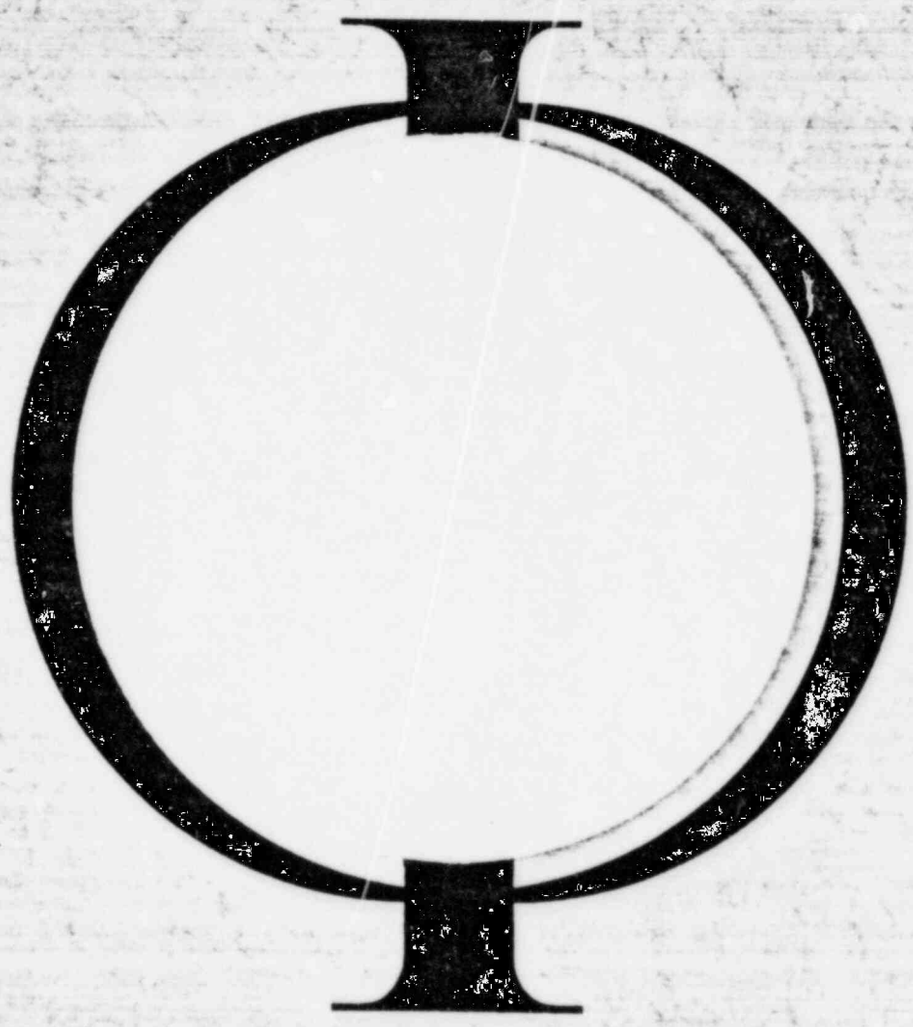

GEOTECHNICAL ENGINEERS INC.

Report

(Soil) on

SOIL TESTING

LIMERICK NUCLEAR STATION

SPRAY POND

Submitted to

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San Francisco, California 94119
and
AMERICAN DRILLING COMPANY
East Providence, Rhode Island

By

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FLOW CHARTS

1.0 INTRODUCTION

1.1 Purpose

The purpose of the laboratory testing program described herein was to determine the engineering properties and the resistance of undisturbed residual soil samples to cyclic loading by means of cyclic triaxial testing. The tests were made on specimens obtained from tube and block samples.

1.2 Scope

A total of 34 3-in. diameter thin-wall samples and the six block samples taken from the test pits were tested. The block samples were obtained by GEI personnel. All samples were described and the testing program consisted of:

16 Cyclic Triaxial ($C\bar{R}$) Tests

14 Consolidated Undrained Triaxial $\bar{R}$ Tests

44 Sieve Analyses

27 Hydrometer Tests

57 Atterberg Limit Tests

16 Specific Gravity Tests

1.3 Authorization

The work reported herein was authorized by American Drilling and Boring Company, Inc., Purchase Order No. 34516.

2.0 OUTLINE OF GENERAL TESTING PROCEDURE

2.1 Control of the Length of the Samples

After obtaining the samples in the field, the samples were transported by GEI personnel to the laboratory in Winchester, Mass. The samples were always handled in an upright position. The distance from the top of the tube to the top of the sample was measured in the field by Bechtel personnel immediately after the sample came out of the borehole and in the laboratory prior to testing. Compaction of the soil during handling would have resulted in an increase in the measured distance. Table I lists the measured distances and their differences. A difference of a few millimeters was considered likely to be the result of measurement errors due to an uneven end of the sample or to the measuring stick indenting the soil. Some of the field measurements were only approximate. Only two samples showed apparent compression of more than 5 mm and of these one was an approximate measurement.

2.2 Extrusion of Samples from the Tubes

A section of the tube of up to 7 in. in length was cut by means of a tube cutter while maintaining the tube in its upright position. The pressure applied by the tube cutter was kept at a minimum to avoid deforming the tube. The sample sections of a given tube sample were designated by A, B, etc., starting from the top. The length and weight of each sample section was determined while in the tube.

When the sample section was not needed for triaxial tests, it was sliced longitudinally after extrusion. The slice was photographed and the soil was oven dried to obtain the water content and the dry unit weight of the sample in the tube. All unit weight determinations are listed in Table VI. The grain size distribution was determined for all sample sections tested and they are given in Figures 2 to 51. The photographs of the longitudinal sections are presented in Appendix D and the individual sample descriptions are presented in Appendix B.

2.3 Trimming of Undisturbed Triaxial Specimens from Block Samples

The wax and cloth covering was removed to expose the soil and an appropriate section was chosen for trimming and testing. A sketch was made of the block sample and the section chosen for testing identified. Long V-cuts were made into the block using a sharp pointed knife slowly cutting deep into the sample until a

roughly 4" x 4" x 8" rectangular section could be removed from the block. The rectangular section was carefully layed horizontally in a mitre box where it could be slowly trimmed using a sharp knife and razor blade into a roughly 3 in. diameter by 8 in. long cylindrical shape. A damp cloth was kept covering the sample to avoid drying. Finally the specimen was turned on a trimming device to approximately 2.8 in. diameter and then the ends trimmed to approximately 6.5 in. The specimen was measured and placed in the triaxial cell. After the triaxial test the specimen was sliced longitudinally and photographed. The photographs are presented in Appendix D and the individual sample descriptions are presented in Appendix C. The test pit logs are given in Appendix E. Table VII summarizes the results of the index tests on the block samples and Figures 2 to 51 give the grain size distribution for samples tested.

3.0 SAMPLE DESCRIPTIONS

3.1 General

All the samples received correspond to a residual soil ranging from a silty sand to a silty clay with a plasticity index ranging from 0 to 27. All undisturbed tube and block samples have relic structure with some zones of the samples having a soil-like consistency while other zones need a considerable effort to break the weathered rock into a soil. Trimming of samples proved difficult where hard clay-like nodules were present or where the joint structure of the weathered rock was preserved.

3.2 Undisturbed Tube Samples

An effort was made in the field to obtain tube samples of the more sandy material. Initial lab testing was concentrated on the sandier tube samples with subsequent testing of the more cohesive soil samples. Some of the tube samples could not be tested due to disturbance as indicated by an oval shape of the tube and/or a damaged cutting edge. Preserving the undisturbed condition of the samples was difficult because of the tendency to break along the relic joint surfaces.

3.3 Block Samples

Samples selected and cut from the test pits ranged from a weathered siltstone with relic structure to a plastic silt and clay. An effort was made in the test pits to sample the most sandy material.

4.0 ATTERBERG LIMITS

4.1 Procedure

The samples used for Atterberg Limits were stored in such a manner that drying was prevented prior to testing. To prepare the samples for testing, distilled water was added to increase the water content to about the liquid limit while mixing the soil paste to obtain a homogeneous sample. The soil was then stored for about 24 hours prior to testing. Then, the liquid and plastic limits were determined in accordance with standard procedures.

4.2 Results

The results of all Atterberg Limit determinations are listed in Tables V, VI, and VII for jar, undisturbed tube and block samples, respectively. The water content of the samples as received are also listed in the tables. The plasticity chart in Figure 1 summarizes the results of all Atterberg Limit determinations.

4.3 Comments

During laboratory testing of the samples, it was observed that the soil rapidly breaks down or slakes in the presence of water. This was true of both the more plastic clay and silt as well as the weathered rock samples. To study the effect of the time interval from mixing the sample with water to the time of testing, sample SP4A/P2A was tested with intervals of overnight, 1, 2, 3 and 13 days. The results are as follows:

Overnight	LL = 27,	PI = 10
1 Day	LL = 28,	PI = 11
2 Days	LL = 28,	PI = 11
3 Days	LL = 28,	PI = 10
13 Days	LL = 26,	PI = 9

The differences in the plasticity are within the range of accuracy of the determinations, and thus there was no increase in plasticity with time of mixing.

5.0 GRAIN SIZE DISTRIBUTION

5.1 Procedure

The sieve and hydrometer analyses were performed using the sample preparation procedures outlined in the flow charts, Figures 88-92. Hexametaphosphate in a concentration of 1.02 gm/liter was used as a defloculant in the hydrometer tests for the great majority of the samples but the concentration was increased to 5.0 gm/liter for som clay samples.

5.2 Results

The grain size curves are presented in Figures 2 to 51 indicating the method used. Tables V, VI and VII list the percentages finer than the #200 sieve and 2 microns for jar, tube, and block samples, respectively.

5.3 Comments

The grain size curves obtained were greatly influenced by the amount of breakdown of the soil caused by using the mechanical shaker, the addition of a dispersing agent, and the amount of finger pressure applied to the soil while washing through the #200 sieve.

Method #2, Figure 89, was used for the great majority of the tests and they show in general good agreement between the hydrometer and sieve analysis phases of the tests. In a few cases the sieve analysis curve indicates a finer material which is apparently the result of a larger degree of soil breakage produced by finger pressure while washing the soil through the #200 sieve.

A comparison of methods 1 and 2 for the hydrometer phase of the tests, Figures 30, 35 and 46, shows that method 2, which involves use of a shaker, indicates a finer soil than method 1 which does not use a shaker. In one case the trend is reversed but the difference is within the range of accuracy of the test results. In addition, Figures 30, 35 and 46 show that use of method 1 produces curves for the sieve analysis which are consistently higher than the curves for the hydrometer analysis.

Figures 3 and 4 compare the sieve analysis curves using methods 3A, 3B and 1. The difference among the three methods depends on whether the soil was dispersed with a shaker or whether the soil was oven dried prior to washing the soil with the #200 sieve. No definite conclusion can be reached concerning the effect of each of the two variations in the procedure.

It can be concluded that relatively minor changes in the testing procedures can produce significant changes in the grain size characteristics of these soils.

6.0 CYCLIC CONSOLIDATED-UNDRAINED TRIAXIAL ($\bar{CR}$) TESTS

6.1 Procedure

Sixteen $\bar{CR}$ tests were performed on samples of the residual soil from the tube and block samples. The sample was trimmed to a length of 6.6 in. with a diameter of 2.8 in. in the manner described in Section 2. Filter strips were used to facilitate consolidation and equalization of pore pressure along the specimen.

All specimens were saturated using back pressures of the order of 10 kg/cm^2. The B values were then determined as a check on the saturation of the specimens, and they ranged between 0.90 and 0.97 with an average of 0.95.

The specimens were consolidated isotropically to an effective consolidation pressure of 1 kg/cm^2.

After closing the drainage valves a symmetrical cyclic deviator stress was applied at a frequency ranging between 1 cycle per 2 to 3 seconds while measuring axial deformation, axial load and pore pressure continuously by means of electric transducers and a chart recorder.

6.2 Results

The results of the individual tests are presented in Figures 66 to 81 by means of the following plots:

Peak Cyclic Deviator Stress in Compression and Extension vs. Cycle Number,

Peak Axial Strain in Compression and Extension and Double Amplitude Strain vs. Cycle Number, and

Induced Pore Pressure at the End of Each Cycle vs. Cycle Number.

Tables X and XI summarize the results of all $\bar{CR}$ tests including the number of cycles to reach double amplitude strains of 2.5%, 5% and 10%. Summary plots were prepared for cyclic deviator stress applied versus the number of cycles to reach each of the double amplitude strains listed above, Figures 82 to 84 for the tube samples and Figures 85 to 87 for the block samples.

6.3 Comments

When the axial deformation was large enough to be visible, it was observed that the axial strain was generally not uniform along the specimen but it would concentrate in one or two zones of the specimen. For both block and tube samples, inclined shear planes related to the relic joint structure developed momentarily followed by necking. Some bulging of the specimens was observed particularly where softer material was present. The failure of the specimens reflected the heterogeneous nature of the residual soil and/or the presence of relic joint structures, i.e., planes of weakness.

The induced pore pressure plotted vs. cycle number in the individual test results on Figures 66 to 81, was determined from the records by reading the pore pressure at the end of each loading cycle. This point corresponds to the point of zero axial load on the specimen which occurs when the load changes from compression to extension. These plots indicate that in most cases the induced pore pressure approached the effective consolidation pressure but did not become equal to it.

The pore pressure was measured by means of an electrical transducer connected to the top and bottom of the specimen. Under the relatively rapid loading there is not enough time for the pore pressure to equalize along the specimen. Thus, in some CR tests the recorded pore pressure probably did not represent the pore pressure in the most highly strained zone of the specimen.

The summary plots in Figures 82 to 87 indicate a large range of resistance to cyclic loading of all samples tested. Examination of the summary plots and of the index properties of the specimens showed that there was no apparent correlation of the resistance to cyclic loading with either the plasticity index or the dry unit weight of the specimens.

7.0 CONSOLIDATED-UNDRAINED TRIAXIAL $\bar{R}$ TESTS

7.1 Procedure

Nine $\bar{R}$ tests were performed on the tube samples and five on the block samples. All specimens tested had a diameter of 2.8 in. and a height of approximately 6.5 in.

The samples were subjected to back pressures for saturation as listed in Tables VIII and IX. Filter strips were used along all specimens. The specimens were then consolidated isotropically to an effective consolidation pressure of 0.5 kg/cm^2.

The rates of axial strain used during the tests generally ranged from 0.12 to 0.15% per minute. For the most impervious samples, a slower rate of 0.08 to 0.10% per minute was used.

7.2 Results

The results of the $\bar{R}$ tests are summarized in Table VIII and IX. The individual test results are presented in Figures 52 to 65 by means of the following plots:

Deviator Stress vs. Axial Strain

Induced Pore Pressure and $\bar{\sigma}_3$ vs. Axial Strain

Stress Paths

7.3 Comments

Failure developed by bulging and shear failure surfaces along relic joint planes inclined 40° to 70° to the horizontal. Some failures occurred along planes which roughly represented the boundaries of oxidized zones in the soil. The cementation was weakened by the oxidation leaving a zone of weakness along which failure took place.

Plotting of the stress paths, Figures 52 to 65, indicate an apparent friction angle (ϕ_o) varying between 37° and 54°. At low strains a high apparent friction angle develops, which decreases with strain as the cementation of the sample breaks down.

In the tube and block samples, as indicated in Tables VIII and IX, the maximum deviator stress $(\sigma_1-\sigma_3)_{max}$ was generally larger for specimens with a higher dry unit weight.

TABLE I

CONTROL OF LENGTH OF TUBE SAMPLES

LIMERICK

Boring No.	Sample No.	Distance from top of tube to top of sample		Apparent sample Compression
		field measurement (a) cm	lab measurement (b) cm	(b) - (a) cm
SP-1	P-4	42.9	42.9	0
SP-1	P-6	44.9	45.0	+0.1
SP-2	P-1	42.7	-	-
SP-2	P-2	51.9	-	-
SP-2	P-3	20.2	20.2	0
SP-2	P-4	54.0*	-	-
SP-4A	P-2	19.6	19.6	0
SP-4A	P-3	31.8*	31.0	-0.8
SP-4A	P-4	20.3	20.3	0
SP-4A	P-5	30.4	30.7	+0.3
SP-5A	P-2	47.6	47.5	-0.1
SP-5A	P-2	16.5	16.5	0
SP-5A	P-4	30.8	30.8	0
SP-6	D-1	-	2.0	-
SP-9A	P-2	40.0	40.7	+0.7
SP-11	P-1	55.0	-	-
SP-11A	P-1	44.0*	43.5	-0.5
SP-12	P-1	51.8*	51.6	-0.2
SP-12	P-2	42.9	43.0	+0.1
SP-13	P-1	37.2	-	-
SP-14	D-1	22.8	22.9	+0.1
SP-14A	P-1	30.0*	31.9	+1.9
SP-14A	P-2	26.0*	26.1	+0.1
SP-15A	P-1	55.9*	-	-
SP-15A	P-2	22.9*	23.0	+0.1
SP-15A	P-3	33.2	33.4	+0.2
SP-15A	P-4	40.8	40.5	-0.3
SP-15A	P-5	29.2*	29.3	+0.1
SP-15A	P-6	28.6	28.7	+0.1
SP-16A	P-1	55.2	-	-
SP-16A	P-2	41.4	-	-
SP-16A	P-3	21.6	21.5	-0.1
SP-16A	P-4	30.7	30.3	-0.4
SP-16A	P-5	43.2*	43.2	0

*Approximate Field Measurement

TABLE II

SCHEDULE OF TESTS

JAR SAMPLES

Boring No.	Sample and Section No.	Depth ft	Index Properties		
			Water Content	Atterberg Limits Table No.	Grain Size Figure No.
SP-1	1	6-7.5	-	V	-
SP-1	3	19.5-20.5	-	-	2
SP-2	5	20.5-22	-	V	-
SP-3	4	15.5-17	-	-	7
SP-4	3	9-10.5	-	-	12
SP-4A	1	16-17.5	-	V	-
SP-5	3	9-10.5	-	-	17
SP-5	4	11.5-13	-	V	-
SP-9	3	8.5-8.9	-	-	24
SP-10	2	5.5-6.4	-	-	25
SP-11	2	8.5-9	-	-	26
SP-16	3	9-10.5	-	V	-
SP-16	6	16.5-18	-	-	45

TABLE III

SCHEDULE OF TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft.	INDEX PROPERTIES			ENGINEERING PROPERTIES					
						$\bar{R}$			$C\bar{R}$		
			Water Content Table No.	Atterberg Limits Table No.	Grain Size Figure No.	Table No/ Fig. No.	σ_c tsf	K_o	Table No/ Fig. No.	σ_c tsf	K_o
SP-1	P-4	16.5-18.5	-	-	-	DISTURBED			-	-	-
	P-6A	26-28	VI	-	3	-	-	-	-	-	-
SP-2	P-1	12-14	-	-	-	NOT TESTED			-	-	-
	P-2	17.5-19.5	-	-	-	NOT TESTED			-	-	-
	P-3A	23-25	VI	-	4	-	-	-	-	-	-
*	P-3B	23-25	VI	VI	-	VIII/54	0.50	1.00	-	-	-
**	P-3B	23-25	-	VI	5	VIII/54	0.50	1.00	-	-	-
	P-3C	23-25	-	VI	-	-	-	-	-	-	-
	P-4	28.5-30	-	-	-	NOT TESTED			-	-	-
SP-4A	P-2A	7-9	VI	VI	13	-	-	-	-	-	-
	P-2B	7-9	-	-	-	NOT TESTED			-	-	-
	P-2C	7-9	VI	VI	14	-	-	-	X/70	1.00	1.00
	P-3A	10-12	VI	VI	15	-	-	-	-	-	-
	P-3B	10-12	-	-	-	NOT TESTED			-	-	-
	P-3C	10-12	VI	VI	16	-	-	-	X/79	1.00	1.00
	P-4A	13-15	VI	VI	-	-	-	-	-	-	-
	P-4B	13-15	-	-	-	NOT TESTED			-	-	-
	P-4C	13-15	VI	VI	-	VIII/60	0.50	1.00			
	P-5A	18-20	VI	VI	-	-	-	-	-	-	-
	P-5B	18-20	-	-	-	DISTURBED			-	-	-
SP-5A	P-1A	4-6	VI	VI	-	-	-	-	-	-	-
	P-1B	4-6	VI	VI	18	-	-	-	X/78	1.00	1.00

* Failure zone

** Non-failure zone

TABLE III (Continued)

SCHEDULE OF TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft.	INDEX PROPERTIES			ENGINEERING PROPERTIES					
						$\bar{R}$			$C\bar{R}$		
			Water Content Table No.	Atterberg Limits Table No.	Grain Size Figure No.	Table No/ Fig. No.	σ_c tsf	K_o	Table No/ Fig. No.	σ_c tsf	K_o
	P-2A	7-9	VI	VI	-	-	-	-	-	-	-
	P-2B	7-9	VI	VI	-	VIII/61	0.50	1.00	-	-	-
	P-2C	7-9	-	VI	19	-	-	-	-	-	-
	P-4	13-15	-	-	-	NOT TESTED			-	-	-
SP-6	D-1A	5.5-7.5	VI	VI	20	-	-	-	-	-	-
	D-1B	5.5-7.5	-	VI	21	-	-	-	-	-	-
SP-9A	P-2A	5.5-7.5	VI	VI	-	-	-	-	-	-	-
SP-11	P-1	6-7.5	-	-	-	DISTURBED			-	-	-
SP-11A	P-1A	3-5	VI	VI	-	-	-	-	-	-	-
	P-1B	3-5	VI	-	-	VIII/63	0.50	1.00	-	-	-
SP-12	P-1A	3-5	VI	VI	-	-	-	-	-	-	-
	P-1B	3-5	-	VI	-	VIII/62	0.50	1.00	-	-	-
	P-2A	5.5-7.5	VI	VI	-	-	-	-	-	-	-
	P-2B	5.5-7.5	VI	VI	-	-	-	-	X/77	1.00	1.00
SP-13	P-1A	3.5-5.5	VI	-	-	VIII/64	0.50	1.00	-	-	-

TABLE III (Continued)

SCHEDULE OF TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft.	INDEX PROPERTIES			ENGINEERING PROPERTIES					
						$\bar{R}$			$\bar{CR}$		
			Water Content Table No.	Atterberg Limits Table No.	Grain Size Figure No.	Table No/ Fig. No.	σ_c tsf	K_o	Table No/ Fig. No.	σ_c tsf	K_o
SP-14	D-1A	3-5	VI	VI	-	-	-	-	-	-	-
	D-1B	3-5	VI	VI	-	-	-	-	X/80	1.00	1.00
SP-14A	P-1A	3.5-5.5	VI	VI	-	-	-	-	-	-	-
	P-1B	3.5-5.5	VI	VI	-	-	-	-	X/81	1.00	1.00
	P-2A	6-8	VI	-	30	-	-	-	-	-	-
	P-2B	6-8	-	VI	31	-	-	-	-	-	-
SP-15A	P-1	4-6	-	-	-	NOT TESTED			-	-	-
	P-2A	7-9	VI	-	35	-	-	-	-	-	-
	P-2B	7-9	-	-	-	NOT TESTED			-	-	-
* (Top)	P-2C	7-9	-	VI	36	-	-	-	X/67	1.00	1.00
*(Bottom)	P-2C	7-9	VI	VI	37	-	-	-	X/67	1.00	1.00
	P-3A	10-12	VI	VI	38	-	-	-	-	-	-
	P-3B	10-12	-	VI	39	-	-	-	-	-	-
	P-4	13-15	-	-	-	DISTURBED			-	-	-
	P-5A	16-18	VI	-	40	-	-	-	-	-	-
	P-5B	16-18	VI	-	-	-	-	-	-	-	-
	P-6A	19-21	VI	-	41	-	-	-	-	-	-
*	P-6B	19-21	VI	VI	-	VIII/52	0.50	1.00	-	-	-
**	P-6B	19-21	-	VI	42	VIII/52	0.50	1.00	-	-	-
*(Top)	P-6C	19-21	VI	VI	43	-	-	-	X/66	1.00	1.00
*(Bottom)	P-6C	19-21	-	VI	44	-	-	-	X/66	1.00	1.00

*Failure zone

**Non-failure zone

TABLE III (Continued)

SCHEDULE OF TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft.	INDEX PROPERTIES			ENGINEERING PROPERTIES					
			Water Content Table No.	Atterberg Limits Table No.	Grain Size Figure No.	$\bar{R}$			$C\bar{R}$		
						Table No/ Fig. No.	σ_c tsf	K_o	Table No/ Fig. No.	σ_c tsf	K_o
SP-16A	P-1	4.5-6.5	-	-	-	NOT TESTED			-	-	-
	P-2C	7.5-9.5	VI		-	VIII/65	0.50	1.00	-	-	-
	P-3A	10.5-12.5	VI	VI	46	-	-	-	-	-	-
*(Top)	P-3C	10.5-12.5	VI	-	47	-	-	-	X/68	1.00	-
*(Bottom)	P-3C	10.5-12.5	-	VI	48	-	-	-	X/68	1.00	-
	P-4A	13.5-15.5	VI	VI	49	-	-	-	-	-	-
	P-4B	13.5.15.5	-	-	-	-	-	-	-	-	-
*(Top)	P-4C	13.5-15.5	VI	VI	50	-	-	-	X/69	1.00	-
*(Bottom)	P-4C	13.5-15.5	-	VI	51	-	-	-	X/69	1.00	-
	P-5A	16.5-18.5	-	VI	-	-	-	-	-	-	-
	P-5B	16.5-18.5	-	-	-	DISTURBED			-	-	-

*Failure zone

TABLE IV

SCHEDULE OF TESTS

BLOCK SAMPLES

Test Pit No.	Sample and Section No.	Depth ft.	INDEX PROPERTIES			ENGINEERING PROPERTIES					
			Water Content Table No.	Atterberg Limits Table No.	Grain Size Figure No.	$\bar{R}$			$\bar{CR}$		
						Table No/ Fig. No.	σ_c tsf	K_o	Table No/ Fig. No.	σ_c tsf	K_o
SP-3	1 (Top)	4.6-5.6	VII	VII	8	-	-	-	XI/76	1.00	1.00
	1 (Bottom)	4.6-5.6	VII	VII	8	-	-	-	XI/76	1.00	1.00
	1	4.6-5.6	-	VII	8	IX/57	0.50	1.00	-	-	-
	2	9.8-10.8	VII	VII	9	-	-	-	XI/75	1.00	1.00
	3	12-13	VII	VII	10	IX/55	0.50	1.00	-	-	-
	3	12-13	VII	-	11	-	-	-	XI/72	1.00	1.00
SP-9	1	3.2-4.7	VII	VII	-	-	-	-	XI/74	1.00	1.00
	1	3.2-4.7	VII	VII	-	IX/59	0.50	1.00	-	-	-
SP-14	1	3-4	VII	VII	28	-	-	-	XI/73	1.00	1.00
	1	3-4	VII	VII	29	IX/58	0.50	1.00	-	-	-
	2	7-8	NOT TESTED			-	-	-	-	-	-
SP-15	1	7-7.9	VII	VII	32,33	-	-	-	XI/71	1.00	1.00
	1	7-7.9	VII	VII	34	IX/56	0.50	1.00	-	-	-

TABLE V

JAR SAMPLES

INDEX TESTS

Boring No.	Sample and Section No.	Depth (ft)	Atterberg Limits		Specific Gravity	% Passing 200 Sieve	% Passing 2 Microns
			LL	PI			
SP-1	1	6-7.5	33	15	--	--	--
SP-1	3	19.5-20.5	--	--	--	43	--
SP-2	5	20.5-22	49	18	--	--	--
SP-3	4	15.5-17	--	--	2.76	98	7
SP-4	3	9-10.5	--	--	--	68	12
SP-4A	1	16-17.5	37	17	--	--	--
SP-5	3	9-10.5	--	--	--	45	11
SP-5	4	11.5-13	35	14	--	--	--
SP-9	3	8.5-8.[illegible]	--	--	--	56	8
SP-10	2	5.5-6.4	--	--	--	44	10
SP-11	2	8.5-9	--	--	--	27 33	5
SP-16	3	9-10.5	40	17	--	96	17
SP-16	6	16.5-18	--	--	--	--	--

TABLE VI

INDEX TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft	Water Content %	Atterburg Limits LL	Atterburg Limits PI	Dry Unit Weight	% Passing 200 Sieve	% Passing 2 microns	Specific Gravity	Other Tests Performed
SP-1	P6A	26-28	15.4	-	-	110.8	83	-	-	-
SP-2	P3A	23-25	22.6	-	-	97.6	94	-	2.79	-
*	P3B	23-25	23.0	37	10	100.6	64	-	-	R-4
**	P3B	23-25	-	37	15	-	-	-	-	R-4
	P3C	23-25	-	37	16	-	15.0	-	-	-
SP-4A	P2A	7-9	21.5	27	10	104.2	76.0	-	2.78	-
	P2C	7-9	23.0	33	7	103.8	-	22	-	CR-5
	P3A	10-12	16.0	34	14	118.3	95	-	2.76	-
	P3C	10-12	17.0	32	14	116.9	100	-	-	CR-14
	P4A	13-15	14.6	36	15	118.5	-	-	-	-
	P4C	13-15	18.0	33	6	112.9	-	-	-	R-11
	P5A	18-20	11.9	36	14	118.2	-	-	-	-

* Failure zone

** Non-failure zone

TABLE VI (Continued)

INDEX TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft.	Water Content %	Atterburg Limits LL	Atterburg Limits PI	Dry Unit Weight lbs/cu ft	% Passing 200 Sieve	% Passing 2 microns	Specific Gravity	Other Tests Performed
SP-5A	P1A	4-6	19.8	37	15	101.9	-	-	-	-
	P1B	4-6	15.0	35	15	116.1	62	-	-	CR-13
	P2A	7-9	22.0	34	18	102.0	-	-	-	-
	P2B	7-9	19.0	33	13	108.9	-	-	-	R-12
	P2C	7-9	-	30	11	-	74	-	-	-
SP-6	D1A	5.5-7.5	16.5	32	8	108.9	47	-	-	-
	D1B	5.5-7.5	-	33	14	-	41	-	-	-
SP-9A	P2A	5.5-7.5	19.7	32	14	-	-	-	-	-
SP-11A	P1A	3-5	19.7	36	15	105.7	-	-	-	-
	P1B	3-5	18.0	-	-	-	-	-	-	R-14
SP-12	P1A	3-5	25.2	43	25	83.9	-	-	-	-
	P1B	3-5	-	43	21	-	-	-	-	R-13
	P2A	5.5-7.5	23.8	46	20	96.2	-	-	-	-
	P2B	5.5-7.5	21.6	42	19	105.2	36	-	-	CR-12
SP-13	P1A	3.5-5.5	18.0	-	-	-	-	-	-	R-15
SP-14	D1A	3-5	24.4	44	25	95.5	-	-	-	-
	D1B	3-5	23.0	38	17	102.9	-	-	-	CR-15

TABLE VI (Continued)

INDEX TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft	Water Content %	Atterburg Limits LL	Atterburg Limits PI	Dry Unit Weight lbs/cu ft	% Passing 200 Sieve	% Passing 2 microns	Specific Gravity	Other Tests Performed
SP-14A	P1A	3.5-5.5	22.5	41	16	80.5	-	-	-	-
	P1B	3.5-5.5	21.0	38	15	106.7	-	-	-	CR-16
	P2A	6-8	19.7	-	-	100.6	84	9	2.70	
	P2B	6-8	-	34	11	-	62	18	-	-
SP-15A	P1C	4-6	33.5	-	-	-	-	-	-	R-16
	P2A	7-9	18.5	-	-	99.8	35	8	-	
*(Top)	P2C	7-9	-	39	11	-	74 79	16	-	CR-2
* Bottom	P2C	7-9	27.0	37	9	97.3	86	14	-	CR-2
	P3A	10-12	23.6	43	22	89.5	53	-	2.72	-
	P3B	10-12	-	29	6	-	84	5	-	-
	P5A	16-18	31.6	-	-	77.7	75	-	2.78	-
	P5B	16-18	20.0	-	-	102.8	-	-	-	-
	P6A	19-21	31.8	-	-	80.8	54	-	2.79	-
*	P6B	19-21	23.0	47	18	99.8	-	-	2.75	R-1
**	P6B	19-21	-	46	20	-	70	15	-	R-1
*(Top)	P6C	19-21	22.0	41	11	103.9	-	20	-	CR-1
*Bottom	P6C	19-21	-	44	15	-	80	15	-	CR-1

* Failure zone

** Non-failure zone

TABLE VI (Continued)

INDEX TESTS

UNDISTURBED SAMPLES

Boring No.	Sample and Section No.	Depth ft	Water Content %	Atterburg Limits LL	Atterburg Limits PI	Dry Unit Weight lbs/cu ft	% Passing 200 Sieve	% Passing 2 microns	Specific Gravity	Other Tests Performed
SP-16A	P3A	10.5-12.5	38.7	51	20	68.0	97	27	2.80	-
*Top	P3C	10.5-12.5	27.0	-	-	95.5	91	25	-	CR-3
*Bottom	P3C	10.5-12.5	-	33	2	-	-	6	-	CR-3
	P4A	13.5-15.5	27.2	36	8	91.9	96	-	2.73	-
	P4B	13.5-15.5	-	-	-	-	-	-	-	-
*Top	P4C	13.5-15.5	22.0	40	13	104.2	-	-	-	CR-4
*Bottom	P4C	13.5-15.5	-	35	0	-	-	10	2.74	CR-4
	P5A	16.5-18.5	-	35	7	-	-	-	-	-

* Failure zone

** Non-failure zone

TABLE VII

INDEX TESTS

BLOCK SAMPLES

Test Pit No.	Sample and Section No.	Depth	Water Content %	Atterberg Limits		Dry Unit Weight	% Passing 200 Sieve	% Passing 2 microns	Specific Gravity	Other Tests Performed
		ft		LL	PI	lbs/cu ft				
Top	1	4.6-5.6	23	44	27	99.5	-	-	-	$C\bar{R}$-11
Bottom	1	4.6-5.6	24	44	26	98.3	92	-	-	$C\bar{R}$-11
	1	4.6-5.6	-	41	24	-	-	-	-	$\bar{R}$-8
SP-3	2	9.8-10.8	21	28	6	99.0	91	-	-	$C\bar{R}$-10
	3	12-13	20	-	-	102.5	69	10	2.73	$\bar{R}$-6
	3	12-13	19	28	4	102.7	92	10	2.75	CR-7
SP-9	1	3.2-4.7	24	42	24	96.0	89	-	2.73	$C\bar{R}$-9
	1	3.2-4.7	23	40	21	94.5	92	23	-	R-10
SP-14	1	3-4	15	32	14	110.9	92	-	2.74	$C\bar{R}$-8
	1	3-4	16	35	16	109.1	91	15	-	R-9
	2	7-8	-	-	-	-	-	-	-	-
SP-15										
*Top	1	7-7.9	23	37	14	94.2	58	14	-	$C\bar{R}$-6
*Bottom	1	7-7.9	23	40	17	93.8	66	13	-	$\bar{R}$-7

TABLE VIII

CONSOLIDATED-UNDRAINED TRIAXIAL $\bar{R}$ TESTS

UNDISTURBED TUBE SAMPLES

Test No.	Boring No.	Sample and Section No.	Depth ft.	Initial Water Content % Calculated	Dry Unit Weights Initial pcf	Dry Unit Weights After Consolidation pcf	Chamber Pressure σ_c kg/cm^2	Back Pressure μ_o kg/cm^2	Effective Consolidation Pressure $\bar{\sigma}_c$ kg/cm^2	Maximum Deviator Stress $(\sigma_1-\sigma_3)_{max}$ kg/cm^2	Induced Pore Pressure @ $(\sigma_1-\sigma_3)_{max}$ kg/cm^2	Permeability Determinations @ $\bar{\sigma}_c$ kg/cm^2	Permeability Determinations K cm/sec
$\bar{R}$1	SP-15A	P6/B	19-21	22.5	99.8	99.4	16.00	15.50	0.50	2.88	-.89	0.50	7.6×10^{-7}
$\bar{R}$2	SP-15A	P5/B	16-18	20.4	102.8	102.9	10.50	10.00	0.50	4.75	-.83	-	-
$\bar{R}$3	SP-4A	P5/B	18-20	-	-	-	SAMPLE DISTURBED DURING SATURATION						-
$\bar{R}$4	SP-2	P3/B	23-25	22.5	100.6	100.8	10.50	10.00	0.50	4.54	-1.12	-	-
$\bar{R}$5	SP-1	P6/B	26-28	-	-	-	SAMPLE DISTURBED IN TUBE					-	-
$\bar{R}$11	SP-4A	P4/C	13-15	17.5	112.9	112.9	9.50	9.00	0.50	5.79	-0.81	-	-
$\bar{R}$12	SP-5A	P2/B	7-9	19.4	108.9	109.5	9.50	9.00	0.50	2.98	-0.76	-	-
$\bar{R}$13	SP-12	P1/B	3-5	24.9	101.3	101.8	9.50	9.00	0.50	4.03	-1.43	-	-
$\bar{R}$14	SP-11A	P1/B	3-5	18.0	111.2	111.6	7.50	7.00	0.50	5.20	-2.00	-	-
$\bar{R}$15	SP-13	P1/A	3.5-5.5	18.0	113.0	113.9	9.50	9.00	0.50	6.86	-1.75	-	-
$\bar{R}$16	SP-16A	P2/C	7.5-9.5	33.5	80.5	81.4	8.50	8.00	0.50	3.16	-0.52	-	-

TABLE IX

CONSOLIDATED-UNDRAINED TRIAXIAL $\bar{R}$ TESTS

BLOCK SAMPLES

Test No.	Boring No.	Sample & Section No.	Depth ft.	Initial Water Content ω_c Calculated	Dry Unit Weights		Chamber Pressure σ_c kg/cm^2	Back Pressure μ_o kg/cm^2	Effective Consolidation Pressure $\bar{\sigma}_c$ kg/cm^2	Maximum Deviator Stress $(\sigma_1 - \sigma_3)_{max}$ kg/cm^2	Induced Pore Pressure $(\sigma_1 - \sigma_3)_{max}$ kg/cm^2	Permeability Determinations	
					Initial pcf	After Consolidation pcf						$\bar{\sigma}_c$ kg/cm^2	K cm/sec
$\bar{R}6$	SP-3	3	12-13	20.2	102.5	103.2	11.50	11.00	0.50	2.75	-0.43	-	-
$\bar{R}7$	SP-15	1	7.0-7.9	22.8	93.8	94.1	11.50	11.00	0.50	1.58	-0.06	-	-
$\bar{R}8$	SP-3	1	4.0-5.0	22.7	99.5	100.2	9.00	8.50	0.50	1.22	-0.05	-	-
$\bar{R}9$	SP-14	1	3.0-4.0	15.6	109.1	109.2	10.50	10.00	0.50	4.17	-1.46	-	-
$\bar{R}10$	SP-9	1	3.2-4.7	25.2	94.5	95.4	11.50	11.00	0.50	1.28	-0.03	-	-

TABLE X

CYCLIC CONSOLIDATED-UNDRAINED TRIAXIAL ($\bar{CR}$) TESTS

TUBE SAMPLES

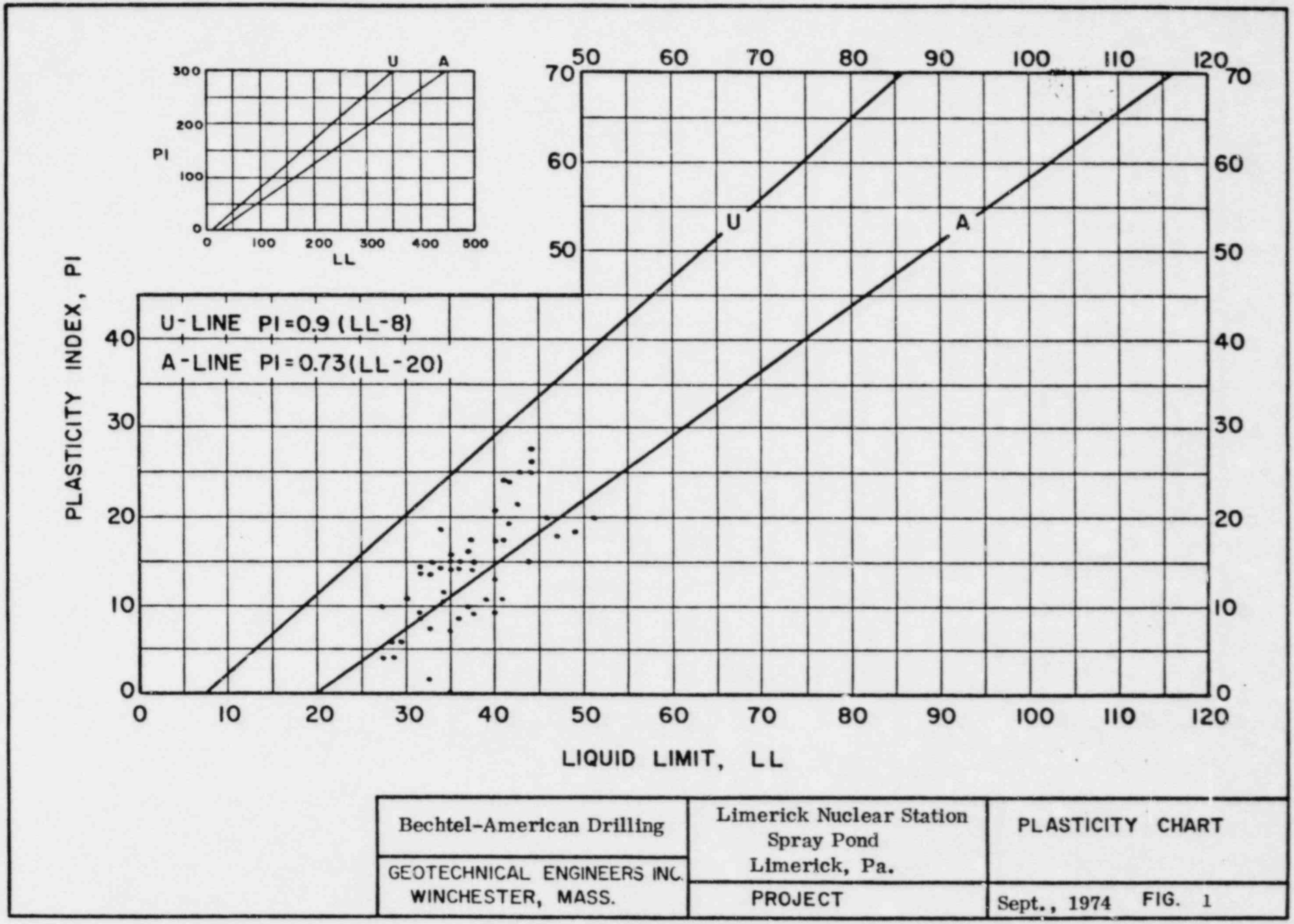
Test Number	Boring Number	Sample and Section Number	Depth	Water Content	Dry Unit Weights			Effective Consolidation Pressure	Cyclic Deviator Stress	$\frac{(\sigma_1-\sigma_3)_{cy}}{2\bar{\sigma}_c}$	Number of Cycles to Double Amplitude Strain Equal to			Axial Extension Failure	Total Number of Cycles Applied	Double Amplitude Strain During Last Cycle
					In the Tube	Triaxial Specimen										
						Initial	After Consolidation	$\bar{\sigma}_c$	$(\sigma_1-\sigma_3)_{cy}$							
			ft.	%	pcf	pcf	pcf	kg/cm^2	kg/cm^2		2.5%	5.0%	10.0%			%
$\bar{CR}1$	SP15A	P6C	19-21	22.1	103.9	102.7	103.2	1.00	1.24	0.620	180	309	-	316	316	-
$\bar{CR}2$	SP15A	P2C	7-9	27.3	97.3	96.1	96.6	1.00	1.94	0.971	-	9	36	-	44	12.1
$\bar{CR}3$	SP16A	P3C	10.5-12.5	26.5	95.5	94.1	95.6	1.00	1.12	0.560	3	12	21	-	22	11.6
$\bar{CR}4$	SP16A	P4C	13.5-15.5	22.1	104.2	102.4	103.0	1.00	0.815	0.408	172	551	940	-	967	10.6
$\bar{CR}5$	SP4A	P2C	7-9	23.1	103.8	102.9	105.4	1.00	1.61	0.806	-	2	13	-	31	13.2
$\bar{CR}12$	SP12	P2B	5.5-7.5	21.6	105.2	101.0	102.0	1.00	1.23	0.61	2	9	43	53	-	-
$\bar{CR}13$	SP5A	P1B	4-6	15.3	116.1	113.4	114.4	1.00	1.46	0.73	3	11	49	-	165	15.8
$\bar{CR}14$	SP4A	P3C	10-12	16.9	116.9	116.6	118.2	1.00	1.45	0.73	11	68	-	84	-	-
$\bar{CR}15$	SP14	D1B	3-5	23.2	102.9	101.1	102.1	1.00	0.95	0.47	2	22	74	-	112	13.8
$\bar{CR}16$	SP14A	P1B	3.5-5.5	21.4	106.7	106.0	106.4	1.00	1.40	0.70	2	13	100	-	231	11.8

TABLE XI

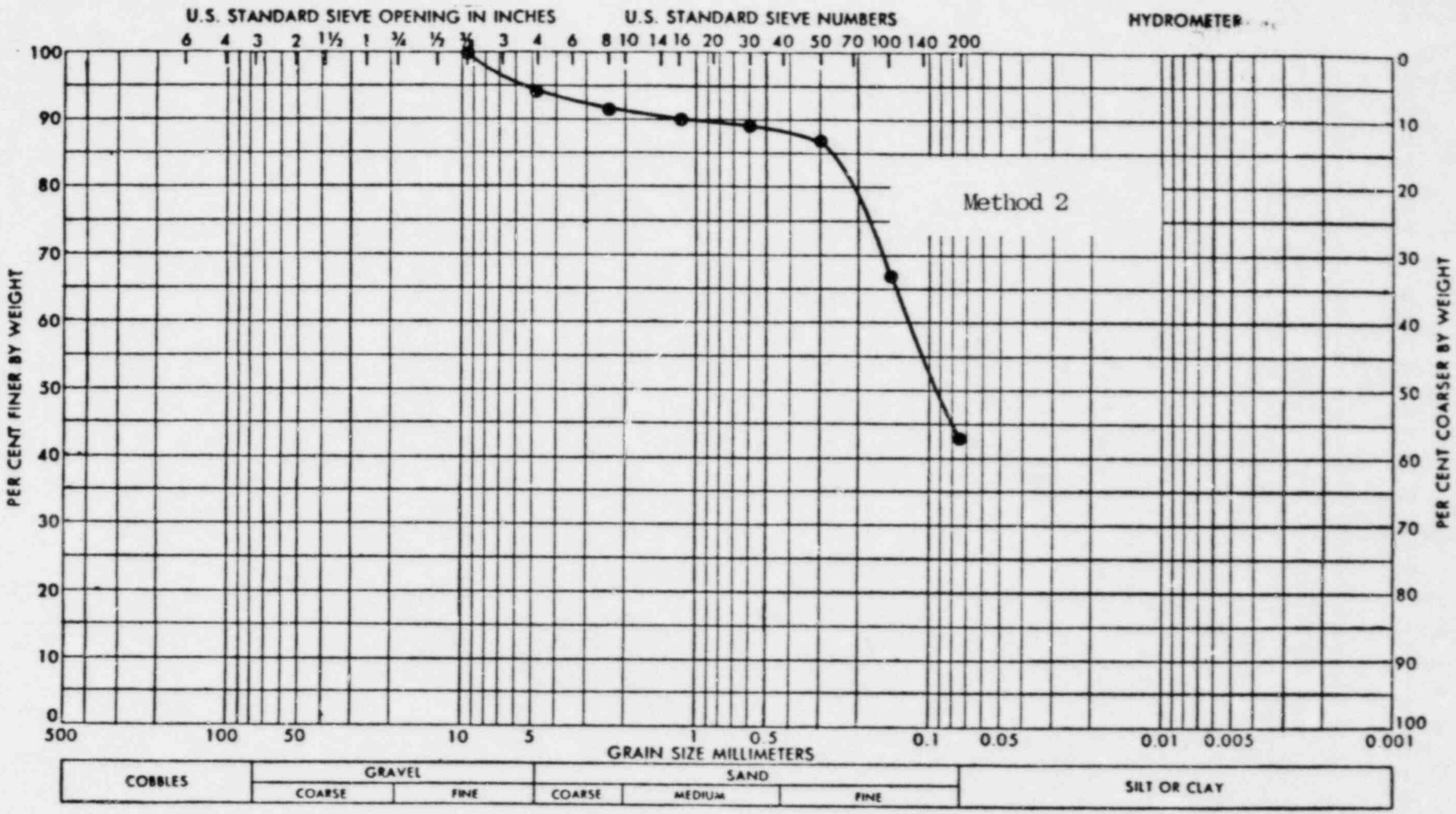
CYCLIC CONSOLIDATED-UNDRAINED TRIAXIAL ($\bar{CR}$) TESTS

BLOCK SAMPLES

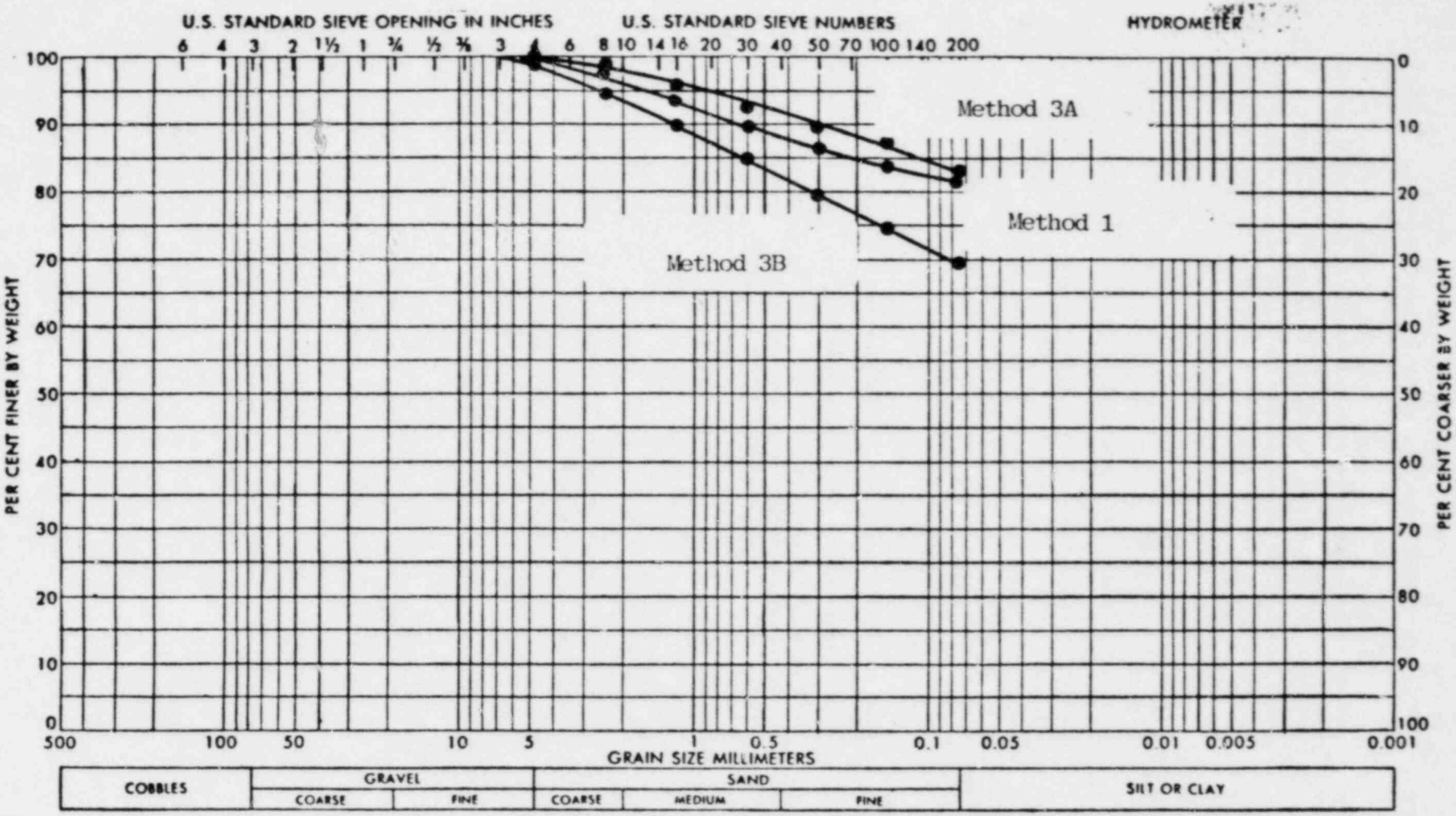
Test Number	Test Pit Number	Sample Number	Depth	Triaxial Specimen			Effective Consolidation Pressure	Cyclic Deviator Stress	$\frac{(\sigma_1-\sigma_3)_{cy}}{2\bar{\sigma}_c}$	Number of Cycles to Double Amplitude Strain Equal to			Axial Extension Failure	Total Number of Cycles Applied	Double Amplitude Strain During Last Cycle
				Water Content	Dry Unit Weights										
					Initial	After Consolidation	$\bar{\sigma}_c$	$(\sigma_1-\sigma_3)_{cy}$							
			ft.		pcf		kg/cm^2	kg/cm^2		2.5%	5.0%	10.0%			%
$\bar{CR}6$	SP15	1	7.0-7.9	22.7	94.2	95.3	1.00	1.24	0.620	22	24	25	26	26	-
$\bar{CR}7$	SP3	3	12-13	19.1	102.7	103.6	1.00	1.21	0.602	4	6	24	-	33	10.2
$\bar{CR}8$	SP14	1	3-4	14.8	110.9	111.3	1.00	1.38	0.688	77	109	-	120	120	-
$\bar{CR}9$	SP9	1	3.2-4.7	24.2	96.0	96.9	1.00	1.55	0.780	-	1	3	-	4	14.5
$\bar{CR}10$	SP3	2	9.8-10.8	21.4	99.0	100.2	1.00	0.89	0.44	15	19	28	-	34	15.0
$\bar{CR}11$	SP3	1	4.6-5.6	24.2	98.3	100.6	1.00	0.89	0.44	2	6	16	-	25	14.0



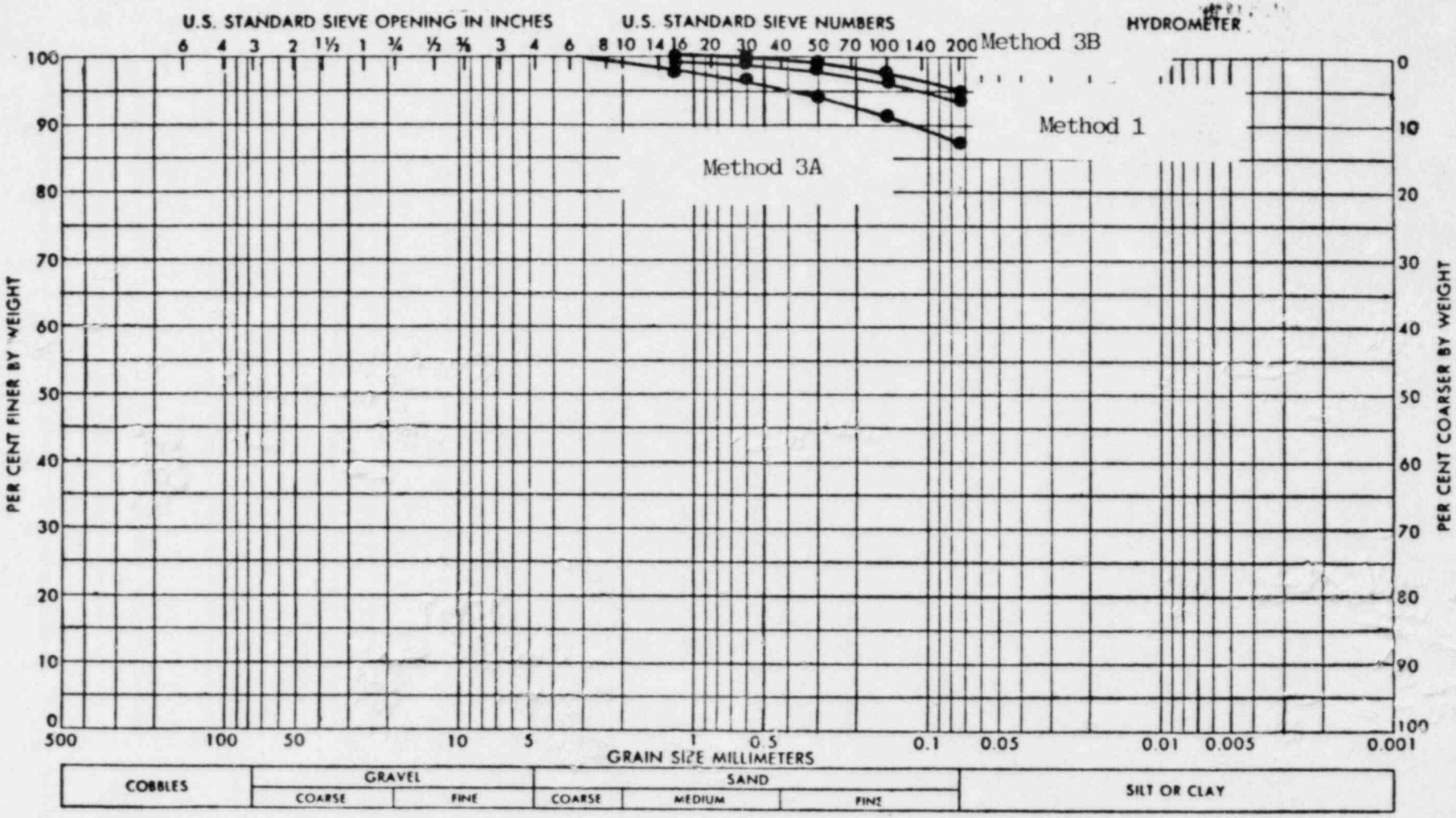
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	PLASTICITY CHART
GEOTECHNICAL ENGINEERS INC. WINCHESTER, MASS.	PROJECT	Sept., 1974 FIG. 1



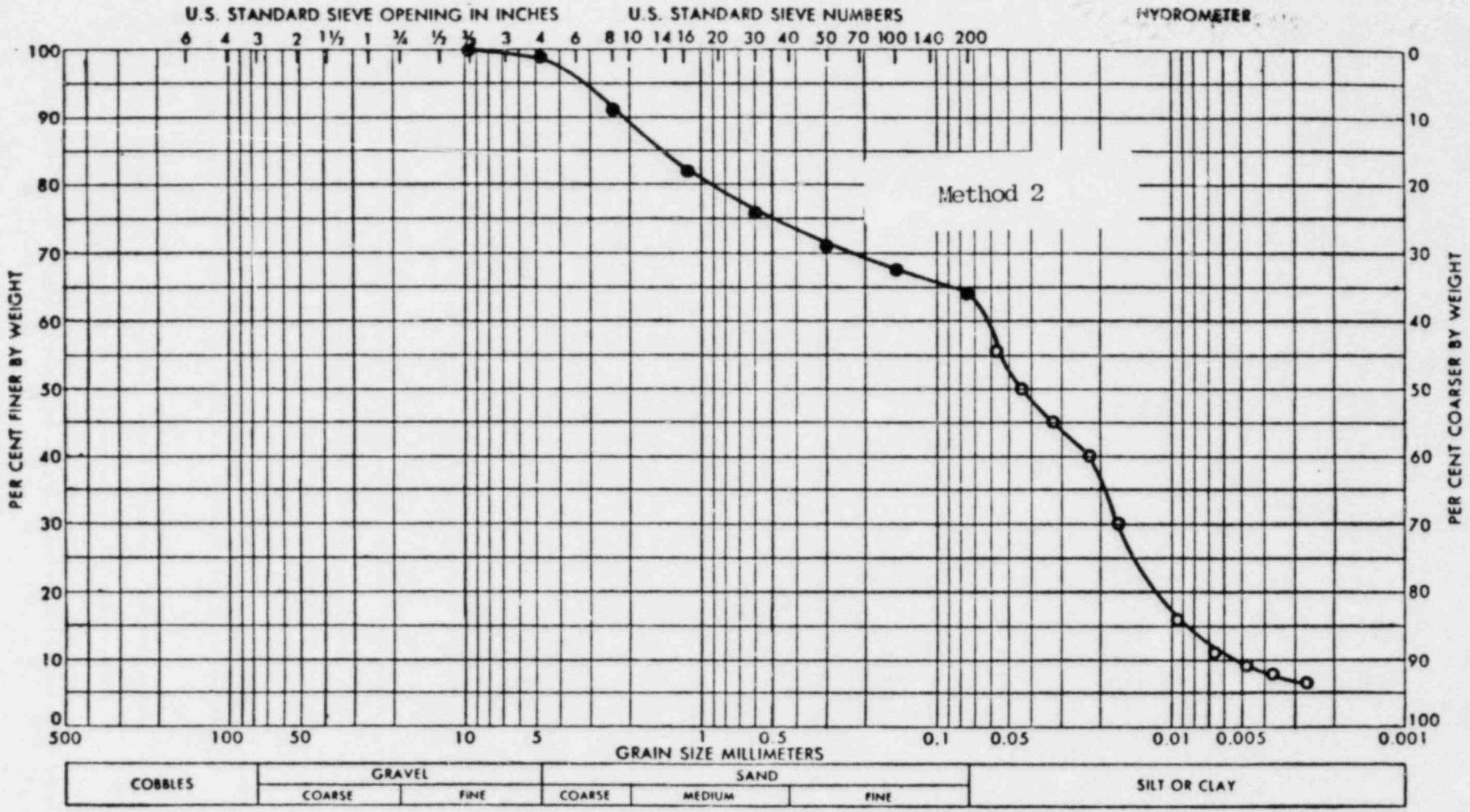
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-1 Sample S-3
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 2



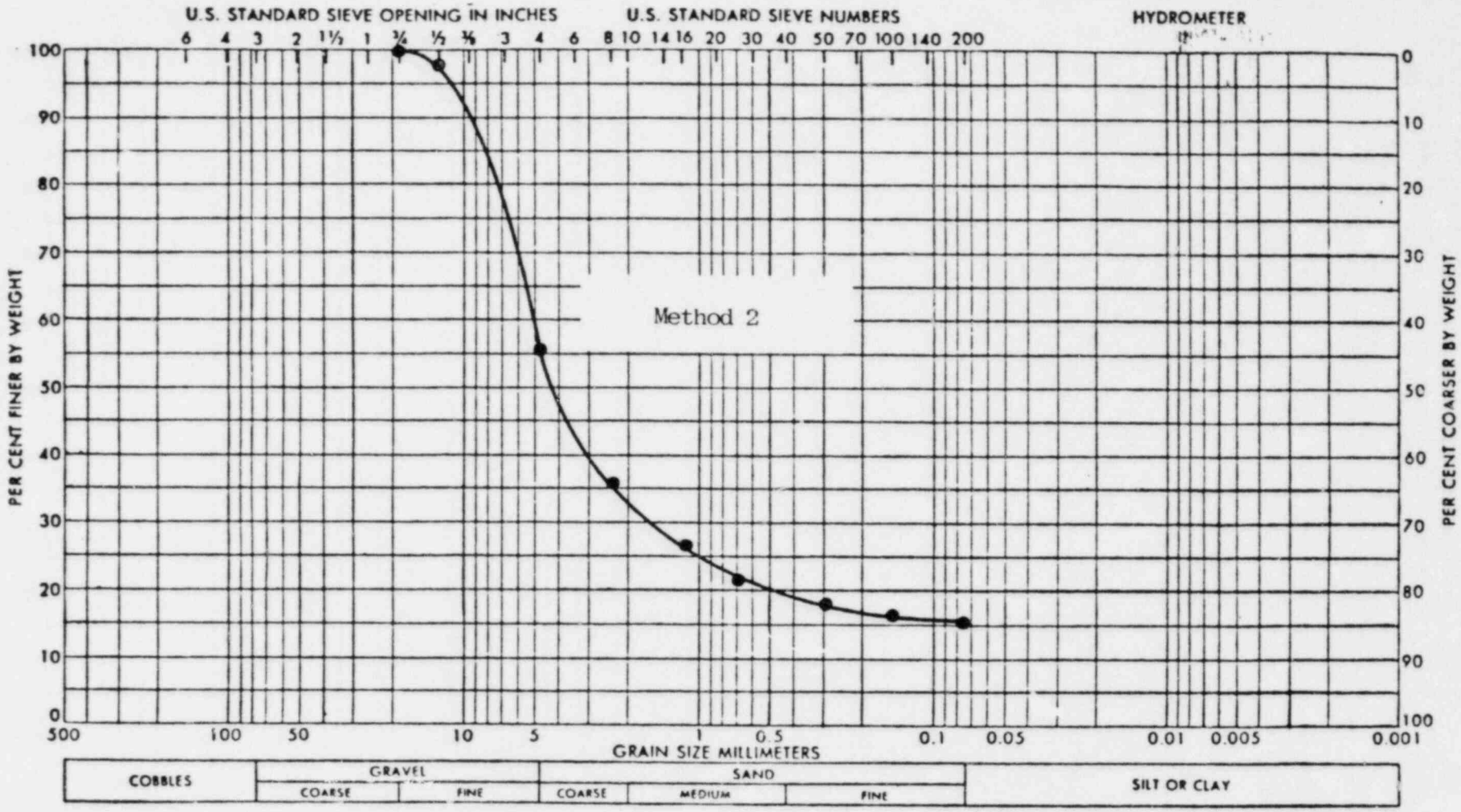
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-1 Sample P-6A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 3



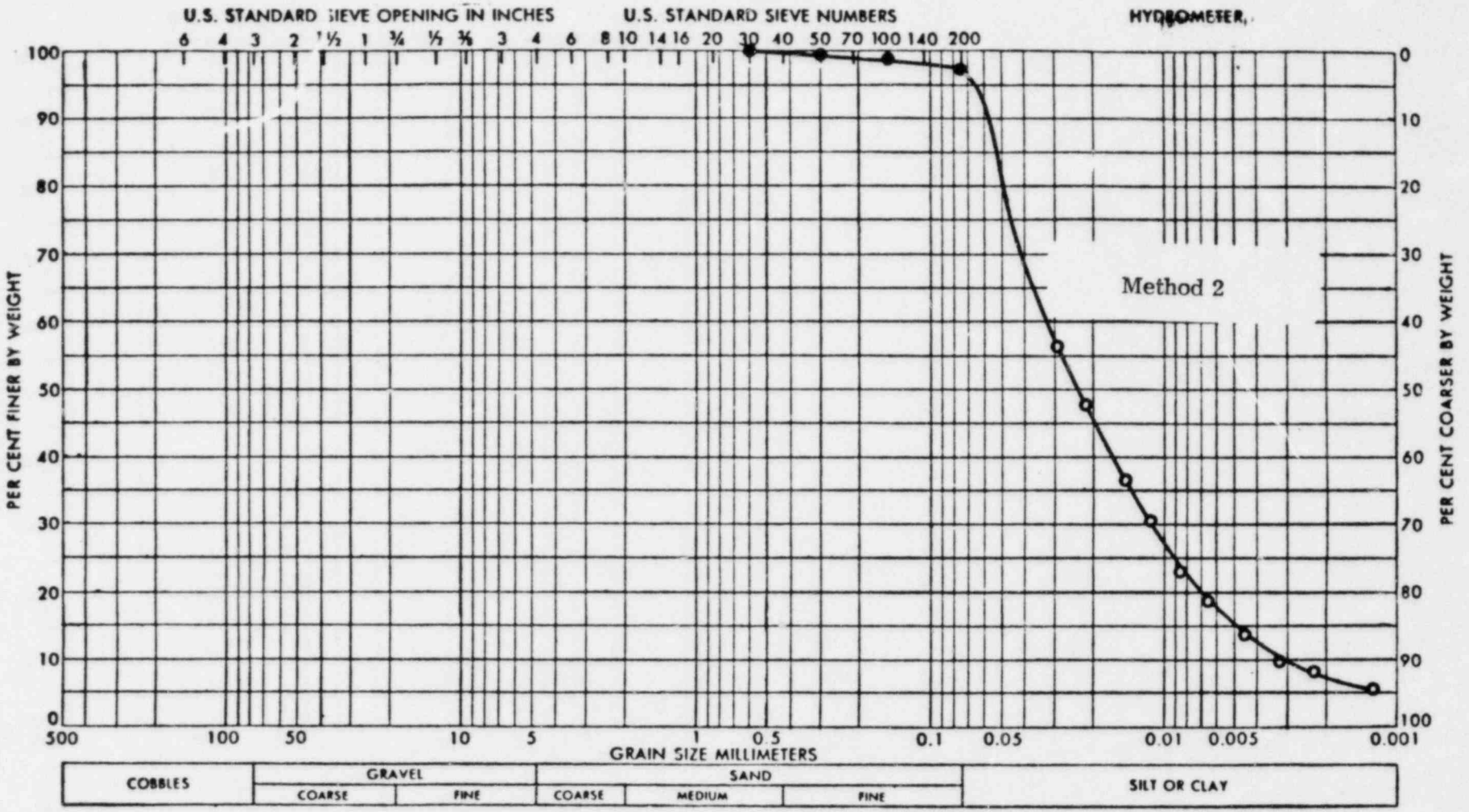
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-2 Sample P-3A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 4



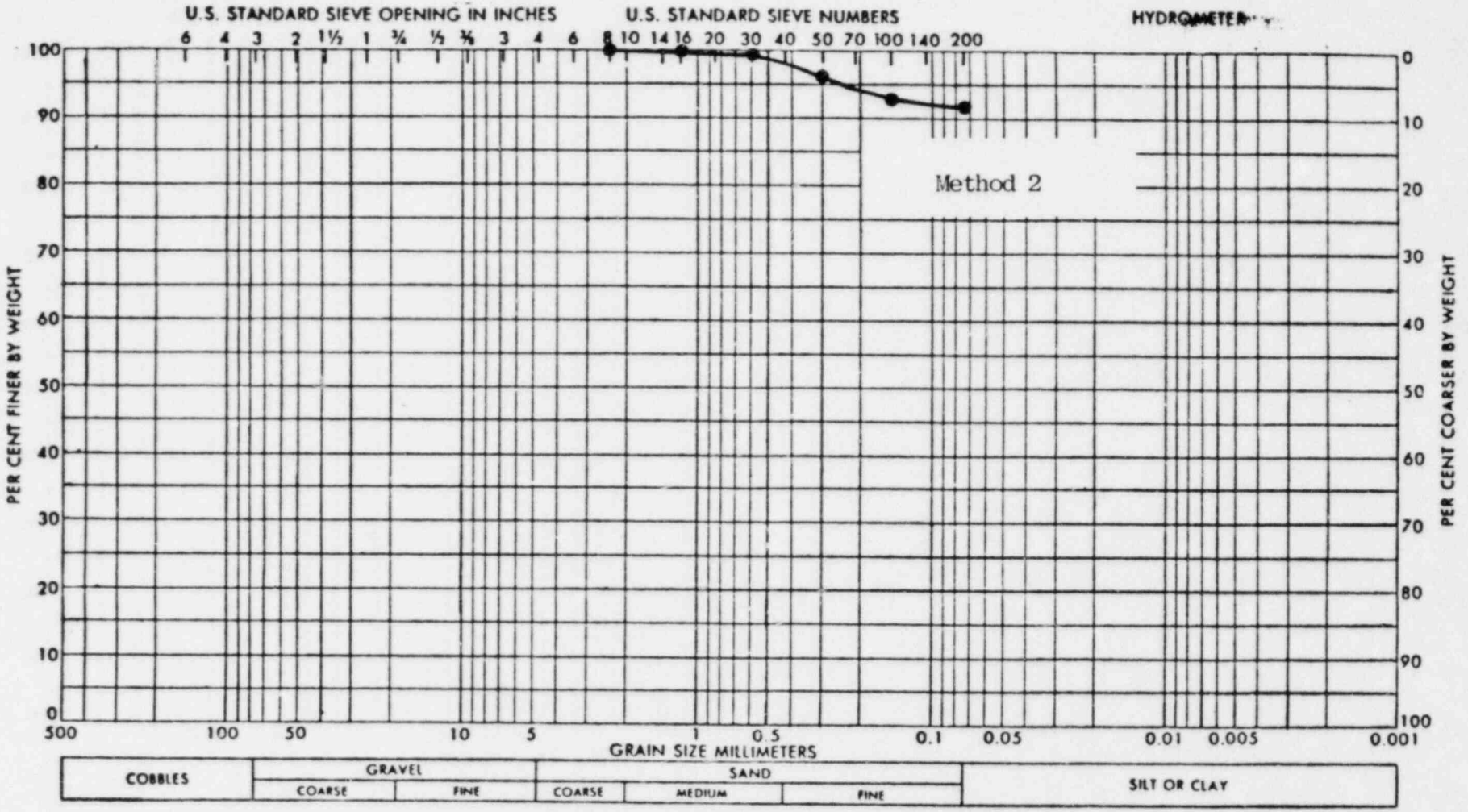
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-2 Sample P-3B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 5



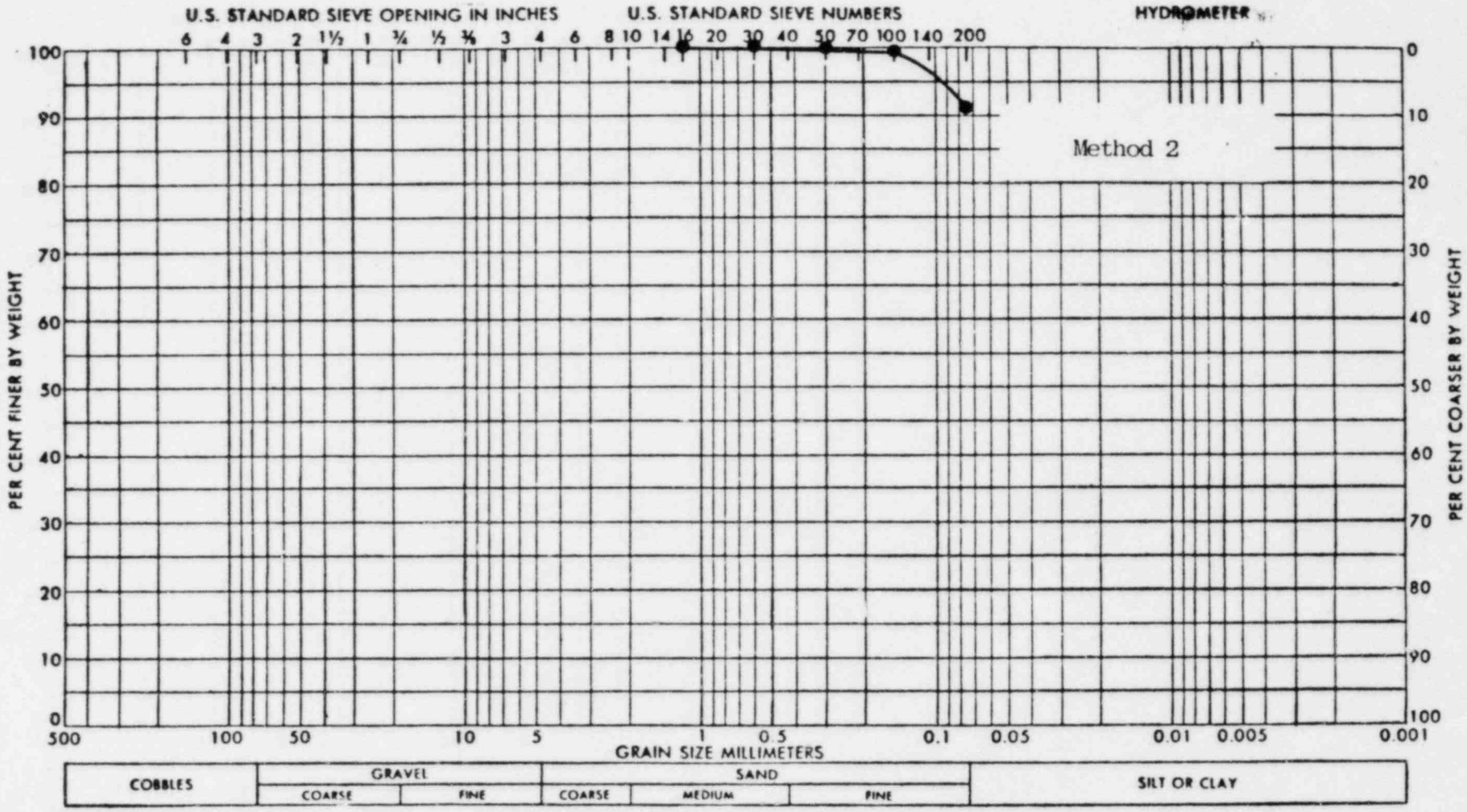
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-2 Sample P-3C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 6



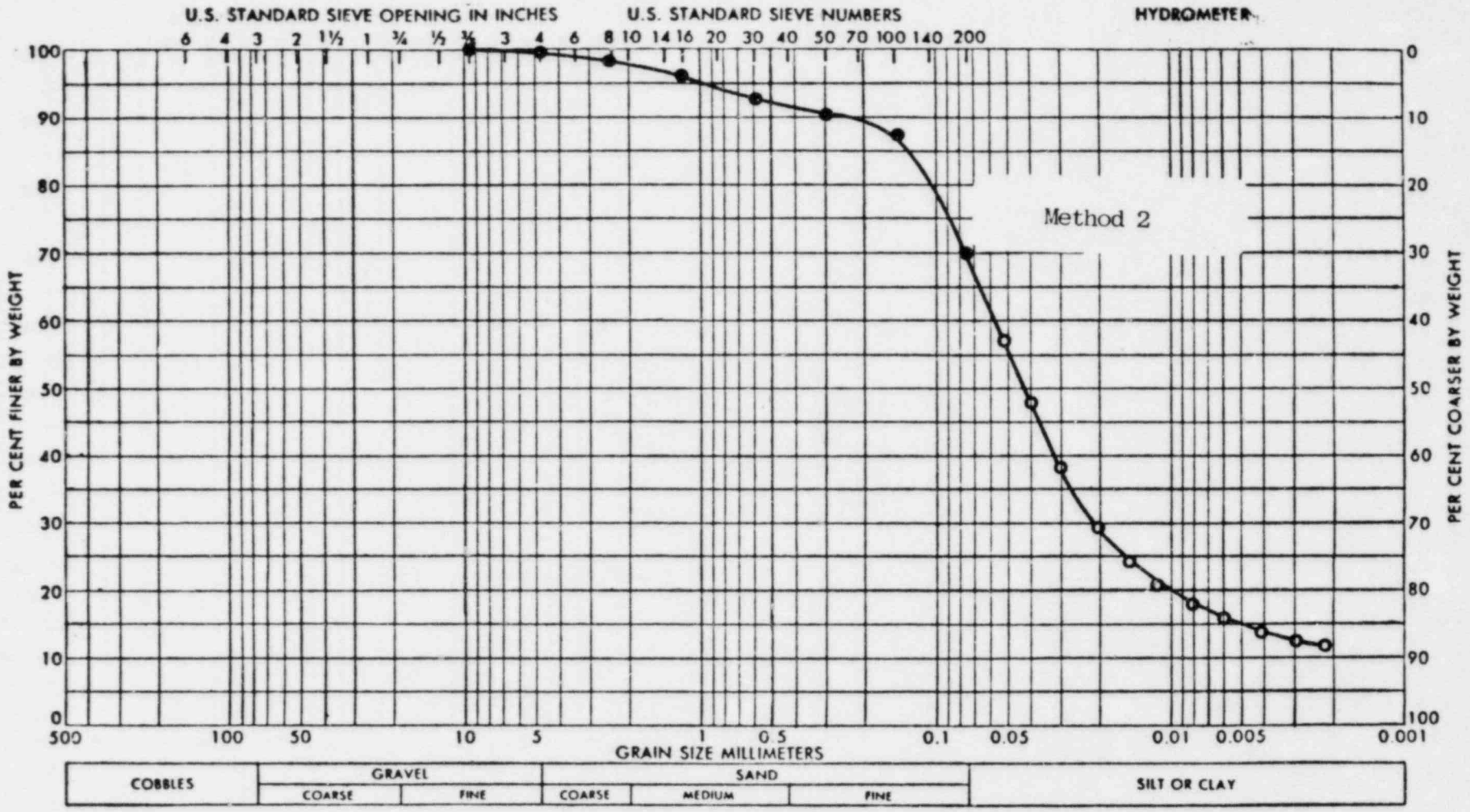
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-3 Sample S-4
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 7



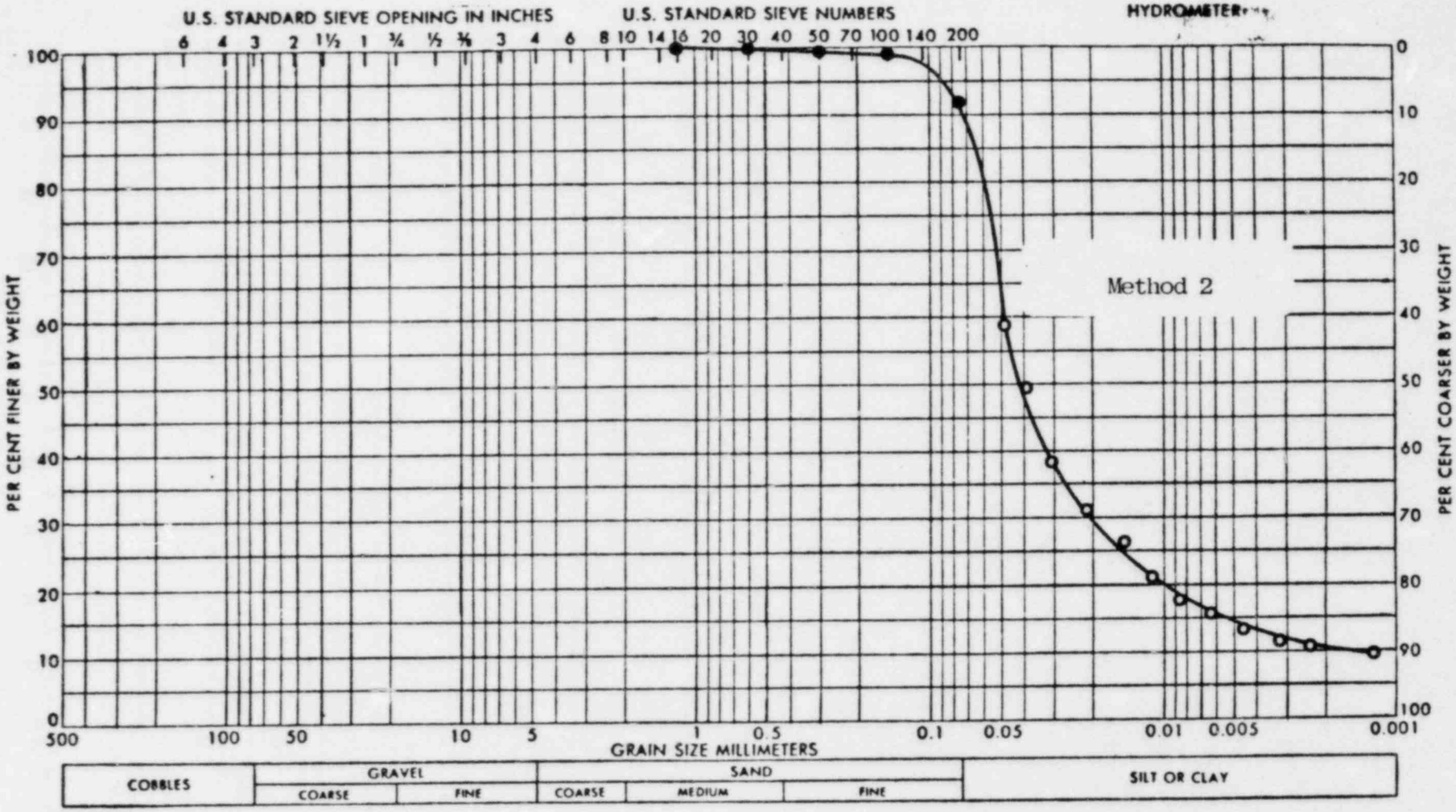
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-3 Sample 1 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 8



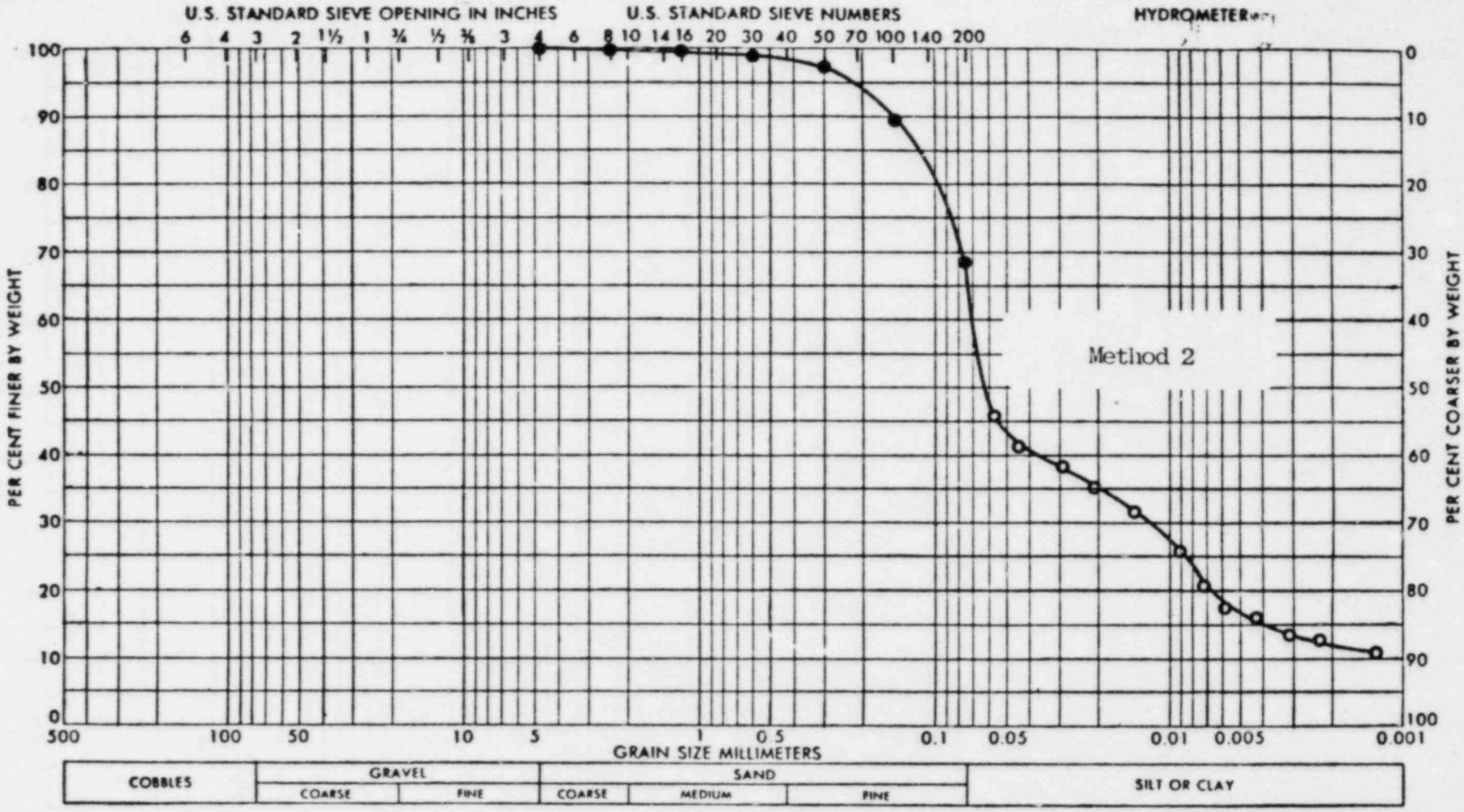
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-3 Sample 2 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 9



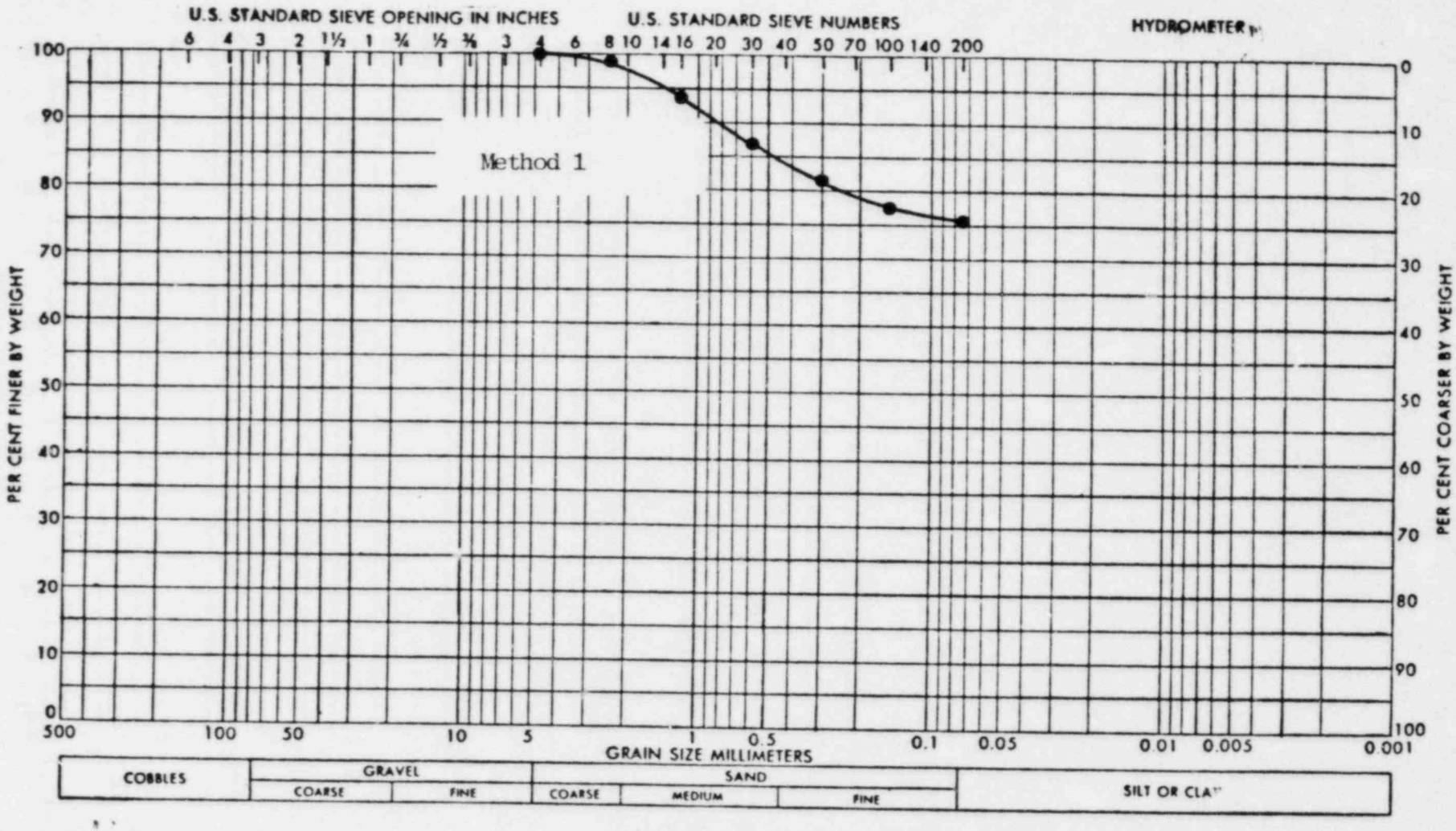
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE ($\bar{R}6$) Boring SP-3 Sample 3 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 10



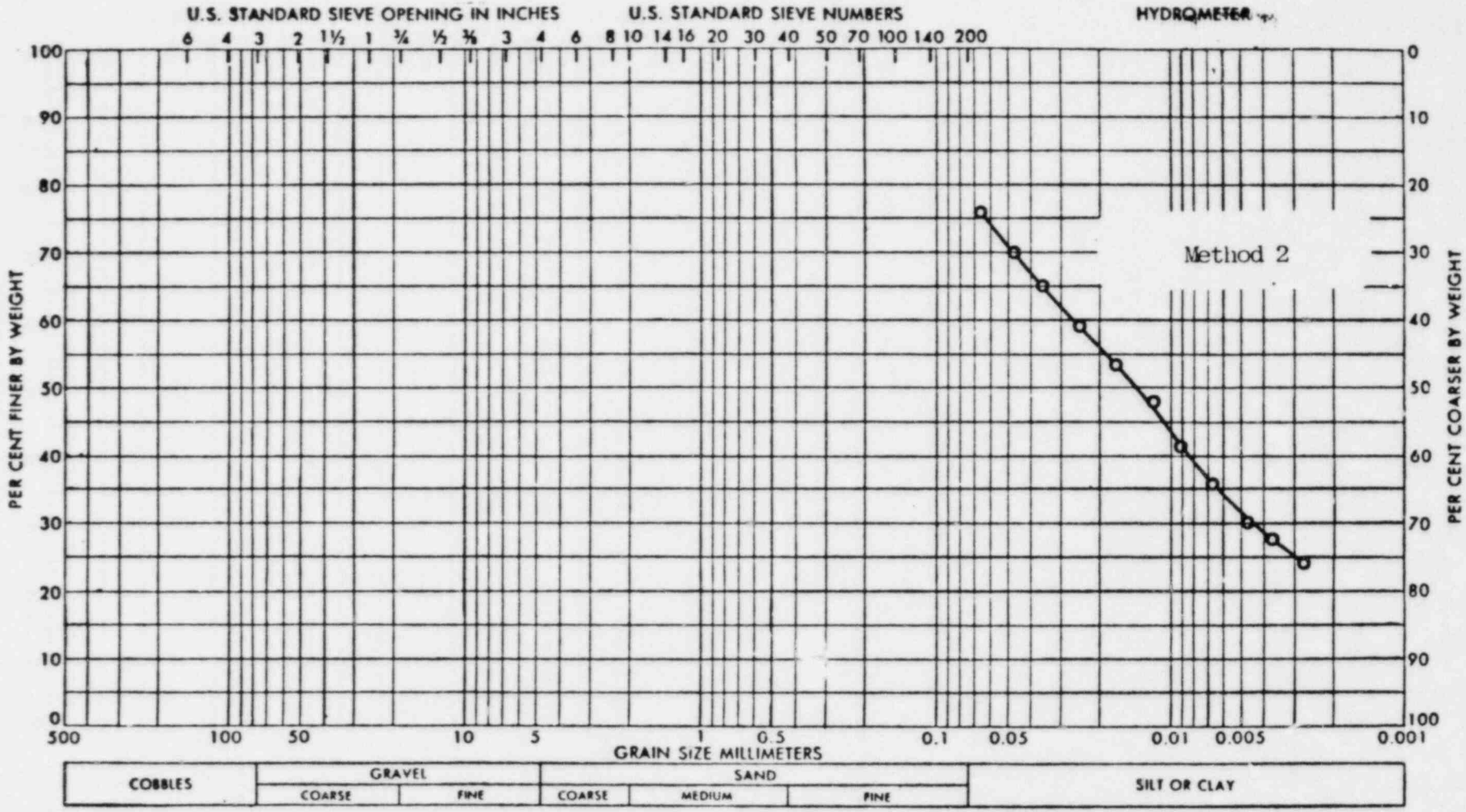
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE(CR7) Boring SP-3 Sample 3 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 11



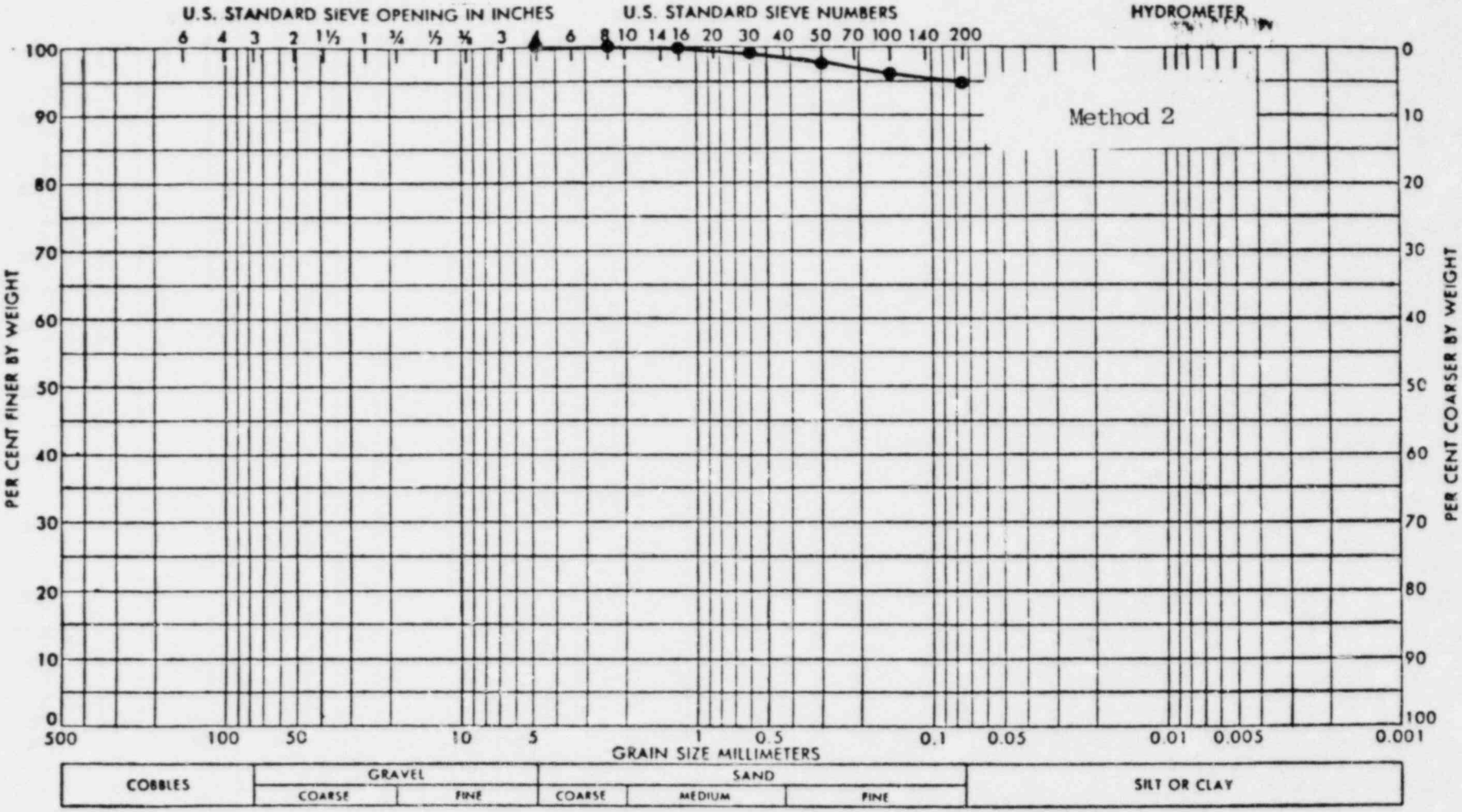
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-4 Sample S-3
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 12



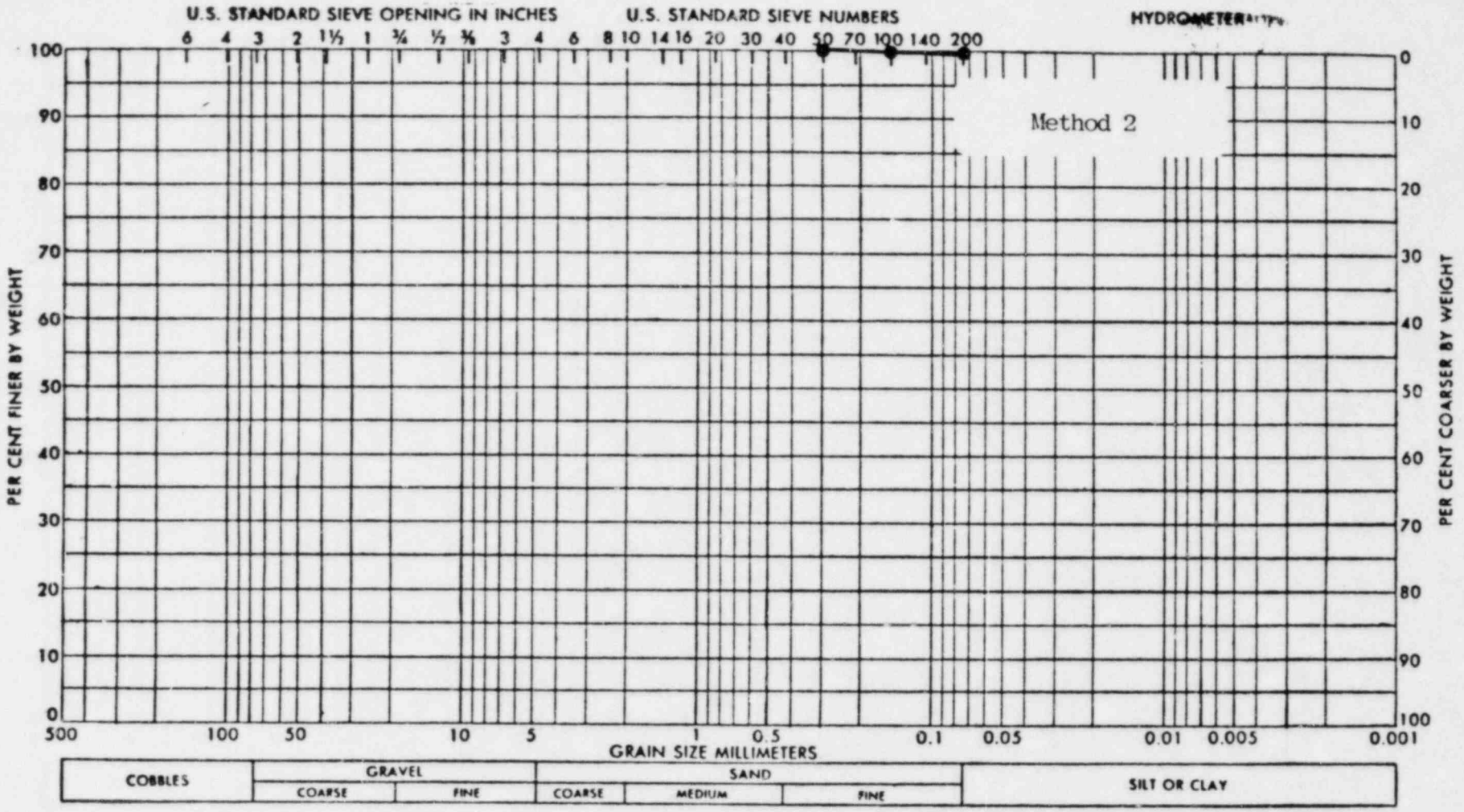
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-4A Sample P-2A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 13



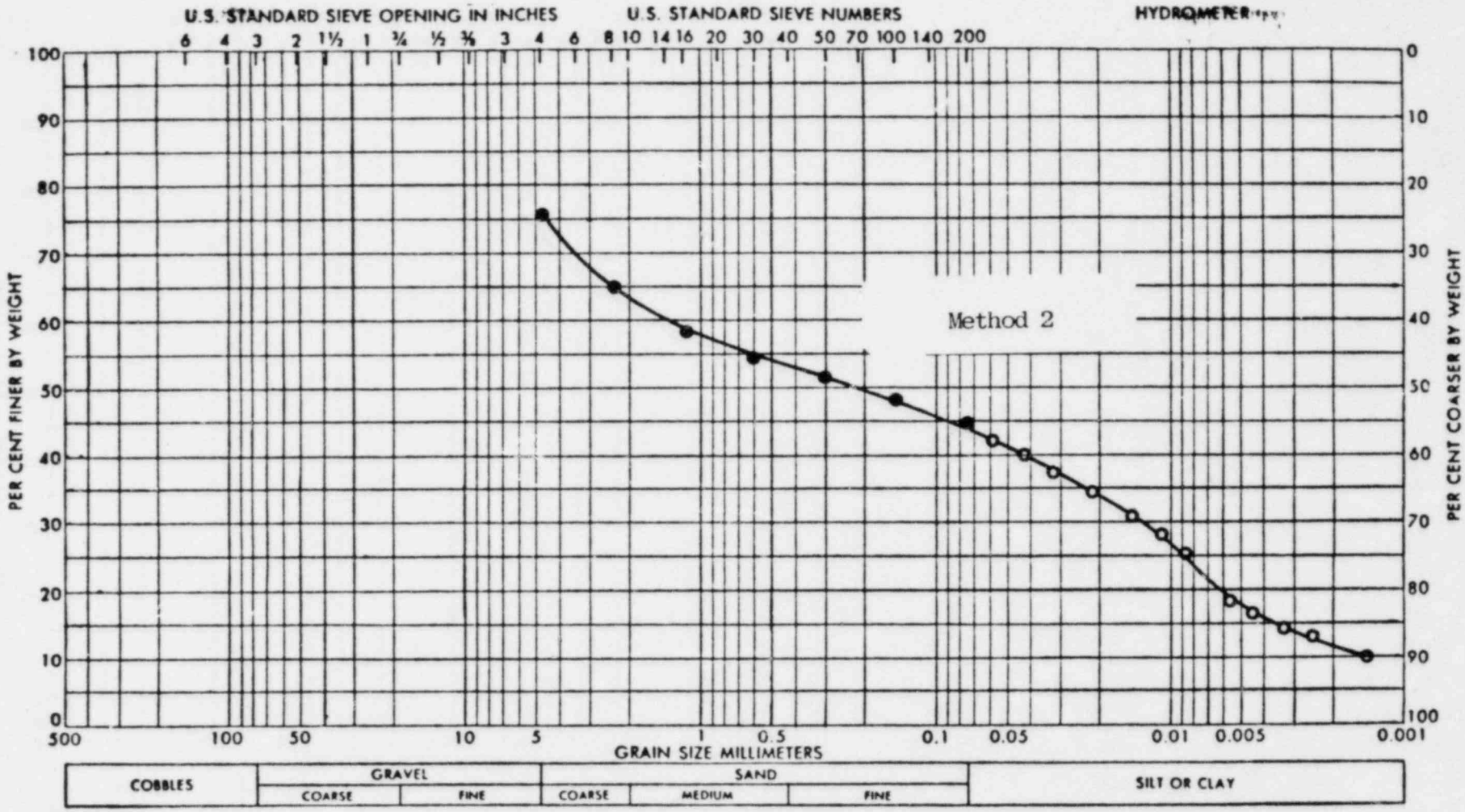
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-4A Sample P-2C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 14



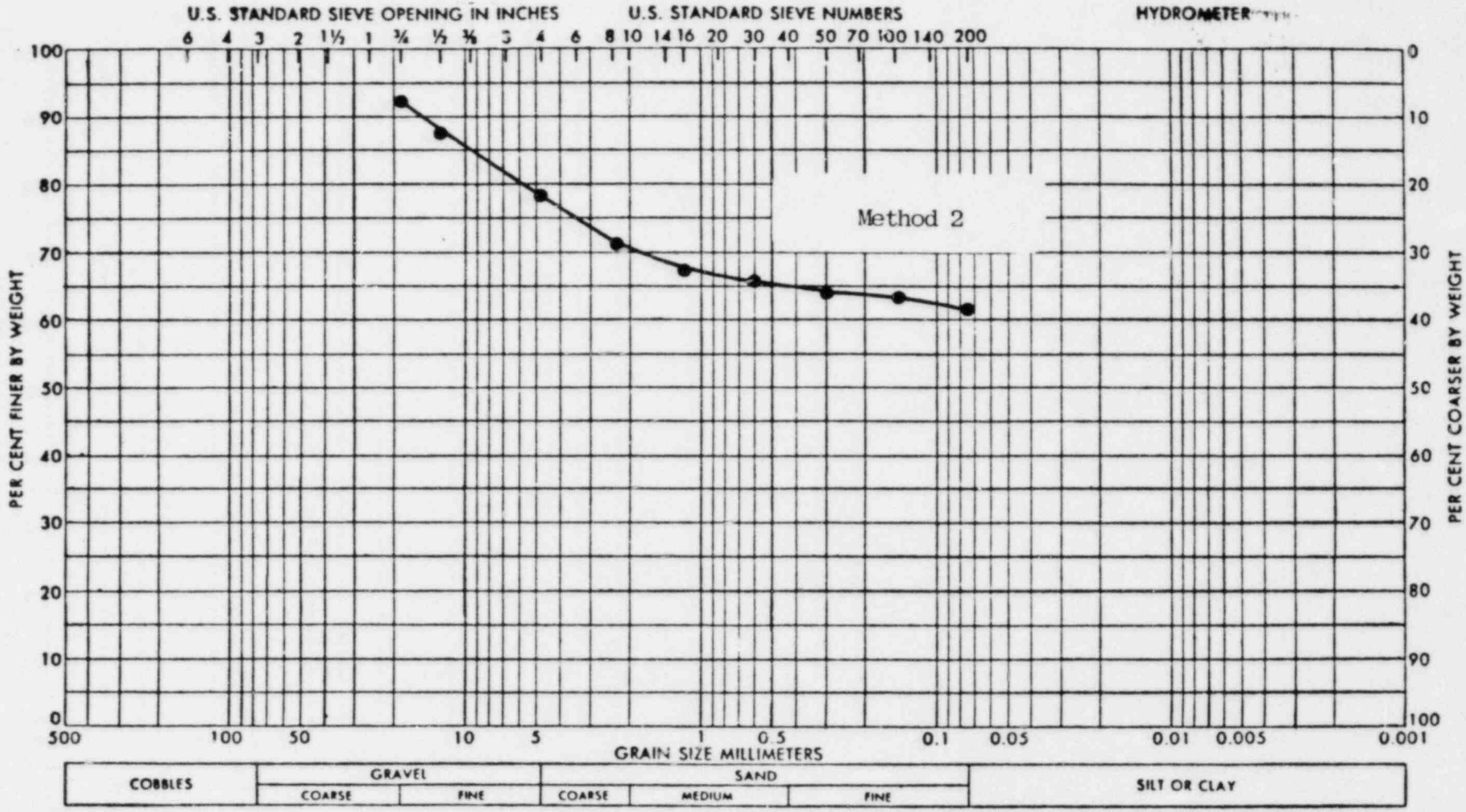
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-4A Sample P-3A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 15



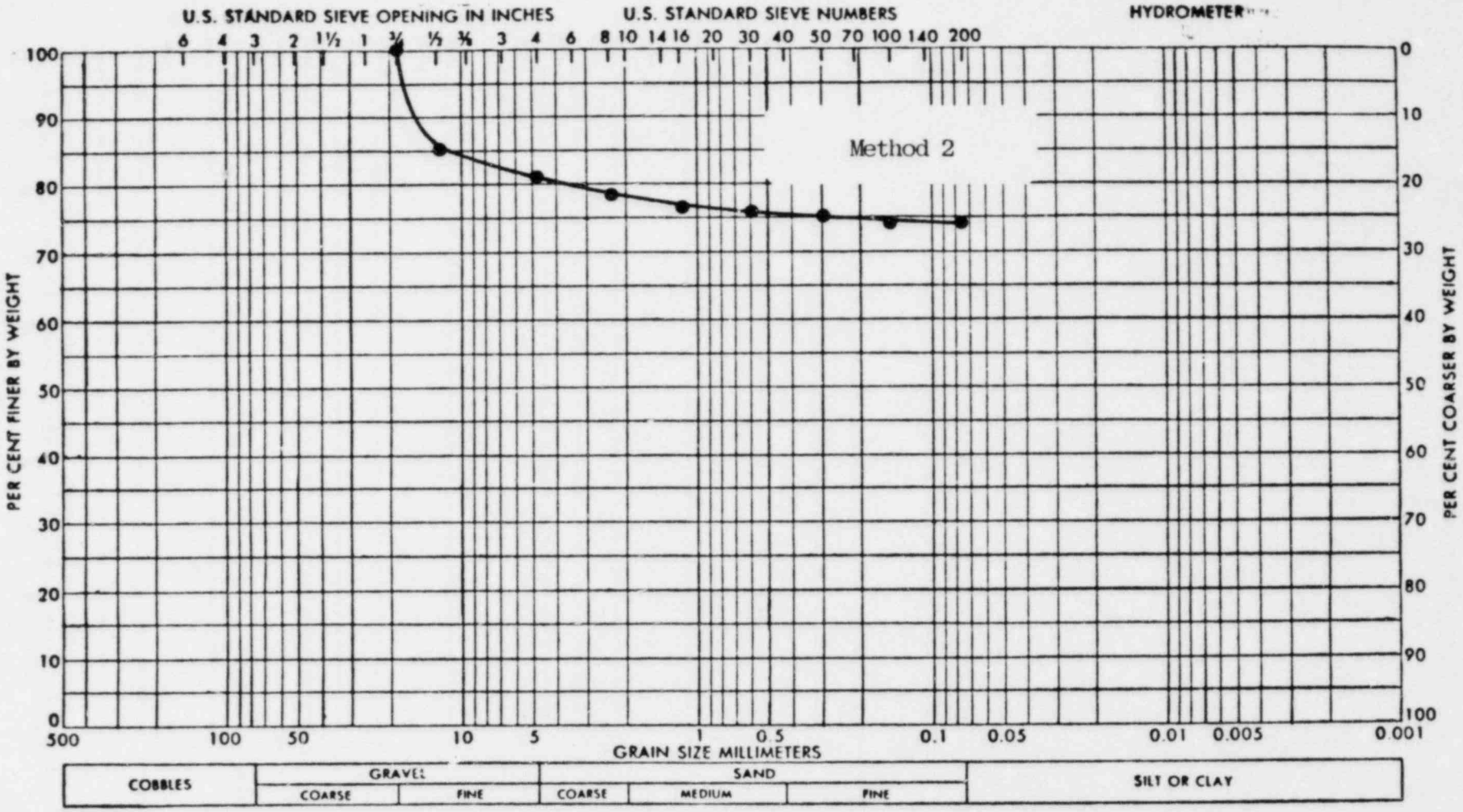
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-4A Sample P-3C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 16



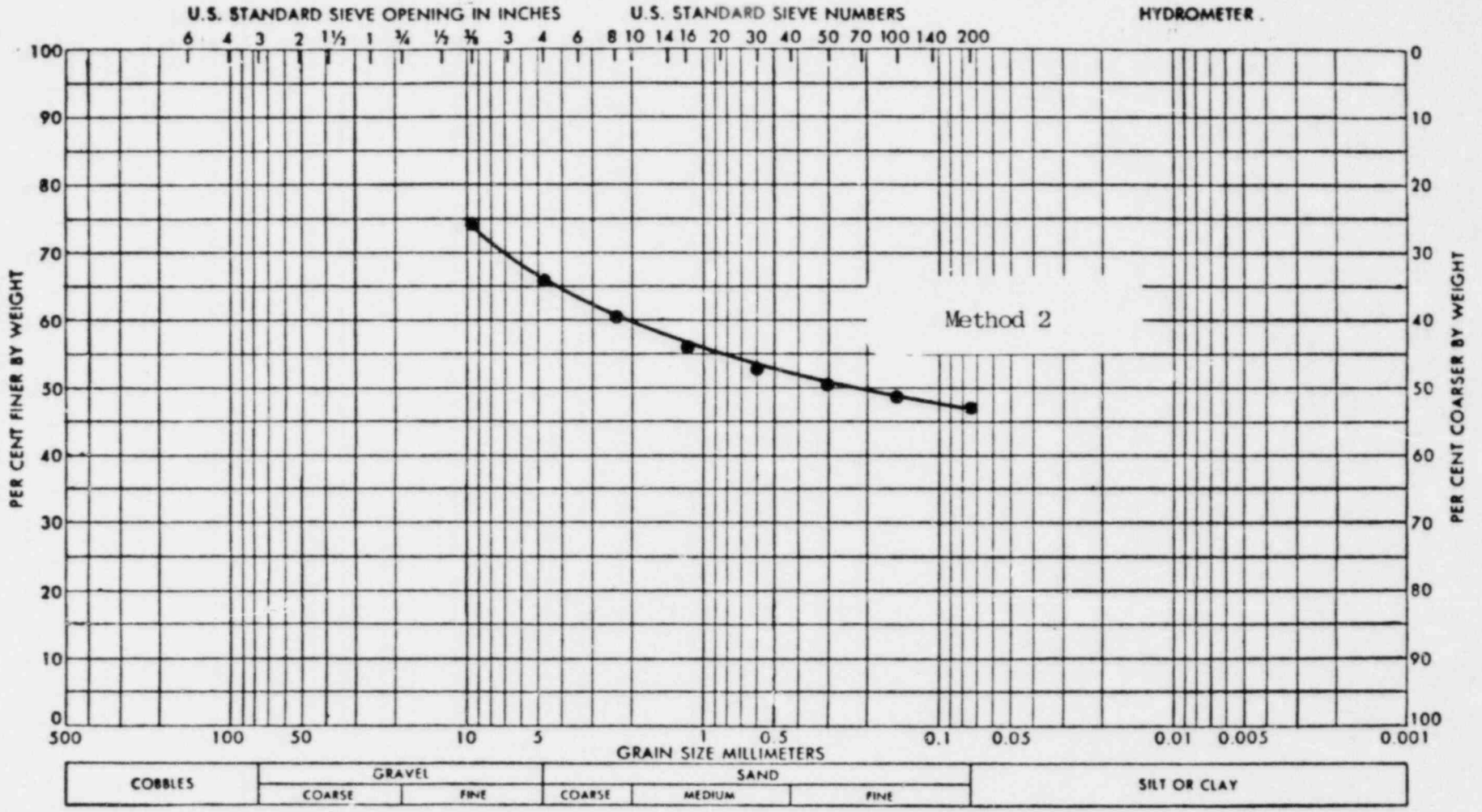
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-5 Sample S-3
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 17



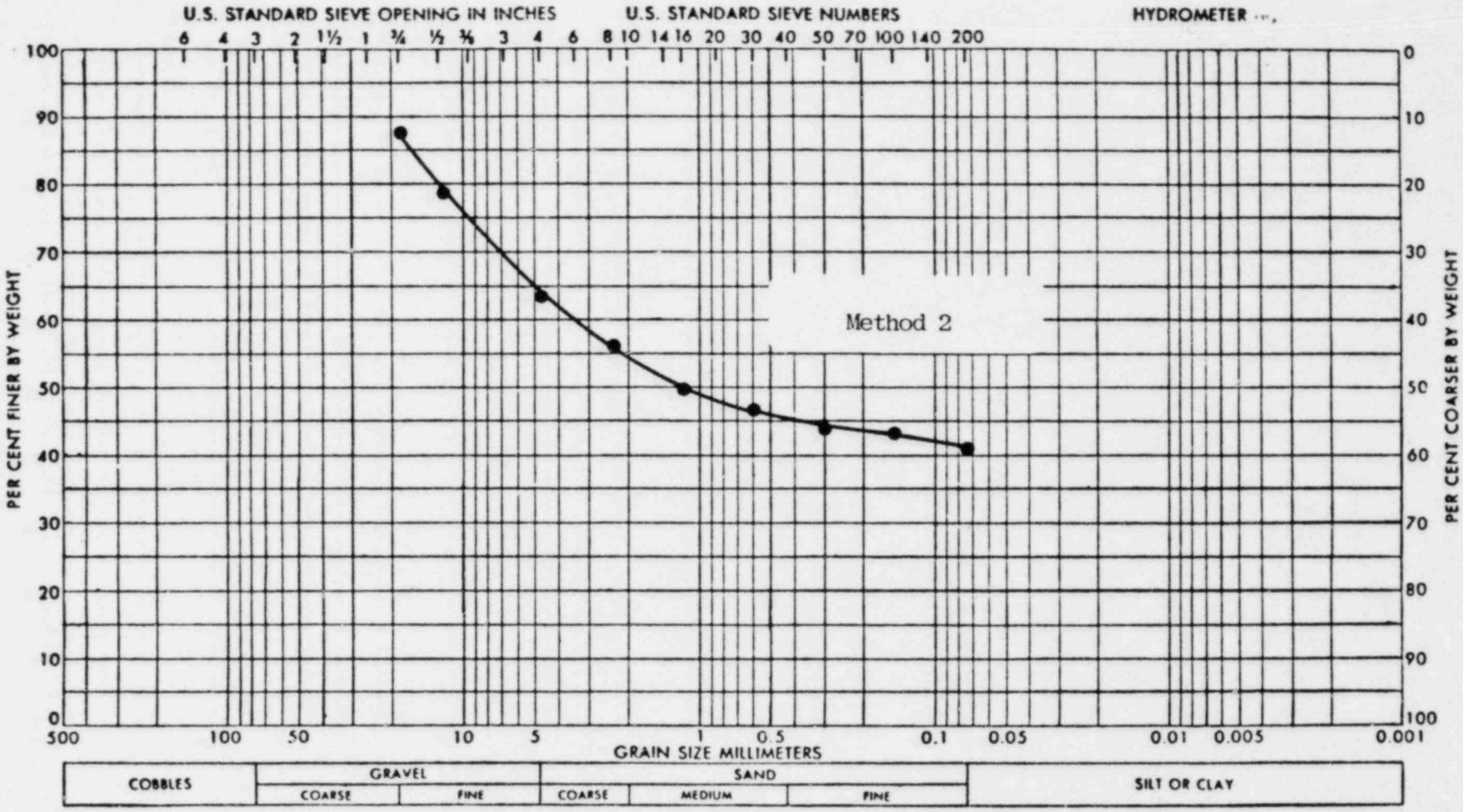
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-5A Sample P-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 18



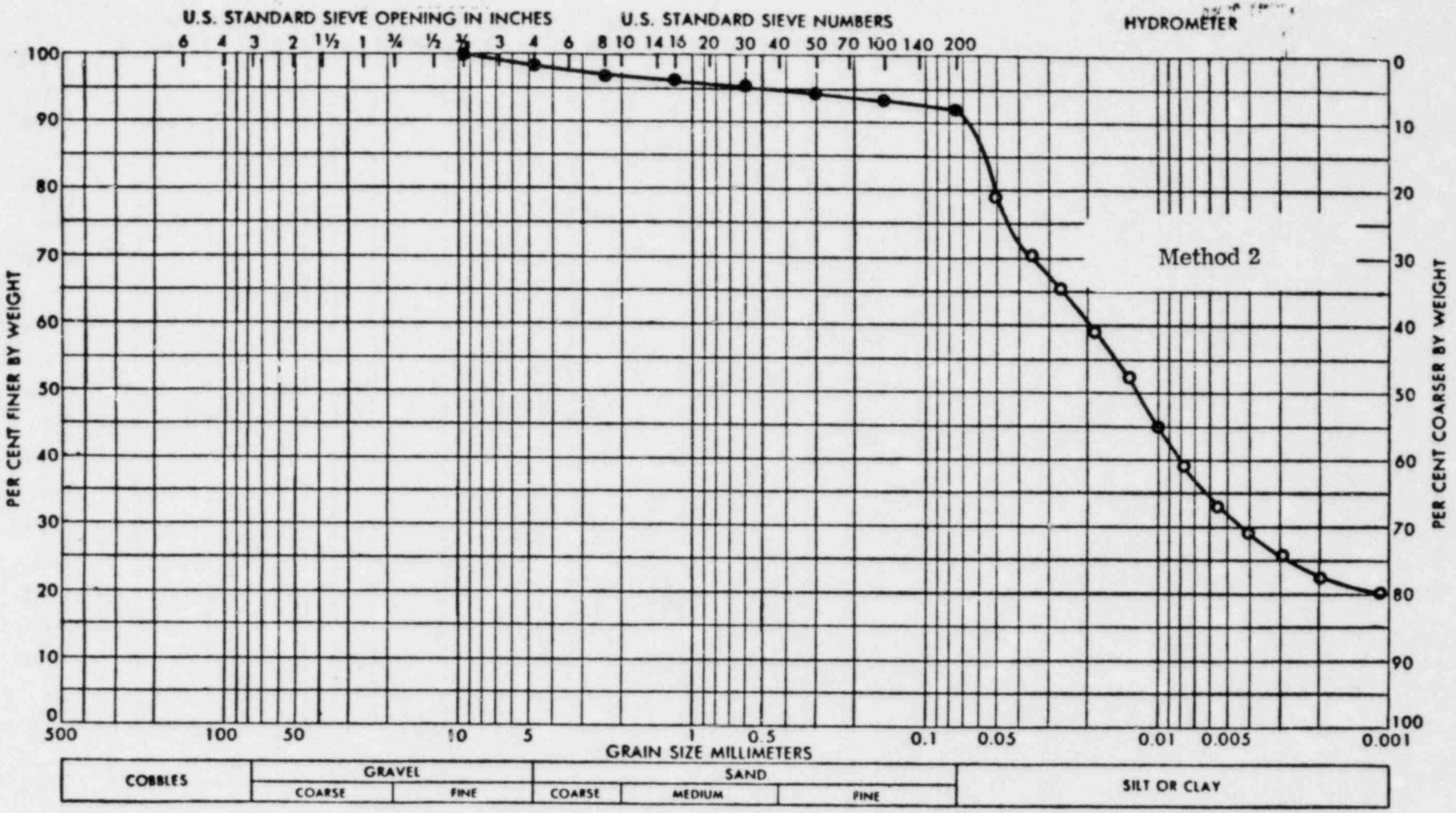
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-5A Sample P-2C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 19



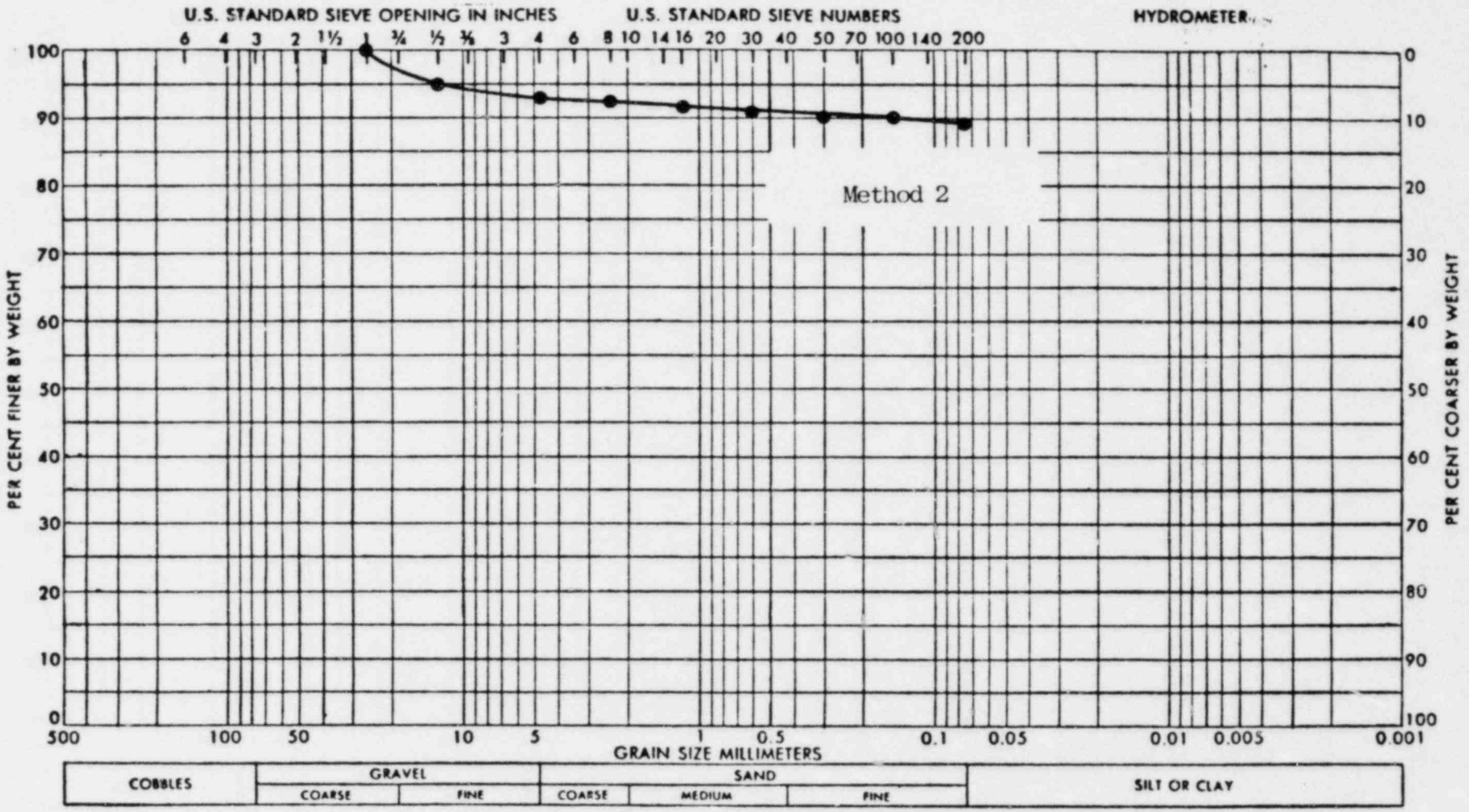
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-6 Sample D-1A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 20



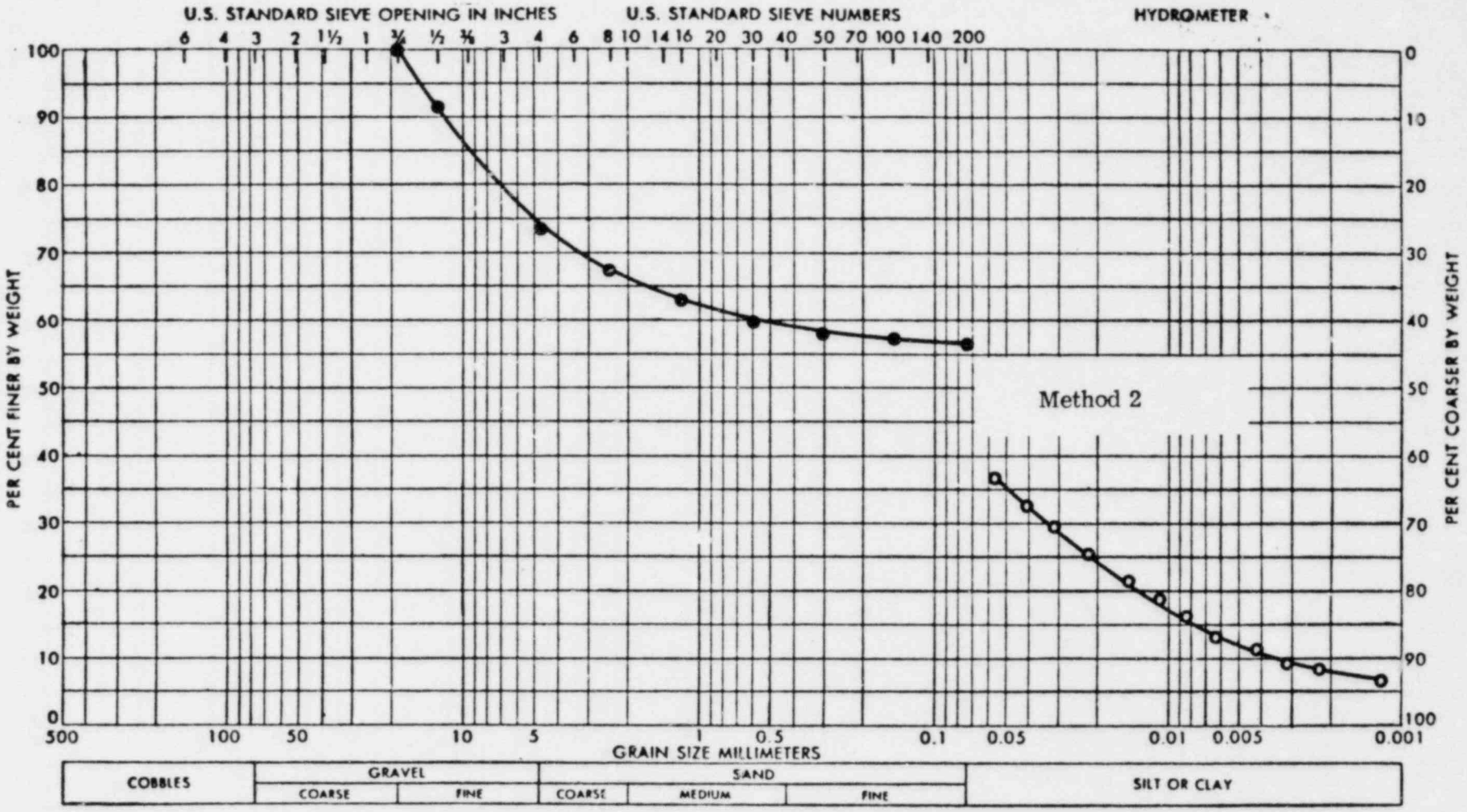
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-6 Sample D-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 21



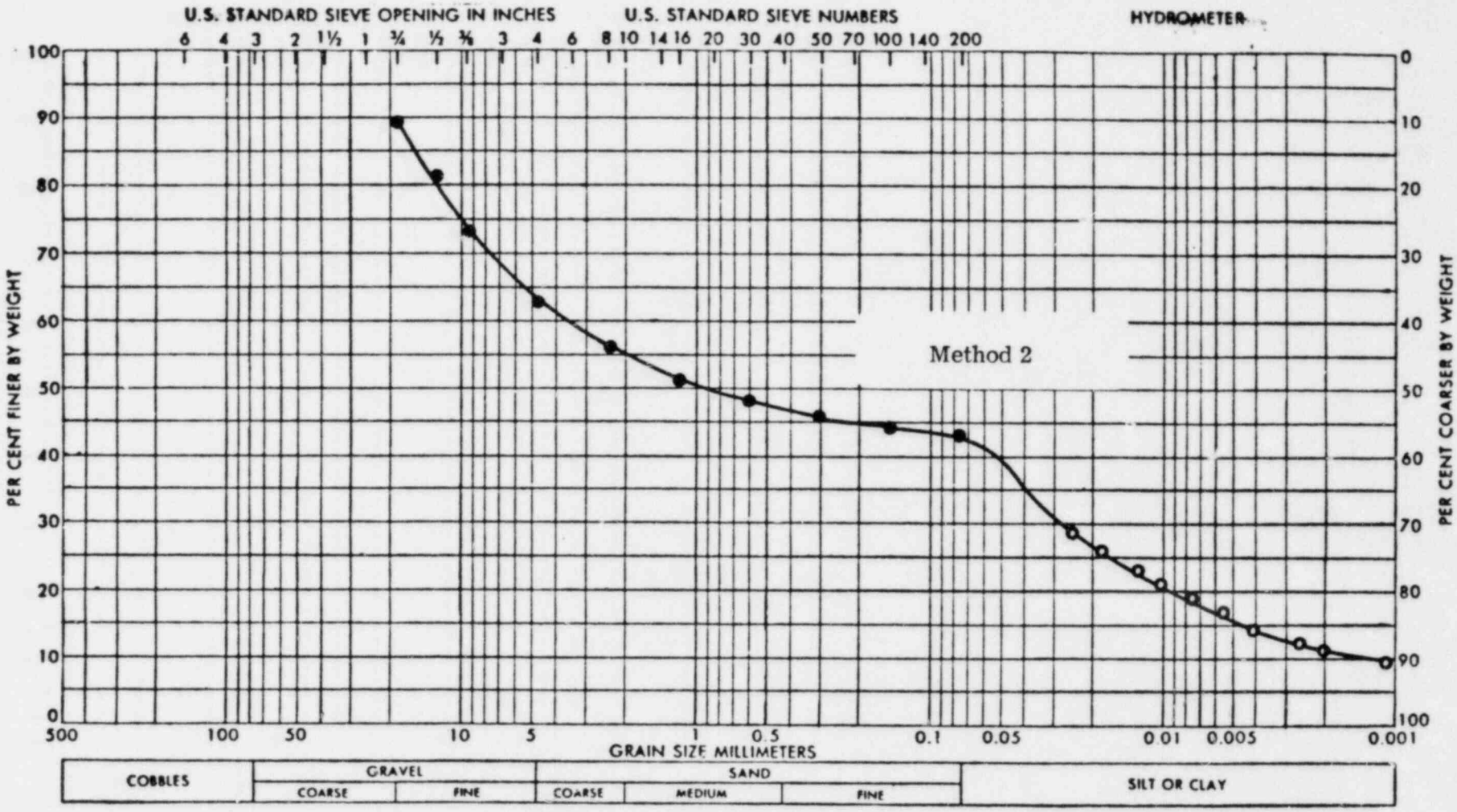
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-9 Sample 1 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 22



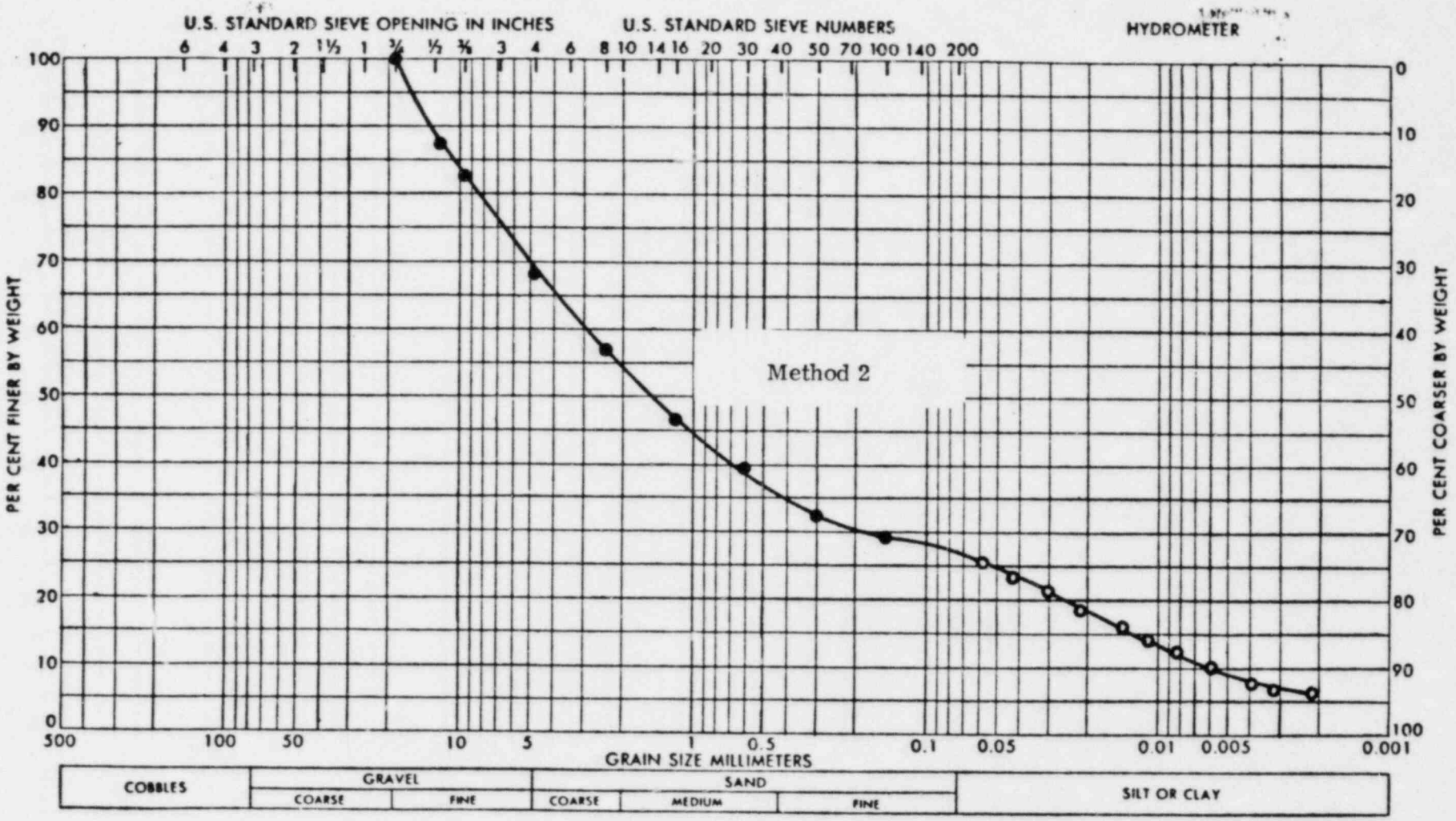
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE($\bar{R}$10) Boring SP-9 Sample 1 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 23



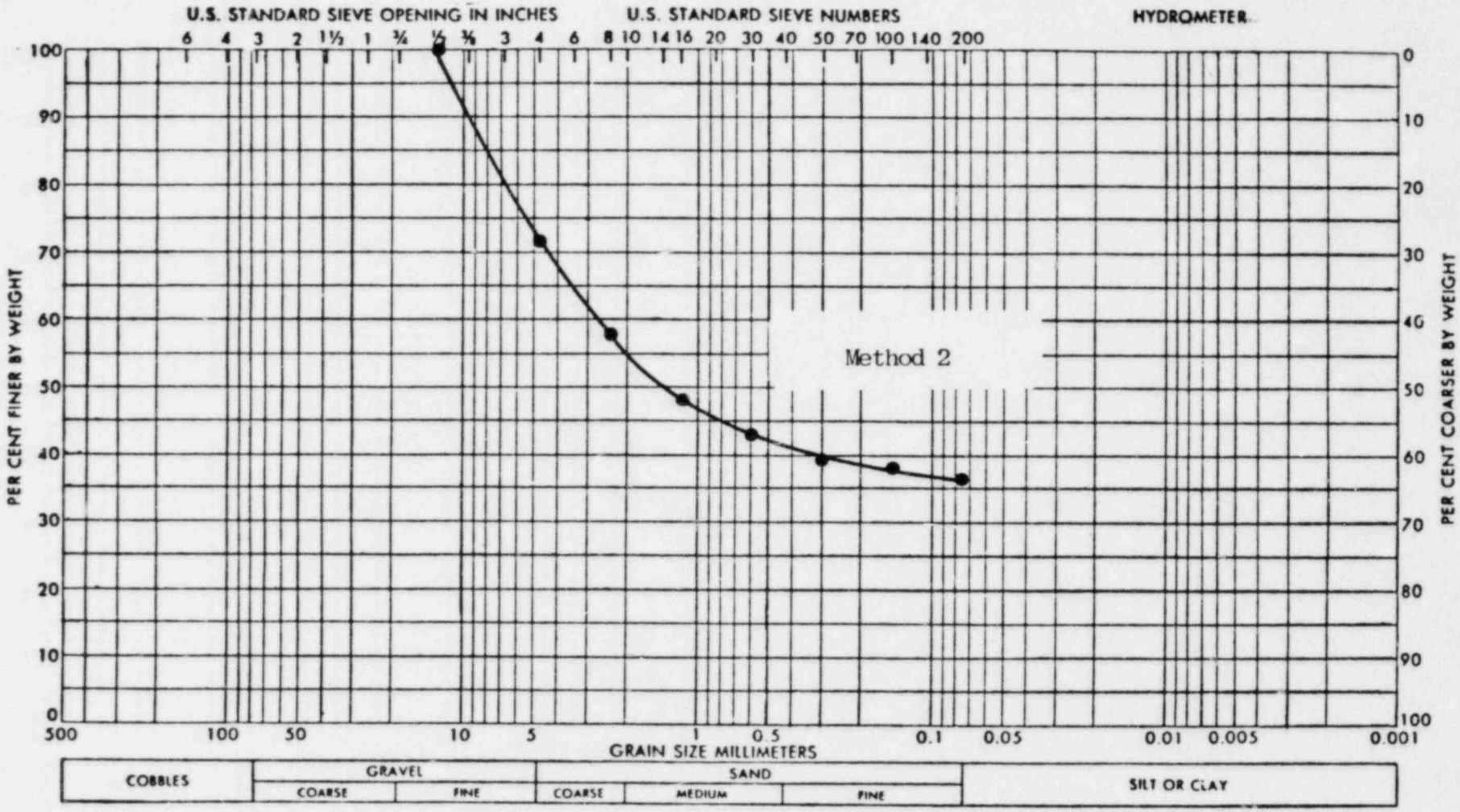
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-9 Sample S-3
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 24



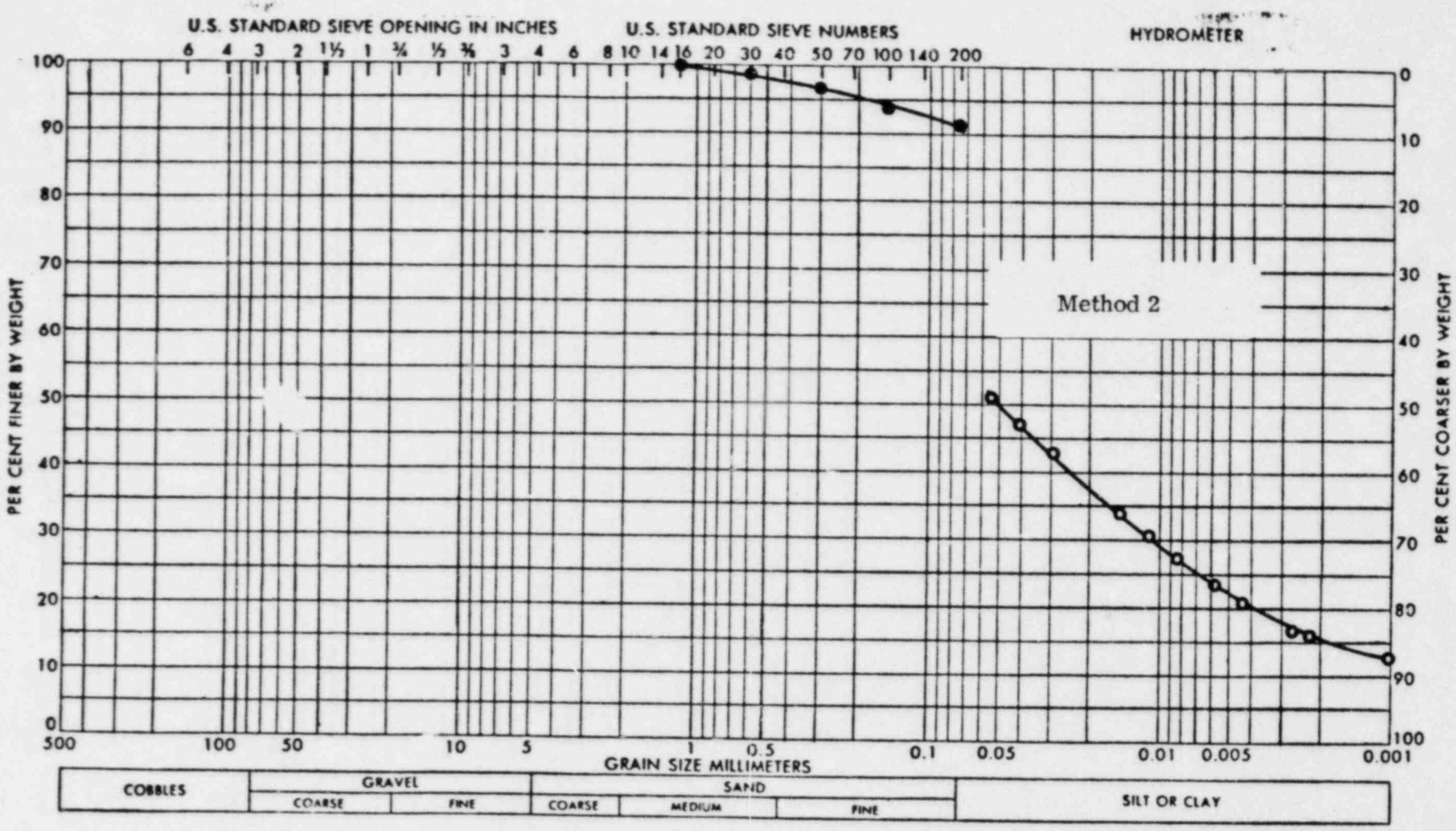
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-10 Sample S-2
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.25



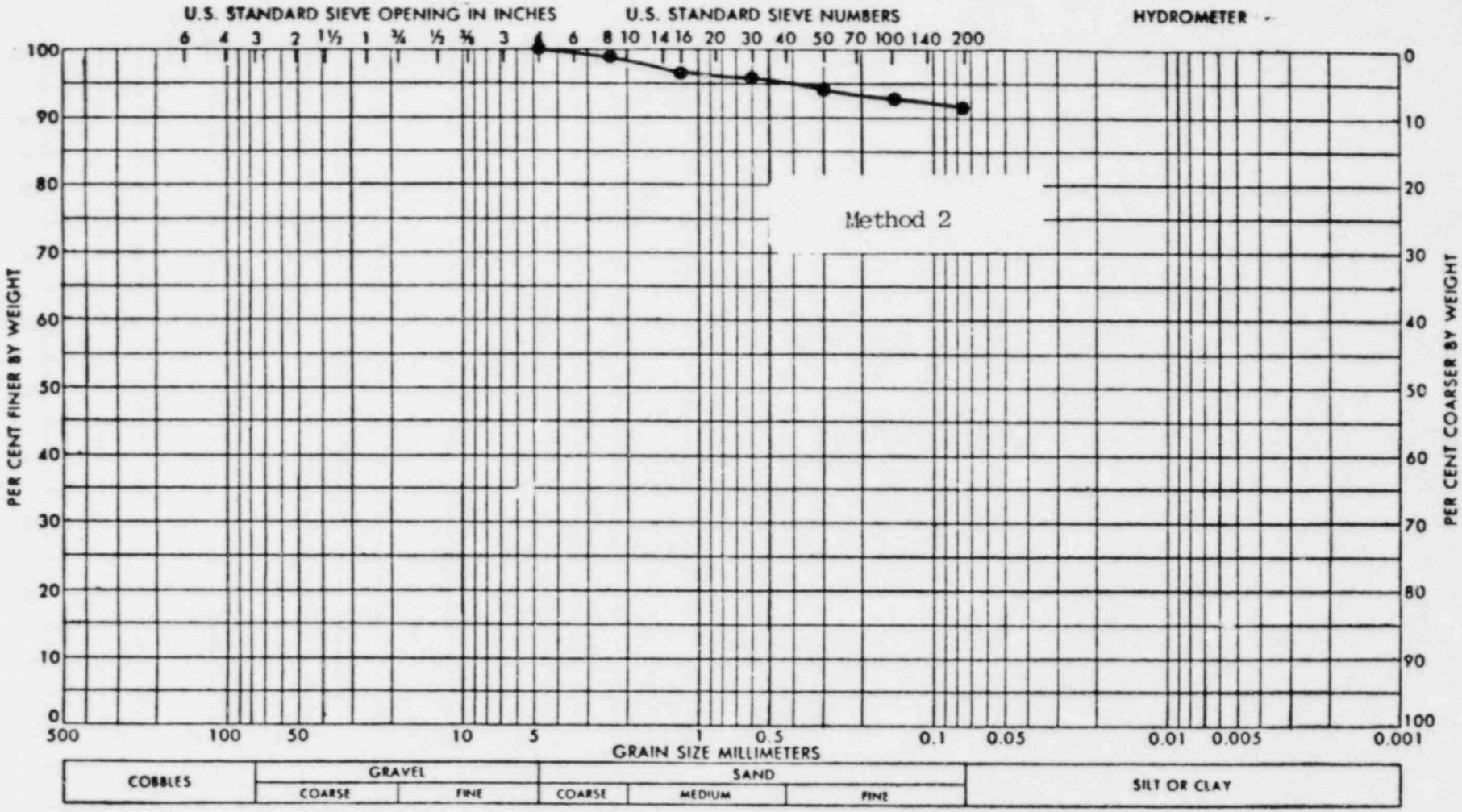
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-11 Sample S-2
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.26



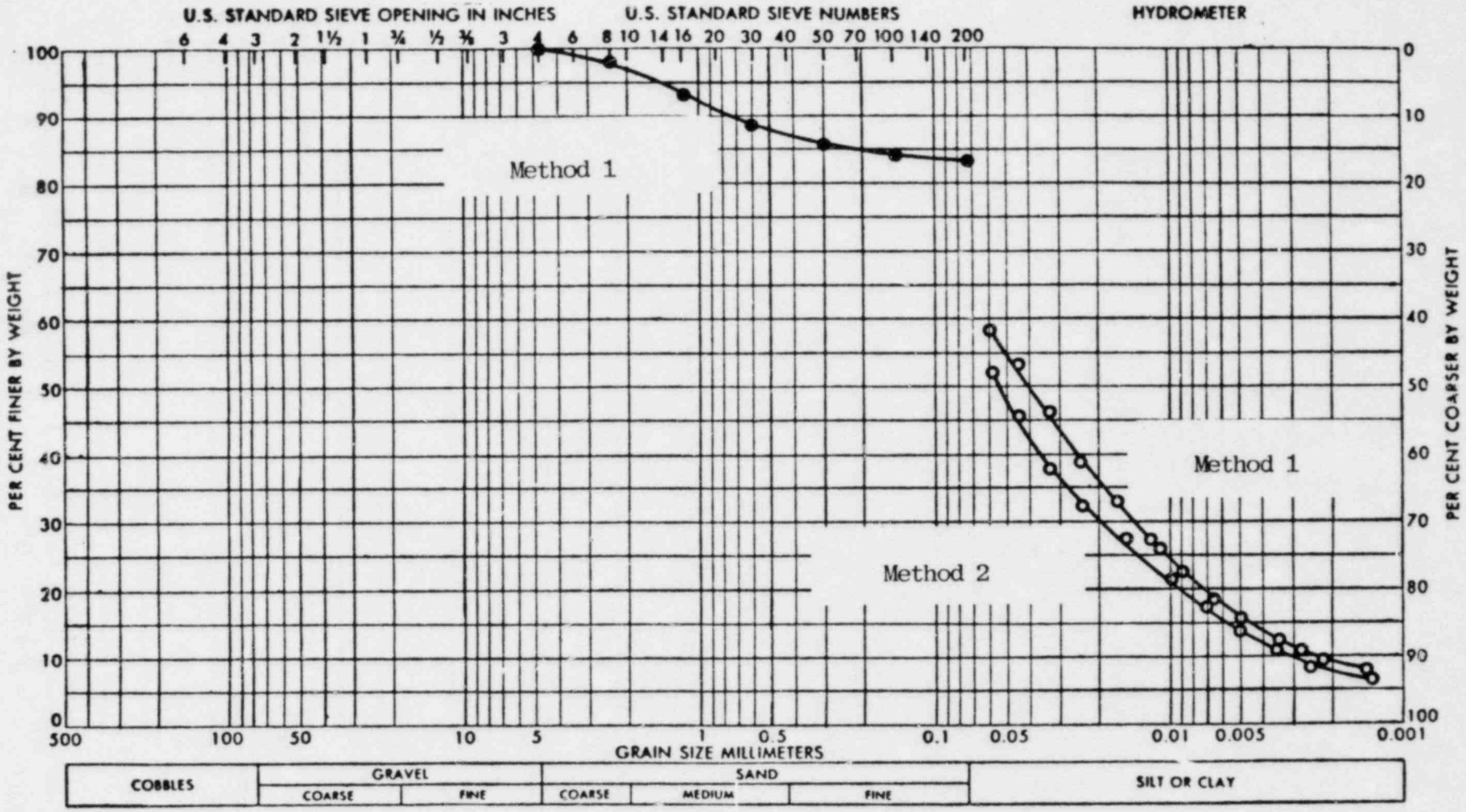
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-12 Sample P-2B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 27



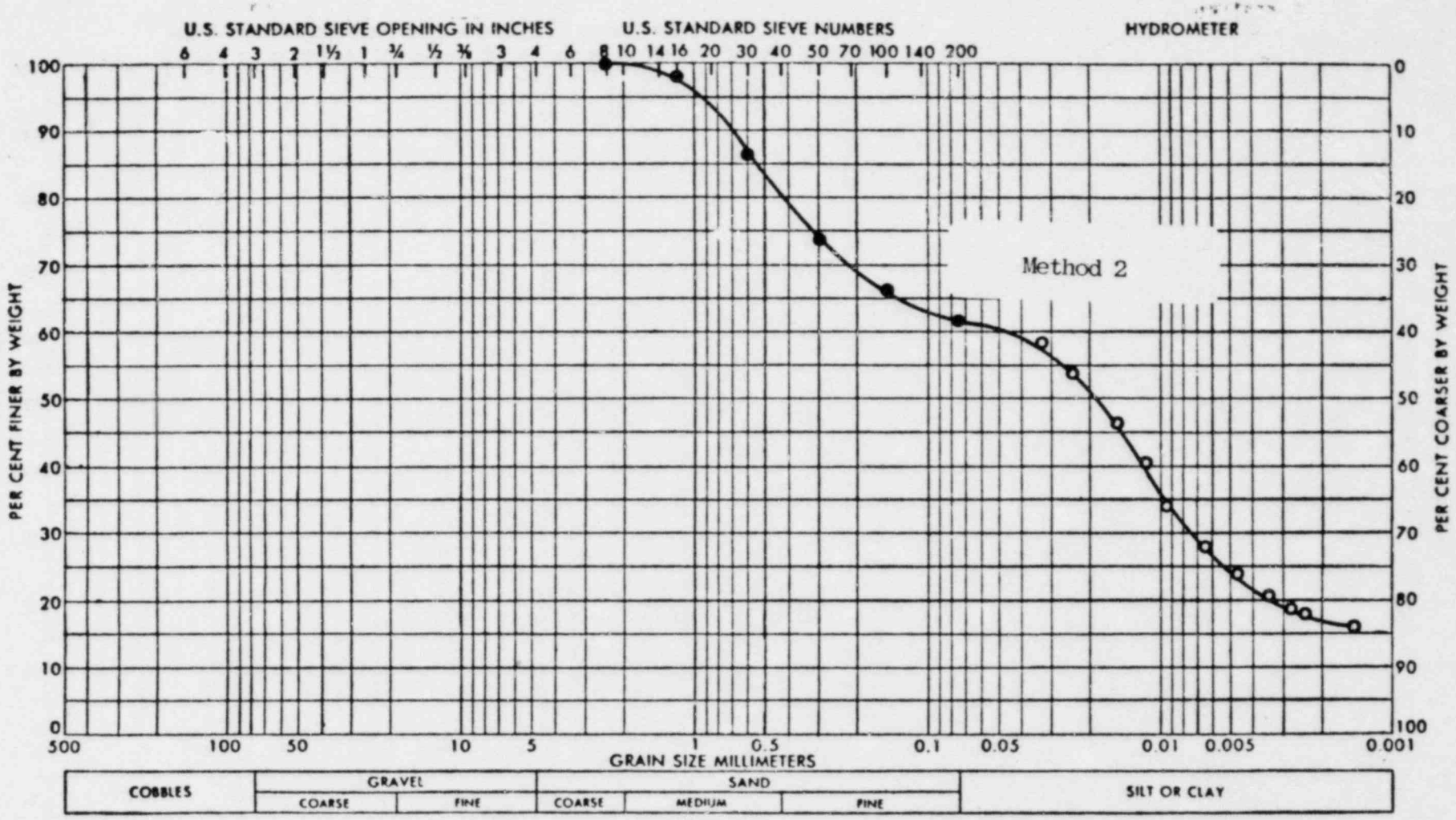
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-14 Sample 1 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 28



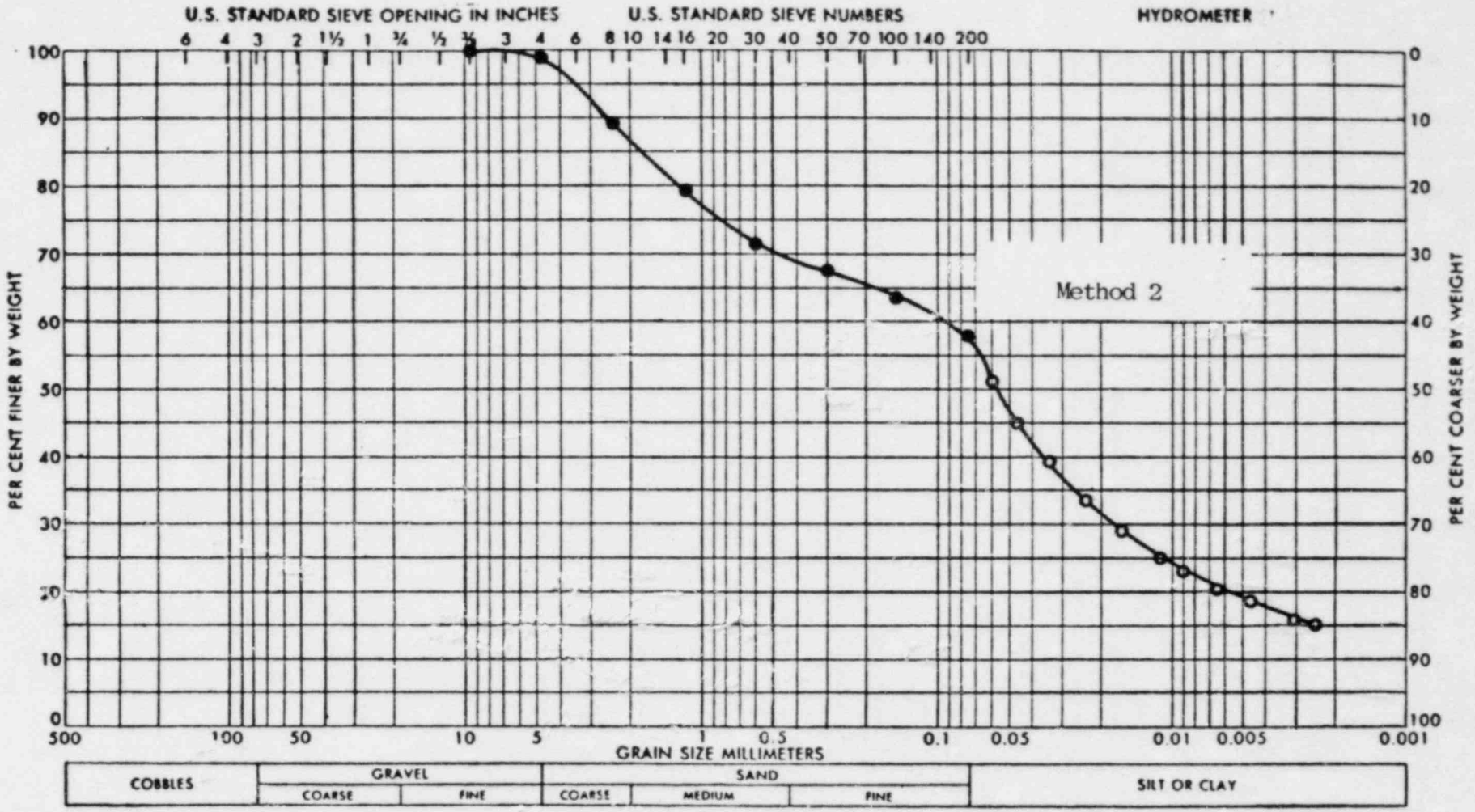
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE (R9) Boring SP-14 Sample 1 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 29



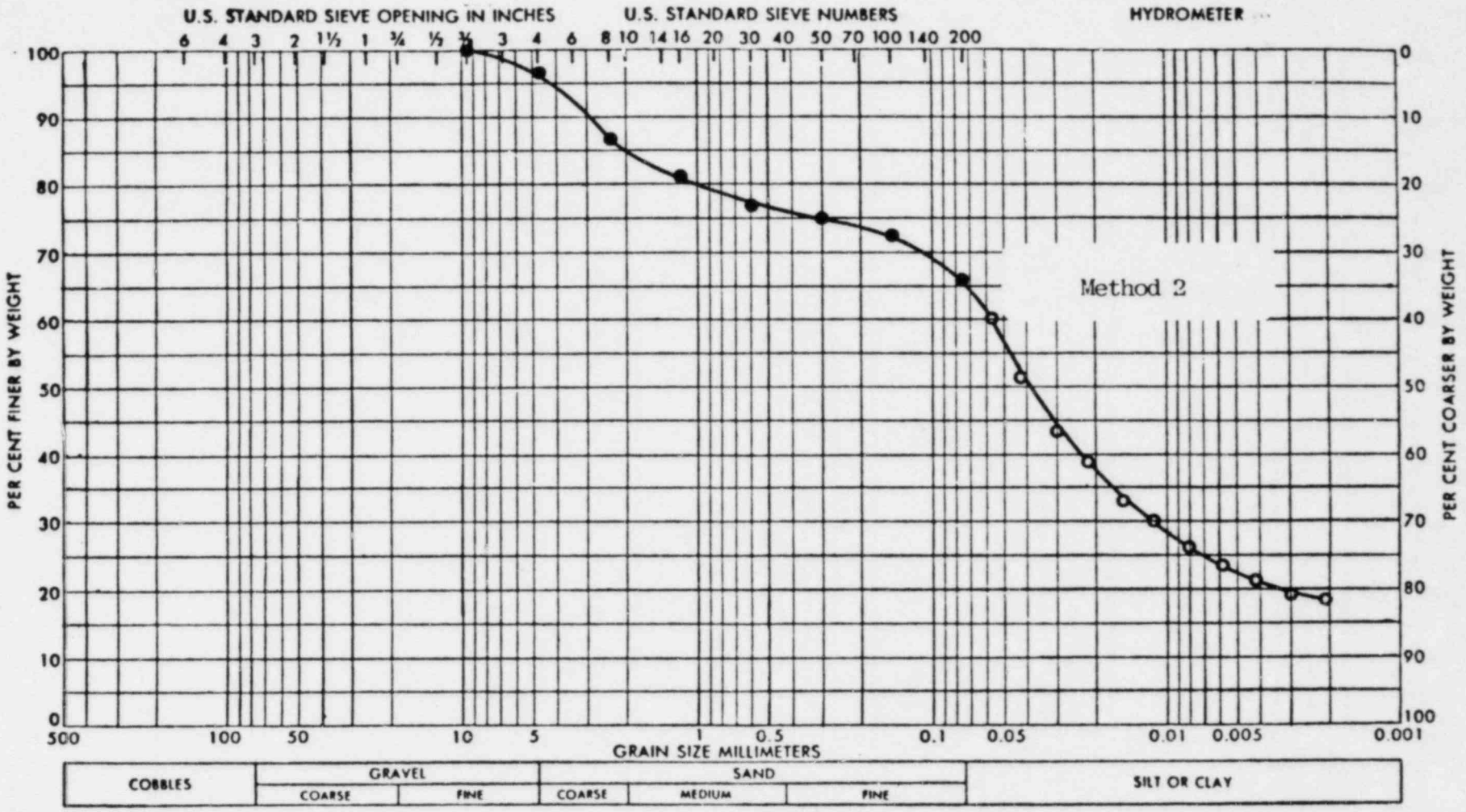
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-14A Sample P-2A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 30



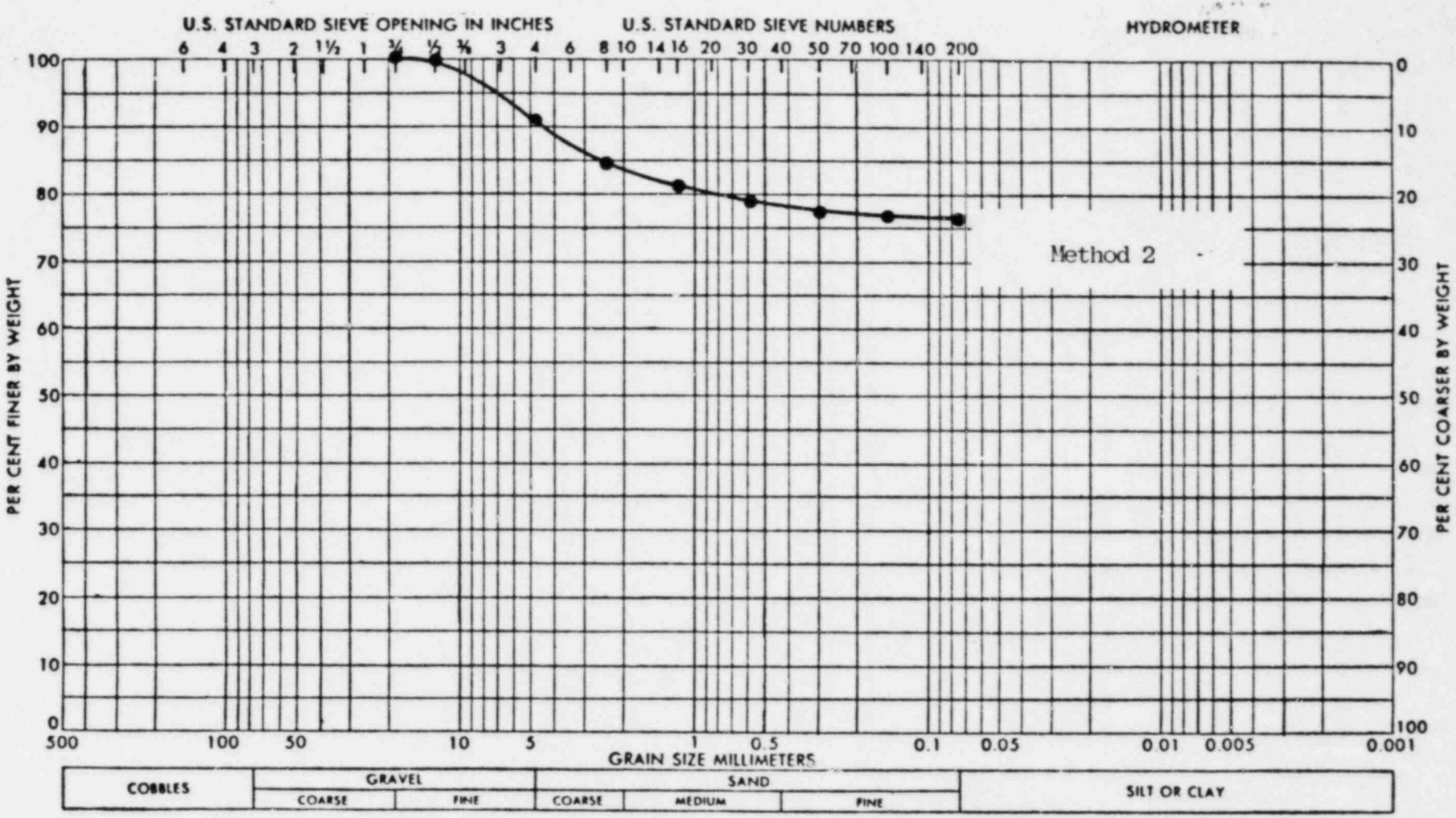
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-14A Sample P-2B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 31



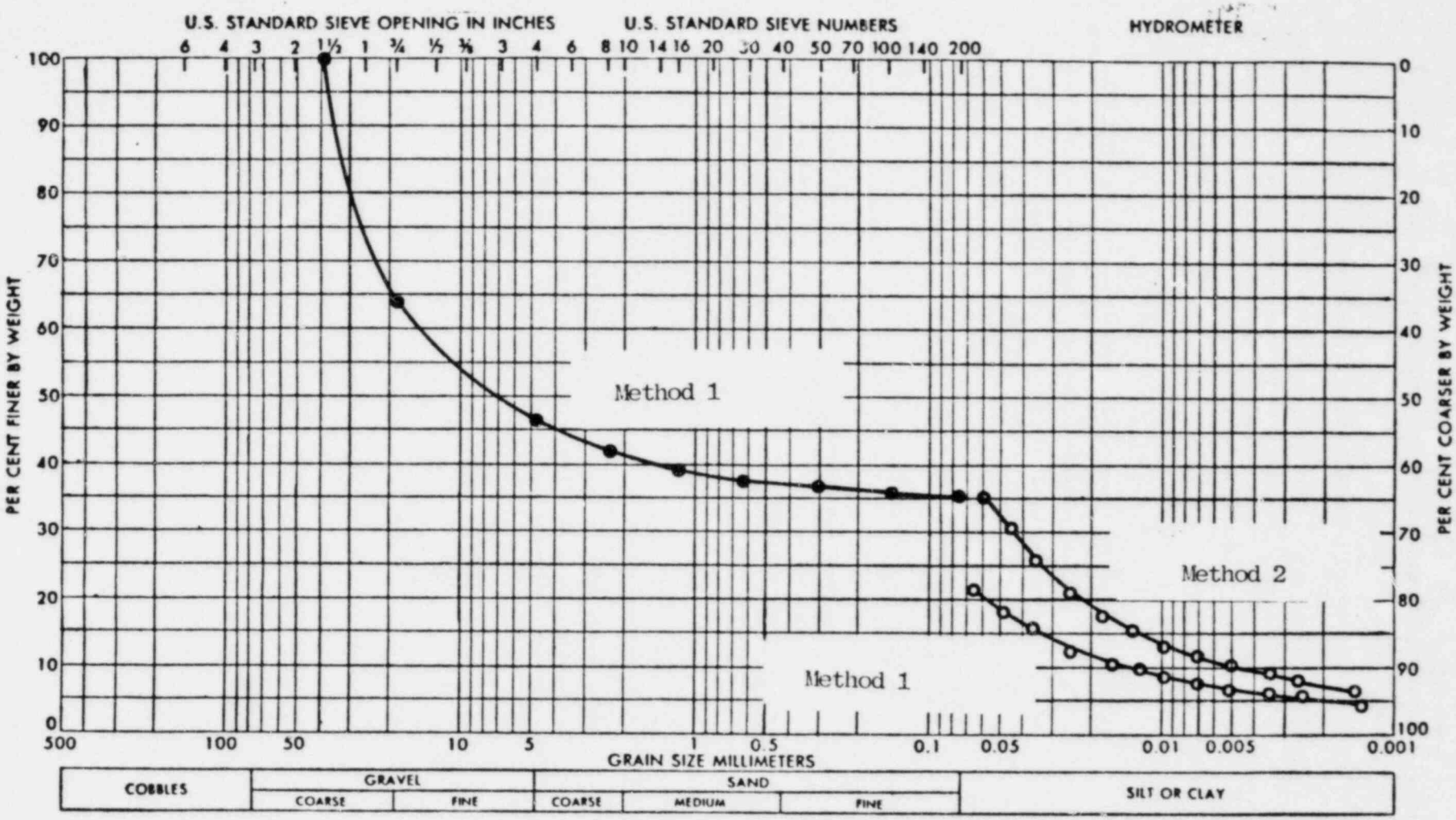
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15 Sample 1 (Block) top
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.32



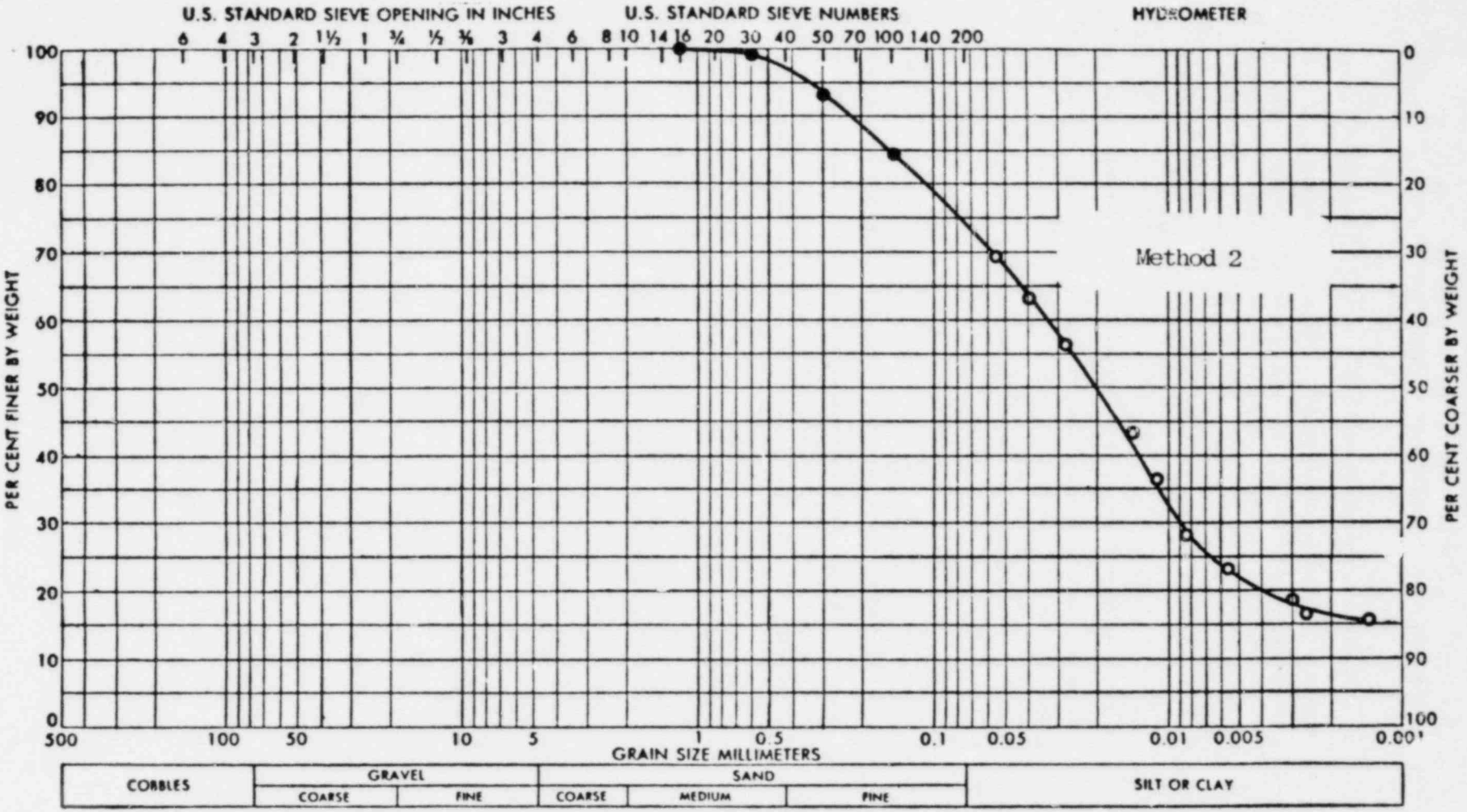
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15 Sample 1 (Block) Bot.
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 33



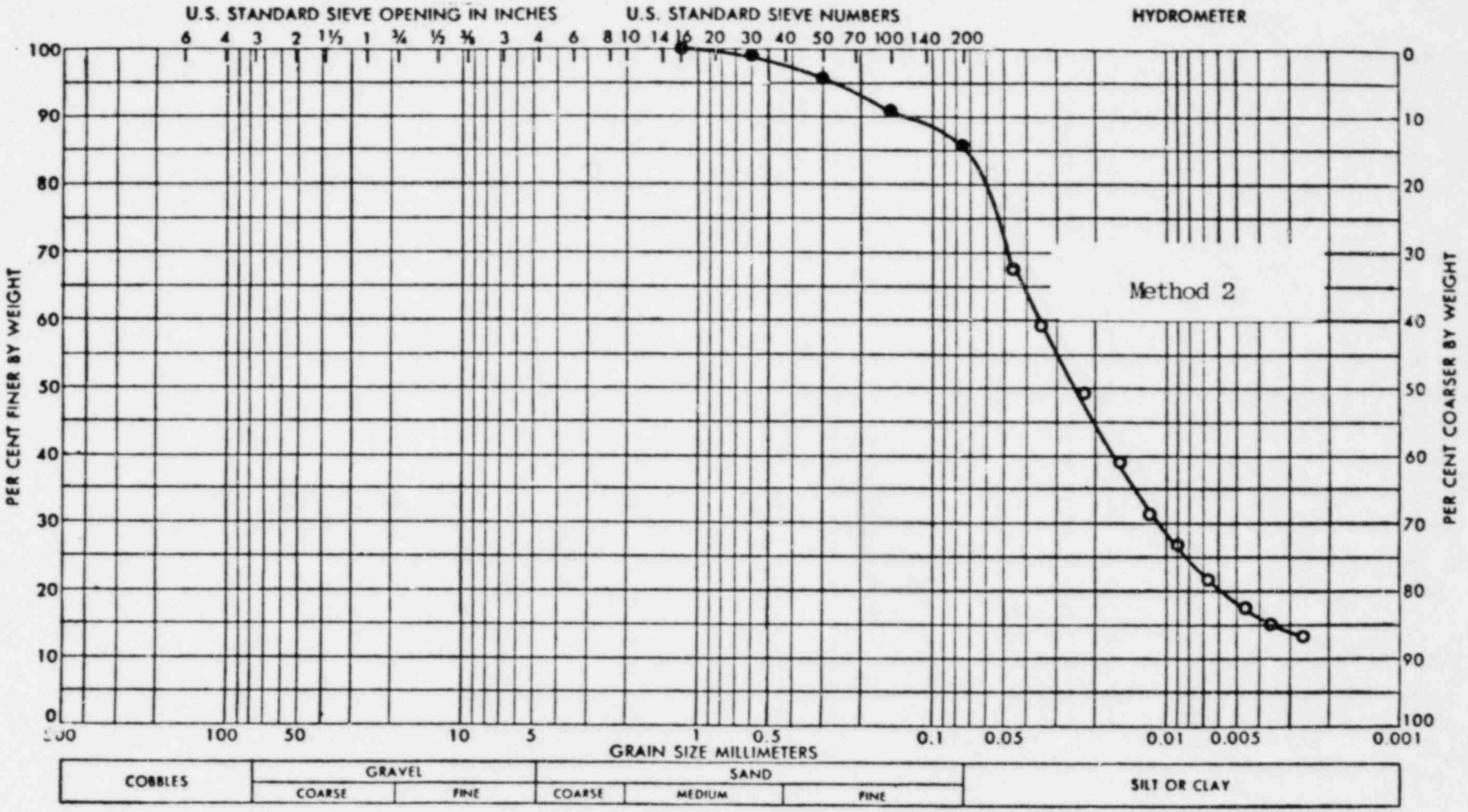
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE ($\bar{R}$7) Boring SP-15 Sample 1 (Block)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 34



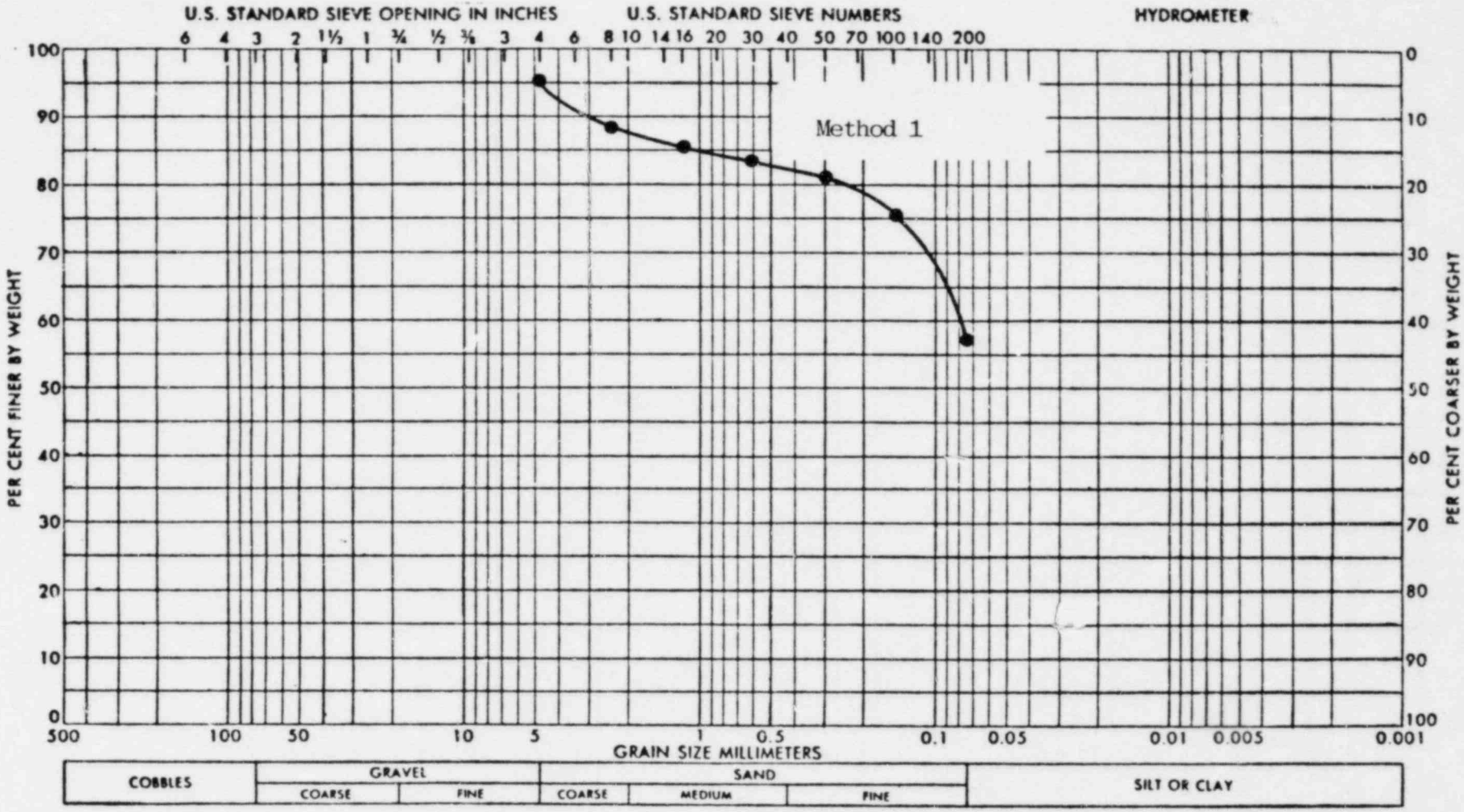
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-2A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 35



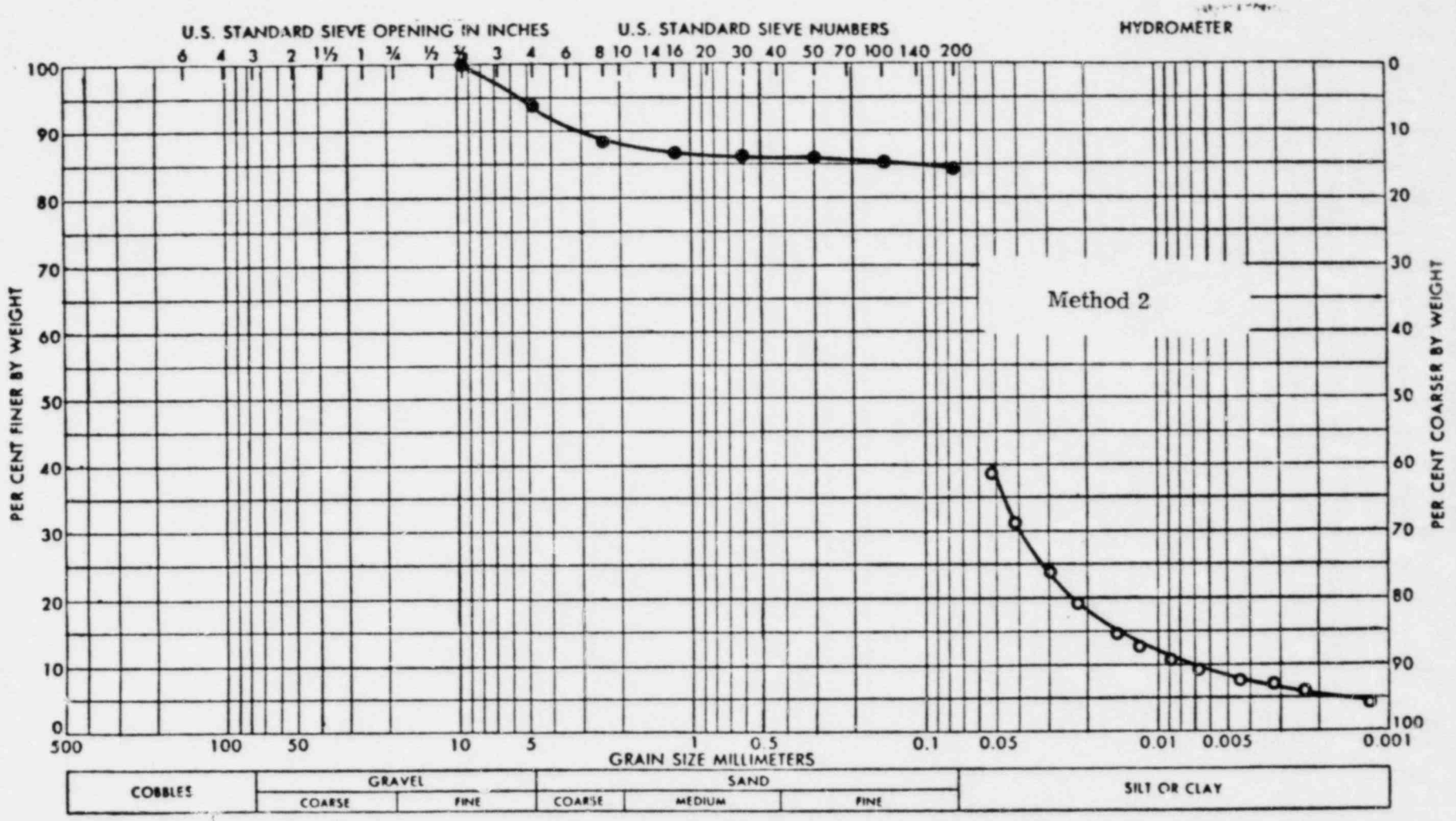
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-2C (Top)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 36



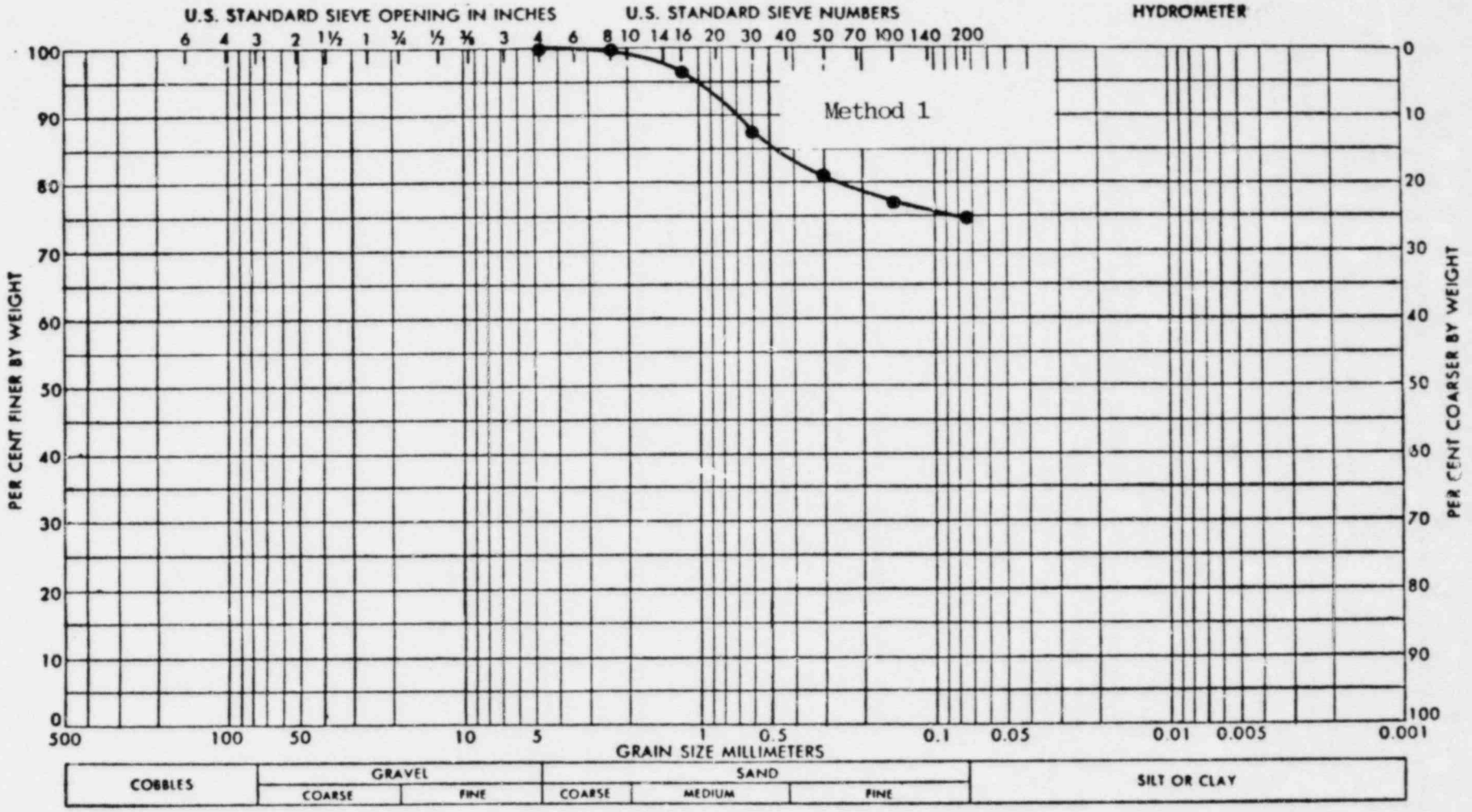
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring 15A Sample P-2C (Bot.)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 37



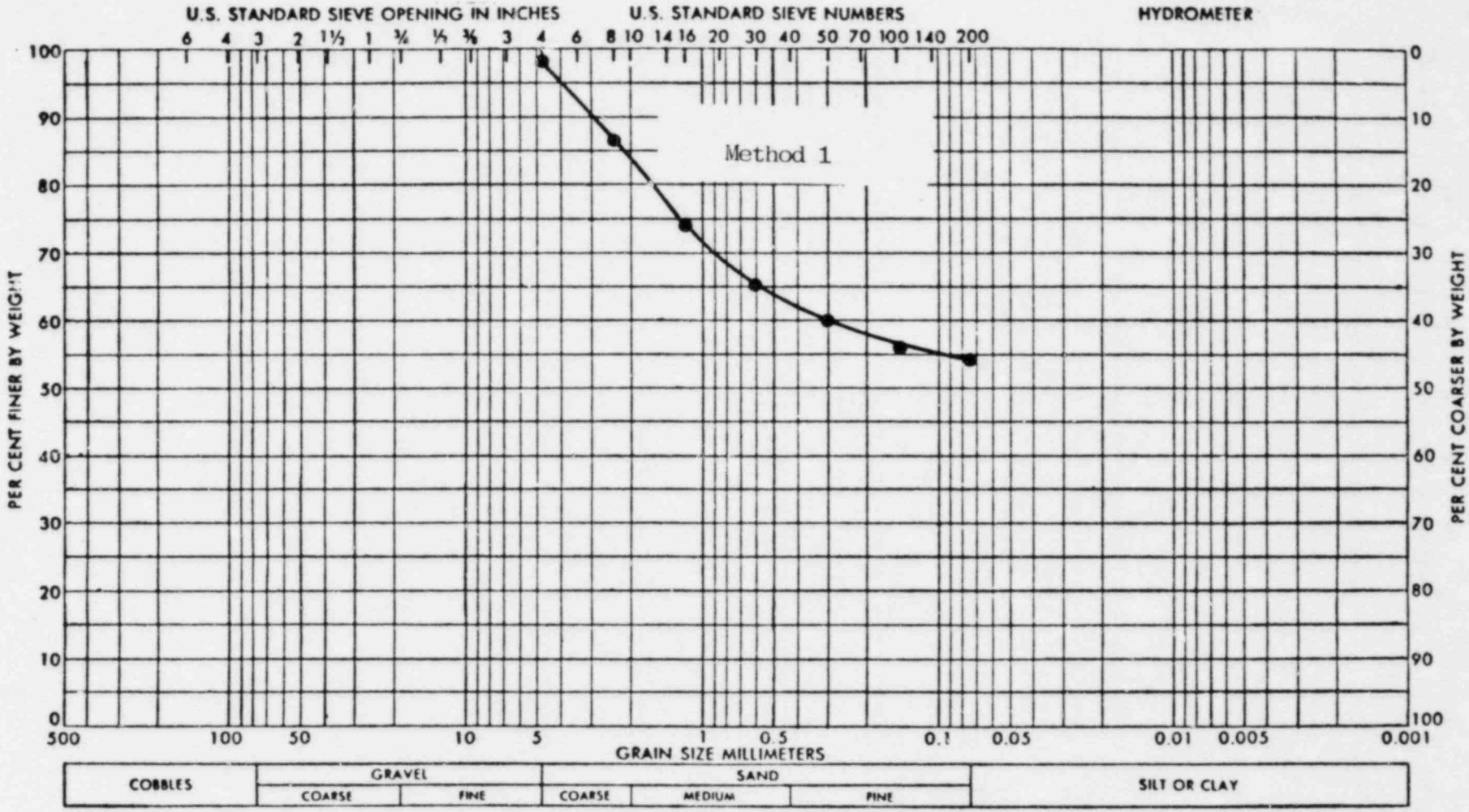
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-3A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 38



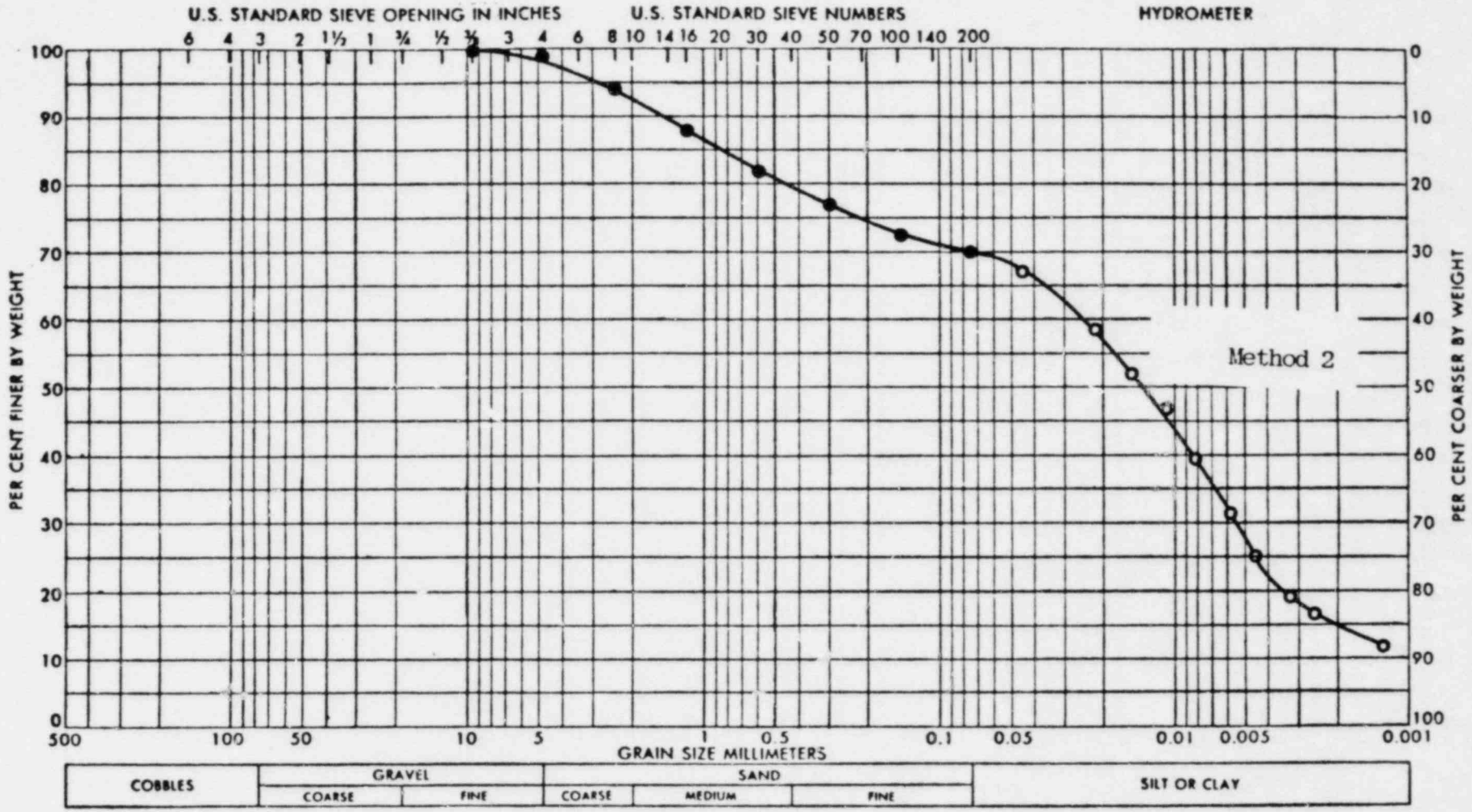
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-3B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 39



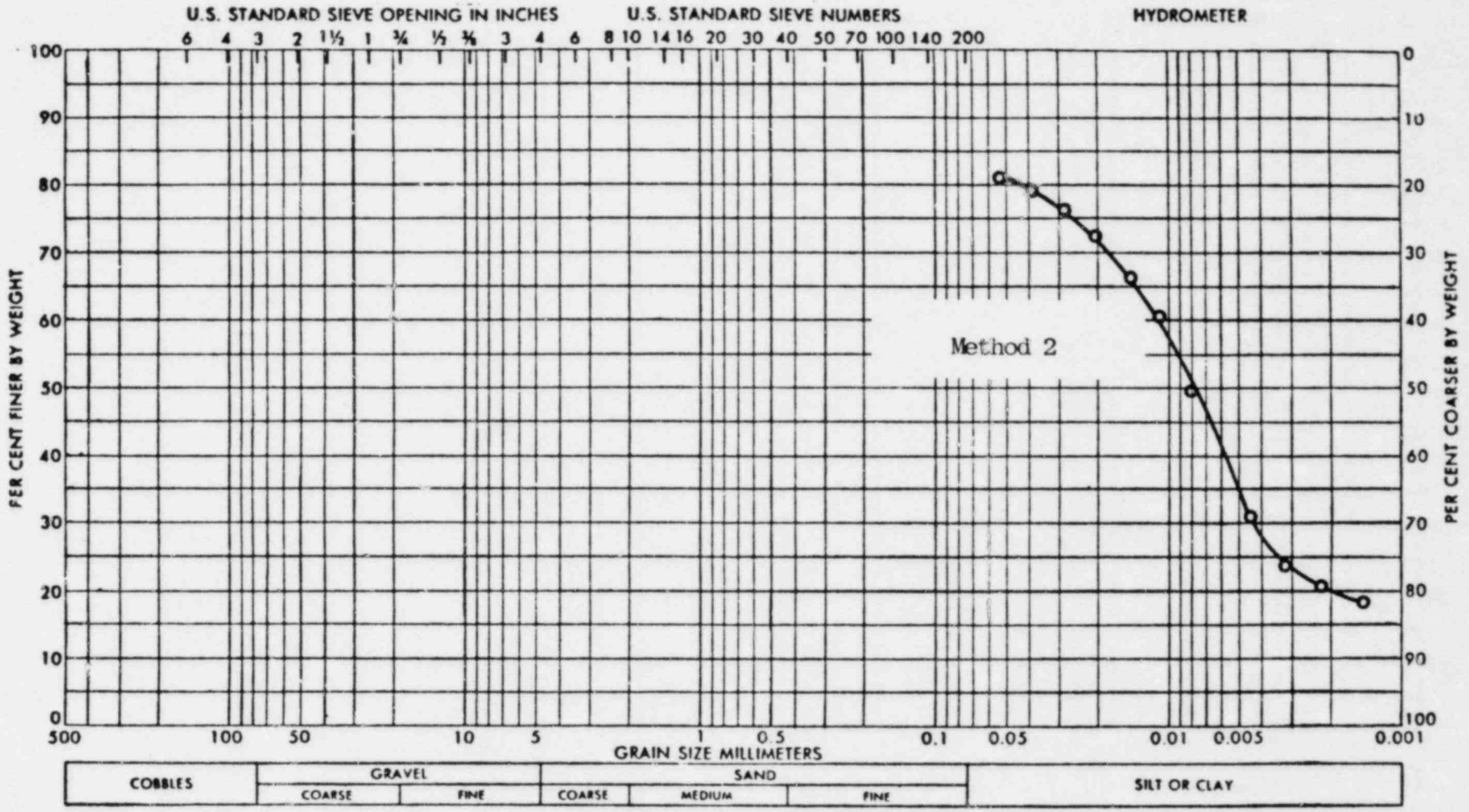
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-5A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 40



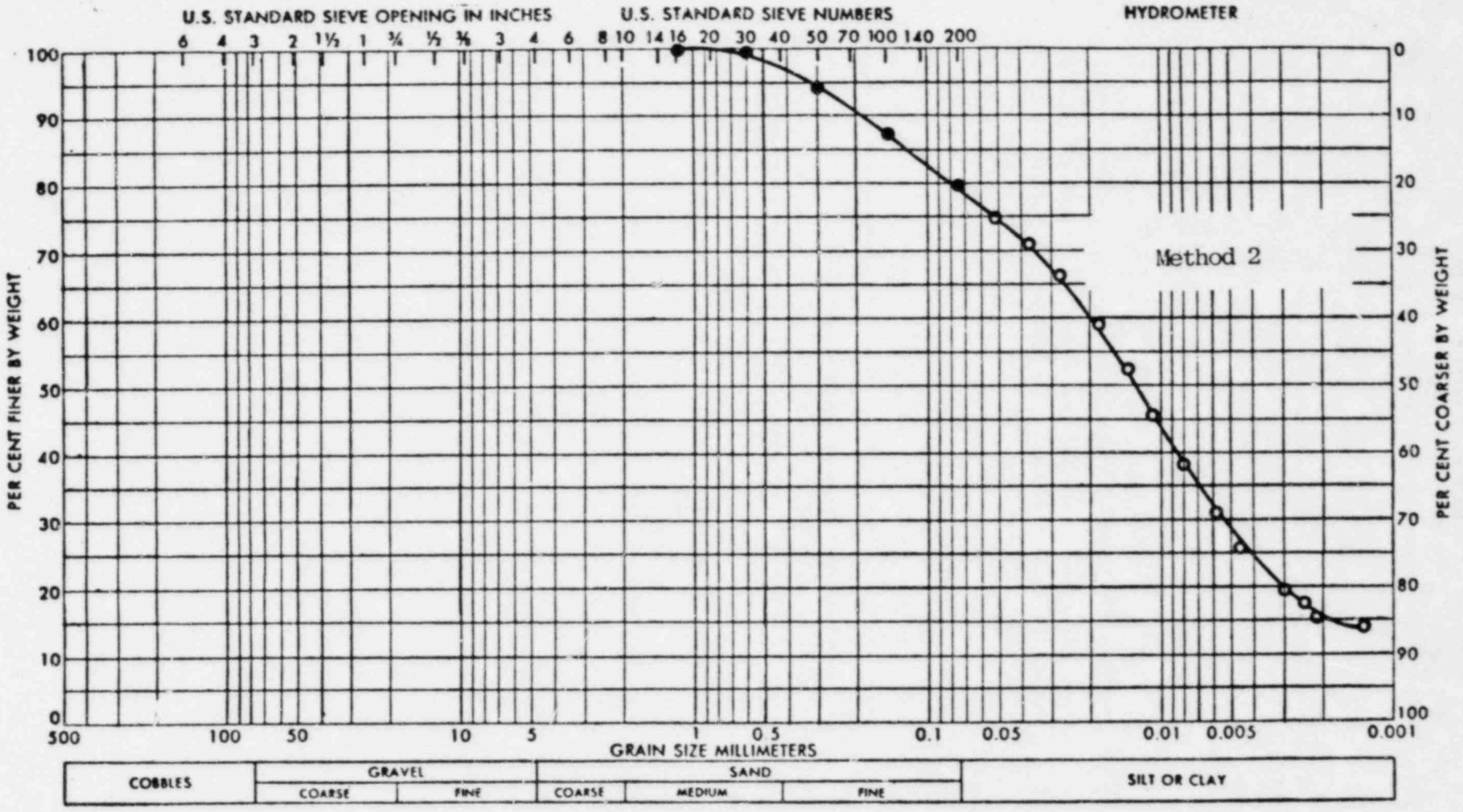
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-6A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 41



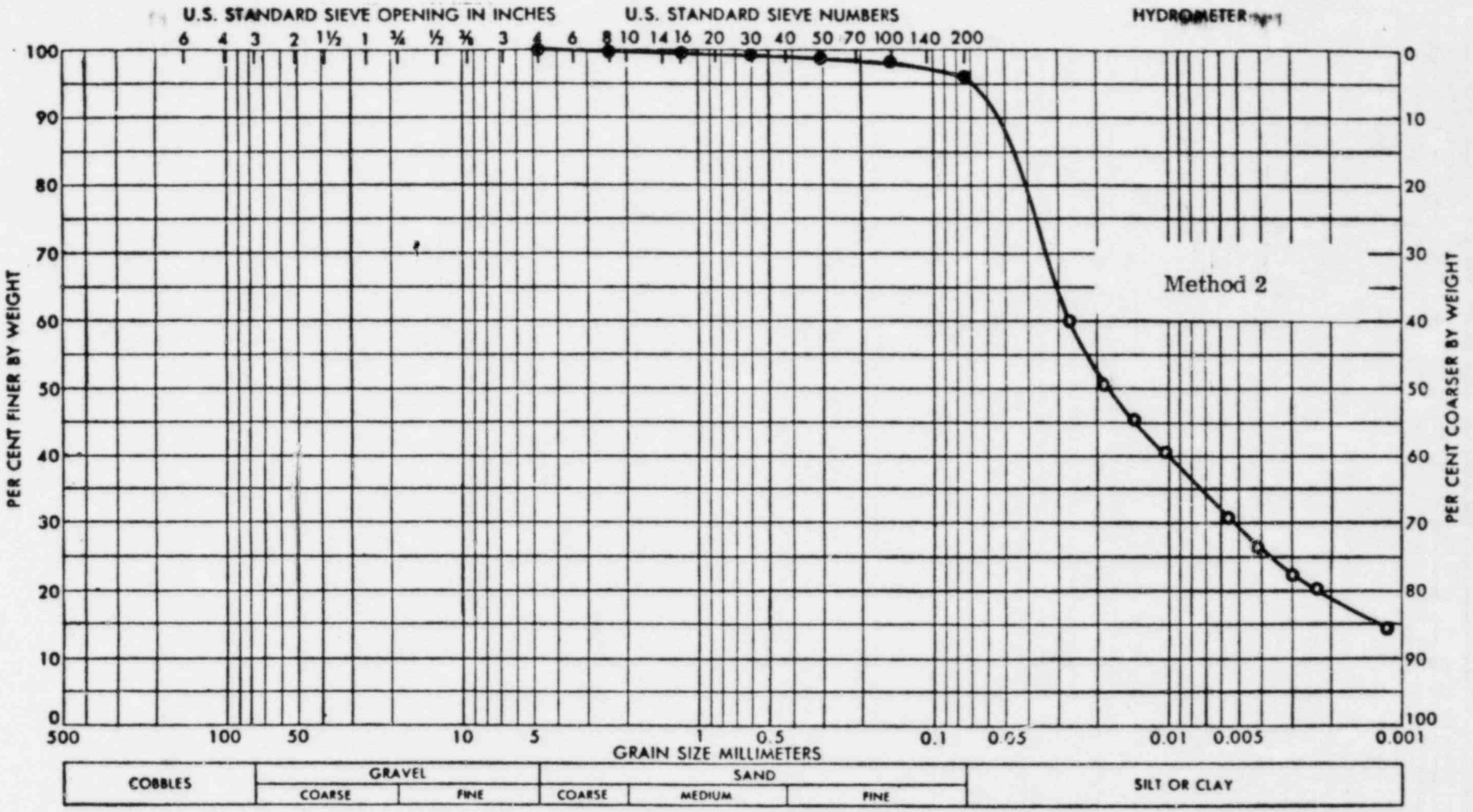
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-6B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 42



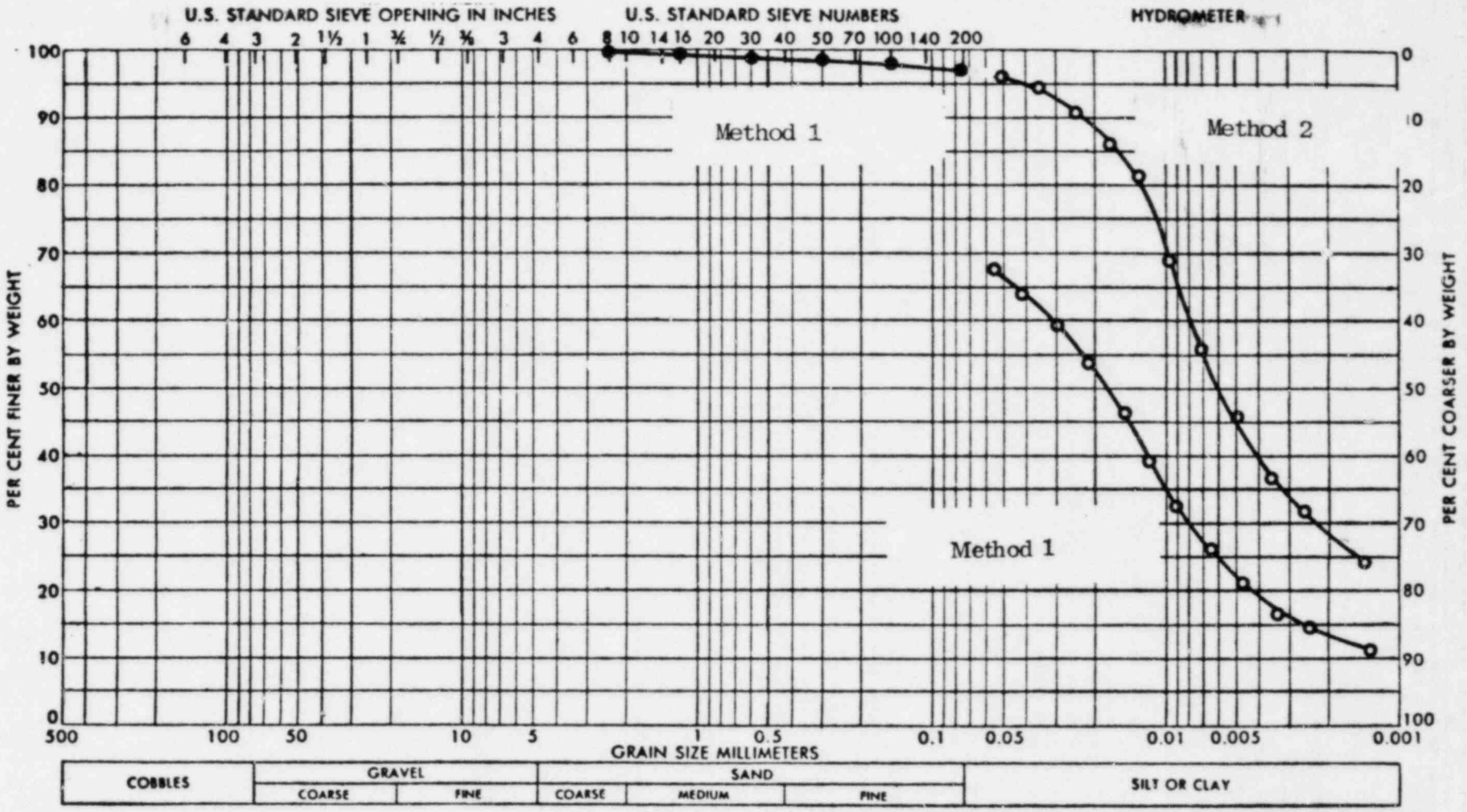
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-6C (Top)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 43



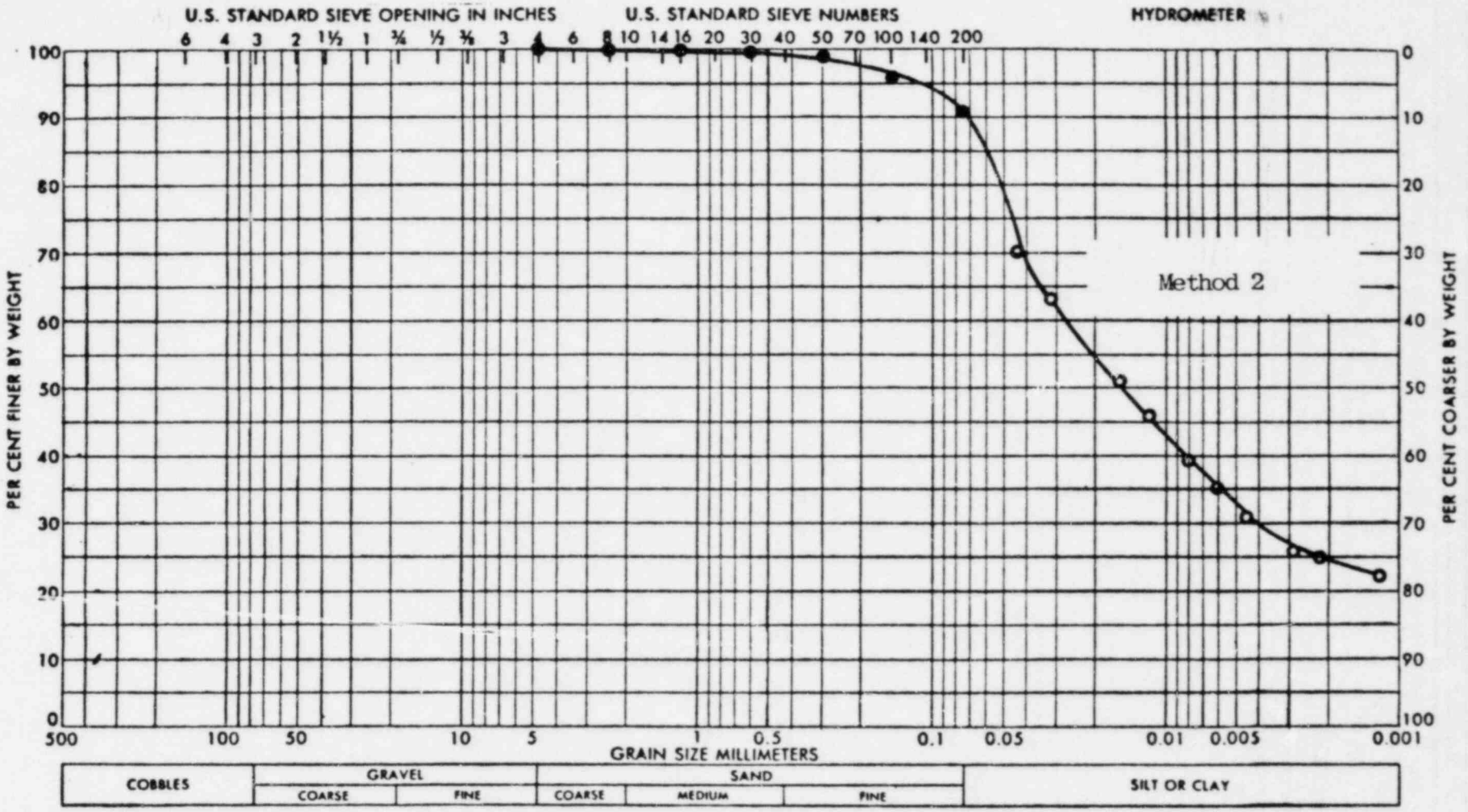
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-15A Sample P-6C (Bot.)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 44



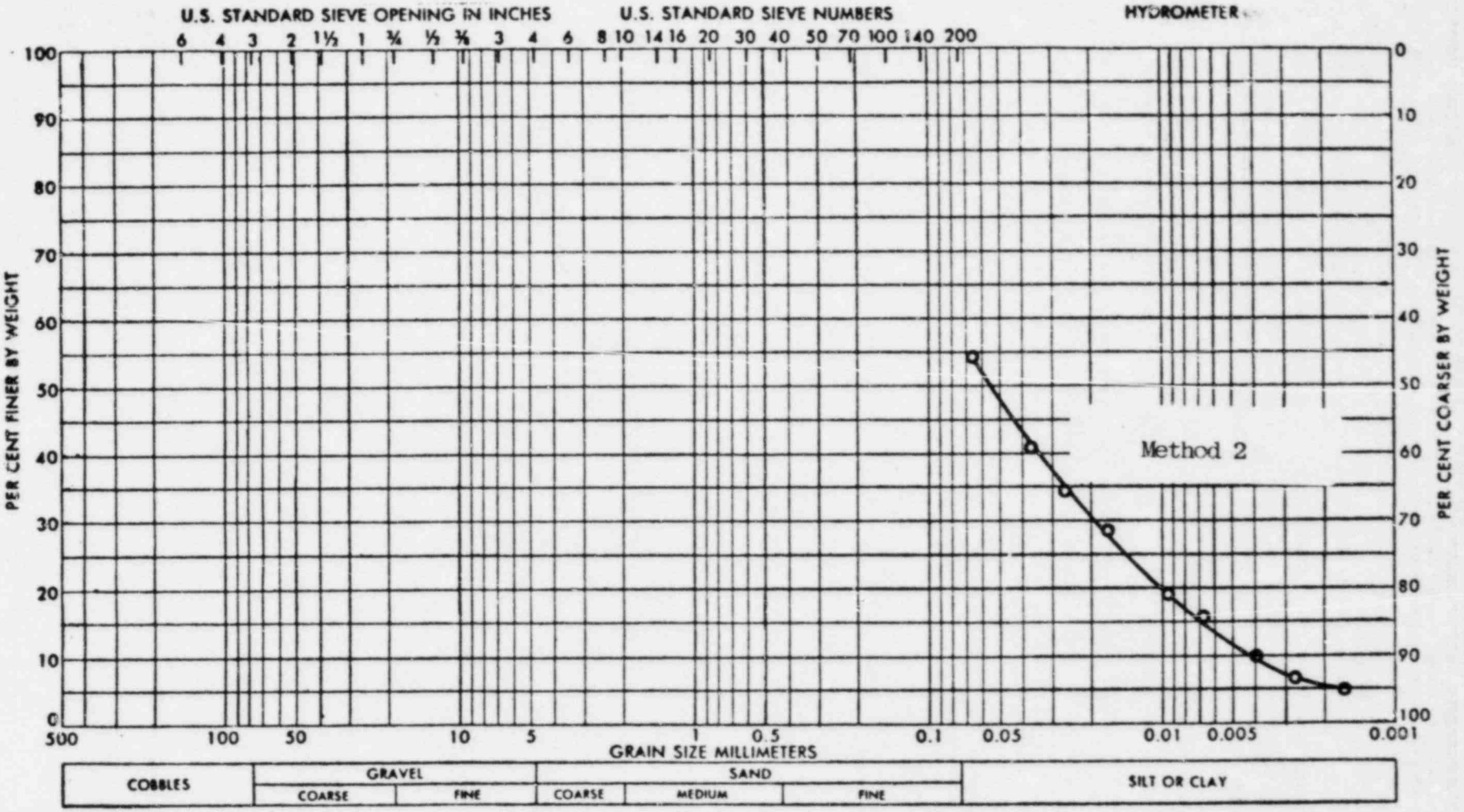
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-16 Sample S-6
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 45



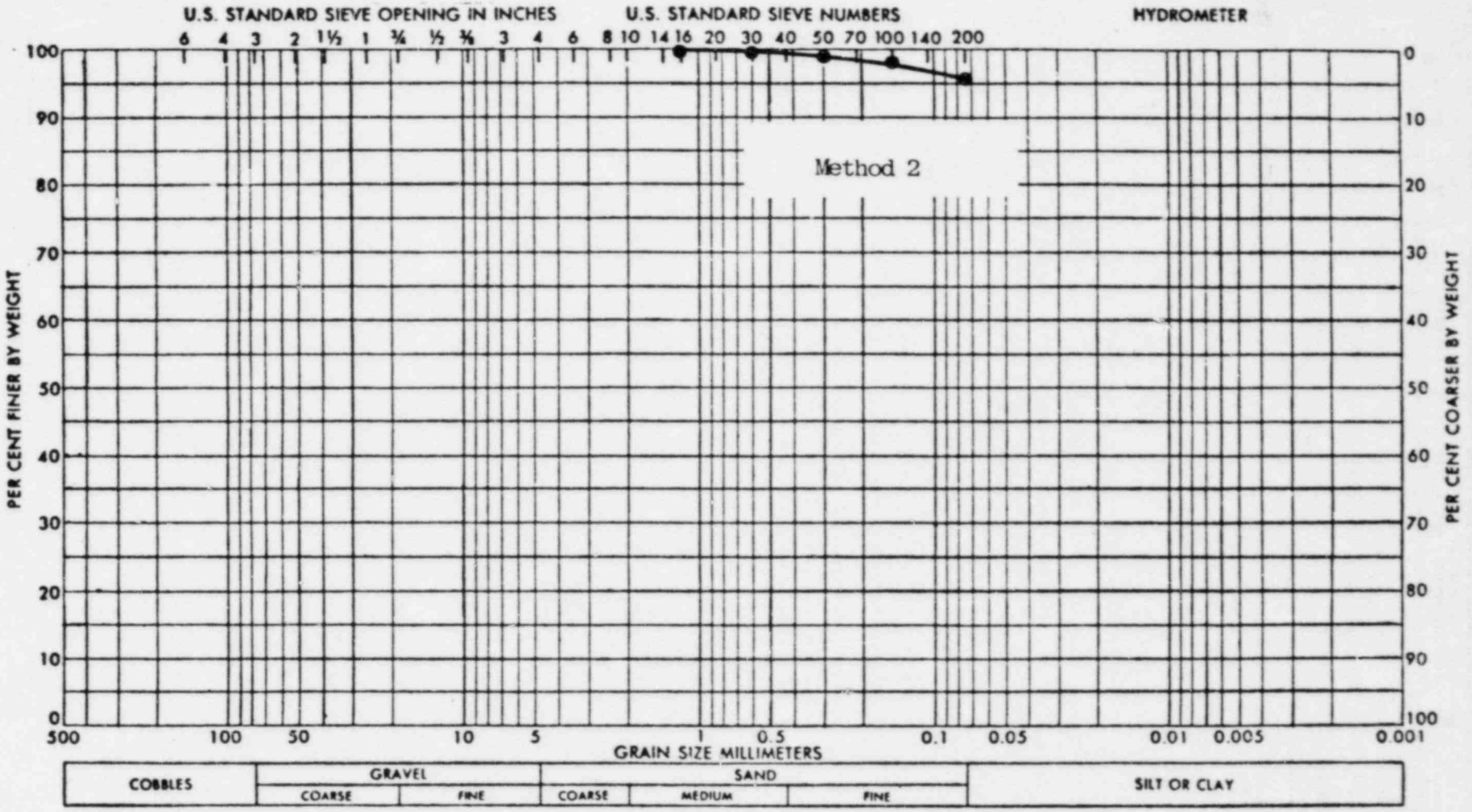
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-16A Sample P-3A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 46



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-16A Sample P-3C (Top)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 47



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-16A Sample P-3C (Bot.)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 48



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-16A Sample P-4A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 49

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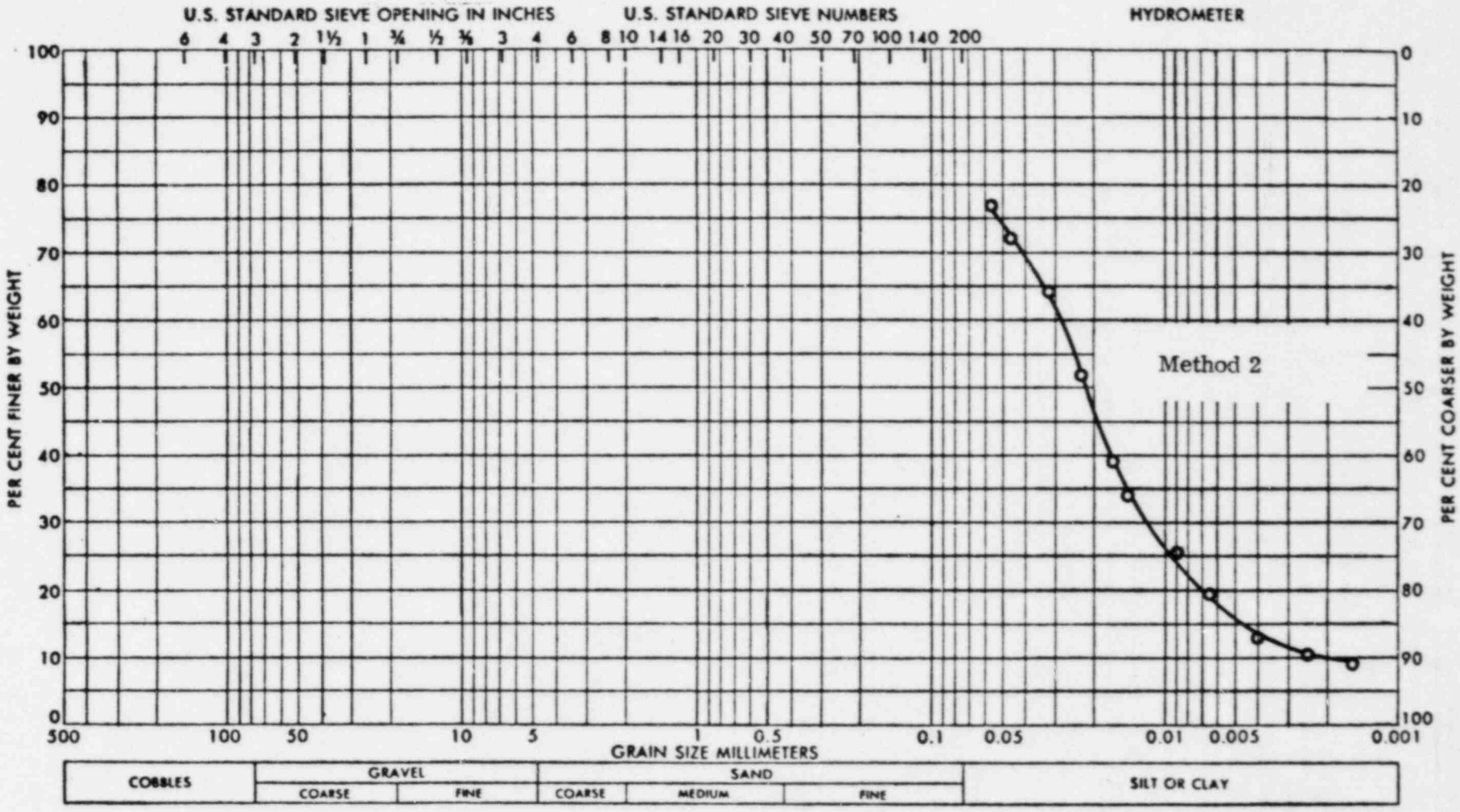
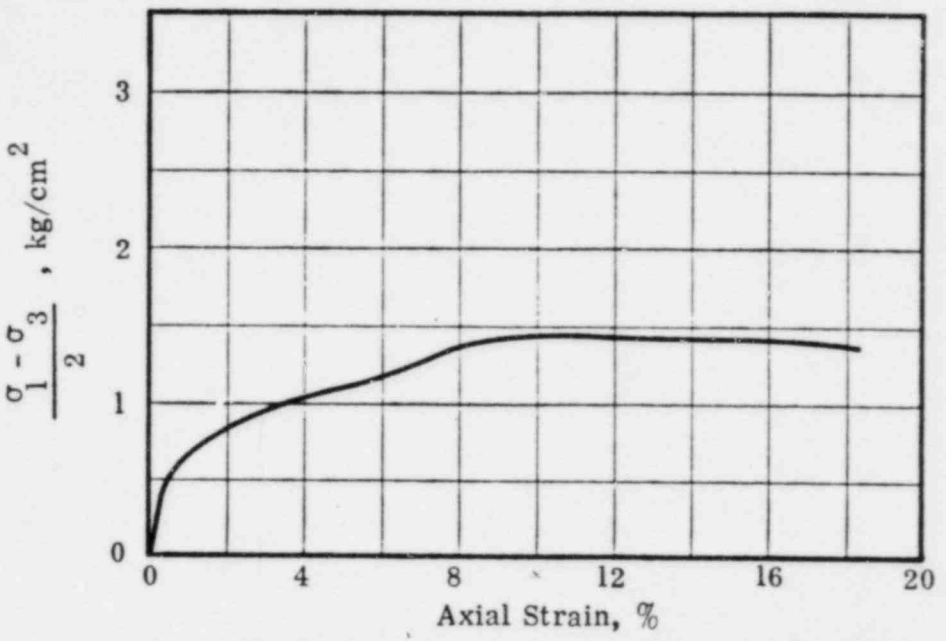
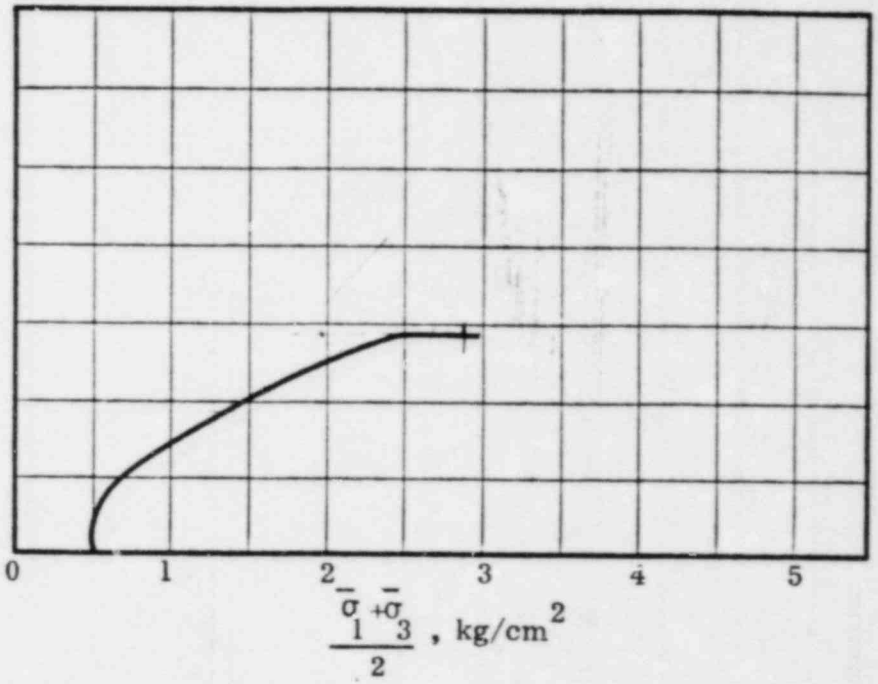
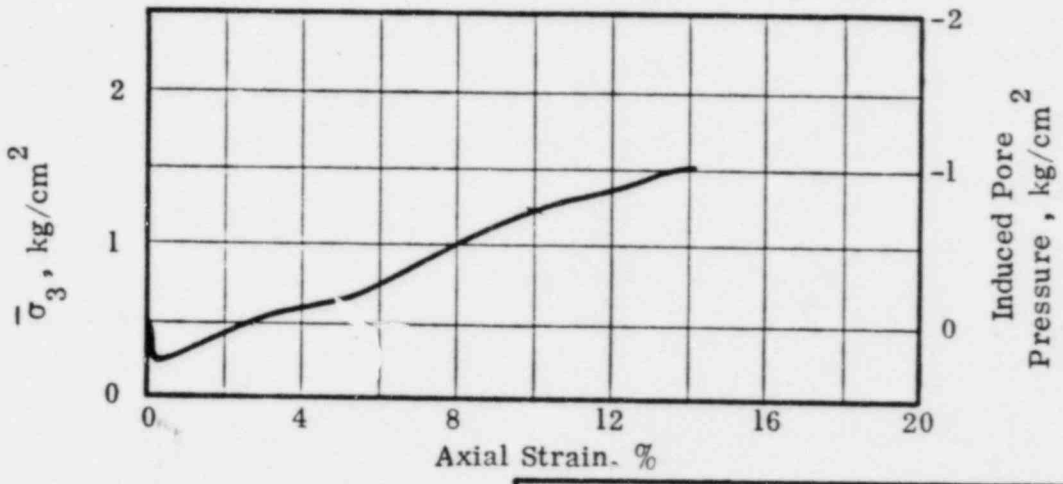
Figure 50



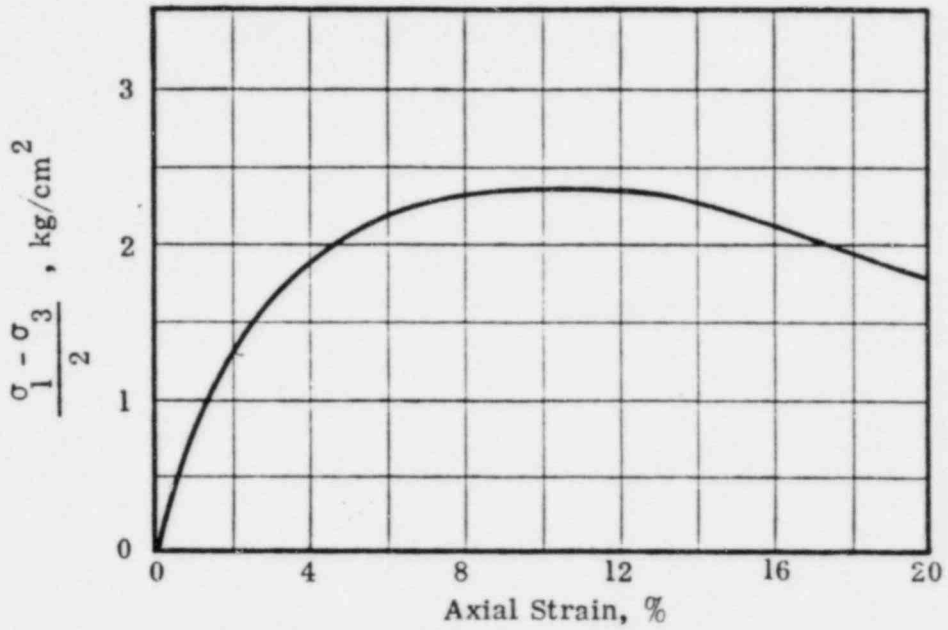
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	GRAIN SIZE CURVE Boring SP-16A Sample P-4A (Bot.)
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 51

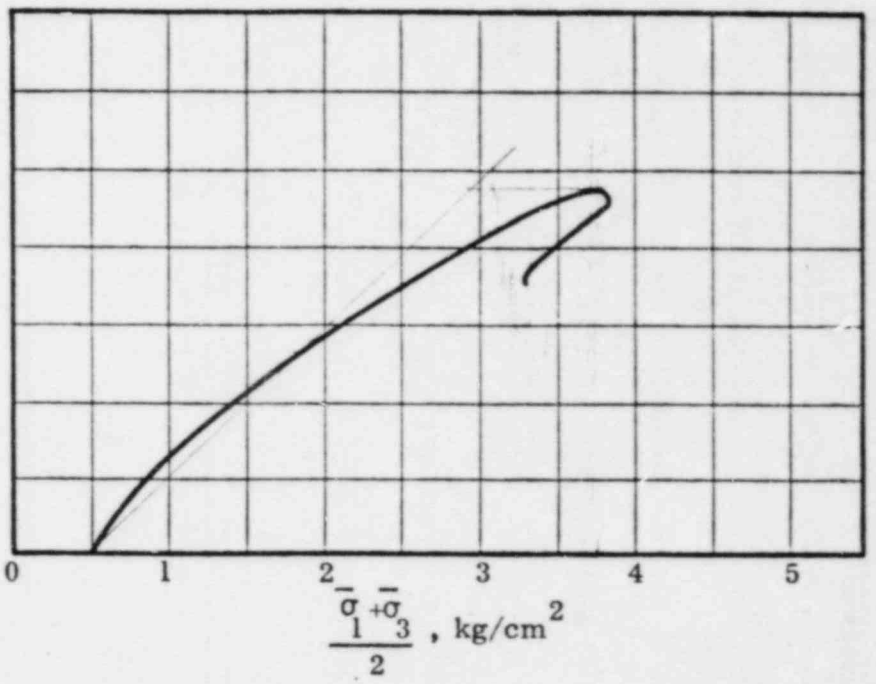


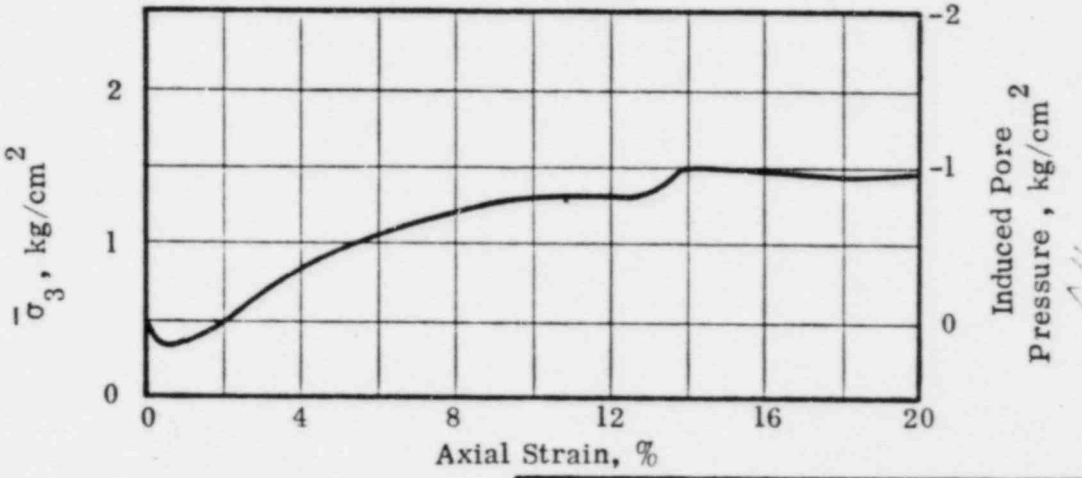




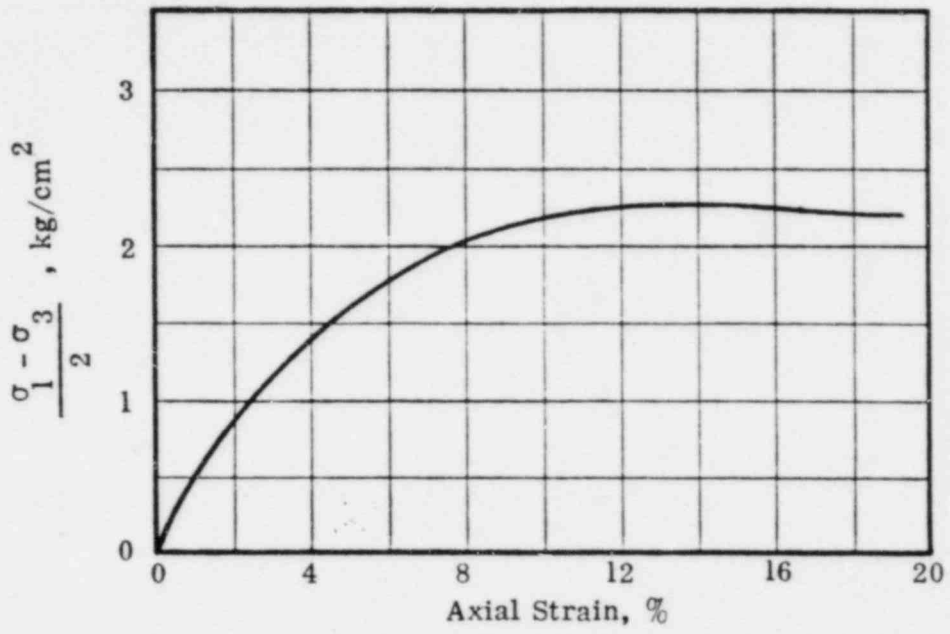
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}1$ Boring SP-15A Sample P-6B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 52

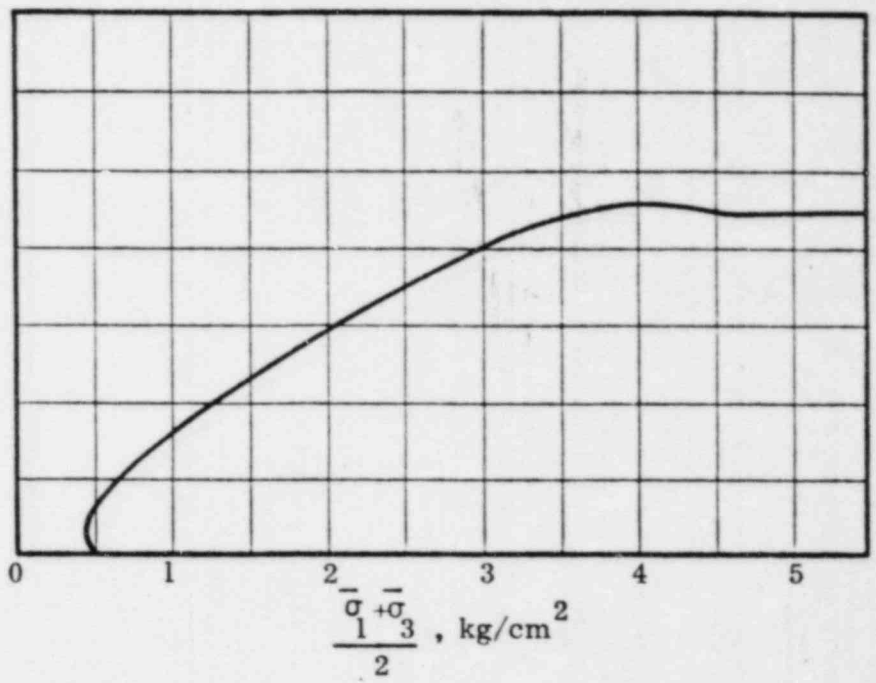


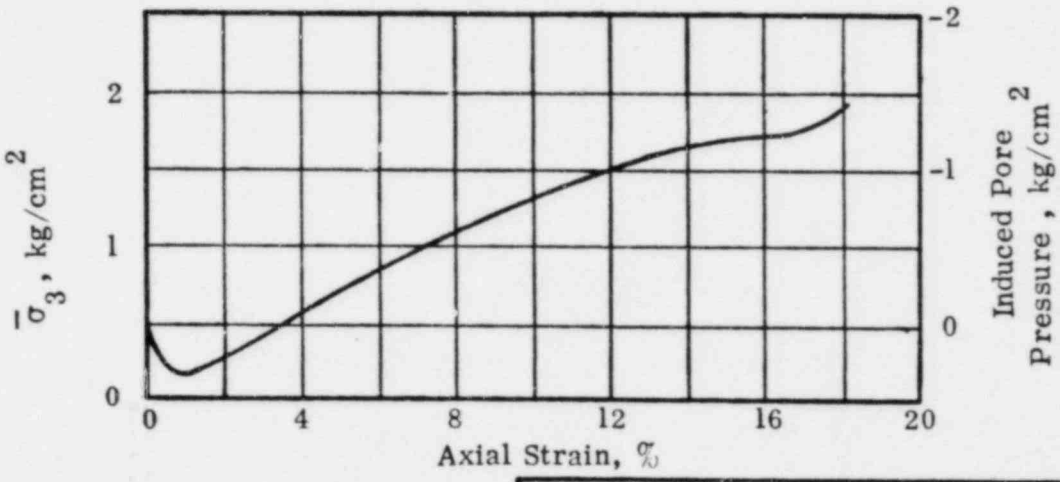




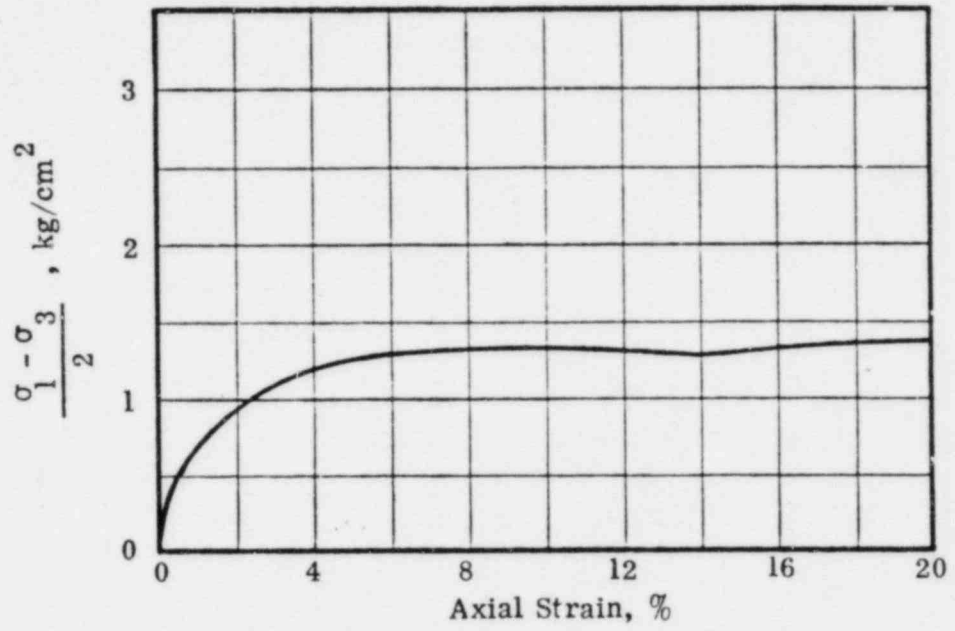
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 2 Boring SP-15A Sample P-5B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 53

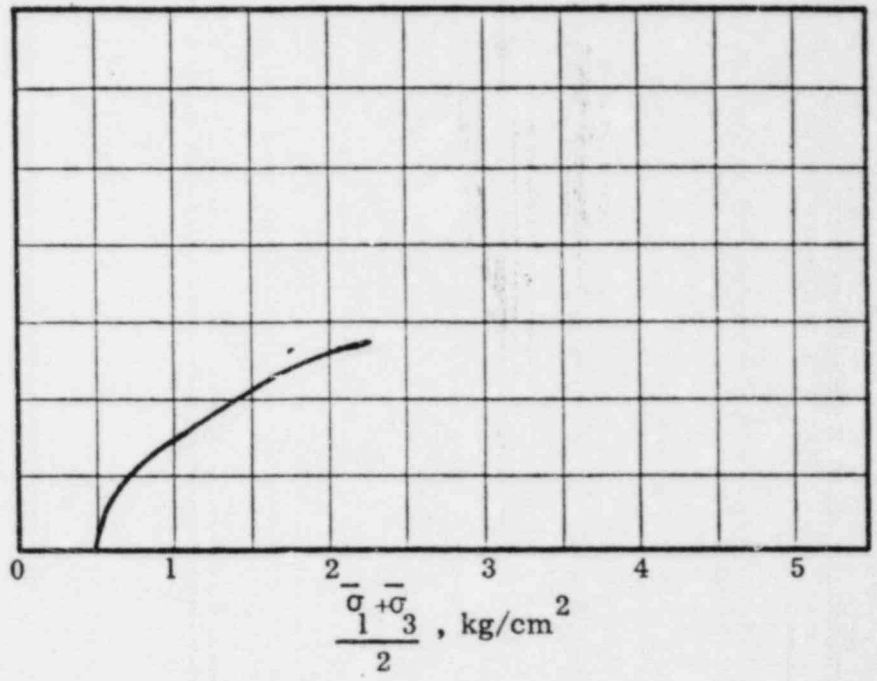


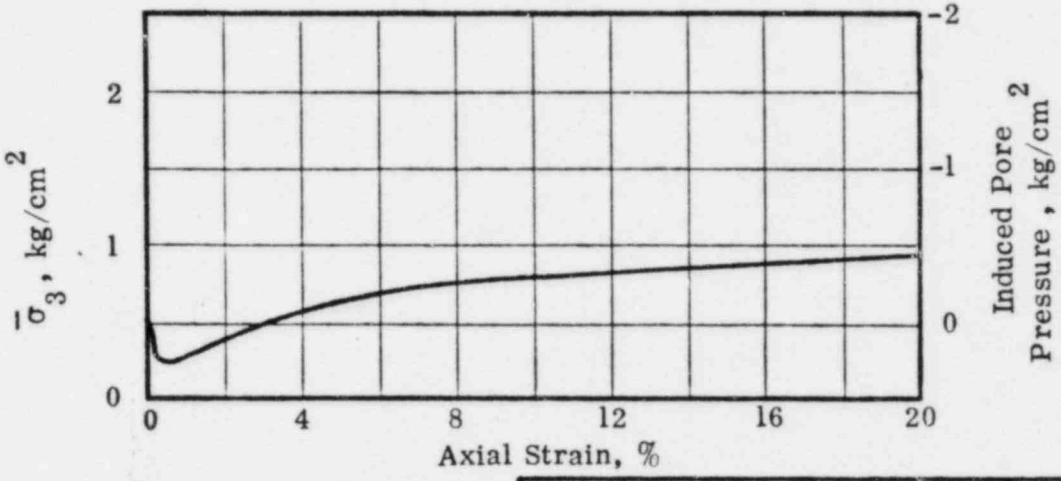




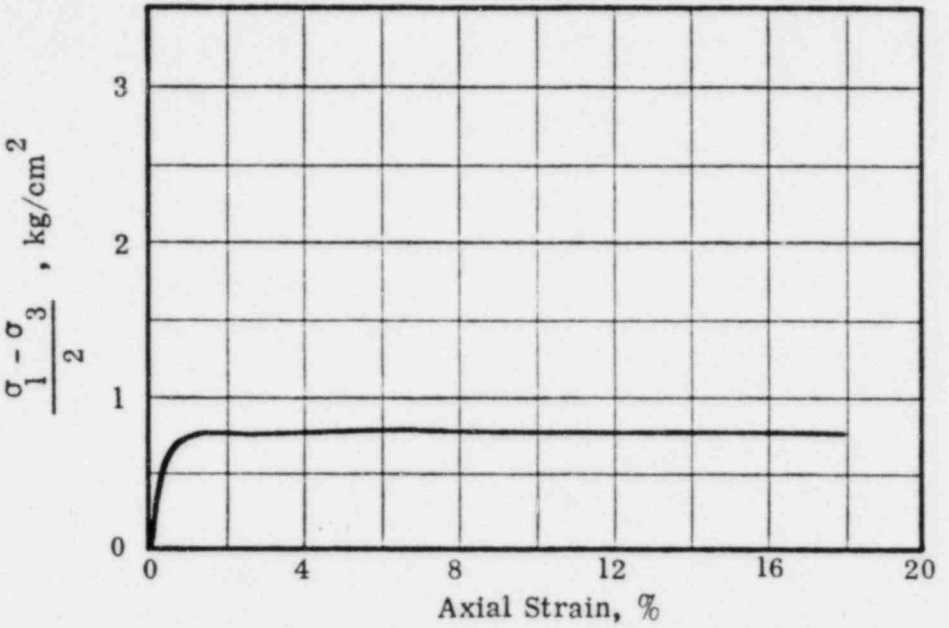
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 4 Boring SP-2 Sample P-3B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.54

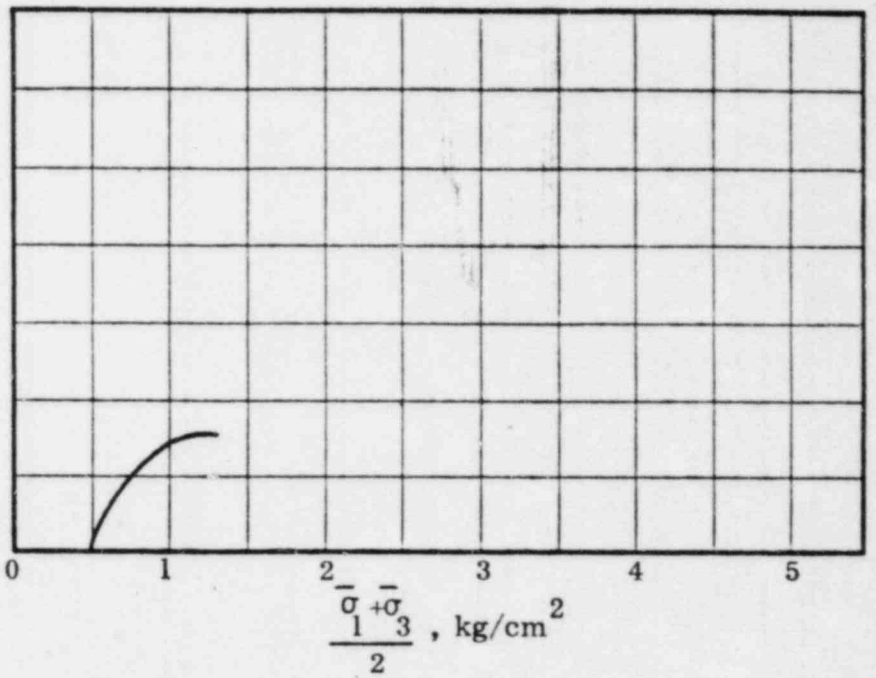


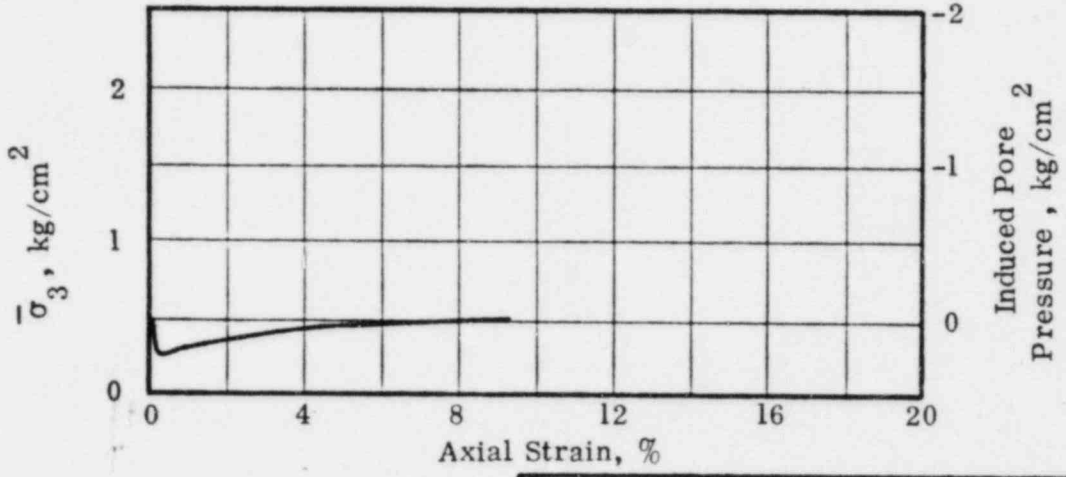




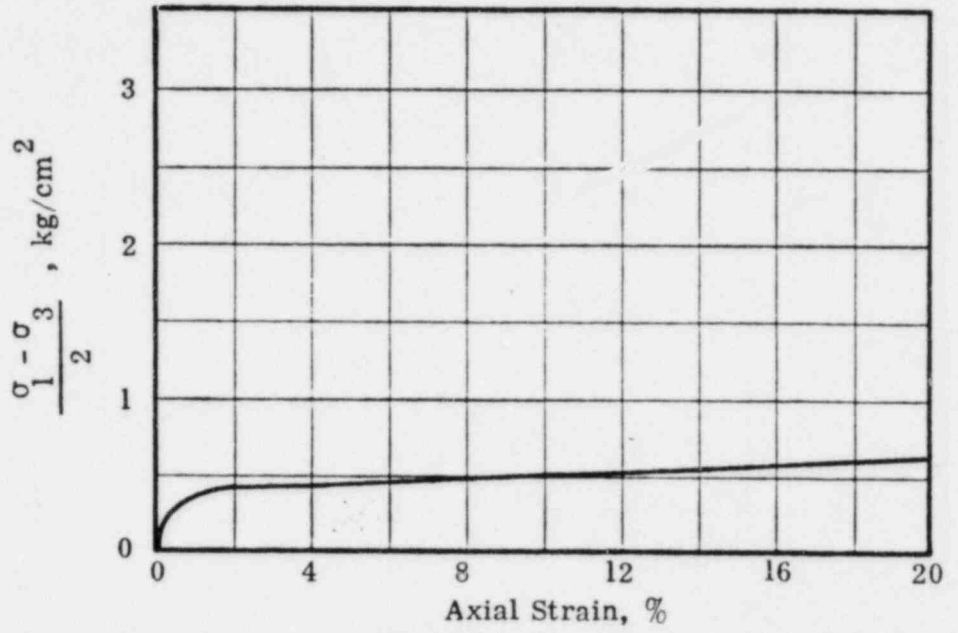
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 6 Boring SP-3 Sample 3
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 55

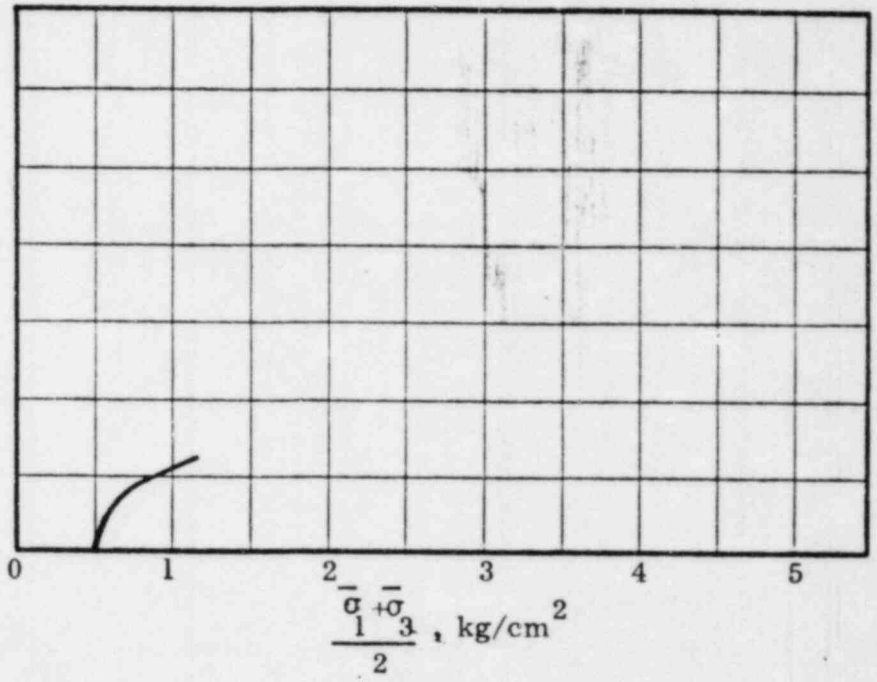


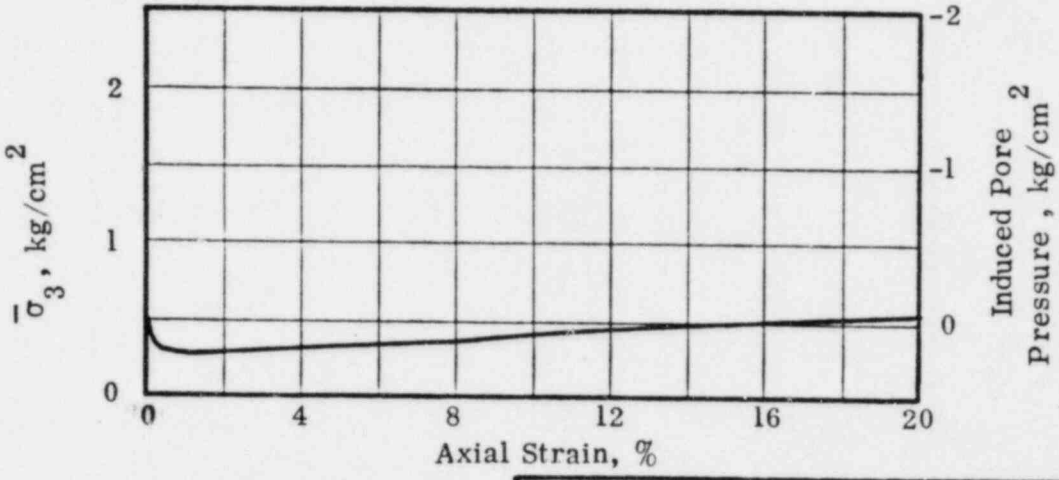




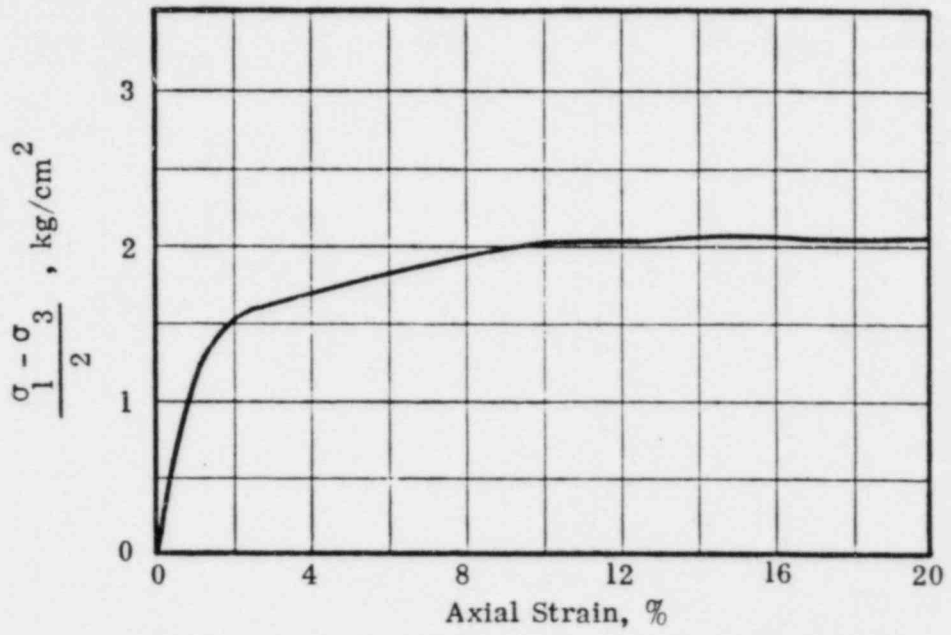
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 7 Boring SP-15 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.56

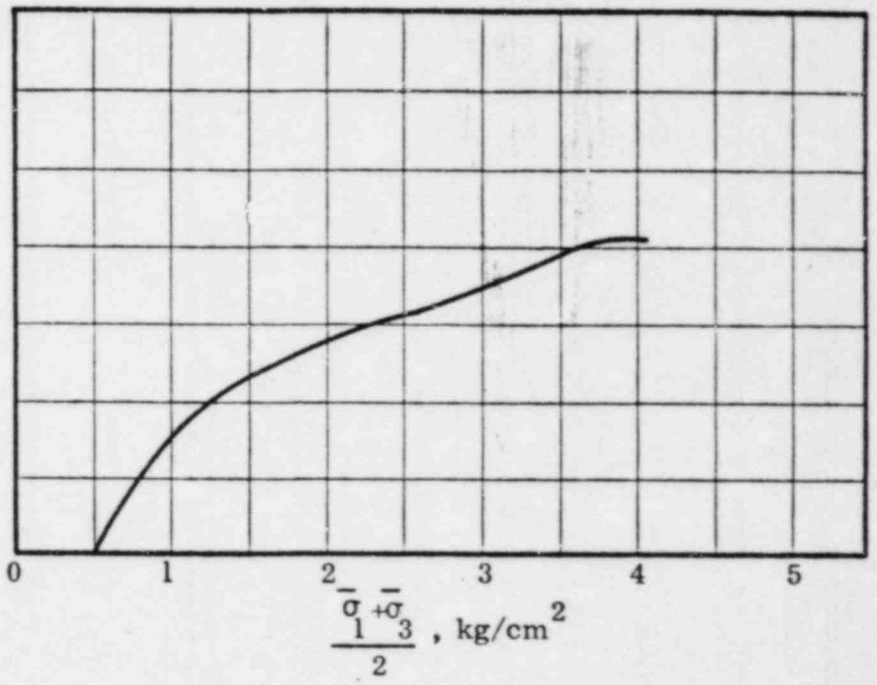


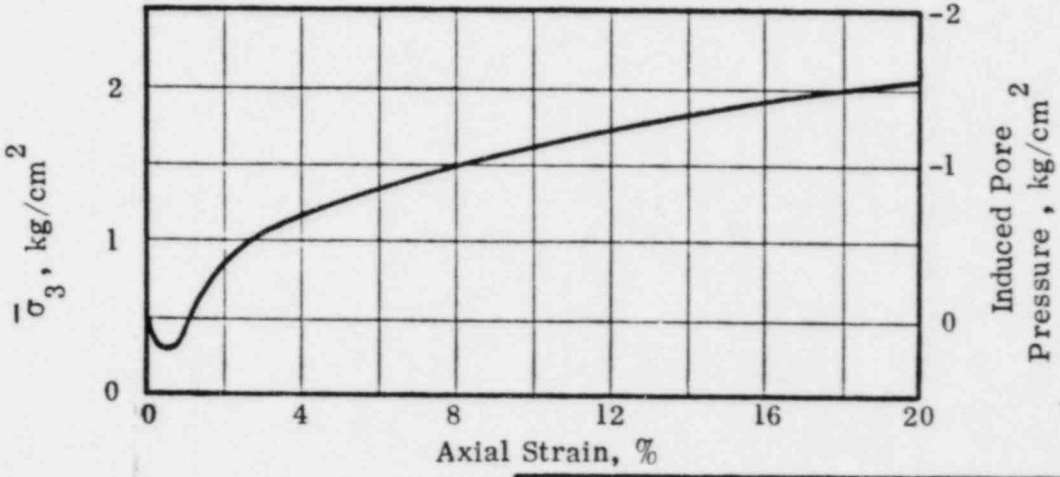




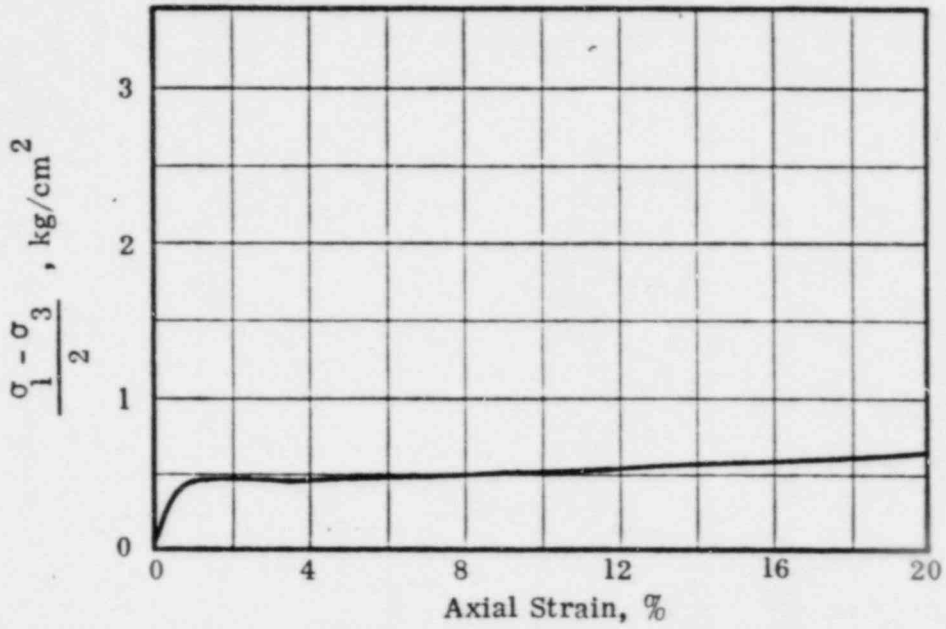
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 8 Boring SP-3 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 57

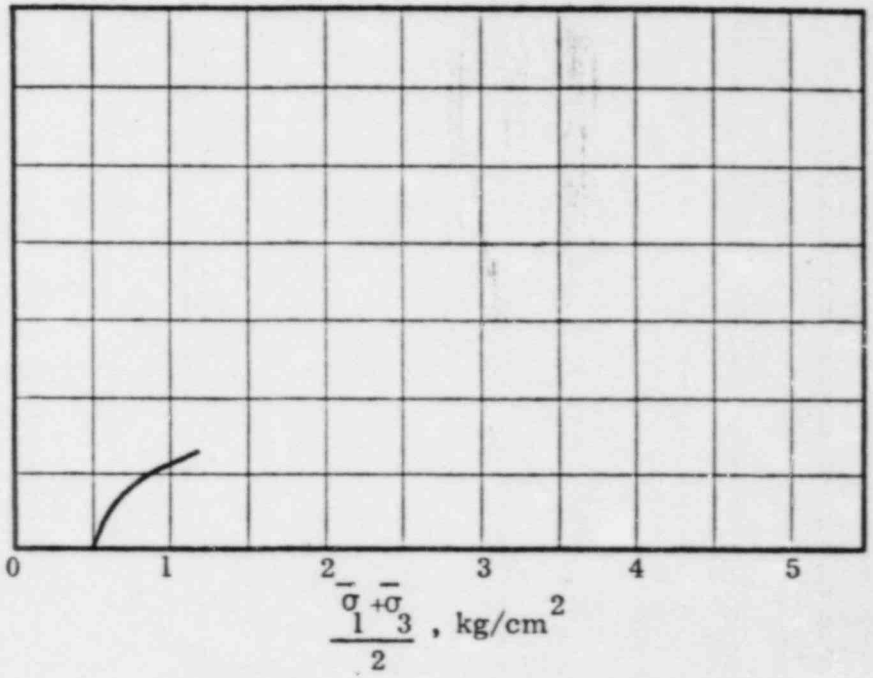


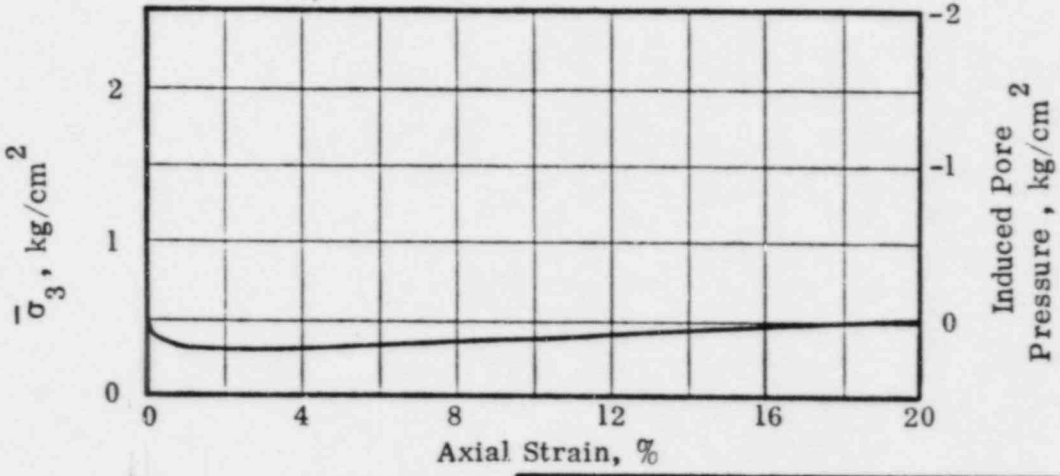




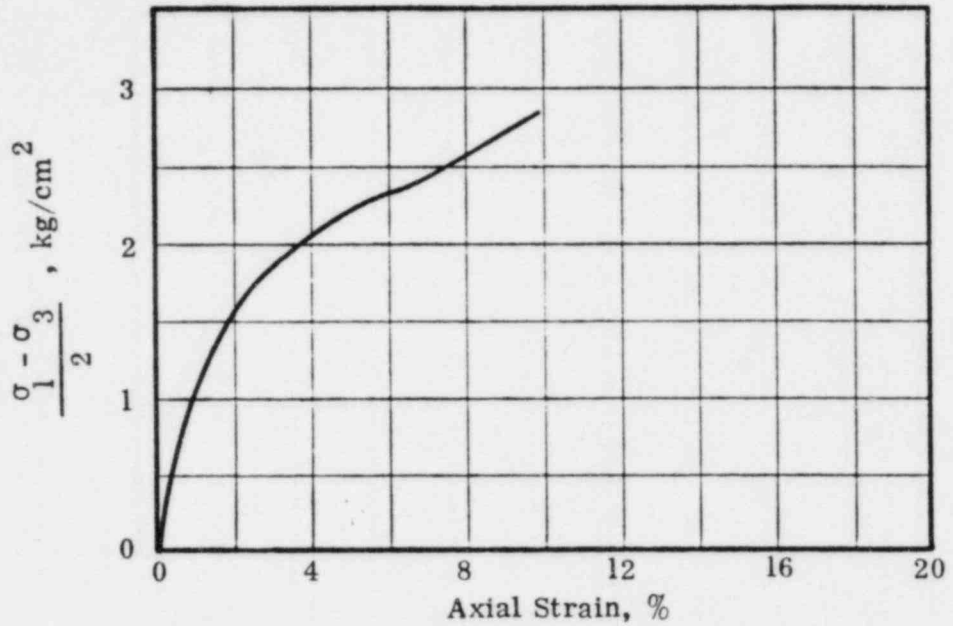
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 9 Boring SP-14 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.58

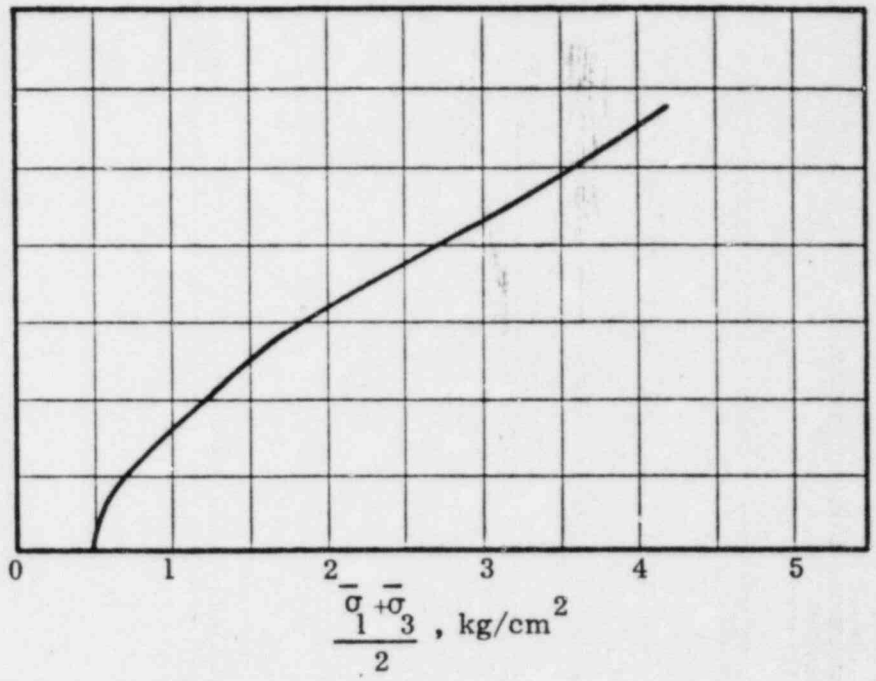


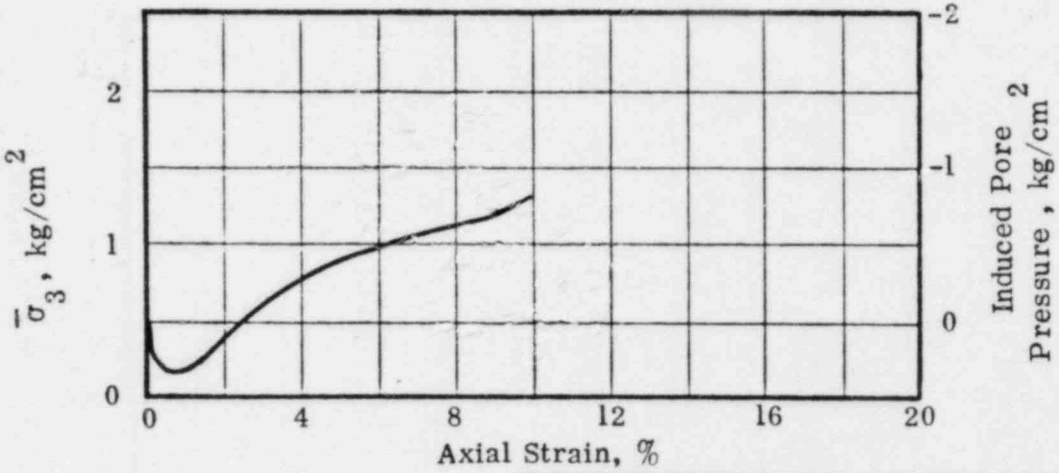




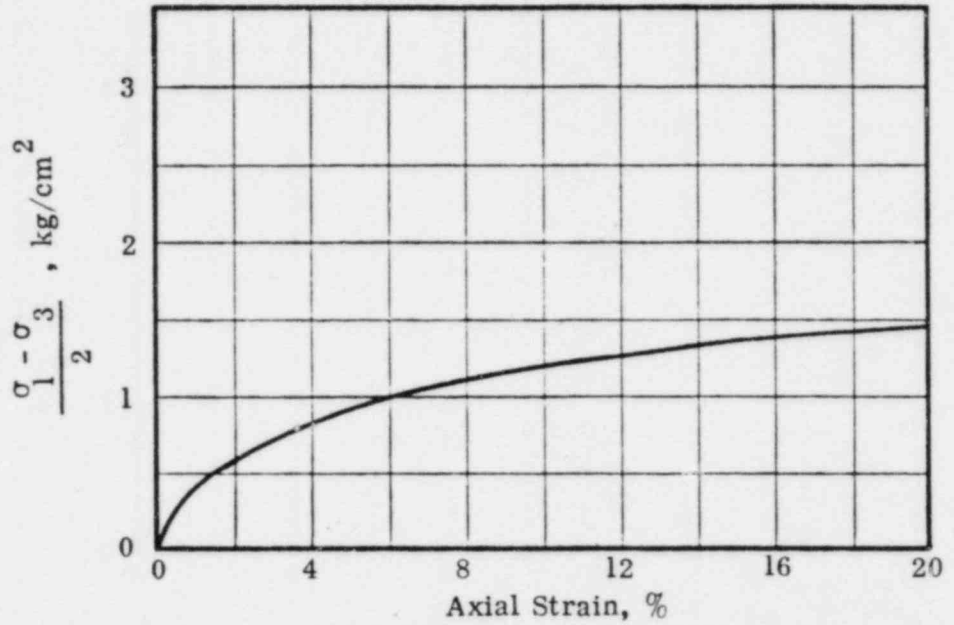
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$10 Boring SP-9 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.59

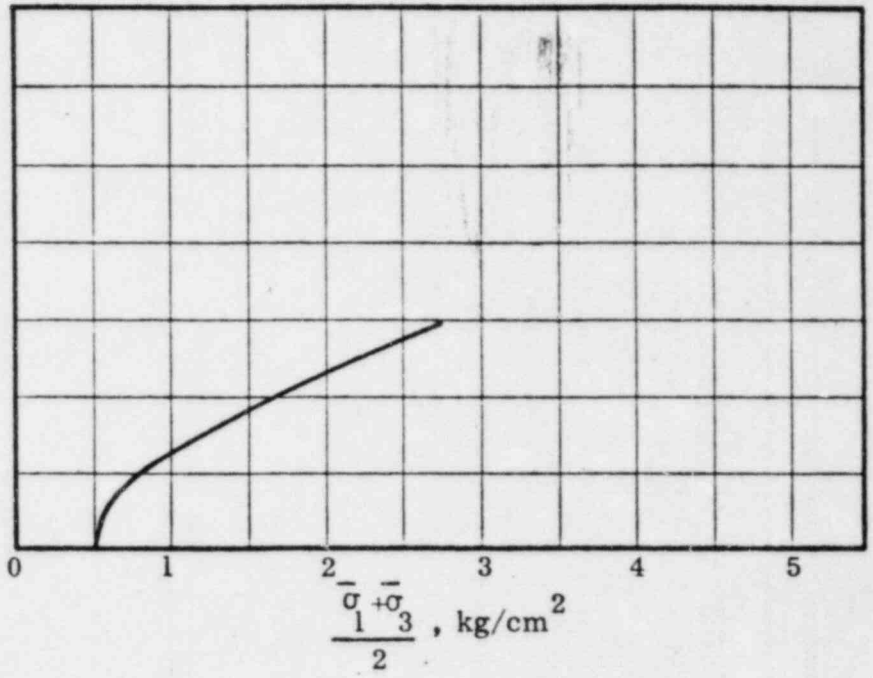


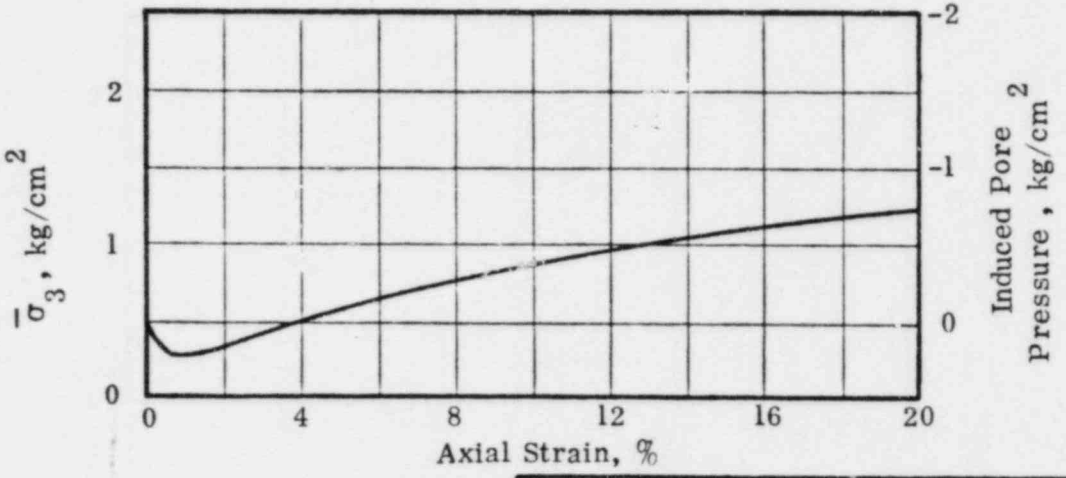




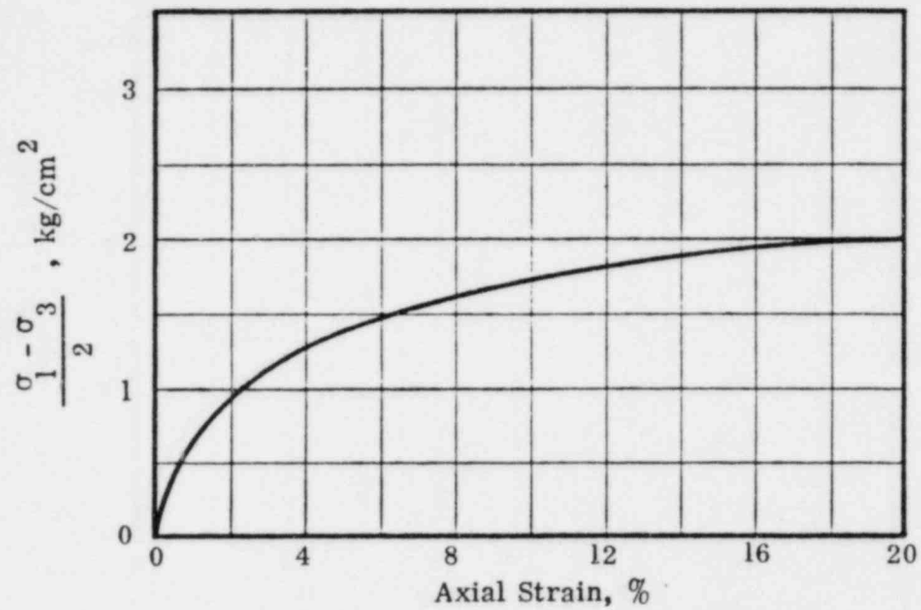
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 1 1 Boring SP-4A Sample P-4C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.60

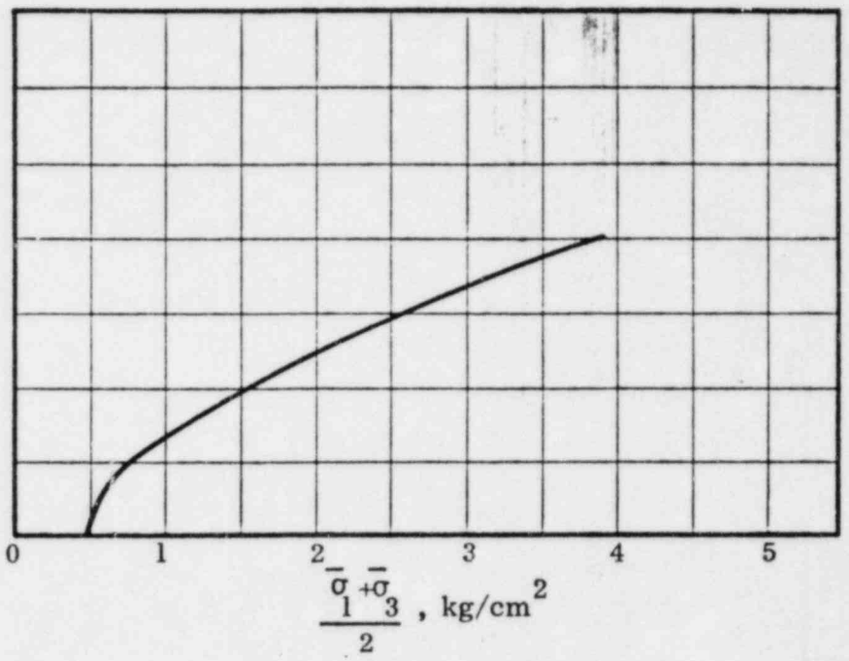


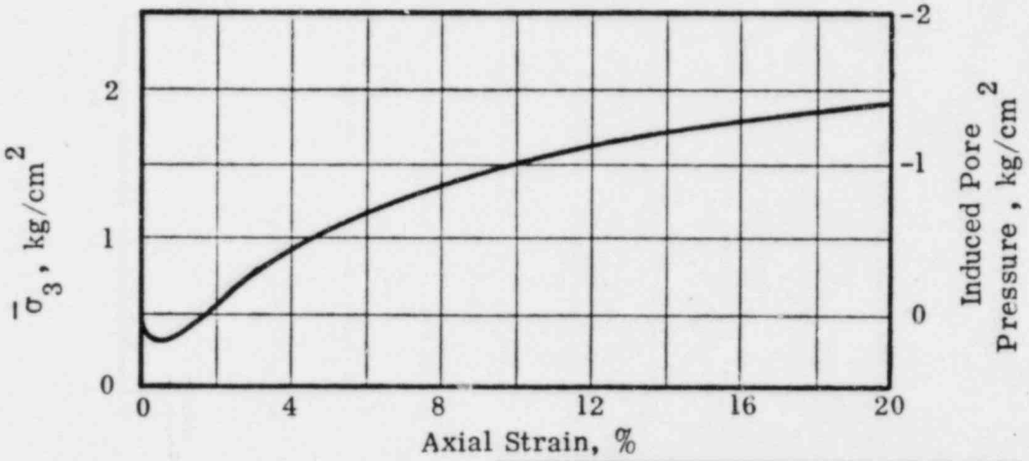




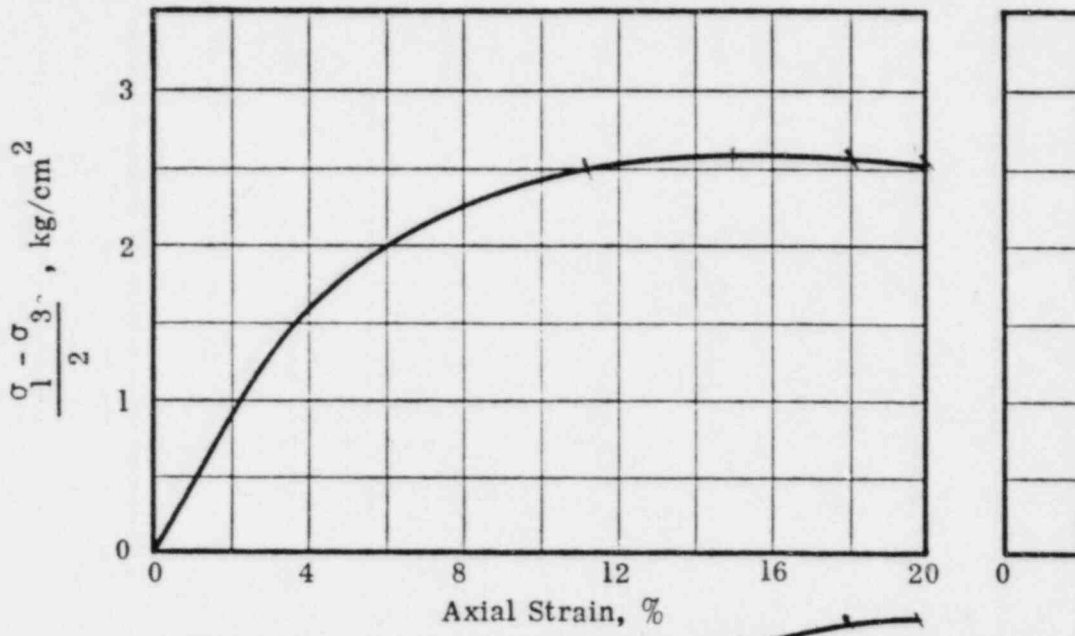
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$12 Boring SP-5A Sample P-2B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.61

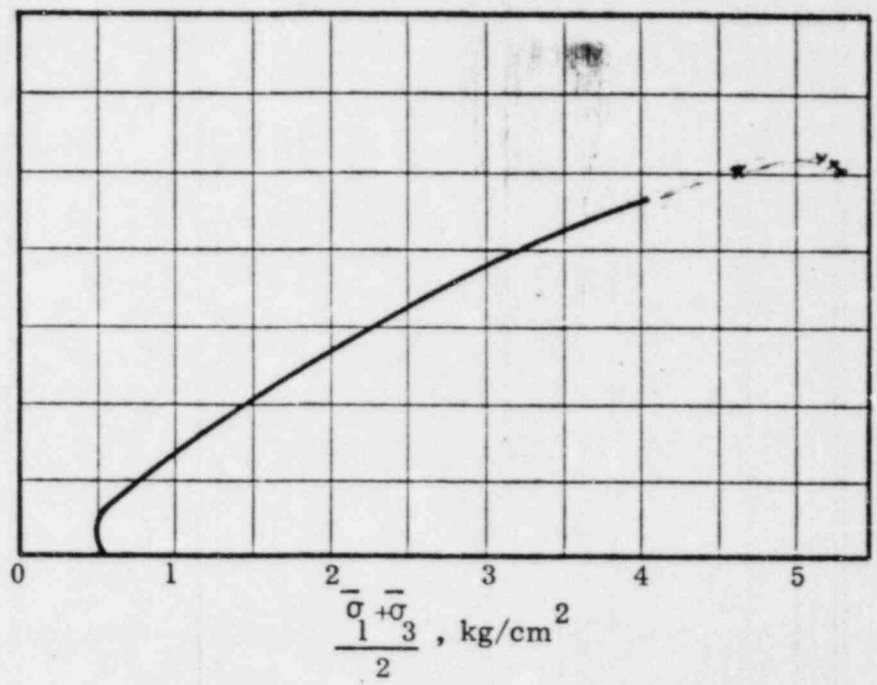


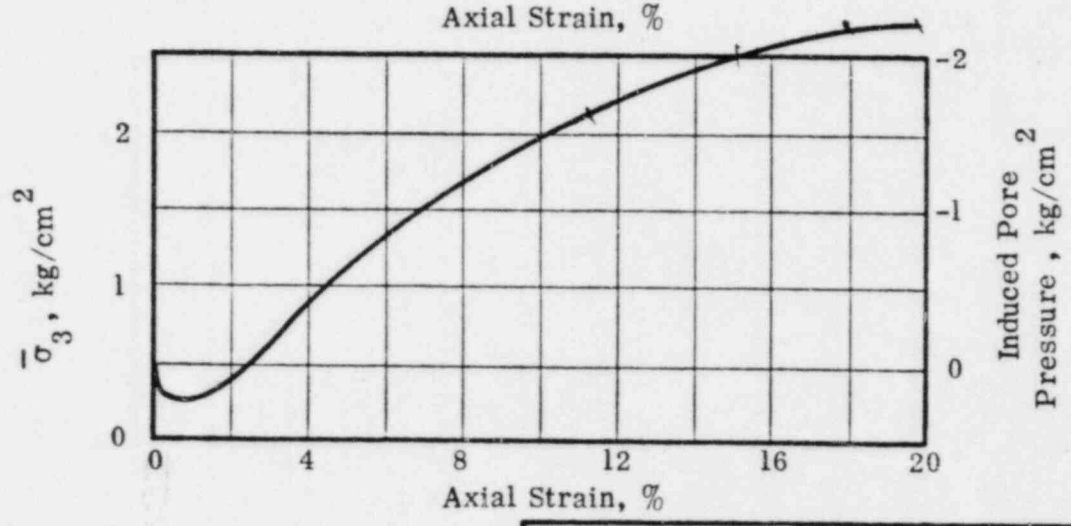




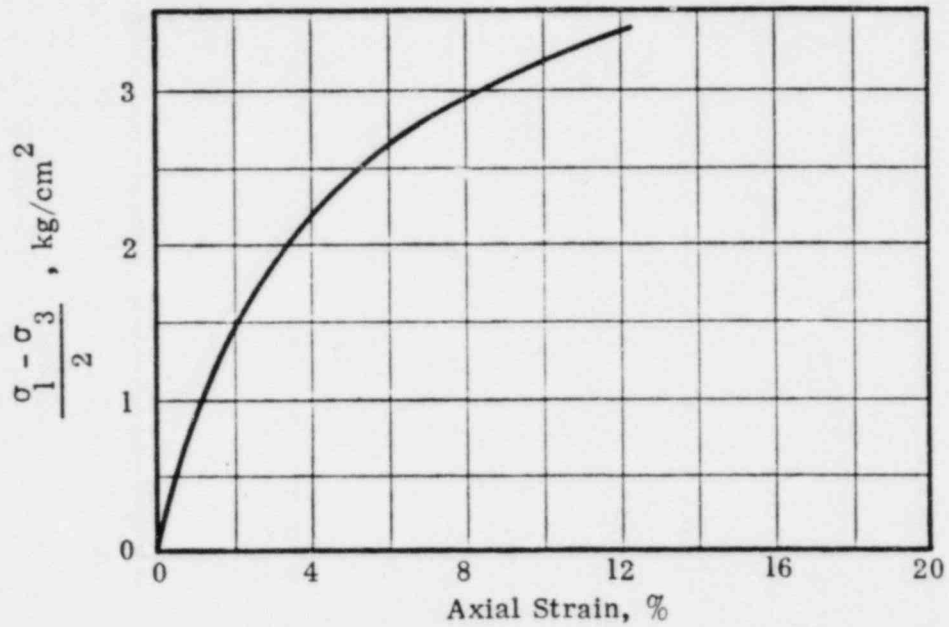
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$13 Boring SP-12 Sample P-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.62

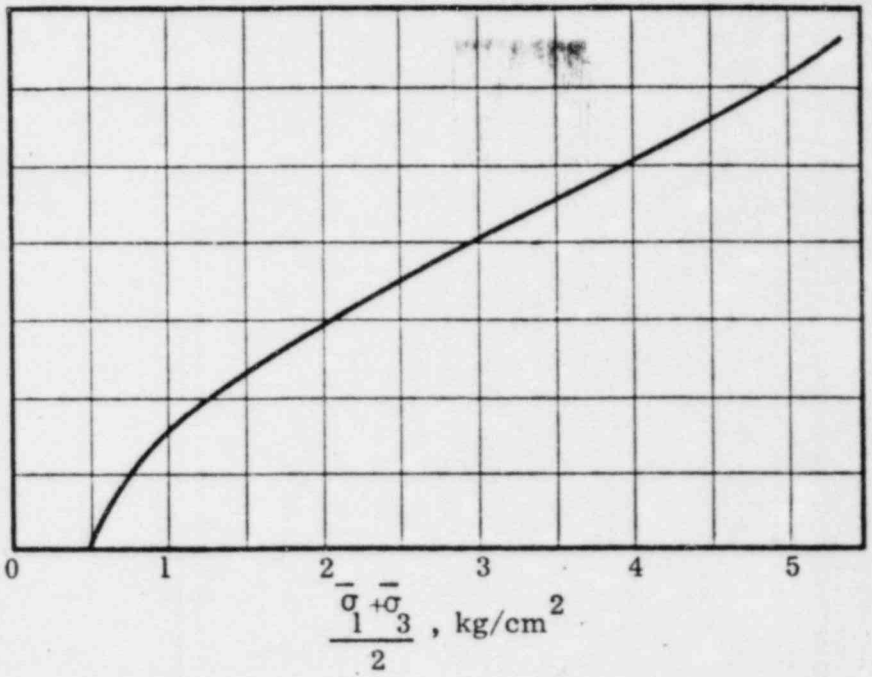


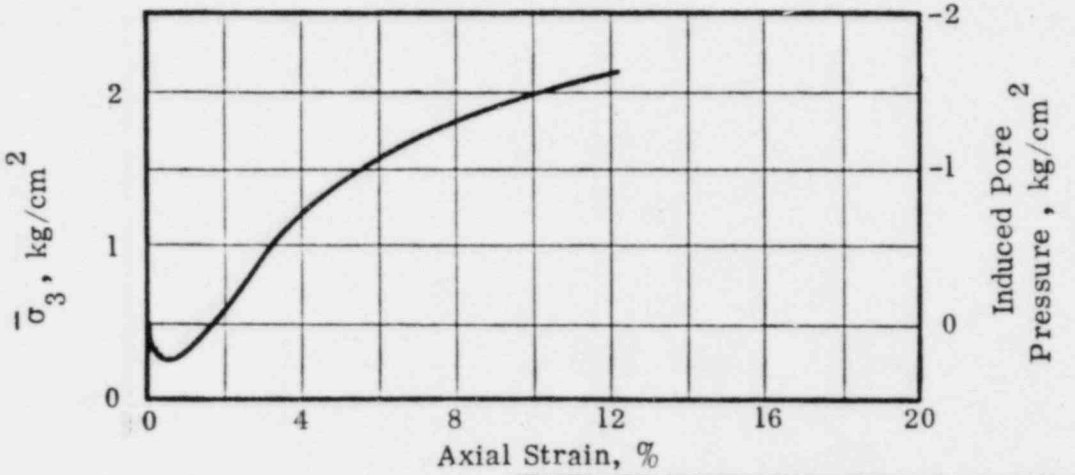




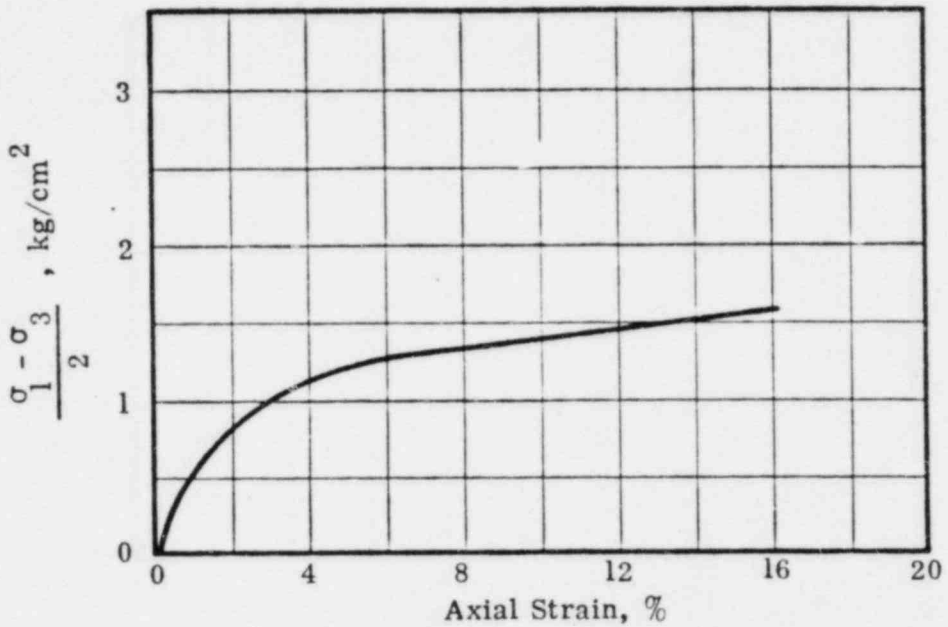
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 14 Boring SP-1 1A Sample P-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.63

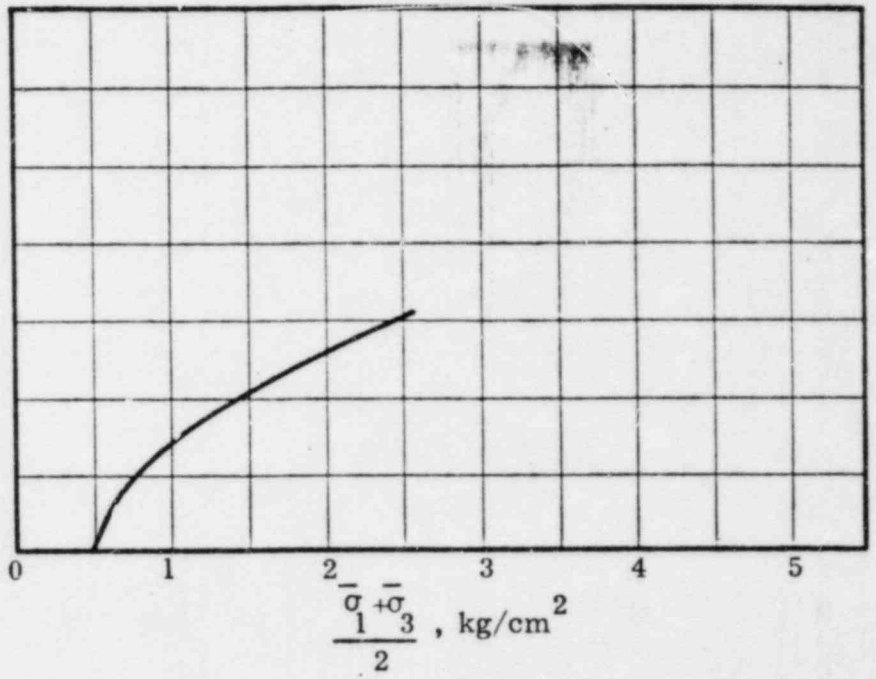


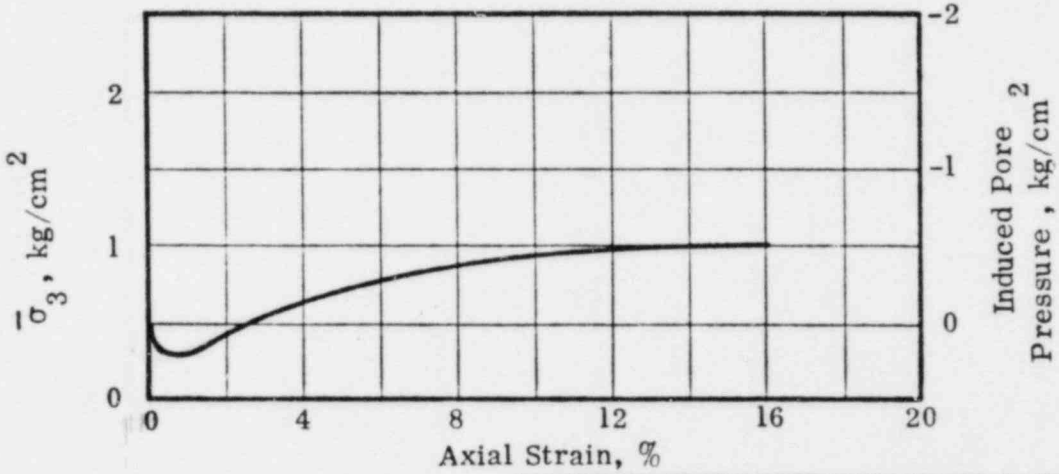




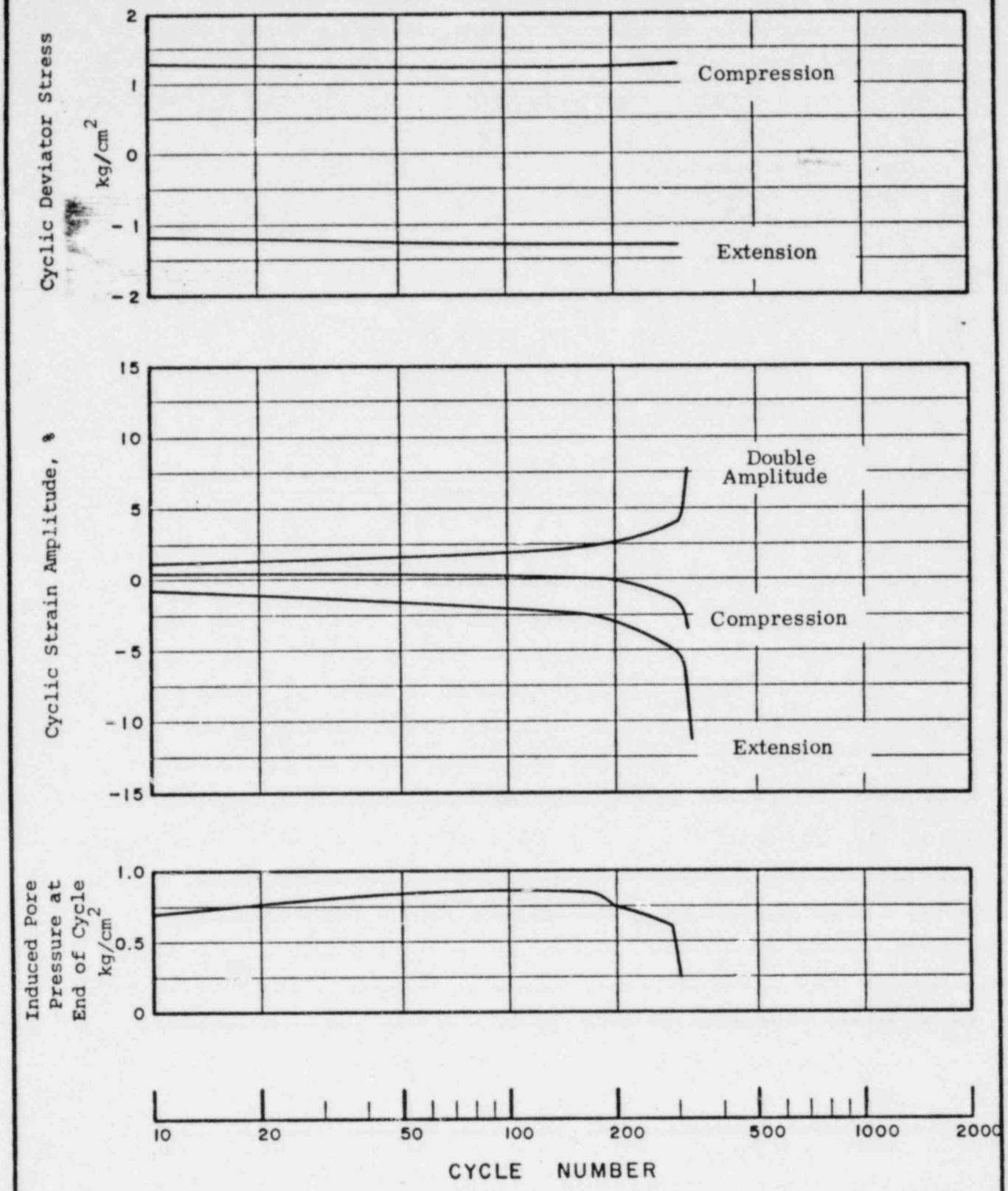
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 15 Boring SP-13 Sample P-1A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 64



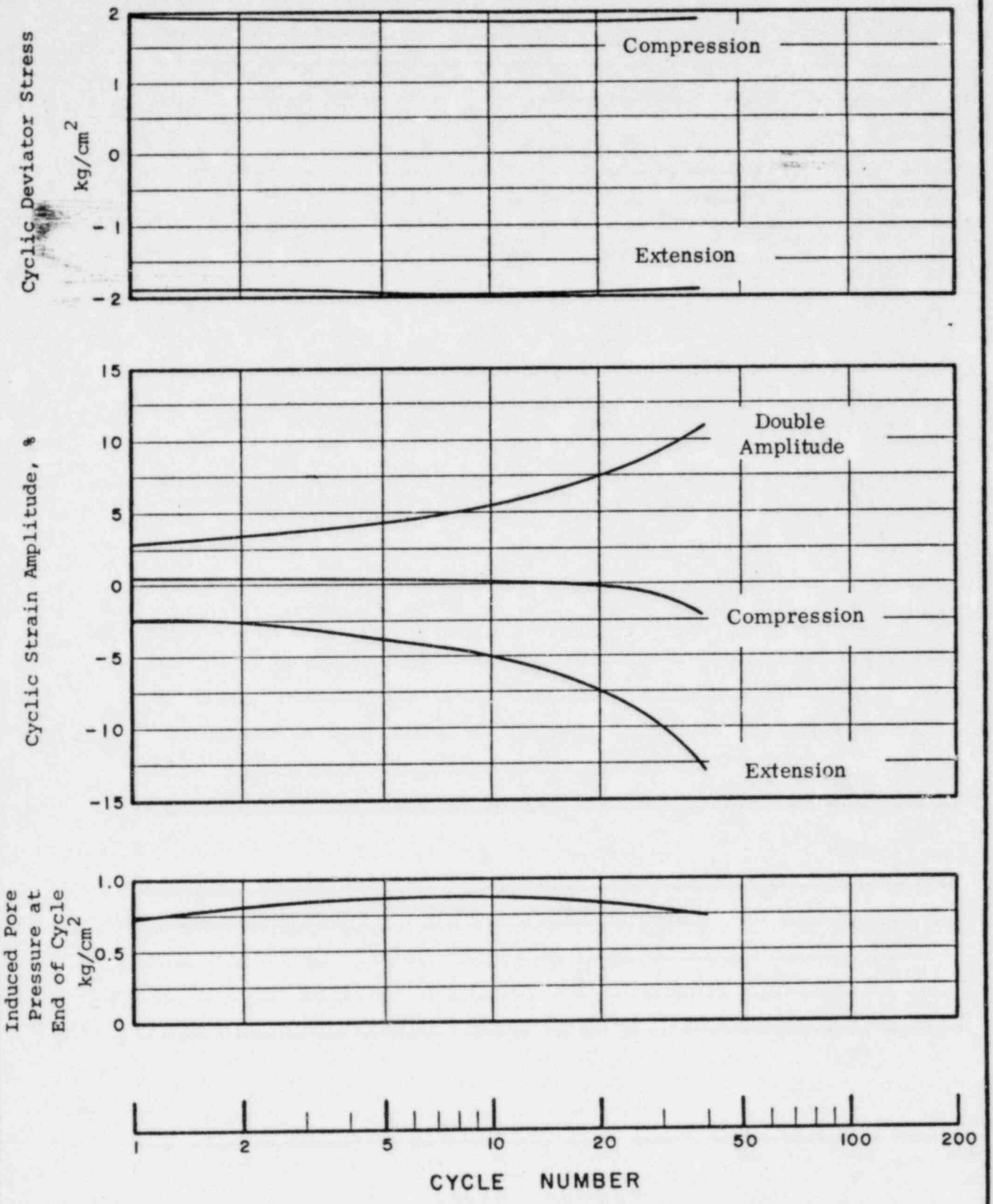




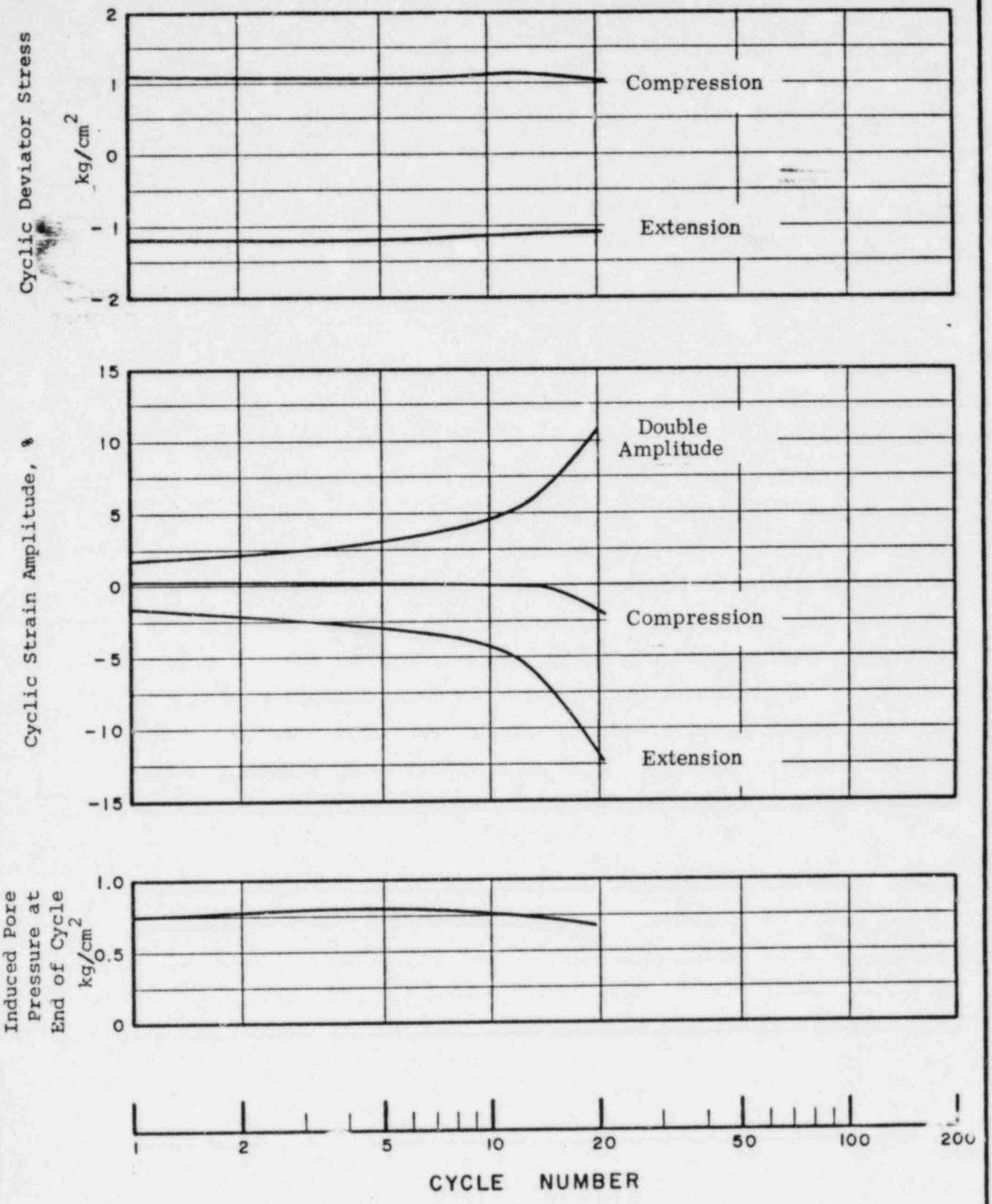
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	TEST $\bar{R}$ 16 Boring SP-16A Sample P-2C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.65



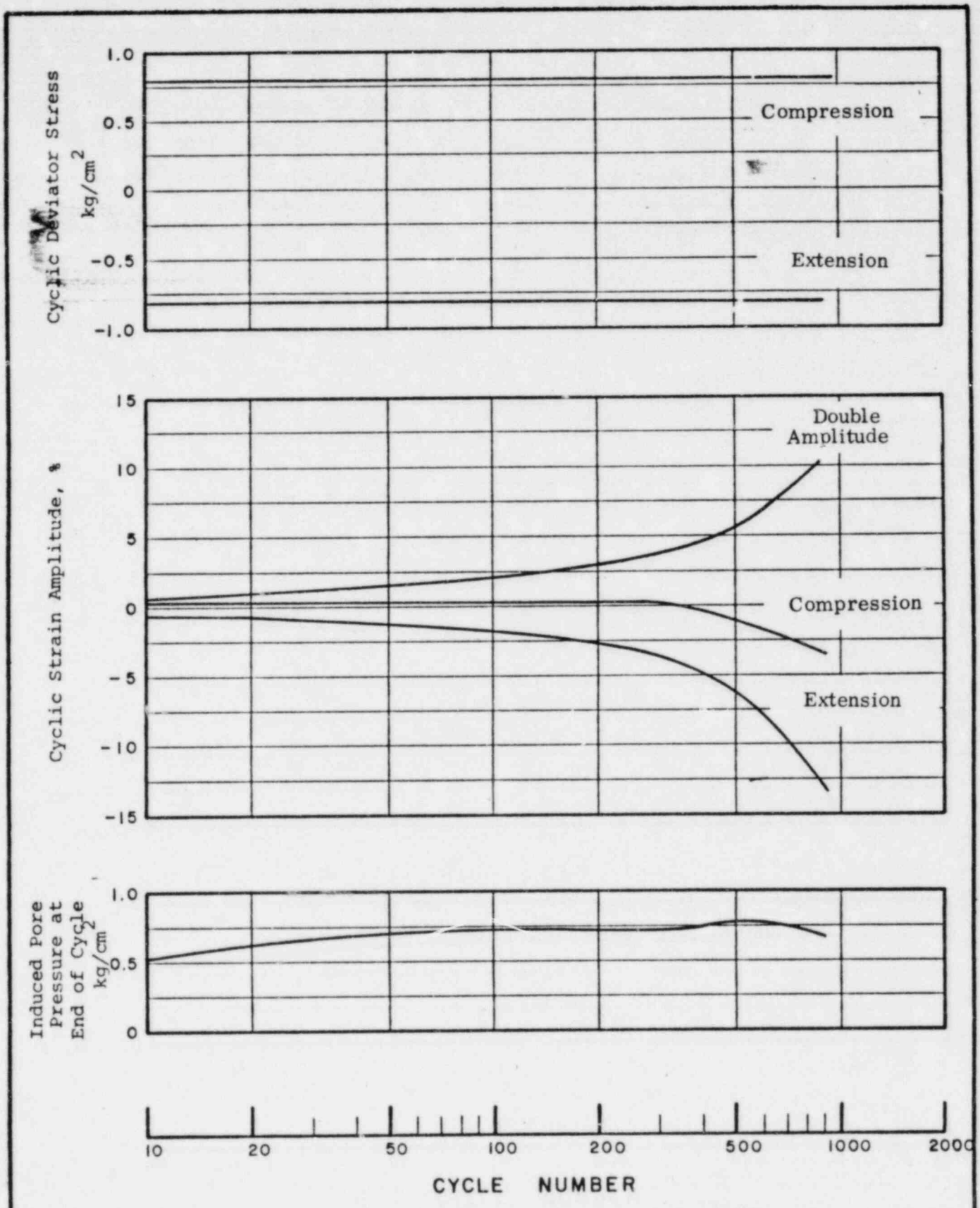
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 1 Boring SP-15A Sample P-6C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 66



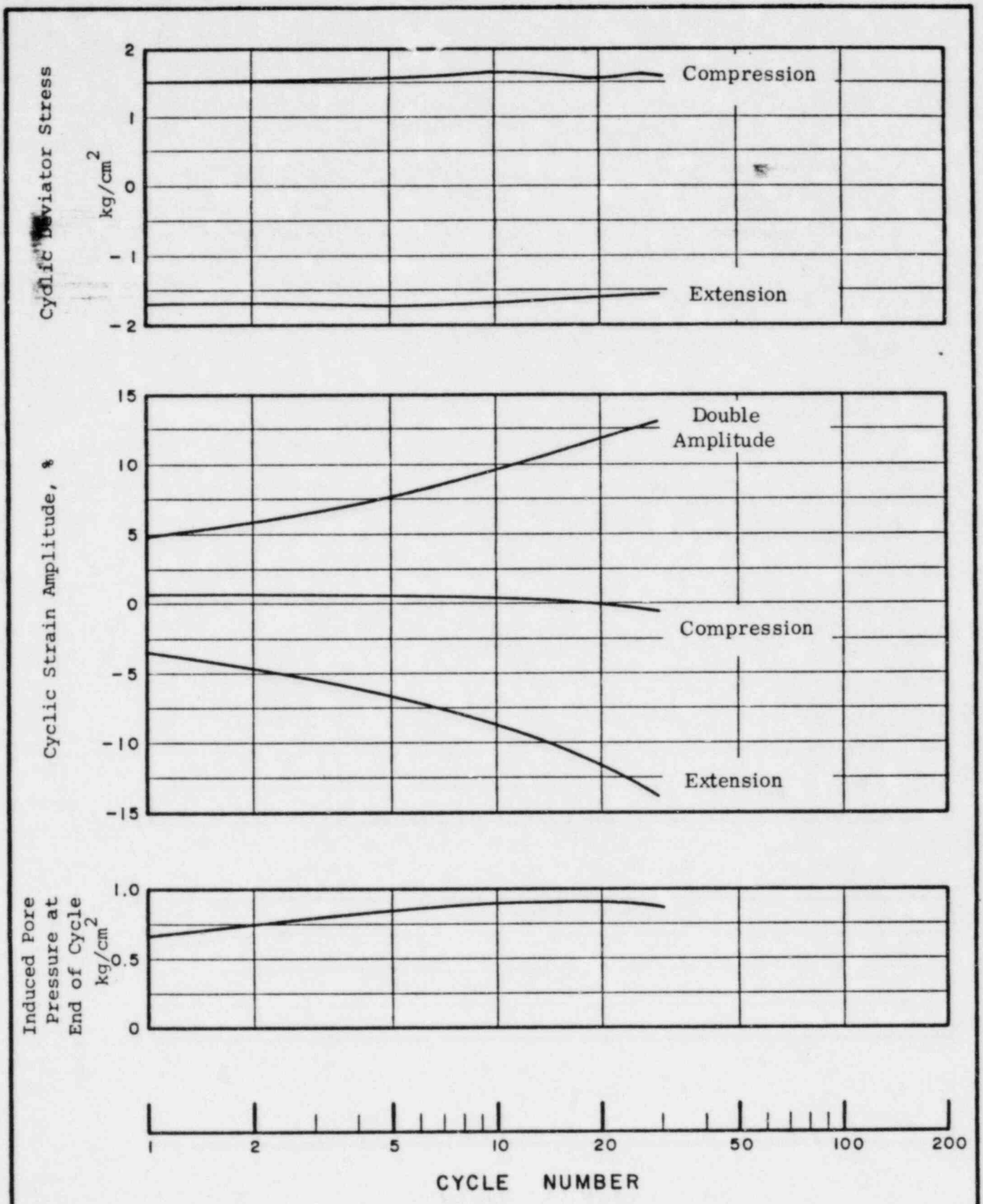
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	$\bar{CR}$ TEST NO. 2 Boring SP-15A Sample P-2C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 67



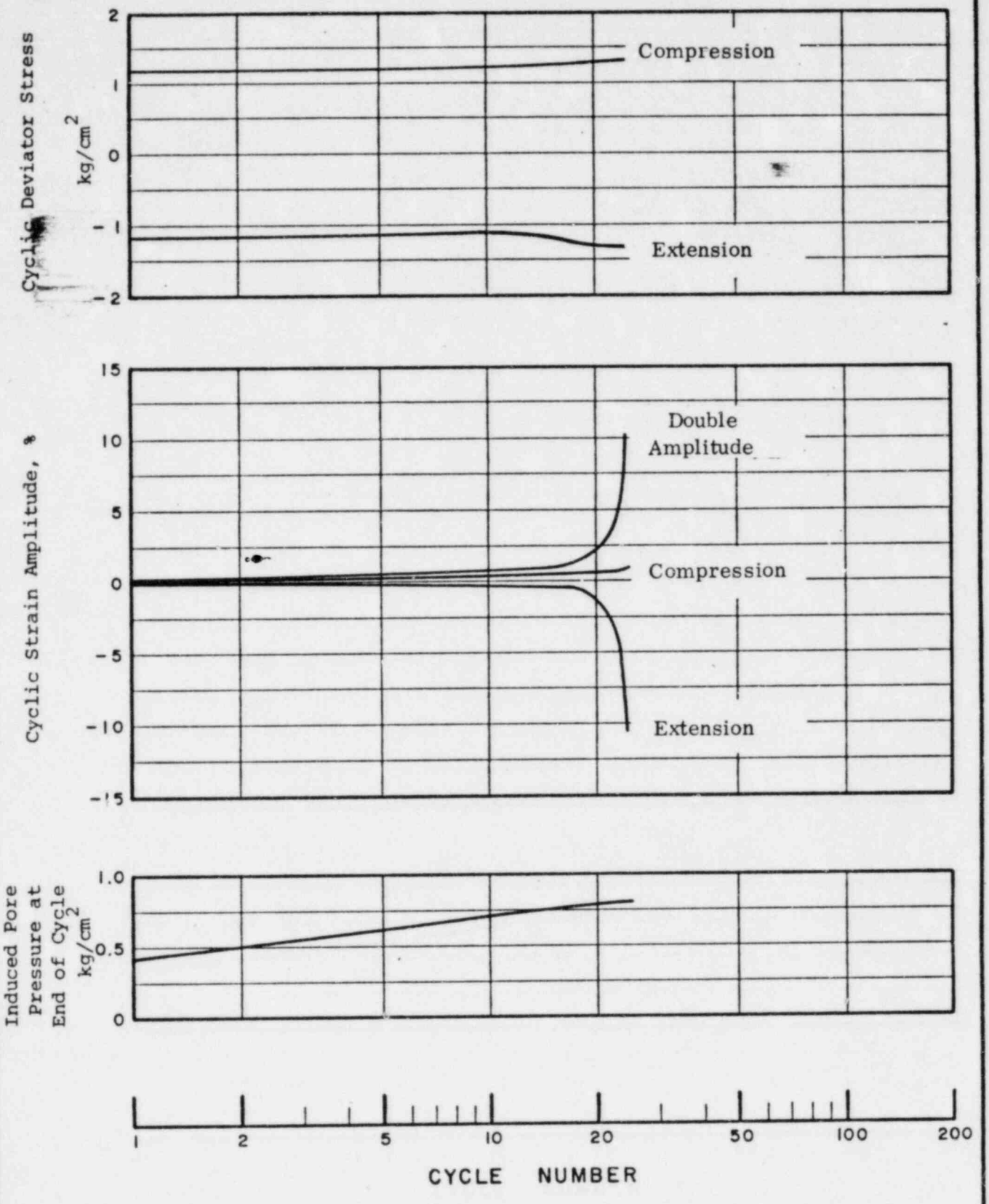
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	$C\bar{R}$ TEST NO. 3 Boring SP-16A Sample P-3C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 68



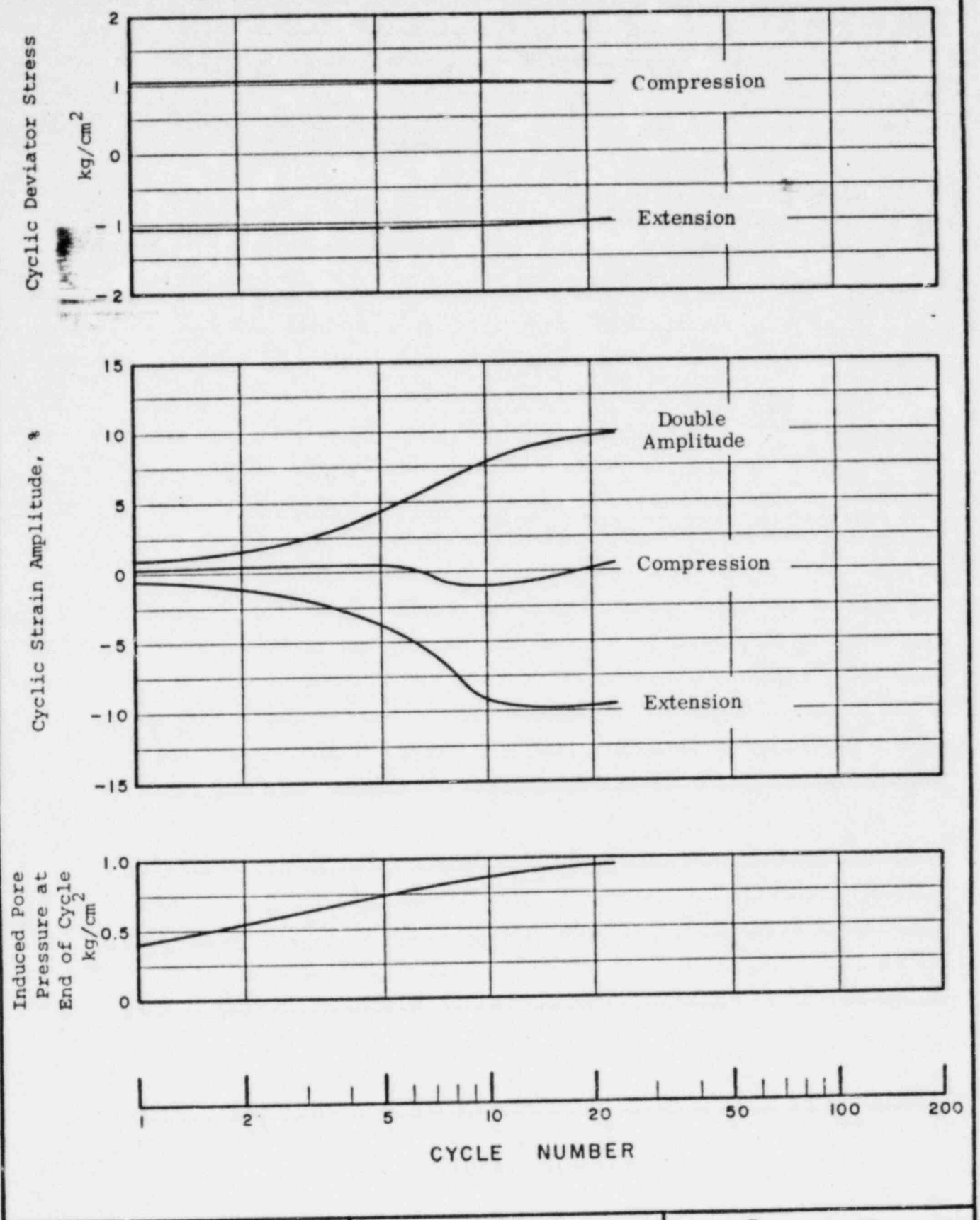
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 4 Boring SP-16A Sample P-4C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig.69



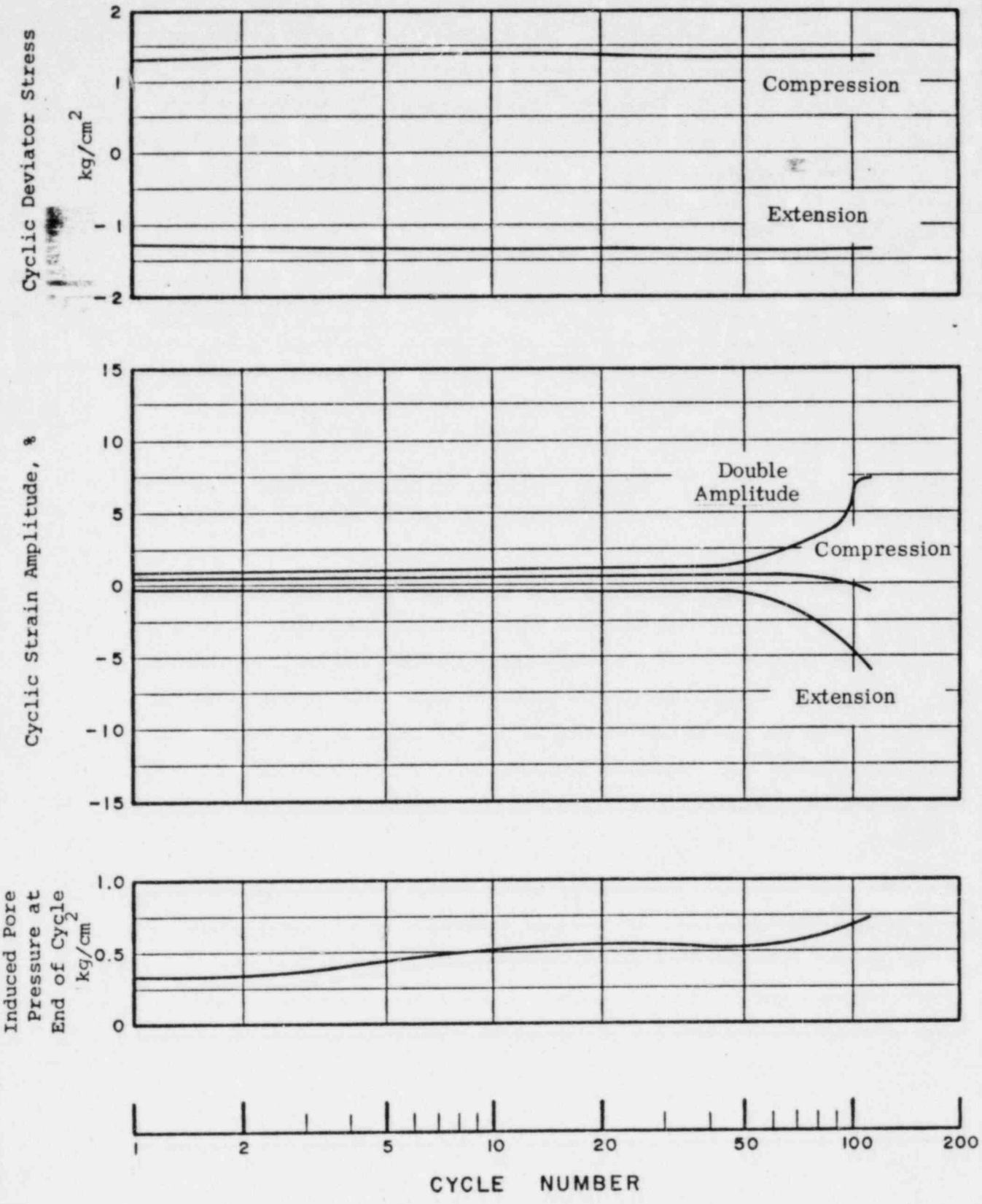
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 5 Boring SP-4A Sample P-2C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 70



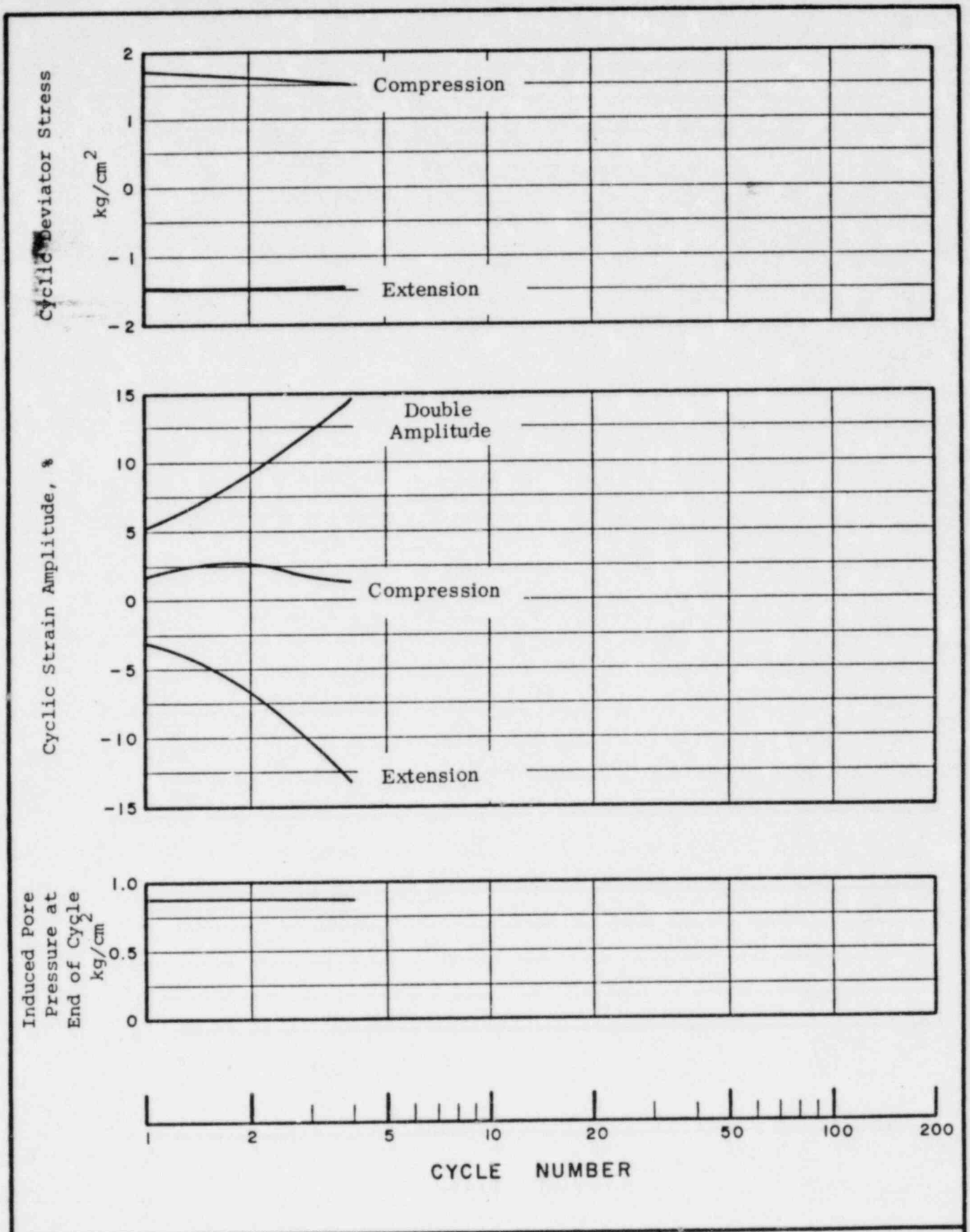
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 6 Boring SP-15 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 71



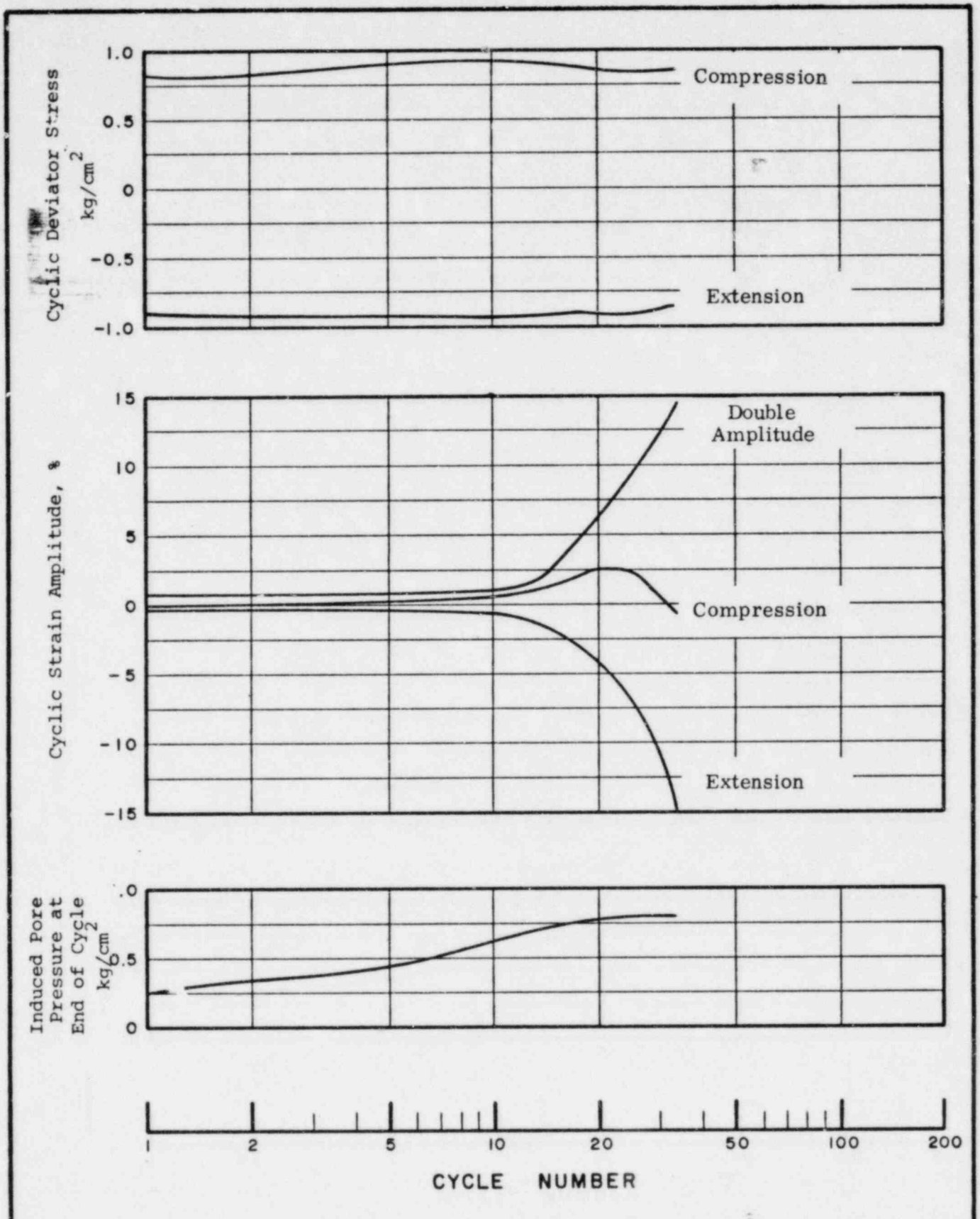
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	$C\bar{R}$ TEST NO. 7 Boring SP-3 Sample 3
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 72



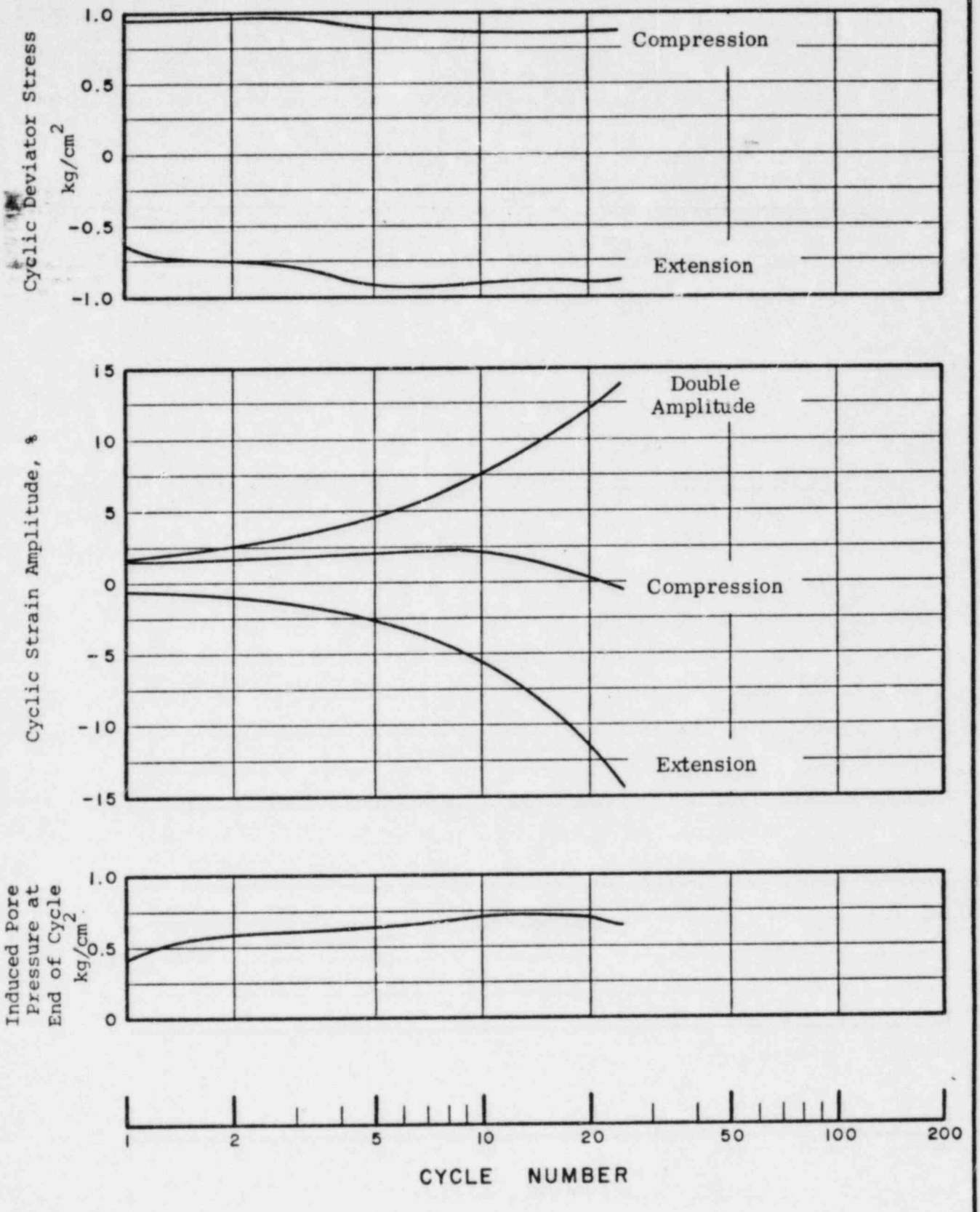
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 8 Boring SP-14 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 73



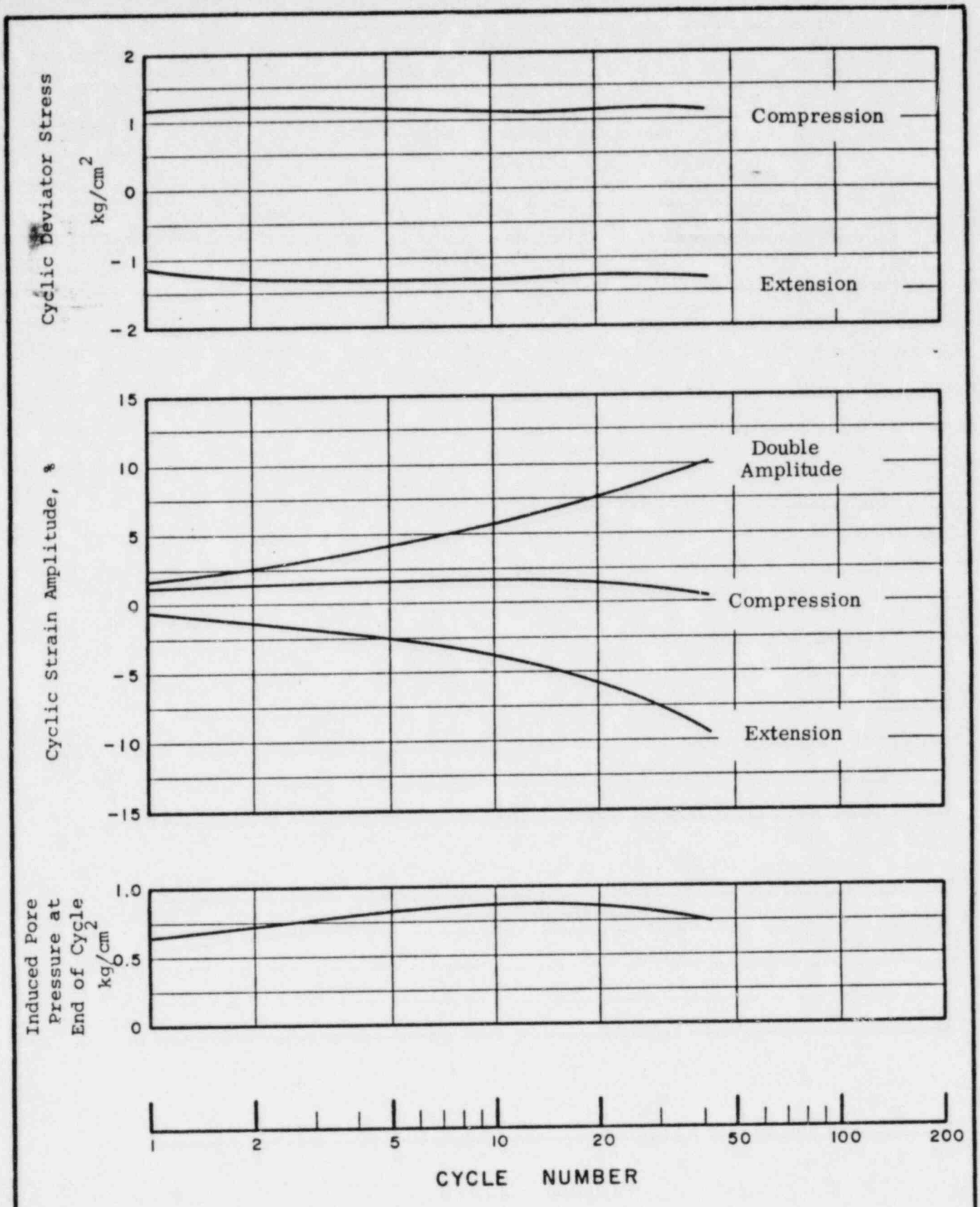
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR̄ TEST NO. 9 Boring SP-9 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 74



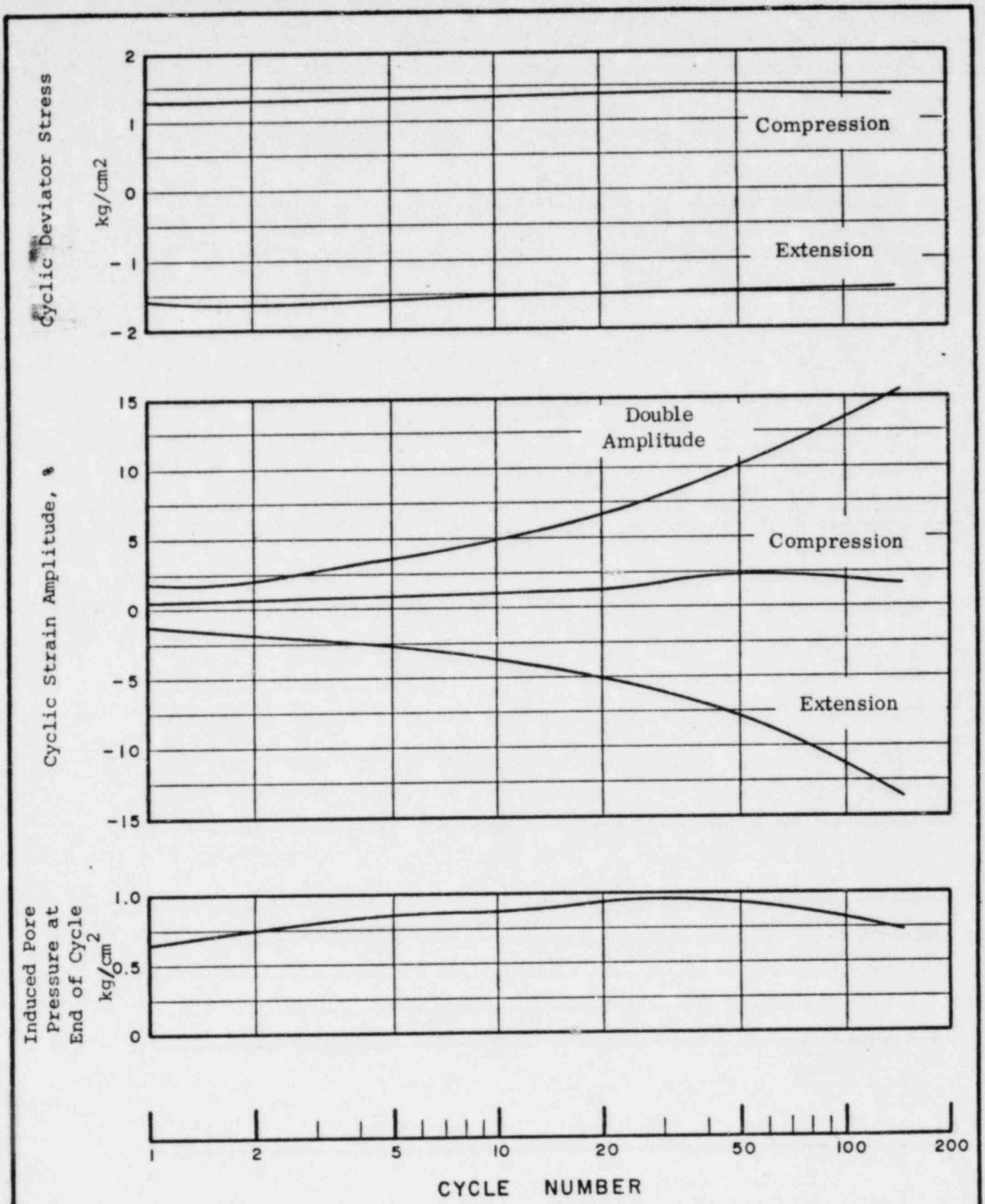
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 10 Boring SP-3 Sample 2
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 75



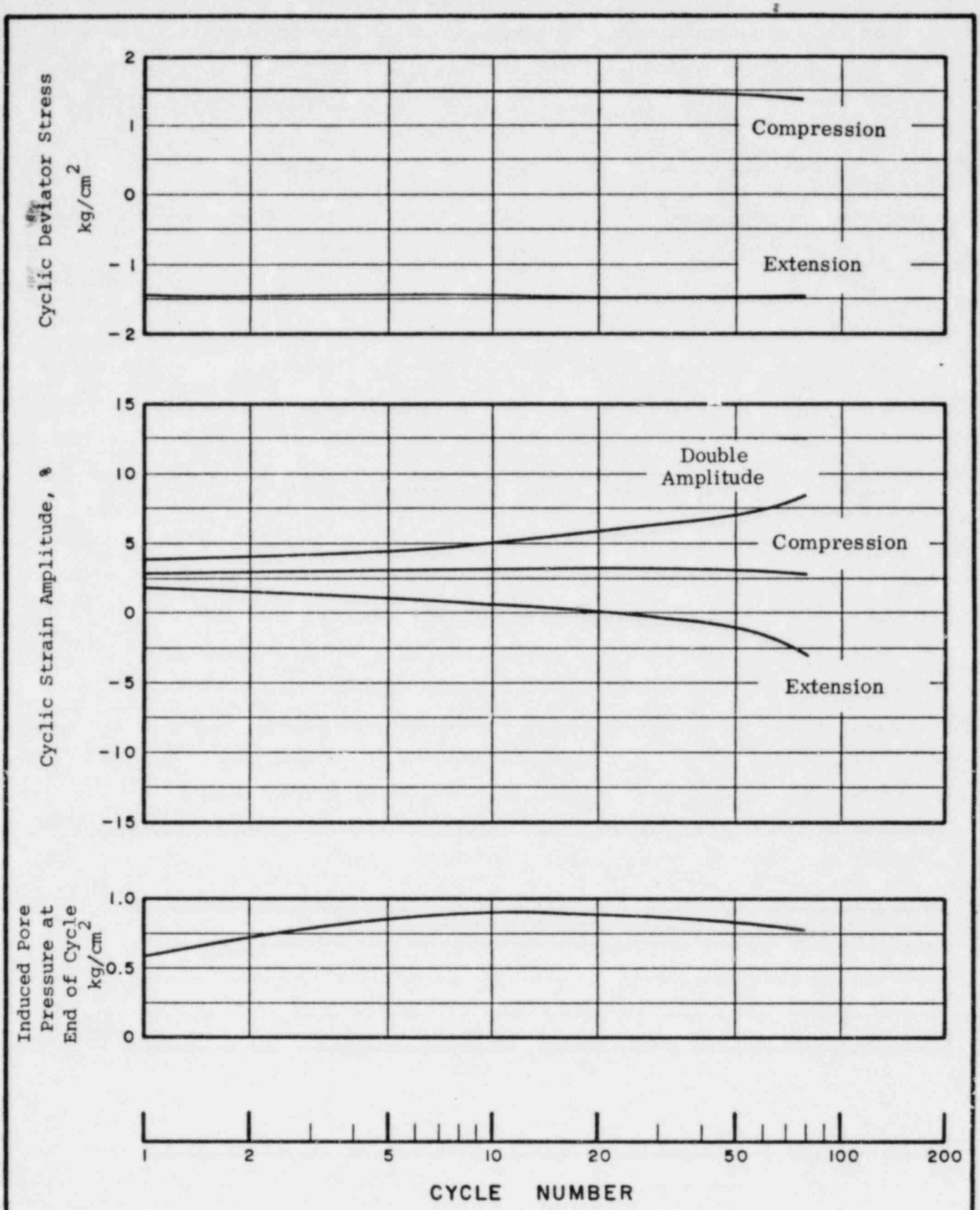
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	$\bar{CR}$ TEST NO. 11 Boring SP-3 Sample 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 76



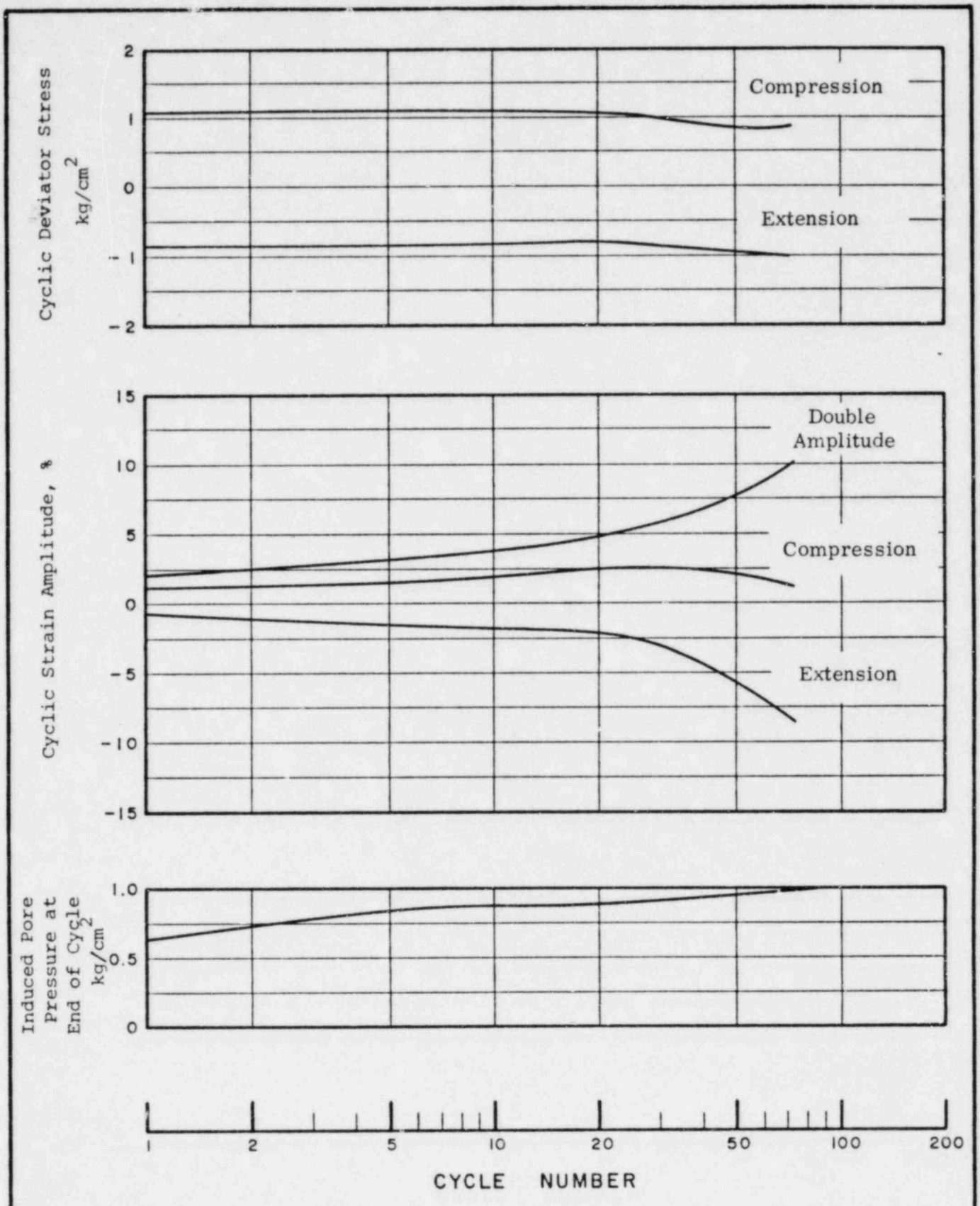
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 12 Boring SP-12 Sample P-2B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 77



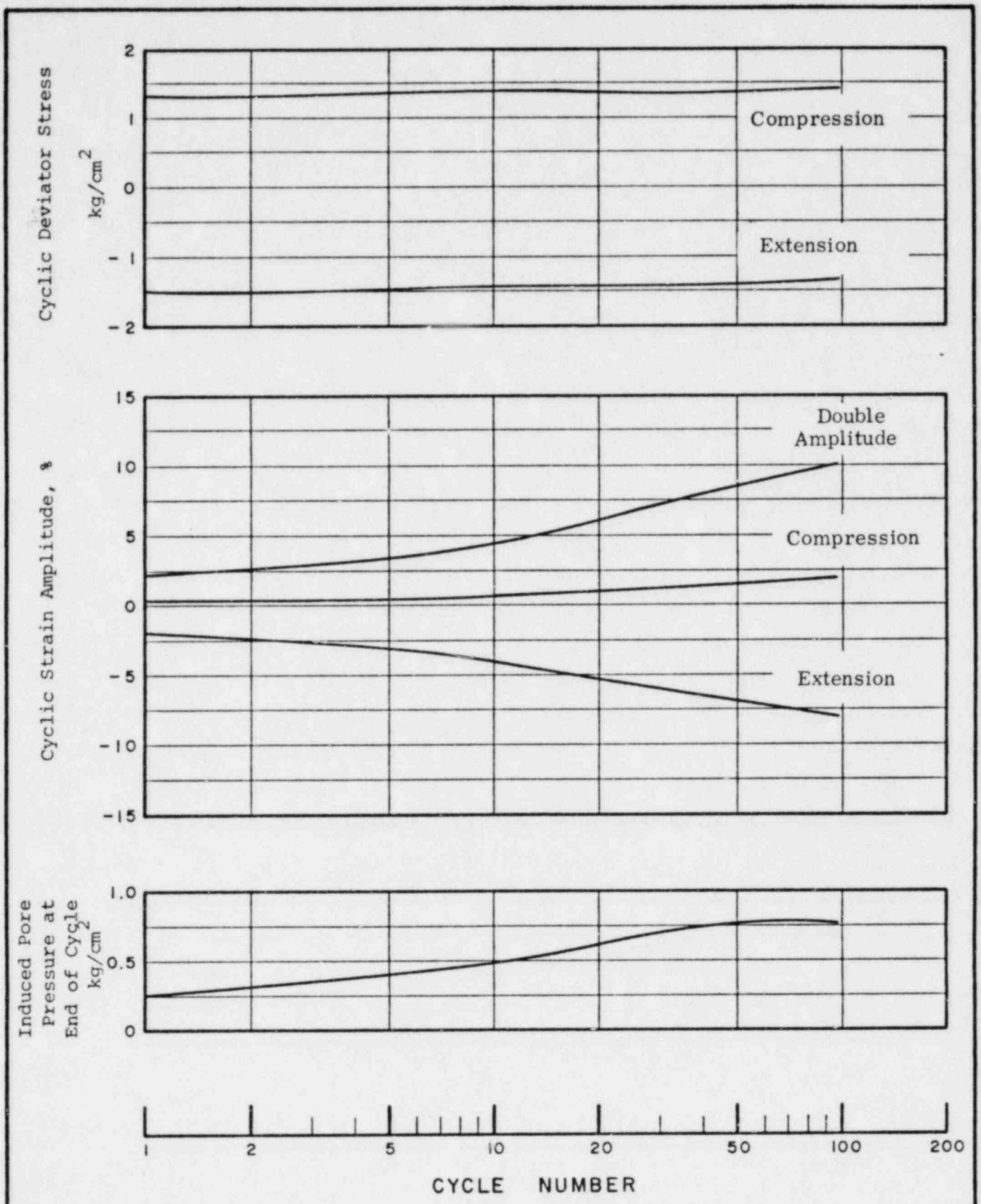
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 13 Boring SP-5A Sample P-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 78



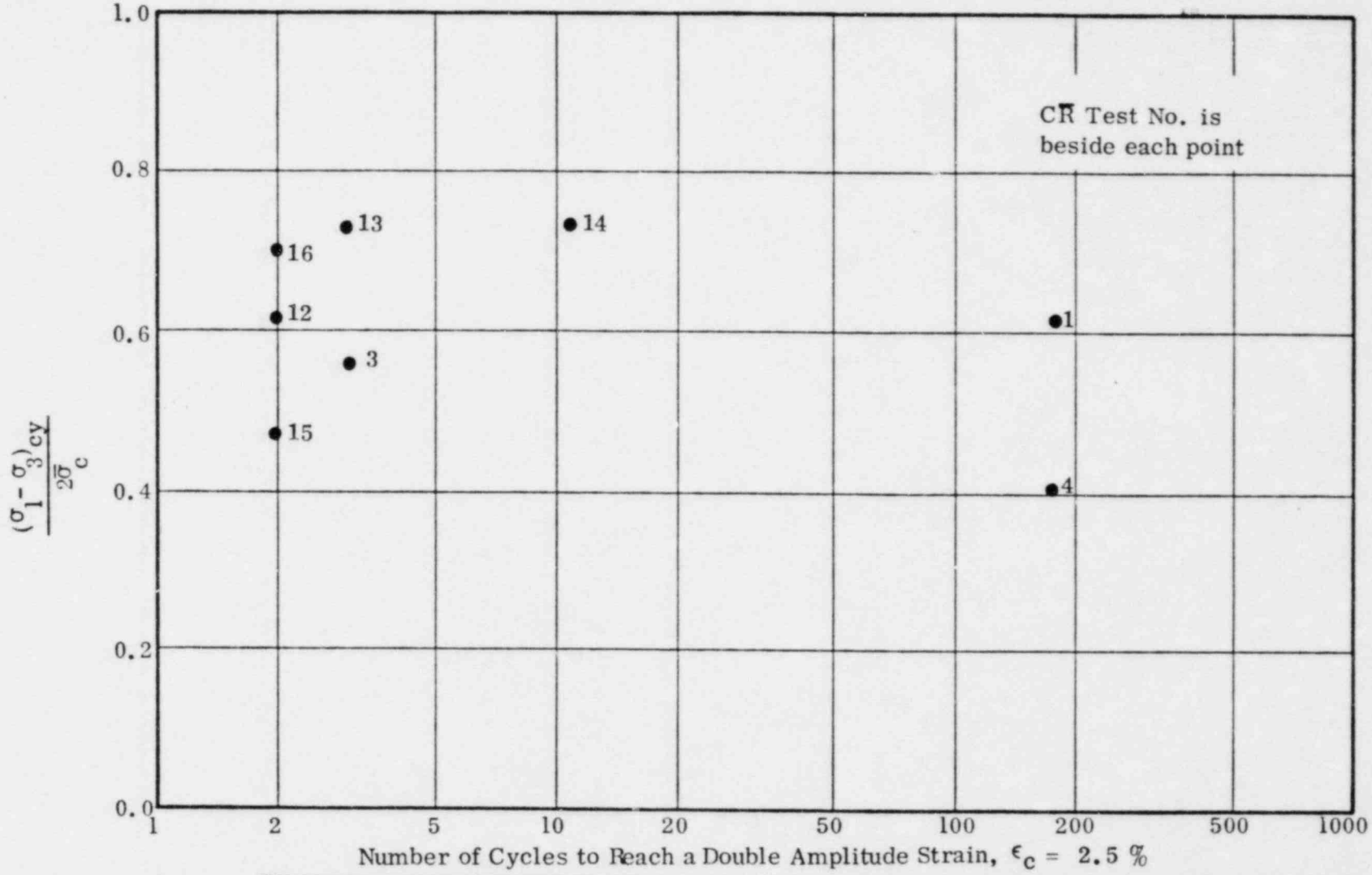
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 14 Boring SP-4A Sample P-3C
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 79



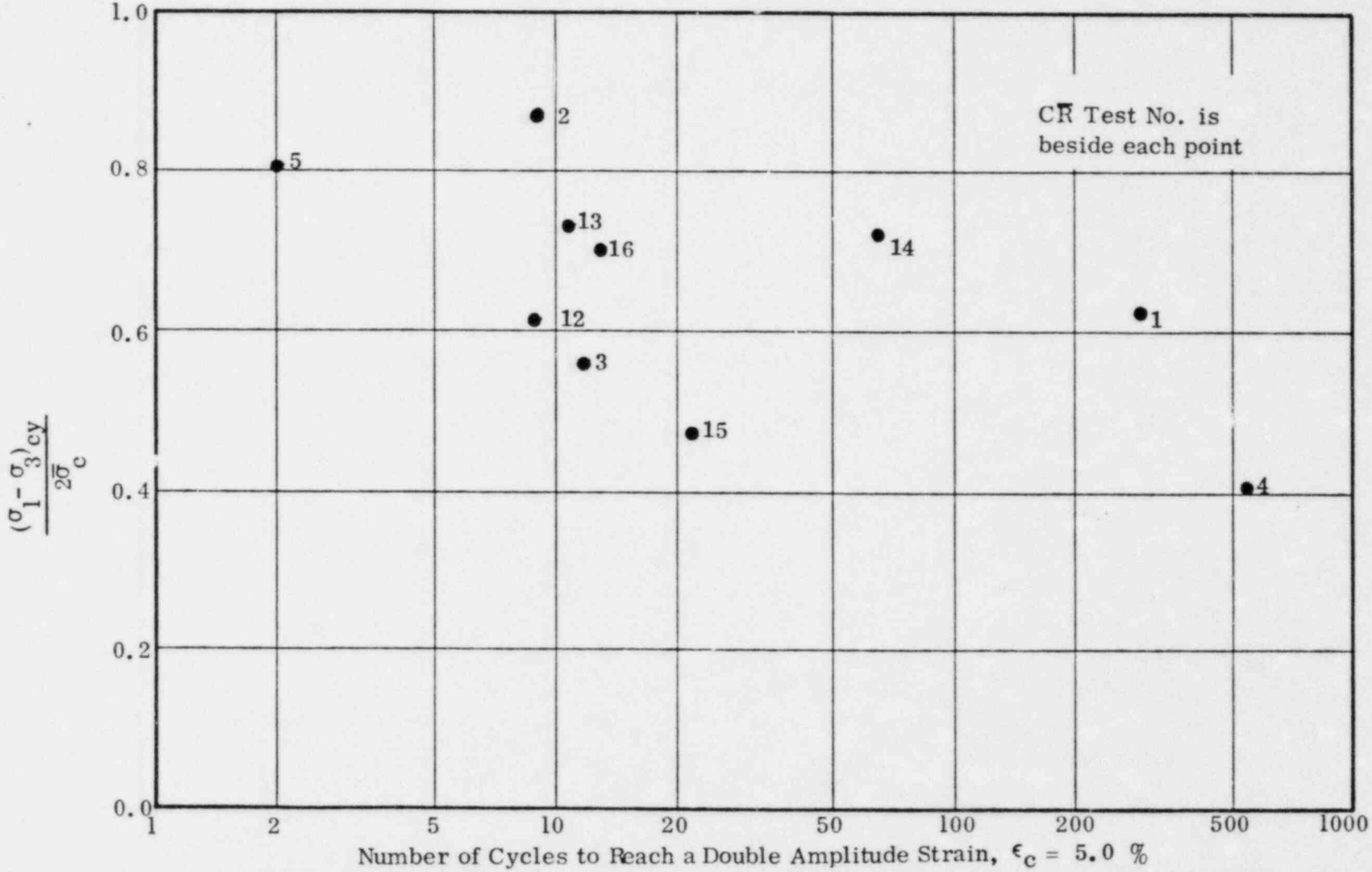
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR̄ TEST NO. 15 Boring SP-4 Sample D-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 80



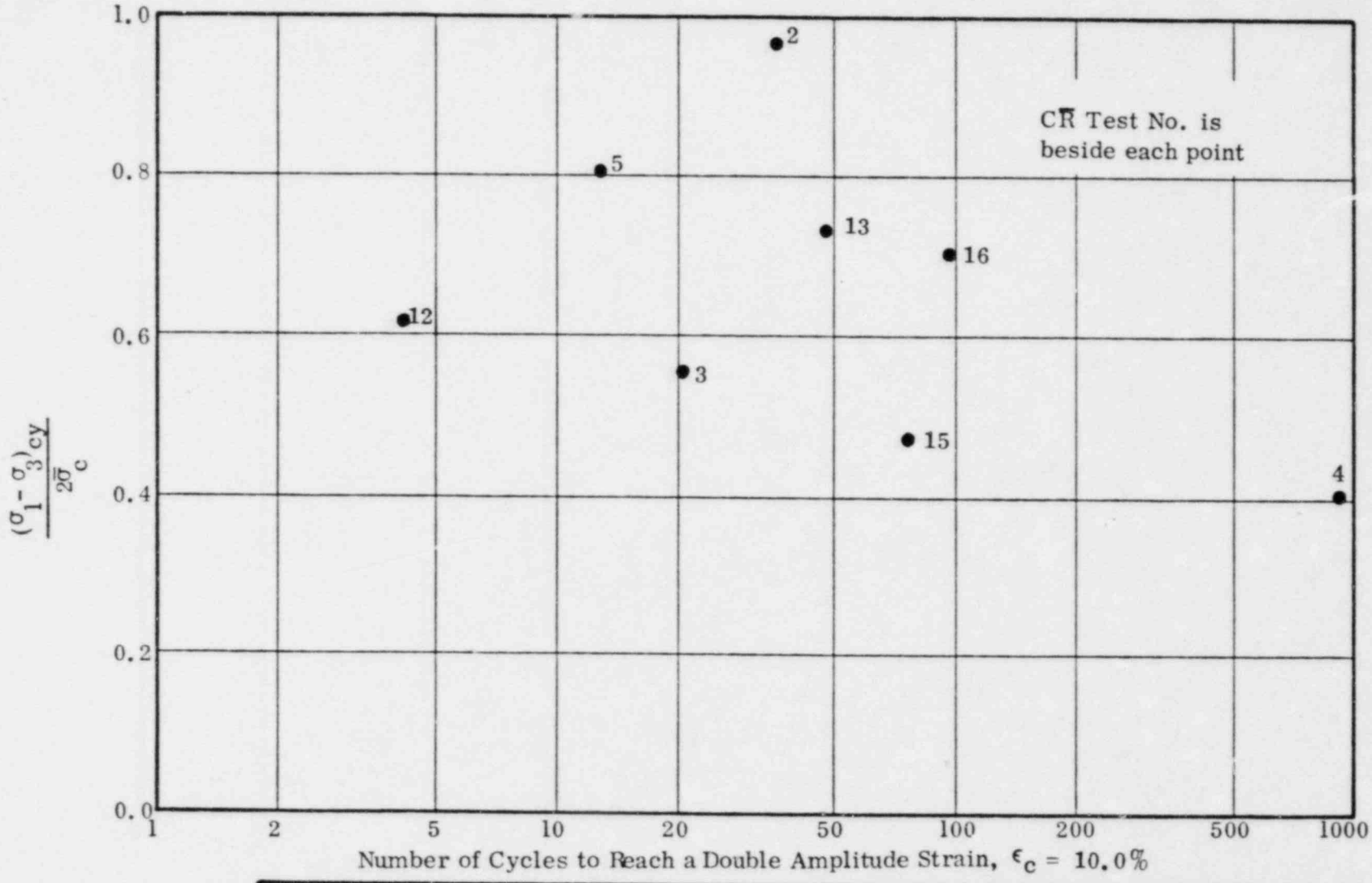
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	CR TEST NO. 16 Boring SP-4A Sample P-1B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 81



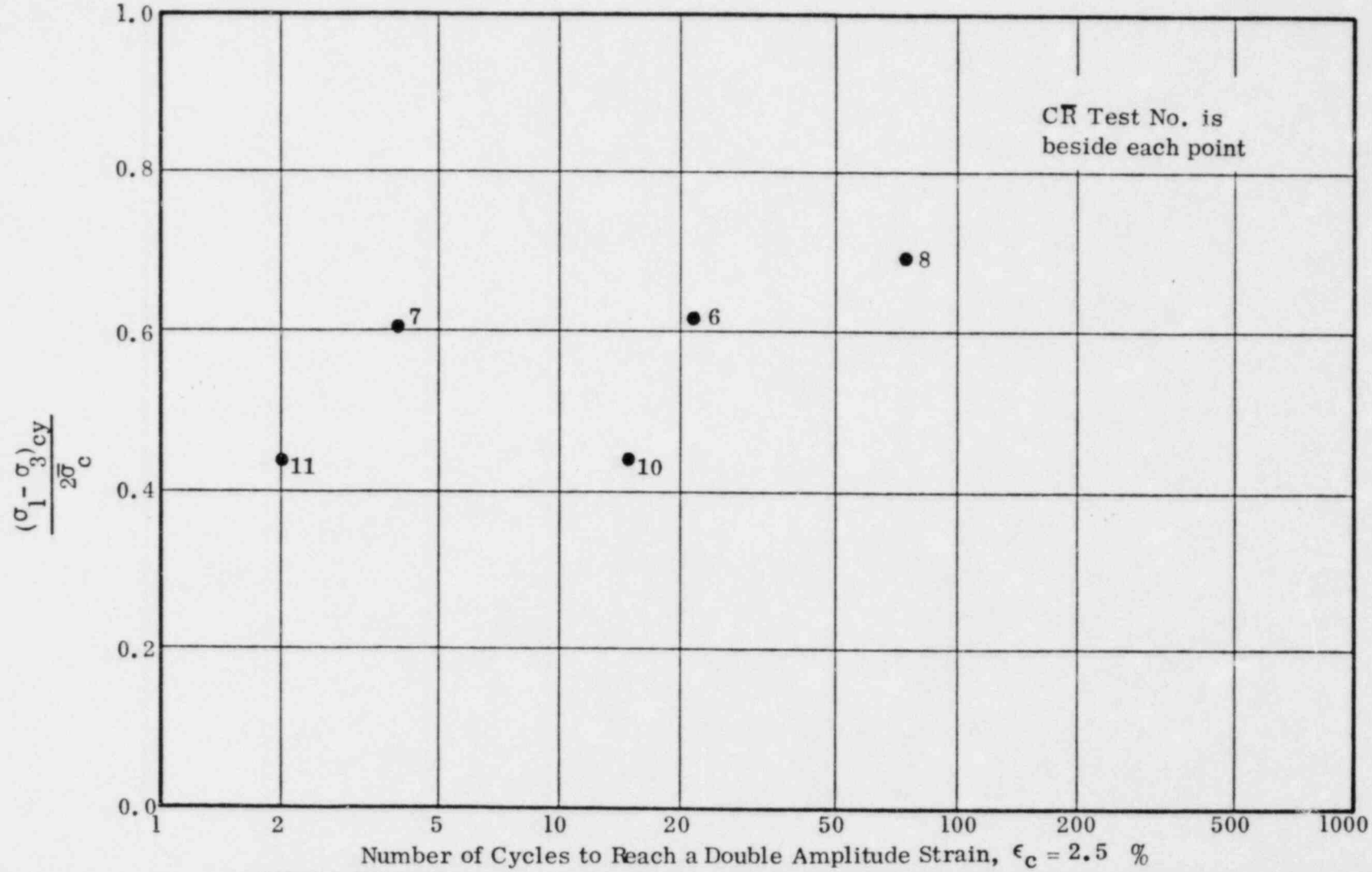
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	SUMMARY PLOT Undisturbed Tube Samples ϵ_c= 2.5 %
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 82



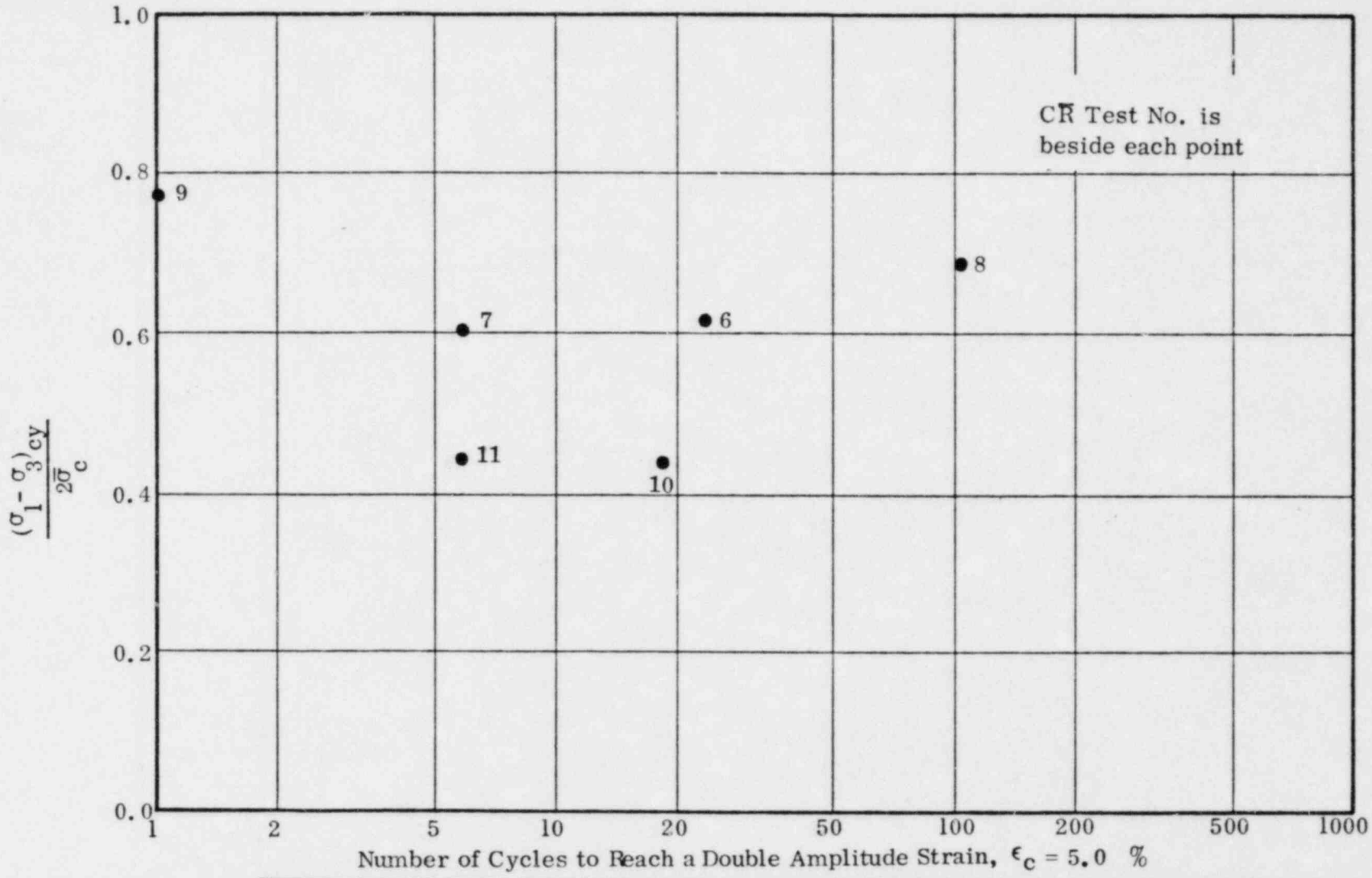
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	SUMMARY PLOT Undisturbed Tube Samples ϵ_c = 5.0 %
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 83



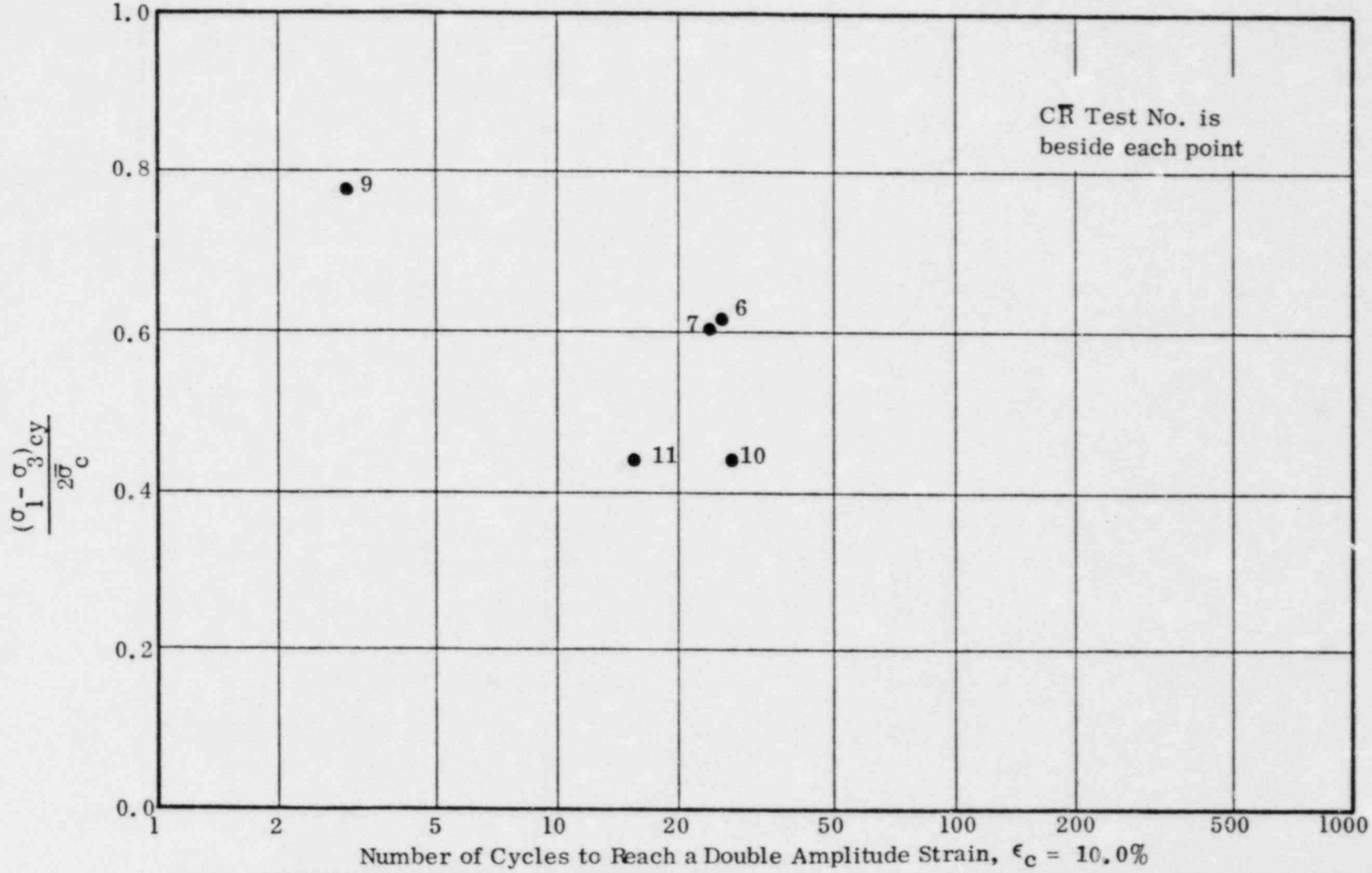
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	SUMMARY PLOT Undisturbed Tube Samples ϵ_c = 10.0%
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 84



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	SUMMARY PLOT Block Samples ϵ_c = 2.5 %
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 85



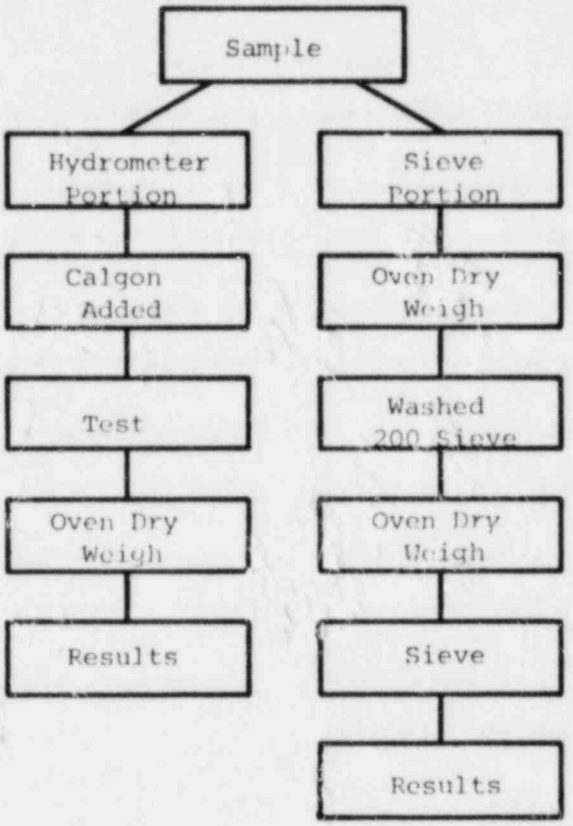
Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	SUMMARY PLOT Block Samples ϵ_c = 5.0 %
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 86



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	SUMMARY PLOT Block Samples ϵ_c = 10.0%
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 87

FLOW CHART

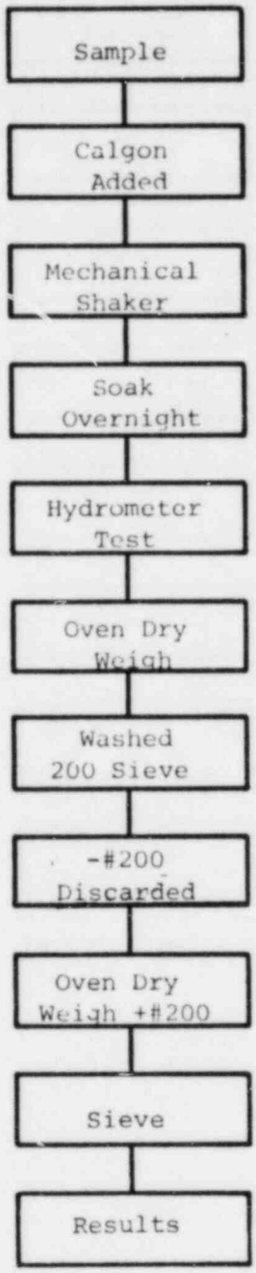
HYDROMETER AND SIEVE ANALYSIS



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	FLOW CHART Method No. 1
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 88

FLOW CHART

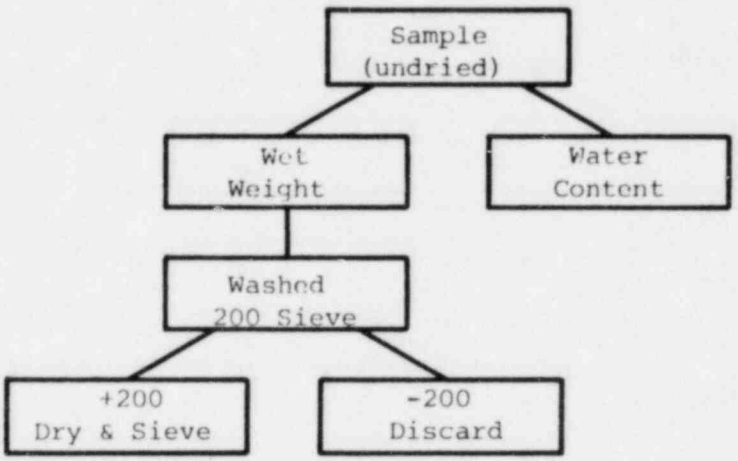
COMBINED MECHANICAL ANALYSIS



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	FLOW CHART Method No. 2
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 89

FLOW CHART

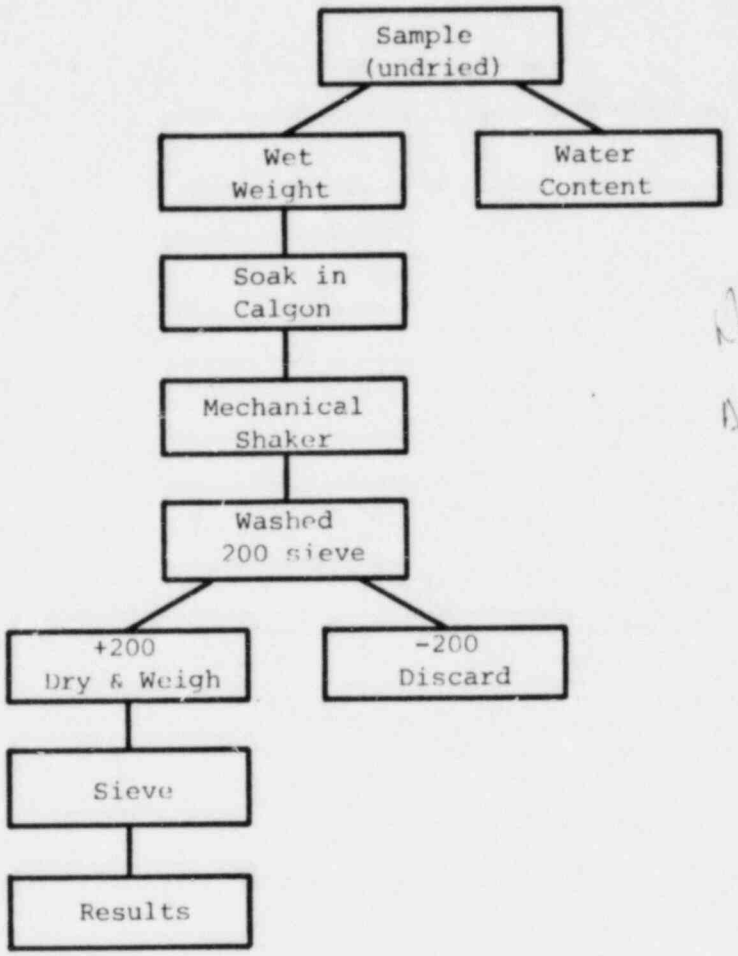
HYDROMETER AND SIEVE ANALYSIS



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	FLOW CHART Method No. 3A
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 90

FLOW CHART

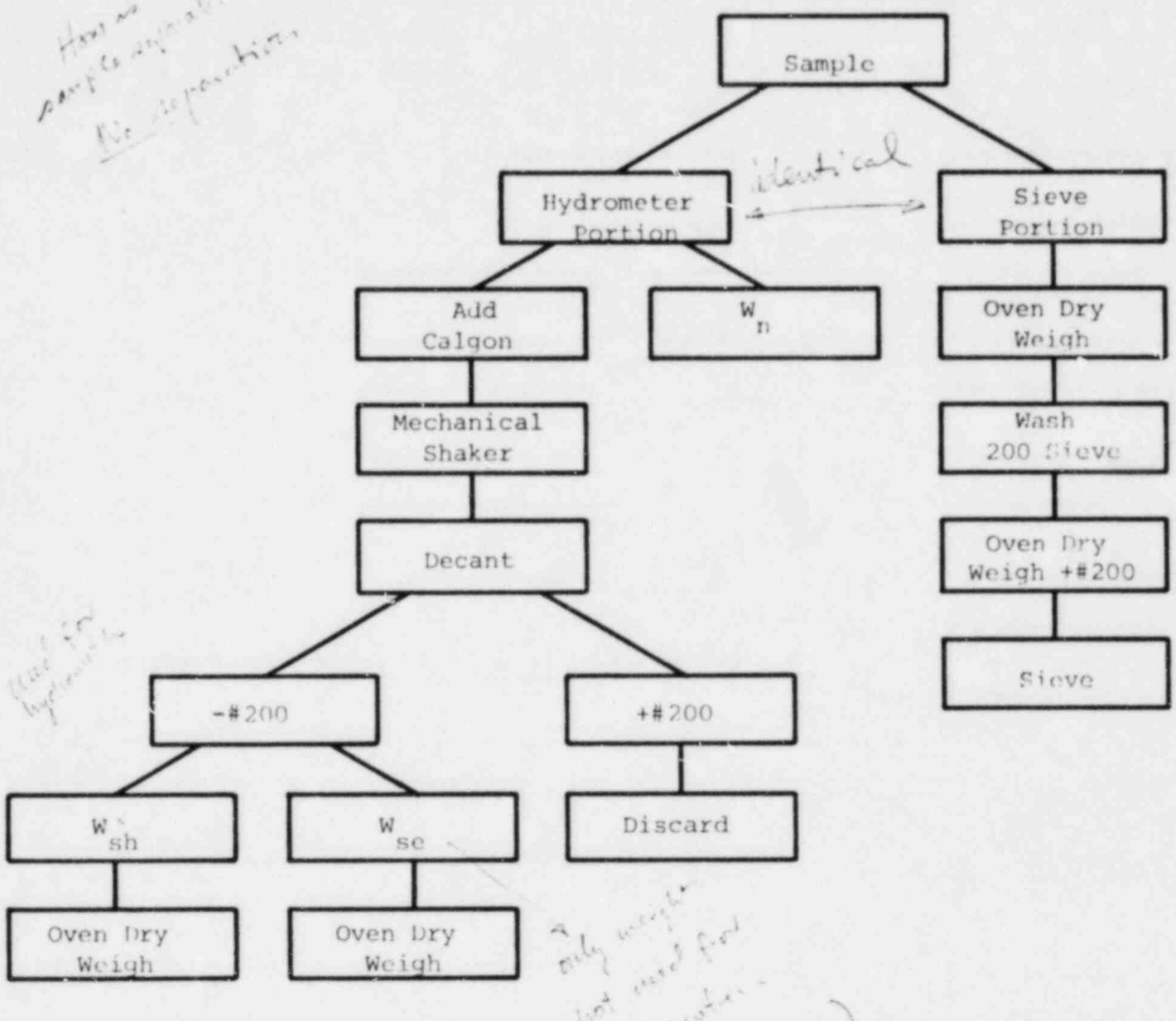
HYDROMETER AND SIEVE ANALYSIS



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	FLOW CHART Method No.3B
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 9

FLOW CHART

HYDROMETER AND SIEVE ANALYSIS



Bechtel-American Drilling	Limerick Nuclear Station Spray Pond Limerick, Pa.	FLOW CHART Method No. 4
Geotechnical Engineers, Inc. Winchester, Massachusetts	Project 74175	Sept., 1974 Fig. 92

APPENDIX A

JAR SAMPLE DESCRIPTIONS

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-1

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
P-1	3-5	--	Brown to slightly red-brown plastic silt, trace of subangular gravel up to 15 mm, trace of medium to fine sand, plasticity is low.
1	6-7.5	11-14-15	Brown sandy, clayey silt, trace of subrounded gravel up to 20 mm, moderate reaction to shaking test; low plasticity.
2	11.5-13	7-13-18	Orange-brown sandy, plastic silt, trace of angular gravel up to 20 mm, black staining and yellow-mottling.
3	19.5-20.5	71-150	Yellow-brown silty fine sand, trace of flat, angular gravel up to 12 mm; black vertical streaks, trace of medium to fine sand, trace of clay.
4	23.3-24.8	21-32-61	Yellow-brown silt with layers of purple-red plastic silt; apparent nodules of gray silt; trace of medium to fine sand.
5	29-29.9	61-150/5"	Purple-brown finely bedded siltstone--weathered; breaks into silt-size particles.

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-2

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	5.5-7	21-19-23	Red-brown angular coarse to medium sand, trace of silt -- FILL
2	7-8.5	16-14-19	Brown sandy, clayey silt with rock fragments -- FILL
3	9.5-11	6-8-17	Red-brown clayey silt, vertical lenses oxidized yellow medium to fine sand -- FILL
4	15-16.5	7-12-13	Yellow-brown sandy, slightly plastic silt -- moderate reaction to shaking test
5	20.5-22	14-17-22	Yellow-brown silt, trace of fine sand; slightly plastic
6	26-27.5	26-41-44	Red-brown siltstone with 30 mm layer of yellow silt -- weathered siltstone -- horizontal bedding preserved

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-3

Project Limerick, PA Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3-4.5	2-3-4	Red-brown clayey silt, trace of fine sand; black staining
4	15.5-17	16-28-72	Red-brown fine sandy silt, trace of clay; harder nodules of clay

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-4

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	4-5.5	5-5-11	Yellow-brown silt, trace of fine sand -- slow reaction to shaking test; black staining
2	6.5-8	17-22-40	Red-brown clayey silt, trace of mica, coarse sand
3	9-10.5	13-18-16	Yellow-brown silt, little fine sand, trace of clay and coarse to medium sand
4	11.5-13	51-63-87	Red-brown slightly plastic silt, trace of fine sand; some of original rock structure preserved, black staining
5	14-15.5	38-44-53	Red-brown weathered siltstone; horizontal bedding
6	16.5-17.8	23-61 120/4"	Red-brown weathered siltstone; horizontal bedding

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-4A

Project Limerick, PA Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	16-17.5	27-43-81	Red-brown plastic silt with laminae and layers of light brown silt up to 10 mm thick, trace of medium to fine sand.
2	21-21.3	120/3"	Red-brown clayey silt, trace of coarse to fine sand.

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-5

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	4-5.5	9-17-43	Yellow-brown sandy silt, trace of rounded to sub-rounded gravel up to 20 mm.
2	6.5-8	14-22-27	Yellow-brown clayey silt, trace of gravel up to 20 mm, coarse to fine sand.
3	9-10.5	13-17-23	Red-brown sandy silt, some sub-angular gravel up to 17 mm, little clay.
4	11.5-13	11-14-19	Red-brown sandy silt, trace of clay and fine rounded gravel up to 10 mm.
5	14-15.5	17-28-51	Red-brown sandy silt, trace of clay and fine rounded gravel up to 10 mm.
6	16-16.4	120/5"	Red-brown gravelly, silty coarse to fine sand, trace of clay.

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-6

Project Limerick, PA Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3-4.5	8-14-17	Yellow brown clayey silt, little medium to fine sand (10-20%), trace of gravel.

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-7

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3-4.5	15-21-33	Red-brown sandy, plastic silt, trace of clay and sub-rounded gravel up to 17 mm.
2	5.5-5.7	120/3"	Red-brown sandy, silty angular gravel--gravel up to 30 mm in size, trace of clay.

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-9

Project Limerick, PA Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3.5-5	3-4-9	Yellow-brown clayey silt, trace of medium to fine sand
2	6-7.5	9-22-36	Yellow-brown sandy silt, trace of weathered gravel
3	8.5-8.9	120/5"	Yellow-brown sandy silt, some flat (wafer-like) gravel pieces; silt slightly plastic, trace of clay

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-10

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3-4.5	7-18-68	Yellow-brown sandy plastic silt, trace of sub-angular gravel up to 35 mm
2	5.5-6.4	61-120	Yellow-brown sandy silt, some angular gravel up to 25 mm, trace of clay

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-11

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3-4.5	12-9-15	Yellow-brown clayey silt, trace of coarse to fine sand
2	8.5-9	189/6"	Yellow-brown silty, gravelly coarse to fine sand; angular gravel up to 25 mm

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-12

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	8.5-10	9-23-35	Yellow-brown sandy silt, trace of weathered gravel; some mixed plastic silt
2	11-12	64-145	Dark-brown to black weathered siltstone

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-12A

Project Limerick, PA

Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	3-4.5	5-7-8	Yellow-brown clayey silt, trace of coarse to fine sand, rock fragments

DESCRIPTION OF JAR SAMPLES

BORING NO. SP-16

Project Limerick, PA Project No. 74175

Sample No.	Depth ft	Number of Blows per 6"	Description
1	4-5.5	10-14-15	Red-brown clayey silt, trace of weathered coarse to medium sand
2	6.5-8	17-14-22	Red-brown clayey silt, trace of weathered coarse to medium sand
3	9-10.5	10-16-21	Mottled yellow-gray sandy silt, trace of fine gravel; silt slightly plastic
4	11.5-13	14-17-23	Yellow-brown silt and mottled yellow-brown clayey silt, trace of fine sand
5	14-15.5	15-25-24	Yellow-brown sandy silt, some mixed plastic silt
6	16.5-18	19-22-23	Yellow-brown sandy silt, some mixed plastic silt
7	19-20.5	12-14-18	Orange-brown sandy silt, some mixed plastic silt
8	21.5-23	15-21-18	Yellow-brown sandy silt, some mixed plastic silt
9	24-24.9	73-120/4"	Yellow-brown and gray sandy slightly plastic silt, trace of rock fragments

APPENDIX B

TUBE SAMPLE DESCRIPTIONS

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-1

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P4 16.5-18.5	--	--	No testing - Tube is deformed

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-1

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P6 26-28	A	5.0	Red-brown siltstone; non-plastic silt with pieces of gravel; gravel easily broken into sand size particles; some yellow oxidized silt
	B	7.3 $\bar{R}$-5	Yellow-brown siltstone; fractured with black-stained joint surfaces; siltstone grades from fine sandy silt to a dark-brown clayey silt Sample too fractured to use for $\bar{R}$-5 test

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-2

Project No. 74175

Project Limerick, PA

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P3 23-25	A	3.5	Yellow-red decomposed siltstone; very brittle and breaks easily into gravel size pieces; blocky joint structure
	B	7.5 ($\bar{R}$-4)	Dark-brown to orange-brown decomposed siltstone; black-stained joints dipping 40°-55°; siltstone breaks down to gravel and sand size pieces; slightly plastic Sample failed along one of the relic joints dipping at 40° 
	C	6.8	Sample too fractured to test - similar to Section B

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-4A

Project Limerick, PA

Project No. 74175

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P2 7-9	A	7.0	Red-brown sandy, plastic silt, trace of gravel; some of gravel is decomposed
	C	7.1 CR-5	Red-brown sandy silt, trace of decomposed fine gravel; pockets of plastic silt Sample showed slight necking after testing

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-4A

Project Limerick, PA

Project No. 74175

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P3 10-12	A	3.0	Red-brown plastic silt, trace of coarse to fine sand & gravel; some of gravel decomposed
	B	7.6	SAMPLE DISTURBED - SIMILAR TO ABOVE SECTION
	C	6.9	
		CR-14	SIMILAR TO ABOVE - SECTION A

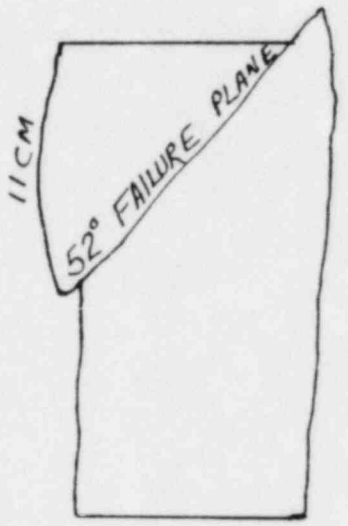
DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-4A

Project Limerick, PA

Project No. 74175

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P4 13-15	A	7.0	Red-brown (fissile) siltstone - breaks along near horizontal bedding planes; siltstone can be broken easily into gravel and/or sand size pieces
	C	8.0 R-11	Red-brown silt, trace of medium to fine sand. Black-stained horizontal joints - trace of orange-brown clay coating on joint surfaces. Sample brittle Sample failed along plane inclined at 52° - not a pre-existing joint 

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-4A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P5 18-20	A	3.5	Red-brown siltstone - near horizontal bedding; rock breaks down into sand and/or gravel size pieces
	B	6.8 R-3	Section B similar to A - sample disturbed during saturation
	C	7.8	Section C similar to A Sample too fractured to test

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-5A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P1 4-6	A	3.3	Mottled yellow-brown plastic sandy silt; trace of gravel.
	B	8.1 CR-13	Sample similar to A

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-5A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P2 7-9	A	8.5	Mottled yellow-brown clayey silt; trace of coarse to fine sand and gravel up to 2 cm
	B	7.1 R-12	Section B similar to A
	C	7.5	Sample disturbed; description similar to A

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-5A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P4 13-15	B	15.0	Red-brown sandy silt; trace of gravel, cobbles - sample is disturbed; loose cobble on top of tube

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-6

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
D1 5.5-7.5	A	5.0	Brown gravelly, sandy silt (non-plastic)
	B	7.0	Brown gravelly, sandy plastic silt - slight plasticity. Sample is disturbed - cavities in sample

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-9A

Project No. 74175

Project Limerick, PA

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P2 5.5-7.5	A	6.6	Yellow-brown plastic silt with pieces of gravel; some of gravel decomposed - hard gravel size pieces of more plastic clayey silt
	B	7.9	Sample description similar to A Sample gouged - unable to $\bar{R}$ test

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-11

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P1 3-5	A	10.3	SAMPLE DISTURBED. Bottom of tube oval shaped. No testing.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-11A

Project No. 74175

Project Limerick

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P-1	A	3.9	Bottom 1/2" of tube is deformed and crimped. Bottom 2" slightly oval. Red-brown clayey silt, trace of gravel similar to above section.
3-5	B	9.0	$\bar{R}14$
			Specimen bulged and showed lateral displacement

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-12

Project No. 74175

Project Limerick, PA

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P1 3-5	A	2.2	Mottled yellow-brown silty clay; trace of sand - low plasticity; pieces of gravel (siltstone) up to 1 cm
	B	7.3 $\bar{R}$-13	Similar to B. Sample bulged after $\bar{R}$ test; small horizontal fractures developed

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-12

Project Limerick, PA

Project No. 74175

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P2 5.5-7.5	A	4.0	Yellow-brown plastic sandy silt; trace of gravel - some of gravel decomposed
	B	7.8 CR-12	Yellow-brown sandy plastic silt; pockets of non-plastic silt and clayey silt; trace of gravel

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-13

Project No. 74175

Project Limerick

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P-1	A	7.2 R-15	Yellow-brown clayey, sandy silt - vertical gray silt layers. Pieces of red-brown and yellow-brown siltstone throughout sample Sample bulged during testing

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-14

Project No. 74175

Project Limerick, PA

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
D1 3-5	A	7.2	Mottled brown silty clay; trace of fine sand.
	B	7.8 CR-15	Mottled brown clayey silt; trace of fine sand.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-14A

Project No. 74175

Project Limerick, PA

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P1 3.5-5.5	A	8.7	Mottled yellow-brown plastic silt; trace of angular gravel, sand
	B	8.7 CR-16	Section similar to A

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-14A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P2 6-8	A	5.5	Yellow-brown silty, sandy gravel - gravel angular and break into sand-size particles; numerous rock fragments
	B	6.9	Section B is similar to A
			SAMPLE DISTURBED - No testing.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-15A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P1 4-6	B	8.1	Mottled gray-brown sandy plastic silt; trace of gravel. Gravel can be easily broken into sand-size pieces. SAMPLE IS DISTURBED - No testing.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-15A

Project No. 75175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P2 7-9	A	6.7	Yellow-brown sandy silt; trace of gravel; gravel easily broken into sand-size particles
	C	6.75 CR-2	Similar to A with pockets of clayey silt Sample showed severe necking at bottom.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-15A

Project No. 74175

Project Limierck, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P3 10-12	A	6.9	Brown silty fine sand; trace of gravel with layers (0.6 in. - 1.7 in.) of gray-pink sandy clay; trace of gravel.
	B	6.9	Yellow-brown weathered siltstone with horizontal and vertical black-stained joints; layers (0.4 - 0.8 in.) of silty fine sand - tube is disturbed; bottom crimped and oval shaped. No testing.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-15A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P4	B	14.0	Yellow-brown plastic silt; trace of fine sand; bottom of section is yellow-brown non-plastic silt
	C	6.4	Yellow-brown brittle siltstone; numerous horizontal fractures at approximately 10° dip; some surfaces are coated with red-brown clay and/or stained black. SAMPLE IS DISTURBED - oval shaped; no testing.

DESCRIPTION OF UNDISTURBED SAMPLES

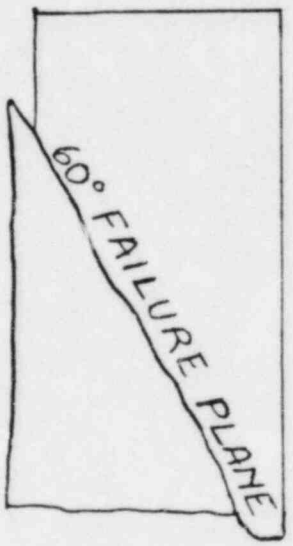
BORING NO. 15A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P5 16-18	A	3.5	Yellow-brown fragmented siltstone - very brittle and fractured; rock breaks easily into gravel size pieces
	B	7.0 R-2	Similar to Section A - sample B failed along relic joint inclined at 60° ~
	C	7.1	Similar to Section A



DESCRIPTION OF UNDISTURBED SAMPLES

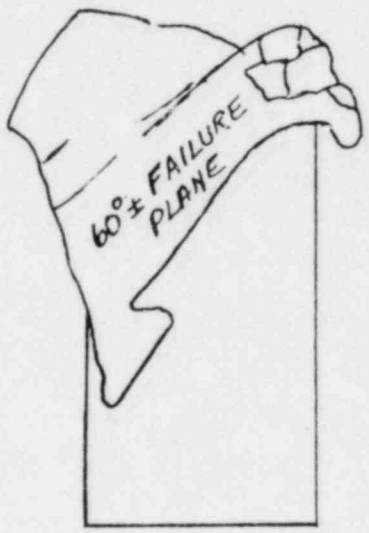
BORING NO. SP-15A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P6	A	3.7	Yellow-brown silty, sandy gravel - gravel partially decomposed; breaks easily into sand size particles; horizontal bedding - weathered siltstone
	B	7.4 R-1	Yellow-brown siltstone with horizontal black layers ~ 1-3 mm thick and orange-brown layers up to 5 mm thick; some vertical joints - locally weathered to plastic silt and clayey silt. Sample failed along two parallel inclined relic joints dipping 60°~
	C	6.7 CR-1	Yellow-brown to dark brown silt - locally plastic silt; crude stratification; nodule shaped zone of hard clay-sample showed necking at bottom after testing



DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-16A

Project No. 74175

Project Limerick

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P-2	C	6.7 R16	Top 3/4 of sample = yellow-brown silt. Remainder is red-brown clayey silt. Sample bulged with shear plane inclined at 75° developing. Shear roughly developed at contact between the two soil types.

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-16A

Project Limerick, PA

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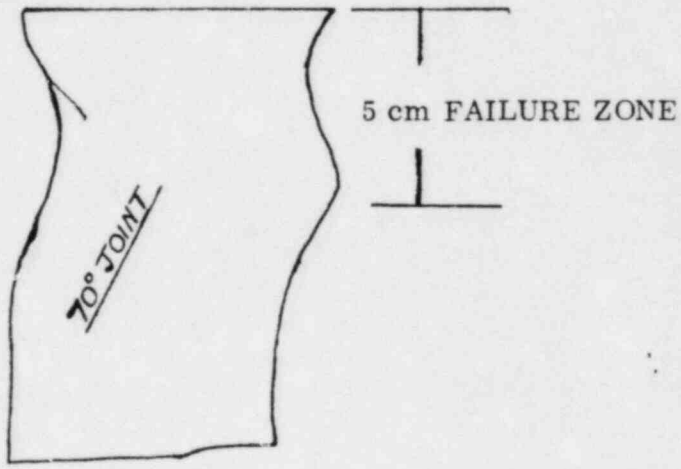
Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P3 10.5-12.5	A	6.5	Mixed red-brown and yellow sandy silt; pieces of decomposed gravel
	C	6.9 CR-3	Yellow-brown silt; several joints and fractures; locally clay in pockets - bottom 13 cm of tube is yellow-brown siltstone; one joint at 70°; siltstone breaks down into silt with effort. After testing, top 5 cm of sample showed necking and lateral displacement



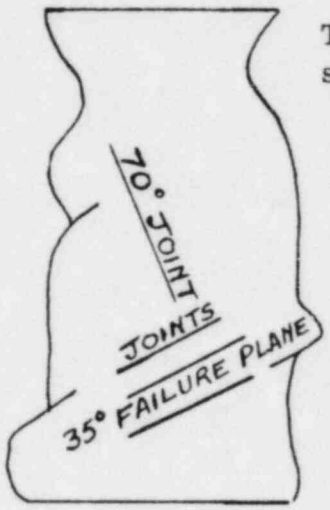
DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-16A

Project No. 74175

Project Limerick, PA

Page 1 of 1

Sample No. and Depth ft	Section No.	Length of Section in.	Description
P4 13.5-15.5	A	3.8	Red-brown sandy silt; nodule-shaped pieces of hard clay
	C	7.0 CR-4	Red-brown silt - locally plastic silt-gravel pieces break down into silt; bottom 12 cm is red-brown siltstone; several joints at 35°; one 70° joint
			 Top 5.5 cm shows severe necking
			Sample failed along joint inclined at 35°~ ; joint coated with clayey silt; 2 cm pocket of clayey silt at bottom of failure surface

DESCRIPTION OF UNDISTURBED SAMPLES

BORING NO. SP-16A

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Sample No. and Depth ft	Section No.	Length of Section in.	Description
P5 16.5-18.5	A	1.5	Yellow-brown silt; some retention of rock structure; one vertical joint; horizontal bedding
	B	9.5	Section B is disturbed - no testing

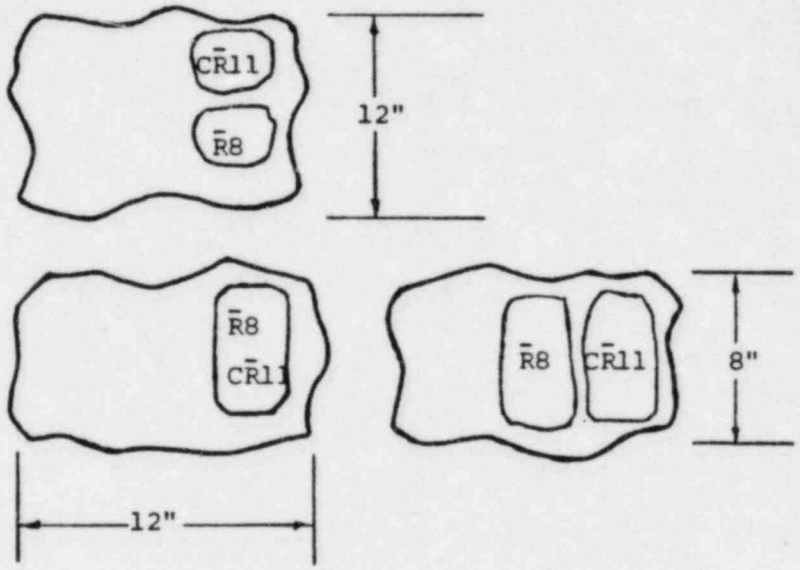
APPENDIX C

BLOCK SAMPLE DESCRIPTIONS

DESCRIPTION OF BLOCK SAMPLES

TEST PIT NO. SP-3

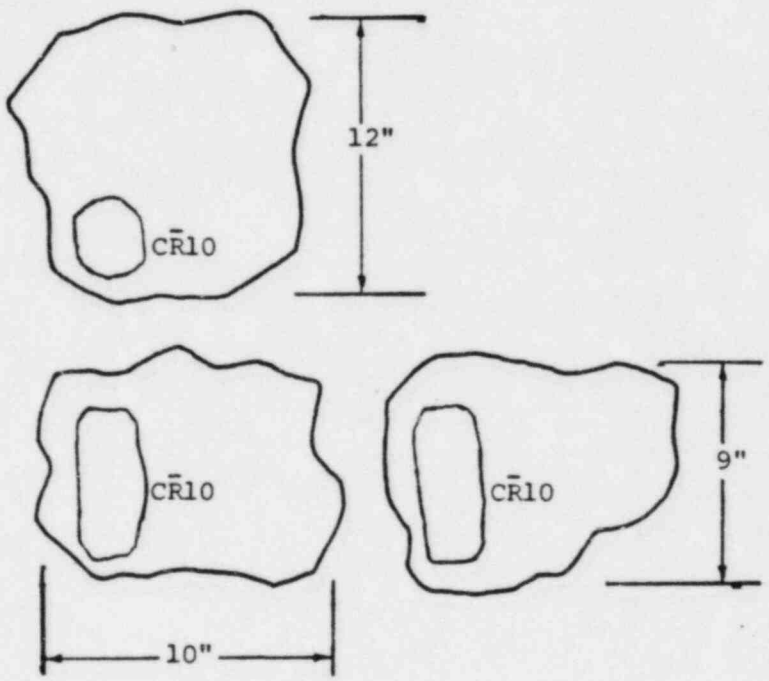
Project No.: 74175

Sample No.	Depth ft.	Description
1	4.6-5.6	 Yellowish brown to reddish brown plastic silt. Top 7 cm: Yellowish plastic silt or clay. Little reaction to shake test. Becomes tough when rolled out to plastic limit. Bottom 11 cm: Faint red-brown plastic silt. Stiffer than above. CR̄11 Top 1/3 of specimen necked. R̄8 Specimen bulged with two inclined fractures developing similar to a cone failure.

DESCRIPTION OF BLOCK SAMPLES

TEST PIT NO. SP-3

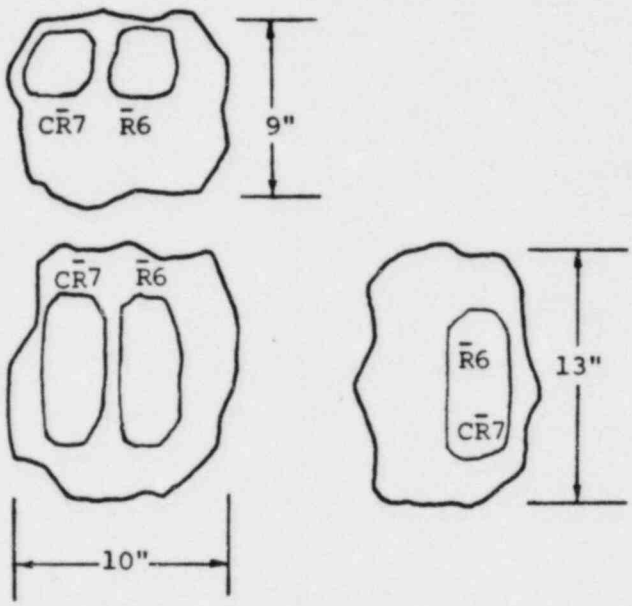
Project No.: 74175

Sample No.	Depth ft.	Description
2	9.8-10.8	 Red-brown firm silt with fine sand. Immediate reaction to shake test. CR̄10 Specimen bulged and necked around softer material.

DESCRIPTION OF BLOCK SAMPLES

TEST PIT NO. SP-3

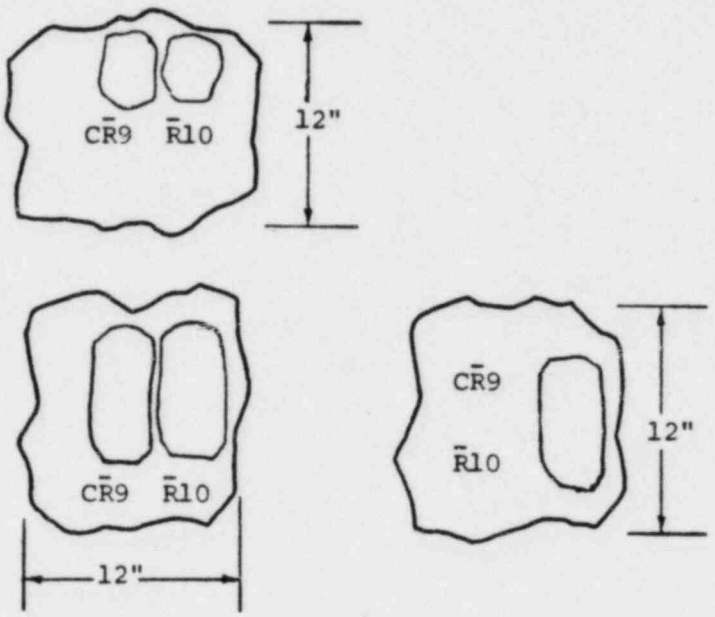
Project No.: 74175

Sample No.	Depth ft.	Description
3	12.0-13.0	 Red-brown decomposed siltstone. Blocks break to silt size with finger pressure. Some fine sands. Joints & fractures coated with orange-brown plastic silt or clay. Fine mica visible throughout sample. C$\bar{R}$7 Numerous small fractures developed with slight necking around middle. $\bar{R}$6 Bulging with two inclined fractures developing at 70 and 55° similar to a cone failure.

DESCRIPTION OF BLOCK SAMPLES

TEST PIT NO. SP-9

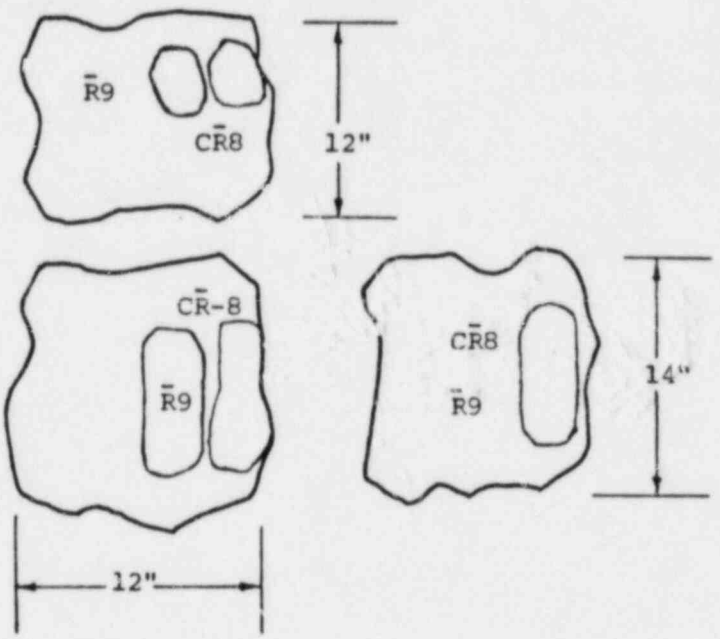
Project No.: 74175

Sample No.	Depth ft.	Description
1	3.2-4.7	 Firm yellow-brown plastic silt with some hard siltstone blocks up to 2 cm. Some fine sands throughout sample. Grayish white and rust coloring. CR̄9 Top 1/3 of specimen necked. R̄10 Bulging developed with small horizontal fractures developing indicating lateral displacement.

DESCRIPTION OF BLOCK SAMPLES

TEST PIT NO. SP-14

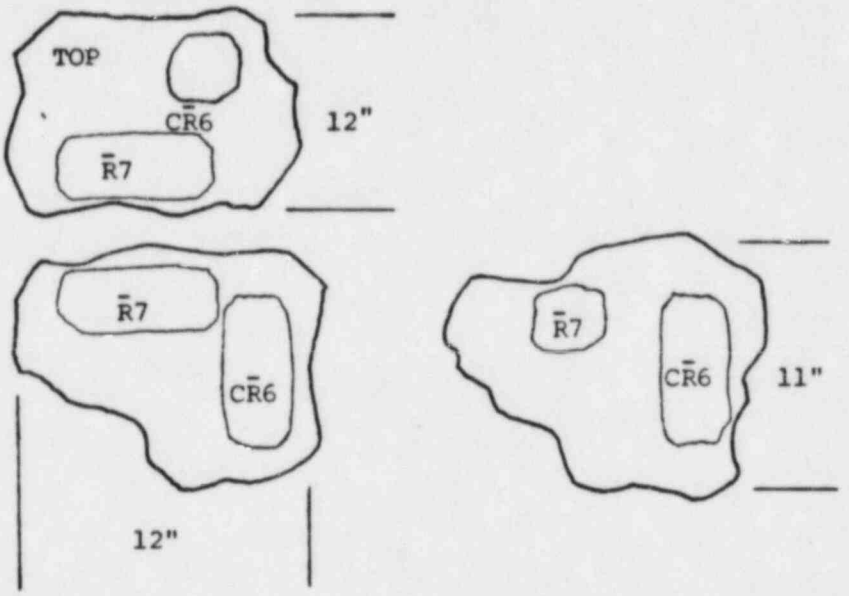
Project No.: 74175

Sample No.	Depth ft.	Description
1	3.0-4.0	 Yellow-brown plastic silt with fine and medium sands. Coarse siltstone blocks up to 3 cm. Hard to break with finger pressure. Some whitish gray coloring. CR̄8 Bottom of specimen necked with inclined fracture developing. R̄9 Specimen bulged with failure surface inclined at 40°.

DESCRIPTION OF BLOCK SAMPLES

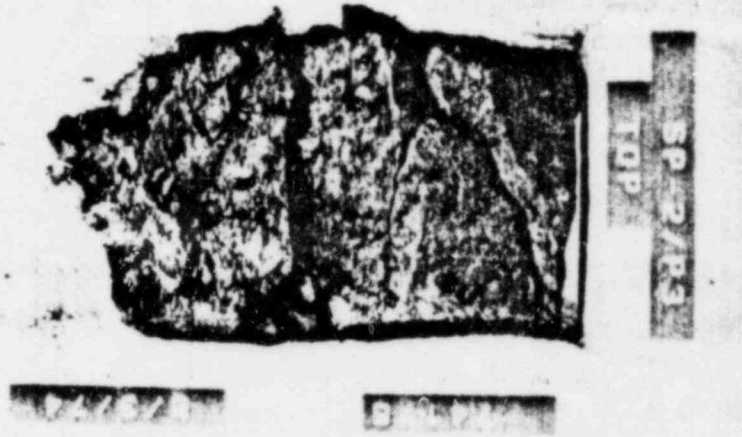
TEST PIT NO. SP-15

Project No.: 74175

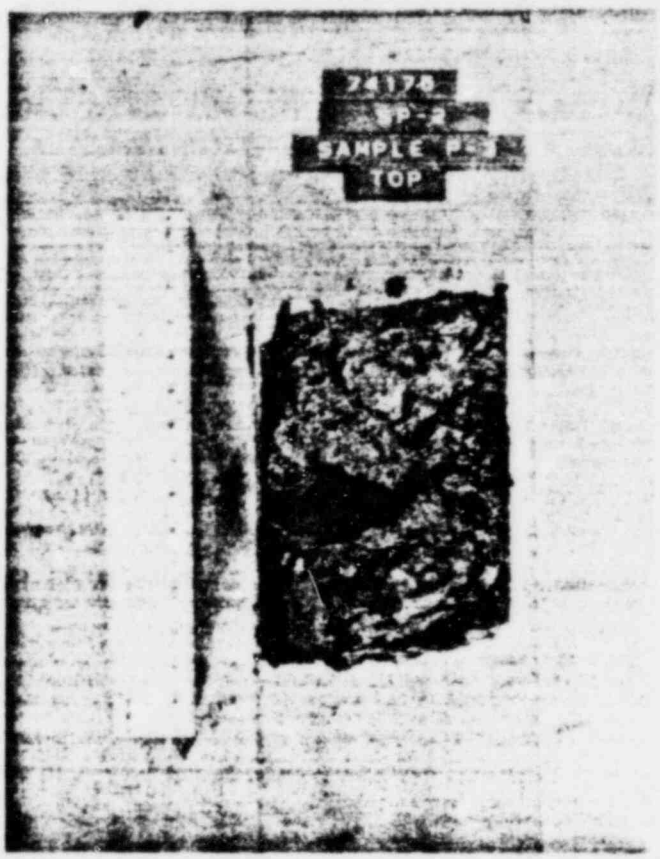
Sample No.	Depth ft.	Description
1	7.0-7.9	 Yellowish-green broken and fractured hard silt with siltstone aggregates. Becoming more sandy silt at bottom of sample. Individual blocks may be broken by hand. Joints and fractures coated with red-brown plastic silt or clay; surfaces having a blackish color. CR̄6 Lower 1/3 of specimen necked. R̄7 Failure plane inclined approximately 45°.

APPENDIX D

PHOTOGRAPHS OF LONGITUDINAL SLICES


SP-7/B2
TOP


TOP


TOP

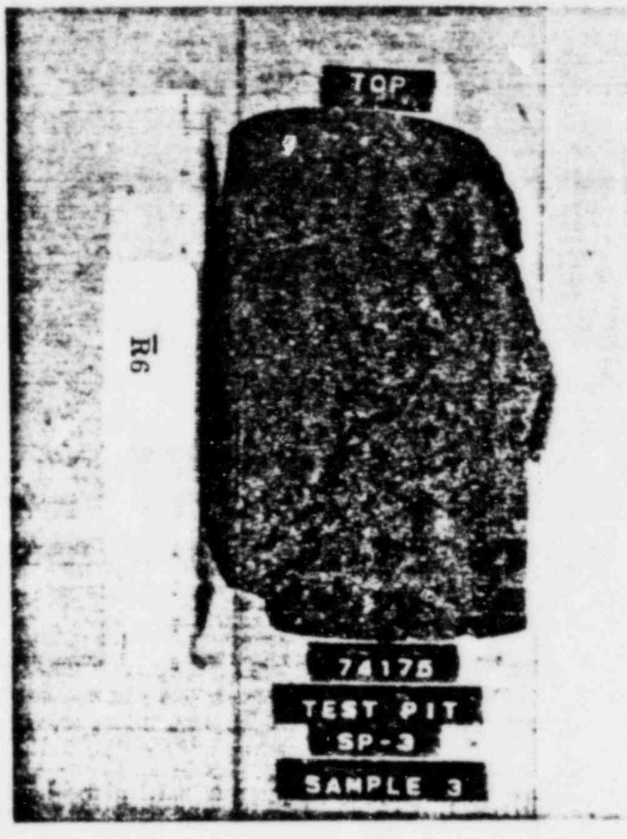

TEST R4


BORING
SAMPLE P-3/B


TOP
SAMPLE


TOP


TOP


TOP
R6
7417B
TEST PIT
SP-3
SAMPLE 3

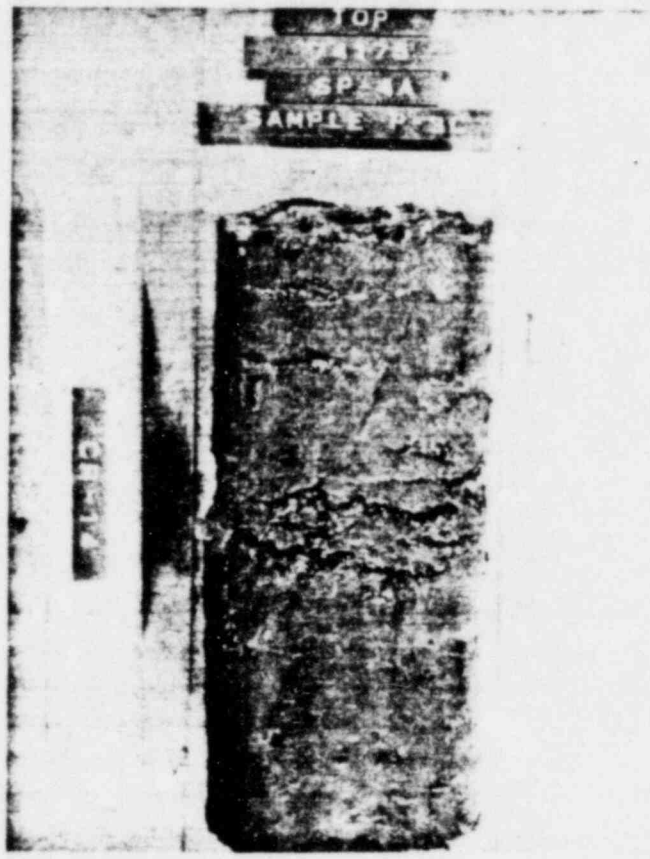

TOP
CR7


TOP

SP-4AVP2
TOP

SP-4AVP3
TOP


TOP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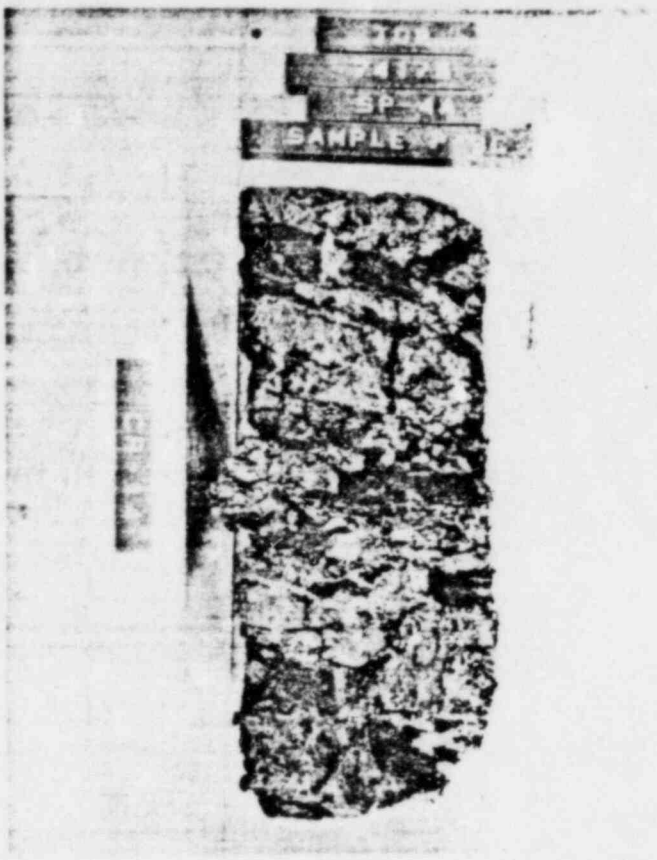
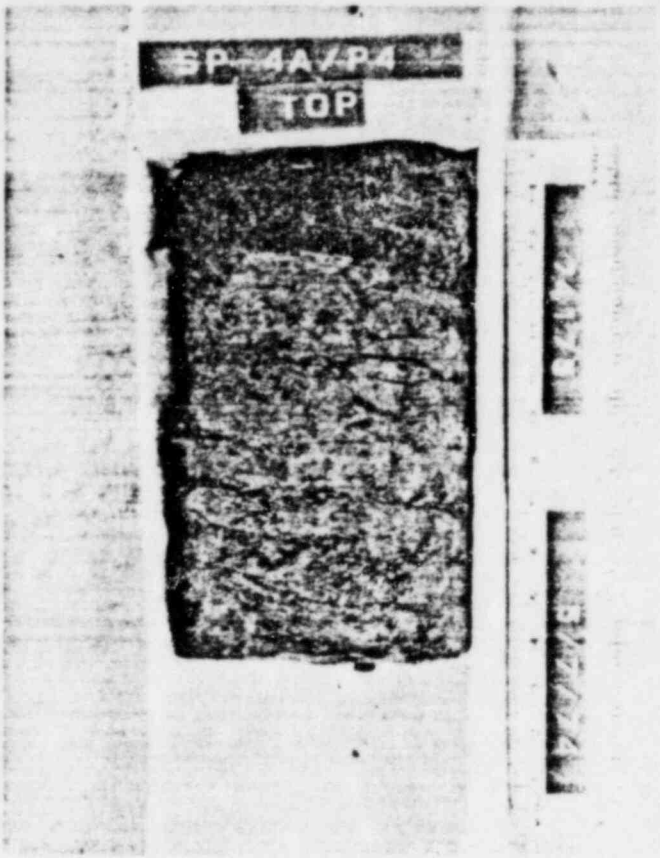
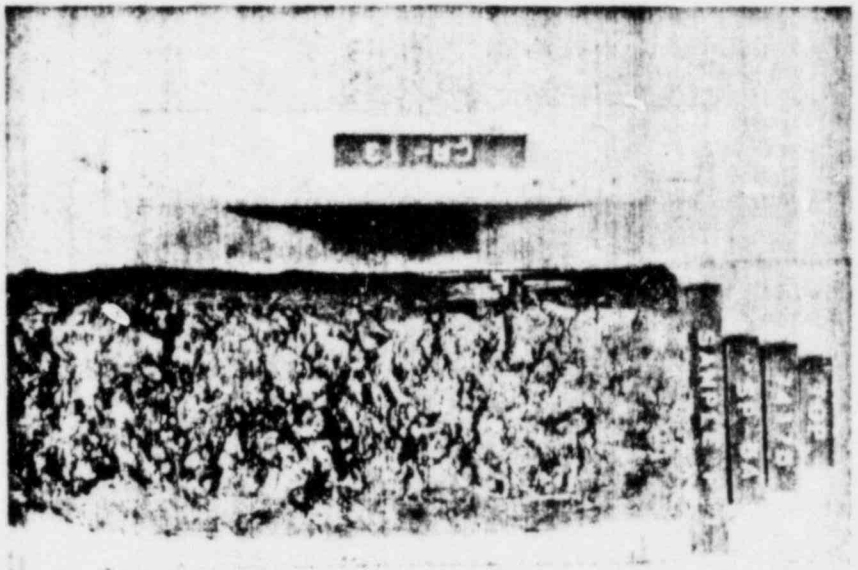
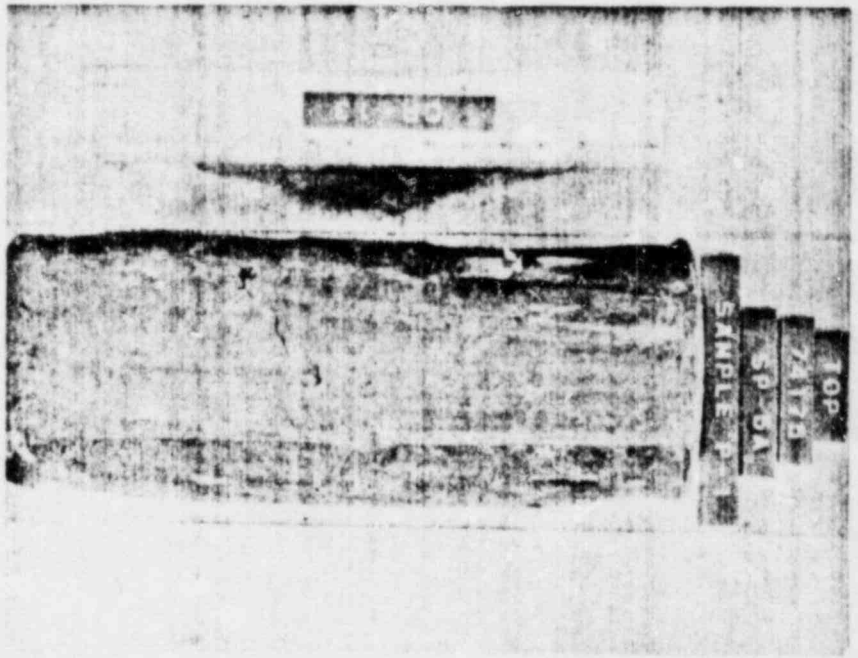
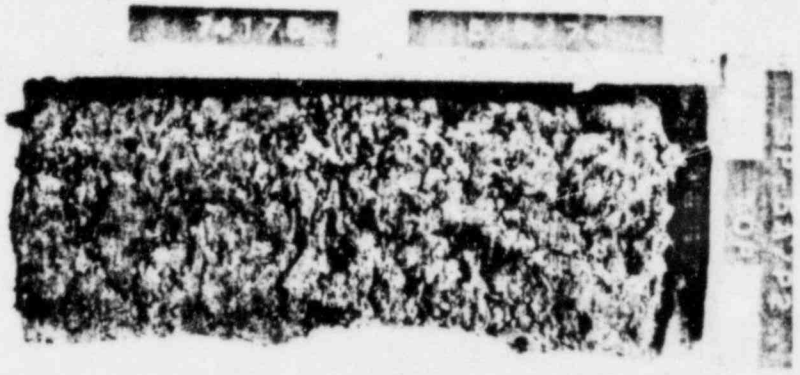


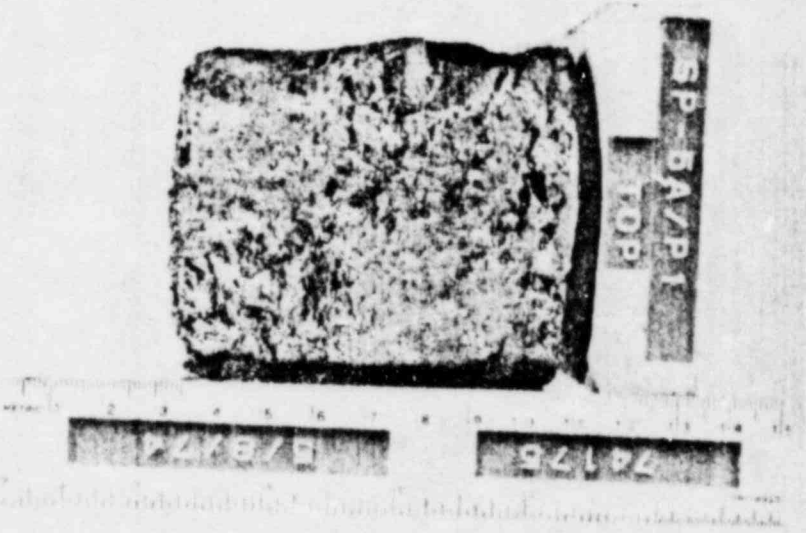

SP-4A/P4
TOP


TDP
74178
3P-4A





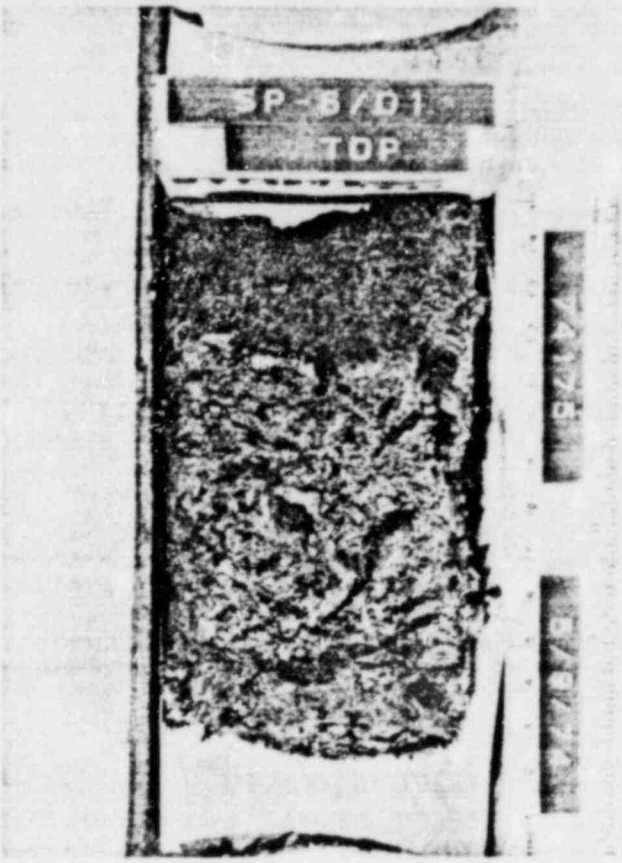



SP-BAYPLE
TOP


TOP


TOP
SP-6
SAMPLE ID


TOP
SAMPLE ID


SP-B/D-1
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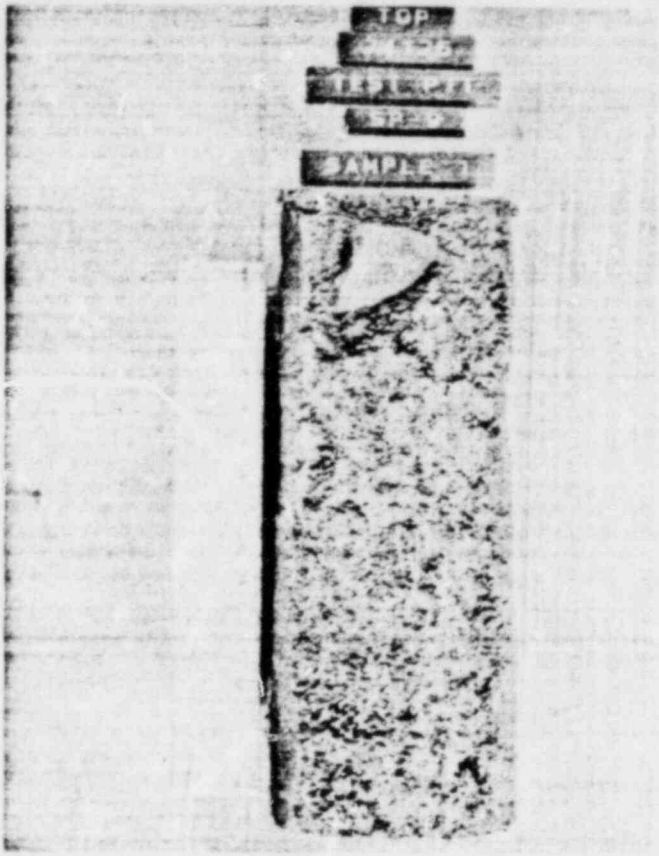
TOP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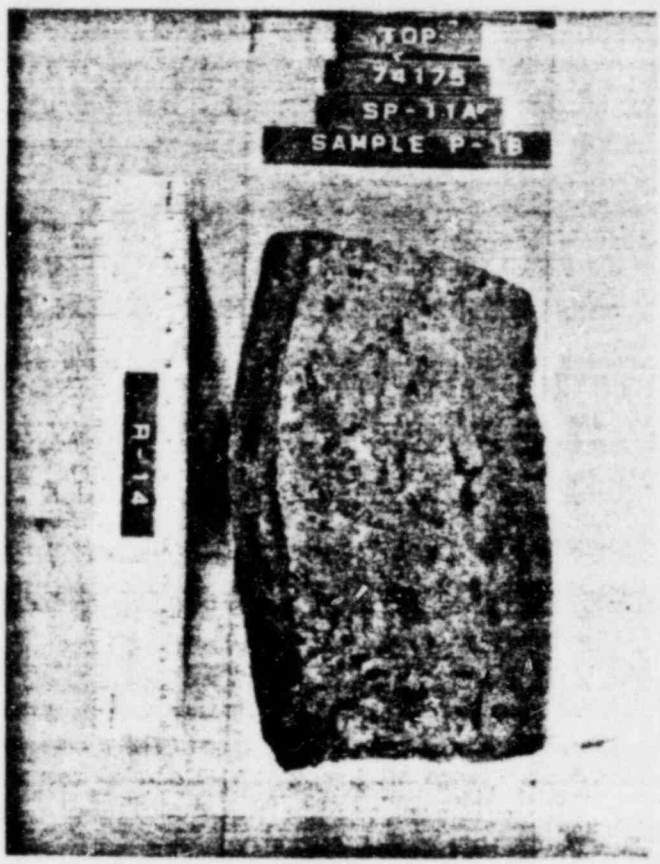
TOP
74178
TEST PIT SP
SAMPLE 1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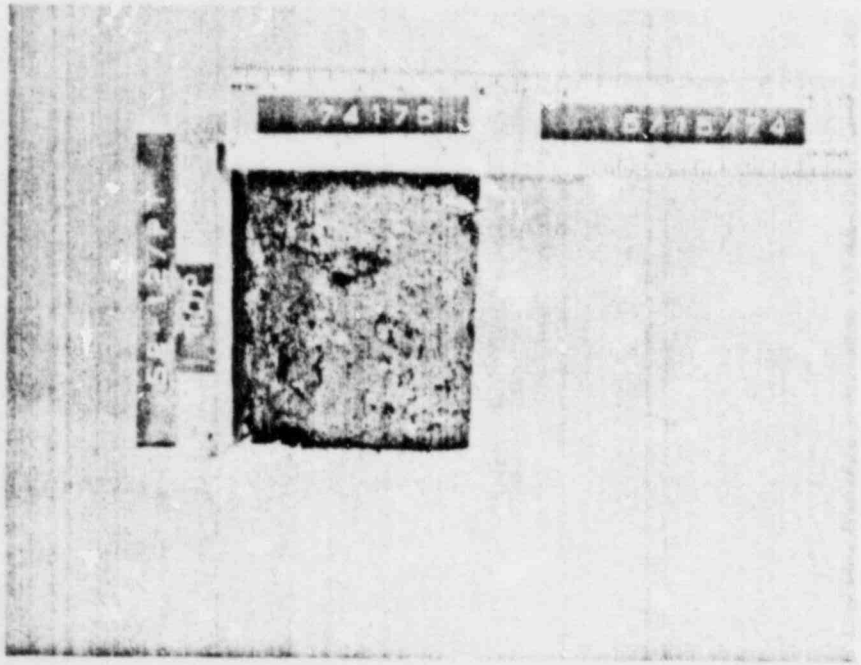
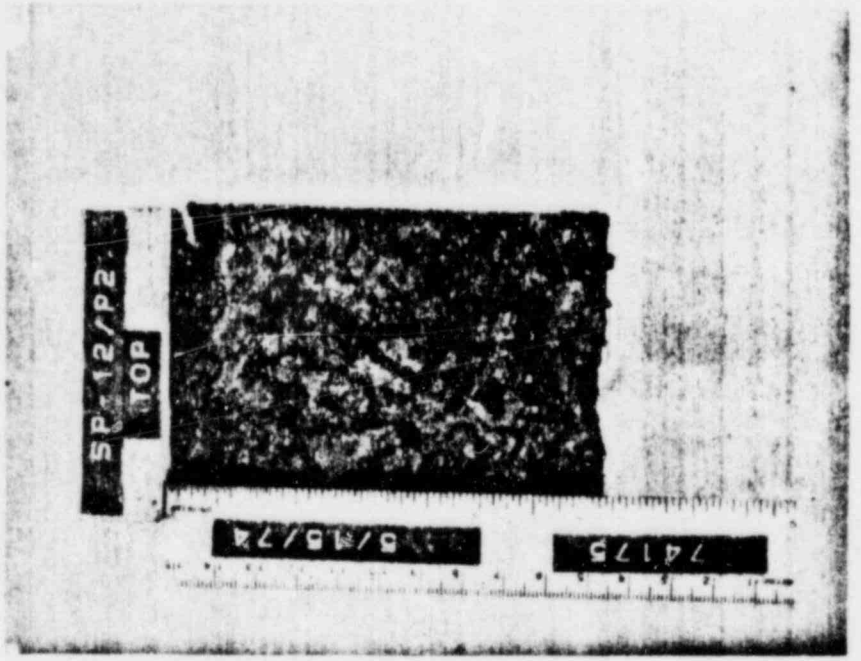
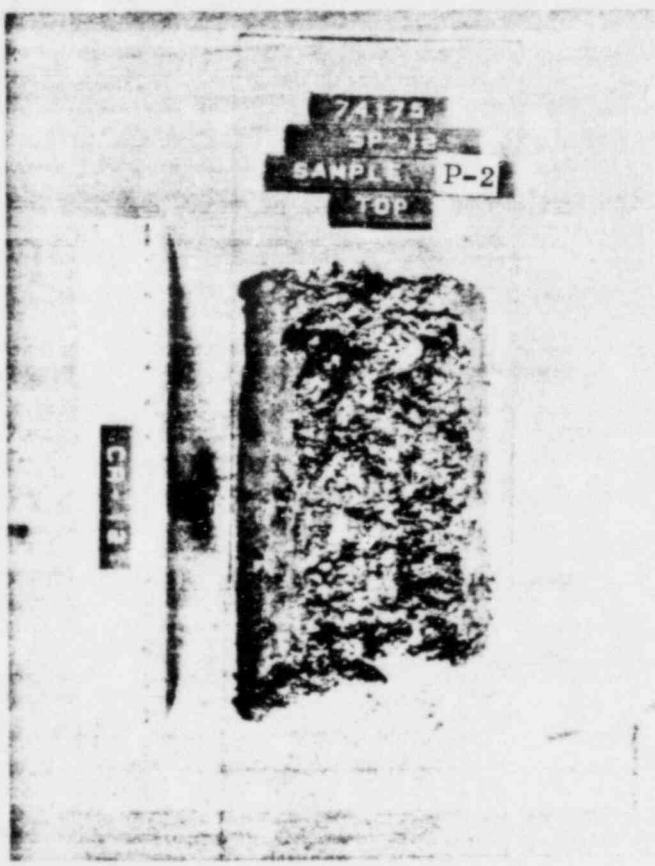
SP-11A
SAMPLE P-1B
R-14

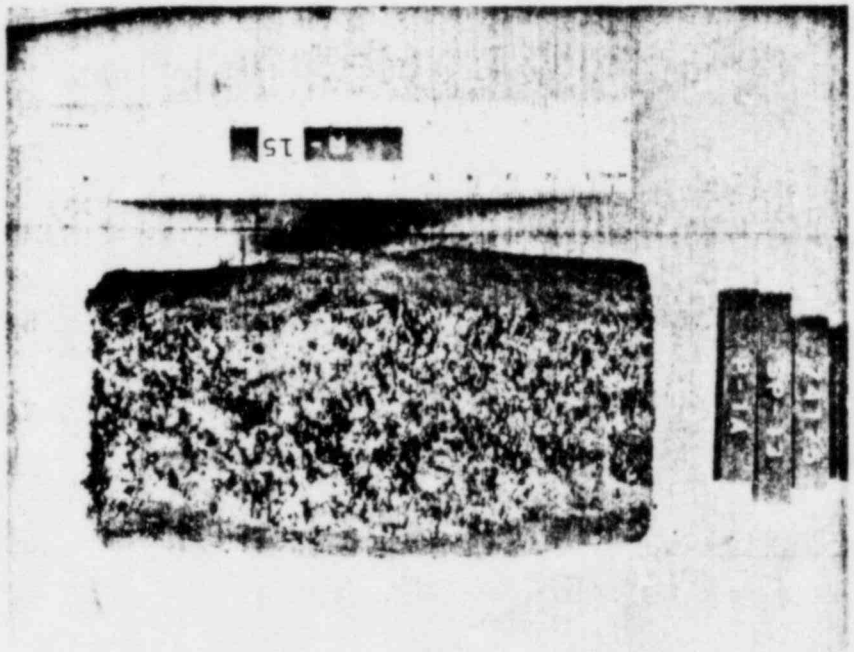


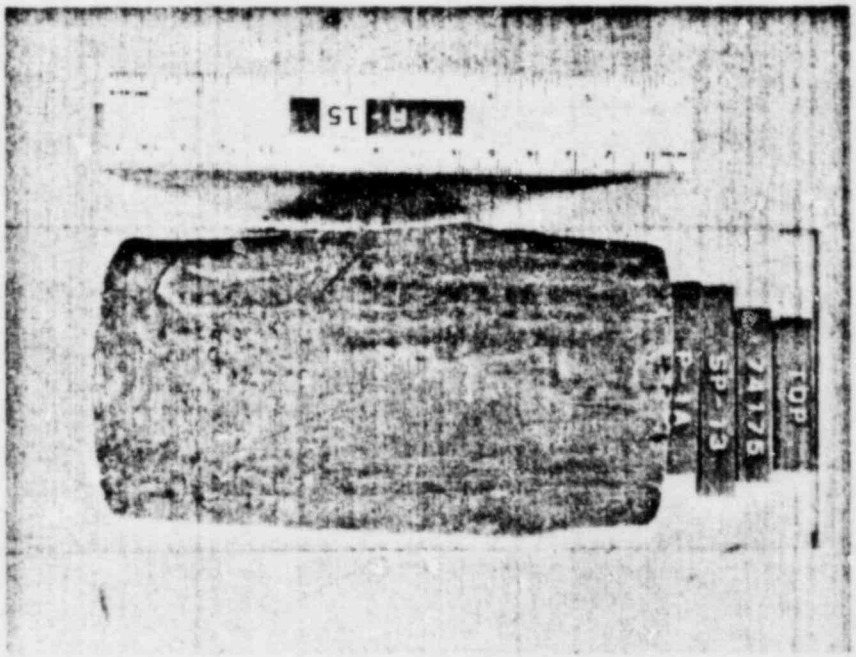

SP-12/P2
TOP
74175


TOP
74175
SP-12 P1-B


P-2

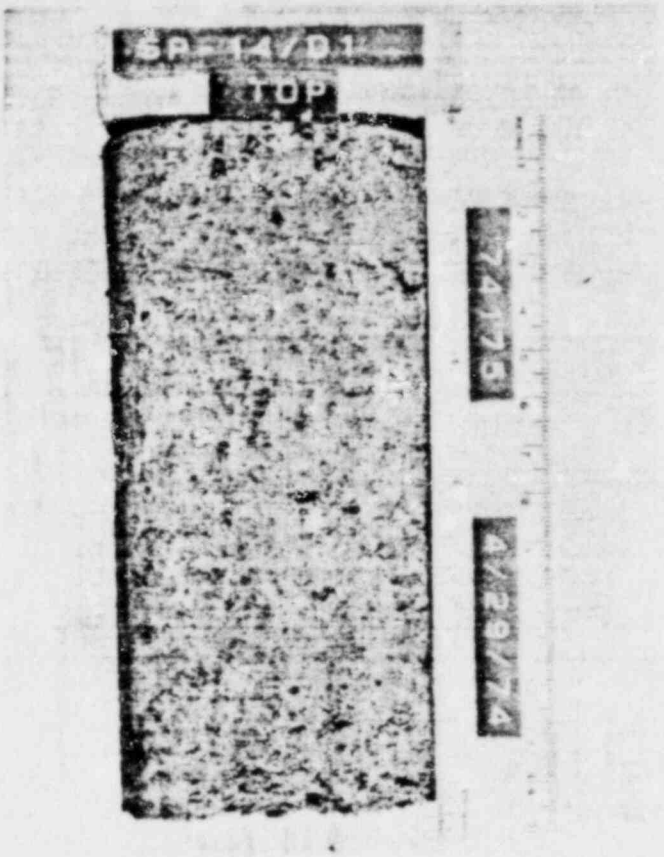

P-2
TOP




TOP
SP-13
P1A


TOP
SAMPLE D


TOP
SAMPLE D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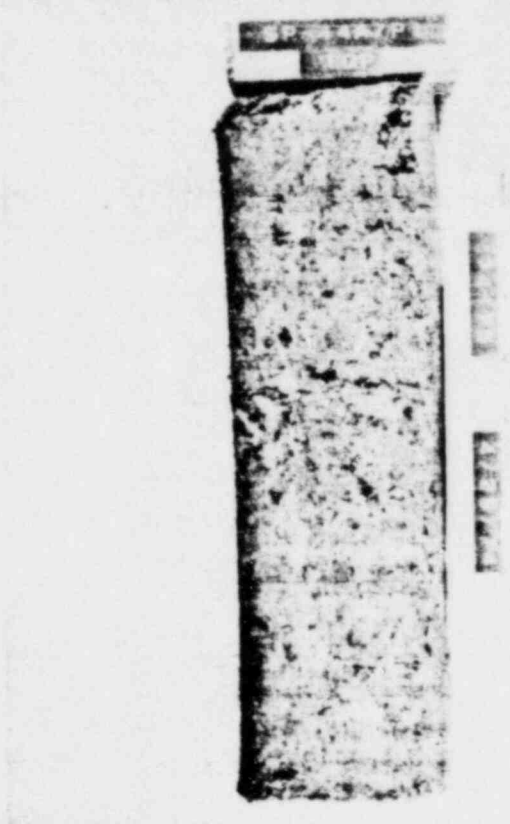

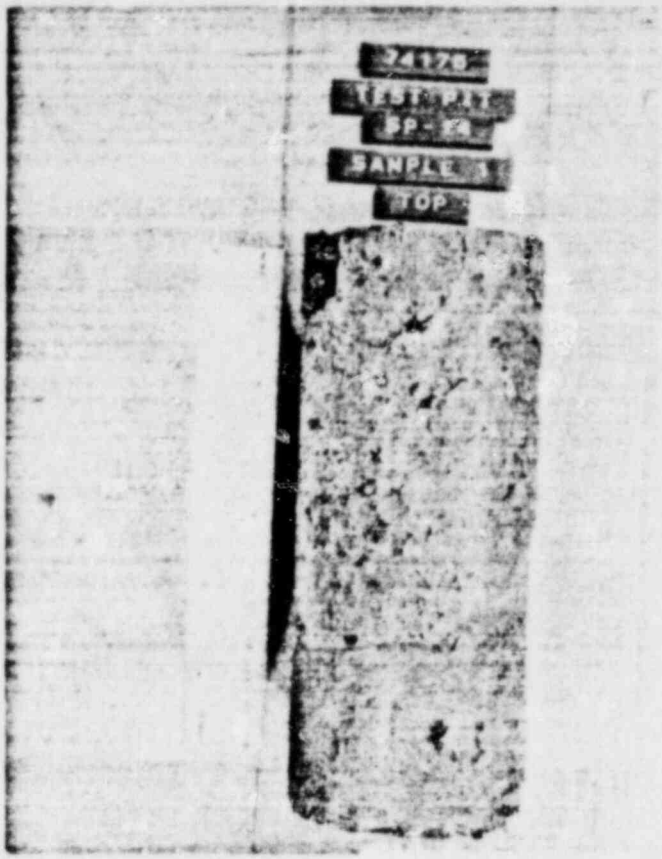
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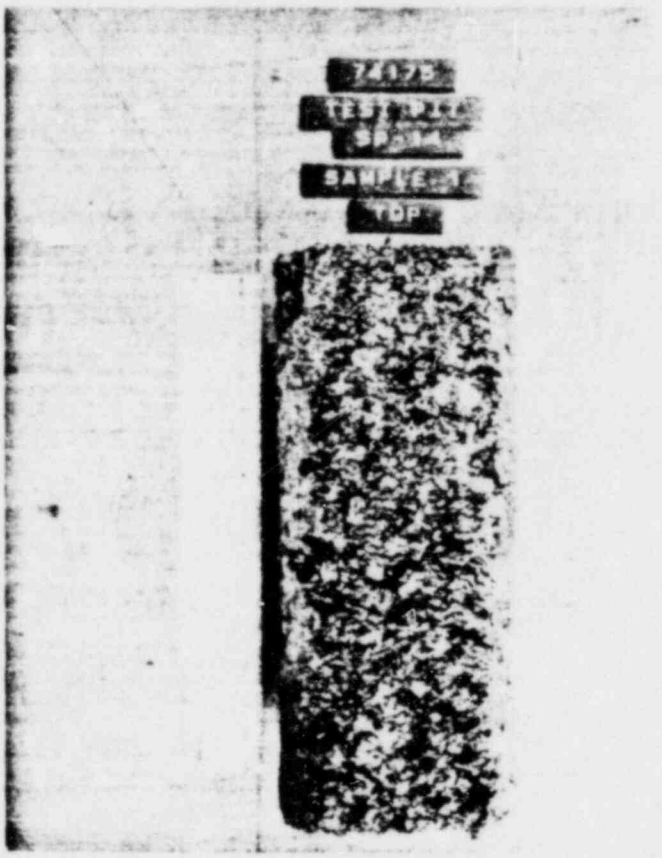
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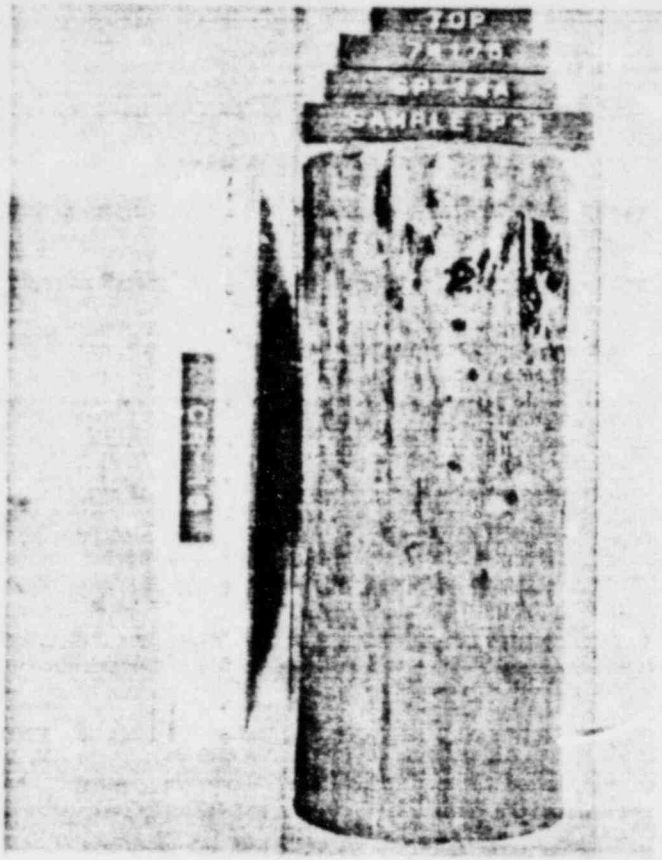
TOP
74178
TEST PIT
SP-14
SAMPLE 1
R-9


TOP
74178
TEST PIT
SP-14
SAMPLE 1
R-9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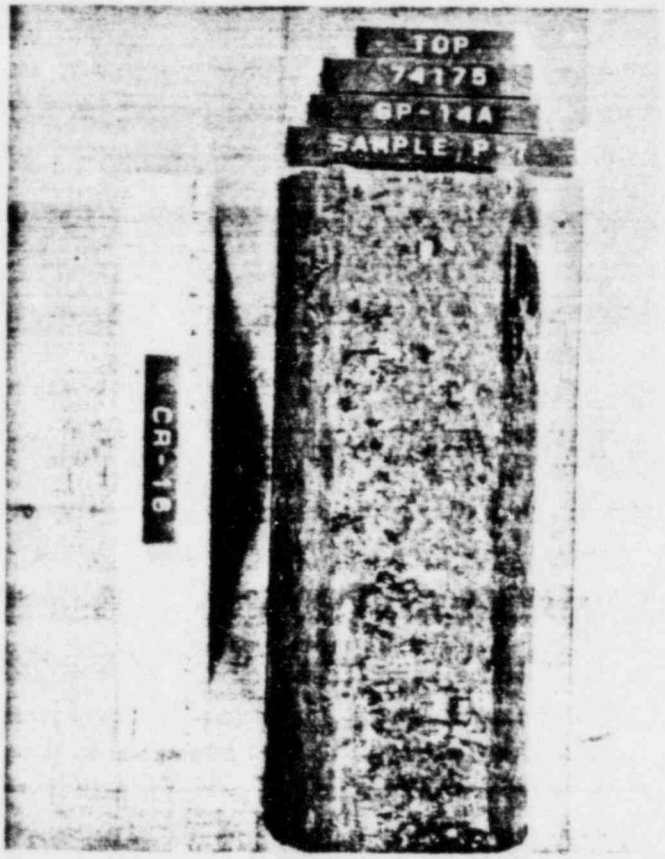
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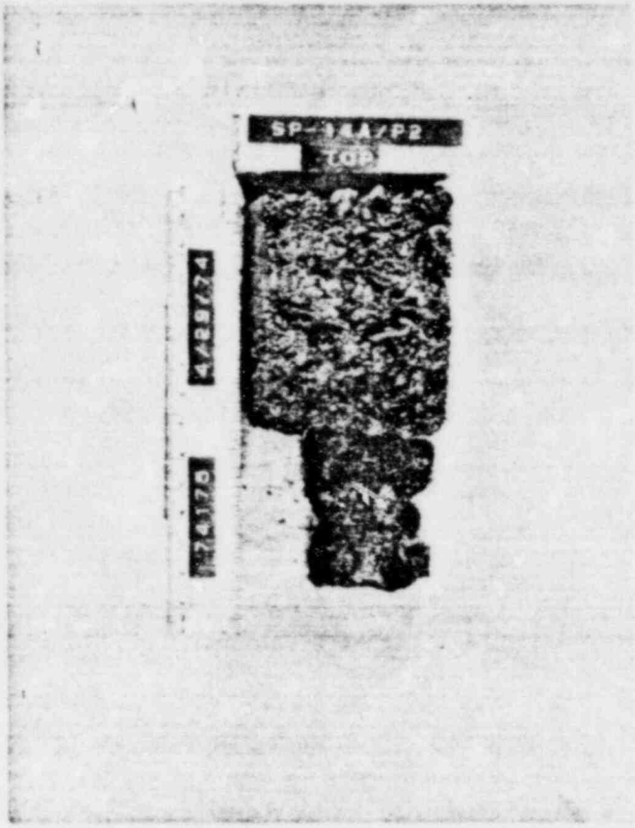
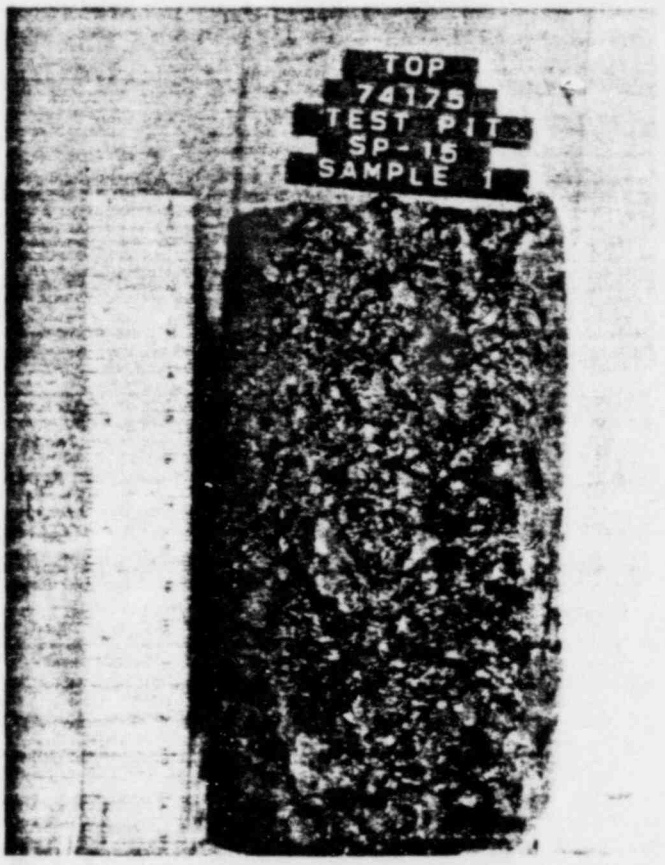
SP-14A
SAMPLE
CR-18


TOP
SP-14A
P28


SP-144A/P2
TOP
CRACK
CRACK


TOP
74.17.5
TEST PIT
SP-15
SAMPLE 1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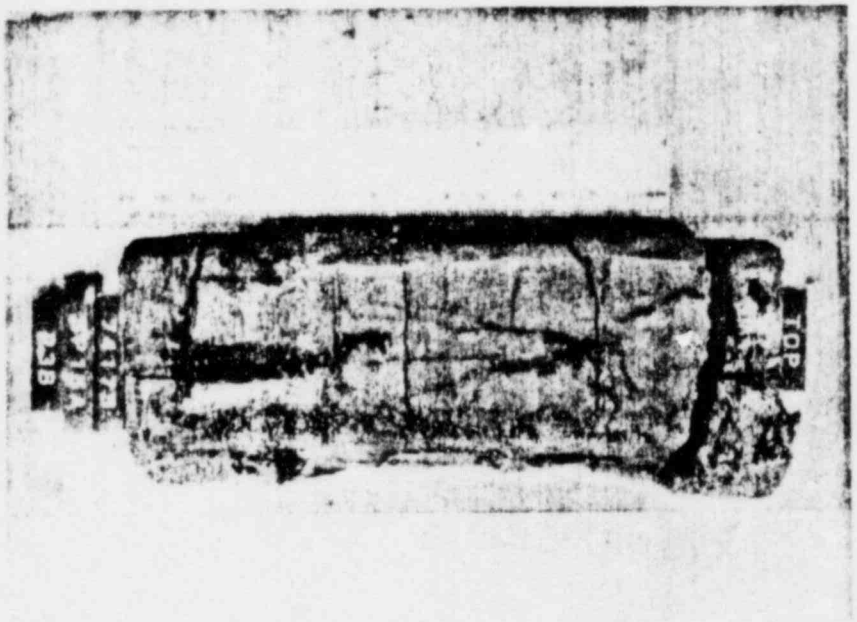
74.17.5
TEST PIT
SP-15
SAMPLE 1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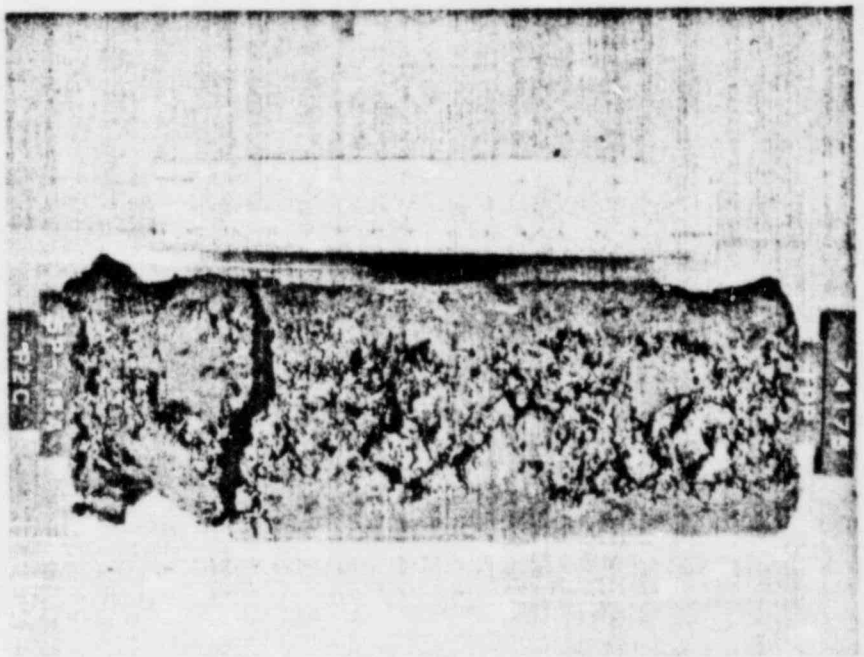
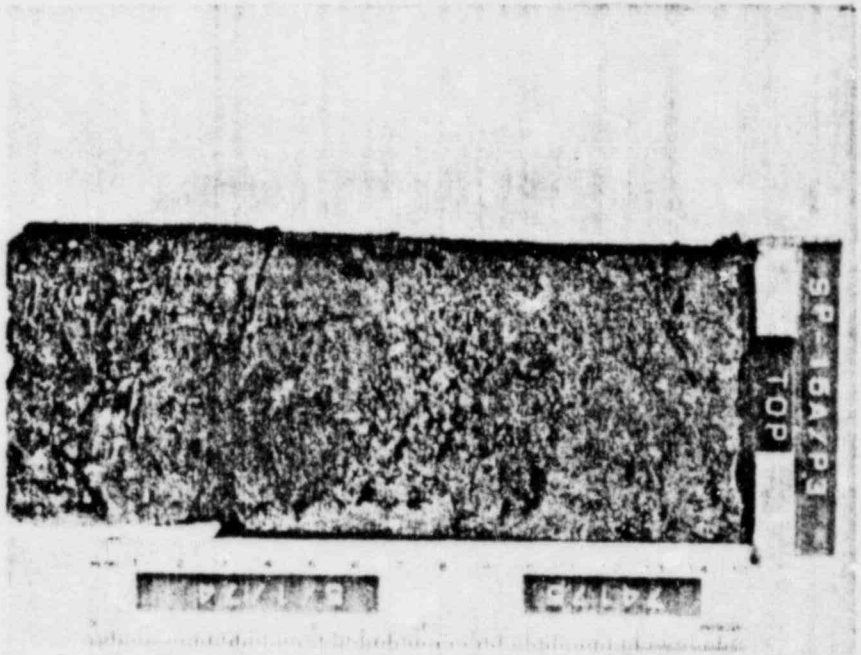
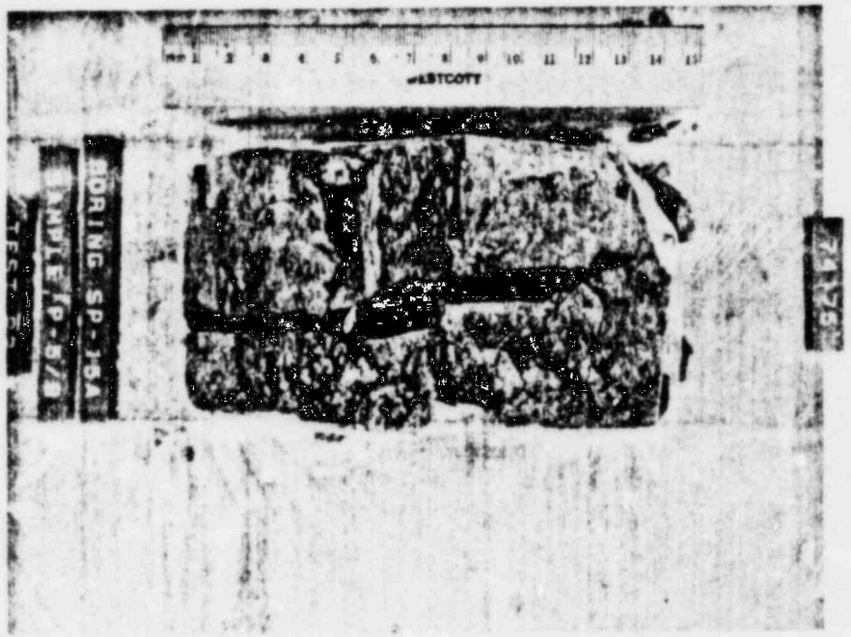
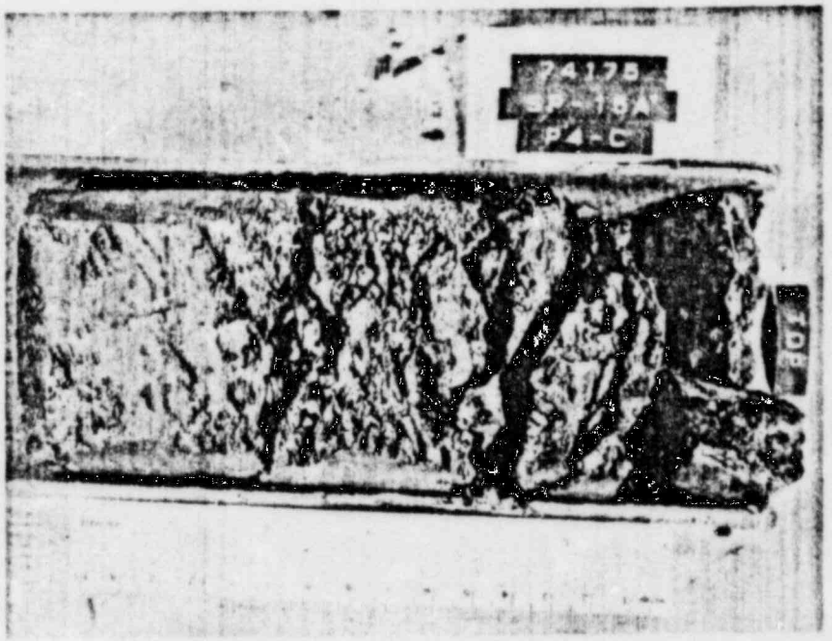



74175
SP-15A/P5
TOP


SP-16A/P1
TOP


WESTCOTT
BORING SP-10A
SAMPLE SP-B1
TOP


SP-10A
TOP

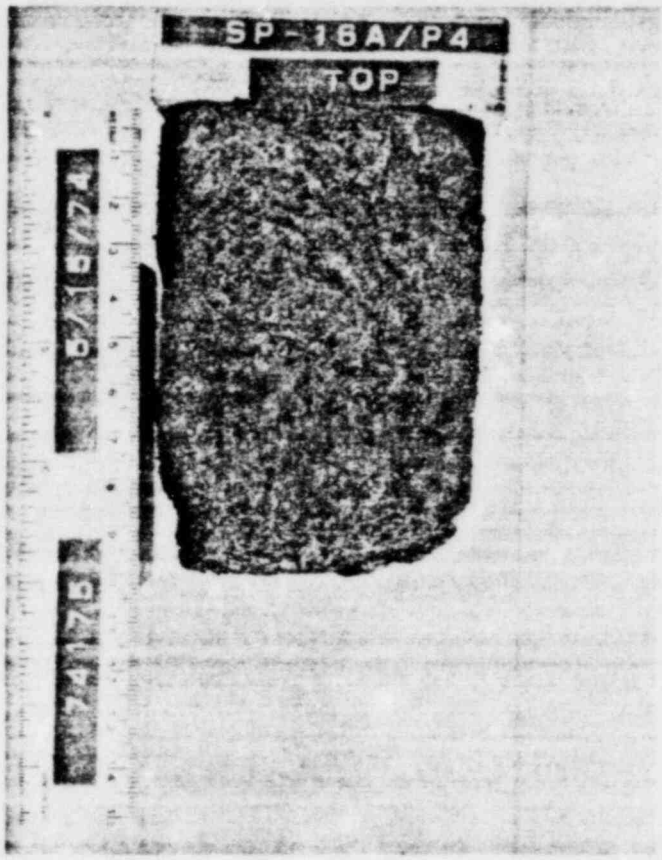

SP-15A/P6
TOP


SP-16A/P3
TOP


A74174
TOP
SP-18A


TOP
74178
SP-18A
P-2C
R-18


TOP
74178
SP-18A
P-2C
R-18


SP-16A/P4
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APPENDIX E

TEST PIT LOGS

DESCRIPTION OF EXPLORATORY TEST PIT

PROJECT Nuclear Station -- Limerick, PA

CLIENT American Drilling & Boring -- Bechtel

TEST PIT LOCATION Near SP-3

PROJECT NO. 74175

TEST PIT NO. SP-3

GND. ELEVATION

INSPECTOR D. Woodhouse

EXPLORATION DATE 4/18/74

DEPTH TO STRATA CHANGE ft.	SAMPLE NO.	SAMPLE DEPTH ft.	SOIL DESCRIPTION
			Purple-red fragmented siltstone fill; pieces cobble to boulder size; interstices filled with sand and silt size particles
2.8			Gray loamy silt
3.8			Yellow-brown plastic silt, low in situ plasticity; silt becomes harder with increasing depth; trace of rounded gravel up to 20 mm in size; some gravel pieces decomposed -- residual soil
5.2	1 CR-11 R-8	4.6 to 5.6	Purple-red, hard plastic silt, trace of decomposed gravel -- residual soil
9.8	2 CR-10	9.8 to 10.8	Red-brown blocky decomposed siltstone -- pieces break into fine sandy silt; some mixed plastic silt in interstices
	R-6 3 CR-7	12.0 to 13.0	
			Bottom of Test Pit at 16.7 ft

GROUNDWATER

DATE	TIME*	DEPTH FT.
4/18/74	0	*

NOT ENCOUNTERED * * HRS. AFTER COMPL.

PIT DIMENSIONS

-- (L) × -- (W) × -- (D) = -- Cu. Ft.

BOULDERS

8" to 18" DIAM: No. -- = Vol. -- Cu. Ft.

Over 18" DIAM: No. -- = Vol. -- Cu. Ft.

TEST PIT NO.

DEPTH 16.7

JAR SAMPLES

BAG SAMPLES 3

GROUNDWATER *

DESCRIPTION OF EXPLORATORY TEST PIT

PROJECT Nuclear Station -- Limerick, PA

CLIENT American Drilling & Boring -- Bechtel

TEST PIT LOCATION Near SP-9

PROJECT NO. 74175

TEST PIT NO. SP-9

GND. ELEVATION

INSPECTOR D. Woodhouse

EXPLORATION DATE 4/18/74

DEPTH TO STRATA CHANGE ft.	SAMPLE NO.	SAMPLE DEPTH ft.	SOIL DESCRIPTION
			Purple-red fragmented siltstone fill-pieces blocky to angular to sub-rounded; interstices filled with sand and silt size particles
2.0			
2.7			Gray loamy silt
	1 CR-9 R-10	3.2 to 4.7	Yellow-brown plastic silt, trace of gravel up to 85 mm; some of gravel is decomposed; silt has higher natural water content than SP-14; water content decreases with depth and becomes more dense; low in situ plasticity
			Bottom of Test Pit at 8.2 ft

GROUNDWATER		
DATE	TIME*	DEPTH FT.
4/18/74	0	*
NOT ENCOUNTERED	*	* HRS. AFTER COMPL.

PIT DIMENSIONS

-- (L) × -- (W) × -- (D) = -- Cu. Ft.

BOULDERS

8" to 18" DIAM: No. -- = Vol. -- Cu. Ft.

Over 18" DIAM: No. -- = Vol. -- Cu. Ft.

TEST PIT NO.

DEPTH 8.2

JAR SAMPLES

BAG SAMPLES 1

GROUNDWATER *

DESCRIPTION OF EXPLORATORY TEST PIT

PROJECT Nuclear Station -- Limerick, PA

CLIENT American Drilling & Boring -- Bechtel

TEST PIT LOCATION Near SP-14

PROJECT NO. 74175

TEST PIT NO. SP-14

GND. ELEVATION

INSPECTOR D. Woodhouse

EXPLORATION DATE 4/17/74

DEPTH TO STRATA CHANGE ft.	SAMPLE NO.	SAMPLE DEPTH ft.	SOIL DESCRIPTION
			Purple-red fragmented siltstone fill-pieces boulder to cobble size; interstices filled with sand and silt size particles
3.0			
	1 CR-8 R-9	3.0 to 4.0	Yellow-brown plastic silt, trace of gravel up to 55 mm; gravel decomposed in places; material has high dry strength; some sand estimated up to 40%; low in situ plasticity--residual soil
6.6			Gray fractured and weathered siltstone--material at 6.6 ft is black, fractured gravel size siltstone fragments with mixed silt
	2	7.0 to 8.0	
			Bottom of Test Pit at 8.0 ft

GROUNDWATER

DATE	TIME*	DEPTH FT.
4/17/74	0	*

NOT ENCOUNTERED * * HRS. AFTER COMPL.

PIT DIMENSIONS

-- (L) x -- (W) x -- (D) = -- Cu. Ft.

BOULDERS

8" to 18" DIAM: No. -- = Vol. -- Cu. Ft.

Over 18" DIAM: No. -- = Vol. -- Cu. Ft.

TEST PIT NO.

DEPTH 8.0

JAR SAMPLES

BAG SAMPLES 2

GROUNDWATER *

DESCRIPTION OF EXPLORATORY TEST PIT

PROJECT Nuclear Station -- Limerick, PA

CLIENT American Drilling & Boring -- Bechtel

TEST PIT LOCATION Near SP-15

PROJECT NO. 74175

TEST PIT NO. SP-15

GND. ELEVATION

INSPECTOR D. Woodhouse

EXPLORATION DATE 4/19/74

DEPTH TO STRATA CHANGE ft.	SAMPLE NO.	SAMPLE DEPTH ft.	SOIL DESCRIPTION
			Purple-red siltstone fill consisting of blocky and angular fragments; pieces cobble and boulder size; interstices filled with silt and sand size particles
3.8			Gray loamy, fine sandy silt
4.4			Intermixed (oxidized) yellow and red-brown plastic silt, trace of gravel; some gravel pieces decomposed; material locally sandy silt -- residual soil
6.6	1 CR-6 R-7	7.0 to 7.9	Yellow-gray to red-brown decomposed siltstone -- siltstone becomes more blocky with increasing depth ~ more of original structure retained; rock is gently dipping with vertical joints; siltstone is locally very friable and fractured; pieces can be broken by hand -- material is fine sandy silt or silty fine sand; some red-brown plastic silt in interstices of siltstone blocks
16.5			Yellow-brown siltstone -- sample of bottom taken

GROUNDWATER

DATE	TIME*	DEPTH FT.
4/19/74	0	*

NOT ENCOUNTERED | * | * HRS. AFTER COMPL.

PIT DIMENSIONS

-- (L) x -- (W) x -- (D) = -- Cu. Ft.

BOULDERS

8" to 18" DIAM: No. -- = Vol. -- Cu. Ft.

Over 18" DIAM: No. -- = Vol. -- Cu. Ft.

TEST PIT NO.

DEPTH 16.5

JAR SAMPLES

BAG SAMPLES 2

GROUNDWATER *