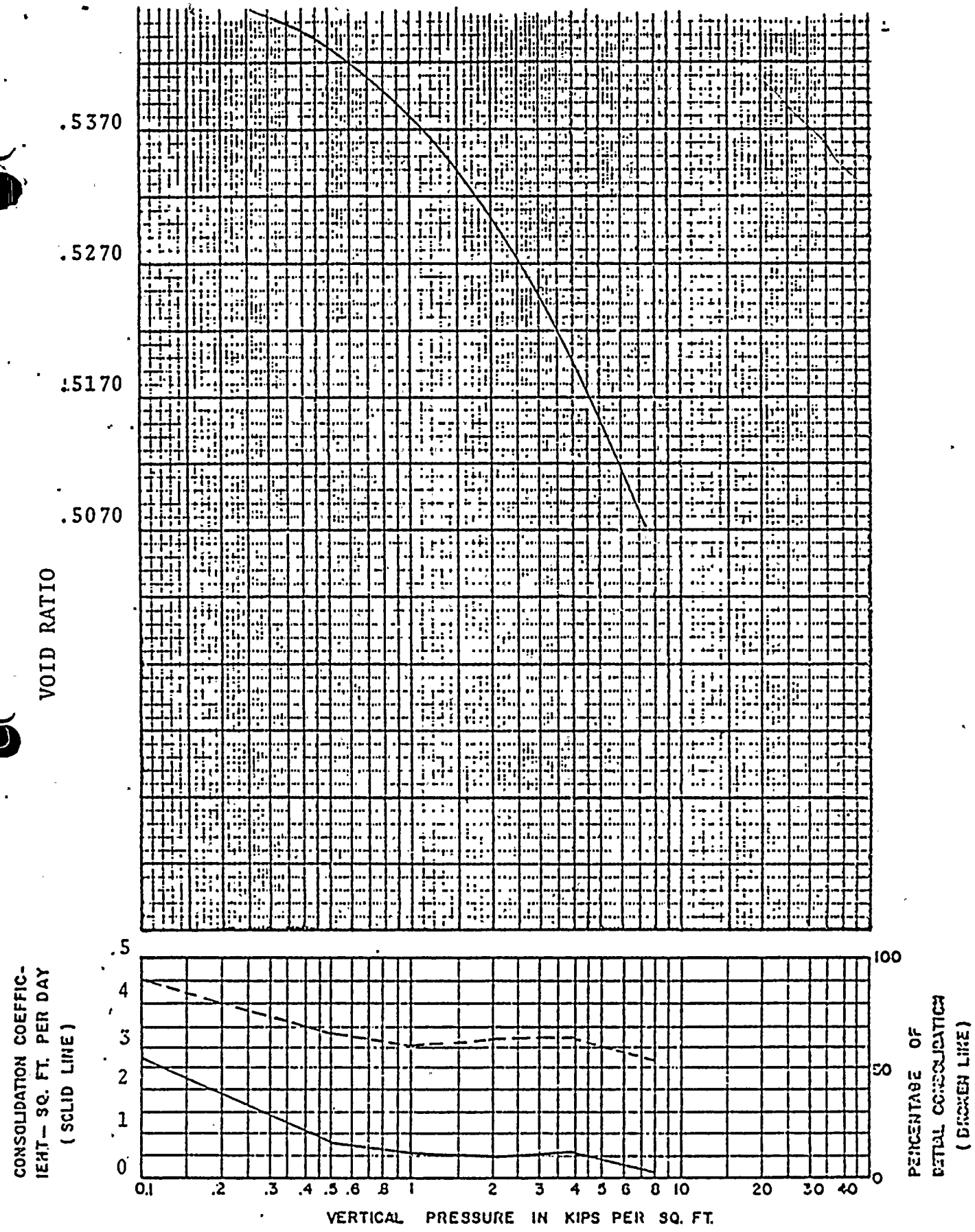
where $\bar{\sigma}_o$ = Mean normal effective stress in lb/ft^2

G_{max} = Maximum shear modulus in k/ft^2

***as shown in Fig. 2E-C.3

Table 2E-C.4

MAIN DAM, AUXILIARY DAM, AUXILIARY DIKE,
DYNAMIC PROPERTIES FOR ROCKFILL MATERIAL



COMPRESSION INDEX .108 @ 8000 psf

UNIT WEIGHT (w) 127.6 pcf; (d) 108.6pcf

WATER CONTENT 17.5%

SATURATION 85.3%

e=.547

97% Compaction
Standard Proctor

CONSOLIDATION TEST

BORING NO. TPZ SAMPLE NO.

ELEV. OR DEPTH JOB NO. RA-503

LAW ENGINEERING TESTING COMPANY

OCT 23 1974