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## Hydraulic Engineering Laboratory Reports

### Title

Recent Sediments of the Central California Continental Shelf, Pigeon Point to Sand Hills Bluff: Part A -- Introduction and Grain Size Analysis

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RECENT SEDIMENTS OF  
THE CENTRAL CALIFORNIA  
CONTINENTAL SHELF

PIGEON POINT TO SAND HILLS BLUFFS

PART A. INTRODUCTION AND  
GRAIN SIZE DATA

by

J. LEE  
T. YANCEY  
and  
P. WILDE



HYDRAULIC ENGINEERING LABORATORY  
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UNIVERSITY OF CALIFORNIA  
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RECENT SEDIMENTS OF THE CENTRAL CALIFORNIA  
CONTINENTAL SHELF  
PIGEON POINT TO SAND HILL BLUFFS

PART A - INTRODUCTION AND GRAIN SIZE ANALYSIS

by

J. Lee, T. Yancey, and P. Wilde

Berkeley, California  
October 1970

## Introduction

The following work is part of a continuing study of the sediments and sedimentary processes of the continental shelf of central California done in cooperation between the University of California, Berkeley, and the Coastal Engineering Research Center, U. S. Army Corps of Engineers. Sediment analyses of the samples were done at the University of California, Berkeley, utilizing the facilities of the Departments of Civil Engineering and Geology and the Institute of Marine Resources. The results of this study will be presented in three separate reports:

Part A Introduction and Grain Size Data (this volume)

Part B Mineralogical Data

Part C Interpretation and Summary of Results

The first two reports, Parts A and B, will be presented with little or no interpretation. In Part C the authors' interpretation of the data plus background information and previous work in the study area will be given.

The area covered by this report extends from Pigeon Point in the north to Sand Hill Point in the south. With the completion of this report a complete section of the continental shelf of California from Russian River to Monterey Bay will have been studied. The methods of sediment analysis employed in the overall study are grain size analysis followed by heavy mineral analysis and interpretation.

## Sample Collection

Samples studied in this report include 39 marine samples, and 9 intertidal beach samples taken specifically for this project. Marine



bottom samples were obtained with an orange peel grab sampler from the converted fishing boat San Michele, September 1969. Participants in the marine sampling program were Ralf Carter, Eugene Silva, Tom Yancey, Jamison Bates, and Pat Wilde. Marine samples were obtained from the shoreline to 300 feet below sea level. The sample density is approximately uniform within the study area (see Fig. 1). Intertidal beach samples were obtained in April 1970 by James Lee and Tom Yancey. The beach samples were obtained using a pipe coring device. The coring device was inserted into the beach at approximately mid to low tide level. In this manner a core of the upper six to ten inches of the beach sediment was obtained.

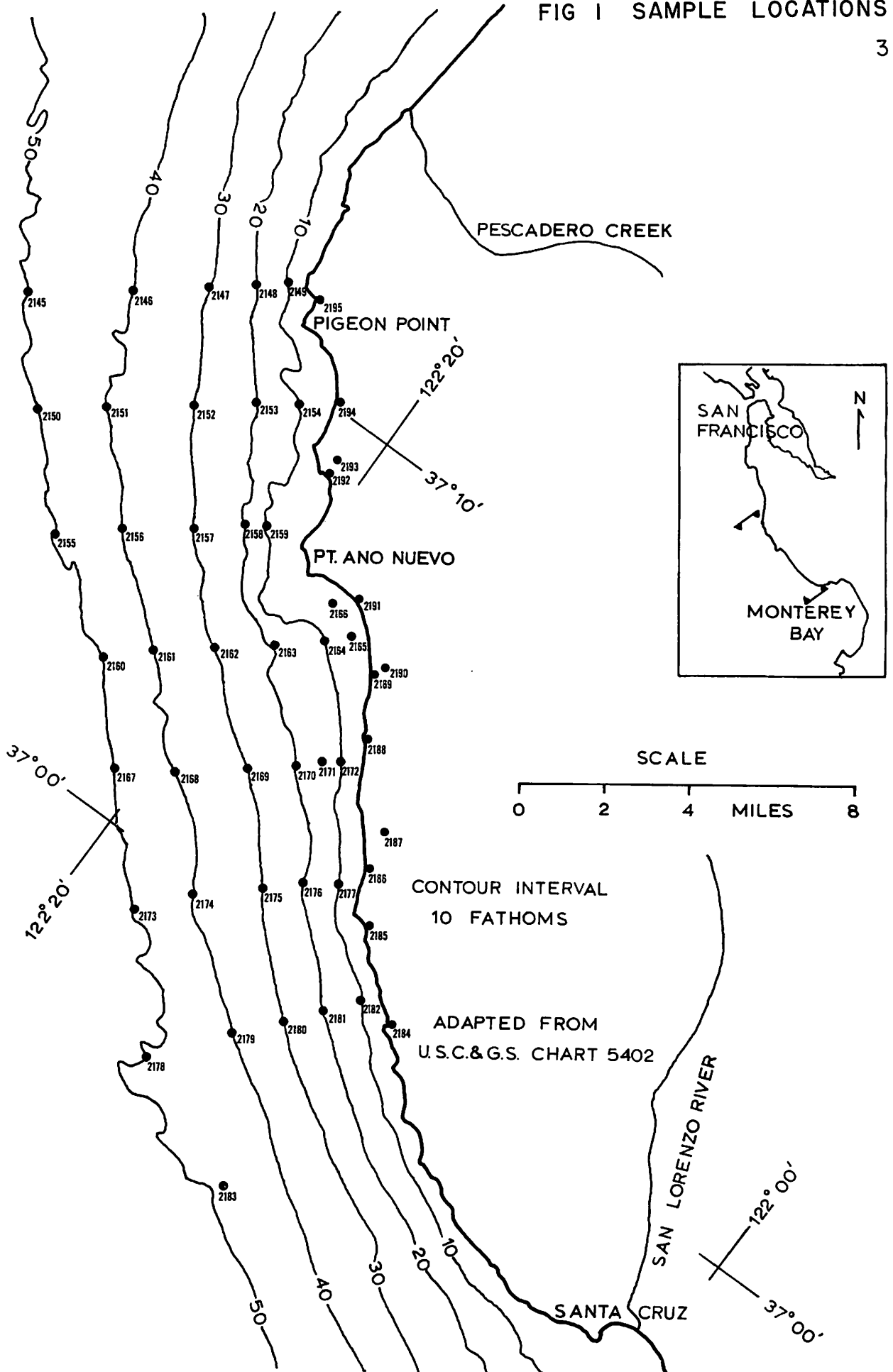
Figure 1 shows the sampling stations (numbers refer to Hydraulic Engineering Laboratory Sediment Collection numbers, U. C. Berkeley) plotted on U. S. Coast and Geodetic Survey Chart 5402. Location of each sample was obtained by Decca radar bearings on shore landmarks. Station depths were obtained by echo sounding with a Raytheon depth finder.

The orange peel bottom sampler took approximately 15 centimeters of surface material. About one liter by volume of sample was saved from each station. This portion of the sample was saved from each station. This portion of the sample was placed in a polyethylene bag and stored in a moist condition in a cylindrical cardboard container until analysis.

#### Grain Size Analysis

The samples were analyzed by Tom Yancey and James Lee at half phi intervals (Krumbein and Pettijohn, 1938, p. 84) through the entire

FIG 1 SAMPLE LOCATIONS



range of the sediment size spread. The sediments contain a wide spread of grain sizes, so for the finer grained samples sieving was supplemented by pipette analysis (Folk, 1965, pp. 37-40) for the silt and clay fraction of the sample. The samples were wet sieved through a  $4\phi$  (.0625 mm) screen with running sea water. The coarser than  $4\phi$  sediments were then dried and sieved in the standard manner. Particles in the silt and clay size range were washed into a reservoir of sea water, and recovered and stored wet in sea water. This procedure enables one to separate silts and clays from coarser particles in a non-destructive manner, i.e., the original composition and particle size of the finer sediments is not changed by treatment with distilled water and drying. The weight of the sample was determined using the wet weighing method of Wilde and others (1970).

The pipette analysis was made at half phi intervals, and carried to a lower limit of  $8\frac{1}{2}\phi$  (0.0027 mm). Only a small number of the samples were carried to  $8\frac{1}{2}\phi$ ; these samples had 80% or greater in the silt and clay size fraction. The remaining samples were carried to a lower limit of  $7\phi$  (0.0078 mm).  $7\phi$  is a convenient lower limit to use in pipette analysis, and in most cases the finer than  $7\phi$  fraction represented less than 5% of the sample. Data from this method was proportionately recalculated to fit the sieving data and the size frequency curve and cumulative curve were assembled from these two methods. Each size fraction of the sieving and pipette analysis were weighted on an analytical balance to 0.001 gram and a weight percent value was calculated for each fraction.

The samples were sized through the following sieves:

<u>U. S. Standard Mesh Number</u>	<u>Nominal Opening</u>	<u>Phi Units</u>
5	3.962 mm	- 2.0
7	2.83 mm	- 1.5
10	1.981 mm	- 1.0
14	1.397 mm	- 0.5
18	0.991 mm	0
25	0.701 mm	+ 0.5
25	0.495 mm	+ 1.0
45	0.351 mm	+ 1.5
60	0.246 mm	+ 2.0
80	0.175 mm	+ 2.5
120	0.124 mm	+ 3.0
170	0.088 mm	+ 3.5
230	0.061 mm	+ 4.0

#### Data Format

The grain size information for each sample is presented in the following pages graphically as (1) a histogram where the width of each bar represents the size range considered and the height of the bar represents the weight percent of that size range; and (2) a cumulative frequency curve, which is a smooth curve drawn between points determined by adding weight percent values in successively smaller grain size classes. Points connected by dashed lines are symmetrically extrapolated values and do not represent measured values.

Modes, or the order of frequency, are determined visually from the histogram, with the first mode being the size class with the

largest weight percent value.

Quartile and percentile values or grain size values at a given weight percent are determined visually from the cumulative curves and are used for calculating statistical measures below. The percentile and quartile subscripts given here indicate the percentage of the distribution coarser than the corresponding grain size value. For example,  $P_{10}$  refers to the grain size at which 10% of the distribution is coarser. This procedure does not conform to standard statistical usage but is less ambiguous for grain size work where by convention the cumulative is plotted in order of decreasing grain size, which is the reverse of statistical practice.

Graphically Determined

<u>Parameter</u>	<u>Grain Size at</u>
$P_{10}$	10 <sup>th</sup> percentile
$Q_{25}$	25 <sup>th</sup> percentile (3 <sup>rd</sup> quartile)
$Q_{50}$	50 <sup>th</sup> percentile (2 <sup>nd</sup> quartile)
MEDIAN	
$Q_{75}$	75 <sup>th</sup> percentile (1 <sup>st</sup> quartile)
$P_{90}$	90 <sup>th</sup> percentile

Calculated

$$S_o = \sqrt{Q_{25}/Q_{75}}$$

SORTING COEFFICIENT:  
(Trask, 1932)

Degree of Scatter

$$S_k = \frac{Q_{25} - Q_{75}}{(Q_{50})^2}$$

QUARTILE SKEWNESS:  
(Trask, 1932)

Symmetry of Distribution

$$K = \frac{Q_{25} - Q_{75}}{2(P_{10} - P_{90})}$$

KURTOSIS:  
(Krumbein and Pettijohn, 1938, p. 238)

Comparison of Central Portion of  
Curve to Spread of Whole Curve

The above calculated statistical parameters plus median grain size are plotted uncountured on the basemap as follows - Fig. 2: Median Grain Size; Fig. 3: Sorting Coefficient; Fig. 4: Skewness; Fig. 5: Kurtosis.

For possible further analysis and for those who prefer phi units as the grain size measure, the following statistical parameters have been calculated: Inclusive Graphic Standard Deviation (sorting coefficient), (Folk, 1965, p. 46), Inclusive Graphic Skewness (Folk, 1965, p. 47), and Graphic Kurtosis (Folk, 1965, p. 48). The above calculated statistical parameters plus phi median grain size are plotted uncountured on the basemap as follows - Fig. 6: Phi Median Grain Size; Fig. 7: Inclusive Graphic Standard Deviation; Fig. 8: Inclusive Graphic Skewness; and Fig. 9: Graphic Kurtosis.

FIG 2 MEDIAN GRAIN DIAMETER

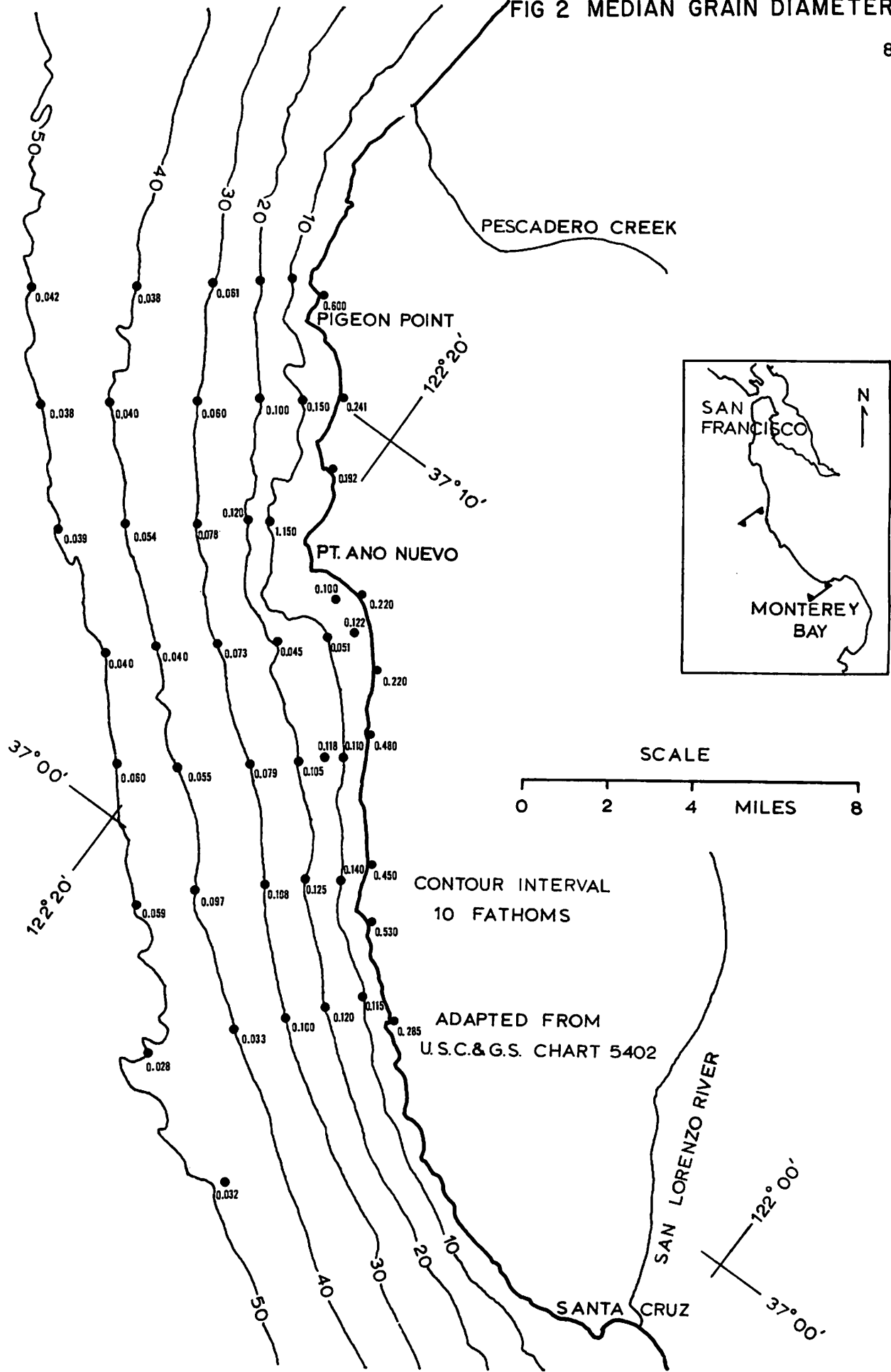








FIG 5 KURTOSIS

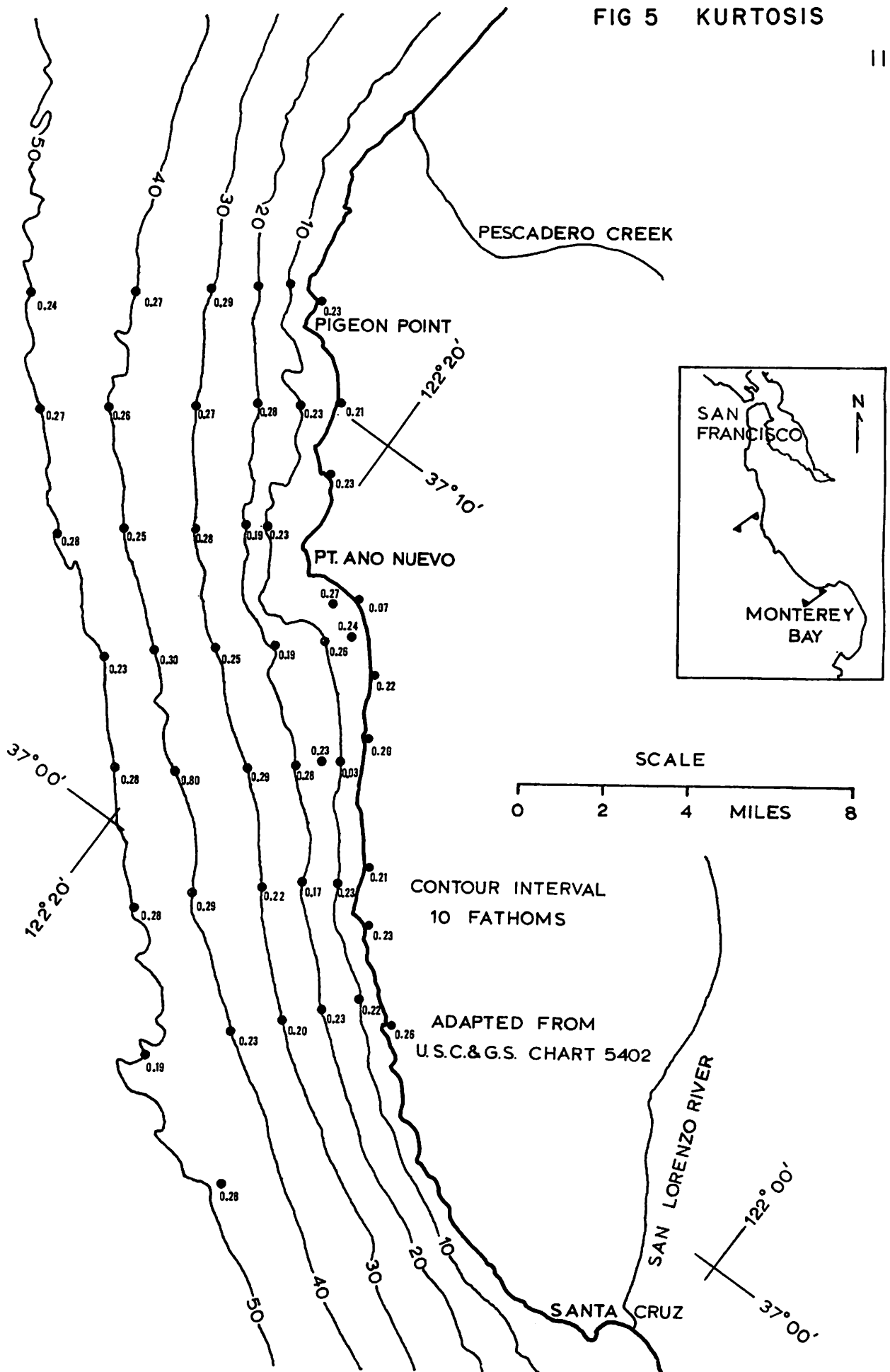


FIG 6 PHI MEDIAN GRAIN DIAMETER

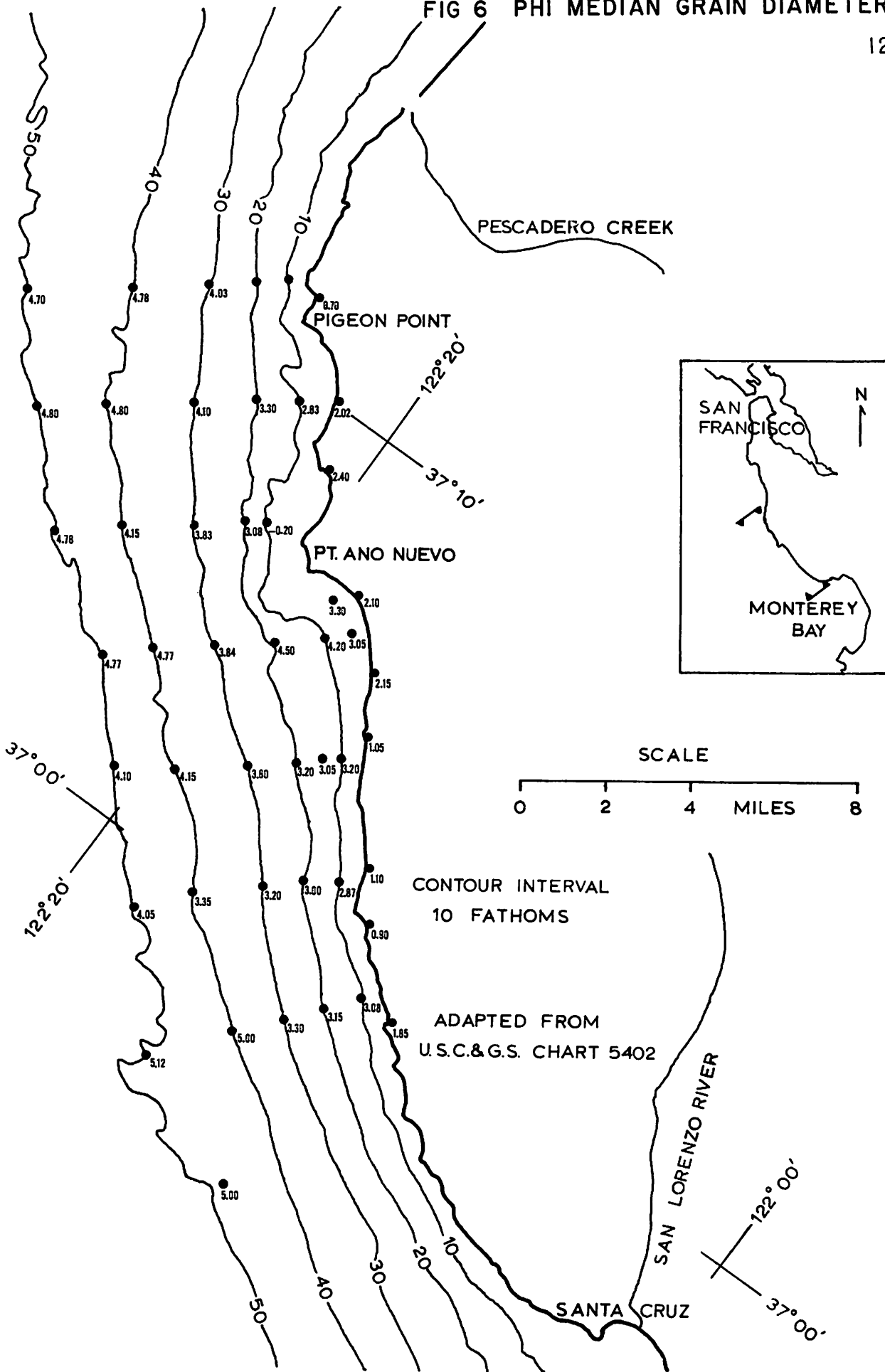


FIG 7 INCLUSIVE GRAPHIC STANDARD DEVIATION

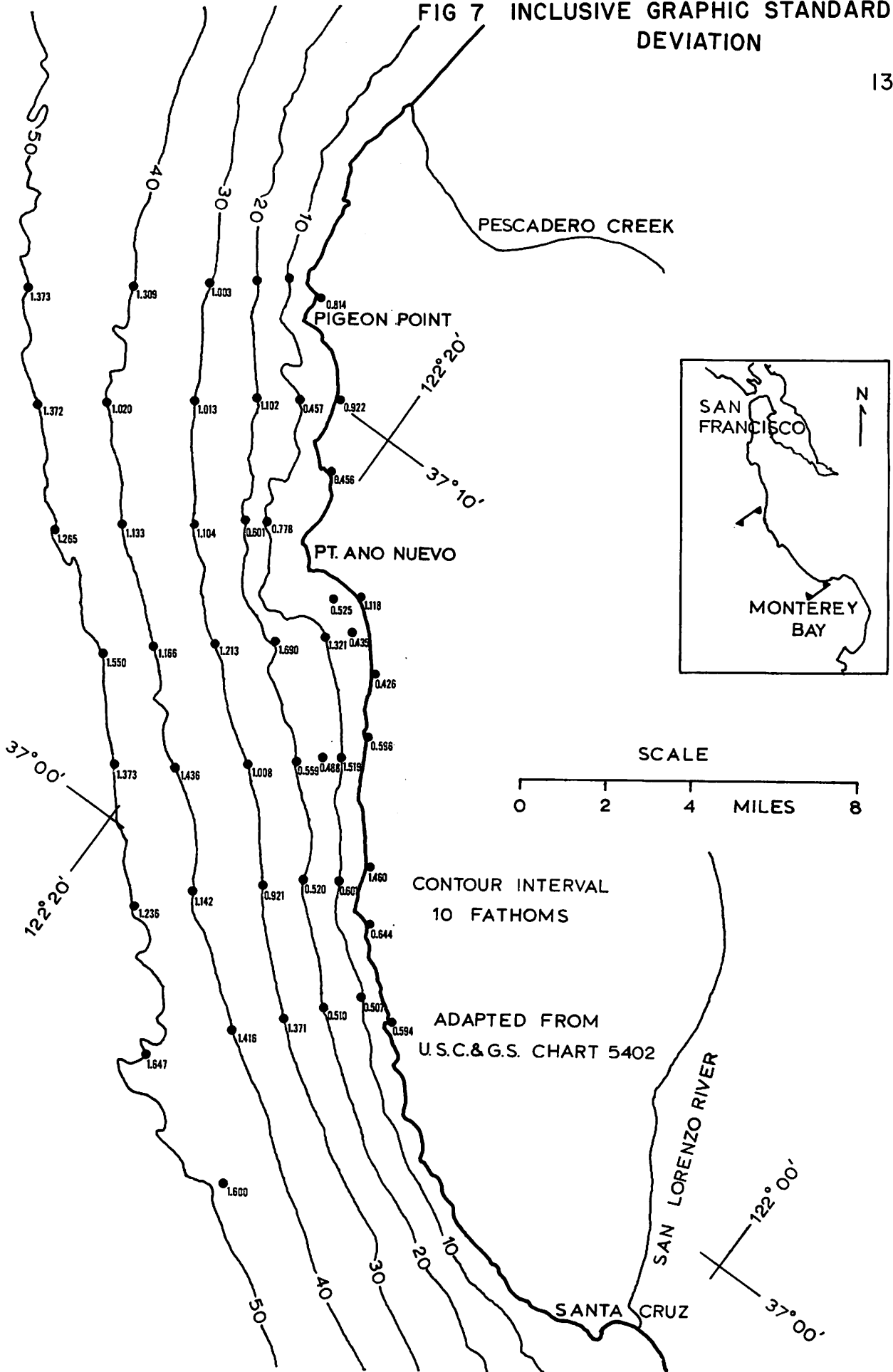
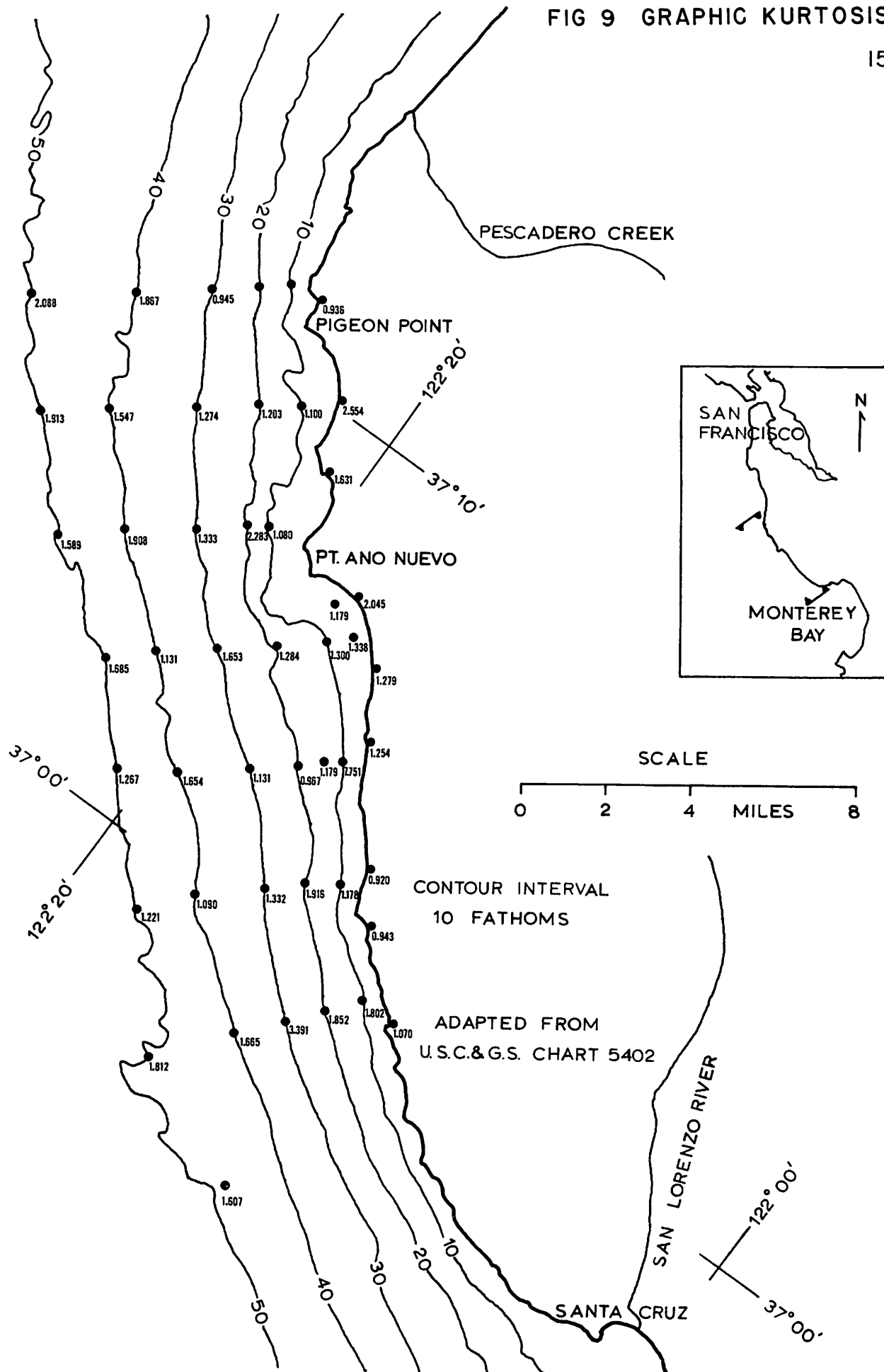




FIG 9 GRAPHIC KURTOSIS



References

- Folk, R. L., 1965, Petrology of Sedimentary Rocks: Univ. Texas-Hemphills, Austin, Texas, 159 p.
- Krumbein, W. C. and Pettijohn, F. J., 1938, Manual of Sedimentary Petrography: New York, Appleton-Century-Crofts, 549 p.
- Sayles, F. L., 1965, Coastal Sedimentation: Point San Pedro to Miramontes Point, California: University of California, Berkeley, Hyd. Eng. Lab., HEL-2-15, 105 p.
- Trask, P. D., 1932, Origin and Environment of Source Sediments of Petroleum: Houston, Gulf Publishing Co., 67 p.
- Wilde, P., Holden J., and Isselhardt, C., 1970, Non-Destructive Wet Weighing of Marine Sediments: Marine Geology, v. 8, pp. 173-178.

# SIZE ANALYSIS

Sample 2145

Sample description greenish gray

Lat. 37° 08.3' Long. 122° 30.1'

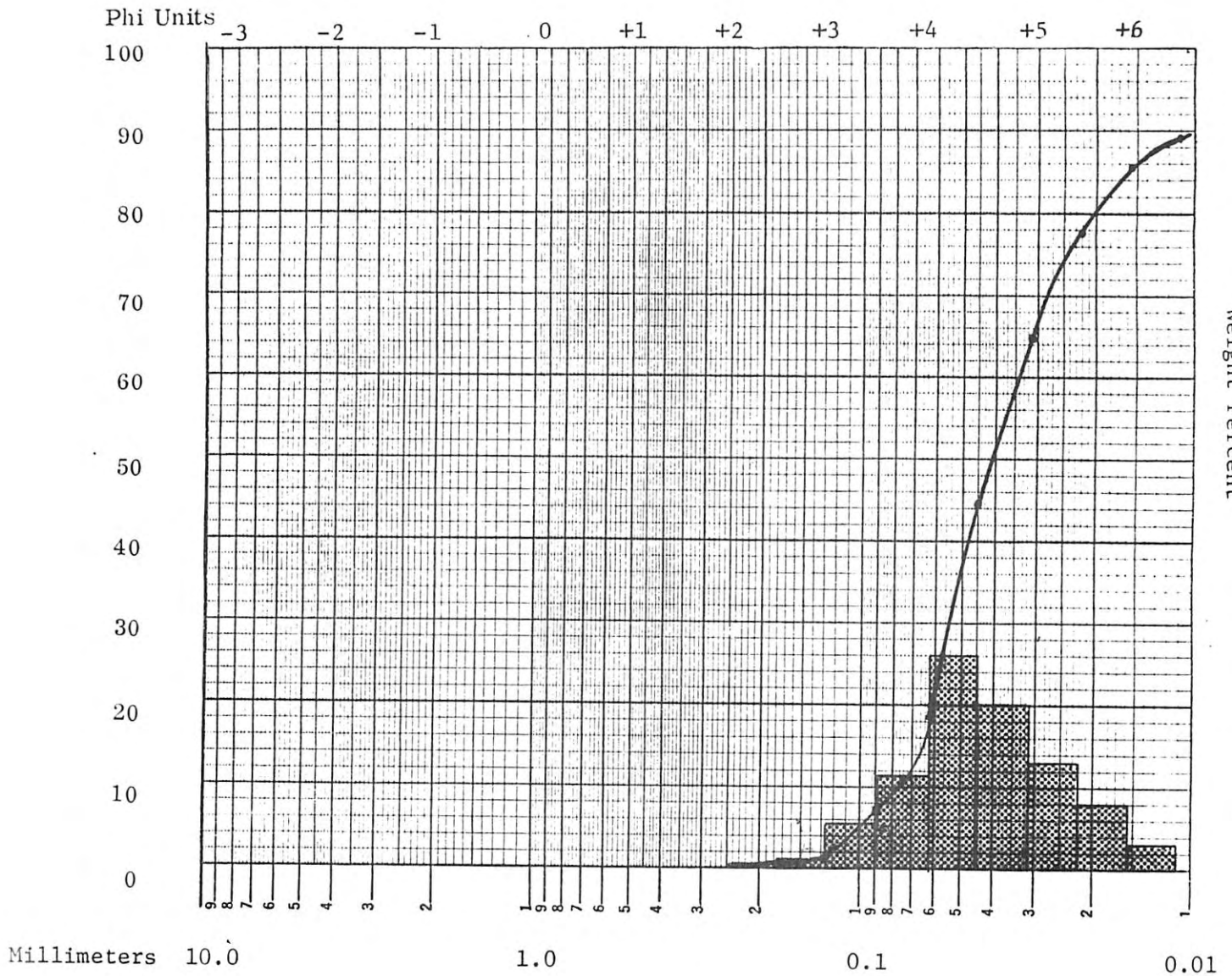
very fine grained sandy silt.

Depth 50 Fathoms

91.6 Meters

300 Feet

Sample Weight 299.659 g



## SIZE PARAMETERS

1st Mode <u>.044 - .062 mm</u>	Q <sub>25</sub> <u>.057 mm</u>	Sorting Coef. <u>1.51</u>
2nd Mode _____	Median: Q <sub>50</sub> <u>.042 mm</u>	Skewness <u>.808</u>
3rd Mode _____	Q <sub>75</sub> <u>.025 mm</u>	Kurtosis <u>.235</u>



# SIZE ANALYSIS

Sample 2146

Sample description greenish

Lat. 37° 09.5' Long. 122° 27.6'

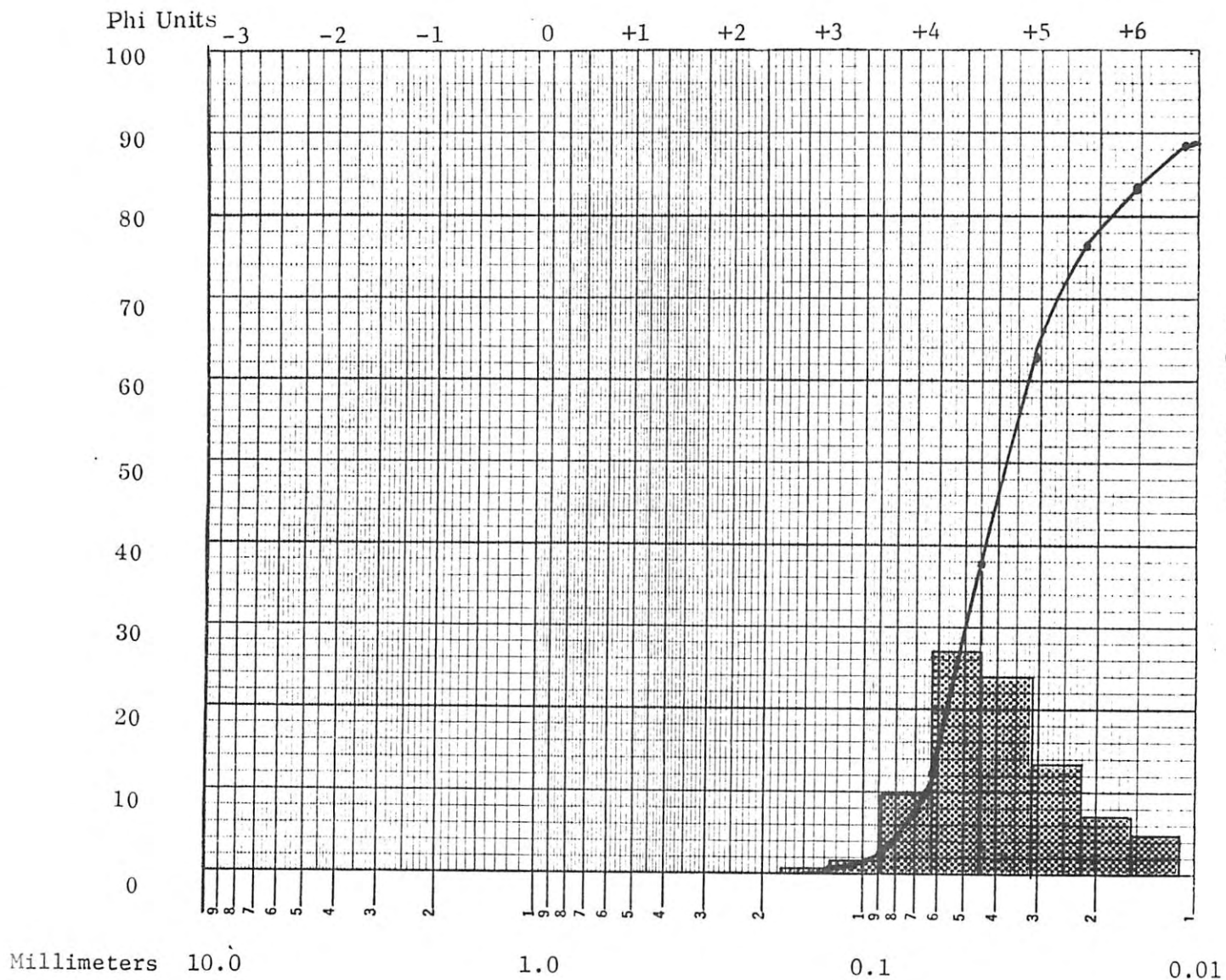
gray very fine grained sandy silt

Depth 40.0 Fathoms

73.2 Meters

240.0 Feet

Sample Weight 274.196 g



## SIZE PARAMETERS

1st Mode .044 - .062 mm       $Q_{25}$  .053 mm      Sorting Coef. 1.518

2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .038 mm      Skewness .844

3rd Mode \_\_\_\_\_       $Q_{75}$  .023 mm      Kurtosis .265

SIZE ANALYSIS

Sample 2147

Sample description greenish

Lat. 37° 10.4' Long. 122° 26.3'

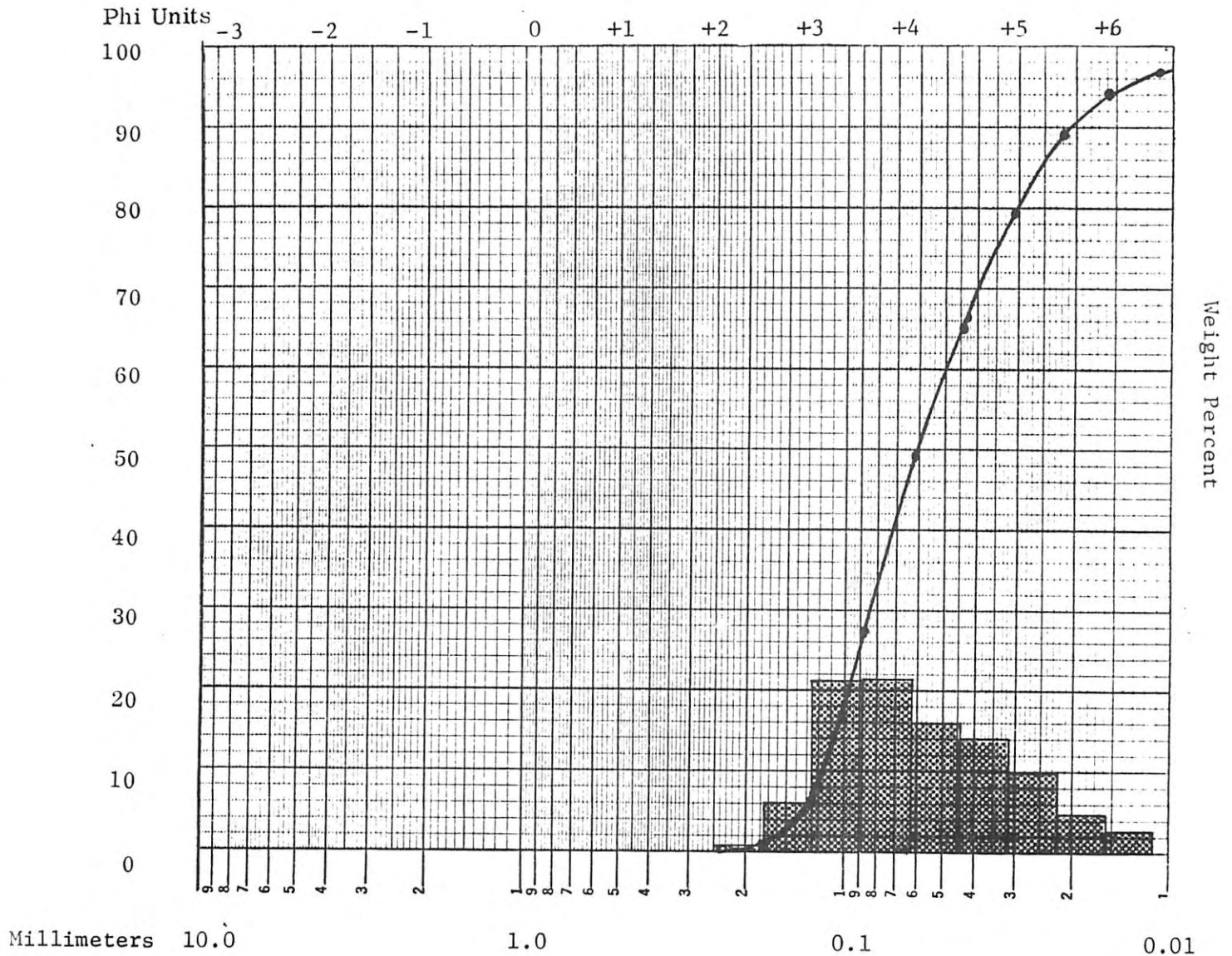
gray fine grained silty sand

Depth 30.0 Fathoms

54.8 Meters

180.0 Feet

Sample Weight 236.736 g



SIZE PARAMETERS

1st Mode .062 - .088 mm       $Q_{25}$  .090 mm      Sorting Coef. 1.604  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .061 mm      Skewness .847  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .035 mm      Kurtosis .292

# SIZE ANALYSIS

Sample 2150

Sample description greenish gray

Lat. 37° 06.2' Long. 122° 28.0'

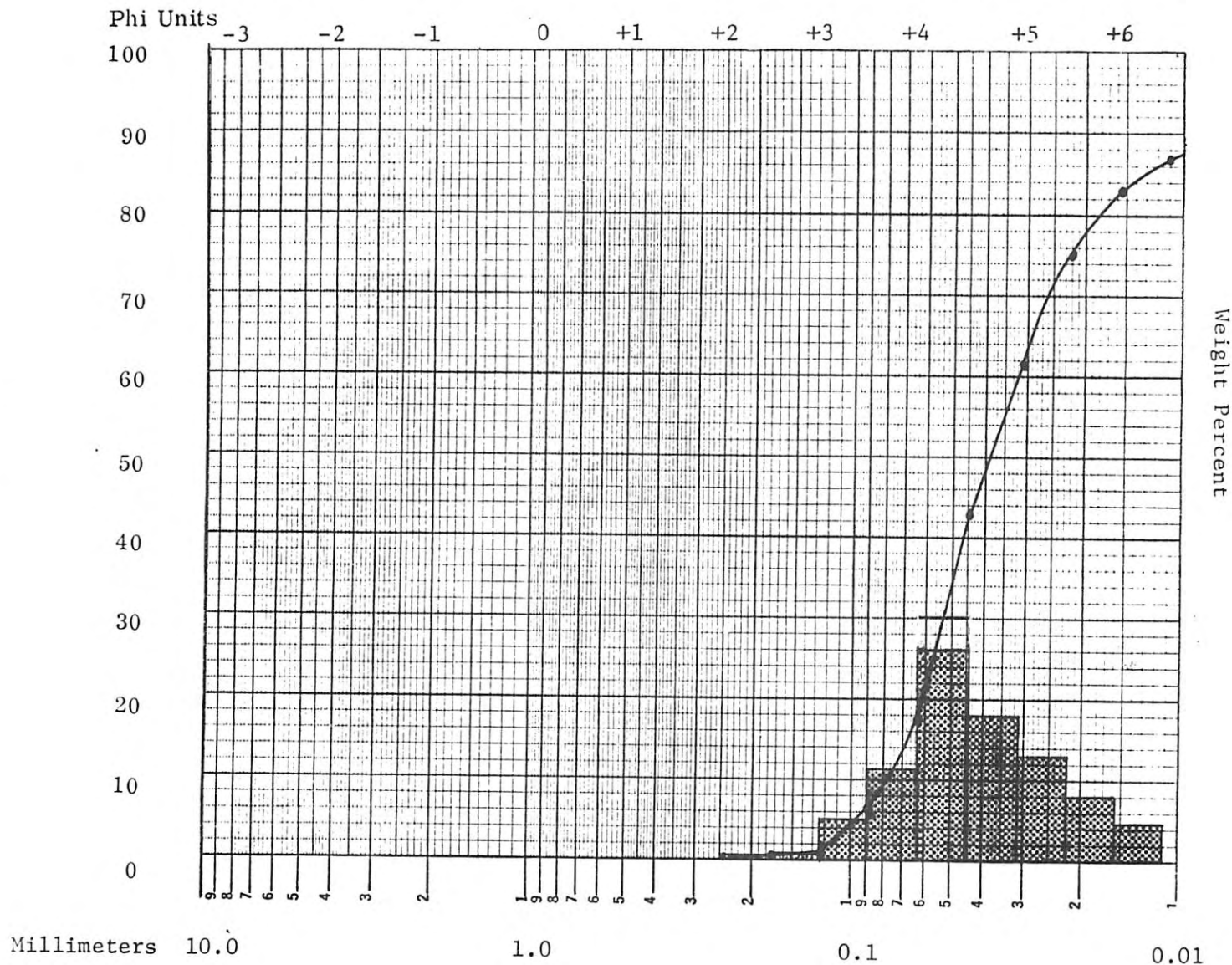
very fine grained sandy silt

Depth 50.0 Fathoms

91.6 Meters

300.0 Feet

Sample Weight 276.513 g



## SIZE PARAMETERS

1st Mode .044 - .062 mm       $Q_{25}$  .057 mm      Sorting Coef. 1.57  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .038 mm      Skewness .908  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .023 mm      Kurtosis 247

# SIZE ANALYSIS

21

Sample 2151

Sample description greenish gray

Lat. 37° 07.1' Long. 122° 26.5'

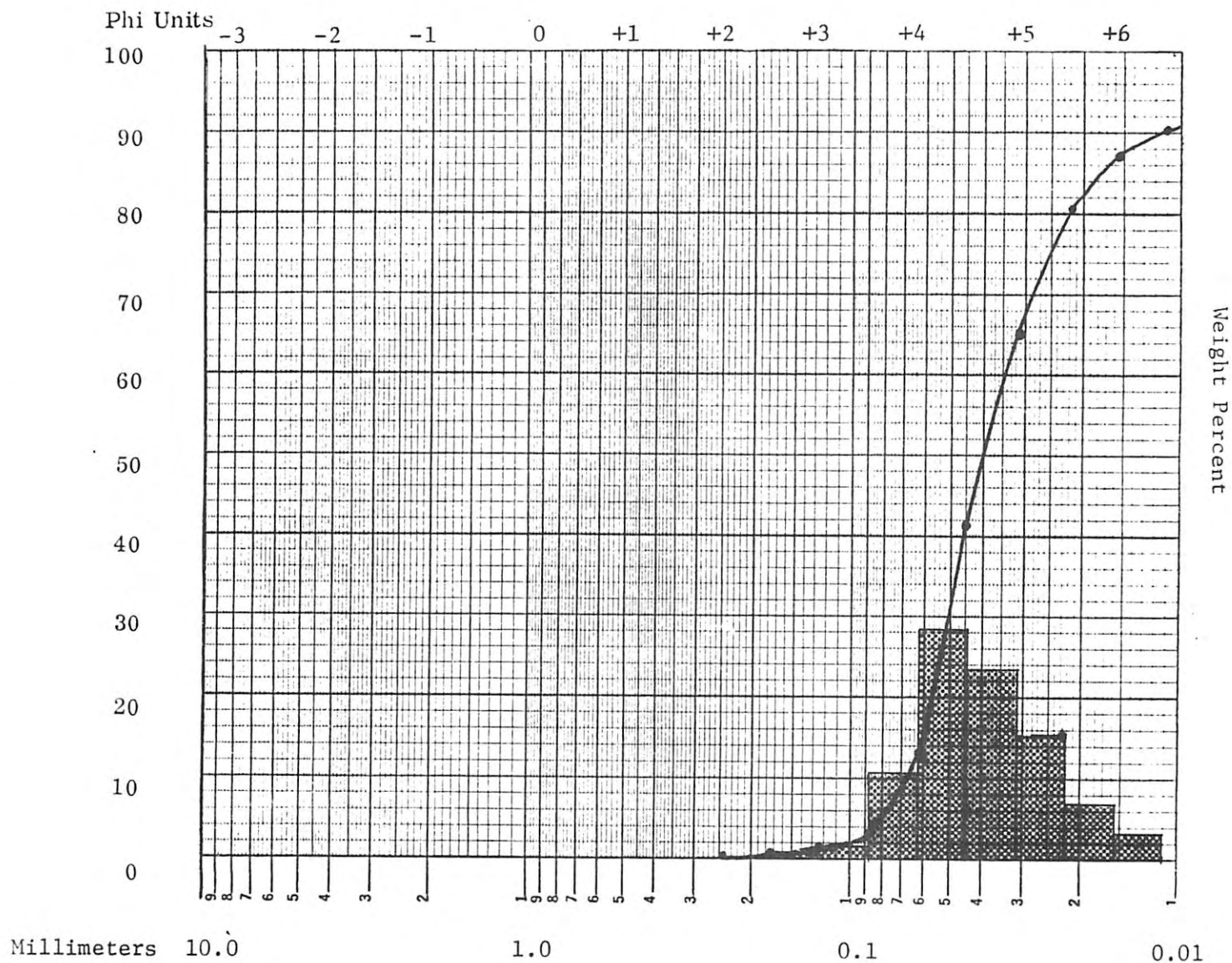
very fine grained sandy silt

Depth 40.0 Fathoms

73.2 Meters

240.0 Feet

Sample Weight 161,384 g



## SIZE PARAMETERS

1st Mode .044 - .062 mm  $Q_{25}$  .053 mm Sorting Coef. 1.46

2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .040 mm Skewness .828

3rd Mode \_\_\_\_\_  $Q_{75}$  .025 mm Kurtosis .257



SIZE ANALYSIS

Sample 2152

Sample description greenish gray

Lat. 37° 08.3' Long. 122° 24.7'

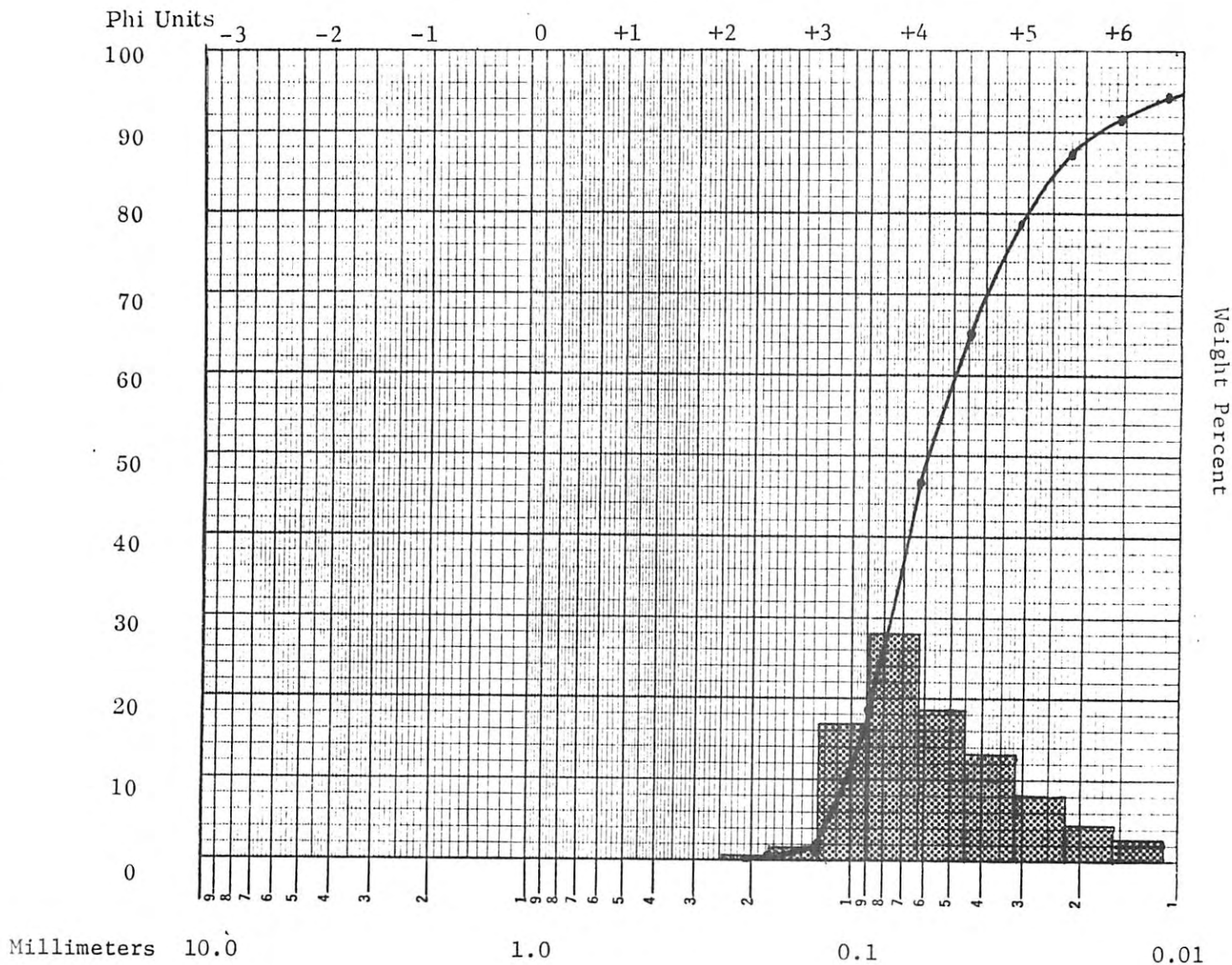
fine grained silty sand

Depth 30.0 Fathoms

54.8 Meters

180.0 Feet

Sample Weight 252.516 g



SIZE PARAMETERS

1st Mode .062 - .088 mm  $Q_{25}$  .082 mm Sorting Coef. 1.53

2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .060 mm Skewness .797

3rd Mode \_\_\_\_\_  $Q_{75}$  .035 mm Kurtosis .270

# SIZE ANALYSIS

Sample 2153

Sample description gray

Lat. 37° 09.1' Long. 122° 23.4'

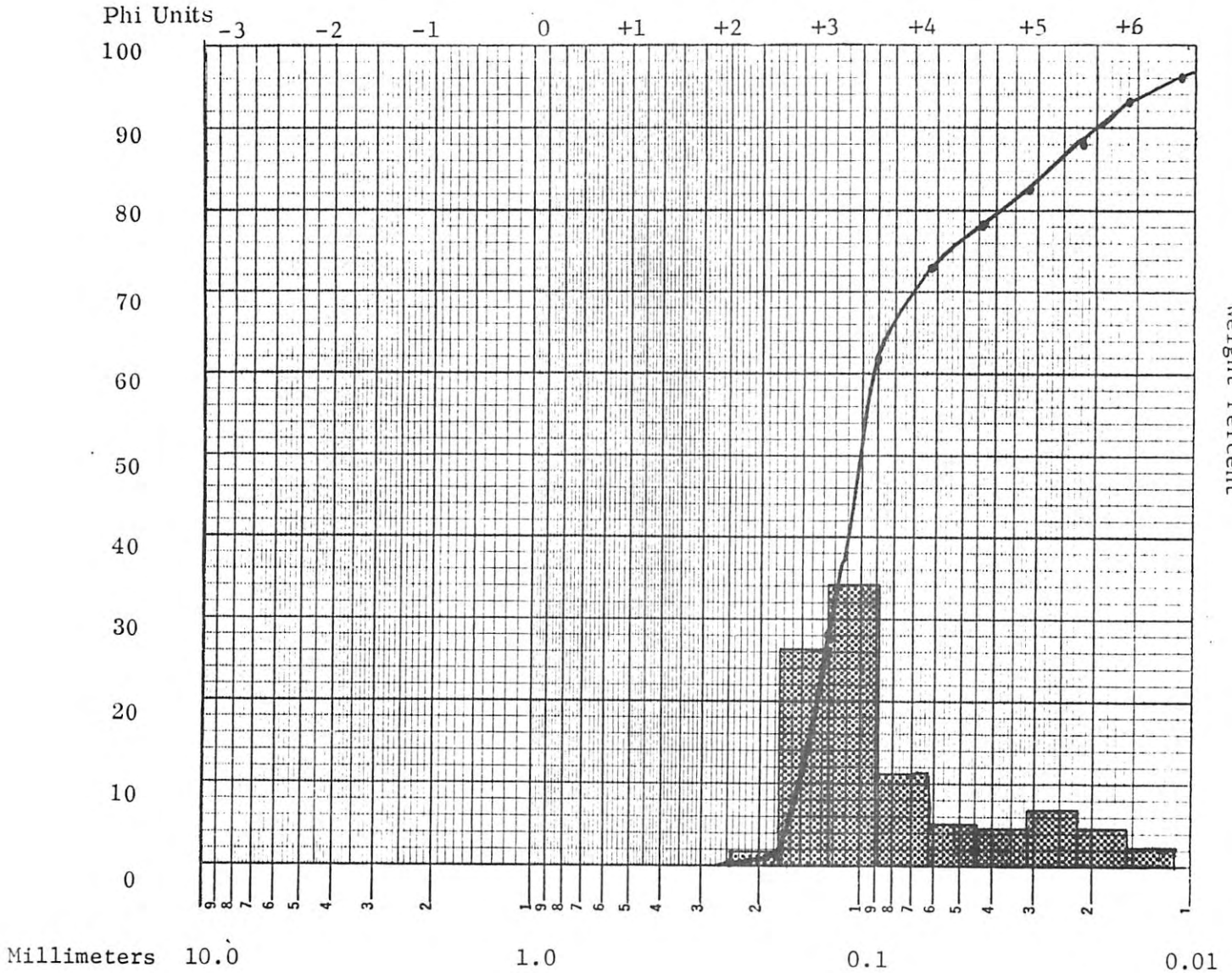
colored fine grained silty sand

Depth 20.0 Fathoms

36.6 Meters

120.0 Feet

Sample Weight 196.250 g



## SIZE PARAMETERS

1st Mode <u>.088 - .125 mm</u>	Q <sub>25</sub> <u>.130 mm</u>	Sorting Coef. <u>1.52</u>
2nd Mode <u>.022 - .031 mm</u>	Median: Q <sub>50</sub> <u>.10 mm</u>	Skewness <u>.728</u>
3rd Mode _____	Q <sub>75</sub> <u>.056 mm</u>	Kurtosis <u>.280</u>

SIZE ANALYSIS

Sample 2154

Sample description gray colored

Lat. 37° 09.6' Long. 122° 22.5'

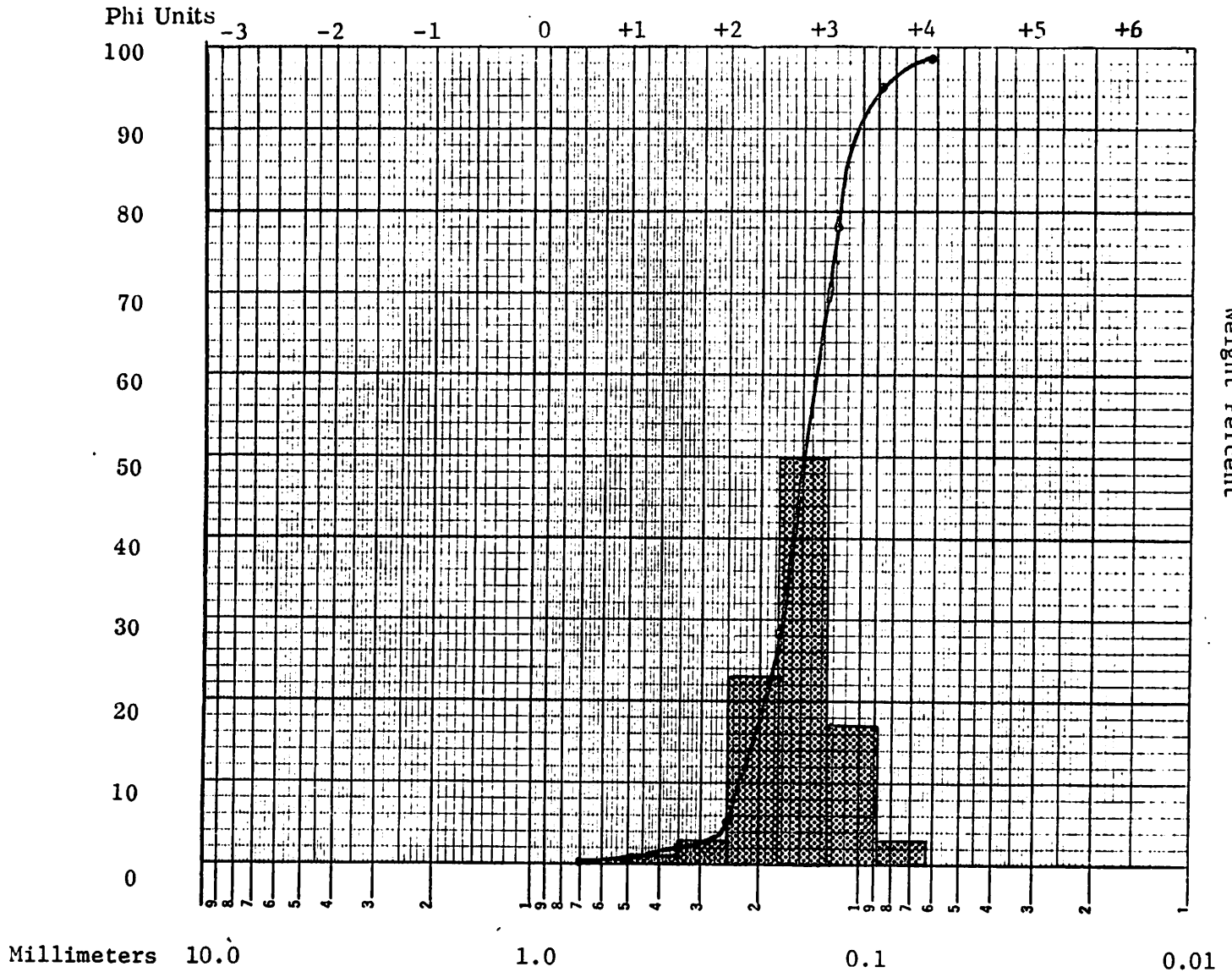
fine grained sand

Depth 10.0 Fathoms

18.3 Meters

60.0 Feet

Sample Weight 280.895 g



SIZE PARAMETERS

1st Mode .125 - .177 mm  $Q_{25}$  .180 mm Sorting Coef. 1.214

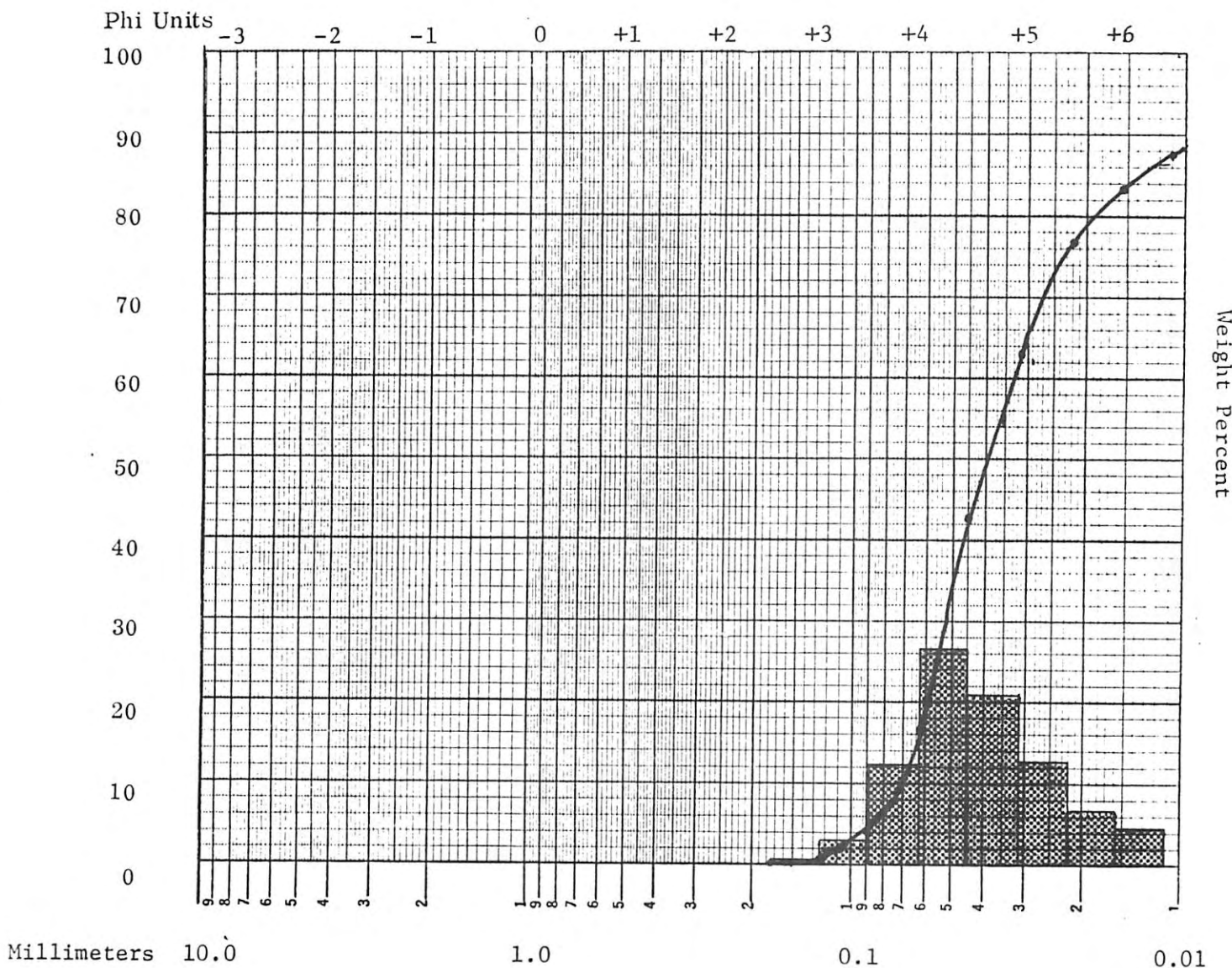
2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .150 mm Skewness .976

3rd Mode \_\_\_\_\_  $Q_{75}$  .122 mm Kurtosis .228

# SIZE ANALYSIS

Sample 2155  
 Lat. 37° 04.3' Long. 122° 25.7'  
 Depth 50.0 Fathoms  
       91.6 Meters  
       300.0 Feet

Sample description greenish gray  
very fine grained sandy silt  
 Sample Weight 181.190 g



### SIZE PARAMETERS

1st Mode .044 - .062 mm       $Q_{25}$  .057 mm      Sorting Coef. 1.574  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .039 mm      Skewness .862  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .023 mm      Kurtosis .276



SIZE ANALYSIS

Sample 2156

Sample description greenish gray

Lat. 37° 05.2 Long. 122° 24.7'

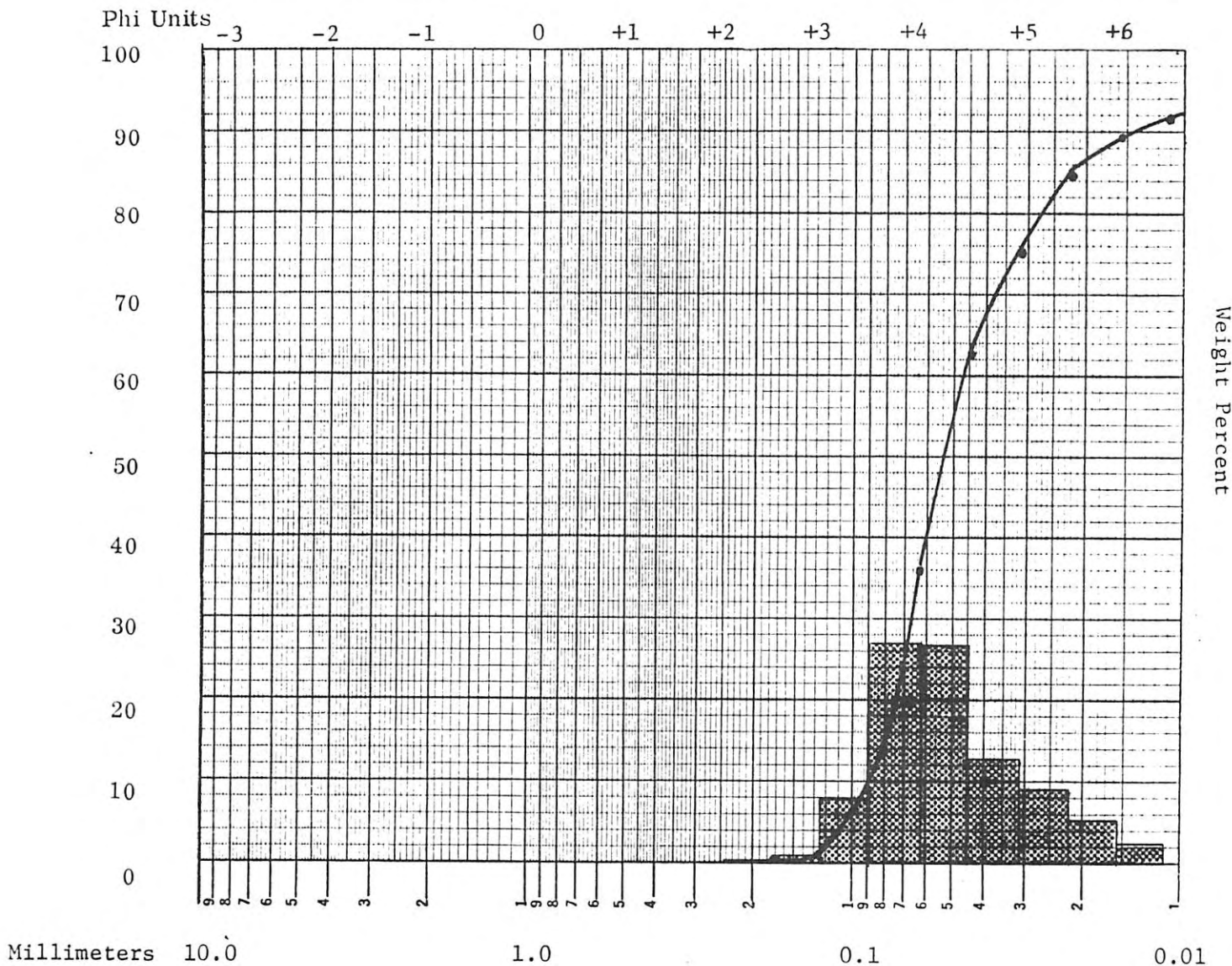
very fine grained sandy silt

Depth 40.0 Fathoms

73.2 Meters

240.0 Feet

Sample Weight 208.419



SIZE PARAMETERS

1st Mode .062 - .088 mm  $Q_{25}$  .070 mm Sorting Coef. 1.456

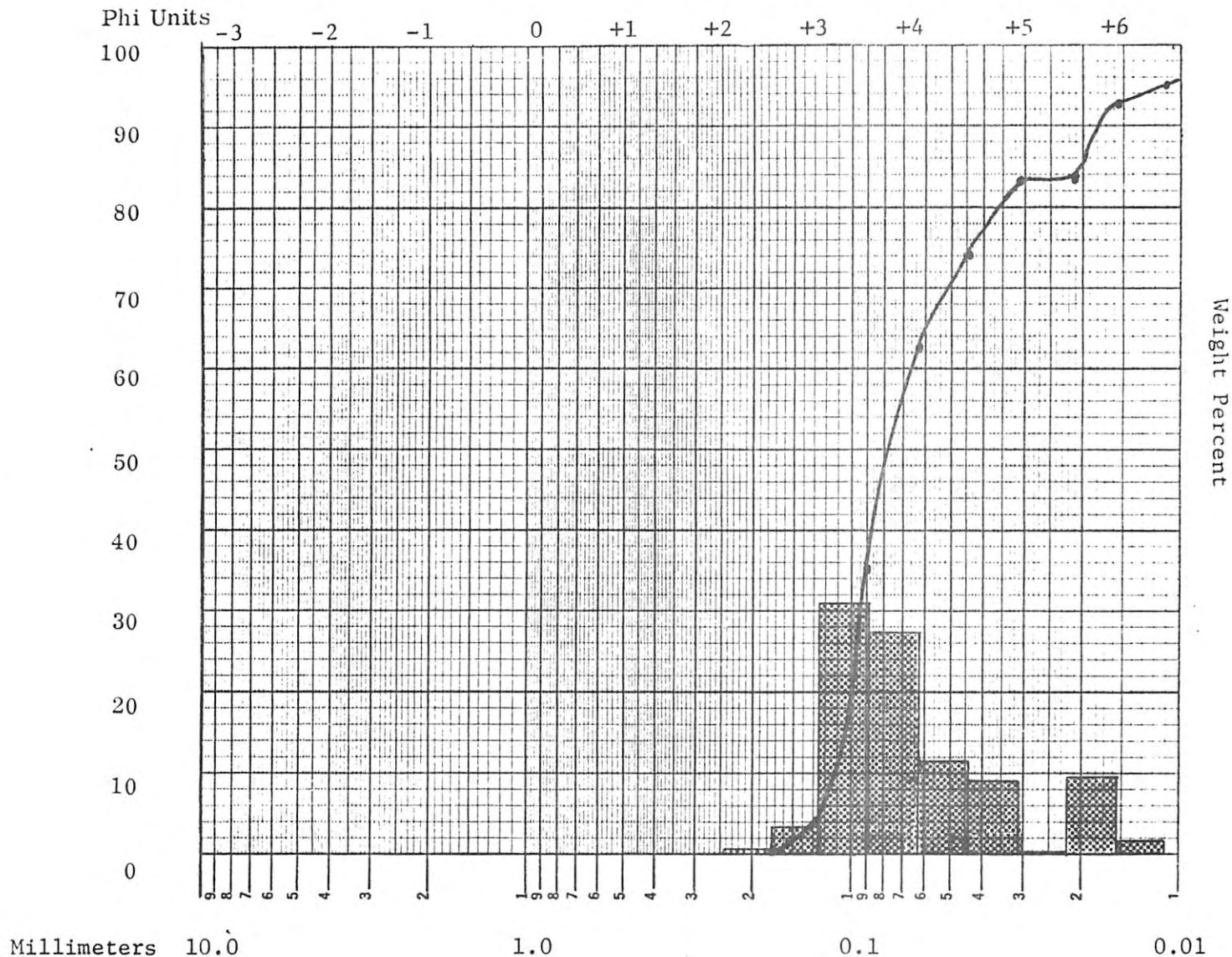
2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .054 mm Skewness .792

3rd Mode \_\_\_\_\_  $Q_{75}$  .033 mm Kurtosis .245

# SIZE ANALYSIS

27

Sample <u>2157</u>	Sample description <u>greenish gray</u>
Lat. <u>37° 06.2'</u> Long. <u>122° 22.8'</u>	<u>fine grained silty sand</u>
Depth <u>30.0</u> Fathoms	
<u>54.8</u> Meters	
<u>180.0</u> Feet	Sample Weight <u>168.141 g</u>



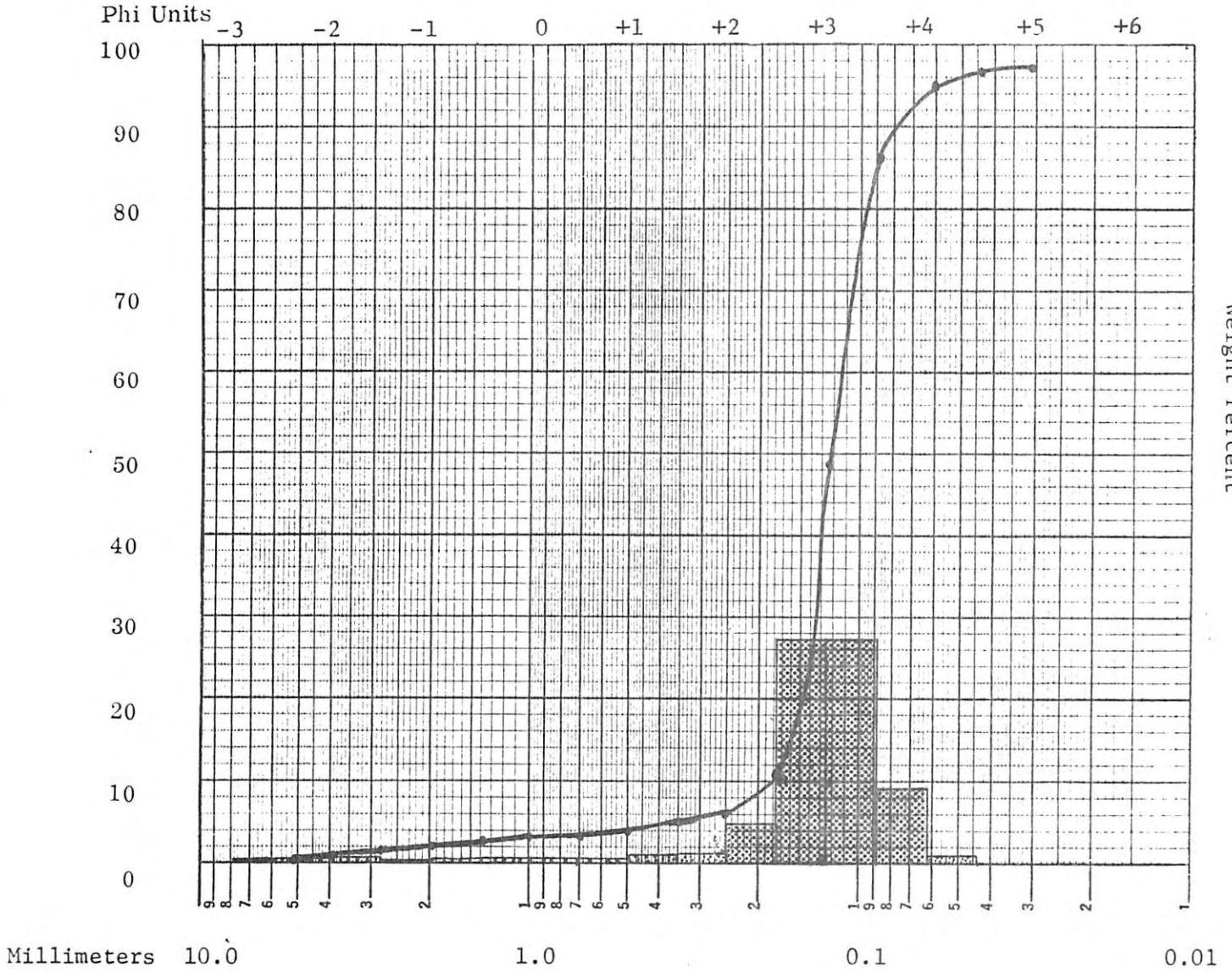
## SIZE PARAMETERS

1st Mode <u>.088 - .125 mm</u>	Q <sub>25</sub> <u>.096 mm</u>	Sorting Coef. <u>1.460</u>
2nd Mode <u>.0156 - .022 mm</u>	Median: Q <sub>50</sub> <u>.078 mm</u>	Skewness <u>.710</u>
3rd Mode _____	Q <sub>75</sub> <u>.045 mm</u>	Kurtosis <u>.277</u>

SIZE ANALYSIS

Sample 2158  
 Lat. 37° 06.8' Long. 122° 21.8'  
 Depth 20 Fathoms  
36.6 Meters  
120.0 Feet

Sample description gray colored  
fine grained sand with abundant  
coarse shell material and a few  
assorted pebbles  
 Sample Weight 153.081 g



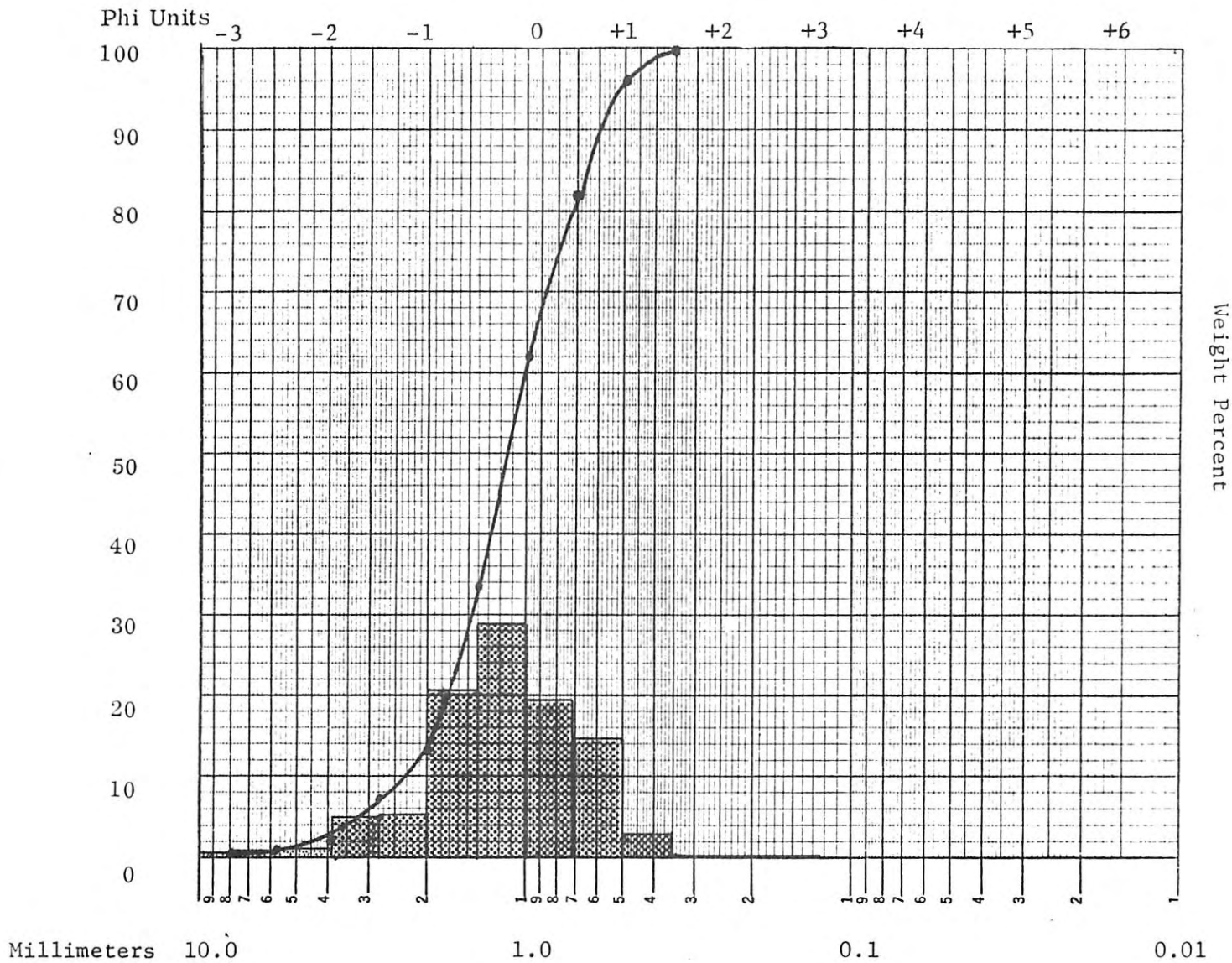
SIZE PARAMETERS

1st Mode .088 - .175 mm  $Q_{25}$  .140 mm Sorting Coef. 1.177  
 2nd Mode 2.88 - 4.00 mm Median:  $Q_{50}$  .120 mm Skewness .982  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .101 mm Kurtosis .193

# SIZE ANALYSIS

Sample 2159  
 Lat. 37° 07.1' Long. 122° 21.3'  
 Depth 10.0 Fathoms  
       18.3 Meters  
       60.0 Feet

Sample description coarse grained  
sand and pebbles, consisting of  
large shell and rock frag., from  
tidal channel lag deposit?  
 Sample Weight 126.964 g.



### SIZE PARAMETERS

1st Mode .991 - 1.397 mm       $Q_{25}$  1.58 mm      Sorting Coef. 1.405  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  1.15 mm      Skewness .956  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .80 mm      Kurtosis .229



SIZE ANALYSIS

Sample 2160

Sample description greenish gray

Lat. 37° 02.7' Long. 122° 22.8'

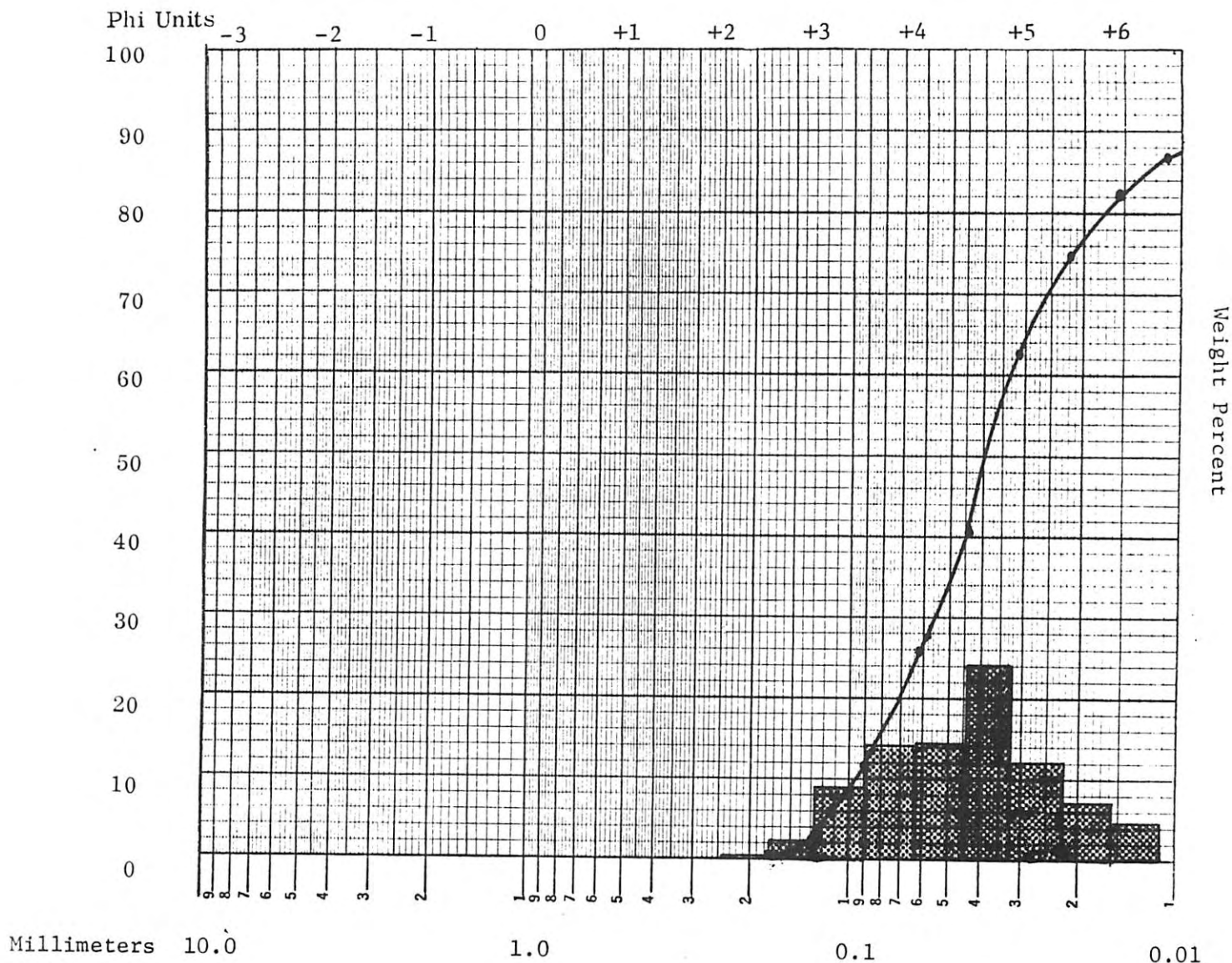
very fine grained sandy silt

Depth 50.0 Fathoms

91.6 Meters

300.0 Feet

Sample Weight 224.874 g

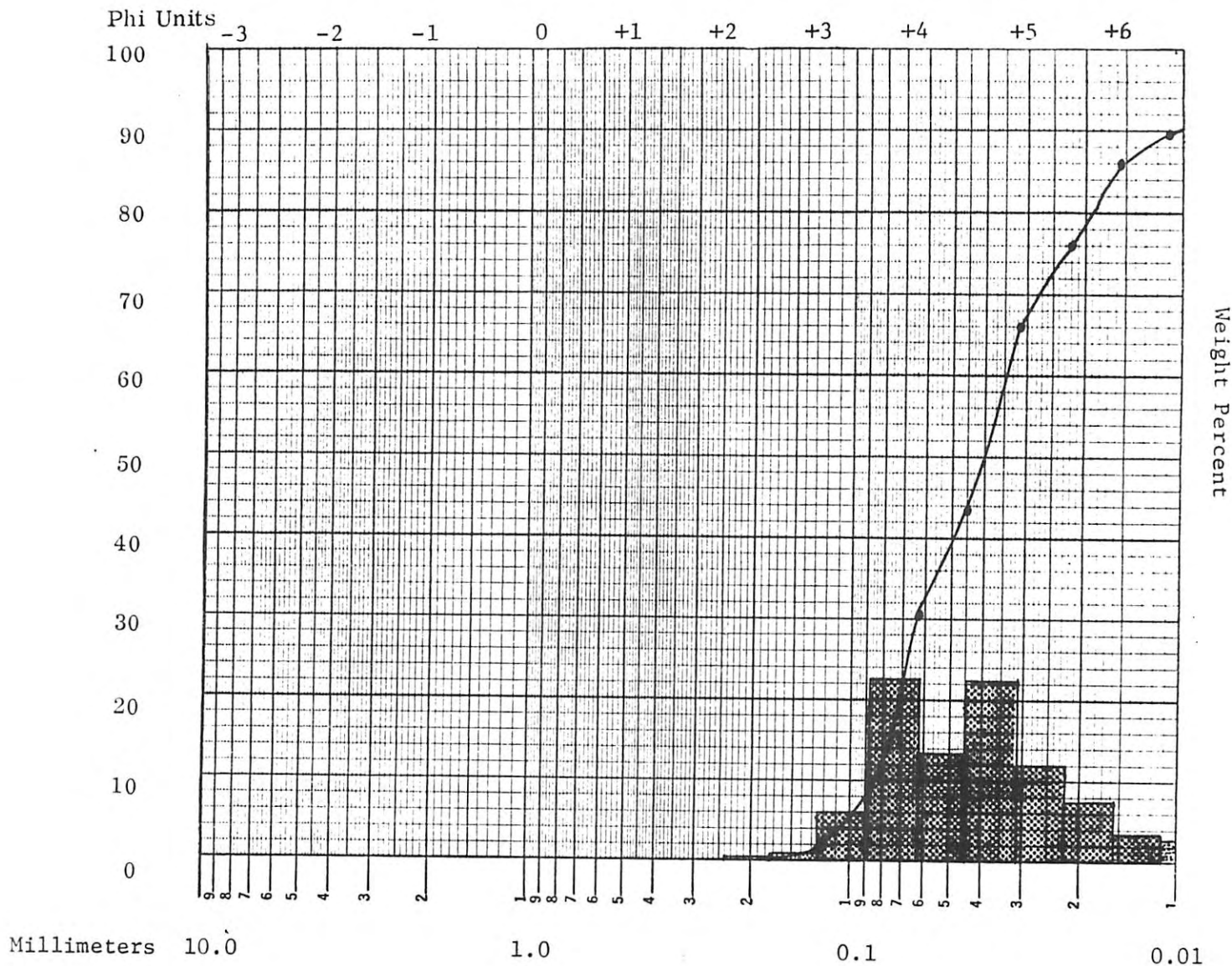


SIZE PARAMETERS

1st Mode <u>.031 - .044 mm</u>	Q <sub>25</sub> <u>.063 mm</u>	Sorting Coef. <u>1.692</u>
2nd Mode _____	Median: Q <sub>50</sub> <u>.040 mm</u>	Skewness <u>.866</u>
3rd Mode _____	Q <sub>75</sub> <u>.022 mm</u>	Kurtosis <u>.233</u>

# SIZE ANALYSIS

Sample <u>2161</u>	Sample description <u>greenish gray</u>
Lat. <u>37° 03.5'</u> Long. <u>122° 21.7'</u>	<u>very fine grained sandy silt</u>
Depth <u>40.0</u> Fathoms	
<u>73.2</u> Meters	
<u>240.0</u> Feet	Sample Weight <u>220.335 g</u>



## SIZE PARAMETERS

1st Mode <u>.062 - .088 mm</u>	Q <sub>25</sub> <u>.068 mm</u>	Sorting Coef. <u>1.719</u>
2nd Mode <u>.031 - .044 mm</u>	Median: Q <sub>50</sub> <u>.040 mm</u>	Skewness <u>.977</u>
3rd Mode _____	Q <sub>75</sub> <u>.023 mm</u>	Kurtosis <u>.302</u>

SIZE ANALYSIS

Sample 2162

Sample description greenish

Lat. 37° 04.3' Long. 122° 20.4'

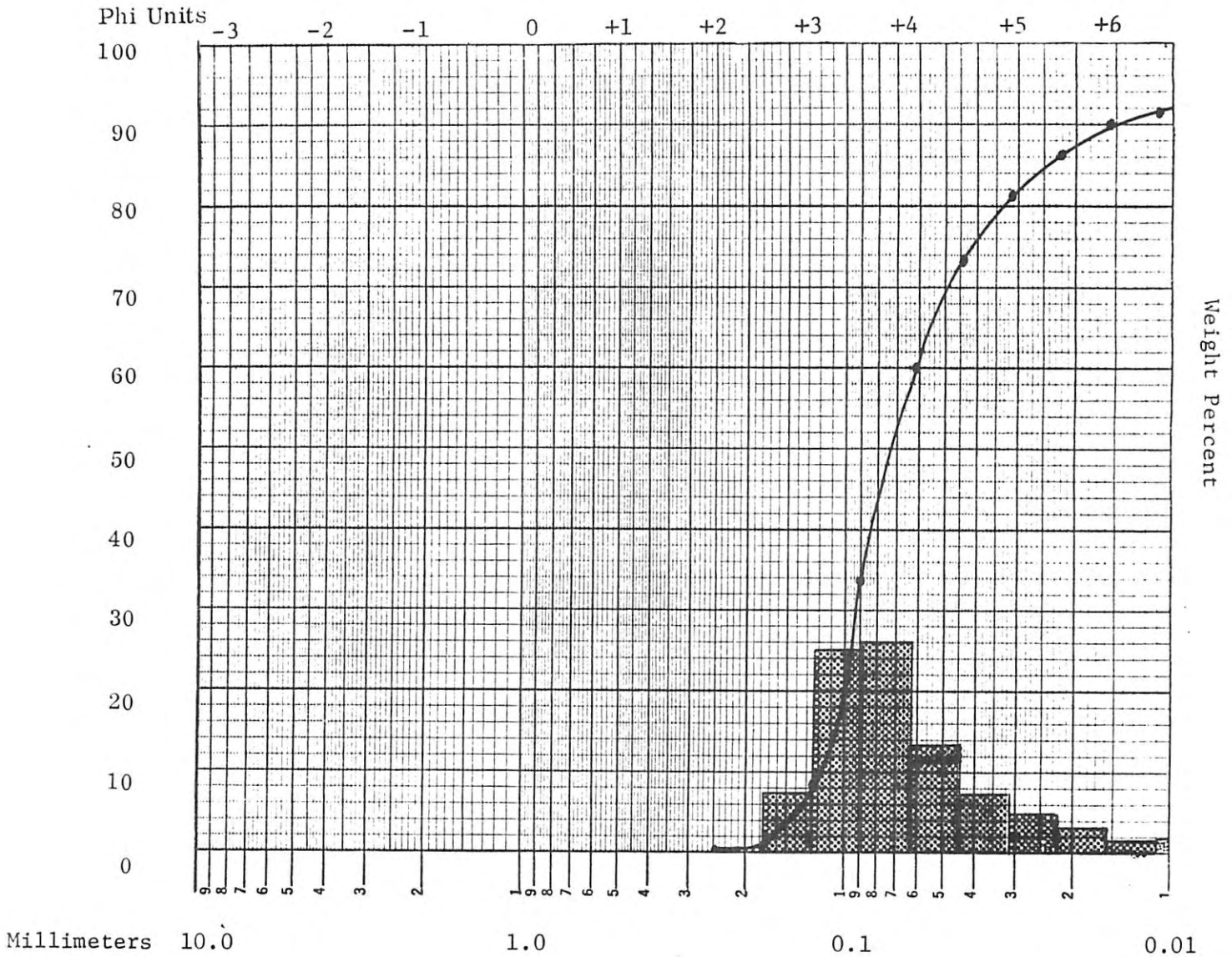
gray fine grained silty sand

Depth 30.0 Fathoms

54.8 Meters

180.0 Feet

Sample Weight 206.932 g



SIZE PARAMETERS

1st Mode .062 - .088 mm  $Q_{25}$  .095 mm Sorting Coef. 1.503

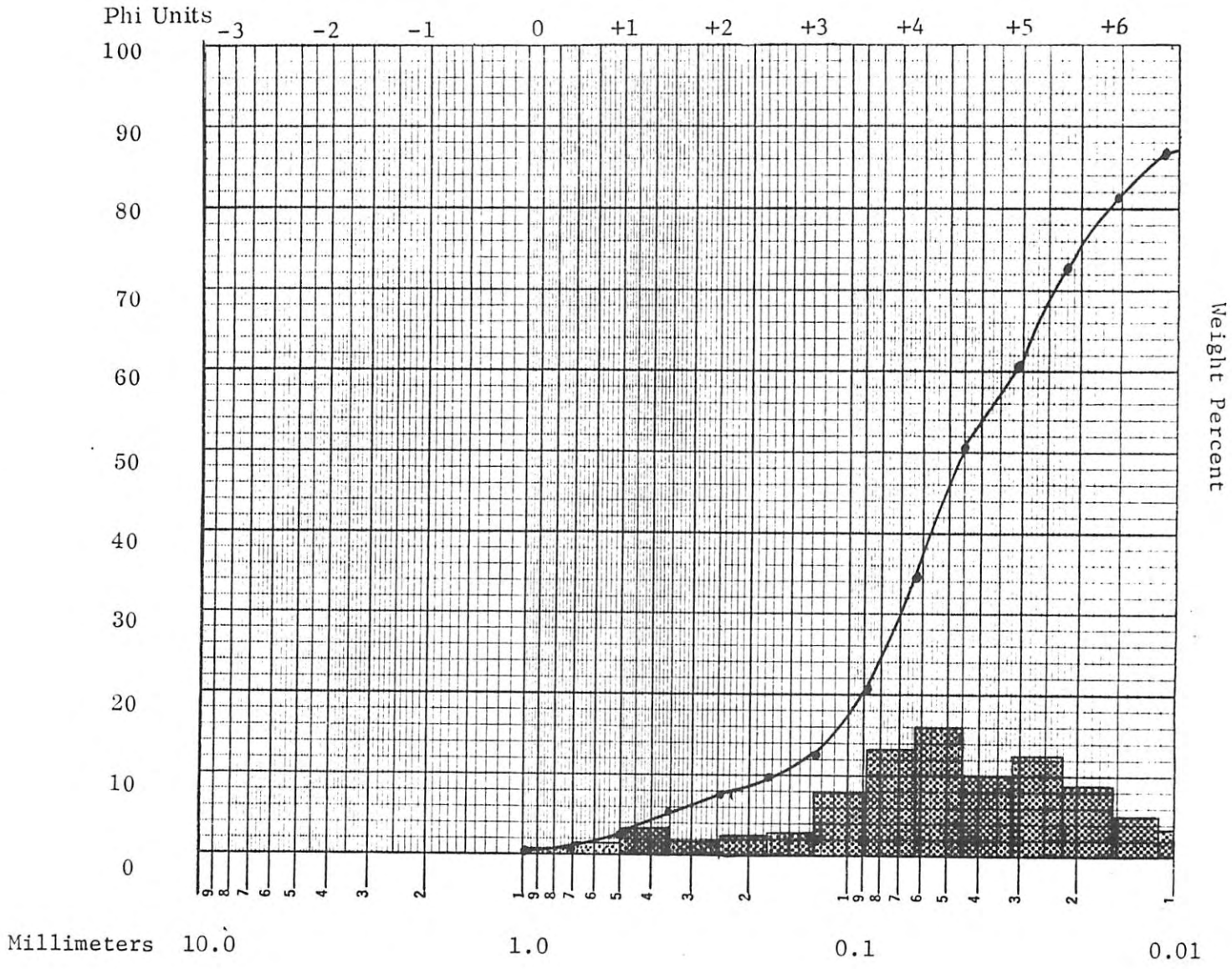
2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .073 mm Skewness .749

3rd Mode \_\_\_\_\_  $Q_{75}$  .042 mm Kurtosis .252

SIZE ANALYSIS

Sample 2163  
 Lat. 37° 05.1' Long. 122° 19.3'  
 Depth 20.0 Fathoms  
36.6 Meters  
120.0 Feet

Sample description greenish gray  
fine grained sandy silt  
 Sample Weight 200.667 g



SIZE PARAMETERS

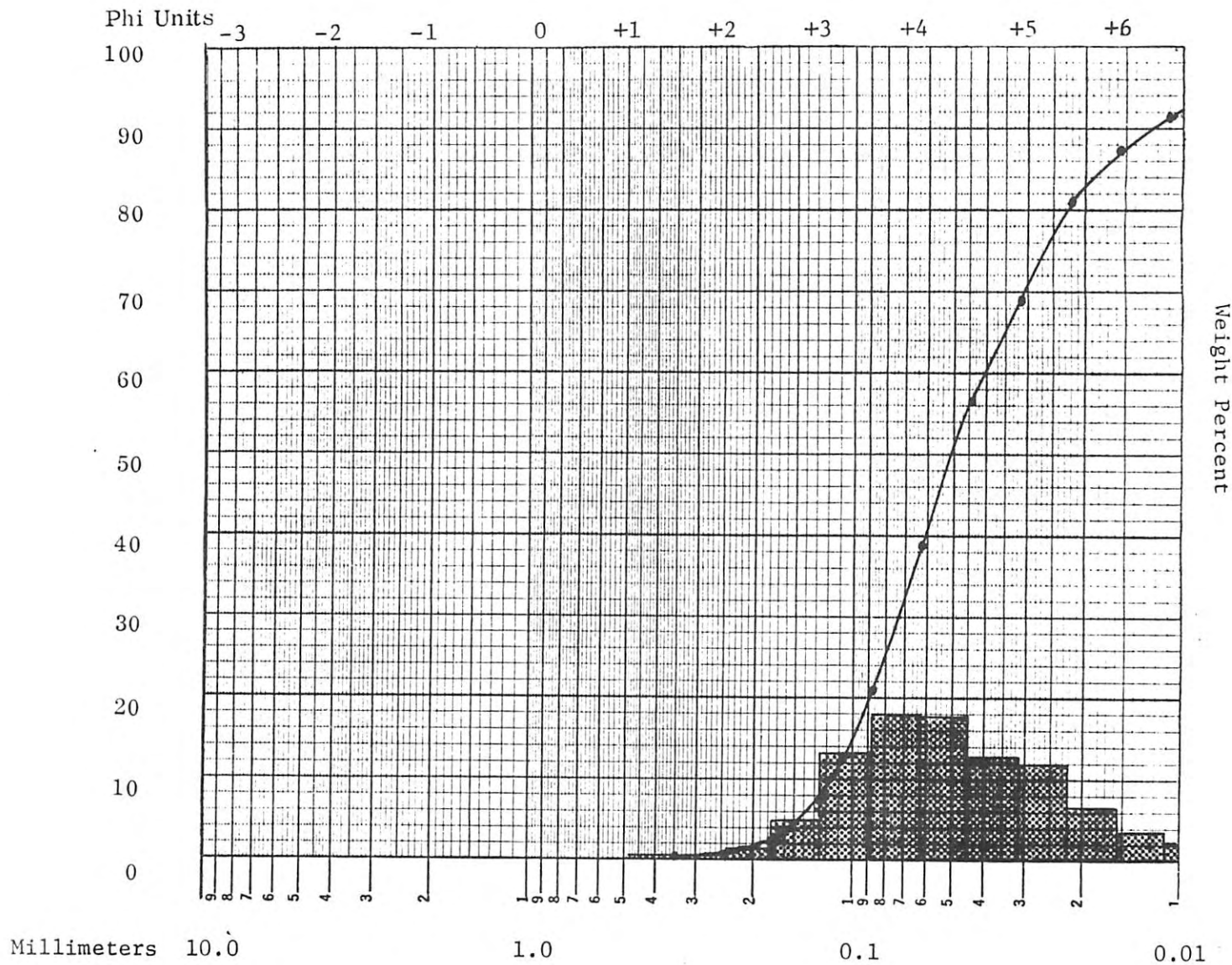
1st Mode .044 - .062 mm       $Q_{25}$  .080 mm      Sorting Coef. 2.000  
 2nd Mode .022 - .031 mm      Median:  $Q_{50}$  .045 mm      Skewness .790  
 3rd Mode .351 - .495 mm       $Q_{75}$  .020 mm      Kurtosis .192



SIZE ANALYSIS

Sample 2164  
 Lat. 37° 05.7' Long. 122° 18.2'  
 Depth 10.0 Fathoms  
18.3 Meters  
60.0 Feet

Sample description gray  
colored fine grained sandy silt  
 Sample Weight 210.418 g.



SIZE PARAMETERS

1st Mode .062 - .088 mm       $Q_{25}$  .080 mm      Sorting Coef. 1.721  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .051 mm      Skewness .830  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .027 mm      Kurtosis .257

SIZE ANALYSIS

Sample 2165

Sample description gray

Lat. 37° 06.2' Long. 122° 17.7'

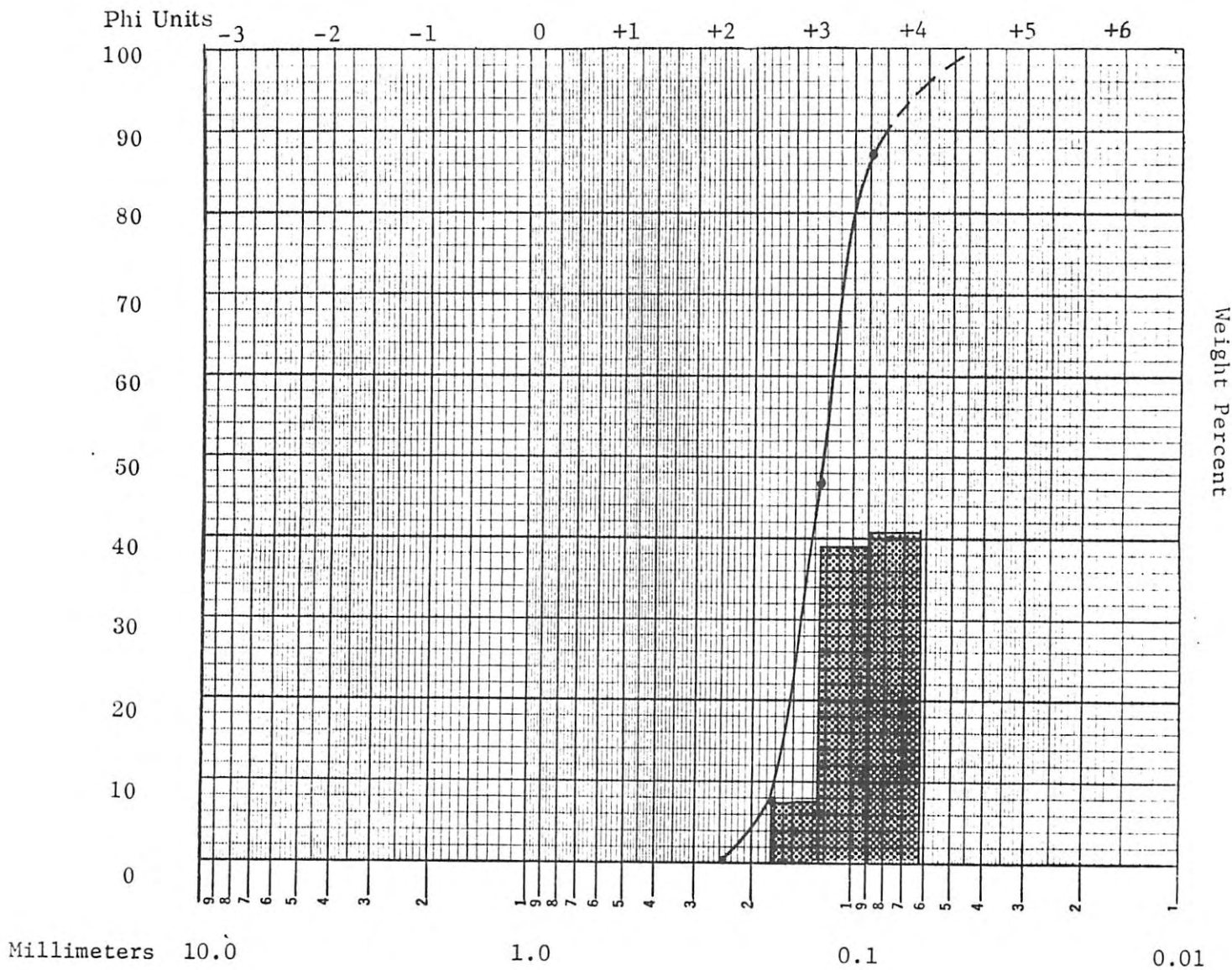
colored fine grained sand

Depth 5.0 Fathoms

9.2 Meters

30.0 Feet

Sample Weight 268.049 g



SIZE PARAMETERS

1st Mode .062 - .088 mm  $Q_{25}$  .149 mm Sorting Coef. 1.185

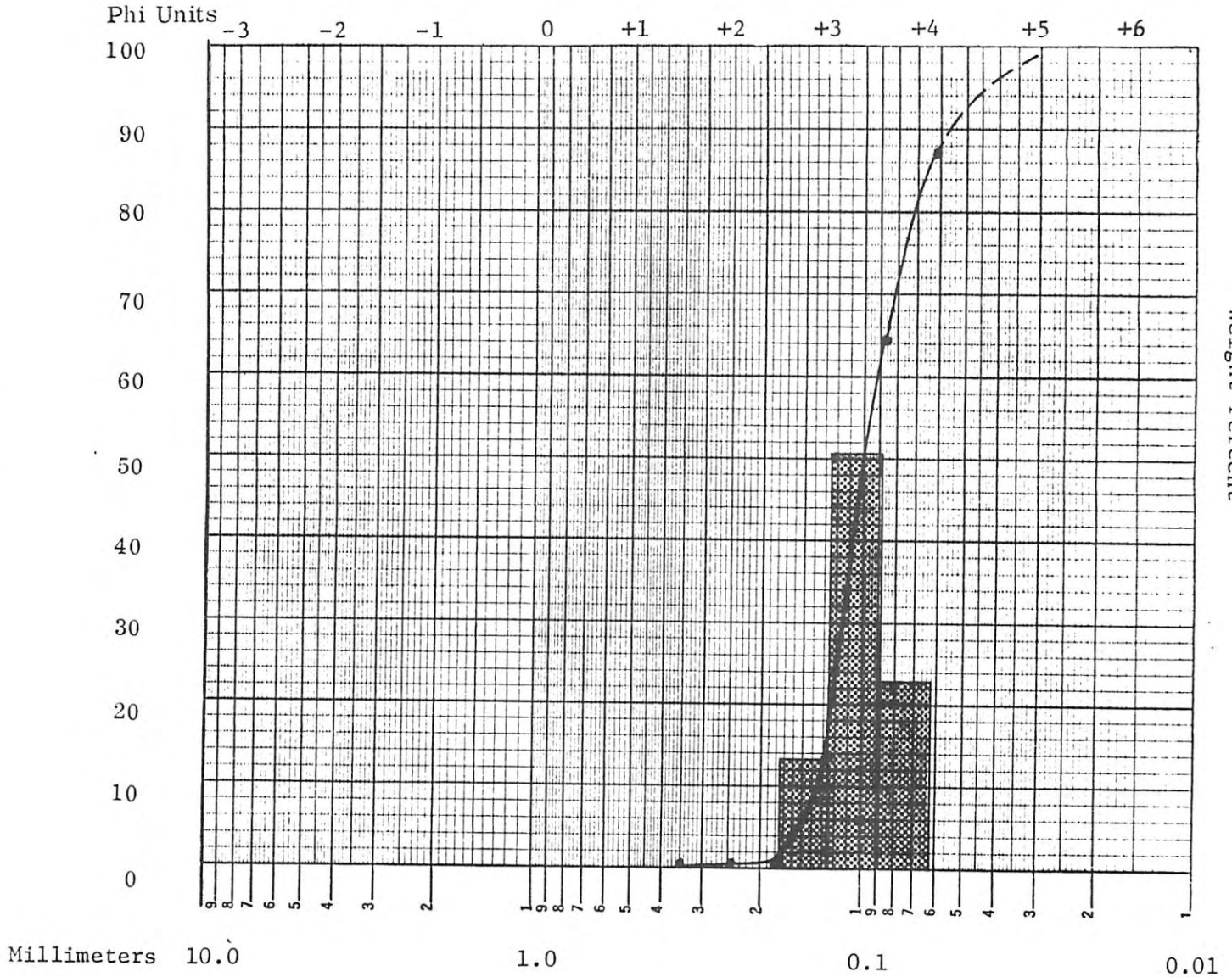
2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .122 mm Skewness 1.06

3rd Mode \_\_\_\_\_  $Q_{75}$  .106 mm Kurtosis .239

SIZE ANALYSIS

Sample 2166  
 Lat. 37° 06.5' Long. 122° 18.6'  
 Depth 6.7 Fathoms  
12.2 Meters  
40.0 Feet

Sample description greenish  
gray fine grained sand  
 Sample Weight 129,831 g



SIZE PARAMETERS

1st Mode .088 - .125       $Q_{25}$  .119 mm      Sorting Coef. 1.243  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .100 mm      Skewness .916  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .077 mm      Kurtosis .269

# SIZE ANALYSIS

37

Sample 2167

Sample description greenish

Lat. 37° 00.9' Long. 122° 20.6'

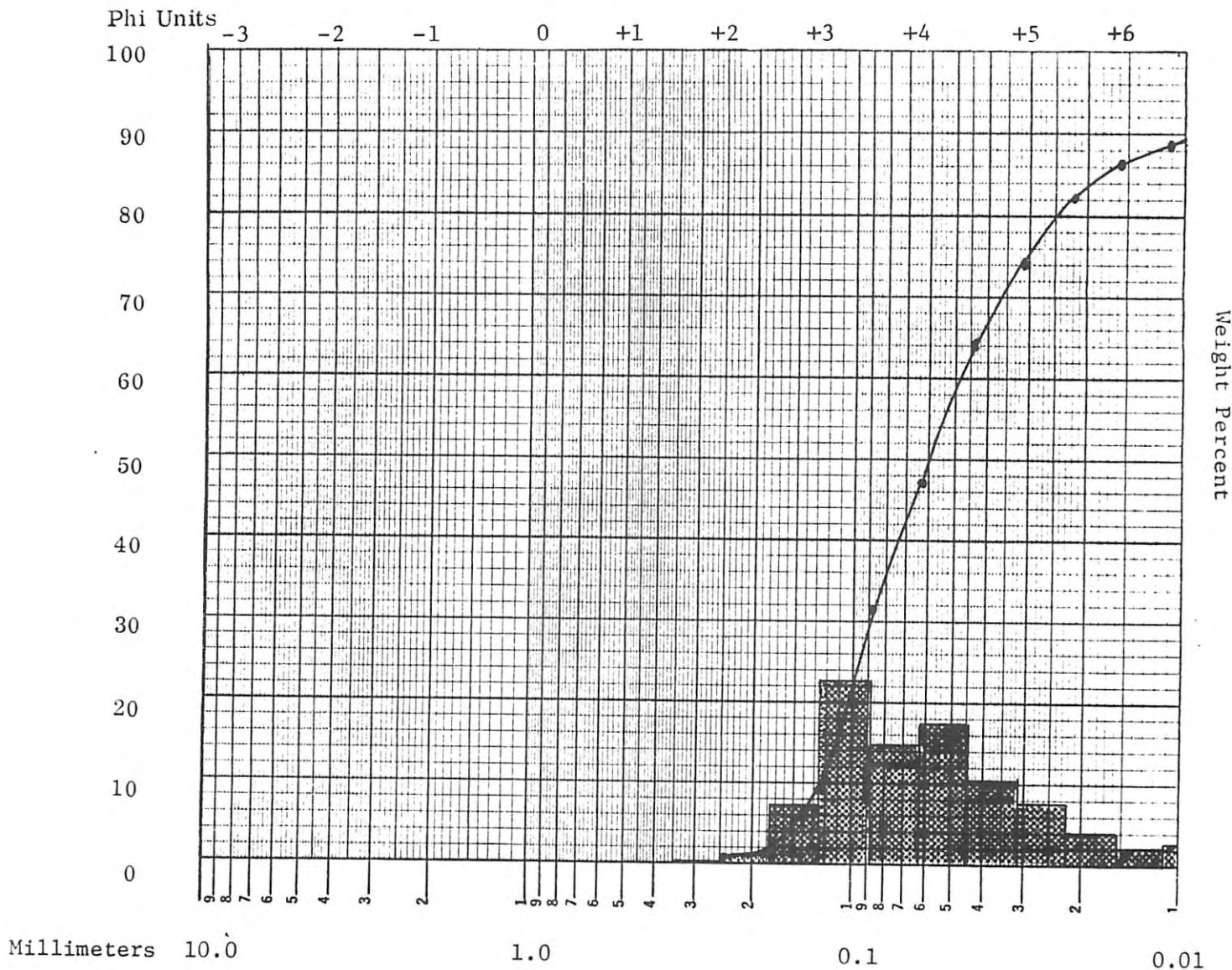
gray very fine grained silty sand

Depth 50.0 Fathoms

91.6 Meters

300.0 Feet

Sample Weight 183.354 g



## SIZE PARAMETERS

1st Mode <u>.088 - .125 mm</u>	Q <sub>25</sub> <u>.096 mm</u>	Sorting Coef. <u>1.788</u>
2nd Mode <u>.044 - .062 mm</u>	Median: Q <sub>50</sub> <u>.060 mm</u>	Skewness <u>.800</u>
3rd Mode <u>.008 - .011 mm</u>	Q <sub>75</sub> <u>.030 mm</u>	Kurtosis <u>.284</u>



# SIZE ANALYSIS

38

Sample 2168

Sample description greenish

Lat. 37° 01.7' Long. 122° 19.4'

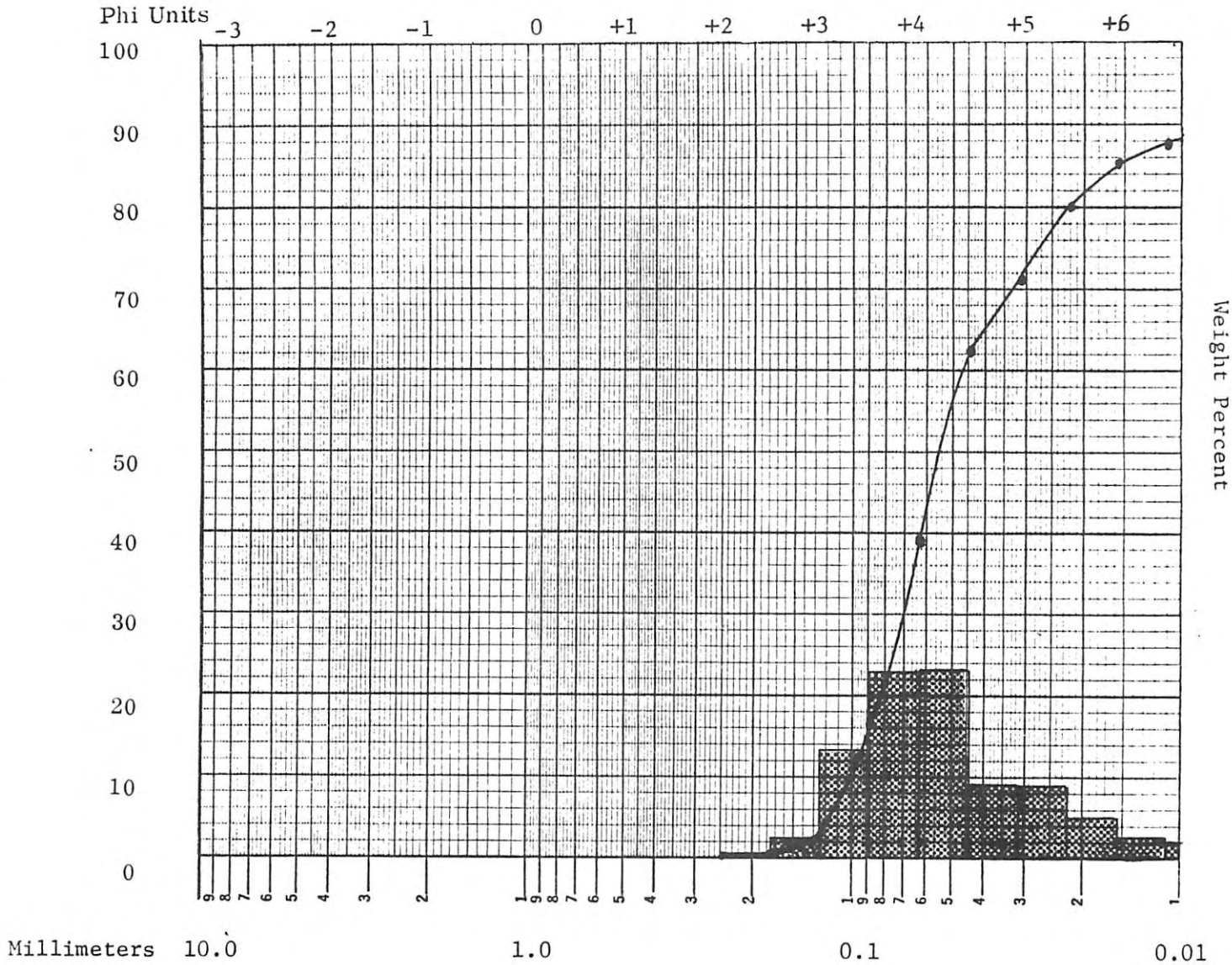
gray very fine grained sandy silt

Depth 40.0 Fathoms

73.2 Meters

240.0 Feet

Sample Weight 254.843 g



## SIZE PARAMETERS

1st Mode <u>.044 - .062 mm</u>	Q <sub>25</sub> <u>.076 mm</u>	Sorting Coef. <u>1.647</u>
2nd Mode _____	Median: Q <sub>50</sub> <u>.055 mm</u>	Skewness <u>.703</u>
3rd Mode _____	Q <sub>75</sub> <u>.028 mm</u>	Kurtosis <u>.800</u>

SIZE ANALYSIS

Sample 2169

Sample description greenish

Lat. 37° 02.6' Long. 122° 17.8'

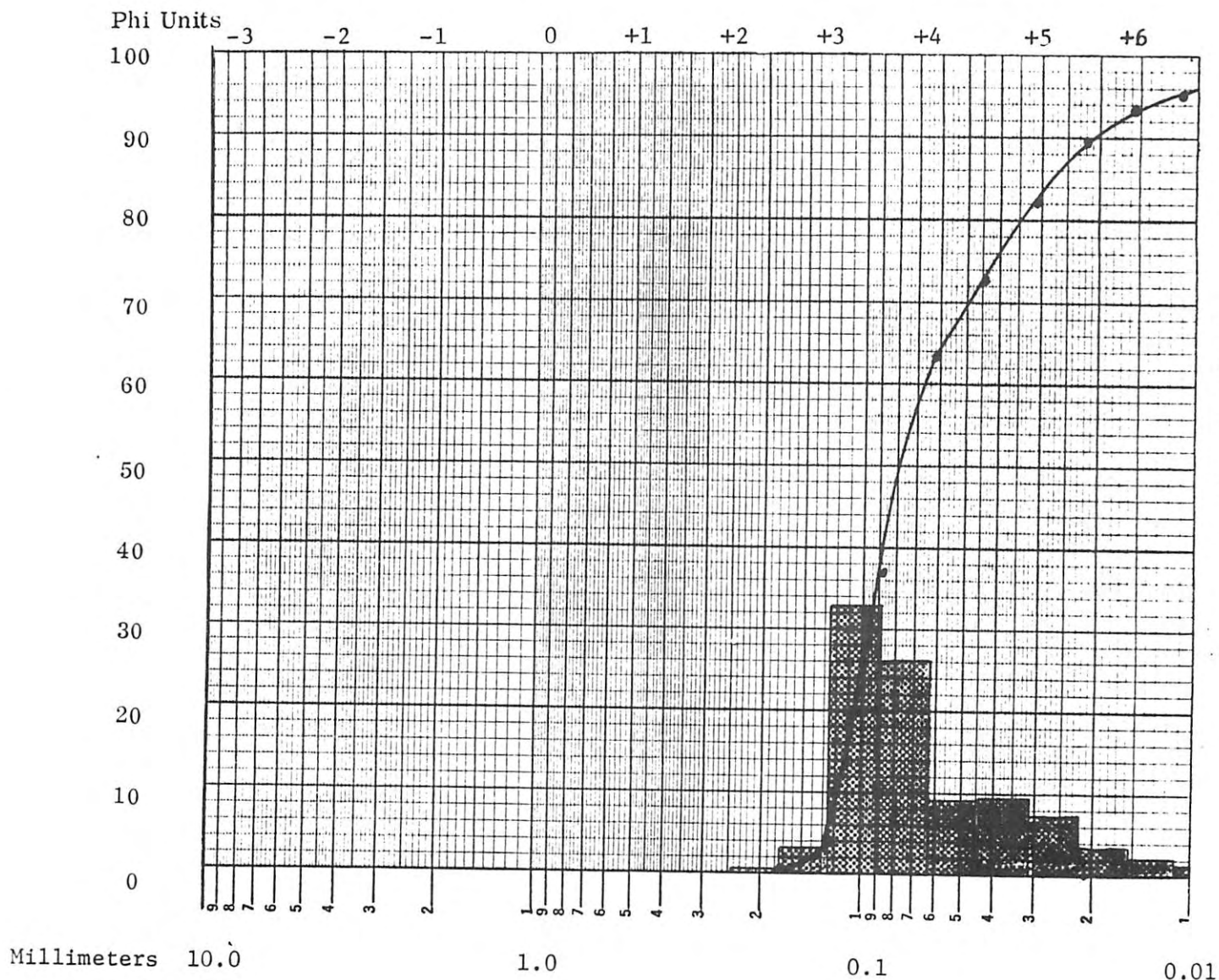
gray fine grained sandy silt

Depth 30.0 Fathoms

54.8 Meters

180.0 Feet

Sample Weight 207.578 g



SIZE PARAMETERS

1st Mode .088 - .125 mm       $Q_{25}$  .100 mm      Sorting Coef. 1.543  
 2nd Mode .031 - .044 mm      Median:  $Q_{50}$  .079 mm      Skewness .673  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .042 mm      Kurtosis .293

# SIZE ANALYSIS

Sample 2170

Sample description gray

Lat. 37° 03.3' Long. 122° 16.9'

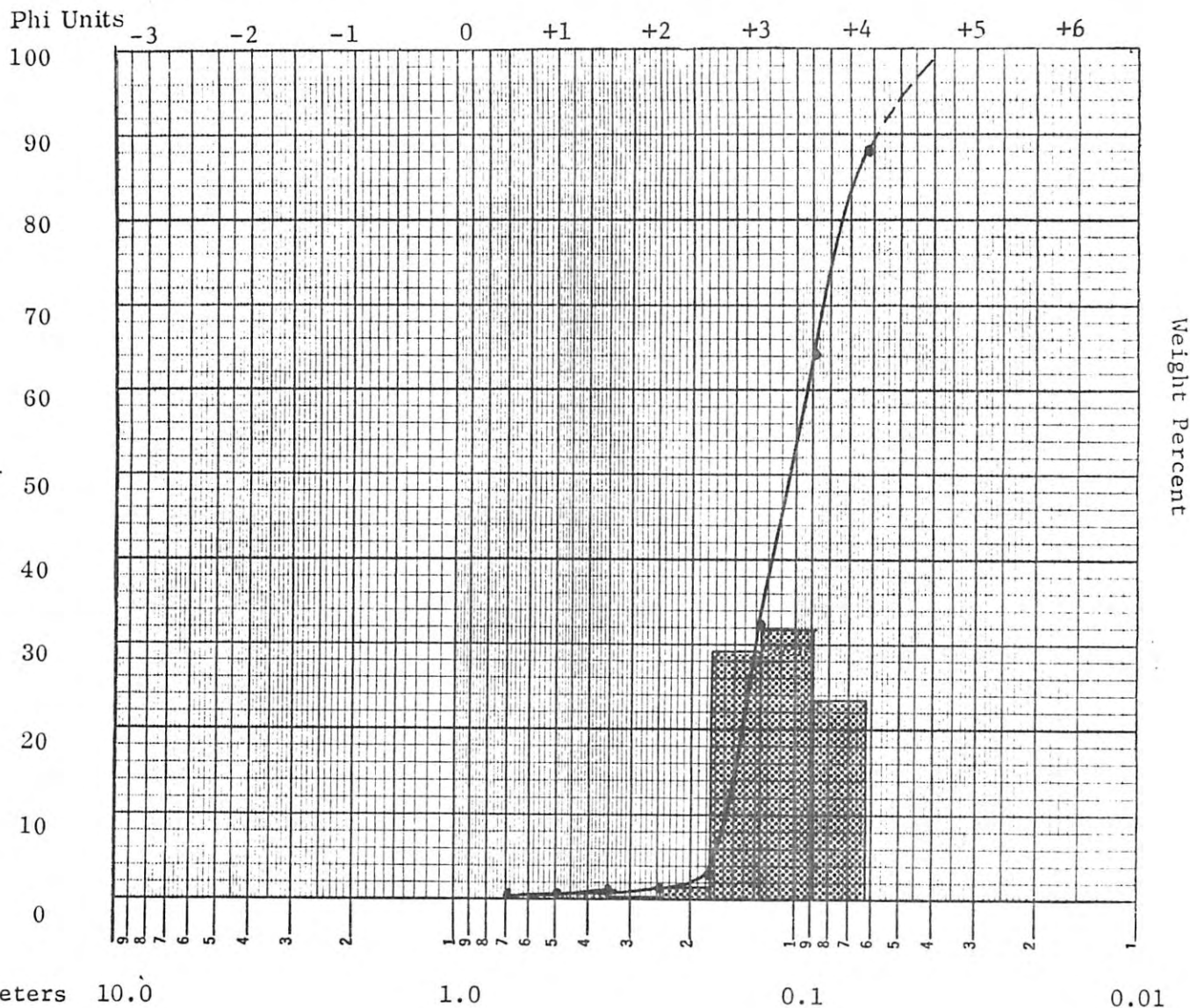
colored fine grained sand

Depth 20.0 Fathoms

36.6 Meters

120.0 Feet

Sample Weight 202.423 g



## SIZE PARAMETERS

1st Mode <u>.088 - .125 mm</u>	$Q_{25}$ <u>.135 mm</u>	Sorting Coef. <u>1.300</u>
2nd Mode <u>.351 - .495 mm</u>	Median: $Q_{50}$ <u>.105 mm</u>	Skewness <u>.976</u>
3rd Mode _____	$Q_{75}$ <u>.080 mm</u>	Kurtosis <u>.275</u>

SIZE ANALYSIS

Sample 2171

Sample description gray'

Lat. 37° 03.7' Long. 122° 16.4'

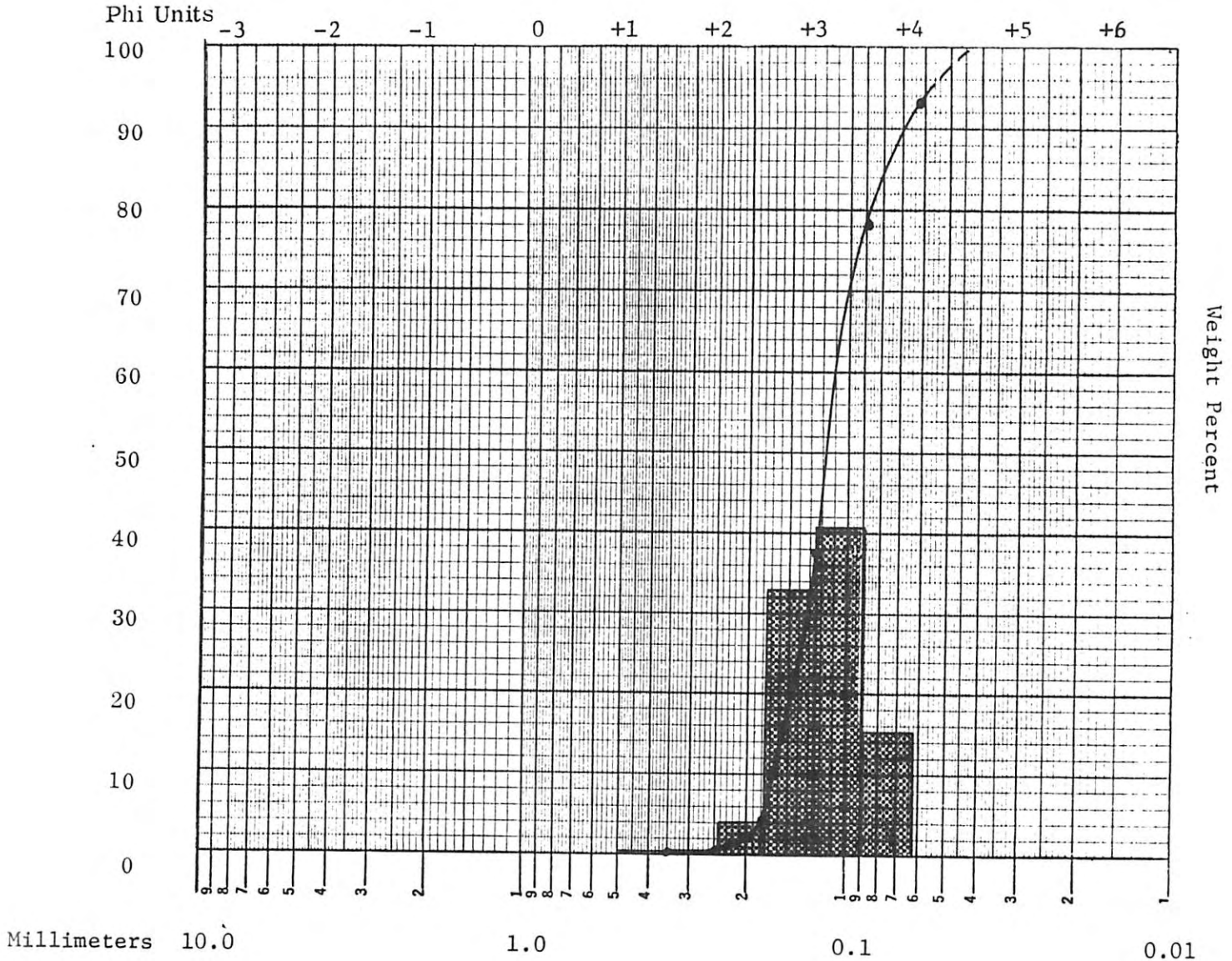
colored fine grained sand

Depth 15.0 Fathoms

27.4 Meters

90.0 Feet

Sample Weight 175.391 g



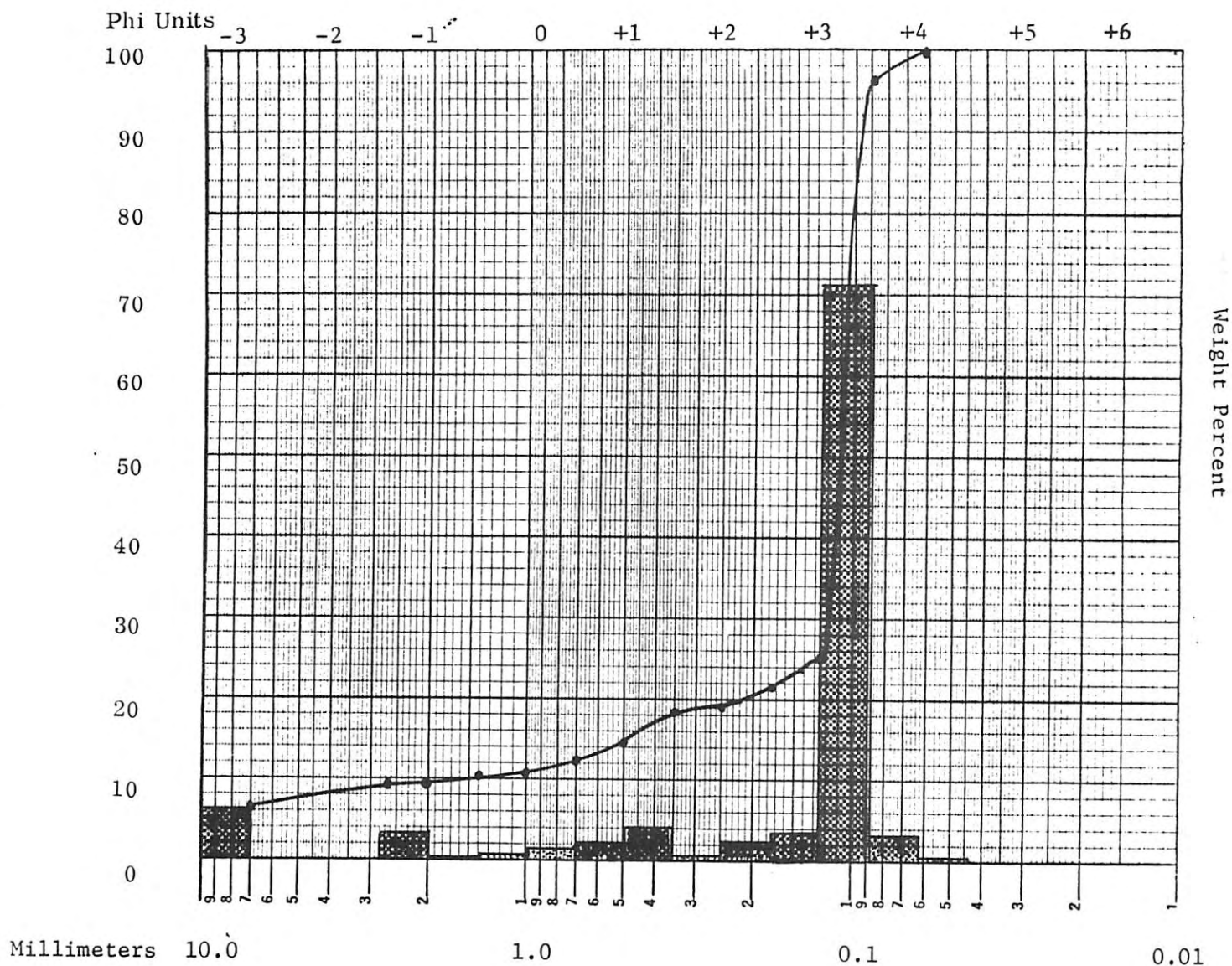
SIZE PARAMETERS

1st Mode .088 - .125 mm  $Q_{25}$  .140 mm Sorting Coef. 1.214  
 2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .118 mm Skewness .955  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .095 mm Kurtosis .234



## SIZE ANALYSIS

Sample 2172 Sample description gray colored  
 Lat. 37°03.9' Long. 122° 15.9' fine grained sand with some  
 Depth 10.0 Fathoms shell material and a few rock  
18.3 Meters fragments  
60.0 Feet Sample Weight 4.1717 g

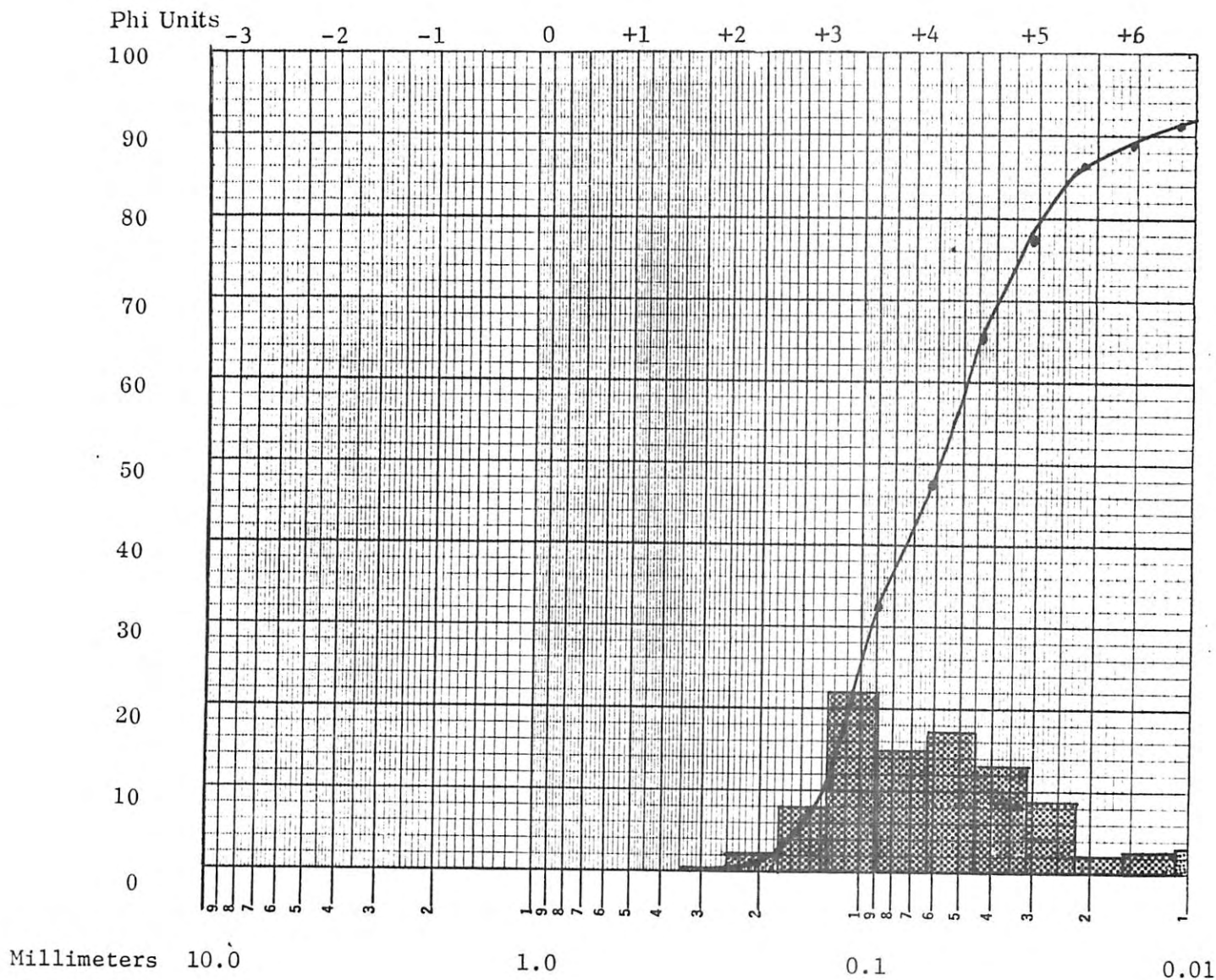
SIZE PARAMETERS

1st Mode .088 - .125 mm  $Q_{25}$  .130 mm Sorting Coef. 1.118  
 2nd Mode 7.0 - 10.0 mm Median:  $Q_{50}$  .110 mm Skewness 1.117  
 3rd Mode .351 - .495 mm  $Q_{75}$  .104 mm Kurtosis .033

# SIZE ANALYSIS

Sample 2173  
 Lat. 36° 58.8' Long. 122° 18.0'  
 Depth 50.0 Fathoms  
91.6 Meters  
300.0 Feet

Sample description greenish gray  
very fine grained sandy silt with  
much glauconite  
 Sample Weight 204.204 g



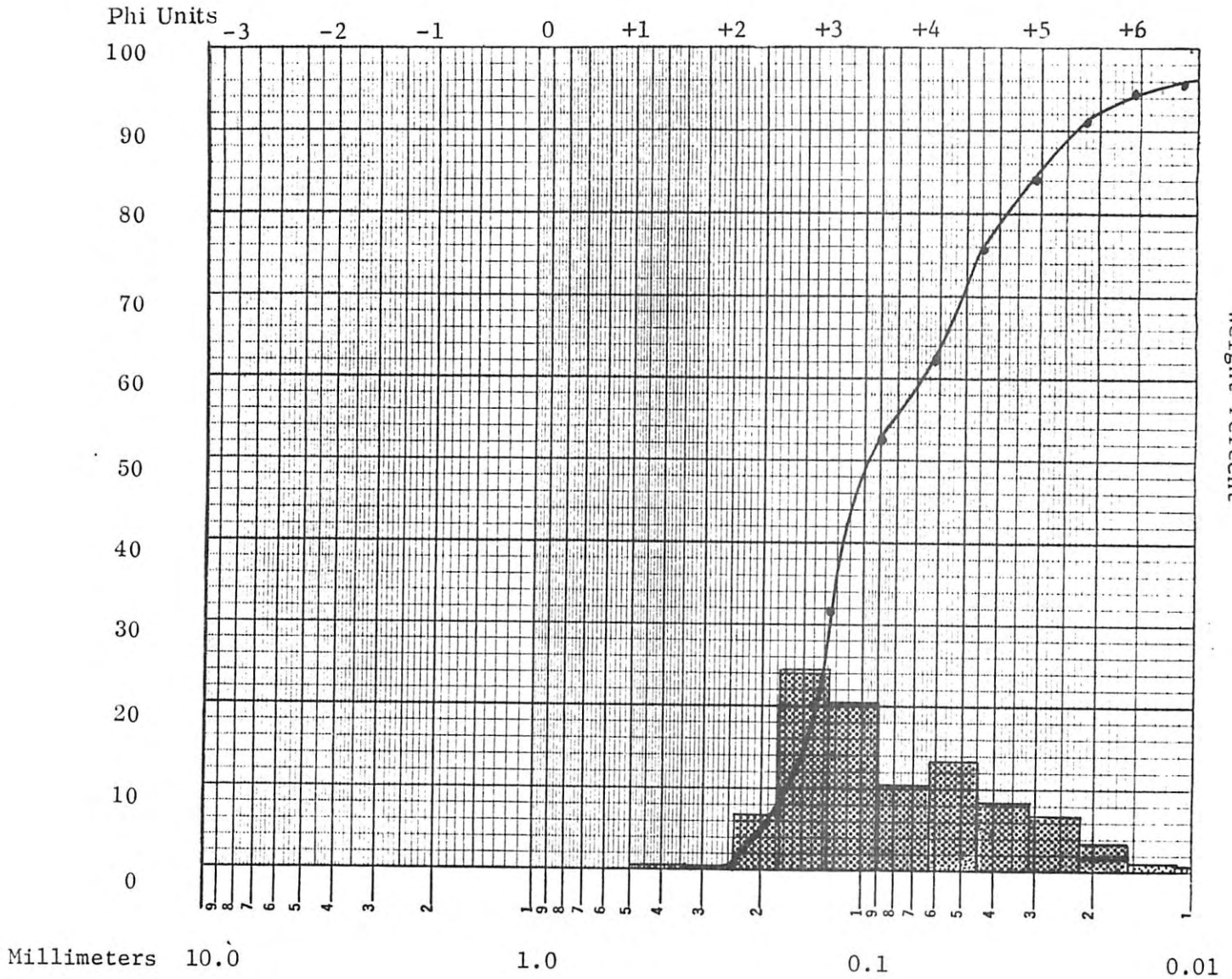
## SIZE PARAMETERS

1st Mode .088 - .125 mm       $Q_{25}$  .100 mm      Sorting Coef. 1.715  
 2nd Mode .044 - .062 mm      Median:  $Q_{50}$  .059 mm      Skewness .977  
 3rd Mode .008 - .011 mm       $Q_{75}$  .034 mm      Kurtosis .284

SIZE ANALYSIS

Sample 2174  
 Lat. 36° 59.7' Long. 122° 17.1'  
 Depth 40.0 Fathoms  
73.2 Meters  
240.0 Feet

Sample description greenish  
gray fine grained silty sand  
 Sample Weight 162.003 g



SIZE PARAMETERS

1st Mode .125 - .177 mm  $Q_{25}$  .130 mm Sorting Coef. 1.663  
 2nd Mode .044 - .062 mm Median:  $Q_{50}$  .097 mm Skewness .649  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .047 mm Kurtosis .287



# SIZE ANALYSIS

Sample 2175

Sample description greenish gray

Lat. 37° 00.8' Long. 122° 15.6'

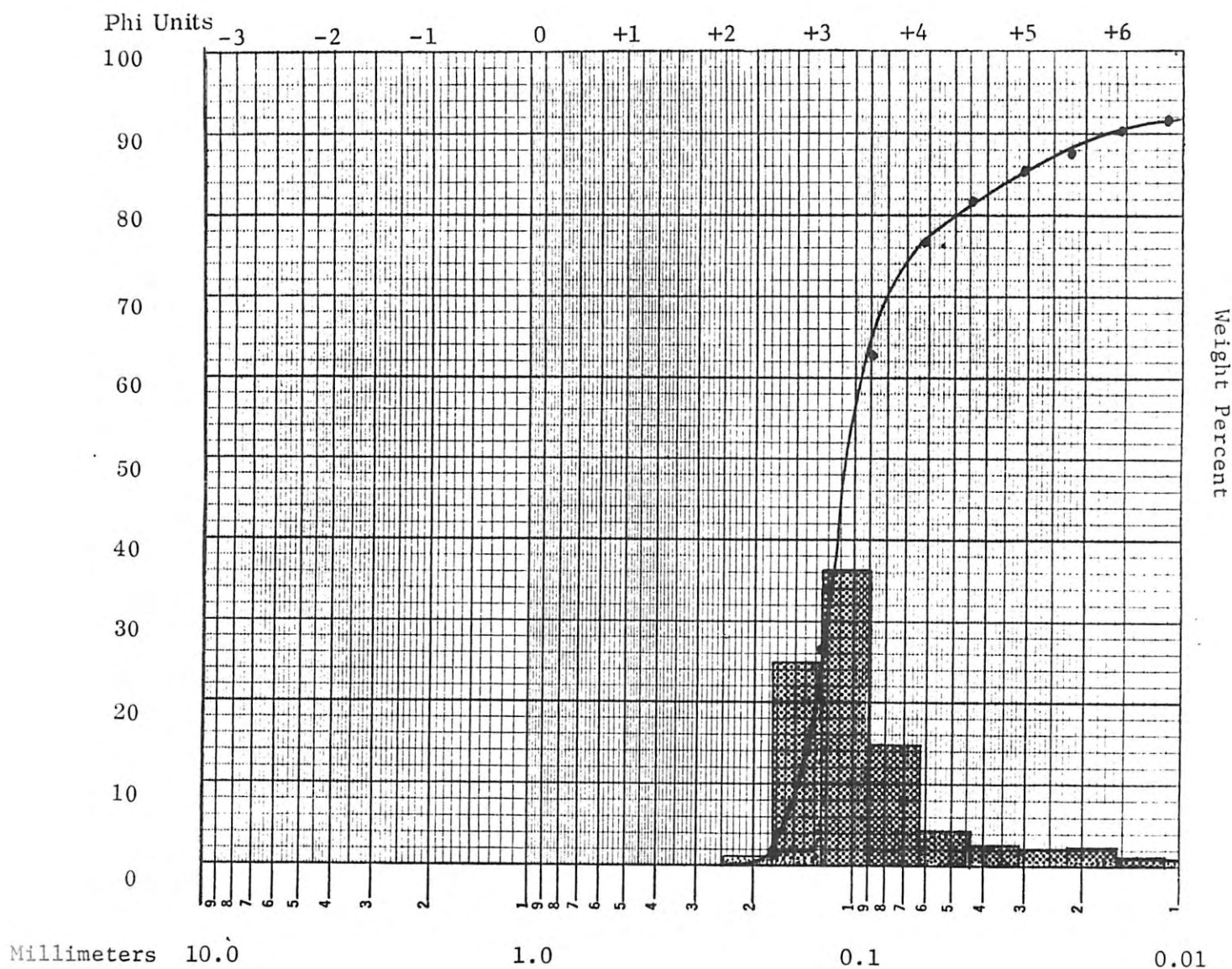
fine grained silty sand

Depth 30.0 Fathoms

54.8 Meters

180.0 Feet

Sample Weight 161.922 g



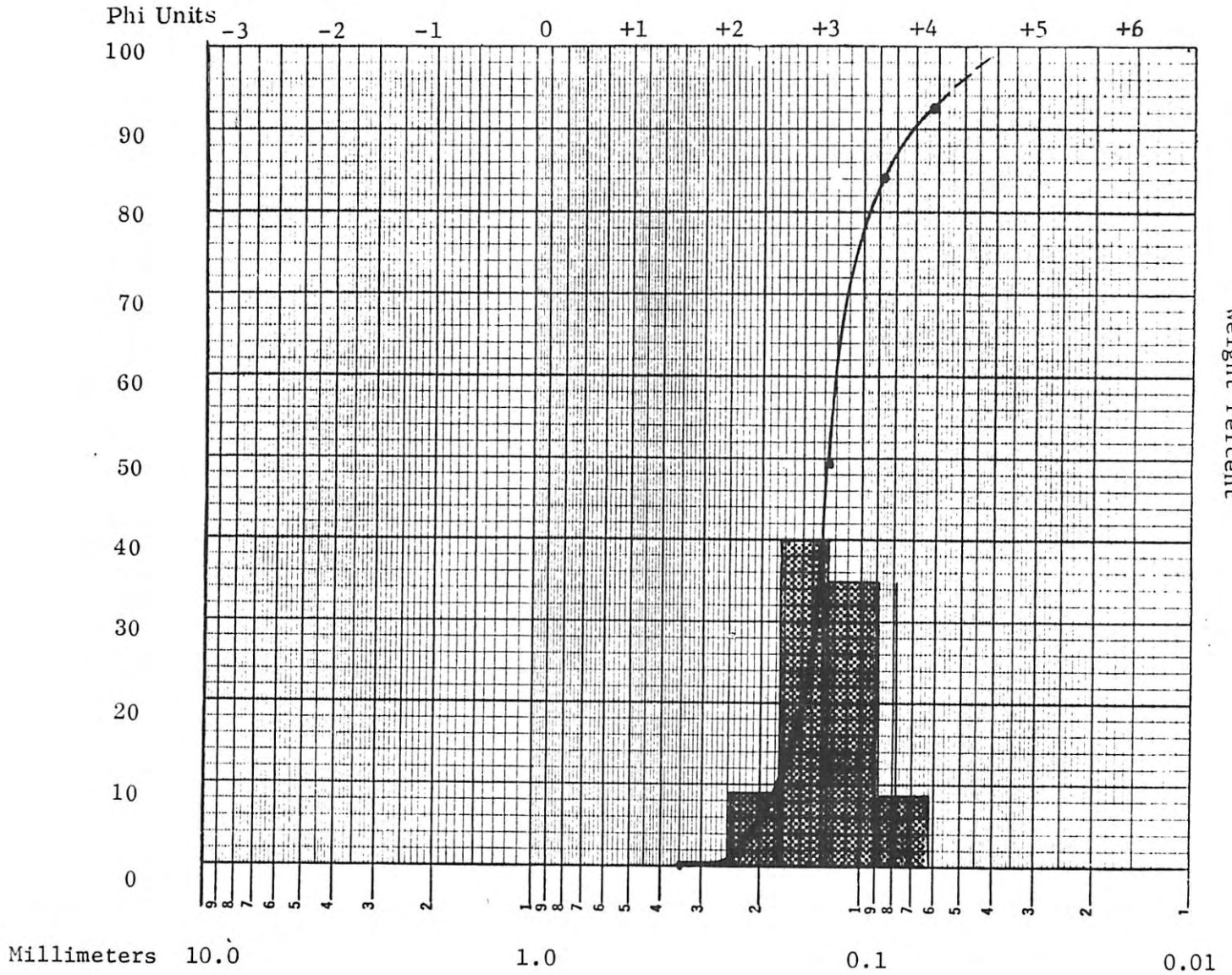
## SIZE PARAMETERS

1st Mode <u>.088 - .125 mm</u>	Q <sub>25</sub> <u>.126 mm</u>	Sorting Coef. <u>1.361</u>
2nd Mode <u>.0156 - .022 mm</u>	Median: Q <sub>50</sub> <u>.108 mm</u>	Skewness <u>.735</u>
3rd Mode _____	Q <sub>75</sub> <u>.068 mm</u>	Kurtosis <u>.223</u>

SIZE ANALYSIS

Sample 2176  
 Lat. 37° 01.3' Long. 122° 14.8'  
 Depth 20.0 Fathoms  
36.6 Meters  
120.0 Feet

Sample description greenish gray  
fine grained sand  
 Sample Weight 144.890 g



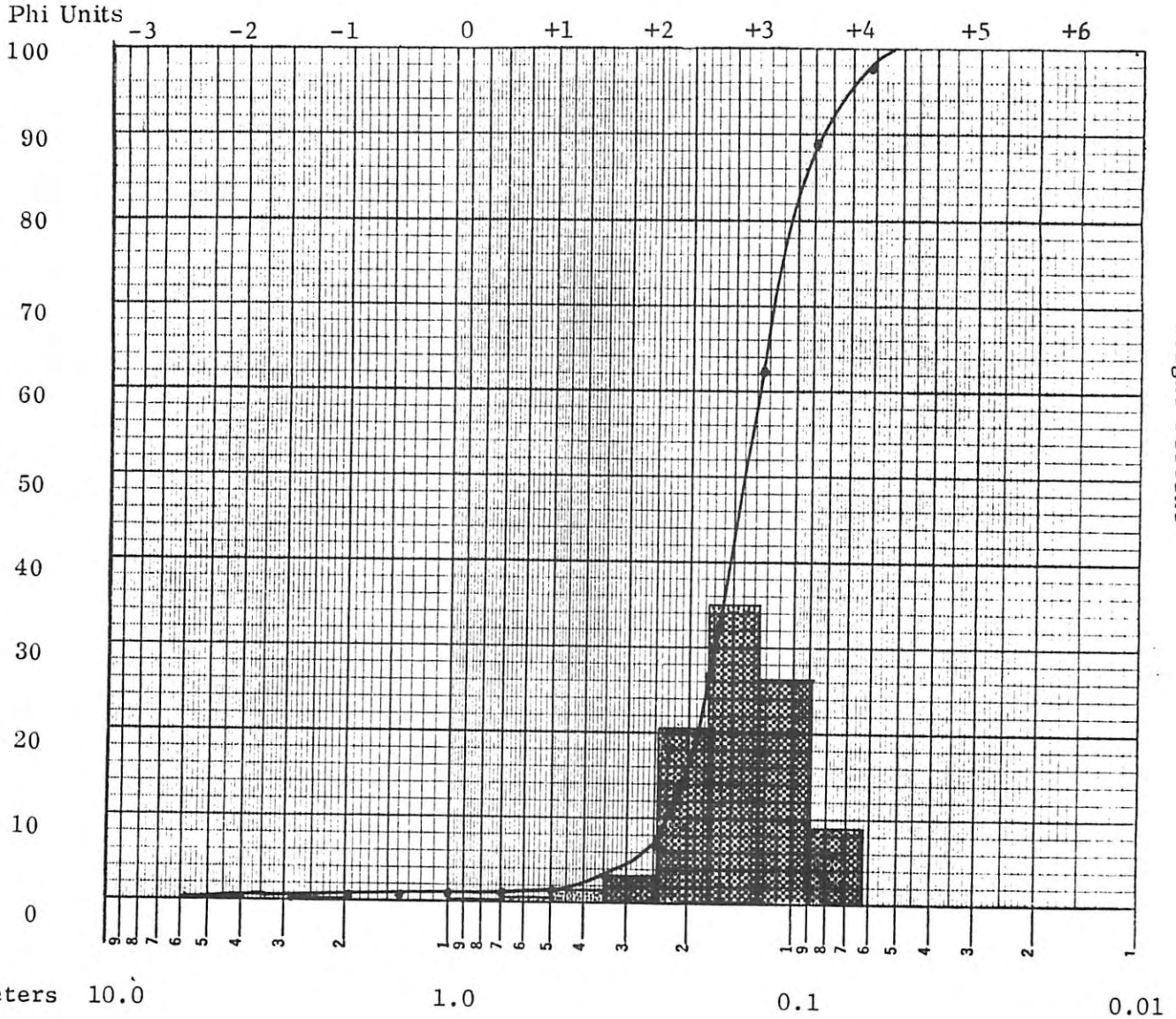
SIZE PARAMETERS

1st Mode .125 - .177 mm       $Q_{25}$  .141 mm      Sorting Coef. 1.159  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .125 mm      Skewness .947  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .105 mm      Kurtosis .165

SIZE ANALYSIS

Sample 2177  
 Lat. 37° 01.8' Long. 122° 14.1'  
 Depth 10 Fathoms  
18.3 Meters  
60.0 Feet

Sample description gray colored  
fine grained sand with occasional  
small pebbles  
 Sample Weight 122.004 g



Weight Percent

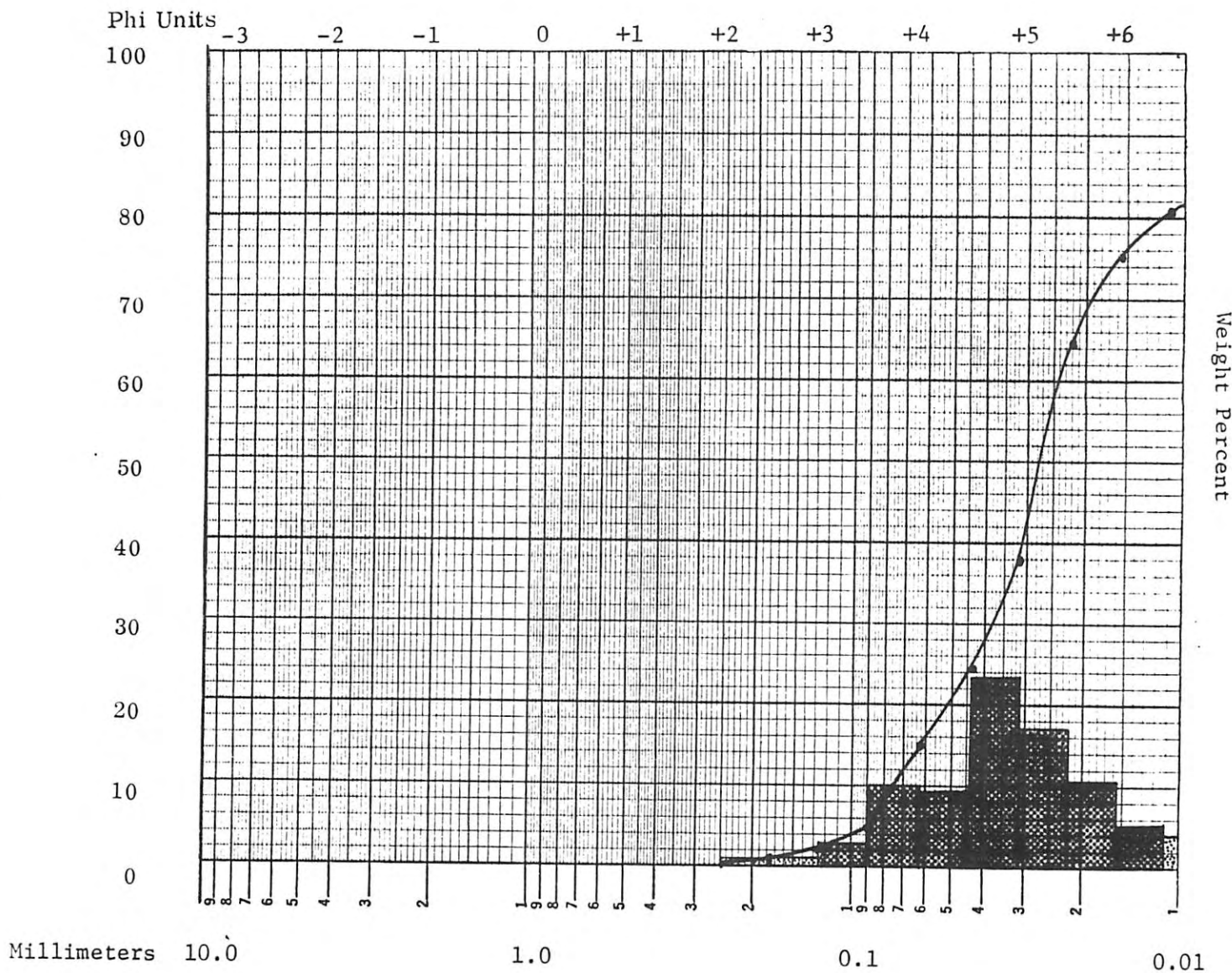
SIZE PARAMETERS

1st Mode 1.981 - 2.80 mm  $Q_{25}$  .180 mm Sorting Coef. 1.268  
 2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .140 mm Skewness 1.03  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .112 mm Kurtosis .234



# SIZE ANALYSIS

Sample <u>2178</u>	Sample description <u>greenish gray</u>
Lat. <u>36° 56.3</u> Long. <u>122° 15.5'</u>	<u>very fine grained sandy silt</u>
Depth <u>49.1</u> Fathoms	<u>with much glauconite and</u>
<u>90.0</u> Meters	<u>common large glauconite aggregates</u>
<u>295.0</u> Feet	Sample Weight <u>236.795 g</u>



### SIZE PARAMETERS

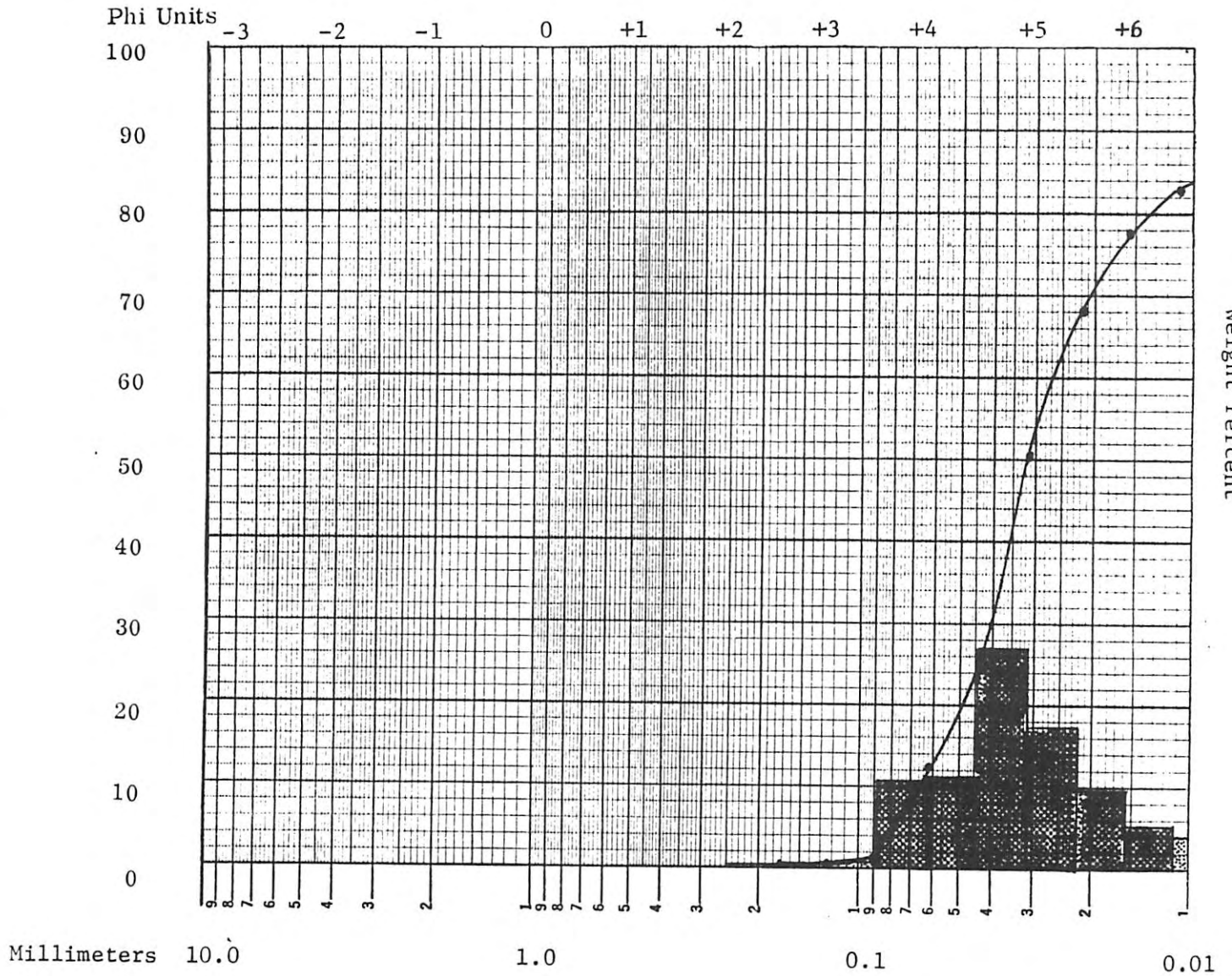
1st Mode <u>.031 - .044 mm</u>	Q <sub>25</sub> <u>.043 mm</u>	Sorting Coef. <u>1.640</u>
2nd Mode <u>.062 - .088 mm</u>	Median: Q <sub>50</sub> <u>.028 mm</u>	Skewness <u>.878</u>
3rd Mode _____	Q <sub>75</sub> <u>.016 mm</u>	Kurtosis <u>.190</u>

# SIZE ANALYSIS

49

Sample 2179  
 Lat. 36° 57.9' Long. 122° 14.0'  
 Depth 40.3 Fathoms  
74.4 Meters  
242.0 Feet

Sample description greenish gray  
very fine grained sandy silt  
 Sample Weight 248.859 g



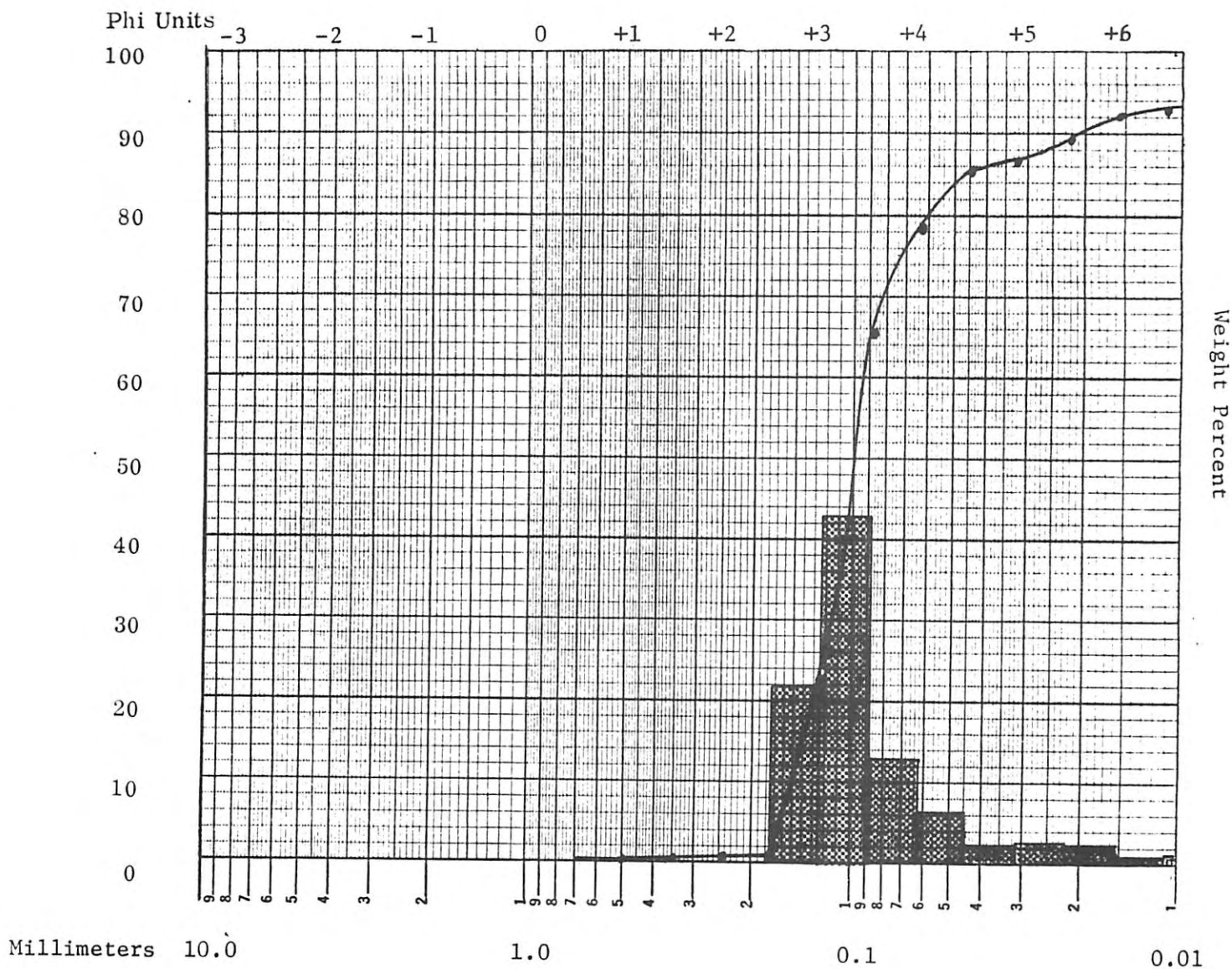
## SIZE PARAMETERS

1st Mode <u>.031 - .044 mm</u>	Q <sub>25</sub> <u>.043 mm</u>	Sorting Coef. <u>1.590</u>
2nd Mode _____	Median: Q <sub>50</sub> <u>.033 mm</u>	Skewness <u>.671</u>
3rd Mode _____	Q <sub>75</sub> <u>.017 mm</u>	Kurtosis <u>.233</u>



# SIZE ANALYSIS

Sample <u>2180</u>	Sample description <u>greenish gray</u>
Lat. <u>36° 58.7'</u> Long. <u>122° 13.1'</u>	<u>fine grained silty sand</u>
Depth <u>30.0</u> Fathoms	
<u>54.8</u> Meters	
<u>180.0</u> Feet	Sample Weight <u>32.772 g</u>



## SIZE PARAMETERS

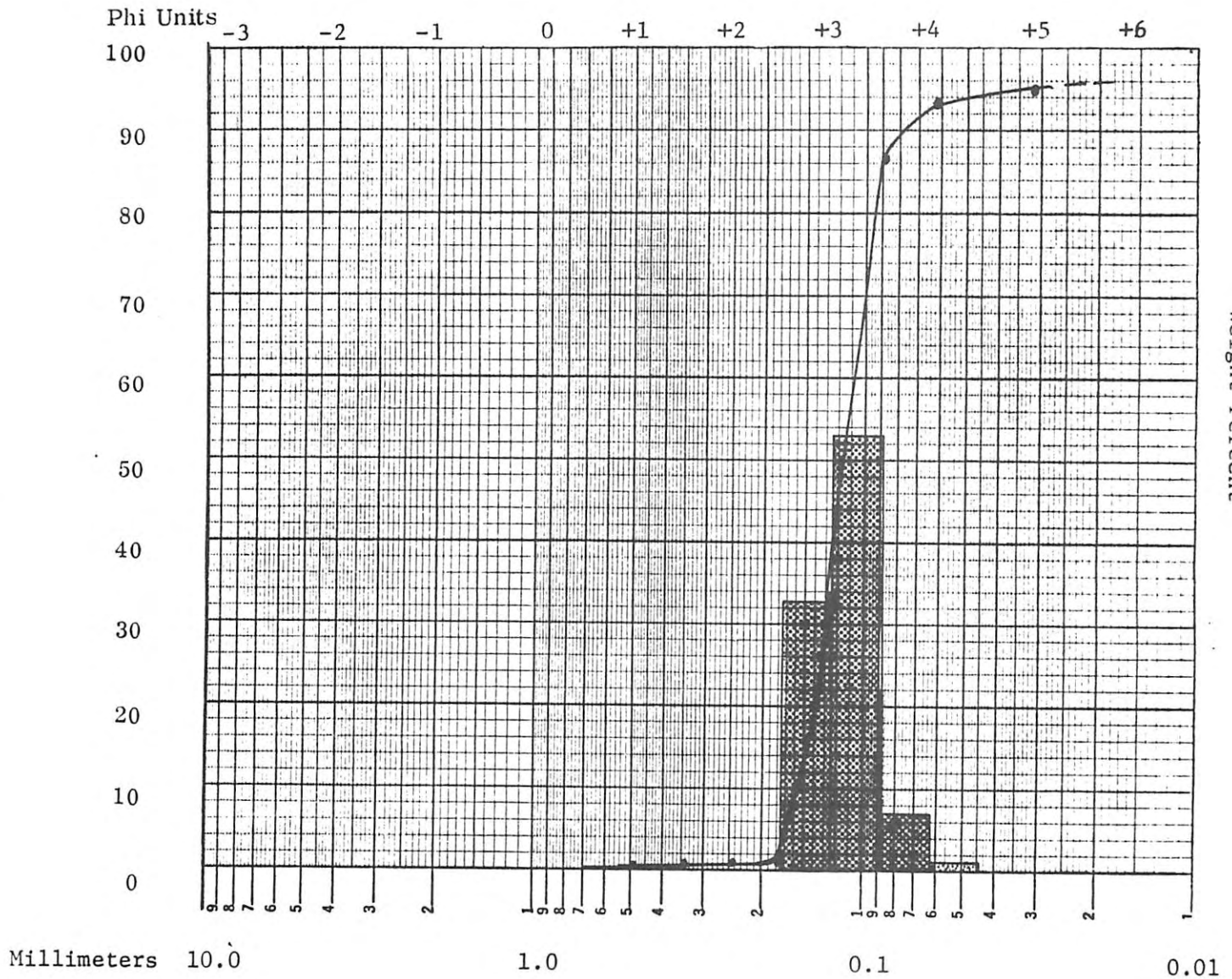
1st Mode <u>.088 - .125 mm</u>	Q <sub>25</sub> <u>.125 mm</u>	Sorting Coef. <u>1.309</u>
2nd Mode <u>.022 - .031 mm</u>	Median: Q <sub>50</sub> <u>.100 mm</u>	Skewness <u>.913</u>
3rd Mode <u>.351 - .495 mm</u>	Q <sub>75</sub> <u>.073 mm</u>	Kurtosis <u>.202</u>

SIZE ANALYSIS

51

Sample 2181  
 Lat. 36° 59.4' Long. 122° 12.4'  
 Depth 20.0 Fathoms  
36.6 Meters  
120.0 Feet

Sample description greenish gray  
fine grained silty sand with  
some very small pebbles  
 Sample Weight 171.962 g



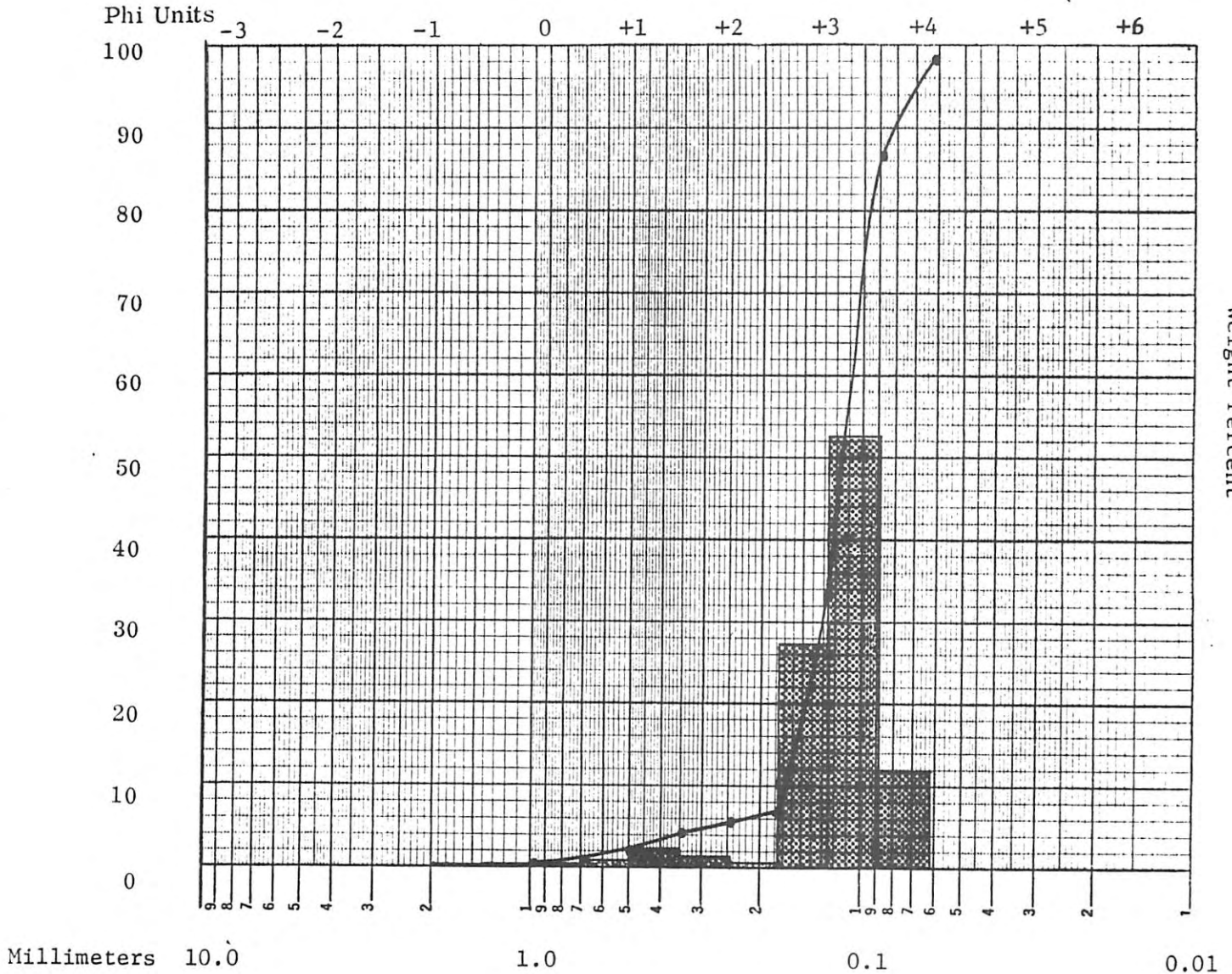
SIZE PARAMETERS

1st Mode .088 - .125 mm  $Q_{25}$  .133 mm Sorting Coef. 1.171  
 2nd Mode .351 - .495 mm Median:  $Q_{50}$  .120 mm Skewness .896  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .097 mm Kurtosis .225

SIZE ANALYSIS

Sample 2182  
 Lat. 37° 00.1' Long. 122° 11.8'  
 Depth 10 Fathoms  
18.3 Meters  
60.0 Feet

Sample description gray colored  
fine grained sand with some  
shell material  
 Sample Weight 22.909 g



SIZE PARAMETERS

1st Mode	<u>.088 - .125 mm</u>	Q <sub>25</sub>	<u>.138 mm</u>	Sorting Coef.	<u>1.174</u>
2nd Mode	<u>.351 - .495 mm</u>	Median: Q <sub>50</sub>	<u>.115 mm</u>	Skewness	<u>1.04</u>
3rd Mode	<u></u>	Q <sub>75</sub>	<u>.100 mm</u>	Kurtosis	<u>.218</u>

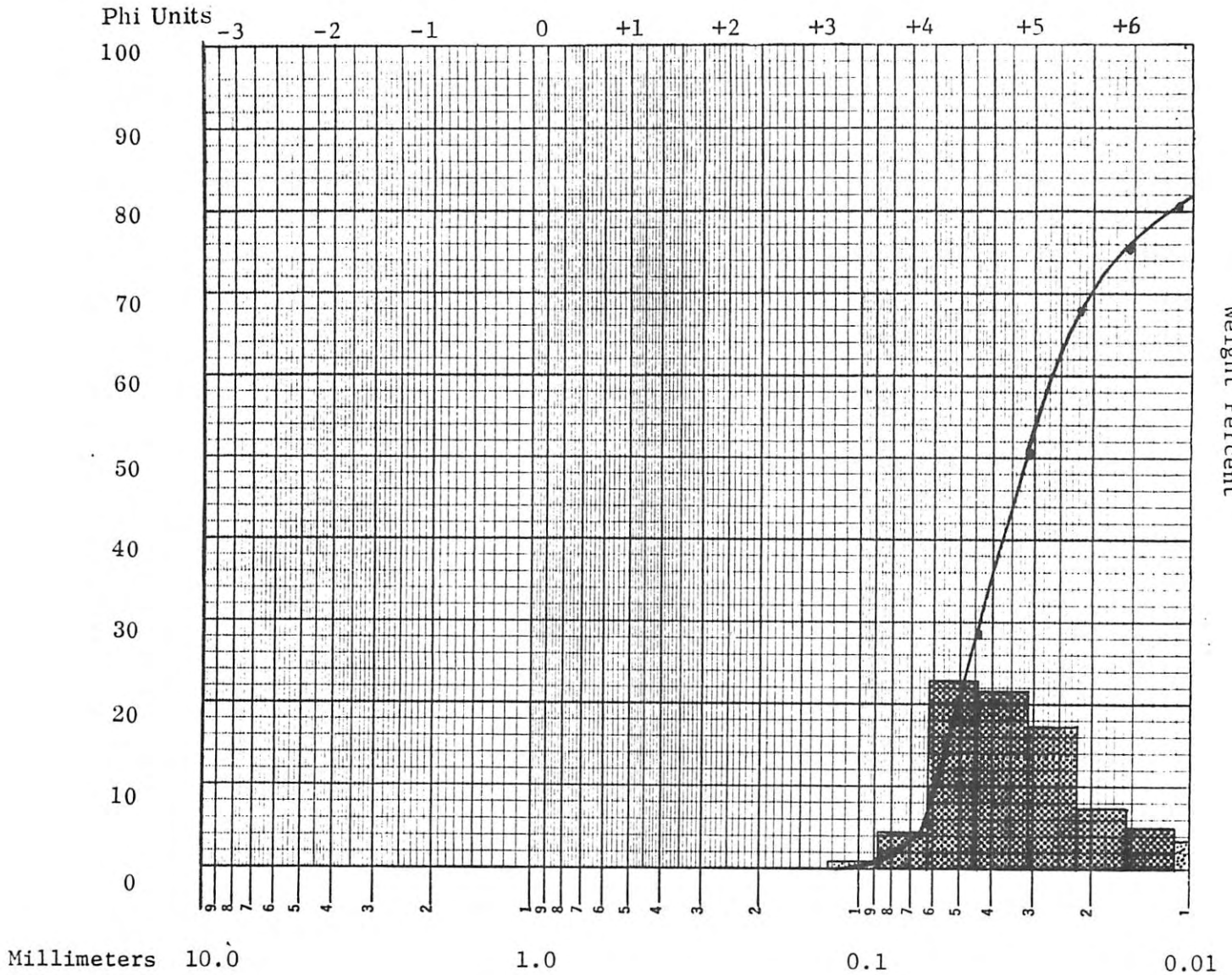


SIZE ANALYSIS

53

Sample 2183  
 Lat. 36° 55.2' Long. 122° 11.7'  
 Depth 48.3 Fathoms  
88.4 Meters  
290.0 Feet

Sample description greenish gray  
very fine grained sandy silt  
 Sample Weight 239.688 g

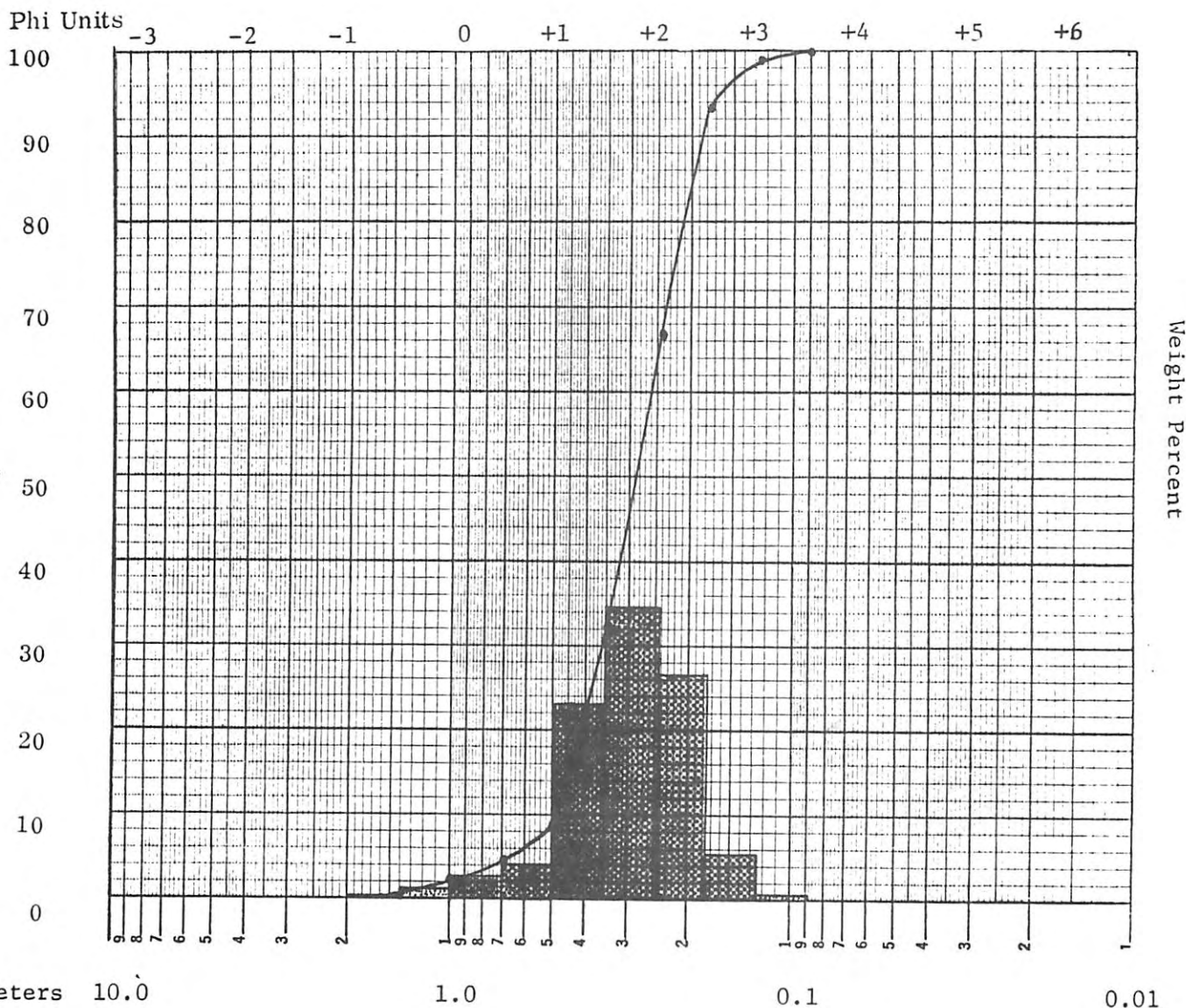


SIZE PARAMETERS

1st Mode .044 - .062 mm       $Q_{25}$  .047 mm      Sorting Coef. 1.714  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .032 mm      Skewness .734  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .016 mm      Kurtosis .275

SIZE ANALYSIS

Sample 2184 Sample description medium to  
 Lat. 37° 00.0' Long. 122° 11.7 fine beach sand  
 Depth Intertidal Fathoms \_\_\_\_\_  
 " Meters \_\_\_\_\_  
 " Feet \_\_\_\_\_ Sample Weight 257.335 g



SIZE PARAMETERS

1st Mode .246 - .351 mm  $Q_{25}$  .380 mm Sorting Coef. 1.314  
 2nd Mode \_\_\_\_\_ Median:  $Q_{50}$  .285 mm Skewness 1.029  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .220 mm Kurtosis .262

SIZE ANALYSIS

Sample 2185

Sample description medium size

Lat. 37° 01.5' Long. 122° 12.9'

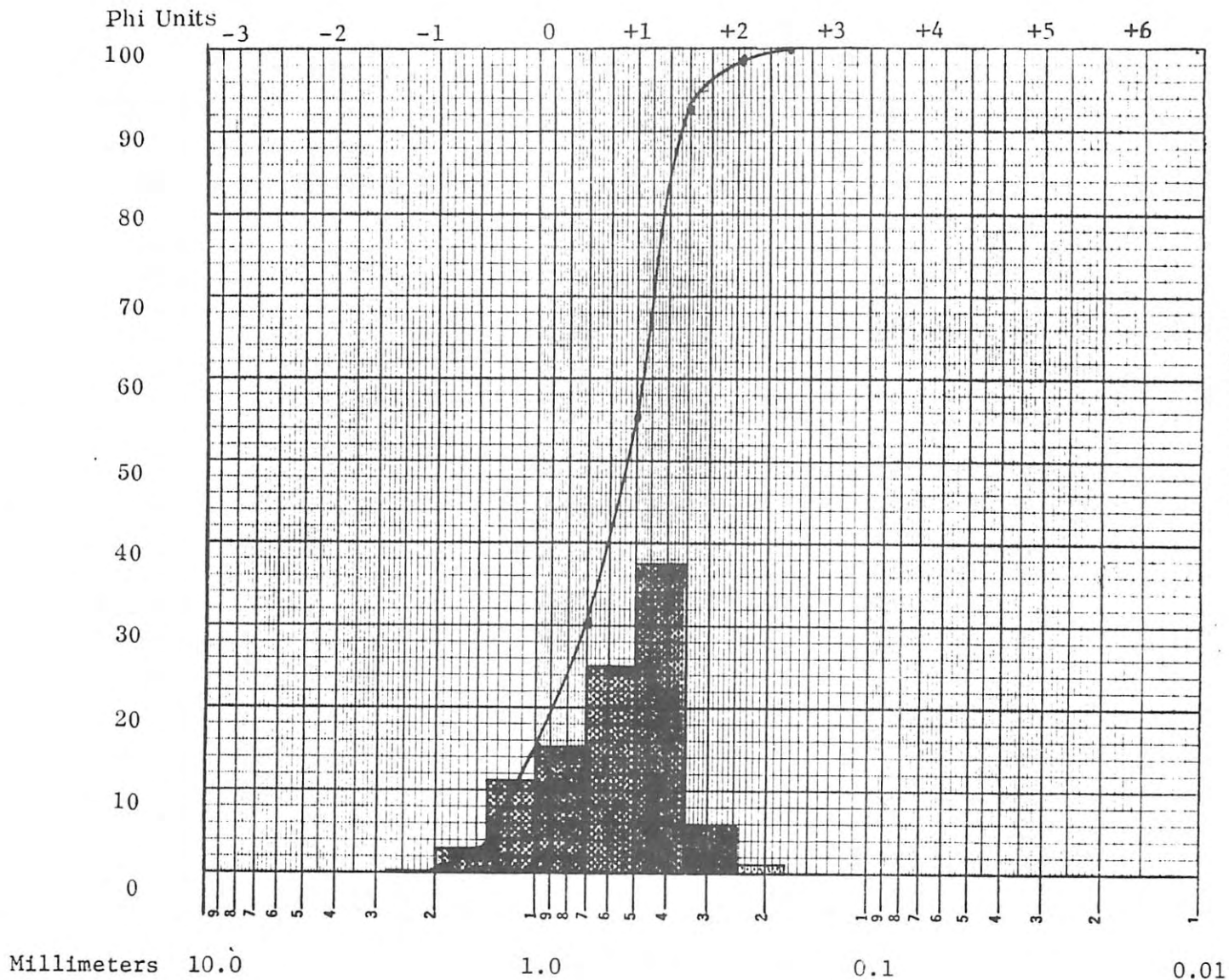
beach sand

Depth Intertidal Fathoms

" Meters

" Feet

Sample Weight 363.205 g



SIZE PARAMETERS

1st Mode <u>.351 - .495</u>	$Q_{25}$ <u>.80 mm</u>	Sorting Coef. <u>1.364</u>
2nd Mode _____	Median: $Q_{50}$ <u>.53 mm</u>	Skewness <u>1.224</u>
3rd Mode _____	$Q_{75}$ <u>.43 mm</u>	Kurtosis <u>.228</u>

SIZE ANALYSIS

Sample 2186

Sample description medium to

Lat. 37° 02.5' Long. 122° 13.7'

coarse beach sand with

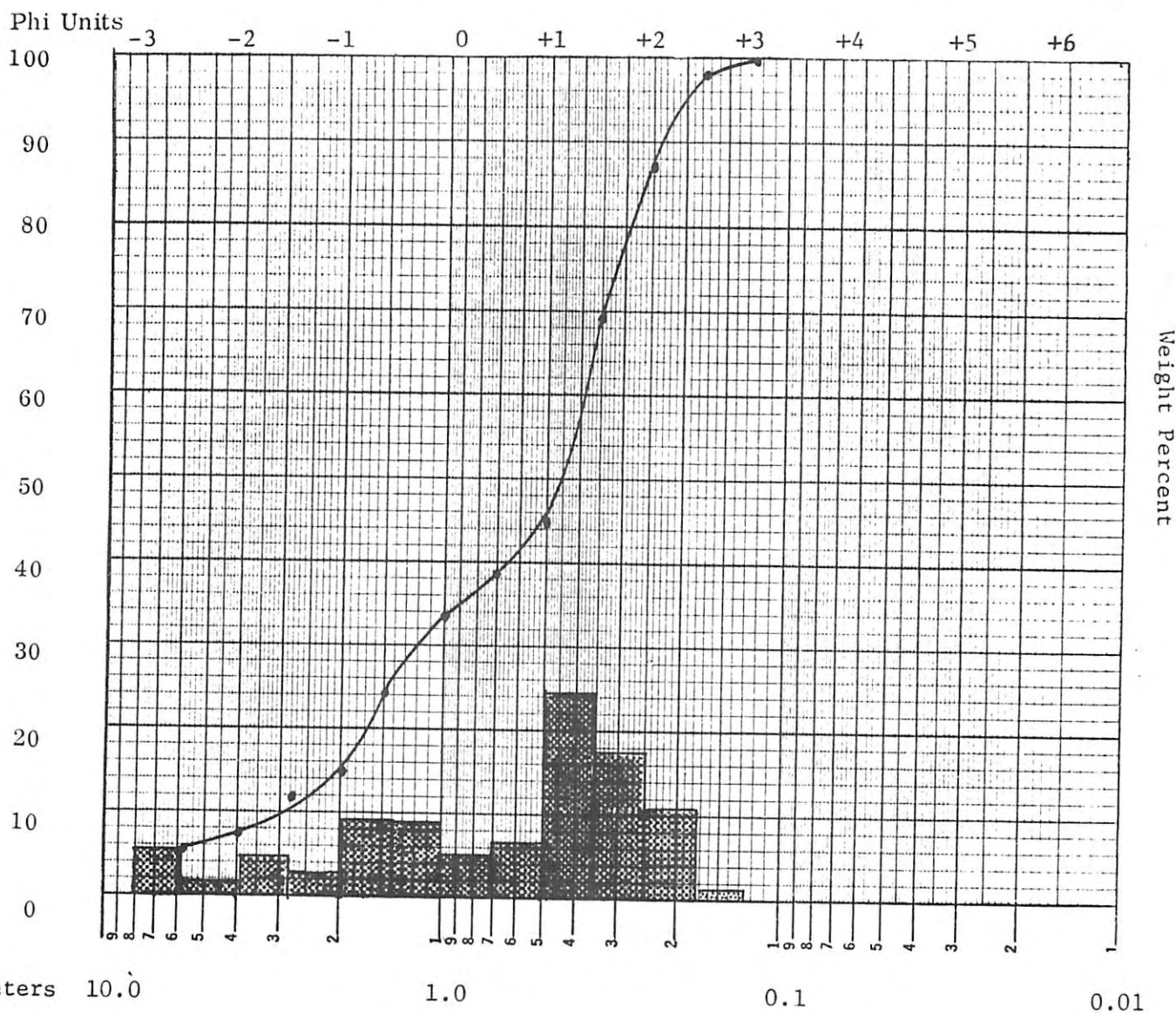
Depth Intertidal Fathoms

occasional small pebbles

" Meters

" Feet

Sample Weight 555.499 g



SIZE PARAMETERS

1st Mode <u>.351 - .495 mm</u>	Q <sub>25</sub> <u>1.46 mm</u>	Sorting Coef. <u>2.136</u>
2nd Mode <u>1.41 - 2.00 mm</u>	Median: Q <sub>50</sub> <u>.45 mm</u>	Skewness <u>2.307</u>
3rd Mode <u>5.80 - 8.00 mm</u>	Q <sub>75</sub> <u>.32 mm</u>	Kurtosis <u>.214</u>



SIZE ANALYSIS

Sample 2188

Sample description medium size

Lat. 37° 04.7' Long. 122° 15.8'

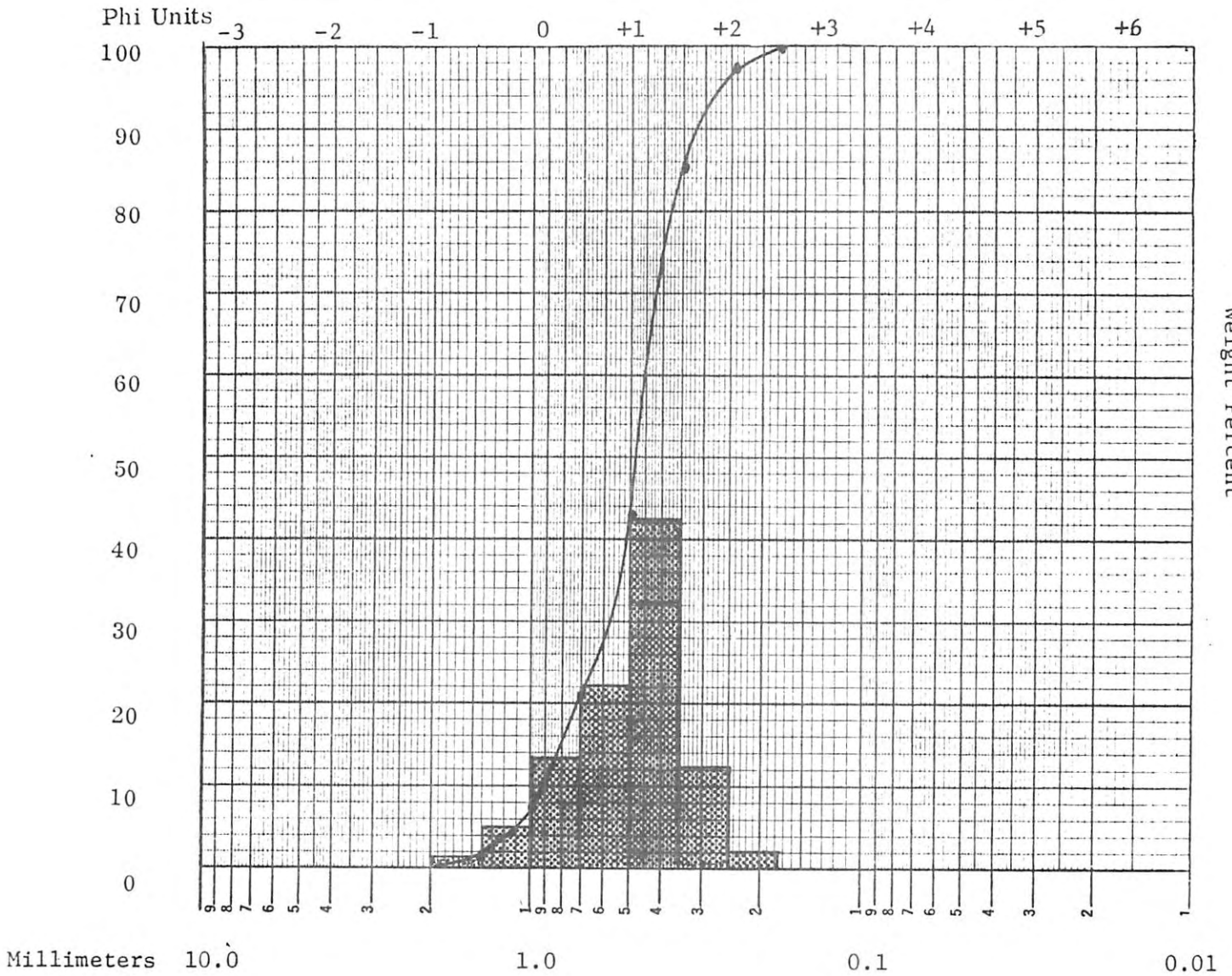
beach sand

Depth Intertidal Fathoms

" Meters

" Feet

Sample Weight 389.730 g



SIZE PARAMETERS

1st Mode <u>.351 - .495 mm</u>	$Q_{25}$ <u>.64 mm</u>	Sorting Coef. <u>1.265</u>
2nd Mode _____	Median: $Q_{50}$ <u>.48 mm</u>	Skewness <u>1.111</u>
3rd Mode _____	$Q_{75}$ <u>.40 mm</u>	Kurtosis <u>.203</u>



SIZE ANALYSIS

Sample 2189

Sample description fine beach

Lat. 37° 05.8' Long. 122° 16.6'

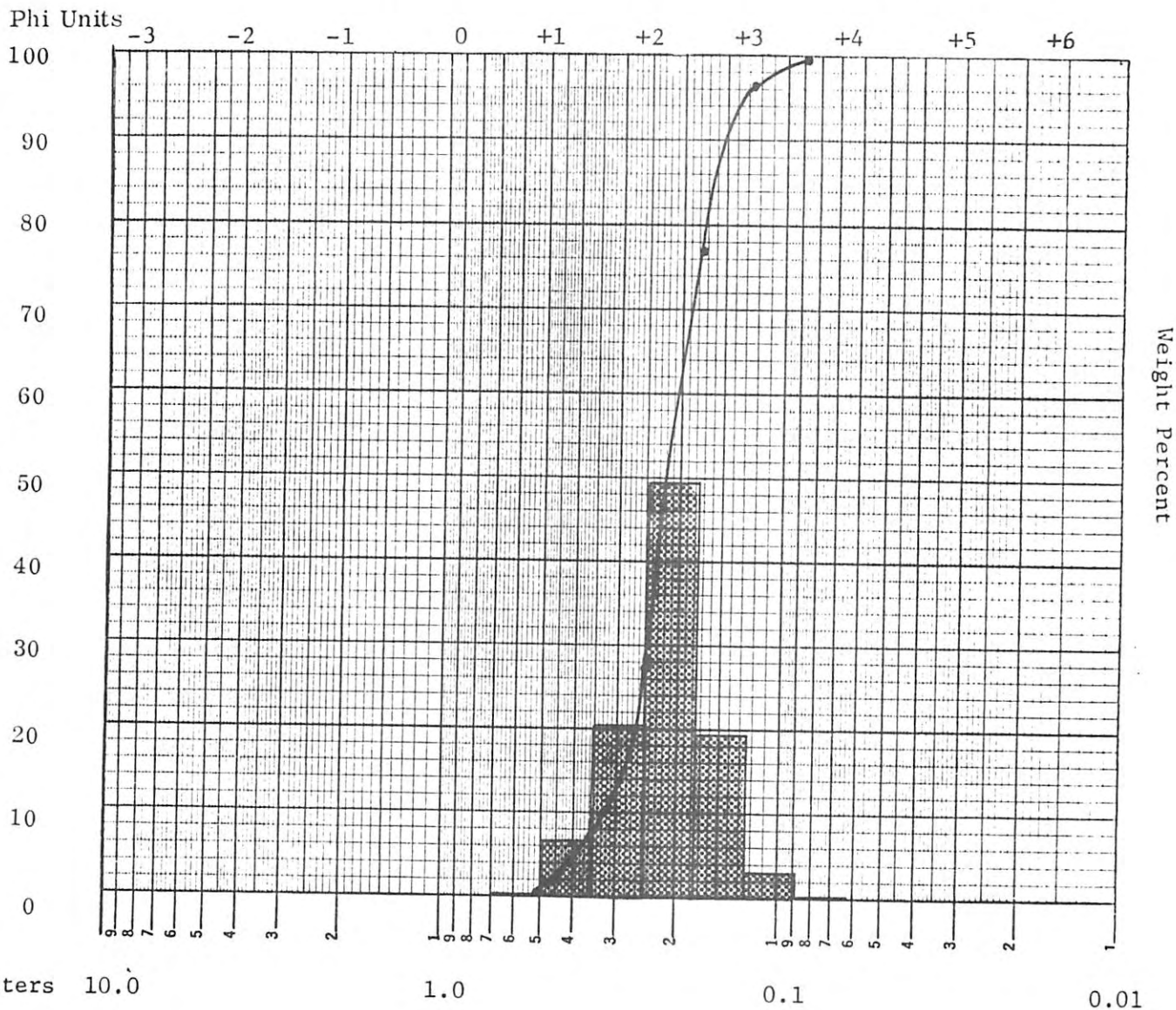
sand

Depth Intertidal Fathoms

" Meters

" Feet

Sample Weight 201.876 g



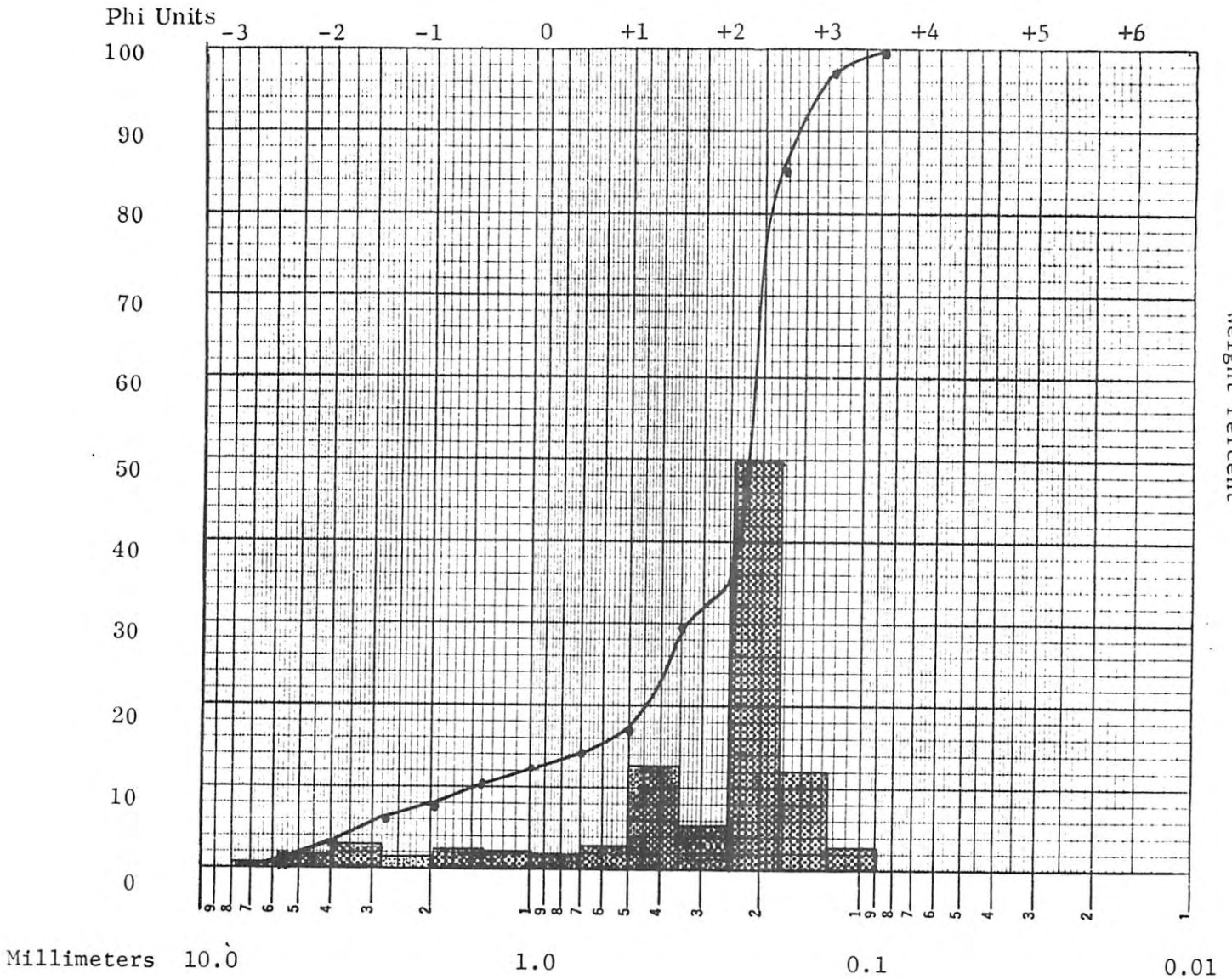
SIZE PARAMETERS

1st Mode .177 - .246       $Q_{25}$  .255 mm      Sorting Coef. 1.190  
 2nd Mode \_\_\_\_\_      Median:  $Q_{50}$  .220 mm      Skewness .948  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .180 mm      Kurtosis .223

SIZE ANALYSIS

Sample 2191  
 Lat. 37° 07.0' Long. 122° 18.3'  
 Depth Intertidal Fathoms  
 " Meters  
 " Feet

Sample description fine to  
medium beach sand with  
medium sized pebbles  
 Sample Weight 548.051 g

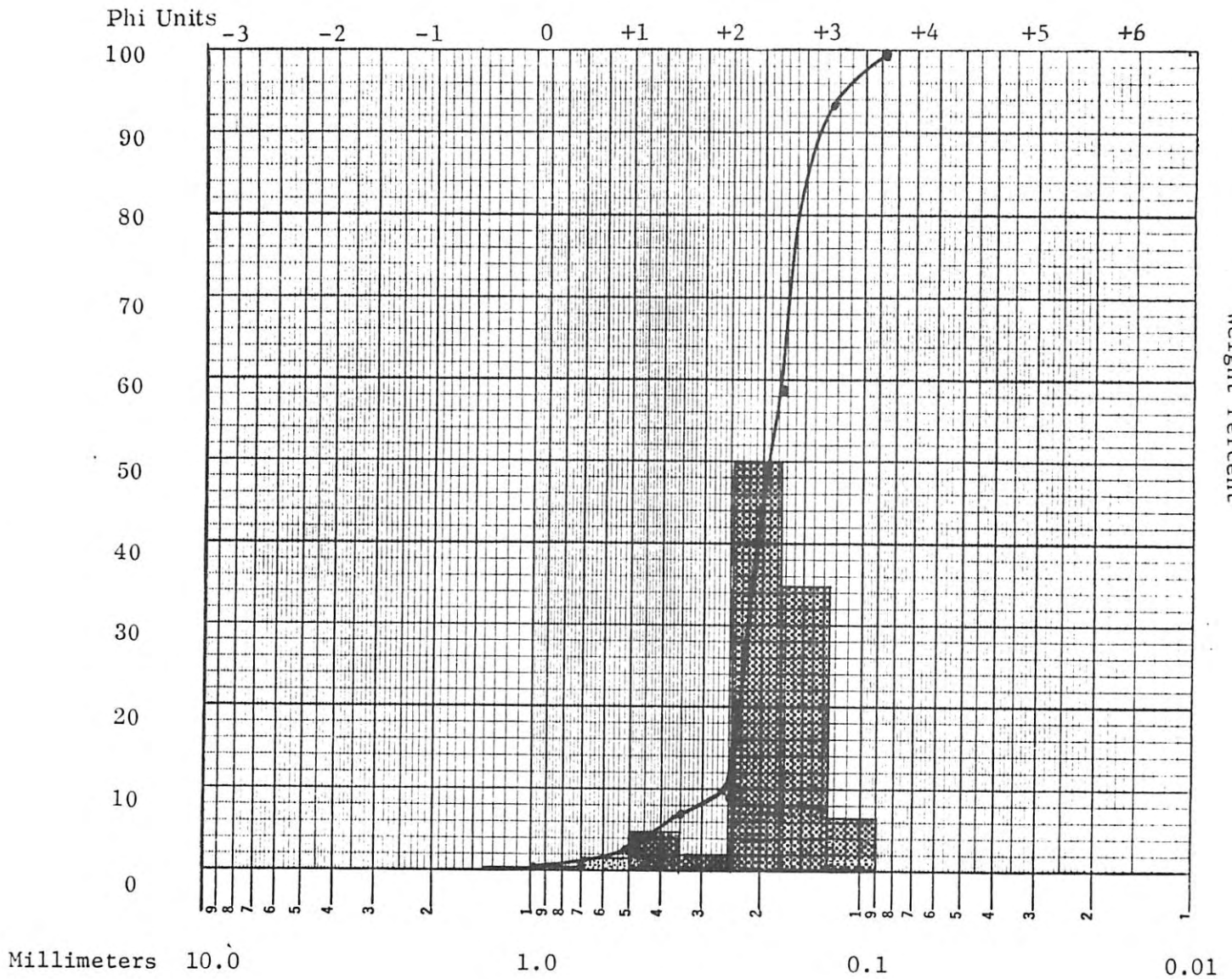


SIZE PARAMETERS

1st Mode <u>.177 - .246 mm</u>	Q <sub>25</sub> <u>.380 mm</u>	Sorting Coef. <u>1.378</u>
2nd Mode <u>.351 - .495 mm</u>	Median: Q <sub>50</sub> <u>.220 mm</u>	Skewness <u>1.57</u>
3rd Mode <u>2.83 - 4.00 mm</u>	Q <sub>75</sub> <u>.200 mm</u>	Kurtosis <u>.070</u>

SIZE ANALYSIS

Sample 2192 Sample description Fine to  
 Lat. 37° 08.7' Long. 122° 20.7' medium beach sand  
 Depth Intertidal Fathoms \_\_\_\_\_  
 " Meters \_\_\_\_\_  
 " Feet \_\_\_\_\_ Sample Weight 107.932



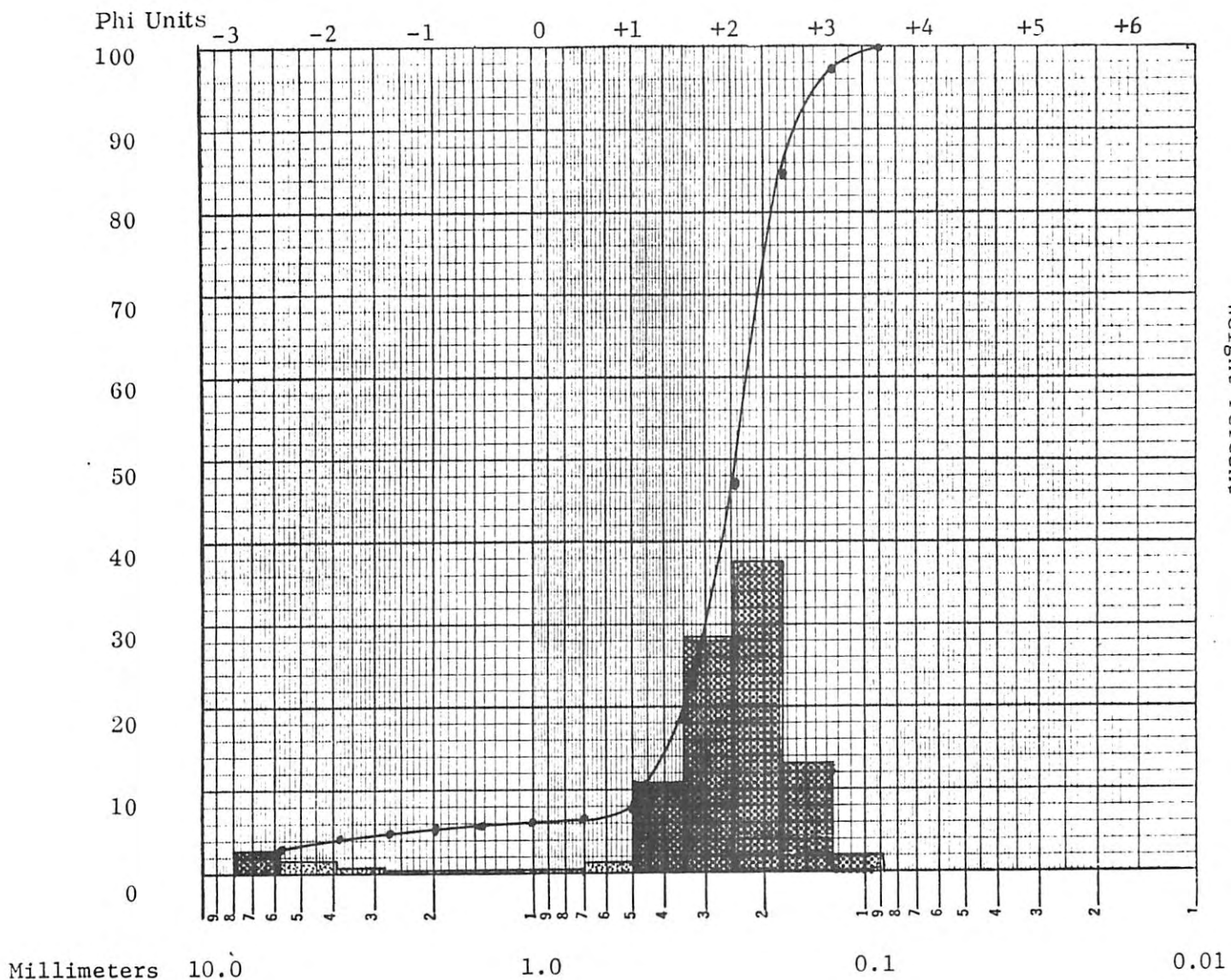
SIZE PARAMETERS

1st Mode .177 - .246 mm  $Q_{25}$  .225 mm Sorting Coef. 1.168  
 2nd Mode .351 - .495 mm Median:  $Q_{50}$  .192 mm Skewness 1.007  
 3rd Mode \_\_\_\_\_  $Q_{75}$  .165 mm Kurtosis .229

SIZE ANALYSIS

Sample 2194  
 Lat. 37° 10.4' Long. 122° 22.0'  
 Depth Intertidal Fathoms  
 " Meters  
 " Feet

Sample description fine beach  
sand with small pebbles  
 Sample Weight 419.825



SIZE PARAMETERS

1st Mode .177 - .246 mm       $Q_{25}$  .315 mm      Sorting Coef. 1.271  
 2nd Mode 5.80 - 8.00 mm      Median:  $Q_{50}$  .241 mm      Skewness 1.058  
 3rd Mode \_\_\_\_\_       $Q_{75}$  .195 mm      Kurtosis .214



