Open File Report 1974-42

Preliminary Report on the Gravel Resources of the Red Deer Area

Explanatory Notes

M. E. Holter
Alberta Research

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Alberta
RESEARCH COUNCIL

For the purpose of this report a radius of approximately 25 miles of the City of Red Deer was chosen for study. In terms of the encompassing townships the area may be described as lying between range 23 west of the fourth meridian and range 3 west of the fifth meridian and between townships 34 and 42 (Fig. 1). An area of approximately 3,000 square miles is thus included. The major parts of the counties of Red Deer and Lacombe fall within the study region.

The bedrock underlying the entire area belongs to the nonmarine Tertiary and Upper Cretaceous Paskapoo Formation which is comprised of grey to greenish grey, thick-bedded, calcareous, cherty sandstone; grey and green mudstone; minor carbonate, thin limestone, coal and tuff beds (Green, 1972). The overlying surficial deposits of nearly the entire area have been mapped by Stalker (1956, 1960) and Bayrock, Boydell and Reimchen (in preparation). A reconnaissance mapping of the southwest portion was carried out by the writer. A simplified composite map of the surficial geology is presented in figure 2.

Investigations for gravel during the summer of 1973 were confined to areas blanketed by preglacial alluvial deposits, glacial outwash, deltaic alluvial deposits, and recent alluvium as outlined in figures 3, 4, 5 and 6. Surrounding deposits include tills, lacustrine materials and sand dunes which yield little or no coarse graded sediments. Topographic base maps with a scale of 1:50,000 were employed for surface control. Air photos were scanned to provide further interpretation with respect to the areal extent of deposits and location of pits and exposures. Prospective areas were visited and bulk sampled. Western Canadian Geological Drilling Services were retained to supplement surface information and as a result approximately 200 auger holes were drilled with a truck-mounted 8 inch auger at regular intervals within promising areas. Drilling was commonly confined to depths of less than 25 feet and sites were only selected along road allowances. Satisfactory

samples were obtained from drilling although few materials greater than 3 inches in diameter were recovered. Test hole data from records in the files of the Groundwater Division were used in addition to drilling information from the 1973 program.

Location of pits, exposures and test holes are given in figures 3 to 6 inclusive. The depth of gravel in each occurrence is indicated wherever the thickness exceeds 5 feet. Sample numbers of each are given and the pertinent analyses may be referred to in tables 1 and 2 and the appendix of this report.

Coal analyses were run on the minus #8 sieve fraction of pit and exposure samples, according to the Alberta Department of Highways laboratory procedures.

Sieve analyses were run on all samples and deviate from ASTM and Alberta Department of Highways procedures only in the use of a slightly different nest of coarse sieves.

Pebble counts were run on the minus 1 1/2" and plus 5/8" fraction of pit and exposure samples. Quartzite pebbles were counted independently of metamorphics, the latter of which normally consist of gneisses. The chert typically shows very little indication of erosional deterioration and, although some workers discourage the use of chert-bearing gravels (e.g., Price, 1958), there appears to be little concern for its effects in regular useage. The sandstones vary considerably from soft Paskapoo-derived rock to well-cemented Lower Cretaceous materials. Deposits which contain high percentages of igneous and metamorphic rock are of good quality except in areas where weathering conditions have resulted in friable pebbles. Vein quartz was arbitrarily counted with igneous pebbles. Shales and ironstones are normally considered detrimental materials.

Table 1. Coal Content of Sand Fraction (minus #8) of Pit Samples

Sample No.	Percent Coal	Sample No.	Percent Coal	Sample No.	Percent Coal
1	0.86	21	0.89	41	0.06
2	0.35	22	1.58	42	0.43
3	0.23	23	0.70	43	0.05
4	0.34	24	2.05	44	0.20
5	0.08	25	1.11	45	0.29
6	0.09	26	0.26	46	0.33
7	0.05	27	0.31	47	0.43
8	0.30	28	0.04	48	0.41
9	0.04	29	0.15	49	0.18
10	3.18	30	0.33	50	0.16
11	0.45	31	0.77	51	0.22
12	0.61	32	0.42	52	0.41
13	0.37	33	0.14	53	0.23
14	0.91	34	0.22	54	0.42
15	0.38	35	0.37	55	0.06
16	1.22	36	0.58	56	0.19
17	0.61	37	0.47		
18	0.93	38	0.37		
19	0.31	39	0.40		
20	1.38	40	0.18		

Table 2. Coal Content of Sand Fraction (minus #8) of Exposure Samples

Sample No.	Percent Coal
A	0.54
B	0.51
C	0.13
D	2.69
E	0.10
F	0.29

Some indication is given of the degree of roundness of the pit and exposure pebbles retained on the 5/8" mesh sieve. The ultimate use of the gravel will dictate the roundness desired.

Descriptions of the amount of surface incrustation are provided for pit and exposure samples (minus 1 1/2", plus 5/8" mesh fraction). "Extreme" incrustation is applied to gravels including a larger number of pebbles with one half or greater of their surface covered with a carbonate layer. "Moderate" incrustation is used to describe gravels with a large number of pebbles with one quarter to one half the surface covered. Gravels made up of pebbles with small patches of carbonate scale on the surface are classified as having "slight" incrustation.

Properly graded quartzite-rich gravels are much preferred as a quality product except where crushing costs rise as a result of working harder rock. Preglacial gravels have particularly high contents of quartzite and therefore those deposits located west of Lacombe in township 41, range 27, west of the fourth meridian are regarded as excellent.

Recent alluvial and Pleistocene outwash deposits normally include good quality gravels although the former are frequently somewhat inaccessible in deeper river valleys and the latter are more unpredictable in occurrence. For example, major outwash deposits such as those in the Lacombe-Red Deer and Pine Lake areas predominantly contain sand. However, commercial quantities of good quality gravel have been outlined and developed. Outwash sheets in the Markerville and Huxley areas appear to be almost entirely devoid of gravel. Localized occurrences of outwash constitute some of the most important gravel sources in many parts of the area (for example, in the Ponoka, Tees and Eckville areas). Glacial alluvial materials are of poor quality. They typically contain high contents of clay and silt and high percentages of weak and friable pebbles such as shale and sandstones, both probably derived from local bedrock.

Eskers have been important sources of gravel in a few localities but large reserves of coarse sediments are relatively rare within them. Associated kame or outwash complexes, such as the one located in township 41, range 2, west of the fifth meridian are, on the other hand, of considerable importance.

REFERENCES

Bayrock, L. A., Reimchen, T. H. F., and Boydell, A. N. (in preparation): Surficial Geology of the Rocky Mountain House Area; Alberta Research.

Green, R., 1972: Geological Map of Alberta, Map 35; Alberta Research.

Price, G. C., 1958: Evaluation and Selection of Aggregates for Concrete Construction, presented at the 39th Annual Convention of the Good Roads Association, Montreal.

Stalker, A. MacS., 1956: Beiseker, Alberta; Geological Survey of Canada Paper 55-7.

----------, 1960: Surficial Geology of the Red Deer-Stettler Map-Area, Alberta; Geological Survey of Canada Memoir 306.

DEFINITIONS

Aeolian - applied to deposits which are due to the transporting action of the wind.

Alluvial alluvium - pertaining to river deposits of relatively recent time.

Esker - sinuous ridge of gravel and sand taken to mark channels in the decaying ice sheet, through which streams passed.

Kame - a mound commonly composed of gravel or sand whose form is the result of original deposition against or upon melting ice.

Lacustrine - produced by lakes.

Outwash - drift deposited by meltwater streams beyond active glacier ice.

Pleistocene - Glacial epoch or ice age.

Preglacial - pertaining to or occurring in geologic time before the Glacial epoch.

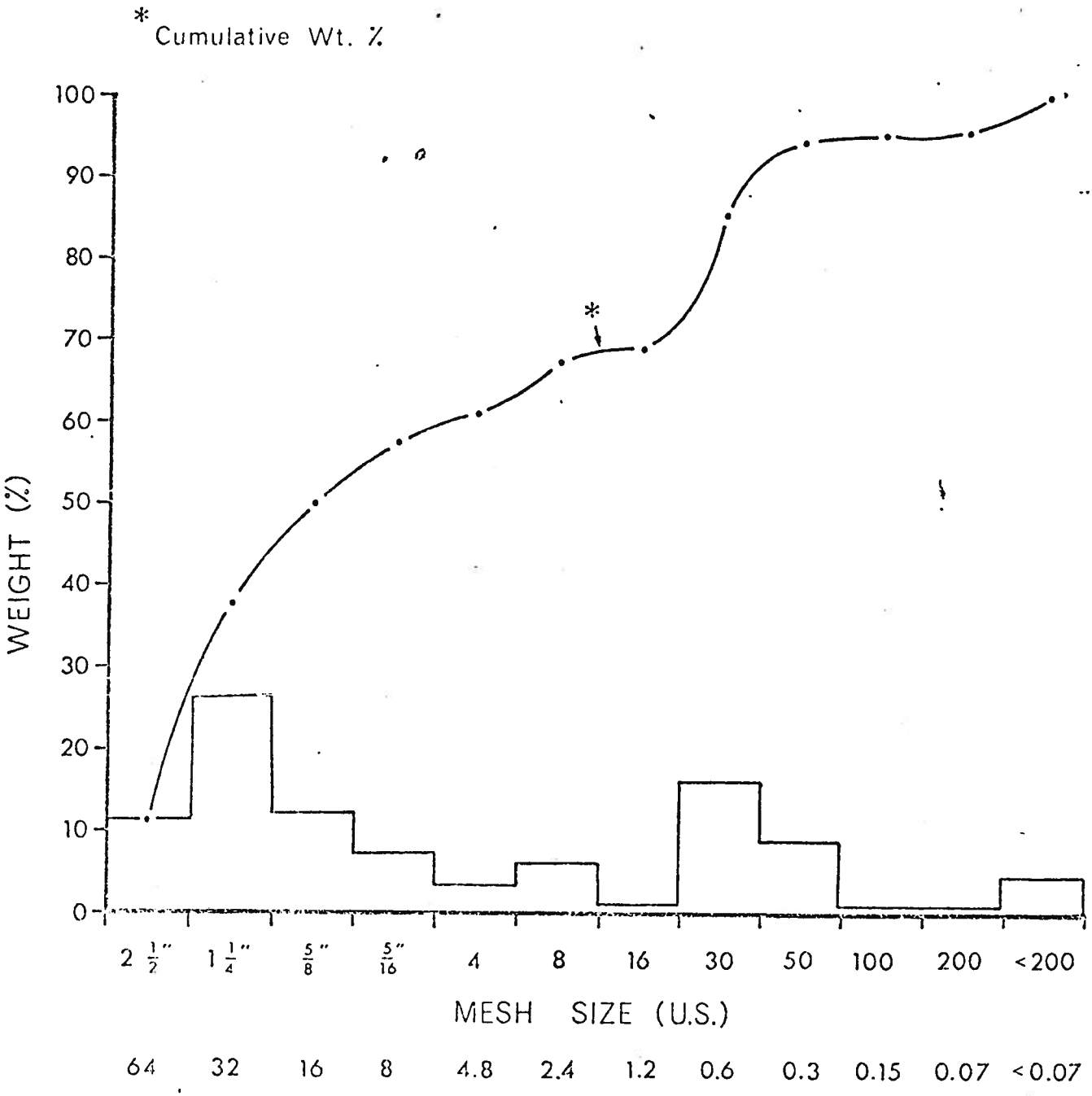
Surficial - unconsolidated materials lying on the bedrock.

Till - nonsorted, nonstratified sediment deposited by a glacier.

APPENDIX

HISTOGRAMS OF ANALYSES

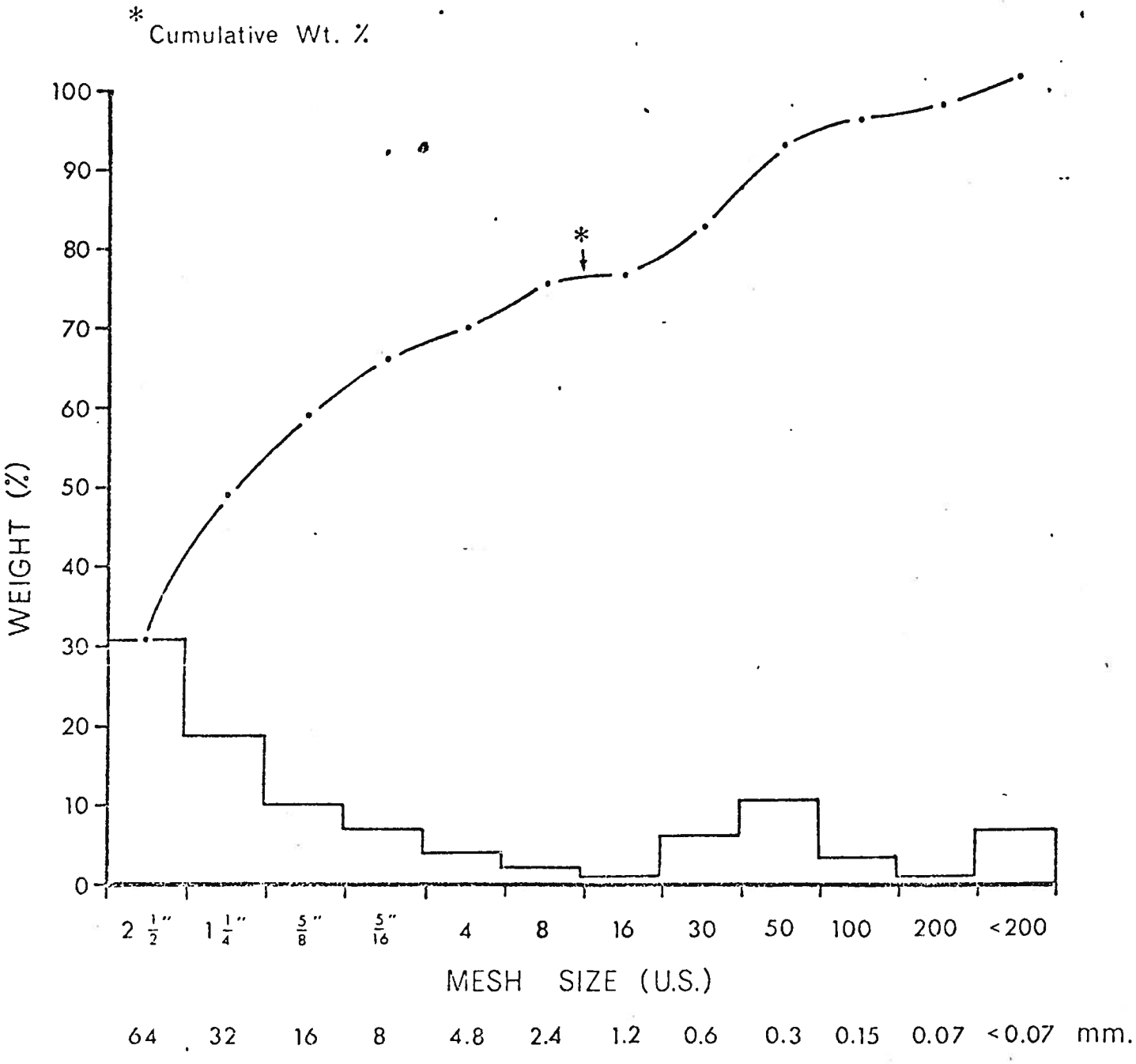
Sieve Analyses,
Pit Samples



SAMPLE NO.: Pit 1

DEPTH: 0-20

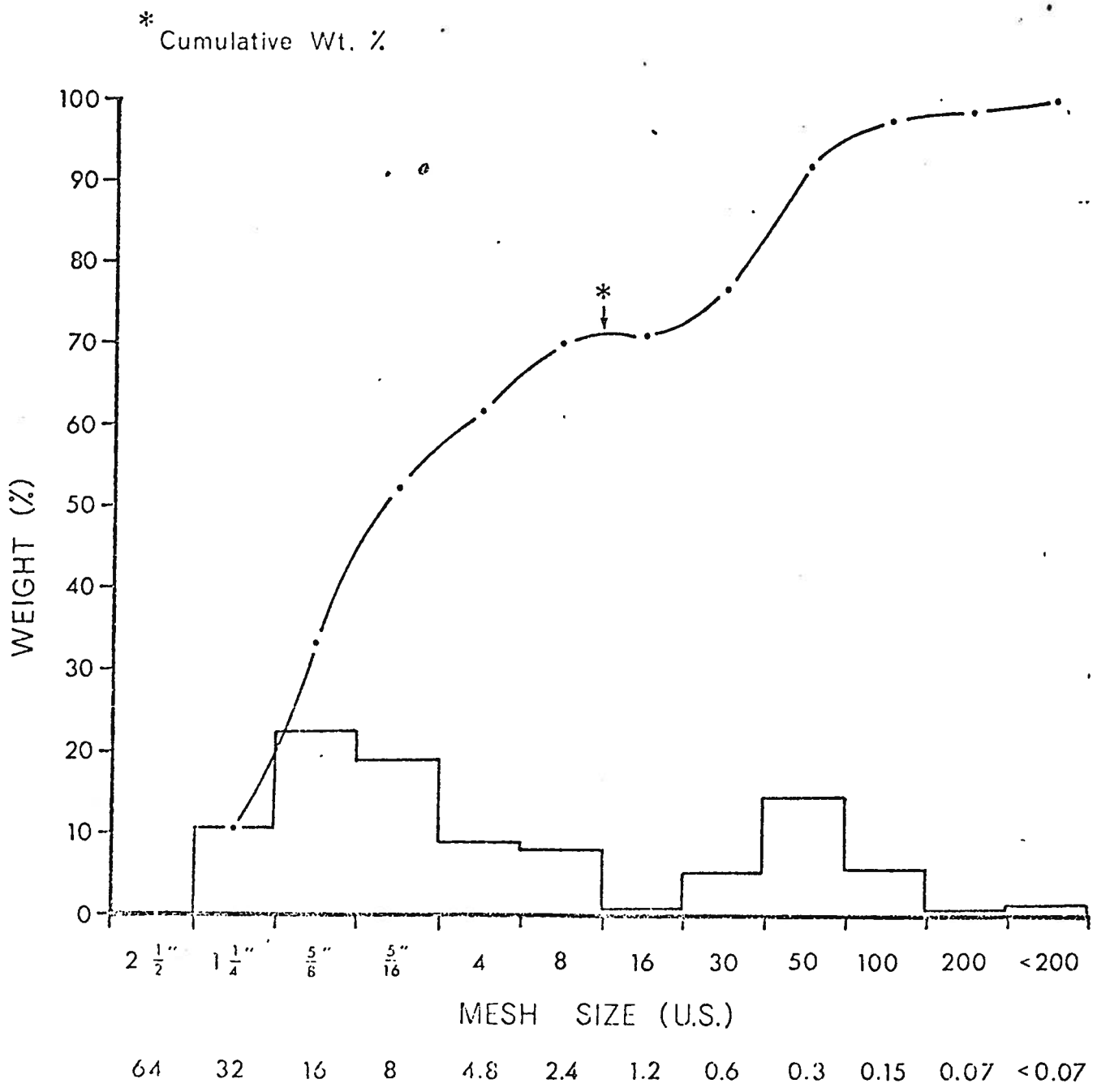
LOCATION: W1/2 [illegible]-27W4



SAMPLE NO.: Pit 2

DEPTH: 0-10

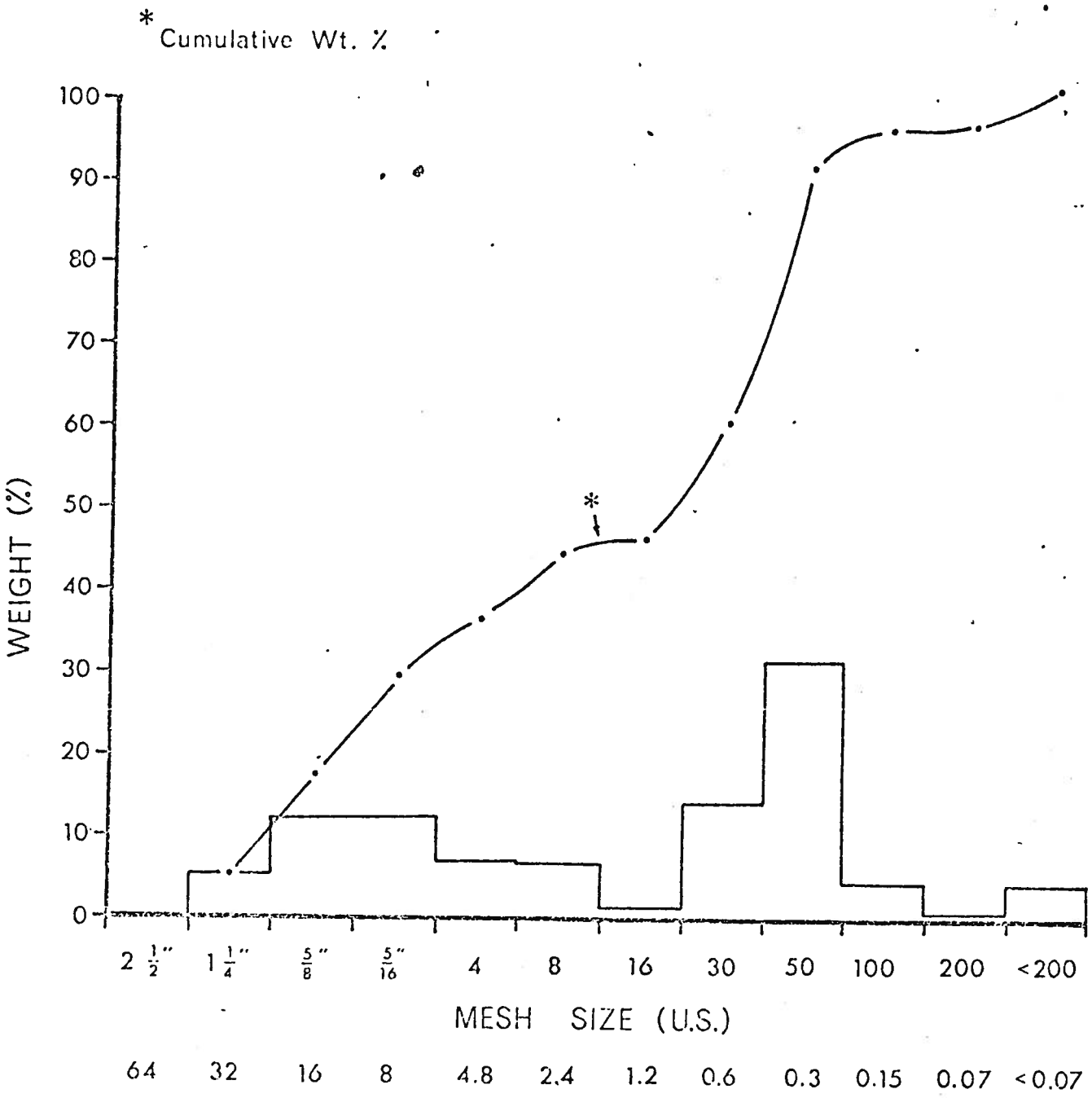
LOCATION: NW 21-34-2W5



SAMPLE NO.: Pit 3

DEPTH: 0--2

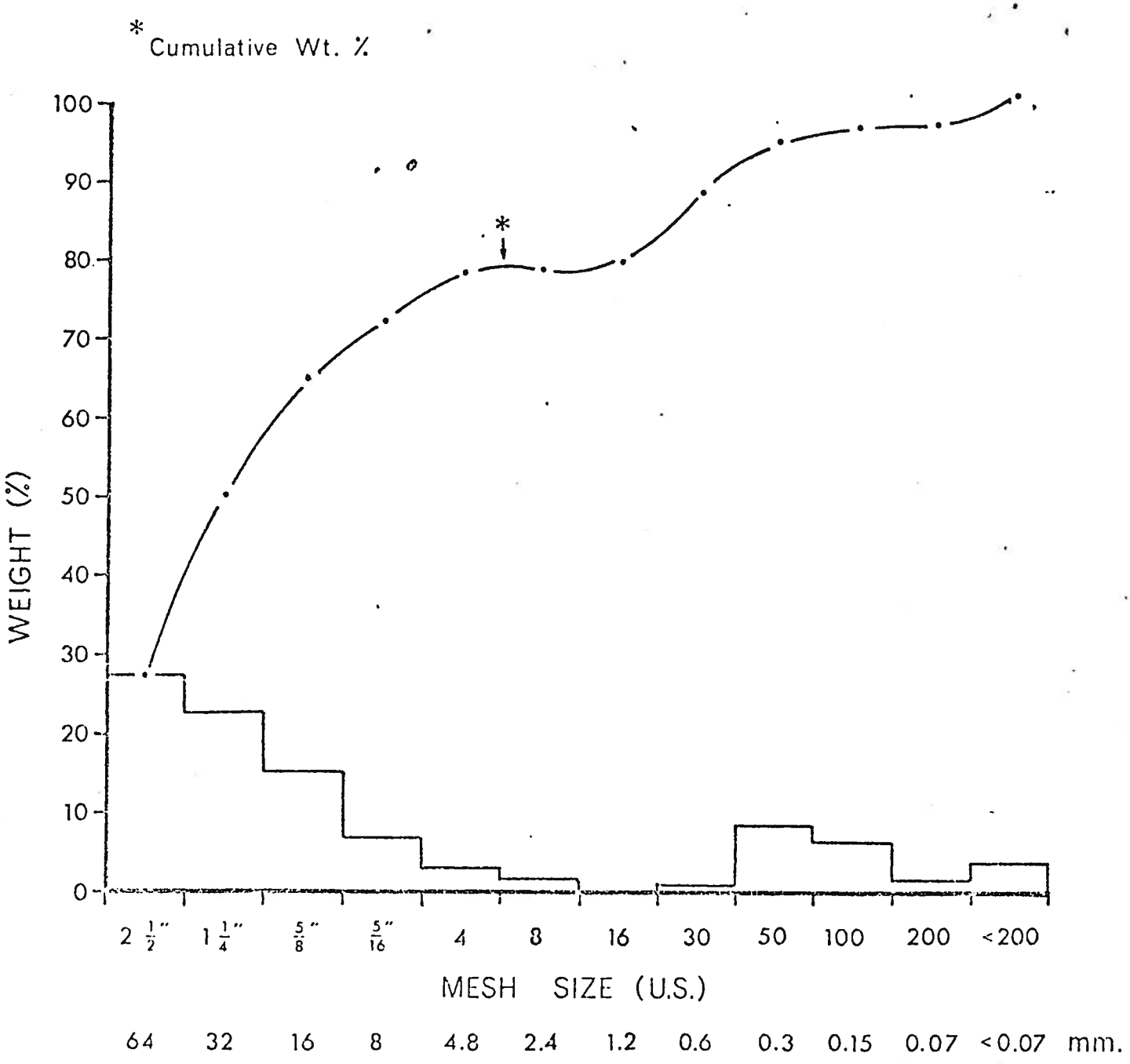
LOCATION: NE 9-35-2W5



SAMPLE NO.: Pit 4

DEPTH: 0-8

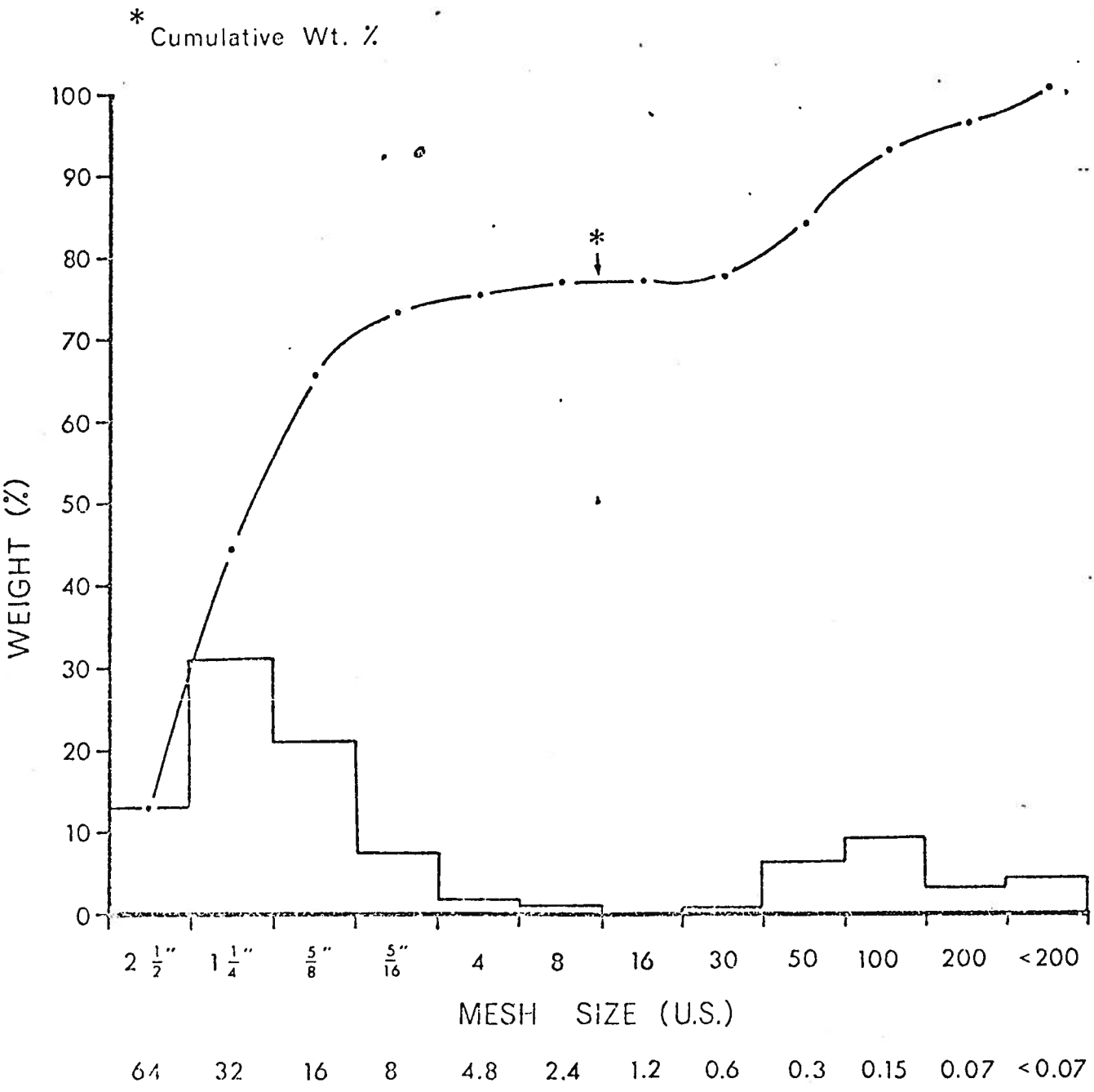
LOCATION: NE 6-35-2W5



SAMPLE NO.: Pit 5

DEPTH: 0-10

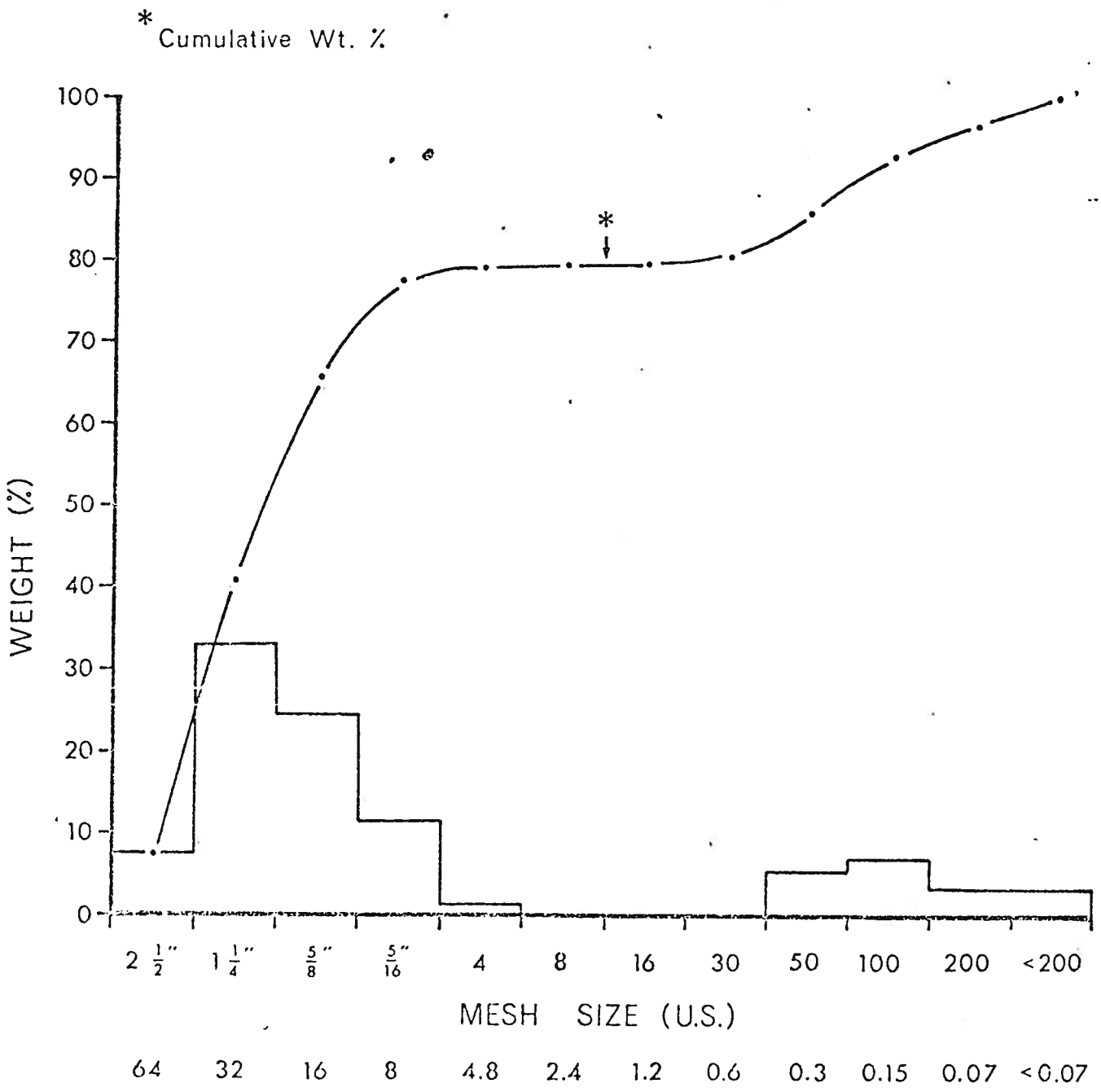
LOCATION: SE 5-41-27W4



SAMPLE NO.: Pit 6

DEPTH: 3 - 15

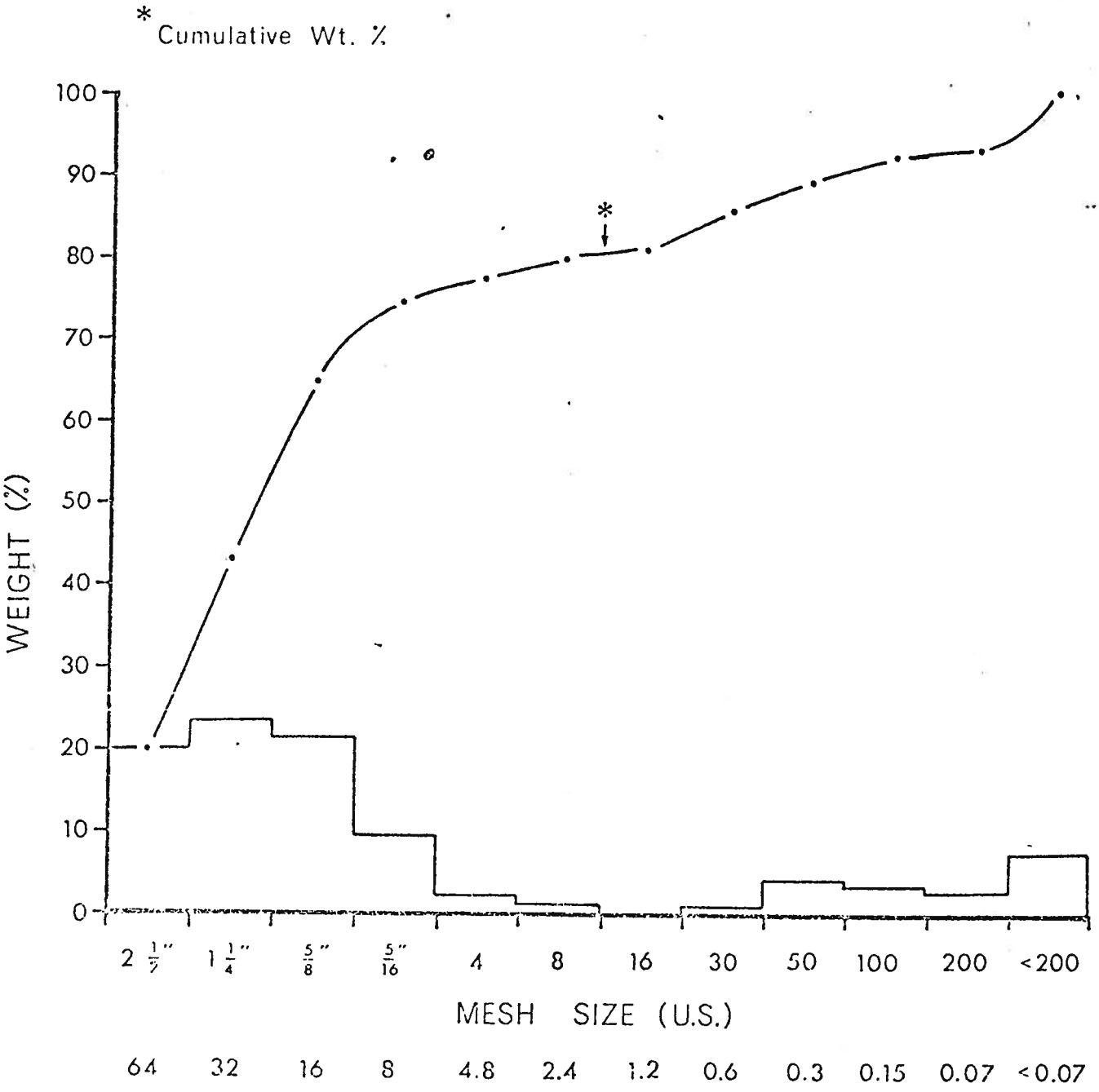
LOCATION: W 1/2 4-41-27W4



SAMPLE NO.: Pit 7

DEPTH: 3-20

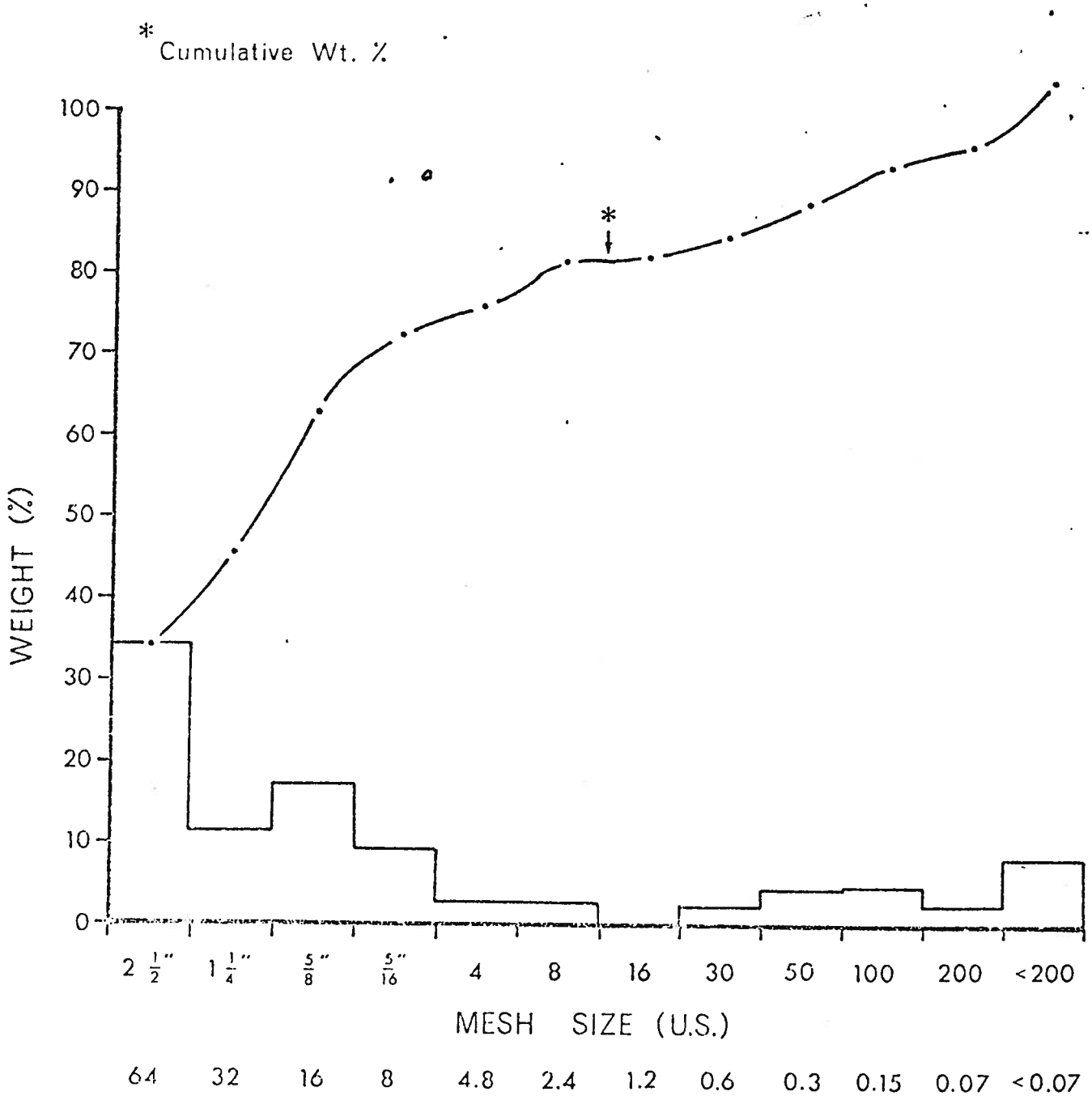
LOCATION: SE 16-41-27W4



SAMPLE NO.: Pit 8

DEPTH: 2-5

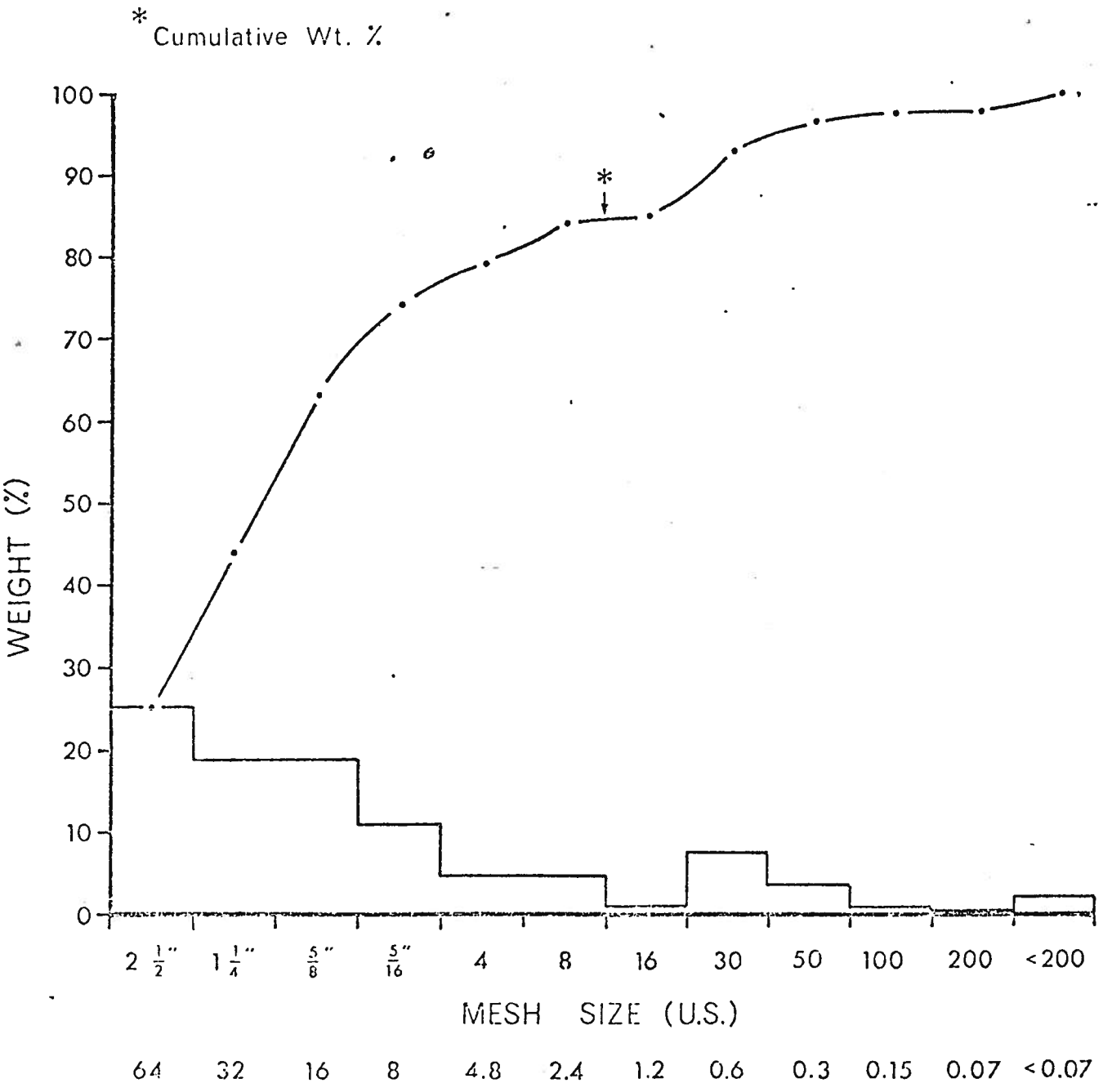
LOCATION: SW 27-41-27W4



SAMPLE NO.: Pit 9

DEPTH: 1-2

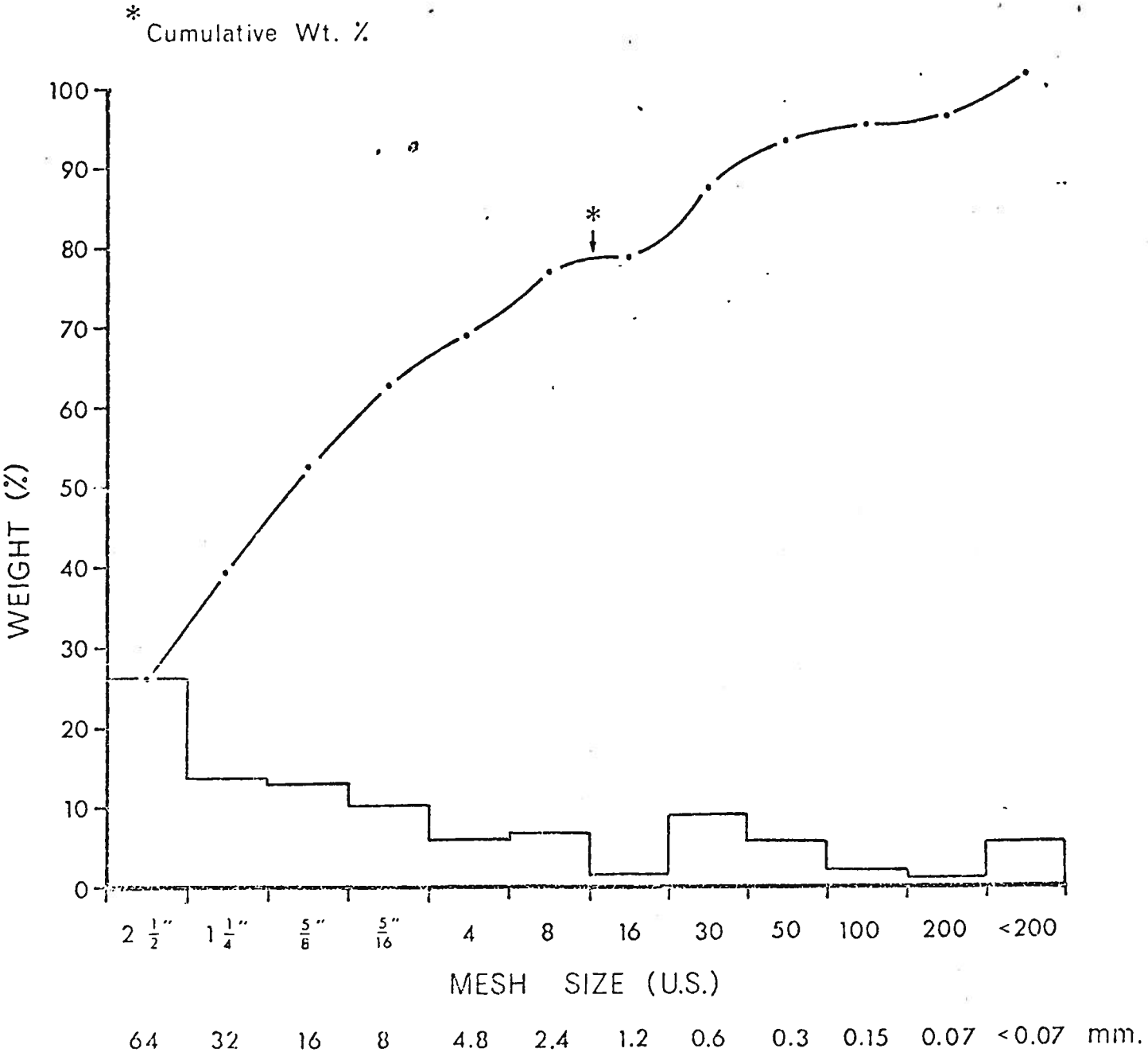
LOCATION: E 1/2 22-41-27W4



SAMPLE NO.: Pit 10

DEPTH: 0-6

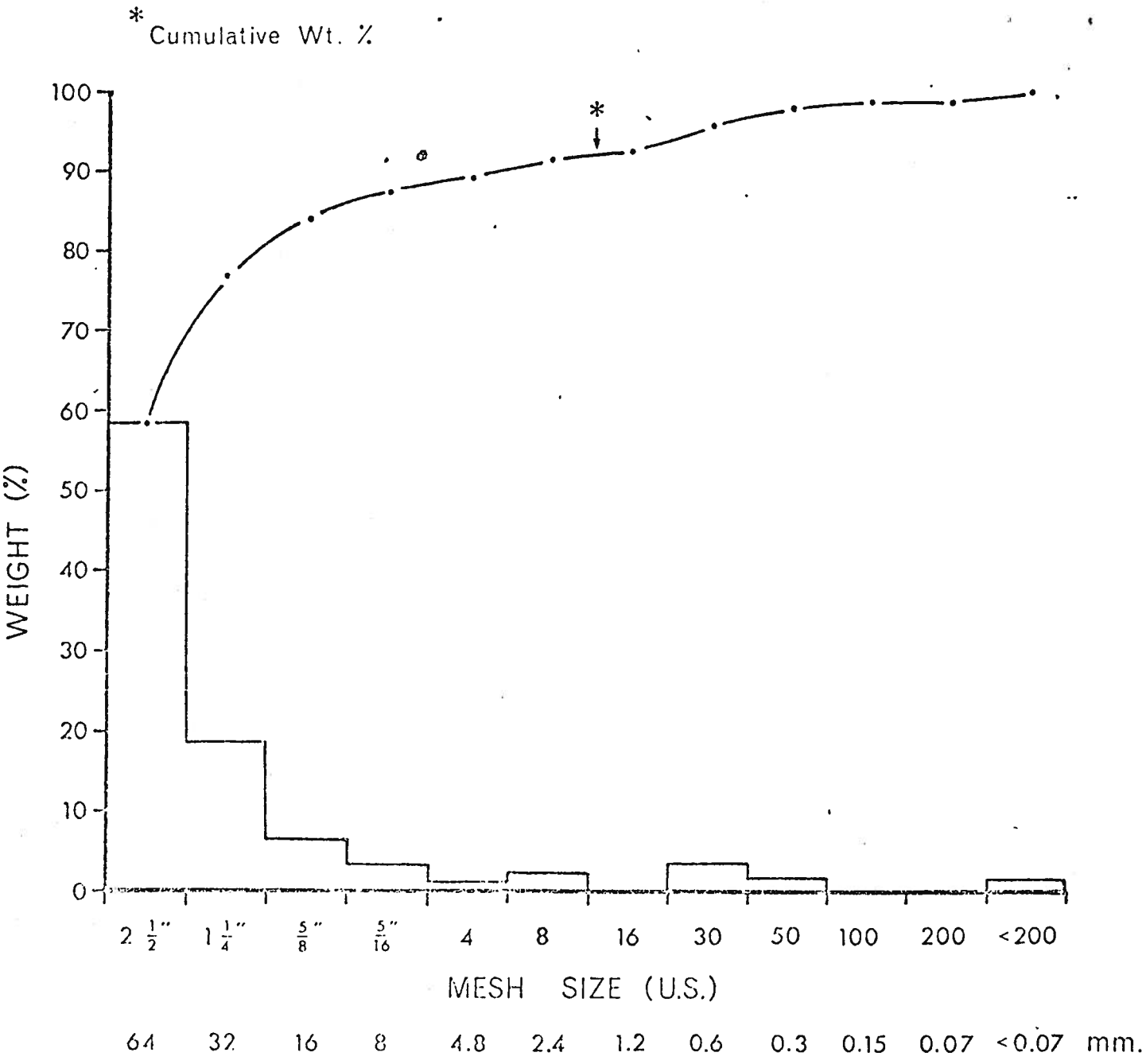
LOCATION: N1/2 22-42-26W4



SAMPLE NO.: Pit 11

DEPTH: 5

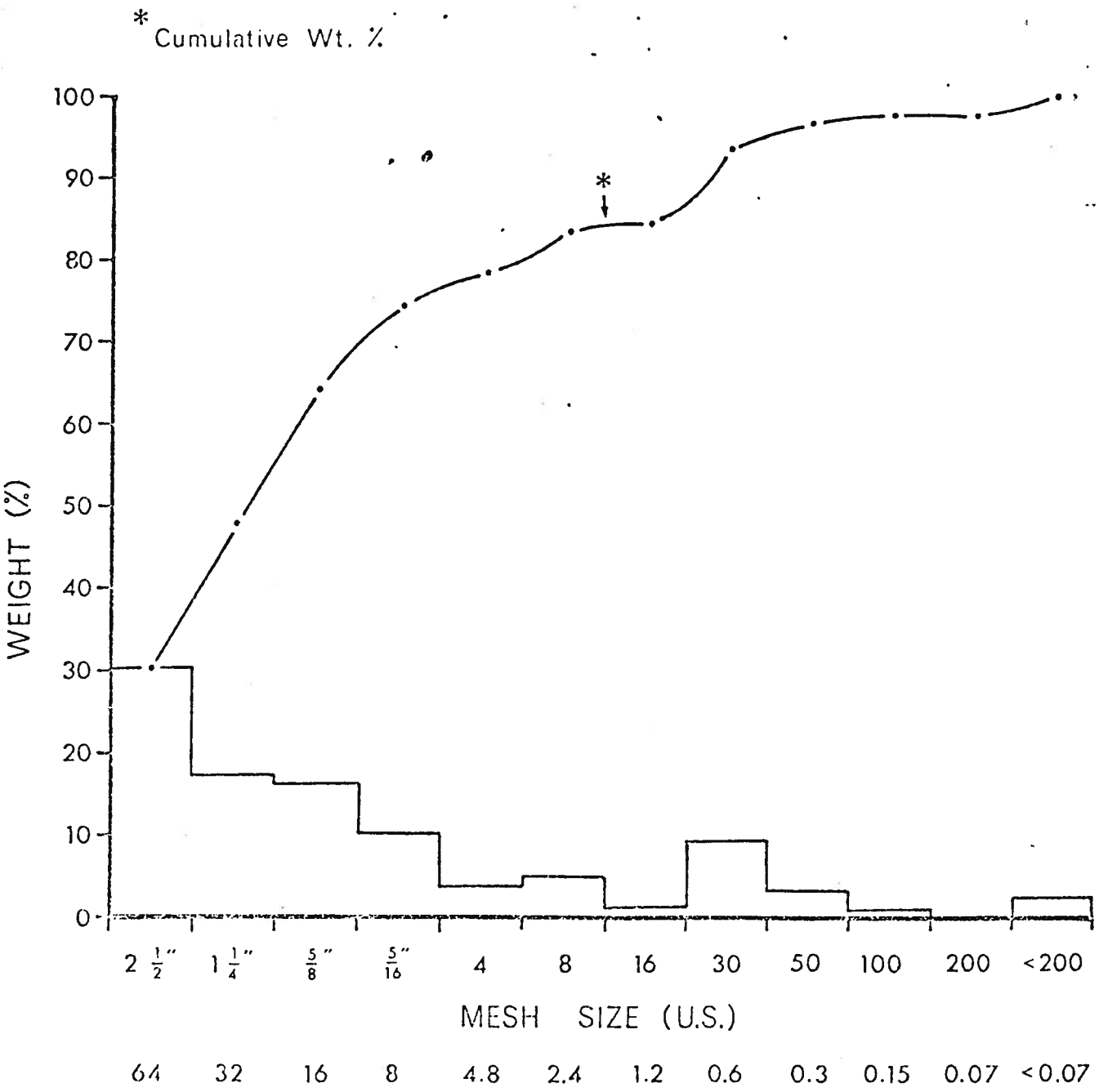
LOCATION: SW 25-42-26W4



SAMPLE NO.: Pit 12

DEPTH: 10-15

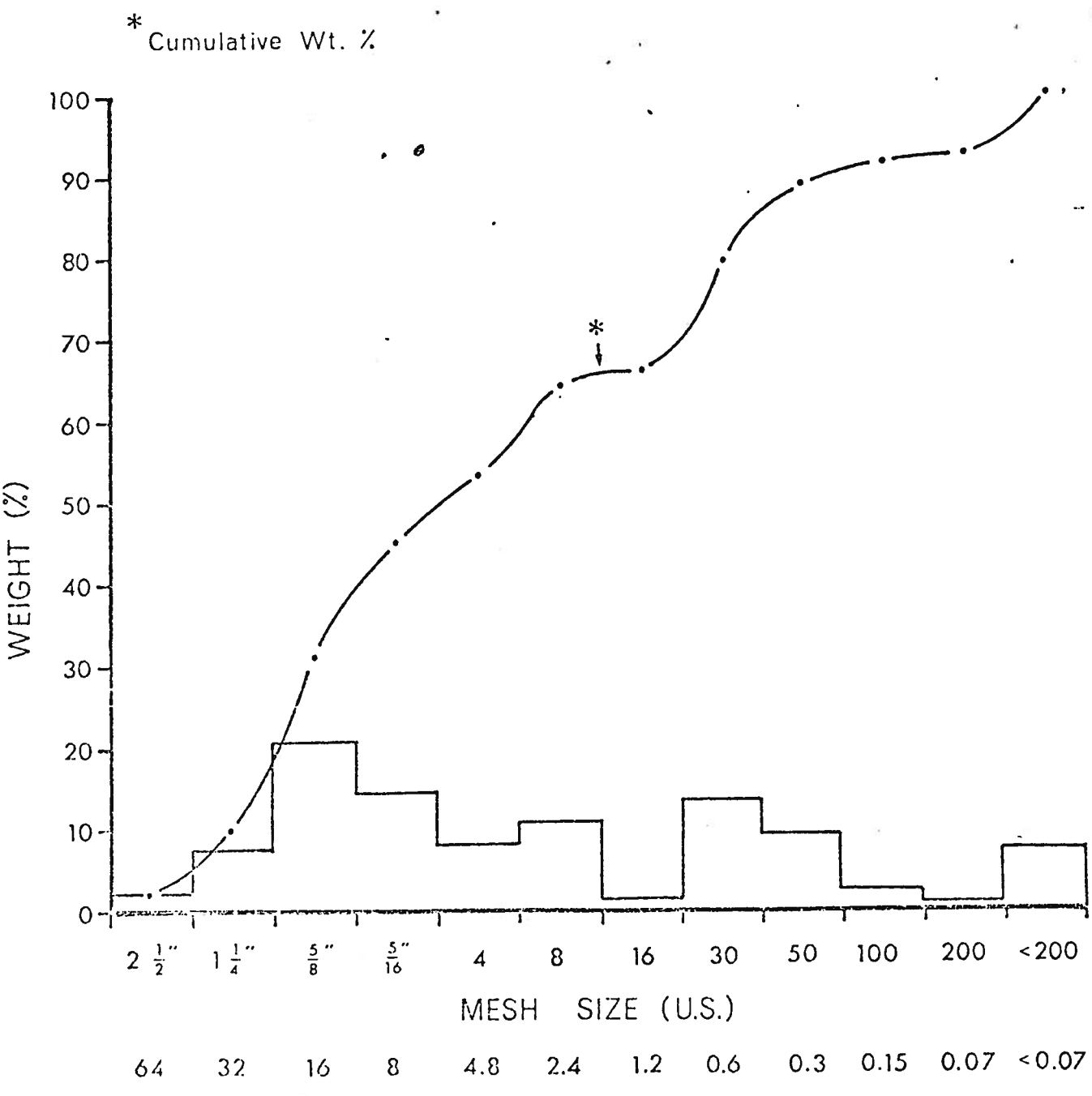
LOCATION: SW 35-42-26W4



SAMPLE NO.: Pit 13

DEPTH: 4-6

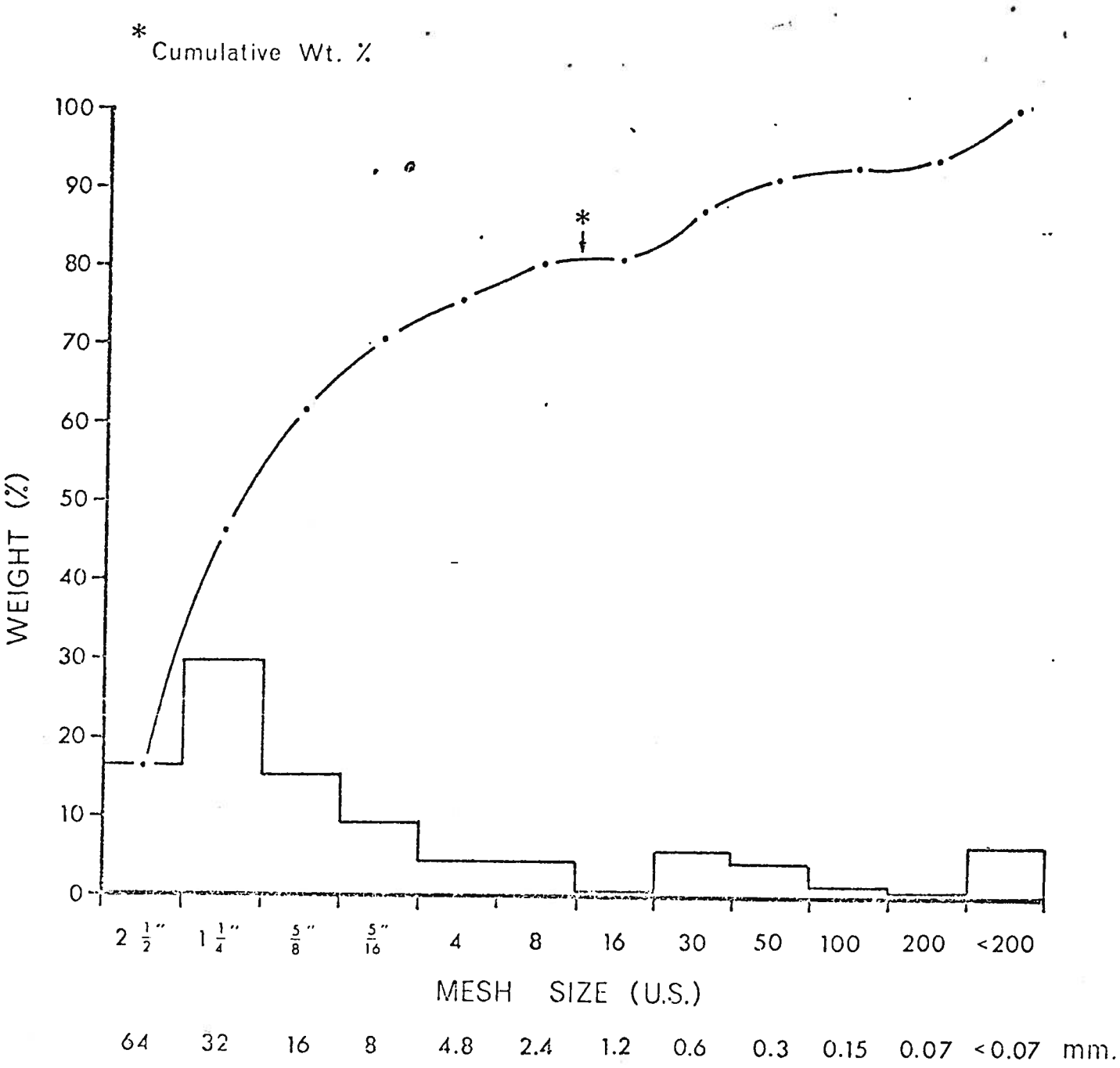
LOCATION: SW 27-42-26W4



SAMPLE NO.: Pit 14

DEPTH: 0-5

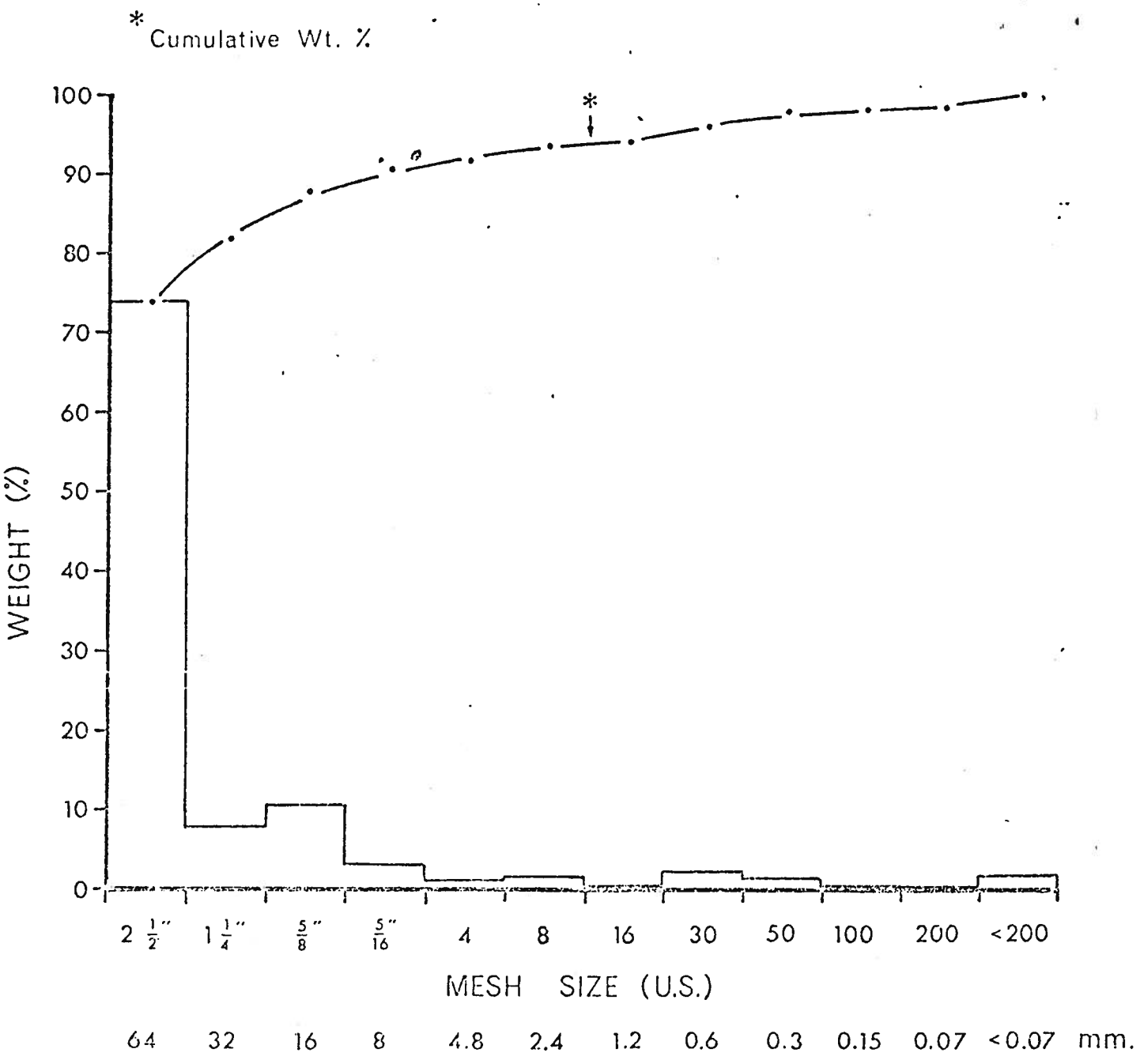
LOCATION: N 1/2 1-42-25W4



SAMPLE NO.: Pit 15

DEPTH: 12-15

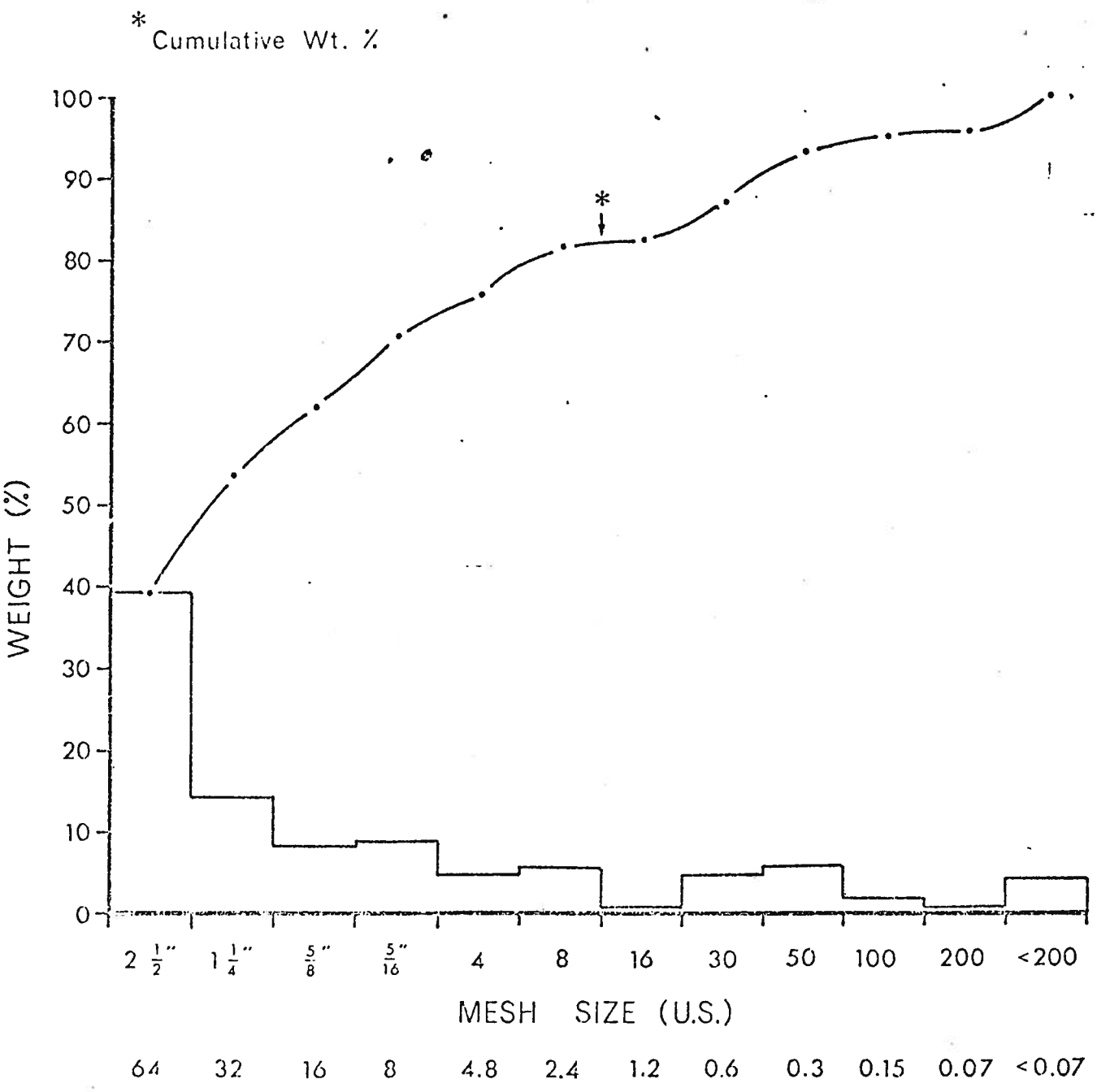
LOCATION: SE 16-40-1W5



SAMPLE NO.: Pit 16

DEPTH: 6-10

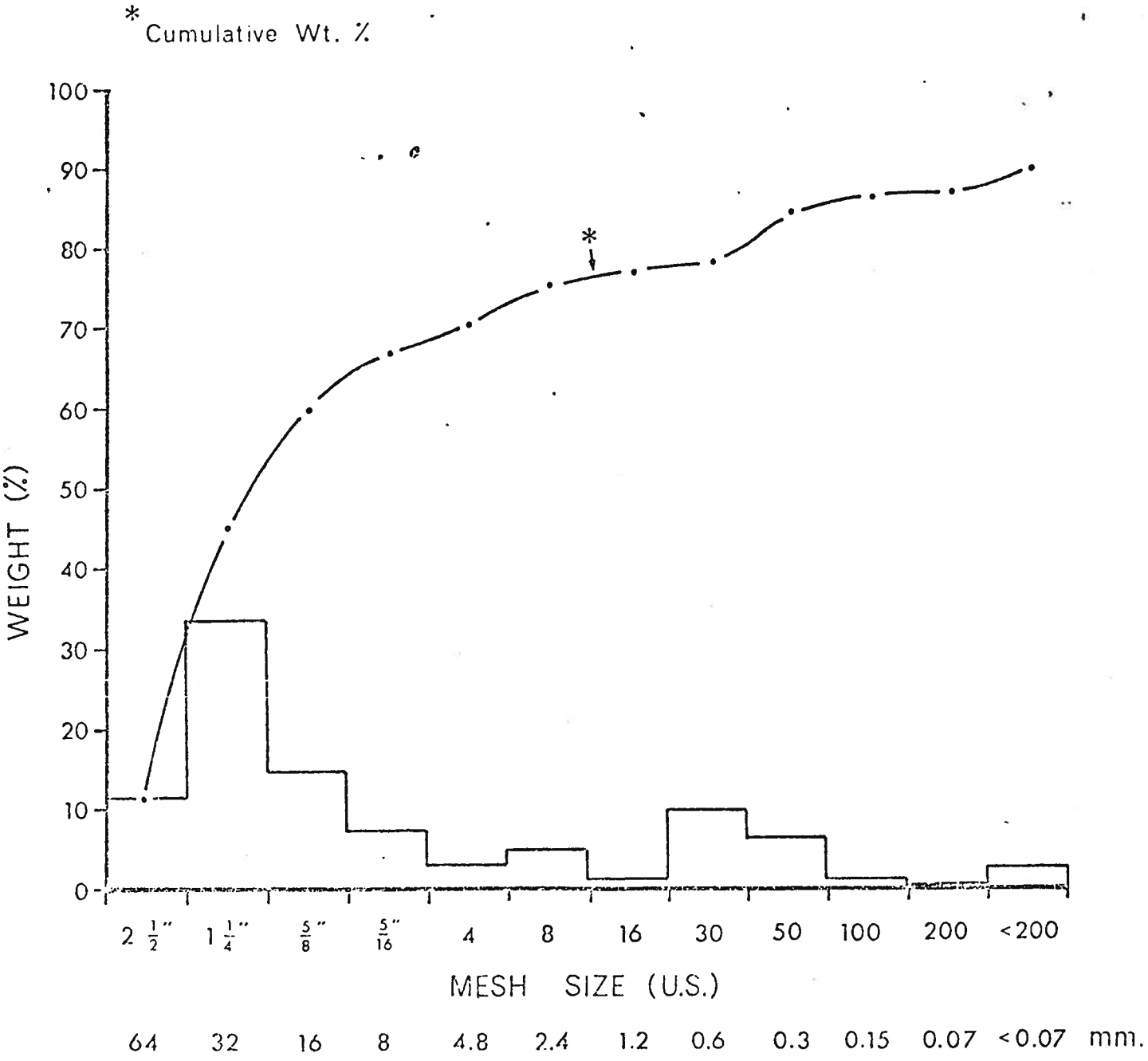
LOCATION: E 1/2 21-39-27W4



SAMPLE NO.: Pit 17

DEPTH: 2-6

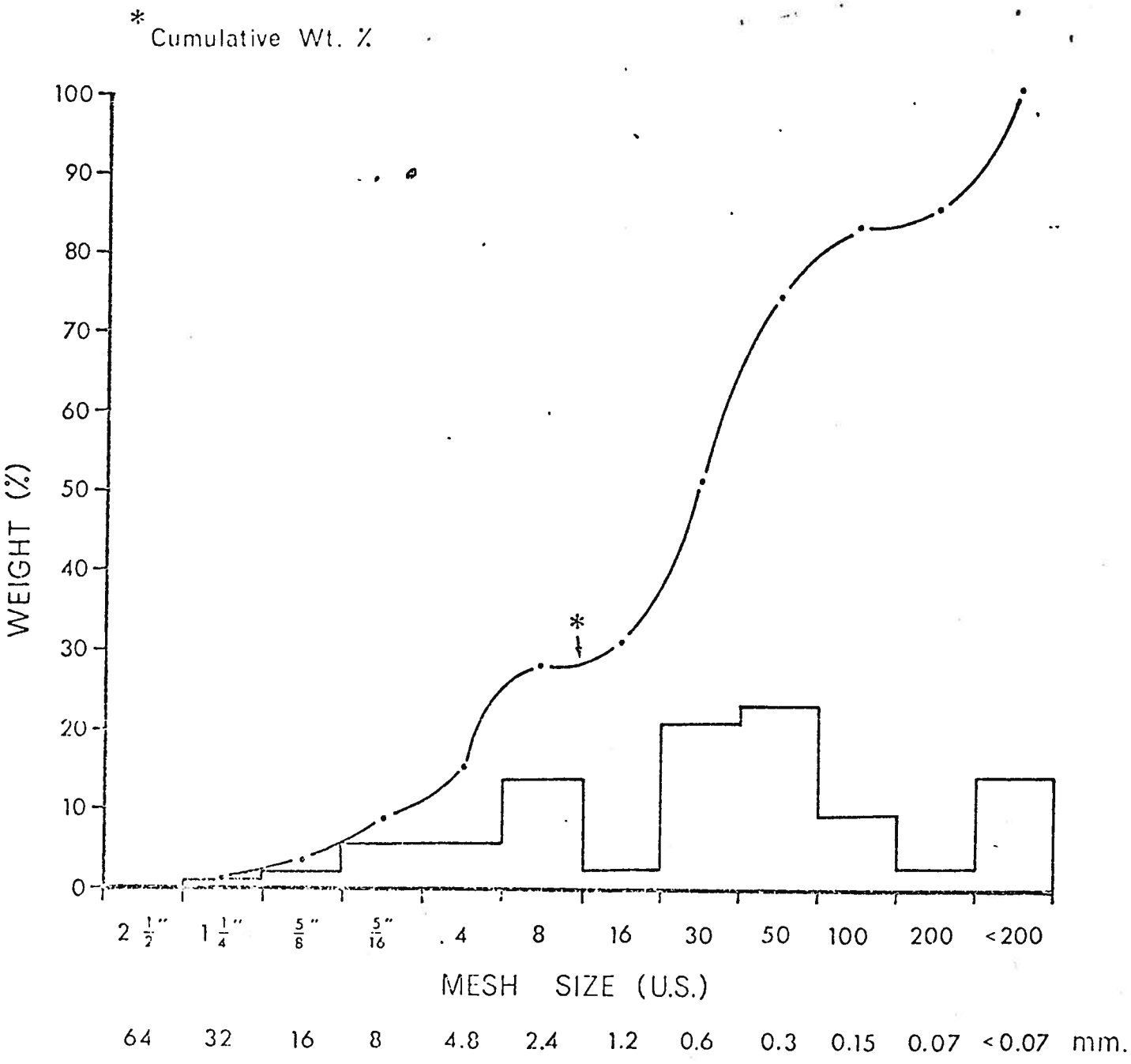
LOCATION: N 1/2 31-40-23W4



SAMPLE NO.: Pit 18

DEPTH: 2-5

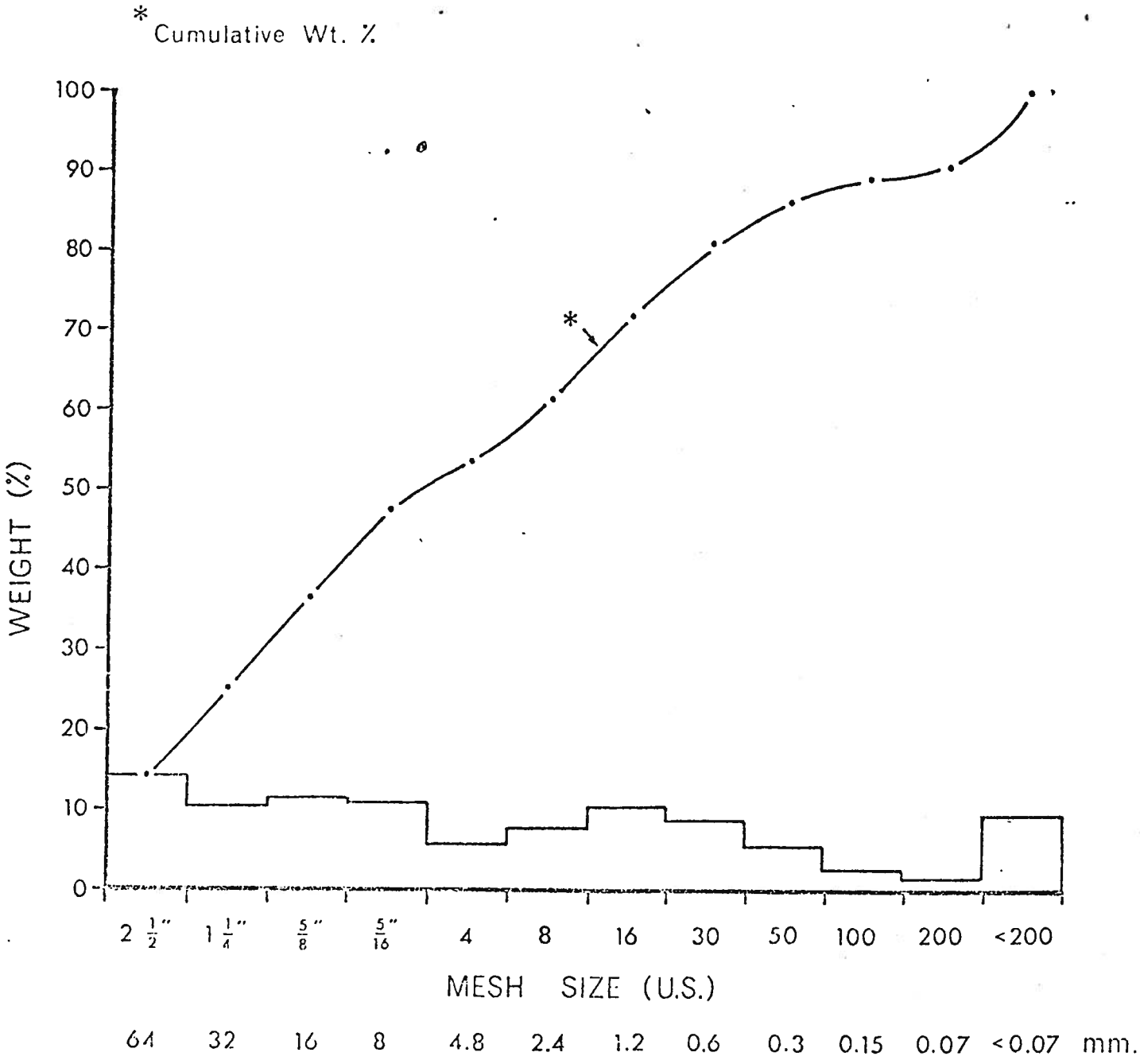
LOCATION: S 1/2 29-40-23W4



SAMPLE NO.: Pit 19

DEPTH: 0-5

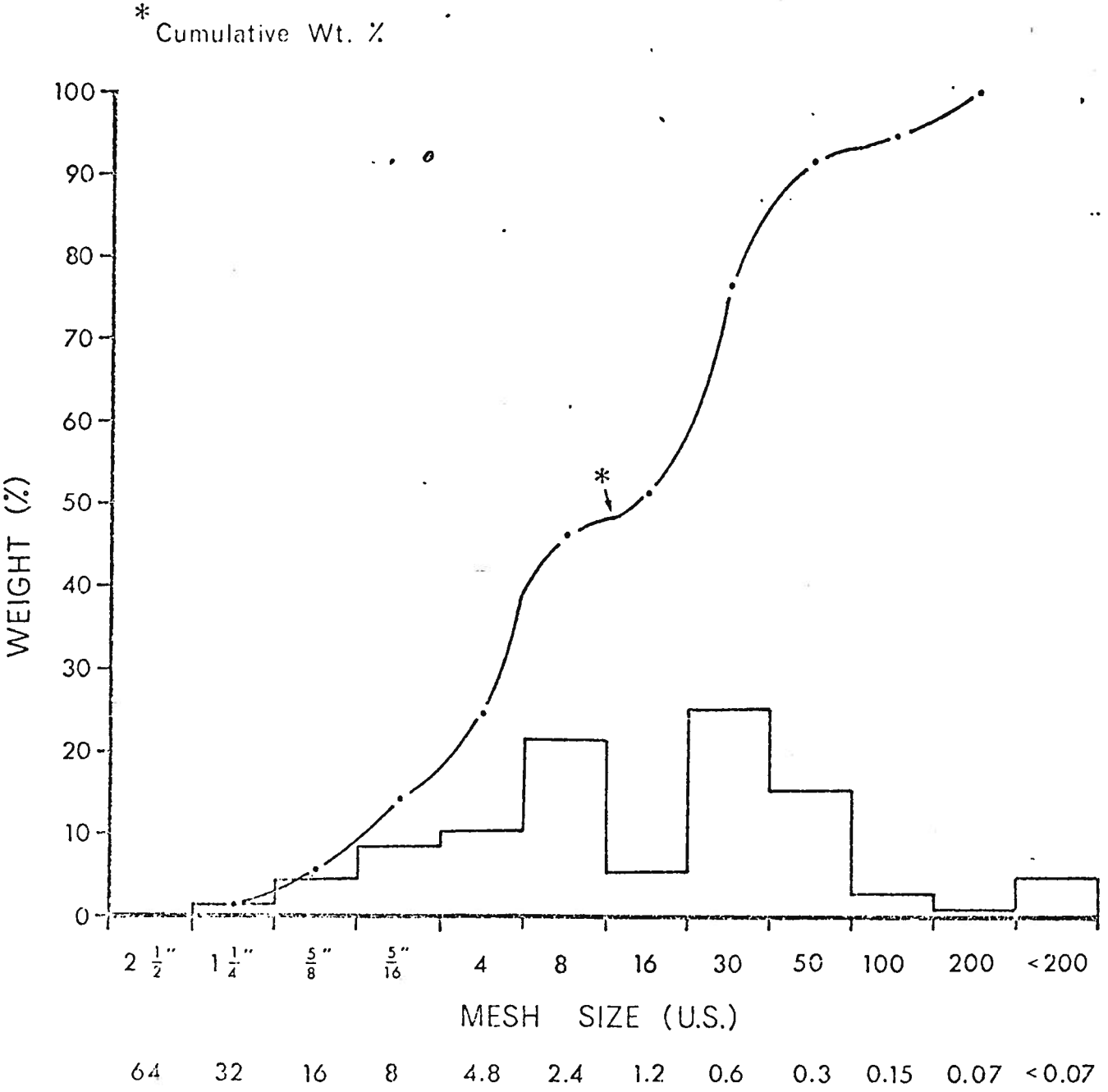
LOCATION: NW 12-41-28W4



SAMPLE NO.: Pit 20

DEPTH: 3

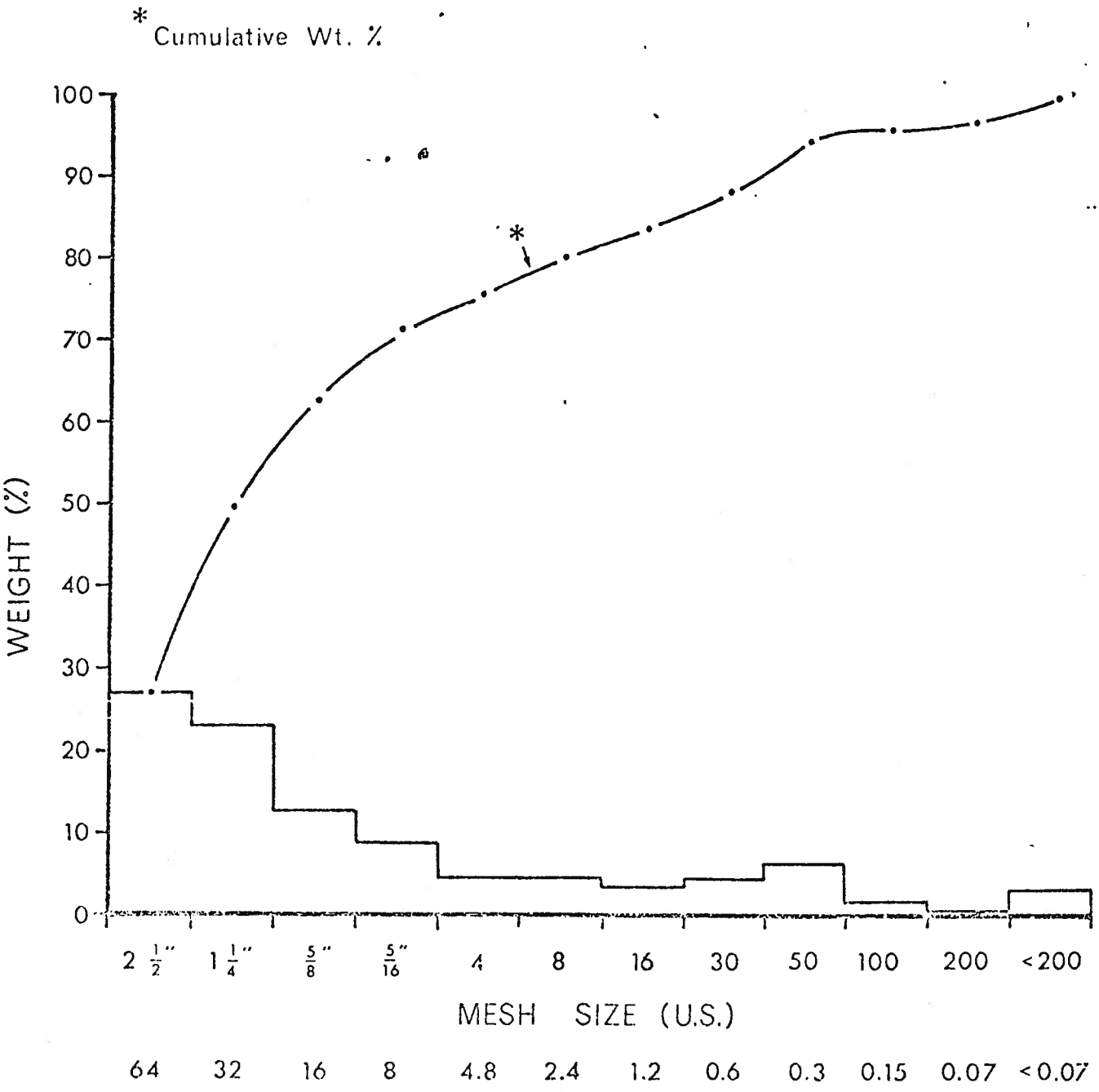
LOCATION: S 1/2 5-41-24W4



SAMPLE NO.: Pit 21

DEPTH: 3-6

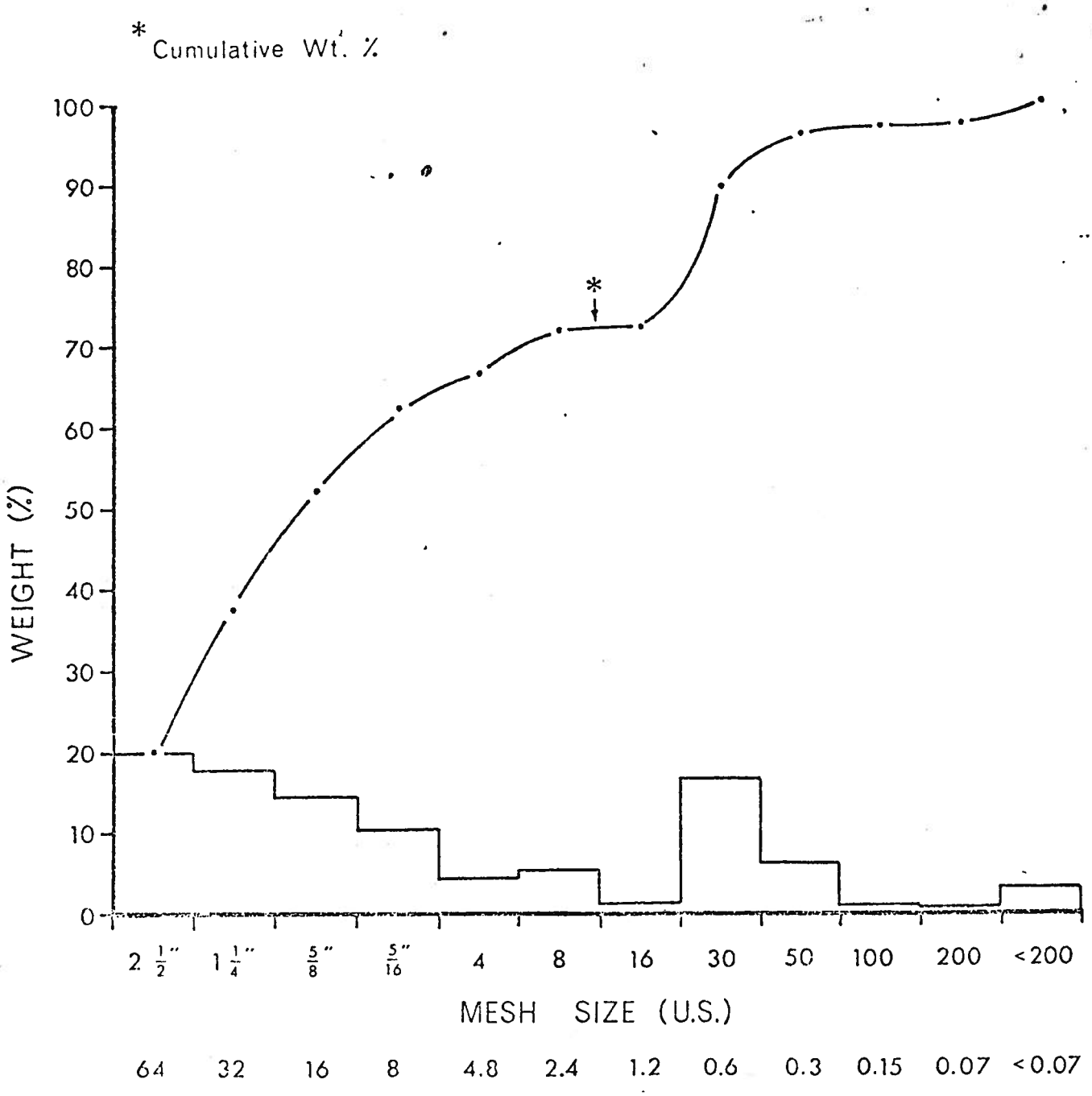
LOCATION: W1/2 36-40-24W4



SAMPLE NO.: Pit 22

DEPTH: 2-5

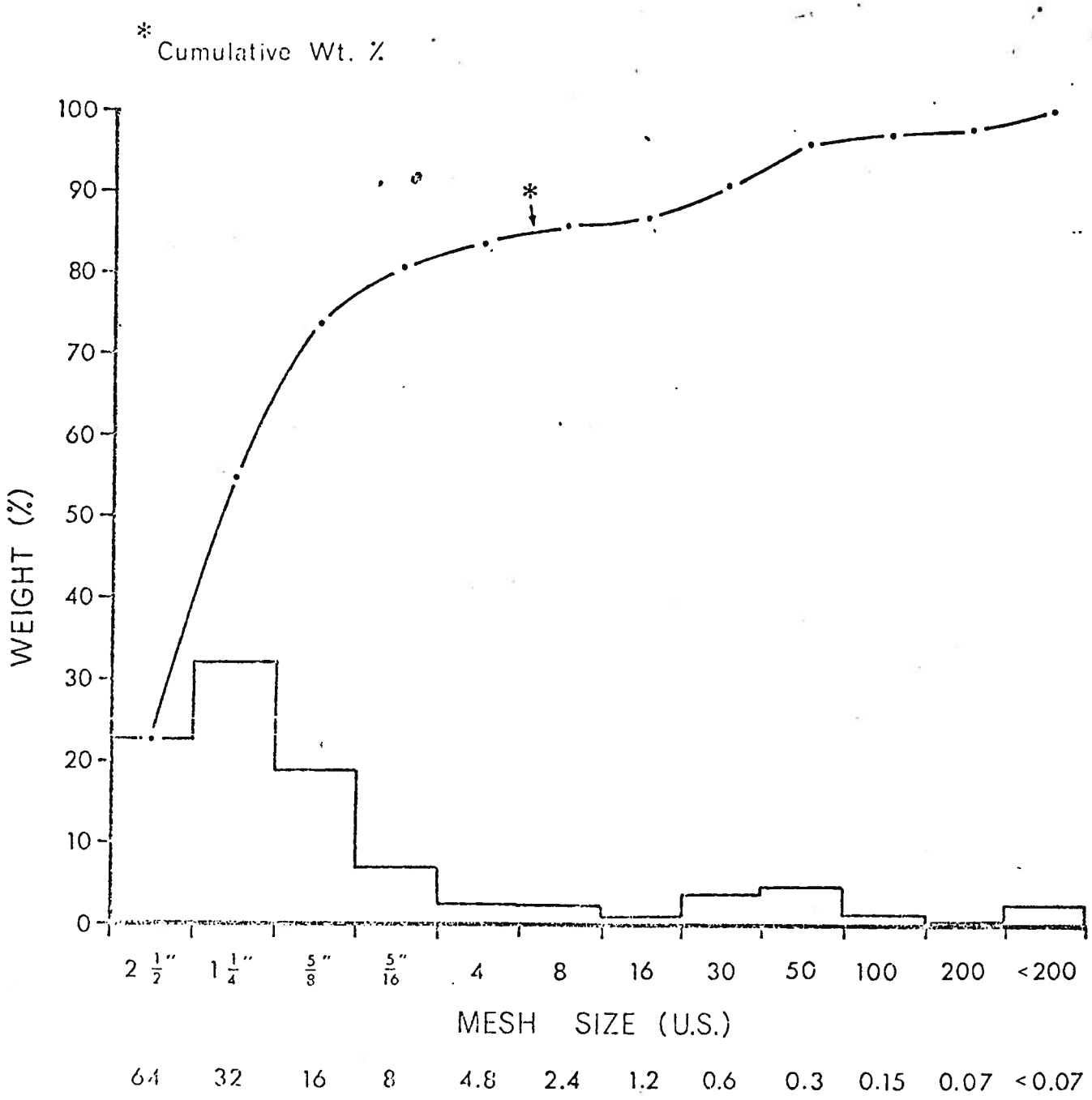
LOCATION: NW 33-33-23W4



SAMPLE NO.: Pit 23

DEPTH: 0-4

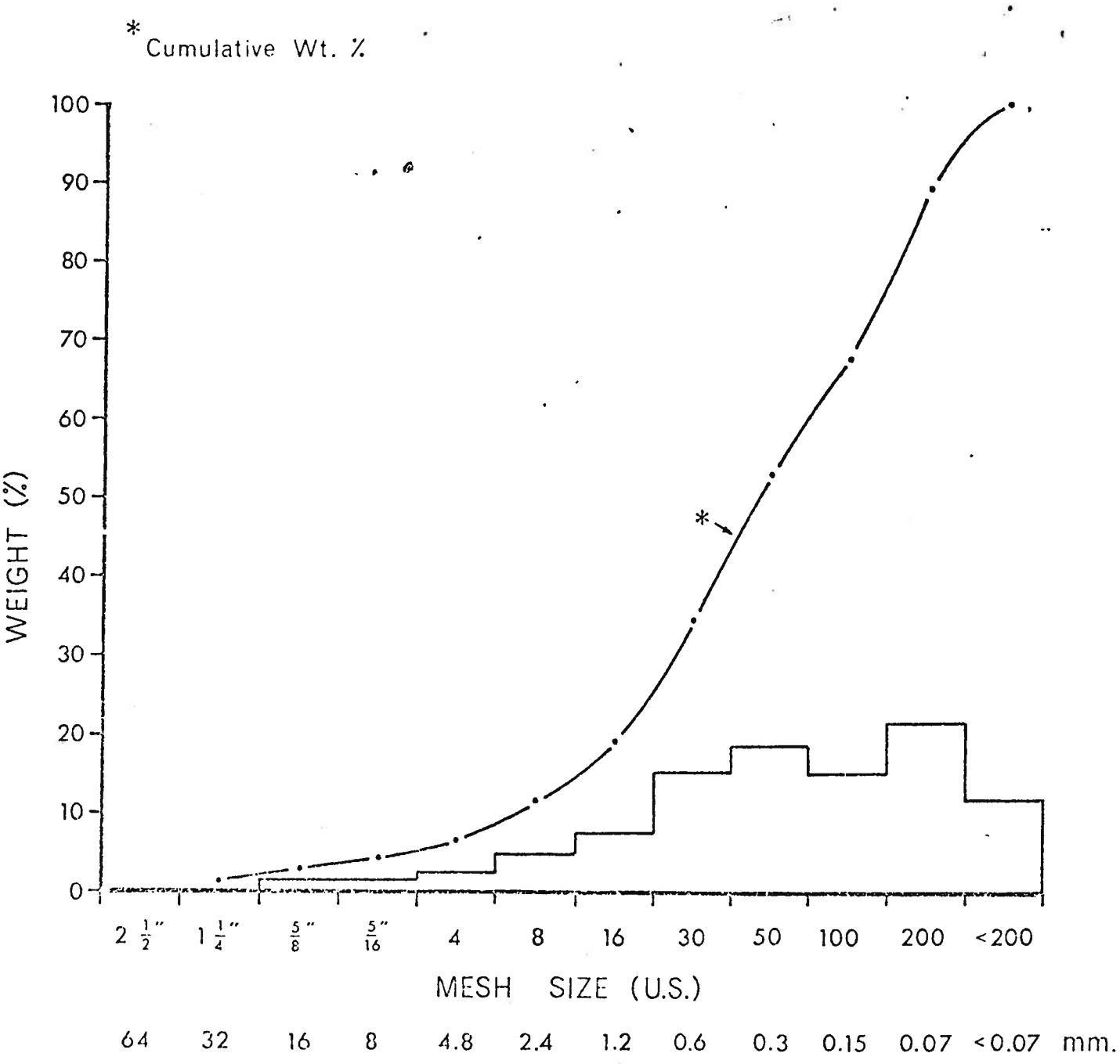
LOCATION: W1/2 17-38-23W4



SAMPLE NO.: Pit 24

DEPTH: 0-15

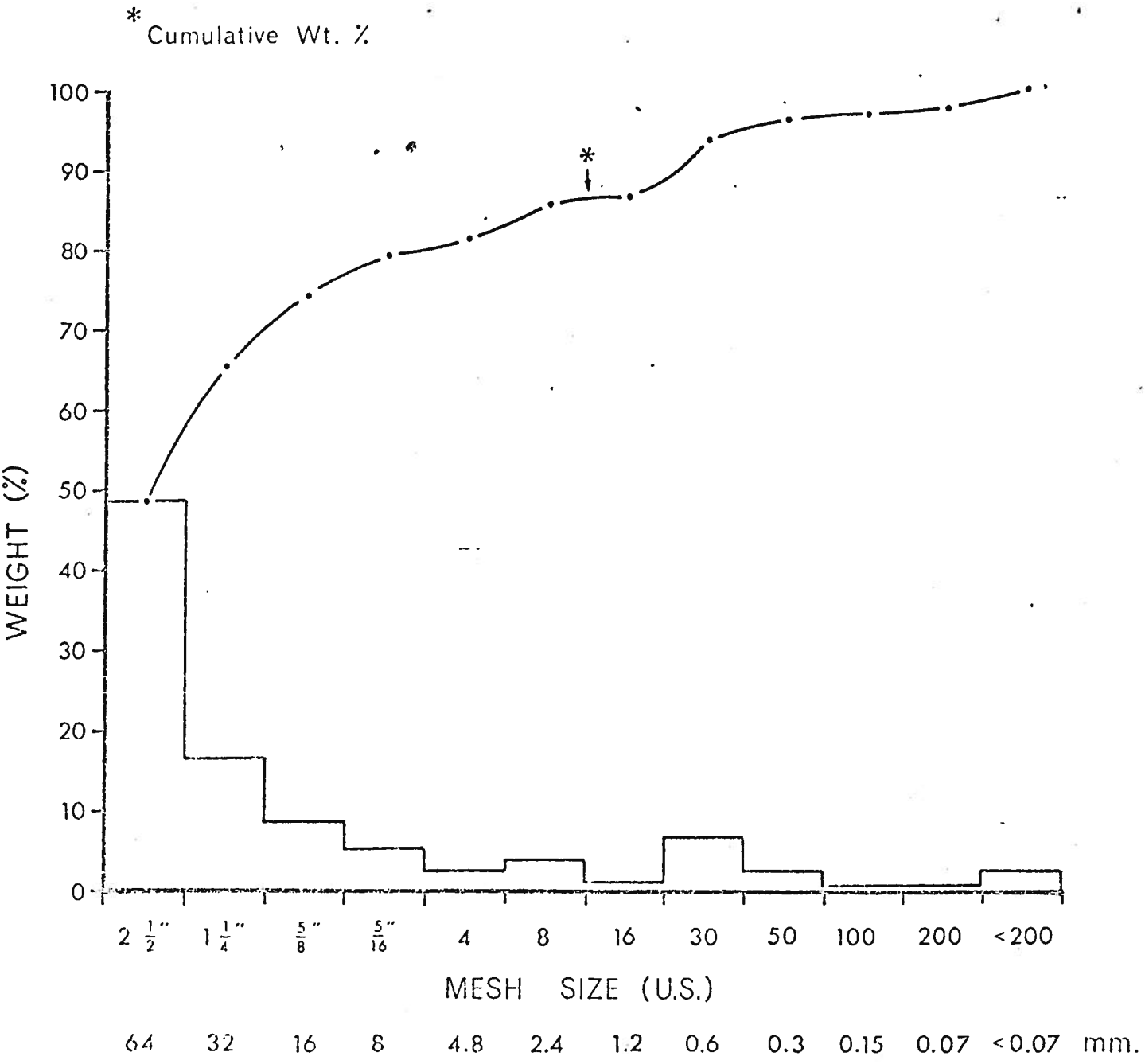
LOCATION: SW 18-39-23W4



SAMPLE NO.: Pit 25

DEPTH: 20-25

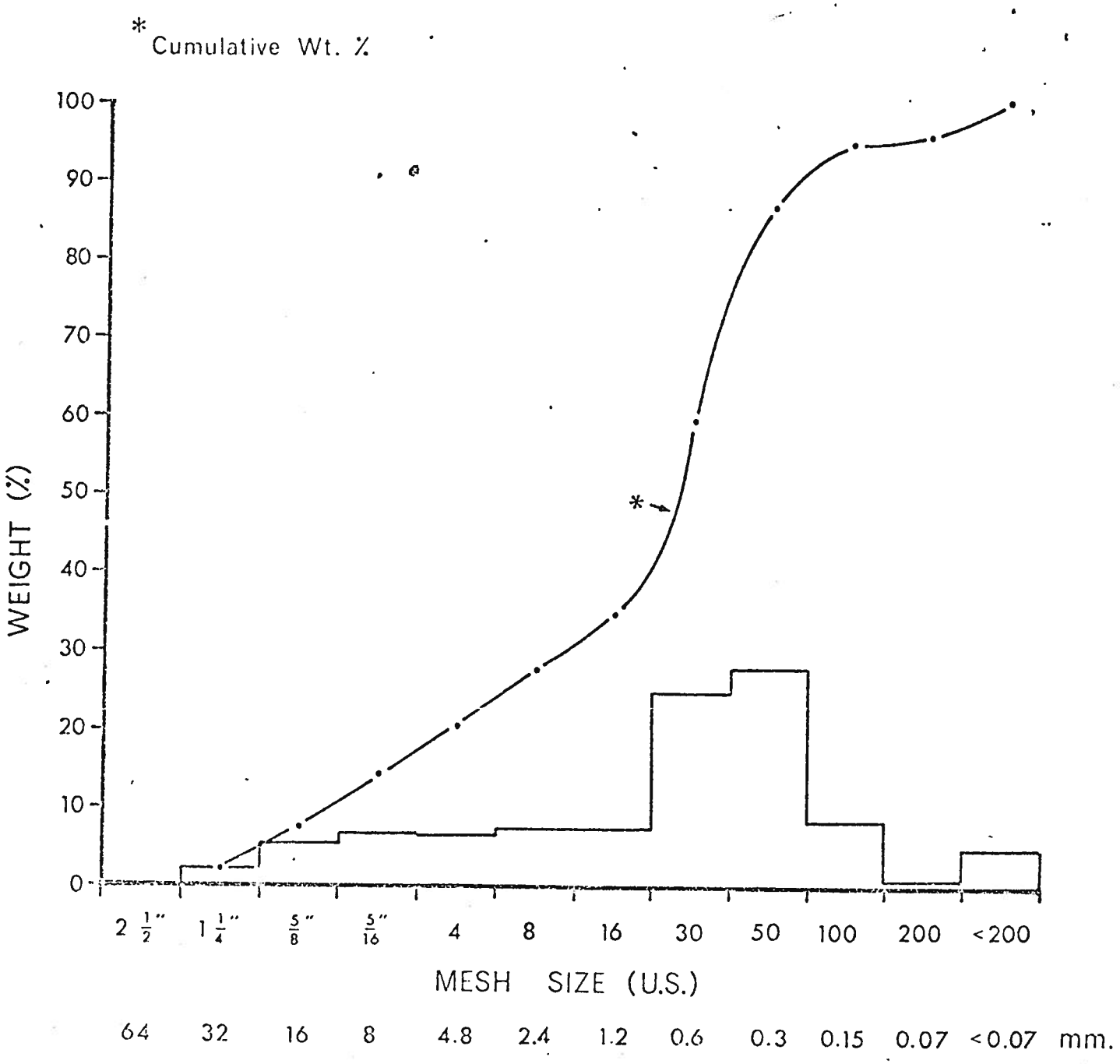
LOCATION: NW 33-37-26W4



SAMPLE NO.: Fit 26

DEPTH: 2-7

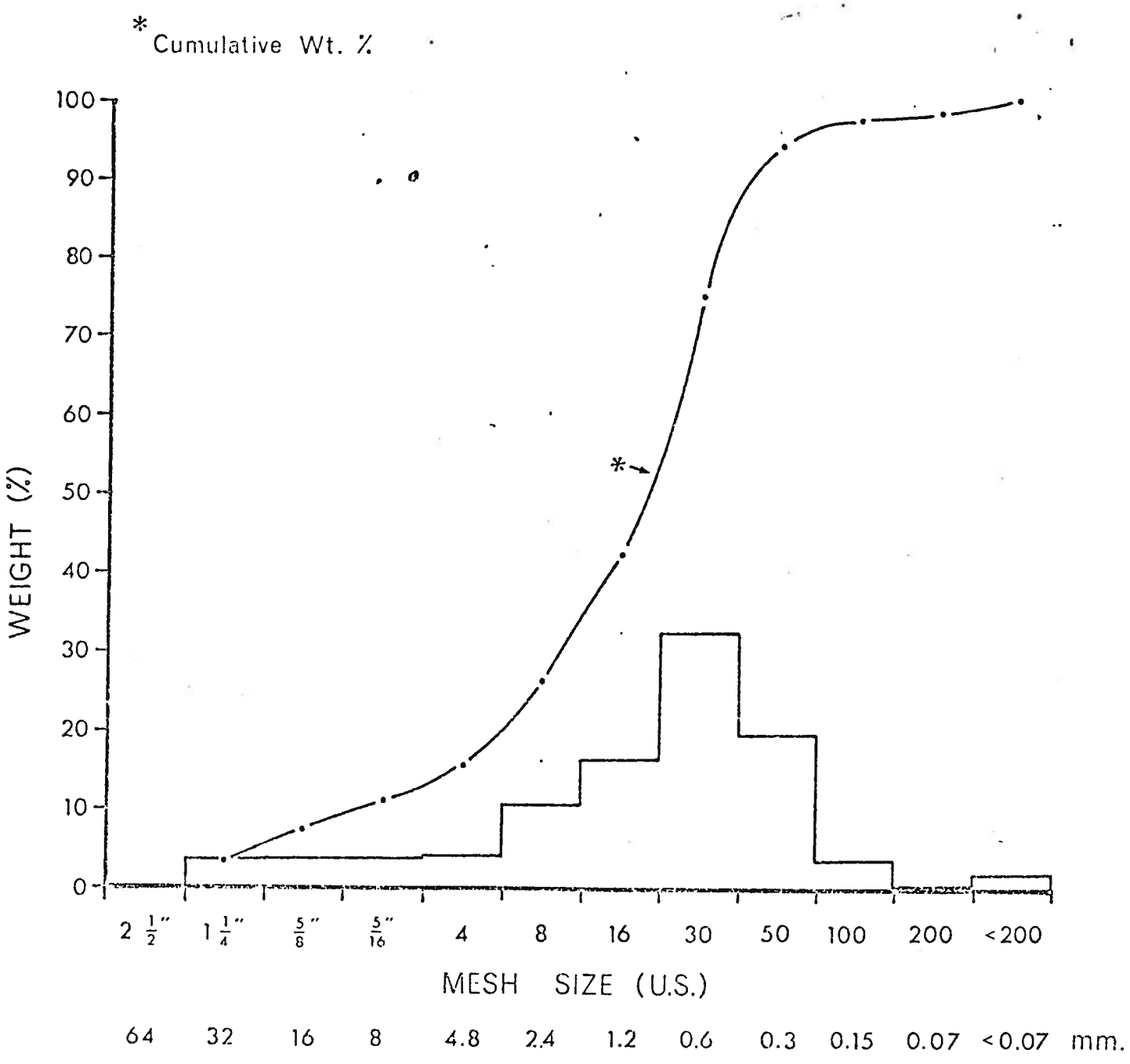
LOCATION: NW 3-33-24W4



SAMPLE NO.: Pit 27

DEPTH: 0-6

LOCATION: SW, 1-38-24W4

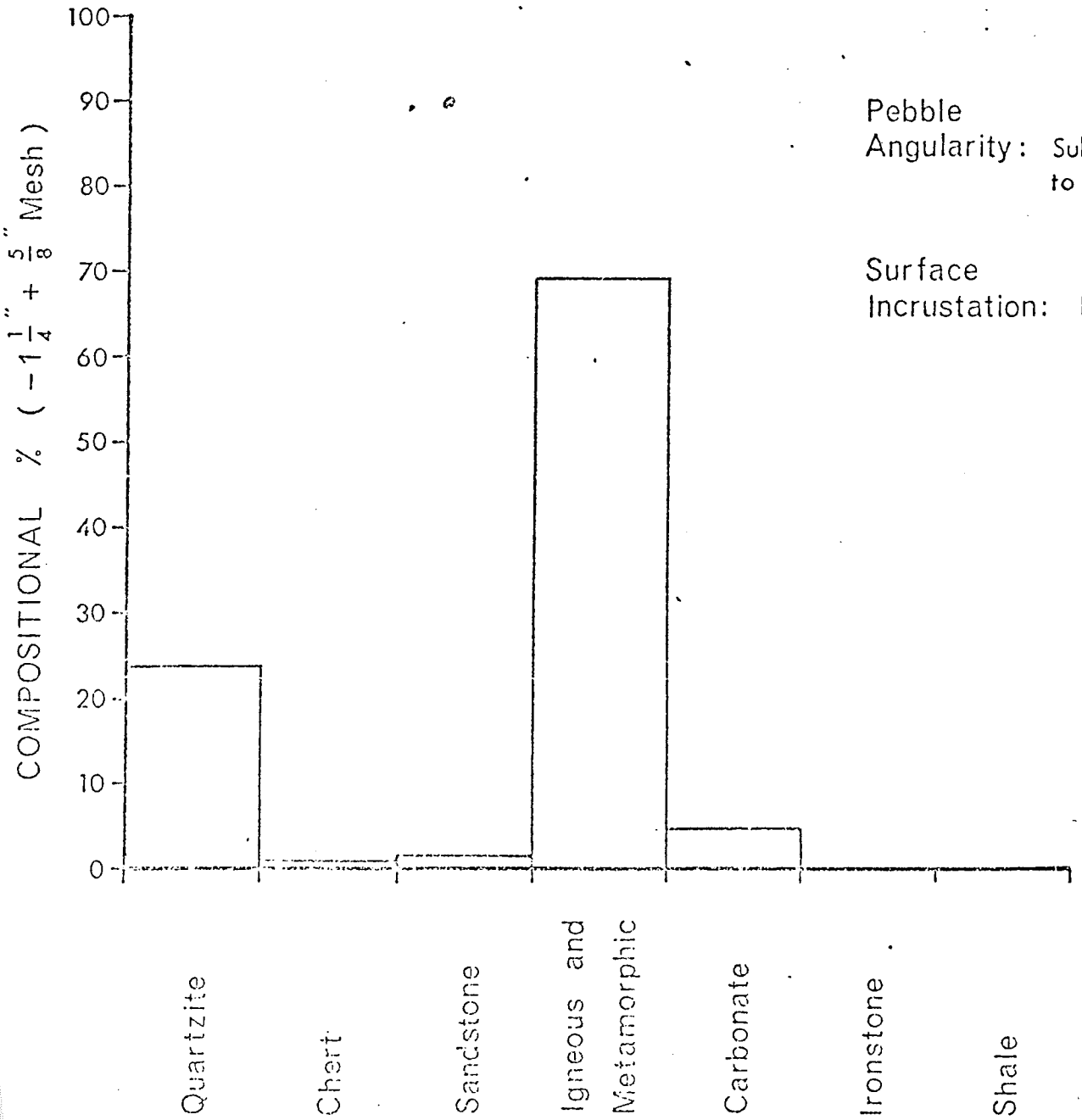


SAMPLE NO.: Pit 28

DEPTH: 0-6

LOCATION: E 1/2 14-37-24W4

* Less than 1%



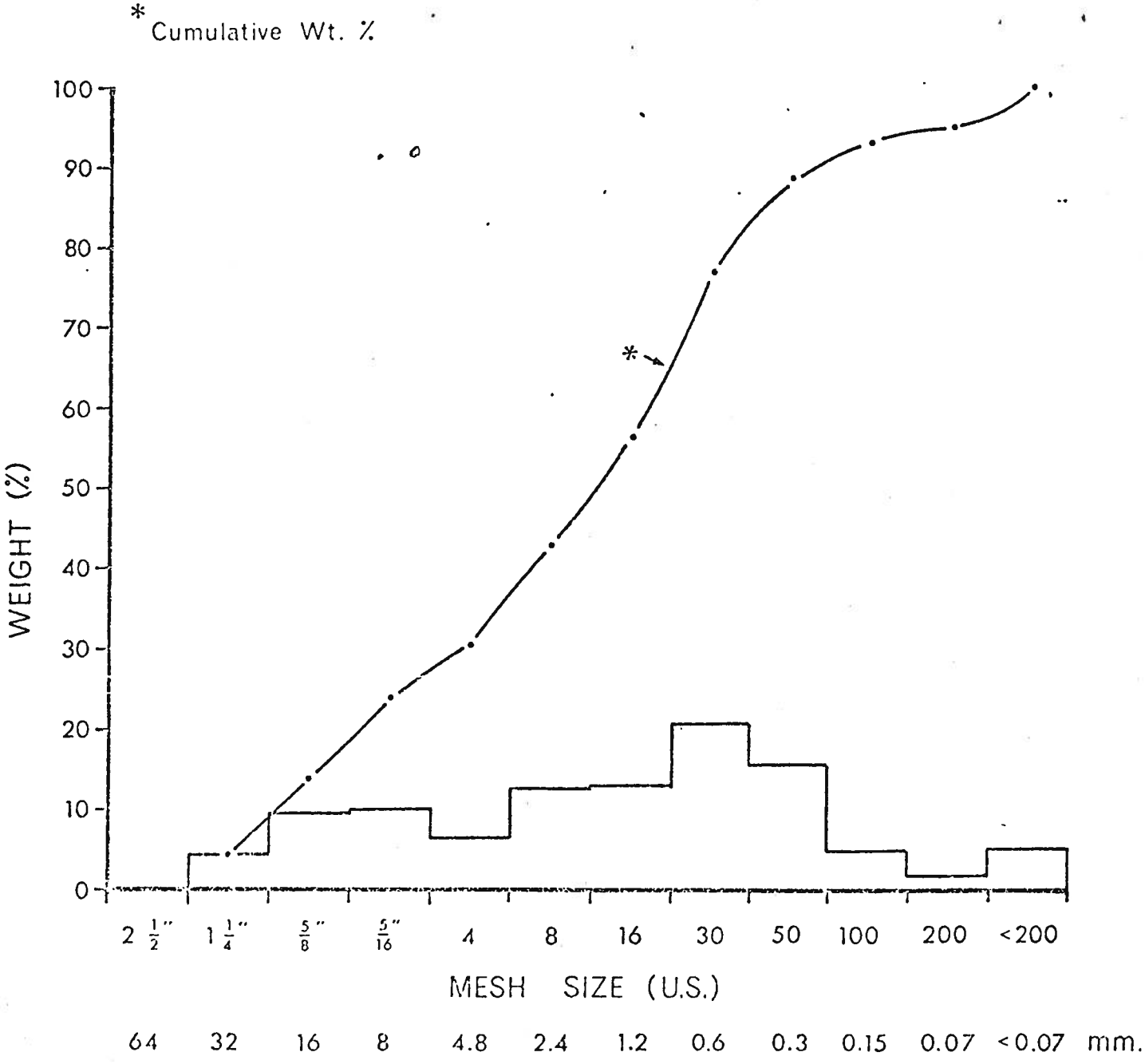
Pebble Angularity: Subangular to Subround

Surface Incrustation: Extreme

SAMPLE NO.: Pit 29

DEPTH: 0 - 5

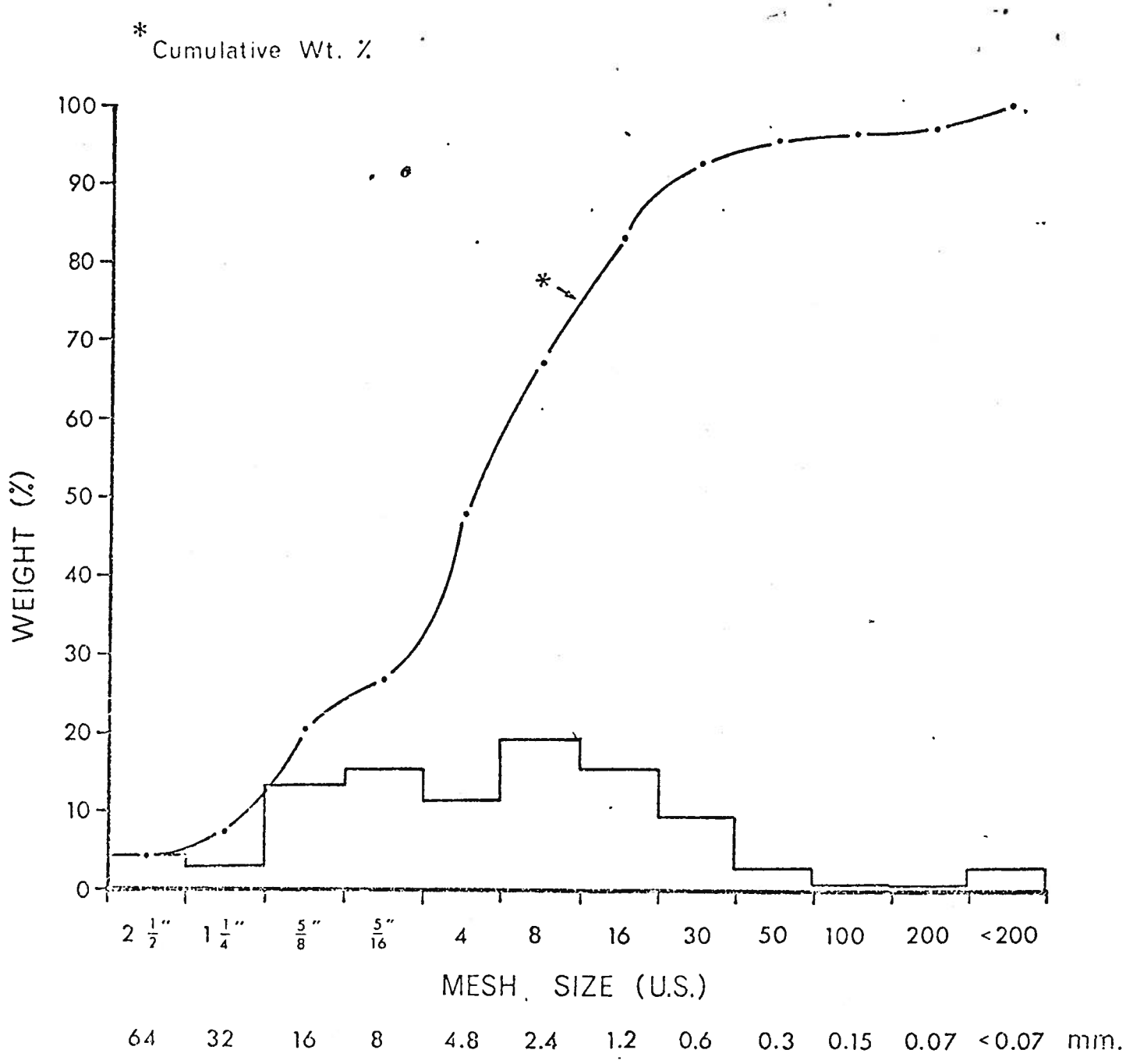
LOCATION: SE 13-37-24W4



SAMPLE NO.: Pit 30

DEPTH: 0-4

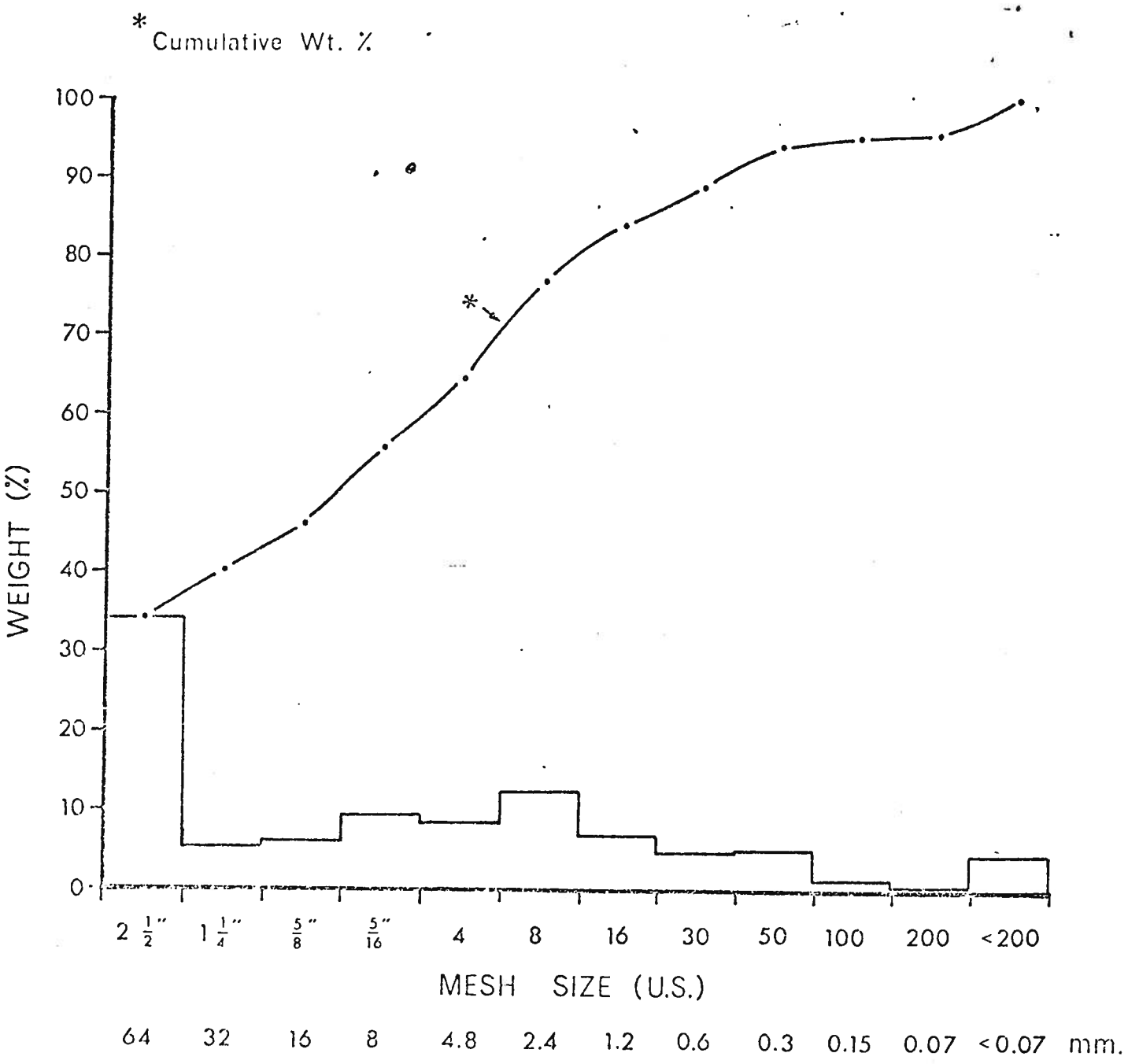
LOCATION: S 1/2 27-37-24W4



SAMPLE NO.: Pit 31

DEPTH: 0-8

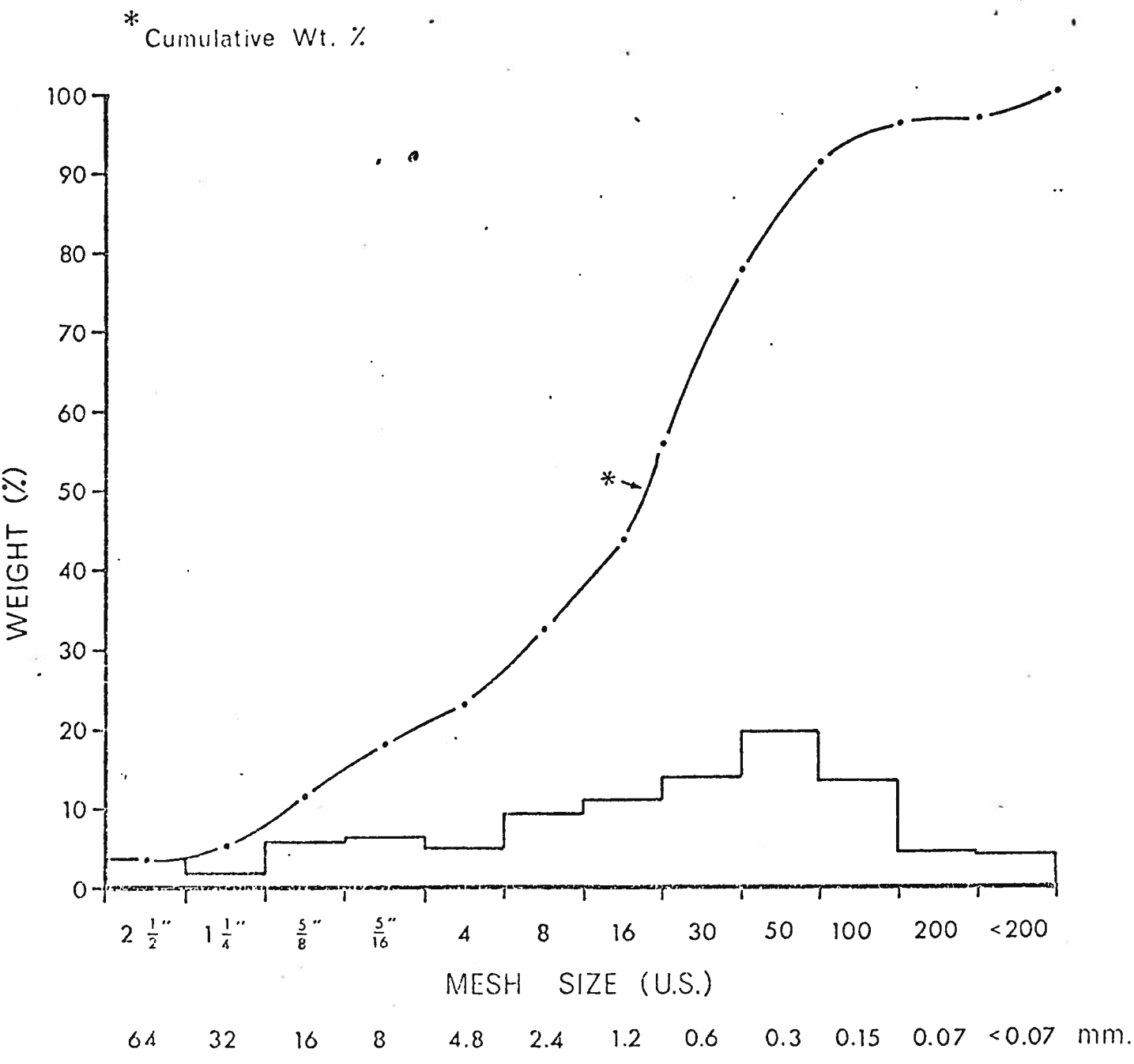
LOCATION: SW 4-38-24W4



SAMPLE NO.: Pit 32

DEPTH: 5-10

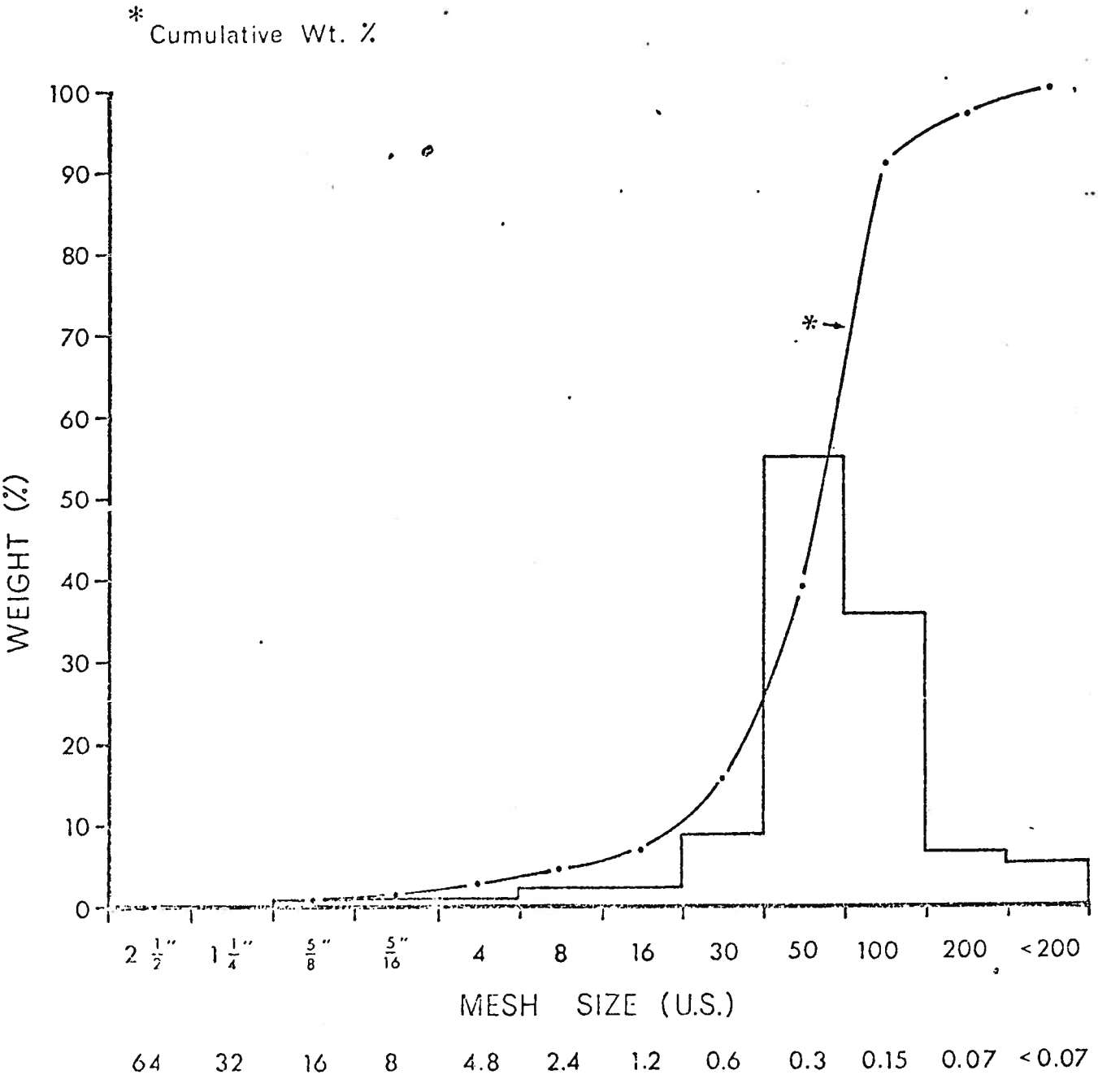
LOCATION: W 1/2 34-37-25W4



SAMPLE NO.: Pit 33

DEPTH: 0-8

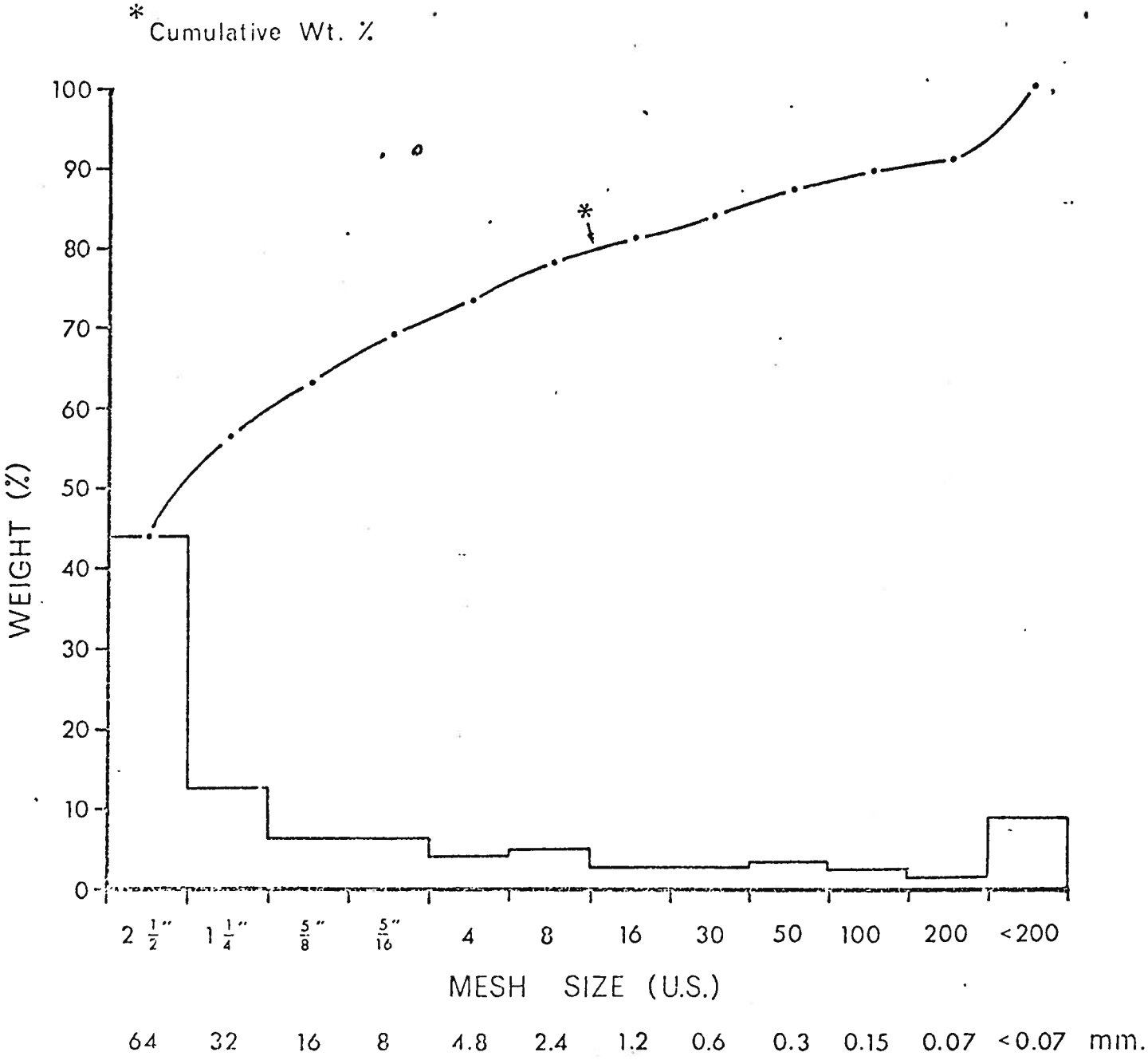
LOCATION: NE 4-37-25W4



SAMPLE NO.: Pit 34

DEPTH: 0-35

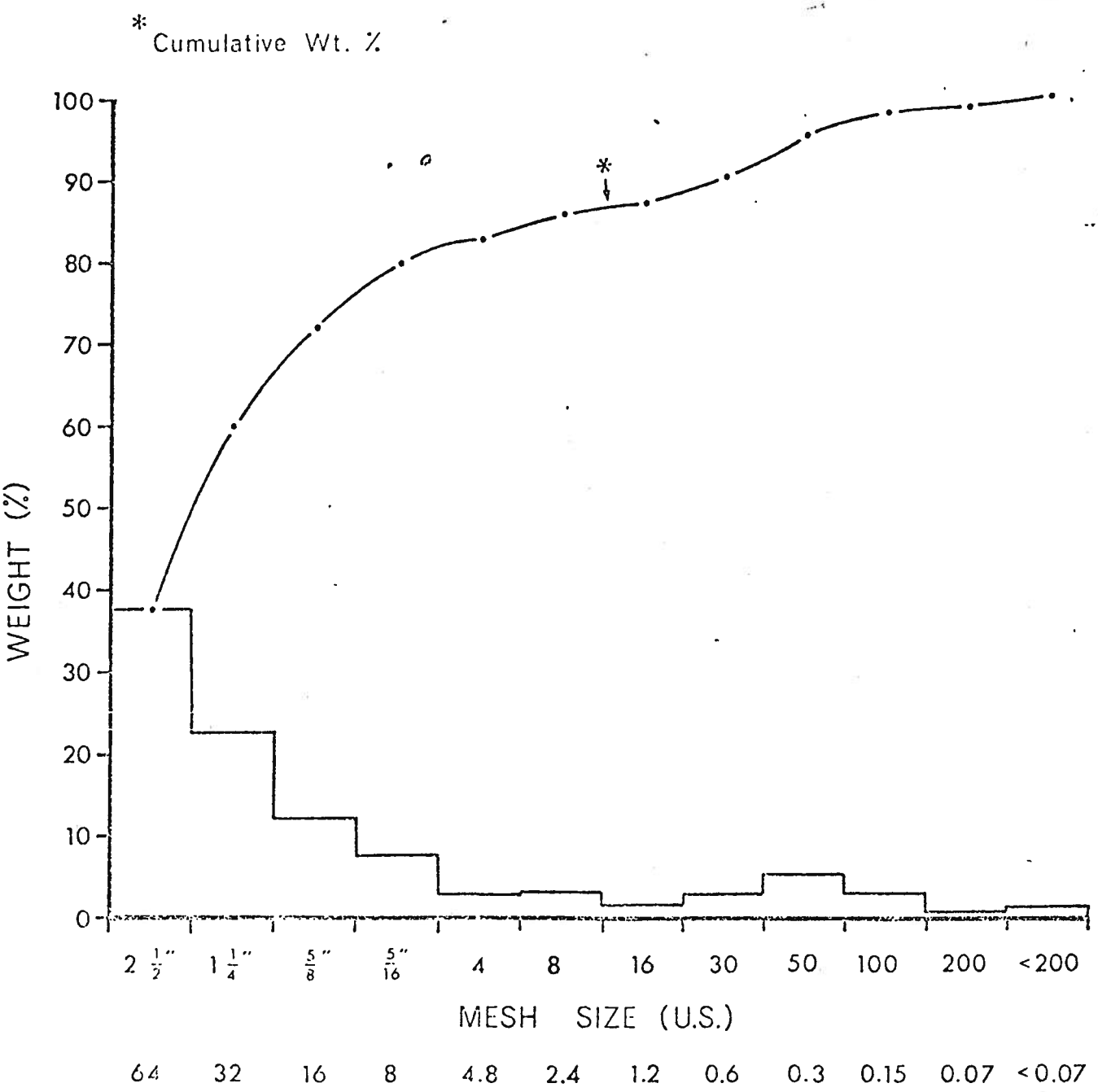
LOCATION: N 1/2 28-36-25W4



SAMPLE NO.: Pit 35

DEPTH: 0-3

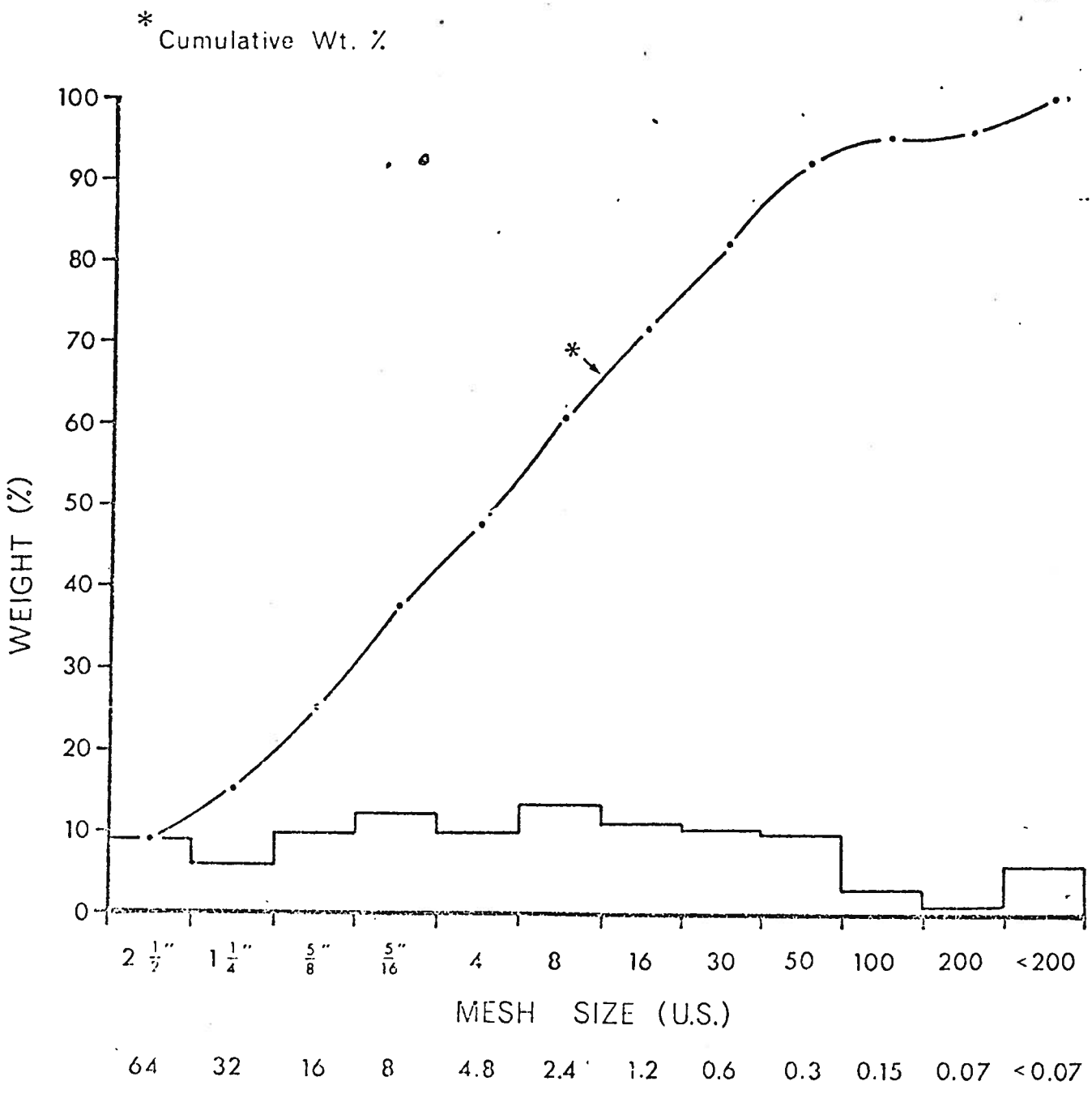
LOCATION: S 1/2 5-37-28W4



SAMPLE NO.: Pit 36

DEPTH: 3-23

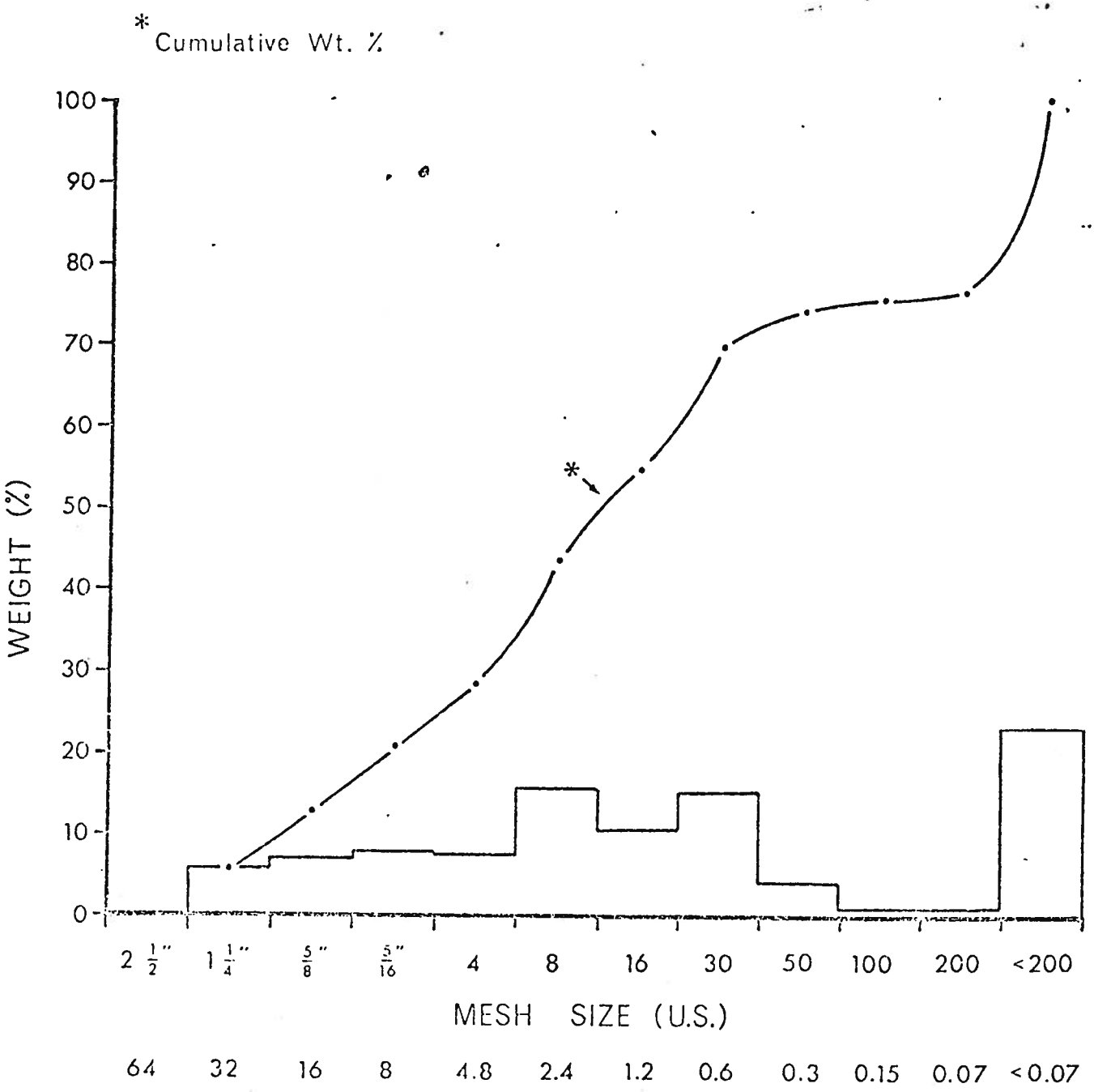
LOCATION: SE 29-36-28W4



SAMPLE NO.: Pit 37

DEPTH: 7-10

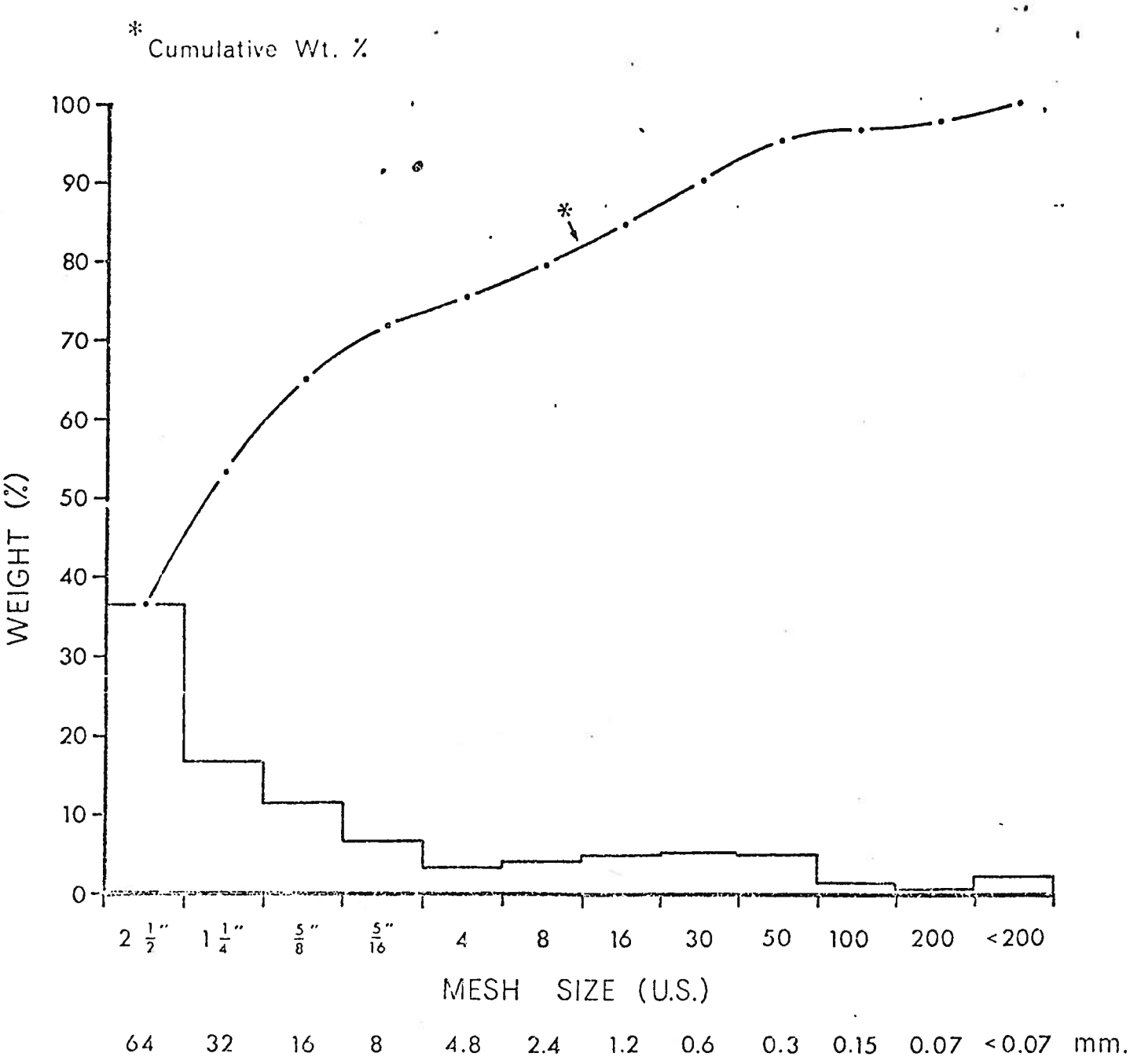
LOCATION: SE 13-40-28W4



SAMPLE NO.: Pit 38

DEPTH: 1-4

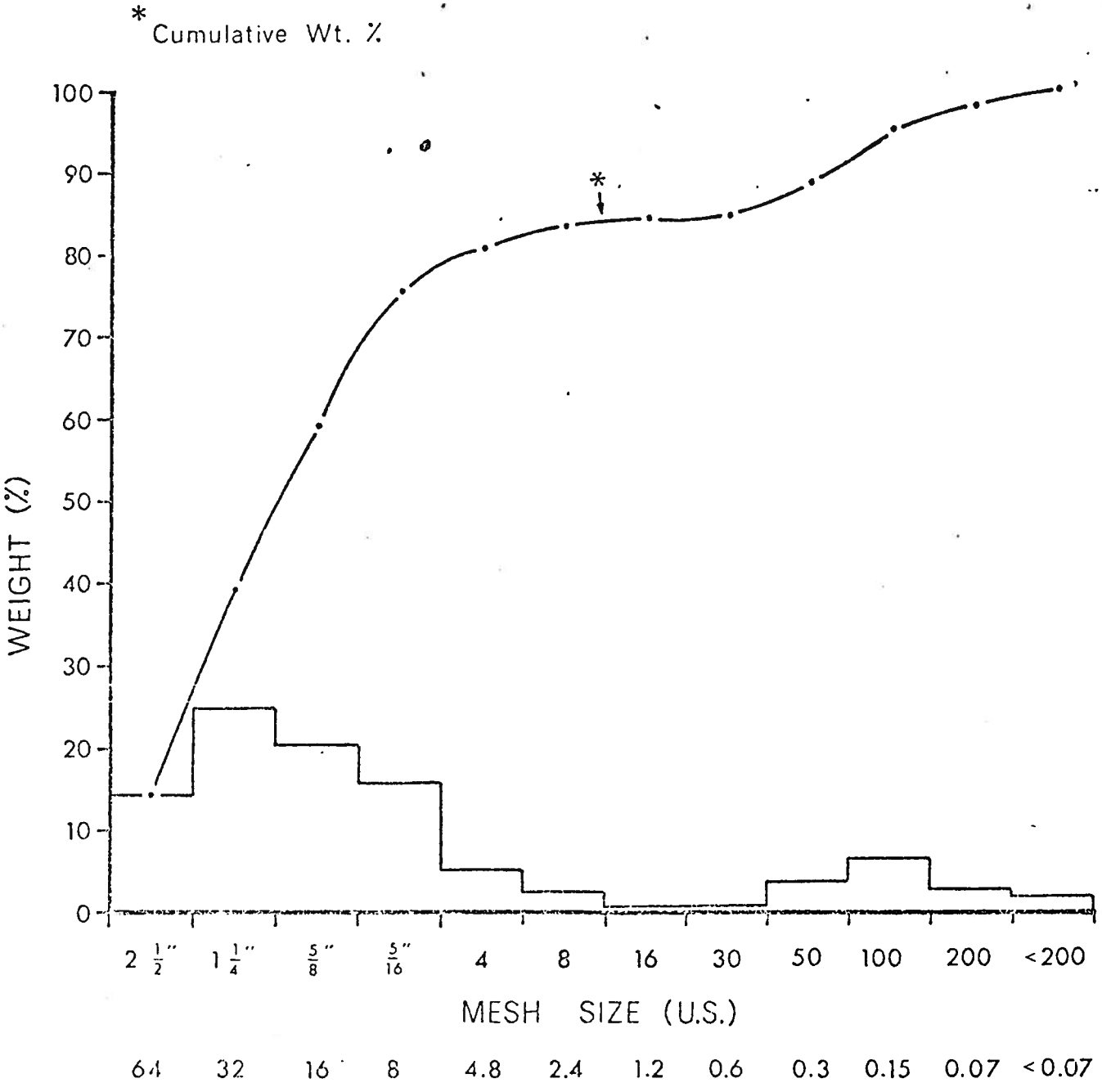
LOCATION: E 1/2 5-41-3W5



SAMPLE NO.: Pit 39

DEPTH: 1-5

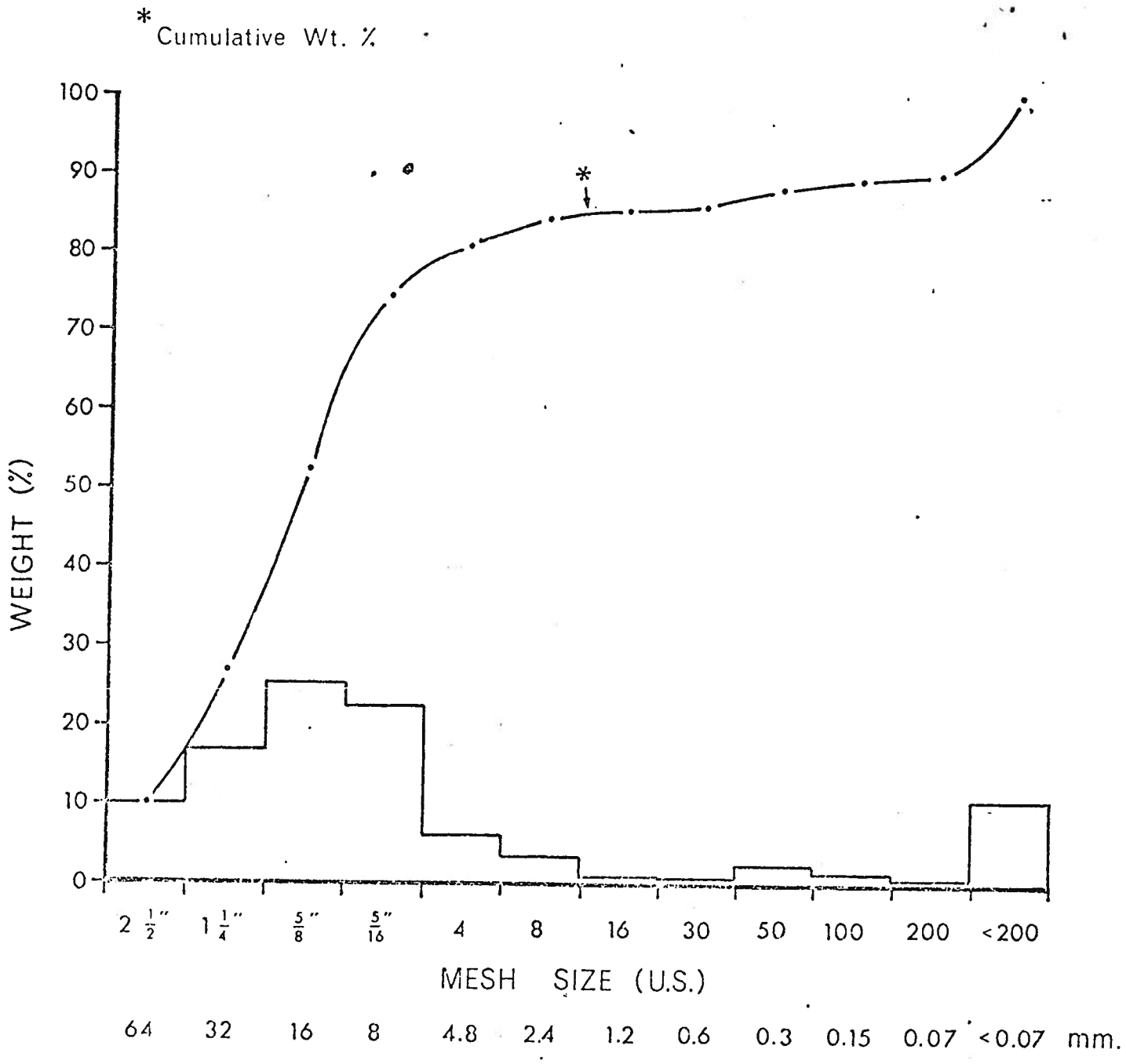
LOCATION: S 1/2 16-39-3W5



SAMPLE NO.: Pit 40

DEPTH: 3-10

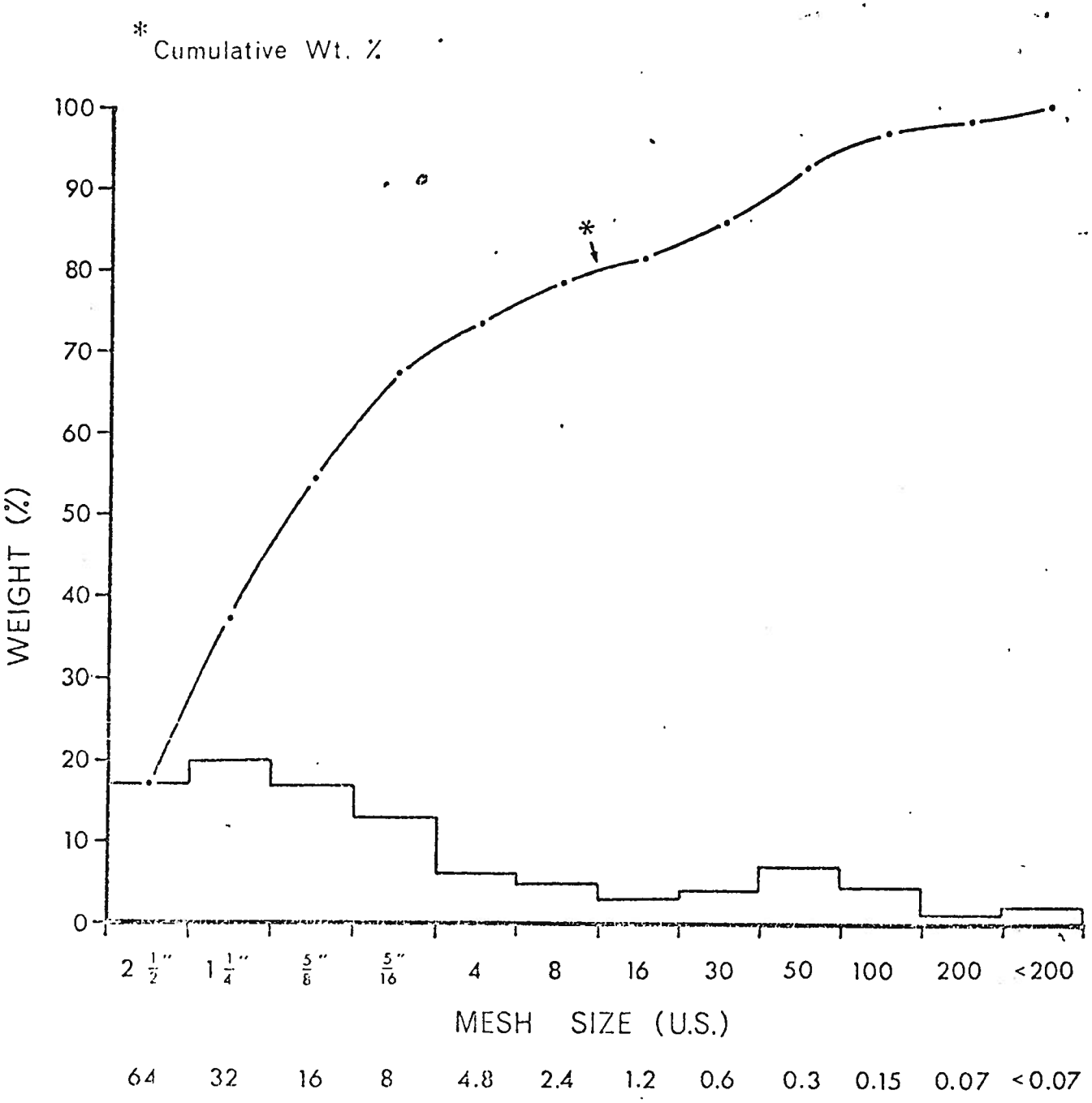
LOCATION: NE 12-36-2W5



SAMPLE NO.: Pit 41

DEPTH: 0-9

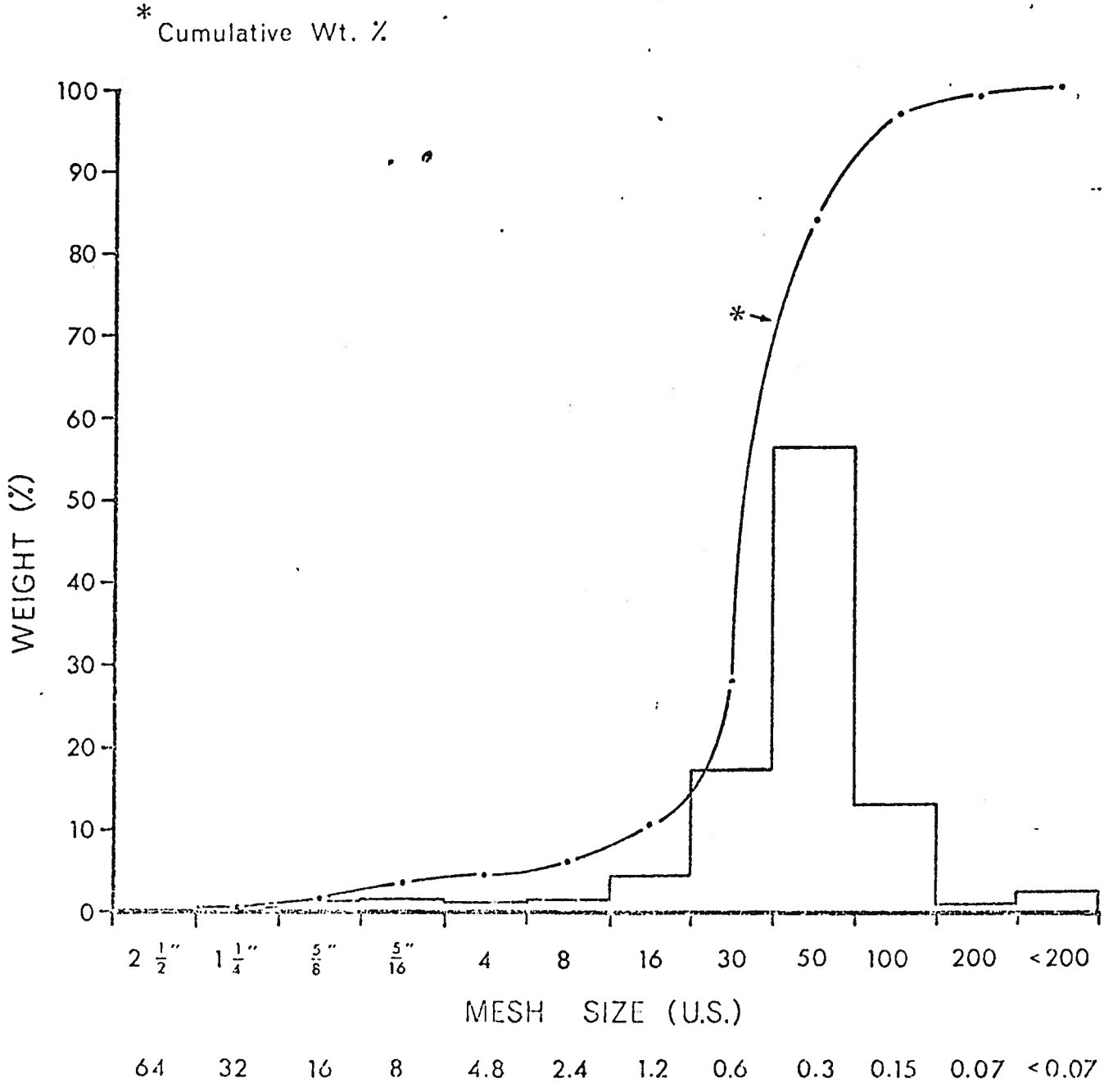
LOCATION: NW 19-35-3W5



SAMPLE NO.: Pit 42

DEPTH: 0-7

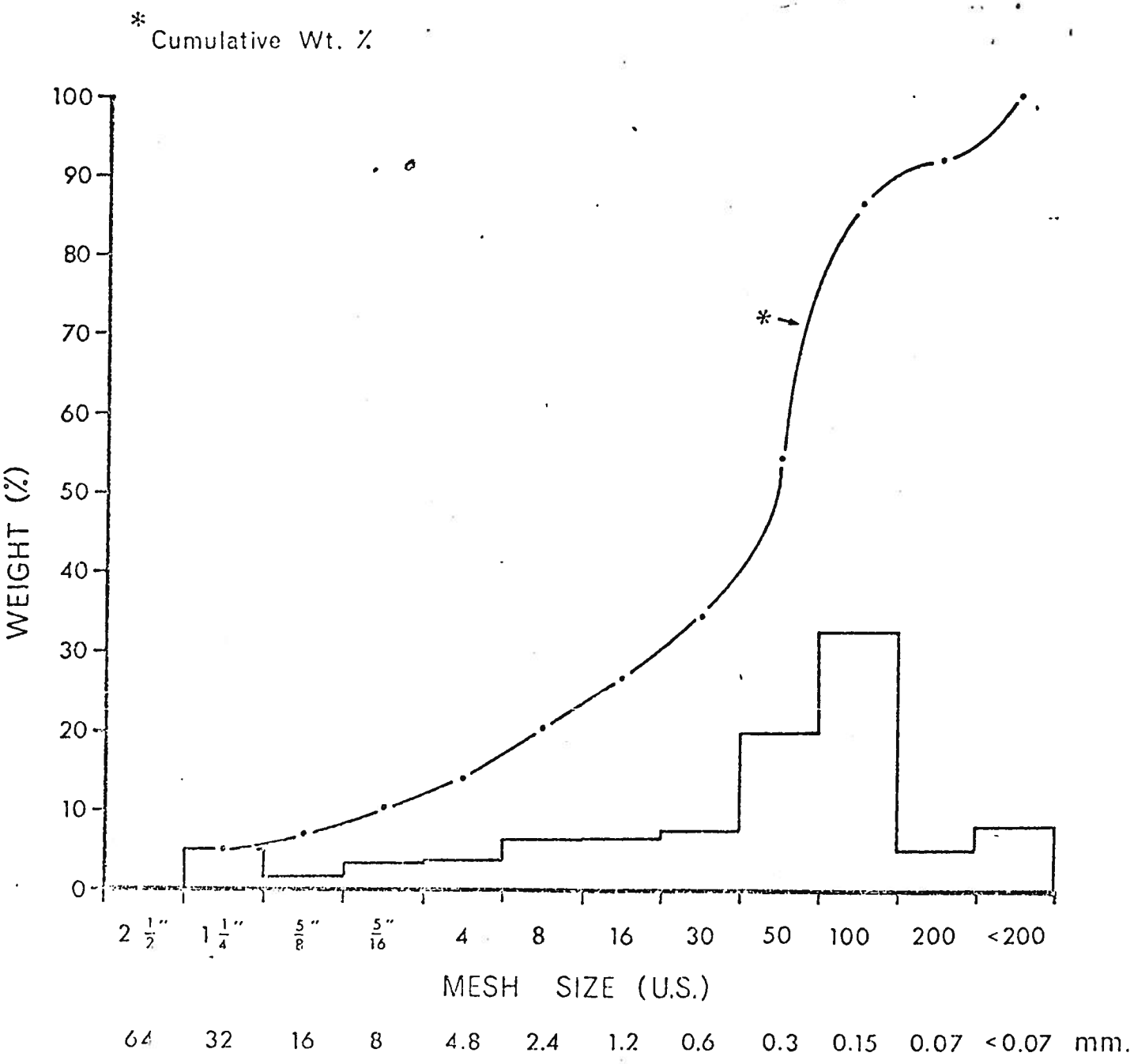
LOCATION: NE 12-35--3W5



SAMPLE NO.: Pit 43

DEPTH: 2

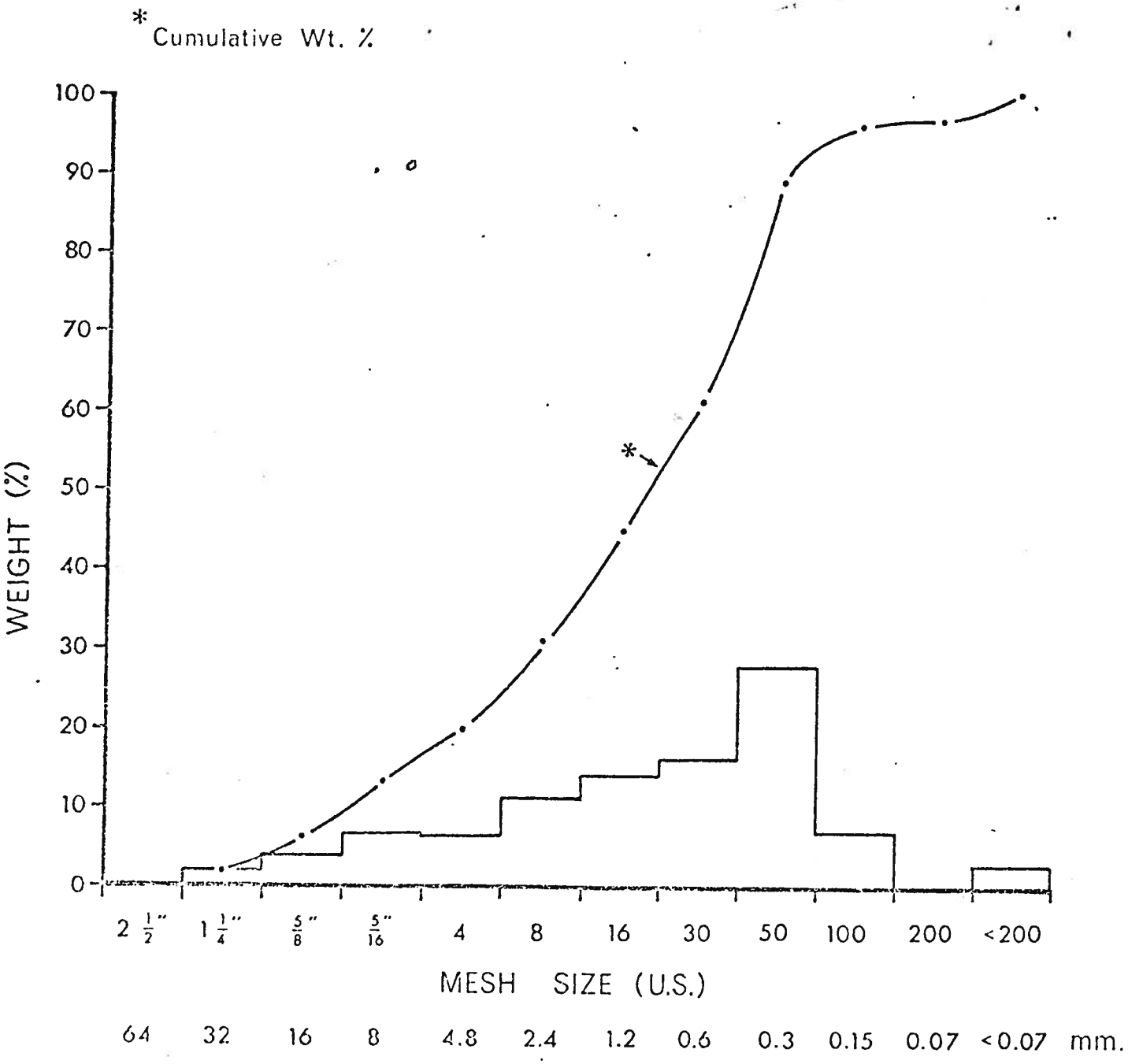
LOCATION: W1/2 8-35-24W4



SAMPLE NO.: Pit 44

DEPTH: 0-4

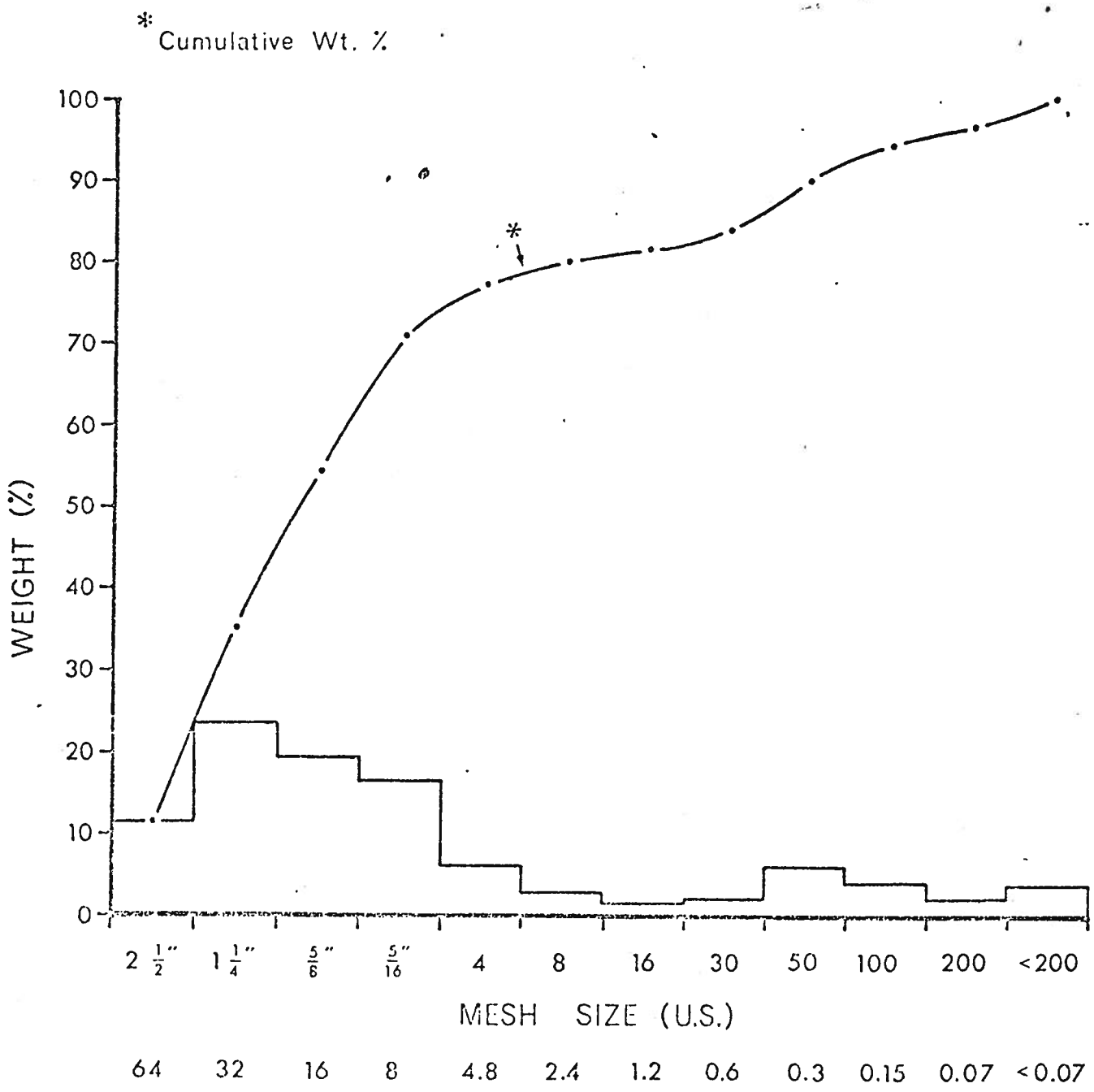
LOCATION: N1/2 11-35-25W4



SAMPLE NO.: Pit 45

DEPTH: 1-7

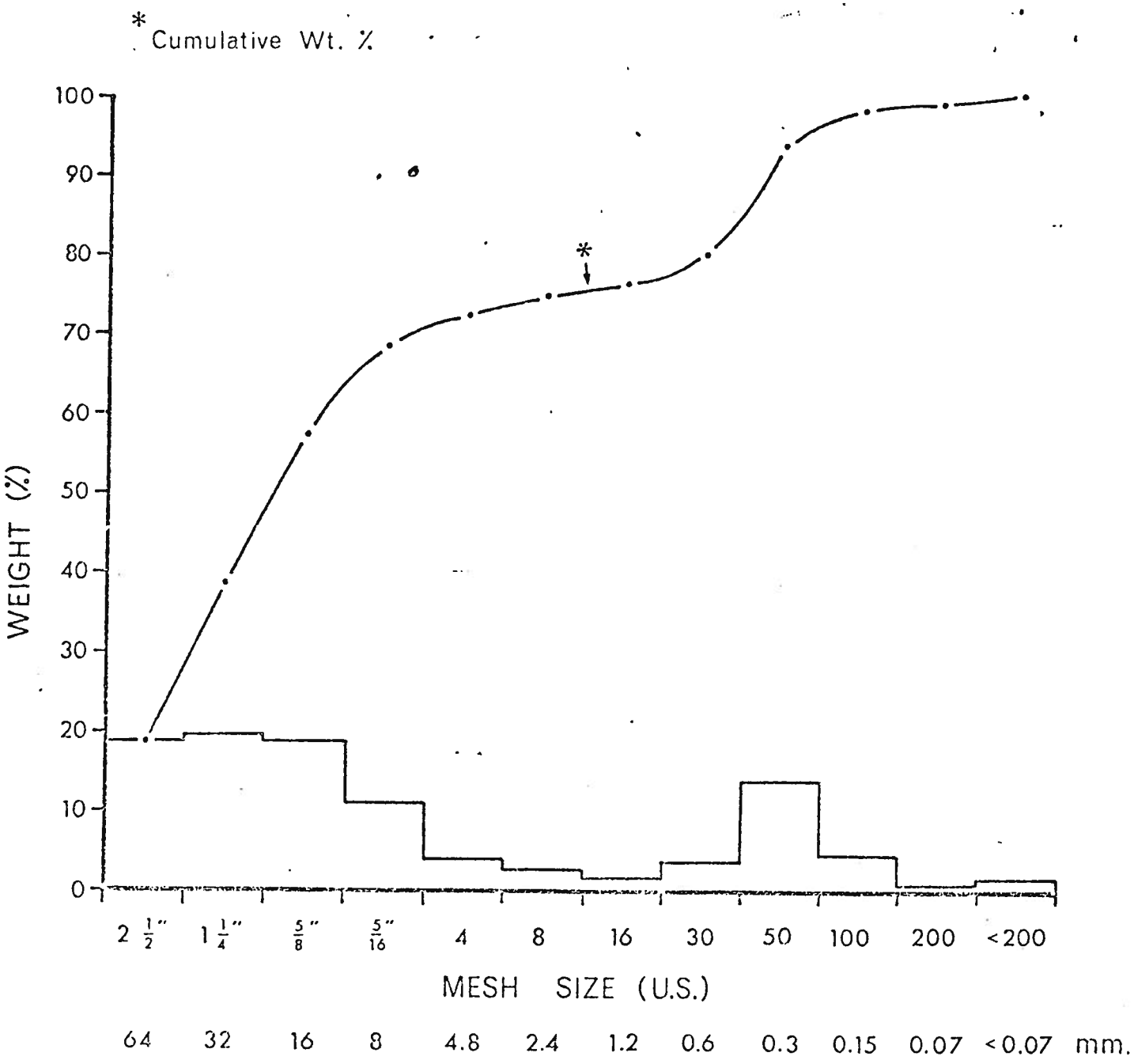
LOCATION: SE 14-35-25W4



SAMPLE NO.: Pit 46

DEPTH: 4-11

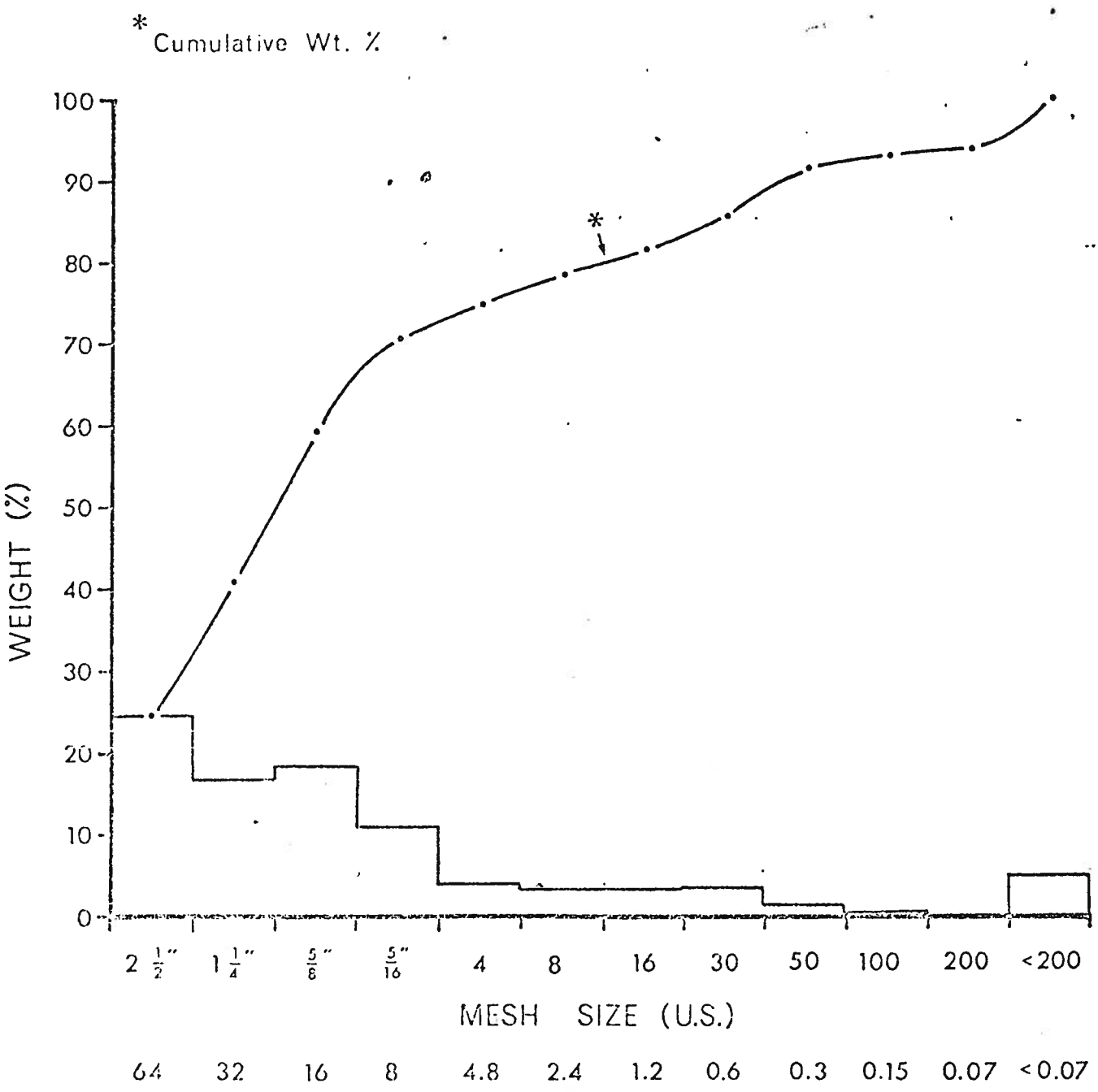
LOCATION: N 1/2 12-38-28W4



SAMPLE NO.: Pit 47

DEPTH: 0-7

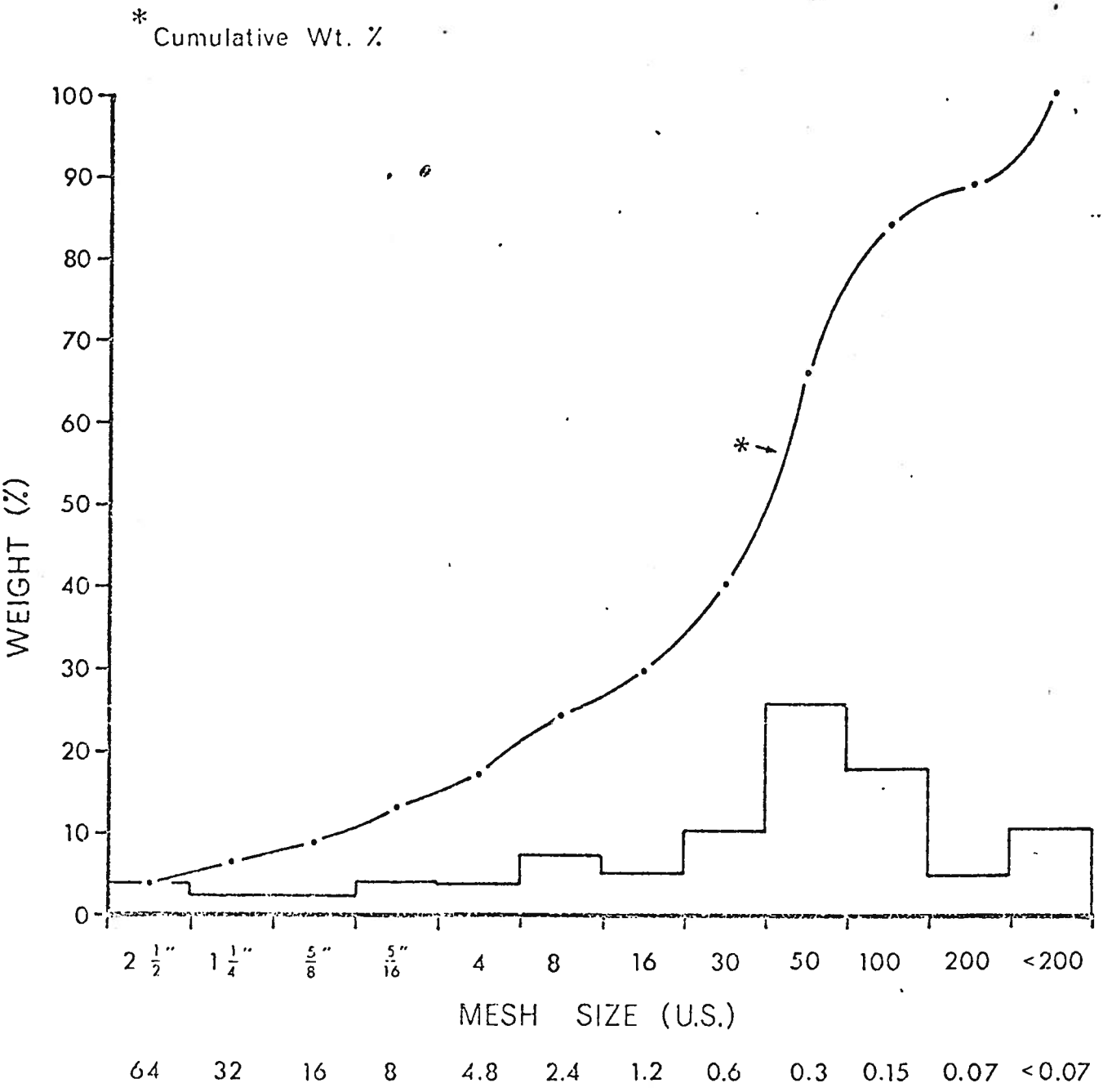
LOCATION: NW 27-38-27W4



SAMPLE NO.: Pit 48

DEPTH: 0-7

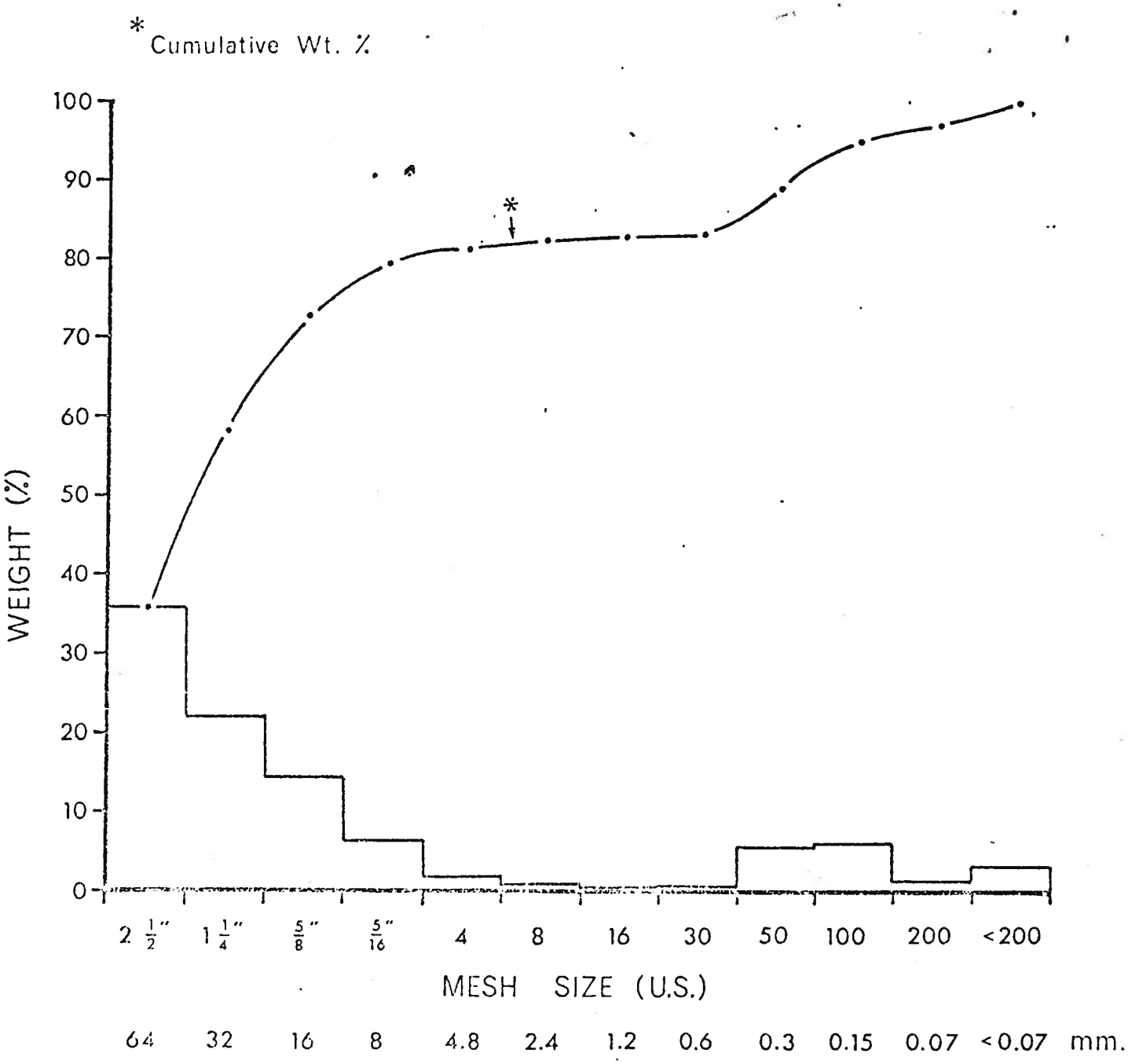
LOCATION: Ctr. 20-39-27W4



SAMPLE NO.: Pit 49

DEPTH: 4 - 16

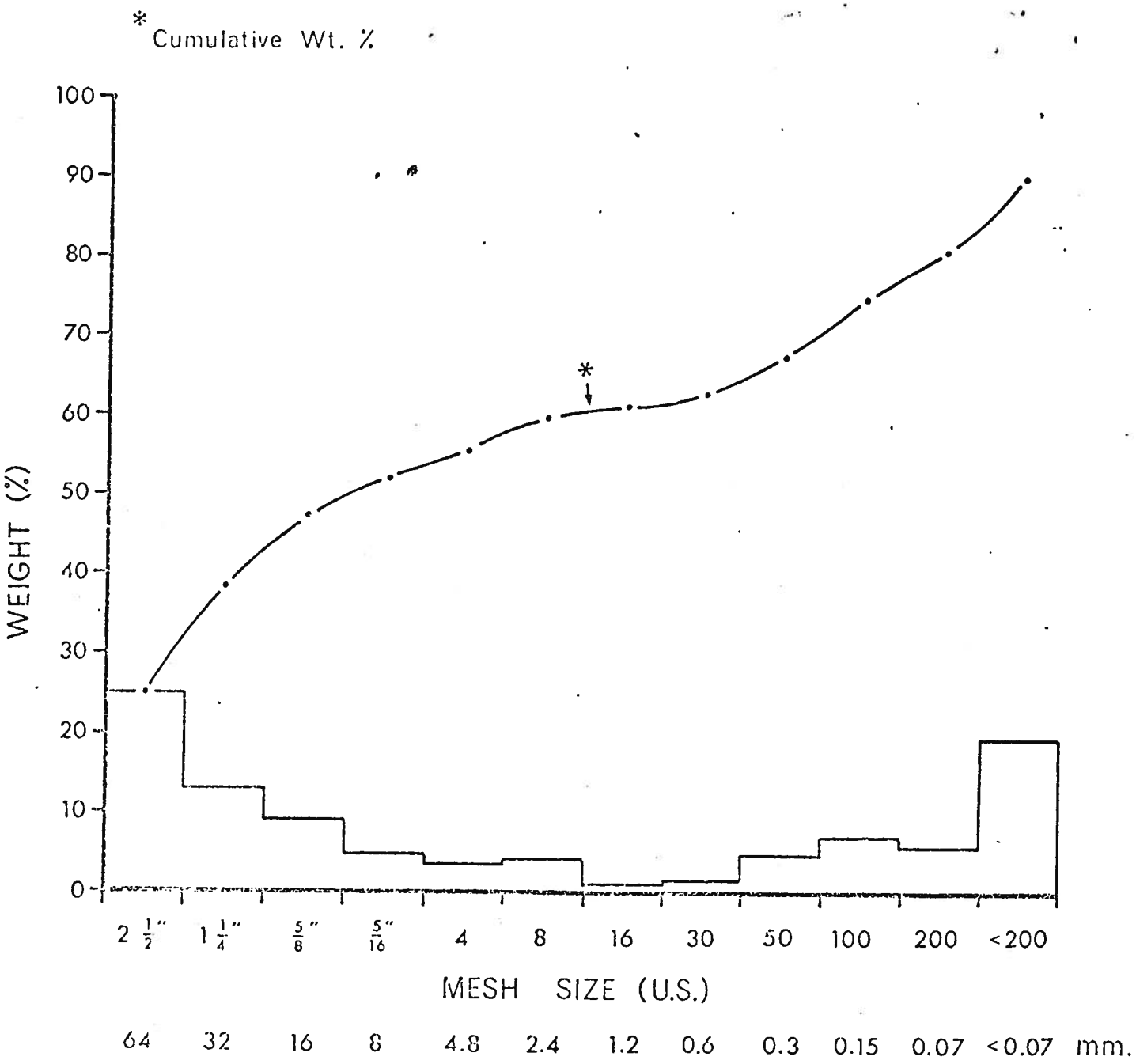
LOCATION: W1/2 11-41-2W5



SAMPLE NO.: Pit 50

DEPTH: 4-8

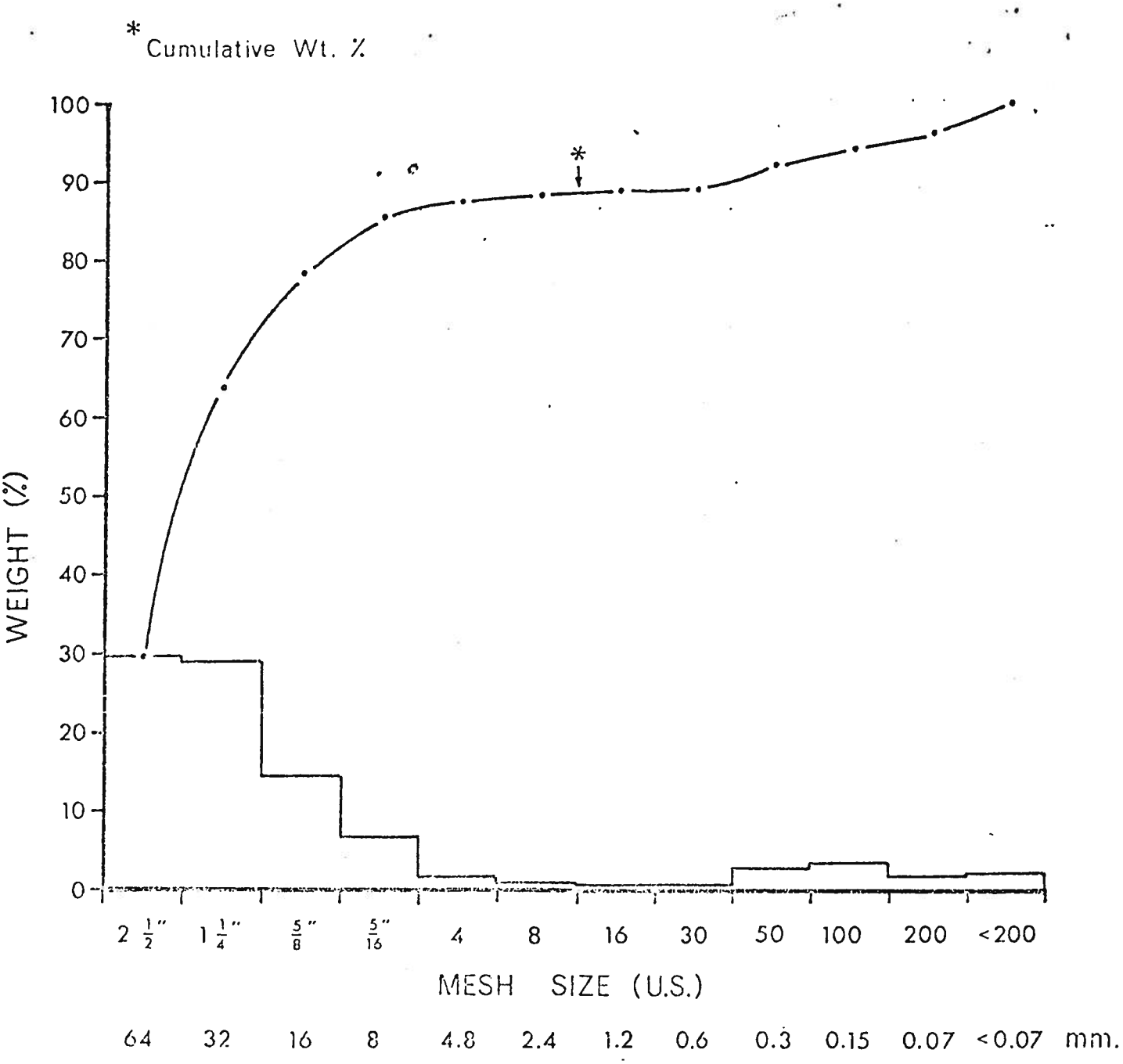
LOCATION: NE 14-35-3W5



SAMPLE NO.: Pit 51

DEPTH: 3

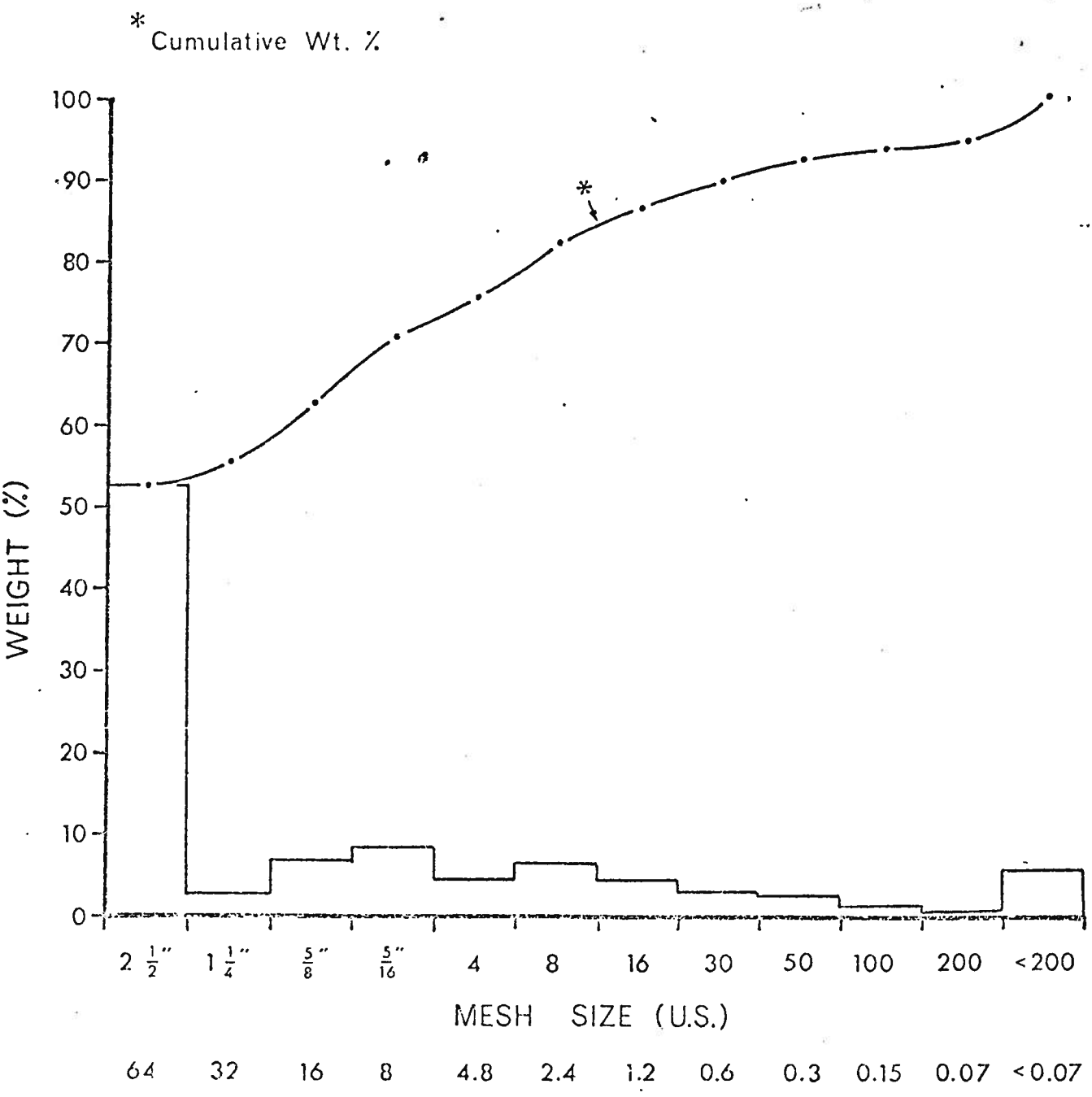
LOCATION: NE 11-35-3W5



SAMPLE NO.: Pit 52

DEPTH: 6-10

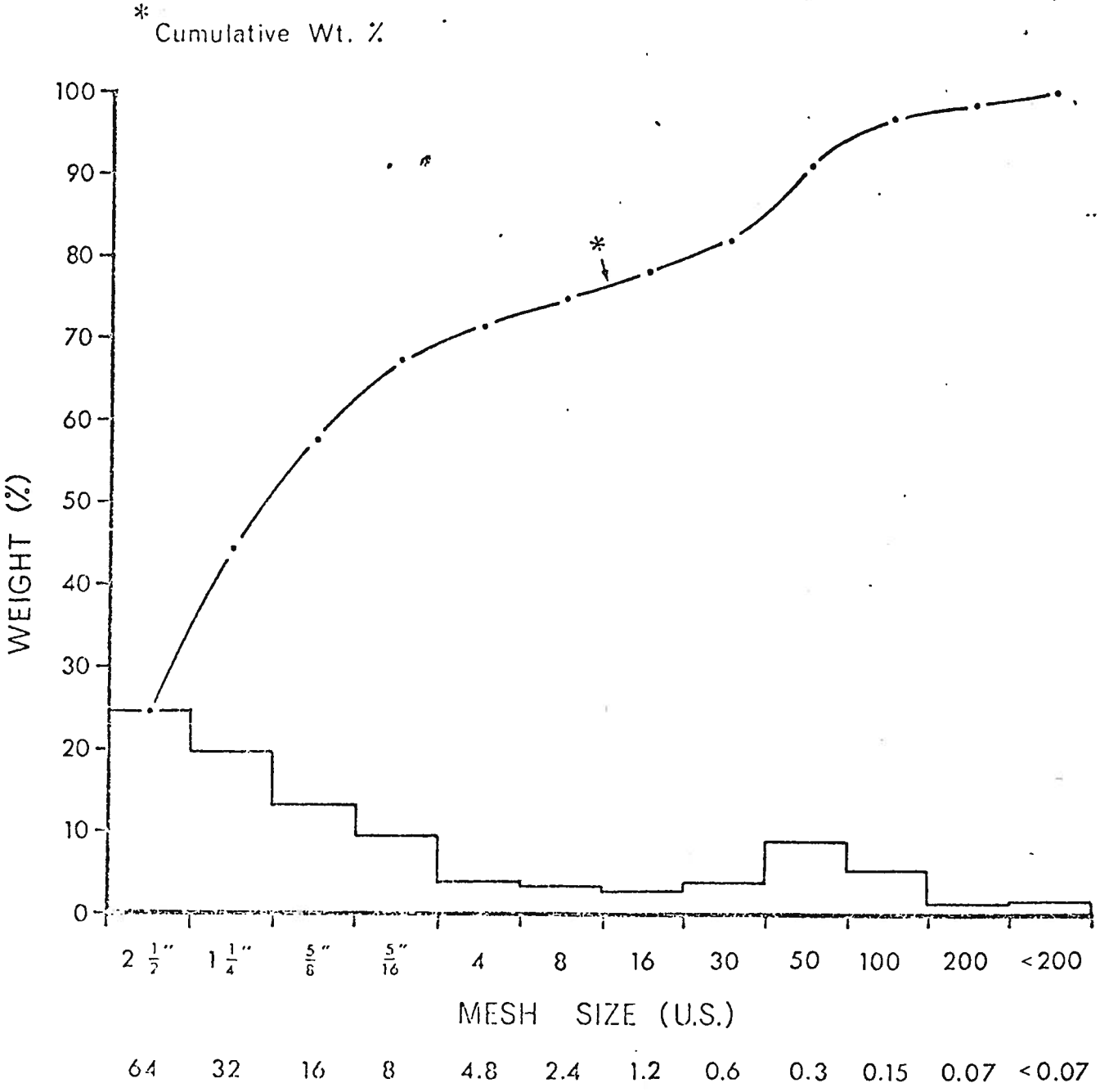
LOCATION: S 1/2 4-43-24W4



SAMPLE NO.: Pit 53

DEPTH: 3-6

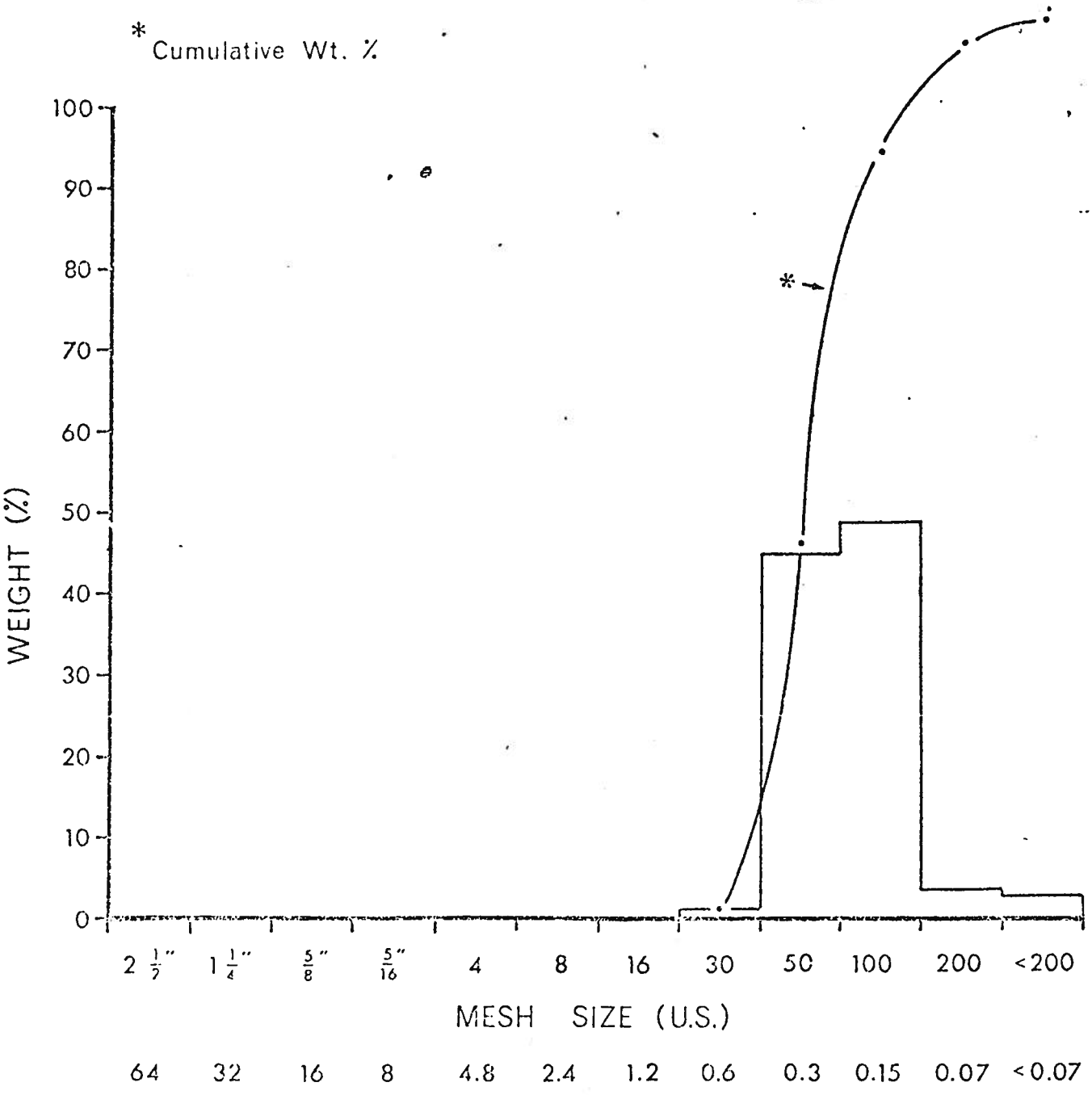
LOCATION: NE 34-34-25W4



SAMPLE NO.: Pit 54

DEPTH: 10-19

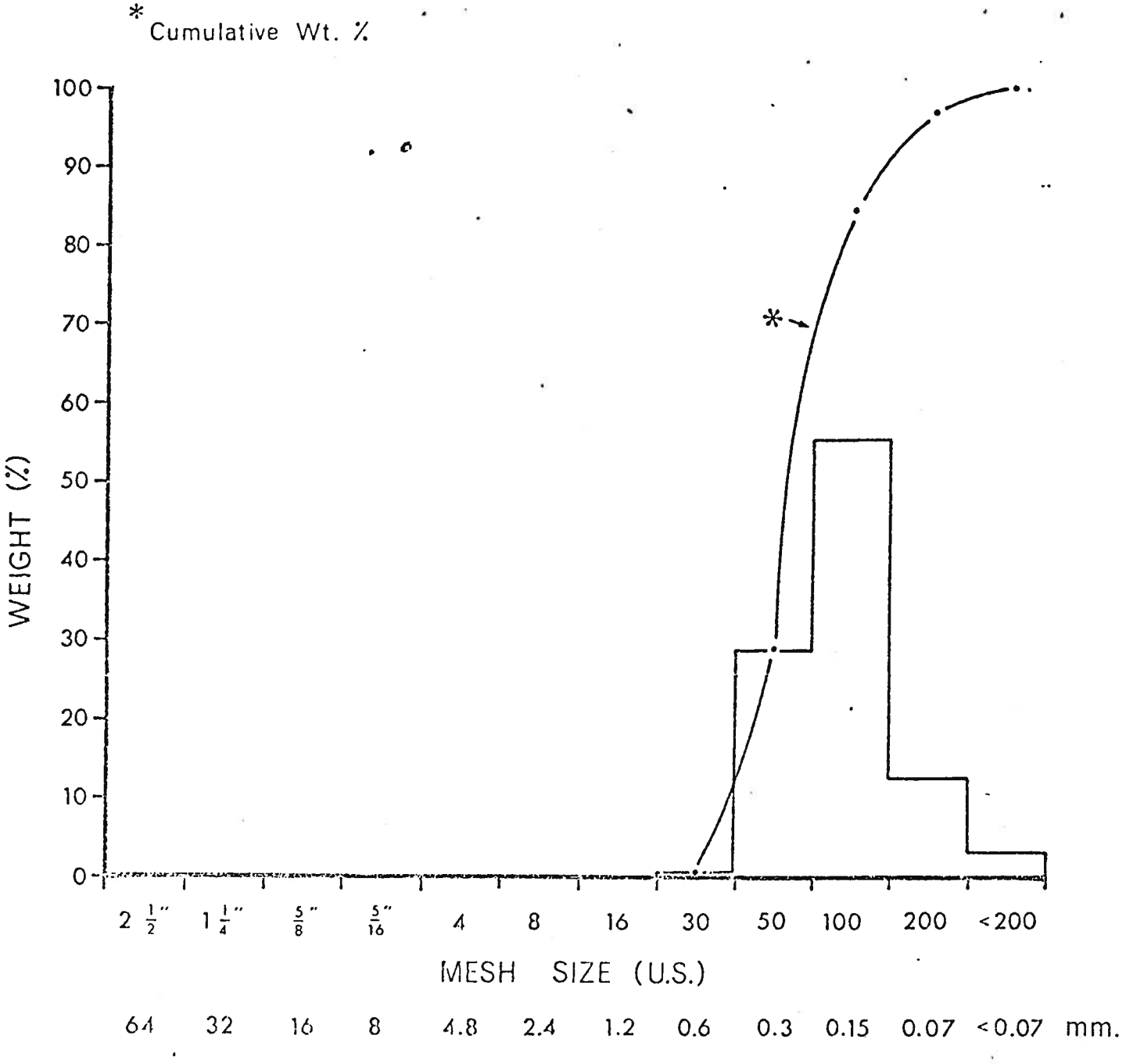
LOCATION: NE 8-36-28W4



SAMPLE NO.: Pit 55

DEPTH: 9-12

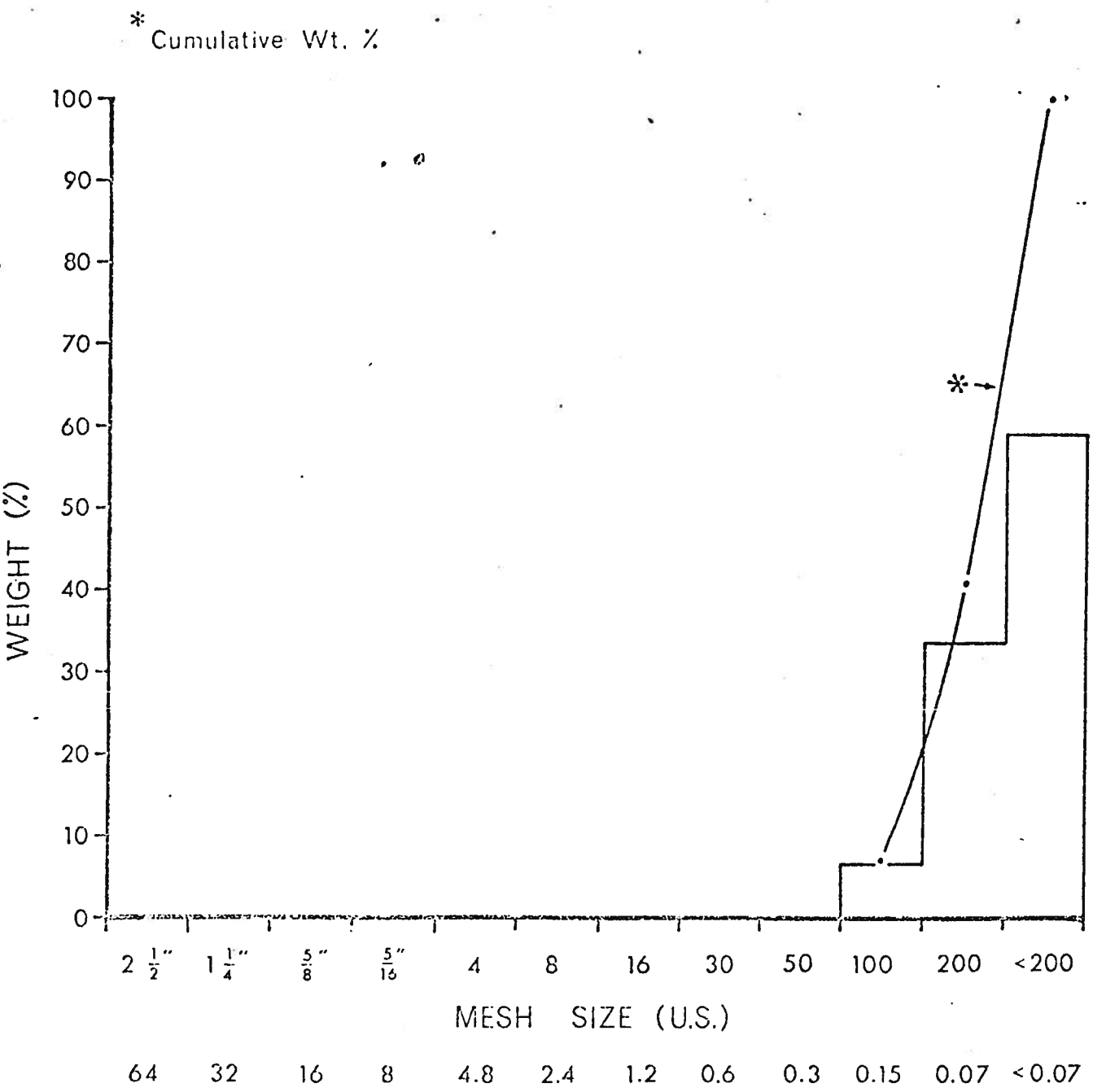
LOCATION: SE 5-39-27W4



SAMPLE NO.: Pit 56

DEPTH: 4 - 6

LOCATION: W 1/2 29-35-28W4



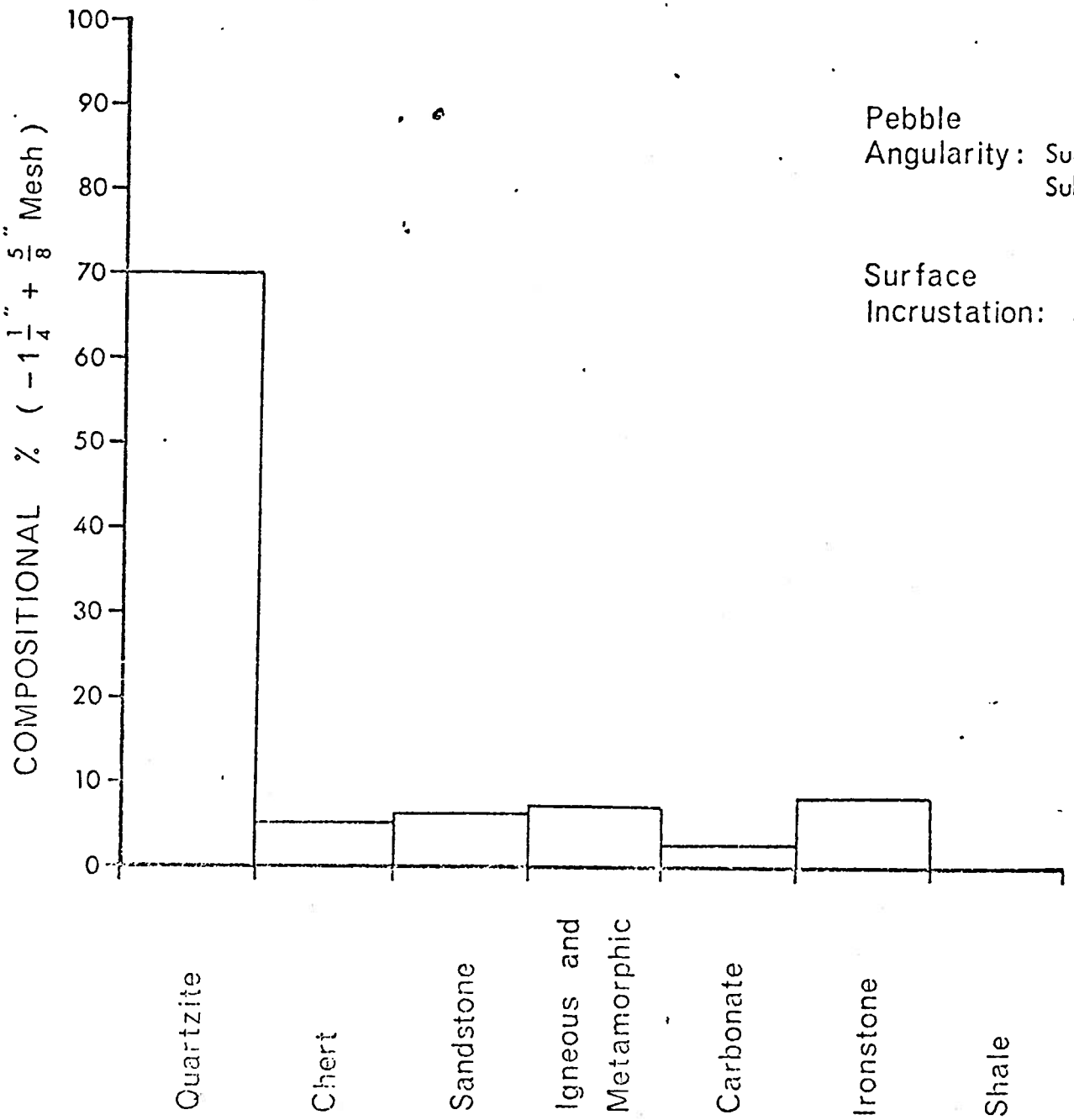
SAMPLE NO.: Pit 57

DEPTH: 2 - 3

LOCATION: NE 10-38-27W4

Pebble Counts and Quality,
Pit Samples

▼ Less than 1%



Pebble Angularity: Subround to Subangular

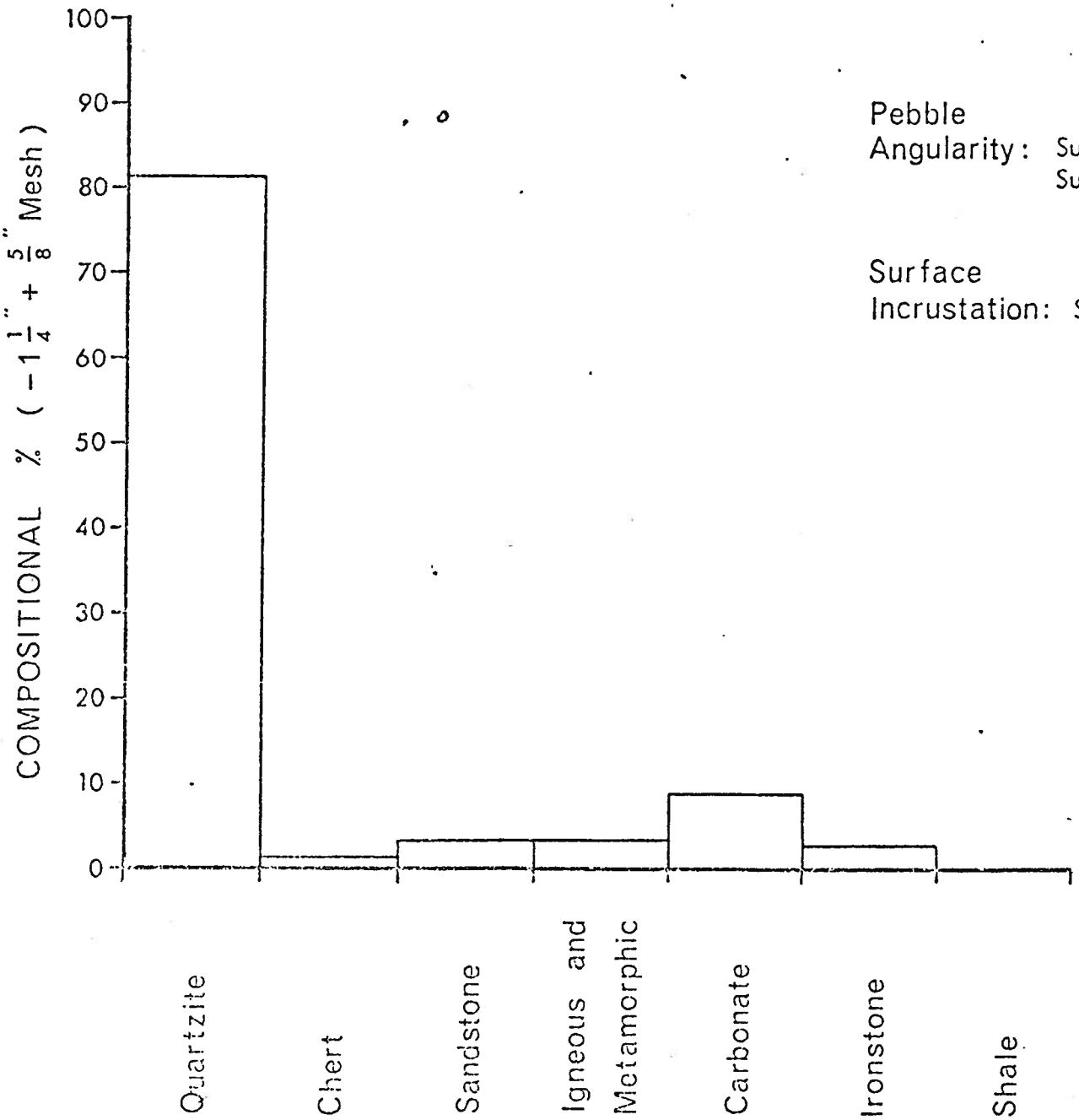
Surface Incrustation: Slight

SAMPLE NO.: Pit 1

DEPTH: 0 - 20

LOCATION: W1/2 28-39-27W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

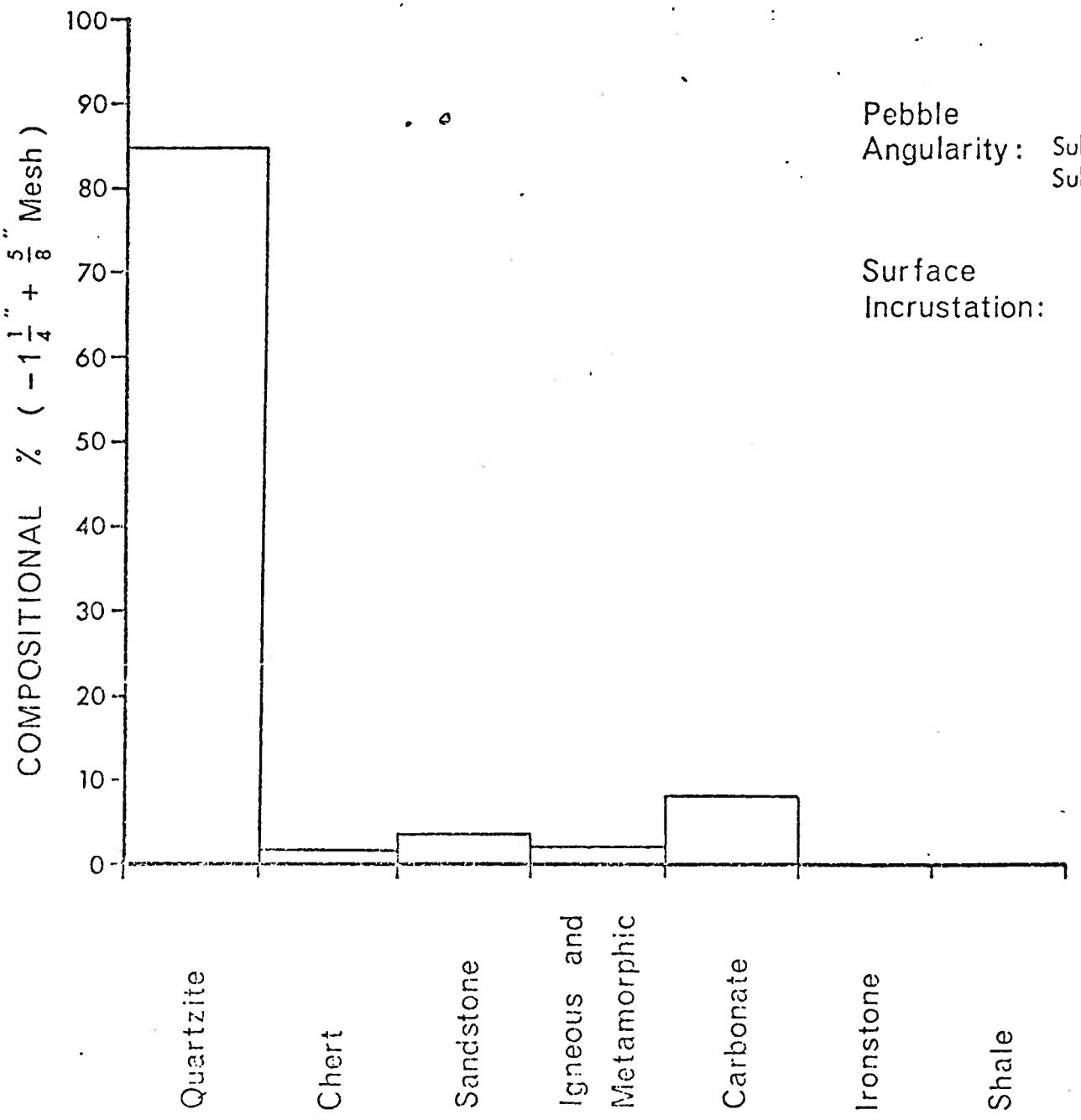
Surface Incrustation: Slight

SAMPLE NO.: Pit 2

DEPTH: 0 - 10 '

LOCATION: NW 21-34-2W5

▼ Less than 1%



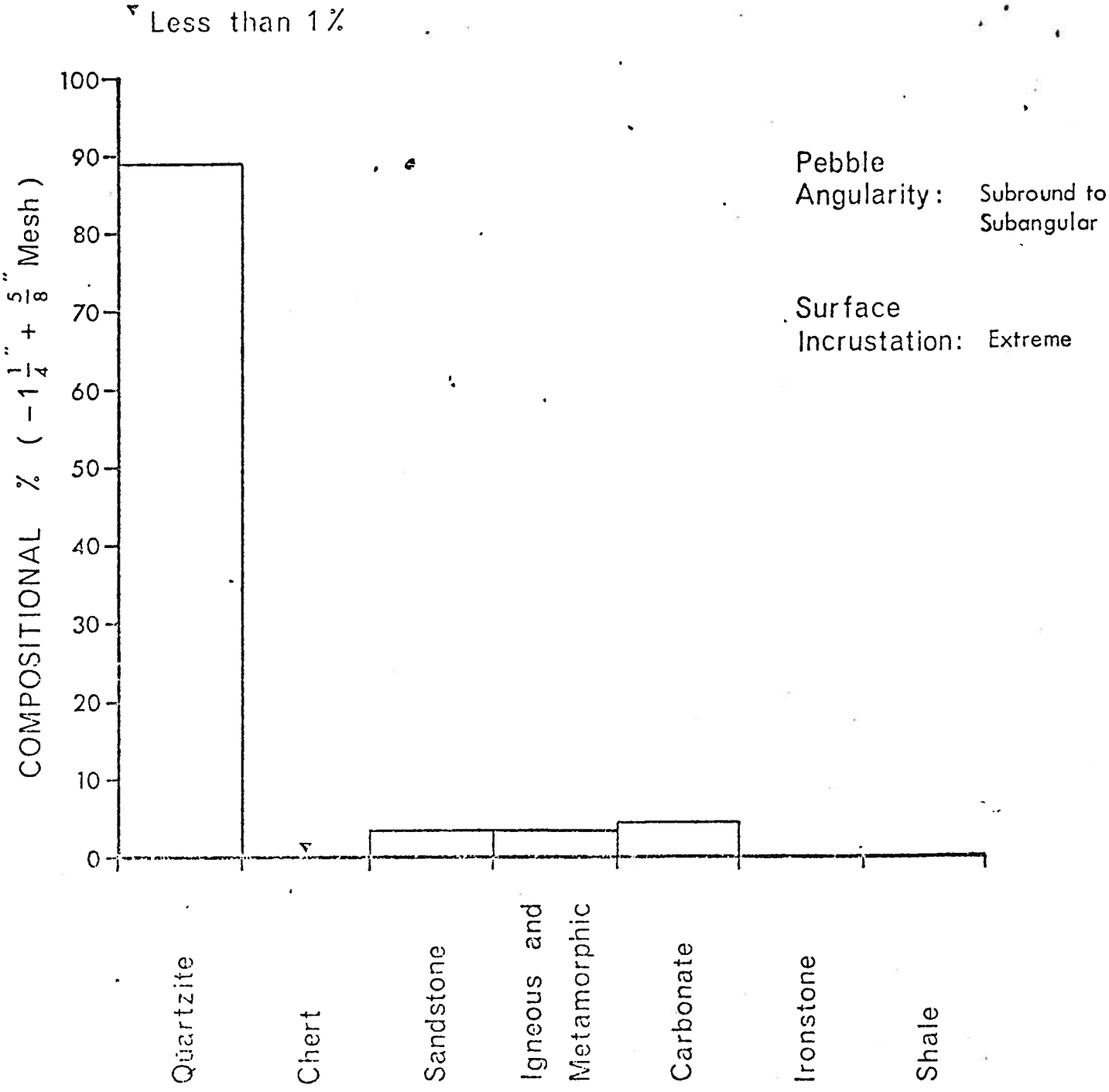
Pebble Angularity: Subround to Subangular

Surface Incrustation: Nil

SAMPLE NO.: Pit 3

DEPTH: 0 - 2

LOCATION: NE 9-35-2W5

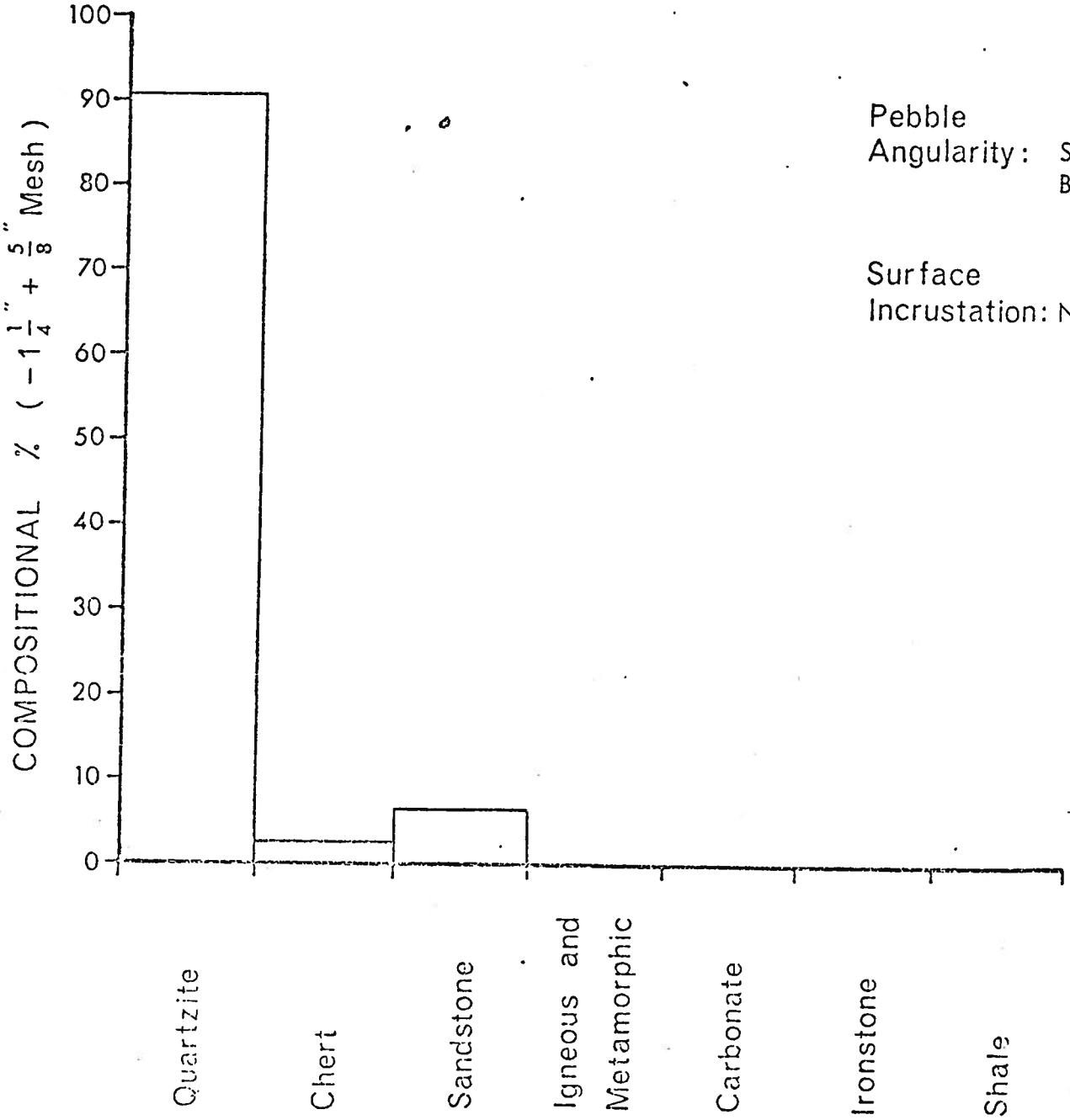


SAMPLE NO.: Pit 4

DEPTH: 0 - 8

LOCATION: NE 6-35-2W5

▼ Less than 1%



Pebble Angularity: Subround and Broken

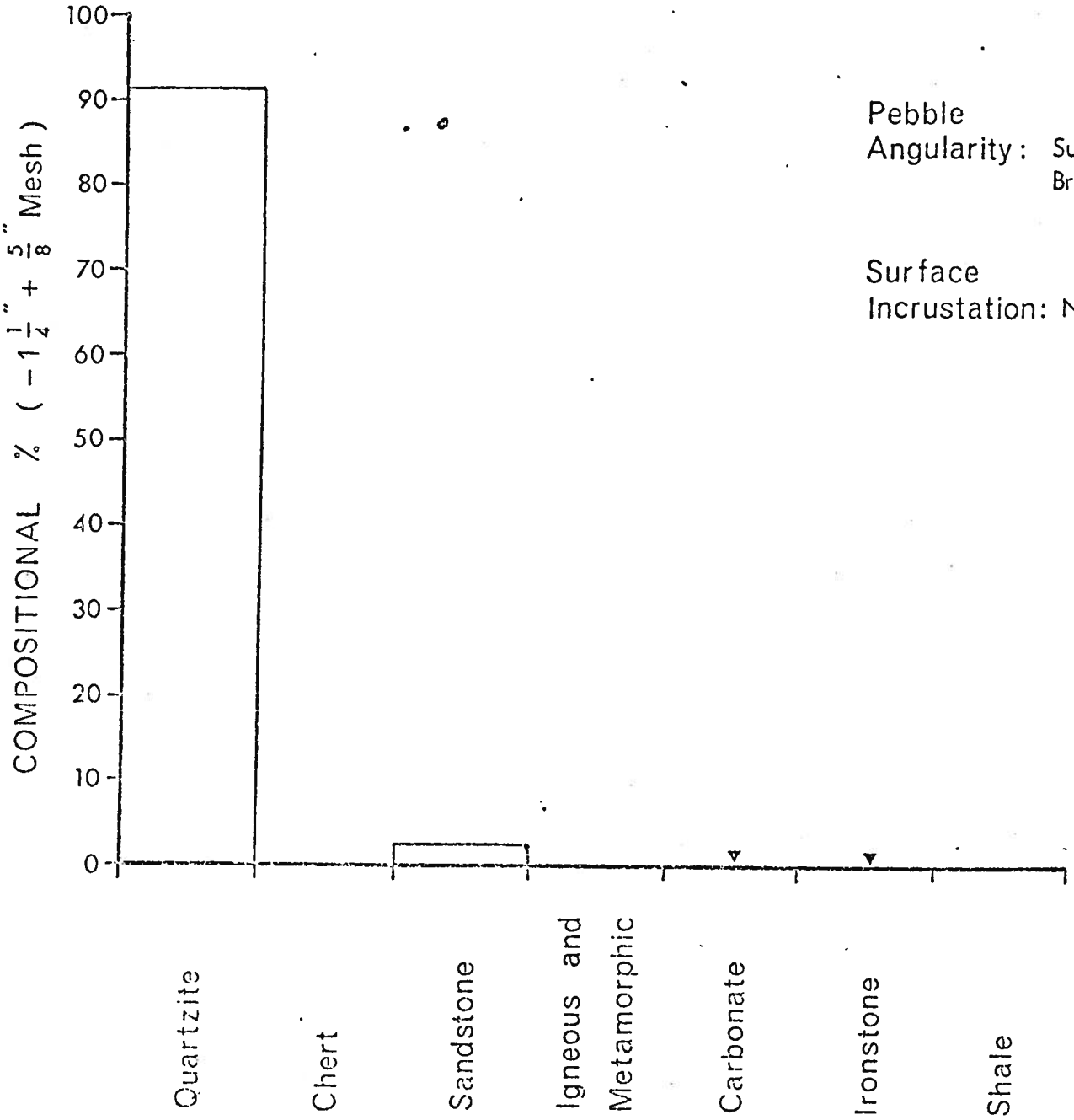
Surface Incrustation: Nil

SAMPLE NO.: Pit 5

DEPTH: 0 - 10

LOCATION: SE 5-41-27W4

▼ Less than 1%



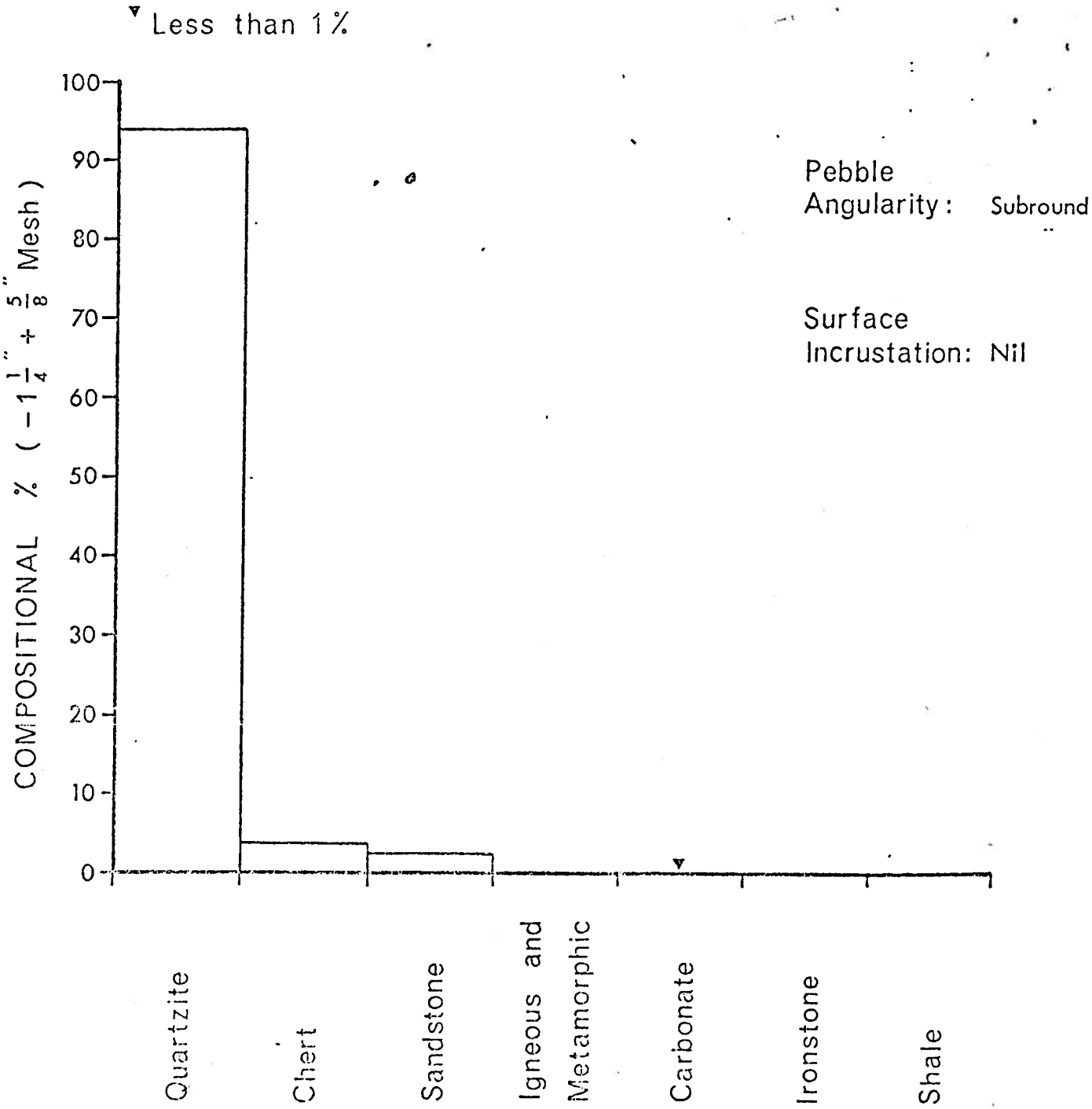
Pebble Angularity: Subround and Broken

Surface Incrustation: Nil

SAMPLE NO.: Pit 6

DEPTH: 3 - 15

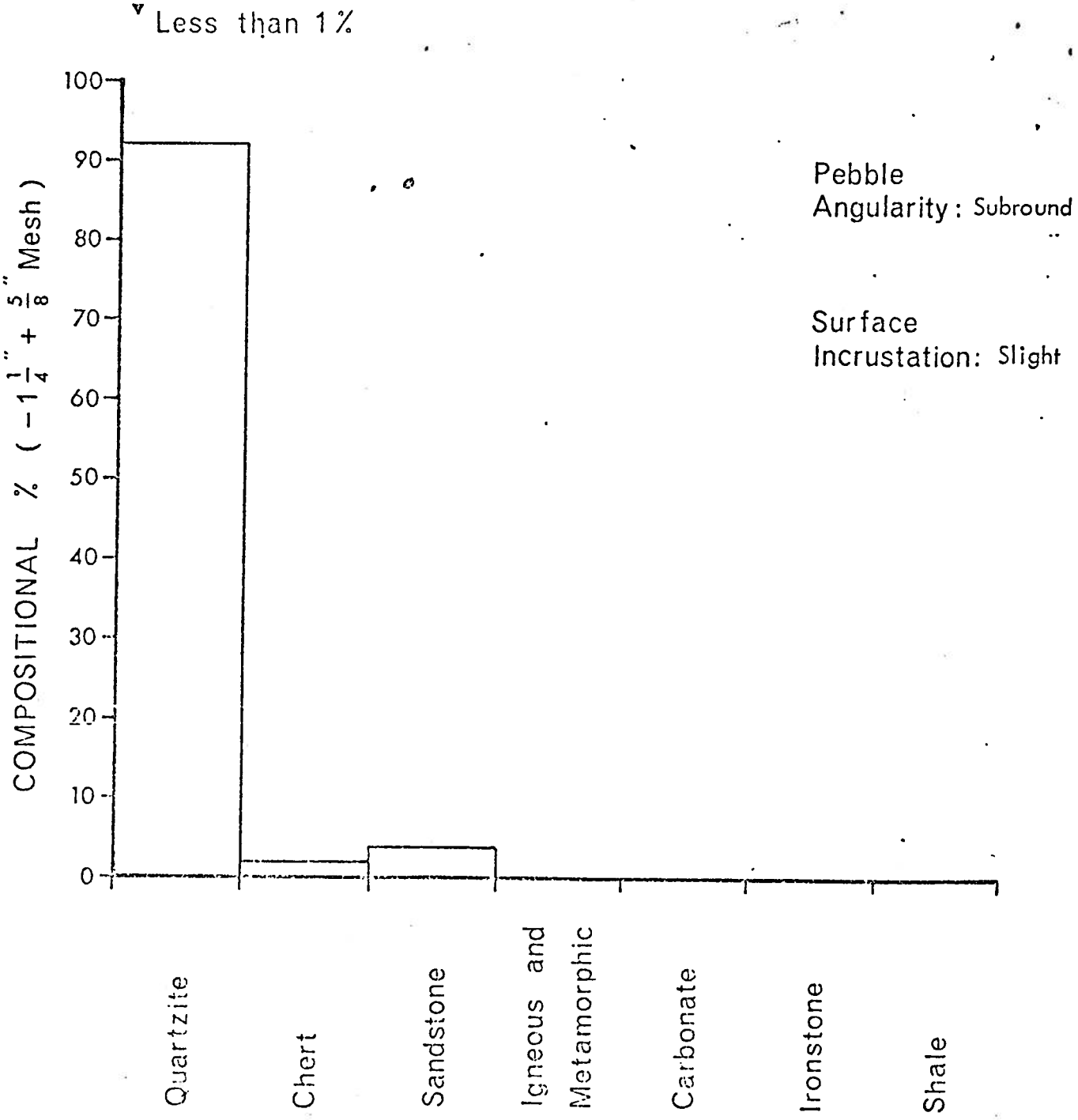
LOCATION: W 1/2 4-41-27W4



SAMPLE NO.: Pit 7

DEPTH: 3 - 20'

LOCATION: SE 16-41-27W4

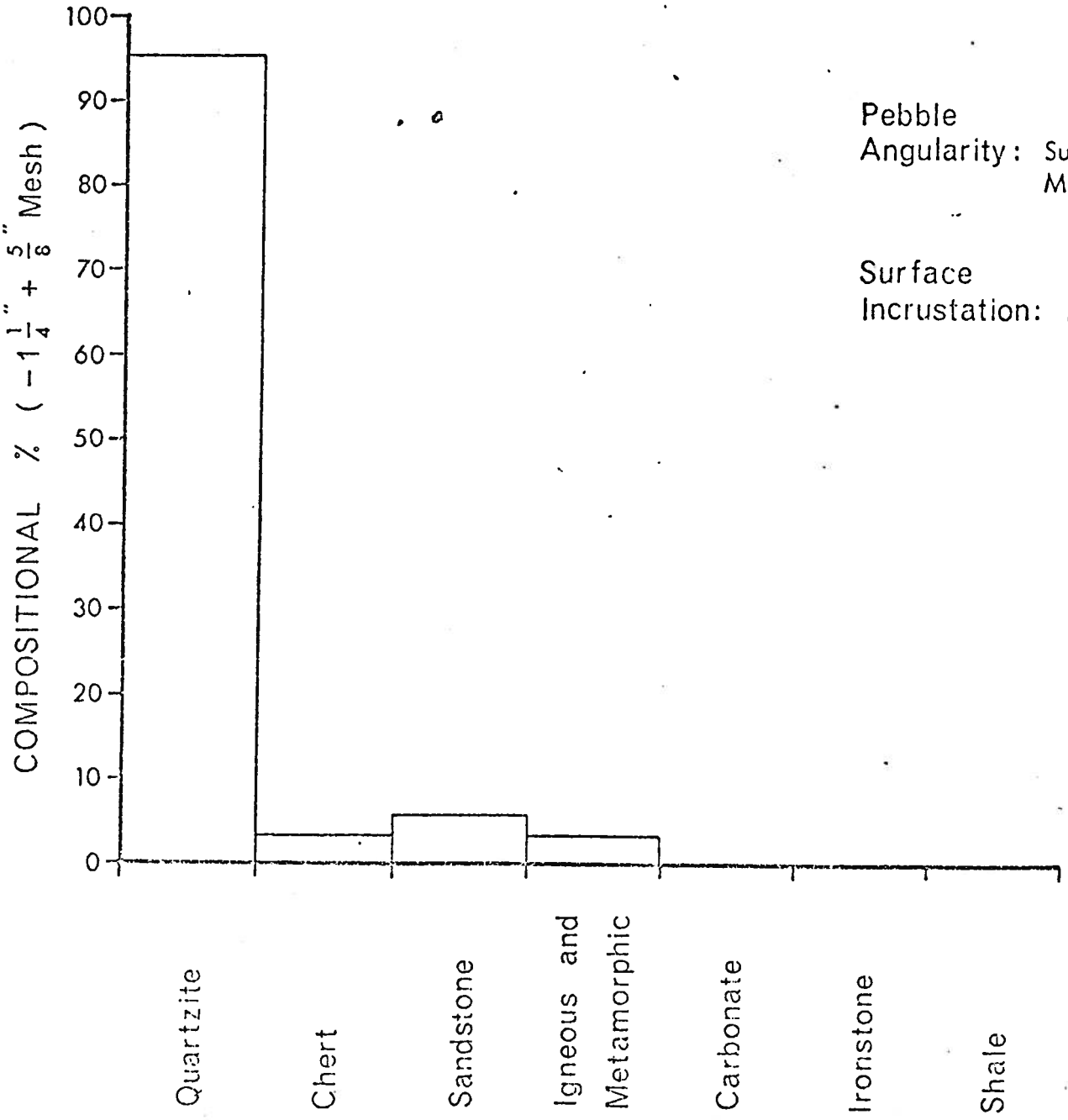


SAMPLE NO.: Pit 8

DEPTH : 2 - 5

LOCATION : SW 27-41-27W4

▼ Less than 1%



Pebble
Angularity: Subround, Minor Subangul

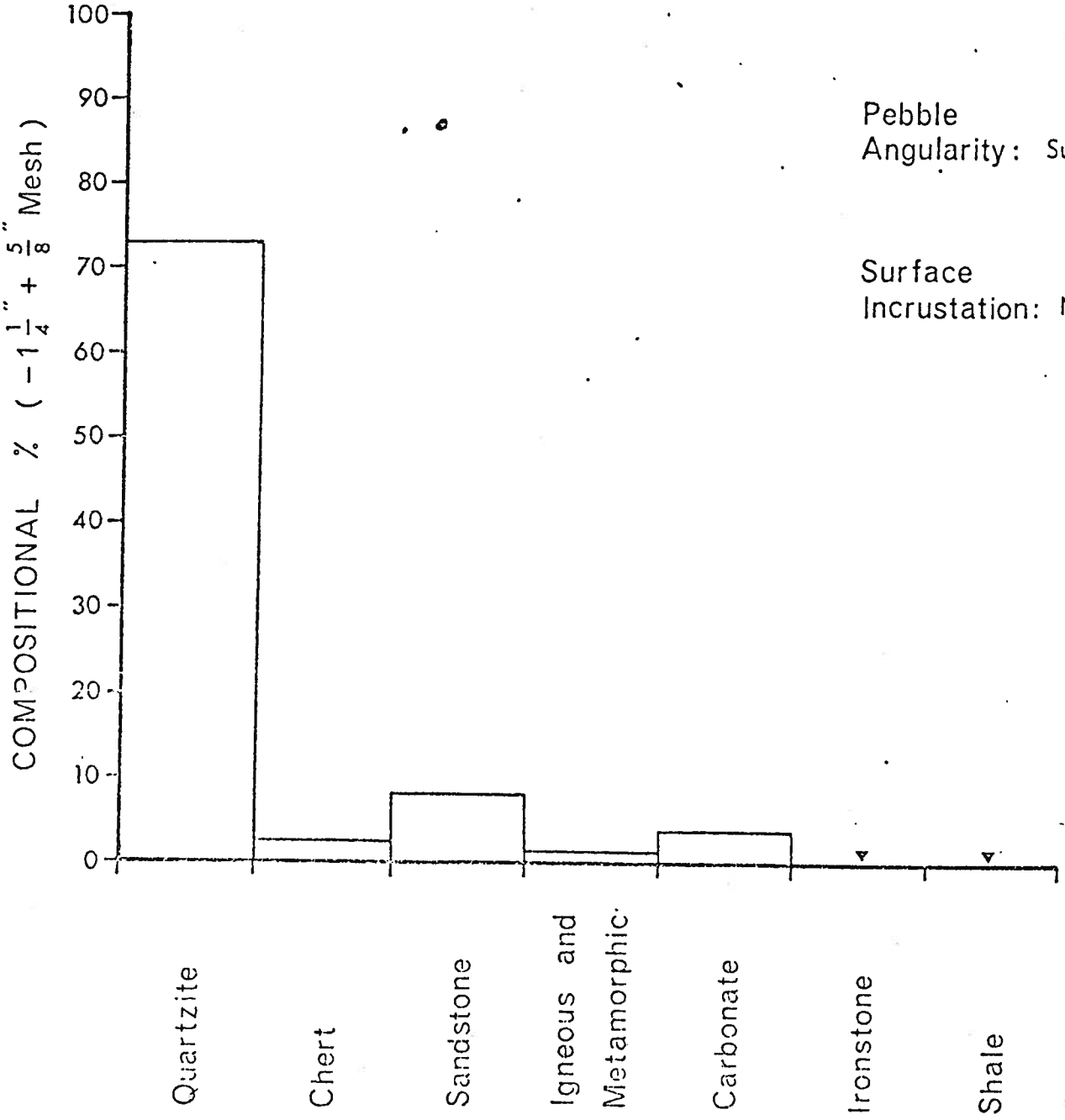
Surface
Incrustation: Nil

SAMPLE NO.: Pit 9

DEPTH: 1 - 2

LOCATION: E 1/2 22-41-27W4

▼ Less than 1%



Pebble
Angularity: Subround

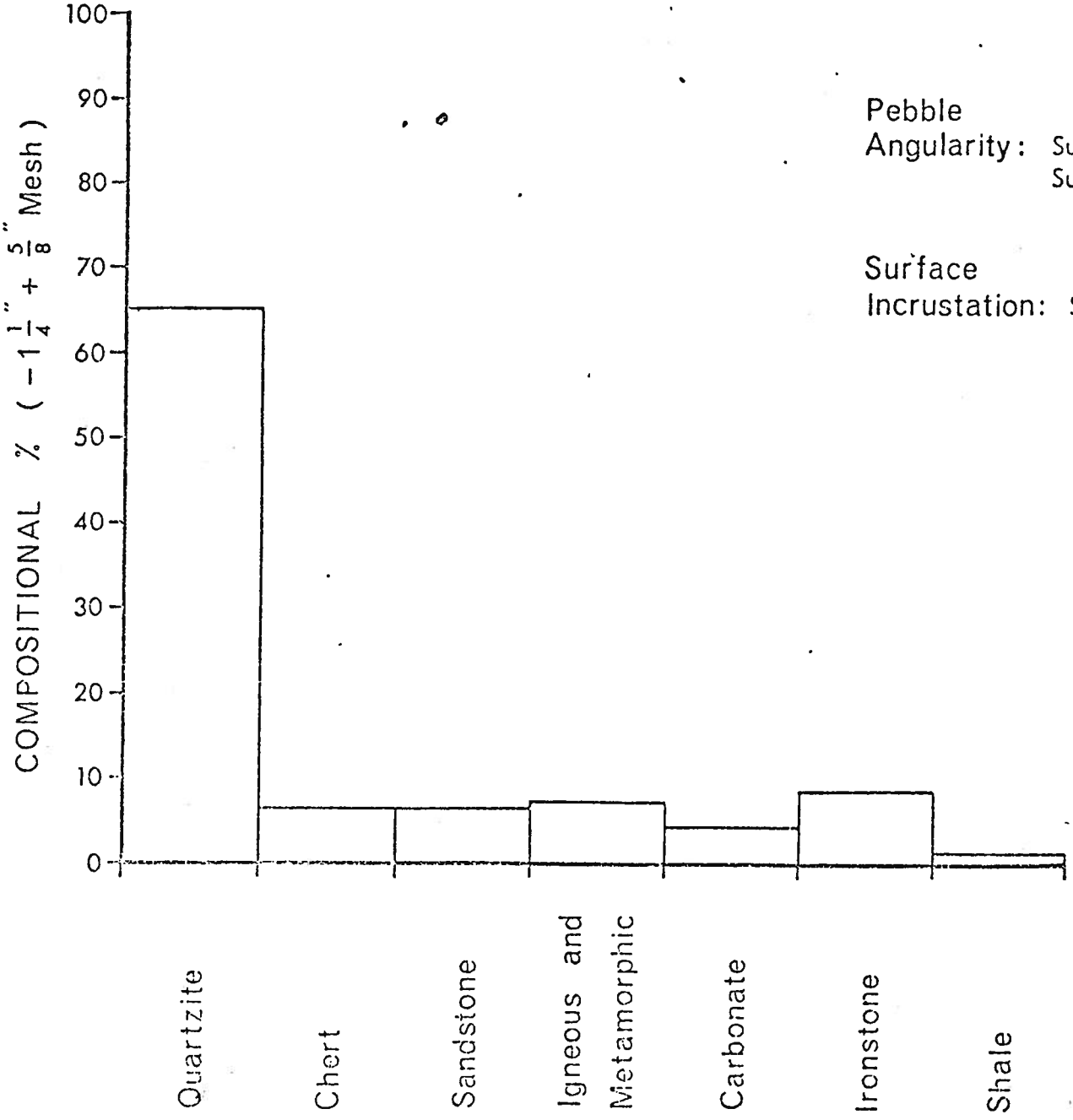
Surface
Incrustation: Nil

SAMPLE NO.: Pit 10

DEPTH: 0 - 6

LOCATION: N 1/2 22-42-26W4

* Less than 1%



Pebble Angularity: Subround to Subangular

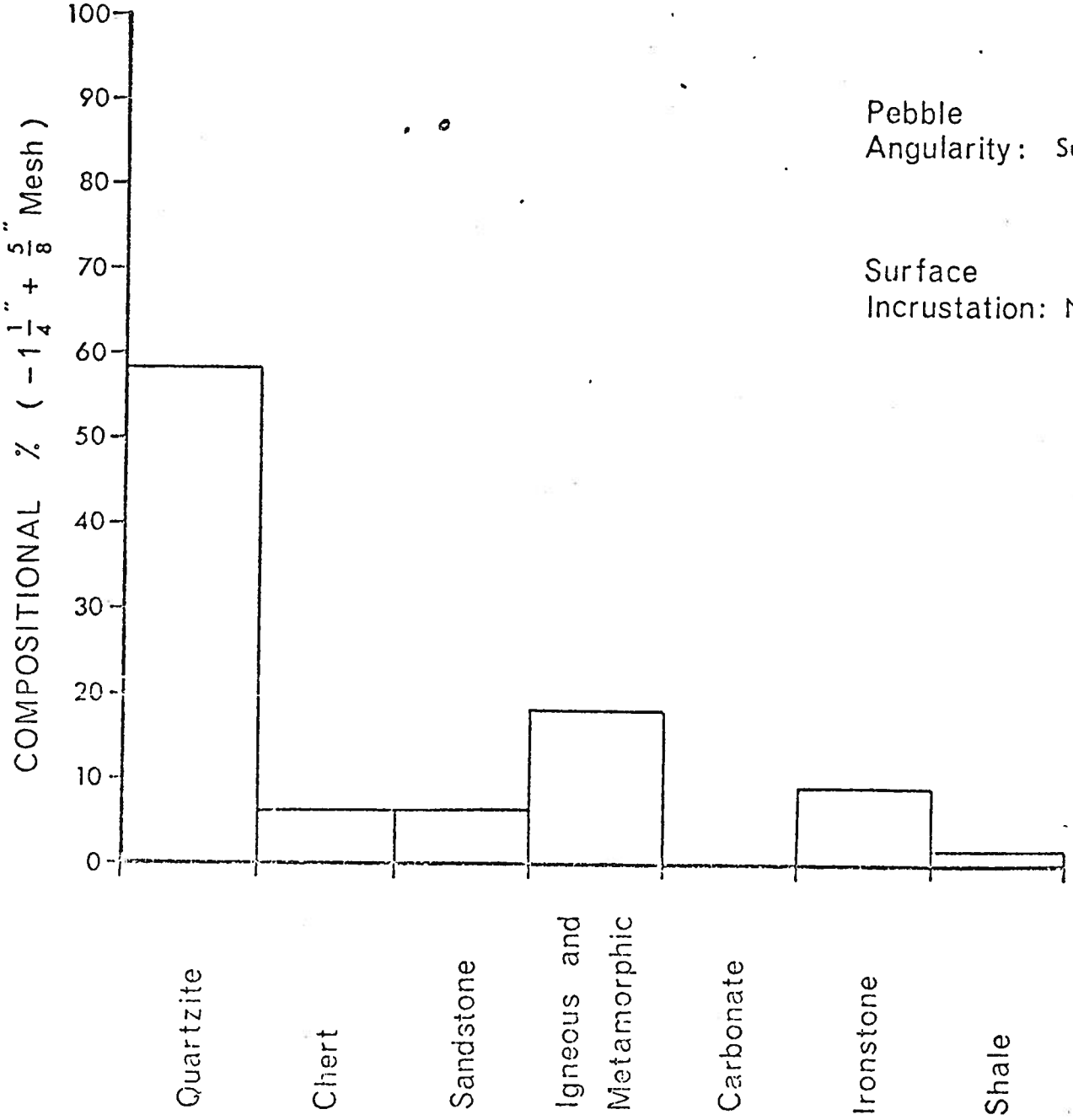
Surface Incrustation: Slight

SAMPLE NO.: Pit 11

DEPTH: 5

LOCATION: SW 25-42-26W4

▼ Less than 1%

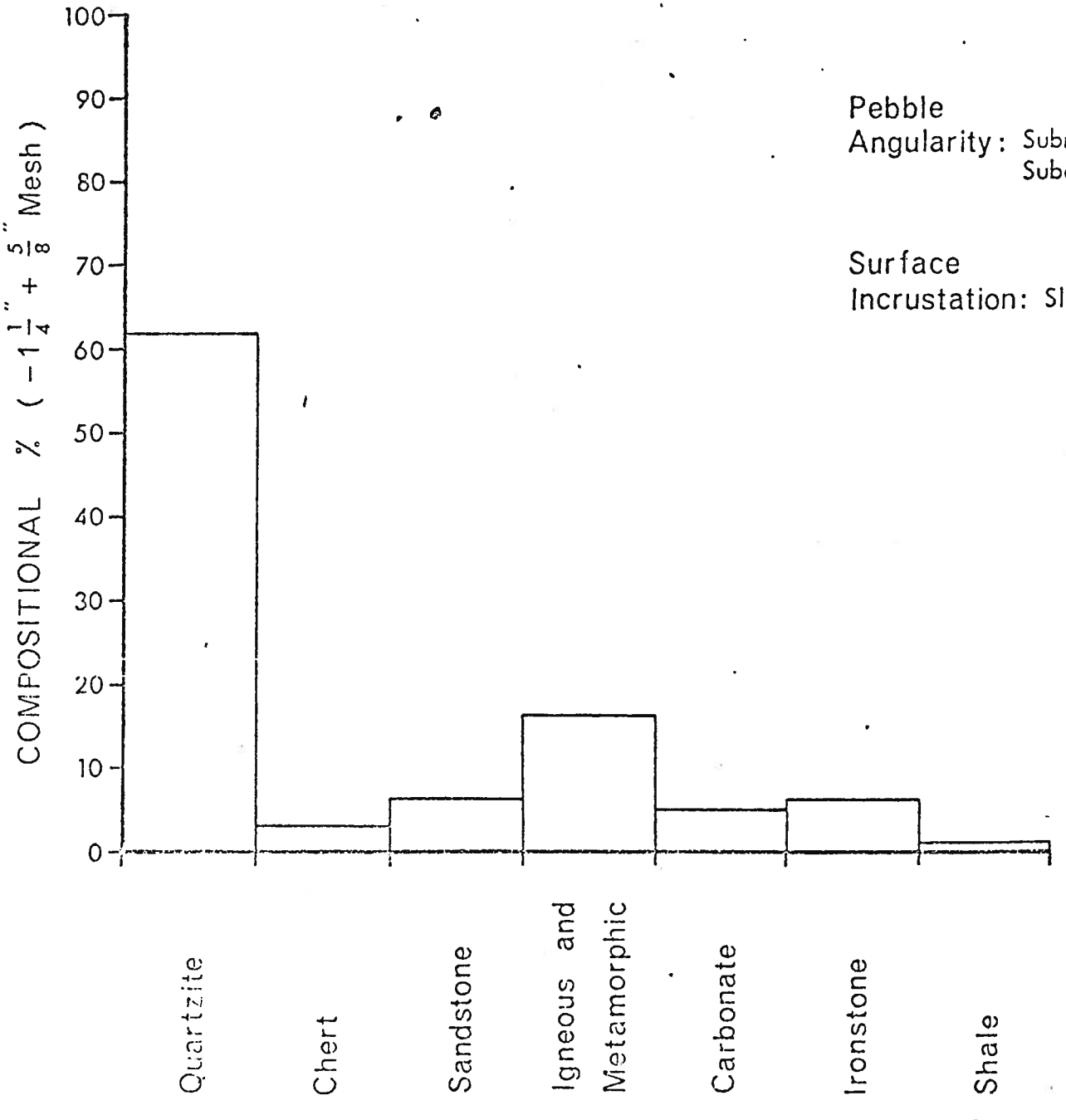


SAMPLE NO.: Pit 12

DEPTH: 10 - 15.

LOCATION: SW 35-42-26W4

* Less than 1%



Pebble Angularity: Subround to Subangular

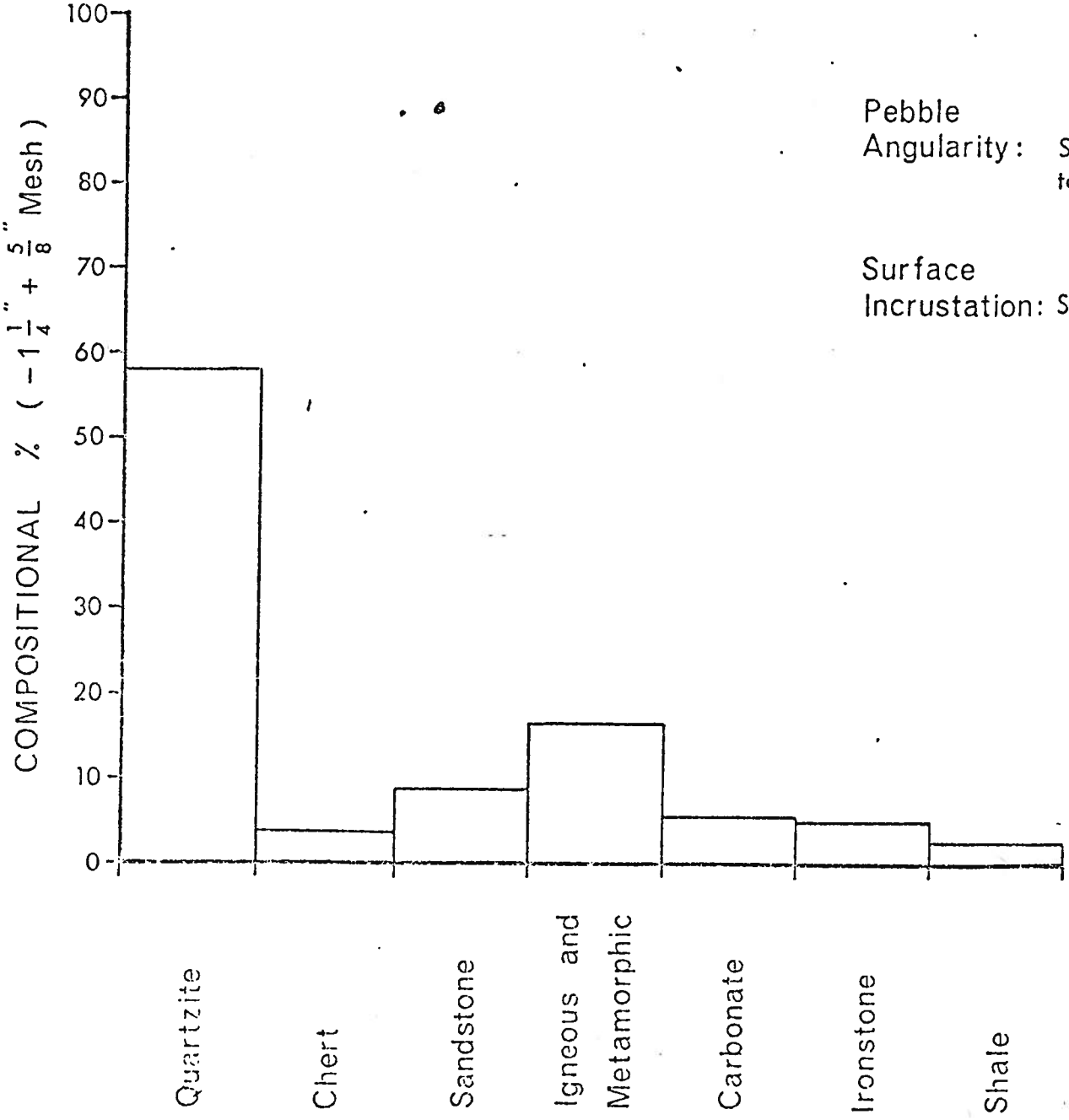
Surface Incrustation: Slight

SAMPLE NO.: Pit 13

DEPTH: 4 - 6'

LOCATION: SW 27-42-26W4

Less than 1%

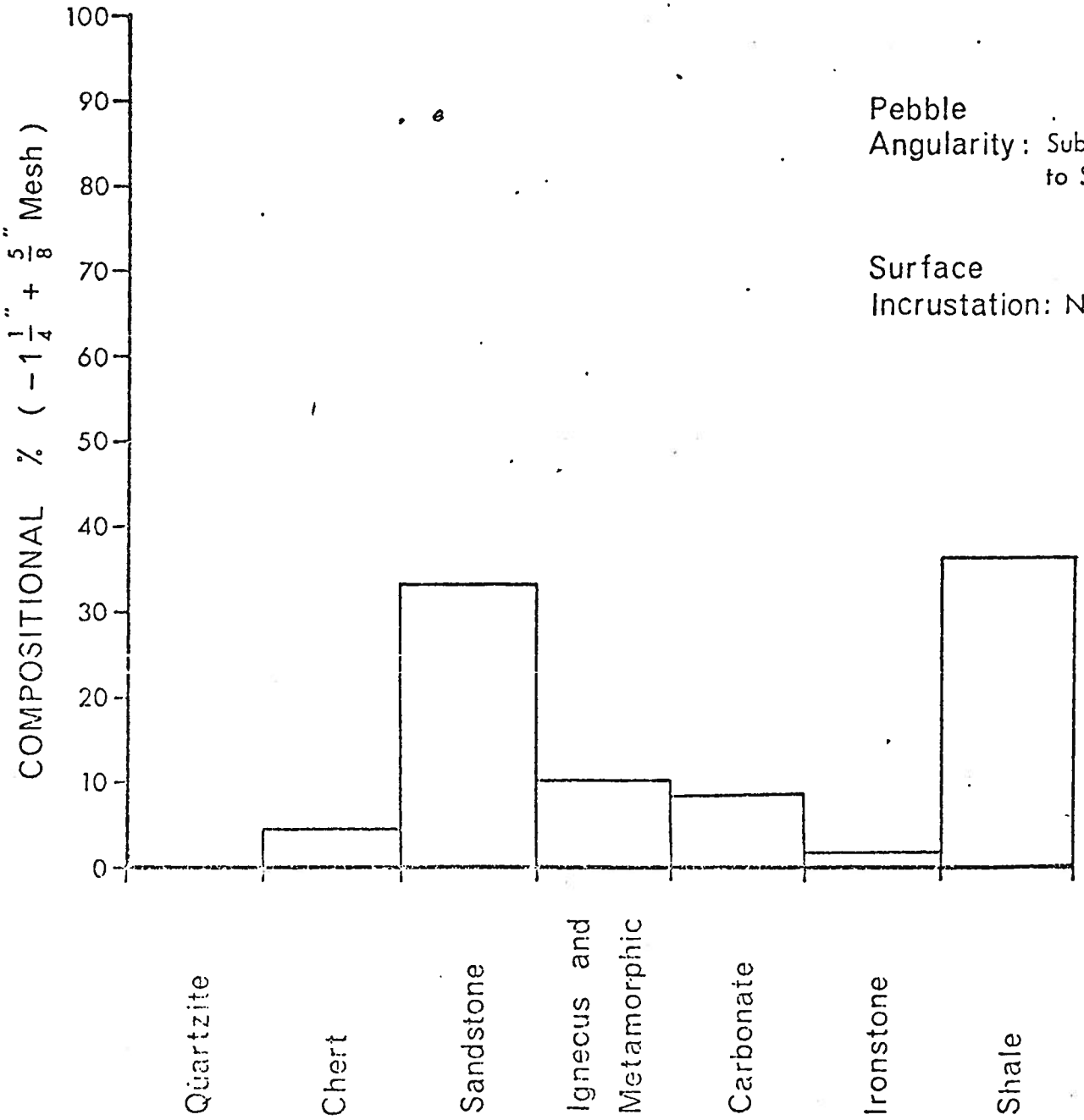


SAMPLE NO.: Pit 14

DEPTH: 0 - 5

LOCATION: N1/2 1-42-25W4

▼ Less than 1%

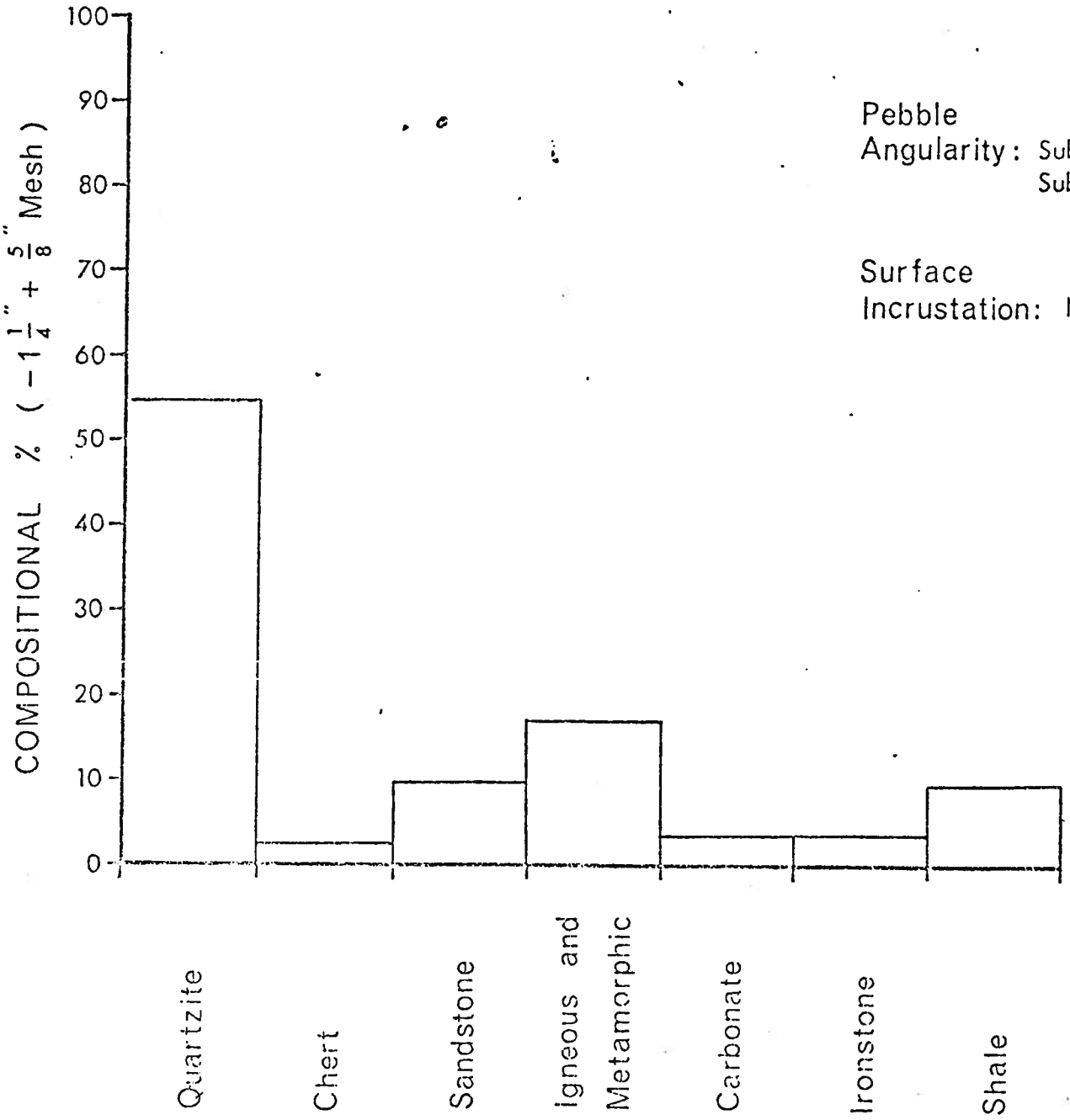


SAMPLE NO.: Pit 15

DEPTH: 12 - 15

LOCATION: SE 16-40-1W5

▼ Less than 1%



Pebble Angularity: Subround to Subangular

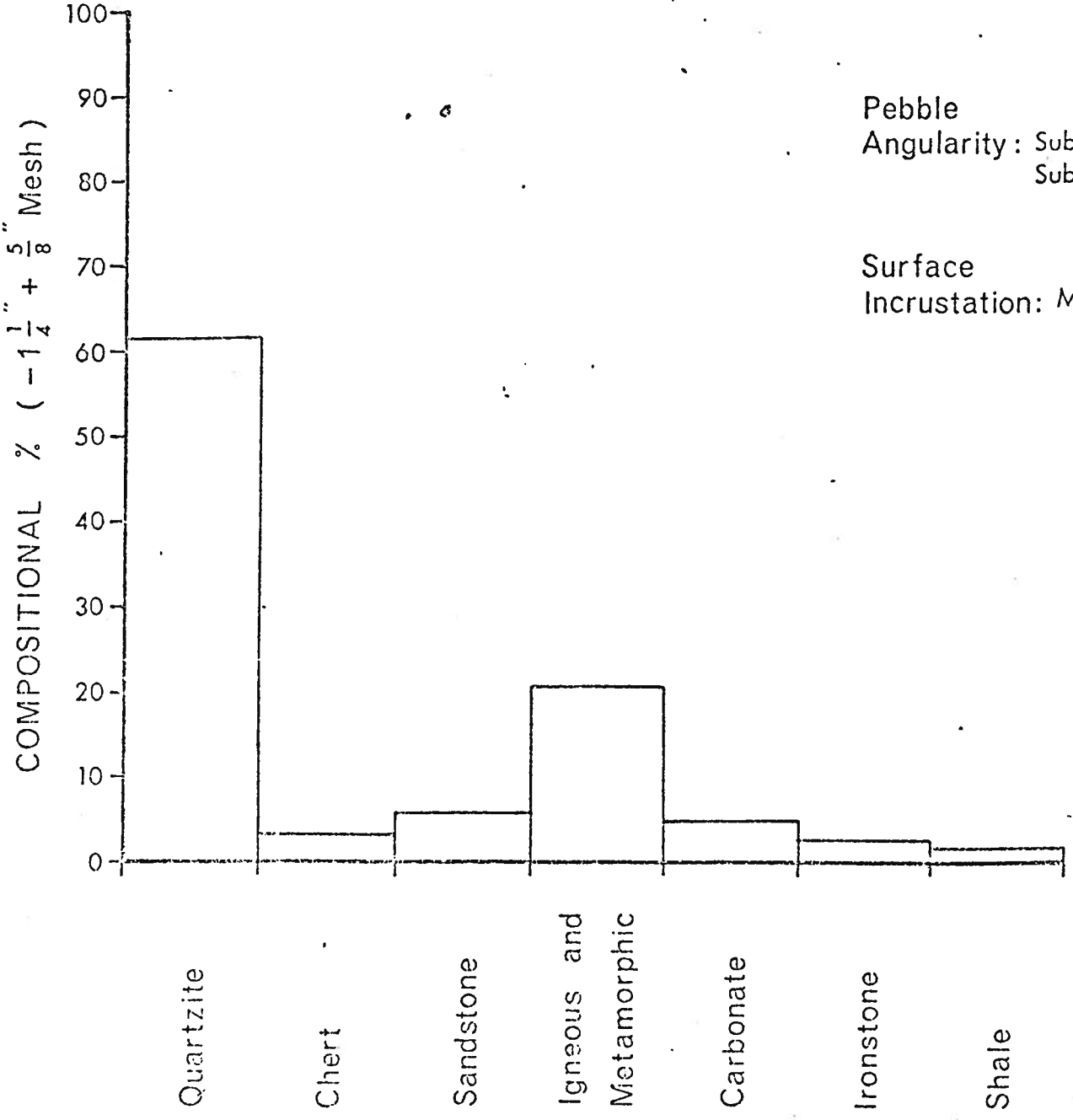
Surface Incrustation: Nil

SAMPLE NO.: Pit 16

DEPTH: 6 - 10 '

LOCATION: E 1/2 21-39-27W4

* Less than 1%



Pebble
Angularity: Subround to Subangular

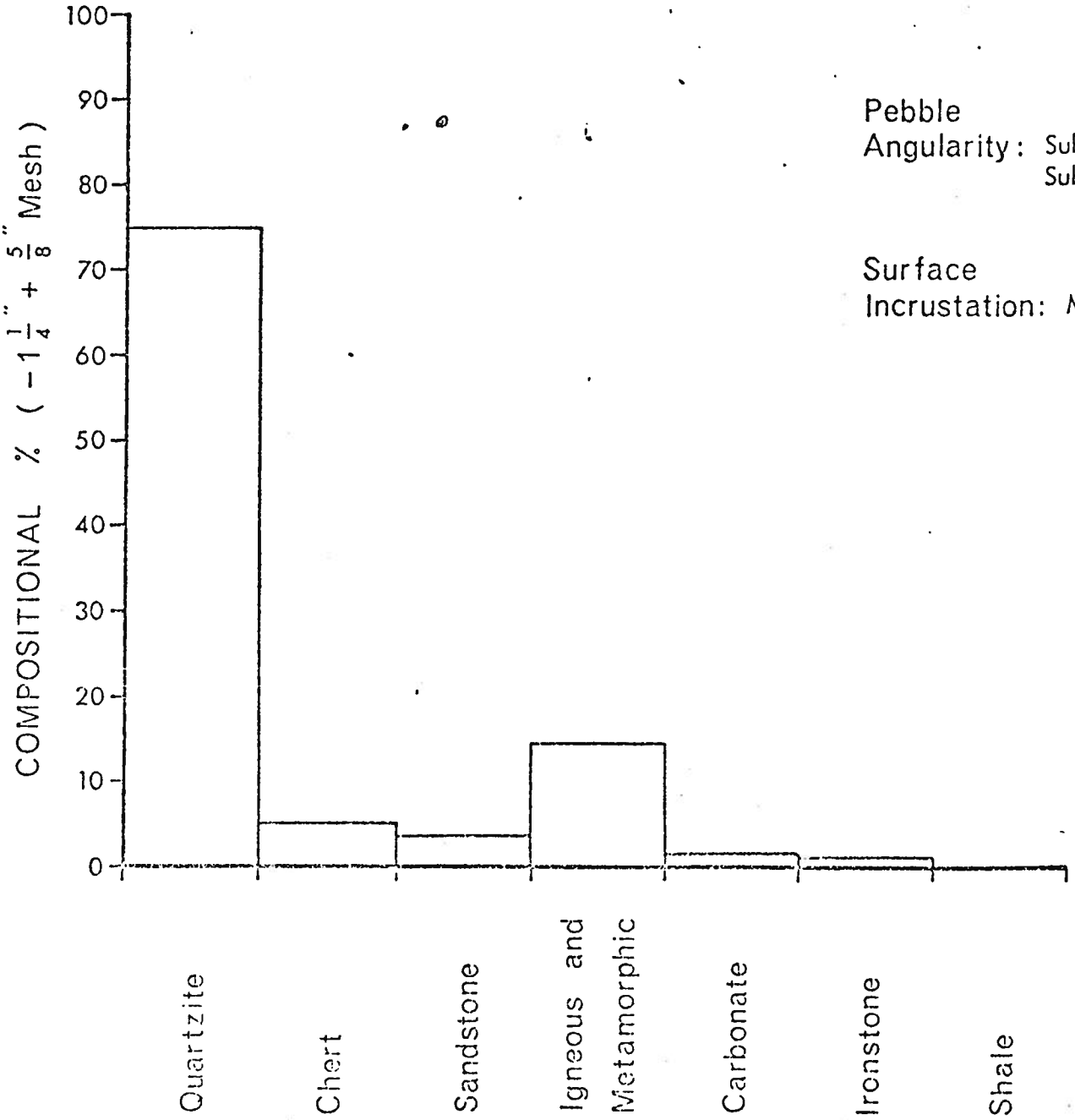
Surface
Incrustation: Moderate

SAMPLE NO.: Pit 17

DEPTH: 2 - 6

LOCATION: N 1/2 31-40-23W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

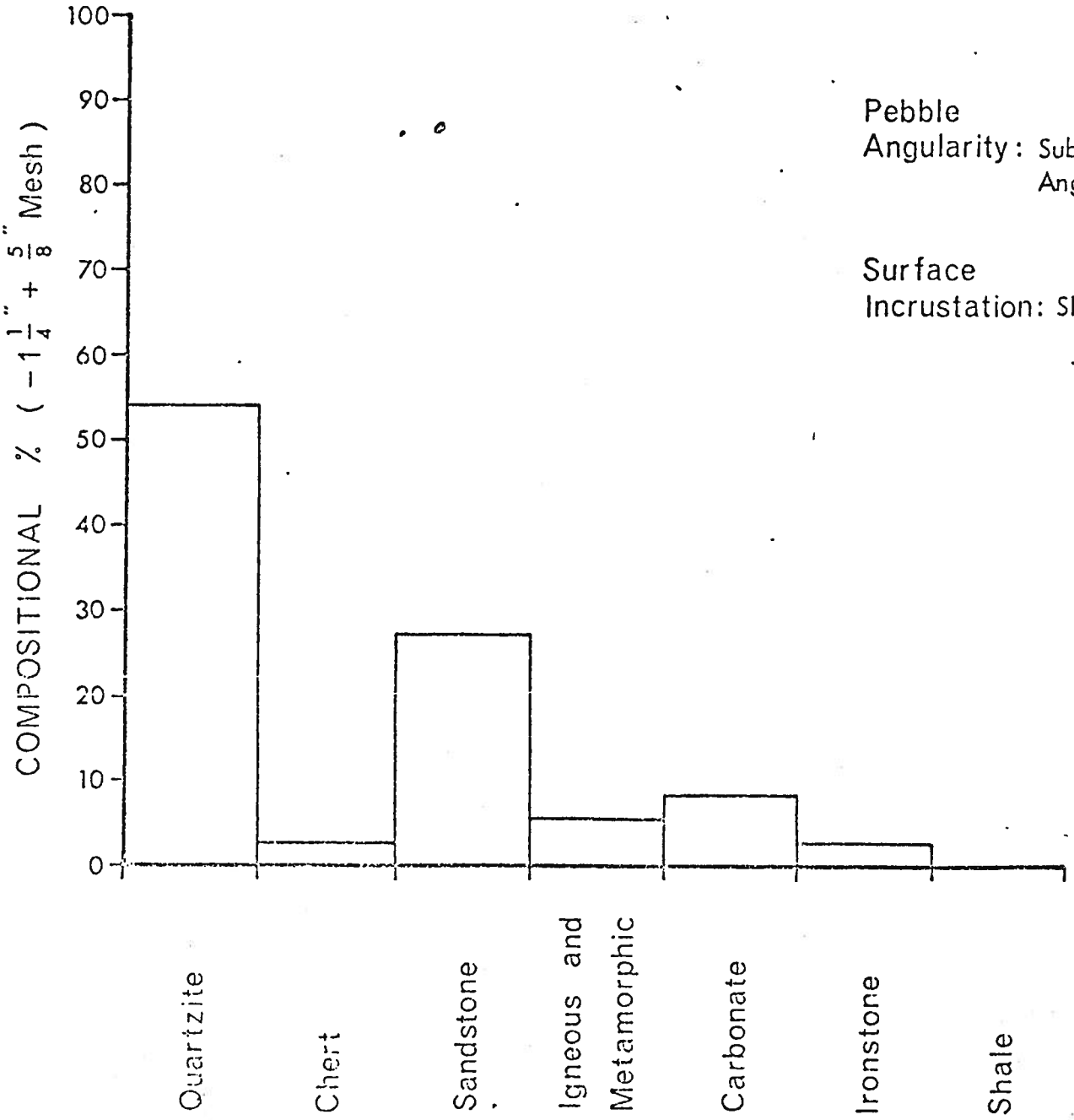
Surface Incrustation: Moderate

SAMPLE NO.: Pit 18

DEPTH: 2 - 5

LOCATION: S 1/2 29-40-23W4

▼ Less than 1%



Pebble Angularity: Subround to Angular

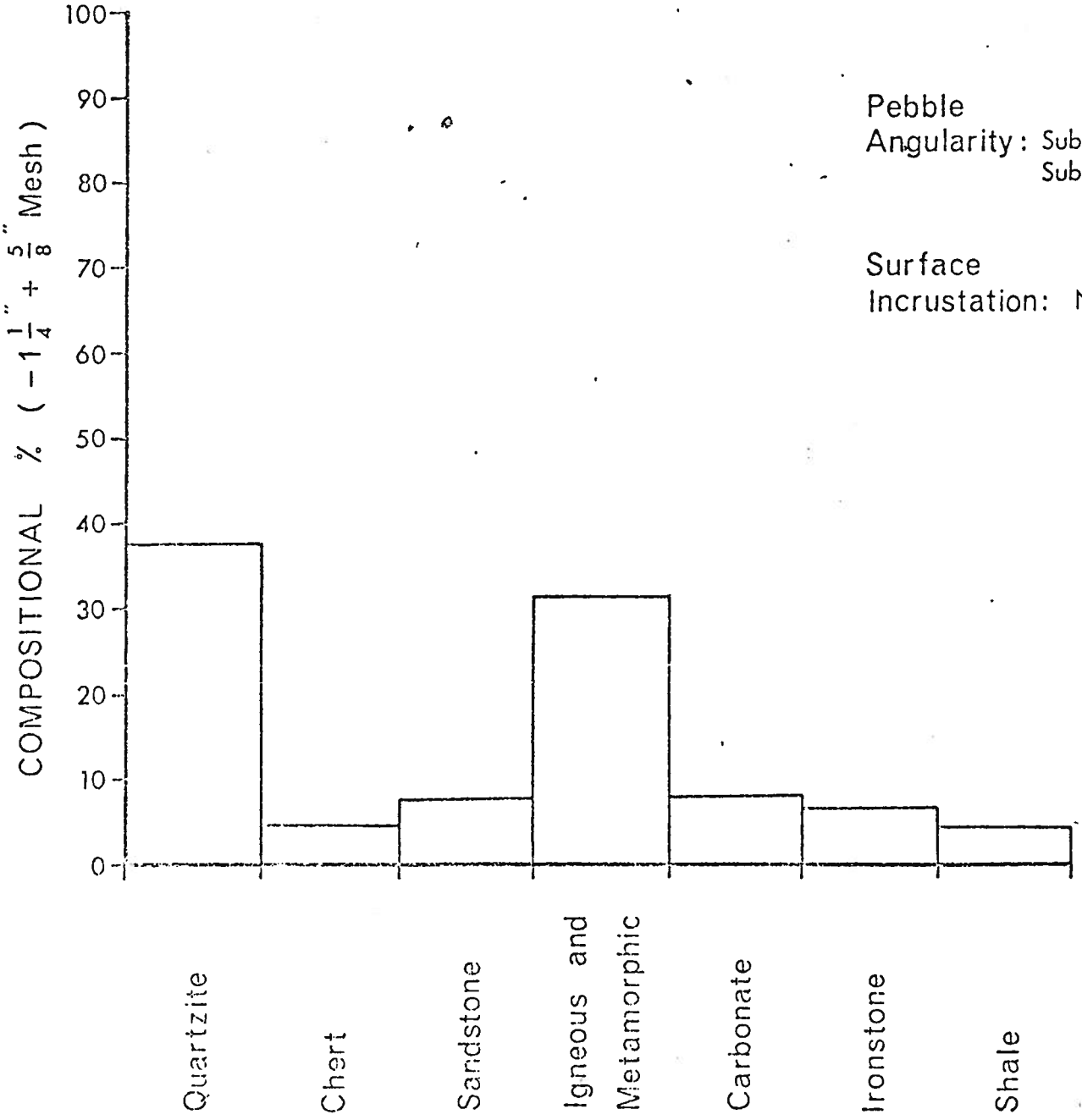
Surface Incrustation: Slight

SAMPLE NO.: Pit 19

DEPTH: 0 - 5

LOCATION: NW 12-41-23W4

* Less than 1%



Pebble
Angularity: Subround to Subangular

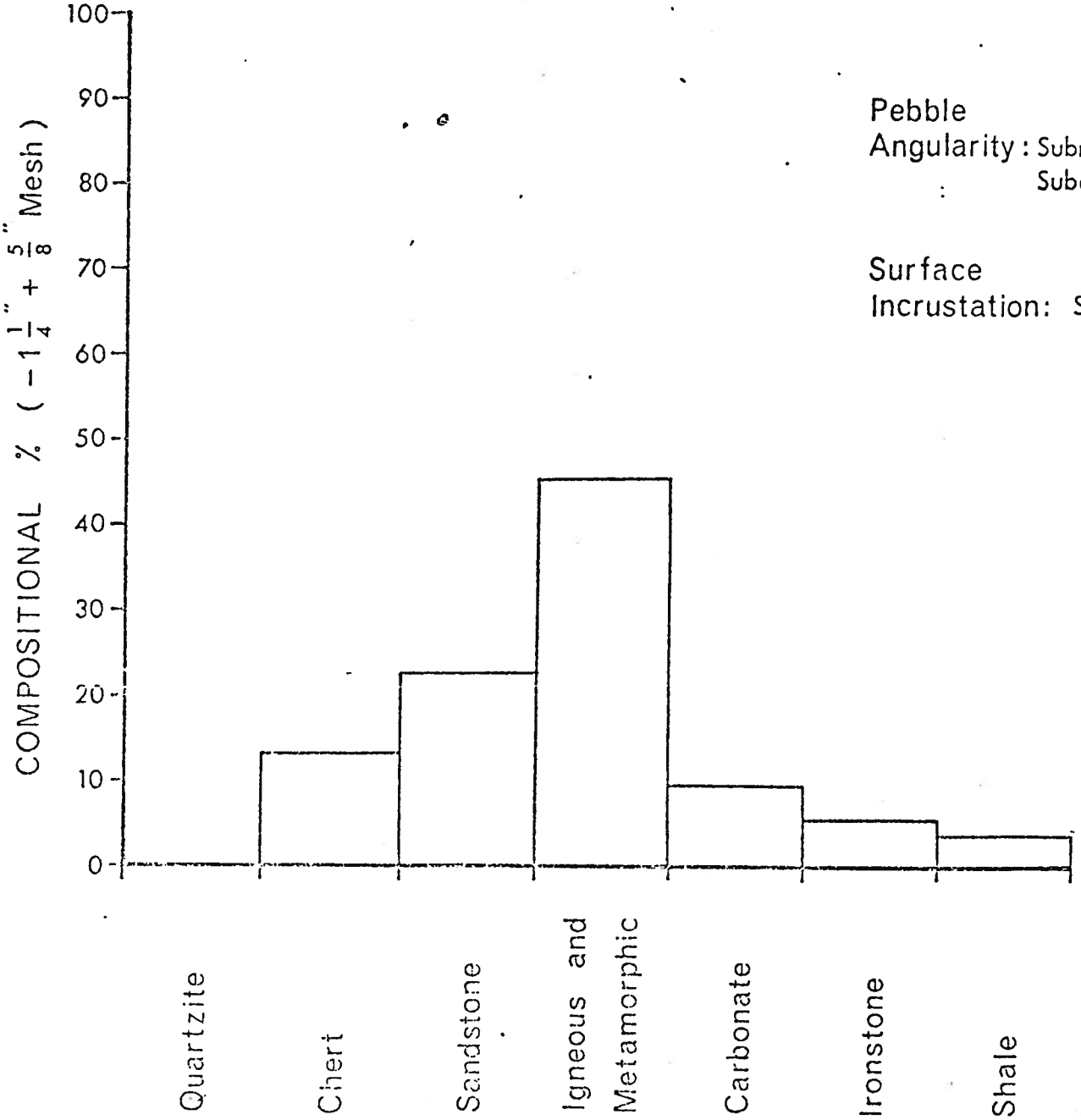
Surface
Incrustation: Nil

SAMPLE NO.: Pit 20

DEPTH: 3

LOCATION: S 1/2 5-41-24W4

* Less than 1%



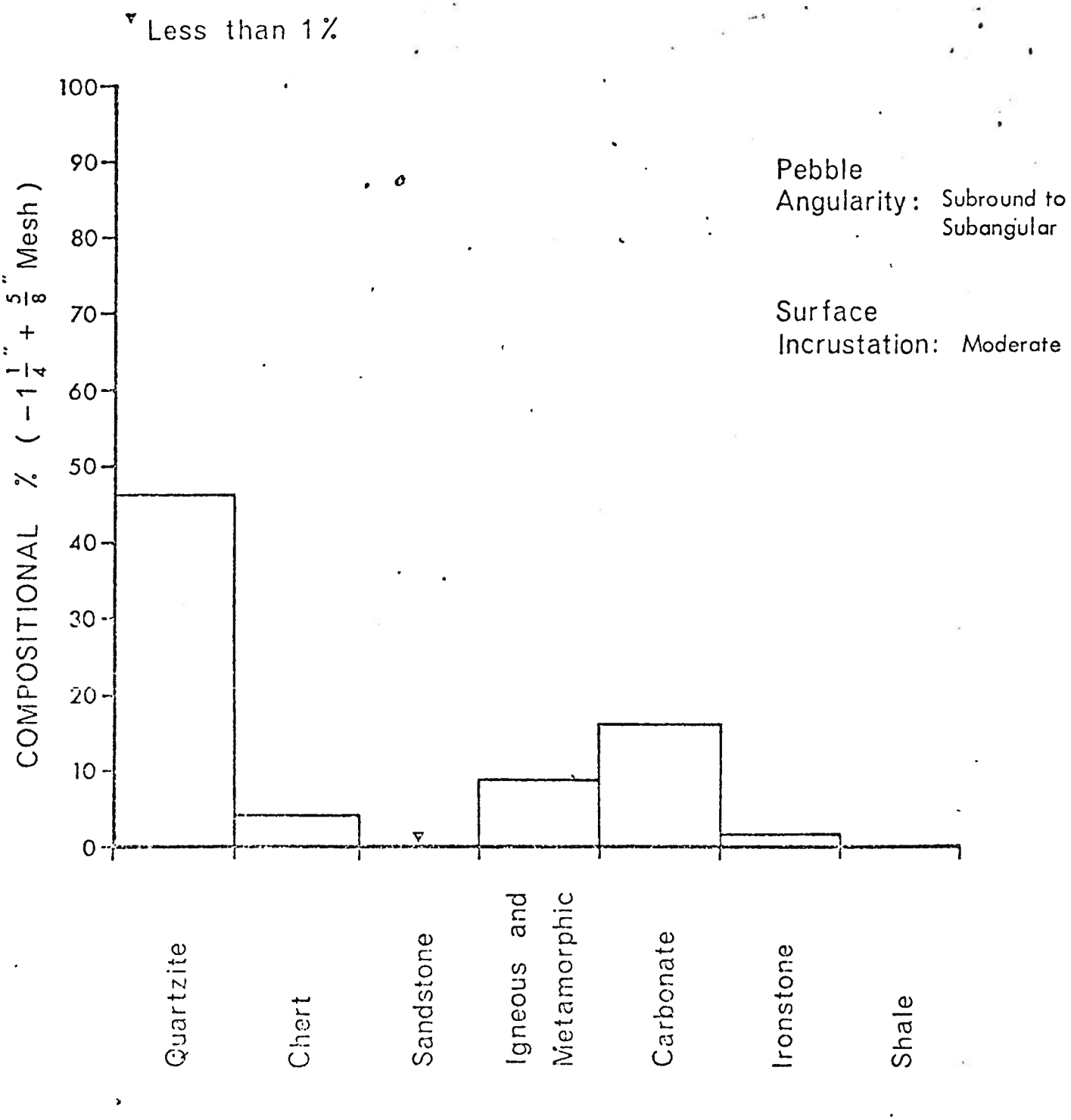
Pebble
Angularity : Subround to Subangular

Surface
Incrustation: Slight

SAMPLE NO.: Pit 21

DEPTH : 3 - 6

LOCATION : W1/2 36-40-24W4

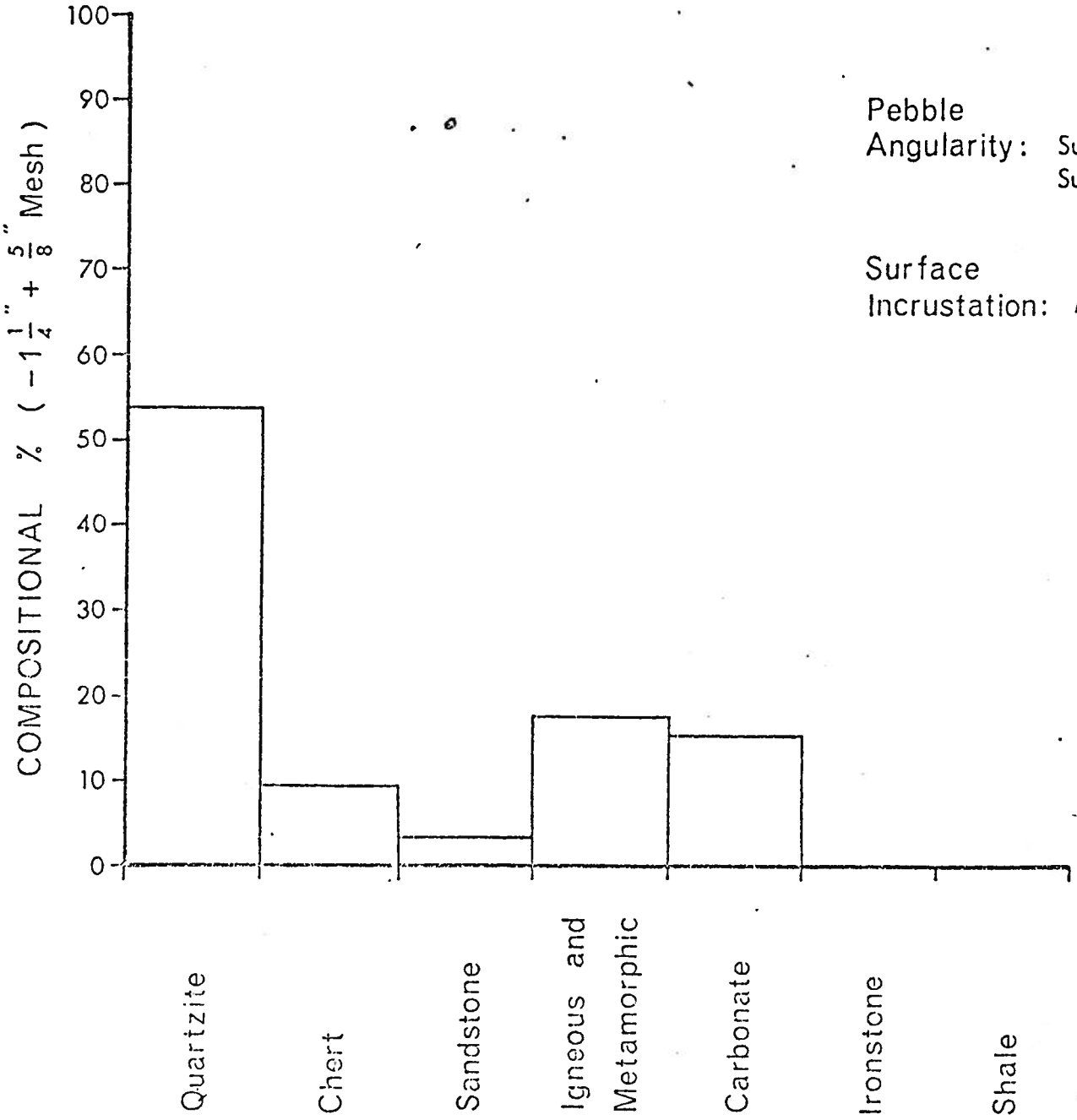


SAMPLE NO.: Pit 22

DEPTH: 2 - 5

LOCATION: NW 33-38-23W4

▼ Less than 1%



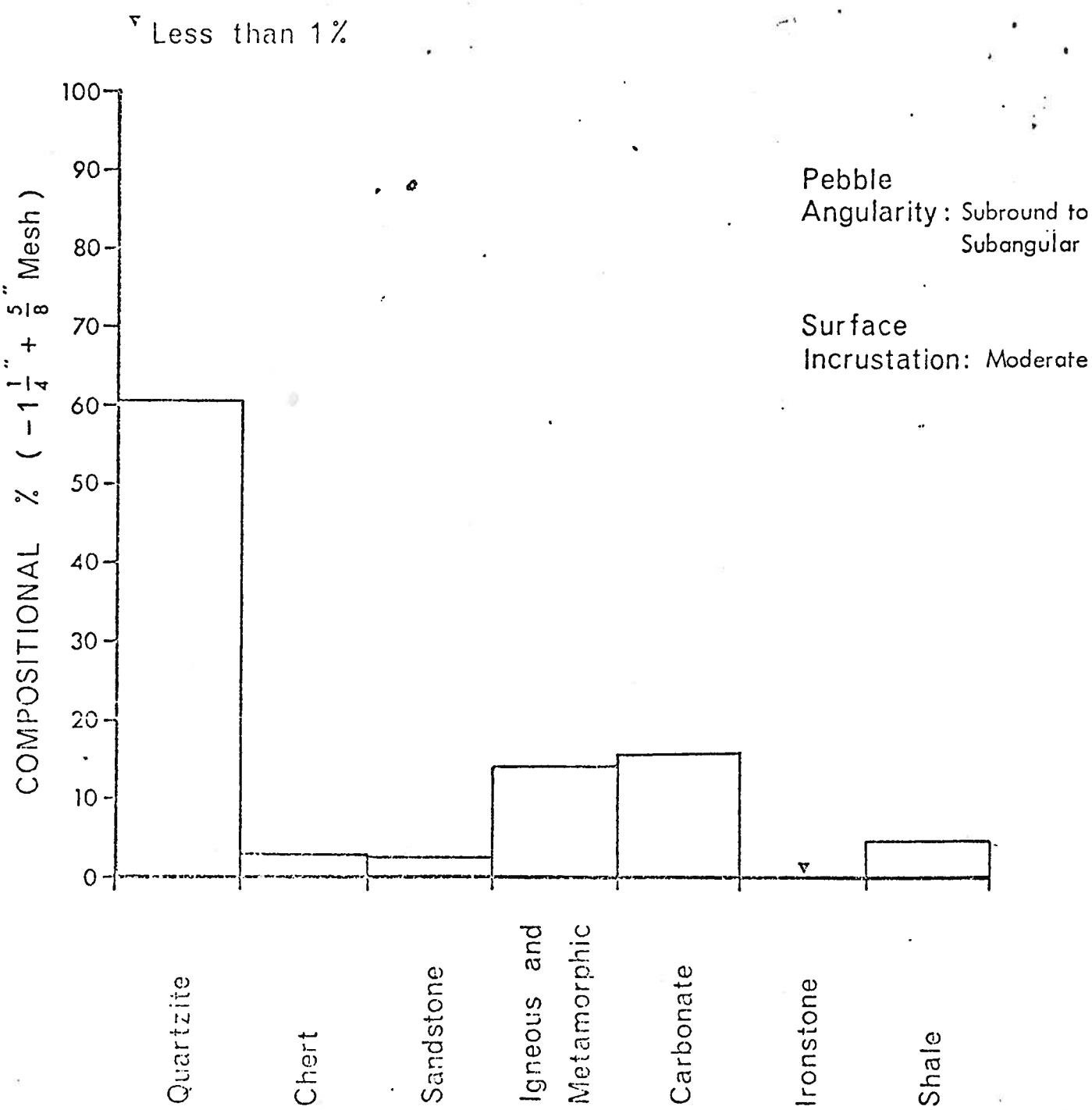
Pebble Angularity: Subround to Subangular

Surface Incrustation: Moderate

SAMPLE NO.: Pit 23

DEPTH: 0 - 4

LOCATION: W1/2 17-33-23W4

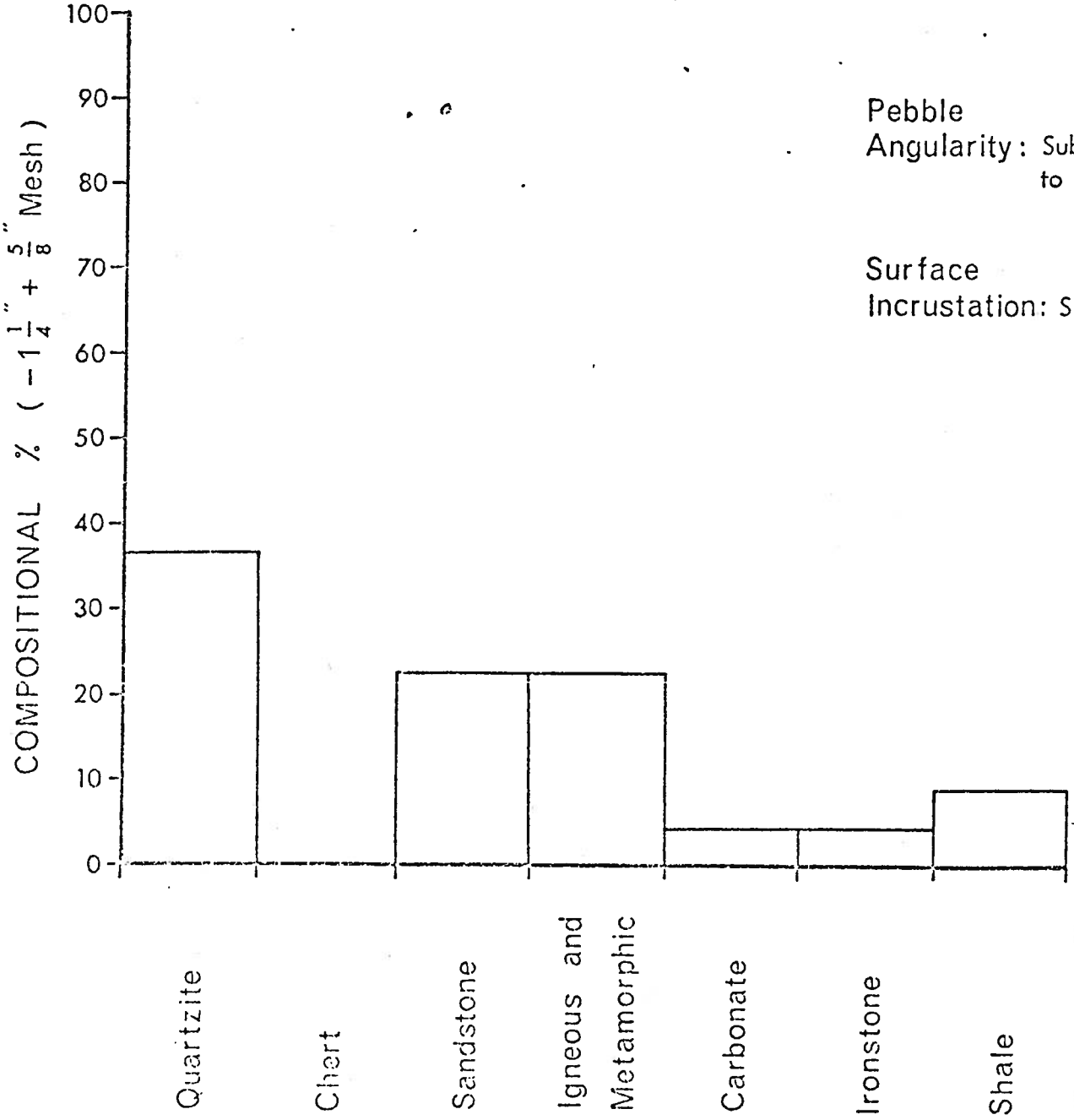


SAMPLE NO.: Pit 24

DEPTH: 0 - 15 '

LOCATION: SW 18-38-23W4

▼ Less than 1%



Pebble
Angularity: Subangular to Subround

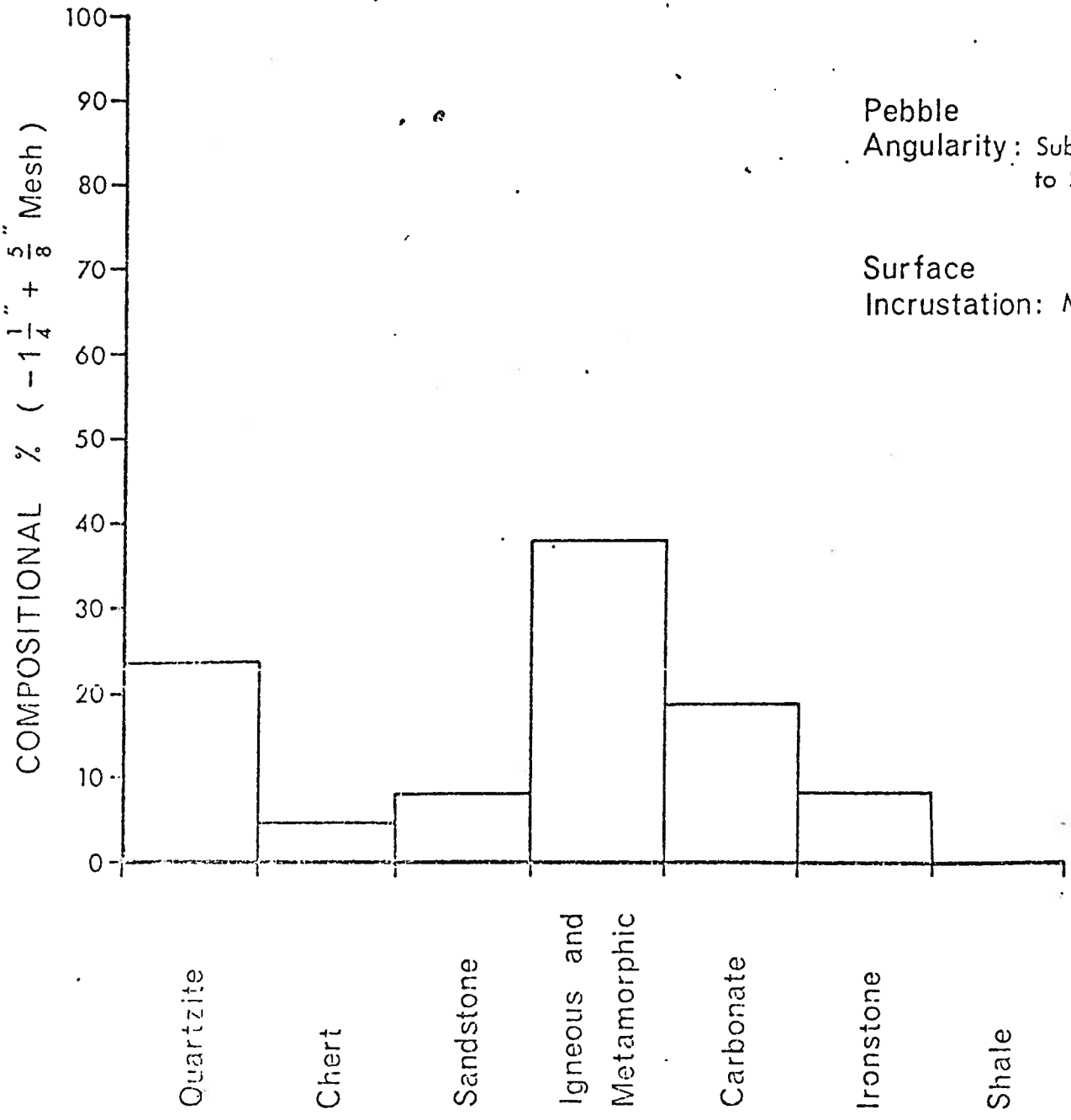
Surface
Incrustation: Slight

SAMPLE NO.: Pit 25

DEPTH: 20 - 25

LOCATION: NW 33-37-26W4

* Less than 1%



Pebble
Angularity: Subangular to Subround

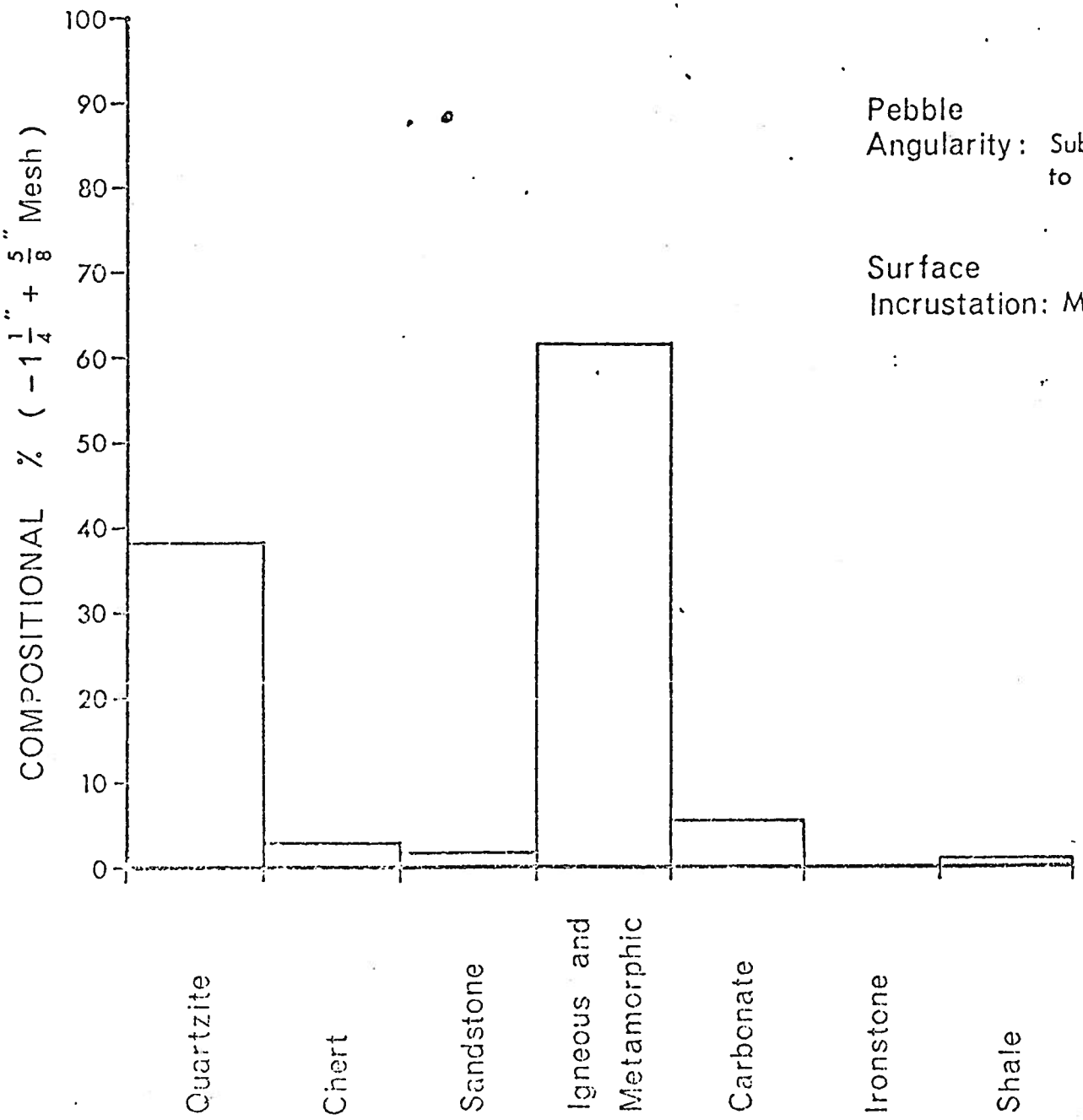
Surface
Incrustation: Moderate

SAMPLE NO.: Pit 26

DEPTH: 2-7

LOCATION: NW 3-38-24W4

▼ Less than 1%



Pebble Angularity: Subangular to Subround

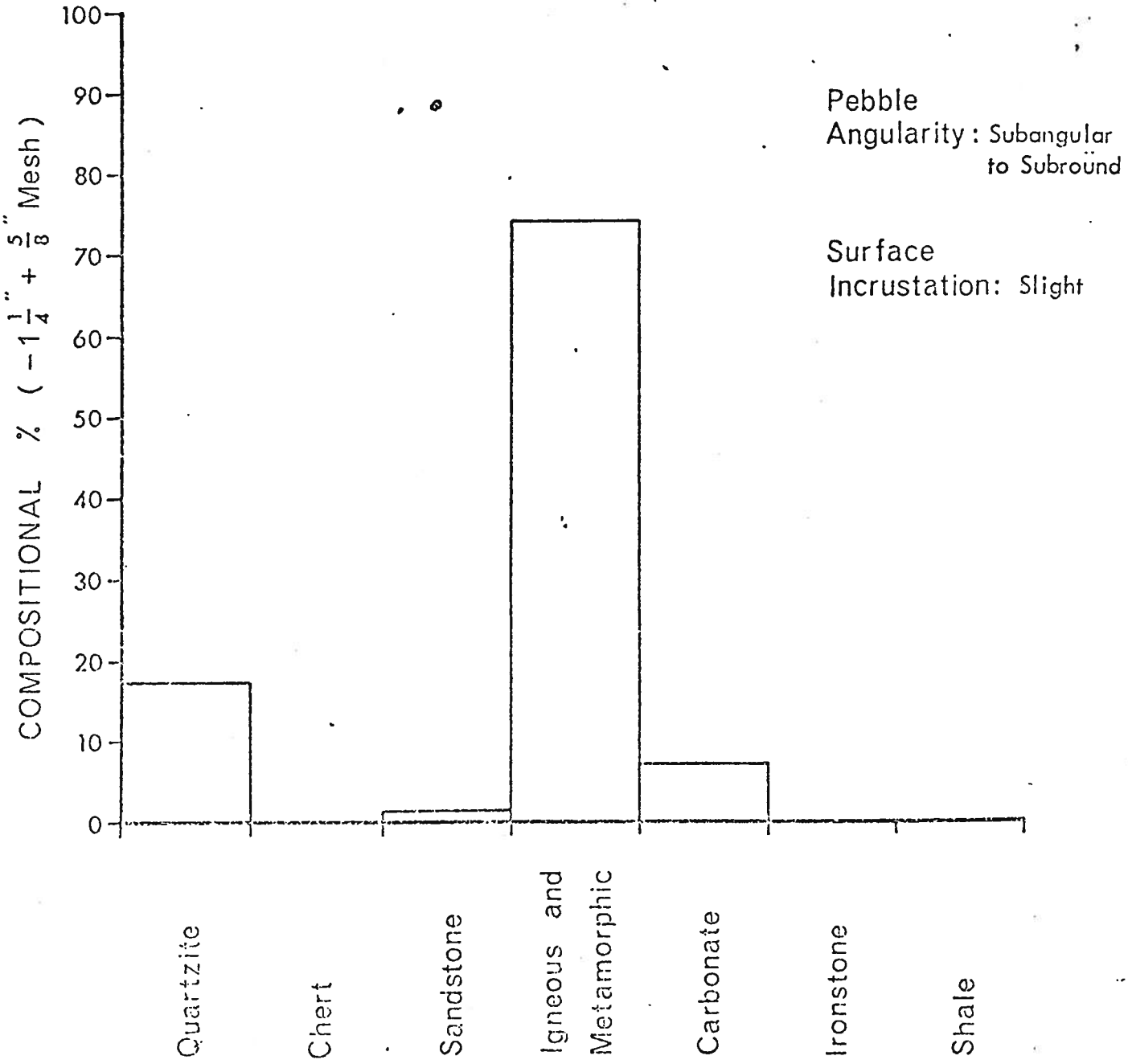
Surface Incrustation: Moderate

SAMPLE NO.: Pit 27

DEPTH: 0 - 6 '

LOCATION: SW 1-38-24W4

▼ Less than 1%



Pebble
Angularity : Subangular to Subround

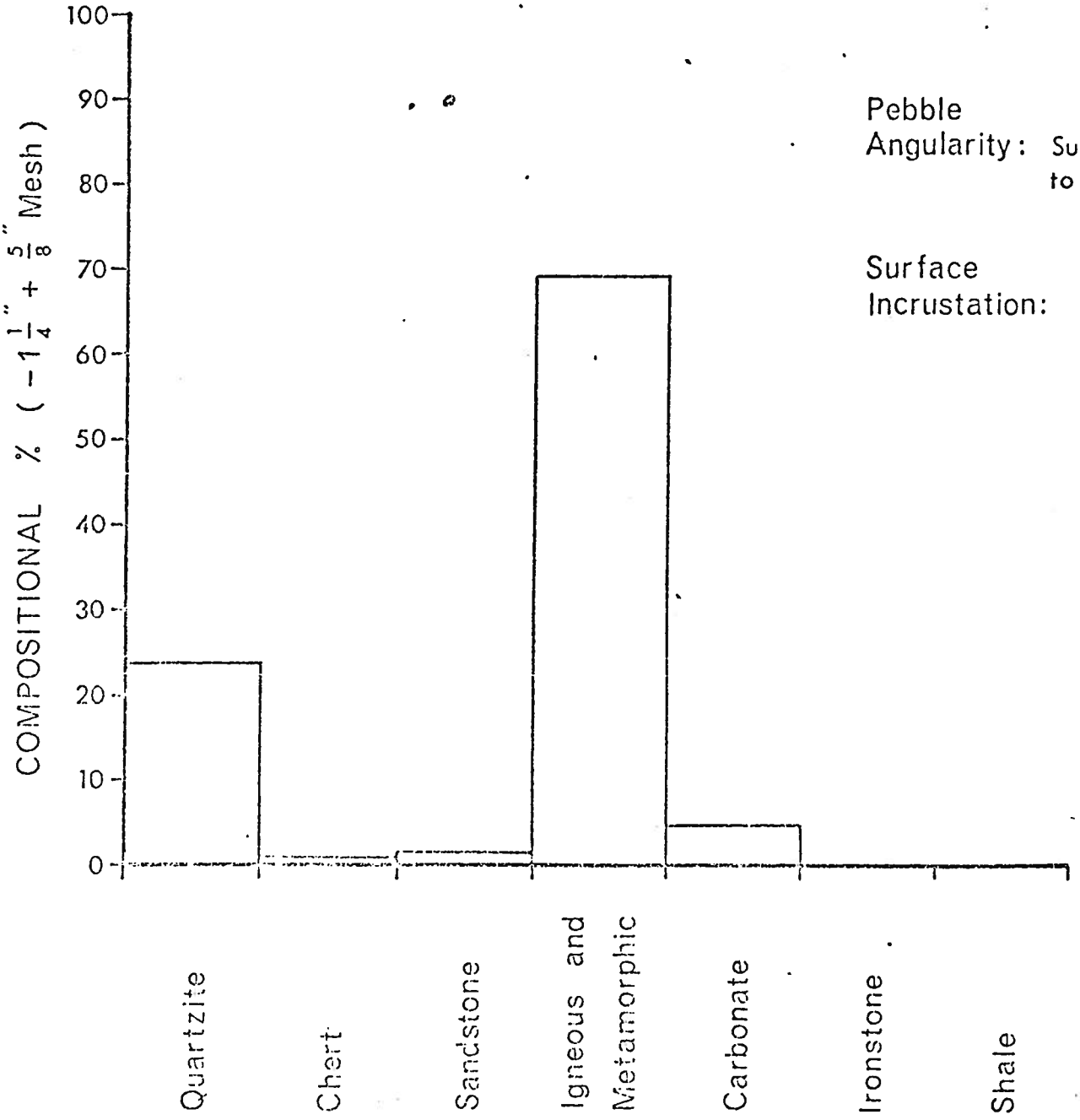
Surface
Incrustation: Slight

SAMPLE NO.: Pit 28

DEPTH : 0 - 6

LOCATION : E 1/2 14-37-24W4

* Less than 1%



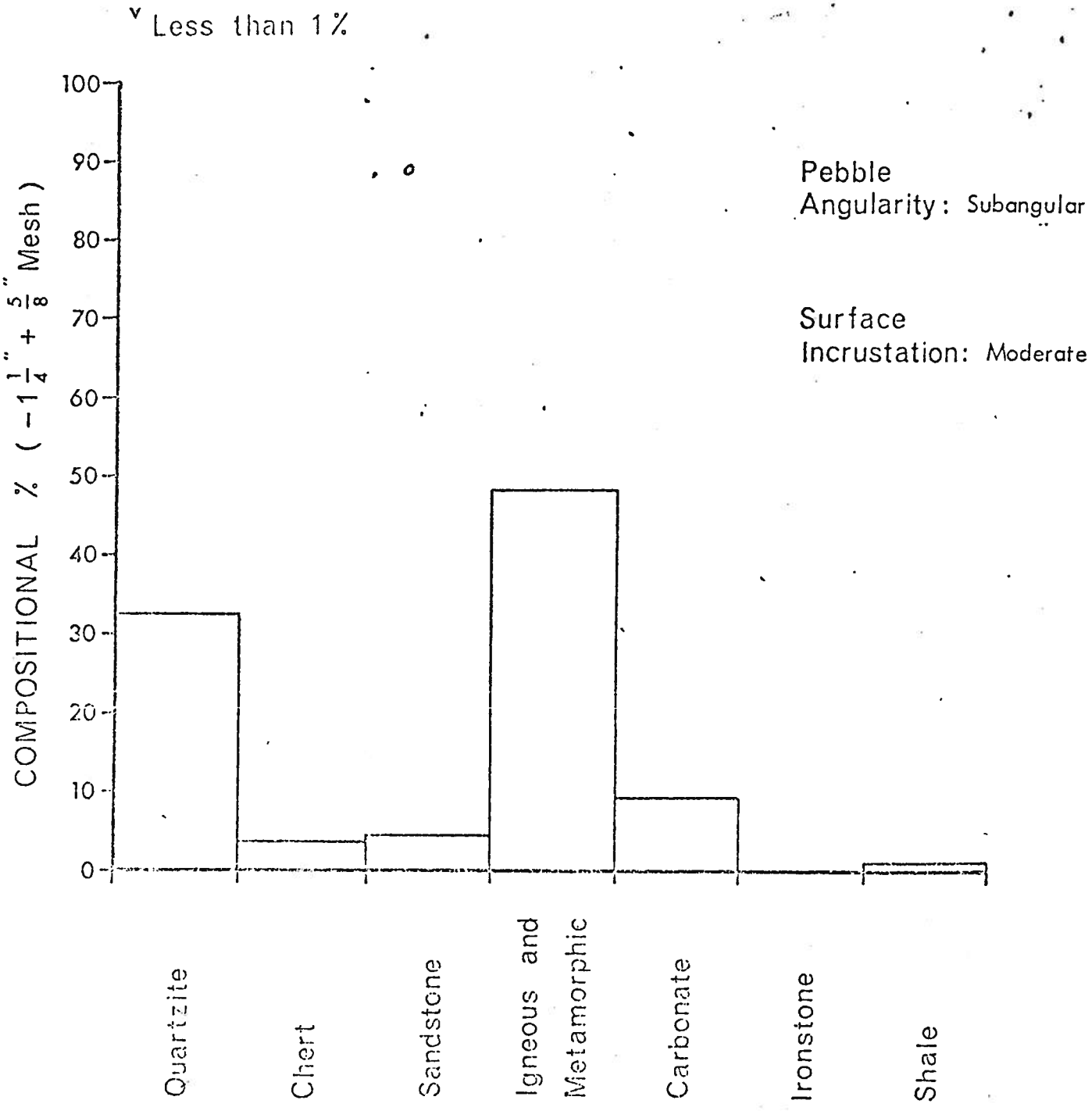
Pebble Angularity: Subangular to Subround

Surface Incrustation: Extreme

SAMPLE NO.: Pit 29

DEPTH: 0 - 5

LOCATION: SE 13-37-24W4

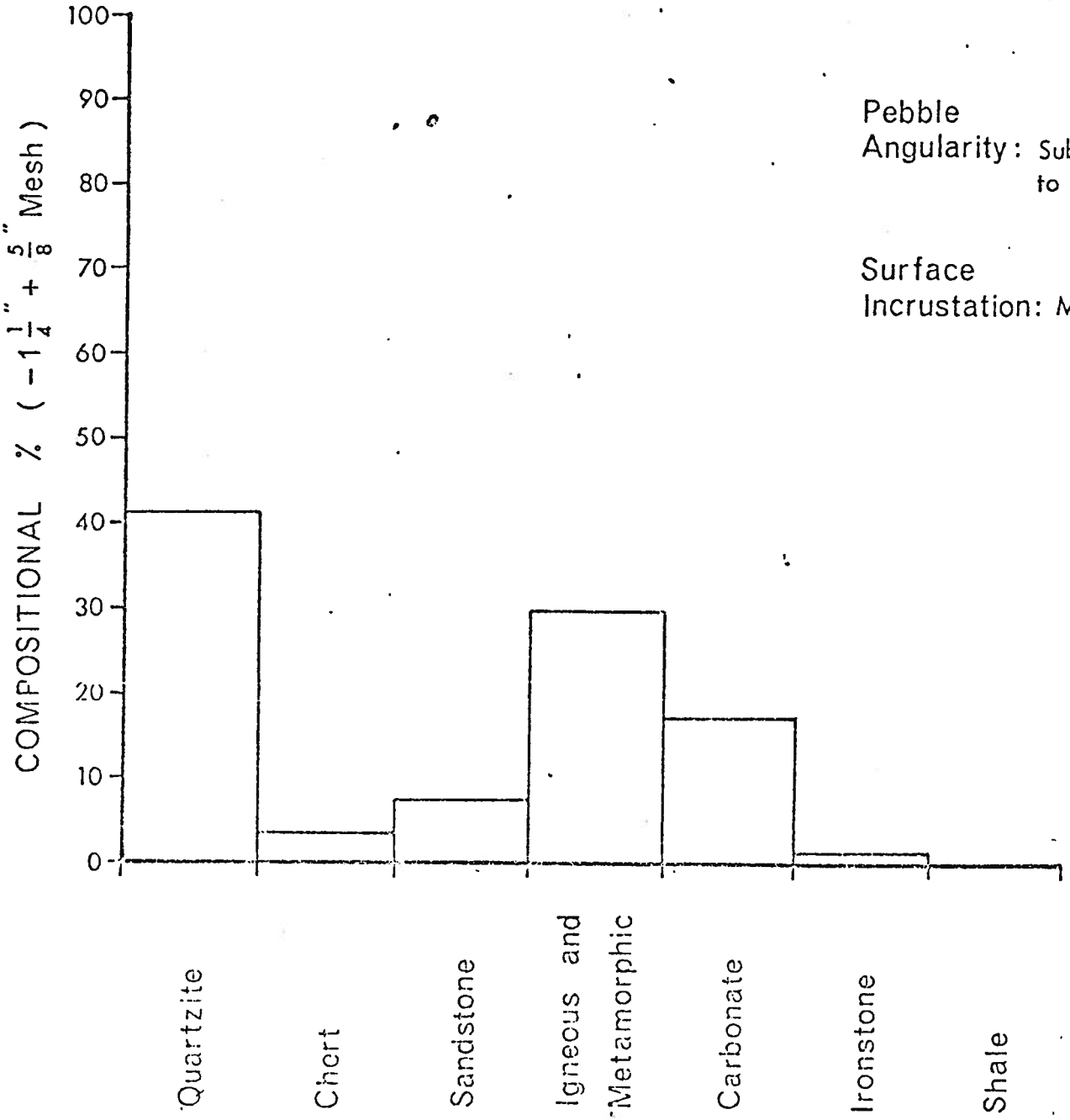


SAMPLE NO.: Pit 30

DEPTH: 0 - 4

LOCATION: S1/2 27-37-24W4

▼ Less than 1%



Pebble Angularity: Subangular to Subround

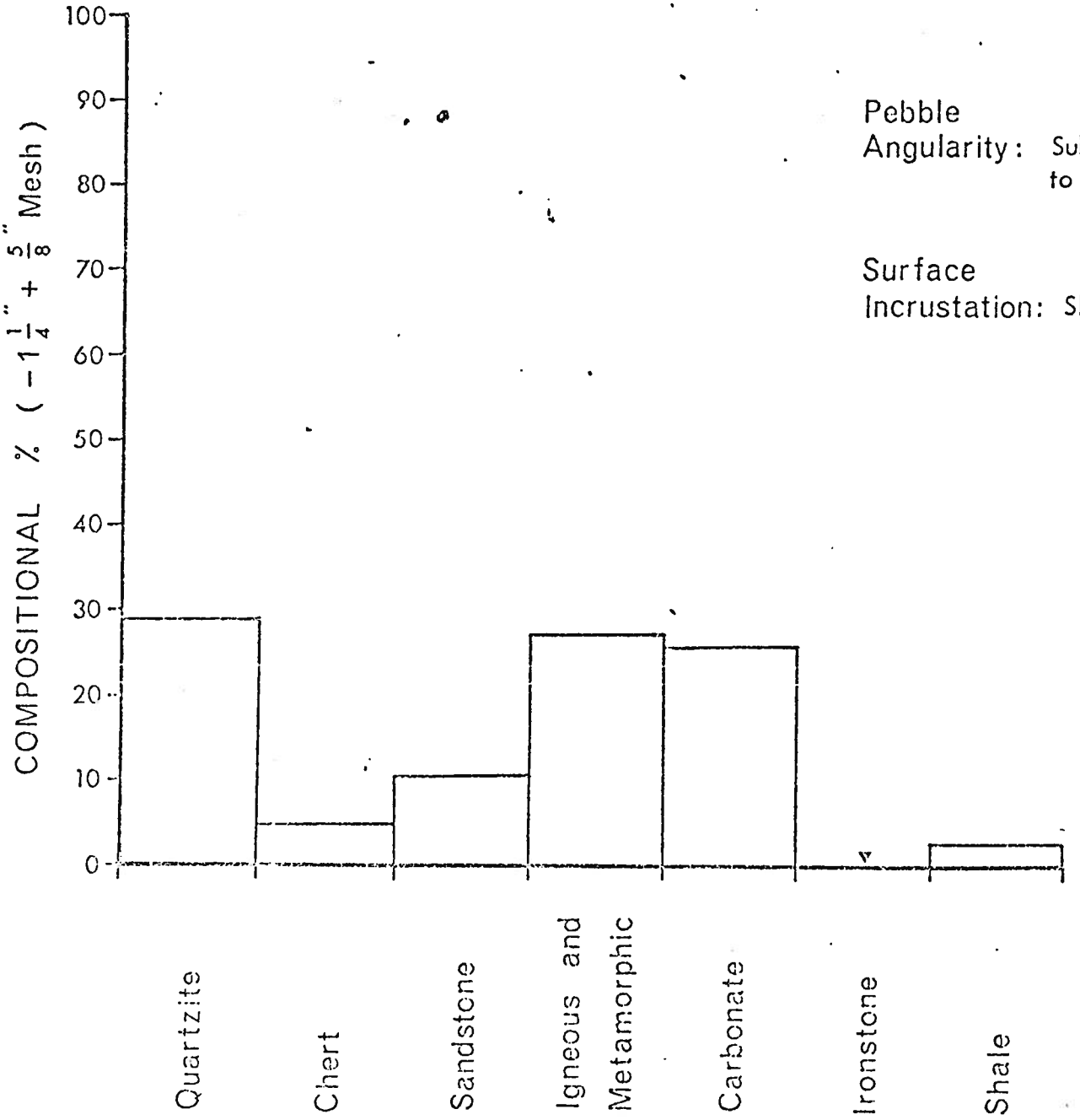
Surface Incrustation: Moderate

SAMPLE NO.: Pit 31

DEPTH: 0 - 8 '

LOCATION: SW 4-38-24W4

▼ Less than 1%



Pebble Angularity: Subangular to Subround

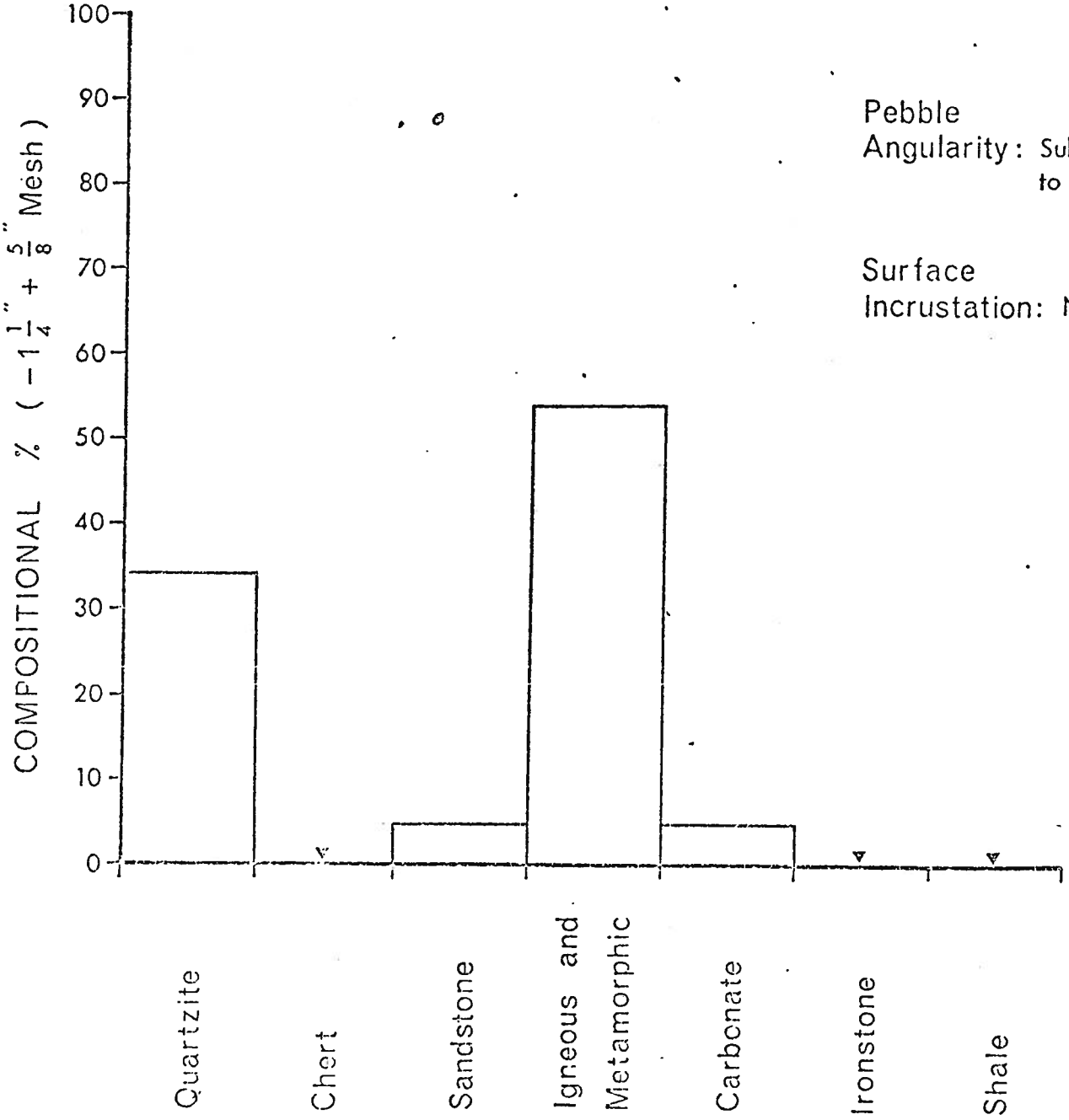
Surface Incrustation: Slight

SAMPLE NO.: Pit 32

DEPTH: 5 - 10 '

LOCATION: W 1/2 34-37-25W4

▼ Less than 1%



Pebble
Angularity: Subangular to Subround

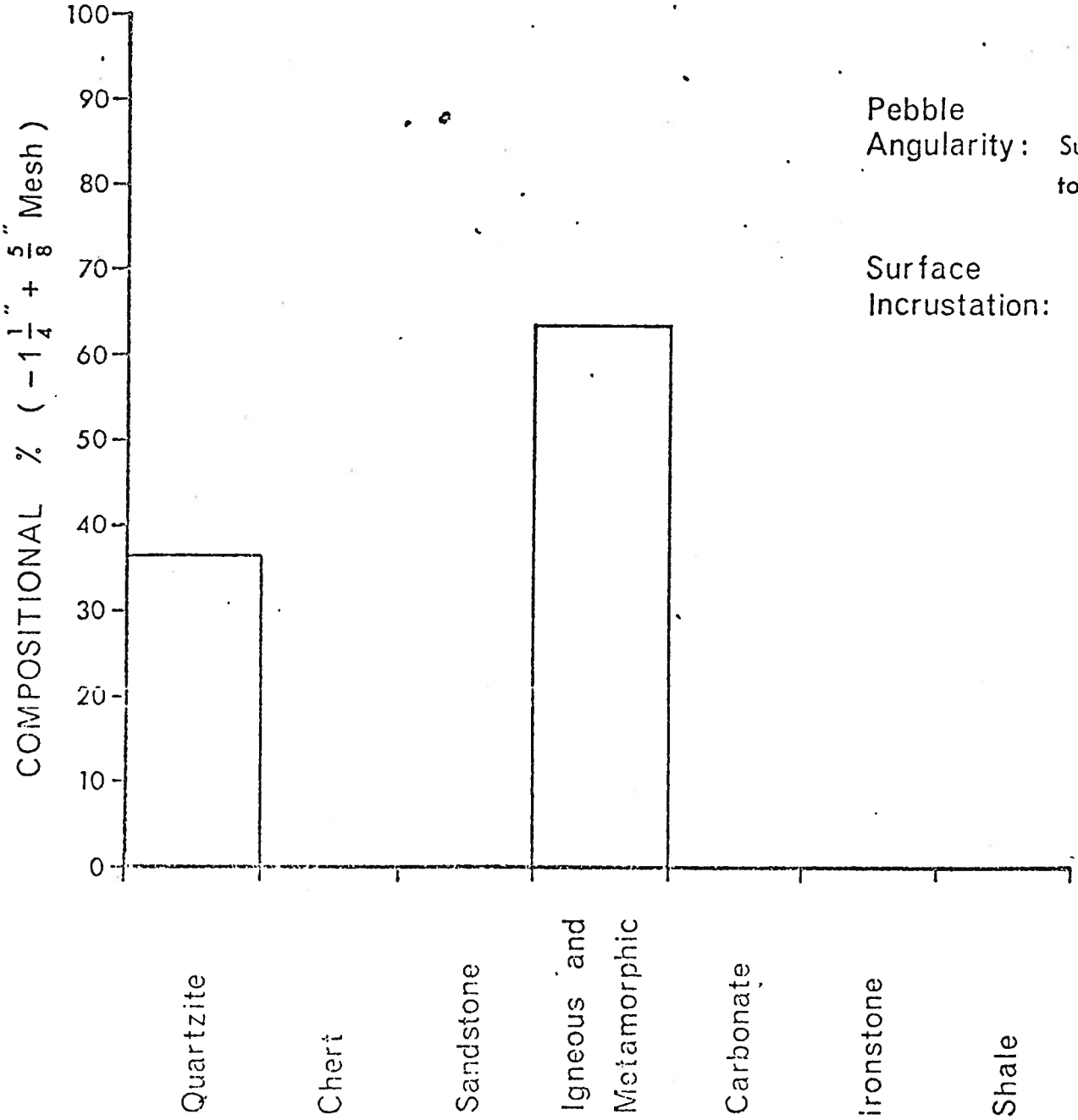
Surface
Incrustation: Nil

SAMPLE NO.: Pit 33

DEPTH: 0 - 8 '

LOCATION: NE 4-37-25W4

▼ Less than 1%



Pebble Angularity: Subangular to Subround

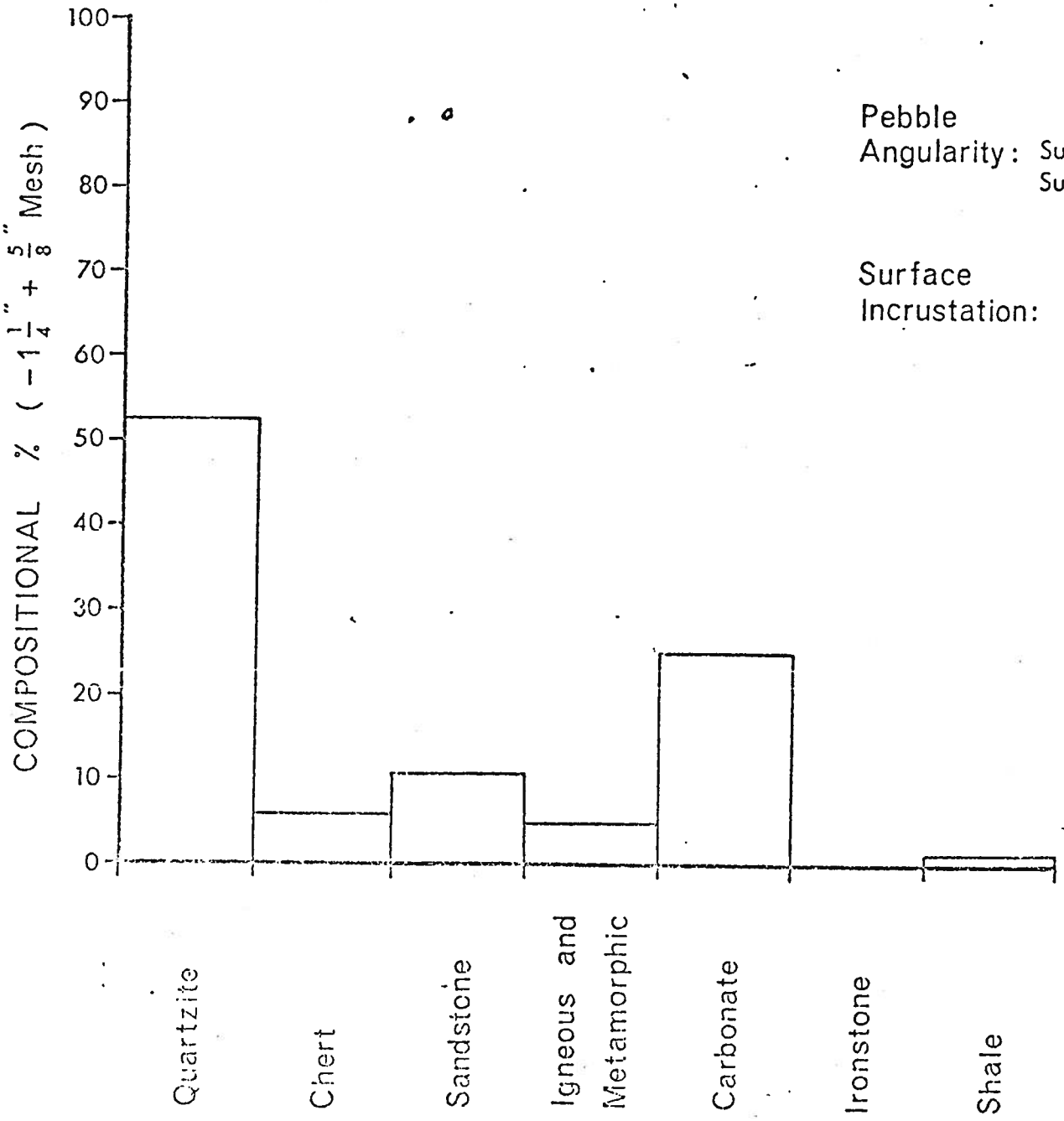
Surface Incrustation: Nil

SAMPLE NO.: Pit 34

DEPTH: 0 - 35

LOCATION: N 1/2 28-36-25W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

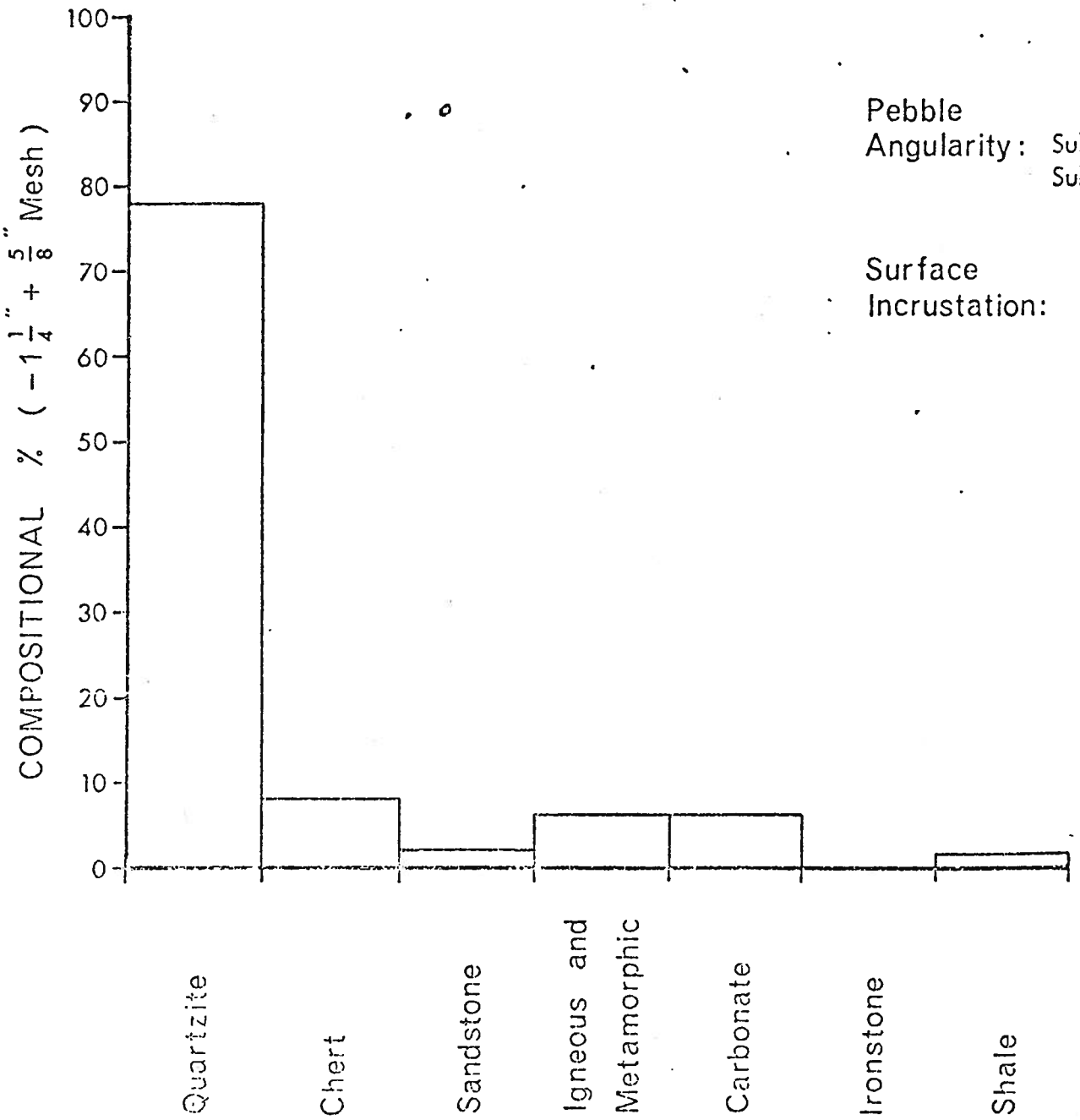
Surface Incrustation: Slight

SAMPLE NO.: Pit 35

DEPTH: 0 - 3 '

LOCATION: S 1/2 5-37-28W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

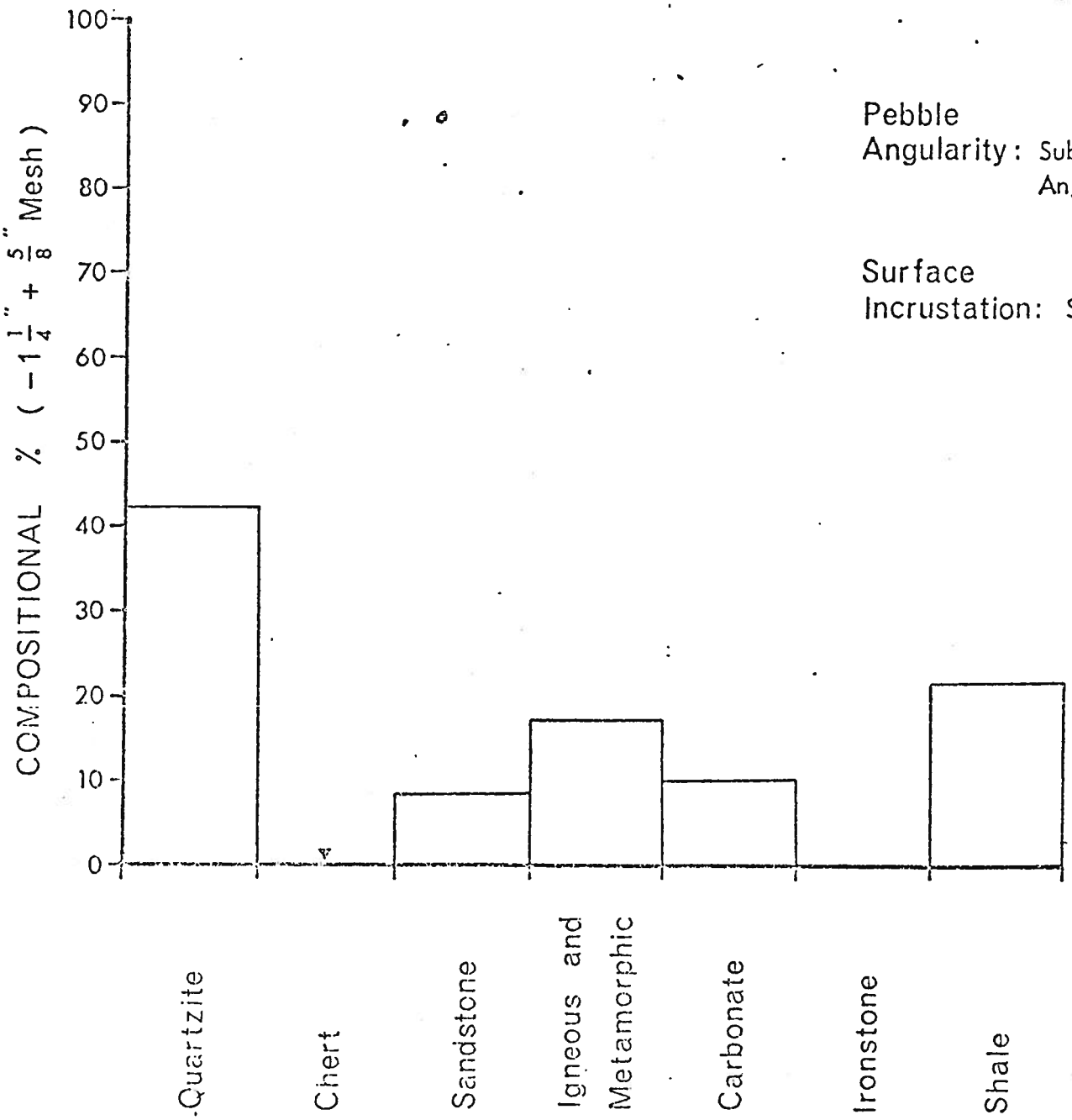
Surface Incrustation: Nil

SAMPLE NO.: Pit 36

DEPTH: 3 - 23'

LOCATION: SE 29-36-28W4

▼ Less than 1%



Pebble Angularity: Subround to Angular

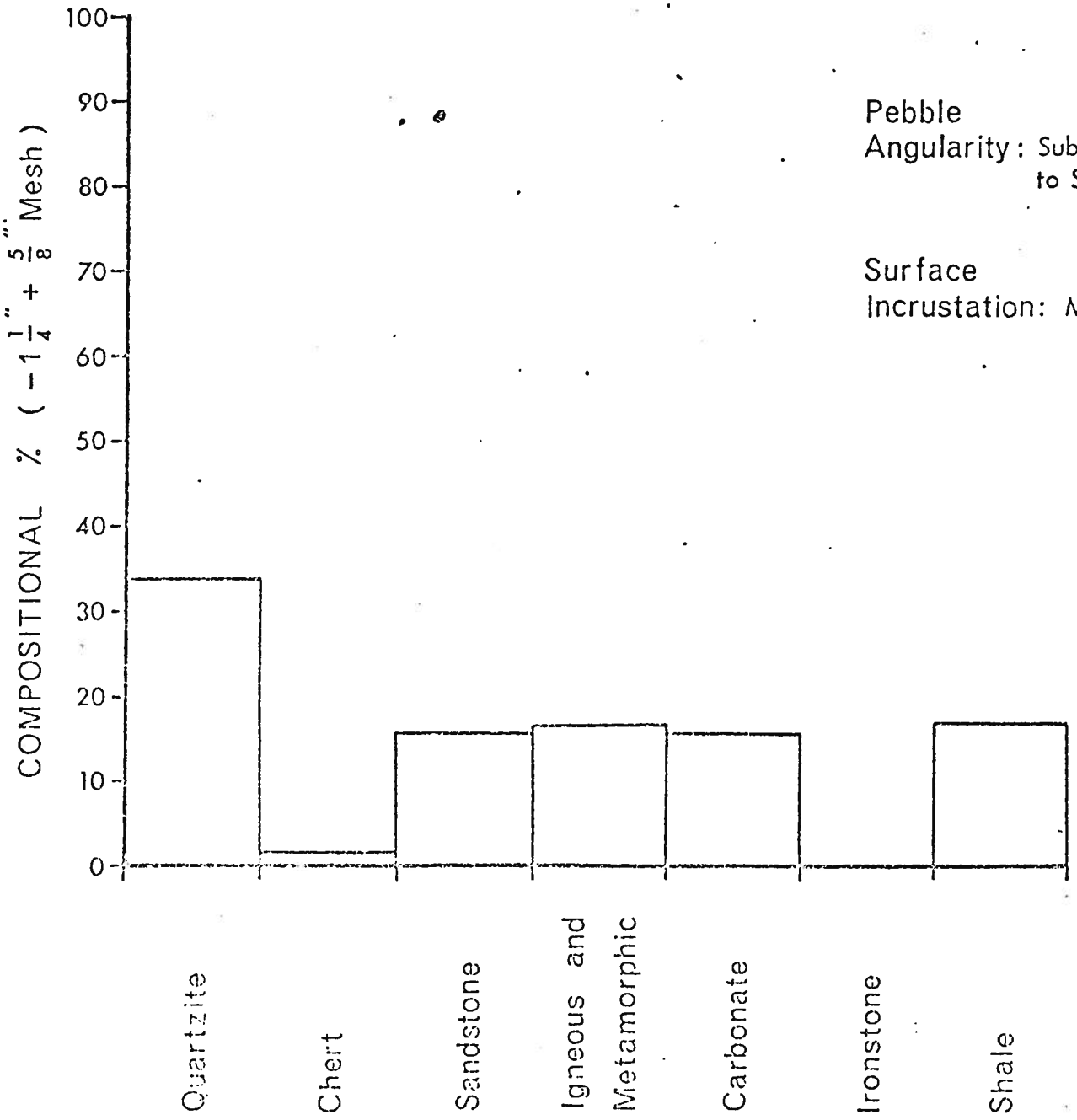
Surface Incrustation: Slight

SAMPLE NO.: Pit 37

DEPTH: 7 - 10 '

LOCATION: SE 13-40-28W4

▼ Less than 1%



Pebble
Angularity: Subangular to Subround

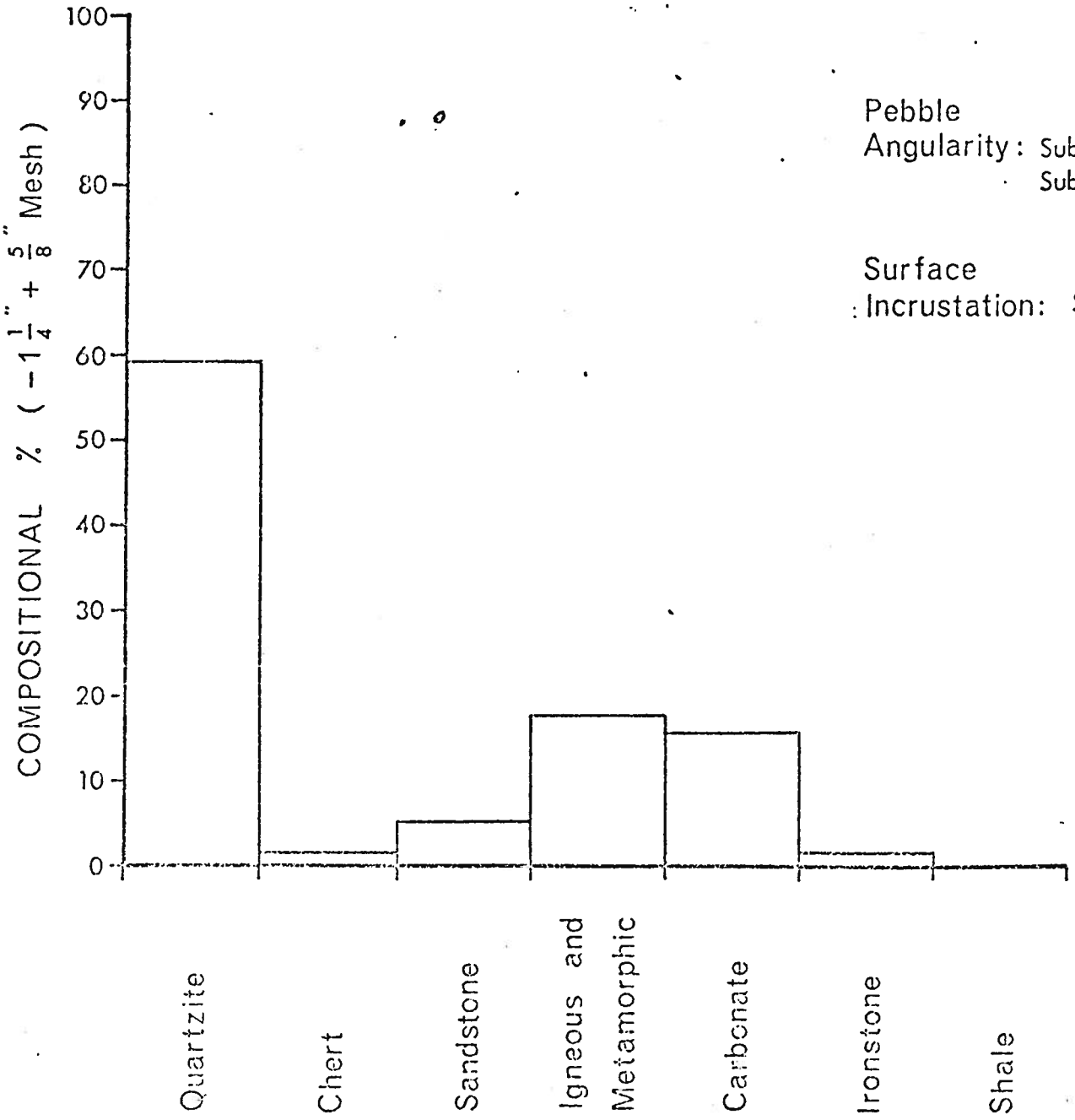
Surface
Incrustation: Moderate

SAMPLE NO.: Pit 38

DEPTH: 1 - 4 '

LOCATION: E 1/2 5-41-3W5

▼ Less than 1%



Pebble Angularity: Subround to Subangular

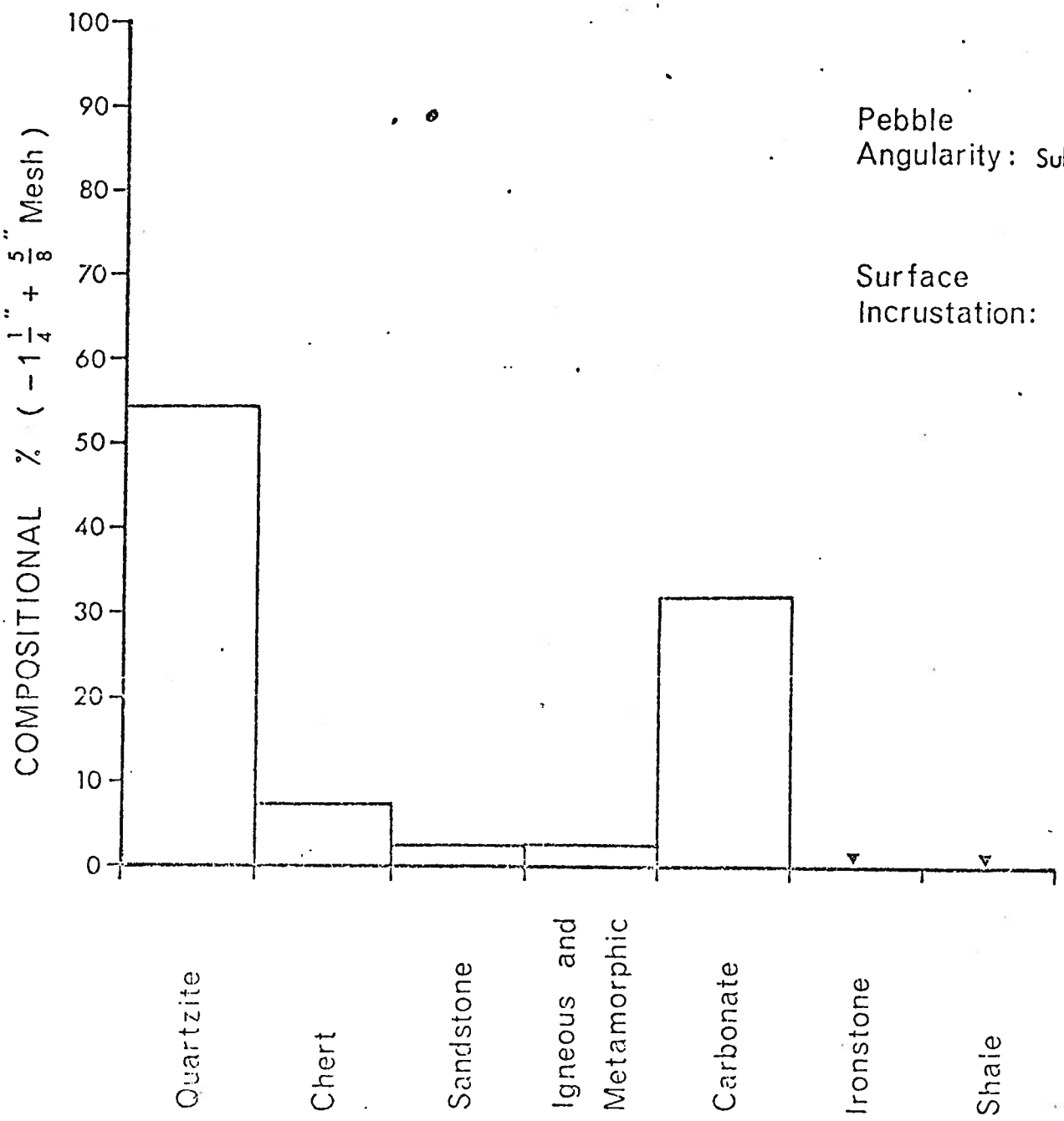
Surface Incrustation: Slight

SAMPLE NO.: Pit 39

DEPTH: 1 - 5

LOCATION: S1/2 16-39-3W5

▼ Less than 1%



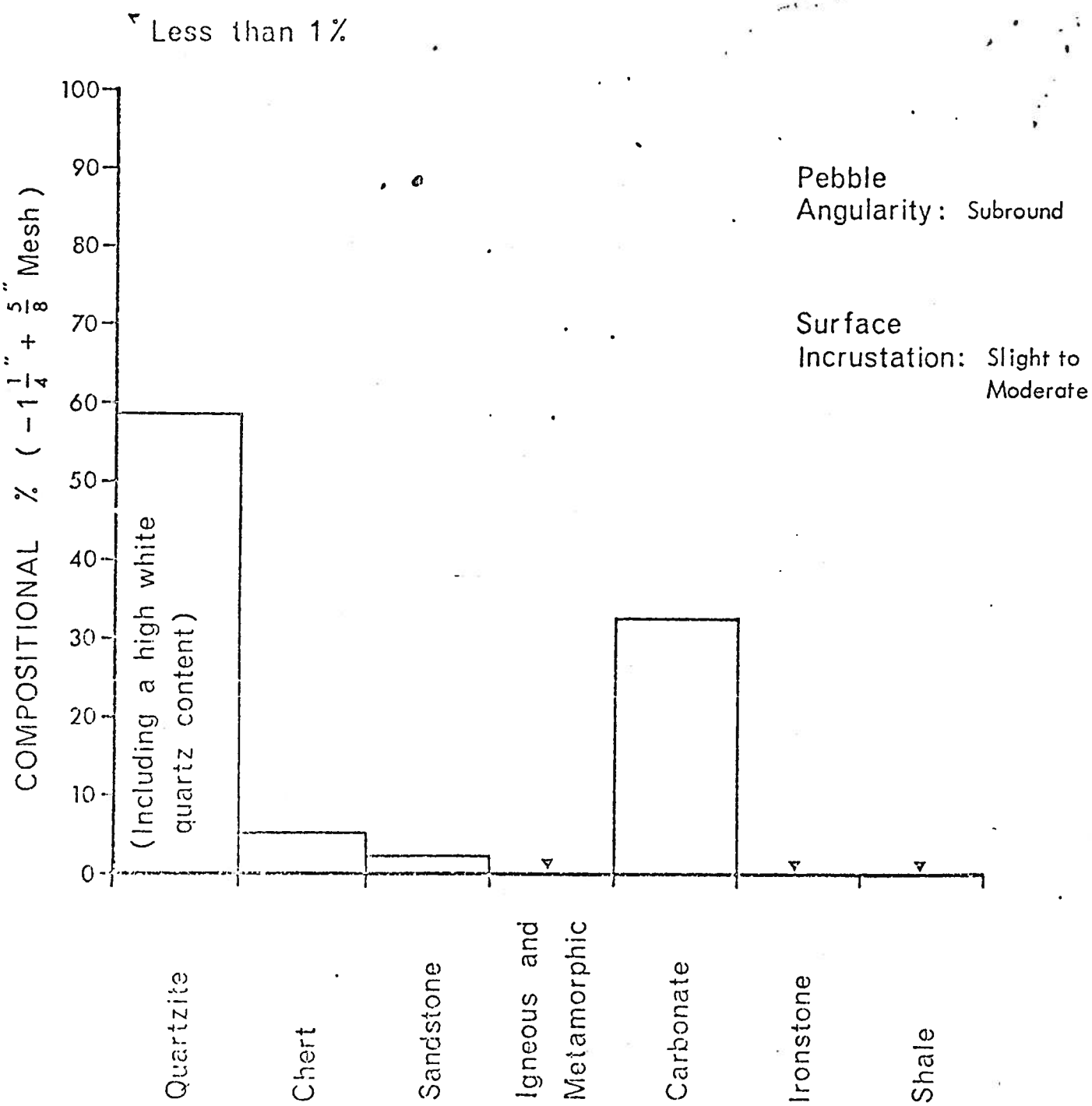
Pebble
Angularity: Subround

Surface
Incrustation: Very Slight

SAMPLE NO.: Pit 40

DEPTH: 3 - 10 '

LOCATION: NE 12-36-2W5

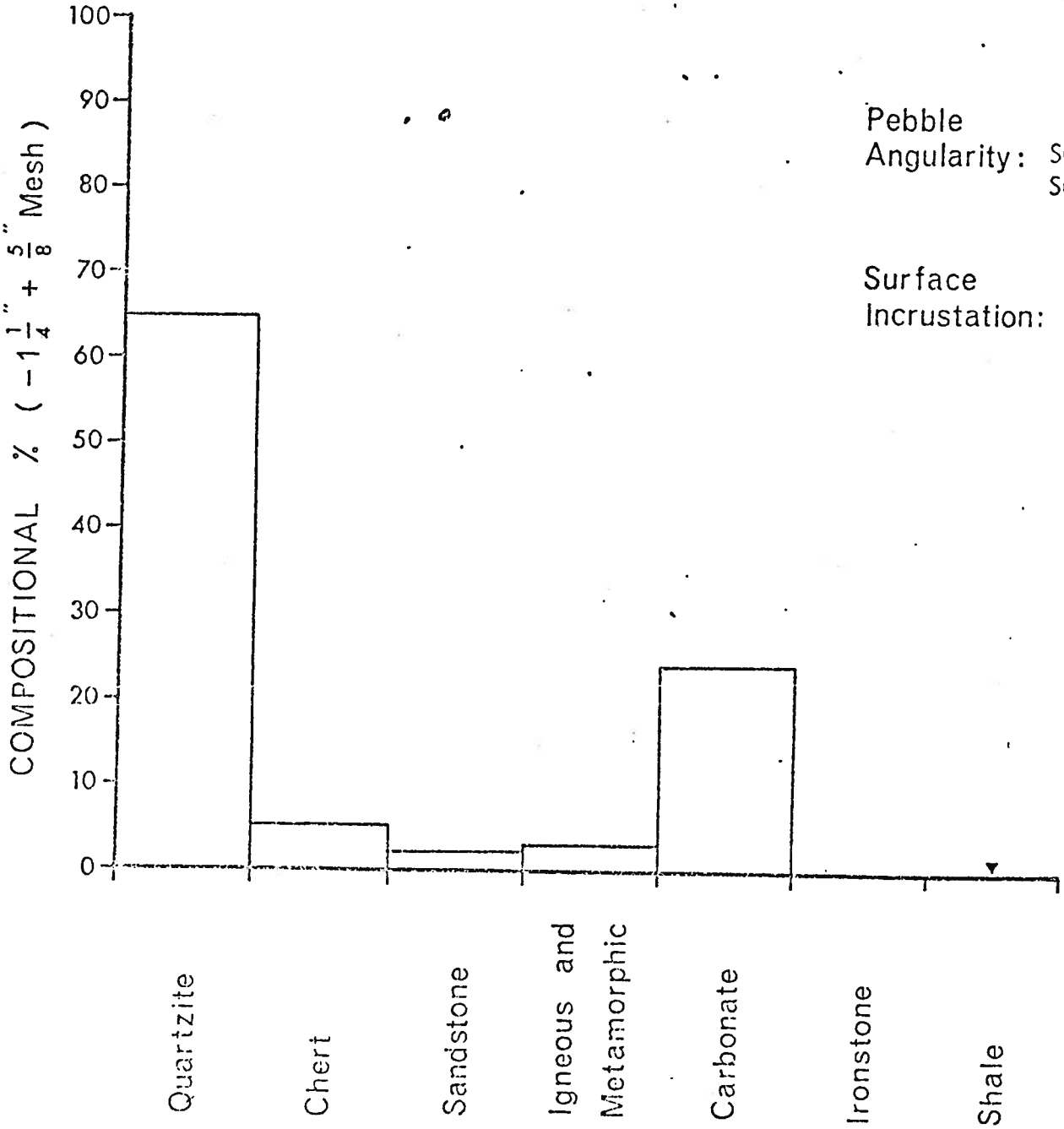


SAMPLE NO.: Pit 41

DEPTH: 0 - 9 '

LOCATION: NW 19-35-3W5

▼ Less than 1%



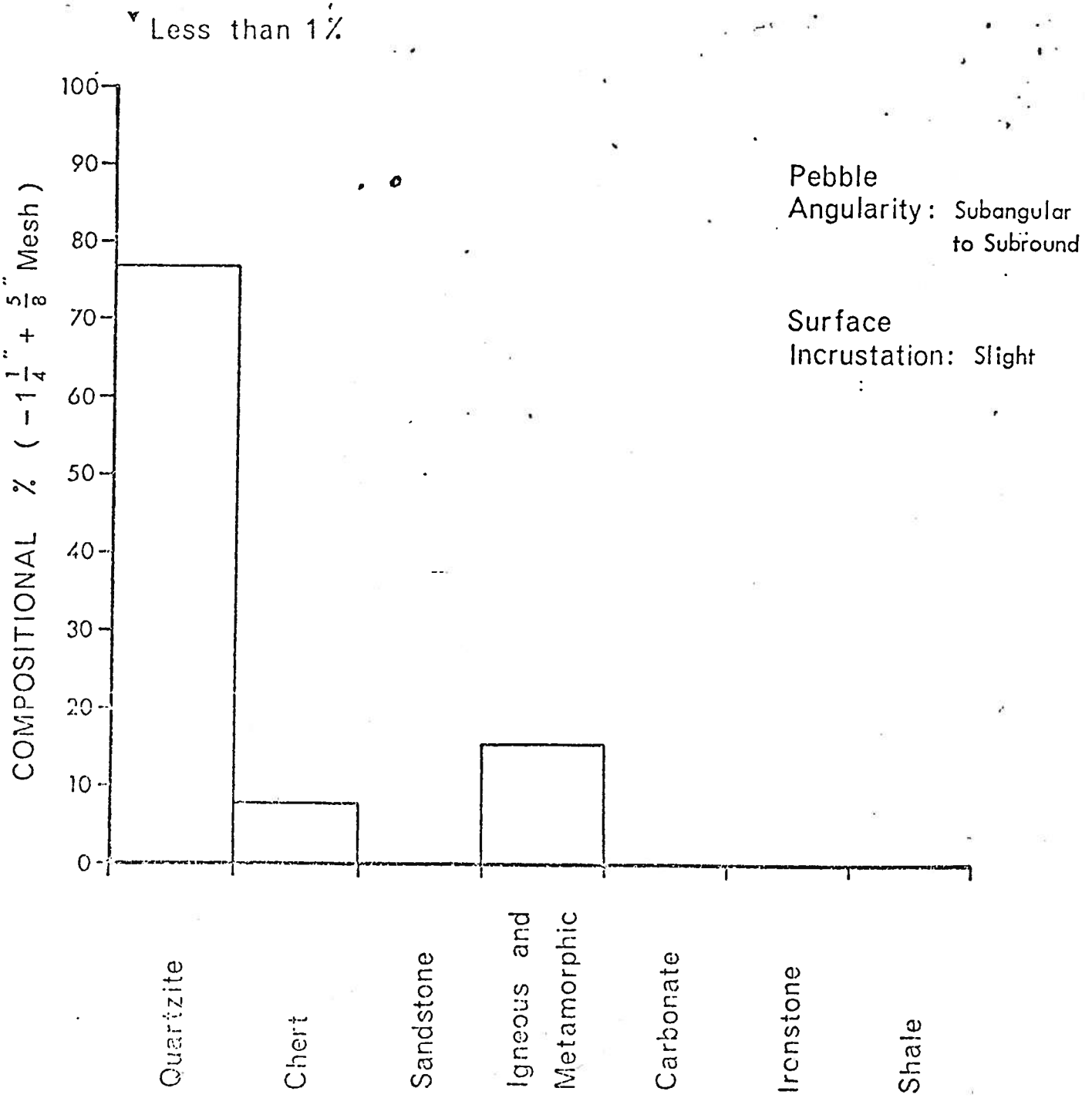
Pebble Angularity: Subround to Subangular

Surface Incrustation: Moderate

SAMPLE NO.: Pit 42

DEPTH: 0 - 7 '

LOCATION: NE 12-35-3W5

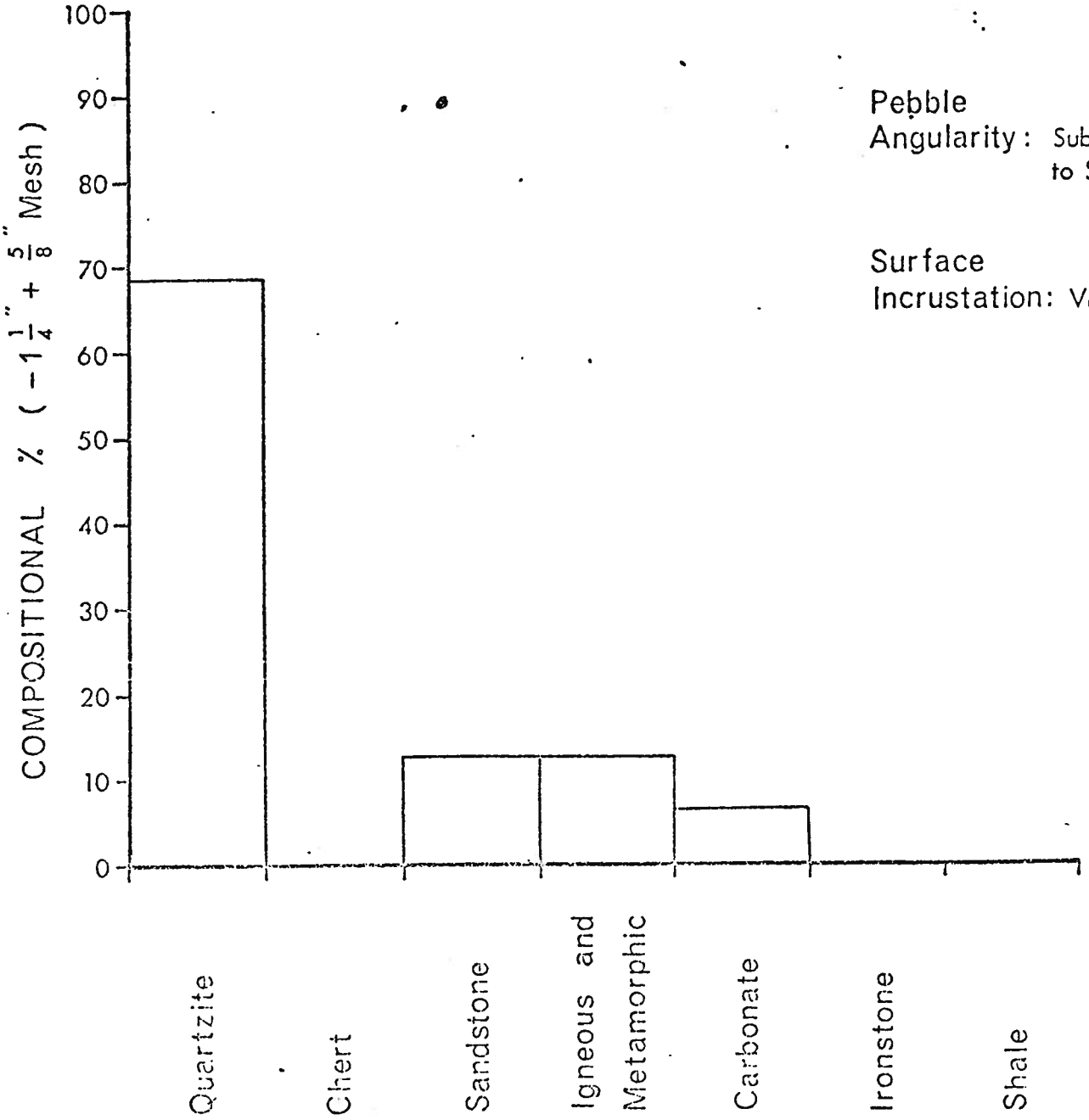


SAMPLE NO.: Pit 43

DEPTH: 2

LOCATION: W1/2 8-35-24W4

▼ Less than 1%



Pebble Angularity: Subangular to Subround

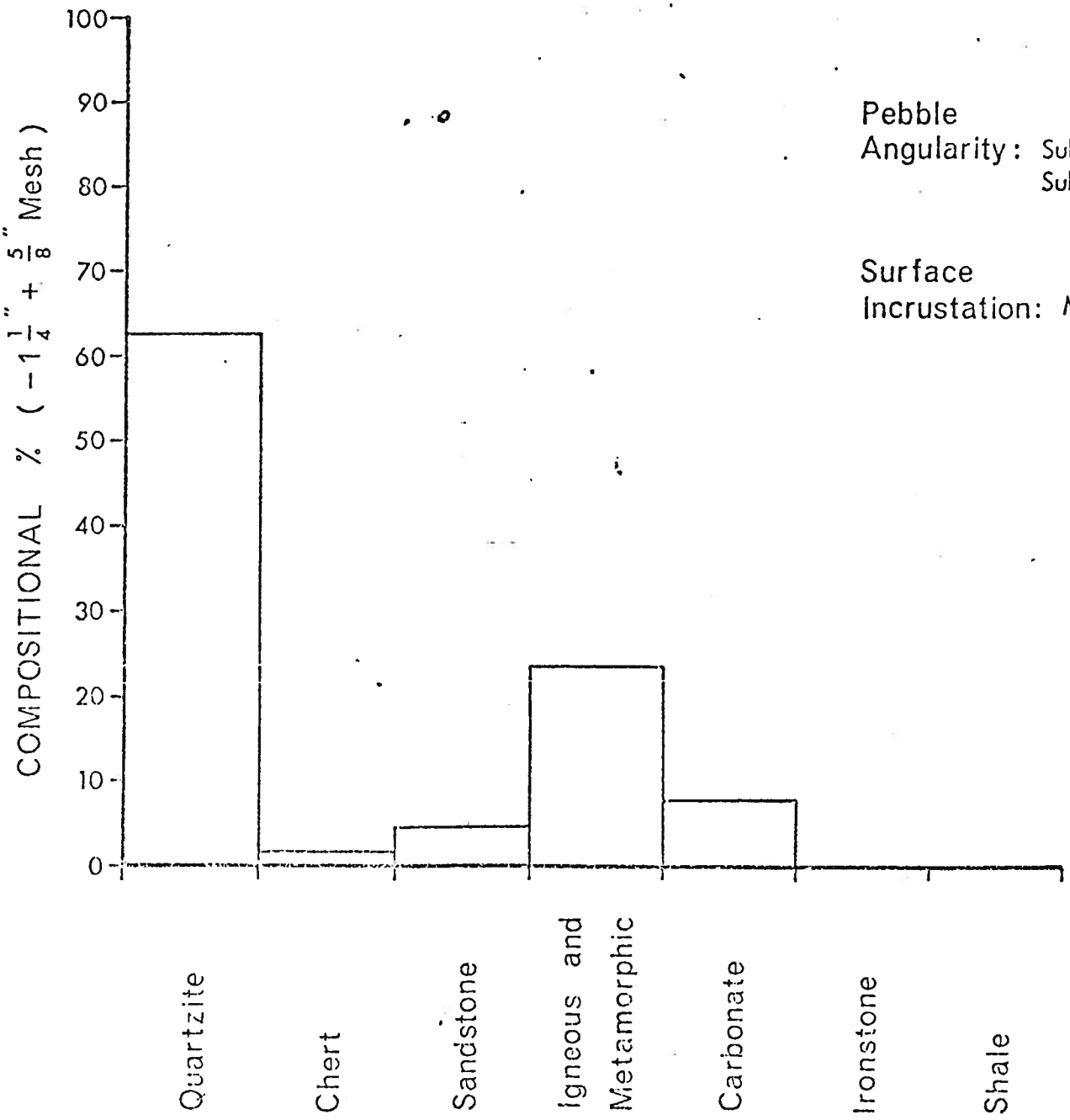
Surface Incrustation: Very Slight

SAMPLE NO.: Pit 44

DEPTH: 0 - 4'

LOCATION: N 1/2 11-35-25W4

▼ Less than 1%



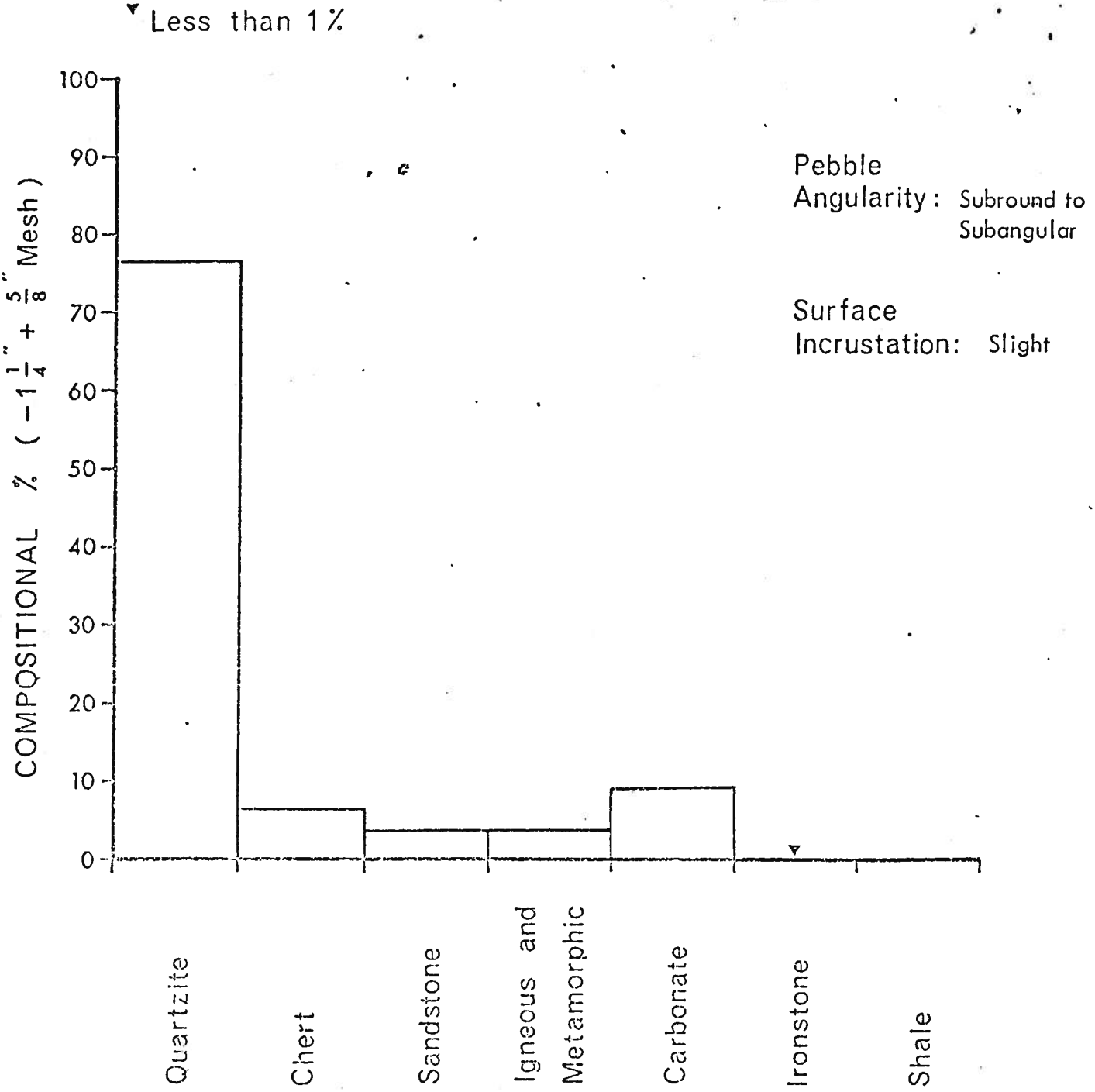
Pebble
Angularity: Subround to Subangular

Surface
Incrustation: Moderate

SAMPLE NO.: Pit 45

DEPTH: 1 - 7 '

LOCATION: SE 14-35-25W4

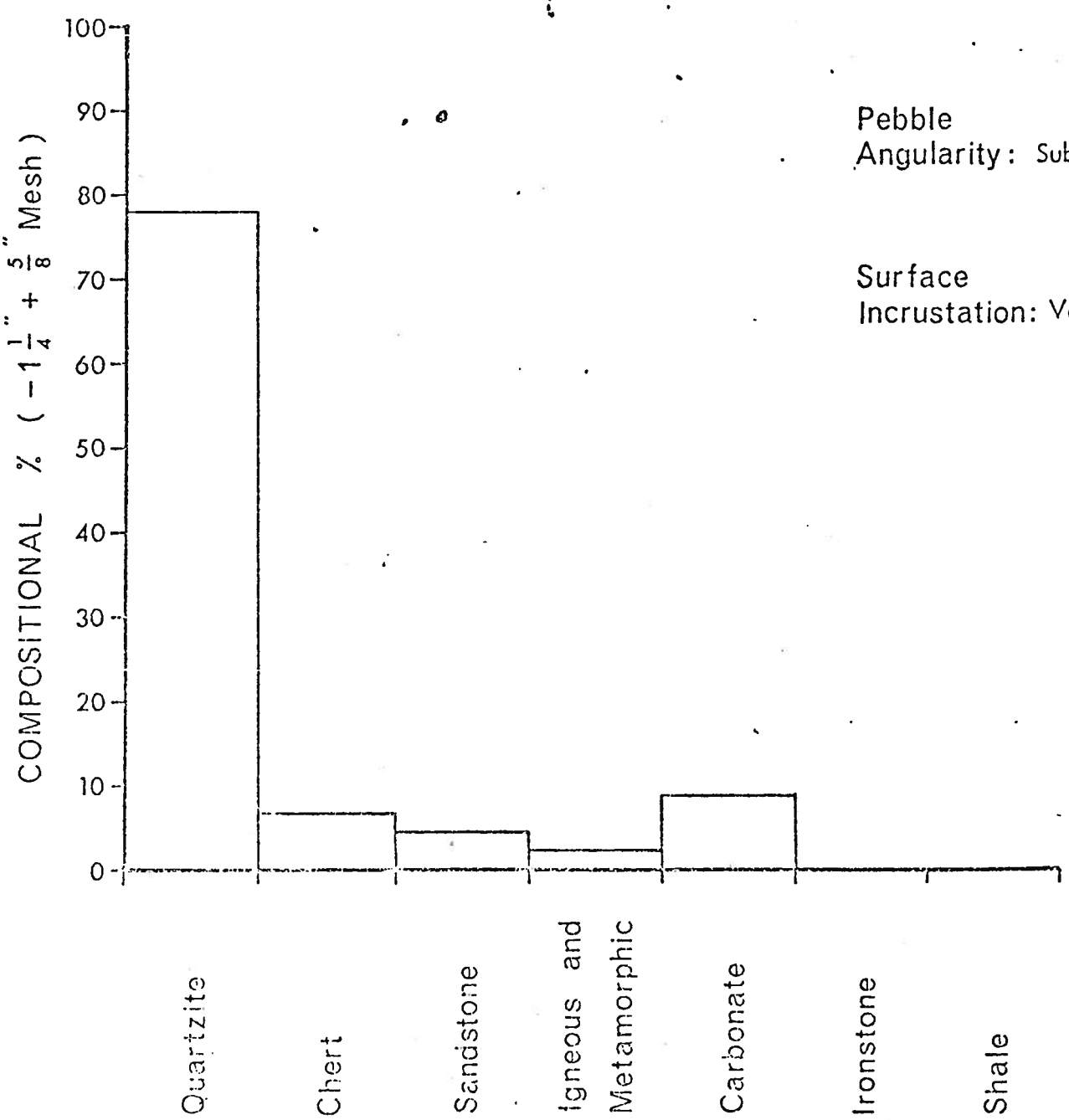


SAMPLE NO.: Pit 46

DEPTH: 4 - 11 '

LOCATION: N1/2 12-38-28W4

▼ Less than 1%



Pebble
Angularity: Subround

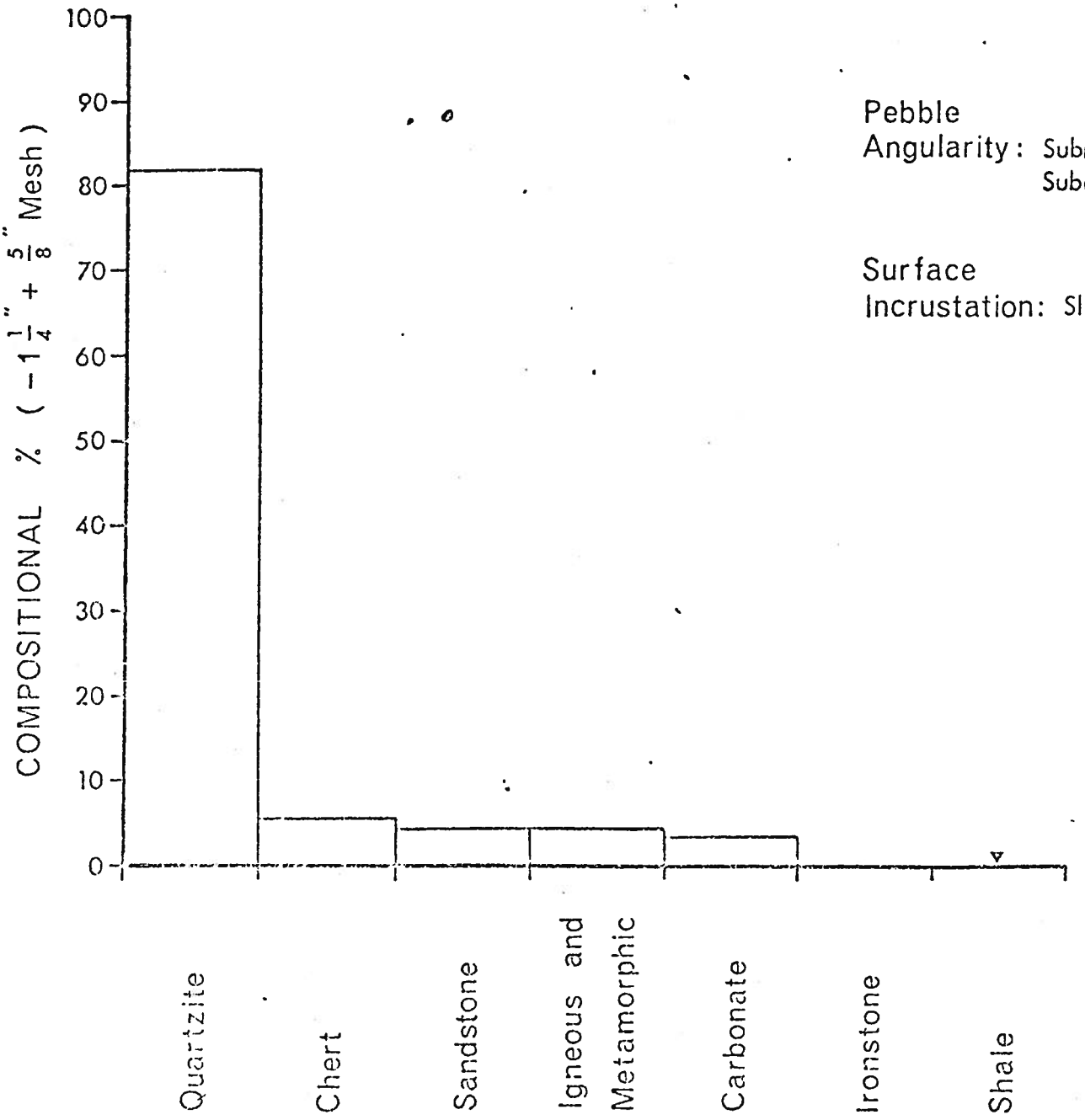
Surface
Incrustation: Very Slight

SAMPLE NO.: Pit 47

DEPTH: 0 - 7

LOCATION: NW 27-38-27W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

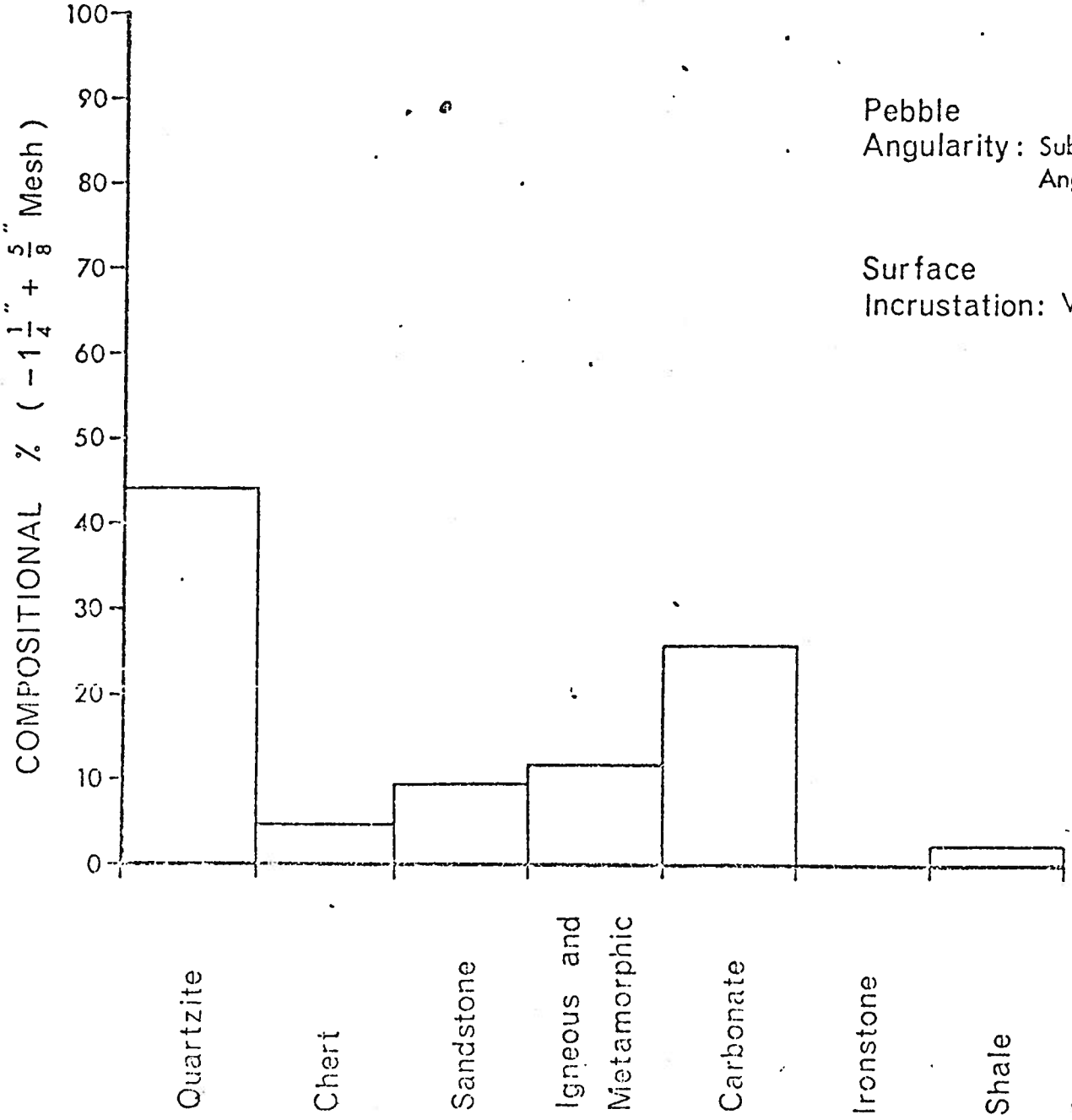
Surface Incrustation: Slight

SAMPLE NO.: Pit 48

DEPTH: 0 - 7

LOCATION: Ctr. 20-39-27W4

▽ Less than 1%



Pebble
Angularity: Subround to Angular

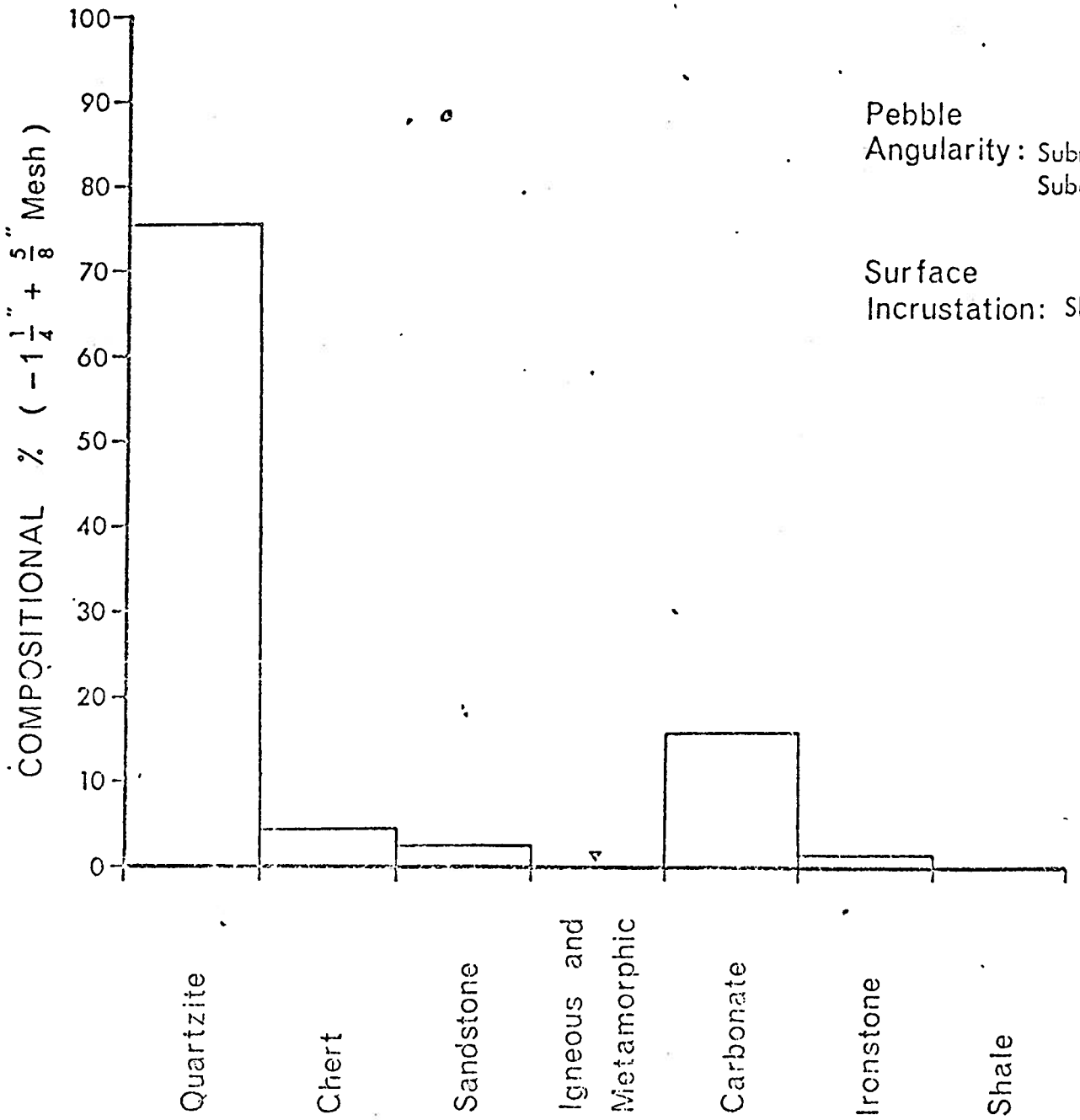
Surface
Incrustation: Very Slight

SAMPLE NO.: Pit 49

DEPTH: 4 - 16 '

LOCATION: W1/2 11-41-2W5

▼ Less than 1%



Pebble Angularity: Subround to Subangular

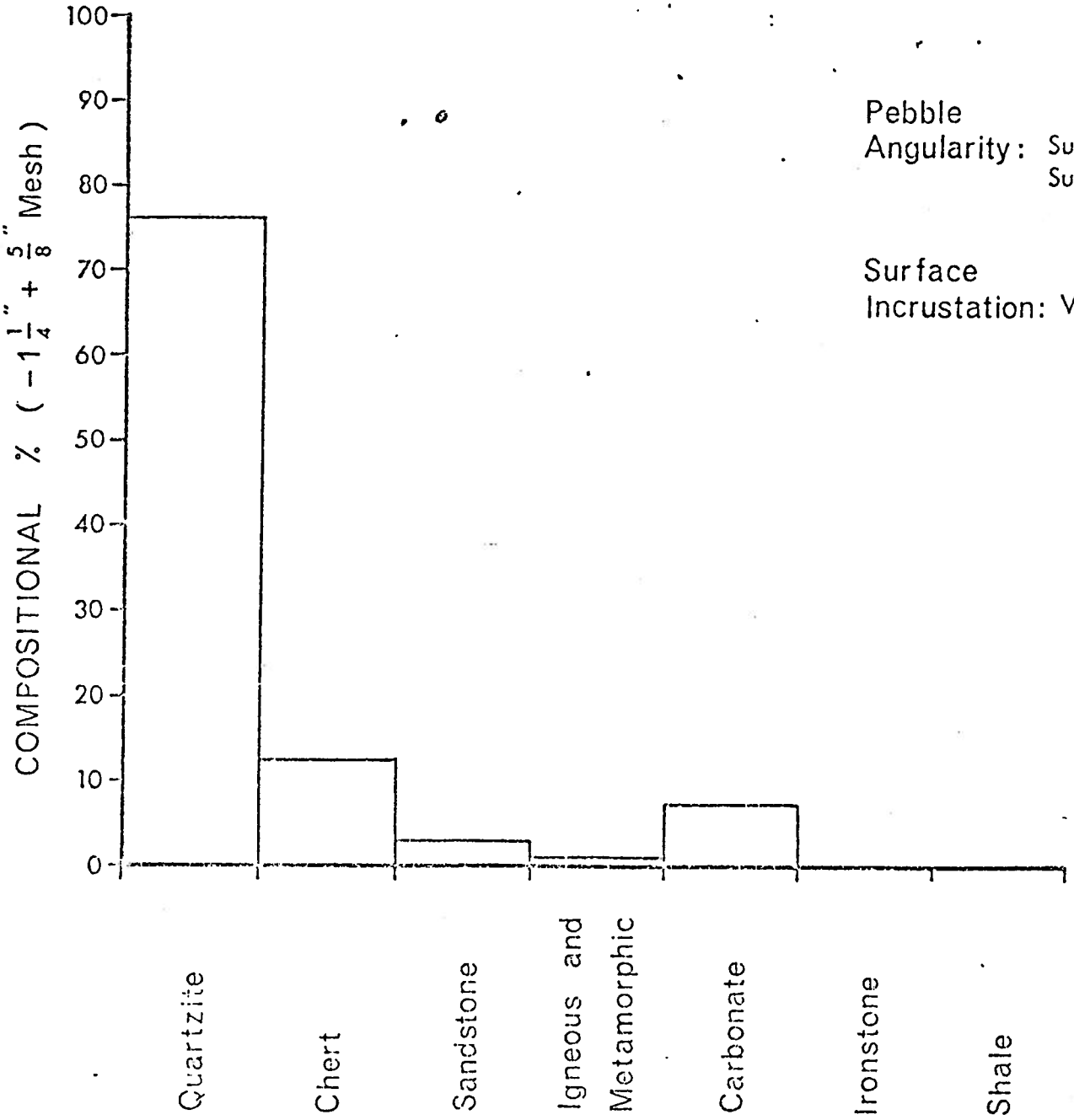
Surface Incrustation: Slight

SAMPLE NO.: Pit 50

DEPTH: 4 - 8

LOCATION: NE 14-35-3W5

* Less than 1%



Pebble Angularity: Subround to Subangular

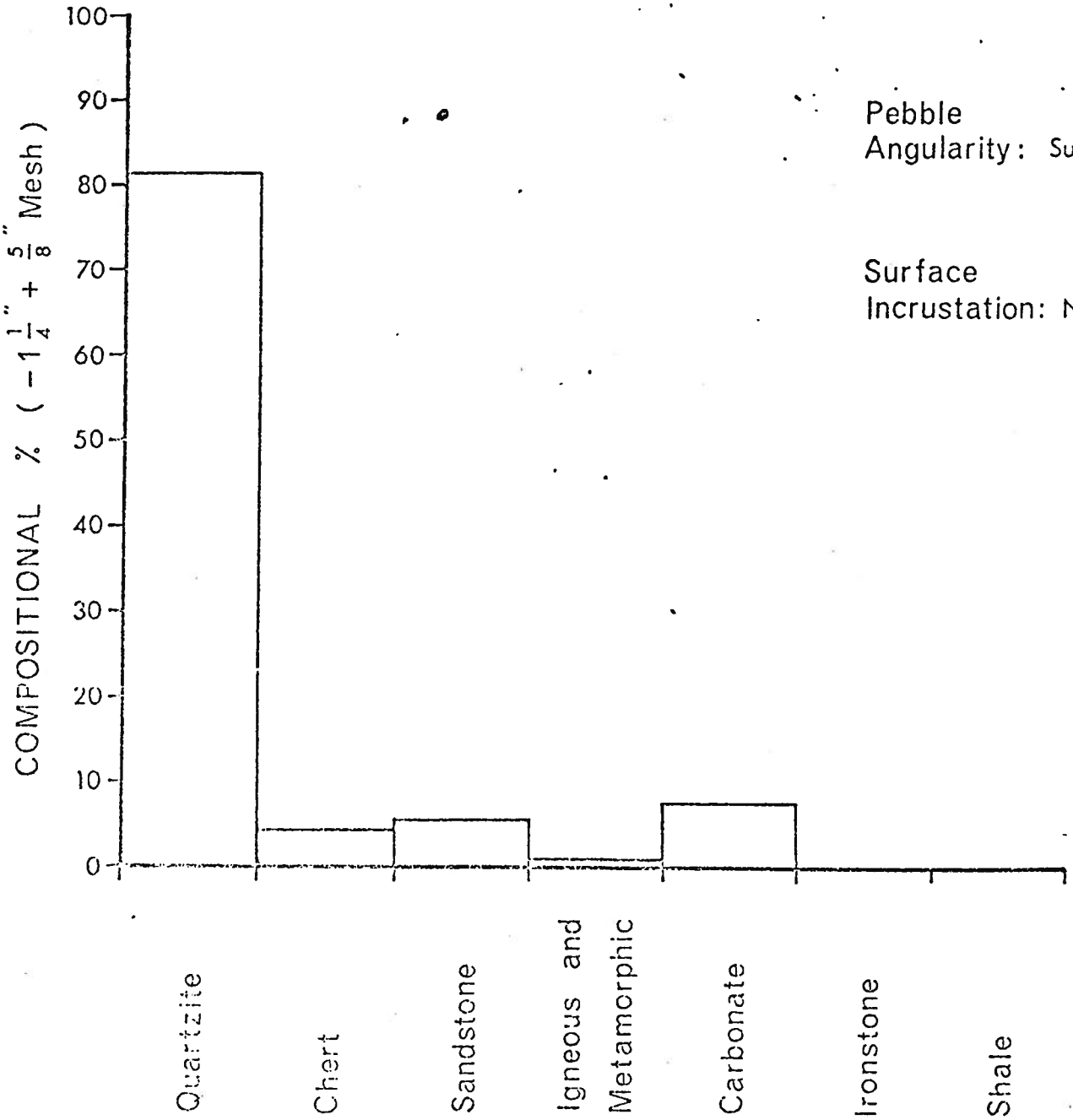
Surface Incrustation: Very Slight

SAMPLE NO.: Pit 51

DEPTH: 3

LOCATION: NE 11-35-3W5

▿ Less than 1%



Pebble
Angularity: Subround

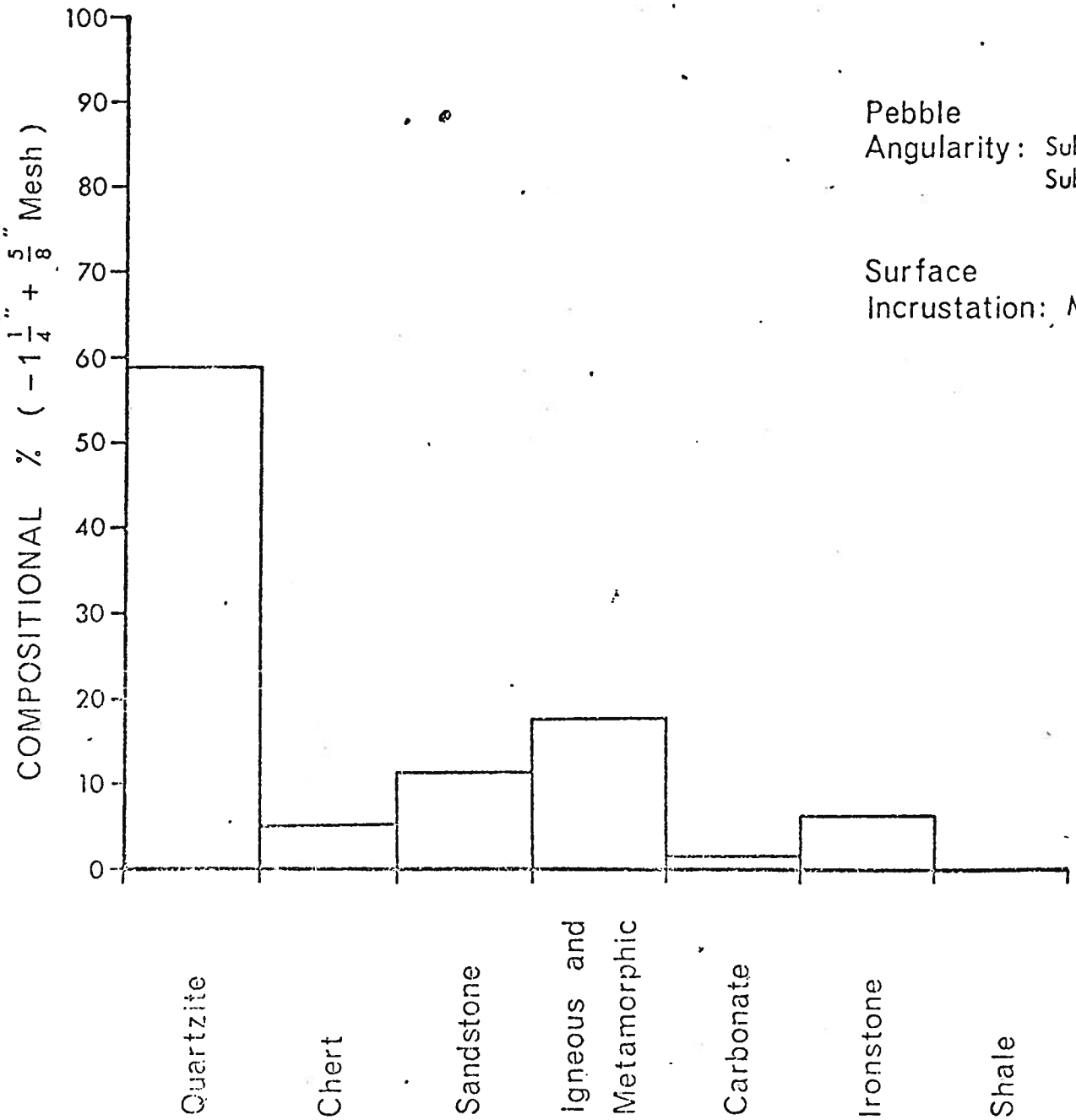
Surface
Incrustation: Nil

SAMPLE NO.: Pit 52

DEPTH: 6 - 10 '

LOCATION: S 1/2 4-43-24W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

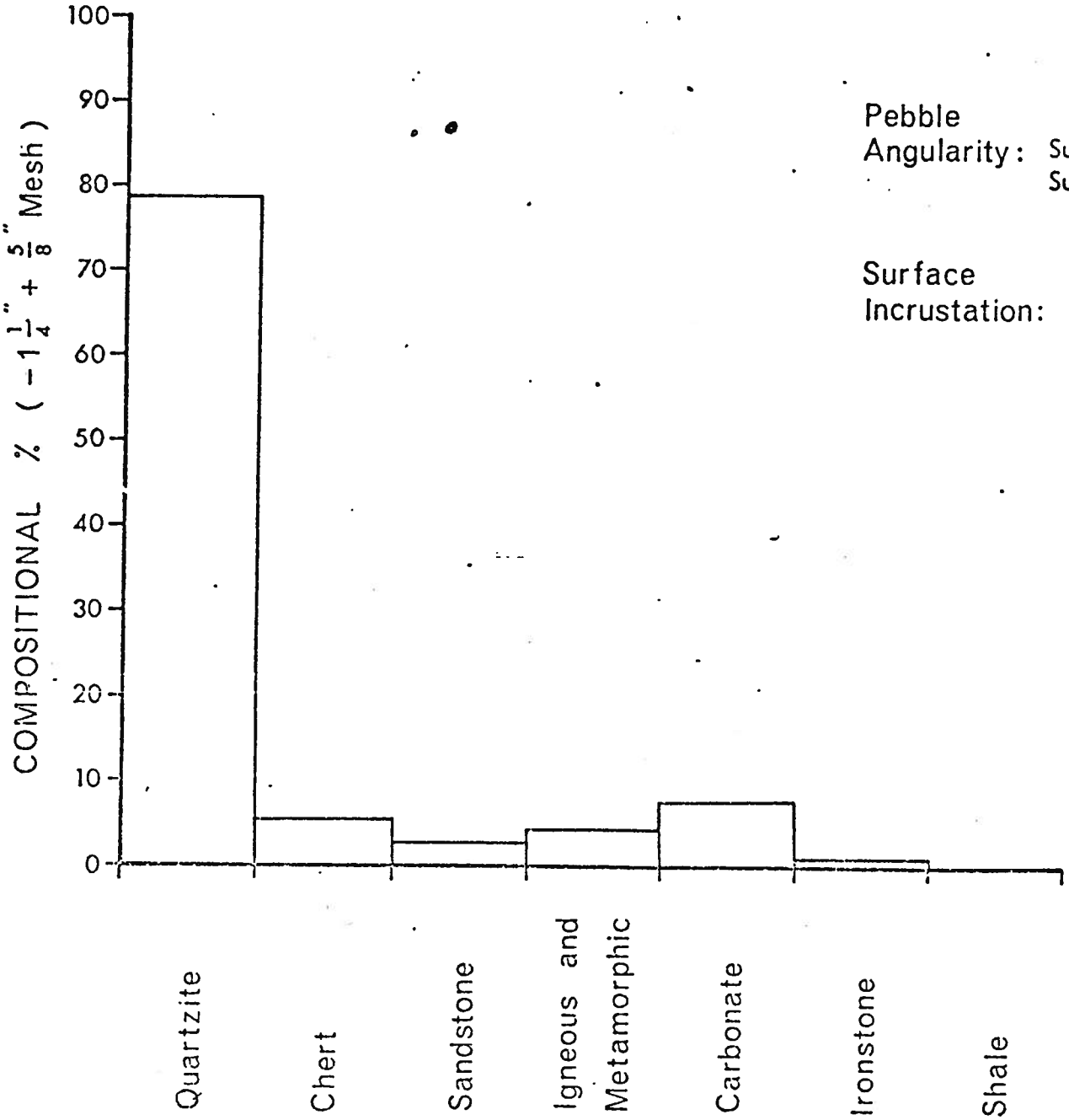
Surface Incrustation: Moderate

SAMPLE NO.: Pit 53

DEPTH: 3 - 6 '

LOCATION: NE 34-34-25W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

Surface Incrustation: Nil

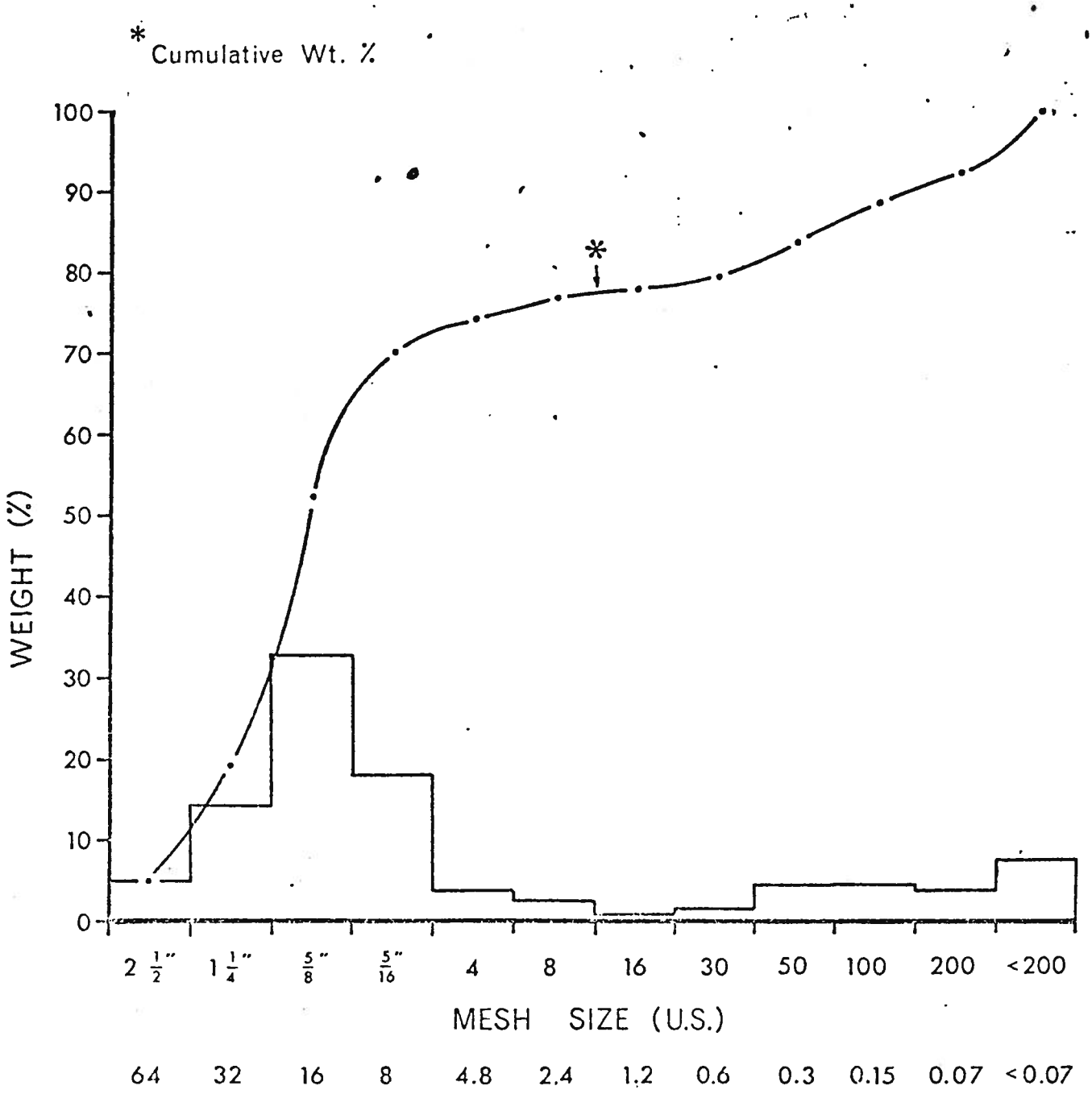
SAMPLE NO.: Pit 54

DEPTH: 10 - 19'

LOCATION: NE 8-36-28W4

Sieve Analyses

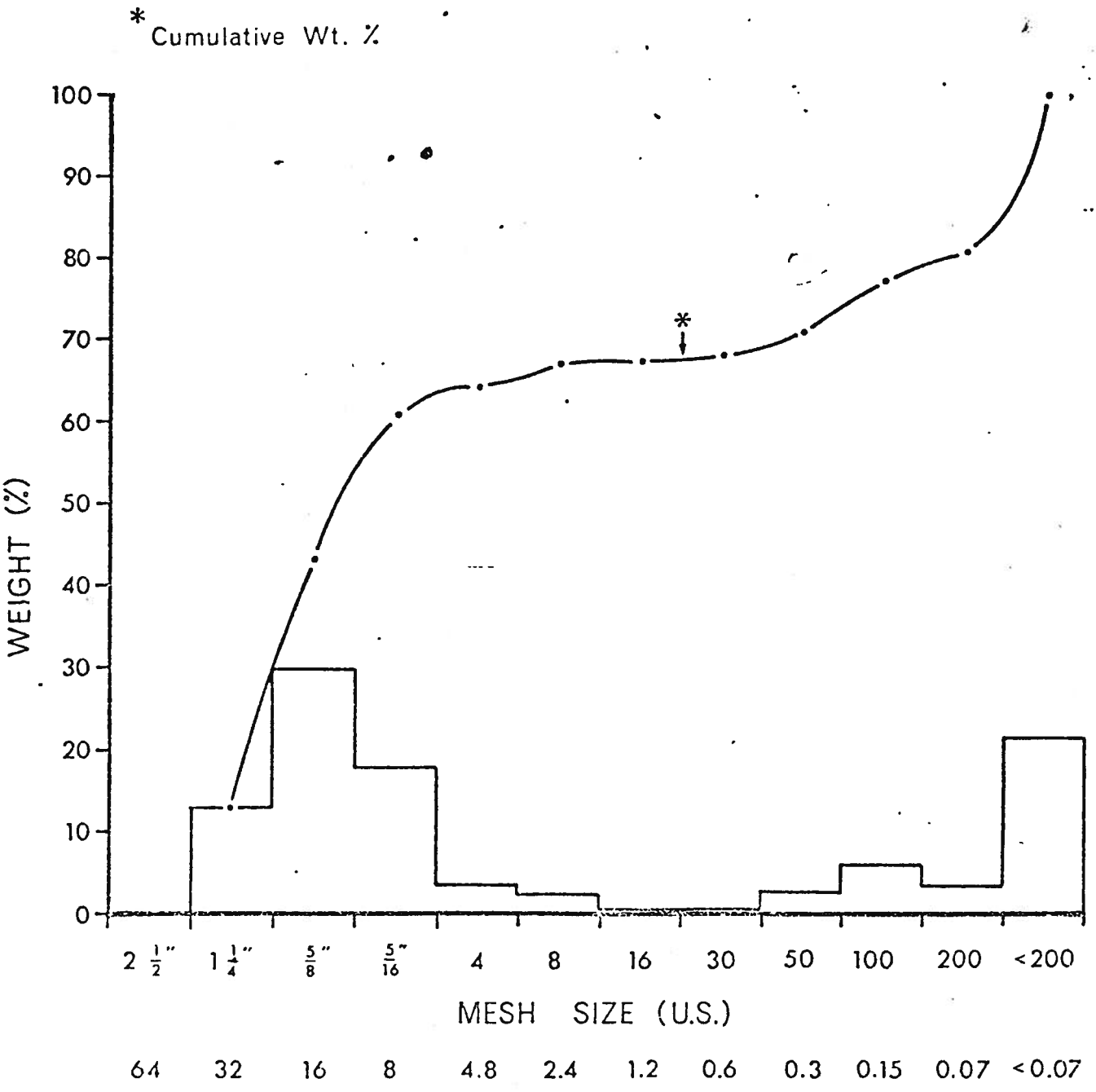
Test Hole Samples



SAMPLE NO.: Hole 1

DEPTH: 12, 27

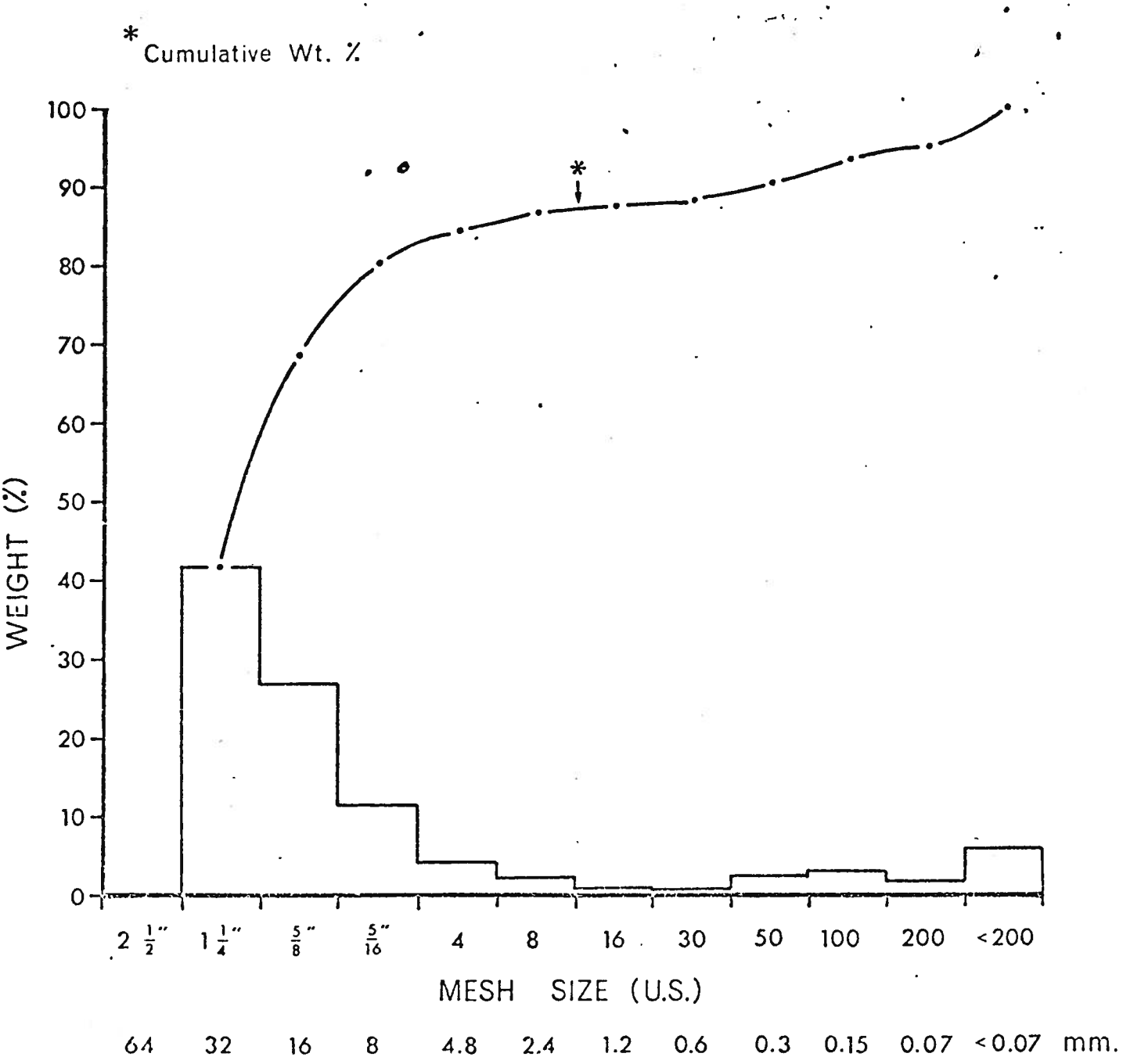
LOCATION: W1/2 18-36-1W5



SAMPLE NO.: Hole 2

DEPTH: 13, 27

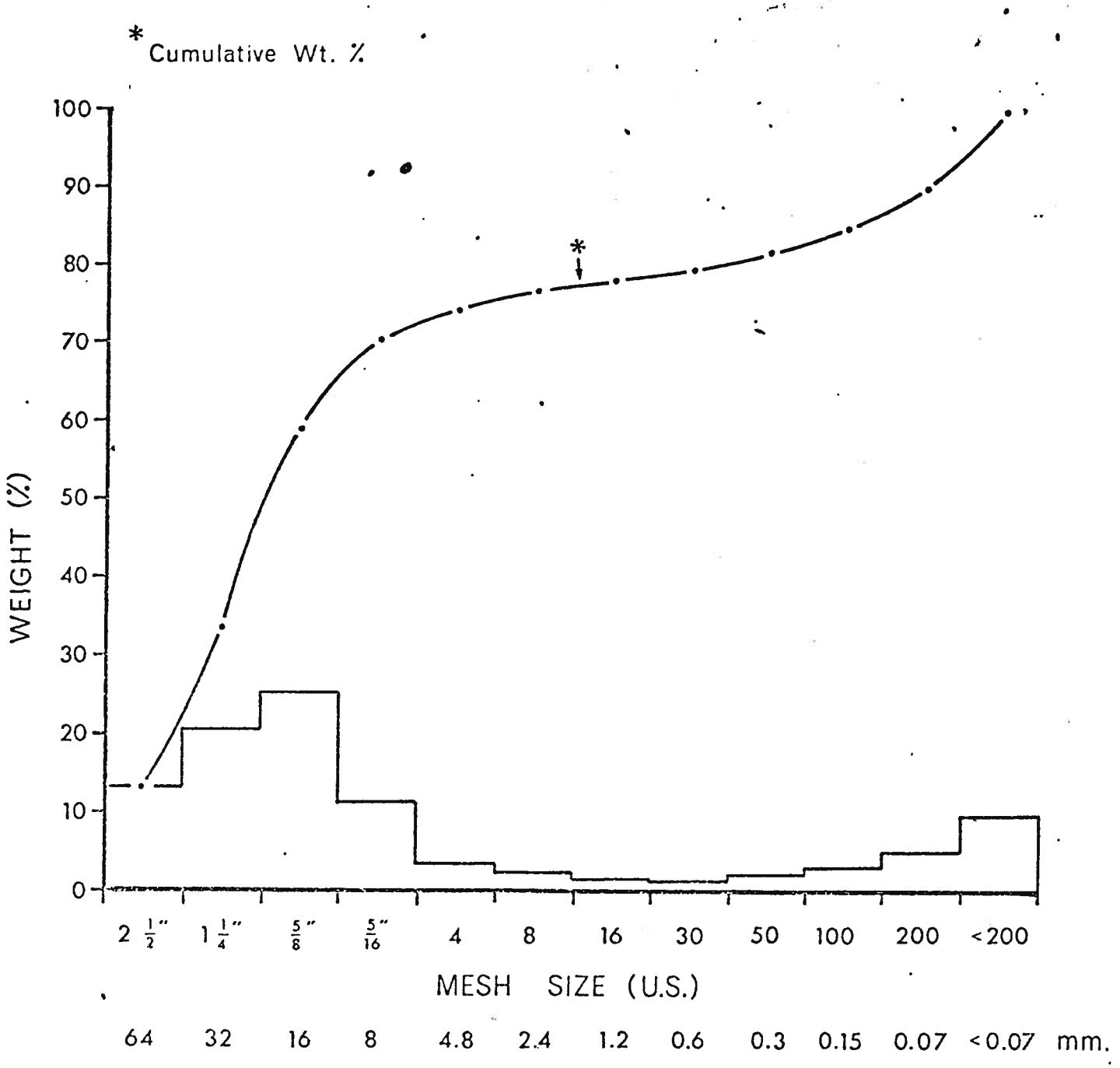
LOCATION: SE 13-36-2W5



SAMPLE NO.: Hole 3

DEPTH: 18

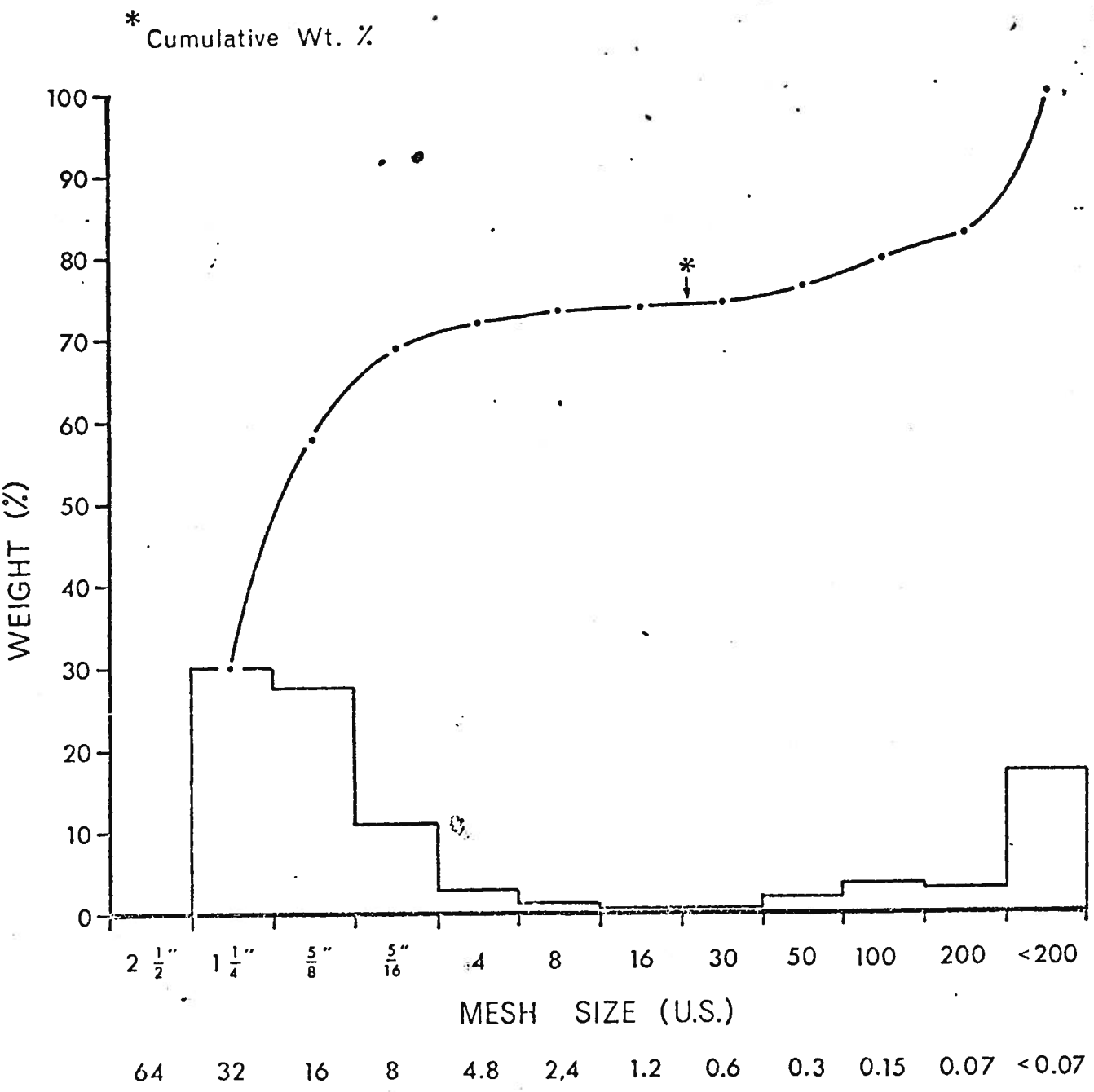
LOCATION: S 1/2 18-36-1W5



SAMPLE NO.: Hole 4

DEPTH: 9, 23, 27, 33

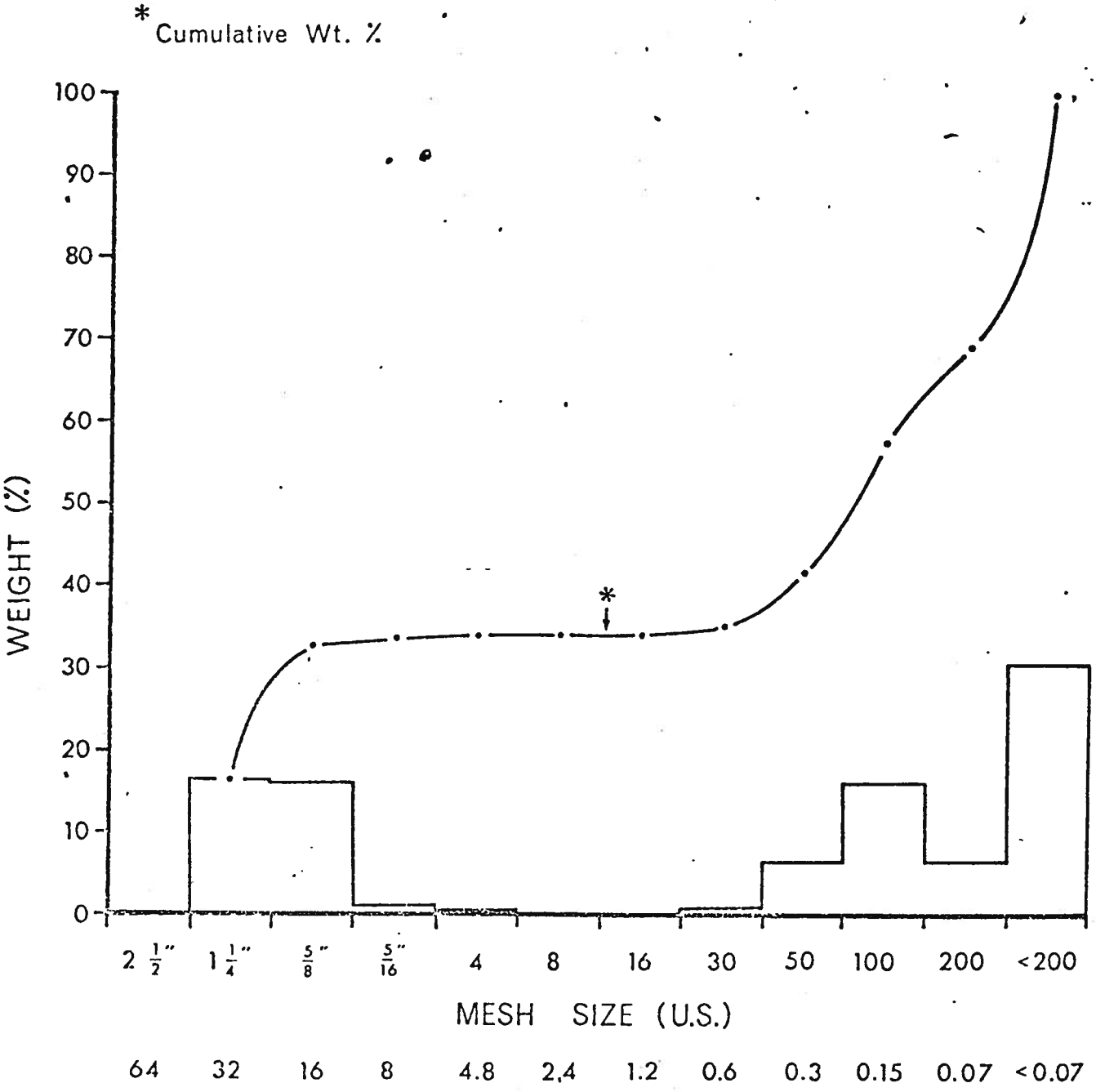
LOCATION: SW-30-35-2W5



SAMPLE NO.: Hole 5

DEPTH: 12, 23

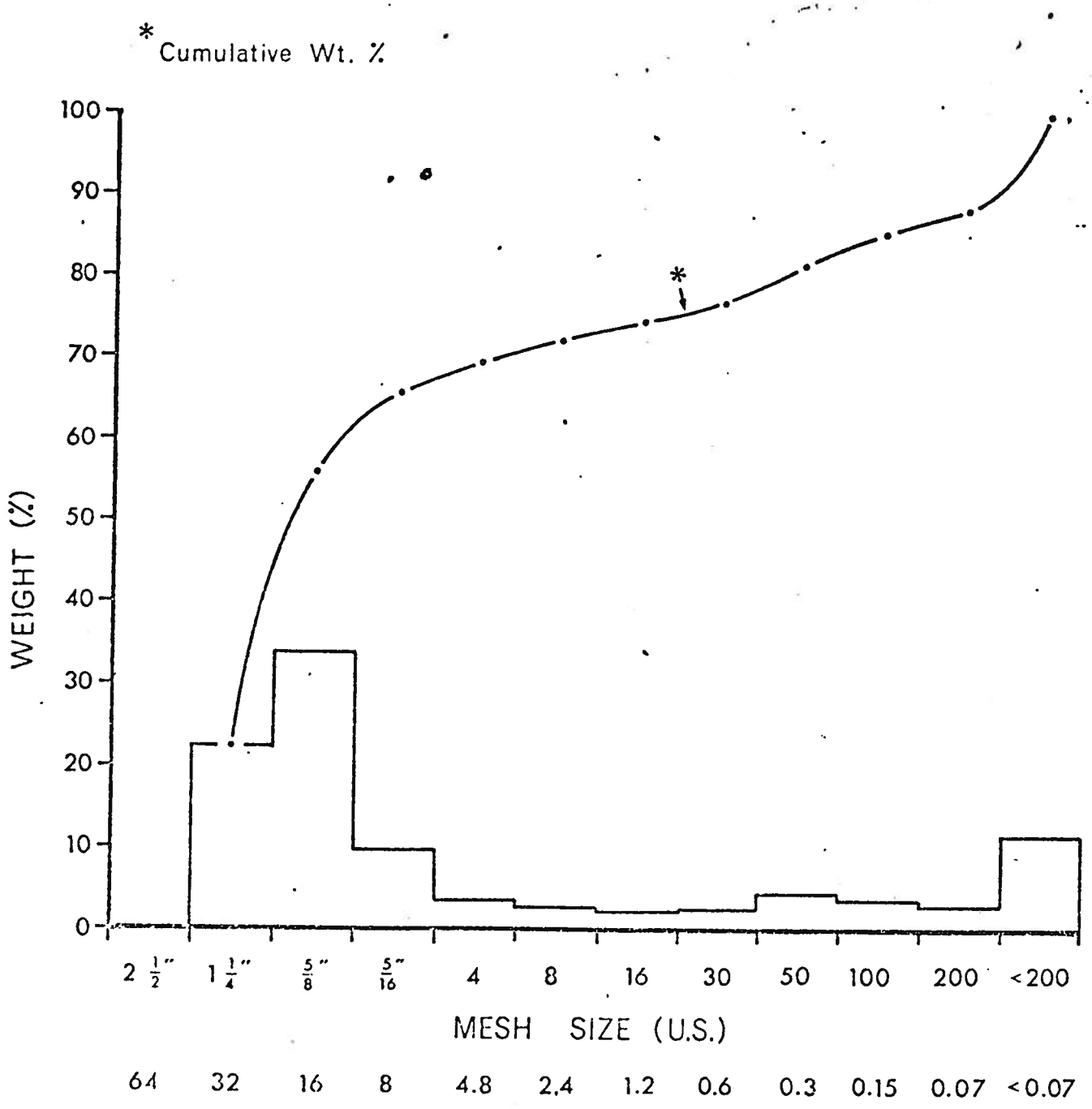
LOCATION: NW 21-35-3W5



SAMPLE NO.: Hole 6

DEPTH: 9

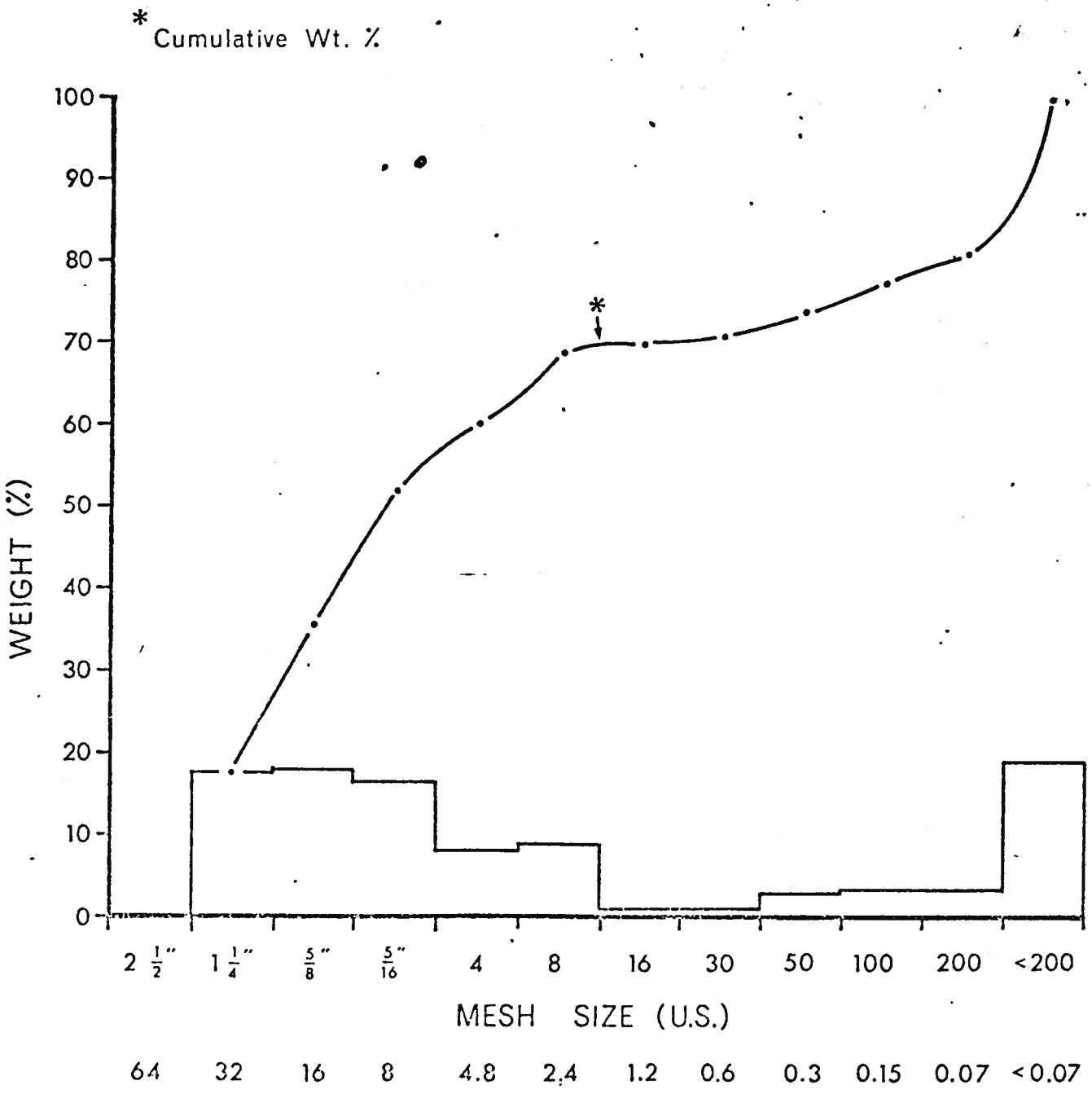
LOCATION: SW4-35-3W5



SAMPLE NO.: Hole 7

DEPTH: 12

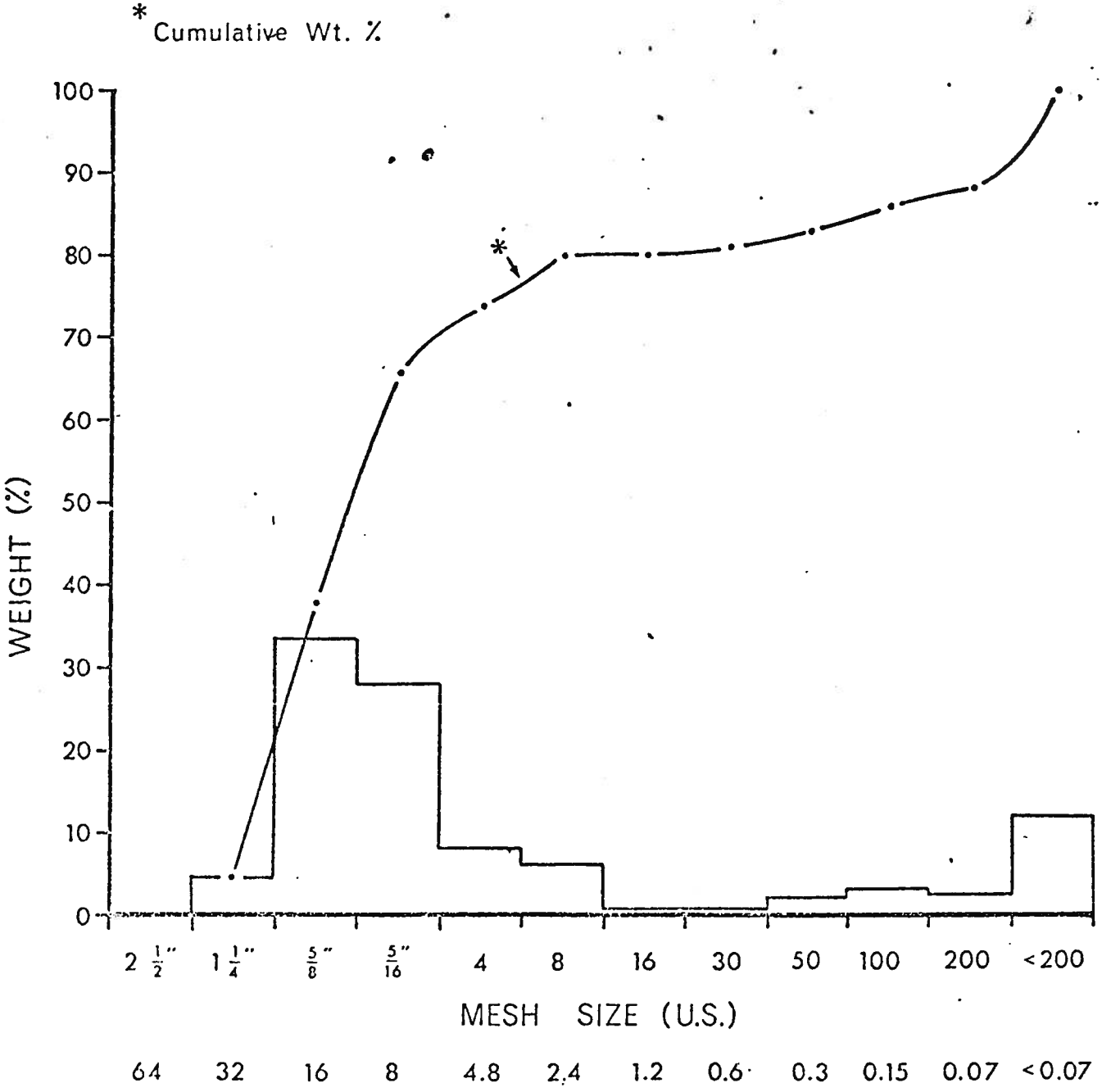
LOCATION: S1/2 29-36-28W4



SAMPLE NO.: Hole 8

DEPTH: 18

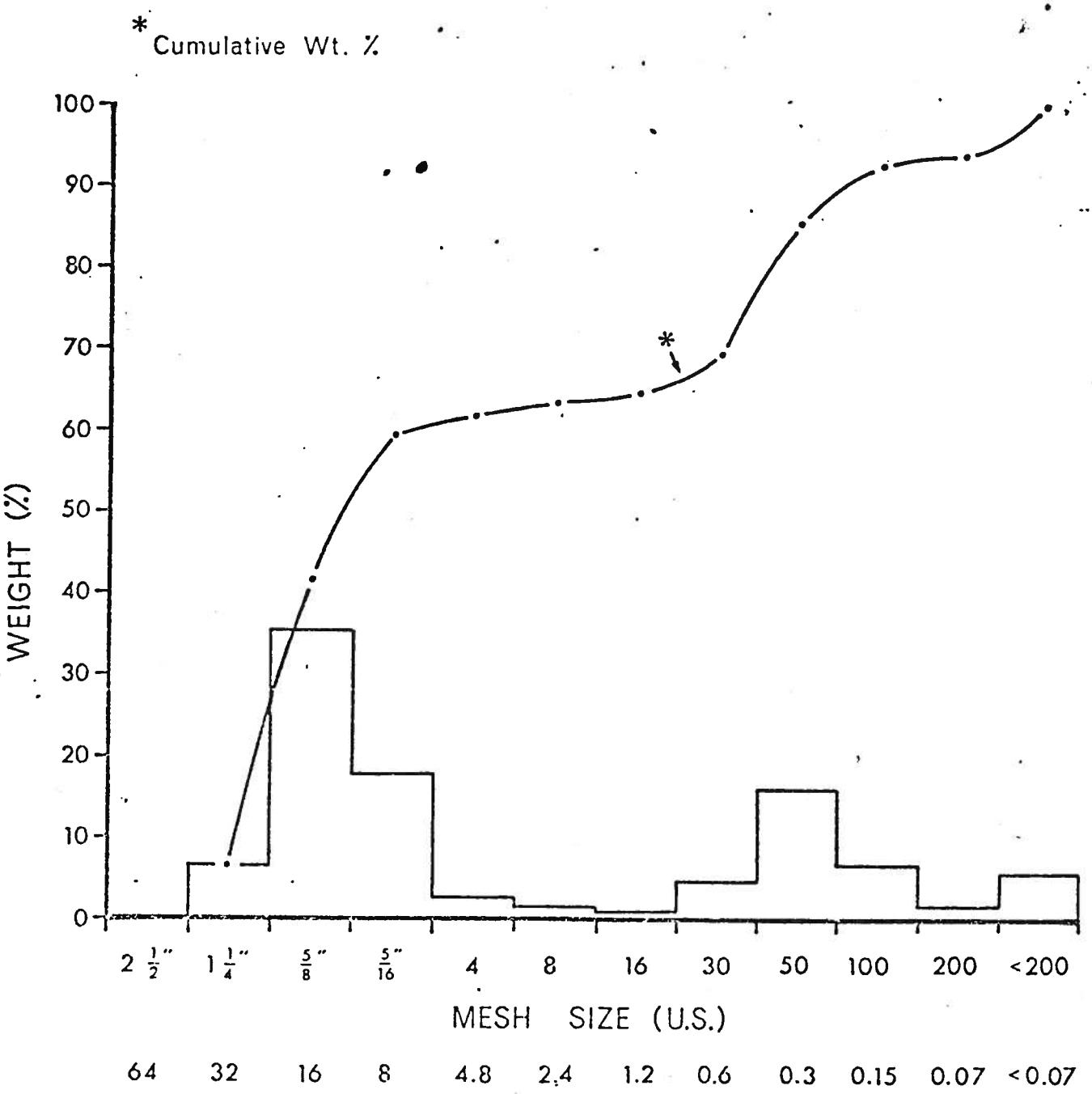
LOCATION: SW 20-36-28W4



SAMPLE NO.: Hole 9

DEPTH: 12

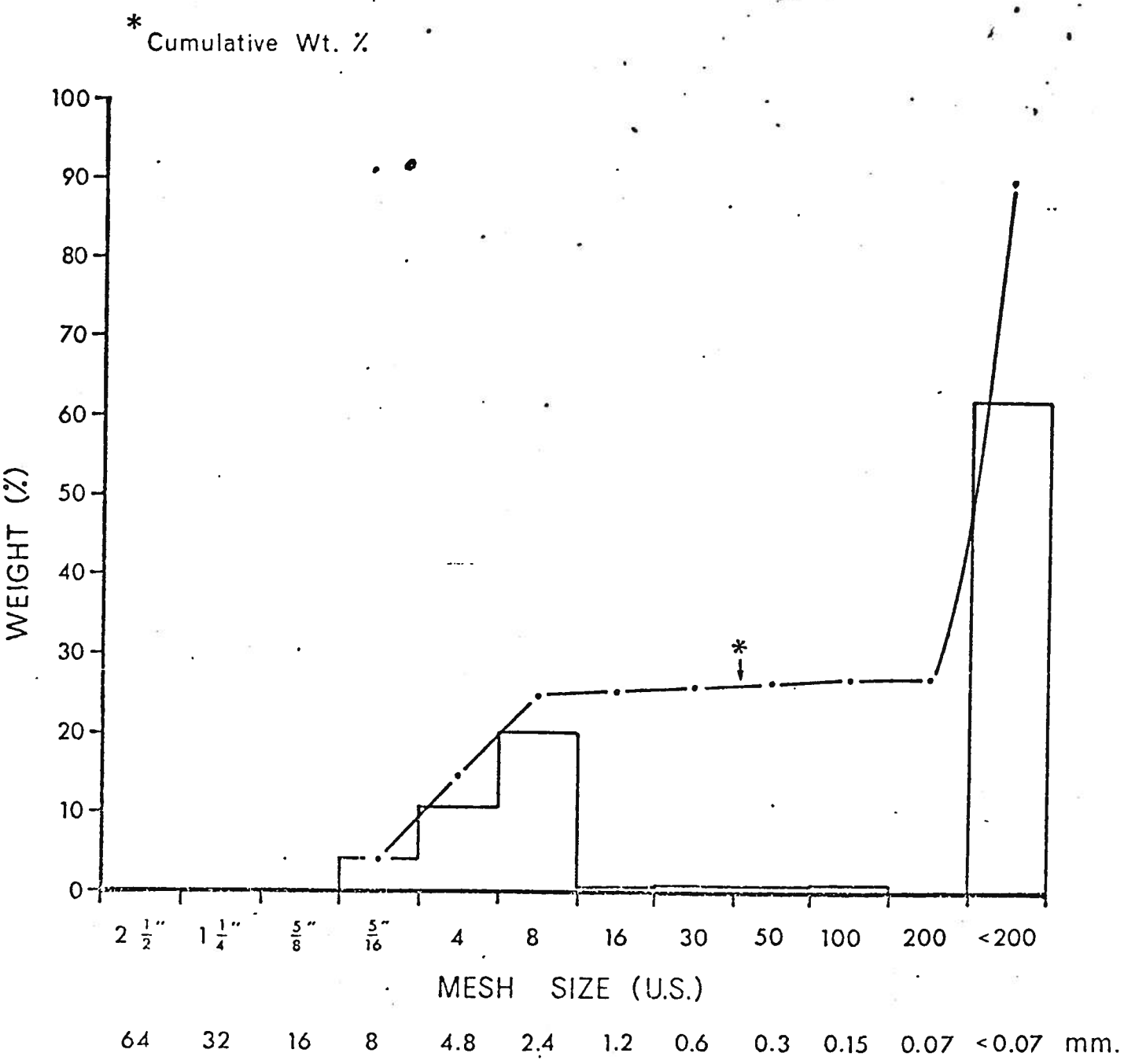
LOCATION: SE-31-36-28W4



SAMPLE NO.: Hole 10

DEPTH: 8

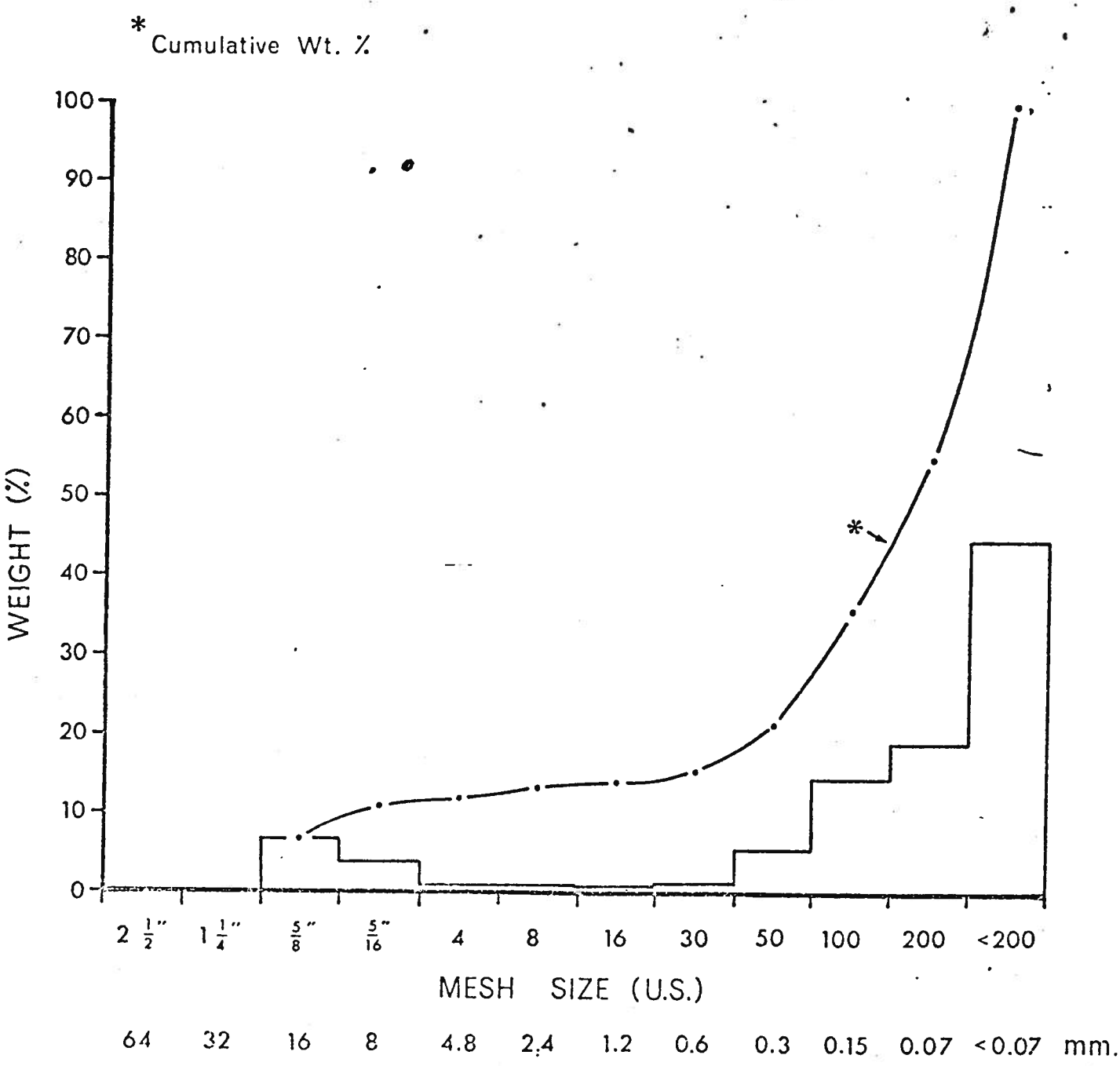
LOCATION: NW 2-40-27W4



SAMPLE NO.: Hole 11

DEPTH: 8

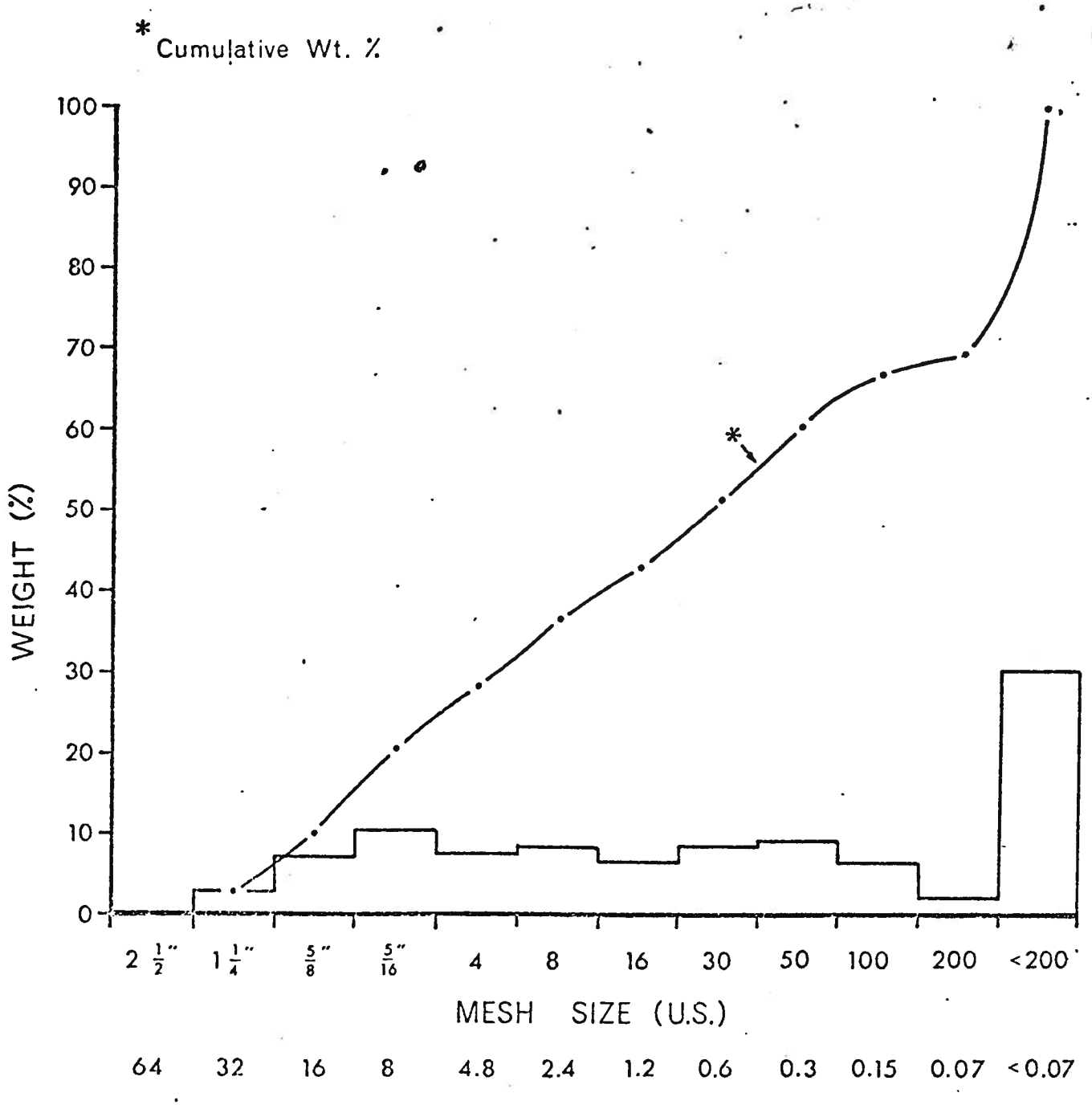
LOCATION: SW 17-39-27W4



SAMPLE NO.: Hole 12

DEPTH: 18

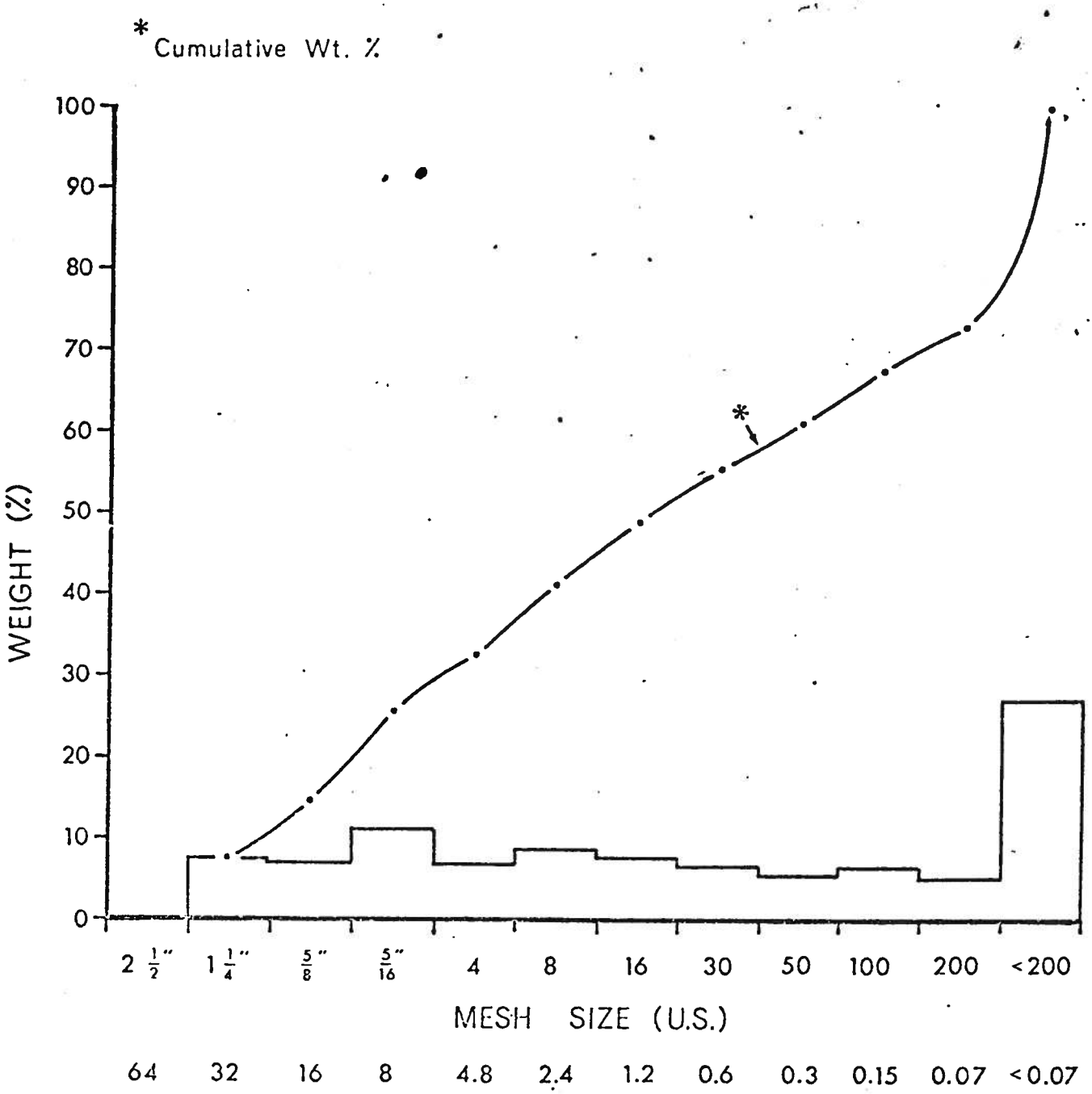
LOCATION: NE 3-40-28W4



SAMPLE NO.: Hole 13

DEPTH: 7, 18

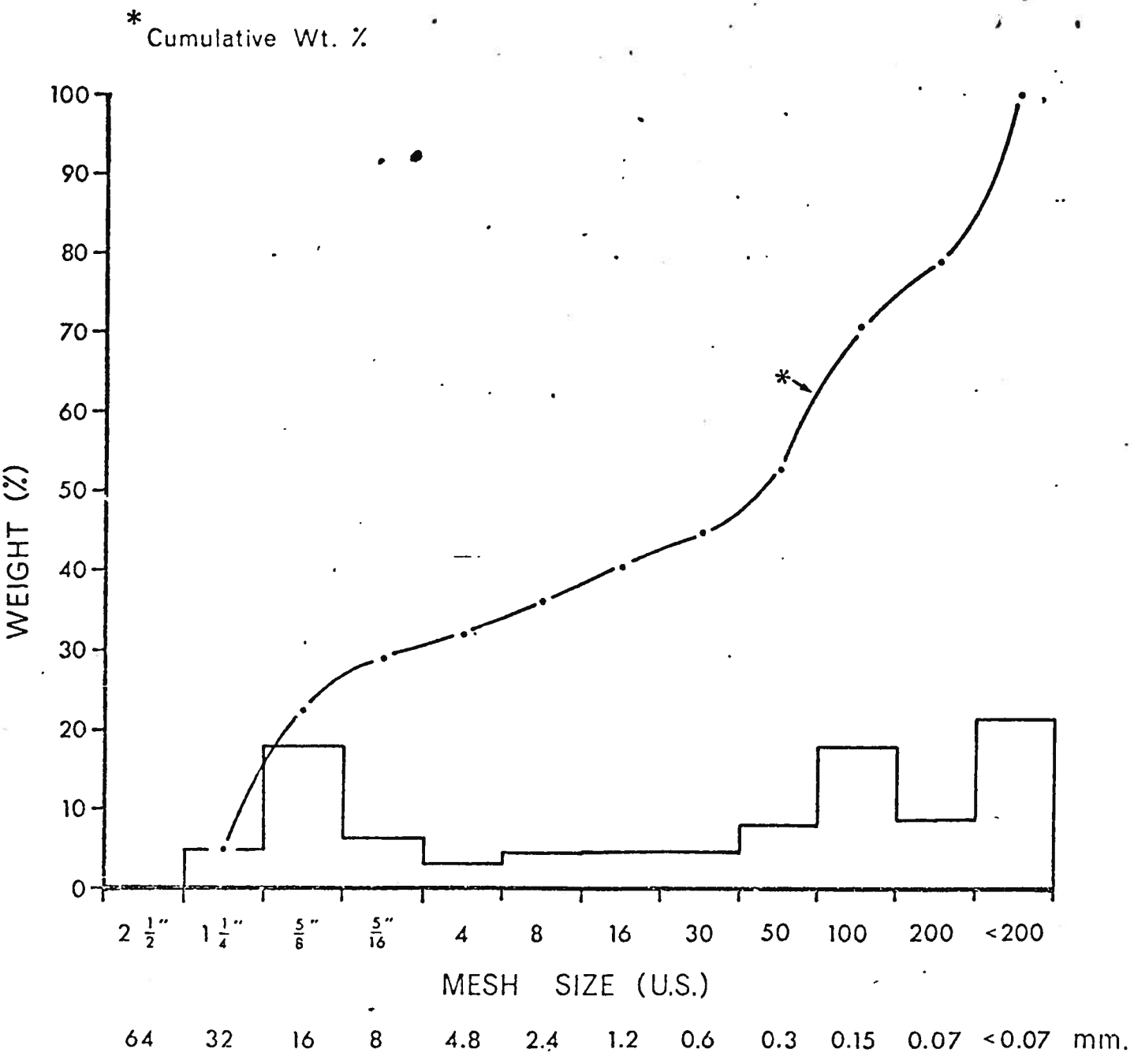
LOCATION: N1/2 10-42-24W4



SAMPLE NO.: Hole 14

DEPTH: 6

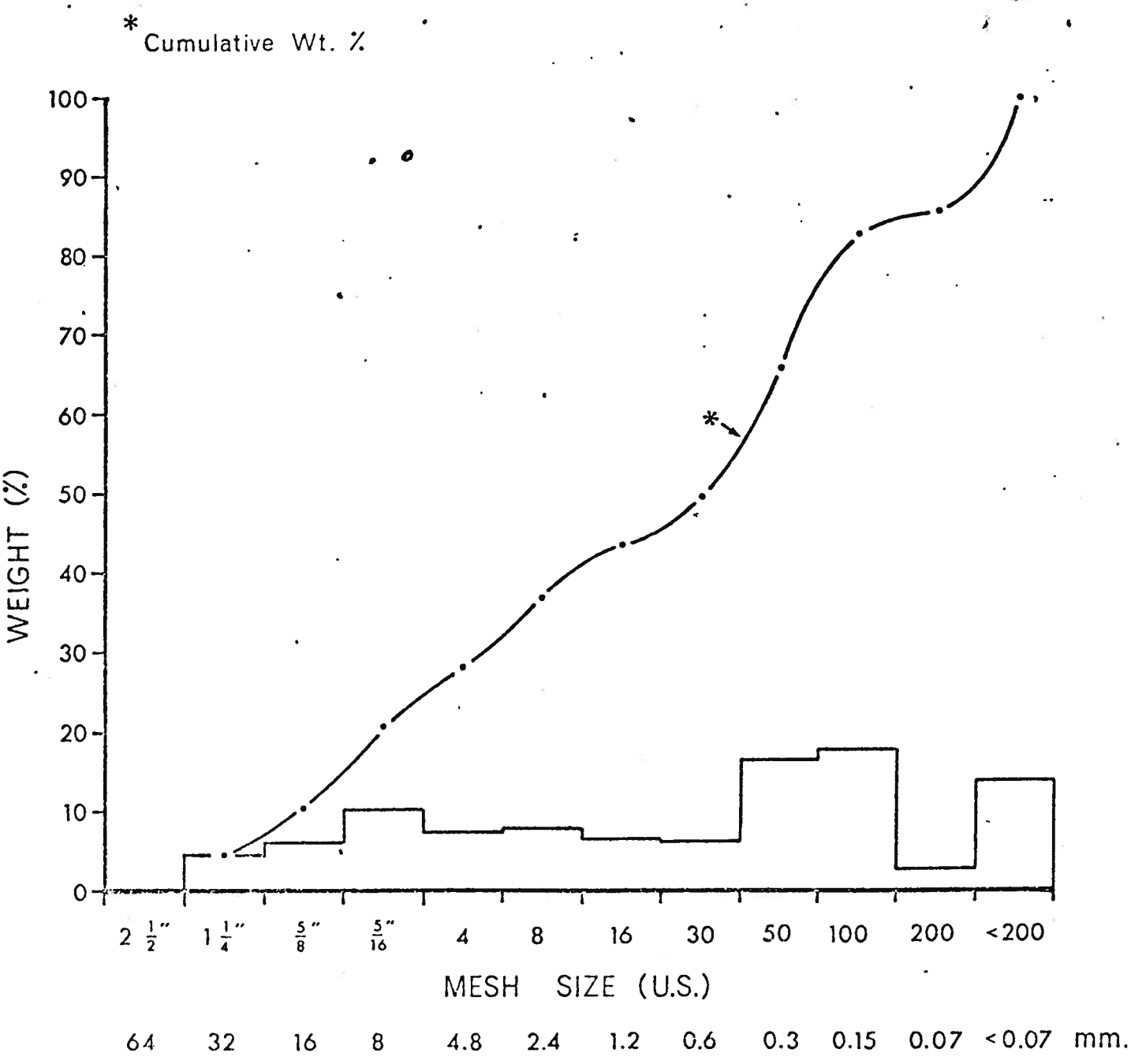
LOCATION: SE 18-41-24W4



SAMPLE NO.: Hole 15

DEPTH: 12

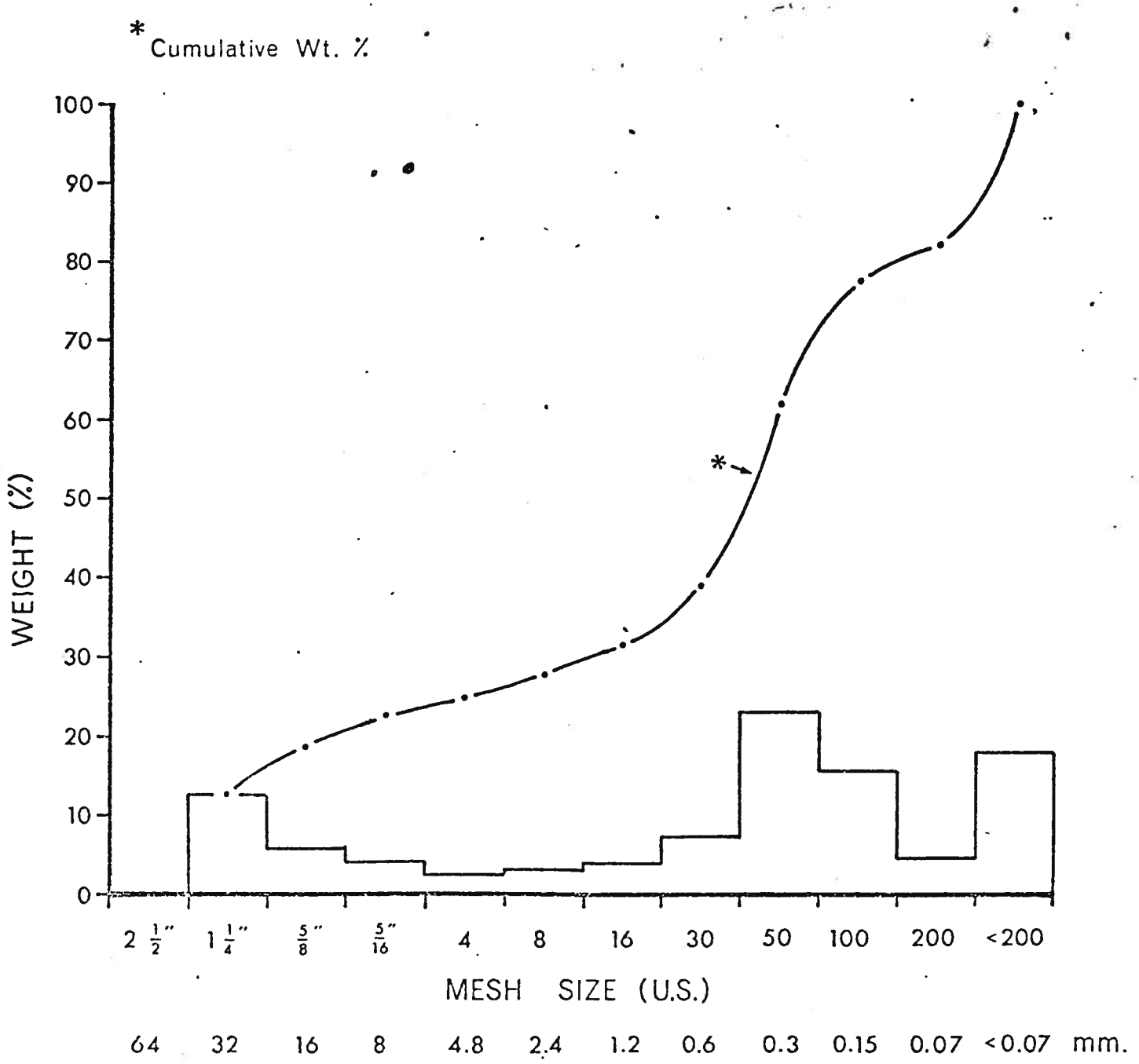
LOCATION: NW 5-41-24W4



SAMPLE NO.: Hole 16

DEPTH: 6

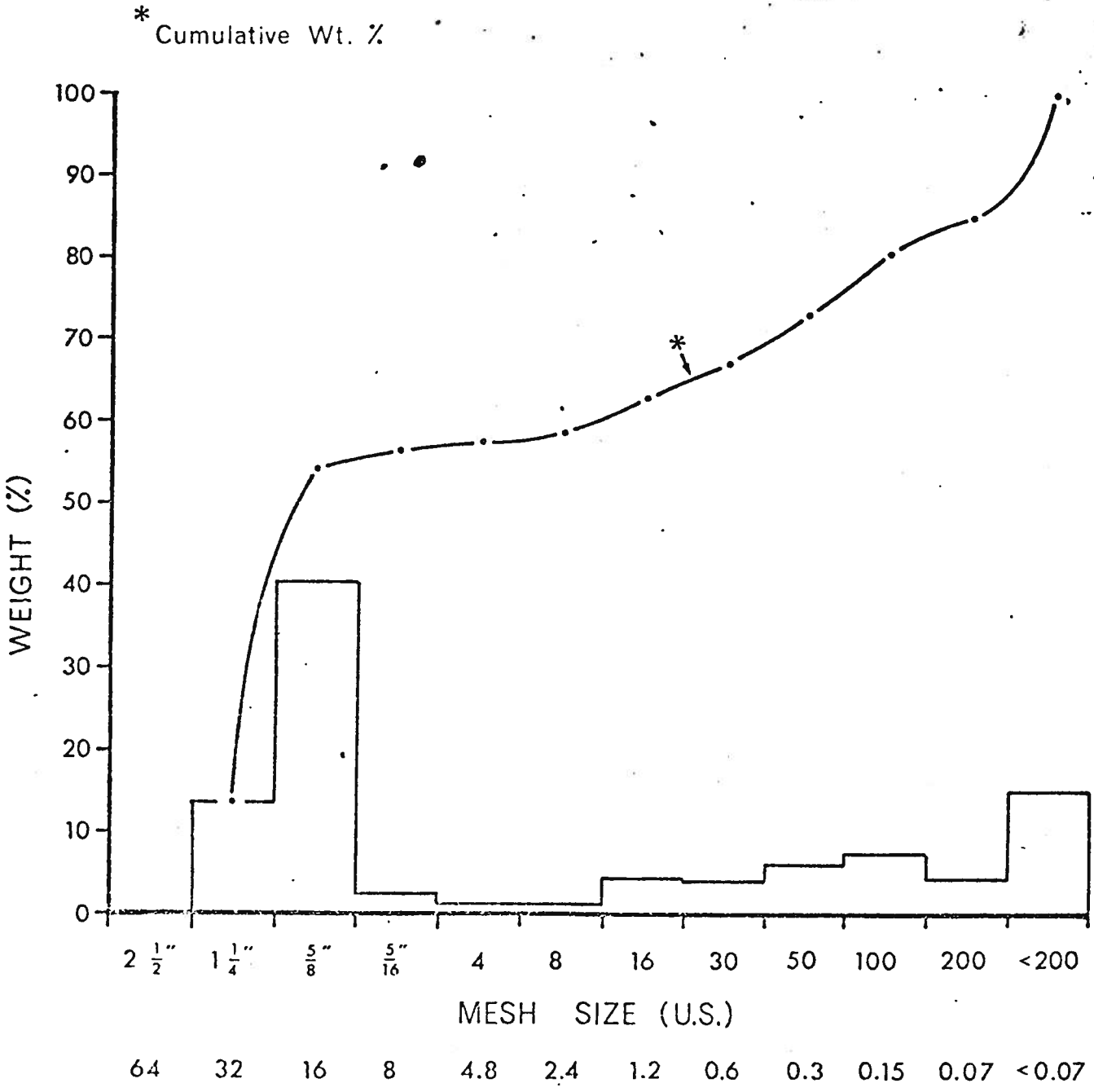
LOCATION: SE 32-40-24W4



SAMPLE NO.: Hole 17

DEPTH: 8

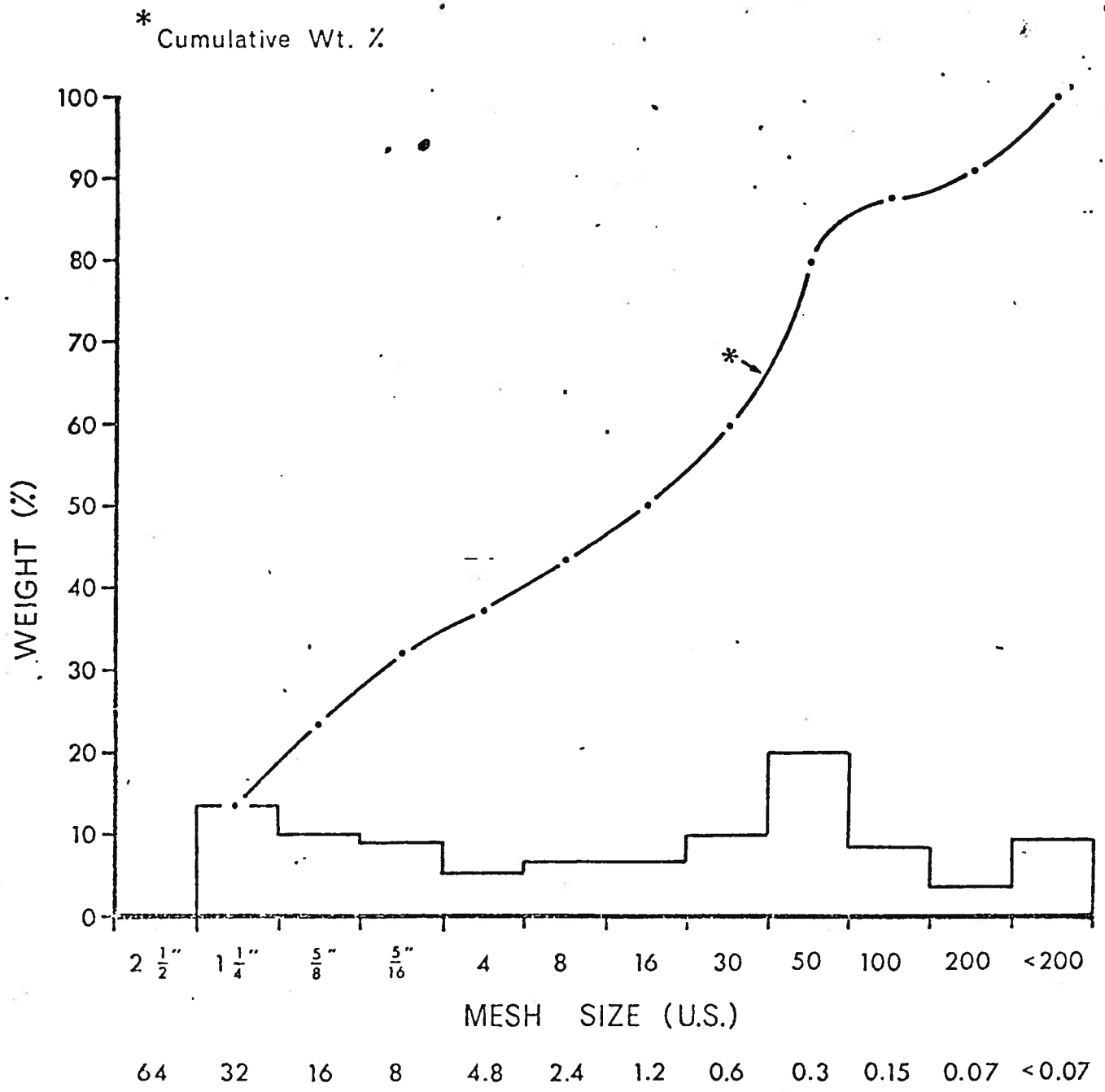
LOCATION: NW 33-40-24W4



SAMPLE NO.: Hole 18

DEPTH: 6

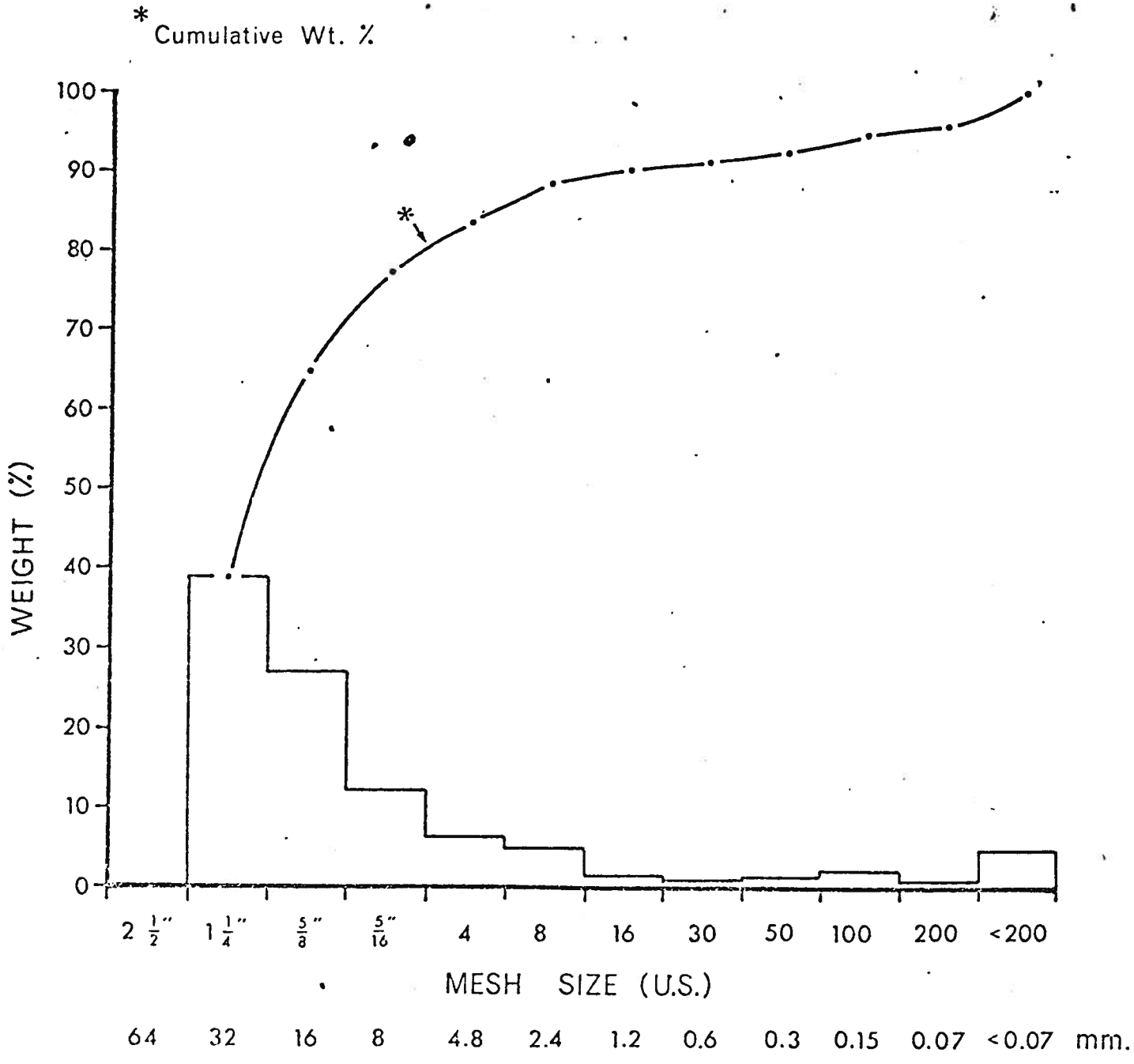
LOCATION: S1/2 14-40-23W4



SAMPLE NO.: Hole 19

DEPTH: 13, 17, 28

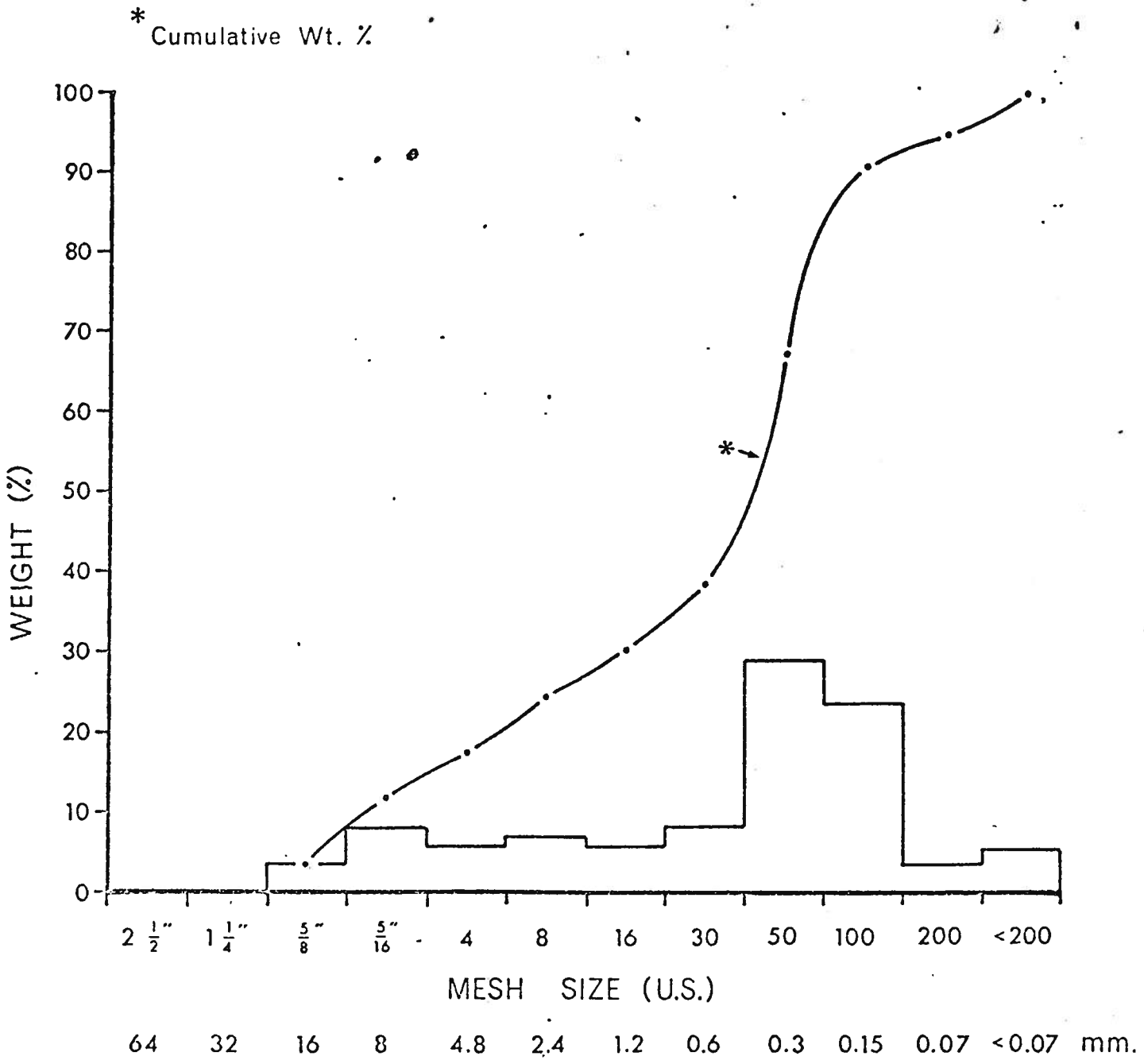
LOCATION: SW 1-40-23W4



SAMPLE NO.: Hole 20

DEPTH: 5

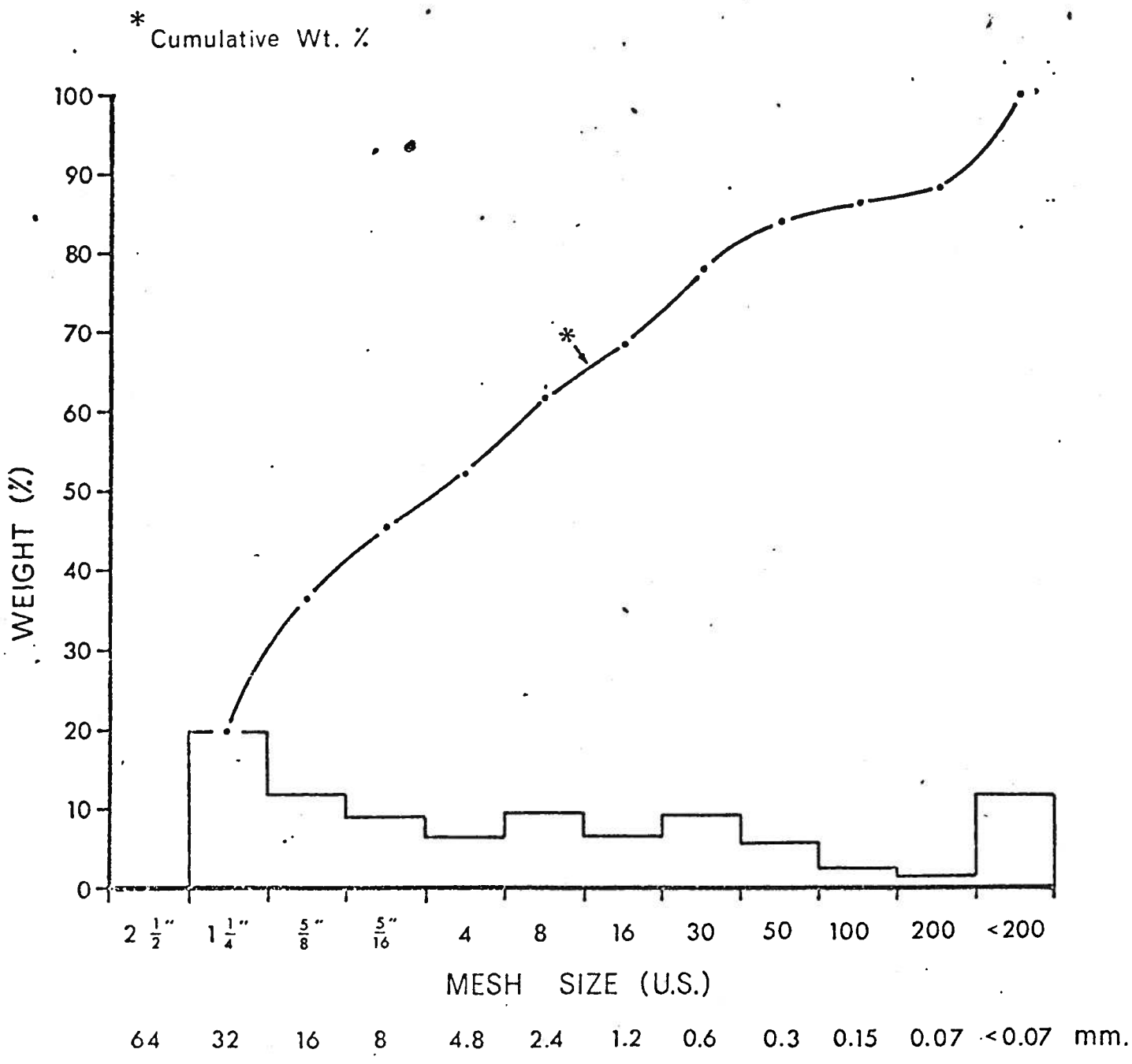
LOCATION: E 1/2 20-39-23W4



SAMPLE NO.: Hole 21

DEPTH : 3

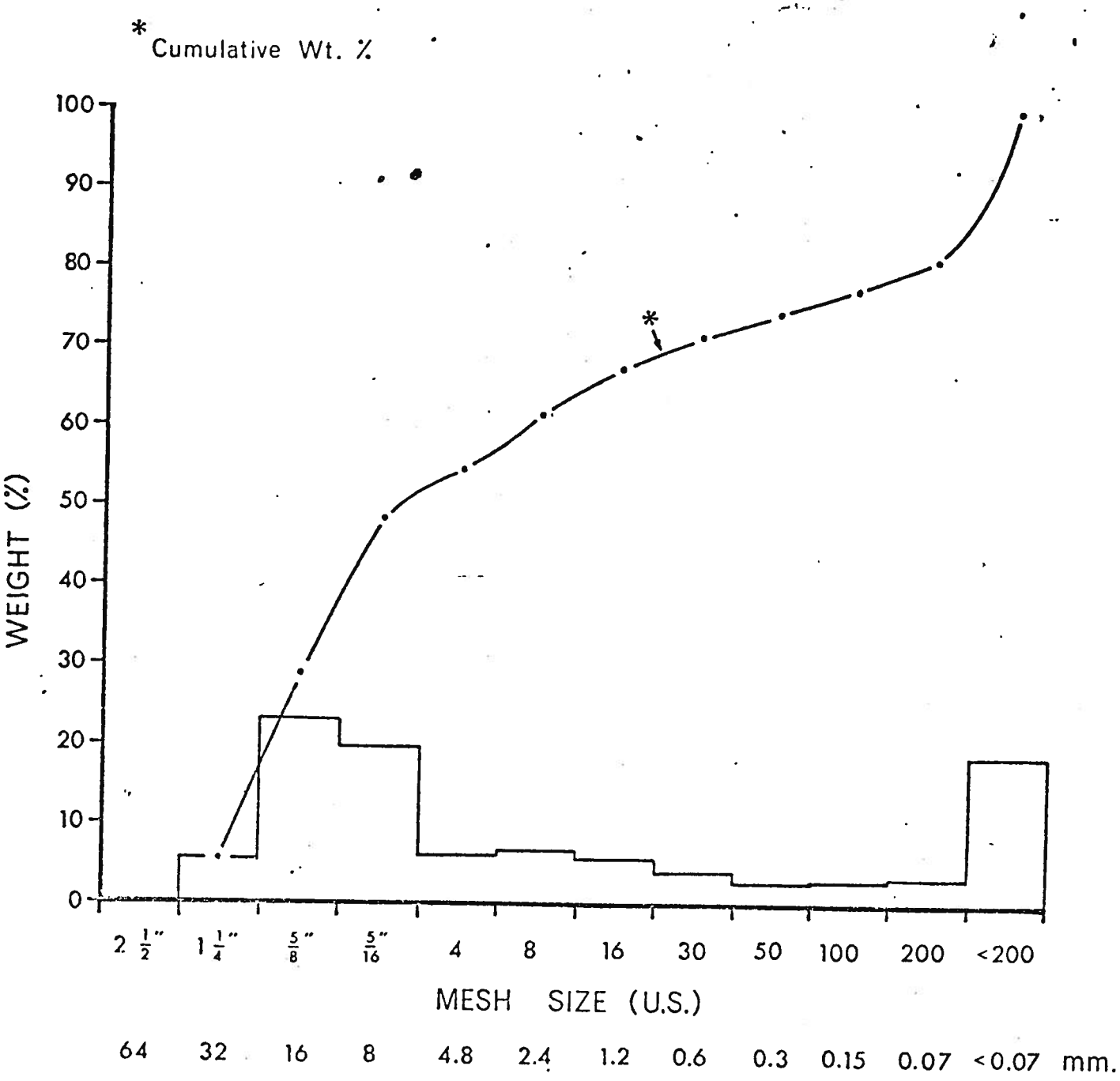
LOCATION : SE 28-39-23W4



SAMPLE NO.: Hole 22

DEPTH: 10

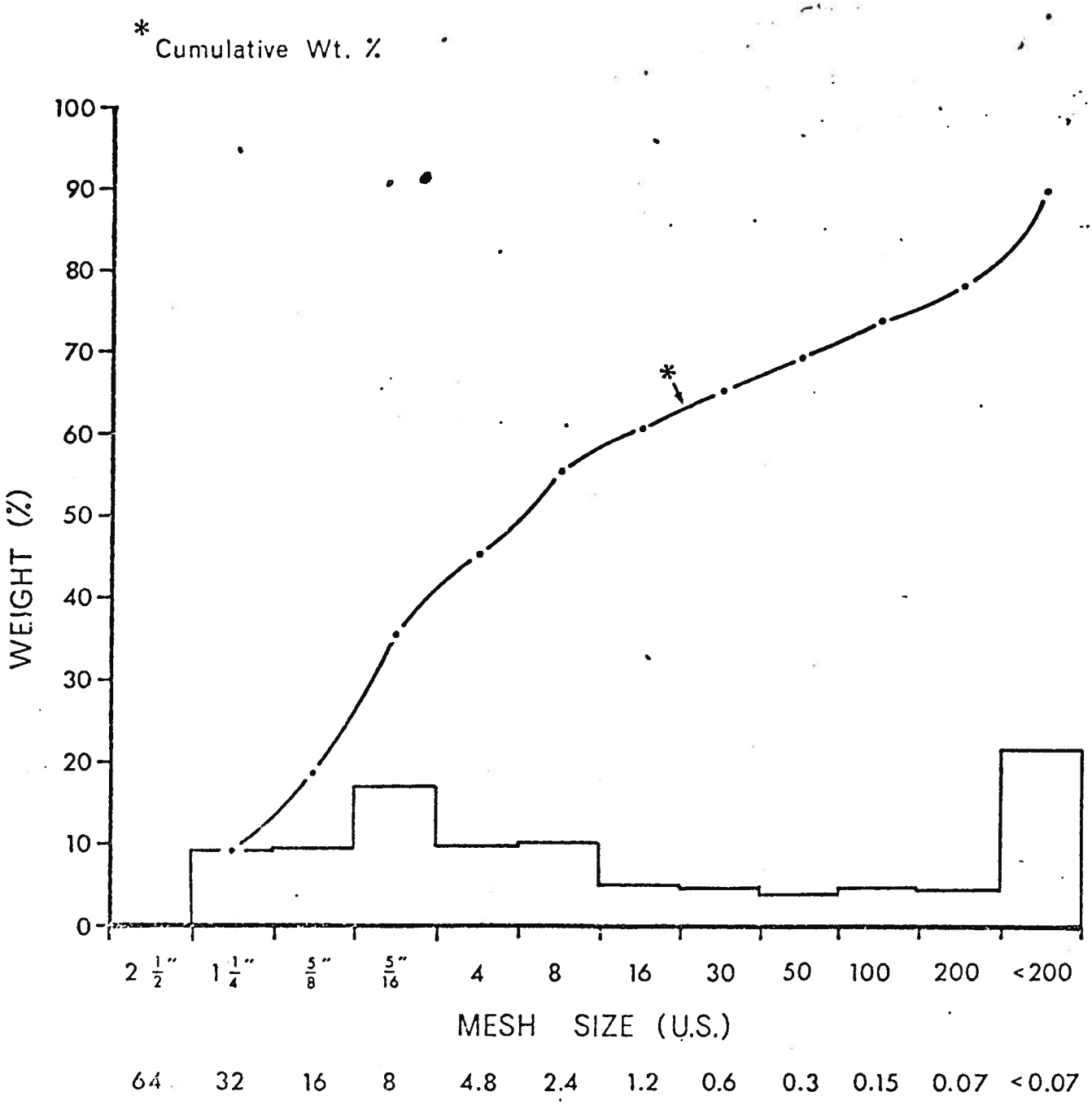
LOCATION: NW 34-37-25W4



SAMPLE NO.: Hole 23

DEPTH : 12

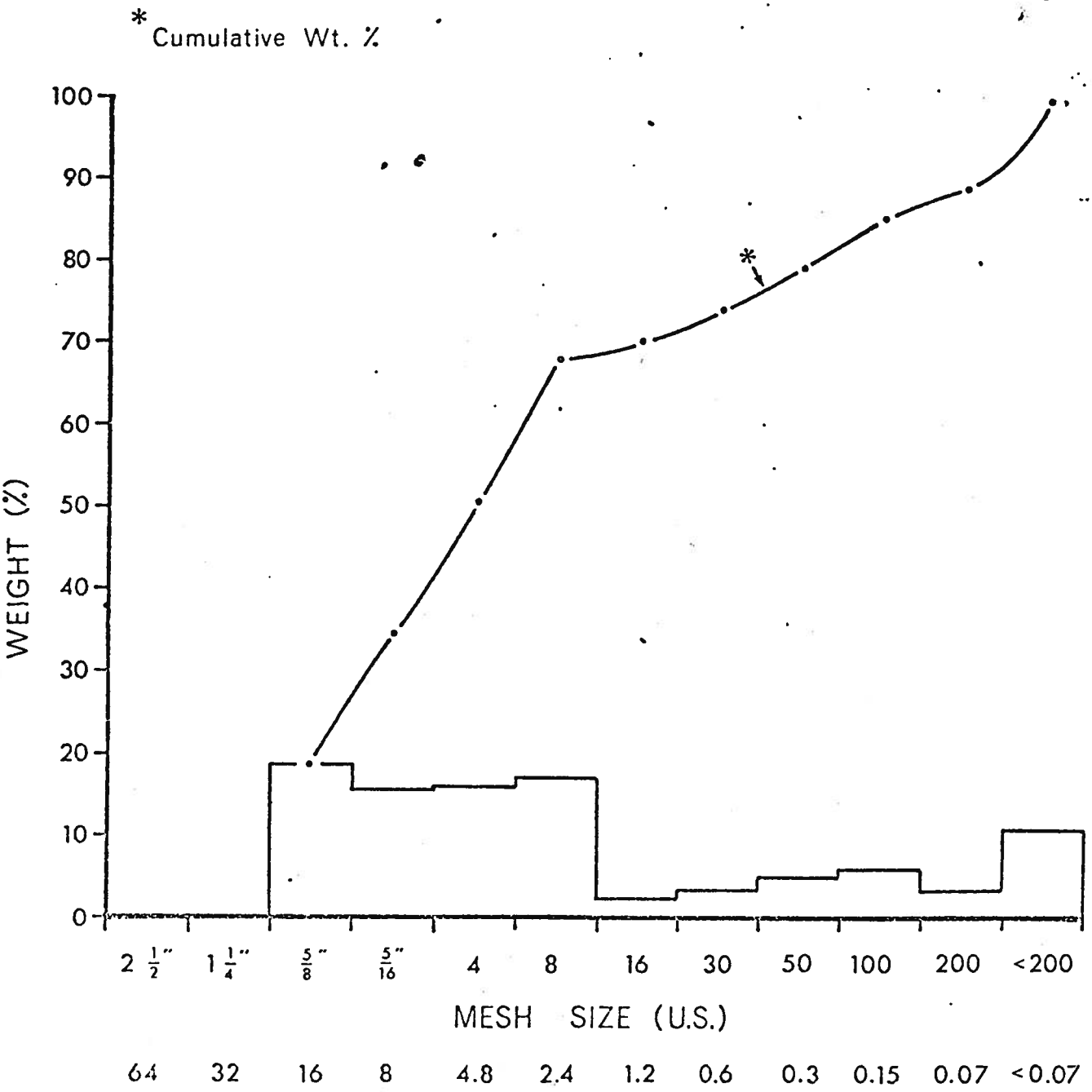
LOCATION : SW 4-38-25W4



SAMPLE NO.: Hole 24

DEPTH: 5

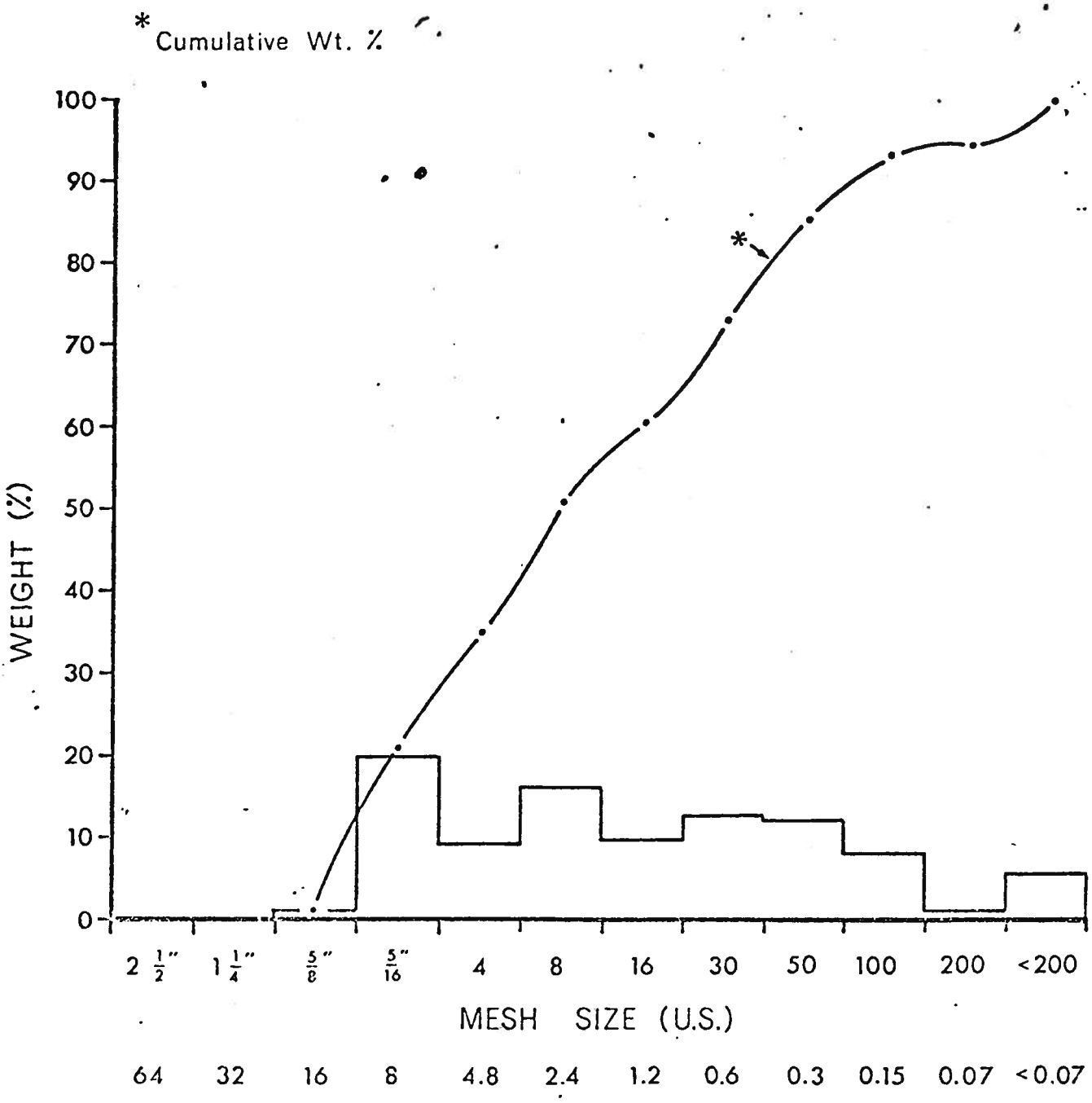
LOCATION: NW 1-38-26W4



SAMPLE NO.: Hole 25

DEPTH: 6

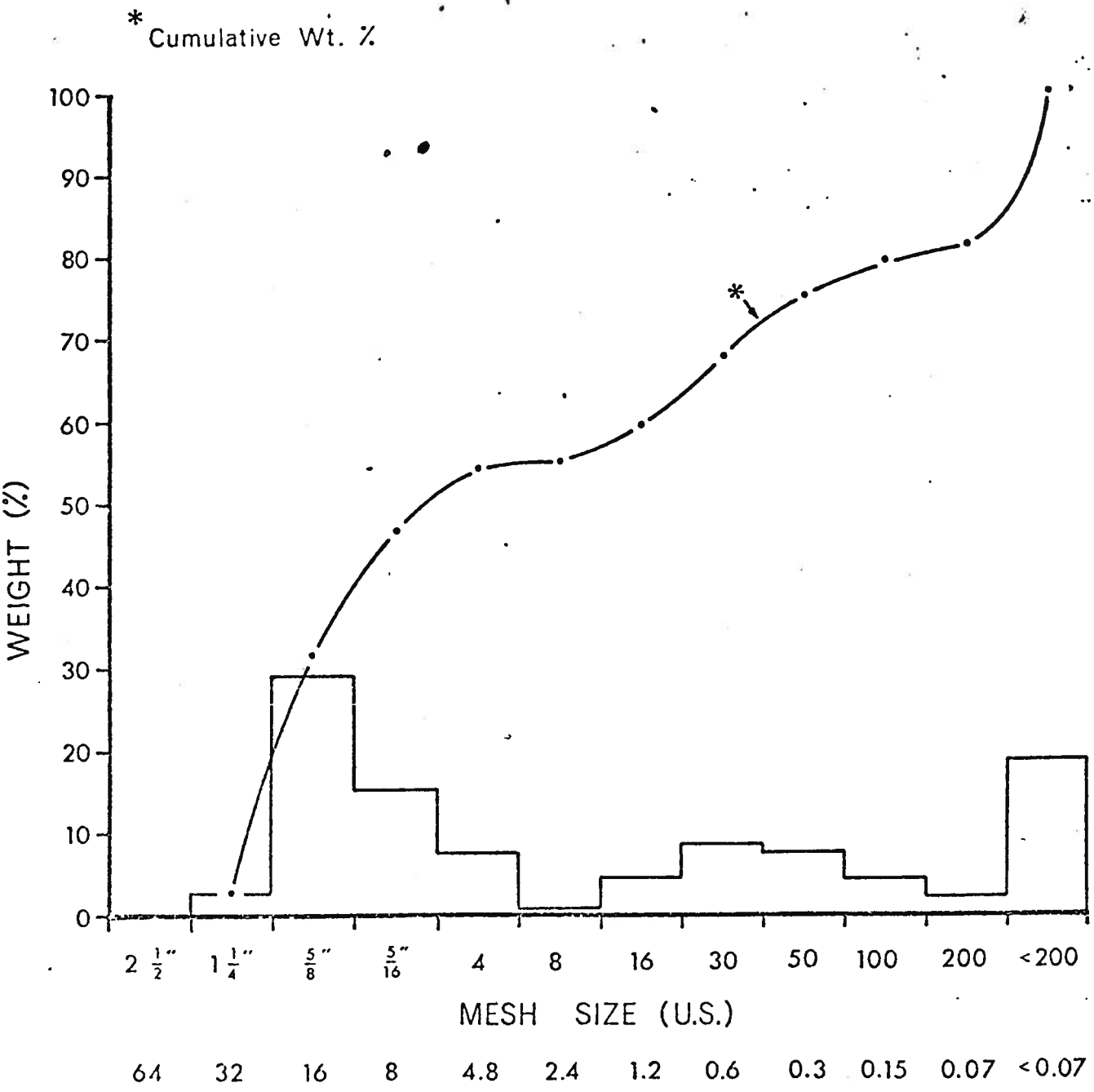
LOCATION: SE.3-37-25W4



SAMPLE NO.: Hole 26

DEPTH: 12

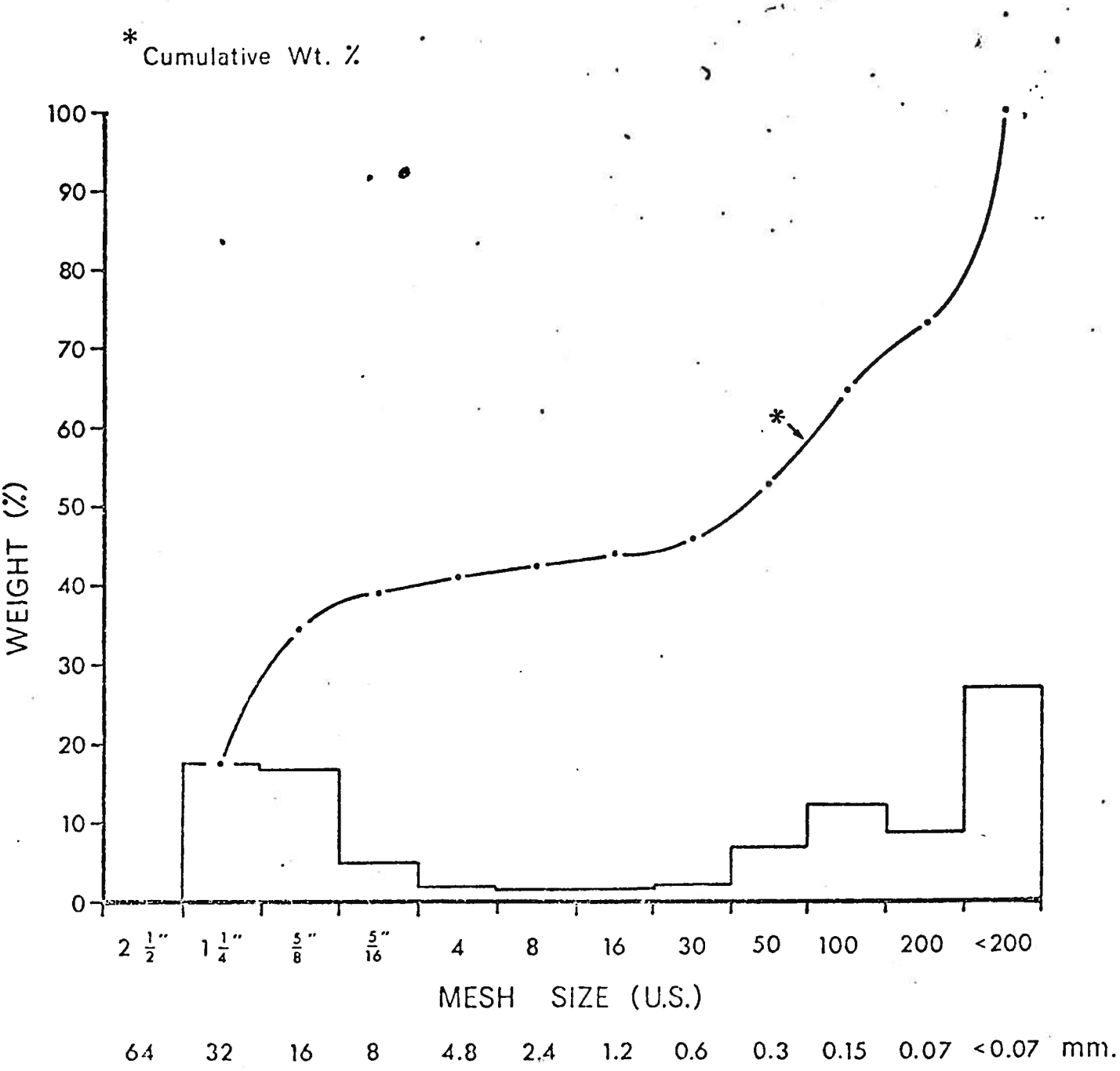
LOCATION: S 1/2 26-36-25W4



SAMPLE NO.: Hole 27

DEPTH: 20

LOCATION: NW 1-35-25W4

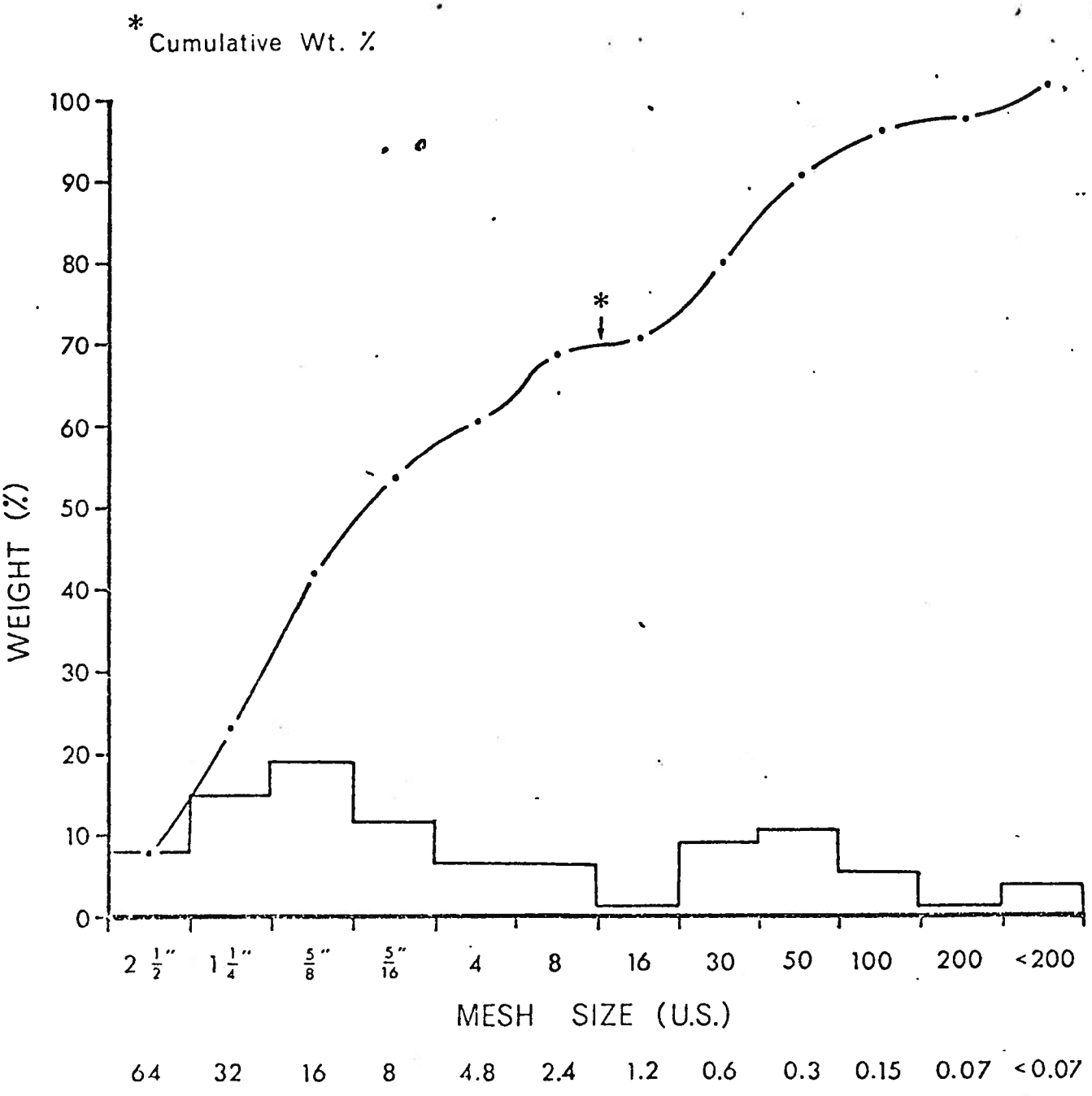


SAMPLE NO.: Hole 28

DEPTH: 8

LOCATION: NW 31-40-27W4

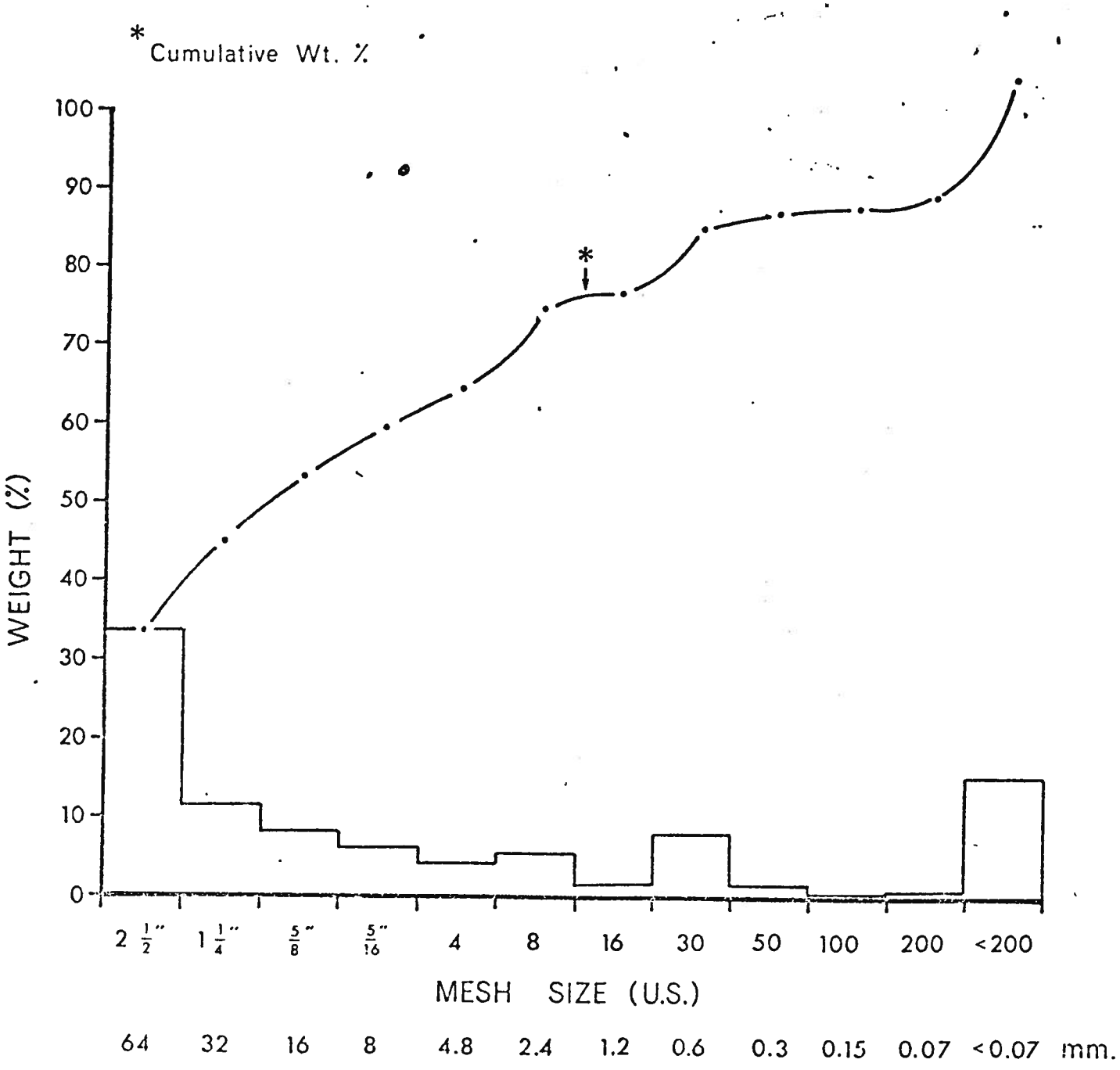
Sieve Analyses
Exposure Samples



SAMPLE NO.: Exposure A

DEPTH: 2-5

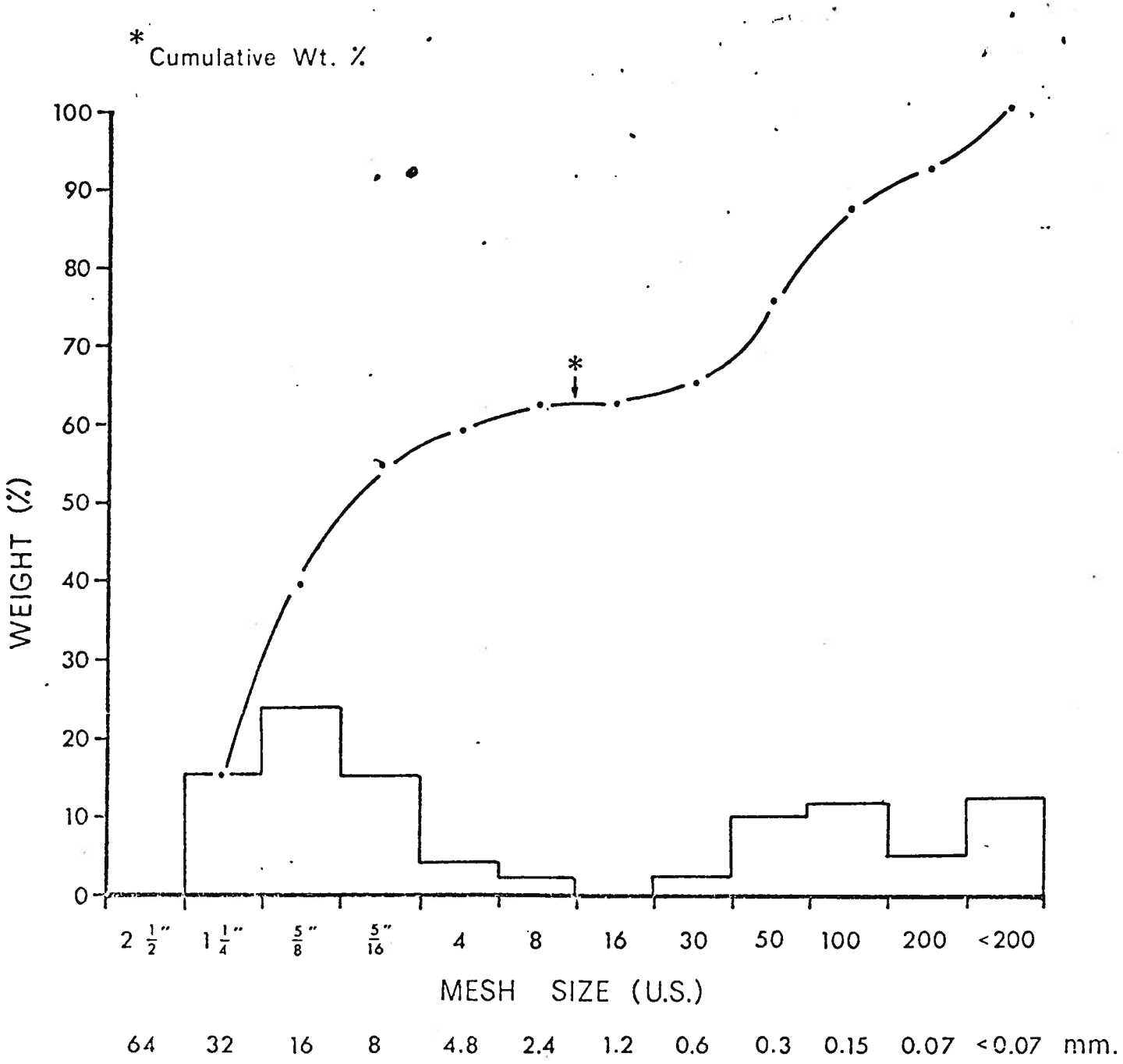
LOCATION: SE 5-42-26W4



SAMPLE NO.: Exposure B

DEPTH: 0-4

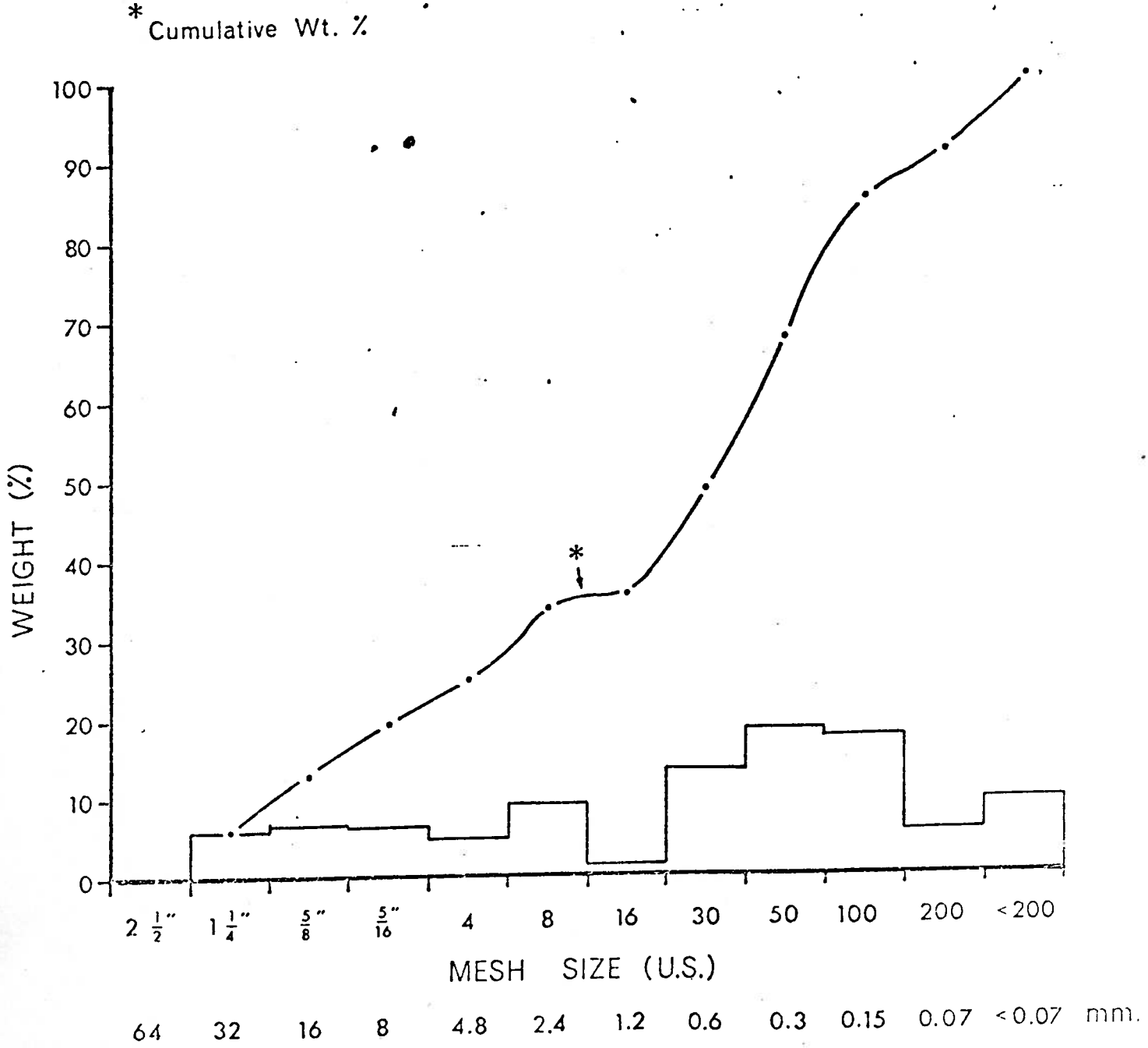
LOCATION: NE 7-41-24W4



SAMPLE NO.: Exposure C

DEPTH: 30-40

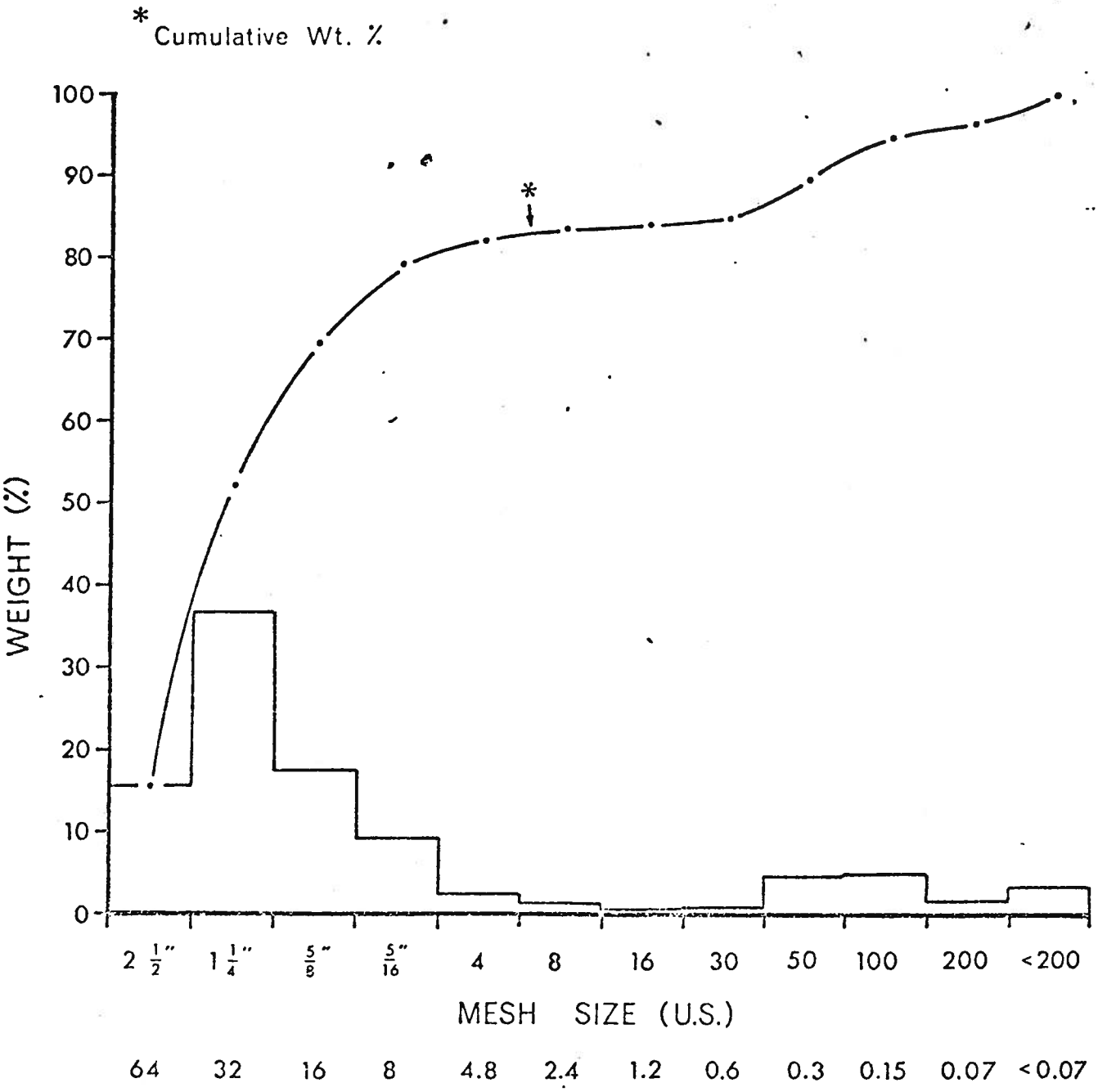
LOCATION: SE,24-39-27W4



SAMPLE NO.: Exposure D

DEPTH: 0-25

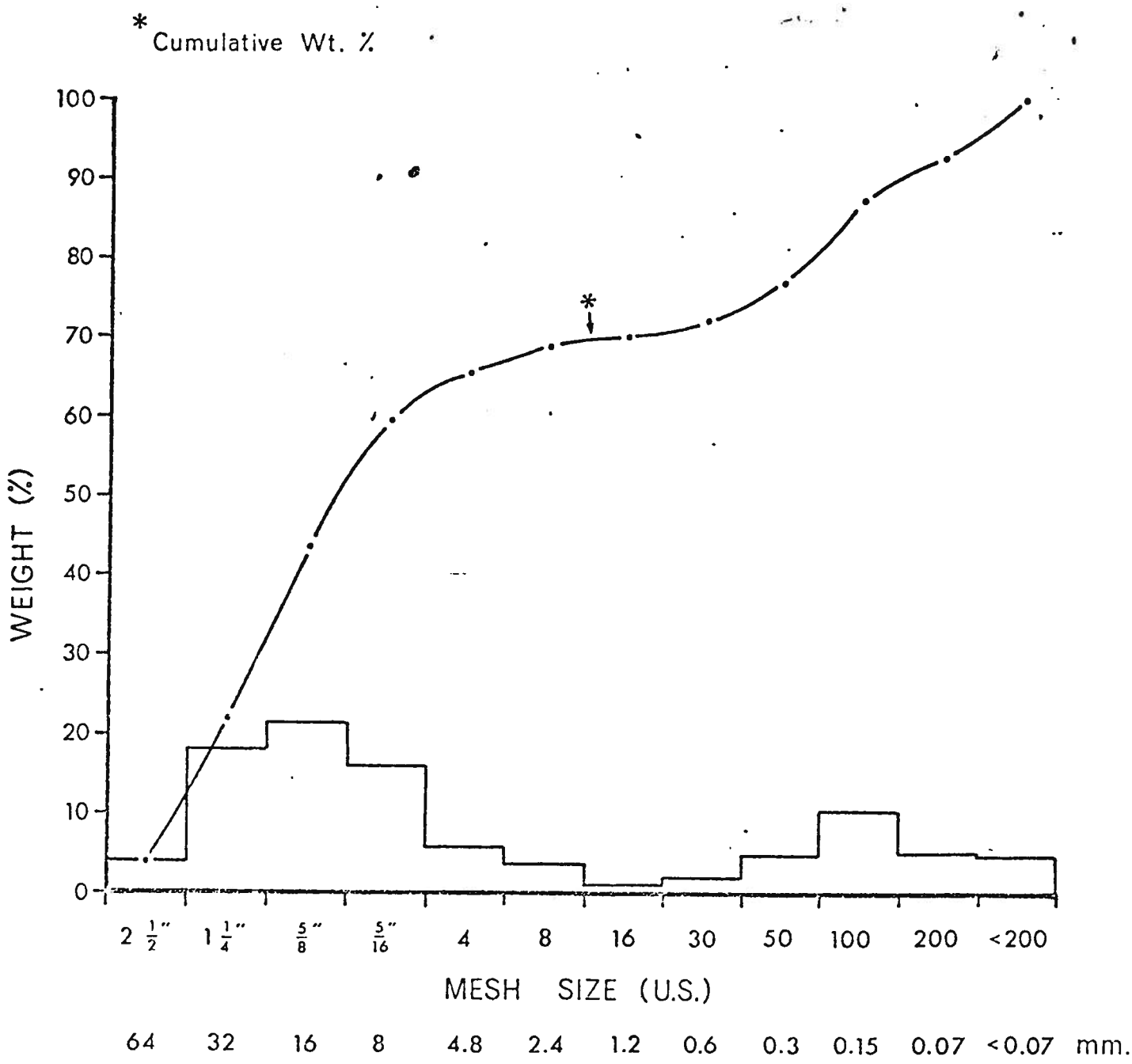
LOCATION: NW 12-40-23W4



SAMPLE NO.: Exposure E

DEPTH: 5-10

LOCATION: S 1/2 19-38-27W4



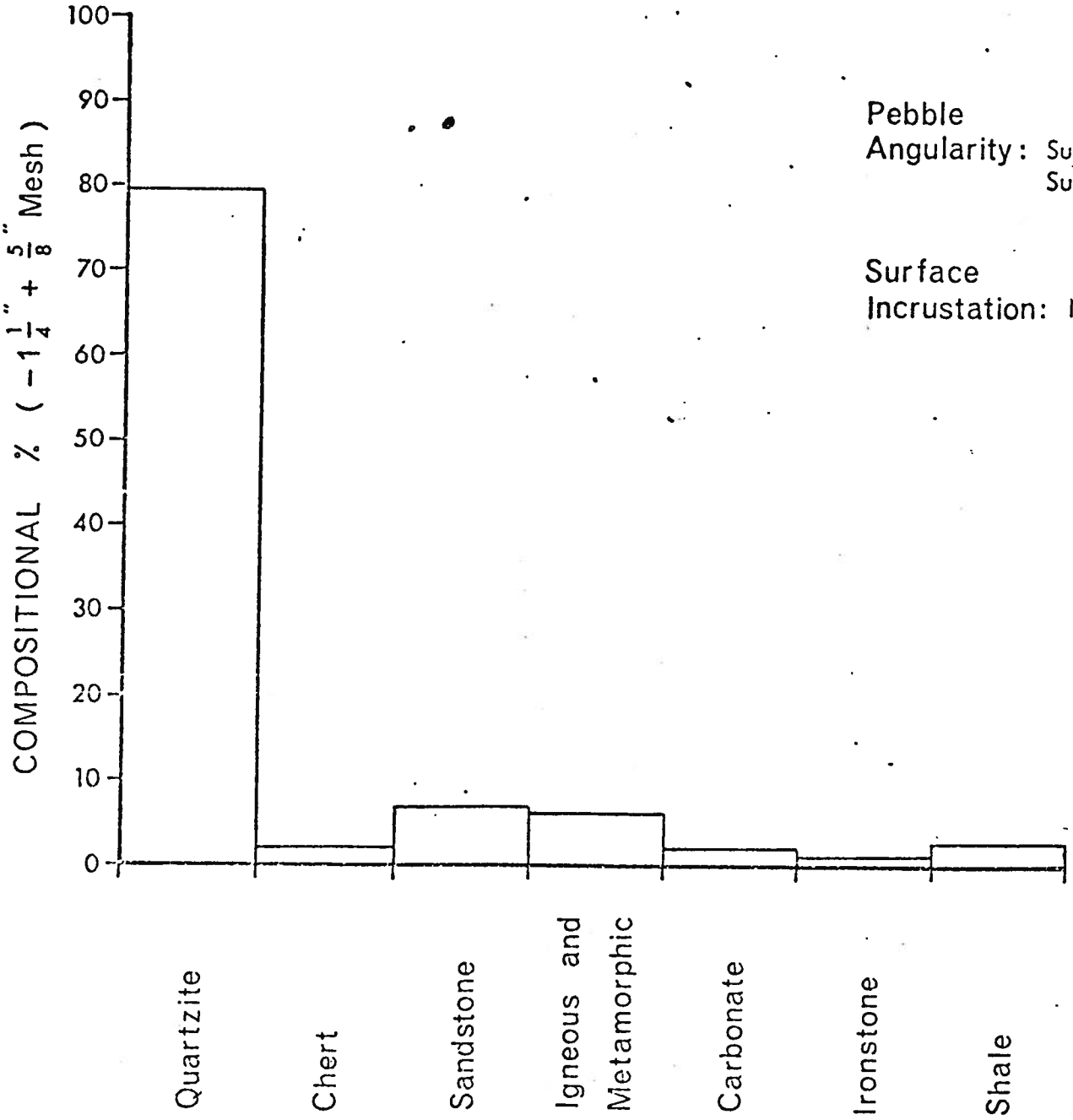
SAMPLE NO.: Exposure F

DEPTH: 0-8

LOCATION: NW 9-36-28W4

Pebble Counts and Quality
Exposure Samples

▼ Less than 1%



Pebble Angularity: Subround to Subangular

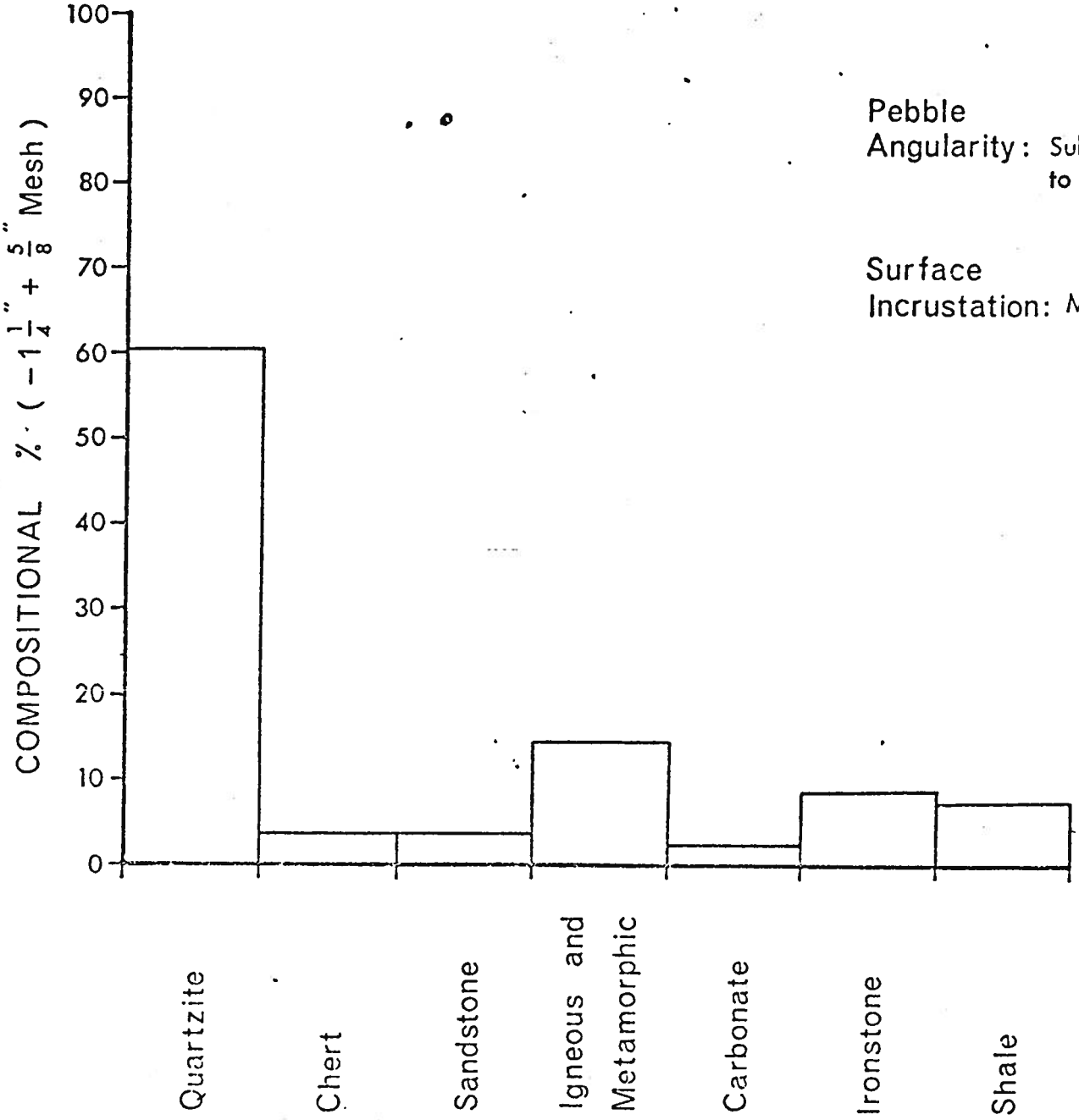
Surface Incrustation: Nil

SAMPLE NO.: Exposure A

DEPTH: 2 - 5 '

LOCATION: SE 5-42-26W4

▼ Less than 1%



Pebble Angularity: Subangular to Subround

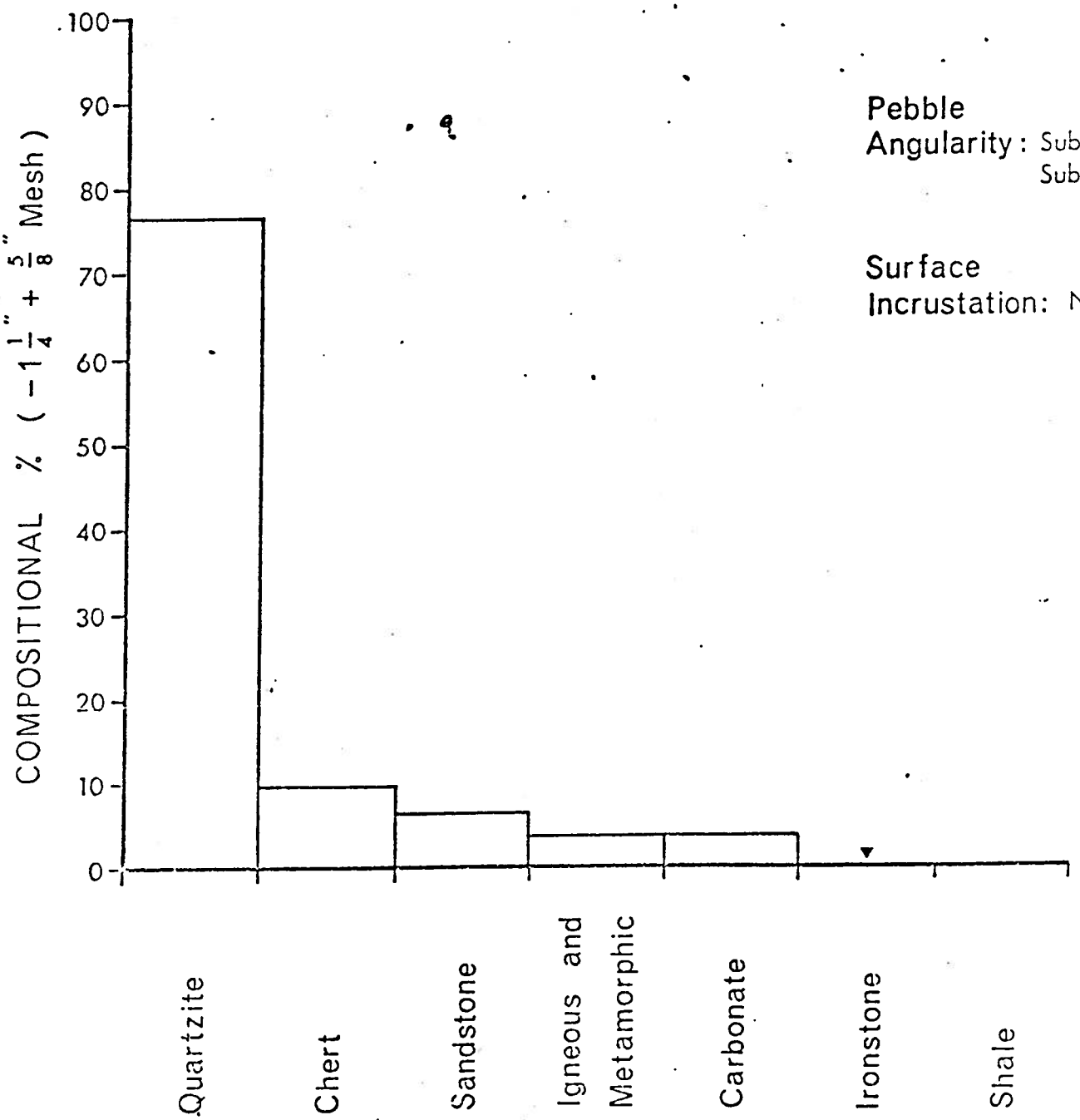
Surface Incrustation: Moderate

SAMPLE NO.: Exposure B

DEPTH: 0 - 4

LOCATION: NE 7-41-24W4

▼ Less than 1%



Pebble Angularity: Subround to Subangular

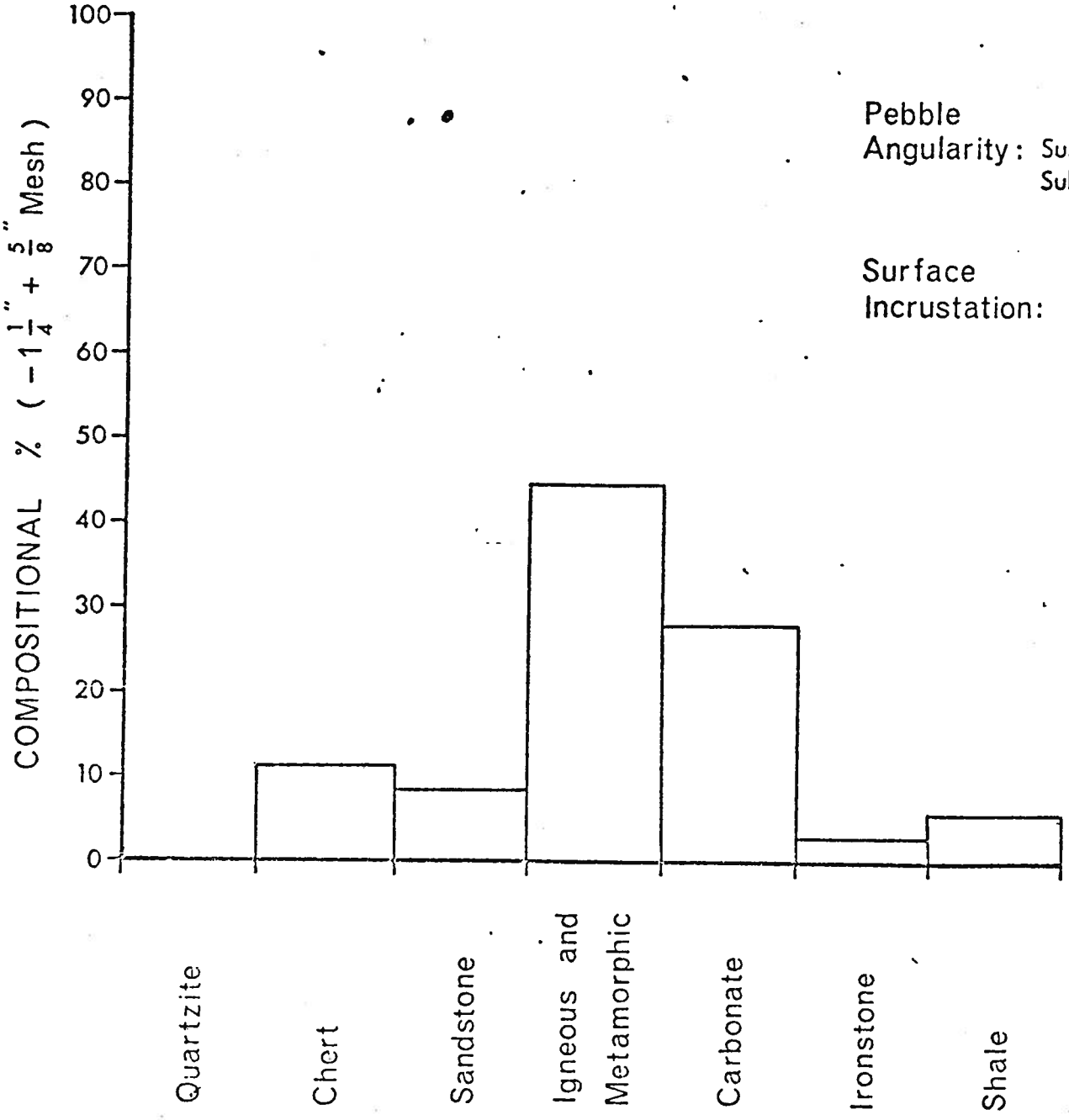
Surface Incrustation: Nil

SAMPLE NO.: Exposure C

DEPTH: 30 - 40 '

LOCATION: SE 24-39-27W4

▼ Less than 1%



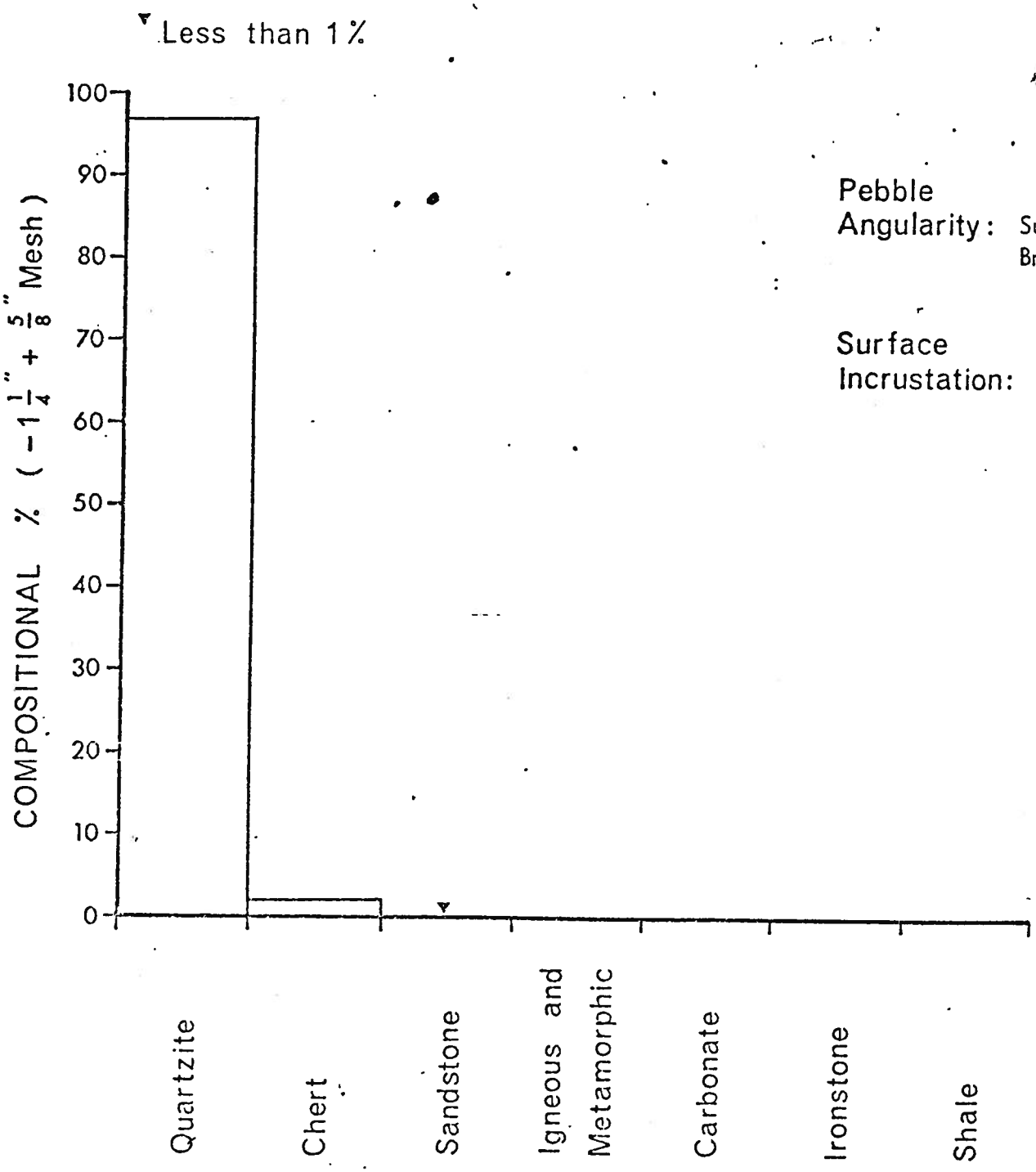
Pebble Angularity: Subround to Subangular

Surface Incrustation: Nil

SAMPLE NO.: Exposure D

DEPTH: 0 - 25'

LOCATION: NW 12-40-23W4

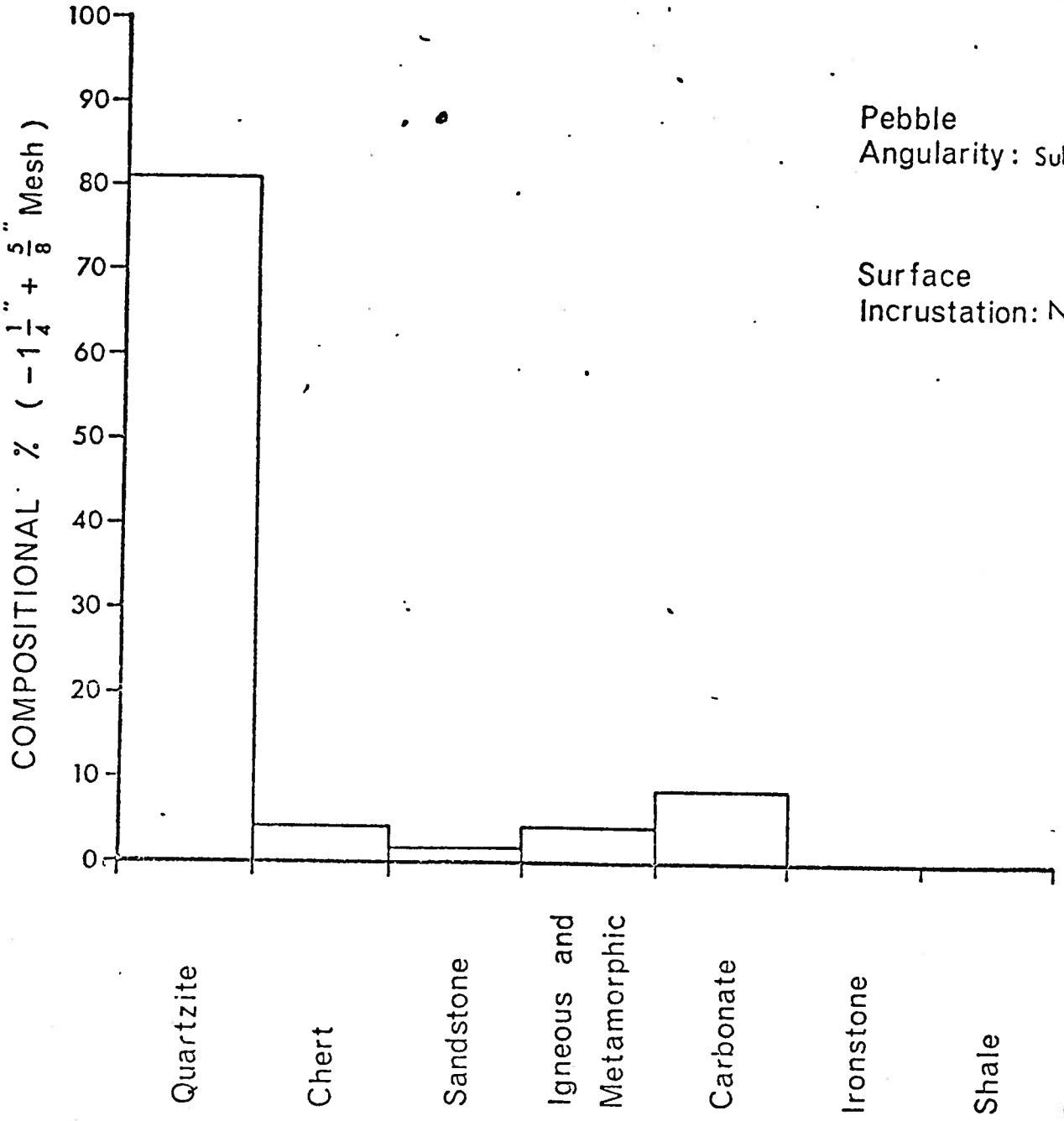


SAMPLE NO.: Exposure E

DEPTH: 5 - 10 '

LOCATION: S 1/2 19-38-27W4

▼ Less than 1%



Pebble
Angularity: Subround

Surface
Incrustation: Nil

SAMPLE NO.: Exposure F

DEPTH: 0 - 8

LOCATION: NW 9-36-28W4