PASSAIC RIVER SEDIMENT STUDY

VOLUME 2 - APPENDICES

SUBMITTED TO

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

PREPARED BY

DIAMOND SHAMROCK CHEMICALS COMPANY

IT CORPORATION

MARCH, 1986

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APPENDIX
A

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APPENDIX A

TIDAL CURRENT MEASUREMENTS

TABLE A-1

HYDROGRAPHIC SURVEY DATA FROM THE PASSAIC RIVER THALWEG NEAR 80 LISTER AVENUE

Date: 19 August 1985

Location: 130 feet due south of transect end point No. 0-9 North.

Field Team: C.J. Motta-WCC
P. Iacono-IT
S. Misdom-IT
J. Hamilton-OSI

Weather: AM - p. cloudy, cool, occasional rain, breeze from east
PM - p. cloudy, warming and clearing toward evening, breeze from east

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction	Salinity (PPT)	Temp (^0C)	Tide Elevation (ft - MLW)	TSS Water Sample No.*
0719	19.1	3	0.75	Flood	9.5	26.0		
		5	0.85	Flood	10.0	26.0		
		7	1.00	Flood	10.0	26.0		
		9	1.10	Flood	10.5	26.0		
		11	1.15	Flood	11.0	26.0		
		13	1.10	Flood	11.0	26.0		
		15	0.95	Flood	12.0	26.0		
0725		17	0.95	Flood	13.0	26.0	1.8	
0729								4546
0732							2.1	
0743	19.7	3	0.95	Flood	11.0	26.0		
		5	1.00	Flood	11.0	26.0		
		7	1.15	Flood	11.0	26.0		
		9	1.25	Flood	12.0	26.0		
		11	1.10	Flood	14.0	26.0		
		13	1.00	Flood	14.0	26.0		
		15	0.85	Flood	14.0	26.0		
		17	0.70	Flood	14.0	26.0		
		18	0.70	Flood	14.0	26.0		
0750								4561
0752							2.7	
0809							3.1	
0817	20.8	3	1.40	Flood	14.0	26.0		
		5	1.40	Flood	14.0	26.0		
		7	1.20	Flood	14.0	26.0		
		9	1.10	Flood	14.5	26.0		
		11	1.05	Flood	15.5	26.0		
		13	1.00	Flood	16.0	26.0		
		15	1.00	Flood	16.0	26.0		
		17	0.85	Flood	16.0	26.0		
		18	0.85	Flood	16.0	26.0		
0824							3.7	
0825								4547
0838							4.1	
0845	21.5	3	1.30	Flood	15.0	25.5		
		5	1.35	Flood	15.0	25.5		
		7	1.15	Flood	15.0	25.5		
		9	1.00	Flood	17.0	25.5		
		11	1.00	Flood	17.5	25.5		
		13	1.00	Flood	17.5	25.5		
		15	1.00	Flood	17.5	25.5		
		17	1.00	Flood	17.5	25.5		
		19	0.80	Flood	18.0	25.5		
0853								4573
0854							4.5	
0910							4.9	

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TABLE A-1

HYDROGRAPHIC SURVEY DATA FROM THE PASSAIC RIVER THALWEG NEAR 80 LISTER AVENUE
(continued)

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction	Salinity (PPT)	Temp (°C)	Tide Elevation (ft - MLW)	TSS Water Sample No.*
0924	22.5	3	1.20	Flood	17.0	25.5		
0925		5	1.30	Flood	17.0	25.5	5.3	
		7	1.30	Flood	17.5	25.5		
		9	1.15	Flood	18.0	25.5		
		11	0.95	Flood	18.0	25.5		
		13	0.80	Flood	18.5	25.5		
		15	0.80	Flood	18.5	25.5		
		17	0.70	Flood	18.5	25.5		
		19	0.60	Flood	18.5	25.5		
		20	0.60	Flood	18.5	25.5		
0932								4554
0939							5.6	
0954	23.3	3	1.05	Flood	18.5	25.5		
0955		5	1.00	Flood	18.0	25.5	6.0	
		7	1.00	Flood	18.0	25.5		
		9	0.85	Flood	18.5	25.5		
		11	0.80	Flood	19.0	25.5		
		13	0.80	Flood	19.0	25.5		
		15	0.75	Flood	19.0	25.5		
		17	0.70	Flood	19.0	25.5		
		19	0.60	Flood	19.0	25.5		
		21	0.45	Flood	19.0	25.5		
1000								4551
1010							6.4	
1025							6.6	
1027	23.9	3	0.90	Flood	18.0	25.5		
		5	0.90	Flood	18.0	25.5		
		7	0.85	Flood	18.0	25.5		
		9	0.80	Flood	18.5	25.5		
		11	0.70	Flood	18.5	25.5		
		13	0.65	Flood	18.5	25.5		
		15	0.60	Flood	18.5	25.5		
		17	0.50	Flood	18.5	25.5		
		19	0.45	Flood	18.5	25.5		
		21	0.40	Flood	18.5	25.5		
1033								4571
1037							6.8	
1052							7.0	
1058	24.3	3	0.60	Flood	18.0	25.5		
		5	0.50	Flood	18.0	25.5		
		7	0.50	Flood	18.0	25.5		
		9	0.50	Flood	18.5	25.5		
		11	0.45	Flood	18.5	25.5		
		13	0.45	Flood	18.5	25.5		
		15	0.40	Flood	18.5	25.5		
		17	0.40	Flood	18.5	26.0		
		19	0.30	Flood	18.5	26.0		
		21	0.30	Flood	18.5	26.0		
		23	0.20	Flood	18.5	26.0		
1107								4565
1108							7.1	
1123							7.3	

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TABLE A-1

HYDROGRAPHIC SURVEY DATA FROM THE PASSAIC RIVER THAWLEG NEAR 80 LISTER AVENUE
(continued)

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction	Salinity (PPT)	Temp (°C)	Tide Elevation (ft - MLW)	TSS Water Sample No.*
1133	24.6	3	0.20	Flood	18.5	25.5		
		5	0.30	Flood	18.0	25.5		
		7	0.30	Flood	18.5	25.5		
		9	0.35	Flood	18.5	25.5		
		11	0.25	Flood	18.5	25.5		
		13	0.25	Flood	18.5	25.5		
		15	0.25	Flood	18.5	25.5		
		17	0.20	Flood	18.5	25.5		
		19	0.10	Flood	18.5	25.5		
		21	0.10	Flood	19.0	25.5		
		23	0.10	Flood	19.0	25.5		
1139							7.3	
1142								4550
1153							7.3	
1153	Based on movement of floating surficial debris, the water along the north bank is at slack tide while the water in the main channel is flooding.							
1204	Based on the current velocity meter, slack tide exists throughout the water column in the main channel.							
1217								4574
1222	Current is ebbing at the surface.							
1223	24.5	3	0.20	Ebb	18.5	25.5		
1224		5	0.20	Ebb	18.5	25.5	7.2	
		7	0.20	Ebb	18.5	25.5		
		9	0.25	Ebb	18.5	25.5		
		11	0.20	Ebb	18.5	25.5		
		13	0.20	Ebb	19.0	25.5		
		15	0.20	Ebb	19.0	25.5		
		17	0.20	Ebb	19.0	25.5		
		19	0.20	Ebb	19.0	25.5		
		21	0.10	Ebb	19.0	25.5		
		22	0.10	Ebb	19.0	25.5		
1233								4548
1244							7.0	
1301							6.7	
1303	23.8	3	0.65	Ebb	17.5	25.5		
		5	0.70	Ebb	17.5	25.5		
		7	0.60	Ebb	18.0	25.5		
		9	0.55	Ebb	18.0	25.5		
		11	0.50	Ebb	18.5	25.5		
		13	0.50	Ebb	18.5	25.5		
		15	0.45	Ebb	18.5	25.5		
		17	0.45	Ebb	18.5	25.5		
		19	0.40	Ebb	18.5	25.5		
		21	0.35	Ebb	18.5	26.0		
1310								4552
1315							6.4	
1331							6.0	
1333	23.3	3	0.90	Ebb	17.5	25.5		
		5	0.95	Ebb	18.0	25.5		
		7	0.90	Ebb	17.5	25.5		
		9	0.80	Ebb	18.0	25.5		
		11	0.80	Ebb	18.5	25.5		
		13	0.80	Ebb	18.5	25.5		
		15	0.75	Ebb	18.5	25.5		
		17	0.75	Ebb	18.5	25.5		
		19	0.60	Ebb	18.5	25.5		
		21	0.60	Ebb	18.5	25.5		

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TABLE A-1

HYDROGRAPHIC SURVEY DATA FROM THE PASSAIC RIVER THALWEG NEAR 80 LISTER AVENUE
(continued)

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction	Salinity (PPT)	Temp (°C)	Tide Elevation (ft - MLW)	TSS Water Sample No.*
1338								4562
1349							5.7	
1403							5.4	
1404	22.6	3	1.00	Ebb	17.0	25.5		
		5	1.00	Ebb	17.5	25.5		
		7	0.85	Ebb	17.5	25.5		
		9	0.80	Ebb	17.5	25.5		
		11	0.85	Ebb	18.0	25.5		
		13	0.70	Ebb	18.0	25.5		
		15	0.60	Ebb	18.0	25.5		
		17	0.50	Ebb	18.0	25.5		
		19	0.50	Ebb	18.5	25.5		
		21	0.35	Ebb	18.5	25.5		
1412								4559
1416							5.0	
1443	21.7	3	1.15	Ebb	17.0	25.5	4.3	
		5	1.10	Ebb	17.0	25.5		
		7	1.05	Ebb	17.0	25.5		
		9	1.00	Ebb	17.0	25.5		
		11	0.80	Ebb	17.0	25.5		
		13	0.70	Ebb	17.5	25.5		
		15	0.65	Ebb	17.5	25.5		
		17	0.55	Ebb	17.5	25.5		
		19	0.50	Ebb	18.0	25.5		
		20	0.50	Ebb	18.0	25.5		
1449								4569
1502							3.8	
1521							3.3	
1523	20.6	3	1.10	Ebb	15.5	25.5		
		5	1.10	Ebb	15.5	25.5		
		7	1.00	Ebb	15.5	25.5		
		9	0.90	Ebb	15.5	25.5		
		11	0.75	Ebb	16.0	25.5		
		13	0.70	Ebb	16.0	25.5		
		15	0.50	Ebb	16.5	25.5		
		17	0.45	Ebb	16.5	25.5		
		19	0.35	Ebb	16.5	25.5		
1530								4555
1550	20.0	3	1.05	Ebb	14.0	25.5		
		5	1.00	Ebb	14.0	25.5		
		7	0.90	Ebb	14.0	25.5		
		9	0.70	Ebb	15.0	25.5		
		11	0.60	Ebb	15.0	25.5		
		13	0.40	Ebb	15.0	25.5		
		15	0.30	Ebb	15.5	25.5		
		17	0.30	Ebb	15.5	25.5		
		18	0.20	Ebb	16.0	25.5		
1557								4575
1558							2.6	
1617							2.4	
1618	19.6	3	0.90	Ebb	13.0	25.5		
		5	0.80	Ebb	13.0	25.5		
		7	0.70	Ebb	13.0	25.5		
		9	0.50	Ebb	13.5	25.5		
		11	0.50	Ebb	14.0	25.5		
		13	0.25	Ebb	14.5	25.5		
		15	0.20	Ebb	15.0	25.5		
		17	0.10	Ebb	15.0	25.5		
		18	0.10	Ebb	15.0	25.5		

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TABLE A-1

HYDROGRAPHIC SURVEY DATA FROM OF THE PASSAIC RIVER THALWEG NEAR 80 LISTER AVENUE
(continued)

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction	Salinity (PPT)	Temp (°C)	Tide Elevation (ft - MLW)	TSS Water Sample No.*
1625								4549
1631							2.1	
1641	19.3	3	0.90	Ebb	12.5	25.5		
		5	0.80	Ebb	13.0	25.5		
		7	0.65	Ebb	13.0	25.5		
		9	0.50	Ebb	13.0	25.5		
		11	0.35	Ebb	13.5	25.5		
		13	0.25	Ebb	14.0	25.5		
		15	0.10	Ebb	15.0	25.5		
		17	< 0.10	Slack	15.0	25.5		
		18	< 0.10	Slack	15.5	25.5		
1649								4557
1659							1.7	
1718	18.7	3	0.90	Ebb	12.0	25.5		
		5	0.80	Ebb	12.0	25.5		
		7	0.60	Ebb	12.0	25.5		
		9	0.55	Ebb	12.0	25.5		
		11	0.35	Ebb	12.5	25.5		
		13	0.20	Ebb	13.0	25.5		
		15	< 0.10	Slack	14.0	25.5		
		17	< 0.10	Slack	14.5	25.5		
1723								4572
1726							1.3	
1750	18.2	3	0.75	Ebb	11.0	25.5		
		5	0.70	Ebb	11.0	25.5		
		7	0.60	Ebb	11.0	25.5		
		9	0.50	Ebb	11.5	25.5		
		11	0.35	Ebb	12.0	25.5		
		13	< 0.10	Slack	13.0	25.5		
		15	< 0.10	Slack	14.0	25.5		
		17	0.25	Flood	15.0	25.5		
1758								4558
1810							0.7	
1819	17.9	3	0.70	Ebb	10.0	25.5		
		5	0.65	Ebb	10.0	25.5		
		7	0.55	Ebb	10.0	25.5		
		9	0.40	Ebb	11.0	25.5		
		11	0.20	Ebb	11.5	25.5		
		13	< 0.10	Slack	12.0	25.5		
		15	0.20	Flood	14.0	25.5		
		17	0.25	Flood	16.0	25.5		
1821								4556
1830							0.6	
1841	17.9	3	0.50	Ebb	9.5	25.5		
		5	0.25	Ebb	9.5	25.5		
		7	0.20	Ebb	10.0	25.5		
		9	0.15	Ebb	10.0	25.5		
		11	< 0.10	Slack	11.0	25.5		
		13	0.25	Flood	11.5	25.5		
		15	0.45	Flood	13.0	25.5		
		17	0.30	Flood	15.5	25.5		

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TABLE A-1

HYDROGRAPHIC SURVEY DATA FROM THE PASSAIC RIVER THALWEG NEAR 80 LISTER AVENUE
(concluded)

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction	Salinity (PPT)	Temp (^0C)	Tide Elevation (ft - MLW)	TSS Water Sample No.*
1850								4564
1853							0.7	
1914							1.1	
1915	18.4	3	0.25	Flood	9.5	25.5		
		5	0.35	Flood	10.0	25.5		
		7	0.50	Flood	10.0	25.5		
		9	0.55	Flood	10.0	25.5		
		11	0.80	Flood	10.5	25.5		
		13	1.00	Flood	12.0	25.5		
		15	0.90	Flood	13.5	25.5		
		17	0.70	Flood	15.5	25.5		
1922								4568
1939	19.2	3	0.80	Flood	10.0	25.5		
1940		5	0.90	Flood	10.5	25.5	1.9	
		7	1.00	Flood	10.5	25.5		
		9	1.10	Flood	11.0	25.5		
		11	1.20	Flood	11.5	25.5		
		13	1.20	Flood	12.0	25.5		
		15	0.90	Flood	12.5	25.5		
		17	0.70	Flood	14.0	25.5		
1946								4553

* Total Suspended Solids (TSS) water samples integrated over the middle 60 per cent of the water column.

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TABLE A-2

HYDROGRAPHIC SURVEY DATA FROM THE PASSAIC RIVER CHANNEL MARGIN NEAR 80 LISTER AVENUE

Date: 19 August 1985

Weather: AM - p. cloudy, cool, occasional rain, breeze from east

Location: 150 feet due north of transect end point No. 0-9 South.

Field Team: C.J. Motta-WCC
P. Iacono-IT
S. Misdom-IT
J. Hamilton-OSI

PM - p. cloudy, warming and clearing toward evening, breeze from east

Time (DST)	Depth (ft) Total	Depth (ft) Measurement	Current Velocity(kts)	Current Direction
0759	8.4	3	0.75	Flood
		5	0.60	Flood
		6	0.50	Flood
0859	10.0	3	1.15	Flood
		5	0.95	Flood
		7	0.90	Flood
		8	0.70	Flood
1008	11.7	3	1.05	Flood
		5	0.90	Flood
		7	0.90	Flood
		9	0.70	Flood
		10	0.65	Flood
1114	12.6	3	0.50	Flood
		5	0.50	Flood
		7	0.40	Flood
		9	0.40	Flood
		11	0.30	Flood
1239	12.4	3	0.50	Ebb
		5	0.55	Ebb
		7	0.45	Ebb
		9	0.40	Ebb
		10	0.35	Ebb
1345	11.2	3	1.10	Ebb
		5	0.85	Ebb
		7	0.60	Ebb
		8	0.50	Ebb
1455	9.4	3	1.05	Ebb
		5	1.05	Ebb
		7	0.75	Ebb
1604	7.9	3	0.85	Ebb
		5	0.60	Ebb
1653	7.2	3	0.60	Ebb
		4	0.50	Ebb
		5	0.50	Ebb
1804	6.2	3	0.50	Ebb
1853	6.1	3	<0.10	Slack
1951	7.7	3	0.70	Flood
		5	0.90	Flood
		6	0.65	Flood

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APPENDIX
B

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APPENDIX B

HYDROGRAPHIC SURVEY OF THE PASSAIC RIVER NEAR 80 LISTER AVENUE

APPENDIX B. HYDROGRAPHIC SURVEY OF THE PASSAIC RIVER NEAR 80 LISTER AVENUE

The objective of the hydrographic survey of the Passaic River was to provide information that could be used to help design a cost-effective sediment sampling program to delineate both the longitudinal and vertical extent of TCDD occurrence in the Passaic River near 80 Lister Avenue. Bathymetric, tidal elevation, current velocity and direction, and salinity data were collected to better understand sediment movement and deposition in the river. Results of the bathymetric surveys were compared to historic bathymetric data to determine the rate of sediment deposition in various areas of the Passaic River.

B.1 METHODS AND MATERIALS

B.1.1 Measurement of Tidal Elevations

Basic to the survey was the measurement of tidal elevations in the Passaic River during the period of bathymetric measurements. Water elevations were measured by In-Situ, Inc. SE1000A recording tide gauges were located upstream of the site at the Jackson Avenue Bridge and downstream of the site at the New Jersey Turnpike Bridge. The water level sensing transducers were held inside a 3-inch PVC stilling well to reduce water-level fluctuations caused by waves or passing boats. Both gauges were surveyed into the nearest vertical and horizontal U.S. Geological Survey benchmarks for correlation with the Mean Low Water (MLW) Datum. The gauges were set to record tidal elevations relative to MLW directly. Data from both gauges were checked prior to the bathymetric survey to ensure the collection of tide data during the survey period.

B.1.2 Bathymetric Survey

Bathymetric contours of the Passaic River bottom were recorded at 75 transects spaced over a 5-mile length of river centered at 80 Lister Avenue. Each transect was run perpendicular to the river channel between two transect end-points. All end-points were marked and surveyed into the New Jersey State Plane Coordinate Grid System. Distance between each pair of end-points was calculated to permit scaling of the bathymetric profiles recorded.

Twenty-five transects were surveyed in the immediate area of 80 Lister Avenue. Of the 25 transects, 17 are located over the locations sampled in 1984, while

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the remaining eight transects are located so as to provide a transect every 200 feet. The 25 transects are number 0-1 through 0-9 and 1-0 through 1-7, as per the original sampling station number system. A total of 26 transects are located upstream of the site area at an average spacing of 400 feet. These transects are numbered U-1 through U-26. Twenty-four transects, numbered D-1 through D-24, are located downstream of the site area, also at an average spacing of 400 feet.

Bathymetric soundings were limited to a period of approximately 4 hours bracketing the predicted time of high tide so that measurements could be taken over the shallow margins of the river. Measurements were taken with a Raytheon DE-719 recording fathometer over a 3-day period (February 8 through 10). At the beginning of each day and frequently during the course of surveying the transects, the fathometer was calibrated by lowering a target to known depths and adjusting the fathometer accordingly.

B.1.3 Current and Salinity Measurements

Current velocity and direction, salinity, and temperature measurements were also taken to help describe the hydrographic character of the Passaic River and the potential for upstream and downstream sediment transport. Measurements were taken every half-hour over the ebb current (7 February 1985) and flood current (11 February 1985) portions of the tidal cycle at Station 0-9-2, which is located near the north side of the river opposite 80 Lister Avenue. The three parameters (current velocity, salinity, and temperature) were measured simultaneously at 2-foot intervals beginning at 3 feet beneath the surface and ending within one-foot of the bottom. Currents were measured with a Bendix B-10 current meter; salinity and temperature were measured with a YS1 Model 33 salinity, conductivity, temperature meter.

B.1.4 Data Analysis

Bathymetric profiles were adjusted using the recorded tide data so that all depths are reported relative to MLW. For example, if a location were shown as being 15.6 feet below the water surface at the time of a 4.6-foot tide height, then the location is reported as having a depth of 11.0 feet, MLW. Adjusted depths were calculated and plotted every 50 feet along each transect.

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Bathymetric soundings along all 75 transects were compared to bathymetric soundings taken by the U.S. Army Corps of Engineers in 1974, 1976, 1978, and 1983 in various sections of the river. Those areas with measurable sedimentation extending over two or more transects were noted and the sedimentation rates estimated.

Current velocity, salinity, and temperature data were correlated with tide level data collected at the New Jersey Turnpike tide gauge. Net (i.e., mean) current velocities were estimated for the bottom, surface and mid-depth locations for both the ebb tide and flood tide portions of the tidal cycle.

B.2 RESULTS AND DISCUSSION

B.2.1 Bathymetric Survey

Results of the bathymetric survey of 75 transects are presented in Figures B-1 through B-11. Figure B-1 is a locator map, and Figures B-2 through B-11 show the bathymetric soundings from upstream of 80 Lister Avenue near the William Stickel Memorial Bridge to a point downstream near the mouth of the Passaic River. The original fathometer recordings are included in the back of this Section.

The surveyed reach upstream of the Jackson Street Bridge (Figures B-2, B-3, and B-4) ranges in width from 350 to 500 feet. It is bounded by bulkheading throughout most of its length. River depths were typically near 5 feet mean low water (MLW) along the flanks of the channel and 17 feet to 19 feet MLW in the middle of the channel. Pronounced shallow areas were noted both upstream and downstream of bridge support and bumper structures. Between the Amtrak Bridge and Jackson Street Bridge, the deeper area of the channel (thalweg) was found toward the outside of the channel meander.

From Jackson Street downstream to near 80 Lister Avenue (Figures B-4, B-5, and B-6), the north shoreline has some limited bulkheading. The south shoreline has some riprap and bulkheading near the site. The river is somewhat wider in this reach at 450 to 600 feet. Mid-channel depths were similar to those immediately upstream. Downstream of Jackson Street and continuing through Transect 0-2, the channel was deepest near the south shoreline. Maximum depths are near center channel at Transect 0-3 and then move toward the north shore

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through and beyond the next bend in the river (Transects O-4 through O-9). Tidal-flat areas (i.e., depths shallower than 0 feet MLW) occur along the north shoreline between Transects U-3 and O-2.5).

The north shoreline near 80 Lister Avenue (Figures B-6 and B-7) is stabilized with rock riprap, and the south shoreline is bulkheaded. Width of the river near the site is 400 to 500 feet. The river bottom in the area slopes gently away from the south shore to the thalweg located near the north shore. Maximum depths in the vicinity of 80 Lister Avenue are somewhat shallower (approximately 17 feet MLW) than those found upstream.

Downstream of the site area (below Transect 1-7) to the Pulaski Skyway (Figures B-7 and B-8), the north and south shorelines are a mixture of apparent natural shoreline, riprapping, and bulkheading. Width of the river through the reach is between 600 and 700 feet. The river bottom slopes gently from the south (and west) shoreline toward the thalweg located toward the outside of the meander near the north (and east) shoreline. Several areas of tidal flats are located along the inside of the bend. The channel is deeper (19 to 25 feet MLW) than in the reach immediately upstream.

From the Pulaski Skyway downstream to Transect D-13 (500 feet below Lincoln Highway) (Figures B-8 and B-9), the river is 500 to 600 feet wide. The west shore is primarily natural-appearing, while the east shore is almost exclusively bulkheaded. Through most of this section, the thalweg is nearer the east shore with maximum depths of 16 to 18 feet MLW.

Downstream of Transect D-13 (Figures B-9, B-10, and B-11), the west shore is generally unbulkheaded but is modified by several docking facilities; the east shore is primarily bulkheaded. Above Transect D-20, the river is 600 to 800 feet wide; downstream of the railroad bridge near Transect D-20, the river quickly widens out into upper Newark Bay. Transects D-14 through D-24, show channel depths in this reach of the river to have a maximum of 31 feet MLW. In the lowest portion of the river below the railroad bridge, the channel is deepest near the west shore, while the east side of the river is very shallow with an extensive area being less than 1 foot MLW.

B.2.2 Comparison with Previous Surveys

Comparisons of the bathymetric profiles recorded in February 1985 were made with

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profiles compiled by the U.S. Army Corps of Engineers (Corps) for the Passaic River at several different times in the recent past. The dates of Corps bathymetric profiles and the corresponding 1985 transects are indicated below:

Corps Survey Dates	February 1985 Transects
April 1974	U-26 through U-22
August 1978	U-24 through U-11
November 1976	U-11 through U-1; O-1 through O-9; 1-0 through 1-7; D-1 through D-26
February 1983	D-6 through D-26

When comparing the current bottom profiles with those prepared by the Corps (COE, 1974, 1976, 1978, and 1983) the dredging history of the Passaic River is pertinent. In May to July 1983, the Corps dredged the channel to 30 feet MLW from about 1,000 feet below Lincoln Highway downstream to the junction with the Hackensack River Channel. This same area was dredged previously in 1977, 1971, 1964, 1961, and 1956. In 1964 and 1965, dredging extended upstream of Lincoln Highway. The Passaic River between Lincoln Highway and the William Stickel Memorial Bridge has not been dredged since 1949 (COE, 1984).

Comparisons with the Corps bathymetry reveal the following general results. Several areas extending 400 to 800 feet along a shoreline have accumulated observable (4 to 5 feet) sediment since the Corps surveys of the 1970's. Most areas of accumulation are along the inside of bends in the river where current velocities are expected to be slower than toward the outside of the bend. Sediment has also accumulated upstream and downstream of several bridge support and bumper structures. Below Lincoln Highway, bottom profiles are deeper in 1985 than those recorded in February 1983 or November 1976 due to the dredging in the spring of 1983. Some sediment is apparently accumulating along the shallow flanks of the dredged channel below Lincoln Highway.

Comparisons of the current survey to those of 1974 and 1978 were made for the Passaic River above the Jackson Street Bridge. Near the upper and lower ends of the Bridge Street Bridge, the bottom is 4 to 5 feet shallower than the adjacent channel. These lobes of sediment are 4 to 6 feet higher than those measured in 1974, yet only 2 to 3 feet higher than measured in 1978, indicating a relatively steady accumulation of sediment from 1974 to the present. Two to 5 feet of sediment have accumulated along the east shoreline upstream of the Center Street

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Bridge (U-21 to U-23) and downstream of the bridge along the west shore (U-17 to U-20). This represents an average annual accumulation rate of approximately 0.6 feet per year since 1978. The sediment build-up along the west shore would be somewhat unique for a riverine system since it is located on the outside of a meander, but its existence may be due to tidal effects on sediment transport. Lobes of sediment were found above and below the Jackson Street Bridge that are as much as 10 feet higher than the adjacent channels. Up to 2 feet of sediment has accumulated since 1976 immediately adjacent to the Jackson Street bumper system.

Between Jackson Street and the site area several small erosional areas and one extensive depositional area relative to 1976 were noted. Small eroded areas of 3 to 4 feet depth (relative to 1976) were noted in transects U-6 through U-9. A larger area of erosion was seen along Transect U-3. An area of sediment deposition was noted along the south (inside of bend) shoreline upstream of 80 Lister Avenue. It stretches approximately 1,600 feet from Transect 0-1.5 through Transect 0-5 and extends approximately one-third the width of the river. Average deposition is 4.5 feet since 1976, indicating an average annual accumulation of approximately 0.5 foot.

Some moderate sediment deposition since 1976 was noted along the south shore adjacent to 80 Lister Avenue. Transect 0-8, 0-9, 1-0, 1-1, and 1-2 had accumulations of 0.5 to 2.5 feet extending out to 300 feet offshore.

A more extensive depositional area was noted downstream of 80 Lister Avenue in Transects 1-5, 1-5.5, and 1-6.5. The area includes approximately 800 feet of the south shoreline and extends more than half the width of the river. Accumulations since 1976 average 2.0 feet (0.2 foot per year) with a maximum of 4.0 feet (0.5 foot per year). A large mass of ice along the south shore at the time of the February 1985 survey prevented the measurement of near-shore depths at Transects 1-5.5, 1-6, and 1-6.5 and precluded a better definition of the area of sedimentation.

Accumulations of sediment since 1976 were noted downstream of the New Jersey Turnpike and on both sides of the adjacent railroad bridge. Up to 5 feet of sediment has accumulated near the upstream end of the railroad bridge fender

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system (Transect D-3), while 3 feet appear to have accumulated at the downstream end. Below the bridge, up to 7 feet of sediment has accumulated in the area of Transects D-4 and D-5 between the south shore and the bridge since 1976.

From Transect D-5 downstream to Transect D-26, bottom profiles from both November 1976 and February 1983 were compared to the current profiles. Transects D-5 through D-14, when compared to 1976 and 1983 data, showed similar changes in depths with time. The current bathymetric profiles when compared to 1976 revealed a relatively consistent accumulation of 2 to 3 feet across the channel. Comparisons of 1985 profiles to 1983 data showed an average increase of only 1 to 2 feet over the area between Transects D-5 and D-14. It therefore appears that, on average, 0.5 to 1.5 feet of sediment have accumulated between November 1976 and February 1983.

Transects D-15 through D-24 are in the reach of the Passaic River that was dredged in the spring of 1983 (COE, 1984). As a consequence, depths recorded in the main channel during the present survey were typically greater than those measured in November 1976 and February 1983. Depths recorded in 1985 were typically 7 to 10 feet deeper than those measured in 1983, but only 5 to 8 feet deeper than in 1976, thereby indicating an accumulation of approximately 2 feet of sediment in the main channel between 1976 and 1983. Depths along the east flank of the channel were occasionally found to be shallower than those of 1976 or 1983. Transects that indicated areas of sedimentation along the flank were D-15, D-16, and D-22. Comparisons of the current survey to earlier surveys were limited in lateral extent since the Corps surveyed only the dredged channel and the area immediately adjacent.

The primary areas of accumulated sediments as determined through these comparisons (indicated dates) are listed below:

Transects	Sediment Accumulation	Average Sedimentation Rate
U-21 to U-23	2-5 feet (Aug. 1978)	0.6 foot/year
U-17 to U-20	2-5 feet (Aug. 1978)	0.6 foot/year
0-1.5 to 0-5	2-6 feet (Nov. 1976)	0.5 foot/year
1-5 to 1-6.5	2-4 feet (Nov. 1976)	0.4 foot/year

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B.2.3 Current Velocity and Salinity Profiles

Current velocity profiles, salinity, and temperature were measured at Station 0-9-2 during the periods of predicted high slack to low slack current and low slack to high slack current on February 7 and 11, 1985, respectively. Tidal elevations were recorded at the New Jersey Turnpike bridge and are shown in Figure B-12. Results of the 7 February survey of ebbing currents are presented in Table B-1 and Figure B-13. Results of the 11 February survey are presented in Table B-2 and Figure B-14. The relationship between predicted and recorded tide heights, current velocities and times of occurrence are listed in Table B-3.

On 7 February, measurements were taken between 1100, 40 minutes prior to the predicted high slack water, and 1730, when slack water was noted at the surface and flooding currents in excess of 0.8 knots were measured at the bottom. Maximum ebb current velocities were consistently seen near the surface with a maximum of 1.5 knots recorded at 1330. Minimum velocities within the water column were consistently noted at the deepest measured location (i.e., 1 foot off the bottom). The highest ebb current velocity near the bottom (0.6 knots) was recorded at 1230. The resultant velocity profile during the period of ebb flow was wedge-shaped.

Flow reversal (i.e., ebb-to-flood) was first noted at 1600 along the bottom. Flood current increased until 1730 when the entire water column with the exception of the surface was flooding. The tide elevations recorded during the period of record ranged from +7.2 feet MLW at 0940 to -0.2 MLW at 1645 for an overall tidal range of 7.4 feet. Salinities measured concurrently with current velocity had a surface to bottom range of 3 to 5.5 parts per thousand (ppth). Highest salinities recorded were approximately 16.5 ppth and were measured at 1100 and 1140 near the bottom while surface salinities were 13.0 to 13.5 ppth. Salinities decreased to lows of 4.7 ppth (surface) and 8.8 to 9.0 ppth (bottom) by 1700.

On 11 February, measurements were taken of flooding current between 0800, 35 minutes prior to predicted low slack water, and 1230, when slack water was noted near mid-depth with lower velocities toward the surface and bottom. The flood velocities of 1.2 knots were recorded at 0830 and 0930. Maximum bottom current

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velocities of 0.7 knots were recorded during this same period. By 1215, ebb currents were seen at the surface along the flanks of the river. By 1245, flow above 7 feet was ebbing while below 7 feet flood currents were still noted. Tide elevations during the period of flood currents were +0.5 feet MLW at 0705 and +5.5 feet MLW at 1329 for an overall range of 5.0 feet. This compares to a tidal range of 7.4 feet on 7 February during measurement of ebbing currents. Lowest salinities were measured at 0800 with 8.0 ppth at the surface and 14.0 ppth at the bottom. Salinities increased through the measurement period, and by 1230, surface and bottom salinities had increased to 17.0 and 18.5 ppth, respectively.

It is expected that if flooding current velocities could have been measured on 7 February immediately following the ebb current measurements rather than 11 February, the velocities would have been somewhat higher since the tidal range was greater on 7 February than on 11 February. The tidal range measured at the New Jersey Turnpike bridge on 7 February between 1645 (low tide) and 2140 (high tide) was 5.9 feet compared to 5.0 feet between 0705 and 1330 on 11 February (Table B-3). No scaling factor can be applied to the 11 February flood velocities due to limited information about the geometry and circulation of the Passaic River estuary.

Bottom and surface velocities measured on 7 and 11 February indicate that the Passaic River estuary near 80 Lister Avenue is characterized by a two-layer flow system. This conclusion is based on the fact that the mean ebb velocity on the bottom was 0.25 knots over 10 measurements, while the mean flood velocity on the bottom over an analogous period of 10 measurements on 11 February was a conservative 0.4 knots. Based on these limited data, the net bottom velocity is upstream. Surface velocities measured over the two periods showed the opposite trend. The mean surface ebb velocity was 1.2 knots while the mean surface flood velocity was only 0.4 knots. The net surface velocity is downstream (seaward) despite the conservative flood velocity measurements. At the 7-foot depth, the mean ebb velocity was 0.9 knots, and the mean flood velocity was 0.6 knots, resulting in a net downstream velocity near the middle of the water column. The combination of net upstream flow on the bottom and net downstream flow on the surface and near mid-depth is characteristic of a partially-mixed estuary (Type B) as defined by Pritchard and Carter (1971). The gradual vertical

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salinity gradient measured on 7 and 11 February is also characteristic of a partially-mixed estuary.

B.3 SUMMARY

Based on the bathymetric survey conducted in February 1985 and those conducted by the Corps previously, it is evident that sediment is accumulating in the Passaic River estuary. From the upstream limit of the survey at the William Stickel Memorial Bridge to below Lincoln Highway, accumulated sediment has been undisturbed by dredging since 1950. In the reach from below Lincoln Highway to the mouth of the river, accumulated sediments have been dredged six times since 1955. Despite dredging activities, areas of accumulated sediment below Lincoln Highway have been delineated based on comparisons to earlier bathymetric surveys performed by the Corps.

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TABLES

TABLE B-1

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 7, 1985 DURING EBB TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
1100a	3	0.75	Ebb	13.5	0.9
	5	0.4±	Ebb	14.5	1.0
	7	0.5±	Ebb	14.5	1.1
	9	0.45	Ebb	14.0	1.3
	11	0.02	Ebb	13.8	1.5
	13	0	-	13.5	1.5
	15	0	-	16.6	1.5
	17	0	-	13.5	1.5
	19	0.35	Ebb	13.5	1.5
	21	0.3	Ebb	13.3	1.5
1140	3	1.0	Ebb	13.0	1.0
	5	0.8	Ebb	12.6	1.0
	7	0.3	Ebb	13.6	1.1
	9	0.7	Ebb	15.2	1.2
	11	0.65	Ebb	15.5	1.2
	13	0.55	Ebb	16.0	1.5
	15	0.50	Ebb	16.3	1.5
	17	0.45	Ebb	16.5	1.5
	19	0.35	Ebb	16.3	1.5
1205	3	1.1	Ebb	12.6	1.0
	5	1.1	Ebb	12.8	1.0
	7	0.9	Ebb	13.5	1.0
	9	0.6	Ebb	14.0	1.0
	11	0.6	Ebb	14.8	1.0
	13	0.65	Ebb	15.5	1.1
	15	0.1	-	15.8	1.1
	17	0.1	Ebb	16.2	1.1
1230	3	1.4	Ebb	12.2	0.8
	5	1.1	Ebb	12.2	1.0
	7	1.1	Ebb	12.4	1.0
	9	1.1	Ebb	12.8	1.1
	11	0.9	Ebb	13.8	1.1
	13	0.8	Ebb	14.3	1.2
	15	0.7	Ebb	15.0	1.3
	17	0.6	Ebb	15.5	1.4

TABLE B-1 (Continued)

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 7, 1985 DURING EBB TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2, Continued.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
1300	3	1.4	Ebb	11.2	0.8
	5	1.4	Ebb	11.1	0.9
	7	1.2	Ebb	11.2	0.9
	9	0.7	Ebb	12.5	1.0
	11	0.8	Ebb	13.0	0.8
	13	0.8	Ebb	13.4	0.9
	15	0.6	Ebb	14.0	0.9
	17	0.3	Ebb	14.8	1.0
1330	3	1.5	Ebb	9.8	0.5
	5	1.4	Ebb	9.8	0.5
	7	1.2	Ebb	10	0.5
	9	1.1	Ebb	10.5	0.8
	11	1.0	Ebb	12.0	0.8
	13	0.9	Ebb	12.5	0.9
	15	0.6	Ebb	13.2	1.0
	16	0.4	Ebb	14.8	1.0
1400	3	1.4	Ebb	9.2	0.2
	5	1.2	Ebb	9.1	0.3
	7	1.2	Ebb	9.4	0.4
	9	1.0	Ebb	10.7	0.4
	11	0.9	Ebb	11.0	0.5
	13	0.8	Ebb	11.5	0.5
	15	0.3	Ebb	12.9	0.8
	16	0.16	Ebb	13.7	0.9
1430	3	1.1	Ebb	8.4	0.1
	5	1.1	Ebb	8.5	0.2
	7	0.96	Ebb	8.6	0.2
	9	0.75	Ebb	9.6	0.2
	11	0.7	Ebb	9.7	0.3
	13	0.6	Ebb	10.7	0.4
	15	0.2	Ebb	12	0.7

TABLE B-1 (Continued)

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 7, 1985 DURING EBB TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2, Continued.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
1500	3	1.1	Ebb	7.6	0.1
	5	0.94	Ebb	7.7	0.2
	7	0.8	Ebb	8.0	0.2
	9	0.74	Ebb	8.6	0.2
	11	0.58	Ebb	9.0	0.3
	13	0.45	Ebb	9.6	0.4
	15	0.18	Ebb	11.0	0.5
1530	3	0.90	Ebb	6.8	0.0
	5	0.75	Ebb	6.9	0.1
	7	0.7	Ebb	7.2	0.1
	9	0.65	Ebb	7.8	0.1
	11	0.45	Ebb	8.4	0.2
	13	0.34	Ebb	8.9	0.2
	14	0.1	Ebb	9.8	0.4
1600	3	0.82	Ebb	6.0	0.0
	5	0.76	Ebb	6.0	0.0
	7	0.60	Ebb	6.4	0.1
	9	0.54	Ebb	7.0	0.1
	11	0.38	Ebb	7.8	0.1
	13	0.12	Flood	9.0	0.2
1630	3	0.76	Ebb	5.2	-0.1
	5	0.65	Ebb	5.5	0.0
	7	0.50	Ebb	6.0	0.0
	9	0.46	Ebb	6.5	0.0
	11	0.26	Ebb	7.5	0.1
	13	0.30	Flood	10.7	0.1
1700	3	0.54	Ebb	4.8	-0.1
	5	0.44	Ebb	4.9	0.0
	7	0.25	Ebb	5.5	0.0
	9	0.14	Ebb	6.2	0.0
	11	LT[b] 0.1	Flood	7.0	0.1
	13	0.38	Flood	8.8	0.1

TABLE B-1 (Continued)

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 7, 1985 DURING EBB TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2, Concluded.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
1730	3	0	-	4.7	-0.2
	5	0.14	Flood	4.9	0.0
	7	0.38	Flood	5.6	0.0
	9	0.42	Flood	6.0	0.1
	11	0.66	Flood	7.0	0.1
	13	0.8	Flood	8.7	0.1
	14	0.84	Flood	9.0	0.1

[a]Erratic current meter readings.

[b]LT = Less than.

TABLE B-2

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 11, 1985 DURING FLOOD TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
0800	3	0.10	Flood	8.0	1.0
	5	0.16	Flood	9.0	1.0
	7	0.28	Flood	9.0	1.0
	9	0.40	Flood	9.0	1.0
	11	0.36	Flood	9.5	1.0
	13	0.62	Flood	10.5	1.0
	15	0.73	Flood	12.0	1.0
	17	0.52	Flood	14.0	1.0
0830	3	0.48	Flood	9.0	0.0
	5	0.52	Flood	9.0	0.0
	7	0.58	Flood	9.5	0.5
	9	0.76	Flood	10.0	0.5
	11	0.82	Flood	10.5	0.5
	13	0.82	Flood	11.0	0.5
	15	1.16	Flood	12.5	0.5
	17	0.9	Flood	14.0	0.5
	18	0.62	Flood	14.0	1.0
0900	3	0.40	Flood	10.0	0.0
	5	0.48	Flood	10.0	0.0
	7	0.56	Flood	10.5	0.0
	9	0.63	Flood	11.5	0.0
	11	0.75	Flood	14.0	0.0
	13	0.58	Flood	15.0	0.5
	15	0.55	Flood	15.5	0.5
	17	0.52	Flood	15.5	0.5
	18	0.45	Flood	15.0	0.5
0930	3	1.1	Flood	11.5	0.0
	5	1.1	Flood	12.0	0.0
	7	1.1	Flood	13.0	0.0
	9	1.2	Flood	15.0	0.0
	11	1.2	Flood	15.5	0.0
	13	1.0	Flood	16.0	0.5
	15	0.9	Flood	16.0	0.5
	17	0.74	Flood	16.0	0.5
	19	0.66	Flood	16.0	0.5

TABLE B-2 (Continued)

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 11, 1985 DURING FLOOD TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2, Continued.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
1000	3	0.82	Flood	13.5	0.0
	5	0.96	Flood	14.0	0.0
	7	1.0	Flood	15.0	0.0
	9	1.0	Flood	15.5	0.0
	11	1.05	Flood	16.0	0.0
	13	1.1	Flood	16.5	0.0
	15	0.85	Flood	17.0	0.5
	17	0.78	Flood	17.0	0.5
	19	0.64	Flood	17.0	0.5
1040	3	0.62	Flood	15.0	0.0
	5	0.72	Flood	15.5	0.0
	7	0.83	Flood	16.5	0.0
	9	0.78	Flood	17.0	0.0
	11	0.76	Flood	17.5	1.0
	13	0.74	Flood	17.5	1.0
	15	0.66	Flood	17.5	1.0
	17	0.63	Flood	17.5	1.0
	19	0.52	Flood	17.5	1.0
1110	3	0.35	Flood	16.0	0.0
	5	0.46	Flood	16.5	0.0
	7	0.57	Flood	17.0	0.0
	9	0.65	Flood	17.0	1.0
	11	0.60	Flood	17.5	1.0
	13	0.56	Flood	17.5	1.0
	15	0.50	Flood	17.5	1.5
	17	0.42	Flood	17.5	1.5
	19	0.42	Flood	17.5	1.5
	20	0.32	Flood	17.5	1.5
1130	3	0.25	Flood	16.0	0.5
	5	0.30	Flood	16.5	0.5
	7	0.40	Flood	17.0	0.5
	9	0.45	Flood	17.0	0.5
	11	0.50	Flood	17.5	0.5
	13	0.45	Flood	17.5	0.5
	15	0.40	Flood	18.0	0.5
	17	0.28	Flood	18.0	0.5
	19	0.20	Flood	18.0	1.0

TABLE B-2 (Continued)

HYDROGRAPHIC PARAMETERS MEASURED ON FEBRUARY 11, 1985 DURING FLOOD TIDE IN THE PASSAIC RIVER AT STATON NO. 0-9-2, Concluded.

Time	Depth (Feet)	Current Vel.(Kts)	Current Direction	Salinity (ppt)	Temp. (°C)
1200	3	0.02	Flood	16.0	0.5
	5	0.13	Flood	16.5	0.5
	7	0.28	Flood	17.0	0.5
	9	0.36	Flood	17.5	0.5
	11	0.37	Flood	18.0	0.5
	13	0.32	Flood	18.0	0.5
	15	0.32	Flood	18.0	0.5
	17	0.20	Flood	18.0	0.5
	19	0.15	Flood	18.0	0.5
	20	0.18	Flood	18.0	0.5
1230	3	LT[a] 0.1	-	17.0	0.5
	5	LT 0.1	-	17.0	0.5
	7	0.26	Flood	17.5	0.5
	9	0.1	Flood	18.0	1.0
	11	0.18	Flood	18.0	1.0
	13	0.20	Flood	18.0	1.0
	15	0.02	Flood	18.0	1.0
	17	LT 0.1	Flood	18.0	1.0
	19	LT 0.1	Flood	18.0	1.0
	21	LT 0.1	Flood	18.5	1.0
1246[b]	3	-	Ebb	-	-
	5	-	Ebb	-	-
	7	-	Ebb	-	-
	9	-	Flood	-	-
	11	-	Flood	-	-
	13	-	Flood	-	-
	15	-	Flood	-	-
	17	-	Flood	-	-
	19	-	Flood	-	-

[a]LT = Less than.

[b]No velocities measured.

TABLE B-3

PREDICTED AND RECORDED TIDAL AND CURRENT PARAMETERS FOR 7 AND 11 FEBRUARY 1985.

Event	Predicted		Recorded[a]	
	Time	Ht (MLW)/Velocity	Time	Ht (MLW)/Velocity
7 February 1985:				
High tide	0950	5.7 feet	0940	7.2 feet
High slack current	1139	0 knots	-[b]	0 knots
Max. ebb current	1406	0.75 knots	1330	1.5 knots
Low tide	1652	-1.1 feet	1645	-0.2 feet
Low slack current	1743	0 knots	1730	0 knots
Tidal range	0950-1052	6.8 feet	0940-1645	7.4 feet
11 February 1985:				
Low tide	0750	-0.1 feet	0705	0.5 feet
Low slack current	0835	0 knots	-[c]	0 knots
Max. flood current	1109	0.64 knots	0930	1.1 knots
High tide	1329	4.6 feet	1330	5.5 feet
High slack current	1411	0 knots	1230	0 knots
Tidal range	0750-1329	4.7 feet	0705-1330	5.0 feet

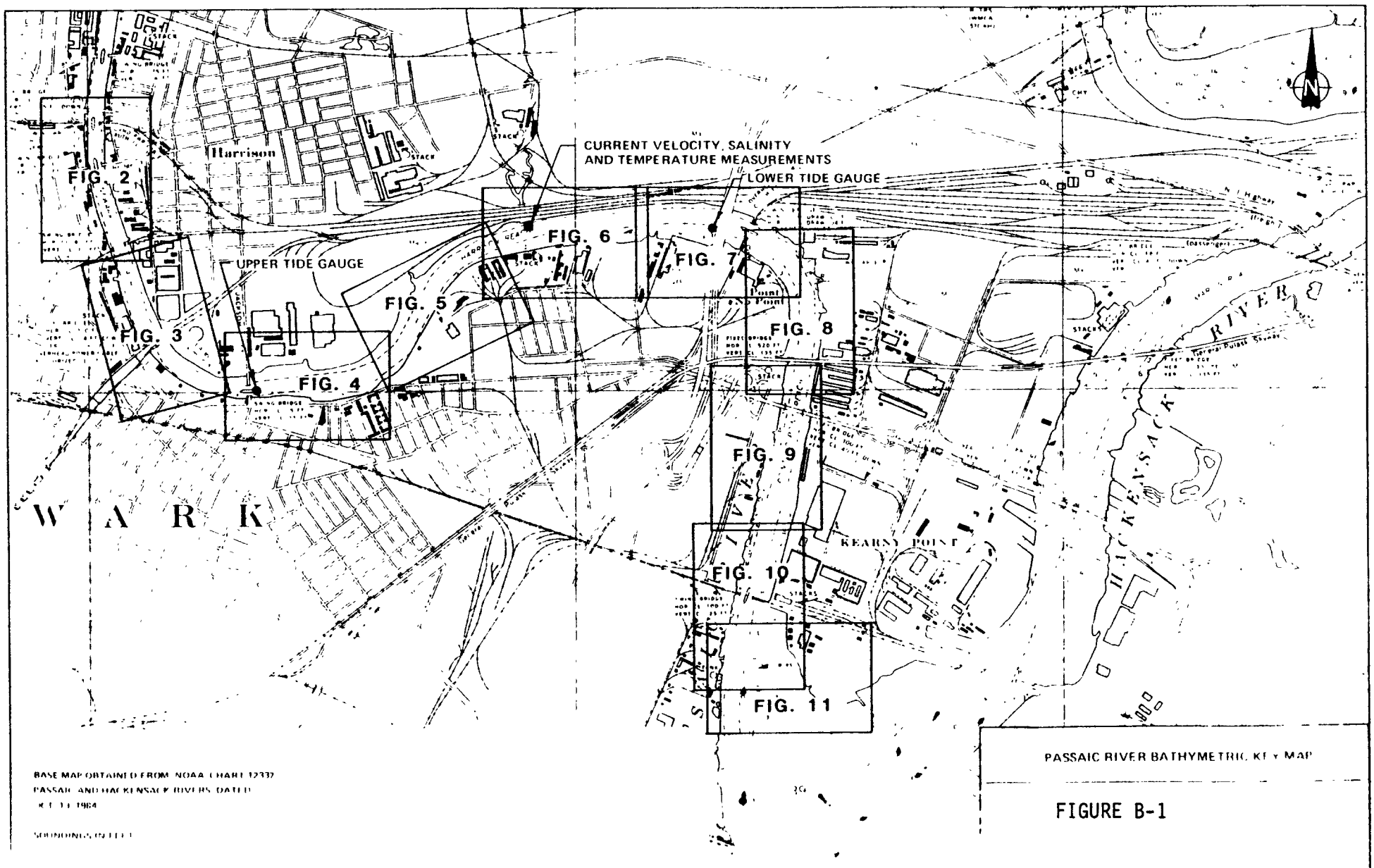
[a]Tide levels recorded at the New Jersey Turnpike Bridge; current velocities measured at Station O-9-2.

[b]Prior to 1100, 7 February.

[c]Prior to 0800, 11 February.

Source: Predicted times and values - NOAA, 1984a, b.

FIGURES



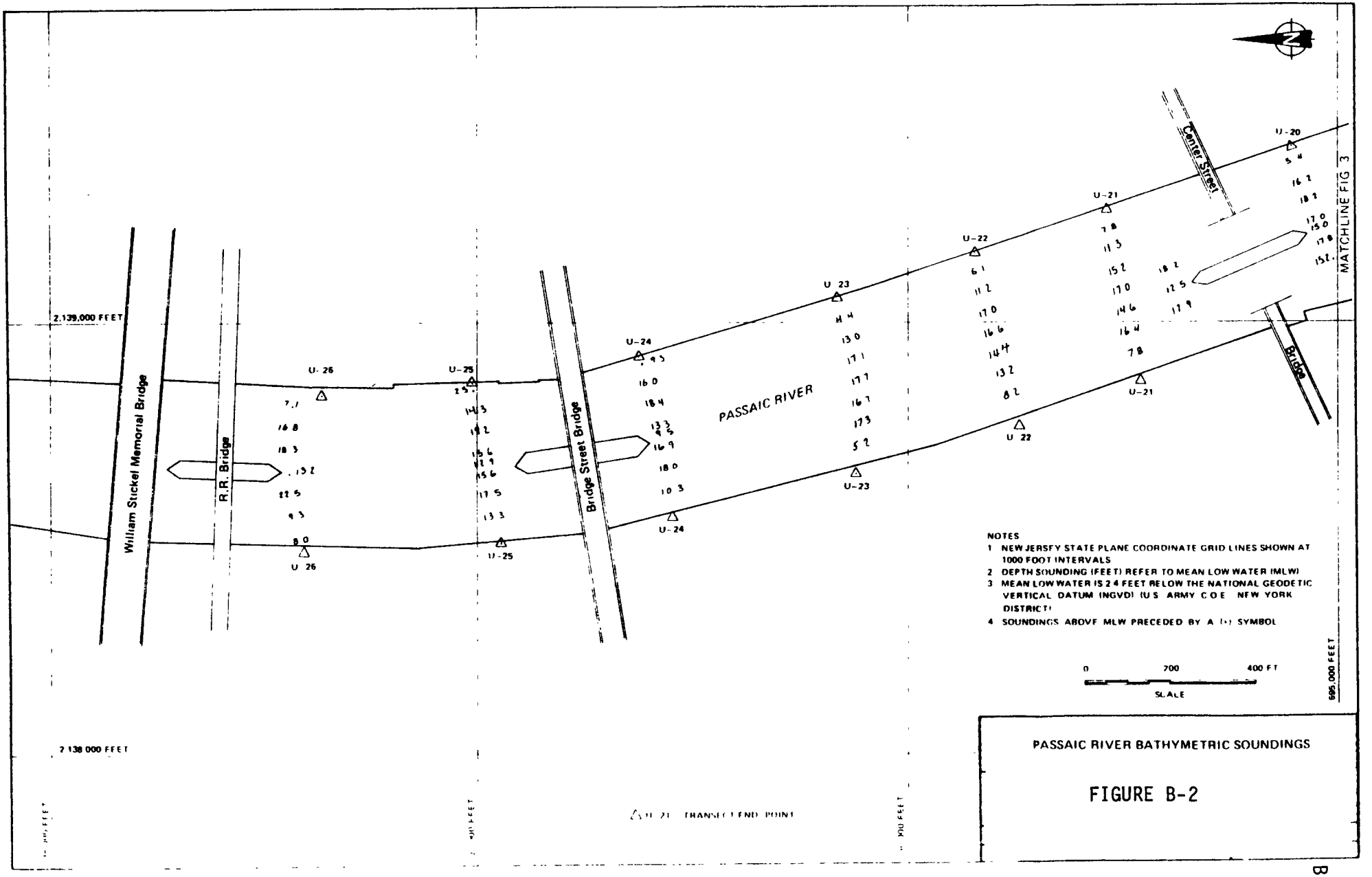
BASE MAP OBTAINED FROM NOAA CHART 12337
PASSAIC AND HACKENSACK RIVERS, DATED
OCT 11 1984

SOUNDINGS IN FEET

PASSAIC RIVER BATHYMETRIC KEY MAP

FIGURE B-1

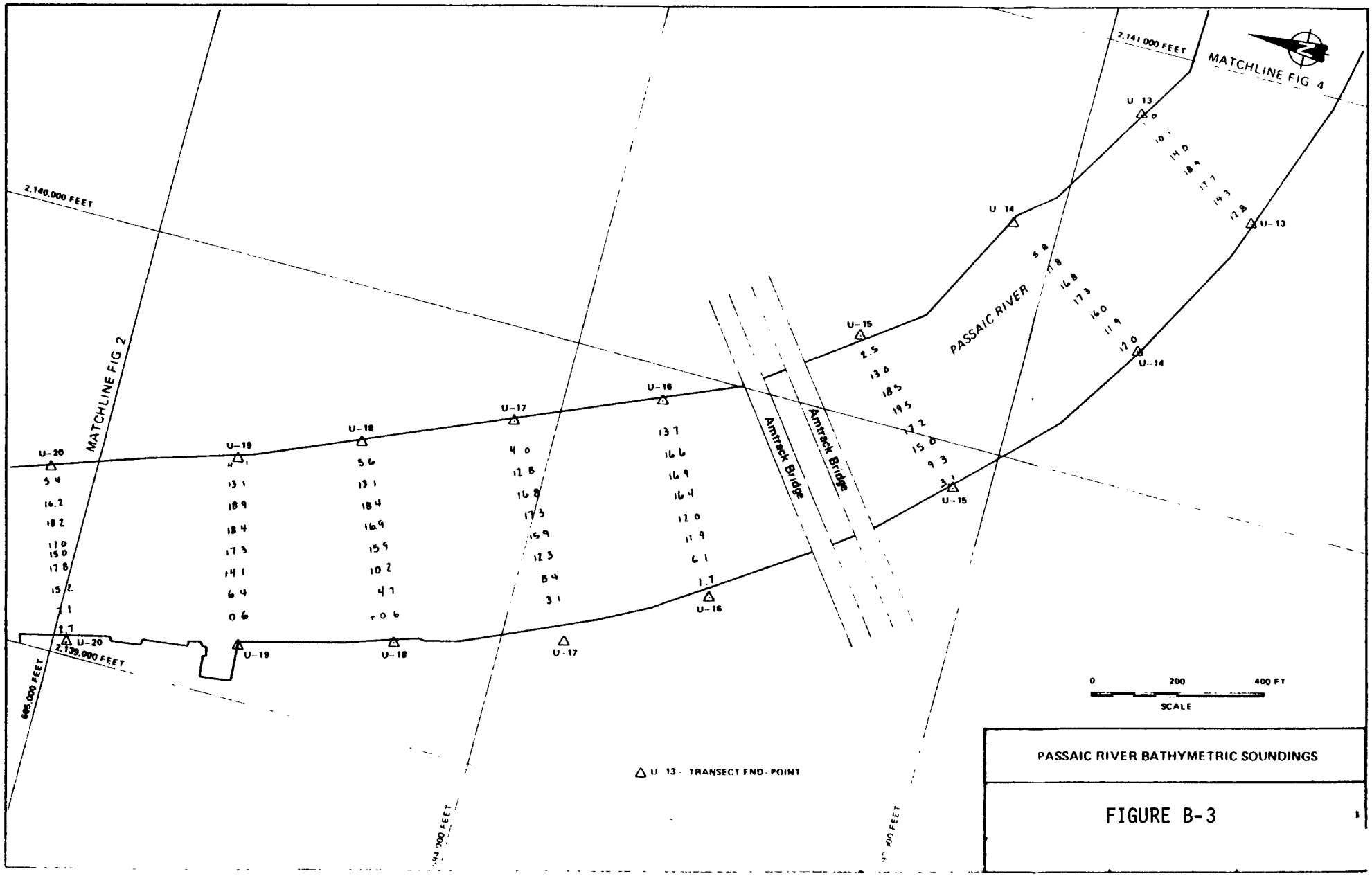
DEP\DA0004308



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-2

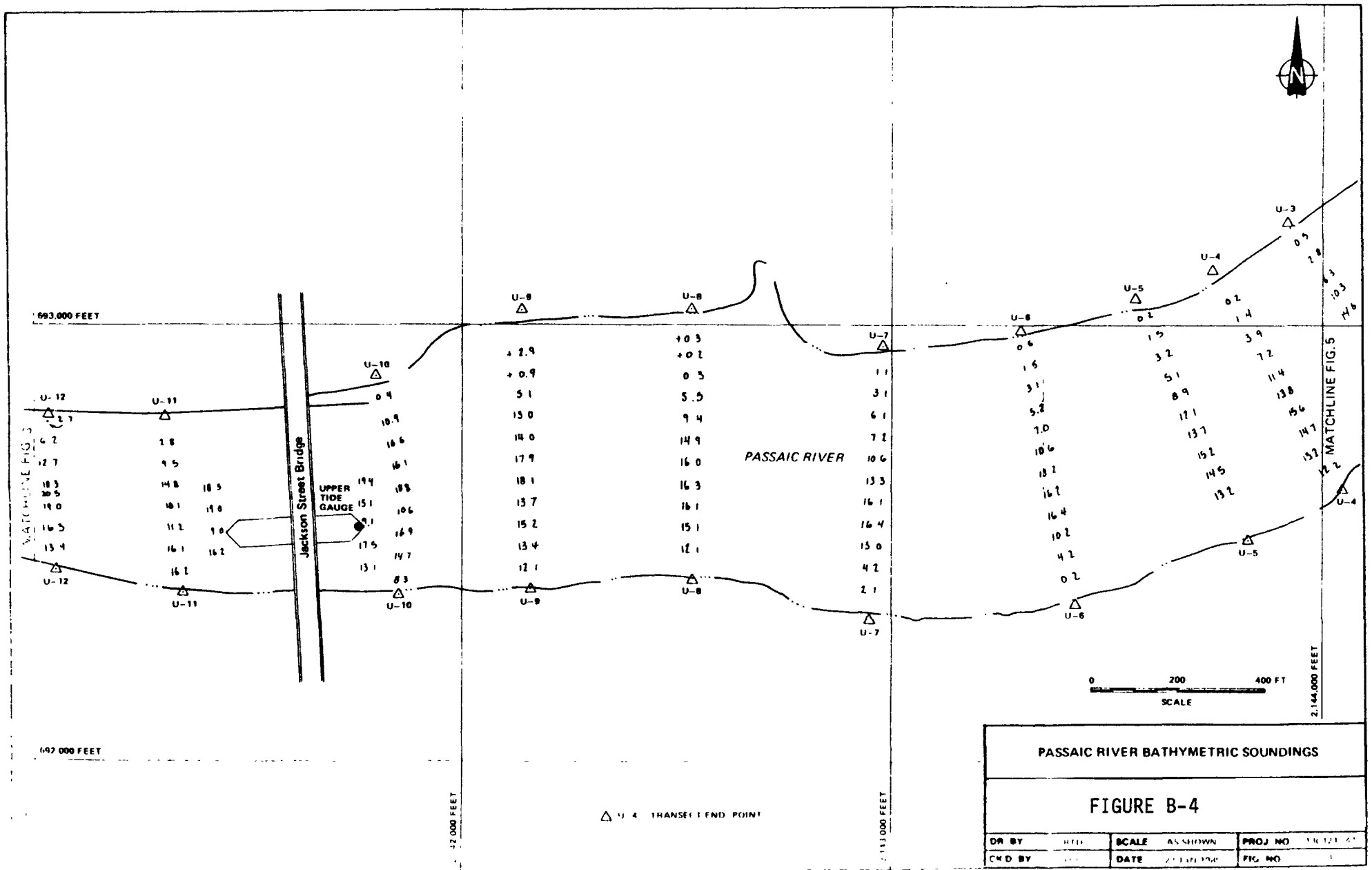
DEP\DA0004309



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-3

DEP\DA0004310

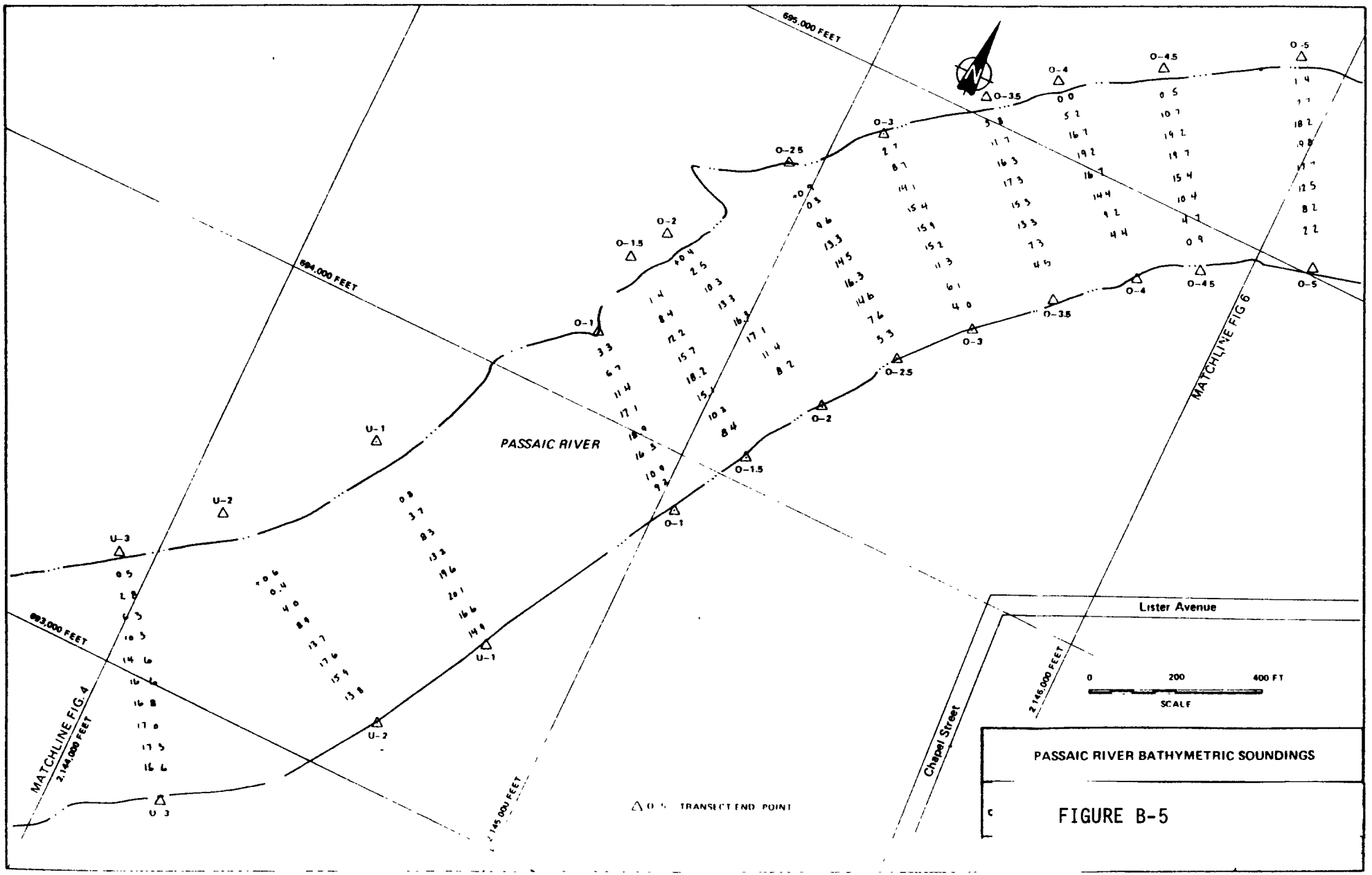


PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-4

DR BY	[illegible]	SCALE	AS SHOWN	PROJ NO	[illegible]
CKD BY	[illegible]	DATE	[illegible]	FIG NO	[illegible]

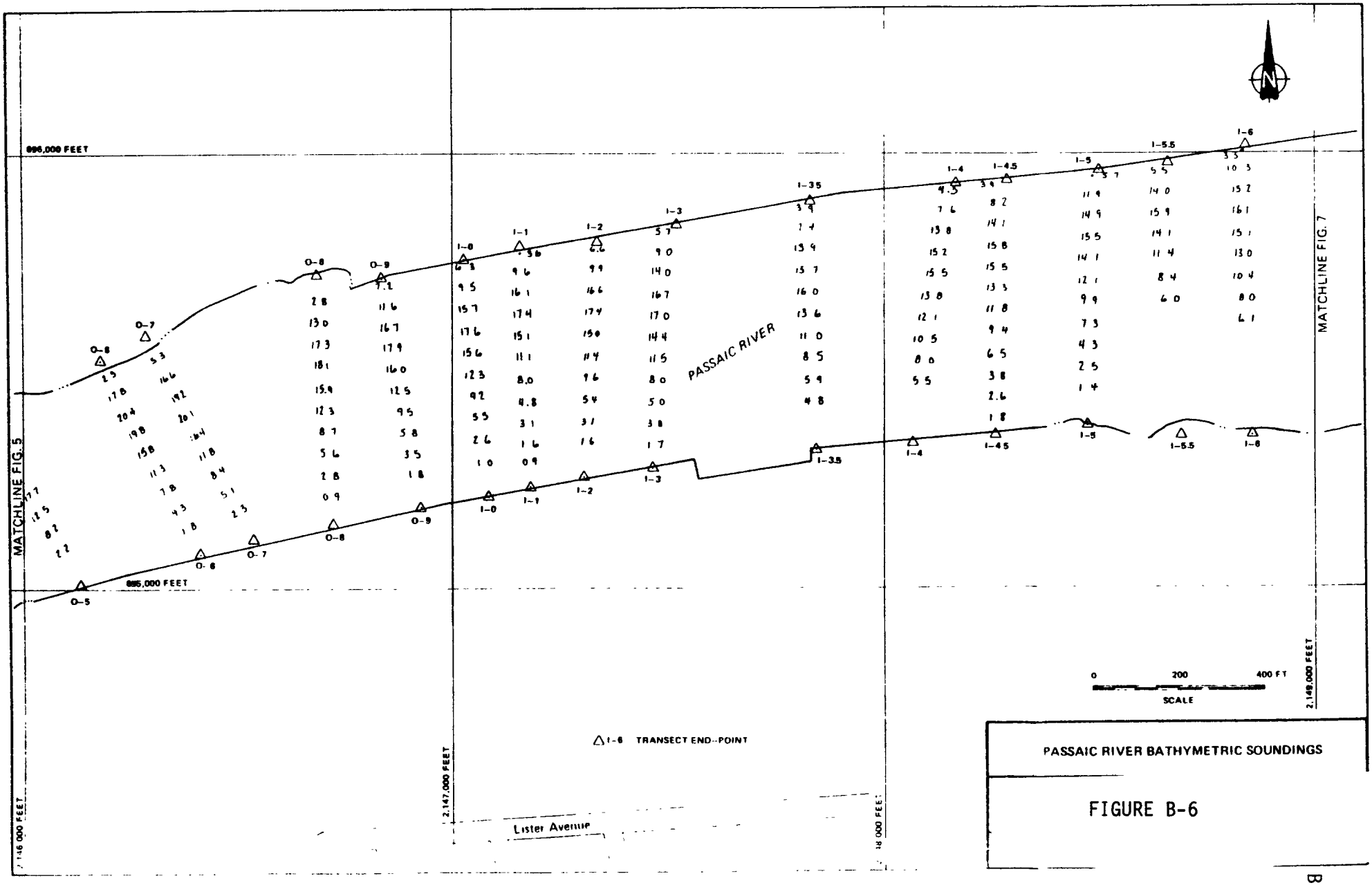
DEP\DA0004311



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-5

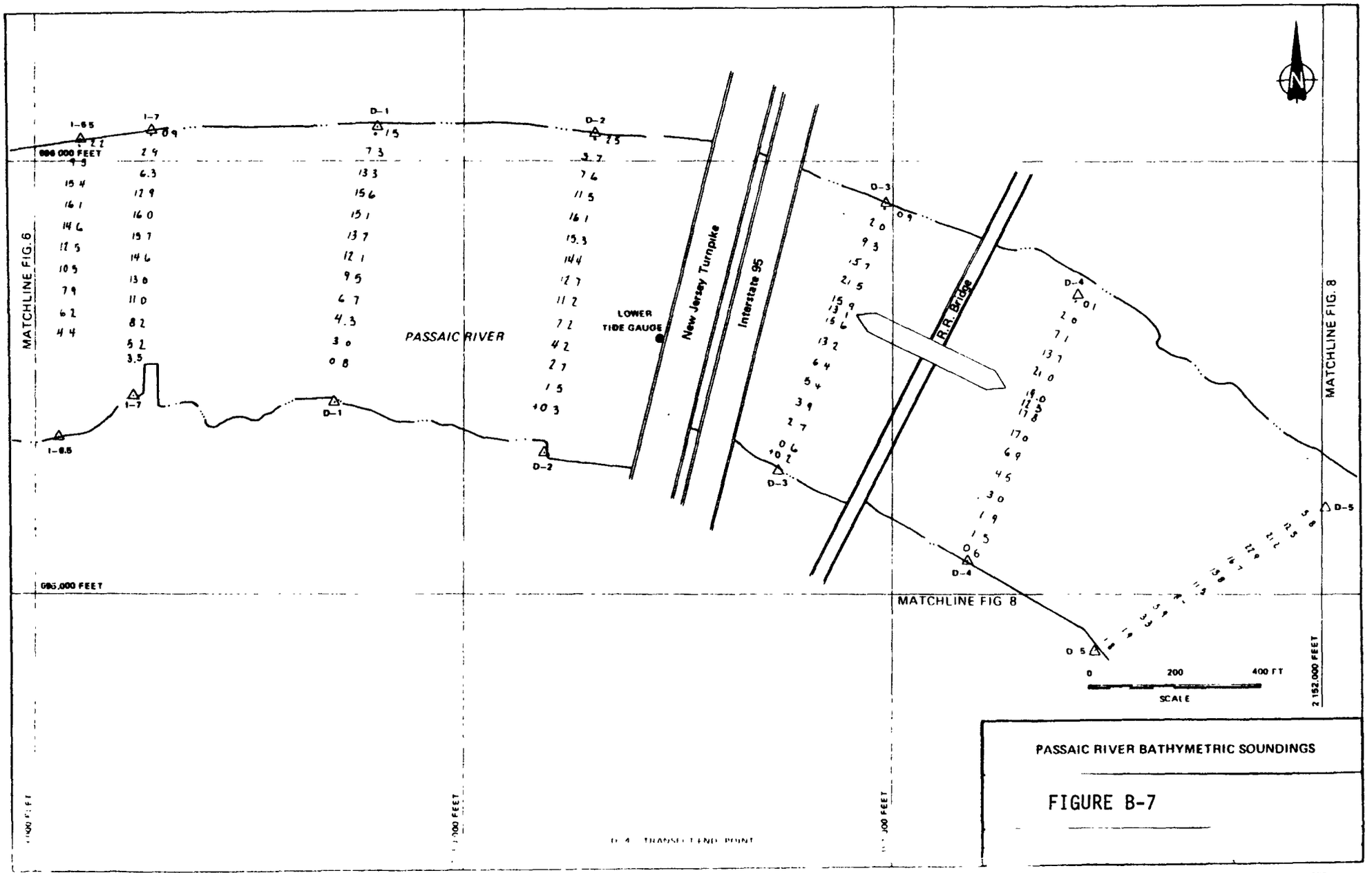
DEP\DA0004312



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-6

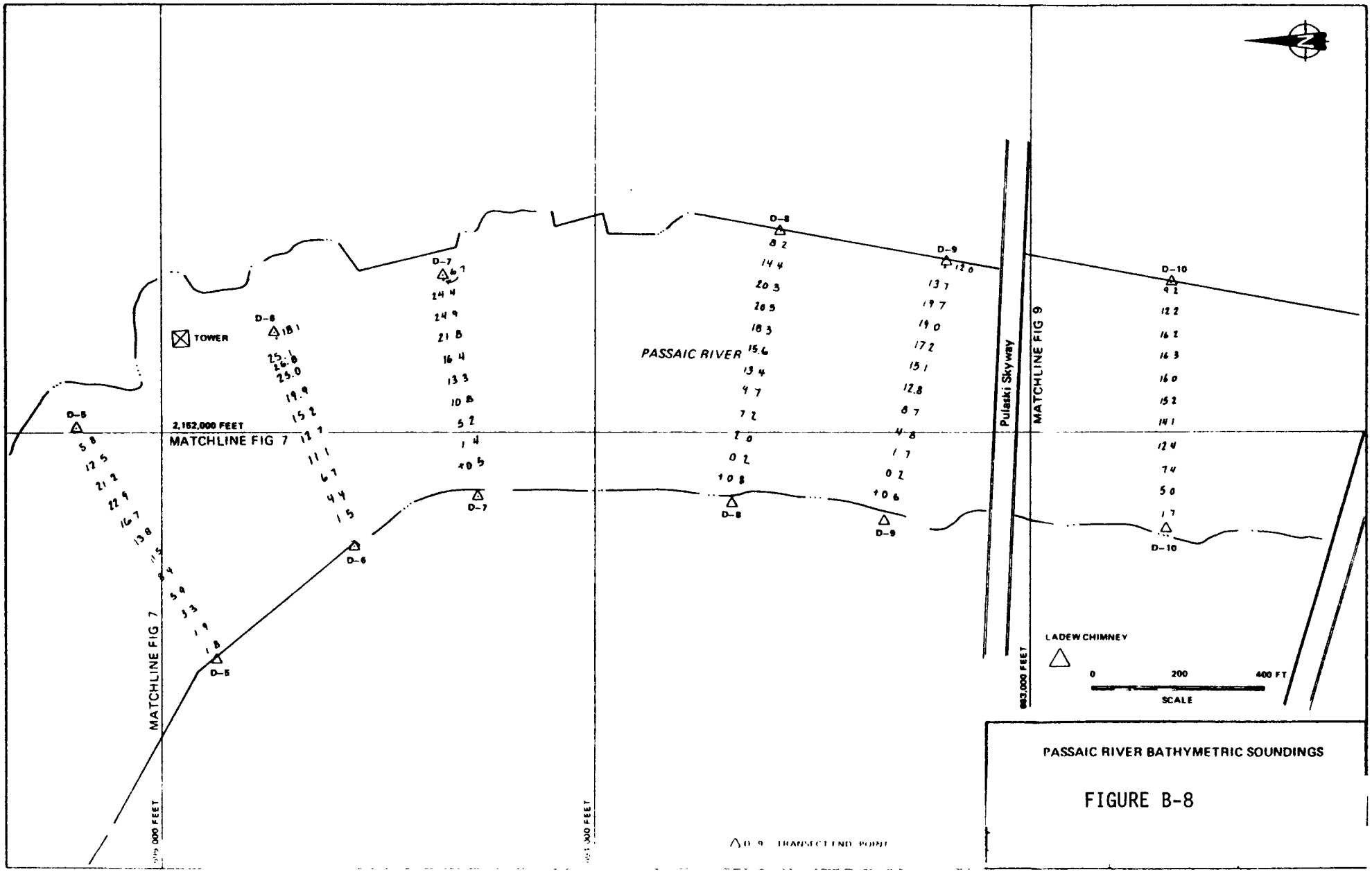
DEP\DA0004313



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-7

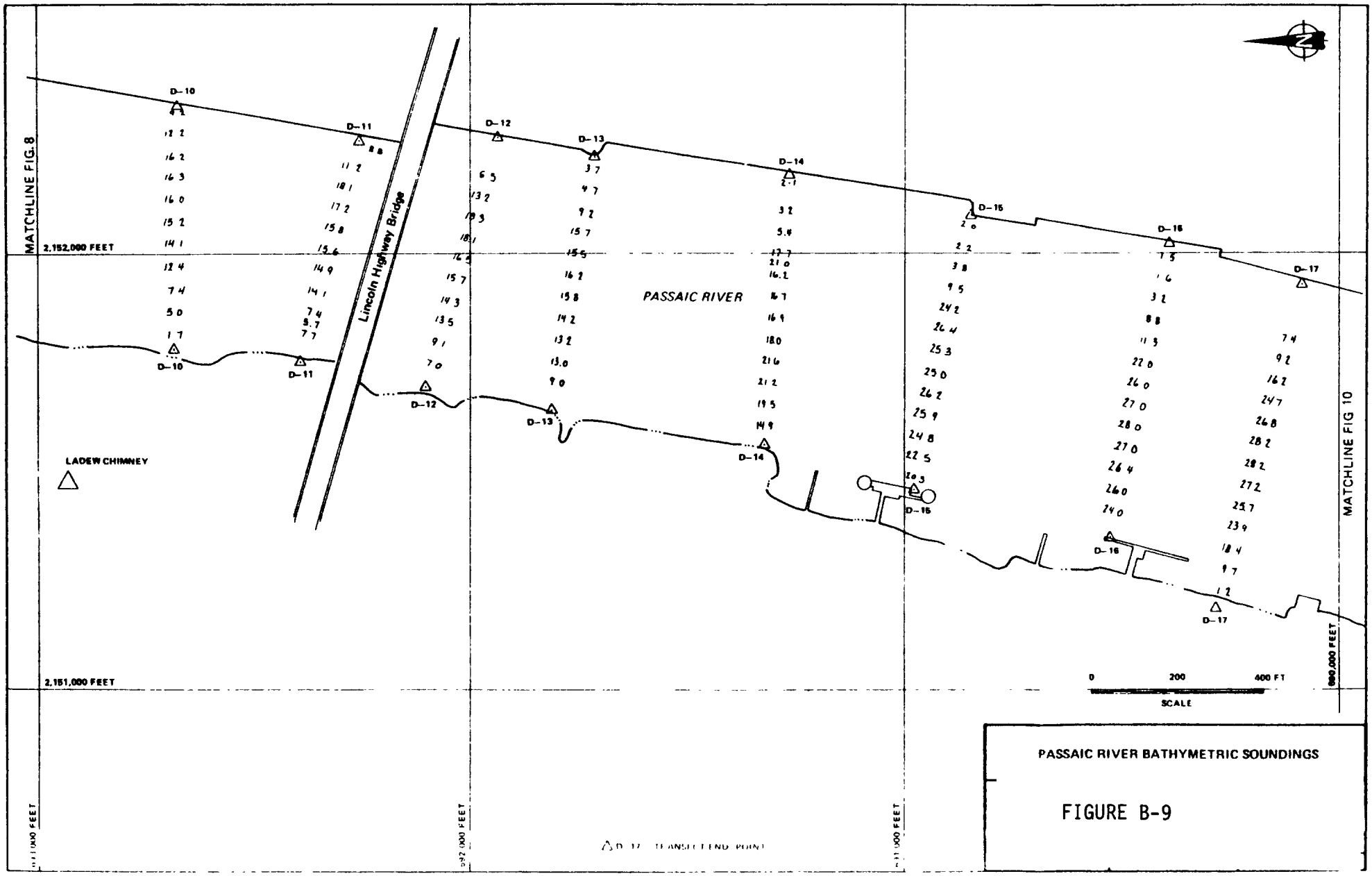
DEP\DA0004314



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-8

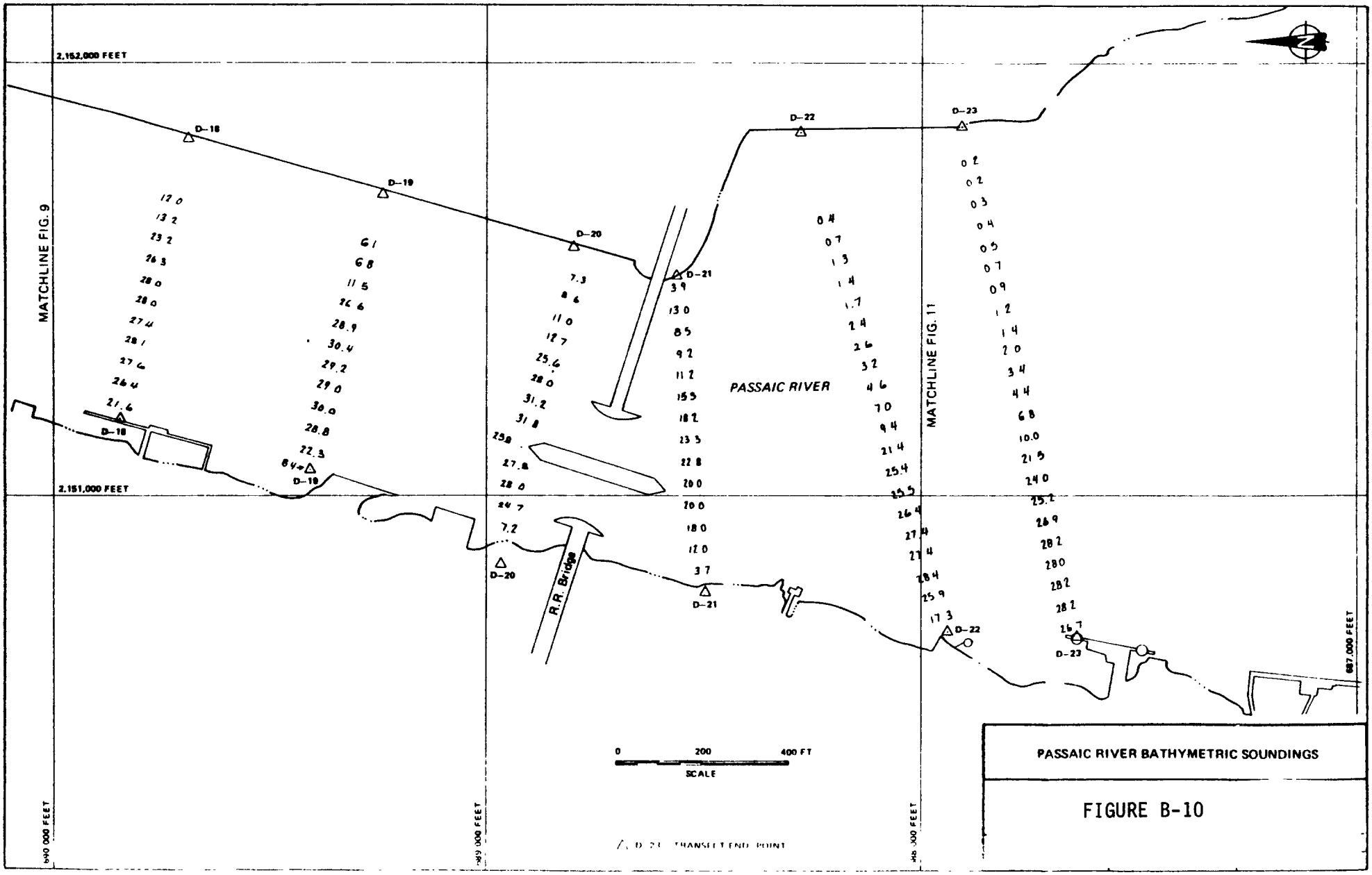
DEP\DA0004315



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-9

DEP\DA0004316



PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-10

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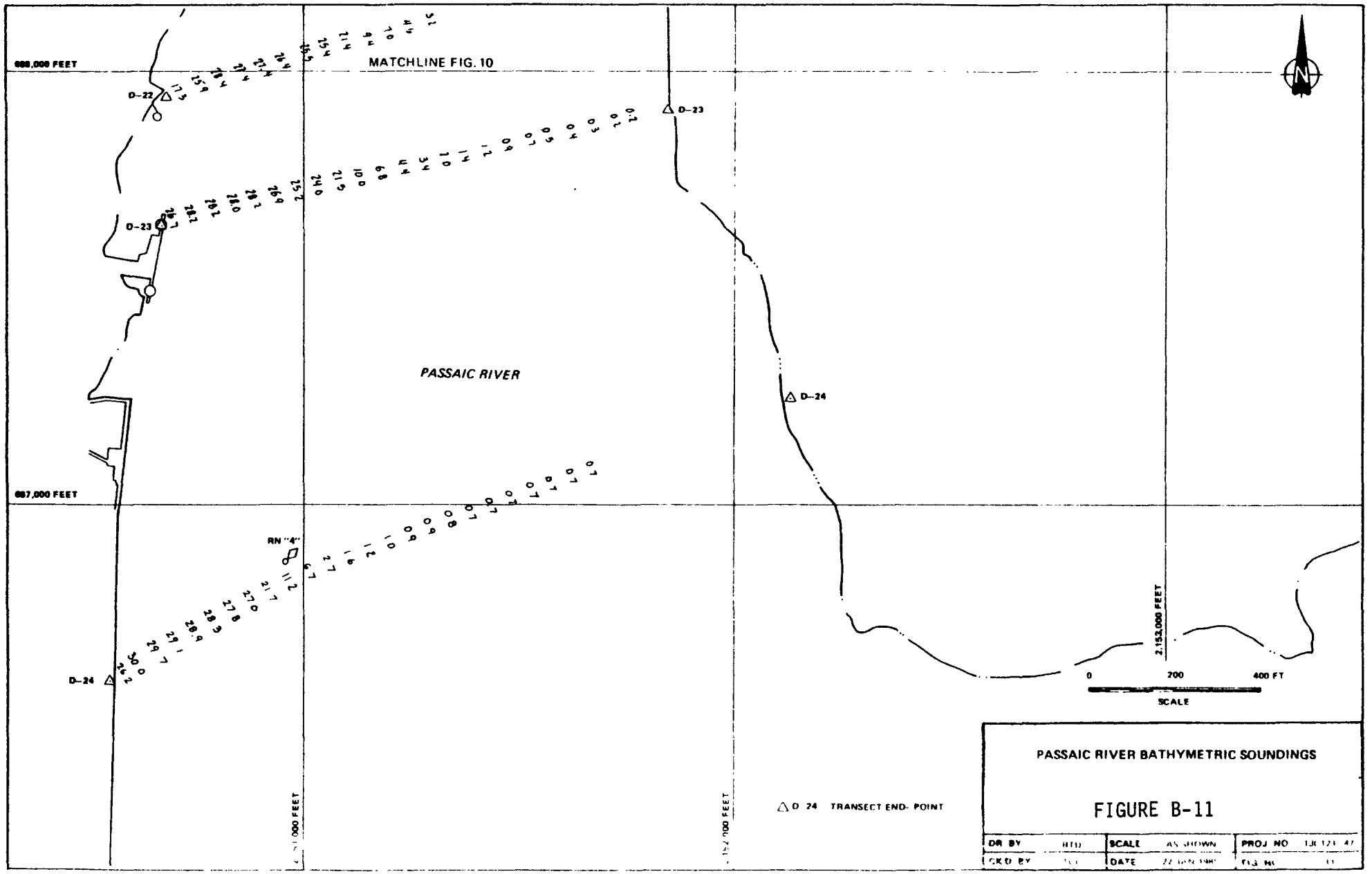

PASSAIC RIVER BATHYMETRIC SOUNDINGS

FIGURE B-11

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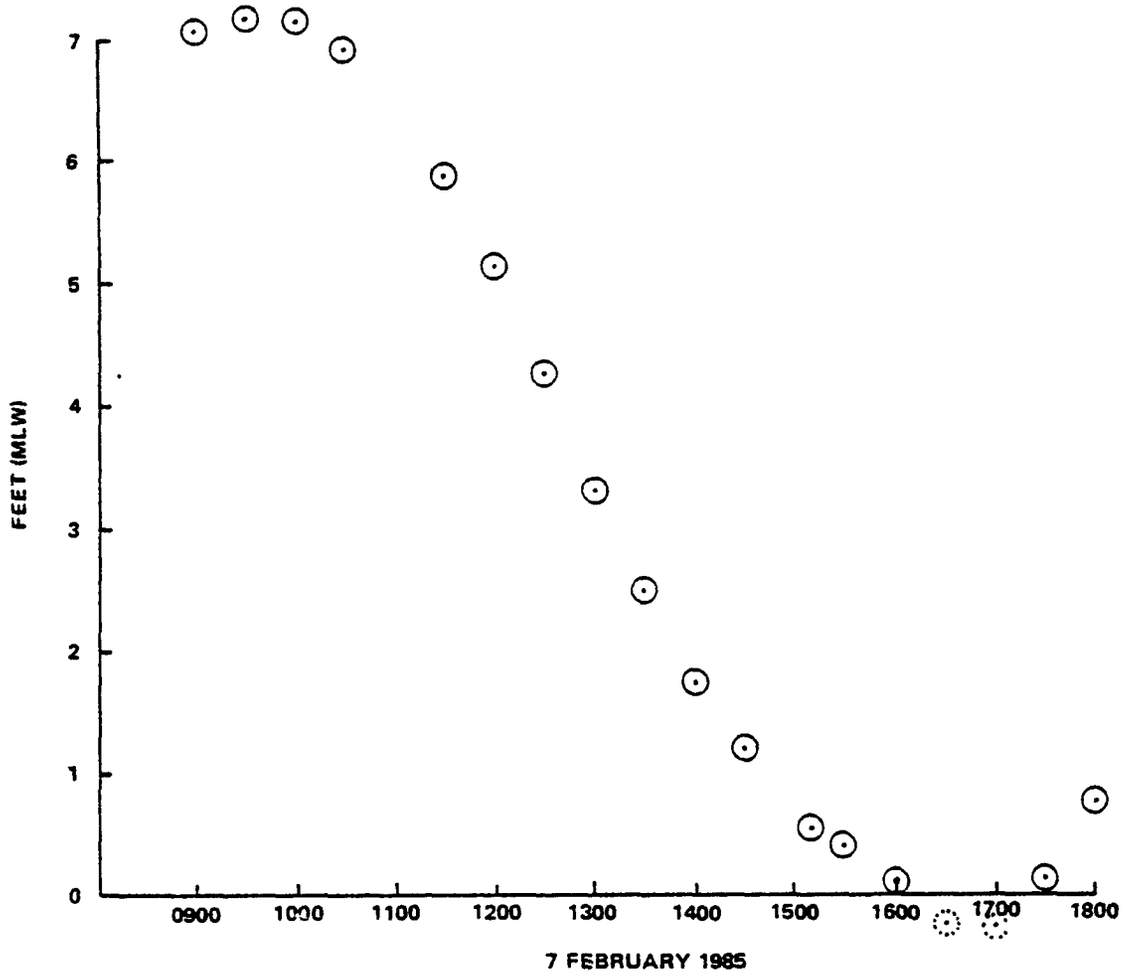
CKD BY	[illegible]	DATE	[illegible]	FIG NO	[illegible]

DEP\DA0004318



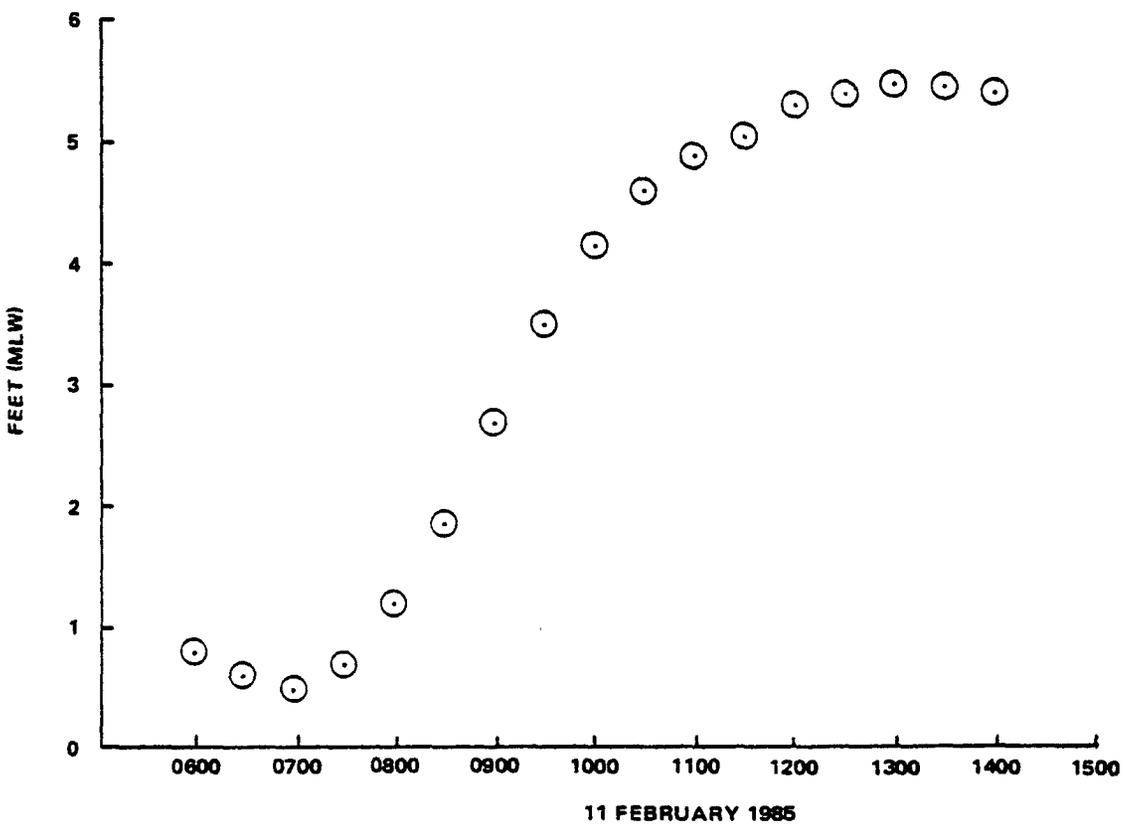
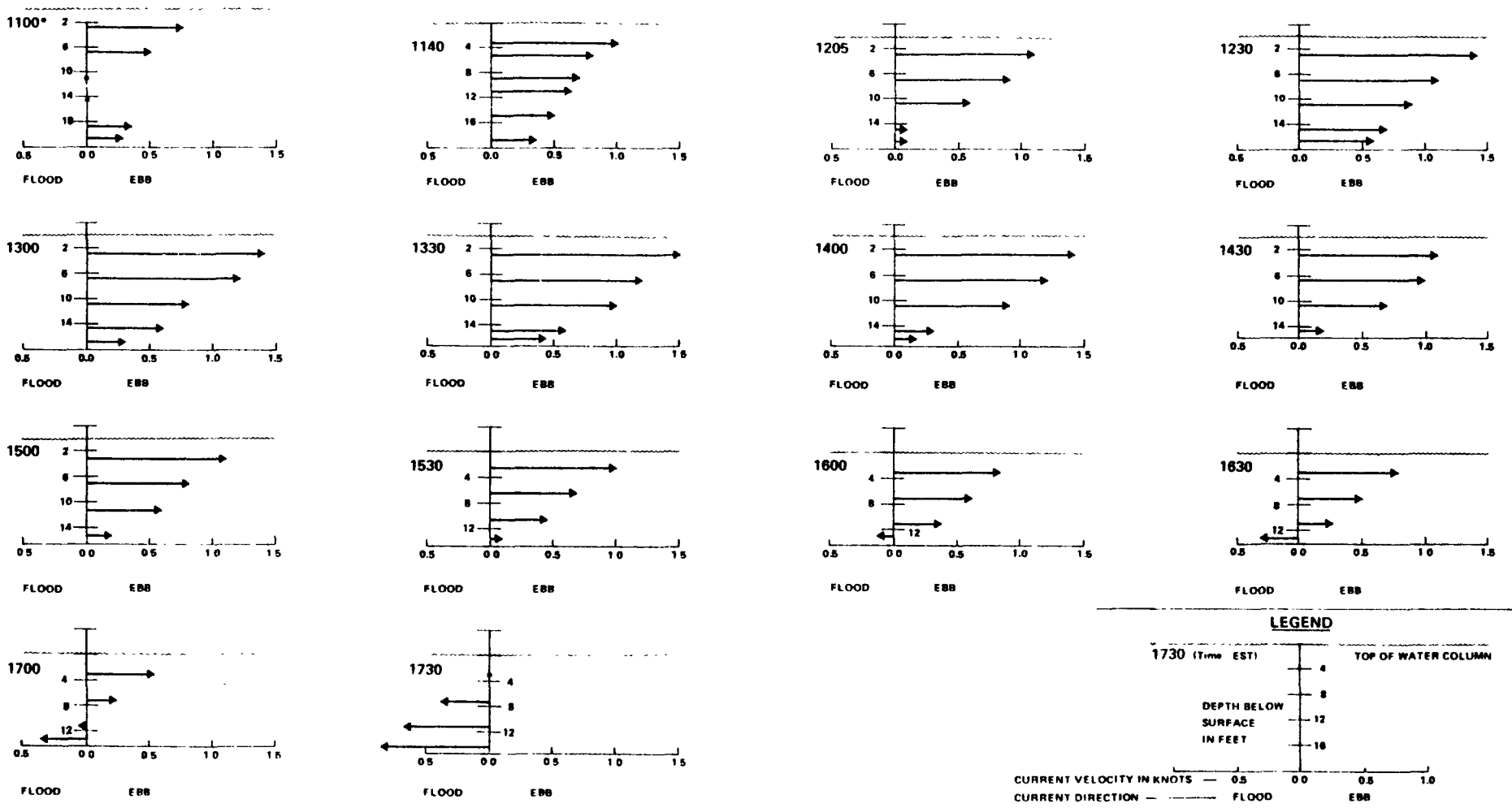


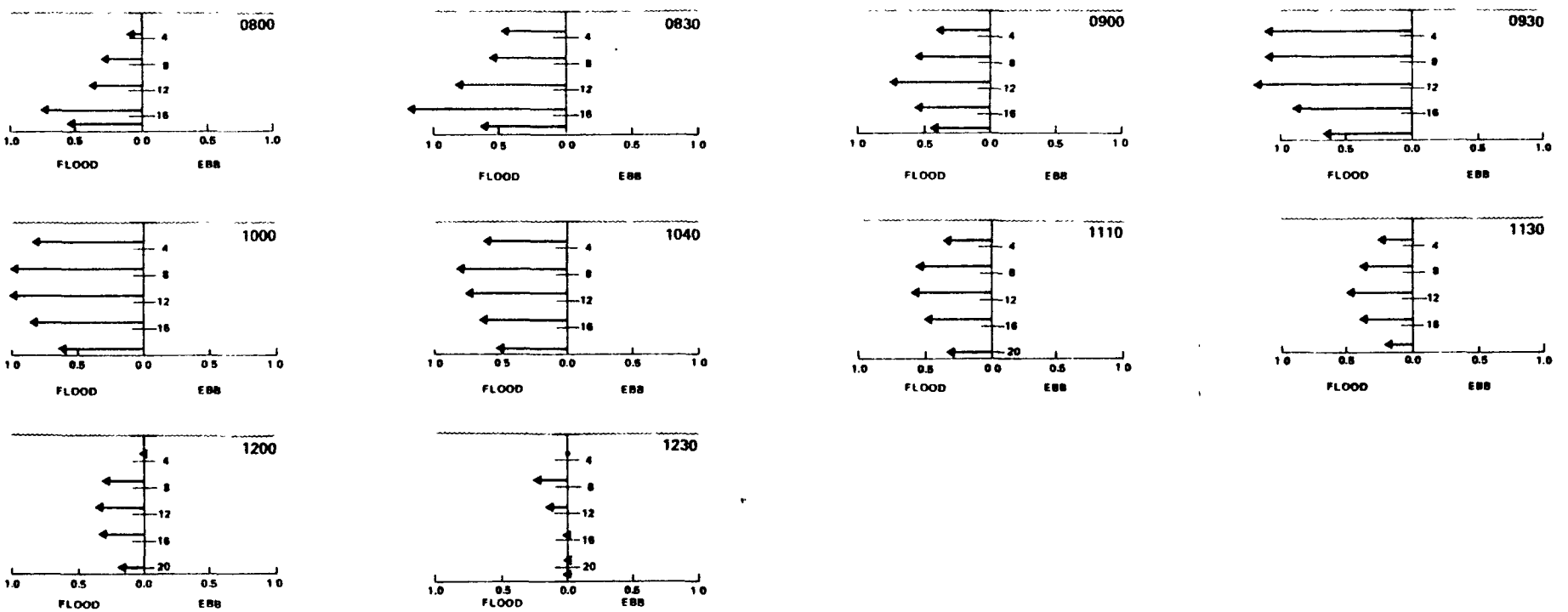
FIGURE B-12 **Passaic River Tidal Elevations recorded at the NJ Turnpike Bridge during the times of current velocity measuring. Values below 0.0 feet (MLW) are estimated.**



EBB CURRENT VELOCITIES (Knots) MEASURED ON 7 FEBRUARY 1985 AT STATION 0-9-2

FIGURE B-13

DEP\DA0004320



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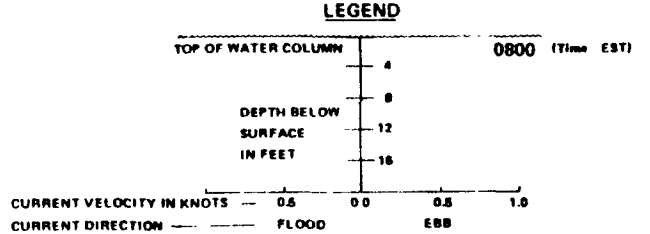


FLOOD CURRENT VELOCITIES (Knots) MEASURED ON 11 FEBRUARY 1985 AT STATION 0-9-2

FIGURE B-14

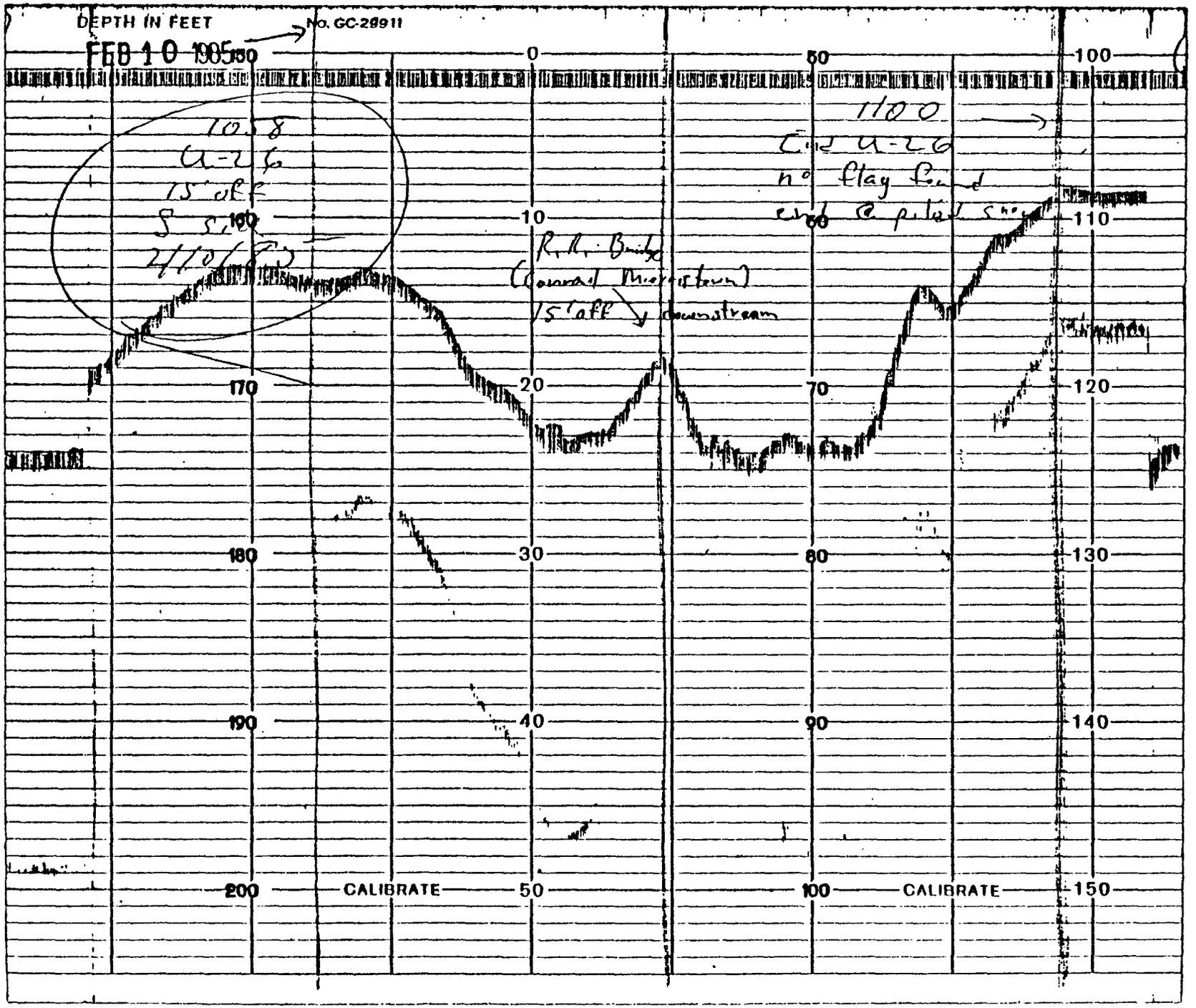
CKD BY | DATE 28 FEB 1985 | FIG NO 14

DEP\DA0004321

APPENDIX B

DATA

FATHOMETER RECORDINGS



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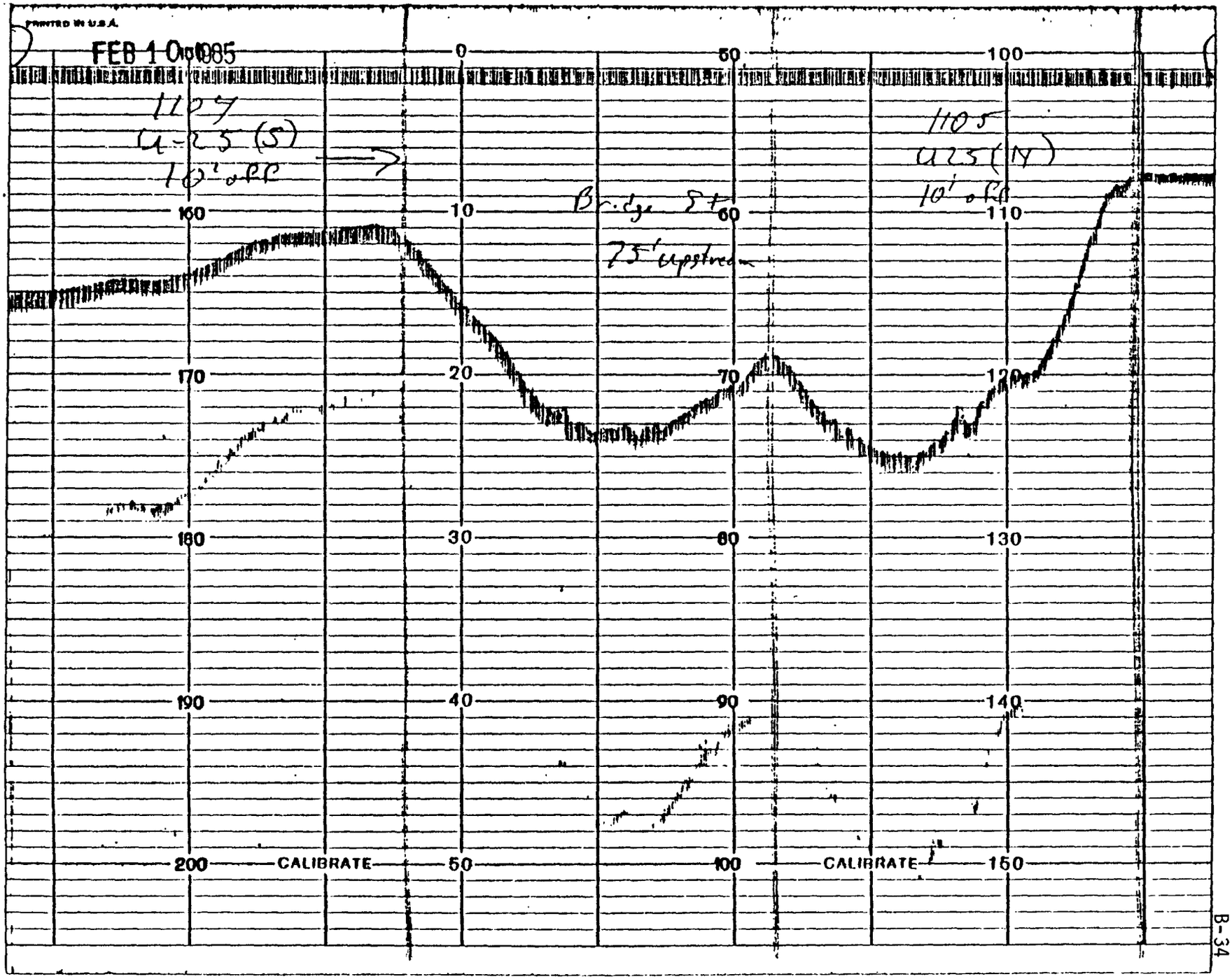

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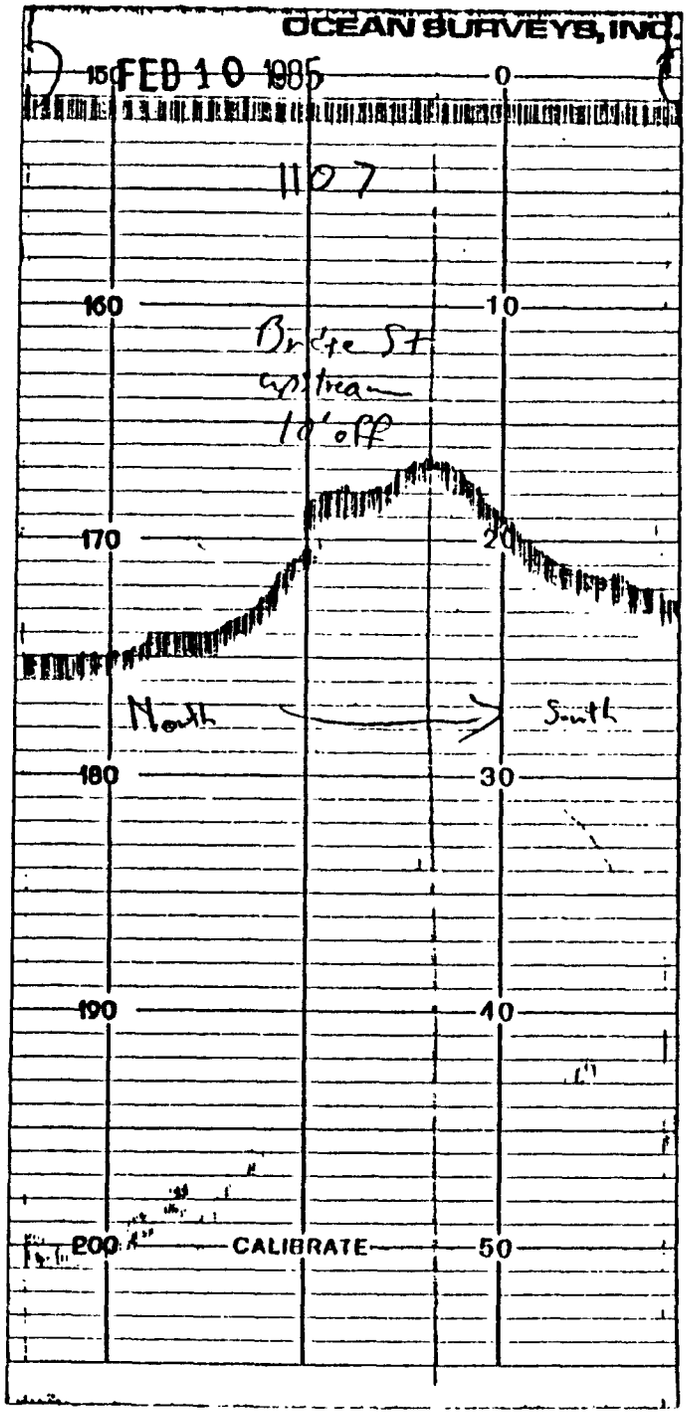

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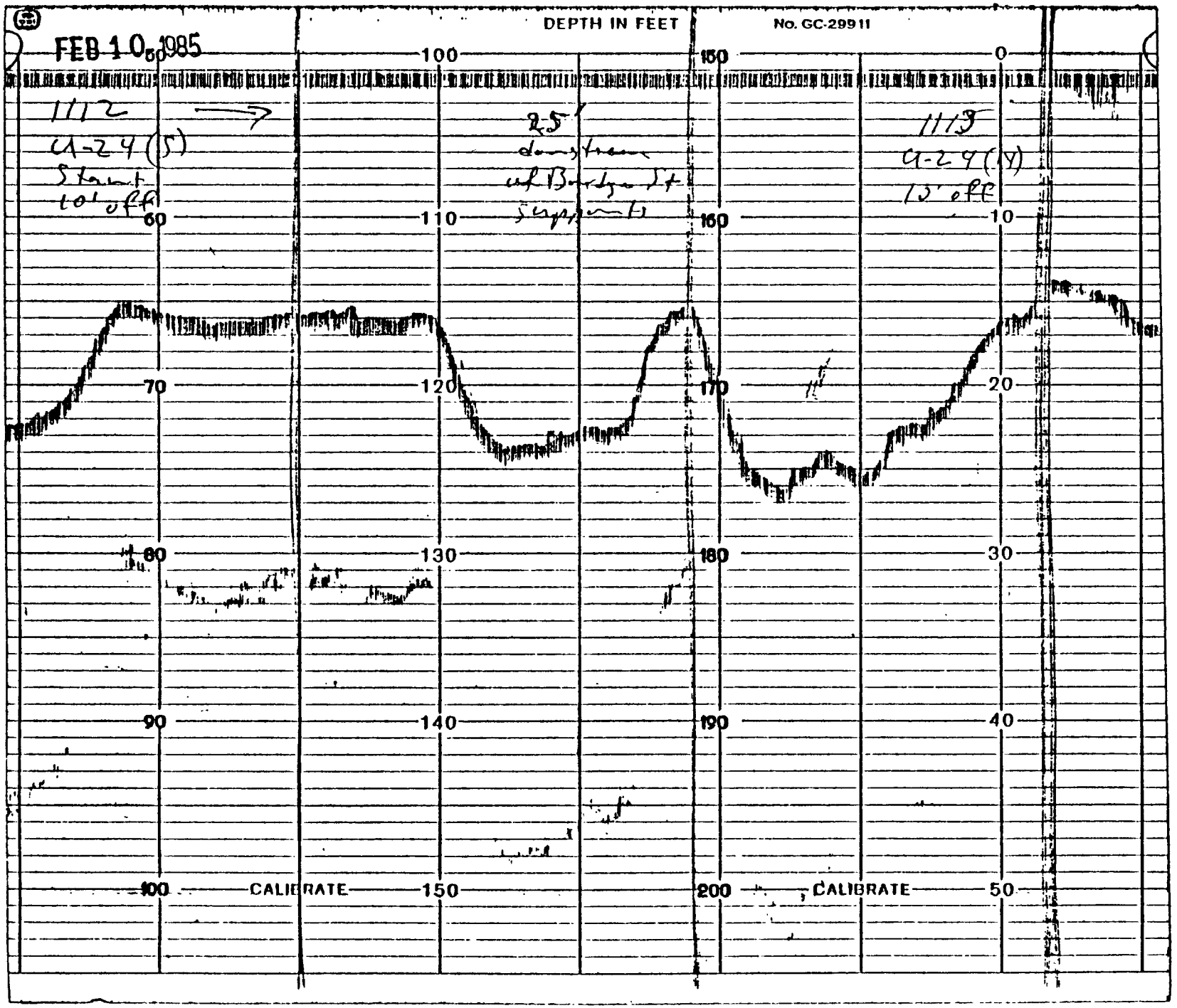

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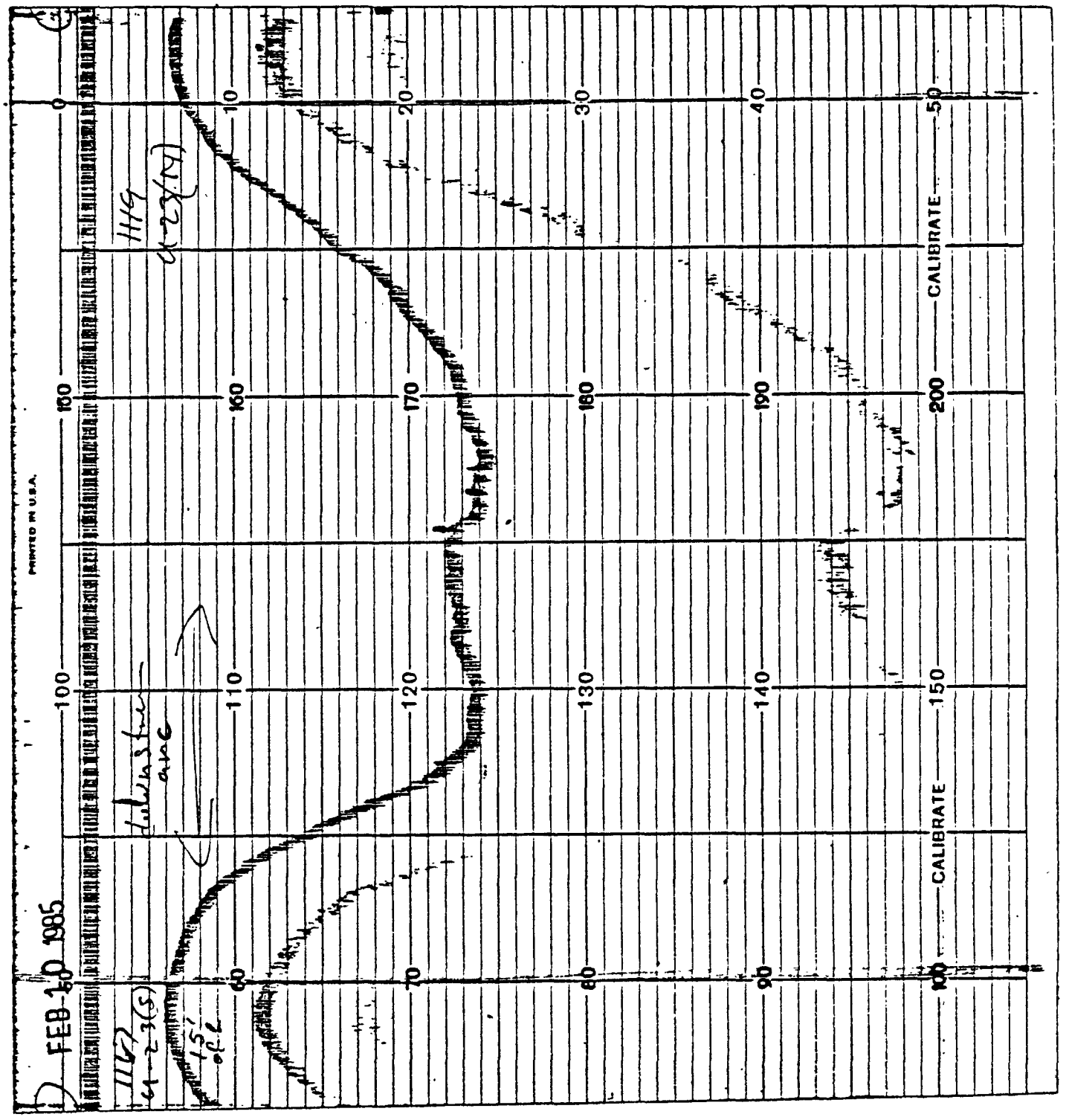
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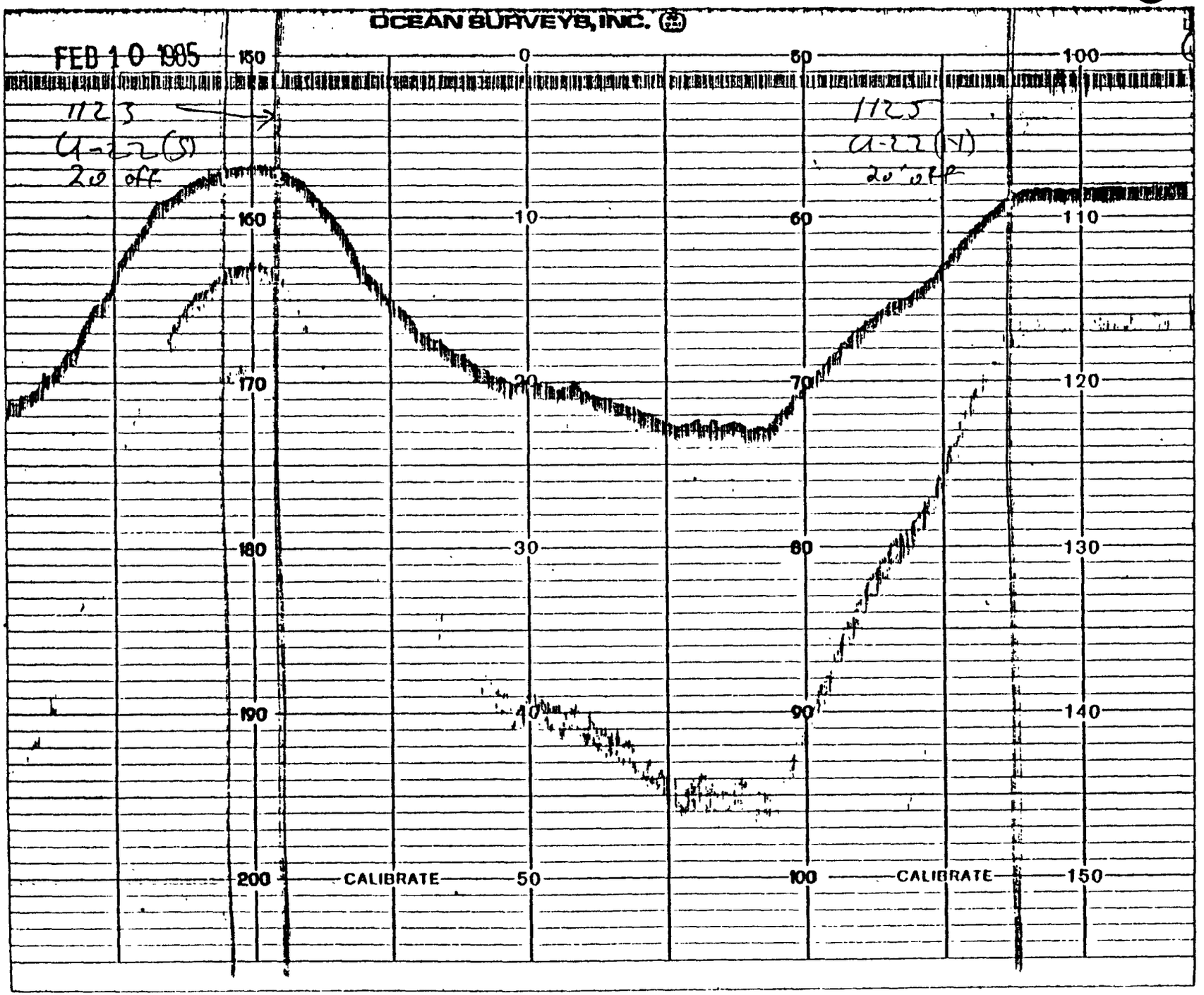
PRINTED IN U.S.A.
CALIBRATE
CALIBRATE



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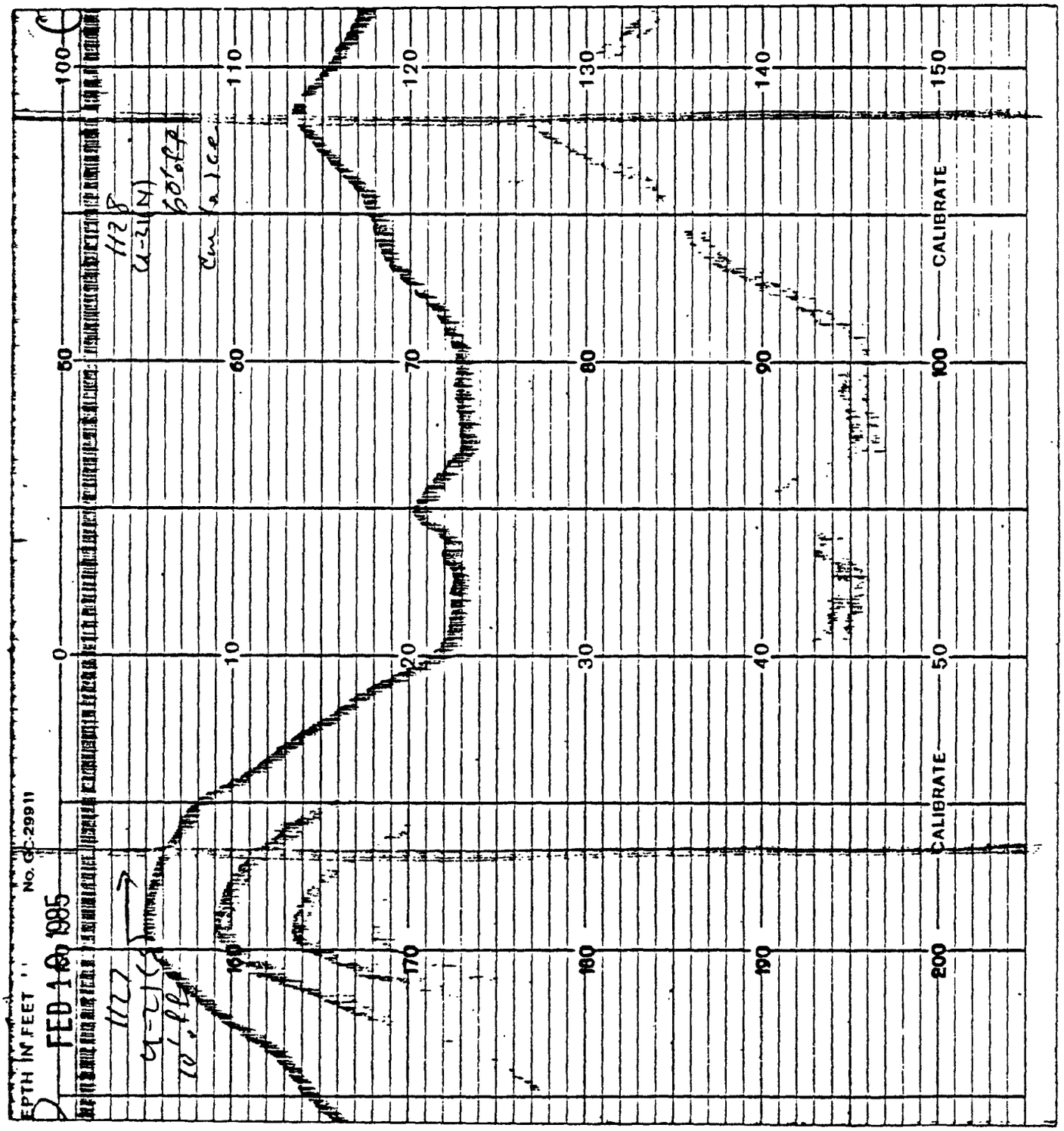
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FEB 10 1985
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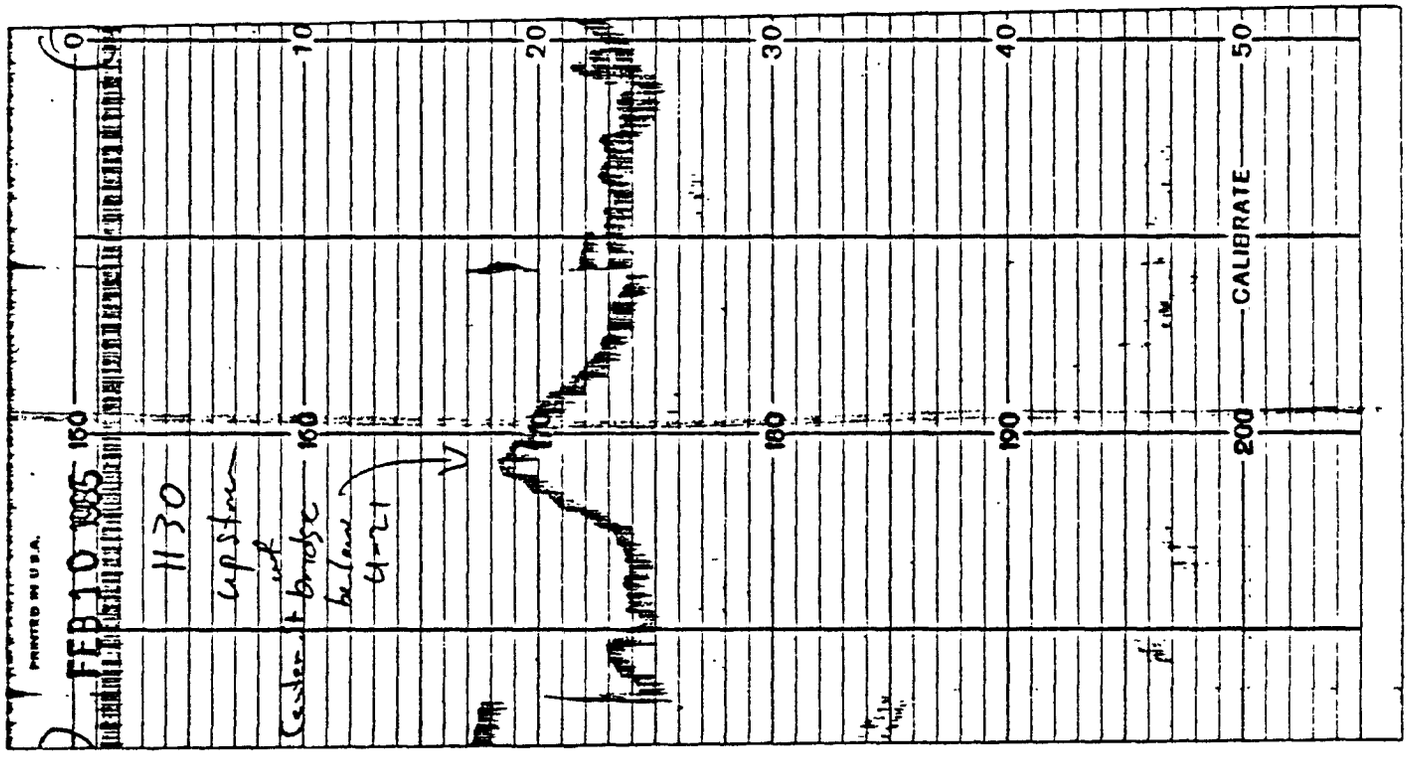
PRINTED IN U.S.A.
FEB 10 1985
1130
upstream
at
Center of bridge
below
4-21
0
10
20
30
40
50
150
160
170
180
190
200
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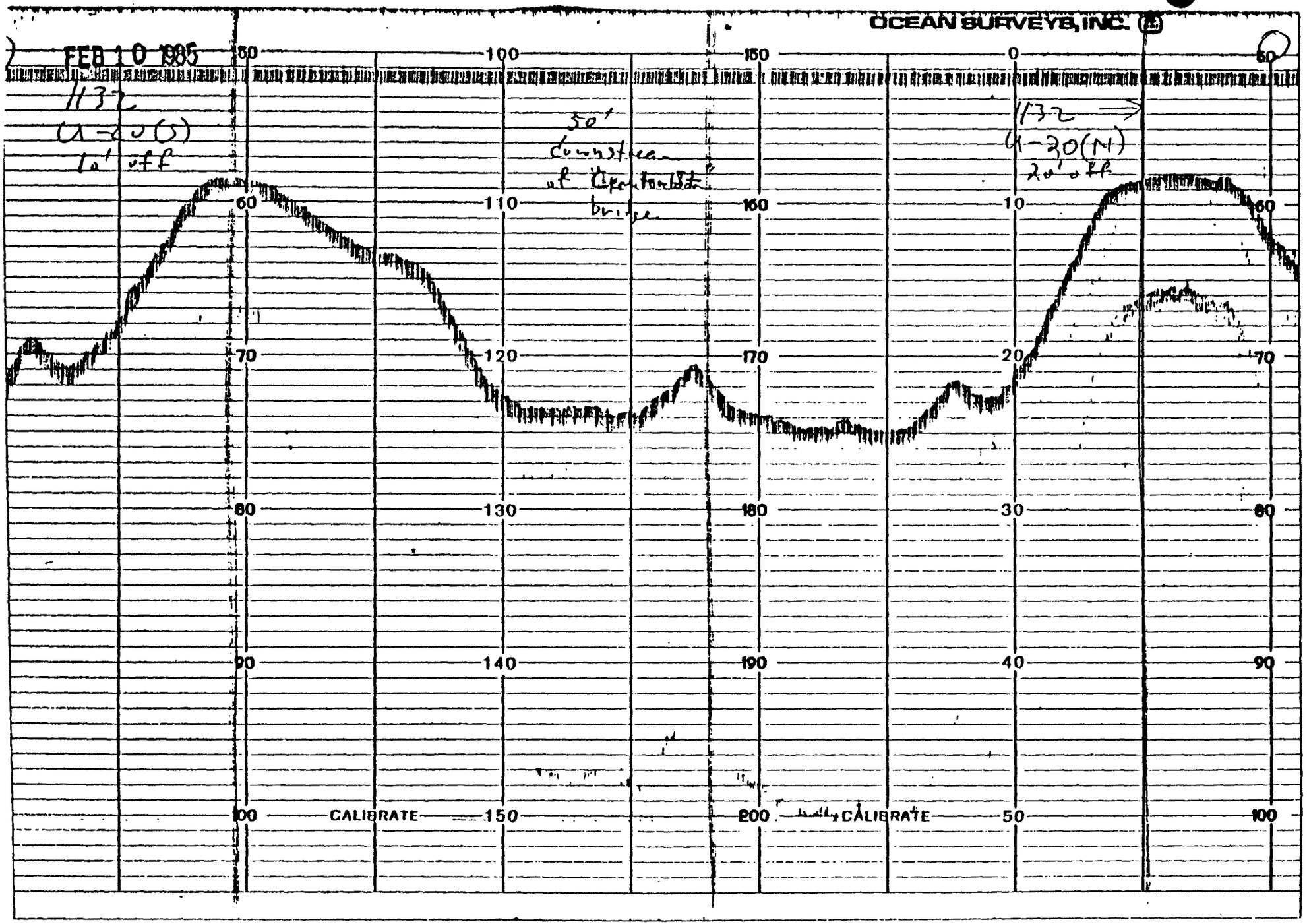

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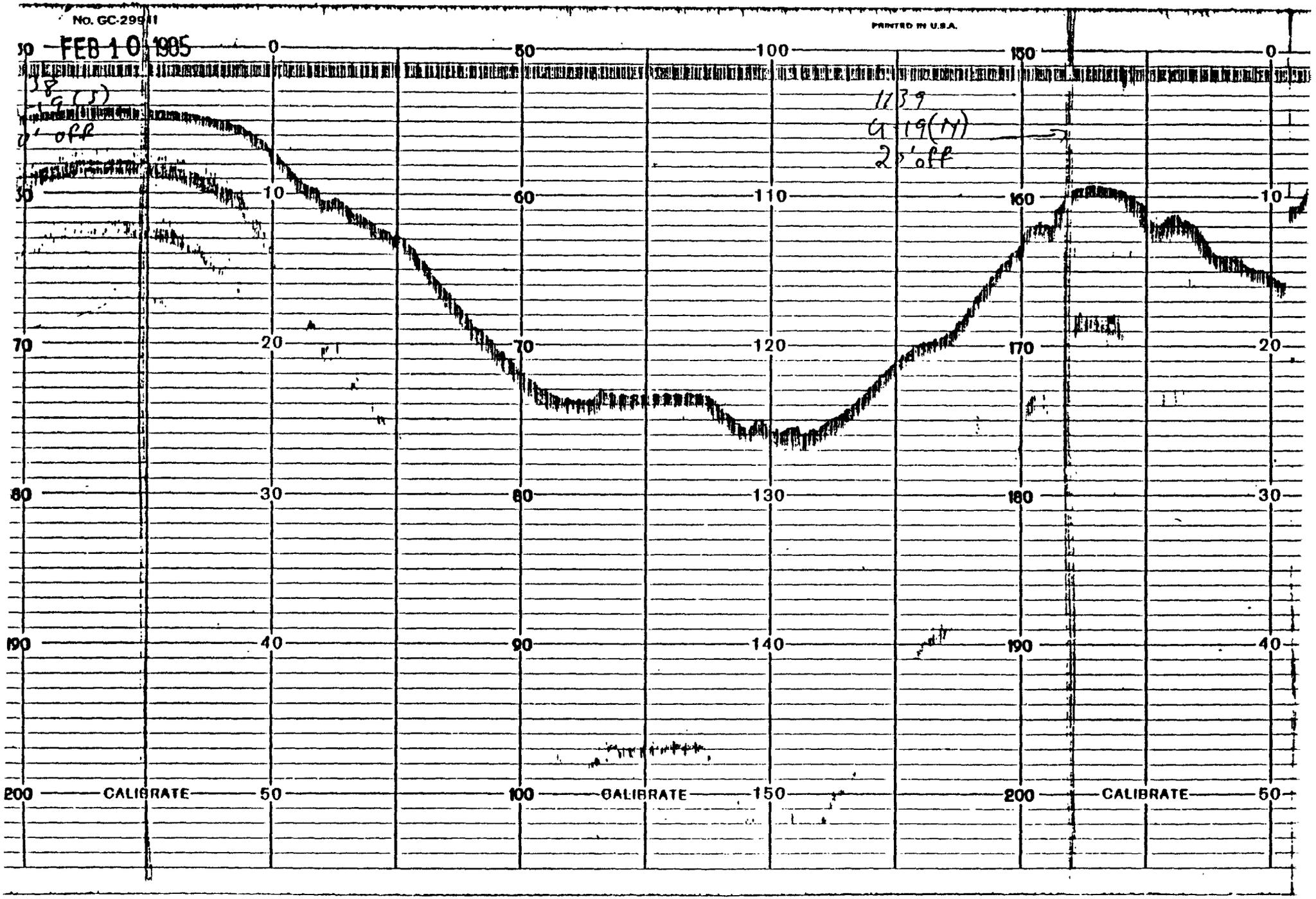

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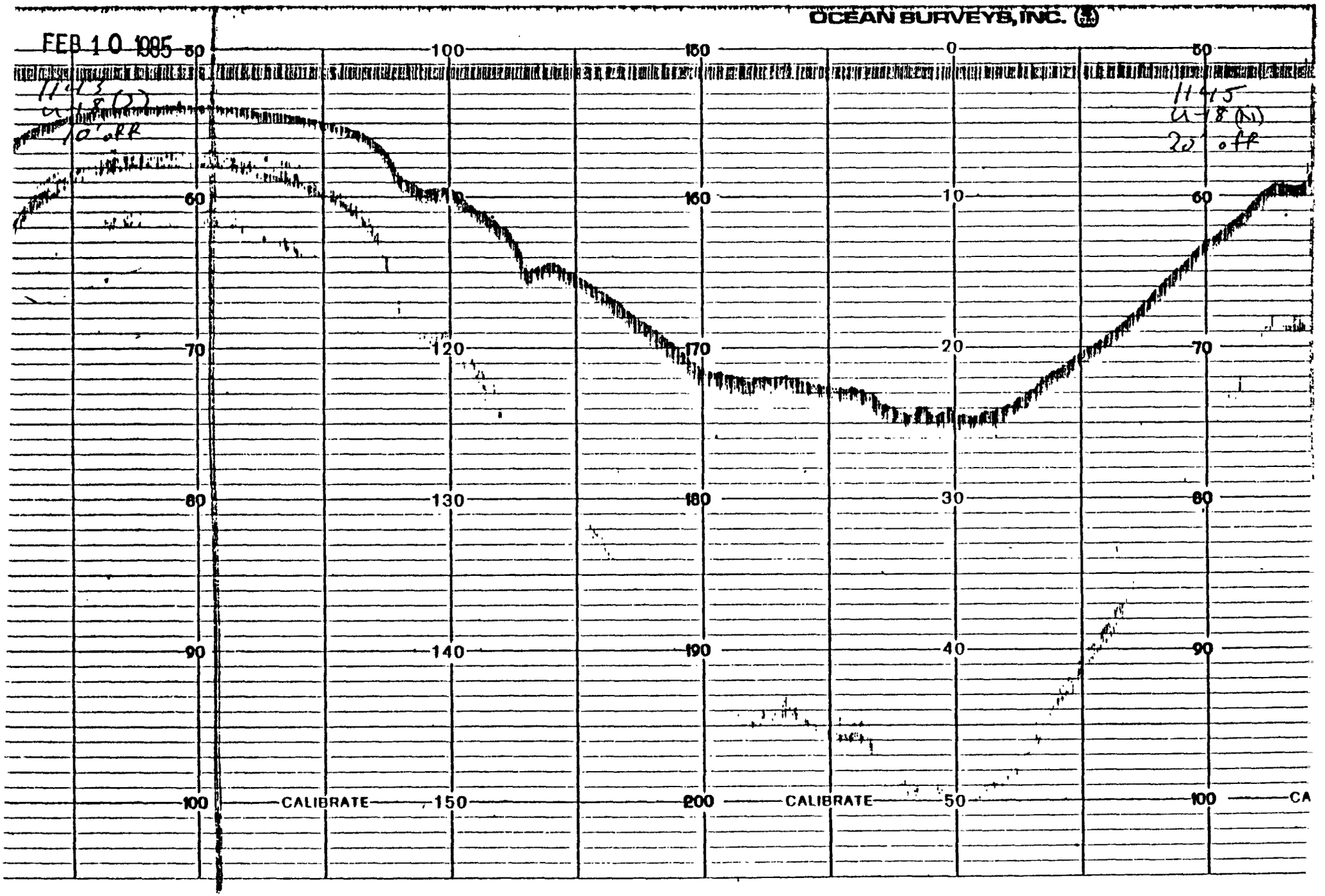

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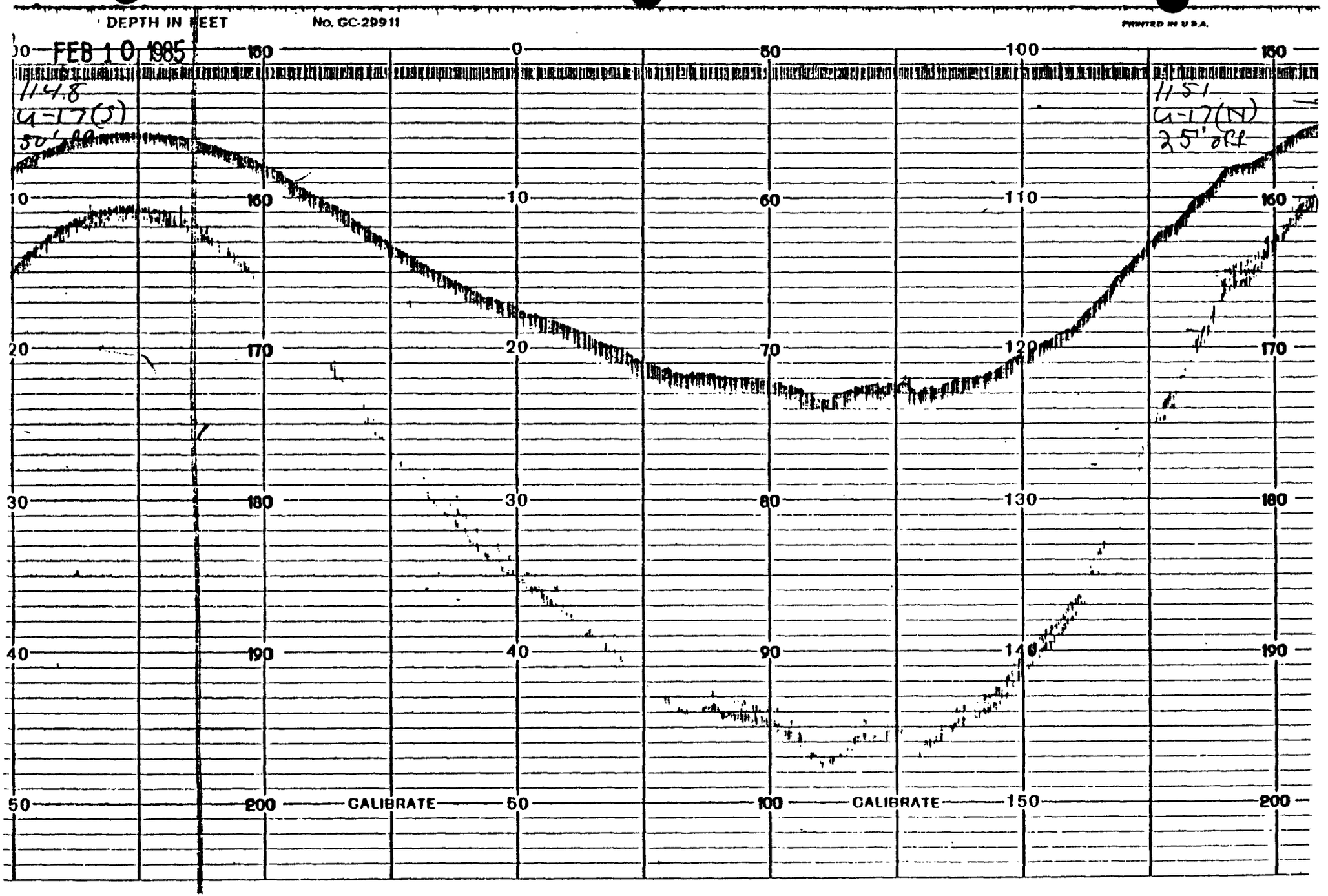

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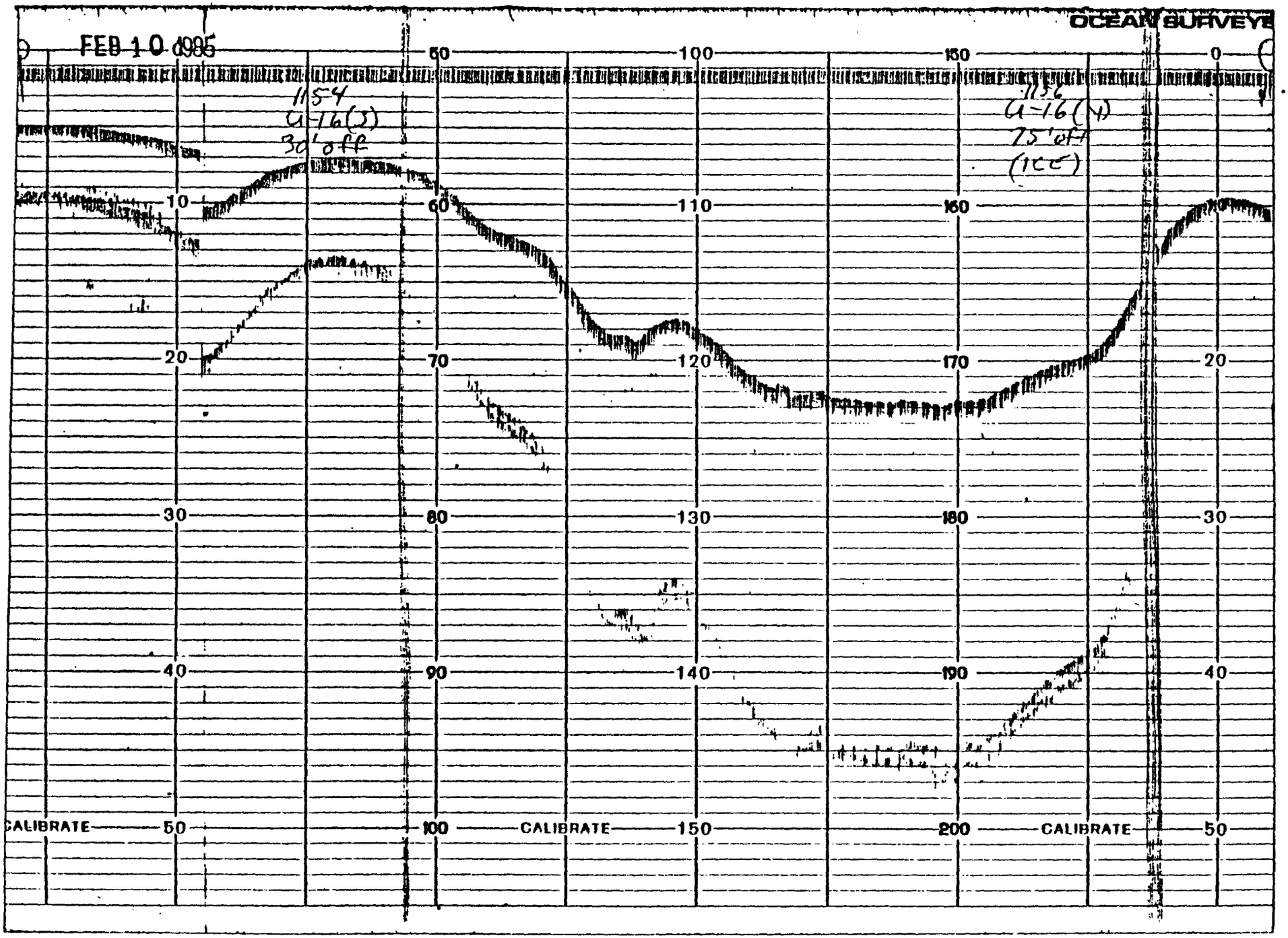

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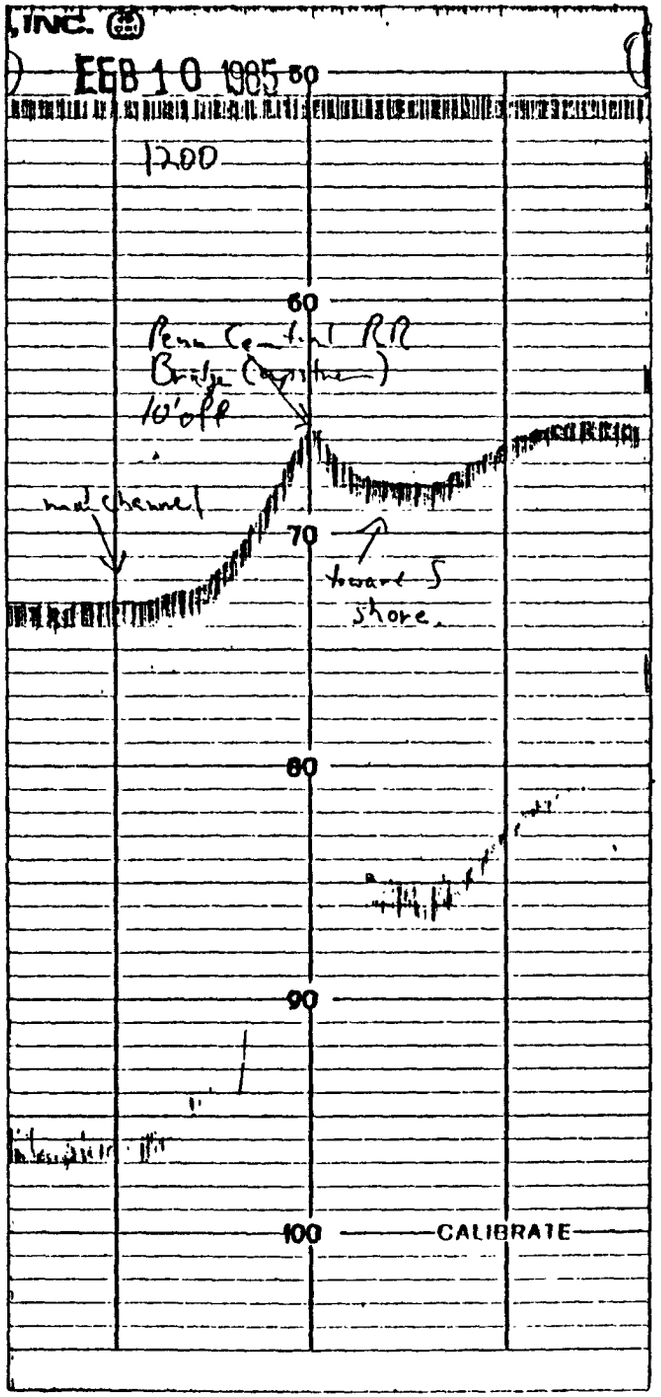

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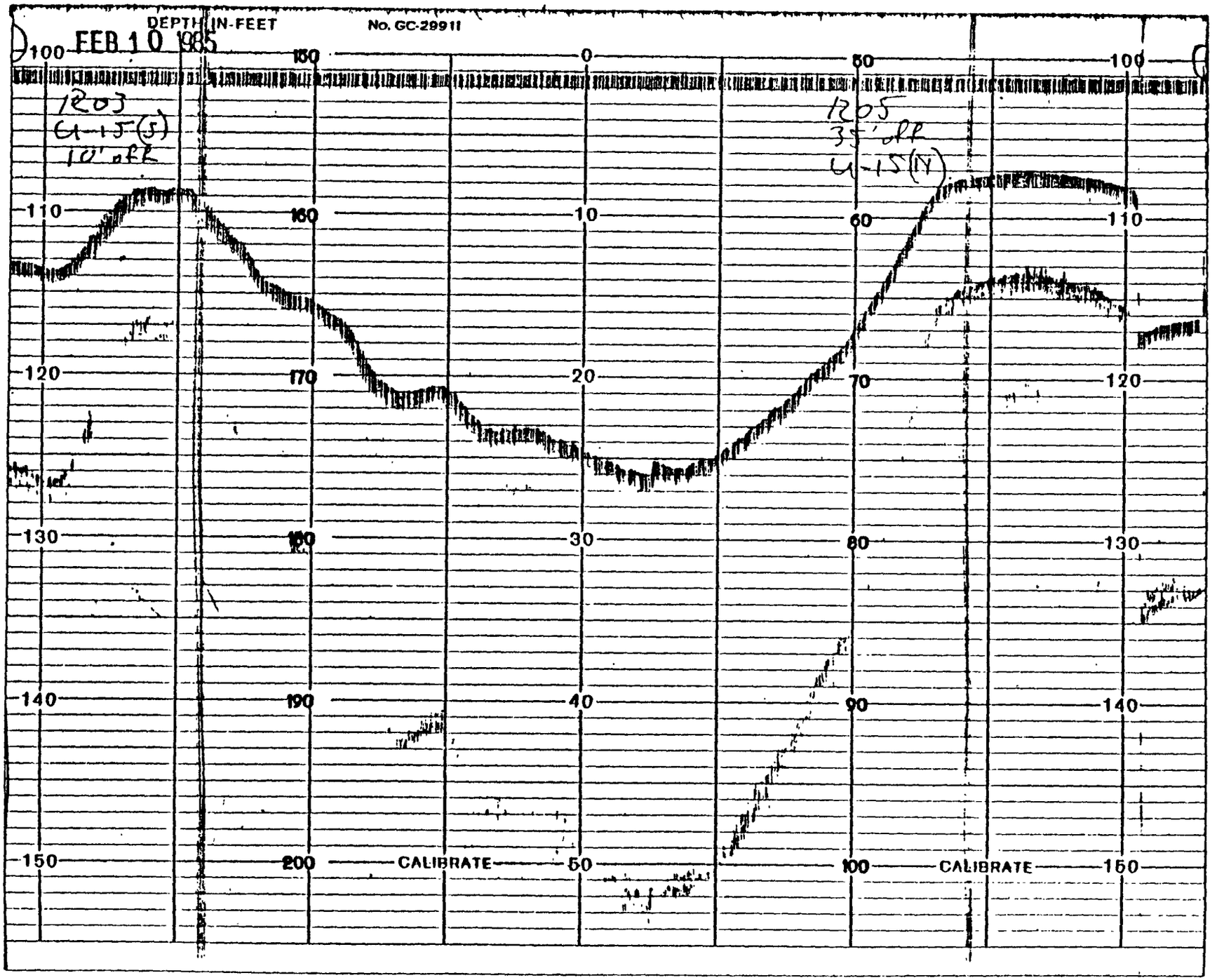

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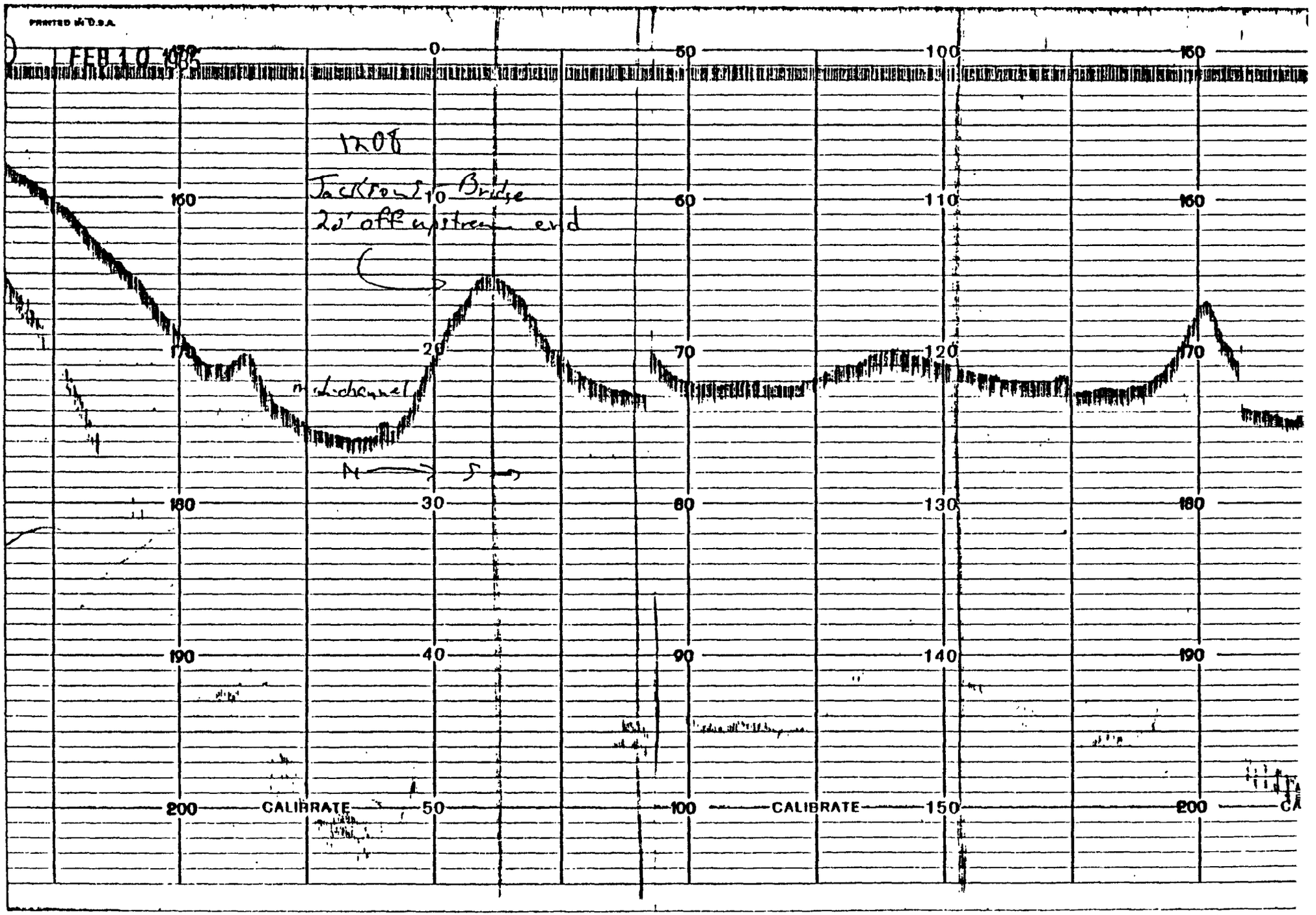

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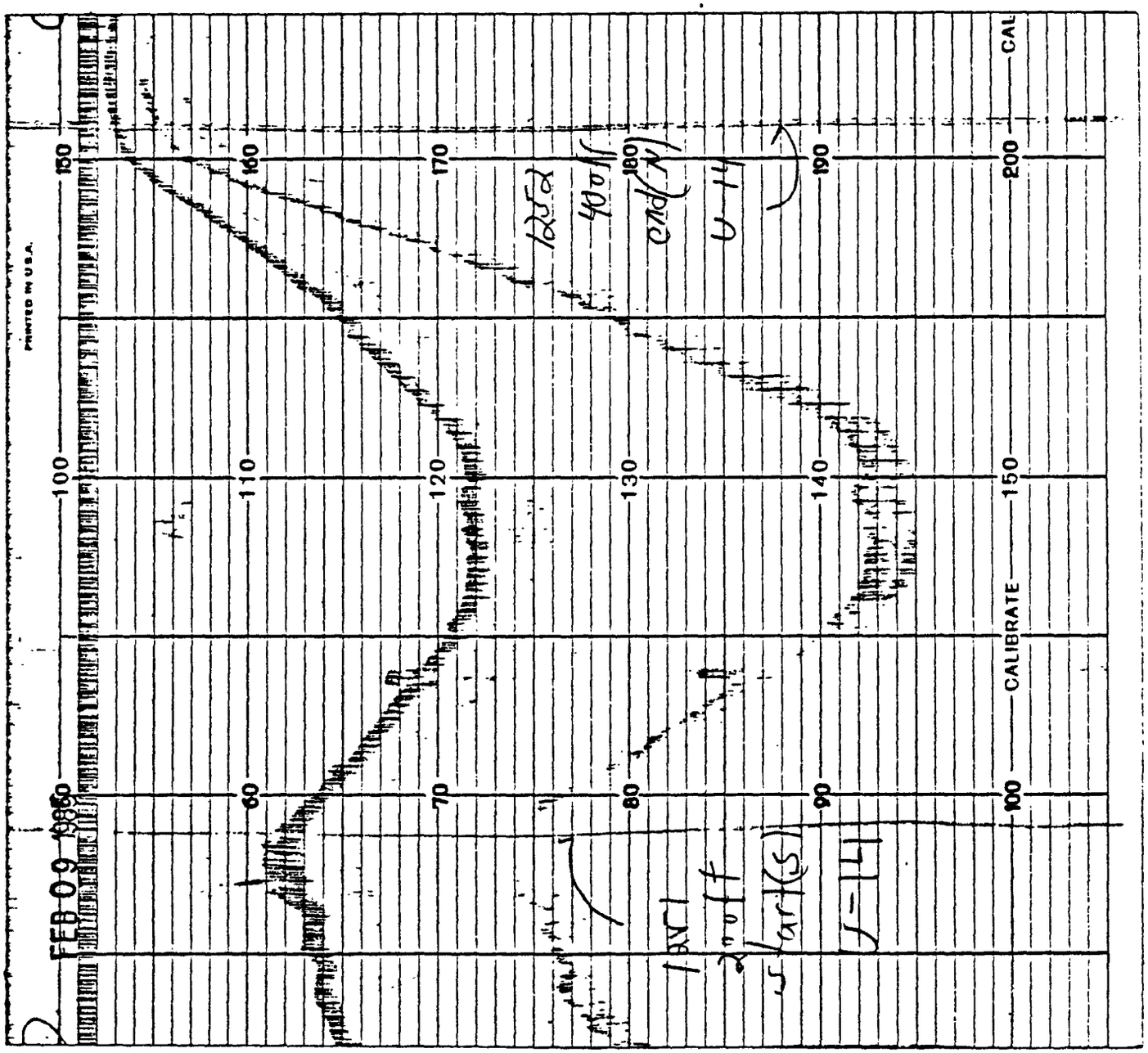
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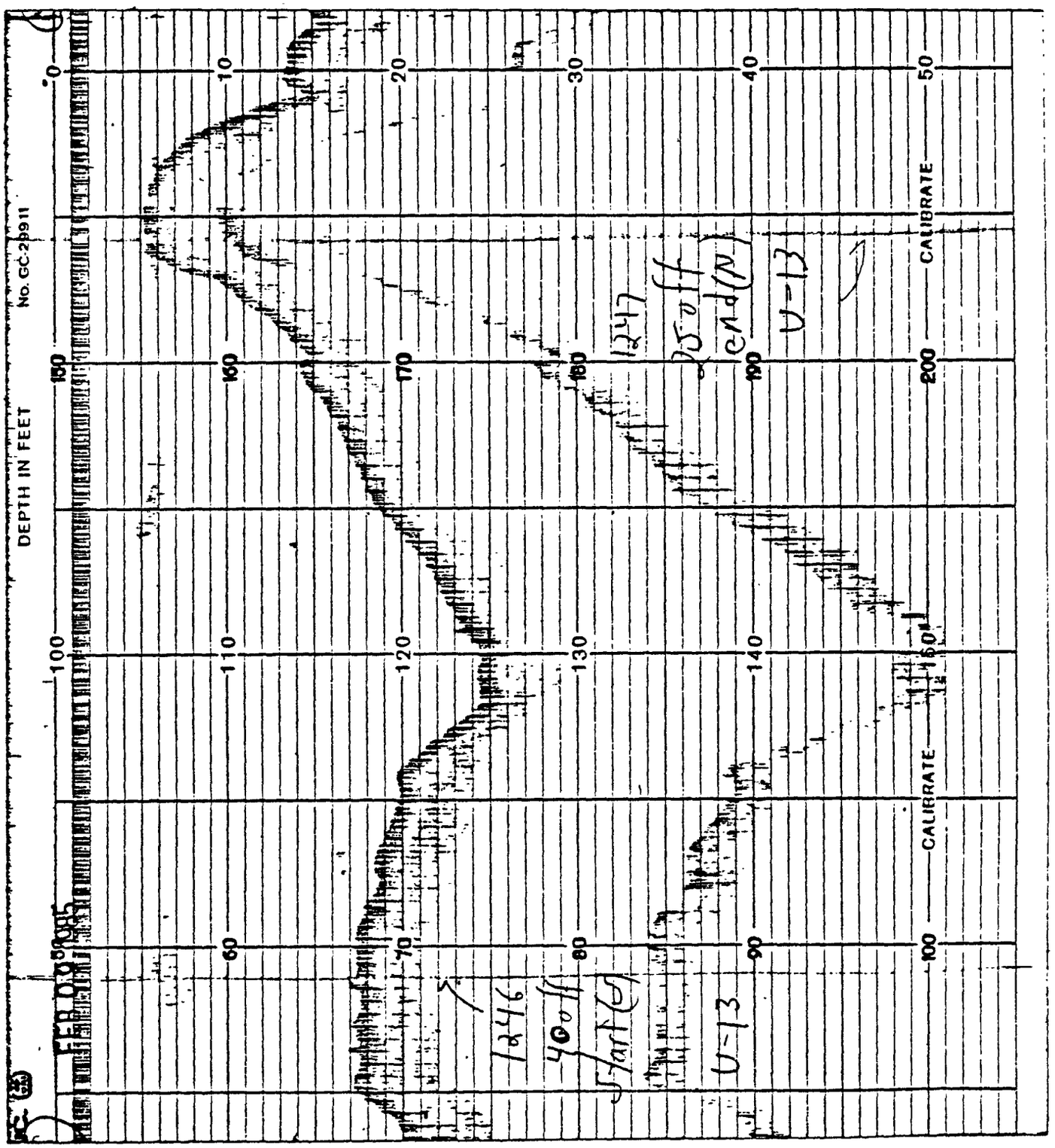
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FEB 09 1985
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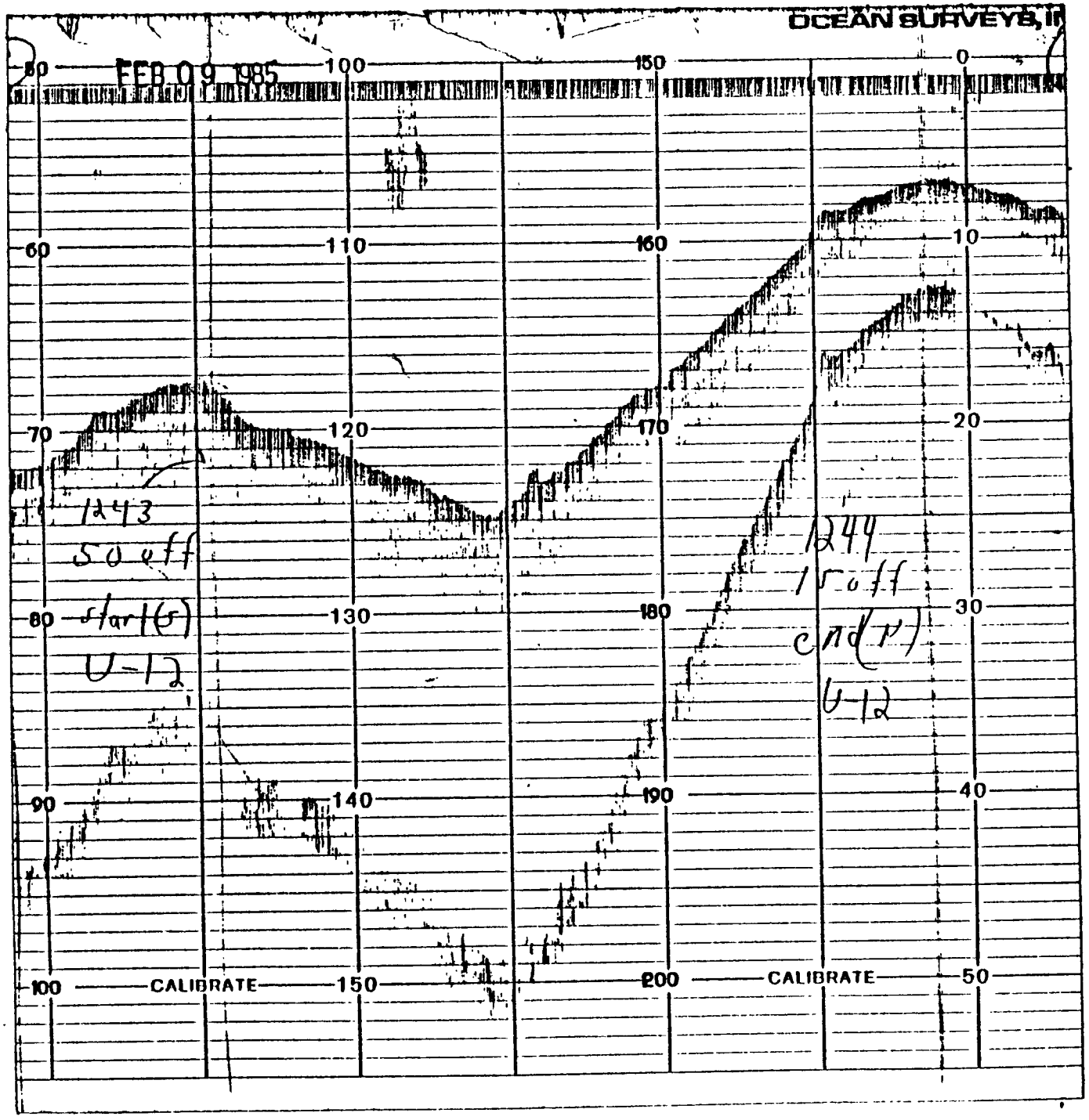
Started
U-13
1247
25 off
ended
U-13



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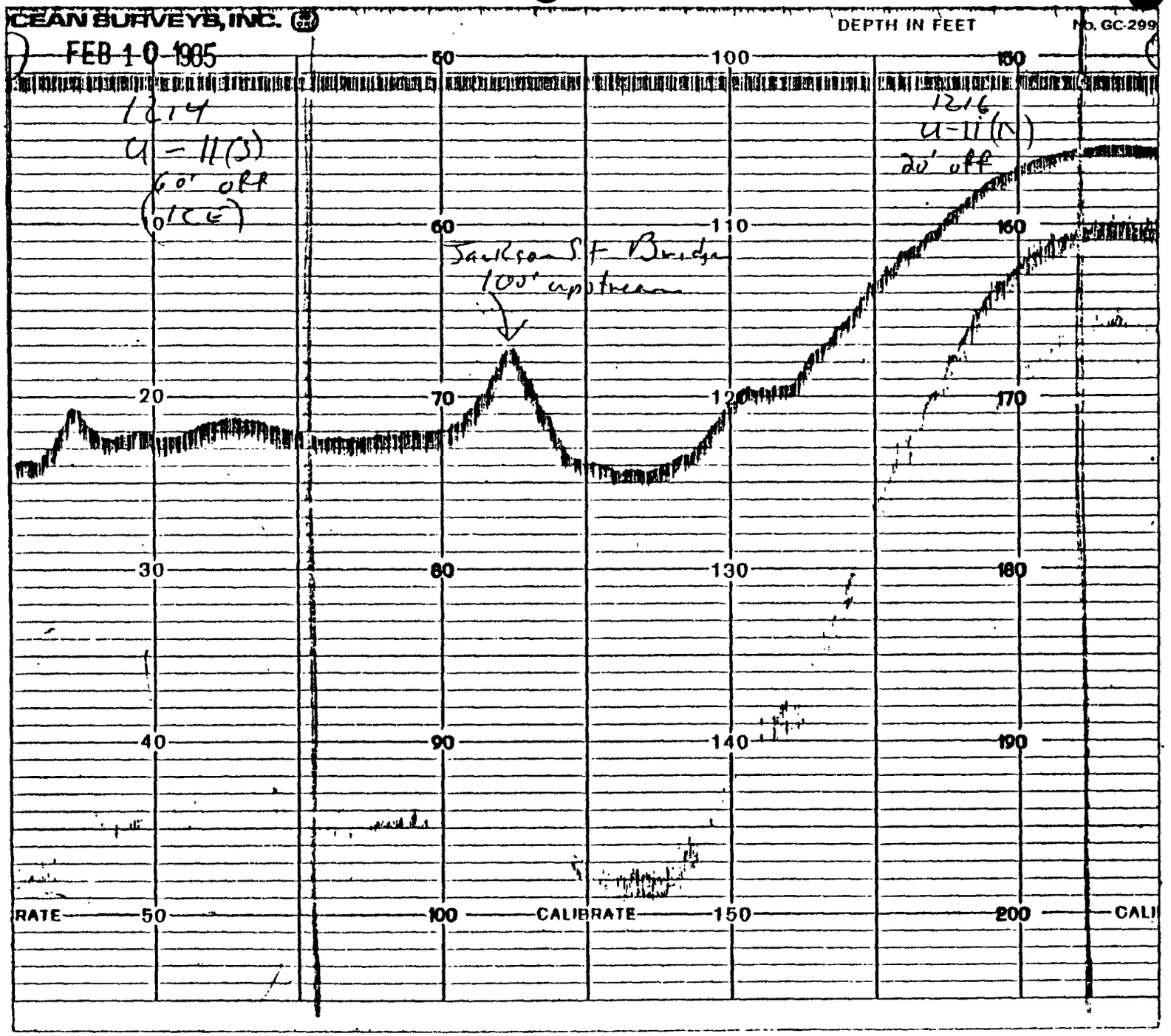

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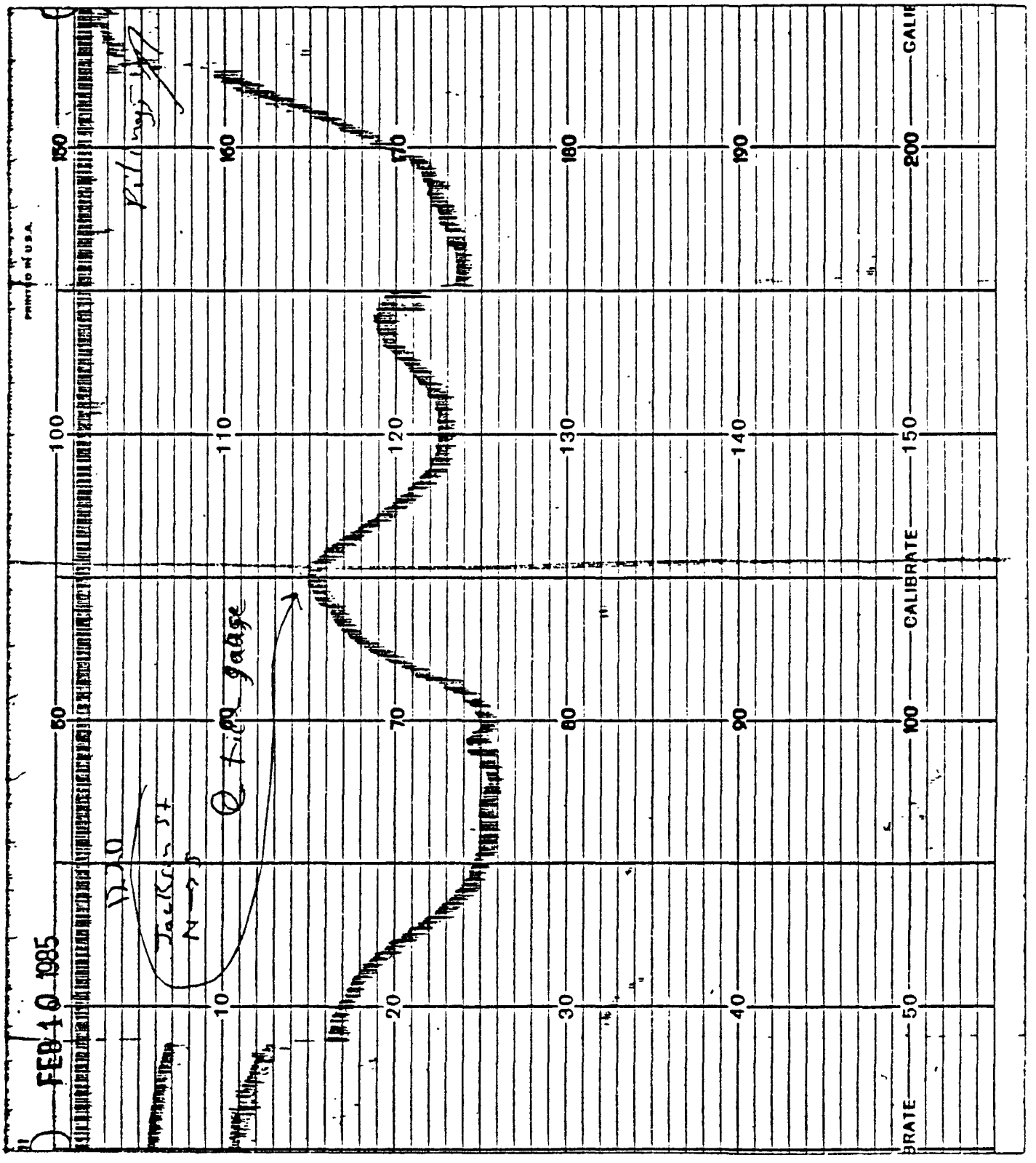
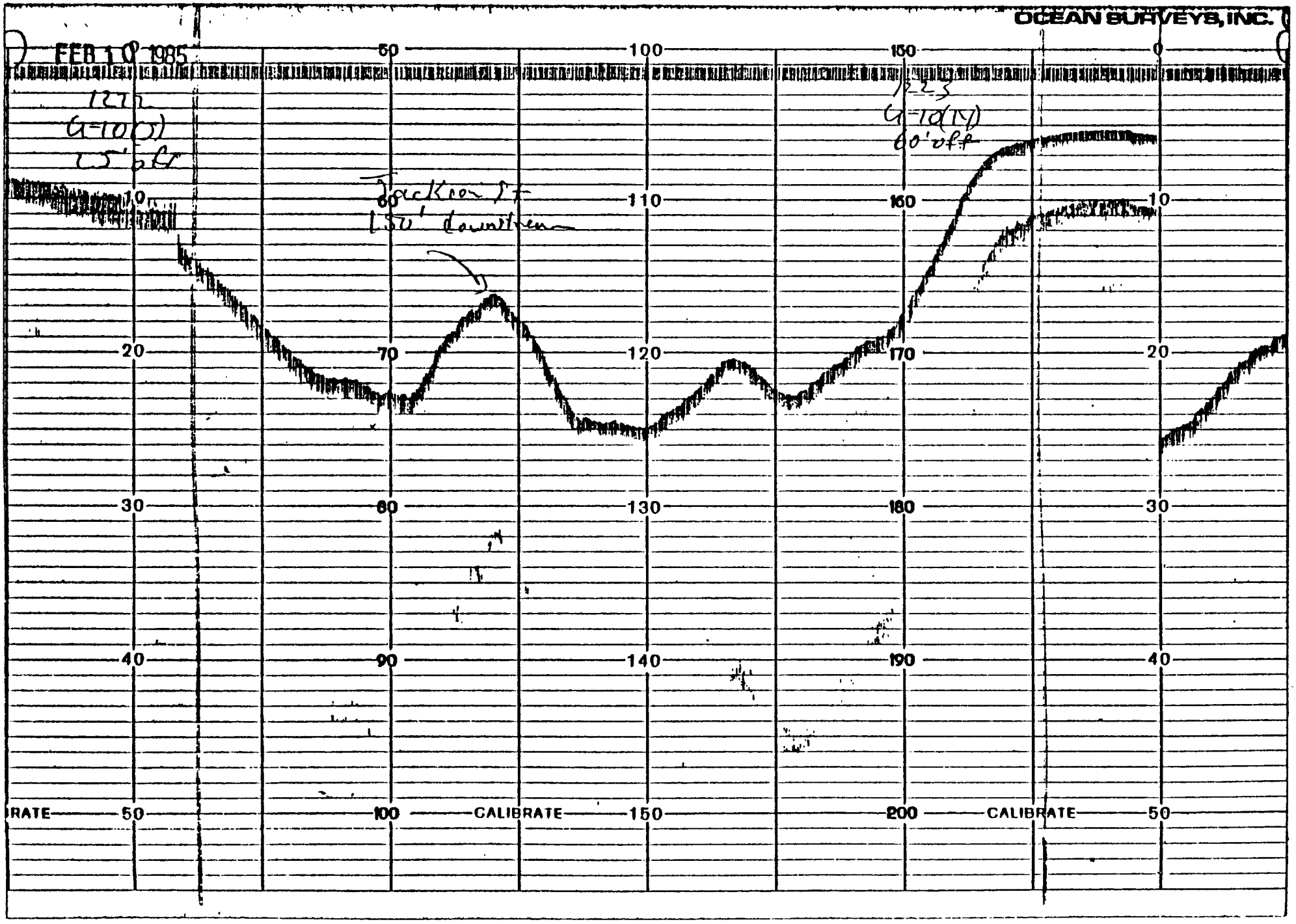

FEB 10 1985
CALIBRATE
CALIBRATE
Piling
Jackson St
N → S
Ø tile gauge
PRINTED IN U.S.A.



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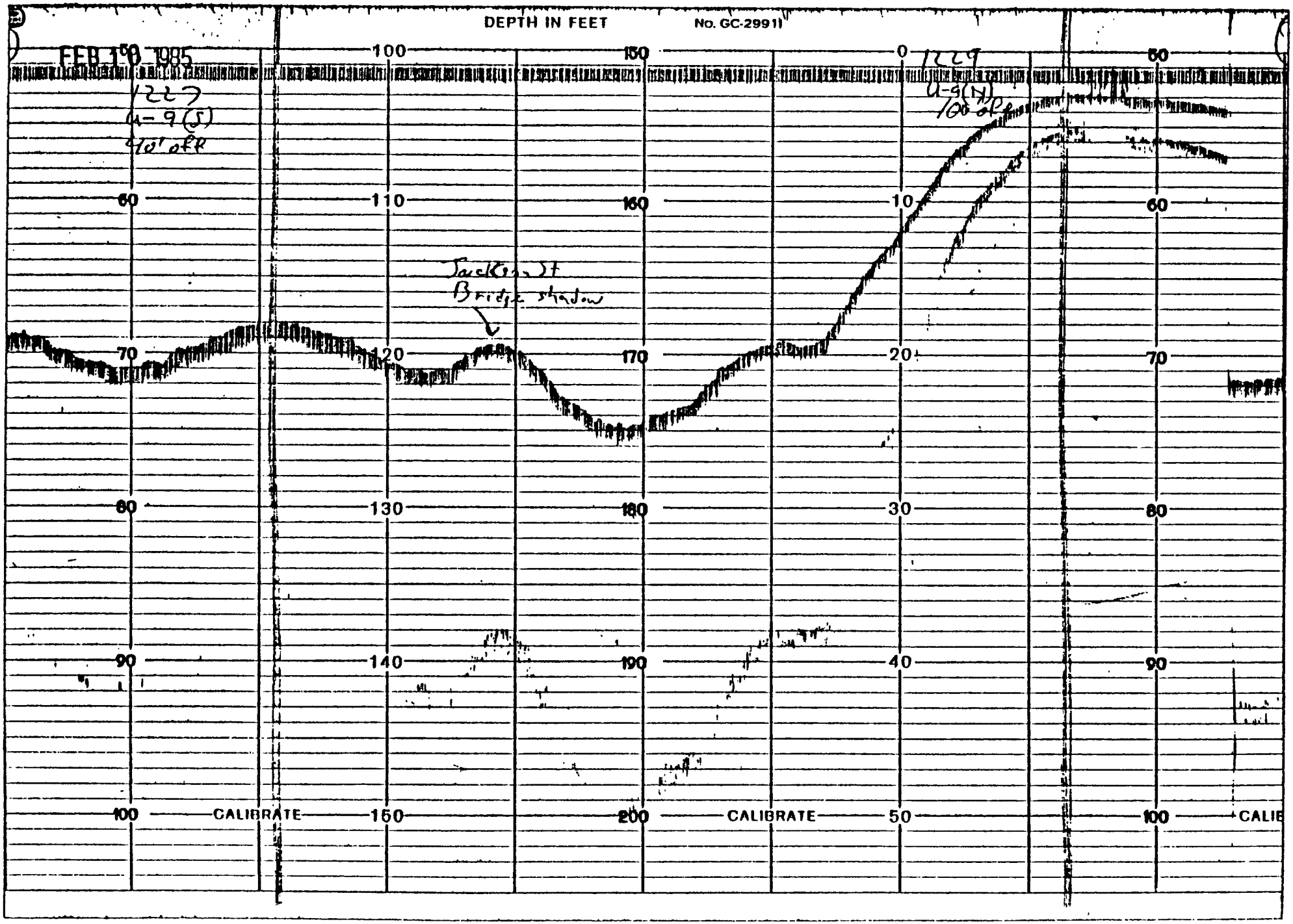

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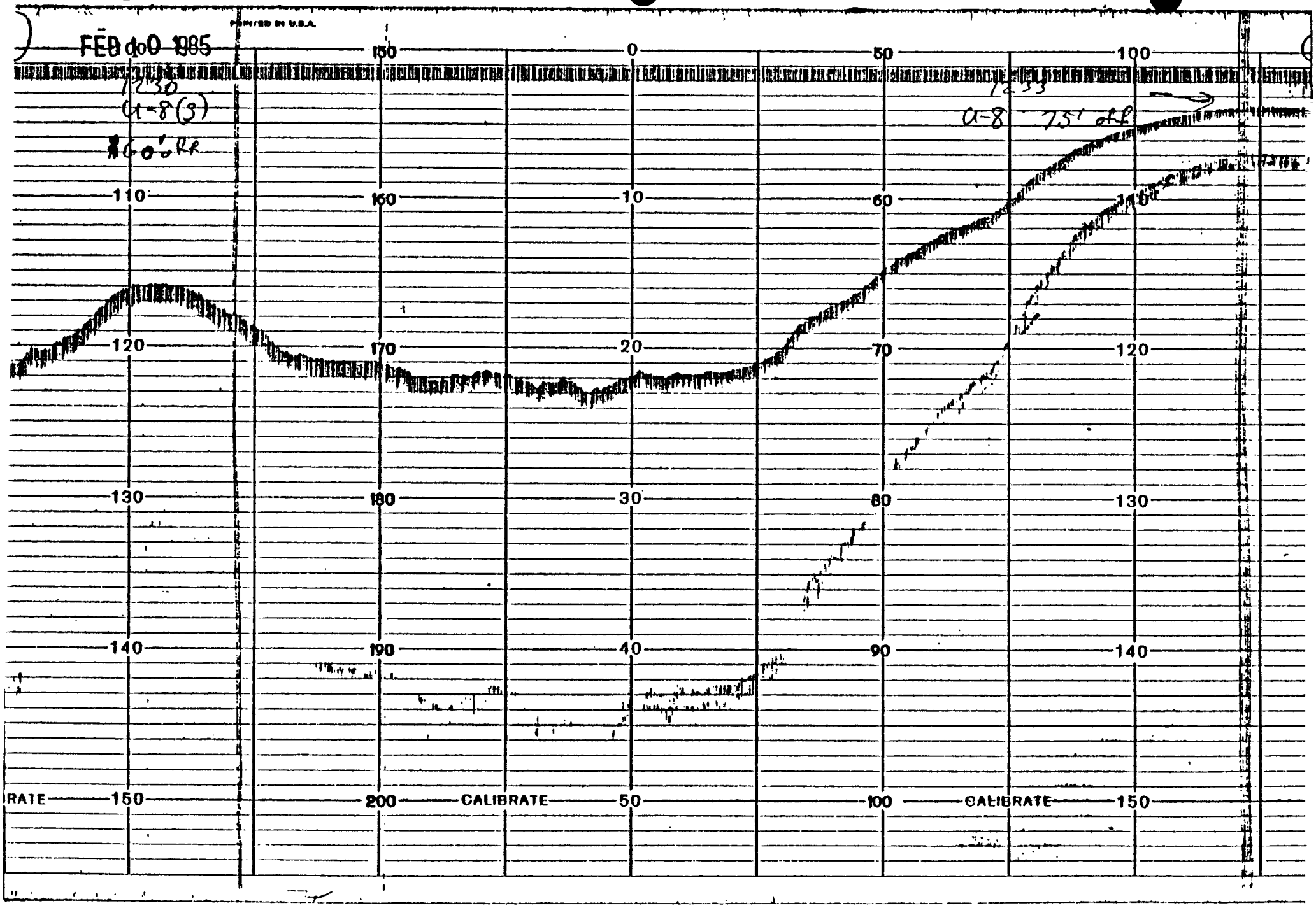

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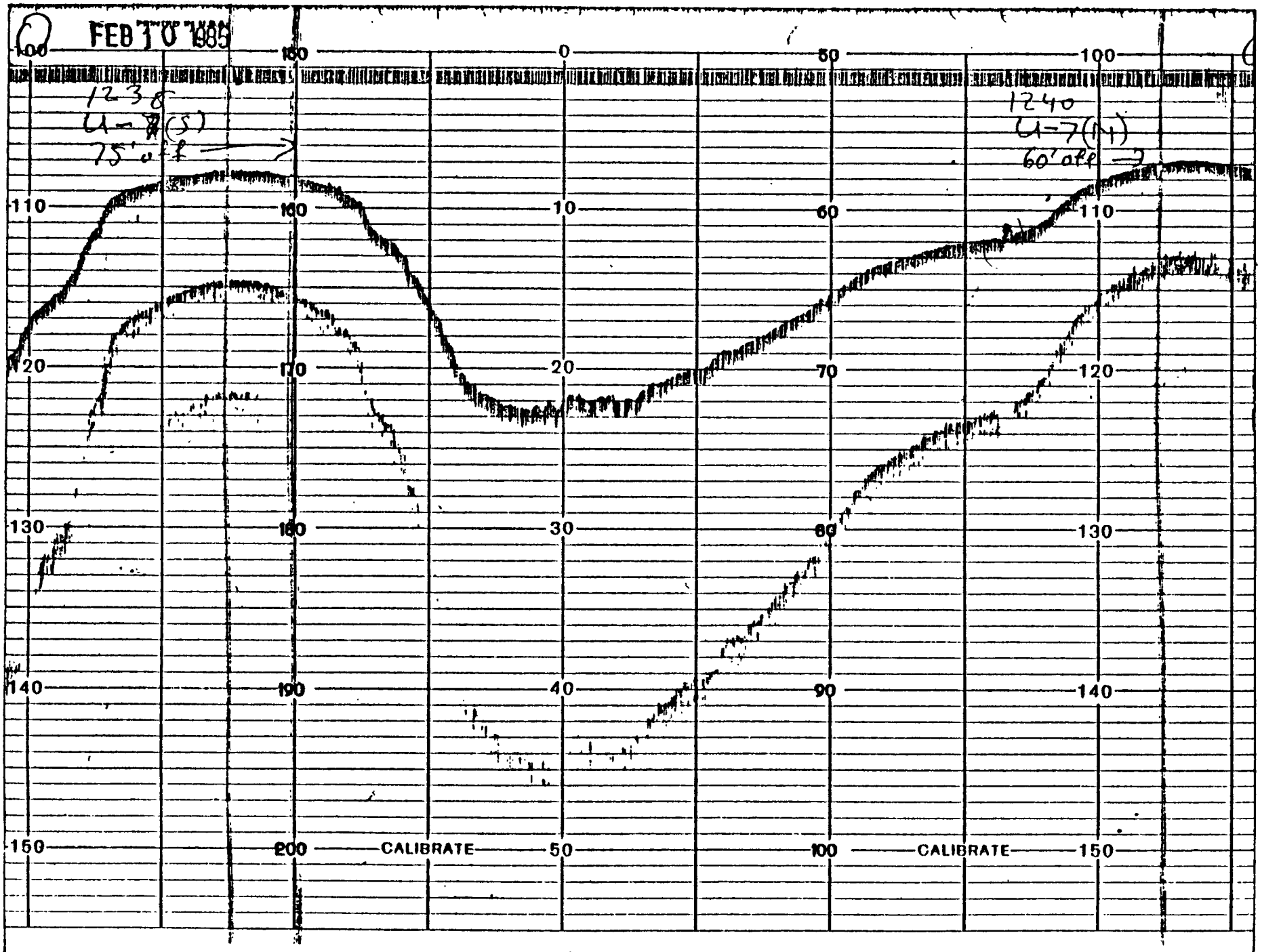

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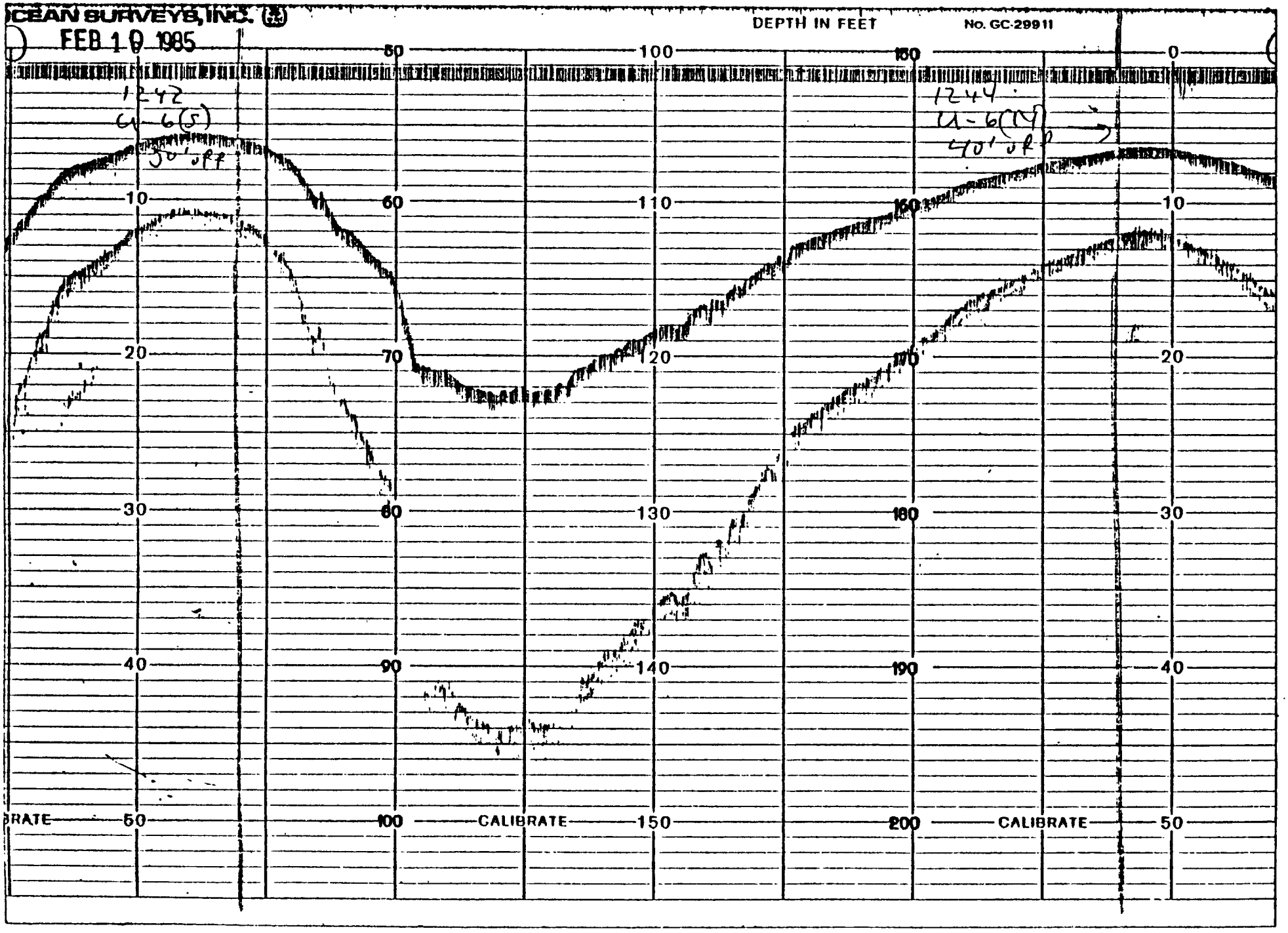

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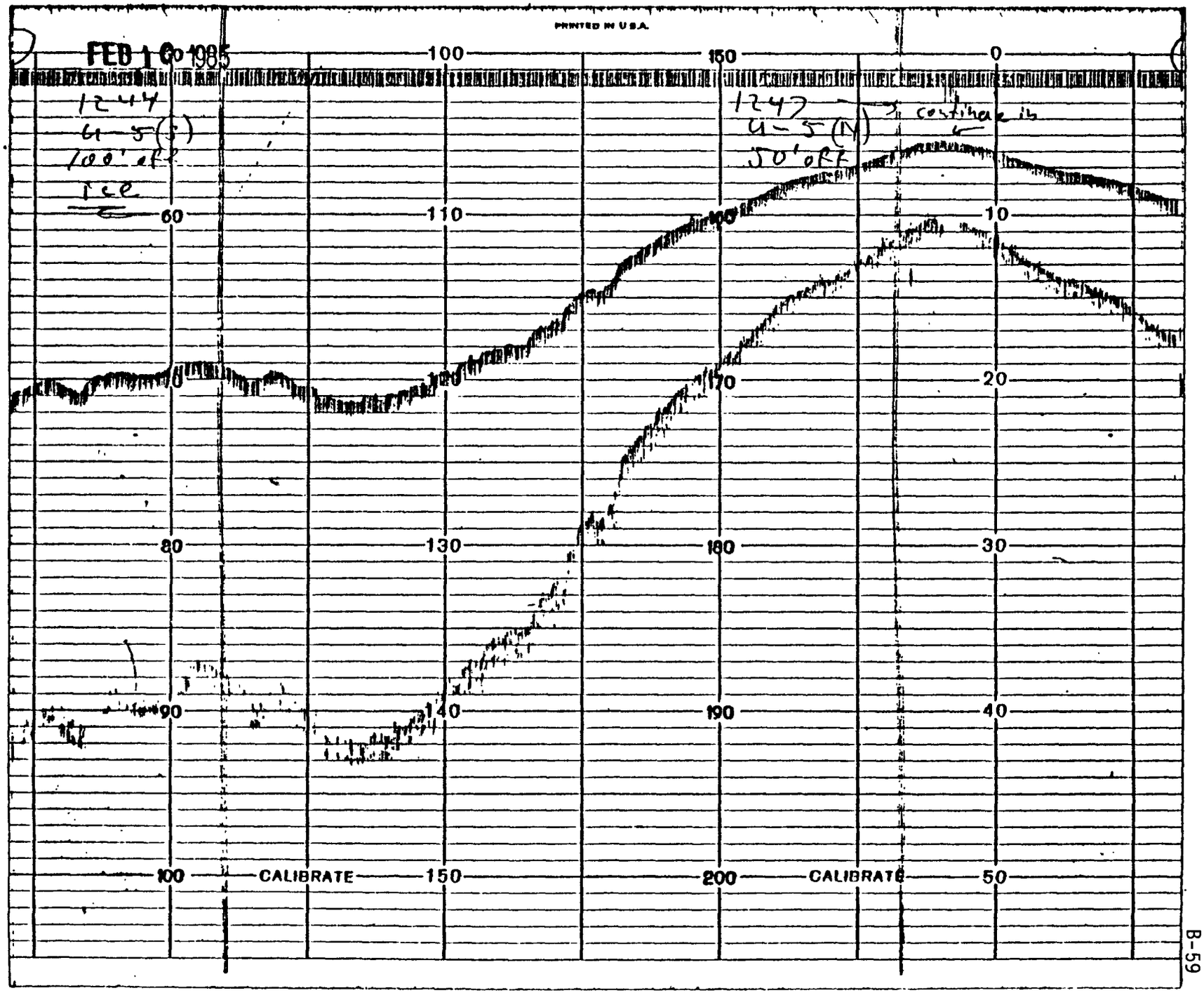

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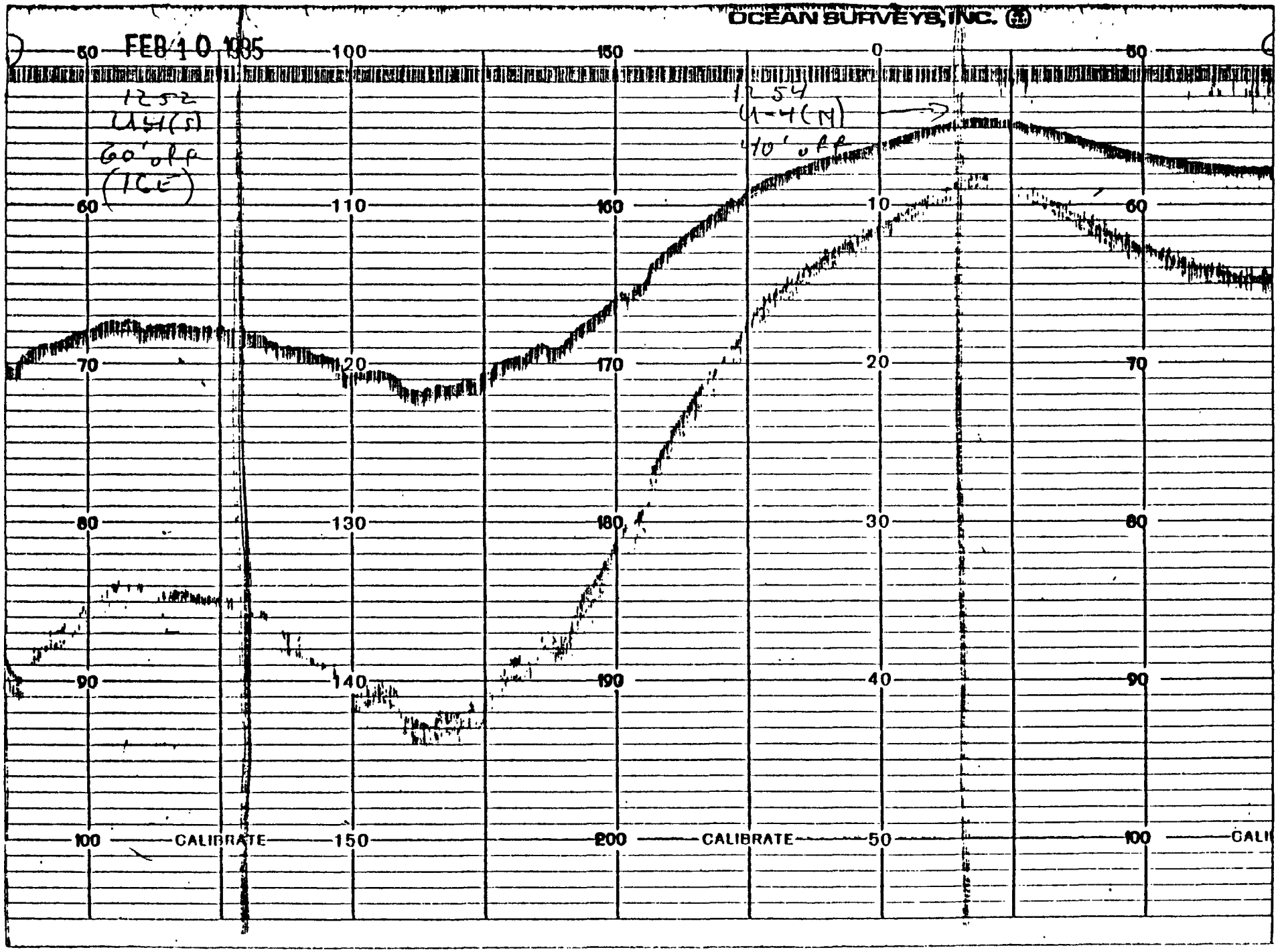

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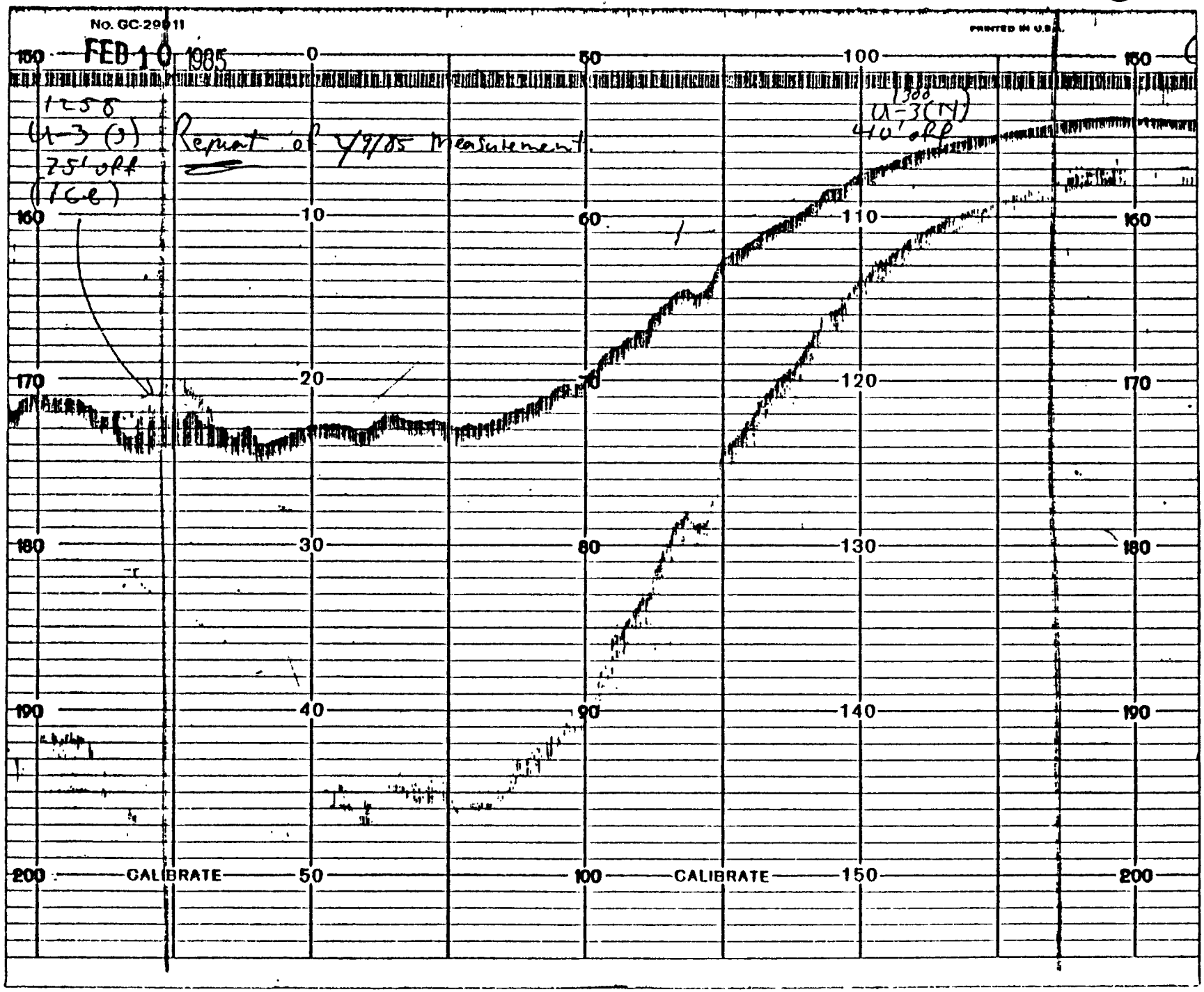

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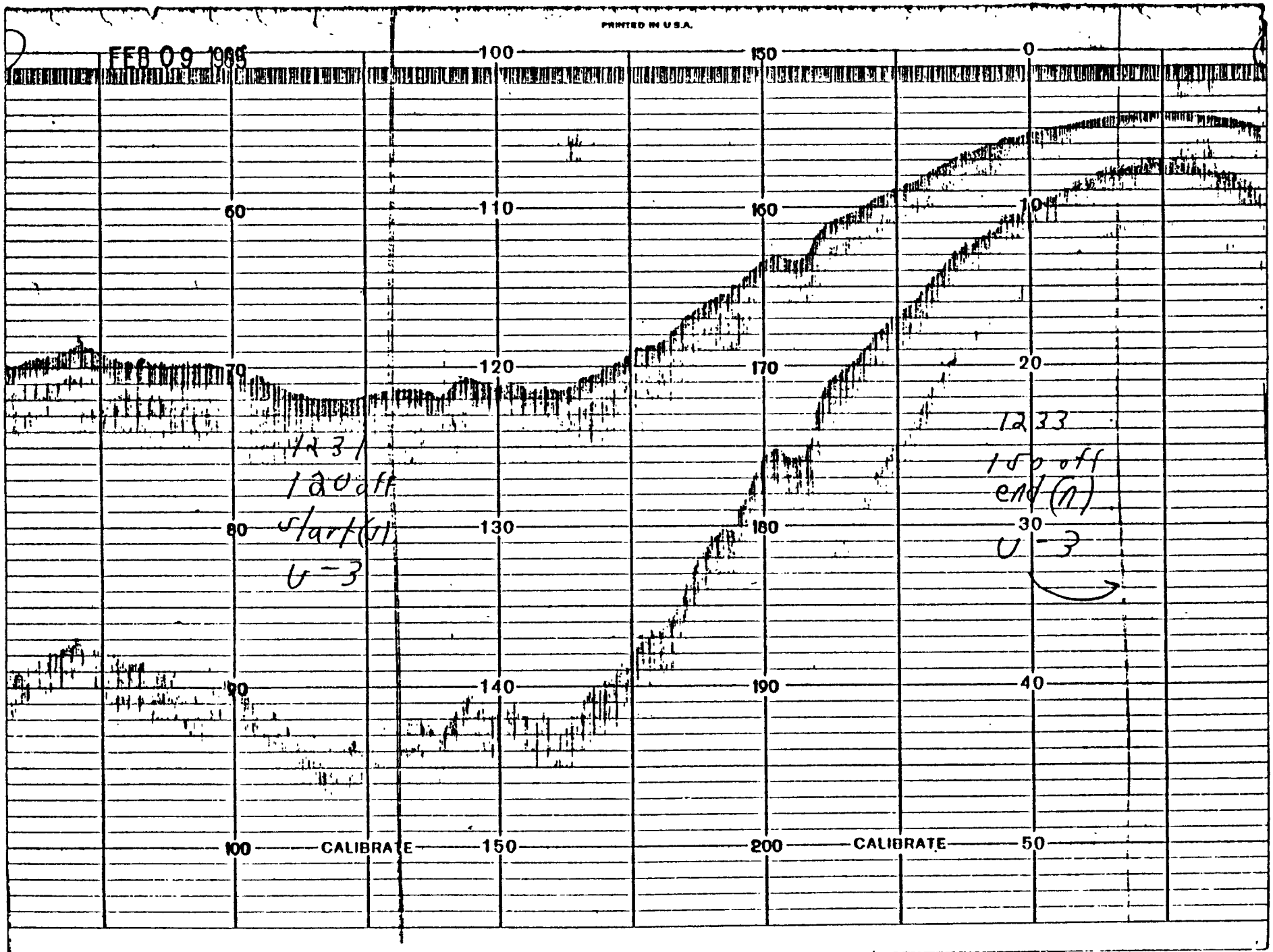

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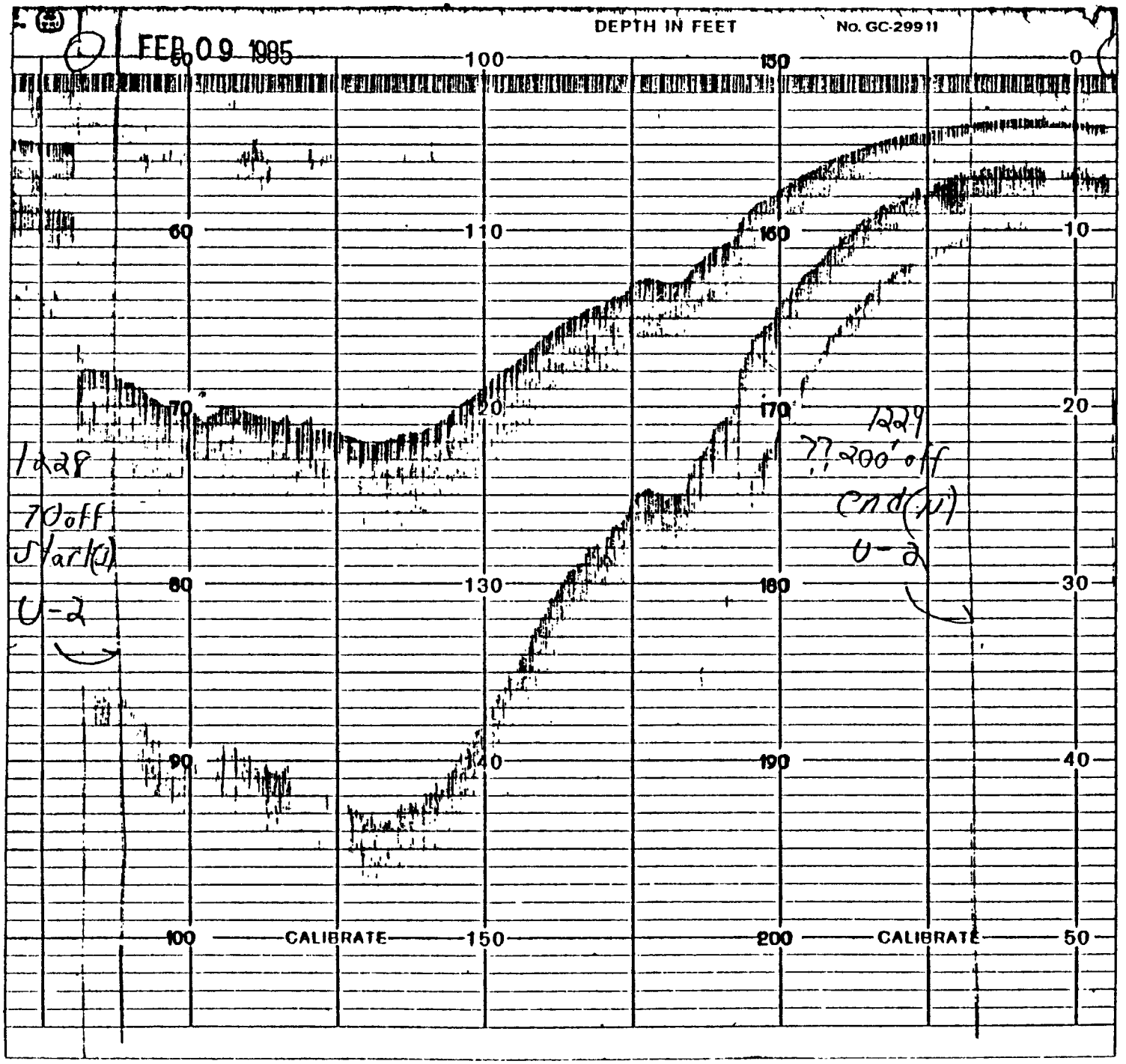

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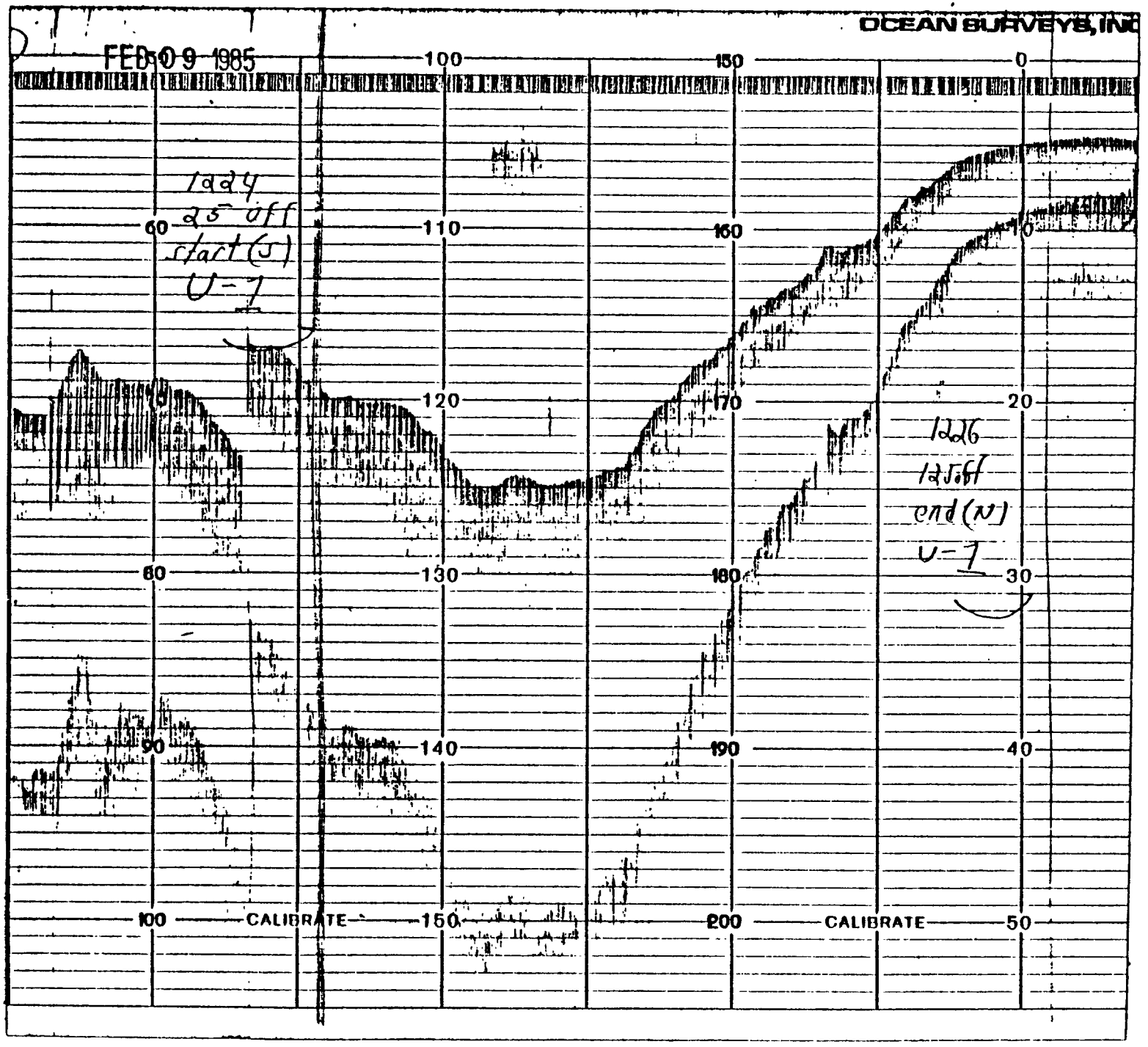

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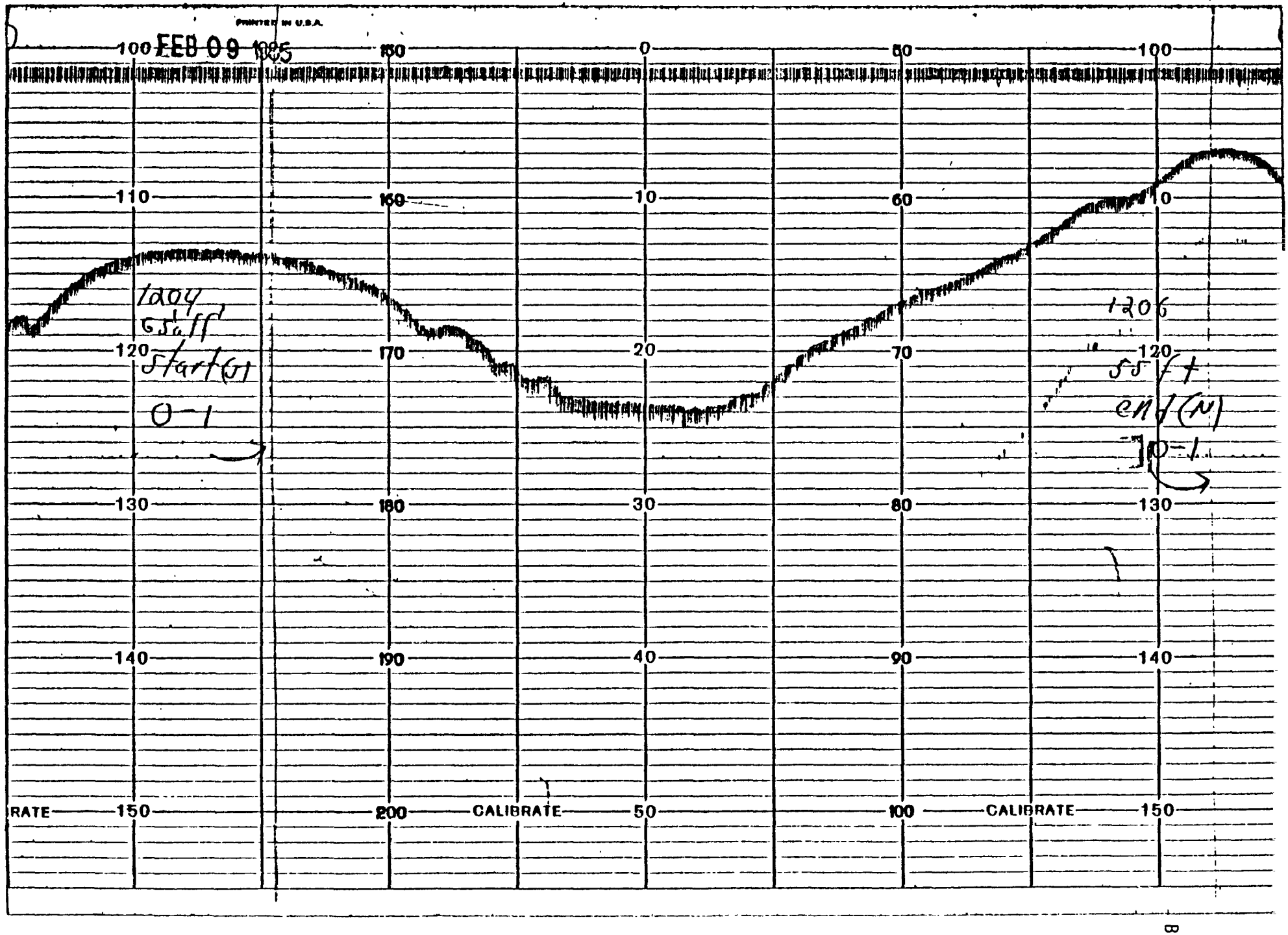

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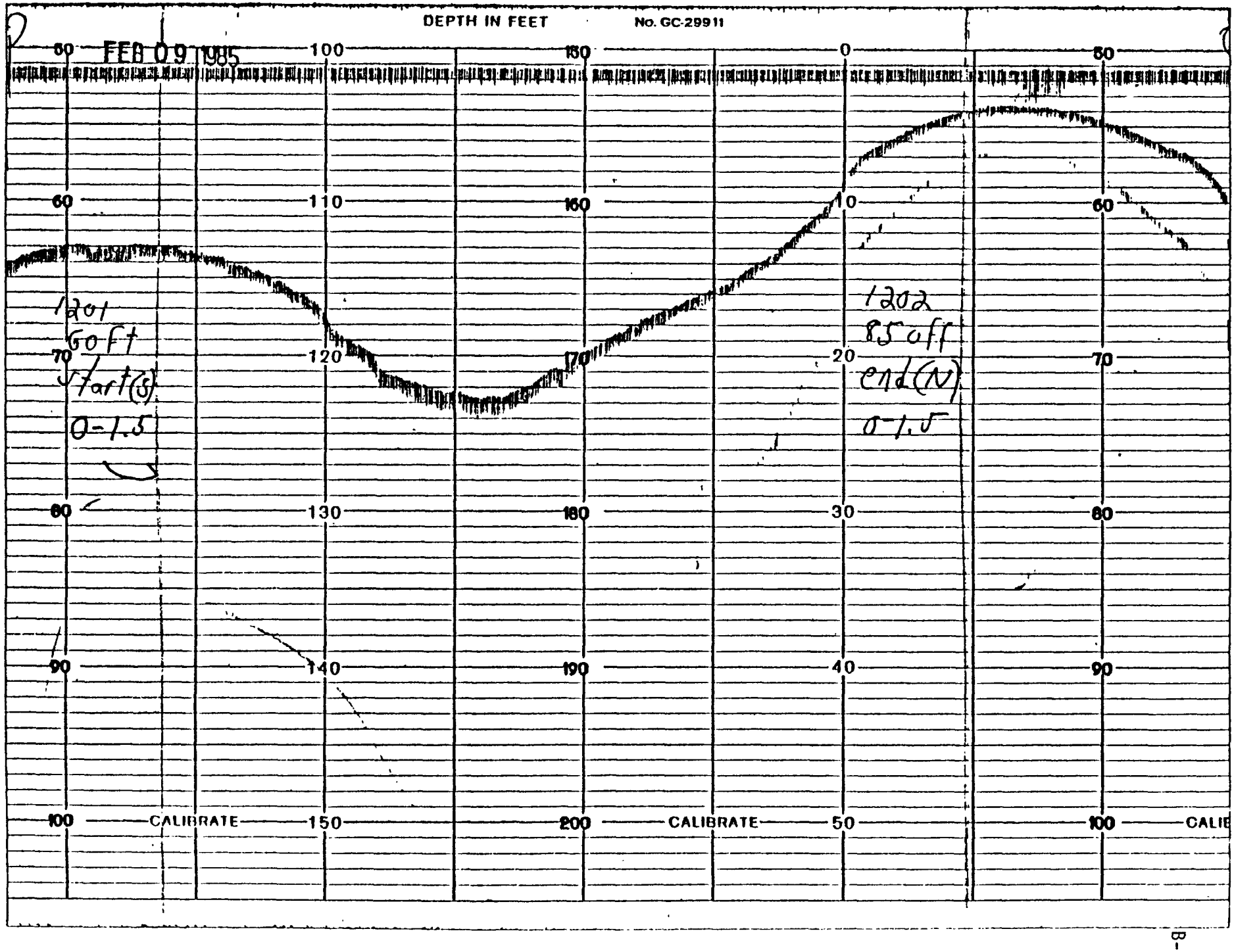

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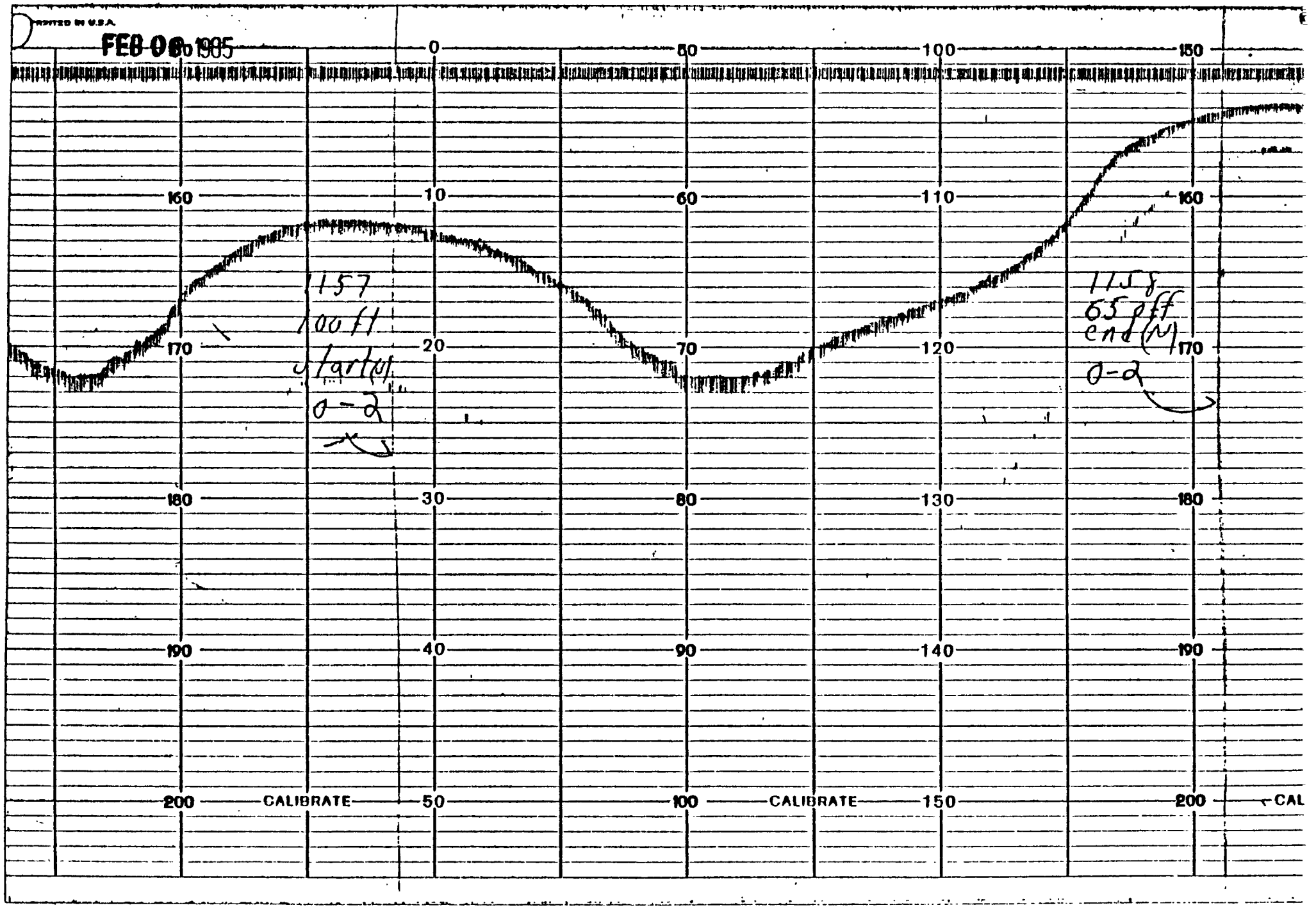

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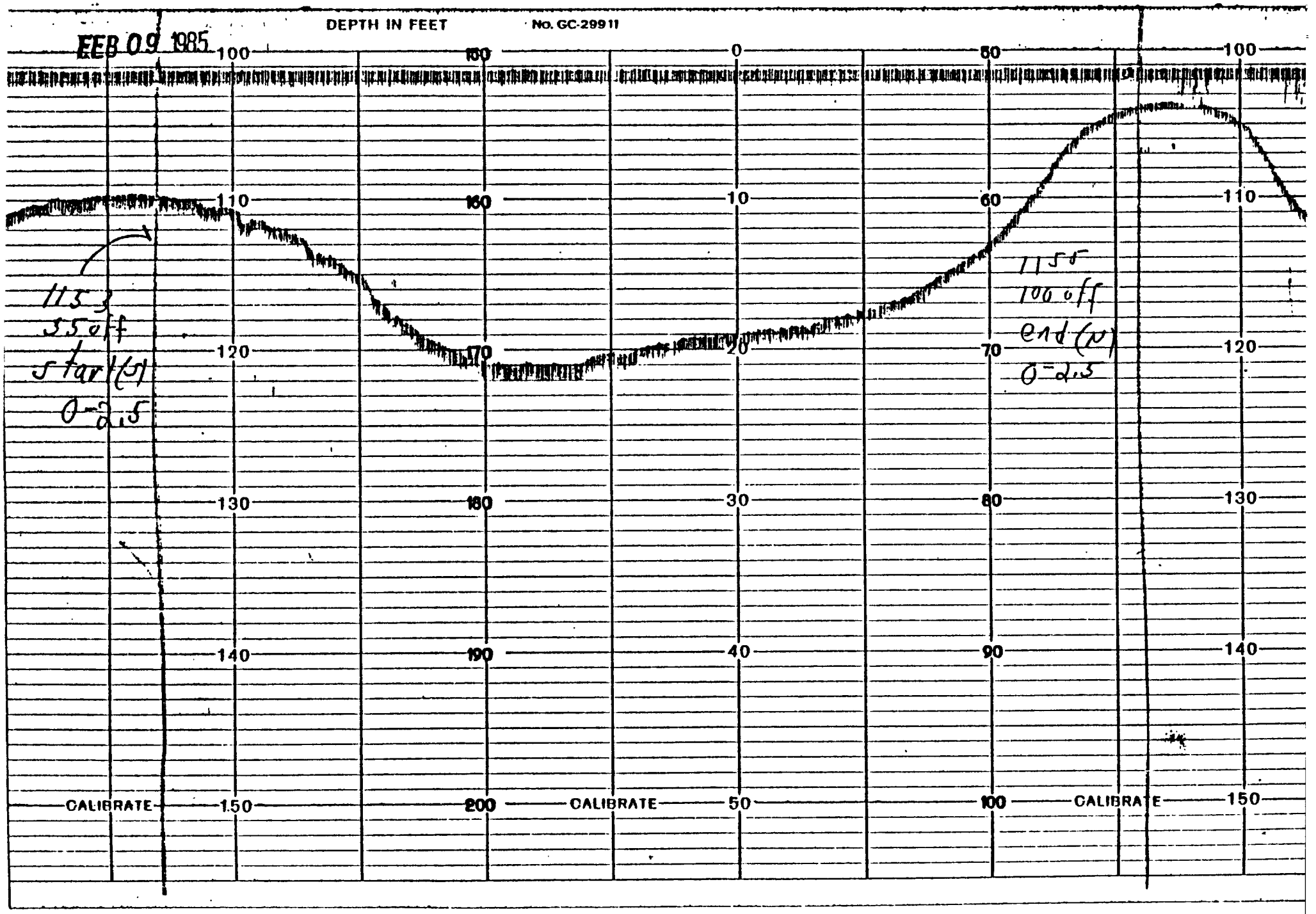

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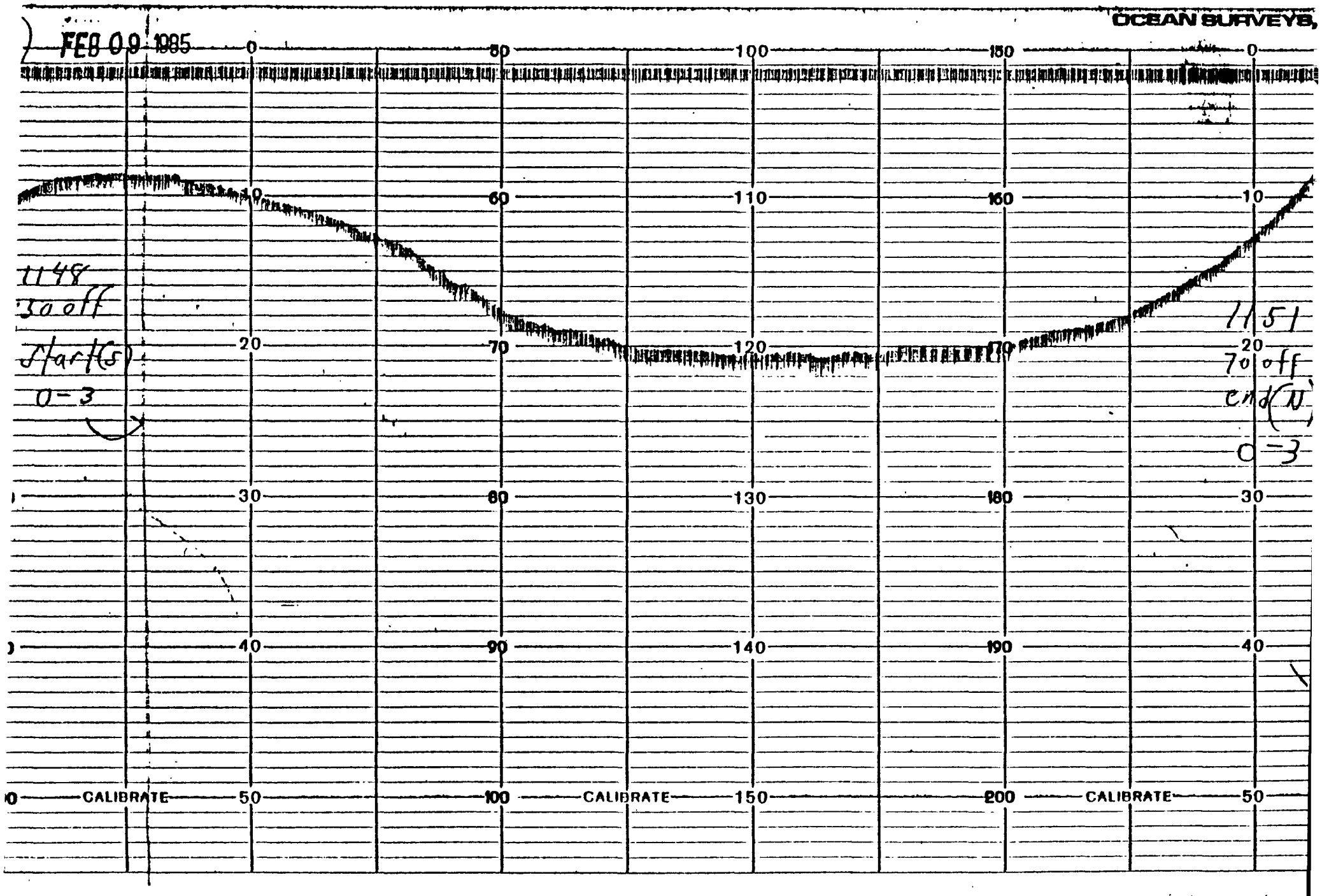

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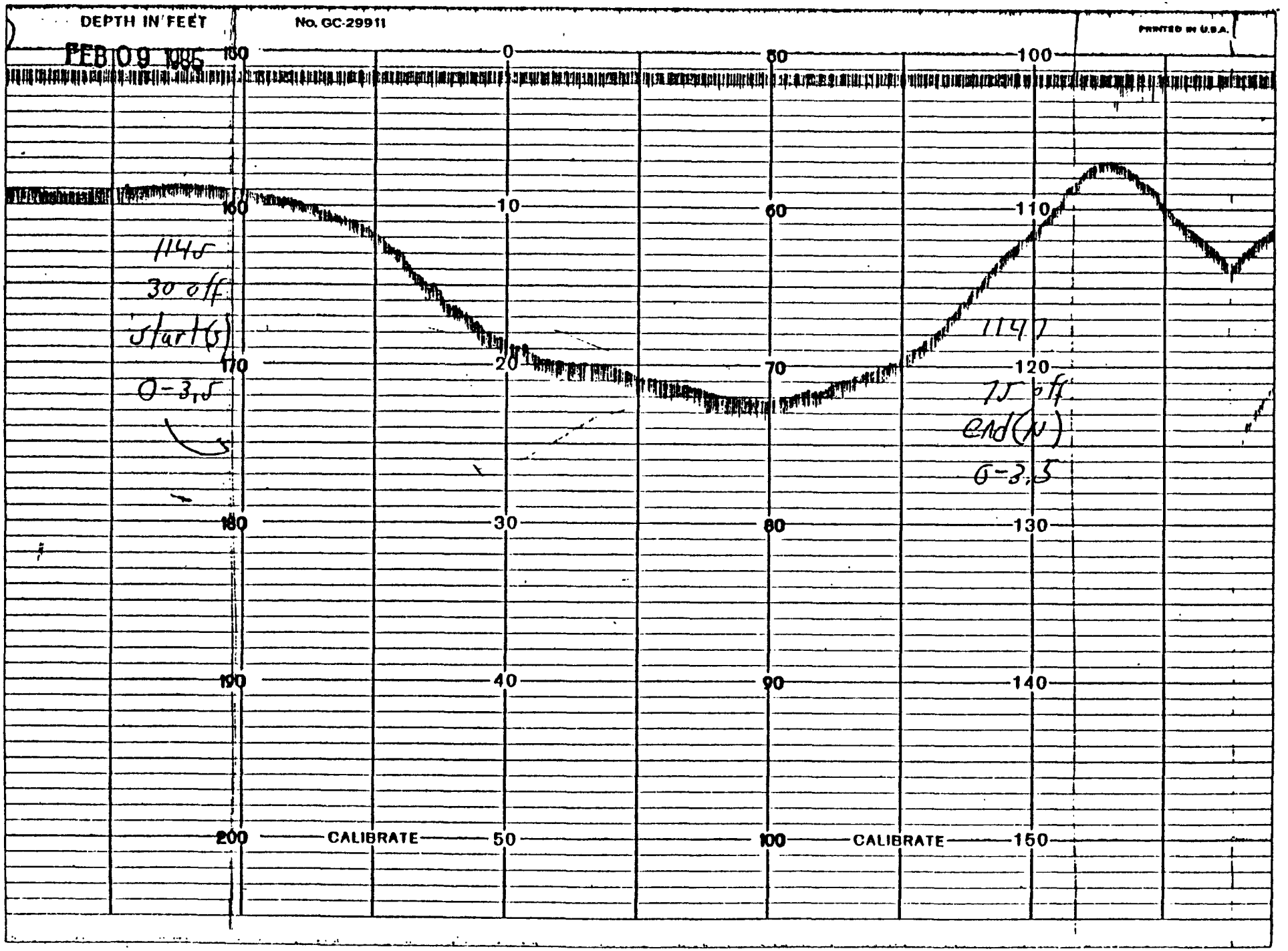

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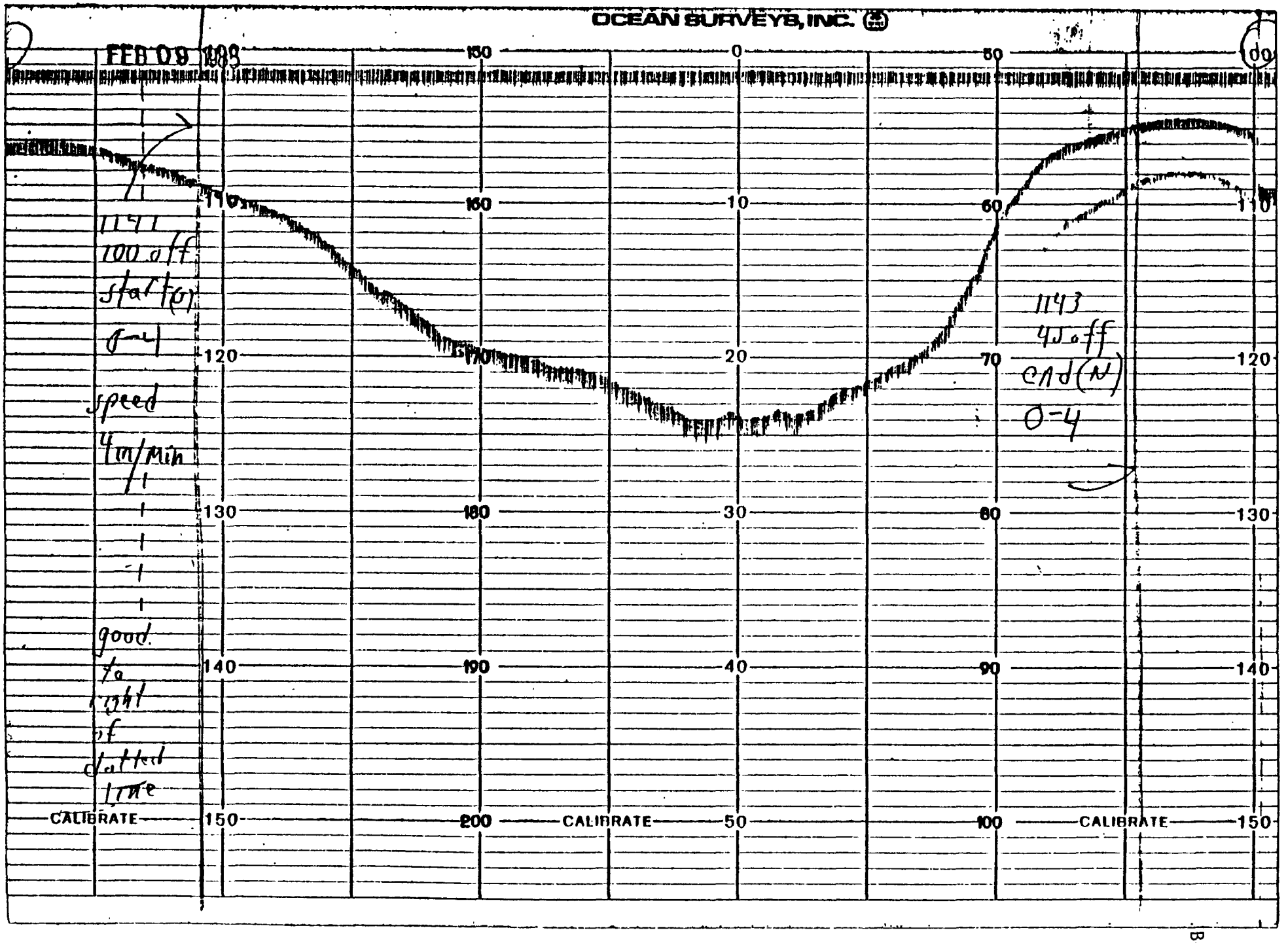

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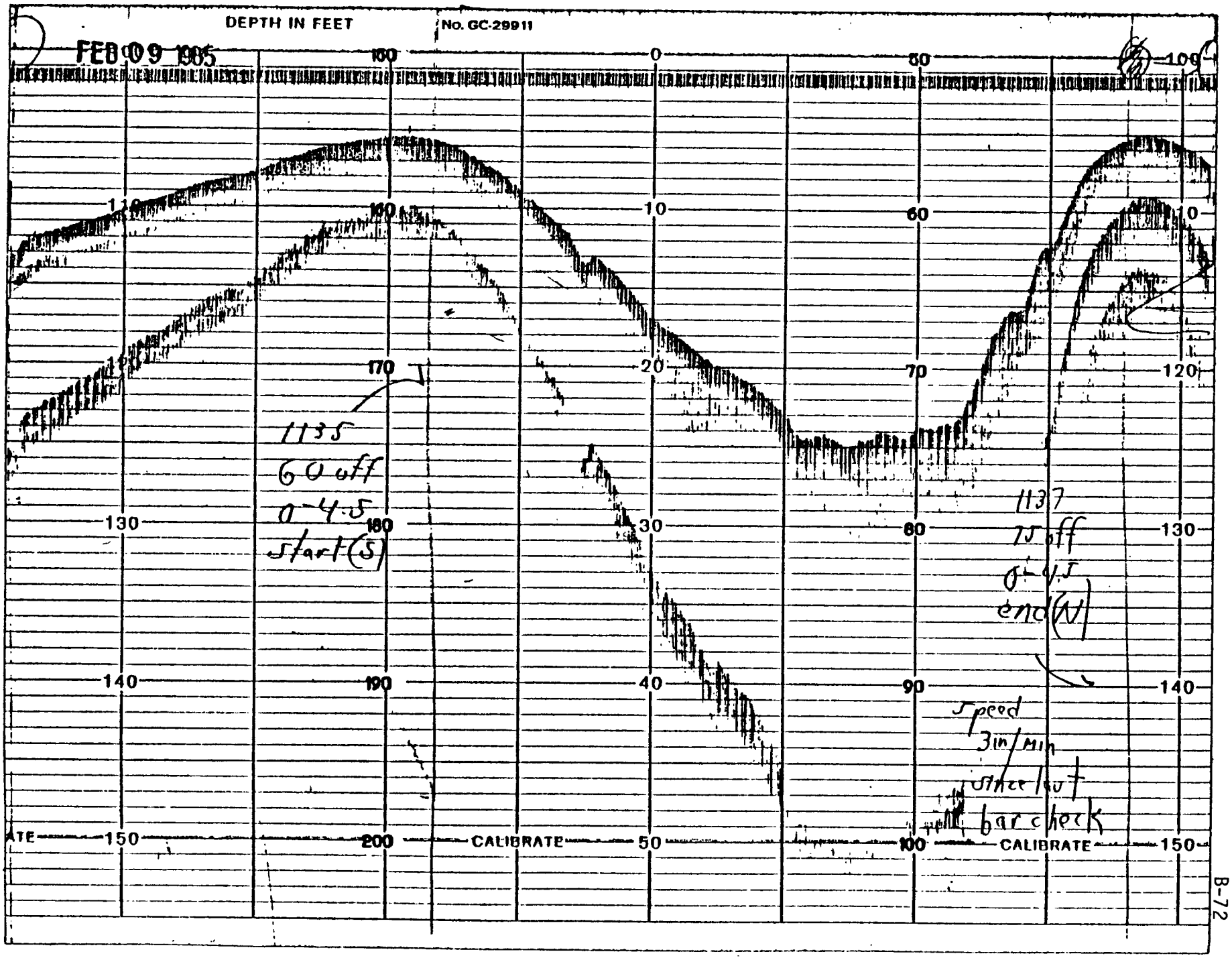

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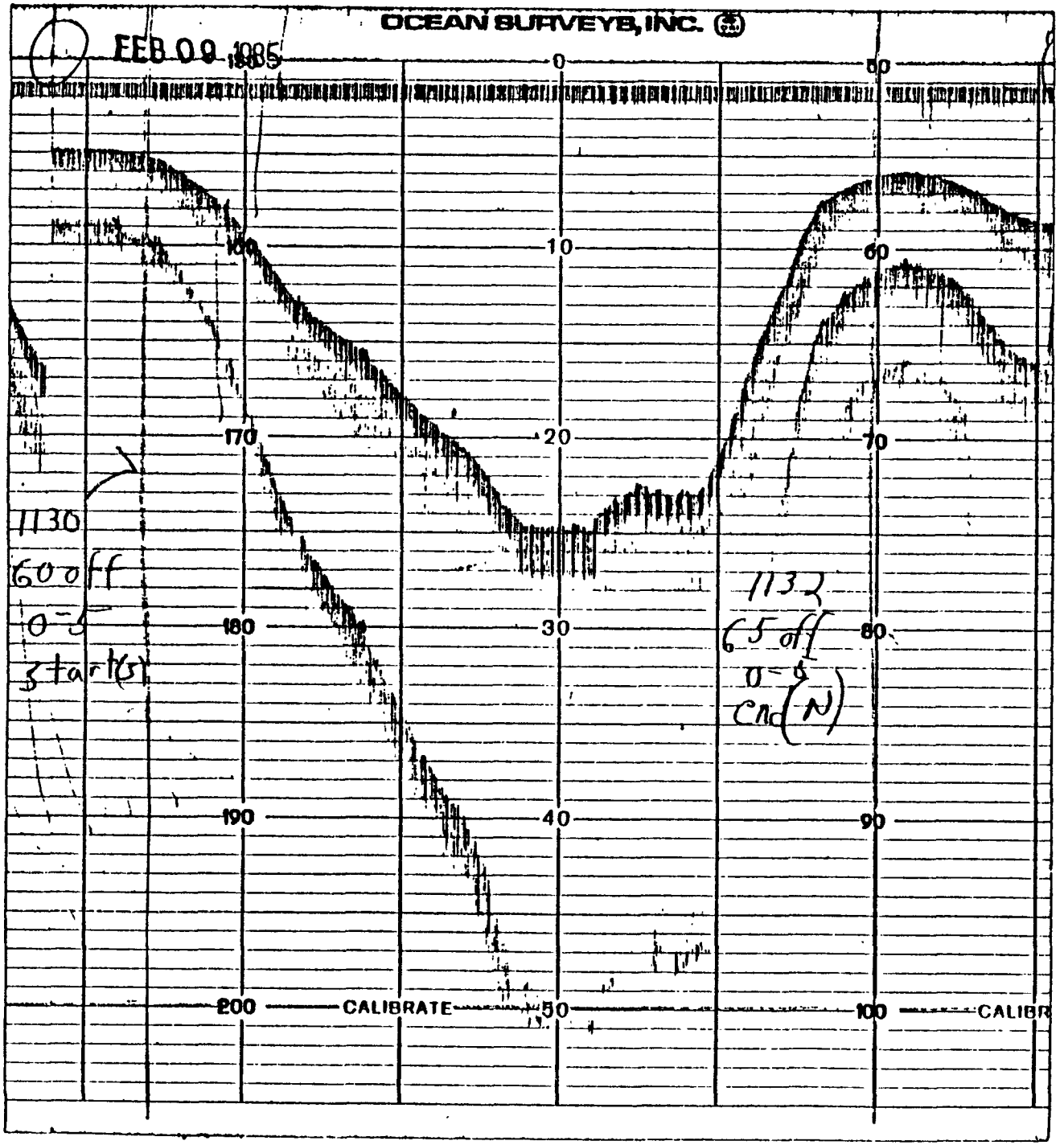

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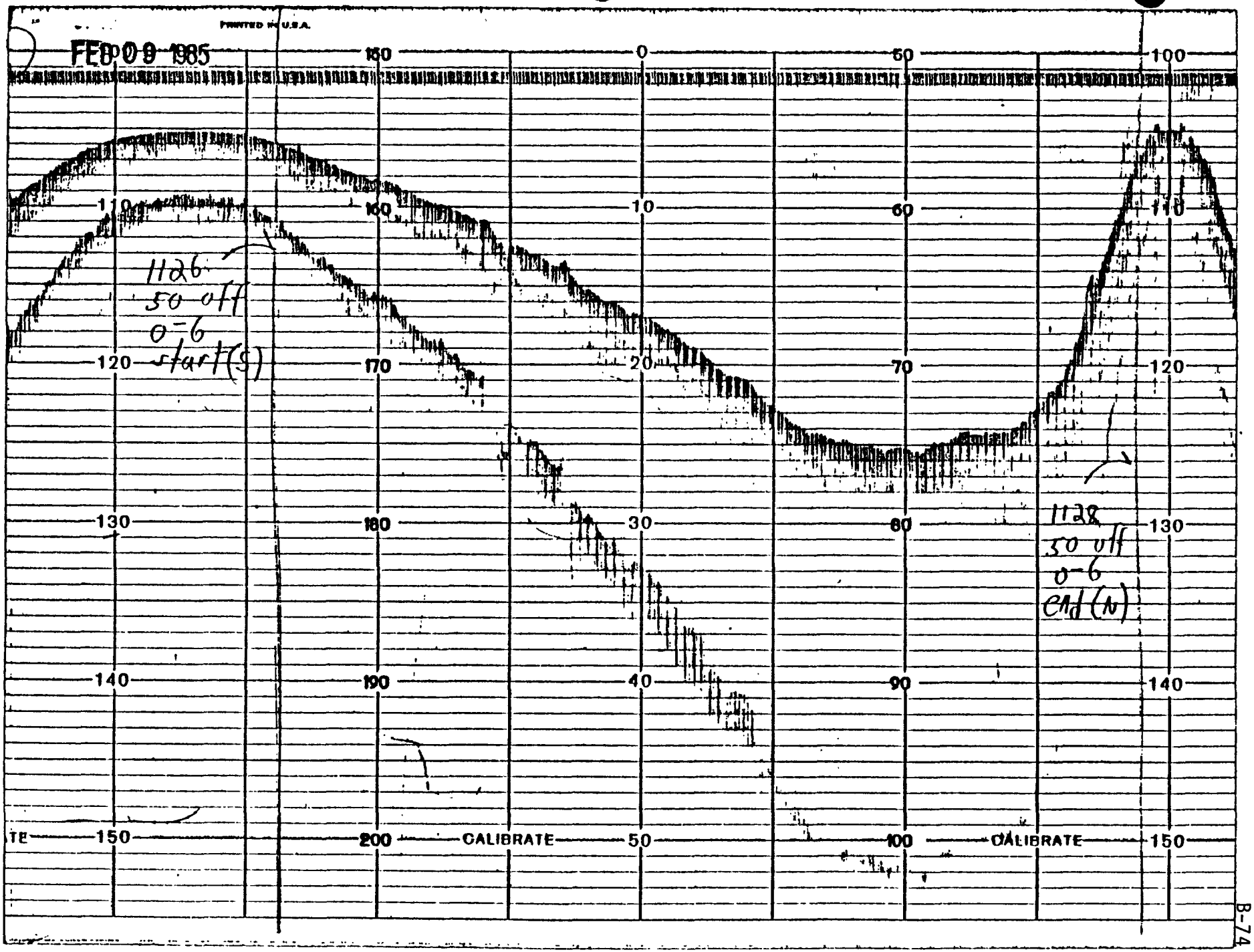

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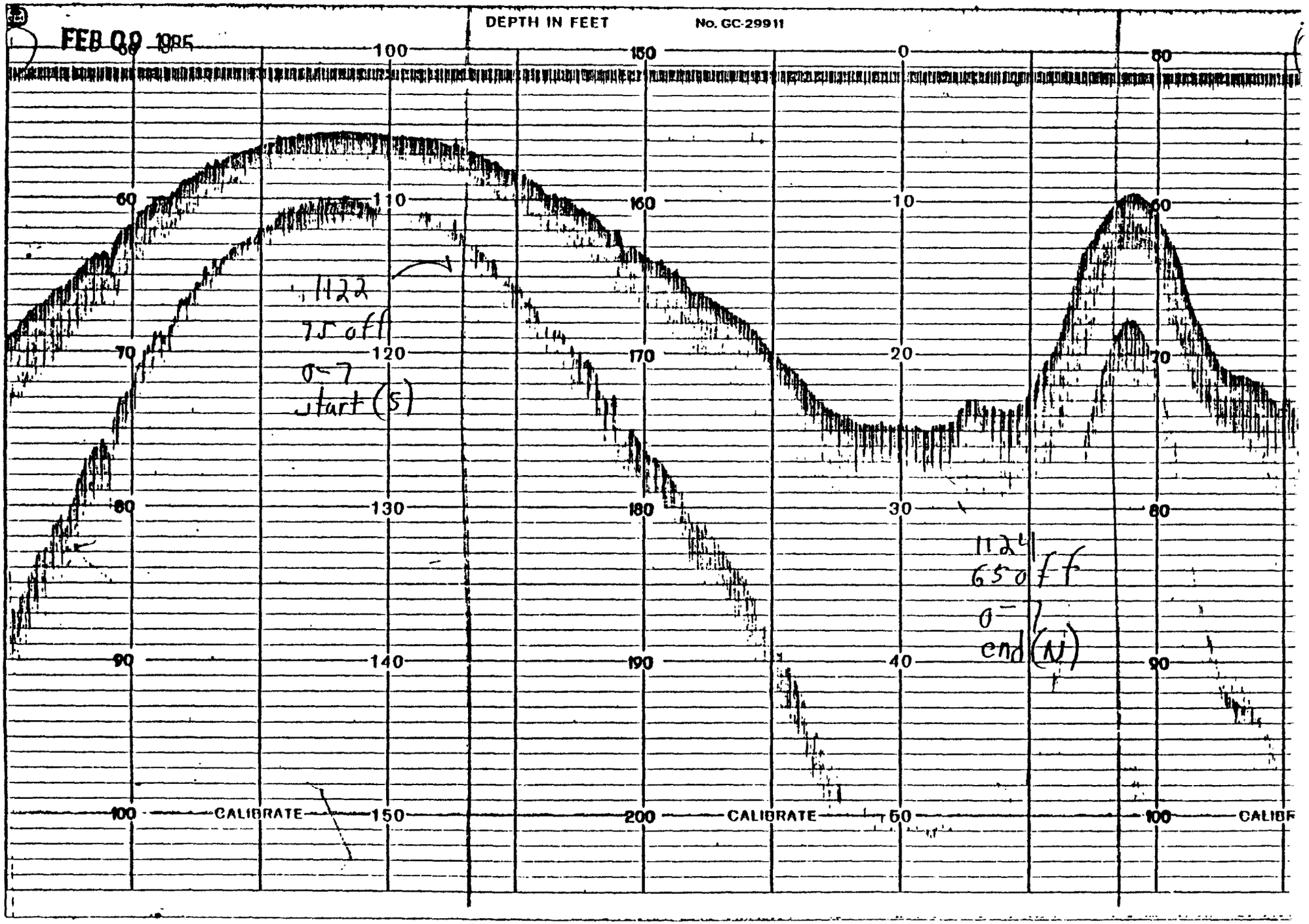

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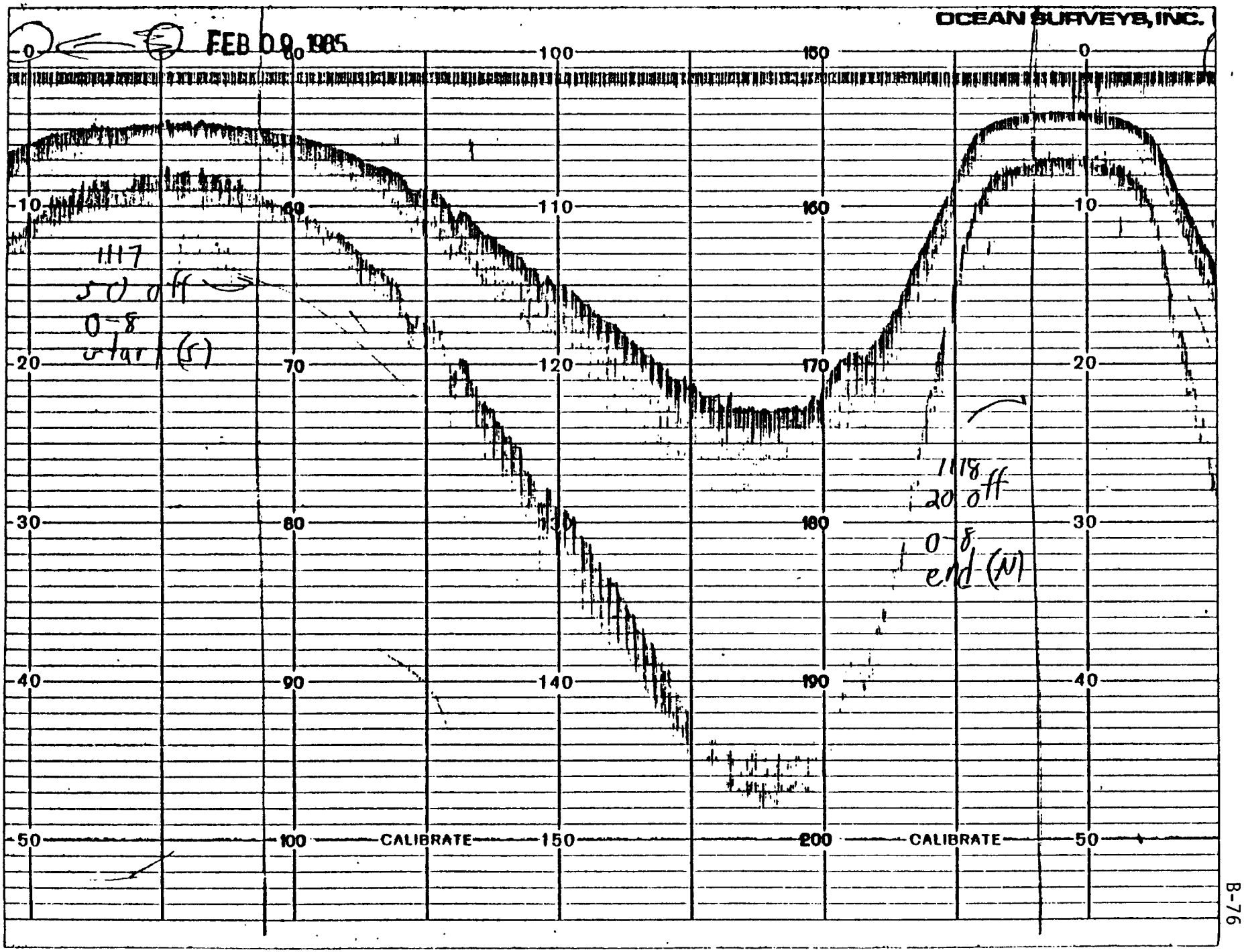

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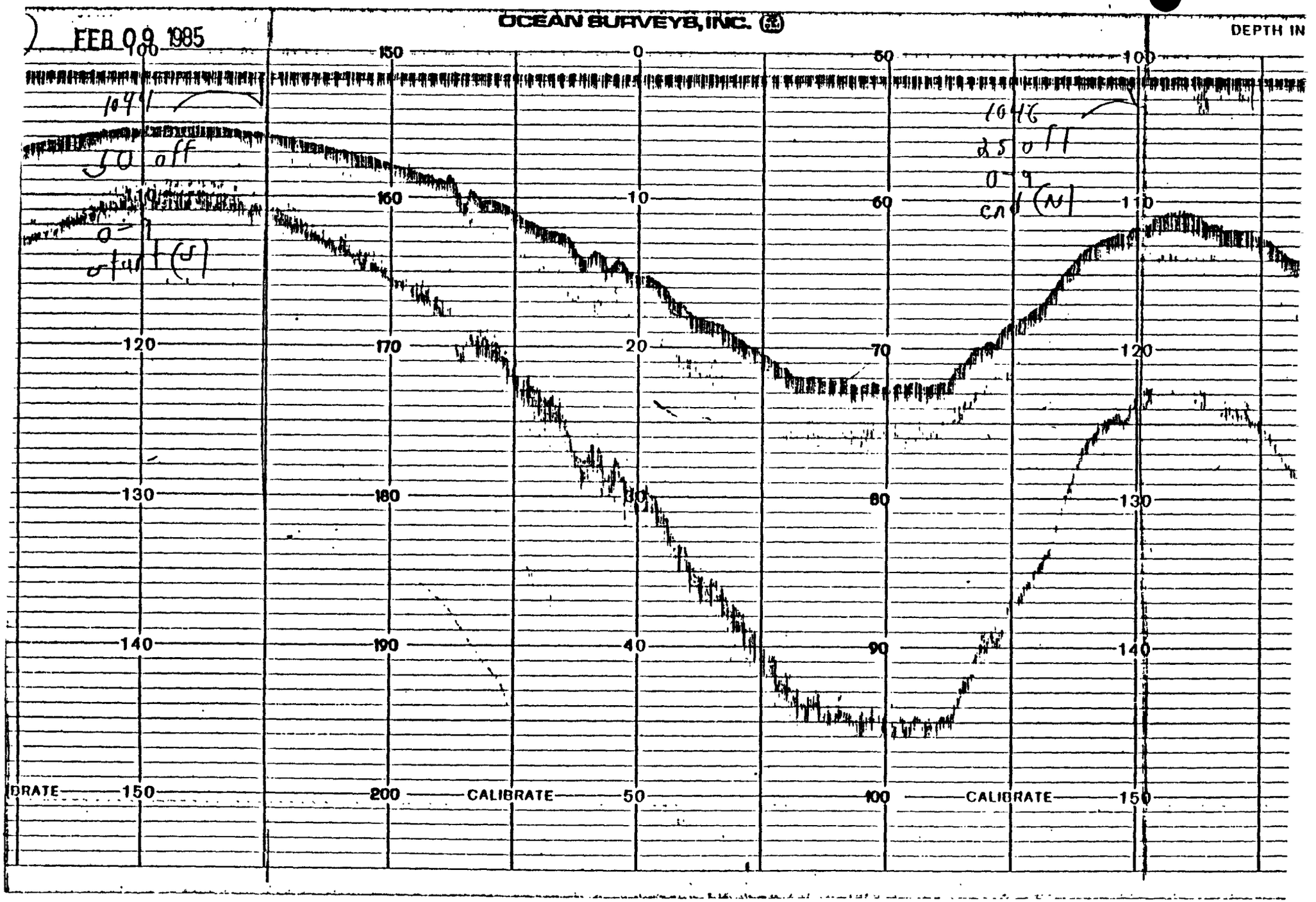

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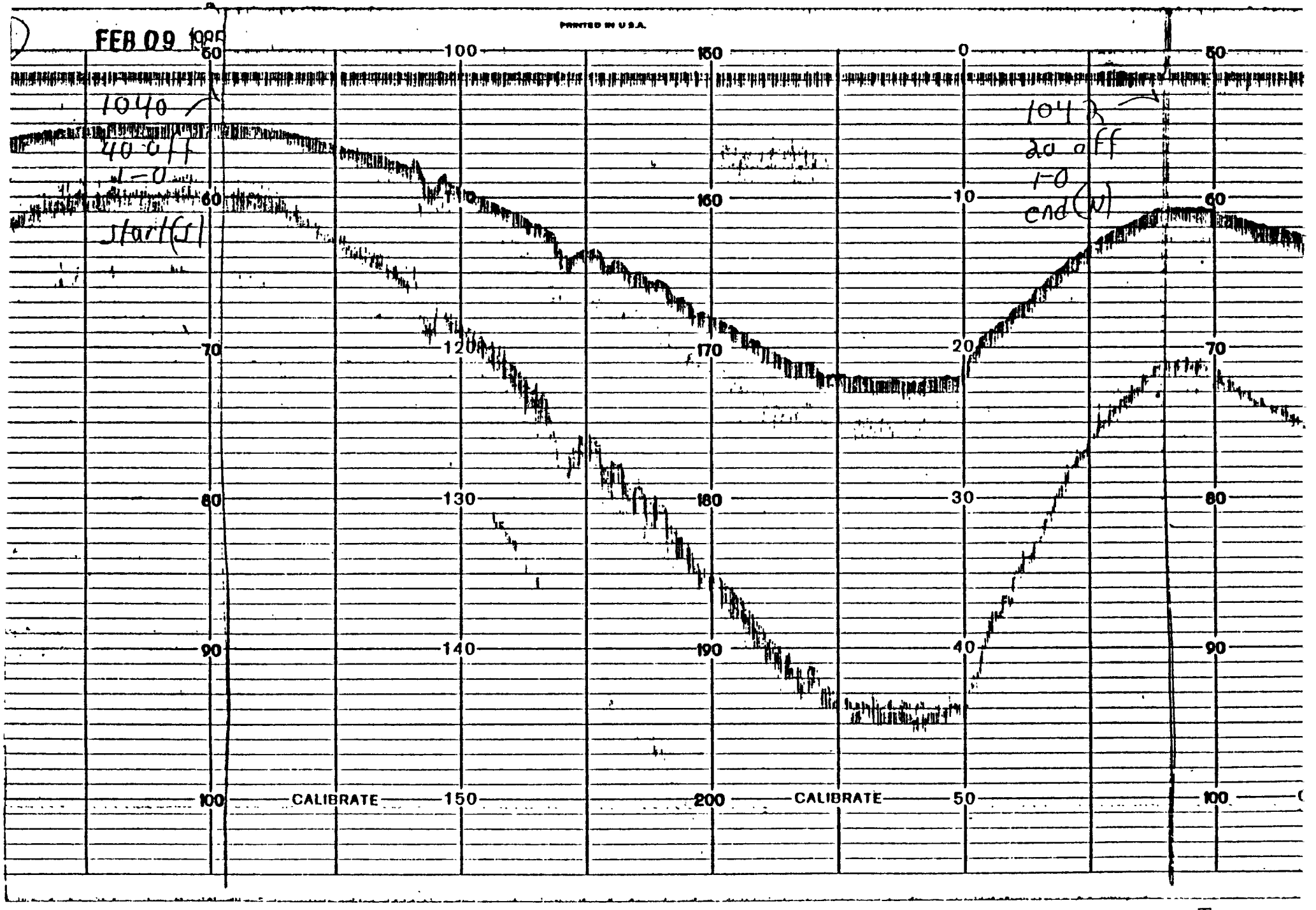

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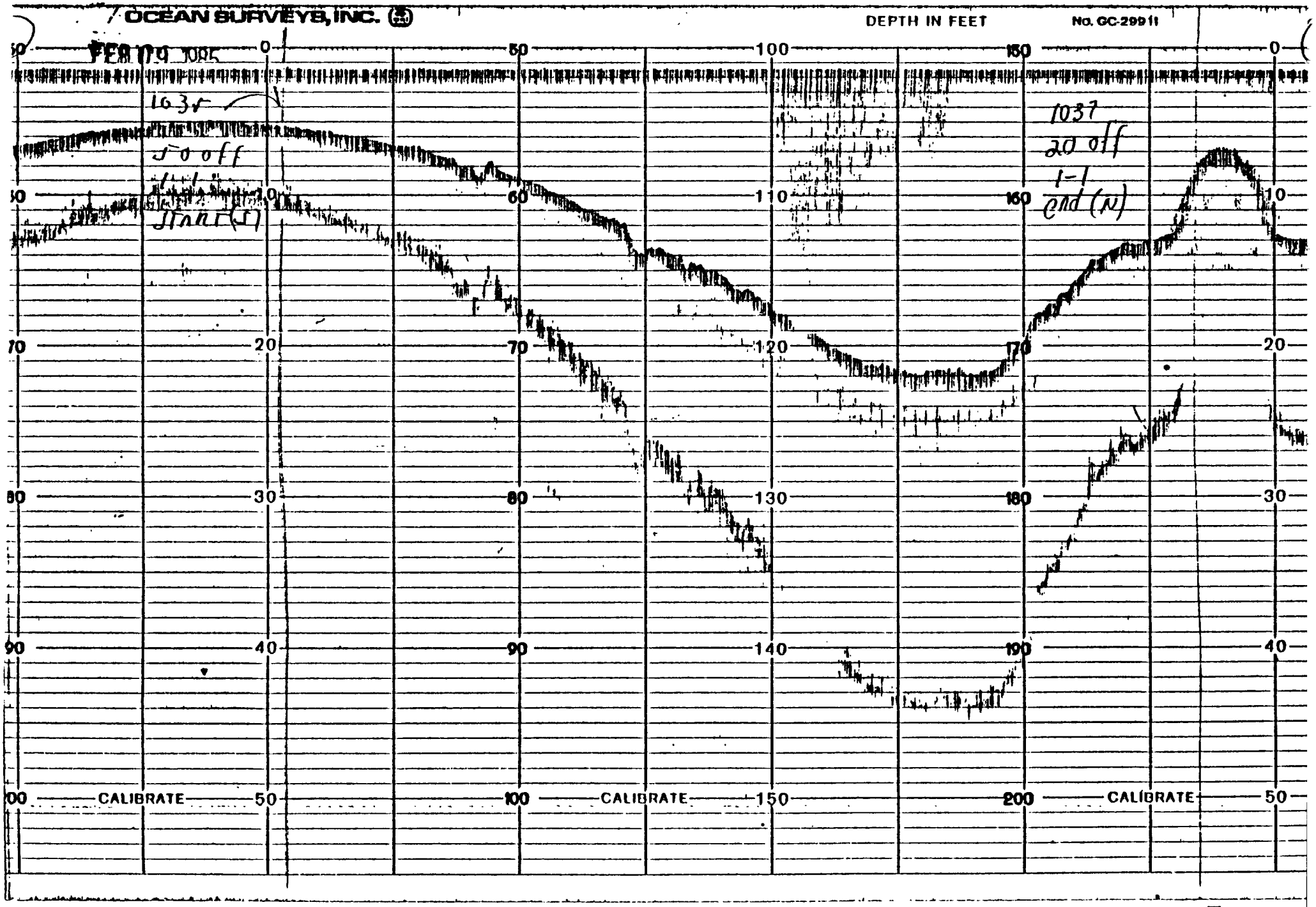

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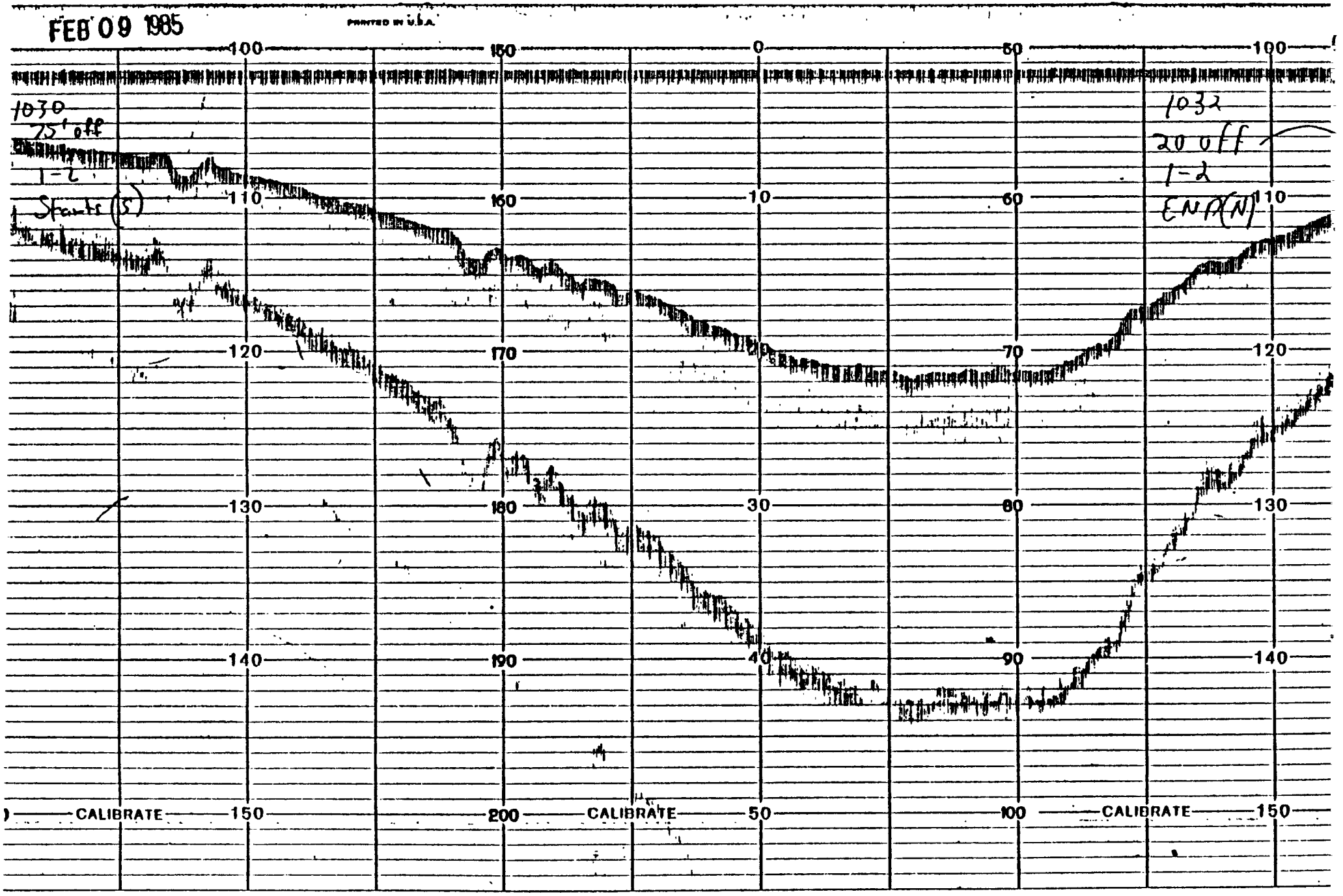

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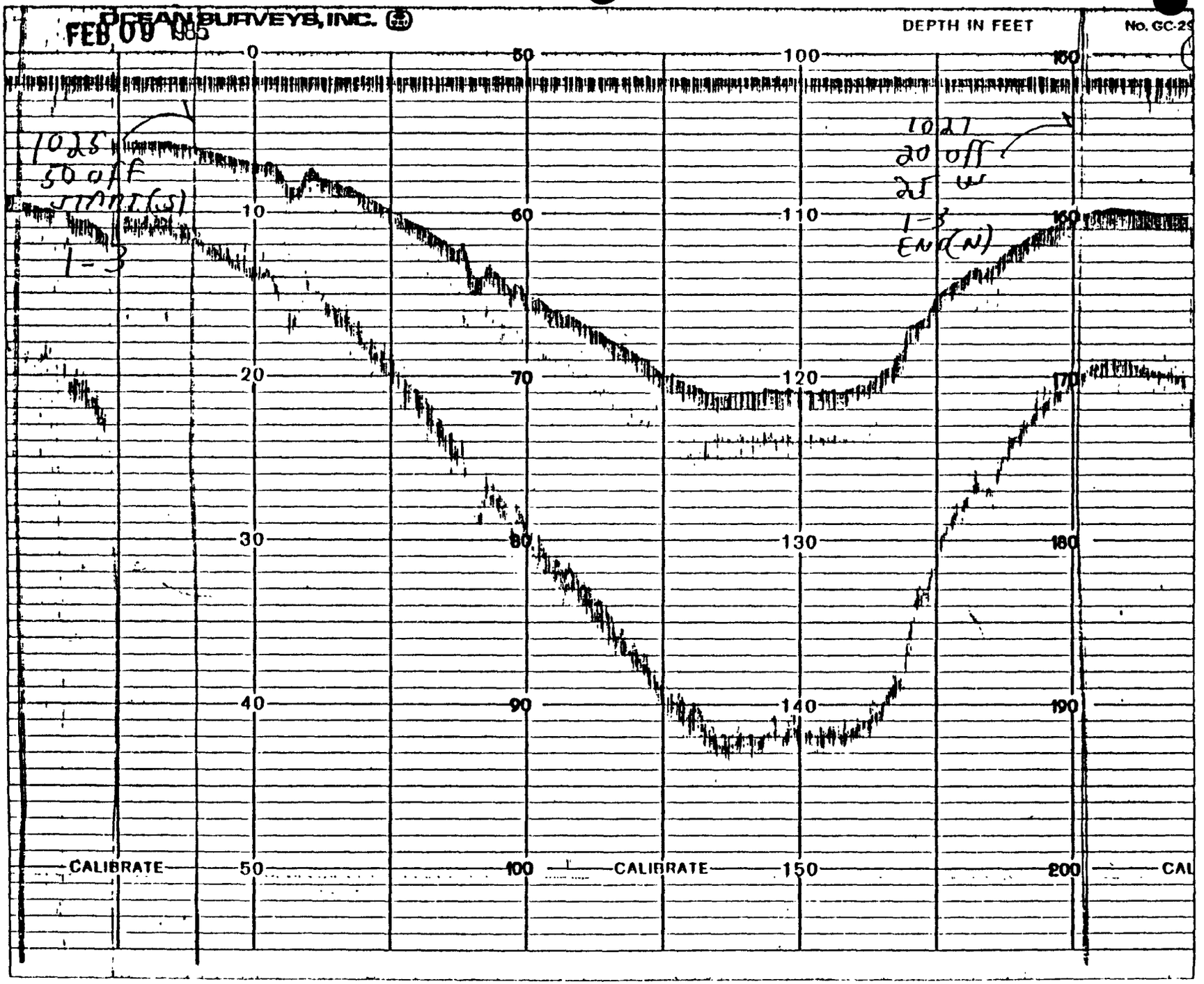

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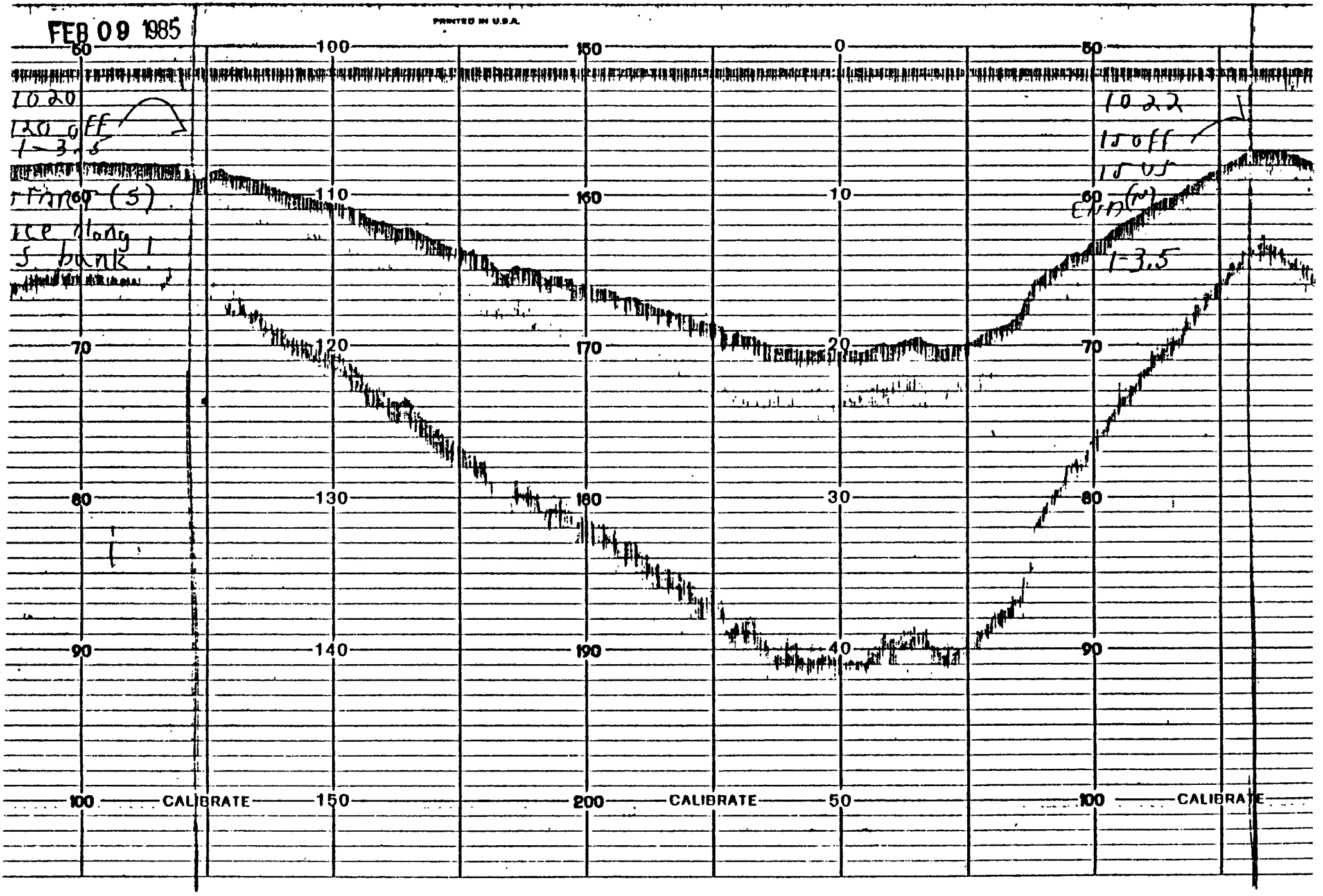

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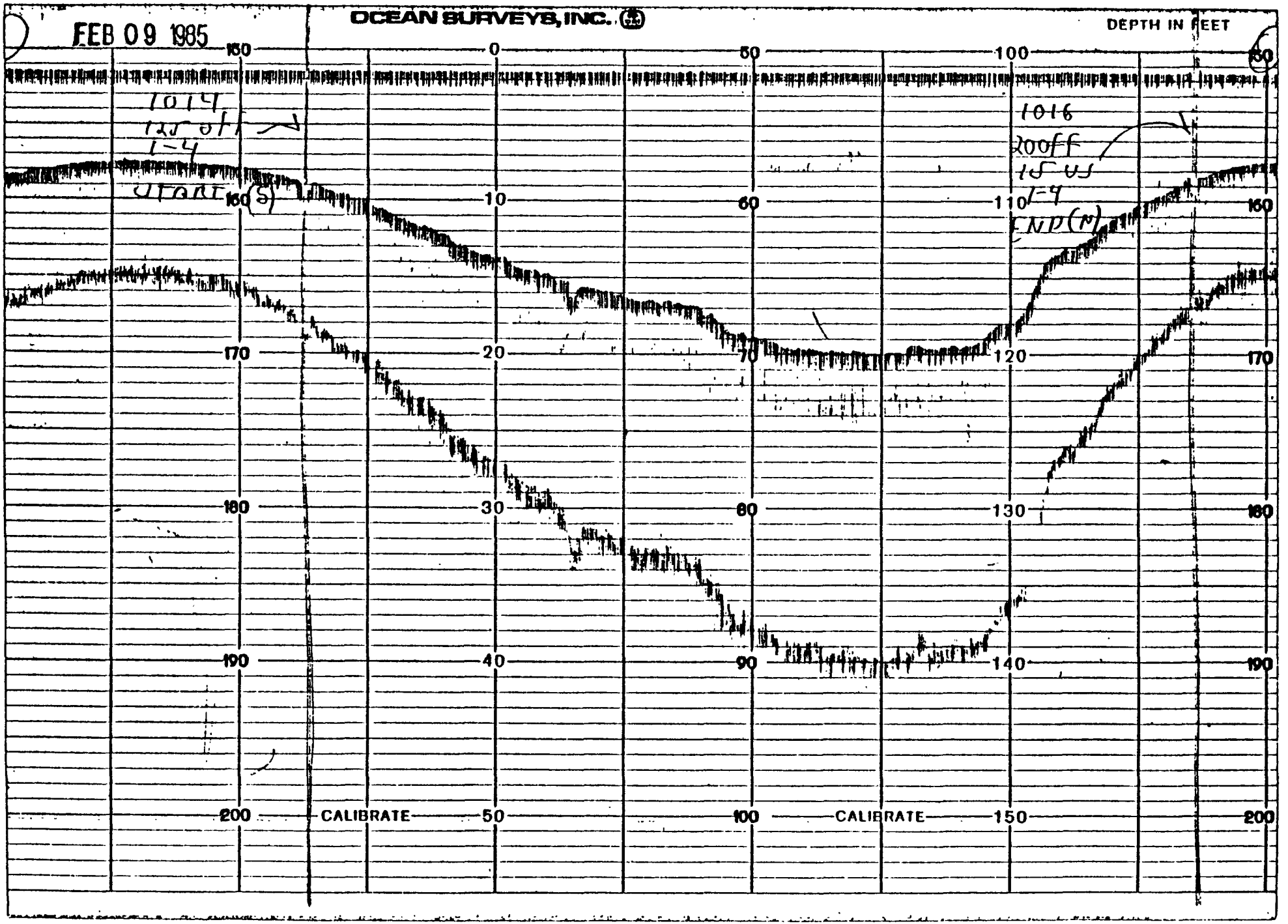

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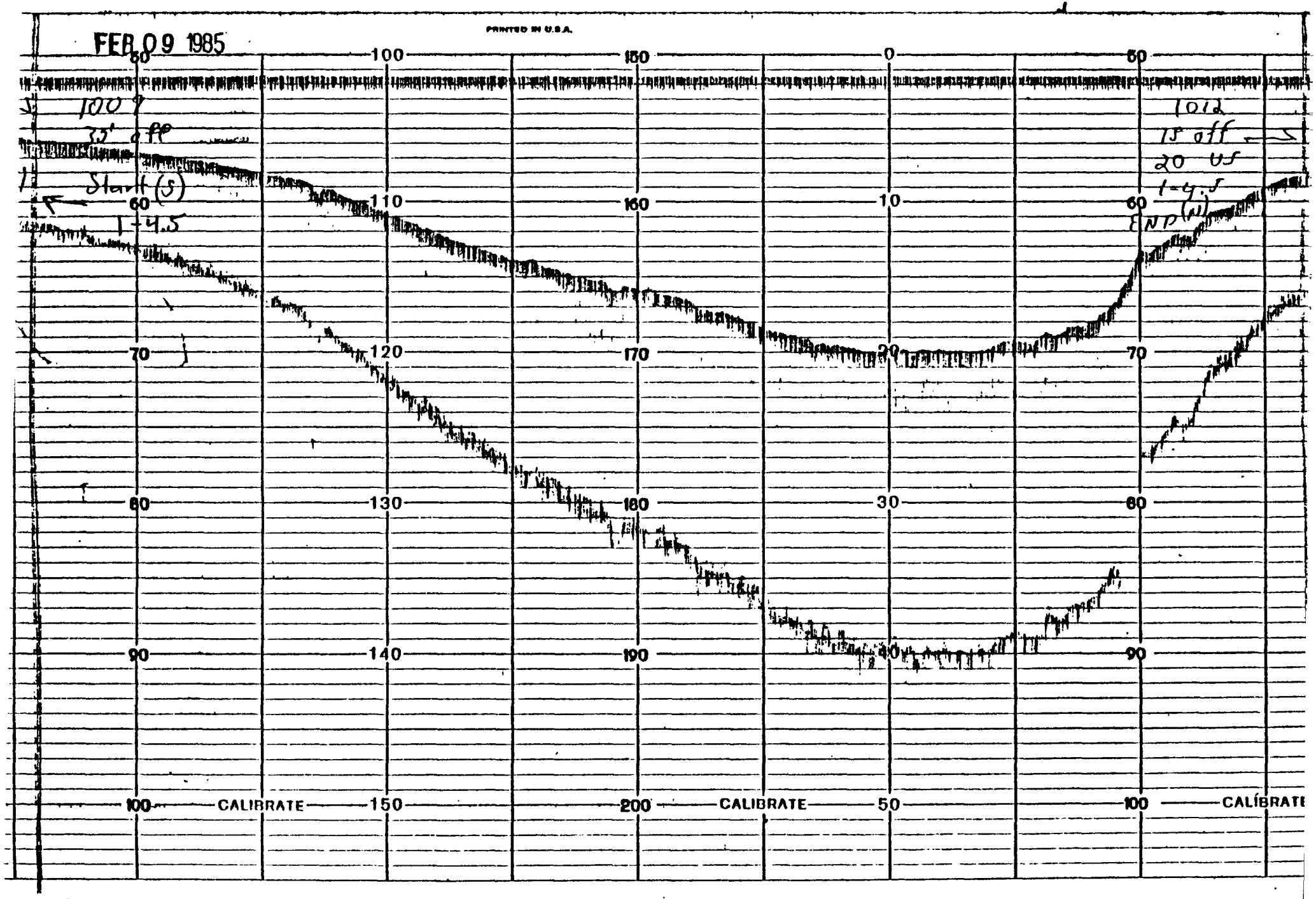

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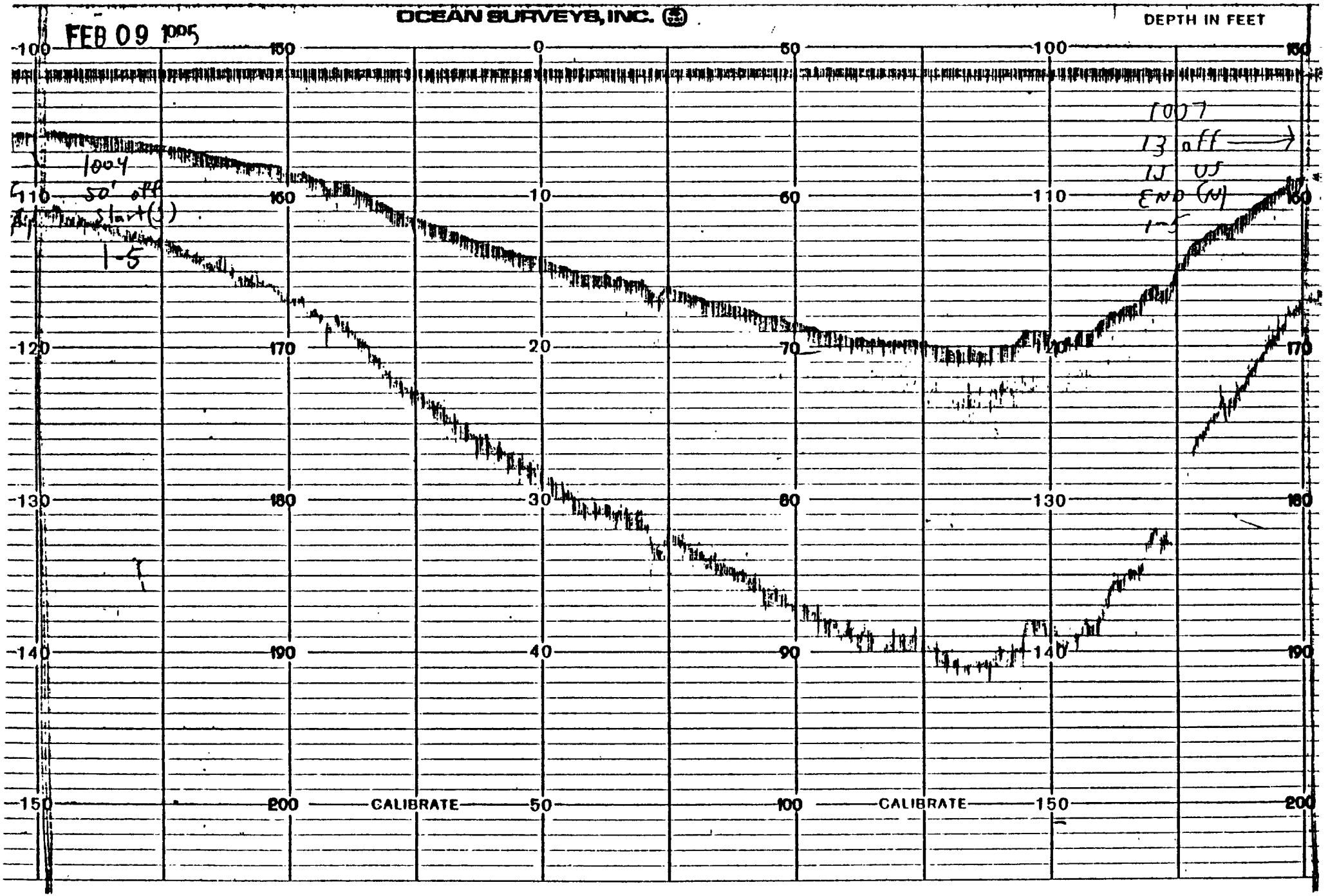

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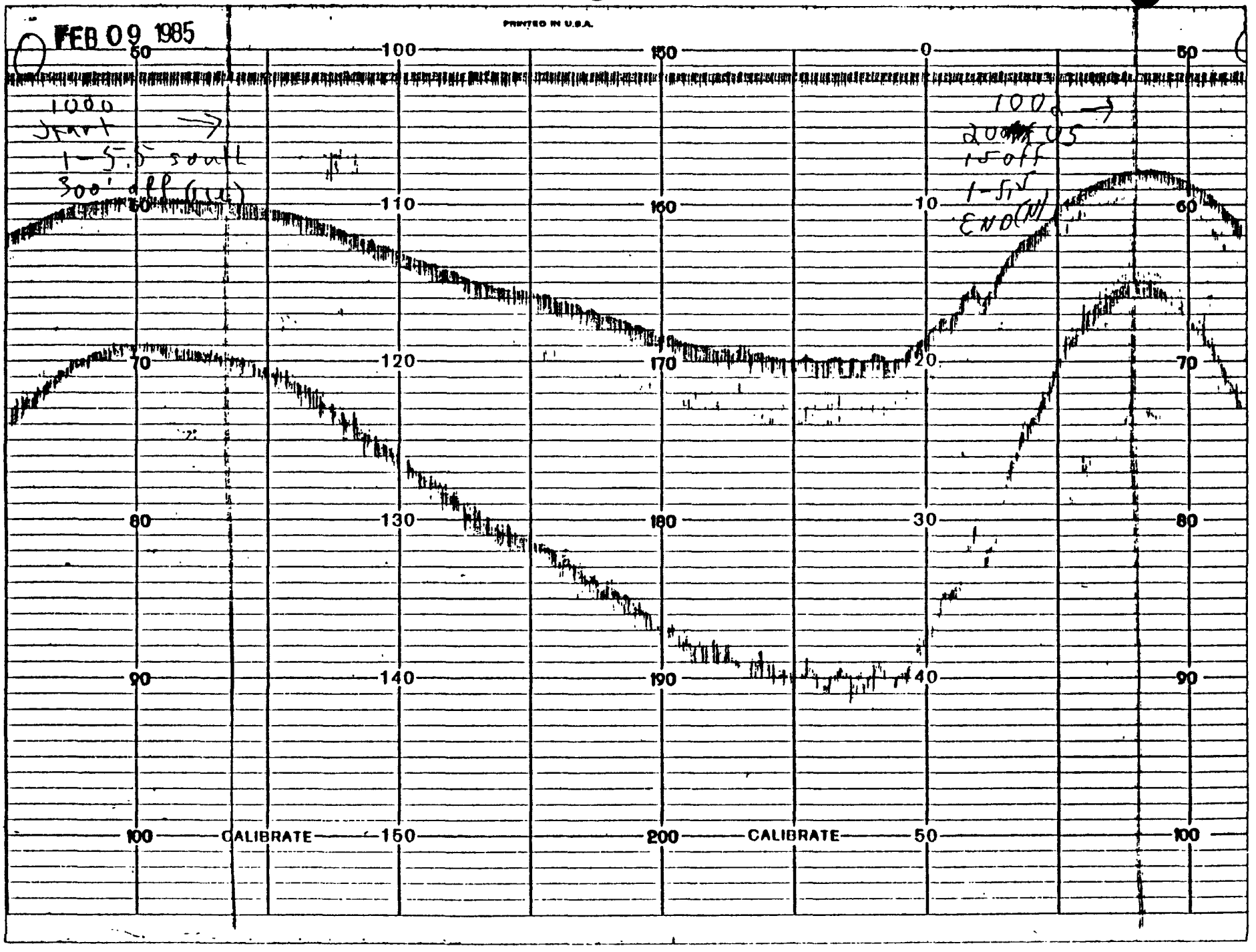

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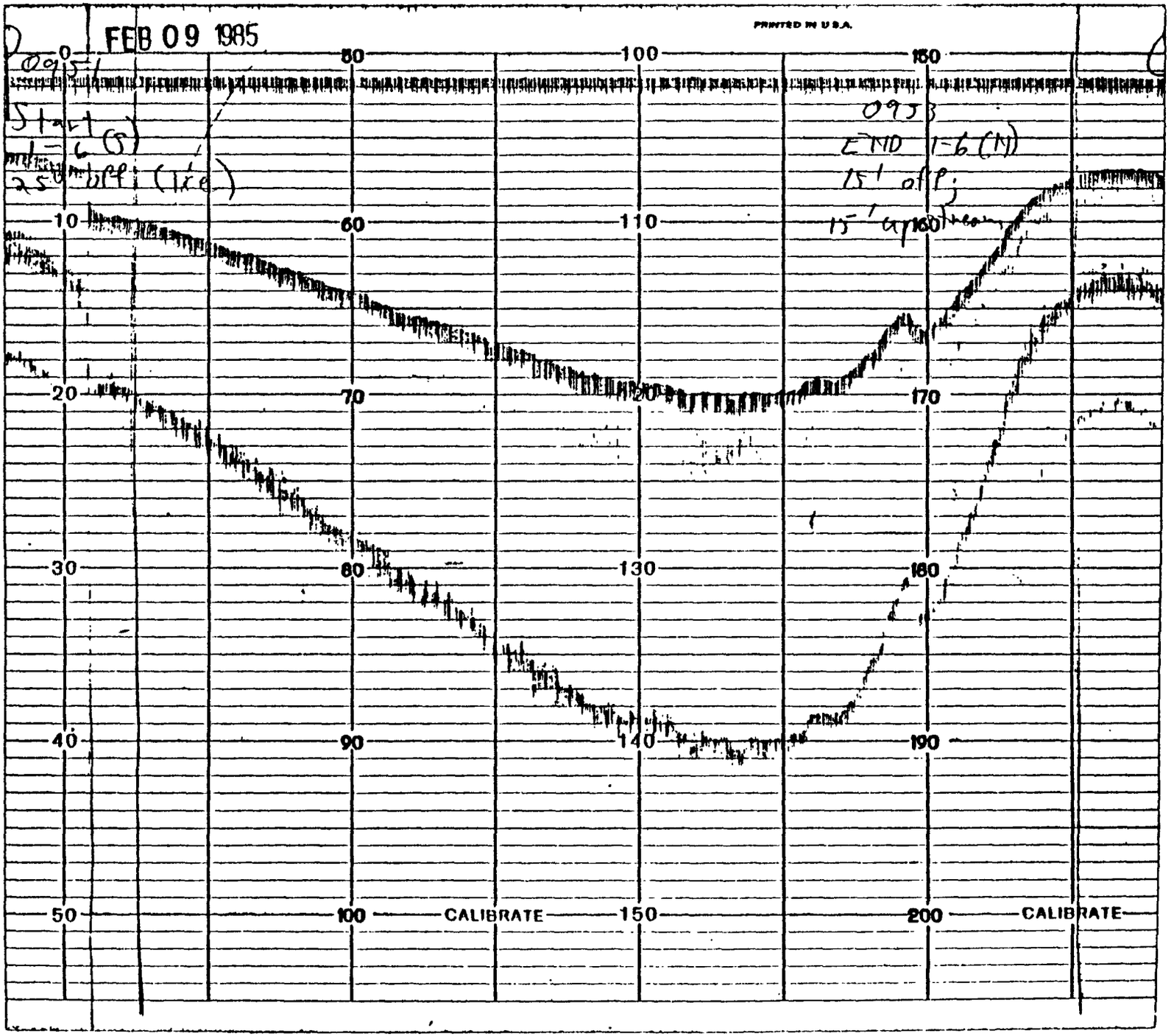

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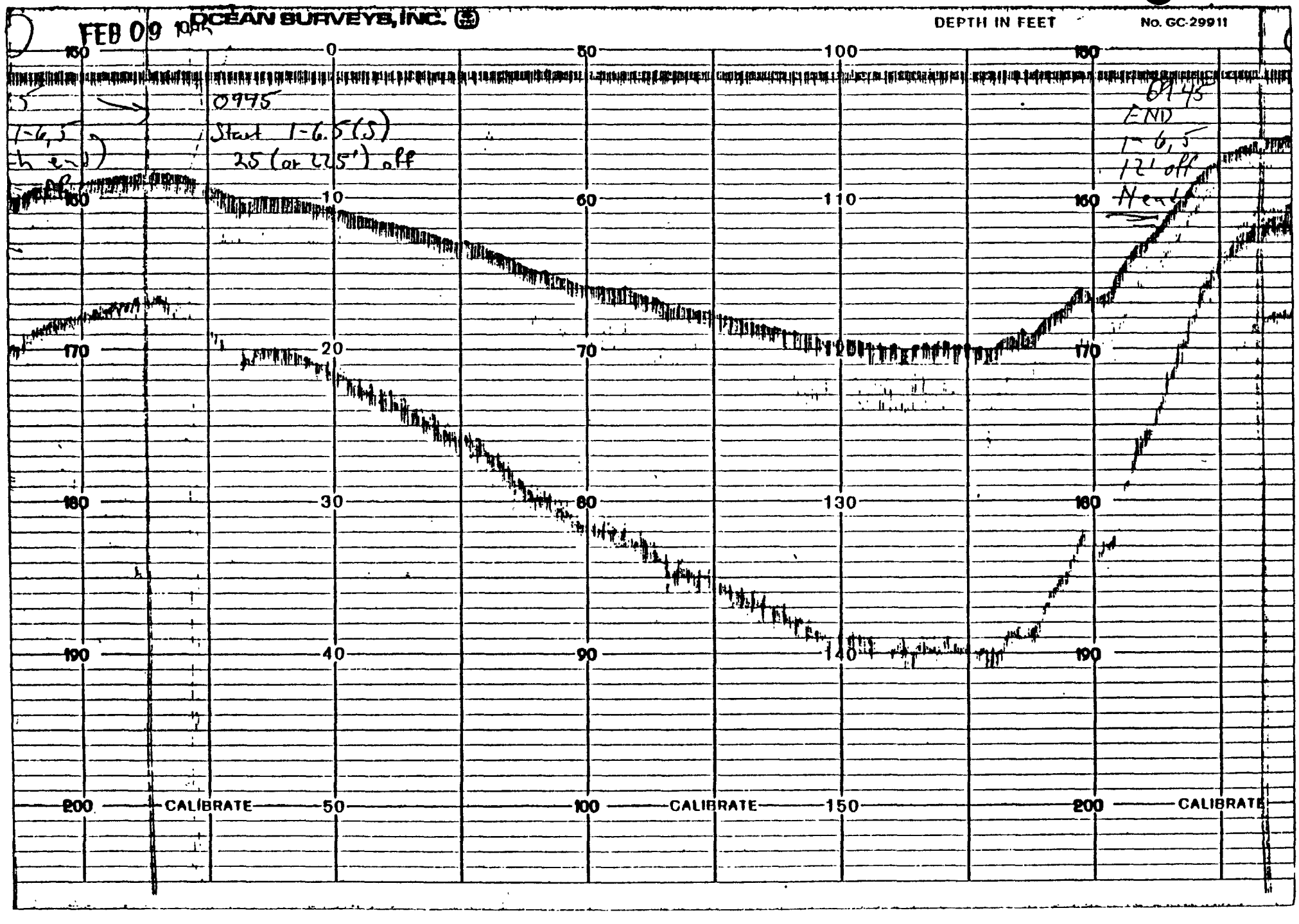

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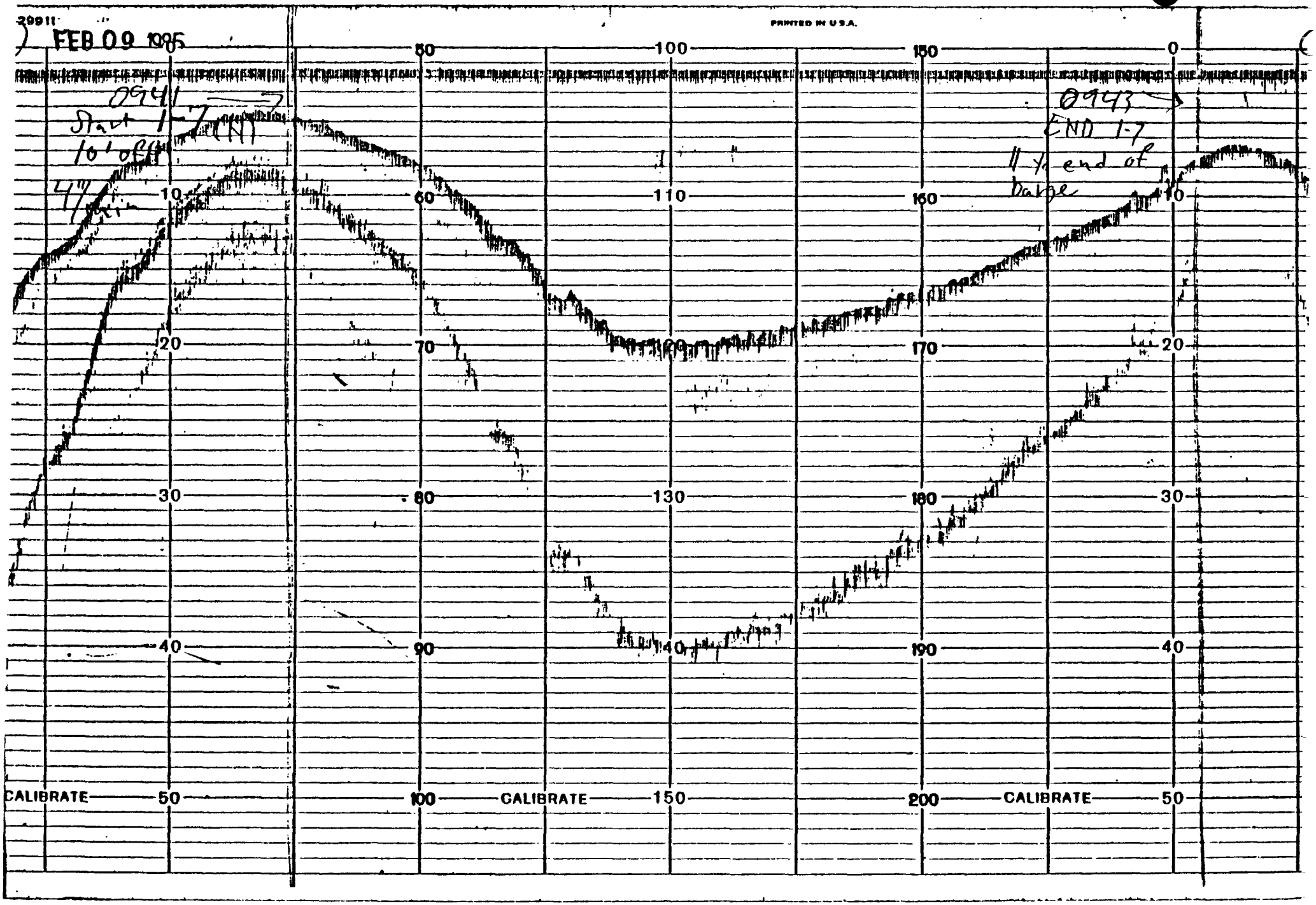

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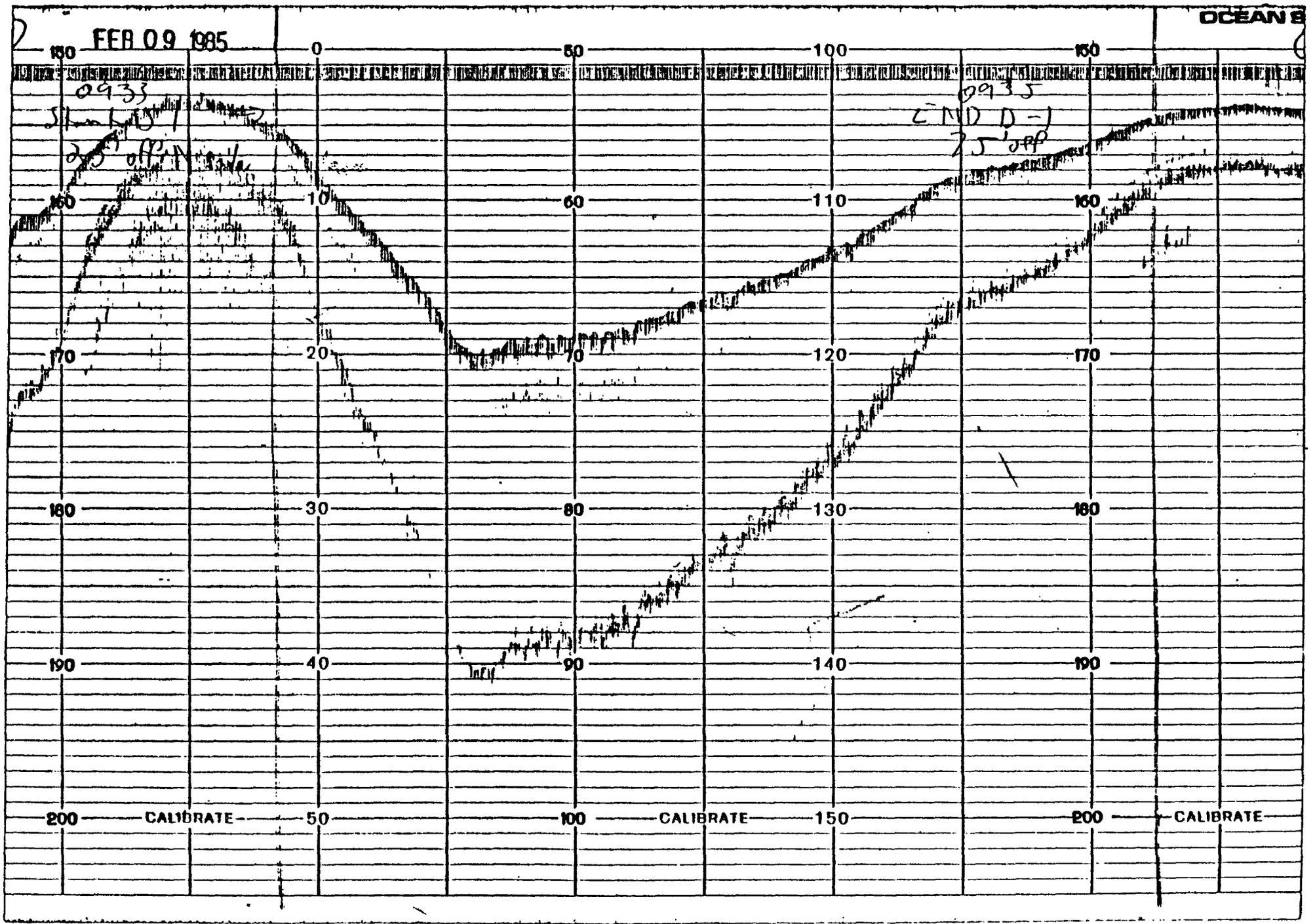

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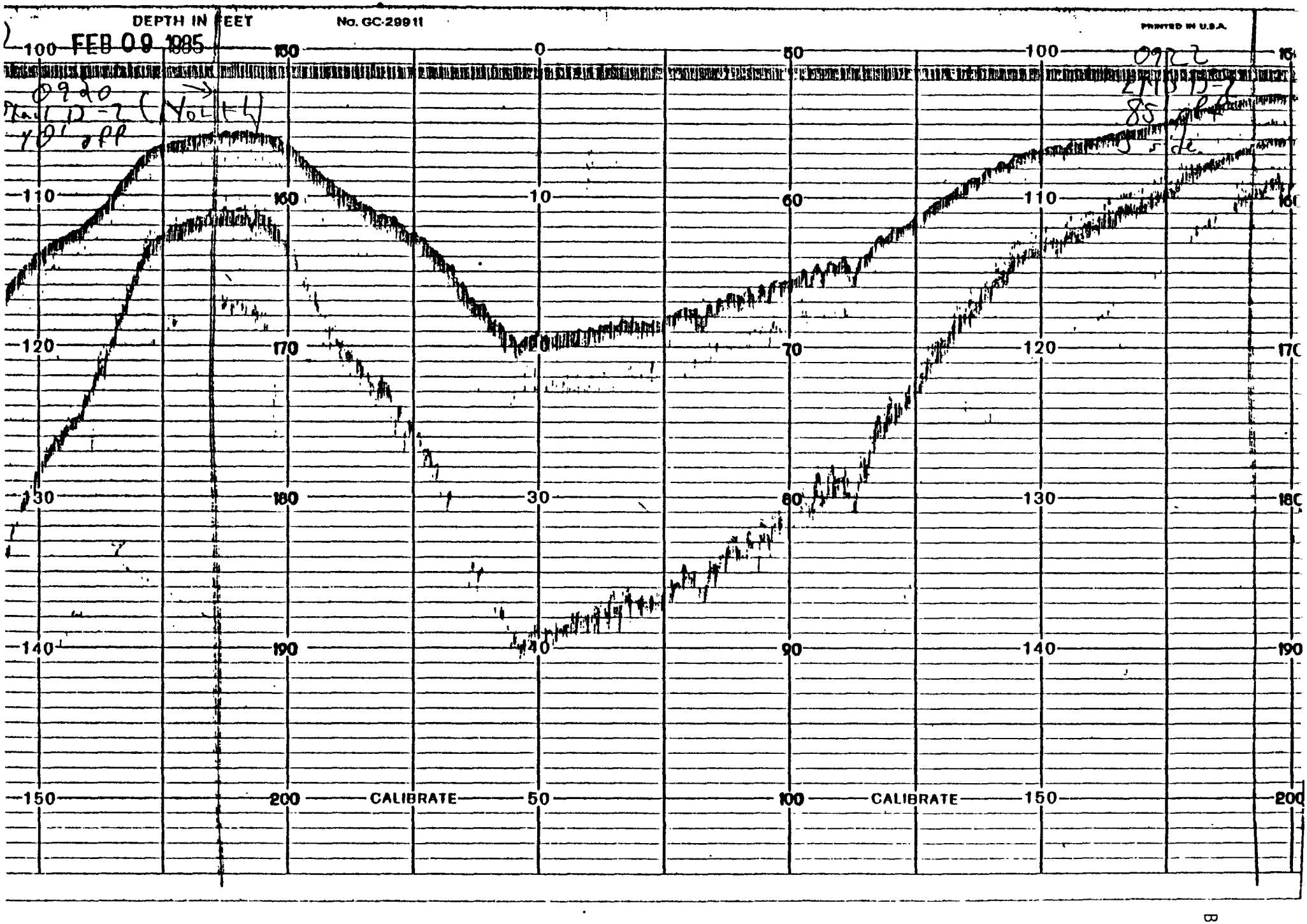

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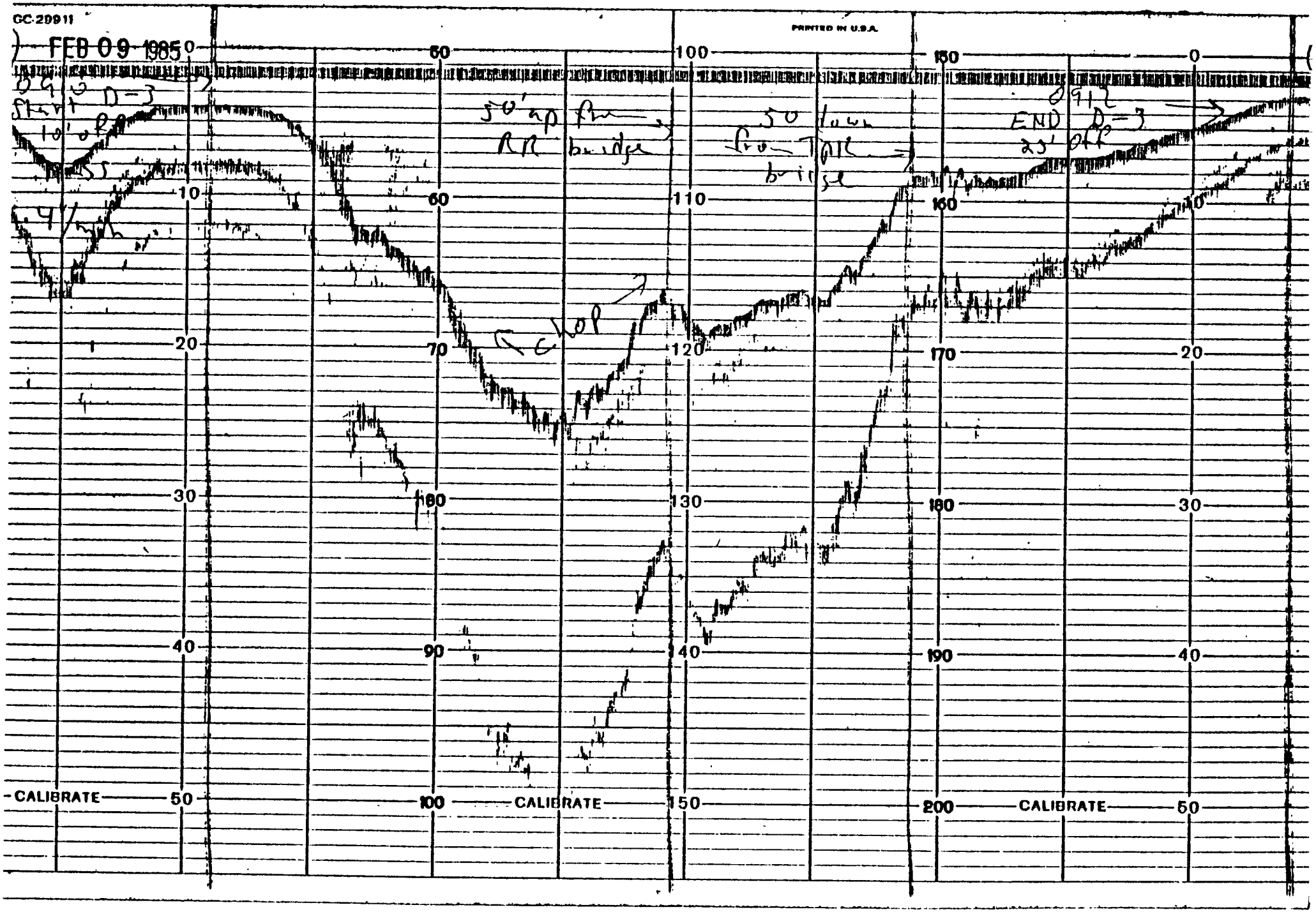

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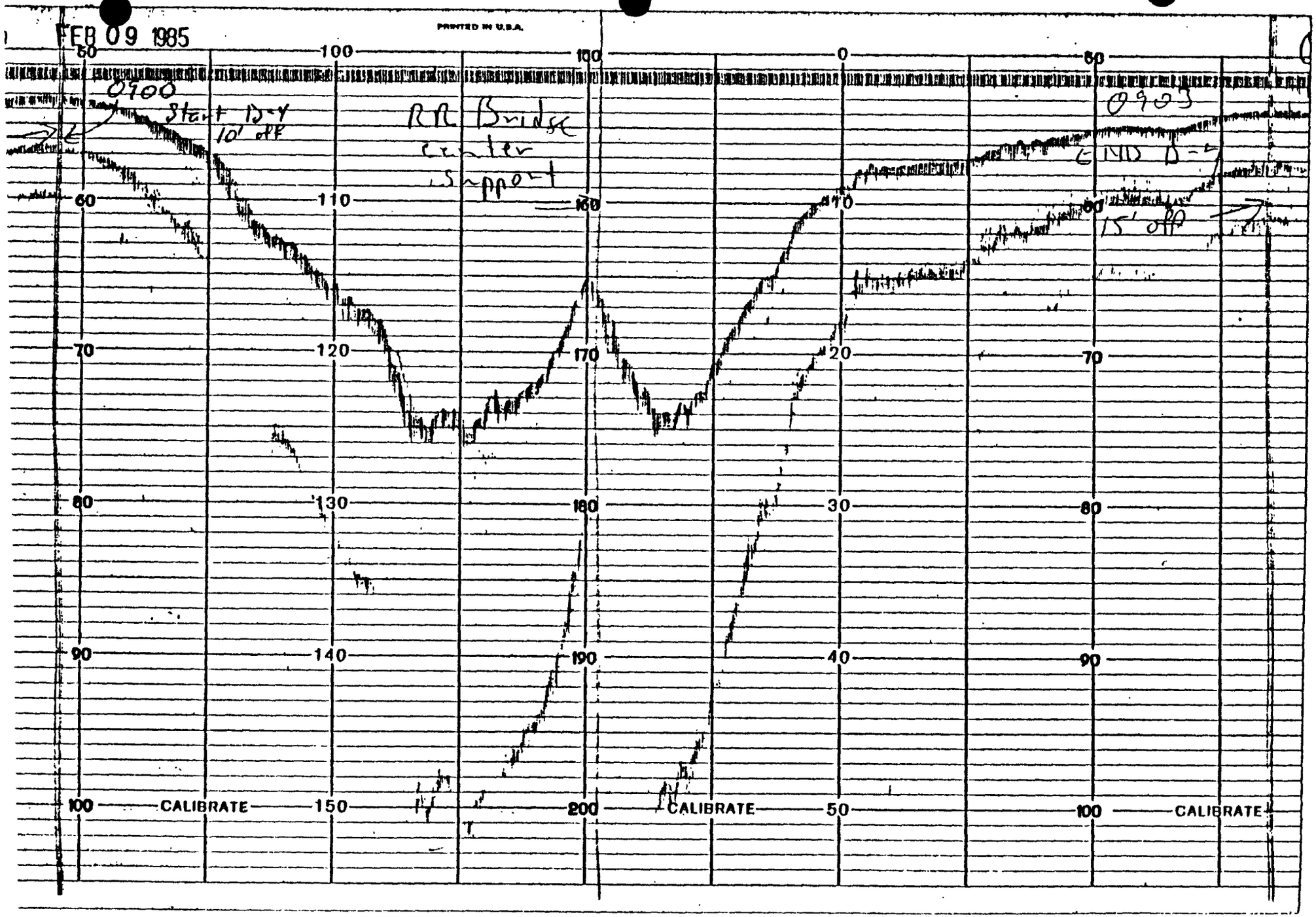

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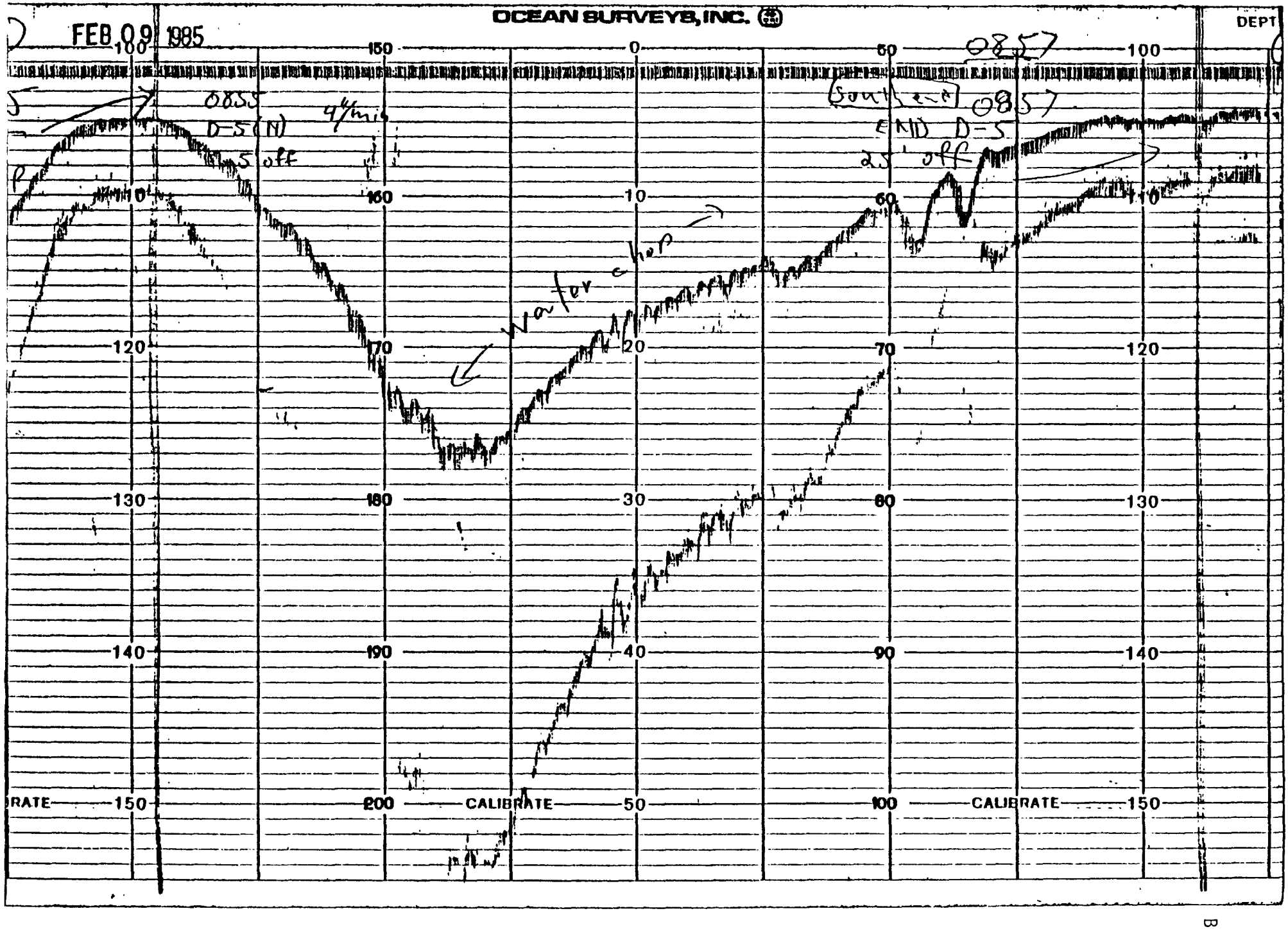

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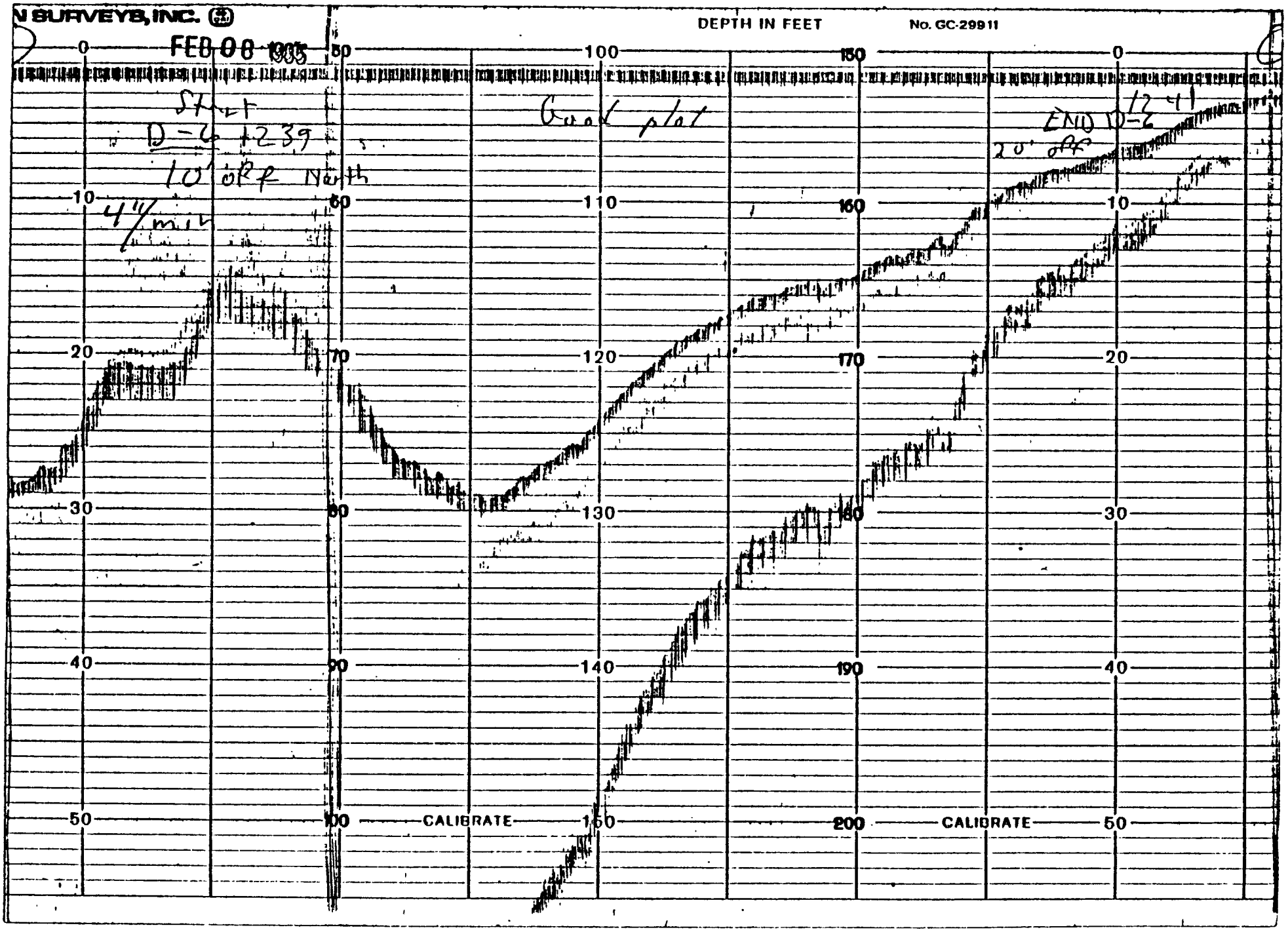

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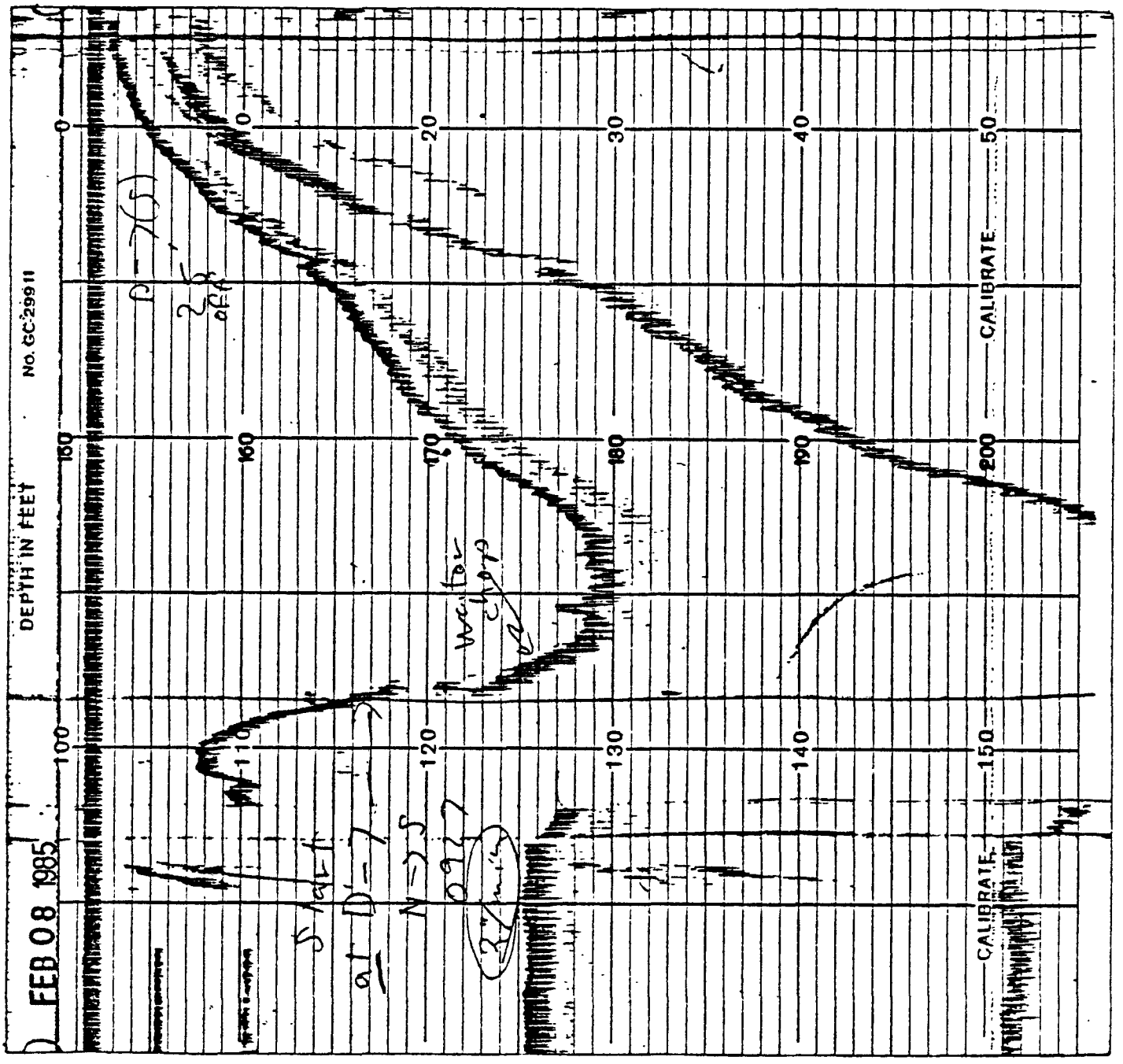
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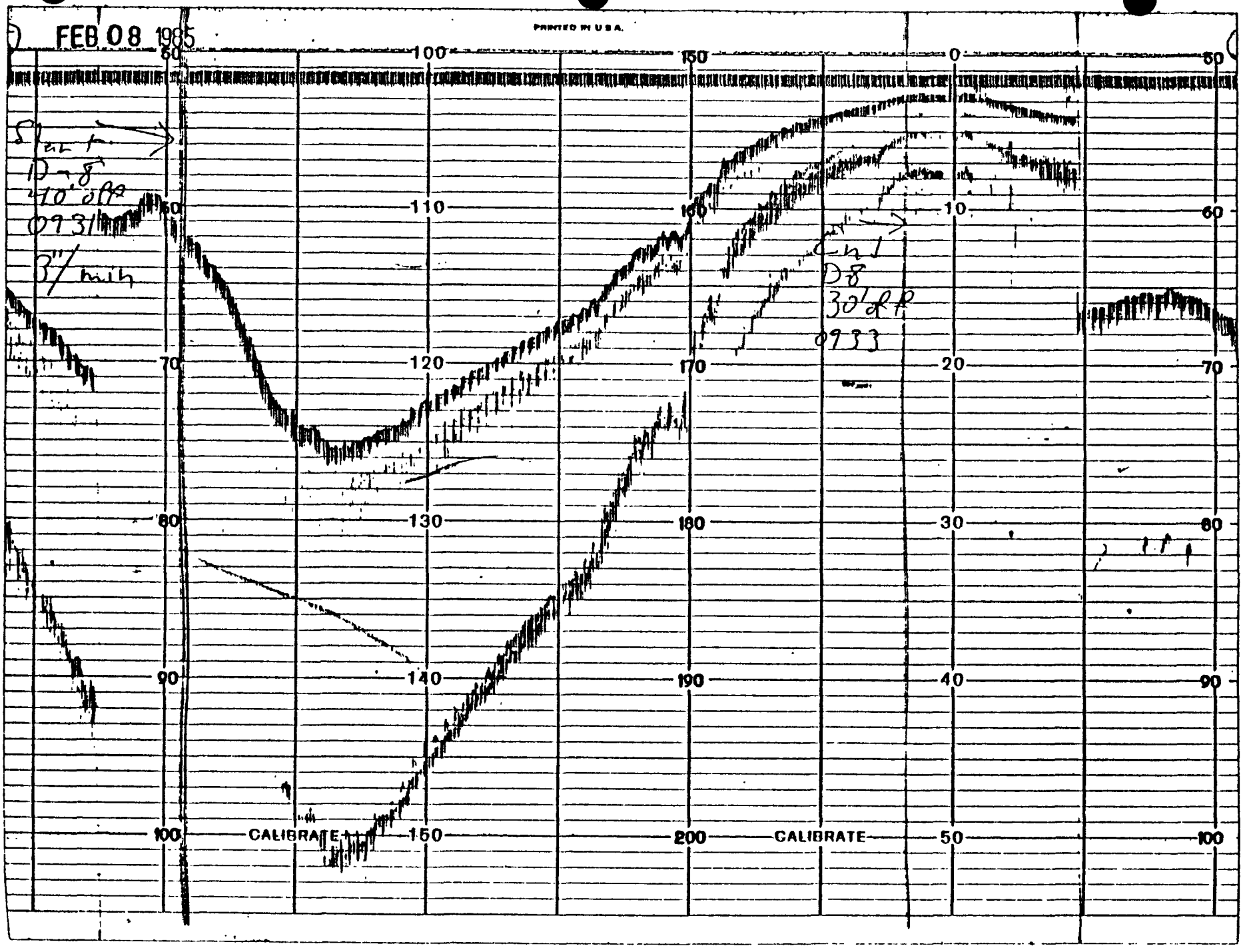

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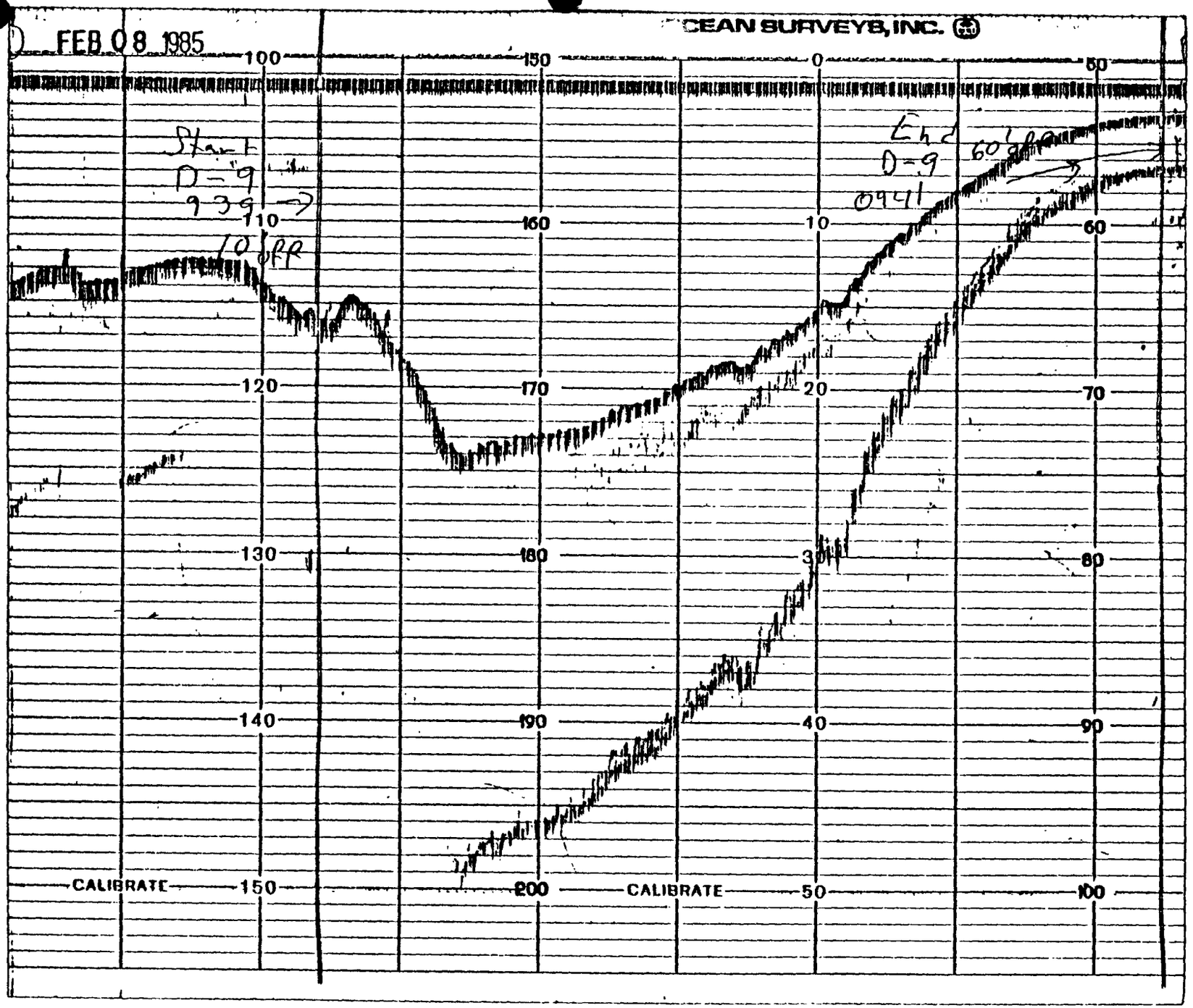

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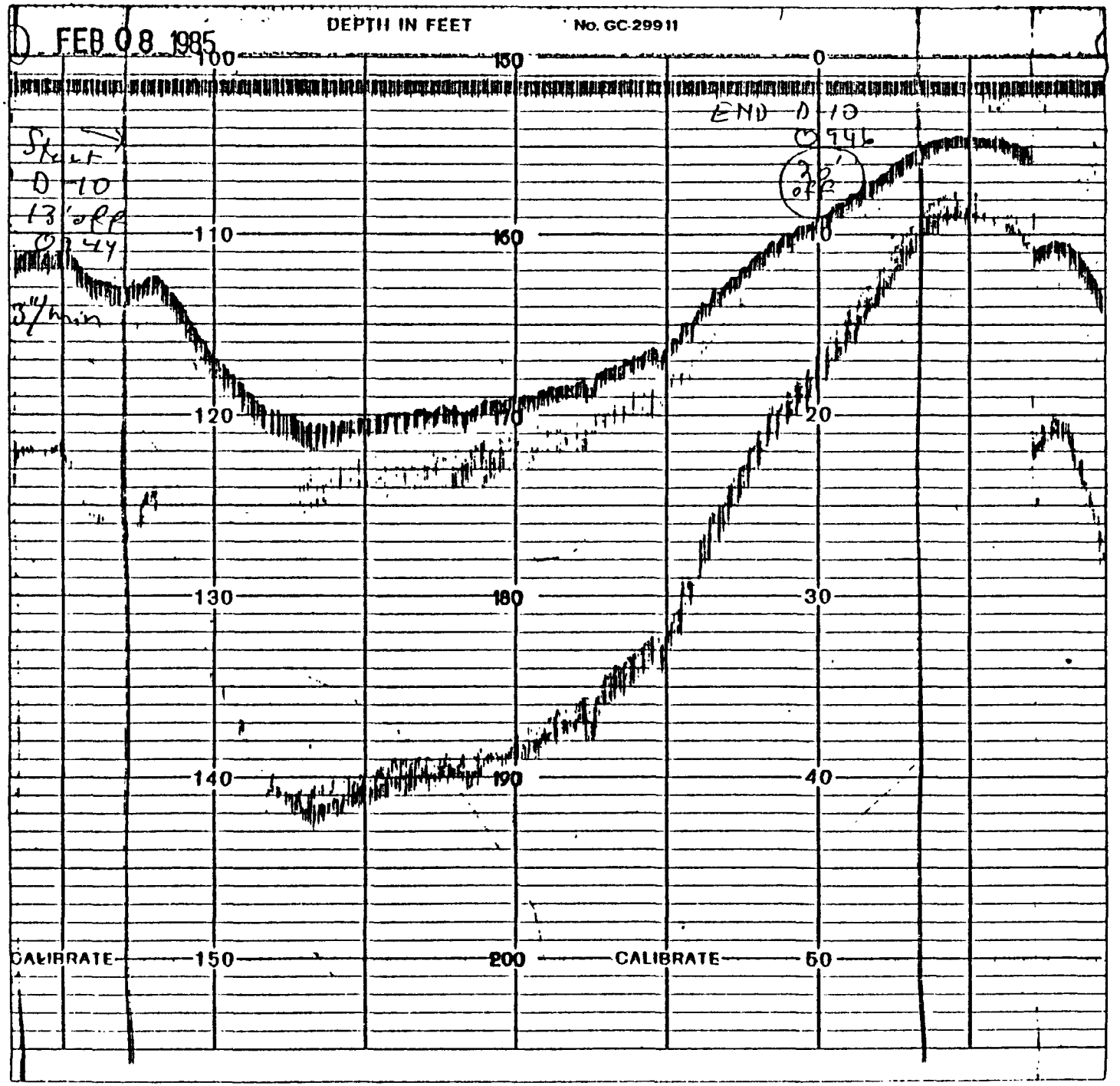

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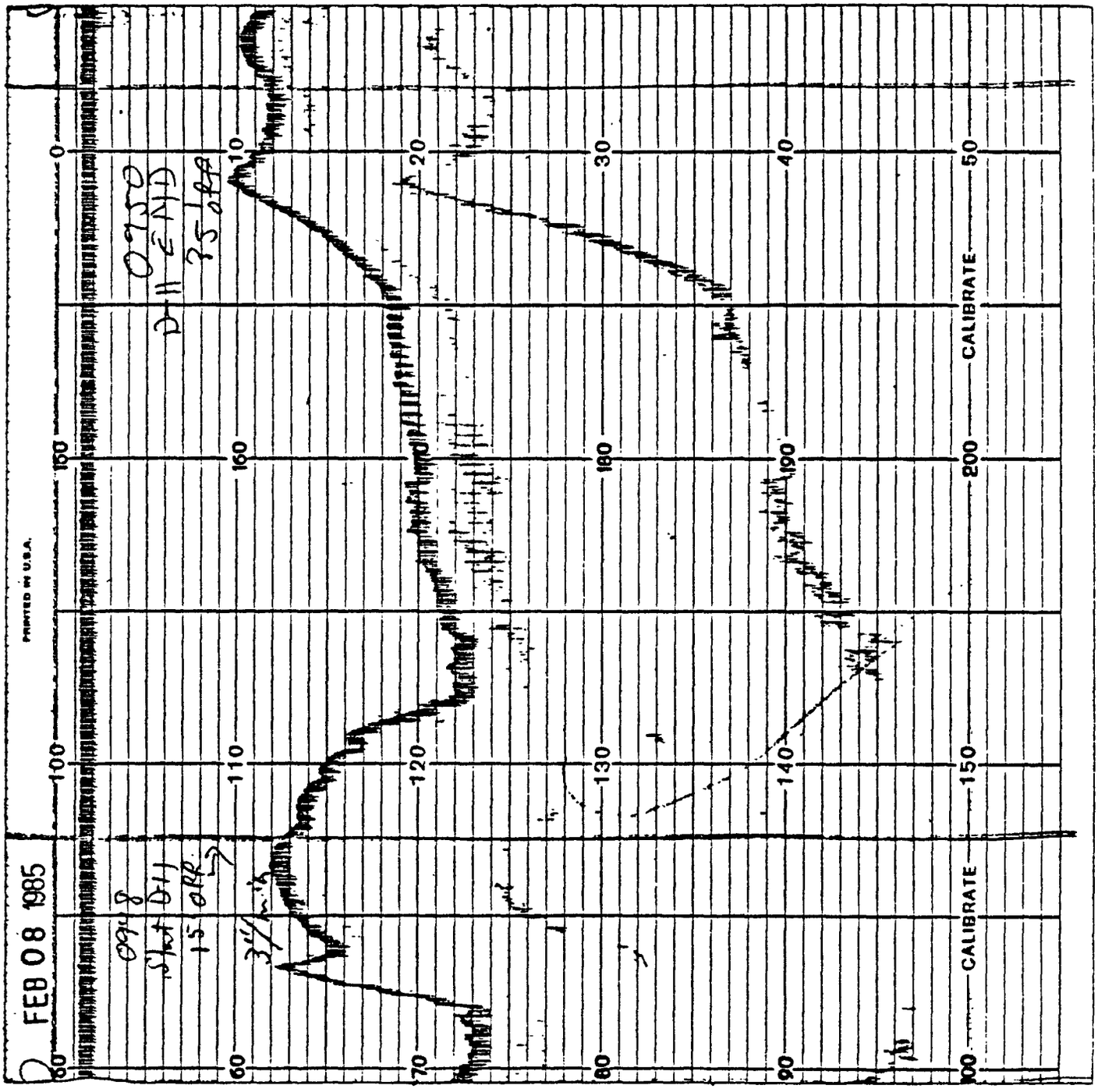
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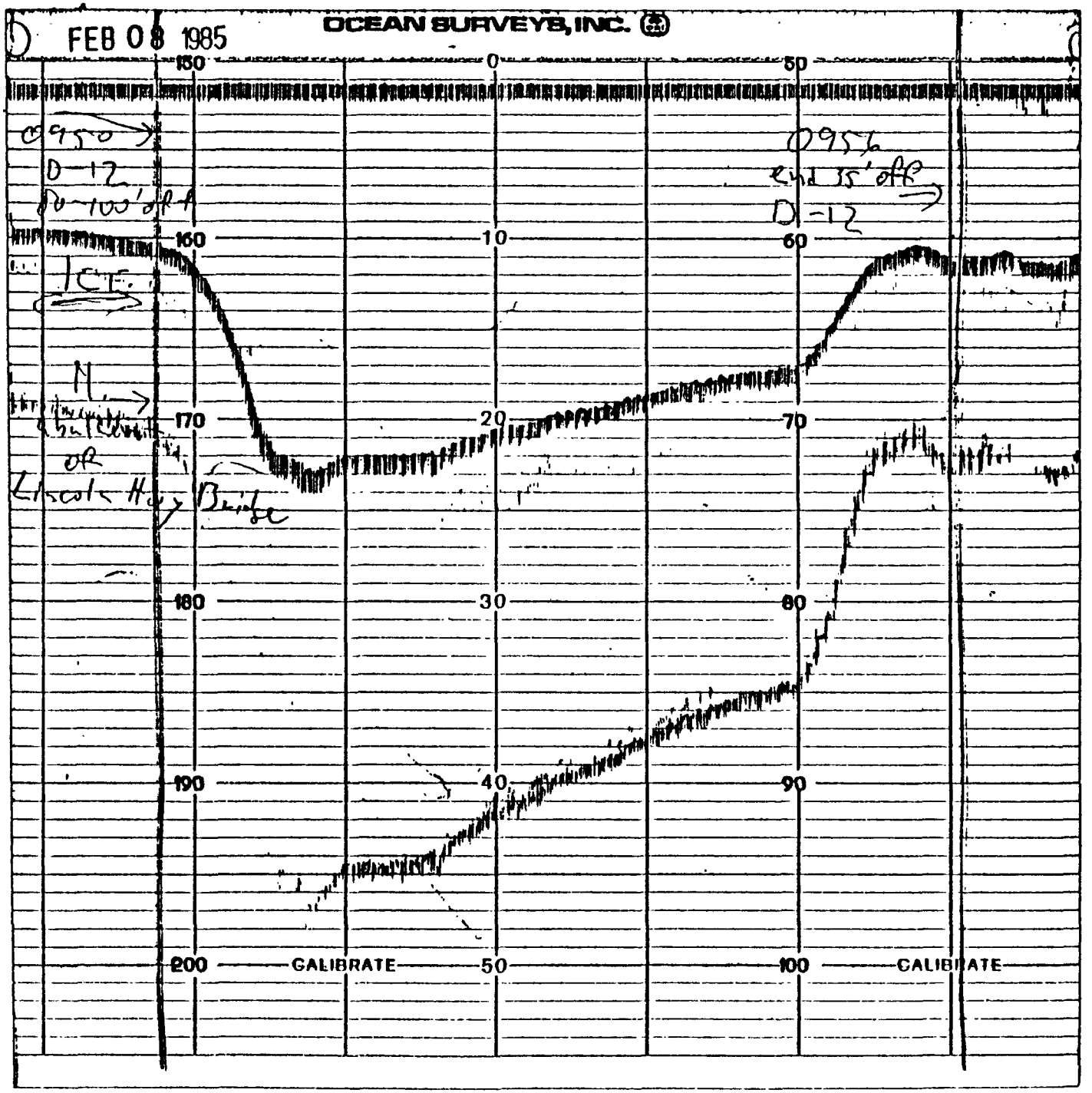

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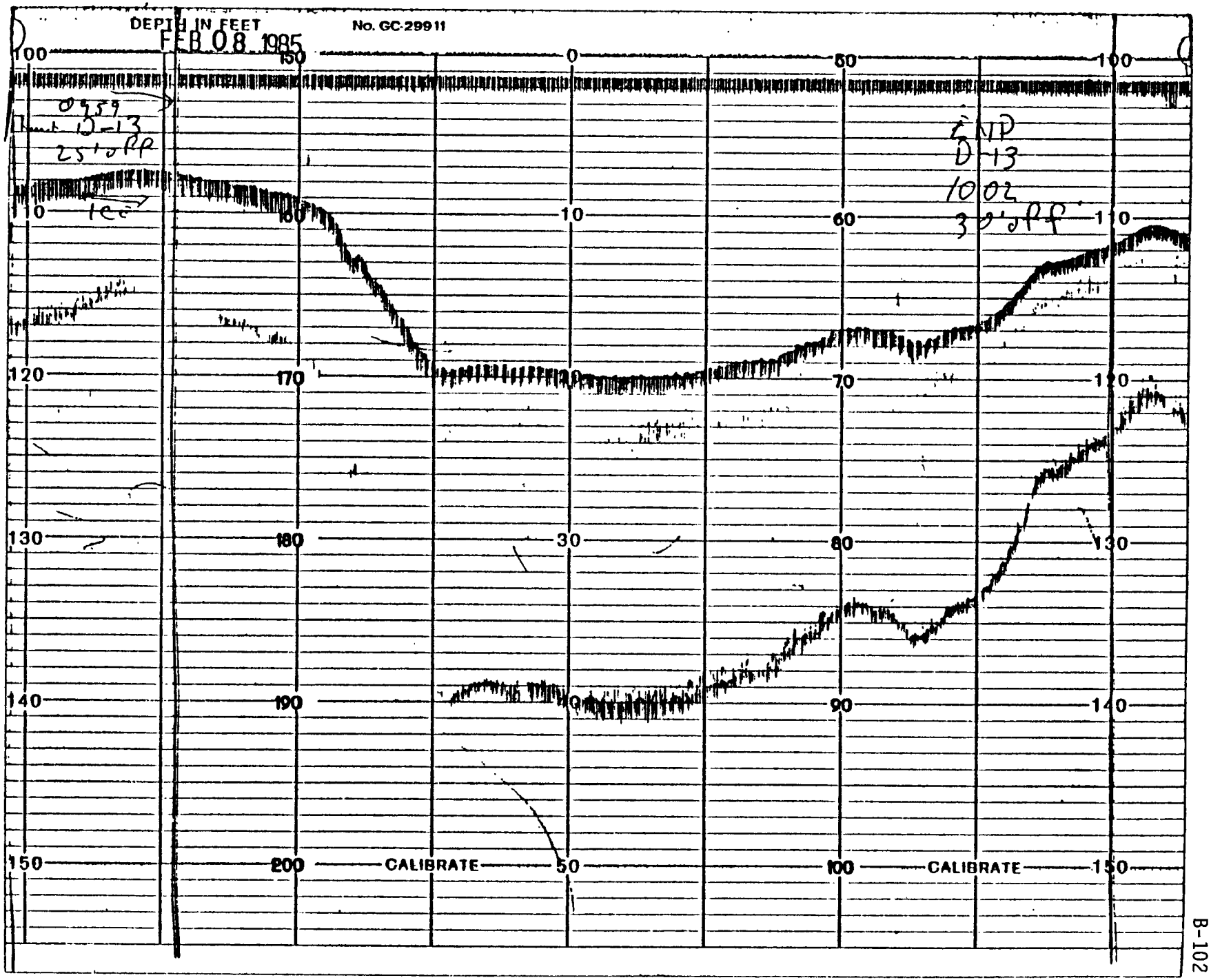

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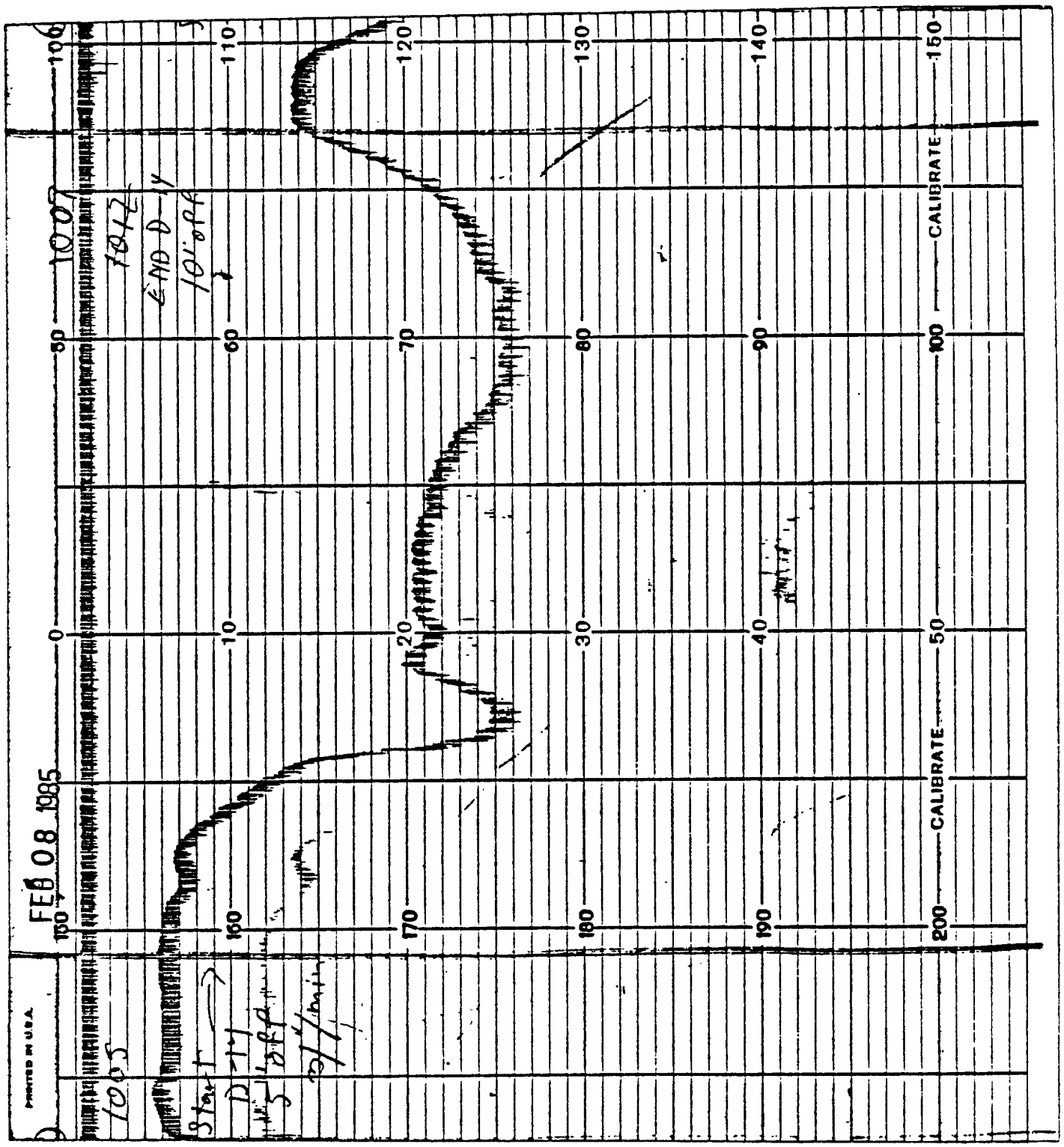
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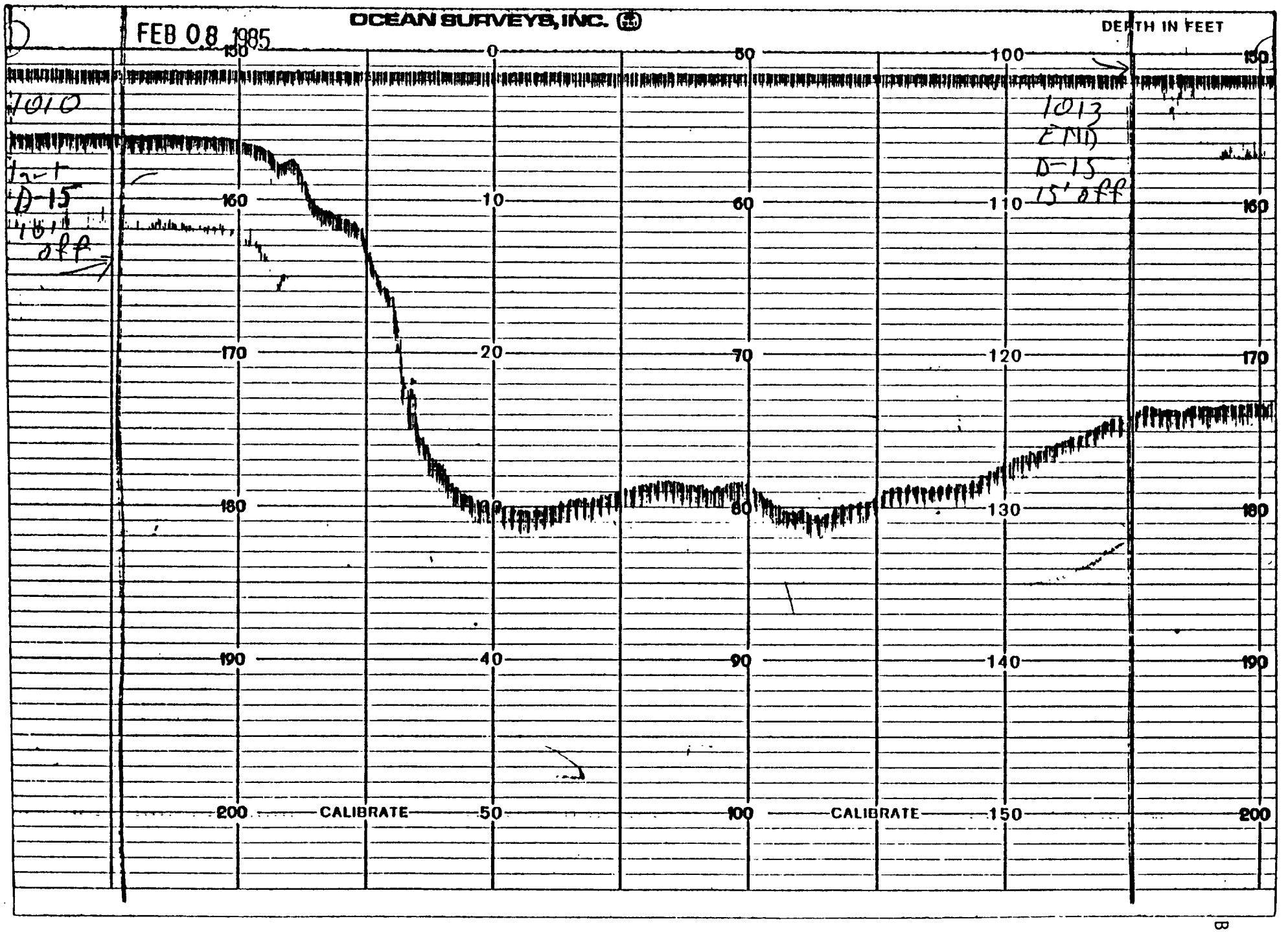

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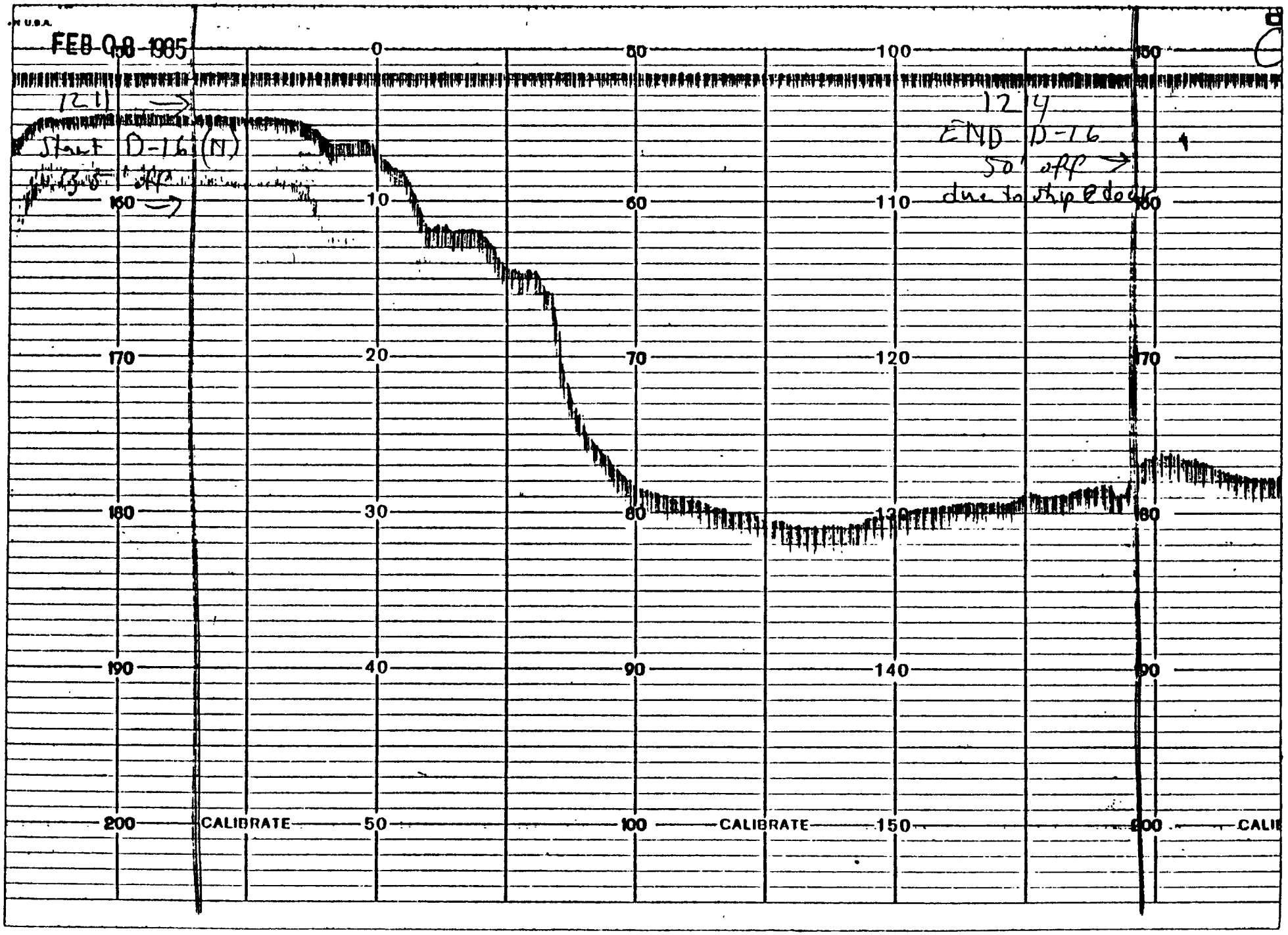

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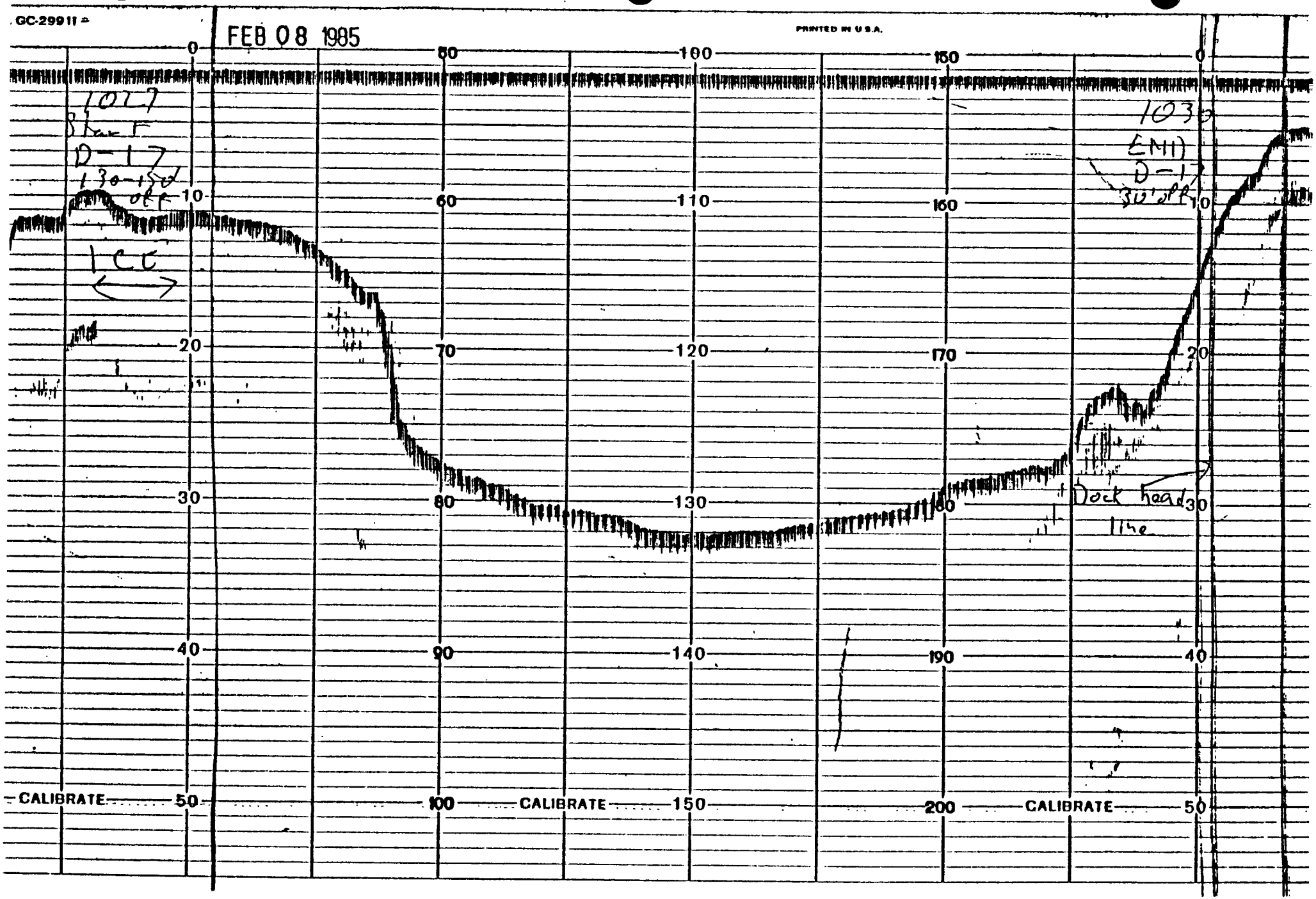

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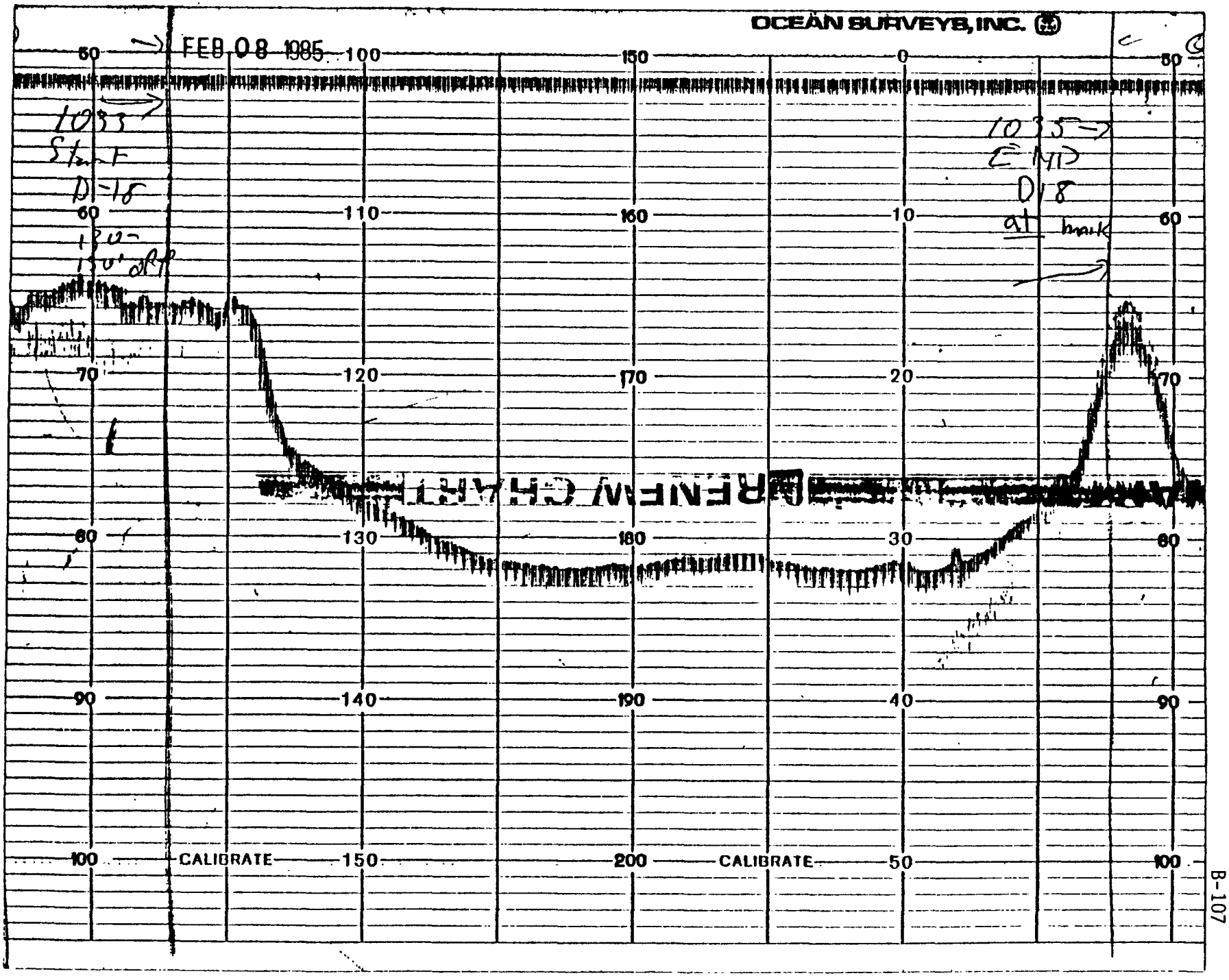

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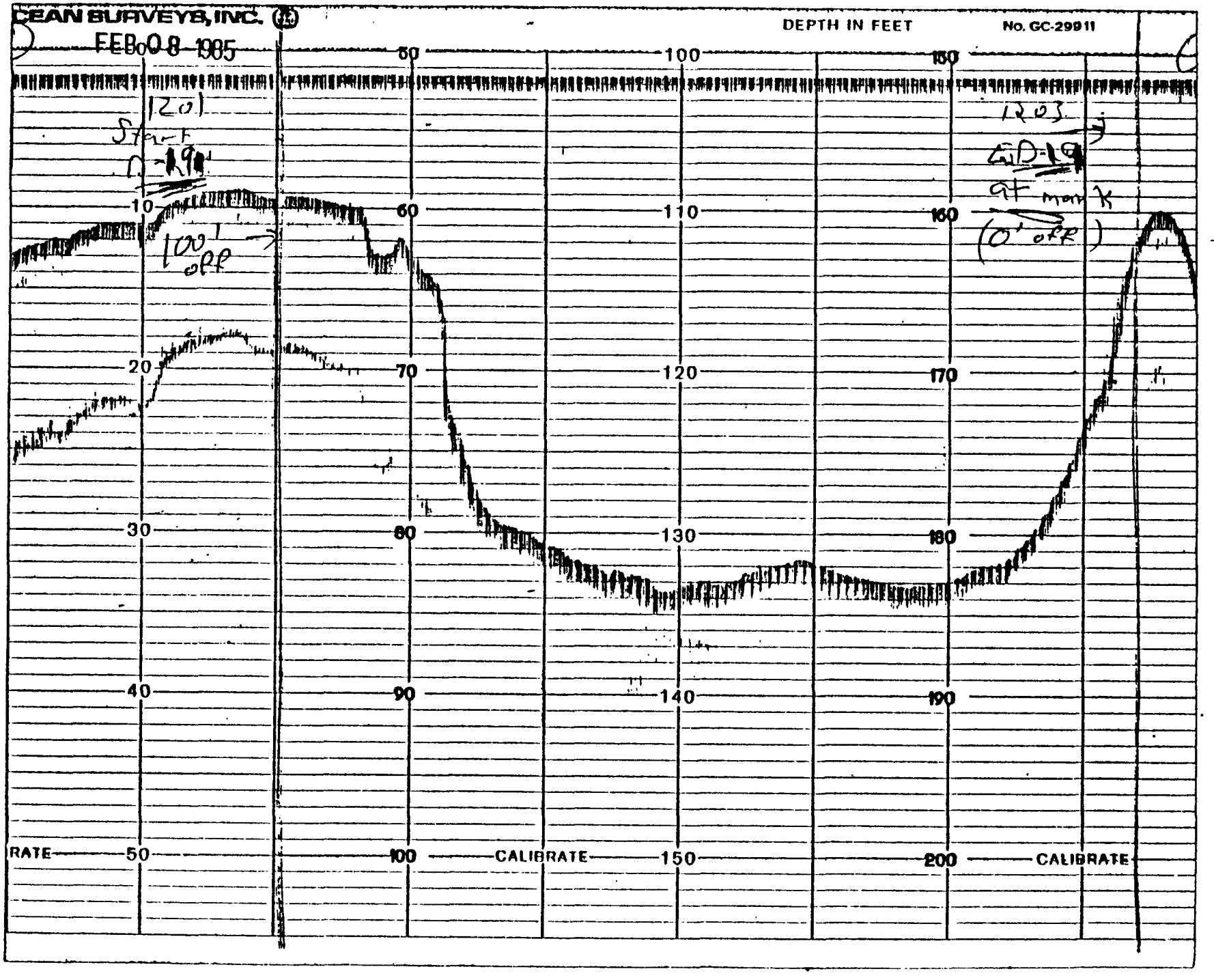

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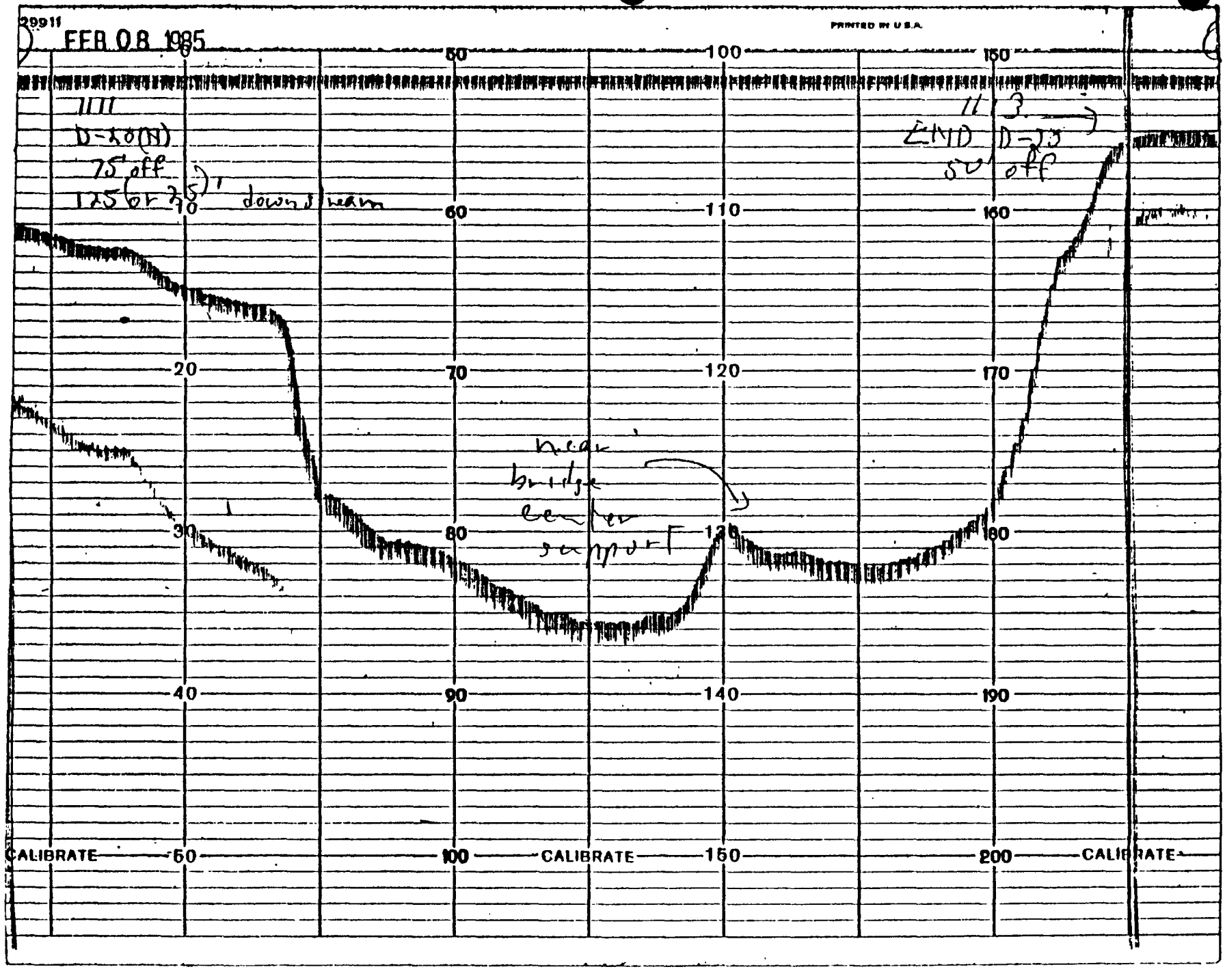

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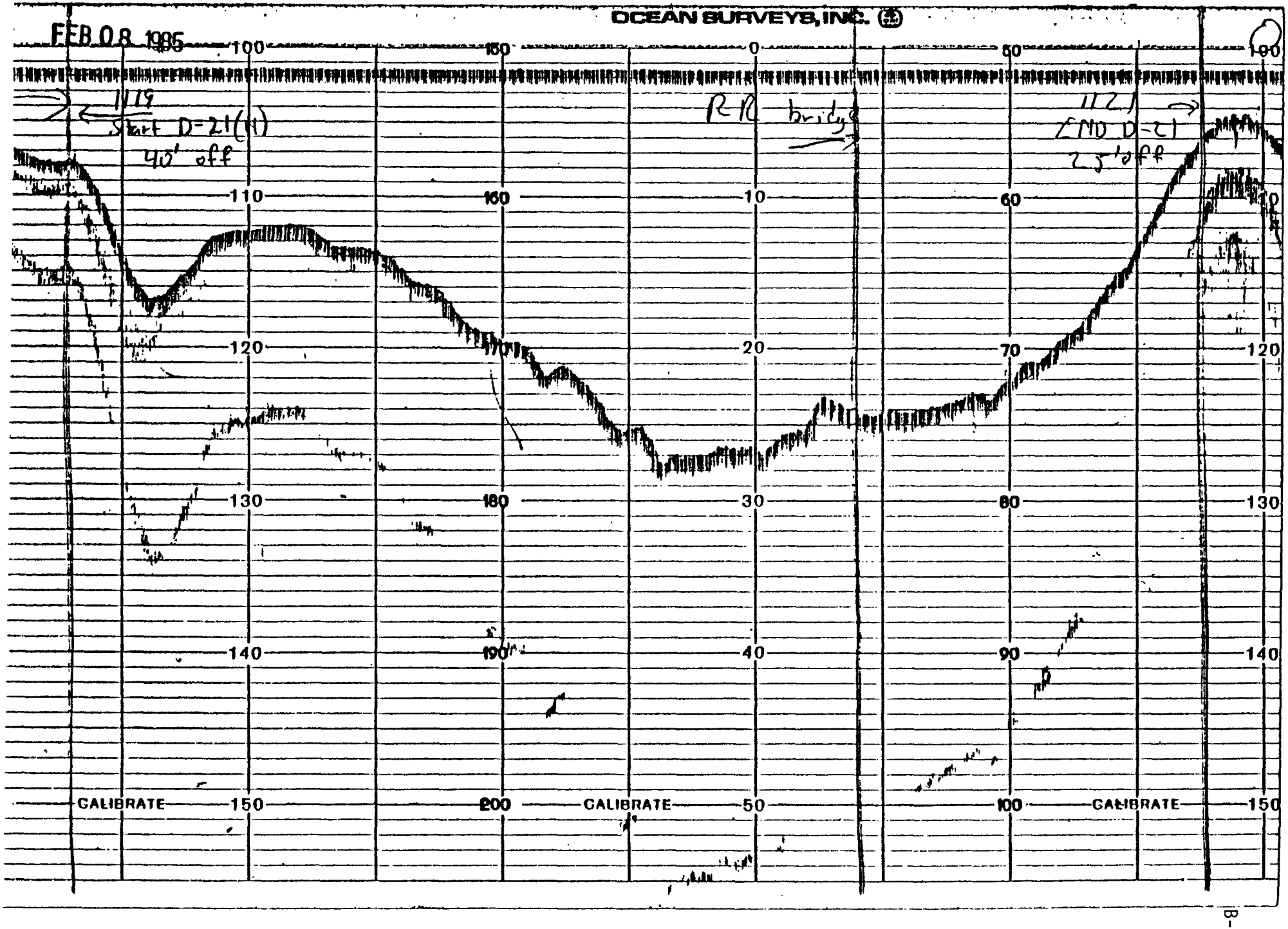

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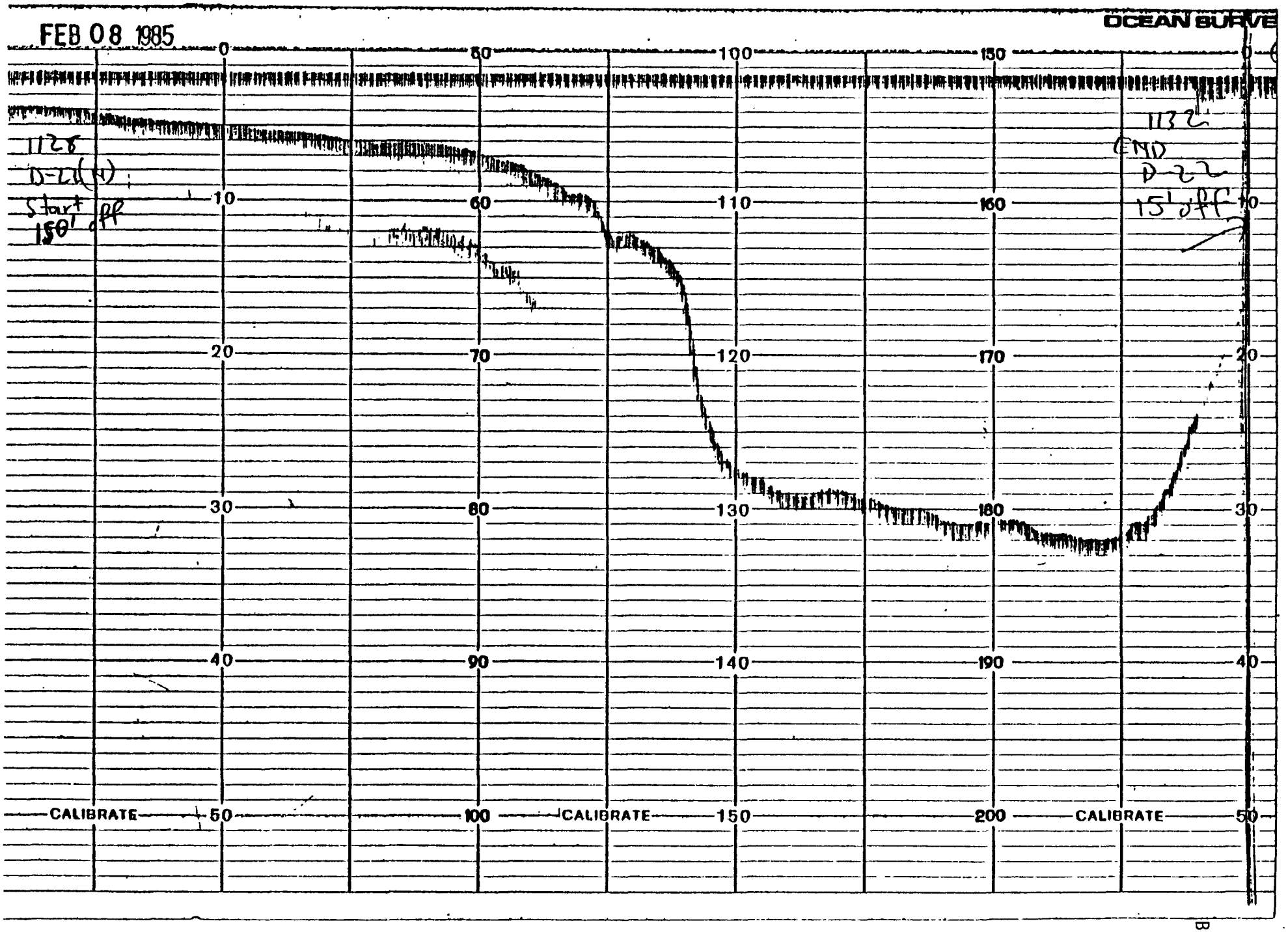

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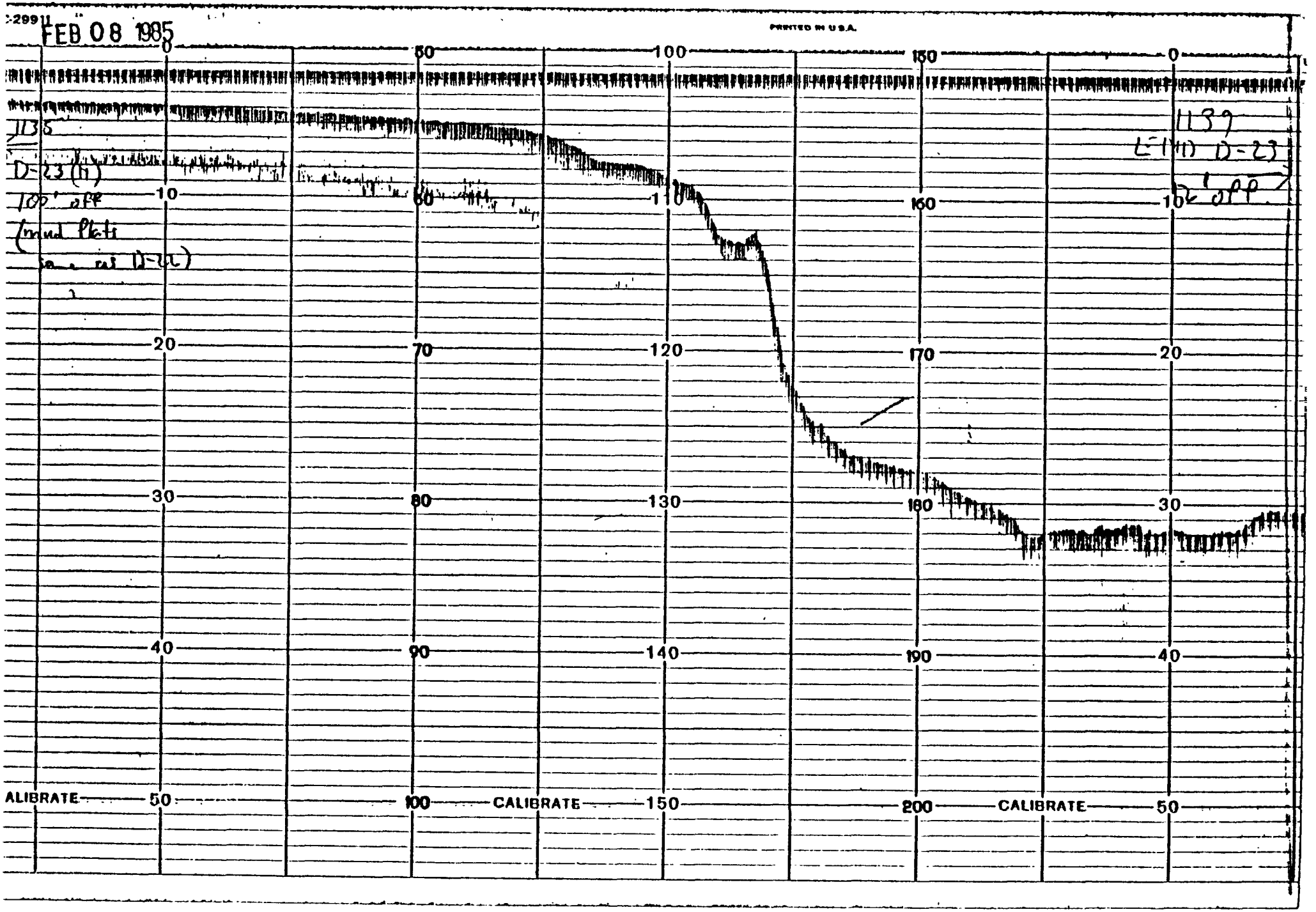

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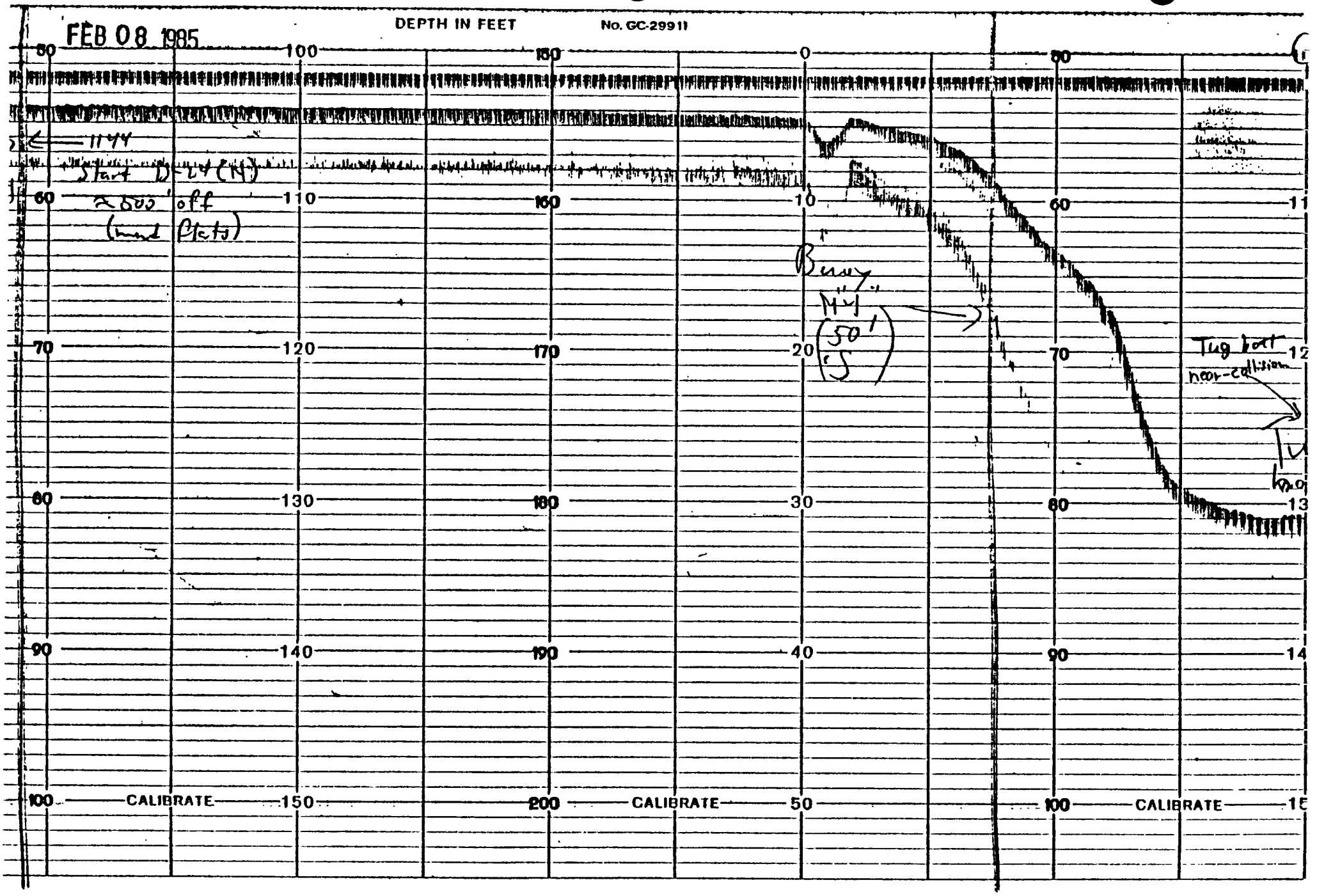

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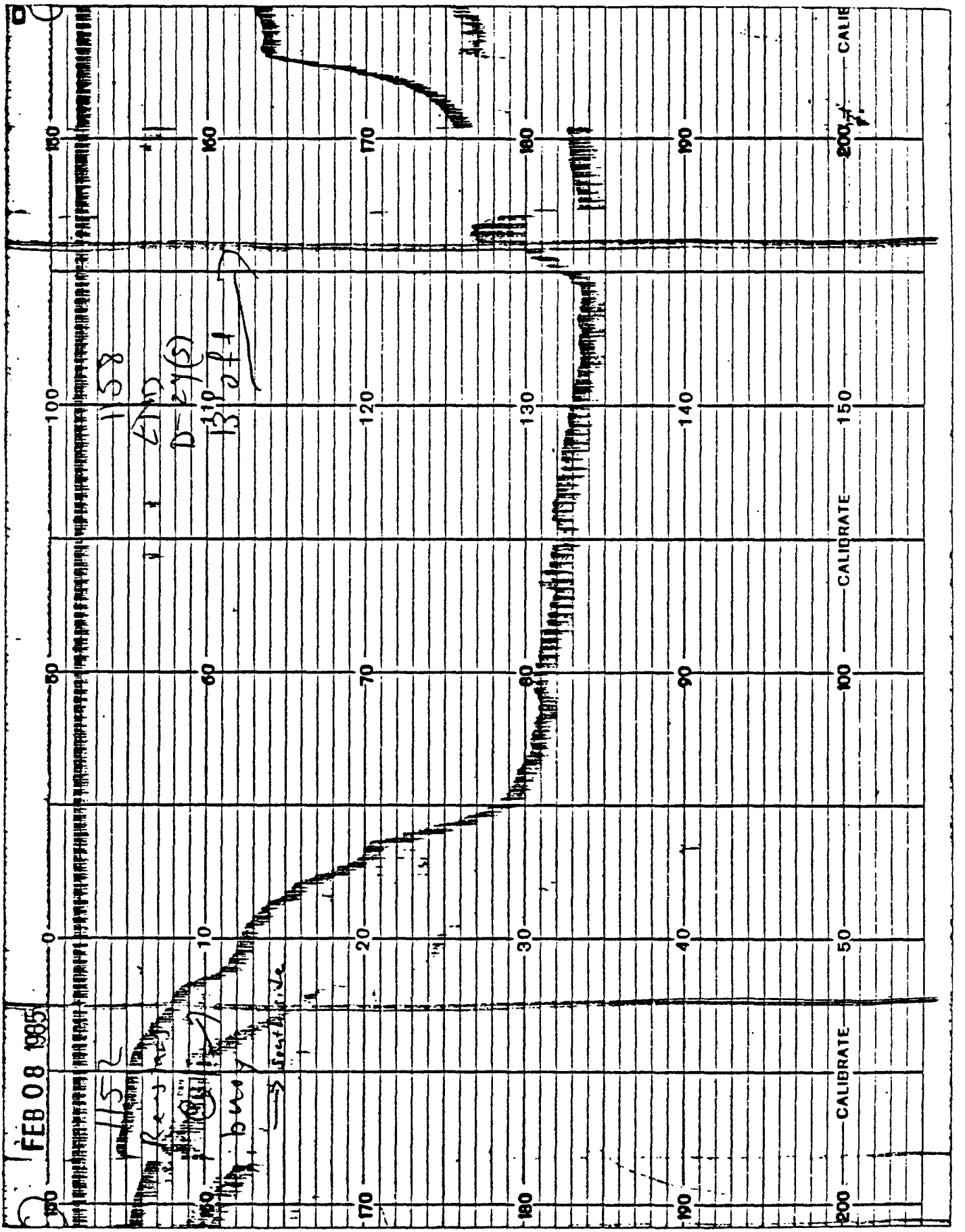
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200

TIDE GUAGE READINGS

N.J. Turnpike Bridge

Hydrologic Monitor
(surface)

Time: 0812
Date: 0208

Data I.D. 01
Sample mode 9

XD Scale 9.96
XD Depth 3.88 F
Int. level 2.65 F

Time: 1654
Date: 0204

0	MIN	0.00 F
15	MIN	3.34 F
30	MIN	3.75 F
45	MIN	4.12 F
60	MIN	4.47 F
75	MIN	4.77 F
90	MIN	5.04 F
105	MIN	5.25 F
120	MIN	5.39 F
135	MIN	5.55 F
150	MIN	5.67 F
165	MIN	5.77 F
180	MIN	5.78 F
195	MIN	5.73 F
210	MIN	5.64 F
225	MIN	5.44 F
240	MIN	5.21 F
255	MIN	4.91 F
270	MIN	4.59 F
285	MIN	4.23 F
300	MIN	3.85 F
315	MIN	3.48 F
330	MIN	3.08 F
345	MIN	2.74 F
360	MIN	2.35 F
375	MIN	1.99 F
390	MIN	1.61 F
405	MIN	1.29 F
420	MIN	1.01 F
435	MIN	0.80 F
450	MIN	0.62 F
465	MIN	0.49 F
480	MIN	0.38 F
495	MIN	0.31 F
510	MIN	0.26 F
525	MIN	0.20 F
540	MIN	0.21 F
555	MIN	0.24 F
570	MIN	0.29 F
585	MIN	0.36 F
600	MIN	0.53 F
615	MIN	0.76 F
630	MIN	1.06 F
645	MIN	1.40 F
660	MIN	1.81 F
675	MIN	2.27 F
690	MIN	2.71 F
705	MIN	3.21 F
720	MIN	3.67 F
735	MIN	4.18 F
750	MIN	4.66 F
765	MIN	5.12 F
780	MIN	5.55 F
795	MIN	5.89 F
810	MIN	6.21 F
825	MIN	6.41 F
840	MIN	6.57 F
855	MIN	6.67 F
870	MIN	6.71 F
885	MIN	6.73 F
900	MIN	6.74 F
915	MIN	6.73 F
930	MIN	6.67 F
945	MIN	6.64 F
960	MIN	6.56 F
975	MIN	6.44 F
990	MIN	6.24 F
1005	MIN	6.03 F
1020	MIN	5.72 F
1035	MIN	5.41 F
1050	MIN	5.03 F
1065	MIN	4.66 F
1080	MIN	4.31 F
1095	MIN	3.96 F
1110	MIN	3.59 F
1125	MIN	3.22 F
1140	MIN	2.87 F
1155	MIN	2.54 F
1170	MIN	2.19 F
1185	MIN	1.85 F
1200	MIN	1.57 F
1215	MIN	1.29 F
1230	MIN	1.02 F
1245	MIN	0.76 F
1260	MIN	0.58 F
1275	MIN	0.39 F
1290	MIN	0.24 F
1305	MIN	0.14 F
1320	MIN	0.10 F
1335	MIN	0.11 F
1350	MIN	0.22 F
1365	MIN	0.41 F
1380	MIN	0.68 F
1395	MIN	1.04 F
1410	MIN	1.46 F
1425	MIN	1.91 F
1440	MIN	2.38 F
1455	MIN	2.87 F
1470	MIN	3.33 F
1485	MIN	3.78 F
1500	MIN	4.22 F
1515	MIN	4.66 F
1530	MIN	5.08 F
1545	MIN	5.41 F
1560	MIN	5.77 F
1575	MIN	6.05 F
1590	MIN	6.28 F
1605	MIN	6.51 F
1620	MIN	6.70 F
1635	MIN	6.84 F
1650	MIN	6.89 F
1665	MIN	6.87 F
1680	MIN	6.85 F
1695	MIN	6.71 F
1710	MIN	6.54 F
1725	MIN	6.33 F
1740	MIN	6.10 F
1755	MIN	5.78 F
1770	MIN	5.41 F
1785	MIN	5.05 F
1800	MIN	4.76 F
1815	MIN	4.43 F
1830	MIN	4.07 F
1845	MIN	3.73 F
1860	MIN	3.39 F
1875	MIN	3.05 F
1890	MIN	2.73 F
1905	MIN	2.44 F
1920	MIN	2.18 F
1935	MIN	1.93 F
1950	MIN	1.77 F
1965	MIN	1.60 F
1980	MIN	1.48 F
1995	MIN	1.38 F
2010	MIN	1.26 F
2025	MIN	1.19 F
2040	MIN	1.16 F
2055	MIN	1.12 F
2070	MIN	1.22 F
2085	MIN	1.36 F
2100	MIN	1.59 F
2115	MIN	1.91 F
2130	MIN	2.31 F
2145	MIN	2.73 F
2160	MIN	3.19 F
2175	MIN	3.73 F
2190	MIN	4.27 F
2205	MIN	4.76 F
2220	MIN	5.27 F
2235	MIN	5.76 F
2250	MIN	6.24 F
2265	MIN	6.61 F
2280	MIN	6.92 F
2295	MIN	7.19 F
2310	MIN	7.36 F
2325	MIN	7.51 F
2340	MIN	7.65 F
2355	MIN	7.78 F
2370	MIN	7.85 F
2385	MIN	7.89 F
2400	MIN	7.91 F
2415	MIN	7.94 F
2430	MIN	7.99 F
2445	MIN	7.77 F
2460	MIN	7.67 F
2475	MIN	7.51 F
2490	MIN	7.29 F
2505	MIN	6.99 F
2520	MIN	6.66 F
2535	MIN	6.31 F
2550	MIN	5.94 F
2565	MIN	5.53 F
2580	MIN	5.11 F
2595	MIN	4.69 F
2610	MIN	4.24 F
2625	MIN	3.81 F
2640	MIN	3.45 F
2655	MIN	3.13 F
2670	MIN	2.91 F
2685	MIN	2.53 F
2700	MIN	2.27 F
2715	MIN	2.04 F
2730	MIN	1.83 F
2745	MIN	1.65 F
2760	MIN	1.47 F
2775	MIN	1.28 F
2790	MIN	1.09 F
2805	MIN	0.99 F
2820	MIN	0.82 F
2835	MIN	0.94 F
2850	MIN	1.00 F
2865	MIN	1.25 F
2880	MIN	1.70 F
2895	MIN	2.15 F
2910	MIN	2.68 F
2925	MIN	3.25 F
2940	MIN	3.78 F
2955	MIN	4.25 F
2970	MIN	4.71 F
2985	MIN	5.17 F
3000	MIN	5.50 F
3015	MIN	5.89 F
3030	MIN	6.23 F
3045	MIN	6.57 F
3060	MIN	6.80 F
3075	MIN	7.06 F
3090	MIN	7.14 F
3105	MIN	7.29 F
3120	MIN	7.39 F
3135	MIN	7.45 F
3150	MIN	7.49 F
3165	MIN	7.47 F
3180	MIN	7.39 F
3195	MIN	7.19 F

2/5 1654

2/6 1654

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1

3225 MIN	6.68	F
3240 MIN	6.34	F
3255 MIN	5.96	F
3270 MIN	5.57	F
3285 MIN	5.21	F
3300 MIN	4.85	F
3315 MIN	4.46	F
3330 MIN	4.14	F
3345 MIN	3.78	F
3360 MIN	3.41	F
3375 MIN	3.09	F
3390 MIN	2.80	F
3405 MIN	2.53	F
3420 MIN	2.27	F
3435 MIN	2.05	F
3450 MIN	1.85	F
3465 MIN	1.63	F
3480 MIN	1.42	F
3495 MIN	1.23	F
3510 MIN	1.07	F
3525 MIN	0.93	F
3540 MIN	0.81	F
3555 MIN	0.79	F
3570 MIN	0.85	F
3585 MIN	1.00	F
3600 MIN	1.27	F
3615 MIN	1.66	F
3630 MIN	2.07	F
3645 MIN	2.54	F
[illegible] MIN	[illegible]	F
[illegible] MIN	4.22	F
3705 MIN	4.90	F
3720 MIN	5.24	F
3735 MIN	5.79	F
3750 MIN	6.15	F
3765 MIN	6.42	F
3780 MIN	6.64	F
3795 MIN	6.76	F
3810 MIN	6.87	F
3825 MIN	6.96	F
3840 MIN	7.09	F
3855 MIN	7.15	F
3870 MIN	7.17	F
3885 MIN	7.19	F
3900 MIN	7.16	F
3915 MIN	7.05	F
3930 MIN	6.91	F
[illegible] MIN	[illegible]	F
3975 MIN	6.21	F
3990 MIN	5.90	F
4005 MIN	5.54	F
4020 MIN	5.14	F
4035 MIN	4.69	F
[illegible] MIN	[illegible]	F
[illegible] MIN	3.81	F
[illegible] MIN	3.31	F
4095 MIN	2.89	F
4110 MIN	2.50	F
4125 MIN	2.13	F
4140 MIN	1.78	F
4155 MIN	1.47	F
4170 MIN	1.21	F
[illegible] MIN	[illegible]	F
4215 MIN	0.55	F
4230 MIN	0.40	F
4245 MIN	0.26	F
[illegible] MIN	[illegible]	F
[illegible] MIN	[illegible]	F
2/7 1654 4320 MIN	0.00	F
4335 MIN	0.00	F
4350 MIN	0.17	F
4365 MIN	0.42	F
4380 MIN	0.78	F
4395 MIN	1.22	F
4410 MIN	1.68	F
4425 MIN	2.18	F
4440 MIN	2.65	F
4455 MIN	3.13	F
4470 MIN	3.59	F
4485 MIN	4.00	F

4500 MIN	5.01	F
4545 MIN	5.22	F
4560 MIN	5.44	F
4575 MIN	5.60	F
4590 MIN	5.64	F
4605 MIN	5.68	F
4620 MIN	5.66	F
4635 MIN	5.57	F
4650 MIN	5.44	F
4665 MIN	5.31	F
4680 MIN	5.19	F
4695 MIN	4.97	F
4710 MIN	4.71	F
4725 MIN	4.54	F
4740 MIN	4.21	F
4755 MIN	3.85	F
4770 MIN	3.49	F
4785 MIN	3.09	F
4800 MIN	2.67	F
4815 MIN	2.28	F
4830 MIN	1.89	F
4845 MIN	1.56	F
4860 MIN	1.20	F
4875 MIN	0.90	F
4890 MIN	0.59	F
4905 MIN	0.31	F
[illegible] MIN	[illegible]	F
4950 MIN	0.00	F
4965 MIN	0.00	F
4980 MIN	0.00	F
4995 MIN	0.02	F
5010 MIN	0.11	F
5025 MIN	0.47	F
5040 MIN	1.07	F
5055 MIN	1.80	F
5070 MIN	1.99	F
5085 MIN	1.97	F
5100 MIN	0.00	F
5115 MIN	0.00	F
5130 MIN	0.00	F
5145 MIN	0.51	F
5160 MIN	1.05	F
5175 MIN	1.10	F
[illegible] MIN	[illegible]	F
5235 MIN	1.79	F

SE1000A
Hydrologic Monitor
(surface)

Time: 0917
Date: 0212

Data I.D.	01	
Sample mode	9	
% Scale	9.96	
% Depth	5.14	F
Int. level	7.40	F

Time: 0507
Date: 0208

0 MIN	3.38	F
15 MIN	3.62	F
30 MIN	3.76	F
45 MIN	3.82	F
60 MIN	3.83	F
75 MIN	3.81	F
90 MIN	3.82	F
105 MIN	3.78	F
120 MIN	3.82	F
135 MIN	3.79	F
150 MIN	3.82	F

[illegible] MIN	[illegible]	F
180 MIN	1.63	F
[illegible] MIN	1.44	F
[illegible] MIN	1.17	F
[illegible] MIN	1.53	F
[illegible] MIN	1.45	F
[illegible] MIN	1.03	F
270 MIN	1.61	F
285 MIN	1.28	F
300 MIN	0.85	F
315 MIN	1.55	F
[illegible] MIN	2.24	F
345 MIN	0.00	F
360 MIN	0.00	F
375 MIN	0.00	F
390 MIN	0.03	F
[illegible] MIN	0.03	F
[illegible] MIN	0.00	F
[illegible] MIN	[illegible]	F
450 MIN	0.00	F
[illegible] MIN	0.00	F
[illegible] MIN	0.00	F
[illegible] MIN	0.00	F
510 MIN	0.02	F
[illegible] MIN	0.00	F
[illegible] MIN	0.00	F
[illegible] MIN	0.02	F
[illegible] MIN	0.00	F
[illegible] MIN	0.00	F
[illegible] MIN	0.00	F
[illegible] MIN	0.02	F
615 MIN	0.00	F
630 MIN	0.00	F
645 MIN	0.00	F
660 MIN	0.01	F
675 MIN	0.00	F
690 MIN	0.00	F
705 MIN	0.02	F
720 MIN	0.55	F
735 MIN	1.14	F
750 MIN	1.55	F
765 MIN	1.64	F
780 MIN	1.74	F
795 MIN	1.71	F
[illegible] MIN	1.71	F
825 MIN	1.87	F
840 MIN	2.03	F
855 MIN	2.13	F
870 MIN	2.11	F
885 MIN	2.15	F
900 MIN	2.14	F
915 MIN	2.07	F
930 MIN	1.98	F
945 MIN	1.96	F
960 MIN	1.82	F
975 MIN	1.59	F
990 MIN	1.32	F
1005 MIN	1.09	F
1020 MIN	1.56	F
1035 MIN	1.30	F
1050 MIN	1.05	F
1065 MIN	0.40	F
1080 MIN	[illegible]	F
1095 MIN	0.00	F
1110 MIN	0.00	F
1125 MIN	0.00	F
1140 MIN	0.00	F
1155 MIN	0.00	F
1170 MIN	0.00	F
1185 MIN	0.00	F
1200 MIN	0.61	F
1215 MIN	0.94	F
1230 MIN	1.13	F
1245 MIN	1.26	F
1260 MIN	1.35	F
1275 MIN	1.42	F
1290 MIN	1.48	F

NT TPK

(2)

B-117

1320 MIN [illegible] F
1335 MIN 1.58 F
1350 MIN 0.00 F
1365 MIN 0.00 F
1380 MIN 0.00 F
1395 MIN 0.55 F
1410 MIN 1.13 F
2/9 1425 MIN 1.68 F
0833 – 1440 MIN 2.20 F
1455 MIN 2.64 F
1470 MIN 3.04 F
1485 MIN 3.32 F
1500 MIN 3.66 F
1515 MIN 3.87 F
1530 MIN 3.98 F
1545 MIN 4.13 F
1560 MIN 4.31 F
1575 MIN 4.42 F
1590 MIN 4.46 F
1605 MIN 4.55 F
1620 MIN 4.62 F
1635 MIN 4.52 F
1650 MIN 4.40 F
1665 MIN 4.24 F
1680 MIN 4.09 F
1695 MIN 3.83 F
1710 MIN 3.54 F
1725 MIN 3.24 F
1740 MIN 2.91 F
1755 MIN 2.55 F
1770 MIN 2.20 F
1785 MIN 1.85 F
1800 MIN 1.46 F
1815 MIN 1.13 F
1830 MIN 0.76 F
1845 MIN 0.49 F
1860 MIN 0.21 F
1875 MIN 0.00 F
1890 MIN 0.00 F
1905 MIN 0.00 F
1920 MIN 0.00 F
1935 MIN 0.00 F
1950 MIN 0.00 F
1965 MIN 0.00 F
1980 MIN 0.00 F
1995 MIN 0.00 F
2010 MIN 0.00 F
2025 MIN 0.00 F
2040 MIN 0.00 F
2055 MIN 0.00 F
2070 MIN 0.00 F
2085 MIN 0.00 F
2100 MIN 0.07 F
2115 MIN 0.50 F
2130 MIN 0.98 F
2145 MIN 1.48 F
2160 MIN 1.96 F
2175 MIN 2.40 F
2190 MIN 2.91 F
2205 MIN 3.23 F
2220 MIN 3.59 F
2235 MIN 3.90 F
2250 MIN 4.20 F
2265 MIN 4.46 F
2280 MIN 4.67 F
2295 MIN 4.86 F
2310 MIN 5.05 F
2325 MIN 5.23 F
2340 MIN 5.36 F
2355 MIN 5.48 F
2370 MIN 5.49 F
2385 MIN 5.51 F
2400 MIN 5.41 F
2415 MIN 5.33 F
2430 MIN 5.22 F
2445 MIN 5.02 F
2460 MIN 4.76 F

[illegible]
2490 MIN 4.14 F
2505 MIN 3.79 F
2520 MIN 3.44 F
2535 MIN 3.05 F
2550 MIN 2.64 F
2565 MIN 2.24 F
2580 MIN 1.85 F
2595 MIN 1.47 F
2610 MIN 1.15 F
2625 MIN 0.87 F
2640 MIN 0.61 F
2655 MIN 0.37 F
2670 MIN 0.17 F
2685 MIN 0.00 F
2700 MIN 0.00 F
2715 MIN 0.00 F
2730 MIN 0.00 F
2745 MIN 0.00 F
2760 MIN 0.00 F
2775 MIN 0.10 F
2790 MIN 0.34 F
2805 MIN 0.65 F
2820 MIN 1.00 F
2835 MIN 1.41 F
2850 MIN 1.88 F
2/10 2865 MIN 2.37 F
0833 – 2880 MIN 2.87 F
2895 MIN 3.33 F
2910 MIN 3.77 F
2925 MIN 4.13 F
2940 MIN 4.49 F
2955 MIN 4.79 F
2970 MIN 4.99 F
2985 MIN 5.15 F
3000 MIN 5.25 F
3015 MIN 5.38 F
3030 MIN 5.41 F
3045 MIN 5.52 F
3060 MIN 5.61 F
3075 MIN 5.71 F
3090 MIN 5.73 F
3105 MIN 5.73 F
3120 MIN 5.70 F
3135 MIN 5.60 F
3150 MIN 5.47 F
3165 MIN 5.29 F
3180 MIN 5.07 F
3195 MIN 4.79 F
3210 MIN 4.45 F
3225 MIN 4.13 F
3240 MIN 3.80 F
3255 MIN 3.46 F
3270 MIN 3.12 F
3285 MIN 2.78 F
3300 MIN 2.42 F
3315 MIN 2.08 F
3330 MIN 1.79 F
3345 MIN 1.50 F
3360 MIN 1.21 F
3375 MIN 1.02 F
3390 MIN 0.79 F
3405 MIN 0.61 F
3420 MIN 0.45 F
3435 MIN 0.29 F
3450 MIN 0.20 F
3465 MIN 0.12 F
3480 MIN 0.14 F
3495 MIN 0.23 F
3510 MIN 0.37 F
3525 MIN 0.55 F
3540 MIN 0.83 F
3555 MIN 1.15 F
3570 MIN 1.46 F
3585 MIN 1.86 F
3600 MIN 2.25 F

[illegible] MIN [illegible] F
3630 MIN [illegible] F
3645 MIN 3.44 F
3660 MIN 3.77 F
3675 MIN 4.10 F
3690 MIN 4.39 F
3705 MIN 4.66 F
3720 MIN [illegible] F
3735 MIN [illegible] F
3750 MIN [illegible] F
3765 MIN 5.42 F
3780 MIN 5.60 F
3795 MIN 5.81 F
3810 MIN 6.01 F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
[illegible] MIN [illegible] F
4140 MIN [illegible] F
4155 MIN [illegible] F
4170 MIN [illegible] F
4185 MIN [illegible] F
4200 MIN [illegible] F
4215 MIN 0.57 F
4230 MIN 0.50 F
4245 MIN 0.57 F
4260 MIN 0.72 F
4275 MIN [illegible] F
4290 MIN 1.19 F
4305 MIN 1.49 F
2/11 0833 – 4320 MIN 1.94 F
4335 MIN [illegible] F
4350 MIN [illegible] F
4365 MIN [illegible] F
4380 MIN [illegible] F
4395 MIN [illegible] F
4410 MIN [illegible] F
4425 MIN 3.41 F
4440 MIN 4.61 F
4455 MIN [illegible] F
4470 MIN [illegible] F
4485 MIN [illegible] F
4500 MIN [illegible] F
4515 MIN [illegible] F
4530 MIN [illegible] F
4545 MIN [illegible] F
4560 MIN 5.41 F
4575 MIN [illegible] F
4590 MIN 5.47 F
4605 MIN 5.45 F
4620 MIN 5.45 F
4635 MIN 5.46 F
4650 MIN 5.41 F
4665 MIN 5.28 F
4680 MIN 5.09 F
4695 MIN 4.87 F
4710 MIN 4.60 F
4725 MIN [illegible] F
4740 MIN [illegible] F

NJ Tpk

(3)

4755	MIN	3.62	F
4770	MIN	3.30	F
4785	MIN	2.95	F
4800	MIN	2.62	F
4815	MIN	2.28	F
4830	MIN	1.97	F
4845	MIN	1.69	F
4860	MIN	1.41	F
4875	MIN	1.24	F
4890	MIN	1.06	F
4905	MIN	0.93	F
4920	MIN	0.81	F
4935	MIN	0.67	F
4950	MIN	0.60	F
4965	MIN	0.56	F
4980	MIN	0.60	F
4995	MIN	0.69	F
5010	MIN	0.83	F
5025	MIN	1.06	F
5040	MIN	1.31	F
5055	MIN	1.61	F
5070	MIN	1.97	F
5085	MIN	2.34	F
5100	MIN	2.76	F
5115	MIN	3.14	F
5130	MIN	3.46	F
5145	MIN	3.85	F
5160	MIN	4.19	F
5175	MIN	4.49	F
5190	MIN	4.77	F
5205	MIN	5.02	F
5220	MIN	5.23	F
5235	MIN	5.44	F
5250	MIN	5.64	F
5265	MIN	5.85	F
5280	MIN	6.05	F
5295	MIN	6.28	F
5310	MIN	6.50	F
5325	MIN	6.72	F
5340	MIN	6.87	F
5355	MIN	7.00	F
5370	MIN	7.02	F
5385	MIN	7.00	F
5400	MIN	6.84	F
5415	MIN	6.58	F
5430	MIN	6.29	F
5445	MIN	5.97	F
5460	MIN	5.64	F
5475	MIN	5.24	F
5490	MIN	4.93	F
5505	MIN	4.61	F
5520	MIN	4.30	F
5535	MIN	3.97	F
5550	MIN	3.69	F
5565	MIN	3.45	F
5580	MIN	3.24	F
5595	MIN	3.11	F
5610	MIN	3.05	F
5625	MIN	3.03	F
5640	MIN	3.05	F
5655	MIN	3.03	F
5670	MIN	2.97	F
5685	MIN	2.92	F
5700	MIN	2.88	F

NJ Tpk
(4)

Jackson St Bridge

Hydrologic Monitor
(surface)

Time: 1129
Date: 0207

Data I.D. 02
Sample mode 9

XD Scale 10.05
XD Depth 4.60 F
Int. level 1.60 F

Time: 1633
Date: 0205

0 MIN	1.54 F
15 MIN	1.96 F
30 MIN	2.41 F
45 MIN	2.94 F
60 MIN	2.83 F
75 MIN	3.32 F
90 MIN	3.79 F
105 MIN	4.23 F
120 MIN	4.65 F
135 MIN	5.01 F
150 MIN	5.33 F
165 MIN	5.61 F
180 MIN	5.83 F
195 MIN	6.06 F
210 MIN	6.23 F
225 MIN	6.32 F
240 MIN	6.37 F
255 MIN	6.31 F
270 MIN	6.26 F
285 MIN	6.10 F
300 MIN	5.90 F
315 MIN	5.65 F
330 MIN	5.36 F
345 MIN	5.00 F
360 MIN	4.63 F
375 MIN	4.29 F
390 MIN	3.99 F
405 MIN	3.69 F
420 MIN	3.35 F
435 MIN	3.05 F
450 MIN	2.74 F
465 MIN	2.44 F
480 MIN	2.19 F
495 MIN	1.92 F
510 MIN	1.74 F
525 MIN	1.56 F
540 MIN	1.46 F
555 MIN	1.35 F
570 MIN	1.29 F
585 MIN	1.22 F
600 MIN	1.18 F
615 MIN	1.13 F
630 MIN	1.13 F
645 MIN	1.12 F
660 MIN	1.18 F
675 MIN	1.25 F
690 MIN	1.47 F
705 MIN	1.72 F
720 MIN	2.13 F
735 MIN	2.51 F
750 MIN	3.03 F
765 MIN	3.51 F
780 MIN	3.98 F
795 MIN	4.49 F
810 MIN	4.98 F
825 MIN	5.45 F
840 MIN	5.85 F
855 MIN	6.44 F
870 MIN	6.71 F
885 MIN	6.89 F
900 MIN	7.05 F
960 MIN	7.42 F
975 MIN	7.44 F
990 MIN	7.47 F
1005 MIN	7.45 F
1020 MIN	7.35 F
1035 MIN	7.21 F
1050 MIN	7.10 F
1065 MIN	6.89 F
1080 MIN	6.63 F
1095 MIN	6.35 F
1110 MIN	5.99 F
1125 MIN	5.64 F
1140 MIN	5.31 F
1155 MIN	4.92 F
1170 MIN	4.52 F
1185 MIN	4.15 F
1200 MIN	3.75 F
1215 MIN	3.41 F
1230 MIN	3.11 F
1245 MIN	2.84 F
1260 MIN	2.58 F
1275 MIN	2.41 F
1290 MIN	2.21 F
1305 MIN	2.20 F
1320 MIN	1.86 F
1335 MIN	1.87 F
1350 MIN	1.85 F
1365 MIN	1.50 F
1380 MIN	1.91 F
1395 MIN	1.90 F
1410 MIN	1.85 F
2/6 1425 MIN	1.86 F
1633 - 1440 MIN	1.60 F
1455 MIN	2.09 F
1470 MIN	2.07 F
1485 MIN	2.40 F
1500 MIN	2.46 F
1515 MIN	3.01 F
1530 MIN	3.53 F
1545 MIN	3.93 F
1560 MIN	4.35 F
1575 MIN	4.70 F
1590 MIN	5.07 F
1605 MIN	5.44 F
1620 MIN	5.76 F
1635 MIN	6.05 F
1650 MIN	6.28 F
1665 MIN	6.45 F
1680 MIN	6.59 F
1695 MIN	6.72 F
1710 MIN	6.83 F
1725 MIN	6.85 F
1740 MIN	6.85 F
1755 MIN	6.80 F
1770 MIN	6.67 F
1785 MIN	6.45 F
1800 MIN	6.16 F
1815 MIN	5.81 F
1830 MIN	5.43 F
1845 MIN	5.05 F
1860 MIN	4.67 F
1875 MIN	4.30 F
1890 MIN	3.95 F
1905 MIN	3.63 F
1920 MIN	3.29 F
1935 MIN	2.93 F
1950 MIN	2.60 F
1965 MIN	2.33 F
1980 MIN	2.07 F
1995 MIN	1.83 F
2010 MIN	1.65 F
2025 MIN	1.47 F
2040 MIN	1.27 F
2055 MIN	1.11 F
2070 MIN	0.94 F
2085 MIN	0.84 F
2100 MIN	0.70 F
2145 MIN	0.53 F
2160 MIN	0.64 F
2175 MIN	0.80 F
2190 MIN	1.01 F
2205 MIN	1.36 F
2220 MIN	1.79 F
2235 MIN	2.29 F
2250 MIN	2.82 F
2265 MIN	3.34 F
2280 MIN	3.89 F
2295 MIN	4.76 F
2310 MIN	5.19 F
2325 MIN	5.57 F
2340 MIN	5.87 F
2355 MIN	6.08 F
2370 MIN	6.24 F
2385 MIN	6.36 F
2400 MIN	6.46 F
2415 MIN	6.55 F
2430 MIN	6.67 F
2445 MIN	6.70 F
2460 MIN	6.73 F
2475 MIN	6.70 F
2490 MIN	6.63 F
2505 MIN	6.49 F
2520 MIN	6.31 F
2535 MIN	6.11 F
2550 MIN	5.86 F
2565 MIN	5.57 F

B-119

Jackson St.

(1)

Jackson St. Bridge

SE1000A
Radiologic Monitor
(Surface)

Time: 0820
Date: 0212

Data I.D. 02
Sample mode 9

KD Scale 10.05
KD Depth 8.17 F
Int. level 5.35 F

Time: 1140
Date: 0207

0	MIN	5.31 F
15	MIN	4.96 F
30	MIN	4.58 F
45	MIN	4.17 F
60	MIN	3.75 F
75	MIN	3.35 F
90	MIN	3.00 F
105	MIN	2.72 F
120	MIN	2.45 F
135	MIN	2.08 F
150	MIN	2.22 F
165	MIN	2.23 F
180	MIN	2.14 F
195	MIN	2.24 F
210	MIN	2.03 F
225	MIN	2.13 F
240	MIN	2.01 F
255	MIN	2.04 F
270	MIN	1.94 F
285	MIN	2.07 F
300	MIN	1.83 F
315	MIN	2.08 F
330	MIN	2.05 F
345	MIN	0.40 F
360	MIN	0.58 F
375	MIN	0.82 F
390	MIN	1.12 F
405	MIN	1.33 F
420	MIN	1.78 F
435	MIN	2.24 F
450	MIN	2.79 F
465	MIN	3.14 F
480	MIN	3.62 F
495	MIN	3.94 F
510	MIN	4.23 F
525	MIN	4.59 F
540	MIN	4.75 F
555	MIN	4.98 F
570	MIN	5.12 F
585	MIN	5.18 F
600	MIN	5.20 F
615	MIN	5.18 F
630	MIN	5.14 F
645	MIN	4.99 F
660	MIN	4.83 F
675	MIN	4.65 F
690	MIN	4.47 F
705	MIN	4.16 F
720	MIN	3.96 F
735	MIN	3.70 F
750	MIN	3.40 F
765	MIN	3.04 F
780	MIN	2.62 F
795	MIN	2.25 F
810	MIN	1.89 F
825	MIN	1.55 F
840	MIN	1.25 F
855	MIN	0.95 F
870	MIN	0.68 F
885	MIN	0.45 F
900	MIN	0.24 F
915	MIN	0.24 F
930	MIN	0.10 F
945	MIN	0.00 F
960	MIN	0.00 F
975	MIN	0.00 F
990	MIN	0.00 F
1005	MIN	0.00 F
1020	MIN	0.00 F
1035	MIN	0.00 F
1050	MIN	0.00 F
1065	MIN	0.00 F
1080	MIN	0.00 F
1095	MIN	0.00 F
1110	MIN	0.00 F
1125	MIN	0.43 F
1140	MIN	0.69 F
1155	MIN	2.28 F
1170	MIN	2.46 F
1185	MIN	2.54 F
1200	MIN	2.82 F
1215	MIN	2.99 F
1230	MIN	3.33 F
1245	MIN	3.62 F
1260	MIN	3.90 F
1275	MIN	4.12 F
1290	MIN	4.33 F
1305	MIN	4.35 F
1320	MIN	4.38 F
1335	MIN	4.33 F
1350	MIN	4.33 F
1365	MIN	4.32 F
1380	MIN	4.32 F
1395	MIN	4.23 F
1410	MIN	4.28 F
1425	MIN	5.20 F
1440	MIN	3.88 F
1455	MIN	3.67 F
1470	MIN	3.49 F
1485	MIN	3.21 F
1500	MIN	2.91 F
1515	MIN	2.54 F
1530	MIN	2.26 F
1545	MIN	2.21 F
1560	MIN	1.53 F
1575	MIN	2.08 F
1590	MIN	1.90 F
1605	MIN	1.93 F
1620	MIN	1.39 F
1635	MIN	1.65 F
1650	MIN	1.61 F
1665	MIN	1.32 F
1680	MIN	0.00 F
1695	MIN	0.00 F
1710	MIN	0.00 F
1725	MIN	0.00 F
1740	MIN	0.00 F
1755	MIN	0.00 F
1770	MIN	0.00 F
1785	MIN	0.00 F
1800	MIN	0.00 F
1815	MIN	0.00 F
1830	MIN	0.00 F
1845	MIN	0.00 F
1860	MIN	0.00 F
1875	MIN	0.00 F
1890	MIN	0.00 F
1905	MIN	0.00 F
1920	MIN	0.57 F
1935	MIN	0.55 F
1950	MIN	0.75 F
1965	MIN	1.03 F
1980	MIN	1.34 F
1995	MIN	1.66 F
2010	MIN	1.90 F
2025	MIN	1.30 F
2040	MIN	1.59 F
2055	MIN	2.73 F
2070	MIN	2.00 F
2085	MIN	1.97 F
2100	MIN	2.12 F
2115	MIN	2.25 F
2130	MIN	2.30 F
2145	MIN	2.28 F
2160	MIN	2.28 F
2175	MIN	2.24 F
2190	MIN	2.16 F
2205	MIN	2.43 F
2220	MIN	[illegible] F
2235	MIN	[illegible] F
2250	MIN	2.25 F
2265	MIN	2.03 F
2280	MIN	1.70 F
2295	MIN	1.40 F
2310	MIN	1.17 F
2325	MIN	0.86 F
2340	MIN	[illegible] F
2355	MIN	0.71 F
2370	MIN	[illegible] F
2385	MIN	0.03 F
2400	MIN	0.00 F
2415	MIN	0.00 F
2430	MIN	0.00 F
2445	MIN	0.00 F
2460	MIN	0.00 F
2475	MIN	0.00 F
2490	MIN	0.00 F
2505	MIN	0.00 F
2520	MIN	0.00 F
2535	MIN	0.00 F
2550	MIN	0.00 F
2565	MIN	0.00 F
2580	MIN	0.00 F
2595	MIN	[illegible] F
2610	MIN	2.67 F
2625	MIN	2.19 F
2640	MIN	2.47 F
2655	MIN	[illegible] F
2670	MIN	2.73 F
2685	MIN	2.91 F
2700	MIN	3.05 F
2715	MIN	[illegible] F
2730	MIN	3.79 F
2745	MIN	3.98 F
2760	MIN	4.25 F
2775	MIN	4.40 F
2790	MIN	4.50 F
2805	MIN	4.59 F
2820	MIN	4.72 F
2835	MIN	4.80 F
2850	MIN	4.86 F
2865	MIN	4.78 F
2880	MIN	4.97 F
2895	MIN	4.86 F
2910	MIN	4.74 F
2925	MIN	4.57 F
2940	MIN	4.37 F
2955	MIN	4.09 F
2970	MIN	3.83 F
2985	MIN	3.57 F
3000	MIN	3.24 F
3015	MIN	2.81 F
3030	MIN	2.65 F
3045	MIN	2.63 F
3060	MIN	2.51 F
3075	MIN	2.44 F
3090	MIN	2.38 F
3105	MIN	2.17 F

1140 2/7

1140 2/9

B-120

Jackson St.

(2)

DEP\DA0004412

3120 MIN	2.15 F	
3135 MIN	2.27 F	
3150 MIN	2.06 F	
3165 MIN	1.96 F	
3180 MIN	1.86 F	
3195 MIN	1.72 F	
3210 MIN	1.67 F	
3225 MIN	0.06 F	
3240 MIN	0.04 F	
3255 MIN	0.05 F	
3270 MIN	0.00 F	
3285 MIN	0.00 F	
3300 MIN	0.20 F	
3315 MIN	0.27 F	
3330 MIN	0.34 F	
3345 MIN	0.52 F	
3360 MIN	0.80 F	
3375 MIN	1.15 F	
3390 MIN	1.56 F	
3405 MIN	1.99 F	
3420 MIN	2.35 F	
3435 MIN	2.77 F	
3450 MIN	3.14 F	
3465 MIN	3.50 F	
3480 MIN	3.84 F	
3495 MIN	4.17 F	
3510 MIN	4.38 F	
3525 MIN	4.63 F	
3540 MIN	4.80 F	
3555 MIN	4.97 F	
3570 MIN	5.19 F	
3585 MIN	5.34 F	
3600 MIN	5.45 F	
3615 MIN	5.53 F	
3630 MIN	5.52 F	
3645 MIN	5.53 F	
3660 MIN	5.43 F	
3675 MIN	5.31 F	
3690 MIN	5.20 F	
3705 MIN	4.96 F	
3720 MIN	4.67 F	
3735 MIN	4.36 F	
3750 MIN	4.02 F	
3765 MIN	3.68 F	
3780 MIN	3.36 F	
3795 MIN	2.98 F	
3810 MIN	2.62 F	
3825 MIN	2.27 F	
3840 MIN	1.90 F	
3855 MIN	1.57 F	
3870 MIN	1.35 F	
3885 MIN	1.09 F	
3900 MIN	0.90 F	
3915 MIN	0.75 F	
3930 MIN	0.59 F	
3945 MIN	0.49 F	
3960 MIN	0.45 F	
3975 MIN	0.39 F	
3990 MIN	0.45 F	
4005 MIN	0.45 F	
4020 MIN	2.27 F	
4035 MIN	2.31 F	
4050 MIN	2.40 F	
4065 MIN	2.60 F	
4080 MIN	2.58 F	
4095 MIN	2.72 F	
4110 MIN	2.81 F	
4125 MIN	3.12 F	
4140 MIN	3.69 F	
4155 MIN	3.99 F	
4170 MIN	4.33 F	
4185 MIN	4.67 F	
4200 MIN	4.95 F	
4215 MIN	5.17 F	
4230 MIN	5.33 F	
4245 MIN	5.46 F	
4260 MIN	5.57 F	

4275 MIN	5.63 F	
4290 MIN	5.69 F	
4305 MIN	5.79 F	
1140 4320 MIN	5.87 F	
2/10 4335 MIN	5.93 F	
4350 MIN	5.96 F	
4365 MIN	5.92 F	
4380 MIN	5.87 F	
4395 MIN	5.75 F	
4410 MIN	5.59 F	
4425 MIN	5.41 F	
4440 MIN	5.17 F	
4455 MIN	4.88 F	
4470 MIN	4.55 F	
4485 MIN	4.24 F	
4500 MIN	3.92 F	
4515 MIN	3.61 F	
4530 MIN	3.30 F	
4545 MIN	2.99 F	
4560 MIN	2.69 F	
4575 MIN	2.41 F	
4590 MIN	2.15 F	
4605 MIN	1.95 F	
4620 MIN	1.63 F	
4635 MIN	1.65 F	
4650 MIN	1.86 F	
4665 MIN	0.83 F	
4680 MIN	0.75 F	
4695 MIN	0.64 F	
4710 MIN	0.59 F	
4725 MIN	0.49 F	
4740 MIN	0.56 F	
4755 MIN	0.63 F	
4770 MIN	0.77 F	
4785 MIN	0.92 F	
4800 MIN	1.13 F	
4815 MIN	1.39 F	
4830 MIN	1.72 F	
4845 MIN	2.22 F	
4860 MIN	2.52 F	
4875 MIN	2.92 F	
4890 MIN	3.30 F	
4905 MIN	3.63 F	
4920 MIN	3.93 F	
4935 MIN	4.22 F	
4950 MIN	4.51 F	
4965 MIN	4.78 F	
4980 MIN	4.98 F	
4995 MIN	5.16 F	
5010 MIN	5.31 F	
5025 MIN	5.49 F	
5040 MIN	5.66 F	
5055 MIN	5.88 F	
5070 MIN	6.07 F	
5085 MIN	6.26 F	
5100 MIN	6.38 F	
5115 MIN	6.41 F	
5130 MIN	6.46 F	
5145 MIN	6.43 F	
5160 MIN	6.35 F	
5175 MIN	6.16 F	
5190 MIN	5.95 F	
5205 MIN	5.63 F	
5220 MIN	5.28 F	
5235 MIN	4.91 F	
5250 MIN	4.54 F	
5265 MIN	4.17 F	
5280 MIN	3.79 F	
5295 MIN	3.44 F	
5310 MIN	3.08 F	
5325 MIN	2.72 F	
5340 MIN	2.39 F	
5355 MIN	2.06 F	
5370 MIN	1.82 F	
5385 MIN	1.54 F	
5400 MIN	1.35 F	

5415 MIN	1.18 F	
5430 MIN	1.01 F	
5445 MIN	0.83 F	
5460 MIN	0.66 F	
5475 MIN	1.67 F	
5490 MIN	1.81 F	
5505 MIN	1.57 F	
5520 MIN	1.33 F	
5535 MIN	1.07 F	
5550 MIN	2.13 F	
5565 MIN	2.17 F	
5580 MIN	2.51 F	
5595 MIN	2.79 F	
5610 MIN	3.25 F	
5625 MIN	3.59 F	
5640 MIN	3.92 F	
5655 MIN	4.26 F	
5670 MIN	4.59 F	
5685 MIN	4.78 F	
5700 MIN	4.95 F	
5715 MIN	5.06 F	
5730 MIN	5.14 F	
2/11 5745 MIN	[illegible] F	
1140 5760 MIN	[illegible] F	
5775 MIN	[illegible] F	
5790 MIN	[illegible] F	
5805 MIN	[illegible] F	
5820 MIN	1.57 F	
5835 MIN	5.40 F	
5850 MIN	5.56 F	
5865 MIN	[illegible] F	
5880 MIN	5.57 F	
5895 MIN	5.50 F	
5910 MIN	5.35 F	
5925 MIN	5.17 F	
5940 MIN	4.93 F	
5955 MIN	4.65 F	
5970 MIN	4.35 F	
5985 MIN	4.05 F	

B-121

Jackson H. B. (j)

TRANSECT END-POINT COORDINATES AND DESCRIPTIONS

IT CORPORATION

By WE Date 1-30-85 Subject Passaic River Control Sheet No. 1 of ____

Chkd. By EM Date 1-31-85 Survey and Station Layout Proj. No. ____

Note: Coordinates on N.J. State coordinate system. To correct North & East coordinates add 600,000 to North and 2,100,000 to East.

Point	N. Coordinate	E. Coordinate	Distance	Description
0-1	94,164.5	44,695.3	445.2	North, Fence post painted
0-1	93,876.0	45,034.4		South, 2"x8" in Bank, painted Green
0-1.5	94,356.5	44,695.4	525.2	North, Yellow Gas Pipe + Stake
0-1.5	94,059.7	45,128.7		South, Paint steel fence corner
0-2	94,442.1	44,742.9	536.9	North, Stake painted
0-2	94,235.6	45,238.5		South, Stake painted
0-2.5	94,707.8	44,933.6	511.9	North, Paint on concrete rubble
0-2.5	94,410.0	45,349.9		South, " " Iron pile
0-3	94,865.3	45,098.9	491.6	North, Stake in bank
0-3	94,554.2	45,479.6		South, Stake nailed to bulkhead (painted)
0-3.5	95,040.8	45,263.0	465.1	North, Steel Fence Post
0-3.5	94,716.8	45,596.7		South, Stake nailed to Bulkhead
0-4	95,150.0	45,399.5	498.2	North, Stake in bank
0-4	94,821.6	45,774.1		South " " "
0-4.5	95,283.9	45,603.9	482.6	North, stake nailed to cutoff P.P.
0-4.5	94,901.5	45,898.3		South, Stake in bank
0-5	95,448.8	45,880.9	497.5	North, " " "
0-5	95,014.2	46,123.1		South, stake nailed to Bulkhead
0-6	95,534.2	46,181.8	506.8	North, stake in bank
0-6	95,083.0	46,412.5		South, Paint on Bulkhead
0-7	95,582.2	46,288.8	534.0	North, Stake in bank
0-7	95,108.9	46,536.0		South, Paint on Bulkhead
0-8	95,729.4	46,689.4	534.9	North, Paint on Rock
0-8	95,145.5	46,723.7		South, " " Bulkhead
0-9	95,717.1	46,835.3	539.0	North, " " Rock
0-9	95,186.0	46,927.4		South, " " Bulkhead
1-0	95,755.4	47,027.8	544.2	North " " Rock Bulkhead
1-0	95,213.7	47,080.0		South, Stake nailed to Bulkhead
1-1	95,790.9	47,152.6	559.6	North, Paint on Rock Bulkhead
1-1	95,232.1	47,181.9		South, Stake nailed to Bulkhead
1-2	95,809.4	47,334.2	556.1	North, Paint on Rock
1-2	95,254.0	47,306.6		South, Stake nailed to Bulkhead, Painted
1-3	95,842.9	47,517.2	566.3	North, Paint on Rock Bulkhead
1-3	95,[illegible]	47,465.1		South, Stake nailed to Bulkhead

IT CORPORATION

By W. Date 1-30,31-85 Subject Passaic River Survey Sheet No. 2 of

hkd. By EH Date 1-33-85 Proj. No.

Point	N Coordinate	E Coordinate	Distance	Description
1-3.5	95,895.1	47,829.9	581.3	North, Stake nailed to Bulkhead
1-3.5	95,314.1	47,848.4		South Stake painted
1-4	95,932.6	48,161.7	602.7	North, Stake nailed to Bulkhead
1-4	95,337.9	48,063.6		South, " Painted
1-4.5	95,943.5	48,280.3	591.5	North Stake nailed to Bulkhead
1-4.5	95,352.5	48,255.5		South Stake painted
1-5	95,963.5	48,499.4	587.0	North Stake nailed to Bulkhead
1-5	95,377.7	48,462.3		South Iron casing painted
1-5.5	95,994.8	48,653.4	634.6	North, Stake nailed to Bulkhead
1-5.5	95,351.1	48,686.8		South, Stake painted
1-6	96,010.5	48,832.9	660.1	North Stake nailed to Bulkhead
1-6	95,350.7	49,854.0		South Stake painted
1-6.5	96,047.4	49,106.8	689.0	North Stake nailed to Bulkhead
1-6.5	95,359.7	49,052.7		South Stake painted
1-7	96,069.9	49,273.3	607.1	North Paint on concrete wall
1-7	95,464.2	49,232.6		South Paint on asphalt bulkhead
D-1	96,083.8	49,800.0	652.0	North Stake nailed to bulkhead
D-1	95,440.7	49,692.8		South Stake on Bank
D-2	96,063.0	50,300.9	745.4	North Stake nailed to bulkhead
D-2	95,327.1	50,182.1		South Stake painted
D-3	95,902.8	50,987.3	664.5	North. Stake nailed to Bulkhead
D-3	95,288.2	50,734.7		South. Stake on bank
D-4	95,687.7	51,431.9	662.2	North Stake nailed to pile
D-4	95,078.3	51,172.4		South Paint on bulkhead
D-5	95,195.2	52,014.1	622.6	North Stake nailed to pile
D-5	94,879.2	51,477.6		South Paint on concrete bulkhead
D-6	94,745.2	52,227.5	518.7	North Paint on barge
D-6	94,552.7	51,745.9		South Paint on metal sibed bulkhead
D-7	94,304.8	52,362.2	509.5	North Paint on Steel pile structure
D-7	94,269.6	51,853.9		South Stake on Bank
D-8	93,578.2	52,466.3	638.9	North Stake nailed to Pile
D-8	93,638.0	51,936.9		South Stake painted
D-9	93,190.6	52,391.2	614.7	North Stake nailed to pile
D-9	93,228.0	51,791.4		South Stake painted

IT CORPORATION

By WE Date 2-1-95 Subject Passaic River Survey Sheet No. 3 of

Chkd. By EM Date Proj. No.

Point	N. Coordinate	E. Coordinate	Distance	Description
D-10	92,678.4	52,331.5	544.0	North stake on bulkhead
D-10	92,688.6	51,787.6		South " nailed to pile
D-11	92,255.7	52,264.8	527.7	North stake nailed to bulkhead
D-11	92,390.3	51,754.6		South Paint on stone
D-12	91,939.6	52,270.1	592.9	North stake on bulkhead
D-12	92,103.2	51,700.2		South Painted Stake nailed to pile
D-13	91,714.0	52,221.1	585.6	North Paint on bulkhead
D-13	91,820.3	51,645.3		South Stake nailed to pile
D-14	91,264.5	52,146.8	587.5	North Paint on bulkhead
D-14	91,324.0	51,562.3		South Paint on pile
D-15	90,890.9	52,086.0	631.0	North Paint on bulkhead
D-15	90,931.2	51,461.5		South Paint, stake nailed to pile
D-16	90,392.5	52,022.1	683.8	North Stake on bulkhead
D-16	90,533.1	51,352.9		South Paint on pile
D-17	90,052.0	51,935.8	764.5	North Paint on bulkhead
D-17	90,286.3	51,199.1		South Paint on Stone Bulkhead
D-18	89,686.2	51,824.0	664.5	North Paint on Old Pile
D-18	89,544.0	51,178.5		South Paint on Pile
D-19	89,235.7	51,695.8	656.8	North " " bulkhead
D-19	89,412.6	51,063.3		South " " "
D-20	88,800.4	51,573.1	748.6	North " " "
D-20	88,968.5	50,843.7		South Stake on bank
D-21	88,563.3	51,506.6	723.5	North Painted Stake on bank
D-21	88,494.1	50,756.4		South " on pile
D-22	88,277.2	51,838.2	1192.8	North Stake nailed to bulkhead
D-22	87,943.0	50,693.2		South " " " Pipe Line Located
D-23	87,916.4	51,843.6	1202.6	North " " " bulkhead
D-23	87,648.5	50,671.2		South Flagging tied to elec conduit on Bulk
D-24	87,246.5	52,127.5	1712.0	North Re-Bar in concrete rubble - painted
D-24	86,594.9	50,544.3		South stake nailed to pile

IT CORPORATION

By WE Date 2-5-85 Subject Passaic River Survey Sheet No. 4 of

Chkd. By Date Proj. No.

Point	N. Coordinate	E Coordinate	Distance	Description	
U-1	93,723.3	44,341.4	527.6	North	Danger Keep Off sign Pig property
U-1	93,423.0	44,774.8		South	Stake nailed to bulkhead
U-2	93,425.9	44,090.9	604.0	North	Stake on bank
U-2	93,144.1	44,625.1		South	Stake nailed to bulkhead
U-3	93,246.0	43,914.1	585.0	North	Stake on bank
U-3	92,766.9	44,249.9		South	Stake nailed to tree, above sewer
U-4	93,124.0	43,744.1	575.9	North	Stake on bank, by concrete
U-4	92,629.2	44,038.7		South	Stake nailed to concrete wall
U-5	93,054.6	43,566.0	603.8	North	Stake on bank
U-5	92,507.0	43,820.5		South	Stake nailed to tree of "heaven"
U-6	92,984.9	43,298.6	639.5	North	Stake nailed to tree
U-6	92,357.3	43,421.1		South	" " " Black walnut Stn
U-7	92,950.4	42,975.6	625.0	North	" " " Tree of heaven
U-7	92,326.3	42,942.2		South	" " " "
U-8	93,036.2	42,532.3	617.7	North	" " " " " "
U-8	92,418.5	42,537.2		South	Stake nailed to Bulkhead
U-9	93,036.6	42,135.0	642.9	North	Painted Fence Post
U-9	92,394.1	42,157.1		South	Stake nailed to pipeline scaffold
U-10	92,888.9	41,796.1	503.2	North	Arched Fence Post painted
U-10	92,387.9	41,843.6		South	Stake on Bank
U-11	92,794.5	41,308.2	405.4	North	Stake nailed to bulkhead
U-11	92,390.9	41,346.3		South	Stake above bulkhead
U-12	92,795.2	41,047.1	348.1	North	Steel Fence Post
U-12	92,448.0	41,022.6		South	" " "
U-13	92,875.6	40,844.9	356.6	North	Stake nailed to bulkhead
U-13	92,568.7	40,663.3		South	" " " "
U-14	93,108.0	40,527.4	420.6	North	Stake on bank
U-14	92,742.9	40,318.6		South	Stake nailed to bulkhead
U-15	93,374.3	40,184.4	409.6	North	Outlet Cap on white Tank
U-15	93,077.6	39,902.0		South	Painted Pile, 5th from downstream end
U-16	93,784.2	39,922.2	470.9	North	Paint on steel bulkhead
U-16	93,550.6	39,513.3		South	Fence Post @ Gate
U-17	94,099.2	39,788.7	512.0	North	Painted on steel bulkhead
U-17	93,860.0	39,336.1		South	Paint mark on brick bldg.

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By WE Date 2-7-85 Subject Passaic River Survey Sheet No. 5 of

Chkd. By EM Date 2-9-85 Proj. No.

Point	N. Coordinate	E. Coordinate	Distance	Description
U-18	94,425.7	39,650.2	465.2	North stake nailed to bulkhead
U-18	94,235.3	39,225.8		South stake on bulkhead
U-19	94,697.5	39,539.4	426.2	North paint on steel bulkhead
U-19	94,584.4	39,128.5		South stake nailed to bulkhead
U-20	95,105.5	39,409.9	398.7	North paint on steel bulkhead
U-20	94,968.6	39,035.4		South stake nailed to bulkhead
U-21	95,537.8	39,261.7	400.2	North paint on Bulkhead
U-21	95,456.0	38,870.0		South stake on tank
U-22	95,846.0	39,156.3	414.5	North paint on steel bulkhead
U-22	95,737.5	38,756.2		South stake on tank
U-23	96,163.2	39,055.5	410.1	North stake tied to fence Corn
U-23	96,116.5	38,648.1		South stake on fence @ light Pole
U-24	96,621.6	38,912.7	373.0	North paint on bulkhead
U-24	96,542.6	38,548.1		South stake nailed to bulkhead
U-25	97,009.2	38,859.4	374.1	North stake set @ bulkhead
U-25	96,943.8	38,491.1		South Green paint stripe on concrete wall
U-26	97,364.5	38,837.1	368.1	North stake set @ bulkhead
U-26	97,403.5	38,471.1		South stake tied to fence @ Bridge

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Chkd. By ____ Date _____ Proj. No. _____

"A" Tide Guage @ T-Pike Bridge N = 95,616.5
E = 50,446.9
Elev. = 5.00'

"B" Tide Guage @ Jackson St. Bridge N =
E =
Elev. = 5.19'

APPENDIX
C

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APPENDIX C

SEDIMENT SAMPLING PROTOCOL AND COLLECTION METHODS

APPENDIX C. SEDIMENT SAMPLING PROTOCOL AND COLLECTION METHODS

An assessment of the lower Passaic River, including examination of the historical and new bathymetric surveys, tidal flow characteristics of the river, dredging history, and other factors, indicated that the river from its mouth to the Dundee Dam could be subdivided into five zones or reaches. Each reach has a unique combination of physical factors. The four factors used to develop the sediment sampling plan were:

- Position relative to the site (upstream and downstream)
- Dredging history of the reach
- Documentation of TCDD occurrence in the sediments
- Local sediment deposition rates (either calculated or estimated)

A sampling strategy was developed for each reach based on the unique characteristics of the reach and the specific objectives of the sampling/analysis for the reach. Following are explanations of the rationale used to select each sampling location and descriptions of these locations.

C.1 SAMPLING LOCATIONS

C.1.1 Site-Area Reach

The sampling objective within the site-area reach was to determine the horizontal and vertical distribution of sediment-associated TCDD. Historically, TCDD was found in surface and near-surface sediment samples collected in this area in the fall of 1984. The highest levels were found at Station 1-3-0 below a depth of 12 inches. Station 1-3-0 is located along the south shoreline approximately 400 feet downstream of the site. Other elevated TCDD levels were found adjacent to the site and across the river from the site.

Long (20 feet) sediment cores were collected at the intersections of four radii and four elliptic arcs having station 1-3-0 as a focus. The four arcs were spaced approximately 200 feet, 500 feet, 800 feet, and 1100 feet upstream and downstream of station 1-3-0 along the south shoreline. The sampling pattern covered the 500-foot width of the river with a total of 17 cores, including one core at 1-3-0 (Figure C-1). Sampling locations of eight cores were shifted slightly from the arc and radii intersections to coincide with previously-sampled locations (0-6-0, 0-8-0, 0-8-2, 0-9-0, 1-1-1, 1-2-0, 1-3-0, and 1-5-0).

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C.1.2 Downstream Reach

The sampling objectives within the downstream reach were to determine the levels of TCDD, if any, downstream of the site area and permit an examination of how the various physical factors noted above have affected the distribution of TCDD in the sediment. The downstream reach includes the area from bathymetric transect 1-5 (downstream limit of the site-area reach) to the mouth of the Passaic River. Moderate-to-low levels of TCDD were found during the 1984 study in surface sediments at Stations 1-5-0, 1-6-0, and 1-7-0; stations which are downstream of the site.

Three physical factors, dredging history, sediment deposition, and distance from the site, were postulated to affect the distribution of TCDD in the sediments within the downstream reach. The main channel in the lower one-half to one-third of the reach has been dredged several times by the U.S. Army Corps of Engineers, most recently in 1983 (Appendix B). Sediment deposition rates of 0 to 0.5 feet per year were calculated for some areas of the downstream reach, based on comparisons between the current bathymetric survey and earlier (1976 and 1983) surveys by the Corps. Distance from the site was also included as a factor, as there are approximately 2.3 miles of river within the downstream reach.

In order to select which areas within the downstream reach should be sampled, each of the three physical factors was considered to have two values. Areas were either dredged (D_1), or not dredged (D_0). Areas experienced either high sediment deposition rates (S_1), or low-to-zero rates (S_0). Third, areas were considered to be either near (L_0) or far (L_1) from the 80 Lister Avenue site. The resultant matrix of physical factors includes eight combinations: $D_0S_0L_0$, $S_0S_0L_1$, $D_0S_1L_0$, $D_0S_1L_1$, $D_1S_1L_0$, $D_1S_0L_1$, $D_1S_0L_0$, $D_1S_1L_1$. Two physical factor combinations--$D_1S_0L_0$ and $D_1S_1L_0$--were not found because upstream of Lincoln Highway near the site no dredging has been performed since at least 1953. Areas for sediment sampling in the downstream reach were selected for the remaining combinations. Table C-1 lists the physical factors and the corresponding areas selected for sediment sampling.

Long (20 feet) cores were taken in areas with high sediment deposition rates (S_1), and short (5 feet) cores were taken in areas with low rates (S_0). An

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evaluation of the flow characteristics of the river indicated that sediment deposition rates could be anticipated to be relatively high within areas D06R and D22L, although the bathymetric survey indicated low sediment deposition. Therefore, long cores were taken in these areas. Cores were taken in sets of four in order to adequately characterize the sediment patterns in each area. Sampling points were spaced roughly 100 feet apart along the longitudinal centerline of each area. This sampling geometry is thought to minimize the Kriging variance within an area. Downstream reach sampling locations are shown in Figures C-1 to C-4.

C.1.3 Upstream Reach

The sampling objectives within the upstream reach were to determine what levels, if any, of TCDD exist in sediments upstream of the site area and to enable a determination of how the two physical factors of distance from the site and sediment deposition rate affect the distribution of TCDD. The upstream reach includes a 2.2-mile stretch of river from bathymetric transect 0-5 (upstream limit of the site-area reach) to the William Stickel Memorial Bridge. The Passaic River in this area has not been dredged since 1949.

In order to determine which areas within the upstream reach should be sampled, the two physical factors, sediment deposition rate(S) and distance (L), were each assigned two values--high (subscript 1) and low (subscript 0). The matrix has four cells: S_0L_0, S_0L_1, S_1L_0, and S_1L_1. Sediment deposition rates were determined using bathymetric profiling. In most cases, four short (5 feet) cores were taken in areas with low sediment deposition rates (S_0), and four long (20 feet) cores were taken in areas with high sediment deposition rates (S_1). Within area U18L, six long cores were collected--four along the left shoreline and two from within an adjacent boat slip (an area of anticipated high sedimentation). All four upstream reach sampling areas are shown in Figures C-5 and C-6 and described in Table C-2.

C.1.4 Far-Upstream Reach

The sampling objective for the far-upstream reach was to reveal any trends in TCDD occurrence along the reach in areas of expected high and low sediment deposition rates. The far-upstream reach extends 11.8 miles from the William Stickel Memorial Bridge upstream to Dundee Dam. Sediment deposition rates are

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unknown in this reach since bottom profiles were not recorded during the 1985 bathymetric survey and the far-upstream reach has not been dredged since 1950. The estimated sediment deposition rates for the various areas within this reach were determined based on the flow characteristics and morphology of the river.

To document trends in TCDD levels in the sediment, ten sets of one short (5 feet) and one long (20 feet) cores were collected at approximately one-mile intervals throughout the reach from adjacent areas of anticipated low and high sediment deposition rates, respectively. Locations of the anticipated low and high sediment deposition rates correspond to the channel and the margin, respectively. In addition, four long cores were collected along the left bank approximately 9 miles upstream of the 80 Lister Avenue site, north of Rutherford Avenue, to enable comparison with sampling protocols for the downstream and upstream reaches. All far-upstream reach sampling locations are shown in Figures C-7 through C-12 and are listed in Table C-3.

C.1.5 Control Reach

Sediment samples were collected above Dundee Dam to serve as controls (i.e., not affected by sediment potentially coming from the Site-Area Reach). Four short cores were collected in Dundee Lake at the locations shown in Figure C-13. Cores C01MA and C01MB were collected from the deeper portion of the lake at 200 feet and 1,000 feet, respectively, above Dundee Dam, while cores C01LA and C01LB were collected from a shallow mid-lake area 1,800 and 2,000 feet, respectively, above the dam.

C.2 SAMPLE ANALYSIS STRATEGY

Approximately one-third of all core sections collected were analyzed following the strategies outlined below and summarized in Table 4-3.

C.2.1 Site Area Reach

The first 10 feet (five sections) of all 17 long cores collected were analyzed for chemical and physical parameters (104 sections). In addition, 5 cores were analyzed in their entirety. Refusal was reached at 6 feet in one core, so only three sections were recovered.

C.2.2 Downstream Reach

Seventeen cores of the 33 cores collected were analyzed according to the

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following staggered analysis scheme, for a total of 67 sections as listed in Table C-1.

Generally, in areas where four deep cores were taken, two cores were analyzed and two were archived. Alternate cores (A and C or B and D) were analyzed while the other pair (B and D or A and C) were archived. Selection was made by coin toss. A total of seven sections from the upper 10 feet were analyzed from each set of two deep cores: the top (0 to 2 ft) and middle (8 to 10 ft) sections of both cores, plus one section from each depth profile between 2 and 8 ft. All other sections were archived. For example:

```
Core A                  Core C

        .. 0 feet ..
  x                       x
  x                       o
  o                       x
  x                       o
  x     .. 10 feet ..     x        x - analyzed
  o                       o        o - archived
  o                       o
  o                       o
  o                       o
  o     .. 20 feet ..     o
```

In areas where shallow cores were taken, all five sections from two short cores per set of four were analyzed (total of 10 sections). The remaining two cores were sectioned and archived for possible future analysis.

C.2.3 Upstream Reach

A total of 18 cores (eight short and ten long) were collected from the Upstream Reach, and nine were analyzed (39 sections) as listed in Table C-2. They were analyzed according to the sectioning strategy outlined in Section C.2.2

Six long cores were collected in area U18L. Core U18LA and U18LC were analyzed as described above, while core U18LE, which was collected from within a boat slip, had all five sections from its upper 10 feet analyzed.

C.2.4 Far-Upstream Reach

A total of 22 cores were collected and 79 sections from 18 cores were analyzed. The analyzed cores were from sampling areas located 3.2, 4.2, 5.4, 6.5, 7.9,

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8.6, 9.0, 9.4, and 10.6 miles upstream of the site zero mile marker (Table C-3). All five 1-foot sections from each of the short cores were analyzed, and all sections of the upper 10 feet (five sections per core) of the long cores were analyzed.

C.2.5 Control Reach

Four short cores were collected from Dundee Lake. Two (C01LA and C01MA) were analyzed for a total of eight sections, while the other two (C01LB and C01MB) were archived.

C.3 SAMPLING TECHNIQUES

Sediment samples were collected by forcing 3-1/2 inch (I.D.) Lexan tubing into the sediments using either a hydraulic vibracoring unit or a hand-operated coring apparatus. All but 6 cores were collected using vibracoring techniques. The remaining 6 cores, comprising all 4 cores from the Control Reach and cores F10MA and F10RA from the Far Upstream Reach, were collected using the hand-operated coring apparatus. Detailed descriptions of the two techniques are provided below.

C.3.1 Vibratory Coring

The vibracore unit (OSI Model 1400) consists of a vibrator head, a steel barrel (either 10 or 20 feet long) a 3-1/2-inch Lexan liner to fit the barrel, a core retainer, a cutting shoe and a hydraulic power unit with connecting hoses (Figure C-14). Operations were conducted from a 20-foot by 40-foot barge equipped with a hydraulic crane and centrally-located anchoring spud. The barge was moved with a 25-foot inboard work boat, while two other smaller boats were used to set and retrieve anchors and to transport equipment and people. A total of eight people were required each day for the vibracoring operations.

At each sampling location, an initial bathymetric reconnaissance survey was conducted to evaluate accessibility within the location. When necessary, marker buoys were set at each of the four core sites within the location. The barge was then positioned at the core site and stabilized using the spud and/or anchor system. The vibracore unit was then hoisted off the deck with the crane and positioned above the site to be cored. The water depth at the site was measured either by a survey crew and survey boat equipped with a fathometer or by a lead

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line lowered from the barge. This depth was recorded on data sheets and reported to the vibracore unit operator. The vibracore unit was then lowered into the water and the vibration unit energized when the bottom of the core barrel (cutting edge) was about 2 feet from the sediment surface. The vibracore unit was lowered further through the water and into the sediment until the desired penetration (core depth) was attained or refusal prevented further penetration. At this point, the vibration unit was turned off and the vibracore unit was extracted from the sediment. Occasionally, the vibracore unit had to be vibrated for a few seconds as it was being extracted to free it from the sediments. Sediments remaining on the vibracore unit were sprayed off with river water pumped through a high pressure/low volume pump system as the corer broke the water surface. The vibracore unit was then laid horizontally on the deck across two support horses to provide access to the Lexan liner.

The cutting edge, coupler and core retainer were removed from the core barrel. About 4 inches of sediment (core) from the bottom end within the Lexan liner was lost as the core retainer was removed. This required that a section from the bottom of the Lexan liner be cut off to maintain its correspondence to the bottom of the core. The bottom end of the Lexan liner was then securely sealed using plastic caps and electrical tape. The liner was then removed from the core barrel and the water above the top of recovery decanted. The top of the liner was then sealed and the core placed on a cutting trough. The trough was a 20-foot section of 5-1/2 inch I.D. PVC cut in half longitudinally and supported horizontally by three support horses. The trough was marked at half foot intervals from 0 to 20 feet.

While the vibracoring operation was being conducted from the barge, a survey crew including a geologist recorded the water level correction as indicated by the nearest staff gauge. These staff gauges were referenced to mean low water (MLW). In addition, the survey crew recorded sampling location data relative to known landmarks using a sextant and range finder. Base maps used in the field were aerial photographs obtained from the NJDEP (scale 1:2,400).

When sectioning the long cores (taken with a 20-foot Lexan liner), a permanent marker was used to mark directly on the Lexan liner the top of the sediment, 2-foot intervals down to the bottom of recovery, and arrows indicating the top

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of each section. A hacksaw was used to cut through the liner at 4 feet below the top of the sediment, and at 2-foot intervals thereafter. As each cut was completed the adjoining ends were capped and the individual section rotated into an upright position, while appropriate labeling was completed. Each section was then stored in an upright position. The Lexan liner at the top of recovery was cut off while that section was held upright.

The short cores (taken with a 10-foot steel barrel and Lexan liner) were sectioned from the bottom to the top of the liner. The liner was marked at 1-foot intervals from the top of recovery to 5 feet below the top of recovery, and arrows indicating the top of each section. Each core was sectioned into 1-foot lengths from 4 to 5 feet and 3 to 4 feet and was left as a single section from 0 to 3 feet. As each cut was completed, the ends were sealed and the section then rotated into an upright position while appropriate labeling was completed. All sediment below the 5-foot mark was returned to the river, and the liner from that section was stored on-board for later disposal. The top cap of each of the three sections was labeled as such along with the appropriate interval numbers. The sections were stored in an upright position.

Field descriptions of the sediment were recorded during sectioning. These descriptions were based on the characteristics of the sediment exposed at the ends of the sections. Smearing along the inside wall of the liner generally made visual descriptions of the sections between ends impractical.

The liner sections were sprayed after sectioning and sealing with the high pressure/low volume pump system described above to remove any sediment from the outer surface of the liner. The sections were then placed upright in a temporary storage rack in preparation for final labeling and packaging. Dirty areas of the barge, the cutting edge, the core retainer, the tools and the other support apparatus that came in contact with the sediment were also sprayed and cleaned with the pump. The inside of the steel core barrel was flushed with river water and a new Lexan liner (also flushed with river water) was inserted and secured to the barrel for use at the next coring site.

The core sections were dried with paper towels and labeled with preprinted, self-adhering labels. The labels were placed near the top of each core section

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and protected with clear tape. Each section was then placed in a clean, opaque plastic bag that was sealed and then labeled with a duplicate preprinted label. These sections were stored upright in the temporary storage and transport racks.

A liner representative of those used was flushed daily with river water, and a field blank prepared for analysis by collecting organic-free water poured through the liner. The field blanks were contained in amber bottles stored in the shade. A trip blank of organic-free water in a closed bottle was also carried on board the barge each day.

A Field Data Sheet was completed for each core that included sediment descriptions, the core penetration depth, the length of sediment recovery, the water depth, the depth correction, and location data. Preprinted labels corresponding to the respective core sections (depth intervals) were attached to each sheet.

Generally, the upper sediments of the cores were relatively fluid. To facilitate extrusion of these core sections they were designated to be frozen when returned to the site. Selection of sections to be frozen was determined by a geologist on the barge and a notation indicated on the field sheet and on the core check sheet.

At the end of each day, the core sections were transported in an upright position in the temporary storage racks to the 80 Lister Avenue site for storage, extrusion and subsequent analysis.

C.3.2 Hand Coring

A hand-operated coring apparatus was used to collect sediment cores from the control reach in Dundee Lake and in the upstream reach at F10MA and F10RA. This apparatus consisted of a 3-1/2-inch (I.D.) Lexan liner (as used in the lower river) tapered at the bottom to provide a cutting edge and an expandable plug attached to a 25-ft cable. Prior to coring, the liner was flushed with river water by immersing it (horizontally) into the river. The expandable plug and cable were then inserted into the bottom of tube, and the plug was expanded to ensure a water/air tight seal. The cable extended up through the Lexan liner and was draped over the top.

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Sampling was done from a barge built using two small work boats which were covered with decking. The barge was stabilized using either a spud or an anchor system after moving to the desired coring site. The water depth was measured using a staff. The liner and expandable plug were then lowered through the center of the barge to about one-half foot above the sediment. The cable length was fixed by passing it through a notch in an overhead tripod and the Lexan liner was then pushed into the sediments using the expandable plug as a fixed piston to create a partial vacuum in the liner. Dowel rods inserted through holes in the top of the liner served as handles while pushing the tube into the bed. The liner was pushed in until refusal was reached. The liner was then retracted from the bed with the assistance of a two-pulley block and tackle system attached to the tripod. The core was lifted on-board in an upright position and the bottom was securely capped.

C.4 SAMPLE STORAGE

Three different methods of temporary storage were maintained during the course of the river project field operation, including:

- Frozen storage
- Cold storage
- Archive storage.

Frozen or cold storage facilities provided selected cores with an environment conducive to preserving the initial chemical character of the sediments for later analysis. Frozen storage was used to solidify the nearly liquid sediments in some sections, generally from the upper portion of each core. This method not only minimized the potential of the sediment shifting within the section but also expedited the extrusion/sampling operations of each section. Frozen storage facilities included both a dry ice freezer barrel used to freeze the core section in an upright position and an electric chest freezer used for longer term storage of previously frozen cores. Cold storage facilities included both a dry ice cooler and an electric refrigerator. The inside temperatures of the cold storage facilities were monitored and maintained at 40°F.

Archive storage facilities were designed to temporarily store, in an upright position, those core sections not designated for analysis during the initial

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phase of this study. These facilities were constructed in the former library room of the engineering building on site. The original shelves were retrofitted to accept and safely store core sections in an upright position. Cores were stocked in groups by individual transect numbers and the group labeled to expedite possible later retrieval.

C.5 SEDIMENT SAMPLE EXTRUSION

The extrusion process consisted of several tasks, including:

- Determination of the unit weight of the sample
- Extrusion of the sample from the Lexan liner
- Removal of the periphery
- Photography and description of the sample
- Sampling of the interior of the core sample section for physical analysis and chemical analyses including TCDD and TOC.

When each core section was received at the extrusion area, its preprinted label was checked against those of the three sample jars that were to be filled. Upper sections (i.e., 0 to 4 feet in a deep core and 0 to 3 feet in a shallow core) were received at the extrusion area frozen and were cut into 2-foot or 1-foot sections, as appropriate, while still frozen.

Each section was then weighed and measured to determine the total unit weight and density (lb/ft^3). The following measurements were taken:

- Weight of sediment section, including the Lexan liner and end caps
- Actual length of sediment section (adjusting for any voids at the ends)
- Following extrusion, the weight of the liner and caps.

The sediment section was extruded by sliding the Lexan liner over the section against a fixed piston assembly that fit snugly into the liner. As the liner slid over the piston, the section was extruded into a semi-circular tray cut from a length of Lexan liner. If the core section was frozen, it was allowed to thaw partially on the outside prior to extrusion.

The sediment sample lying in the tray was trimmed to minimize shifting of exterior sediments caused by the liner penetrating upper sediment layers prior to reaching the depth of interest. Trimming of unfrozen samples was done using a 45 degree cut at one end of the sample, followed by a single-stroke cut longitudinally that cut the sample in half without having the upper, discarded

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half fall back onto the bottom half. The second cut was made using a piece of reinforced shim stock 5 inches wide and 26 inches long.

Frozen samples were trimmed using a slightly different technique. The ends of the sample were removed using an ice pick. With the sample in an upright position, the outer 2 to 5 mm of the entire sample circumference was removed using a clean knife.

The exposed sediment or scraped frozen sediment section was photographed using 35-mm color print film. The section was marked by co-photographing its sample I.D. number on a magnetic alphabet/numeral board. The sample was described using the Burmister System and all relevant observations including color, texture, stratification, degree of disturbance during sampling or extrusion, etc., were recorded on River Sample Extrusion Forms.

The scraped frozen sediment section was then placed on a clean surface, broken into small pieces using a clean ice pick, and the pieces placed into a clean mixing tray. The interior of the unfrozen sediment section was collected and placed into a clean mixing tray using a clean utensil. The exterior edges and ends were not sampled. Each sample was mixed thoroughly by hand to a homogeneous consistency and placed into three bottles, a 250-ml amber glass, a 40-ml vial, and a 1-qt bottle. All sample bottles (together with their chain-of-custody sheets) were moved out of the extrusion area prior to receipt of the next core section and empty bottles. All utensils that had been used in the extrusion process were cleaned thoroughly after each extrusion.

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TABLES

Table C-1. Downstream Reach Sampling Areas

Physical Factors	Sampling Areas	Descriptions	Core Length (No.)	Analyzed	Archived
D_0 S_0 L_0	D65R	North shoreline; approx. 150 ft wide, 800 ft long	Short (4)	D65RA D65RC	D65RB D65RD
D_0 S_0 L_1	D19R	East shoreline; approx. 150 ft wide, 600 ft long	Short (4)	D19RB D19RD	D19RA D19RC
D_0 S_1 L_1	D65L	South shoreline immediately upstream of barges; approx. 300 ft wide, 600 ft long	Long (4)	D65LA D65LC	D65LB D45LD
D_0 S_1 L_1	D06R	East shoreline among pier-heads; approx. 100 ft wide, 1100 ft long	Long (4)	D06RB D06RD	D06RA D06RC
D_0 S_1 L_1	D22R	East shoreline near river mouth; approx. 200 ft wide, 600 ft long	Long (4)	D22RA D22RC	D22RB D22RD
D_0 S_1 L_1	D22L	West shoreline among pier-heads; approx. 100 ft wide, 1000 ft long	Long (5)	D22LB[a] D22LD D22LE	D22LA D22LC
D_1 S_0 L_1	No area available				
D_1 S_0 L_1	D19M	Mid-channel; approx. 200 ft wide, 600 ft long	Short (4)	D19MB D19MD	D19MA D19MC
D_1 S_1 L_0	No area available				
D_1 S_1 L_1	D22M	Mid-channel, approx. 200 ft wide, 600 ft long	Long (4)	D22MA D22MC	D22MB D22MD

D399A T-C-1

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Table C-2. Upstream Reach Sampling Areas

Physical Factors	Sampling Areas	Descriptions	Core Length (No.)	Analyzed	Archived
S_1 L_0	U45L	South shoreline; approx. 150 ft wide, 700 ft long	Long (4)	U45LB U45LD	U45LA U45LC
S_0 L_0	U45R	North shoreline; approx. 100 ft wide, 600 ft long	Short (4)	U45RB U45RD	U45RA U45RC
S_1 L_1	U18L	West shoreline; approx. 150 ft wide, 500 ft long Two additional cores within slip	Long (6)	U18LA U18LC U18LE	U18LB U18LD U18LF
S_0 L_1	U18R	East shoreline; approx. 150 ft wide, 500 ft long	Short (4)	U18RA U18RC	U18RB U18RD

D399A T-C-2

Table C-3. Far Upstream Reach Sediment Sampling Locations

Distance Above Site Zero Mile Marker (miles)	Description	Locations: Short Cores	Locations: Long Cores	Analyzed (Y) or Archived (A)
3.2	Kearny Reach	F01MA	F01RA	Y
4.2	Arlington Reach	F02MA	F02RA	Y
5.4	Belleville Reach (Rutgers Street)	F03MA	F03RA	Y
6.5	Vicinity of Riverside County Park	F04MA	R04RA	Y
7.9	Below Third River	F05MA	F05RA	Y
8.6	Above Rt. 3 Bridge	F06MA	F06RA	Y
9.0	North of Rutherford Avenue		F65LA F65LB F65LC F65LD	A Y A Y
9.4	Rutherford Reach	F07MA	F07LA	Y
10.6	Below Gregory Street Bridge	F08MA	F08RA	Y
11.4	Wallington Reach, near Market Street	F09MA	F09RA	A
12.6	Below Saddle River	F10MA[a]	F10RA[a]	A

[a]Sampled using the hand-coring apparatus.

D399A T-C-3

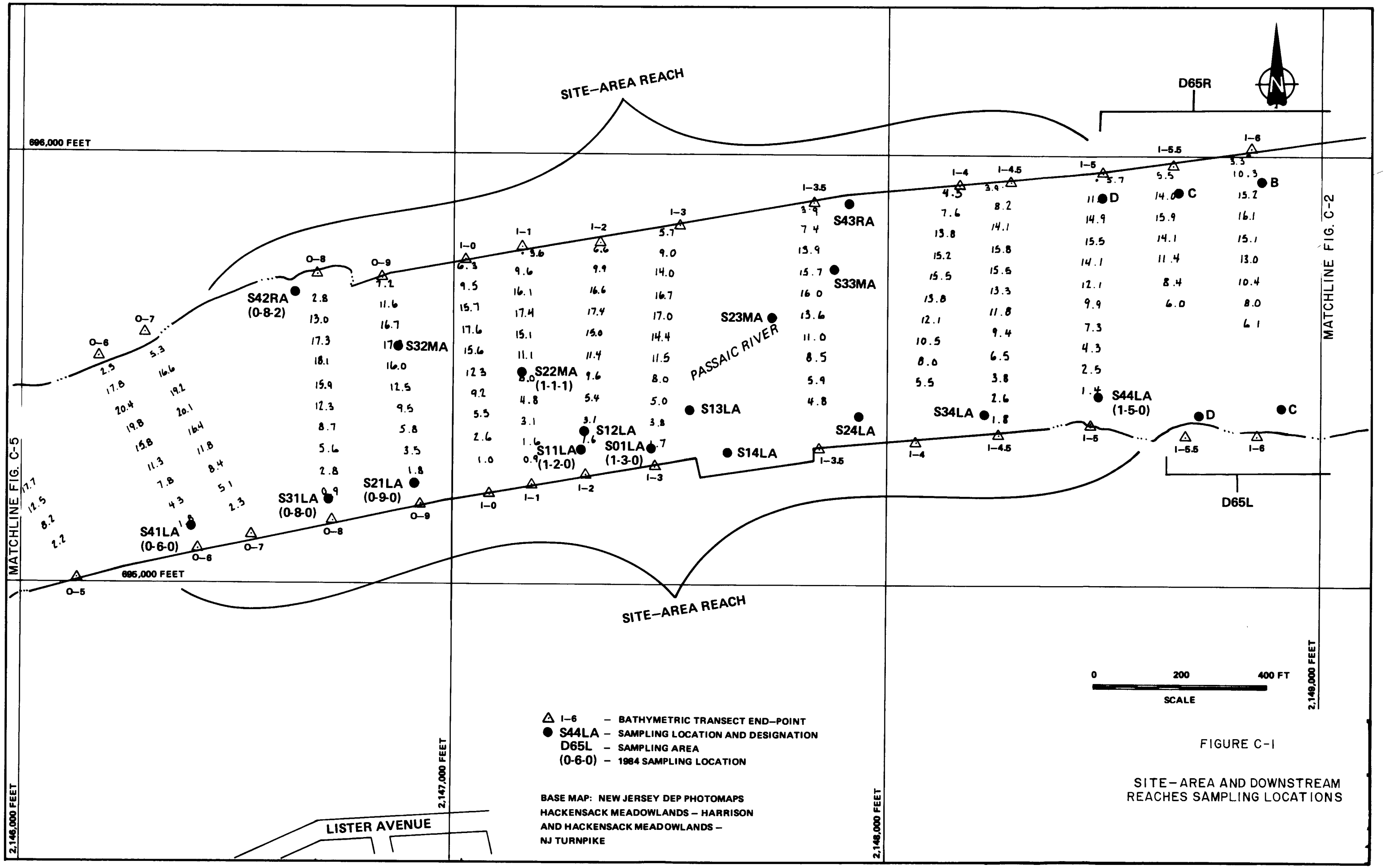


FIGURE C-I

SITE–AREA AND DOWNSTREAM REACHES SAMPLING LOCATIONS

DEP\DA0004439

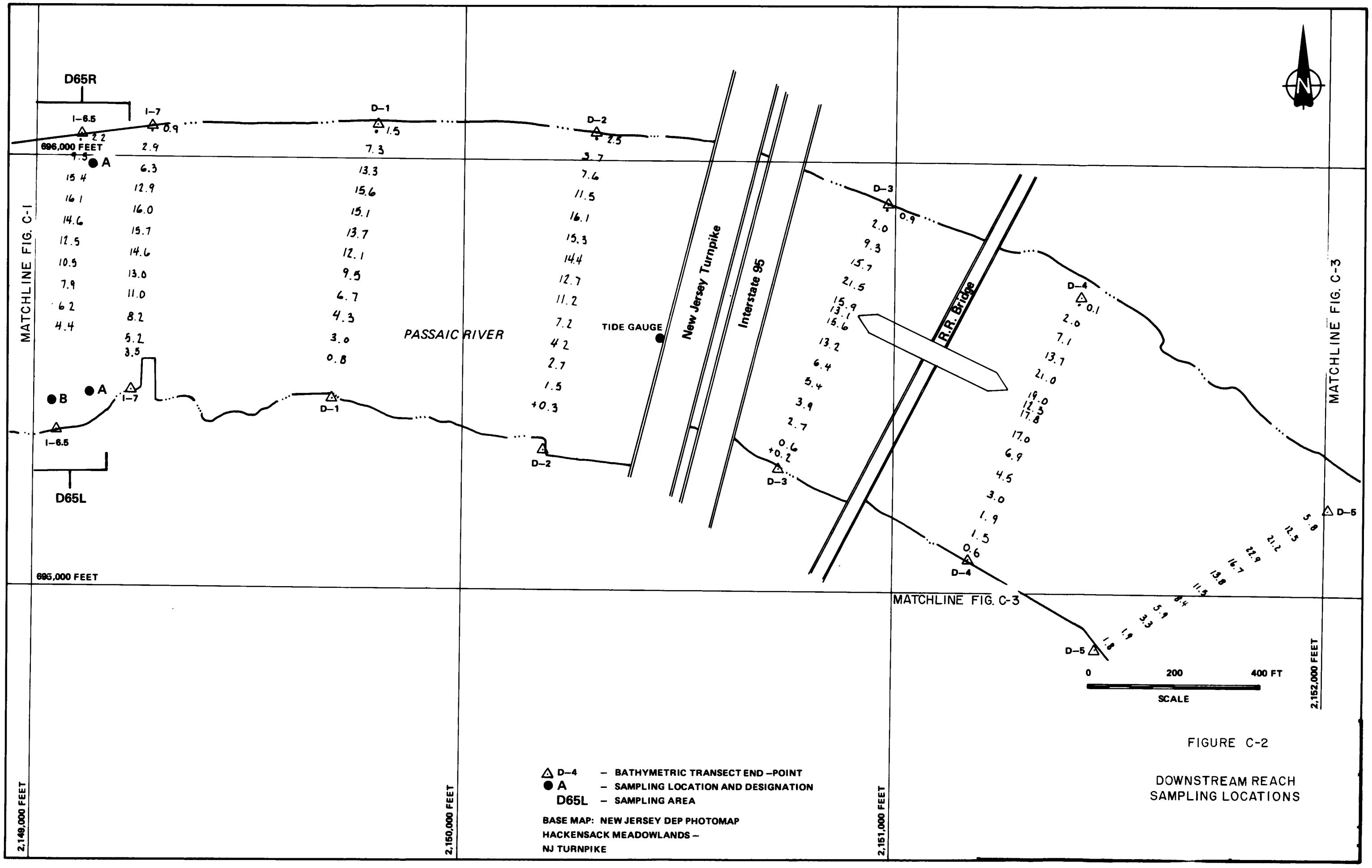


FIGURE C-2

DOWNSTREAM REACH
SAMPLING LOCATIONS

DEP\DA0004440

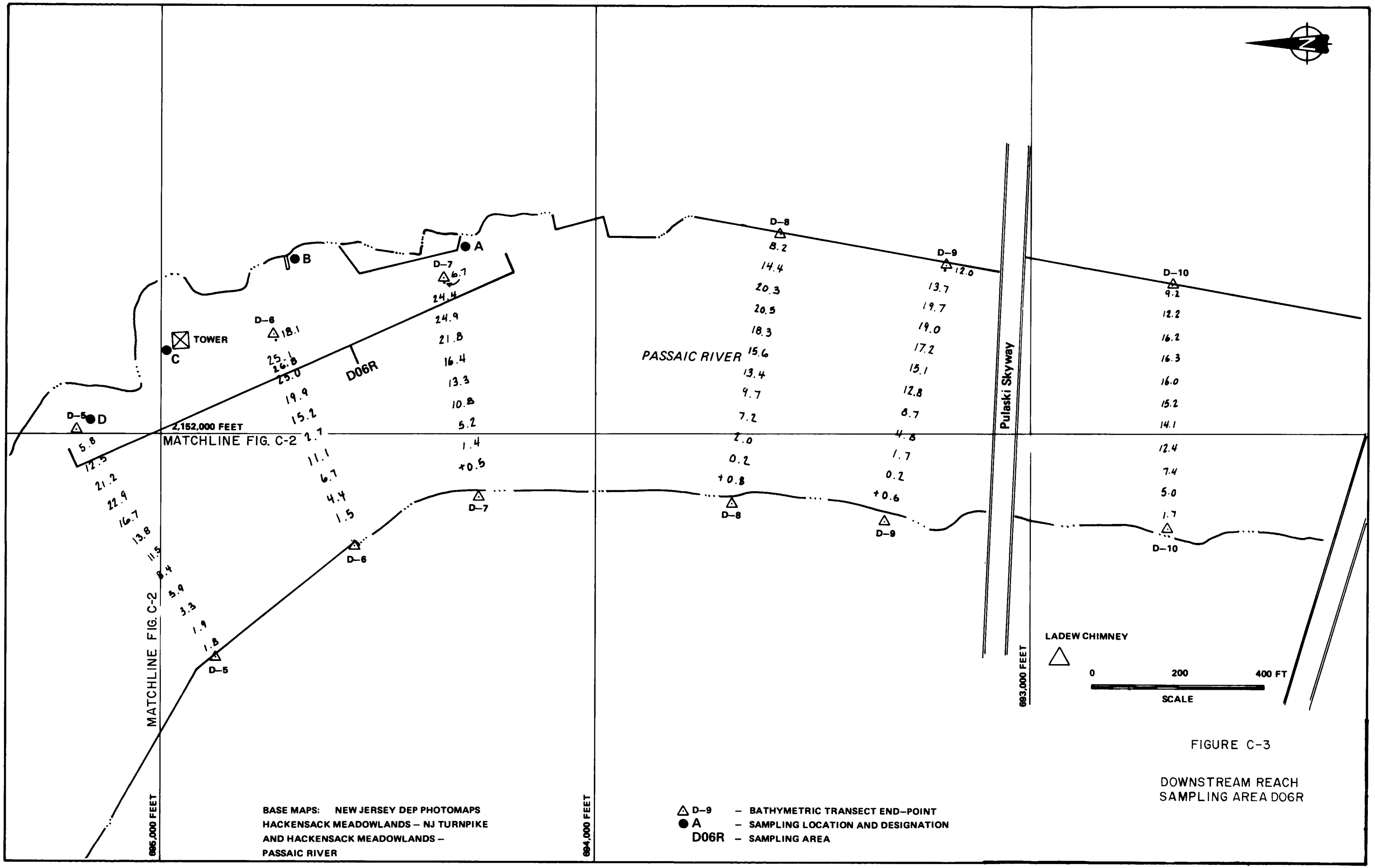


FIGURE C-3

DOWNSTREAM REACH
SAMPLING AREA D06R

DEP\DA004441

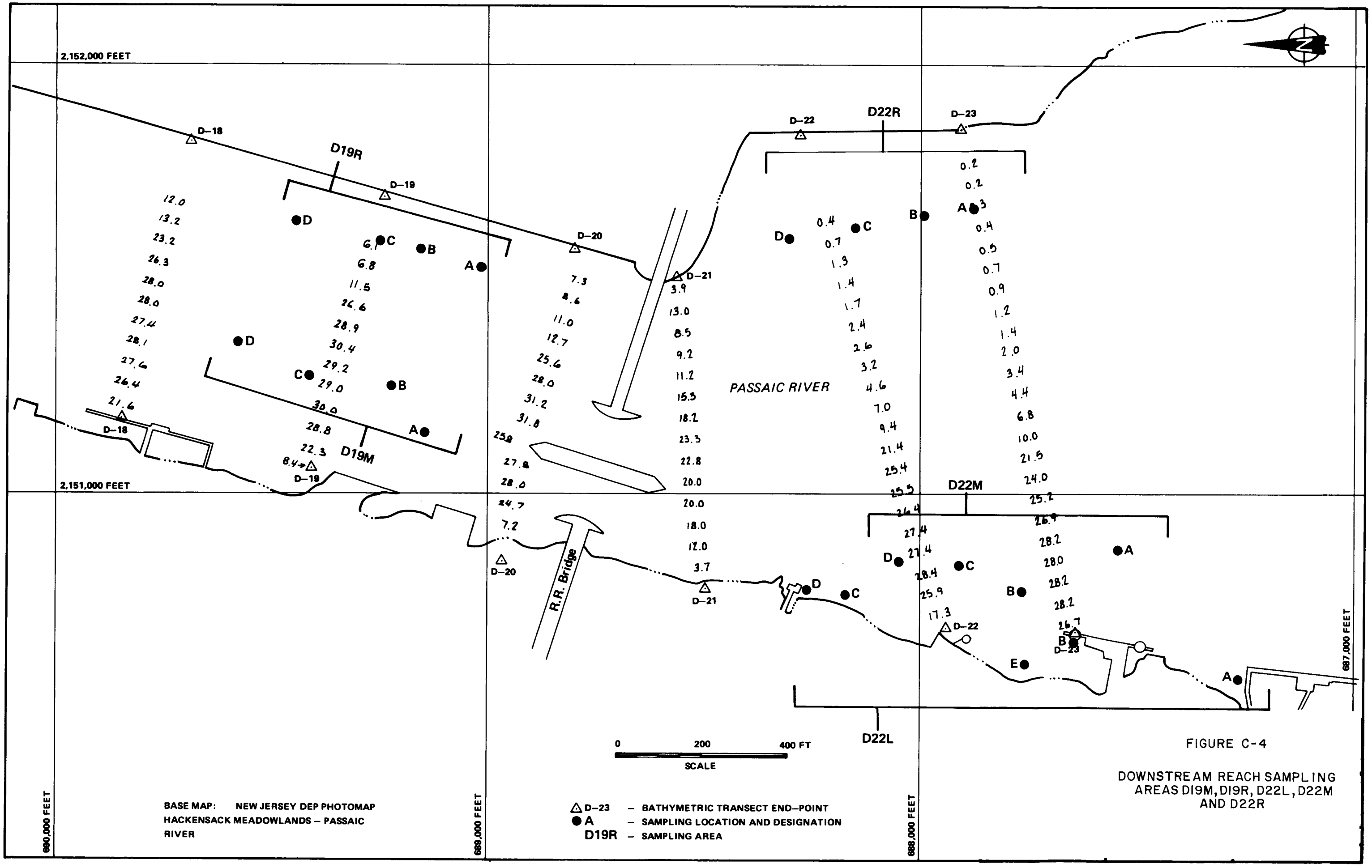


FIGURE C-4

DOWNSTREAM REACH SAMPLING AREAS DI9M, DI9R, D22L, D22M AND D22R

DEP\DA0004442

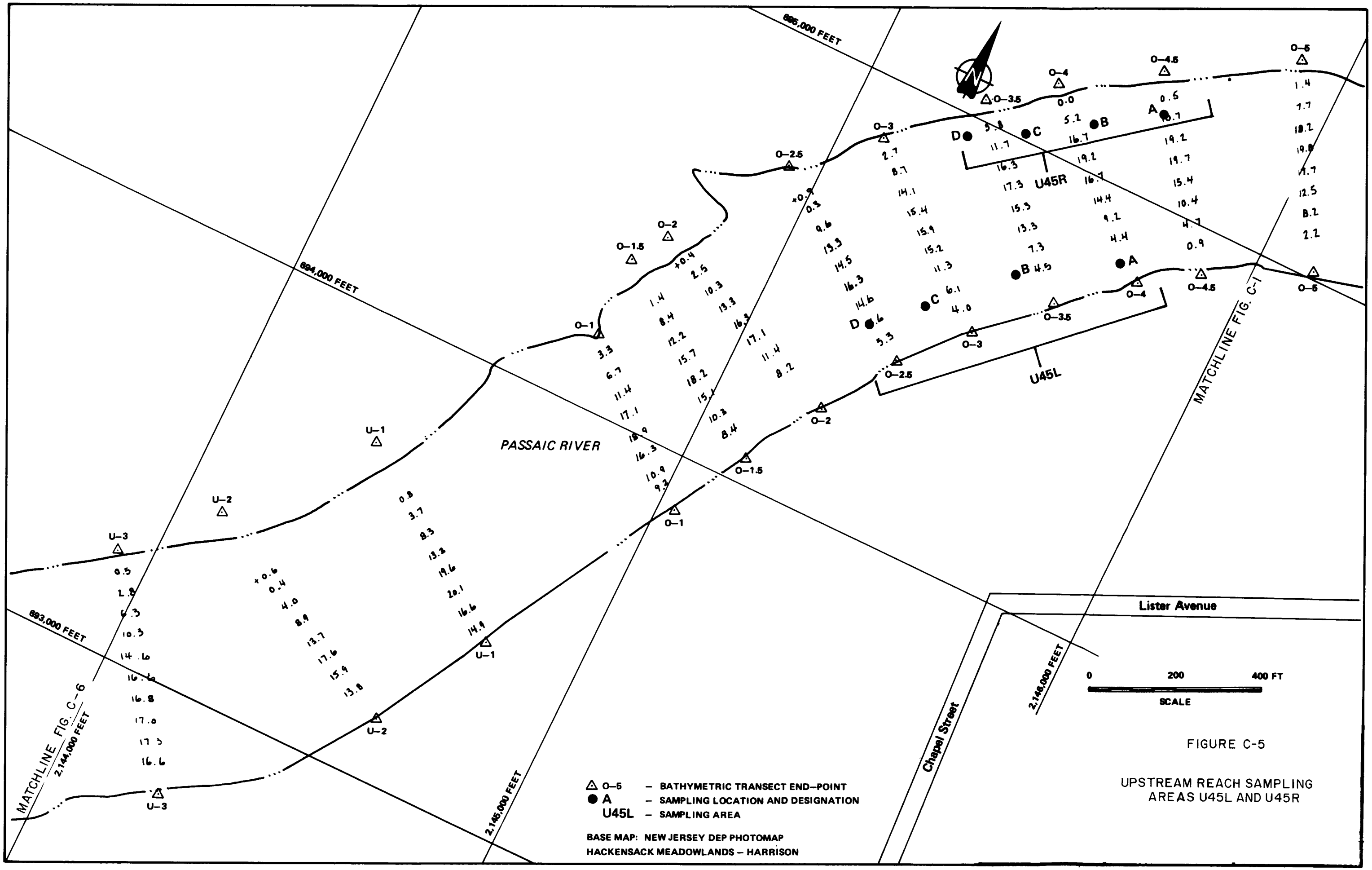


FIGURE C-5

UPSTREAM REACH SAMPLING AREAS U45L AND U45R

DEP\DA000443

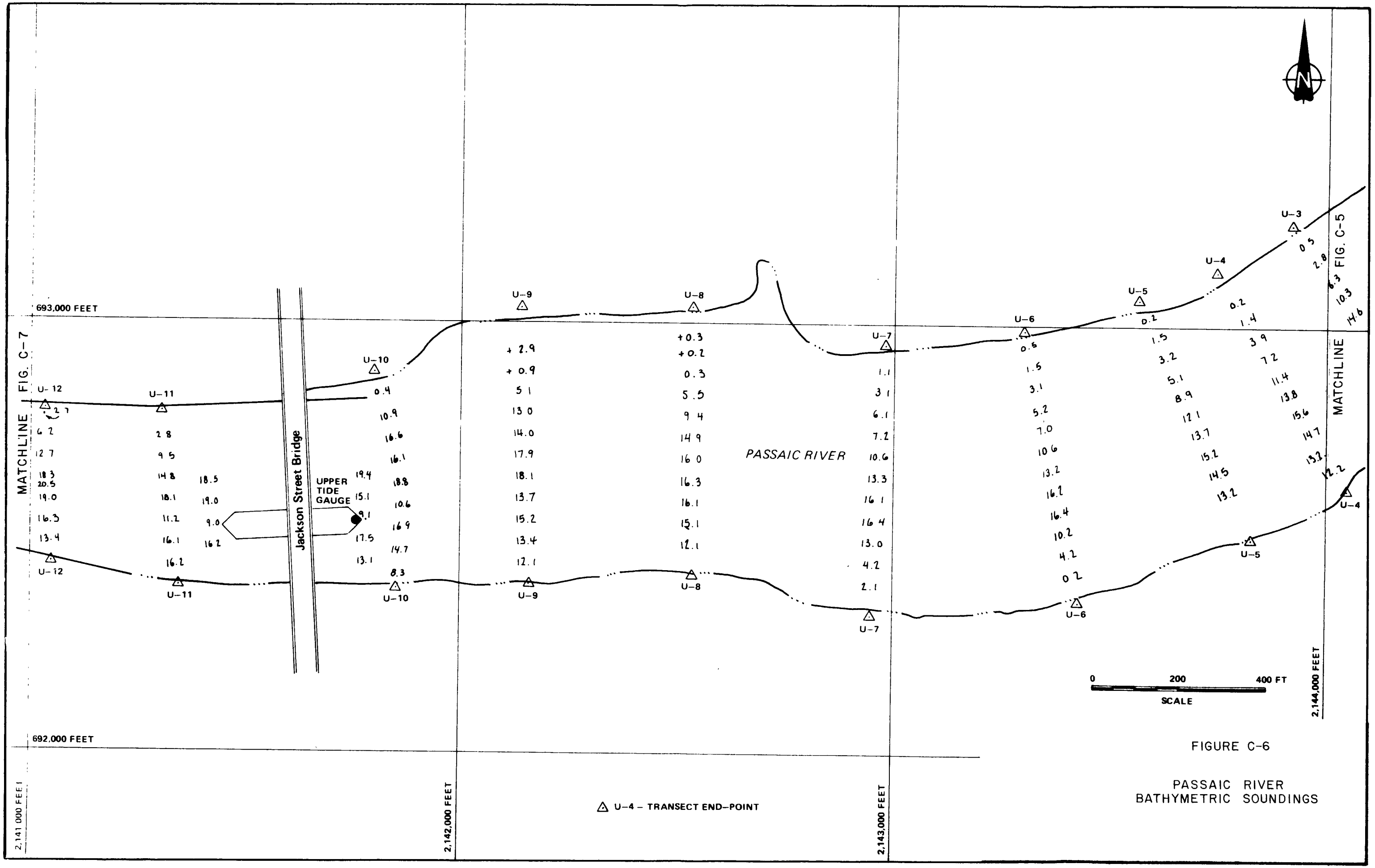


FIGURE C-6

PASSAIC RIVER
BATHYMETRIC SOUNDINGS

DEP\DA000444

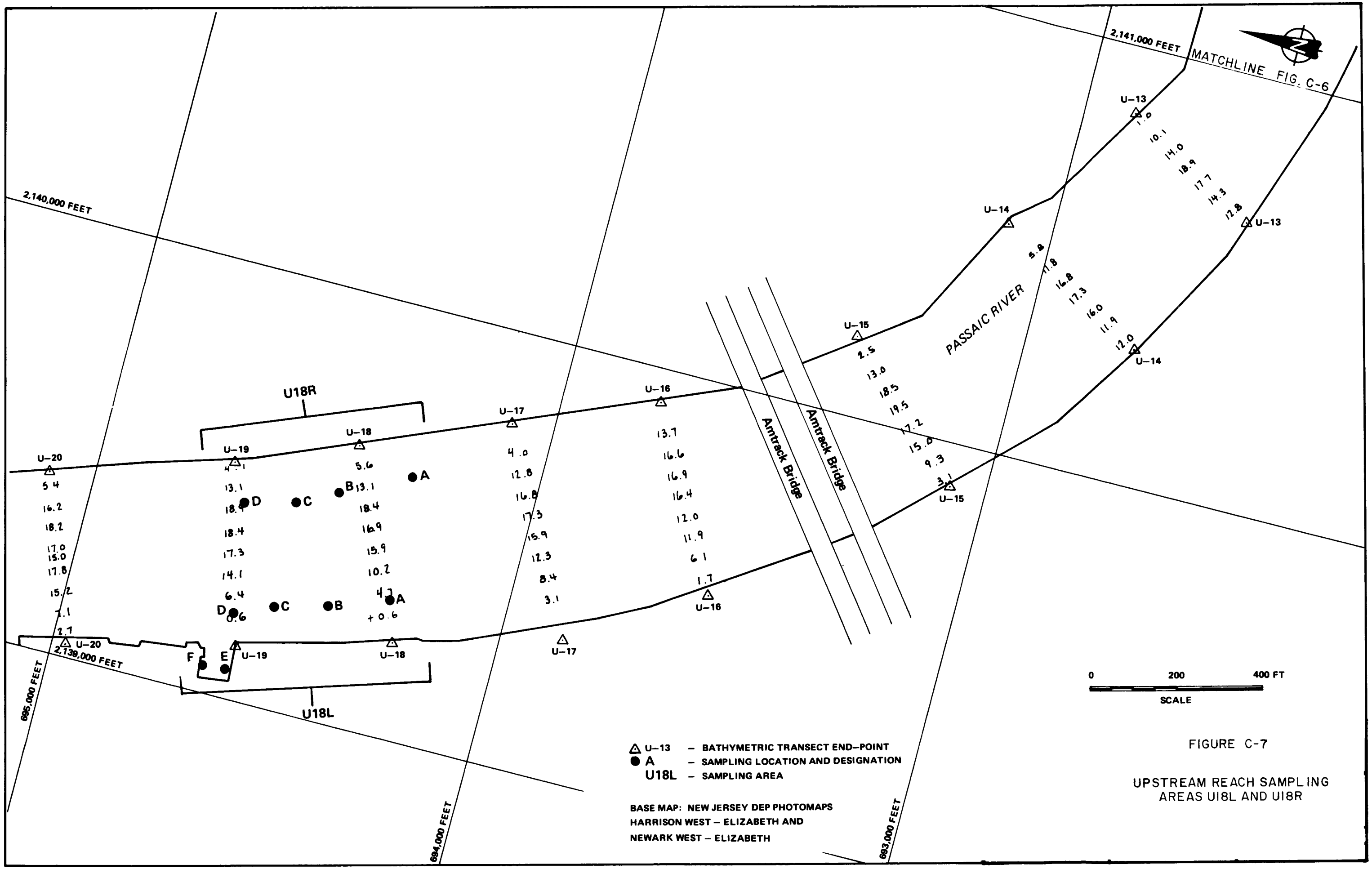
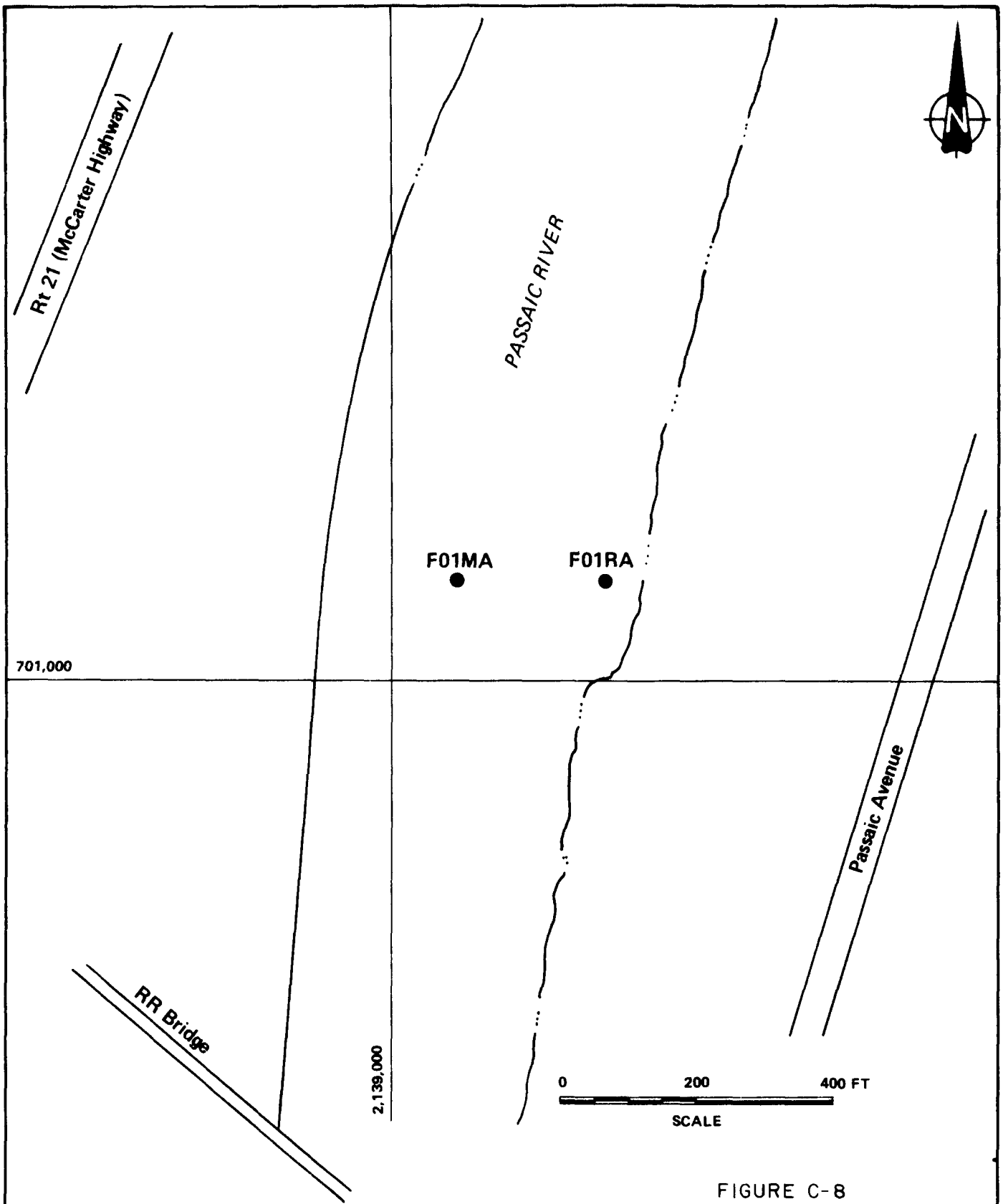


FIGURE C-7

UPSTREAM REACH SAMPLING AREAS UI8L AND UI8R

DEP\DA0004445



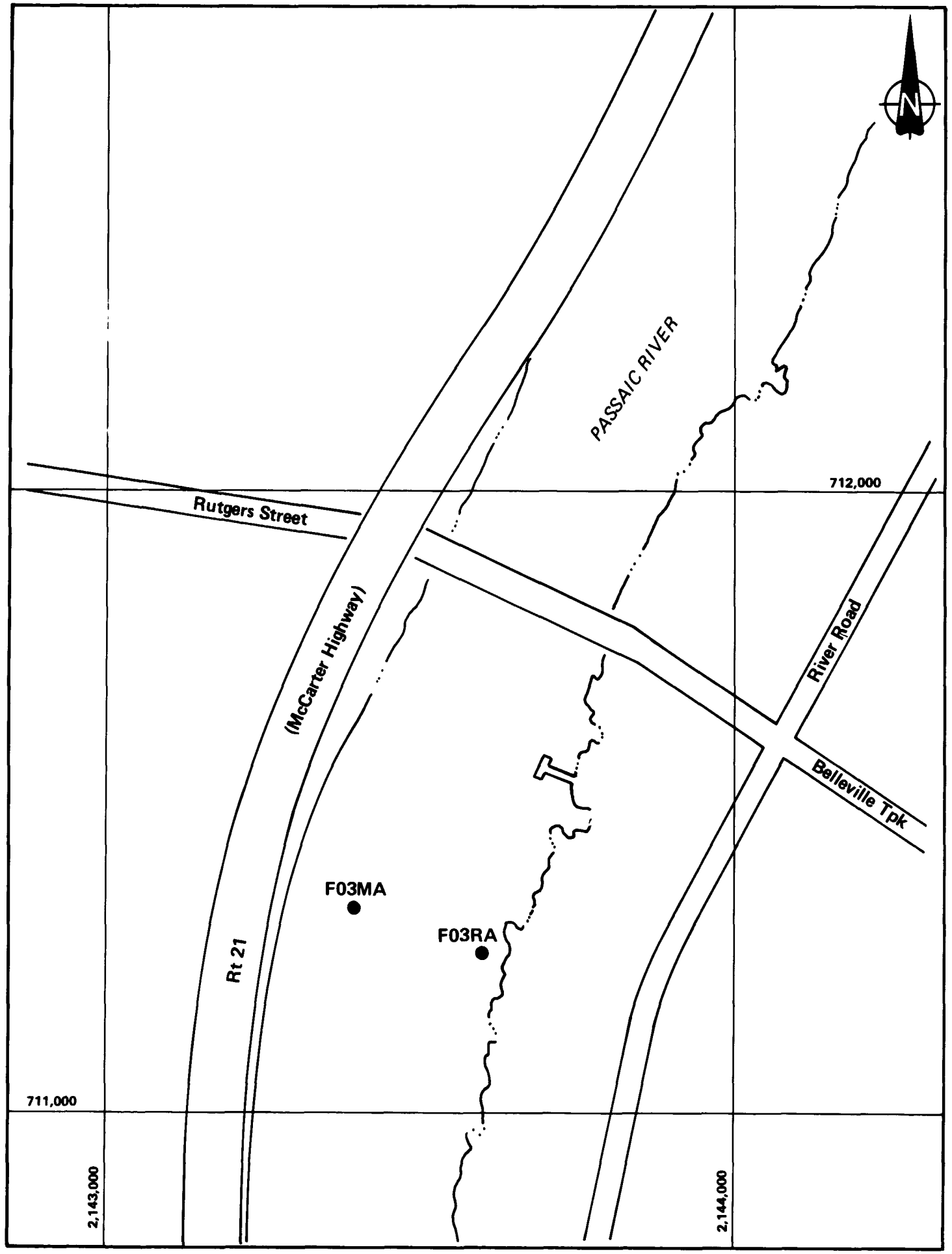
● F01MA SAMPLING LOCATION AND DESIGNATION

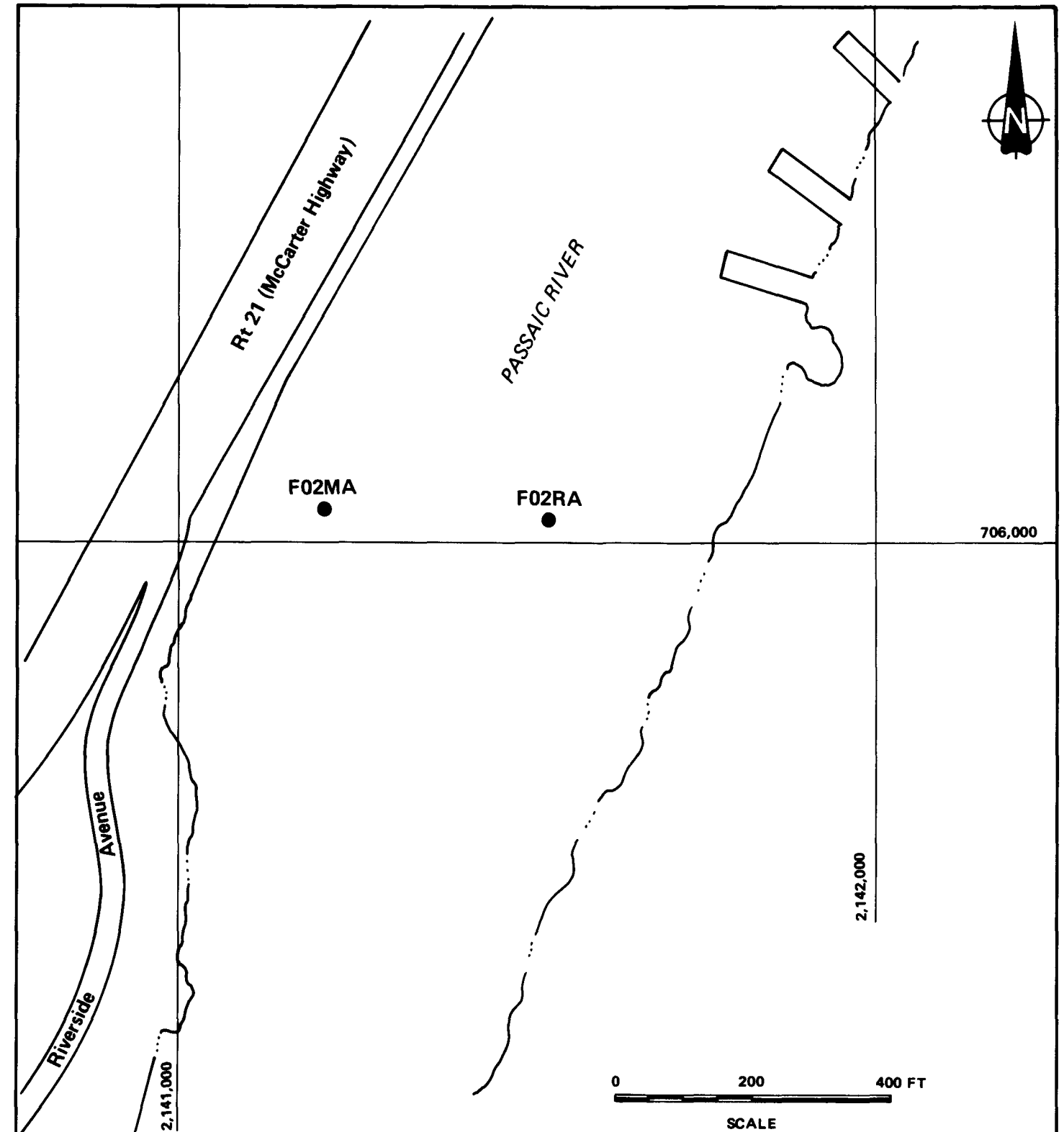
NEW JERSEY STATE PLANE COORDINATE GRID SHOWN AT 1000 FOOT INTERVALS

BASE MAP: NEW JERSEY DEP PHOTOMAP BRANCH BROOK–ORANGE

FIGURE C-8

FAR-UPSTREAM REACH SAMPLING LOCATIONS F01MA AND F01RA





● F03MA SAMPLING LOCATION AND DESIGNATION

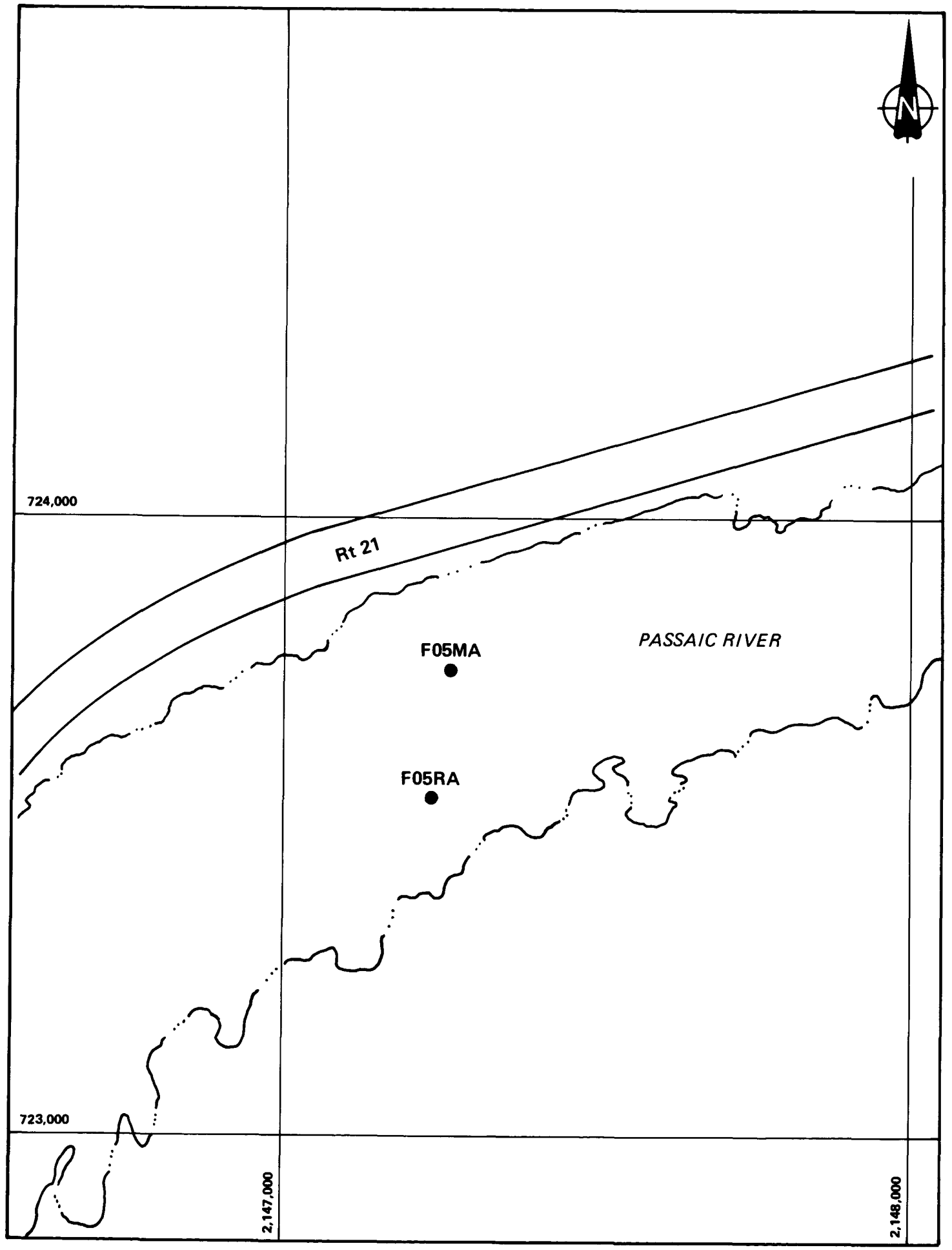
NEW JERSEY STATE PLANE COORDINATE GRID SHOWN AT 1000 FOOT INTERVALS

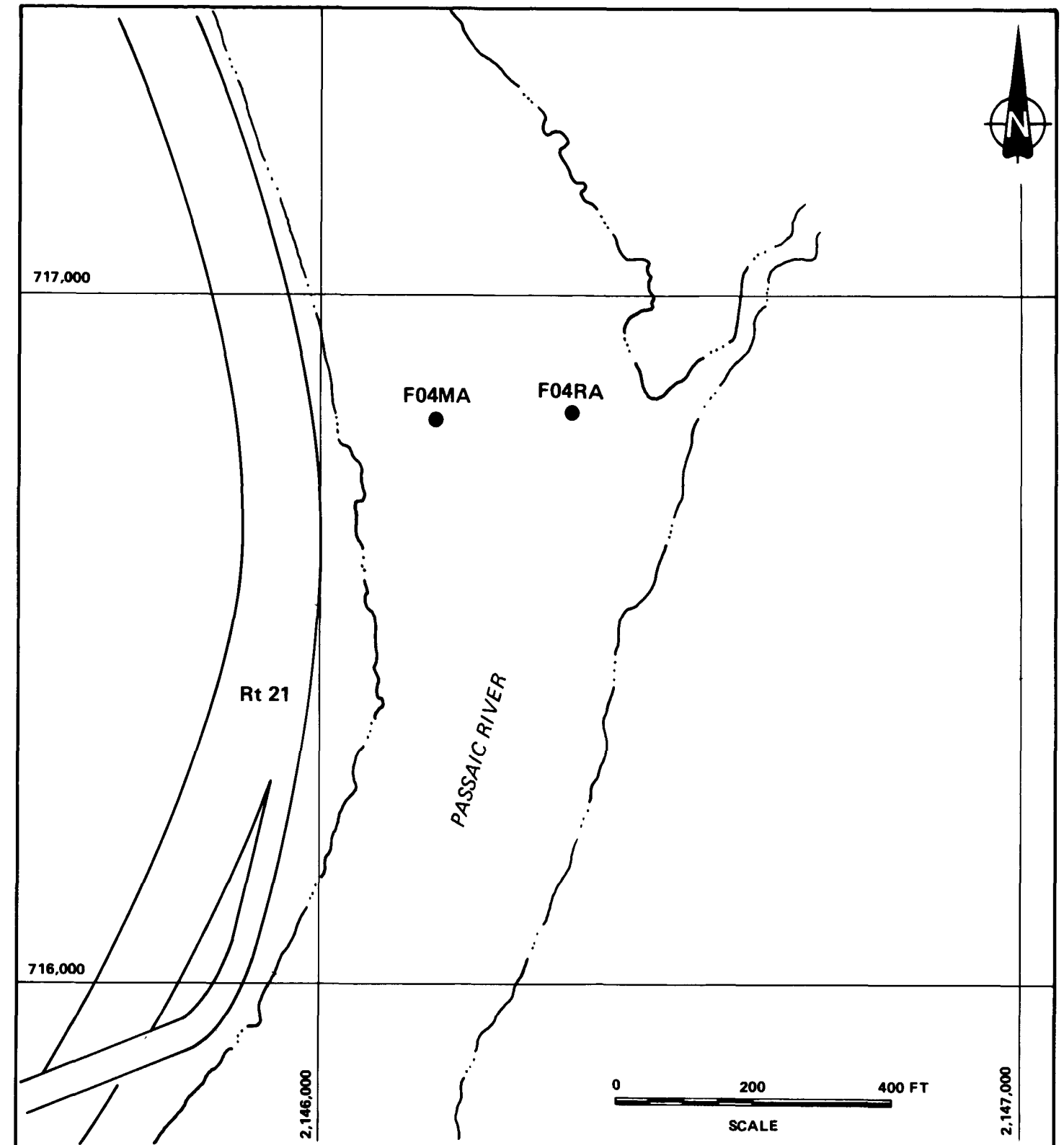
BASE MAPS: NEW JERSEY DEP PHOTOMAPS ARLINGTON–ORANGE AND BRANCH BROOK–ORANGE

FIGURE C-9

FAR-UPSTREAM REACH SAMPLING LOCATIONS F03MA, F03RA, F02MA AND F02RA

DEP\DA0004447





● F05MA SAMPLING LOCATION AND DESIGNATION

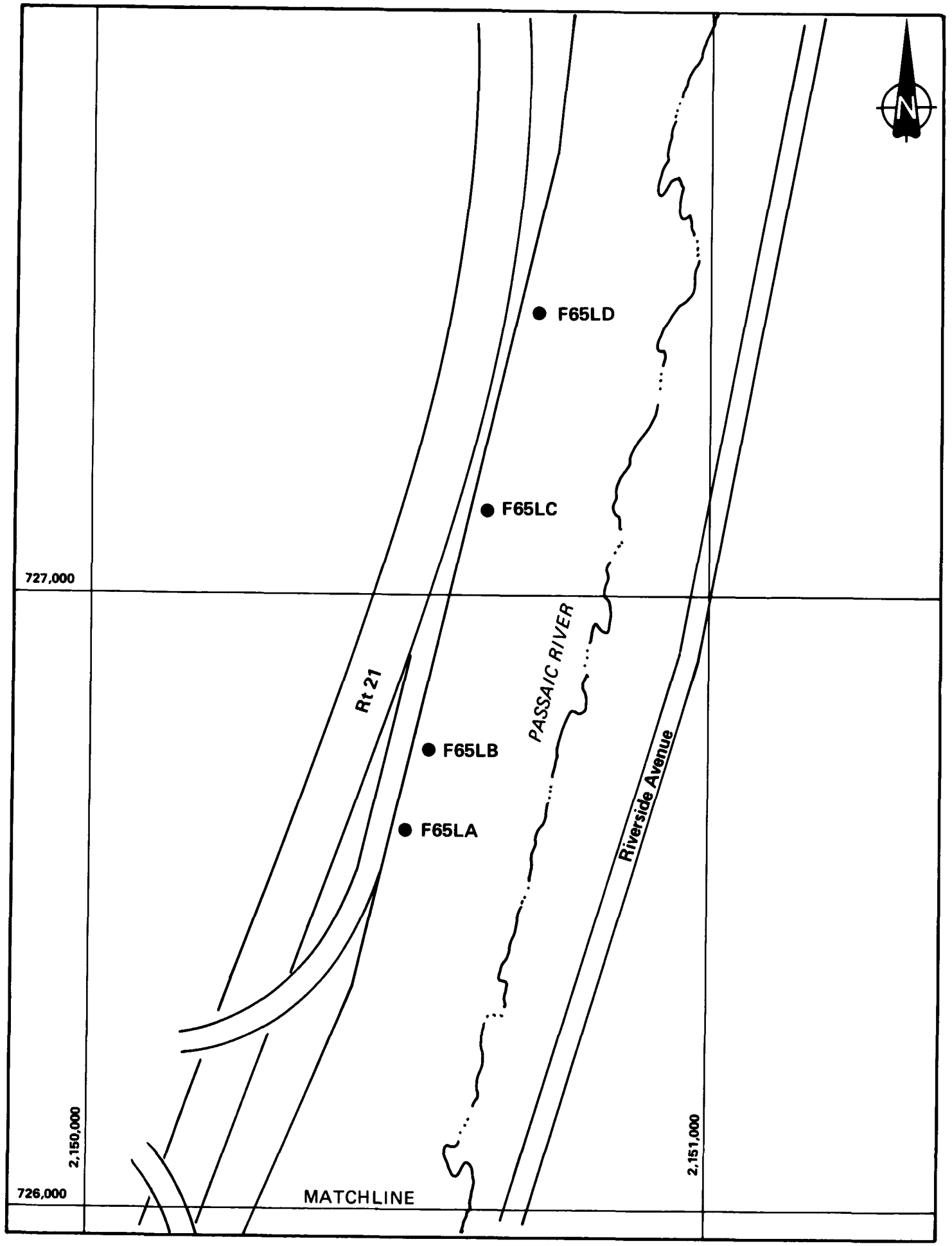
NEW JERSEY STATE PLANE COORDINATE GRID SHOWN AT 1000 FOOT INTERVALS

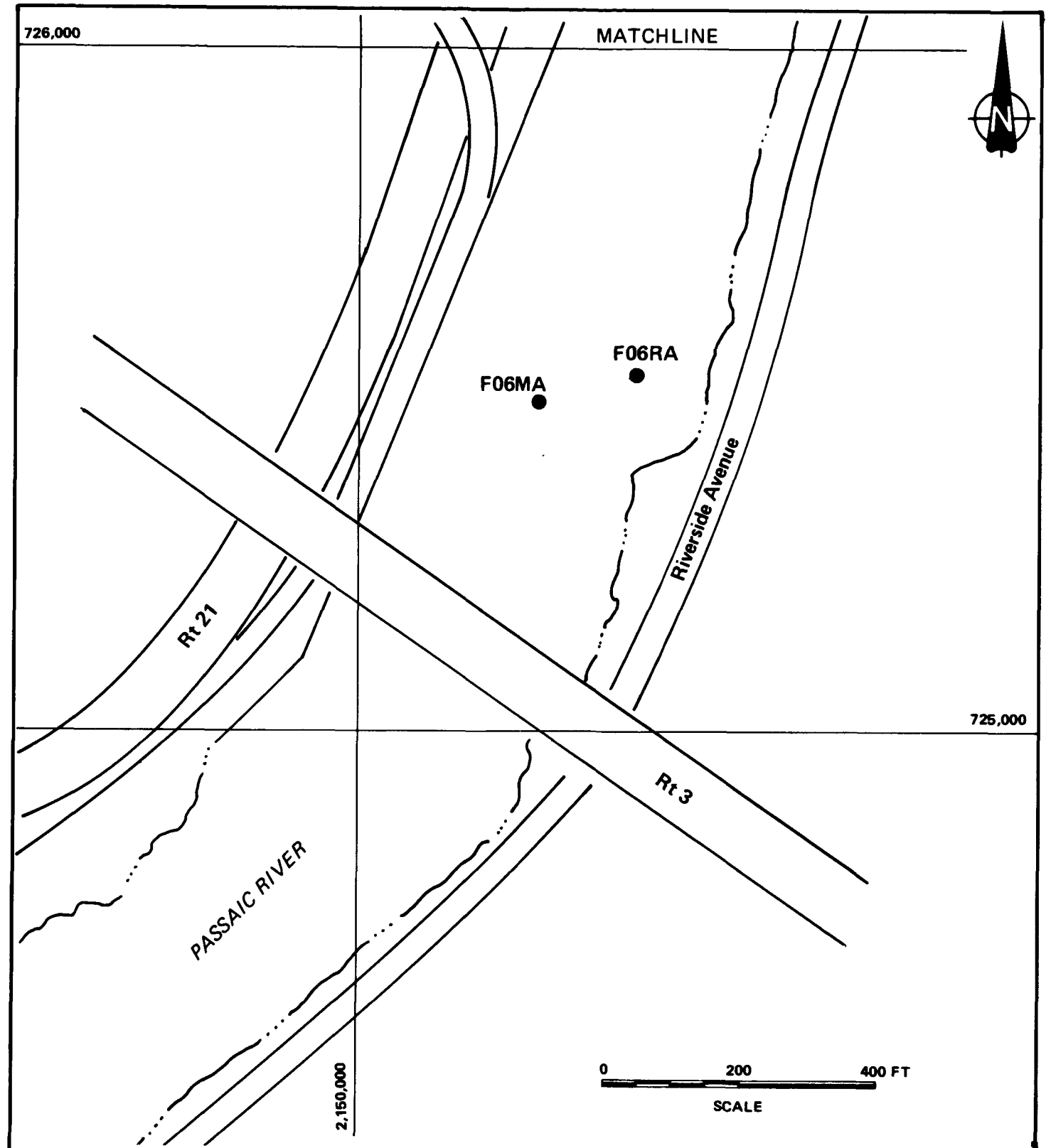
BASE MAPS: NEW JERSEY DEP PHOTOMAPS NUTLEY–ORANGE AND BELLEVILLE–ORANGE

FIGURE C-10

FAR-UPSTREAM REACH SAMPLING LOCATIONS F05MA, F05RA, F04MA AND F04RA

DEP\DA0004448





● F65LA SAMPLING LOCATION AND DESIGNATION

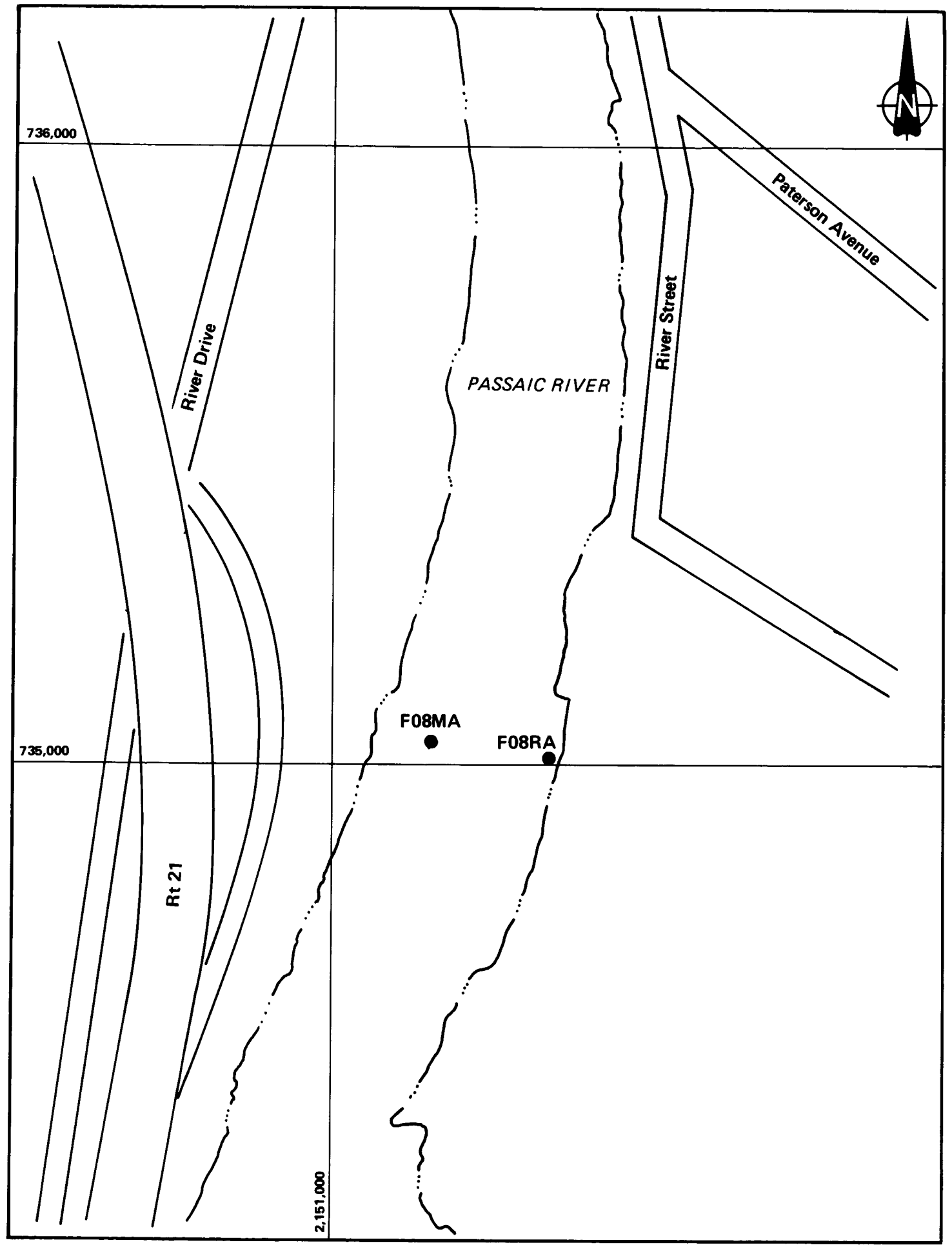
NEW JERSEY STATE PLANE COORDINATE GRID SHOWN AT 1000 FOOT INTERVALS

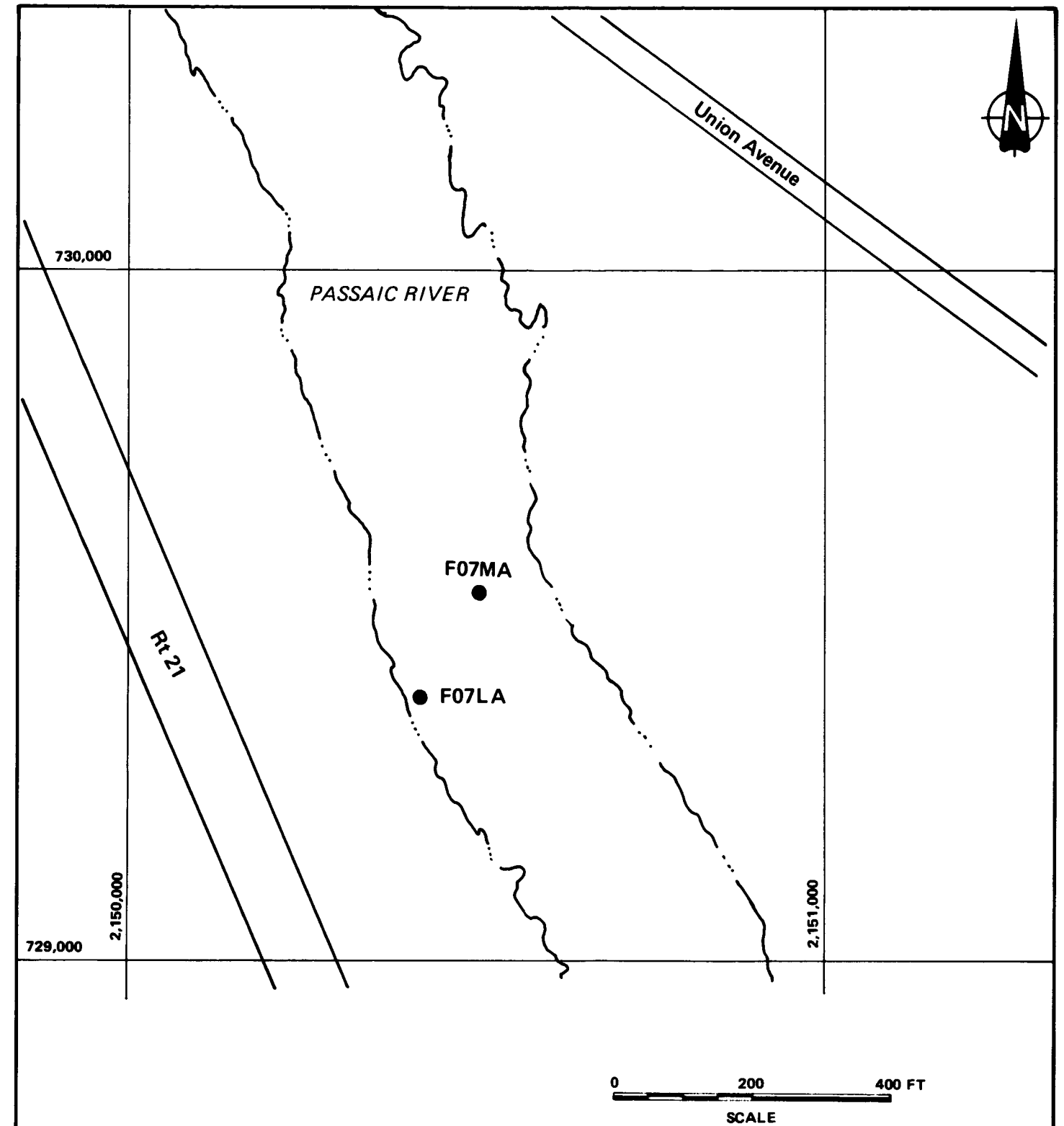
BASE MAPS: NEW JERSEY DEP PHOTOMAPS RUTHERFORD WEST–WEEHAWKIN

FIGURE C-II

FAR–UPSTREAM REACH SAMPLING LOCATIONS F65L(A-D), F06MA AND F06RA

DEP\DA0004449





● F08MA SAMPLING LOCATION AND DESIGNATION

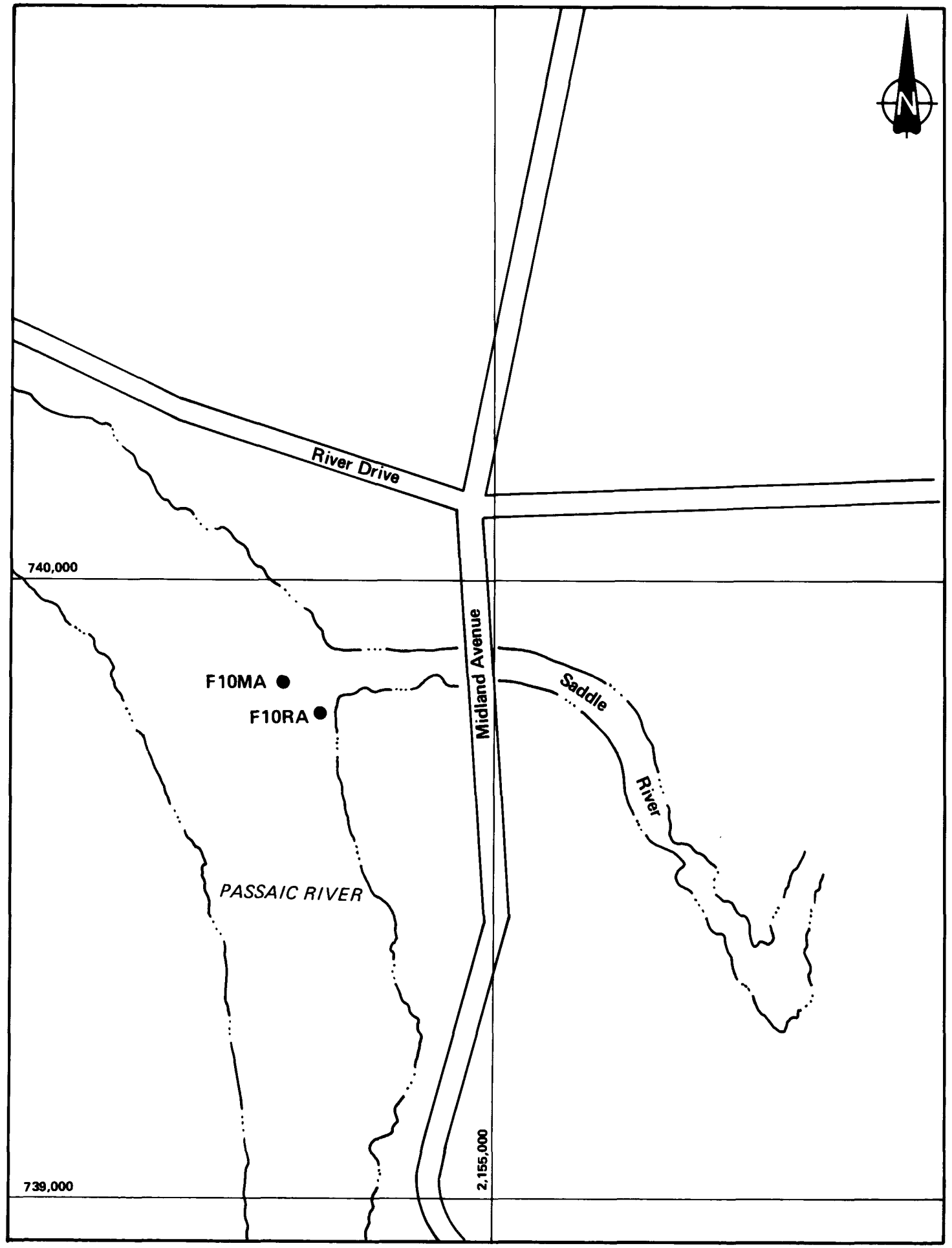
NEW JESREY STATE PLANE COORDINATE GRID SHOWN AT 1000 FOOT INTERVALS

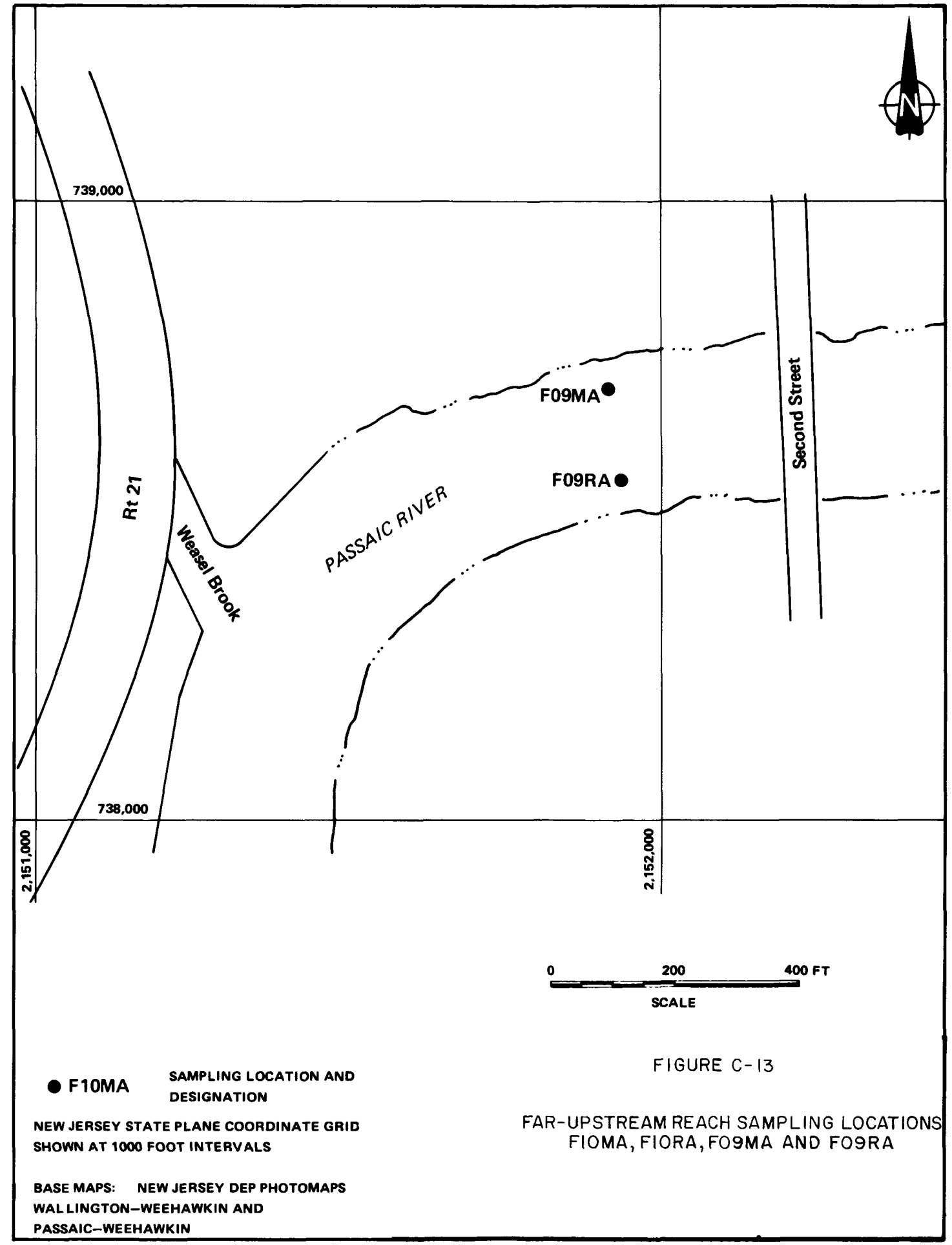
BASE MAPS: NEW JERSEY DEP PHOTMAPS PASSAIC–WEEHAWKIN AND CARLTON–WEEHAWKIN

FIGURE C-12

FAR-UPSTREAM REACH SAMPLING LOCATIONS F08MA, F08RA, F07MA AND F07LA

DEP\DA0004450





● F10MA SAMPLING LOCATION AND DESIGNATION

NEW JERSEY STATE PLANE COORDINATE GRID SHOWN AT 1000 FOOT INTERVALS

BASE MAPS: NEW JERSEY DEP PHOTOMAPS WALLINGTON–WEEHAWKIN AND PASSAIC–WEEHAWKIN

FIGURE C-13

FAR-UPSTREAM REACH SAMPLING LOCATIONS F10MA, F10RA, F09MA AND F09RA

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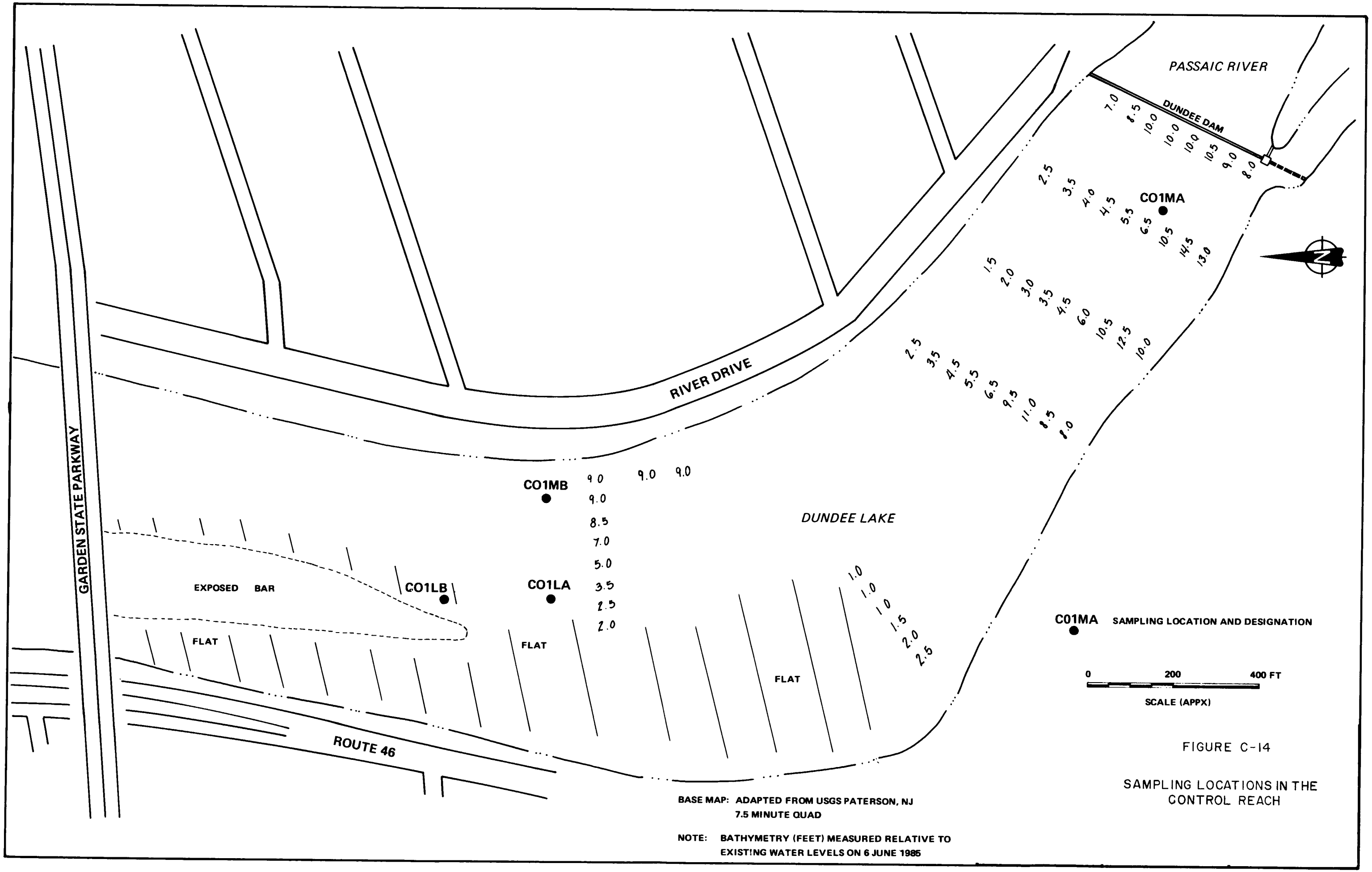

FIGURE C-14

SAMPLING LOCATIONS IN THE CONTROL REACH

DEP\DA0004452

DRAWN BY	CHECKED BY	DRAWING NUMBER
mel 1-17-86	AD 3/20/86	846733-A10
	APPROVED BY	
	3/20/86	

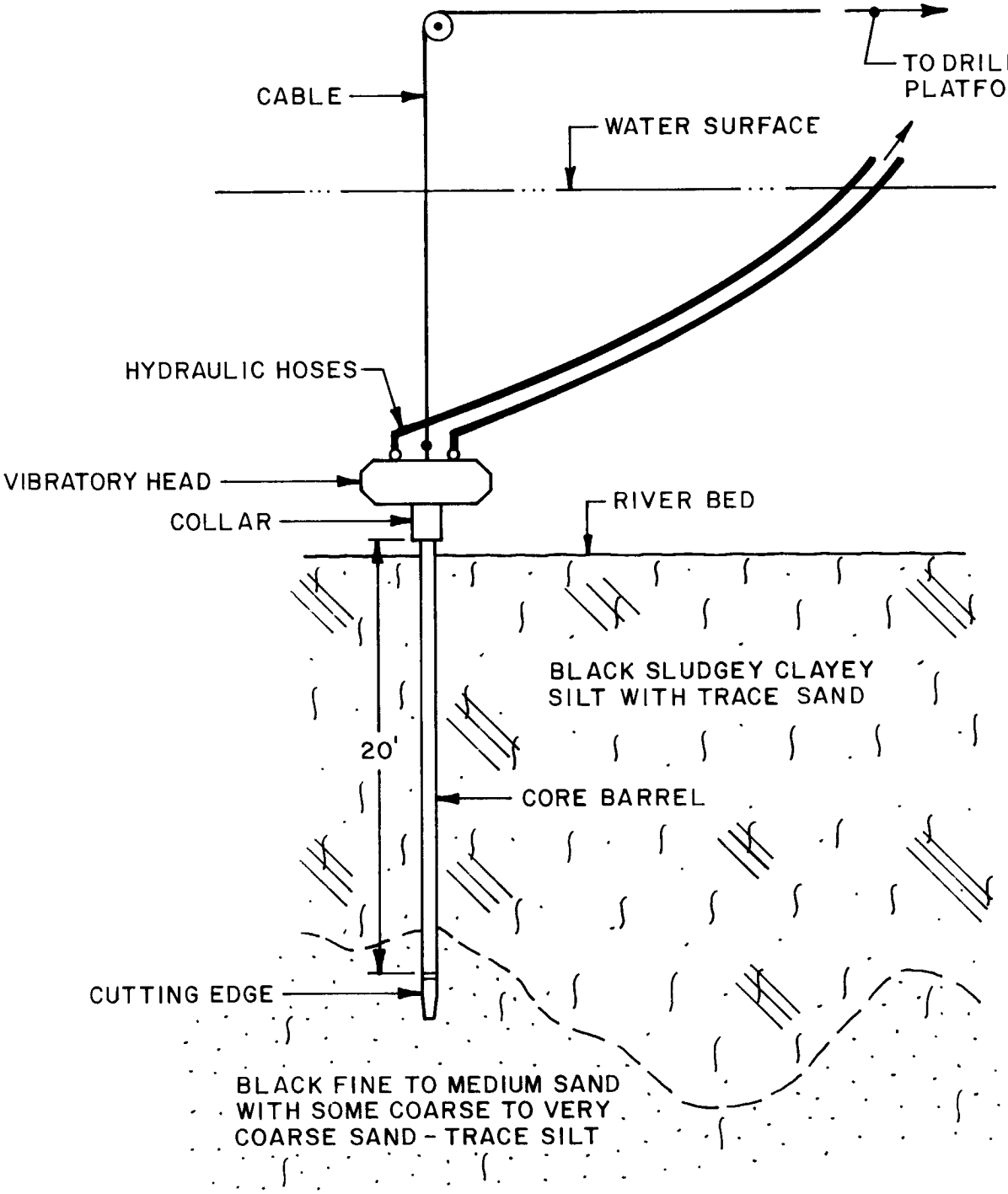

FIGURE C-15

SCHEMATIC DIAGRAM OF CORE POSITION IN RIVER BED PRIOR TO EXTRACTION

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

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Do Not Scale This Drawing

APPENDIX
D

DEP\DA0004454

APPENDIX D

SAMPLE HANDLING AND ANALYTICAL METHODS

APPENDIX D. SAMPLE HANDLING AND ANALYTICAL METHODS

D.1 PASSAIC RIVER SEDIMENT STUDY - DAILY SAMPLE HANDLING AND DOCUMENTATION - STANDARD OPERATING PROCEDURE

D.1.1.0 Preparation for Collection - Transfer from Barge to Sample Trailer

The Sample Coordinator had available a list of all borings to be drilled in each designated area of the four defined reaches of the river and the control area. The list indicated whether the borings were long (20') or short (5'), and whether the samples were to be analyzed immediately or archived. At least one day in advance, the sampling team leadman verified the order in which the sample cores were scheduled for collection. The Sample Coordinator prepared labels containing complete sample designations for each core section, initiated chain-of-custody records, and provided a Field Log notebook for recording sample information. Samples were transferred to the sample trailer at the end of the day's collections; all documentation was completed and reviewed at that time.

D.1.1.1 Upon verification of the next cores scheduled for collection, the Sampling Coordinator assigned a 14-digit designation code to each core section. Figure D-1 illustrates the meaning of each portion of the full designation code.

D.1.1.2 The full sample designations were entered into the Master Sample Collection and Shipping Log (Figure D-2), in numerical order according to the unique 4-digit label numbers assigned.

D.1.1.3 A field and trip blank pair (organic-free water matrix, for dioxin analysis only) was assigned at this time to accompany the day's samples. One pair was assigned each day that cores were collected; code designations were entered into the Master Log as for samples.

D.1.1.4 A sample label set (Figure D-3) was prepared for each sample code designation entered in the Master Log.

D.1.1.5 Five labels from each set (i.e., for each sample) were provided in the morning to the sampling team for all samples scheduled for collection

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that day.

D.1.1.6 As samples were collected from the barge, one sampling team member will recorded all pertinent information on a Sediment Boring Log Form (Figure D-4). A sample label for each core section within a boring was affixed directly to the form, as shown.

D.1.1.7 One sample label was affixed to the "top" of the Lexan tube containing the sample; a second label was placed similarly at the "top" after the tube was wrapped and taped in plastic.

D.1.1.8 At the end of the day's collections, all sample core sections were transferred back to the sample trailer via a sampling team member, in the sampling van.

D.1.1.9 Immediately on receipt of the samples, the Sample Coordinator cross-checked the boring log records with the actual core samples received to verify that all recorded samples were accurately accounted for.

D.1.1.10 Chain-of-Custody records for the sample CORES were initiated at this time:

D.1.1.10.1 The Sample Coordinator initiated these records prior to sample receipt by writing/typing the full sample code designations on each record, indicating "RIVER SEDIMENT CORES" as the sample matrix and "Temporary Storage" as the destination.

D.1.1.10.2 The Sampling Team Leadman completed all other portions of the custody records, especially date collected, sampler names, description, time and amount collected, and container type.

D.1.1.10.3 Any samples intended for collection but not taken (e.g., deep sections where no recovery was obtained) and initially logged in the Master Log and custody record were clearly voided at this time.

D.1.1.10.4 The Sampling Team Leadman officially transfered custody of the sample cores by signing each record as "Relinquished by".

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D.1.1.10.5 The Sampling Coordinator again verified the accuracy of the custody records against the cores received; when all (if any) discrepancies have been resolved, she accepted custody of the samples by signing the records as "Received by".

D.1.1.11 A member of the sampling team then recorded pertinent sample information in the Field Log Notebook provided by the Sampling Coordinator; a prepared label for each sample collected that day was inserted directly into the notebook to identify each sample.

D.1.1.12 Every page of the Field Log Notebook was signed and dated.

D.1.1.13 Sediment Boring Log forms was reviewed by a sampling team member for completeness, accuracy, and clarity, and signed by the reviewer. A copy of the signed forms was provided to the Sampling Coordinator for further distribution and filing.

D.1.1.14 At this point, the following paperwork was sent to Knoxville:

a. Copies of pertinent Master Log pages
b. Copies of pertinent Field Log Notebook pages
c. Copies of CORE chain-of-custody records
d. Copies of Sediment Boring Logs.

D.1.1.15 The following paperwork was kept on file at Newark:

a. Field Log Notebooks
b. Master Log
c. Original CORE custody records (white & yellow copies - unseparated)
d. Copies of Sediment Boring Logs.

D.1.2.0 TEMPORARY STORAGE

Core samples were stored vertically in 55-gallon drums or on shelves, in a locked room of the office building on the 80 Lister Avenue site, under custody of the Sample Coordinator, until they were transferred to the Extrusion Lab. All cores that required freezing (as noted on Sediment Boring Logs) were placed directly into the freezer, also vertically. A refrigerator was also available, for temporary storage of some of the cores.

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Samples were stored in an organized manner, to allow rapid location of individual core sections for transfer to the Extrusion Area.

Ideally, core sections were stored in groups according to the individual borings/areas they are from. Copies of chain-of-custody records associated with each group of samples were stored with them to serve as a "checklist" of what samples were stored in each area. Where possible, groups of samples were numbered to indicate the order in which they were collected.

D.1.3.0 TRANSFER OF CORES TO EXTRUSION LAB

D.1.3.1 The Sample Coordinator assigned core sections daily to be extruded, in the on-site Extrusion Lab.

D.1.3.2 All core sections from a particular boring were assigned for extrusion at the same time (as a set); this allowed use of the CORE chain-of-custody record as a worklist, since all core sections from a boring were recorded on a single custody record at the time of collection.

D.1.3.2.1 When, for any reason, this was not possible, an "intermediate" core custody record was prepared to provide a single list of all core sections being transferred to the Extrusion Lab.

D.1.3.3 Borings were assigned for extrusion in the order they were collected with the following exception: borings with all core sections designated only for initial archive remained on hold in temporary storage until extrusion of borings containing some (or all) core sections for immediate analysis was completed. All core sections from the borings that were assigned were extruded as a set, per Section D.3.2, whether the individual section was designated for archive or analysis.

D.1.3.4 The Sample Coordinator signed the original CORE chain-of-custody for each assigned boring as "relinquished"; a personnel member from the Extrusion Lab then signed the records as "received" when he took the samples to the lab.

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D.1.3.5 The original custody records remained on file in the trailer to prevent contamination; copies were provided to Extrusion Lab personnel to use as worklists.

D.1.3.6 One field blank for dioxin was prepared at the Extrusion Lab each day by rinsing one piece of equipment used regularly for sample extrusion with organic-free water. A labelled container and supply of organic-free water was supplied daily by the Sample Coordinator.

D.1.3.7 Copies of the Sediment Boring Logs were also made available to the Extrusion Lab personnel with each day's assigned samples.

D.1.4.0 EXTRUSION LAB

D.1.4.1 The procedure for extrusion of core sections by Extrusion Lab personnel is found in Figures D-5 and D-6.

D.1.4.2 All core sections, whether for archive or analysis, were homogenized and split into 3 separate containers:

- 1-250 ml amber glass bottle
- 1-40 ml clear glass vial
- 1-1 qt clear glass Mason jar

D.1.4.3 Sample bottles and labels were provided to the lab personnel with the daily assigned samples, by the Sample Coordinator.

D.1.4.4 After the extruded and homogenized sediment samples were transferred to the jars, the outside of each container was wiped clean and the label attached by Extrusion Lab personnel.

D.1.4.5 A "River Sediment Sample Extrusion Form" (Figure D-7) was completed by Extrusion Lab personnel for each core section extruded. These records were reviewed for accuracy, completeness, and clarity by lab personnel, and signed prior to release.

D.1.4.6 As each assigned core section was completed, it was "checked off" the custody record worklist by noting "extruded - (initials) - date" in the last column on the form.

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D.1.5.0 TRANSFER OF SAMPLE BOTTLES FROM EXTRUSION LAB

At the end of each day, or when extrusion was complete for a set of core samples:

D.1.5.1 Each signed "River Sediment Sample Extrusion Form" was decontaminated by being placed into a Zip-Loc plastic bag at the Decon Line - making 3 copies through the plastic bag; the original in the bag was stored on-site.

D.1.5.2 Each chain-of-custody copy used in the lab was similarly placed in a plastic bag - all notes in the far right column were transferred to the original custody record, preferably by the same person who wrote on the copy at the lab; the copy in the bag was stored on-site.

D.1.5.3 Each sample bottle designated for TOC or dioxin/metals analysis was placed in a plastic bag at the Decon Line (250 ml ambers and 40 ml clears), for transfer to the sample trailer.

D.1.5.3.1 NEW chain-of-custody records (one for each container to be sent to a separate laboratory) for these sample bottles were completed at this time, and signed over from the Extrusion Lab to the Sample Coordinator. These samples were then shipped to the appropriate labs per usual procedure, accompanied by the new custody records and appropriate Analysis Request forms.

D.1.5.4 Each sample bottle (qt jars) designated for geotechnical analysis were sent to the on-site sediment lab with a "Sediment Raw Data" form (Figure D-8); a new chain-of-custody record for each of these containers were initiated at this time, and were kept on file at the Handling Trailer to avoid contamination. Custody records show the samples that have been relinquished from the Extrusion Lab to the Sediment Lab with appropriate signatures.

D.1.5.5 All 3 bottles for each sample designated for archive were transferred to the on-site archive room; new chain-of-custody records were initiated for these samples, signed over from Extrusion Lab to the Sample Coordinator, and kept on file at the sample trailer.

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D.1.5.6 The original CORE custody records of the sample core sections extruded were, at this point, obsolete; the samples had been processed into a "new form", and were now covered under the new custody records.

D.1.5.6.1 The original core custody records were now separated - the yellow copy remained on file at the trailer; the white original was sent to Knoxville for permanent filing.

D.1.5.7 At this point, the following paperwork was sent to Knoxville:

a. Original CORE custody records, now completed (See Section D.1.5.6)
b. Copies - River Sediment Sample Extrusion Forms
c. Copies - new custody records for all samples now extruded, whether for archive (single record) or analysis (set of 3 records)
d. Copies - Analysis Request Forms

D.1.5.8 The following paperwork was kept on file at the Newark trailer:

a. Copies - River Sediment Sample Extrusion Forms
b. Original custody records (unseparated) for all archived samples
c. Yellow copy of all custody records for samples sent to Knoxville and Pittsburgh for analysis (white originals accompany the samples)
d. Unseparated original custody records for samples sent to Sediment Lab.
e. Yellow copy of CORE custody records for samples now extruded
f. Copies - Analysis Request forms

D.1.5.9 A copy of the River Sediment Sample Extrusion Forms was also provided to Woodward-Clyde Consultants (WCC).

D.1.6.0 ON-SITE SEDIMENT LAB

D.1.6.1 When analyses were completed, the "Sediment Raw Data" forms (Figure D-8) for each sample were placed in plastic bags at the Decon Line to effect decontamination.

D.1.6.1.1 These forms were reviewed for completeness, accuracy, and clarity by lab personnel and signed prior to release.

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D.1.6.2 Three copies of the forms were made through the plastic bag: one was filed at the Sample Tailer, one was sent to Knoxville, and the third was provided to WCC personnel.

D.1.6.2.1 The original in the bag was stored on site.

D.1.6.3 When all analyses were completed for required physical properties, any remaining sample in the quart jars was returned to archive by sediment laboratory personnel. No custody transfer was necessary at this time; custody records remained on file in the Trailer for this sample fraction.

D.2 PHYSICAL ANALYSIS FOR SEDIMENTS

Physical analyses of sediment samples were performed at the on-site physical analysis lab on 273 samples scheduled for both TCDD and TOC analysis. A representative portion of the extruded sediment sample was received in a clean one-quart jar from the extrusion lab. The label on the 1-qt sample jar and the accompanying data sheet were checked by the director of the physical analysis laboratory upon receipt to verify that the sample numbers were the same. If the numbers were in correspondence, chain-of-custody forms were completed and physical analyses begun.

Analyses included determination of sample grain-size distribution (a mechanical analysis using a nest of sieves and a hydrometer), water content and specific gravity. All analyses followed standard procedures described in the American Society for Testing and Materials Annual Book of Standards (ASTM, 1985).

D.2.1 Visual Classification of Sediments

The sample was visually classified using the Burmister System (ASTM, 1985) prior to testing. The visual classification of the samples was based upon the grain-size distribution and the sediment description recorded on the River Sample Extrusion Forms. Although Burmister and Unified Soil Classification (USC) Systems use information obtained from Atterberg limit tests to classify material passing the #200 sieve, the Atterberg limit tests were not performed, and plasticity indices for the sediments were not available. Instead, an estimate of the sediment plasticity was made from the grain-size distribution and the sediment description.

DEP\DA0004463

D.2.2 Grain-size Determination

All samples were visually inspected prior to grain size determination analysis to determine testing requirements. Those samples estimated to have less than 20 percent material finer than the #200 sieve (0.074 mm) were not submitted to the hydrometer portion of the grain size analysis. Samples estimated to have at least 20 percent silts and clays were analyzed for grain size distribution using both a nest of sieves and the hydrometer. Sediment to be analyzed using a hydrometer was first screened through a #4 sieve (4.75 mm). That portion which passed was soaked in a deflocculent solution of hexametaphosphate and then placed in hydrometer cylinders filled with distilled water.

Selected surface sediment samples were also analyzed using river water to determine sediment settling behavior under in-situ conditions (Table D-1). These tests were analyzed using the correction factors determined for the distilled water/deflocculent tests.

Hydrometer cylinders were maintained in a constant-temperature water bath during the measurement period. Hydrometer readings were recorded at one-half minute and repeated after 1, 2, 5, 10, 15, 30, 60, 120, and 480 minutes. A final reading was performed approximately 24 hours after test initiation. The hydrometer test results were analyzed assuming a sediment specific gravity of 2.65. Following the hydrometer analysis, the sample was recombined with the portion of the sediment which was retained by the #4 sieve (4.75 mm), and the entire sample was washed over a #200 sieve to remove the fine fraction. The sample retained on the #200 sieve was then dried and shaken for 15 minutes through a nest of up to 11 sieves with mesh sizes of 3 inches to 0.074 mm (#200).

A smooth grain-size curve could not be drawn for a few of the samples due to a discrepancy where the sieve analysis and the hydrometer analysis overlap (#200 sieve and first hydrometer data points). In order to obtain a smooth curve, the hydrometer portion was shifted vertically to match the sieve analysis portion. The combined curve was assumed to be the interpretive curve for those sediment samples originally having non-continuous curves. These curves in Appendix F.

D.2.3 Specific Gravity Analyses

Specific gravity analyses were performed using a specific gravity flask with

DEP\DA0004464

distilled water following ASTM Methods (ASTM, 1985). Sample percent water content was determined on all samples by drying a portion of each sample in a 110°C oven until a constant weight was reached. Percent water content is calculated by dividing the weight of water (wet weight minus dry weight) by the dry weight and multiplying by 100.

The various subsamples analyzed were not returned to the original sample bottle. Therefore, the unused sample was available for retesting if required. All data sheets were reviewed by the sediment analysis laboratory director prior to removal from the laboratory.

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APPENDIX
E

DEP\DA0004466

APPENDIX E

FIELD AND TRIP BLANK RESULTS AND LEAD ANALYSES QUALITY ASSURANCE DATA

E-1

RSLT.LNE	CLIENT#	SAM.DESC	SORT2	TASK
ND (0.0024 ppb)	F081-3052-H-L	Field Blank-River Sediment Core (Sample Collection)	850506	RIVER1
ND (0.0016 ppb)	F082-3054-H-L	Field Blank-River Sediment Core (Sample Collection)	850507	RIVER1
ND (0.0015 ppb)	F083-3096-H-L	Field Blank-River Sediment Core (Sample Collection)	850508	RIVER1
ND (0.0029 ppb)	F084-3113-H-L	Field Blank-River Sediment Core (Sample Collection)	850509	RIVER1
ND (0.0014 ppb)	T047-3154-H-L	Travel Blank-River Sediment Core (Extrusion Lab)	850509	RIVER1
ND (0.0015 ppb)	F085-3155-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850509	RIVER1
ND (0.0020 ppb)	F087-3219-H-L	Field Blank-River Sediment Core (Sample Collection)	850510	RIVER1
ND (0.00060 ppb)	F087-3284-H-L	Field Blank-River Sediment Core (Sample Collection)	850513	RIVER1
ND (0.0017 ppb)	T052-3285-H-L	Travel Blank-River Sediment Core (Extrusion Lab)	850513	RIVER1
ND (0.0014 ppb)	F088-3286-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850513	RIVER1
ND (0.0020 ppb)	F089-3291-H-L	Field Blank-River Sediment Core (Sample Collection)	850514	RIVER1
ND (0.00096 ppb)	F092-3298-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850515	RIVER1
ND (0.0016 ppb)	F093-3390-H-L	Field Blank-River Sediment Core (Sample Collection)	850515	RIVER1
ND (0.0026 ppb)	F094-3638-H-L	Field Blank-River Sediment Core (Sample Collection)	850516	RIVER1
ND (0.00058 ppb)	F095-3639-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850516	RIVER1
ND (0.0015 ppb)	F097-3646-H-L	Field Blank-River Sediment Core (Sample Collection)	850517	RIVER1
ND (0.0024 ppb)	T057-3650-H-L	Travel Blank-River Sediment Core (Sample Collection)	850520	RIVER1
ND (0.0013 ppb)	F099-3651-H-L	Field Blank-River Sediment Core (Sample Collection)	850520	RIVER1
ND (0.0022 ppb)	F100-3652-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850520	RIVER1
ND (0.0030 ppb)	T057-3656-H-L	Travel Blank-River Sediment Core (Sample Collection)	850521	RIVER1
ND (0.00084 ppb)	F101-3657-H-L	Field Blank-River Sediment Core (Sample Collection)	850521	RIVER1
ND (0.0033 ppb)	F102-3658-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850521	RIVER1
ND (0.0072 ppb)	F105-3876-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850522	RIVER1
ND (0.0022 ppb)	F107-3881-H-L	Field Blank-River Sediment Cores (Sample Collection)	850523	RIVER1
ND (0.00062 ppb)	F108-3882-H-L	Field Blank-River Sediment Cores (Extrusion Lab)	850524	RIVER1
ND (0.0058 ppb)	F109-3884-H-L	Field Blank-River Sediment Cores (Sample Collection)	850524	RIVER1
ND (0.0039 ppb)	F113-3909-H-L	Field Blank-River Sediment Core (Sample Collection)	850528	RIVER1
ND (0.0016 ppb)	F114-3910-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850529	RIVER1
ND (0.0046 ppb)	F116-3913-H-L	Field Blank-River Sediment Core (Sample Collection)	850529	RIVER1
ND (0.010 ppb)	F118-3963-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850530	RIVER1
ND (0.0058 ppb)	F122-4023-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850531	RIVER1
ND (0.0074 ppb)	F125-4064-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850603	RIVER1
ND (0.10 ppb)	F129-4066-H-L	Field Blank-River Sediment Core (Sample Collection)	850605	RIVER1
ND (0.0034 ppb)	F130-4068-H-L	Field Blank-River Sediment Core (Sample Collection)	850604	RIVER1
ND (0.010 ppb)	F131-4070-H-L	Field Blank-River Sediment Core (Extrusion Lab)	850604	RIVER1
ND (0.0024 ppb)	F136-4194-H-L	Field Blank-River Sediment Cores (Extrusion Lab)	850606	RIVER1

E-2

SAMPLE #	ANA. STAT	CLIENT #	SAMP. DESC	SORT 2	TASK
L3051	00	02 T043-3051-H-L	Travel Blank-River Sediment Core (Sample Collection)	850506	RIVER1
L3053	00	02 T044-3053-H-L	Travel Blank-River Sediment Core (Sample Collection)	850507	RIVER1
L3095	00	02 T045-3095-H-L	Travel Blank-River Sediment Core (Sample Collection)	850508	RIVER1
L3112	00	02 T046-3112-H-L	Travel Blank-River Sediment Core (Sample Collection)	850509	RIVER1
L3218	00	02 T049-3218-H-L	Travel Blank-River Sediment Core (Sample Collection)	850510	RIVER1
L3283	00	02 T051-3283-H-L	Travel Blank-River Sediment Core (Sample Collection)	850513	RIVER1
L3290	00	02 T053-3290-H-L	Travel Blank-River Sediment Core (Sample Collection)	850514	RIVER1
L3389	00	02 T055-3389-H-L	Travel Blank-River Sediment Core (Sample Collection)	850515	RIVER1
L3637	00	02 T054-3637-H-L	Travel Blank-River Sediment Core (Sample Collection)	850516	RIVER1
L3645	00	02 T056-3645-H-L	Travel Blank-River Sediment Core (Sample Collection)	850517	RIVER1
L3879	00	02 F100-3879-H-L	Field Blank-River Sediment Cores (Extrusion Lab)	850523	RIVER1
L3880	00	02 T059-3880-H-L	Travel Blank-River Sediment Core (Sample Collection)	850523	RIVER1
L3883	00	02 T060-3883-H-L	Travel Blank-River Sediment Core (Sample Collection)	850524	RIVER1
L3906	00	02 F112-3906-H-L	Field Blank-River Sediment Cores (Extrusion Lab)	850528	RIVER1
L3908	00	02 T070-3908-H-L	Travel Blank-River Sediment Core (Sample Collection)	850528	RIVER1
L3912	00	02 T071-3912-H-L	Travel Blank-River Sediment Core (Sample Collection)	850529	RIVER1
L4065	00	02 T080-4065-H-L	Travel Blank-River Sediment Core (Sample Collection)	850604	RIVER1
L4067	00	02 T081-4067-H-L	Travel Blank-River Sediment Core (Sample Collection)	850605	RIVER1

IT CORPORATION

IT ANALYTICAL SERVICES

5815 Middlebrook Pike • Knoxville, Tennessee 37921 • 615-588-6401

CERTIFICATE OF ANALYSIS

TO: IT Corporation
ATTN: Janice Sterrett
5815 Middlebrook Pike
Knoxville, TN 37921

DATE REPORTED: July 1, 1985
PROJECT CODE: ITCS 20314
ORDER NUMBER: 846722.93

Sample Description: Quality Assurance Data: Process Blank

Concentration units are mg/liter (ppm)

Lead	<0.01

Sworn to and subscribed before me this 1st
day of July, 1985
My commission expires January 16, 1988

Janice Y. Atwell
Notary Public

Alyce L. Moore
Approved by

Laboratory Manager
Title

Accredited by the American Association for Laboratory Accreditation in the chemical field of testing, as listed in the current AALA Directory of Accredited Laboratories

IT CORPORATION

IT ANALYTICAL SERVICES

5815 Middlebrook Pike • Knoxville, Tennessee 37921 • 615-588-6401

CERTIFICATE OF ANALYSIS

TO: IT Corporation
ATTN: Janice Sterrett
5815 Middlebrook Pike
Knoxville, TN 37921

DATE REPORTED: July 1, 1985
PROJECT CODE: ITCS 20314
ORDER NUMBER: 846722.93

Sample Number: S01LA-3301-202-M-Y

Concentration units are µg/gram (ppm)

QA/QC - Spike Recovery Data

	Amount Analyzed in Sample	+	Spike Amount Added	=	Theoretical Concentration Sample + Spike	Analyzed Conc. of Sample + Spike	% Recovery
Lead	520.		360.		880.	825.	85.

Sworn to and subscribed before me this 1st
day of July, 1985
My commission expires January 16, 1988

Janice G. Sterrett
Notary Public

Allyce R. Moore
Approved by

Laboratory Manager
Title

AALA Accredited by the American Association for Laboratory Accreditation in the chemical field of testing as listed in the current AALA Directory of Accredited Laboratories

E-5

IT CORPORATION

IT ANALYTICAL SERVICES

5815 Middlebrook Pike • Knoxville Tennessee 37921 • 615-588-6401

CERTIFICATE OF ANALYSIS

TO: IT Corporation
ATTN: Janice Sterrett
5815 Middlebrook Pike
Knoxville, TN 37921

DATE REPORTED: July 1, 1985
PROJECT CODE: ITCS 20314
ORDER NUMBER: 846722.93

Sample Description: Quality Assurance Data: Blind Sample Splits

Concentration units are µg/gram (ppm)

	3299	
	Reported Value	Blind Split
Lead	490.	460.

Sworn to and subscribed before me this 1st day of July, 1985
My commission expires January 16, 1988

Janice G. Sterrett
Notary Public

Alyce R. Moore
Approved by

Laboratory Manager
Title

Accredited by the American Association for Laboratory Accreditation in the chemical field of testing as listed in the current AALA Directory of Accredited Laboratories

DEP\DA0004472

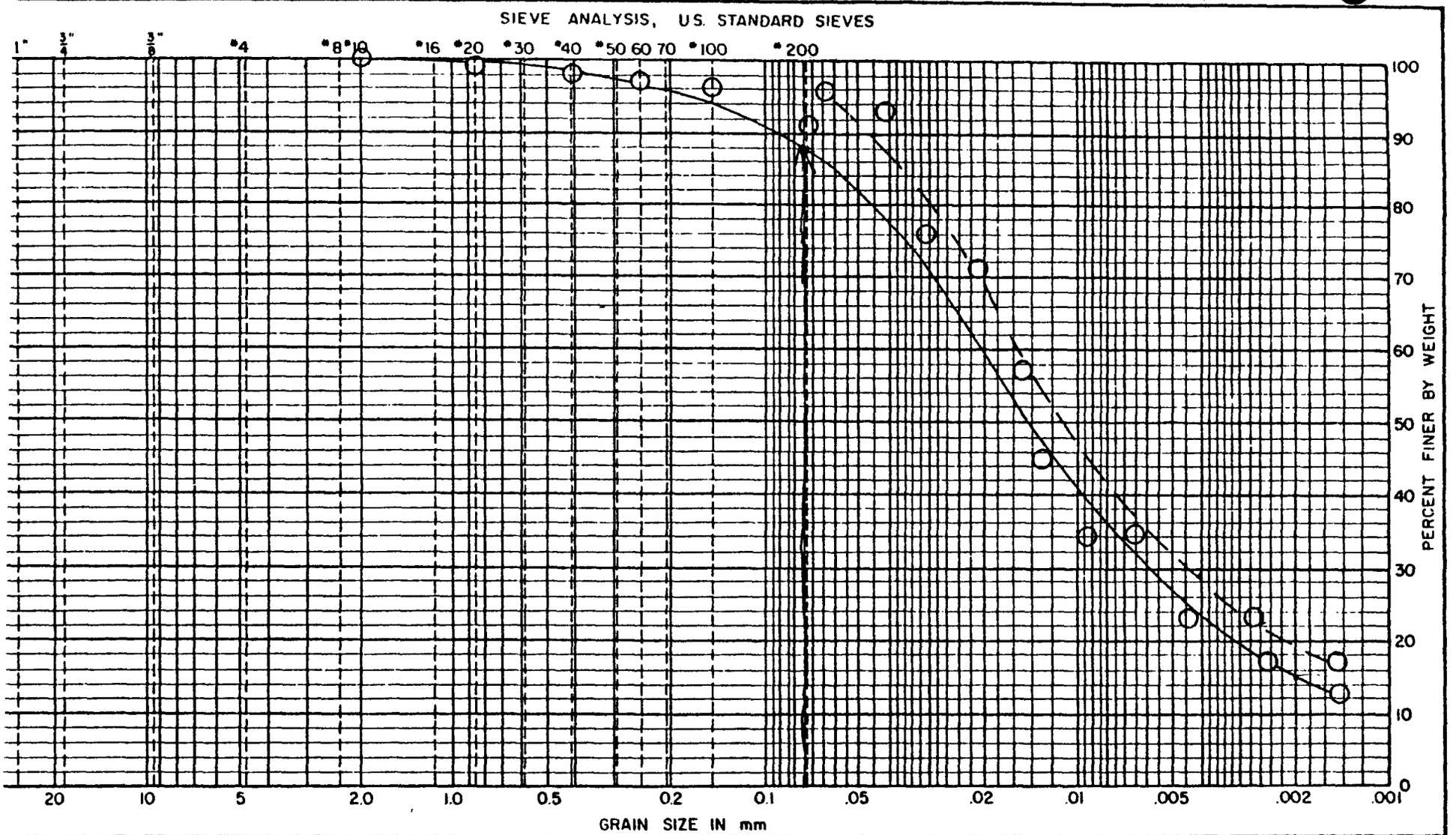
APPENDIX
F

DEP\DA0004473

APPENDIX F

SEDIMENT PHYSICAL ANALYSES DATA

SITE-AREA REACH



GRAVEL		SAND			CLAY OR SILT
RSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray SILT with little clay and sand

BURMISTER- Dark gray SILT, little Clay, little medium to fine(+) Sand

ISTURE ONTENT (%) 156

TAL WET ENSITY (pcf) 89

ECIFIC RAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 15

PERCENT SILT (74.0-2.0 μm) 69

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. S01LA 3299 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-15-85

DRAWN BY tw 7-10-85

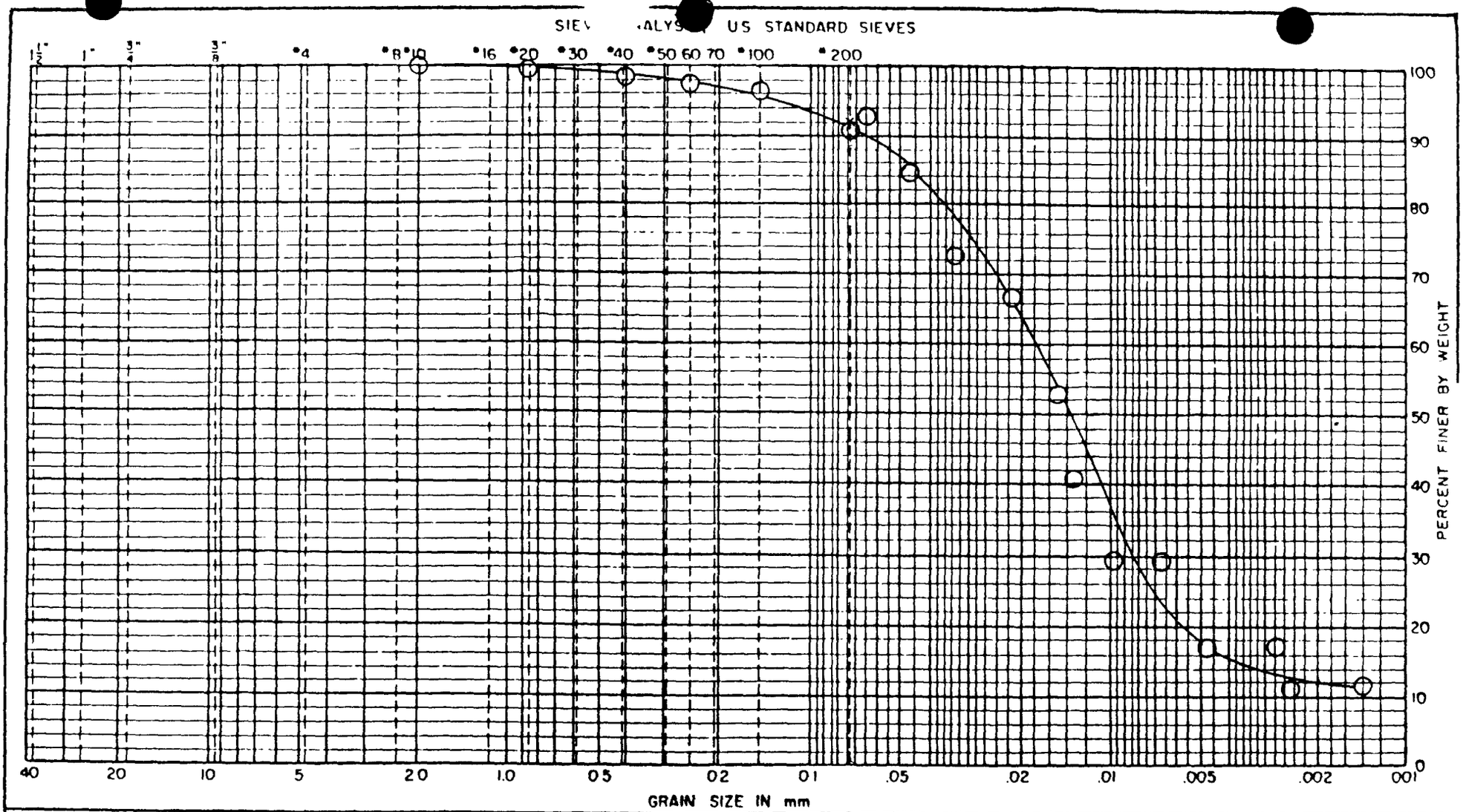
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004476



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray Clayey SILT with a trace of fine Sand.

BURMISTER- Dark Gray Clayey SILT trace (+), fine Sand

MOISTURE CONTENT (%) 156

TOTAL WET DENSITY (pcf) 89

SPECIFIC GRAVITY 2.45

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. S01LA-3299-200-MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/15/85

DRAWN BY: Th 7-25-85

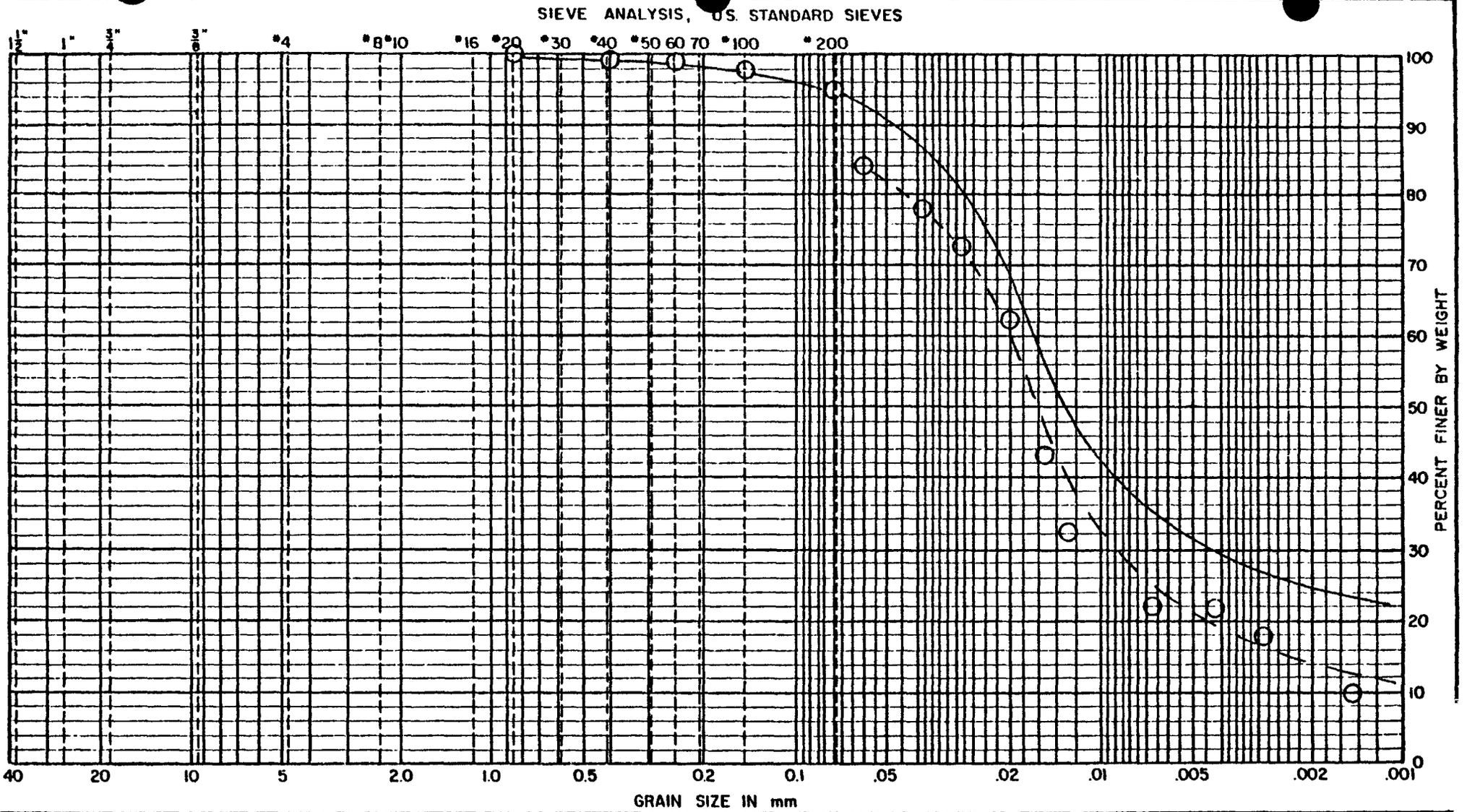
CHECKED BY: SAG 7-29-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004477



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 133

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT, some Clay trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. S01LA 3300 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

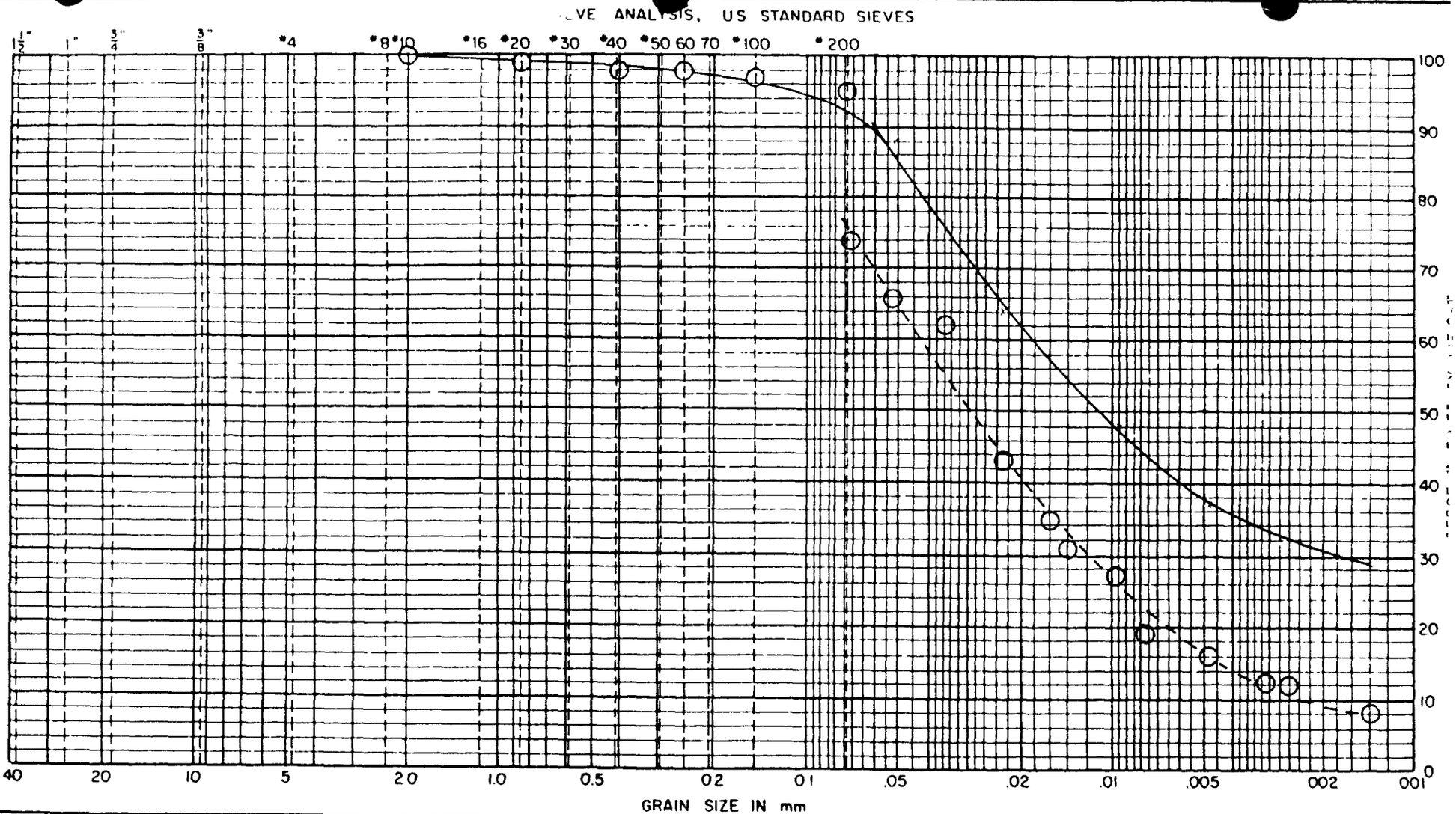
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004478



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 146

TOTAL WET DENSITY (pcf) 75

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic CLAY and SILT with a trace of fine Sand

BURMISTER- Black Organic CLAY and SILT trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 61

PERCENT CLAY (<2.0 μm) 31

SAMPLE NO. S01LA-3301-202-MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5/15/85

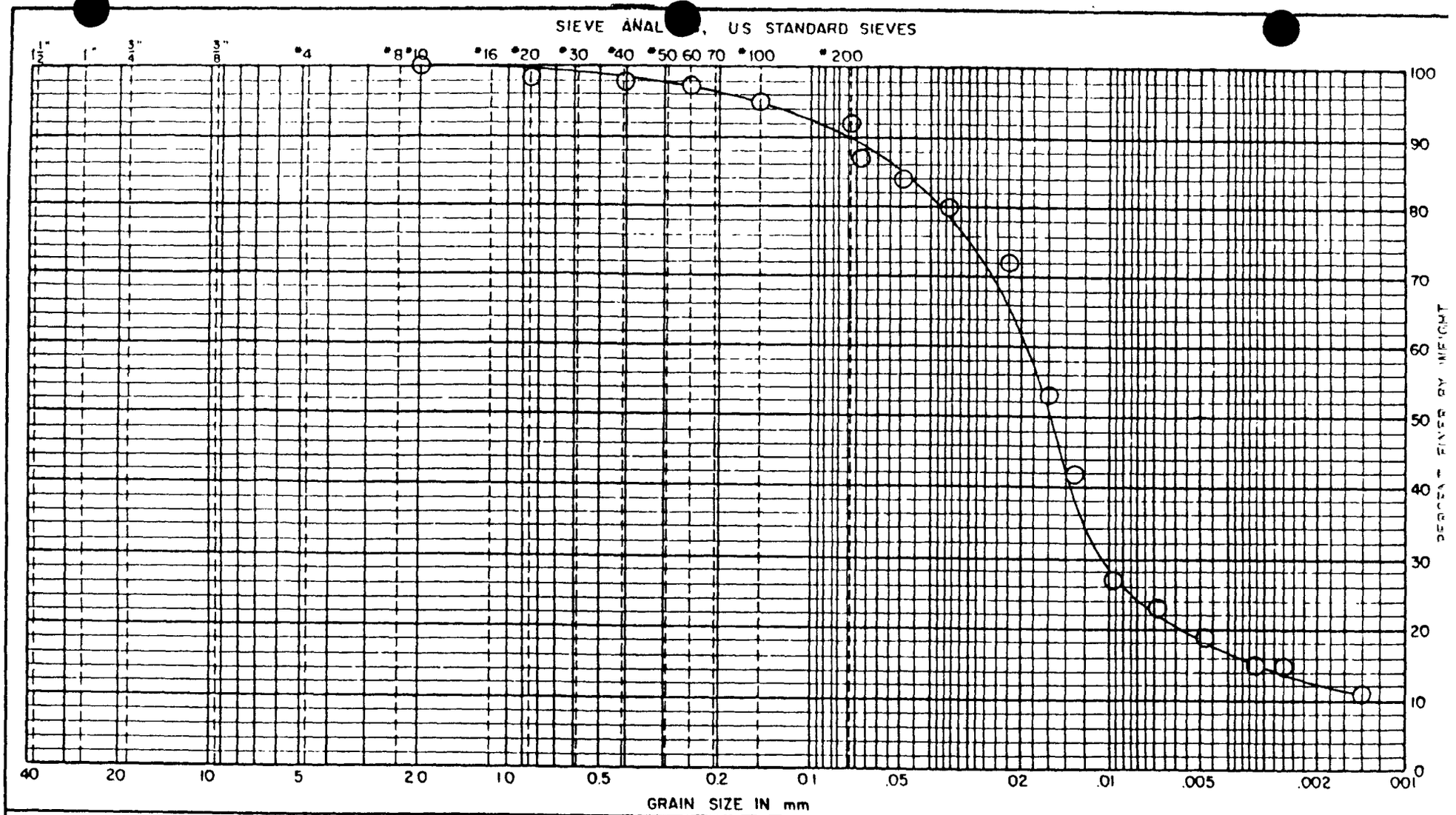
DRAWN BY: Ow 7-25-85
CHECKED BY: SAG 7-29-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004479



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 161

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic SILT and CLAY with a trace of fine Sand.

BURMISTER- Black Organic SILT and CLAY trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) 78

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. S01LA-3302-203-MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5/15/85

DRAWN BY: Gw 7-25-85

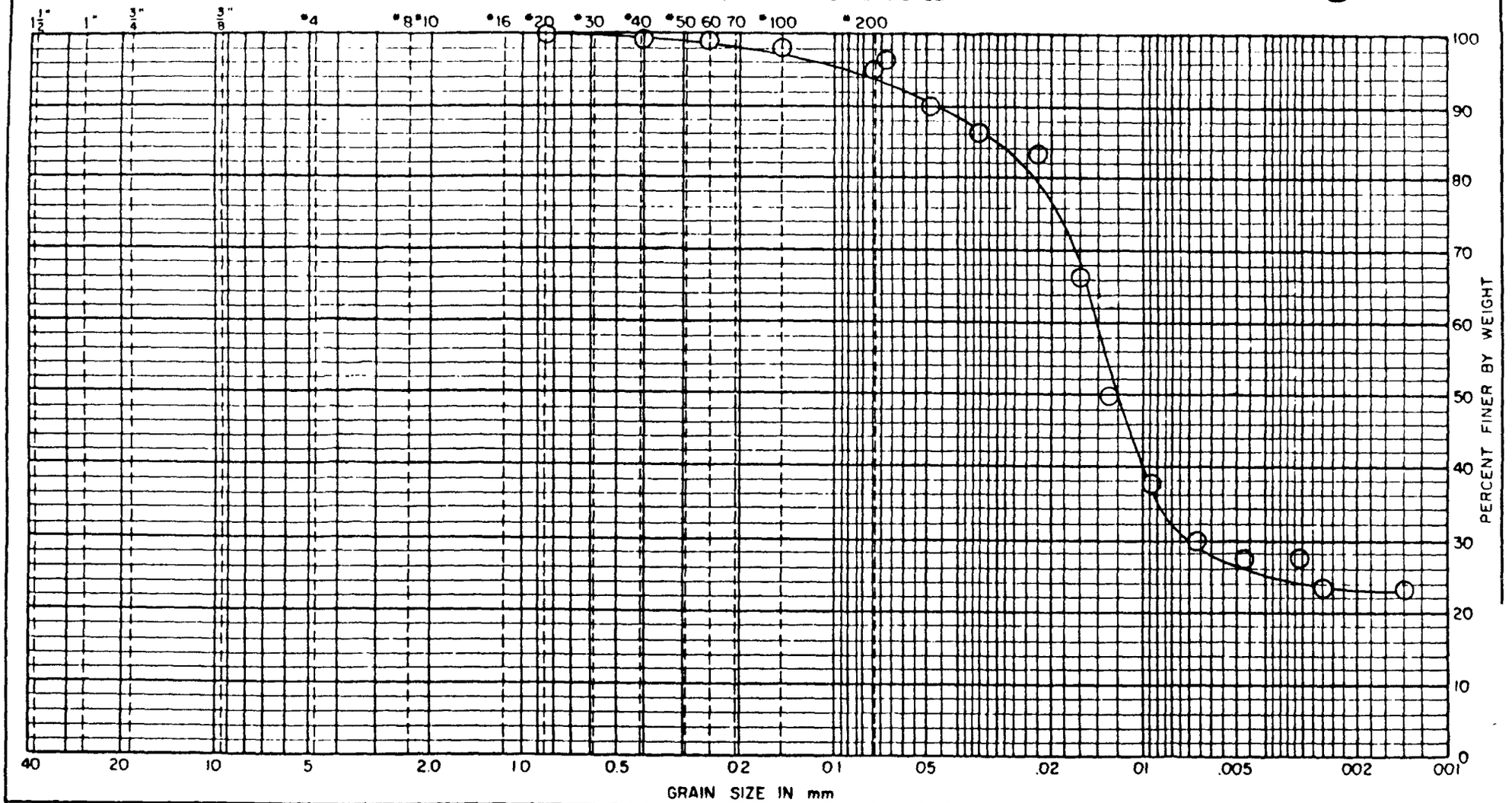
CHECKED BY: SAG 7-29-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004480



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 117

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic CALY and SILT with a trace of fine Sand

BURMISTER- Black Organic CALY and SILT trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 72

PERCENT CLAY (<2.0 µm) 22

SAMPLE NO. S01LA-3303-204-MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5/15/85

DRAWN BY: Ch 7-25-85

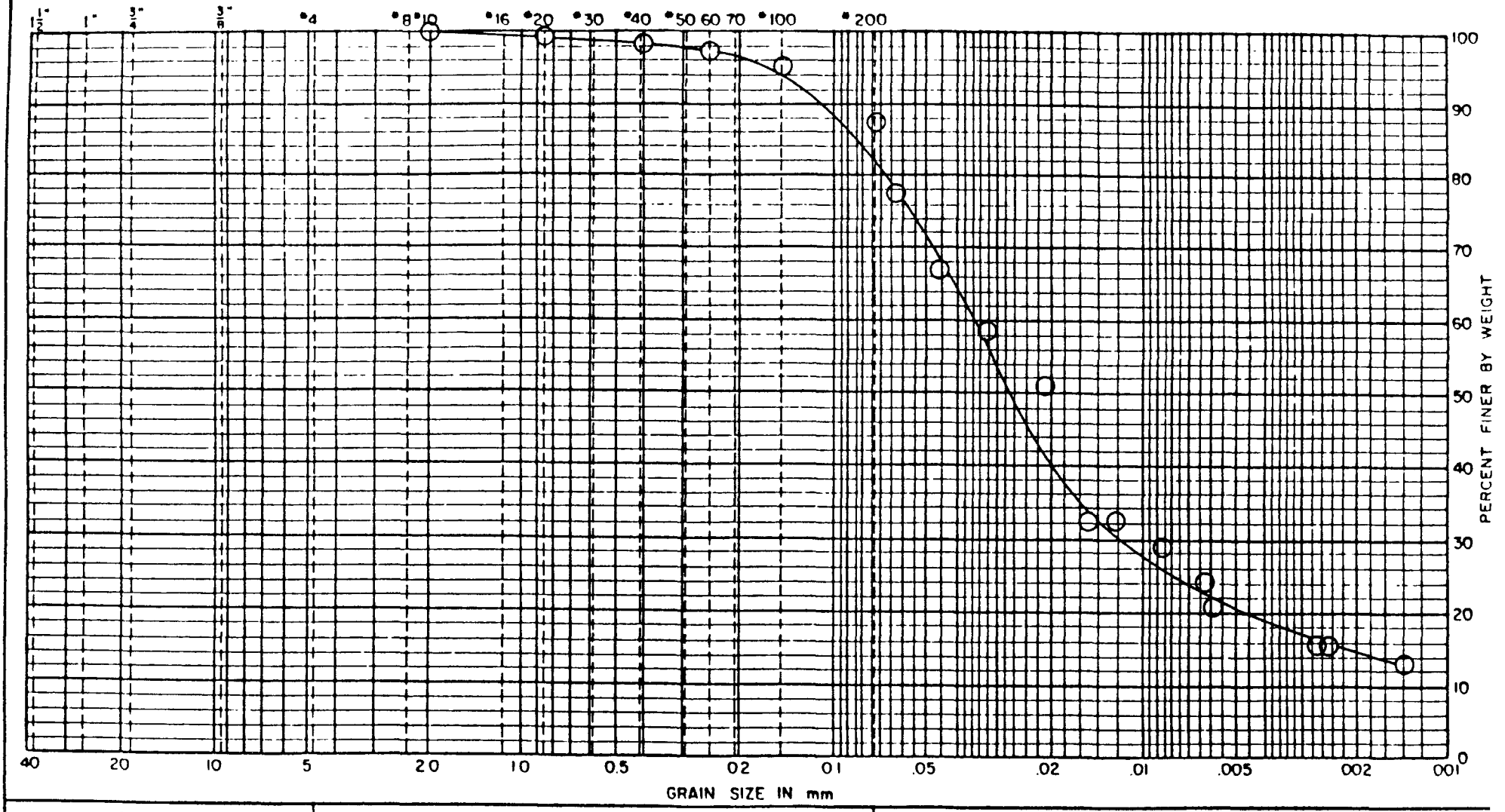
CHECKED BY: SAG 7-29-85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004481



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 133

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY 2.48

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic SILT and CLAY with a little fine Sand

BURMISTER- Black Organic SILT and CLAY little (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 18

PERCENT SILT (74.0-2.0 µm) 67

PERCENT CLAY (<2.0 µm) 15

SAMPLE NO. S11LA-3309-200-MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/15/85

DRAWN BY: Gw 7-26-85

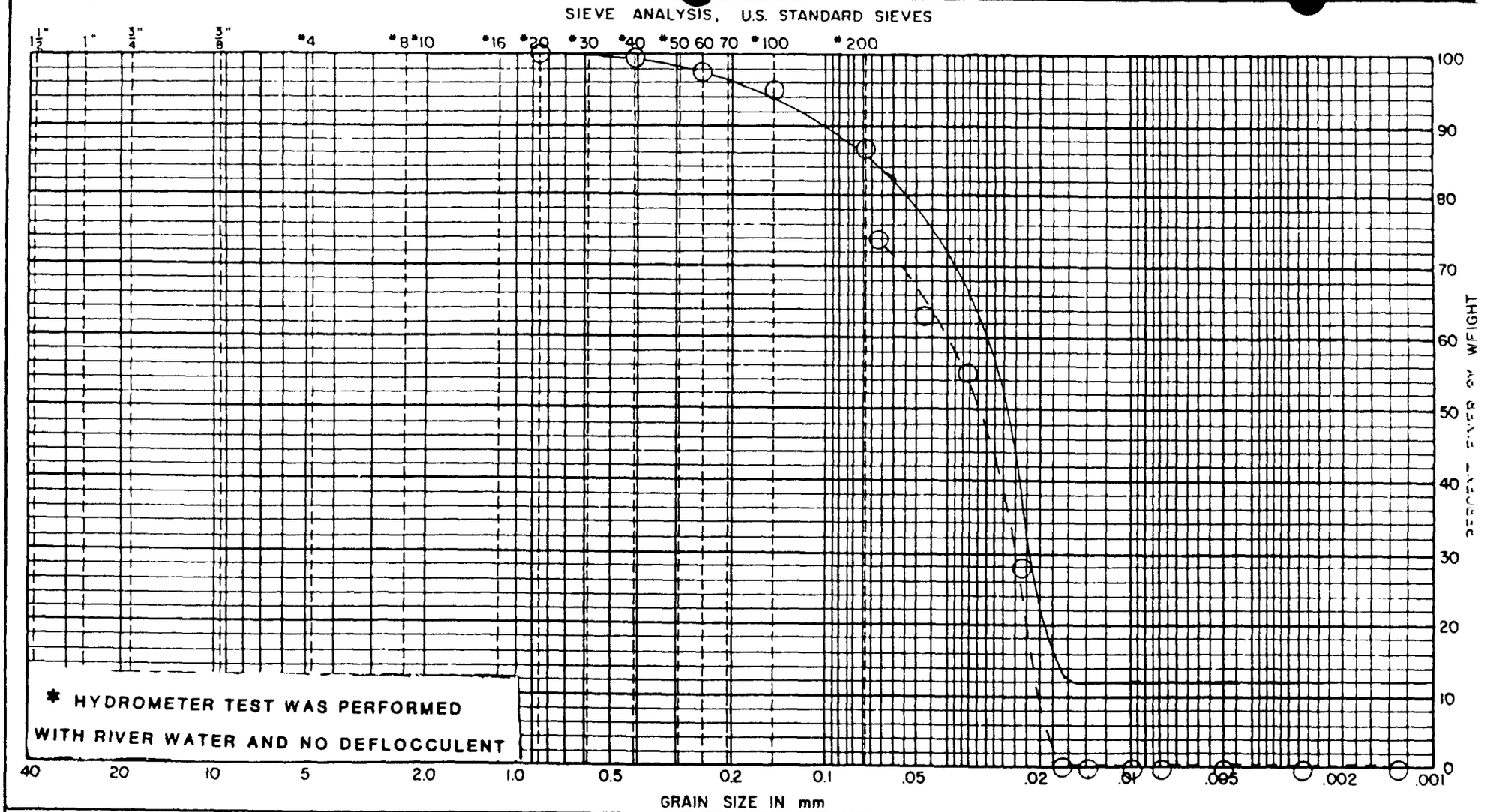
CHECKED BY: SAG 7-29-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004482



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 133

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY 2.48

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic Clayey SILT* with a little fine Sand.

BURMISTER- Black Organic Clayey SILT* little(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 13

PERCENT SILT (74.0-2.0 µm) 75 } 87

PERCENT CLAY (<2.0 µm) 12

SAMPLE NO. S11LA-3309-200-MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/15/85

DRAWN BY: SAG 7-29-85

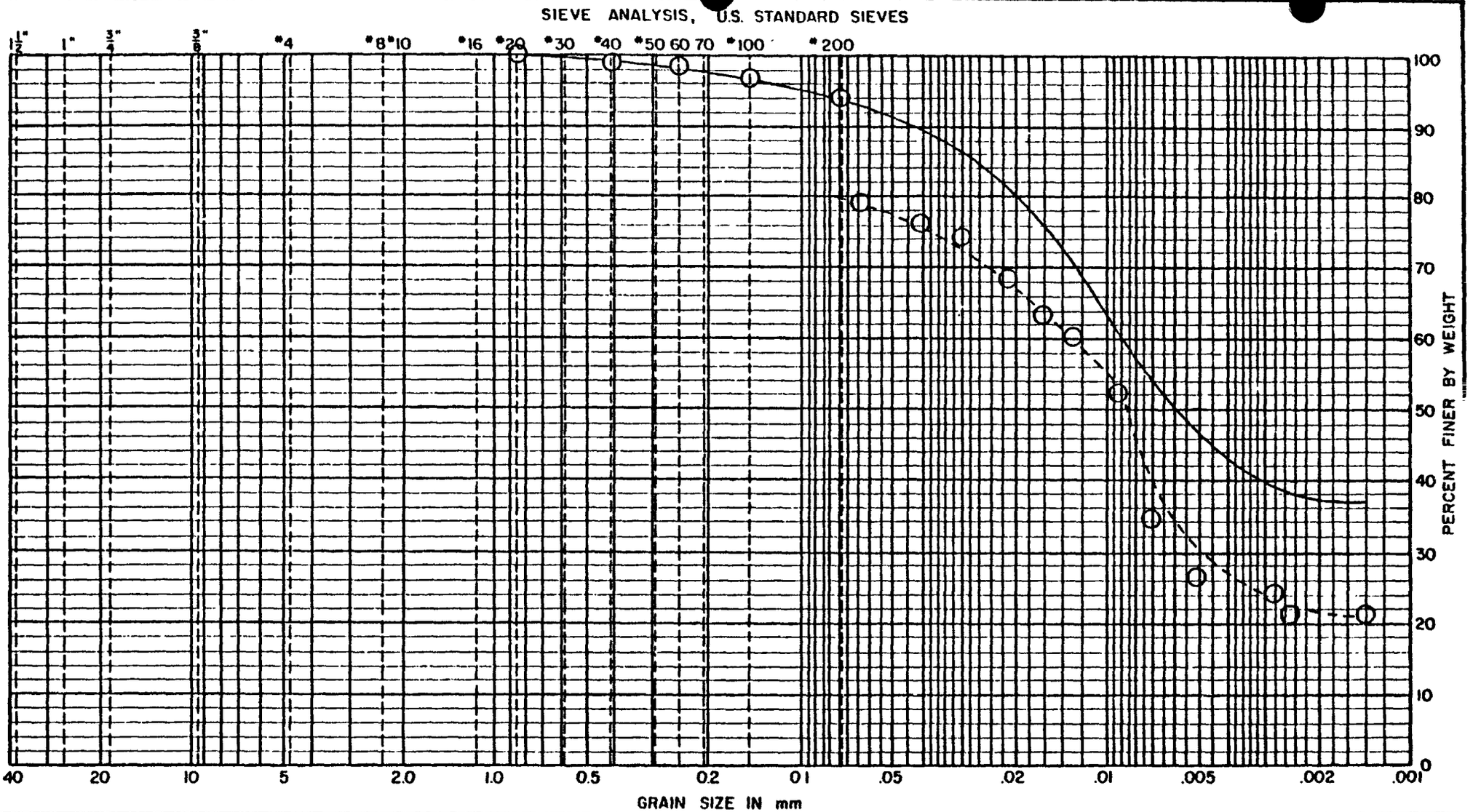
CHECKED BY: [illegible] 7/31/85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004483



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT and CLAY with trace fine grained sand and plant fibers

BURMISTER- Black to dark gray Organic SILT and (-)CLAY trace(+), fine Sand

MOISTURE CONTENT (%) 115

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 7

PERCENT SILT (74.0-2.0 µm) 57

PERCENT CLAY (<2.0 µm) 36

SAMPLE NO. S11LA 3310 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-15-85

DRAWN BY: CA 7-10-85

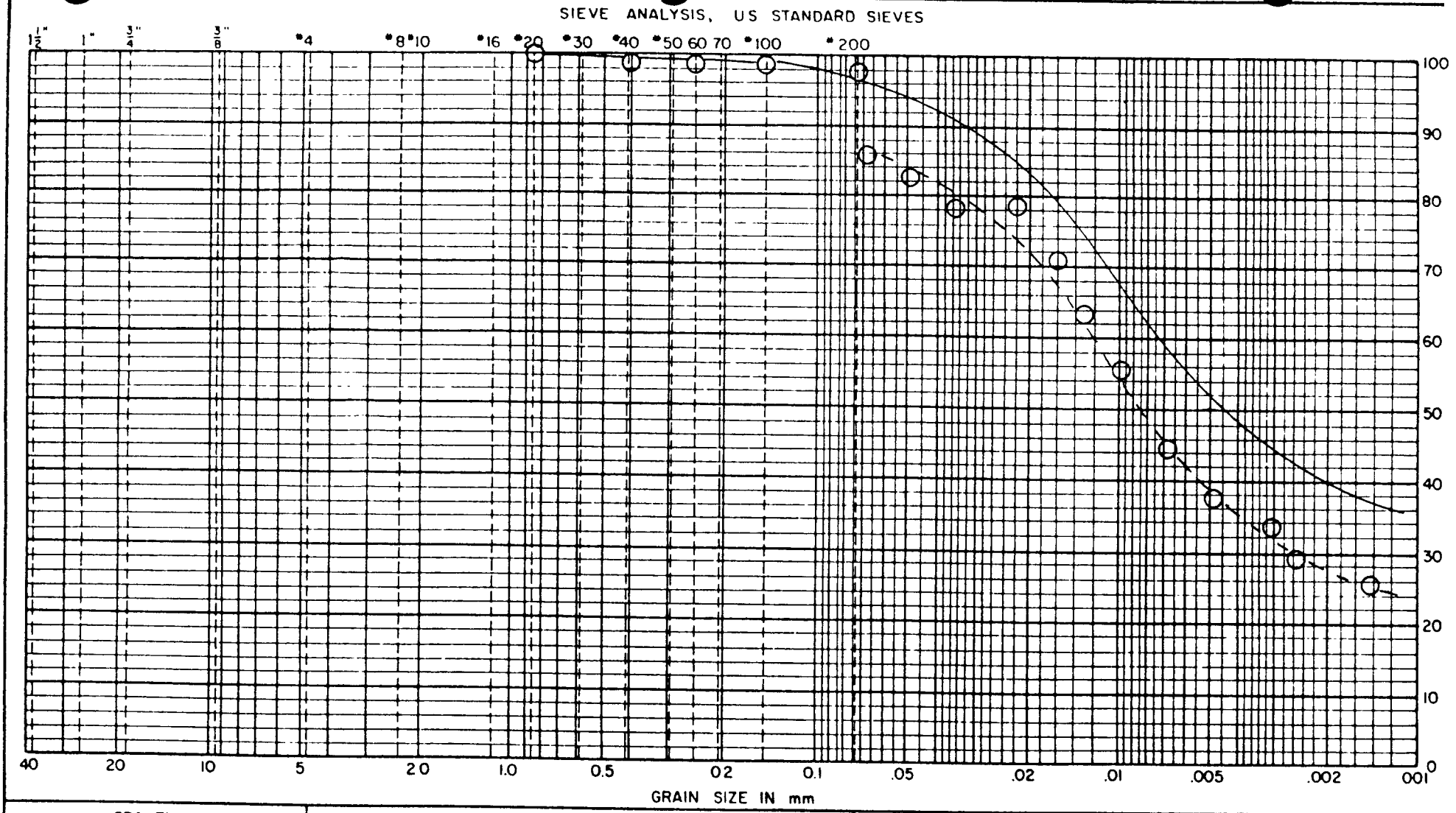
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004484



GRAVEL		SAND			CLAY &/OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 160

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC- Black Organic CLAY and SILT with a trace of fine Sand

BURMISTER- Black Organic CLAY and SILT trace (-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 56

PERCENT CLAY (<2.0 μm) 40

SAMPLE NO. S11LA-3311-202-MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5/15/85

DRAWN BY: SAG 7-29-85

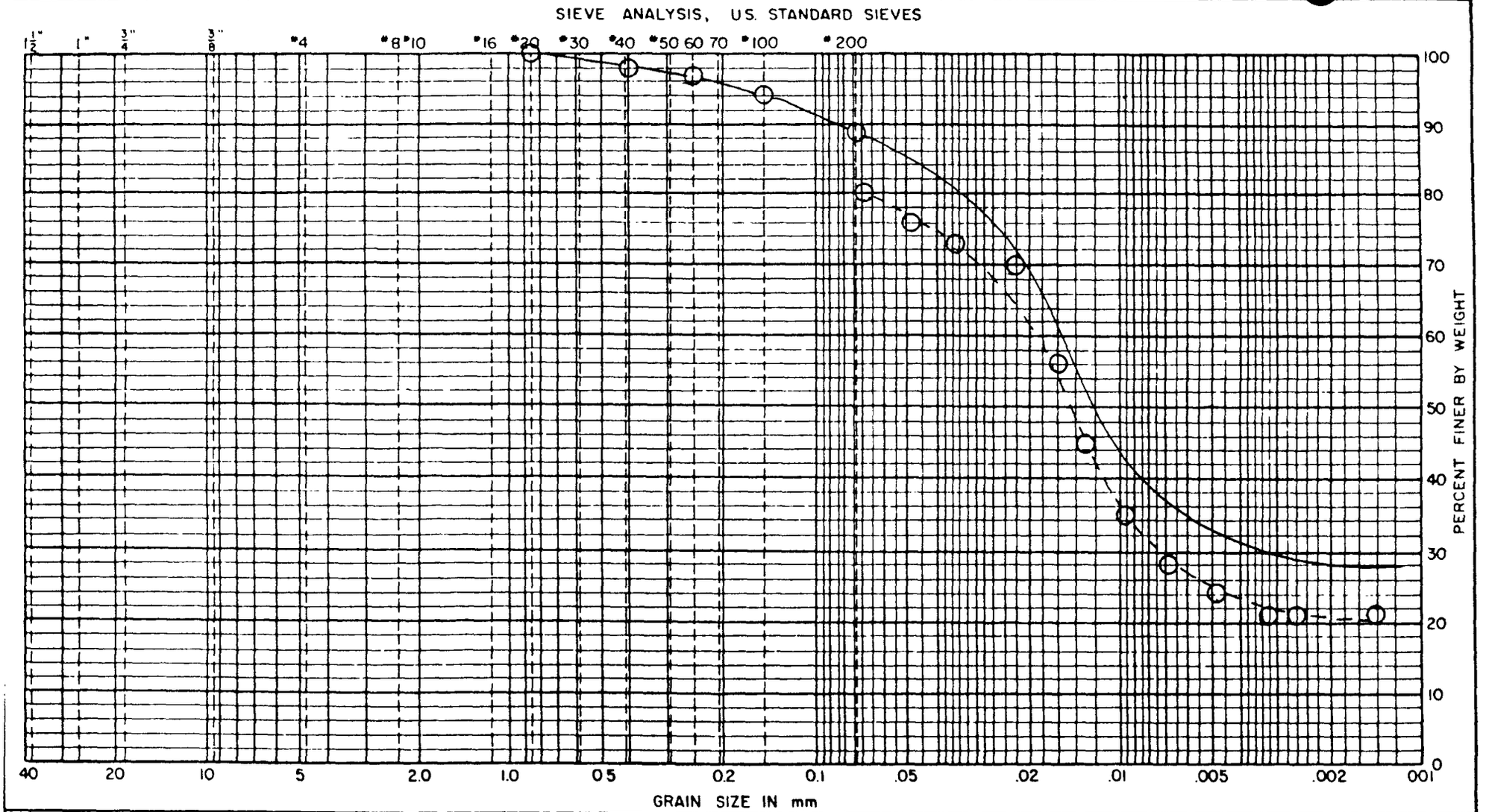
CHECKED BY: GGA 7/31/85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004485



GRAVEL		SAND			CLAY &/OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC- Black Organic CLAY and SILT with a little fine Sand

BURMISTER- Black Organic CLAY and SILT little (-), fine Sand

MOISTURE CONTENT (%) 135

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 11

PERCENT SILT (74.0-2.0 µm) 61

PERCENT CLAY (<2.0 µm) 28

SAMPLE NO. S11LA-3312-203-MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5/15/85

DRAWN BY: SAG 7-29-85

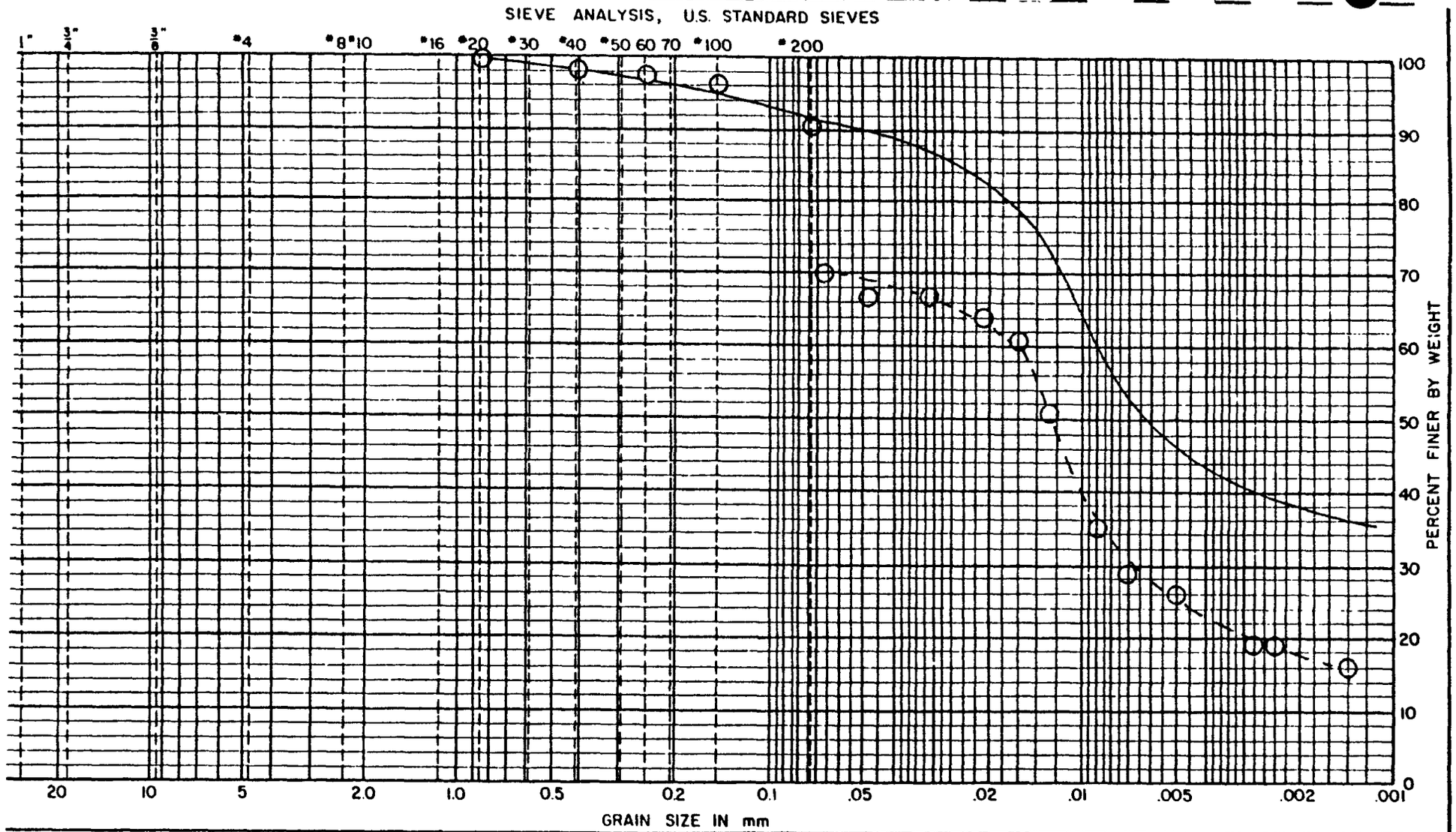
CHECKED BY: JSA 7/31/85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004486



GRAVEL		SAND			CLAY OR SILT
RSE	FINE	COARSE	MEDIUM	FINE	

ISTURE ONTENT (%) 108

TAL WET ENSITY (pcf) 86

ECIFIC RAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and trace of fine grained sand and plant fibers and leaves

BURMISTER- Black Organic SILT trace(+), fine Sand, little Clay, trace plant fibers, leaves.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 53

PERCENT CLAY (<2.0 μm) 38

SAMPLE NO. S11LA 3313 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

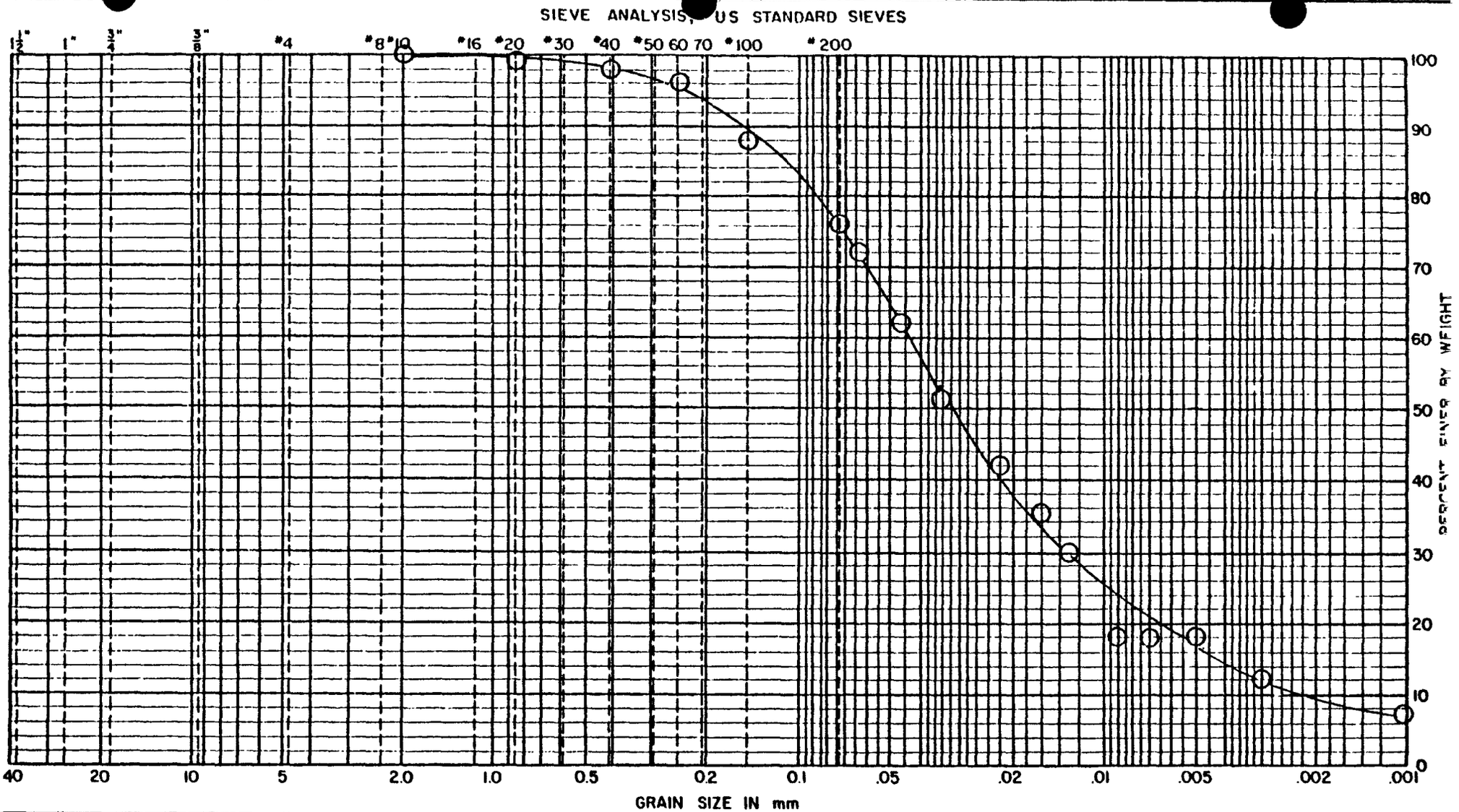
CHECKED BY Ch 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004487



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT and CLAY with some fine sand

BURMISTER- Black Organic SILT and CLAY some(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 24

PERCENT SILT (74.0-2.0 µm) 66

PERCENT CLAY (<2.0 µm) 10

MOISTURE CONTENT (%) 102

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY 2.51

SAMPLE NO. S12LA 3391 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-20-85

DRAWN BY: tew 7-9-85

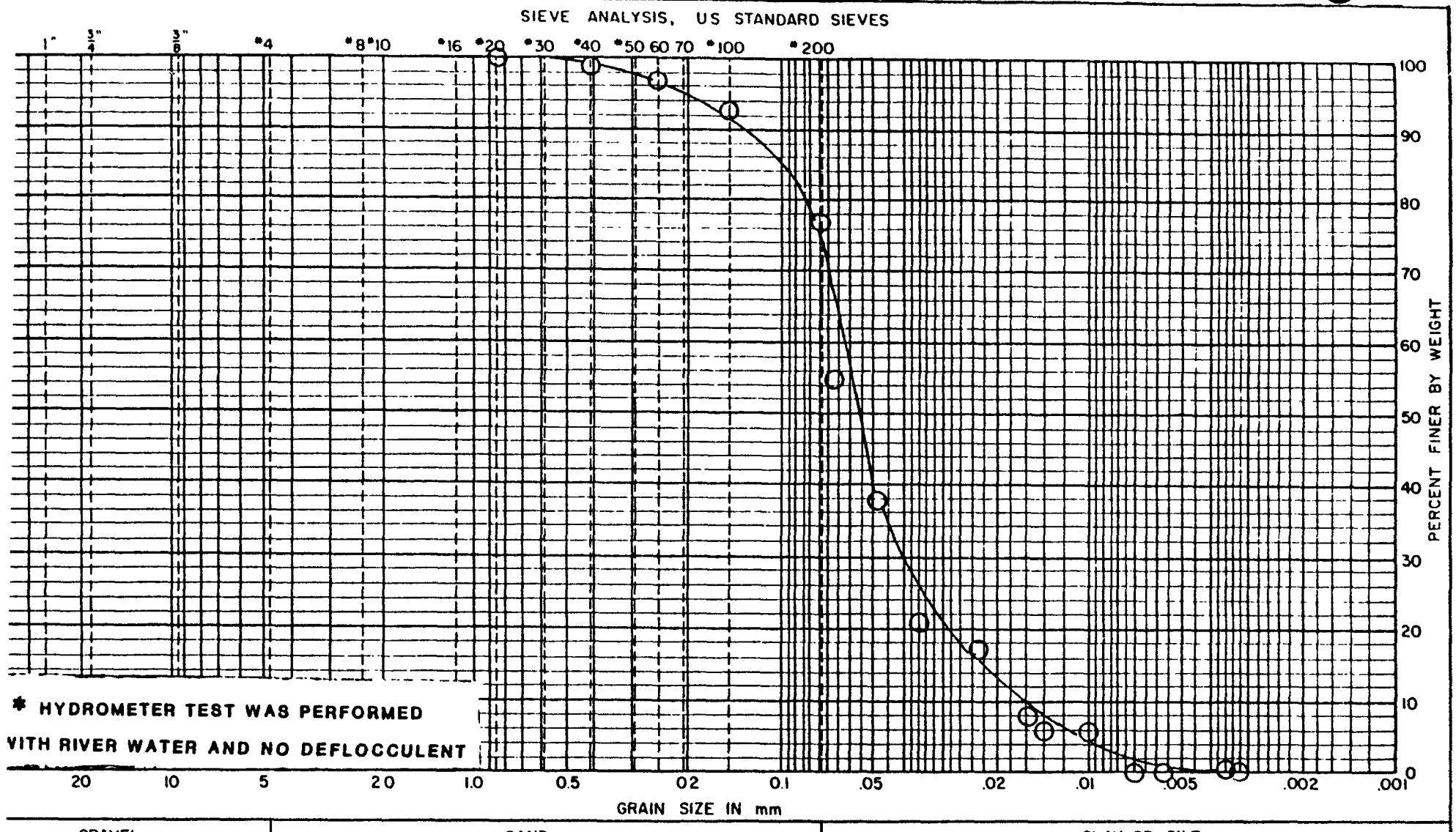
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004488



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT* with some fine sand and vegetative fibers and leaves, OL

BURMISTER - Black Organic SILT* some(-), fine Sand little (+) to some(-) vegetative fibers and leaves

MOISTURE CONTENT (%) 102

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 23

PERCENT SILT (74.0-2.0 μm) 77

PERCENT CLAY (<2.0 μm) 0

SAMPLE NO. S12LA 3391 200 MY (River-Water)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-20-85

DRAWN BY: 7-10-85

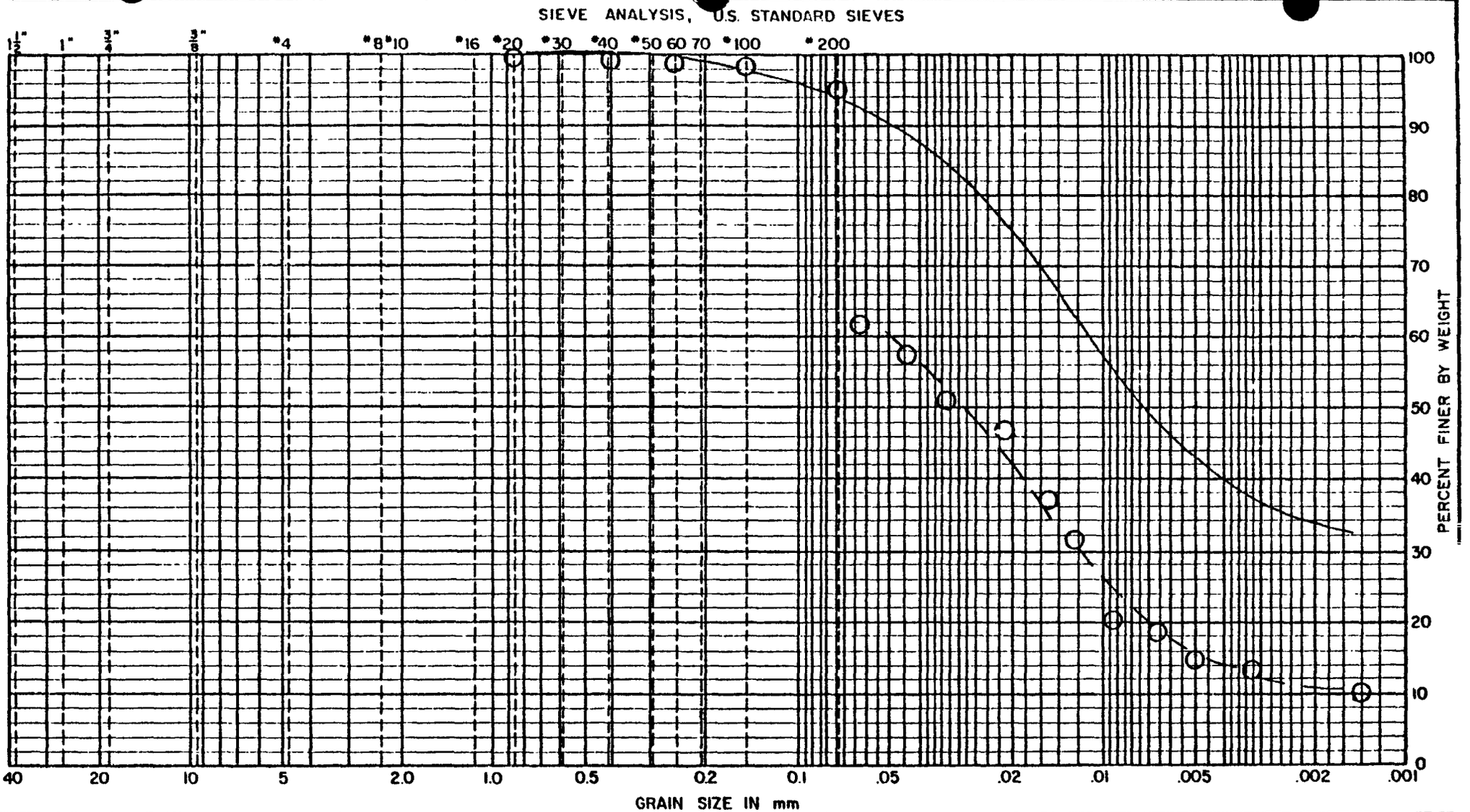
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004489



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of medium to fine sand

BURMISTER- Black Organic SILT some(+) Clay trace, medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 34

MOISTURE CONTENT (%) 76

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

SAMPLE NO. S12LA 3392 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-20-85

DRAWN BY: tew 7-9-85

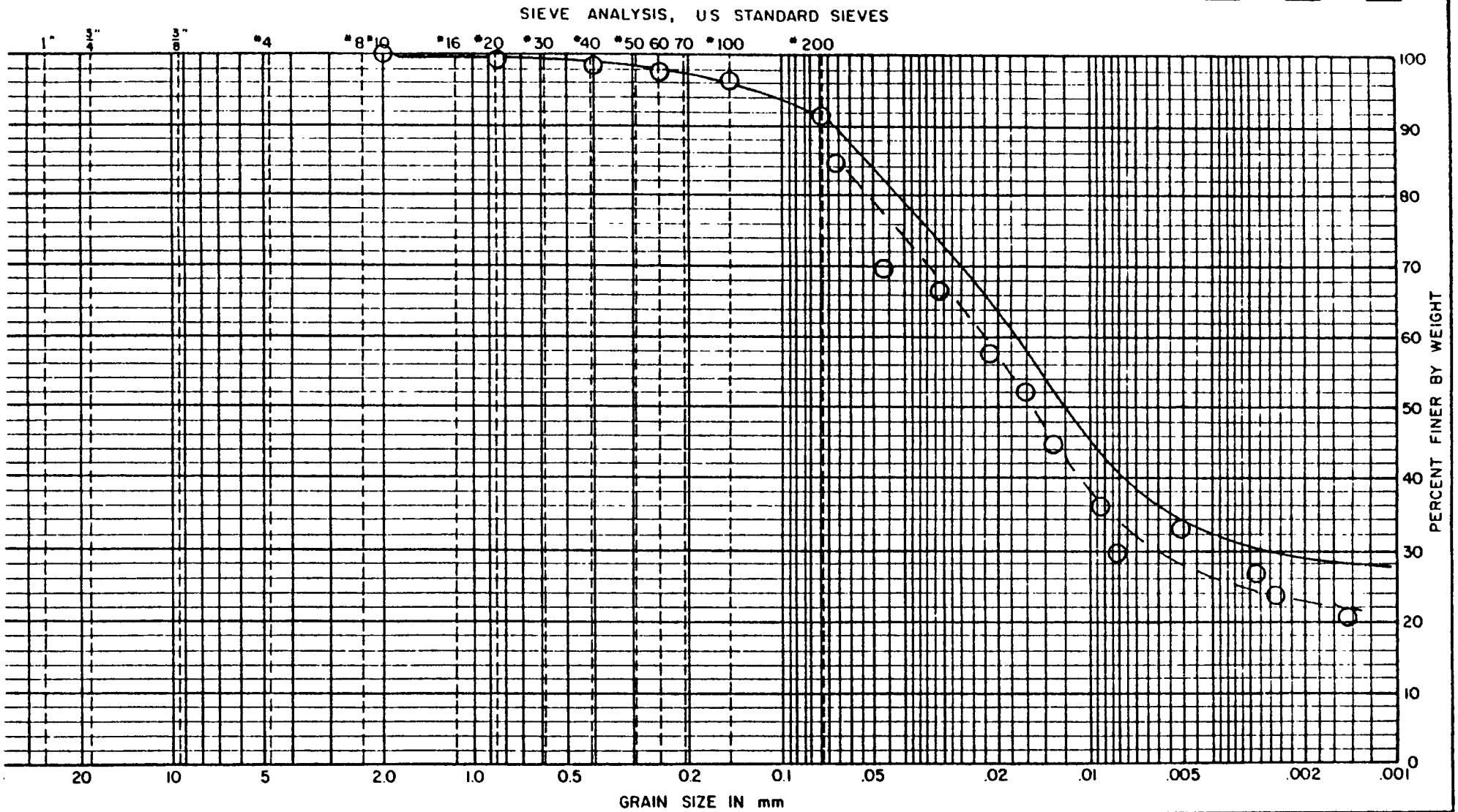
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004490



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic CLAY and SILT, trace(+), fine Sand

MOISTURE CONTENT (%) 121

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 62

PERCENT CLAY (<2.0 μm) 30

SAMPLE NO. S12LA 3393 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

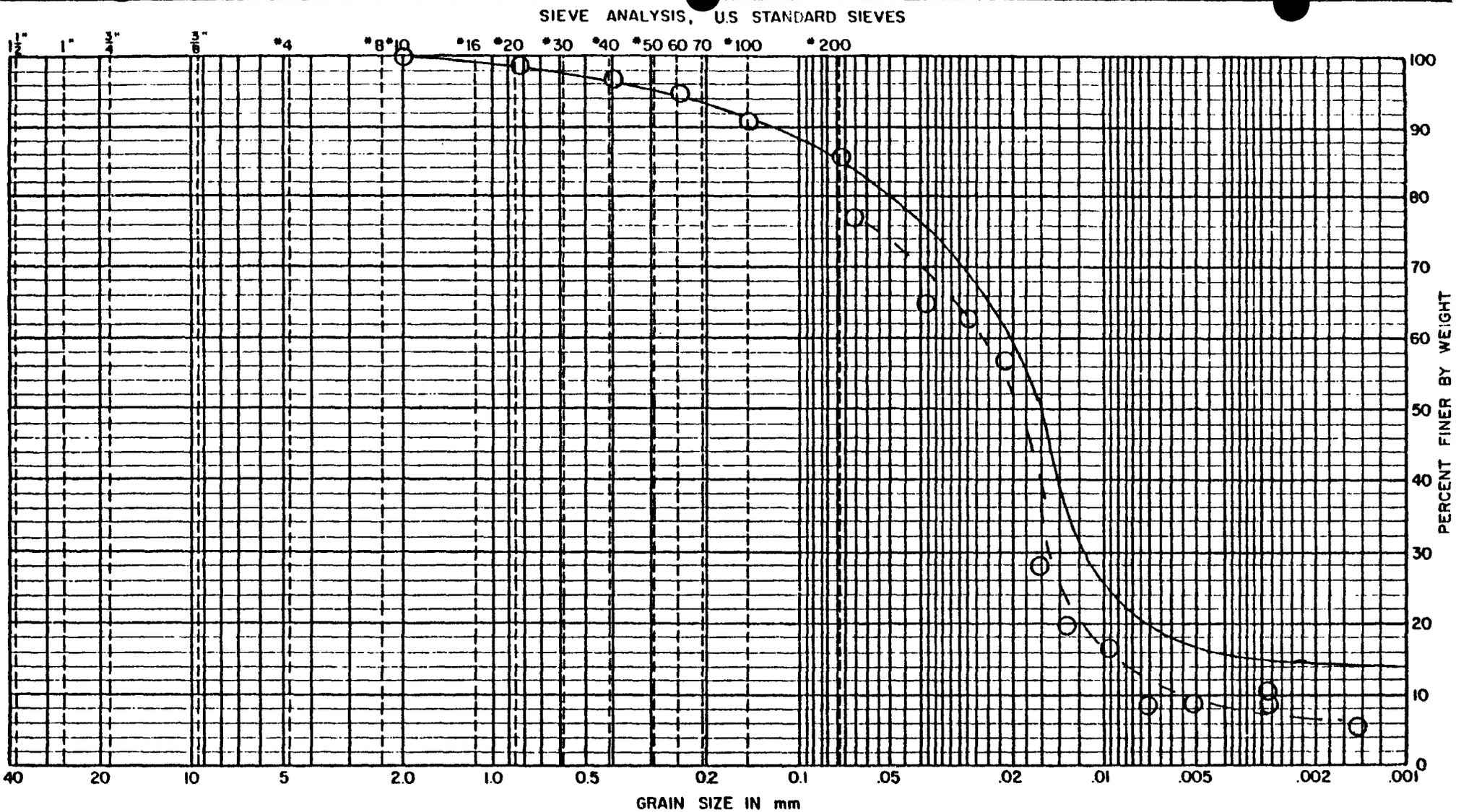
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004491



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 114

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, Clayey SILT, little medium to fine sand

BURMISTER- Dark gray SILT little Clay little, medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 15

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 15

SAMPLE NO. S12LA 3394 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

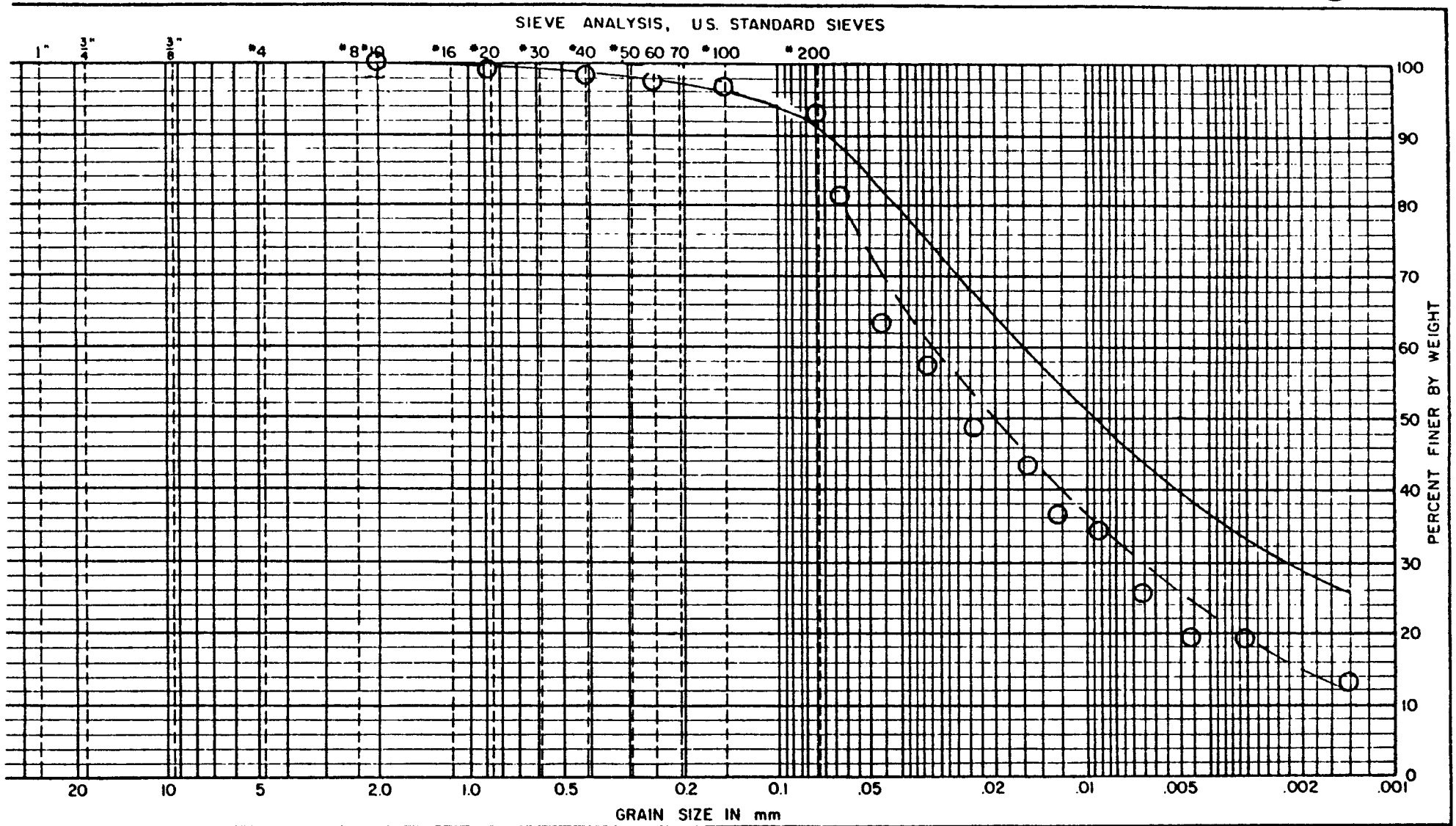
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004492



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown gray SILT with little clay and trace of sand

BURMISTER- Brown gray SILT little Clay trace, Sand

MOISTURE CONTENT (%) 87

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 78

PERCENT CLAY (<2.0 µm) 16

SAMPLE NO. S12LA 3395 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-20-85

DRAWN BY: tew 7-9-85

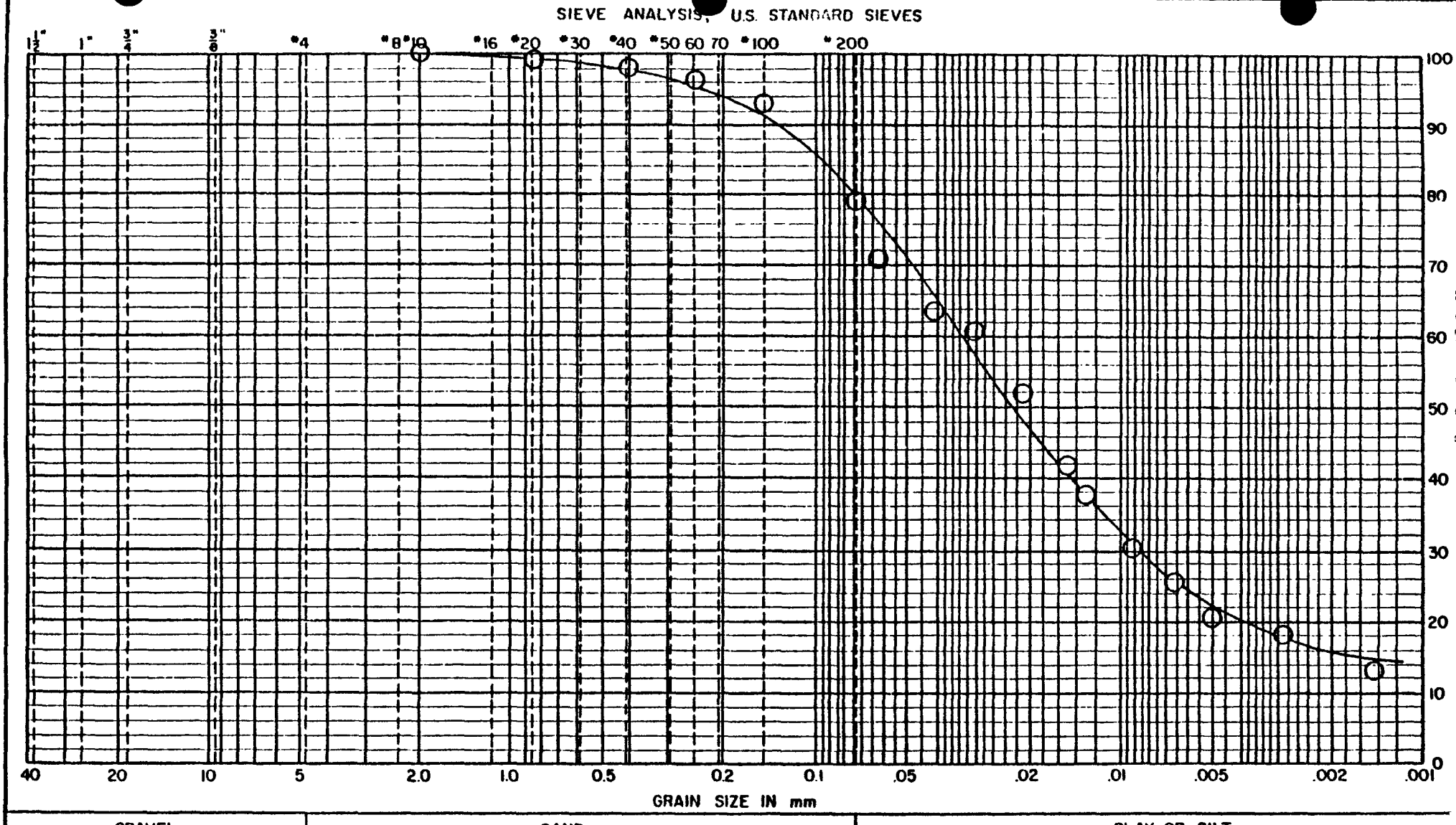
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004493



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 104

TOTAL WET DENSITY (pcf) 89

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with little medium to fine sand

BURMISTER- Black Organic SILT, little Clay, little(+) medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 20

PERCENT SILT (74.0-2.0 μm) 64

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. S13LA 3401 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-20-85

DRAWN BY: tw 7-10-85

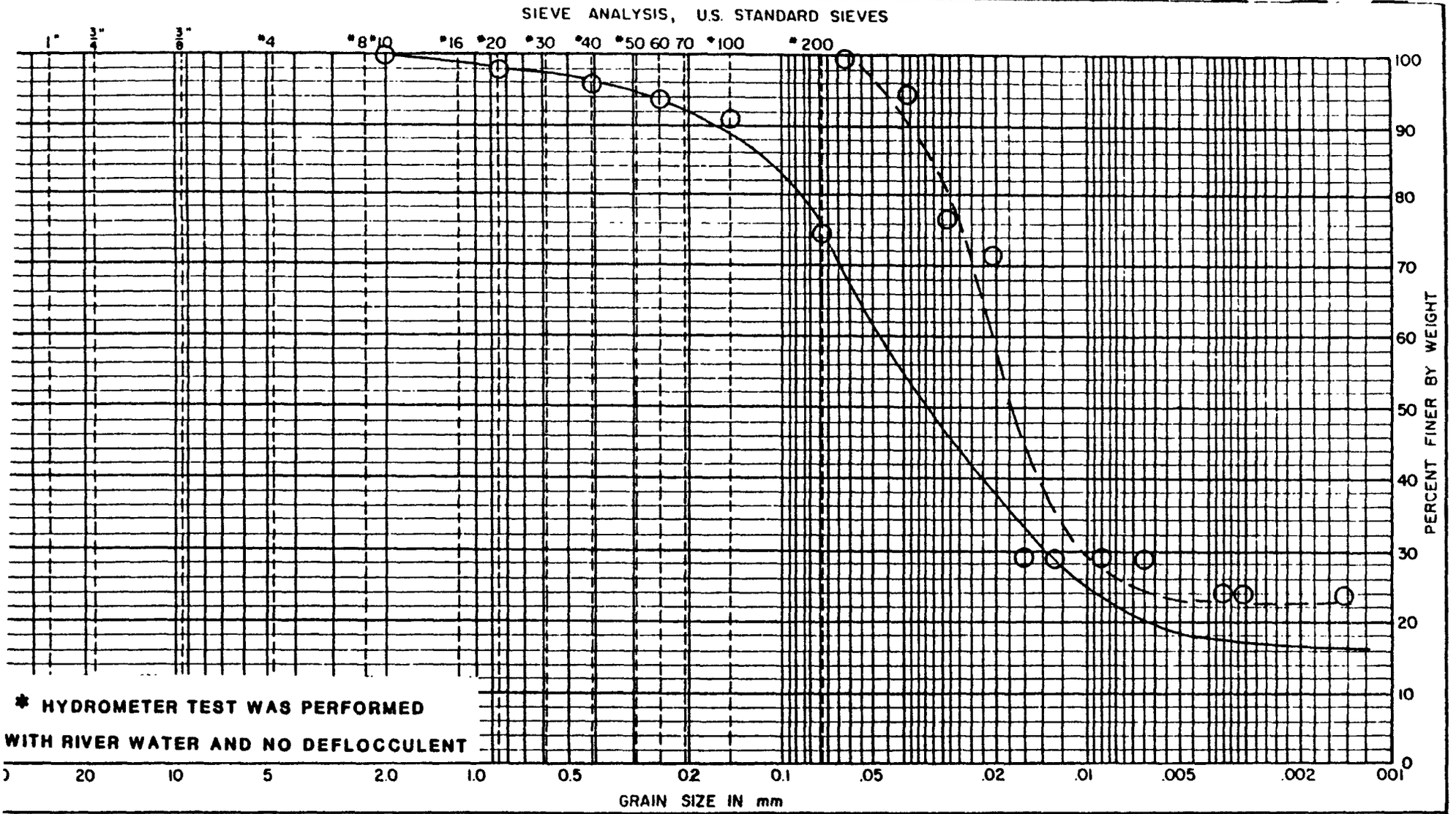
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004494



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT or CLAY* with some medium to fine sand

BURMISTER- Black Organic SILT or CLAY* some(-) medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 23

PERCENT SILT (74.0-2.0 µm) 77

PERCENT CLAY (<2.0 µm) 0

MOISTURE CONTENT (%) 104

TOTAL WET DENSITY (pcf) 89

SPECIFIC

SAMPLE NO. S13LA 3401 200 MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-20-85

DRAWN BY: tew 7-10-85

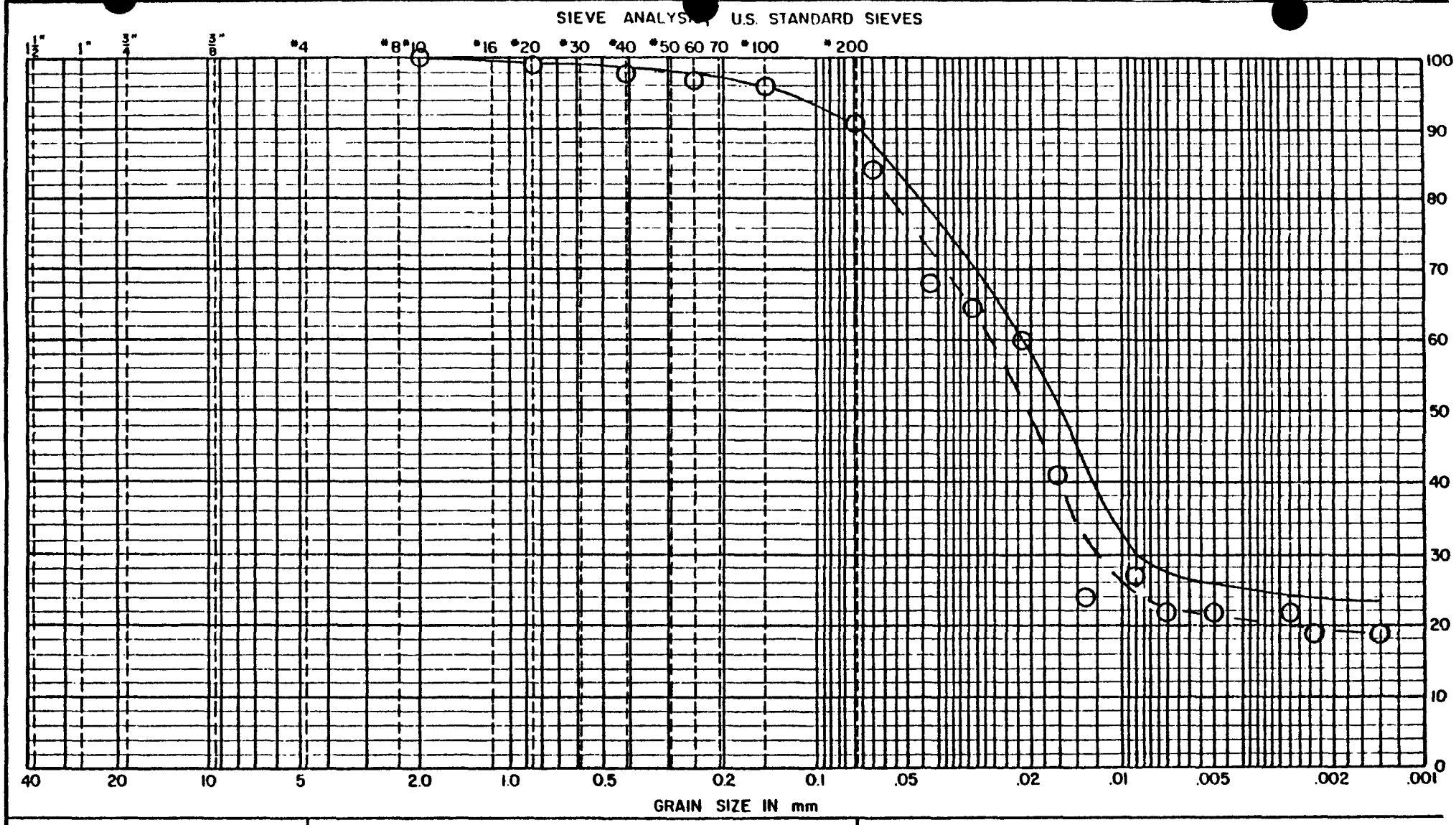
CHECKED BY: 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004495



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 143

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a little fine grained sand, plant fibers and leaves

BURMISTER- Black Organic SILT little(-), fine Sand, some(-) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 12

PERCENT SILT (74.0-2.0 μm) 62

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. S13LA 3402 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-20-85

DRAWN BY: 7-11-85

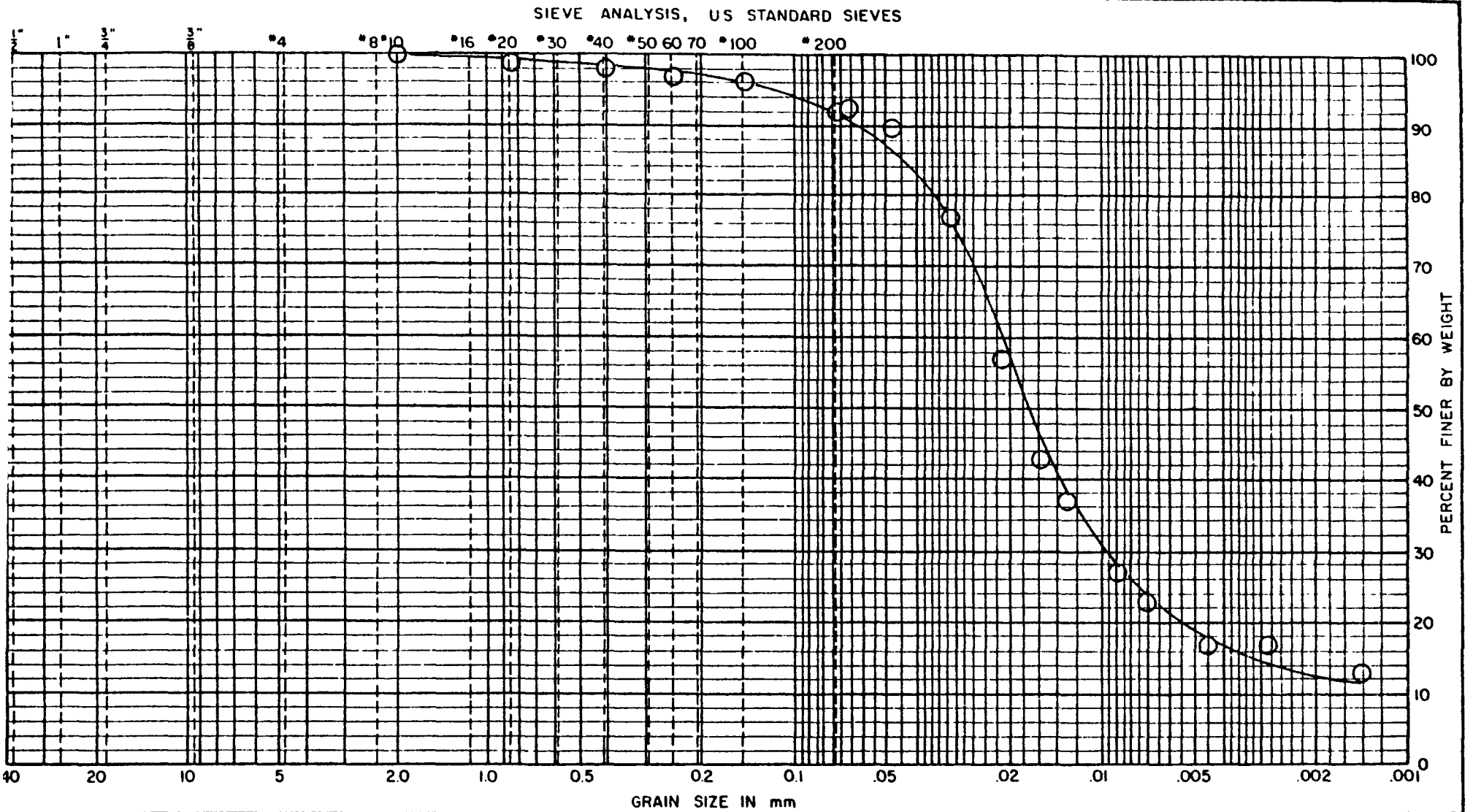
CHECKED BY: 7-12-85

PROJECT

GRADATION CURVES

FIG. NO.

DEP\DA0004496



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of medium to fine sand

BURMISTER- Black Organic SILT littel(-) Clay, trace (+), medium to fine(+) Sand.

MOISTURE CONTENT (%) 120

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 7

PERCENT SILT (74.0-2.0 µm) 80

PERCENT CLAY (<2.0 µm) 13

SAMPLE NO. S13LA 3403 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

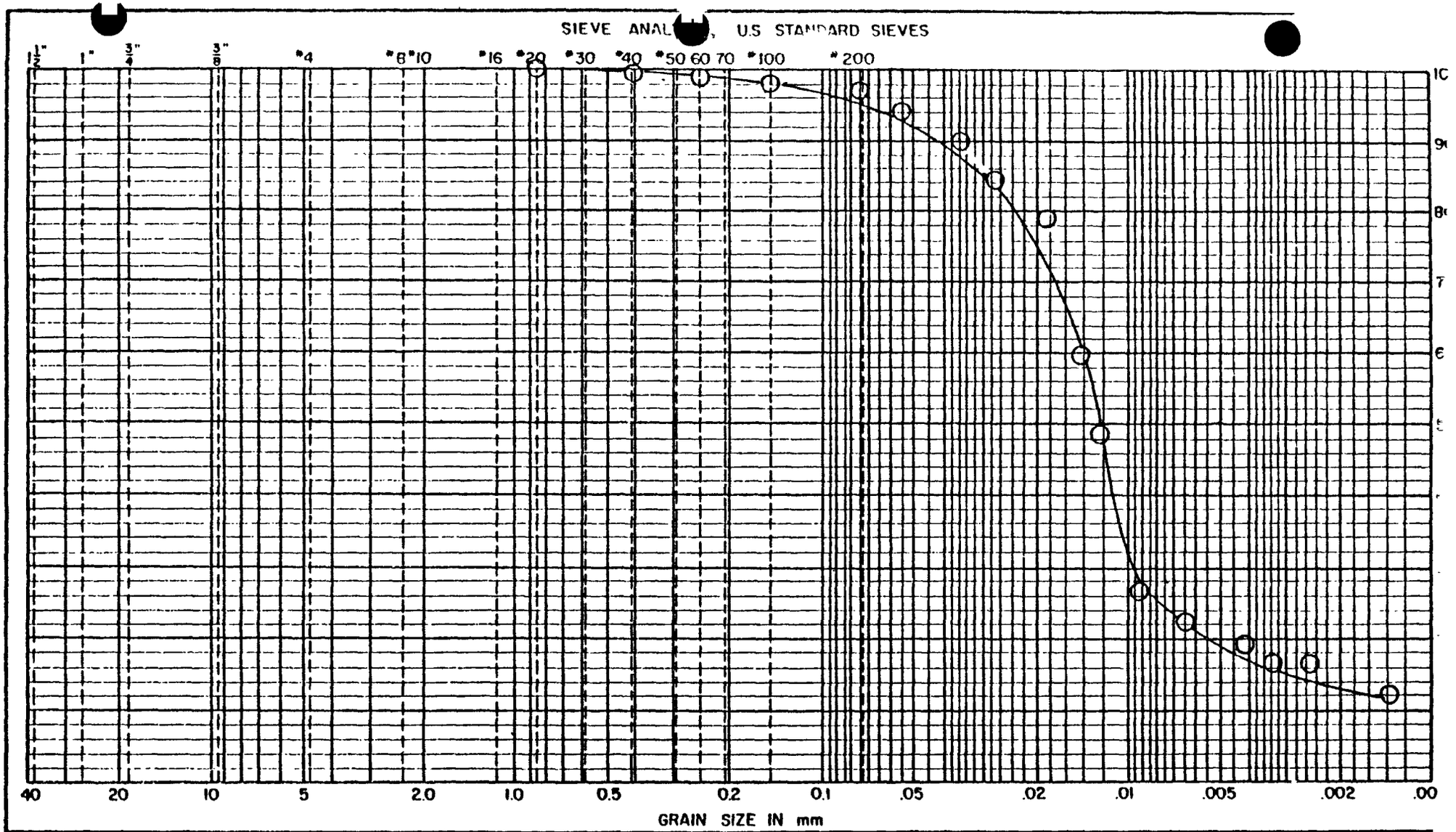
CHECKED BY: [illegible] 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004497



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 91

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace of fine sand

BURMISTER- Dark gray Organic SILT, little Clay trace fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 5

PERCENT SILT (74.0-2.0 µm) 81

PERCENT CLAY (<2.0 µm) 14

SAMPLE NO. S13LA 3404 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

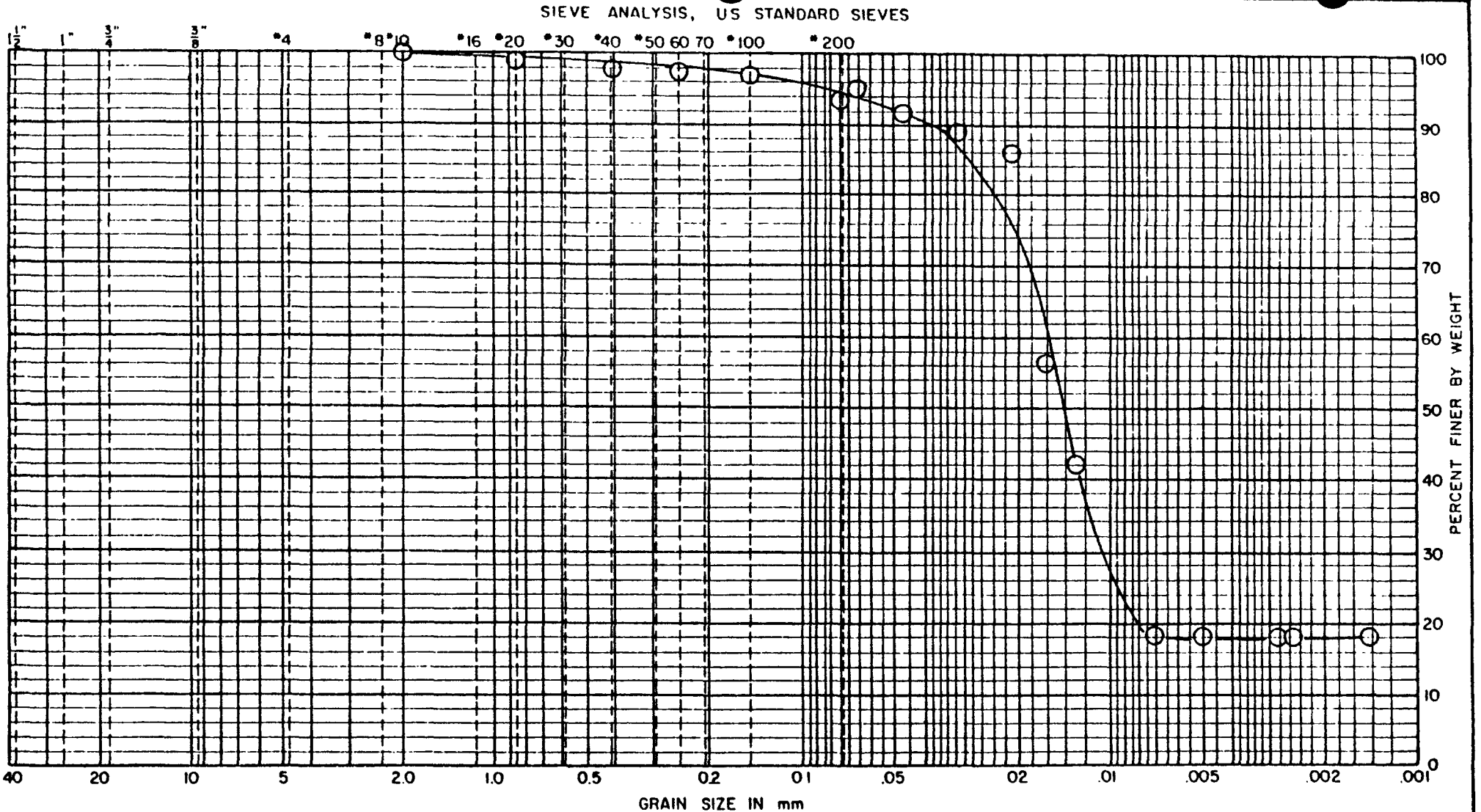
CHECKED BY: 7-12-85

GRADATION CURVES

PROJECT

FIG. N

DEP\DA0004498



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 112

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace of fine clay

BURMISTER- Dark gray Organic SILT little(+) Clay, trace fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 5

PERCENT SILT (74.0-2.0 µm) 77

PERCENT CLAY (<2.0 µm) 18

SAMPLE NO. S13LA 3405 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

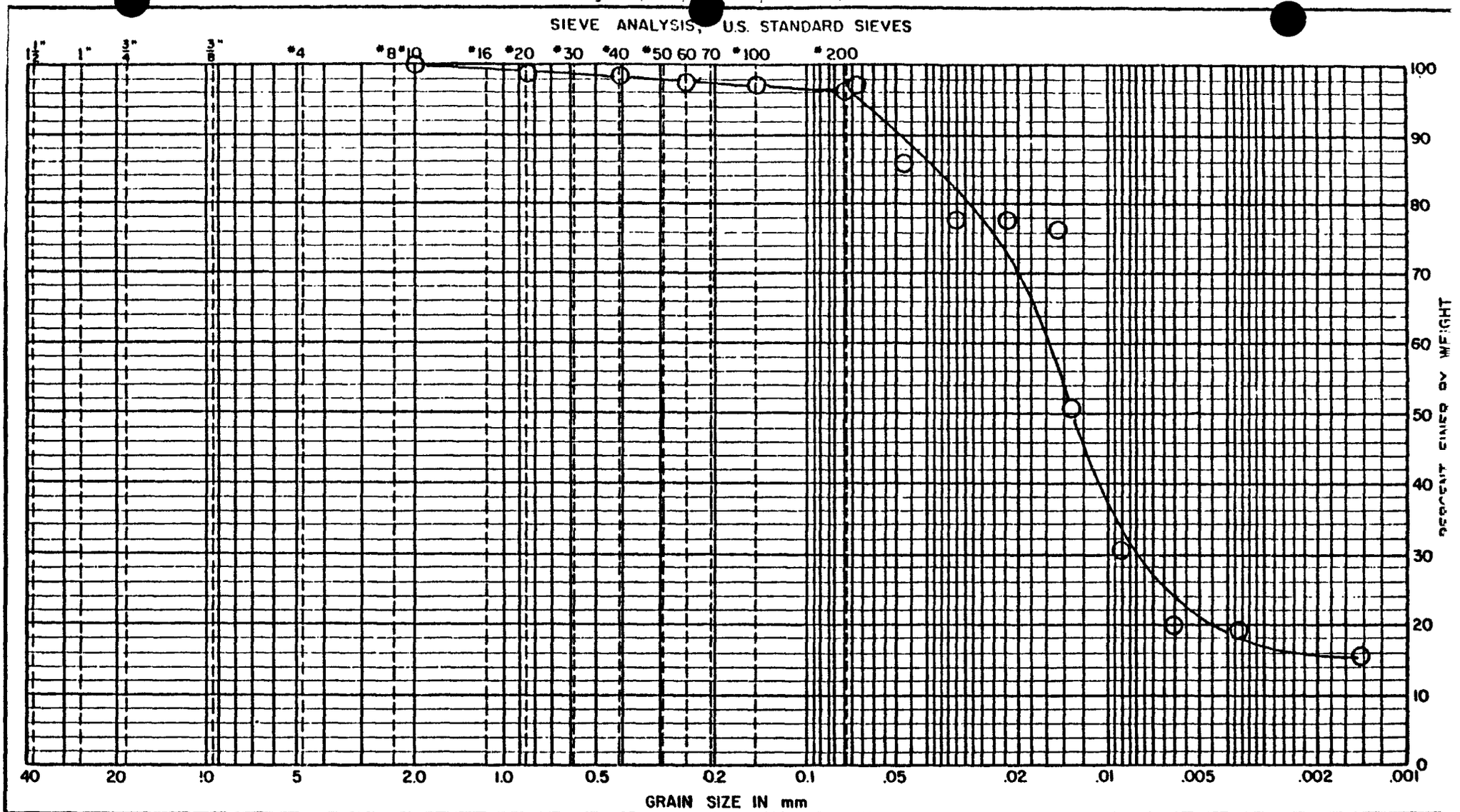
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004499



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 145

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT little Clay trace(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. S14LA 3319 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

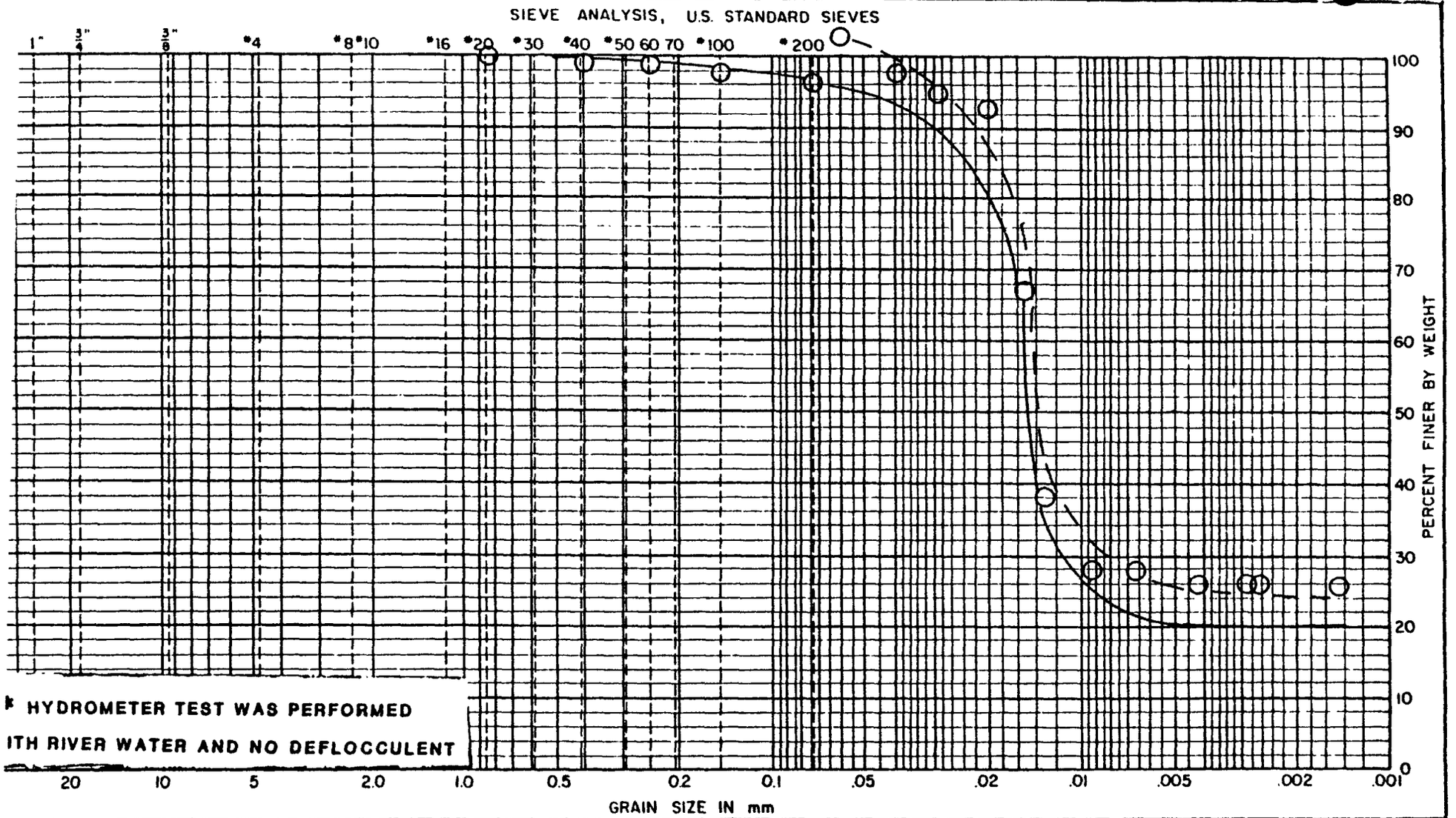
CHECKED BY: Ch 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004500



GRAVEL		SAND			CLAY OR SILT
OARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT or CLAY* with trace of fine sand

BURMISTER- Black Organic SILT or CLAY* trace(-), fine Sand

OISTURE CONTENT (%) 145

OTAL WET DENSITY (pcf) 84

PECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 3

PERCENT SILT (74.0-2.0 μm) 97

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S14LA 3319 200 MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-17-85

DRAWN BY: 7-10-85

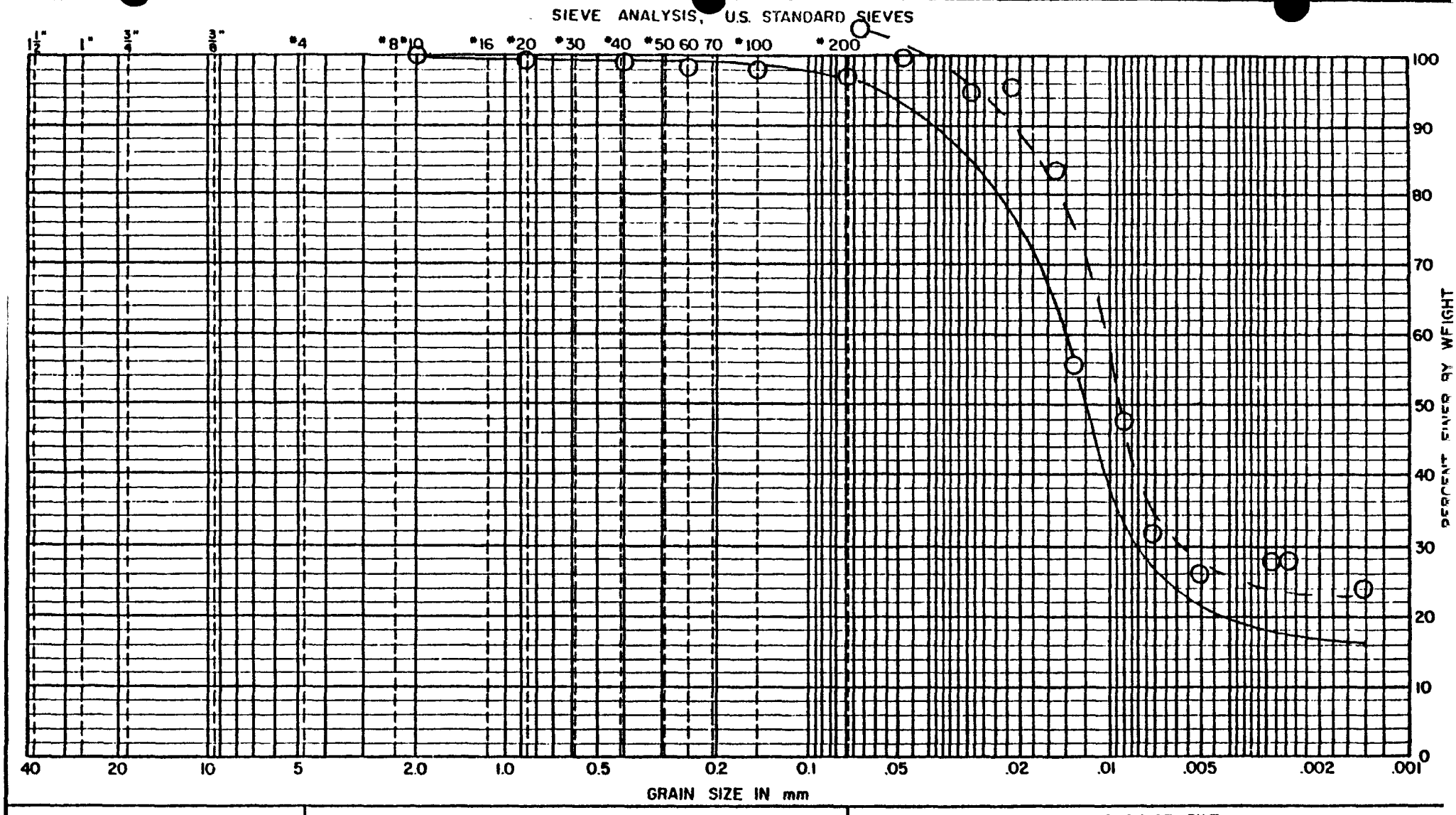
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004501



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 160

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT, trace fine sand

BURMISTER- Black Organic SILT, little (+) Clay trace(-), fine sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 2

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 18

SAMPLE NO. S14LA 3320 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

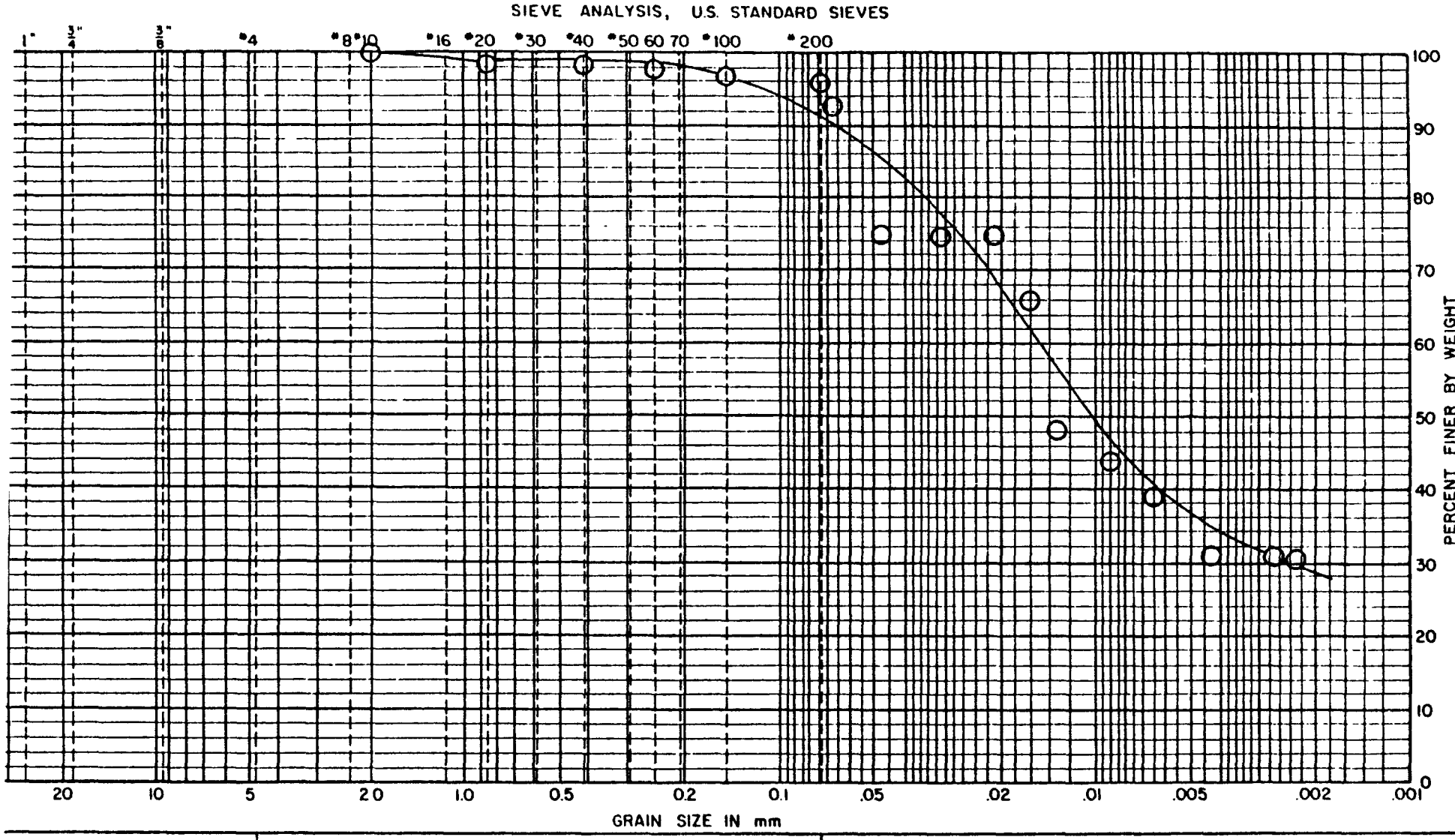
CHECKED BY: Ch 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004502



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, SILT with some clay and little sand

BURMISTER- Dark gray SILT some Clay little(-), Sand

DISTURE CONTENT (%) 191

TAL WET DENSITY (pcf) 74

ECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 10

PERCENT SILT (74.0-2.0 µm) 60

PERCENT CLAY (<2.0 µm) 30

SAMPLE NO. S14LA 3321 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-17-85

DRAWN BY: 7-11-85

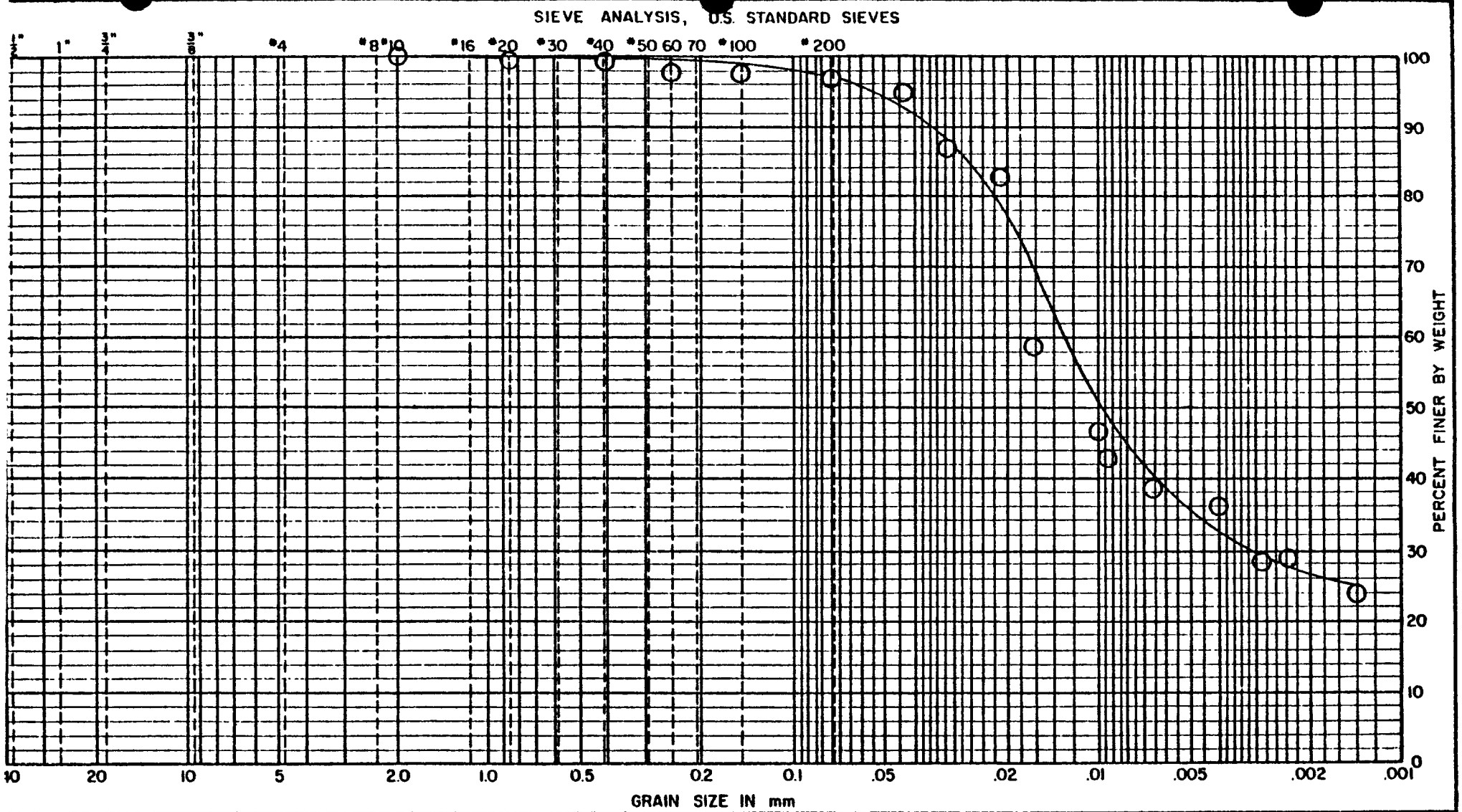
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004503



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 146

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, SILT with some clay and trace of sand

BURMISTER- Black SILT some Clay trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. S14LA 3322 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-17-85

DRAWN BY: CA 7-11-85

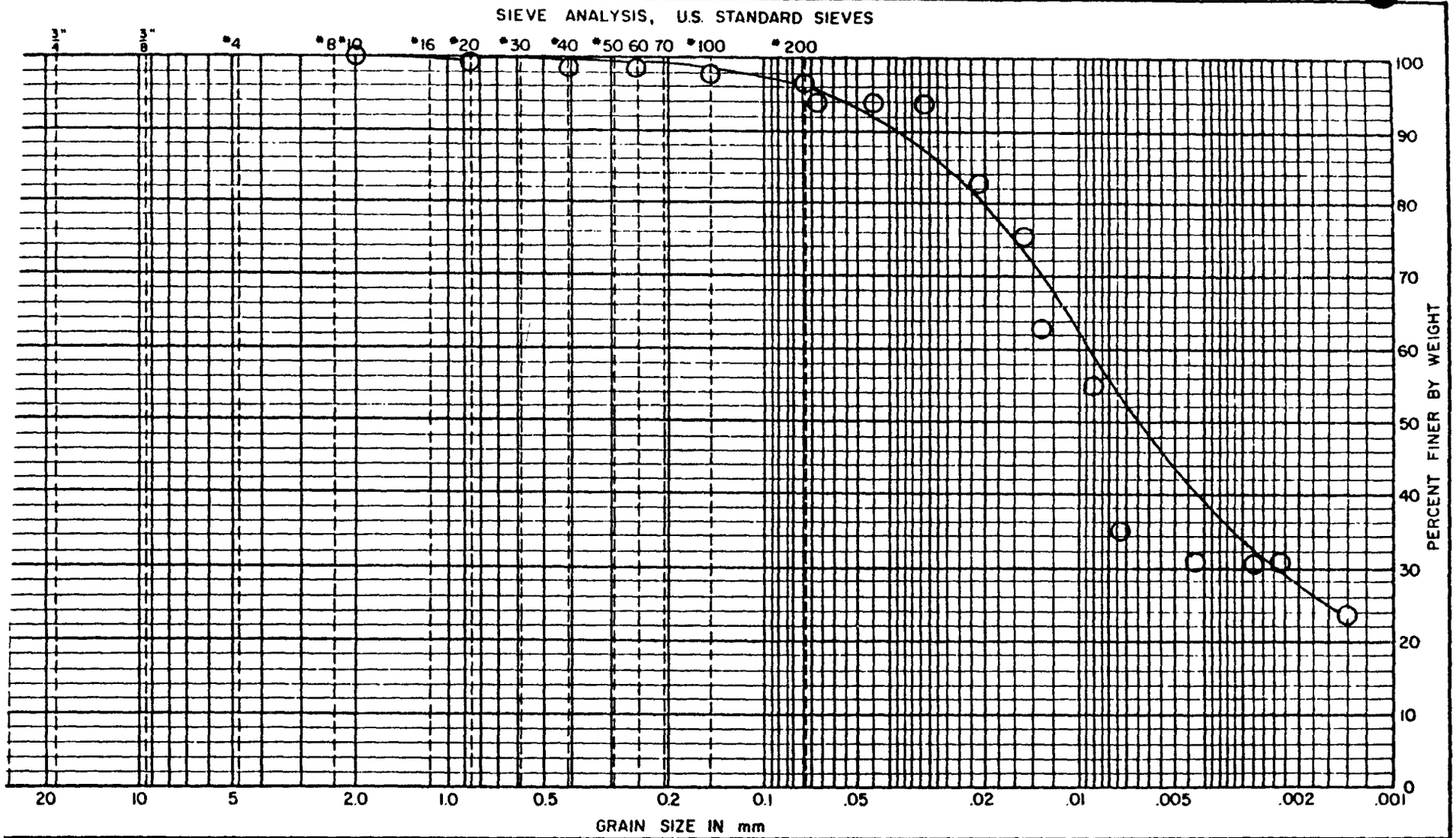
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004504



GRAVEL		SAND			CLAY OR SILT
ISE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray SILT with some clay and trace of sand

BURMISTER- Dark gray SILT some clay trace, fine Sand

STURE
NTENT (%) 149

AL WET
NSITY (pcf) 77

CIFIC
RAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5
PERCENT SILT (74.0-2.0 μm) 67
PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. S14LA 3323 204 MY
SAMPLE DEPTH, ft. 8-10
SAMPLING DATE 5-17-85

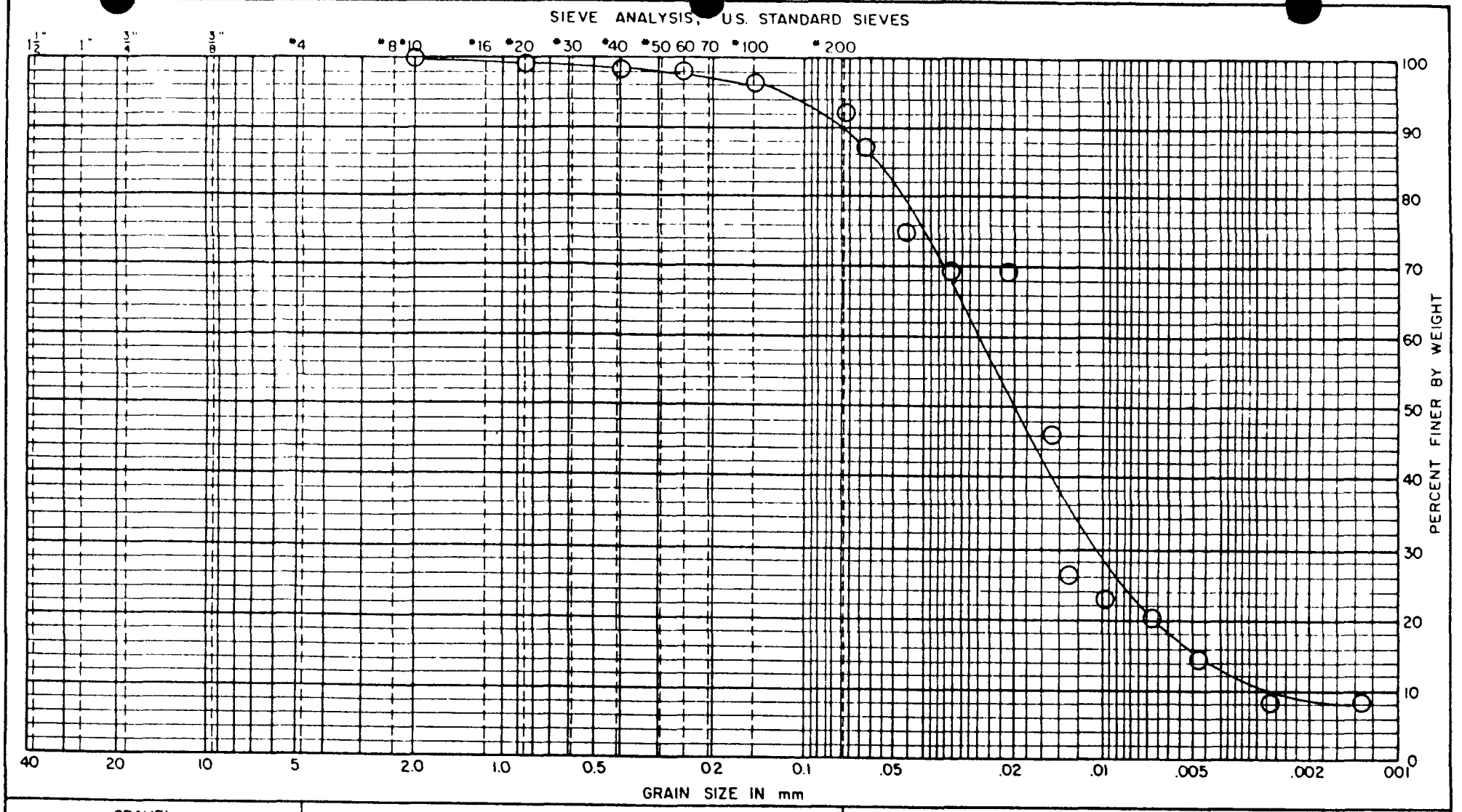
DRAWN BY: 7-11-85
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004505



GRAVEL		SAND			CLAY &/OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC- Black Clayey SILT with a trace of fine Sand

BURMISTER- Black Clayey SILT trace (+), fine Sand

MOISTURE CONTENT (%) 147

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY 2.43

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 10

PERCENT SILT (74.0-2.0 µm) 81

PERCENT CLAY (<2.0 µm) 9

SAMPLE NO. S21LA-3329-200-MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/15/85

DRAWN BY: SAG 7-29-85

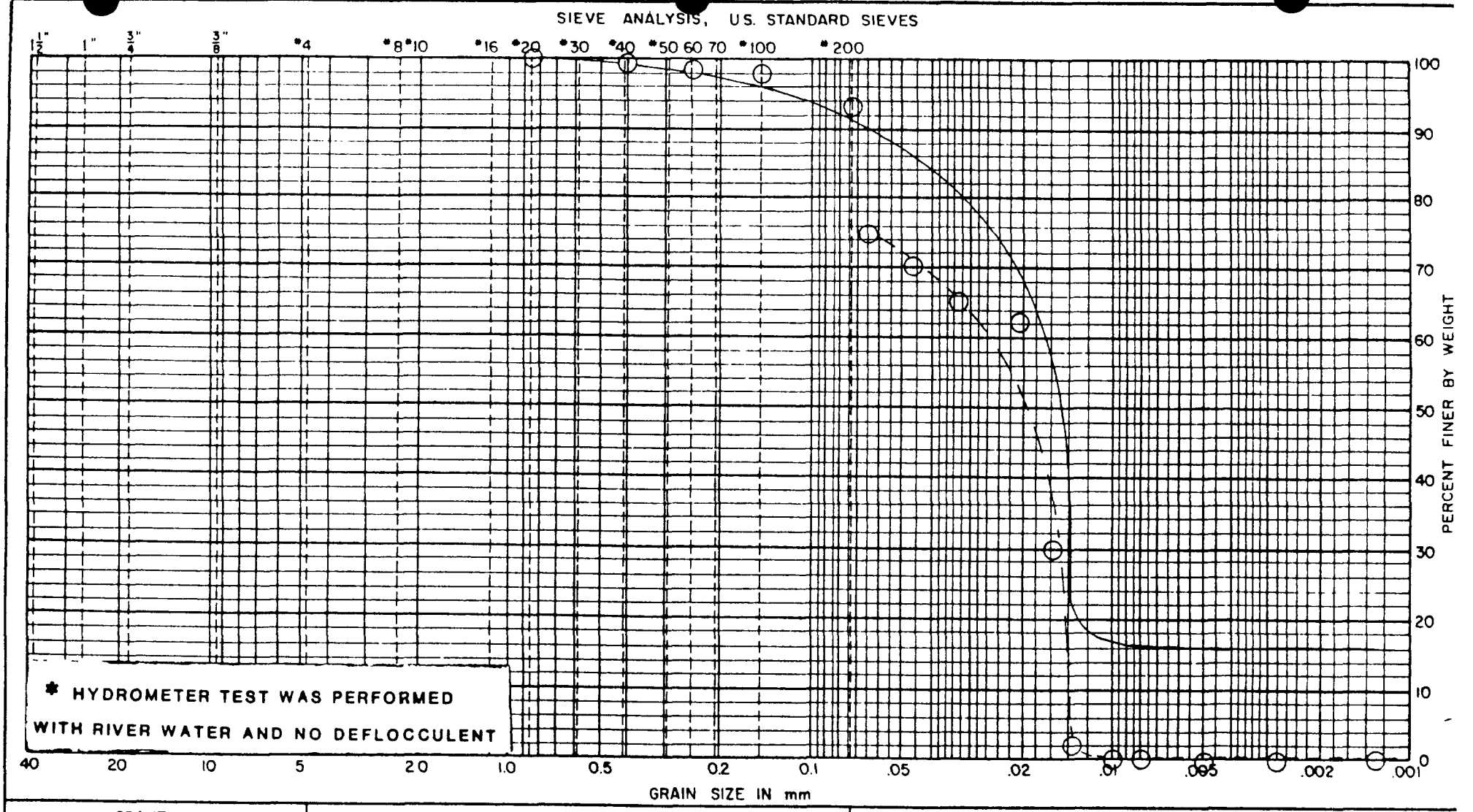
CHECKED BY: 7/31/85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004506



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 147

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY 2.43

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT and CLAY with a trace of fine Sand

BURMISTER- Black SILT and CLAY* trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) 76 } 92

PERCENT CLAY (<2.0 µm) 16

SAMPLE NO. S21LA-3329-200-MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/15/85

DRAWN BY: SAG 7-29-85

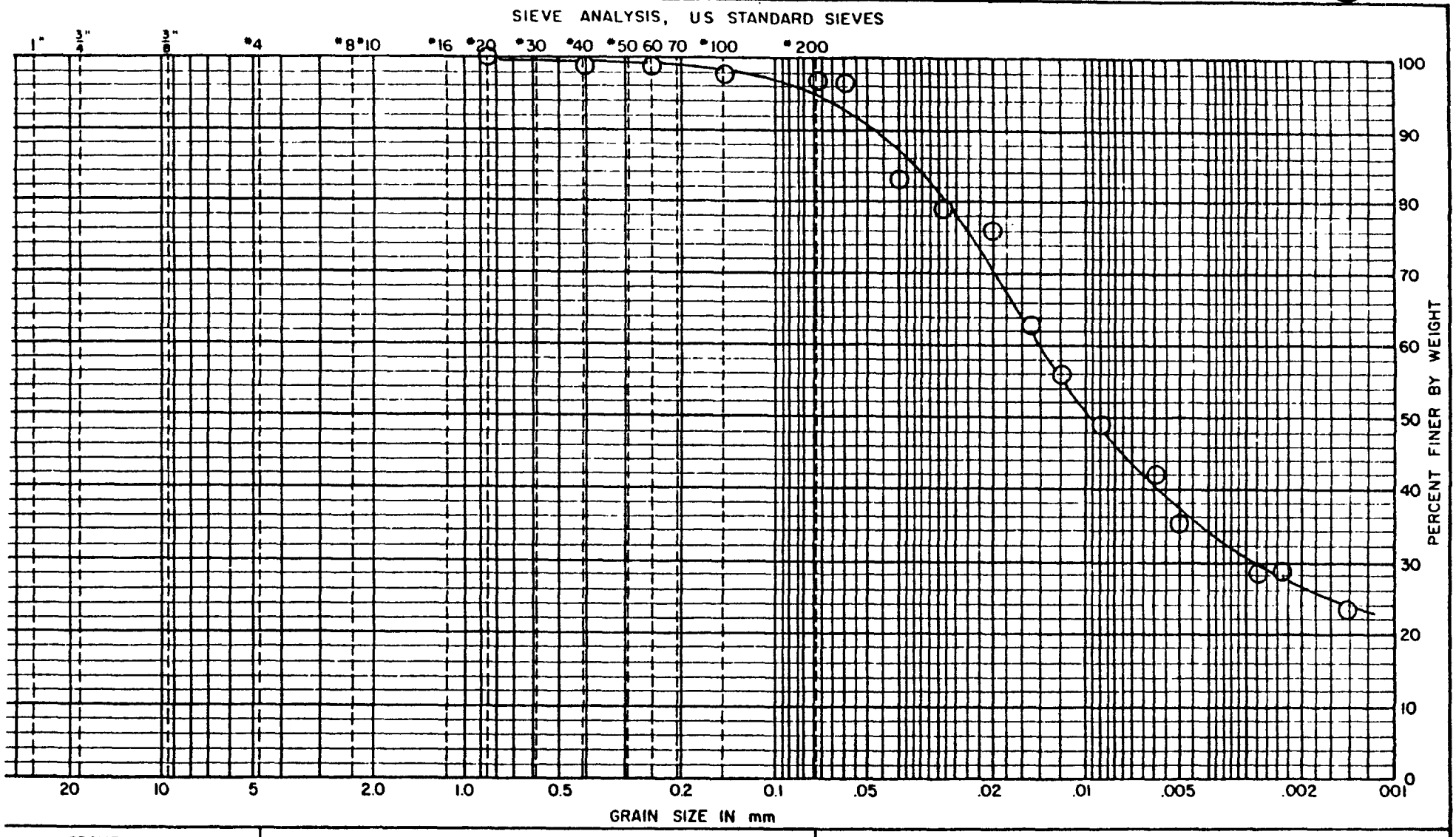
CHECKED BY: [illegible] 7/31/85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004507



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some clay and trace of fine grained sand

BURMISTER- Dark gray Organic SILT trace, fine Sand, some Clay

MOISTURE CONTENT (%) 112

TOTAL WET DENSITY (pcf) 87

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 69

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. S21LA 3330 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

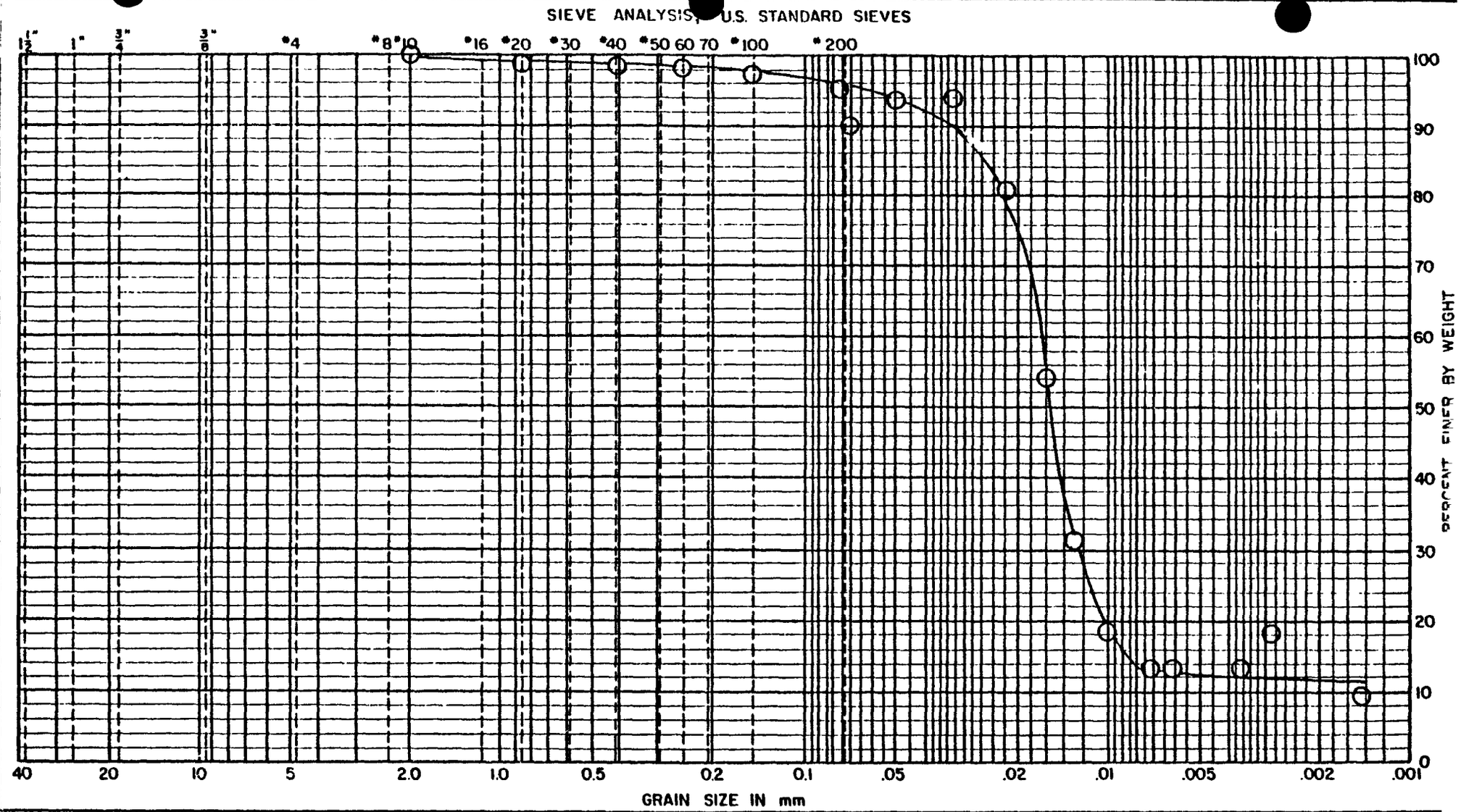
CHECKED BY: Ch 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004508



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT, with trace of medium to fine sand

BURMISTER- Dark gray Organic SILT, little(-) Clay, trace, medium to fine Sand

MOISTURE CONTENT (%) 189

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 85

PERCENT CLAY (<2.0 μm) 11

SAMPLE NO. S21LA 3331 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

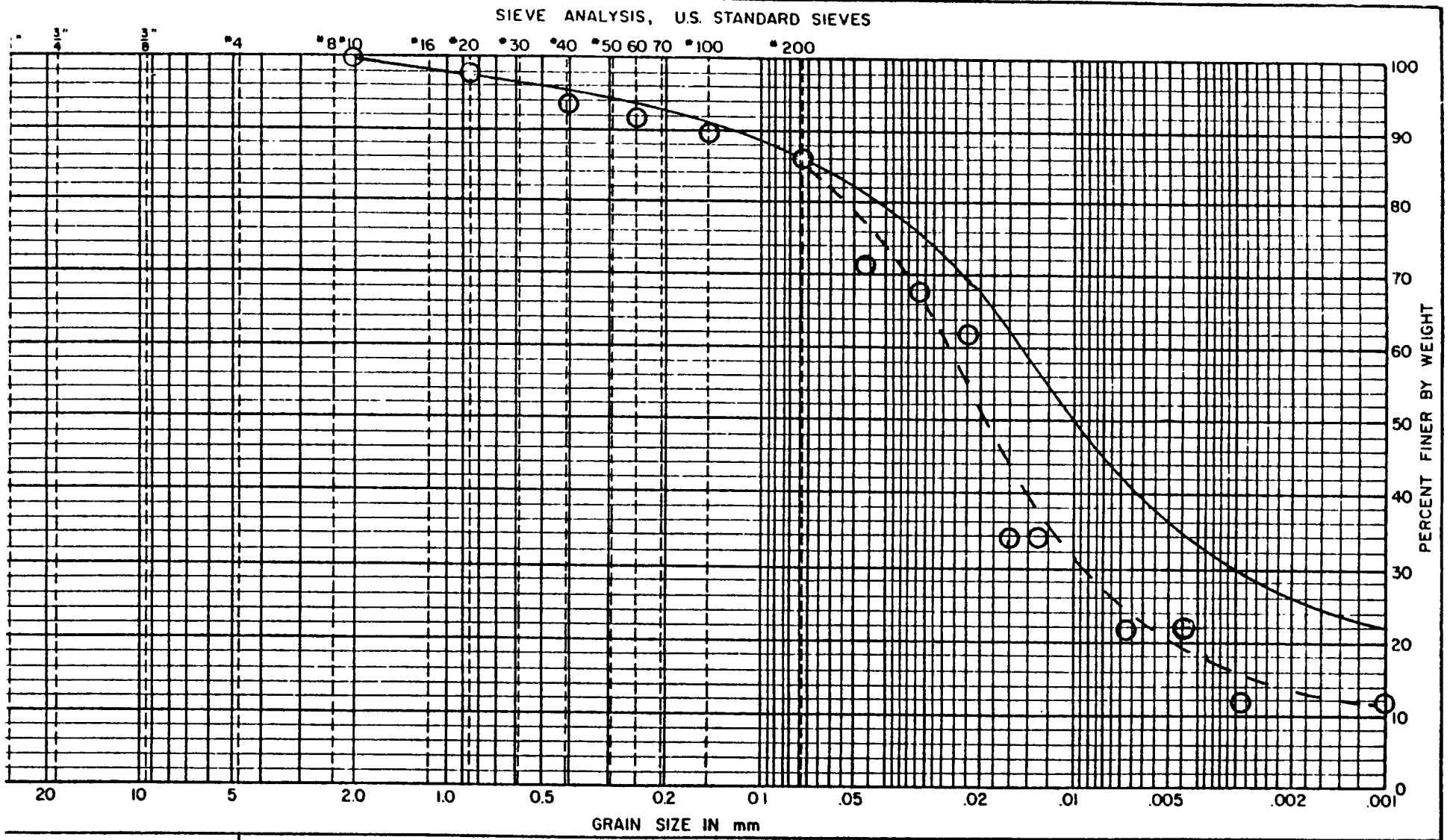
CHECKED BY: Chw 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004509



GRAVEL		SAND			CLAY OR SILT
SE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT, with some clay and little sand

BURMISTER- Black to dark gray Organic SILT, some Clay little, medium to fine sand

STURE NTENT (%) 122

AL WET NSITY (pcf) 81

CIFIC AVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 14

PERCENT SILT (74.0-2.0 µm) 60

PERCENT CLAY (<2.0 µm) 26

SAMPLE NO. S21LA 3332 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

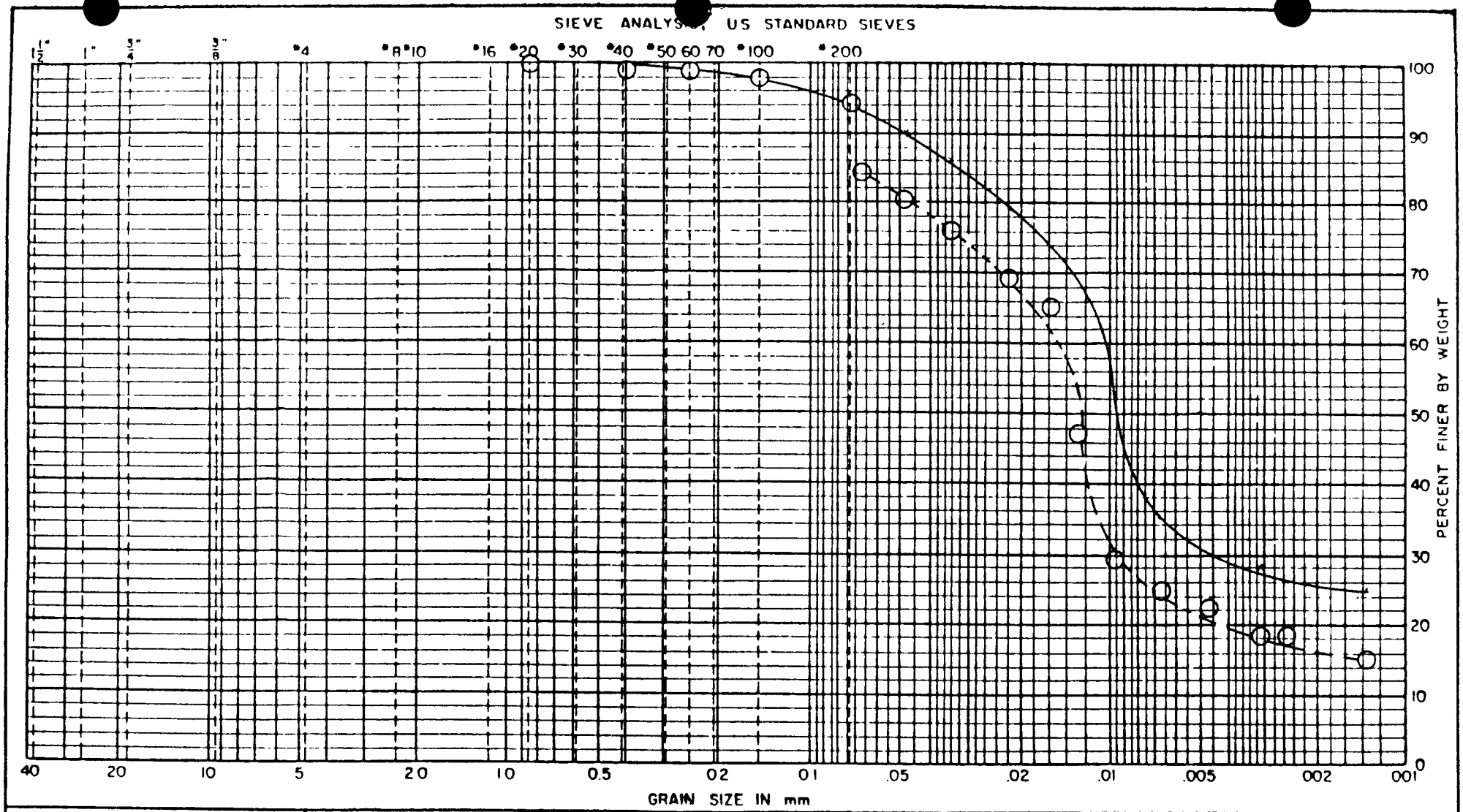
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004510



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic CLAY and SILT with a trace of fine Sand

BURMISTER- Black Organic CLAY and SILT trace, fine Sand

MOISTURE CONTENT (%) 151

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY _____

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. S21LA-3333-204-MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5/15/85

DRAWN BY: Dw 7-26-85

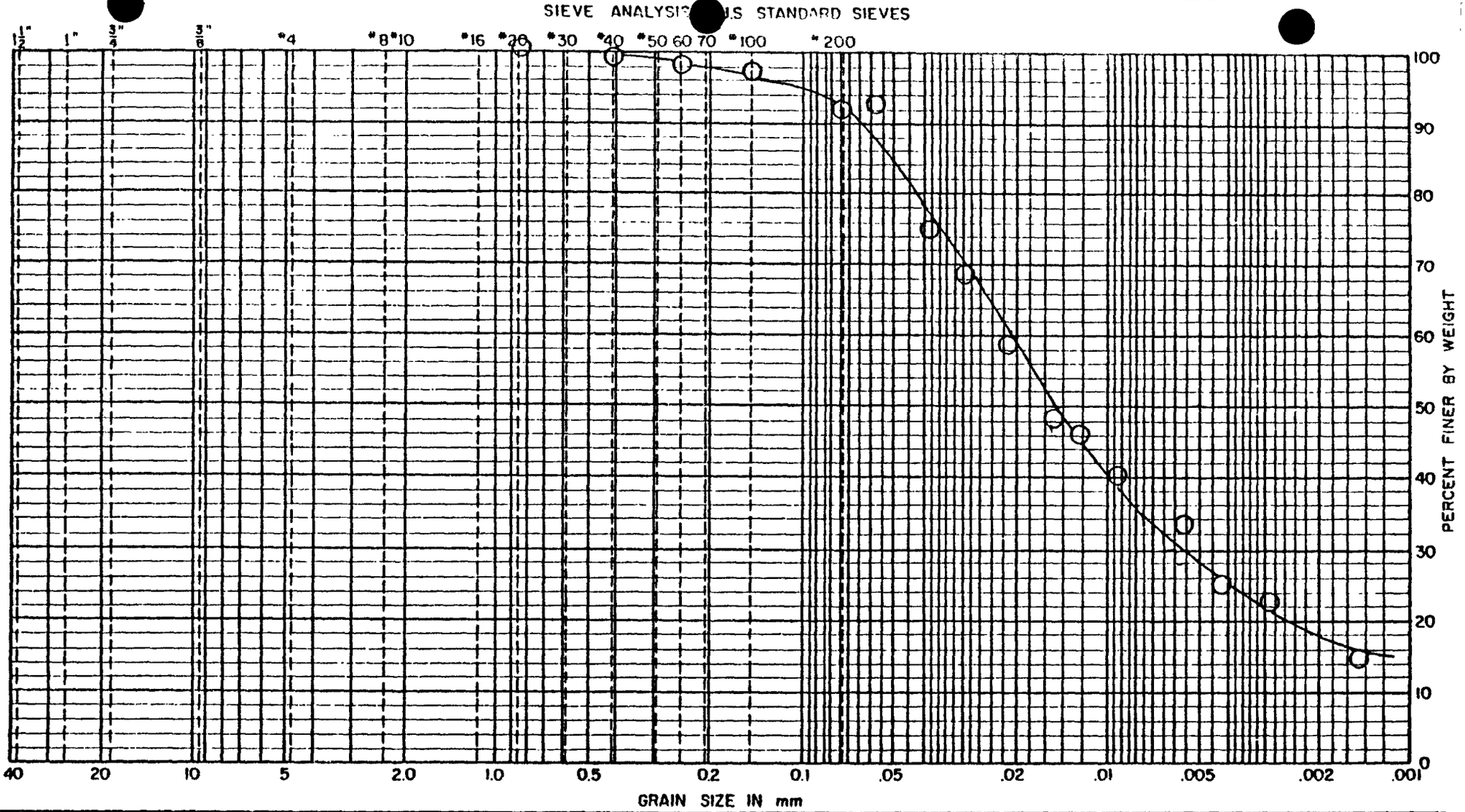
CHECKED BY: SAG 7-29-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004511



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 94

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY 2.53

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to gray, organic Clayey SILT with trace of fine sand

BURMISTER- Black to gray Organic SILT, little(+) Clay trace(+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 73

PERCENT CLAY (<2.0 μm) 20

SAMPLE NO. S22MA 3411 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY: tcw 7-10-85

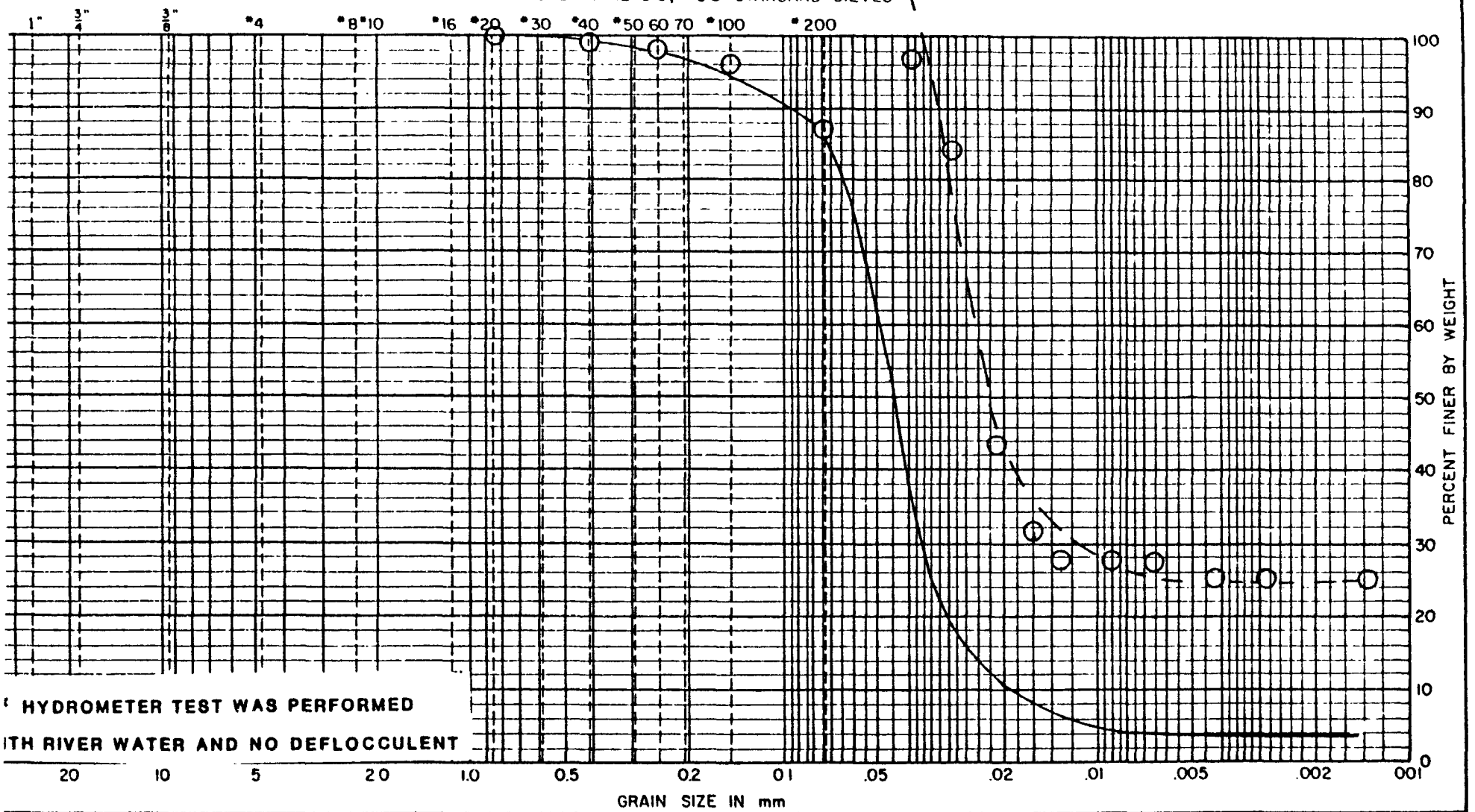
CHECKED BY: 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004512



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to gray, organic SILT or CLAY* with little fine sand

BURMISTER- Black to gray Organic SILT or CLAY*, little(-), fine Sand

MOISTURE CONTENT (%) 94

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY 2.53

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 13

PERCENT SILT (74.0-2.0 µm) } 87

PERCENT CLAY (<2.0 µm)

SAMPLE NO. S22MA 3411 200 MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY Tes 7-11-85

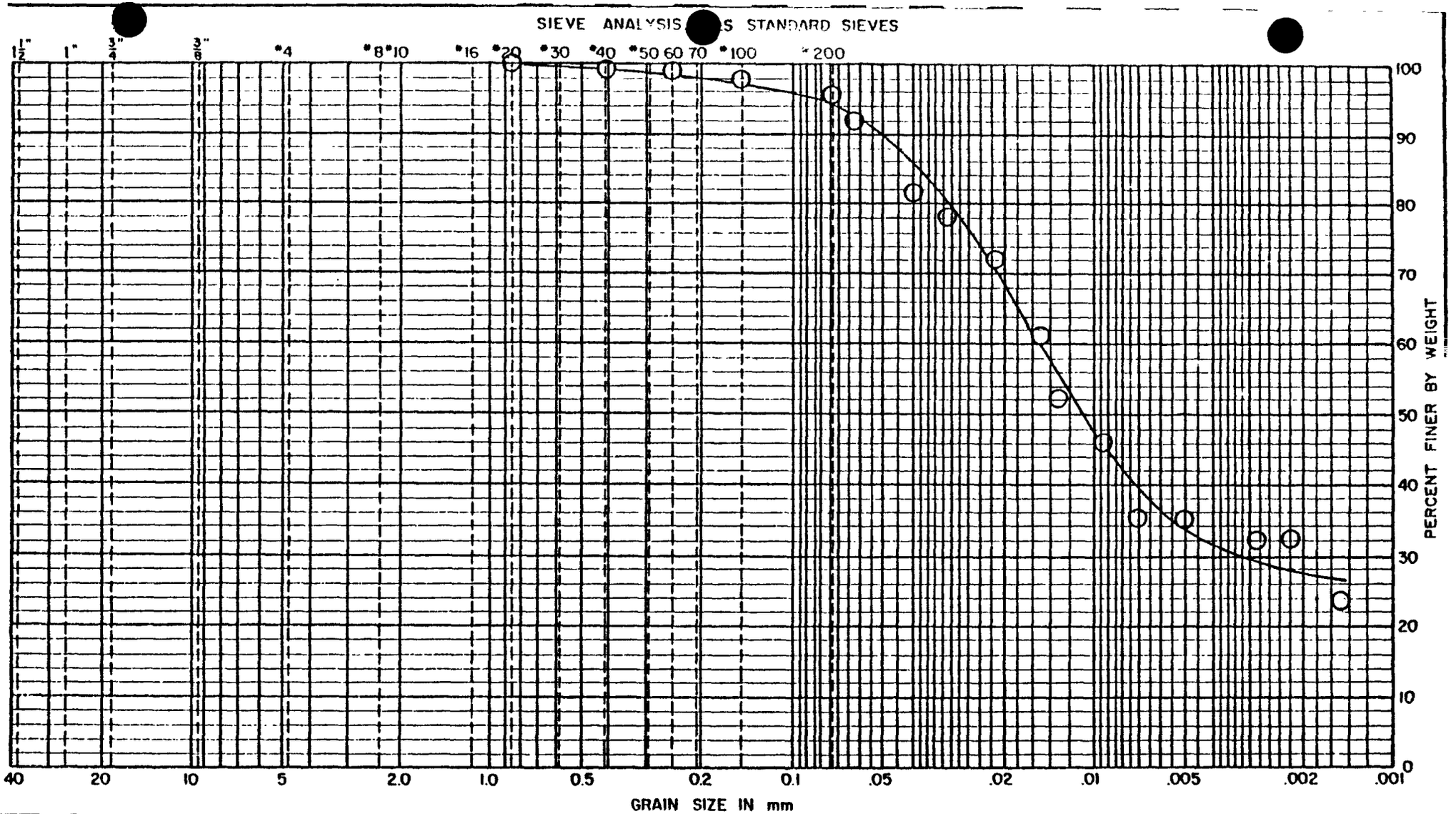
CHECKED BY R 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004513



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 137

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of fine graine sand and plant fibers

BURMISTER- Black Organic SILT trace(+), fine Sand, some Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 7

PERCENT SILT (74.0-2.0 µm) 65

PERCENT CLAY (<2.0 µm) 28

SAMPLE NO. S22MA 3412 201 MY

SAMPLE DEPTH, ft. 5-21-85

SAMPLING DATE 5-21-85

DRAWN BY: CL 7-10-85

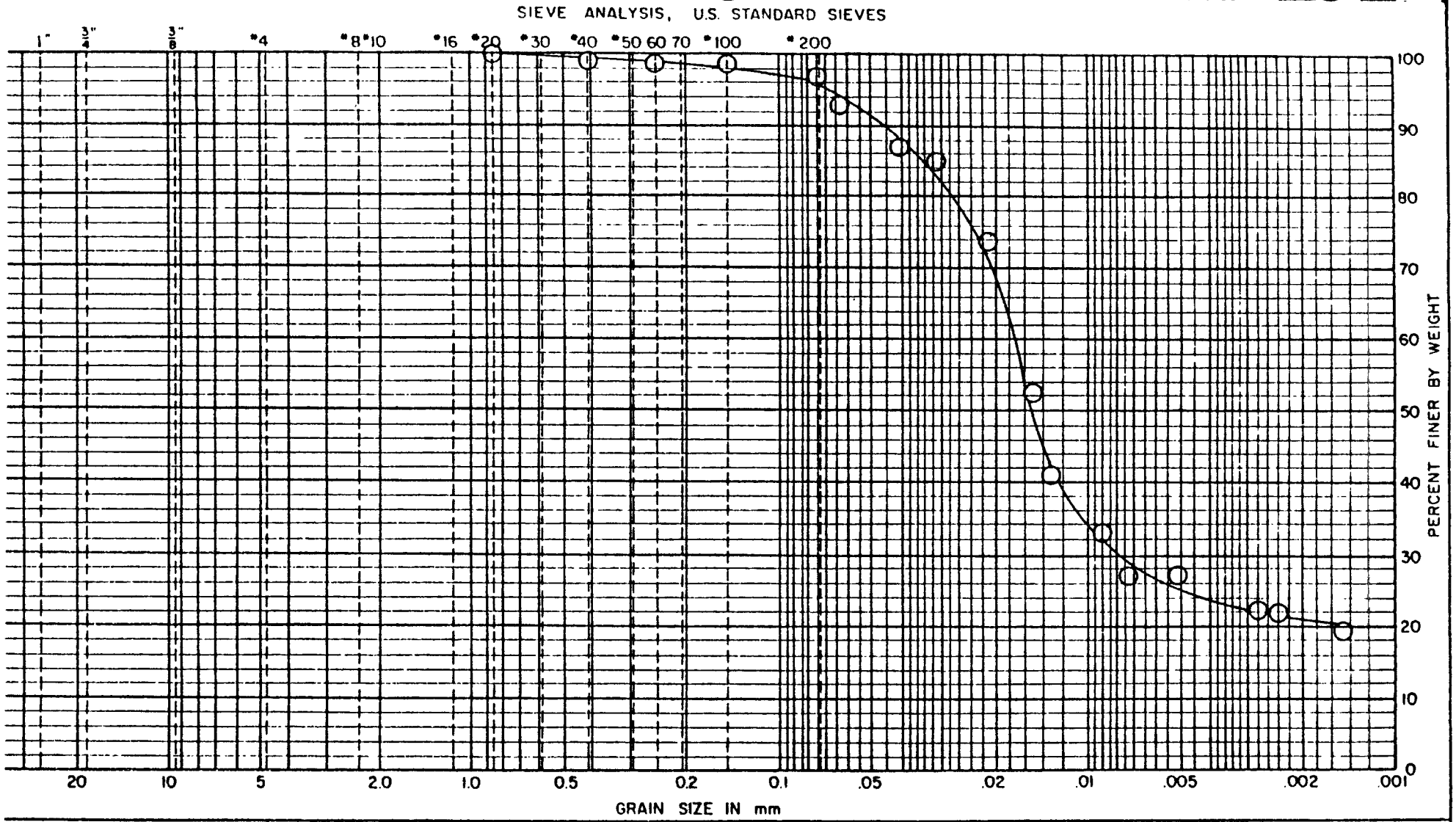
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004514



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT with some clay and trace of fine grained sand in lenses

BURMISTER - Black to dark gray Organic SILT trace, fine Sand, some(-) Clay

MOISTURE CONTENT (%) 135

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 73

PERCENT CLAY (<2.0 µm) 21

SAMPLE NO. S22MA 3413 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-21-85

DRAWN BY: [illegible] 7-10-85

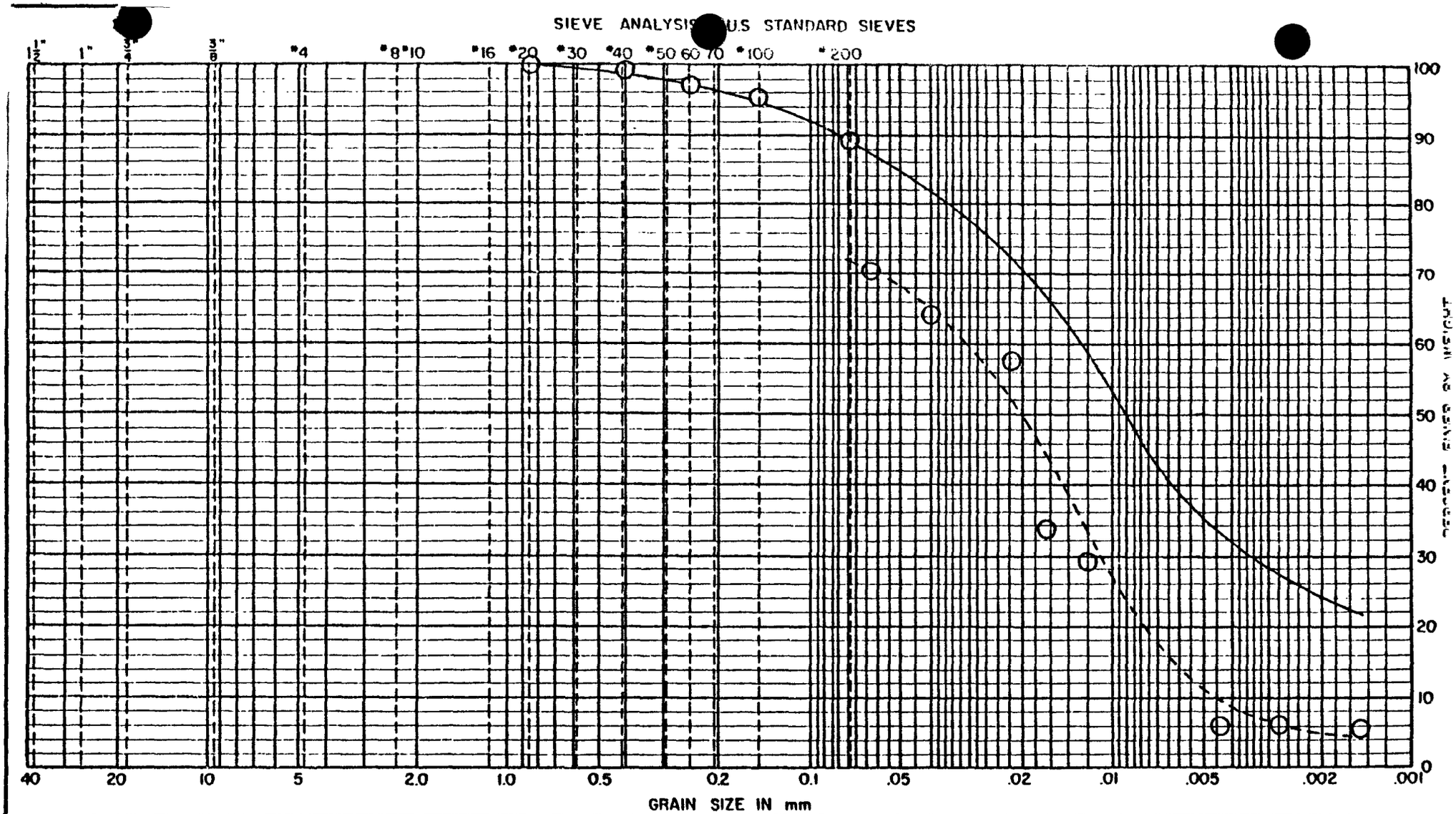
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004515



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray and black, organic SILT with some clay and little sand

BURMISTER- Gray and black Organic SILT some(-) Clay little(-) Sand

MOISTURE CONTENT (%) 96

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 12

PERCENT SILT (74.0-2.0 µm) 64

PERCENT CLAY (<2.0 µm) 24

SAMPLE NO. S22MA 3414 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-21-85

DRAWN BY: Dw 7-11-85

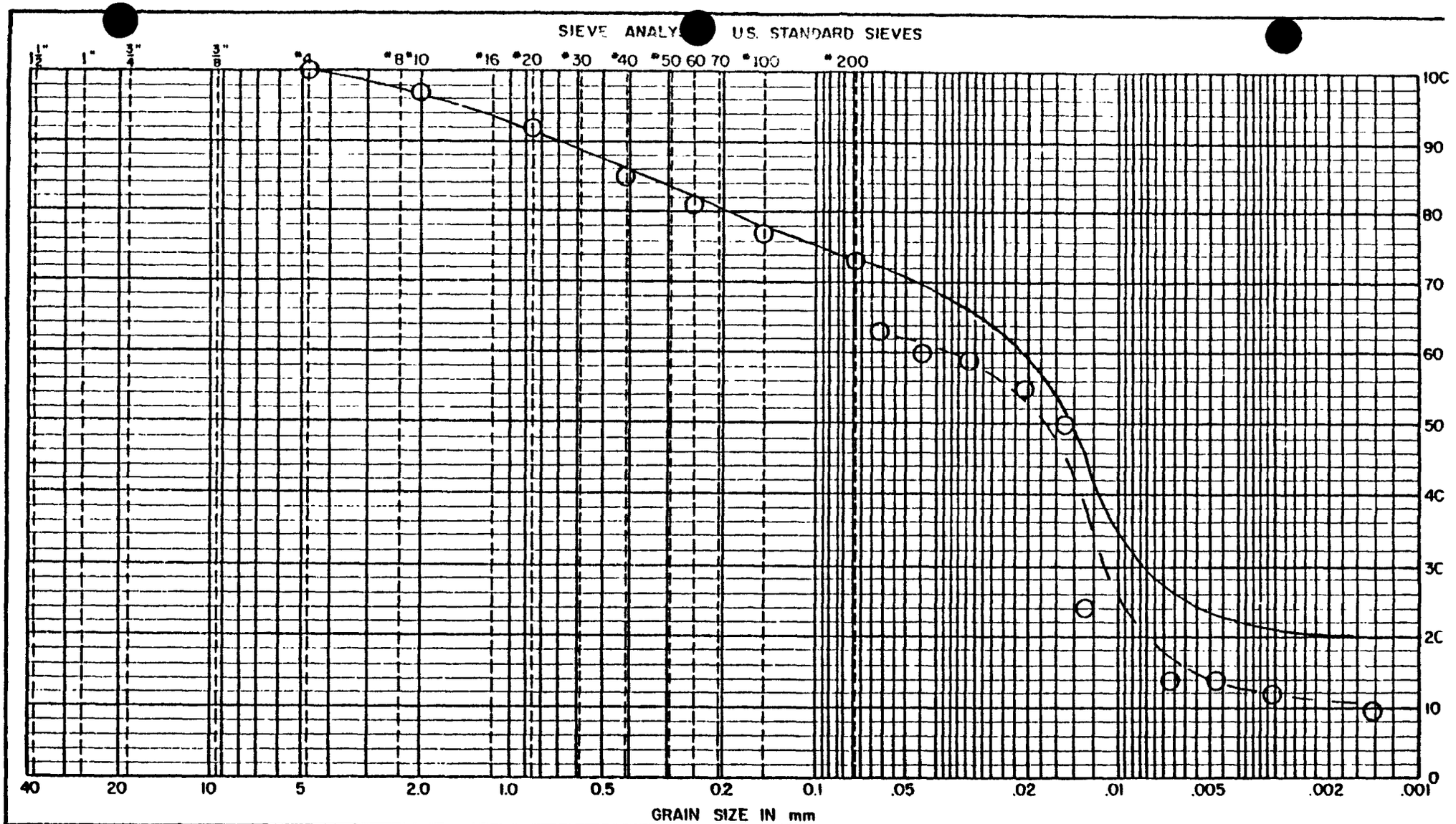
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004516



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic CLAY and SILT with some coarse to fine sand

BURMISTER- Dark gray Organic CLAY and SILT some, coarse to fine Sand

MOISTURE CONTENT (%) 62

TOTAL WET DENSITY (pcf) 96

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 27

PERCENT SILT (74.0-2.0 μm) 53

PERCENT CLAY (<2.0 μm) 20

SAMPLE NO. S22LA 3415 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-21-85

DRAWN BY: 7-10-85

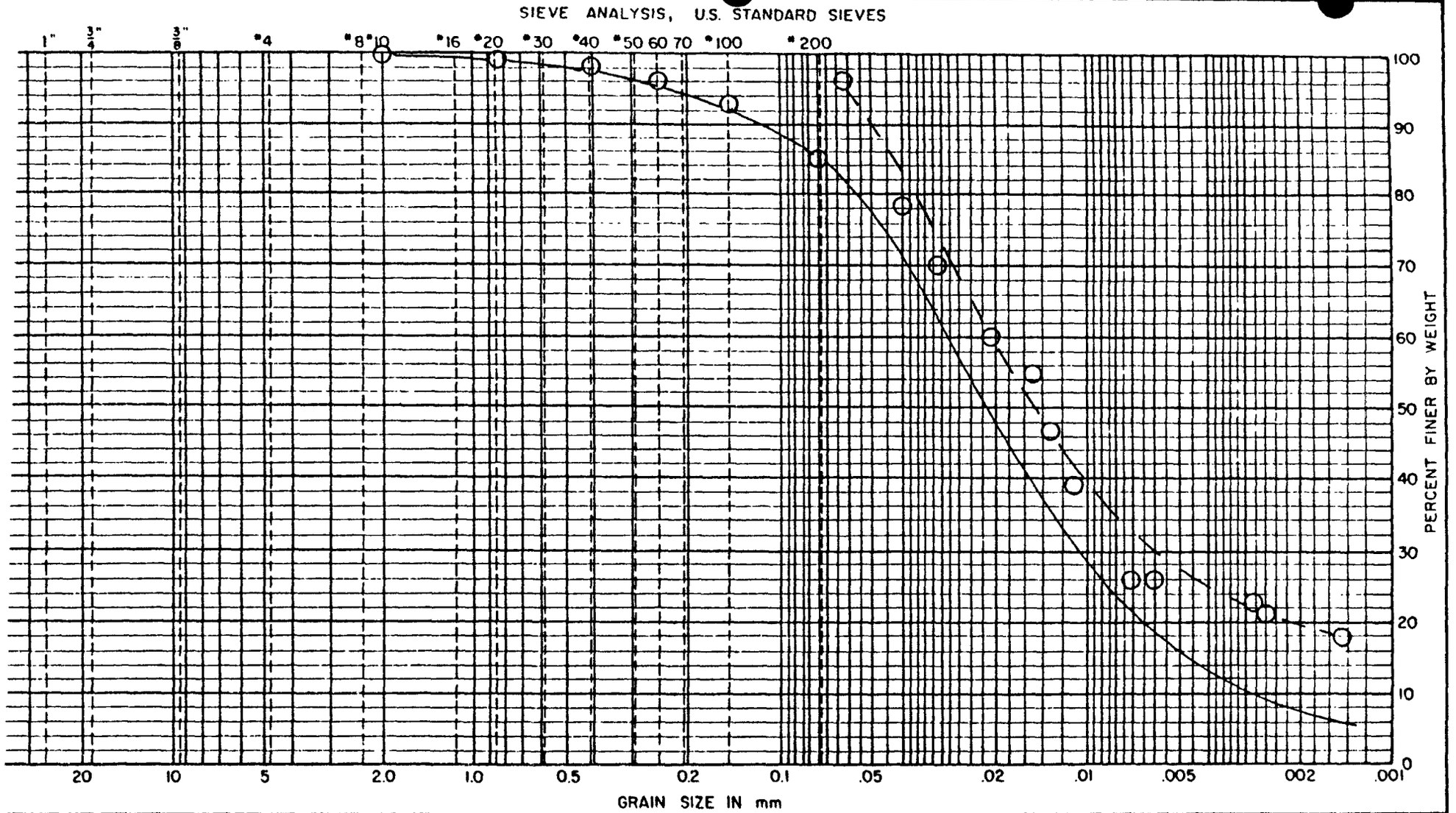
CHECKED BY: 7-12-85

PROJECT

GRADATION CURVES

FIG. NO.

DEP\DA0004517



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 124

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY 2.51

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, Organic Clayey SILT with little fine sand

BURMISTER- Black Organic SILT trace(+) Clay, little fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 15

PERCENT SILT (74.0-2.0 μm) 78

PERCENT CLAY (<2.0 μm) 7

SAMPLE NO. S23MA 3421 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

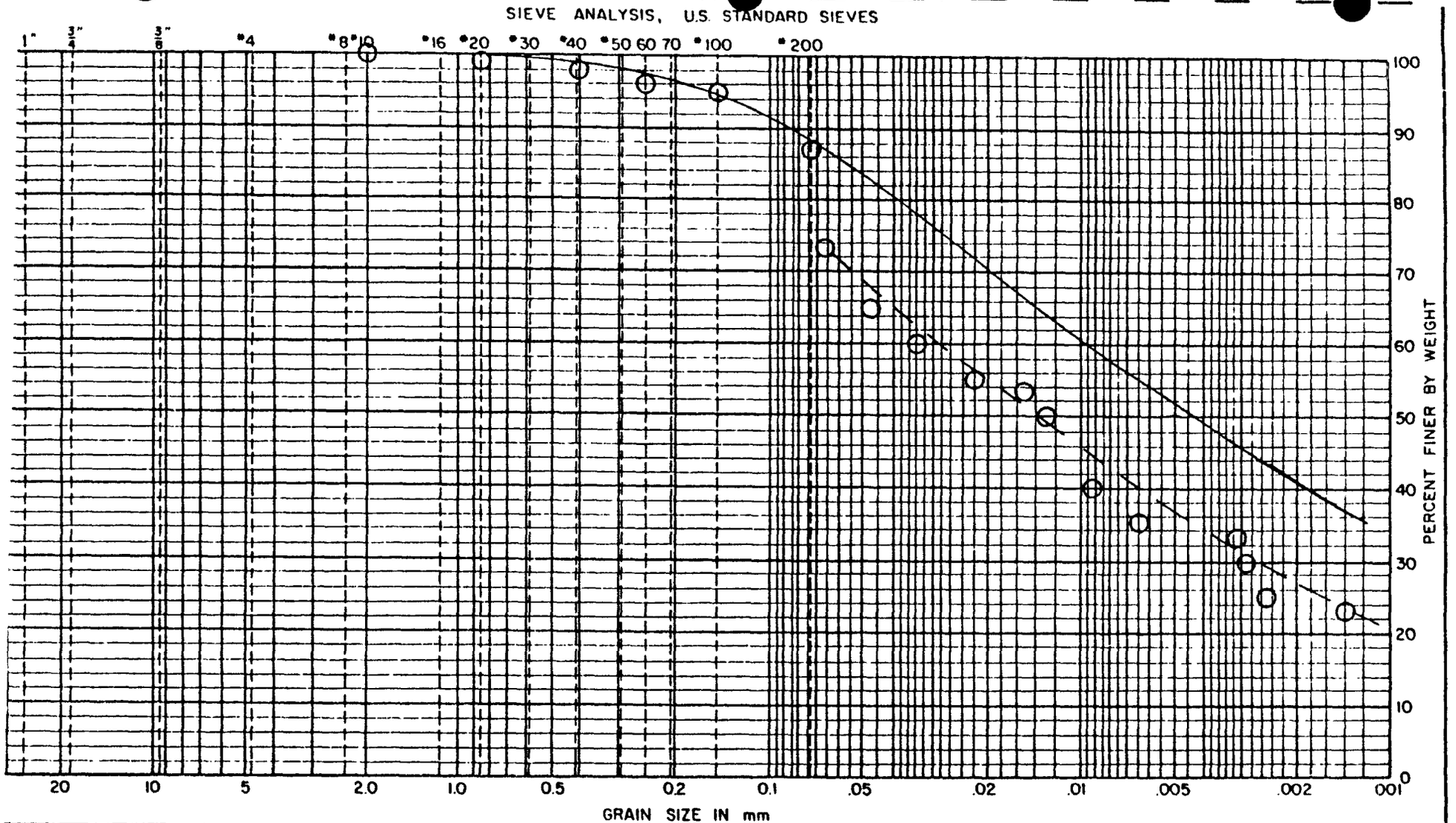
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004518



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT and CLAY little medium to fine sand

BURMISTER - Black organic SILT and Clay little medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 14

PERCENT SILT (74.0-2.0 μm) 46

PERCENT CLAY (<2.0 μm) 40

DISTURE CONTENT (%) 108

TAL WET DENSITY (pcf) N/A

ECIFIC IRAVITY

SAMPLE NO. S23MA 3422 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-20-85

DRAWN BY: JED 7-10-85

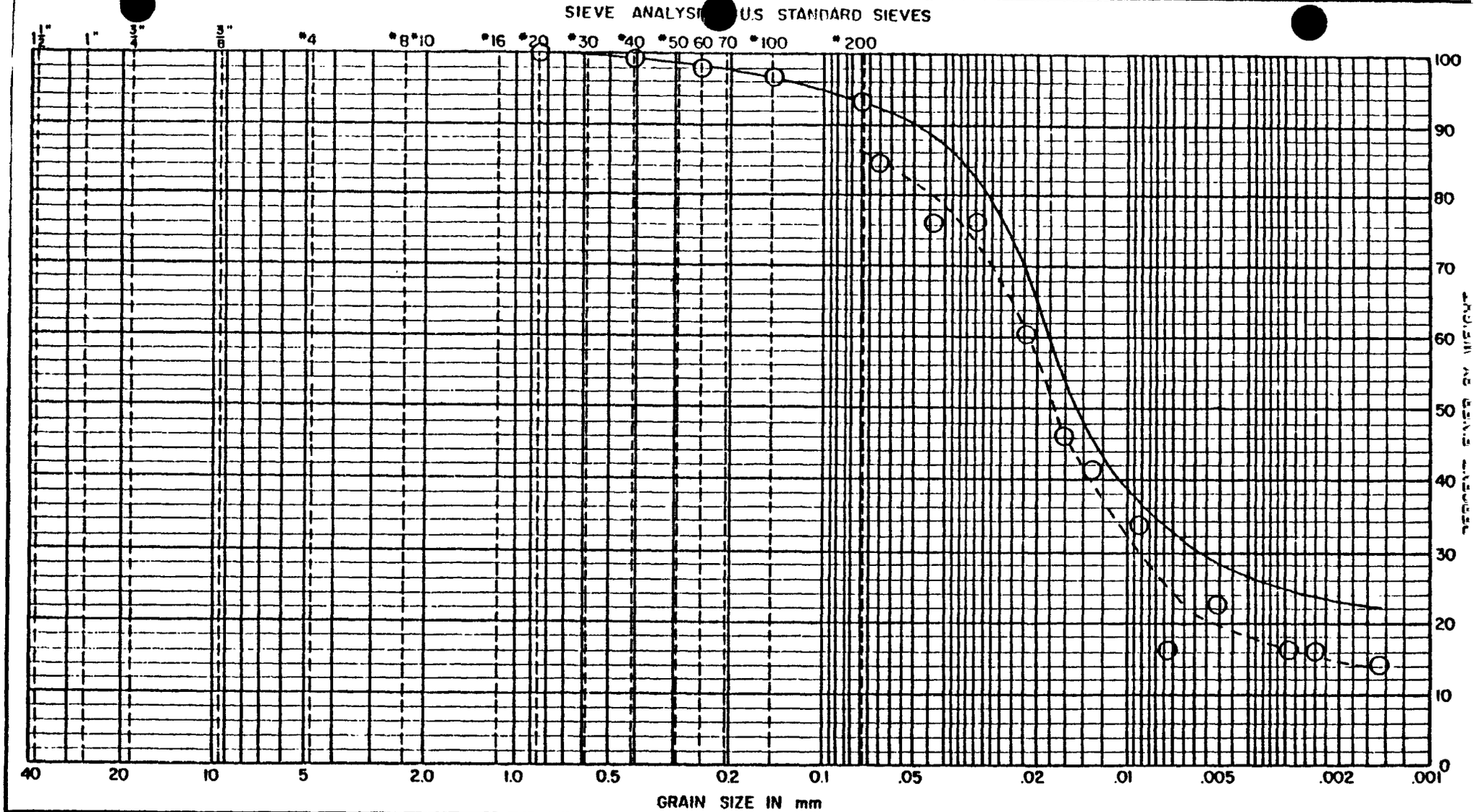
CHECKED BY: [illegible] 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004519



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 113

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some clay and a trace of fine grained sand

BURMISTER- Dark gray Organic SILT trace(+), fine Sand, some(-) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 69

PERCENT CLAY (<2.0 μm) 23

SAMPLE NO. S23MA 3423 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-20-85

DRAWN BY RW 7-10-85

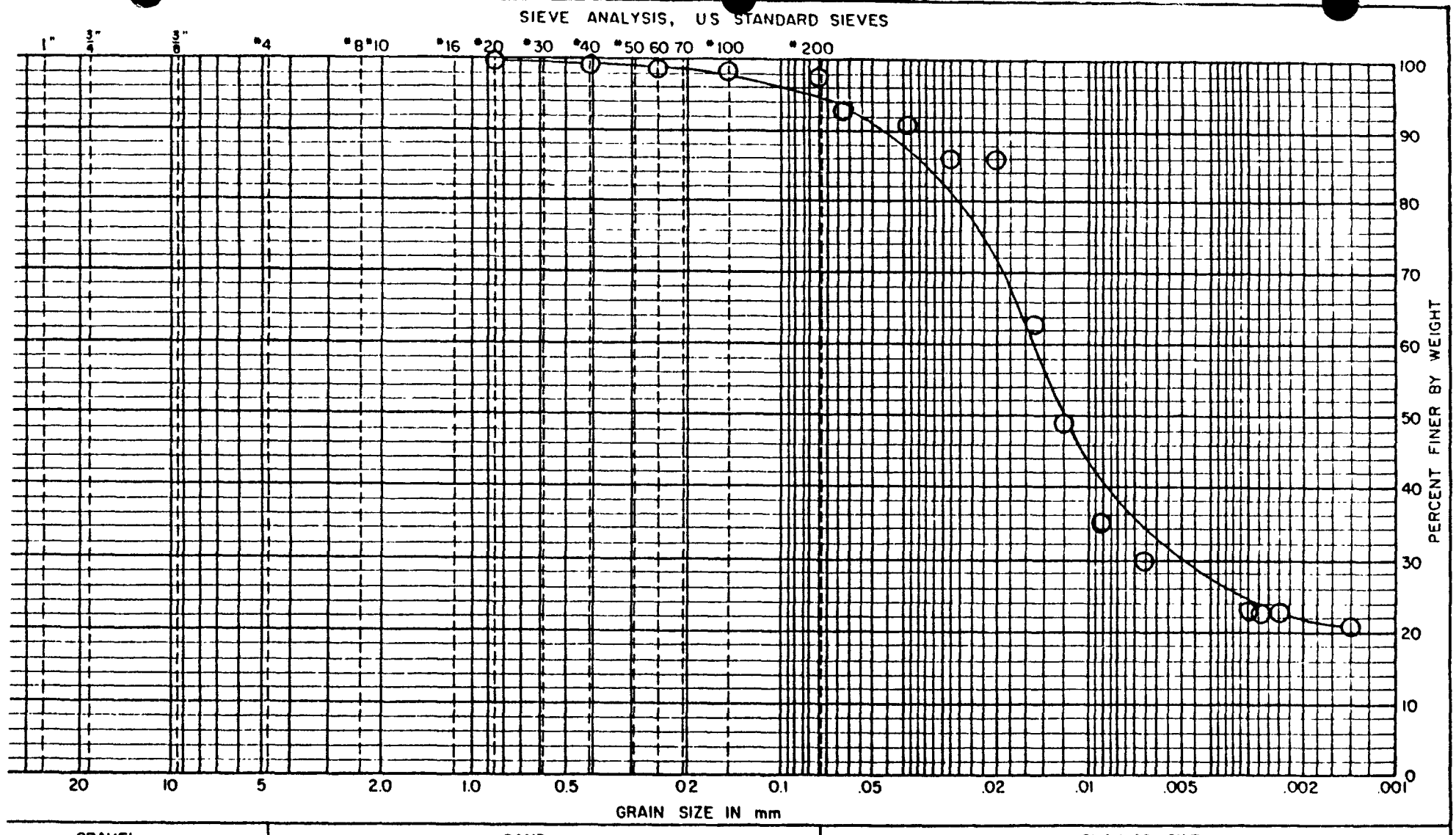
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004520



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black organic SILT with some clay and trace of fine sand

BURMISTER- Black Organic SILT some(-) Clay trace(+) fine Sand

MOISTURE CONTENT (%) 91

TOTAL WET DENSITY (pcf) 90

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 7

PERCENT SILT (74.0-2.0 µm) 71

PERCENT CLAY (<2.0 µm) 22

SAMPLE NO. S23MA 3424 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-20-85

DRAWN BY: 7-10-85

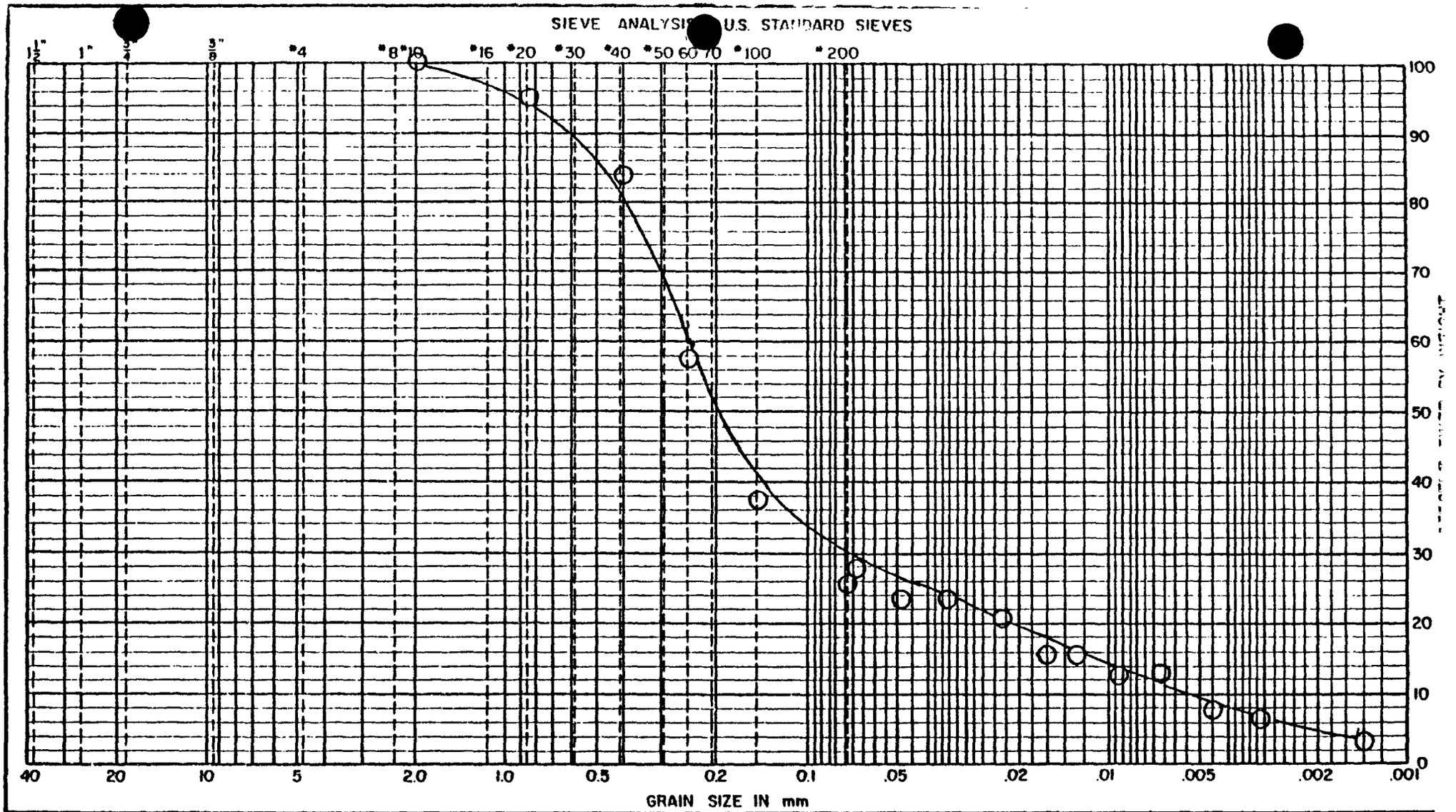
CHECKED BY: 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004521



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, medium to fine grained SAND with some silt and trace clay

BURMISTER- Gray medium to fine(+) SAND some(-) Silt trace Clay little plant fibers

MOISTURE CONTENT (%) 33

TOTAL WET DENSITY (pcf) 118

SPECIFIC GRAVITY _____

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 70

PERCENT SILT (74.0-2.0 μm) 26

PERCENT CLAY (<2.0 μm) 4

SAMPLE NO. S23MA 3425 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-20-85

DRAWN BY: tw 7-9-85

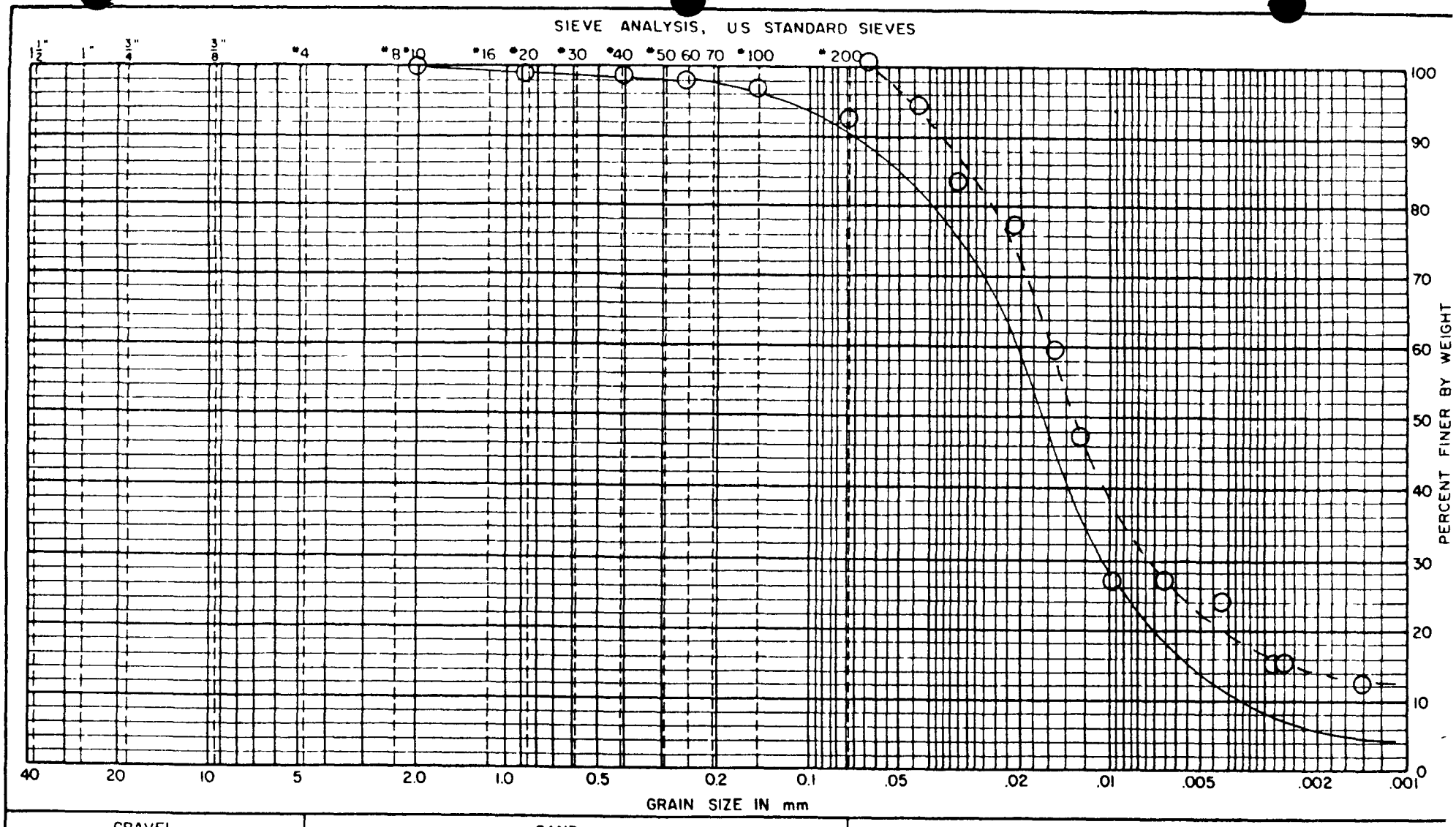
CHECKED BY: GW 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004522



GRAVEL		SAND			CLAY &/OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 141

TOTAL WET DENSITY (pcf) 94

SPECIFIC GRAVITY 2.49

VISUAL CLASSIFICATION OF SAMPLE

USC- Black to dark gray Organic Clayey SILT with a trace of fine Sand

BURMISTER- Black to dark gray Organic Clayey SILT trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm)	10
PERCENT SILT (74.0-2.0 µm)	84
PERCENT CLAY (<2.0 µm)	6

SAMPLE NO. S24LA-3339-200-MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/17/85

DRAWN BY: SAG 7-29-85

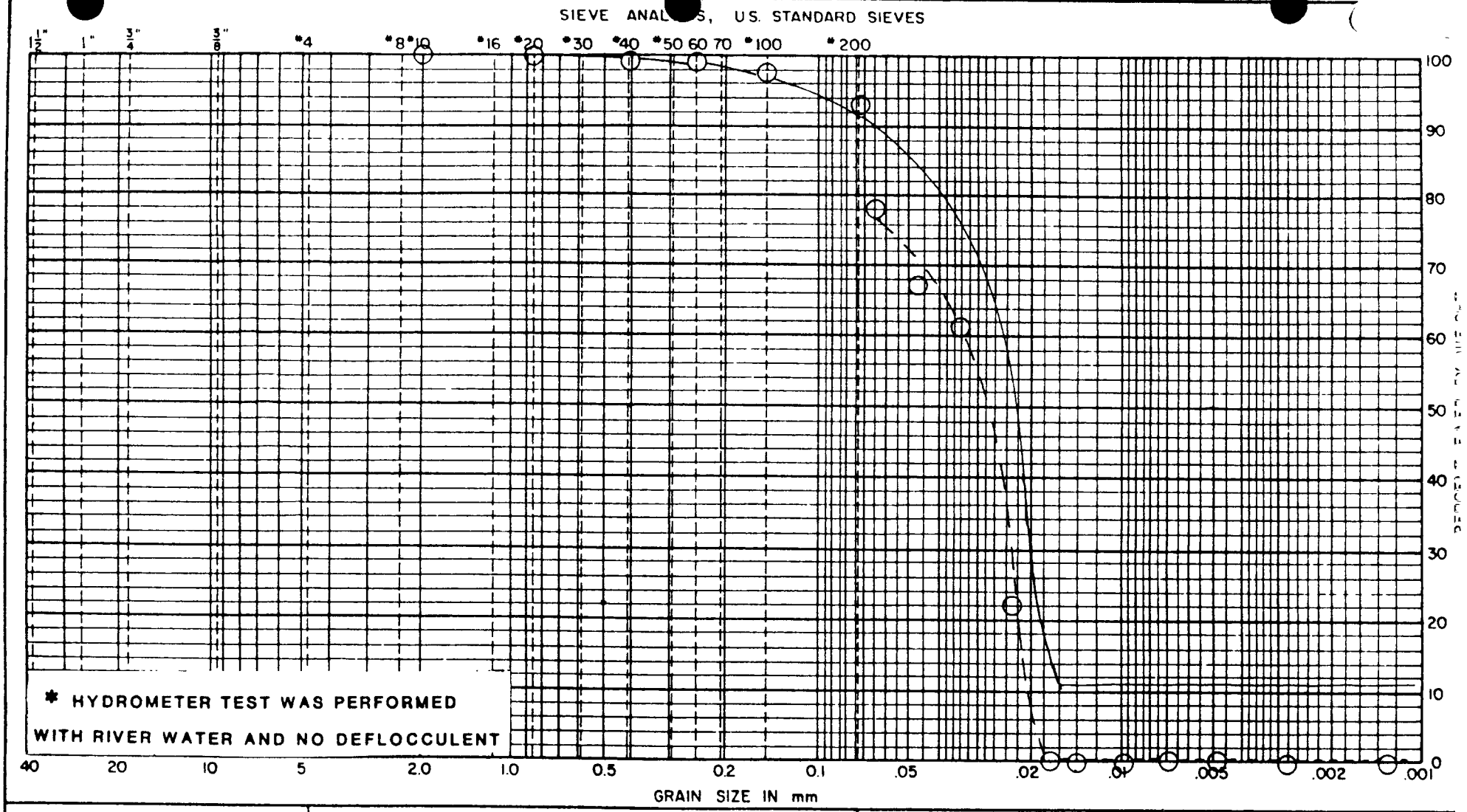
CHECKED BY: [illegible] 31 July 85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004523



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 141

TOTAL WET DENSITY (pcf) 94

SPECIFIC GRAVITY 2.49

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Clayey SILT* with a trace of fine Sand

BURMISTER- Black CLayey SILT* trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 82

PERCENT CLAY (<2.0 μm) 11

SAMPLE NO. S24LA-3339-200-MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/17/85

DRAWN BY: SAG 7-29-85

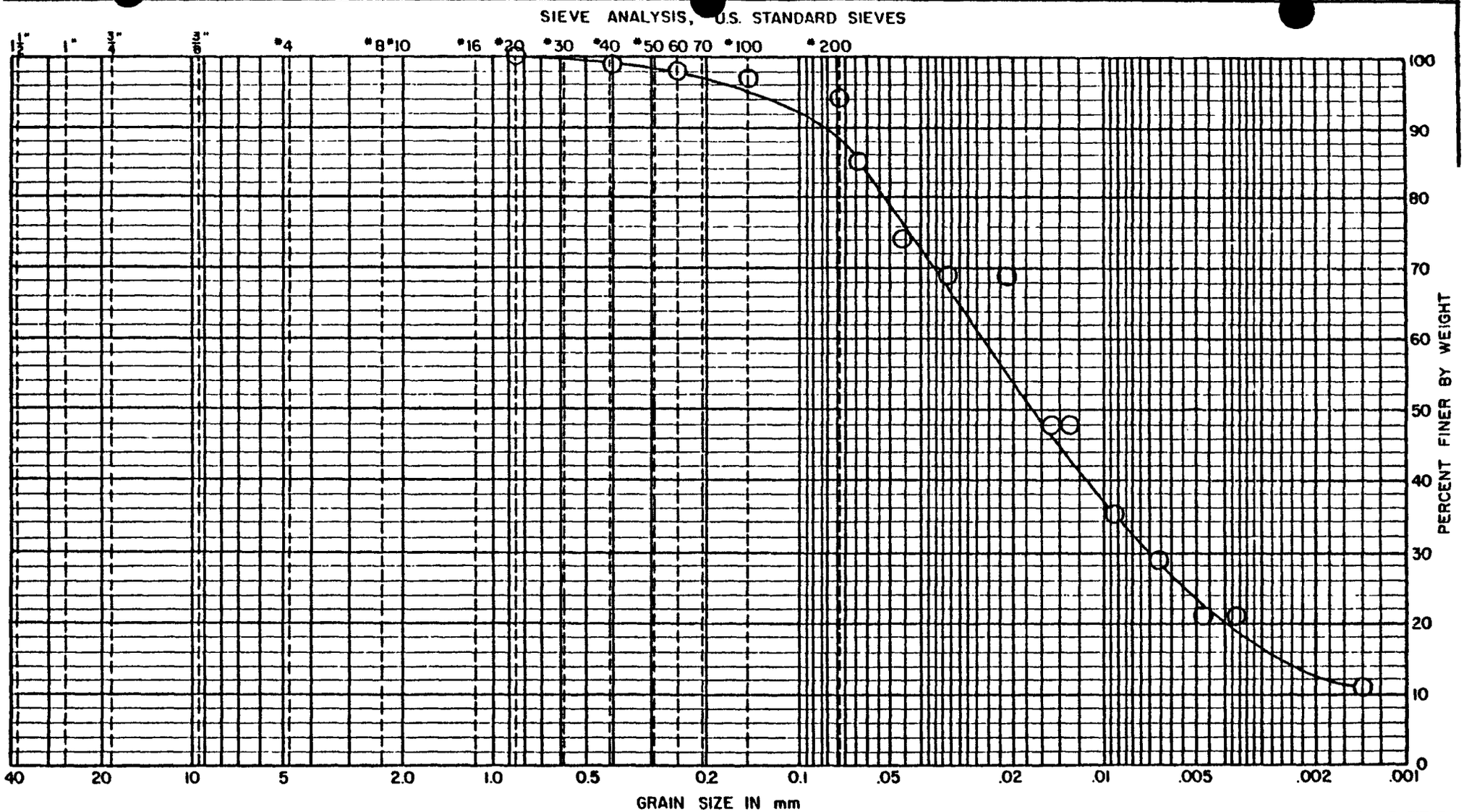
CHECKED BY: GAD 7/31/85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004524



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 146

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and trace of medium to fine sand

BURMISTER - Black Organic SILT some(-) Clay trace, medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 67

PERCENT CLAY (<2.0 μm) 24

SAMPLE NO. S24LA 3340 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-17-85

DRAWN BY: Ah 7-11-85

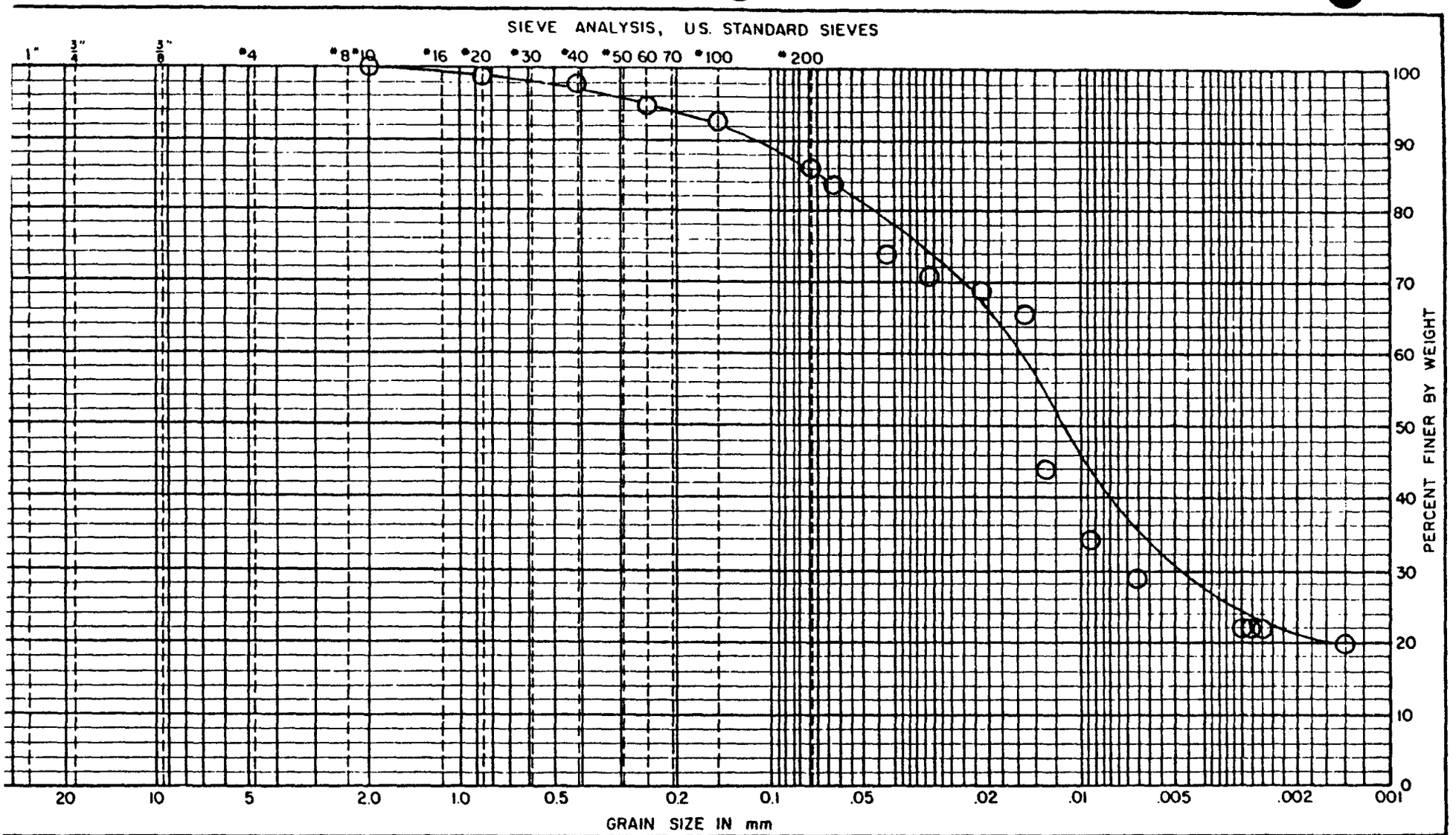
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004525



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray SILT with some clay and little medium to fine sand

BURMISTER- Dark gray SILT, some(-) Clay, little, medium to fine(+) Sand

MOISTURE CONTENT (%) 97

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 16

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 21

SAMPLE NO. S24LA 3341 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-17-85

DRAWN BY: 7-11-85

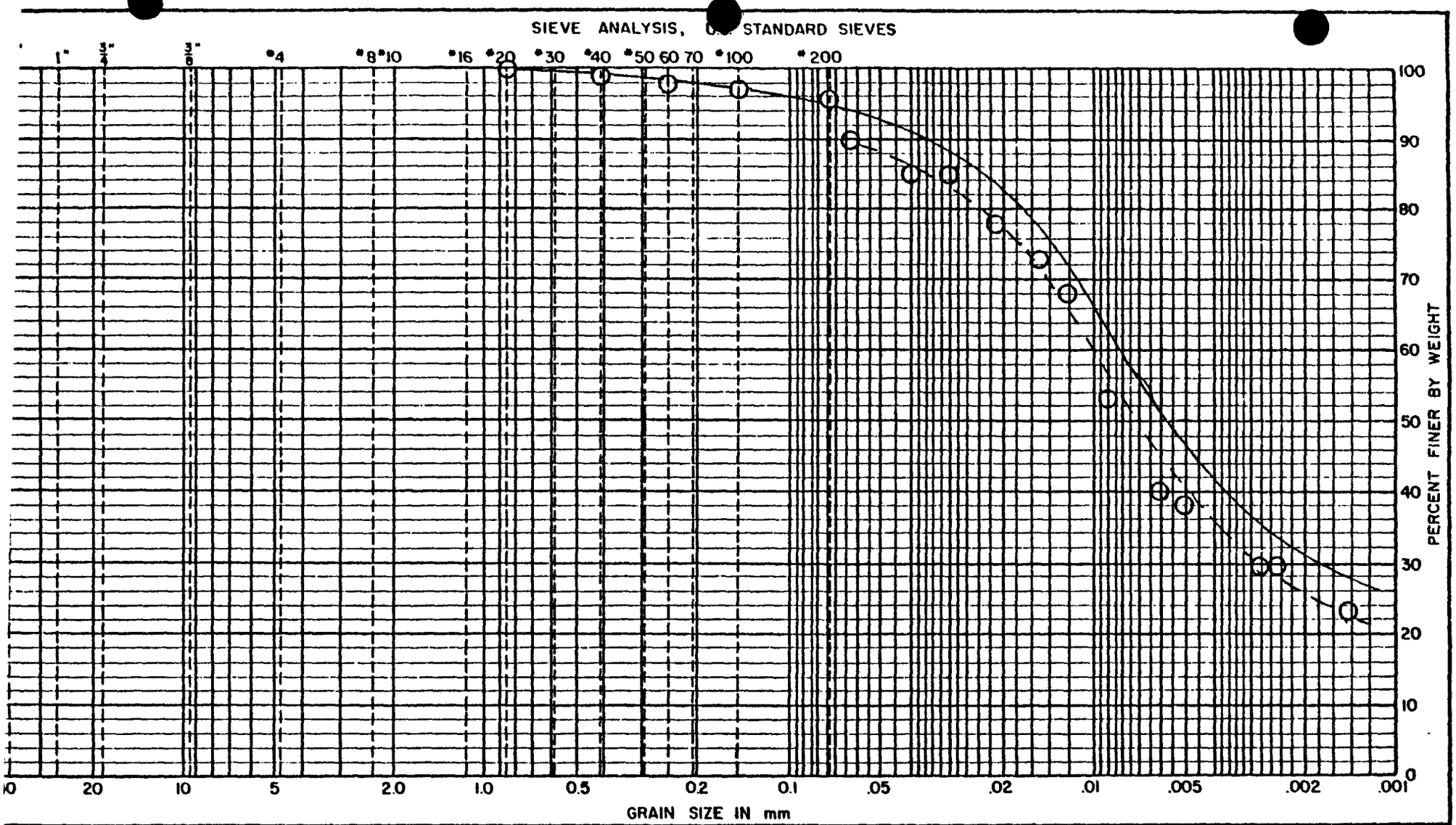
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004526



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 88

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY NA

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown and dark gray, organic Clayey SILT with trace of fine grained SAND

BURMISTER- Brown and dark gray organic SILT, some Clay, trace(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 62

PERCENT CLAY (<2.0 μm) 32

SAMPLE NO. S24LA 3342 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

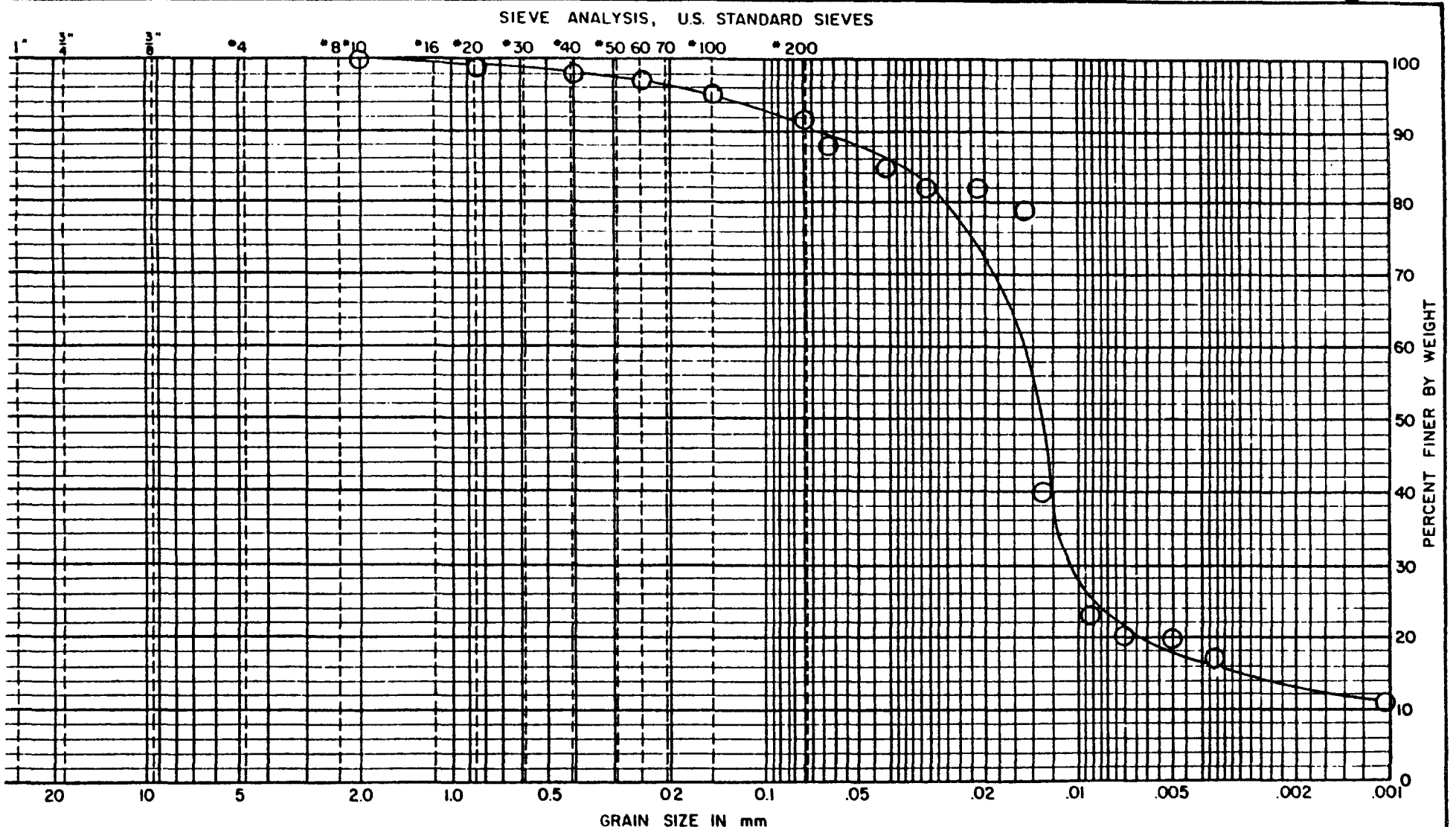
CHECKED BY: Ch 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004527



GRAVEL		SAND			CLAY OR SILT
RSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace fine sand

BURMISTER- Black Organic SILT little(-) Clay, trace(+), fine sand

ISTURE ONTENT (%) 127

TAL WET ENSITY (pcf) 82

ECIFIC RAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 78

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S24LA 3343 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-17-85

DRAWN BY: [illegible] 7-10-85

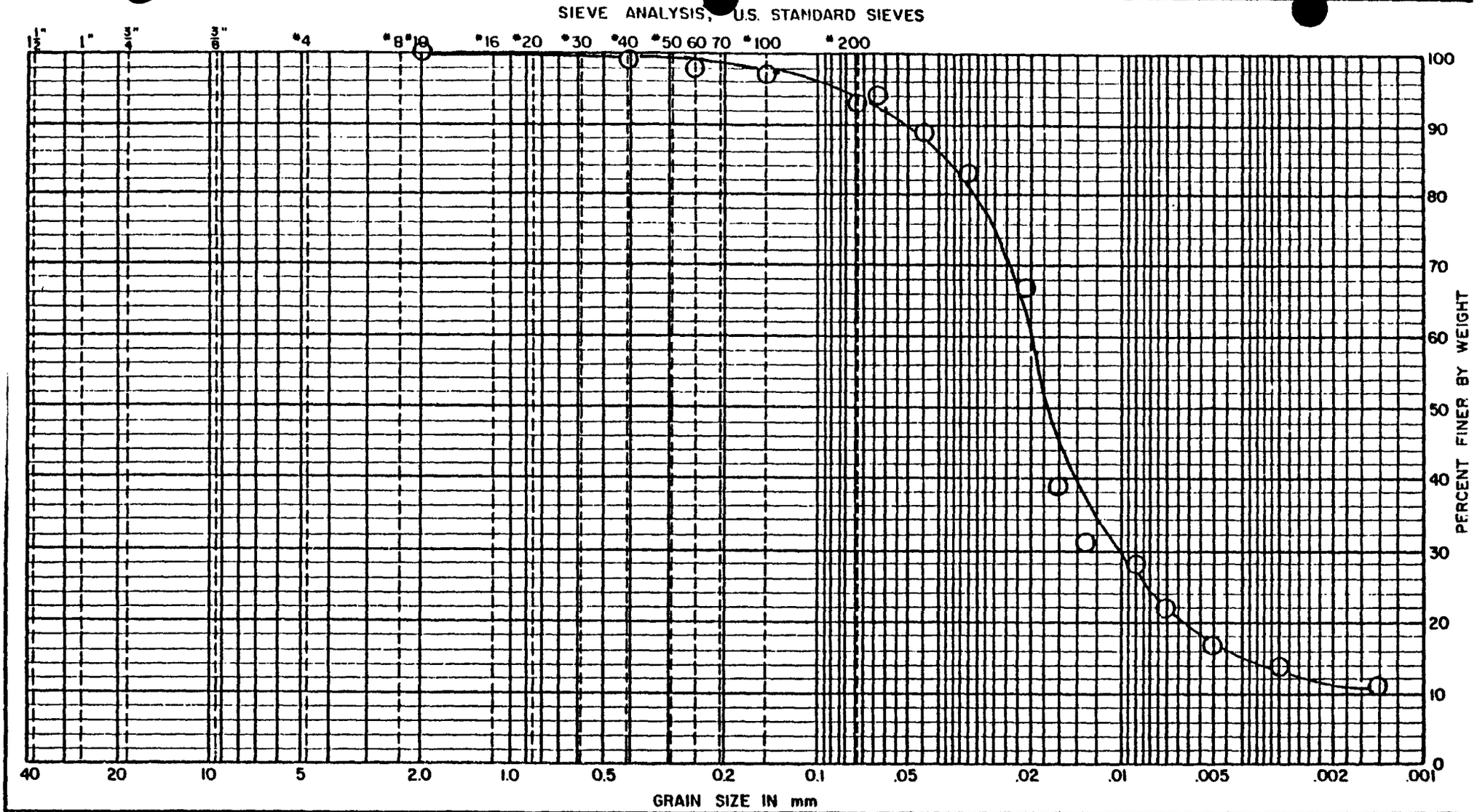
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004528



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT and CLAY with a trace of fine sand

BURMISTER - Black Organic SILT little(-) Clay trace, fine Sand

MOISTURE CONTENT (%) 159

TOTAL WET DENSITY (pcf) 72

SPECIFIC GRAVITY 2.44

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 82

PERCENT CLAY (<2.0 μm) 11

SAMPLE NO. S31LA 3349 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-15-85

DRAWN BY: Zow 7-9-85

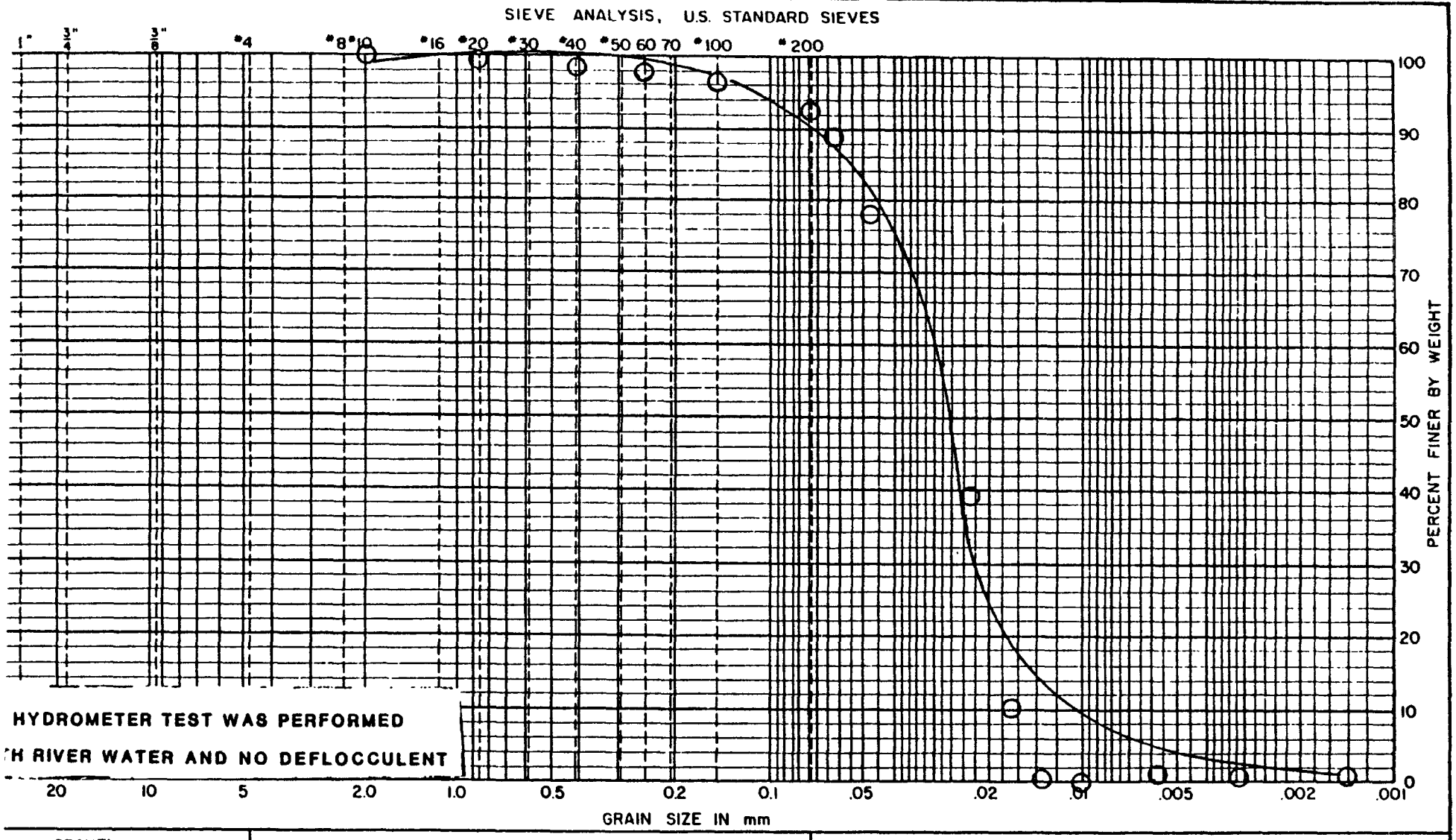
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004529



GRAVEL		SAND			CLAY OR SILT
RSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT* with trace of fine sand and clay

BURMISTER - Black organic SILT* trace, fine(+) Sand trace(-) Clay

ISTURE ONTENT (%) 159

TAL WET ENSITY (pcf) 72

ECIFIC RAVITY 2.44

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) 90

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S31LA 3349 200 MY (River water)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-15-85

DRAWN BY: tbw 7-9-85

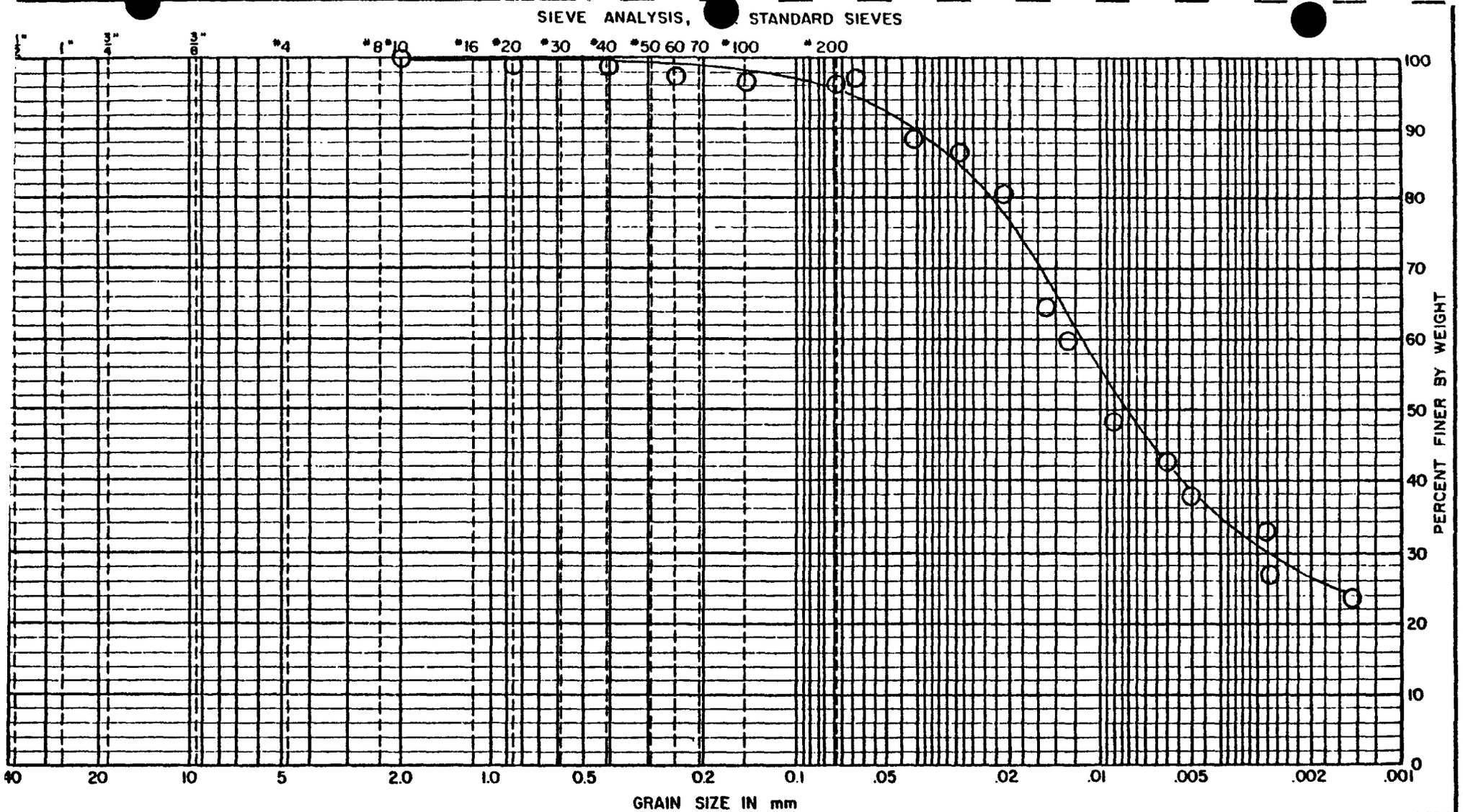
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004530



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and trace fine grained sand and fibers

BURMISTER- Black Organic SILT trace(-), fine Sand, some Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 27

MOISTURE CONTENT (%) 124

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

SAMPLE NO. S31LA 3350 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

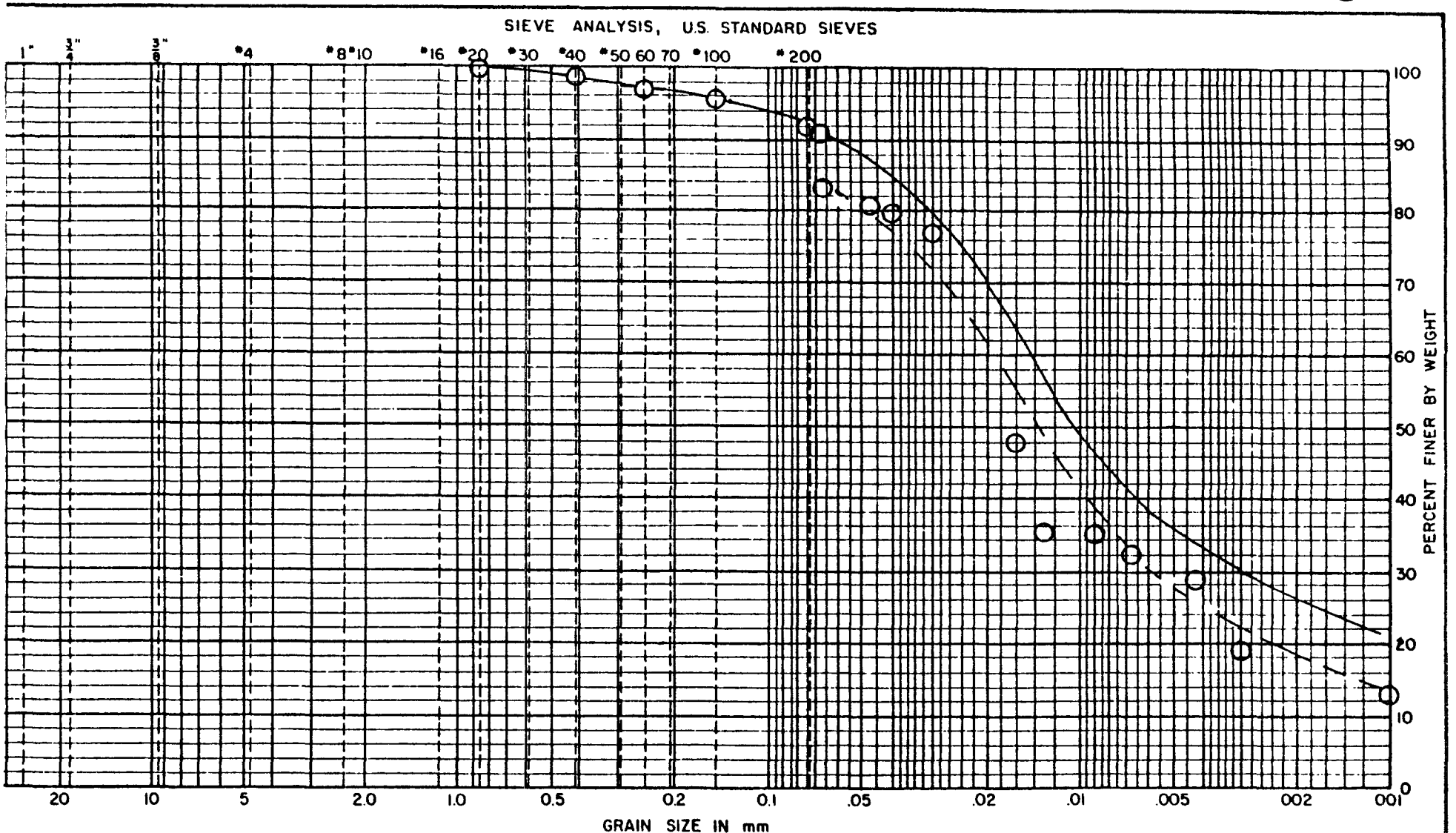
CHECKED BY: [illegible] 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004531



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT with some clay and trace of sand

BURMISTER- Black to dark gray Organic SILT some Clay trace(+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 24

IISTURE ONTENT (%) 112

TAL WET ENSITY (pcf) 86

ECIFIC RAVITY

SAMPLE NO. S31LA 3351 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-15-85

DRAWN BY: 7-11-85

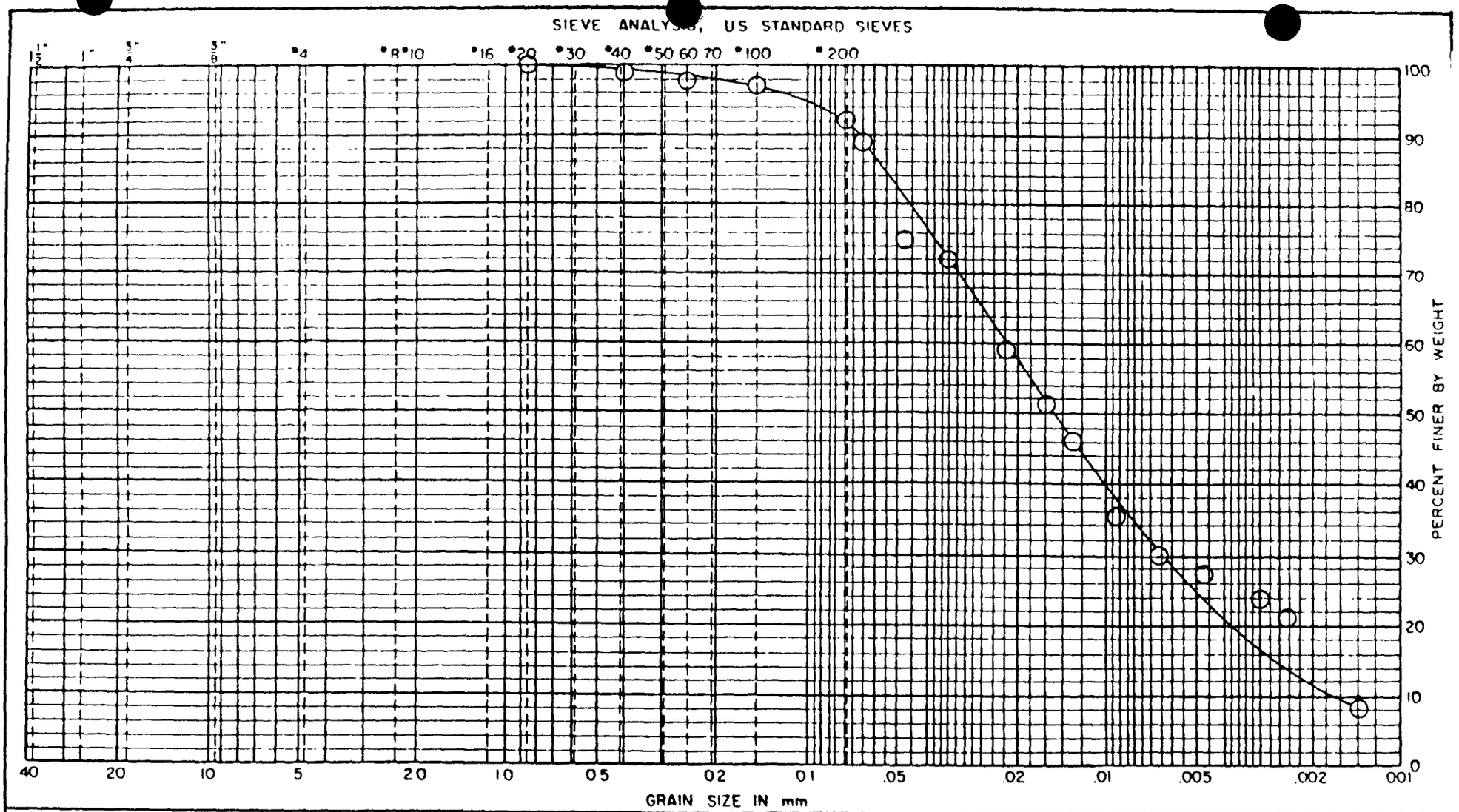
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004532



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic CLayey SILT with a trace of fine Sand

BURMISTER- Black Organic Clayey SILT trace (+), fine Sand

MOISTURE CONTENT (%) 91

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 81

PERCENT CLAY (<2.0 μm) 11

SAMPLE NO. S31LA-3352-203-MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5/15/85

DRAWN BY: Qw 7-26-85

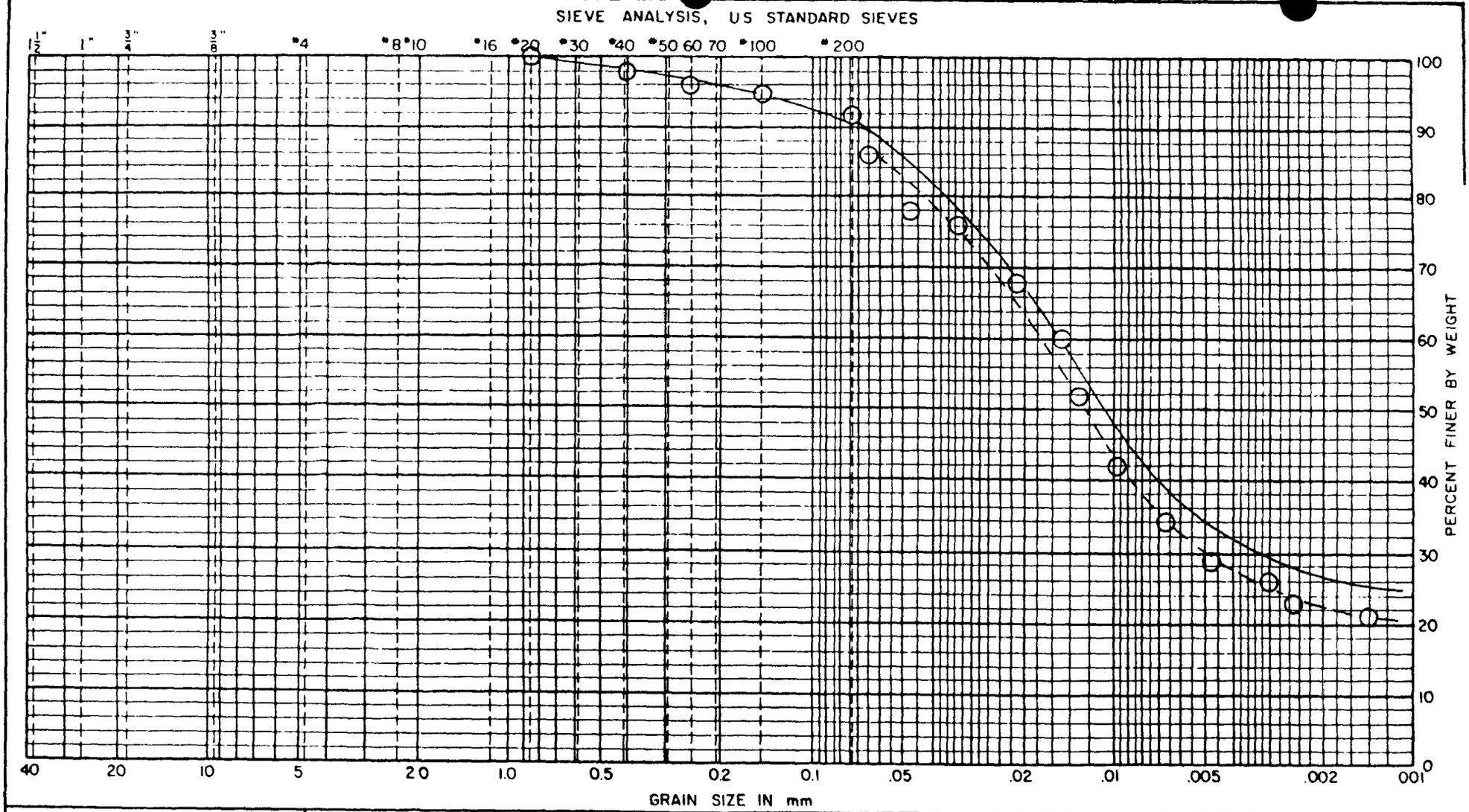
CHECKED BY: SAG 7-29-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004533



GRAVEL		SAND			CLAY &/OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 84

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC- Black to dark gray Organic CLAY and SILT with a trace of fine Sand

BURMISTER- Black to dark gray organic CLAY and SILT trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) 66

PERCENT CLAY (<2.0 µm) 26

SAMPLE NO. S31LA-3353-204-MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5/15/85

DRAWN BY: SAG 7-29-85

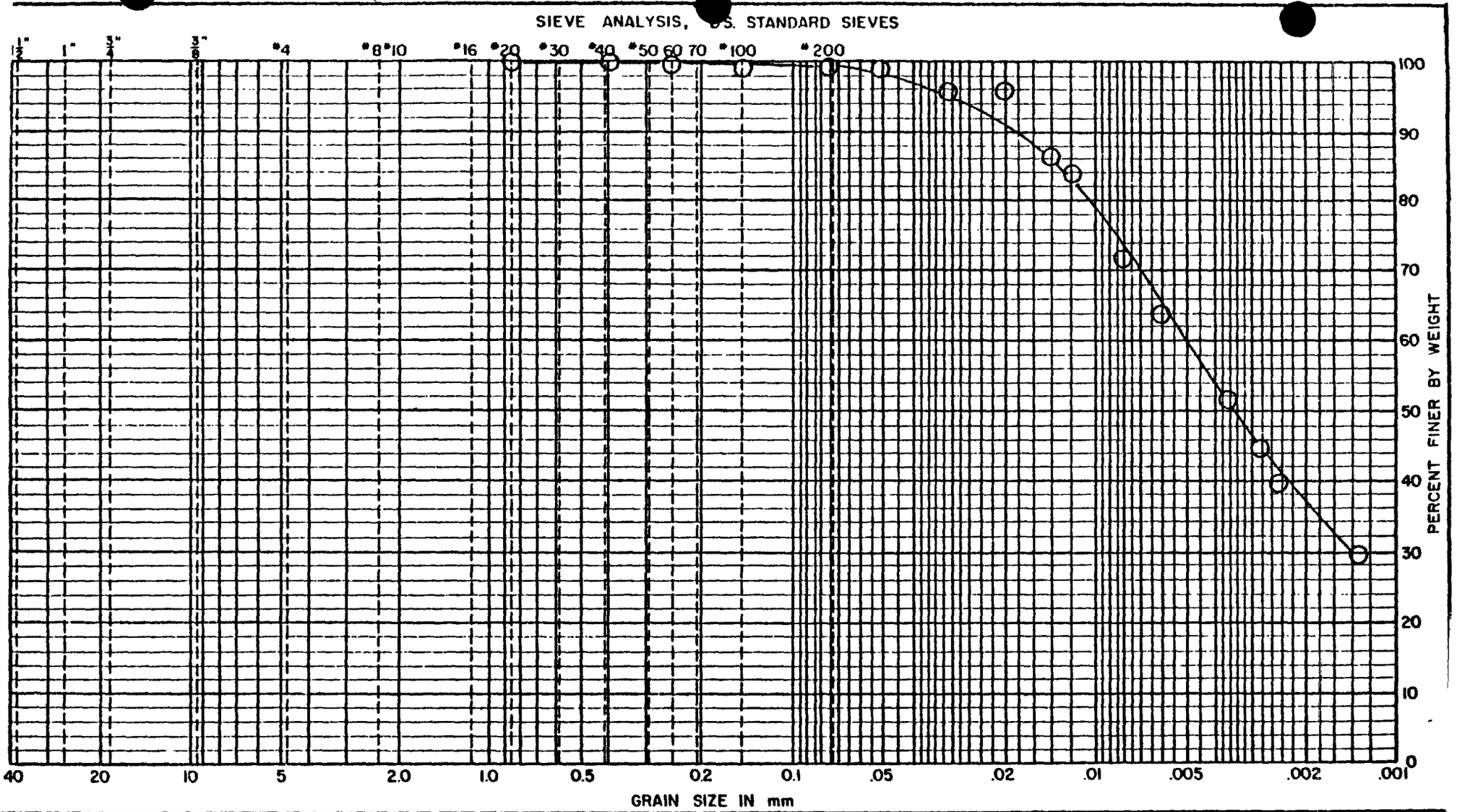
CHECKED BY: JA 7/31/85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004534



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, Clayey SILT with trace of fine sand

BURMISTER- Dark gray SILT and CLAY, trace(-), fine Sand

MOISTURE CONTENT (%) 74

TOTAL WET DENSITY (pcf) 90

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 1

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 36

SAMPLE NO. S31LA 3354 205 MY

SAMPLE DEPTH, ft. 10-12

SAMPLING DATE 5-15-85

DRAWN BY: SAG 7-10-85

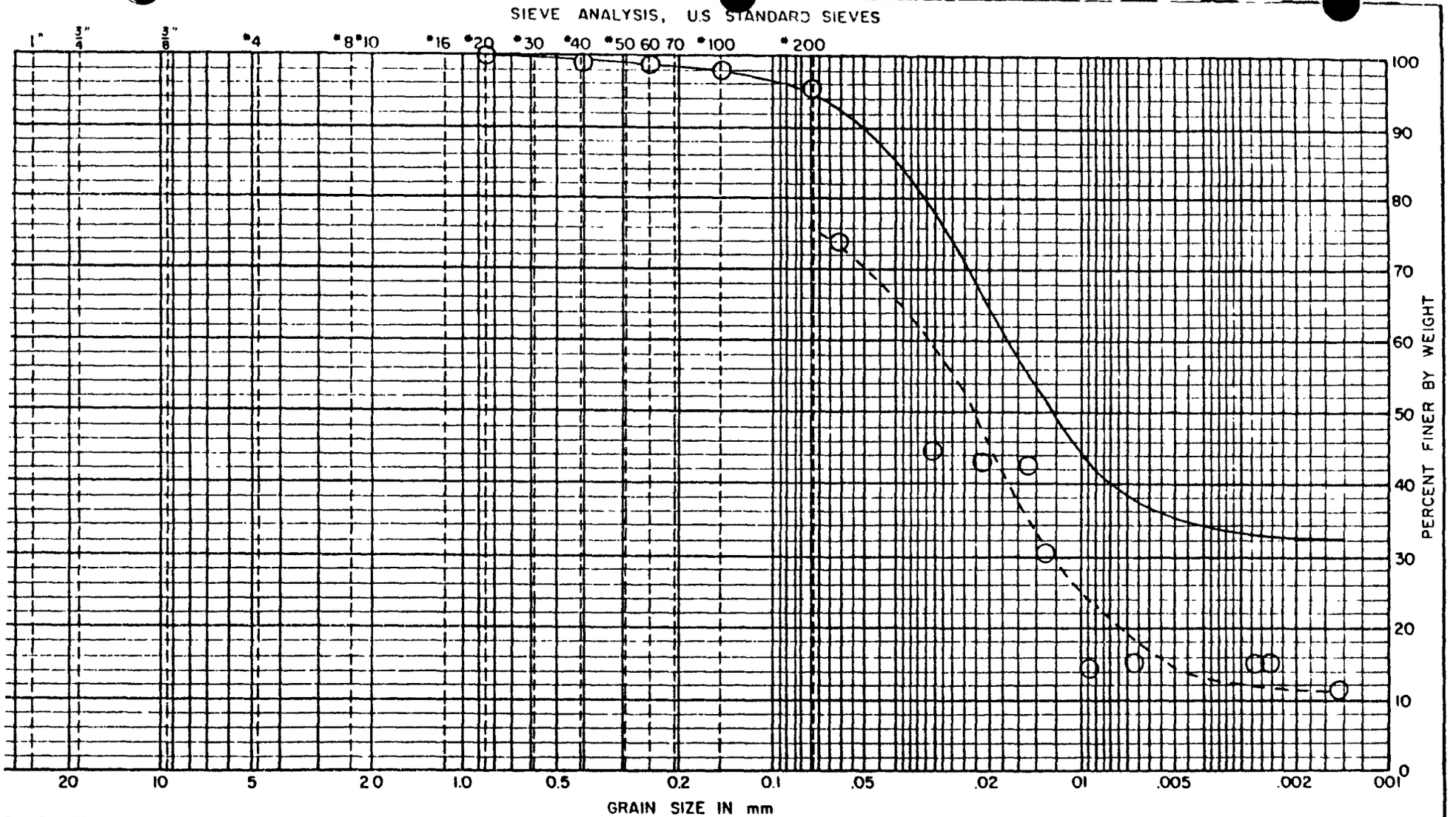
CHECKED BY: Ch 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004535



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Clayey SILT with trace of fine sand

BURMISTER- SILT some(+) Clay, trace fine Sand

MOISTURE CONTENT (%) 95

TOTAL WET DENSITY (pcf) not available

SPECIFIC GRAVITY 2.44

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 33

SAMPLE NO. S32MA 3431 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY: Chu 7-10-85

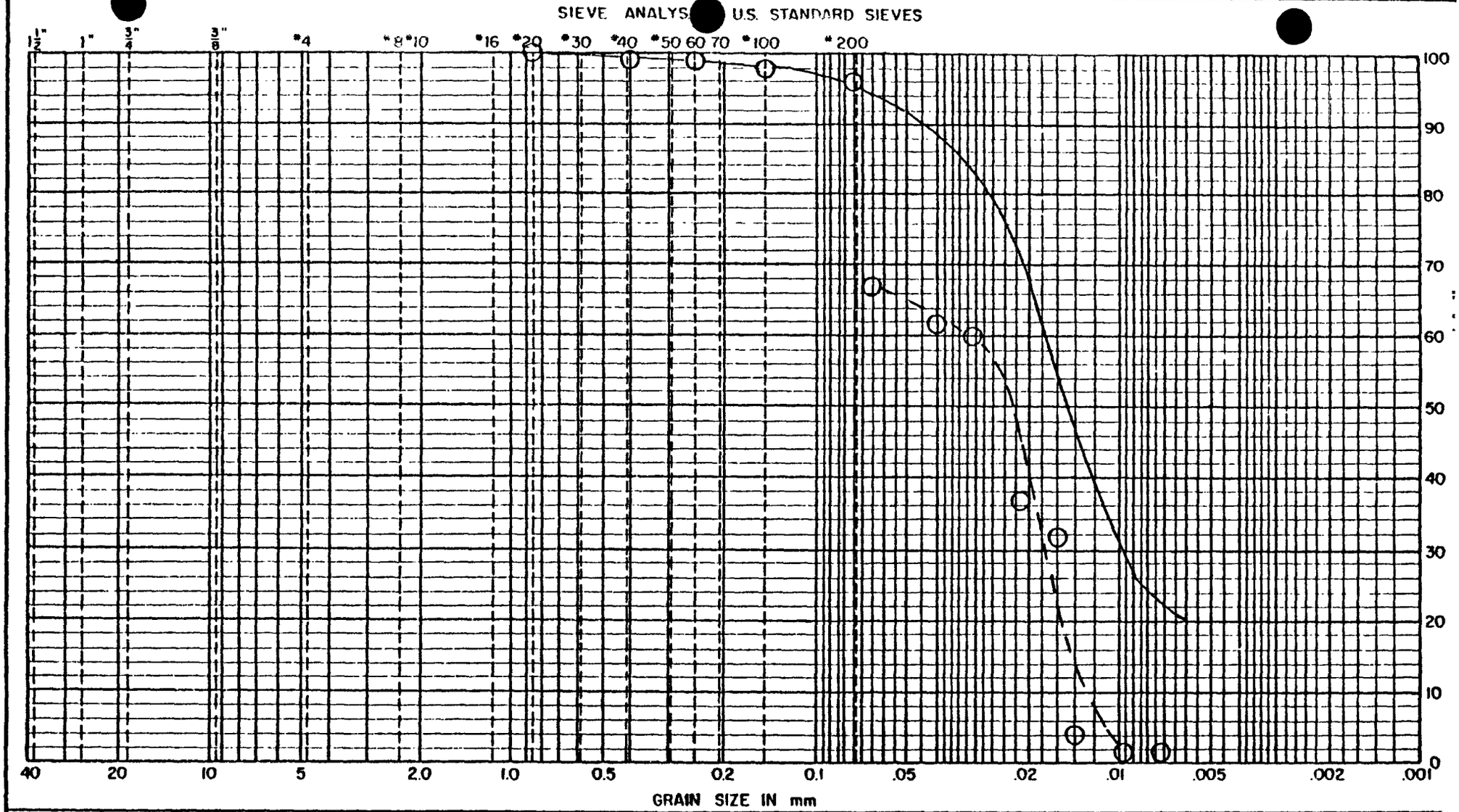
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004536



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with trace of fine sand

BURMISTER- Black Organic SILT trace, fine Sand

MOISTURE CONTENT (%) 116

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 96

PERCENT CLAY (<2.0 μm) 0

SAMPLE NO. S32MA 3432 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-21-85

DRAWN BY: tcw 7-10-85

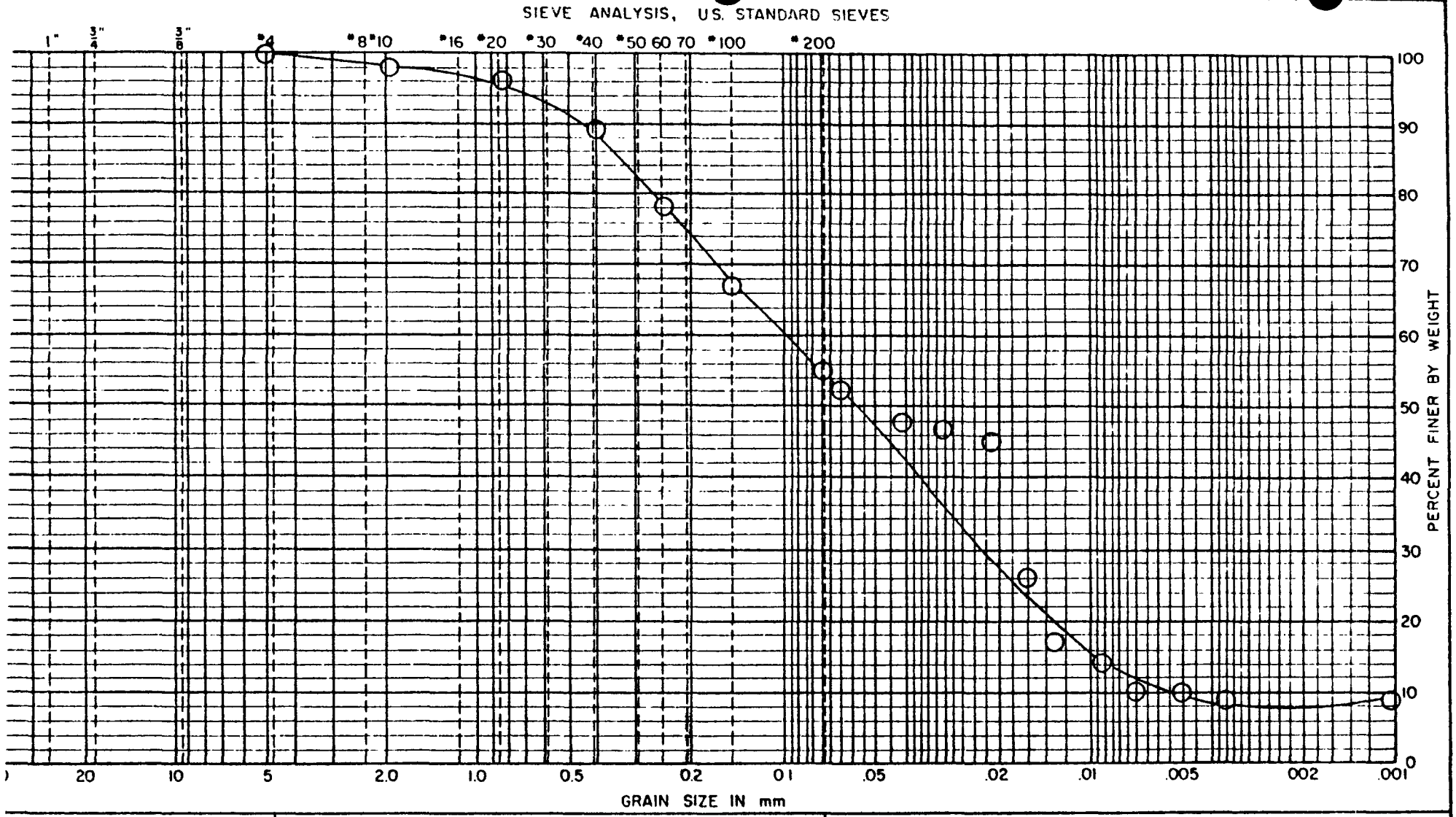
CHECKED BY: tcw 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004537



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 56

TOTAL WET DENSITY (pcf) 100

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT and gray brown, medium to fine SAND

BURMISTER- Black Organic SILT and gray brown medium to fine(+) Sand, trace Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 45

PERCENT SILT (74.0-2.0 μm) 47

PERCENT CLAY (<2.0 μm) 8

SAMPLE NO. S~~23~~32MA 3433 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-21-85

DRAWN BY: [illegible] 7-11-85

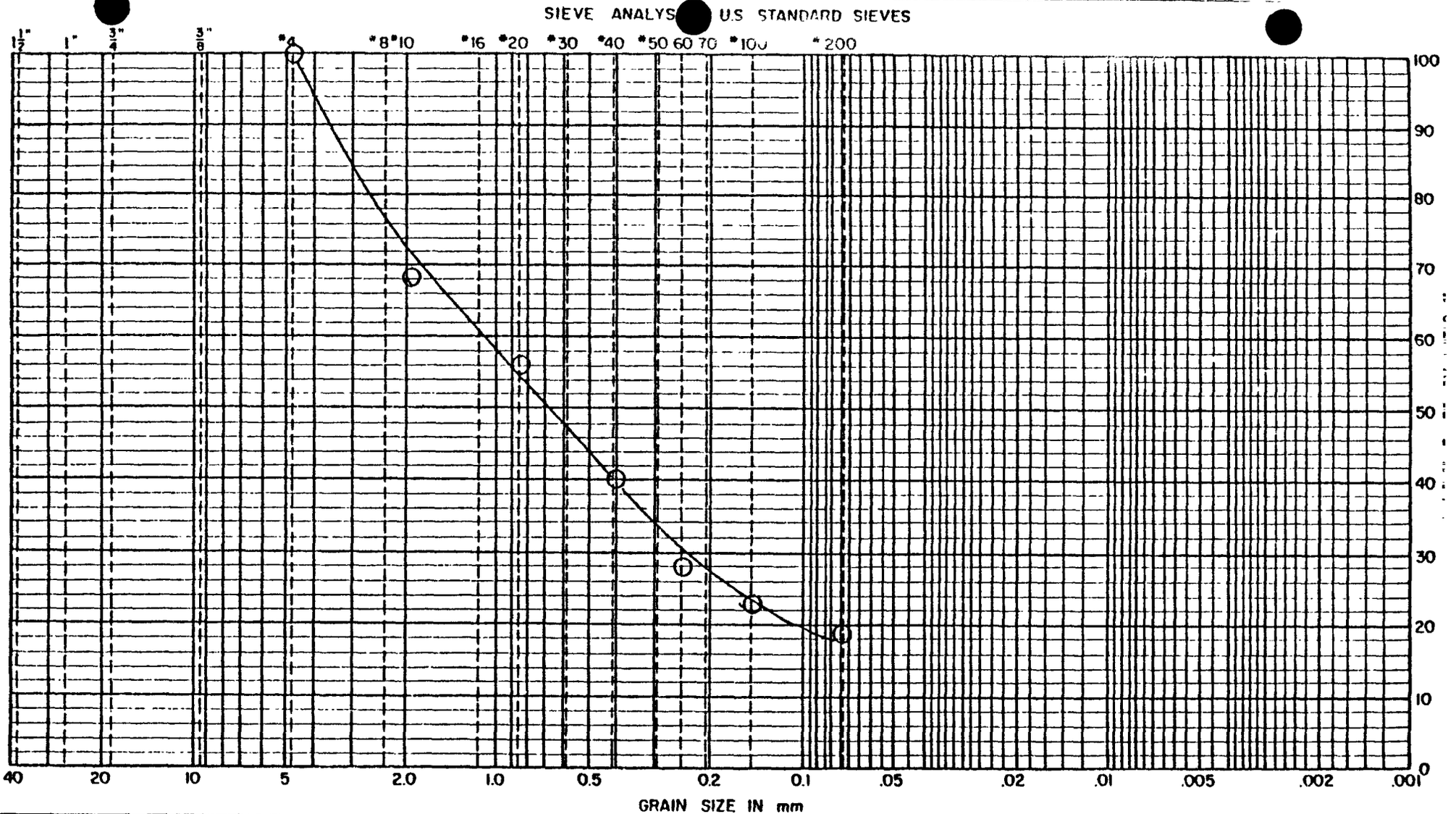
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004538



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, poorly graded SAND with some silt and clay

BURMISTER- Brown coarse to fine SAND some Silt and Clay

MOISTURE CONTENT (%) 24

TOTAL WET DENSITY (pcf) 119

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 82

PERCENT SILT (74.0-2.0 μm) } 18

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S32MA 3434 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-21-85

DRAWN BY: SAG 7-10-85

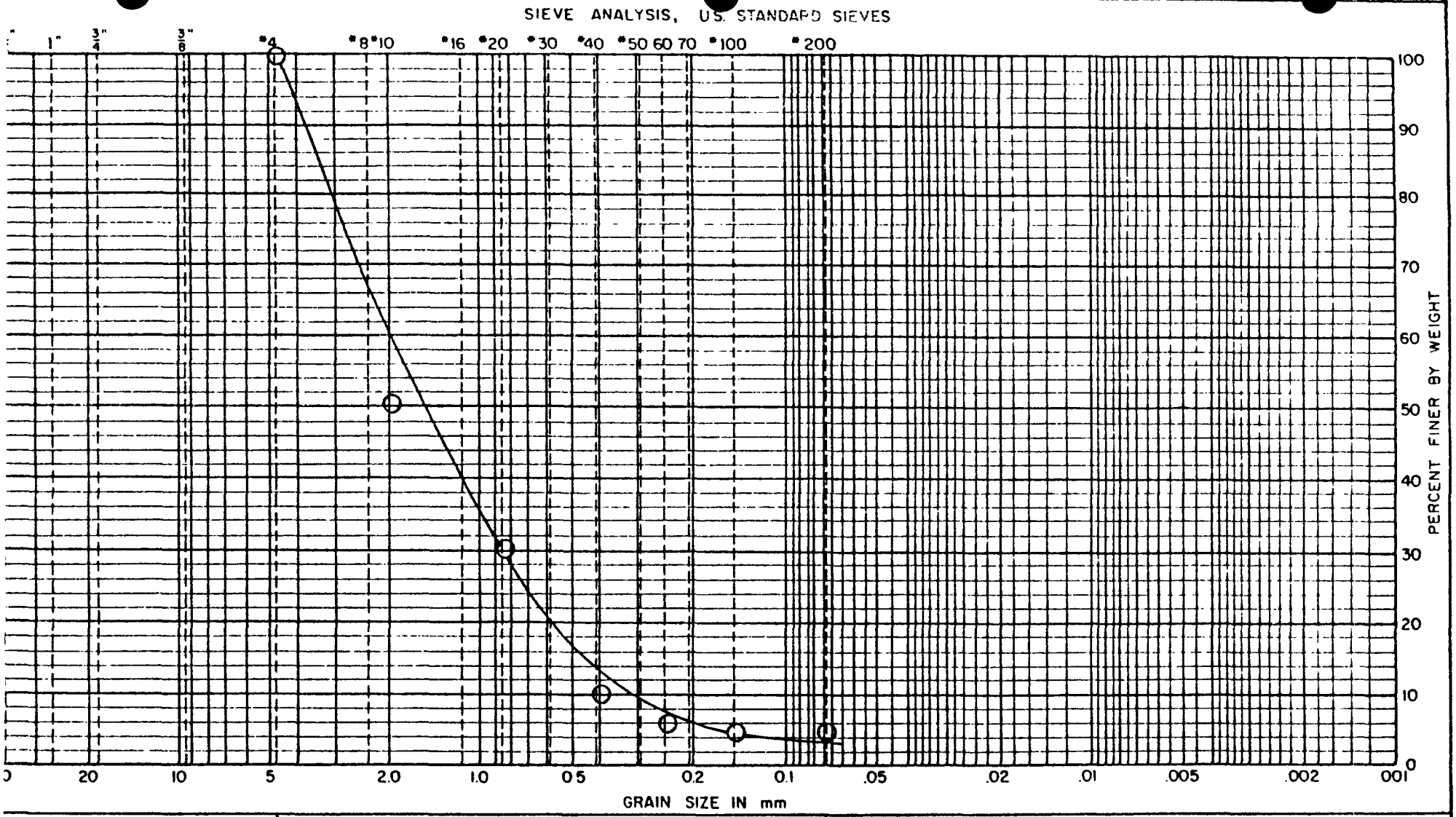
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004539



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, well graded SAND with trace of silt

BURMISTER- Brown coarse to fine SAND trace Silt

MOISTURE CONTENT (%) 11

TOTAL WET DENSITY (pcf) 136

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 95

PERCENT SILT (74.0-2.0 µm) 5

PERCENT CLAY (<2.0 µm) 0

SAMPLE NO. S32MA 3435 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-21-85

DRAWN BY: SAG 7-10-85

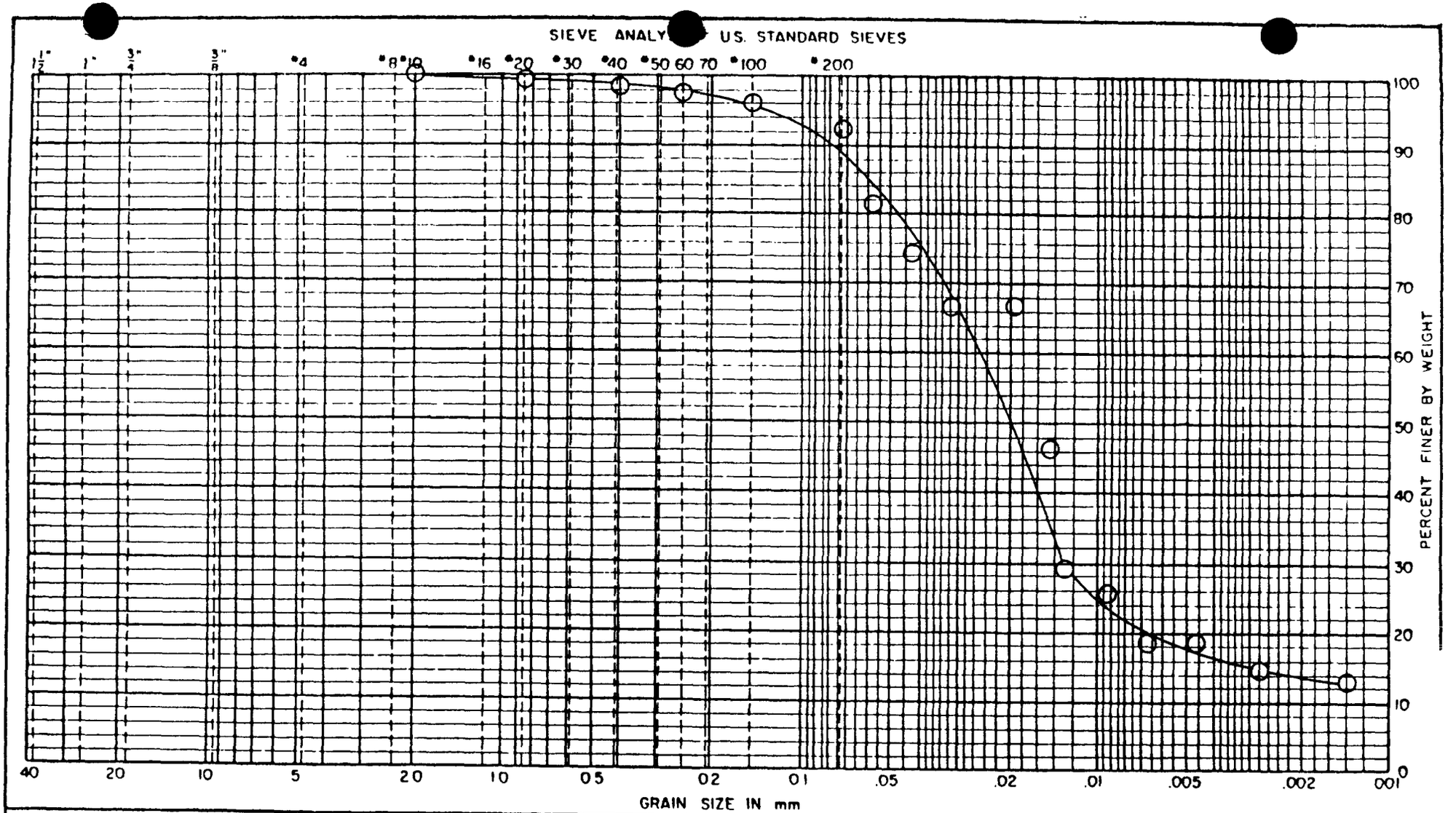
CHECKED BY: Ch 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004540



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 150

TOTAL WET DENSITY (pcf) 96

SPECIFIC GRAVITY 2.45

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic SILT and CLAY with a little fine Sand

BURMISTER- BlackOrganic SILT and CLAY little (-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 11

PERCENT SILT (74.0-2.0 µm) 75

PERCENT CLAY (<2.0 µm) 14

SAMPLE NO. S33MA-3441-200-MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/20/85

DRAWN BY: CR 7-26-85

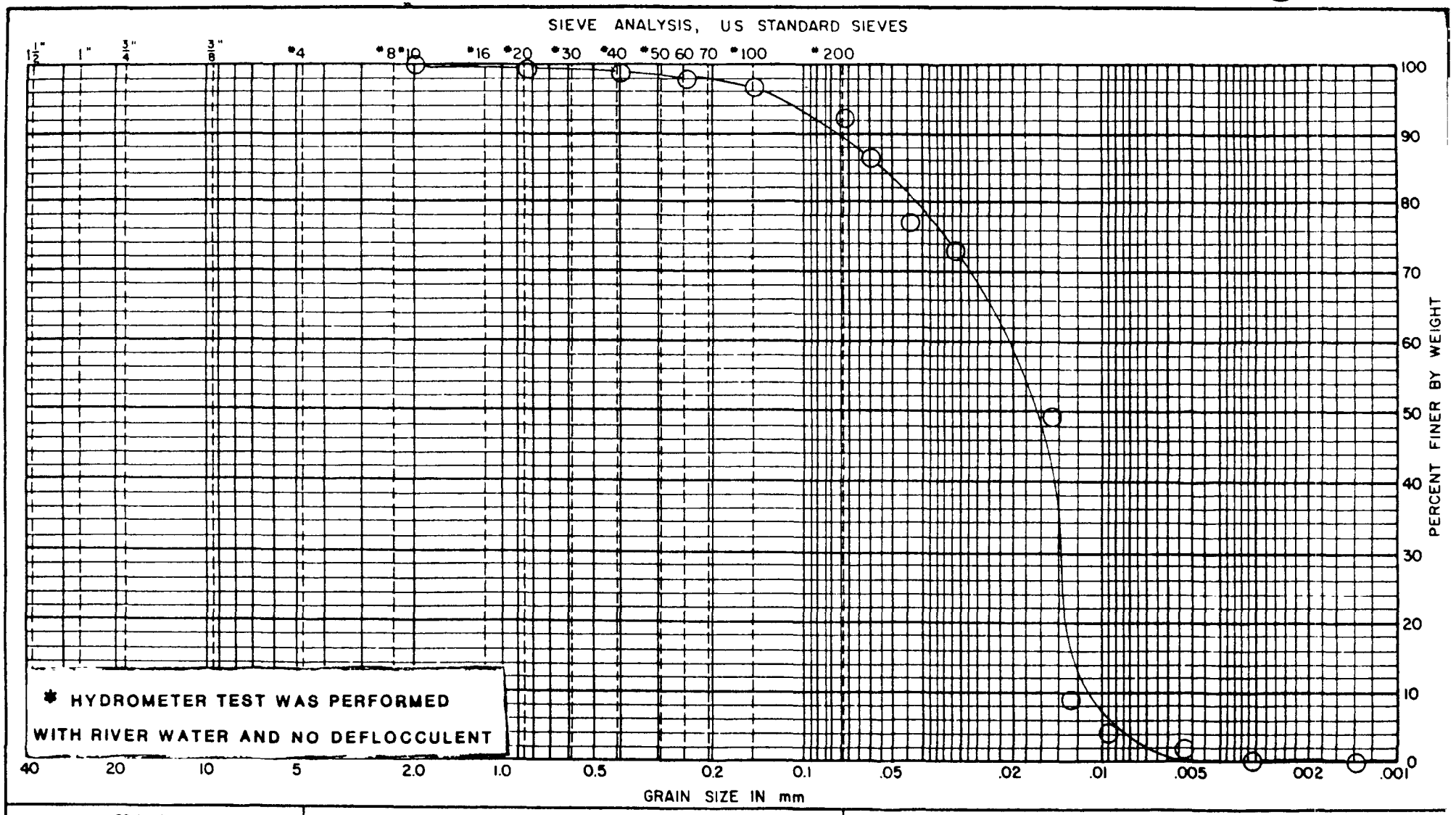
CHECKED BY: SAG 7-29-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004541



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 150

TOTAL WET DENSITY (pcf) 96

SPECIFIC GRAVITY 2.45

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic SILT* with a trace of fine Sand

BURMISTER- Black Organic SILT* trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 10

PERCENT SILT (74.0-2.0 µm) 90

PERCENT CLAY (<2.0 µm) 0

SAMPLE NO. S33MA-3441-200-MY River

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/20/85

DRAWN BY: SAG 7-29-85

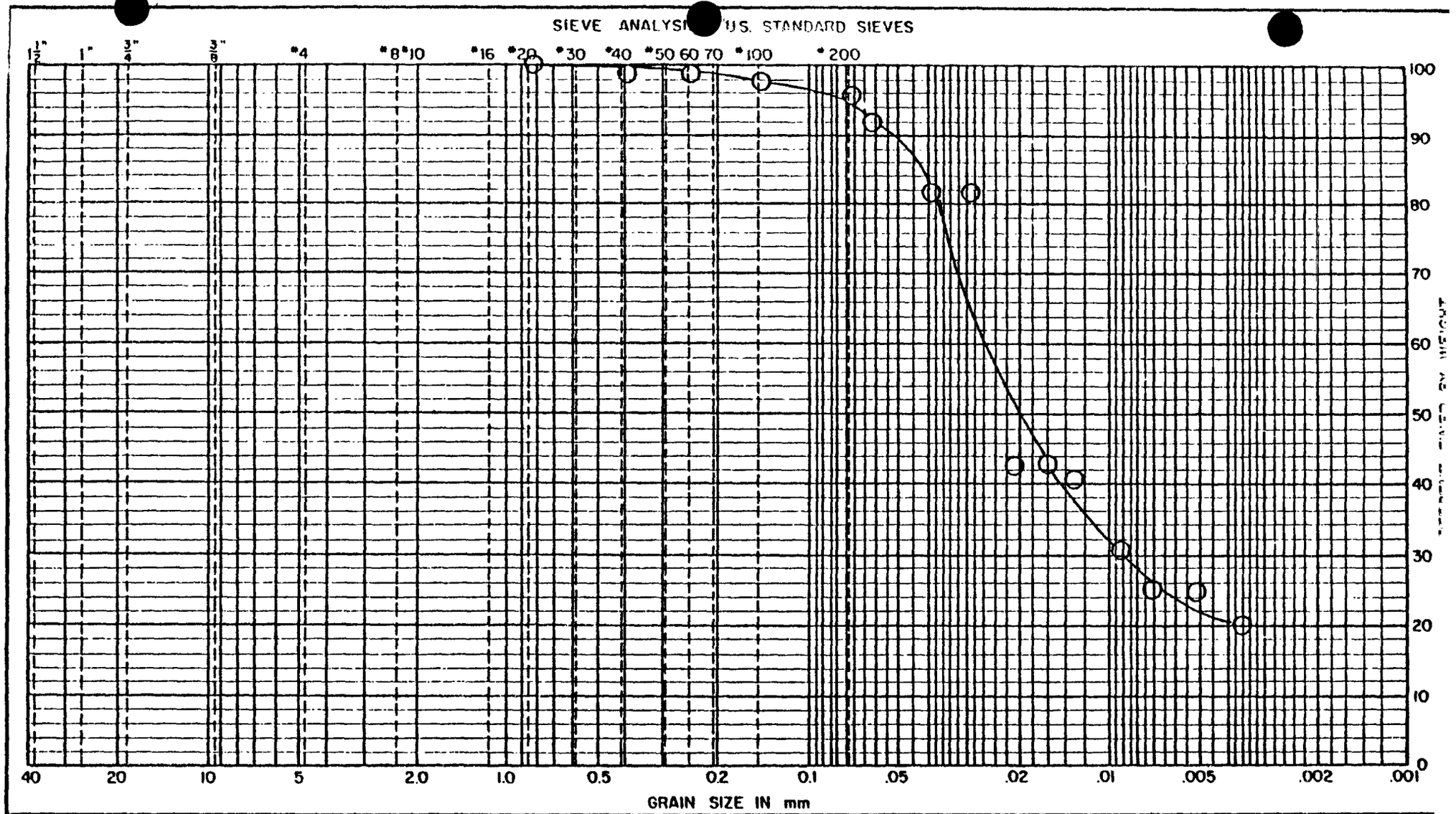
CHECKED BY: [illegible] 7/31/85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004542



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 137

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SITL with trace of fine sand

BURMISTER- Black Organic SILT little(+) Clay trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 75

PERCENT CLAY (<2.0 μm) 20

SAMPLE NO. S33MA 3442 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-20-85

DRAWN BY: tw 7-10-85

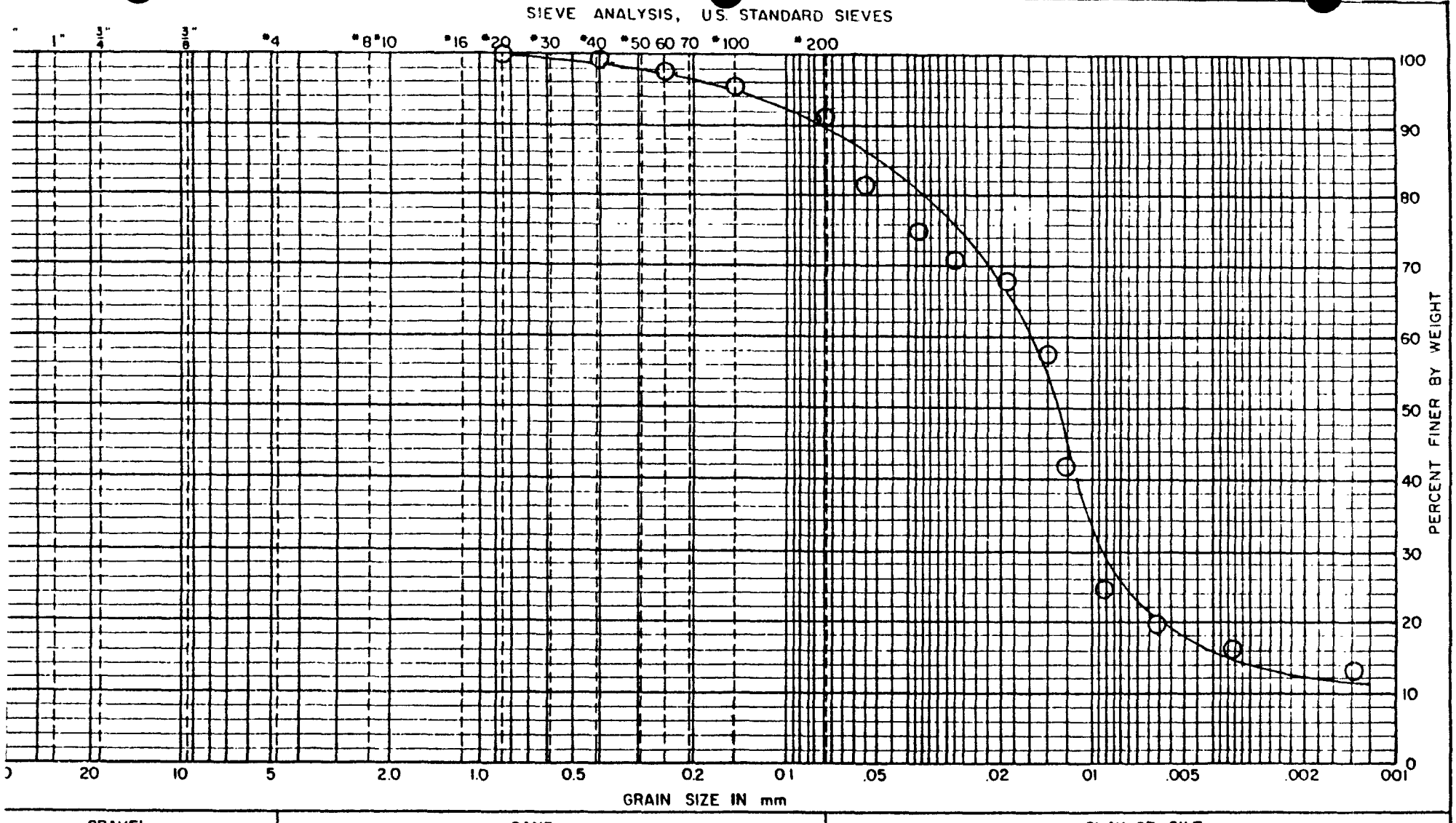
CHECKED BY: Ph 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004543



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT, with little fine sand

BURMISTER- Black Organic SILT, little Clay, little(-) fine Sand

MOISTURE CONTENT (%) 94

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 11

PERCENT SILT (74.0-2.0 μm) 75

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. S33MA 3443 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

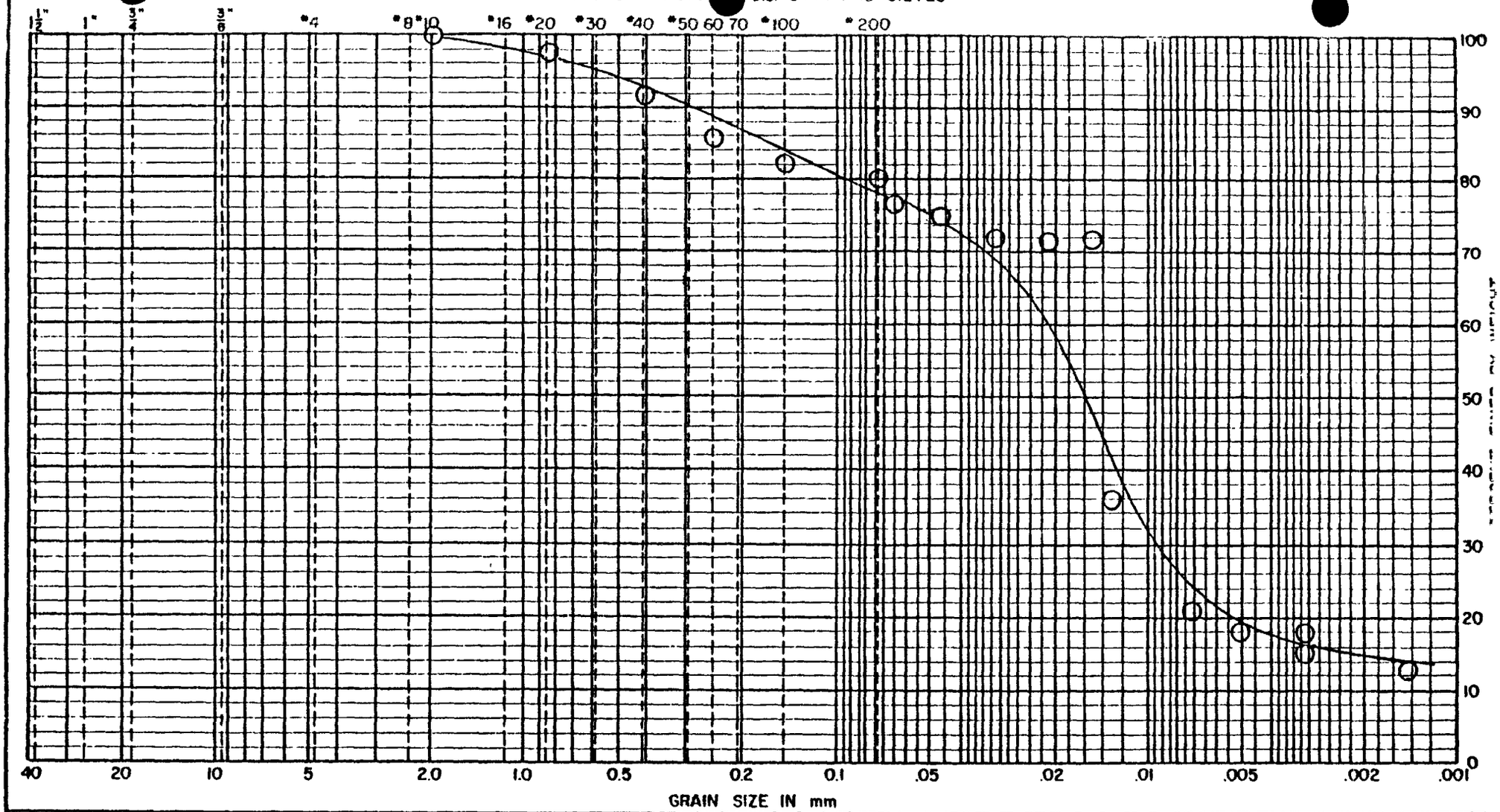
CHECKED BY [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004544



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 71

TOTAL WET DENSITY (pcf) 96

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with some medium to fine sand

BURMISTER- Black Organic SILT little Clay some(-), medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 22

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 15

SAMPLE NO. S33MA 3444 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-20-85

DRAWN BY: SAG 7-10-85

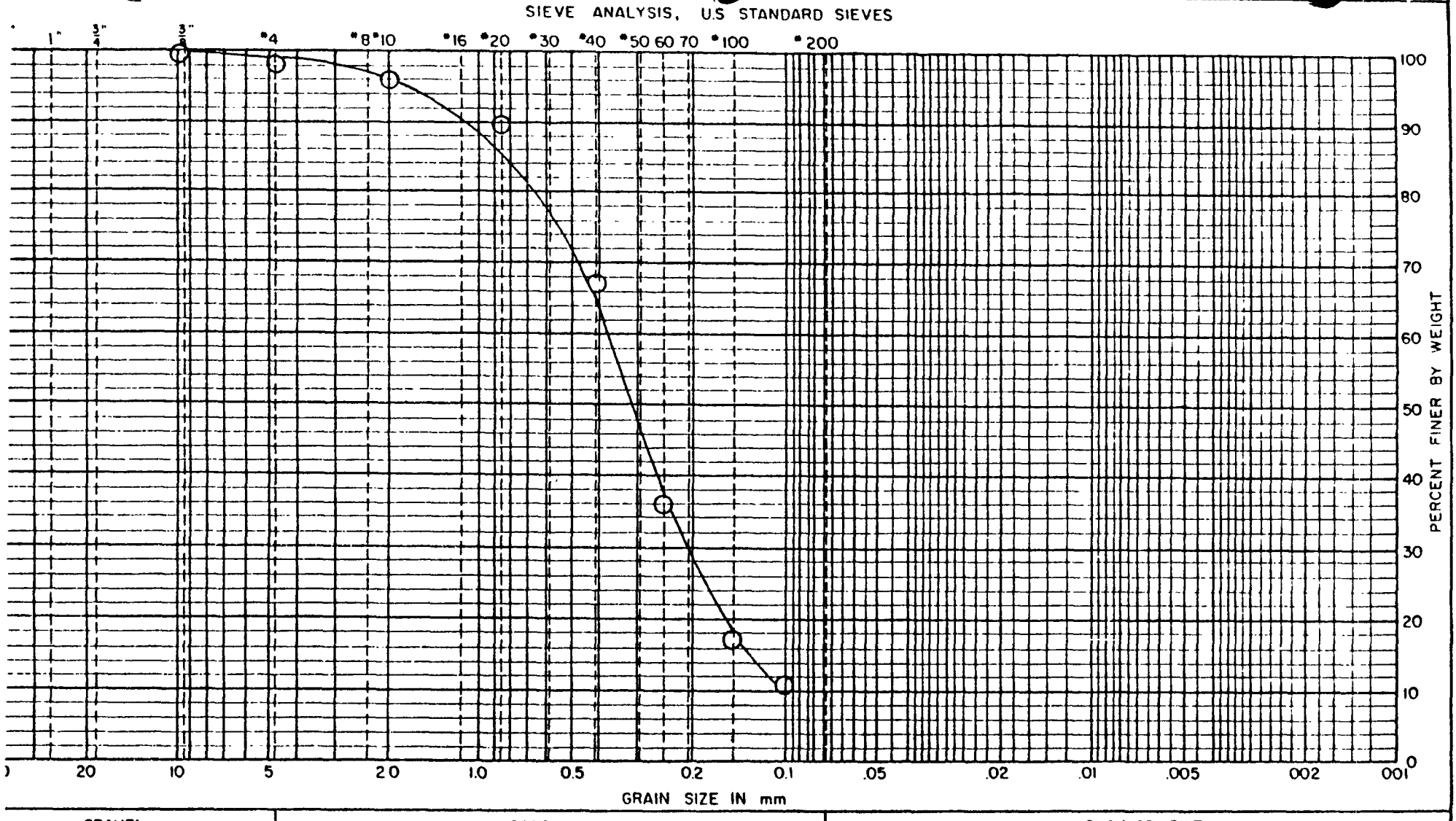
CHECKED BY: [illegible] 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004545



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, medium to fine, poorly graded SAND

BURMISTER- Brown medium to fine SAND

MOISTURE CONTENT (%) 17

TOTAL WET DENSITY (pcf) 135

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 90

PERCENT SILT (74.0-2.0 μm)

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S33MA 3445 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-20-85

DRAWN BY: tew 7-11-85

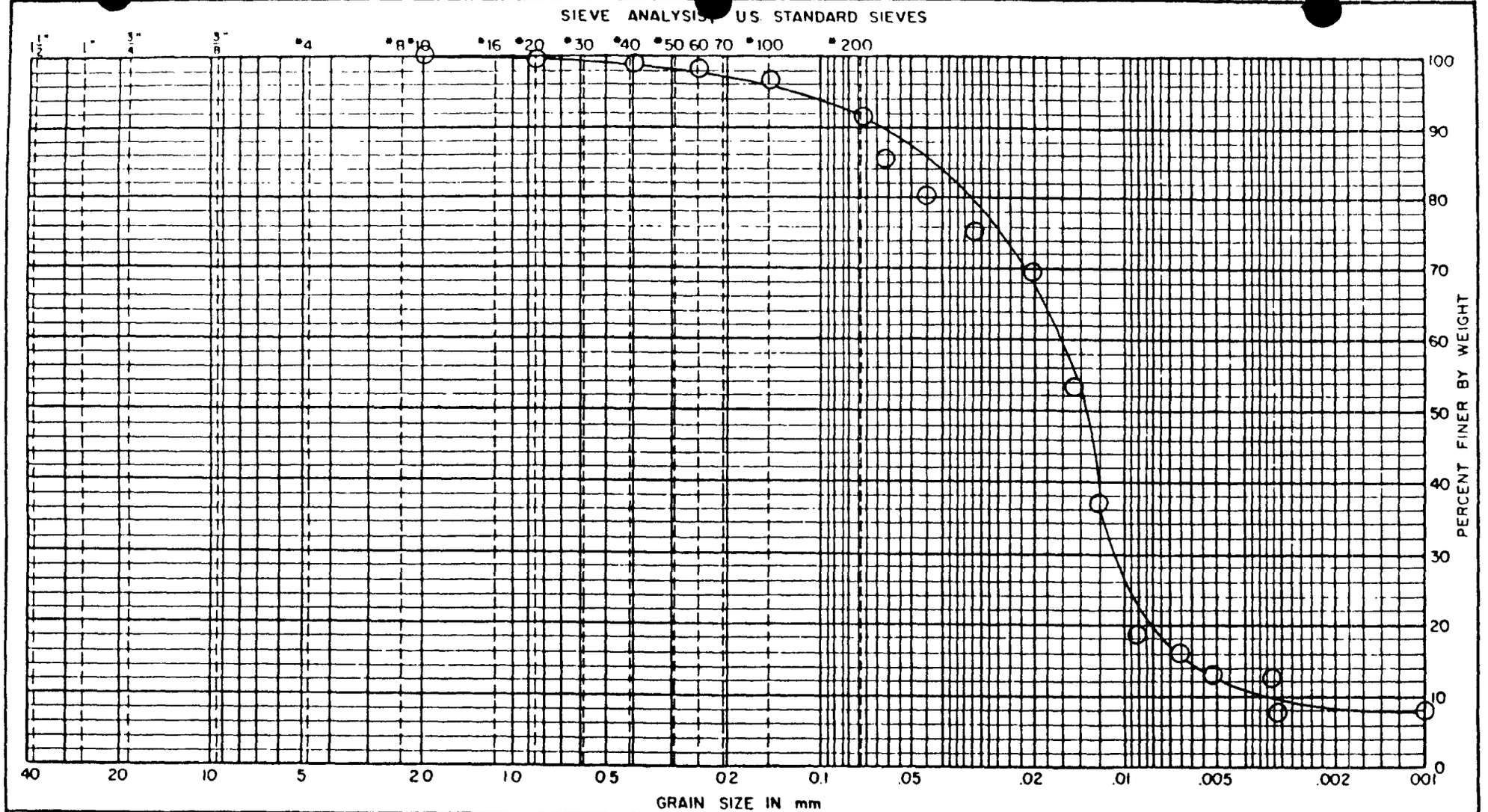
CHECKED BY: 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004546



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 139

TOTAL WET DENSITY (pcf) 94

SPECIFIC GRAVITY 2.47

VISUAL CLASSIFICATION OF SAMPLE

USC - Black organic CLayey SILT with a trace of fine Sand

BURMISTER- Black organic Clayey SILT trace (+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) 83

PERCENT CLAY (<2.0 µm) 9

SAMPLE NO. S34LA-3359-200-MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/17/85

DRAWN BY: 7-25-85

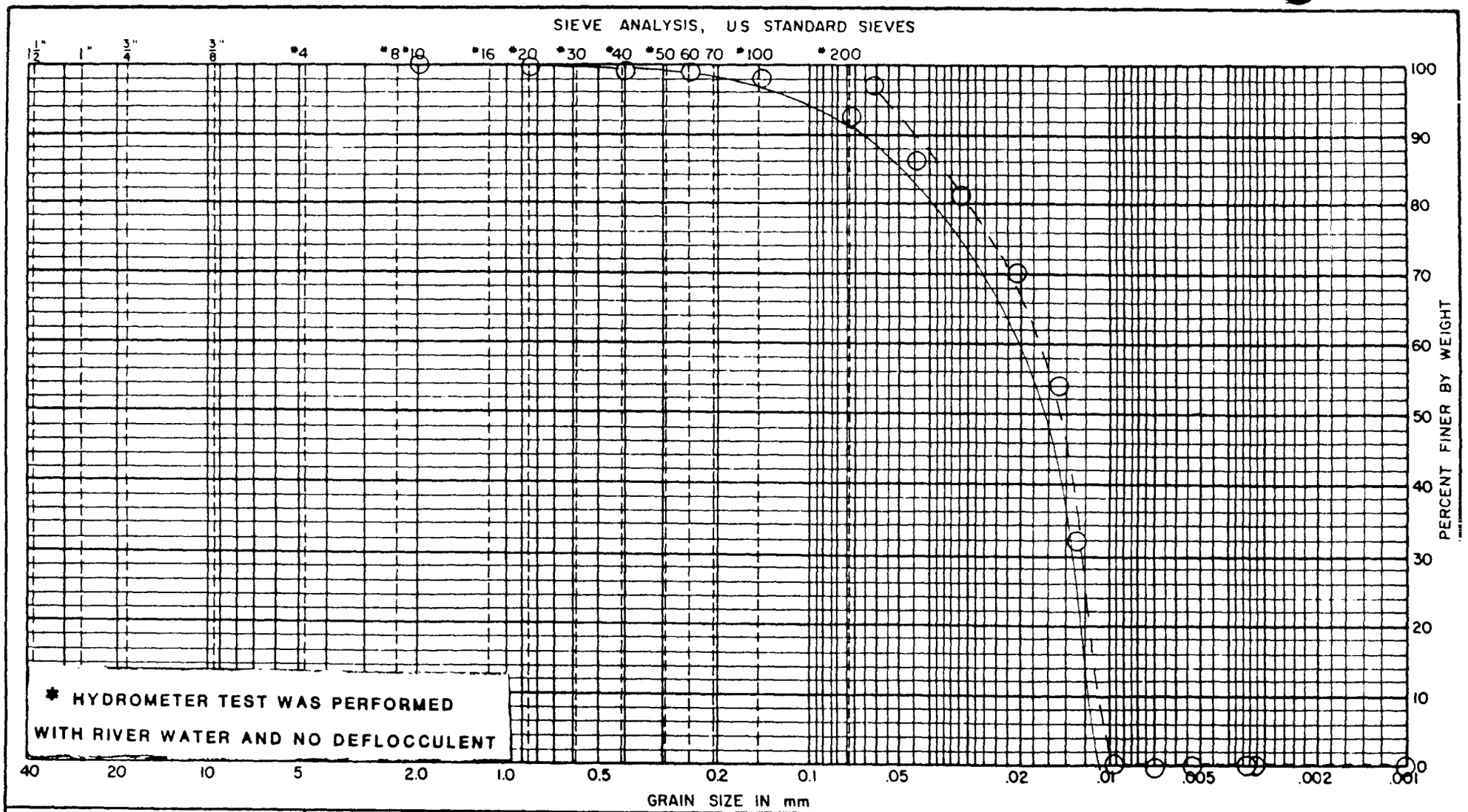
CHECKED BY: SAG 7-29-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004547



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 139

TOTAL WET DENSITY (pcf) 94

SPECIFIC GRAVITY 2.47

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic SILT* with a trace of fine Sand

BURMISTER- Black Organic SILT* trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 94

PERCENT CLAY (<2.0 μm) 0

SAMPLE NO. S34LA-3359-200-MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5/17/85

DRAWN BY: SAG 7-29-85

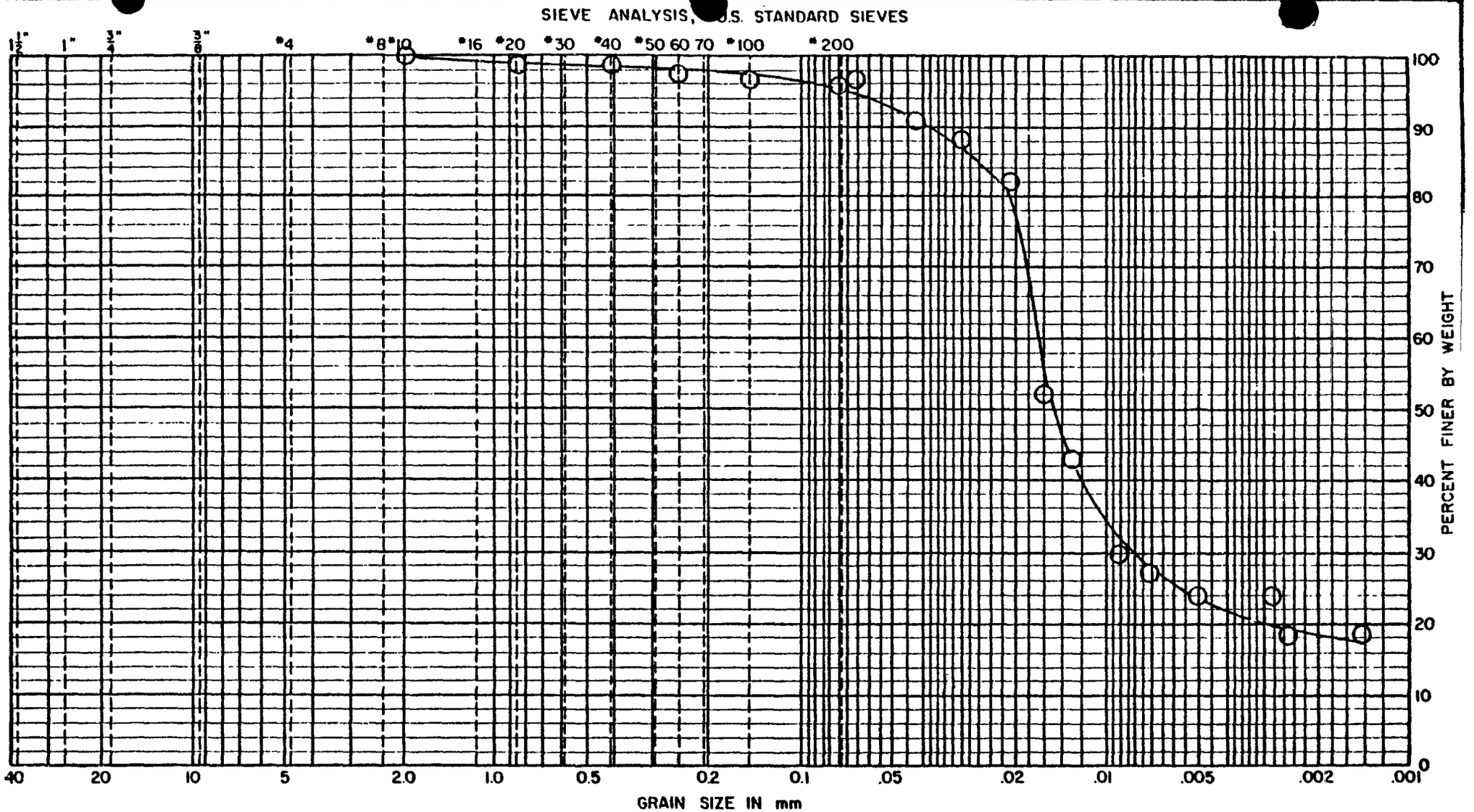
CHECKED BY: [illegible] 7/31/85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004548



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 151

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of leaves and plant fibers, fine sand

BURMISTER- Black Organic SILt, little(+) Clay, trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 76

PERCENT CLAY (<2.0 μm) 19

SAMPLE NO. S34LA 3360 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

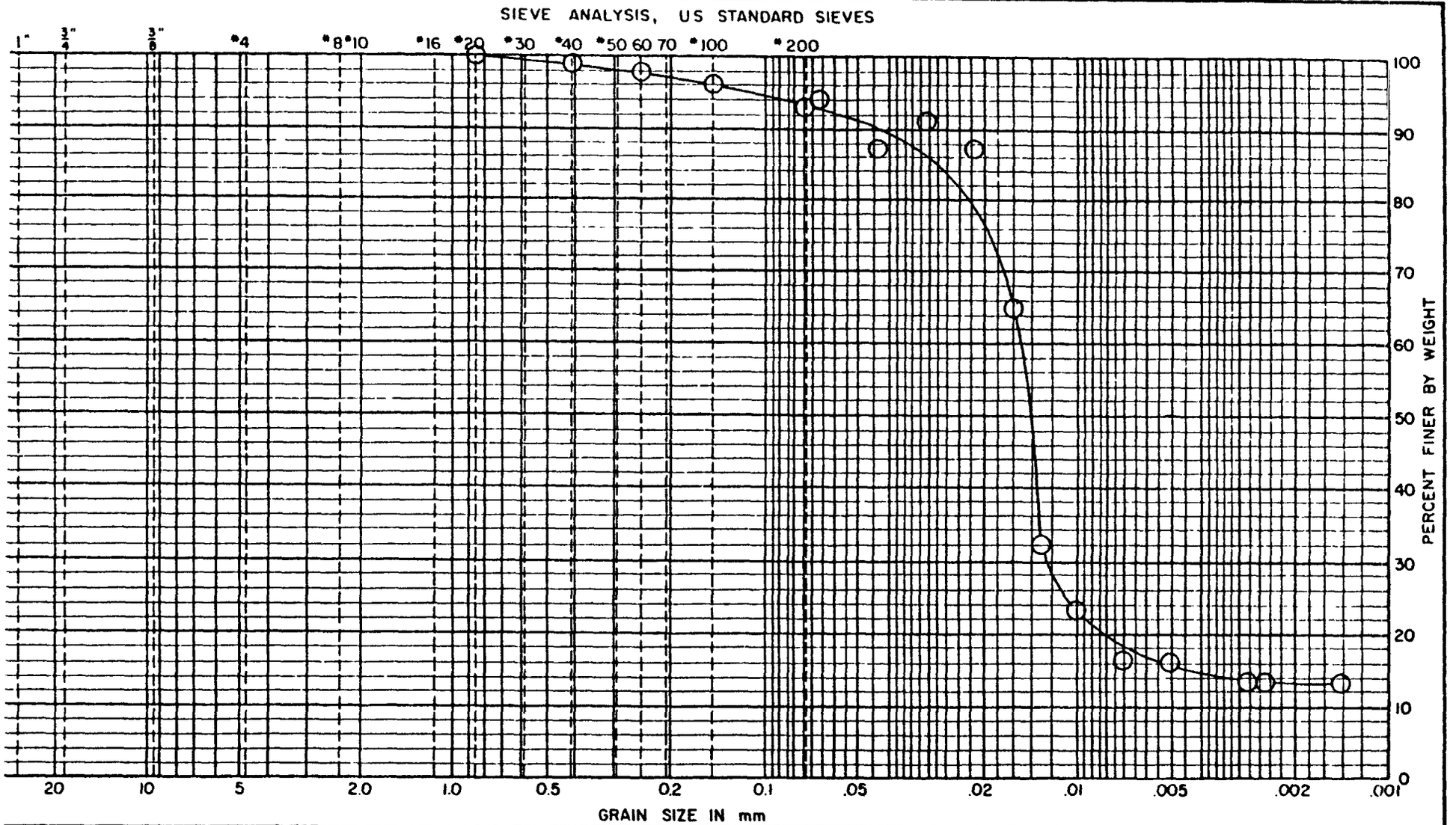
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004549



GRAVEL		SAND			CLAY OR SILT
RSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with a little clay and a trace of fine grained sand

BURMISTER- Black Organic SILT trace(+), fine Sand, little(-) Clay

ISTURE ONTENT (%) 151

TAL WET ENSITY (pcf) 77

ECIFIC RAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 13

SAMPLE NO. S34LA 3361 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-17-85

DRAWN BY: CL 7-10-85

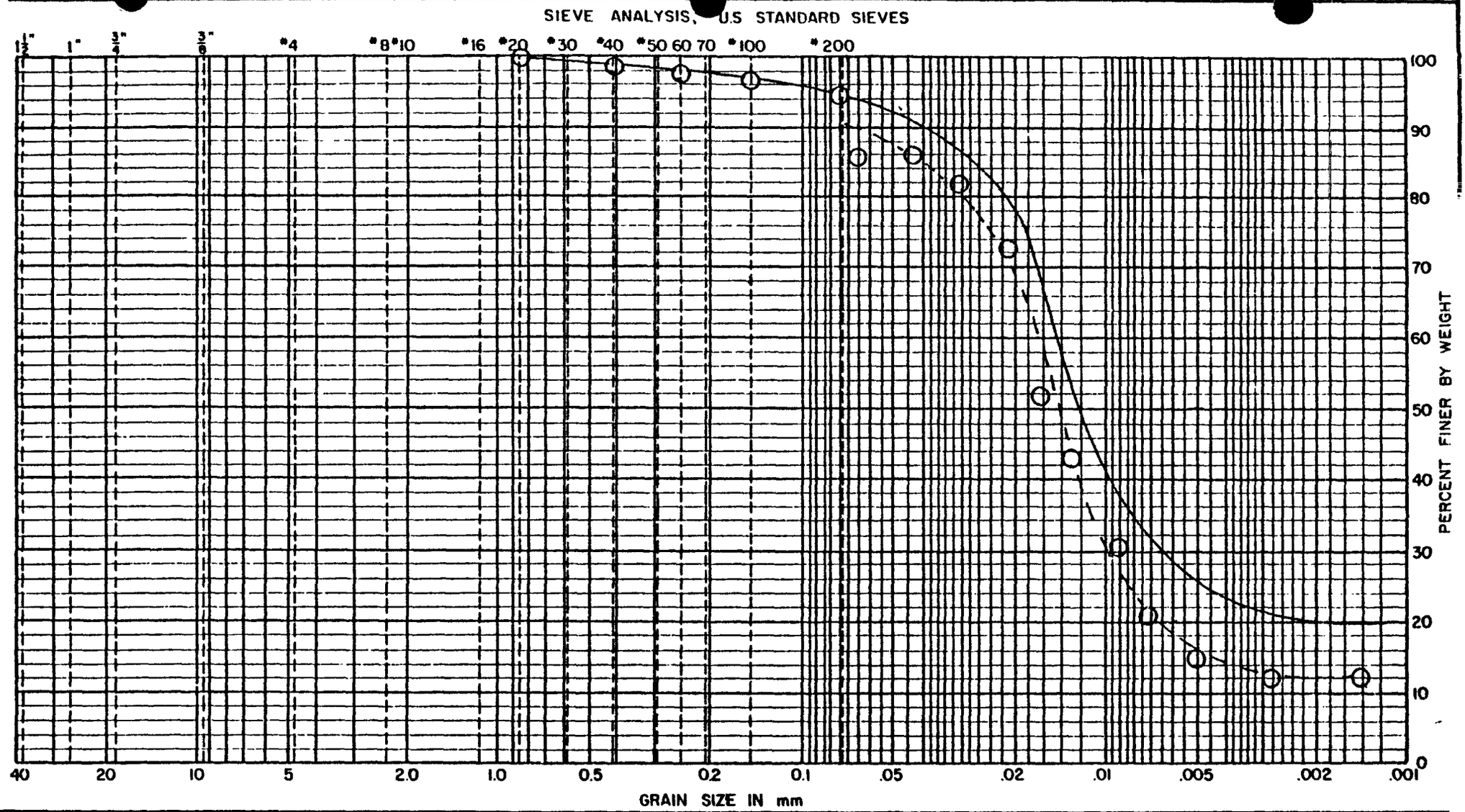
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004550



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 144

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and trace of fine grained sand and plant fibers

BURMISTER- Black Organic SILT trace, fine Sand, little(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 74

PERCENT CLAY (<2.0 μm) 20

SAMPLE NO. S34LA 3362 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

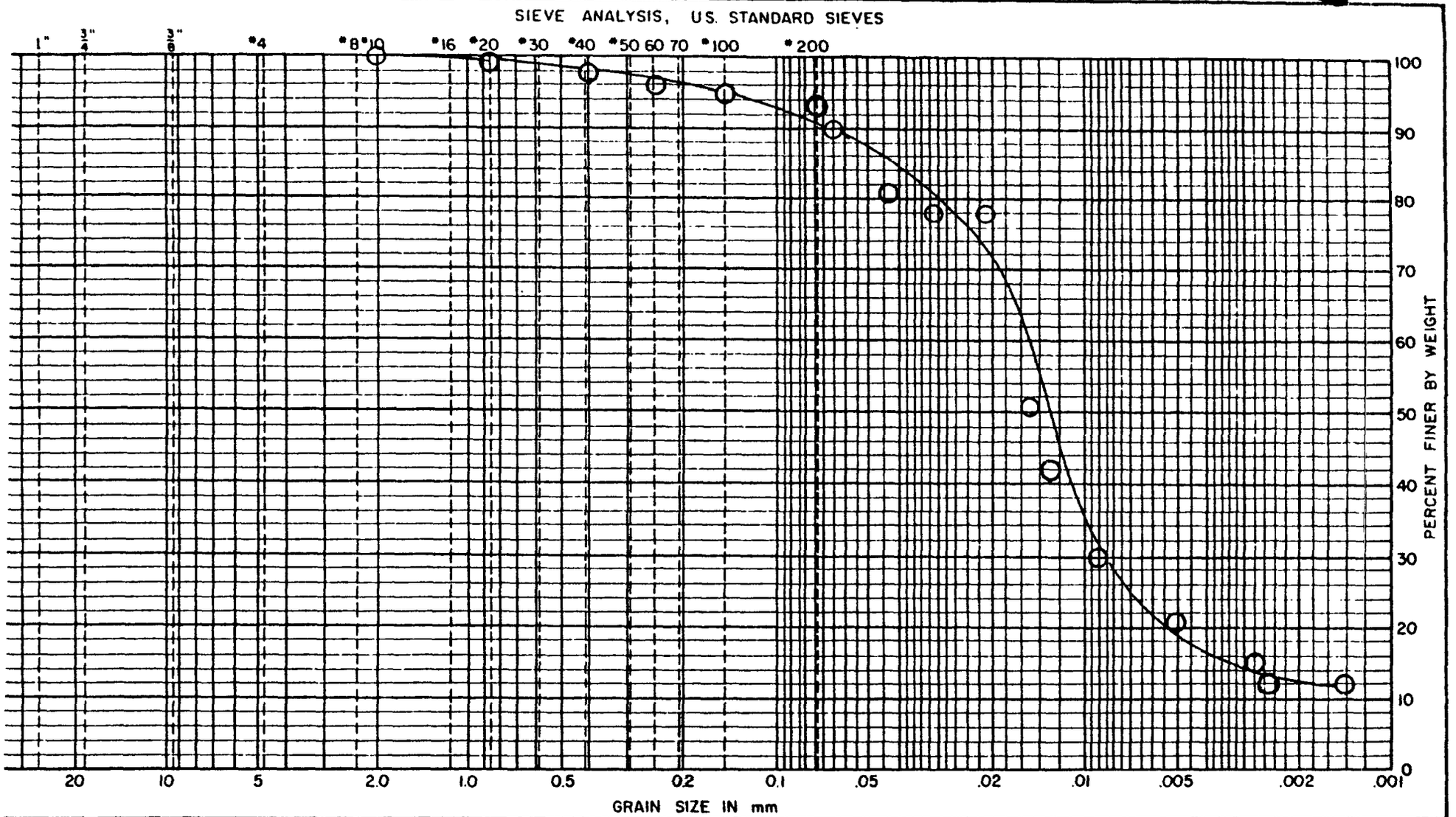
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004551



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT with trace fine grained sand and plant fibers

BURMISTER- Black SILT trace(+), fine Sand.

MOISTURE CONTENT (%) 125

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) 77

PERCENT CLAY (<2.0 μm) 13

SAMPLE NO. S34LA 3363 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

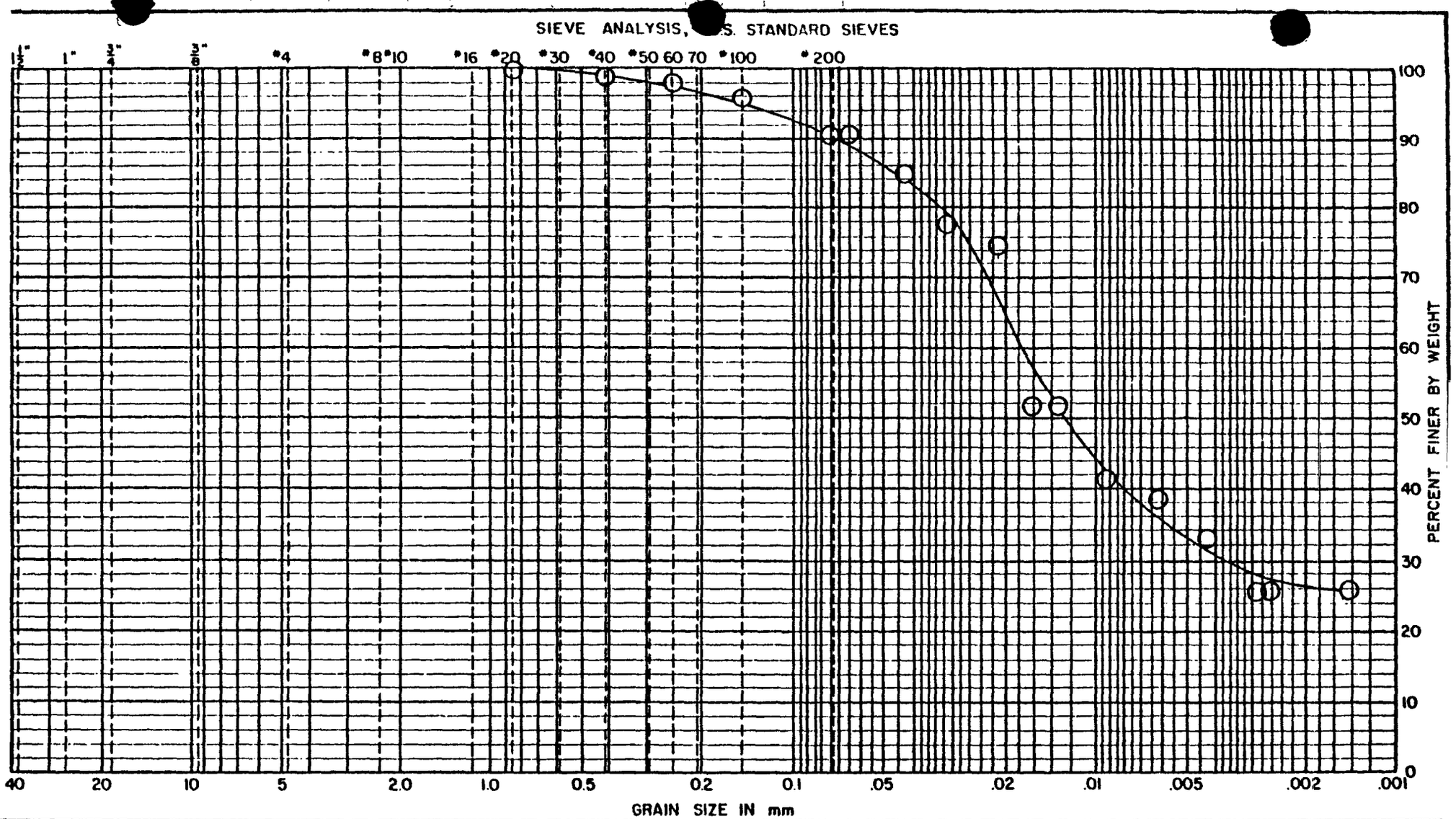
CHECKED BY: [illegible] 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004552



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 207

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT some Clay, trace(+) fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 65

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. S41LA 3369 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-17-85

DRAWN BY: tew 7-10-85

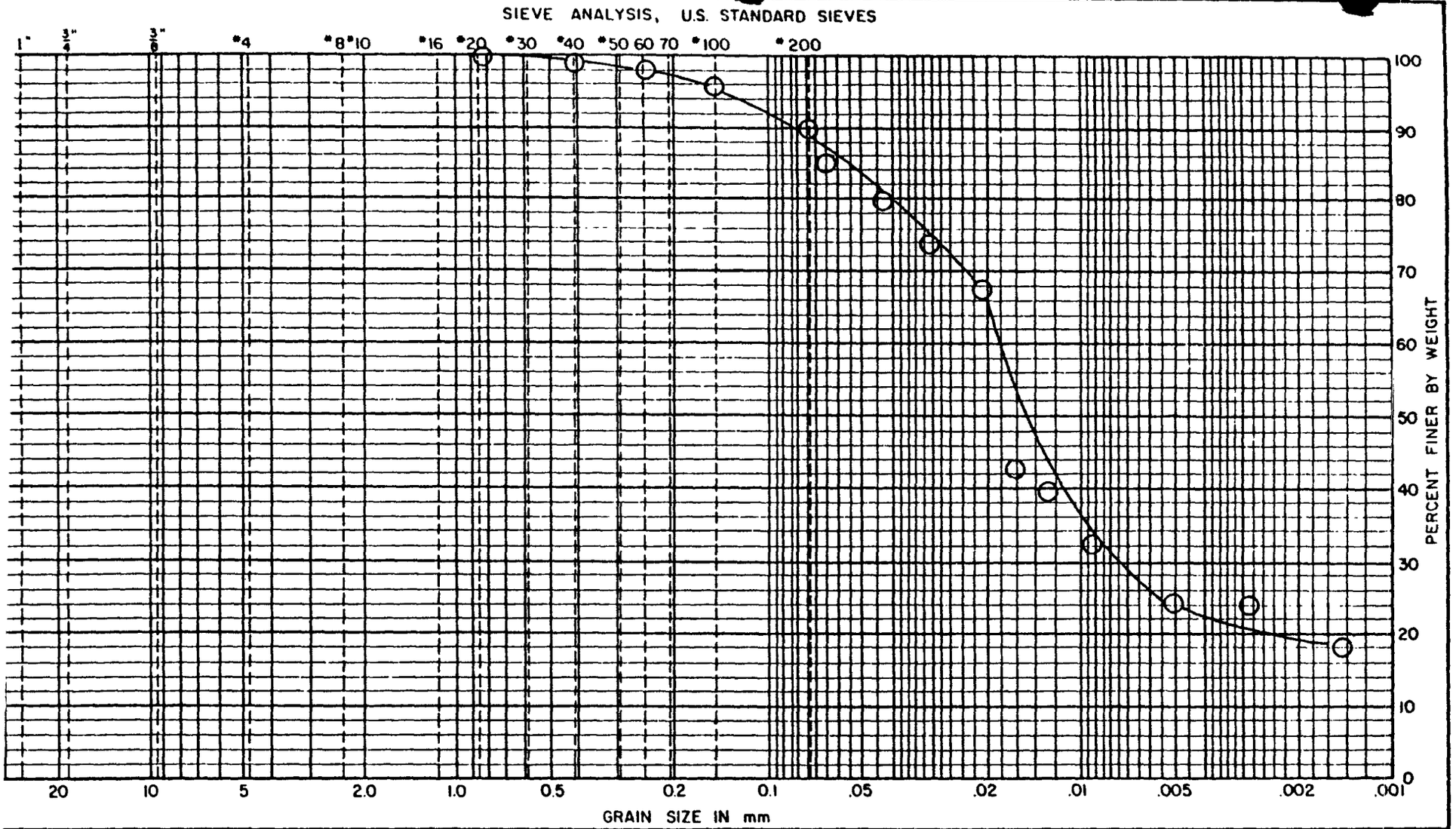
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004553



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of medium to fine sand

BURMISTER- Black Organic SILT and CLAY trace(-), medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 20

MOISTURE CONTENT (%) 136

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

SAMPLE NO. S41LA 3370 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-17-85

DRAWN BY: 7-10-85

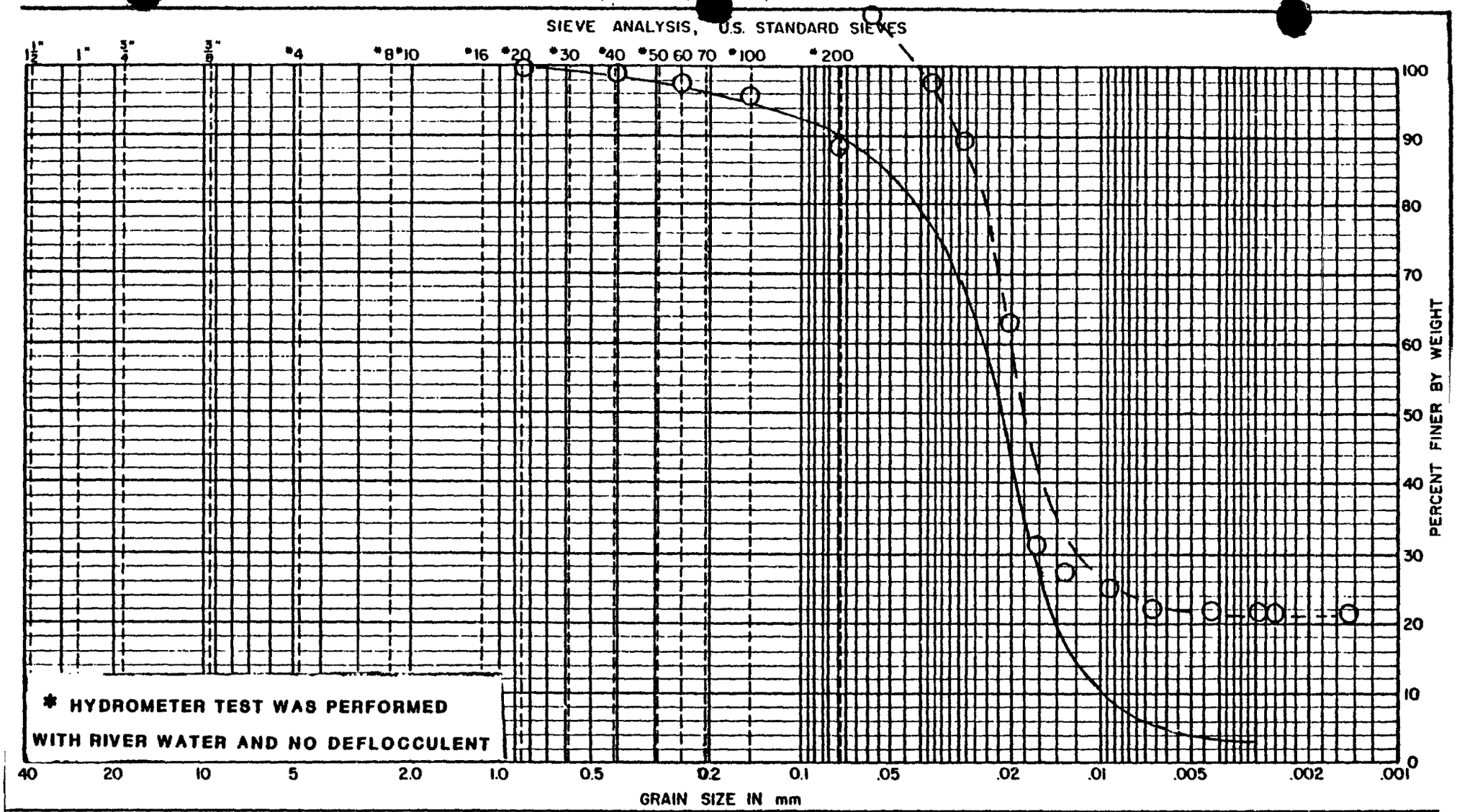
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004554



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 136

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT or CLAY* with trace of fine sand

BURMISTER- Black Organic SILT or CLAY* trace(+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) } 90

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S41LA 3370 201 MY RIVER

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-17-85

DRAWN BY: tew 7-10-85

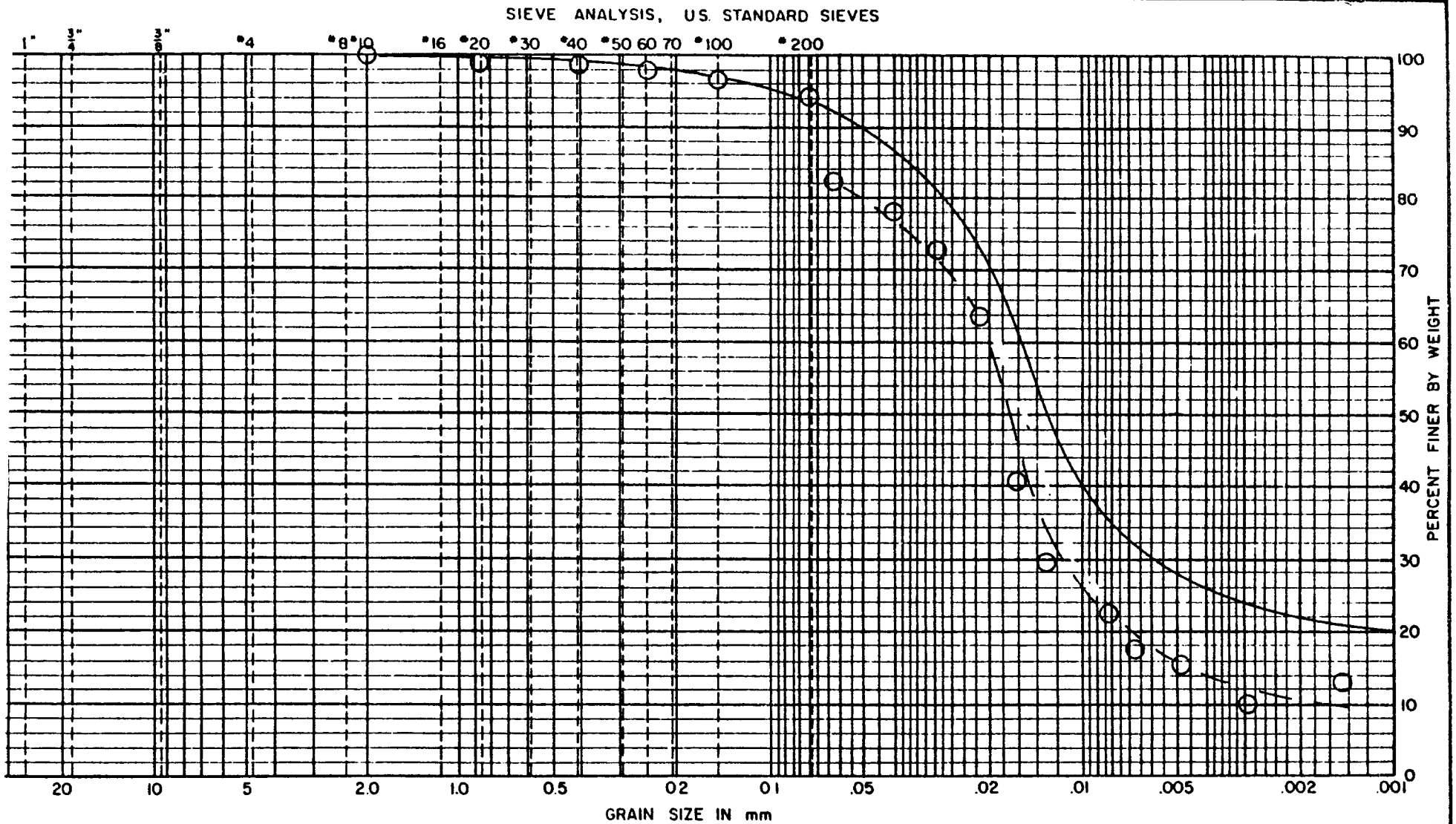
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004555



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace of medium to fine sand

BURMISTER- Dark gray Organic SILT, some(-) Clay trace, medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 71

PERCENT CLAY (<2.0 μm) 22

DISTURBED MOISTURE CONTENT (%) 140

TOTAL WET DENSITY (pcf) 41

SPECIFIC GRAVITY

SAMPLE NO. S41LA 3371 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

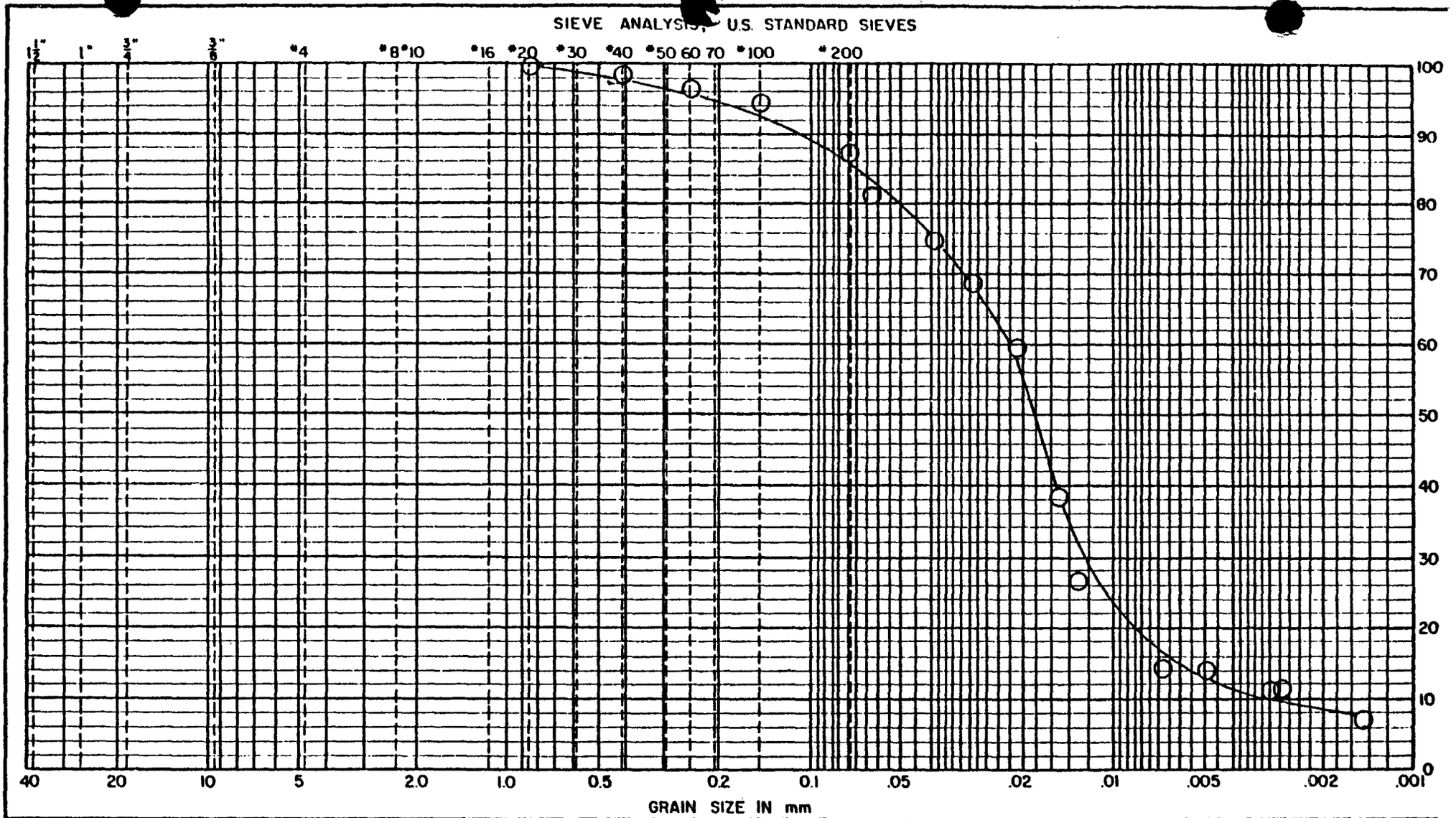
CHECKED BY: Ch 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004556



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 130

TOTAL WET DENSITY (pcf) 87

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with little medium to fine sand

BURMISTER- Black Organic SILT trace(+) Clay, little, medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 14

PERCENT SILT (74.0-2.0 μm) 76

PERCENT CLAY (<2.0 μm) 10

SAMPLE NO. S41LA 3372 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

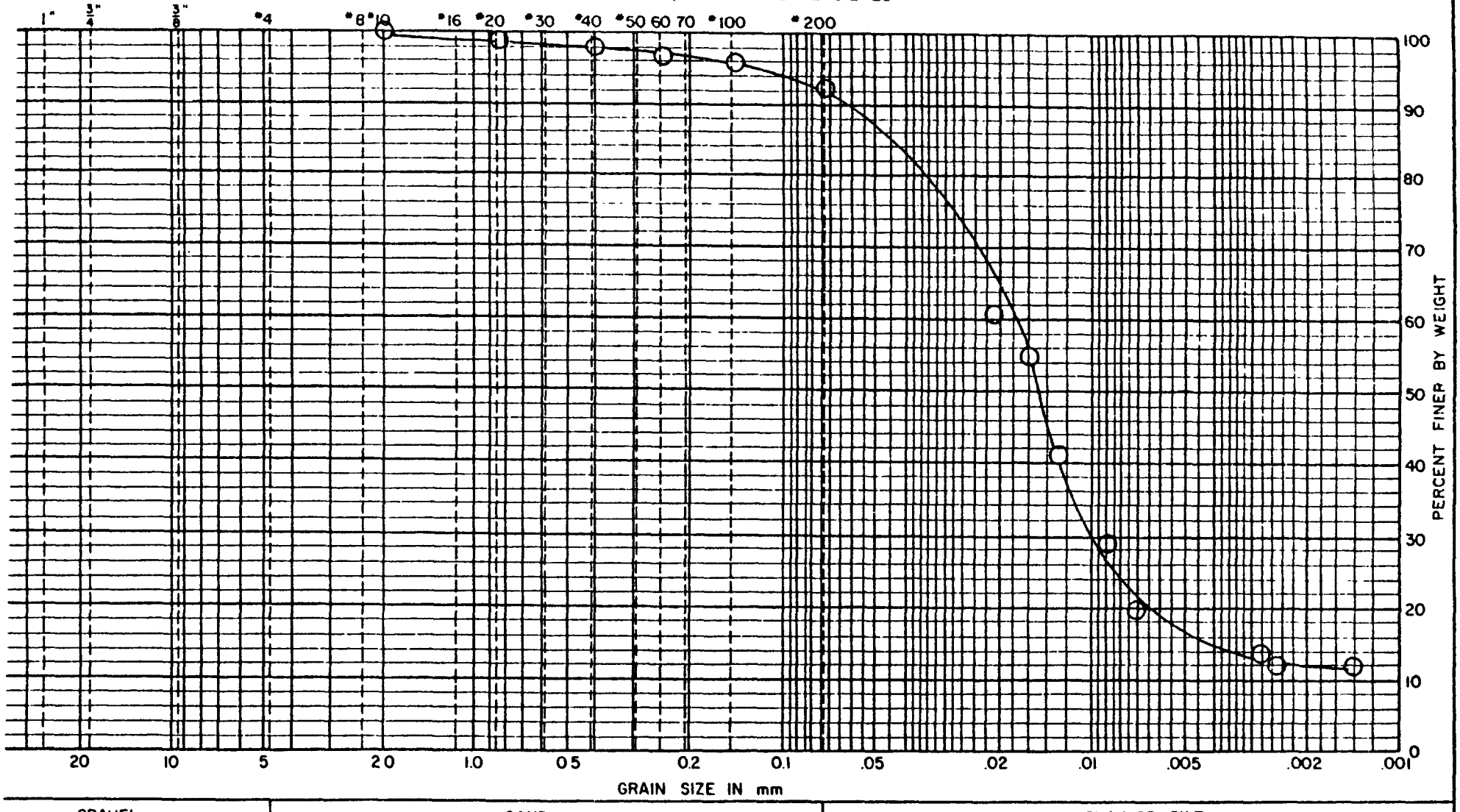
CHECKED BY: [illegible] 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004557



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT with some clay and peat, trace of fine grained sand and vegetation

BURMISTER- Blac to dark gray Organic SILT trace(-), fine Sand, little(+) Peat, little(-) Clay

MOISTURE CONTENT (%) 125

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 79

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. S41LA 3373 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

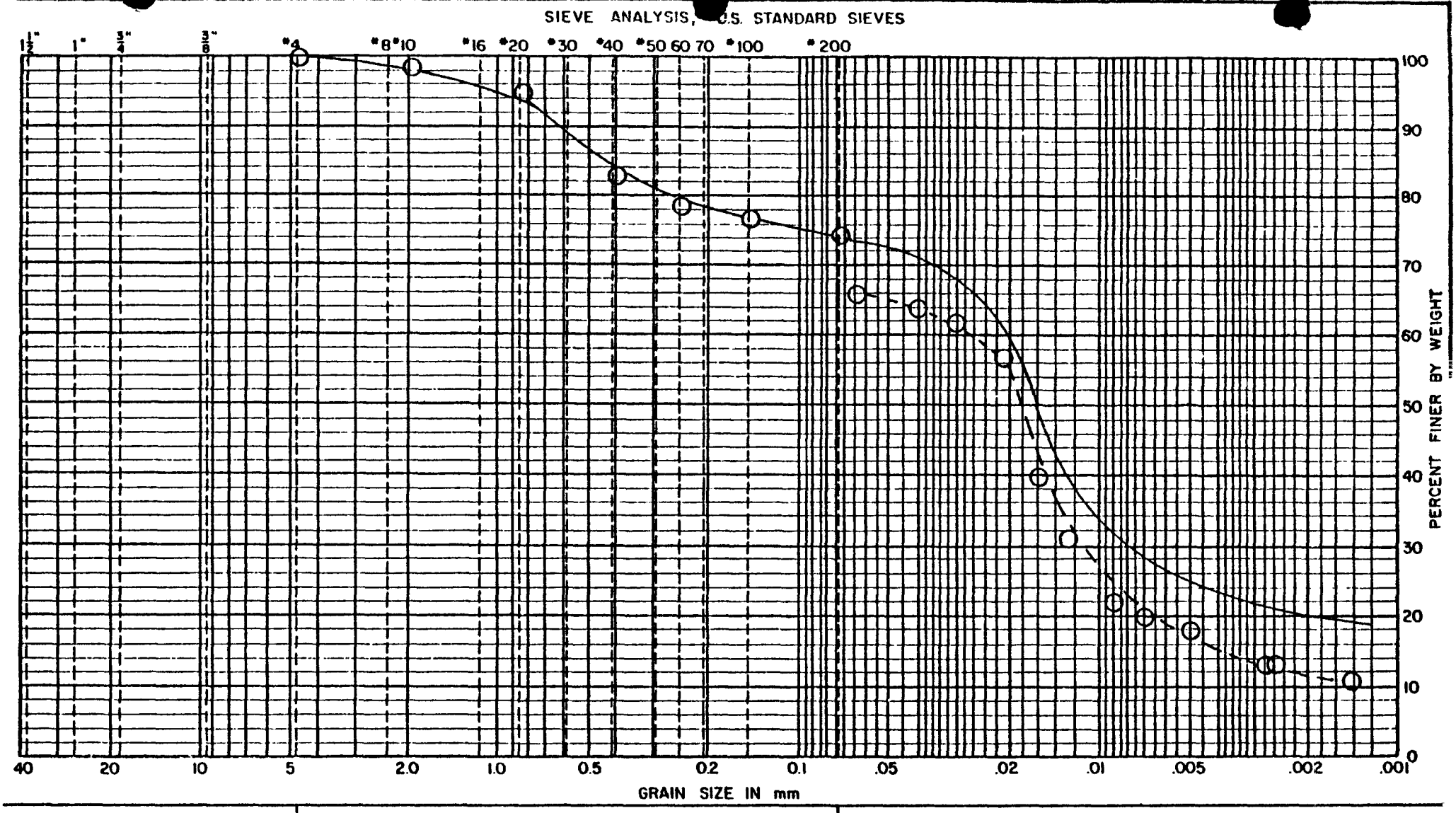
CHECKED BY: CW 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004558



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 66

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some medium to fine grained sand and clay

BURMISTER- Black Organic SILT some, medium to fine Sand, some(-) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 26

PERCENT SILT (74.0-2.0 μm) 54

PERCENT CLAY (<2.0 μm) 20

SAMPLE NO. S41LA 3374 205 MY

SAMPLE DEPTH, ft. 10-12

SAMPLING DATE 5-17-85

DRAWN BY: SAG 7-10-85

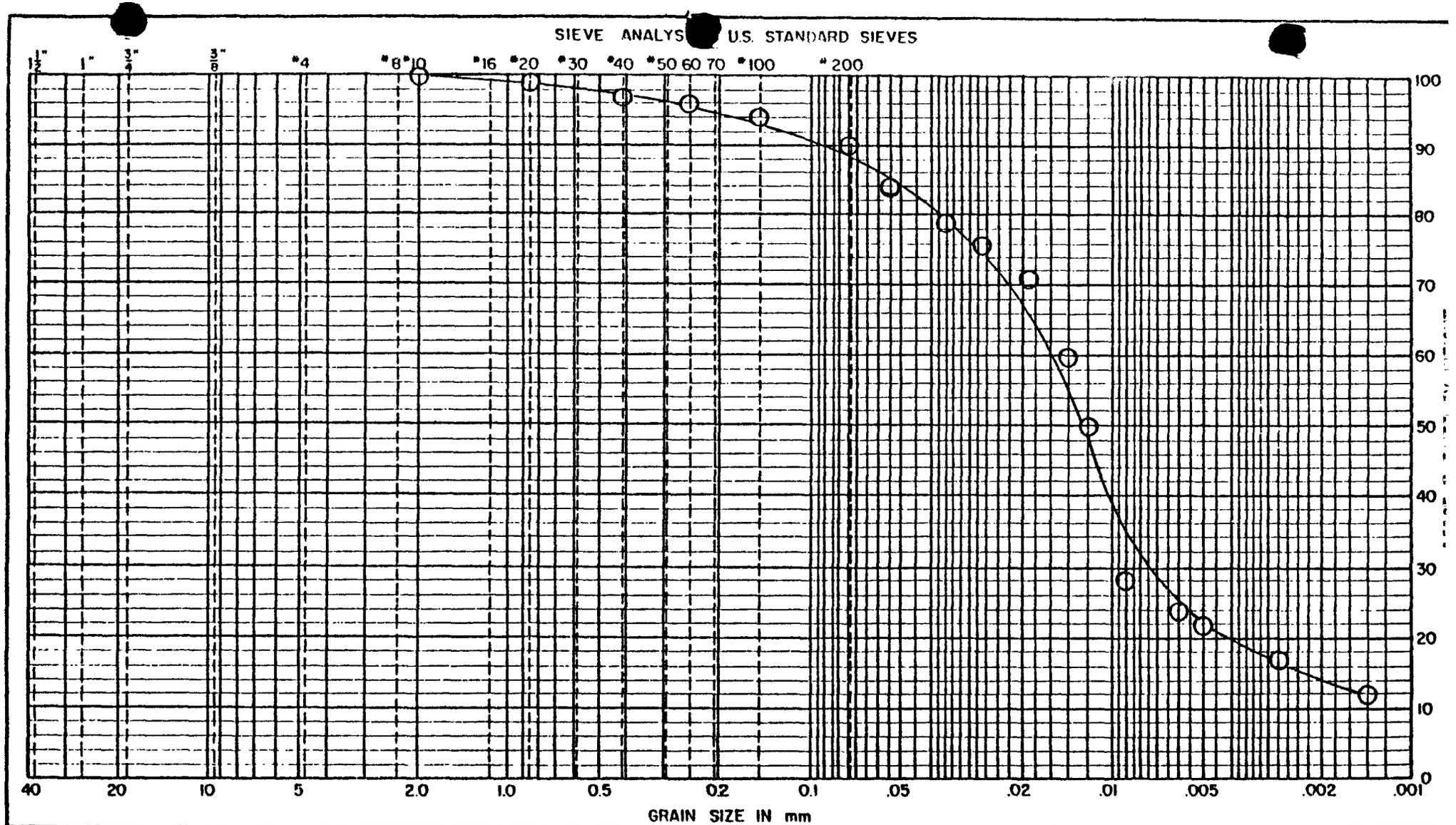
CHECKED BY Chu 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004559



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 212

TOTAL WET DENSITY (pcf) 87

SPECIFIC GRAVITY 2.51

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to gray, organic SILT with a little clay and medium to fine grained sand

BURMISTER- Black to gray Organic SILT little(-), medium to fine Sand, little Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 13

PERCENT SILT (74.0-2.0 μm) 73

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. S42RA 3451 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY: 7-10-85

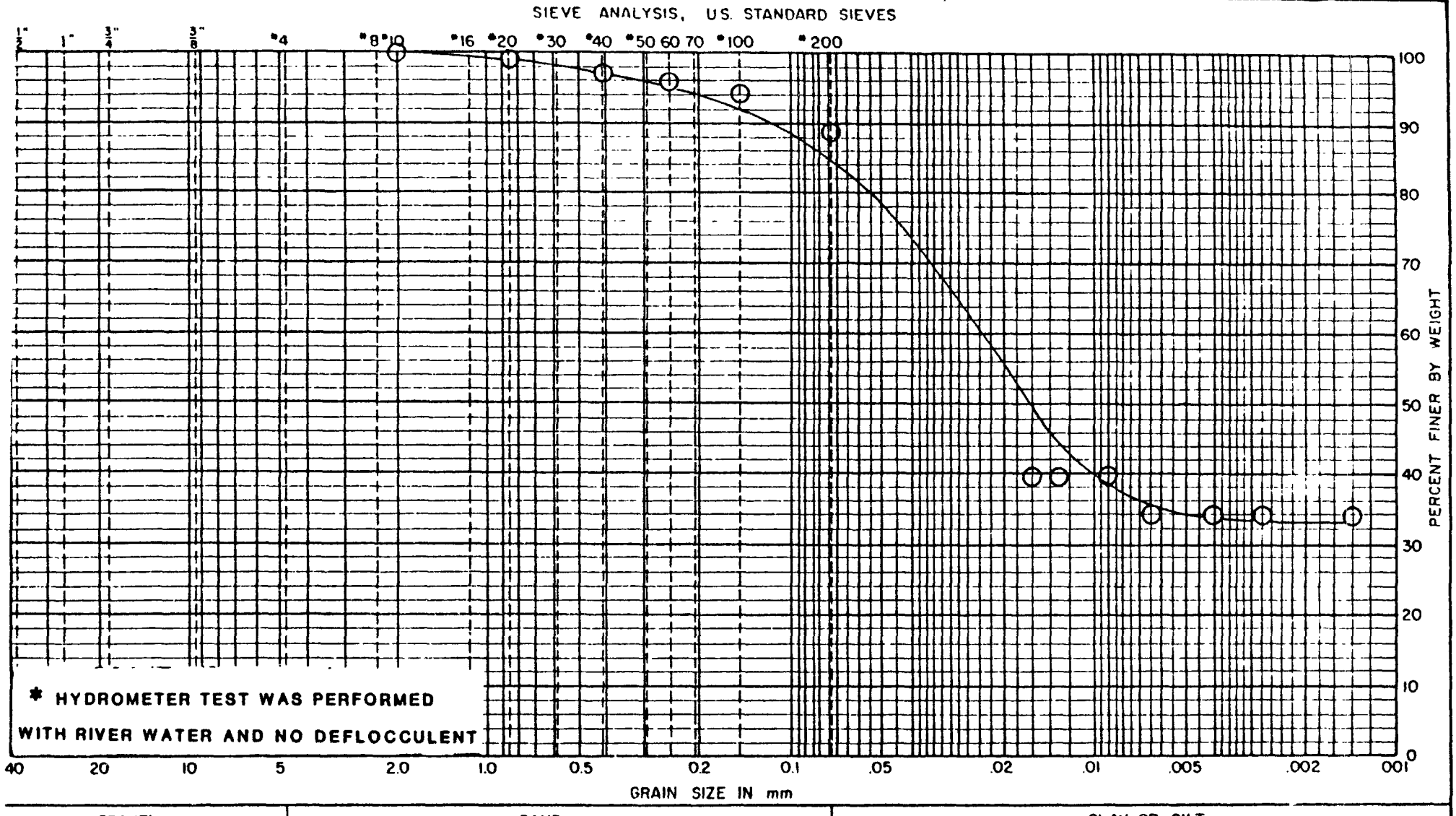
CHECKED BY: 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004560



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 212

TOTAL WET DENSITY (pcf) 87

SPECIFIC GRAVITY 2.51

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to gray, organic SILT or CLAY* with little fine sand

BURMISTER- Black to gray Organic SILT or CLAY* little, fine sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 14

PERCENT SILT (74.0-2.0 µm) } 86

PERCENT CLAY (<2.0 µm)

SAMPLE NO. S42RA 3451 200 MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY: tew 7-11-85

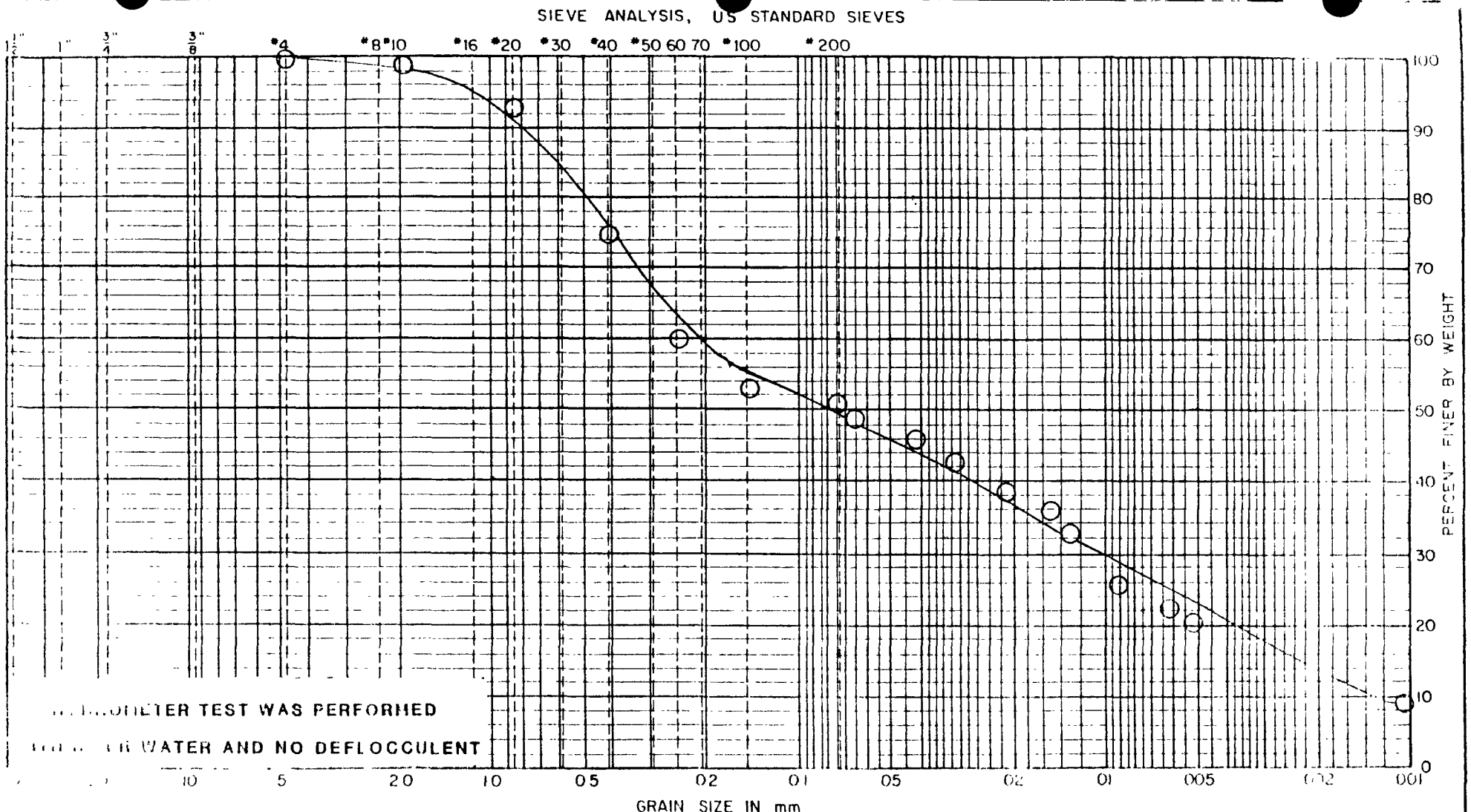
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004561



	SAND			CLAY OR SILT
FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, organic Clayey SILT and medium to fine Sand, little Peat

BURMISTER- Gray Organic SILT and medium to fine Sand little Clay, little Peat.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 40

PERCENT SILT (74.0-2.0 µm) 46

PERCENT CLAY (<2.0 µm) 14

...CONTENT (%) 47

TOTAL WET DENSITY (pcf) 99

SPECIFIC GRAVITY

SAMPLE NO. S42RA 3452 ... RIVER

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-21-85

DRAWN BY tcw 7-10-85

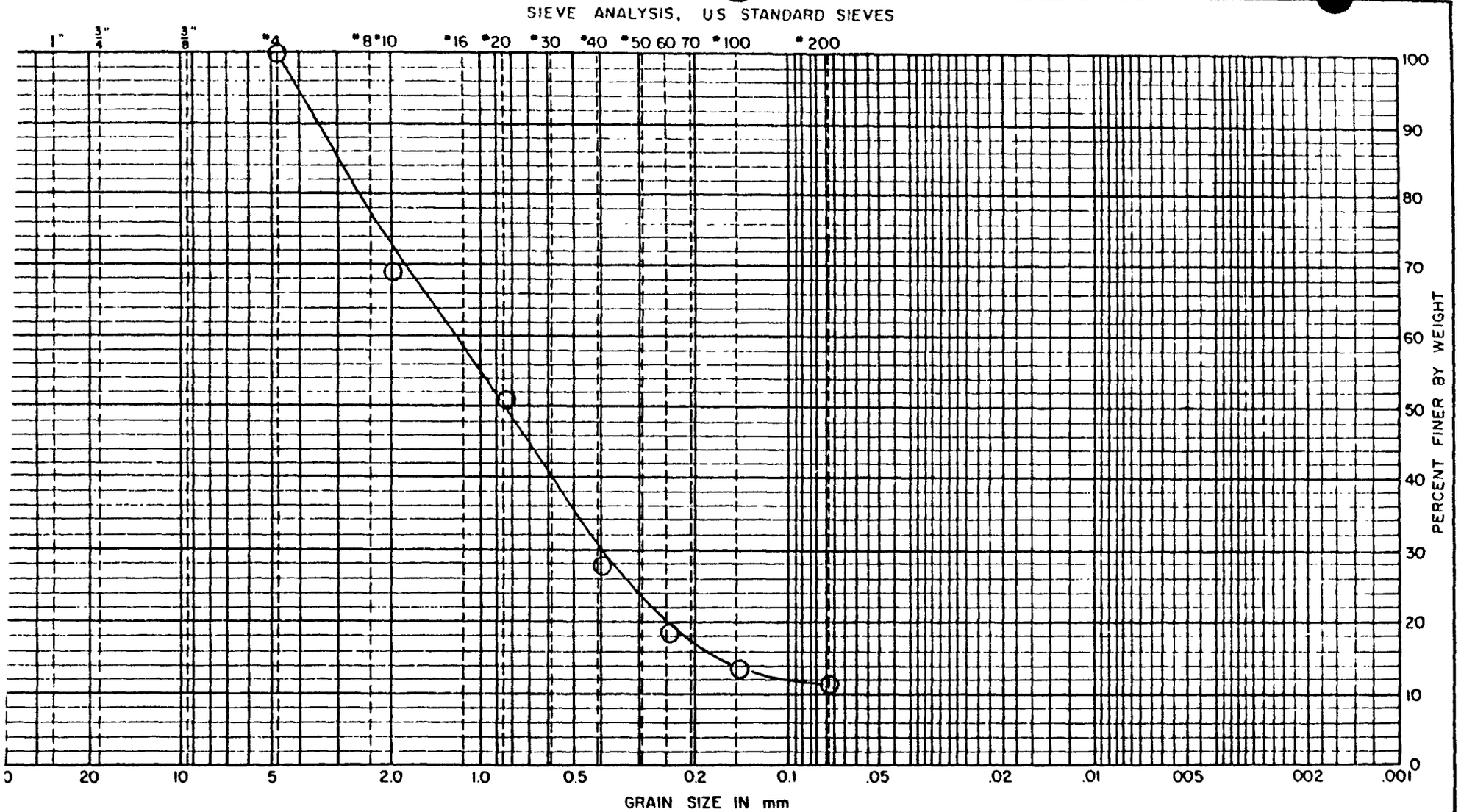
CHECKED BY [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO

DEP\DA0004562



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 16

TOTAL WET DENSITY (pcf) 125

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Red brown, poorly graded SAND, with trace of silt and clay

BURMISTER- Red brown coarse to fine SAND, trace Silt and Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 88

PERCENT SILT (74.0-2.0 µm) 8

PERCENT CLAY (<2.0 µm) 4

SAMPLE NO. S42RA 3453 202 MY

SAMPLE DEPTH, ft. 4-6 (?)

SAMPLING DATE 5-21-85

DRAWN BY: SAG 7-10-85

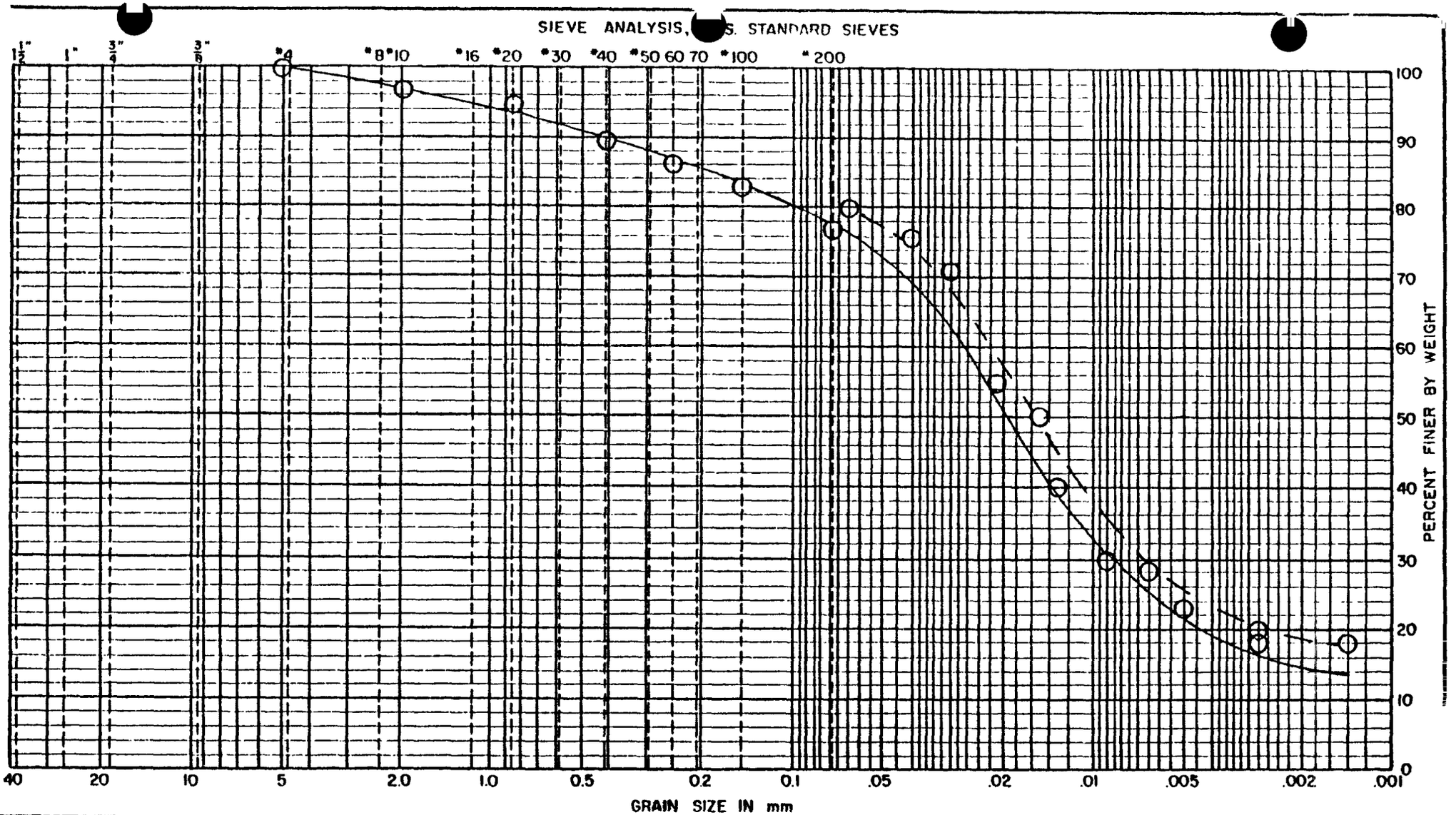
CHECKED BY: Qu 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004563



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some medium to fine grained sand and a little clay

BURMISTER- Black Organic SILT some(-), medium to fine Sand, little Clay

MOISTURE CONTENT (%) 143

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY 2.42

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 23

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. S43RA 3461 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY: tew 7-11-85

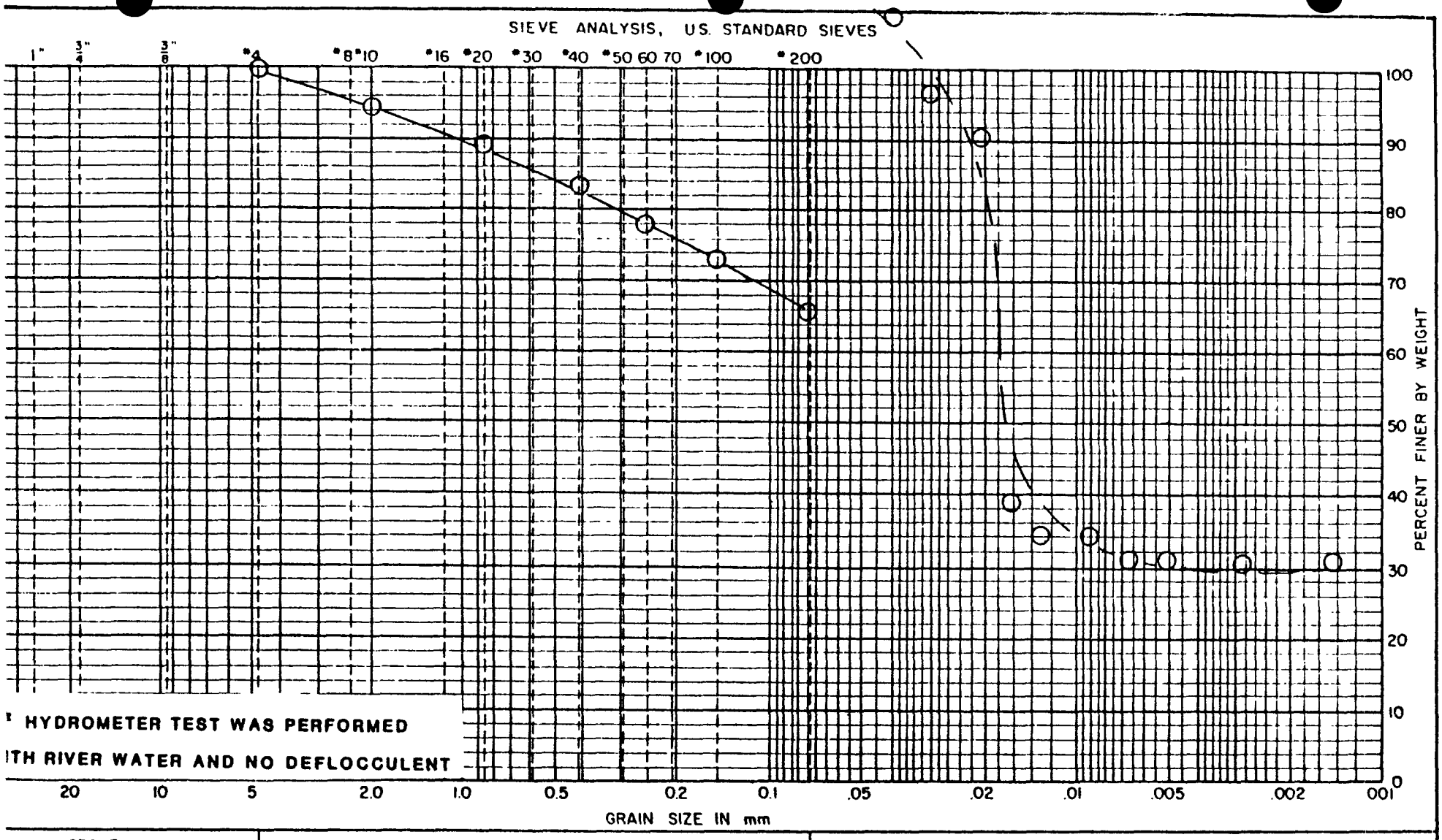
CHECKED BY: [illegible] 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004564



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT or CLAY* with some medium to fine sand

BURMISTER - Black Organic SILT or CLAY* some(+), medium to fine Sand

OISTURE CONTENT (%) 143

OTAL WET DENSITY (pcf) 80

PECIFIC GRAVITY 2.42

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 34

PERCENT SILT (74.0-2.0 μm) } 66

PERCENT CLAY (<2.0 μm)

SAMPLE NO. S43RA 3461 200 MY RIVER

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-21-85

DRAWN BY: SAG 7-10-85

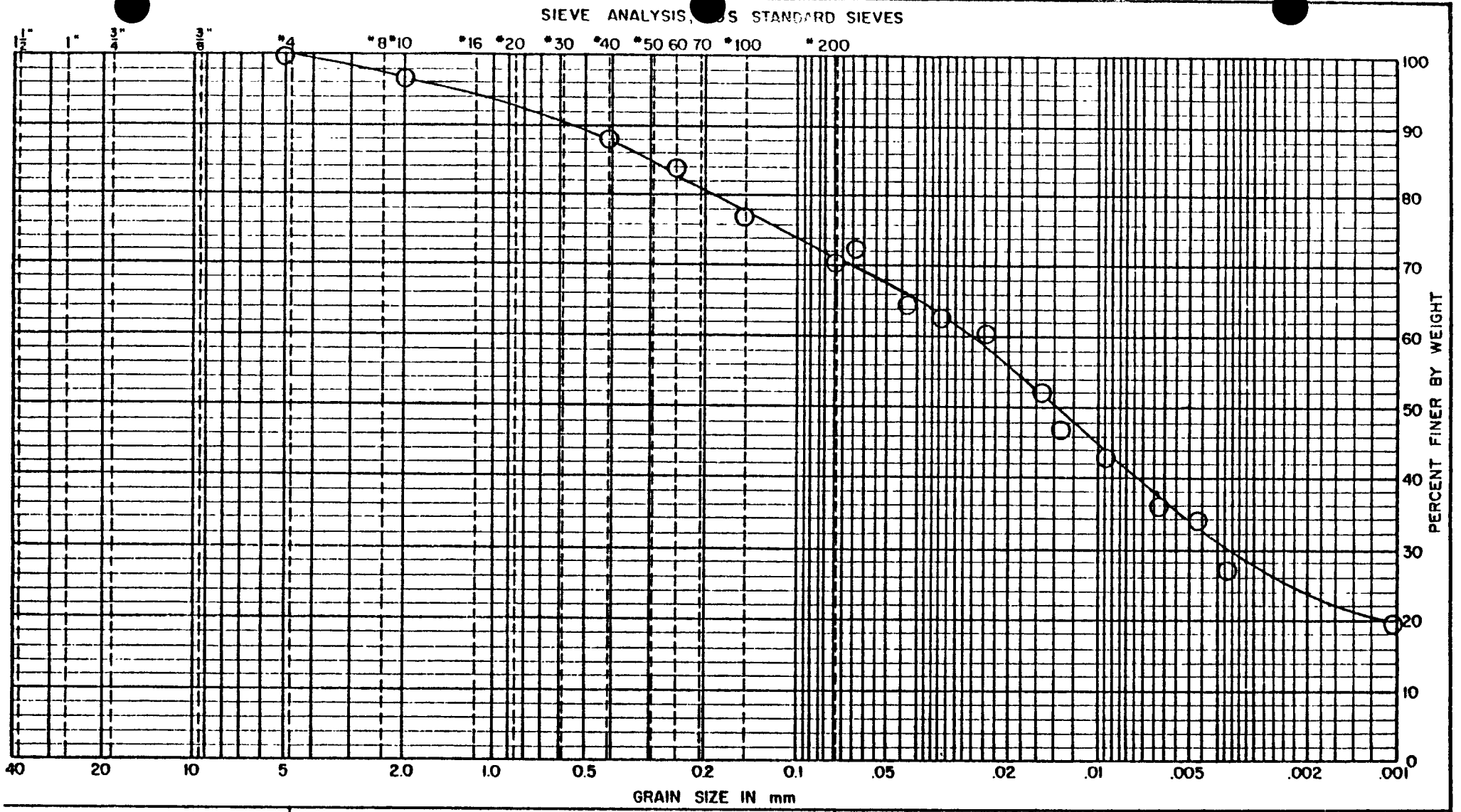
CHECKED BY Ch 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004565



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some sand and clay

BURMISTER- Black Organic SILT, some(+) Sand, some(-) Clay.

MOISTURE CONTENT (%) N/A

TOTAL WET DENSITY (pcf) 91

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 30

PERCENT SILT (74.0-2.0 µm) 46

PERCENT CLAY (<2.0 µm) 24

SAMPLE NO. S43RA 3462 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-21-85

DRAWN BY: tao 7-10-85

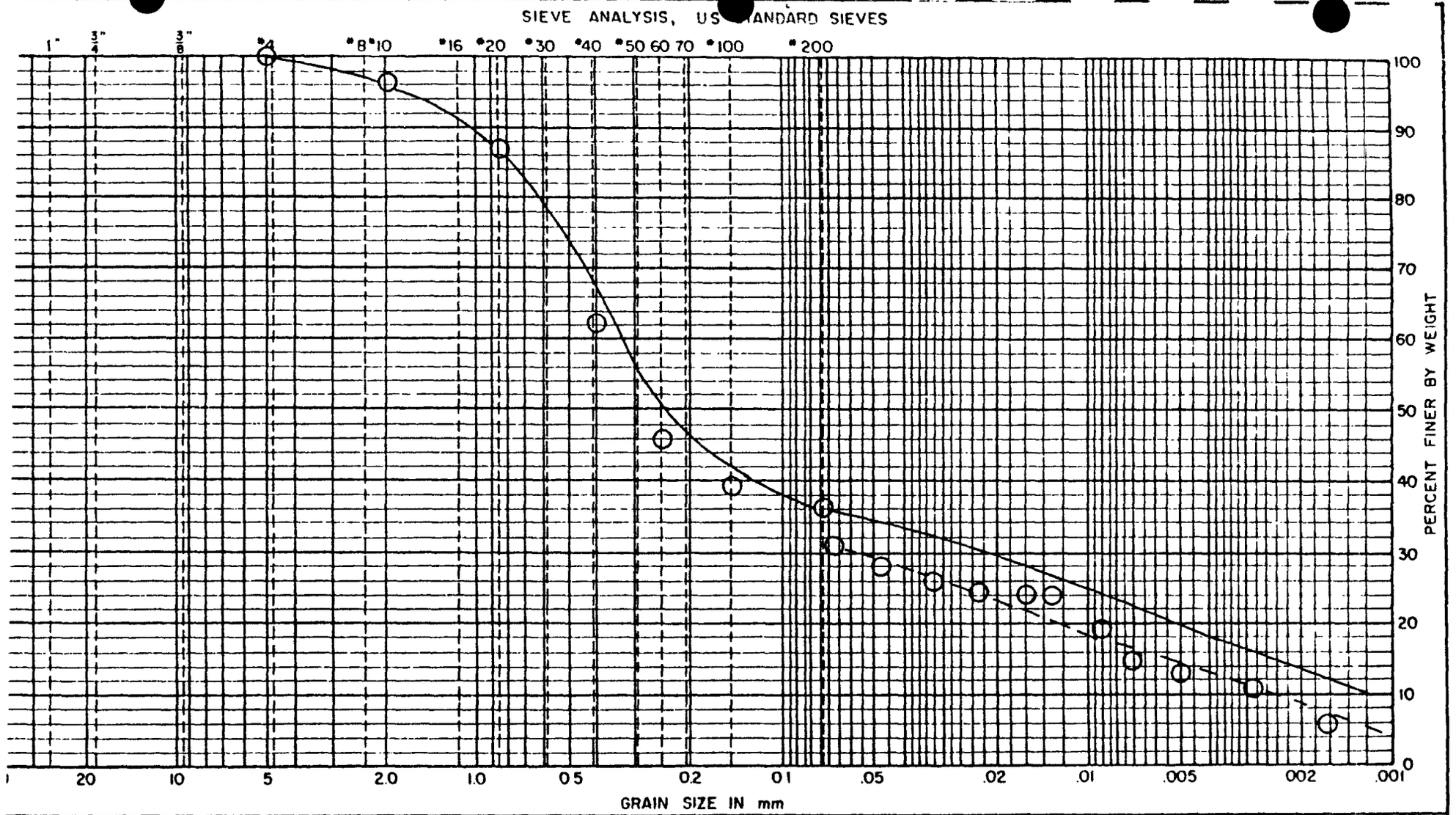
CHECKED BY: Ph 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004566



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown to gray, medium to fine grained SAND with some silt and a little clay

BURMISTER- Brown to gray medium to fine SAND, some(-) Silt, little Clay

MOISTURE CONTENT (%) 38

TOTAL WET DENSITY (pcf) 111

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 64

PERCENT SILT (74.0-2.0 μm) 22

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. S43RA 3463 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-21-85

DRAWN BY: tcw 7-11-85

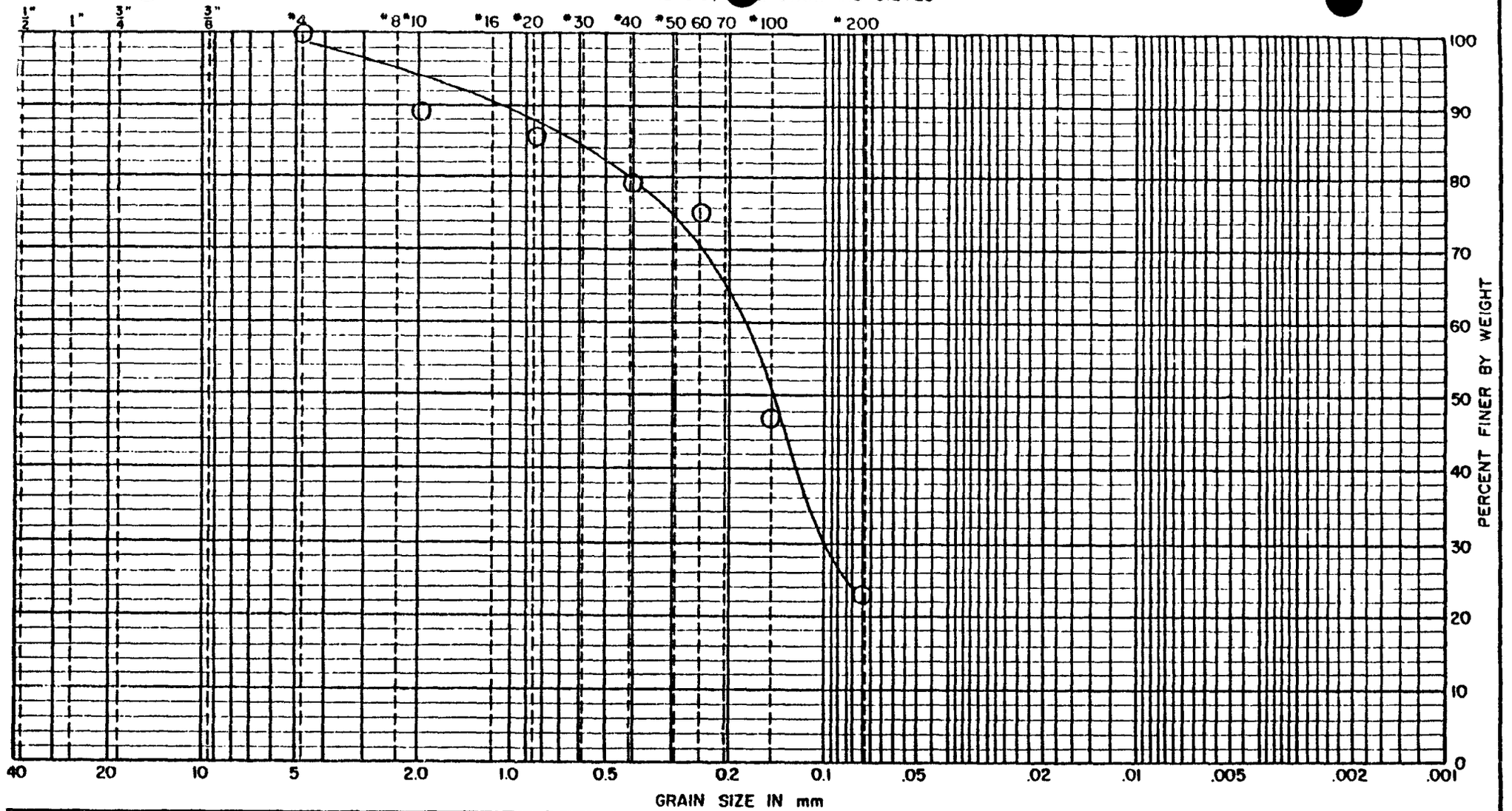
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004567



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 18

TOTAL WET DENSITY (pcf) 135

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown to brown, coarse to fine grained SAND, with some silt and clay

BURMISTER- Dark brown to brown coarse to fine SAND, some(-) Silt and Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 77

PERCENT SILT (74.0-2.0 µm) } 23

PERCENT CLAY (<2.0 µm) _____

SAMPLE NO. S43RA 3464 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-21-85

DRAWN BY: SAG 7-10-85

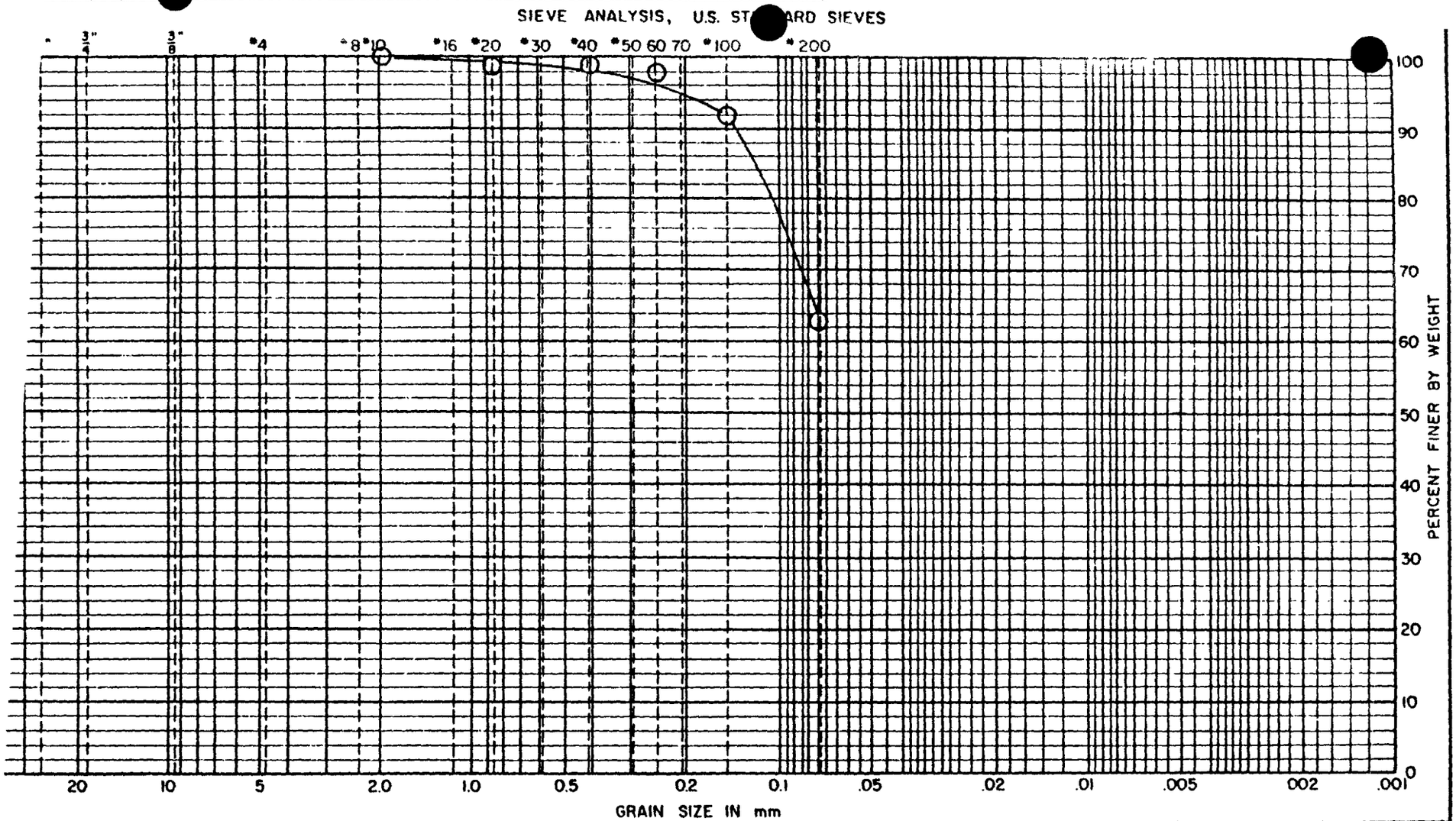
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004568



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown to tan, SILT or CLAY* and medium to fine SAND

BURMISTER- Brown to tan SILT or CLAY* and medium to fine Sand

MOISTURE CONTENT (%) 20

TOTAL WET DENSITY (pcf) 132

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 37

PERCENT SILT (74.0-2.0 µm) } 63

PERCENT CLAY (<2.0 µm)

SAMPLE NO. S43RA 3465 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-21-85

DRAWN BY: SAG 7-10-85

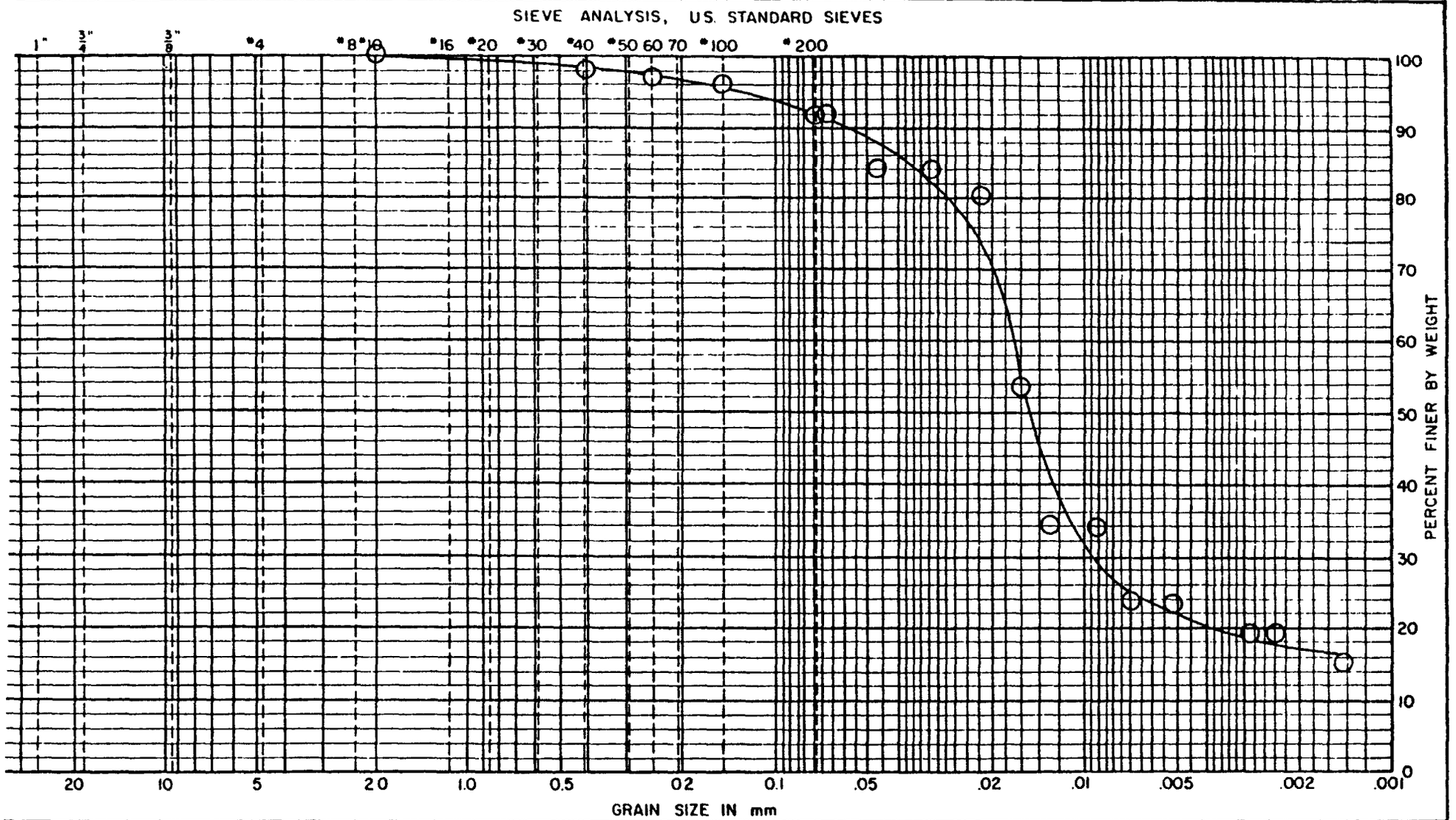
CHECKED BY: Ch 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004569



GRAVEL		SAND			CLAY OR SILT
OARSE	FINE	COARSE	MEDIUM	FINE	

IOISTURE CONTENT (%) 218

OTAL WET DENSITY (pcf) 132

PECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with a lttle clay and a trace of fine grained sand and plant fibers

BURMISTER- Black Organic SILT trace(+), fine Sand, little(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 74

PERCENT CLAY (<2.0 μm) 17

SAMPLE NO. S44LA 3379 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-20-85

DRAWN BY: CL 7-10-85

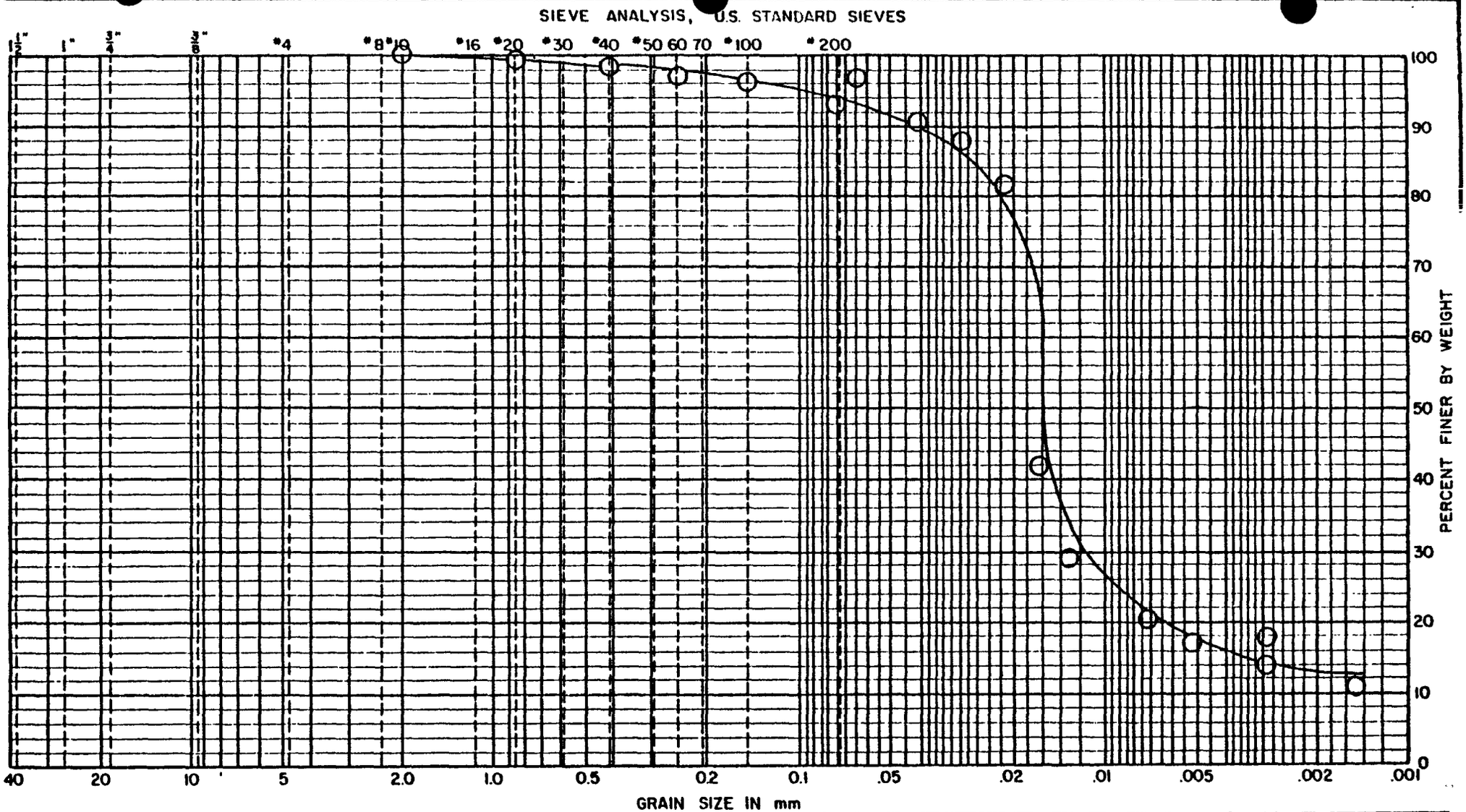
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004570



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with a little clay and trace of sand

BURMISTER- Black Organic SILT, little Clay, trace, fine Sand

MOISTURE CONTENT (%) 164

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 79

PERCENT CLAY (<2.0 µm) 15

SAMPLE NO. S44LA 3380 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-20-85

DRAWN BY: tw 7-10-85

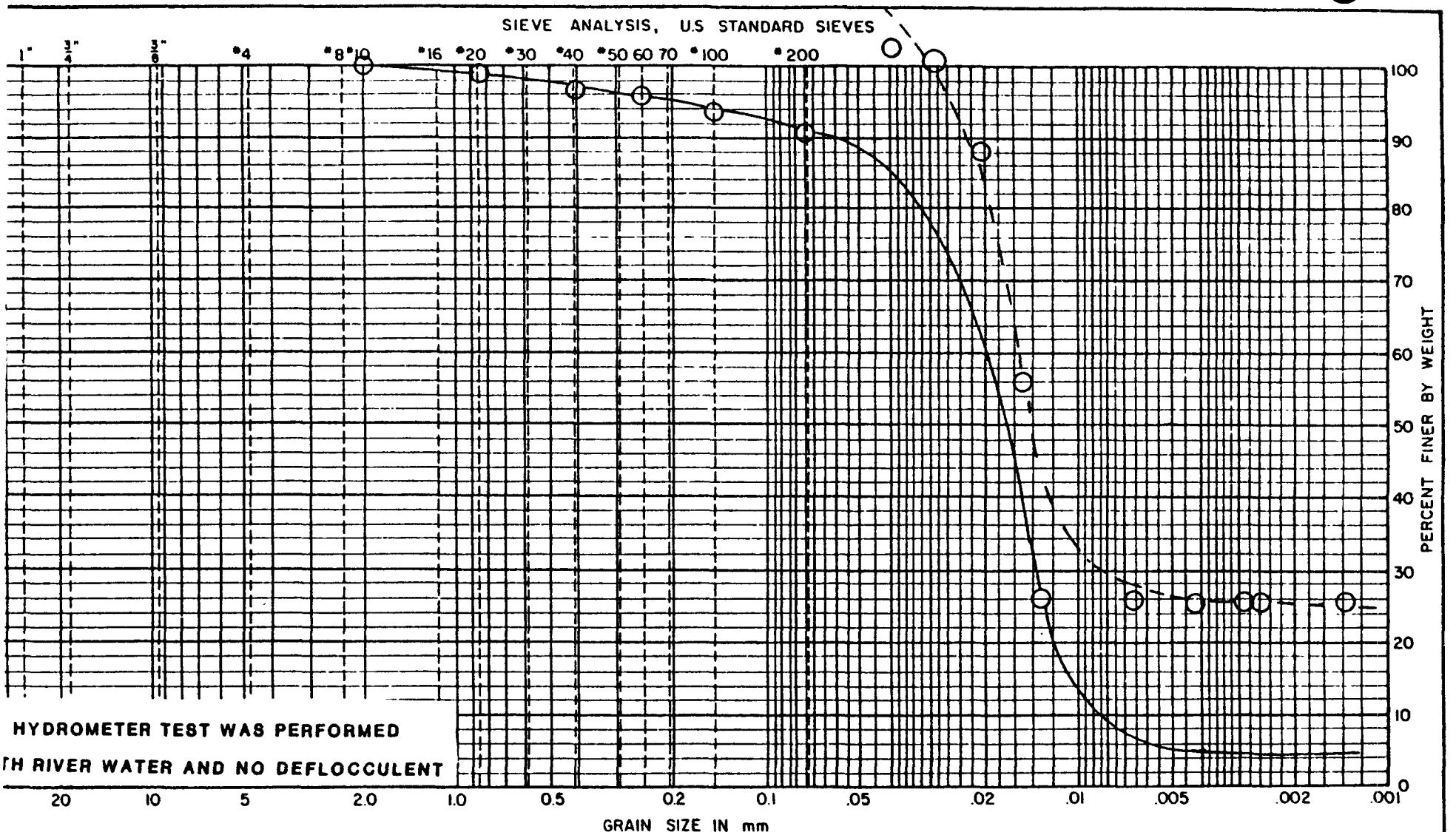
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004571



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT or CLAY* with trace of fine sand

BURMISTER- Black Organic SILT or CLAY*, trace(+) fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) } 92

PERCENT CLAY (<2.0 µm)

DISTURE CONTENT (%) 164

TAL WET DENSITY (pcf) 78

ECIFIC GRAVITY

SAMPLE NO. S44LA 3380 201 MY RIVER

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-20-85

DRAWN BY: 7-11-85

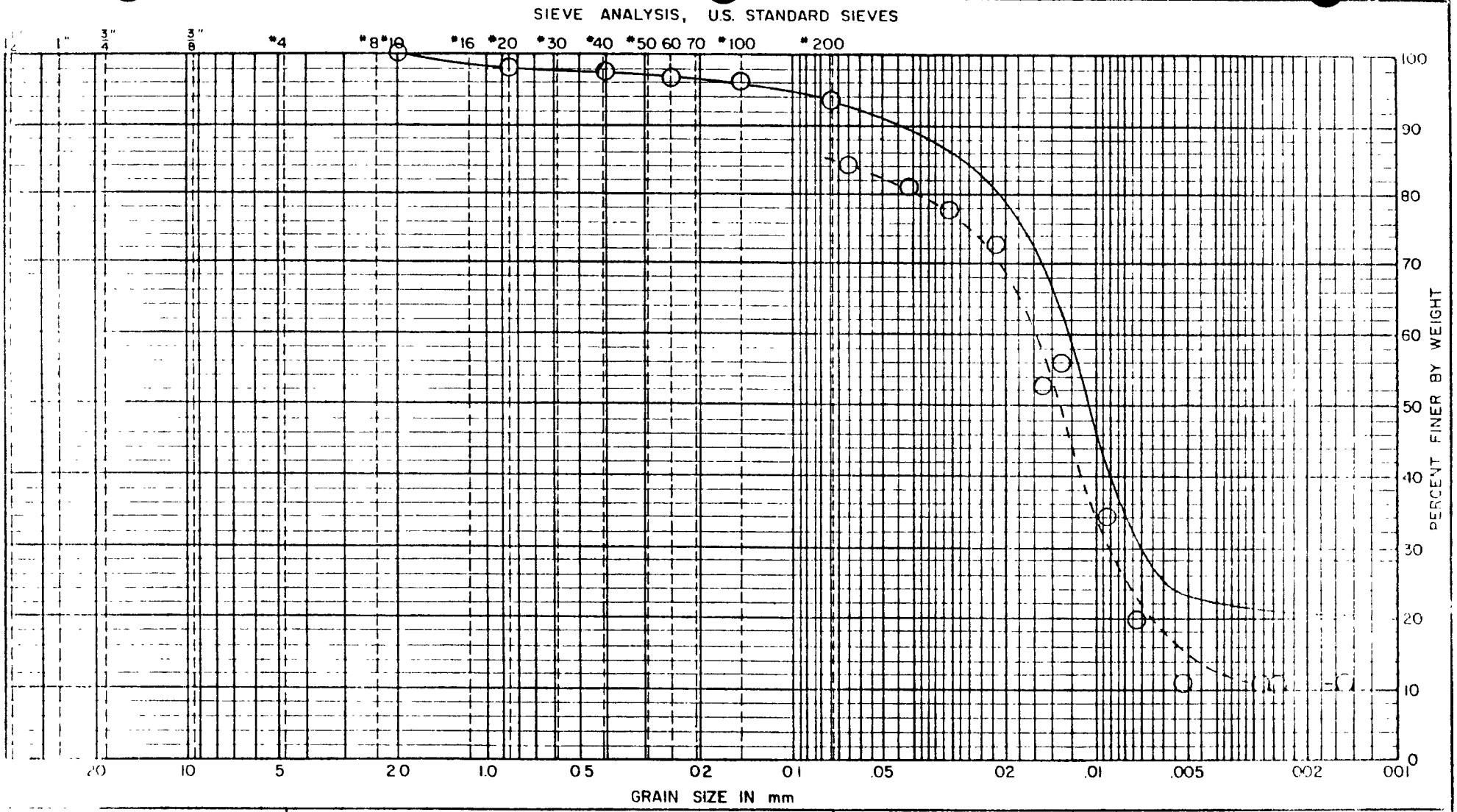
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004572



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of fine grained sand and plant fibers

BURMISTER- Black Organic SILT trace(+), fine Sand, some(-) Clay

MOISTURE CONTENT (%) 203

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 72

PERCENT CLAY (<2.0 μm) 21

SAMPLE NO. S44LA 3381 202 M7

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-20-85

DRAWN BY: Gw 7-10-85

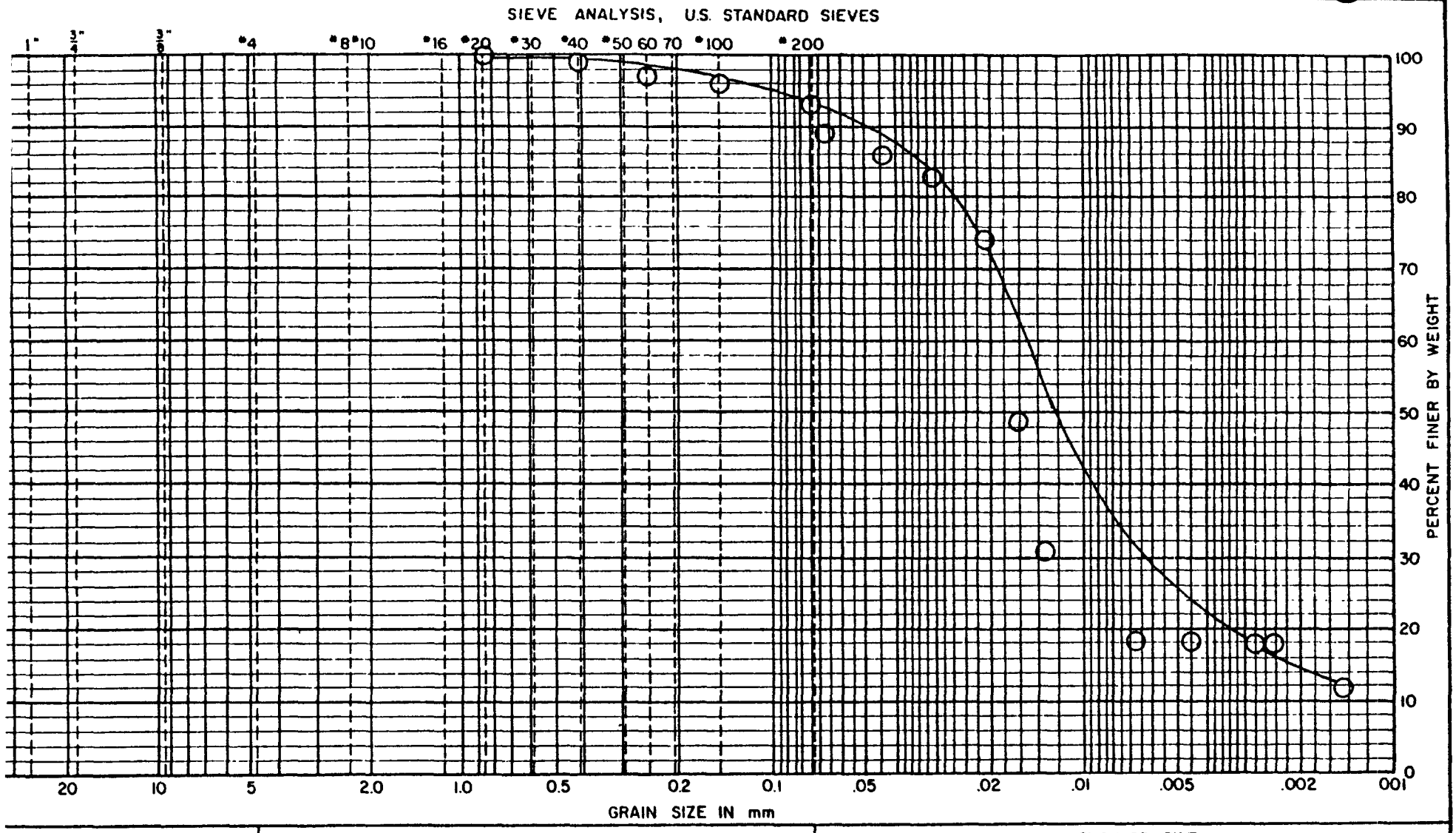
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004573



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black organic SILT with little clay and trace of fine sand

BURMISTER- Black Organic SILT, little Clay trace(+), fine Sand

MOISTURE CONTENT (%) 152

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 77

PERCENT CLAY (<2.0 μm) 15

SAMPLE NO. S44LA 3382 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-20-85

DRAWN BY: tew 7-10-85

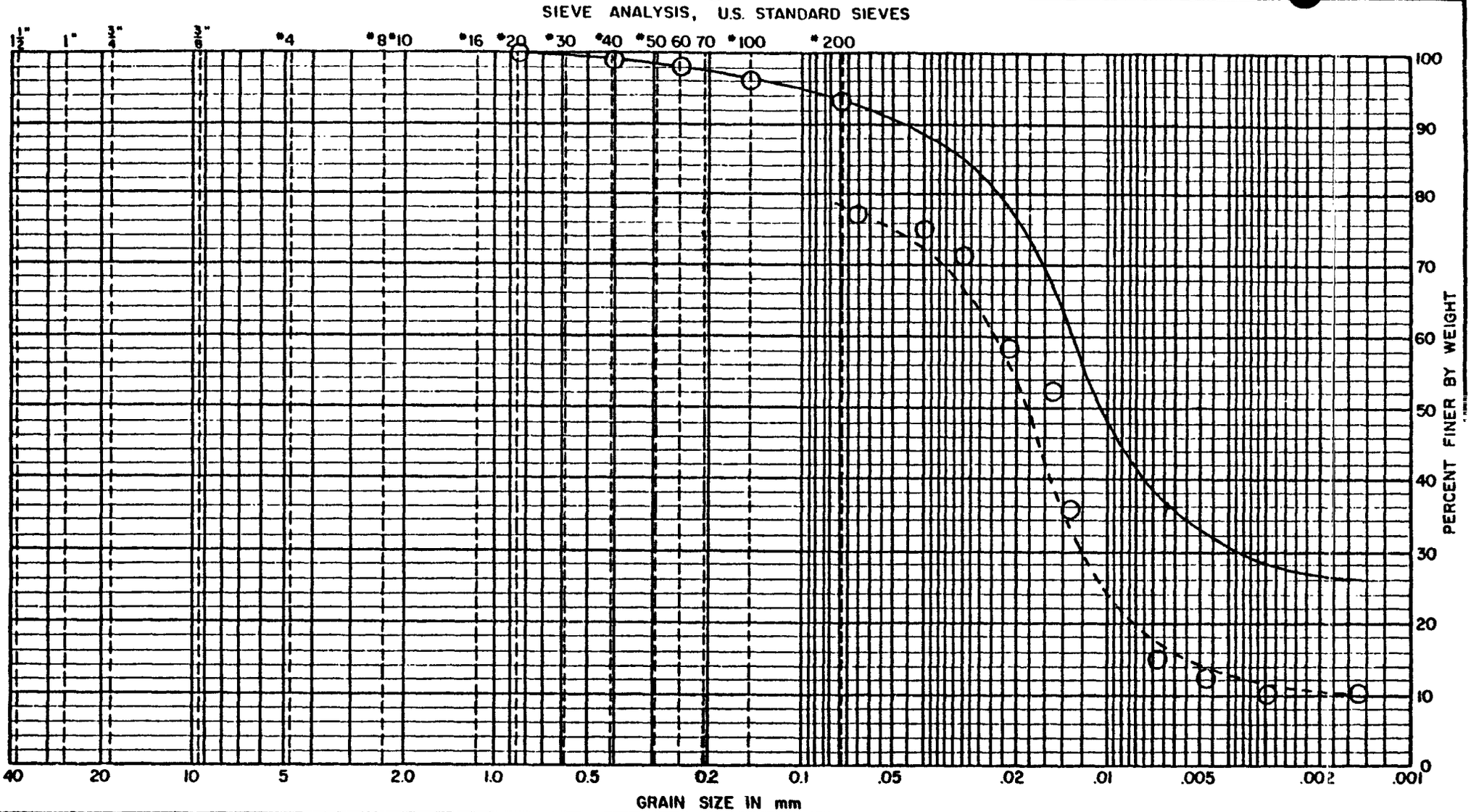
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004574



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 133

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and trace of medium to fine sand

BURMISTER- Black Organic SILT some(-) Clay trace, medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 67

PERCENT CLAY (<2.0 μm) 25

SAMPLE NO. S44LA 3383 204 M)

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-20-85

DRAWN BY Ch 7-11-85

CHECKED BY: SAG 7-12-85

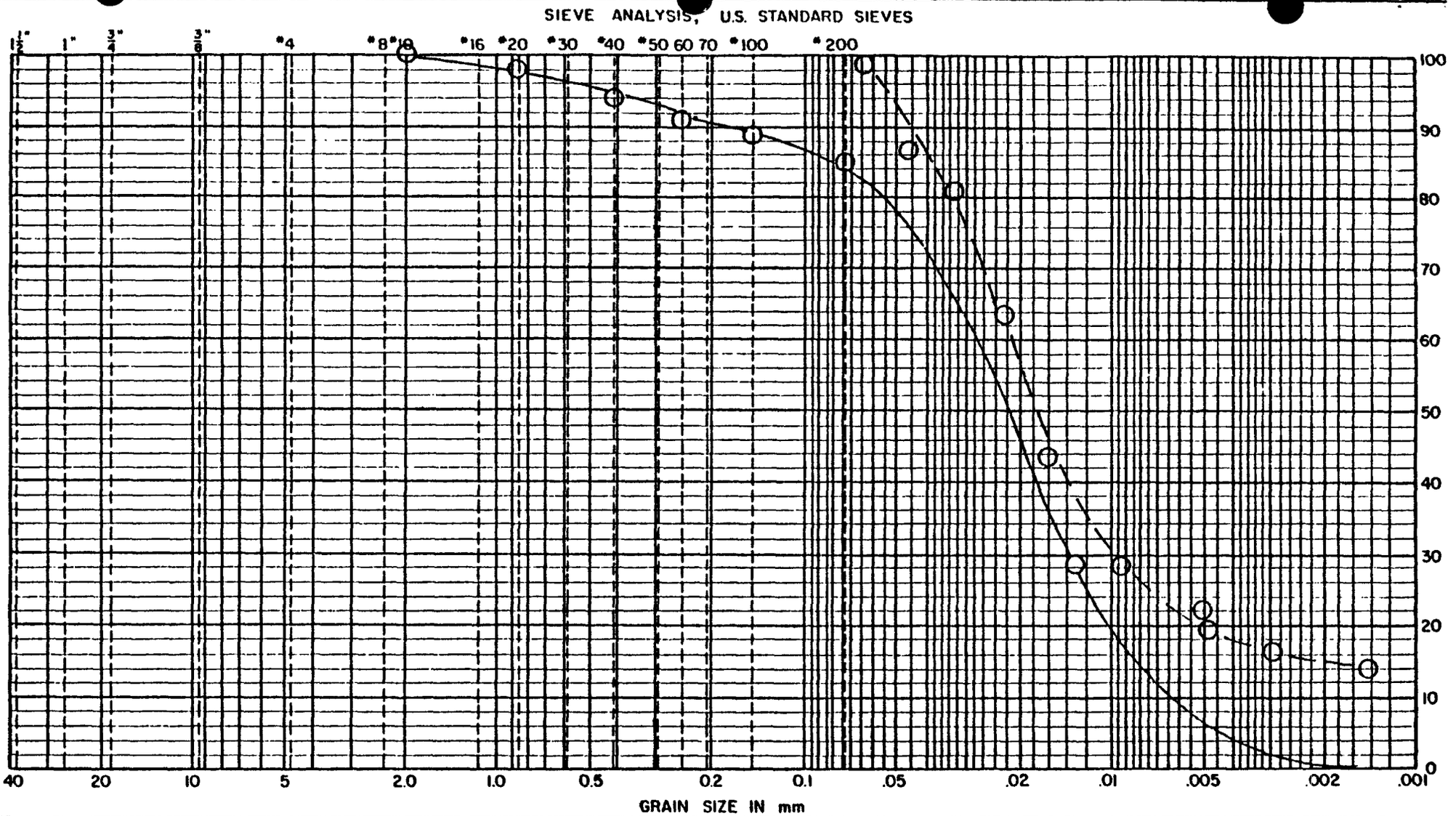
PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004575

DOWNSTREAM REACH



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 168

TOTAL WET DENSITY (pcf) 69

SPECIFIC GRAVITY 2.48

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with a little medium to fine sand

BURMISTER - Black Organic SILT little, medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 16

PERCENT SILT (74.0-2.0 µm) 82

PERCENT CLAY (<2.0 µm) 2

SAMPLE NO. D06RB 3124 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-9-85

DRAWN BY: [illegible] 7-9-85

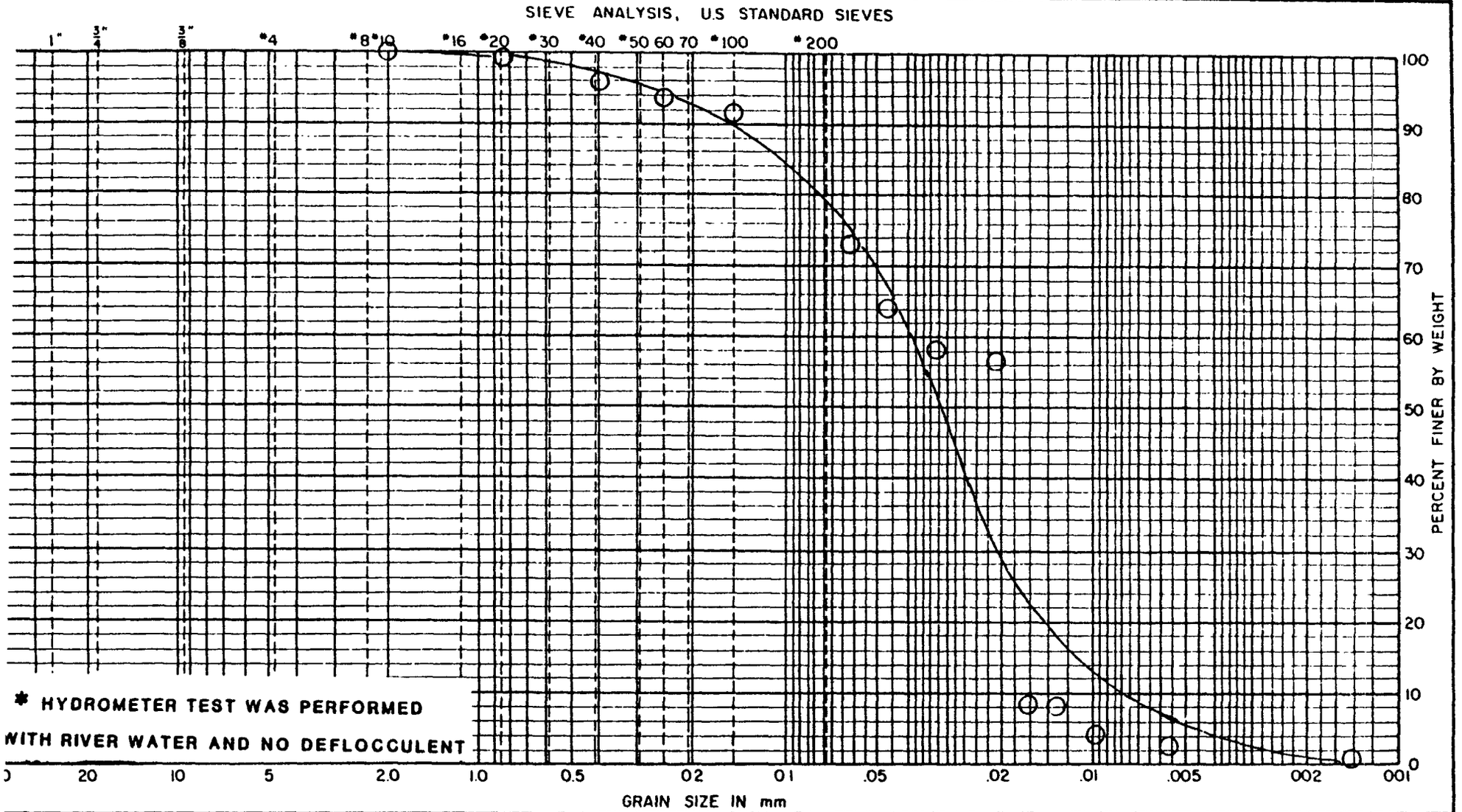
CHECKED BY: [illegible] 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004577



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 168

TOTAL WET DENSITY (pcf) 69

SPECIFIC GRAVITY 2.48

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT* with some fine sand

BURMISTER - Black Organic SILT* some(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 22

PERCENT SILT (74.0-2.0 µm) 77

PERCENT CLAY (<2.0 µm) 1

SAMPLE NO. D06RB 3124 200 MY (River water)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-9-85

DRAWN BY: [illegible] 7-9-85

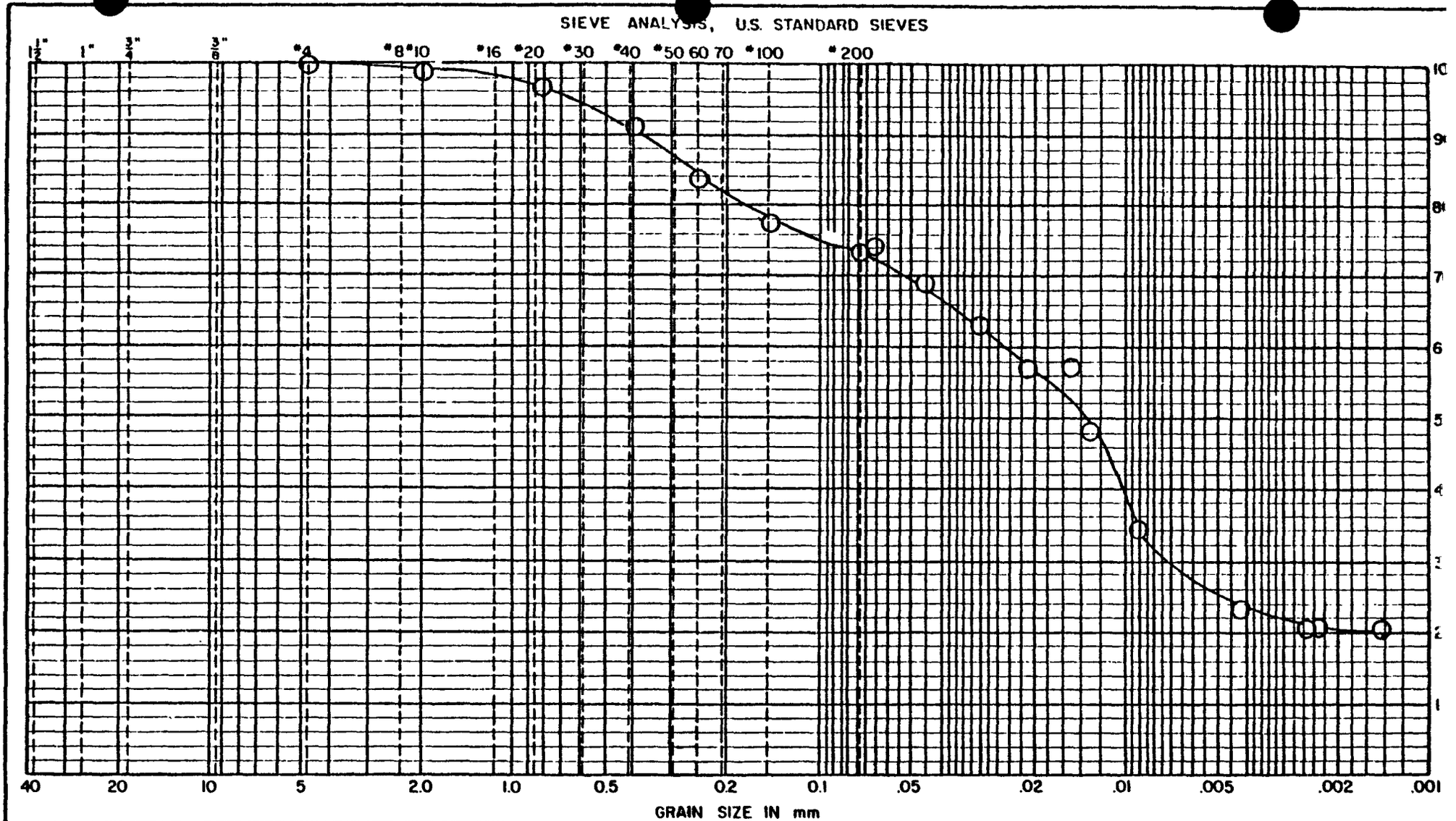
CHECKED BY [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004578



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 87

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some brown, medium to fine grained sand with a little clay

BURMISTER- Black organic SILT, some fine Sand, little(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 26

PERCENT SILT (74.0-2.0 µm) 54

PERCENT CLAY (<2.0 µm) 20

SAMPLE NO. D06RB 3126 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-9-85

DRAWN BY: SS 7-11-85

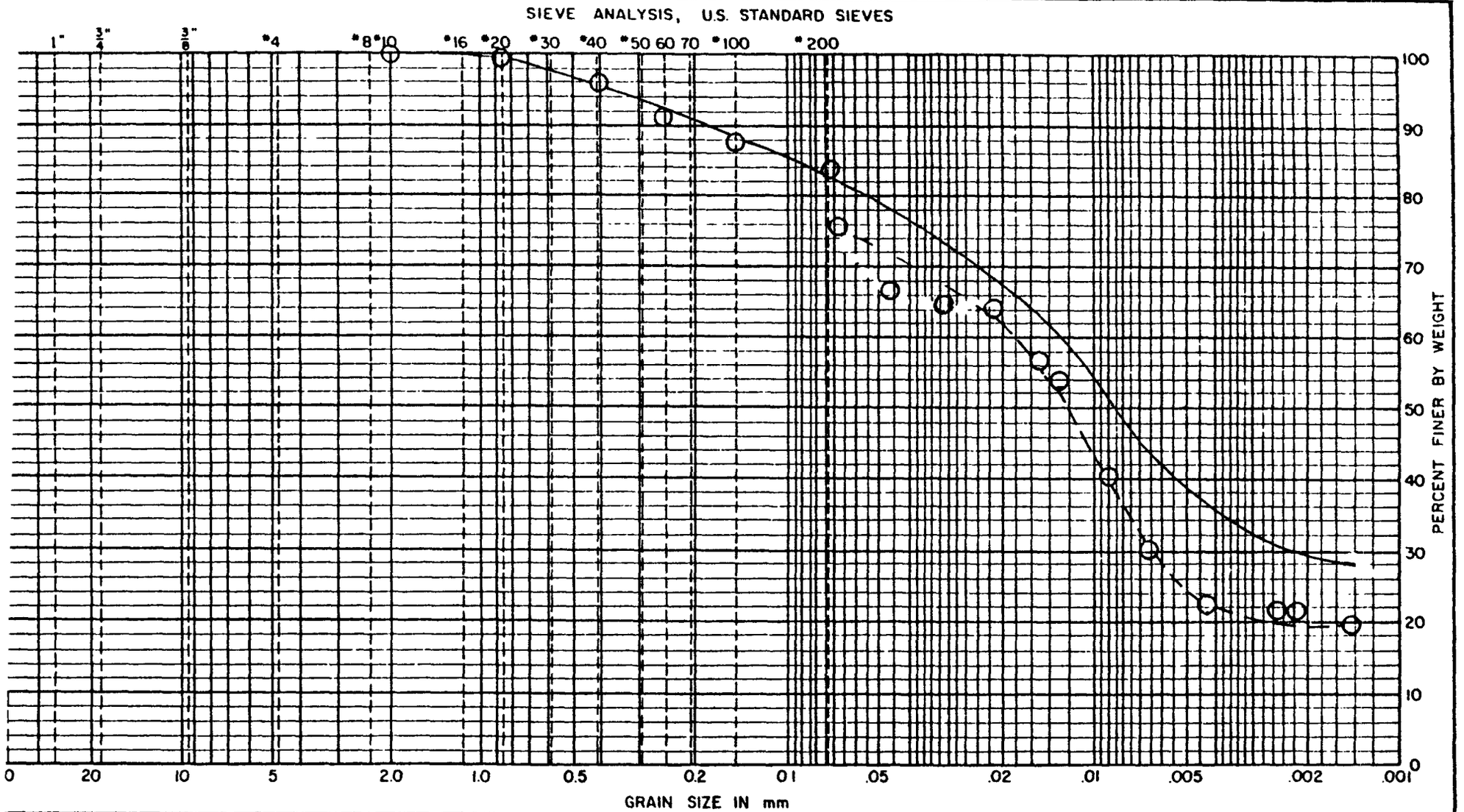
CHECKED BY: GW 9-12-85

GRADATION CURVES

PROJECT

FIG. NO

DEP\DA0004579



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, Clayey SILT with little medium to fine sand

BURMISTER-Black SILT, some Clay, little(+) medium to fine(+) Sand

MOISTURE CONTENT (%) 78

TOTAL WET DENSITY (pcf) 93

SPECIFIC GRAVITY _____

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 16

PERCENT SILT (74.0-2.0 μm) 56

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D06RB 3128 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-9-85

DRAWN BY: TZ 7-11-85

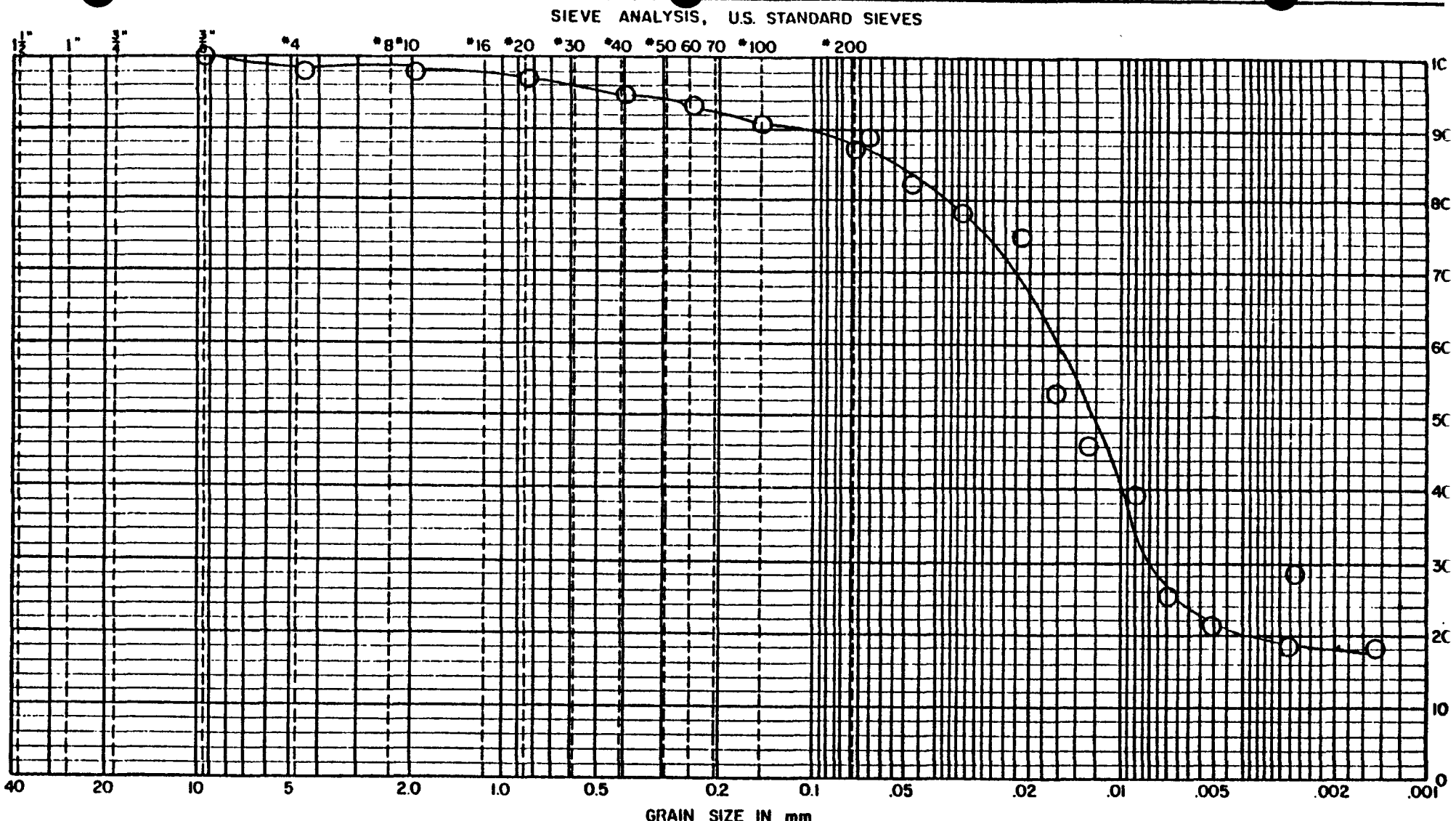
CHECKED BY: Dh 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004580



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 139

TOTAL WET DENSITY (pcf) 73

SPECIFIC GRAVITY 2.43

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT, with little medium to fine sand and trace of plant fibers

BURMISTER- Black Organic SILT little(+), Clay fine(+) Sand, little(-) medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm)	13
PERCENT SILT (74.0-2.0 μm)	69
PERCENT CLAY (<2.0 μm)	18

SAMPLE NO. D06RD 3144 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-9-85

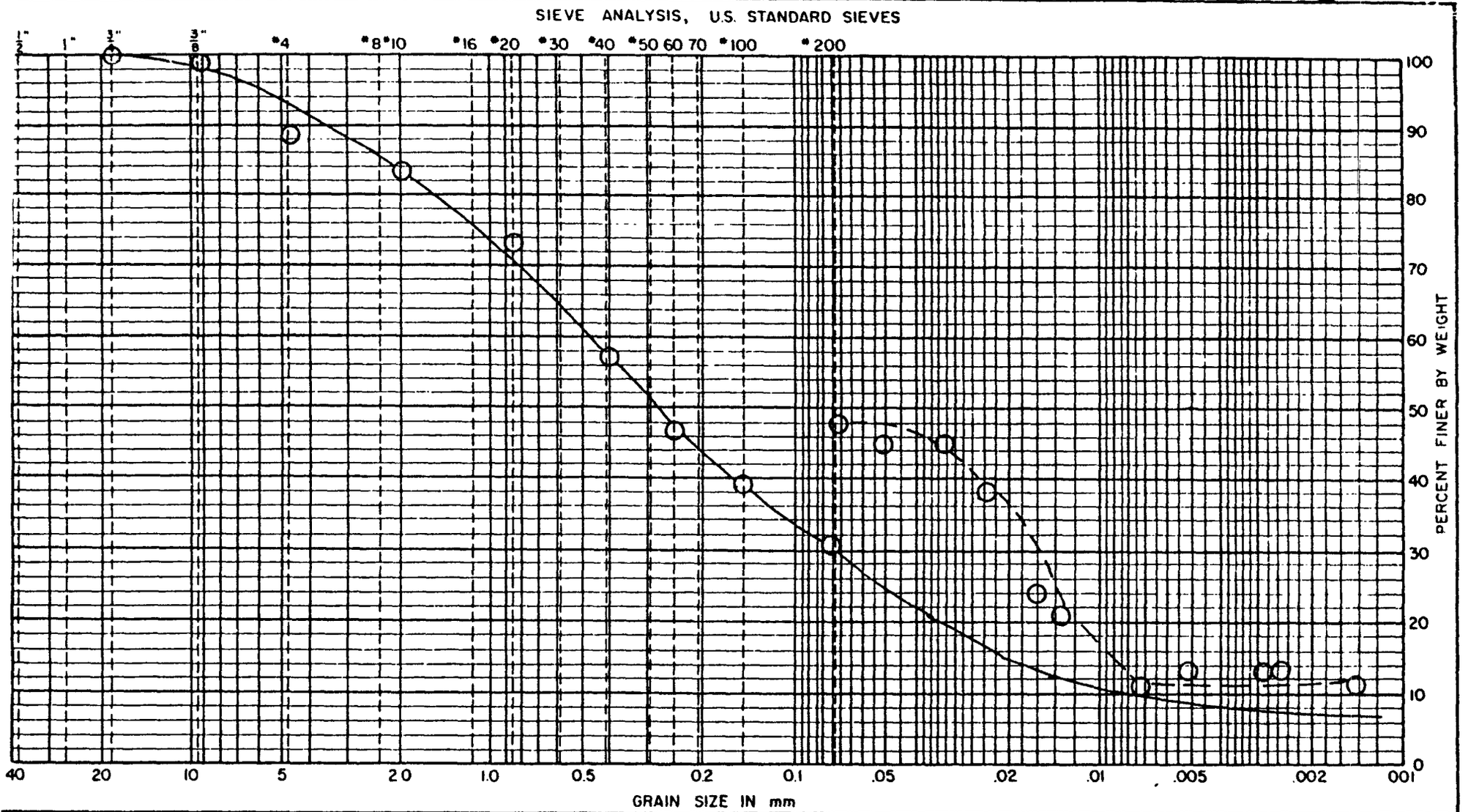
DRAWN BY Qu 7-11-85
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004581



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 72

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, coarse to fine grained, Silty SAND with trace of gravel

BURMISTER- Black coarse to fine SAND little(+), Silt, little(-) Clay, trace(+) Gravel

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 62

PERCENT SILT (74.0-2.0 μm) 24

PERCENT CLAY (<2.0 μm) 7

SAMPLE NO. D06RD 3145 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-9-85

DRAWN BY: 7-11-85

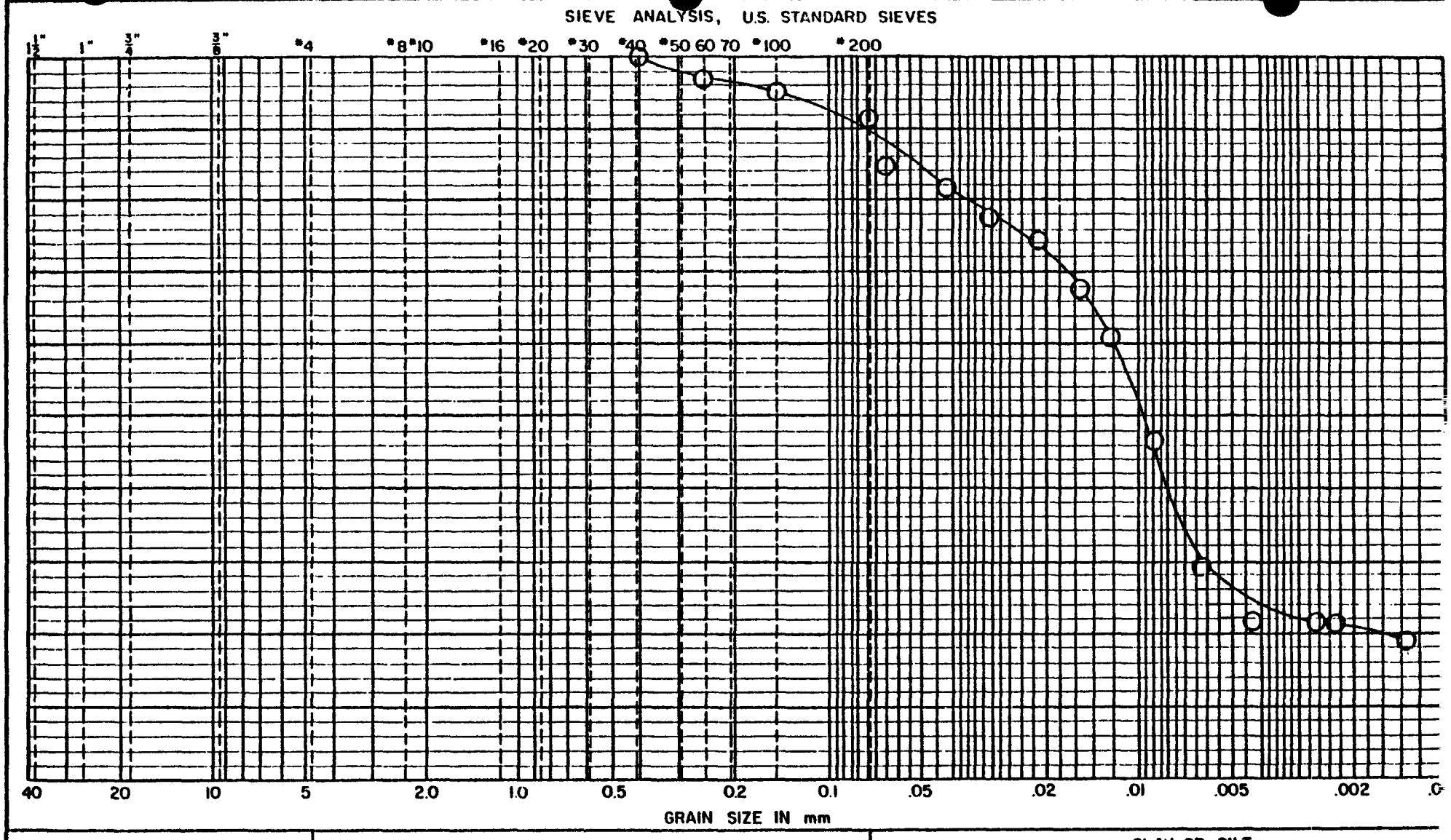
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004582



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 133

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with little clay and little sand, with fibers

BURMISTER- Black Organic SILT, little(-) Clay, little (=) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 10

PERCENT SILT (74.0-2.0 µm) 70

PERCENT CLAY (<2.0 µm) 20

SAMPLE NO. D06RD 3147 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-9-85

DRAWN BY: CL 7-11-85

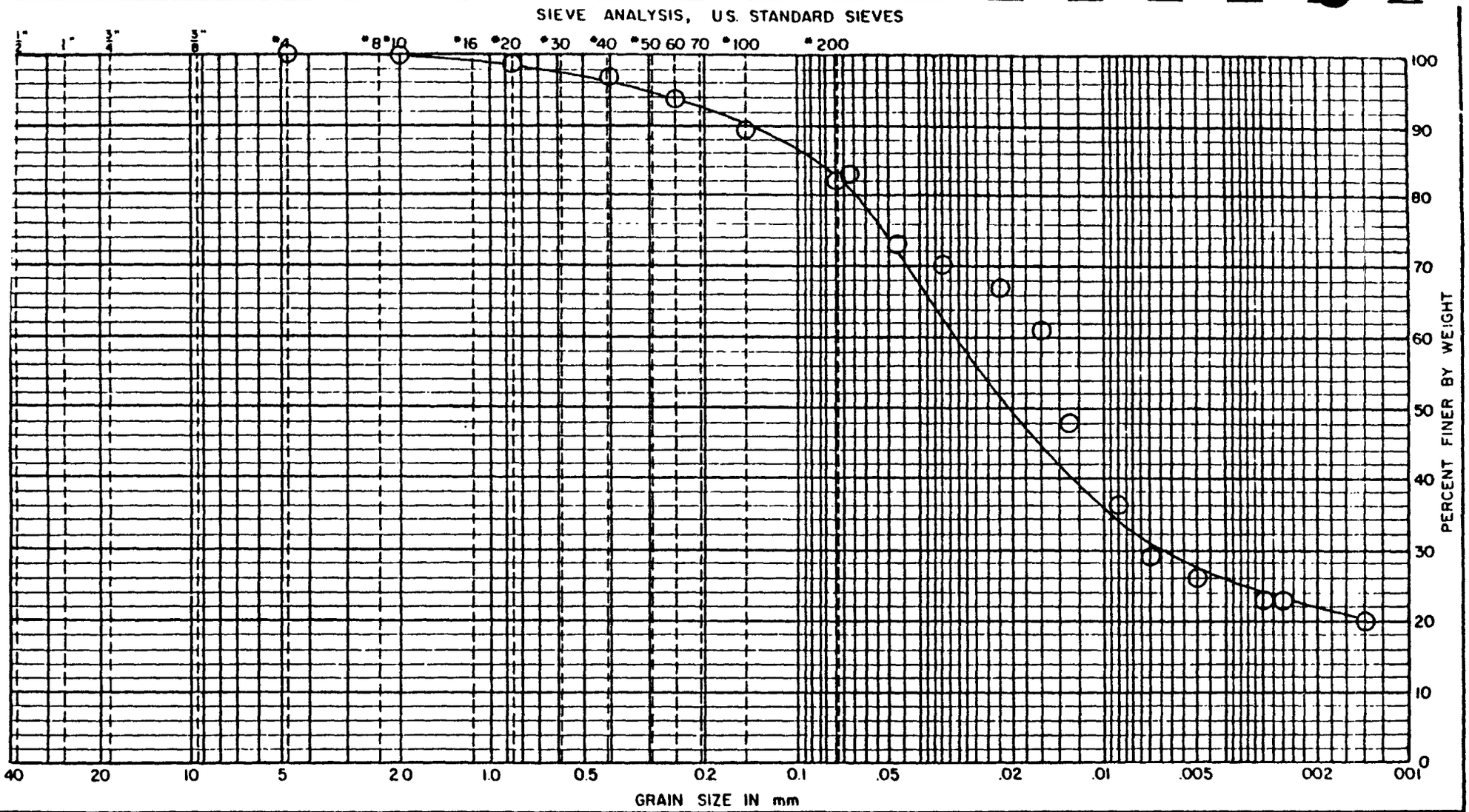
CHECKED BY: SAG 7-12-85

PROJEC

GRADATION CURVES

FIG. 1

DEP\DA0004583



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some medium to fine grained sand and clay

BURMISTER- Black Organic SILT little (+), medium to fine Sand, little Clay.

MOISTURE CONTENT (%) 94

TOTAL WET DENSITY (pcf) 95

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 19

PERCENT SILT (74.0-2.0 μm) 65

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. D06RD 3148 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-9-85

DRAWN BY: GL 7-11-85

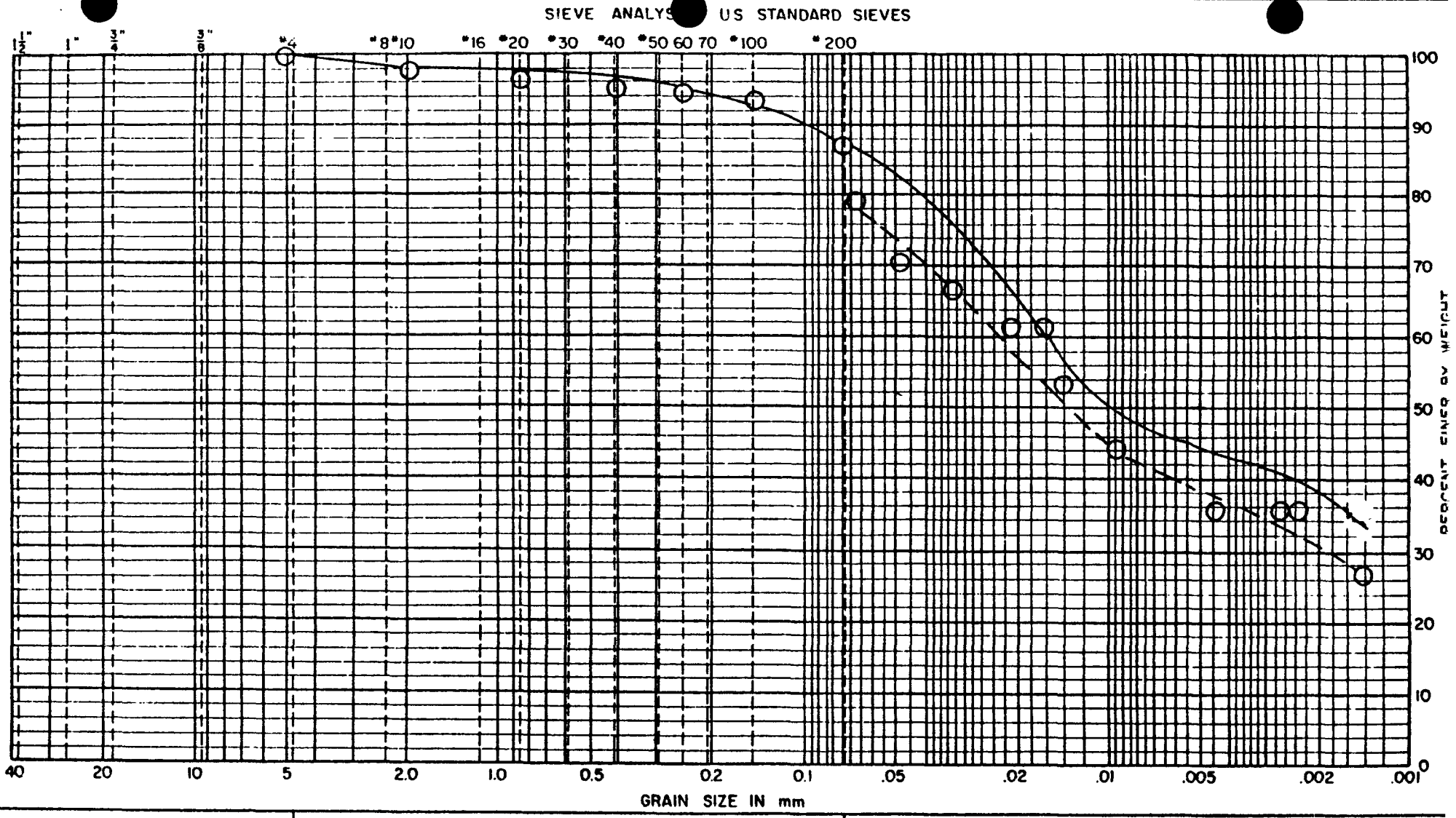
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004584



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 179

TOTAL WET DENSITY (pcf) 116

SPECIFIC GRAVITY 2.49

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with little medium to fine sand

BURMISTER- Dark gray Organic Silt and Clay little, medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 13

PERCENT SILT (74.0-2.0 μm) 49

PERCENT CLAY (<2.0 μm) 38

SAMPLE NO. D19MB 2955 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-10-85

DRAWN BY: tiw 7-11-85

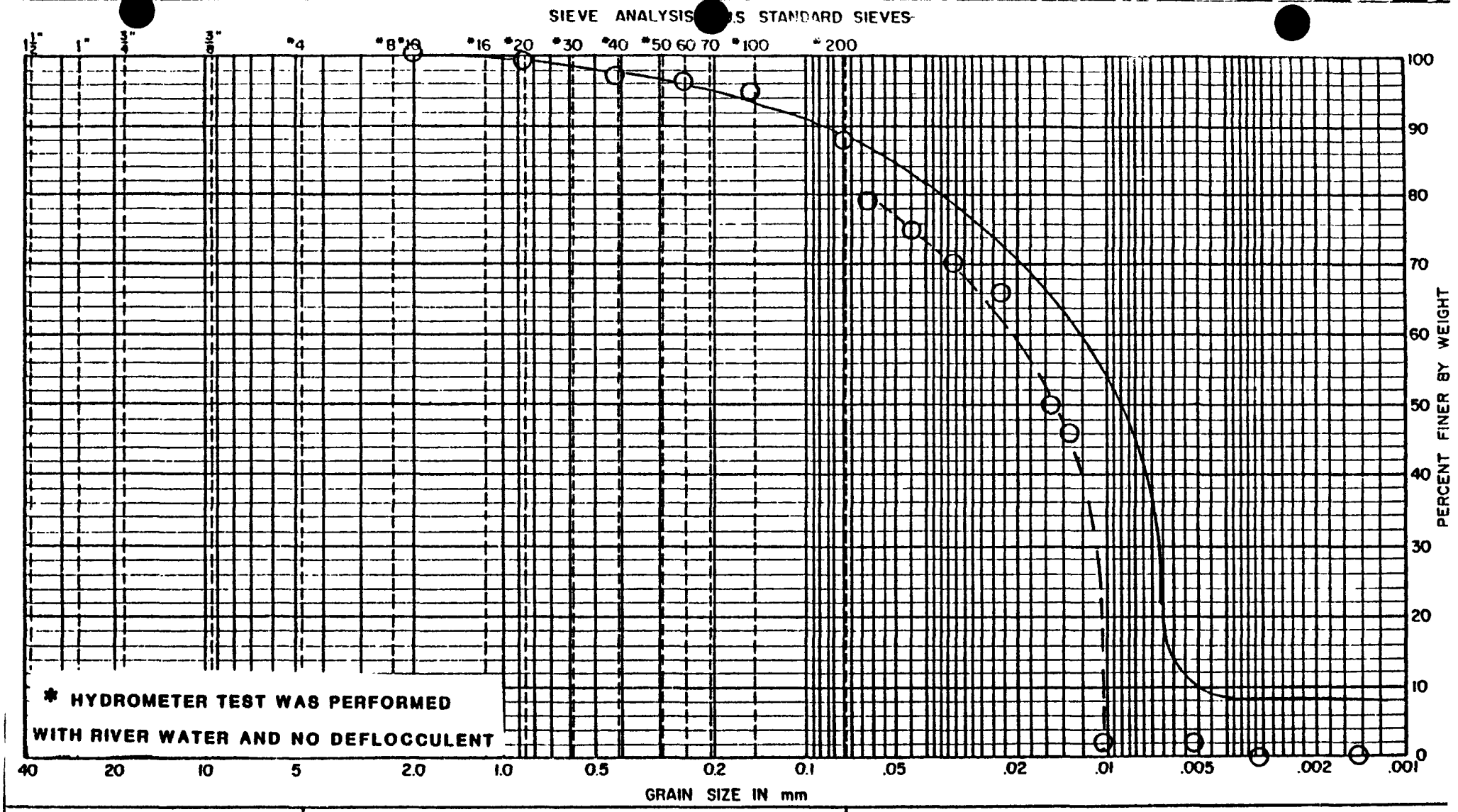
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004585



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 179

TOTAL WET DENSITY (pcf) 116

SPECIFIC GRAVITY 2.49

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic CLAY and SILT with a little medium to fine sand, OH

BURMISTER- Dark gray Organic CLAY and SILT little(-), medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 12

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 8

SAMPLE NO. D19MB 2955 500 MY (River Water)

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-10-85

DRAWN BY: tew 7-11-85

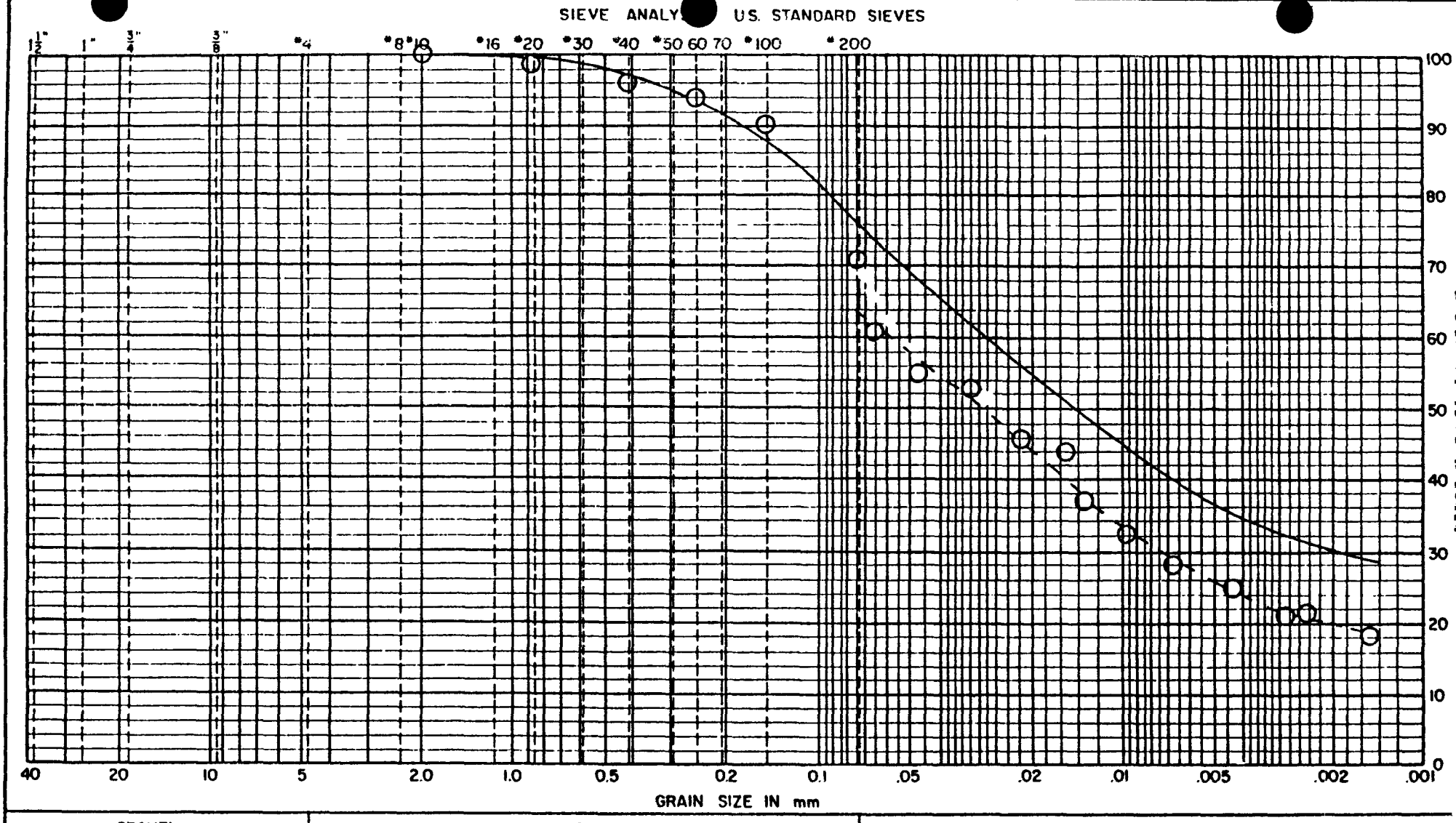
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004586



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT with some clay and some medium to fine sand

BURMISTER- Black SILT, some Clay, some Sand

MOISTURE CONTENT (%) 140

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 26

PERCENT SILT (74.0-2.0 μm) 45

PERCENT CLAY (<2.0 μm) 29

SAMPLE NO. D19MB 2956 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-10-85

DRAWN BY: CB 7-11-85

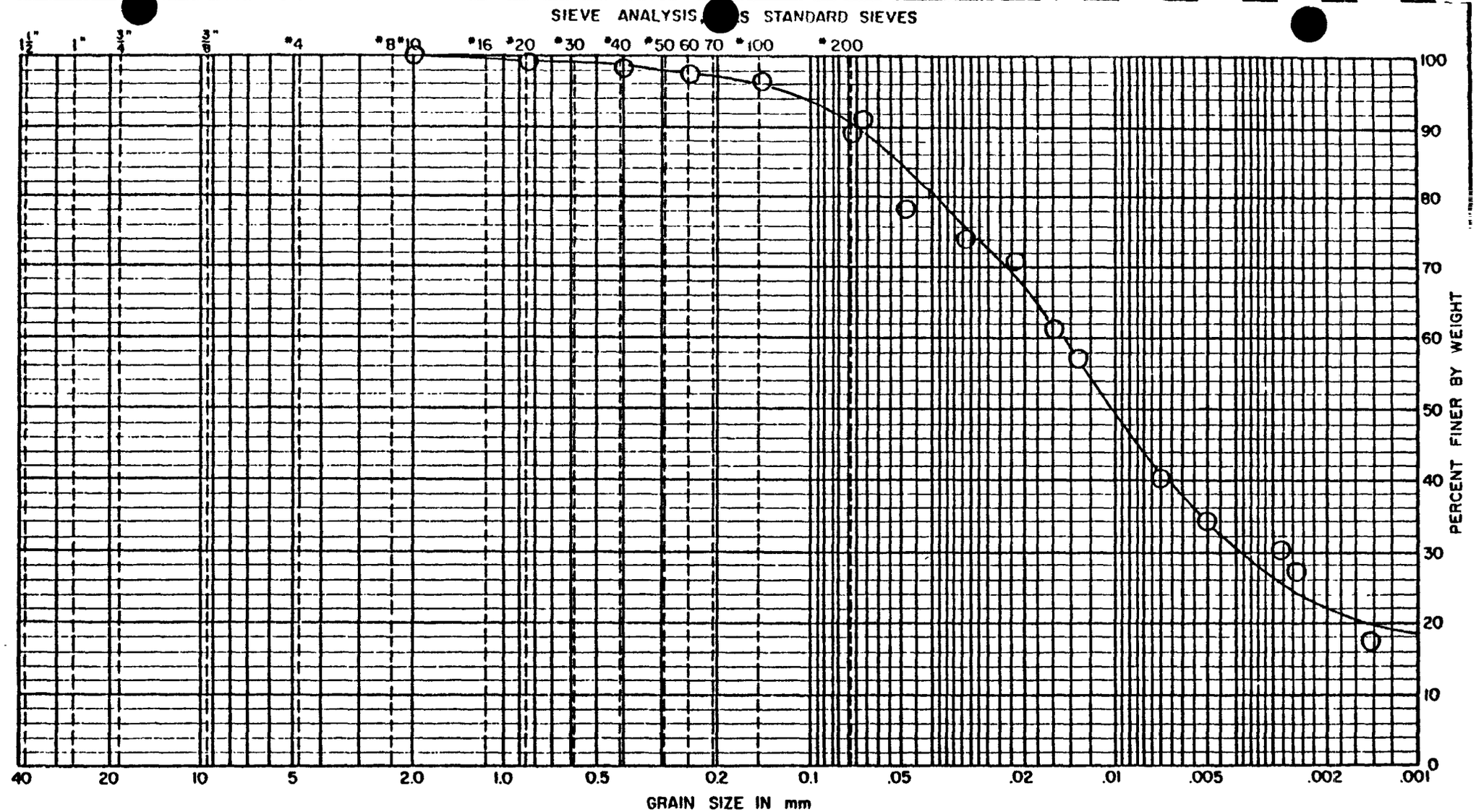
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004587



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 140

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace of medium to fine sand

BURMISTER- Dark gray organic SILT some(-), Clay, trace(+), medium to fine(+) Sand.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 10

PERCENT SILT (74.0-2.0 µm) 68

PERCENT CLAY (<2.0 µm) 22

SAMPLE NO. D19MB 2957 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-10-85

DRAWN BY: CL 7-11-85

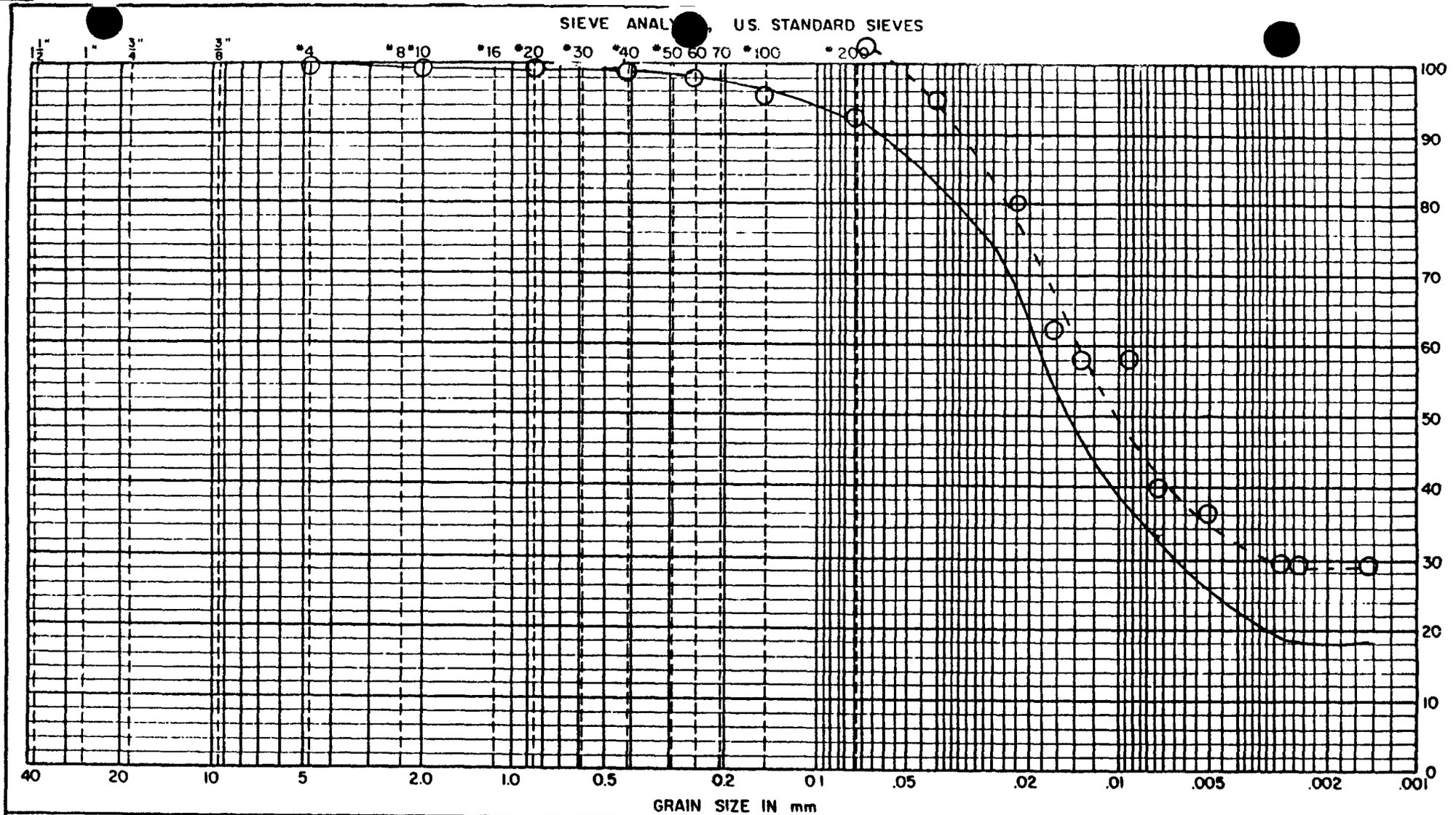
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004588



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 144

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of fine grained sand, with fibers and misc. material

BURMISTER- Black Organic SILT trace(+), fine Sand, little(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm)	10
PERCENT SILT (74.0-2.0 μm)	72
PERCENT CLAY (<2.0 μm)	18

SAMPLE NO. D19MB 2958 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-10-85

DRAWN BY: [illegible] 7-11-85

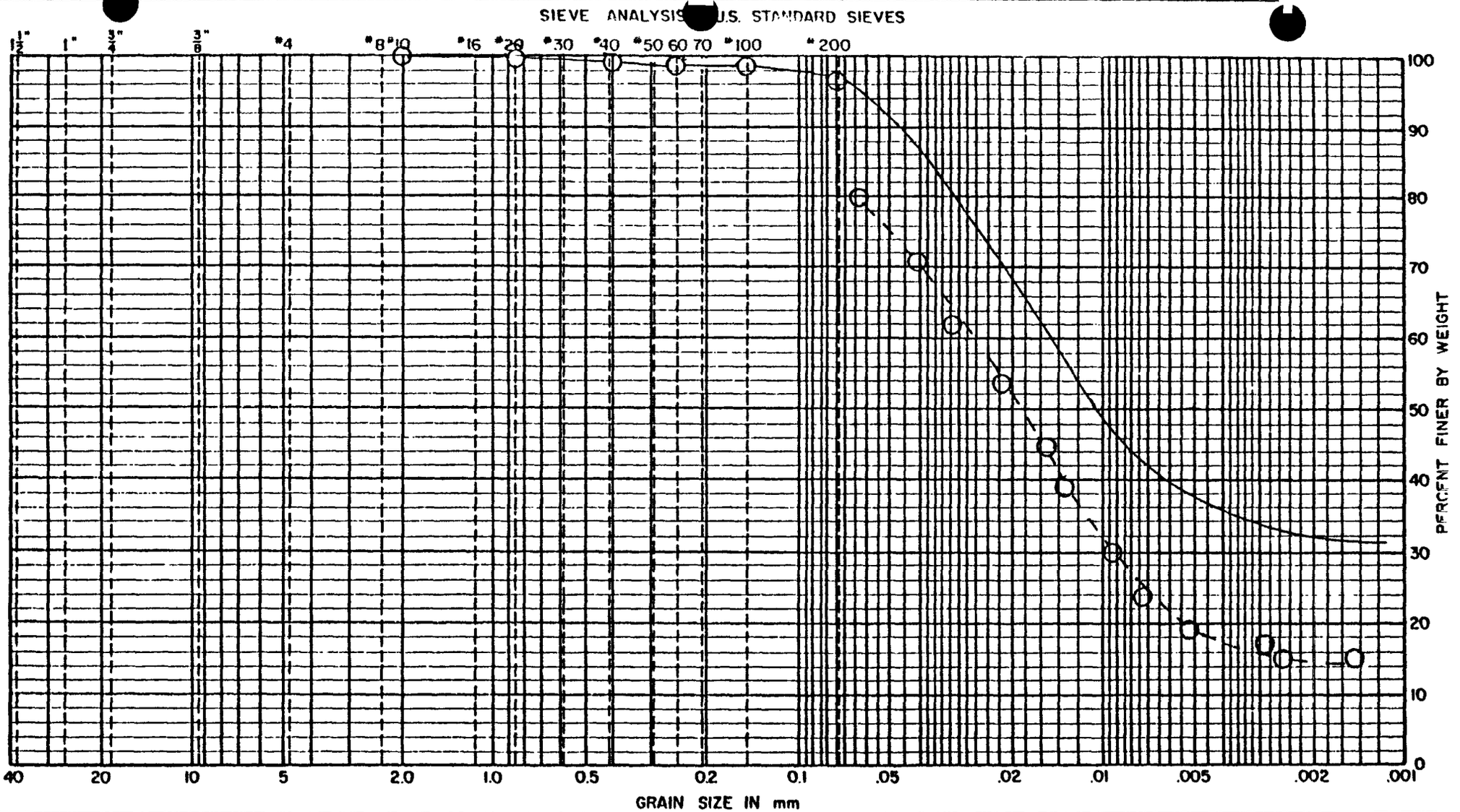
CHECKED BY: SAG 7-12-85

PROJECT

GRADATION CURVES

FIG. NO.

DEP\DA0004589



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 49

TOTAL WET DENSITY (pcf) 109

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay, trace of fine grained sand and organic odor

BURMISTER- Black Organic SILT trace, fine Sand, some(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 5

PERCENT SILT (74.0-2.0 µm) 63

PERCENT CLAY (<2.0 µm) 32

SAMPLE NO. D19MB 2959 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-10-85

DRAWN BY: FS 7-11-85

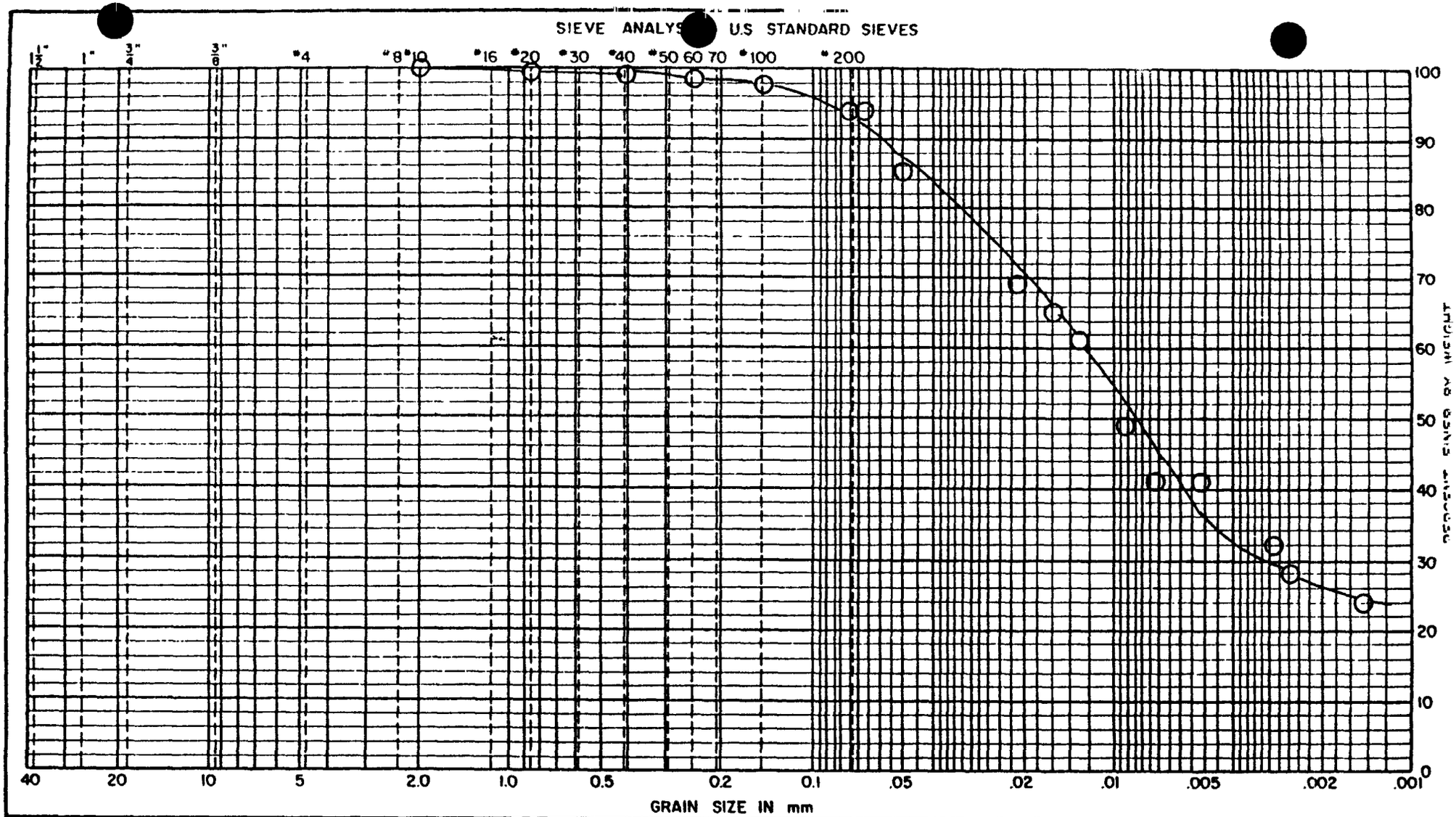
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004590



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace fine sand

BURMISTER- Dark gray Organic SILT some Clay, trace, fine Sand.

MOISTURE CONTENT (%) 153

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY 2.49

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. D19MD 2960 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-10-85

DRAWN BY: 7-11-85

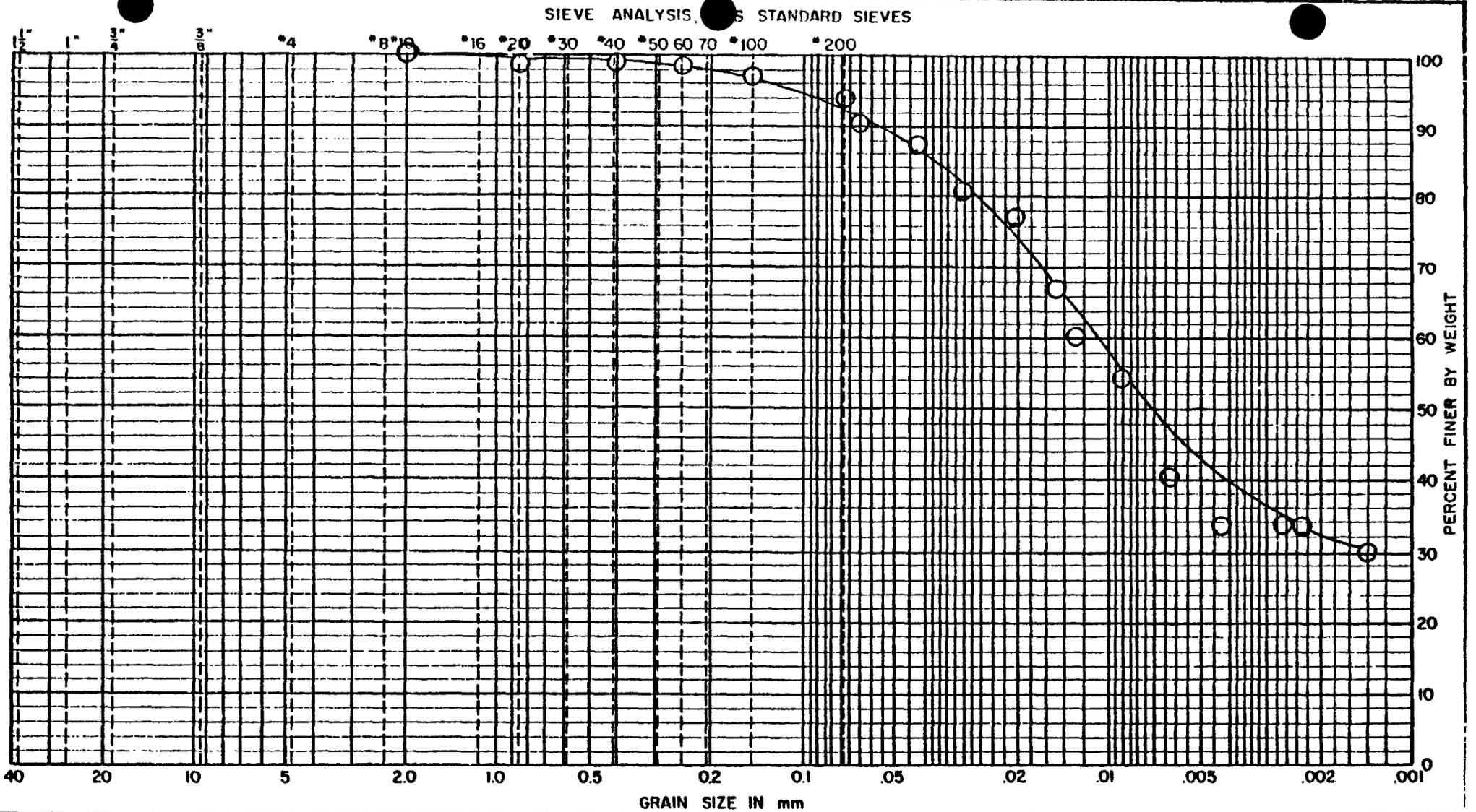
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004591



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT with some Clay and trace of fine Sand

BURMISTER- Black SILT some(+) Clay trace(+) fine Sand

MOISTURE CONTENT (%) 159

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY _____

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 32

SAMPLE NO. D19MD 2961 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-10-85

DRAWN BY: [illegible] 7-11-85

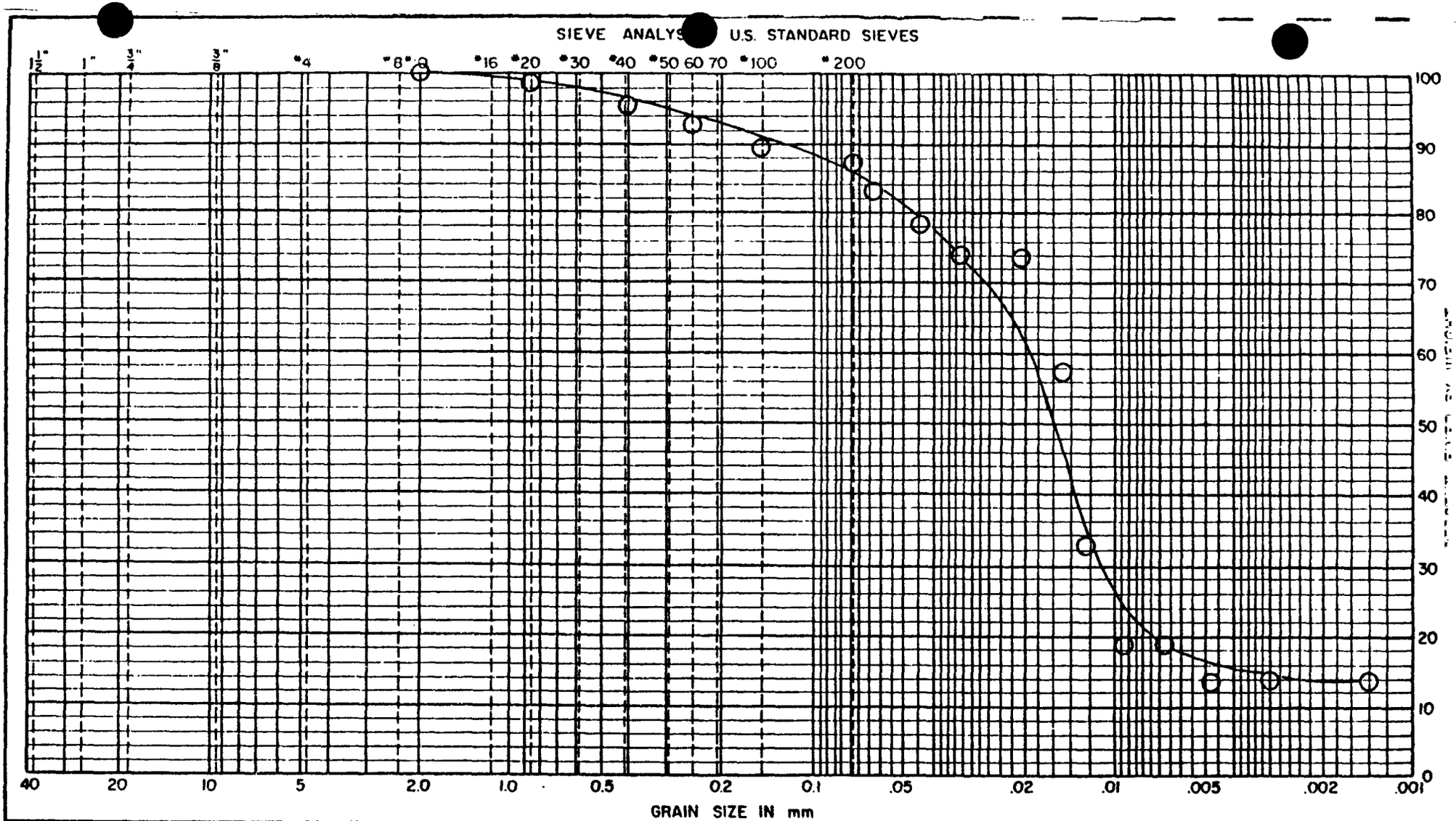
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004592



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with little Clay and fine Sand

BURMISTER- Dark gray Organic SILT little Clay little (-) fine Sand, fibers

MOISTURE CONTENT (%) 106

TOTAL WET DENSITY (pcf) 92

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 12

PERCENT SILT (74.0-2.0 µm) 74

PERCENT CLAY (<2.0 µm) 14

SAMPLE NO. D19MO 2962 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-10-85

DRAWN BY: Tew 7-1-85

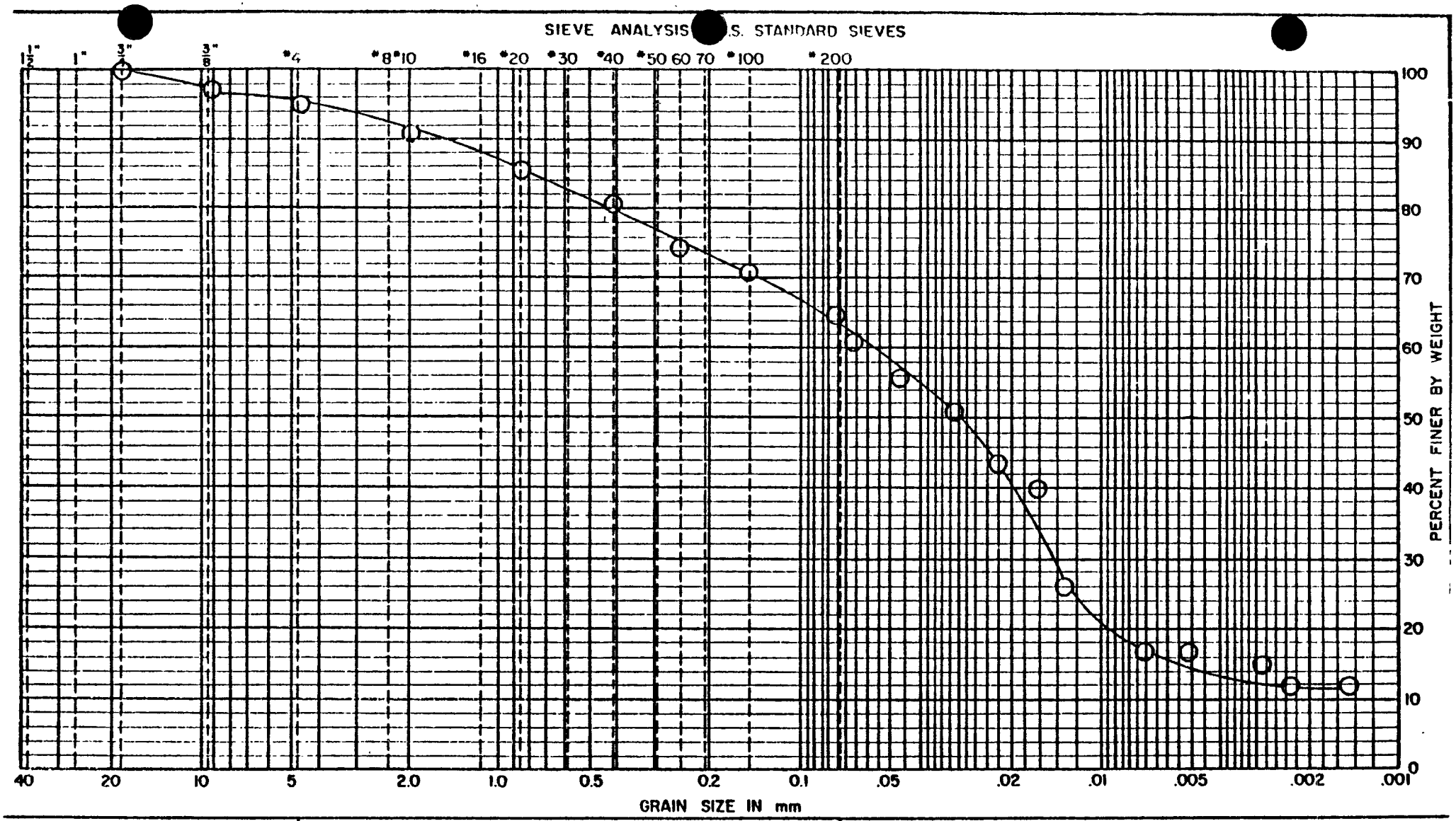
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004593



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 41

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, medium to fine grained SAND, with some silt and a trace of clay and cinders

BURMISTER- Brown medium to fine SAND, some Silt, little (-) Clay. Cinders.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 36

PERCENT SILT (74.0-2.0 μm) 53

PERCENT CLAY (<2.0 μm) 11

SAMPLE NO. D19MD 2963 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-10-85

DRAWN BY: tw 7-11-85

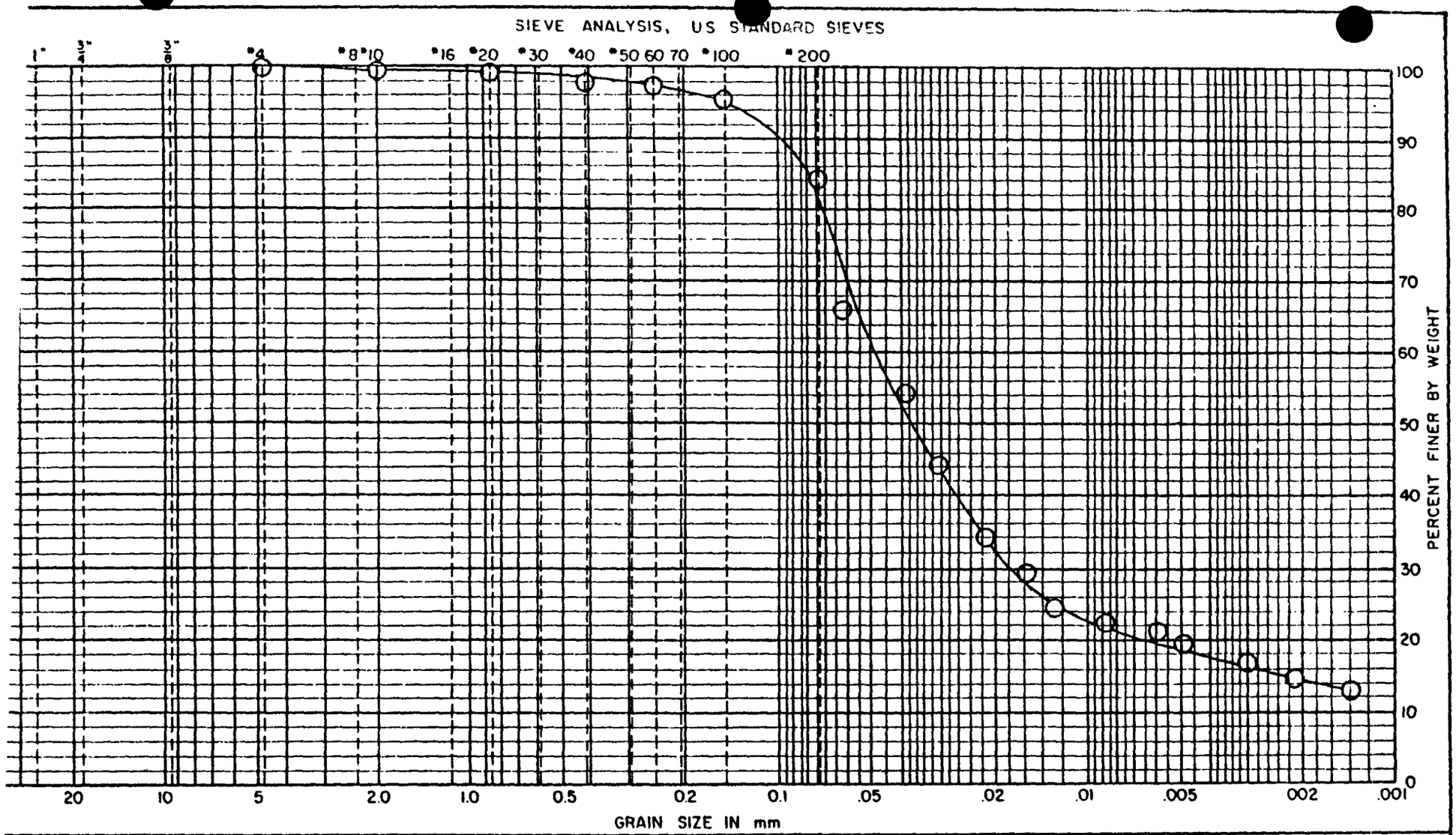
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004594



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, SILT with some medium to fine sand and a little clay

BURMISTER - Brown SILT some(+), medium to fine Sand, little(-) Clay

MOISTURE CONTENT (%) 22

TOTAL WET DENSITY (pcf) 133

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 18

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. D19MD 2964 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-10-85

DRAWN BY: [illegible] 7-11-85

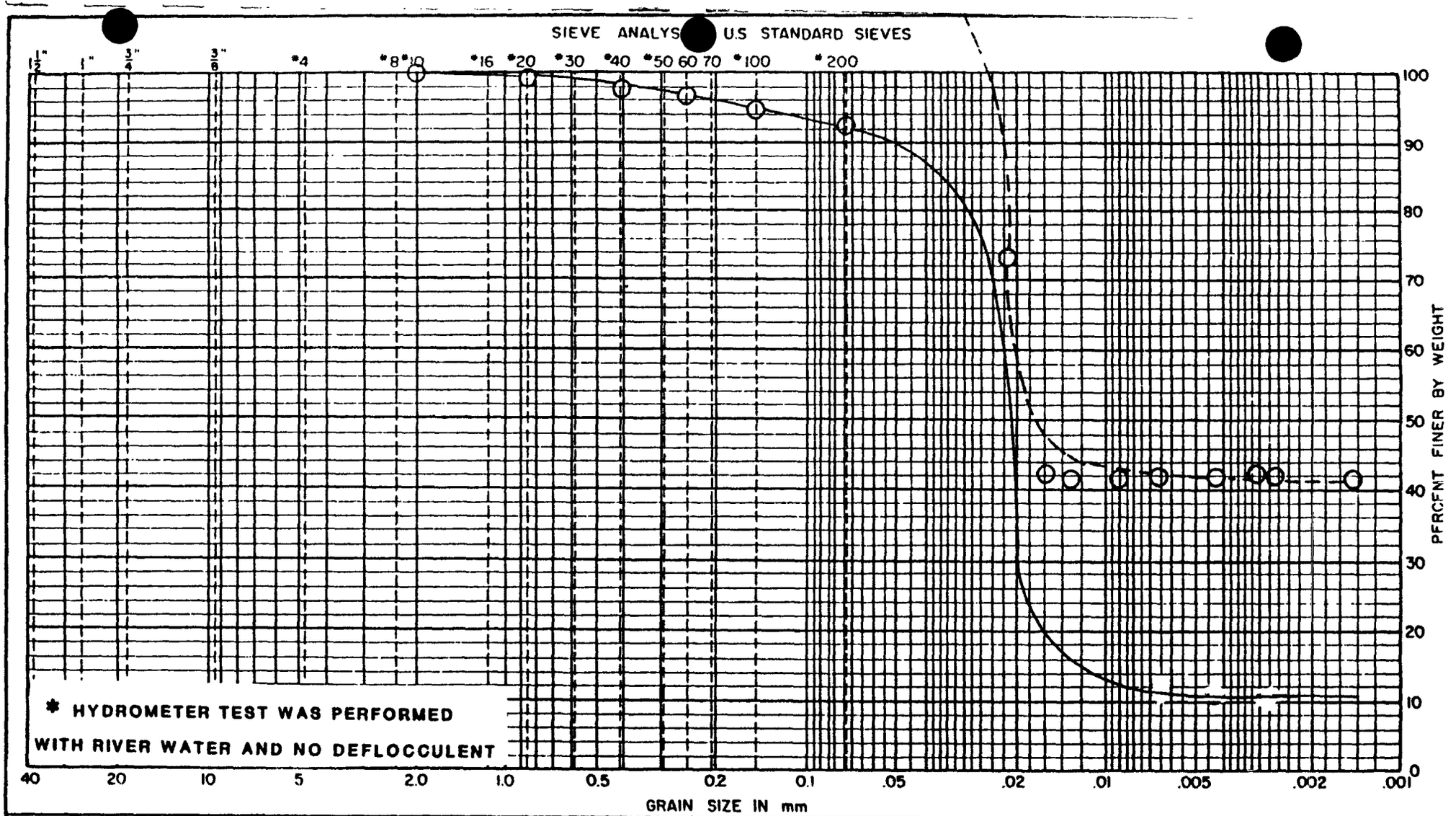
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004595



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark Gray PEAT* some (-) Clay, trace(+), medium to fine (+) Sand.

BURMISTER-

Test was performed using River Water as the suspending medium and no deflocculent.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) } 92

PERCENT CLAY (<2.0 µm)

MOISTURE CONTENT (%) 232

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

SAMPLE NO. D19RB 2974 500 MY RIVER

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-6-85

DRAWN BY: 7-11-85

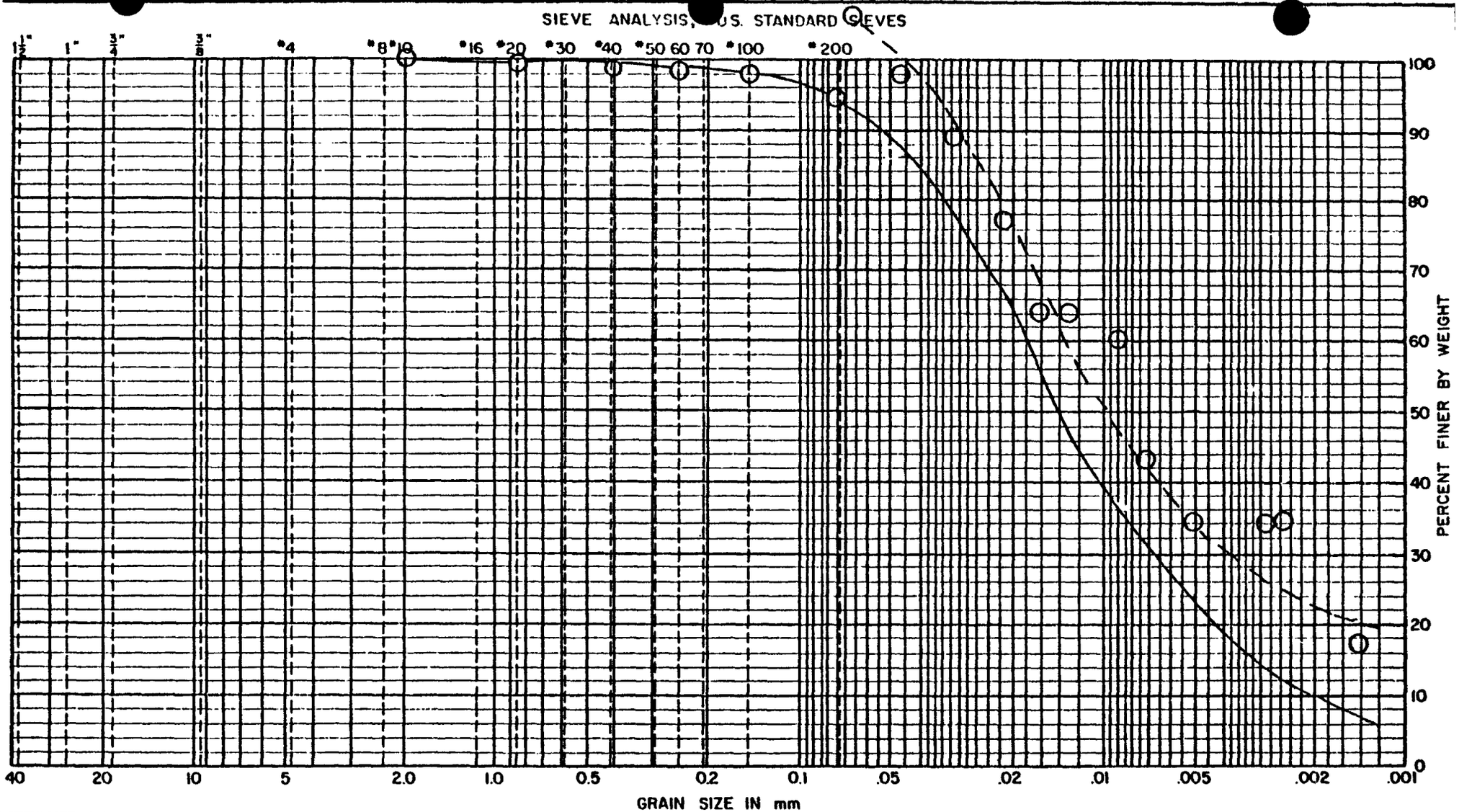
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004596



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 180

TOTAL WET DENSITY (pcf) 73

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace of fine sand

BURMISTER- Dark gray Organic SILT little(-), Clay, trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 85

PERCENT CLAY (<2.0 μm) 10

SAMPLE NO. D19RB 2975 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-6-85

DRAWN BY: AW 7-11-85

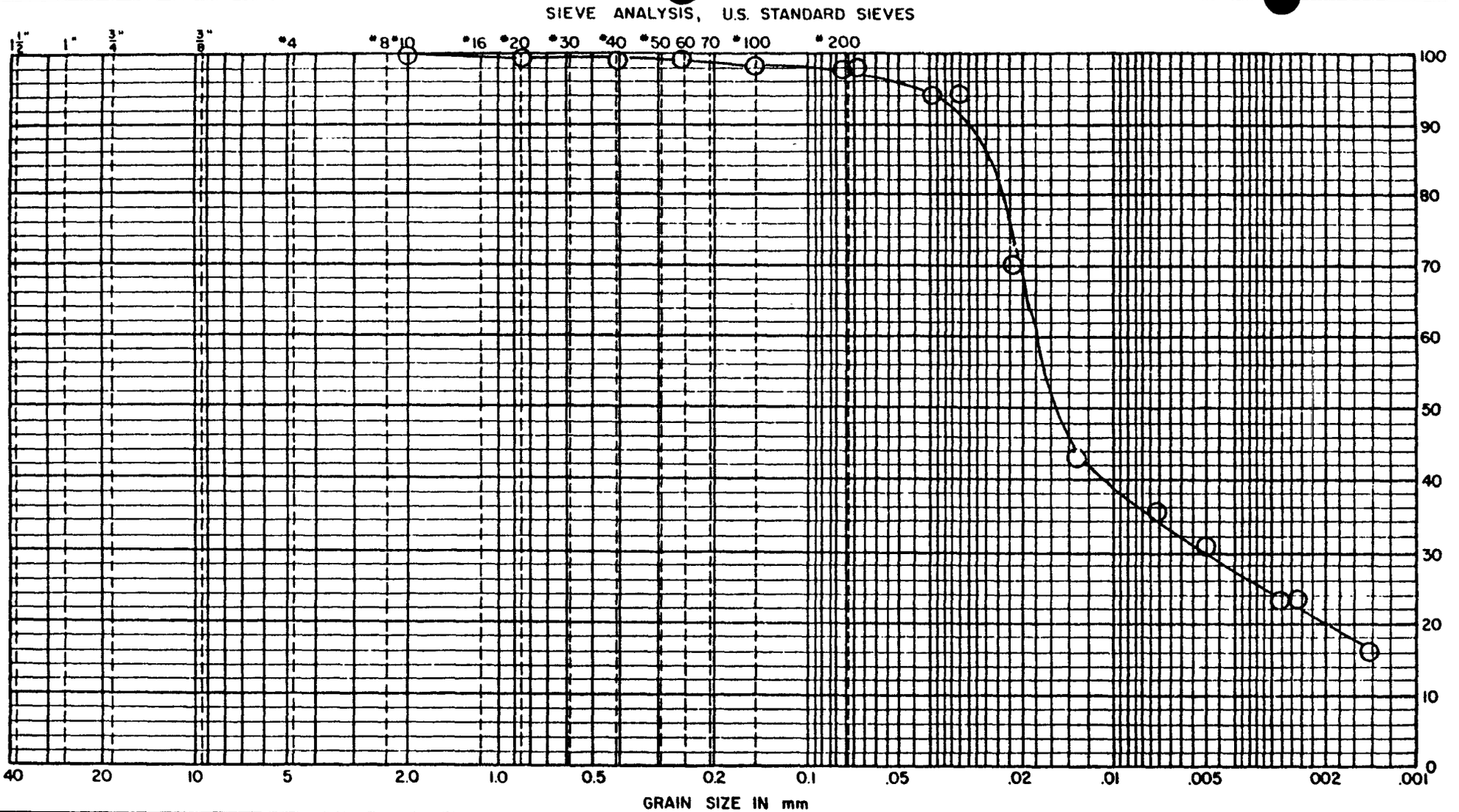
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004597



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 178

TOTAL WET DENSITY (pcf) 75

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with trace of fine sand

BURMISTER- Dark gray Organic SILT little(+) Clay, trace(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 2

PERCENT SILT (74.0-2.0 µm) 78

PERCENT CLAY (<2.0 µm) 20

SAMPLE NO. D19RB 2976 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-6-85

DRAWN BY: tw 7-11-85

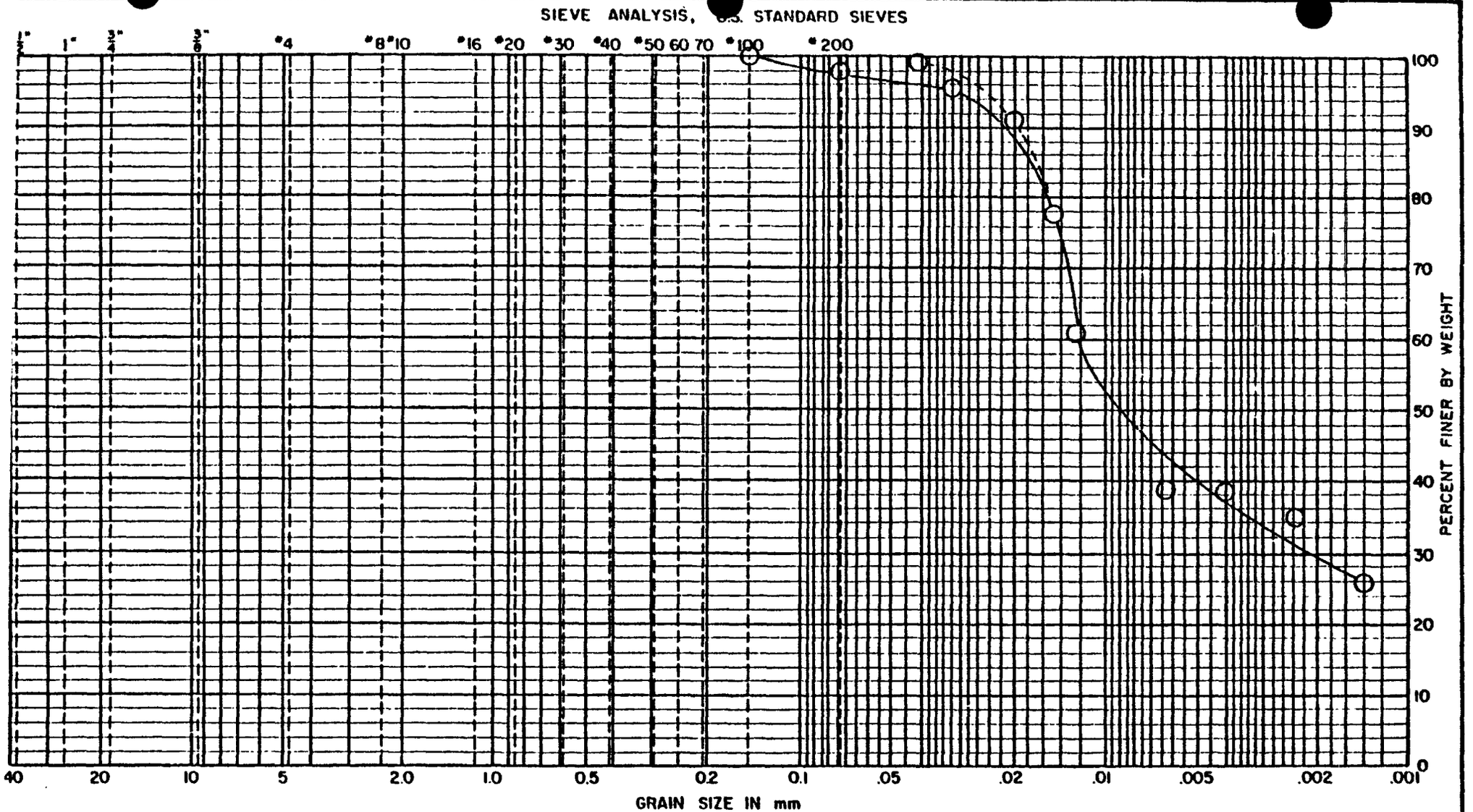
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT N

FIG. NO.

DEP\DA0004598



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 180

TOTAL WET DENSITY (pcf) 71

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT, with trace of fine sand

BURMISTER-Black Organic SILT (+), Clay, trace (-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 1

PERCENT SILT (74.0-2.0 μm) 66

PERCENT CLAY (<2.0 μm) 33

SAMPLE NO. D19RB 2978 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-6-85

DRAWN BY: AL 7-11-85

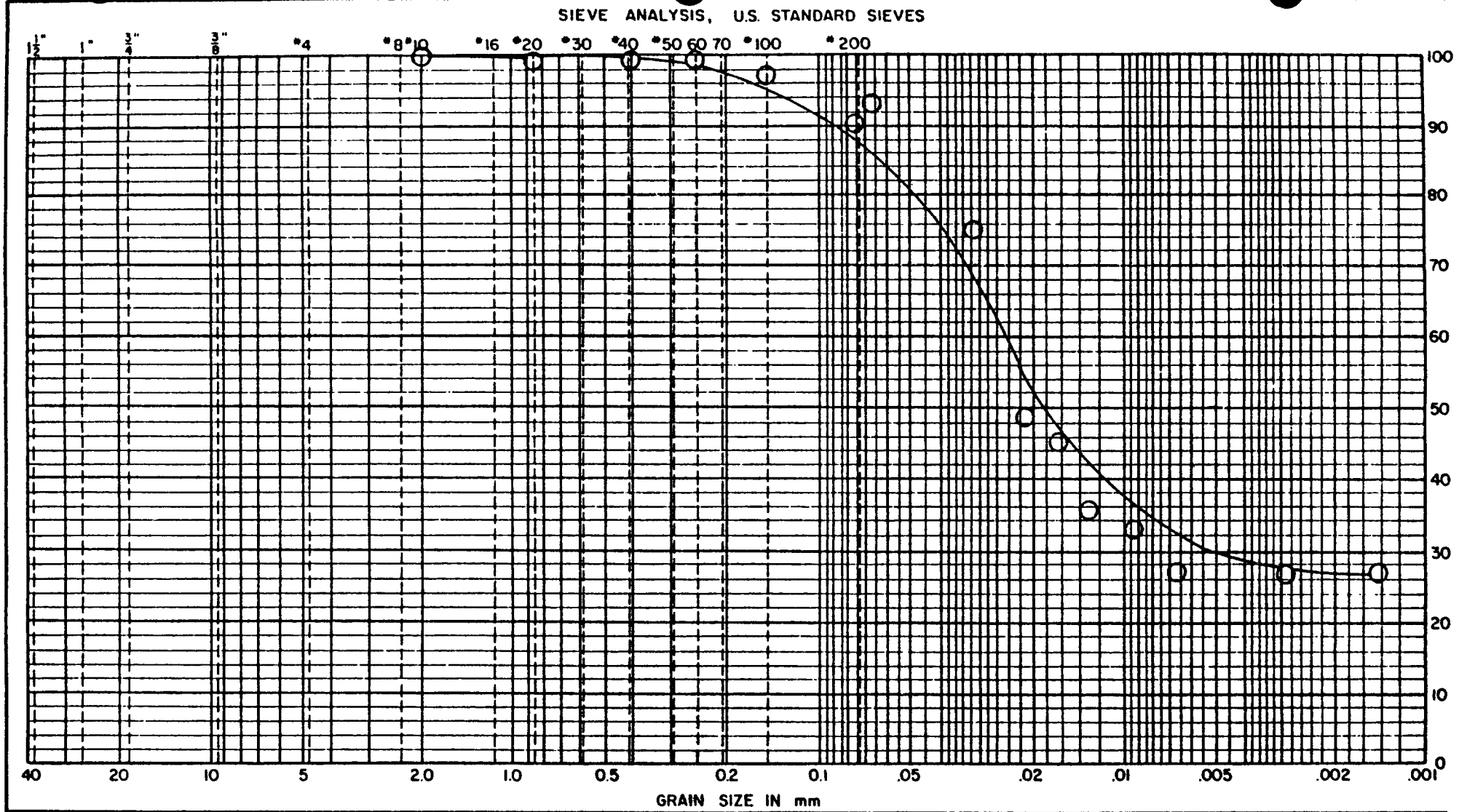
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004599



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - SILT with some Clay and little fine Sand

BURMISTER - SILT some Clay(-), little fine Sand

MOISTURE CONTENT (%) 169

TOTAL WET DENSITY (pcf) 90

SPECIFIC GRAVITY 2.53

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 14

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. D19RD 2979 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-6-85

DRAWN BY: [illegible] 7-11-85

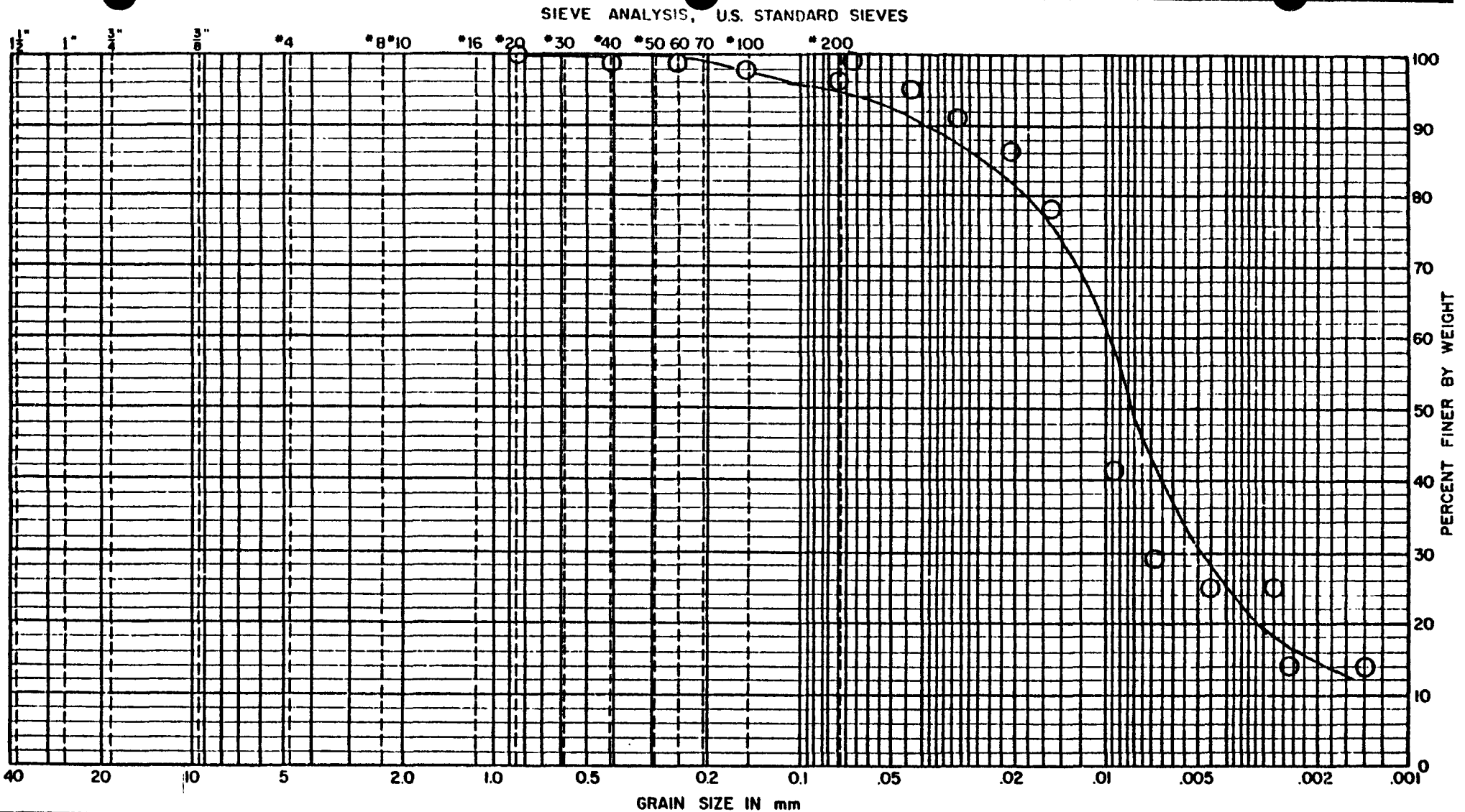
CHECKED BY: SAG 7-12-85

PROJECT No

GRADATION CURVES

FIG. NO.

DEP\DA0004600



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, Clayey SILT with trace of fine sand

BURMISTER- Dark gray SILT little, Clay, trace fine Sand

MOISTURE CONTENT (%) 212

TOTAL WET DENSITY (pcf) 74

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 5

PERCENT SILT (74.0-2.0 µm) 80

PERCENT CLAY (<2.0 µm) 15

SAMPLE NO. D19RD 2980 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-6-85

DRAWN BY: Ch. 7-11-85

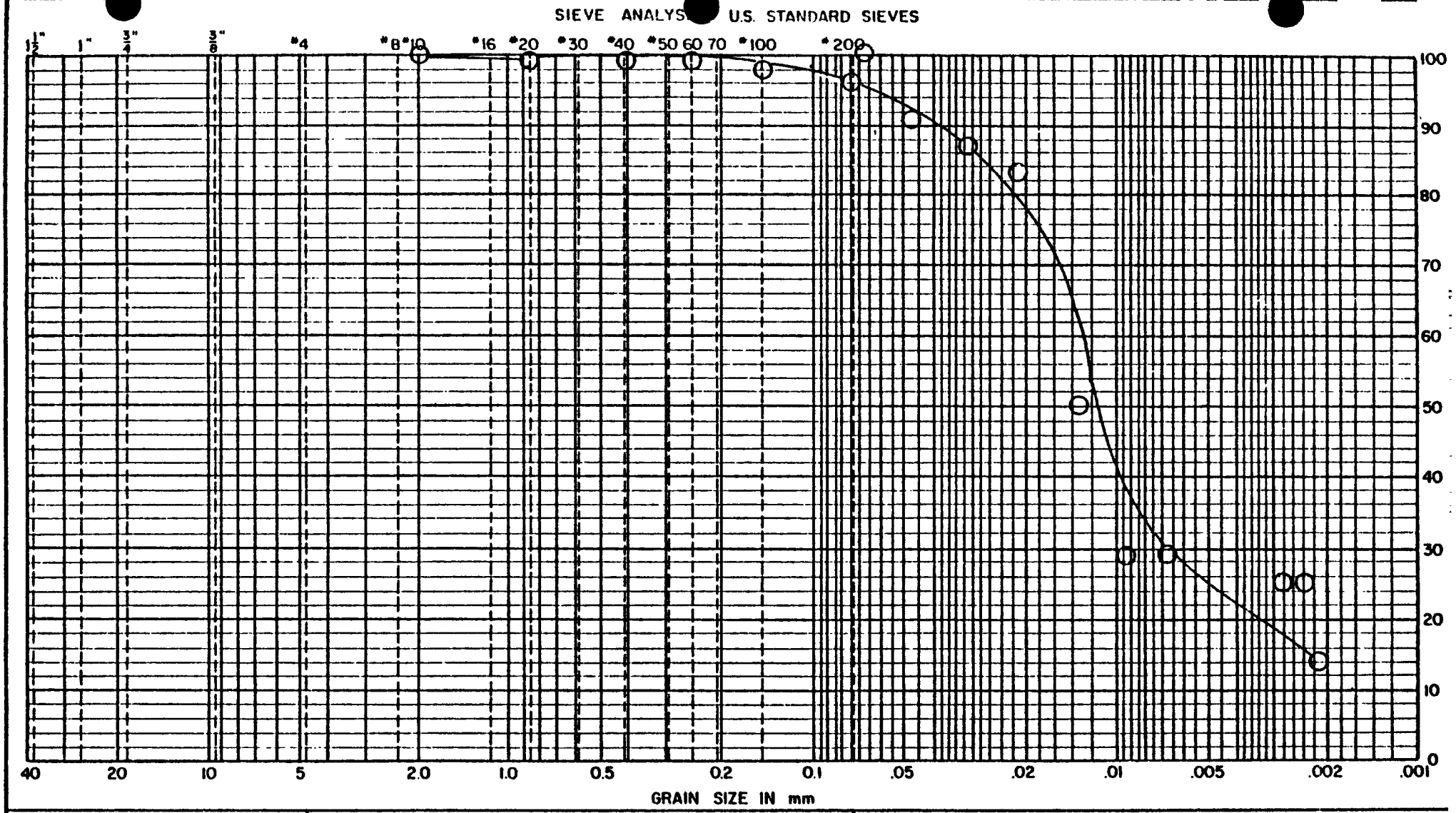
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004601



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 186

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, Clayey SILT with trace of fine sand

BURMISTER- Dark gray Organic SILT little, Clay, trace(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 82

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. D19RD 2981 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-6-85

DRAWN BY: Ch. 7-11-85

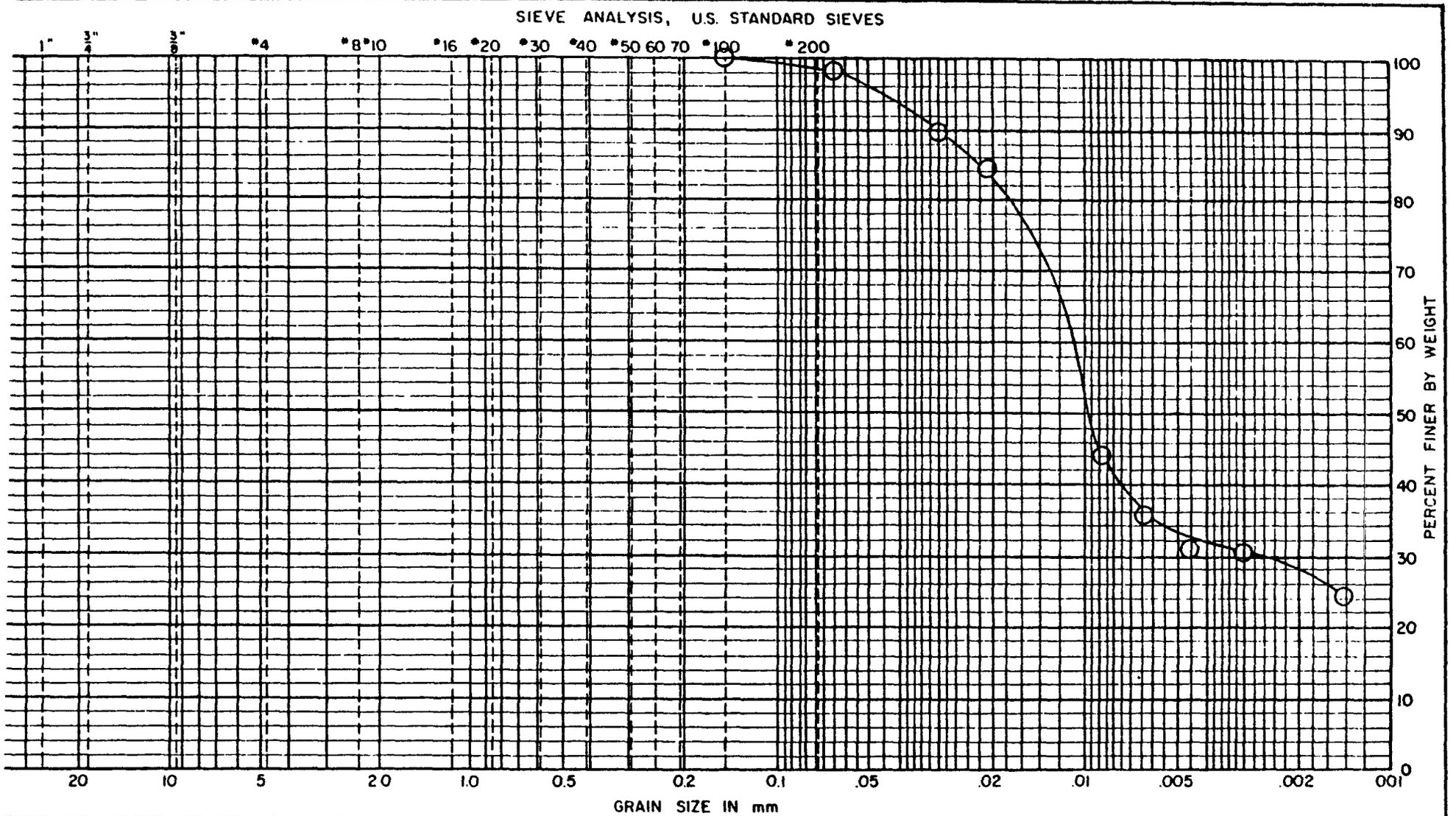
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004602



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT some(+), Clay, trace(-), fine Sand

MOISTURE CONTENT (%) 174

TOTAL WET DENSITY (pcf) 75

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 2

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D19RD 2983 503MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-6-85

DRAWN BY: tw 7-11-85

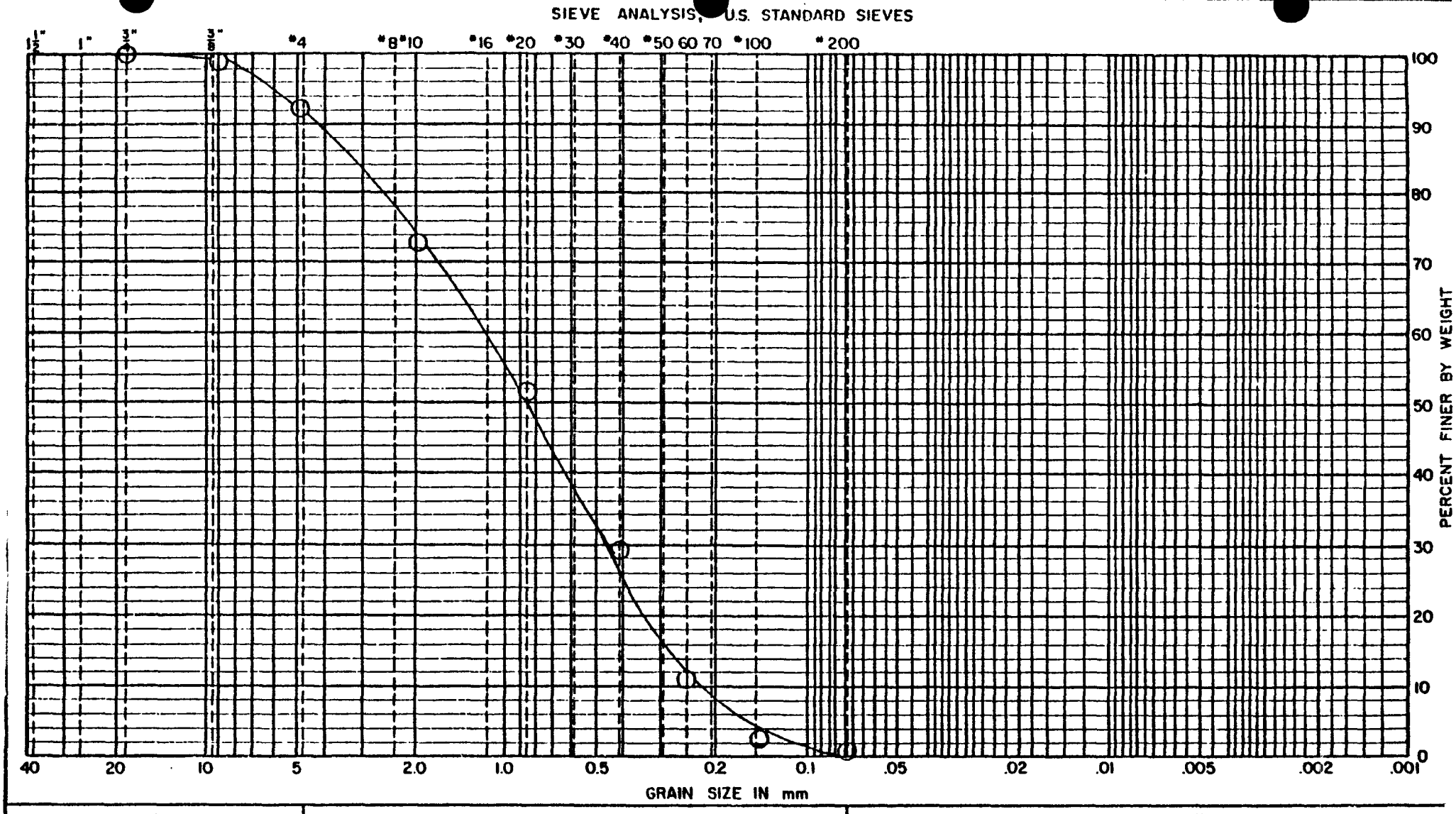
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004603



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 10

TOTAL WET DENSITY (pcf) 130

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, coarse to fine grained SAND with some fine gravel and trace of silt

BURMISTER- Dark gray coarse to fine SAND, little(-) fine Gravel, trace Silt.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 100

PERCENT SILT (74.0-2.0 μm) -

PERCENT CLAY (<2.0 μm) -

SAMPLE NO. D22LB 3006 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-7-85

DRAWN BY: [illegible] 7-11-85

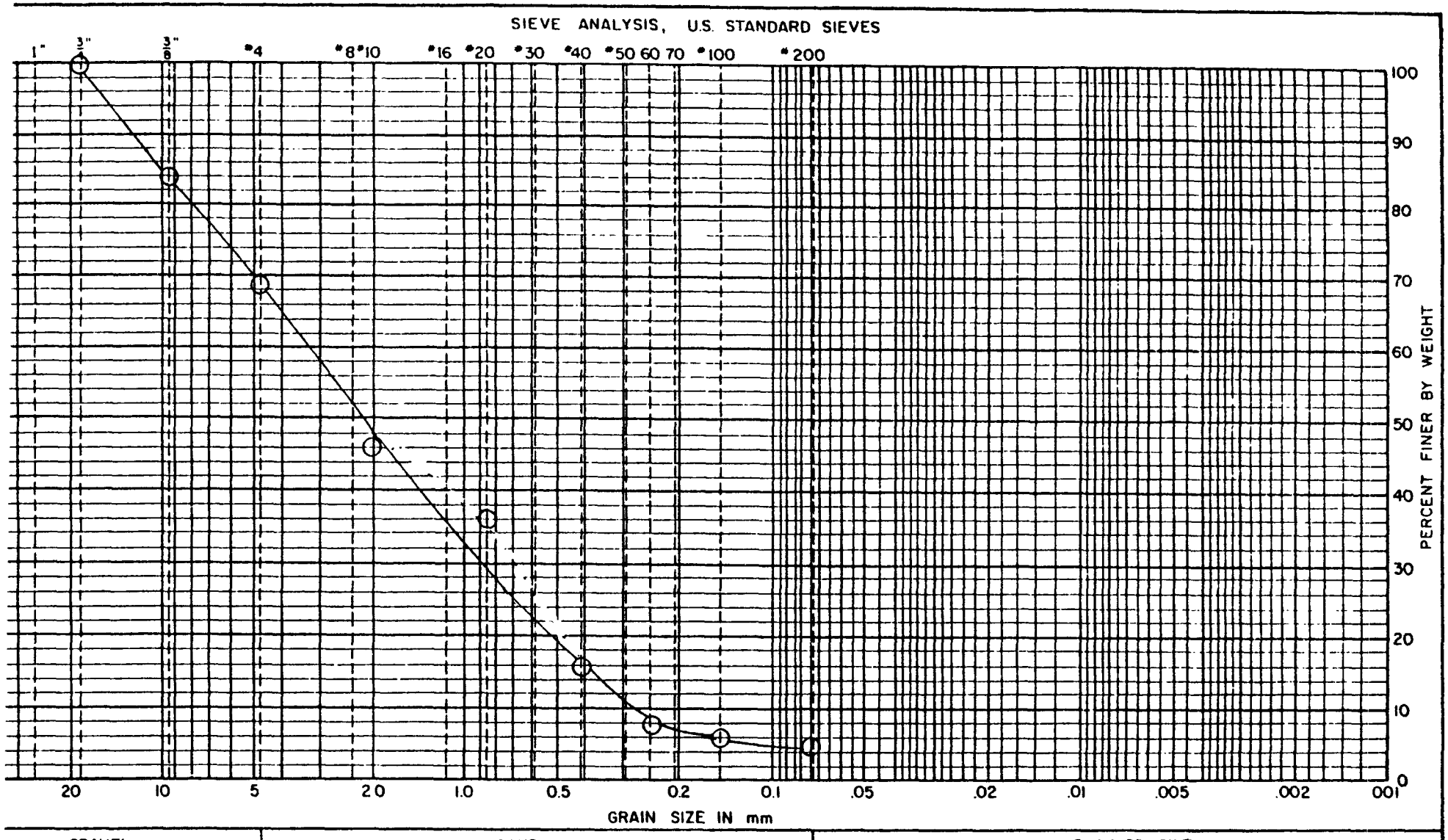
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004604



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 9

TOTAL WET DENSITY (pcf) 127

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray brown, coarse to fine GRAVEL and coarse to fine grained SAND with trace silt

BURMISTER- Gray brown coarse to fine SAND, and coarse to fine GRAVEL, trace Silt.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 100

PERCENT SILT (74.0-2.0 μm) -

PERCENT CLAY (<2.0 μm) -

SAMPLE NO. D22LB 3008 204 MY

SAMPLE DEPTH, ft. 8-9.5

SAMPLING DATE 5-7-85

DRAWN BY: SS 7-11-85

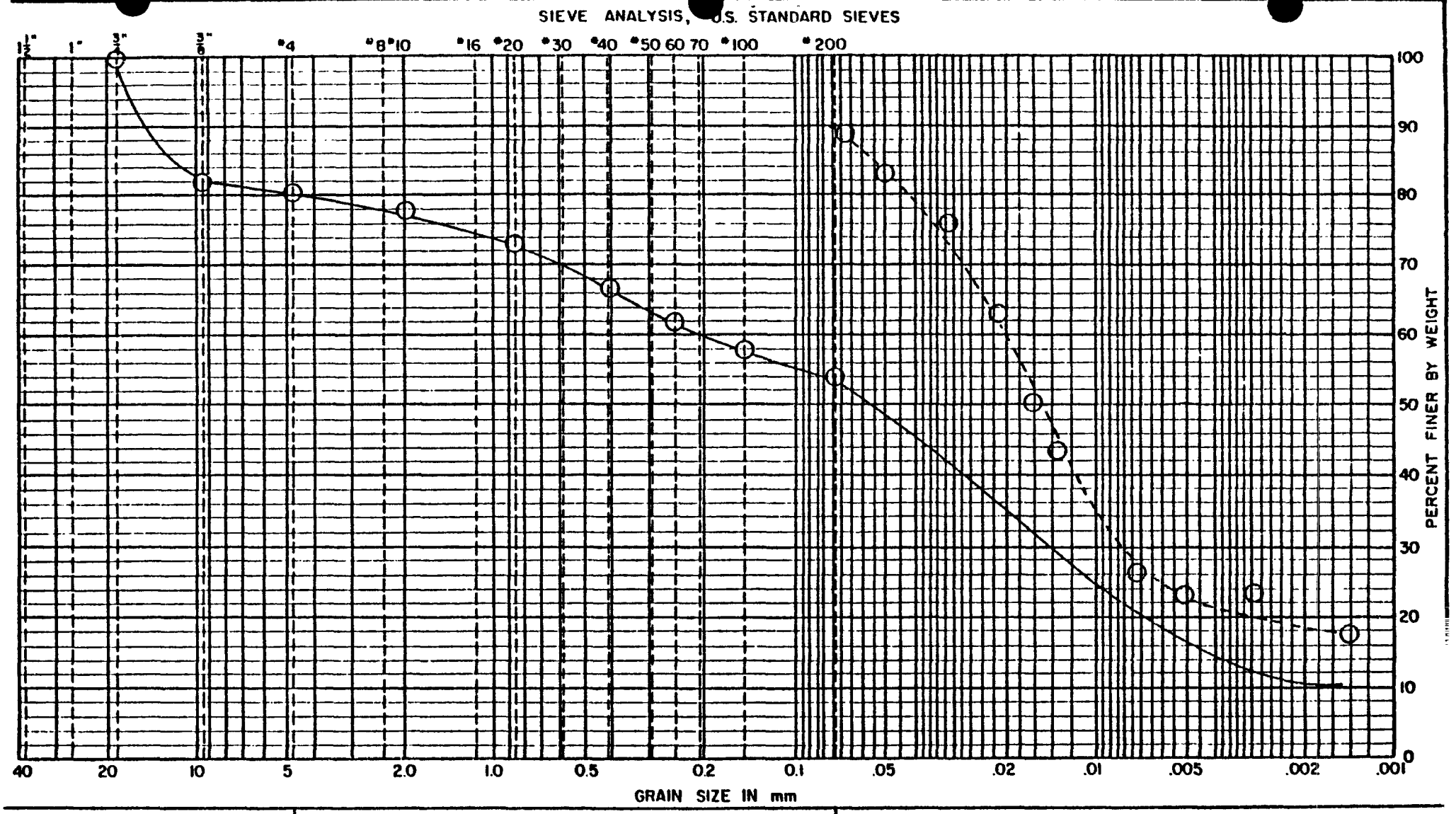
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004605



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 97

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY 2.59

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with some coarse to fine sand

BURMISTER- Black Organic SILT some(+), coarse to fine Sand, little(+) Clay, trace (-) Gravel

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 46

PERCENT SILT (74.0-2.0 μm) 42

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. D22LD 3014 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-8-85

DRAWN BY: 7-11-85

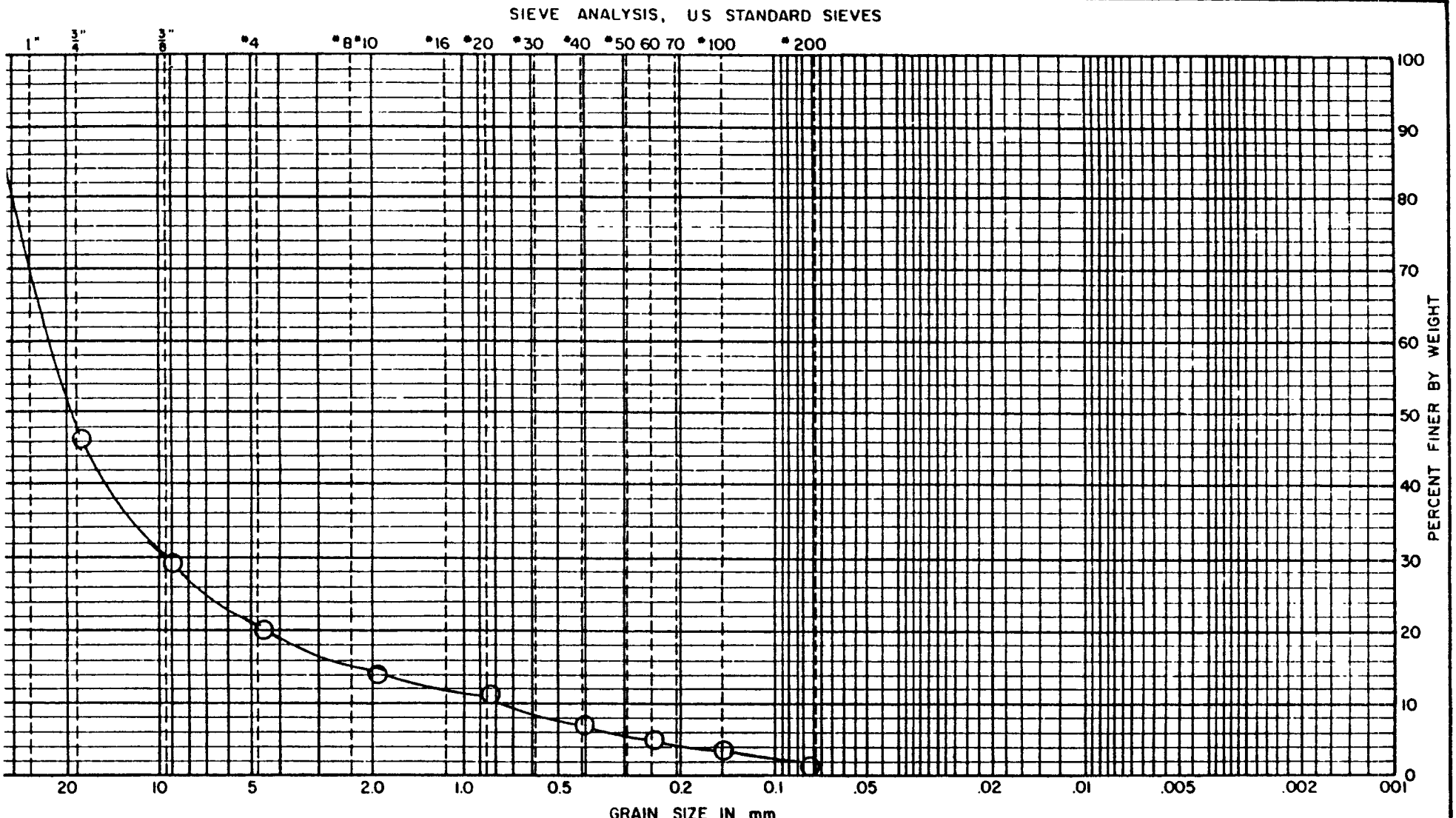
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004606



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, coarse to fine GRAVEL with some coarse to medium grained sand

BURMISTER- Black coarse to fine GRAVEL little, coarse to medium Sand

MOISTURE CONTENT (%) 44

TOTAL WET DENSITY (pcf) 117

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 100

PERCENT SILT (74.0-2.0 μm) -

PERCENT CLAY (<2.0 μm) -

SAMPLE NO. D22LD 3015 202 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-8-85

DRAWN BY: [illegible] 7-11-85

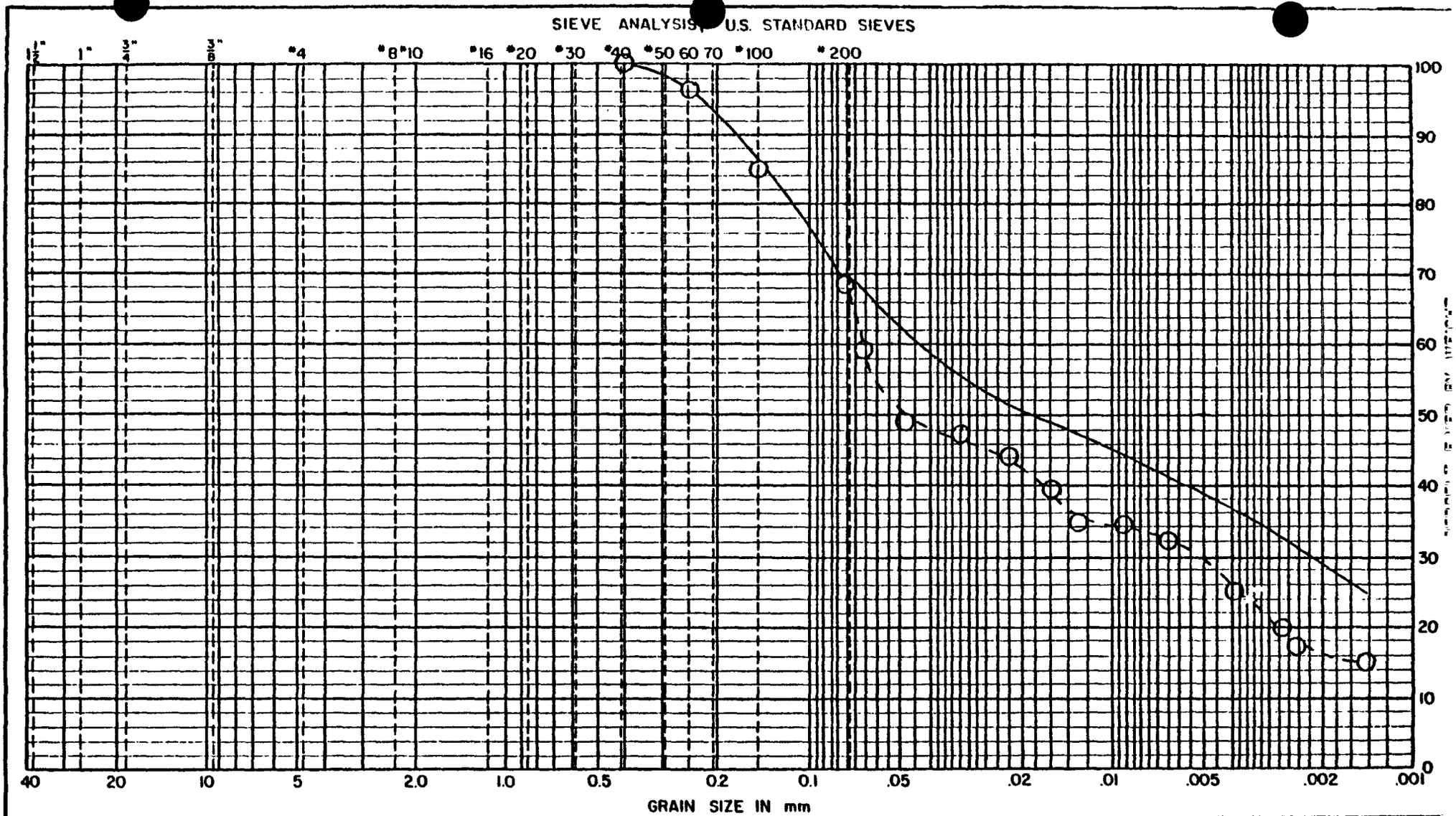
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004607



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 69

TOTAL WET DENSITY (pcf) 93

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, organic Clayey SILT with some medium to fine sand

BURMISTER- Gray Organic SILT, some Clay some(+), medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 31

PERCENT SILT (74.0-2.0 μm) 41

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D22LD 3017 203MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-8-85

DRAWN BY: CL 7-11-85

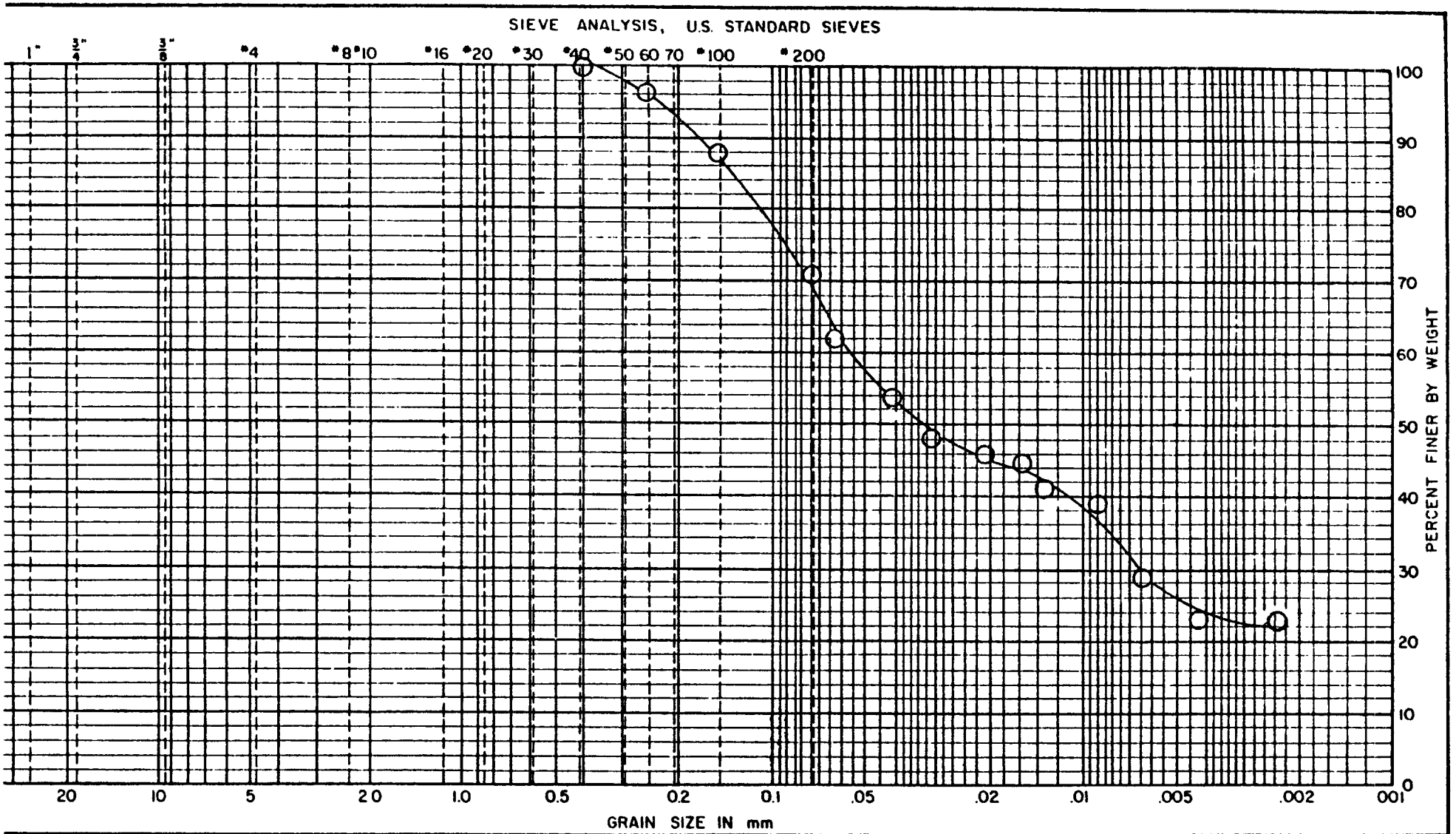
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004608



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, organic SILT with some fine Sand and Clay

BURMISTER- Gray organic SILT some (+), fine Sand, some (-) Clay

MOISTURE CONTENT (%) 60

TOTAL WET DENSITY (pcf) 100

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 28

PERCENT SILT (74.0-2.0 µm) 52

PERCENT CLAY (<2.0 µm) 20

SAMPLE NO. D22LD 3018 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-8-85

DRAWN BY: tw 7-11-85

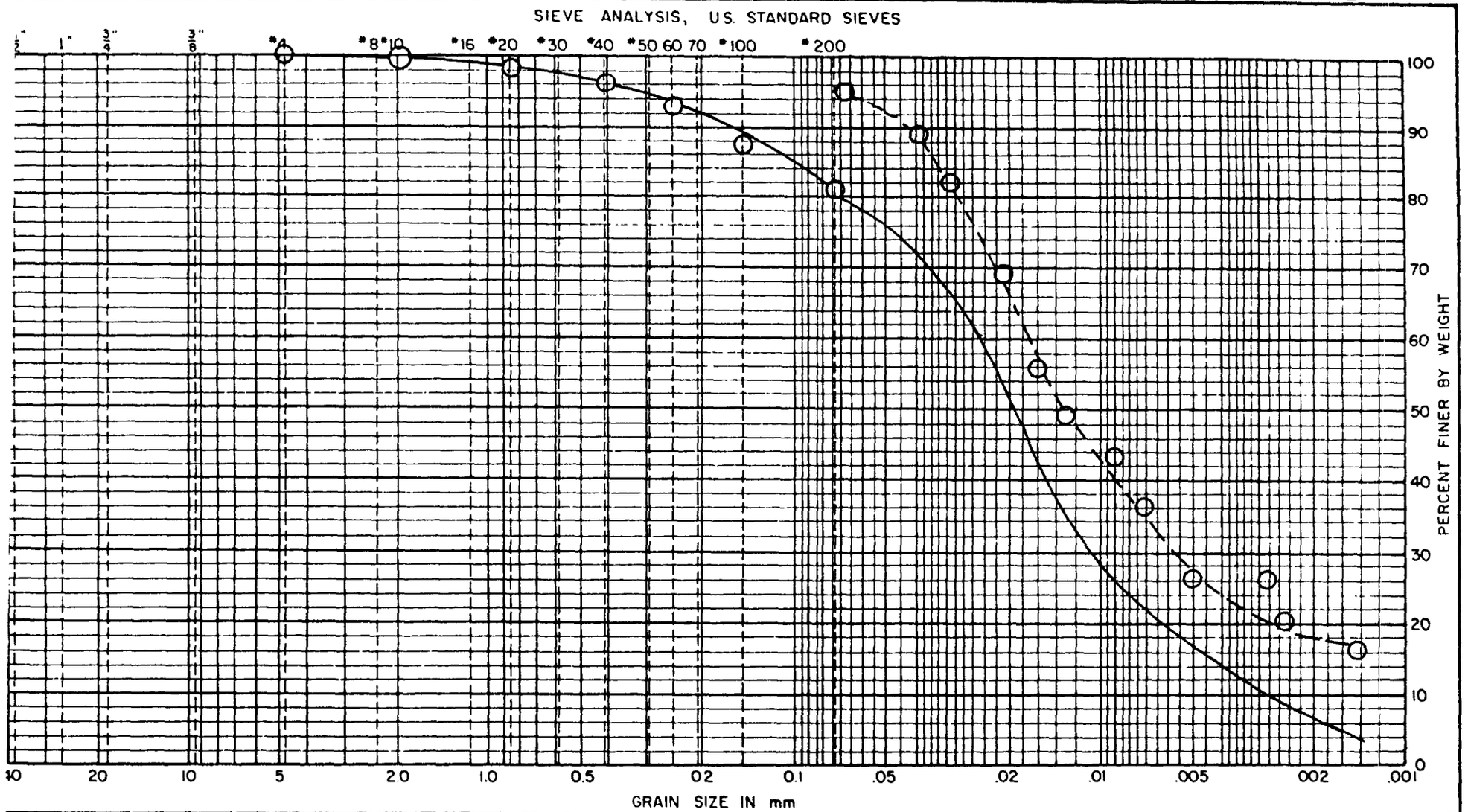
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004609



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 140

TOTAL WET DENSITY (pcf) not available

SPECIFIC GRAVITY 2.51

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some medium to fine grained sand, trace of clay and plant fibers

BURMISTER- Black Organic SILT some(-), medium to fine (+) Sand, traceClay and plant fibers.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 21

PERCENT SILT (74.0-2.0 μm) 73

PERCENT CLAY (<2.0 μm) 6

SAMPLE NO. D22LE 3092 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-8-85

DRAWN BY: Th 7-11-85

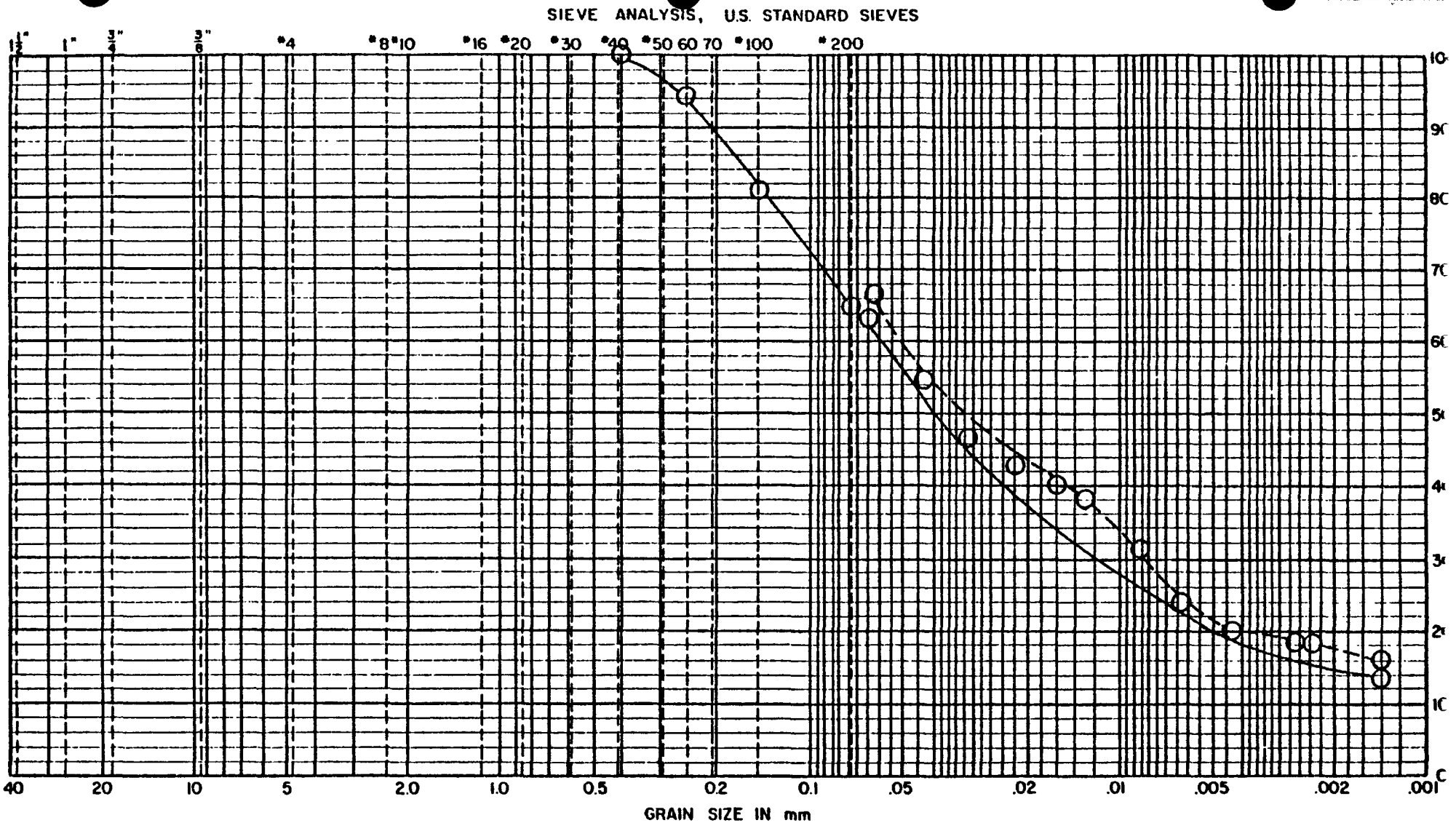
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004610



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 53

TOTAL WET DENSITY (pcf) 105

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, Clayey SILT with some medium to fine sand

BURMISTER- Black to dark gray Organic SILT, little Clay, some(+), medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 36

PERCENT SILT (74.0-2.0 μm) 50

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. D22LE 3099 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-8-85

DRAWN BY: CL 7-11-85

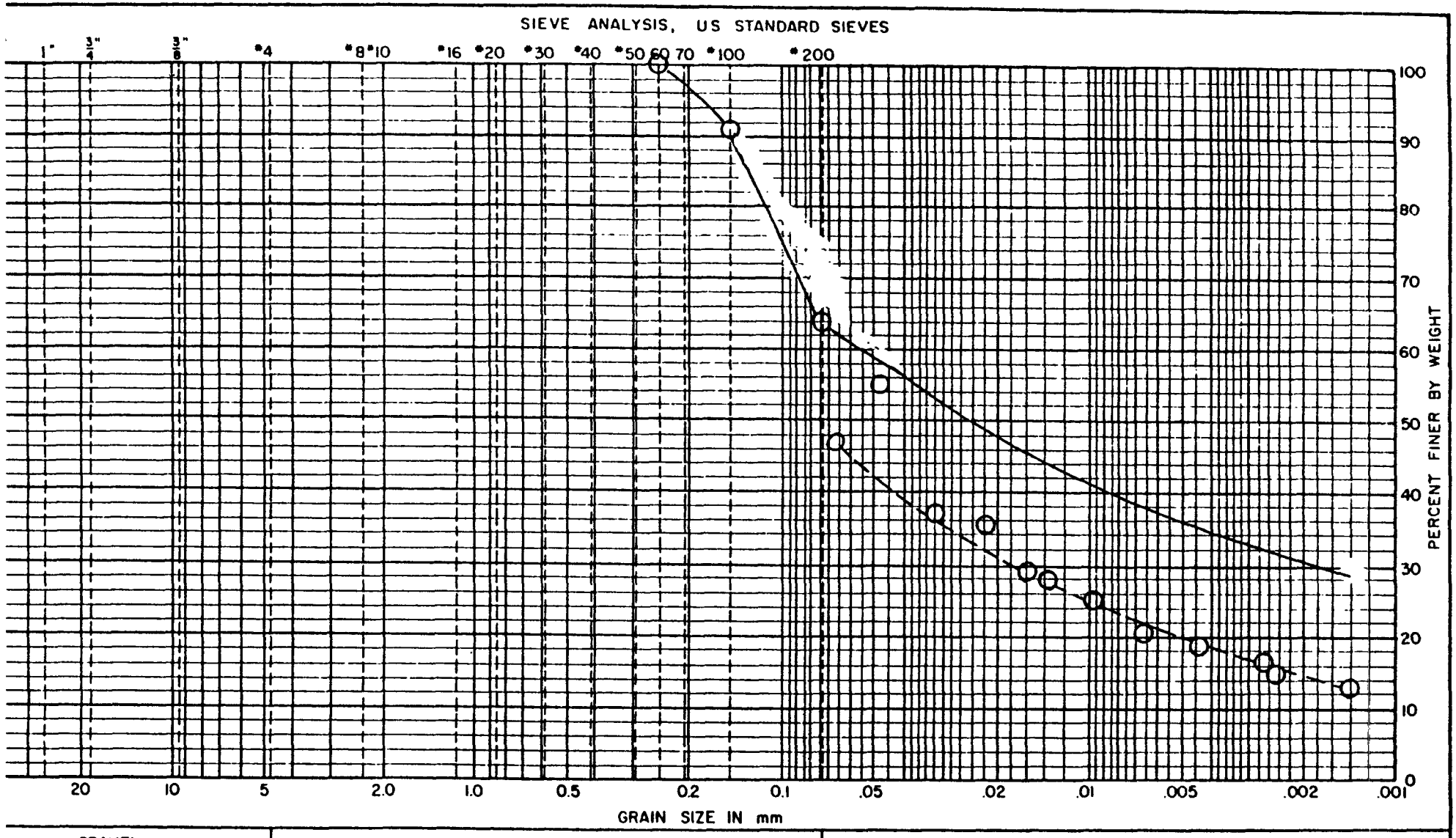
CHECKED BY: SAG 7-12-85

PROJECT

GRADATION CURVES

FIG. NO.

DEP\DA0004611



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, organic SILT with some fine sand and some clay

BURMISTER- Gray Organic SILT some(+), Sand some, Clay

MOISTURE CONTENT (%) 53

TOTAL WET DENSITY (pcf) 100

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 32

PERCENT SILT (74.0-2.0 μm) 40

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D22LE 3101 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-8-85

DRAWN BY: 7-11-85

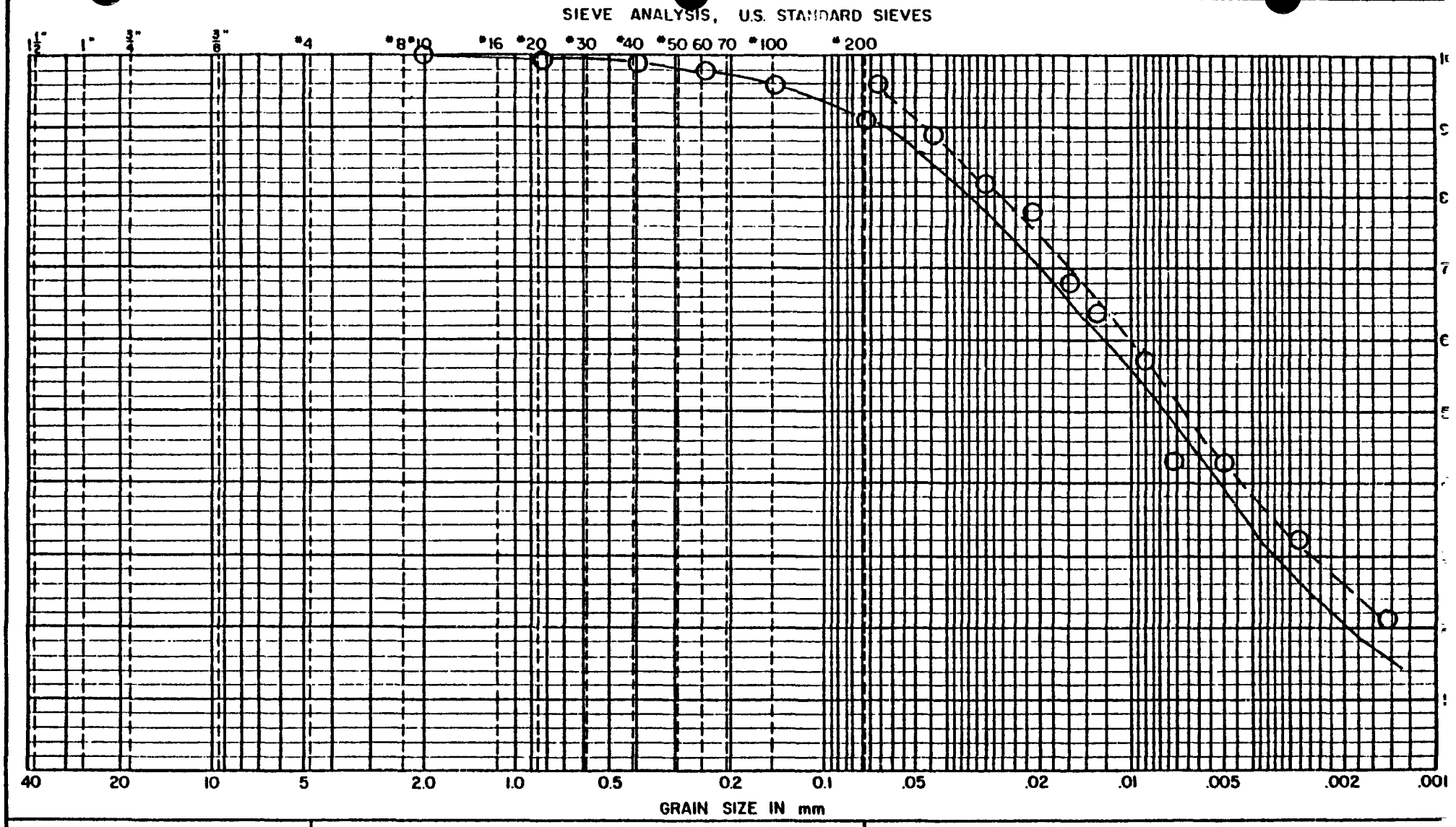
CHECKED BY:

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004612



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 186

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY 2.55

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some clay, plant fibers and trace of fine grained sand

BURMISTER- Dark gray Organic SILT trace(+), fine Sand, little(+) Clay, plant fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm)	10
PERCENT SILT (74.0-2.0 µm)	69
PERCENT CLAY (<2.0 µm)	21

SAMPLE NO. D22MA 3220 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-14-85

DRAWN BY: 7-11-85

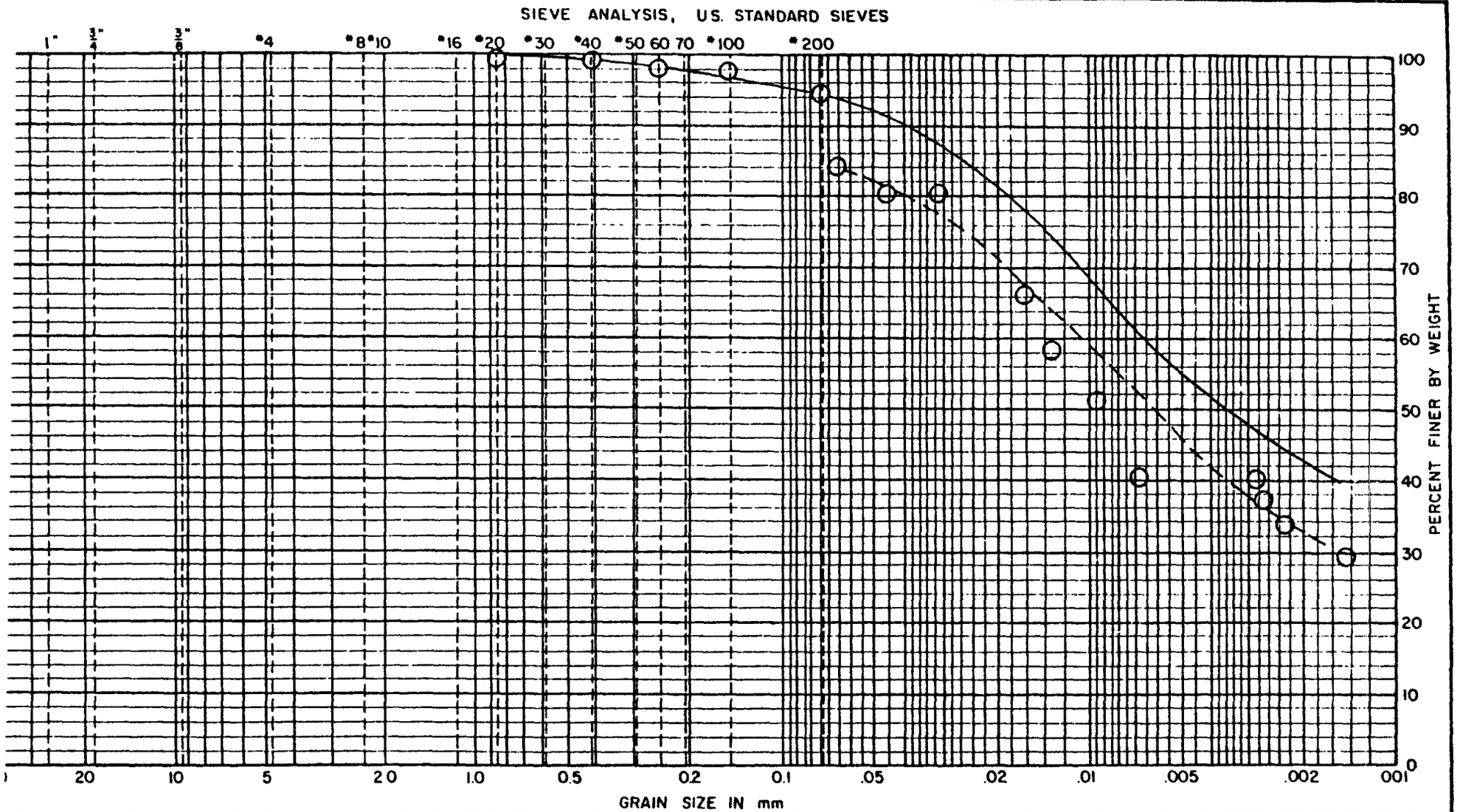
CHECKED BY: 7-12-85

GRADATION CURVES

PROJECT

FIG. NO

DEP\DA0004613



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 204

TOTAL WET DENSITY (pcf) 74

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT and CLAY with trace of medium to fine sand

BURMISTER- Black SILT and Clay(+) trace of medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 54

PERCENT CLAY (<2.0 μm) 40

SAMPLE NO. D22MA 3221 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-14-85

DRAWN BY: 7-11-85

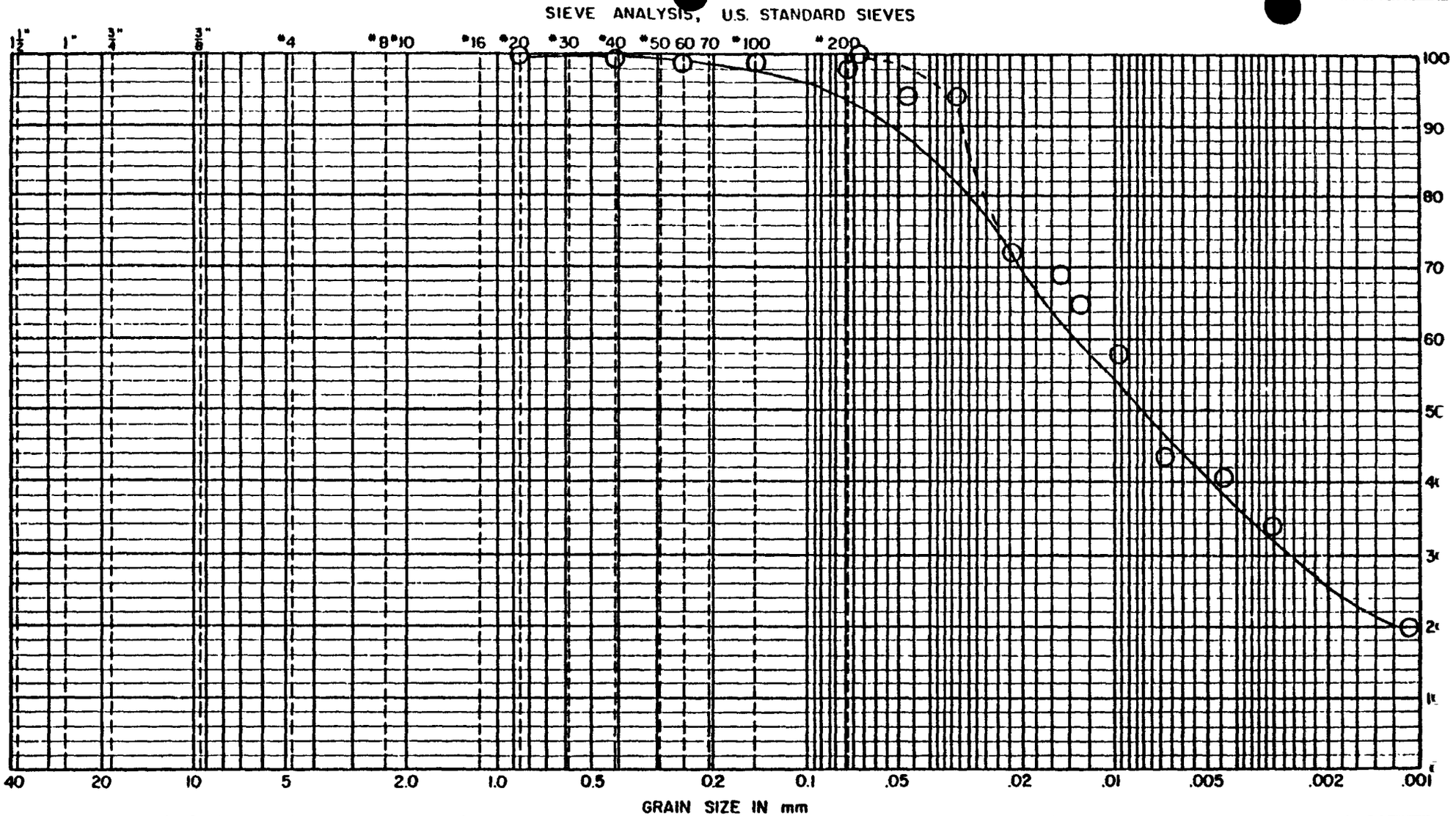
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004614



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 134

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT, some Clay, trace fine Sand.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 68

PERCENT CLAY (<2.0 µm) 26

SAMPLE NO. D22MA 3223 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-14-85

DRAWN BY: Qw 7-11-85

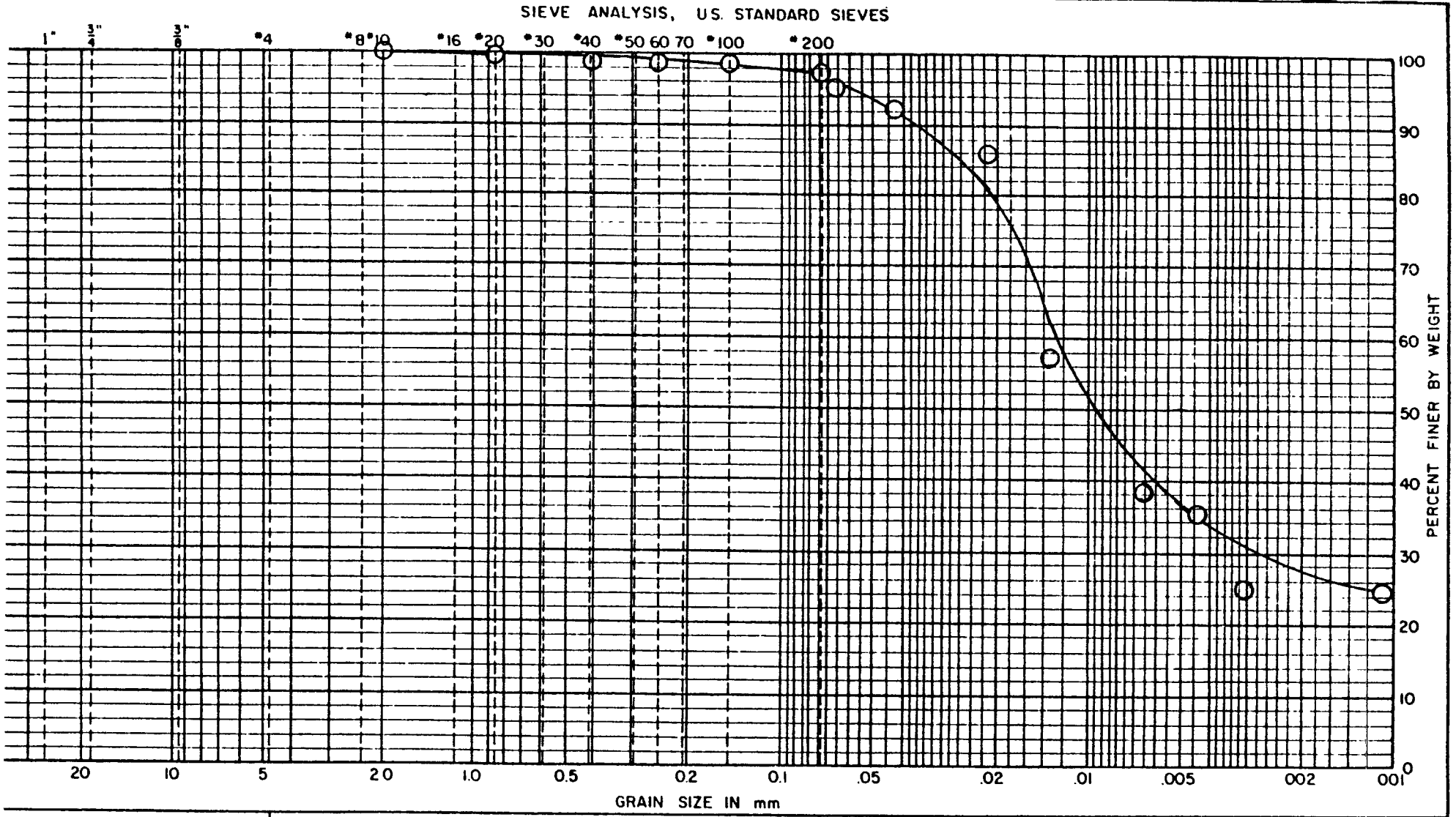
CHECKED BY: SAG 7-12-85

PROJECT

GRADATION CURVES

FIG. NO

DEP\DA0004615



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT some, Clay, trace(-) fine Sand.

MOISTURE CONTENT (%) 116

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 3

PERCENT SILT (74.0-2.0 μm) 69

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D22MA 3224 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-14-85

DRAWN BY: [illegible] 7-11-85

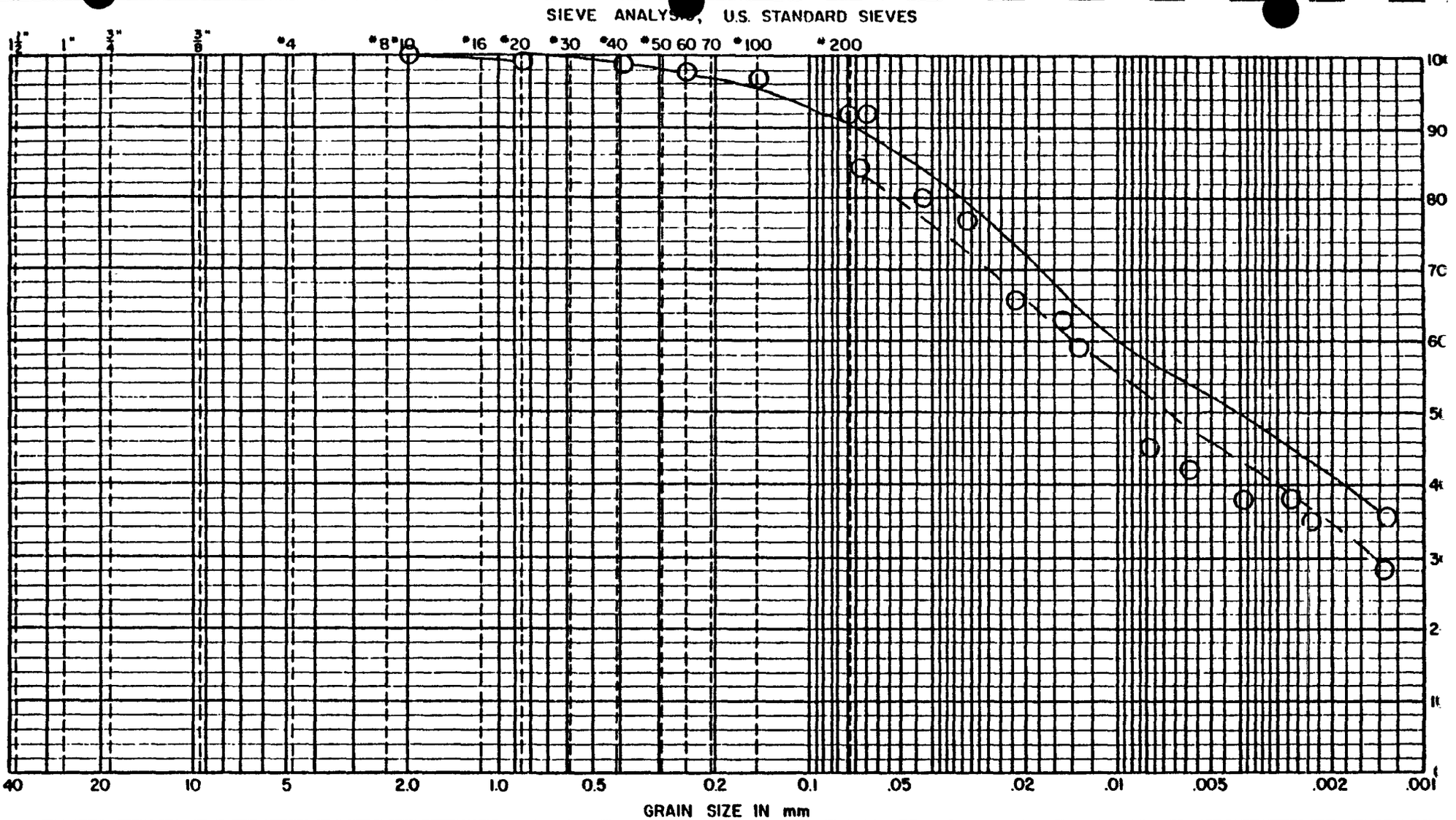
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004616



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 146

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY 2.52

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brownish-gray, SILT and CLAY, with trace of fine sand

BURMISTER- Dark brownish gray SILT and Clay, trace(+) fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) 49

PERCENT CLAY (<2.0 μm) 41

SAMPLE NO. D22MC 3240 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-14-85

DRAWN BY: CL 7-11-85

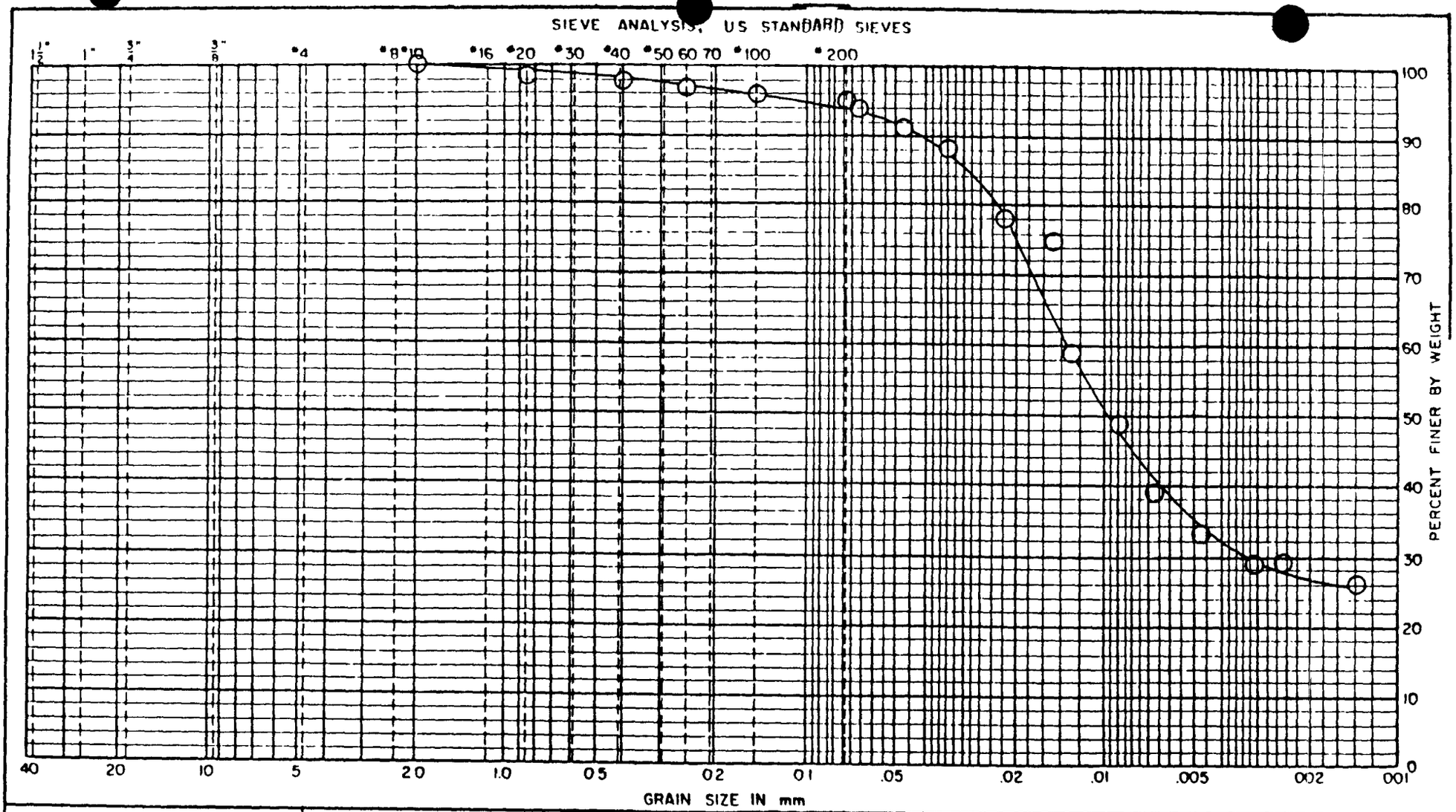
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT

FIG. NO

DEP\DA0004617



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black Organic CLAY and SILT with a trace of fine Sand.

BURMISTER- Black Organic CLAY and SILT trace, fine Sand

MOISTURE CONTENT (%) 115

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 67

PERCENT CLAY (<2.0 μm) 27

SAMPLE NO. D22MC-3242-202-MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5/14/85

DRAWN BY: Chu 7-25-85

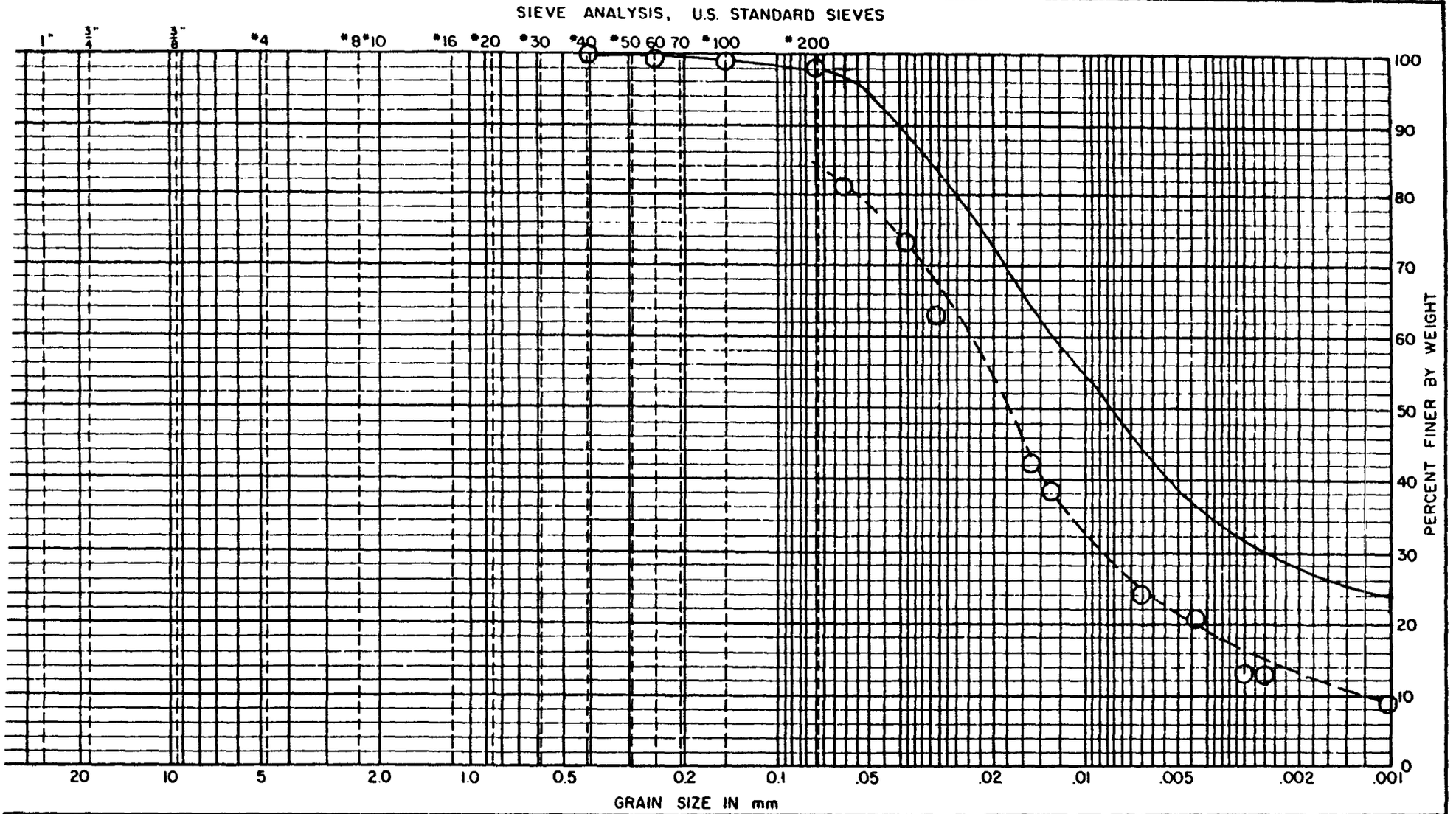
CHECKED BY: SAG 7-29-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004618



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 23

TOTAL WET DENSITY (pcf) 132

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, SILT with trace of gray, silty clay in frequent layers

BURMISTER- Brown SILT some(+), Clay, trace(-) fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 2

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D22MC 3244 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-14-85

DRAWN BY: Ch 7-11-85

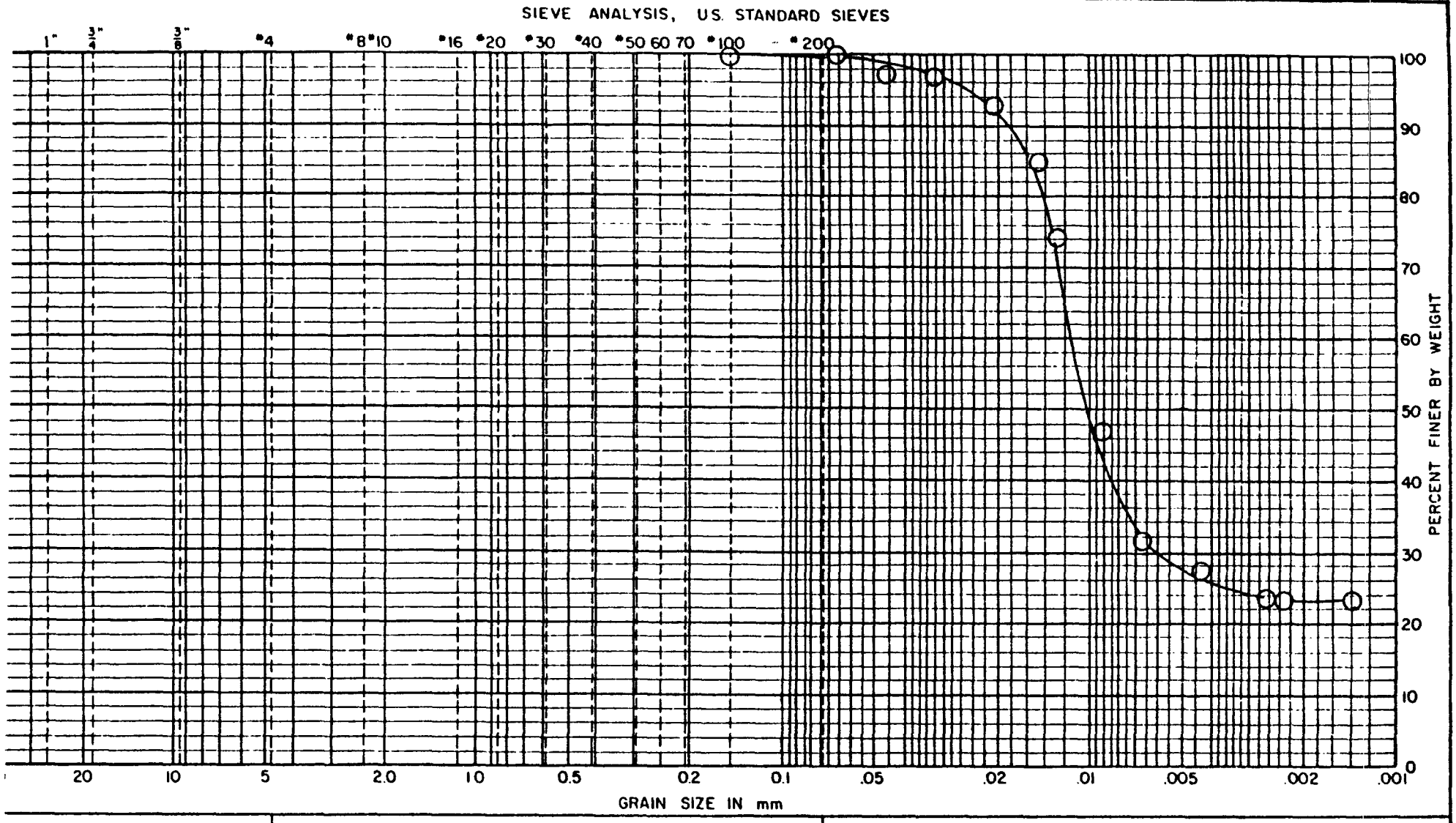
CHECKED BY: BED 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004619



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fibers

BURMISTER- Black Organic SILT, some(-) Clay

MOISTURE CONTENT (%) 171

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 1

PERCENT SILT (74.0-2.0 µm) 77

PERCENT CLAY (<2.0 µm) 22

SAMPLE NO. D22RA 3057 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-8-85

DRAWN BY: JR 7-11-85

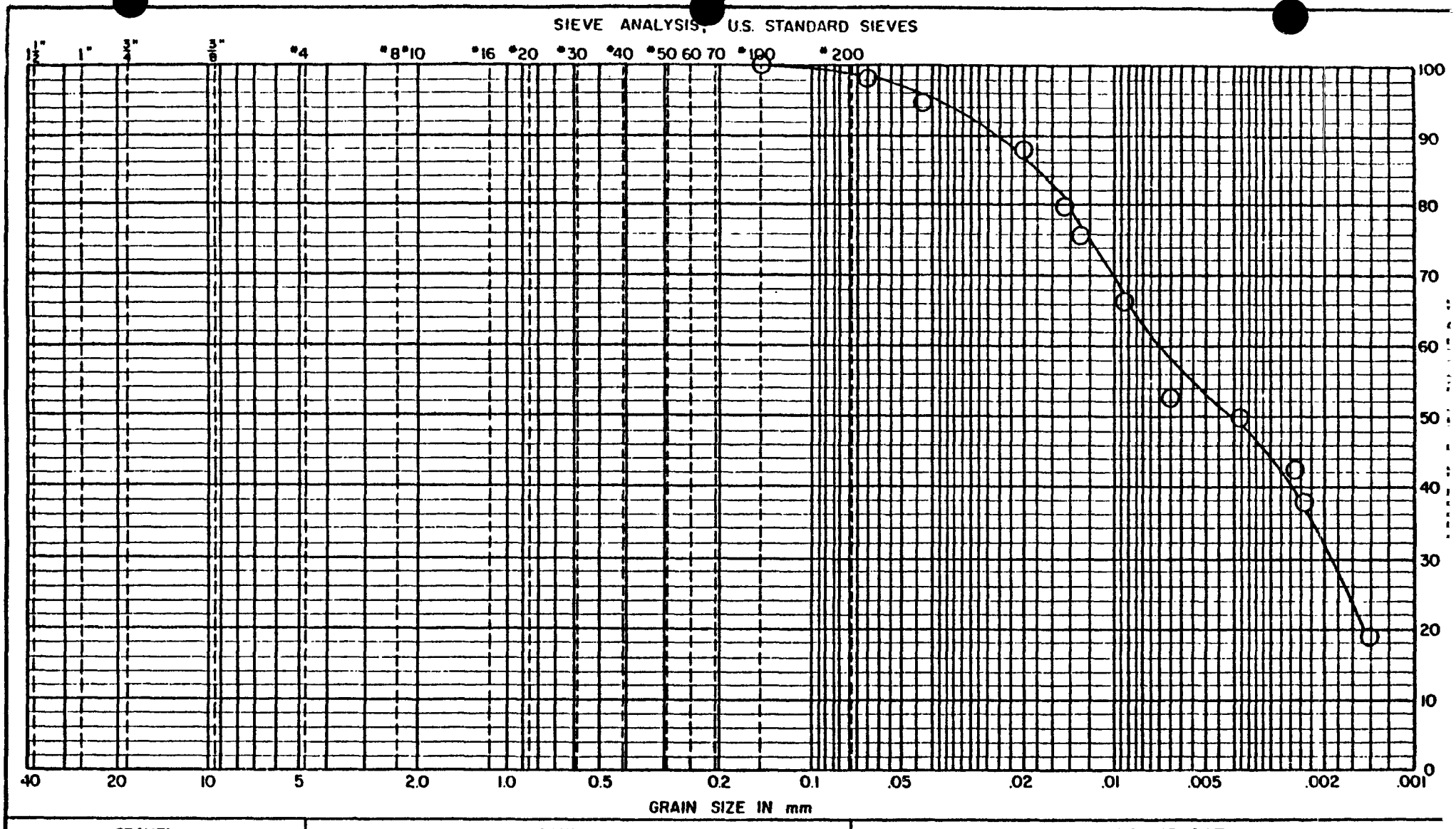
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004620



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 127

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic Clayey SILT with trace of wood fibers

BURMISTER- Black to dark gray Organic SILT, some Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 0

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 30

SAMPLE NO. D22RA 3058 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-8-85

DRAWN BY: CW 7-11-85

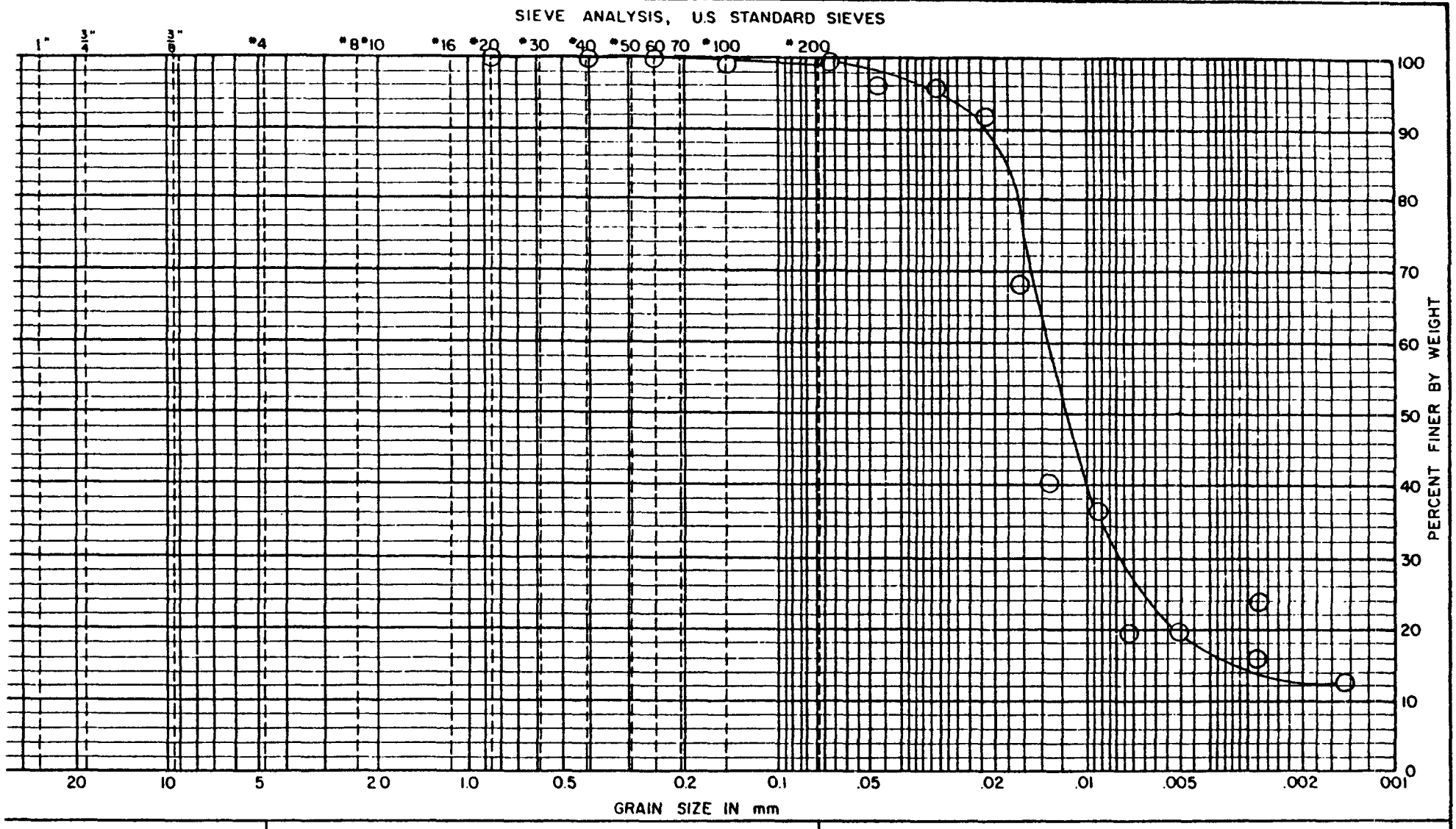
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004621



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 192

TOTAL WET DENSITY (pcf) not available

SPECIFIC GRAVITY 2.51

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT little(-) Clay, trace (-) fine Sand.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 1

PERCENT SILT (74.0-2.0 µm) 87

PERCENT CLAY (<2.0 µm) 12

SAMPLE NO. D22RC 3075 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-7-85

DRAWN BY: tcw 7-11-85

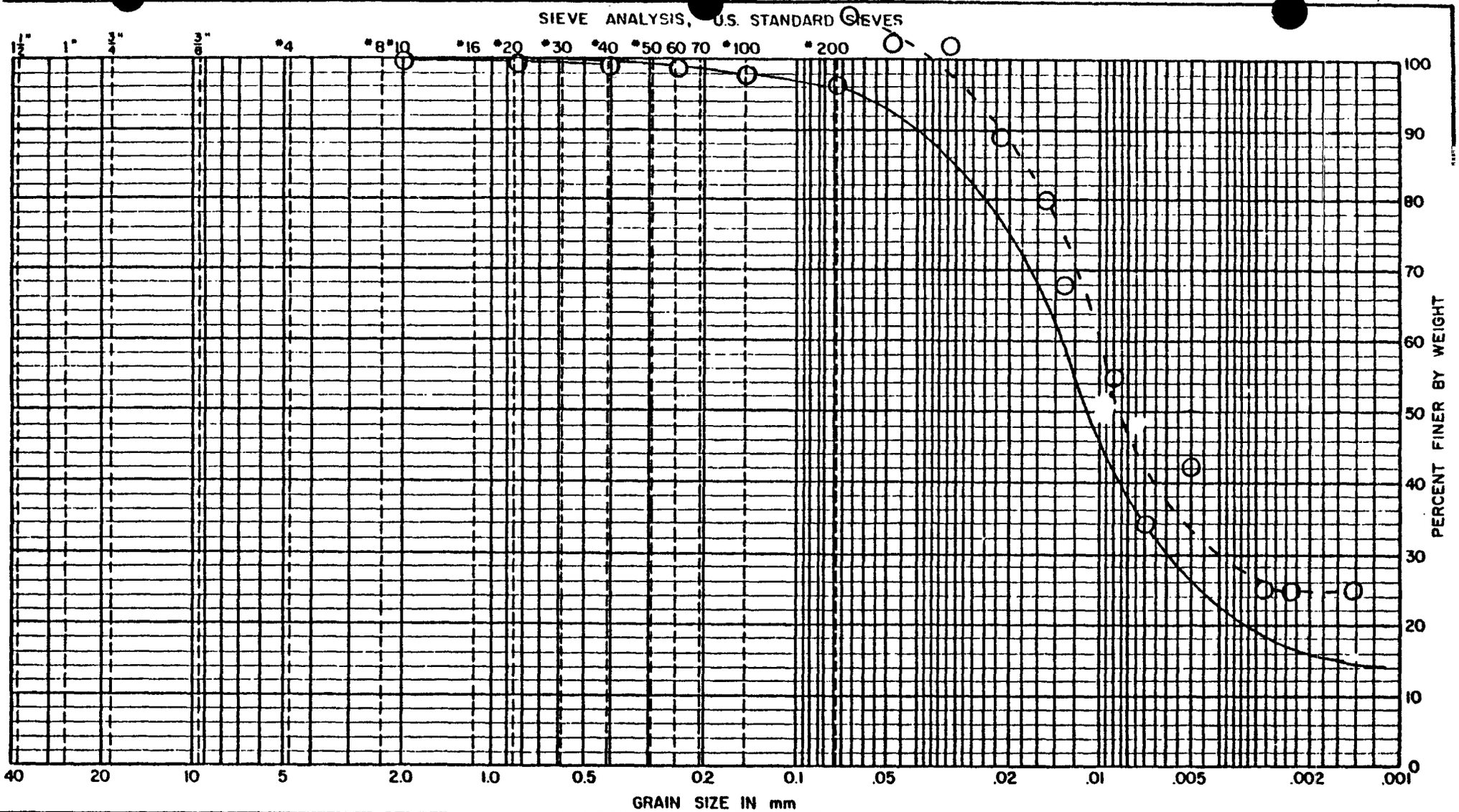
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004622



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 190

TOTAL WET DENSITY (pcf) 73

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some clay and medium to fine grained sand and a trace of plant fibers

BURMISTER- Dark gray Organic SILT little(-), medium to fine(+) Sand, little Clay, trace plant fibers.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. D22RC 3076 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-7-85

DRAWN BY: SA 7-11-85

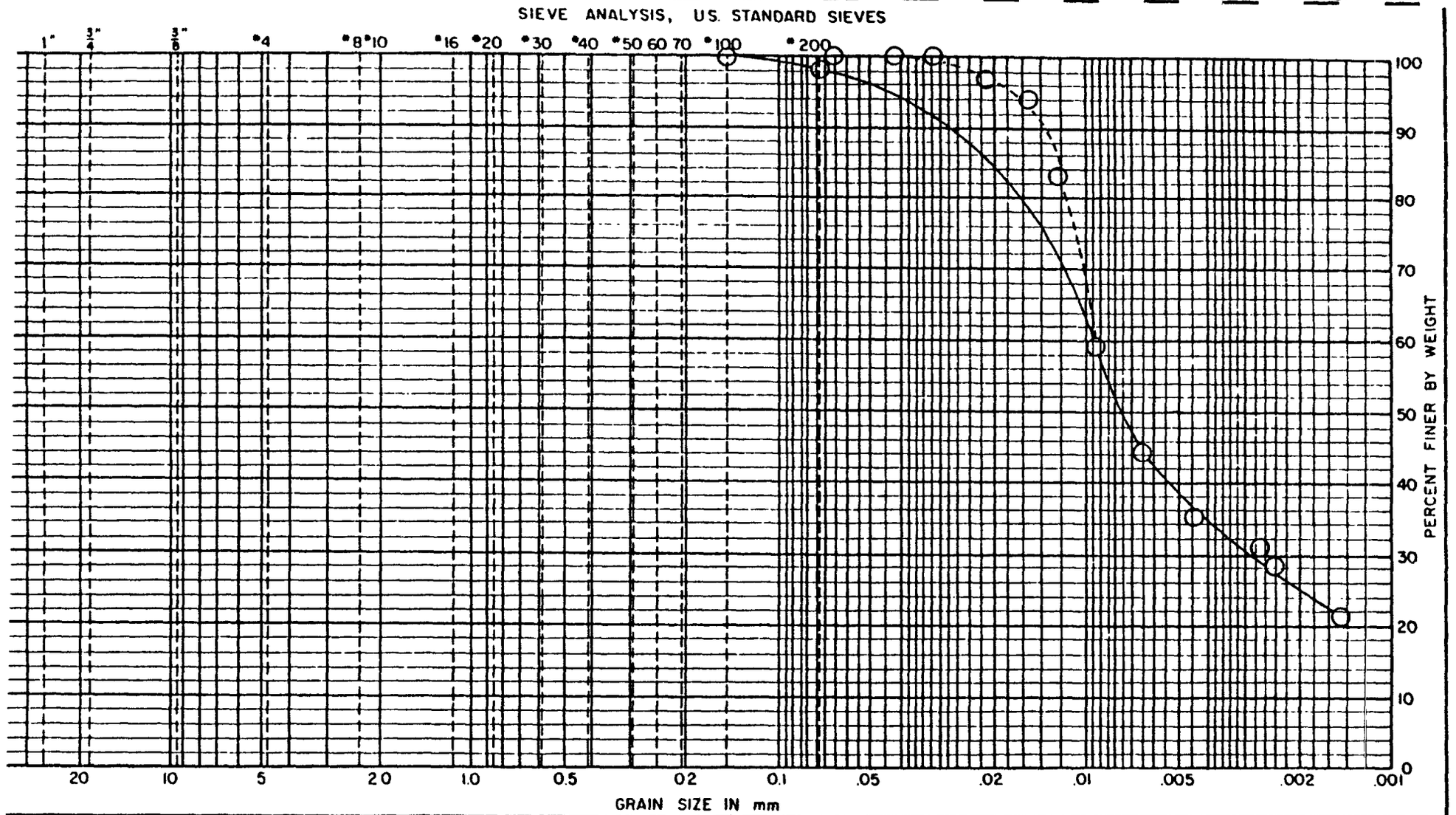
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004623



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT

BURMISTER- Black Organic SILT, some CLAY

MOISTURE CONTENT (%) 139

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 0

PERCENT SILT (74.0-2.0 μm) 74

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. D22RC 3078 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-7-85

DRAWN BY: 7-11-85

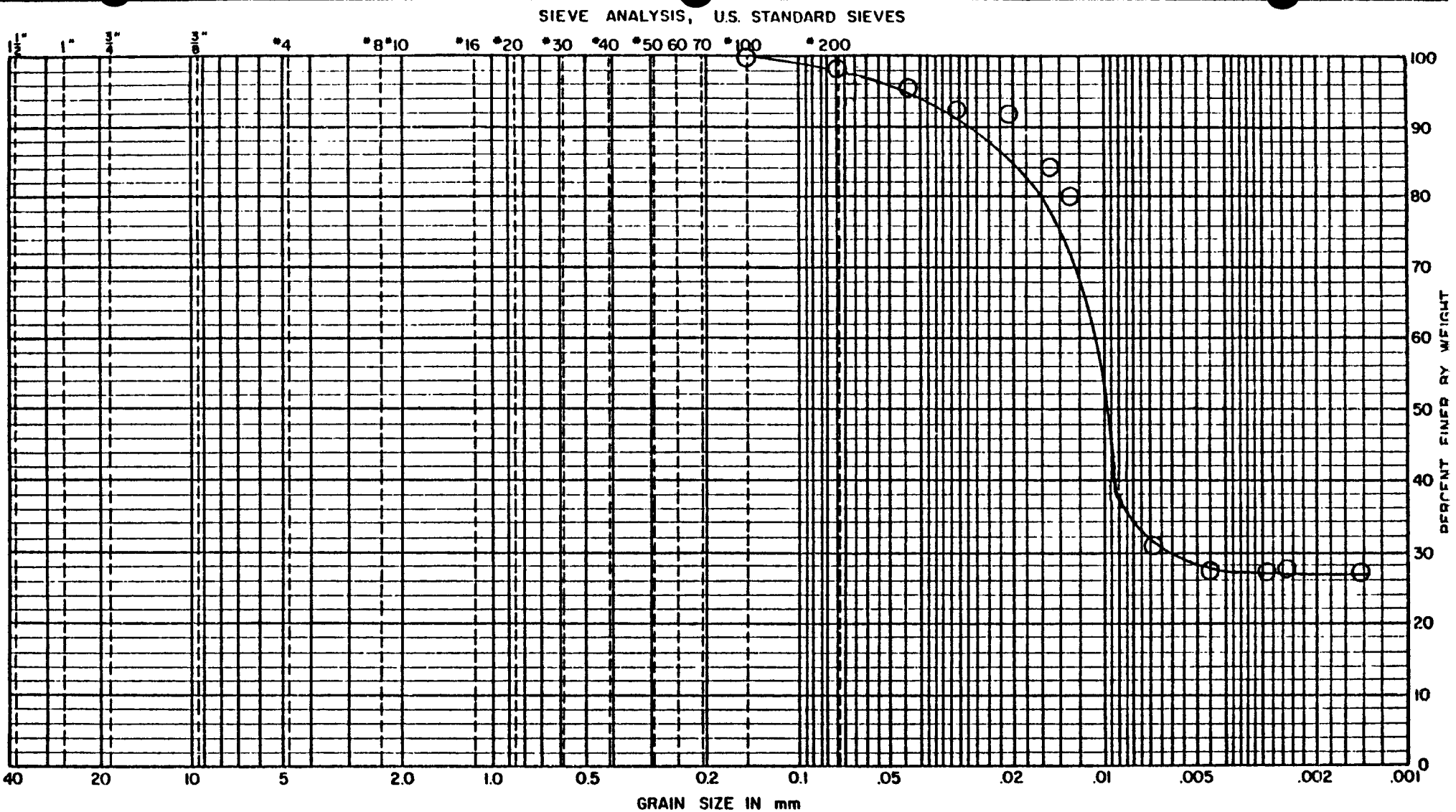
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004624



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 166

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT, some Clay, trace(-), fine SAND

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 1

PERCENT SILT (74.0-2.0 µm) 72

PERCENT CLAY (<2.0 µm) 27

SAMPLE NO. D22RC 3079 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-7-85

DRAWN BY: tcw 7-11-85

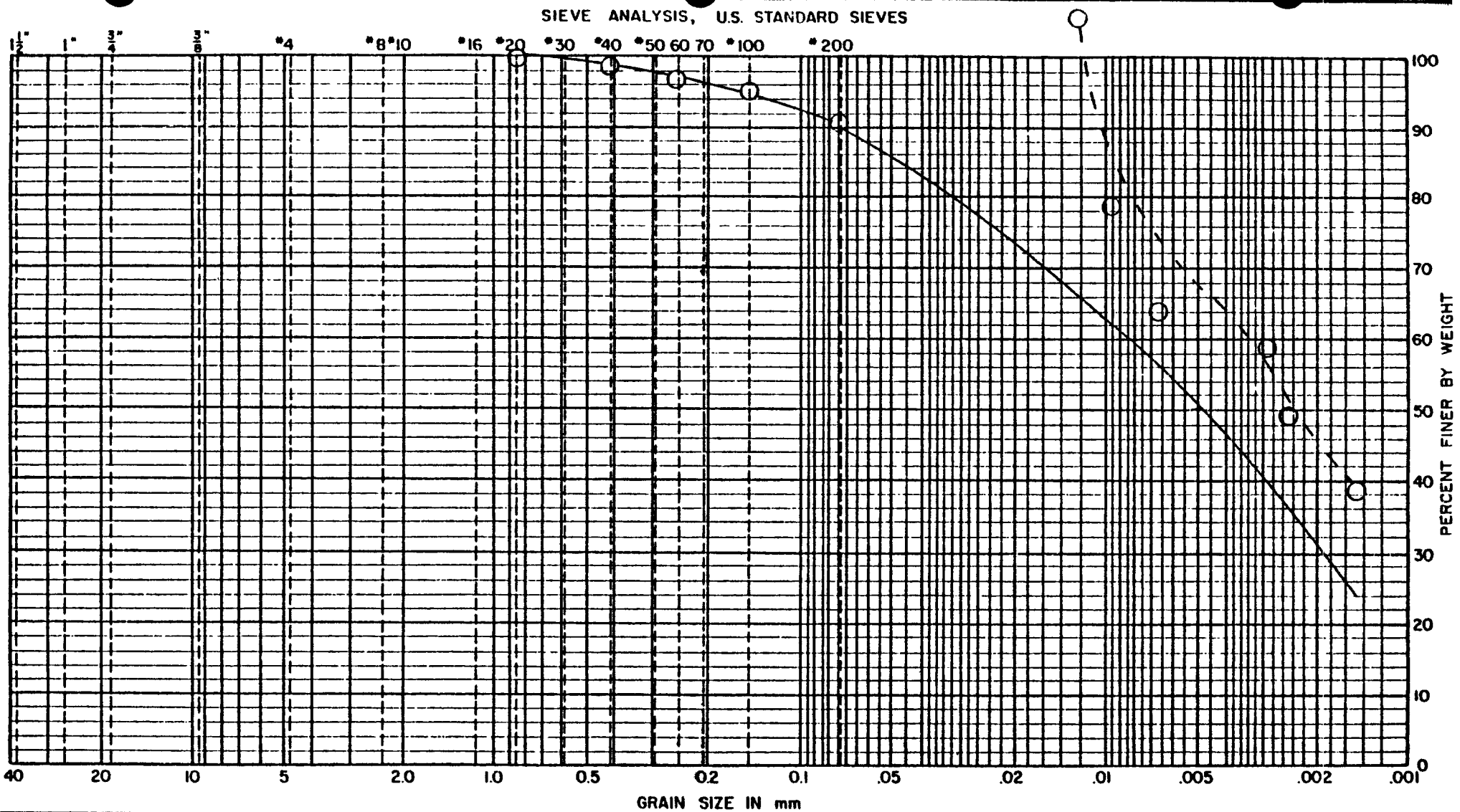
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004625



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark Grayish brown Clayey SILT with a trace of fine Sand and a little Plant Fibers

BURMISTER- Dark Grayish brown Clayey SILT trace(+), fine Sand, little Plant Fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 10

PERCENT SILT (74.0-2.0 µm) } 90

PERCENT CLAY (<2.0 µm)

MOISTURE CONTENT (%) 315

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

SAMPLE NO. D22RD 3055 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-8-85

DRAWN BY: 7-11-85

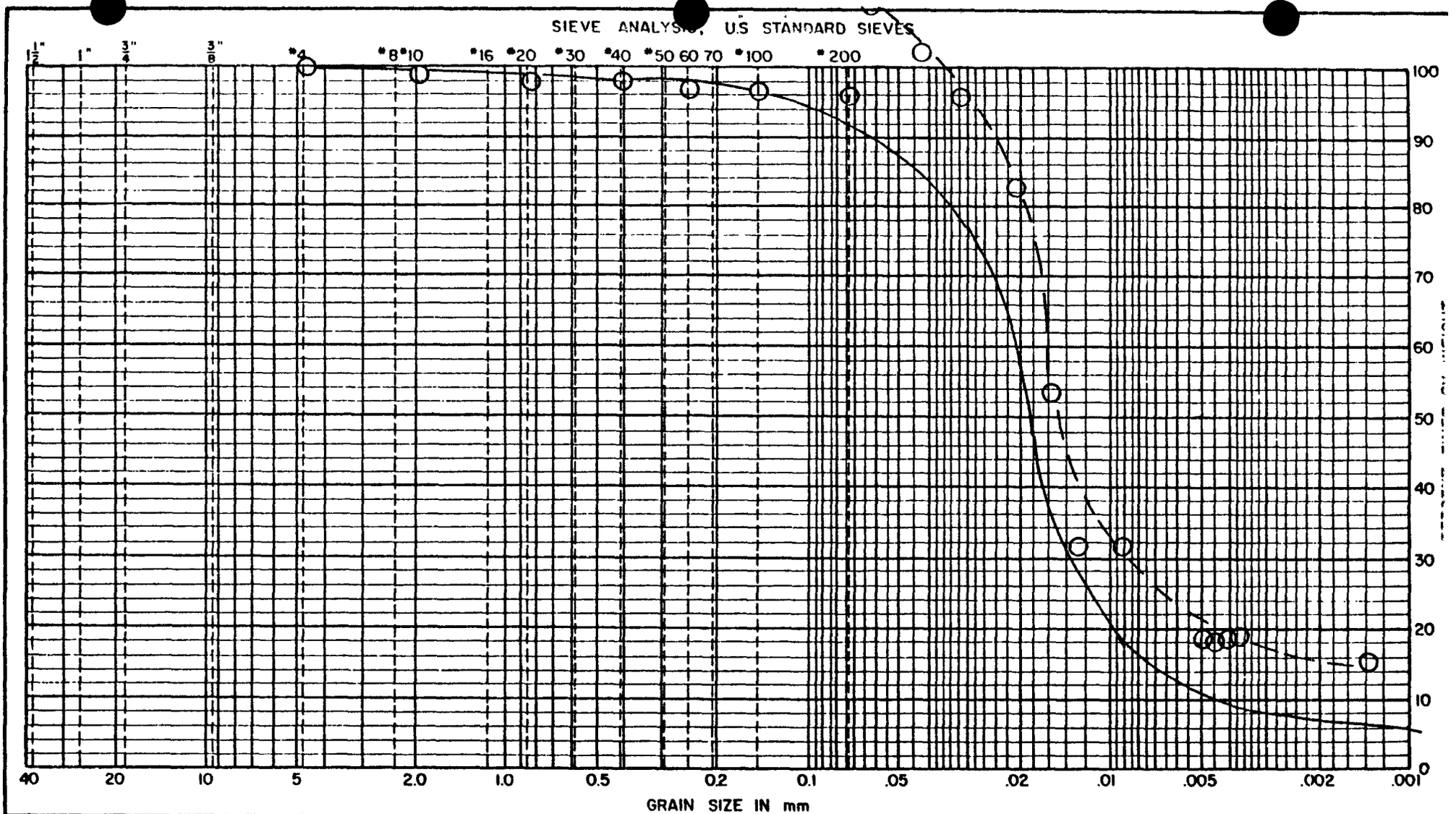
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004626



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 228

TOTAL WET DENSITY (pcf) 73

SPECIFIC GRAVITY 2.44

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with a trace of fine sand

BURMISTER- Black Organic SILT trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 86

PERCENT CLAY (<2.0 µm) 8

SAMPLE NO. D65LA 3178 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-13-85

DRAWN BY: [illegible] 7-9-85

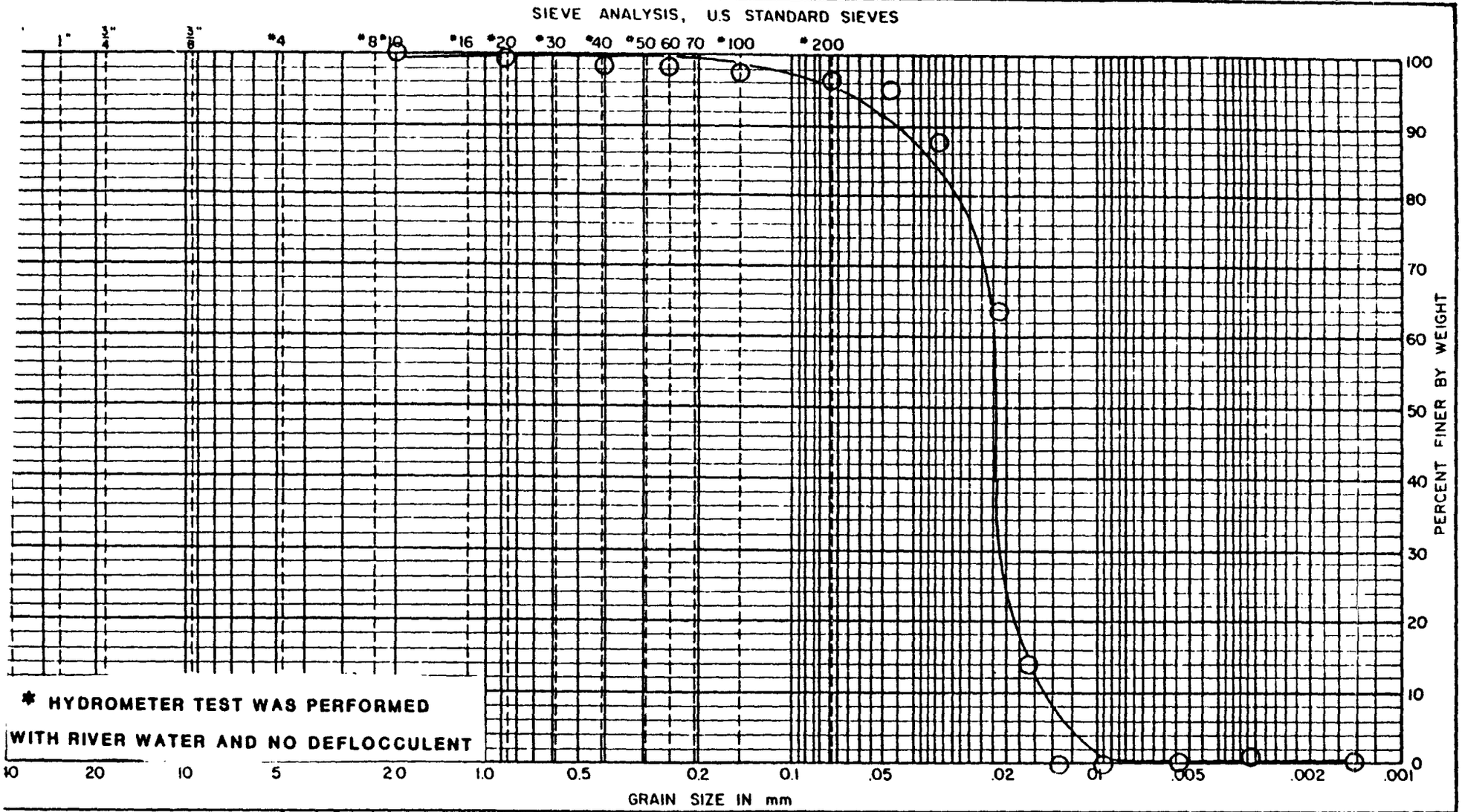
CHECKED BY: [illegible] 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004627



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with trace of sand

BURMISTER- Black Organic SILT trace Sand

MOISTURE CONTENT (%) 228

TOTAL WET DENSITY (pcf) 73

SPECIFIC 2.44

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 95

PERCENT CLAY (<2.0 μm)

SAMPLE NO. D65LA 3178 200 MY (River water)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-13-85

DRAWN BY: 7-9-85

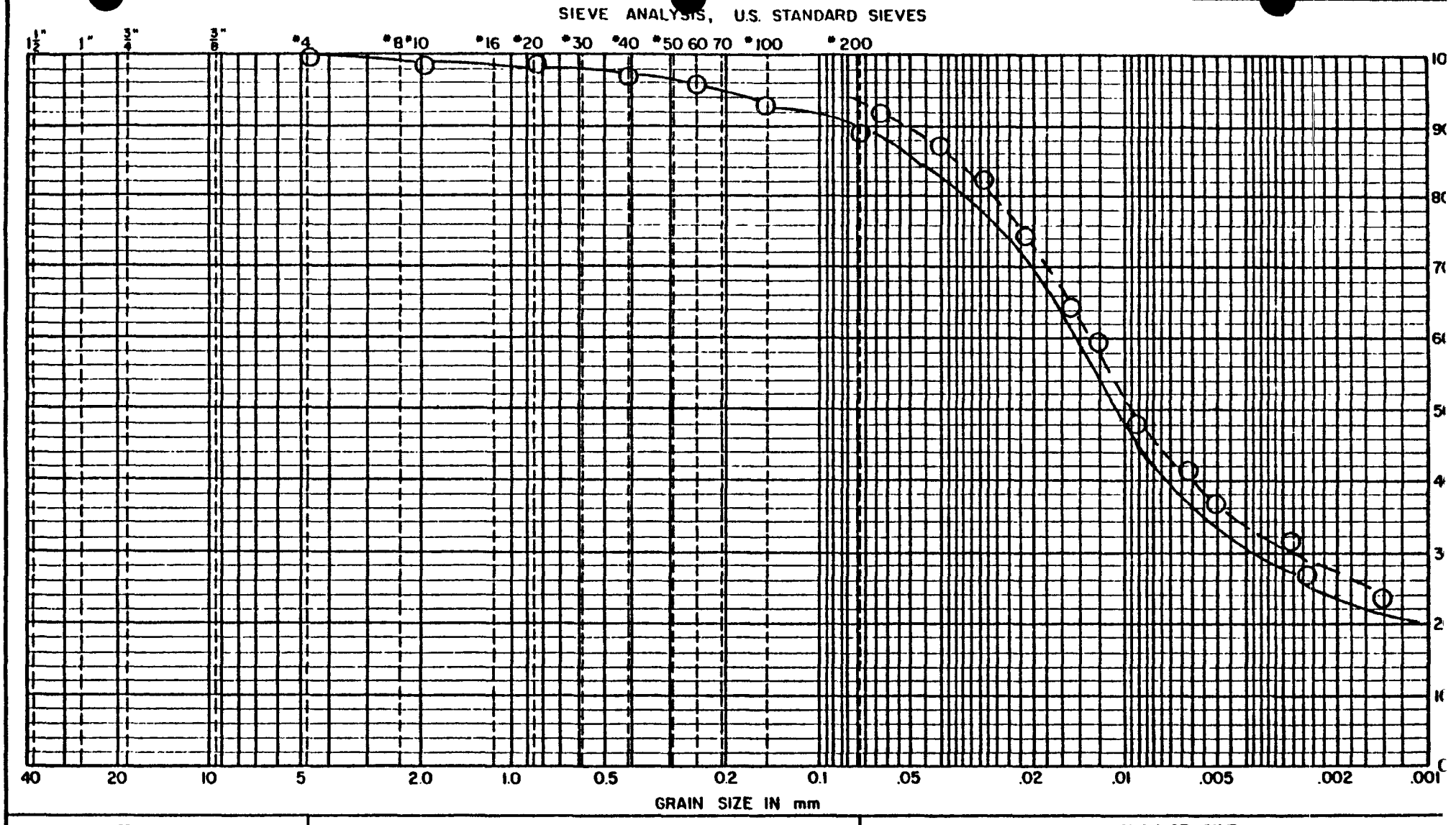
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004628



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 110

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with trace of brown clay in lenses, and plant fibers

BURMISTER- Black Organic SILT, trace Clay, trace plant fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 12

PERCENT SILT (74.0-2.0 μm) 65

PERCENT CLAY (<2.0 μm) 23

SAMPLE NO. D65LA 3179 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-13-85

DRAWN BY: Chu 7-11-85

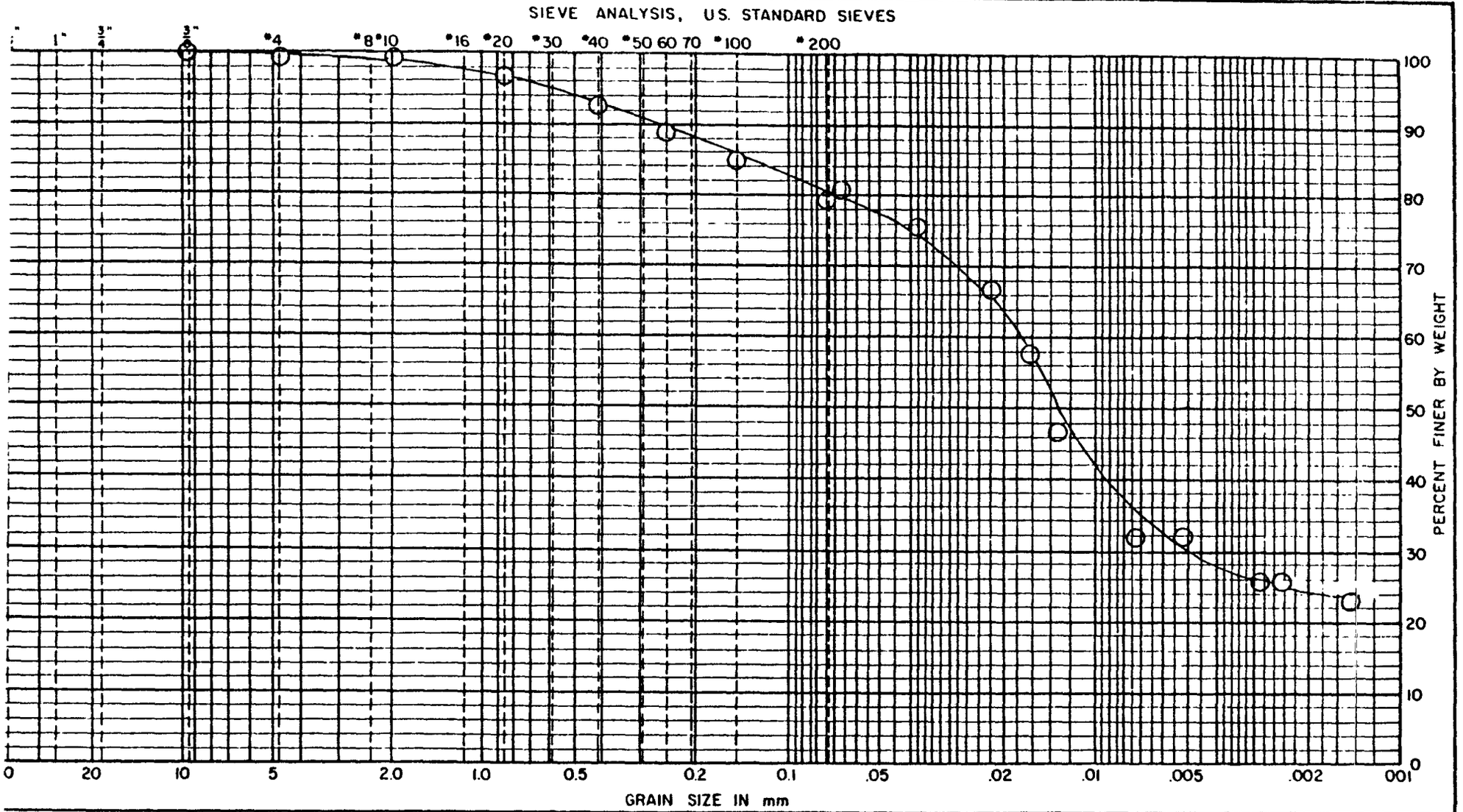
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004629



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 81

TOTAL WET DENSITY (pcf) 87

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, SILT with some medium to fine grained sand and a little clay

BURMISTER- Dark gray SILT some(-) medium to fine Sand, little Clay.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 21

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. D65LA 3181 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-13-85

DRAWN BY: 7-11-85

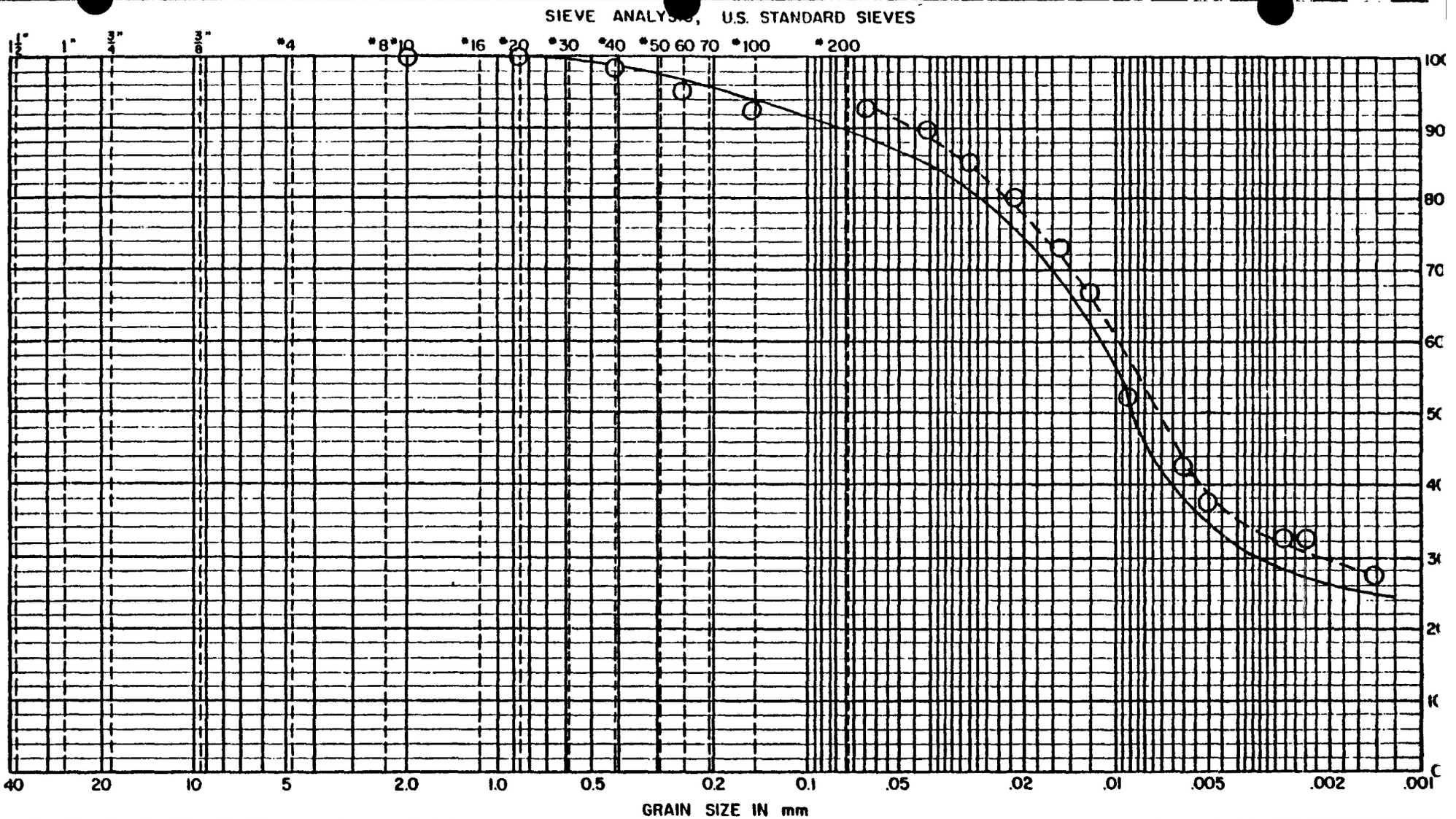
CHECKED BY: 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004630



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 88

TOTAL WET DENSITY (pcf) 93

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to gray, SILT with some clay and a trace of fine grained sand in occasional layers

BURMISTER- Black to gray SILT little(-), fine Sand, some Clay.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm)	12
PERCENT SILT (74.0-2.0 µm)	63
PERCENT CLAY (<2.0 µm)	25

SAMPLE NO. D65LA 3182 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-13-85

DRAWN BY: [illegible] 7-11-85

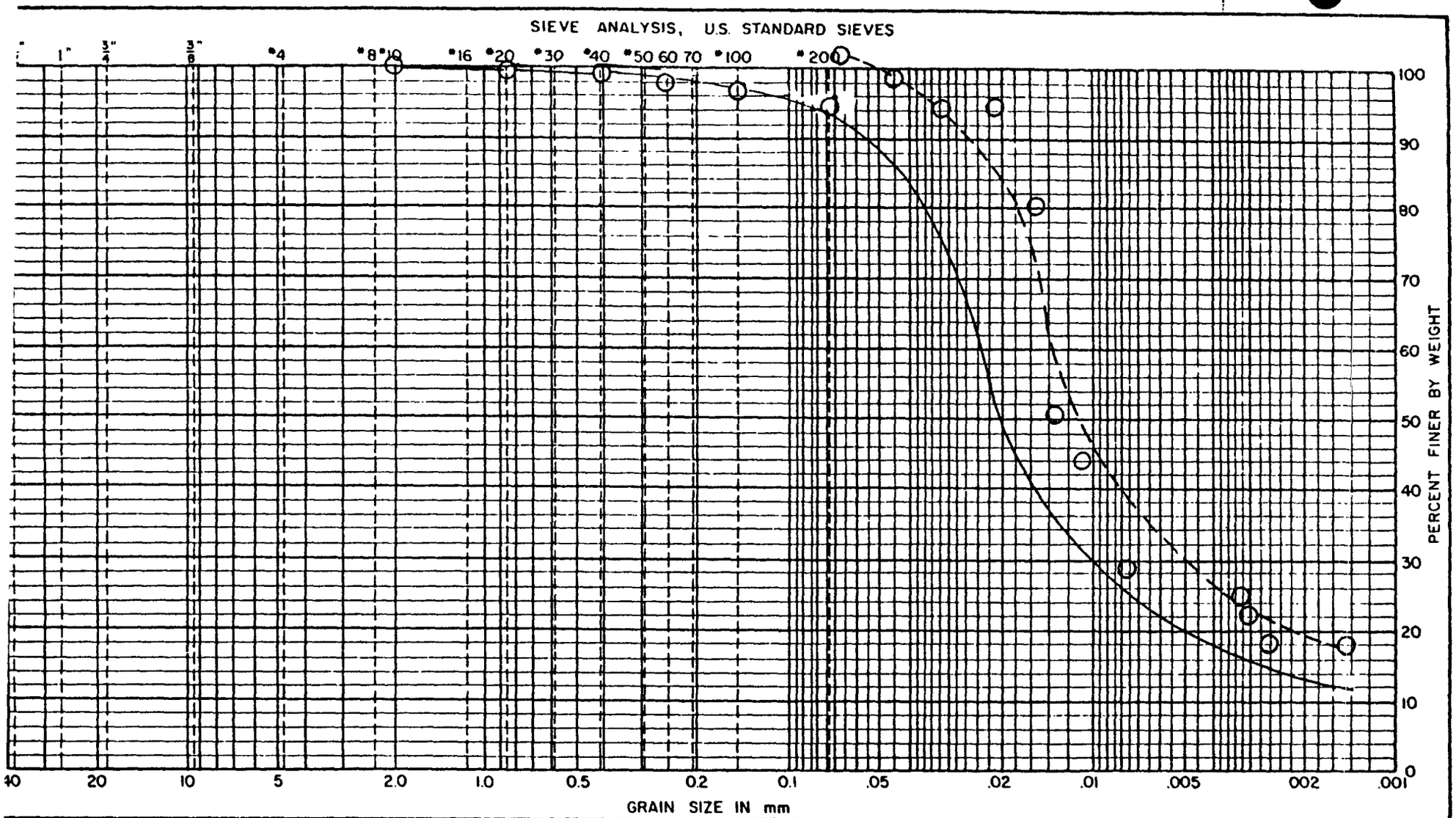
CHECKED BY: [illegible] 7-12-85

PROJECT

GRADATION CURVES

FIG. NO.

DEP\DA0004631



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT, with littel clay and trace of sand

BURMISTER- Black SILT litte(+) Clay, trac(+) Sand

MOISTURE CONTENT (%) 189

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY 2.45

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 79

PERCENT CLAY (<2.0 μm) 13

SAMPLE NO. D65LC 3198 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-13-85

DRAWN BY: 7-11-85

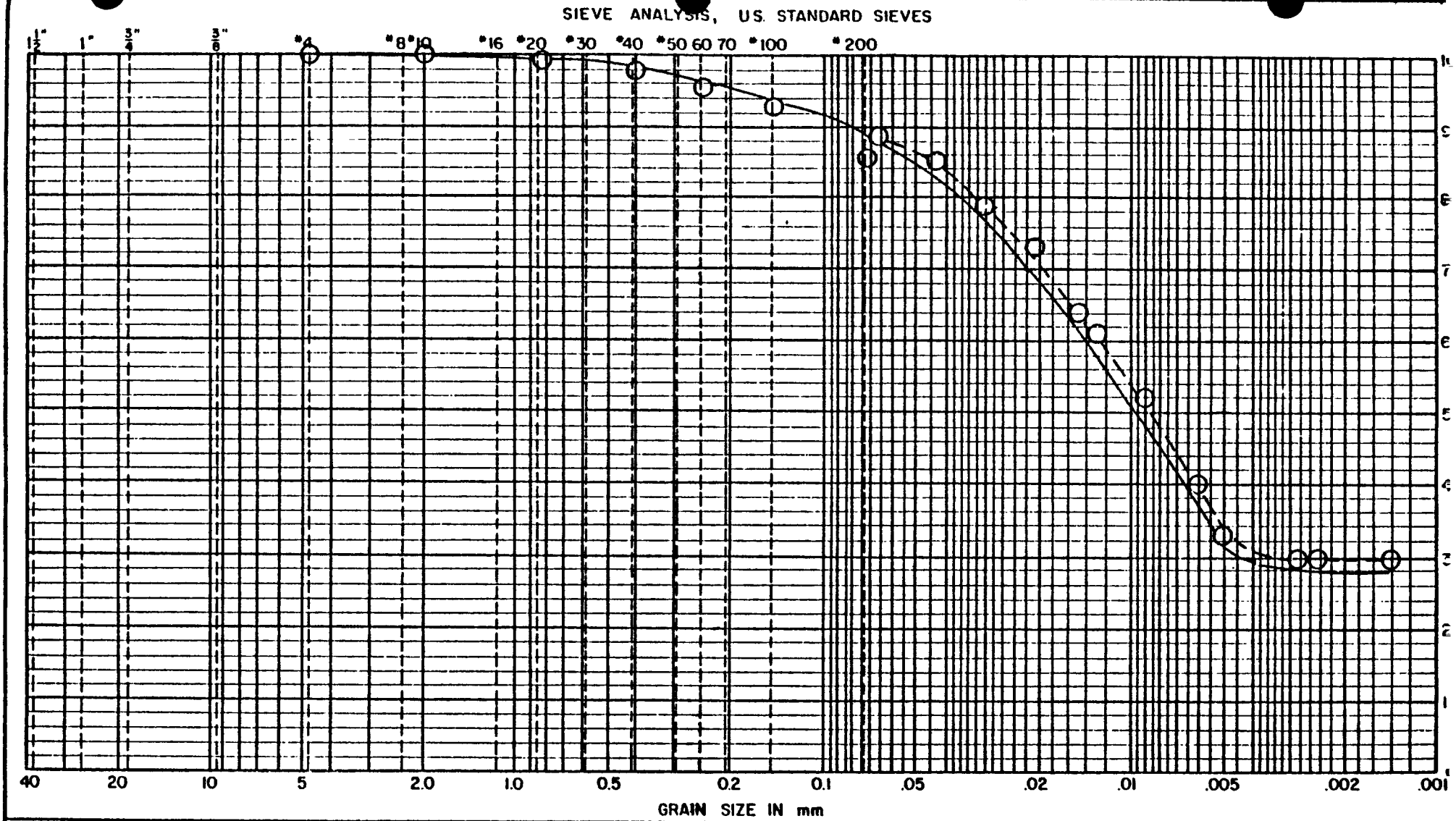
CHECKED BY 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004632



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 90

TOTAL WET DENSITY (pcf) 89

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT, with some clay and trace of fine grained sand and peat

BURMISTER- Black to dark gray Organic SILT little(-), fine Sand, some Clay.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 13

PERCENT SILT (74.0-2.0 μm) 59

PERCENT CLAY (<2.0 μm) 28

SAMPLE NO. D65LC 3200 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-13-85

DRAWN BY: Chw 7-11-85

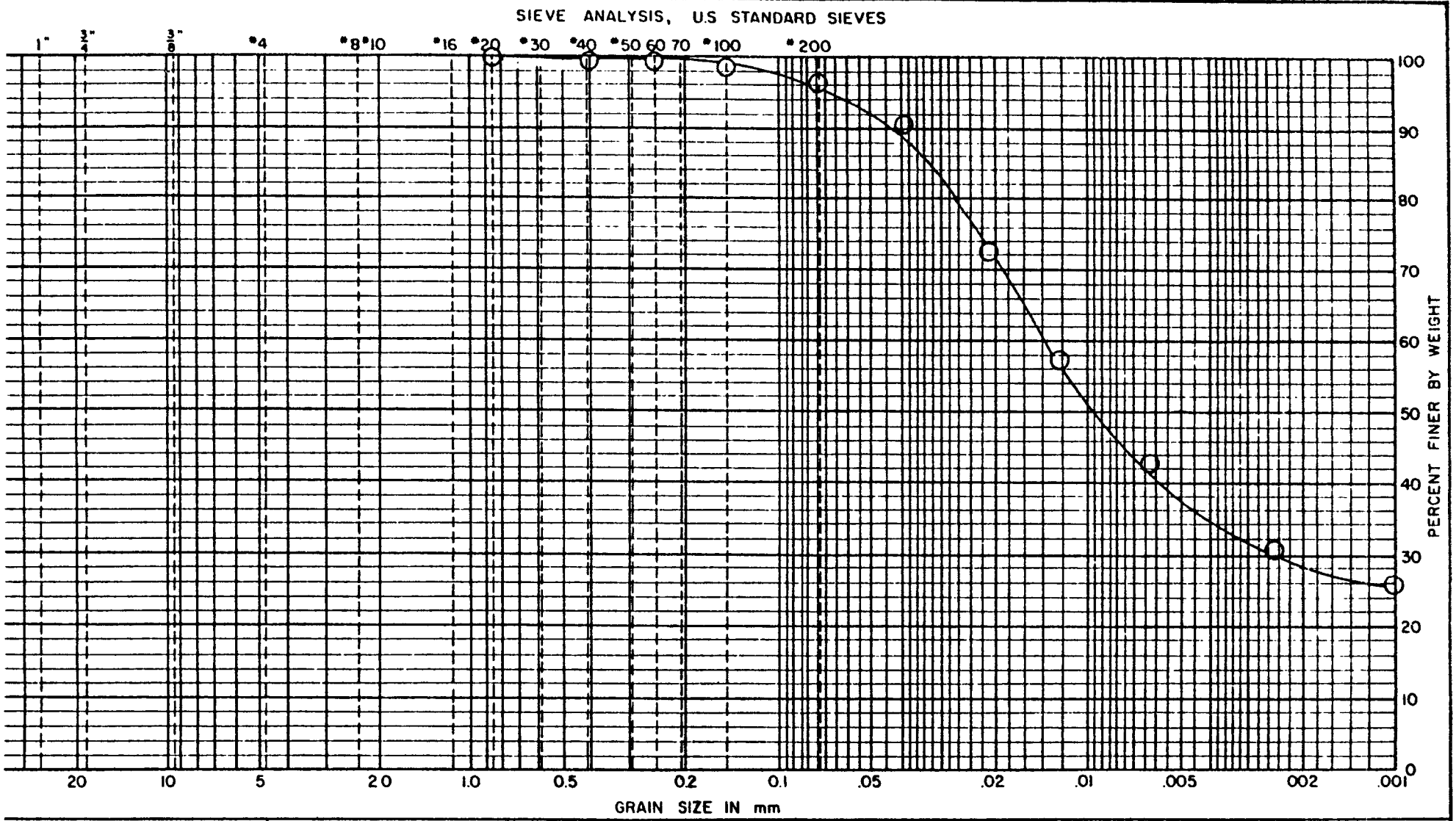
CHECKED BY: DED 7-12-85

GRADATION CURVES

PROJECT

FIG. NO.

DEP\DA0004633



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, organic Clayey SILT, with trace of fine sand and trace of peat

BURMISTER- Gray Organic SILT, some Clay, trace fine Sand.

MOISTURE CONTENT (%) 72

TOTAL WET DENSITY (pcf) 97

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 7

PERCENT SILT (74.0-2.0 μm) 66

PERCENT CLAY (<2.0 μm) 27

SAMPLE NO. D65LC 3202 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-13-85

DRAWN BY: 7-11-85

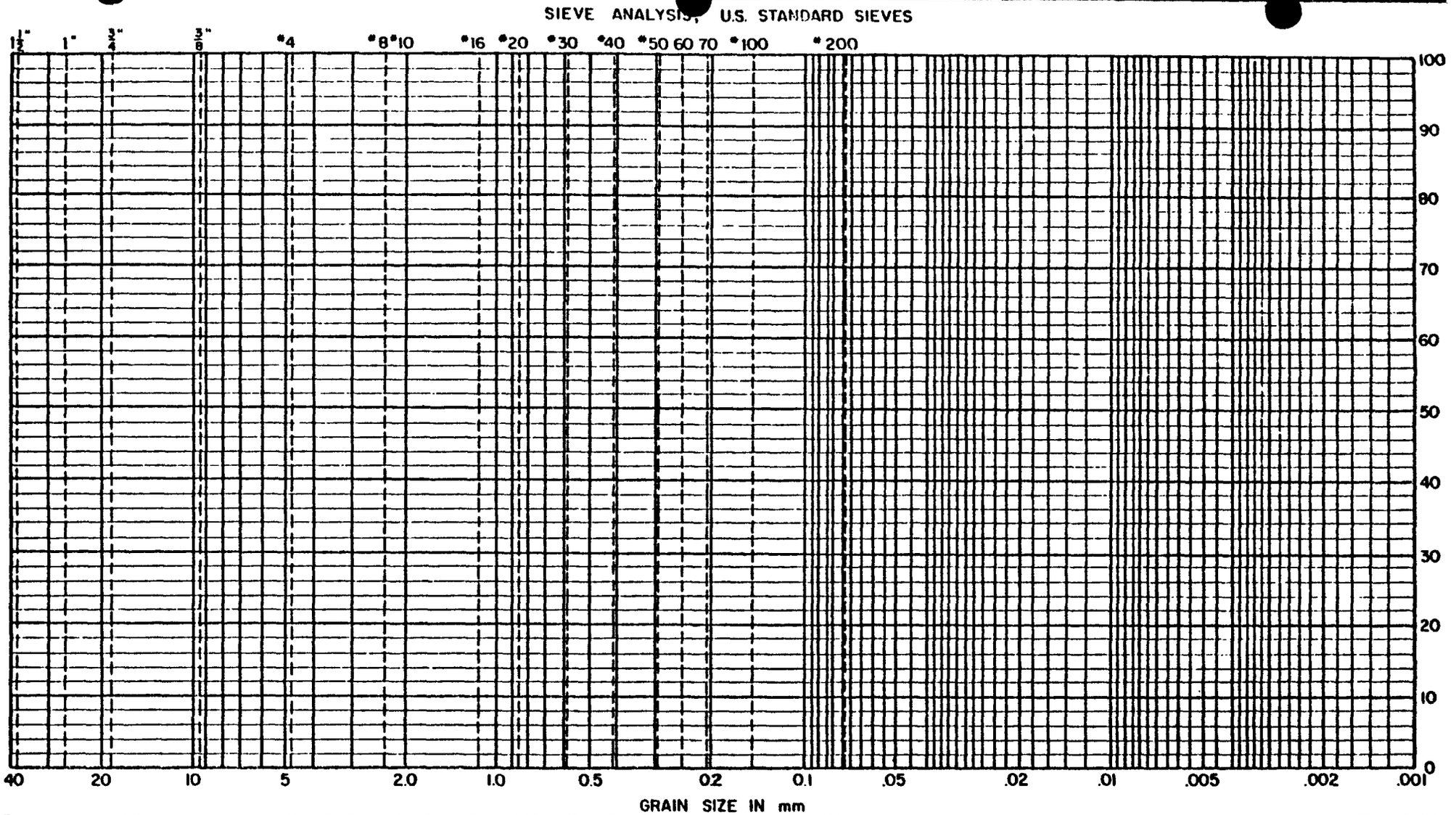
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004634



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 176

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY 2.50

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark Gray fine SAND with some Clayey Silt and a little Gravel

BURMISTER - Dark Gray fine SAND, some (+) Clayey Silt, little fine Gravel

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) -No wet weight available

PERCENT SILT (74.0-2.0 μm)

PERCENT CLAY (<2.0 μm)

SAMPLE NO. D65RA 3260 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-13-85

DRAWN BY: CW 7-12-85

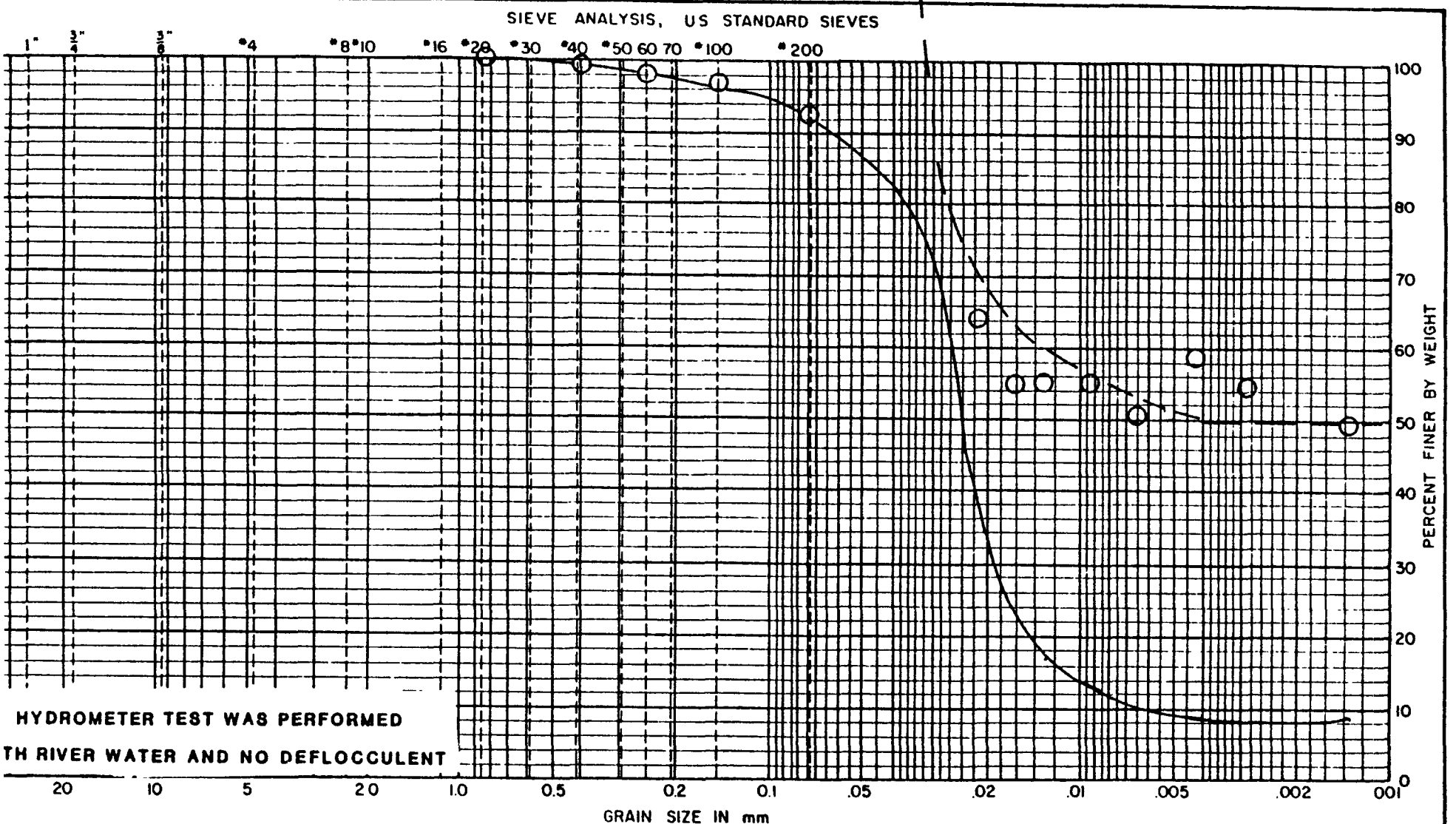
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT N

FIG. NO.

DEP\DA0004635



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT and CLAY* with a trace of fine sand

BURMISTER- Black SILT and CLAY* trace (+), fine Sand

DISTURBED MOISTURE CONTENT (%) 176

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) } 92

PERCENT CLAY (<2.0 µm)

SAMPLE NO. D65RA 3260 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-13-85

DRAWN BY 7-11-85

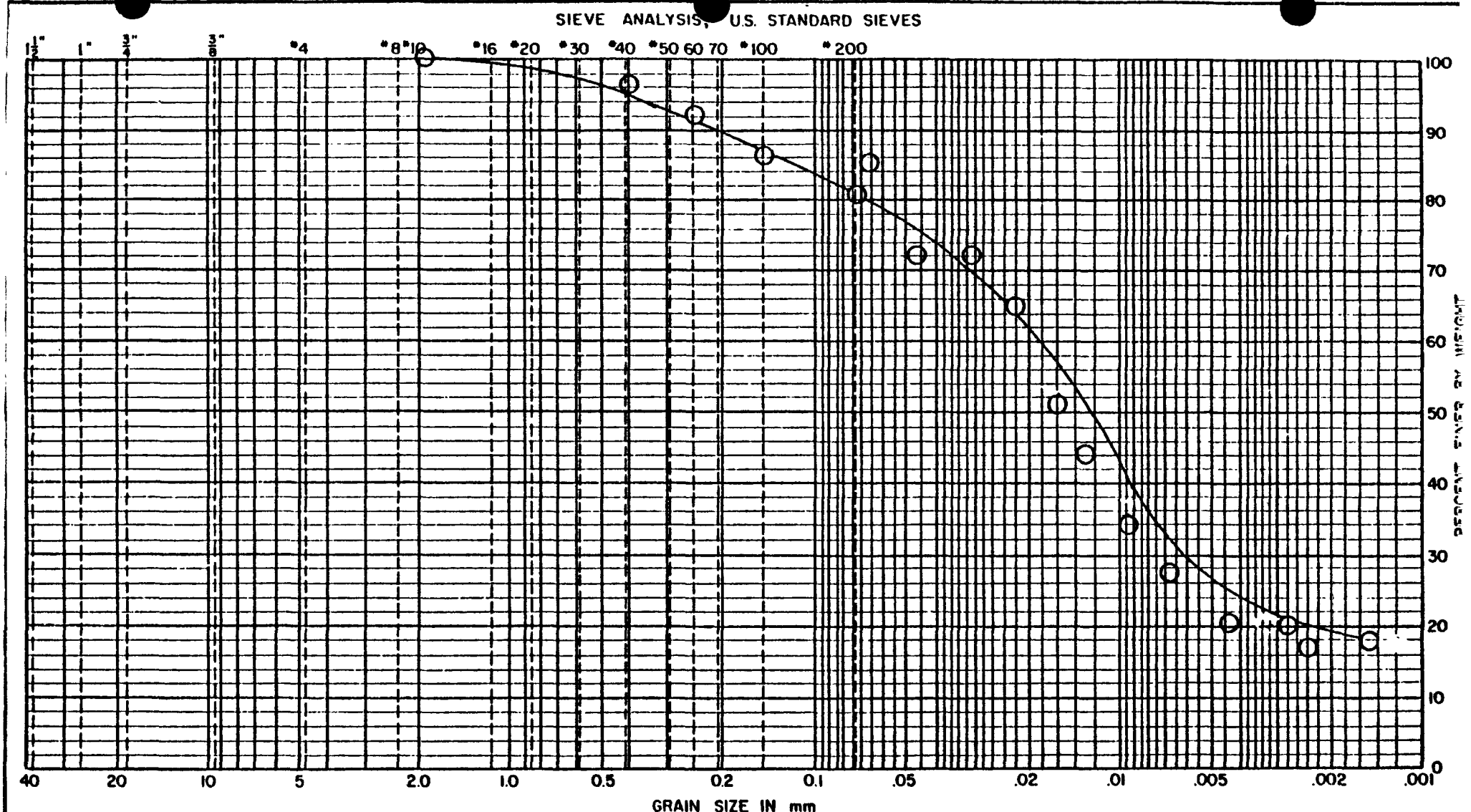
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004636



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 143

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, Clayey SILT with little medium to fine sand

BURMISTER- Dark gray SILT little(+), medium to fine(+) Sand, little(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 20

PERCENT SILT (74.0-2.0 μm) 62

PERCENT CLAY (<2.0 μm) 18

SAMPLE NO. D65RA 3261 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-13-85

DRAWN BY: 7-11-85

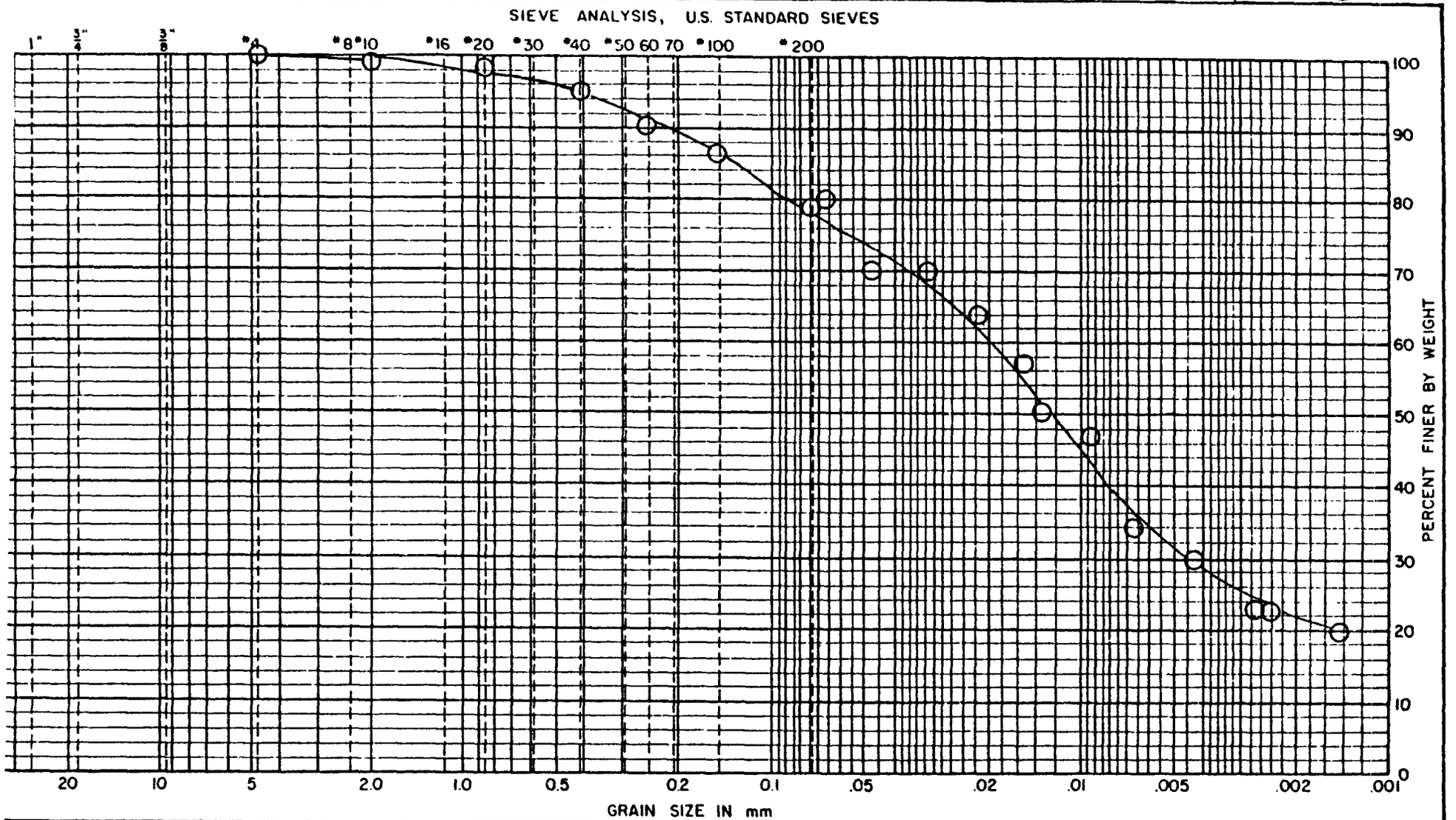
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004637



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, Clayey SILT with some medium to fine sand

BURMISTER- Dark gray SILT some(-), medium to fine(+) Sand, some(-) Clay

MOISTURE CONTENT (%) 131

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 22

PERCENT SILT (74.0-2.0 μm) 66

PERCENT CLAY (<2.0 μm) 22

SAMPLE NO. D65RA 3262 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-13-85

DRAWN BY: CAW 7-11-85

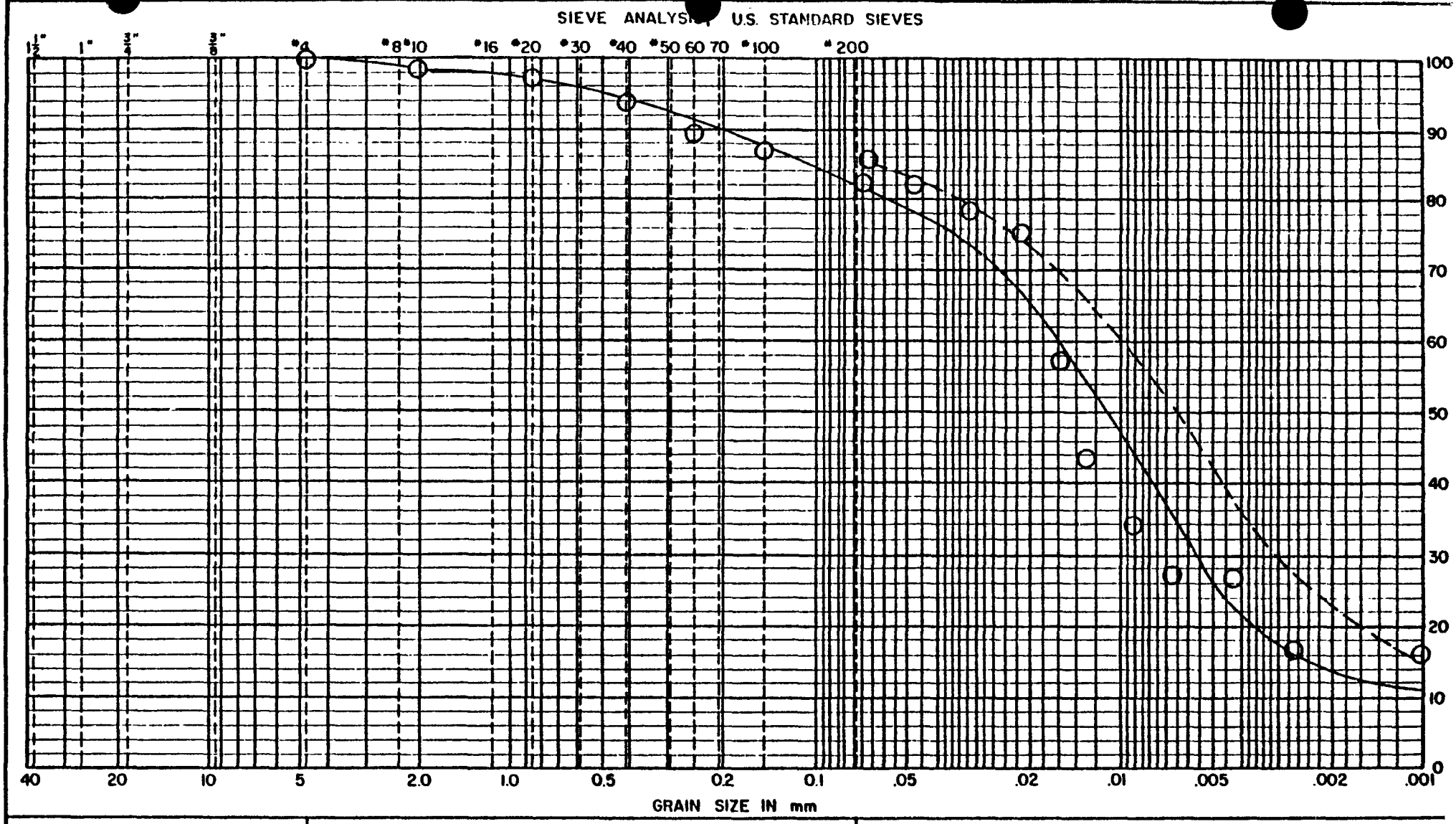
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004638



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 126

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT, with little medium to fine sand

BURMISTER- Black Organic SILT little(+), medium to fine(+) Sand, trace(+) Clay.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 19

PERCENT SILT (74.0-2.0 μm) 71

PERCENT CLAY (<2.0 μm) 10

SAMPLE NO. D65RA 3263 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-13-85

DRAWN BY: tew 7-11-85

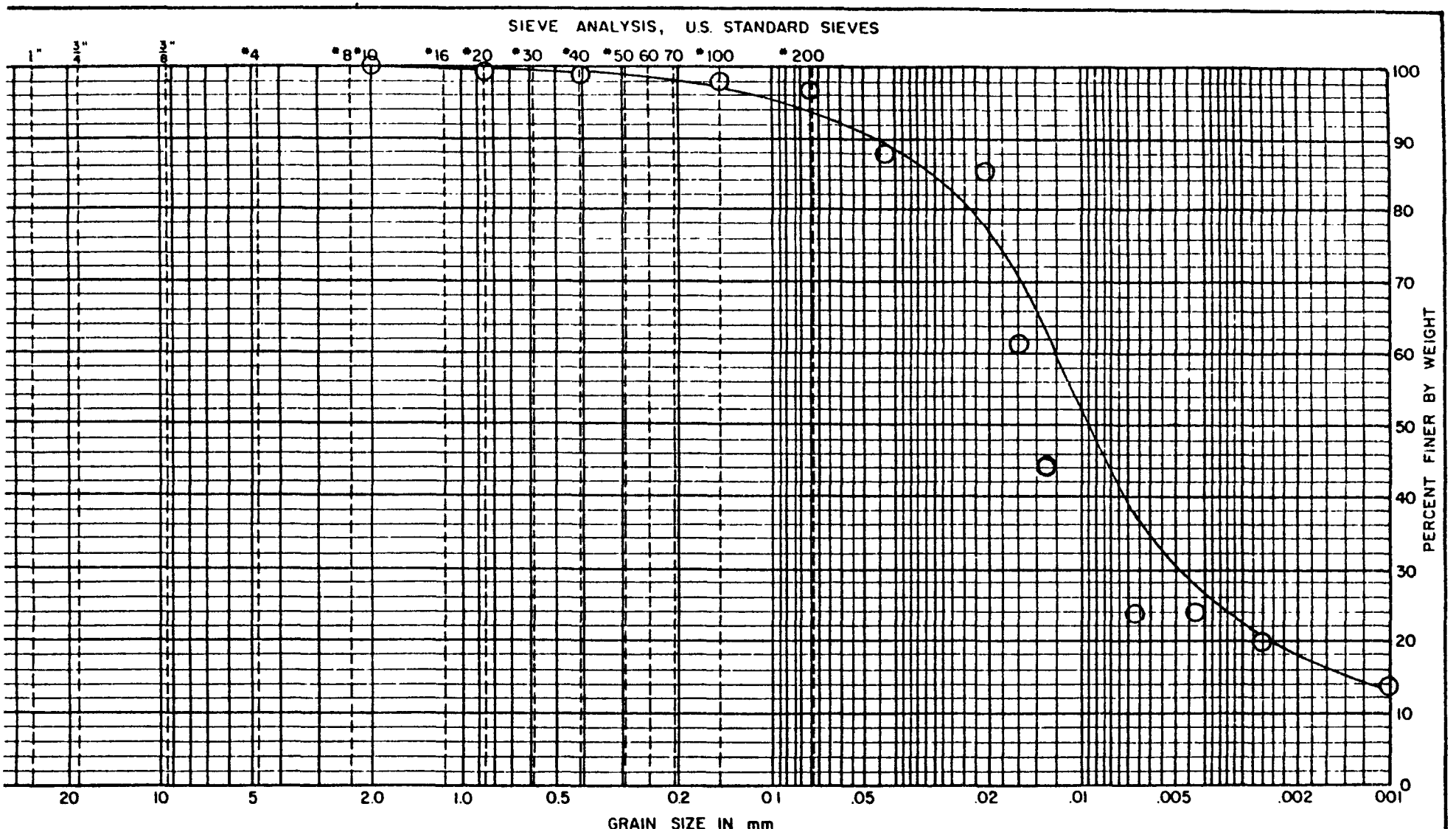
CHECKED BY: Ch 7-12-85

GRADATION CURVES

PROJECT N

FIG. NO.

DEP\DA0004639



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand

BURMISTER- Black Organic SILT little(+), Clay, trace fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 75

PERCENT CLAY (<2.0 µm) 19

MOISTURE CONTENT (%) 126

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

SAMPLE NO. D65RA 3264 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-13-85

DRAWN BY 7-11-85

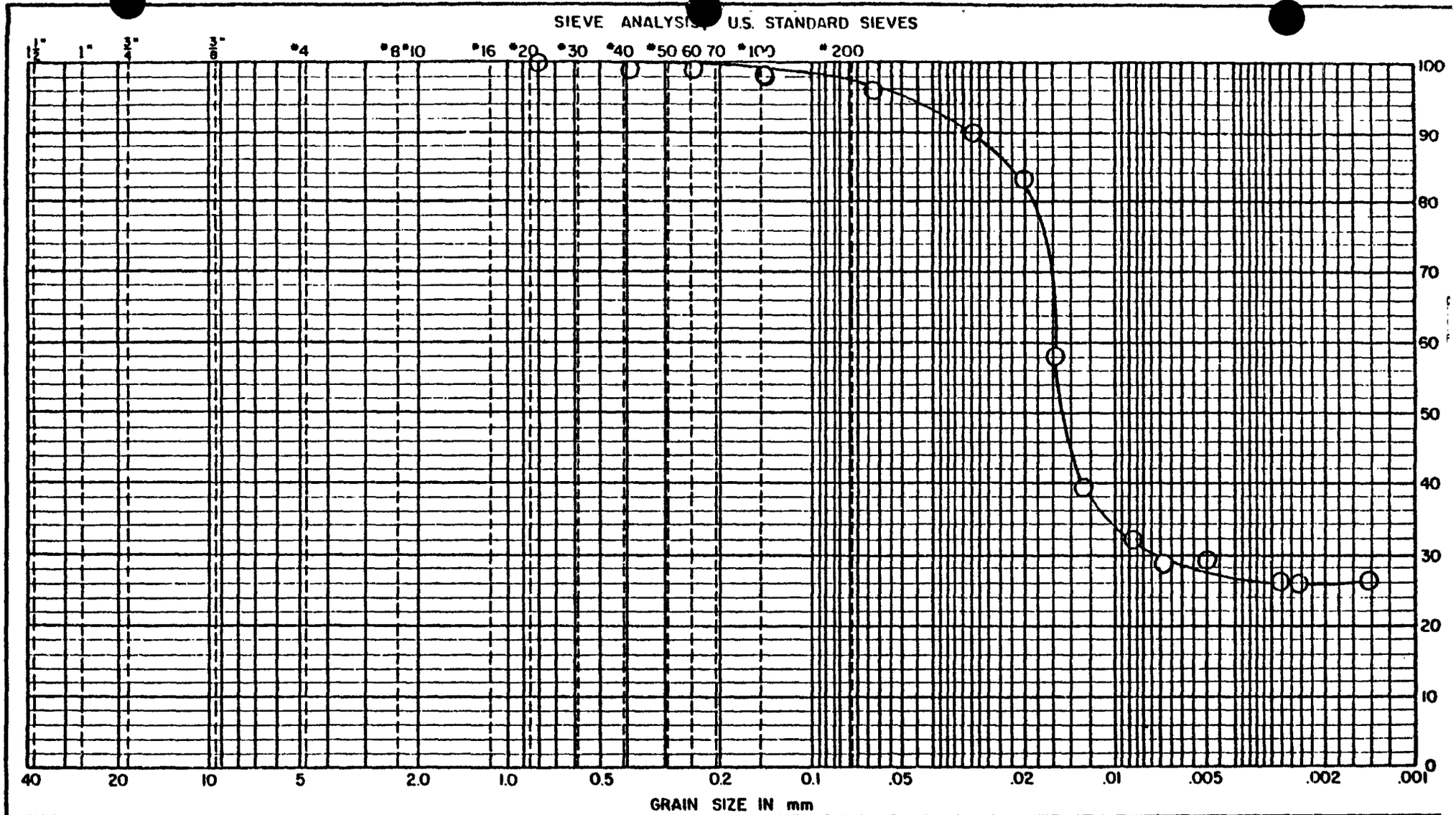
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004640



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 160

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY 2.38

VISUAL CLASSIFICATION OF SAMPLE

USC - Black SILT with a little clay and trace of fine grained sand and plant fibers

BURMISTER- Black Organic SILT trace, fine Sand, little Clay. Plant fibers.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 78

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. D65RC 3270 500 MY

SAMPLE DEPTH, ft. 81

SAMPLING DATE 5-13-85

DRAWN BY: tew 7-11-85

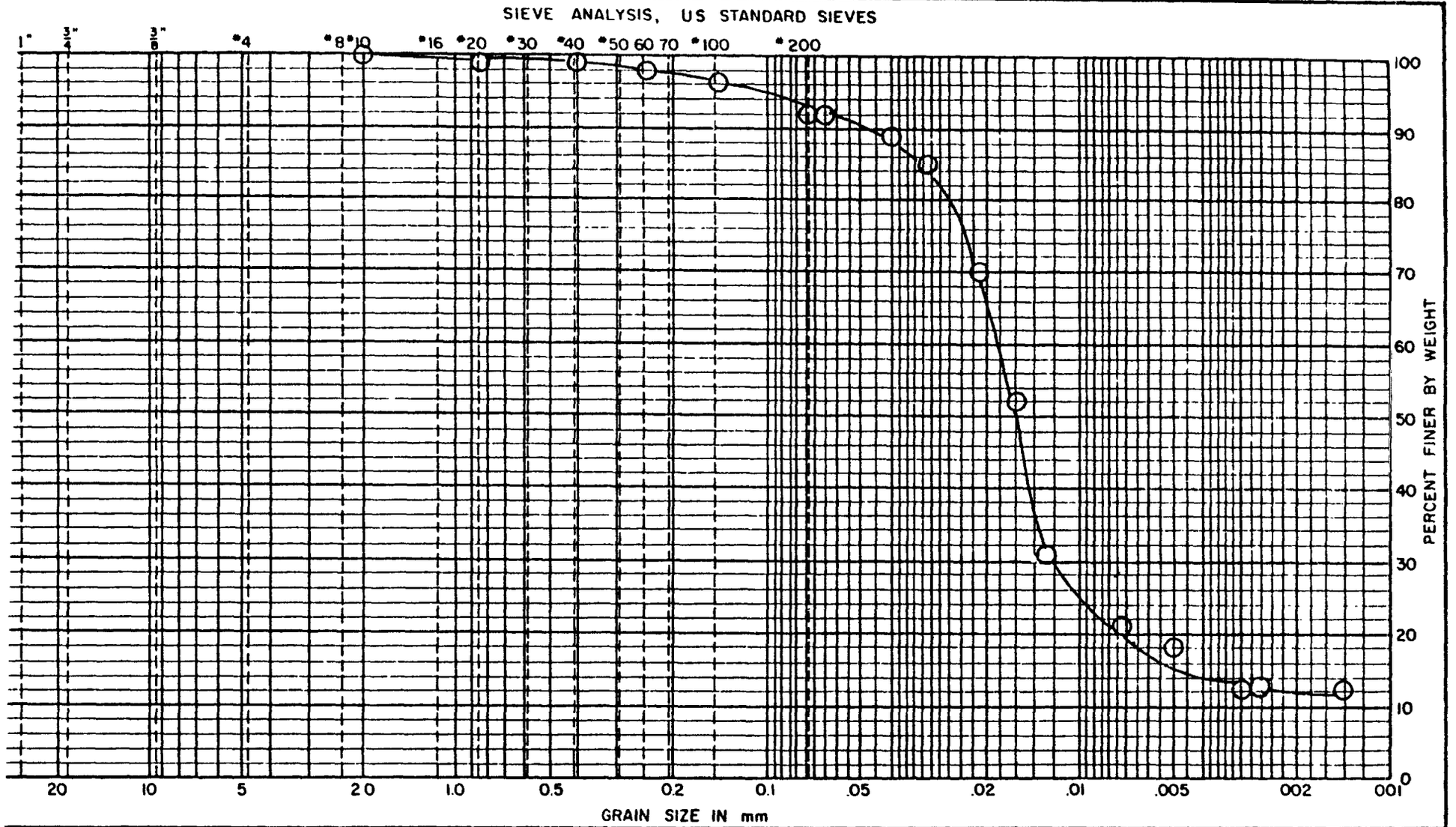
CHECKED BY: [illegible] 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004641



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some cay and a trace of fine grained sand

BURMISTER- Black Organic SILT trace(+), fine Sand, little(-) Clay

ISTURE ONTENT (%) 145

TAL WET ENSITY (pcf) 85

ECIFIC

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 80

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. D65RC 3271 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-13-85

DRAWN BY: 7-11-85

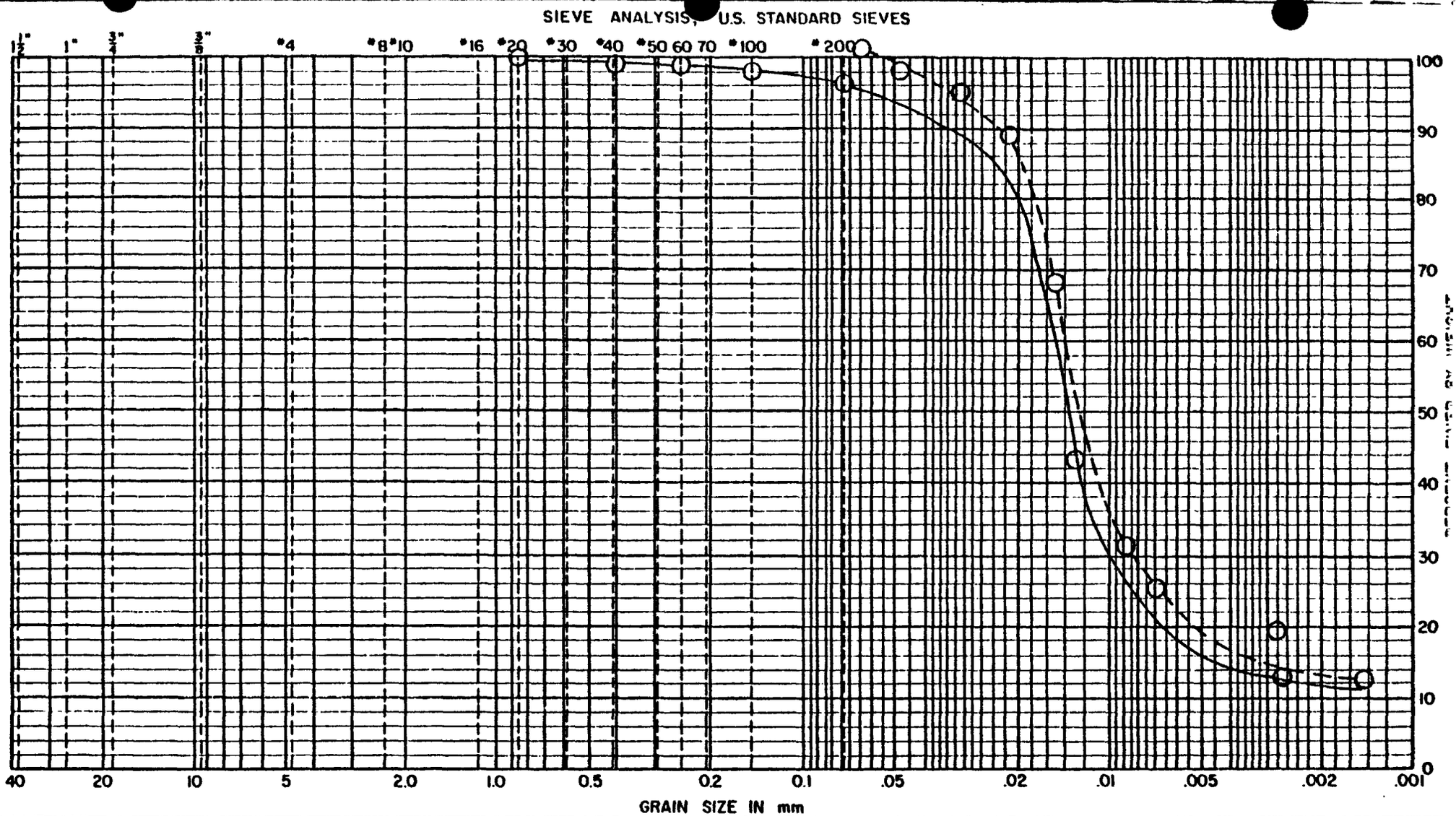
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004642



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 136

TOTAL WET DENSITY (pcf) not available

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some clay and trace of fine grained sand

BURMISTER- Dark gray Organic SILT trace, fine Sand, little Clay.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 83

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. D65RC 3272 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-13-85

DRAWN BY: 7-11-85

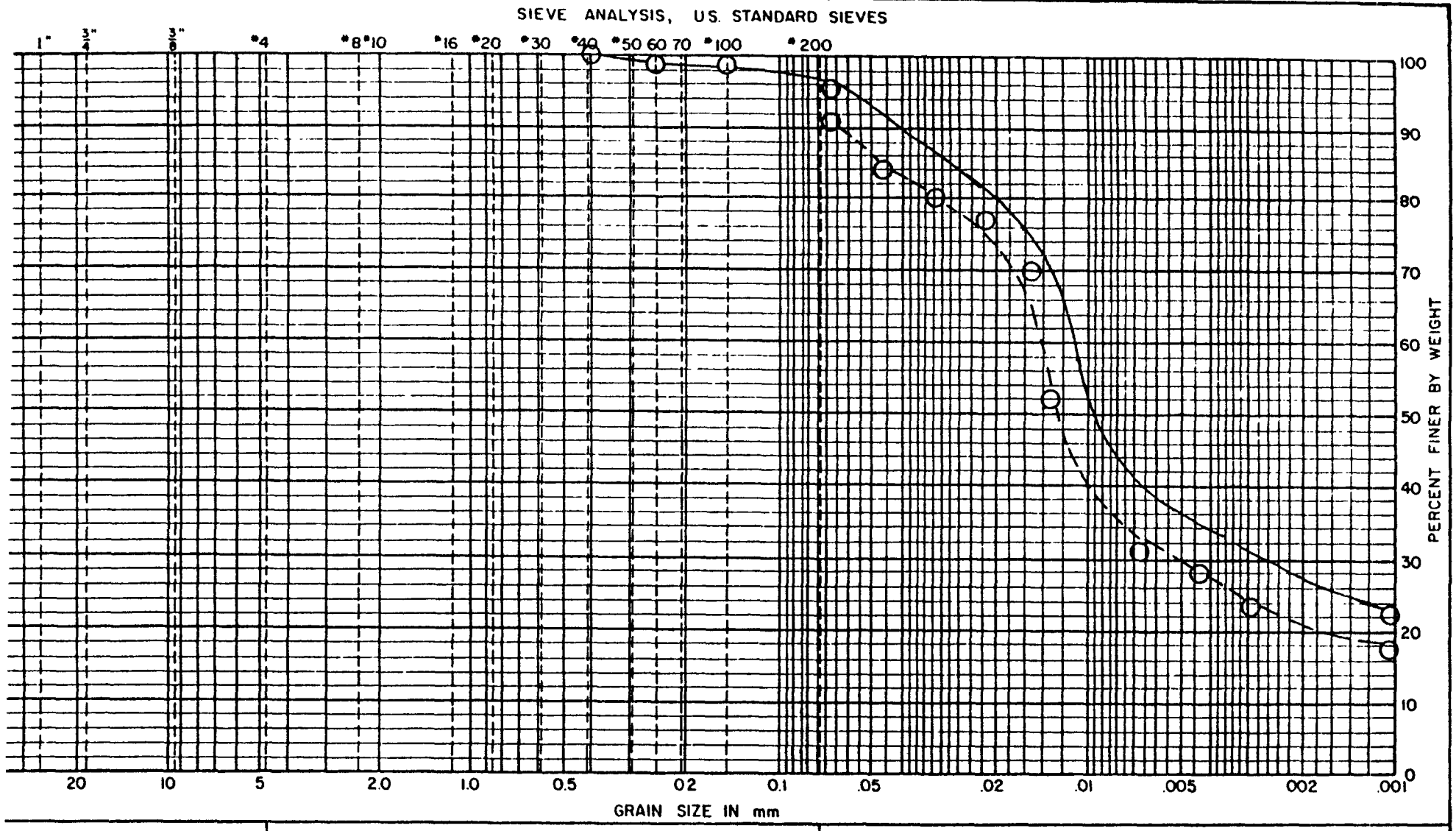
CHECKED BY: 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004643



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT, with trace of fine sand

BURMISTER - Black Organic SILT some(+), Clay, trace(-) fine sand

MOISTURE CONTENT (%) 120

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 3

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 27

SAMPLE NO. D65RC 3273 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-13-85

DRAWN BY: Ch 7-11-85

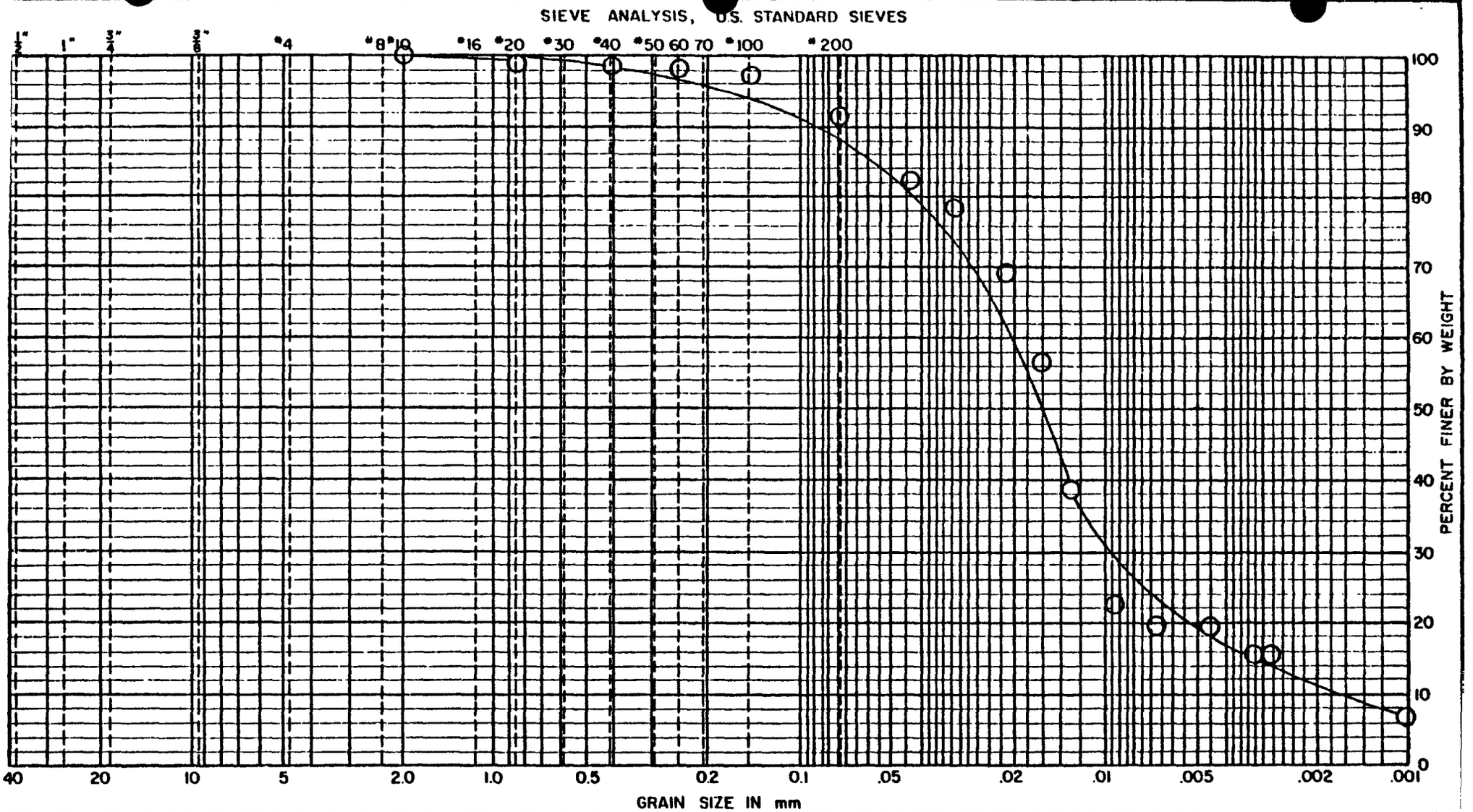
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004644



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 119

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with little medium to fine sand

BURMISTER- Black Organic SILT little, Clay, little(-) medium to fine (+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 11

PERCENT SILT (74.0-2.0 μm) 76

PERCENT CLAY (<2.0 μm) 13

SAMPLE NO. D65RC 3274 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-13-85

DRAWN BY: Ch 7-11-85

CHECKED BY: SAG 7-12-85

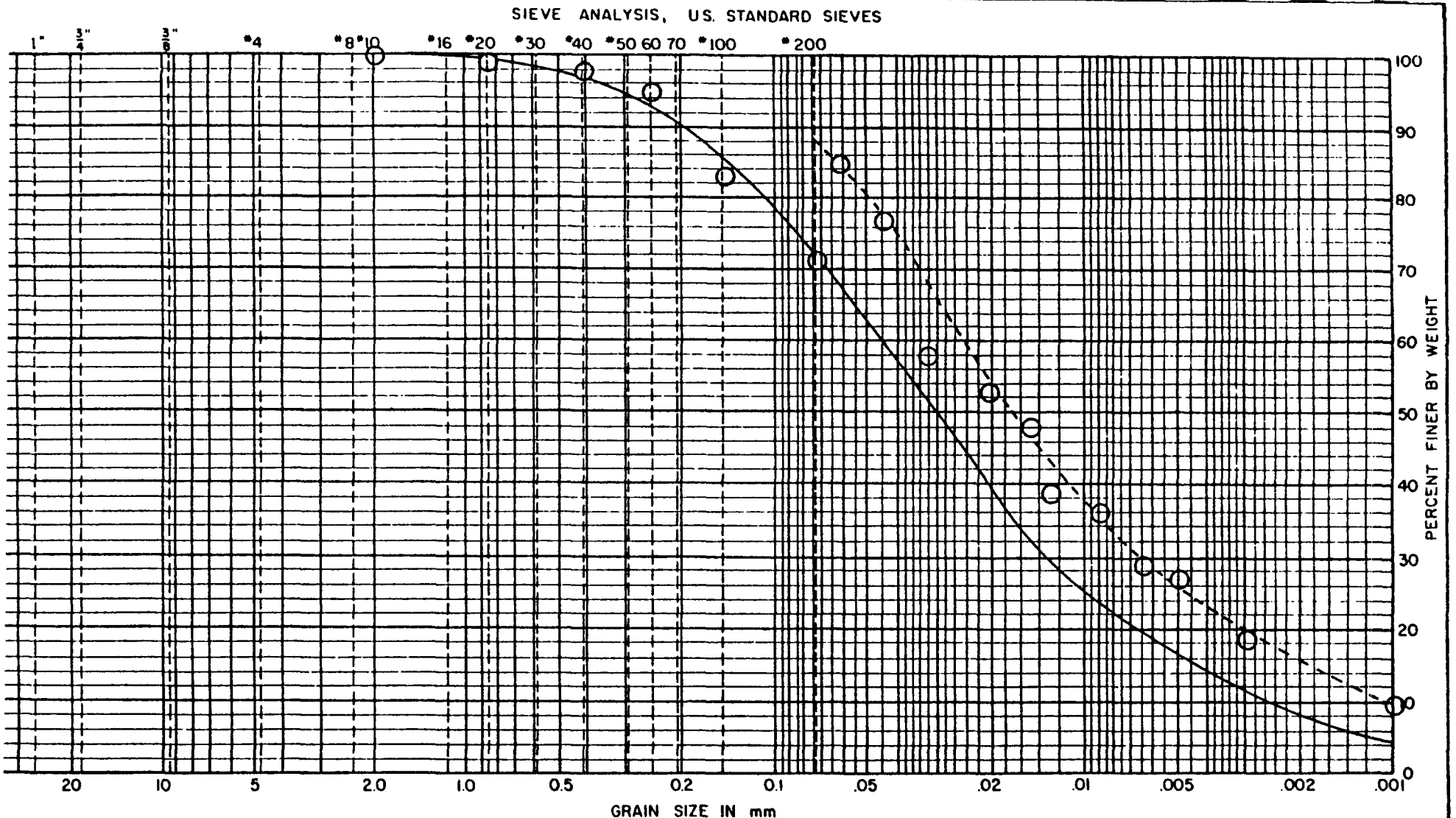
GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004645

UPSTREAM REACH



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black and gray, organic Clayey SILT with some fine sand

BURMISTER- Black and gray Organic Clayey SILT some, fine Sand

MOISTURE CONTENT (%) 125

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY 2.50

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 29

PERCENT SILT (74.0-2.0 μm) 63

PERCENT CLAY (<2.0 μm) 8

SAMPLE NO. U18LA 3537 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-23-85

DRAWN BY 7-9-85

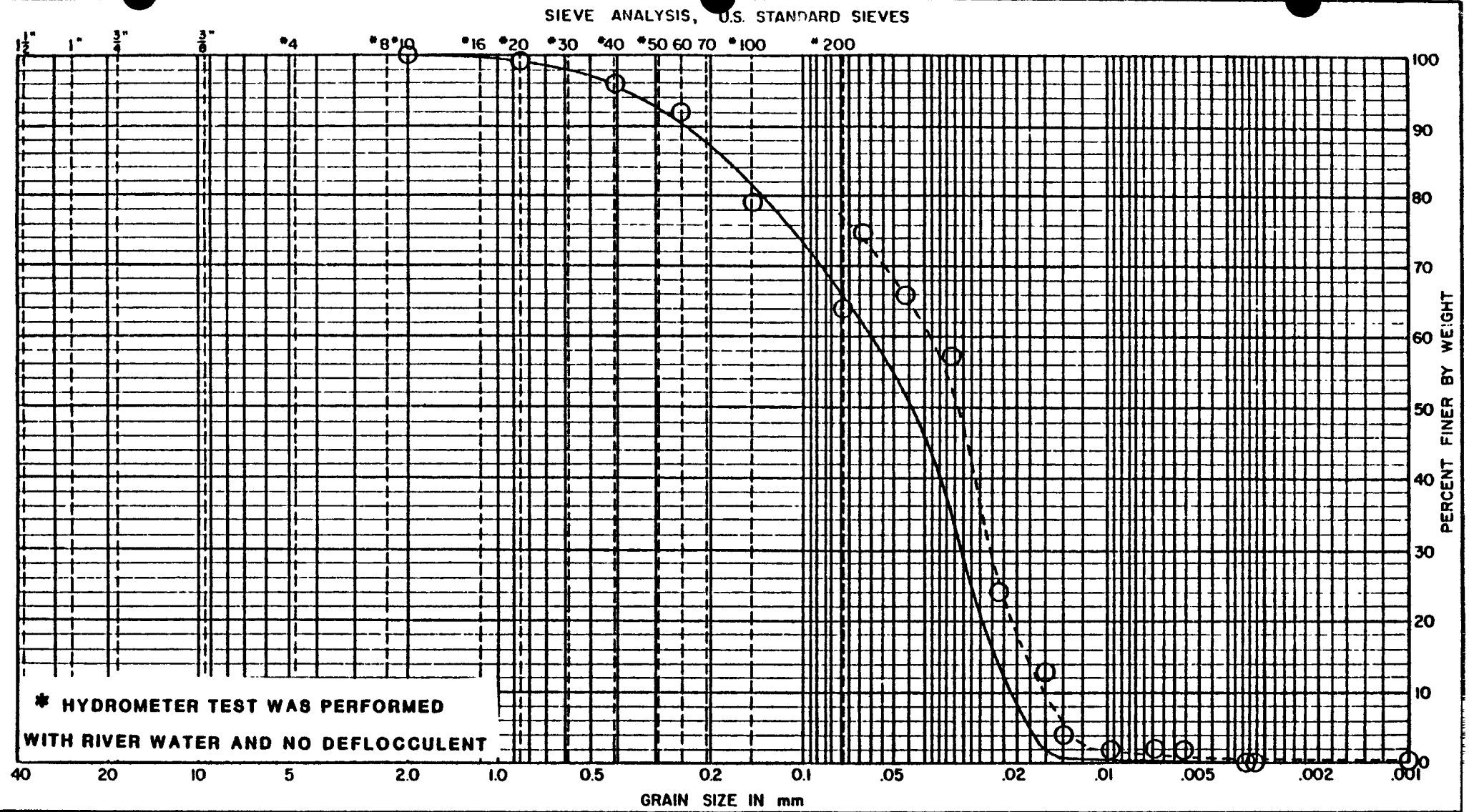
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004647



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black and gray, organic SILT with some fine sand

BURMISTER- Black and gray Organic SILT some(+), fine Sand

MOISTURE CONTENT (%) 125

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY 2.50

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 36

PERCENT SILT (74.0-2.0 μm) 64

PERCENT CLAY (<2.0 μm) 0

SAMPLE NO. U18LA 3537 200 MY (Riverwater)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-23-85

DRAWN BY: CL 7-9-85

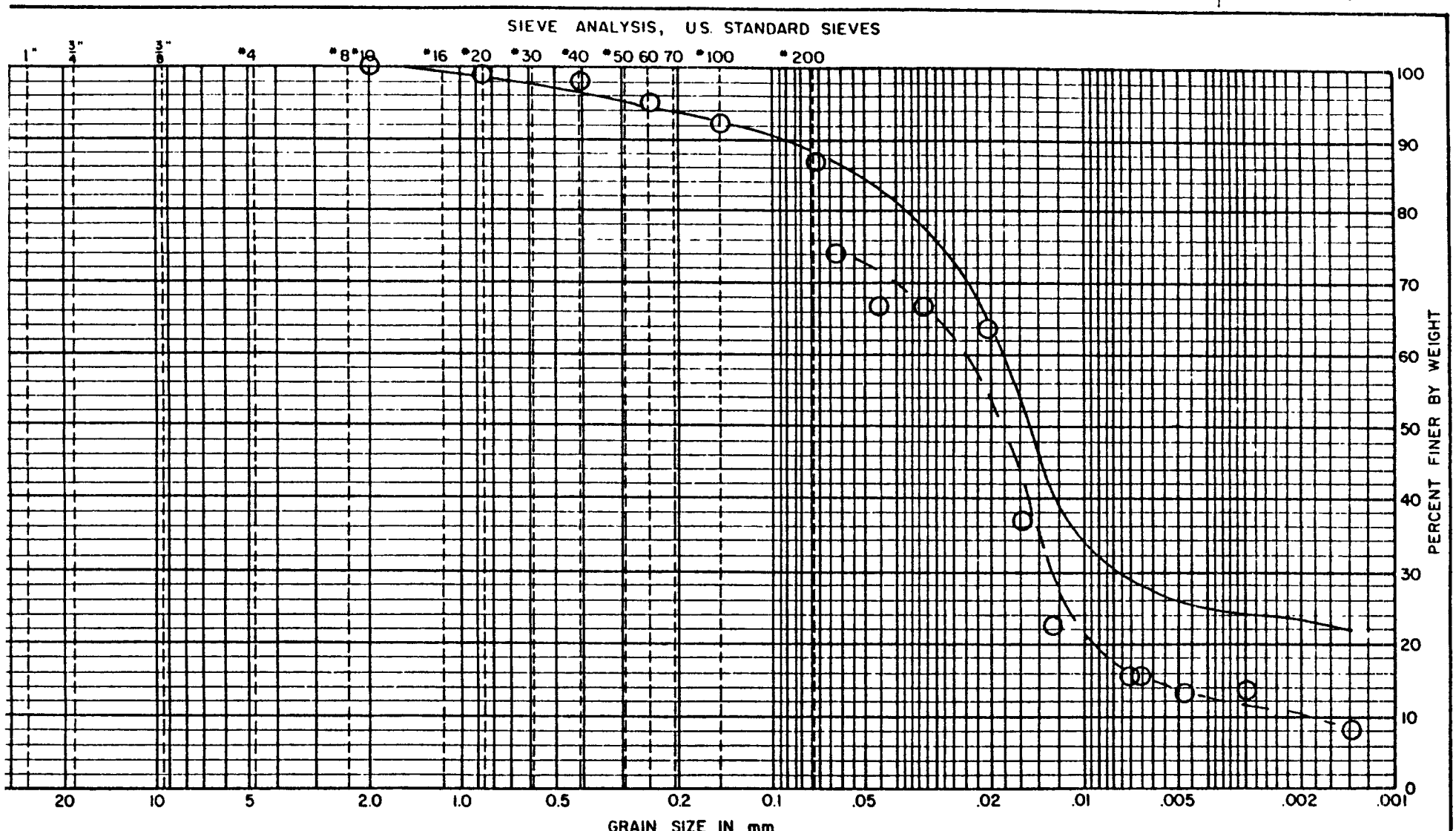
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004648



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with a little medium to fine sand

BURMISTER- Black Organic CLAY and SILT little(-), medium to fine(+) Sand

DISTURE CONTENT (%) 136

TAL WET DENSITY (pcf) 77

PECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 12

PERCENT SILT (74.0-2.0 µm) 65

PERCENT CLAY (<2.0 µm) 23

SAMPLE NO. U18LB 3539 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-23-85

DRAWN BY: SS 7-11-85

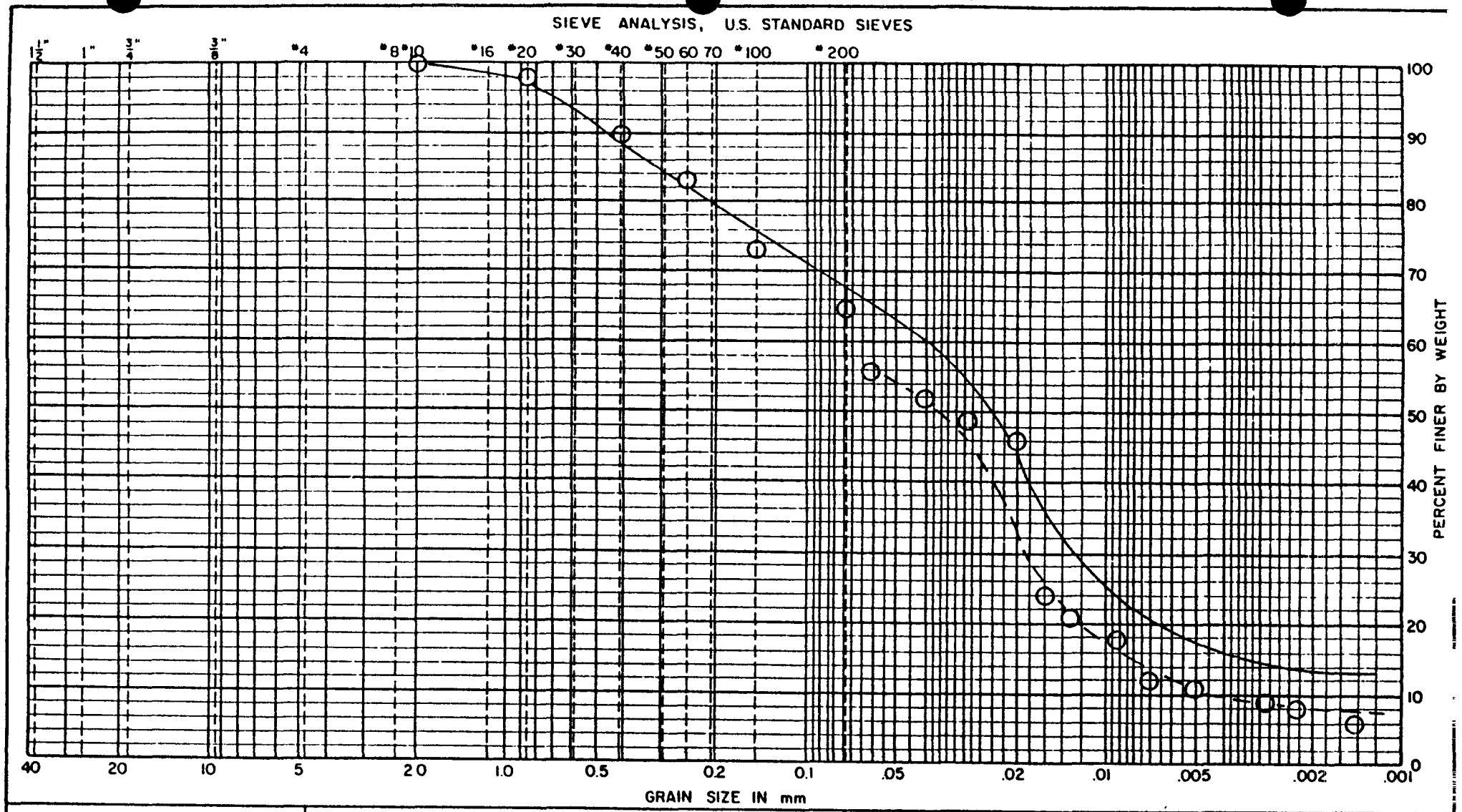
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004649



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT and CLAY with some medium to fine sand

BURMISTER- Black Organic SILT and CLAY some(+), medium to fine(+) Sand

MOISTURE CONTENT (%) 79

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 32

PERCENT SILT (74.0-2.0 μm) 52

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. U18LA 3541 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-23-85

DRAWN BY: 7-10-85

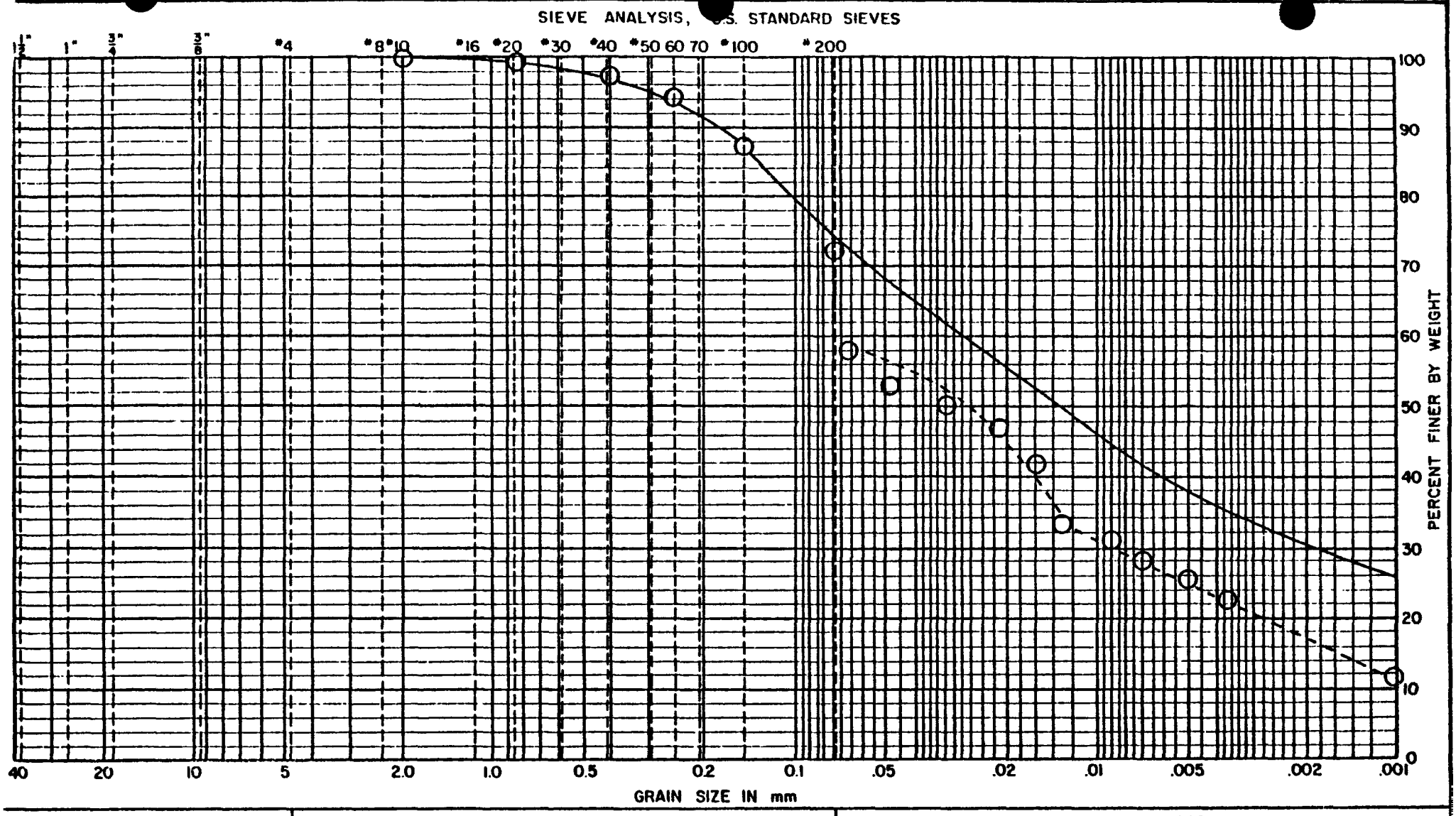
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004650



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with some fine sand

BURMISTER- Black Organic CLAY and SILT some, fine Sand

MOISTURE CONTENT (%) 122

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 26

PERCENT SILT (74.0-2.0 μm) 44

PERCENT CLAY (<2.0 μm) 30

SAMPLE NO. U18LC 3557 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-23-85

DRAWN BY: CW 7-9-85

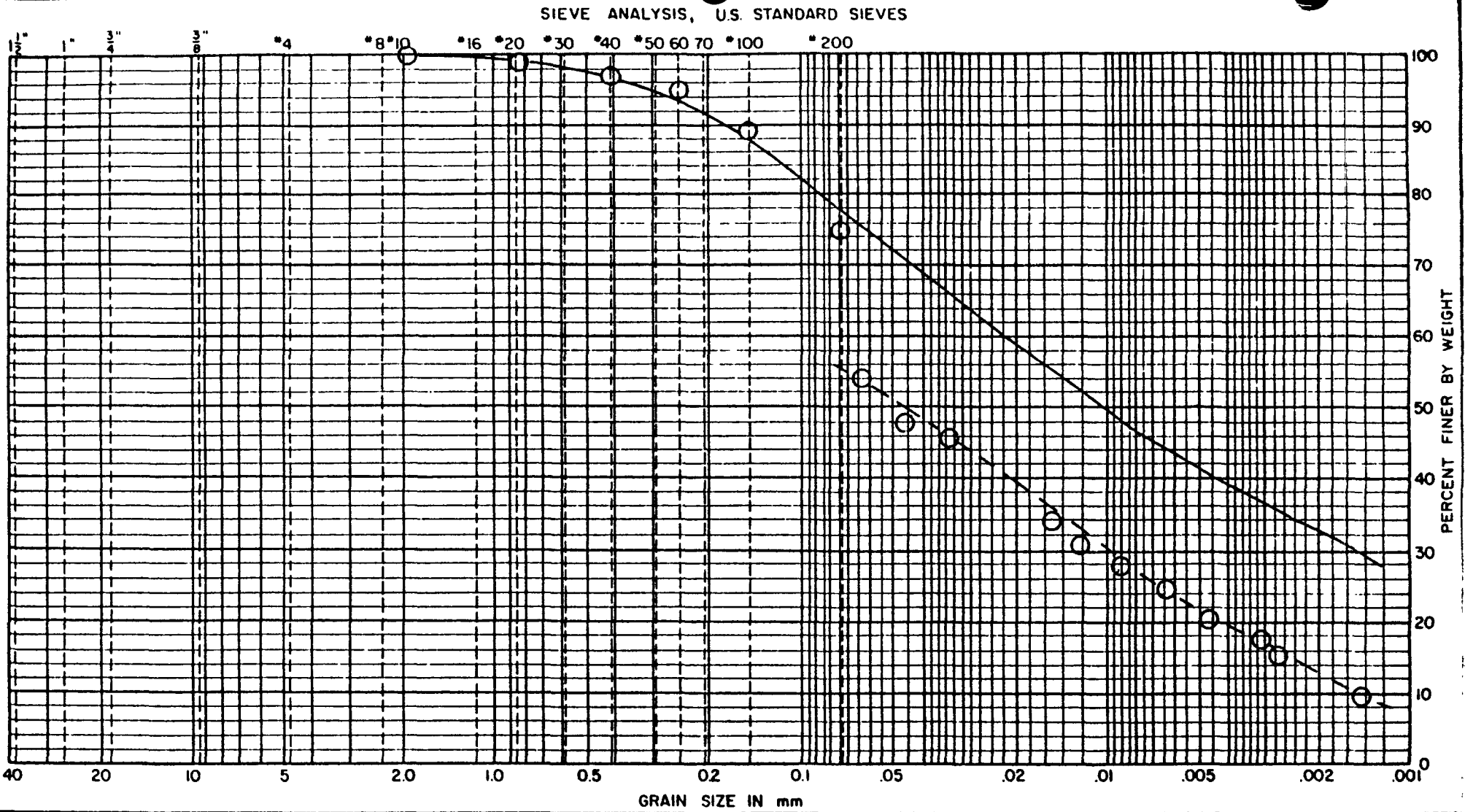
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004651



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 116

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with some fine sand

BURMISTER- Black Organic CLAY and SILT some(-), fine Sand little vegetative fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 22

PERCENT SILT (74.0-2.0 μm) 44

PERCENT CLAY (<2.0 μm) 34

SAMPLE NO. U18LC 3558 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-23-85

DRAWN BY: 7-11-85

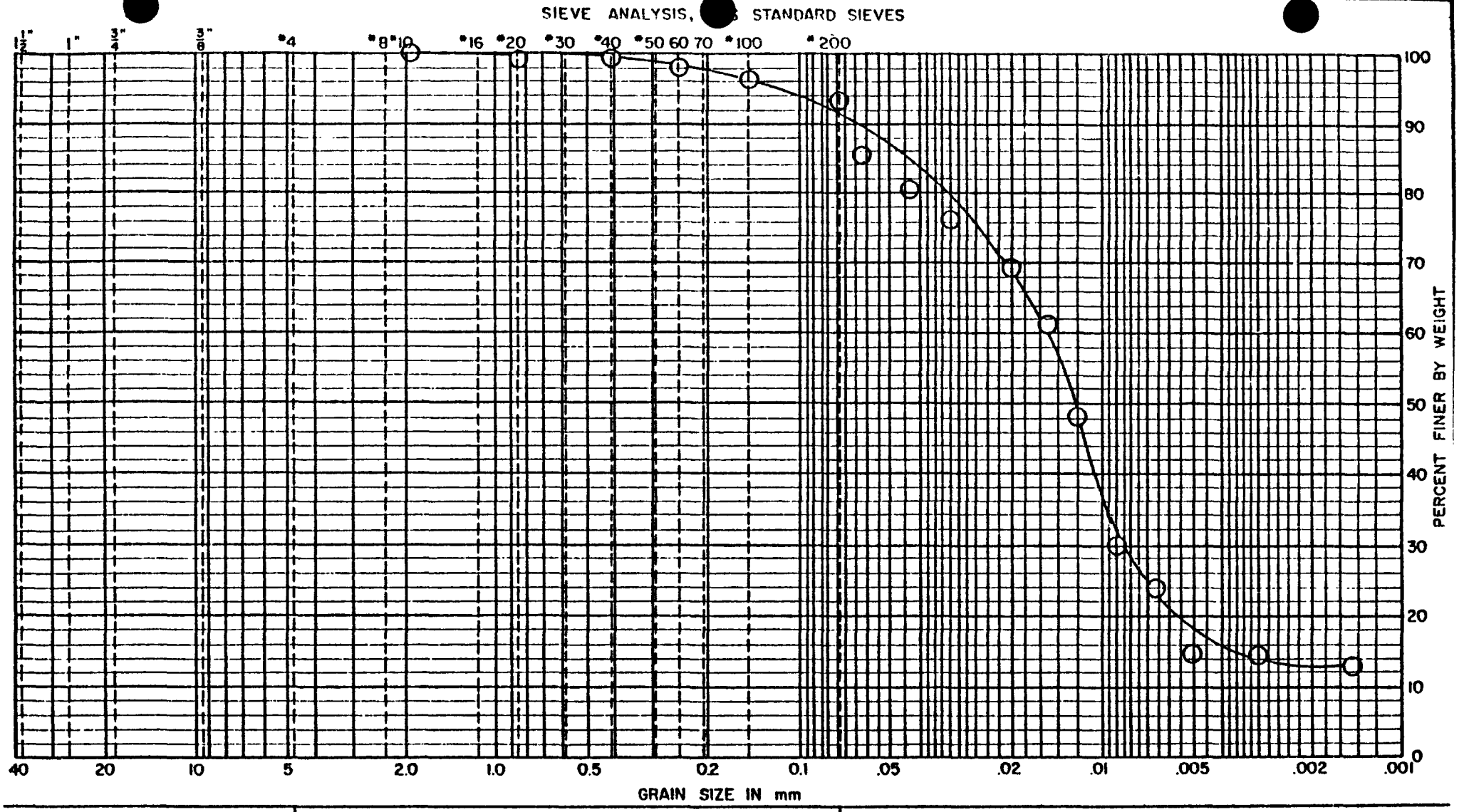
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004652



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with a trace of fine sand

BURMISTER- Black Organic Clayey SILT trace(+), fine Sand

MOISTURE CONTENT (%) 155

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 79

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. U18LC 3560 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-23-85

DRAWN BY: CL 7-11-85

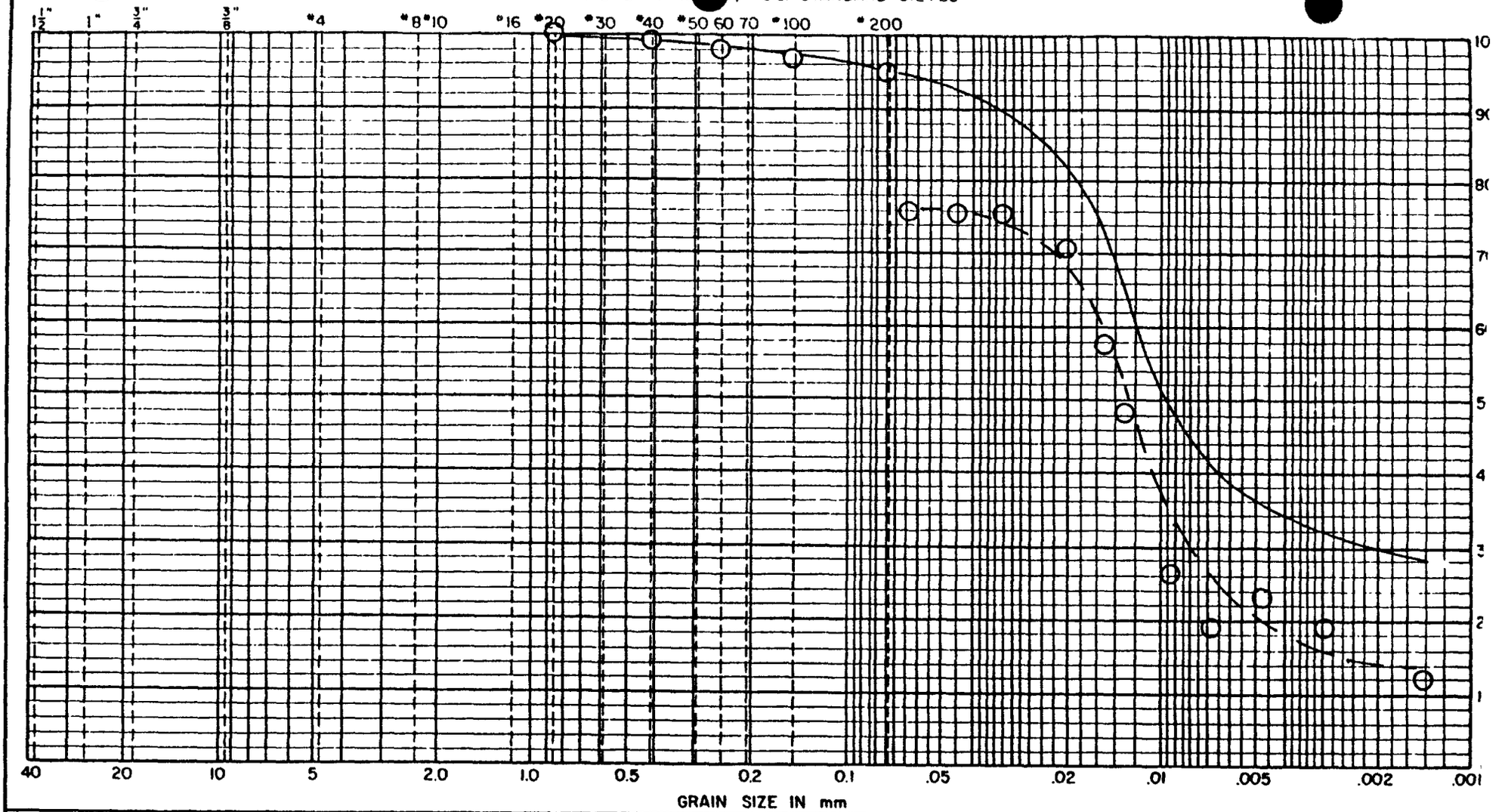
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004653



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with a trace of fine sand

BURMISTER- Black Organic CLAY and SILT trace, fine Sand

MOISTURE CONTENT (%) 120

TOTAL WET DENSITY (pcf) 79

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 65

PERCENT CLAY (<2.0 μm) 31

SAMPLE NO. U18LC 3561 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-23-85

DRAWN BY: SS 7-11-85

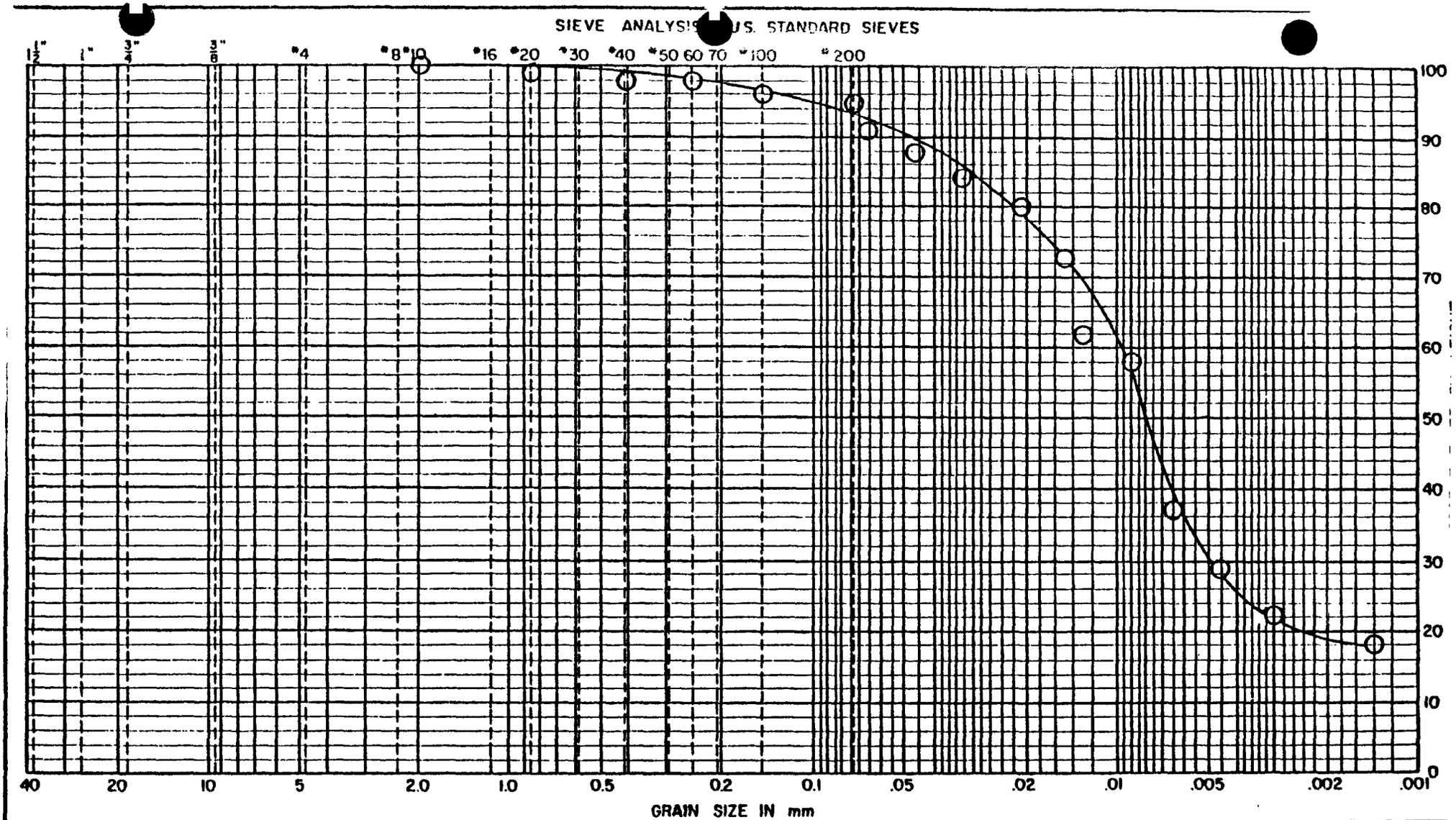
CHECKED BY: SAG 7-12-85

PROJECT

GRADATION CURVES

FIG. NO

DEP\DA0004654



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with a trace of fine sand, OH

BURMISTER- Black Organic CLAY and SILT trace, fine Sand

MOISTURE CONTENT (%) 237

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY 2.38

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 6

PERCENT SILT (74.0-2.0 μm) 76

PERCENT CLAY (<2.0 μm) 18

SAMPLE NO. U18LE 3895 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE Date Sampled Not Availab

DRAWN BY CR 7-9-85

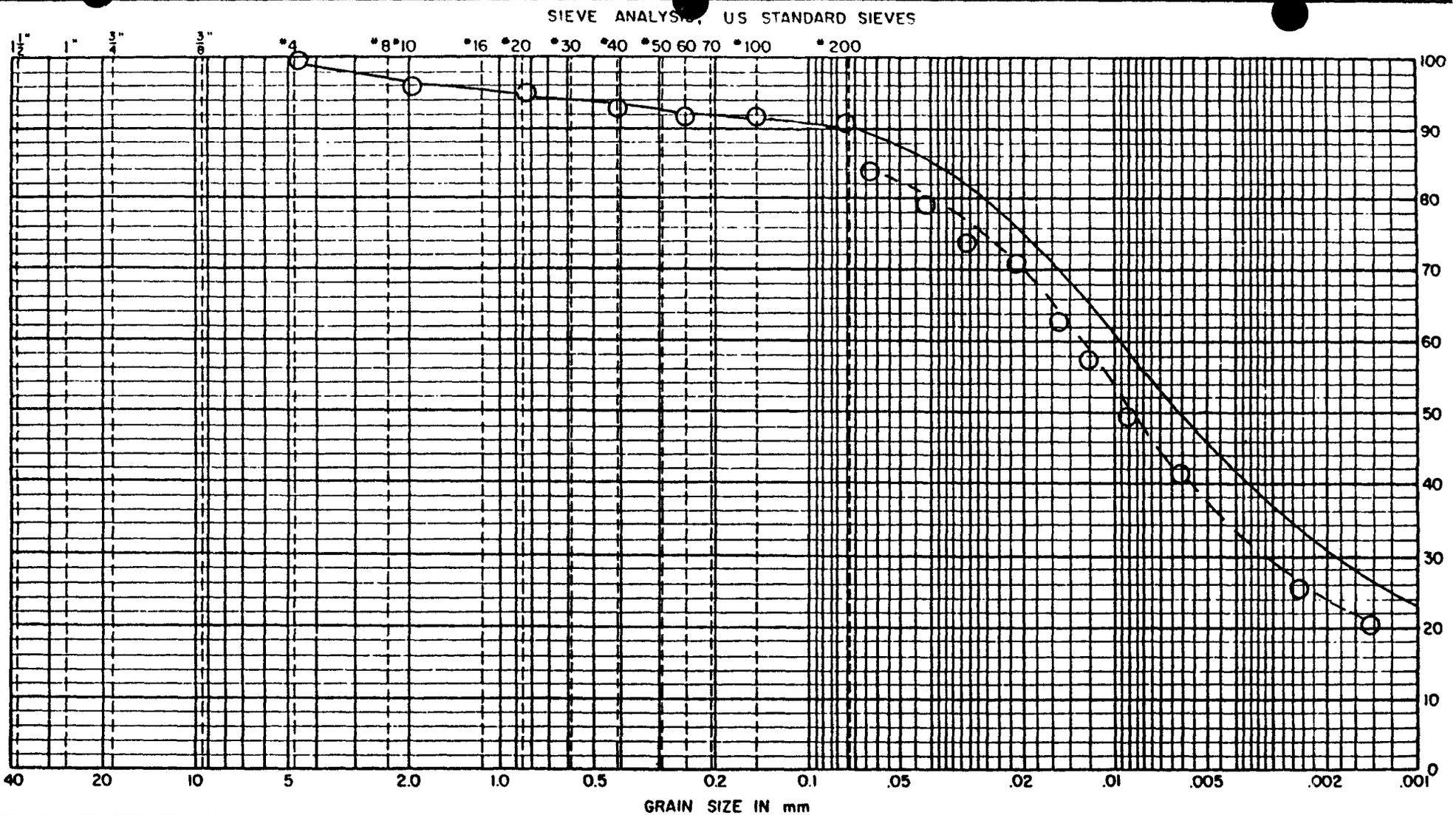
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004655



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 132

TOTAL WET DENSITY (pcf) 77

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with trace of fine sand, OH

BURMISTER - Black Organic CLAY and SILT trace(+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 9

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 31

SAMPLE NO. U18LE 3896 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE Sampling Date Not Availal

DRAWN BY: Chw 7-11-85

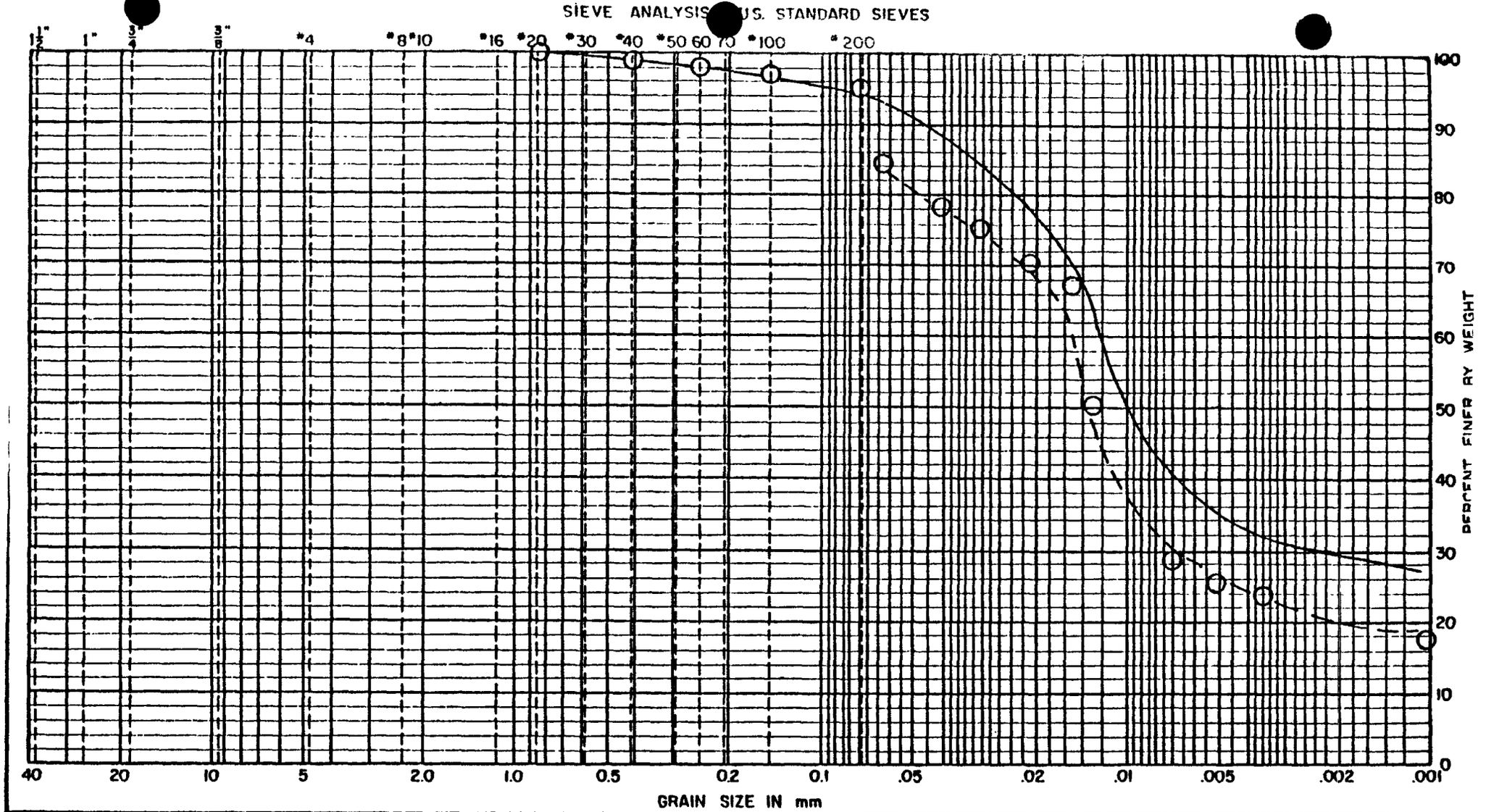
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004656



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with trace of vegetative fibers, OH

BURMISTER- Black Organic CLAY and SILT trace, fine Sand trace vegetative fibers

MOISTURE CONTENT (%) 113

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 6

PERCENT SILT (74.0-2.0 µm) 66

PERCENT CLAY (<2.0 µm) 28

SAMPLE NO. U18LE 3897 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE Sampling Date Not Availab

DRAWN BY: 7-11-85

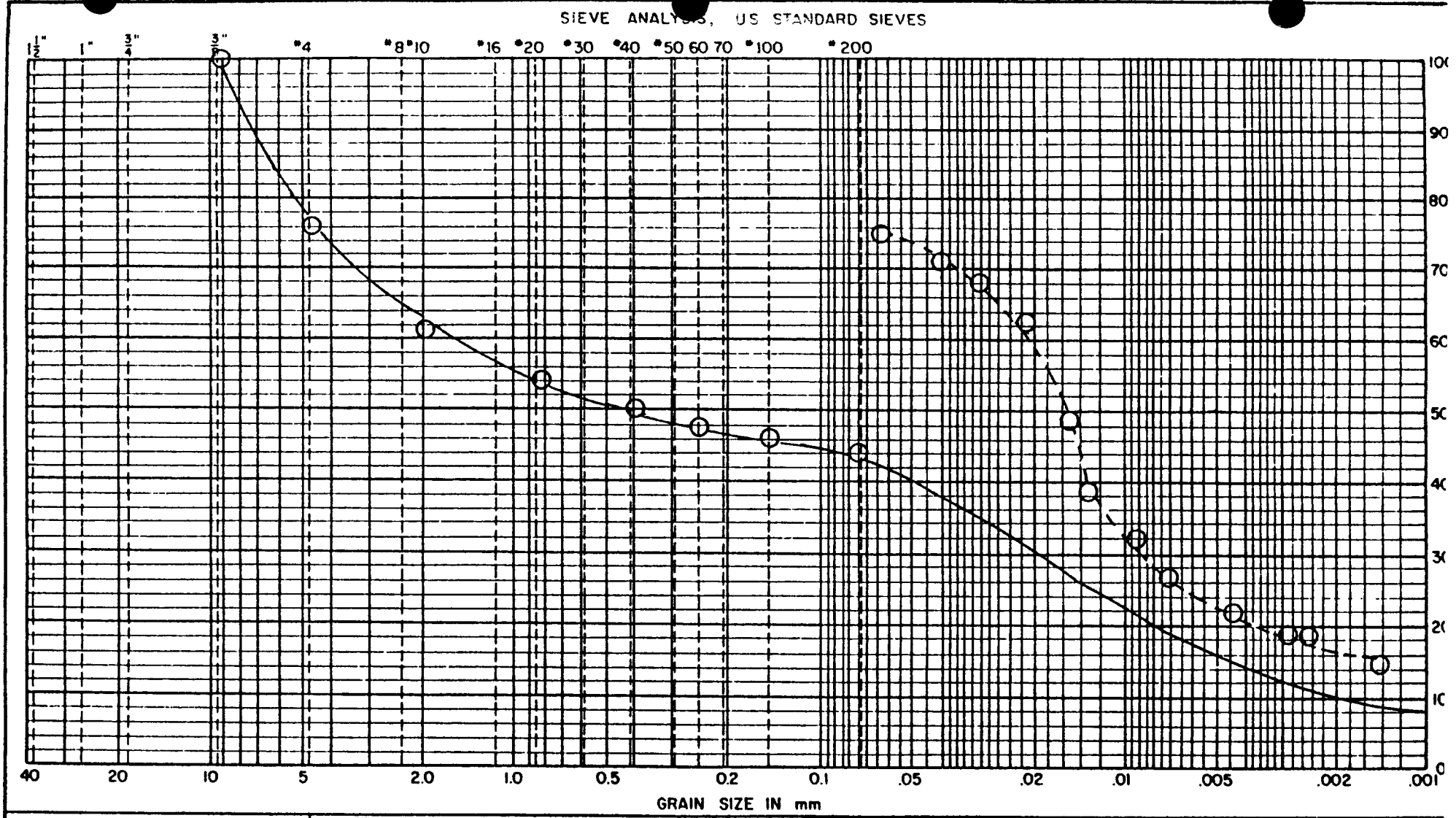
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004657



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 89

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, coarse to fine SAND, organic SILT and CLAY SM-SC

BURMISTER- Black coarse to fine SAND and Organic SILT and CLAY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 56

PERCENT SILT (74.0-2.0 μm) 34

PERCENT CLAY (<2.0 μm) 10

SAMPLE NO. U18LE 3898 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE Date Sampled Not Availab

DRAWN BY Chw 7-11-85

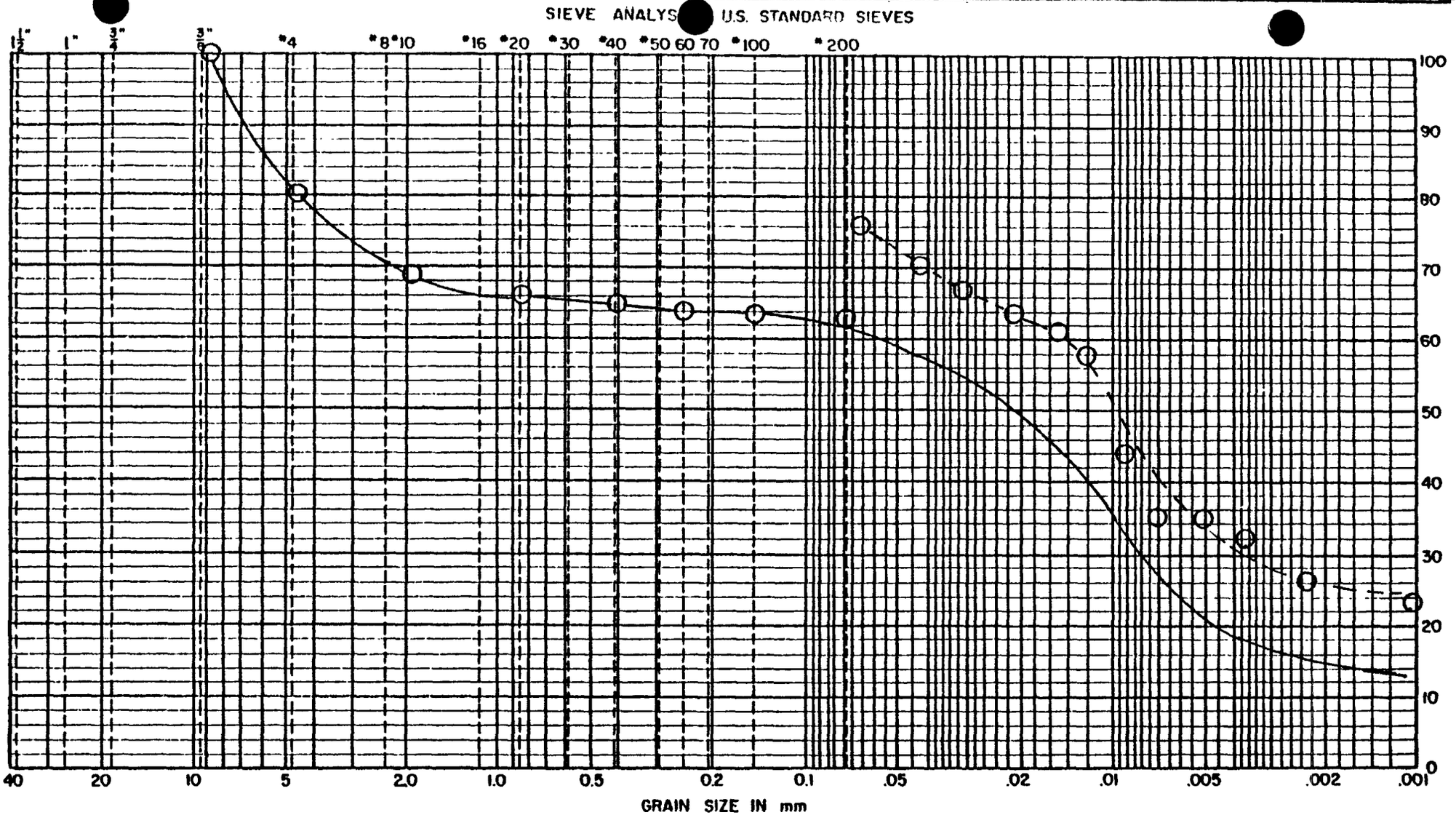
CHECKED BY: SAG 7-12-85

PROJECT

GRADATION CURVES

FIG. NO.

DEP\DA0004658



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 102

TOTAL WET DENSITY (pcf) 88

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with coarse to fine sand and trace of gravel, OH

BURMISTER- Black Organic CLAY and SILT and coarse to fine Sand trace, Gravel

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 38

PERCENT SILT (74.0-2.0 μm) 48

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. U18LE 3899 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE Sampling Date Not Availab

DRAWN BY: 9-11-85

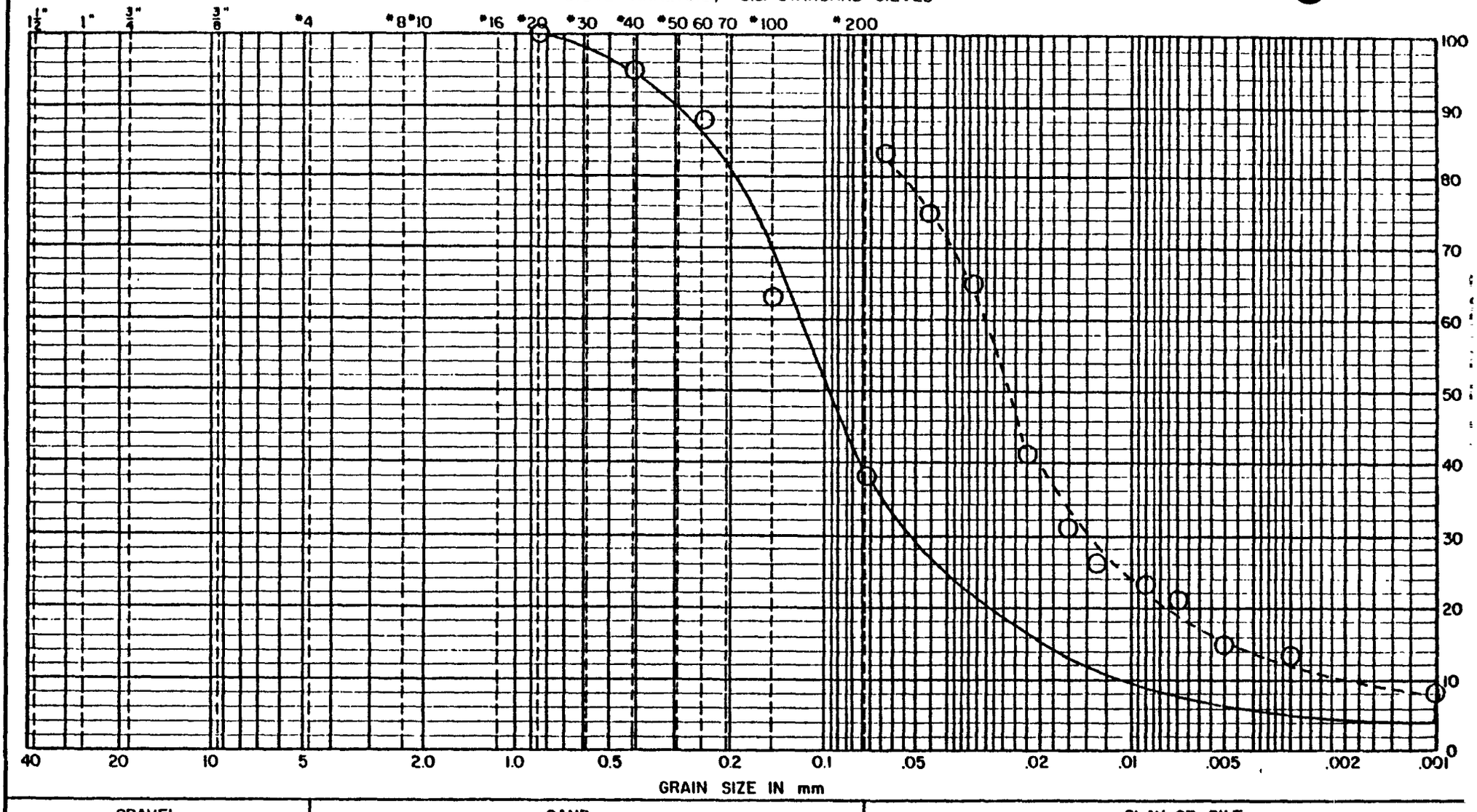
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004659



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 131

TOTAL WET DENSITY (pcf) 99

SPECIFIC GRAVITY 2.50

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray SAND with some organic clayey silt SM-SC

BURMISTER- Dark gray medium to fine(+) SAND some(+), Organic Clayey Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 62

PERCENT SILT (74.0-2.0 μm) 34

PERCENT CLAY (<2.0 μm) 4

SAMPLE NO. U18RA 3517 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-23-85

DRAWN BY: CW 7-9-85

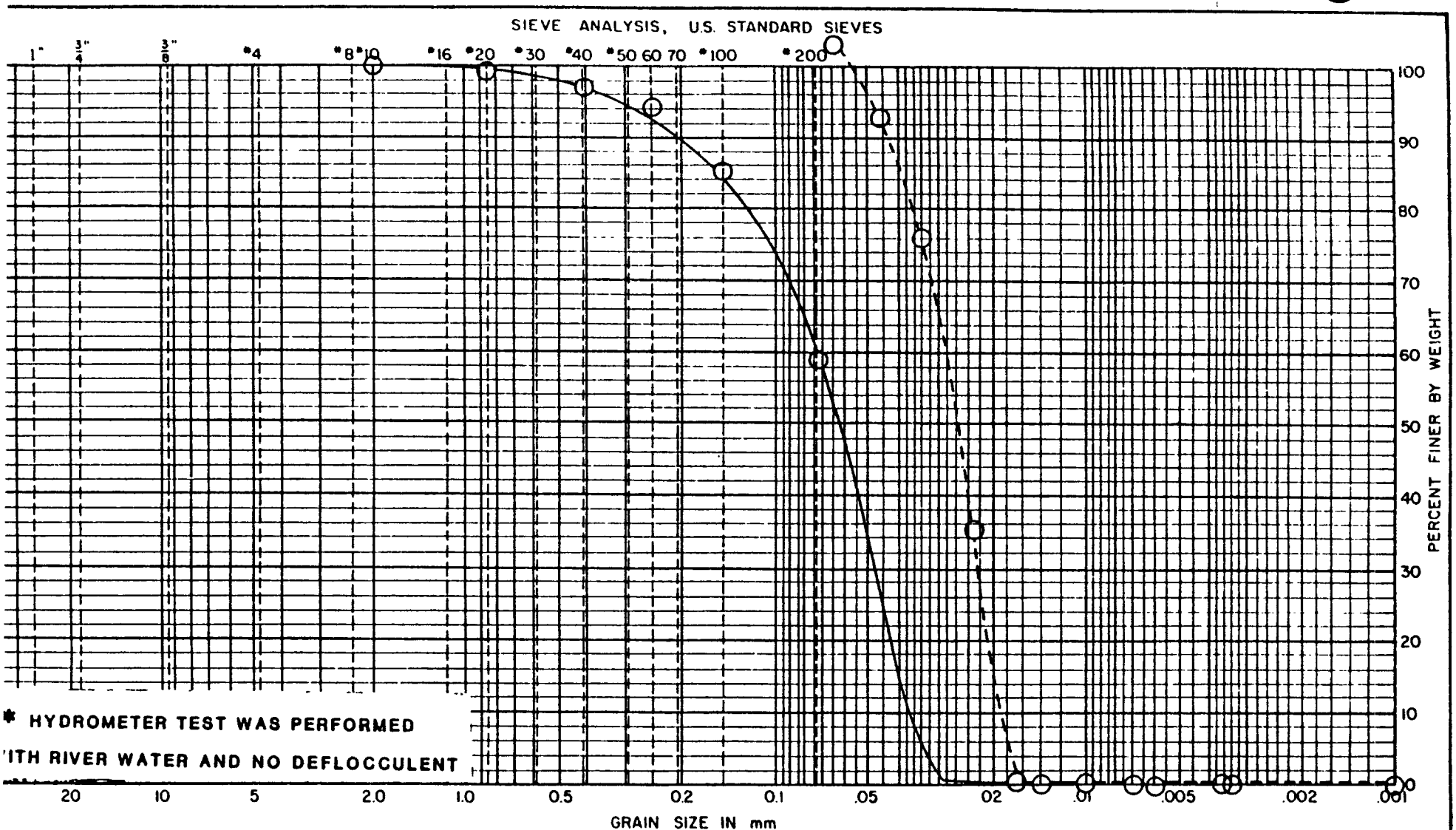
CHECKED BY: SAG 7-10-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004660



GRAVEL		SAND			CLAY OR SILT
OARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT* and fine SAND, OL

BURMISTER- Dark gray Organic SILT* and fine SAND

OISTURE CONTENT (%) 110

OTAL WET DENSITY (pcf) 99

PECIFIC GRAVITY 2.50

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 41

PERCENT SILT (74.0-2.0 µm) 59

PERCENT CLAY (<2.0 µm) 0

SAMPLE NO. U18RA 3517 500 MY (riverwater)

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-23-85

DRAWN BY: FW 7-9-85

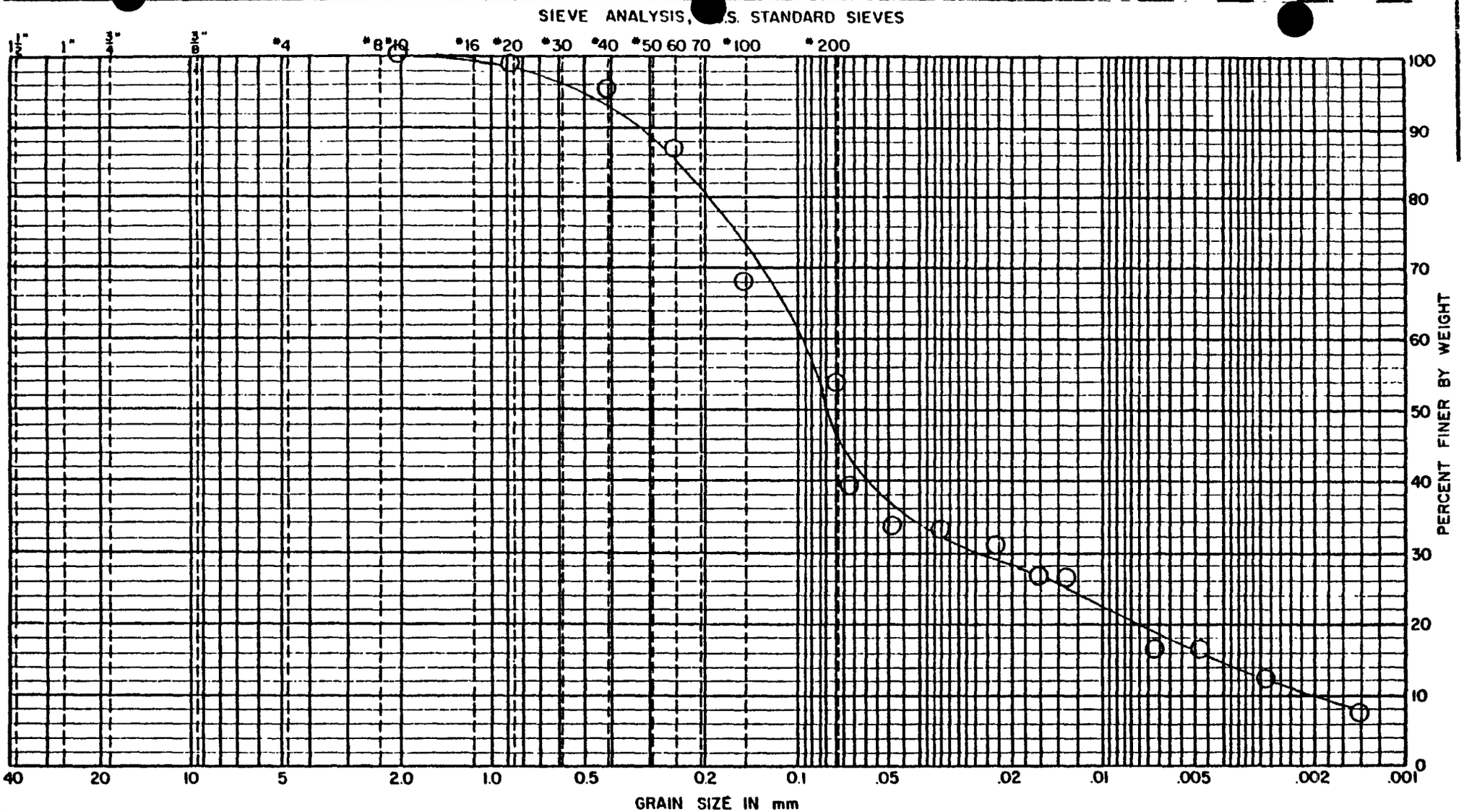
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004661



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black and very dark brown, medium to fine grained SAND with organic silt and clay

BURMISTER- Black and very dark brown medium to fine(+) SAND and organic Silt and Clay

MOISTURE CONTENT (%) 99

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 52

PERCENT SILT (74.0-2.0 μm) 38

PERCENT CLAY (<2.0 μm) 10

SAMPLE NO. U18RA 3518 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-23-85

DRAWN BY: 7-11-85

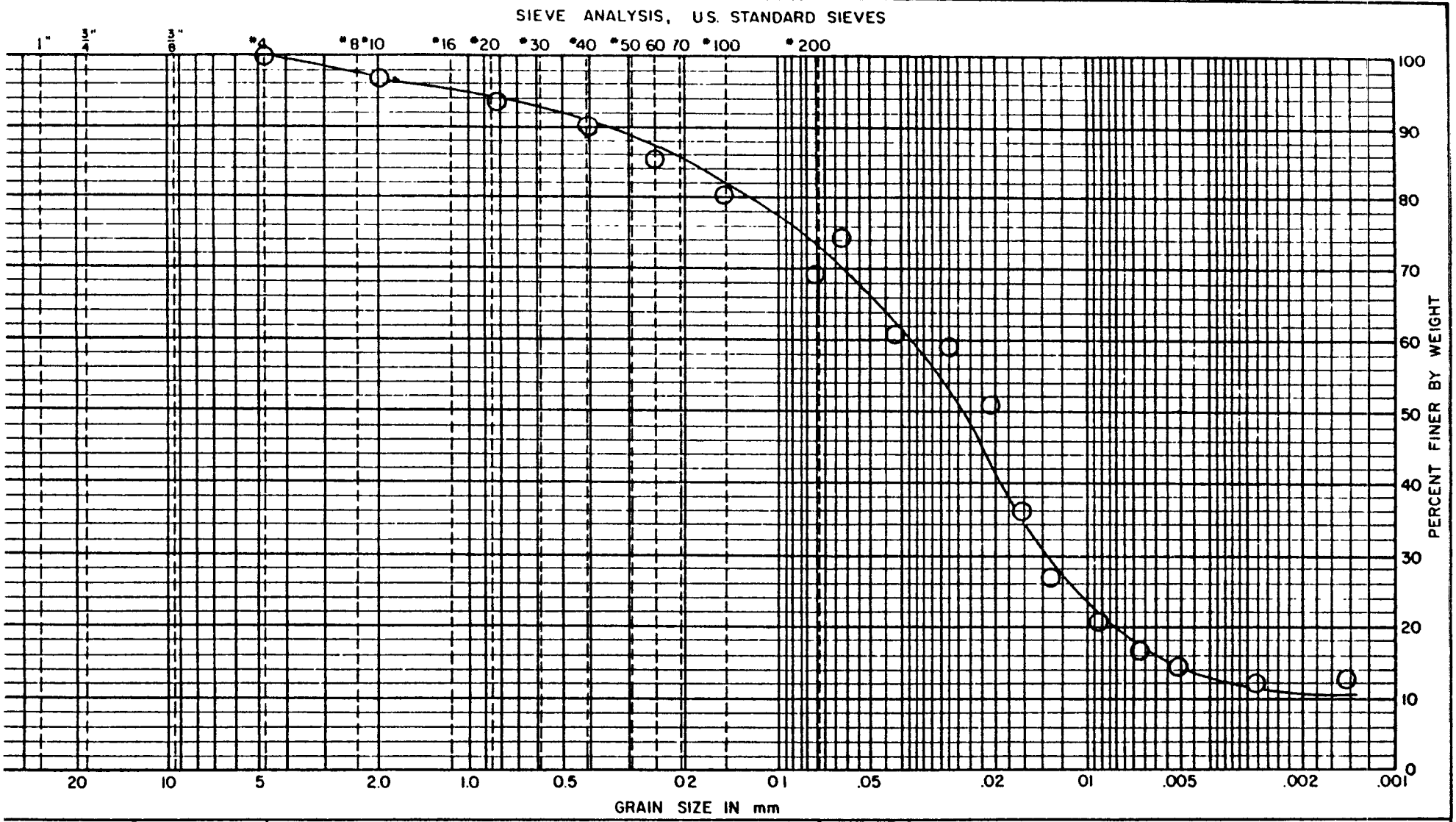
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004662



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some medium to fine grained sand, a little clay and trace of plant fibers

BURMISTER - Dark gray Organic SILT some(+), medium to fine Sand, little(-) Clay. Plant fibers

MOISTURE CONTENT (%) 122

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 30

PERCENT SILT (74.0-2.0 μm) 58

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. U18RA 3519 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-23-85

DRAWN BY: tem 7-11-85

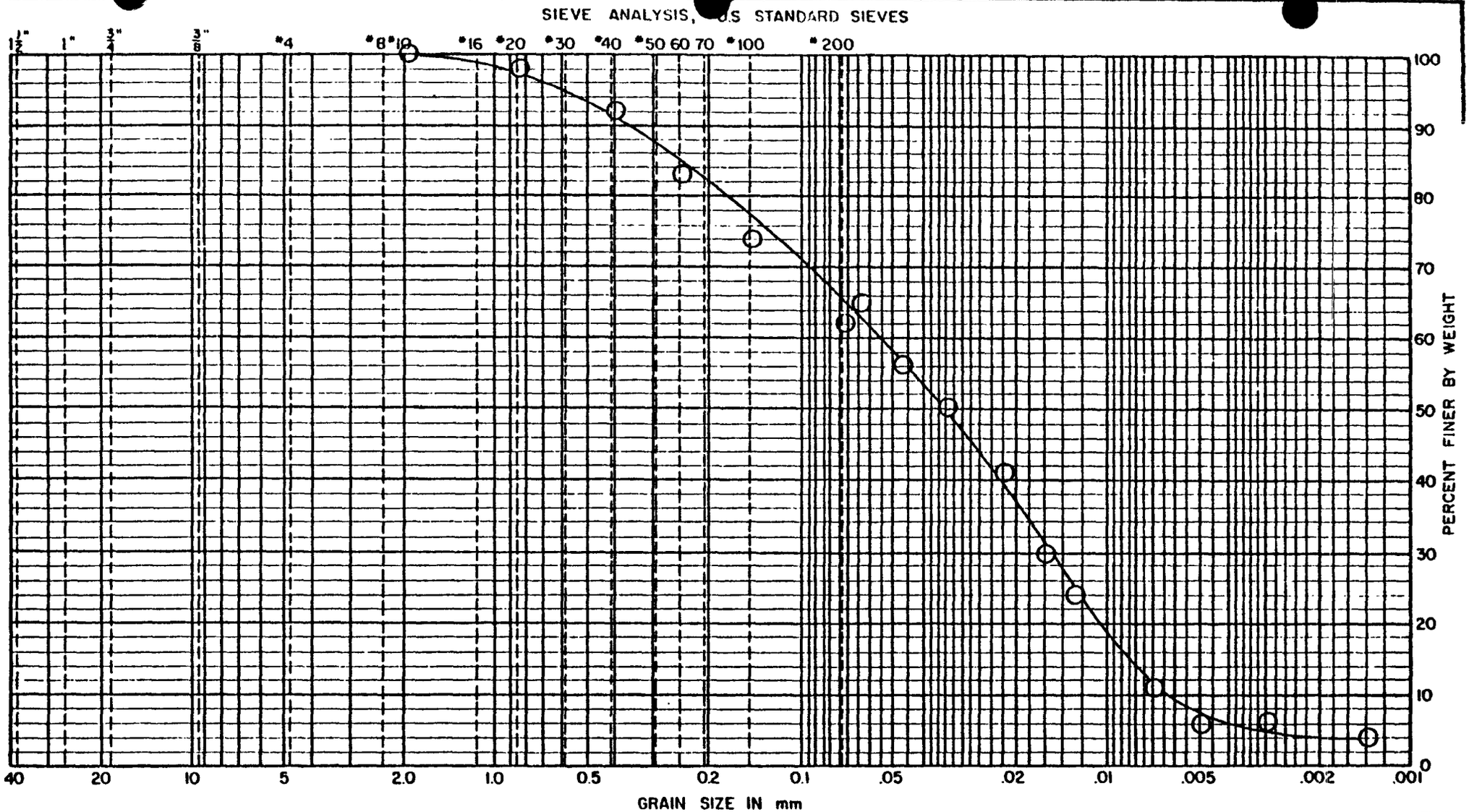
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004663



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 89

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with some sand and trace of plant leaves, OL

BURMISTER- Black Organic Clayey SILT some(+), Sand, trace plant leaves

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 36

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 4

SAMPLE NO. U18RA 3520 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-23-85

DRAWN BY: FW 7-9-85

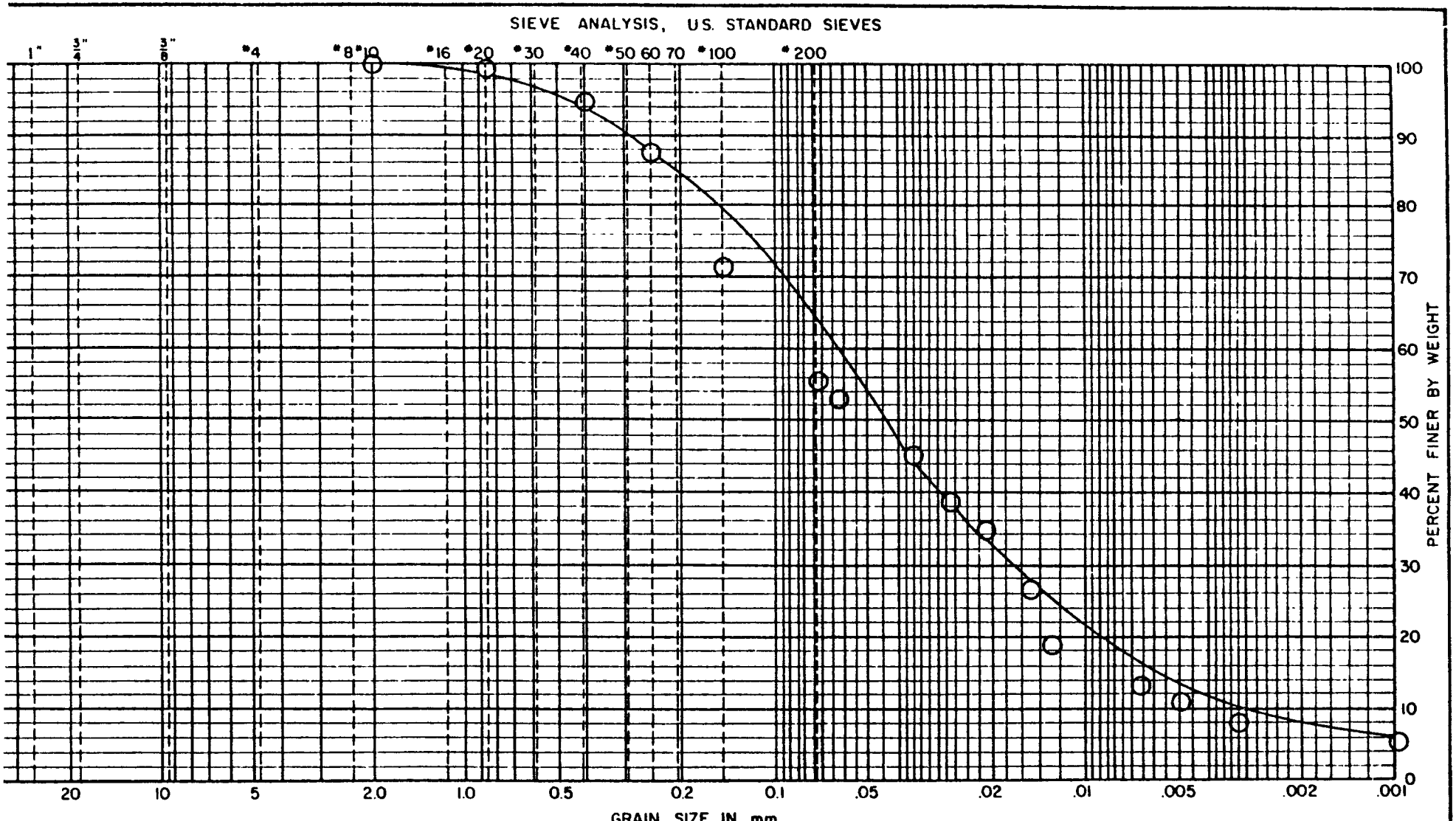
CHECKED BY: SAG 7-10-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004664



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some medium to fine sand and trace of clay

BURMISTER - Black Organic SILT some, medium to fine(+) Sand trace(+) Clay, trace(+) fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 35

PERCENT SILT (74.0-2.0 μm) 57

PERCENT CLAY (<2.0 μm) 8

MOISTURE CONTENT (%) 59

TOTAL WET DENSITY (pcf) 95

SPECIFIC GRAVITY

SAMPLE NO. U18RA 3521 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-23-85

DRAWN BY: Ch 7-9-85

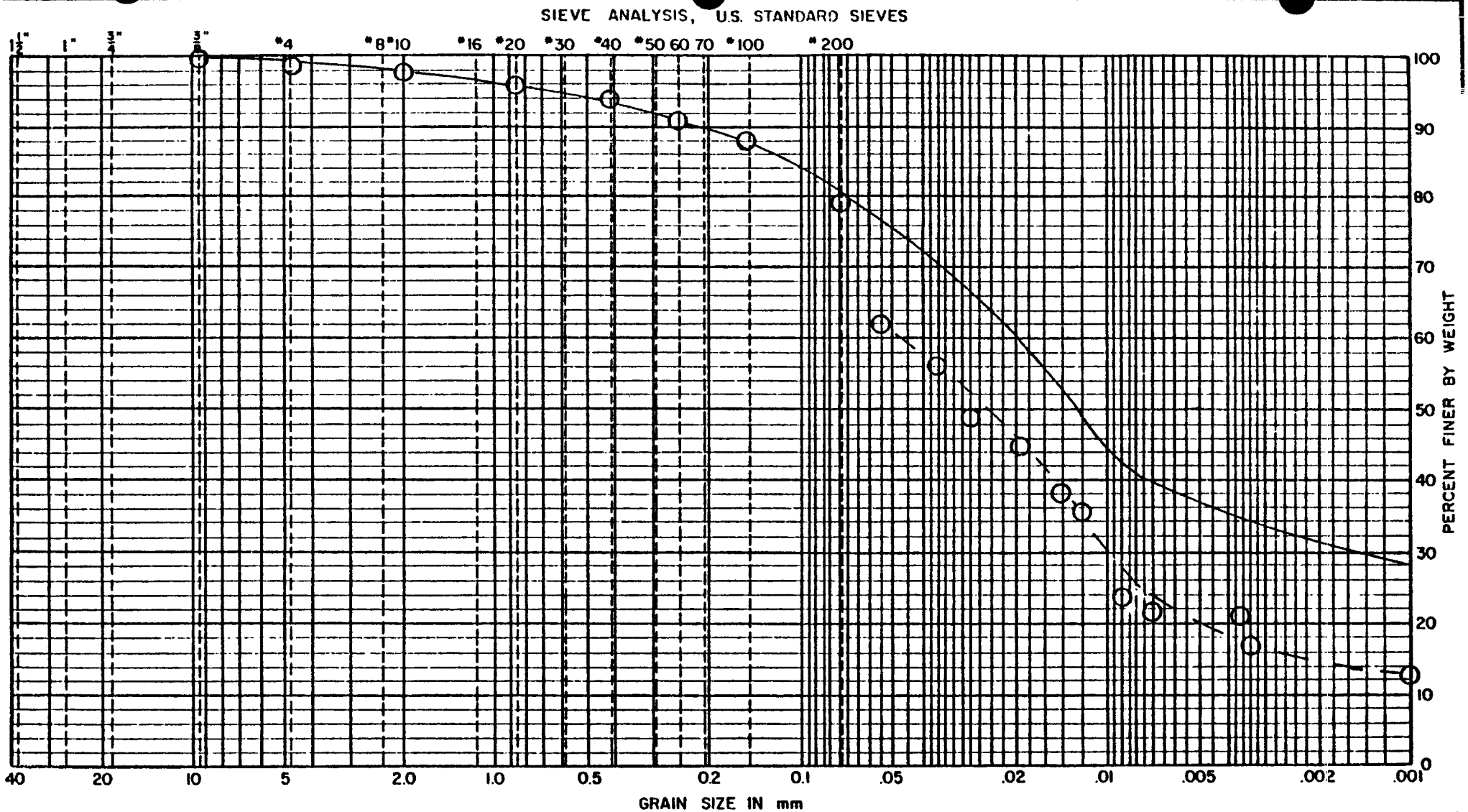
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004665



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic CLAY and SILT with a little coarse to fine graine sand

BURMISTER- Dark gray Organic CLAY and SILT little(+), coarse to fine Sand

MOISTURE CONTENT (%) 220

TOTAL WET DENSITY (pcf) 91

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 20

PERCENT SILT (74.0-2.0 μm) 48

PERCENT CLAY (<2.0 μm) 32

SAMPLE NO. U18RC 3527 500 MV

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-23-85

DRAWN BY: 7-10-85

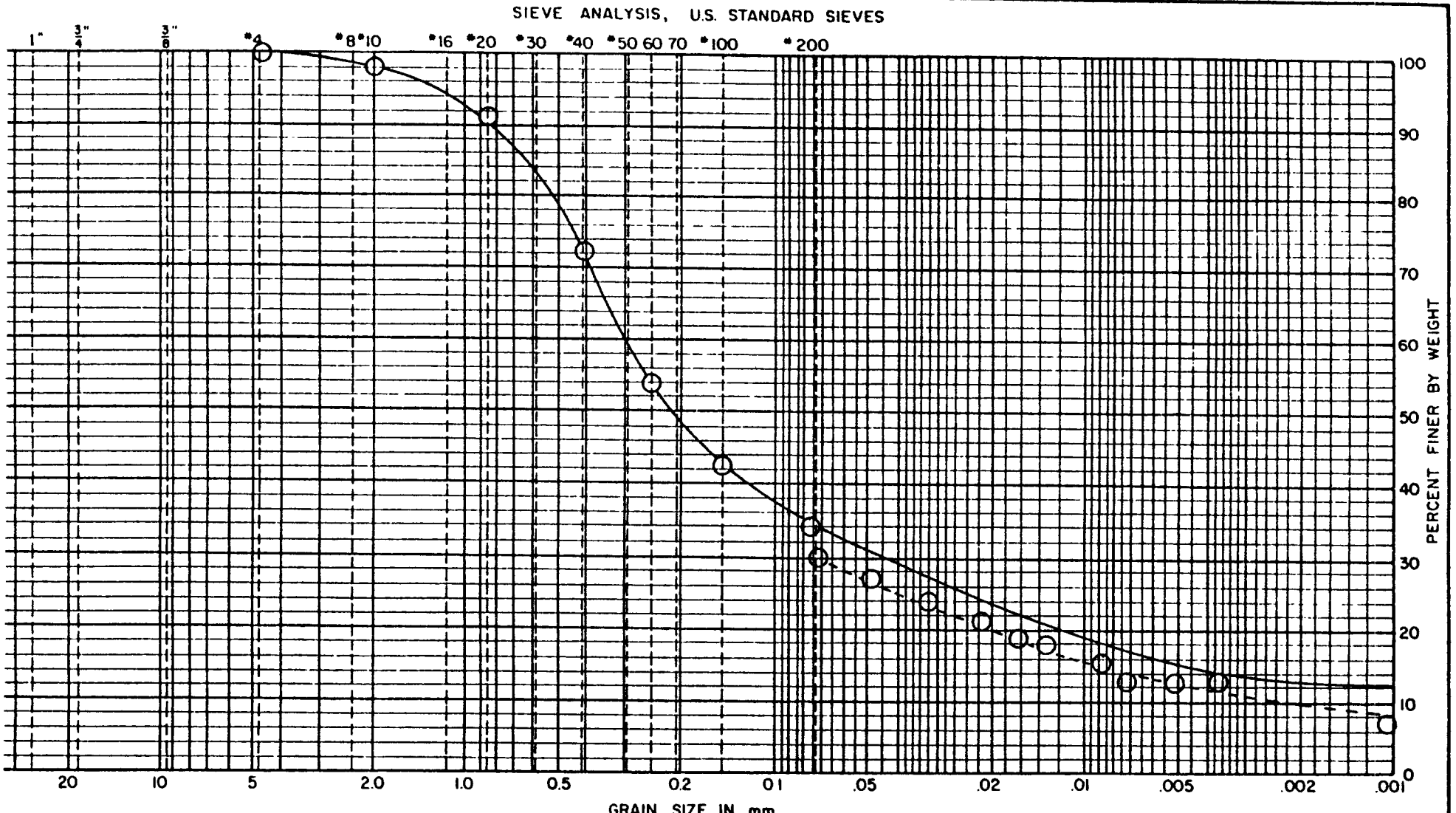
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004666



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, medium to fine grained SAND with some clay and silt with a trace of wood fragments

BURMISTER- Black medium to fine SAND some, Clay and Silt , trace(+) wood fragments

MOISTURE CONTENT (%) 47

TOTAL WET DENSITY (pcf) 95

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 66

PERCENT SILT (74.0-2.0 μm) 22

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. U18RA 3528 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-23-85

DRAWN BY: Ch 7-9-85

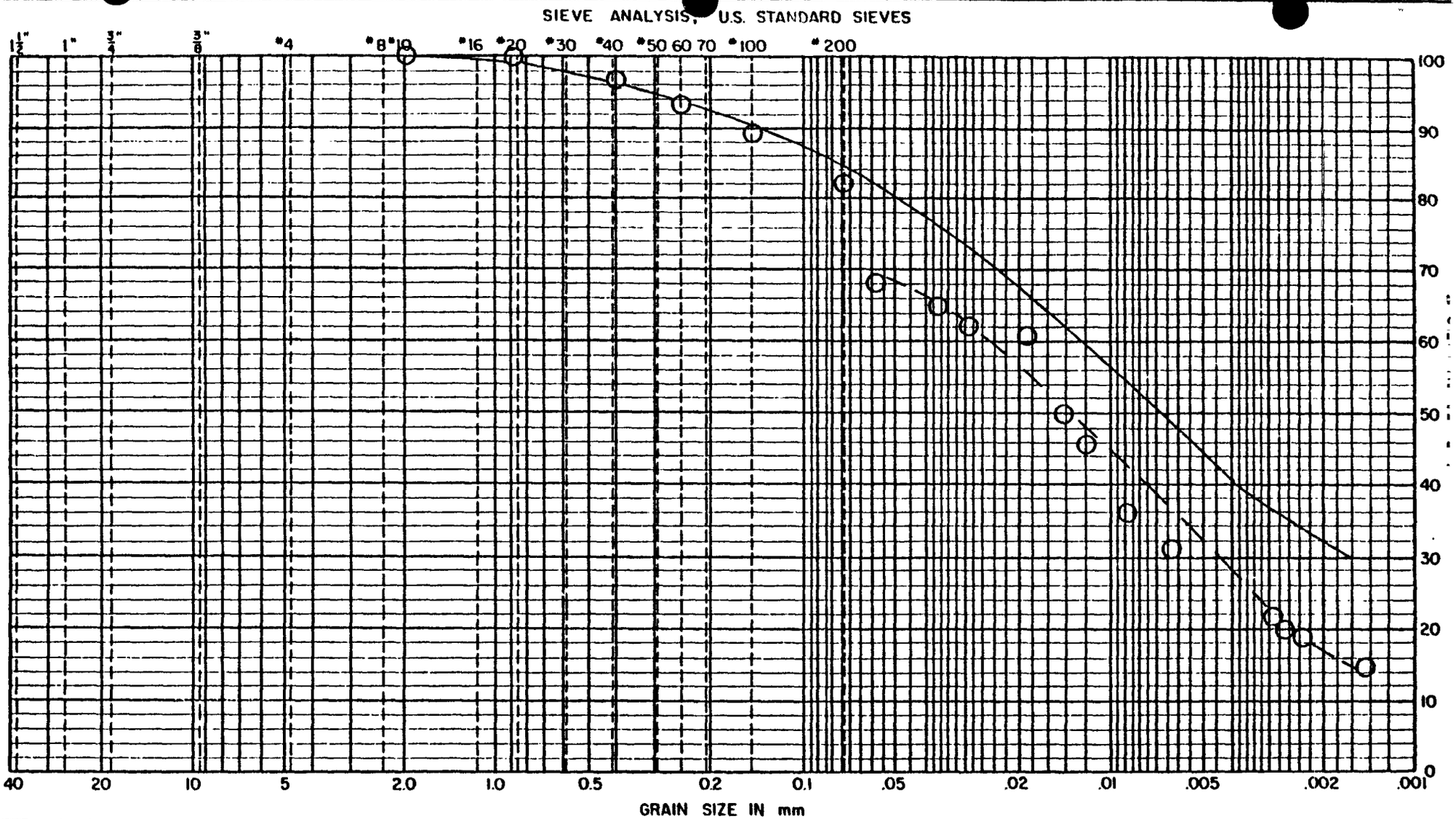
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004667



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 68

TOTAL WET DENSITY (pcf) 94

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT and CLAY with a little fine sand

BURMISTER- Black Organic SILT and CLAY little(+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 17

PERCENT SILT (74.0-2.0 μm) 53

PERCENT CLAY (<2.0 μm) 30

SAMPLE NO. U18RA 3529 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-23-85

DRAWN BY: Ch 7-11-85

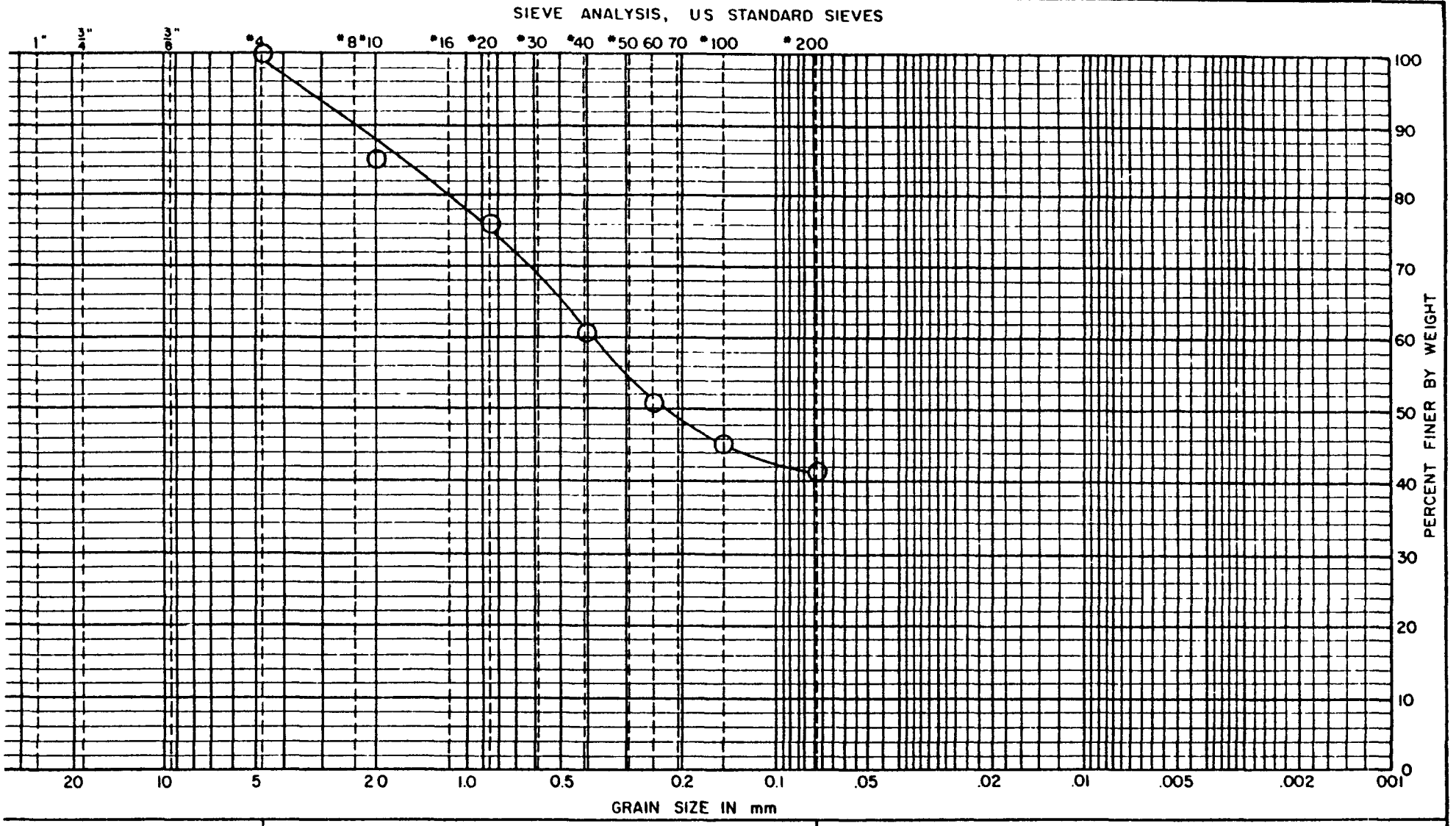
CHECKED BY: SAG 7-12-85

PROJECT No

GRADATION CURVES

FIG. NO.

DEP\DA0004668



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, coarse to fine grained SAND with organic clay and silt SP

BURMISTER- Dark gray coarse to fine SAND and Organic CLAY and SILT

MOISTURE CONTENT (%) 34

TOTAL WET DENSITY (pcf) 118

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 59

PERCENT SILT (74.0-2.0 µm) } 41

PERCENT CLAY (<2.0 µm)

SAMPLE NO. U18RC 3530 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-23-85

DRAWN BY: 7-9-85

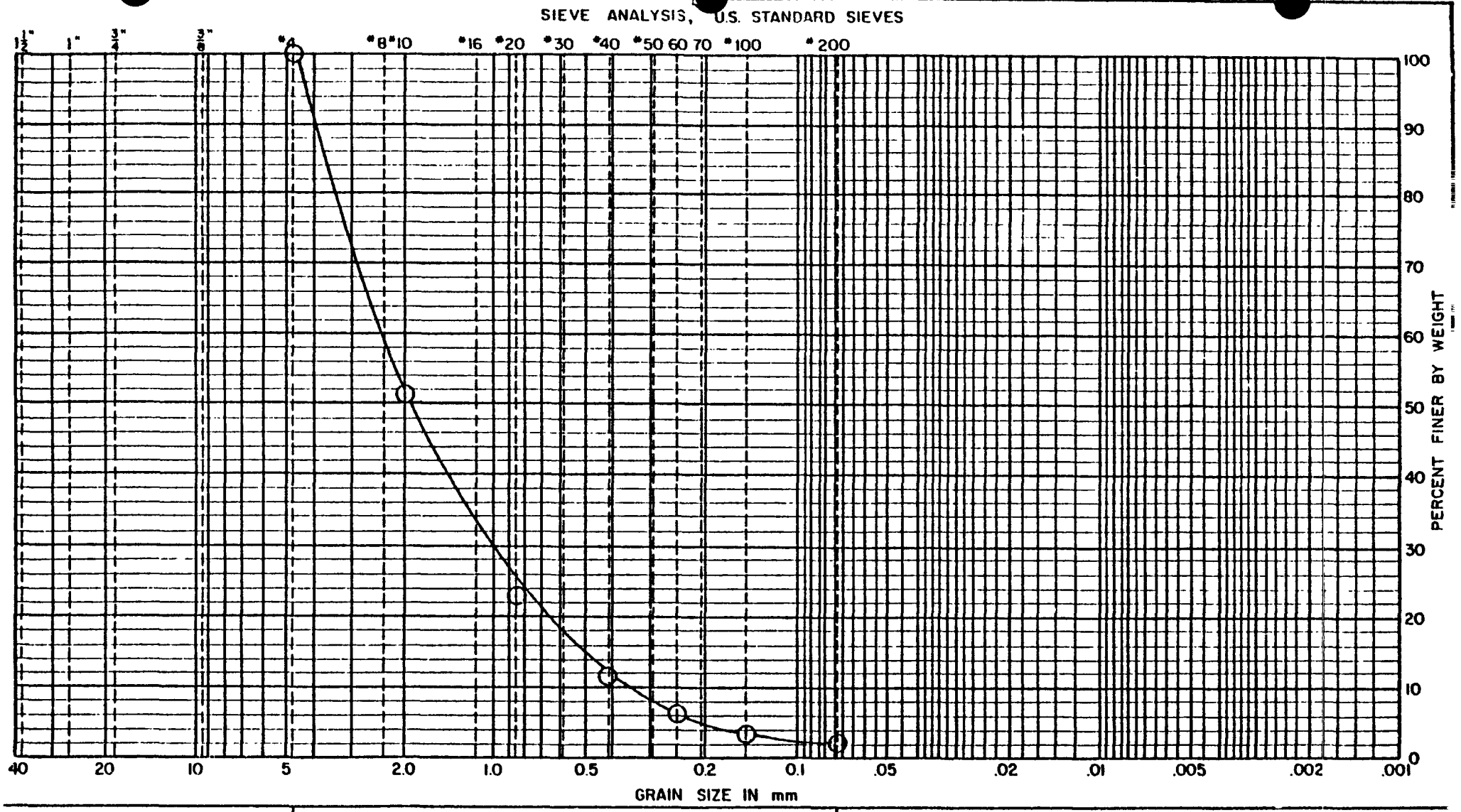
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004669



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Coarse to fine grained SAND with some gravel SW

BURMISTER- Coarse to fine SAND, some gravel

MOISTURE CONTENT (%) 9

TOTAL WET DENSITY (pcf) 136

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 98

PERCENT SILT (74.0-2.0 μm) } 2

PERCENT CLAY (<2.0 μm)

SAMPLE NO. U18RC 3531 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-23-85

DRAWN BY: TJ 7-11-85

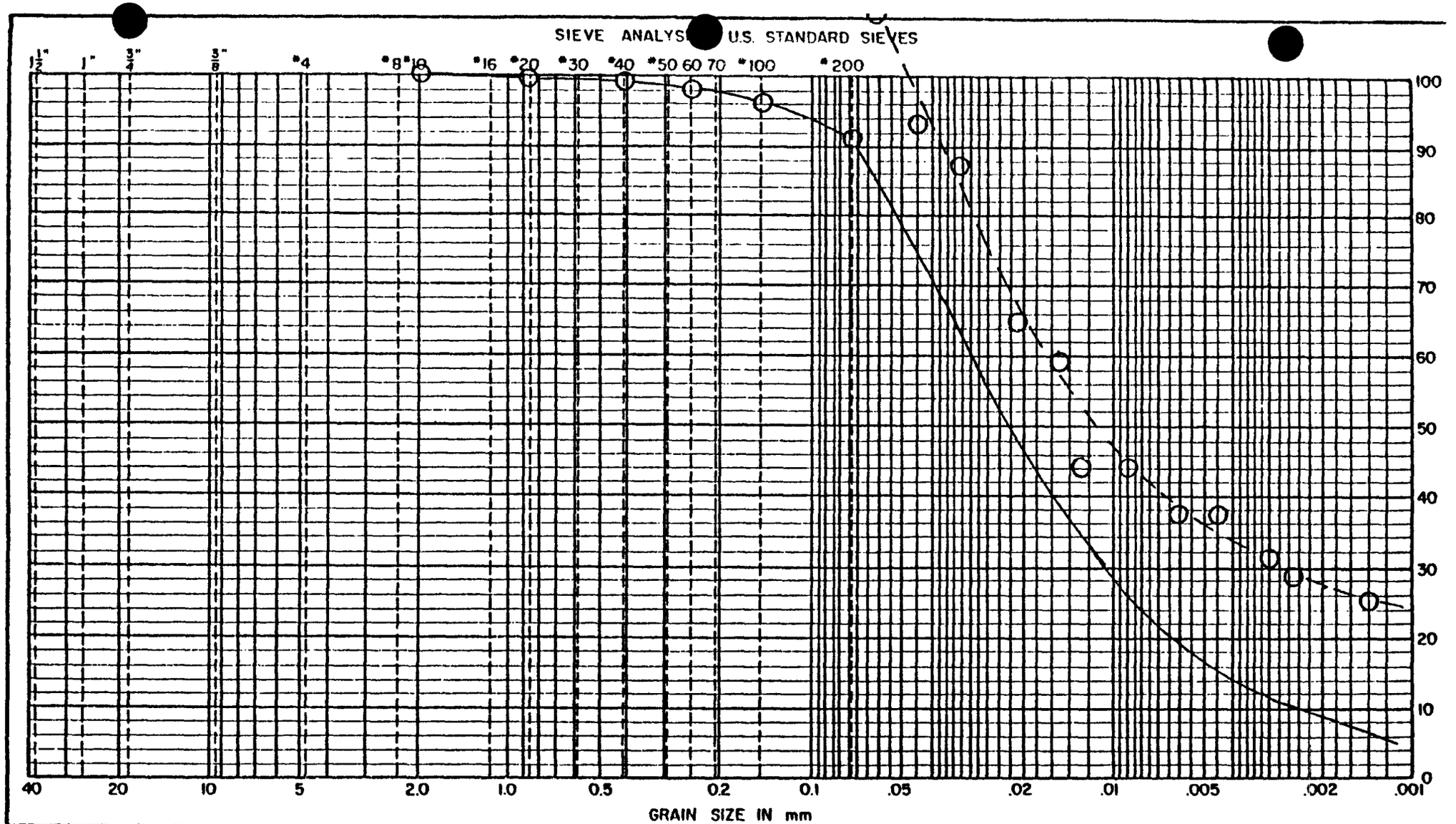
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004670



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with trace of fine sand and vegetative fibers, OL

BURMISTER- Black Organic SILT, trace(+) Clay, trace(+) fine Sand, trace vegetative fibers

MOISTURE CONTENT (%) 159

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY 2.48

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 9

PERCENT SILT (74.0-2.0 µm) 83

PERCENT CLAY (<2.0 µm) 8

SAMPLE NO. U45LB 3607 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-16-85

DRAWN BY: 7-10-85

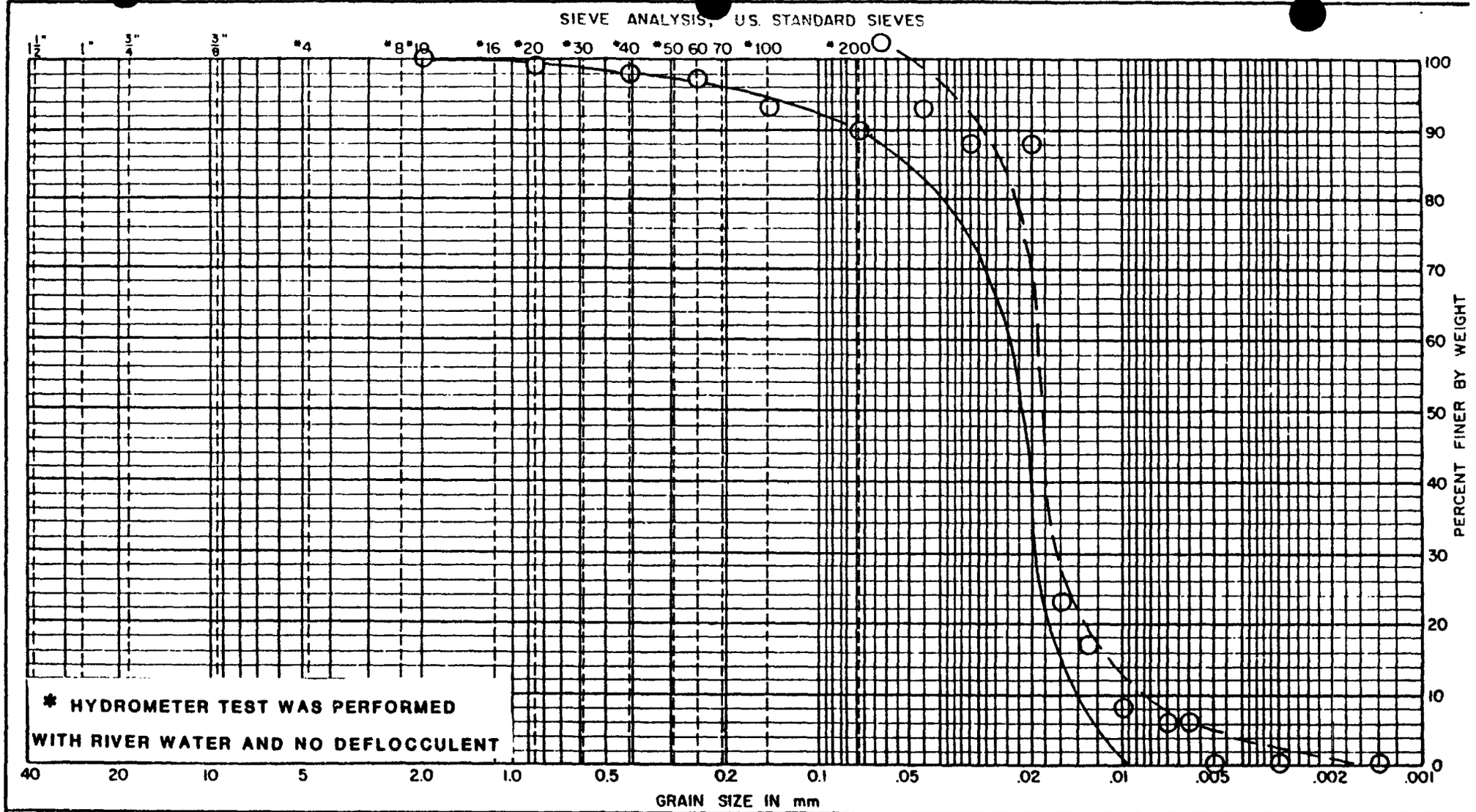
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004671



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT and/or CLAY* with trace of fine sand and vegetative fibers, OL

BURMISTER- Black Organic SILT and/or CLAY*, trace(+) fine Sand, trace vegetative fibers

MOISTURE CONTENT (%) 159

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY 2.48

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 10

PERCENT SILT (74.0-2.0 μm) } 90*

PERCENT CLAY (<2.0 μm)

SAMPLE NO. U45LB 3607 200 MY (riverwater)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-16-85

DRAWN BY: JS 7-11-85

CHECKED BY: RL 7-12-85

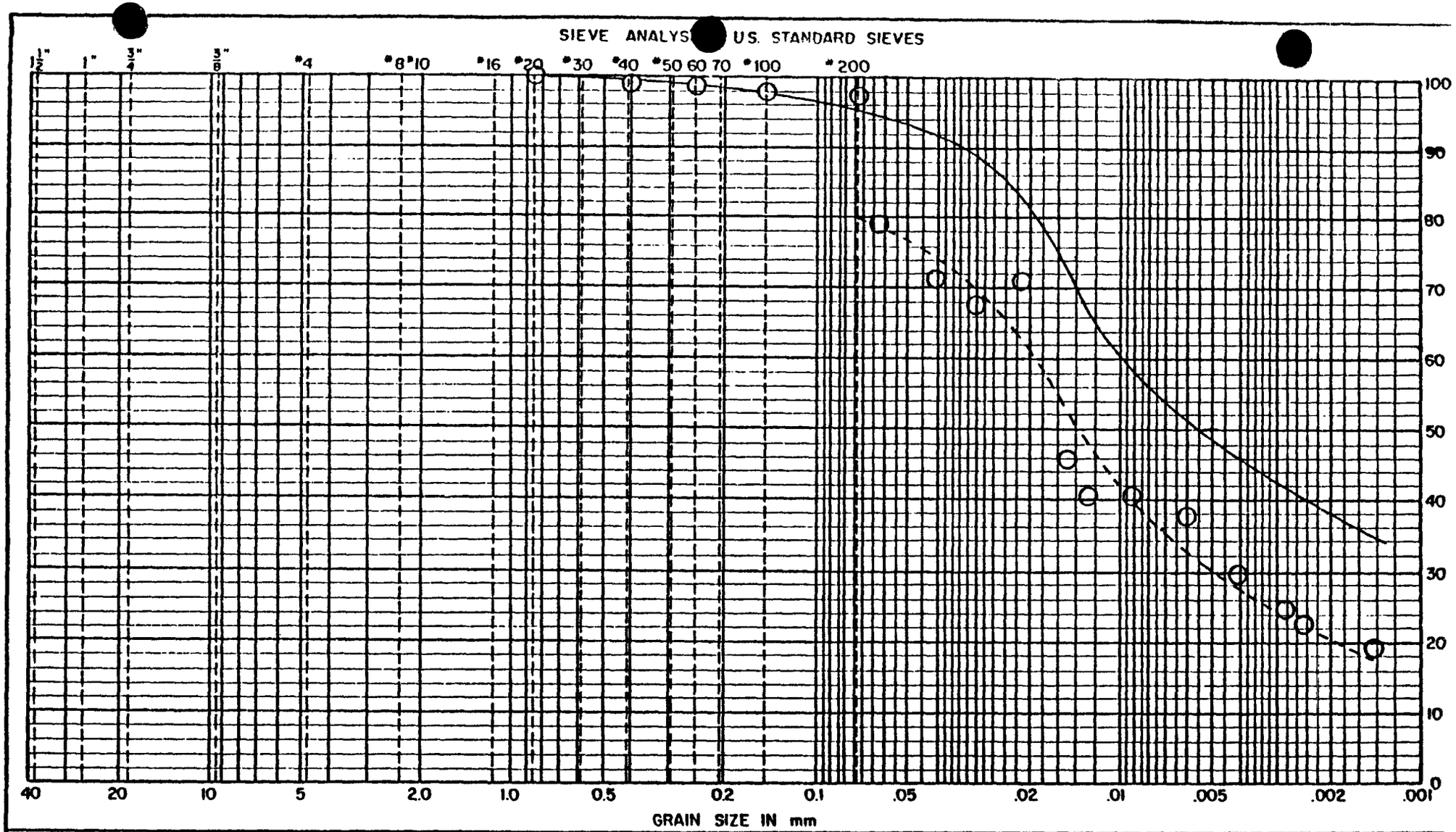
PROJECT NO.

GRADATION CURVES

FIG. NO.

* Test was performed with riverwater and no deflocculent

DEP\DA0004672



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with trace of fine sand

BURMISTER - Black Organic CLAY and SILT trace, fine Sand

MOISTURE CONTENT (%) 136

TOTAL WET DENSITY (pcf) 75

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 57

PERCENT CLAY (<2.0 μm) 38

SAMPLE NO. U45LB 3609 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-16-85

DRAWN BY: CL 7-10-85

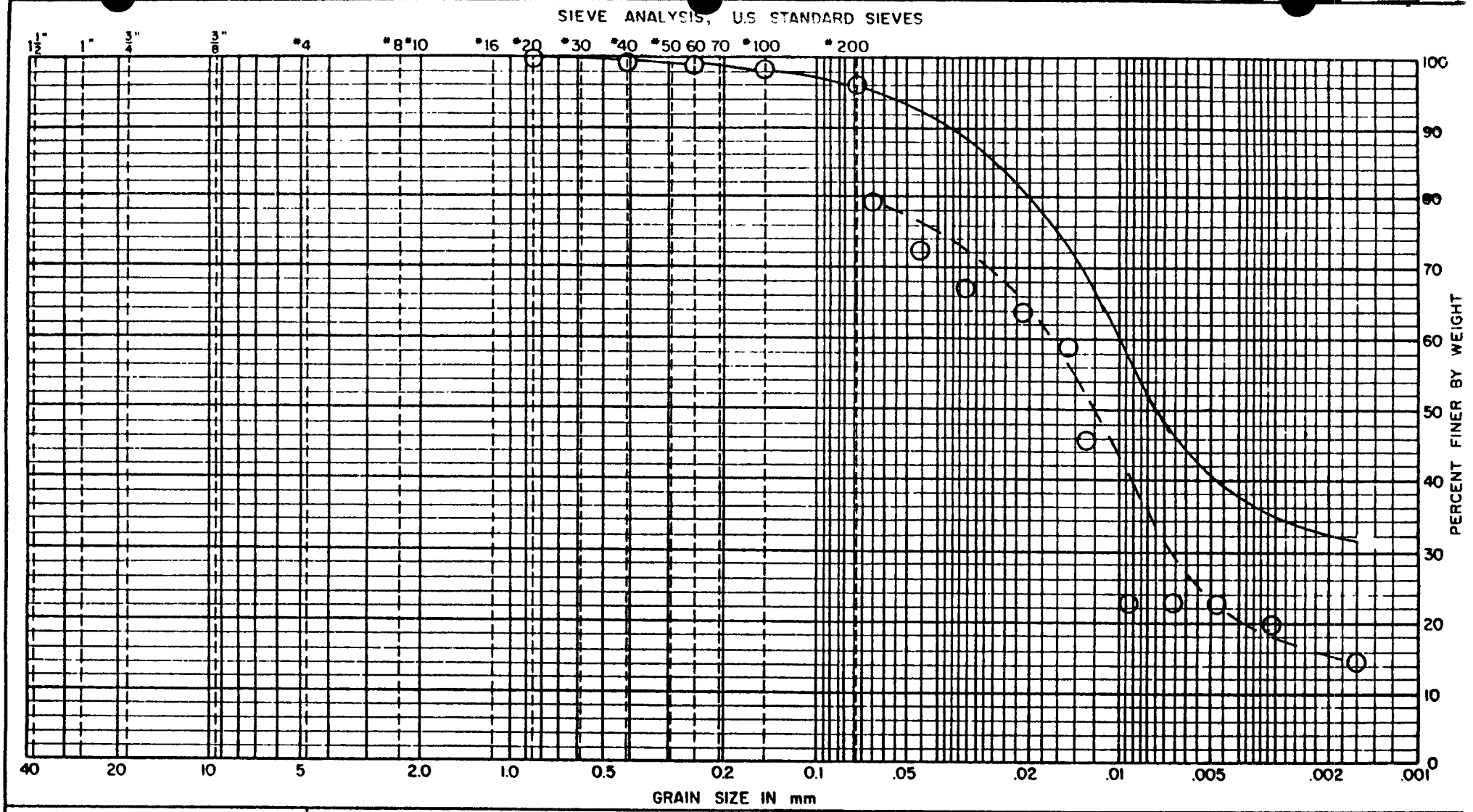
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004673



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 123

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with a trace of fine sand

BURMISTER- Black Organic CLAY and SILT trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 4

PERCENT SILT (74.0-2.0 μm) 64

PERCENT CLAY (<2.0 μm) 32

SAMPLE NO. U45LB 3611 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-16-85

DRAWN BY: 7-11-85

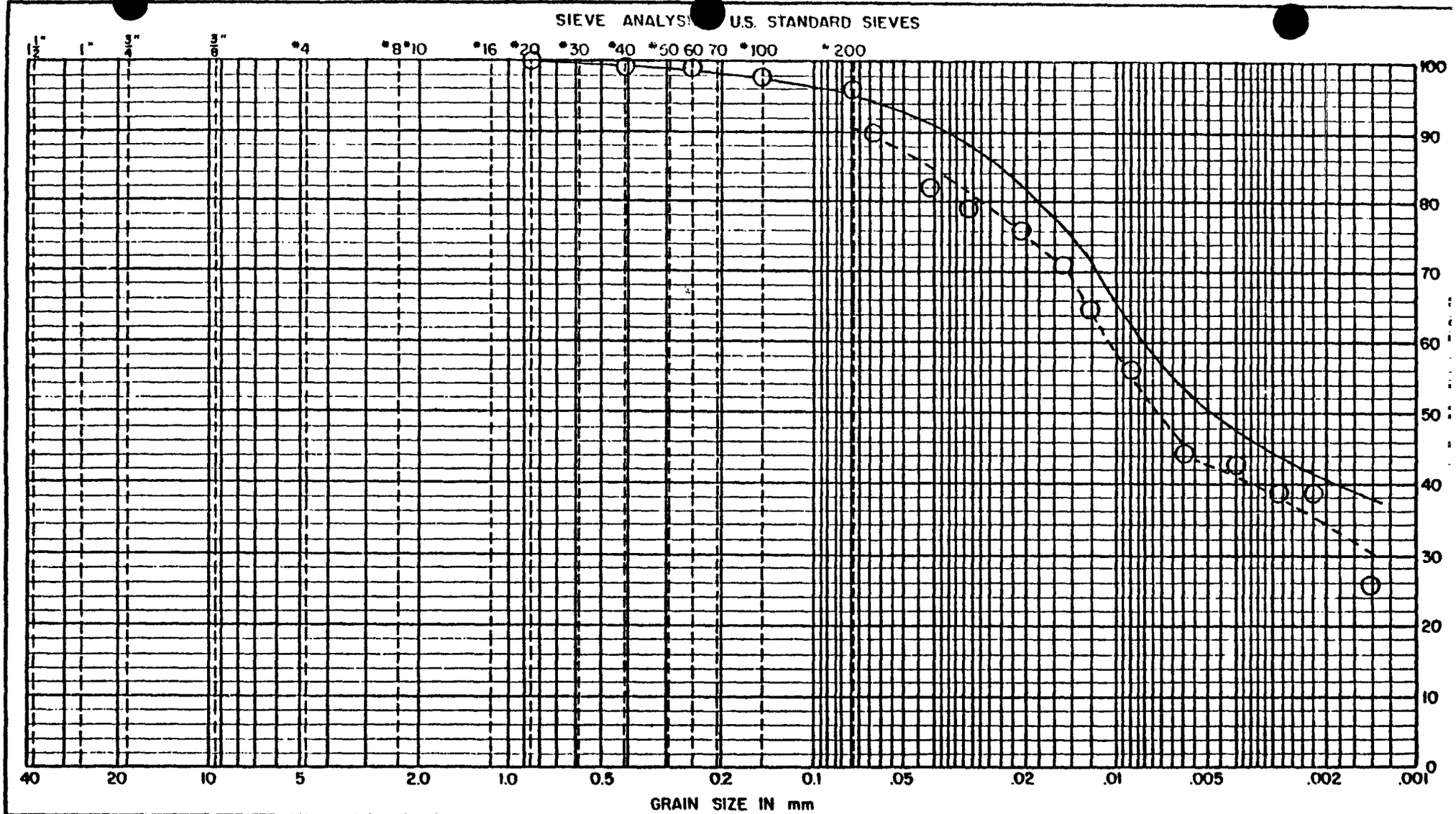
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004674



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 183

TOTAL WET DENSITY (pcf) 46

SPECIFIC GRAVITY 2.47

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with trace of fine sand

BURMISTER- Black Organic CLAY and SILT trace, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 5

PERCENT SILT (74.0-2.0 µm) 53

PERCENT CLAY (<2.0 µm) 42

SAMPLE NO. U45LD 3627 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-16-85

DRAWN BY: Chw 7-10-85

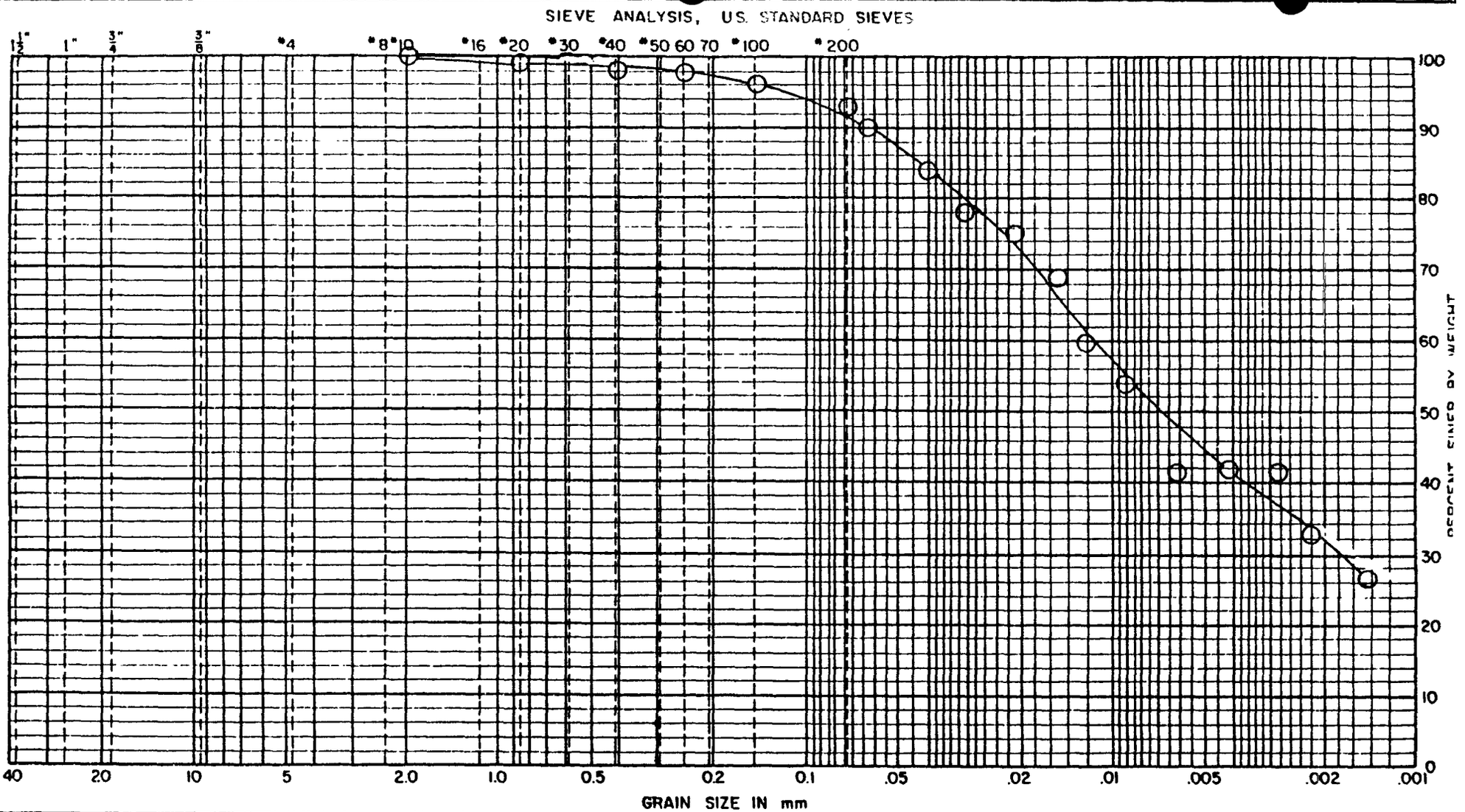
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004675



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 190

TOTAL WET DENSITY (pcf) 74

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with trace fine sand and vegetative fibers

BURMISTER- Black Organic CLAY and SILT trace(+), fine Sand, trace vegetative fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 59

PERCENT CLAY (<2.0 μm) 33

SAMPLE NO. U45LD 3628 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-16-85

DRAWN BY: S.T. 7-11-85

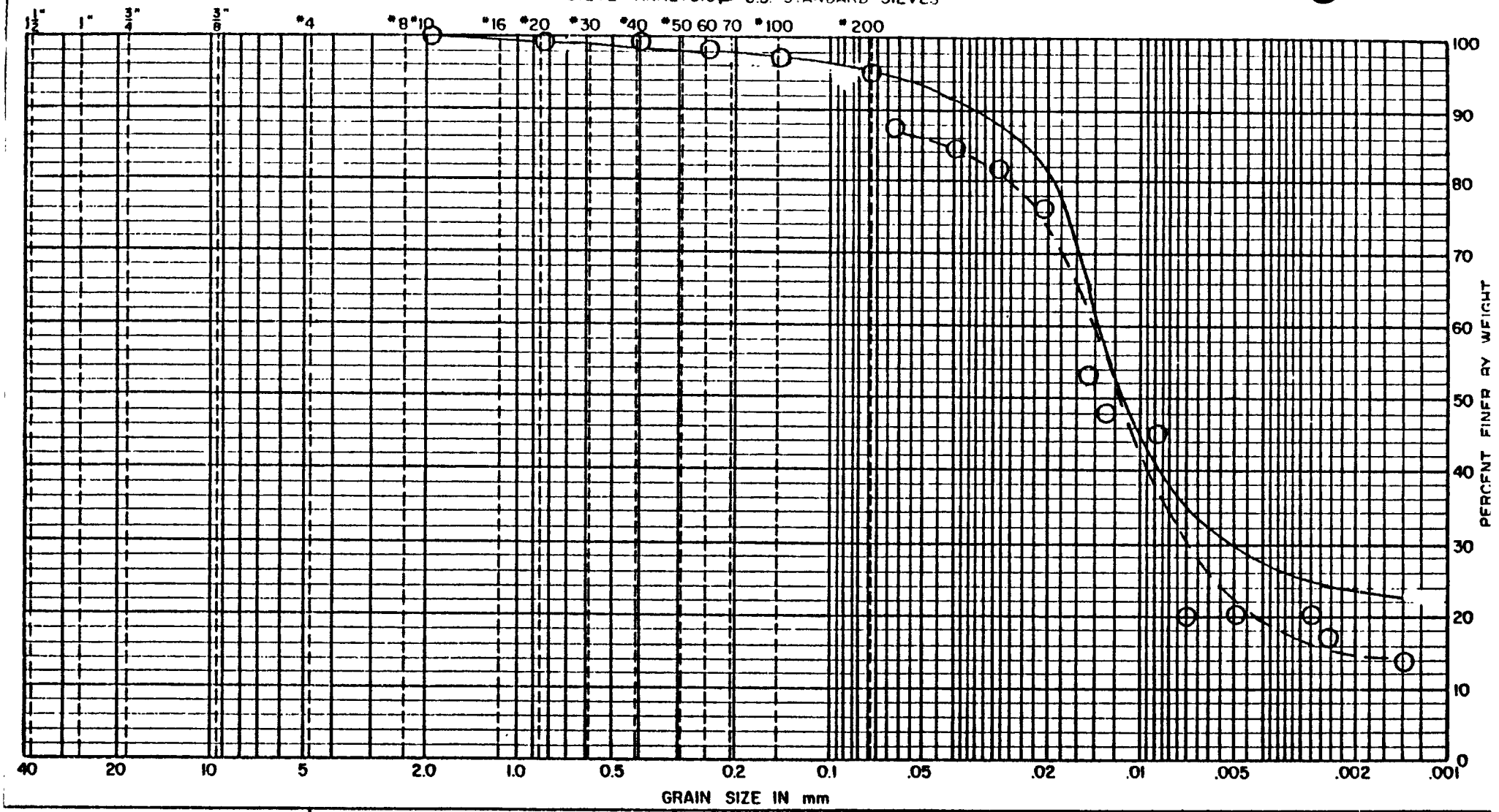
CHECKED BY: G. 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004676



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 162

TOTAL WET DENSITY (pcf) 76

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with trace of sand and wood fibers

BURMISTER- Black Organic CLAY and SILT trace, fine Sand trace wood fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 72

PERCENT CLAY (<2.0 μm) 23

SAMPLE NO. U45LD 3630 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-16-85

DRAWN BY: 7-11-85

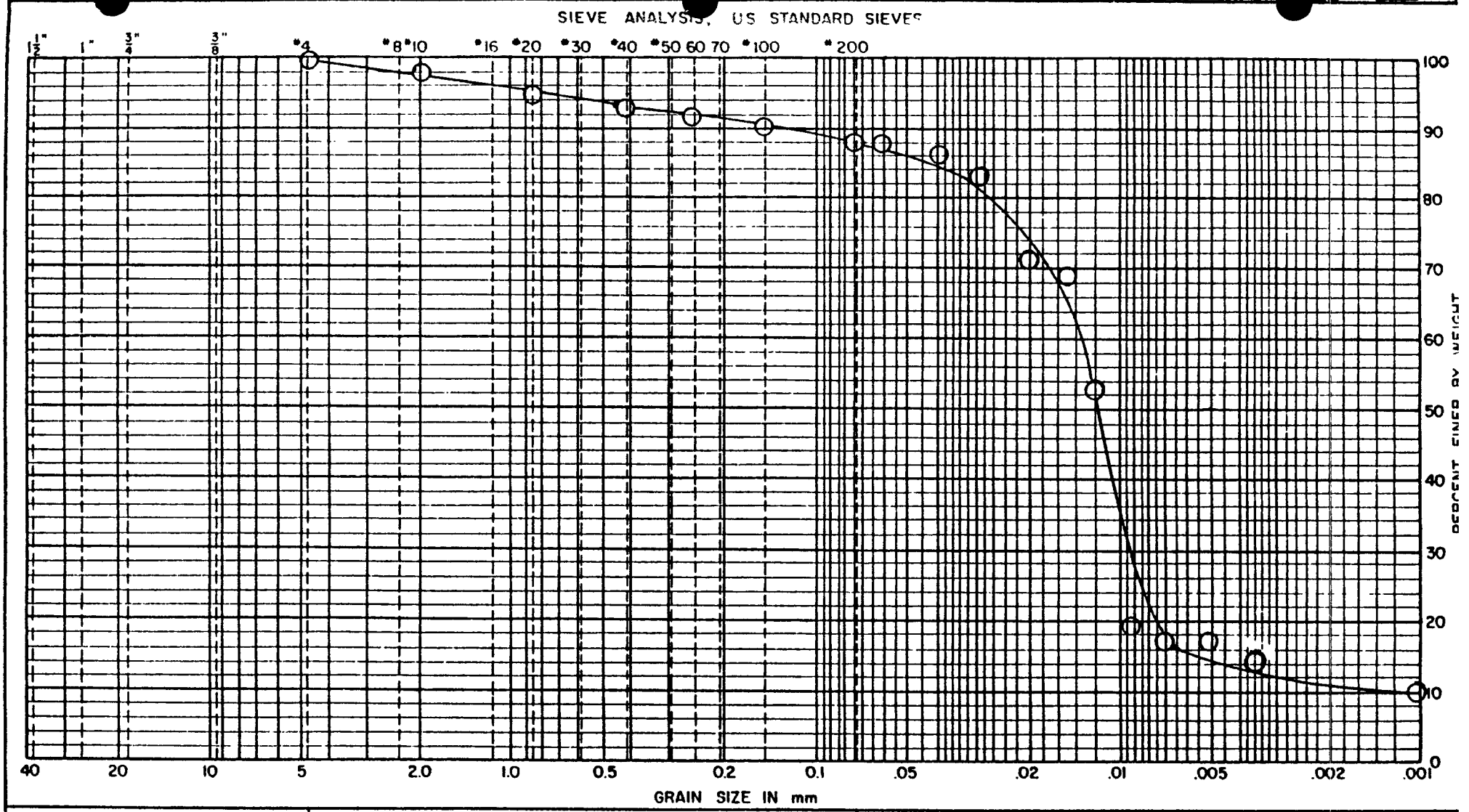
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004677



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 120

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT with little fine sand

BURMISTER- Black Organic Clayey SILT little(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 12

PERCENT SILT (74.0-2.0 µm) 78

PERCENT CLAY (<2.0 µm) 10

SAMPLE NO. U45LD 3631 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-16-85

DRAWN BY: 7-10-85

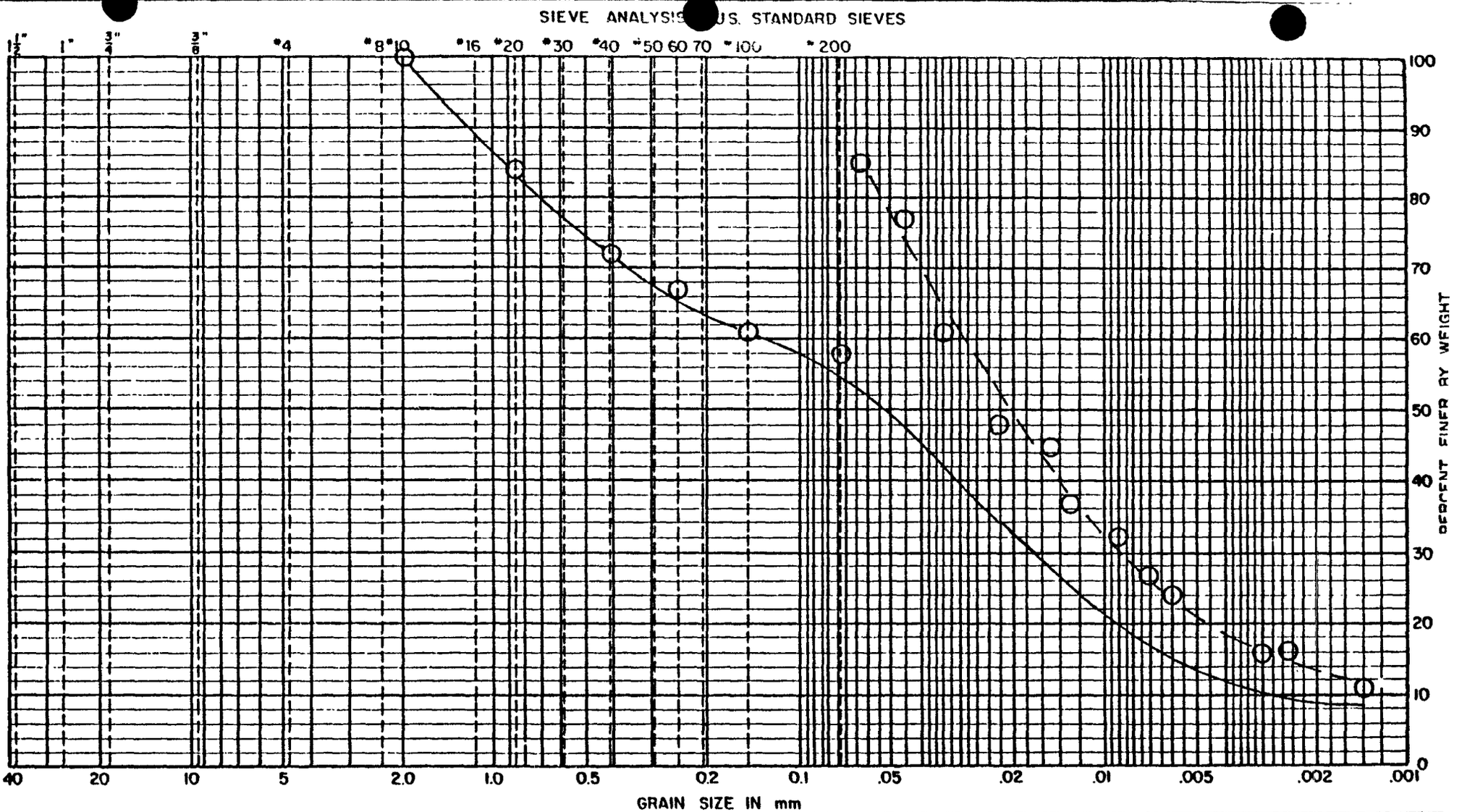
CHECKED BY: 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004678



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic Clayey SILT and SAND, trace plant fibers and occasional peat pockets, SM-SC

BURMISTER- Black Organic Silt and Sand, trace(+) Clay, trace plant fibers, occasional peat pockets

MOISTURE CONTENT (%) 109

TOTAL WET DENSITY (pcf) 68

SPECIFIC GRAVITY 2.31

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 45

PERCENT SILT (74.0-2.0 μm) 46

PERCENT CLAY (<2.0 μm) 9

SAMPLE NO. U45RB 3582 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-17-85

DRAWN BY: [illegible] 7-11-85

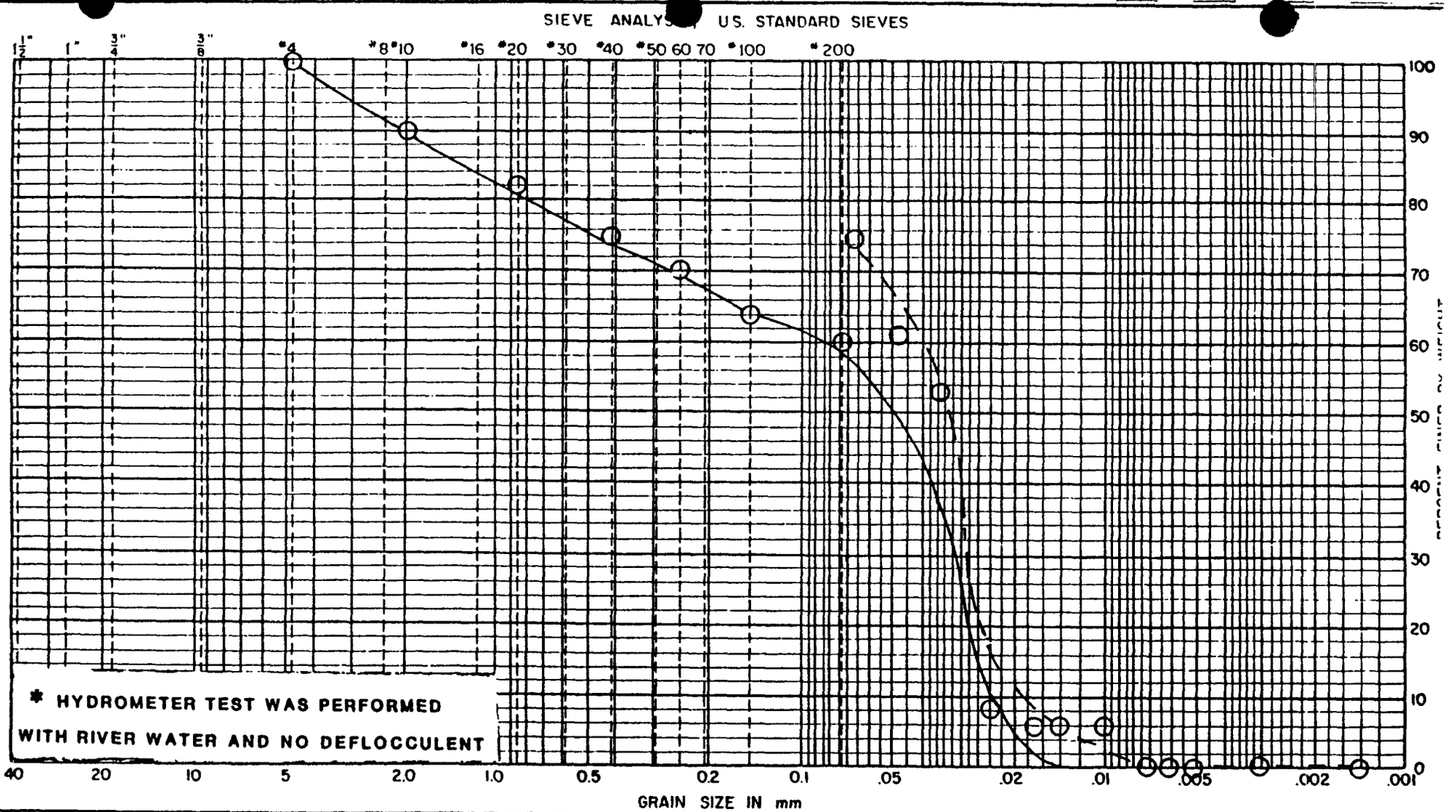
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004679



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT* and coarse to fine SAND with trace of plant fibers and occasional peat pockets

BURMISTER - Black Organic SILT* and coarse to fine SAND, trace plant fibers

MOISTURE CONTENT (%) 109

TOTAL WET DENSITY (pcf) 68

SPECIFIC GRAVITY 2.31

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 40

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 0

SAMPLE NO. U45RB 3582 500 MY river

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-17-85

DRAWN BY: SS 7-11-85

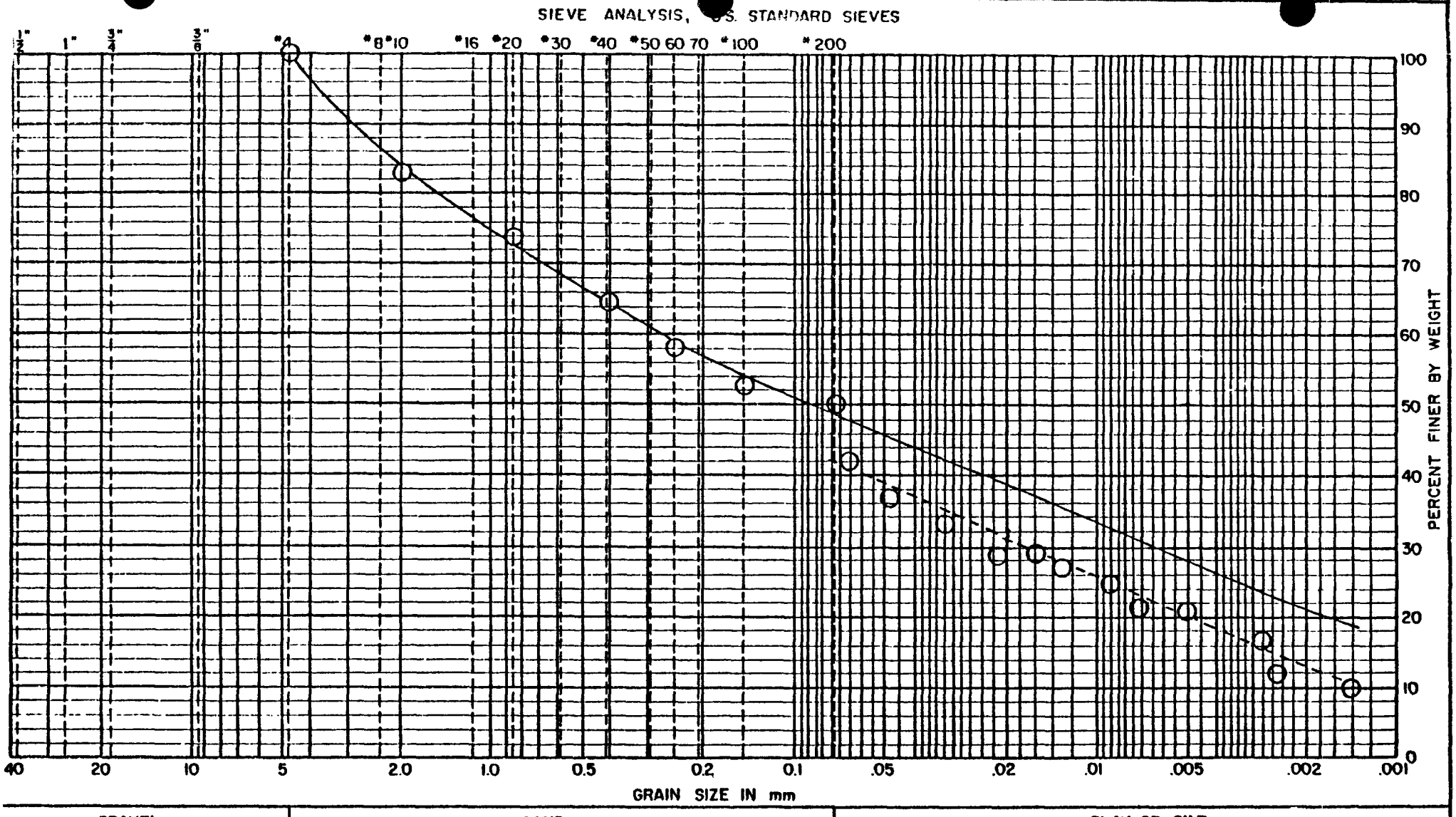
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004680



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, coarse to fine grained SAND and organic Silty CLAY

BURMISTER- Black coarse to fine(+) SAND and Organic Silty CLAY

MOISTURE CONTENT (%) 76

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 51

PERCENT SILT (74.0-2.0 μm) 27

PERCENT CLAY (<2.0 μm) 22

SAMPLE NO. U45RB 3583 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-17-85

DRAWN BY: 7-10-85

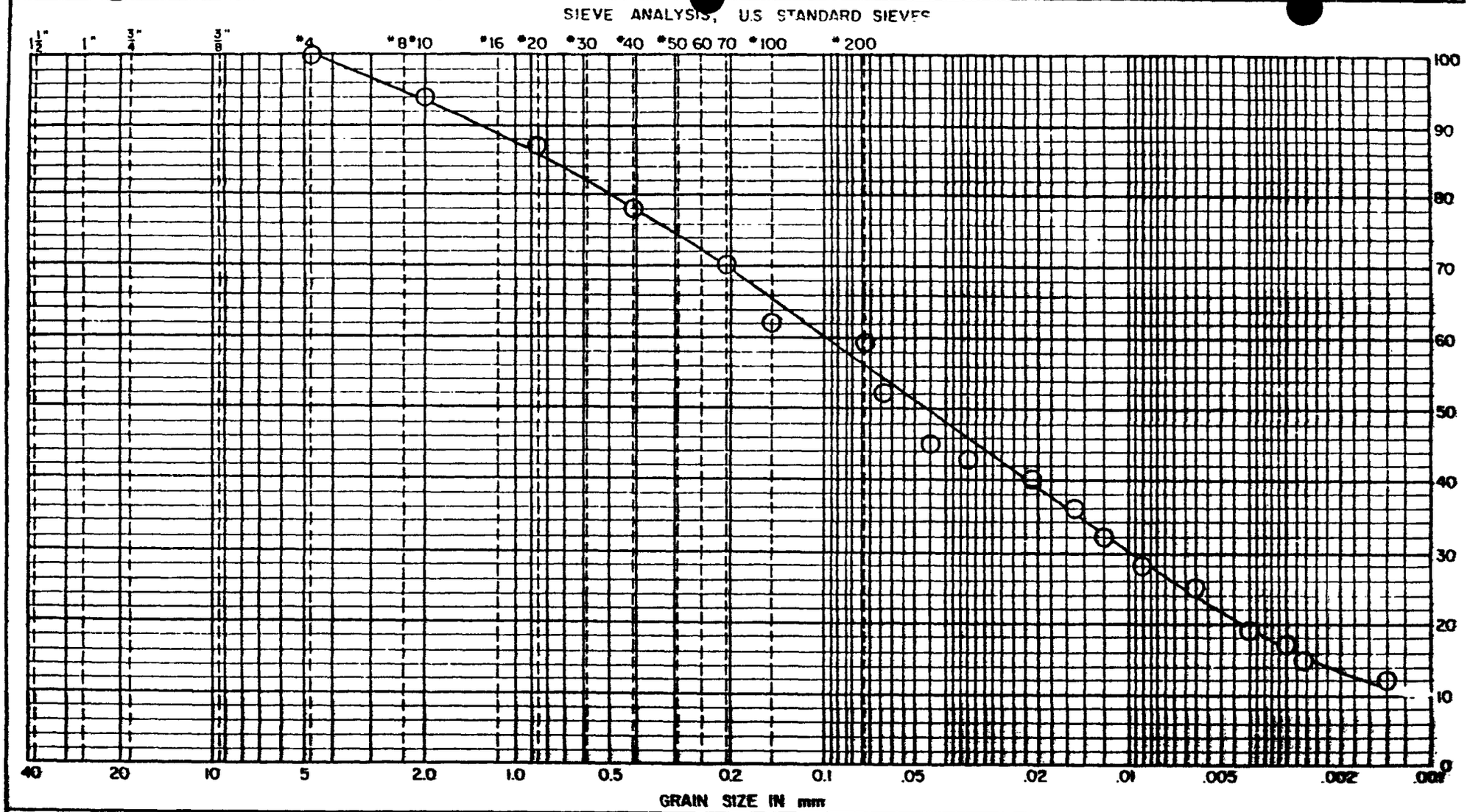
CHECKED BY: JAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004681



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 94

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black and gray, coarse to fine grained SAND and organic Clayey SILT with wood fragments and cinders, SM-SC

BURMISTER- Black and gray coarse to fine Sand and Organic Silt little(-) Clay, trace wood fragments and cinders

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm)	44
PERCENT SILT (74.0-2.0 µm)	43
PERCENT CLAY (<2.0 µm)	13

SAMPLE NO. U45RB 3584 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-17-85

DRAWN BY: 7-9-85

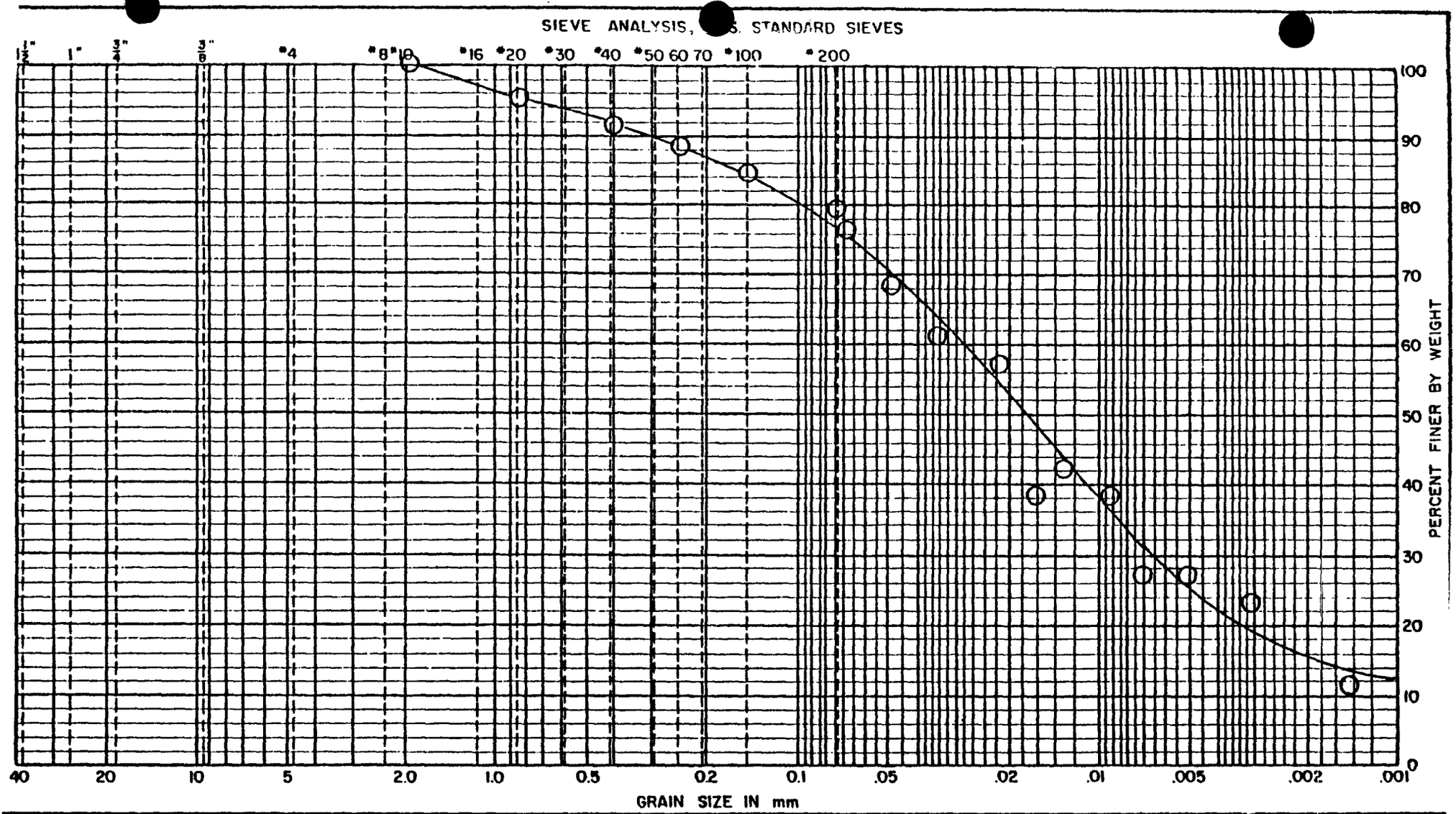
CHECKED BY: SAG 7-10-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004682



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, organic SILT and CLAY with some medium to fine sand and peat

BURMISTER- Brown Organic SILT and CLAY some(-), medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 24

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 16

MOISTURE CONTENT (%) 309

TOTAL WET DENSITY (pcf) 69

SPECIFIC GRAVITY

SAMPLE NO. U45RB 3585 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-17-85

DRAWN BY: 7-11-85

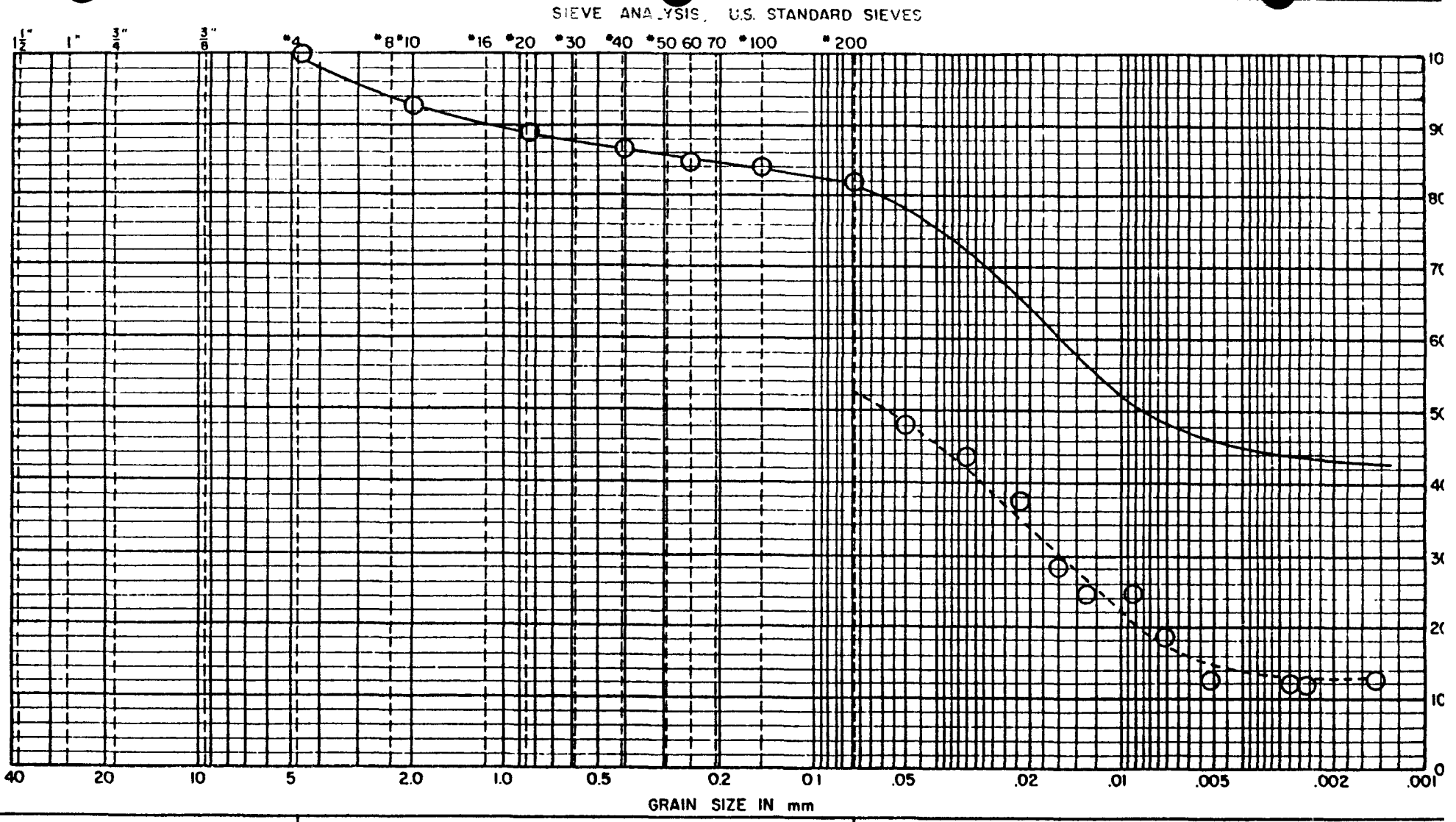
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004683



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 169

TOTAL WET DENSITY (pcf) 69

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, organic Silty CLAY with a little coarse to fine sand and fibrous peat

BURMISTER- Brown Organic Silty CLAY little(+), coarse to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 18

PERCENT SILT (74.0-2.0 μm) 38

PERCENT CLAY (<2.0 μm) 44

SAMPLE NO. U45RB 3586 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-17-85

DRAWN BY: 7-9-85

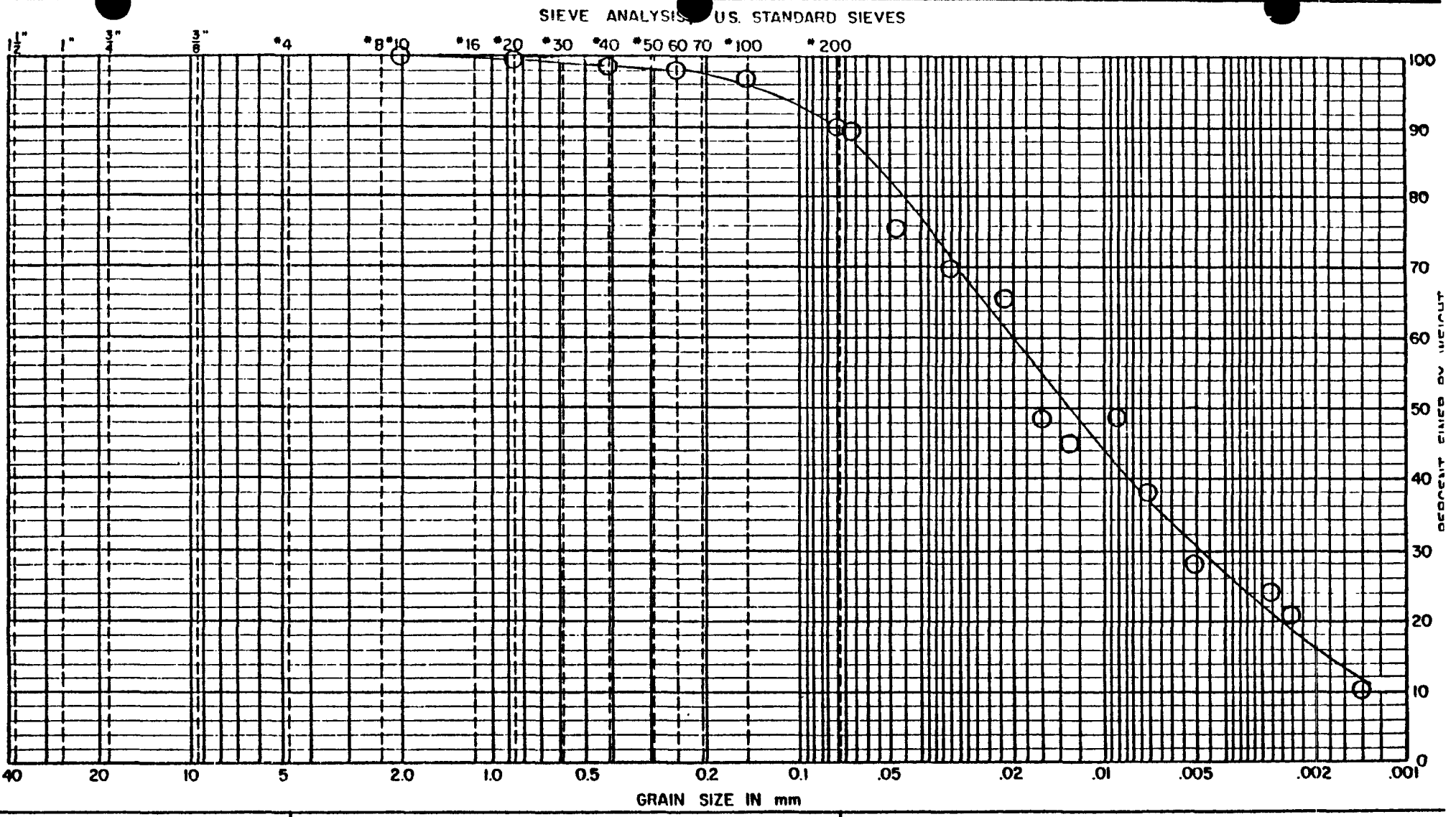
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004684



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 135

TOTAL WET DENSITY (pcf) 89

SPECIFIC GRAVITY 2.53

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of cinders, misc. materials

BURMISTER- Black Organic SILT, some(-) Clay. Cinders, misc. materials

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 13

PERCENT SILT (74.0-2.0 µm) 70

PERCENT CLAY (<2.0 µm) 17

SAMPLE NO. U45RD 3592 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-16-85

DRAWN BY: JL 7-11 85

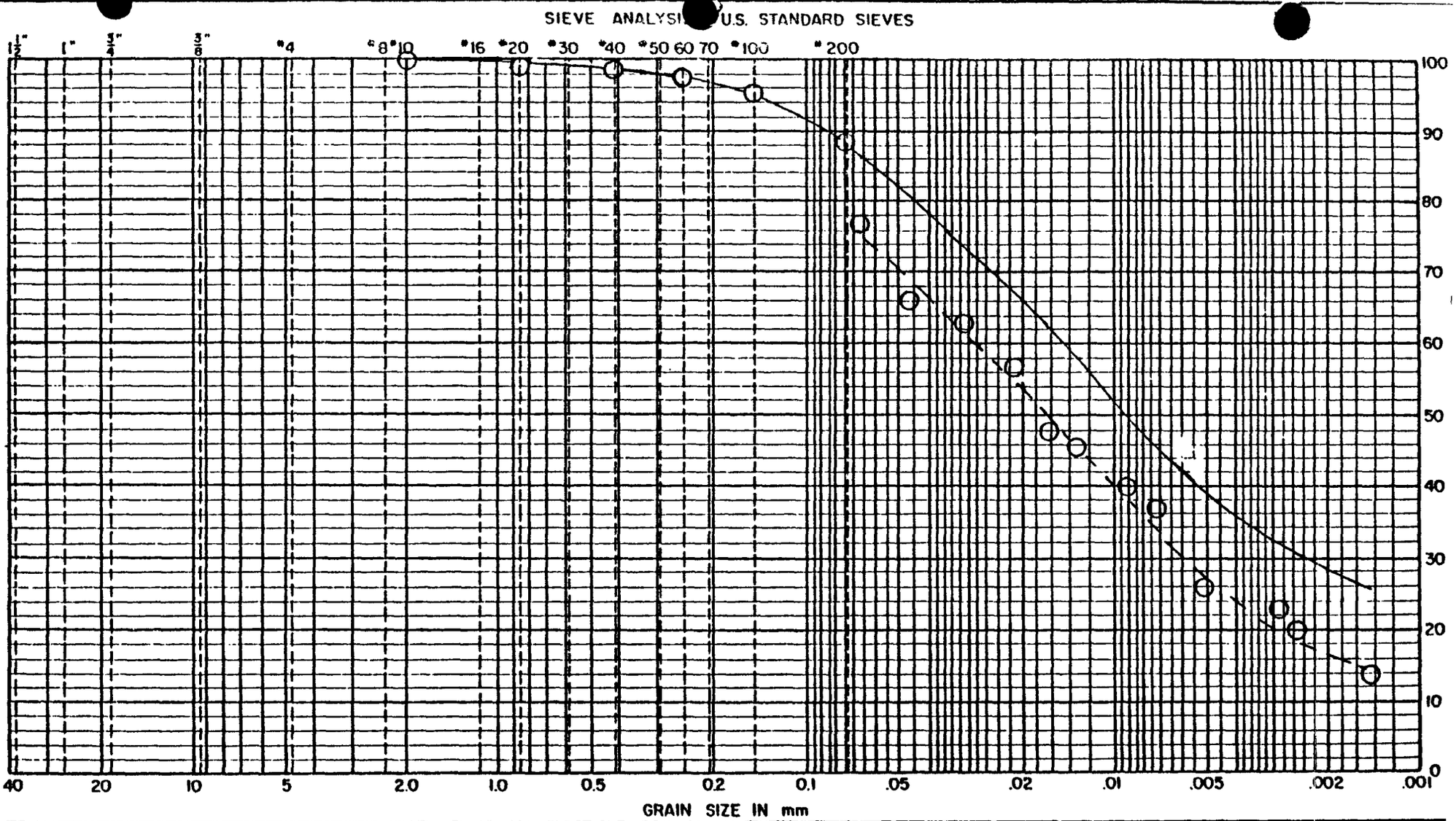
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004685



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic SILT with some clay and a trace of medium to fine grained sand

BURMISTER- Dark gray Organic SILT little, medium to fine Sand, some Clay.

MOISTURE CONTENT (%) 83

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 14

PERCENT SILT (74.0-2.0 µm) 58

PERCENT CLAY (<2.0 µm) 28

SAMPLE NO. U45RD 3593 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-16-85

DRAWN BY: TG 7-11-85

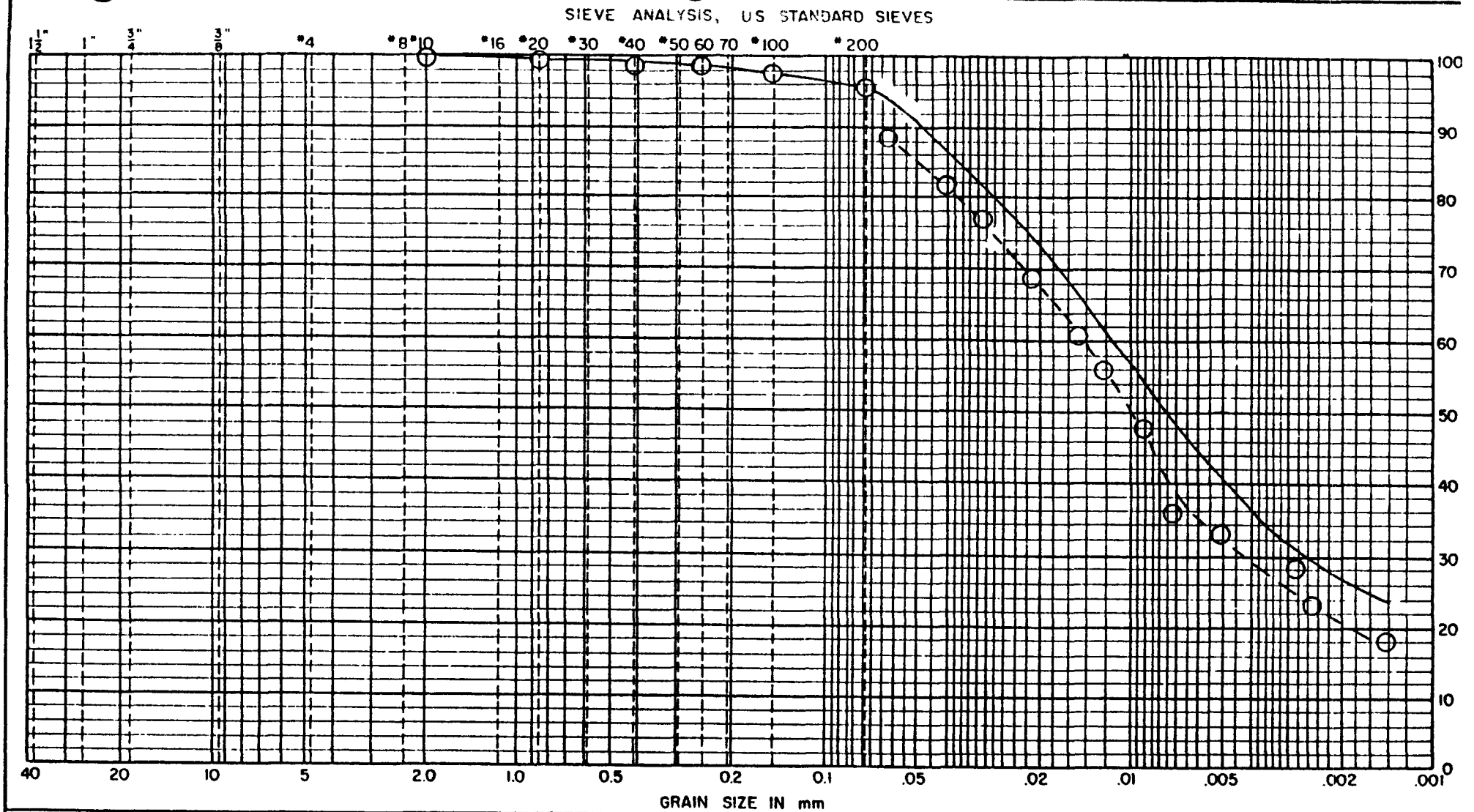
CHECKED BY: SAG 7-12-85

PROJECT N

GRADATION CURVES

FIG. NO.

DEP\DA0004686



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 101

TOTAL WET DENSITY (pcf) _____

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - SILT with some clay and trace of fine grained sand

BURMISTER- SILT trace(-), fine Sand, some(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 27

SAMPLE NO. U45RD 3594 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-16-85

DRAWN BY: [illegible] 7-10-85

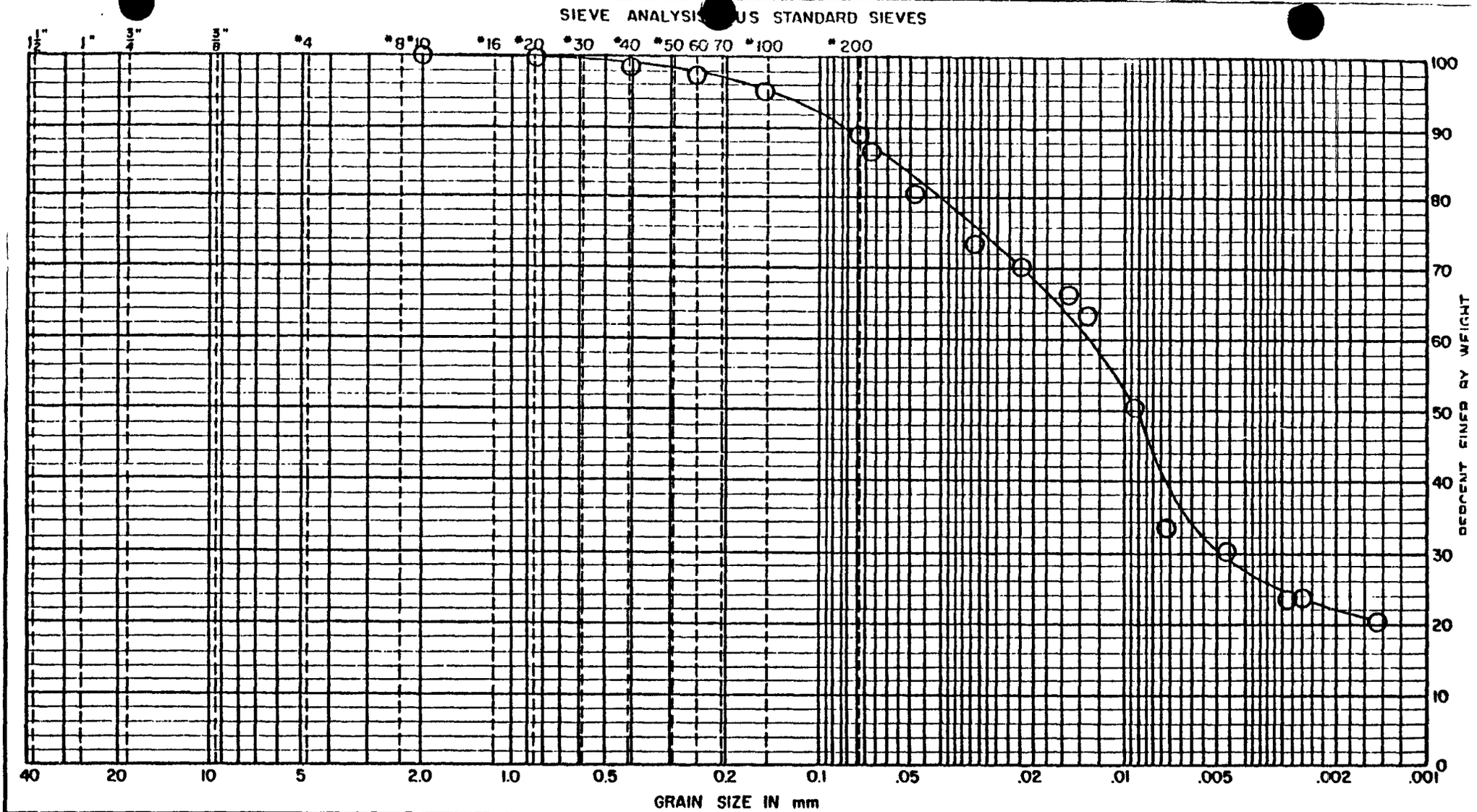
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004687



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of fine grained sand

BURMISTER- Black Organic SILT trace(+), fine Sand, some Clay.

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 13

PERCENT SILT (74.0-2.0 µm) 65

PERCENT CLAY (<2.0 µm) 22

MOISTURE CONTENT (%) 117

TOTAL WET DENSITY (pcf) 82

SPECIFIC GRAVITY

SAMPLE NO. U45RD 3595 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-16-85

DRAWN BY: Chw 7-9-85

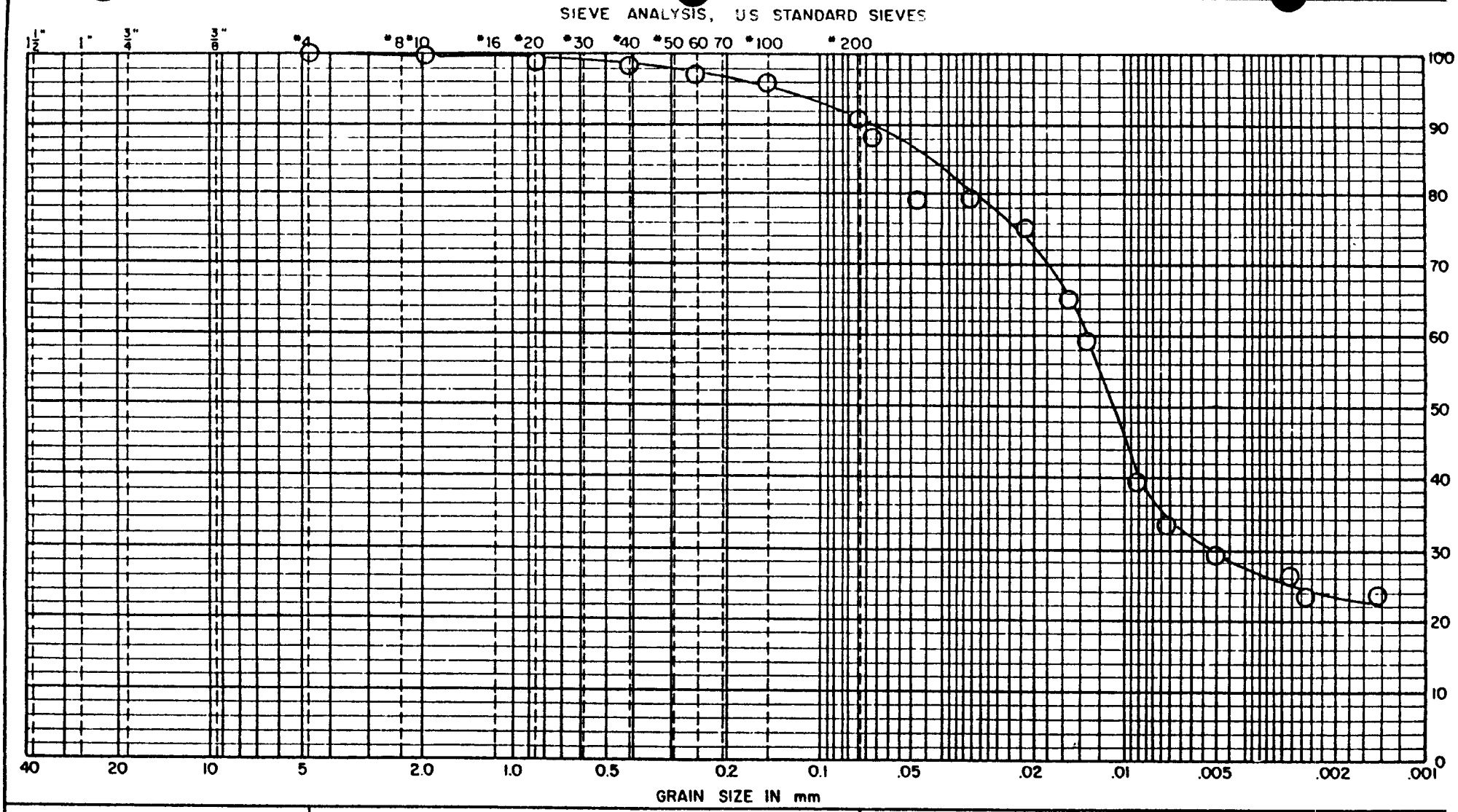
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004688



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 105

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic SILT with some clay and a trace of fine grained sand and plant fibers

BURMISTER- Black Organic SILT little(-), fine Sand, some(-) Clay. Plant fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 11

PERCENT SILT (74.0-2.0 μm) 66

PERCENT CLAY (<2.0 μm) 23

SAMPLE NO. U45RD 3596 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-16-85

DRAWN BY CL 7-11-85

CHECKED BY: SAG 7-12-85

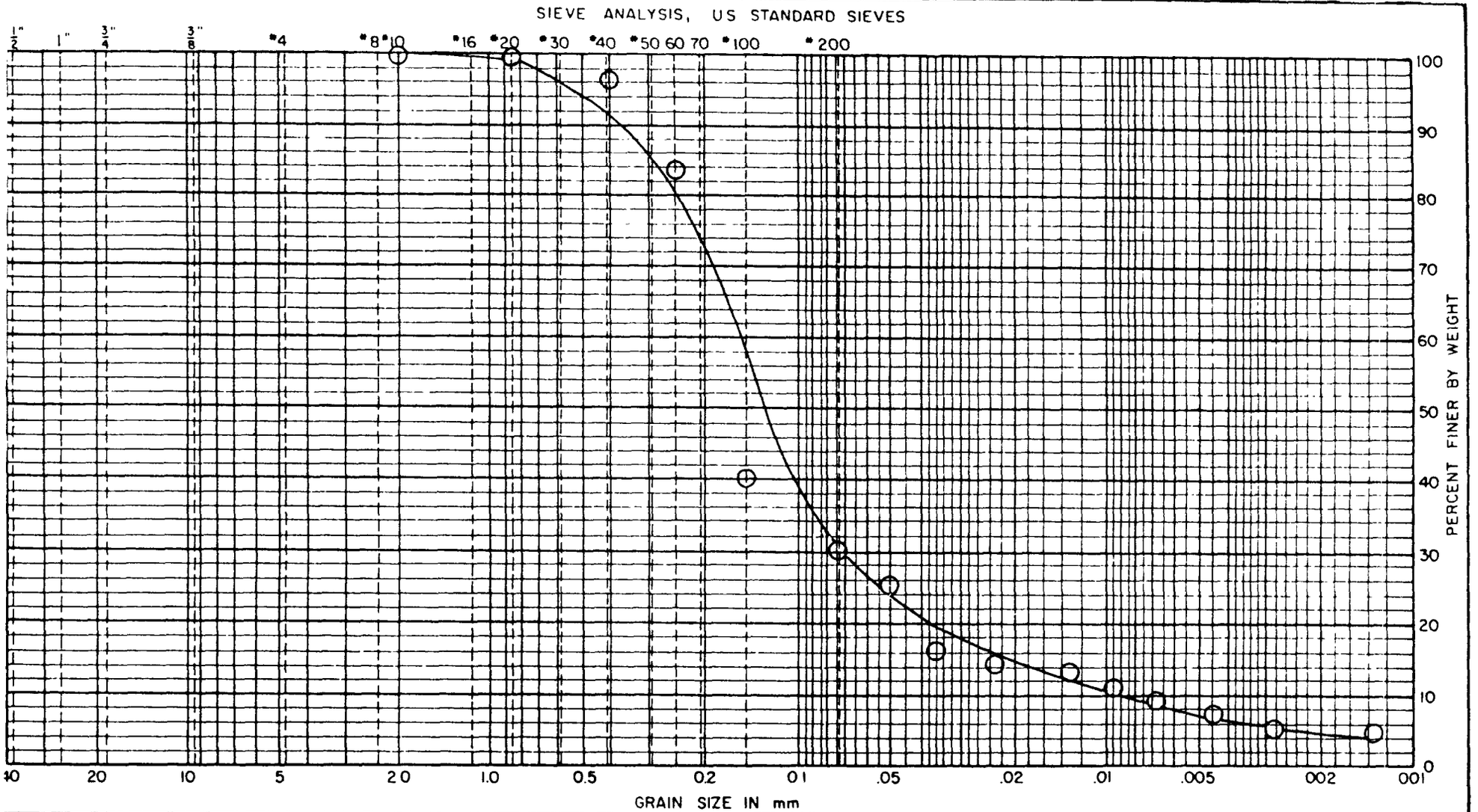
PROJECT No

GRADATION CURVES

FIG NO.

DEP\DA0004689

FAR-UPSTREAM REACH



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown, medium to fine grained SAND with some silt and a trace of clay

BURMISTER- Dark brown medium to fine(+) SAND, some Silt trace Clay

MOISTURE CONTENT (%) 36

TOTAL WET DENSITY (pcf) 116

SPECIFIC GRAVITY 2.63

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 70

PERCENT SILT (74.0-2.0 μm) 26

PERCENT CLAY (<2.0 μm) 4

SAMPLE NO. F01MA 3720 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5/24/85

DRAWN BY SG 7-11-85

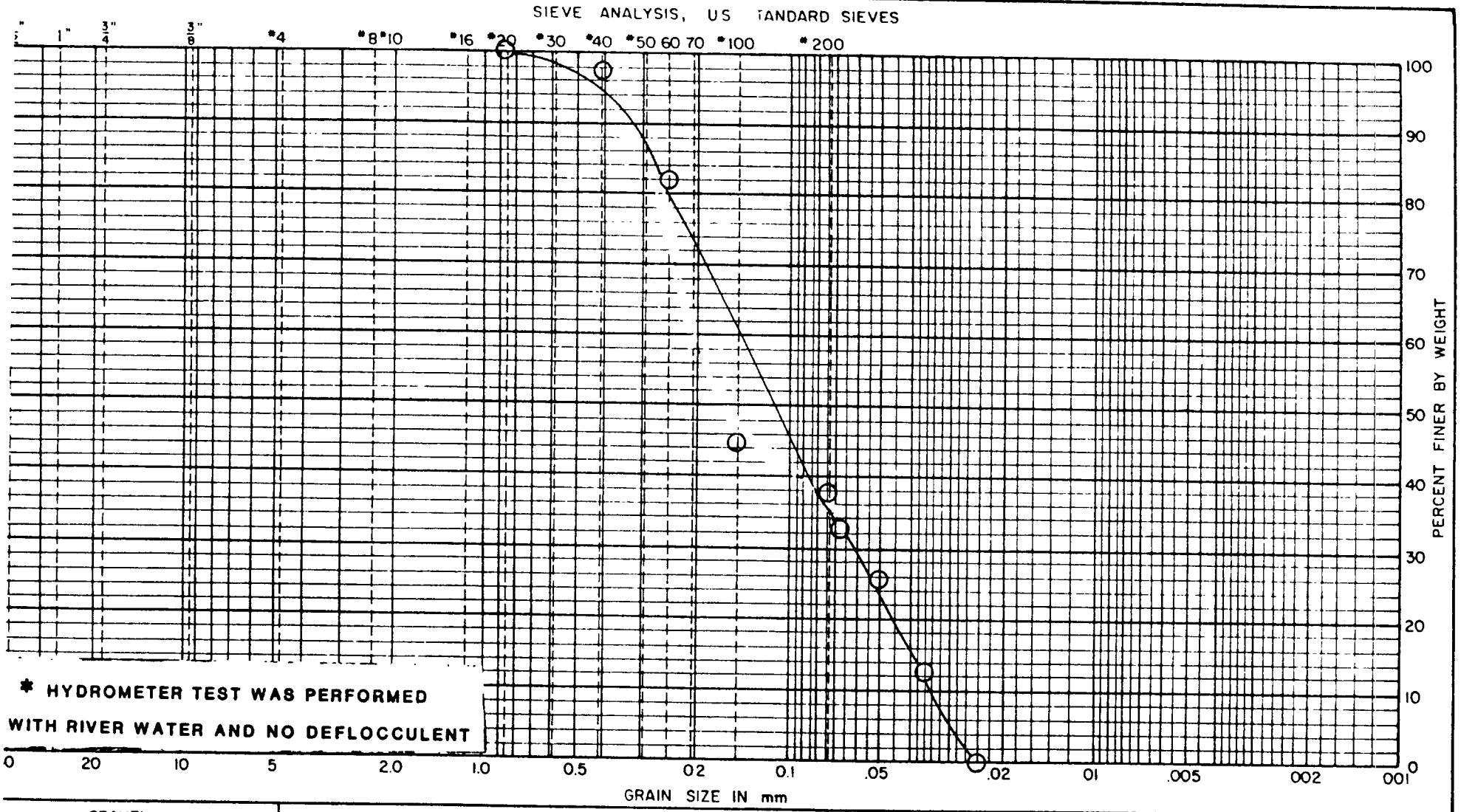
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004691



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 36

TOTAL WET DENSITY (pcf) 116

SPECIFIC GRAVITY 2.63

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown, medium to fine grained SAND and SILT*

BURMISTER- Dark brown medium to fine(+) SAND and (-) Silt*

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 64

PERCENT SILT (74.0-2.0 μm) 36

PERCENT CLAY (<2.0 μm) 0

SAMPLE NO. F01MA 3720 500 MY (River water)

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-24-85

DRAWN BY: FS 7-11-85

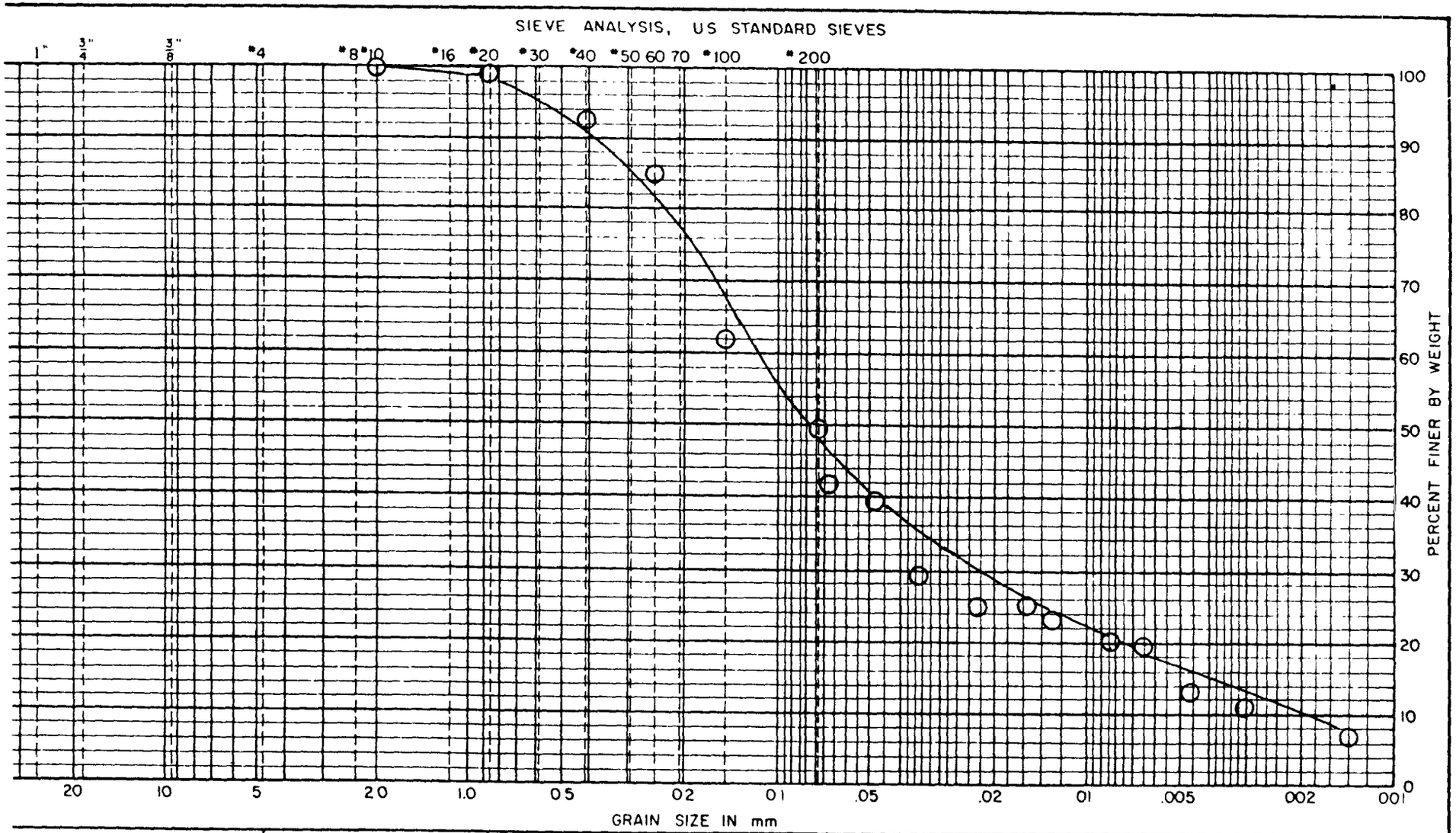
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004692



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark brown, medium to fine SAND and SILT with trace of clay

BURMISTER- Black to dark brown medium to fine(+) SAND and Silt, trace(+) Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm)	50
PERCENT SILT (74.0-2.0 μm)	40
PERCENT CLAY (<2.0 μm)	10

DISTURE CONTENT (%)	69
TAL WET ENSITY (pcf)	94
ECIFIC RAVITY	

SAMPLE NO. F01MA 3721 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-24-85

DRAWN BY: 7-11-85

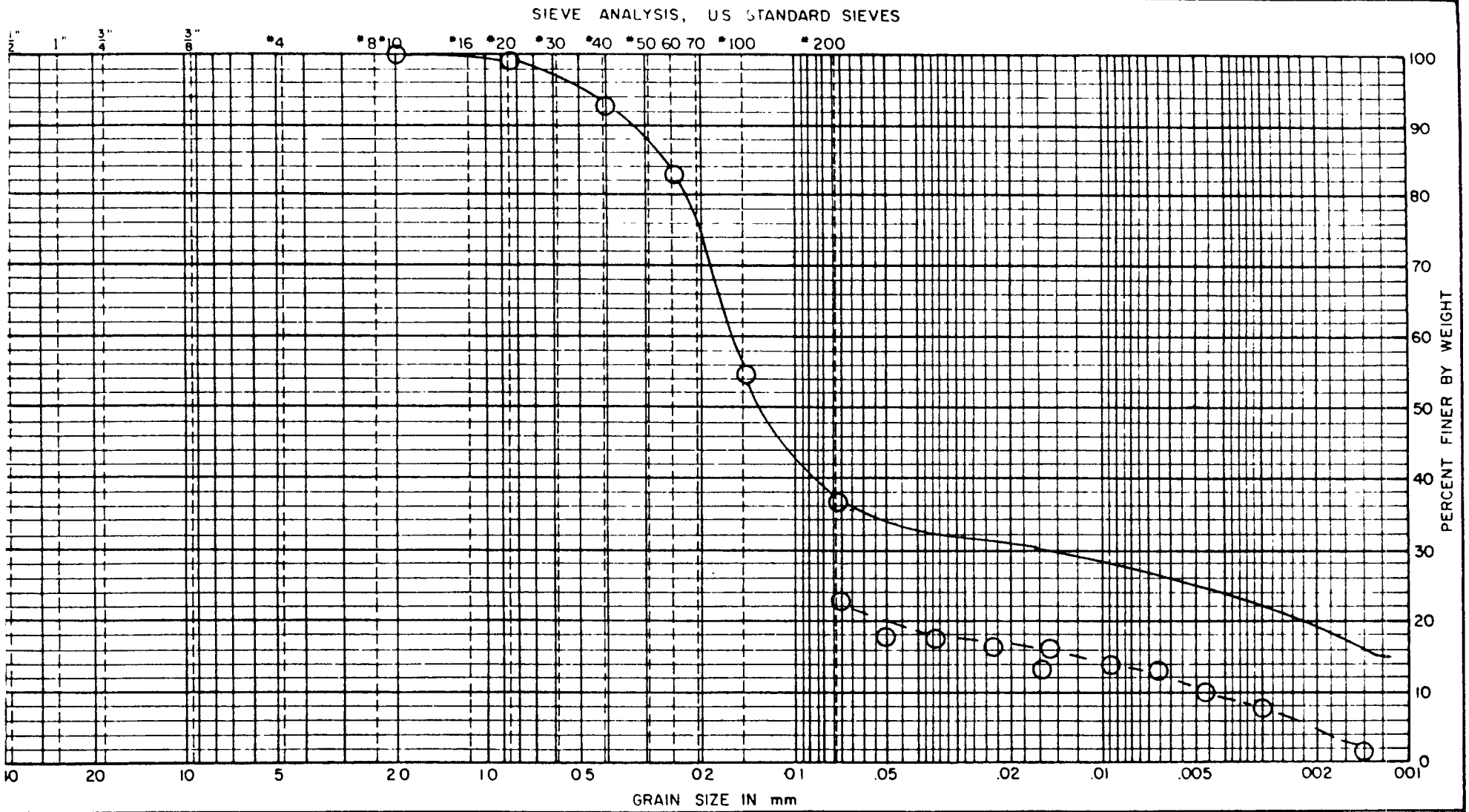
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004693



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 43

TOTAL WET DENSITY (pcf) 98

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark brown, medium to fine grained SAND with organic clay and silt, SM-SC

BURMISTER- Black to dark brown medium to fine(+) SAND and organic Clay and Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 62

PERCENT SILT (74.0-2.0 µm) 18

PERCENT CLAY (<2.0 µm) 20

SAMPLE NO. F01MA 3722 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-24-85

DRAWN BY: 7-11-85

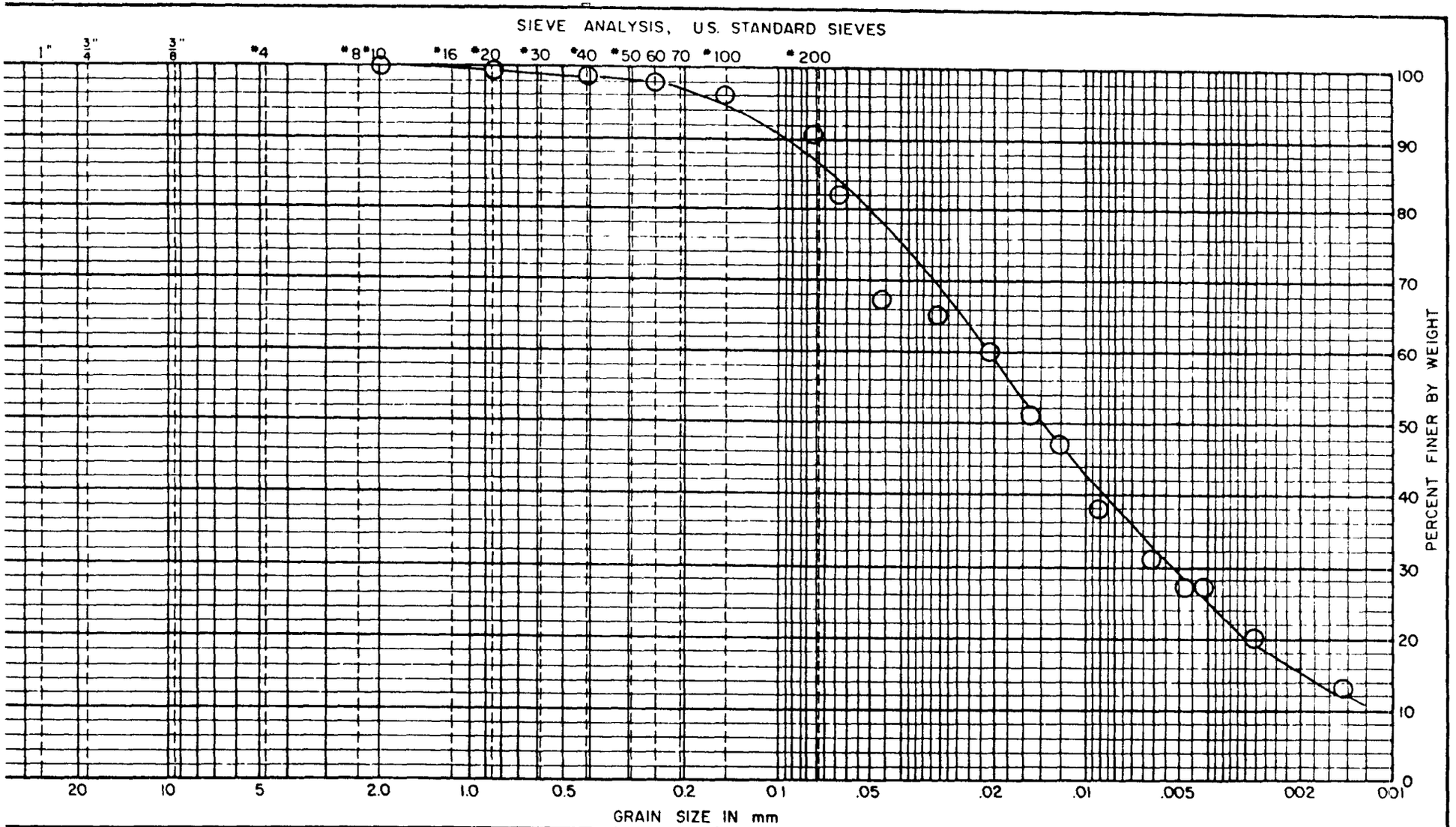
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004694



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Clayey SILT with a little medium to fine grained sand and trace of plant fibers

BURMISTER- Dark gray Organic Clayey SILT little, medium to fine Sand, trace plant fibers

MOISTURE CONTENT (%) 111

TOTAL WET DENSITY (pcf) 84

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 16

PERCENT SILT (74.0-2.0 μm) 70

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. F01MA 3723 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-24-85

DRAWN BY tw 7-11-85

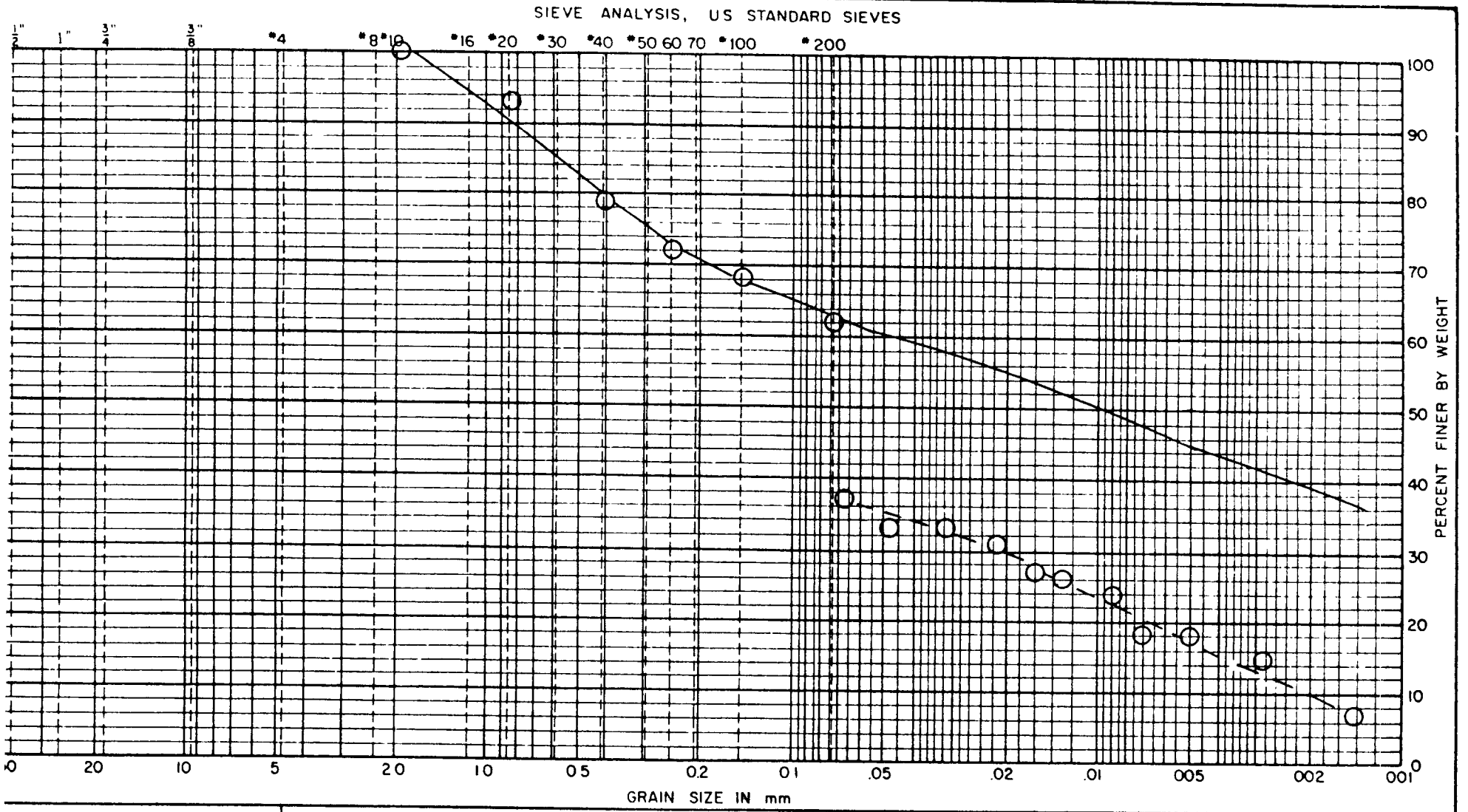
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004695



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 71

TOTAL WET DENSITY (pcf) 86

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT and medium to fine sand

BURMISTER- Black Organic CLAY and SILT and medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 37

PERCENT SILT (74.0-2.0 μm) 25

PERCENT CLAY (<2.0 μm) 38

SAMPLE NO. F01MA 3724 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-24-85

DRAWN BY: [illegible] 7-10-85

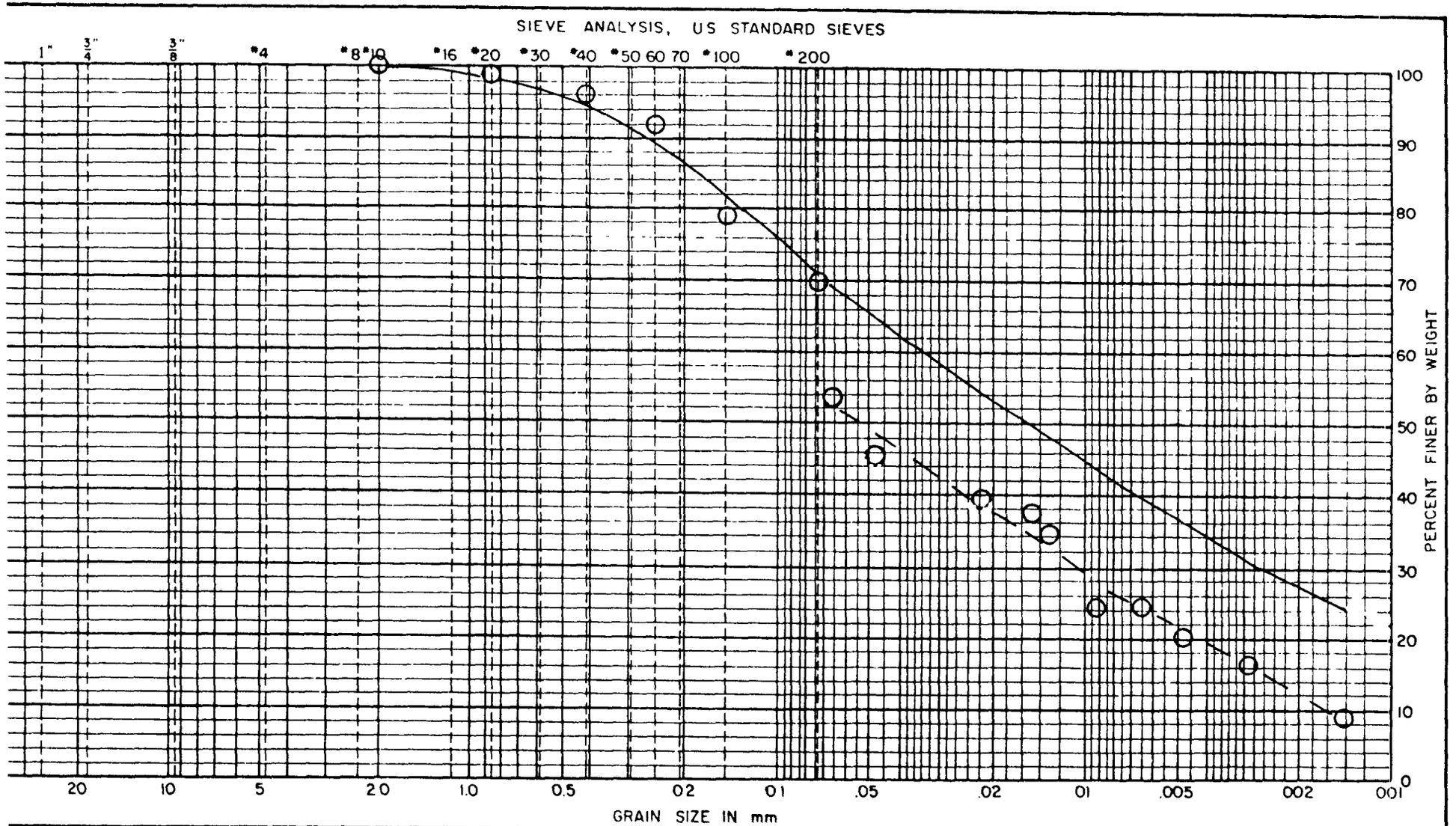
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004696



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, organic CLAY and SILT with some medium to fine sand

BURMISTER- Black Organic CLAY and SILT some, medium to fine(+) Sand

MOISTURE CONTENT (%) 86

TOTAL WET DENSITY (pcf) 100

SPECIFIC GRAVITY 2.24

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 29

PERCENT SILT (74.0-2.0 µm) 43

PERCENT CLAY (<2.0 µm) 28

SAMPLE NO. F01RA 3725 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-24-85

DRAWN BY: [illegible] 7-11-85

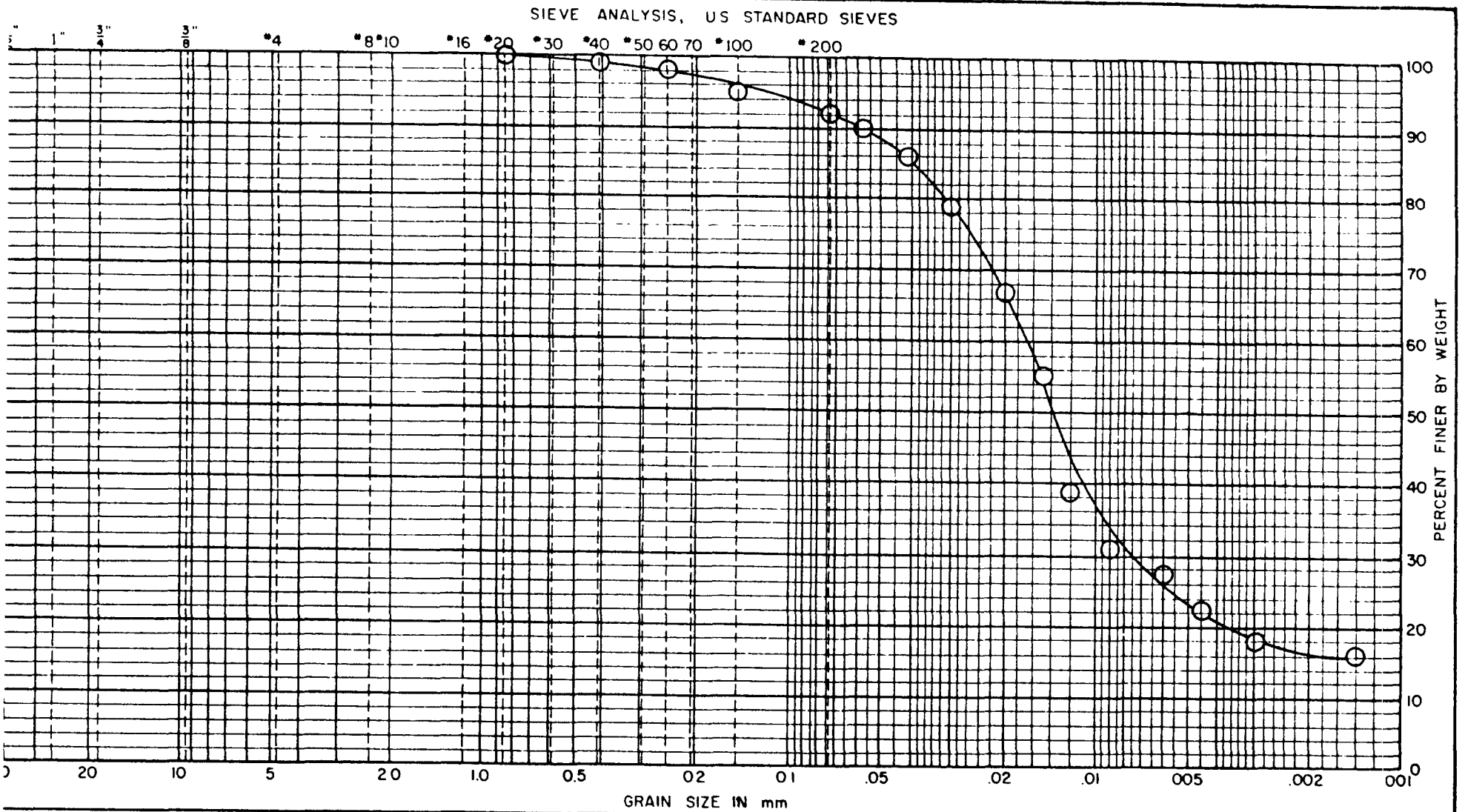
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004697



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 110

TOTAL WET DENSITY (pcf) 80

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark brown, Clayey SILT with trace of fine sand and fibers, OL

BURMISTER- Black and dark brown Organic SILT little Clay, trace(+), fine Sand, fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 8

PERCENT SILT (74.0-2.0 μm) 76

PERCENT CLAY (<2.0 μm) 16

SAMPLE NO. F01RA 3726 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-24-85

DRAWN BY: [illegible] 7-10-85

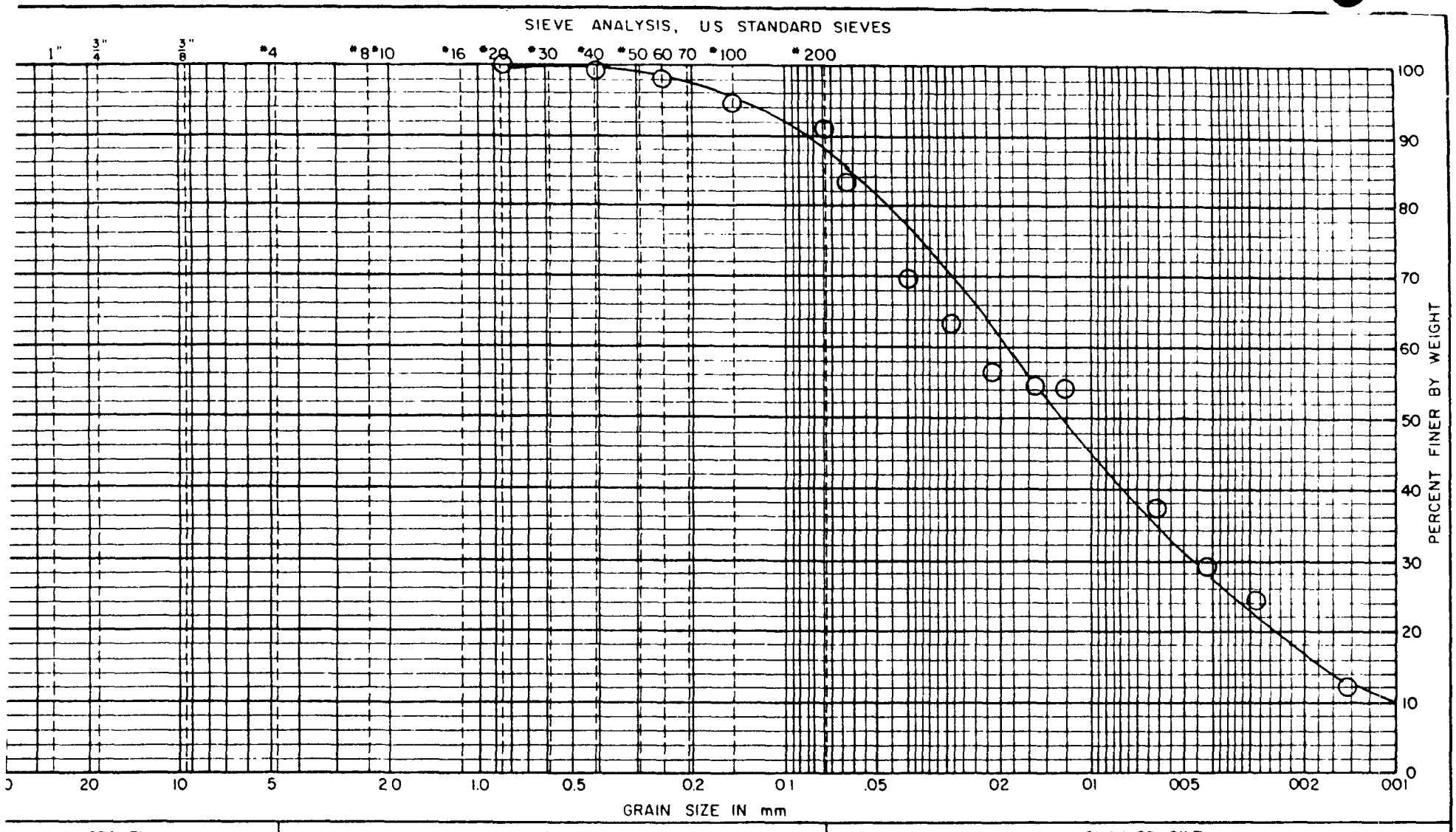
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004698



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 86

TOTAL WET DENSITY (pcf) 92

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown to brown, organic Clayey SILT with medium to fine grained sand and trace of shells

BURMISTER-Dark Brown to brown Organic Clayey SILT little, medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 15

PERCENT SILT (74.0-2.0 µm) 67

PERCENT CLAY (<2.0 µm) 18

SAMPLE NO. F01RA 3727 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-24-85

DRAWN BY tw 7-9-85

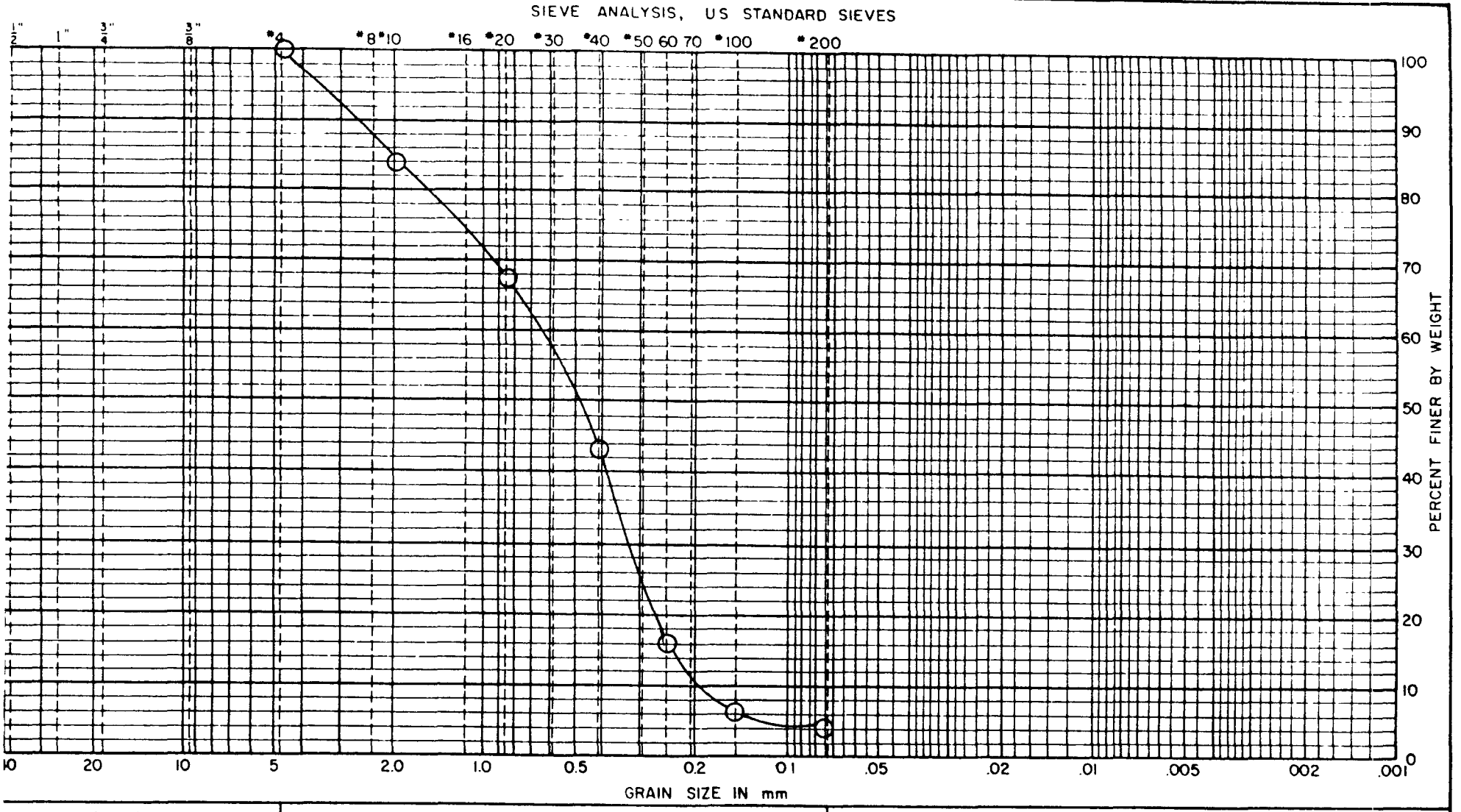
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004699



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown, coarse to fine grained SAND with a trace of silt, SP

BURMISTER- Grayish brown coarse to fine SAND trace(-) Silt

MOISTURE CONTENT (%) 13

TOTAL WET DENSITY (pcf) 130

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 96

PERCENT SILT (74.0-2.0 μm) 4

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F01RA 3728 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-24-85

DRAWN BY: 7-10-85

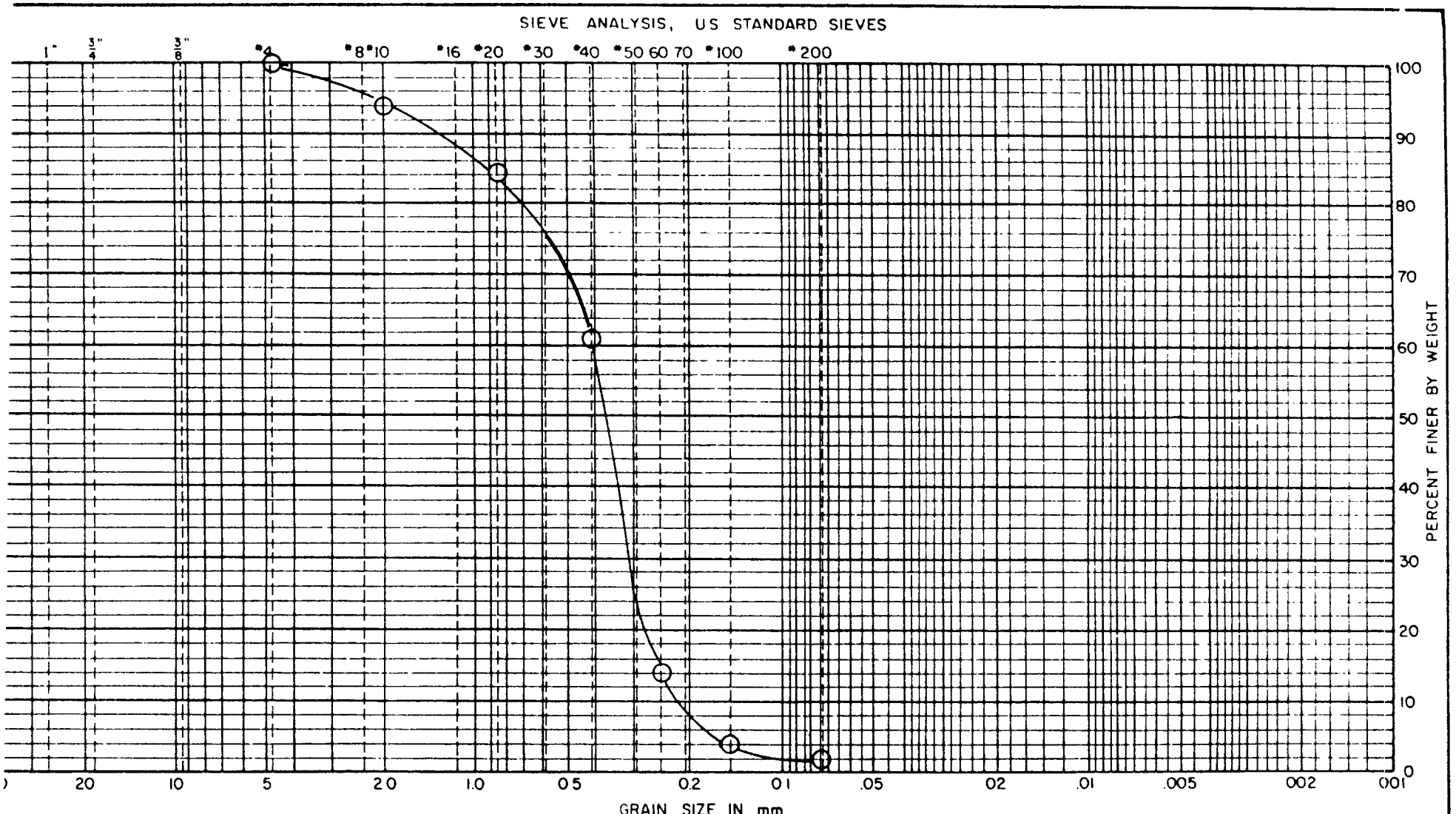
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004700



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, coarse to fine grained SAND with a trace of silt, SP

BURMISTER-Dark gray coarse to fine SAND trace(-), Silt

MOISTURE CONTENT (%) 15

TOTAL WET DENSITY (pcf) 126

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 98

PERCENT SILT (74.0-2.0 μm) 2

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F01RA 3729 204 MY

SAMPLE DEPTH, ft. 8-10.1

SAMPLING DATE 5-24-85

DRAWN BY 7-10-85

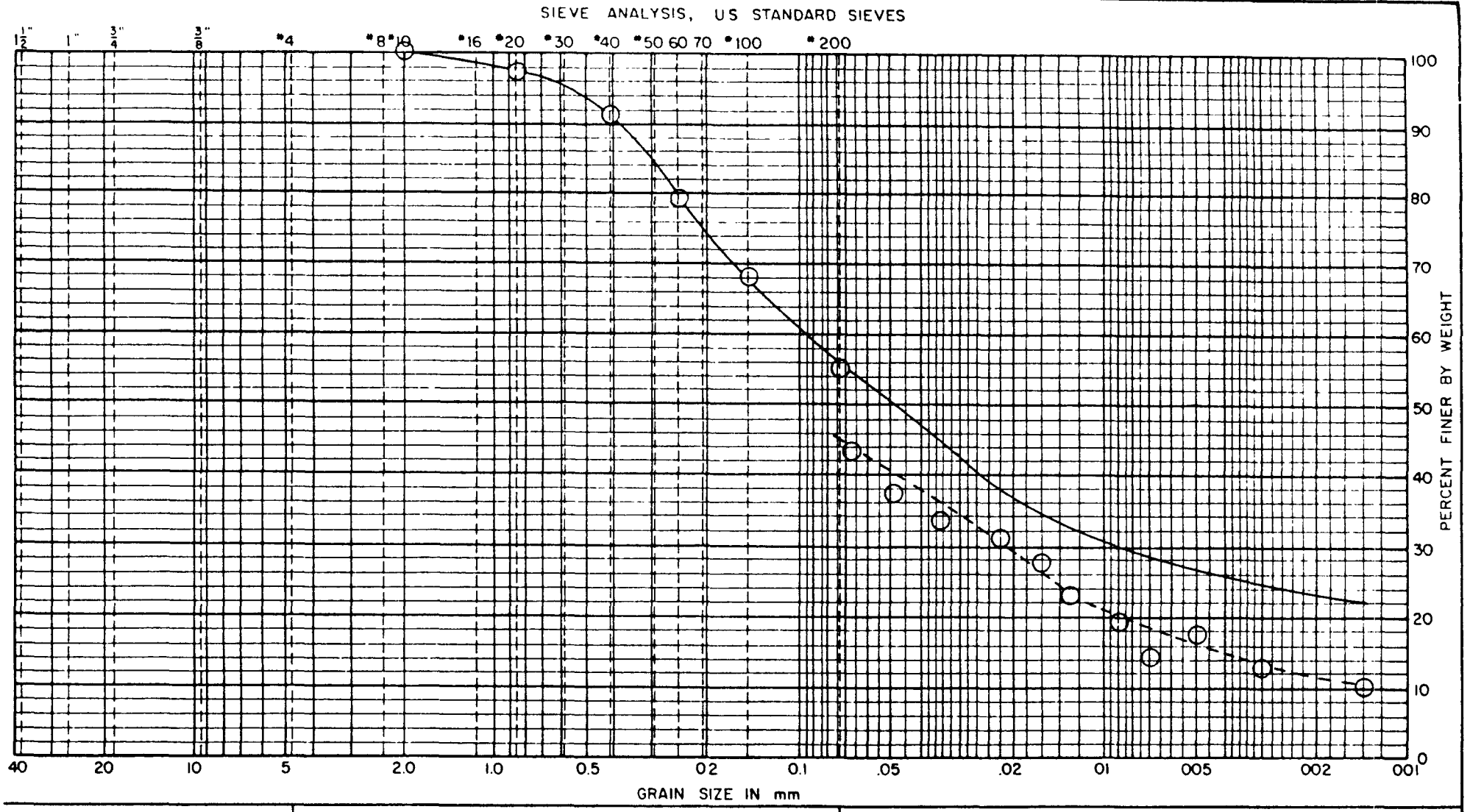
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004701



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, medium to fine grained SAND with some organic silt and clay, SM-SC

BURMISTER- Black medium to fine SAND some(+), organic Silt some(-) Clay, little vegetative leaves and fibers

MOISTURE CONTENT (%) 124

TOTAL WET DENSITY (pcf) 81

SPECIFIC GRAVITY 2.44

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 45

PERCENT SILT (74.0-2.0 µm) 33

PERCENT CLAY (<2.0 µm) 22

SAMPLE NO. F02MA 3735 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-24-85

DRAWN BY: 7-10-85

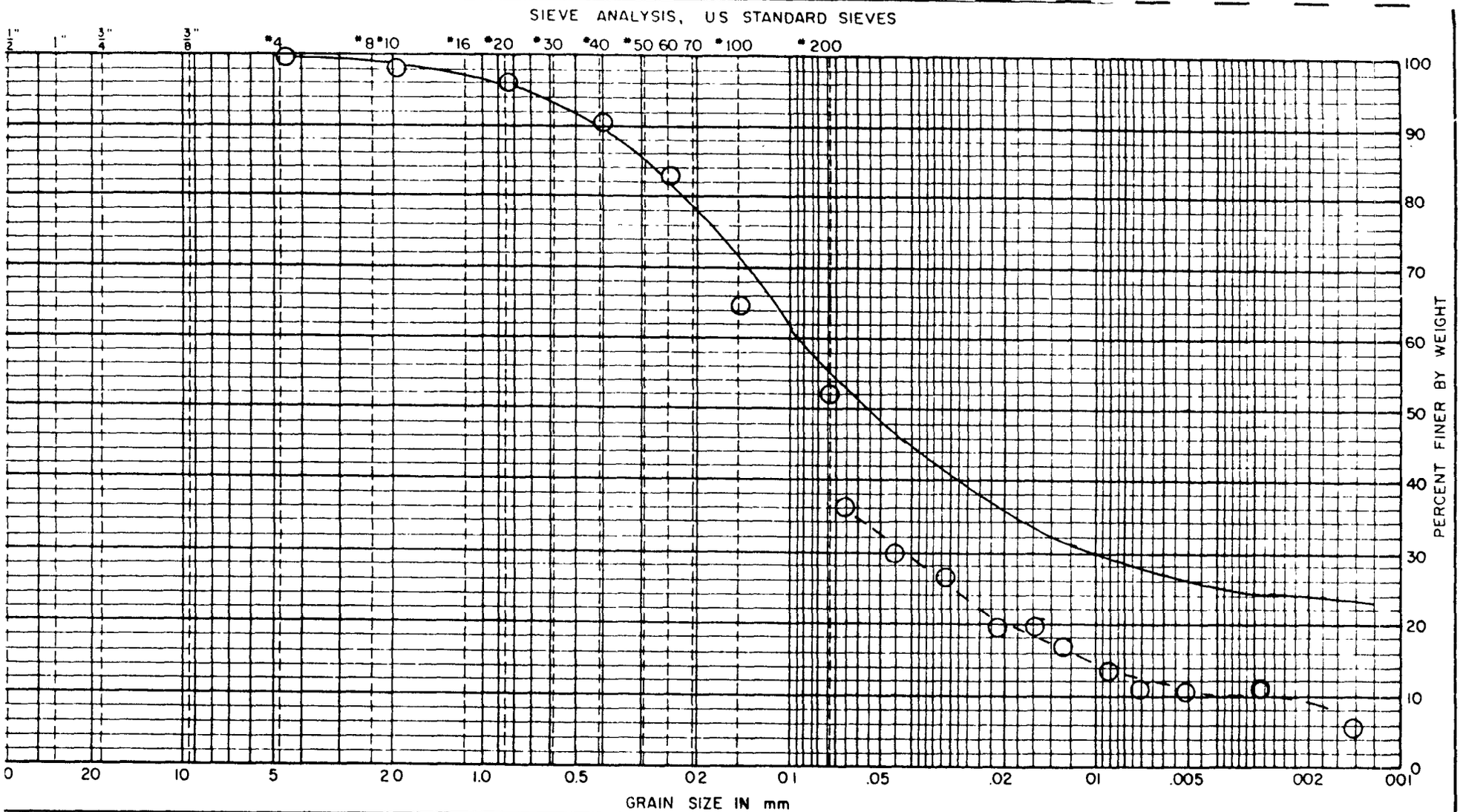
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004702



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black, medium to fine grained SAND with silt and clay, SM-SC

BURMISTER- Black, medium to fine SAND, and Clay and Silt

MOISTURE CONTENT (%) 47

TOTAL WET DENSITY (pcf) 113

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 52

PERCENT SILT (74.0-2.0 μm) 23

PERCENT CLAY (<2.0 μm) 25

SAMPLE NO. F02MA 3736 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-24-85

DRAWN BY tew 7-9-85

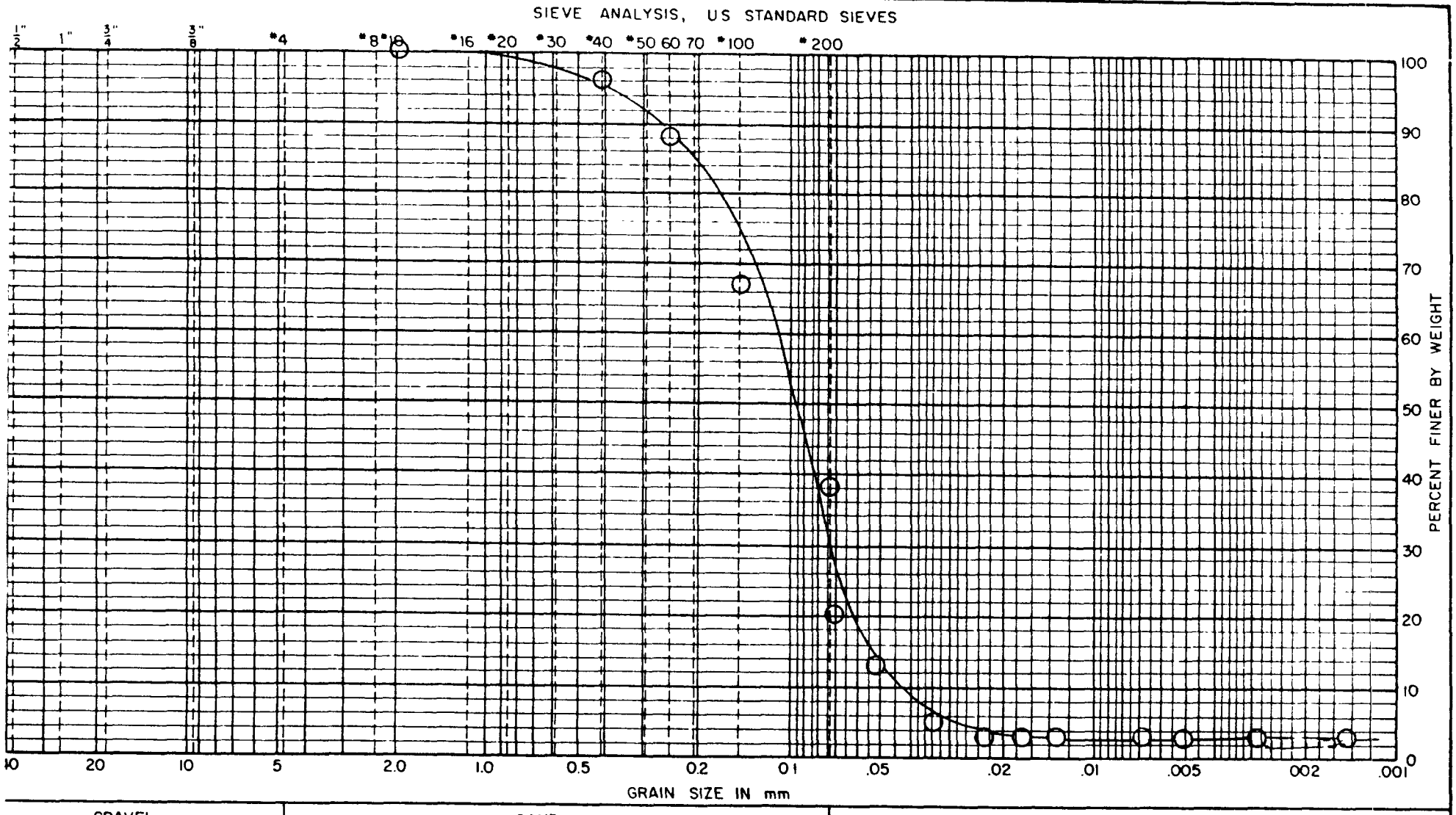
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004703



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, medium to fine grained SAND with some silt SM

BURMISTER- Brown medium to fine(+) SAND some, Silt

MOISTURE CONTENT (%) 19

TOTAL WET DENSITY (pcf) 129

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 68

PERCENT SILT (74.0-2.0 μm) 29

PERCENT CLAY (<2.0 μm) 3

SAMPLE NO. F02MA 3737 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-24-85

DRAWN BY: SG 7-11-85

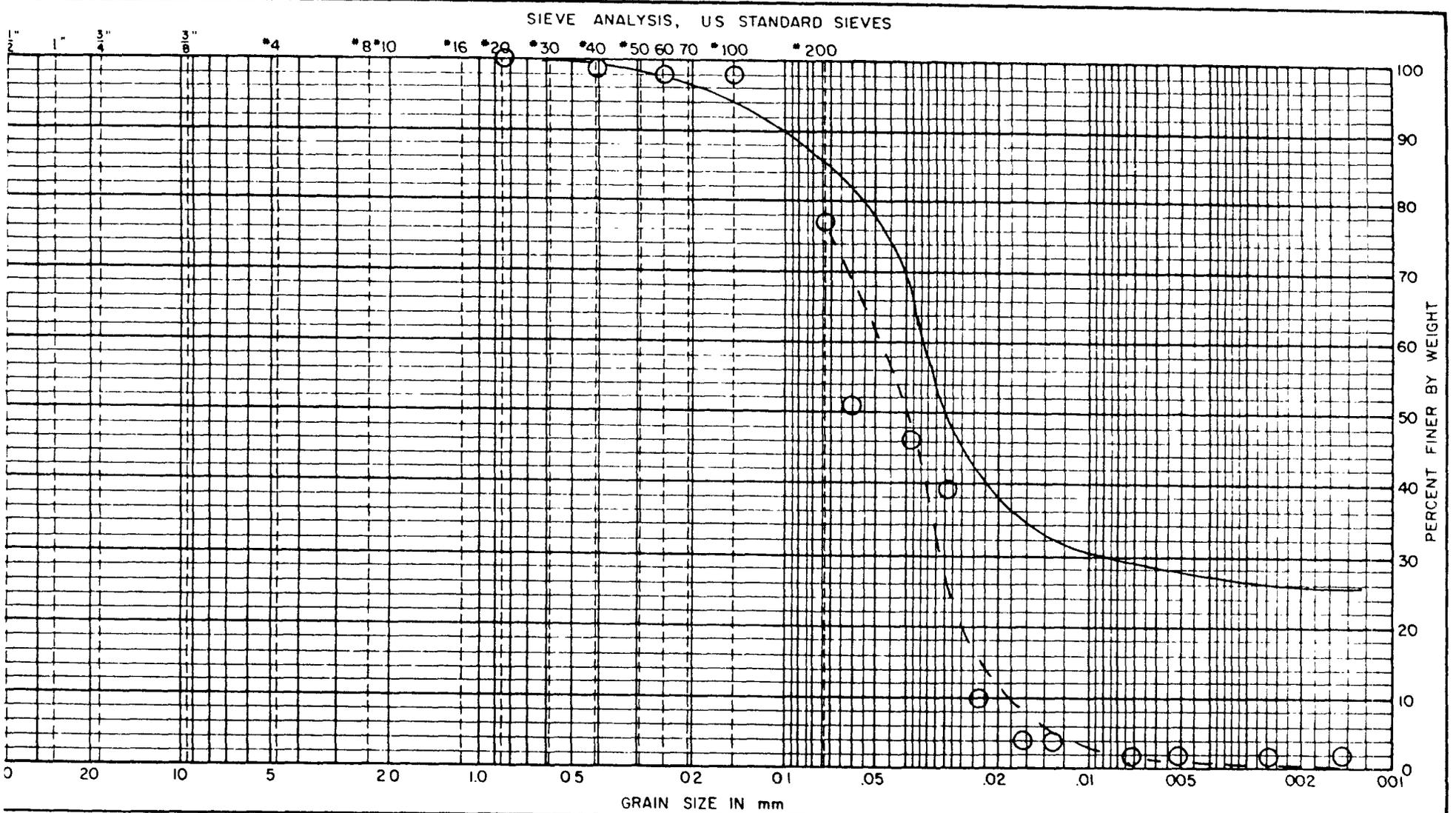
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004704



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 20

TOTAL WET DENSITY (pcf) 130

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown SILT with a little fine sand, ML

BURMISTER- Brown SILT little, fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 14

PERCENT SILT (74.0-2.0 μm) 60

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. F02MA 3738 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-24-85

DRAWN BY tcw 7-10-85

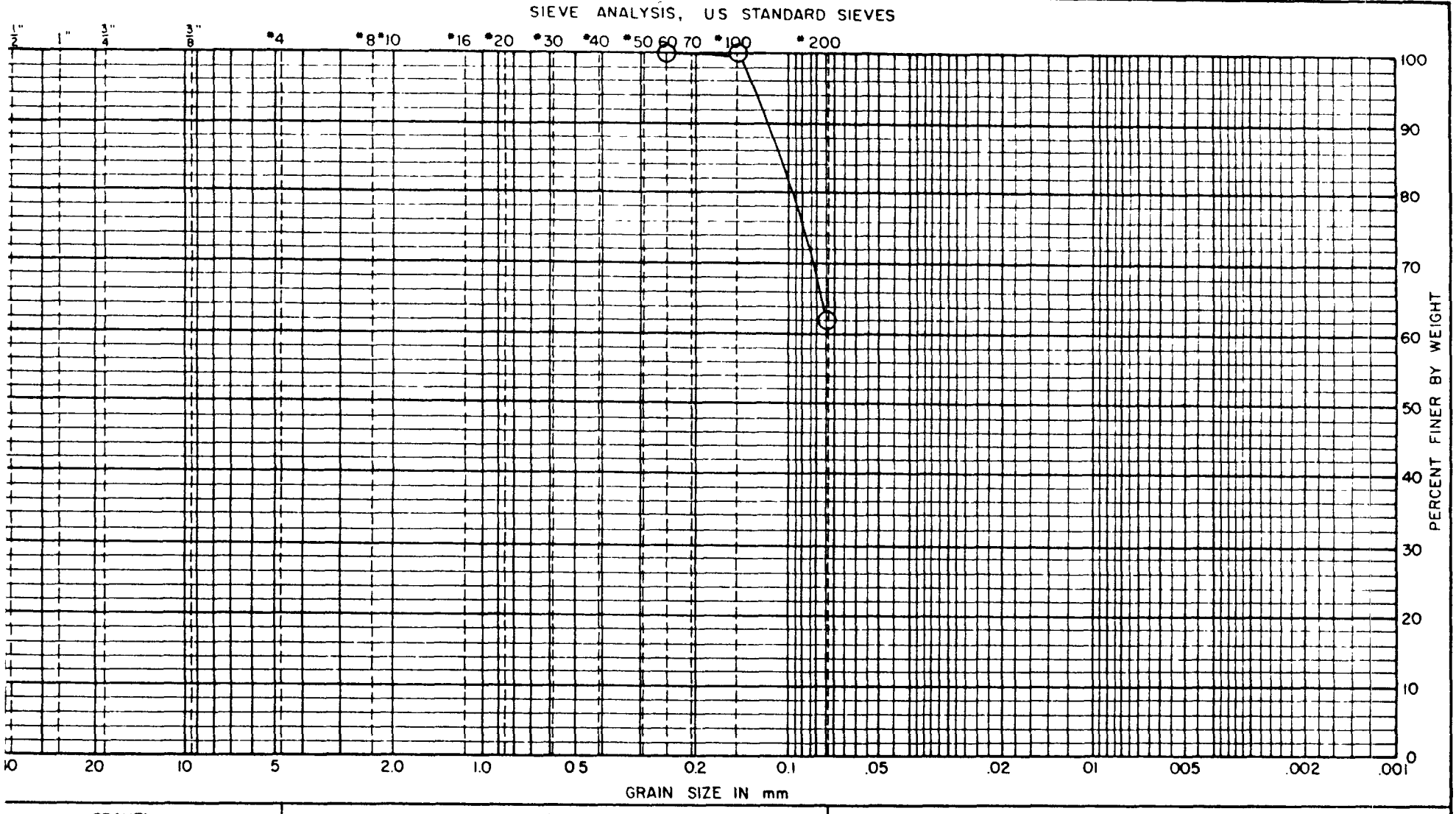
CHECKED BY SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004705



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown SILT with fine sand

BURMISTER- Brown SILT and fine Sand

MOISTURE CONTENT (%) 20

TOTAL WET DENSITY (pcf) 130

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 38

PERCENT SILT (74.0-2.0 μm) } 62

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F02MA 3739 504 MA

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-24-85

DRAWN BY: 7-10-85

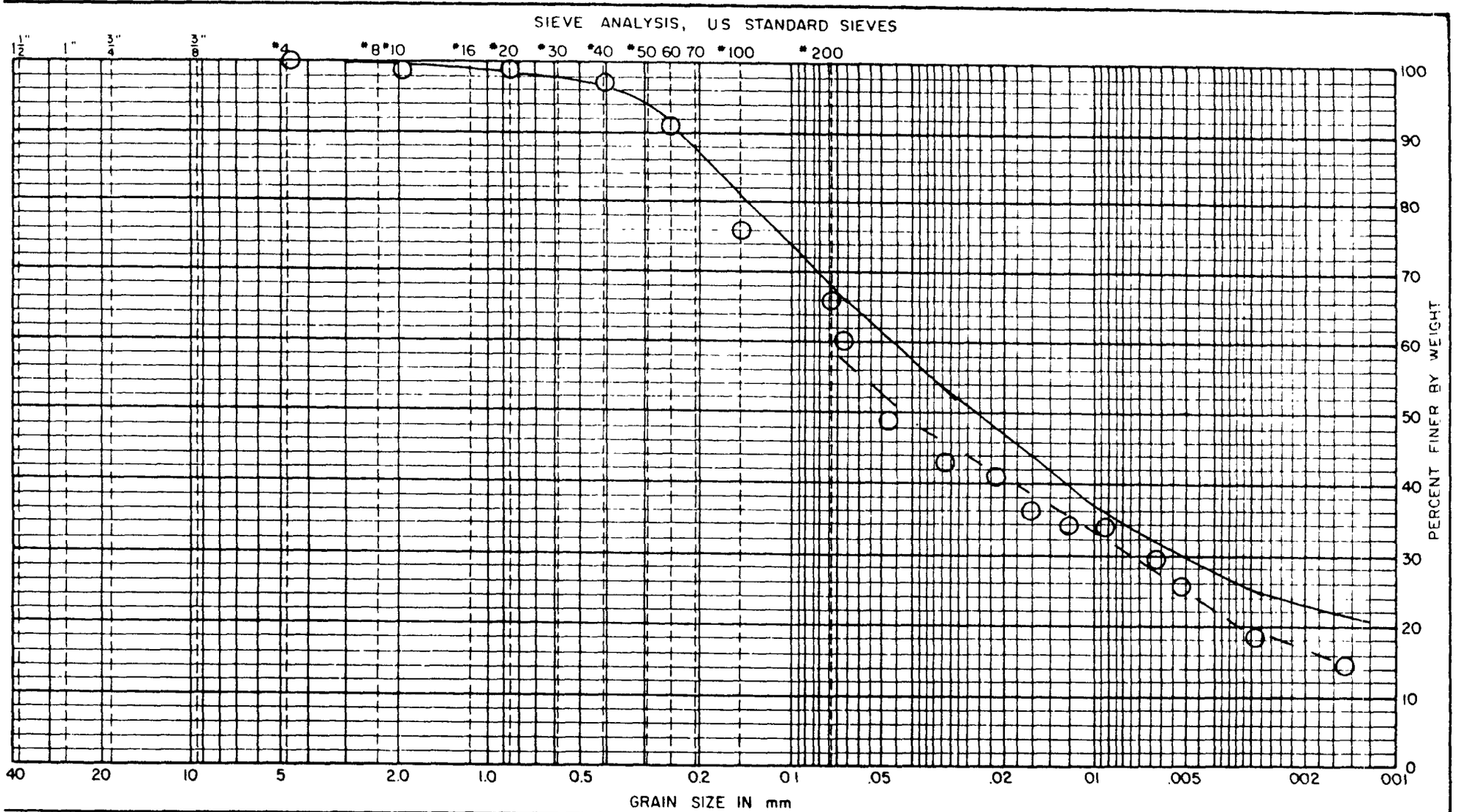
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004706



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, SILT and CLAY with some medium to fine sand ML-CL

BURMISTER- Brown SILT and CLAY some(+), medium to fine(+) Sand

MOISTURE CONTENT (%) 75

TOTAL WET DENSITY (pcf) 98

SPECIFIC GRAVITY 2.42

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 32

PERCENT SILT (74.0-2.0 μm) 44

PERCENT CLAY (<2.0 μm) 24

SAMPLE NO. F02RA 3740 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-24-85

DRAWN BY: tw 7-10-85

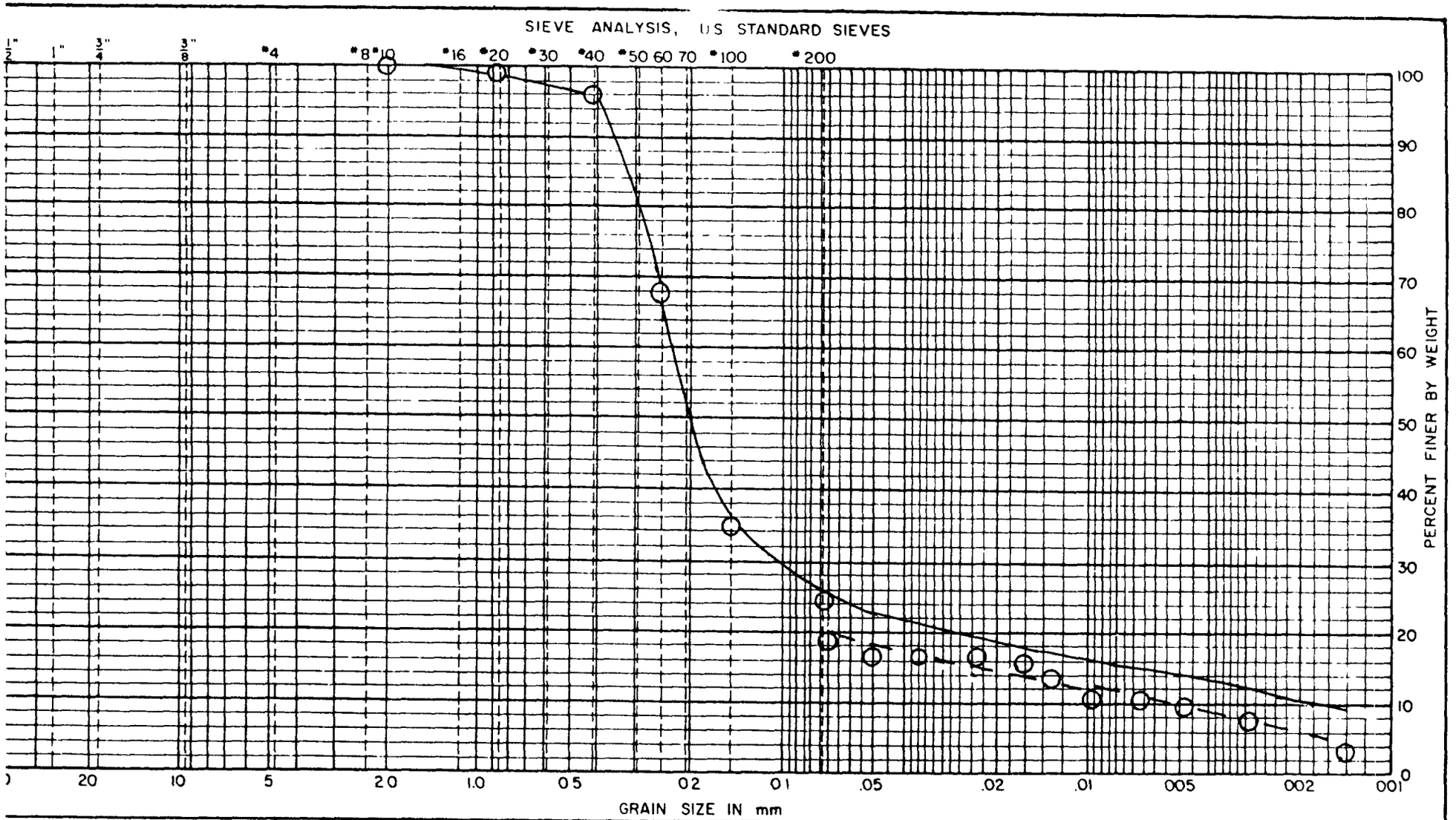
CHECKED BY SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004707



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown, medium to fine grained SAND with some silt and clay, SM-SC

BURMISTER - Dark brown medium to fine(+) SAND, some Silt and Clay

MOISTURE CONTENT (%) 33

TOTAL WET DENSITY (pcf) 117

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 74

PERCENT SILT (74.0-2.0 μm) 15

PERCENT CLAY (<2.0 μm) 11

SAMPLE NO. F02RA 3741 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-24-85

DRAWN BY: GS 7-11-85

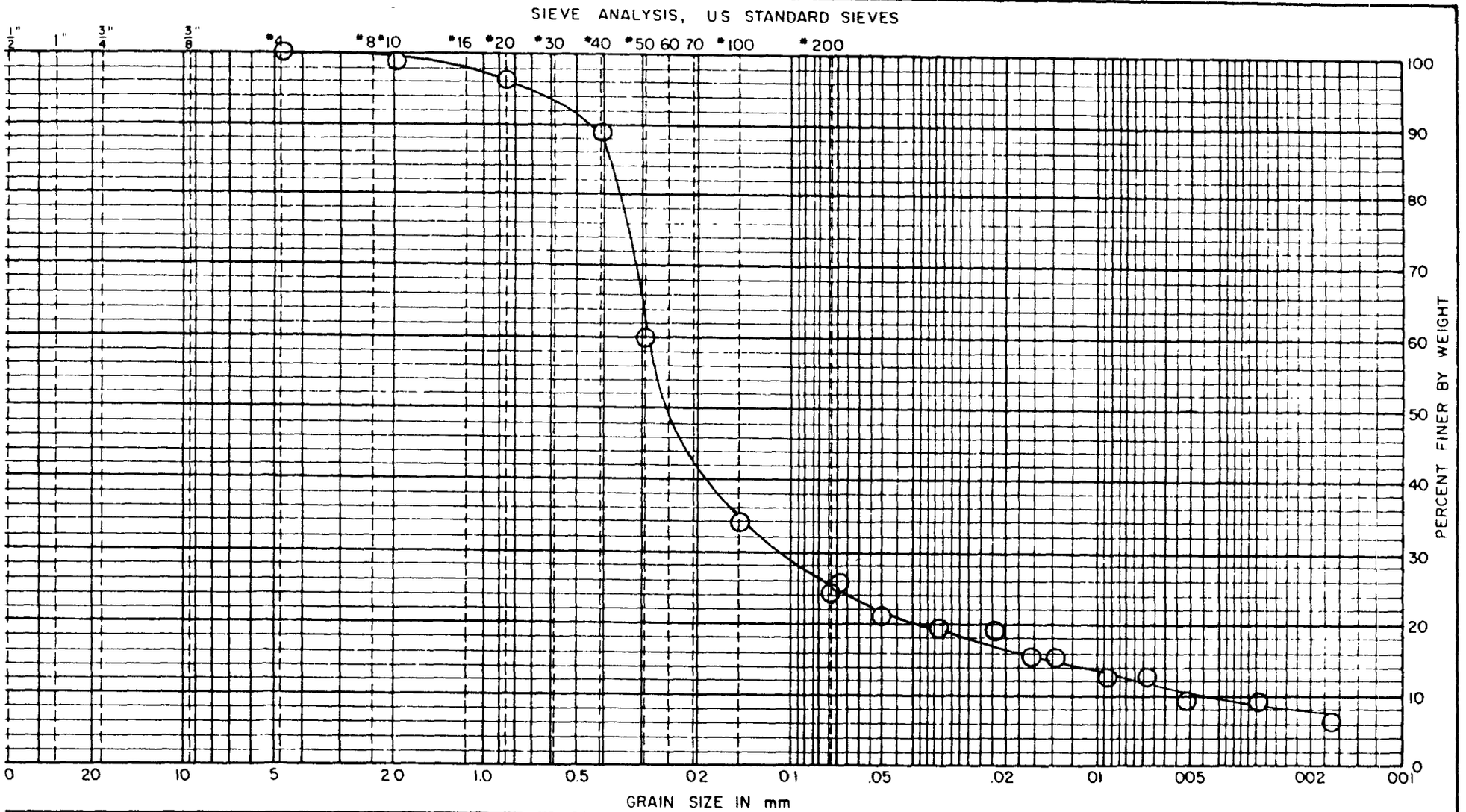
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004708



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown medium to fine SAND with some clayey silt, SM-SC

BURMISTER- Grayish brown medium to fine SAND, some(-) Clayey Silt

MOISTURE CONTENT (%) 34

TOTAL WET DENSITY (pcf) 116

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 74

PERCENT SILT (74.0-2.0 μm) 17

PERCENT CLAY (<2.0 μm) 9

SAMPLE NO. F02RA 3742 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-24-85

DRAWN BY [illegible] 7-10-85

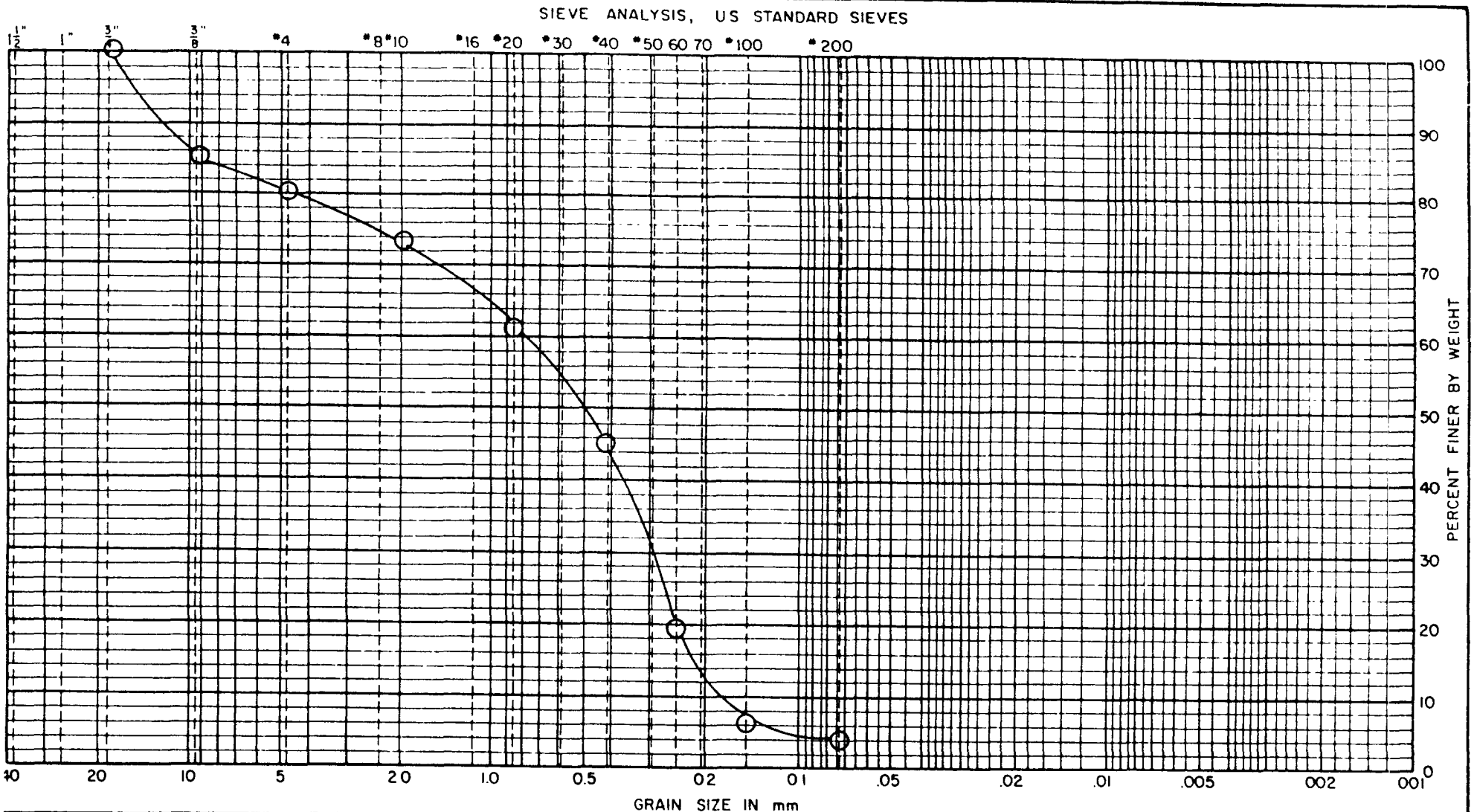
CHECKED BY SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO

DEP\DA0004709



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 19

TOTAL WET DENSITY (pcf) 136

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray brown, coarse to fine grained SAND with a trace of silt and a little gravel, SP

BURMISTER- Gray brown coarse to fine SAND, trace(-) Silt, little(+) Gravel

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 96

PERCENT SILT (74.0-2.0 μm) 4

PERCENT CLAY (<2.0 μm) _____

SAMPLE NO. F02RA 3743 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-24-85

DRAWN BY: Tew 7-10-85

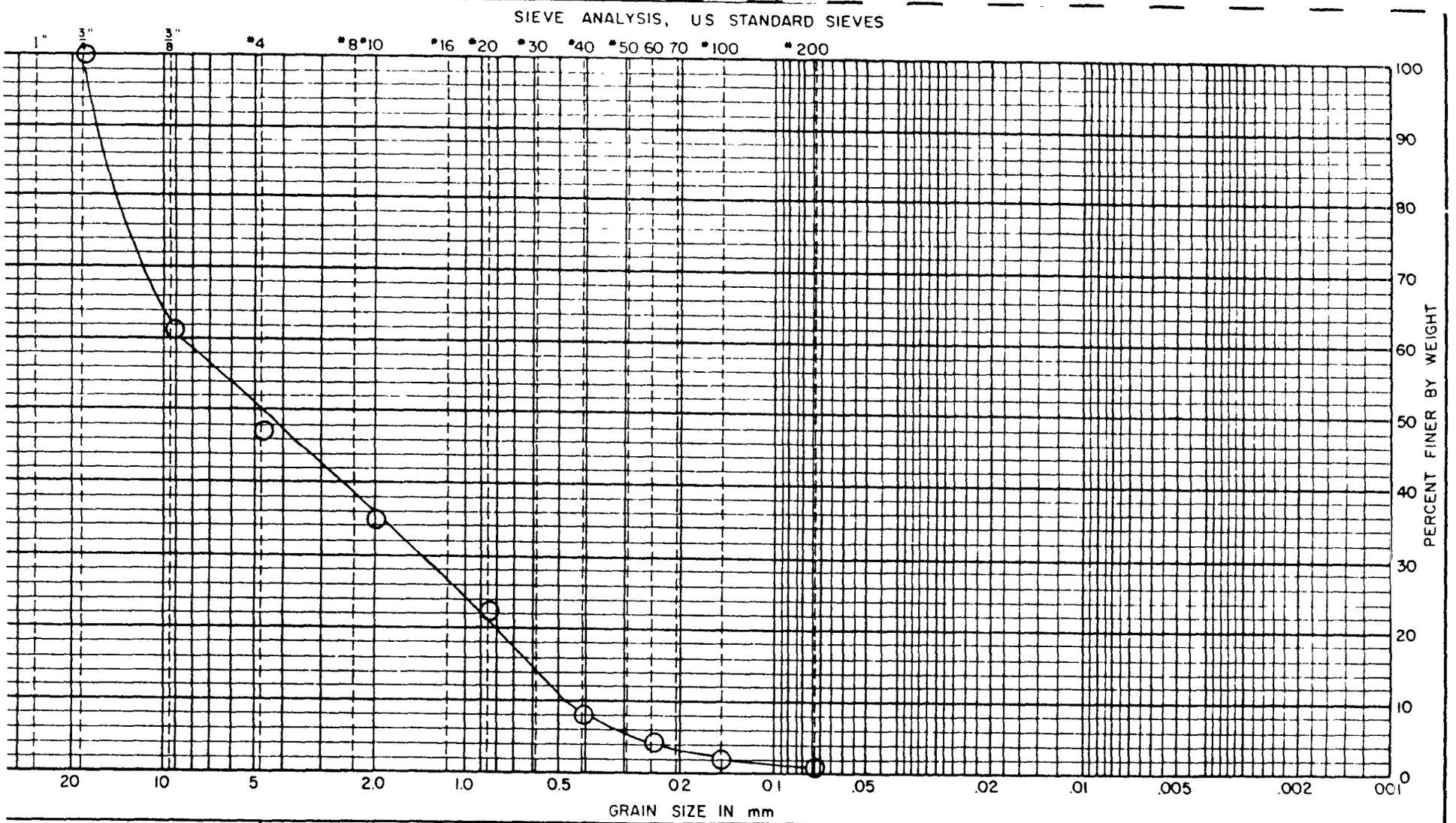
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004710



GRAVEL		SAND			CLAY OR SILT
ARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray brown, fine GRAVEL and coarse to fine SAND and trace of silt

BURMISTER- Gray brown fine GRAVEL and coarse to fine Sand, trace(-) Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 99 (50-Gravel, 49-Sand)

PERCENT SILT (74.0-2.0 μm) 1

PERCENT CLAY (<2.0 μm)

OISTURE CONTENT (%) 18

OTAL WET DENSITY (pcf) 137

ECIFIC RAVITY

SAMPLE NO. F02RA 3744 204 MY

SAMPLE DEPTH, ft. 8-8,8

SAMPLING DATE 5-24-85

DRAWN BY: Lew 7-10-85

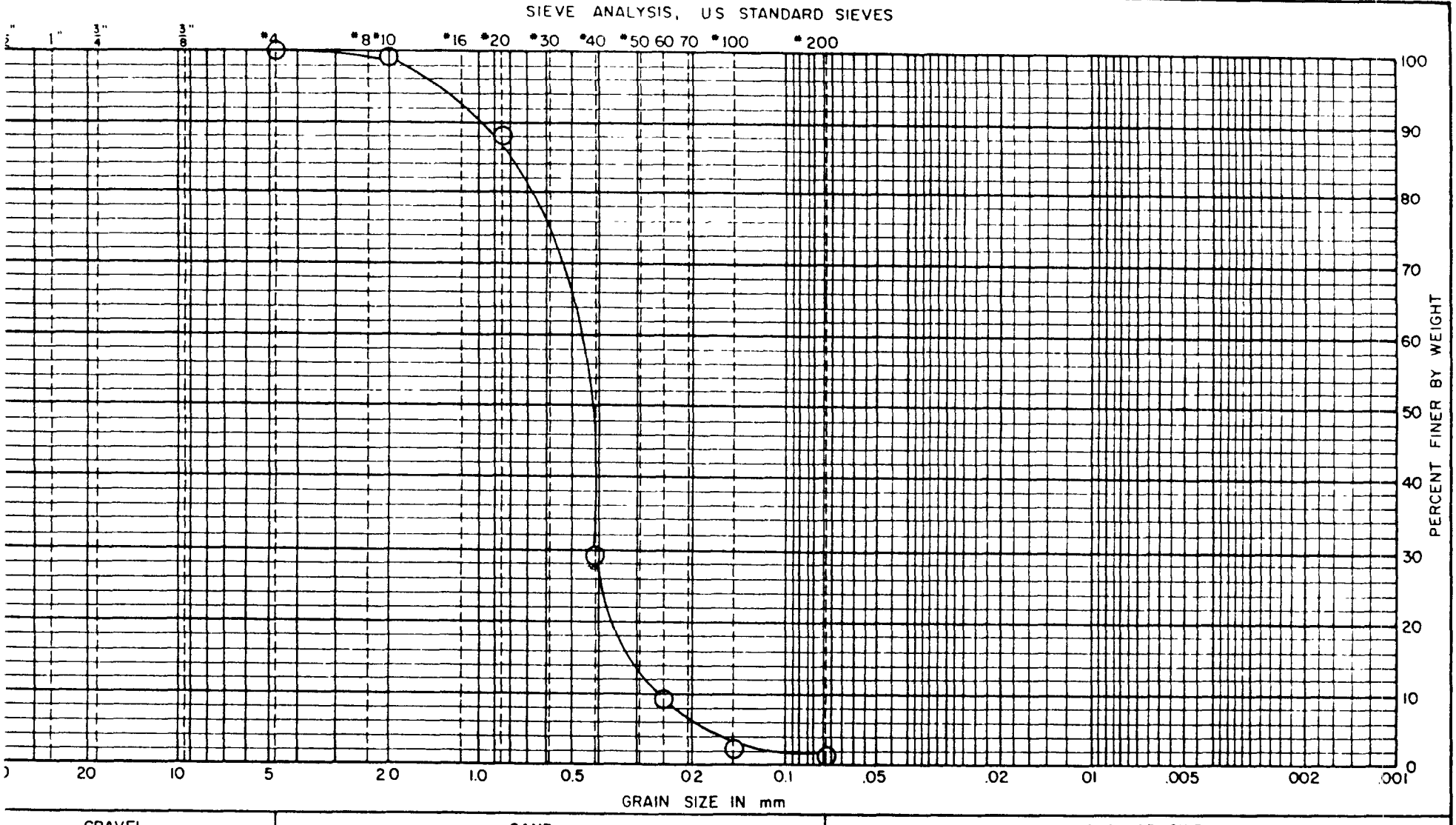
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004711



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 10

TOTAL WET DENSITY (pcf) 113

SPECIFIC GRAVITY 2.66

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, medium to fine grained SAND with trace of silt, SP

BURMISTER- Brown medium to fine SAND, trace(-) Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm)	99
PERCENT SILT (74.0-2.0 μm)	1
PERCENT CLAY (<2.0 μm)	0

SAMPLE NO. F03MA 3750 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-28-85

DRAWN BY: Ch 7-11-85

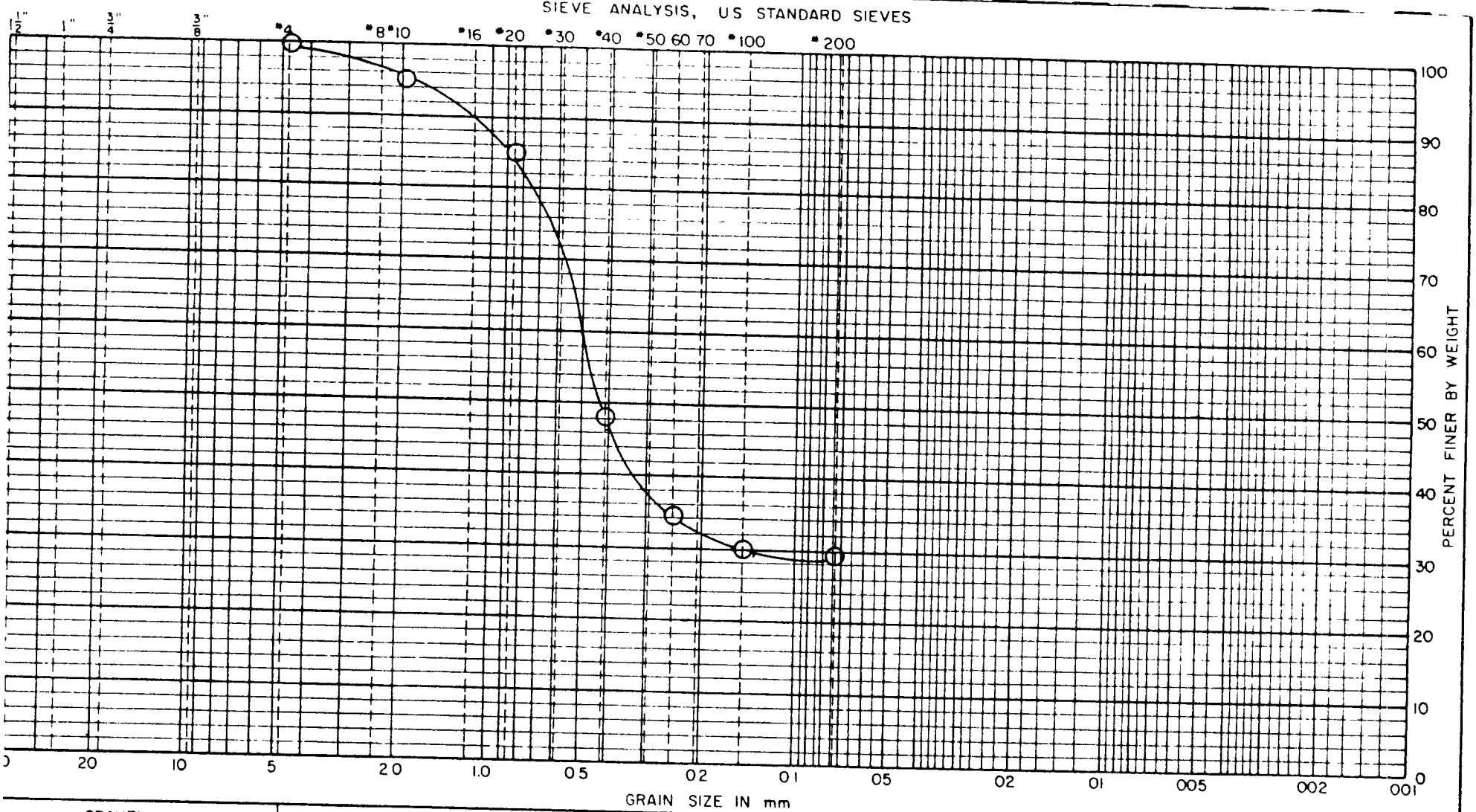
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004712



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 11

TOTAL WET DENSITY (pcf) 131

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray, medium to fine SAND with some clayey silt SM-SC

BURMISTER- Gray medium to fine SAND, some Clayey Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 72

PERCENT SILT (74.0-2.0 µm) } 28

PERCENT CLAY (<2.0 µm)

SAMPLE NO. F03MA 3751 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-28-85

DRAWN BY: Tw 7-10-85

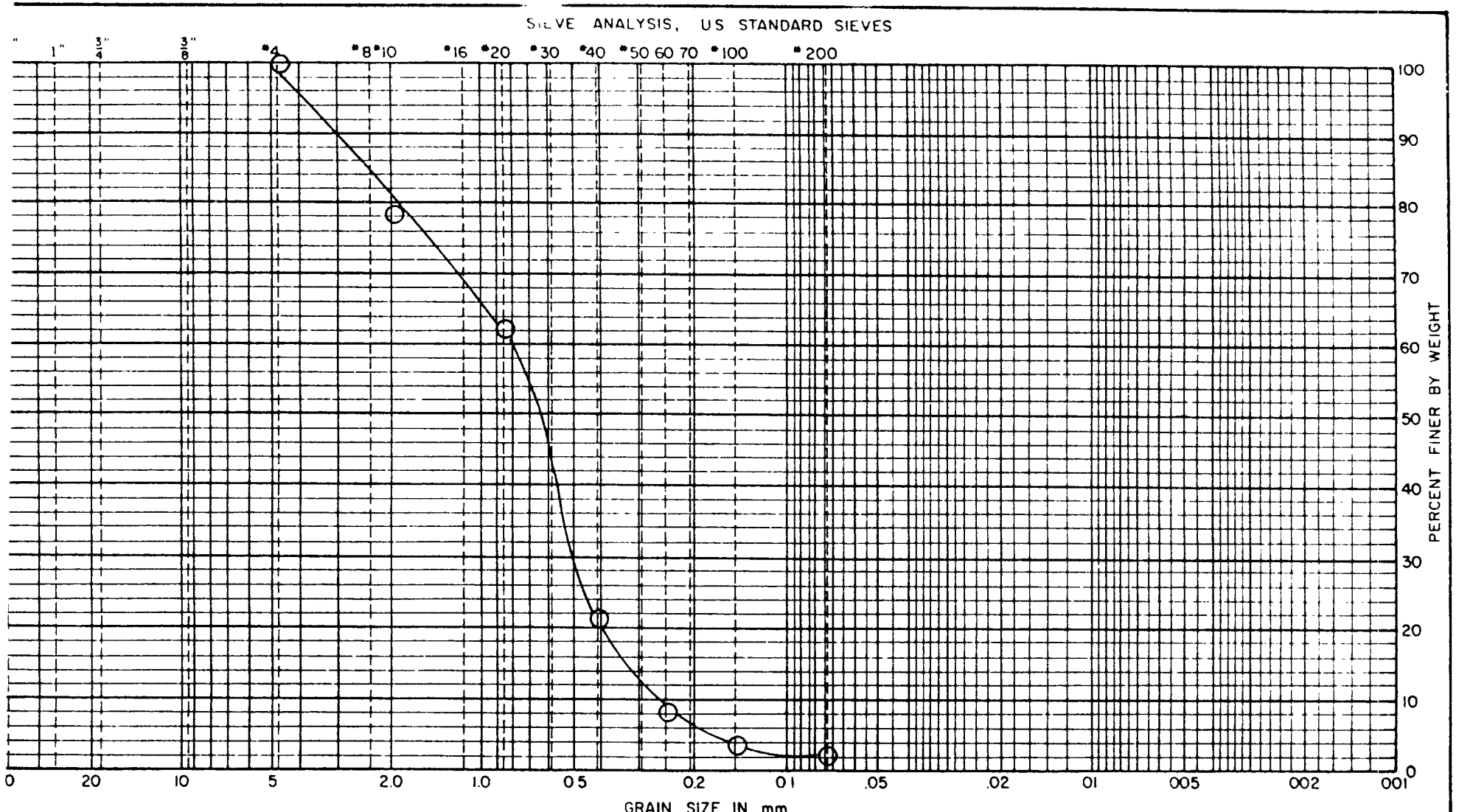
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO

DEP\DA0004713



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray to dark gray, coarse to fine SAND with a trace of silt, SP

BURMISTER- Gray to dark gray coarse to fine SAND, trace(-) Silt

MOISTURE CONTENT (%) 9

TOTAL WET DENSITY (pcf) 136

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 98

PERCENT SILT (74.0-2.0 μm) 2

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F03MA 3752 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-28-85

DRAWN BY: tw 7-10-85

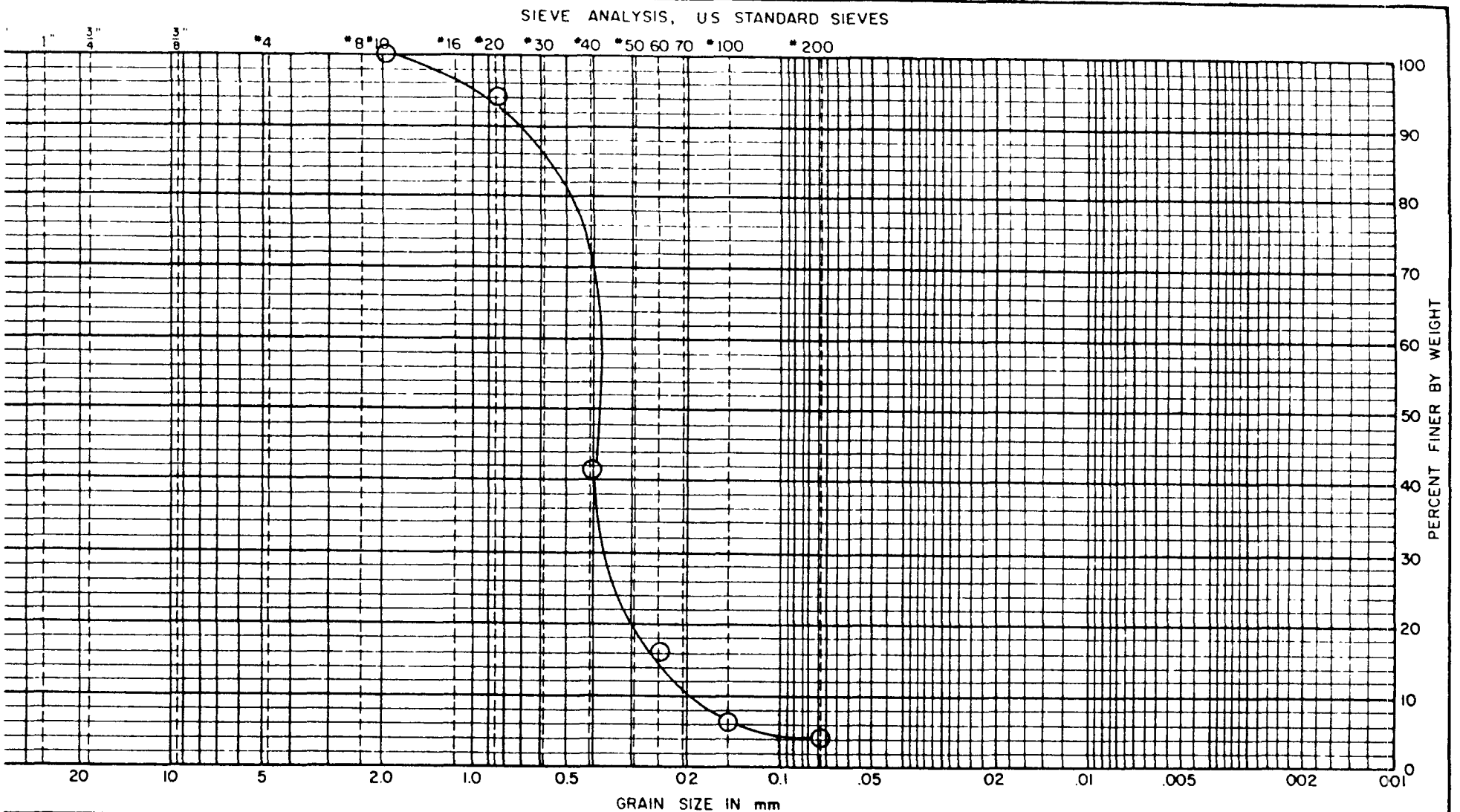
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004714



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, medium to fine grained SAND with a trace of silt, SP

BURMISTER- Brown medium to fine SAND, trace Silt

MOISTURE CONTENT (%) 13

TOTAL WET DENSITY (pcf) 135

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 96

PERCENT SILT (74.0-2.0 μm) 4

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F03MA 3754 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-28-85

DRAWN BY: tew 7-10-85

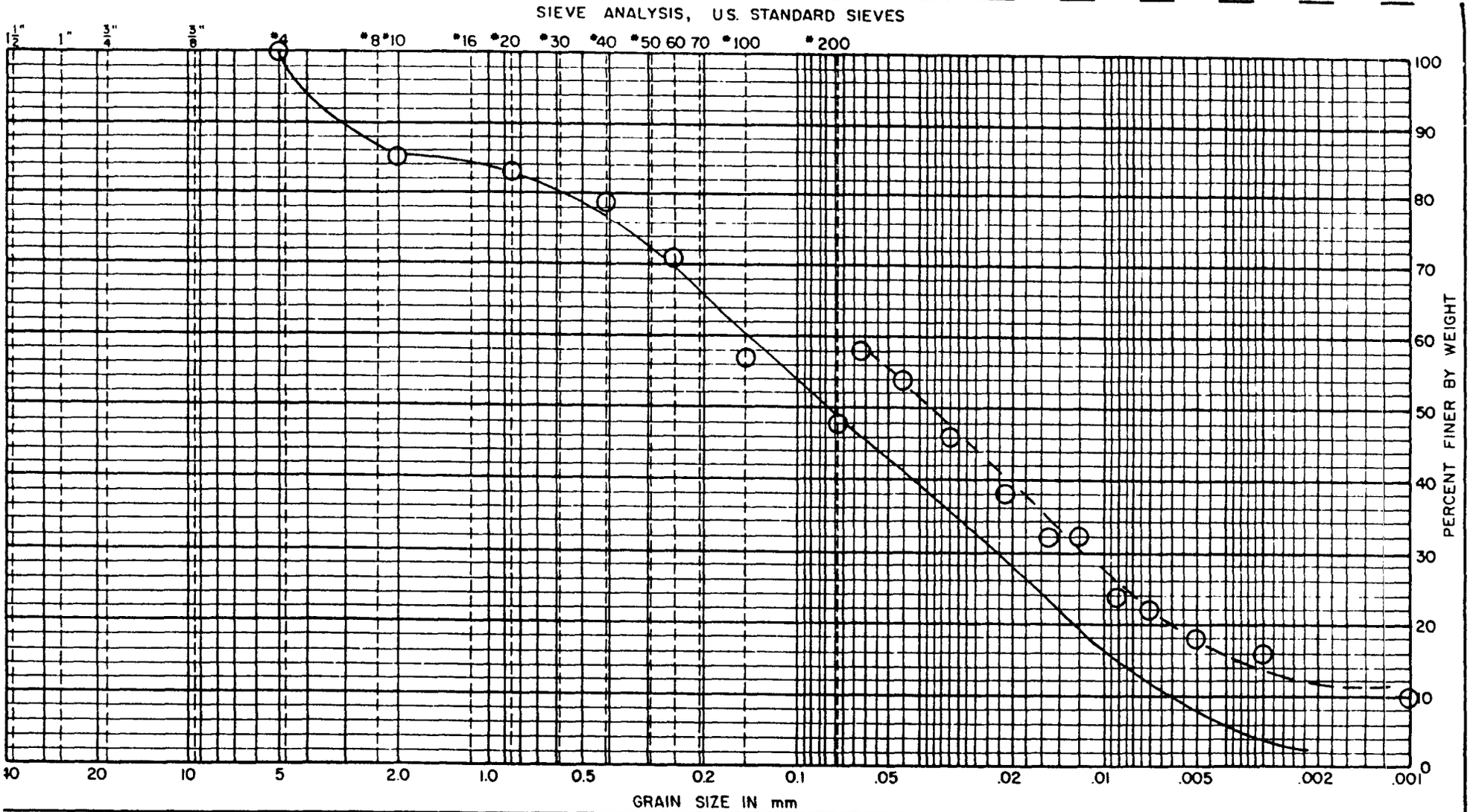
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004715



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 88

TOTAL WET DENSITY (pcf) 93

SPECIFIC GRAVITY 2.52

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown, coarse to fine grained SAND and dark gray SILT with trace of clay and plant fibers, SM

BURMISTER-Grayish brown coarse to fine SAND and dark gray Organic SILT, trace(-) Clay, trace plant fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 51

PERCENT SILT (74.0-2.0 µm) 47

PERCENT CLAY (<2.0 µm) 2

SAMPLE NO. F03RA 3755 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-24-85

DRAWN BY: Ew 7-10-85

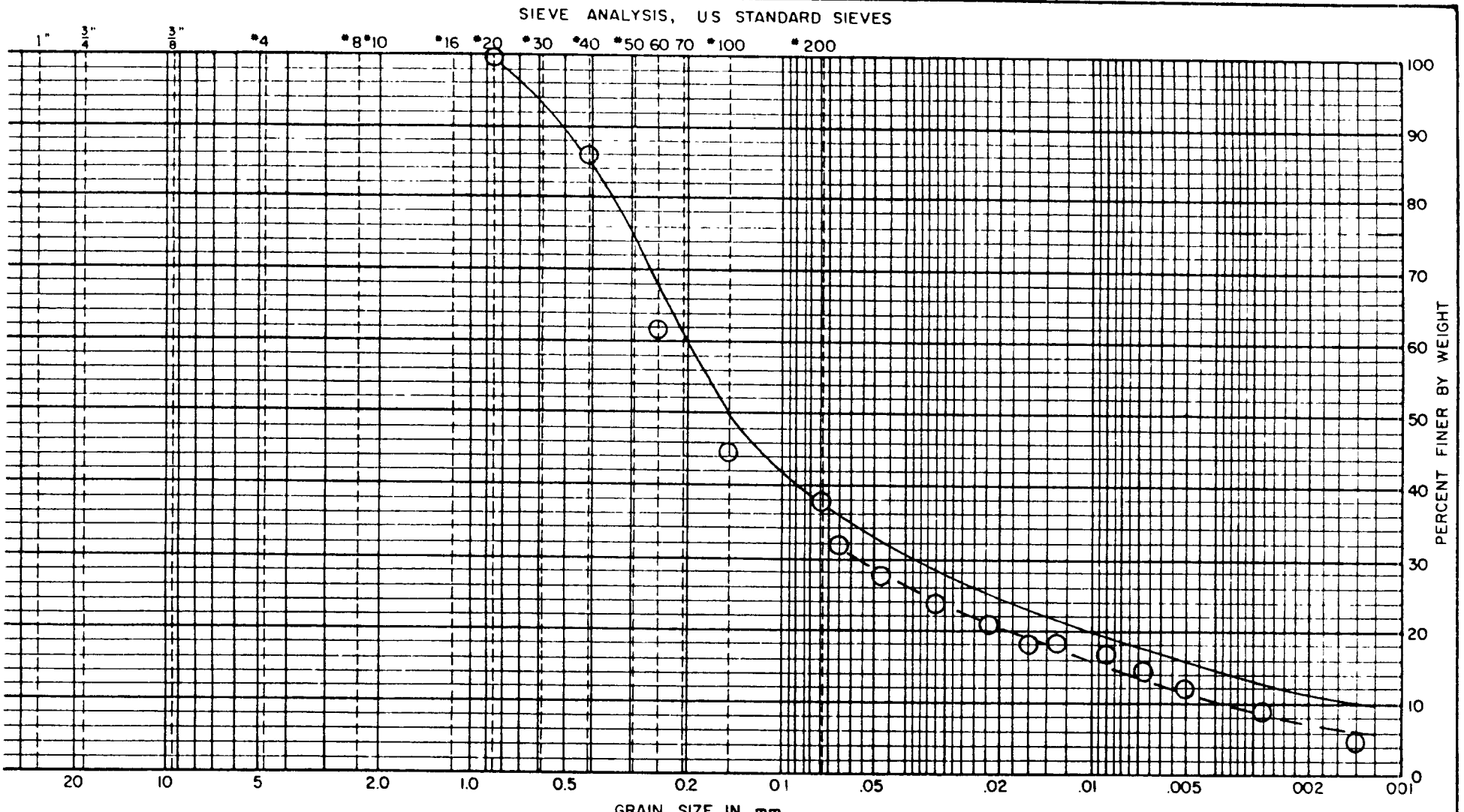
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004716



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown, medium to fine grained SAND with some silt and clay

BURMISTER- Grayish brown medium to fine SAND, some(+) Silt and Clay

MOISTURE CONTENT (%) 42

TOTAL WET DENSITY (pcf) 110

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 66

PERCENT SILT (74.0-2.0 μm) 22

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. F03RA 3756 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-24-85

DRAWN BY: 7-10-85

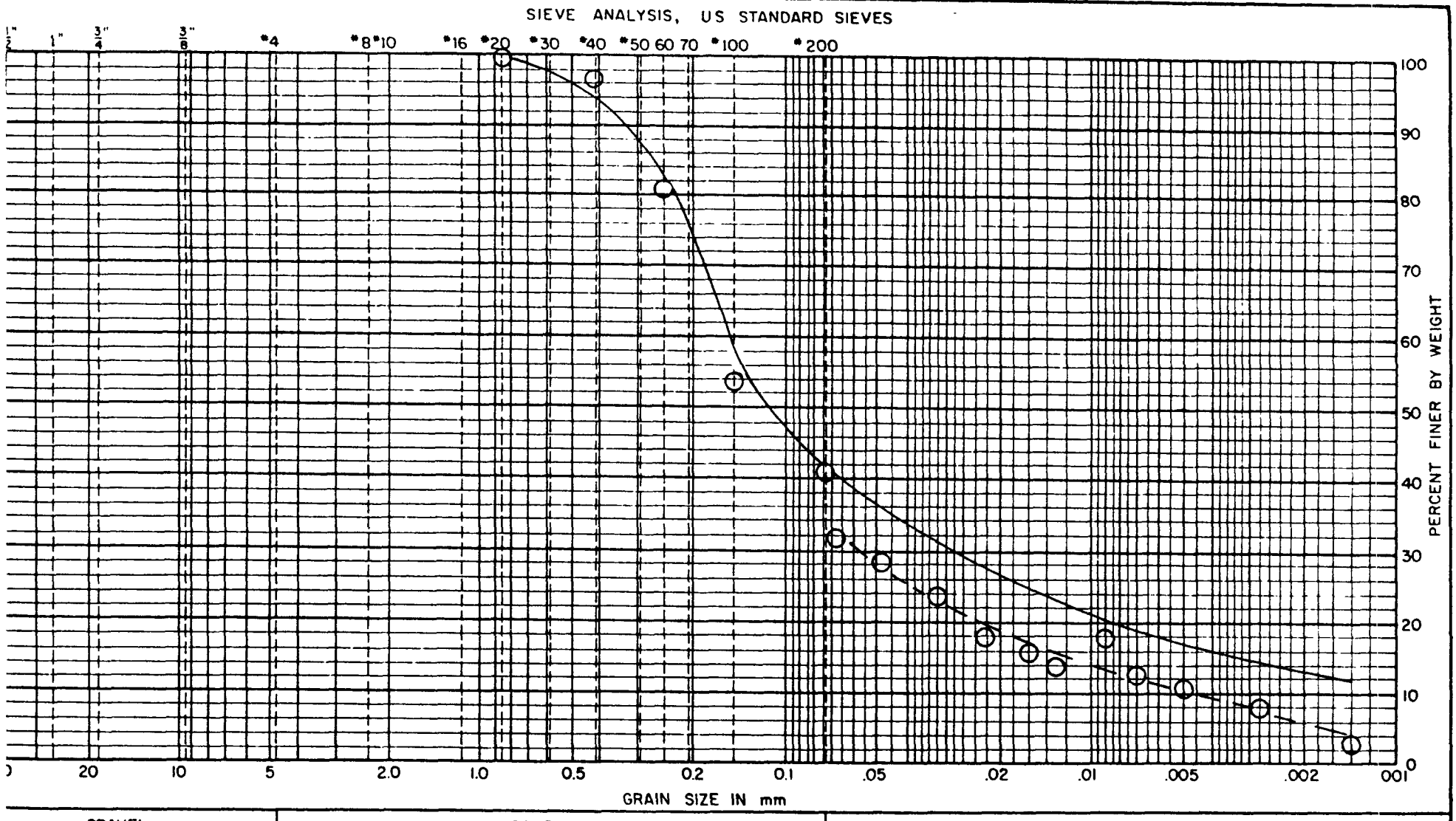
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004717



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown, medium to fine grained SAND, with silt, clay and peat, SM-SC

BURMISTER- Dark brown medium to fine(+) SAND and Silt and Clay

MOISTURE CONTENT (%) 69

TOTAL WET DENSITY (pcf) 96

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 58

PERCENT SILT (74.0-2.0 µm) 29

PERCENT CLAY (<2.0 µm) 13

SAMPLE NO. F03RA 3757 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-24-85

DRAWN BY: [illegible] 7-10-85

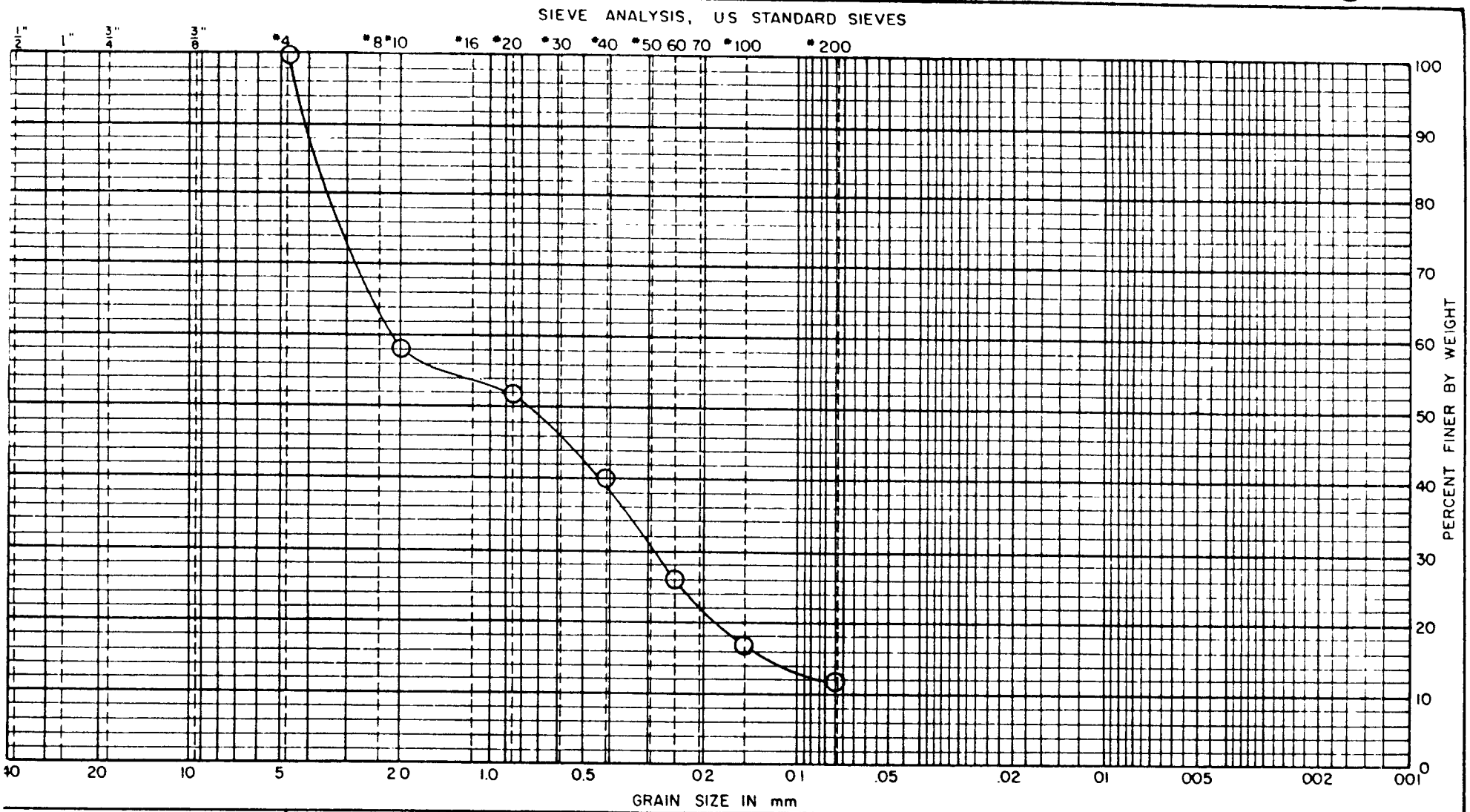
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004718



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Gray brown, coarse to fine grained SAND with a little clayey silt, SP-SM

BURMISTER - Gray brown coarse to fine SAND, little(-) Clayey Silt

MOISTURE CONTENT (%) 11

TOTAL WET DENSITY (pcf) 102

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 88

PERCENT SILT (74.0-2.0 μm) } 12

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F03RA 3758 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-24-85

DRAWN BY: 7-10-85

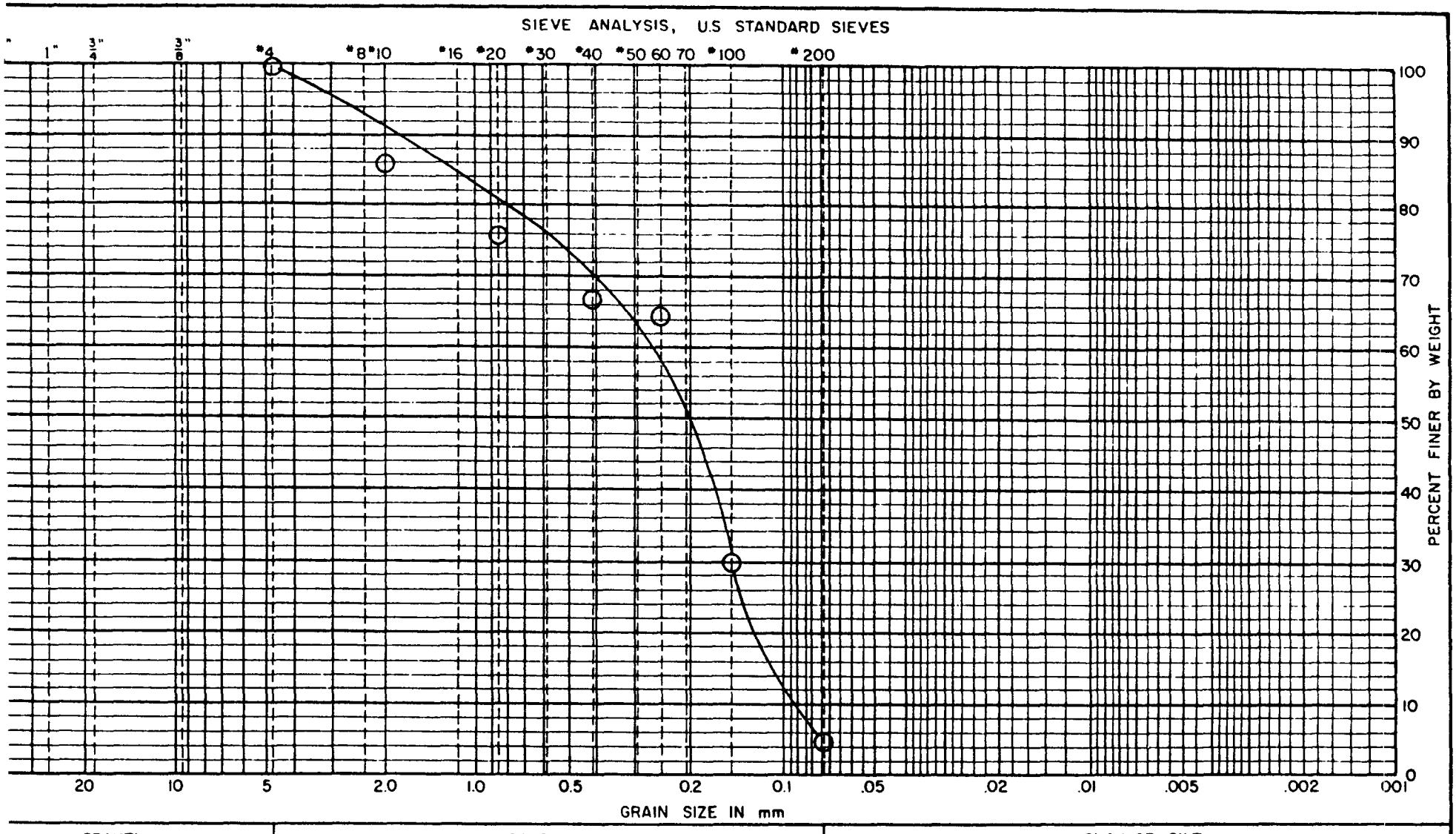
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG. NO.

DEP\DA0004719



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 18

TOTAL WET DENSITY (pcf) 130

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Rusty brown to tan yellow, coarse to fine grained SAND with a trace of silt, SP-SM

BURMISTER- Rusty brown to tan yellow coarse to fine SAND, trace Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 94

PERCENT SILT (74.0-2.0 μm) 6

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F03RA 3759 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-24-85

DRAWN BY: [illegible] 7-10-85

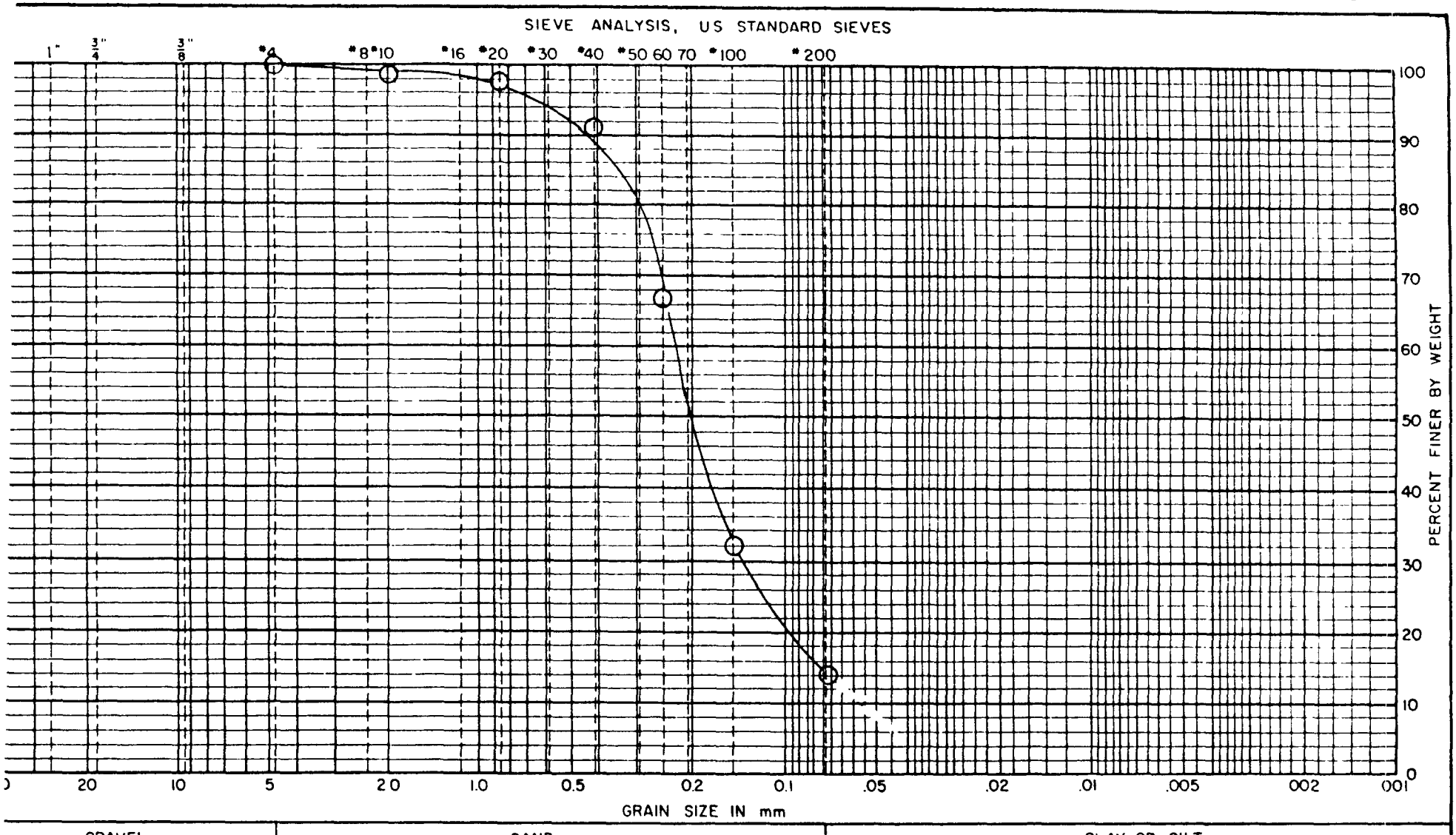
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004720



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Reddish brown, medium to fine grained SAND with a little silt, SP

BURMISTER- Reddish brown medium to fine SAND, little. Silt

MOISTURE CONTENT (%) 17

TOTAL WET DENSITY (pcf) 151

SPECIFIC GRAVITY 2.67

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 86

PERCENT SILT (74.0-2.0 µm) } 14

PERCENT CLAY (<2.0 µm)

SAMPLE NO. F06MA 3795 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-30-85

DRAWN BY: 7-11-85

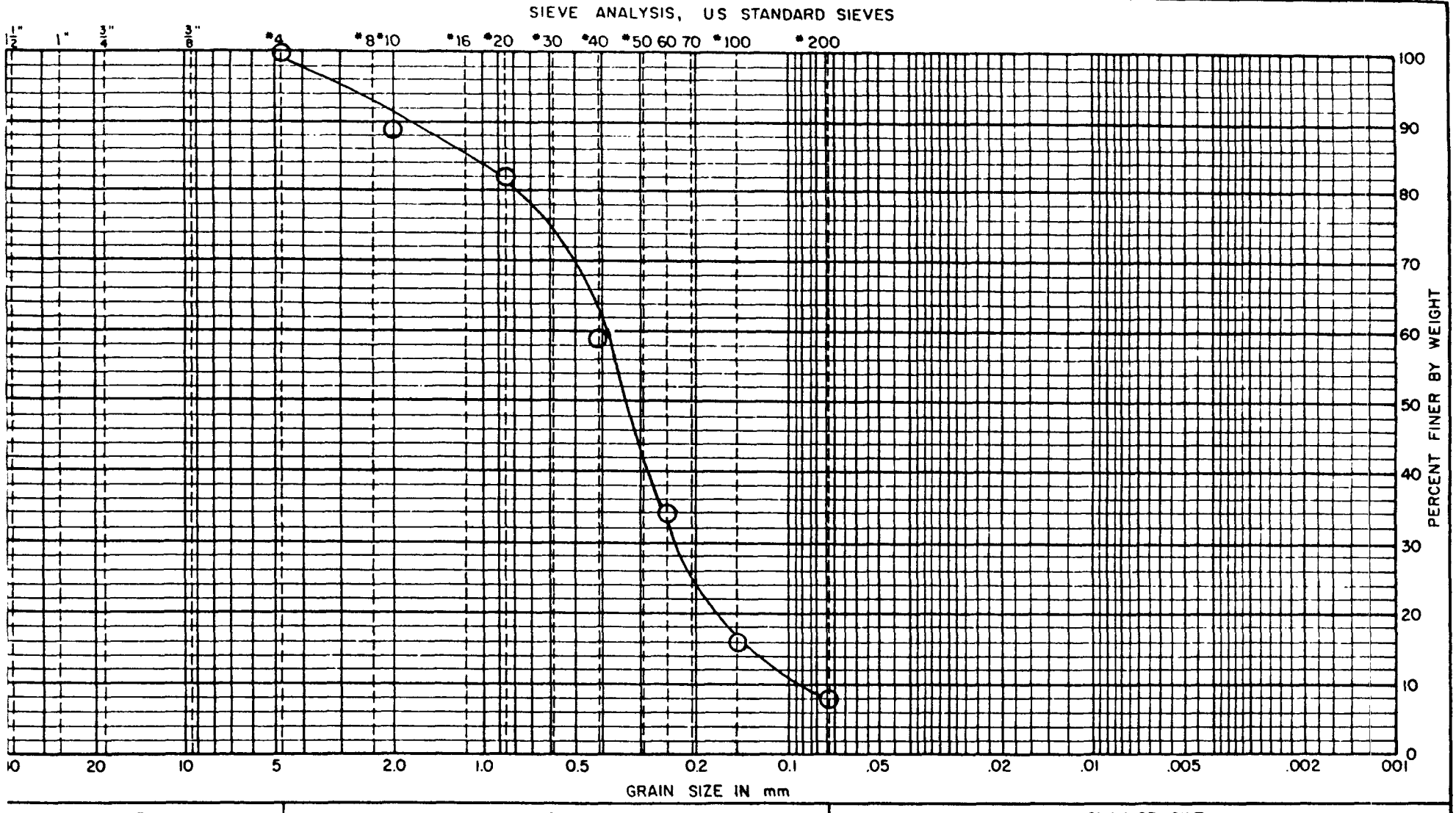
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004721



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 13

TOTAL WET DENSITY (pcf) 143

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, coarse to fine grained SAND with a trace of silt, SP-SM

BURMISTER- Brown coarse to fine SAND, trace(+) Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 92

PERCENT SILT (74.0-2.0 µm) 8

PERCENT CLAY (<2.0 µm)

SAMPLE NO. F06MA 3796 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-30-85

DRAWN BY: [illegible] 7-10-85

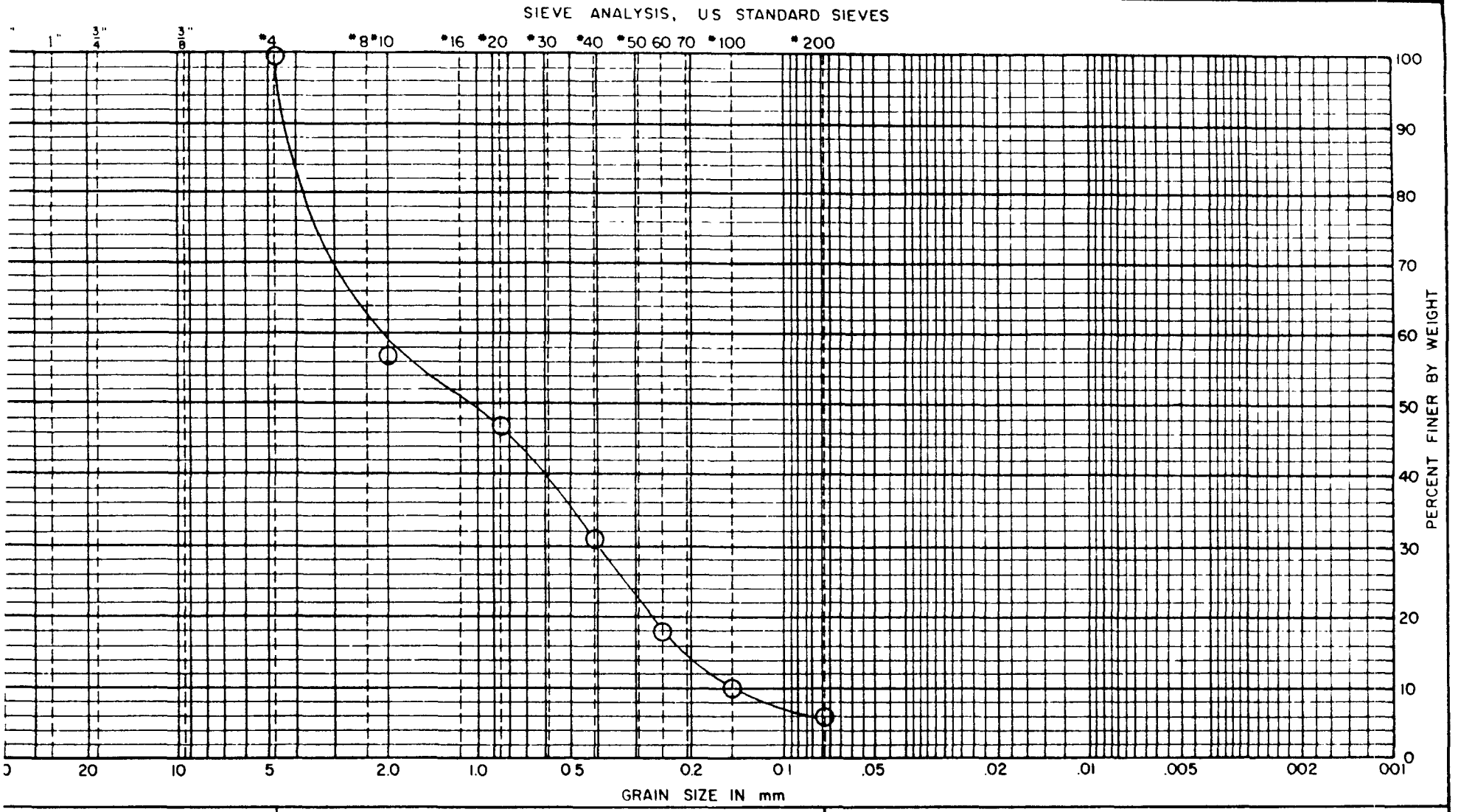
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004722



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 11

TOTAL WET DENSITY (pcf) 145

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Reddish brown, coarse to fine SAND with trace of silt, SP-SM

BURMISTER- Reddish brown coarse to fine SAND, trace Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 94

PERCENT SILT (74.0-2.0 µm) 6

PERCENT CLAY (<2.0 µm)

SAMPLE NO. F06MA 3797 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5/30/85

DRAWN BY: 7-10-85

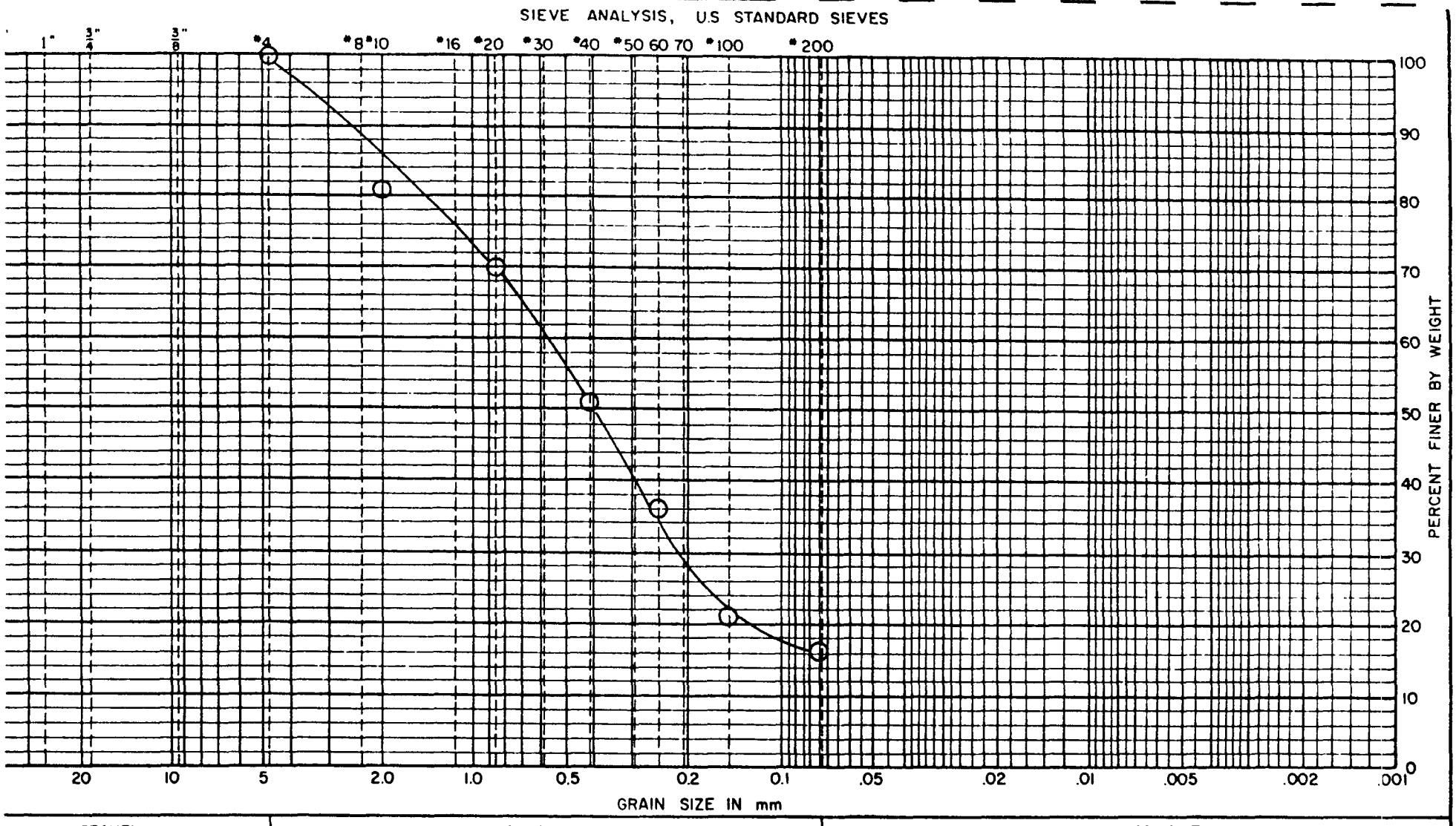
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004723



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Reddish brown, coarse to fine grained SAND with a little clayey silt, SM-SC

BURMISTER- Reddish brown coarse to fine SAND, little Clayey Silt

MOISTURE CONTENT (%) 17

TOTAL WET DENSITY (pcf) 261

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 84

PERCENT SILT (74.0-2.0 μm) } 16

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F06MA 3798 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-30-85

DRAWN BY: [illegible] 7-10-85

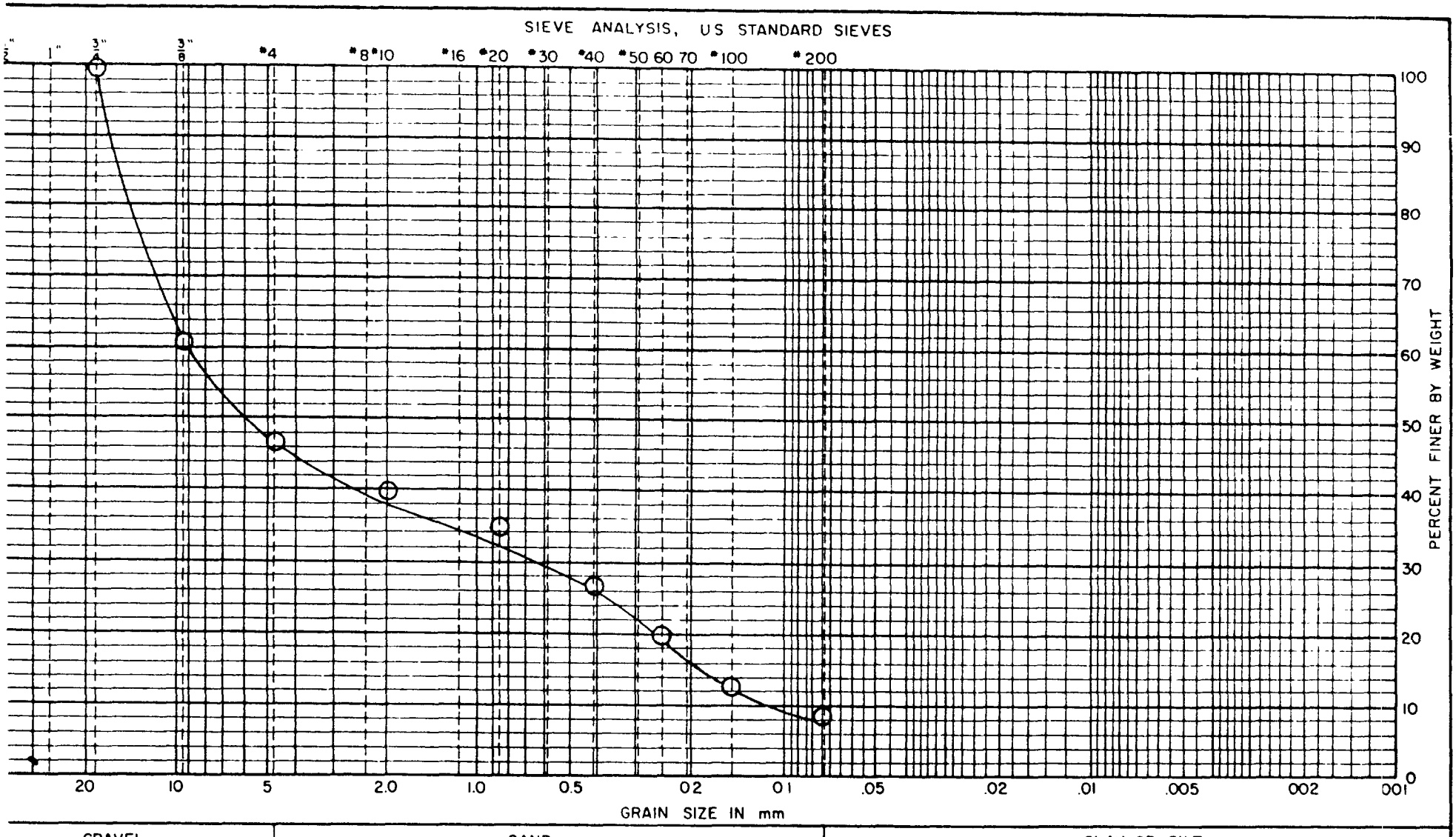
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004724



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, fine GRAVEL and coarse to fine SAND with a trace of silt, GP-SM

BURMISTER - Brown fine GRAVEL and coarse to fine Sand, trace(+) Silt

MOISTURE CONTENT (%) 10

TOTAL WET DENSITY (pcf) 149

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 92 (52-Gravel, 40-Sand)

PERCENT SILT (74.0-2.0 μm) 8

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F06MA 3799 504 MY

SAMPLE DEPTH, ft. 4-4.5

SAMPLING DATE 5-30-85

DRAWN BY: 7-10-85

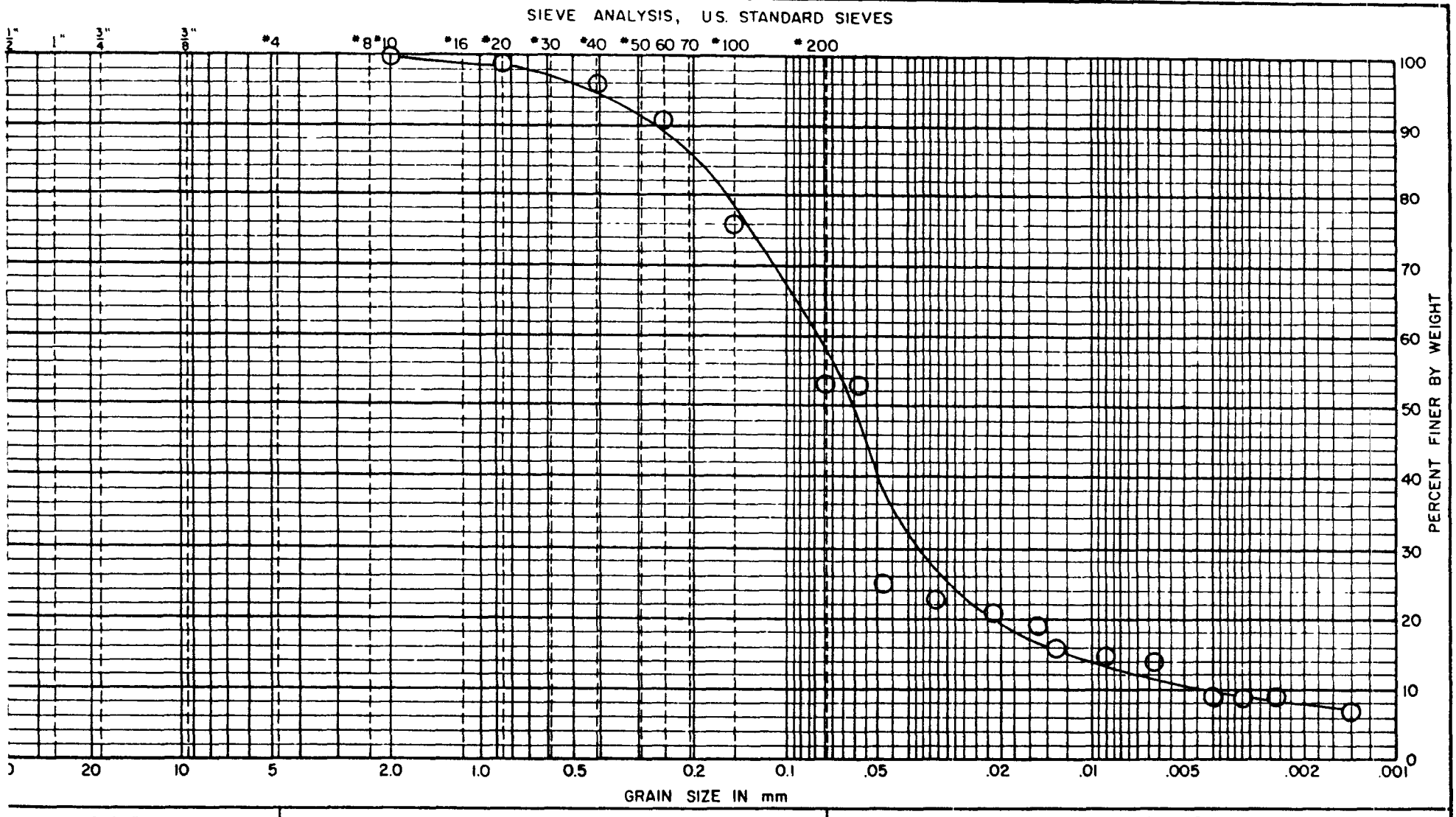
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004725



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown SILT and fine SAND, SM

BURMISTER- Dark Brown SILT and fine Sand

MOISTURE CONTENT (%) 44

TOTAL WET DENSITY (pcf) 109

SPECIFIC GRAVITY 2.62

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 40

PERCENT SILT (74.0-2.0 µm) 52

PERCENT CLAY (<2.0 µm) 8

SAMPLE NO. F06RA 3800 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-29-85

DRAWN BY: TG 7-10-85

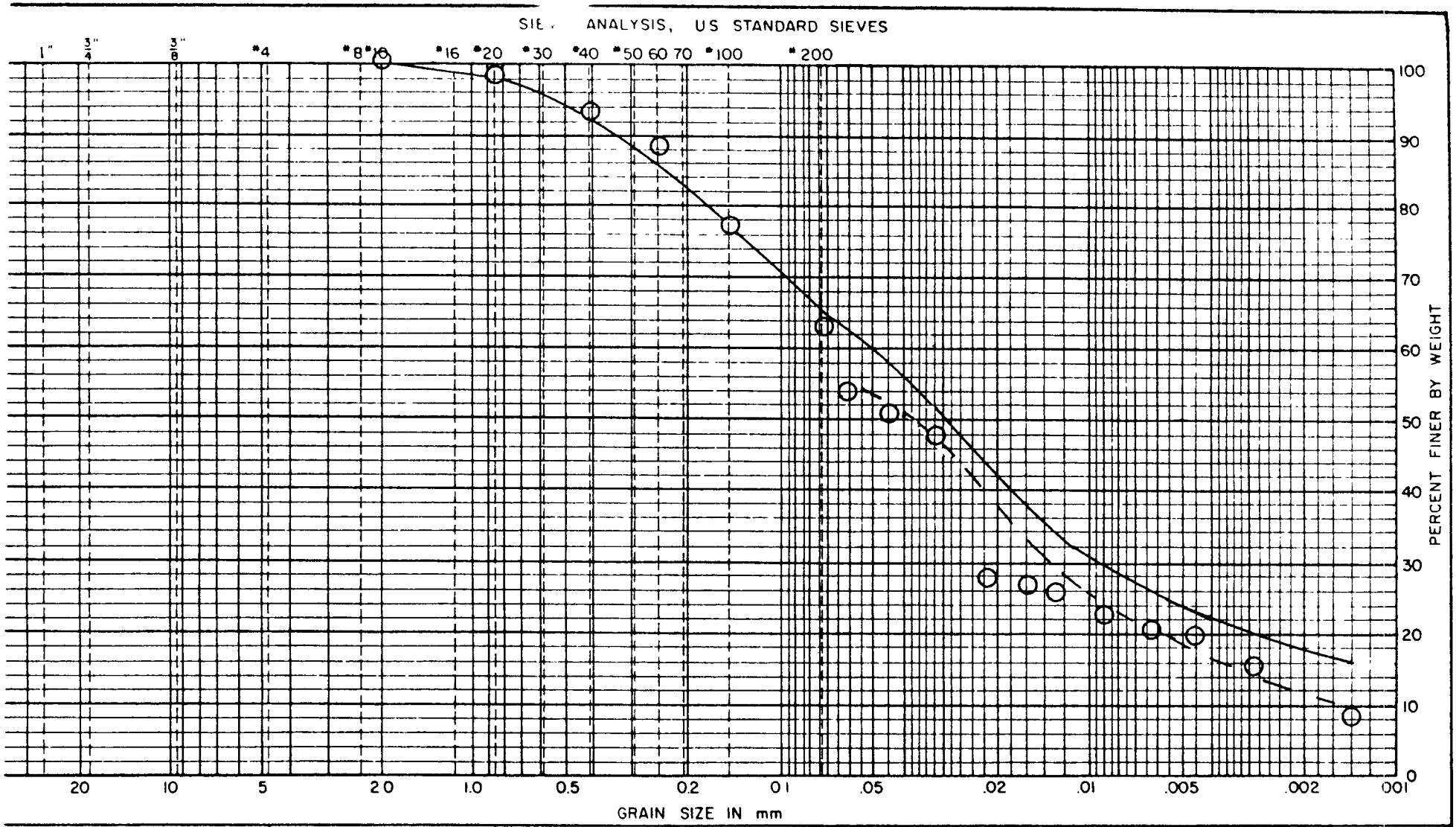
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004726



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown SILT and CLAY with some medium to fine Sand

BURMISTER- Dark Brown SILT and CLAY some(+), medium to fine(+) Sand

MOISTURE CONTENT (%) 57

TOTAL WET DENSITY (pcf) 105

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 34

PERCENT SILT (74.0-2.0 µm) 48

PERCENT CLAY (<2.0 µm) 18

SAMPLE NO. F06RA 3801 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-29-85

DRAWN BY: 7-11-85

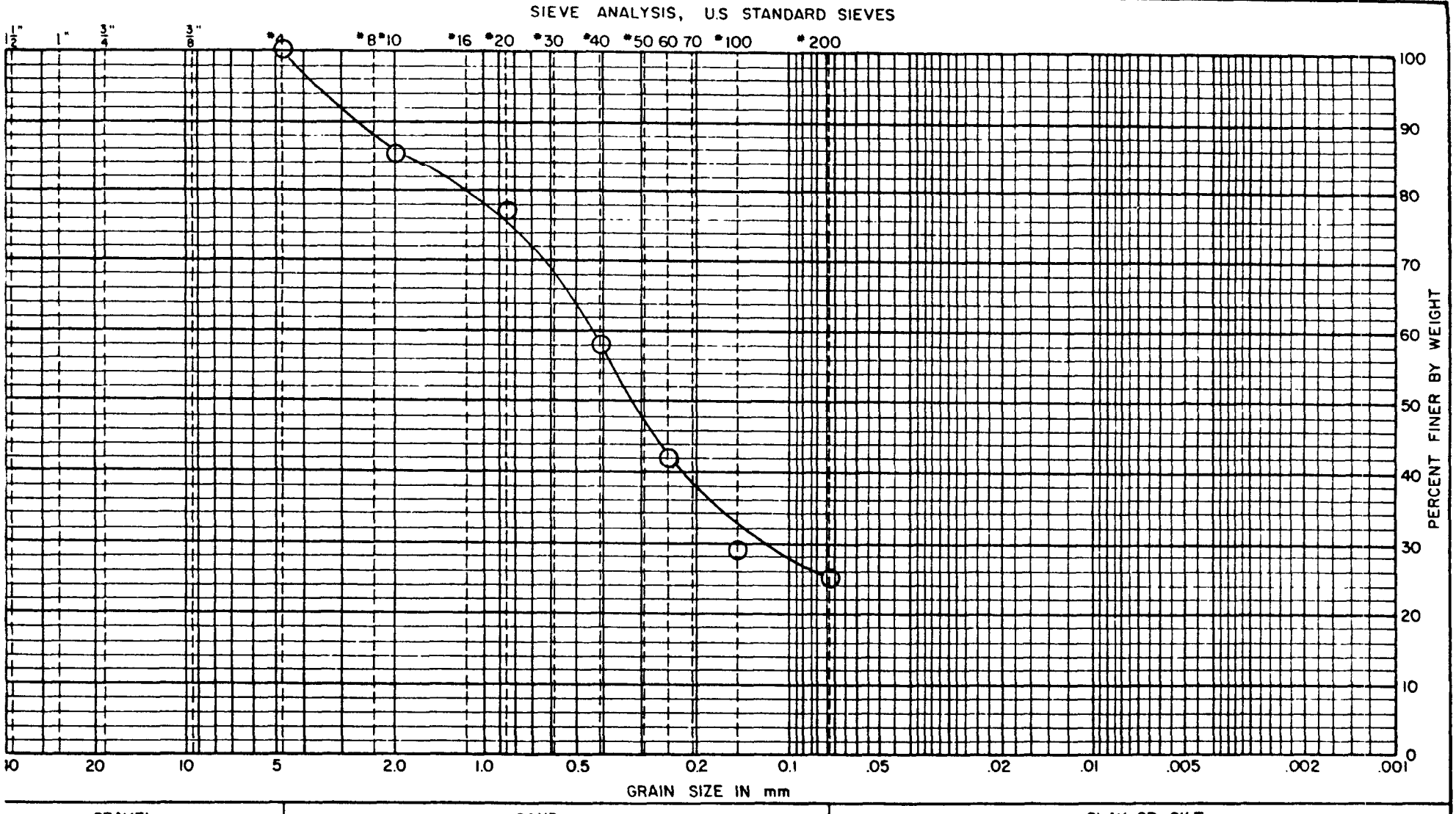
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004727



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 42

TOTAL WET DENSITY (pcf) 113

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown, medium to fine grained SAND with some silt and/or clay, SM-SC

BURMISTER- Grayish brown medium to fine SAND, some Silt and/or Clay

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 75

PERCENT SILT (74.0-2.0 µm) } 25

PERCENT CLAY (<2.0 µm)

SAMPLE NO. F06RA 3802 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-29-85

DRAWN BY: 7-10-85

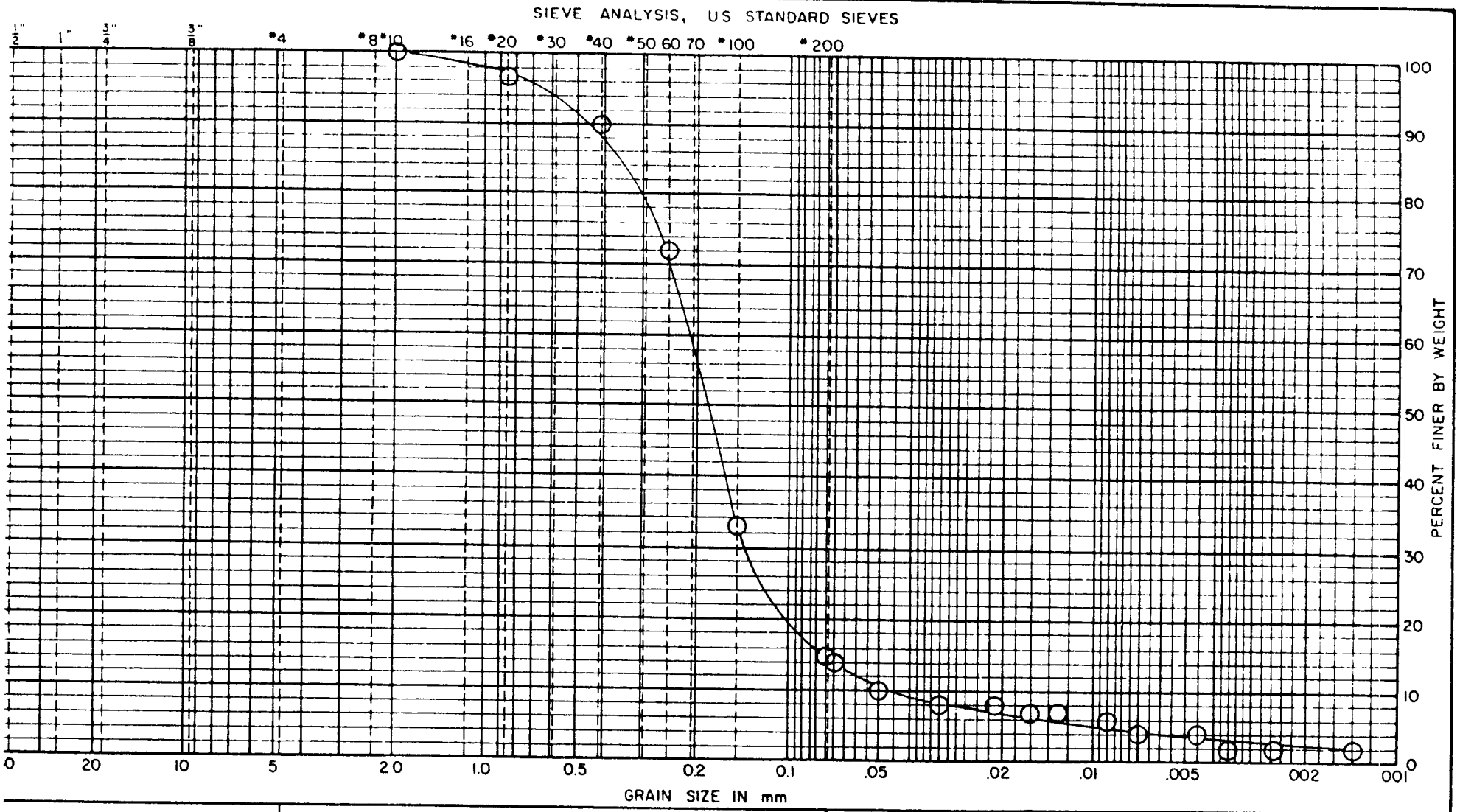
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004728



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, fine grained SAND with a little silt and wood fibers, SM-SC

BURMISTER- Brown fine SAND, little(-) Silt, little wood fibers

MOISTURE CONTENT (%) 23

TOTAL WET DENSITY (pcf) 126

SPECIFIC GRAVITY _____

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 86

PERCENT SILT (74.0-2.0 μm) 12

PERCENT CLAY (<2.0 μm) 2

SAMPLE NO. F06RA 3803 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-29-85

DRAWN BY: 7-10-85

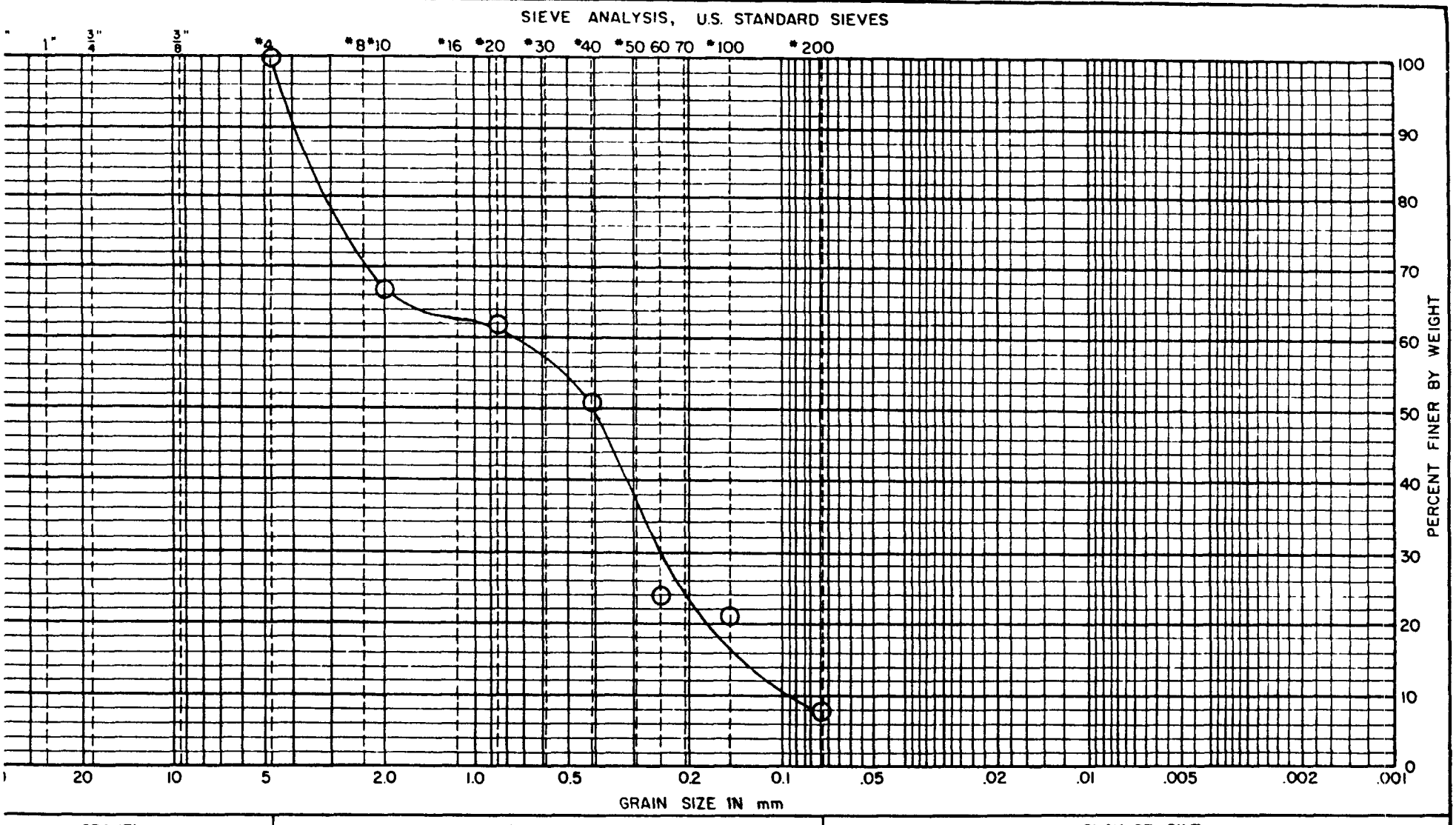
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004729



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, coarse to fine SAND with a trace of silt SP-SM

BURMISTER- Brown coarse to fine SAND, trace(+) Silt

MOISTURE CONTENT (%) 14

TOTAL WET DENSITY (pcf) 134

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 92

PERCENT SILT (74.0-2.0 μm) 8

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F06RA 3804 204 MY

SAMPLE DEPTH, ft. 8-8,5

SAMPLING DATE 5-29-85

DRAWN BY: [illegible] 7-10-85

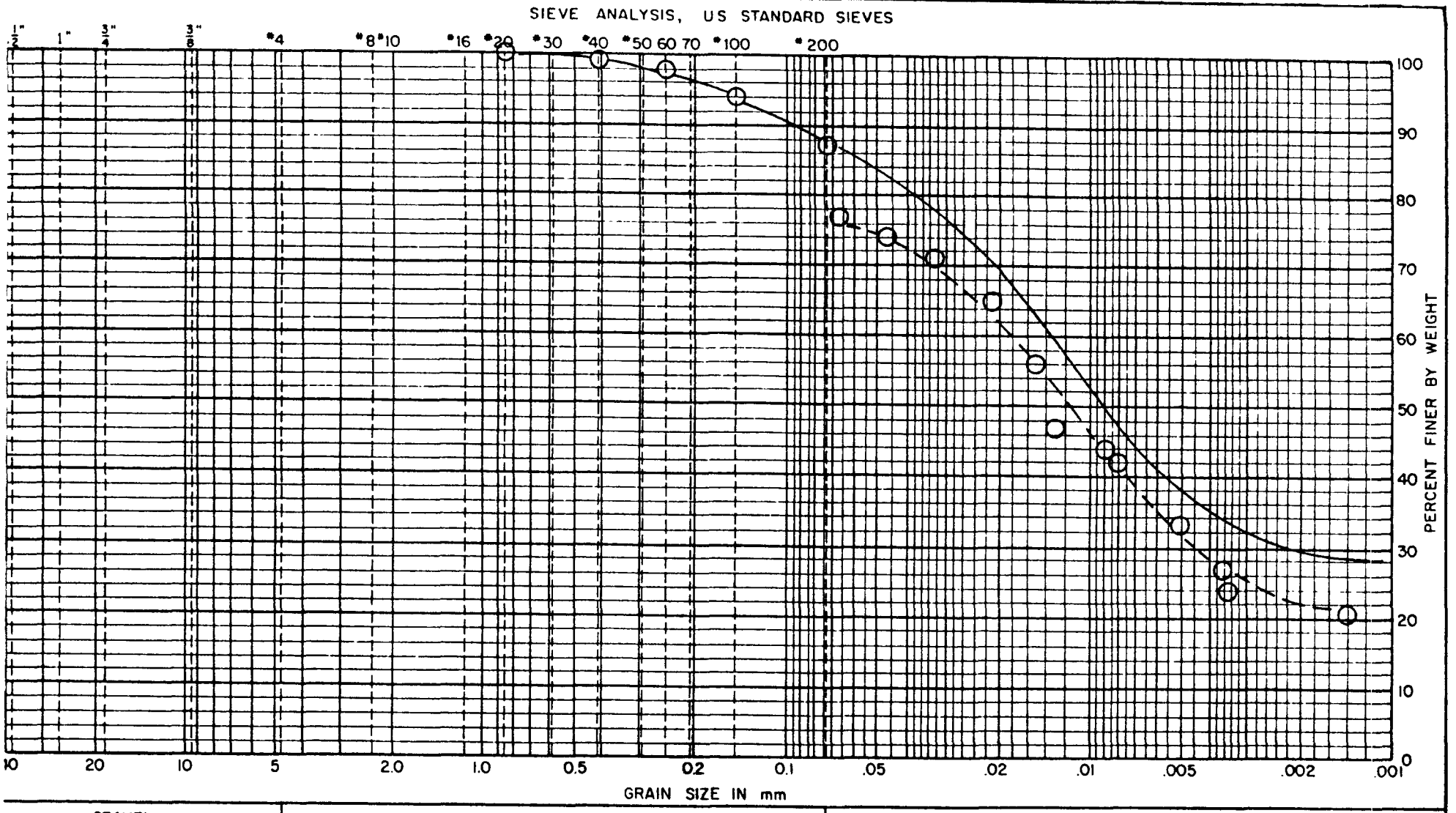
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004730



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 155

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY 2.43

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Silty CLAY with little fine sand, OH

BURMISTER-Dark gray Organic SILT, some(+) Clay, little (-) fine Sand, little woody plant material

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 12

PERCENT SILT (74.0-2.0 µm) 58

PERCENT CLAY (<2.0 µm) 30

SAMPLE NO. F07LA 3815 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-29-85

DRAWN BY: tew 7-10-85

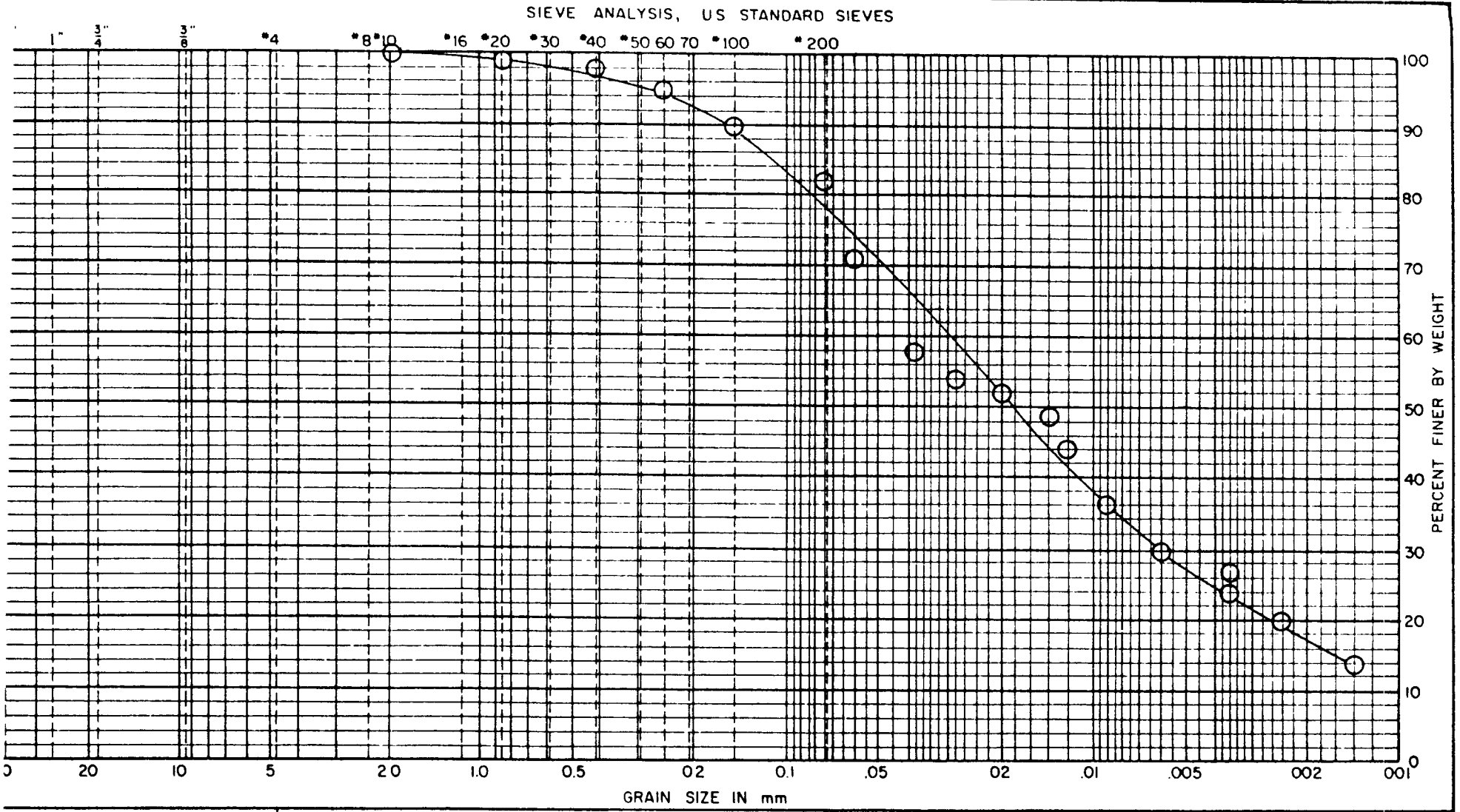
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004731



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 105

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark gray, organic SILT and CLAY with some fine sand

BURMISTER- Black to dark gray Organic SILT and CLAY some(-), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 22

PERCENT SILT (74.0-2.0 µm) 60

PERCENT CLAY (<2.0 µm) 18

SAMPLE NO. F07LA 3816 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-29-85

DRAWN BY: DJ 7-10-85

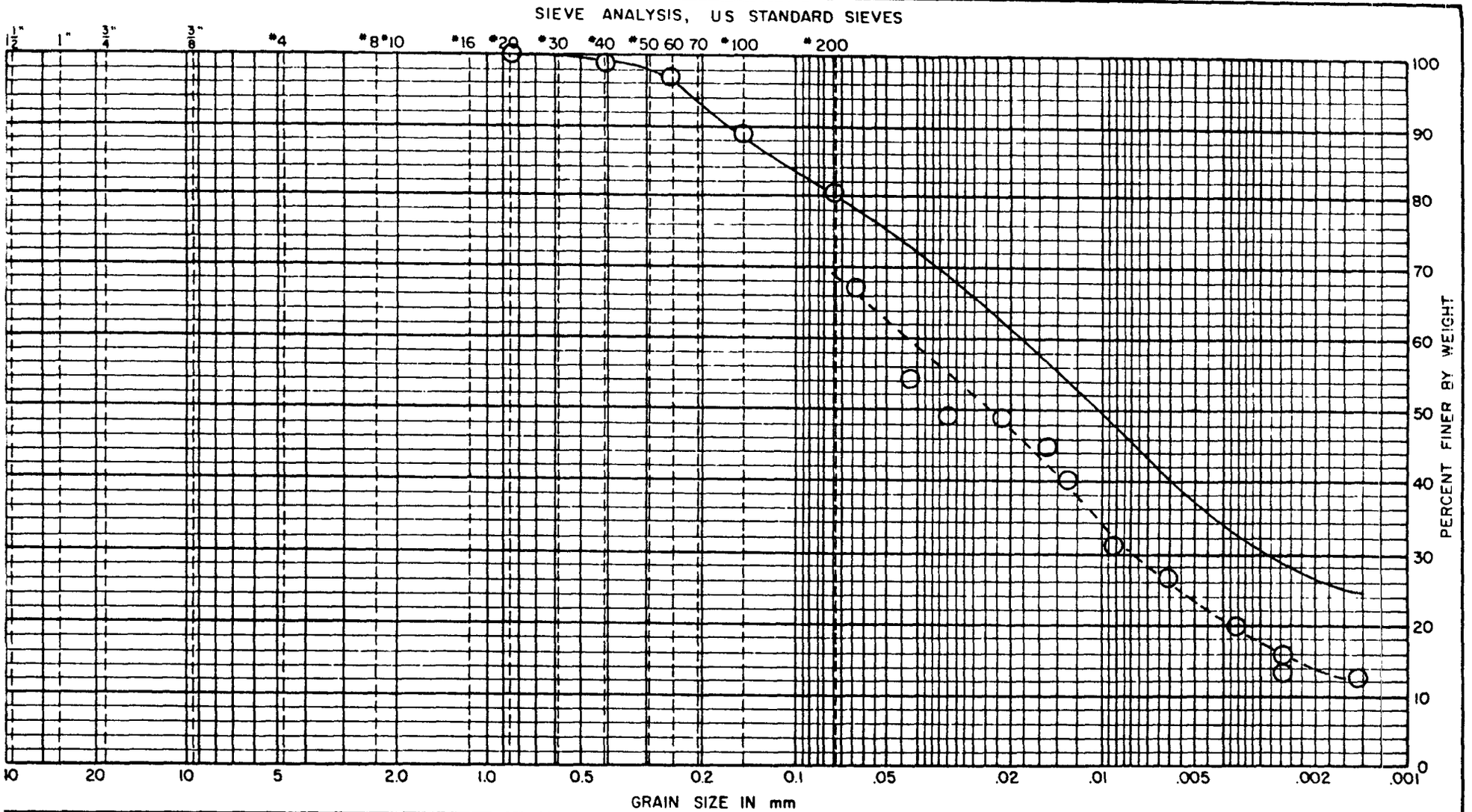
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004732



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 98

TOTAL WET DENSITY (pcf) 175

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black to dark brown, organic CLAY and SILT with a little fine sand

BURMISTER- Black to dark brown Organic CLAY and SILT little(+) fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 18

PERCENT SILT (74.0-2.0 μm) 56

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. F07LA 3817 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 5-29-85

DRAWN BY: 7-10-85

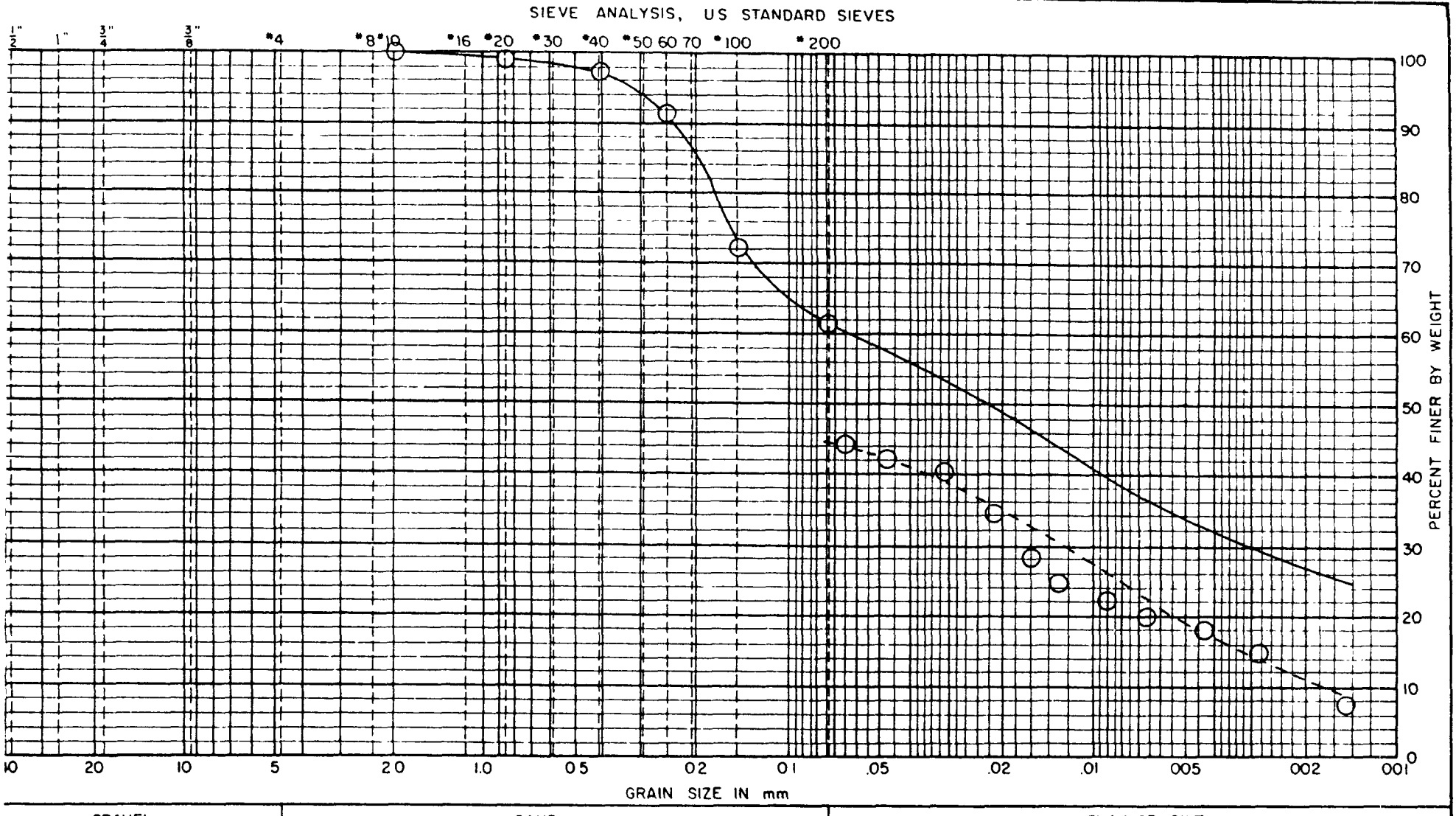
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004733



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 70

TOTAL WET DENSITY (pcf) 91

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown and black, organic Silty CLAY and medium to fine SAND

BURMISTER- Dark brown and black Organic Silty CLAY and medium to fine(+) Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 40

PERCENT SILT (74.0-2.0 μm) 34

PERCENT CLAY (<2.0 μm) 26

SAMPLE NO. F07LA 3818 203 MY

SAMPLE DEPTH, ft. 6-8

SAMPLING DATE 5-29-85

DRAWN BY: Ch 7-10-85

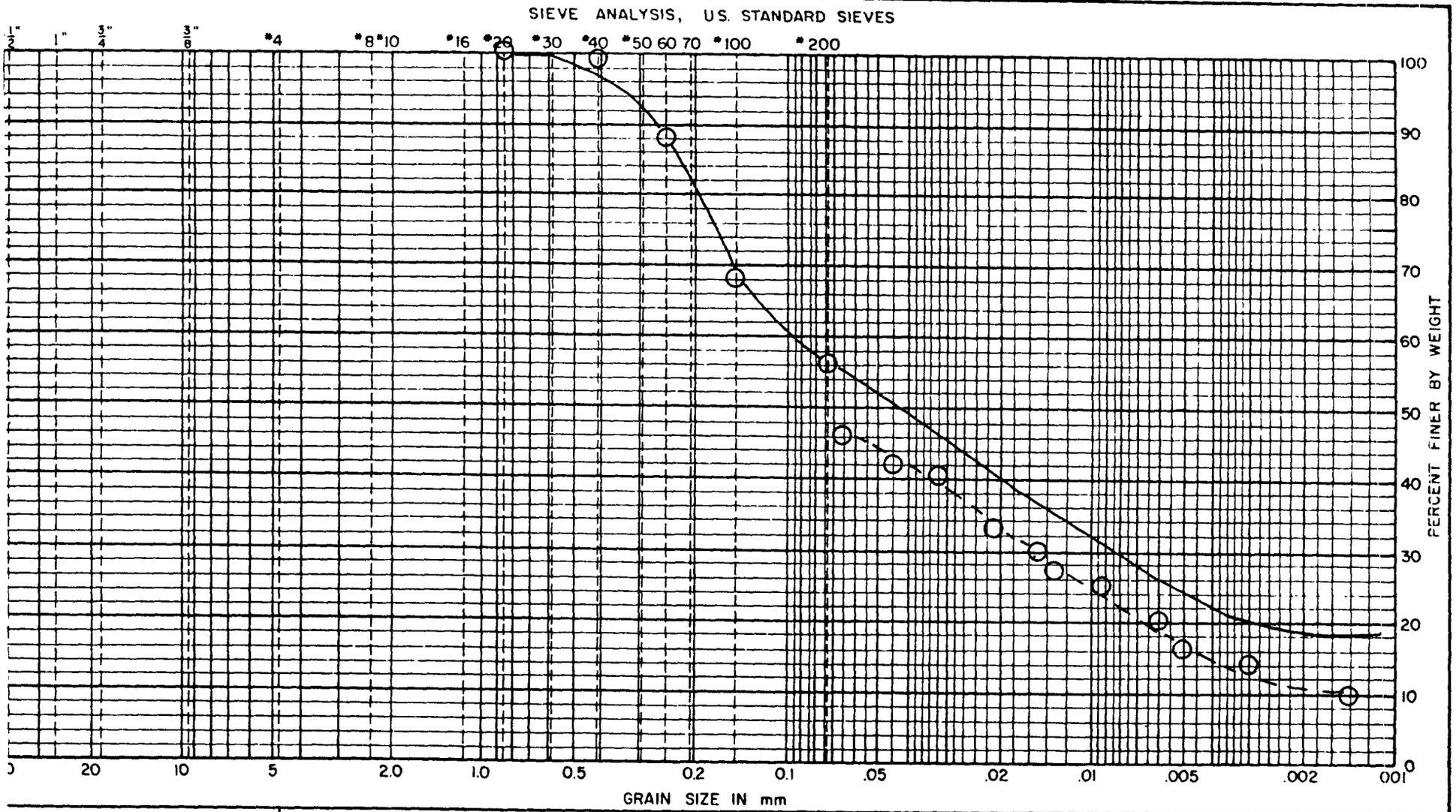
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004734



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown, fine grained Sand and Clayey SILT SM-SC

BURMISTER- Grayish brown fine Sand and Silt, little(+) Clay

MOISTURE CONTENT (%) 55

TOTAL WET DENSITY (pcf) 103

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 43

PERCENT SILT (74.0-2.0 μm) 38

PERCENT CLAY (<2.0 μm) 19

SAMPLE NO. F07LA 3819 204 MY

SAMPLE DEPTH, ft. 8-10

SAMPLING DATE 5-29-85

DRAWN BY: [illegible] 7-10-85

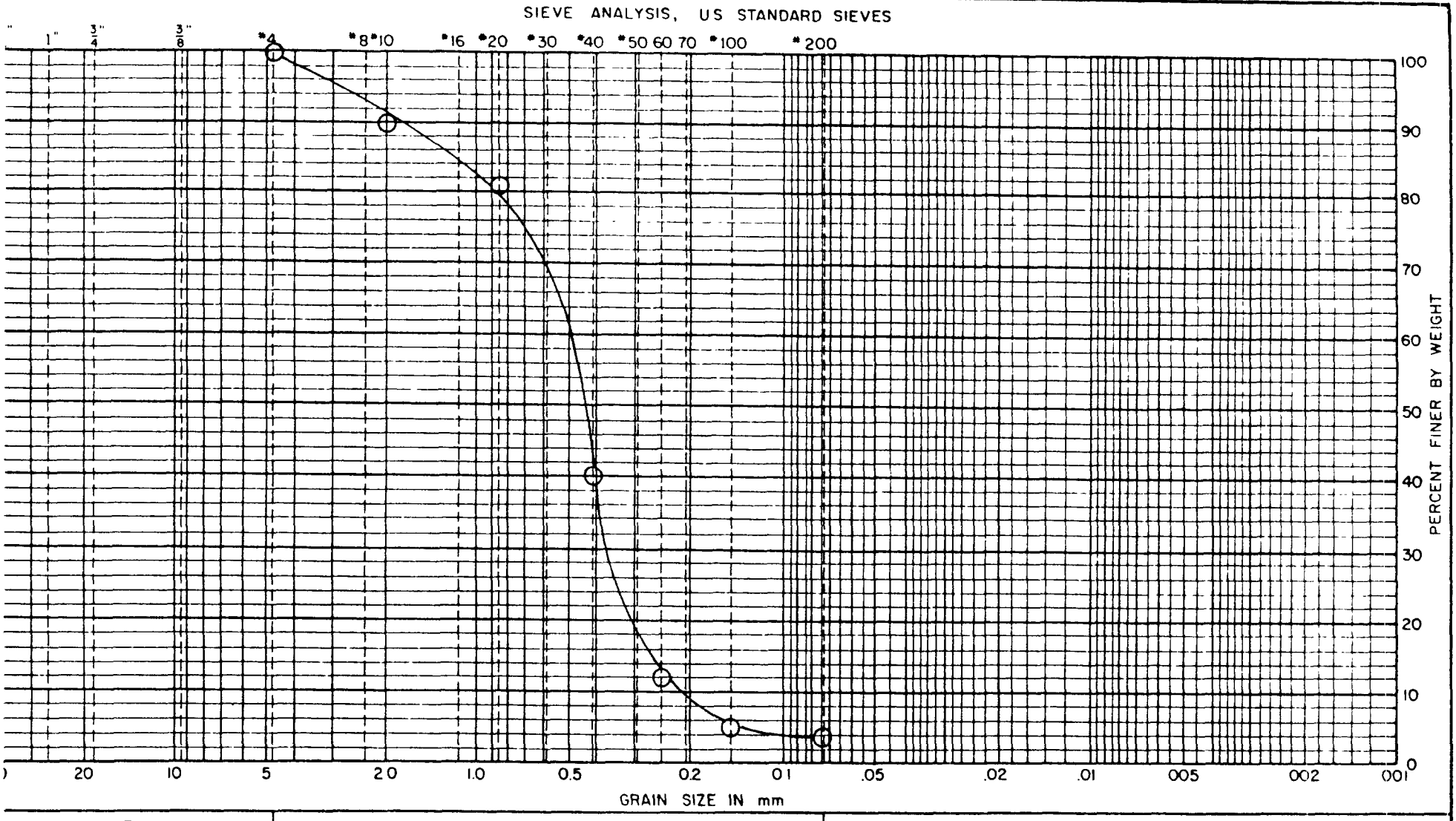
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004735



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Reddish brown, coarse to fine SAND with a trace of silt, SP

BURMISTER- Reddish brown coarse to fine SAND, trace Silt

MOISTURE CONTENT (%) 14

TOTAL WET DENSITY (pcf) 127

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 96

PERCENT SILT (74.0-2.0 µm) 4

PERCENT CLAY (<2.0 µm)

SAMPLE NO. F07MA 3810 500 MY

SAMPLE DEPTH, ft. 0-1

SAMPLING DATE 5-30-85

DRAWN BY [illegible] 7-10-85

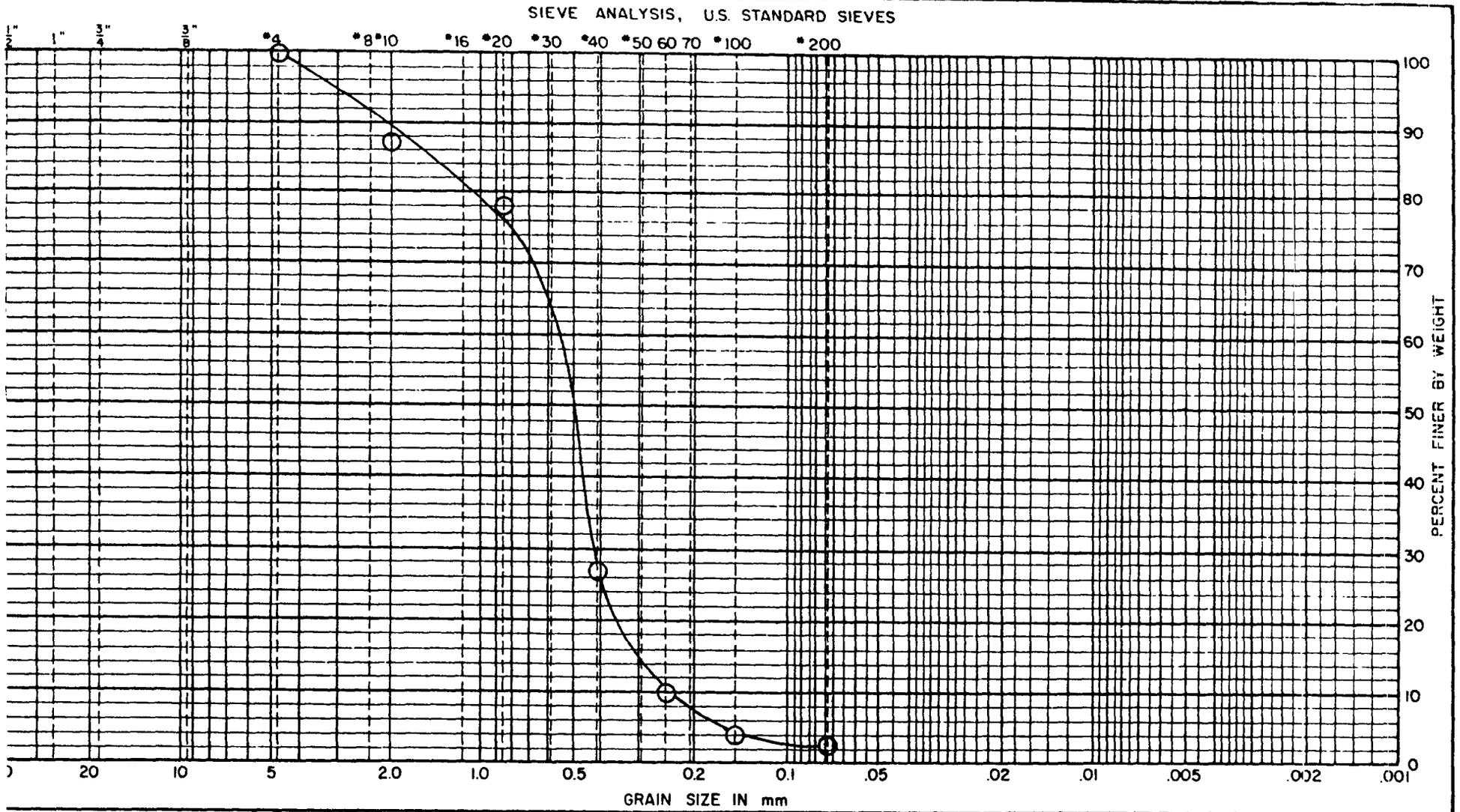
CHECKED BY SAG 7-10-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004736



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 14

TOTAL WET DENSITY (pcf) 131

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Reddish brown, coarse to fine SAND with a trace of silt, SP

BURMISTER - Reddish brown coarse to medium(+) to fine SAND, trace(-) Silt

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 97

PERCENT SILT (74.0-2.0 μm) 3

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F07MA 3811 501 MY

SAMPLE DEPTH, ft. 1-2

SAMPLING DATE 5-30-85

DRAWN BY: 7-10-85

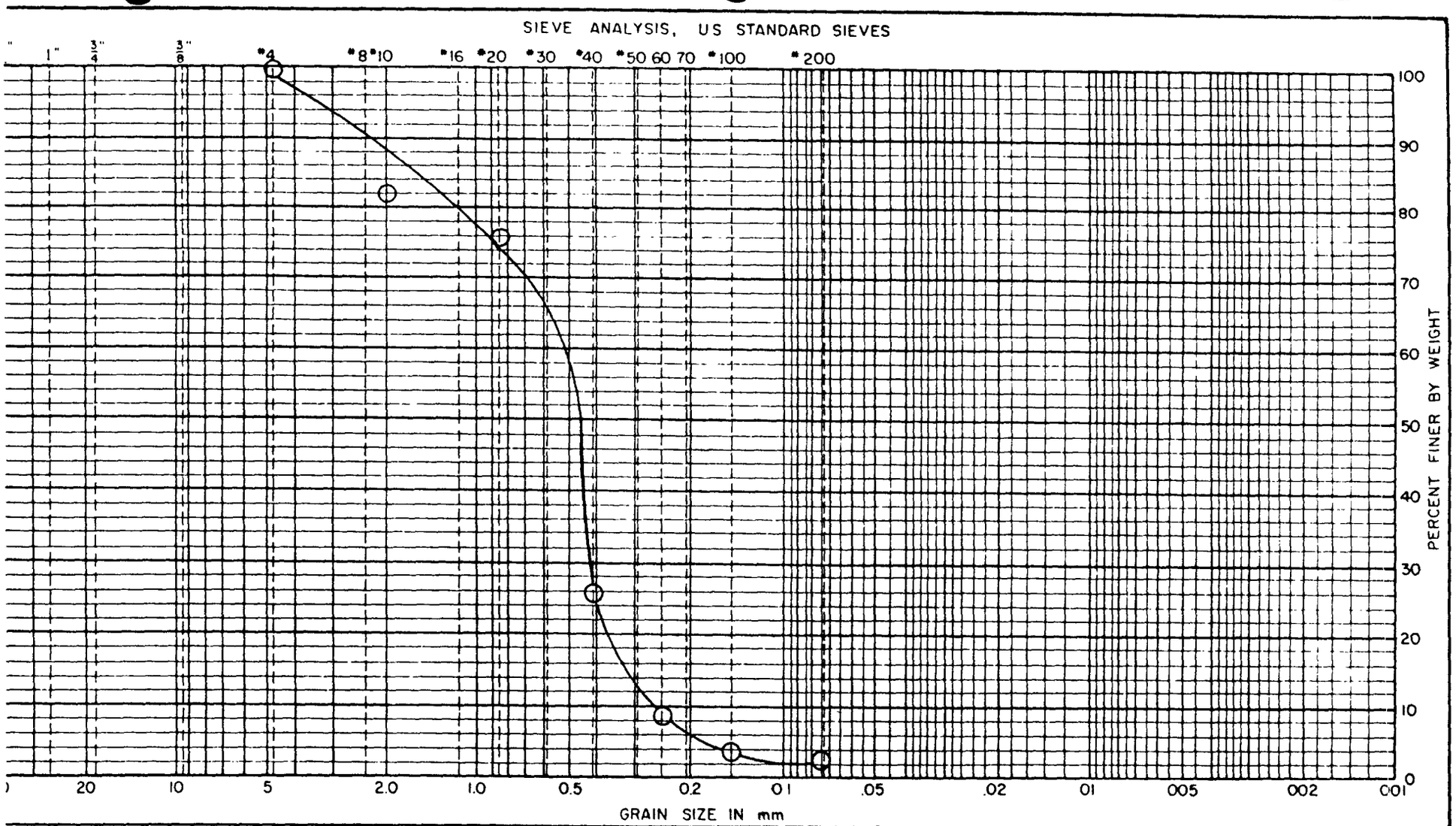
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004737



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, coarse, medium to fine SAND with a trace of silt, SP

BURMISTER- Brown coarse to medium(+) to fine SAND, trace(-) Silt

MOISTURE CONTENT (%) 13

TOTAL WET DENSITY (pcf) 139

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 97

PERCENT SILT (74.0-2.0 μm) 3

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F07MA 3812 502 MY

SAMPLE DEPTH, ft. 2-3

SAMPLING DATE 5-30-85

DRAWN BY: [illegible] 7-10-85

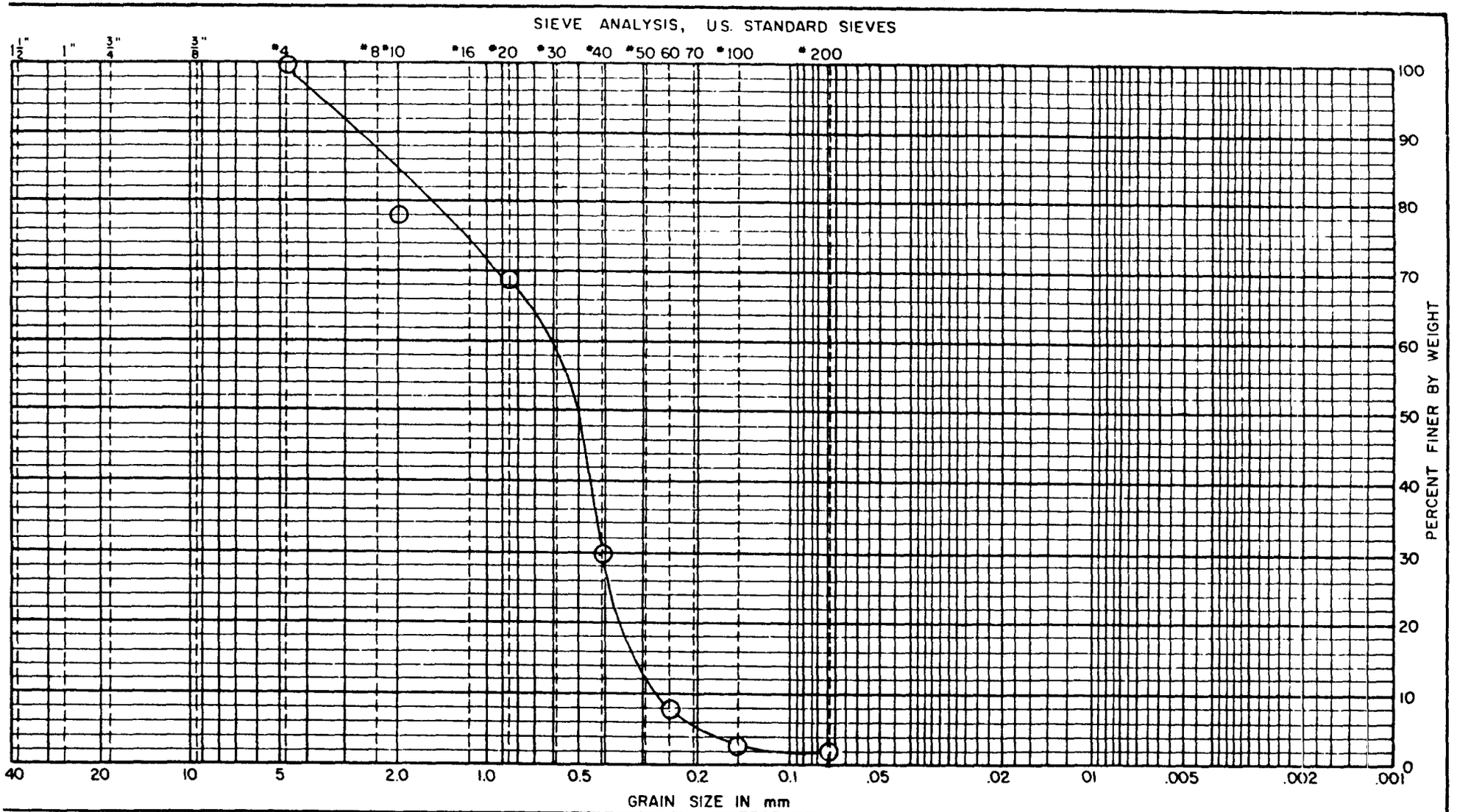
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004738



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Reddish brown coasre to medium SAND with a trace of silt, SP

BURMISTER - Reddish brown coarse to medium SAND, trace (-) Silt

MOISTURE CONTENT (%) 13

TOTAL WET DENSITY (pcf) 129

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 98

PERCENT SILT (74.0-2.0 μm) 2

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F07MA 3813 503 MY

SAMPLE DEPTH, ft. 3-4

SAMPLING DATE 5-30-85

DRAWN BY: [illegible] 7-10-85

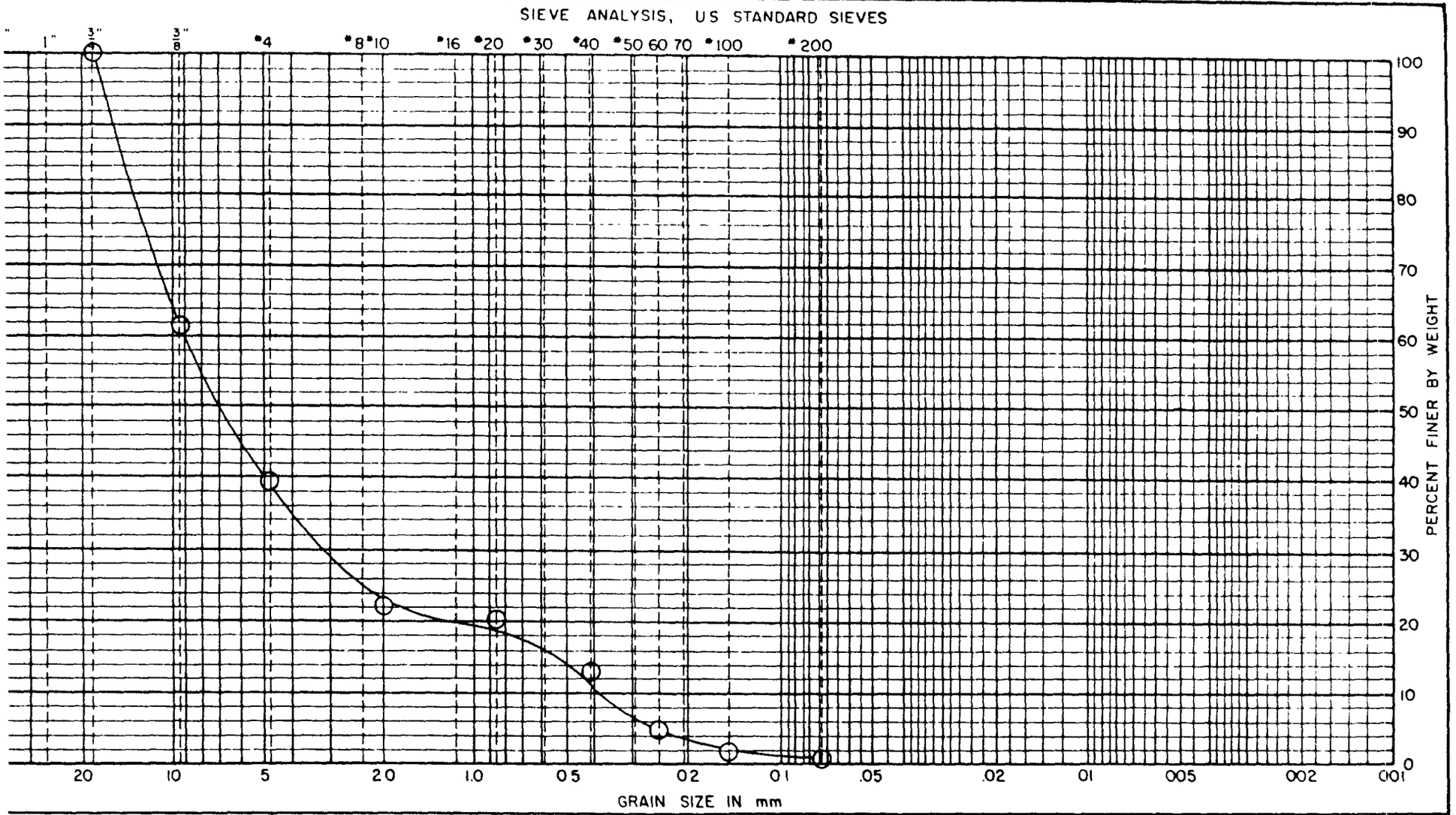
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

DEP\DA0004739



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown, fine GRAVEL and coarse to fine SAND with and trace of silt, SP-SP

BURMISTER- Brown, fine GRAVEL and coarse to fine Sand, trace(-) Silt

MOISTURE CONTENT (%) 11

TOTAL WET DENSITY (pcf) 132

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 99 (58 Gravel, 41-Sand)

PERCENT SILT (74.0-2.0 μm) 1

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F07MA 3814 504 MY

SAMPLE DEPTH, ft. 4-5

SAMPLING DATE 5-30-85

DRAWN BY: 7-10-85

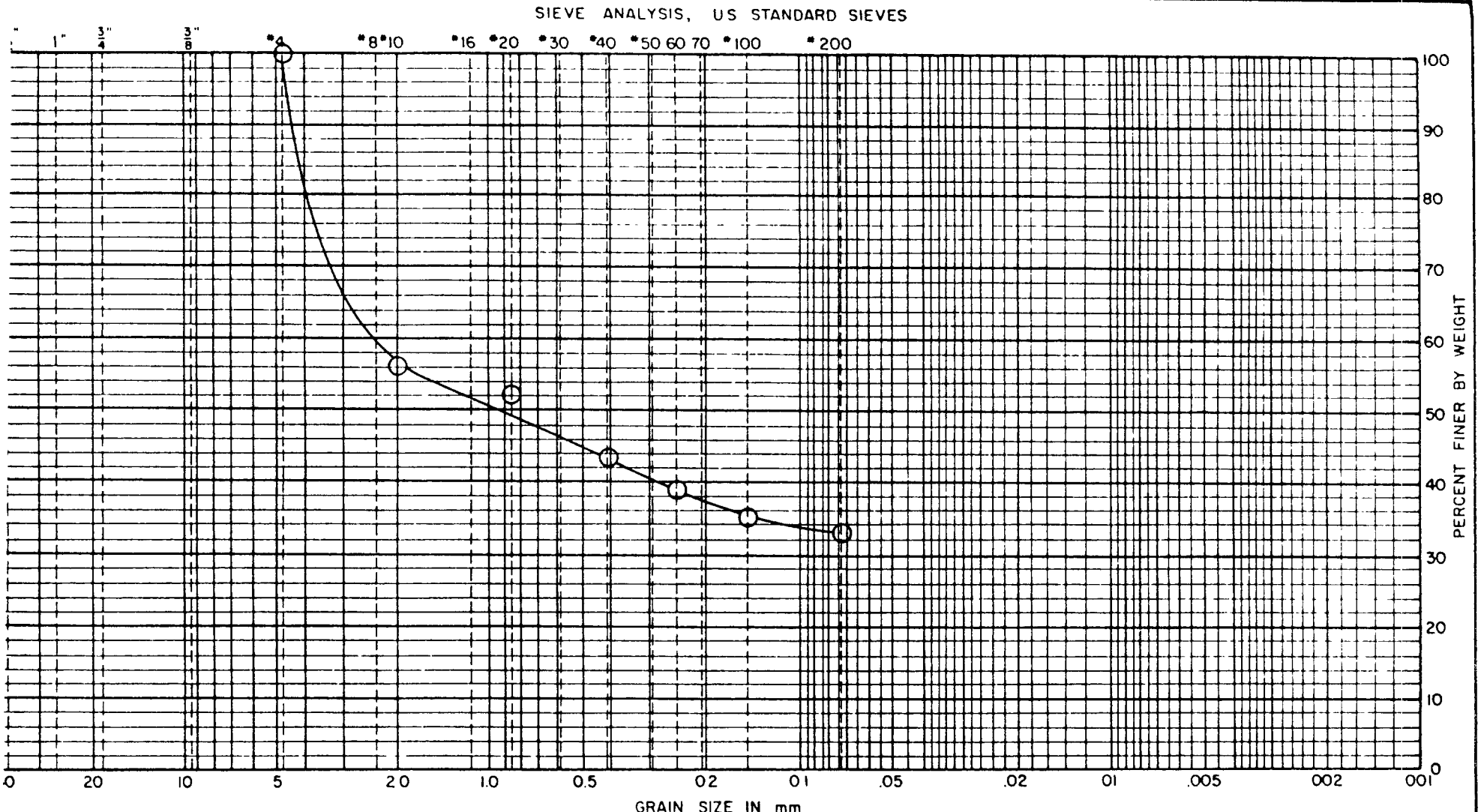
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004740



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, coarse to fine grained SAND with some silt and clay

BURMISTER- Dark gray coarse(+) to fine SAND, some(+) Silt and Clay

MOISTURE CONTENT (%) 20

TOTAL WET DENSITY (pcf) 122

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 68

PERCENT SILT (74.0-2.0 μm) } 32

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F65LB 3986 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-30-85

DRAWN BY: 7-10-85

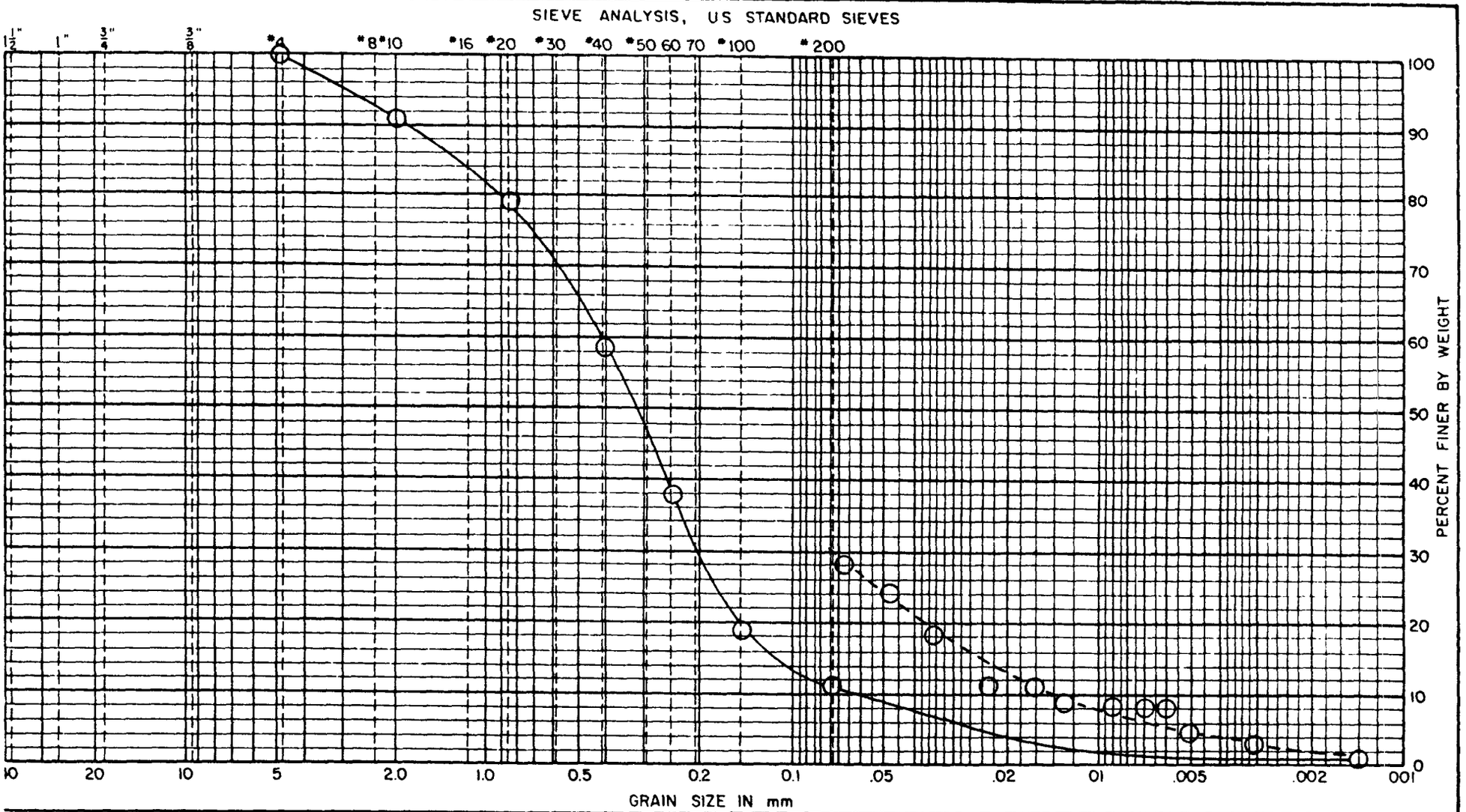
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO

DEP\DA0004741



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brown to dark brown Silty SAND, SW-SM

BURMISTER-Brown to dark brown coarse to fine(+) SAND, trace(+) Silt

MOISTURE CONTENT (%) 35

TOTAL WET DENSITY (pcf) 130

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 89

PERCENT SILT (74.0-2.0 µm) 10

PERCENT CLAY (<2.0 µm) 1

SAMPLE NO. F65LB 3987 201 MY

SAMPLE DEPTH, ft. 2-2.4

SAMPLING DATE 5-30-85

DRAWN BY: Ch 7-10-85

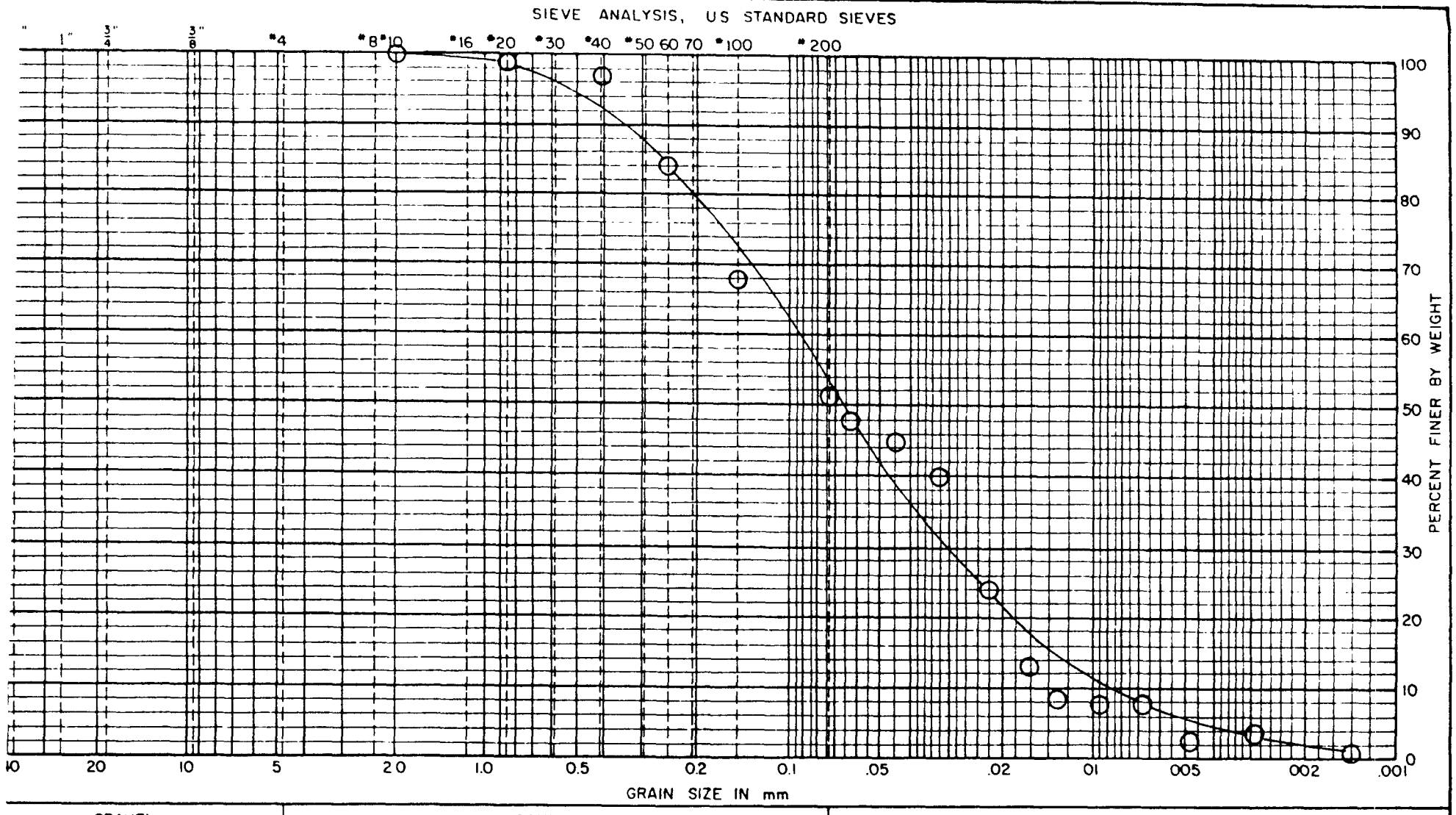
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004742



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray SILT and SAND with trace of clay

BURMISTER - Dark gray SILT and (+) Sand trace(-) Clay

MOISTURE CONTENT (%) 29

TOTAL WET DENSITY (pcf) 137

SPECIFIC GRAVITY 2.66

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 48

PERCENT SILT (74.0-2.0 μm) 50

PERCENT CLAY (<2.0 μm) 2

SAMPLE NO. F65LD 4006 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 5-30-85

DRAWN BY 7-10-85

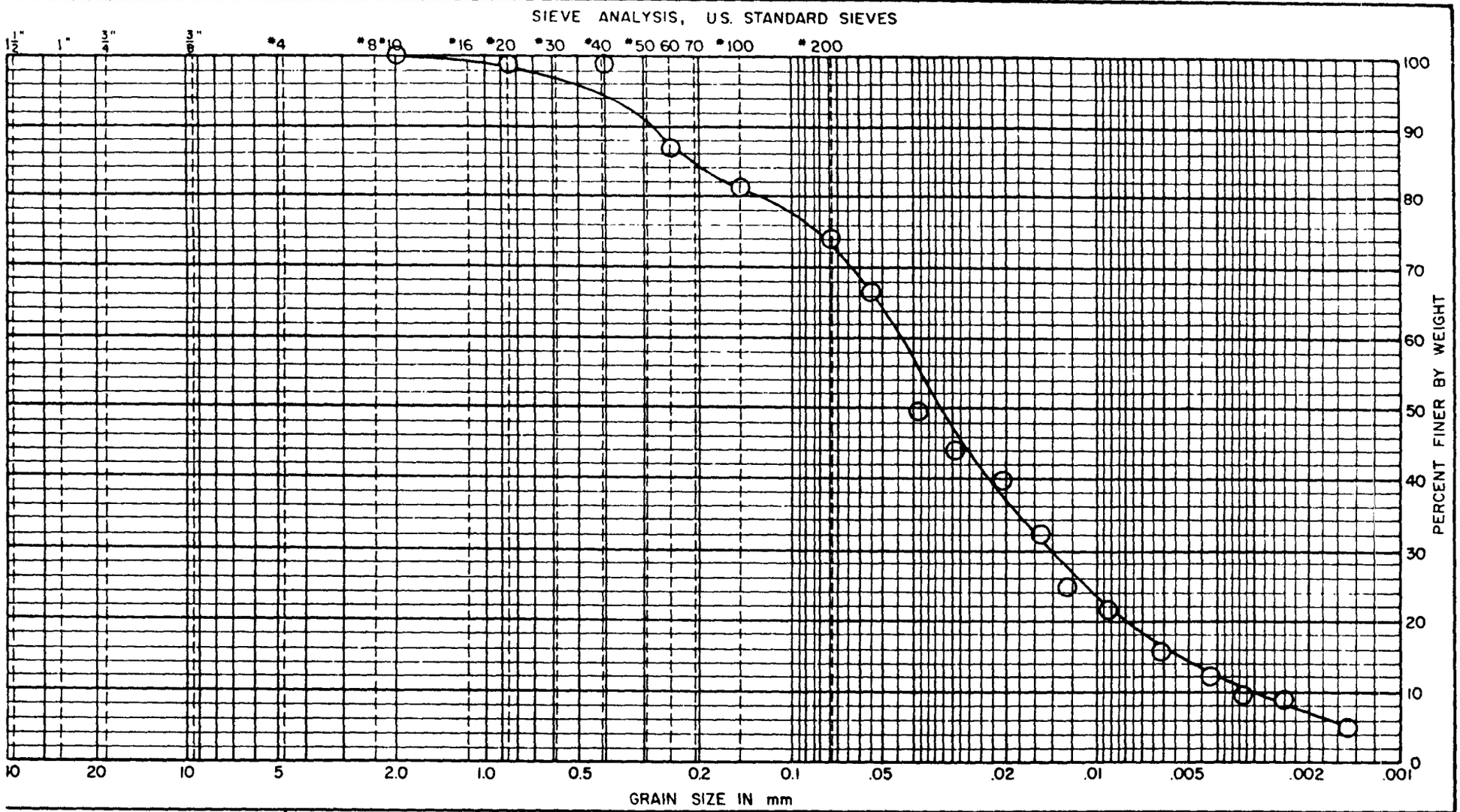
CHECKED BY SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG NO.

DEP\DA0004743



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Grayish brown, Clayey SILT with some medium to fine sand

BURMISTER- Grayish brown Clayey SILT some, medium to fine Sand

MOISTURE CONTENT (%) 37

TOTAL WET DENSITY (pcf) 115

SPECIFIC GRAVITY 2.68

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 26

PERCENT SILT (74.0-2.0 μm) 66

PERCENT CLAY (<2.0 μm) 8

SAMPLE NO. F65LD 4007 20~~0~~1 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 5-30-85

DRAWN BY: 7-10-85

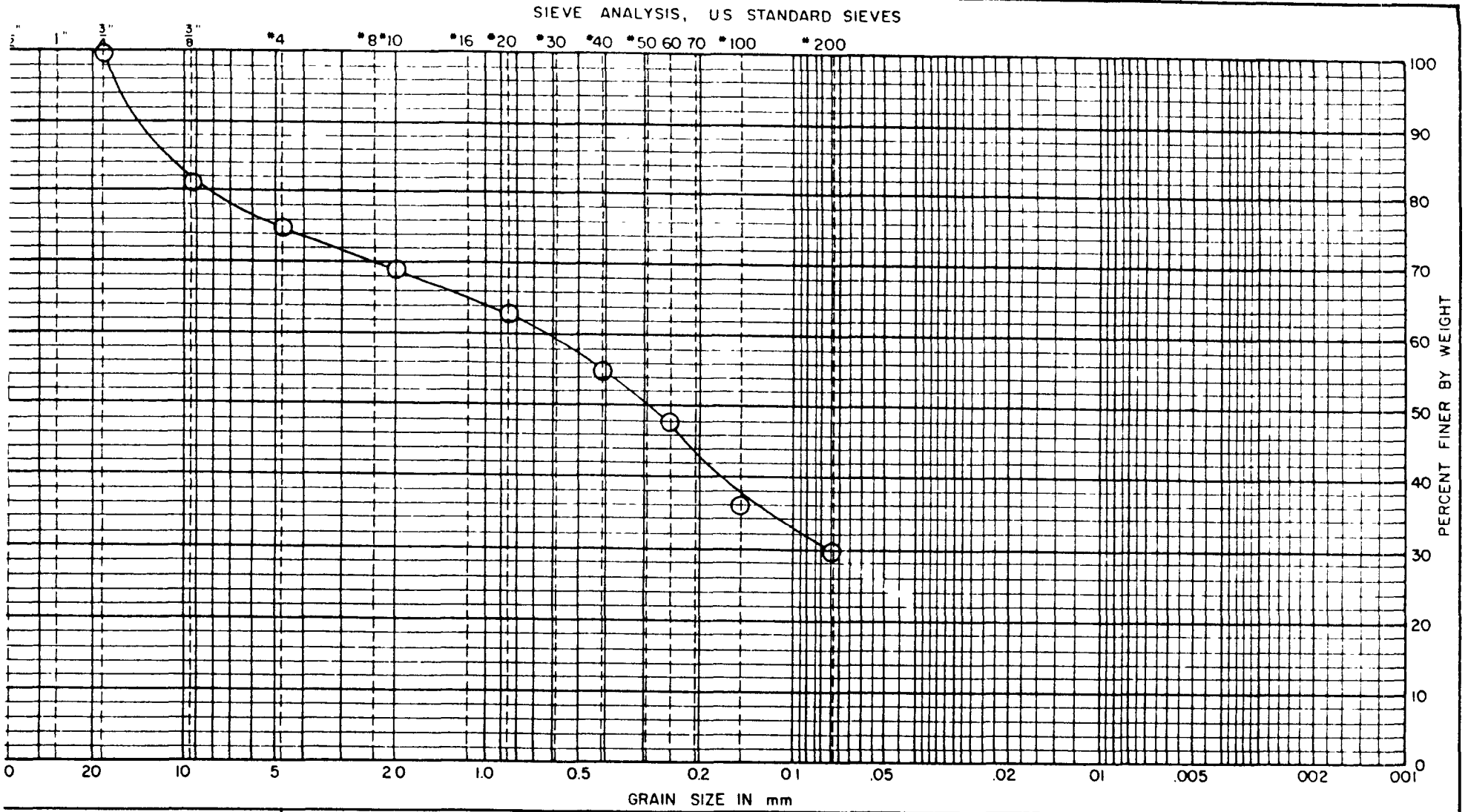
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004744



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 10

TOTAL WET DENSITY (pcf) 152

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Red brown, coarse to fine SAND with some silty clay and fine gravel, SM-SC

BURMISTER- Red brown coarse to fine SAND, some Silty Clay, some(-) fine Gravel

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 70

PERCENT SILT (74.0-2.0 μm) } 30

PERCENT CLAY (<2.0 μm)

SAMPLE NO. F65LD 4008 202 MY

SAMPLE DEPTH, ft. 4-4.7

SAMPLING DATE 5-30-85

DRAWN BY: [illegible] 7-11-85

CHECKED BY: SAG 7-12-85

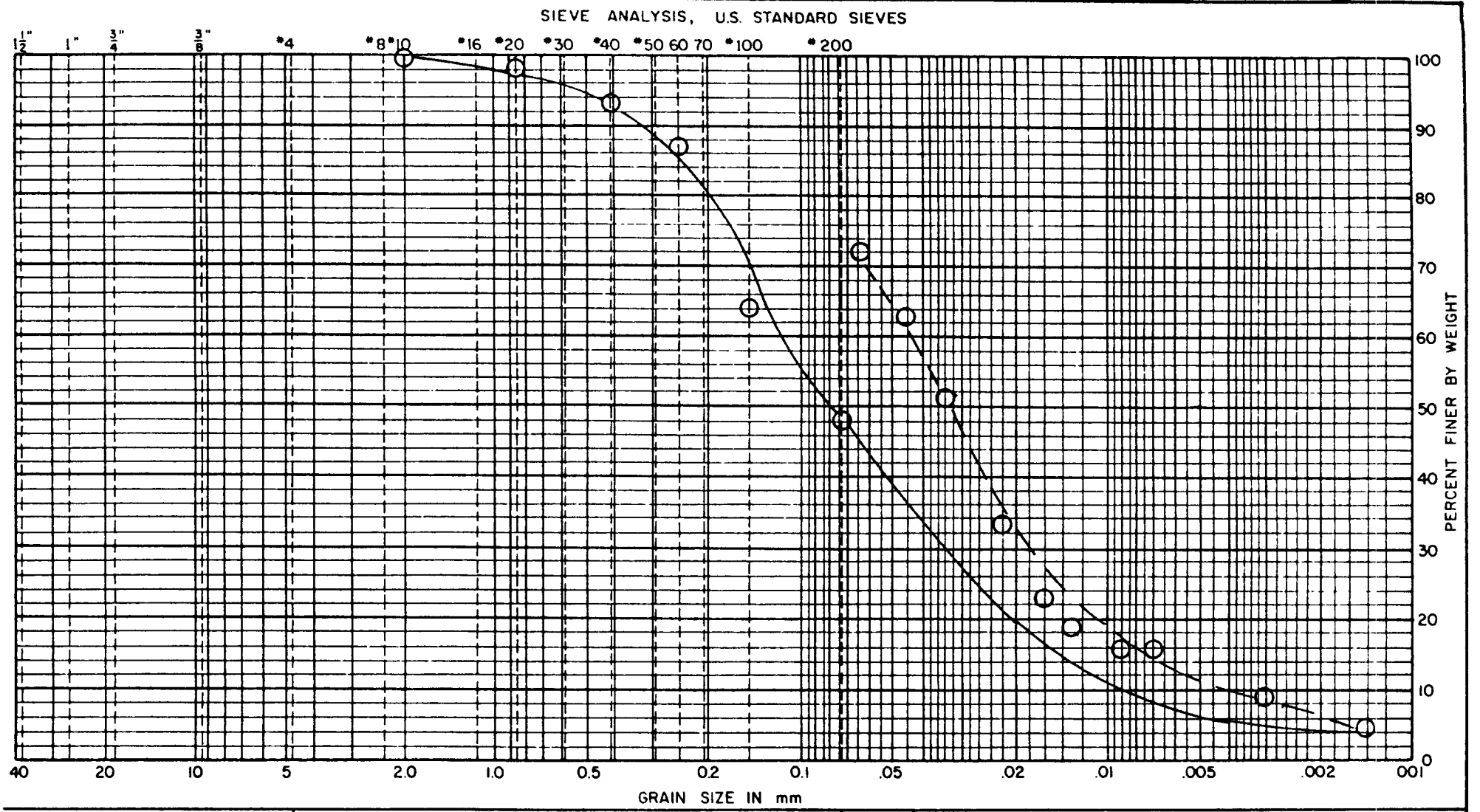
GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004745

CONTROL REACH



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Black and dark brown, medium to fine grained SAND and organic Clayey SILT with trace vegetative leaves, SM-SC

BURMISTER-Black and dark brown medium to fine SAND, and Organic SILT, trace Clay little vetetative leaves and fibers

MOISTURE CONTENT (%) 77

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY 2.54

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 52

PERCENT SILT (74.0-2.0 µm) 43

PERCENT CLAY (<2.0 µm) 5

SAMPLE NO. C01LA 3680 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 6-4-85

DRAWN BY: 7-11-85 tew

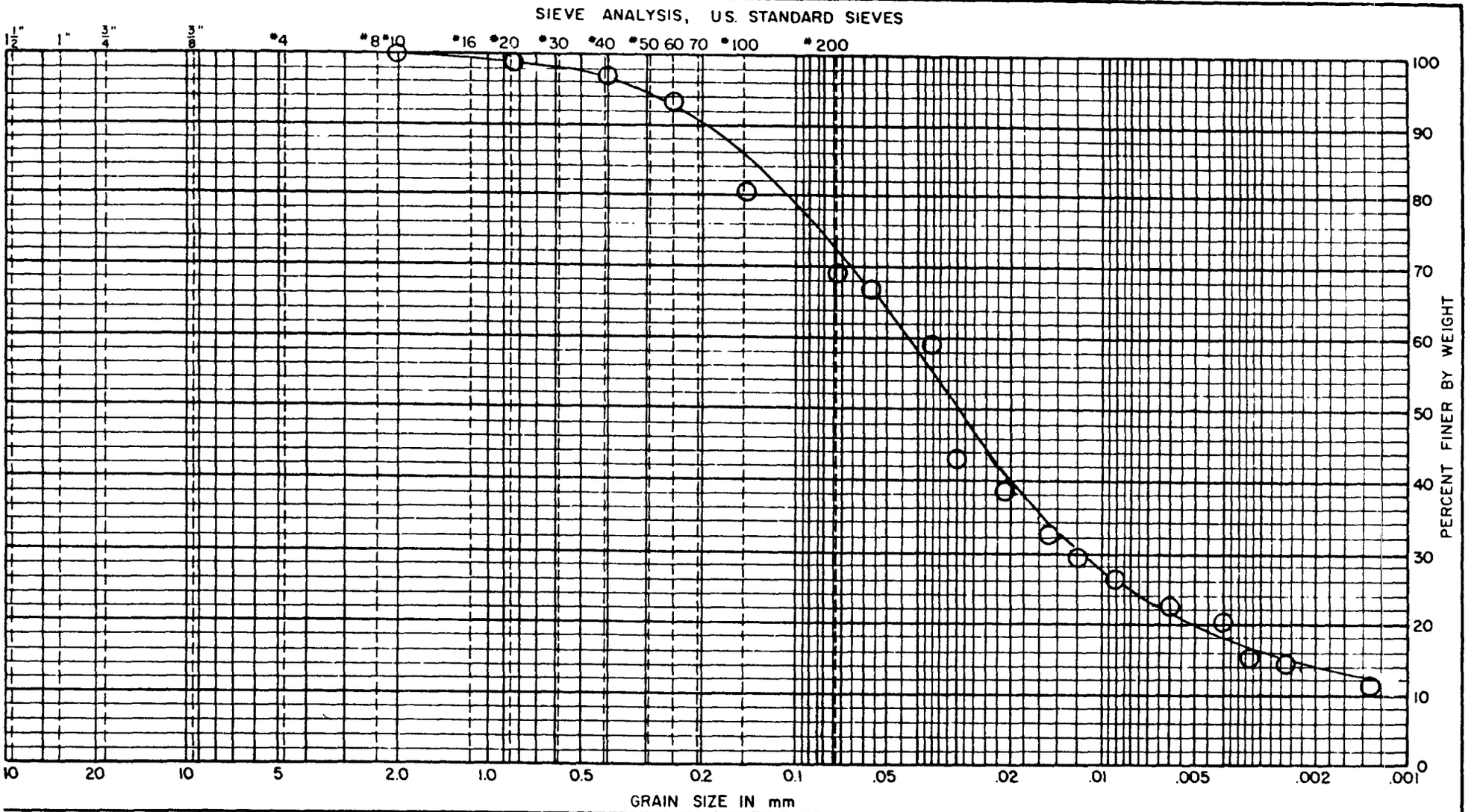
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004747



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Silty CLAY with trace of fine sand, vegetative leaves and fibers OH

BURMISTER- Dark gray Organic SILT, little Clay, some, fine Sand little vegetative leaves

MOISTURE CONTENT (%) 98

TOTAL WET DENSITY (pcf) 85

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 28

PERCENT SILT (74.0-2.0 μm) 58

PERCENT CLAY (<2.0 μm) 14

SAMPLE NO. C01LA 3681 201 MY

SAMPLE DEPTH, ft. 2-4

SAMPLING DATE 6-4-85

DRAWN BY: 7-11-85

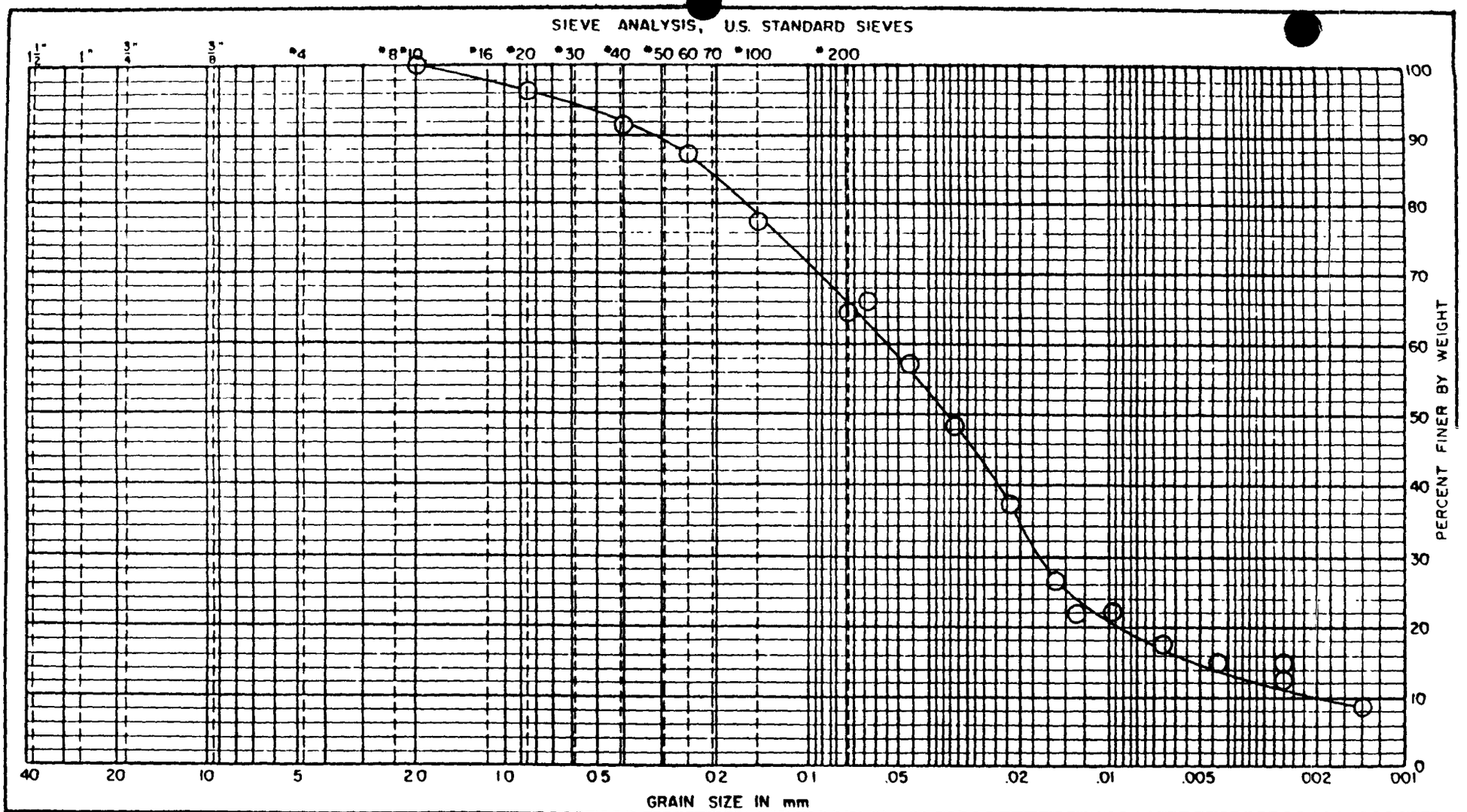
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004748



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 122

TOTAL WET DENSITY (pcf) 78

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Black and dark brown Clayey SILT and medium to fine Sand.

BURMISTER- Black and dark brown Clayey SILT and medium to fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 34

PERCENT SILT (74.0-2.0 µm) 56

PERCENT CLAY (<2.0 µm) 10

SAMPLE NO. C01LA-3682-202-MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 6/4/85

DRAWN BY: CR 7-26-85

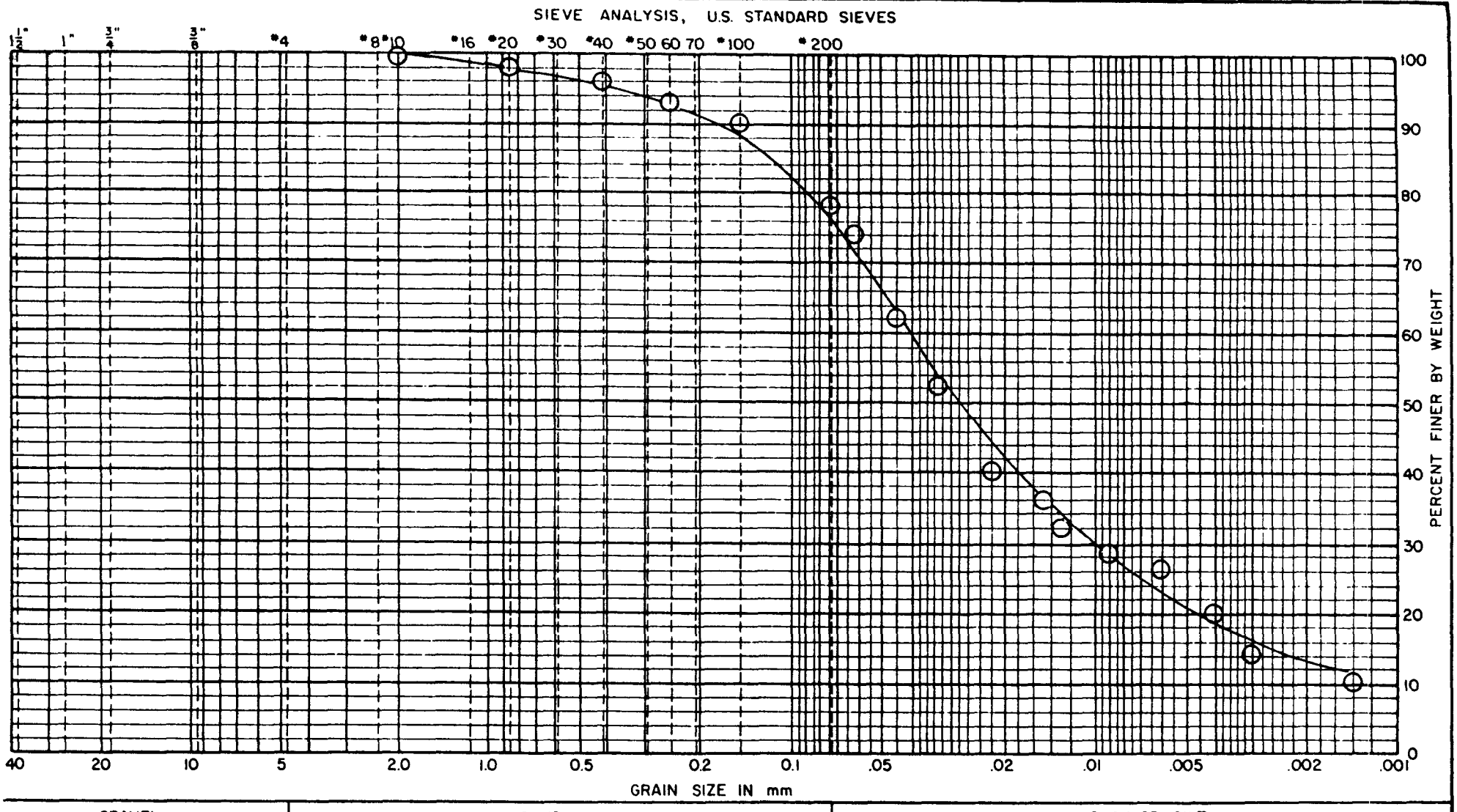
CHECKED BY: SAG 7-29-85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004749



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 123

TOTAL WET DENSITY (pcf) 72

SPECIFIC GRAVITY

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark brown, organic Clayey SILT with some medium to fine sand, vegetative leaves and fibers, OH-PT

BURMISTER- Dark brown Organic SILT, little(-) Clay, some(-), medium to fine Sand, some vegetative leaves and fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 24

PERCENT SILT (74.0-2.0 μm) 64

PERCENT CLAY (<2.0 μm) 12

SAMPLE NO. C01LA 3683 203 MY

SAMPLE DEPTH, ft. 6-6.5?

SAMPLING DATE 6-4-85

DRAWN BY: tew 7-11-85

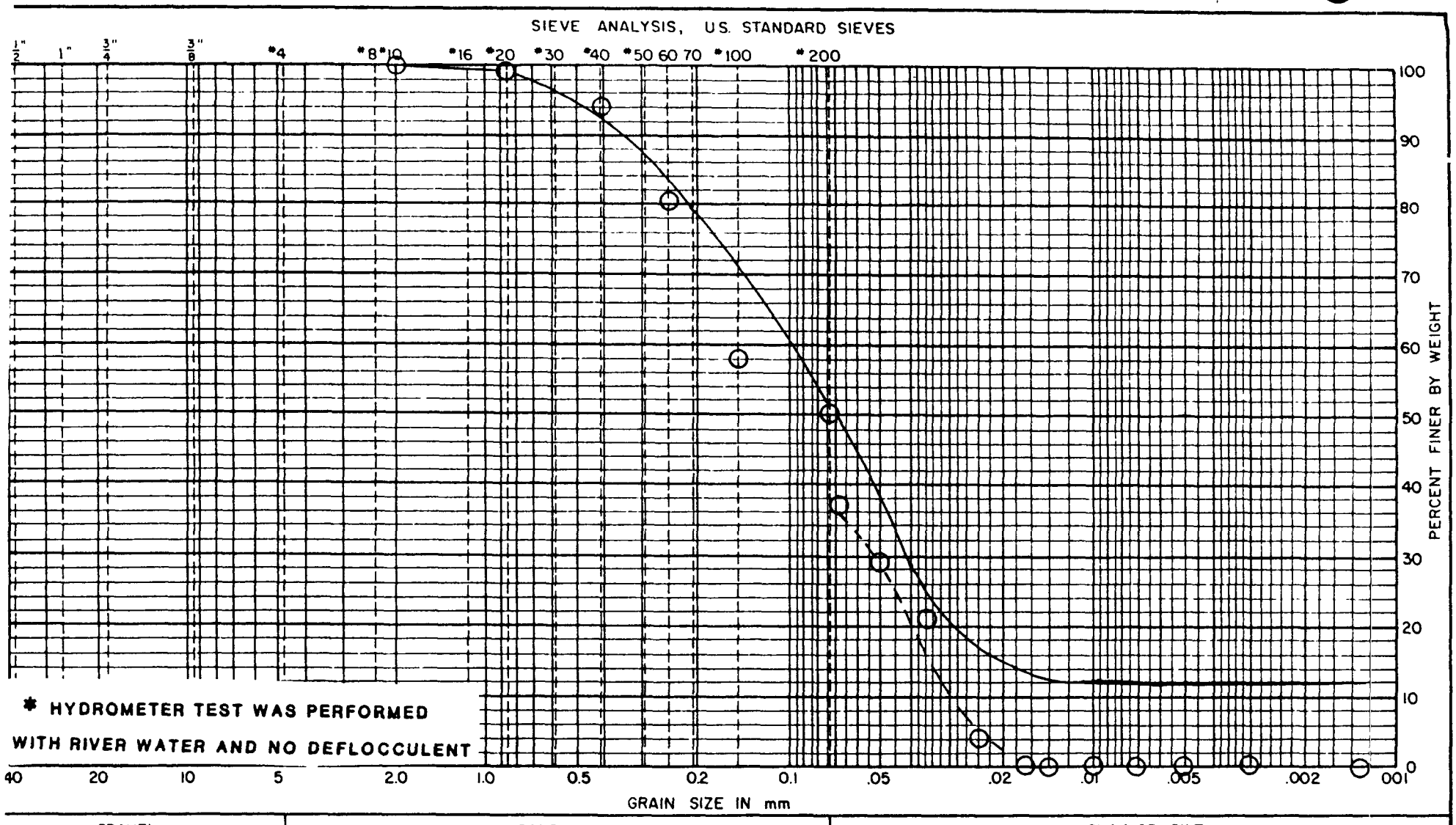
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG. NO.

DEP\DA0004750



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Brownish gray, medium to fine grained SAND and CLAY and/or SILT* SM-SC

BURMISTER- Brownish gray medium to fine SAND and CLAY and/or SILT*

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 50

PERCENT SILT (74.0-2.0 µm) } 50

PERCENT CLAY (<2.0 µm)

MOISTURE CONTENT (%) 91

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY 2.53

SAMPLE NO. C01MA 3670 200 MY (River Water)

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 6-4-85

DRAWN BY: 7-11-85

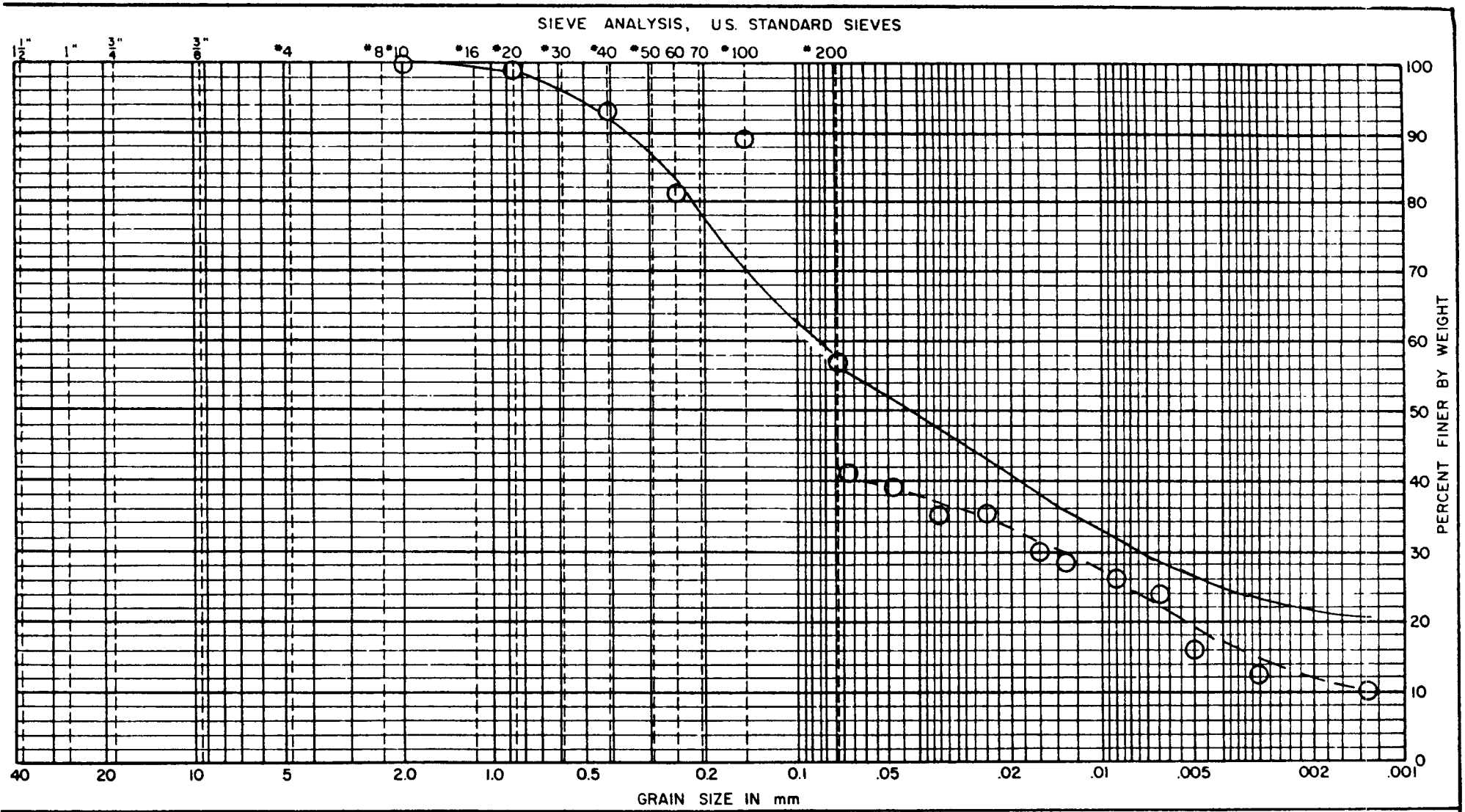
CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG. NO.

DEP\DA0004751



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 91

TOTAL WET DENSITY (pcf) 83

SPECIFIC GRAVITY 2.53

VISUAL CLASSIFICATION OF SAMPLE

USC - Brownish gray, fine SAND and Clayey SILT, SM-SC

BURMISTER - Brownish gray fine Sand and Silt, some(-) Clay, trace plant fibers

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 43

PERCENT SILT (74.0-2.0 μm) 35

PERCENT CLAY (<2.0 μm) 22

SAMPLE NO. C01MA 3670 200 MY

SAMPLE DEPTH, ft. 0-2

SAMPLING DATE 6-4-85

DRAWN BY: 7-11-85

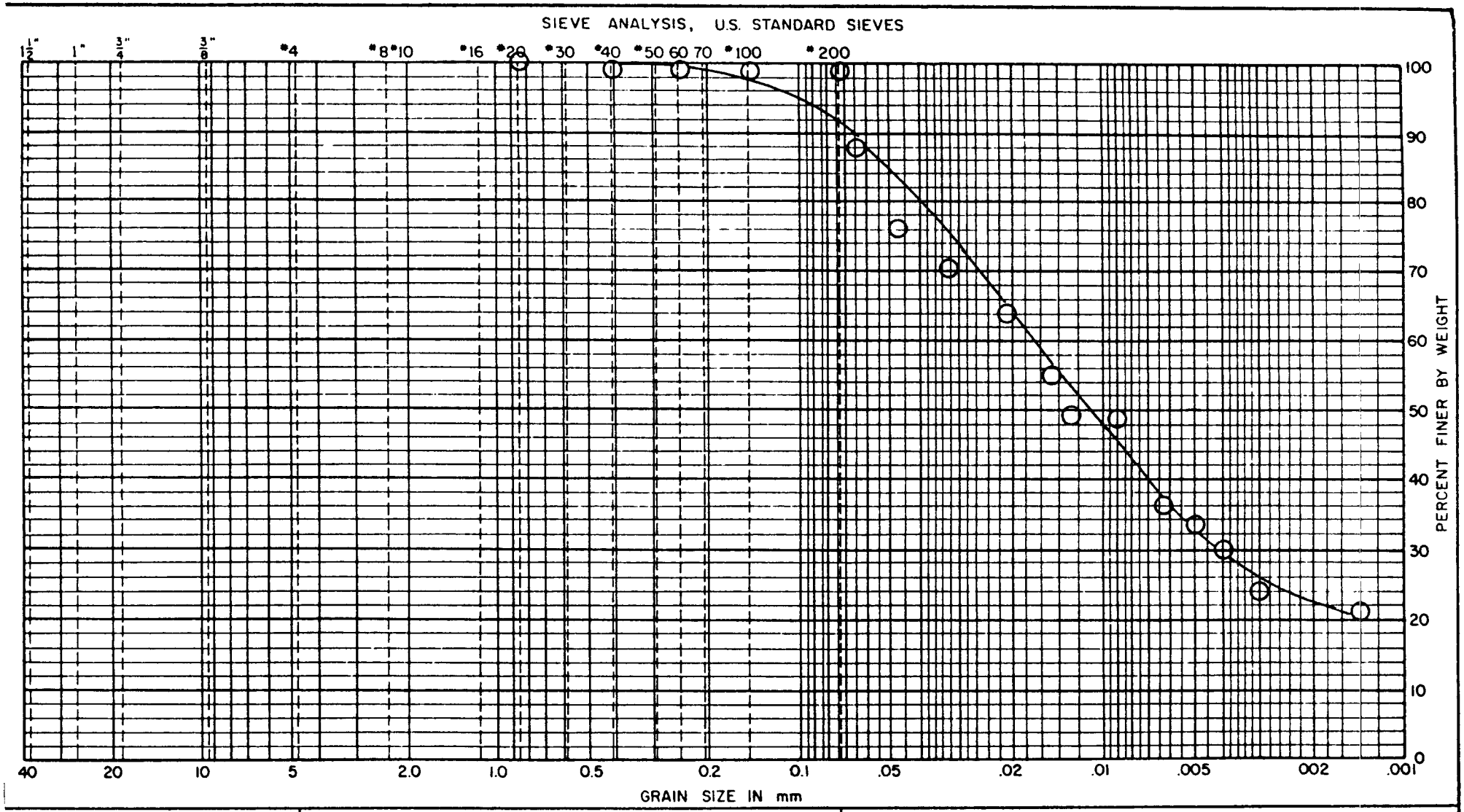
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO

FIG NO.

DEP\DA0004752



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

MOISTURE CONTENT (%) 175

TOTAL WET DENSITY (pcf) 75

SPECIFIC GRAVITY _____

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Silty CLAY with trace of fine sand, OH

BURMISTER- Dark gray Organic SILT, some(-) Clay, trace(+), fine Sand

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 µm) 8

PERCENT SILT (74.0-2.0 µm) 70

PERCENT CLAY (<2.0 µm) 22

SAMPLE NO. C01MA 3671 201 MY

SAMPLE DEPTH, ft. 2-4 ?

SAMPLING DATE 6-4-85

DRAWN BY: GA 7-10-85

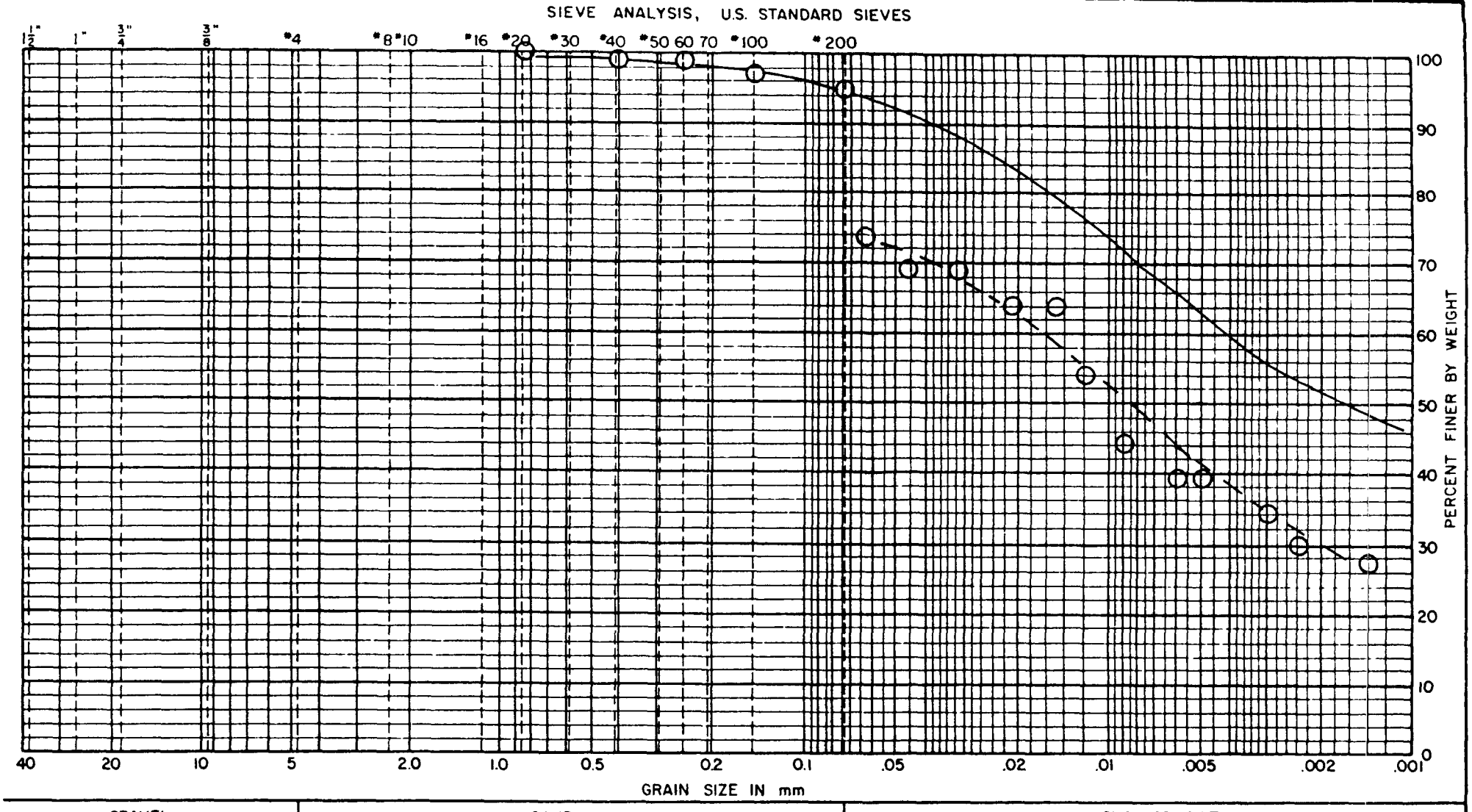
CHECKED BY: SAG 7-12-85

GRADATION CURVES

PROJECT NO.

FIG NO.

DEP\DA0004753



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray to gray, Silty CLAY with trace fine sand and vegetative fibers

BURMISTER- Dark gray to gray Organic CLAY and SILT, trace fine Sand, trace vegetative fibers

MOISTURE CONTENT (%) 168

TOTAL WET DENSITY (pcf) 72

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 5

PERCENT SILT (74.0-2.0 μm) 44

PERCENT CLAY (<2.0 μm) 51

SAMPLE NO. C01MA 3672 202 MY

SAMPLE DEPTH, ft. 4-6

SAMPLING DATE 6-4-85

DRAWN BY: 7-10-85

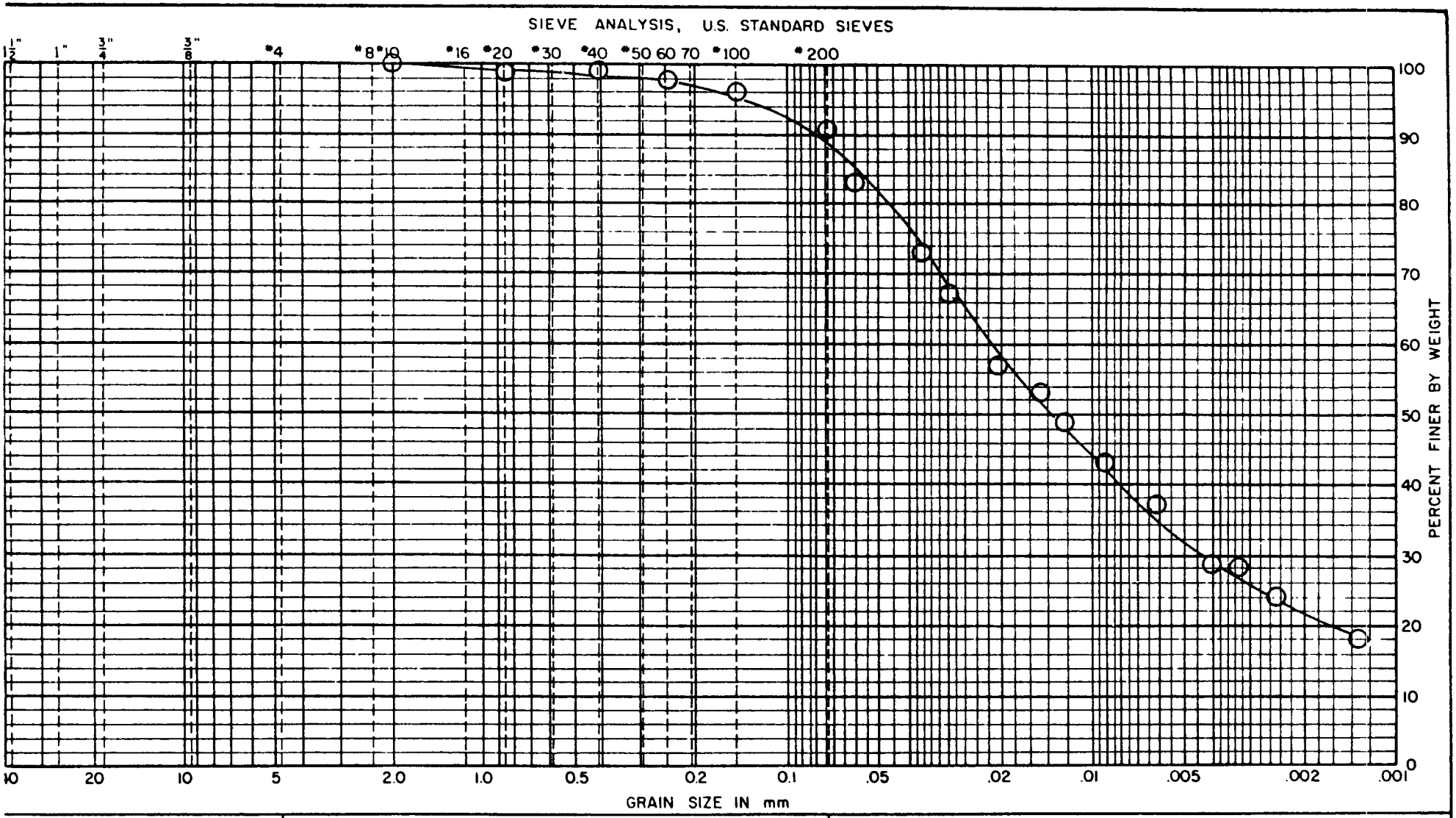
CHECKED BY: SAG 7-12-85

PROJECT NO

GRADATION CURVES

FIG. NO.

DEP\DA0004754



GRAVEL		SAND			CLAY OR SILT
COARSE	FINE	COARSE	MEDIUM	FINE	

VISUAL CLASSIFICATION OF SAMPLE

USC - Dark gray, organic Silty CLAY with trace of fine sand and some vegetative leaves and fibers, OH

BURMISTER- Dark gray Organic SILT, some(-) Clay, trace(+) fine Sand, some(+) vegetative leaves and misc. fibers

MOISTURE CONTENT (%) 91

TOTAL WET DENSITY (pcf) 71

SPECIFIC GRAVITY

GRAIN SIZE DISTRIBUTION (USC)

PERCENT SAND (>74.0 μm) 11

PERCENT SILT (74.0-2.0 μm) 68

PERCENT CLAY (<2.0 μm) 21

SAMPLE NO. C01MA 3673 203 MY

SAMPLE DEPTH, ft. 6-6.75 ?

SAMPLING DATE 6-4-85

DRAWN BY: tw 7-8-85

CHECKED BY: SAG 7-12-85

PROJECT NO.

GRADATION CURVES

FIG NO.

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APPENDIX
G

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APPENDIX G

GEOSTATISTICAL ANALYSIS OF THE SPATIAL DISTRIBUTION OF DIOXIN CONCENTRATIONS IN THE PASSAIC RIVER

APPENDIX G. GEOSTATISTICAL ANALYSIS OF THE SPATIAL DISTRIBUTION OF DIOXIN CONCENTRATIONS IN THE PASSAIC RIVER

A nonparametric geostatistical analysis was used to infer the spatial distribution of dioxin in the sediments of the Passaic River from the dioxin concentrations measured during the course of this investigation. The applicability of nonparametric geostatistical techniques, that is geostatistical techniques free of underlying assumptions regarding the form of the local concentration distribution, to the estimation of spatial distribution of hazardous contaminants has been demonstrated (Issaks, 1984). The development of this technique occurred in response to situations like the one presented by the distribution of dioxin in the lower Passaic River sediments, where the concentration distribution is highly skewed and the data exhibit extreme variability of concentrations in small spatial neighborhoods. Computer software used in conducting this study was obtained from Geostat Systems International (1985) and SAS Institute (1982, 1982).

In the subject investigation of dioxin concentrations in the sediments of the Passaic River, estimates of the local distribution of dioxin concentrations are sought rather than estimates of the concentrations themselves. The application of "indicator Kriging" to the problem of estimating the spatial distribution of dioxin concentrations has notable advantages as described in Chapter 6.0 of this report. Providing risk qualified mappings of dioxin concentrations, the technique permits incorporation of measurements reported as less than the limit of detection, and works well when concentrations vary greatly with small spatial volumes, as in the case for dioxin distribution within the lower Passaic River sediments.

G.1 CHOICE OF "CUTPOINT" CONCENTRATIONS

On the assumption that the total lower Passaic River constituted an entity in terms of sediment concentrations of dioxin, all the observed dioxin concentration data were used to estimate the sample cumulative distribution function. Figures 6-1 through 6-4 of this report present this cumulative distribution function. This cumulative distribution function was divided into

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eleven segments with the choice of ten concentration "cutpoints" thus defining ten indicator variables which were analyzed using the geostatistical techniques described below.

The ten "cutpoints" were chosen primarily to provide an adequate linear segmentation of the cumulative distribution function (cdf). The ability of the chosen segmentation to describe the relationship between the sample cumulative distribution function (rank order of the data) and the measured concentration with a linear relationship within each segment was confirmed by performing simple linear regression of the cdf on the observed concentration. A few "cutpoints", such as the NJDEP-accepted limit of detection (0.78 ppb) and 1 ppb were selected based on convenience. These "cutpoints," which form the basis for the indicator variables and the linear approximations to the various segments, are also shown in Figures 6-1 through 6-4 and Table 6-1.

G.2 INDICATOR DATA TRANSFORM

To apply indicator kriging (IK), the data must be transformed from the original measurements of concentrations into indicator variables. This was accomplished by letting $z(x_a)$, a=1, N represent the initial data set,

where:

$z(x_a)$	= the dioxin concentration at datum location x_a, which as interpreted as a realization of the random variable, $Z(x_a)$,
x_a	= the location of the datum in space, given in three dimensional coordinates, and
N	= the total number of data.

The indicator transform of the datum, $z(x_a)$, is defined as:

$$i(x_a:z) = \begin{cases} 1, \text{ if } z(x_a) \leq z, \\ 0, \text{ if not,} \end{cases} \qquad (G.1)$$

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where z = a "cutpoint" concentration.

The distribution of the associated random variable, $I(x_a:z)$, is called a Bernoulli distribution, and its mean and variance are given by:

$$E[I(x:z)] = 1 \cdot prob[z(x) \leq z] + 0 \cdot prob[z(x) \geq z] = F(z), \quad (G.2)$$

$$Var[I(x:z)] = F(z) \cdot [1 - F(z)], \quad (G.3)$$

where, $F(z) = prob[z(x) \leq z]$ is the stationary cumulative distribution function of the random variable Z(x).

In practice, F(z) is estimated by the cumulative histogram, $F^*[z(x_a)]$, of all the N data. If each datum receives the weight 1/N, the cumulative histogram is given by:

$$F^*[z(x_a)] = (1/N) \cdot t_a, \text{ for } a = 1,\ldots,N \quad (G.4)$$

where t_a is the rank order of the datum $z(x_a)$ which is an integer ranging from 1 (for the smallest datum), to N (for the largest datum).

G.3 THE INDICATOR KRIGING ESTIMATOR

The goal of IK estimation is to estimate the conditional distribution function of the unknown concentrations, Z(x) at location x, given "n" data within its neighborhood. Symbolically this is represented as:

$$F_x[Z| \ (n)] = prob[Z(x) \leq z| \ (n)] \quad (G.5)$$

An estimate of the conditional distribution of Z(x) can be obtained by an ordinary Kriging of the indicator transformed data.

The indicator Kriging estimator, $1^*(x:z)$, appears as a linear combination of the indicator data, $i(x_a:z)$, in the neighborhood, "n", surrounding the point for which a prediction is to be made. This can be symbolized as

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$$I^*(x:z) = \sum_{\bar{n}} w_a \bullet i(x_a:z) \qquad (G.6)$$

where the weights, w_a, are derived from the variogram description of regional continuity. $I^*(x:z)$ is an estimate of the conditional distribution function of $Z(x)$ given the data. Note that there are as many indicator Kriging estimators as there are cutpoints. In the present case there are 10 such estimators.

G.4 VARIOGRAM DESCRIPTION OF CONTINUITY

The spatial continuity relationship (correlation) for each indicator, $I(x:z_k)$, was characterized by an empirical variogram model of the apparent continuity in each of three dimensions. The construction of such a model is based on the assumption that the value of the indicator at location x, i.e. $I(x:z_k)$, may be greatly influenced by values of that indicator at nearby locations and less influenced by more distant values. This degree of relationship between points a specified distance, h, apart may be measured by

$$q(h) = 1/2\ [I(x:z_k)-I(x+h:z_k)]^2 \qquad (G.7)$$

Averaging all differences between pairs of points separated by a distance, h, gives rise to the variogram.

The function q(h) is directly related to the coefficient of correlation, r(h), between two indicator values a distance h apart by:

$$r(h) = 1 - \frac{q(h)}{Var} \qquad (G.8)$$

where Var represents the total variance among the indicator values.

Continuity relationships are usually directionally dependent; therefore, a variogram model of each of these relationships (semi-variogram) was constructed for this investigation in the direction of river flow, the cross river direction and in the vertical direction with increasing depth.

G.5 EXPERIMENTAL VARIOGRAM MODELS

Based on the assumption that sediment depositional characteristics would likely create different continuity relationships in the "with flow" and "cross

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flow" directions of the river, sample variograms were estimated accordingly. The sample variograms are shown in Figures G-1 through G-10. Each figure presents the sample semi-variogram in the vertical plane, cross flow direction and with flow direction for one of the ten indicators.

The variogram model of continuity for each indicator was refined and the region of data influence (the neighborhood, "n") was determined by use of the "jacknife" technique. This is a technique of removing each datum one at a time and using the model to estimate the removed datum. The variogram models and associated regions of influence which minimized the sum squared differences between estimated and observed indicator values were used for estimation of the cdf in the river sediments. The final variogram models and the regions of influence are presented in Tables G-1 and G-2 in terms of the directional ranges and search radii, respectively, for each indicator. The range of the variogram is that distance between points of observation at which the covariation between the points is equal to the total variance of the data set; in other words, the distance beyond which spatial correlation vanishes. The search radii define the distance limitation for the information neighborhood to be used in the estimation.

The variogram model selected for use in this study is the "spherical" model. This model provided a reasonably good fit to the data in this study. The formula for the model is given by:

$$q(h) = \begin{cases} C_0 + C[1.5(h/a) - 0.5(h/a)^3] & \text{for } h \le a \\ C_0 + C & \text{for } h > a \end{cases} \qquad (G.9)$$

where,

C_0 = the variation due to "random" causes, often called the nugget effect,

C = the spatial variation due to the continuity structure of the variable,

h = the distance between samples,

C_0+C = the total variation among samples in the area under study, termed the sill of the variogram, and

a = the distance between samples at which the variogram reaches its sill, or range.

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G.6 ESTIMATION OF RIVER SEDIMENT CONCENTRATIONS

The characterization of the spatial distribution of dioxin concentrations in the sediments of the Passaic River was performed by obtaining estimates of the conditional probability distribution function, $I^*(x:z_k)$, for each of the ten concentration cutpoints, z_k, $k=1,\ldots,10$. These estimates of the probability that a cutpoint concentration will not be exceeded were obtained at each node of a 100- by 100- by 2-foot grid system for each identified river area from which sediment samples were obtained. The grid spacing was chosen based upon the reasoning that all measured concentrations could be characterized as representing composites of 2-foot increments of the core samples, and that very few borings were made within 100 feet of each other.

G.7 ORDER RELATIONS

In practice, the conditional probability distribution function, $Fx[z|\ (n)]$, is estimated by a discrete set of k values, $I^*(x:z_k)$, one for each of the k cutpoints. In this case there are ten such values. Since each estimate is determined individually, there is no guarantee that $I^*(x:z_k)$ will verify the order-relations of a cumulative distribution function, i.e.:

$$I^*(x:z_{k-1}) \leq I^*(x:z_k) \text{ for } k=2,\ldots,10 \qquad (G.10)$$

In cases where order relation problems presented themselves, corrected estimates were obtained using a simple averaging of the points in the region of the problem. This is consistent with the procedure recommended by Isaaks (1984) and the results are nearly identical to more sophisticated averaging algorithms. Once these ordering problems are resolved, several types of data presentations are possible.

G.8 DATA PRESENTATIONS

The conditional probability of an unknown dioxin concentration in an area being less than a threshold, T, can be found by simple linear interpolation from the estimated conditional probability distribution function. This interpolation is of the form:

$$\text{prob}[Z(x) \leq T|\ (n)] = I^*[x:z_{k-1}|\ (n)] +$$

$$I^*[x:z_k|\ (n)] - I^*[x:z_{k-1}|\ (n)] \cdot (T-z_{k-1})/(z_k-z_{k-1}) \qquad (G.11)$$

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The conditional probability of an unknown dioxin concentration being greater than the threshold, T, is just one minus the probability given by equation (G.11), i.e:

$$\text{prob}[Z(x) > T|\ (n)] = 1.0 - \text{prob}[Z(x) \leq T|\ (n)] \qquad \text{(G.12)}$$

The isopleths of the probability that an unknown dioxin concentration exceeds 1 ppb in the upper 2 feet of sediments of the site area reach as shown in Chapter 6.0 of this report were estimated in this manner.

The expected value of an unknown concentration of dioxin, Z(x), can be estimated using the following approximation to its conditional expectation:

$$E^*[Z(x)|(n)] = \sum_{1}^{K+1} u_k\left[I^*[x:z_k|(n)] - I^*[x:z_{k-1}|(n)]\right] \qquad \text{(G.13)}$$

where $I^*[x:z_{k+1}|\ (n)] = 1.0$,

$I^*[x:z_0|\ (n)] = 0.0$, and

u_k = the mean concentration of the class of data between cutpoint concentrations z_k and z_{k-1}.

The class mean concentrations are given in Table G-3. The predicted concentrations by river area given in Figure 6-6 represent the distribution of the conditional expectations of unknown concentrations estimated for each reach.

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TABLES

Table G-1. Variogram Models
Passaic River Sediments
2,3,7,8-TCDD Indicator Variables

		Variogram Ranges in Feet		
Indicator	Sill	With Flow	Cross River	Depth
I1	0.218	500	400	5.0
I2	0.249	250	250	5.0
I3	0.242	500	250	5.0
I4	0.235	500	250	5.7
I5	0.220	250	250	5.7
I6	0.196	250	250	5.7
I7	0.142	200	200	4.0
I8	0.094	200	200	4.0
I9	0.061	250	50	5.0
I10	0.021	250	50	2.0

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Table G-2. Estimation Neighborhoods
Passaic River Sediments
2,3,7,8-TCDD Indicator Variables

Indicator	Cutpoint TCDD,ppb	Information Ellipsoid Radii in Feet		
		With Flow	Cross River	Depth
I1	0.40	150	150	10
I2	0.78	700	700	10
I3	0.88	700	700	10
I4	1.00	800	800	10
I5	1.40	700	700	10
I6	2.30	700	700	10
I7	5.30	700	700	10
I8	12.5	700	700	10
I9	35.5	700	700	10
I10	232	700	700	10

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Table G-3. Mean Dioxin Concentrations by Indicator Class

Indicator	Class Mean Dioxin, ppb
I2	0.610
I3	0.847
I4	0.952
I5	1.231
I6	1.837
I7	3.810
I8	8.620
I9	23.130
I10	134.170
I11[a]	727.140

[a]I11 symbolizes the data maximum.

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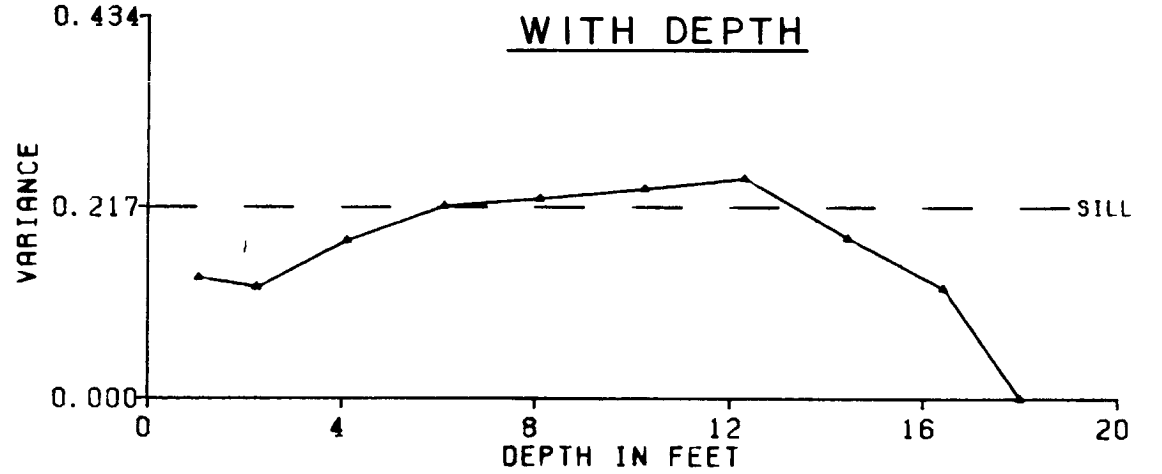

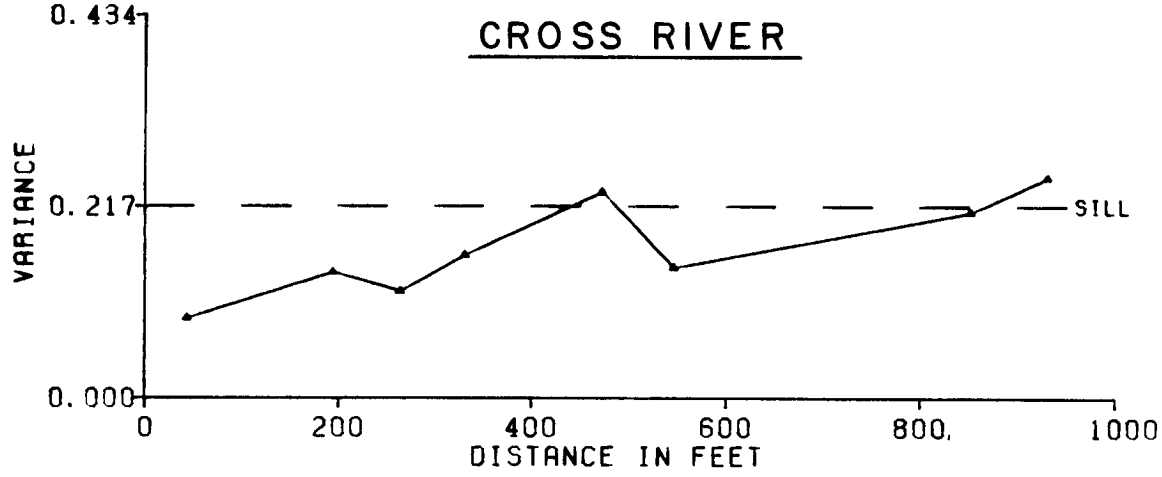

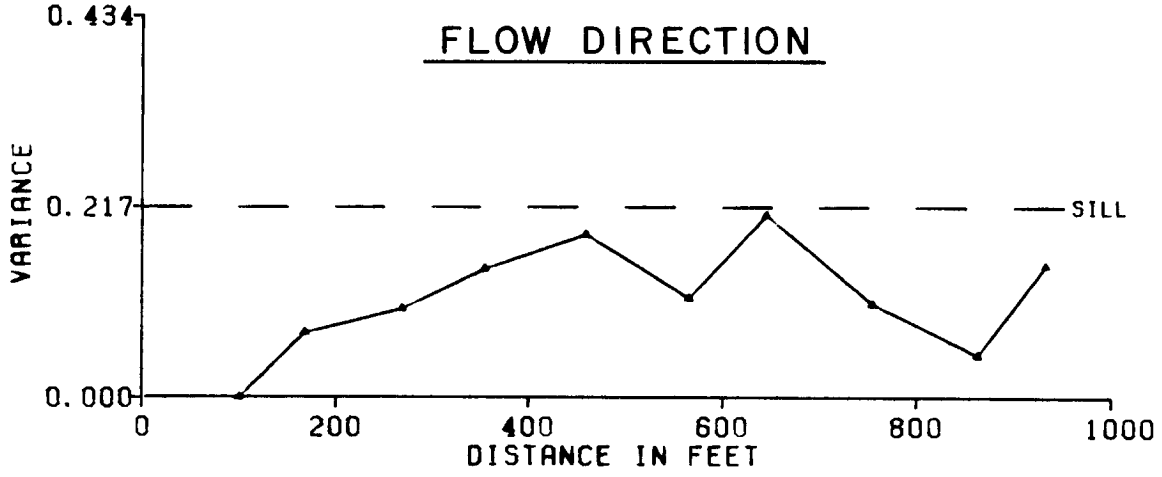

FIGURE G-1

SAMPLE VARIOGRAMS
TCDD INDICATOR II
TCDD <0.40 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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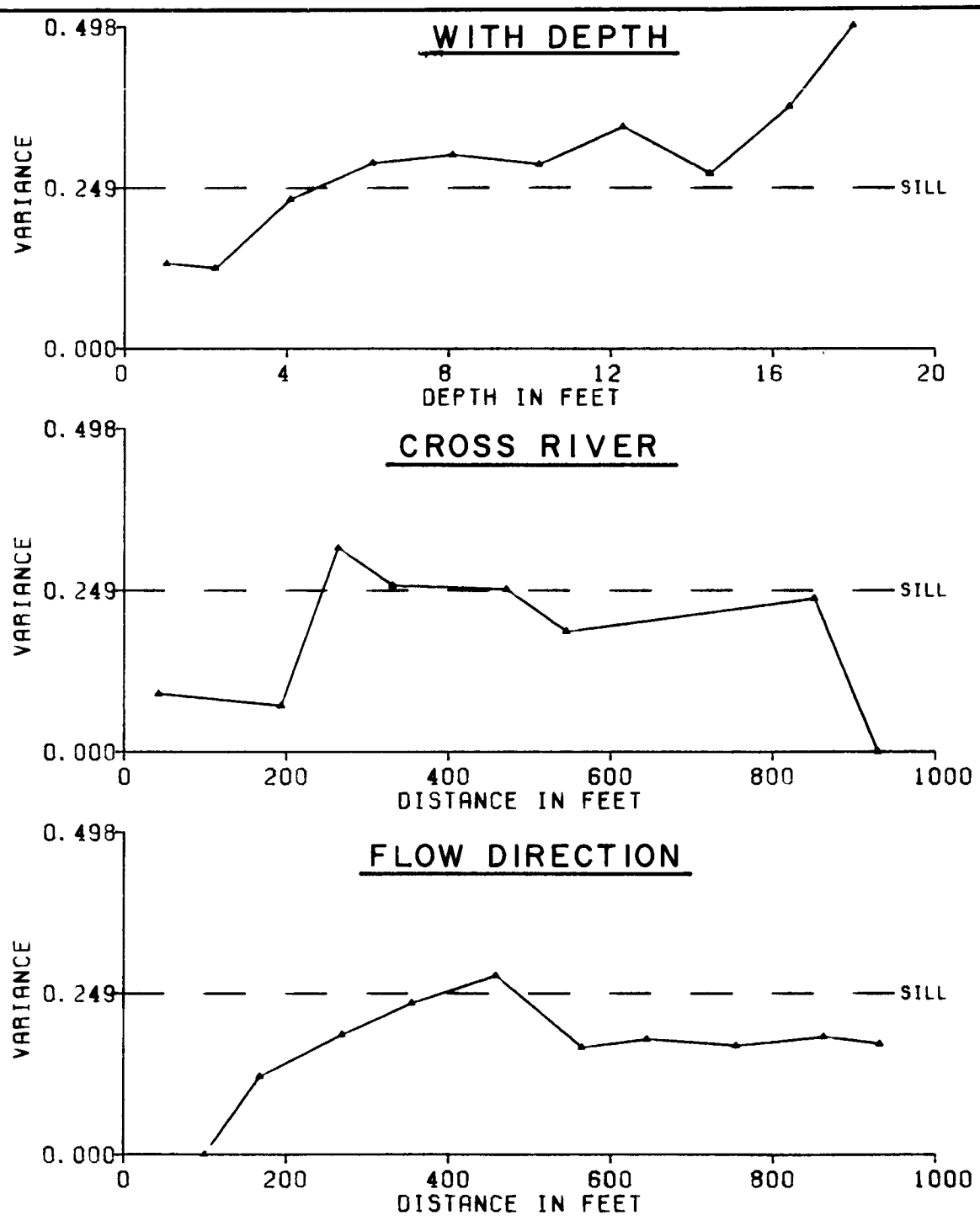

FIGURE G-2

SAMPLE VARIOGRAMS
TCDD INDICATOR I2
TCDD <0.78 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES.

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
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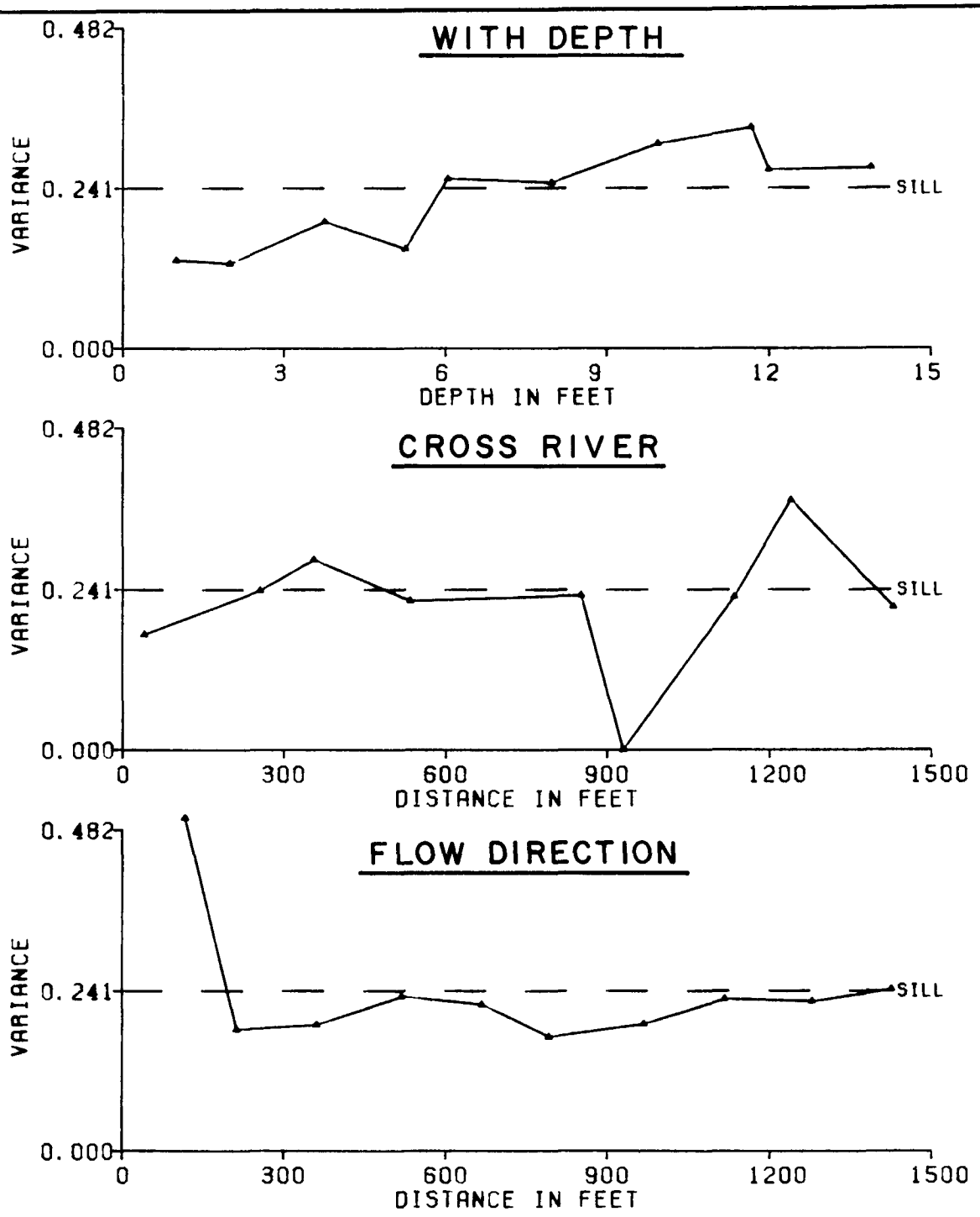

FIGURE G-3

SAMPLE VARIOGRAMS
TCDD INDICATOR I3
TCDD <0.88 PPB

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DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
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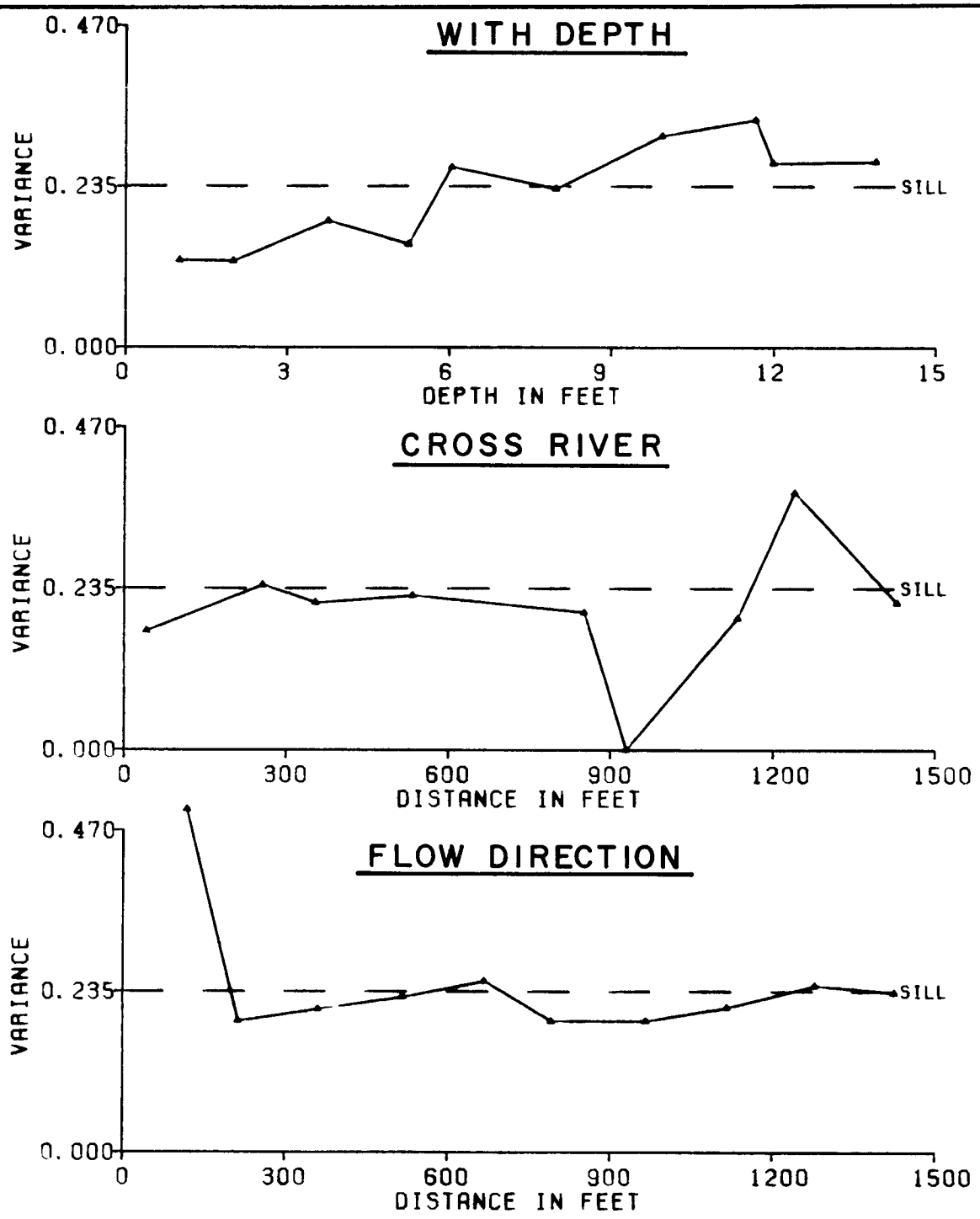

FIGURE G-4

SAMPLE VARIOGRAMS
TCDD INDICATOR I4
TCDD <1.00 PPB

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NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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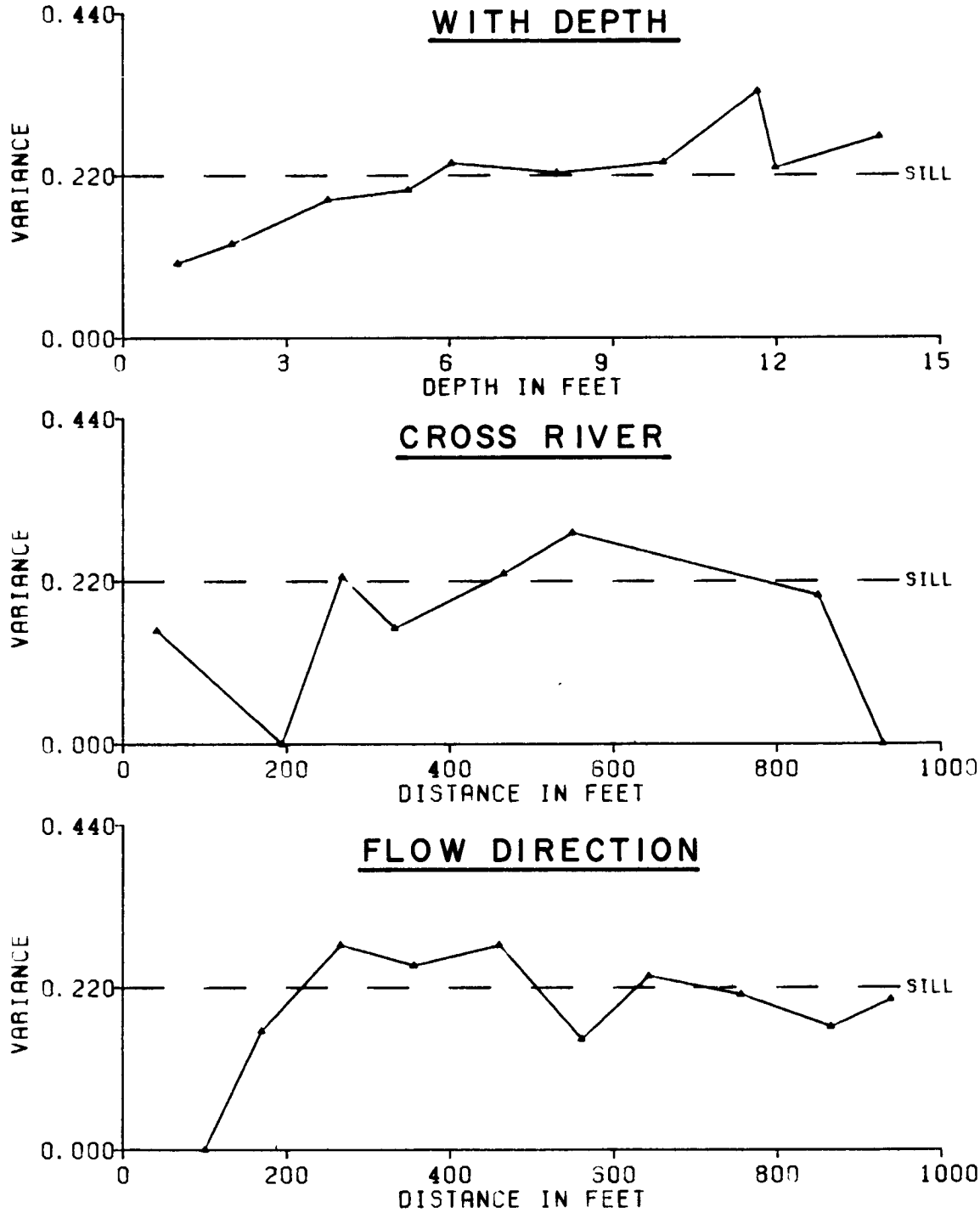

FIGURE G-5

SAMPLE VARIOGRAMS
TCDD INDICATOR I5
TCDD <1.40 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN
3. SILL EQUALS TOTAL VARIANCE.

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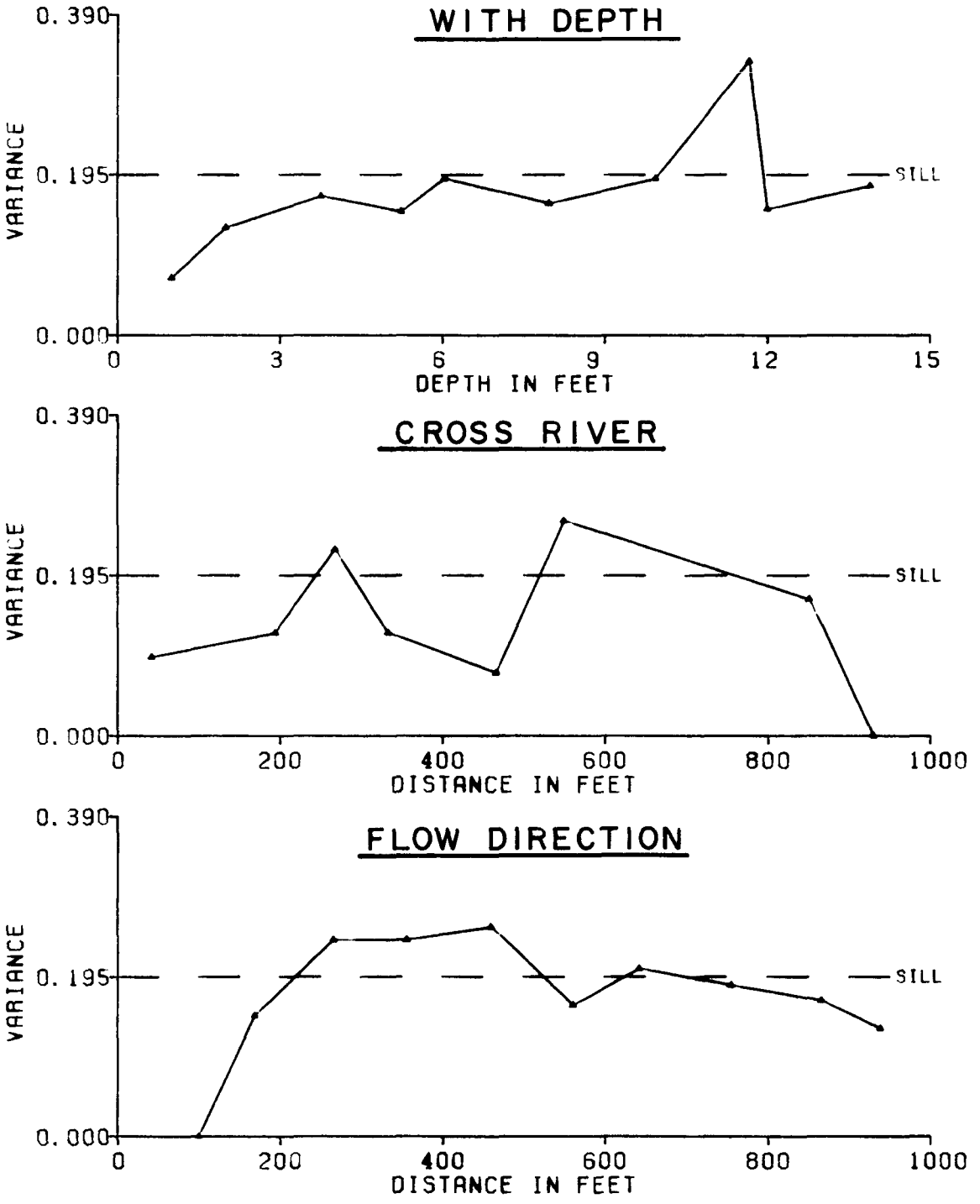

FIGURE G-6

SAMPLE VARIOGRAMS
TCDD INDICATOR I6
TCDD <2.30 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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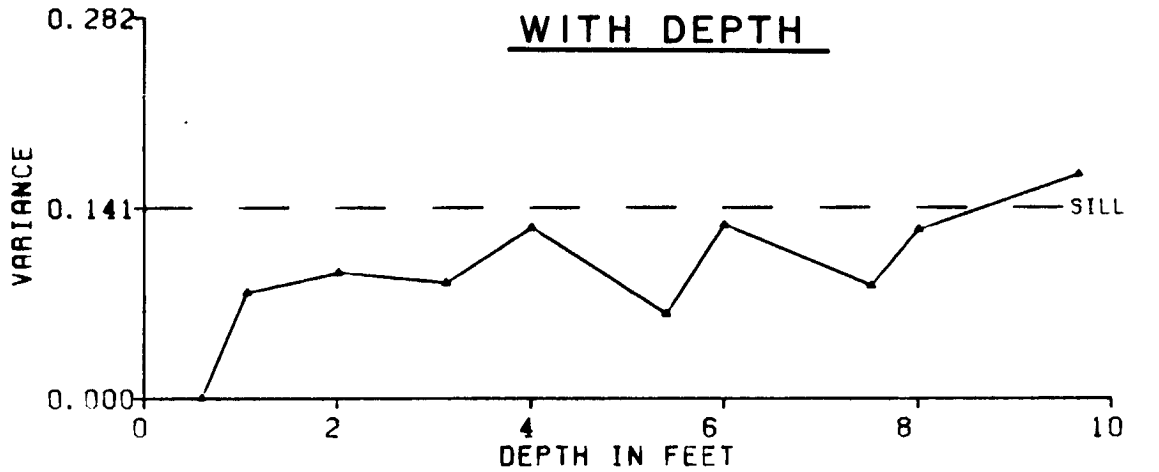

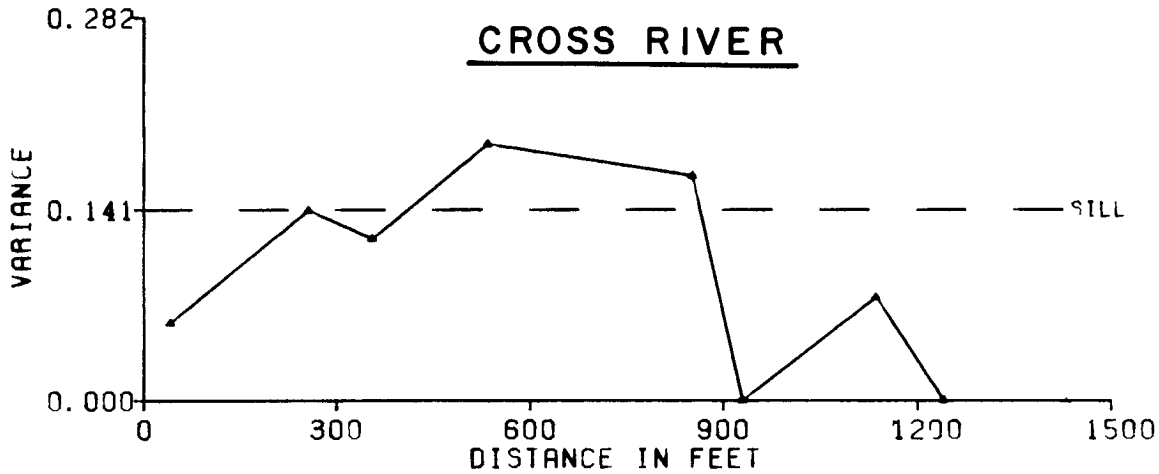

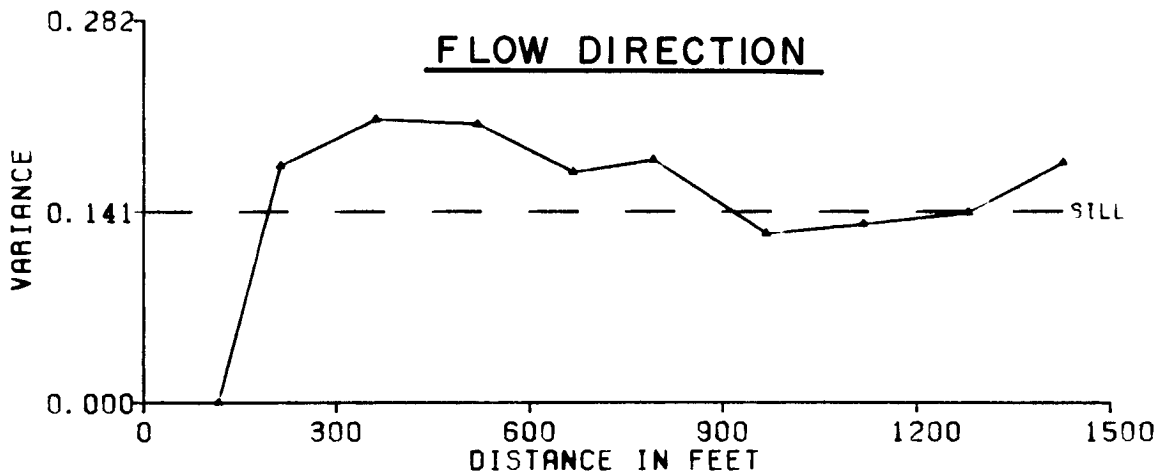

FIGURE G-7

SAMPLE VARIOGRAMS
TCDD INDICATOR I7
TCDD <5.30 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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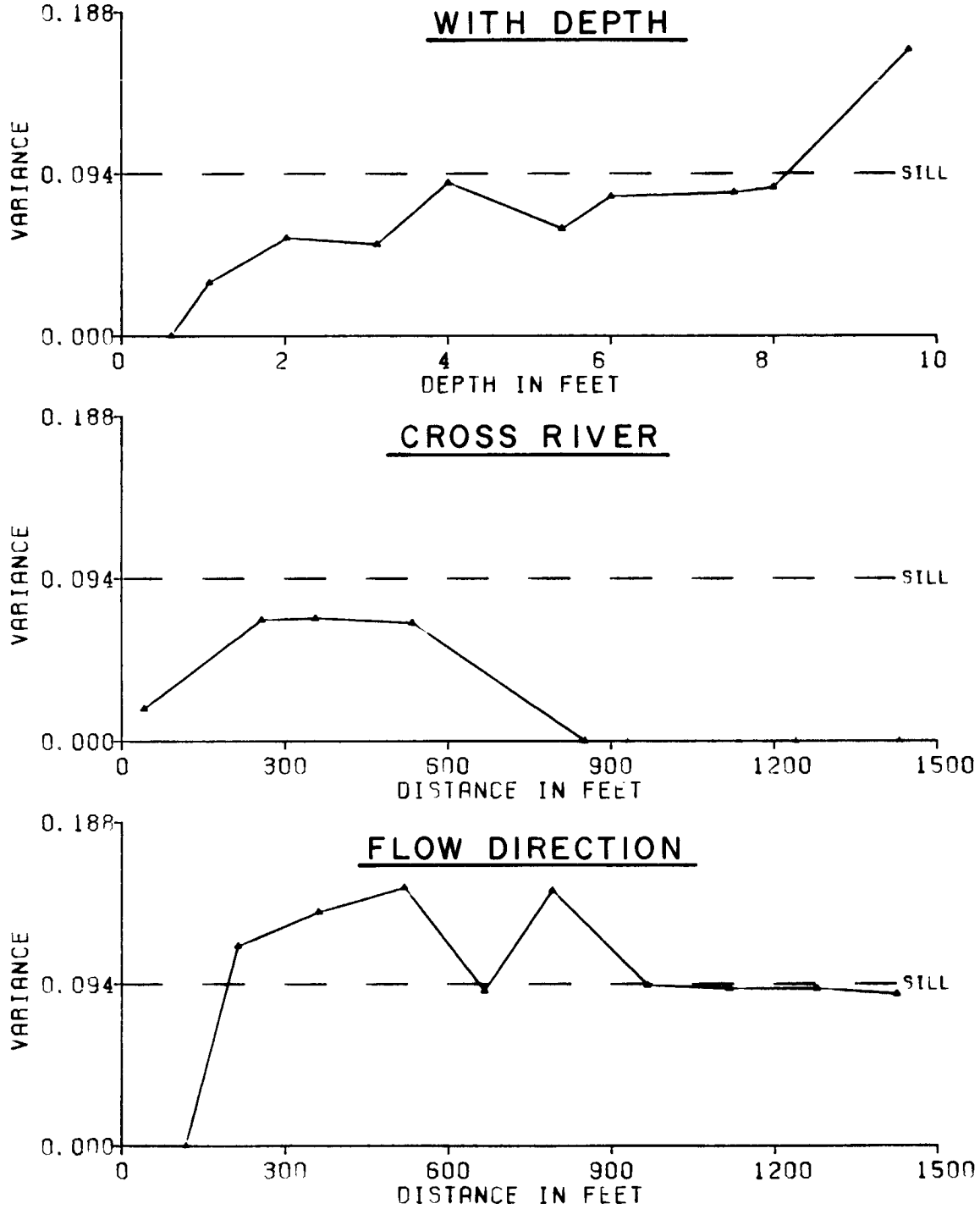

FIGURE G-8

SAMPLE VARIOGRAMS
TCDD INDICATOR I8
TCDD <12.50 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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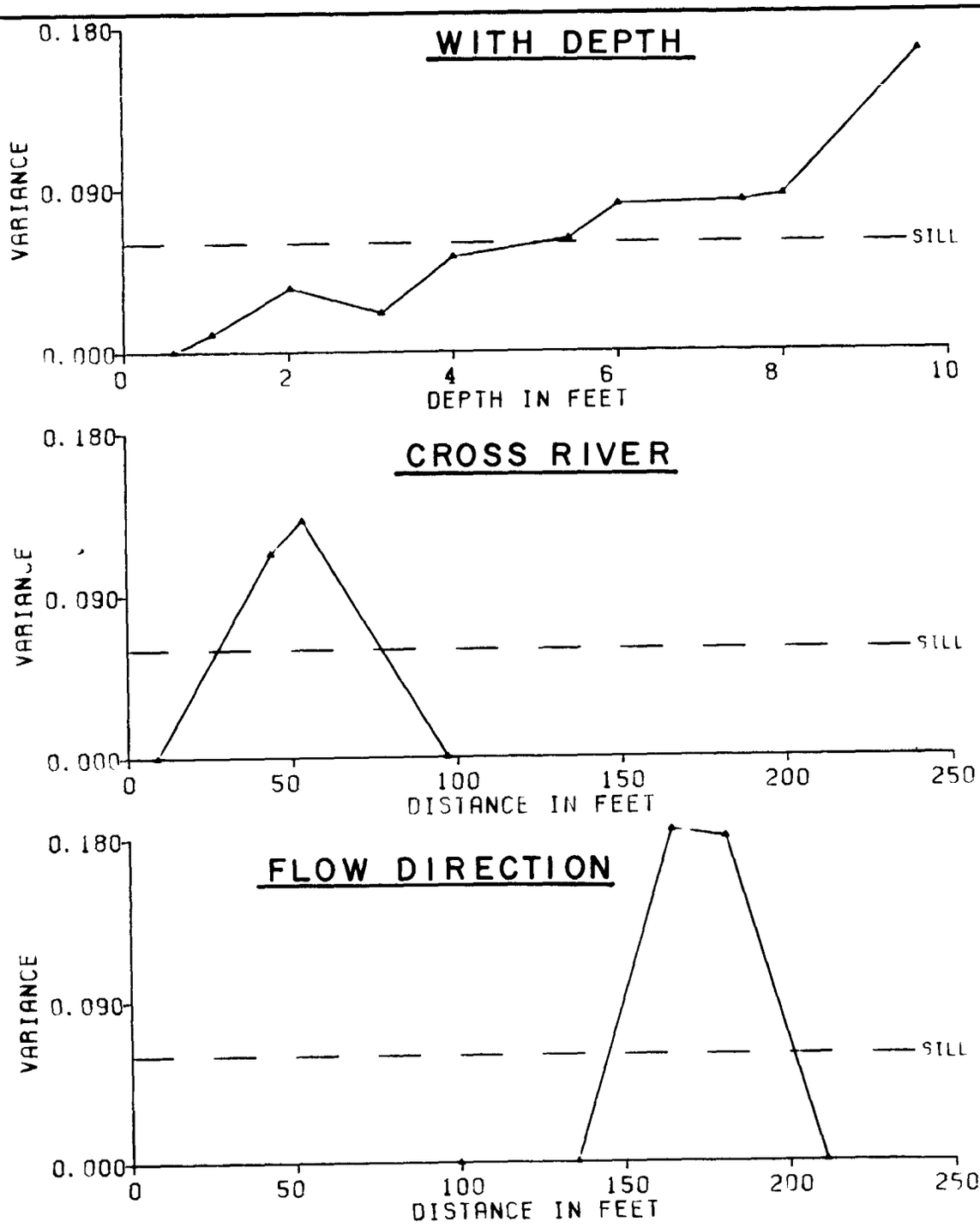

FIGURE G-9

SAMPLE VARIOGRAMS
TCDD INDICATOR I9
TCDD <35.50 PPB
PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES.

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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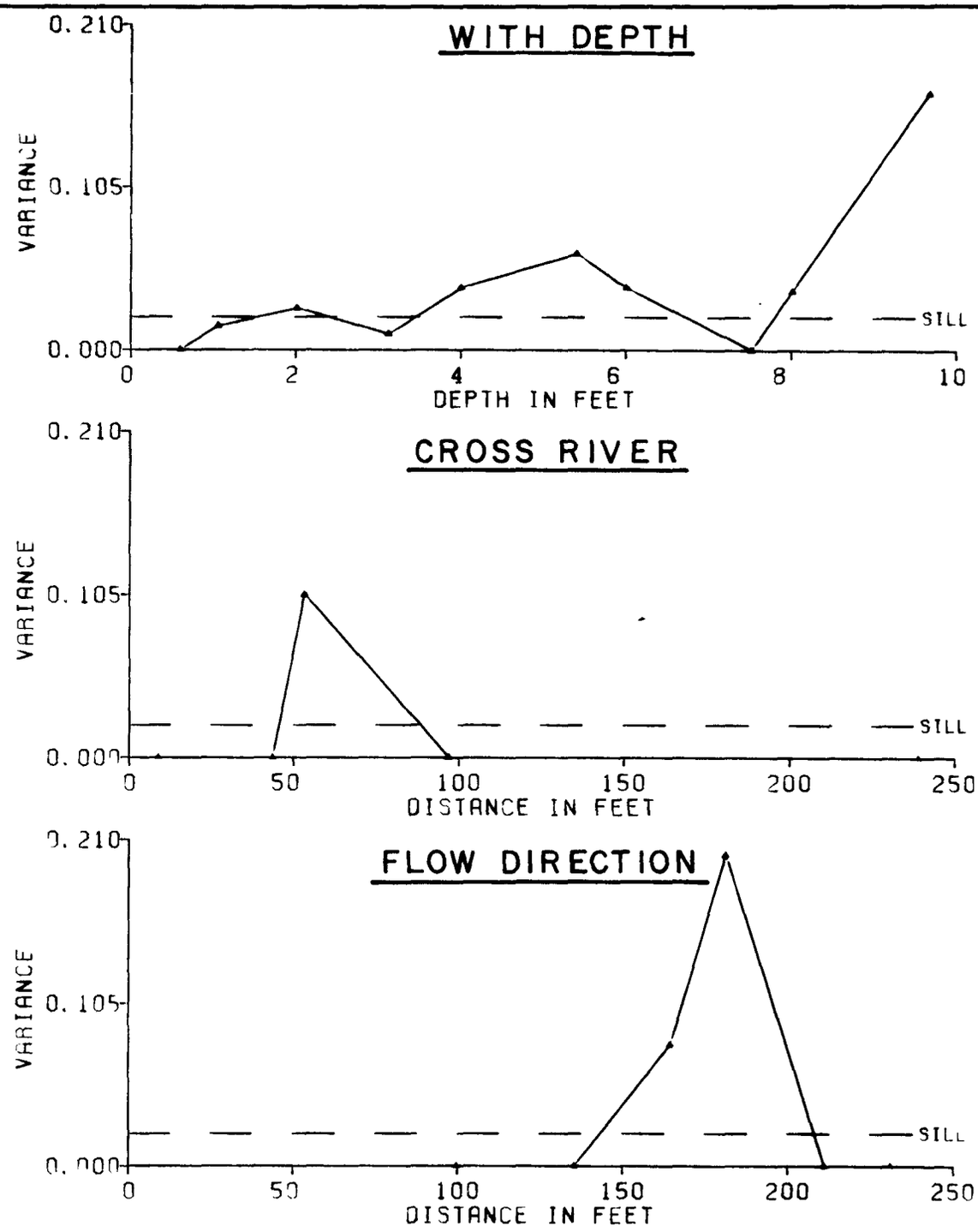

FIGURE G-10

SAMPLE VARIOGRAMS
TCDD INDICATOR I10
TCDD <232.00 PPB

PREPARED FOR

DIAMOND SHAMROCK
DALLAS, TEXAS

NOTES:

1. DISTANCE IS THE INTERVAL BETWEEN SAMPLES.
2. ALL REFERENCES TO TCDD ARE SPECIFICALLY 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN.
3. SILL EQUALS TOTAL VARIANCE.

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APPENDIX
H

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APPENDIX H

BIOCOMMUNITIES STUDY PASSAIC VALLEY SEWERAGE COMMISSION
COMBINED SEWER OVERFLOW FACILITIES PLAN

BIOCOMMUNITIES STUDY

PASSAIC VALLEY SEWERAGE COMMISSION

COMBINED SEWER OVERFLOW

FACILITIES PLAN

July 1982

Princeton Aqua Science
789 Jersey Avenue
New Brunswick, New Jersey

DEP\DA0004781

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PASSAIC VALLEY COMBINED SEWER OVERFLOW STUDY

BIOCOMMUNITIES INVENTORY

SUMMARY

As part of the Combined Sewer Overflow facilities planning study, Princeton Aqua Science conducted a biological survey of the Passaic River from Little Falls to the mouth of the river. The purpose of this survey was to characterize the river biota and to evaluate the quality of the riverine habitat. Furthermore, the study was designed to attempt to isolate the effect combined sewer overflows may have on composition of the river biota.

Three sampling programs were conducted. The preliminary survey in September of 1981 included whole plankton samples, periphyton scrapings, benthic grabs, zooplankton samples and fish seining. Data from this preliminary survey of all community segments were evaluated to identify which segments of the biota would provide the best indicators of habitat quality, to determine the most effective means of sampling those segments of the ecosystem, and to identify sampling stations that would provide a representative profile of the river. Surveys were then conducted in November 1981 and May 1982.

Results of the surveys of fish, benthic invertebrates and periphyton consistently showed that the study area is subject to environmental stress with conditions deteriorating in a downstream direction. Though fish species collected at stations 9, 10, and 13 are tolerant of limited polluted conditions, their presence suggests that water quality is better than in the downstream stations were only the extremely tolerant *Fundulus heteroclitus* was collected. The most diverse benthic community including insect larvae occurred at station 13 suggesting lesser organic loads than at the downstream stations. Samples at stations 3, CS03 and 2 either contained no organisms or were dominated by the tubificid worm *Limnodrilus* which is indicative of heavy organic loads. Periphyton samples showed a similar trend. Most species were typical of the oligo- to mesosaprobic range. However, pollution intolerant saprophobic species occurred upstream. Some indication of the immediate effects of storm loading occurred in the vicinity of CS03 where *Nitzschia parvula* constituted 95% of the sample after a storm event.

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SECTION I

PRELIMINARY SURVEY AND STUDY DESIGN

A. SAMPLING STATIONS

The preliminary survey included a reconnaissance of the entire study area and sampling for fish, plankton, zooplankton, benthic organisms and algae. Sampling stations (Figure 1) for the fall and spring surveys were selected to coincide with water quality sampling stations and to reflect varied conditions in the river.

Station 13

Station 13 is located in Totowa, upstream of the study area. Preliminary sampling showed the biota, particularly macroinvertebrates and fish to reflect better quality habitat than downstream stations. This station can be used as a reference for evaluation of community composition and structure at the downstream stations.

Station 9

Station 9 is located in Elmwood Park upstream of CSO 9 (Market Street) but downstream of CSO's 10 through 17.

CSO9

The Market Street overflow in Paterson is the largest in the Paterson section of the study area. A station was established upstream of CSO9 to reflect the contributions of these CSO's and surface runoff and a station was located downstream of CSO9 to isolate possible impacts of that overflow.

Station 3

Located in Belleville, this station is downstream of Dundee Dam in the estuarine section of the river. It is approximately 10 miles downstream of CSO9 and is upstream of CSO 1-8. This station provides the best reference point for the evaluation of biota in the estuarine segment.

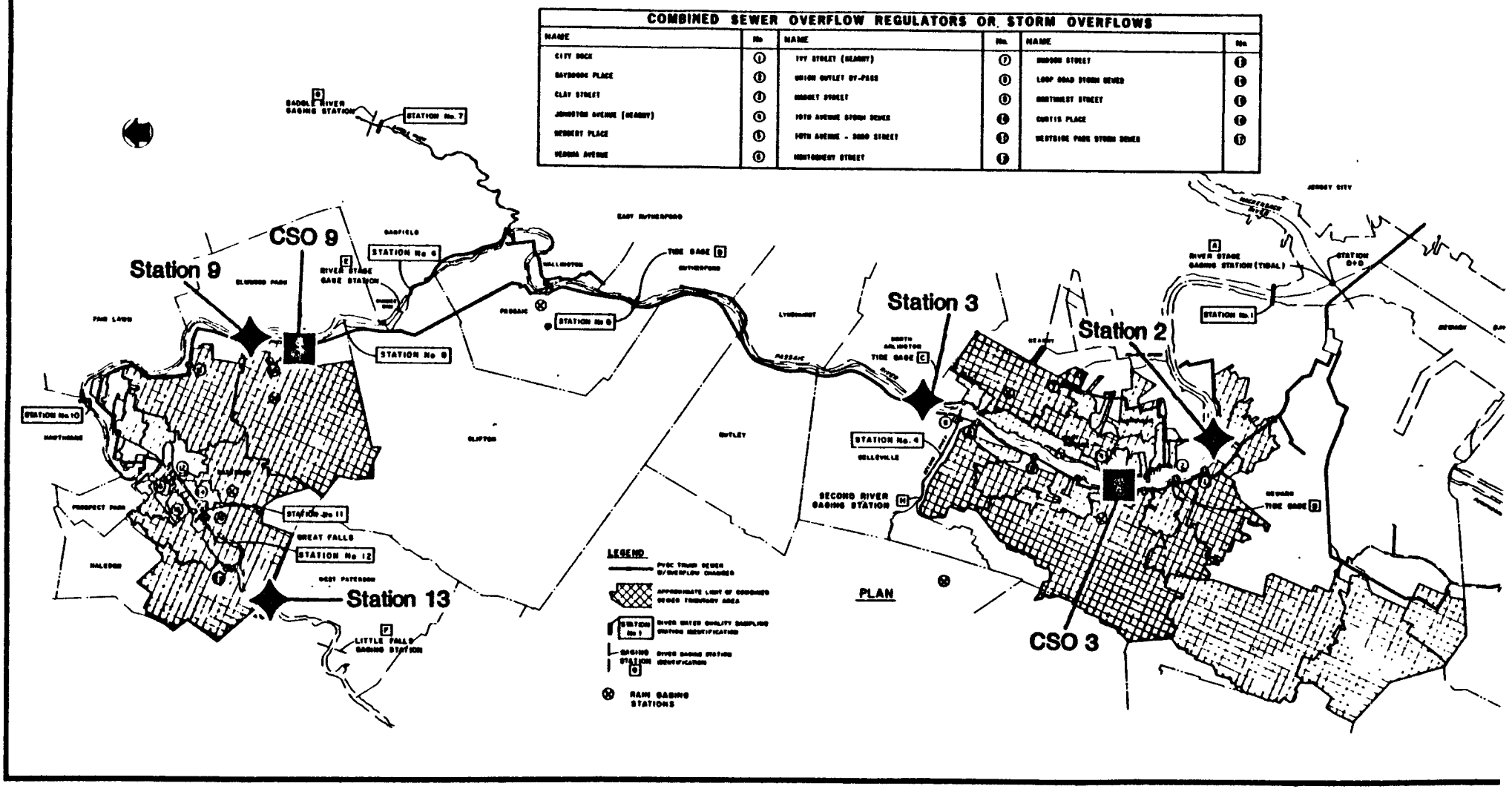

FIGURE 1

SAMPLING STATIONS

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CSO3

Stations were established upstream and downstream of the Clay Street overflow. This is the major overflow in Newark.

Station 2

This station at Union Avenue is the most downstream station in the study area. It is influenced by the cumulative flows from all CSO's and by Newark Bay water.

B. SAMPLING METHODS

The effectiveness of each of the sampling methods employed during the preliminary survey and the methods selected for use in the fall and spring surveys are discussed below.

Fish

Seining for fish was performed along the Passaic River in September. Results of this survey showed low diversity in both the estuarine and nontidal segments of the river. These data provide a basis to characterize the river fish community and are discussed further in Section II. Further sampling for fish was not carried out because sample yields were low and because the mobile fish would not provide any information which could be used to segregate the effect of the CSO's.

Zooplankton

September samples of zooplankton provide information to characterize this segment of the river biota. However, as with fish, no effect of the CSO's could be isolated using zooplankton as the basis of interpretation. No further zoplankton samples were taken.

Benthic Invertebrates

The surber sampler for benthic invertebrates was effective upstream. Repeated Ekman dredge samples in the deeper lower reaches yielded no organisms. Sediments were muck and hydrogen sulfide odors were noted. Since this community is sedentary, effects of CSO discharges might be detected from analysis of benthic community structure. Uniform substrate Dende samplers were set out in the November sampling program

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to obtain benthic data. However, when collected no growth had occurred in these samplers. Therefore, an intensive grab (Ekman) sample program was used for spring sampling. These data are discussed in Section IV.

Phytoplankton

Net plankton samples were taken with a 63 μ mesh net during the preliminary survey. Since the primary purpose of this sampling was to characterize water column flora and to aid in interpreting chlorophyll a data and the river model, whole plankton sampling was repeated only in the fall survey. These data are reviewed in Section V.

Periphyton

The attached algal associations, like benthos, reflect an integration of response to varied water quality conditions over time. Scrapings taken during the preliminary survey showed sufficient growth, variation among stations, and species diversity to evaluate habitat quality and to potentially isolate effects of the CSO's. Uniform substrate samplers were set out at the designated stations in November and May and collected after three weeks of growth had occurred. These data are reviewed in Section V.

SECTION II

FISHERY SURVEY

The fish fauna of the Passaic River was sampled by haul seine at six (6) stations from approximately river mile 3.0 upstream to river mile 26.0 on September 4, 1981 (Table 1). A total of 11 species were identified. The only species represented in the collections obtained at stations 2, 3, and 5 was Fundulus heteroclitus, the common mummichog. This species is extremely tolerant of "polluted" environments being able to withstand low dissolved oxygen conditions. It is also euryhaline and eurythermal, being physiologically capable of coping with the fluctuating temperature and salinity levels which commonly occur in estuarine environs. Further upstream, at station 9 the occurrence of sunfish (Lepomis gibbosus and L. macrochirus) and the minnows (Notropis sp.) as well as F. diaphanus, a freshwater species of Fundulus, that this section of the river is rarely, if ever, subjected to salinities greater than 1-2%. The same can be said of stations 10 and 13. Although the fish species collected at stations 9, 10, and 13 are tolerant of limited polluted conditions, their presence does suggest that water quality in these sections of the river is better than that in the downstream stations. At station 13, the occurrence of Gambusia affinis, the mosquito fish, Anguilla rostrata, american eel, and Cyprinus carpio, the common carp, all suggest that this station is subject to low stream flows and, possibly, reduced dissolved oxygen concentrations. These three species are commonly taken in habitats where flows are minimal. They also display tendencies to withstand reduced dissolved oxygen conditions.

Table 1

Passaic River Fish Survey

Station	Code	River Mile	Location	Salinity	Number of Specimens	Species Collected
2	1354-47	3.0	Newark Below CS01-8	6.0%		*Fundulus heteroclitus*
3	1354-48	7.5	North Arlington	1.0%		*F. heteroclitus*
5	1354-49	Approx. 13.0	Belleville Tpk.	0.0		*F. heteroclitus*
9	1354-50	17.9	Paterson, Market St.	0.0		*F. heteroclitus* *F. diaphanus* *Lepomis gibbosus* *L. macrochirus* *Notropis* sp.
10	1354-51	Approx. 21.0	Paterson	0.0		*L. gibbosus* *L. macrochirus* *Notropis* sp.
13	1354-52	Approx. 26.0	Control station, Totowa	0.0		*Cyprinus carpio* *Arguilla rostrata* *Gambusia affinis* *Ictalurus* (possibly) reported by fishermen

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SECTION III

ZOOPLANKTON SURVEY

A survey of the Passaic River zooplankton community was conducted at two locations, station 5 (river mile 13.0) and station 10 (river mile 21) on September 11, 1981 (Tables 2 and 3). Samples were collected with a 153 μ mesh, 1/2 m^2 diameter mouth opening zooplankton net. One ml aliquots were analysed at 40x with a Bausch and Lomb compound microscope. Identification was to genera as per Pennak 1978. Rotifers dominated both samples, with Keratella, approximately 30% of total by number, the most commonly occurring species at both stations. The rotifers Brachionus and Rotifera were also important components of the zooplankton accounting for 13.5% and 26.1% of the total sample at station 5, and 23.2% and 32.2% at station 10, respectively. Although rotifers dominated both samples, the occurrence and relative composition of Cladocerans was greater at station 10. The increase in the numbers of Cladocerans at this station may be indicative of waters that are not grossly polluted.

In general, the species diversity, richness, and eveness of station 10 is superior to that of station 5 (Table 3). These indices are commonly employed as indicators of a community's stability which with higher diversity related to a better environmental quality of the habitat.

Table 2

ZOOPLANKTON
SEPTEMBER 1981

	Station 10	Station 5
Rotifera		
Keratella	454	323
Kellicotia	17	--
Rotifera sp.	72	247
Filinia	13	9
Polyarthra	29	--
Brachionis	328	128
Protozoa		
Ceratium	4	119
Annelida		
Oligochaete	25	--
Nematoda		
Nematode	8	--
Arthropoda, Cladocera		
Ceriodaphnia	29	--
Bosmina	84	--
Chydorus	8	43
Alona	--	17
Arthropoda, Copepoda		
Copepod nauplii	273	--
Copepodites	46	--
Diaptomus	4	--
Paracyclops	4	26
Argulus nauplii	4	34
Arthropoda, Ostracoda		
Ostracod sp.	4	--
TOTAL	1406	946

Table 3

SPECIES DIVERSITY, RICHNESS AND EVENESS
OF ZOOPLANKTON OF THE PASSAIC RIVER*

	Species Diversity	Richness	Eveness
Station 5	1.72	1.167	0.787
Station 10	1.995	2.235	0.690

*Based on total counts using the following equations

$$\text{Diversity} = D = 2.303\ (\log_{10}N - \frac{1}{N}\ N_i \log_{10}N_i)$$

$$\text{Richness} = R = \frac{S - 1}{\log_e N}$$

$$\text{Eveness} = E = \frac{D}{\log_e S}$$

where N = total population
S = total number of species
N_i = individuals in species N_i

SECTION IV

BENTHIC INVERTEBRATES

Benthic samples were taken in the preliminary survey of September 1981 using a surber sampler at Station 13, Totowa and an Ekman grab at the remaining stations. Only the Totowa and Elmwood Park samples contained organisms in this sampling. No organisms were collected on the Dende uniform substrate samplers set out in November of 1981.

Benthic samples were collected on May 4, 1982 and May 5, 1982 at all designated stations along the Passaic River Valley, and on May 27, 1982 at the Clay Street Station. Samples were collected with an Ekman dredge. Approximately 617 cm^2 of sediment were sampled by each Ekman grab. Preliminary sorting of the samples was conducted in the field using 6000 micron and 1500 micron mesh screens. All samples were immediately fixed with a 10% formalin solution and stained with rose-bengal. Final sorting was done in the lab using 1000 and 600 mesh sieves, all organisms being transferred to 20 ml vials and preserved with 70% isopropyl alcohol.

Identification of the organisms was done using a Bausch and Lomb compound, binocular microscope at 400 x or 1000 x, or, for the larger organisms, a Bausch and Lomb binocular disecting microscope at 25 x. The diagnostic keys of Pennak (1978) and Ward and Whipple (1959) were followed, and organisms identified to genus or lowest possible taxa.

In general, the diversity of the benthic fauna was very low throughout the lower reaches of the river, but increased at some of the upstream stations.

The most pauparate fauna was recorded at the Clay Street Station, below the Combined Sewer Outfall (CSO). No organisms were collected at this station in both of the May grab samples nor had any been collected in September. The fauna of the Clay Street Station above the CSO consisted solely of Limnodrilus sp., a tubificid worm. The sediments at both Clay Street Stations were composed of black muck with a strong petroleum odor. The apparent quality of the sediments and the poor faunal assemblage are both indicative of an environmentally stressed system. The most concentrated populations of tubificid worms are generally found in streams and rivers that are polluted with sewage.

The fauna collected at the Belleville Turnpike and Market Street stations (upstream and downstream from the CSO) were also poorly represented. Tubificid worms of the genus Limnodrilus dominated these samples. Dominance of the fauna by these worms is a good indication that these ecosystems are subject to heavy organic loads.

Although tubificid worms dominated the samples taken at Union Avenue and Elmwood Park stations, other organisms were represented. Nais, an aquatic oligochaete, was collected at both stations, and Asellus, an isopod, was collected at the Union Street station.

The greatest diversity was observed at the Totowa station. Included in the sample with the ubiquitous Limnodrilus were insect larvae (Trichoptera and Chrionomidae) and a gastropod. Such organisms suggest the occurrence of lower organic loads at this point in the river.

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Table 4

BENTHIC INVERTEBRATES

Station 13, Totowa

	Sept. 1981 (surber)	May 1982 (Ekman)
Annelida Oligochaeta		
Limnodrilus sp.		2
Nais sp.		1
Plesiopora (order)	16	
Mollusca-Gastropoda		
Lymnaea sp.		
Arthropoda		
Crustacea, Cladocera		
Ceridaphnia sp.	1	
Crustacea, Copepoda		
Diaptomus sp.	20	
Paracyclops sp.	1	
Insecta		
Tricoptera		1
Chrionomidae		1
Tendipidae	9	

(No organisms were found on uniform substrate sampler in November 1981)

Station 9, Elmwood Park

	Sept. 1981	May 1982
Arthropoda		
Crustacea, Cladocera		
Ceriodaphnia sp.	1	
Crustacea, Copepoda		
Diaptomus sp.	3	
Insecta, Diptera		
Tendipidae pupa	1	
Dipteran pupae	6	
Insecta, Coleoptera	2	
Mollusca		
Gastropoda		
Campelonia sp.	1	

Table 4 (Continued)

	Sept. 1981	May 1982
Annelidia		
Oligochaeta		
Plesiopora (order)	67	
Limnodrilus sp.		12
Nais sp.		2
Lumbriculus sp.		2
Hirundinea	1	
Colenterata, Hydrozoa		
Hydra sp.	1	

(No organisms were found on uniform substrate samplers in November 1981)

No organisms were collected either by Ekman grabs (September 1981) or uniform substrate samplers (November 1981) at the remaining stations. All data below was collected in May 1982 using the Ekman sampler.

Market St. above CS09	
Annelidia, Oligochaeta	
Limnodrilus sp.	3
Market St. below CS09	
Annelidia, Oligochaeta	
Limnodrus sp.	16
Tubiflex sp.	1
Station 3, Bellville Turnpike	
Annelidia, Oligochaeta	
Limnodrilus sp.	206
Dead Mussel Shells	21
Clay St. above CS03 - May 4, 1982	
Annelidia, Oligochaeta	
Limnodrilus sp.	43
Dead Mussel Shells	

Sediments with same qualities as below CSO. Very noticable petrolem odor.

Table 4 (Continued)

Clay St. above CS03 - May 27, 1982

Annelidia, Oligochaeta	
Limnodrilus sp.	86
Limnodrilus fragments	24

Clay St. below CS03 - May 4, 1982

No organisms

Sediments very dark grey to black with heavy petroleum odor. When bottom stirred up caused small oil slick on surface texture of sediments very fine silt & muck.

Clay St. below CS03 - May 27, 1982

No organisms

Sediments with strong petroleum odor. Black color, silt-muck complex.

Union Ave. - May 4, 1982

Annelidia, Oligochaeta	
Limnodrilus sp.	
Lumbriculus sp.	1
Naidae gragments	3
Arthropoda, Crustacea	
Asellus sp.	1

SECTION V

PERIPHYTON

Periphyton (attached algae) are a stationary community that could reflect evidence of CSO impacts for days after the discharge occurs. This community also shows the response to varying conditions in the river (e.g. integrates tidal effects). Uniform substrate samplers for periphyton were set out in November and again in May. These were collected after three weeks of growth had occurred. There was no significant rainfall during the November sampling period and therefore, no overflow from the CSO's. However, significant rainfall did occur during the May 1982 sampling period.

The periphyton community consists primarily of diatoms, therefore, samples were boiled in nitric acid until all of the organic material was destroyed. Distilled water was added to the cleaned samples. Samples were preserved in alcohol and slides prepared.

A count of two hundred cells was performed and cells were identified by species according to the nomenclature of Patrick and Reimer.

The species distribution of each sample is shown in Tables 5 and 6 by percentage. Community species diversity was calculated using the Shannon-Weaver index. The tables show the number of species, diversity, evenness, and redundancy.

Pollution tolerance of species present was evaluated using the saprobien system data compiled in Environmental Requirements and Pollution Tolerance of Freshwater Diatoms (USEPA, 1974). In this system species are classified as follows:

Polysaprobic: characteristic of zone of degradation and putrefication, oxygen usually absent or low in concentration.

Mesosaprobic: characteristic of zone where oxidation of organic load is proceeding.

(alpha range): range of stronger pollution nitrogen in the form of amino acids.

(beta range): range of weaker pollution, nitrogen in the form of ammonia compounds.

Oligosaprobic: characteristic of zone where oxidation of biodegradable compounds is complete. The concentration of inorganic nutrients is usually high.

Saprophilic: occurring usually in polluted waters but also in clean water habitats.

Saproxenous: occurring in clean water habitats but also in polluted ones.

Saprophobic: characteristic of waters that have not been exposed to pollutants.

Results

As most of the species that occurred in the samplers are indifferent to salinity variations, the estuarine and nonestuarine samples consisted of the same species for the most part. Coscinodiscus rothii and Nitzschia filiformis were restricted to the estuarine section of the river.

Cyclotella meneghenia was the dominant species in all November samples. It constituted in the range of 20% of the organisms. C. meneghenia typically occurs in peak abundance in the fall. This species is classified as mesosaprobic - or typically present where oxidation of organic load is occuring and is in the range of stronger pollution with nitrogen predominantly in the form of amino acids. The second consistently most abundant species was Nitzschia palea which is classified as meso- to polysaprobic. This is the most pollution tolerant of all the species that occurred. The remaining species are predominantly oligo- to mesosaprobic. The conditions in the Passaic River in general must be classified as being indicative of a significant organic load. However, the only two saproprobic species (typical of clean waters) observed in the study Cocconeis placentula and Cyclotella stelligera were found only in the upsptream section of the study area (Stations 13, 9). Achnanthes species are classified as saproxenous or oligosaprobic. This genus exhibited greatest diversity at station 13. These indications of somewhat better quality habitat at station 13 are consistent with the findings of benthic invertebrate analyses.

In the early May samples, Navicula lanceolata was consistently the dominant species along the river. It comprised approximately 15% of the diatom community. Cyclotella menegheniana though still common did not appear as frequently as in the fall. Other common species included Asterionella formosa, Fragillaria construens, Navicula cryptocelphala, Surirella ovalis, S. ovata, and Synedra sp. Coscinodiscus rothii, typically estuarine, continued to be common downstream of station 3. All of these species are typical of oligo- to mesosaprobic conditions. Nitszchia palea which is the most tolerant of the species found in the Passaic River (meso to poly saprobic) continued to be common throughout the river as it had been in the fall sampling.

Table 7 is a summary of community structure parameters for all periphyton samples taken in the study. for the most part, species diversity (H^{+}) ranged between 3.0 and 3.26 and evenness ranged from .8 to .86. Some samples exhibited diversities below this range as follows. The November sample at CS09 (upstream) had a diversity of 2.16 (eveness = .64) due primarily to the unusual abundance of Pinnularia sp.

Again on May 5 this station had a reduced diversity. Navicula lanceolata comprised 62% of this sample. The May 5 samples at Stations 3 and 2 also showed reduced diversity (2.03 and 1.22 respectively). In both cases Nitzschia parvula was unusually dominant (56% and 80% of the samples). The May 27 samples were taken after a significant period of rainfall. The diversity at Stations 13 through 3 was at the higher end of the typical range. However, the two stations in the vicinity of CS03 were almost entirely dominated by Nitzschia parvula (95 and 92%). Minimum diversity of .29 and .49 occurred at these stations. This significant change in community structure may reflect an immediate response to recent CSO overflows.

In addition to the intensive analysis of the periphyton community, the preliminary and fall surveys included analysis of whole plankton samples to generally characterize the phytoplankton in the water column. Table 8 shows the species distribution from the November samples. As in the periphyton samples, species present are typically indicative of organic enrichment. In addition to the diatom species previously discussed, the cyanophyte Microcystis flos-aqua and the chlorophyte Pediastrum duplex are such indicators. Table 9 shows the distribution of whole plankton by class. The plankton community is dominated numerically by diatoms and by blue green algae in terms of biomass. Diatoms tended to increase in abundance in the November samples as is typical of the fall bloom period for diatoms while cyanophytes tend to be more abundant in late summer.

PERIPHYTON UNIFORM SUBSTRATE SAMPLES (in percent)

	13	UPSTR CS09	DWNSTR CS09	3	UPSTR CS03	DWNSTR CS03	2
Achnanthes sp.			1.96				
A. clevei						0.5	
A. lanceolata	2.5	6.6	2.5	0.91	1.4	3	3.3
A. lanceolata var dubia	1.01						
A. linearis	1.01		1.5				
A. minutissima	1.01					0.5	
Amphora ovalis	0.5		1.5				
Asterionella formosa	0.5	0.94	0.49	1.4	0.48	0.5	0.55
Caloneis sp #1						0.5	
C. bacillum				0.91			
Cocconeis placentula	3.04	3.8	0.49		0.48	1.5	
C. placentula var lineata	1.01		1.96			0.5	1.1
Coscinodiscus lacustris				10			
C. rothii					4.3	4.5	7.7
Cyclotella menegheniana	28.9	17.9	14.7	25.6	11.9	21.1	23.1
C. stelligera		0.94	0.49				
Cymbella sp	1.5	0.94	0.49				
C. affinis						1	0.55
Cymatopleura solea				0.46			
Diatoma tenue var elongatum					0.48		
D. vulgare	1.01	6.6		0.91	0.48	1.5	1.1
Entomoneis paludosa					0.95	1	
Fragilaria sp	2.5	0.94	1.96	1.8	1.4	4	3.3
F. construens			1.5		2.38	1	1.65
F. crotonensis							2.2
F. leptostauron						0.5	
Frustulia rhomboides var amphipleuroides					0.48		
F. rhomboides var saxonica				1.4	0.48	1	
Gomphonema sp	1.5			0.46		0.5	1.1
G. angustatum			0.49				
G. olivaceum			0.98			0.5	0.55
G. parvulum	4.1	3.8	3.4		0.95	2	
Gyrosigma sp						0.5	
Melosira granulata	5.07	1.9	2.5	4.1	8.57	3	7.7
M. nummuloides					11.4	4	
M. varians	1.5	7.5	3.9	2.3			4.9
Meridion circulare				1.4		0.5	0.55
Navicula sp.	1.5	0.94		0.91	0.48	1	1.1
N. capitata		0.94	0.49				
N. cryptocephala	3.04	1.9	3.4	5.9	9.04	6.03	5.5
N. cuspidata					0.48	0.5	0.55
N. exigua		0.94	0.49				
N. integra			0.49				
N. lanceolata	1.5						
N. mutica	2.03	1.9	0.98		1.9	1	3.3
N. pupula	5.07	2.8	2.9	1.8	0.48	0.5	4.4
N. pusilla				5.9	12.4	2.5	0.55
N. pygmaea						0.5	
N. radiosa	0.5					0.5	
N. rhynchocephala		1.9	1.5	0.46	4.76	0.5	1.65
N. tripunctata			2.9	0.46	0.48	0.5	
Nitzschia sp	1.01	3.8	0.49	0.91	1.9	0.5	
N. acicularis	4.6						
N. amphibia		3.8	4.4		1.4	1	1.65
N. dissipata							1.65
N. filiformis				4.6	0.95		0.55
N. hungarica	0.5						
N. longissima						1	
N. palea	8.1	6.6	8.3	4.1	6.67	5	5.5
N. parvula			1.5	13.2	3.8	12.06	
N. tryblemella	1.01	1.9					
Pinnularia sp	4.1	15.1	1.96		0.95	0.5	
Rhoicosphenia curvata	0.5	1.9	1.5		0.48	0.5	
Rhopalodia sp	0.5					0.5	
R. gibba							0.55
Skeletonema costatum				0.91	2.38	4.5	1.65
Stephanodiscus astraea	1.5		0.98	0.91		0.5	1.1
Surirella sp			0.98				1.1
S. angustata				0.46		0.5	
S. ovata	2.5	0.94		1.8	0.95	1.5	0.55
Synedra sp	2.5	0.94	1.96	1.4	1.4		3.3
S. acus			1.96	2.7	1.4	2.5	4.4
S. incisa		0.94					
S. radians			1.96				1.1
S. rumpens	2.5		2.5			0.5	
S. ulna		0.94		0.91		0.5	
Tabellaria fenestrata					1.4		
Thalassiosira fluviatilis				0.91			
Shannon index	2.92	2.16	3.04	2.73	2.97	3.14	3.01
Evenness	0.82	0.64	0.84	0.80	0.83	0.81	0.84
H max	3.56	3.37	3.61	3.43	3.56	3.87	3.58
H min	1.06	0.85	1.10	0.87	1.01	1.47	1.09
Redundancy	0.25	0.48	0.23	0.27	0.23	0.31	0.23

DEP\DA0004802

Table 6

MAY PERIPHYTON

Abundance in percent of count

Station Date	13B 5/5	13BU 5/27	9B 5/5	9BU 5/27	UPS. CS09B 5/5	UPS. CS09BU 5/27	DWNS. CS09B 5/5
Achnanthes sp.	1.97	4	.5	1.5	.5	-	1
A. clevei	-	-	-	-	-	-	-
A. exigua				-			
A. hungarica				1			
A. lanceolata	.49	1	1	3.4	-	2.5	2.4
A. lanceolata var dubia	-	-	-	-	.5	-	1
A. linearis	3.44	-	-	-			
A. macrocephala				.5			
A. minutissima	-	-	-	-	-	-	-
Amphora coffeiformis							1
Amphora ovalis	.49	2	.5	-	-	1	-
Asterionella formosa	2.46	7.8	5.5	-	2.5	5.4	.5
Caloneis sp #1	-	-	-	-	-	-	-
C. bacillum	-	-	.5	-	-	-	.5
Cocconeis placentula	-	1.5	.5	2	1	3	1
C. placentula var lineata	.98	1	.5	.5	-	1	-
Coscinodiscus lacustris	-	-	-	-	-	-	-
C. rothii	-	-	-	-	-	-	-
Cyclotella menegheniana	1.47	8.3	3.5	5.4	-	6.4	1
C. stelligera	-	-	-	-	-	-	-
Cymbella sp							
C. affinis	-	-	-	-	-	-	-
C. minuta	.5	1	3	2.5	2	3	2.4
Cymatopleura solea	.49	-	.5	-	-	-	-
Diatoma tenue var elongatum	-	-	.5	-	.5	.5	-
D. vulgare	.98	.5	-	-	-	.5	.5
Entomoneis paludosa	-	-	-	-	-	-	-
Epithemia adnata							.5
Eunotia spp.	-	.5	-	1.5	-	-	.5
E. curvatus					-	.5	-
E. praerupta		.5					
Fragilaria sp.	8.86	1.5	2.5	4.4	3.4	2.5	8.8
F. construens	5.41	2	5	3.9	1	2.5	5.9
F. crotonensis	-	2.5	-	1	-	.5	-
F. leptostauron	-	-	-	-	-	-	-
F. pinnata	-	-	-	-			2
F. vaucheriae		.5		.5			-
Frustulia rhomboides var amphipleuroides	-	-	-	-	-	-	2
F. rhomboides var saxonic	-	-	-	-	-	-	-
Gomphonema sp.	.49	.5	4	-	.5	.5	1
G. acumentum				1			
G. angustatum	-	-	-	-	-	-	-
G. olivaceum	.98	.5	.5	.5	1.5	1	1
G. parvulum	-	3	-	5.4	1	3.5	5
G. sphaerophorum	-	-	-	.5			
G. truncatum	.5	-	-	-	-	.5	-
Gyrosigma sp.	-	-	-	-	-	-	-

Table 6 (Continued)

	13B 5/5	13BU 5/27	9B 5/5	9BU 5/27	UPS. CS09B 5/5	UPS. CS09BU 5/27	DWNS. CS09B 5/5
Hantzschia amphioxys							
Melosira granulata	2	4.4	1	1.5	-	4	2.9
M. nummuloides	-	-	-	-	-	-	-
M. varians	.5	4.9	6	4.9	.5	.5	2.9
Meridion circulare	.5	.5	-	.5	-	1	-
M. circulare var. constrictum		.5	.5		-	.5	
Navicula sp.	-	2	1	.5	-	-	-
N. capitata	-	-	-	-	.5	-	-
N. cryptocephala	8.86	7.35	4	10.8	2.9	8.4	6.3
N. cuspidata	-	.5	-	-	-	-	-
N. exigua	-	-	-	-	-	-	-
N. integra	-	1	-	.5	-	.5	.5
N. lanceolata	16.2	14.7	24.4	12.8	61.8	16.8	16.1
N. mutica	-	-	-	-	-	1.5	1
N. pupula	.5	1.5	-	.5	1	1	.5
N. pusilla	-	-	-	-	-	-	-
N. pygmaea	-	-	-	-	-	-	-
N. radiosa	-	-	-	-	-	-	-
N. rhynchocephala	1	2	1	1	1	2.5	.5
N. secreta						.5	2.9
N. tripunctata	1.97	.5	-	4.4	-	-	-
Nitzschia sp.	.49	-	.5	2.5	-	-	.5
N. acicularis	5.41	-	-	.5	1.5	-	-
N. amphibia	1.97	1	1.5	2	-	4	-
N. dissipata	-	-	-	-	-	-	-
N. filiformis	-	-	-	-	-	-	-
N. hungarica	.98	-	-	.5	-	2	-
N. longissima	-	-	-	-	-	-	-
N. palea	3.94	7.35	5.5	5.9'	1.5	5	5.9
N. parvula	-	-	.5	-	-	-	-
N. sigma							
N. tryblemella	1.47	2.5	2.5	.5	-	.5	.5
Pinnularia sp.	.98	.5	-	-	-	1.5	.5
P. stomataphora			1				
Rhoicosphenia curvata	-	1.5	.5	1	-	.5	.5
Rhopalodia sp.	-	-	-	-	-	-	-
R. gibba	-	-	-	-	-	-	-
Skeletonema costatum	-	-	-	-	-	-	-
Stauroneis anceps							.5
Steneroptera intermedia							.5
Stephanodiscus astraea	-	-	-	-	-	.5	-
Surirella sp.	-	-	1	-	-	-	-
S. angustata	1.47	2	1	.5	-	.5	2
S. ovalis	3.4	2.9	6.9	2.5	3.4	.5	1.5
S. ovata	2.95	1.5	6.5	1.5	3.4	1.5	3.9
Synedra sp.	8.86	2.5	2.5	5.4	3.4	3.5	8.8
S. acus	-	-	-	1.5	-	-	-

Station Date	13B 5/5	13BU 5/27	9B 5/5	9BU 5/27	UPS. CS09B 5/5	UPS. CS09BU 5/27	DWNS. CS09B 5/5
S. delicatissima		.5			-	.5	
S. fasciculata					.5	.5	1
S. incisa	-	-	-	-	-	.5	.5
S. radians	1.47	-	-	-	-	-	-
S. rumpens	-	.5	3.5	.5	3.4	.5	1
S. ulna	3.44	1.5	1	1	1	4.5	1.5
Tabellaria fenestrata	1.97	-	-	1	-	1	-
Thalassiosira fluviatilis	-	-	-	-	-	-	-
Shannon Index	3.13	3.24	2.99	3.26	1.79	3.26	3.19
Eveness	.87	.87	.83	.86	.55	.85	.85
H max	3.61	3.74	3.58	3.76	3.22	3.83	3.76
H min	1.06	1.25	1.04	1.28	0.74	1.32	1.27
Redundancy	0.19	.20	.24	.2	0.58	.22	.23
#Species	37	42	36	43	25	45	43

Station Date	DWNS. CS09BU 5/27	3B 5/4	3BU 5/28	UPS. CS03B 5/4	UPS. CS03B 5/28	DWNS. CS03B 5/4	DWNS. CS03B 5/28
Achnanthes sp.	.5	-	1.5	-		1.9	
A. clevei	-	-	-	-		-	
A. exigua	.5	2					
A. hungarica							
A. lanceolata	1.5	1.5	1.5	.5		.5	
A. lanceolata var dubia	-	-	-	-		-	
A. linearis	.5	-	-	-		-	
A. macrocephala	.5					1.4	
A. minutissima	-	-	-	-		-	
Amphora coffeiformis							
Amphora ovalis	4.5	.5	-	-		-	-
Asterionella formosa	4	1.5	1	1		-	.5
Caloneis sp #1	-	-	-	-		-	
C. bacillum	-	-	-	-		-	
Cocconeis placentula	1.5	.5	-	1		.5	
C. placentula var lineata	1	-	-	-		.5	
Coscinodiscus lacustris	-	-	-	.5		-	
C. rothii	-	1	5	5.4	1	10.3	
Cyclotella menegheniana	11.4	2.5	16	9.9	1.5	13.1	1
C. stelligera	-	-	-	-		-	
Cymbella sp		-		.5		.5	
C. affinis	-	-	-	-		-	
C. minuta	2.5	-	1	.5			
Cymatopleura solea	-	-	-	-		-	
Diatoma tenue var elongatum	-	-	-	.5		-	
D. vulgare	.5	-	1	.5		1.4	
Entomoneis paludosa	-	.5	-	-		-	-
Epithemia adnata							
Eunotia spp.							
E. curvatus							
E. praerupta							
Fragilaria sp.	2	.5	3.5	2.5		4.7	1
F. construens	4	-	2.5	-		2.3	
F. crotonensis	-	-	1	-		-	
F. leptostauron	-	-	-	-		-	
F. pinnata	.5						
F. vaucheriae							
Frustulia rhomboides var amphipleuroides	-	-	-	-		.5	
F. rhomboides var saxonica	-	-	-	-		-	
Gomphonema sp.	-	-	-	.5		.9	
G. acumentum							
G. angustatum	-	-	-	-		-	
G. olivaceum	-	.5	1.5	-		-	
G. parvulum	2	-	.5	4.5		4.2	
G. sphaerophorum							
G. truncatum							
Gyrosigma sp.	-	.5	-	-	-	-	-

Table 6 (Continued)

Station Date	DWNS. CS09BU 5/27	3B 5/4	3BU 5/28	UPS. CS03B 5/4	UPS. CS03B 5/28	DWNS. CS03B 5/4	DWNS. CS03B 5/28
Hantzschia amphioxys			3.5				
Melosira granulata	2.5	1.5	4.5	1	.5	3.8	.5
M. nummuloides	-	-	-	-	-	-	-
M. varians	.5	-	1	2	.5	.5	
Meridion circulare	2	-	-	.5	.5	1.4	
M. circulare var. constrictum							
Navicula sp.	2	1	1	.5		.9	-
N. capitata	-	-	-	-		-	-
N. cryptocephala	10.4	8	2.5	2		6.1	.5
N. cuspidata	.5	-	.5	-		-	
N. exigua	-	-	-	-		-	
N. integra	-	-	1	.5		1.4	
N. lanceolata	13.9	5.5	8	25.2		8.5	1
N. mutica	-	-	-	-		-	-
N. pupula	3	1.5	2	.5		-	.5
N. pusilla	-	-	-	-		-	
N. pygmaea	-	.5	-	-		-	
N. radiosa	-	-	-	-		-	
N. rhynchocephala	1.5	-	-	-		.9	
N. secreta							
N. tripunctata	1	-	-	-		.5	-
Nitzschia sp.	1	-	1.5	.5		.9	.5
N. acicularis	.5	.5	.5	-		-	-
N. amphibia	2	1.5	1.5	1.5	.5	1.9	.5
N. dissipata	-	-	-	-			
N. filiformis	-	-	-	-			
N. hungarica	.5	1	.5	-			
N. longissima	-	-	-	-	-	-	-
N. palea	8.5	2	3	1.5	-	3.3	-
N. parvula	-	56.7	13	5.4	95	2.8	92.1
N. sigma		1	.5				
N. tryblemella	1.5	-	-	1.5	-	.5	-
Pinnularia sp.	-	.5	1	-	-		-
P. stomataphora							
Rhoicosphenia curvata	1.5	-	-	.5			
Rhopalodia sp.	-	-	-	-			
R. gibba	-	-	-	-			
Skeletonema costatum	-	-	-	-			
Stauroneis anceps							
Steneroptera intermedia							
Stephanodiscus astraea	-	.5	-	-		-	
Surirella sp.	-	-	-	-		.5	
S. angustata	-	-	-	.5		.5	
S. ovalis	.5	-	4				
S. ovata	1	4.5	1.5	2.5		1.4	
Synedra sp.	2.5	.5	3.5	2.5		4.7	1
S. acus	-	-	.5	-			

Table 6 (Continued)

Station Date	DWNS. CS09BU 5/27	3B 5/4	3BU 5/28	UPS. CS03B 5/4	UPS. CS03B 5/28	DWNS. CS03B 5/4	DWNS. CS03B 5/28
S. delicatissima							
S. fasciculata							
S. incisa	.5	-	-	-			
S. radians	-	-	-	-			
S. rumpens	1.5	-	1	3		1.4	
S. ulna	2	.5	3	1	.5	1.9	.5
Tabellaria fenestrata	1.5	.5	1.5	.5		1.4	
Thalassiosira fluviatilis	-	-	-			-	
Shannon Index	3.16	2.03	3.1	2.7	.29	3.19	.49
Eveness	.85	.59	.86	.76	.14	.87	.19
H max	3.69	3.43	3.6	3.6	2.07	3.66	2.64
H min	1.20	.91	1.1	1.1	.22	1.13	.4
Redundancy	.211	.56	.19	.33	.96	.19	.95
#Species	40	29	34	35	8	38	13

Table 6 (Continued)

Station 2	B	B
Date	5/5	5/28
Achnanthes sp.	-	-
A. clevei	-	-
A. exigua		4.5
A. hungarica		
A. lanceolata	1.5	1.5
A. lanceolata var dubia		
A. linearis		
A. macrocephala		1
A. minutissima		
Amphora coffeiformis		
Amphora ovalis		.5
Asterionella formosa		.5
Caloneis sp #1		-
C. bacillum		-
Cocconeis placentula		1.5
C. placentula var lineata		1.5
Coscinodiscus lacustris		-
C. rothii		1.5
Cyclotella menegheniana	2	8
C. stelligera		-
Cymbella sp		
C. affinis		-
C. minuta		.5
Cymatopleura solea		-
Diatoma tenue var elongatum		.5
D. vulgare		1
Entomoneis paludosa		-
Epithemia adnata		
Eunotia spp.		
E. curvatus		
E. praerupta		
Fragilaria sp.	2	.5
F. construens		1.5
F. crotonensis		
F. leptostauron		
F. pinnata		
F. vaucheriae		
Frustulia rhomboides var amphipleuroides		-
F. rhomboides var saxonica		1
Gomphonema sp.		1.5
G. acumentum		
G. angustatum		-
G. olivaceum		.5
G. parvulum	2	2
G. sphaerophorum		
G. truncatum		.5
Gyrosigma sp.		-

Table 6 (Continued)

Station 2 Date	B 5/4	B 5/28
Hantzschia amphioxys		
Melosira granulata		2.5
M. nummuloides		-
M. varians	.5	.5
Meridion circulare		
M. circulare var. constrictum		
Navicula sp.		-
N. capitata		-
N. cryptocephala	1.5	7
N. cuspidata		-
N. exigua		-
N. integra	1	1
N. lanceolata	3	8.5
N. mutica		1
N. pupula		
N. pusilla		
N. pygmaea		
N. radiosa		
N. rhynchocephala		1
N. secreta		
N. tripunctata	-	
Nitzschia sp.		.5
N. acicularis	-	
N. amphibia		3
N. dissipata		
N. filiformis		
N. hungarica		
N. longissima	-	-
N. palea	1	3
N. parvula	79.5	34.5
N. sigma		5.5
N. tryblemella	-	.5
Pinnularia sp.	-	-
P. stomataphora		
Rhoicosphenia curvata	1	.5
Rhopalodia sp.		
R. gibba		
Skeletonema costatum		
Stauroneis anceps		
Steneroptera intermedia		
Stephanodiscus astraea	-	
Surirella sp.	-	
S. angustata	.5	1.5
S. ovalis		.5
S. ovata	.5	1
Synedra sp.	2	.5
S. acus		

Table 6 (Continued)

Station 2 Date	B 5/4	B 5/28
S. delicatissima		
S. fasciculata		
S. incisa		
S. radians		
S. rumpens	1	-
S. ulna	-	1.5
Tabellaria fenestrata	.5	1
Thalassiosira fluviatilis	-	-
Shannon Index	1.22	2.82
Eveness	.43	.76
H max	2.83	3.69
H min	.47	1.17
Redundancy	.68	.34
#Species	16	34

Table 7

PERIPHYTON COMMUNITY STRUCTURE SUMMARY

	November			May 4/5			May 27/28		
Station	# Species	H'	Eveness	# Species	H'	Eveness	# Species	H'	Even
13	34	2.92	.82	37	3.13	.87	42	3.24	.8
9	-	-	-	36	2.99	.83	43	3.26	.8
Upstream CS09	28	2.16	.64	25	1.79	.55	45	3.26	.8
Downstream CS09	37	3.04	.84	43	3.19	.85	40	3.16	.8
3	31	2.73	.80	29	2.03	.59	34	3.1	.8
Upstream CS03	35	2.97	.83	35	2.7	.76	8	.29	.1
Downstream CS03	48	3.14	.81	38	3.19	.87	13	.49	.1
2	34	3.01	.84	16	1.22	.43	34	2.82	.7

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Table 8

PHYTOPLANKTON COLLECTED 11/24/81
(in percent)

	STATION								
	13	10	9	UPSTR CS09	DWNSTR CS09	3	UPSTR CS03	DWNSTR CS03	2
Cyanophyta									
coccoid		0.49	0.93	1.5	1.6				
Microcystis flos-aquae	15	28.4	19.9	11.6	12.6	2.38			0.98
Oscillatoria sp.	1	0.99	1.85		1.1	1.19	1.9		
Chlorophyta									
coccoid	1		2.3	7	3.3		0.49		2.9
colonial				0.5					
Ankistordesmus convolutus									
A. falcatus					1.6				
Chlamydomonas (?)				0.5					
Closterium sp.		1.99				1.19		1.5	2.9
Coelastrum microporum					0.55				
Cosmarium sp.		0.49							
Pediastrum duplex	0.5	0.49	1.38			1.19	1.9	0.5	0.98
P. duplex var gracillimum		2.5							
P. simplex		0.49				3.57		1.5	1.47
P. simplex var duodenarium	0.5		1.38				1.47		
Scendesmus sp.									
S. longus							0.49		
S. quadricauda									0.49
Spirogyra sp.						7.14			
Staurastrum									0.49
Euglenophyta									
Euglena sp.	1.5		0.46		0.55				
Trachelomonas sp.	0.5						0.49		
T. euchlora			0.46						

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Table 8 (Continued)

PHYTOPLANKTON COLLECTED 11/24/81
(in percent)

	STATION								
	13	10	9	UPSTR CS09	DWNSTR CS09	3	UPSTR CS03	DWNSTR CS03	2
Bacillariophyta									
centrate	16	9.45	11.5	13.1	9.3		9.8	8.5	11.7
pennate	38.5	22.9	35.2	41.2	56.8		22	34	21.6
naviculoid	1.5	2.98	1.38	5.53	3.3		1.9	2	3.43
Achnanthes linearis						1.19			
Amphora ovalis						2.38			
Asterionella formosa	0.5	0.99			0.55	1.19		2	8.8
Cocconeis placentula		0.49			1.1				
Coscinodiscus sp.				2.5		10.71			
C. lacustris							0.49	2	
C. rothii		0.49	2.7	1			13.2	11.5	5.4
Cyclotella glomerata						2.38			
C. menegheniana	1.5	0.99	2.3		1.6		1.47	3.5	1.96
Cymatopleura solea	1.5	5.47	3.24	2.5	3.8		0.98	1	1.96
Cymbella sp.									
Diatoma vulgare			3.24	0.5					
Diploneis sp.								0.5	
Ditylum sp.							0.49		
D. brightwelli						1.19			
Entomoneis sp.									
Fragilaria sp.						4.76			
F. construens				0.5					
F. crotonensis		0.49		1			0.49	1	0.98
Gomphonema sp.		0.49		0.5				0.5	0.49
Gomphonema (side)									
Gyrosigma/Pleurosigma						1.19	3.43	0.5	
G. fasicola (?)							0.49		
Melosira sp.	18.5	16.9	11.1	6.5		5.95	16.2	14.5	21.5
M. nummuloides								2	
M. varians				1.5		7.14			
Meridion circulare	0.5								

DEP\DA0004814

Table 8 (Continued)

PHYTOPLANKTON COLLECTED 11/24/81

(in percent)

	STATION								
	13	10	9	UPSTR CS09	DWNSTR CS09	3	UPSTR CS03	DWNSTR CS03	2
Navicula sp.						1.19			
Nitzschia sp.	1	2.5	0.46	2.5	2.18	8.33	5.9	4.5	9.3
Pinnularia sp.						1.19			
Plagiotropis lepidoptera						1.19		0.5	
Rhoicosphenia curvata									
Rhopalodia sp. (broken)									
Skeletomena costatum						1.19			
Surirella sp.	0.5					8.33	7.8		
Surirella (side)								4.5	1.96
S. ovata							7.35	3	0.49
Synedna ulna						21.43			
Triaceratium alternans								0.5	
Chrysophyta									
spiny							0.98		
Mallomonas sp.						2.38			
Other									
Dinobryon									

DEP\DA0004815

Table 9

WHOLE PLANKTON DISTRIBUTION BY CLASS

FALL 1981

STATION NO.	Date	Cyanophyta	Chlorophyta	Euglenophyta	Bacillariophyta	Chrysophyta
		(Percent of Sample)				
ember 1981						
	9/4/81	17	5.5	1	70.5	6
	9/11/81	22.3	18.2	-	55.4	4.1
	9/11/81	48	10	-	36	-
	9/11/81	27	3	2	66	-
	9/11/81	12	13	3	70	-
ember 1981						
	11/24/81	1	9	-	90	-
3 downstream	11/24/81	-	3.5	-	96.5	-
3 upstream	11/24/81	2	4.5	.5	92	1
	11/24/81	4	16	-	73	3
9 downstream	11/24/81	15.3	5.5	.5	78.7	-
9 upstream	11/24/81)	13	8	-	79	-
	11/4/81	9	5.5	.5	85	-
	11/24/81	23	5	1	71	-
	11/4/81	30	6	-	64	-
	11/4/81	25.3	2	-	72.2	.5
	11/24/81	16	2	2	80	-

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