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Quaternary sea level change, Lake formation, and associated glacial events, with special reference to the lower tees basin

Andrew R. Lockery

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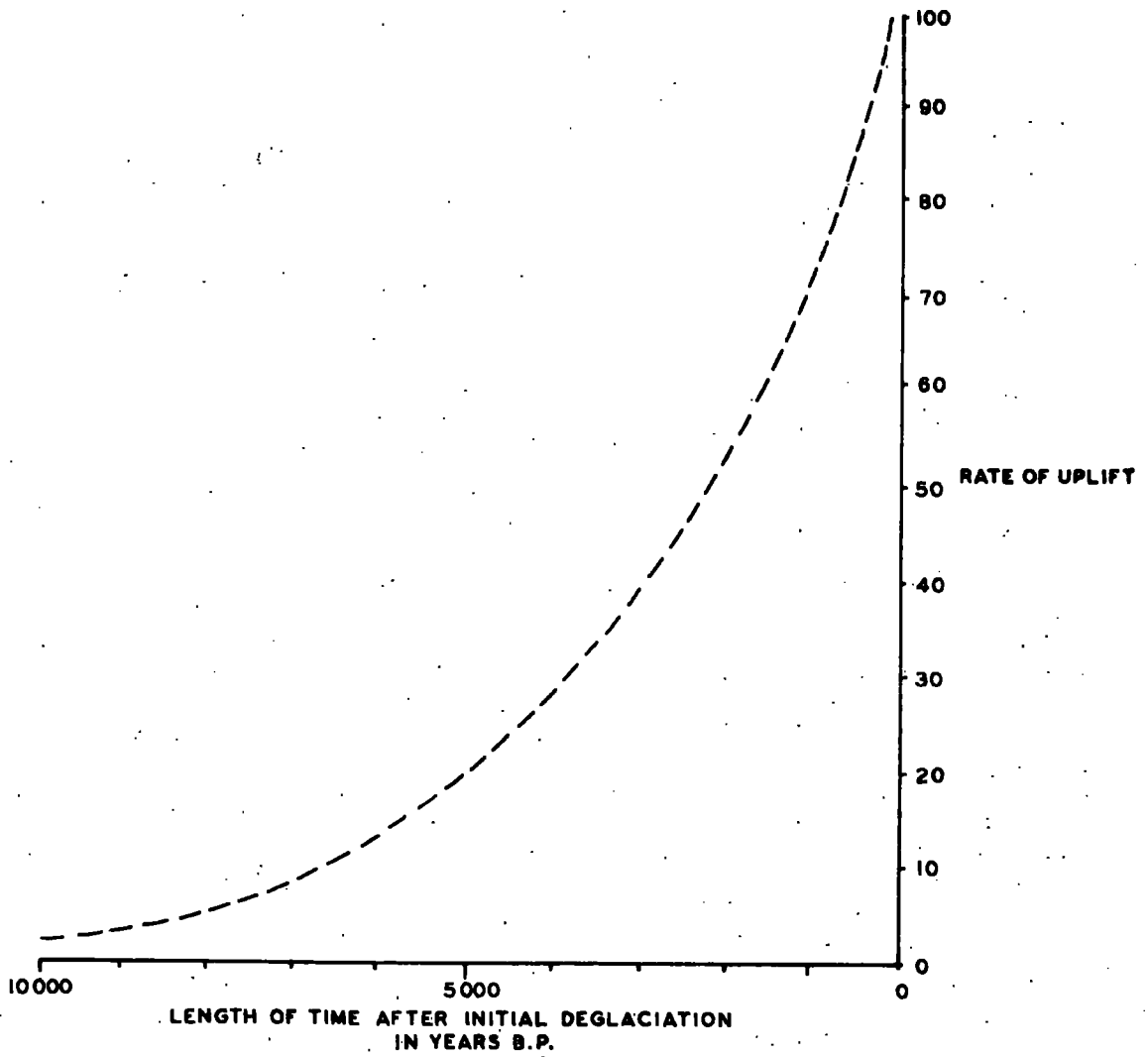
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ISOSTATIC UPLIFT

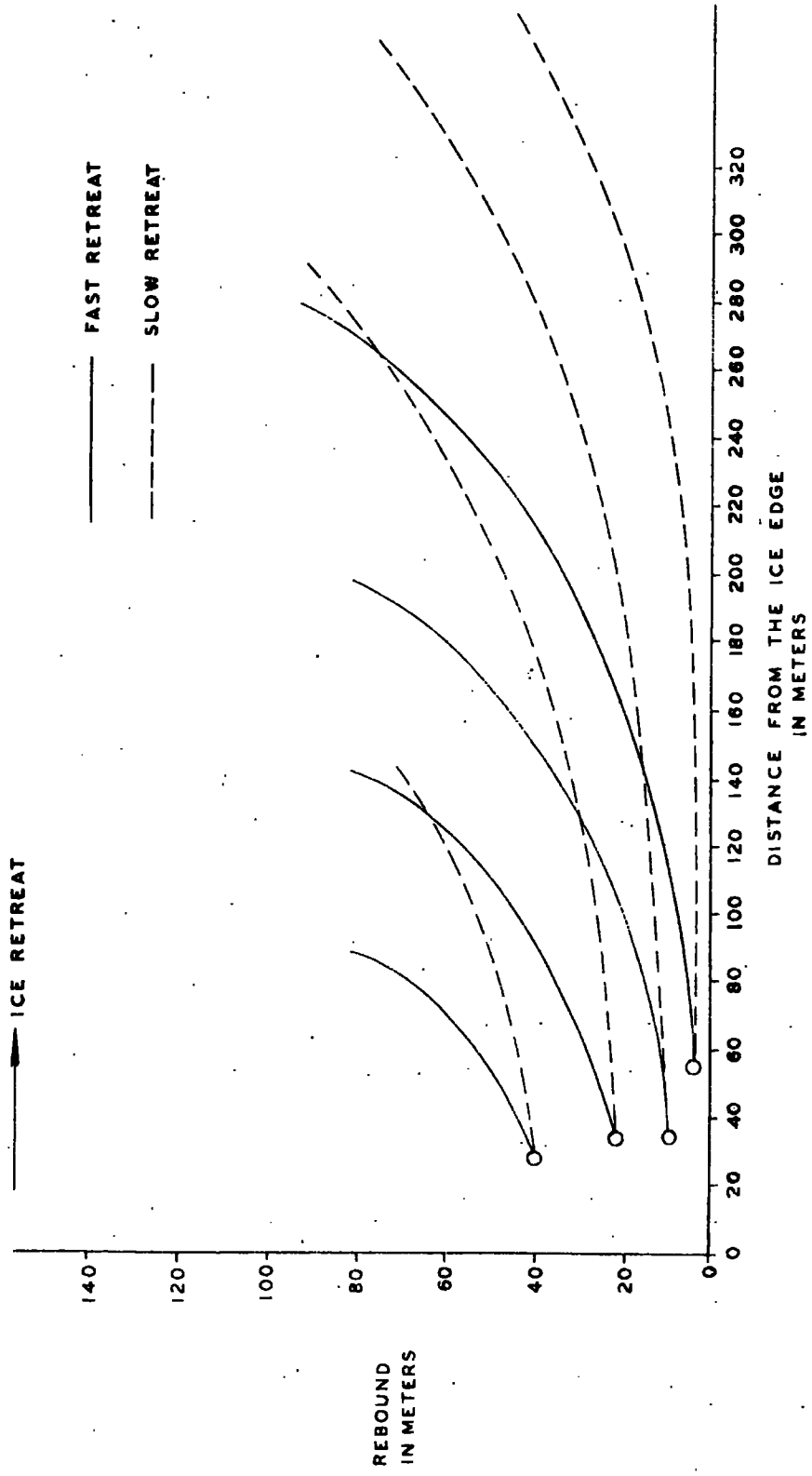


ADAPTED FROM NANSSEN 1927

FIG. 1.



THE EFFECTS OF DIFFERENT RATES OF
GLACIER RETREAT ON THE AMOUNT OF
POST GLACIAL REBOUND



AFTER ANDREWS 1968

FIG. 2

ISOBASES OF LATE AND POSTGLACIAL RAISED SHORELINES IN
HIGHLAND BRITAIN



100' --- LATE GLACIAL

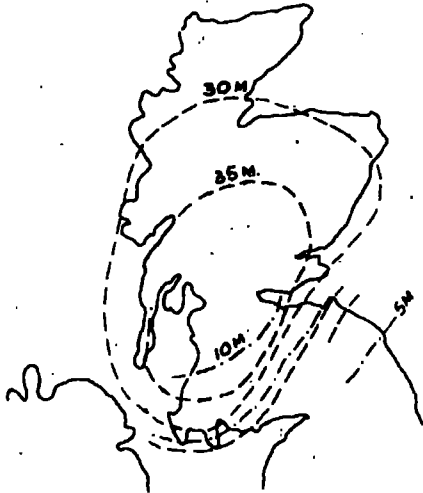
--- POSTGLACIAL
NEOLITHIC

WRIGHT



--- LATE GLACIAL
ISOBASES (FEET)
--- LITTORINA BEACH
ZERO ISOBASE

MOVIUS



--- LATE GLACIAL
100' BEACH
ISOBASES
(METERS)
--- POST GLACIAL
25' BEACH

DONNER



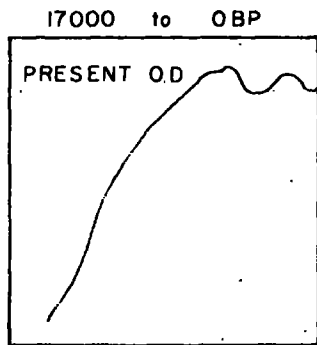
--- POST GLACIAL UPLIFT
(IN FEET)

SISSONS

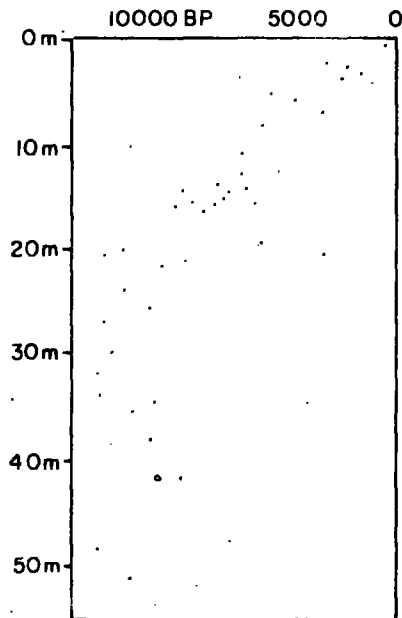
AFTER SMITH

FIG. 3

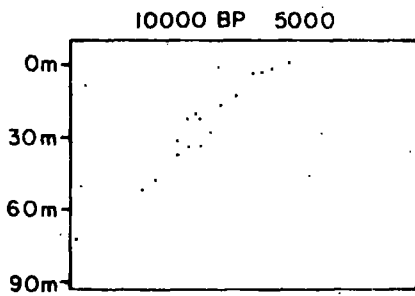
GRAPHS DEPICTING THE EUSTATIC RISE OF SEA LEVEL FOLLOWING THE LAST ICE AGE



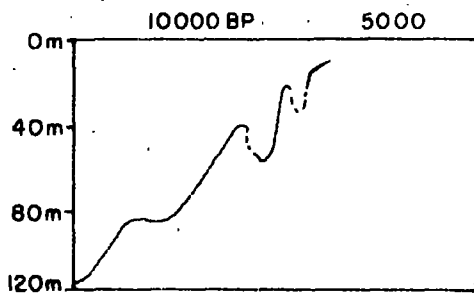
1.



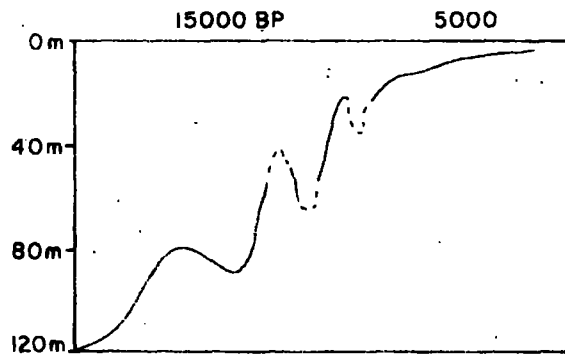
3.



2.



4.

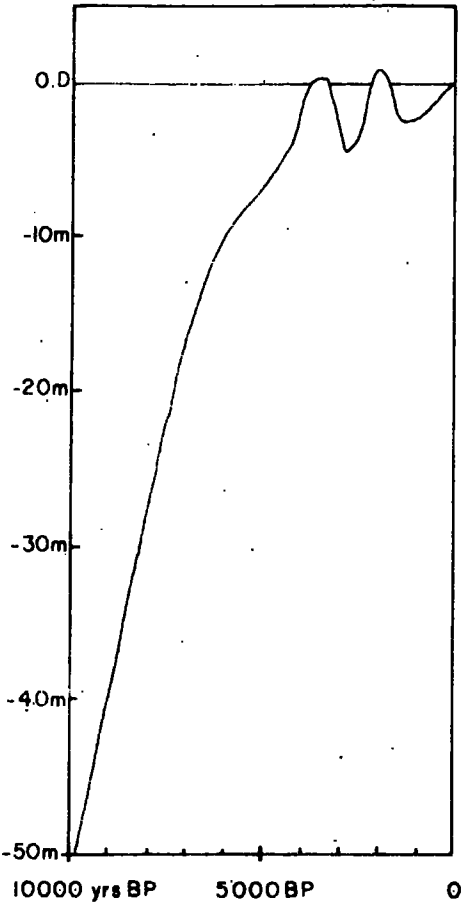


5.

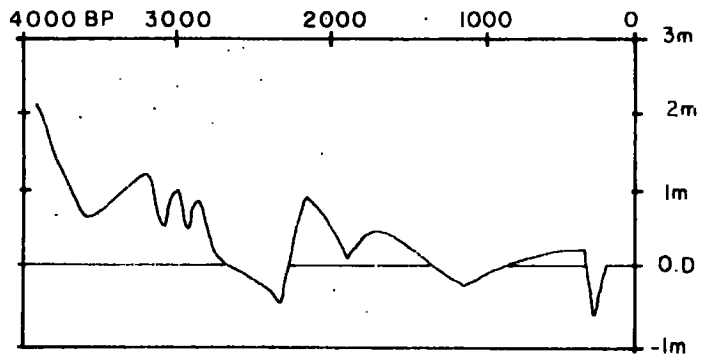
- 1) Fairbridge 1961
- 2) Godwin and Suggate 1958
- 3) Shepard and Suess 1956
- 4) Curray 1960
- 5) Shepard 1960

FIG. 4

GRAPHS DEPICTING THE EUSTATIC RISE OF SEA LEVEL FOLLOWING THE LAST ICE AGE

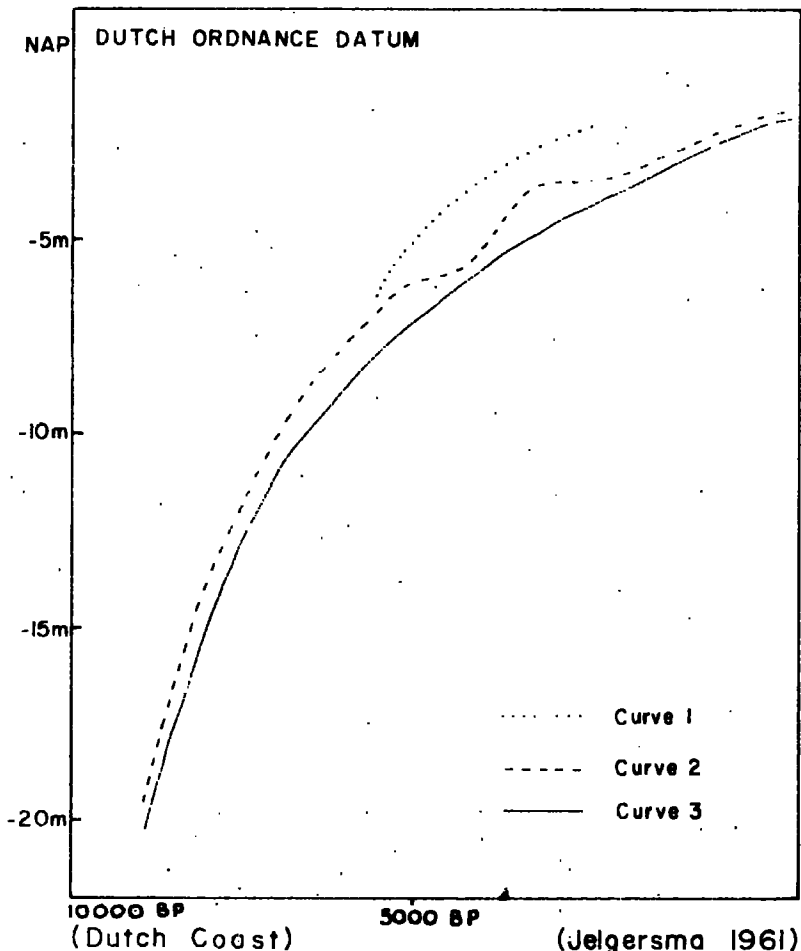


Sea level change in the
Fenlands of East Anglia
(Godwin 1940)



(New Zealand)

(Schofield 1960)



10000 BP
(Dutch Coast)

5000 BP

(Jelgersma 1961)

FIG. 5

RETREAT OF THE WÜRM ICE SHEET



D DISTRICT
 - - - - LAMMERMUIR STRANRAAR
 - - - - HIGHLAND
 - - - - NEWDRIFT
 - - - - N.E. ANTRIM I.O.M. CUMBERLAND
MC CALLIEN
MOVIUS

3 DINNET RE-ADVANCE
2 ABERDEEN RE-ADVANCE
1 MORAY FIRTH
 - - - - STRATHMORE GLACIATION
 - - - - OTHER STAGES
SYNGE



..... MORAINE GLACIATION
 - - - - HIGHLAND
 - - - - NORTHERN BRITISH RE-ADVANCE
CHARLESWORTH

AFTER SMITH



- - - - LOCH LOMOND
 - - - - PERTH
 - - - - LAMMERMUIR
 - - - - YORK RE-ADVANCE
SISSONS

SISSONS

FIG. 6

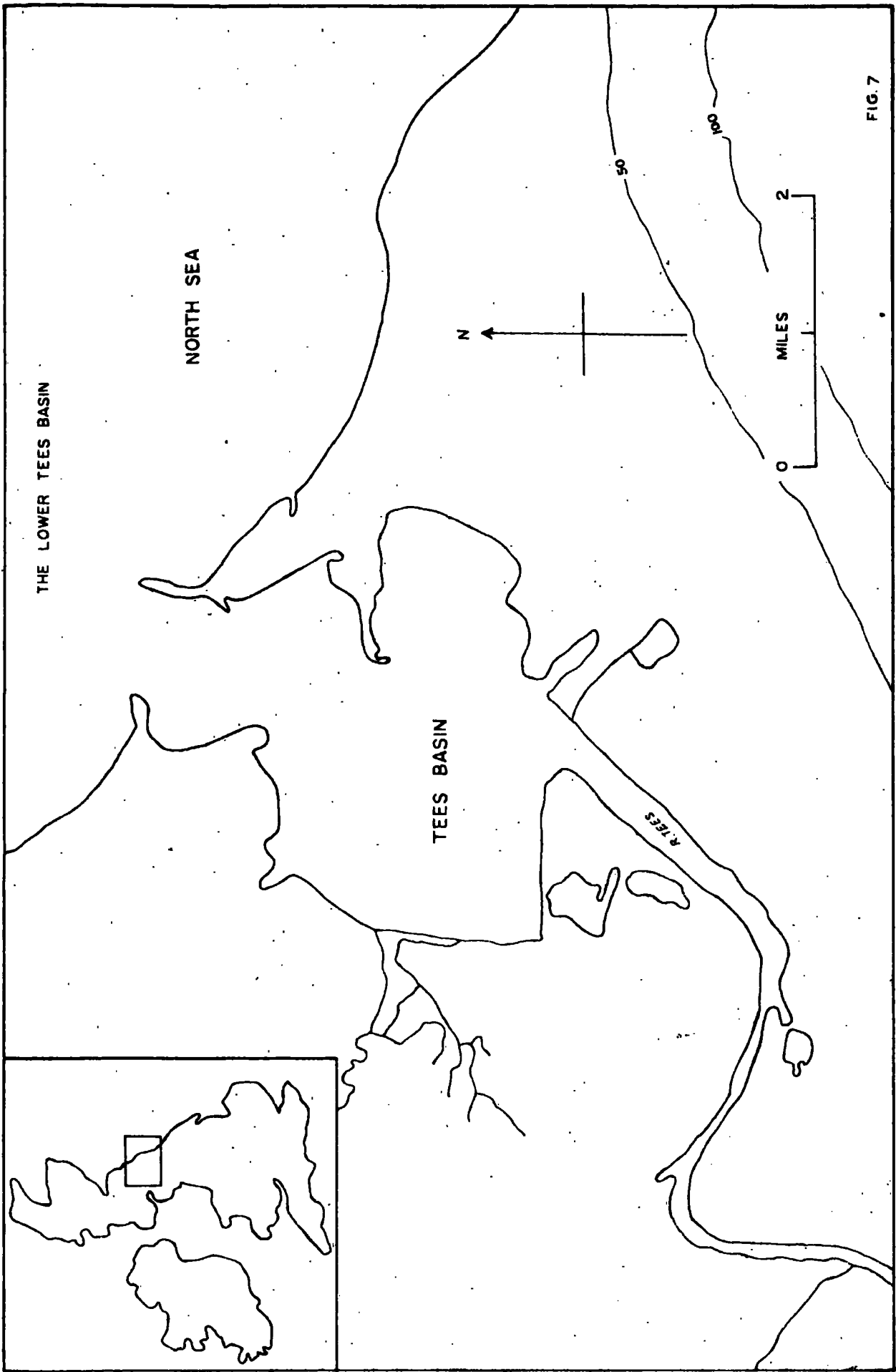
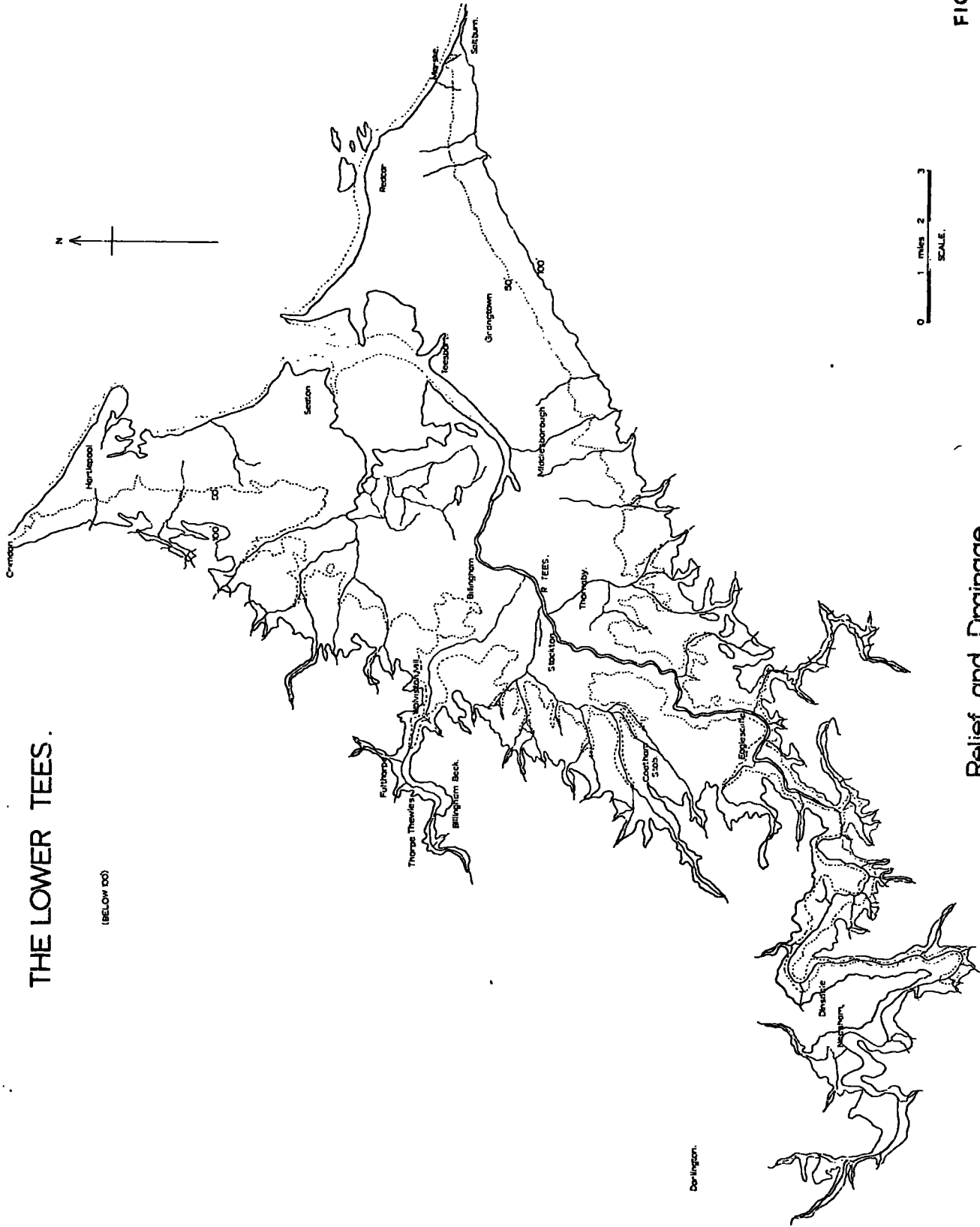


FIG. 7

THE LOWER TEES.

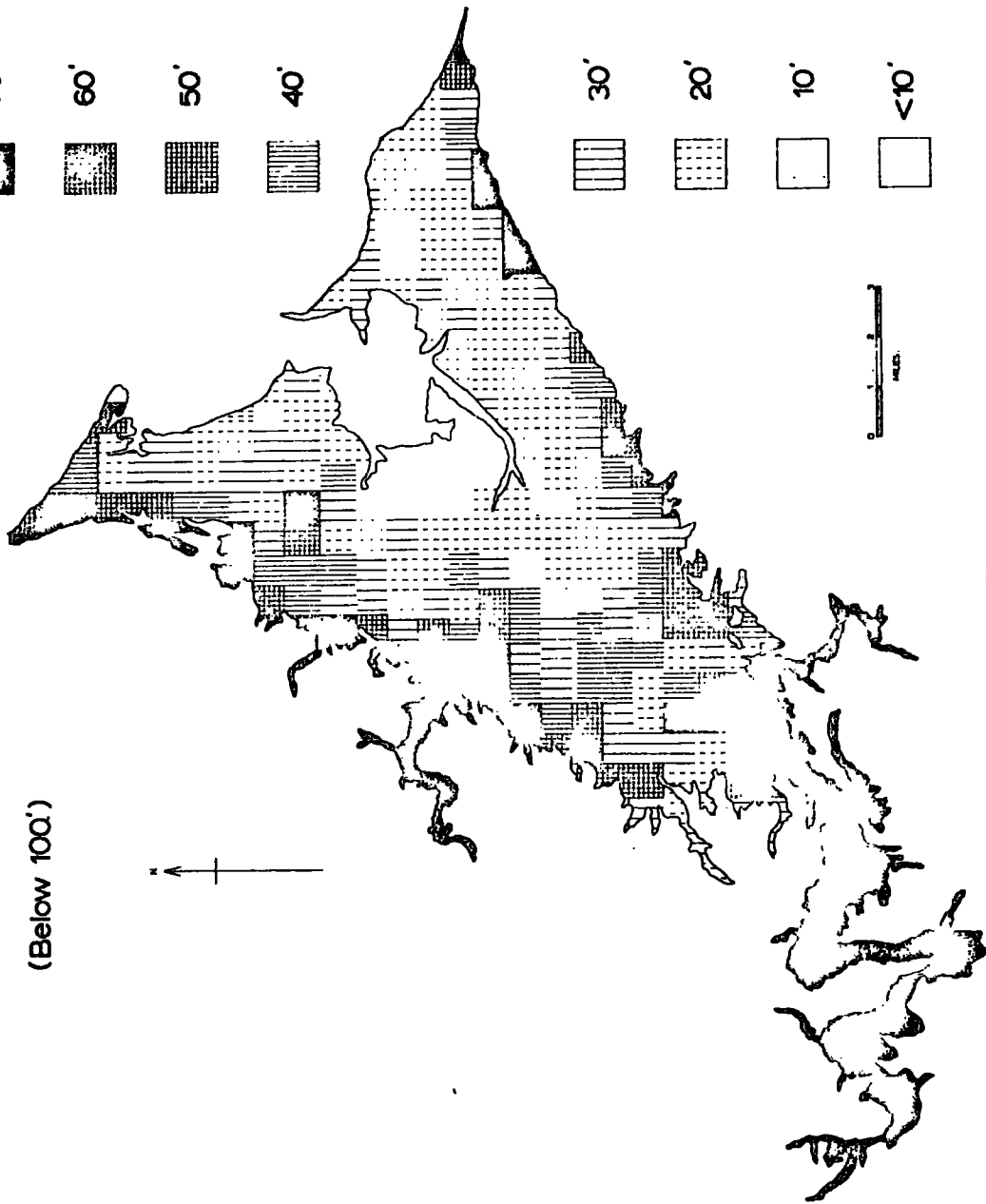
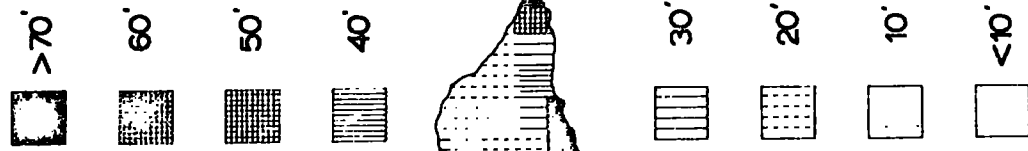
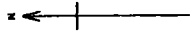
(BELOW 100)



Relief and Drainage.

FIG. 8

THE LOWER TEES.
(Below 100')



Amplitude of Relief.

FIG. 9

THE LOWER TEES.

(BELOW 100.)

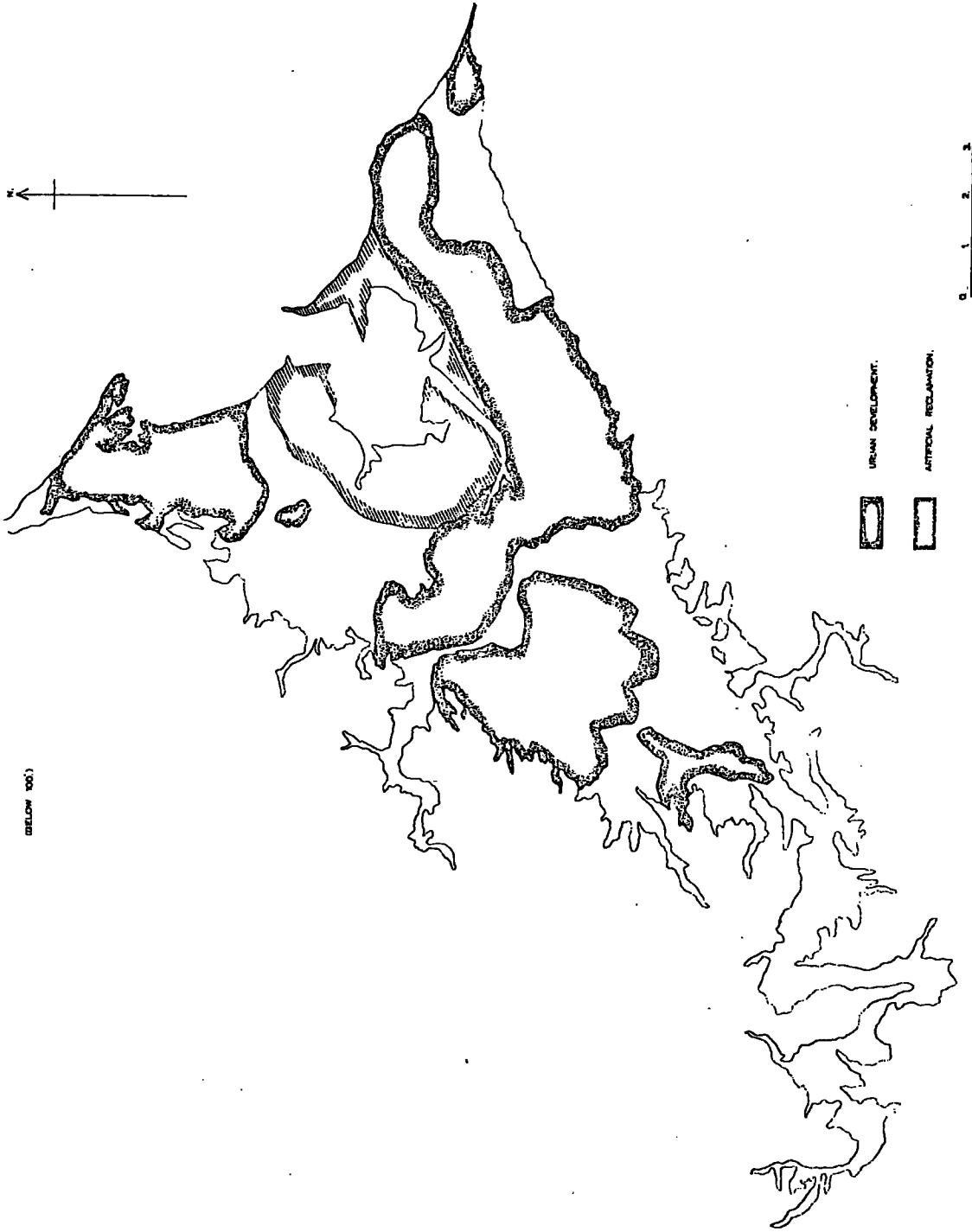
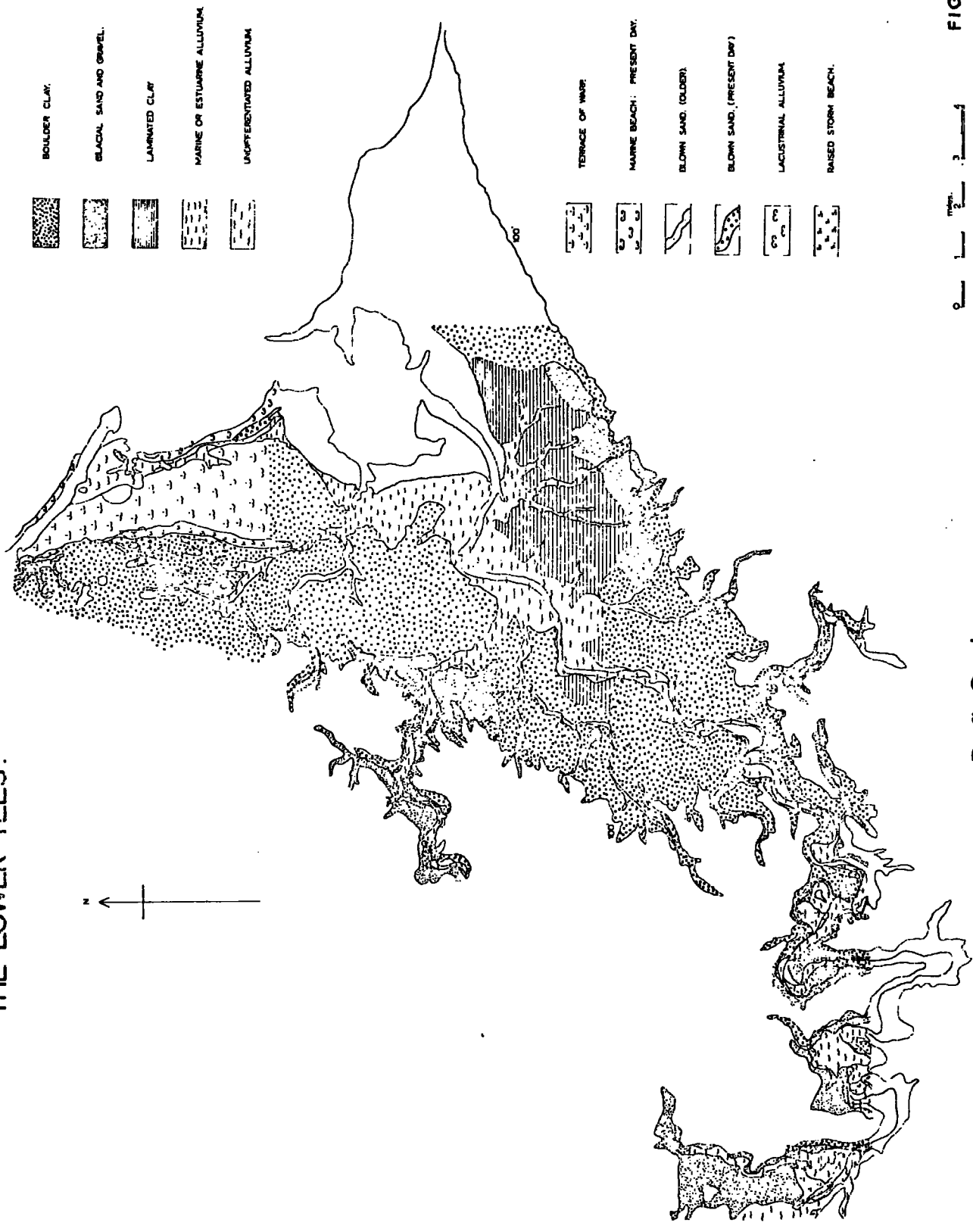


FIG. 10
Areas unsuitable for morphometric analysis. BASED ON PELLONOR, O.S. STAFF, 64 TESSING, 1941.

THE LOWER TEES.



- BOLDER CLAY:
- GLACIAL SAND AND GRAVEL:
- LAMINATED CLAY:
- MARINE OR ESTUARINE ALLUVIUM:
- UNDIFFERENTIATED ALLUVIUM:

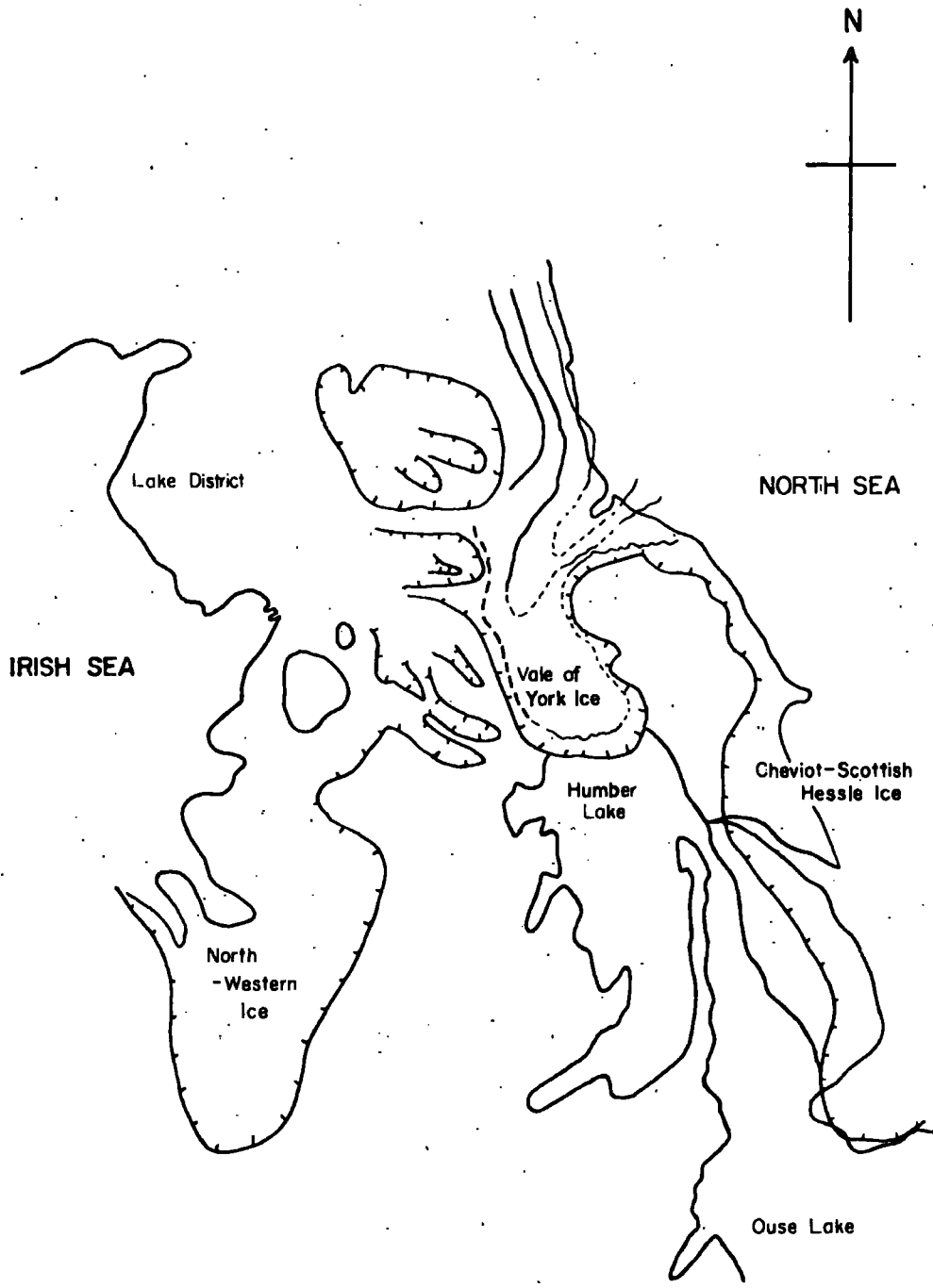
- TERRACE OF WAUR:
- MARINE BEACH: PRESENT DAY:
- BLOWN SAND (OLDER):
- BLOWN SAND (PRESENT DRY):
- LACUSTRINE ALLUVIUM:
- RAISED STORM BEACH:

FIG. 11

0 1 2
MILE
SCALE

Drift Geology.

GLACIAL RETREAT STAGES IN NORTH-WEST ENGLAND

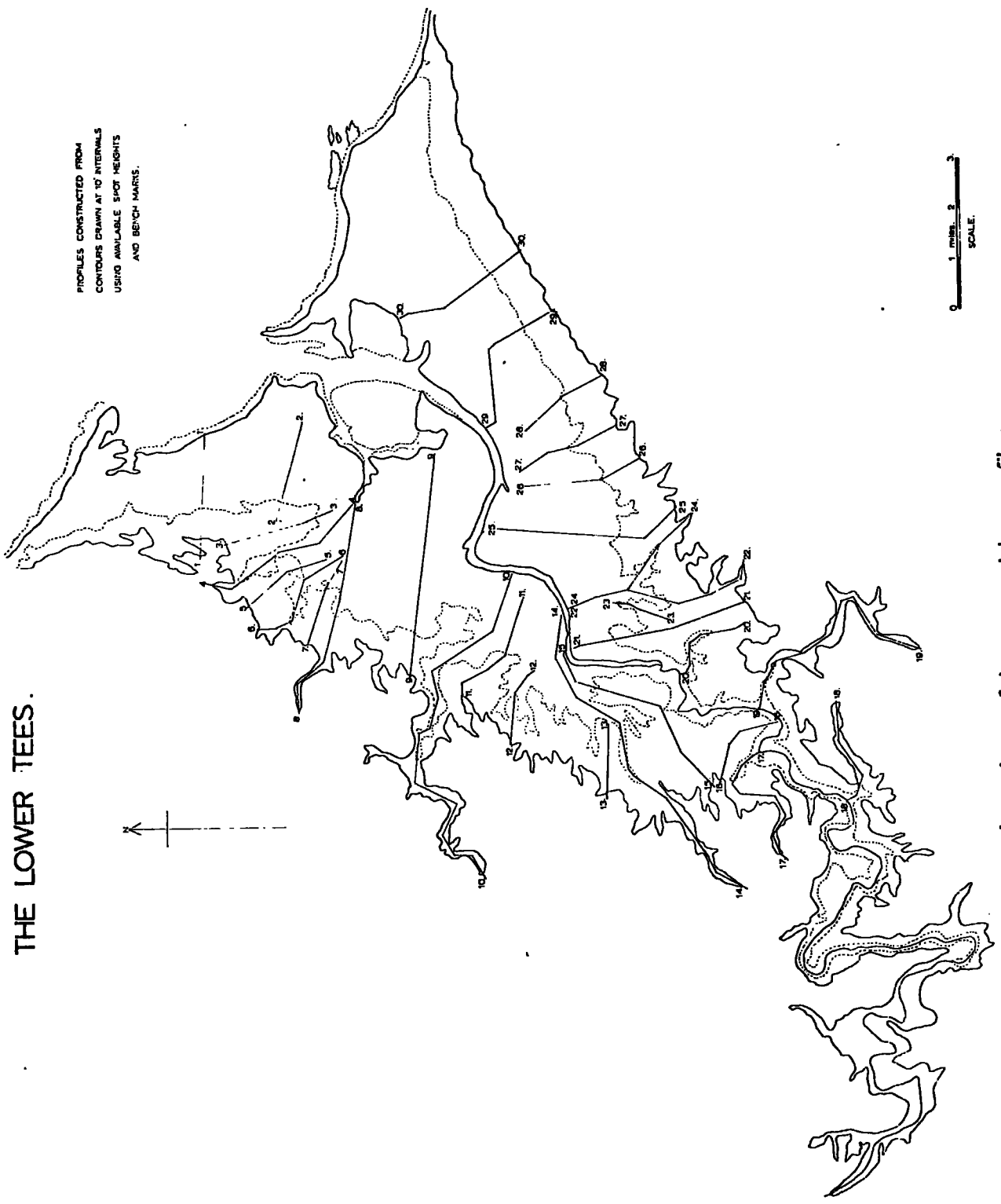


FROM A. RAISTRICK

Fig. 12.

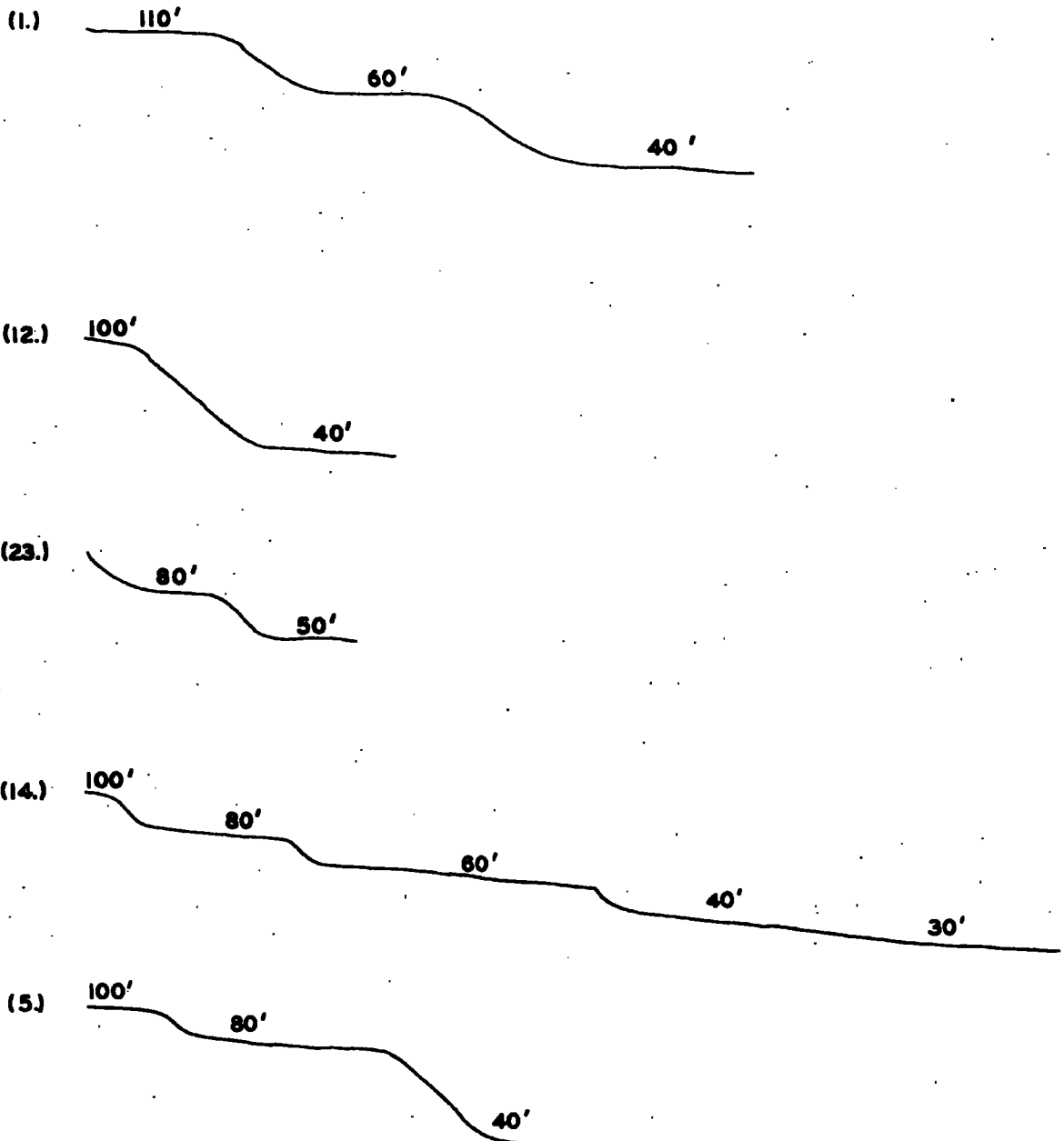
THE LOWER TEES.

PROFILES CONSTRUCTED FROM
CONTOURS DRAWN AT 10' INTERVALS
USING AVAILABLE SPOT HEIGHTS
AND BENCH MARKS.



Location of topographic profiles.

PROFILES ACROSS 10 FOOT CONTOUR INTERVALS, CONSTRUCTED
FROM SPOT HEIGHTS AND BENCH MARKS.



(NUMBERS REFER TO THOSE ON FIG. 13)

FIG-14

THE LOWER TEES
(BELOW 100 FEET)
LOCATION OF LEVELLED
TRAVERSES

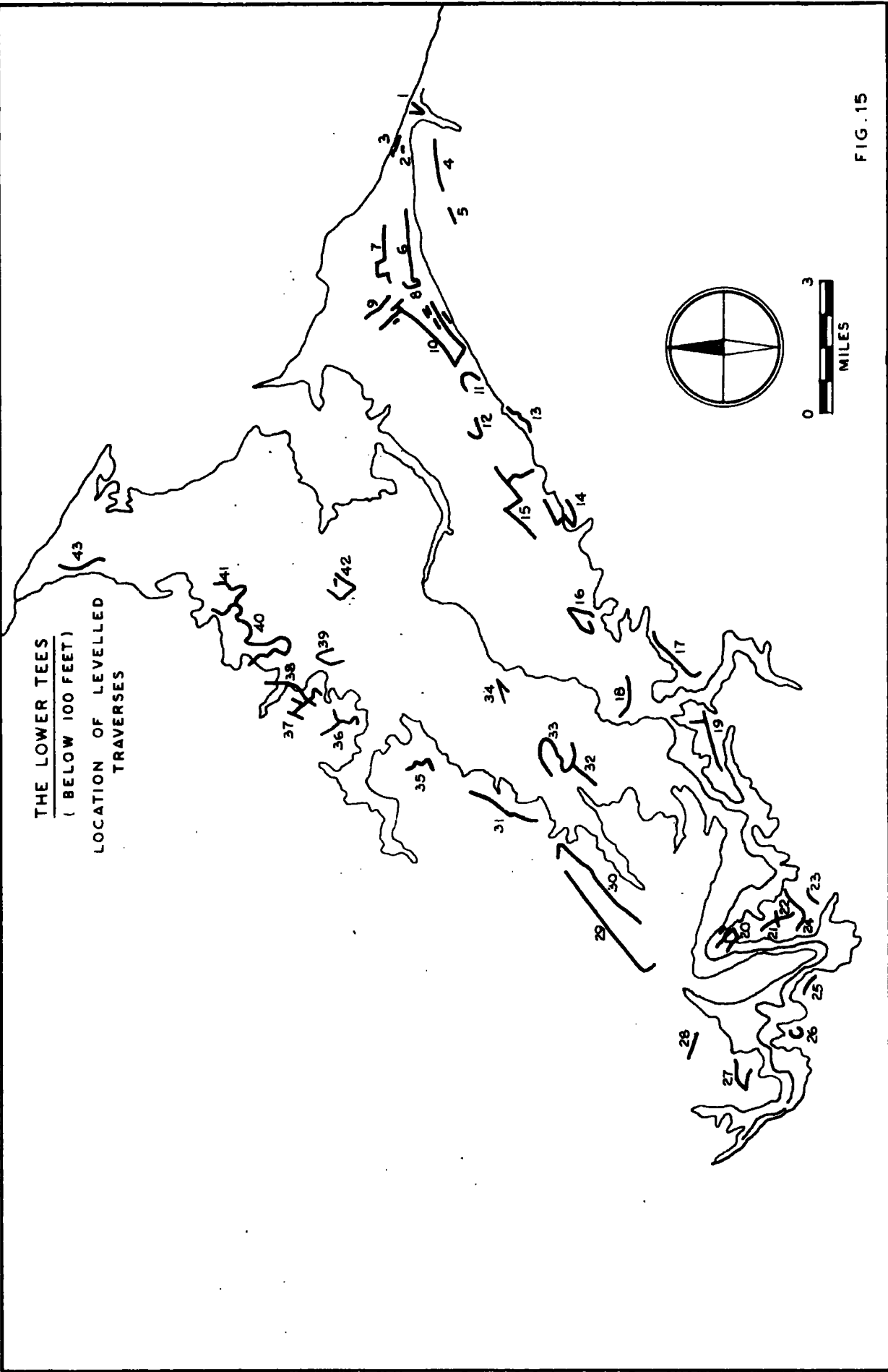
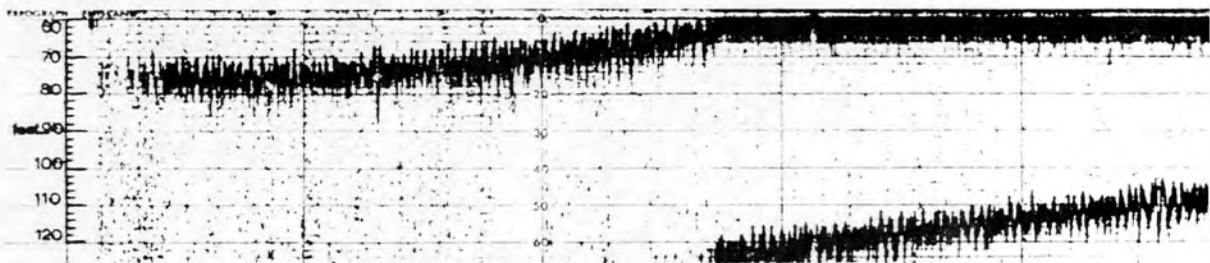


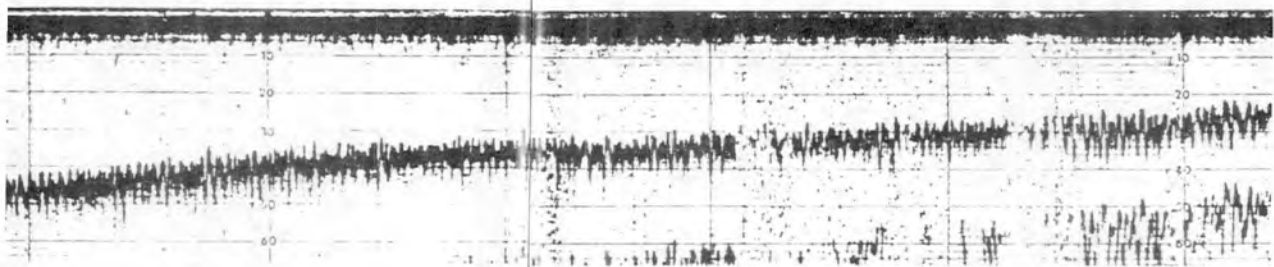
FIG. 15

RANGE 2



HARTLEPOOL

TEES BAY



1 MILE

ECHO - SOUNDING

| | |
|------------|-------------|
| DIRECTION | North East |
| SPEED | 1.5 Knots |
| WIND SPEED | Force 5 |
| CONDITIONS | 16 ft swell |
| DATE | 6 12 67 11c |

THE LOWER TEES BASIN
 HEIGHTS OF LEVELLED TRAVERSES SOUTH OF THE R. TEES
 — STAINSBY HALL FARM TO SALTBURN



FIG. 16

THE LOWER TEES BASIN
 HEIGHTS OF LEVELLED TRAVERSES SOUTH OF THE R. TEES
 STAINSBY HALL FARM TO LOW HAIL FARM



· 17 SITE
 VERT. SCALE : 1" = 2'
 HORIZ. SCALE : 1" = 330'
 VERT. EXAGG. : X165

FIG. 17

THE LOWER TEES BASIN
 HEIGHTS OF LEVELLED TRAVERSES NORTH OF THE R. TEES
 — HURWORTH TO BILLINGHAM BECK

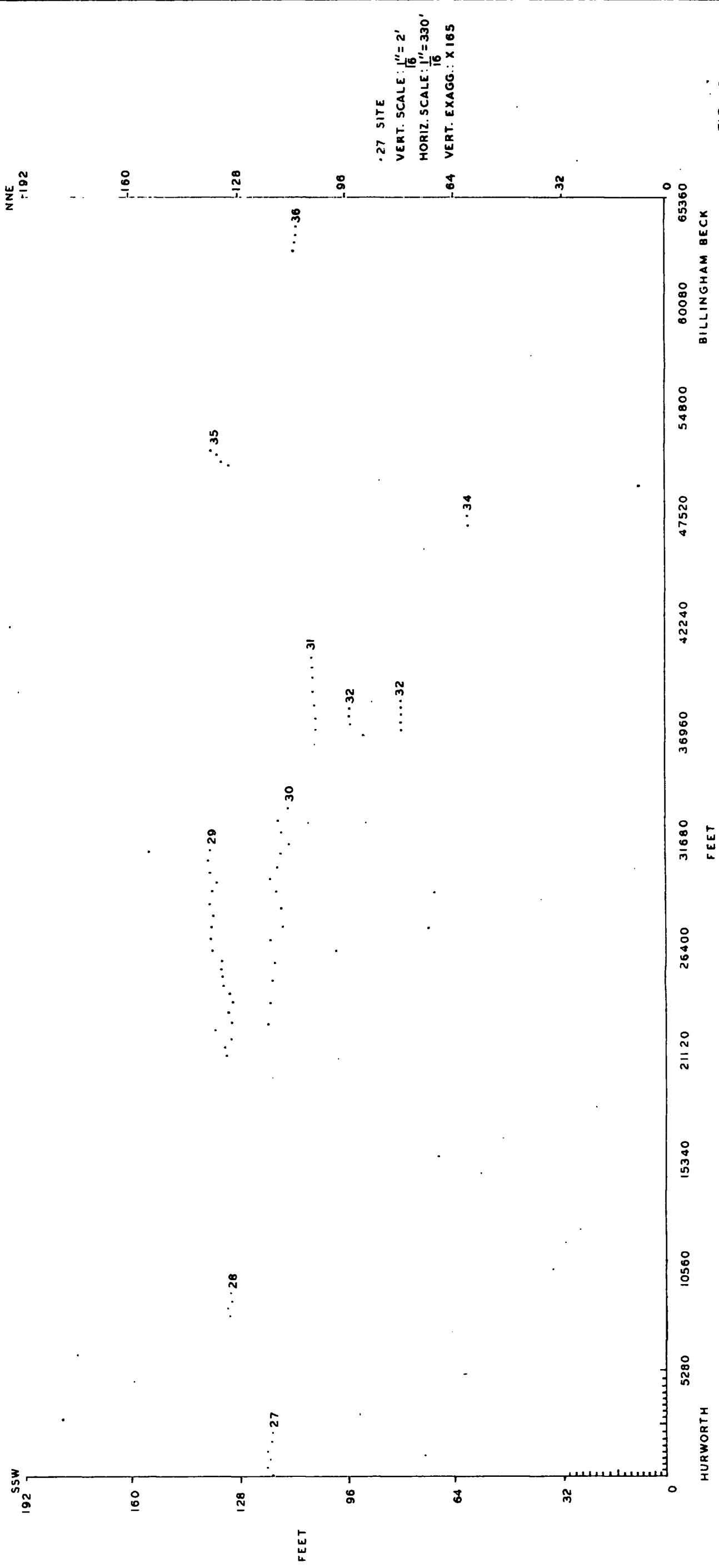


FIG. 18

THE LOWER TEES BASIN
 HEIGHTS OF LEVELLED TRAVERSES NORTH OF THE R. TEES
 — WOLVISTON TO HARTLEPOOL

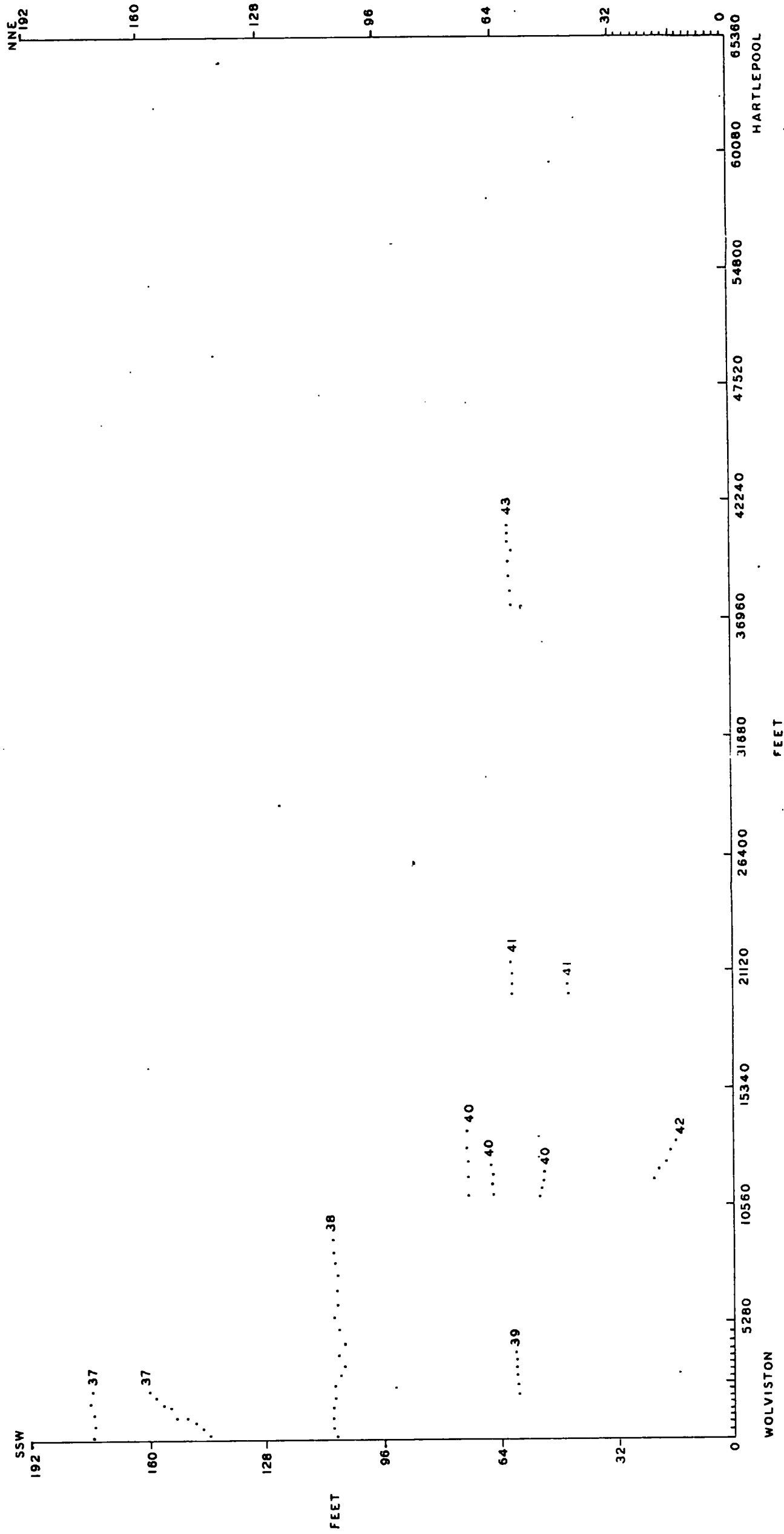


FIG. 19

THE LOCATION OF ECHO SOUNDINGS OFF THE EAST COAST OF HIGHLAND
BRITAIN SHOWING THE FIVE MAJOR REGIONS

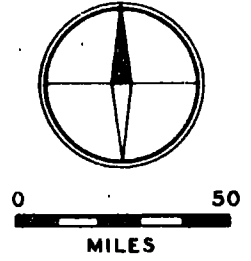
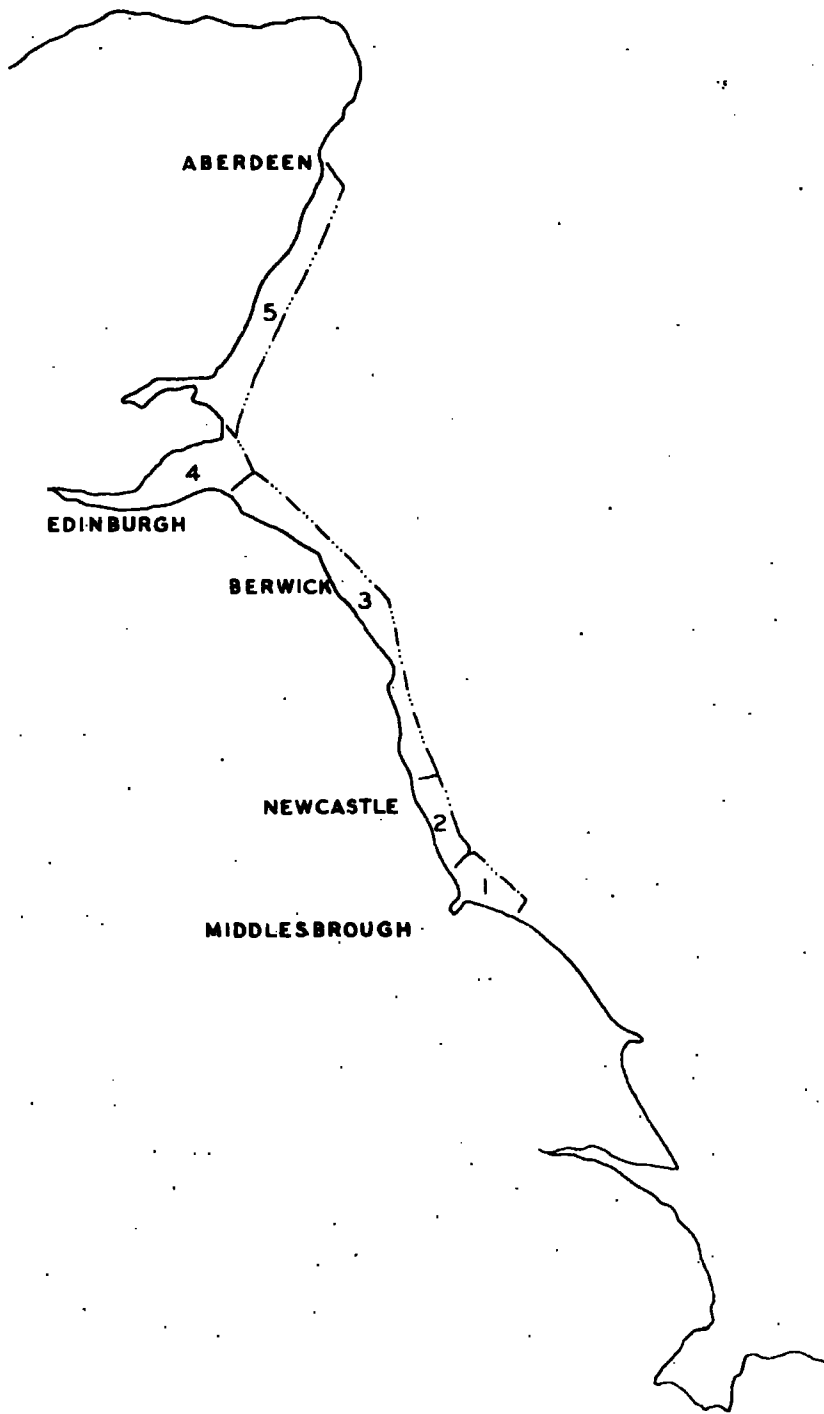


FIG. 21

THE TEES BAY
THE LOCATION OF SOUNDINGS

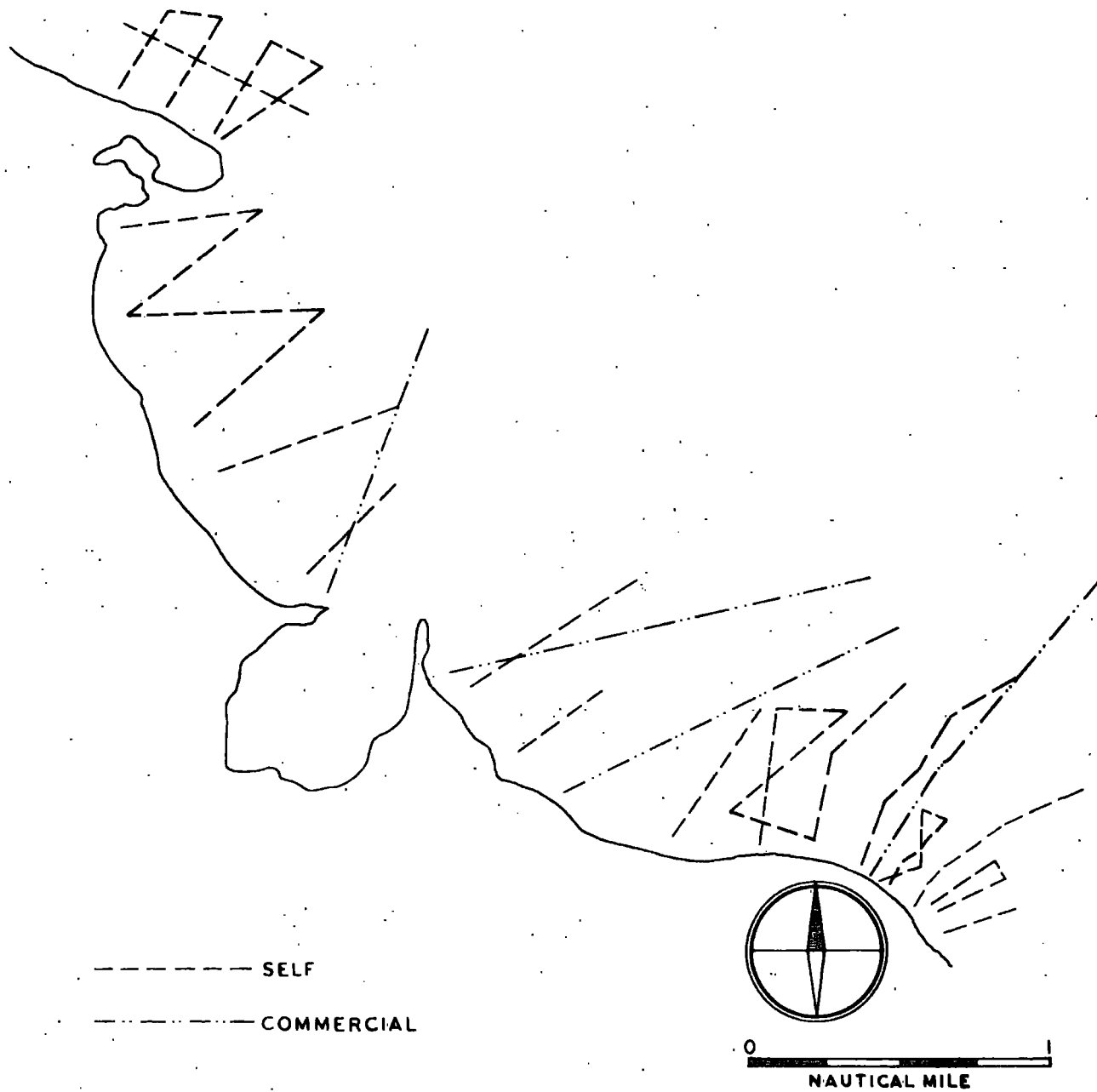
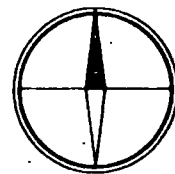


FIG. 22

TEES BAY TO TYNEMOUTH
LOCATION OF SOUNDINGS



----- SELF
- · - · - COMMERCIAL

FIG. 23

TYNEMOUTH TO BERWICK
THE LOCATION OF SOUNDINGS

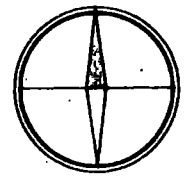
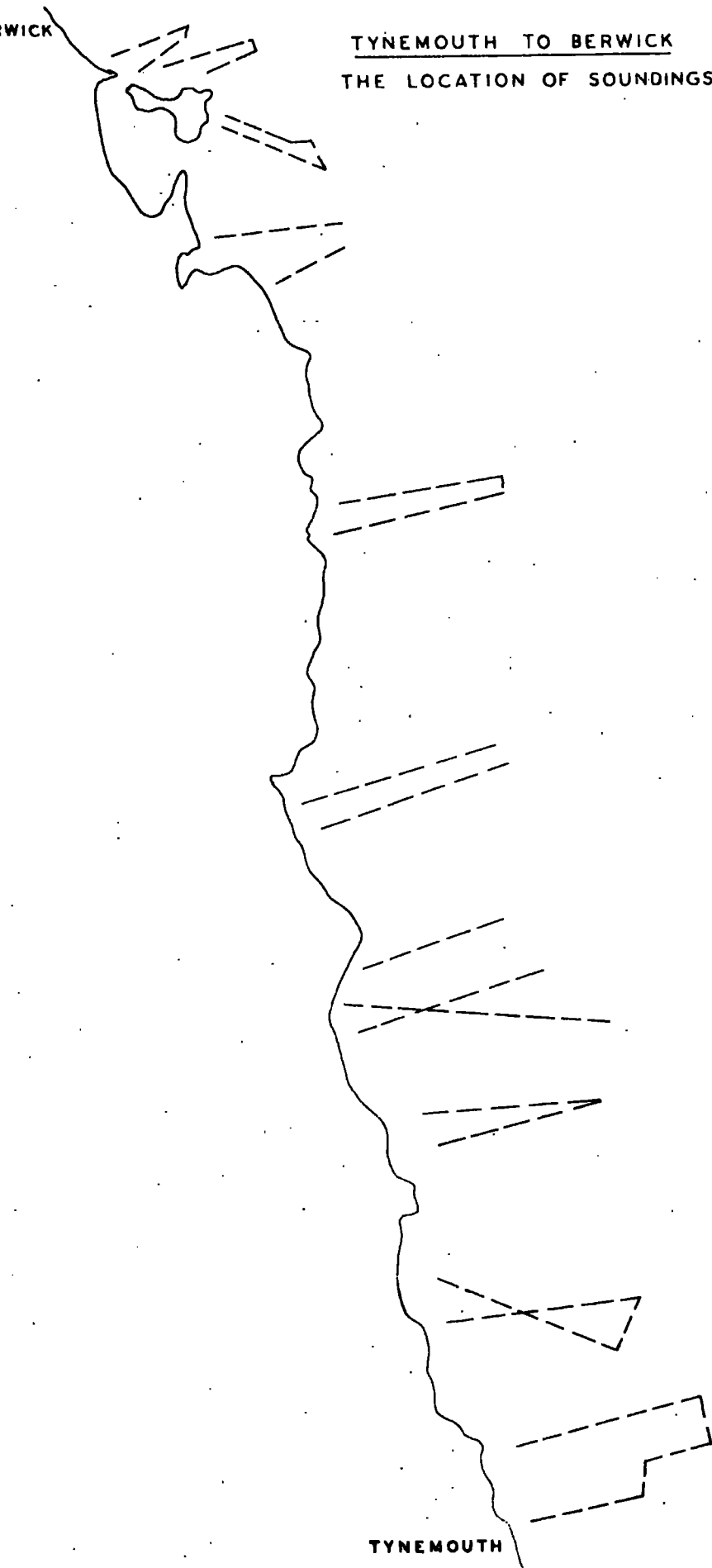
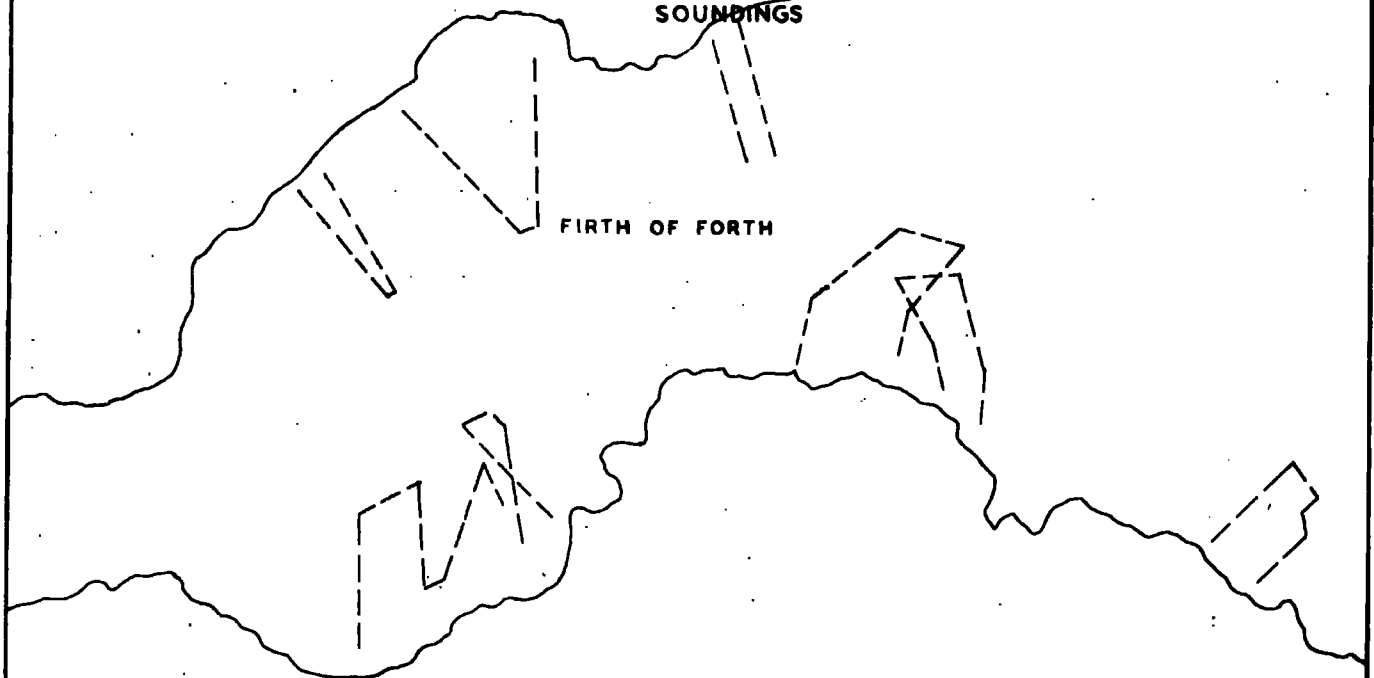


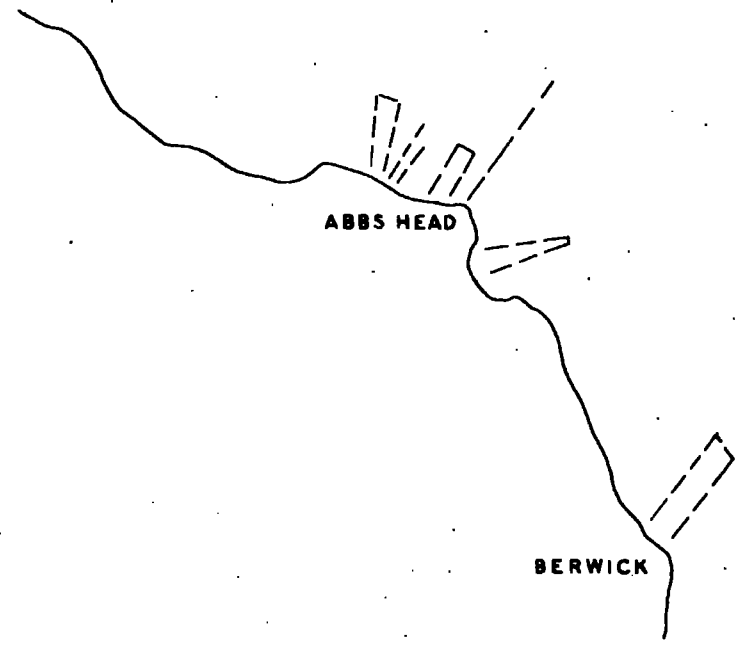
FIG. 24

ABBS HEAD AND THE FIRTH OF FORTH

THE LOCATION OF
SOUNDINGS

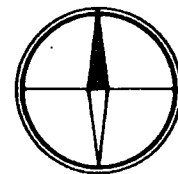


FIRTH OF FORTH



ABBS HEAD

BERWICK



0 5
MILES

FIG. 25

FIRTH OF FORTH TO STONEHAVEN
THE LOCATION OF SOUNDINGS

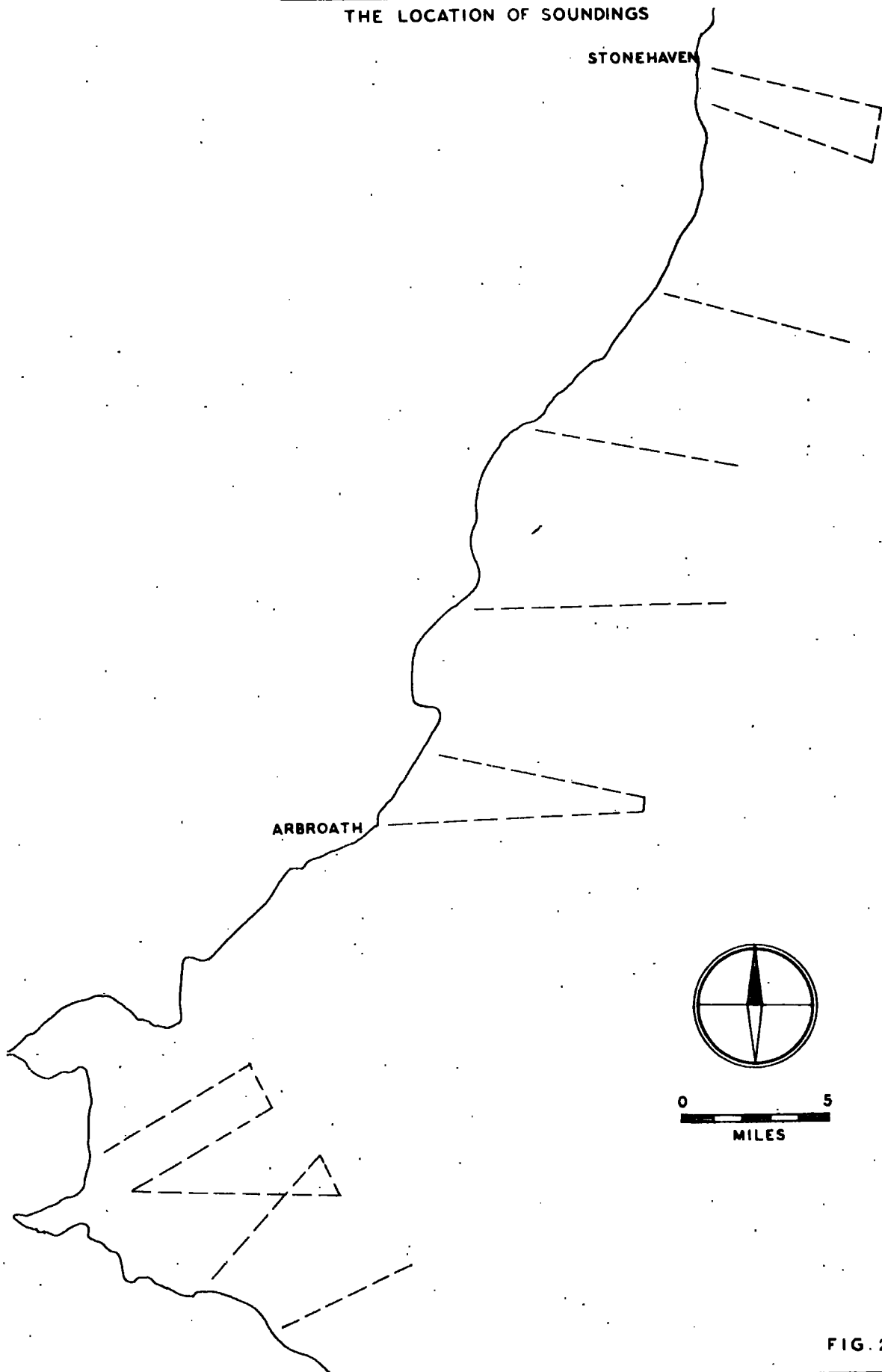


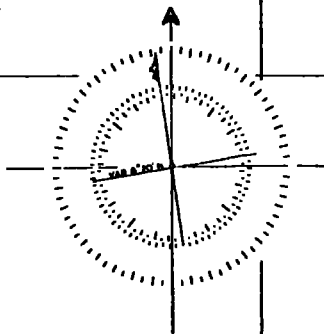
FIG. 26

ENGLAND EAST COAST
TEES BAY.
 MORPHOLOGY

- BASED ON -
- 1 ADMIRALTY SOUNDINGS
 - 2 COMMERCIAL SOUNDINGS
 - 3 SOUNDINGS COMPLETED BY SELF 1067-B

DEPTH

- Fathoms
- Feet
- O.D. NEWLYN



Cables 10 5 0 1 Sea. mile

Feet 1000 500 0 500

Metres 1000 500 0 500

FIG. 27

SEABED PROFILES
THE LOWER TEES

REBCAR

- 113'

S. GARE
LIGHTHOUSE

- 70'

- 80'

SLIGHT CHANGE
OF GRADIENT

- 180'

SLIGHT
CHANGE
OF GRADI-
- ENT

N. GARE
LIGHTHOUSE

- 70'

- 80'

- 178'

LONG SCAR ROCKS

- 70'

- 80'

HARTLEPOOL (SOUTH)

- 180'

HARTLEPOOL (NORTH)

- 180'



NAUTICAL MILE

VERTICAL SCALE : X 2

FIG. 28

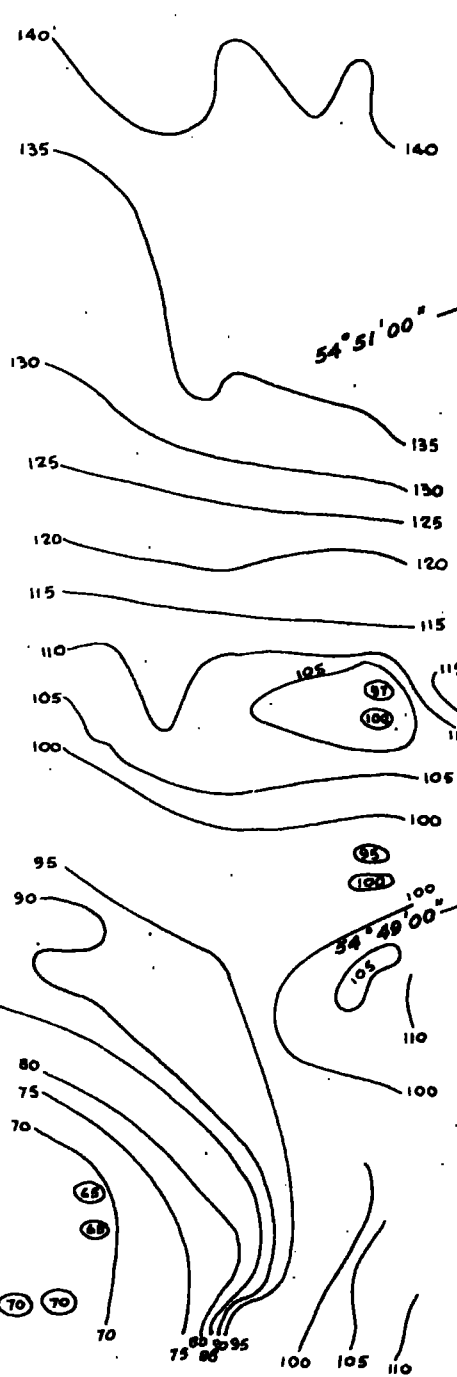
SEABED CONTOUR PLAN OFF THE
SUNDERLAND
COAST

54° 53' 00"

150
54° 53' 00"

SOUNDINGS ARE SHOWN IN FEET
REDUCED TO ADMIRALTY CHART
DATUM.

CONTOURS AT 5FT. INTERVALS.



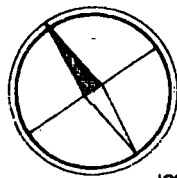
54° 51' 00"

54° 51' 00"

SEAHAM

54° 49' 00"

54° 49' 00"



SCALE IN FT.



SCALE IN METERS

FIG. 29

54° 47' 00"

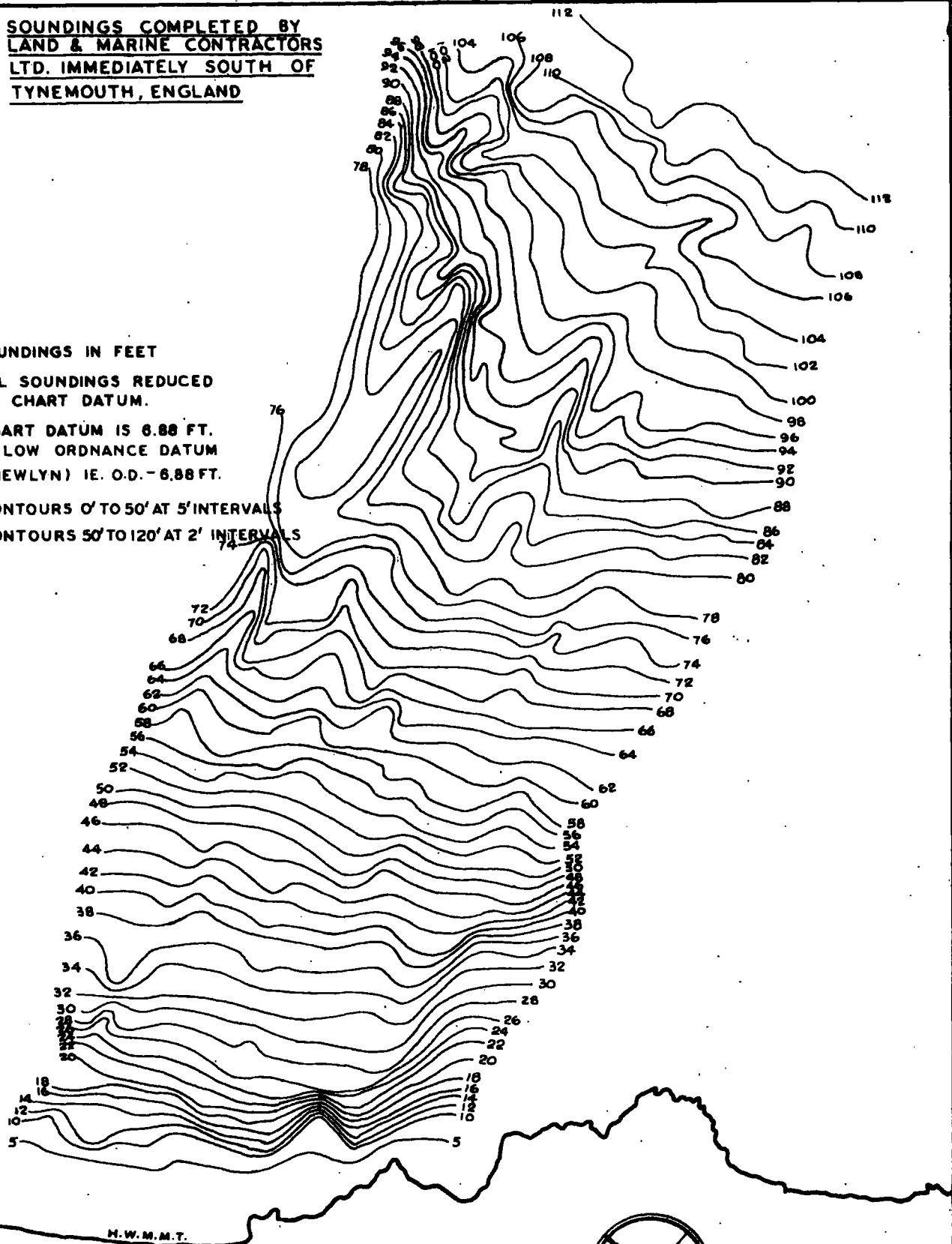
**SOUNDINGS COMPLETED BY
LAND & MARINE CONTRACTORS
LTD. IMMEDIATELY SOUTH OF
TYNEMOUTH, ENGLAND**

SOUNDINGS IN FEET

ALL SOUNDINGS REDUCED
TO CHART DATUM.

CHART DATUM IS 6.88 FT.
BELOW ORDNANCE DATUM
(NEWLYN) I.E. O.D. - 6.88 FT.

CONTOURS 0' TO 50' AT 5' INTERVALS
CONTOURS 50' TO 120' AT 2' INTERVALS



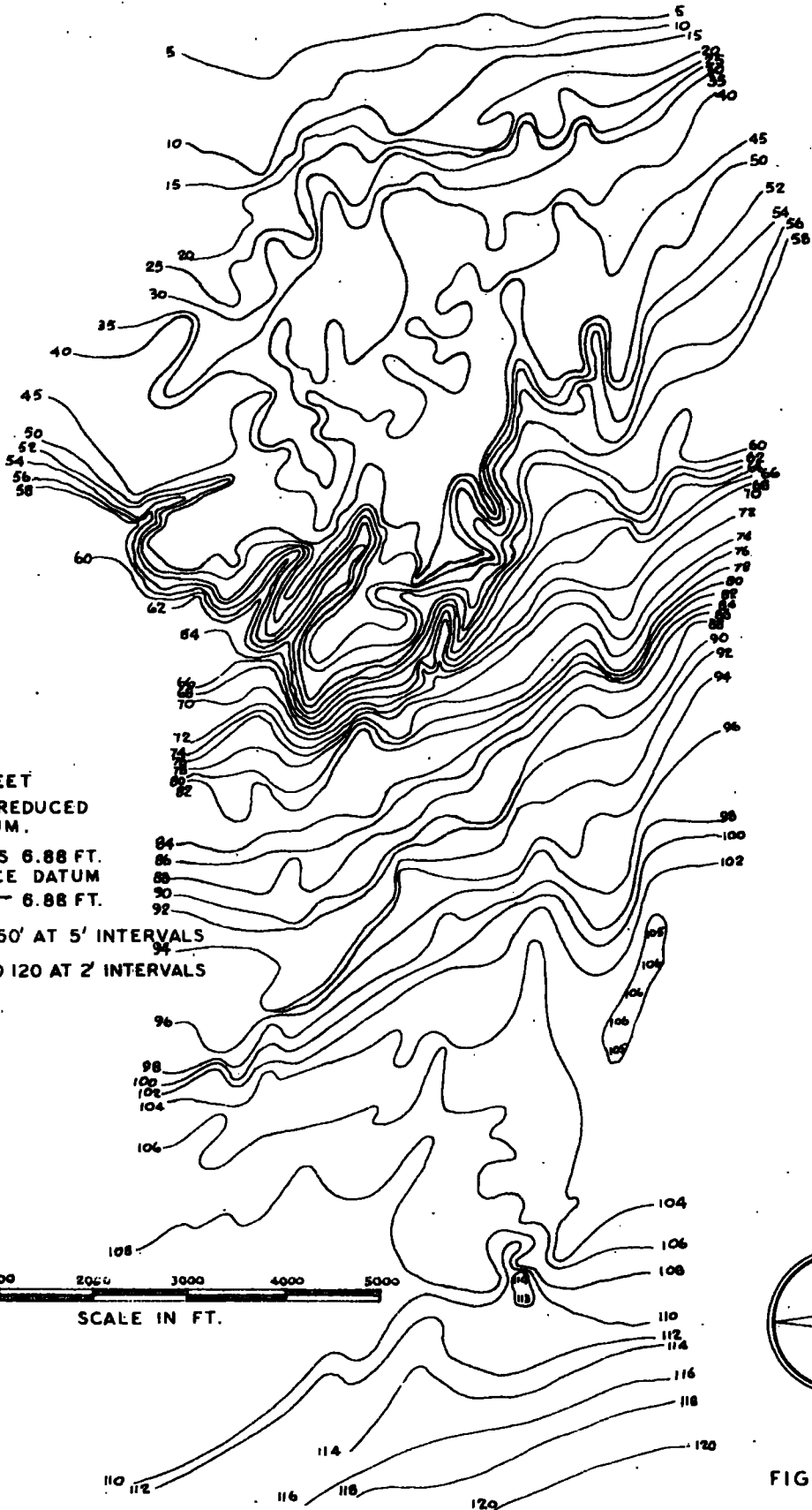
SCALE IN FT.

FIG. 30

SOUNDINGS COMPLETED BY LAND & MARINE CONTRACTORS LTD. IMMEDIATELY NORTH OF WHITVEY BAY

H.W.M.C.

ST. MARY'S LIGHTHOUSE



SOUNDINGS IN FEET
ALL SOUNDINGS REDUCED
TO CHART DATUM.

CHART DATUM IS 6.88 FT.
BELOW ORDNANCE DATUM
(NEWLYN) I.E. O.D. - 6.88 FT.

CONTOURS 0' TO 50' AT 5' INTERVALS
CONTOURS 50' TO 120 AT 2' INTERVALS

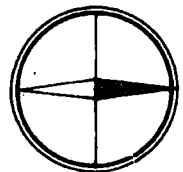


FIG. 31

**SEABED CONTOURS OFF THE SOUTHERN
NORTHUMBERLAND
COAST**

BASED ON SOUNDINGS
COMPLETED BY THE
DOVE MARINE LABORATORY

CONTOURS & FIGURES
SHOW DEPTH IN METERS
(FEET) IN BRACKETS
BELOW CHART DATUM.

CHART DATUM APPROX.
7-FT. BELOW O.D.

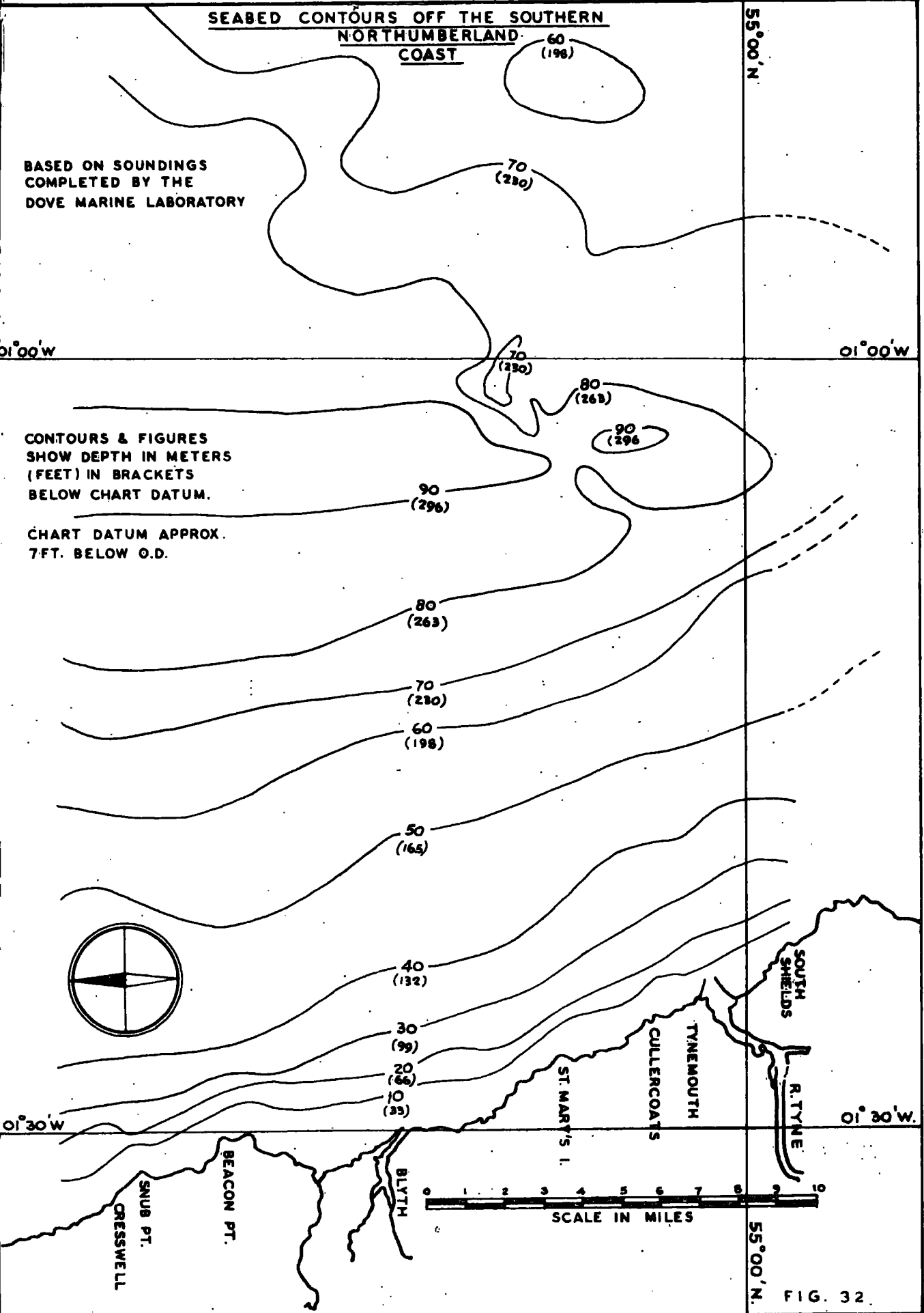
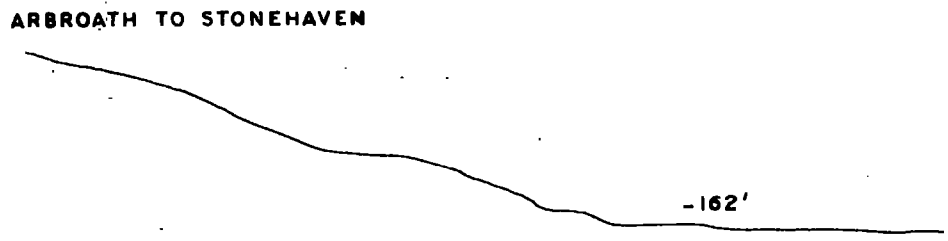
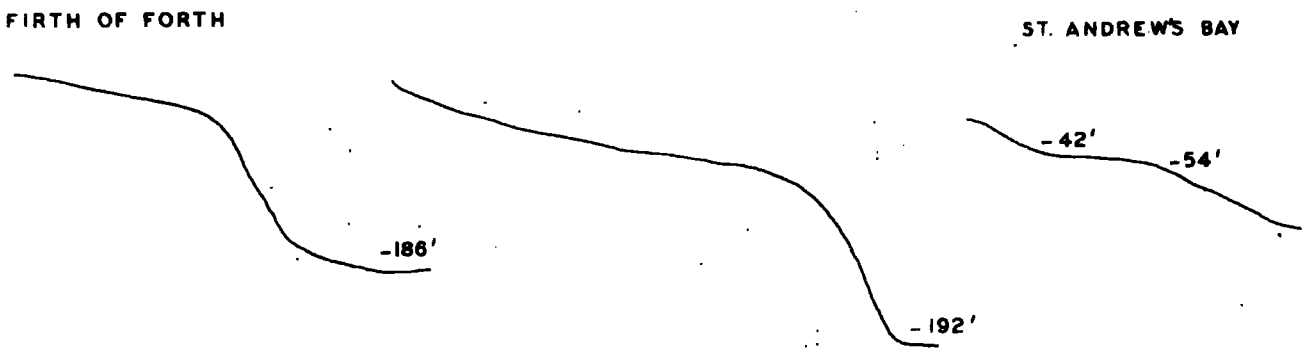
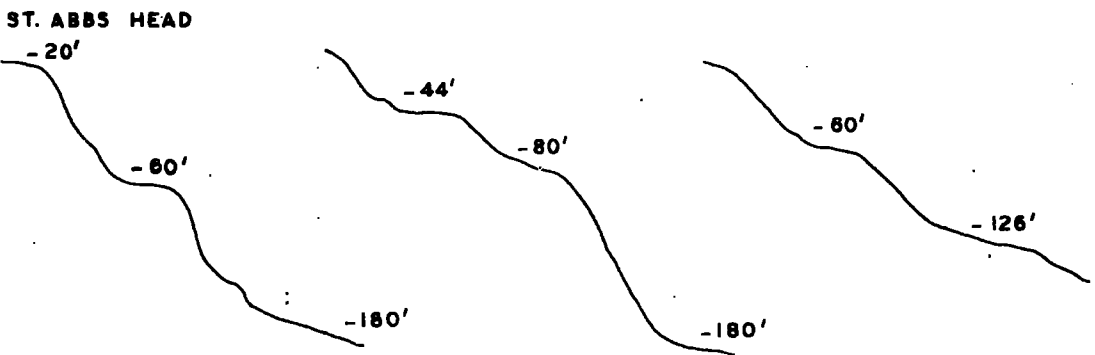
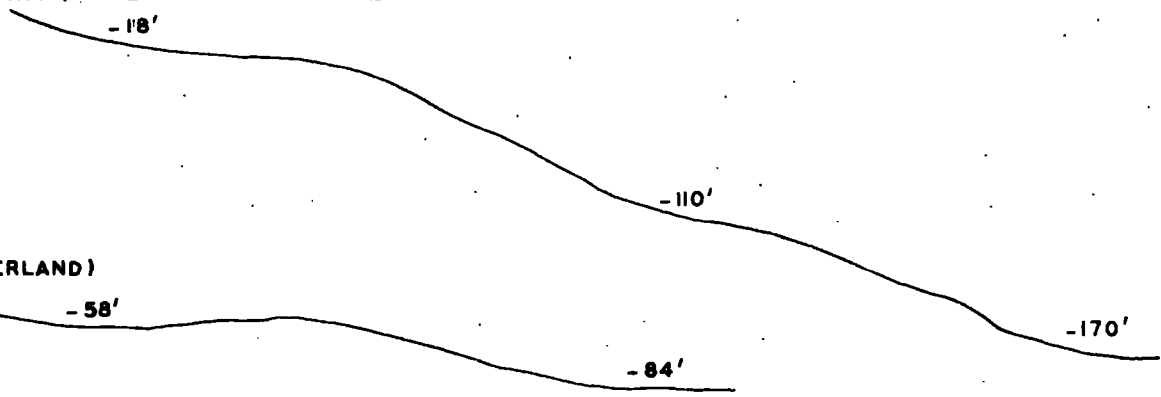


FIG. 32

SOUTER POINT (TYNEMOUTH) SEABED PROFILES



NAUTICAL MILE
VERTICAL SCALE: X2

FIG. 33

SCHEMATIC DIAGRAM OF SPARKER SURVEY
AND EQUIPMENT

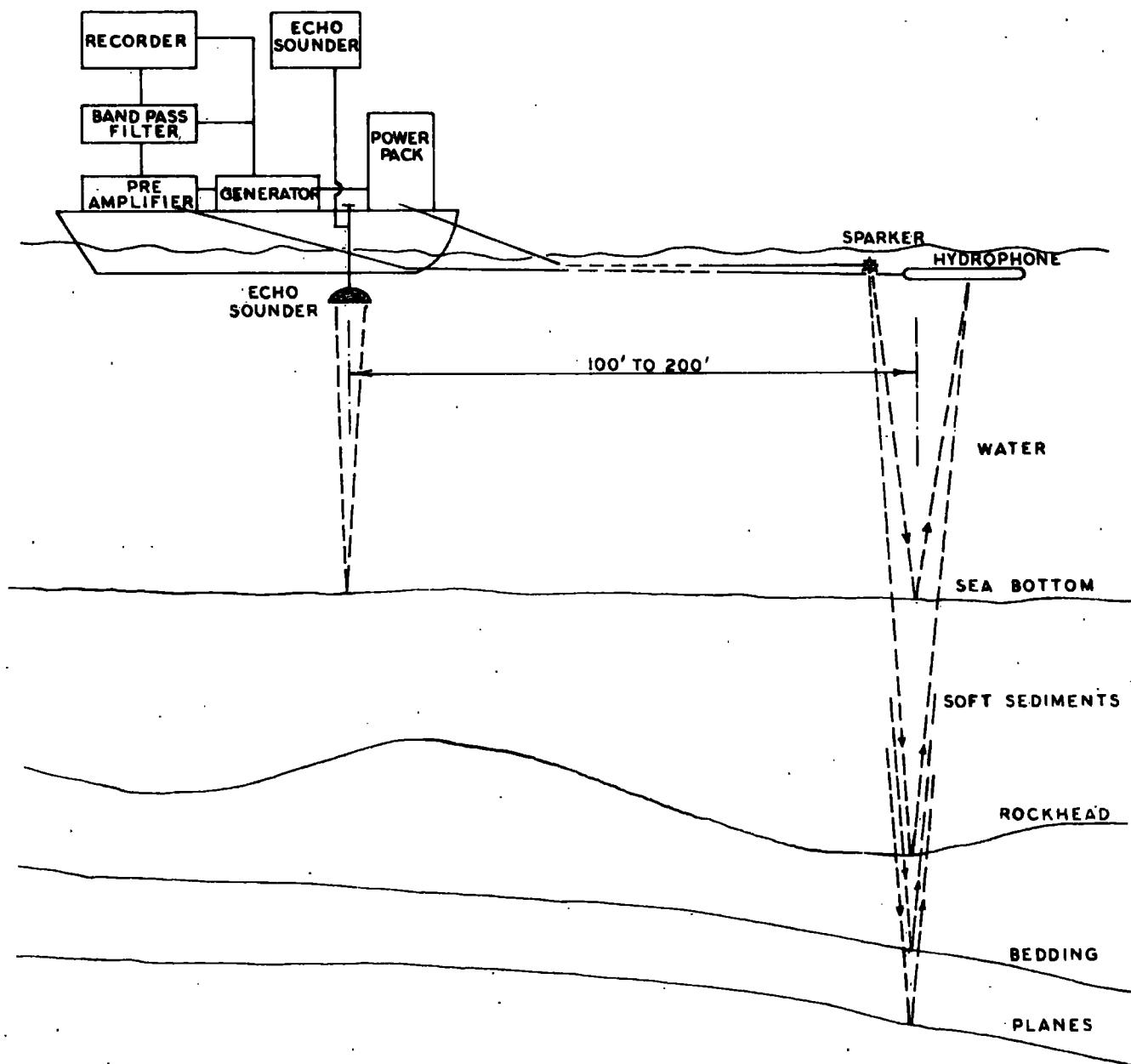
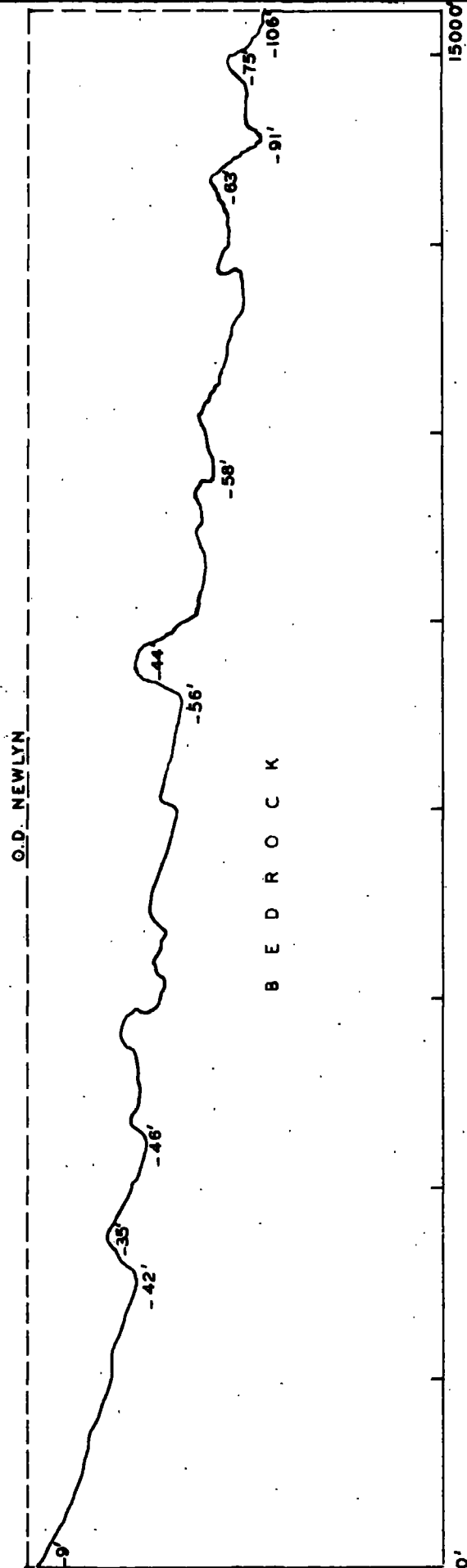


FIG. 34

PROFILE 1

E.N.E FROM POINT ON SHORE MIDWAY BETWEEN MARSKE AND REDCAR



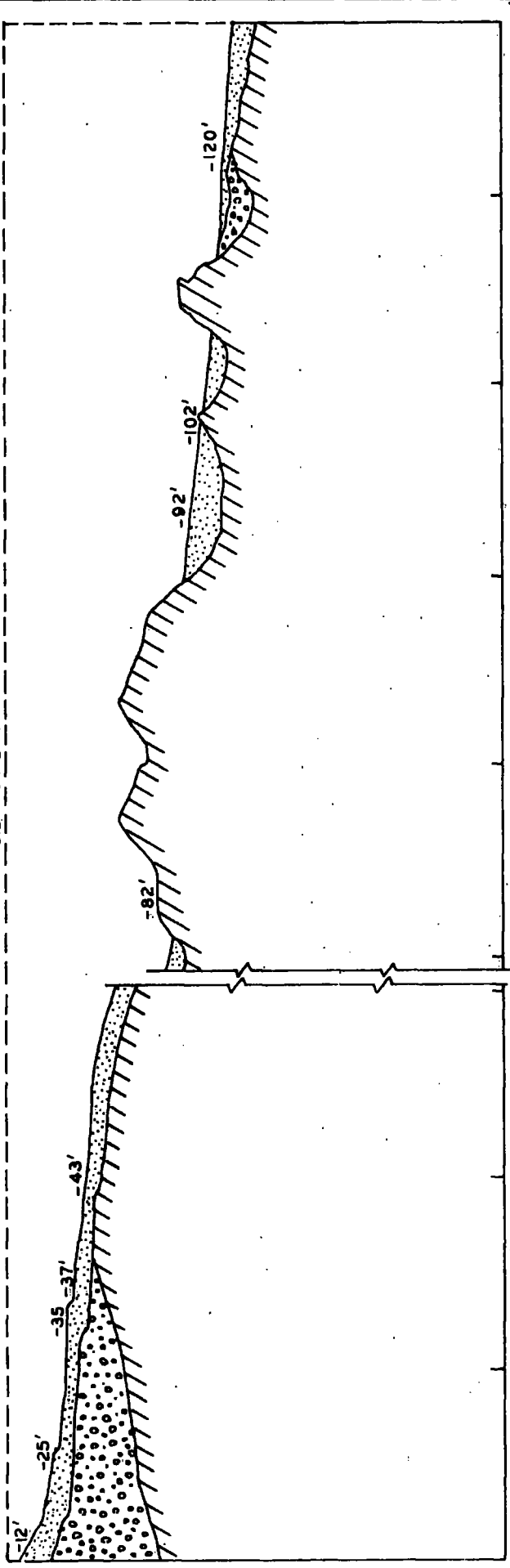
HORIZONTAL SCALE : 1" = 1700'
VERTICAL SCALE : 1" = 170'
VERTICAL EXAGGERATION: X10

NOTE: PROFILE SHOWS ONLY BEDROCK

FIG. 35

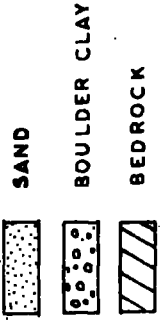
E.N.E. FROM POINT MIDWAY BETWEEN WEST SCAR ROCKS & OFF THE SOUTH GARE LIGHTHOUSE

OD. NEWLYN



5100' 1:400'

20000'

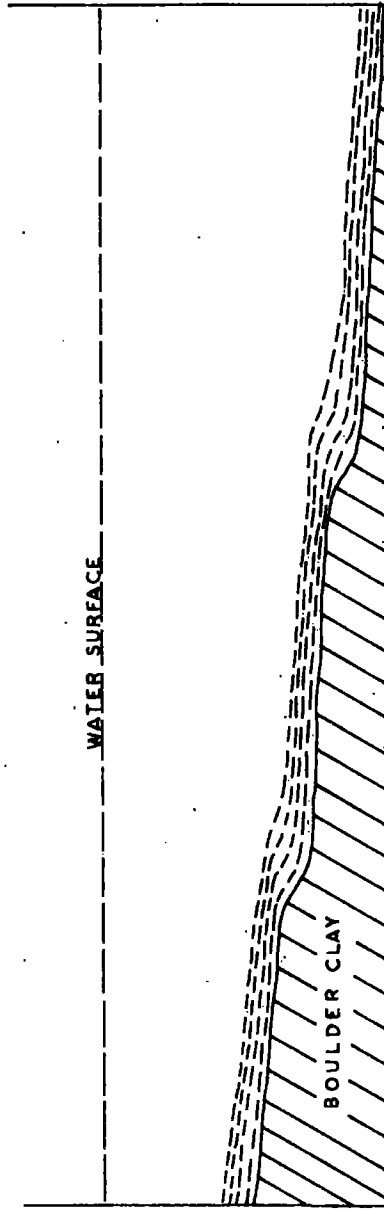


HORIZONTAL SCALE: 1" = 1700'

VERTICAL SCALE: 1" = 170'

VERTICAL EXAGGERATION: X10

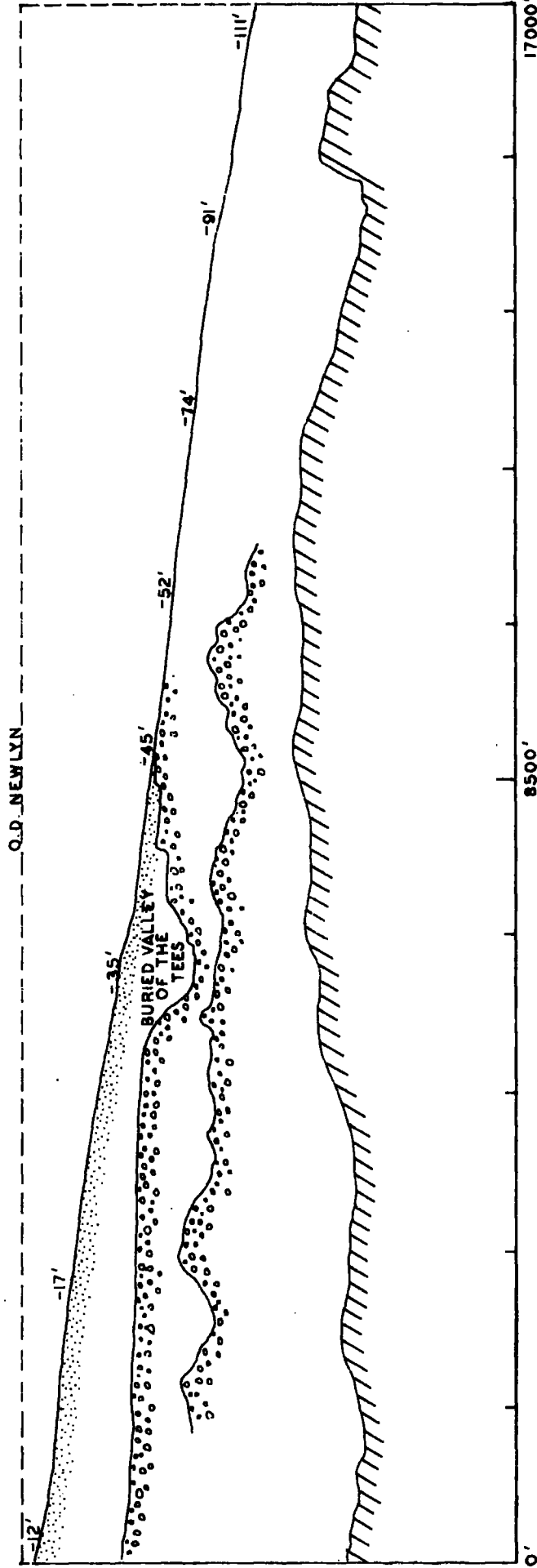
EXPERIMENT ILLUSTRATING THE POSSIBLE RELATIONSHIP BETWEEN SEABED FORMS AND THE SURFACE OF THE UNDERLYING BOULDER CLAY.



NOTE HOW THE SETTLED LAYERS HAVE THE EFFECT OF MOVING THE BREAK OF SLOPE TOWARD DEEPER WATER

PROFILE 3

E.N.E. FROM POINT ONE MILE SOUTH OF THE SOUTH GARE LIGHTHOUSE



HORIZONTAL SCALE: 1" = 1700'
VERTICAL SCALE: 1" = 170'
VERTICAL EXAGGERATION: X10

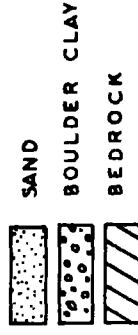
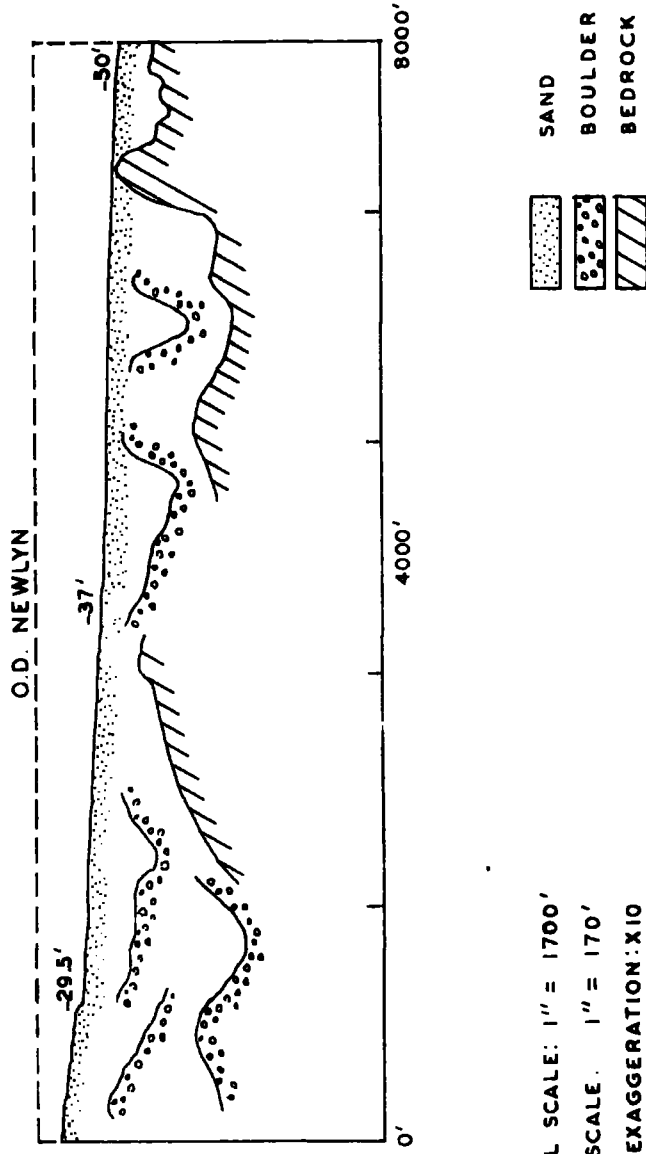


FIG 38

N.N.E. FROM NORTH GARE LIGHTHOUSE



HORIZONTAL SCALE: 1" = 1700'
VERTICAL SCALE: 1" = 170'
VERTICAL EXAGGERATION: X10

FIG. 39

GRAPHICAL METHODS OF PRESENTATION OF PARTICLE SIZE ANALYSES

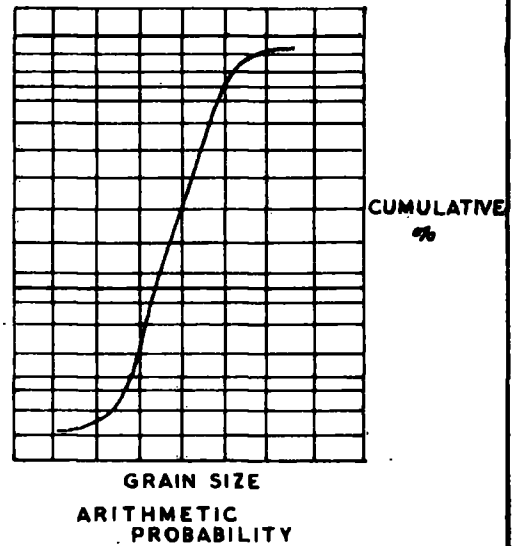
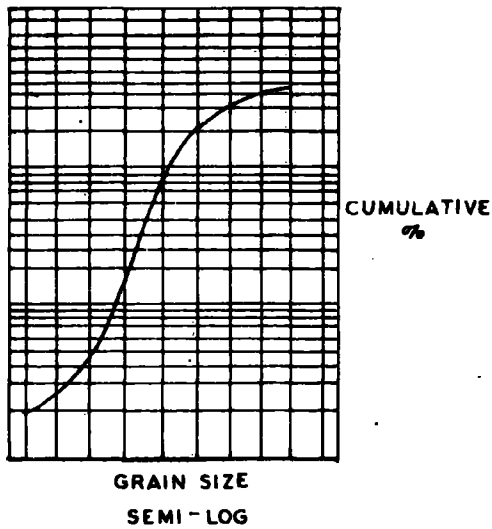
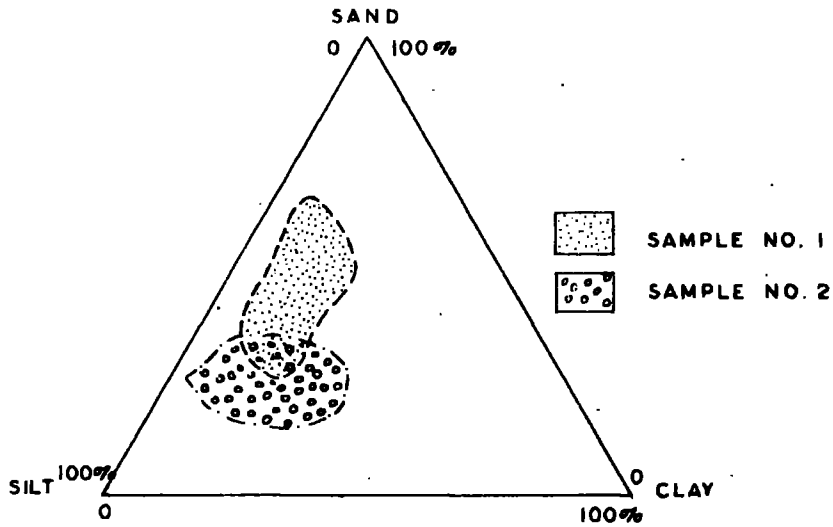
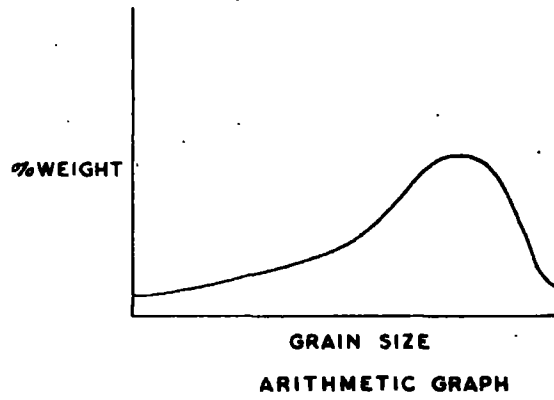
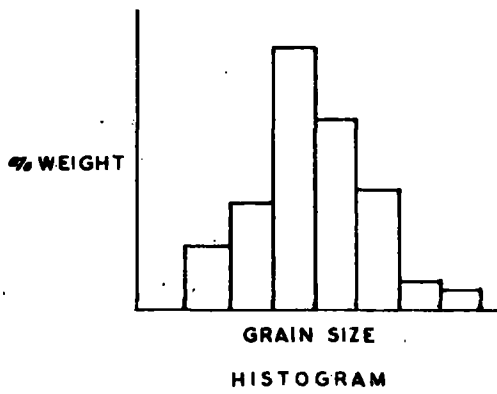
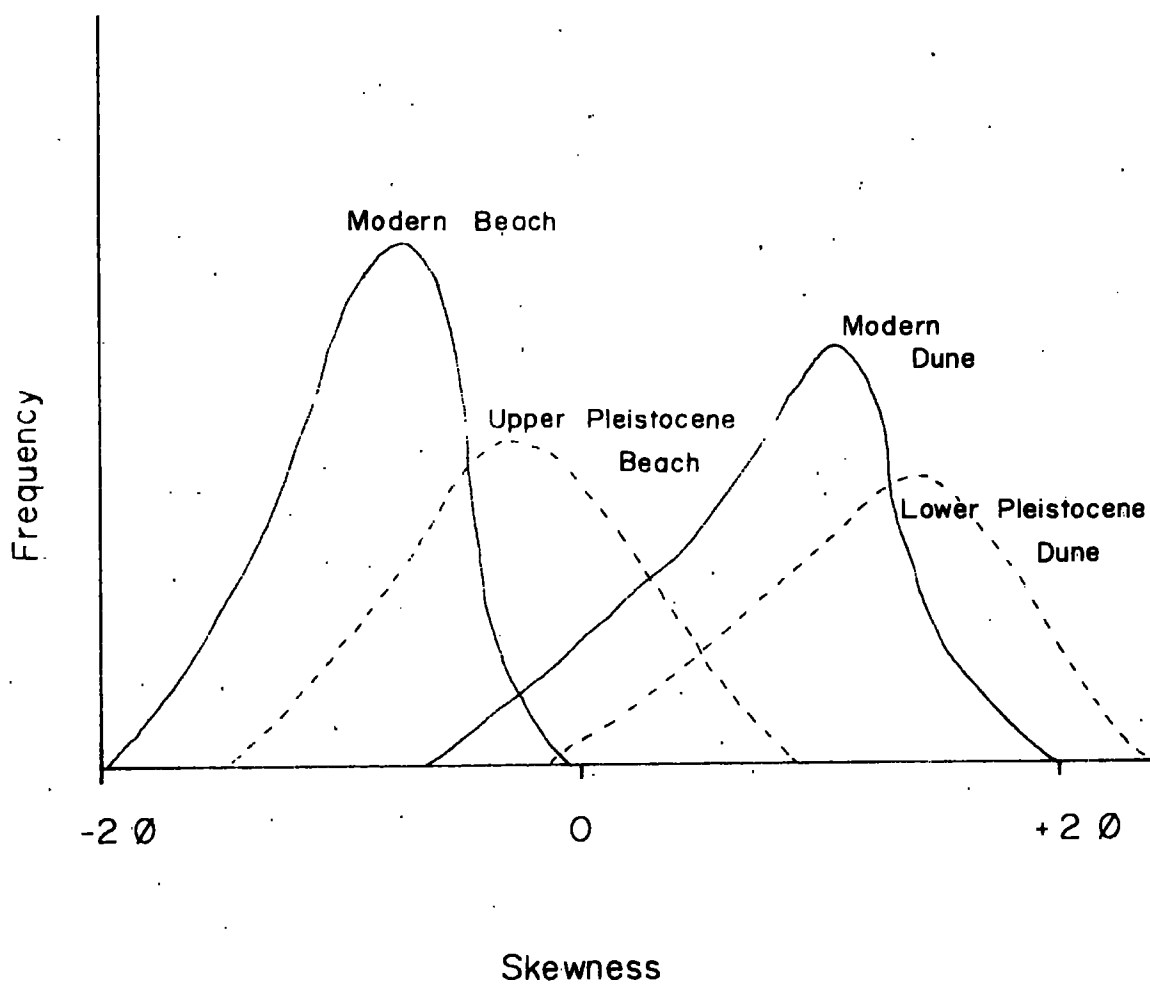


FIG. 40.

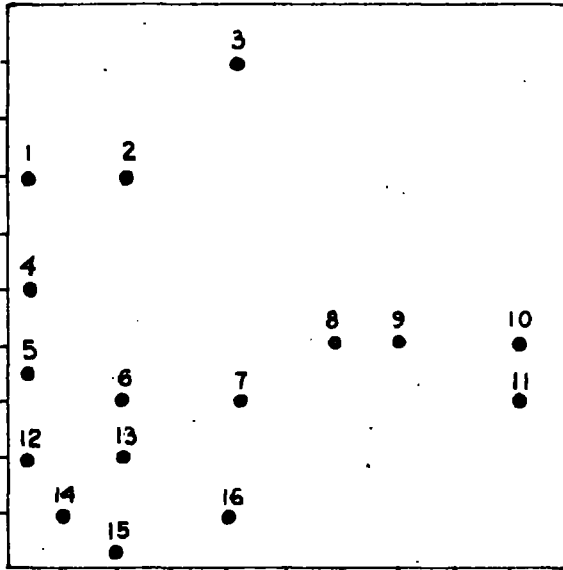
THE SEPARATION OF BEACH AND DUNE SANDS USING FRIEDMAN'S MEASURE OF SKEW



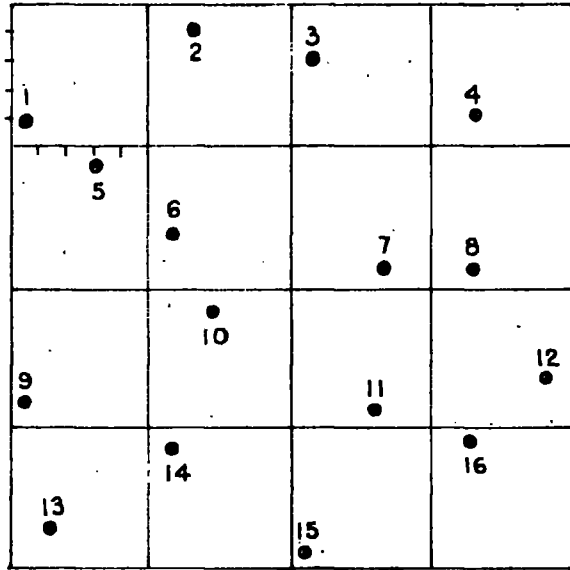
After Chappell 1967

FIG. 41

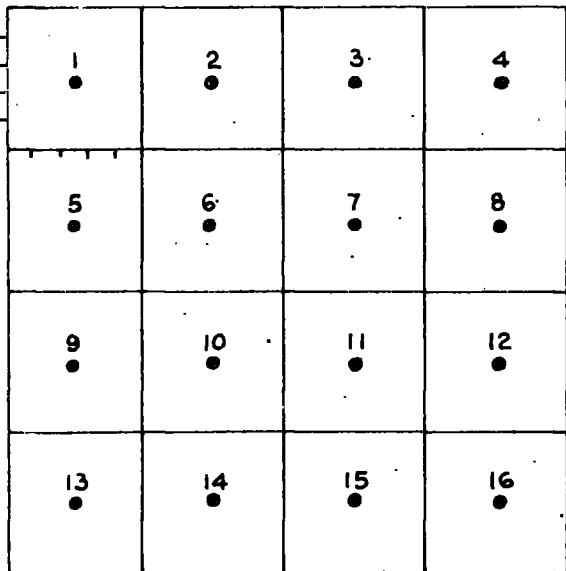
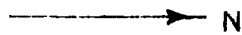
SAMPLING DIAGRAMS
ILLINOIS BEACH EXPERIMENT



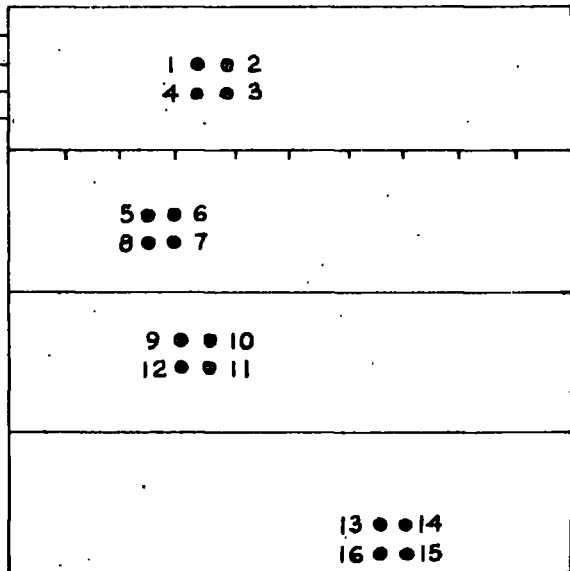
A. SIMPLE RANDOM SAMPLES



B. RANDOM IN CELLS



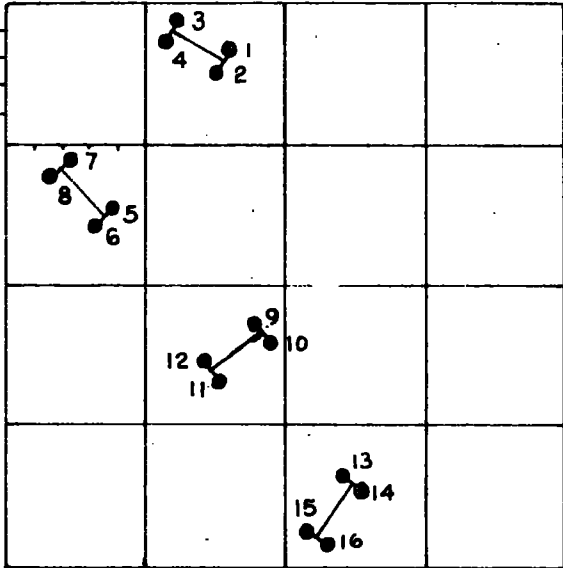
C. SYSTEMATIC IN CELLS



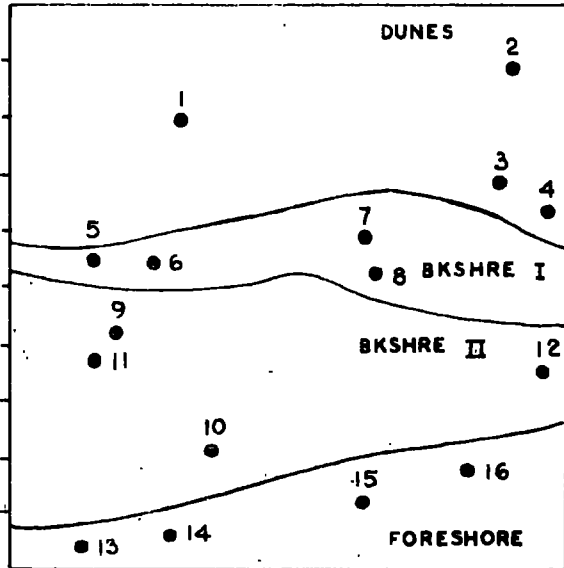
D. CLUSTERS OF FOUR

AFTER KRUMBEIN & SLACK

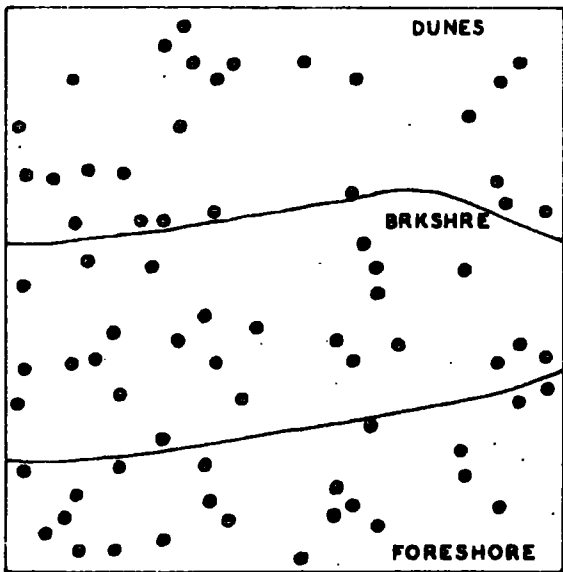
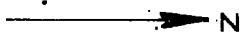
SAMPLING DIAGRAMS
ILLINOIS BEACH EXPERIMENT



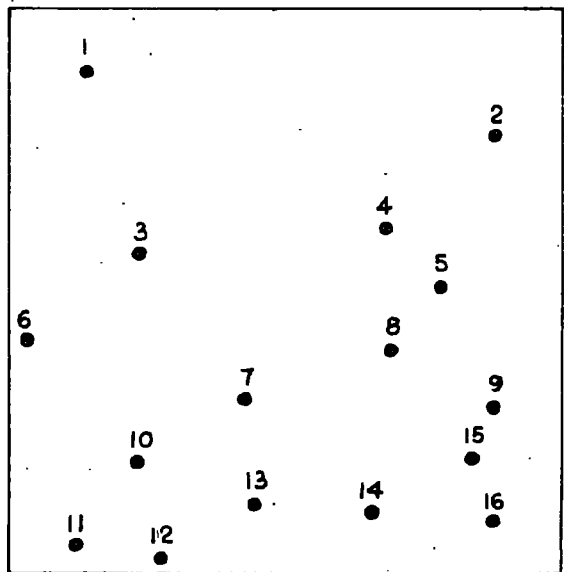
E. THREE LEVEL DESIGN



F. STRATIFIED RANDOM



G. THREE STRATA (COMBINED SAMPLES)

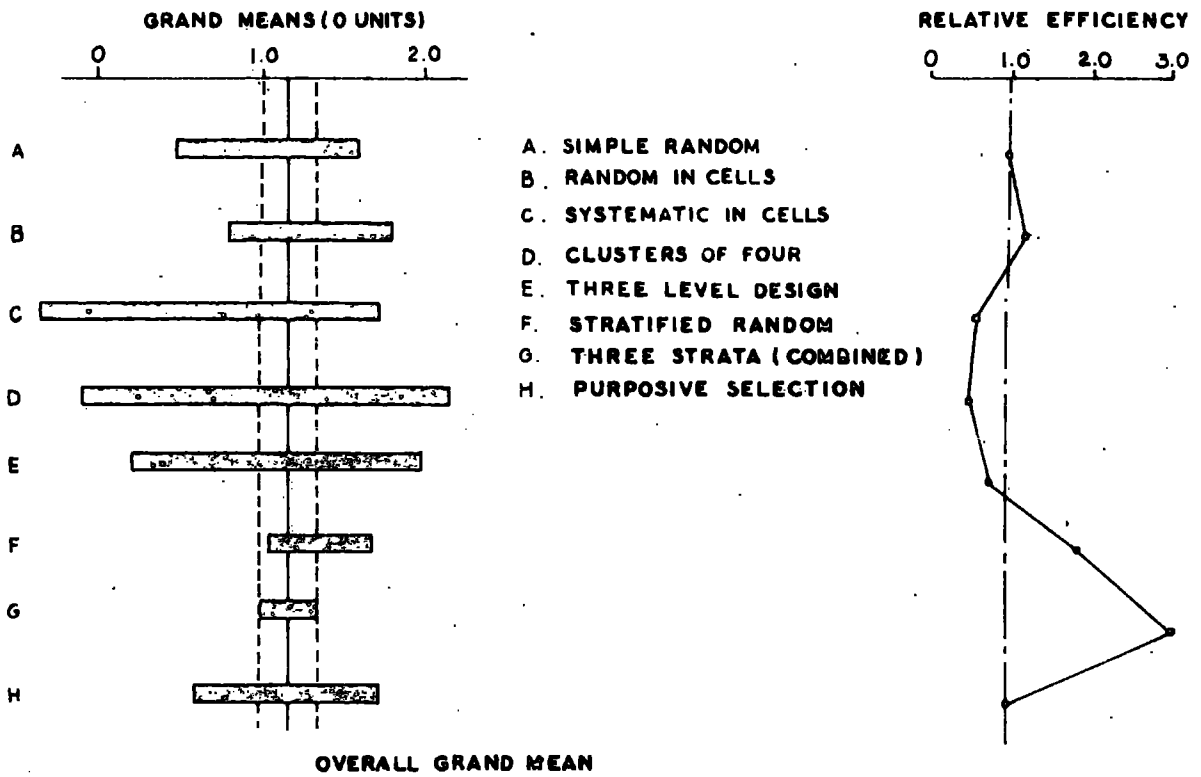


H. PURPOSIVE SELECTION

AFTER KRUMBEIN & SLACK

FIG. 43

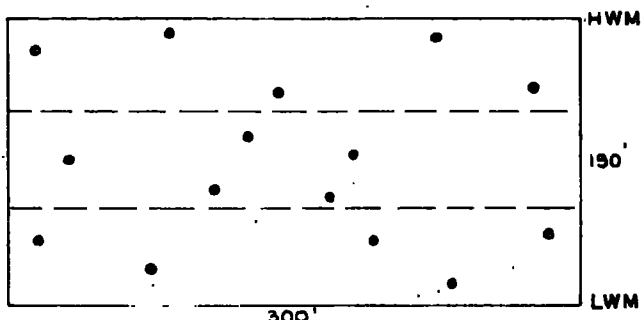
**CONFIDENCE BANDS AND RELATIVE EFFICIENCY OF SAMPLING
DESIGNS FOR PHI MEAN PARTICLE DIAMETERS.**



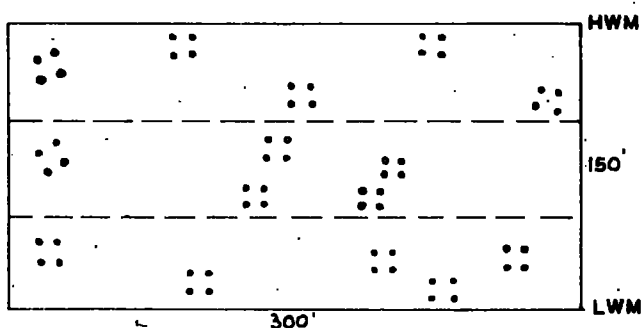
AFTER KRUMBEIN & SLACK

FIG. 44.

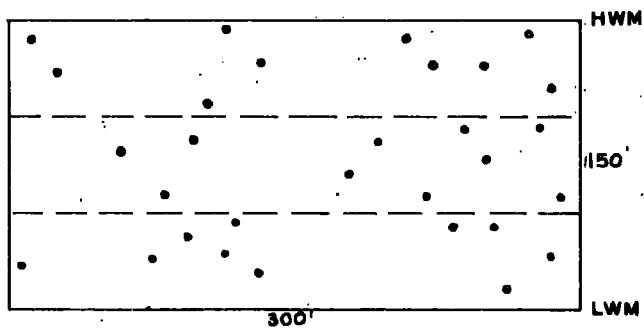
STRATIFIED RANDOM SAMPLES ON THE PRESENT DAY BEACH AT REDCAR



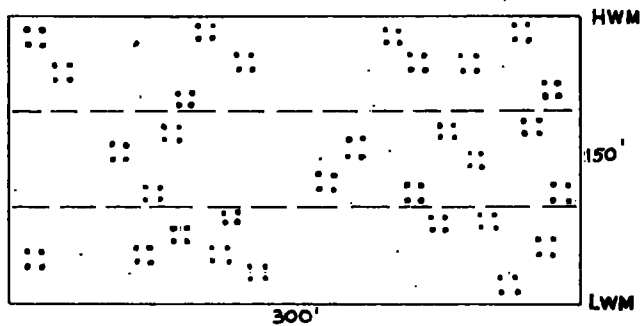
FIFTEEN SAMPLES



CLUSTER SAMPLING AT EACH OF THE FIFTEEN SAMPLE PTS.



THIRTY SAMPLES



CLUSTER SAMPLING AT EACH OF THE THIRTY SAMPLE PTS.

MEAN CURVES OF SAND SIZE FRACTIONS

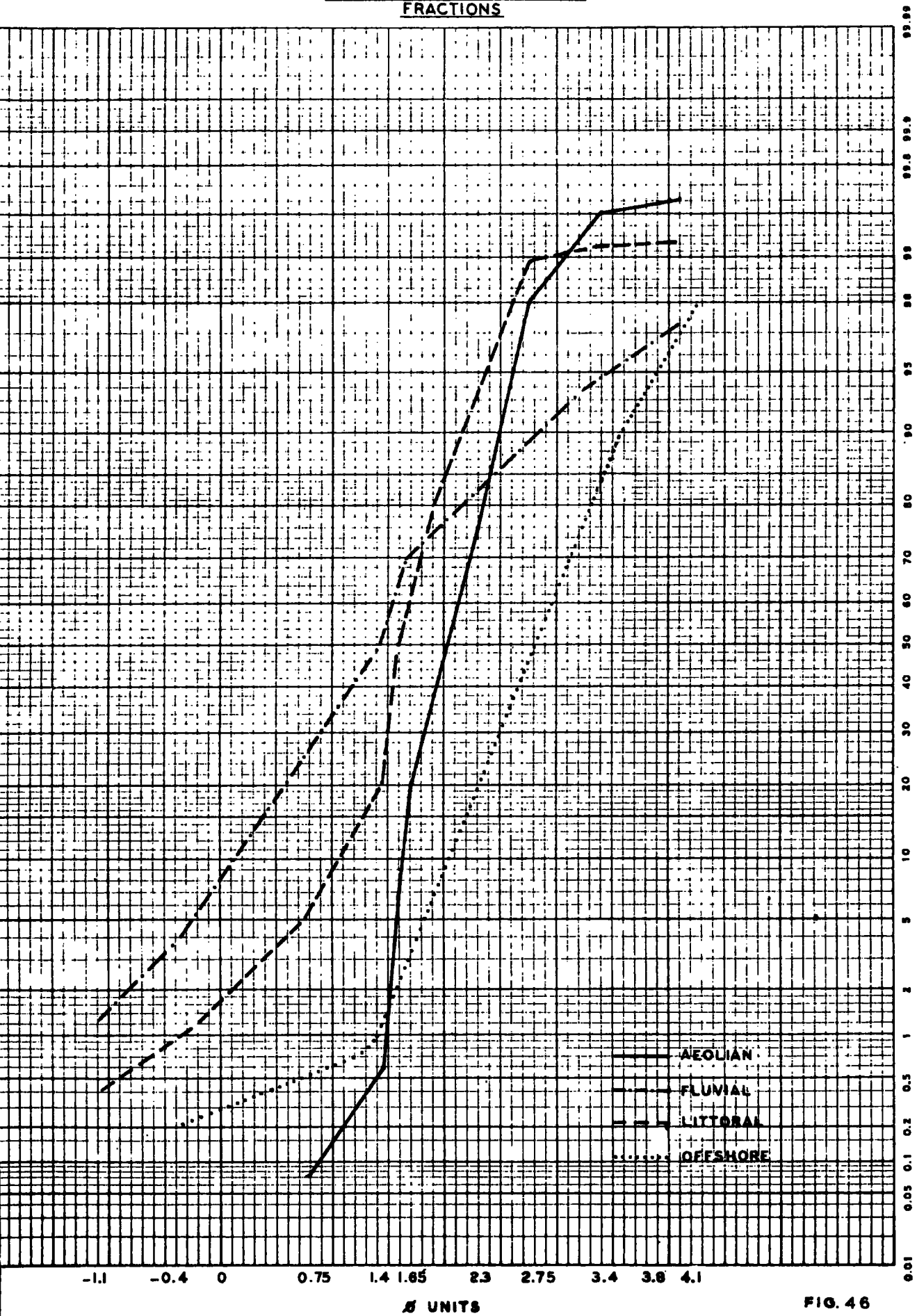


FIG. 46

THORPE THEWLES BECK
THE EFFECTS OF CHANGING CONDITION ON PARTICLE SIZE

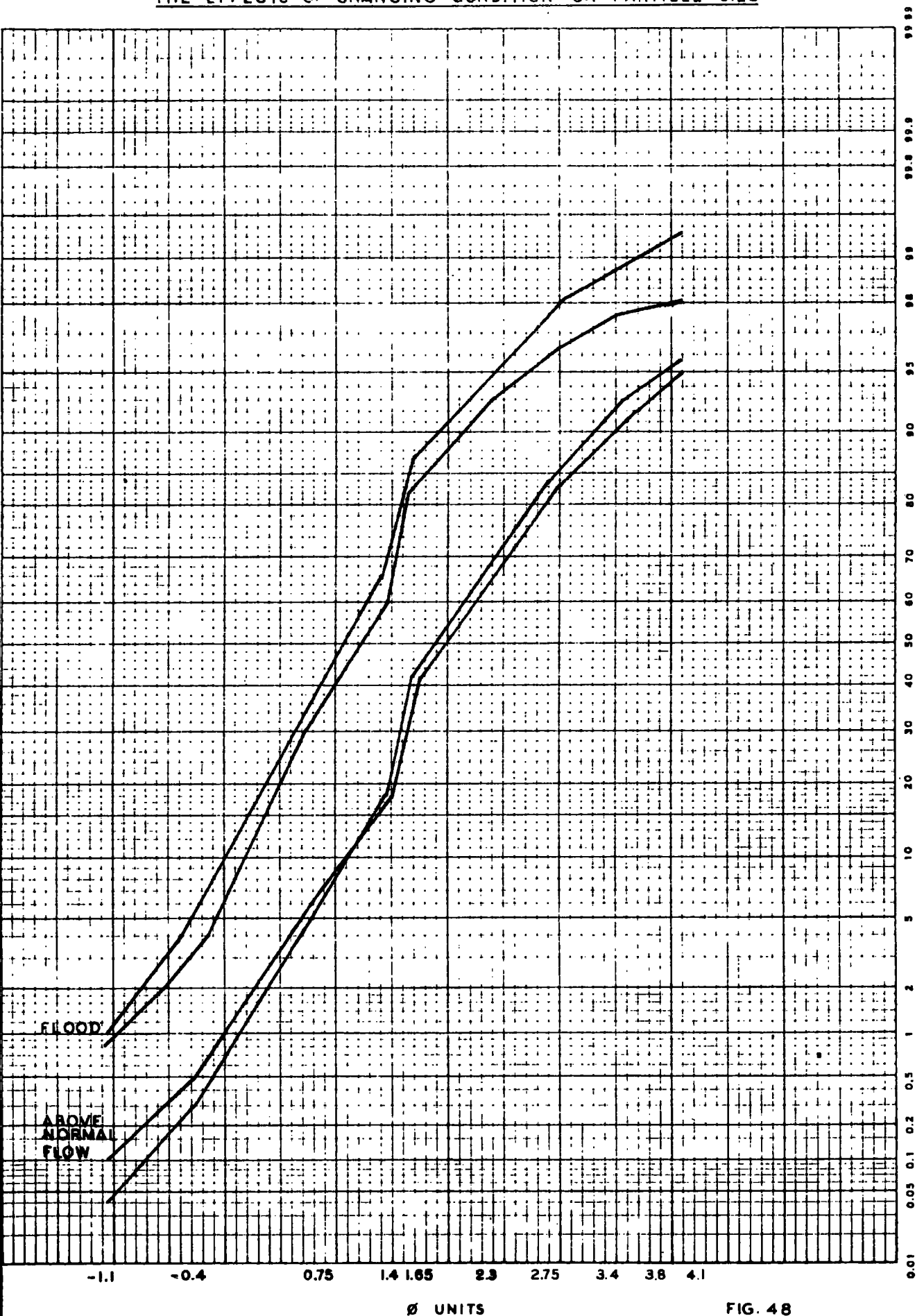


FIG. 48

THE LOCATION OF BEACH SAMPLE AREAS
IN THE TEES BASIN

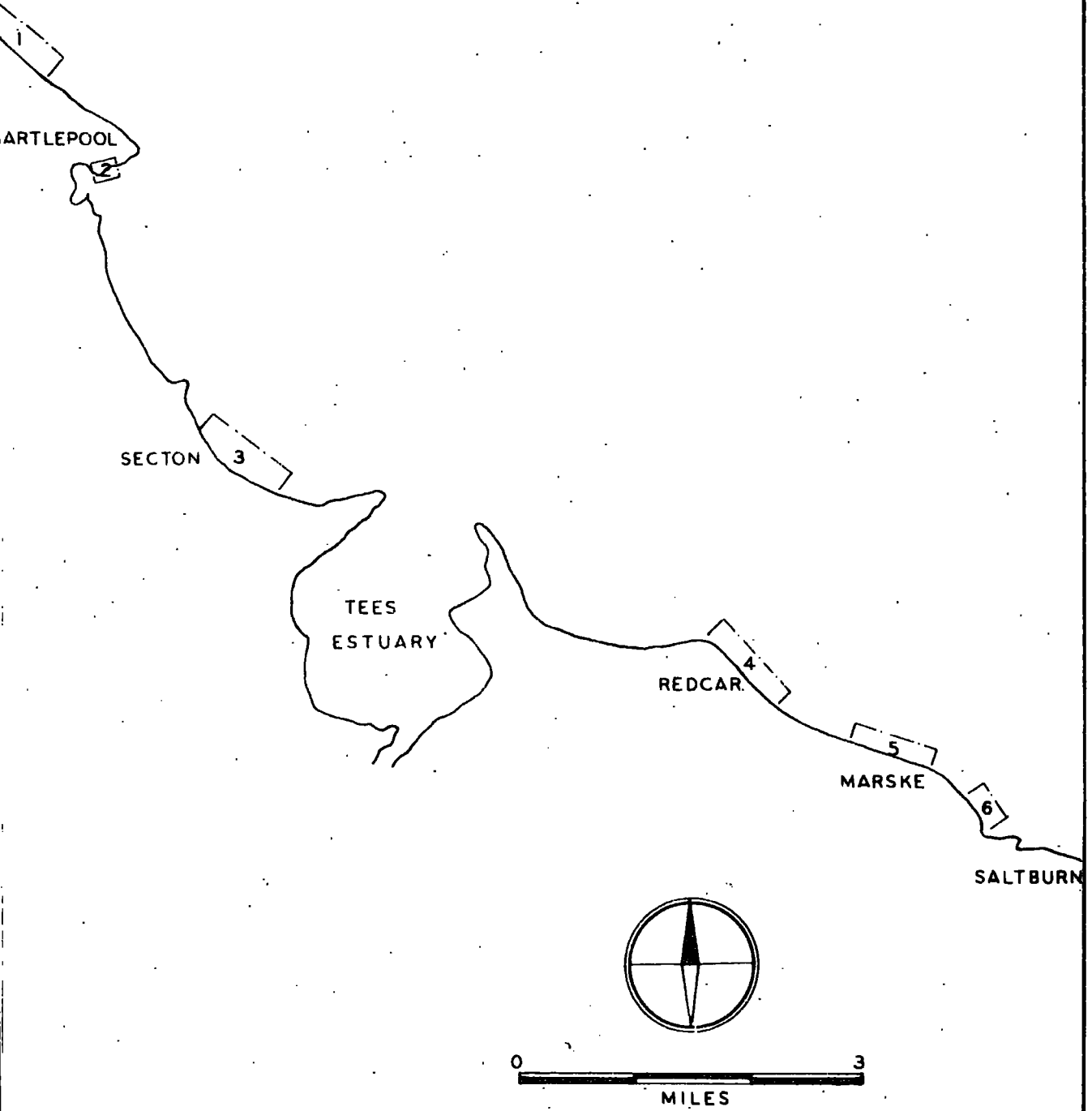
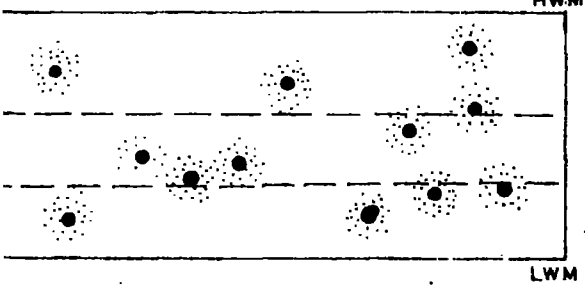


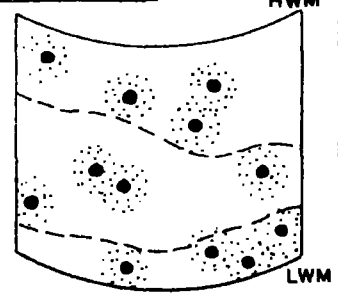
FIG. 49

SAMPLE LOCATIONS FOR EACH BEACH AREA

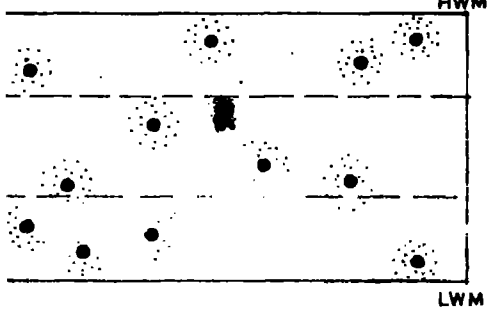
1.) CRIMDON BEACH



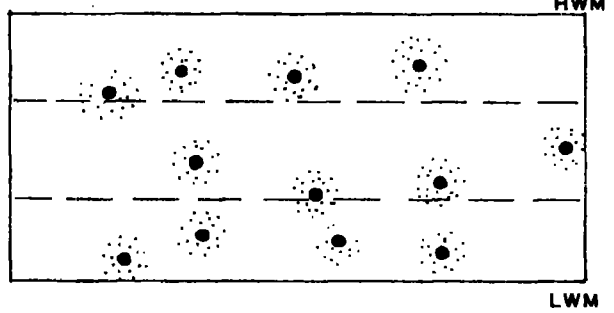
2.) HARTLEPOOL YACHT CLUB BEACH



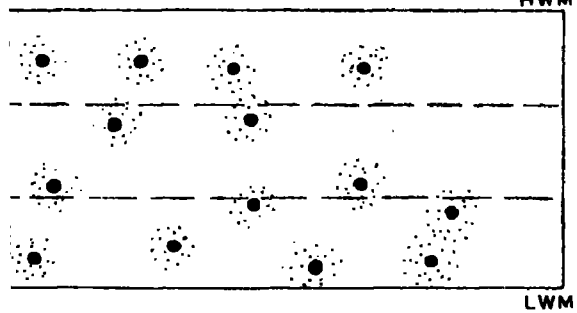
3.) SEATON CAREW BEACH



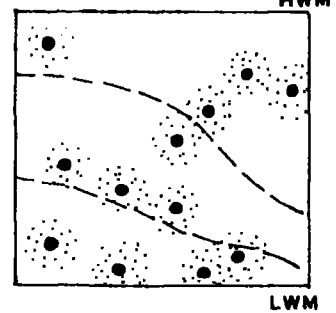
4.) REDCAR BEACH



5.) MARSKE BEACH



6.) SALTBURN BEACH [NORTH]



SCALE: 1" = 100'

FIG. 50

CRIMDON BEACH
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS

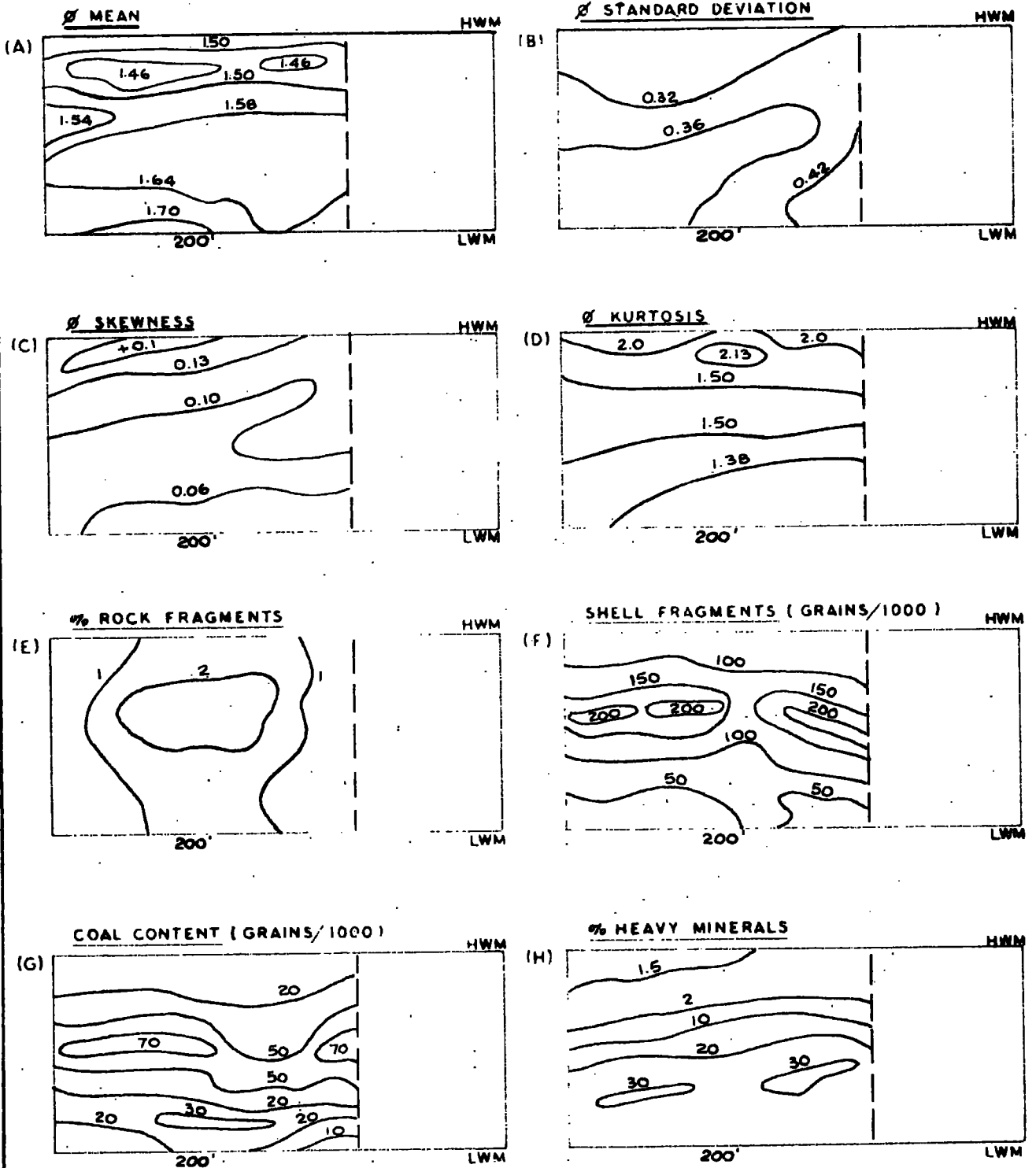
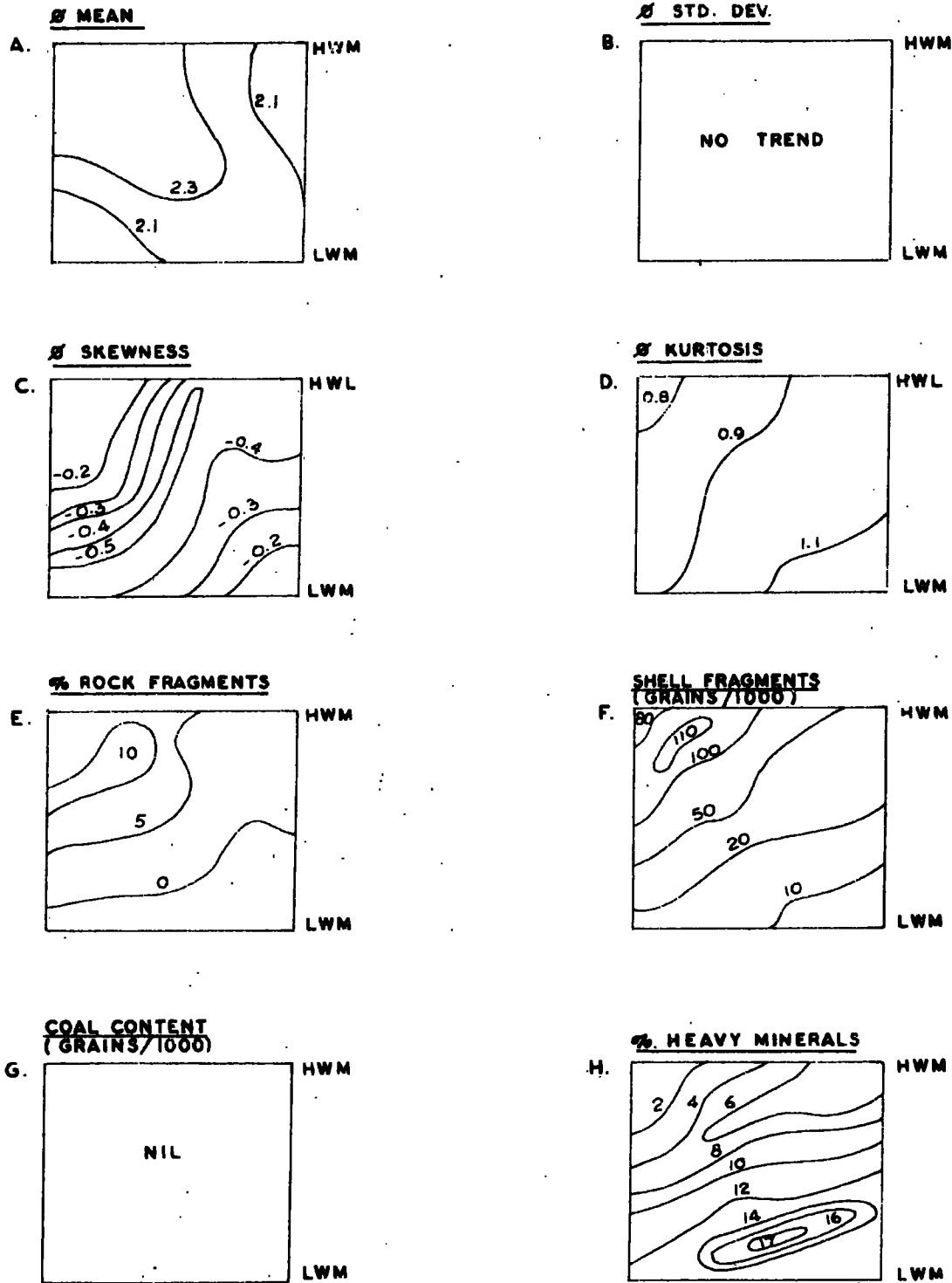


FIG. 51

SALTBURN BEACH (N.)

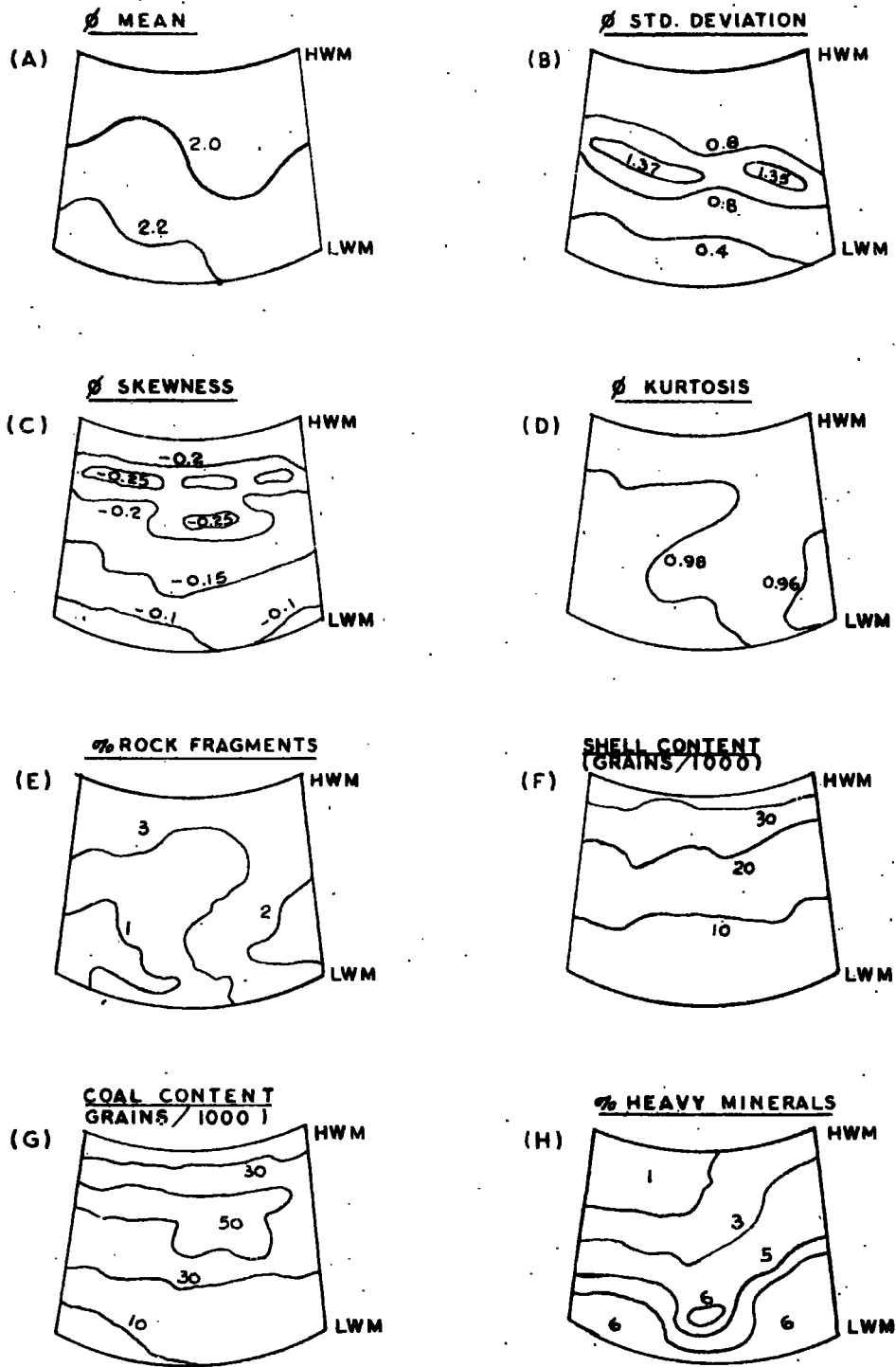
SHOWING SPATIAL DISTRIBUTION OF SEDIMENTARY CHARACTERISTICS



SCALE: 1" = 100'

FIG. 52

HARTLEPOOL YACHT CLUB BEACH
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS



SCALE: 1" = 100'

FIG. 53

MARSKE BEACH
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS

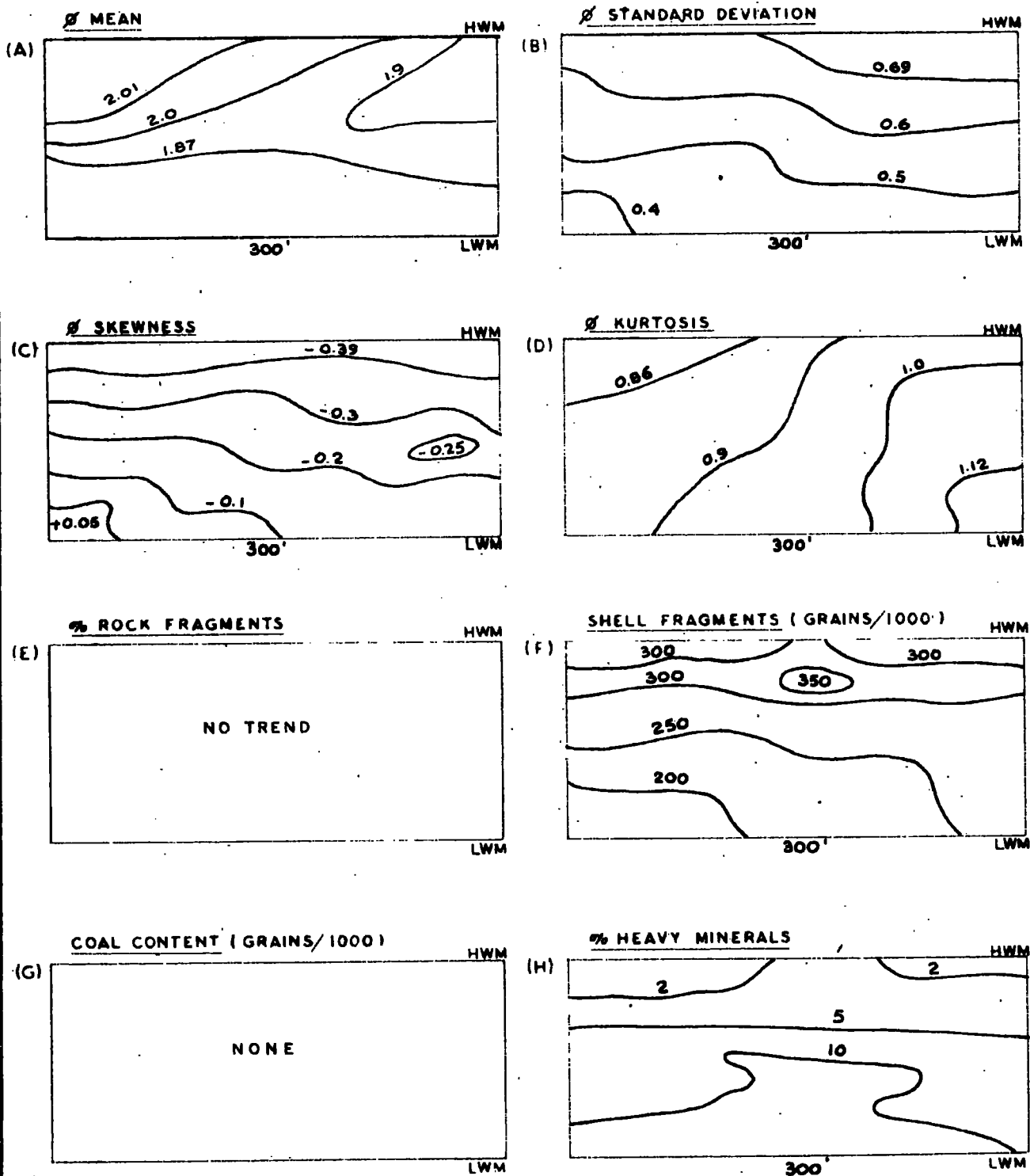


FIG. 54.

REDCAR BEACH
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS

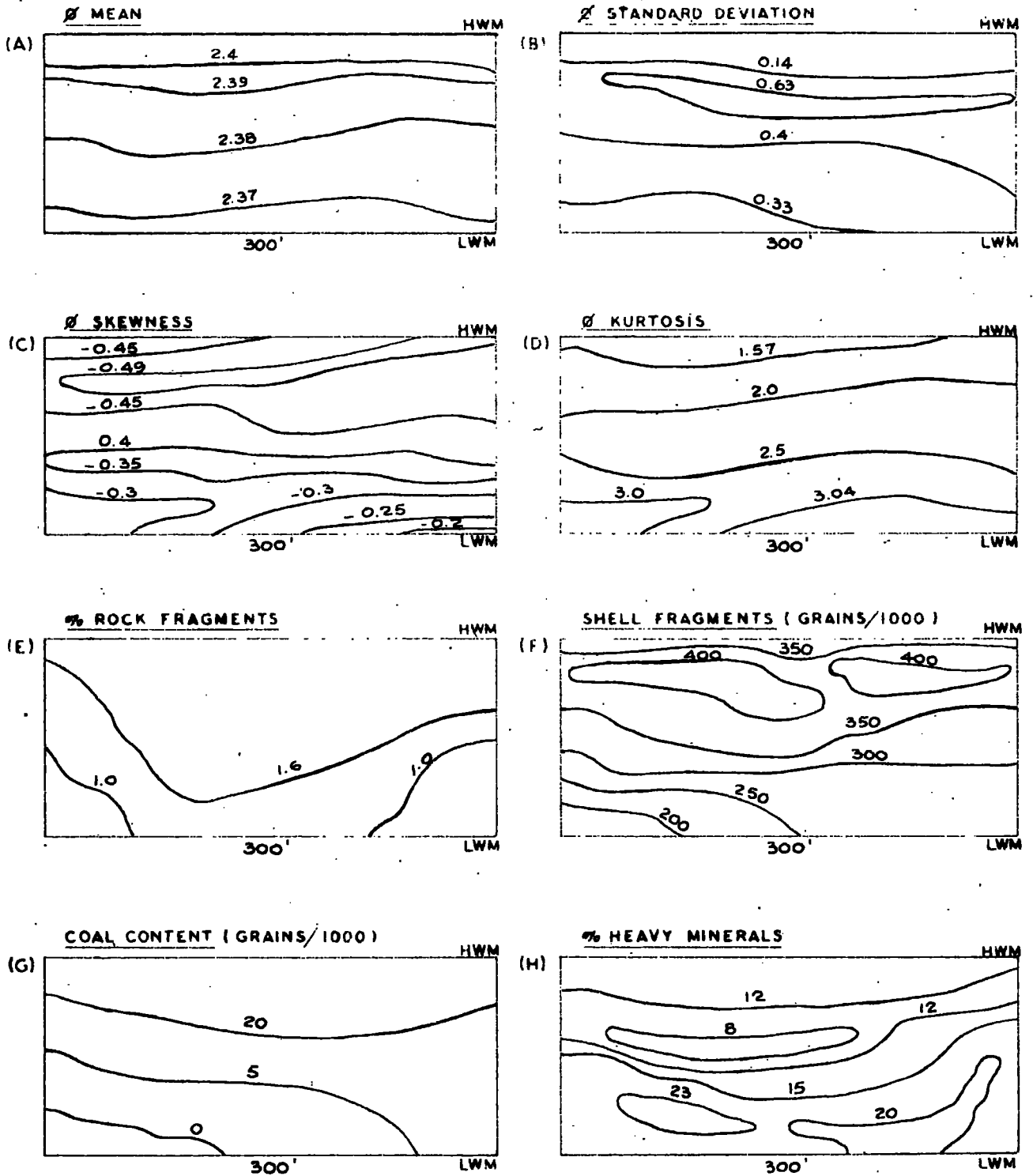


FIG 55

SEATON CAREW BEACH
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS

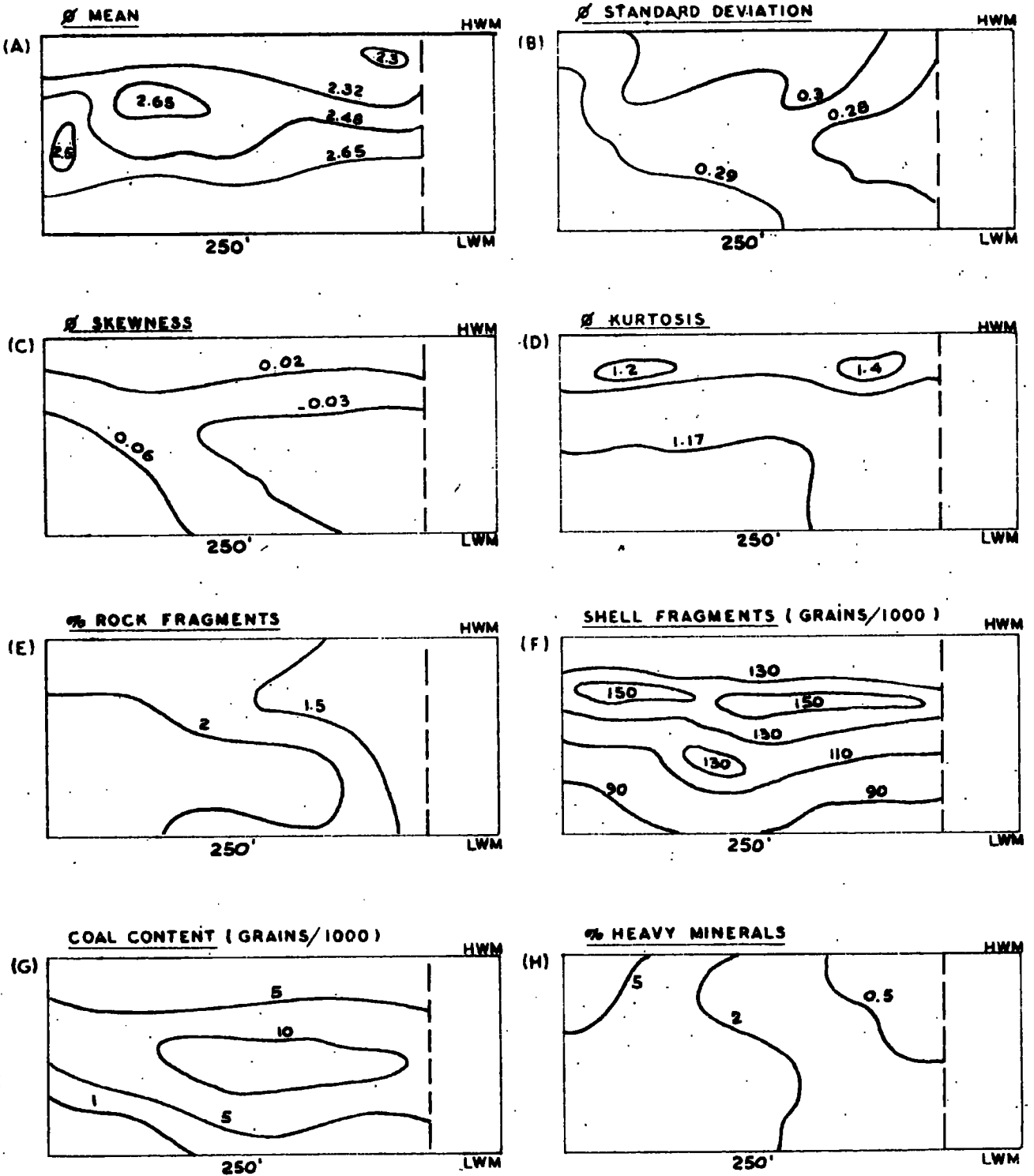


FIG. 56

PARTICLE SIZE
TYPICAL CURVES FROM THE SIX BEACH
SITES

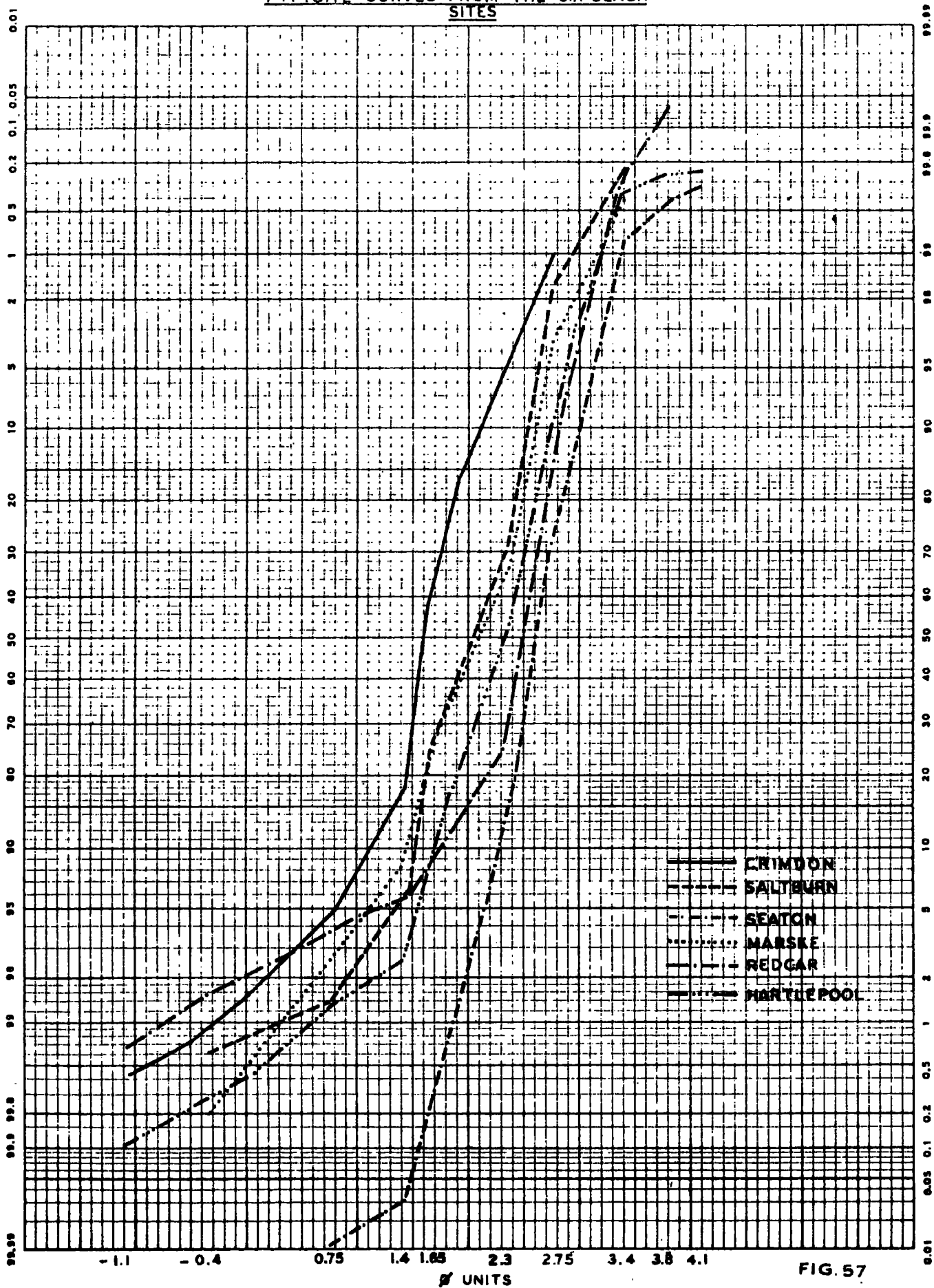


FIG. 57

THE LOCATION OF DUNE SAMPLES

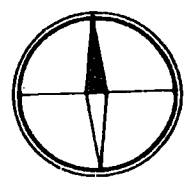
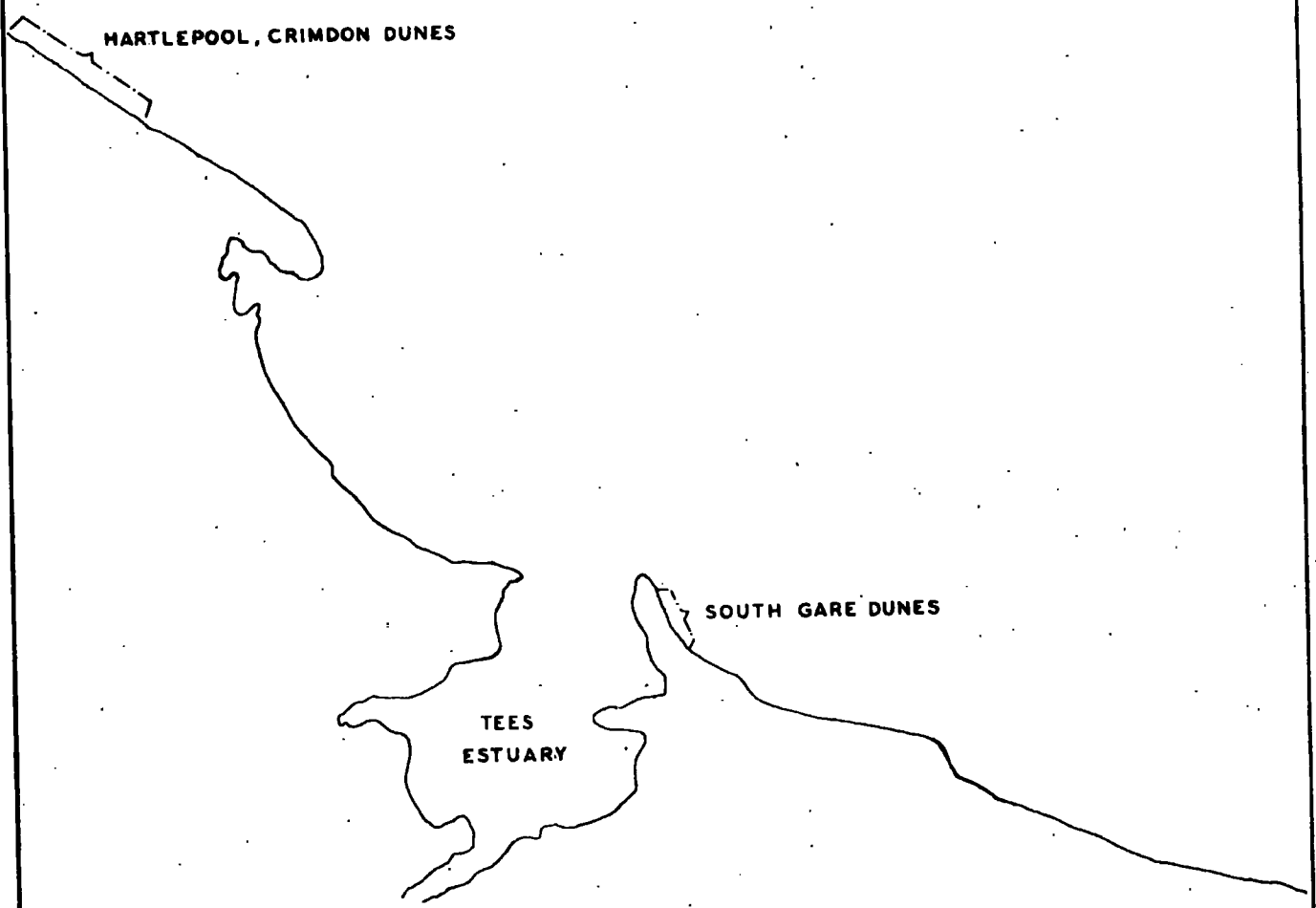


FIG. 58

HARTLEPOOL TO CRIMDON DUNE BELT
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS

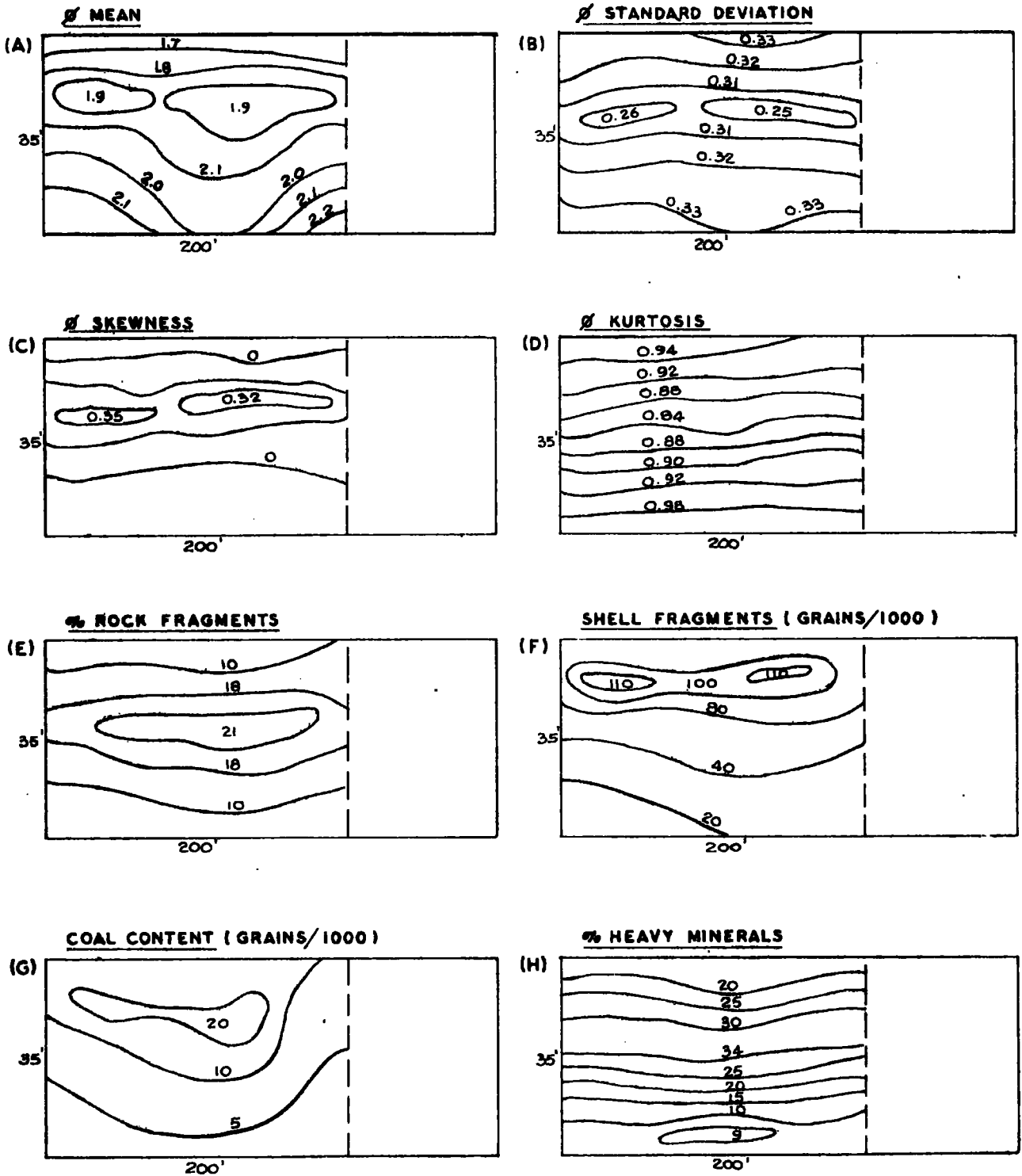


FIG. 59

SOUTH GARE DUNE BELT
SPATIAL DISTRIBUTION OF SEDIMENTARY
CHARACTERISTICS

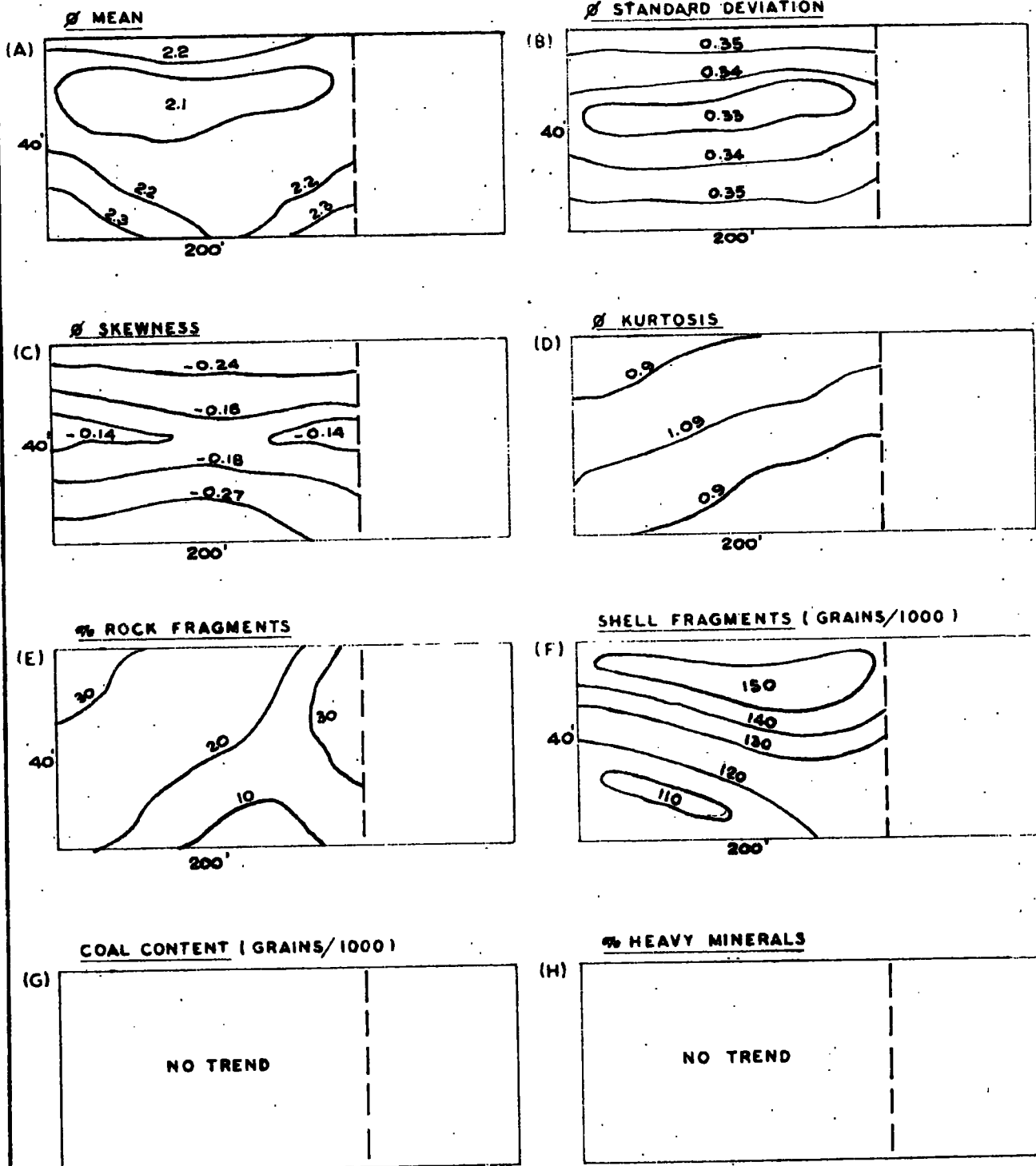


FIG. 60

TYPICAL CURVES OF DUNE SAMPLES

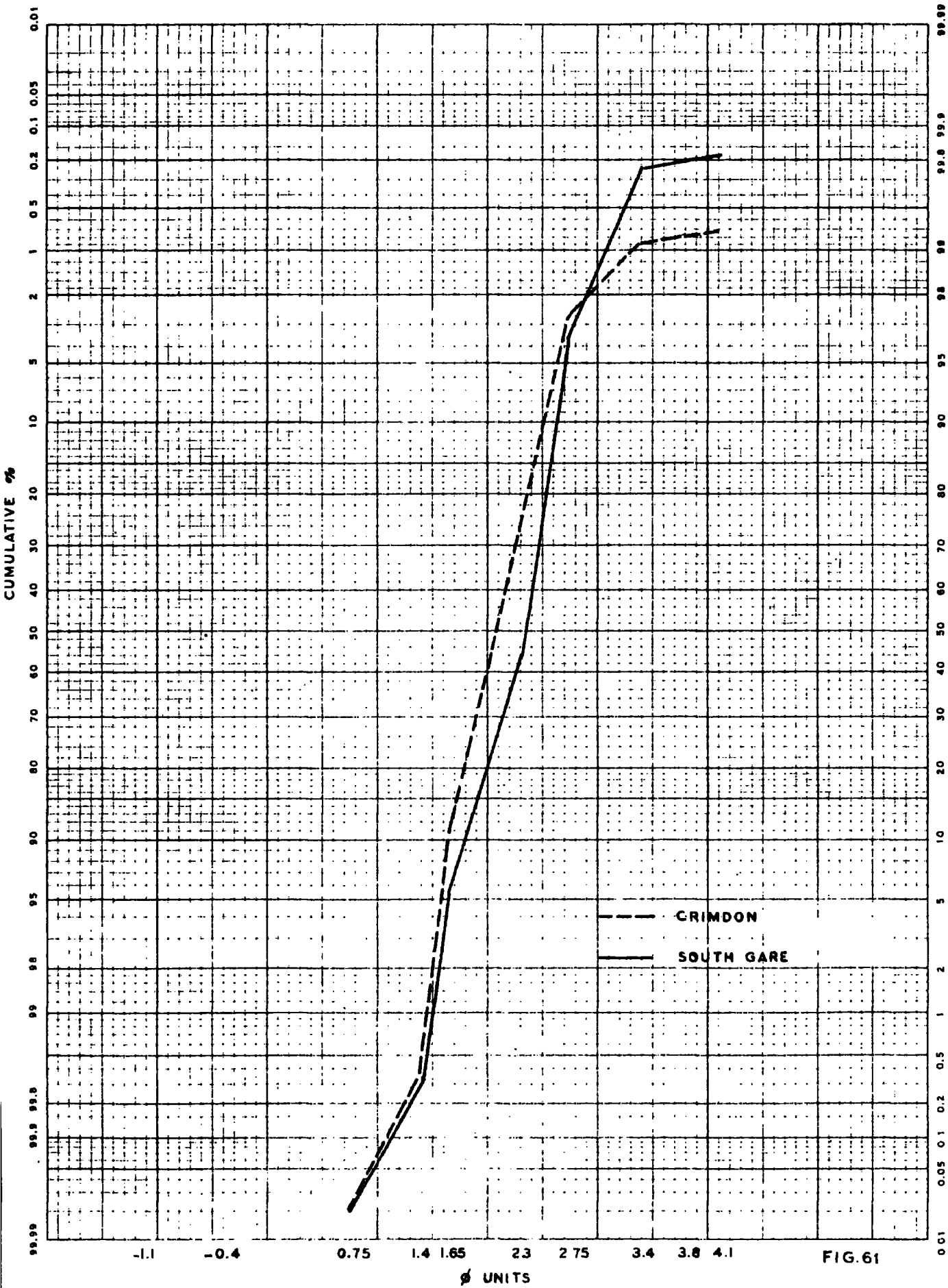


FIG. 61

LOCATION OF RIVER SAMPLES

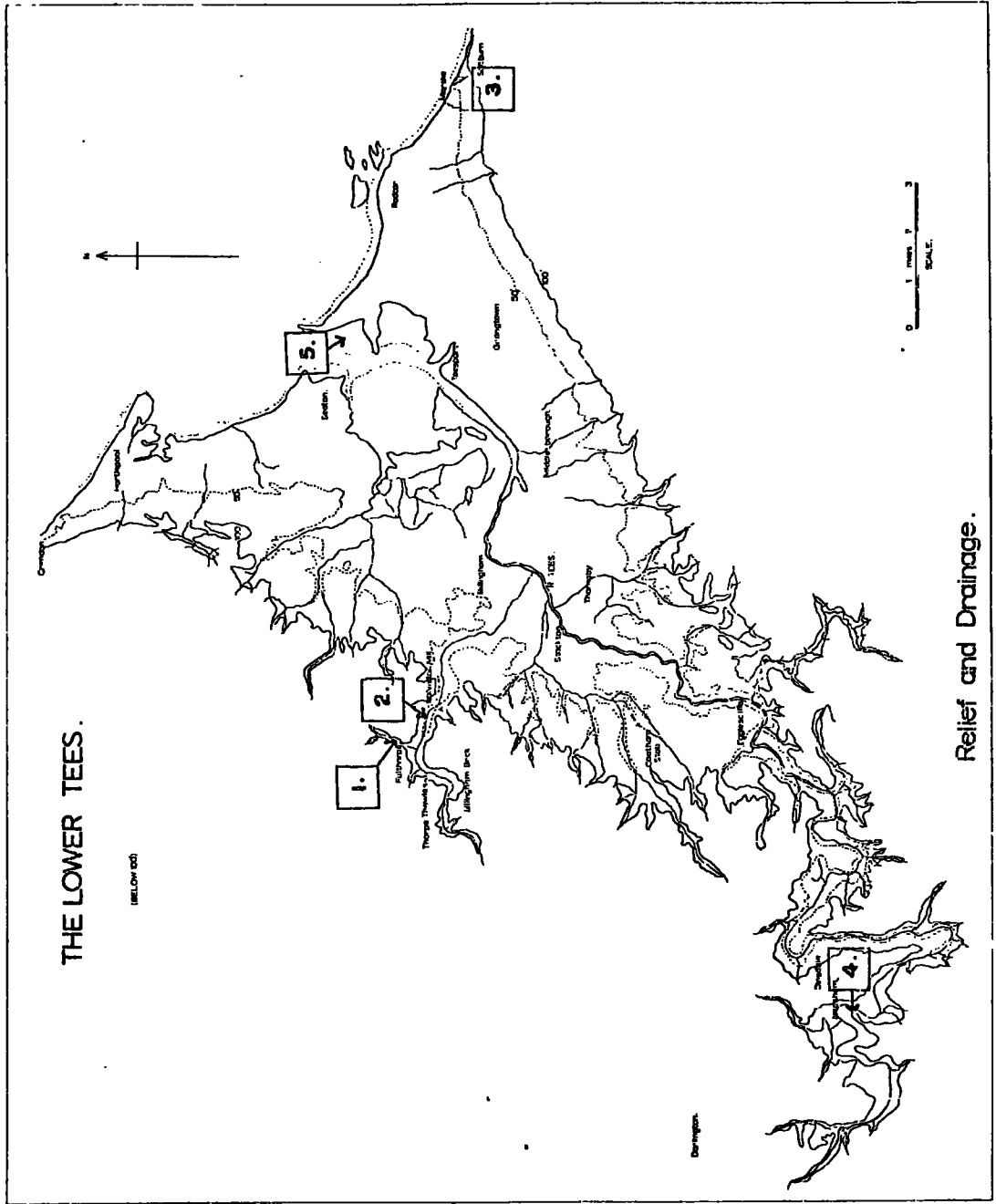
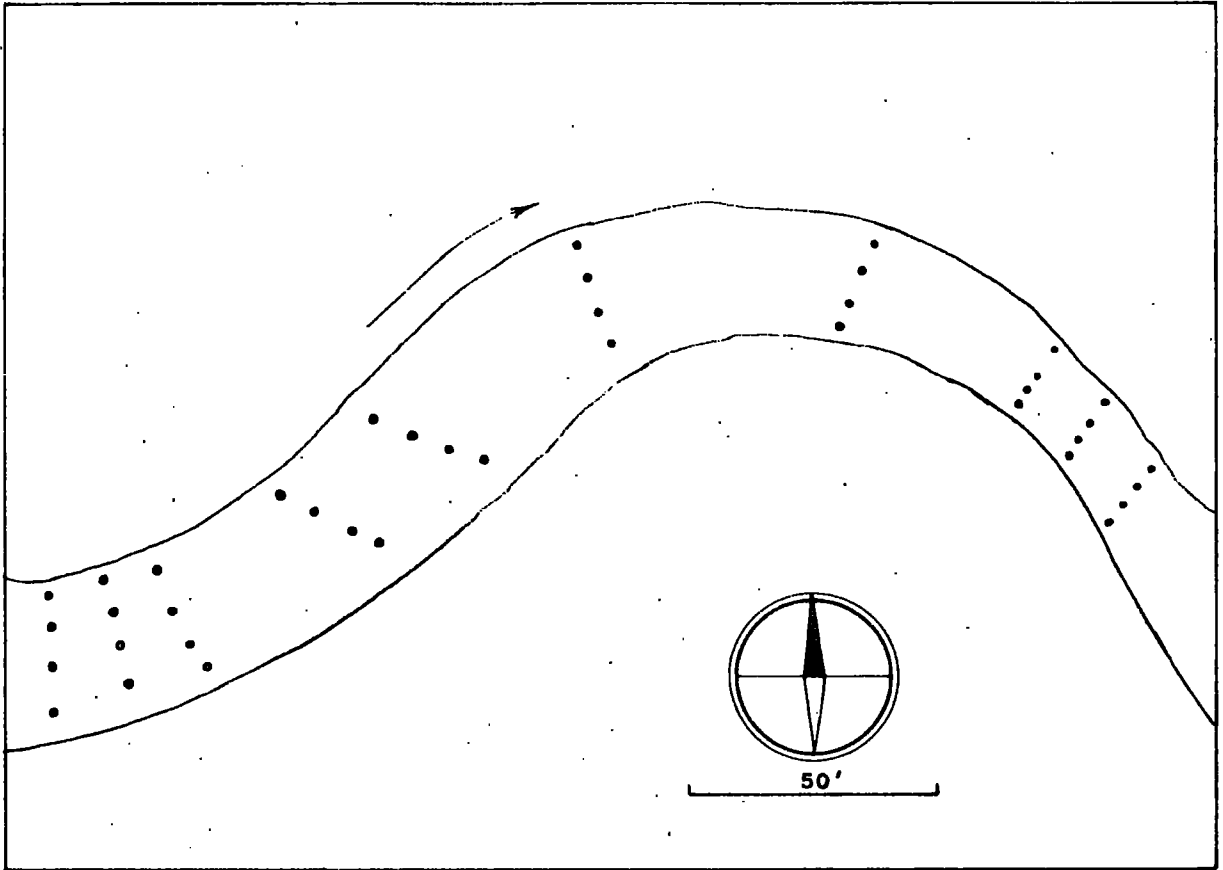


FIG. 62

THE LOCATION OF FLUVIAL SAMPLES IN THE RIVER TEES



SAND BAR IN THORPE THEWLES BECK, ENGLAND.

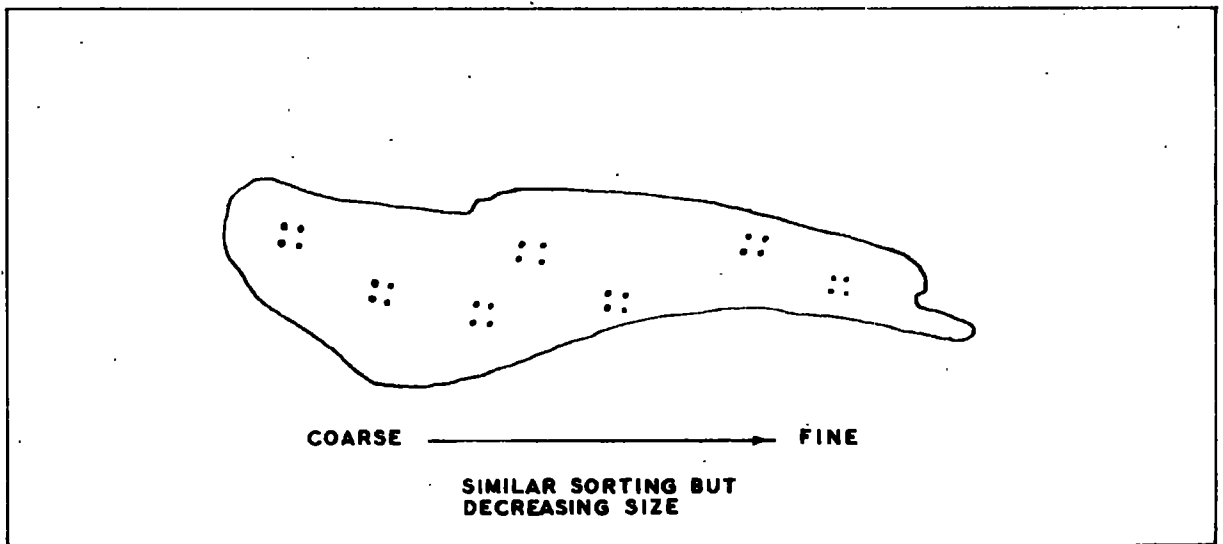
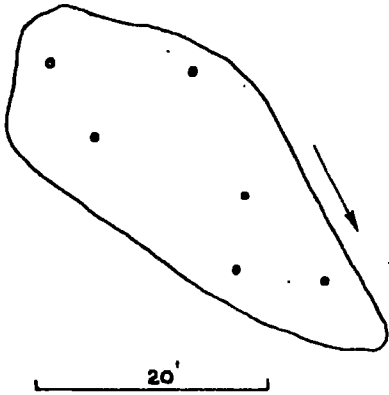


FIG. 63

THE LOWER TEES
LOCATION OF RIVER SAMPLES

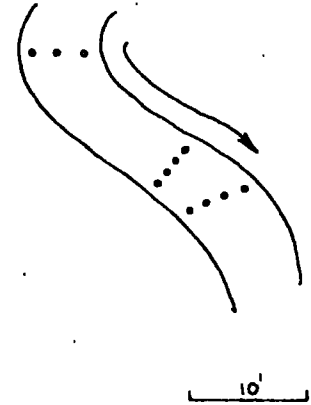
SAMPLE AREA 1.

THORPE THEWLES BECK
(SANDBANK)



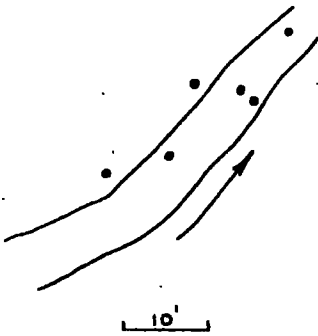
SAMPLE AREA 2.

BILLINGHAM BECK



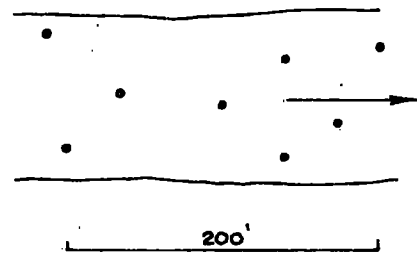
SAMPLE AREA 3.

SKELTON BECK
(SALTBURN)



SAMPLE AREA 4.

R. TEES (NEASHAM)



SAMPLE AREA 5
S. GARE ESTUARY

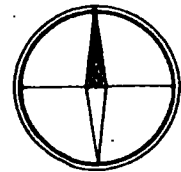
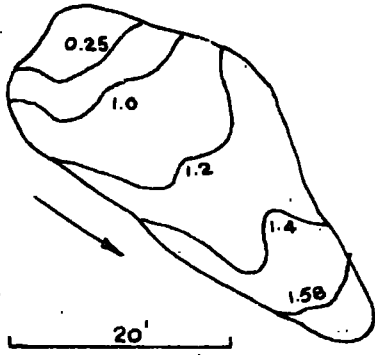


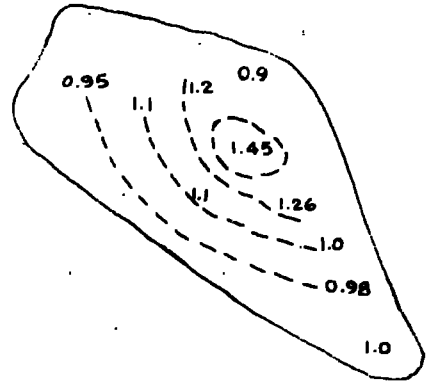
FIG. 64

THORPE THEWLES BECK
 SPATIAL VARIATION OF SEDIMENTARY CHARACTERISTICS

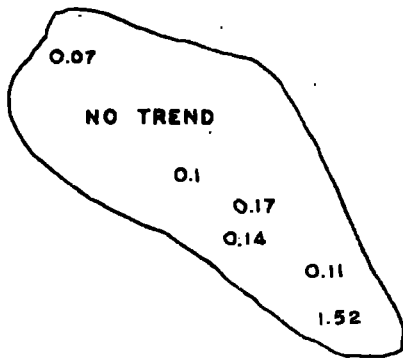
(A) ϕ MEAN



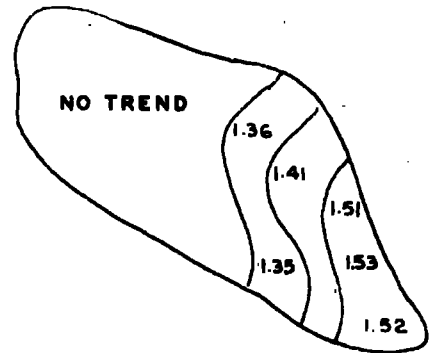
(B) ϕ STANDARD DEVIATION



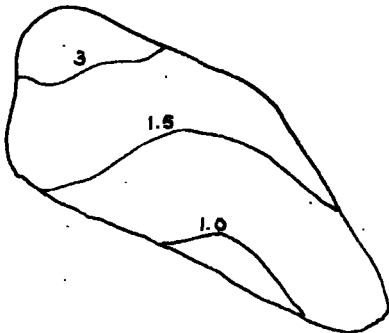
(C) ϕ SKEWNESS



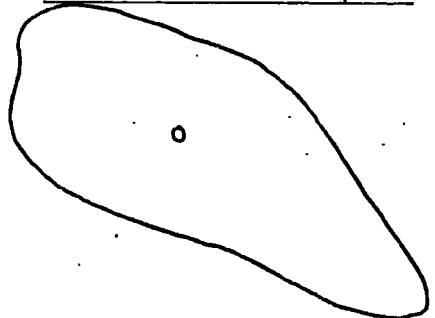
(D) ϕ KURTOSIS



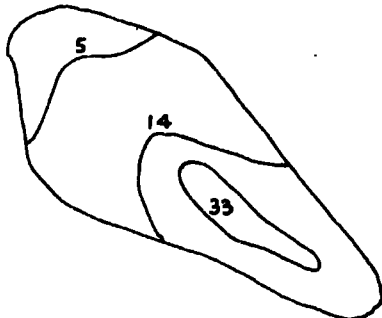
(E) % ROCK FRAGMENTS



(F) SHELL CONTENT (GRAINS/1000)



(G) COAL CONTENT (GRAINS/1000)



(H) % HEAVY MINERALS

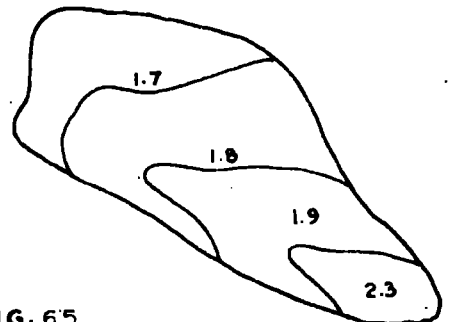
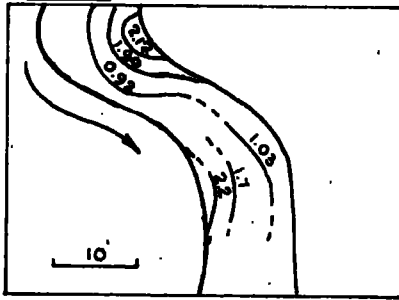


FIG. 65

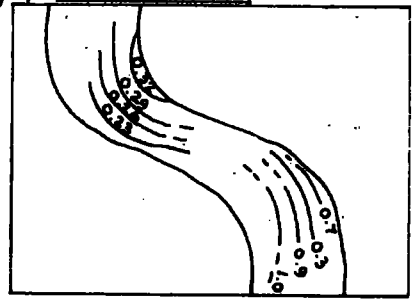
SPATIAL VARIATIONS OF SEDIMENTARY CHARACTERISTICS

BILLINGHAM BECK

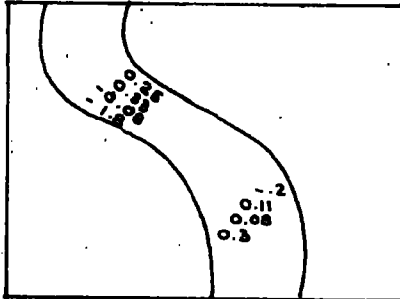
(A) ϕ MEAN



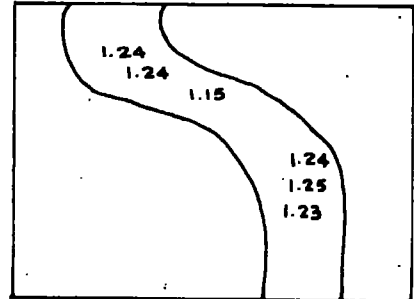
(B) ϕ STD. DEVIATION



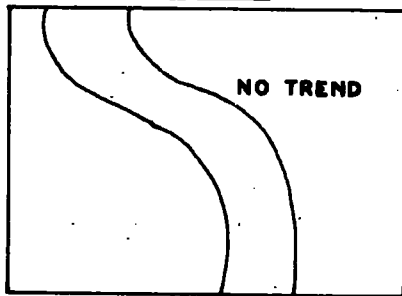
(C) ϕ SKEWNESS



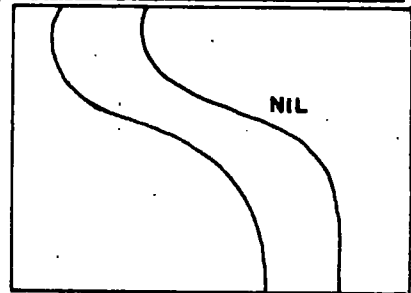
(D) ϕ KURTOSIS



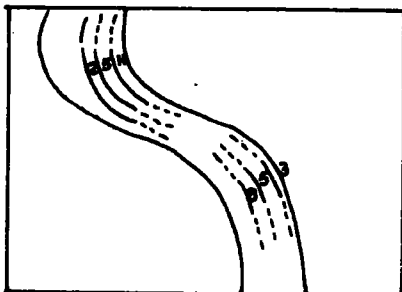
(E) % ROCK FRAGMENTS



(F) SHELL CONTENT (GRAINS/1000)



(G) COAL CONTENT (GRAINS/1000)



(H) % HEAVY MINERALS

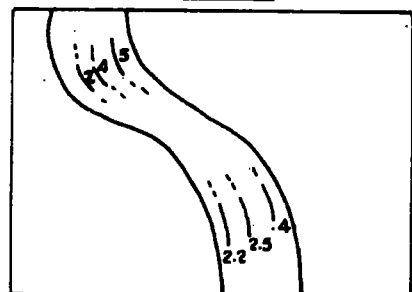
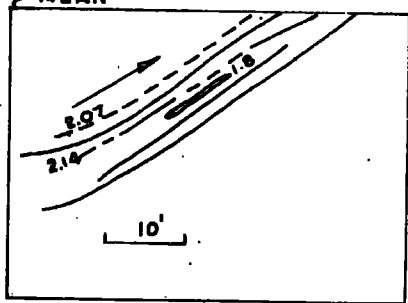


FIG. 66

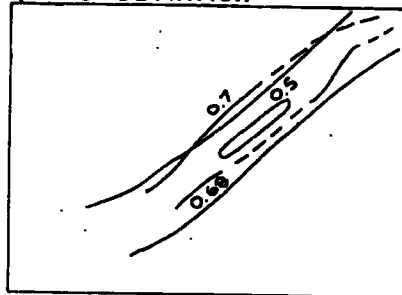
SPATIAL VARIATION OF SEDIMENTARY CHARACTERISTICS

**SKELTON BECK
(SALTBURN)**

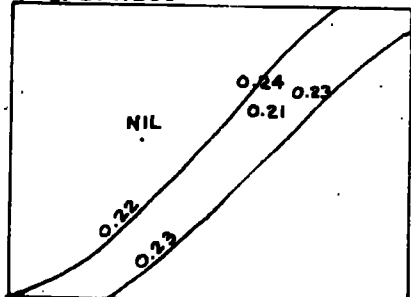
(A) ϕ MEAN



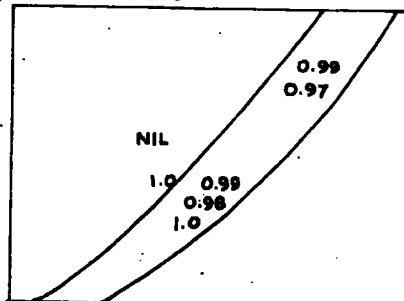
(B) ϕ STD. DEVIATION



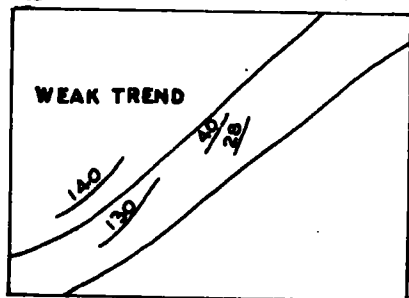
(C) ϕ SKEWNESS



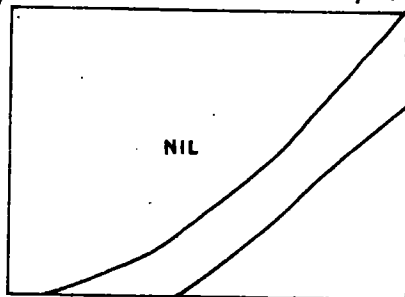
(D) ϕ KURTOSIS



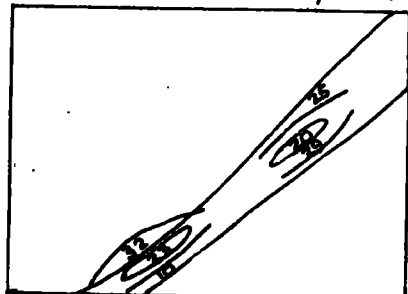
(E) % ROCK FRAGMENTS



(F) SHELL FRAGMENTS (GRAINS/1000)



(G) COAL CONTENT (GRAINS/1000)



(H) % HEAVY MINERALS

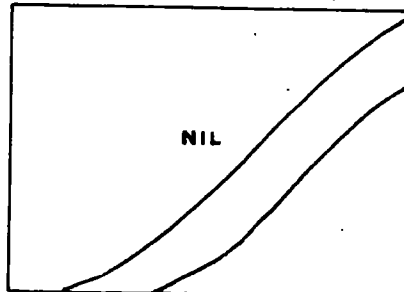
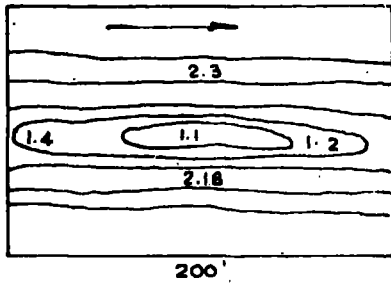


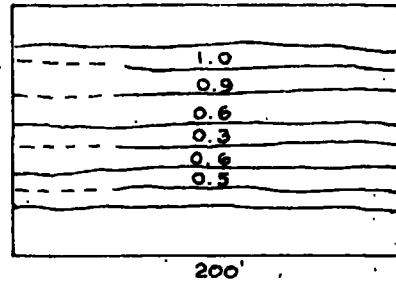
FIG. 67.

**RIVER TEES
(NEASHAM)
AREAL VARIATION OF SEDIMENTARY CHARACTERISTICS**

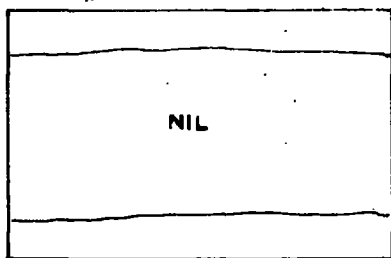
(A) ϕ MEAN



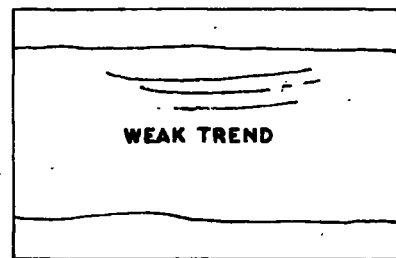
(B) ϕ DEVIATION (STD.)



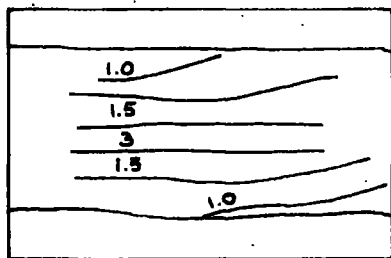
(C) ϕ SKEWNESS



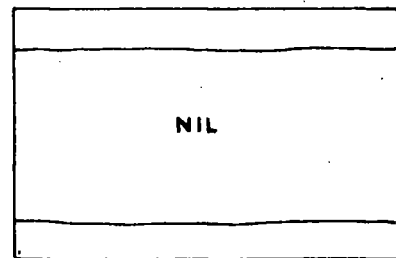
(D) ϕ KURTOSIS



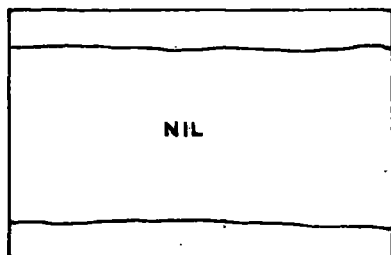
(E) % ROCK FRAGMENTS



(F) SHELL FRAGMENTS (GRAINS/1000)



(G) COAL CONTENT (GRAINS/1000)



(H) % HEAVY MINERALS

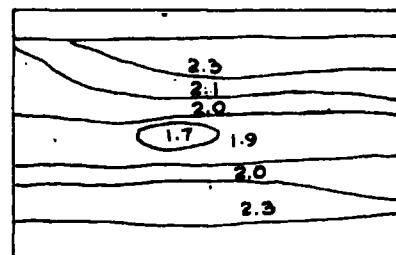
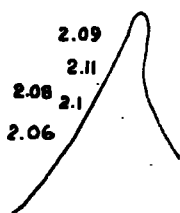


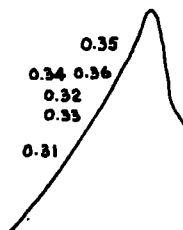
FIG. 68

SOUTH GARE ESTUARY
AREAL VARIATION OF SEDIMENTARY CHARACTERISTICS

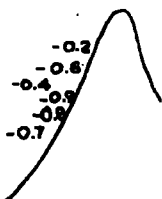
(A) Ø MEAN



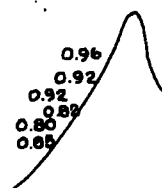
(B) Ø STD. DEVIATION



(C) Ø SKEWNESS



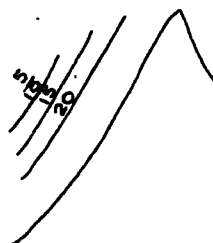
(D) Ø KURTOSIS



(E) % ROCK FRAGMENTS



(F) SHELL CONTENT (GRAINS/1000)



(G) COAL CONTENT (GRAINS/1000)

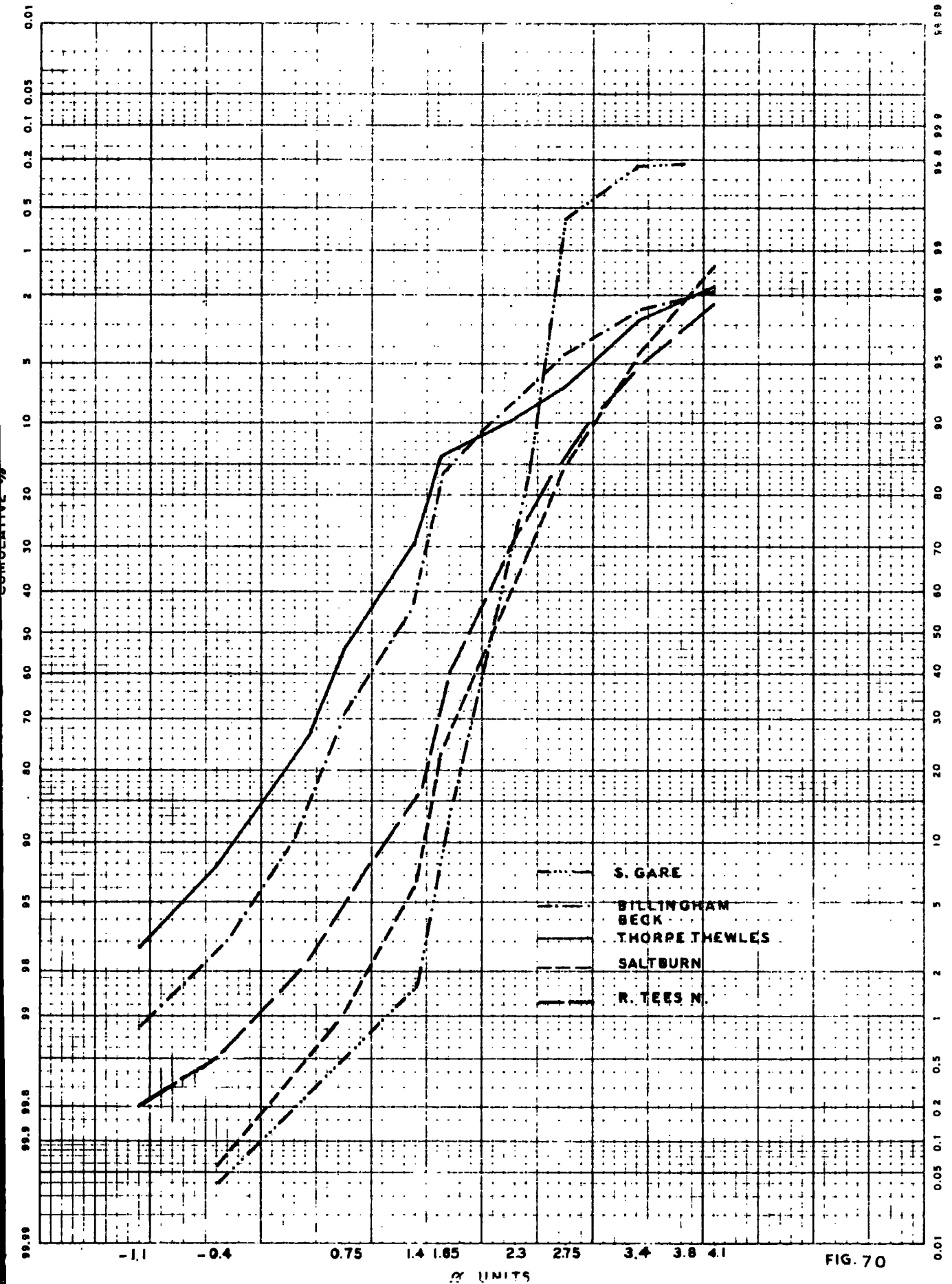


(H) % HEAVY MATERIALS



FIG. 69

TYPICAL CURVES OF RIVER SAMPLES



THE LOCATION OF OFFSHORE SAMPLES
IN THE TEES BAY

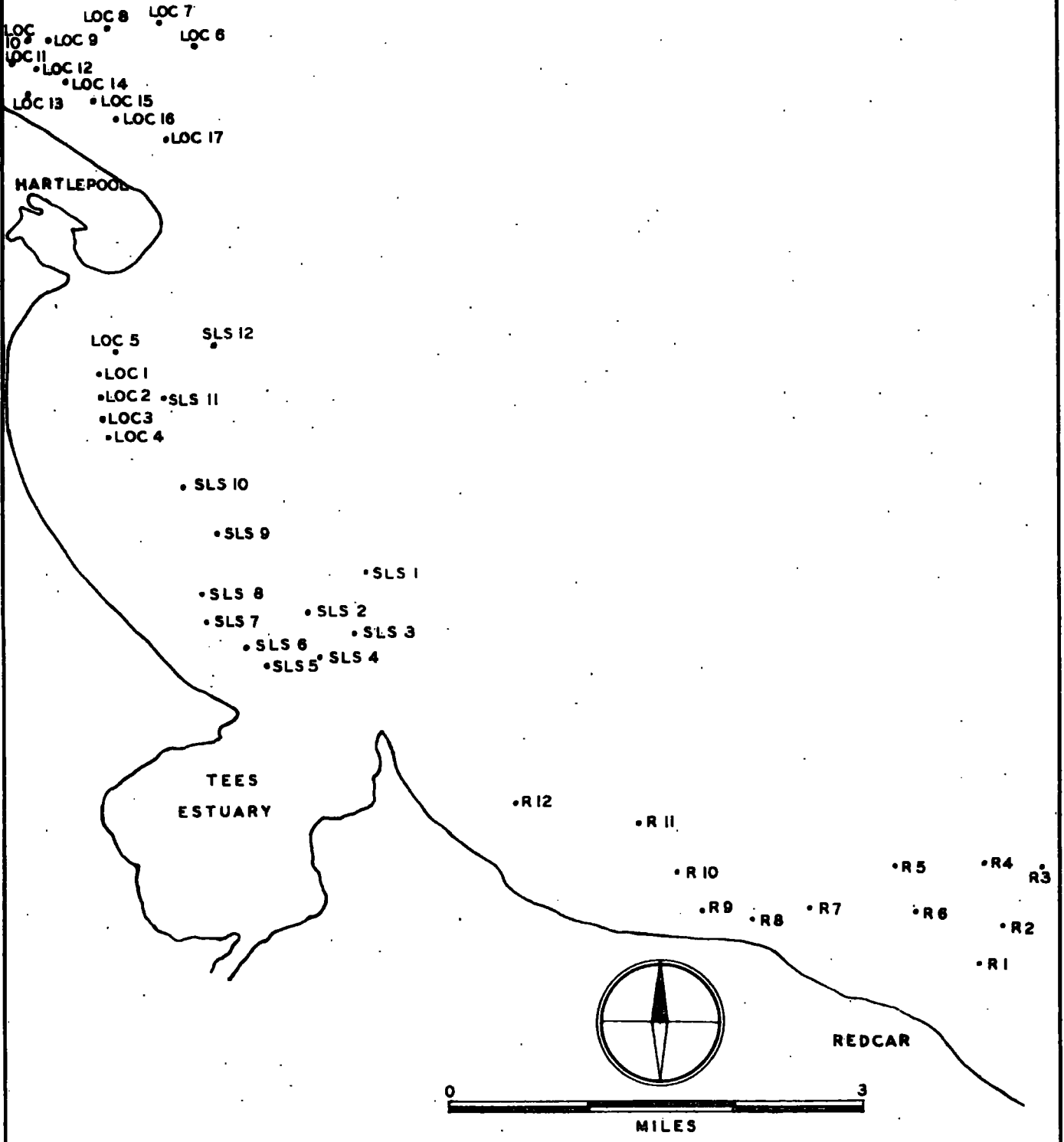


FIG. 71.

**OFFSHORE
SPATIAL VARIATION OF SEDIMENTARY
CHARACTERISTICS**

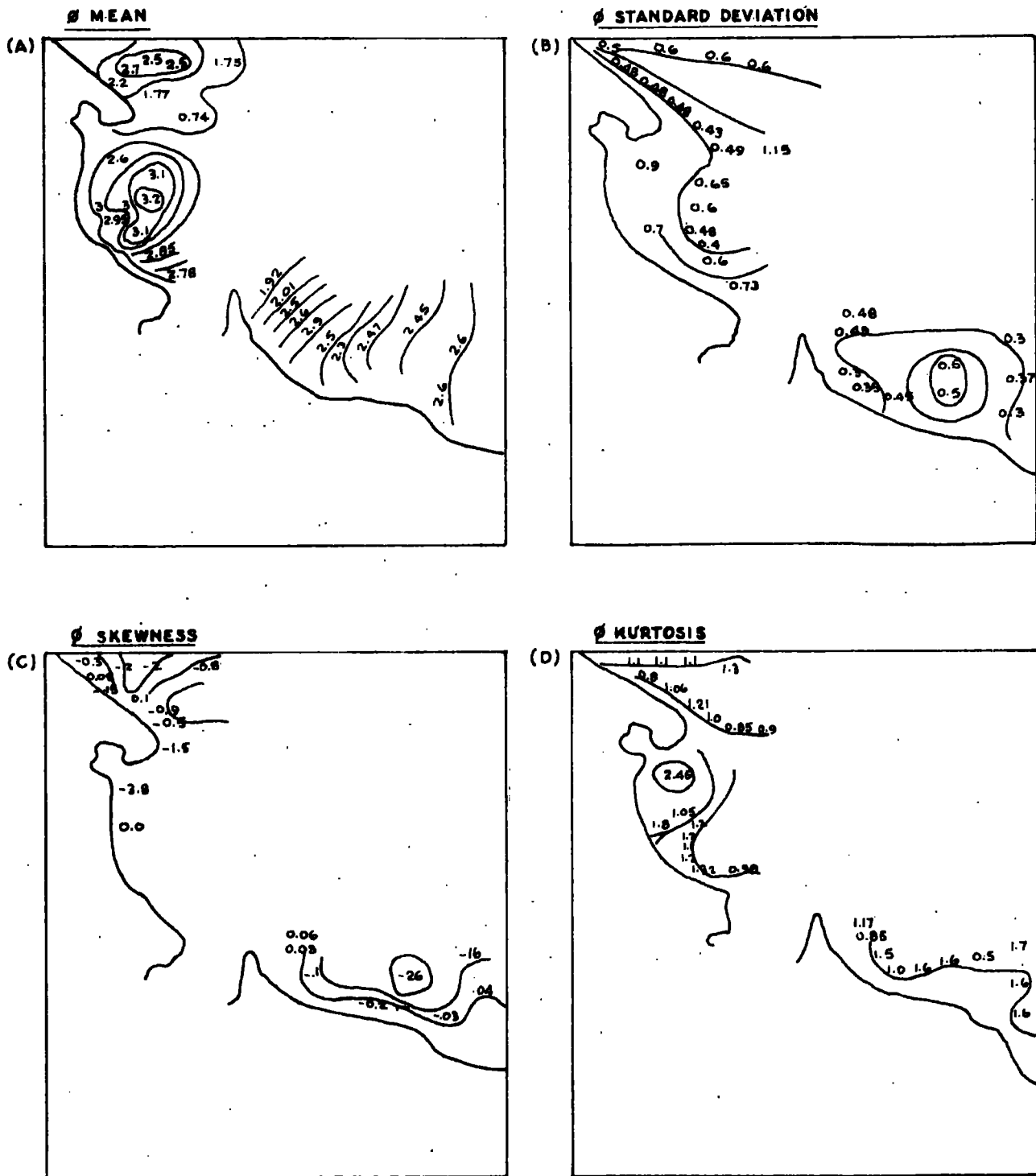


FIG. 72.

OFFSHORE
SPATIAL VARIATION OF SEDIMENTARY CHARACTERISTICS

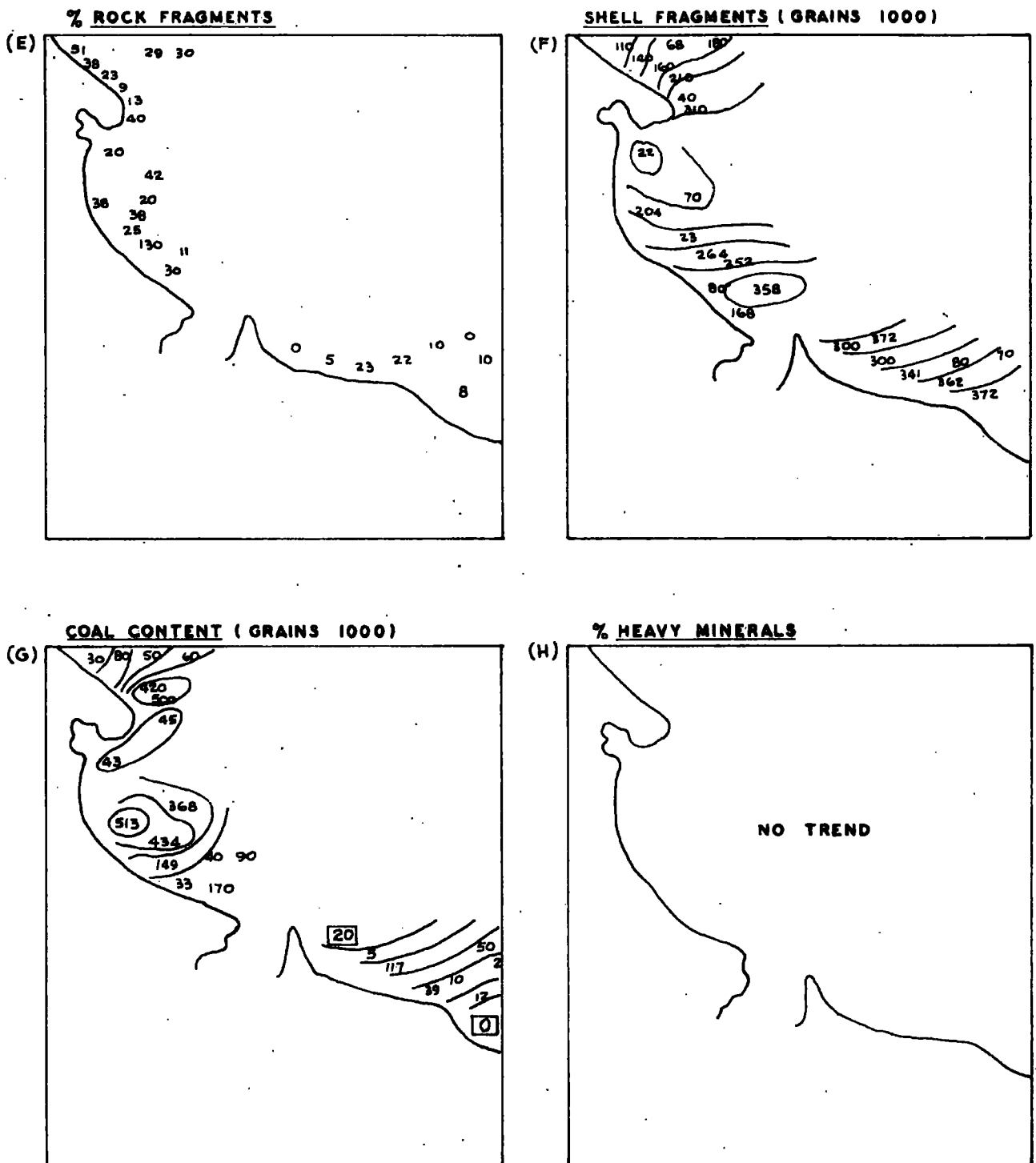


FIG. 7.3

TYPICAL CURVES OF OFFSHORE SAMPLES

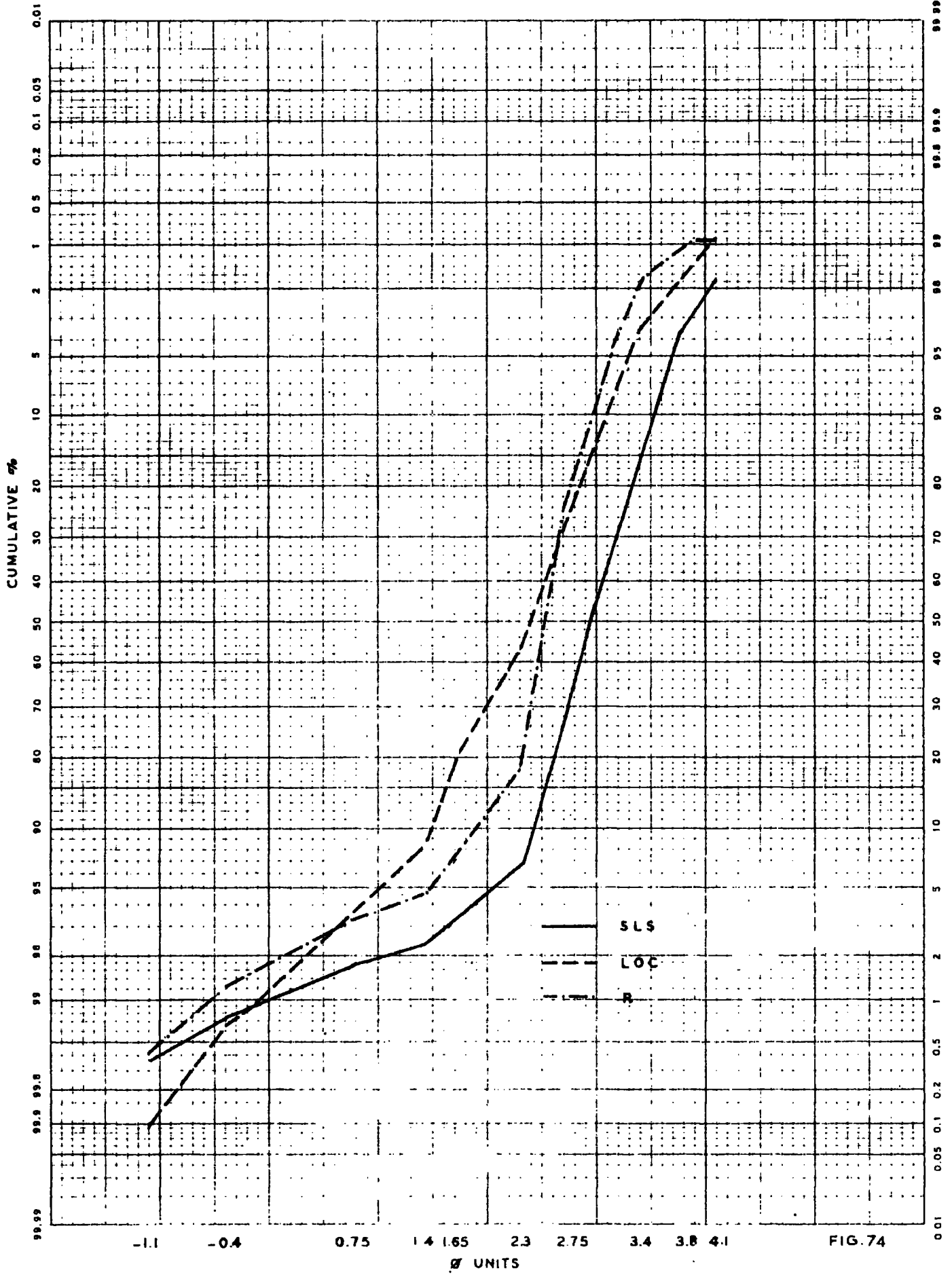


FIG. 74

DROMAN (SUTHERLAND, SCOTLAND)
LOCATION OF SAMPLES ON MARINE AND LAKE SHORES

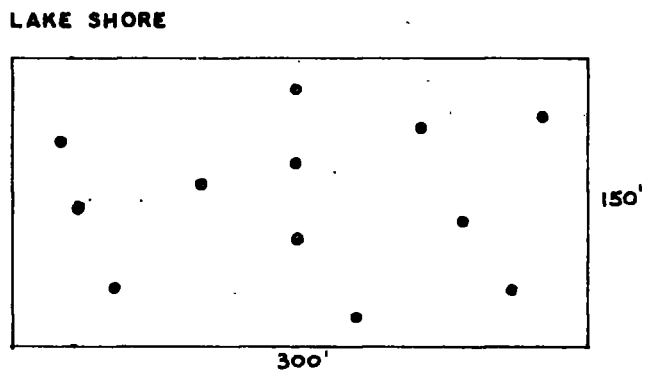
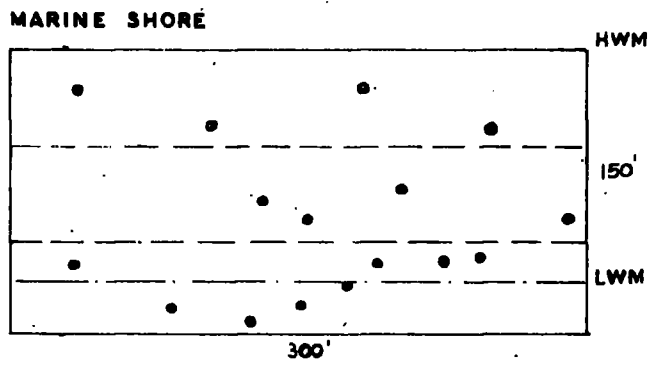


FIG. 75

TYPICAL CURVES OF SUTHERLAND MARINE AND LACUSTRINE SHORE DEPOSITS PLUS
 MARINE DEPOSIT LESS SHELL CONTENT.

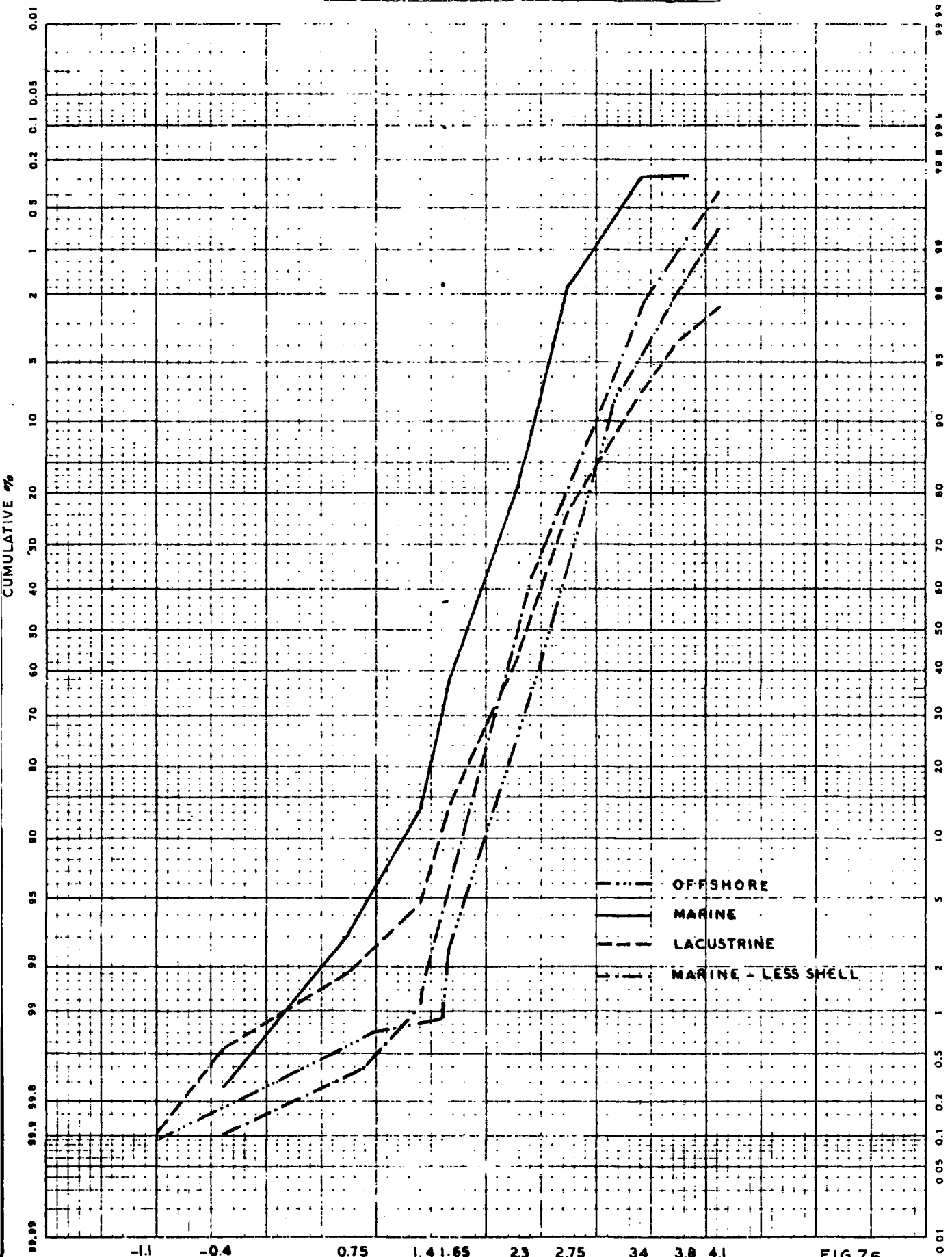


FIG.76

σ UNITS

**PARTICLE SIZE GRAPH DEMONSTRATING THE EFFECT OF SOURCE MATERIAL
ON BEACH SEDIMENTS**

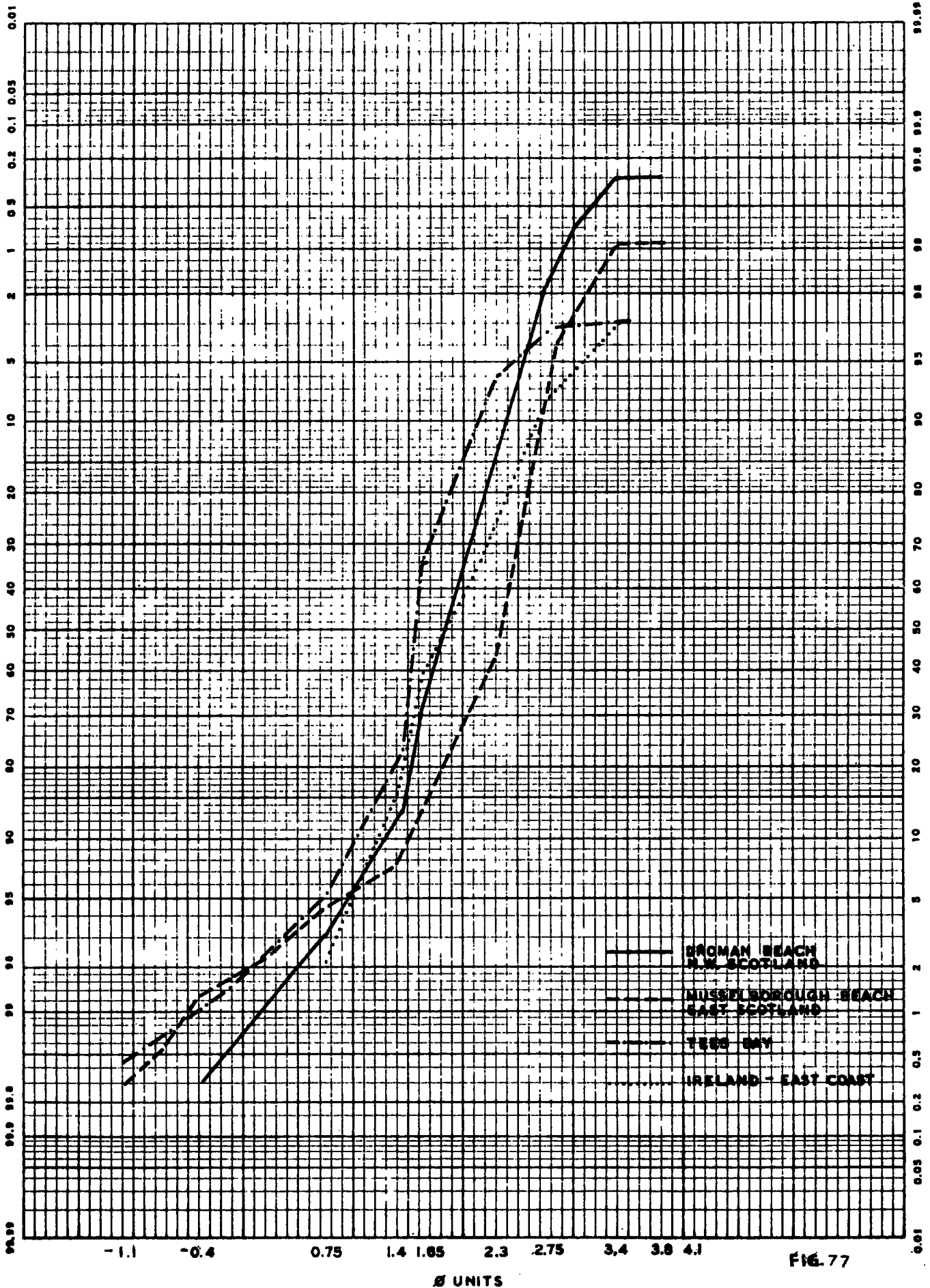


FIG. 77

ϕ UNITS

BEACH SAMPLES FROM AREAS OUTSIDE THE TEES RIVER BASIN.

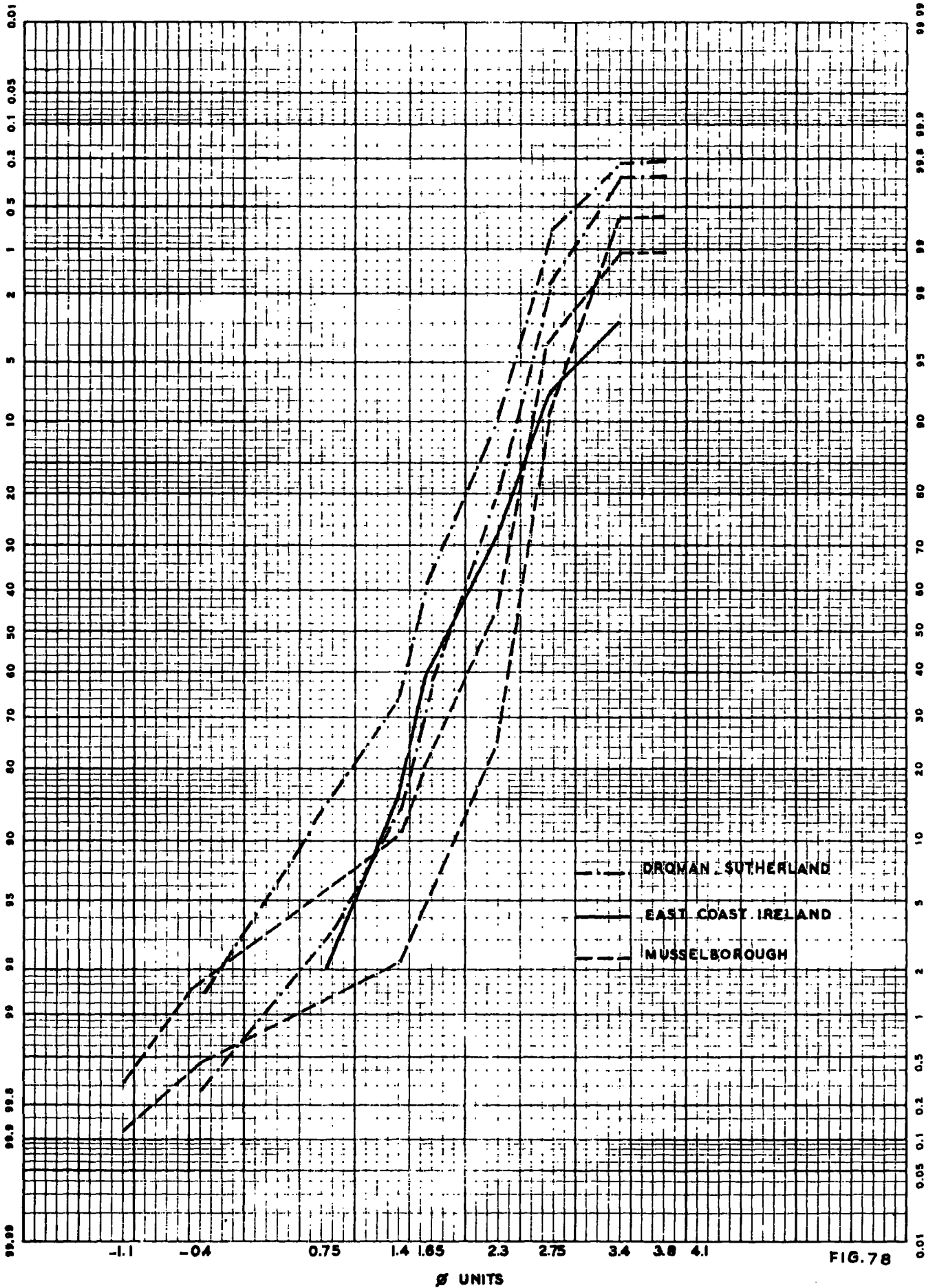
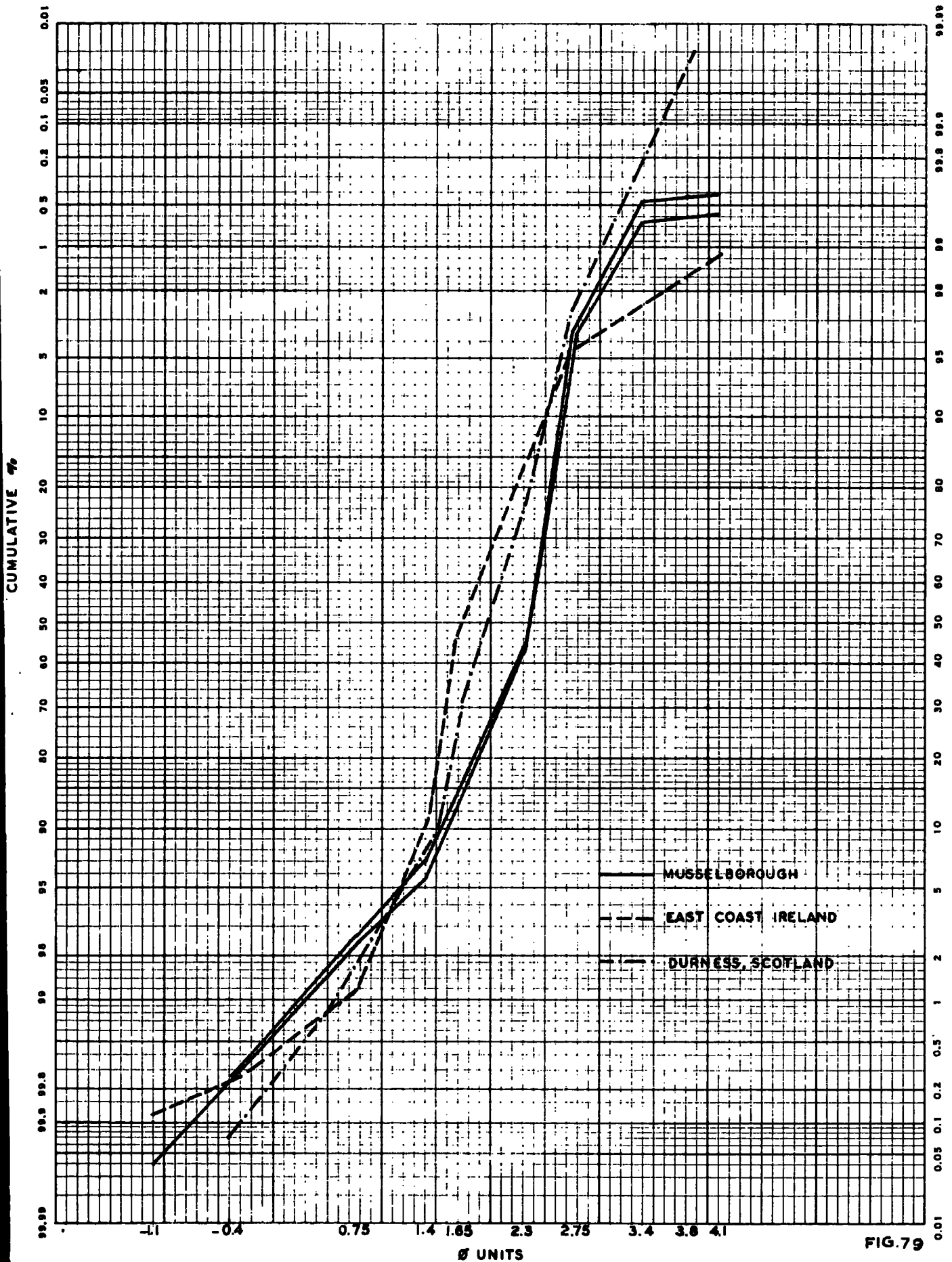


FIG. 7.8

DUNE SAMPLES FROM AREAS OUTSIDE THE TEES RIVER BASIN



RIVER SAMPLES FROM OUTSIDE THE TEES RIVER BASIN .

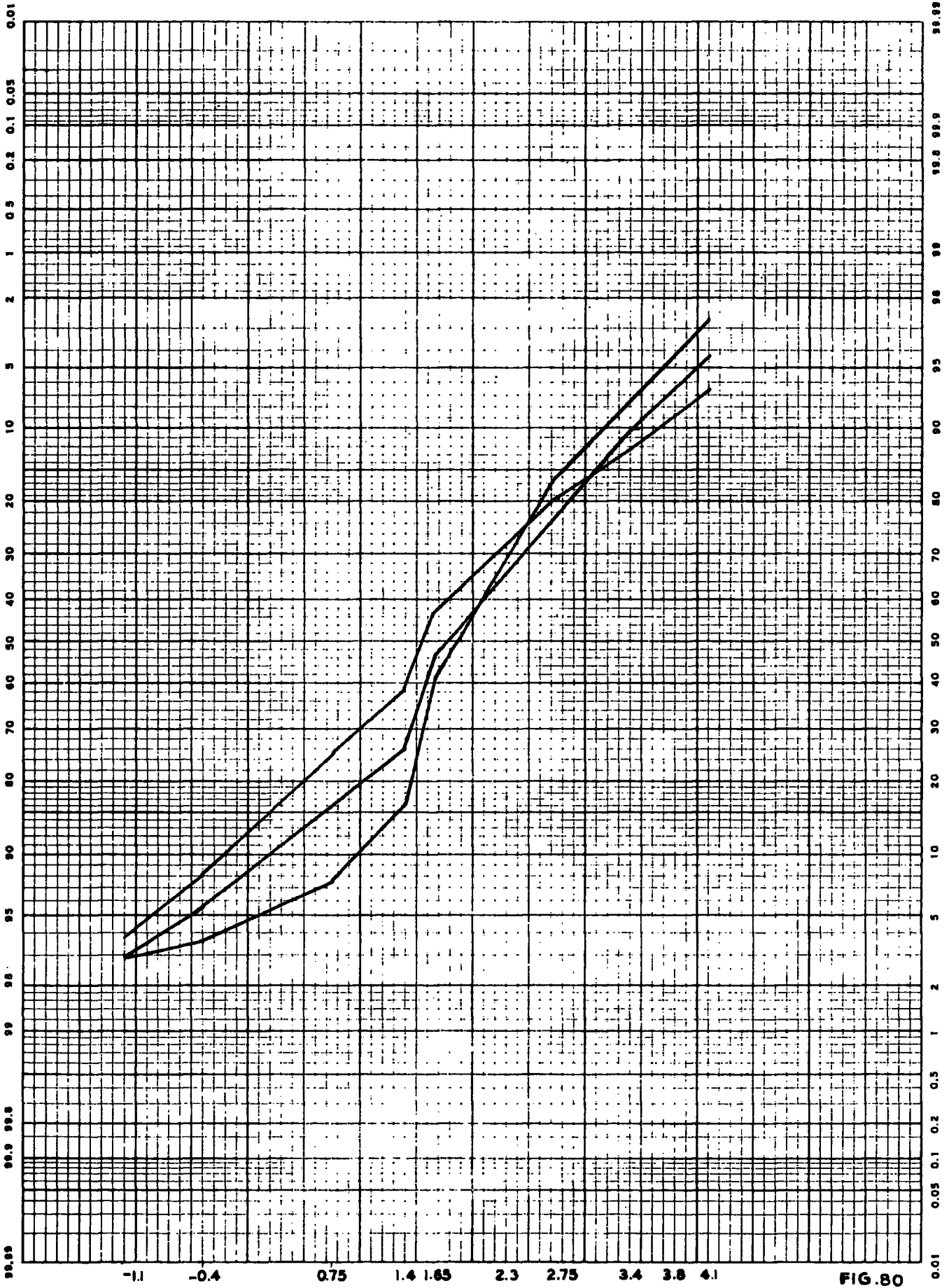
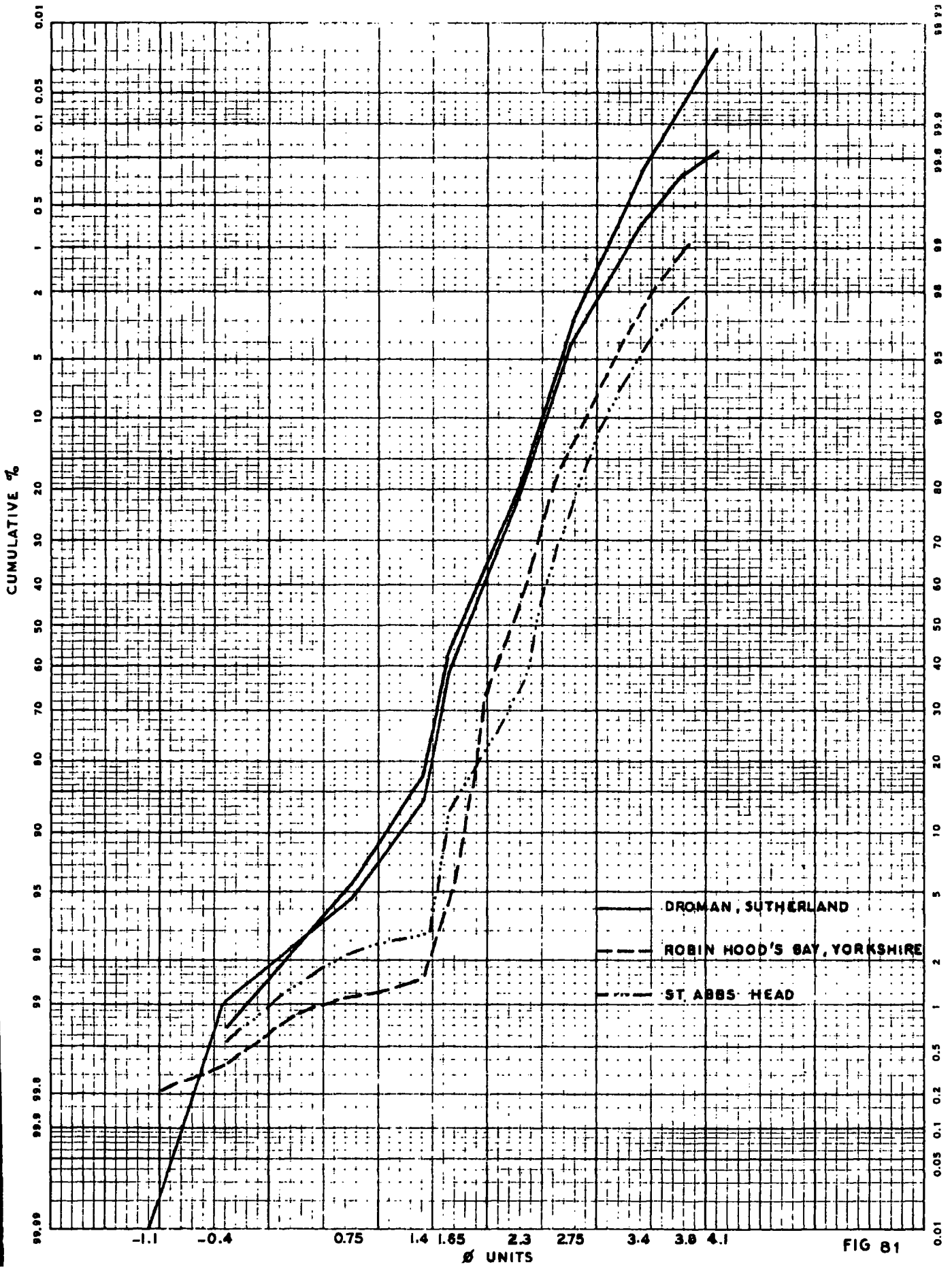


FIG. 80

σ UNITS

OFFSHORE SAMPLES FROM AREAS OUTSIDE THE RIVER TEES BASIN



SAND FRACTION FROM BOULDER CLAYS IN NORTHUMBERLAND AND DURHAM.

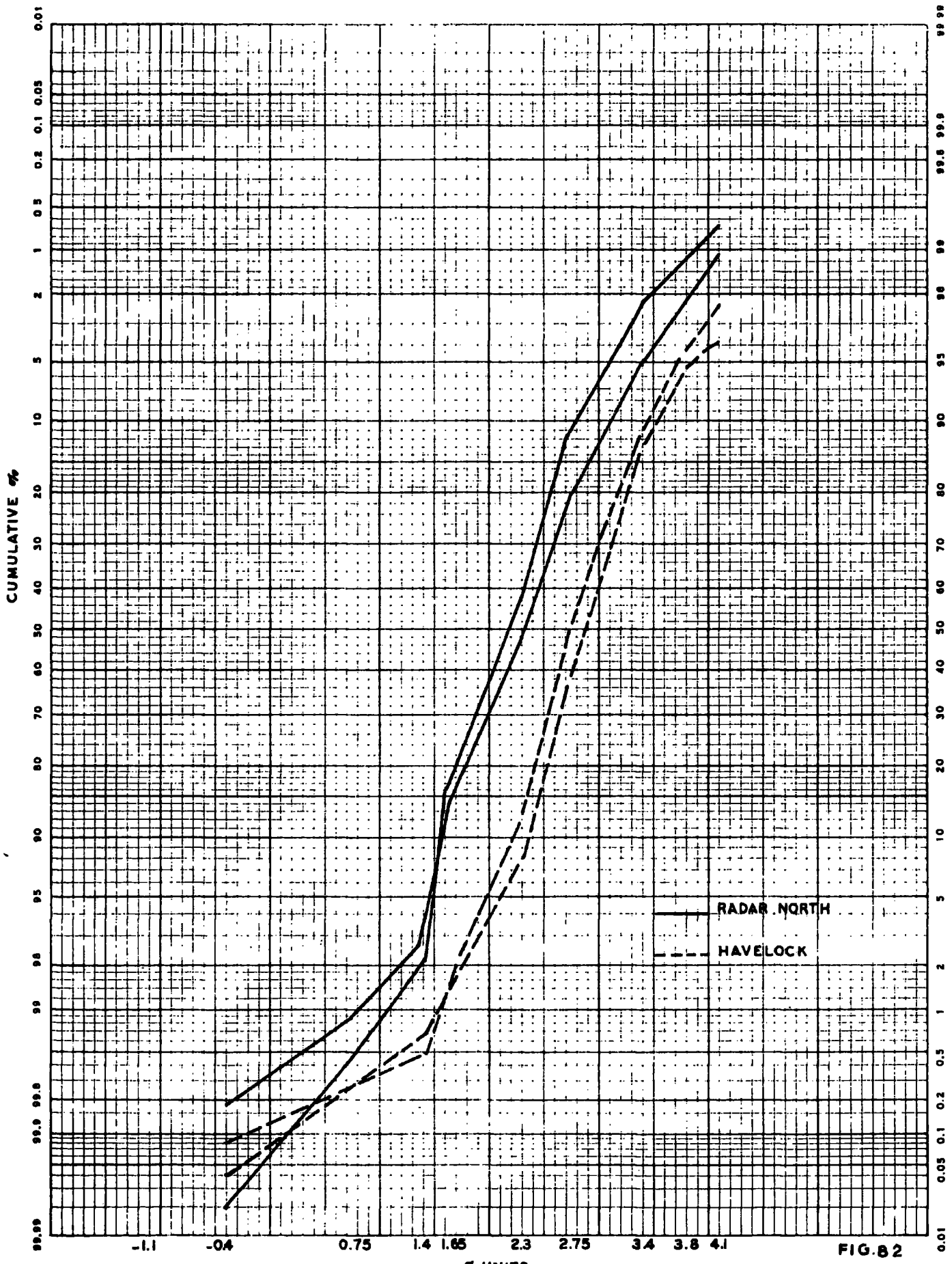


FIG. 82

FLUVIO - GLACIAL SAMPLES FROM SOUTHEAST ICELAND.

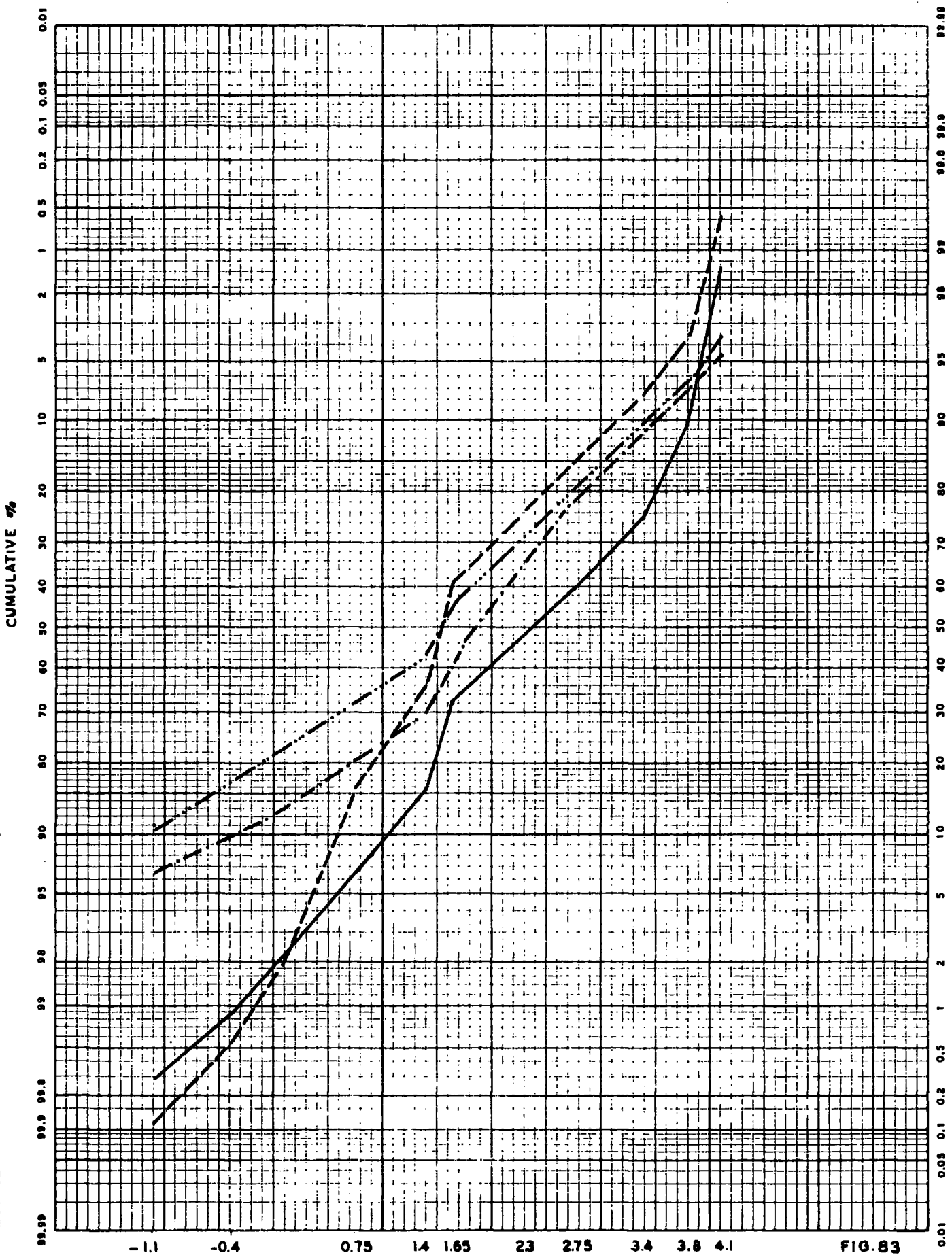


FIG. 83

**TYPICAL CURVES OF THE FOUR PRESENT DAY SANDY ENVIRONMENTS
IN THE TEES BASIN**

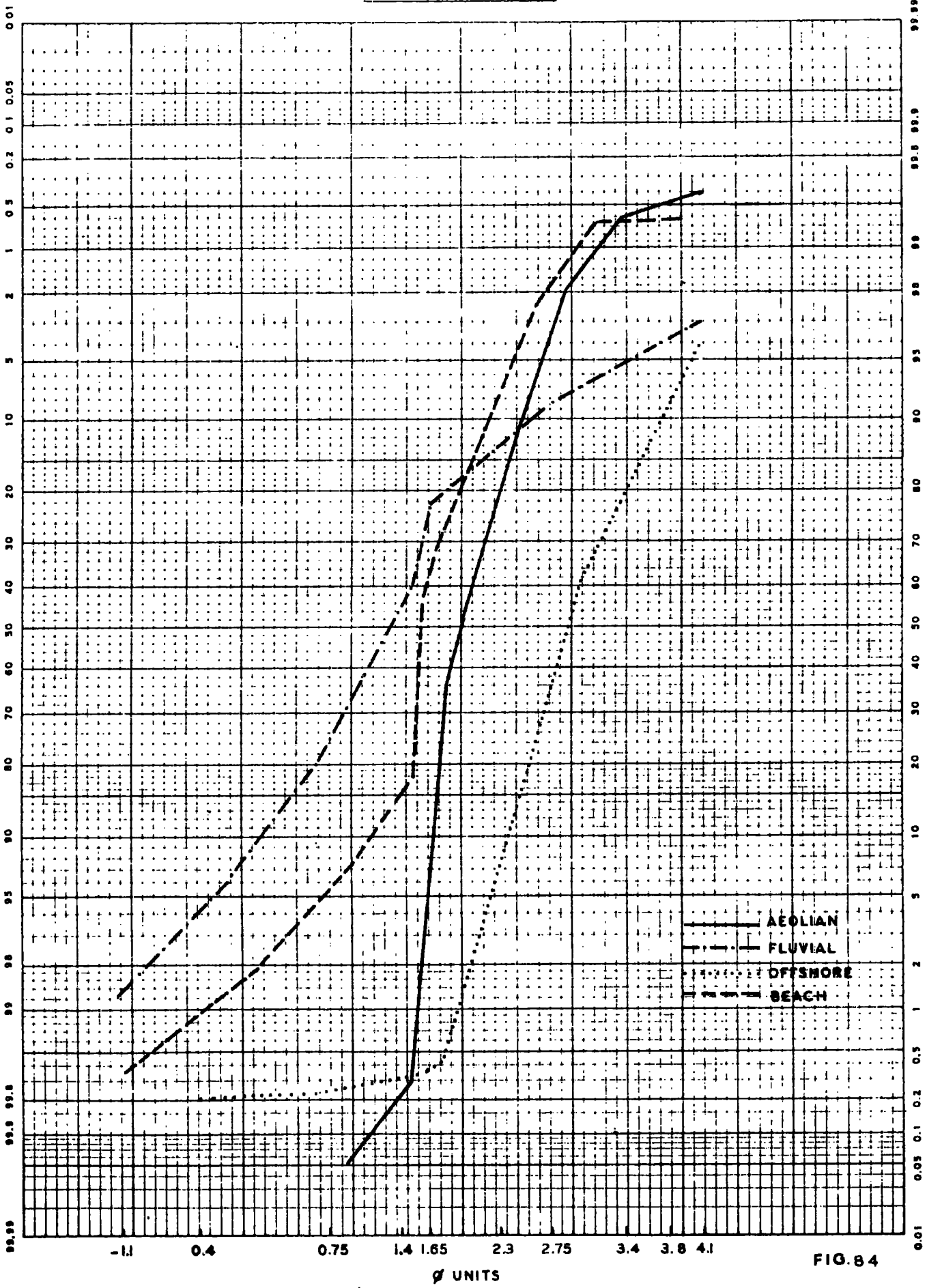


FIG. 84

TYPICAL CURVES OF VARIOUS SANDS AFTER REMOVAL OF SHELL
COAL AND HEAVY MINERALS

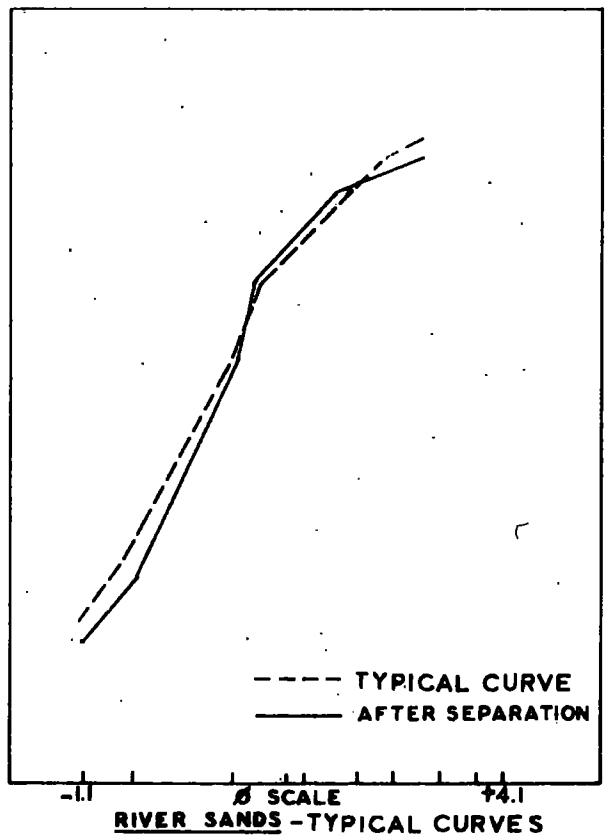
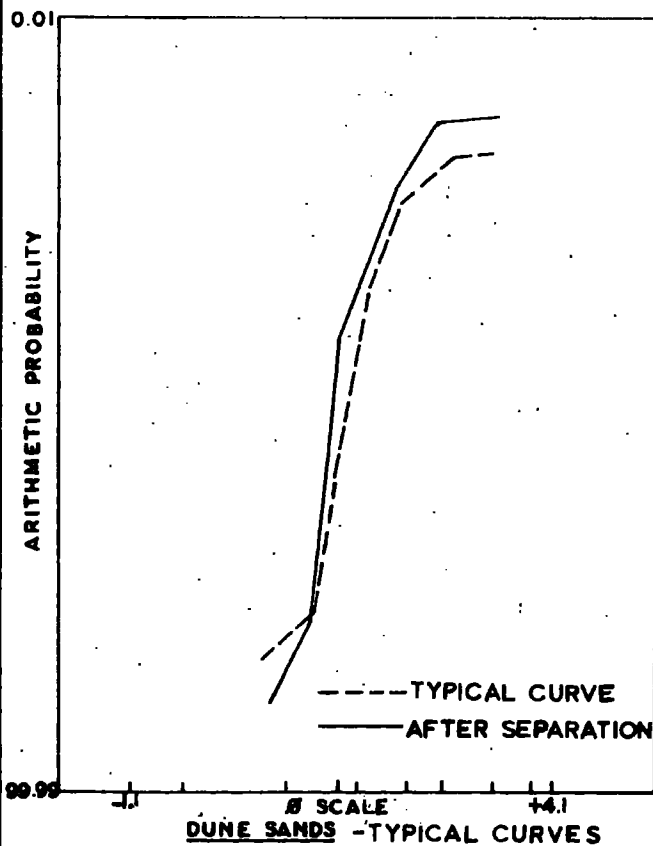
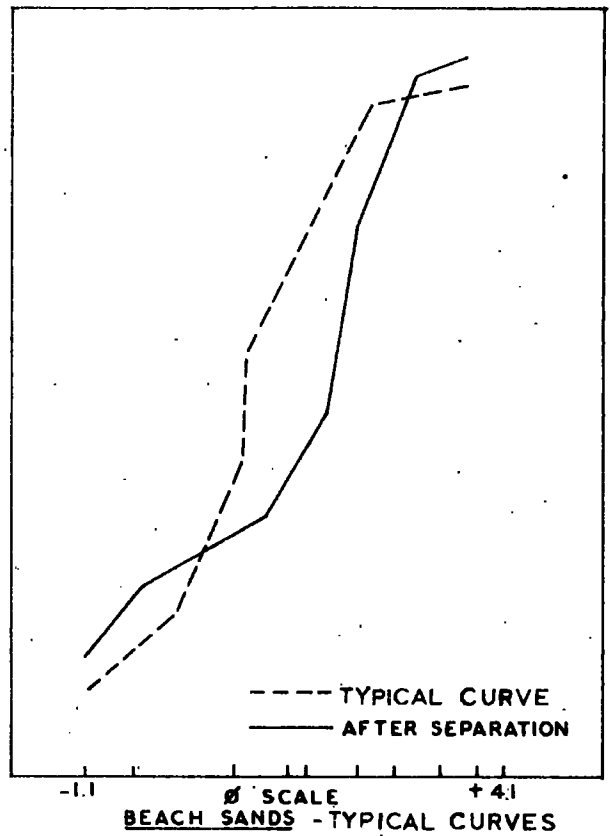
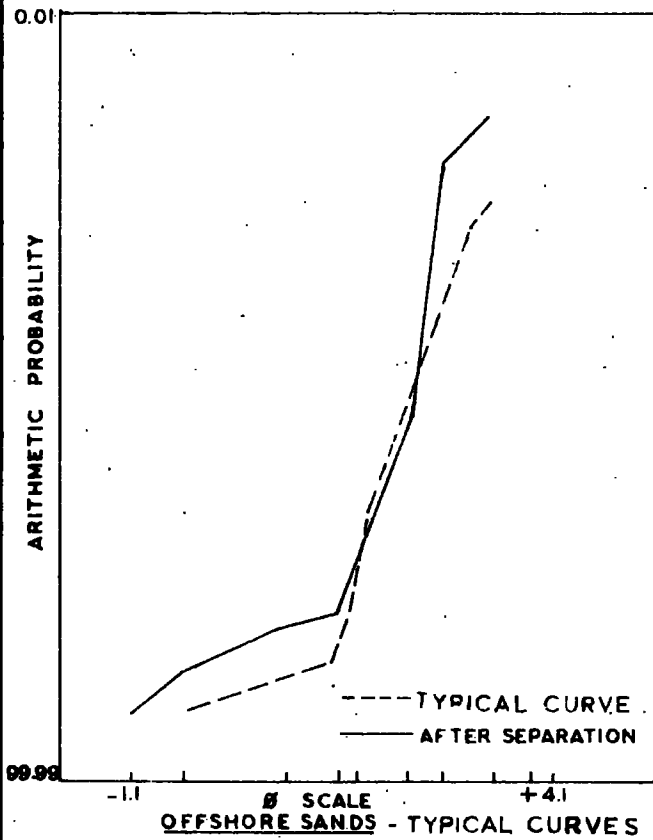
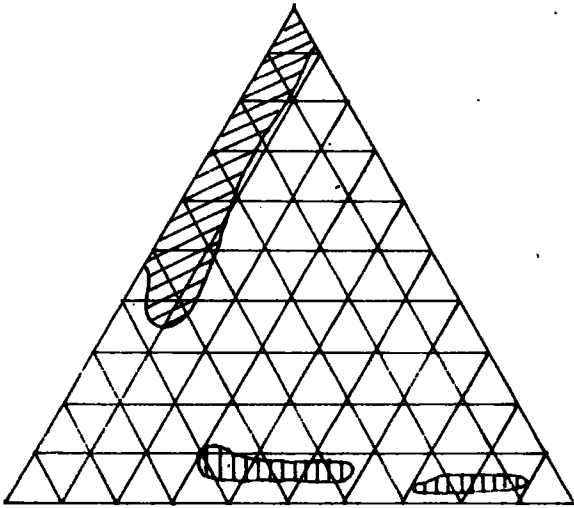




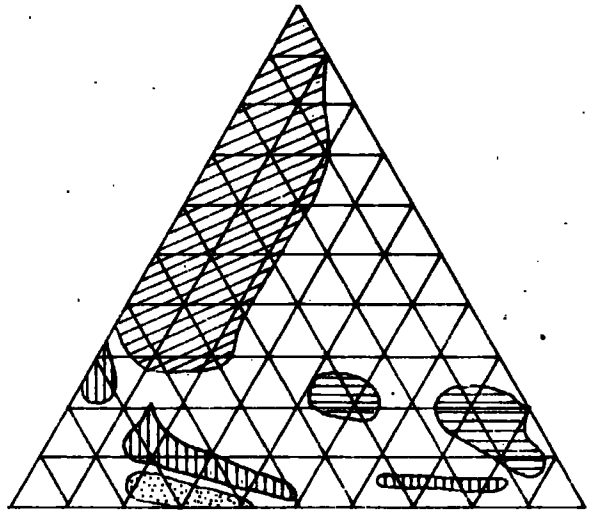
FIG. 85





FACTOR LOADING RATIOS OF KNOWN AND UNKNOWN ENVIRONMENTS



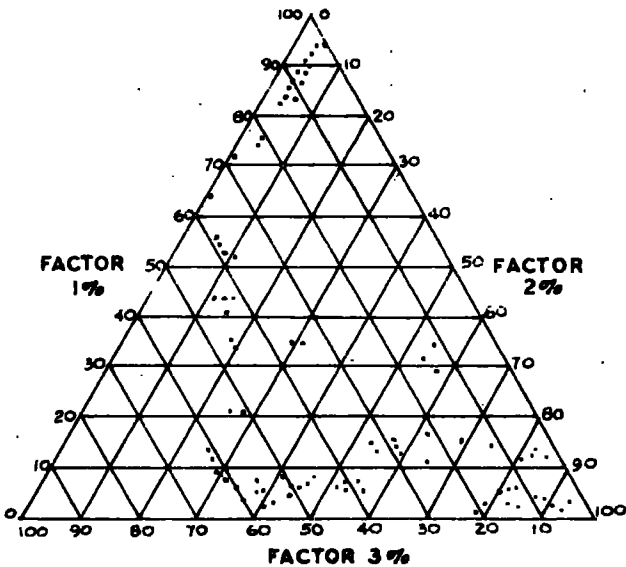
-  LAKESHORE
-  LAKE NEAR SHORE

LACUSTRINE ENVIRONMENT

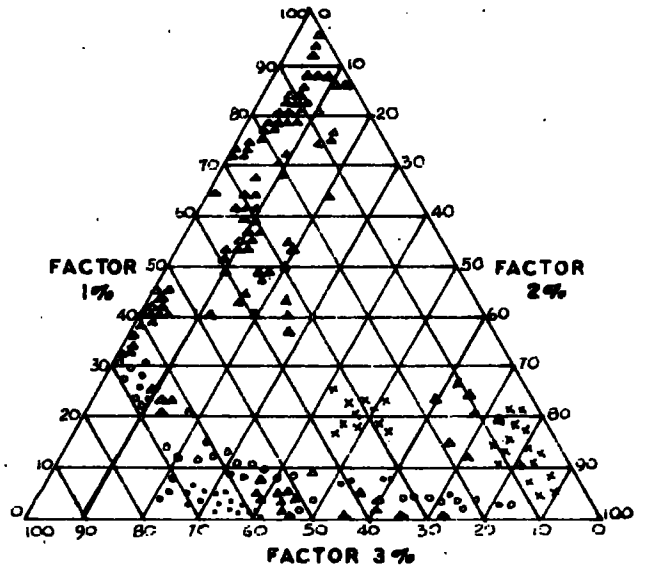


-  OFFSHORE 78% SUCCESSFUL
-  DUNE 86% "
-  RIVER 100% "
-  BEACH 100% "

ENVIRONMENTAL ZONES



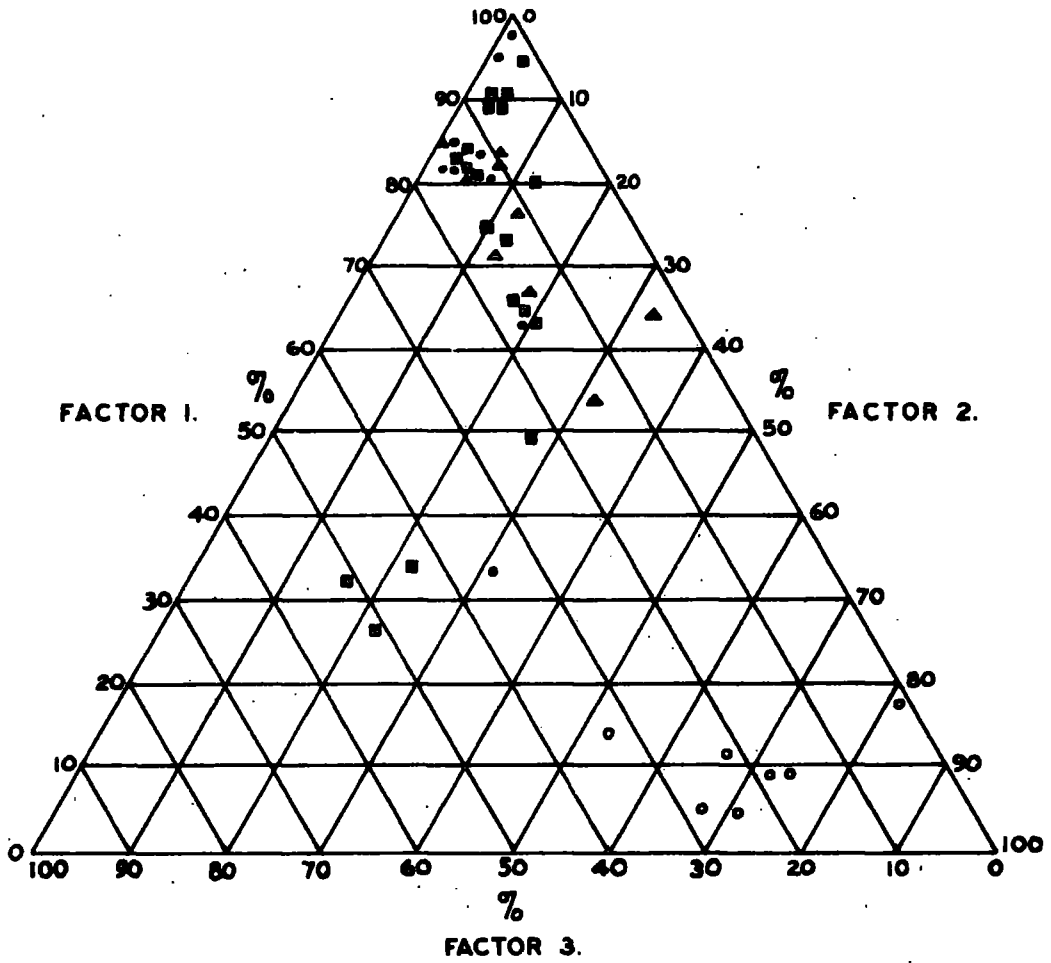
DISTRIBUTION OF SAMPLES OF UNKNOWN ORIGIN.



- DUNE
- BEACH
- × RIVER
- ▲ OFFSHORE

DIFFERENTIATION OF ENVIRONMENTS USING FACTOR RATIOS BASED ON PARTICLE SIZE

**FACTOR LOADINGS OF KNOWN SAMPLES
(BASED ON ALL SEDIMENTARY DATA)**



- BEACH
- ▲ DUNE
- RIVER
- OFFSHORE

FIG. 87

PERCENTAGE SILT CONTENT OF THE TEES LAMINATED CLAY DEPOSITS.

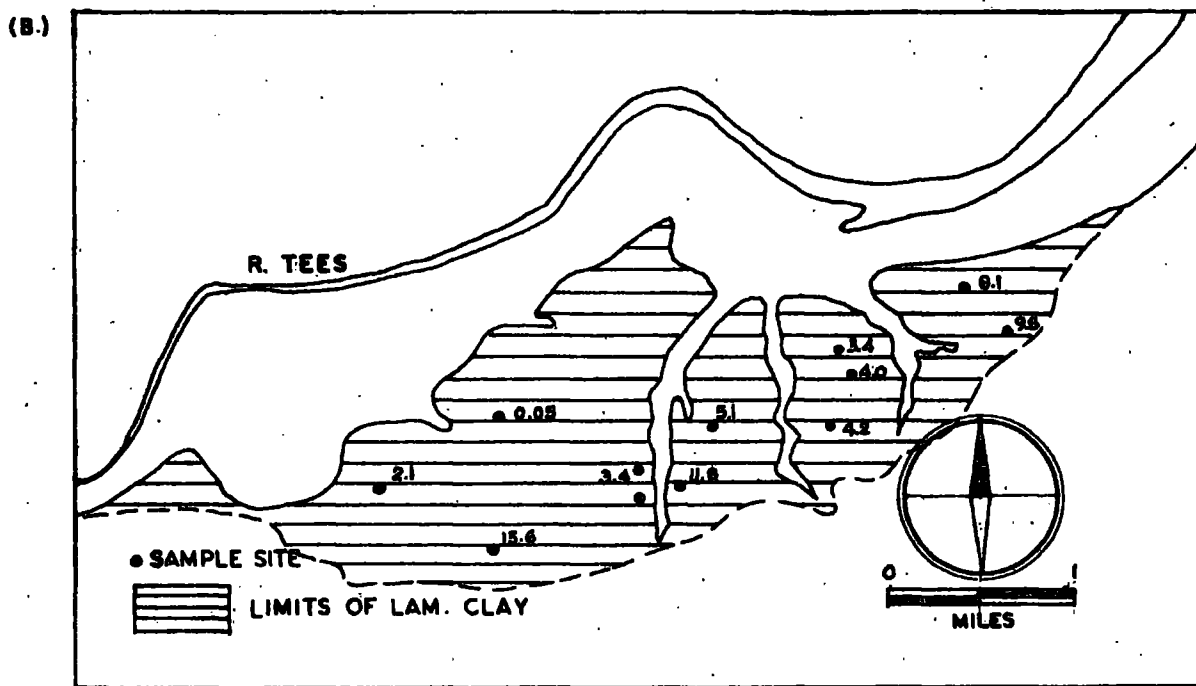
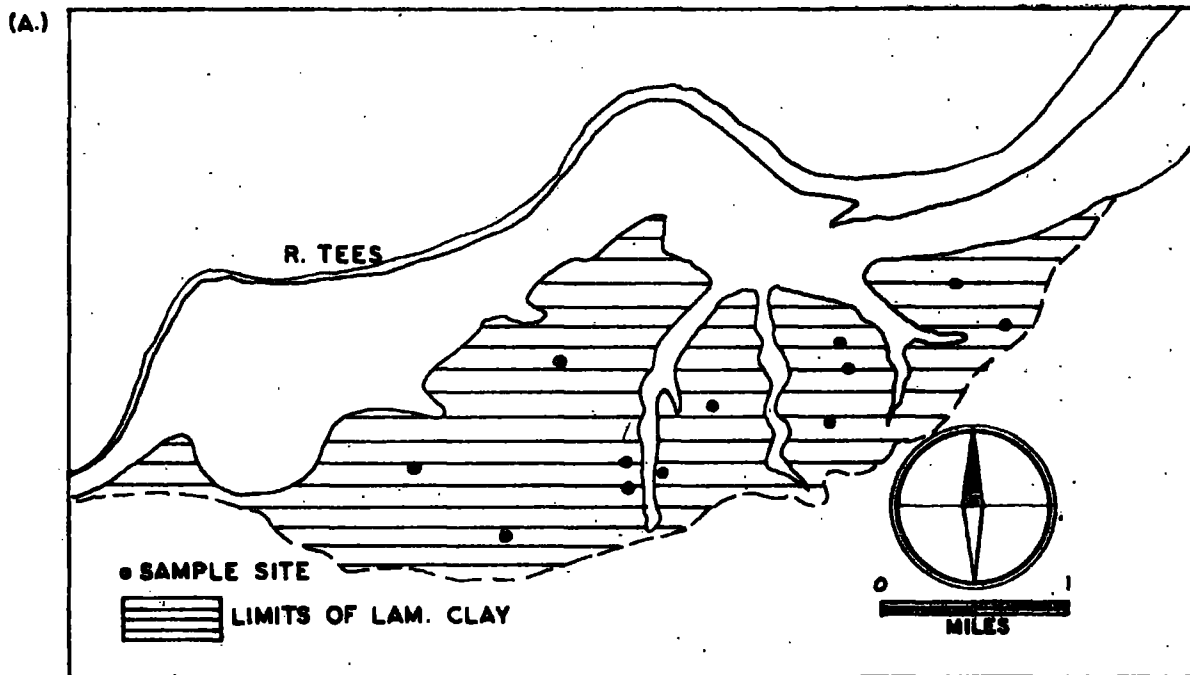


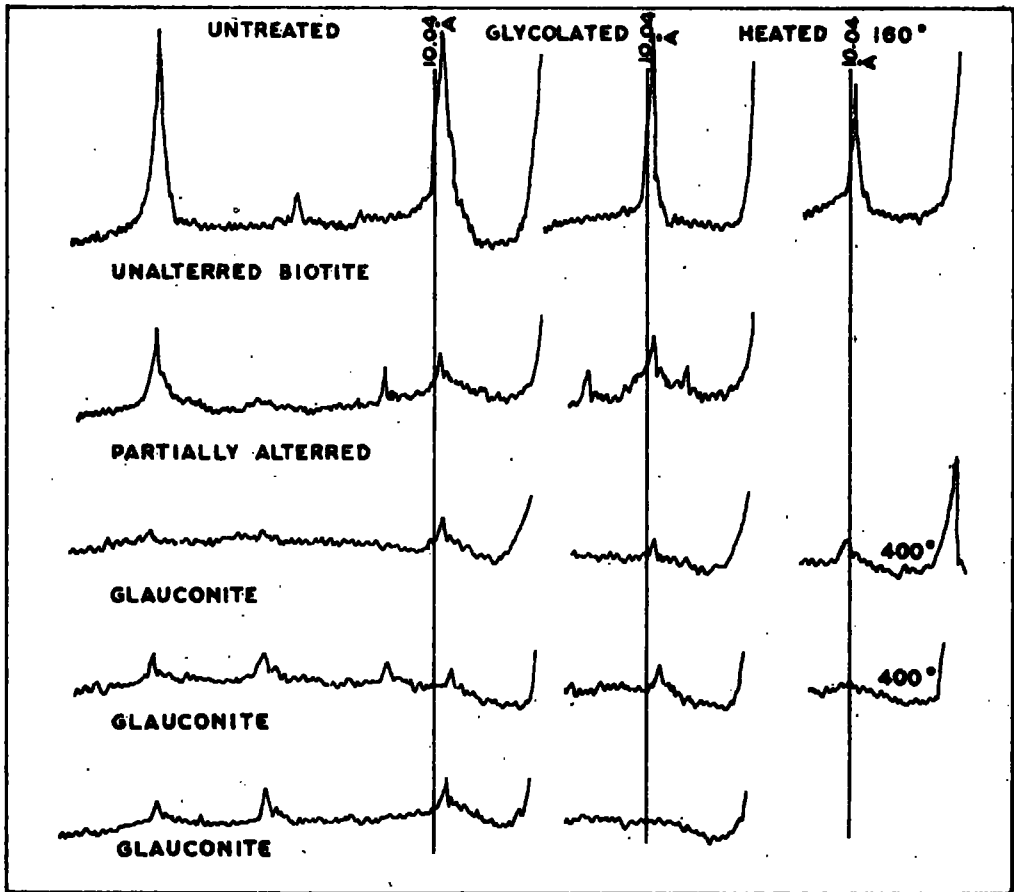
FIG. 88

X-RAY DIFFRACTOMETER PATTERNS OF LOBATE, SPHEROIDAL-
ELLIPSOID AND IRREGULAR-PAPILLIFORM GLAUCONITE GRAINS.



AFTER PRATT 1962.

X-RAY DIFFRACTION PATTERNS OF BIOTITE AND GLAUCONITE



AFTER PRATT 1962.

FIG. 90

COMPARISON OF GLAUCONITE CONTAINING DEPOSIT
WITH THE TEES LAMINATED CLAY.

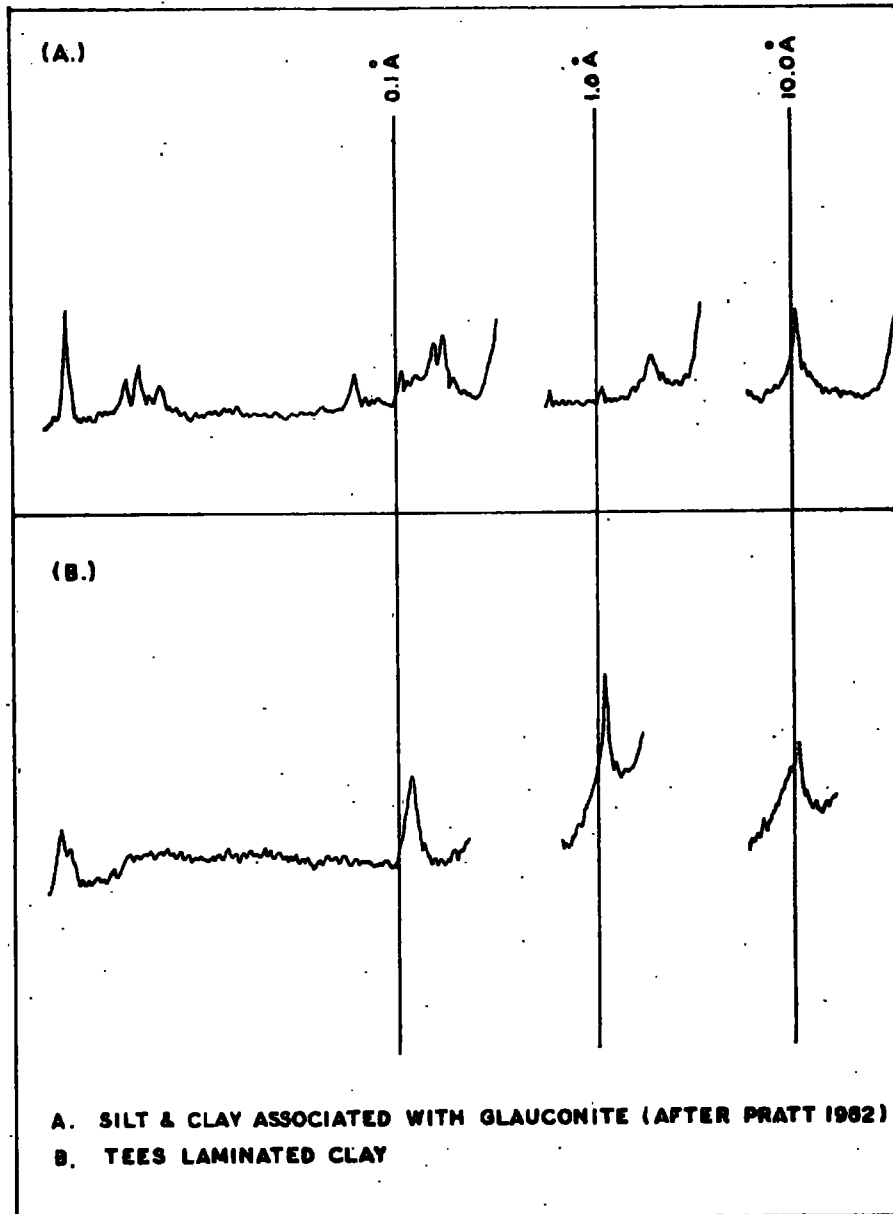
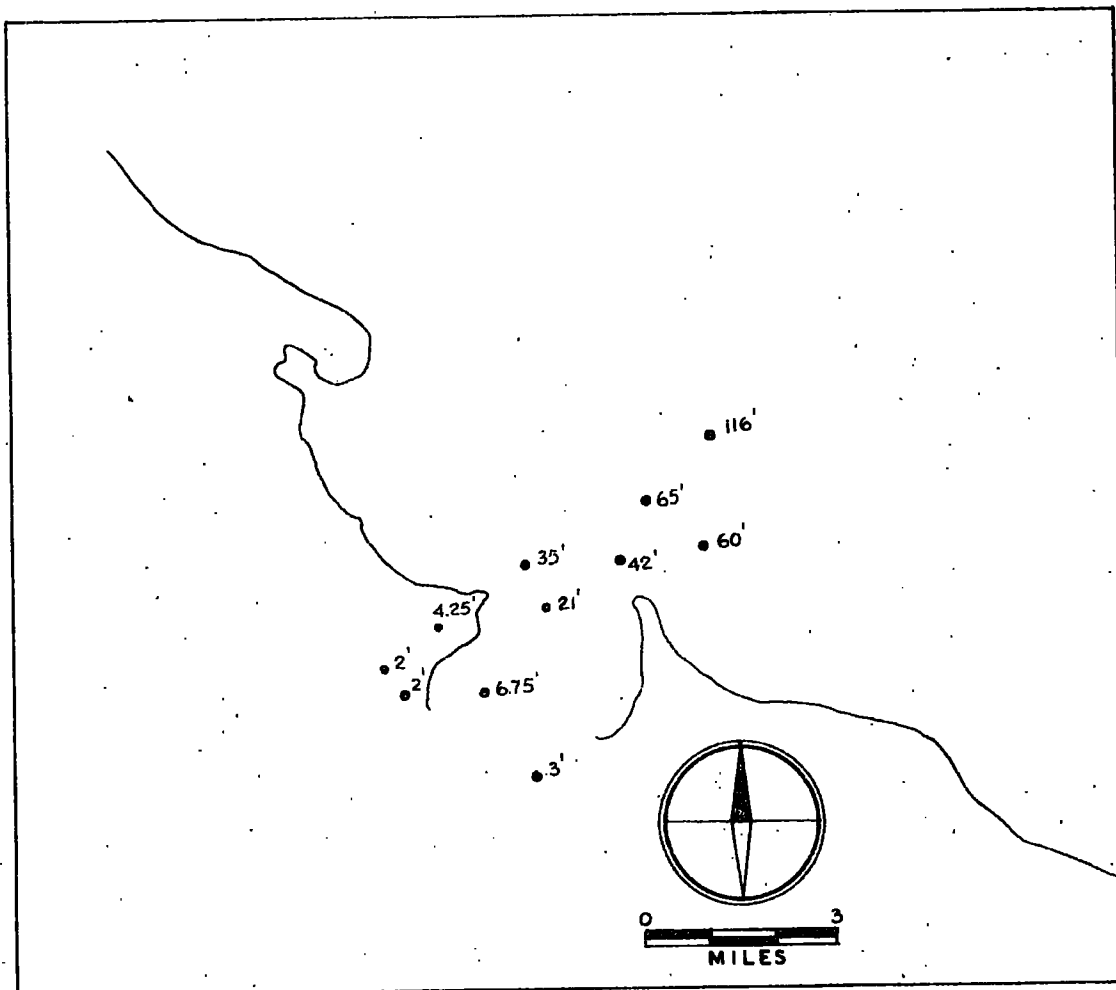


FIG. 91

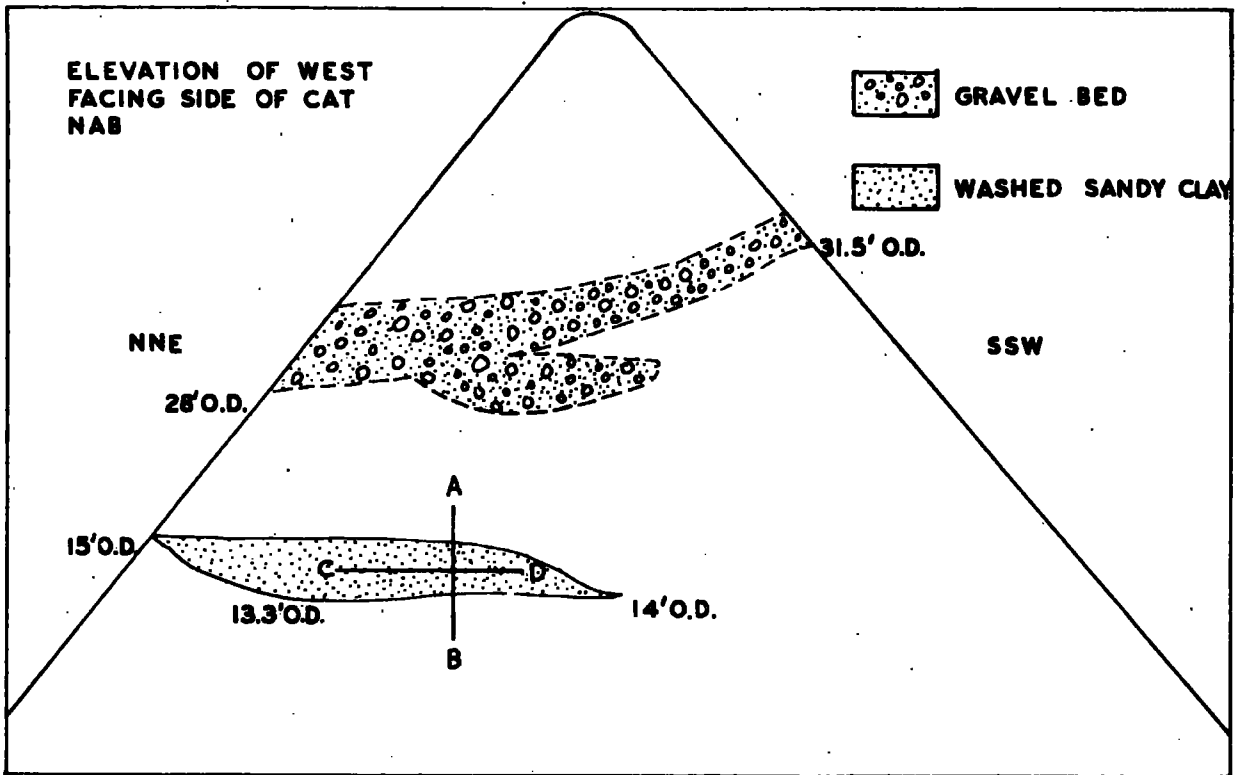
LOCATION OF BOREHOLES RECORDING LAMINATED CLAY AT DEPTHS
BELOW ORDNANCE DATUM.



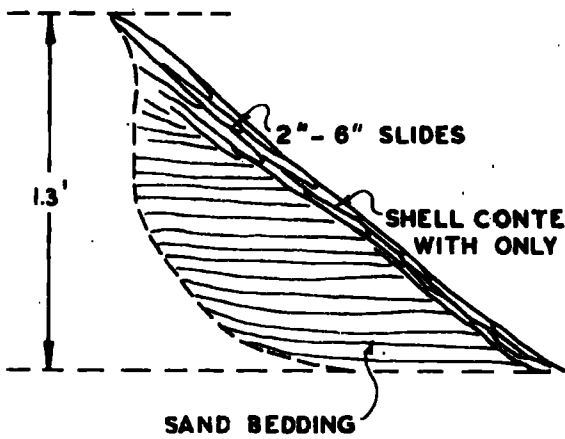
• 2' INDICATES DEPTH OF LAMINATED CLAY SURFACE

FIG. 92

SUPPOSED MARINE DEPOSIT RECORDED AT SALTBURN BEACH.



SECTION A - B



SECTION C - D

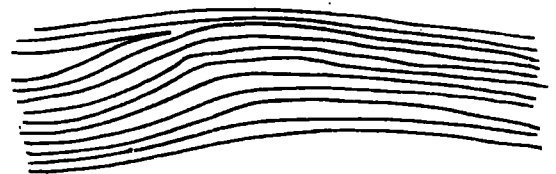


FIG. 93

4 JUN 1971

PARTICLE SIZE CURVES OF THE SUPPOSED MARINE SAND AT SALTBURN

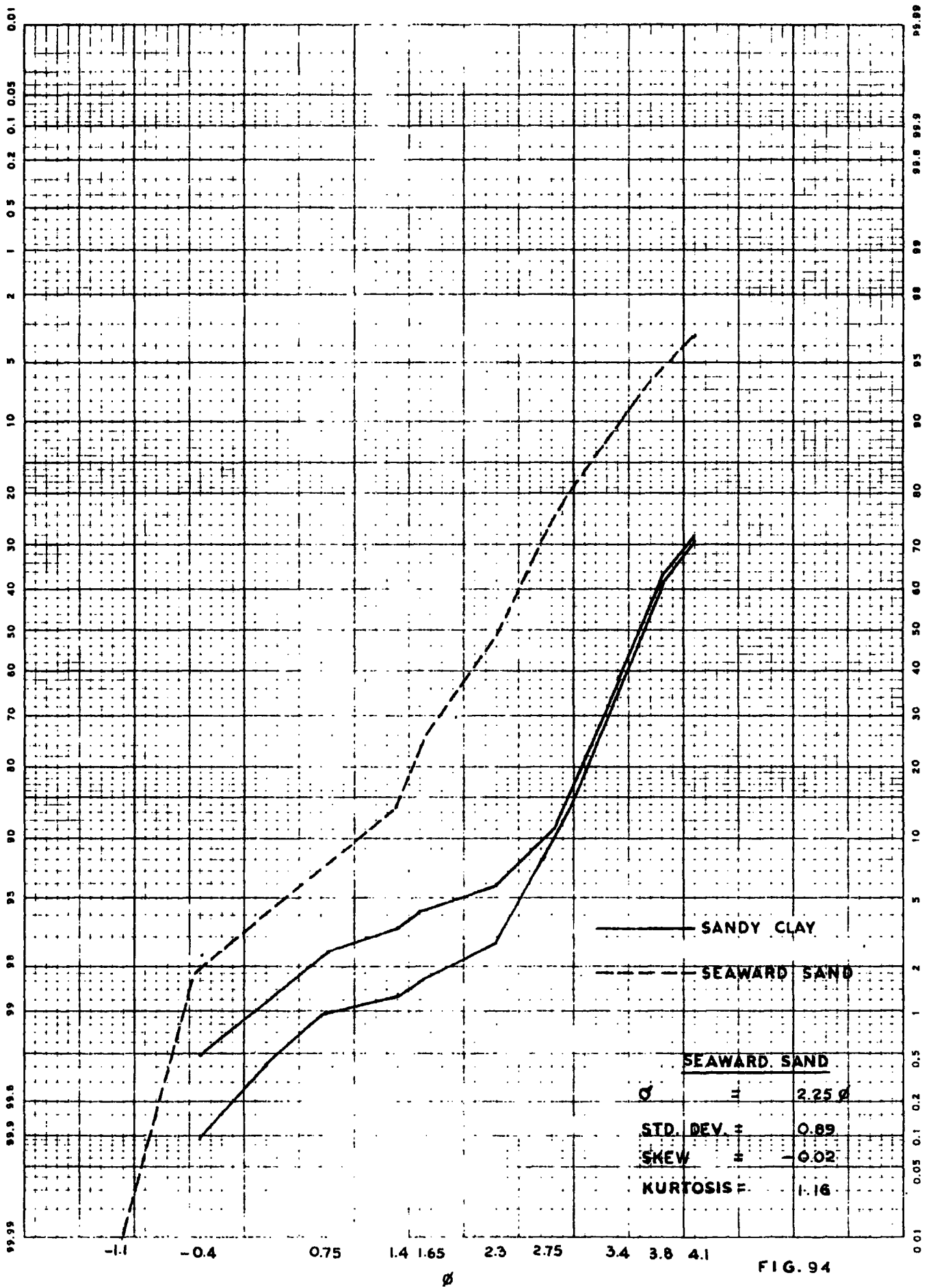
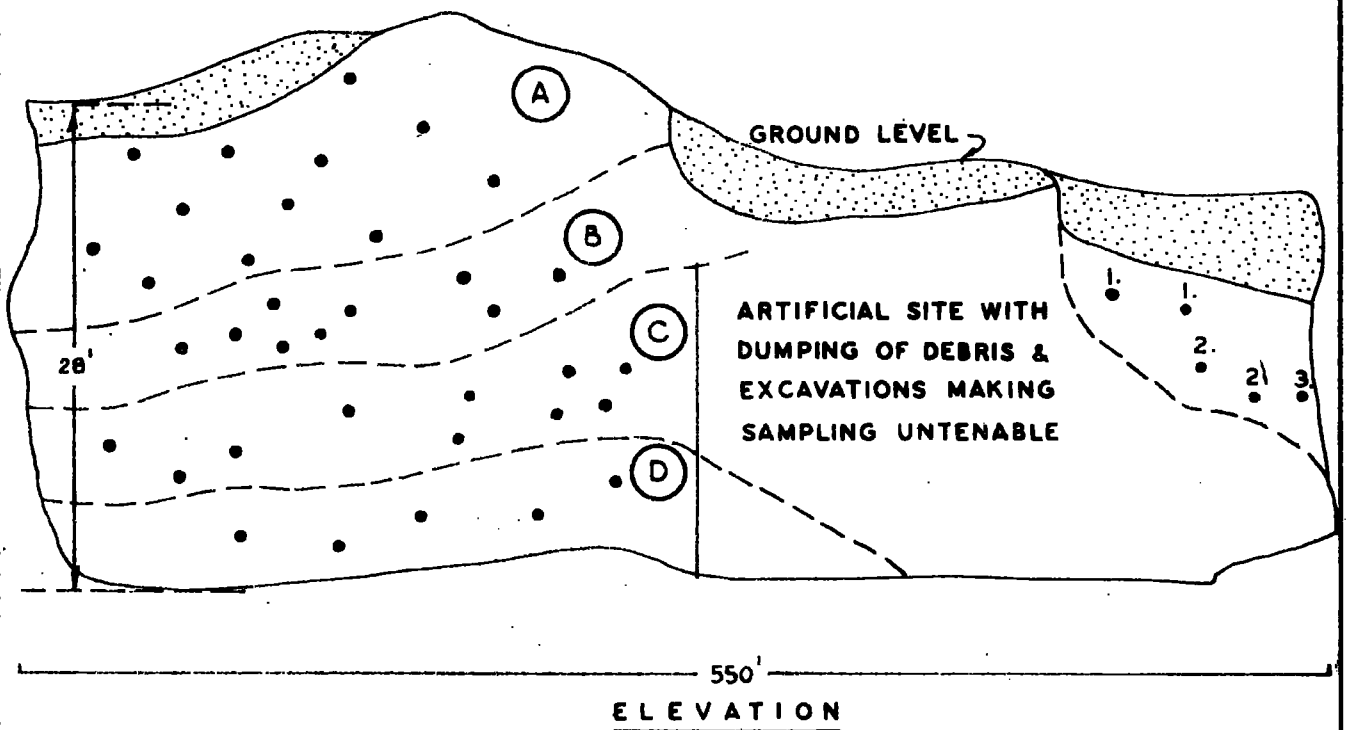


FIG. 94

BRIERTON SAND DEPOSIT, WEST HARTLEPOOL (477299)

LOCATION OF SAMPLES



CLAY DEPOSIT

FIG. 95

**GRAPH SHOWING PARTICLE SIZE CURVES OF SAMPLES
FROM BRIERTON**

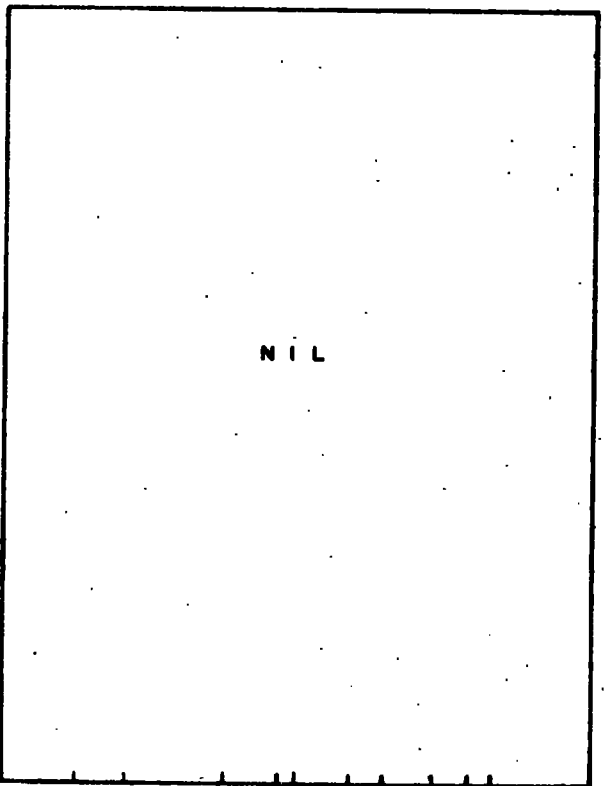
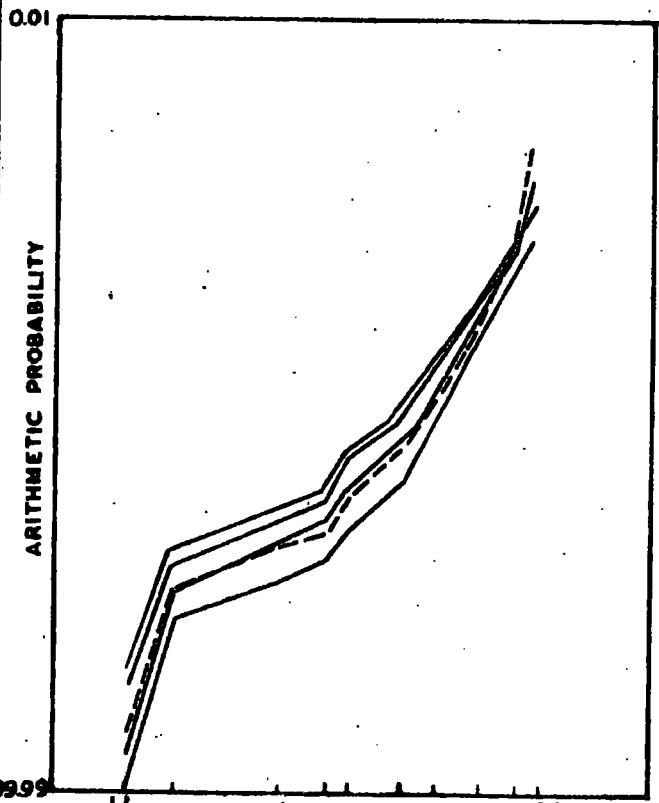
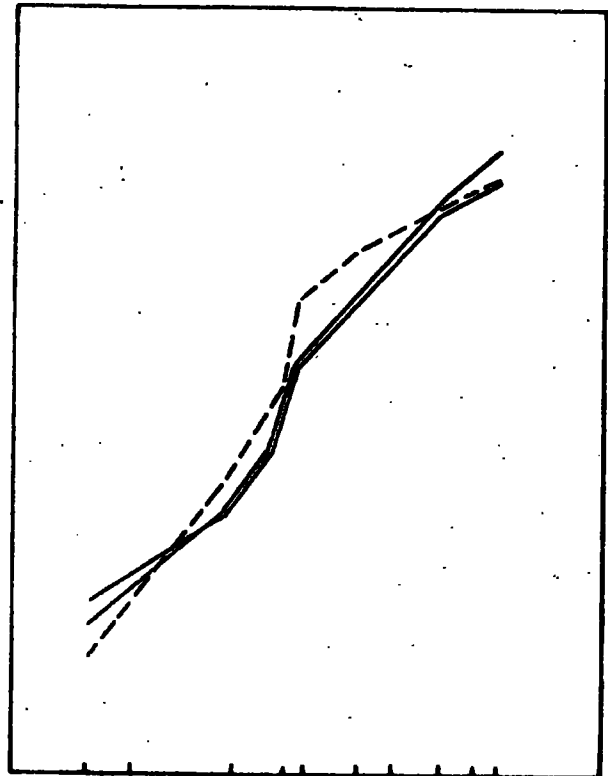
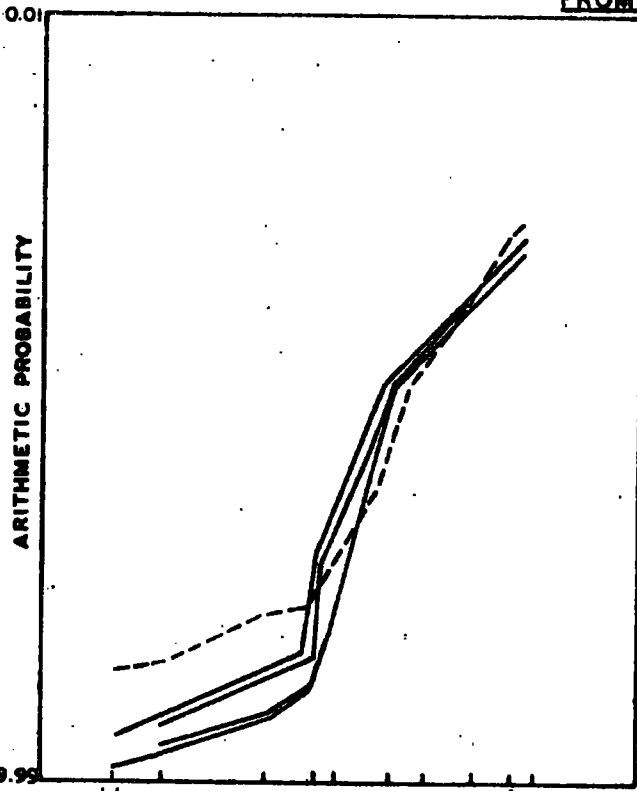


FIG. 96

PARTICLE SIZE CURVES OF SAMPLES FROM ESTON CEMETERY & PARKEND FARM

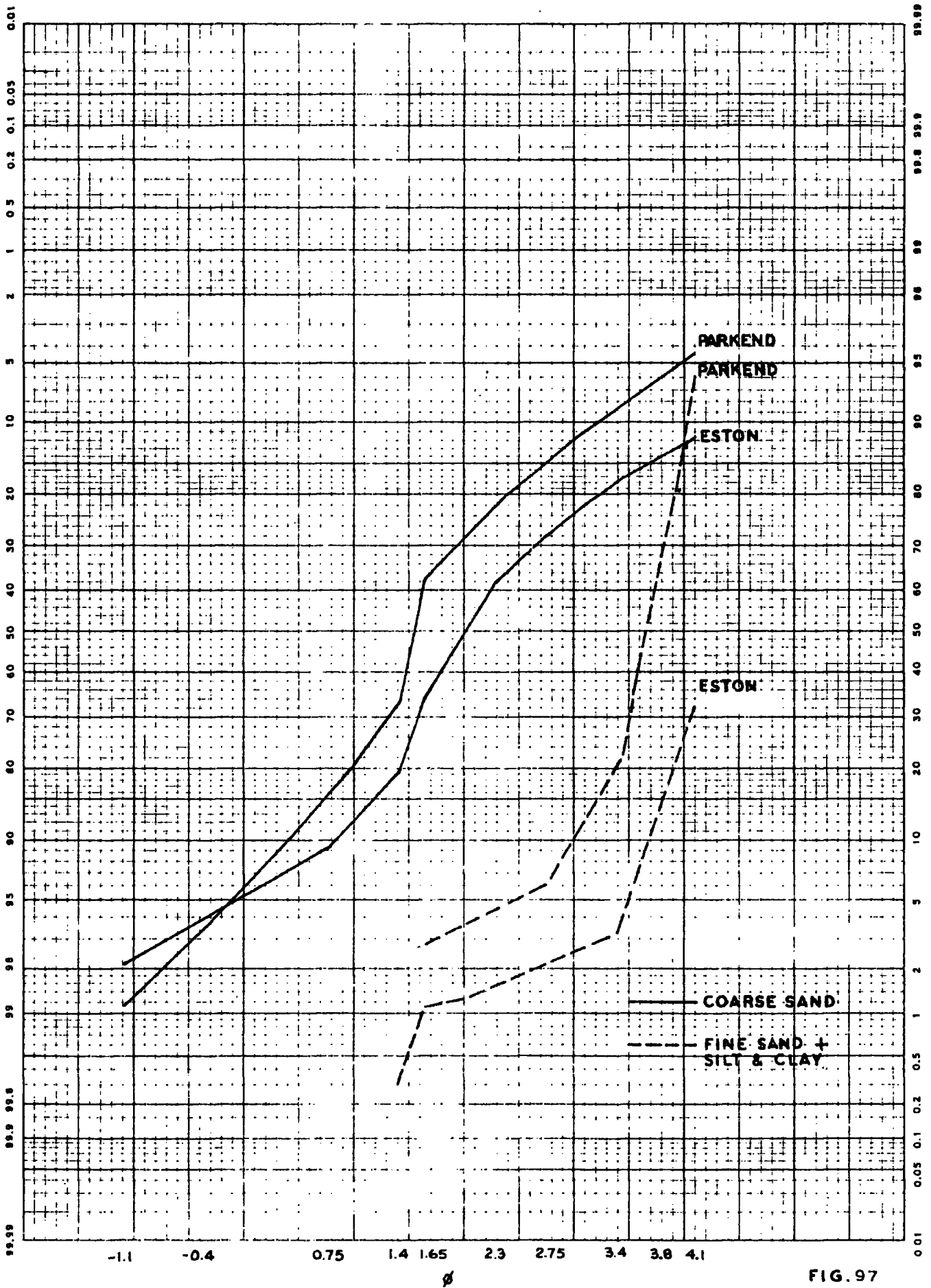


FIG. 97

PARTICLE SIZE CURVES OF SAND SAMPLES FROM THE ORMESBY BECK VALLEY

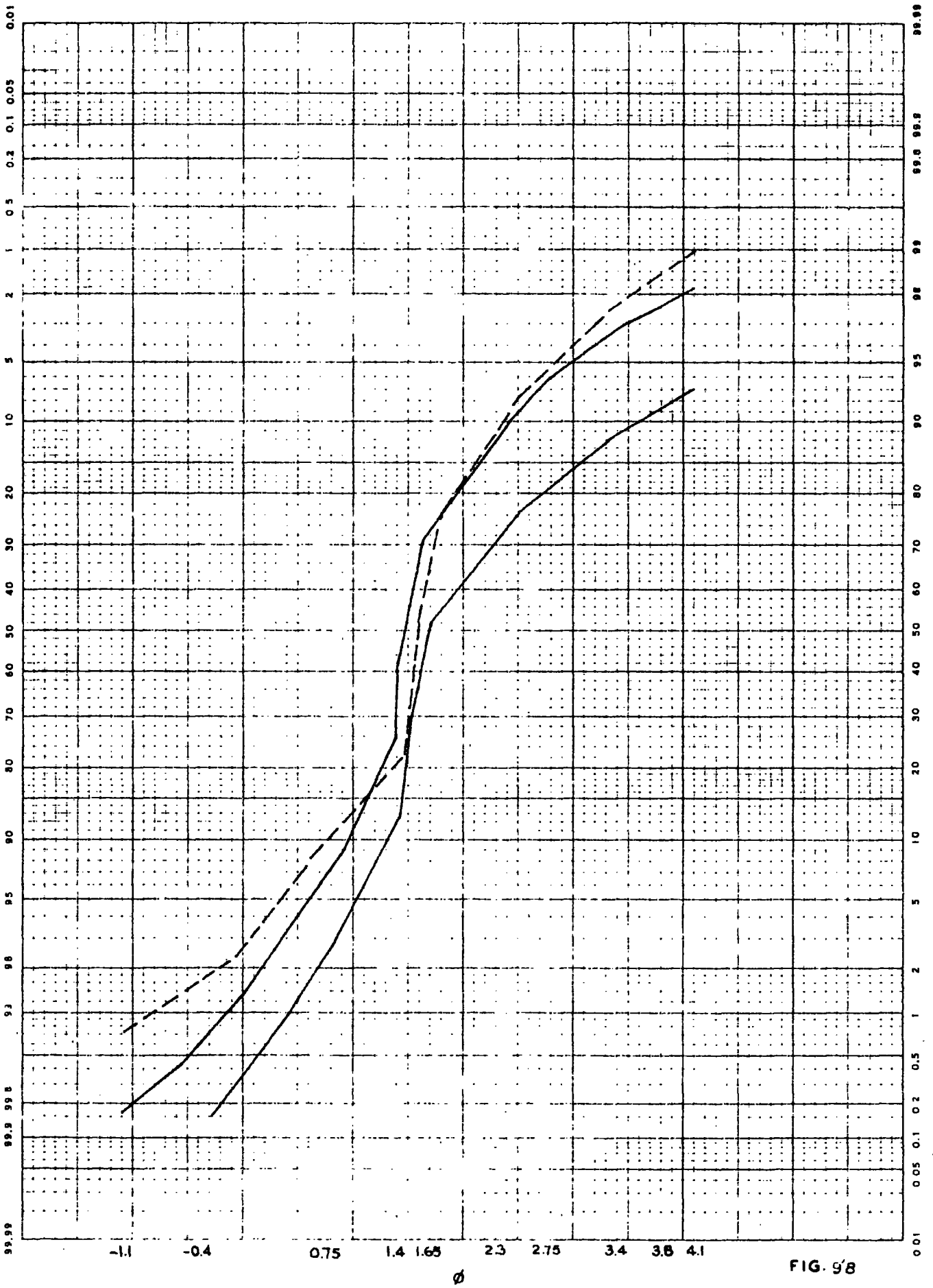


FIG. 98

**FOUR PARTICLE SIZE CURVES FROM NEWTON BEWLEY SAND
SAMPLES.**

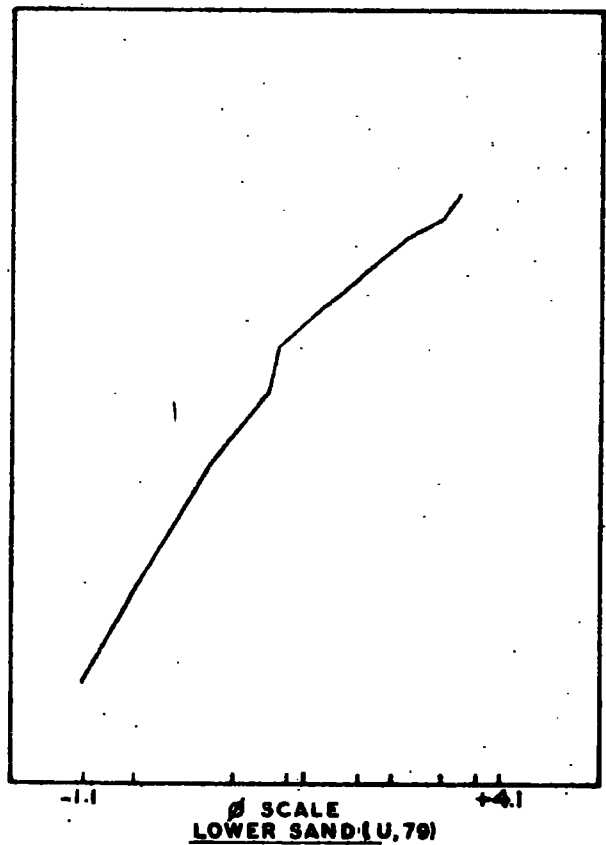
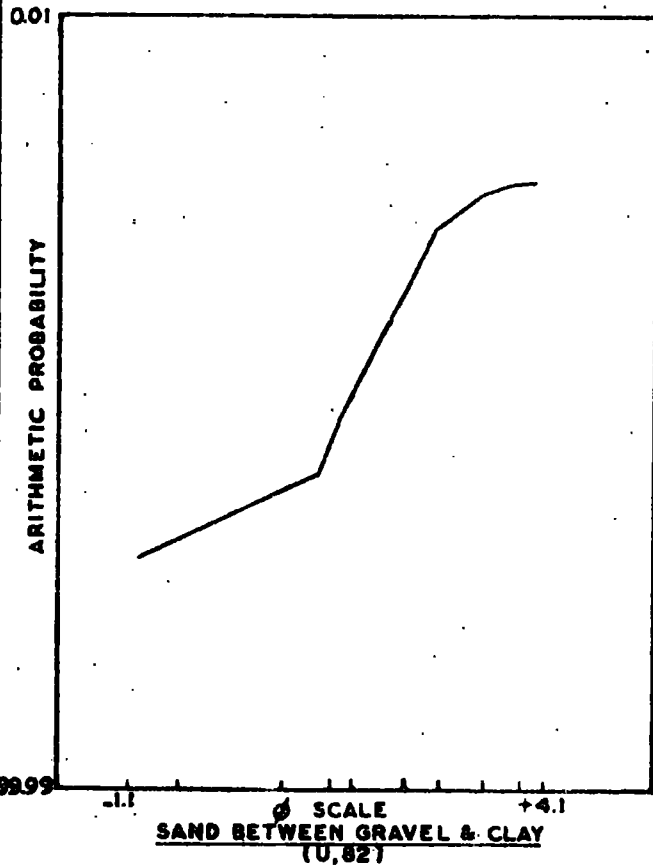
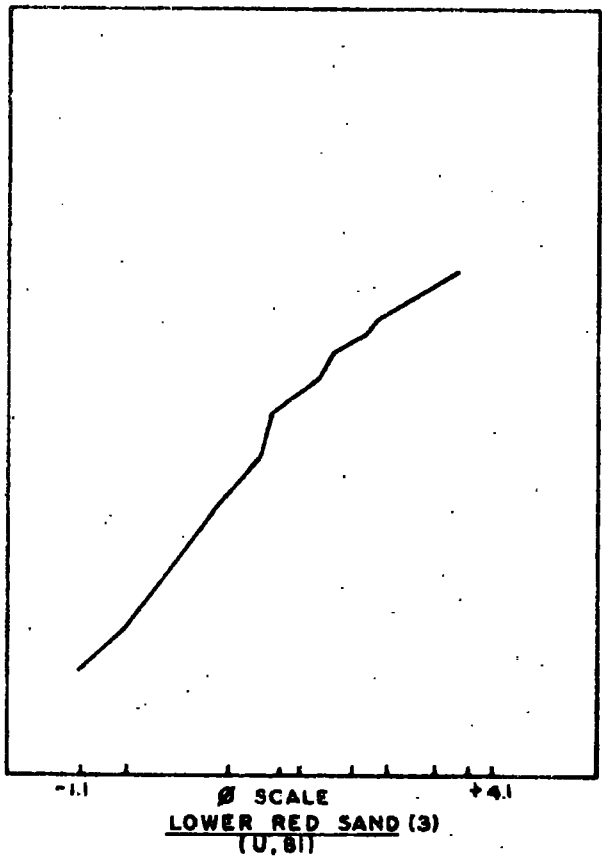
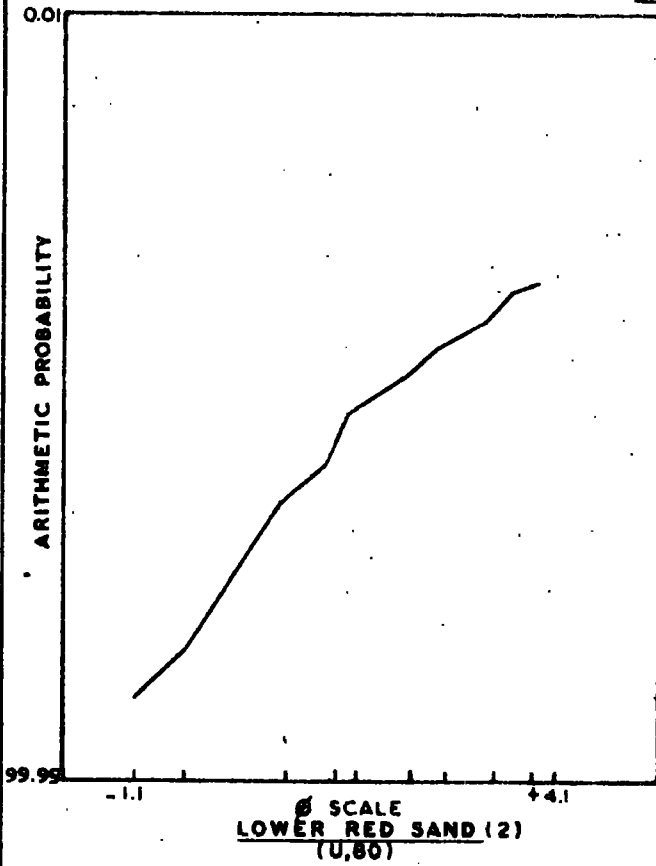
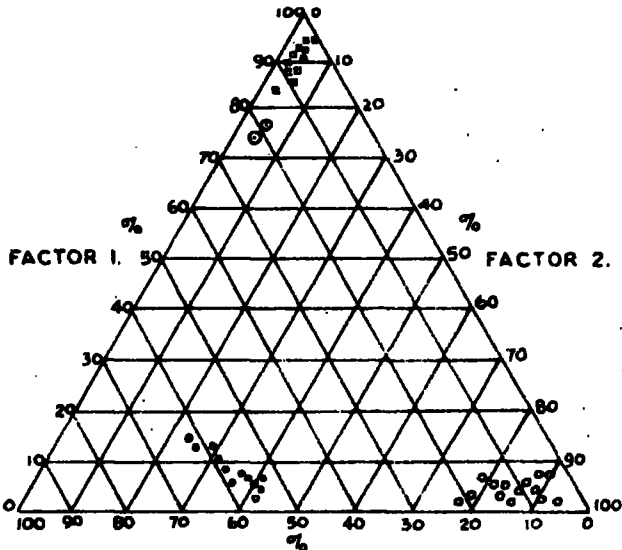
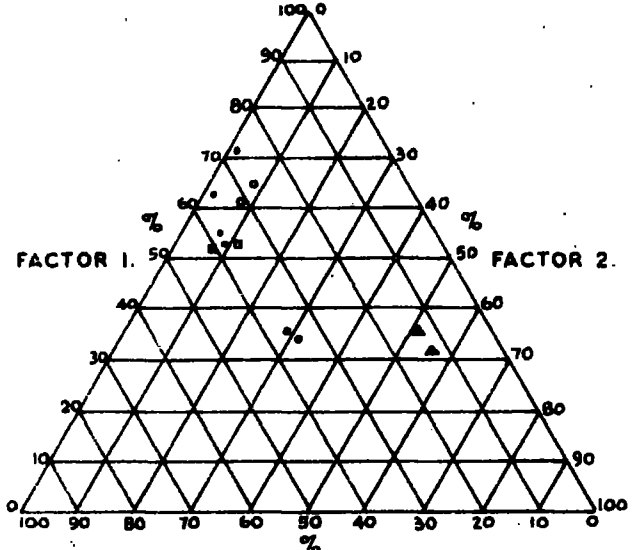


FIG. 99

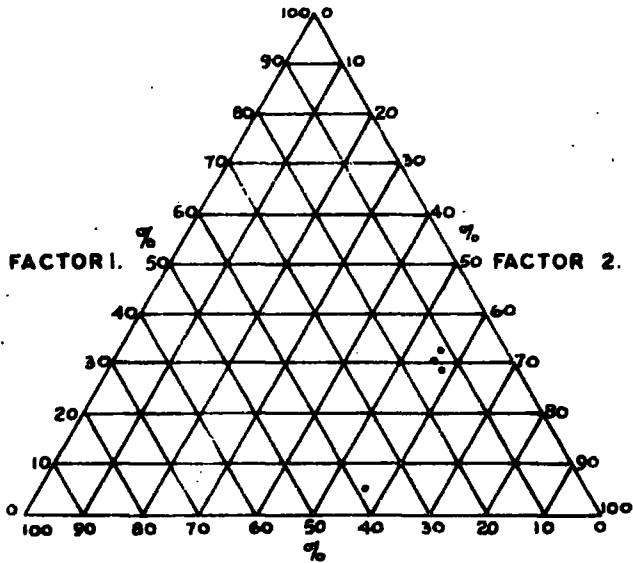
FACTOR LOADINGS BASED ON PARTICLE SIZE ANALYSIS.



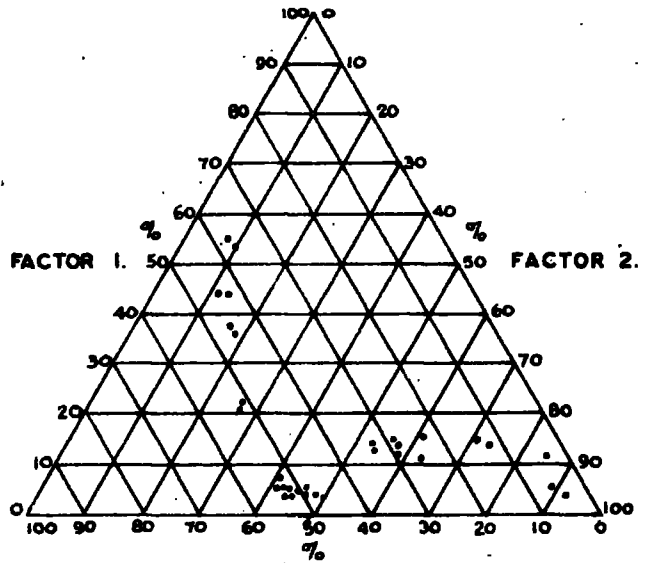
- HURWORTH H. SAMPLES
- HURWORTH
- WYNYARD
- ⊙ WYNYARD BASAL SAND



- COATHAM STOB
- ▲ SANDY FLAT
- SPITTAL FLAT
- CAT FLAT



**NEWTON BEWLEY SAND & GRAVEL
PIT**



**WEST HARTLEPOOL
(BRIERTON - NZ 477299)**

PARTICLE SIZE CURVES OF SUPPOSED RAISED MARINE SAND AT HUNTCLIFF (NZ 692218)

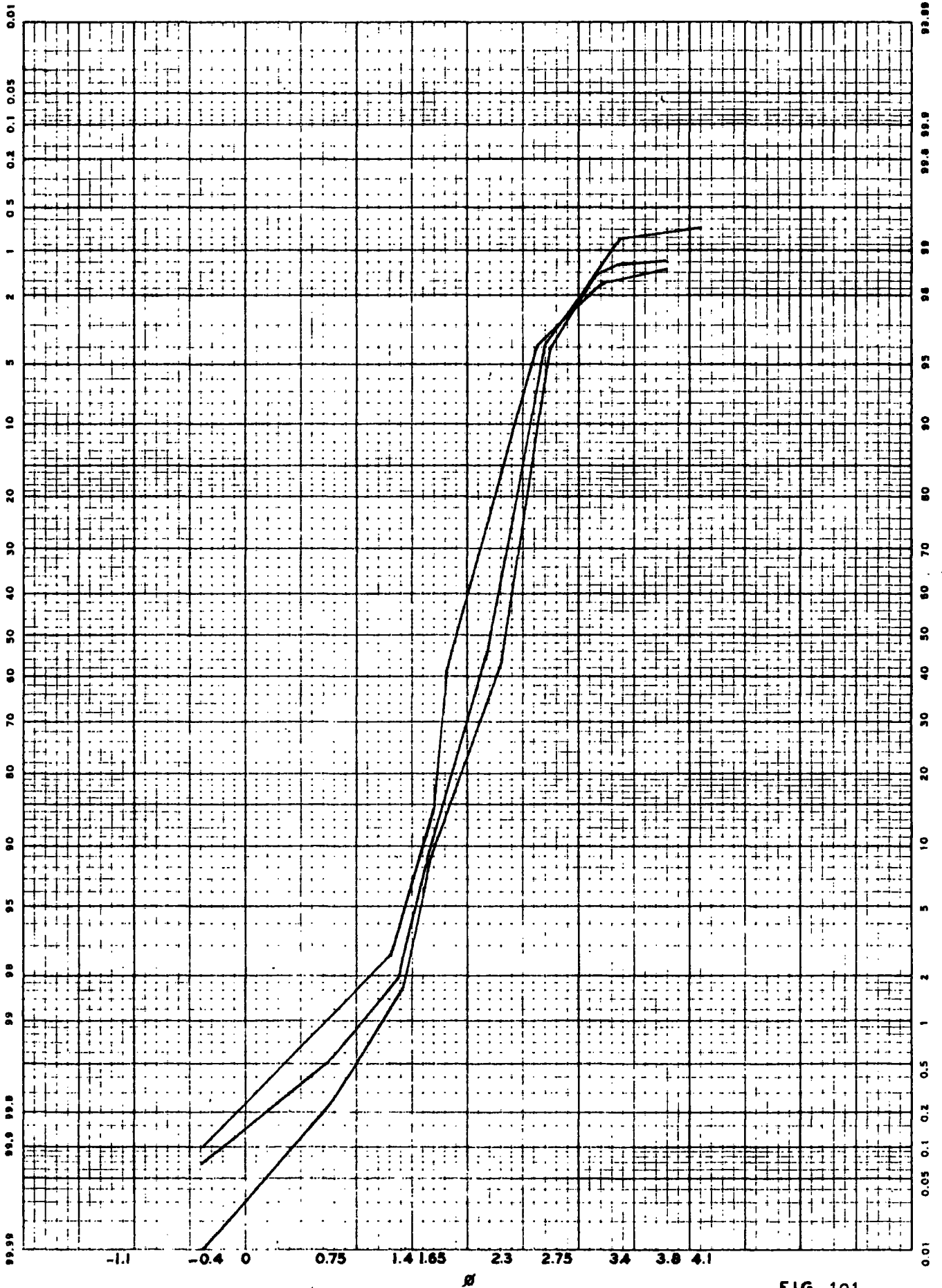


FIG. 101

PARTICLE SIZE CURVES OF SAMPLES TAKEN FROM SANDY FLAT (NZ 493158)

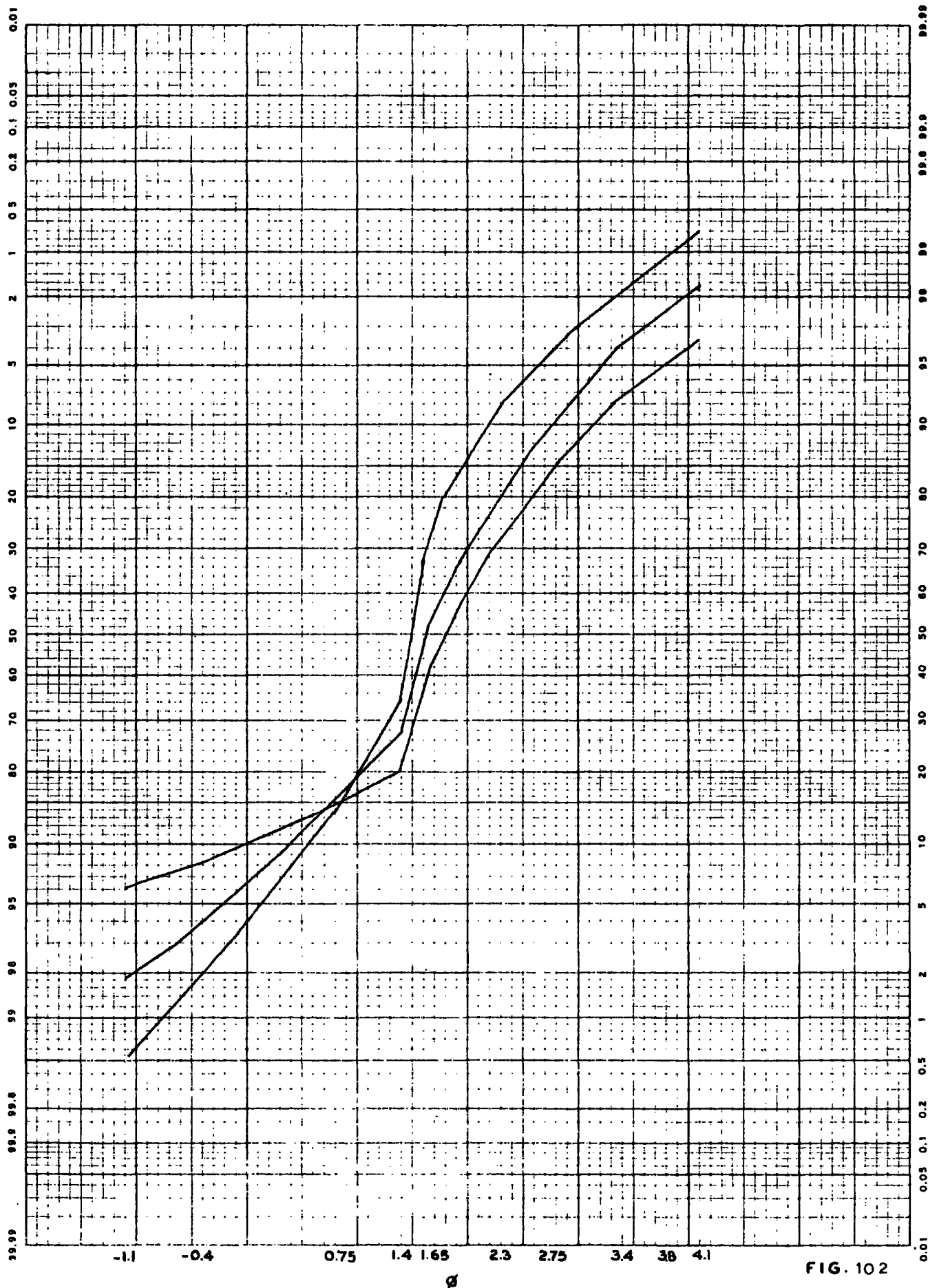
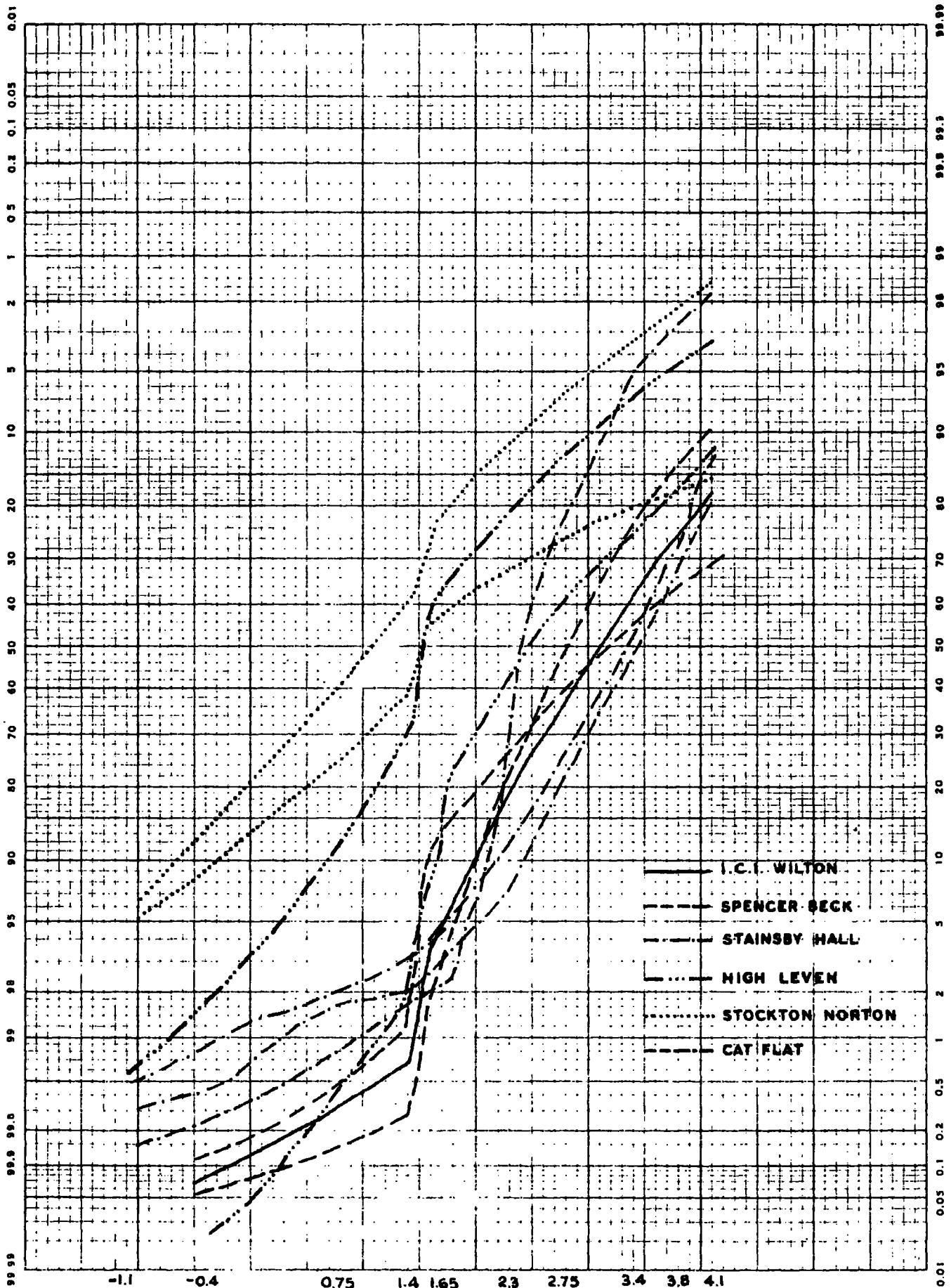


FIG. 102

**PARTICLE SIZE CURVES OF SAND SAMPLES FROM LEVELLED TERRACES IN
THE TEES BASIN.**



— I.C.I. WILTON
 - - - SPENCER BECK
 - · - STAINSBY HALL
 - · · - HIGH LEVEN
 · · · · · STOCKTON NORTON
 - · · · - CATIFLAT

FIG.103

LOCATION OF SAMPLE POINTS FOR THE COLLECTION
OF SAND SAMPLES FROM COATHAM STOB.

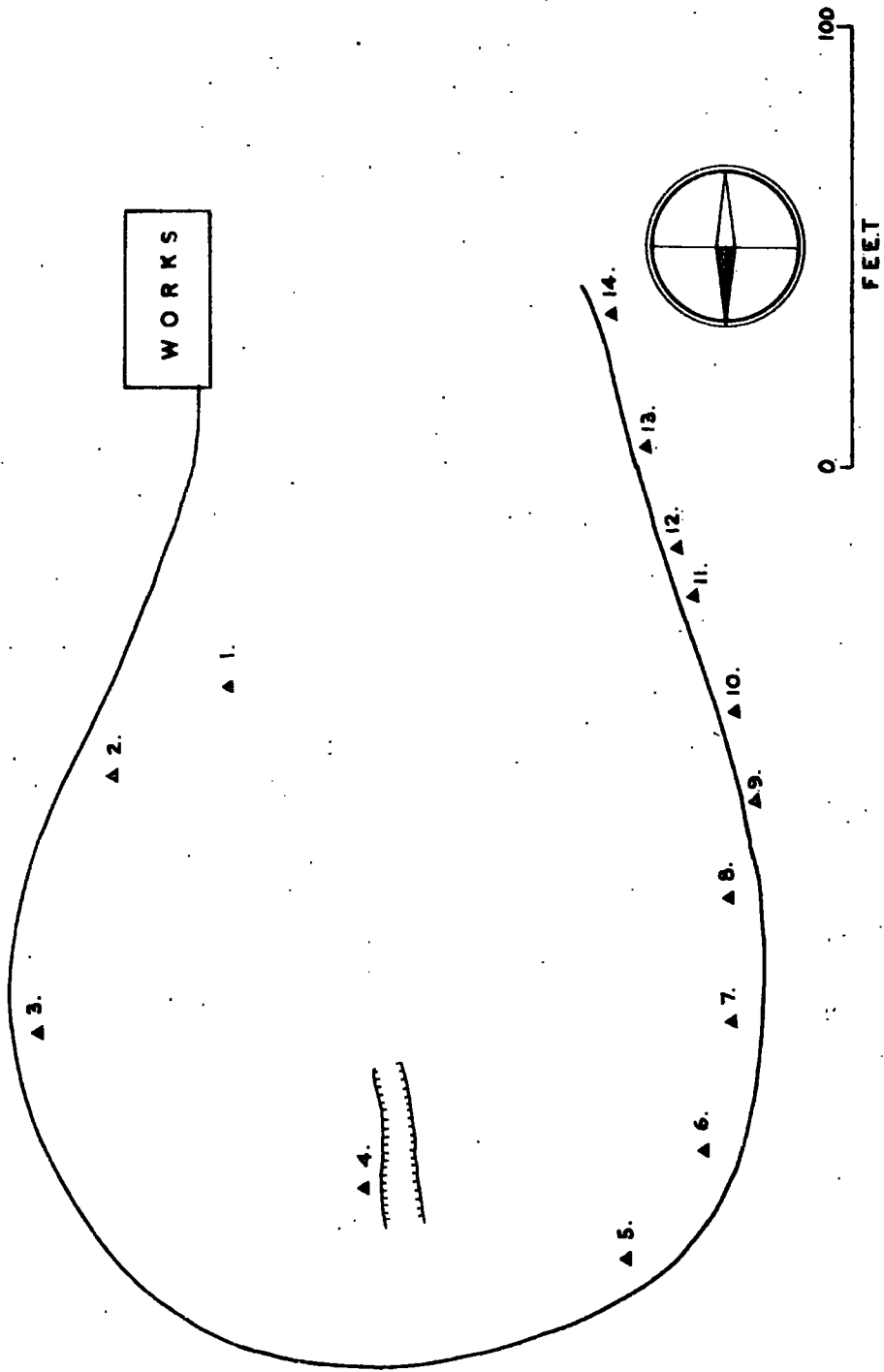


FIG. 104.

TYPICAL PARTICLE SIZE CURVES OF SAMPLES FROM COATHAM STOB

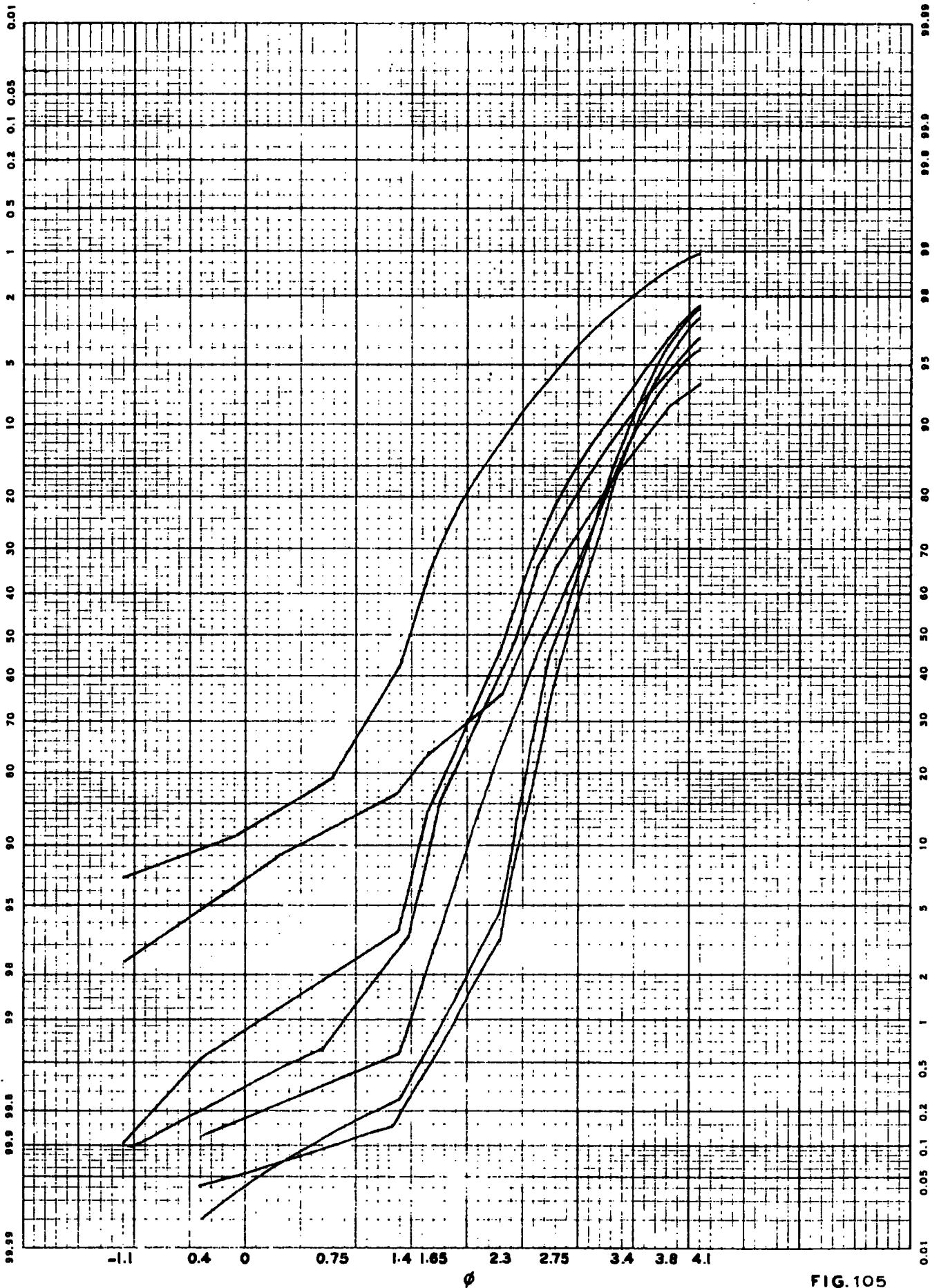


FIG. 105

TYPICAL PARTICLE SIZE CURVES OF SAMPLES FROM HURWORTH
BRICK PIT.

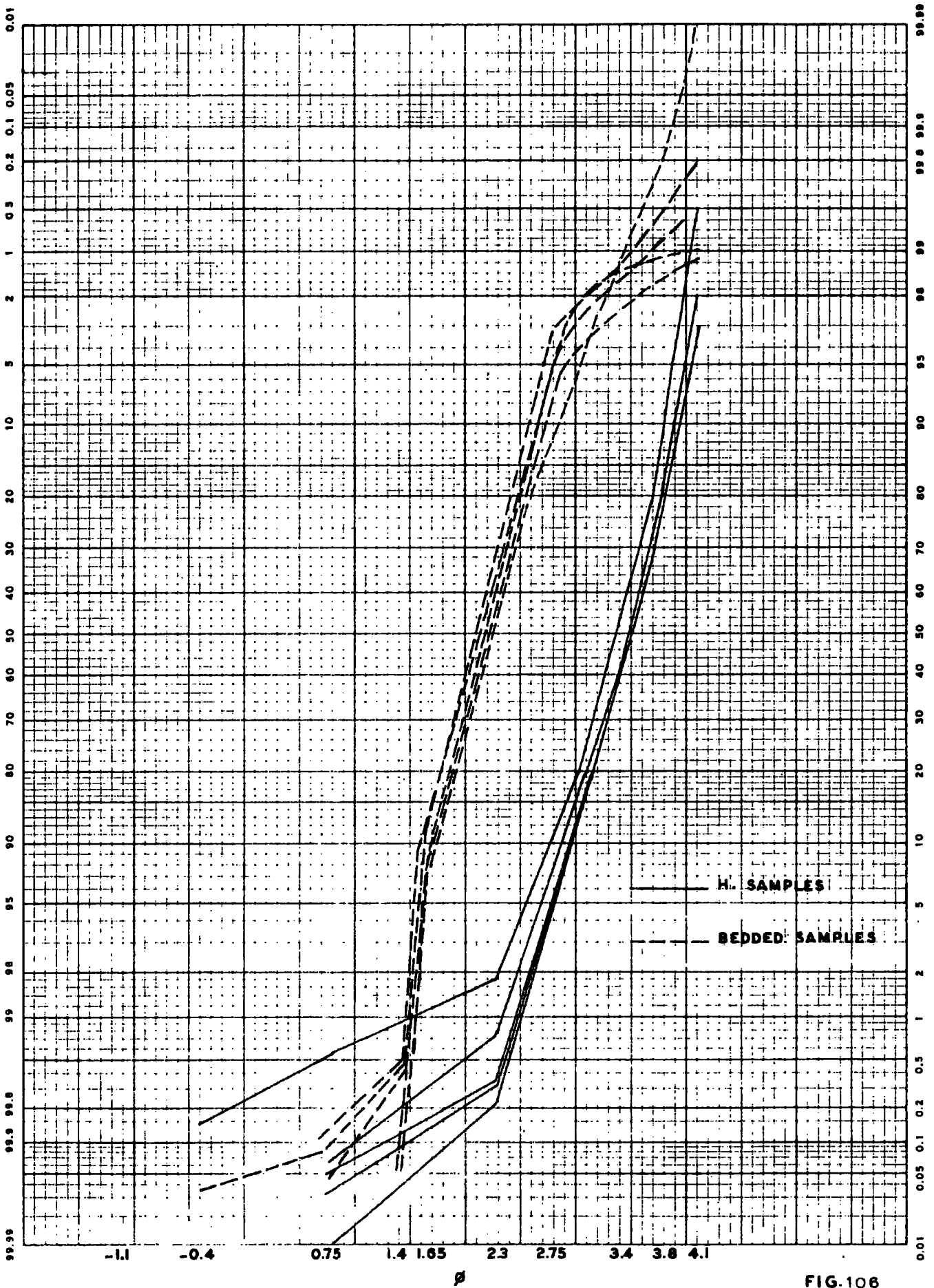


FIG. 106

TYPICAL PARTICLE SIZE CURVES OF SAMPLES FROM WYNYARD SAND PIT
(NZ 415246)

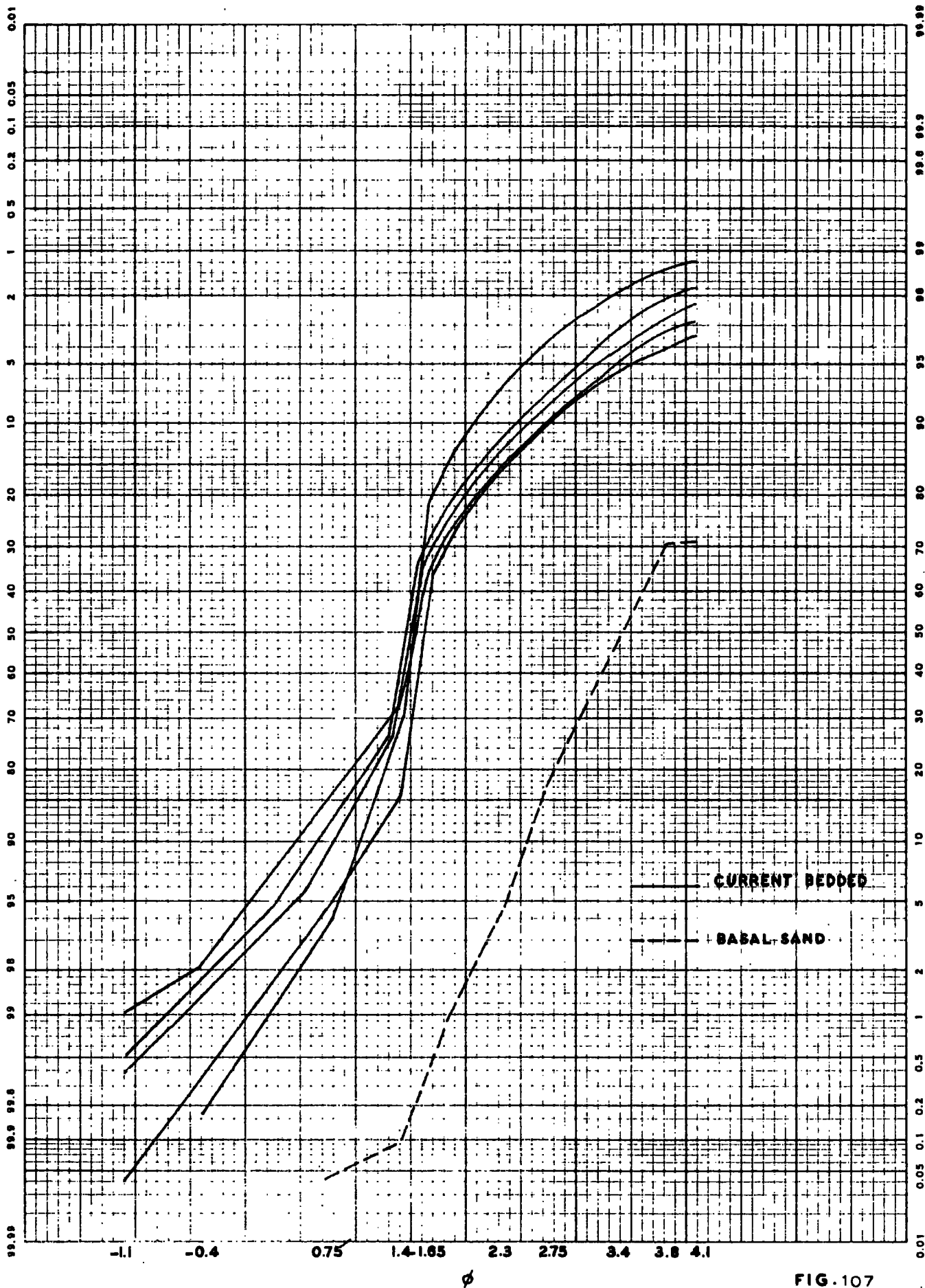


FIG. 107



BIBLIOGRAPHY

This bibliography does not attempt to include all works relevant to the subject under discussion but only those which, in the author's opinion, have led to a greater understanding of the relevant topics. Articles are listed under the relevant chapter with a sub-division between those works referenced in the text and other significant works.

Chapter 1

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CHAPTER 2
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Chapter Eleven

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PHOTOGRAPHS.

PLATE I.



Supposed raised marine sand. Cat Nab, Saltburn.

PLATE II.



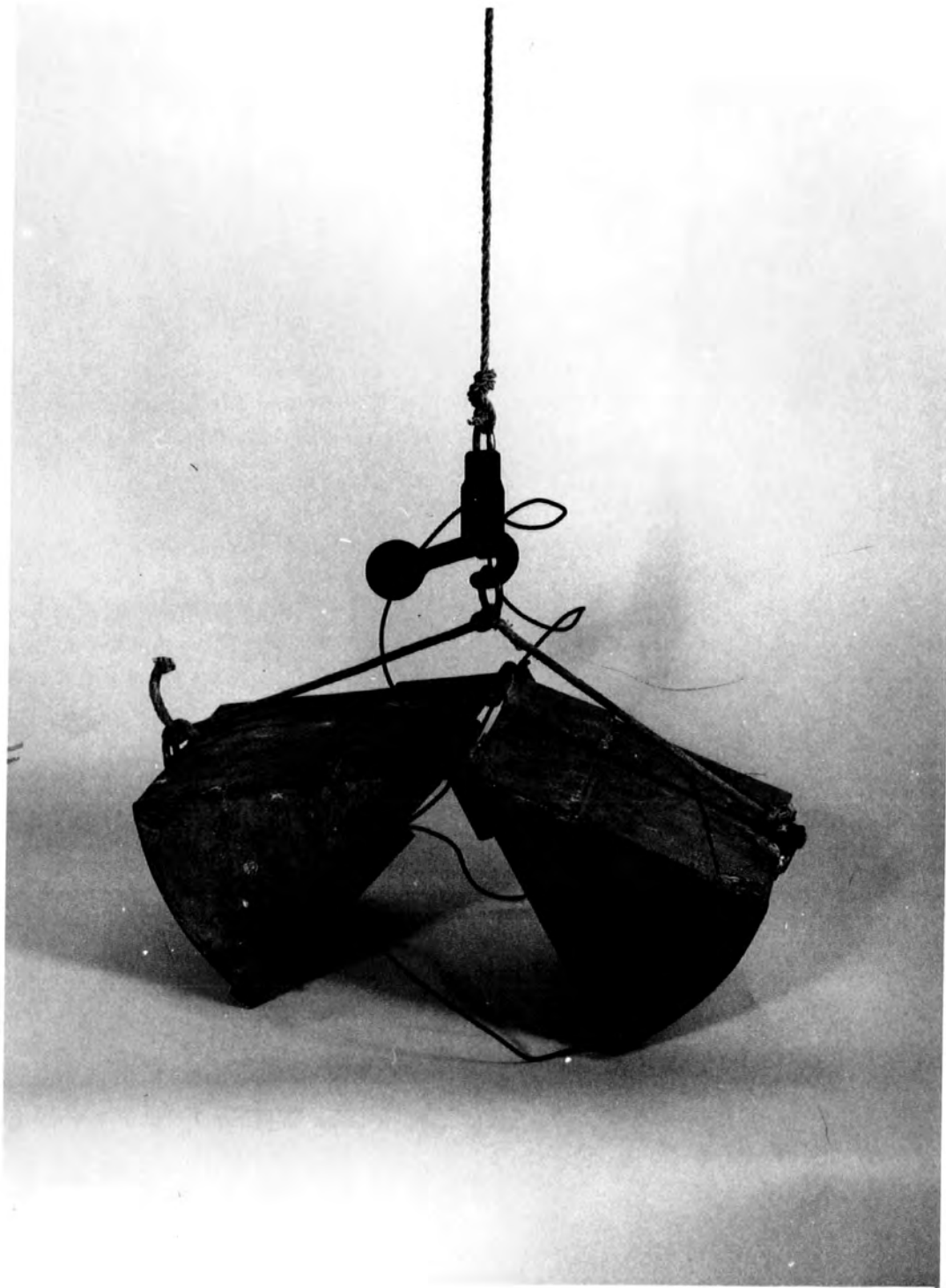
BREAK OF SLOPE NEAR HOWDEN HALL FARM. LOWER TEES.

PLATE III.



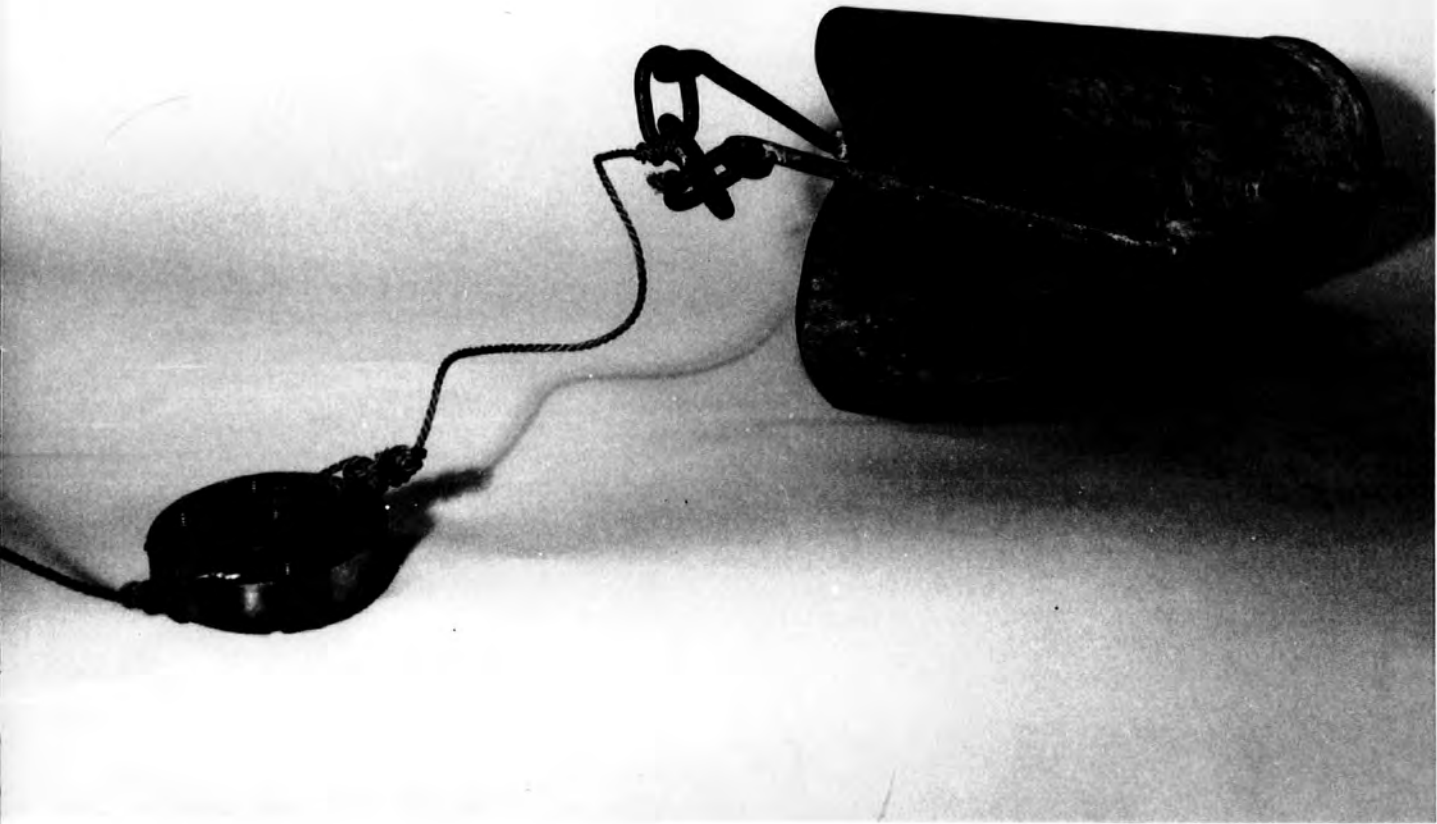
SUPPOSED RAISED STORM BEACH DEPOSITS NEAR HARTLEPOOL.

PLATE IV.



SEA BED GRAB SAMPLER AS USED IN THE TEES BAY.

PLATE V.



SEA BED BUCKET DREDGE AS USED IN THE TEES BAY.

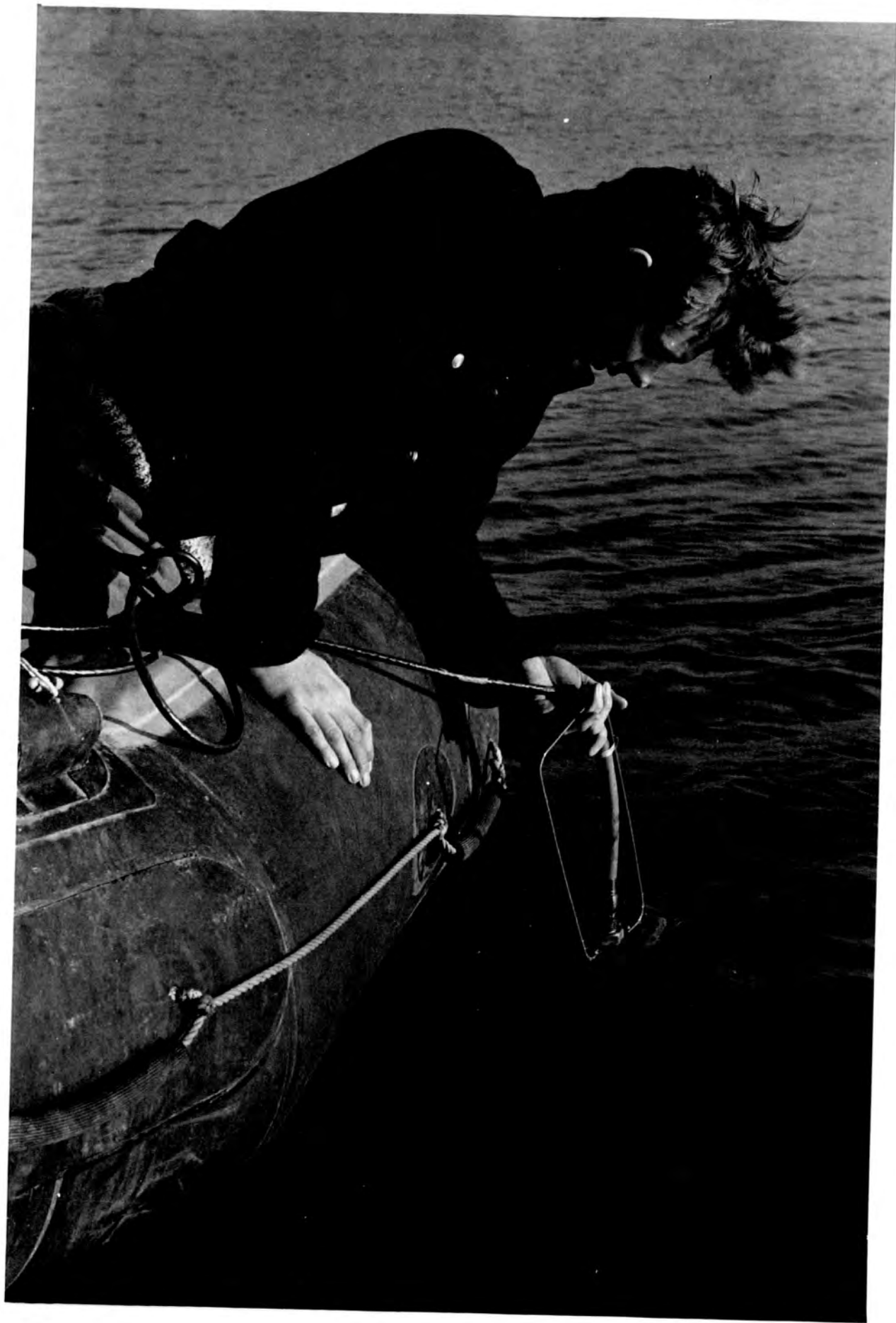
MARINE SURVEY.

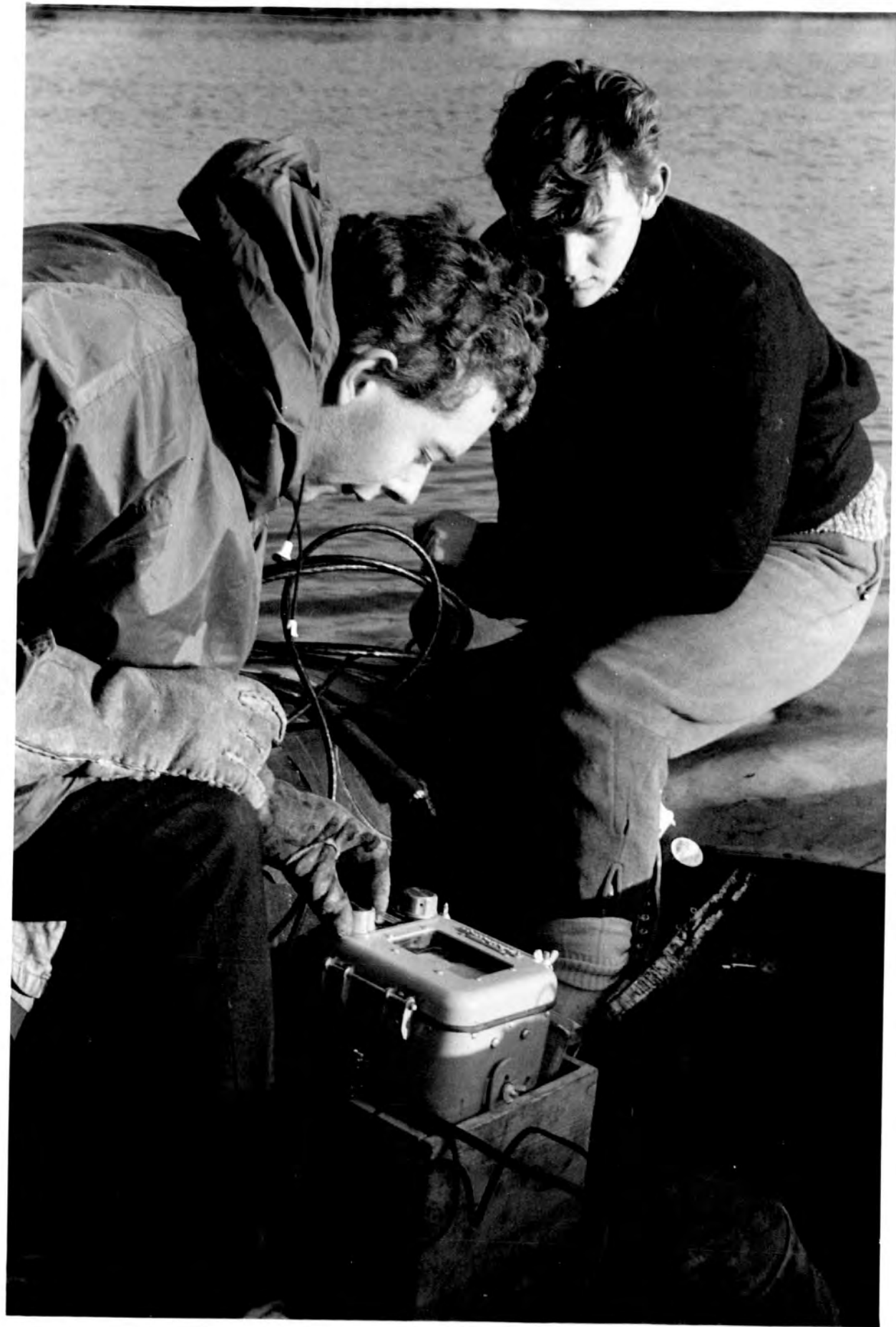
PLATE VI. VESSEL, EQUIPMENT, AND PERSONNEL USED DURING
SAMPLING AND SOUNDING CRUISES.

PLATE VII. ECHO SOUNDER TRANSDUCER.

PLATE VIII. ECHO SOUNDING CHART RECORDER.







APPENDICES.

APPENDICES.

APPENDIX INATIONAL GRID REFERENCES OF PLACE NAMES REFERREDTO IN THE TEXT

Names are listed in the order they occur in the text.

O.S., Sheets 84, 85, 86.

THE LOWER TEES

| <u>Place Name</u> | <u>Location</u> |
|-------------------|-----------------|
| Cleveland Hills | 585017 |
| Egglescliffe | 421135 |
| Billingham Beck | 436233 |
| River Leven | 449114 |
| Ormesby Beck | 511181 |
| Middle Beck | 495175 |
| Stainmore Pass | 914109 |
| Hutton Henry | 425361 |
| Stokesley | 520084 |
| Warrenby | 581250 |
| Coatham | 591252 |
| Redcar | 615249 |
| Saltburn | 667215 |
| Whitby | 905109 |
| Easington | 417435 |
| Hartlepool | 522333 |
| Throston | 491338 |
| Greatham | 492277 |
| Thorpe Thewles | 400233 |

The Lower Tees - continued

| <u>Place Name</u> | <u>Location</u> |
|--------------------|-----------------|
| Viewly Hill Farm | 435237 |
| Stockton | 445225 |
| Skelton Beck | 667215 |
| Windy Hill Farm | 652218 |
| Marske | 645230 |
| Ox Close Farm | 651211 |
| Pontac Farm | 626211 |
| Fell Briggs | 613210 |
| Sparrow Park Farm | 621211 |
| Turners House | 601210 |
| Long Beck House | 625217 |
| Cat Flats | 623217 |
| Black's Bridge | 621215 |
| Wheat Acres Farm | 599218 |
| Yearby | 600210 |
| Middlesbrough | 495186 |
| Kirkleatham Hall | 595209 |
| Fox Rush Farm | 587221 |
| Broadway Farm | 560205 |
| Town Farm | 582207 |
| Lackenby Hall | 565195 |
| Normanby High Farm | 535195 |
| Spencer Beck Farm | 540180 |
| Coulby Manor | 496154 |
| Sandy Flat Farm | 493158 |
| Stainsby Hall Farm | 471152 |
| High Leven | 450123 |
| Maltby | 466137 |

The Lower Tees - continued

| <u>Place Name</u> | <u>Location</u> |
|----------------------|-----------------|
| Barwick Farm | 432146 |
| Thornaby Vale | 455145 |
| Leven Month Farm | 435122 |
| Morley Carr | 412110 |
| Spittal Flat | 428117 |
| Howe Hill Cottages | 355110 |
| Hill House | 354102 |
| Over Dinsdale | 362100 |
| Girsby Grange Farm | 385086 |
| Old School (Girsby) | 358094 |
| Low Entercommon | 335060 |
| Eryholme | 321088 |
| Low Hail Farm | 309097 |
| Breakhouse Bank | 332084 |
| Garden House Farm | 303106 |
| Hurworth | 305104 |
| Hurworth Moor | 315121 |
| Middleton St. George | 355140 |
| Long Newton | 380162 |
| Tees Airport | 375130 |
| Elton | 401174 |
| Betty's Farm | 405190 |
| Coatham Stob | 405162 |
| Howden Hall | 415225 |
| Warren House Farm | 437254 |
| Woodside | 436273 |
| Wolviston | 454258 |
| Middle Burn Toft | 457279 |

The Lower Tees - continued

| <u>Place Name</u> | <u>Location</u> |
|-------------------|-----------------|
| Marsh House | 461256 |
| High Grange | 457251 |
| North Burn | 462274 |
| Claxton | 476287 |
| Cowpen Bewley | 483247 |
| Throston Grange | 492341 |
| Middle Warren | 494346 |
| Springwell House | 488355 |
| I.C.I. Wilton | 585198 |
| Girsby | 355085 |
| Seaham | 437493 |
| South Gare | 557277 |
| North Gare | 542284 |
| Seaton Carew | 513301 |
| Wynyard | 418250 |
| Stob House Farm | 457272 |
| Brierton | 476300 |
| Crimdon | 487365 |
| Cat Nab | 668216 |
| Huntcliff | 691219 |
| Newton Bewley | 475266 |
| Dalton Piercy | 465312 |
| Dinsdale | 330115 |
| Neasham | 331102 |
| The Slake | 515328 |
| Seal Sands | 525252 |

APPENDIX IILEVELLED HEIGHTS OF RAISED TERRACES

| <u>Terrace</u> | <u>Height (in feet)</u> | <u>Location</u> |
|------------------------|-------------------------|-----------------|
| Skelton Beck, Saltburn | 13.60 | 668217 |
| " " " | 13.35 | |
| " " " | 16.36 | |
| " " " | 17.26 | |
| " " " | 19.25 | 667213 |
| Windy Hill | 134.42 | 652218 |
| " " | 133.98 | |
| " " | 133.67 | |
| " " | 133.41 | |
| " " | 133.52 | |
| " " | 132.78 | |
| " " | 132.43 | |
| " " | 132.19 | |
| " " | 132.18 | 650219 |
| Ox Close Farm | 141.2 | 651211 |
| " " " | 143.16 | |
| " " " | 151.69 | |
| " " " | 152.11 | |
| " " " | 154.23 | |
| " " " | 155.07 | |
| " " " | 156.43 | |
| " " " | 154.12 | |
| " " " | 162.81 | |
| " " " | 164.45 | |
| " " " | 169.72 | |
| " " " | 170.08 | |
| " " " | 168.48 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | <u>Location</u> |
|-------------------|-------------------------|-----------------|
| Pontac Farm | 168.01 | 626211 |
| Fell Briggs | 151.40 | 613210 |
| " " | 155.82 | |
| " " | 157.15 | |
| " " | 157.44 | |
| Sparrow Park Farm | 157.67 | 621211 |
| Turners House | 84.90 | 601210 |
| " " | 85.50 | |
| " " | 84.74 | |
| " " | 83.31 | |
| " " | 84.38 | |
| " " | 84.40 | |
| " " | 85.64 | |
| " " | 85.47 | |
| " " | 83.45 | |
| " " | 84.83 | |
| " " | 84.70 | |
| " " | 84.68 | |
| Long Beck House | 84.82 | 625217 |
| Blacks Bridge | 47.43 | 621215 |
| " " | 47.28 | |
| " " | 47.14 | |
| " " | 46.97 | |
| " " | 47.39 | |
| " " | 46.98 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | <u>Location</u> |
|------------------|-------------------------|-----------------|
| Wheat Acres Farm | 46.54 | 599218 |
| Kirkleatham Hall | 55.65 | 595207 |
| " " | 55.23 | |
| " " | 54.61 | |
| " " | 54.71 | |
| " " | 55.14 | |
| " " | 55.67 | 585215 |
| ICI Wilton | 52.56 | 580210 |
| " " | 52.91 | |
| " " | 51.91 | |
| " " | 52.50 | |
| " " | 52.47 | |
| " " | 52.42 | |
| " " | 52.37 | 575209 |
| Broadway Farm | 80.44 | 560205 |
| " " | 81.20 | |
| " " | 80.47 | |
| " " | 81.13 | |
| " " | 80.78 | |
| " " | 80.91 | |
| " " | 81.37 | |
| " " | 81.55 | |
| Broadway Farm | 78.92 | 560206 |
| " " | 78.76 | |
| " " | 78.48 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | <u>Location</u> |
|------------------------|-------------------------|-----------------|
| Broadway Farm | 93.11 | 577203 |
| " " | 93.12 | |
| " " | 93.08 | |
| " " | 92.97 | |
| " " | 92.68 | |
| " " | 92.31 | |
| " " | 92.30 | |
| Town Farm | 92.17 | 582207 |
| Lackenby Hall | 75.68 | 565195 |
| " " | 75.79 | |
| " " | 76.31 | |
| " " | 77.09 | |
| " " | 77.18 | |
| Spencer Beck Farm | 100.07 | 540180 |
| " " " | 100.77 | |
| " " " | 98.59 | |
| " " " | 100.13 | |
| " " " | 100.38 | 536177 |
| Normanby High Farm | 50.69 | 535195 |
| " " " | 50.32 | |
| " " " | 49.91 | |
| " " " | 49.65 | |
| " " " | 49.42 | |
| " " " | 49.38 | 534195 |

| <u>Terrace</u> | <u>Height (in feet)</u> | | <u>Location</u> |
|--------------------|-------------------------|--------------------|-----------------|
| Coulby Manor | <u>High Terrace</u> | <u>Low Terrace</u> | 496154 |
| " " | 108.22 | 106.96 | |
| " " | 109.95 | 103.72 | |
| " " | 106.21 | 105.73 | |
| " " | 108.12 | 105.51 | |
| " " | 107.89 | 104.24 | |
| " " | | 105.26 | 494154 |
| Sandy Flats Farm | 99.63 | Low Terrace | 493158 |
| " " " | 99.37 | 46.73 | |
| " " " | 99.14 | 46.43 | |
| " " " | 99.01 | | |
| " " " | 98.94 | | |
| " " " | 98.87 | | |
| " " " | 98.93 | | 497158 |
| Stainsby Hall Farm | 77.93 | | 471152 |
| " " " | 77.40 | | |
| " " " | 77.18 | | |
| " " " | 77.29 | | |
| " " " | 77.28 | | 468152 |
| High Leven | 122.24 | 116.75 | 450123 |
| " " | 122.22 | 116.41 | |
| " " | 122.13 | 115.77 | |
| Maltby | 122.05 | 115.33 | 466137 |
| " | | 115.30 | |

| <u>Terrace</u> | | <u>Height (in feet)</u> | <u>Location</u> |
|--------------------|----|-------------------------|-----------------|
| Barwick Farm | | 76.71 | 432146 |
| Leven Mouth Farm | | 118.39 | 435122 |
| " " " | | 118.40 | |
| " " " | | 118.36 | |
| " " " | | 118.21 | |
| " " " | | 119.0 | |
| " " " | | 118.61 | |
| " " " | | 118.37 | |
| " " " | | 118.35 | |
| " " " | | 118.30 | |
| " " " | | 118.31 | |
| Morley Carr | | 118.31 | 412110 |
| Howe Hill Cottages | 1) | 77.13 | 355110 |
| " " " | | 77.77 | |
| " " " | | 78.67 | |
| " " " | | 79.04 | |
| " " " | | 79.20 | |
| " " " | | 79.50 | |
| " " " | | 80.37 | |
| " " " | | 80.45 | |
| Howe Hill Cottages | 2) | 108.12 | 355110 |
| " " " | | 106.78 | |
| Howe Hill Cottages | 3) | 113.39 | |
| " " " | | 113.95 | |
| " " " | | 113.56 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | <u>Location</u> |
|--------------------|-------------------------|-----------------|
| East of Hill House | 121.32 | 362100 |
| " " | 122.49 | |
| " " | 122.31 | |
| " " | 122.84 | |
| " " | 120.34 | |
| " " | 118.49 | |
| " " | 120.75 | |
| " " | 121.97 | |
| " " | 122.60 | |
| " " | 122.78 | |
| Rose Hill Farm | 123.23 | 358104 |
| Girsby Grange | 144.76 | 385086 |
| " " | 144.78 | |
| " " | 144.89 | |
| " " | 144.92 | |
| " " | 144.95 | |
| " " | 145.02 | |
| " " | 145.02 | |
| Old School Girsby | 1) 132.4 | 358094 |
| " " | 135.16 | |
| " " | 132.26 | |
| " " | 135.22 | |
| " " | 135.37 | |
| " " | | |
| " " | 2) 128.44 | |
| " " | 129.42 | |
| " " | 128.83 | |
| " " | 129.08 | |
| " " | 129.50 | |
| " " | 129.59 | |

| <u>Terrace</u> | | <u>Height (in feet)</u> | <u>Location</u> |
|-----------------------------|----|-------------------------|-----------------|
| Low Entercommon | 1) | 174.24 | 335060 |
| " " | | 174.55 | |
| " " | | 174.61 | |
| " " | | 174.72 | |
| " " | 2) | 166.13 | 335060 |
| " " | | 166.24 | |
| " " | | 166.41 | |
| Low Hail Farm | | 134.93 | 309097 |
| " " | | 134.40 | |
| " " | | 134.73 | |
| " " | | 134.62 | |
| " " | | 134.68 | |
| " " | | 134.62 | |
| " " | | 134.49 | |
| " " | | 134.85 | |
| Garden House Farm, Hurworth | | 118.20 | 303106 |
| " " | " | 120.22 | |
| " " | " | 119.60 | |
| " " | " | 120.22 | |
| " " | " | 118.05 | |
| " " | " | 118.05 | |
| Hurworth Moor | | 131.67 | 315121 |
| " " | | 130.94 | |
| " " | | 130.82 | |
| " " | | 131.30 | |
| " " | | 131.60 | |
| " " | | 130.75 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | <u>Location</u> |
|----------------------|-------------------------|-----------------|
| Middleton St. George | 132.82 | 355140 |
| " " | 130.82 | |
| " " | 136.69 | |
| " " | 130.91 | |
| " " | 131.60 | |
| " " | 130.73 | |
| " " | 131.12 | |
| " " | 134.57 | |
| " " | 134.78 | |
| " " | 135.87 | |
| " " | 135.55 | |
| " " | 137.55 | |
| " " | 137.45 | |
| Long Newton | 137.84 | 380162 |
| Long Newton | 113.08 | 380162 |
| " " | 116.17 | |
| " " | 115.89 | |
| " " | 113.19 | |
| " " | 115.45 | |
| " " | 117.56 | |
| " " | 119.00 | |
| " " | 117.40 | |
| " " | 116.38 | |
| " " | 116.58 | |
| Middleton St. George | 119.47 | 355140 |

| <u>Terrace</u> | | <u>Height (in feet.)</u> | <u>Location</u> |
|---------------------------|----|--------------------------|-----------------|
| Elton | | 105.73 | 401174 |
| " | | 105.77 | |
| " | | 104.78 | |
| " | | 104.67 | |
| " | | 105.39 | |
| " | | 105.13 | |
| " | | 105.76 | |
| Betty's Farm | | 106.42 | 405190 |
| Coatham Stob | 1) | 94.81 | |
| " " | | 94.82 | |
| " " | | | |
| " " | 2) | 79.75 | |
| " " | | 79.82 | |
| " " | | 79.94 | |
| " " | | 80.21 | |
| " " | | 80.29 | |
| Coatham Stob (sand layer) | 1) | 94.86 | 405162 |
| " " | | 94.86 | |
| " " | | 94.87 | |
| " " | | 94.88 | |
| " " | | 94.89 | |
| " " | | 94.89 | |
| " " | 2) | 95.33 | |
| " " | | 95.50 | |
| " " | | 95.43 | |
| " " | | 95.47 | |
| " " | | 95.54 | |
| " " | | 95.69 | |

| <u>Terrace</u> | <u>Height. (in feet)</u> | <u>Location</u> |
|------------------------|--------------------------|-----------------|
| North edge of Stockton | 59.58 | 445225 |
| | 59.63 | |
| Howden Hall | 131.96 | 415225 |
| " " | 132.20 | |
| " " | 132.95 | |
| " " | 136.24 | |
| Warren House Farm | 111.36 | 437254 |
| " " " | 111.40 | |
| " " " | 112.06 | |
| " " " | 111.98 | |
| " " " | 112.01 | |
| " " " | 112.23 | |
| " " " | 112.49 | |
| " " " | 112.59 | |
| Woodside | 176.79 | 436273 |
| " | 175.94 | |
| " | 176.67 | |
| " | 178.80 | |
| " | 177.74 | |
| Wolviston | 109.91 | 454258 |
| " | 110.36 | |
| " | 110.73 | |
| " | 110.30 | |
| " | 109.63 | |
| " | 109.44 | |
| " | 107.42 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | | <u>Location</u> |
|----------------------|-------------------------|----------|-----------------|
| Wolvison (continued) | | 106.93 | |
| " | | 108.56 | |
| " | | 106.07 | |
| " | | 108.51 | |
| " | | 110.68 | |
| Middle Burn Toft | | 109.94 | 457279 |
| Marsh House | 1) | 59.81 | 2) 59.75 |
| " " | | 59.78 | 59.51 |
| " " | | 59.78 | 59.26 |
| " " | | 59.66 | 59.25 |
| " " | | 59.57 | |
| " " | | 59.51 | |
| High Grange | | 59.23 | 457251 |
| Middle Burn Toft | 1) 53.55 | 2) 73.75 | 3) 68.45 |
| " " " | 54.01 | 73.61 | 68.45 |
| " " " | 53.14 | 73.54 | 68.41 |
| " " " | 53.02 | 73.44 | 67.55 |
| " " " | 52.44 | 73.32 | 67.45 |
| " " " | | | 67.31 |
| " " " | | | 66.48 |
| Claxton | | 61.24 | 476287 |
| " | | 61.13 | |
| " | | 61.30 | |
| " | | 61.61 | |

| <u>Terrace</u> | <u>Height (in feet)</u> | | <u>Location</u> |
|-----------------|-------------------------|----------|-----------------|
| Claxton | 1) 67.97 | 2) 45.19 | 476287 |
| " | 69.17 | | |
| " | 67.38 | | |
| " | 66.02 | | |
| | | | |
| Cowpen Bewley | 19.05 | | 483247 |
| " " | 17.51 | | |
| " " | 15.82 | | |
| " " | 14.80 | | |
| " " | 14.64 | | |
| | | | |
| Throston Grange | 60.19 | | 492341 |
| " " | 60.23 | | |
| " " | 58.33 | | |
| " " | 59.32 | | |
| " " | 60.34 | | |
| " " | 60.41 | | |
| " " | 60.52 | | |
| " " | 60.60 | | |
| " " | 60.22 | | |
| " " | 60.99 | | |
| | | | |
| Middle Warren | 60.66 | | 494346 |

APPENDIX 3METHODS OF SEDIMENTARY ANALYSES1) Particle Size Analysis - Dry Sieving

1) Encompasses Size Range -2ϕ to $+4.2\phi$ (coarse sand to fine sand).

2) Apparatus

- (a) British Standard Sieves plus shaker.
- (b) Balance accurate to 0.01 grams.
- (c) Sample Riffler.
- (d) Drying Oven (constant temperature 105° to 110°C).
- (e) Mortar and Pestle.
- (f) Evaporating dishes.
- (g) Spatulas.

3) Procedure

- (a) Sample dried.
- (b) Sample riffled to obtain 100 gram sample.
- (c) Sample checked for grain conglomerates which result from inadequate washing before drying. (Only applicable to salt water samples).
- (d) Sample sieved for up to 15 minutes.
- (e) Residue on each sieve weighed and recorded as a percentage of the total sample weight
- (f) Results recorded and presented graphically on arithmetic probability paper.

HEAVY MINERAL ANALYSIS -(See accompanying table)

Procedure

- (a) Sample residues from the British Standard Sieves 72, 100, 150, 200, rewashed to remove dust.
- (b) Sample redried.
- (c) Sample subjected to hand magnet to remove magnetic and pyrrhotite.
- (d) Sample put through S.G. Franz Isodynamic separator (electro magnet.) (At least twice if not more times to obtain best separation.
- (e) Weight of sample recorded before and after processing to determine weight loss.
- (f) Weight loss recorded as a percentage of sample size fraction.

Other Mineralogical Studies

1) Mica Content

- (a) Microscopic grain count per 1000 on each of the above four size fractions. (72, 100, 150, 200.)

Best results were obtained using X10 magnification under reflected light, with the grains on a black matt finished base.

2) Coal Content

(As above but with white background.)

3) Shell Content

(As above with black background.)

Other Mineralogical Studies - continued

4) Rock Fragments

(As above with black background and X20 magnification on smaller size fractions.)

APPENDIX 4*PARTICLE SIZE ANALYSISSamples Used for Factor Analysis 1

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 |
| 8 | 0.04 | 0.04 | - | - | 0.08 | 0.08 | 2.92 | 0.08 | 0.2 |
| 14 | 0.02 | 0.06 | 0.14 | 0.12 | 0.08 | 0.48 | 2.41 | 0.42 | 0.82 |
| 25 | 0.36 | 0.8 | 0.34 | 0.38 | 1.21 | 1.29 | 4.08 | 1.29 | 3.02 |
| 36 | 0.64 | 1.04 | 0.56 | 0.58 | 0.4 | 0.58 | 1.91 | 0.78 | 5.61 |
| 52 | 1.5 | 2.02 | 0.66 | 0.76 | 0.78 | 1.01 | 2.91 | 2.1 | 24.16 |
| 72 | 2.4 | 3.0 | 1.2 | 1.2 | 2.8 | 4.92 | 9.31 | 7.19 | 46.23 |
| 100 | 5.5 | 6.26 | 3.6 | 3.8 | 23.42 | 37.77 | 31.54 | 10.75 | 16.51 |
| 150 | 37.9 | 37.90 | 67.2 | 66.4 | 53.57 | 47.8 | 28.88 | 33.0 | 2.2 |
| 200 | 26.8 | 28.22 | 20.6 | 21.06 | 8.95 | 3.89 | 4.31 | 17.2 | 0.14 |
| 240 | 12.56 | 11.06 | 2.86 | 3.08 | 2.26 | 0.51 | 3.4 | 9.2 | 0.07 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|------|
| | Sample Number | | | | | | | | |
| | W10 | W11 | W12 | W13 | W14 | W15 | W16 | W17 | W18 |
| 8 | 0.02 | - | 0.06 | 0.2 | 0.08 | 0.1 | 0.05 | 0.1 | 0.1 |
| 14 | 0.26 | 0.2 | 0.39 | 0.45 | 0.3 | 0.4 | 0.29 | 0.2 | 0.18 |
| 25 | 2.26 | 1.68 | 1.95 | 2.6 | 1.1 | 1.2 | 1.28 | 0.85 | 0.92 |
| 36 | 4.89 | 0.7 | 1.12 | 2.89 | 1.22 | 1.15 | 1.59 | 0.3 | 0.8 |
| 52 | 10.29 | 1.48 | 2.48 | 13.49 | 5.35 | 5.21 | 5.9 | 0.53 | 0.8 |
| 72 | 41.85 | 4.18 | 6.2 | 46.15 | 17.68 | 18.1 | 18.93 | 0.62 | 1.08 |
| 100 | 27.23 | 7.2 | 8.0 | 23.91 | 19.78 | 19.07 | 19.2 | 6.1 | 6.4 |
| 150 | 4.33 | 30.7 | 31.07 | 4.09 | 34.28 | 35.98 | 34.64 | 38.42 | 40.9 |
| 200 | 0.11 | 21.0 | 18.5 | 0.1 | 12.91 | 12.1 | 11.26 | 33.5 | 28.1 |
| 240 | 0.01 | 11.12 | 10.39 | 0.01 | 3.62 | 3.47 | 3.08 | 12.28 | 12.9 |

* Appendices 4 and 5 have been restricted primarily to those samples which were used for factor analysis. This was done because many of the results were included in the text in graphical or summary table form and also because it was factor analysis which provided the key to the differentiation of depositional environments.

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W19 | W20 | W21 | W22 | W23 | W24 | W25 | W26 | W27 |
| 8 | 1.1 | 0.27 | 0.4 | 0.08 | 0.51 | 0.27 | 0.38 | 0.09 | 0.09 |
| 14 | 1.82 | 0.41 | 0.71 | 0.2 | 0.5 | 0.52 | 0.35 | 0.3 | 0.21 |
| 25 | 3.16 | 1.75 | 2.11 | 1.08 | 0.92 | 1.3 | 1.01 | 0.95 | 0.95 |
| 36 | 1.28 | 0.99 | 0.91 | 0.81 | 0.32 | 0.48 | 0.48 | 0.42 | 0.44 |
| 52 | 2.22 | 1.09 | 1.02 | 0.92 | 0.6 | 0.7 | 0.78 | 0.71 | 0.69 |
| 72 | 8.0 | 2.0 | 2.5 | 1.7 | 2.95 | 2.8 | 3.59 | 3.59 | 4.03 |
| 100 | 29.7 | 12.48 | 16.17 | 10.92 | 19.58 | 18.61 | 23.67 | 24.03 | 25.38 |
| 150 | 46.5 | 36.09 | 36.8 | 34.1 | 54.09 | 55.79 | 53.33 | 56.25 | 55.37 |
| 200 | 4.8 | 15.89 | 14.0 | 17.1 | 16.21 | 15.3 | 12.98 | 11.2 | 10.5 |
| 240 | 0.44 | 8.09 | 6.51 | 8.03 | 2.76 | 2.09 | 1.68 | 1.3 | 1.13 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W28 | W29 | W30 | W31 | W32 | W33 | W34 | W35 | W36 |
| 8 | 0.05 | 0.93 | 1.44 | 0.5 | 1.14 | 0.01 | 0.02 | 0.89 | 13.18 |
| 14 | 0.14 | 0.7 | 1.71 | 0.85 | 0.83 | 0.03 | 0.11 | 1.41 | 6.11 |
| 25 | 0.62 | 2.63 | 2.52 | 2.45 | 2.05 | 0.53 | 0.8 | 3.7 | 13.93 |
| 36 | 0.38 | 1.44 | 1.1 | 1.6 | 1.32 | 0.38 | 0.4 | 1.0 | 9.89 |
| 52 | 0.6 | 3.75 | 2.98 | 4.02 | 3.6 | 0.61 | 0.62 | 1.08 | 22.63 |
| 72 | 3.98 | 25.33 | 21.1 | 24.92 | 24.52 | 1.8 | 2.25 | 2.4 | 26.25 |
| 100 | 27.38 | 53.92 | 54.9 | 52.55 | 52.6 | 14.53 | 16.13 | 15.3 | 6.52 |
| 150 | 53.5 | 9.95 | 12.58 | 11.6 | 12.22 | 48.63 | 48.79 | 42.99 | 0.74 |
| 200 | 11.02 | 0.6 | 0.92 | 0.7 | 0.8 | 19.05 | 16.31 | 13.89 | 0.05 |
| 240 | 1.1 | 0.1 | 0.15 | 0.08 | 0.12 | 6.54 | 5.91 | 5.75 | - |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W37 | W38 | W39 | W40 | W41 | W42 | W43 | W44 | W45 |
| 8 | 0.4 | 0.6 | 3.6 | 1.1 | 2.0 | 1.81 | 2.3 | 60.9 | 57.6 |
| 14 | 1.12 | 18.6 | 3.02 | 1.1 | 1.51 | 1.23 | 1.3 | 10.7 | 9.7 |
| 25 | 2.6 | 24.42 | 7.6 | 1.9 | 1.89 | 2.08 | 1.13 | 11.92 | 12.89 |
| 36 | 2.6 | 10.41 | 5.9 | 0.98 | 0.81 | 0.98 | 0.8 | 3.32 | 4.29 |
| 52 | 14.41 | 10.52 | 15.28 | 1.7 | 1.61 | 2.01 | 1.86 | 2.6 | 3.5 |
| 72 | 48.23 | 9.0 | 36.46 | 13.6 | 13.9 | 13.47 | 15.32 | 2.0 | 3.0 |
| 100 | 23.2 | 6.51 | 18.5 | 58.4 | 59.55 | 57.89 | 59.59 | 5.7 | 5.78 |
| 150 | 4.18 | 5.97 | 5.91 | 19.82 | 17.37 | 19.73 | 15.9 | 2.21 | 2.21 |
| 200 | 0.72 | 3.21 | 1.18 | 0.8 | 1.1 | 0.7 | 0.58 | 0.14 | 0.27 |
| 240 | 0.38 | 1.52 | 0.42 | 0.1 | 0.11 | 0.1 | 0.09 | 0.08 | 0.11 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W46 | W47 | W48 | W49 | W50 | W51 | W52 | W53 | W54 |
| 8 | 70.2 | 0.18 | 0.09 | 0.15 | 0.19 | 0.13 | 0.08 | 0.41 | 0.21 |
| 14 | 11.47 | 0.25 | 0.58 | 0.6 | 0.47 | 0.49 | 0.1 | 0.8 | 0.64 |
| 25 | 11.16 | 0.8 | 3.03 | 3.48 | 1.95 | 1.59 | 1.38 | 2.21 | 1.31 |
| 36 | 2.8 | 0.62 | 4.42 | 3.56 | 2.25 | 1.5 | 0.68 | 1.2 | 0.61 |
| 52 | 1.71 | 1.95 | 12.0 | 9.23 | 7.45 | 4.82 | 1.47 | 1.81 | 1.17 |
| 72 | 0.75 | 17.37 | 23.5 | 22.78 | 23.9 | 19.0 | 6.85 | 12.1 | 6.42 |
| 100 | 1.13 | 69.1 | 32.03 | 33.1 | 37.13 | 40.5 | 65.47 | 60.02 | 62.87 |
| 150 | 0.47 | 9.38 | 20.85 | 23.81 | 23.61 | 28.9 | 22.6 | 19.64 | 25.03 |
| 200 | 0.09 | 0.12 | 1.69 | 1.75 | 1.58 | 1.7 | 0.7 | 0.76 | 0.97 |
| 240 | 0.03 | 0.05 | 0.2 | 0.18 | 0.11 | 0.2 | 0.11 | 0.11 | 0.19 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W55 | W56 | W57 | W58 | W59 | W60 | W61 | W62 | W63 |
| 8 | 0.03 | 3.0 | 3.3 | 0.15 | 0.1 | 0.1 | 0.1 | 0.1 | 0.15 |
| 14 | 0.39 | 1.88 | 2.31 | 0.79 | 1.0 | 0.45 | 0.26 | 0.32 | 0.48 |
| 25 | 0.88 | 2.6 | 3.51 | 1.87 | 1.8 | 2.5 | 0.7 | 0.82 | 1.07 |
| 36 | 0.48 | 1.06 | 1.52 | 0.77 | 0.66 | 0.89 | 0.28 | 0.3 | 0.48 |
| 52 | 1.0 | 1.95 | 2.9 | 1.11 | 1.1 | 1.02 | 0.36 | 0.48 | 0.54 |
| 72 | 5.56 | 7.32 | 9.4 | 2.16 | 1.88 | 1.9 | 0.9 | 1.1 | 1.26 |
| 100 | 62.15 | 30.05 | 29.32 | 14.4 | 12.04 | 13.06 | 9.6 | 9.62 | 10.11 |
| 150 | 27.71 | 45.6 | 41.62 | 55.26 | 56.12 | 56.0 | 62.02 | 63.0 | 59.3 |
| 200 | 1.09 | 5.1 | 4.69 | 13.35 | 16.5 | 12.41 | 20.0 | 18.02 | 20.65 |
| 240 | 0.2 | 0.41 | 0.4 | 2.89 | 2.89 | 3.0 | 3.33 | 3.2 | 3.41 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W64 | W65 | W66 | W67 | W68 | W69 | W70 | W71 | W72 |
| 8 | 0.03 | 0.06 | 0.02 | 0.37 | 0.15 | 0.08 | 0.09 | 0.1 | 0.5 |
| 14 | 0.45 | 0.6 | 0.28 | 0.6 | 0.41 | 0.42 | 0.69 | 0.68 | 0.22 |
| 25 | 1.39 | 2.31 | 1.63 | 1.6 | 1.37 | 1.25 | 2.38 | 1.29 | 2.12 |
| 36 | 0.9 | 1.3 | 1.2 | 1.0 | 0.89 | 0.99 | 0.9 | 0.55 | 0.72 |
| 52 | 3.63 | 4.43 | 3.34 | 2.9 | 2.4 | 2.72 | 1.78 | 1.67 | 1.71 |
| 72 | 16.52 | 15.21 | 15.01 | 11.0 | 9.4 | 10.3 | 9.02 | 10.99 | 9.48 |
| 100 | 22.81 | 20.2 | 21.77 | 18.58 | 17.15 | 18.3 | 23.75 | 26.29 | 24.6 |
| 150 | 27.43 | 27.6 | 27.93 | 48.7 | 50.45 | 49.98 | 32.5 | 31.7 | 31.91 |
| 200 | 11.02 | 9.67 | 9.7 | 9.89 | 11.43 | 10.78 | 10.22 | 10.81 | 12.0 |
| 240 | 4.05 | 4.91 | 4.5 | 2.41 | 2.86 | 2.46 | 4.63 | 4.63 | 5.05 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W73 | W74 | W75 | W76 | W77 | W78 | W79 | W80 | W81 |
| 8 | 0.15 | 0.02 | 0.1 | 0.01 | 0.11 | - | - | 0.15 | 0.2 |
| 14 | 0.23 | 0.2 | 0.75 | 1.1 | 0.37 | 0.28 | 0.5 | 0.6 | 0.5 |
| 25 | 1.92 | 1.88 | 2.0 | 4.22 | 2.2 | 2.91 | 2.02 | 1.65 | 1.85 |
| 36 | 0.7 | 0.78 | 0.75 | 1.2 | 0.75 | 1.1 | 0.72 | 0.61 | 1.98 |
| 52 | 1.6 | 1.7 | 1.91 | 2.09 | 1.55 | 2.11 | 1.7 | 1.6 | 5.95 |
| 72 | 8.85 | 9.35 | 10.74 | 8.97 | 8.41 | 10.19 | 10.4 | 9.18 | 18.91 |
| 100 | 23.35 | 23.52 | 25.05 | 22.44 | 22.25 | 24.15 | 25.86 | 24.5 | 3.04 |
| 150 | 33.3 | 30.9 | 32.08 | 28.32 | 33.25 | 30.2 | 31.1 | 33.8 | 34.7 |
| 200 | 11.25 | 11.48 | 11.21 | 10.84 | 11.15 | 8.02 | 9.9 | 10.81 | 2.6 |
| 240 | 5.5 | 5.32 | 4.22 | 4.95 | 5.19 | 5.78 | 4.5 | 5.1 | 0.58 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|------|-------|
| | Sample Number | | | | | | | | |
| | W82 | W83 | W84 | W85 | W86 | W87 | W88 | W89 | W90 |
| 8 | 0.07 | 0.08 | 0.1 | 0.1 | 0.09 | 0.04 | 0.02 | 0.17 | 0.4 |
| 14 | 0.3 | 0.3 | 0.42 | 0.39 | 0.3 | 0.51 | 0.12 | 0.52 | 0.88 |
| 25 | 1.22 | 1.73 | 1.89 | 1.82 | 1.7 | 1.92 | 1.0 | 3.1 | 4.47 |
| 36 | 1.84 | 2.88 | 1.92 | 4.38 | 4.45 | 4.09 | 3.55 | 2.1 | 3.28 |
| 52 | 6.35 | 8.21 | 6.34 | 19.0 | 18.9 | 18.89 | 17.81 | 3.55 | 5.4 |
| 72 | 21.03 | 24.26 | 19.48 | 44.32 | 45.3 | 45.81 | 43.62 | 5.12 | 6.68 |
| 100 | 32.34 | 30.0 | 31.79 | 23.51 | 23.48 | 22.82 | 26.89 | 9.9 | 10.42 |
| 150 | 32.13 | 28.07 | 33.78 | 5.01 | 4.93 | 4.8 | 5.95 | 37.0 | 27.78 |
| 200 | 2.1 | 2.08 | 2.51 | 0.03 | 0.1 | 0.09 | 0.1 | 19.2 | 16.18 |
| 240 | 0.62 | 0.41 | 0.3 | 0.2 | 0.12 | 0.2 | 0.27 | 4.66 | 4.1 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W91 | W92 | W93 | W94 | W95 | W96 | W97 | W98 | W99 |
| 8 | 0.39 | 0.52 | 0.18 | 0.11 | 0.01 | 0.01 | 0.21 | 0.1 | 0.17 |
| 14 | 0.58 | 1.15 | 0.9 | 0.89 | 0.6 | 0.48 | 2.6 | 0.87 | 0.71 |
| 25 | 2.9 | 2.81 | 2.3 | 2.51 | 2.64 | 2.4 | 4.65 | 2.31 | 1.49 |
| 36 | 1.98 | 1.29 | 1.0 | 0.9 | 1.21 | 0.95 | 1.32 | 0.89 | 0.7 |
| 52 | 2.6 | 1.95 | 1.38 | 1.26 | 1.53 | 1.35 | 1.6 | 1.1 | 1.04 |
| 72 | 3.36 | 3.2 | 2.65 | 2.39 | 2.71 | 2.72 | 3.55 | 2.78 | 2.5 |
| 100 | 12.0 | 13.95 | 12.88 | 14.01 | 13.5 | 13.32 | 26.92 | 13.75 | 14.7 |
| 150 | 39.75 | 41.09 | 42.41 | 41.49 | 41.53 | 41.83 | 40.62 | 44.6 | 44.32 |
| 200 | 17.48 | 16.51 | 16.78 | 16.39 | 19.1 | 17.52 | 9.55 | 15.15 | 16.87 |
| 240 | 3.61 | 2.71 | 3.63 | 3.7 | 2.83 | 2.78 | 0.6 | 2.8 | 2.98 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | W100 | W101 | W102 | W103 | W104 | W105 | W106 | W107 | W108 |
| 8 | - | - | 0.02 | - | 0.09 | 0.08 | 0.02 | 0.13 | 0.21 |
| 14 | 0.55 | 0.22 | 0.38 | 0.32 | 0.11 | 0.37 | 0.27 | 0.3 | 0.49 |
| 25 | 2.41 | 1.39 | 1.49 | 0.92 | 1.92 | 1.25 | 0.9 | 0.81 | 0.9 |
| 36 | 1.35 | 0.87 | 0.77 | 1.2 | 2.3 | 2.2 | 2.01 | 0.52 | 0.52 |
| 52 | 1.25 | 0.88 | 0.7 | 1.41 | 15.89 | 16.12 | 14.41 | 1.33 | 1.32 |
| 72 | 3.13 | 2.92 | 2.42 | 3.45 | 50.6 | 49.92 | 47.78 | 16.14 | 15.49 |
| 100 | 15.26 | 15.96 | 16.6 | 16.32 | 23.7 | 24.4 | 27.33 | 32.12 | 31.29 |
| 150 | 44.55 | 44.48 | 45.61 | 41.7 | 3.3 | 4.6 | 6.28 | 42.27 | 43.1 |
| 200 | 13.82 | 16.6 | 14.59 | 15.52 | 0.15 | 0.23 | 0.32 | 4.2 | 4.32 |
| 240 | 3.37 | 3.0 | 3.49 | 2.38 | 0.2 | 0.02 | 0.2 | 0.46 | 0.47 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|------|
| | Sample Number | | | | | | | | |
| | W109 | W110 | W111 | W112 | W113 | W114 | W115 | W116 | W117 |
| 8 | 0.07 | 0.26 | 0.16 | 0.22 | 1.01 | 0.1 | 0.21 | 0.24 | - |
| 14 | 0.29 | 0.49 | 0.29 | 0.5 | 0.61 | 0.13 | 0.69 | 0.41 | 0.3 |
| 25 | 0.77 | 1.0 | 0.7 | 1.1 | 1.29 | 0.46 | 1.8 | 1.11 | 1.66 |
| 36 | 0.43 | 0.52 | 0.39 | 0.59 | 0.5 | 0.32 | 1.0 | 1.0 | 1.0 |
| 52 | 1.3 | 1.4 | 0.63 | 0.89 | 0.59 | 0.47 | 1.2 | 1.42 | 1.3 |
| 72 | 17.53 | 17.48 | 9.41 | 11.58 | 8.23 | 7.75 | 13.42 | 10.59 | 12.1 |
| 100 | 32.88 | 33.13 | 67.56 | 63.93 | 61.91 | 66.5 | 58.86 | 62.9 | 58.8 |
| 150 | 40.61 | 39.67 | 19.71 | 19.8 | 24.11 | 22.89 | 20.9 | 20.66 | 22.3 |
| 200 | 3.7 | 3.7 | 0.5 | 0.55 | 0.62 | 0.62 | 1.0 | 0.91 | 1.31 |
| 240 | 0.46 | 0.31 | 0.05 | 0.1 | 0.1 | 0.1 | 0.13 | 0.15 | 0.2 |

| Sieve Size | Sample Number | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | W118 | W119 | W120 | W121 | W122 | W123 | W124 | W125 | W126 |
| | 8 | 0.25 | 0.13 | 0.41 | 0.4 | 0.55 | 9.67 | 32.72 | 6.7 |
| 14 | 0.4 | 0.9 | 1.4 | 0.8 | 1.92 | 14.2 | 13.28 | 12.82 | 7.12 |
| 25 | 1.35 | 5.67 | 9.46 | 6.83 | 10.88 | 18.26 | 15.85 | 29.19 | 22.12 |
| 36 | 0.87 | 10.1 | 14.39 | 12.32 | 15.02 | 10.95 | 5.91 | 16.6 | 17.11 |
| 52 | 1.03 | 21.89 | 23.0 | 25.23 | 23.89 | 12.25 | 5.27 | 13.71 | 16.05 |
| 72 | 11.97 | 38.91 | 33.75 | 38.59 | 34.32 | 16.68 | 6.5 | 12.5 | 18.6 |
| 100 | 59.1 | 17.23 | 13.5 | 12.83 | 10.8 | 8.04 | 6.28 | 5.37 | 9.7 |
| 150 | 22.41 | 3.63 | 2.77 | 2.06 | 1.65 | 4.42 | 5.1 | 1.92 | 3.36 |
| 200 | 1.26 | 0.2 | 0.12 | 0.1 | 0.08 | 3.11 | 2.9 | 0.18 | 0.27 |
| 240 | 0.18 | 0.01 | 0.01 | 0.01 | 0.01 | 0.6 | 0.5 | 0.02 | 0.05 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|------|
| | Sample Number | | | | | | | | |
| | W127 | W128 | W129 | W130 | W131 | W132 | W133 | W134 | W135 |
| 8 | 0.2 | 0.17 | 0.02 | - | - | - | 0.59 | 0.01 | 0.5 |
| 14 | 0.67 | 0.49 | 0.2 | 0.26 | 0.13 | 0.16 | 0.32 | 0.32 | 0.51 |
| 25 | 1.21 | 2.71 | 0.6 | 0.97 | 0.7 | 1.1 | 1.83 | 1.5 | 1.28 |
| 36 | 2.4 | 7.8 | 0.4 | 0.58 | 0.33 | 0.65 | 1.1 | 0.97 | 0.81 |
| 52 | 17.57 | 22.55 | 0.69 | 0.88 | 0.53 | 1.01 | 1.9 | 1.6 | 1.4 |
| 72 | 52.2 | 47.2 | 16.6 | 17.3 | 15.4 | 17.8 | 14.3 | 12.32 | 12.3 |
| 100 | 22.55 | 15.11 | 64.99 | 63.09 | 64.76 | 63.95 | 53.58 | 54.6 | 54.9 |
| 150 | 2.62 | 2.1 | 15.58 | 15.75 | 16.7 | 14.02 | 22.9 | 25.11 | 24.5 |
| 200 | 0.11 | 0.17 | 0.47 | 0.48 | 0.6 | 0.42 | 1.96 | 2.17 | 2.4 |
| 240 | 0.01 | 0.08 | 0.03 | 0.03 | 0.06 | 0.03 | 0.22 | 0.25 | 0.3 |

| Sieve Size | Percentage | | | | |
|------------|---------------|-------|-------|-------|-------|
| | Sample Number | | | | |
| | W136 | W137 | W138 | W139 | W140 |
| 8 | 0.01 | 0.12 | - | - | - |
| 14 | 0.27 | 0.12 | 0.2 | 0.1 | 0.09 |
| 25 | 1.08 | 0.65 | 0.9 | 0.5 | 0.5 |
| 36 | 0.7 | 0.38 | 0.4 | 0.31 | 0.31 |
| 52 | 1.25 | 0.4 | 0.4 | 0.32 | 0.39 |
| 72 | 11.45 | 1.8 | 2.1 | 1.76 | 2.13 |
| 100 | 53.4 | 30.47 | 32.98 | 32.53 | 33.42 |
| 150 | 28.0 | 54.4 | 53.17 | 54.56 | 53.62 |
| 200 | 2.53 | 9.49 | 8.1 | 8.1 | 7.71 |
| 240 | 0.31 | 0.72 | 0.59 | 0.55 | 0.59 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|------|-------|-------|-------|-------|------|-------|------|
| | Sample Number | | | | | | | | |
| | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 |
| 8 | - | - | - | - | - | - | - | - | - |
| 14 | - | - | - | - | - | - | - | 0.02 | - |
| 25 | 0.2 | - | 0.1 | 0.1 | 0.04 | 0.1 | 0.1 | 0.12 | 0.1 |
| 36 | 0.2 | 0.1 | 0.15 | 0.2 | 0.2 | 0.8 | 1.04 | 1.0 | 1.0 |
| 52 | 7.0 | 4.24 | 5.62 | 10.8 | 8.24 | 36.24 | 37.0 | 26.4 | 25.8 |
| 72 | 61.56 | 54.8 | 58.18 | 62.44 | 61.1 | 57.2 | 56.8 | 61.96 | 62.0 |
| 100 | 27.54 | 36.6 | 32.07 | 24.4 | 27.66 | 4.58 | 4.4 | 9.6 | 10.2 |
| 150 | 1.76 | 3.0 | 2.38 | 1.4 | 1.8 | 0.2 | 0.2 | 0.20 | 0.3 |
| 200 | 0.02 | 0.2 | 0.11 | - | - | - | - | - | - |
| 240 | - | - | - | - | - | - | - | - | - |

| Sieve Size | Percentage | | | |
|------------|---------------|------|-------|------|
| | Sample Number | | | |
| | D10 | D11 | D12 | D13 |
| 8 | - | - | - | - |
| 14 | - | - | - | - |
| 25 | - | - | 0.02 | 0.04 |
| 36 | 0.1 | 0.1 | 0.42 | 0.5 |
| 52 | 9.24 | 8.52 | 10.64 | 10.4 |
| 72 | 58.44 | 59.7 | 59.76 | 60.9 |
| 100 | 29.04 | 29.3 | 26.38 | 25.5 |
| 150 | 1.84 | 1.84 | 1.90 | 2.2 |
| 200 | 0.1 | 0.08 | 0.12 | 0.18 |
| 240 | 0.06 | 0.06 | 0.04 | 0.06 |

| Sieve Size British Standard | Percentage | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | |
| | B37 | B38 | B39 | B40 | B41 | B42 |
| 8 | 0.08 | 0.18 | 0.36 | 0.18 | 0.2 | 0.1 |
| 14 | 0.18 | 0.18 | 0.36 | 0.2 | 0.1 | 0.16 |
| 25 | 0.66 | 0.62 | 1.36 | 1.14 | 0.64 | 1.0 |
| 36 | 1.26 | 1.22 | 1.64 | 1.58 | 0.9 | 1.22 |
| 52 | 10.34 | 10.44 | 9.14 | 8.62 | 6.4 | 7.44 |
| 72 | 37.22 | 36.8 | 46.28 | 43.4 | 34.8 | 38.96 |
| 100 | 38.1 | 39.02 | 33.44 | 36.58 | 43.72 | 40.56 |
| 150 | 11.52 | 11.30 | 7.18 | 7.86 | 12.84 | 10.2 |
| 200 | 0.14 | 0.14 | 0.18 | 0.12 | 0.16 | 0.1 |
| 240 | 0.04 | 0.10 | 0.06 | 0.04 | 0.02 | 0.02 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 |
| 8 | 0.86 | 1.0 | 0.1 | 0.04 | 3.76 | 1.41 | 2.7 | 1.63 | 0.8 |
| 14 | 1.82 | 2.98 | 0.3 | 0.2 | 6.1 | 3.01 | 3.8 | 2.96 | 3.16 |
| 25 | 27.54 | 33.1 | 5.9 | 6.04 | 27.0 | 24.78 | 21.3 | 19.92 | 31.18 |
| 36 | 29.6 | 28.96 | 10.38 | 11.62 | 17.6 | 21.8 | 17.98 | 19.32 | 25.68 |
| 52 | 23.4 | 20.9 | 22.36 | 24.6 | 13.96 | 20.78 | 15.68 | 20.93 | 18.14 |
| 72 | 9.2 | 7.2 | 23.62 | 23.56 | 7.6 | 11.27 | 9.04 | 12.84 | 6.6 |
| 100 | 3.24 | 3.22 | 16.24 | 15.4 | 4.56 | 6.11 | 5.84 | 6.74 | 3.06 |
| 150 | 1.76 | 1.41 | 10.78 | 10.12 | 4.0 | 4.62 | 4.84 | 6.06 | 2.72 |
| 200 | 0.46 | 0.36 | 3.70 | 3.0 | 1.56 | 1.77 | 1.94 | 2.39 | 1.16 |
| 240 | 0.22 | 0.2 | 1.62 | 1.3 | 0.82 | 0.92 | 1.04 | 1.21 | 0.68 |

| Sieve Size | Percentage | | |
|------------|---------------|-------|-------|
| | Sample Number | | |
| | R10 | R11 | R12 |
| 8 | 2.21 | 0.34 | 0.56 |
| 14 | 5.23 | 0.76 | 1.39 |
| 25 | 39.11 | 14.4 | 19.37 |
| 36 | 24.58 | 23.04 | 26.13 |
| 52 | 14.89 | 27.86 | 27.28 |
| 72 | 4.89 | 14.62 | 12.2 |
| 100 | 2.23 | 6.81 | 5.04 |
| 150 | 3.9 | 4.97 | 3.24 |
| 200 | 0.8 | 1.92 | 1.11 |
| 240 | 0.42 | 1.0 | 0.58 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|------|-------|-------|------|-------|
| | Sample Number | | | | | | | | |
| | U1 | U2 | U3 | U4 | U5 | U6 | U7 | U8 | U9 |
| 8 | 0.4 | 0.6 | 0.4 | 1.86 | 0.4 | 0.12 | - | - | - |
| 14 | 0.84 | 1.0 | 0.84 | 0.84 | 0.24 | 0.18 | - | - | 0.02 |
| 25 | 10.0 | 9.3 | 13.6 | 12.84 | 4.26 | 4.0 | 0.04 | 0.04 | 0.1 |
| 36 | 24.2 | 21.8 | 16.5 | 16.9 | 10.9 | 10.4 | 0.06 | 0.06 | 0.1 |
| 52 | 37.4 | 36.3 | 37.7 | 38.42 | 48.2 | 48.74 | 0.22 | 0.22 | 0.38 |
| 72 | 17.30 | 18.84 | 21.26 | 21.06 | 24.4 | 25.16 | 2.7 | 2.8 | 4.2 |
| 100 | 5.04 | 6.26 | 4.4 | 4.0 | 5.52 | 5.56 | 16.2 | 17.5 | 40.2 |
| 150 | 1.7 | 2.4 | 1.74 | 1.4 | 2.44 | 2.4 | 35.02 | 34.0 | 44.64 |
| 200 | 0.2 | 0.4 | 0.4 | 0.2 | 0.6 | 0.6 | 16.16 | 16.0 | 6.84 |
| 240 | - | - | 0.12 | - | 0.1 | 0.1 | 0.2 | 3.22 | 1.4 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | U10 | U11 | U12 | U13 | U14 | U15 | U16 | U17 | U18 |
| 8 | - | - | 0.18 | 0.2 | - | 3.4 | 2.8 | 0.92 | 0.76 |
| 14 | 0.04 | 0.12 | 0.16 | 0.24 | 0.1 | 5.64 | 4.82 | 1.34 | 1.44 |
| 25 | 0.04 | 0.22 | 0.4 | 0.3 | 0.36 | 7.0 | 6.94 | 19.84 | 22.72 |
| 36 | 0.1 | 0.22 | 0.38 | 0.32 | 0.4 | 4.22 | 4.1 | 34.54 | 35.9 |
| 52 | 0.32 | 1.8 | 2.22 | 3.0 | 3.44 | 10.0 | 9.76 | 28.0 | 26.44 |
| 72 | 2.8 | 13.12 | 15.0 | 20.0 | 21.0 | 19.04 | 19.14 | 8.36 | 7.56 |
| 100 | 31.78 | 31.8 | 31.34 | 33.8 | 32.72 | 20.16 | 20.44 | 2.28 | 2.4 |
| 150 | 51.62 | 35.96 | 35.34 | 24.8 | 25.4 | 17.8 | 18.56 | 1.36 | 1.16 |
| 200 | 8.2 | 9.4 | 9.0 | 7.32 | 6.78 | 5.62 | 6.0 | 0.42 | 0.4 |
| 240 | 2.42 | 3.16 | 2.8 | 3.2 | 3.0 | 2.24 | 2.24 | 0.28 | 0.16 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | U19 | U20 | U21 | U22 | U23 | U24 | U25 | U26 | U27 |
| 8 | 0.6 | 0.64 | 0.2 | 0.24 | - | - | 2.54 | 2.6 | 1.58 |
| 14 | 0.9 | 1.0 | 0.38 | 0.4 | 0.12 | 0.18 | 2.2 | 1.6 | 2.2 |
| 25 | 8.9 | 10.22 | 5.56 | 6.9 | 3.92 | 4.42 | 10.44 | 8.62 | 6.4 |
| 36 | 20.64 | 22.38 | 21.5 | 24.2 | 23.6 | 25.78 | 15.02 | 13.76 | 10.98 |
| 52 | 39.76 | 40.1 | 42.0 | 43.34 | 48.24 | 48.68 | 26.8 | 26.16 | 26.76 |
| 72 | 17.5 | 16.18 | 18.24 | 15.84 | 15.84 | 14.6 | 21.32 | 22.0 | 23.46 |
| 100 | 5.6 | 4.82 | 6.42 | 4.8 | 3.84 | 3.42 | 11.24 | 12.5 | 13.6 |
| 150 | 2.46 | 1.94 | 2.8 | 1.72 | 1.6 | 1.2 | 5.48 | 6.6 | 8.04 |
| 200 | 0.72 | 0.54 | 0.78 | 0.4 | 0.5 | 0.42 | 1.42 | 1.84 | 2.3 |
| 240 | 0.28 | 0.26 | 0.22 | 0.24 | 0.34 | 0.14 | 0.6 | 0.76 | 0.96 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | U28 | U29 | U30 | U31 | U32 | U33 | U34 | U35 | U36 |
| 8 | 1.4 | 2.0 | 1.3 | 0.08 | 0.1 | 0.18 | 0.06 | - | - |
| 14 | 1.5 | 1.96 | 2.26 | 0.14 | 0.06 | 0.2 | 0.08 | - | - |
| 25 | 5.48 | 9.76 | 10.16 | 0.26 | 0.33 | 0.42 | 0.36 | 0.24 | 0.1 |
| 36 | 11.22 | 13.62 | 13.64 | 0.32 | 1.16 | 0.36 | 1.0 | 0.32 | 0.2 |
| 52 | 26.28 | 25.2 | 24.4 | 3.1 | 8.44 | 3.5 | 7.86 | 2.0 | 2.02 |
| 72 | 23.16 | 21.0 | 21.18 | 19.4 | 24.6 | 20.58 | 24.36 | 14.0 | 15.5 |
| 100 | 14.02 | 12.76 | 13.30 | 33.14 | 30.44 | 34.64 | 30.56 | 25.56 | 28.2 |
| 150 | 8.46 | 7.5 | 7.6 | 27.46 | 22.64 | 27.78 | 23.46 | 28.36 | 31.38 |
| 200 | 2.64 | 2.18 | 2.34 | 7.36 | 6.64 | 7.6 | 7.2 | 10.9 | 12.62 |
| 240 | 1.18 | 1.0 | 0.96 | 2.78 | 2.8 | 3.08 | 2.98 | 5.16 | 5.54 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | U37 | U38 | U39 | U40 | U41 | U42 | U43 | U44 | U45 |
| 8 | 0.2 | 0.06 | 0.6 | 0.2 | 0.2 | 0.02 | 0.4 | 0.26 | 0.04 |
| 14 | 0.2 | 0.2 | 0.46 | 0.6 | 0.24 | 0.06 | 0.2 | 0.44 | 0.16 |
| 25 | 0.48 | 0.68 | 2.24 | 0.6 | 0.78 | 0.84 | 1.22 | 1.64 | 0.66 |
| 36 | 1.84 | 1.52 | 6.0 | 6.22 | 3.06 | 3.44 | 4.42 | 5.0 | 3.02 |
| 52 | 9.62 | 11.26 | 21.8 | 22.24 | 18.18 | 19.97 | 23.5 | 25.0 | 19.8 |
| 72 | 35.74 | 35.1 | 40.36 | 39.9 | 43.24 | 44.2 | 41.3 | 40.56 | 44.88 |
| 100 | 28.96 | 28.6 | 19.04 | 19.36 | 23.24 | 20.6 | 18.56 | 18.2 | 20.84 |
| 150 | 13.78 | 13.3 | 5.6 | 5.56 | 7.36 | 6.64 | 6.0 | 5.42 | 6.56 |
| 200 | 3.8 | 3.6 | 1.14 | 1.04 | 1.5 | 1.4 | 1.4 | 1.14 | 1.36 |
| 240 | 1.4 | 1.2 | 0.44 | 0.4 | 0.2 | 0.2 | 0.6 | 0.38 | 0.42 |

| Sieve Size | Percentage | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|------|-------|
| | Sample Number | | | | | | | | |
| | U46 | U47 | U48 | U49 | U50 | U51 | U52 | U53 | U54 |
| 8 | 0.24 | 0.14 | 0.6 | - | - | - | 0.12 | - | - |
| 14 | 0.16 | 0.2 | 0.24 | 0.1 | 0.06 | - | 0.06 | - | - |
| 25 | 0.82 | 0.8 | 0.98 | 0.12 | 0.12 | 0.02 | 0.1 | 0.02 | 0.1 |
| 36 | 3.4 | 2.94 | 3.4 | 0.36 | 0.42 | 0.3 | 0.4 | 0.2 | 0.2 |
| 52 | 21.16 | 18.92 | 19.44 | 14.36 | 14.36 | 12.18 | 14.26 | 8.6 | 10.4 |
| 72 | 44.02 | 44.16 | 44.48 | 53.02 | 51.4 | 51.82 | 54.06 | 51.5 | 54.02 |
| 100 | 19.4 | 23.0 | 22.0 | 25.7 | 26.42 | 27.78 | 25.7 | 31.5 | 29.3 |
| 150 | 6.44 | 6.5 | 6.16 | 4.8 | 5.6 | 6.02 | 4.56 | 6.7 | 5.18 |
| 200 | 1.54 | 1.12 | 1.78 | 0.4 | 0.68 | 0.76 | 0.4 | 0.8 | 0.42 |
| 240 | 0.6 | 0.4 | 0.2 | 0.2 | 0.28 | 0.28 | 0.2 | 0.34 | 0.16 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Sample Number | | | | | | | | |
| | U55 | U56 | U57 | U58 | U59 | U60 | U61 | U62 | U63 |
| 8 | - | - | - | - | - | - | - | - | - |
| 14 | - | - | - | - | - | 0.04 | - | - | - |
| 25 | - | - | 0.02 | - | 0.04 | 0.04 | - | 0.04 | 0.16 |
| 36 | 0.1 | 0.06 | 0.16 | 0.16 | 0.38 | 0.32 | 0.02 | 0.1 | 0.24 |
| 52 | 5.2 | 5.58 | 7.16 | 9.0 | 13.4 | 11.96 | 0.14 | 0.26 | 0.4 |
| 72 | 47.4 | 48.22 | 50.6 | 53.4 | 52.84 | 53.58 | 0.4 | 0.36 | 0.42 |
| 100 | 35.5 | 35.2 | 32.44 | 29.48 | 25.78 | 26.8 | 12.62 | 12.56 | 18.1 |
| 150 | 9.04 | 8.58 | 7.4 | 5.98 | 5.44 | 5.42 | 45.4 | 46.04 | 47.74 |
| 200 | 1.5 | 1.2 | 1.0 | 0.64 | 0.7 | 0.6 | 22.26 | 21.72 | 18.7 |
| 240 | 0.6 | 0.4 | 0.4 | 0.26 | 0.26 | 0.22 | 13.16 | 12.8 | 10.2 |

| Sieve Size | Sample Number | | | | | | | | |
|------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | U64 | U65 | U66 | U67 | U68 | U69 | U70 | U71 | U72 |
| | 8 | - | - | - | - | - | - | - | - |
| 14 | 0.14 | - | - | - | - | - | - | - | - |
| 25 | 0.34 | 0.1 | 0.06 | 0.02 | 0.04 | 0.04 | 0.01 | 0.04 | 0.04 |
| 36 | 0.36 | 0.1 | 0.1 | 0.06 | 0.06 | 0.06 | 0.02 | 0.04 | 0.04 |
| 52 | 0.36 | 0.2 | 0.2 | 0.1 | 0.14 | 0.1 | 0.02 | 0.04 | 0.04 |
| 72 | 0.6 | 0.42 | 0.36 | 0.36 | 0.42 | 0.2 | 0.2 | 0.3 | 0.2 |
| 100 | 14.6 | 12.2 | 10.44 | 13.58 | 12.24 | 8.2 | 9.1 | 9.8 | 10.7 |
| 150 | 45.42 | 47.2 | 43.8 | 47.42 | 48.6 | 42.8 | 41.9 | 42.06 | 41.2 |
| 200 | 21.24 | 21.6 | 22.16 | 23.24 | 23.16 | 23.0 | 22.6 | 21.36 | 20.42 |
| 240 | 11.9 | 13.38 | 13.84 | 12.78 | 12.78 | 13.84 | 13.78 | 12.38 | 12.04 |

| Sieve Size British Standard | Percentage | | | | | | | | |
|-----------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|------|
| | Sample Number | | | | | | | | |
| | U73 | U74 | U75 | U76 | U77 | U78 | U79 | U80 | U81 |
| 8 | 0.3 | 0.22 | 0.4 | 0.06 | 0.42 | 0.28 | 0.3 | 0.3 | 1.08 |
| 14 | 9.72 | 7.04 | 8.8 | 4.16 | 11.6 | 5.6 | 1.42 | 0.66 | 1.62 |
| 25 | 28.06 | 23.1 | 24.82 | 16.54 | 30.0 | 21.44 | 19.7 | 14.52 | 14.9 |
| 36 | 22.64 | 22.38 | 19.4 | 17.56 | 20.16 | 19.1 | 13.7 | 15.9 | 14.3 |
| 52 | 24.56 | 26.72 | 18.72 | 20.56 | 17.38 | 20.6 | 13.49 | 17.01 | 16.6 |
| 72 | 9.9 | 12.44 | 12.58 | 16.62 | 9.8 | 15.0 | 11.1 | 12.63 | 13.1 |
| 100 | 2.58 | 4.04 | 7.6 | 11.64 | 5.24 | 9.32 | 9.45 | 9.52 | 10.5 |
| 150 | 0.86 | 2.0 | 4.5 | 7.4 | 1.82 | 5.98 | 12.48 | 11.77 | 13.4 |
| 200 | 0.2 | 0.52 | 0.24 | 2.4 | 1.04 | 1.4 | 5.2 | 7.49 | 5.39 |
| 240 | 0.12 | 0.24 | 1.70 | 1.2 | 0.14 | 0.8 | 4.9 | 1.52 | 1.62 |

| Sieve Size | Percentage | | | | | | | |
|------------|---------------|------|-------|-------|------|------|-------|-------|
| | Sample Number | | | | | | | |
| | U82 | U83 | U84 | U85 | U86 | U87 | U88 | U89 |
| 8 | 8.08 | 0.4 | 0.5 | 1.1 | - | - | 11.41 | 10.1 |
| 14 | 5.12 | 1.4 | 1.0 | 1.51 | - | - | 2.2 | 3.4 |
| 25 | 14.28 | 18.6 | 14.38 | 15.1 | 0.23 | 0.1 | 6.4 | 7.1 |
| 36 | 7.8 | 14.2 | 15.4 | 13.9 | 0.20 | 0.31 | 13.1 | 12.8 |
| 52 | 16.2 | 14.0 | 18.1 | 16.82 | 2.9 | 2.32 | 16.9 | 15.78 |
| 72 | 29.3 | 11.4 | 12.21 | 13.3 | 16.4 | 15.5 | 23.2 | 20.3 |
| 100 | 13.3 | 9.9 | 9.41 | 10.1 | 28.2 | 28.7 | 13.84 | 16.9 |
| 150 | 3.2 | 11.8 | 11.88 | 13.5 | 26.4 | 32.0 | 6.32 | 8.5 |
| 200 | 0.42 | 4.9 | 7.3 | 4.0 | 13.8 | 12.6 | 2.1 | 3.61 |
| 240 | 0.18 | 4.8 | 1.6 | 1.1 | 6.4 | 5.7 | 0.9 | 1.4 |

Samples Used for Factor Analysis 2

| <u>Seaton Carew Beach 2</u> | <u>Saltburn Beach</u> | <u>Beach N.of Saltburn</u> | <u>Marske Beach 1</u> | <u>South Gare Beach 10</u> | <u>Redcar Beach 3</u> |
|---------------------------------|---------------------------|--------------------------------|---------------------------|--------------------------------|---------------------------|
| - | 0.39 | - | 0.16 | - | 0.64 |
| - | 0.3 | 0.28 | 0.02 | - | 0.8 |
| 0.01 | 2.3 | 1.07 | 0.76 | 0.06 | 1.4 |
| 0.02 | 6.11 | 4.52 | 0.98 | 0.12 | 5.41 |
| 0.2 | 14.6 | 18.32 | 4.78 | 3.8 | 1.7 |
| 11.2 | 36.33 | 43.29 | 34.36 | 35.2 | 13.82 |
| 62.55 | 37.09 | 30.8 | 54.36 | 54.81 | 65.78 |
| 25.2 | 2.3 | 1.49 | 4.36 | 5.91 | 14.78 |
| 0.5 | 0.03 | - | 0.04 | 0.07 | 0.2 |
| 0.1 | - | - | - | - | - |

| <u>Musselborough Beach 1</u> | <u>Hartlepool Yacht Club 3</u> | <u>Hartlepool Yacht Club 1</u> | <u>Crimdon Beach 1</u> | <u>Crimdon Beach 3</u> |
|----------------------------------|------------------------------------|------------------------------------|----------------------------|----------------------------|
| 0.32 | 0.1 | 0.18 | 0.36 | 0.18 |
| 1.4 | 0.16 | 0.18 | 0.36 | 0.6 |
| 4.09 | 1.0 | 0.62 | 2.64 | 5.58 |
| 1.22 | 1.22 | 17.66 | 14.72 | 10.34 |
| 10.66 | 7.44 | 10.44 | 52.26 | 39.24 |
| 33.22 | 38.96 | 36.8 | 23.0 | 33.4 |
| 41.52 | 40.56 | 39.02 | 2.0 | 5.22 |
| 2.32 | 10.2 | 11.3 | 0.04 | 0.3 |
| 0.01 | 0.1 | 0.14 | - | - |
| - | 0.02 | 0.1 | - | - |

| <u>Droman Beach A</u> | <u>Droman Beach B</u> | <u>S. Gare Dune D</u> | <u>S. Gare Dune A</u> | <u>Cliffslip Huntcliff</u> | <u>Musselborough Sand Dune</u> |
|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------------|------------------------------------|
| - | - | - | - | - | 0.1 |
| 0.27 | 1.4 | - | - | 0.07 | 0.17 |
| 2.9 | 13.59 | 0.02 | 0.01 | 0.45 | 2.46 |
| 10.34 | 19.12 | 0.28 | 0.11 | 1.44 | 3.99 |
| 23.58 | 29.01 | 5.21 | 2.63 | 8.42 | 7.09 |
| 44.18 | 27.62 | 48.04 | 35.02 | 38.8 | 28.73 |
| 5.22 | 17.05 | 8.54 | 43.68 | 58.51 | 46.85 |
| 0.3 | 1.39 | 0.51 | 2.45 | 3.5 | 2.72 |
| - | 0.01 | 0.01 | 0.04 | 0.02 | 0.08 |
| - | - | 0.01 | - | - | 0.01 |

| <u>Crimdon Dune 2</u> | <u>Crimdon Dune 18'</u> | <u>Crimdon Dune 33'</u> | <u>Crimdon Dune 5'</u> | <u>Droman Dune B</u> |
|---------------------------|-----------------------------|-----------------------------|----------------------------|--------------------------|
| - | - | - | - | - |
| 0.02 | - | - | - | 0.07 |
| 0.12 | 0.05 | 0.1 | 0.2 | 1.5 |
| 1.0 | 0.8 | 0.2 | 0.2 | 8.35 |
| 26.4 | 36.24 | 10.8 | 7.0 | 22.98 |
| 61.96 | 57.2 | 62.44 | 61.56 | 43.8 |
| 53.87 | 9.6 | 4.58 | 24.4 | 27.54 |
| 3.1 | 0.26 | 0.2 | 1.4 | 1.76 |
| 0.07 | - | - | - | 0.02 |
| - | - | - | - | - |

| <u>Droman Dune A</u> | <u>Saltburn River Sand</u> | <u>Thorpe Thewles 4</u> | <u>Saltburn 1967 Flood</u> | <u>Thorpe Thewles 1</u> | <u>Thorpe Thewles 2</u> |
|--------------------------|--------------------------------|-----------------------------|--------------------------------|-----------------------------|-----------------------------|
| - | - | - | 4.07 | 1.41 | 1.63 |
| 0.01 | 0.06 | 0.05 | 6.61 | 3.01 | 2.96 |
| 1.55 | 1.01 | 0.32 | 29.27 | 24.78 | 19.92 |
| 9.53 | 5.42 | 5.18 | 19.08 | 21.8 | 19.32 |
| 24.85 | 18.92 | 18.3 | 15.13 | 20.78 | 20.93 |
| 42.08 | 35.51 | 36.38 | 8.24 | 11.27 | 12.84 |
| 18.98 | 24.03 | 24.37 | 4.94 | 6.11 | 6.74 |
| 2.69 | 10.42 | 10.12 | 4.33 | 4.62 | 6.06 |
| 0.27 | 2.49 | 2.4 | 1.69 | 1.77 | 2.39 |
| - | 0.83 | 0.93 | 0.89 | 1.15 | 1.21 |

| <u>Billingham Beck 1</u> | <u>Billingham Beck 2</u> | <u>Offshore SLS 10</u> | <u>Offshore SLS 4</u> | <u>Offshore LOC 2</u> |
|------------------------------|------------------------------|----------------------------|---------------------------|---------------------------|
| 0.86 | 0.04 | 0.01 | 0.05 | 0.08 |
| 1.82 | 0.2 | 0.02 | 0.29 | 0.08 |
| 27.54 | 6.04 | 0.54 | 1.28 | 1.21 |
| 29.6 | 11.62 | 0.38 | 1.59 | 0.4 |
| 23.4 | 24.6 | 0.61 | 5.9 | 0.78 |
| 9.2 | 23.56 | 1.8 | 18.93 | 2.8 |
| 3.24 | 15.4 | 14.53 | 19.2 | 23.42 |
| 1.76 | 10.12 | 48.63 | 34.64 | 53.57 |
| 0.46 | 3.0 | 19.05 | 11.26 | 8.95 |
| 0.22 | 1.3 | 6.54 | 3.08 | 2.26 |

| <u>Offshore SLS 3</u> | <u>Offshore LOC 12</u> | <u>Offshore R5</u> | <u>Offshore R1</u> | <u>Offshore LOC 16</u> | <u>Offshore SLS 9</u> | <u>Offshore R2</u> |
|---------------------------|----------------------------|------------------------|------------------------|----------------------------|---------------------------|------------------------|
| 0.06 | 0.2 | 2.3 | 1.01 | 0.02 | 0.27 | 0.25 |
| 0.6 | 0.45 | 1.3 | 0.61 | 0.26 | 0.52 | 0.04 |
| 2.31 | 2.6 | 1.13 | 1.29 | 2.26 | 1.3 | 1.35 |
| 1.3 | 2.89 | 0.8 | 0.5 | 4.89 | 0.48 | 0.87 |
| 4.43 | 13.49 | 1.86 | 0.59 | 18.29 | 0.7 | 1.03 |
| 15.21 | 46.15 | 15.32 | 8.23 | 41.85 | 2.8 | 11.97 |
| 2.02 | 28.91 | 59.59 | 61.91 | 27.23 | 18.61 | 59.1 |
| 27.6 | 4.09 | 15.9 | 24.11 | 4.33 | 55.79 | 22.41 |
| 9.67 | 0.1 | 0.58 | 0.62 | 0.11 | 15.3 | 1.26 |
| 4.91 | 0.01 | 0.09 | 0.1 | 0.01 | 2.09 | 0.18 |

| <u>Offshore R8</u> | <u>Offshore LOC 7</u> | <u>Offshore LOC 1</u> | <u>Offshore SLS 6</u> | <u>Offshore LOC 10</u> | <u>Offshore R9</u> | <u>Droman Offshore A Site 1</u> |
|------------------------|---------------------------|---------------------------|---------------------------|----------------------------|------------------------|---|
| - | 0.19 | 0.06 | 0.08 | 0.09 | - | - |
| 0.09 | 0.47 | 0.39 | 0.42 | 0.3 | 0.26 | 3.2 |
| 0.5 | 1.95 | 1.95 | 1.25 | 1.7 | 0.97 | 9.09 |
| 0.31 | 2.25 | 1.12 | 0.99 | 4.45 | 0.58 | 13.8 |
| 0.39 | 7.45 | 2.48 | 2.72 | 18.9 | 0.88 | 27.2 |
| 2.13 | 23.9 | 6.2 | 10.3 | 45.3 | 17.3 | 34.33 |
| 33.42 | 37.13 | 8.0 | 18.3 | 23.48 | 63.09 | 10.58 |
| 53.62 | 23.61 | 31.07 | 49.98 | 4.93 | 15.75 | 1.5 |
| 7.71 | 1.58 | 18.5 | 10.78 | 0.1 | 0.48 | 0.25 |
| 0.59 | 0.11 | 10.39 | 2.46 | 0.12 | 0.03 | 0.05 |

| <u>Droman Offshore B Site 1</u> | <u>Droman Offshore A Site 2</u> | <u>Droman Offshore B Site 2</u> | <u>Droman Offshore C Site 2</u> | <u>Coatham Stob Yellow Sand 1</u> | <u>Coatham Stob Yellow Sand 3</u> |
|---|---|---|---|---------------------------------------|---------------------------------------|
| - | 0.01 | - | - | 0.1 | 0.01 |
| 1.9 | 1.01 | 0.83 | 0.68 | 0.06 | 0.02 |
| 6.51 | 3.65 | 5.01 | 4.7 | 0.41 | 0.7 |
| 11.65 | 9.59 | 12.4 | 12.41 | 2.71 | 3.95 |
| 25.28 | 24.2 | 27.71 | 25.81 | 8.92 | 12.22 |
| 36.3 | 40.93 | 37.28 | 37.88 | 26.5 | 29.65 |
| 15.55 | 17.6 | 13.3 | 14.7 | 31.97 | 28.2 |
| 2.21 | 2.75 | 2.8 | 3.15 | 18.71 | 15.65 |
| 0.31 | 0.36 | 0.51 | 0.42 | 5.34 | 4.29 |
| 0.1 | 0.1 | 0.11 | 0.09 | 1.51 | 1.42 |

| <u>Coatham Stob 1</u> | <u>Coatham Stob 4</u> | <u>Coatham Stob 4 2</u> | <u>Coatham Stob 4 1</u> | <u>Coatham Stob 5 2</u> | <u>Coatham Stob Same as 3</u> | <u>Coatham Stob 3</u> |
|---------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------------|---------------------------|
| 11.53 | 2.5 | 0.12 | 0.3 | 12.5 | 0.67 | - |
| 2.22 | 0.78 | 0.42 | 0.61 | 2.7 | 0.5 | 0.07 |
| 6.24 | 4.9 | 1.37 | 1.38 | 10.53 | 0.78 | 0.04 |
| 13.12 | 8.78 | 2.8 | 2.0 | 23.2 | 4.4 | 0.85 |
| 16.88 | 12.95 | 9.36 | 5.78 | 23.37 | 17.58 | 4.48 |
| 23.2 | 21.3 | 31.19 | 20.72 | 17.8 | 39.38 | 22.09 |
| 13.71 | 21.6 | 32.07 | 35.16 | 6.61 | 23.66 | 33.85 |
| 6.4 | 15.79 | 15.57 | 22.4 | 1.81 | 8.6 | 22.95 |
| 2.08 | 4.8 | 3.6 | 5.8 | 0.4 | 1.83 | 7.12 |
| 0.82 | 1.6 | 1.03 | 1.88 | 0.15 | 0.58 | 2.31 |

| <u>Brierton Top 3A</u> | <u>Brierton 2C</u> | <u>Brierton Mid 3B</u> | <u>Brierton 3C Bottom</u> | <u>Brierton C4</u> |
|----------------------------|------------------------|----------------------------|-------------------------------|------------------------|
| 1.92 | 0.28 | 0.04 | 0.02 | 0.04 |
| 0.76 | 5.6 | 0.08 | 0.02 | 0.16 |
| 1.2 | 21.44 | 0.4 | 0.08 | 0.66 |
| 2.6 | 19.10 | 0.8 | 0.18 | 3.02 |
| 18.16 | 20.6 | 6.22 | 1.8 | 19.8 |
| 32.84 | 15.0 | 19.16 | 15.0 | 44.88 |
| 23.64 | 9.32 | 21.84 | 26.2 | 20.84 |
| 11.78 | 5.98 | 22.76 | 27.0 | 6.56 |
| 2.8 | 1.4 | 10.02 | 11.2 | 1.36 |
| 1.2 | 0.8 | 5.94 | 6.18 | 0.42 |

| <u>Brierton 4C Above 3C</u> | <u>Brierton A2</u> | <u>Brierton C2</u> | <u>Brierton C5</u> |
|-------------------------------------|------------------------|------------------------|------------------------|
| 0.18 | 1.58 | 0.6 | 0.14 |
| 0.2 | 2.2 | 0.46 | 0.2 |
| 1.22 | 6.4 | 2.24 | 0.8 |
| 2.42 | 10.98 | 6.0 | 2.94 |
| 12.94 | 26.76 | 21.8 | 18.92 |
| 31.56 | 23.46 | 40.36 | 44.16 |
| 28.92 | 13.6 | 19.04 | 23.0 |
| 15.2 | 8.04 | 5.6 | 6.5 |
| 3.3 | 2.3 | 1.14 | 1.12 |
| 1.2 | 0.96 | 0.44 | 0.4 |

| <u>Wynyard Basal Sand</u> | <u>Wynyard C</u> | <u>Wynyard A</u> | <u>Wynyard 3</u> | <u>Wynyard 2</u> |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|
| - | 0.4 | 0.4 | 0.2 | 0.6 |
| - | 0.84 | 0.84 | 0.38 | 0.9 |
| 0.04 | 10.0 | 13.6 | 5.56 | 8.9 |
| 0.06 | 24.2 | 16.5 | 21.5 | 20.64 |
| 0.22 | 37.4 | 37.7 | 42.0 | 39.76 |
| 2.7 | 17.3 | 21.26 | 18.24 | 17.5 |
| 16.2 | 5.04 | 4.4 | 6.42 | 5.6 |
| 35.02 | 1.7 | 17.4 | 2.8 | 2.46 |
| 16.16 | 0.2 | 0.4 | 0.78 | 0.72 |
| 0.2 | - | 0.12 | 0.22 | 0.28 |

| <u>Hurworth 3</u> | <u>Hurworth H3</u> | <u>Hurworth 1</u> | <u>Hurworth 5</u> | <u>Hurworth H6</u> |
|-----------------------|------------------------|-----------------------|-----------------------|------------------------|
| - | - | - | - | - |
| - | - | - | - | - |
| 0.1 | 0.02 | - | 0.04 | 0.04 |
| 0.2 | 0.2 | 0.02 | 0.07 | 0.38 |
| 0.24 | 8.6 | 0.14 | 0.11 | 13.4 |
| 0.44 | 51.5 | 0.42 | 0.22 | 52.84 |
| 13.1 | 31.5 | 13.38 | 9.16 | 25.78 |
| 49.47 | 6.7 | 48.12 | 47.83 | 5.44 |
| 22.61 | 0.8 | 23.59 | 25.7 | 0.7 |
| 14.02 | 0.34 | 13.95 | 15.47 | 0.26 |

| <u>Newton Bewley 2</u> | <u>Girsby Flat</u> | <u>Eaglescliffe 3</u> | <u>Eaglescliffe 4</u> | <u>Rockcliffe 1</u> | <u>Stockton Norton 1</u> |
|----------------------------|------------------------|---------------------------|---------------------------|-------------------------|------------------------------|
| 0.3 | - | 0.05 | 0.02 | 0.2 | - |
| 0.66 | 1.36 | 0.1 | 0.02 | 0.22 | 0.07 |
| 14.52 | 5.4 | 0.2 | 0.1 | 0.31 | 15.4 |
| 15.9 | 5.2 | 0.2 | 0.11 | 0.88 | 38.8 |
| 17.01 | 7.2 | 0.41 | 0.22 | 3.0 | 20.68 |
| 12.63 | 15.53 | 1.85 | 1.88 | 27.01 | 12.38 |
| 9.52 | 19.33 | 9.8 | 23.79 | 46.62 | 4.55 |
| 11.77 | 17.78 | 44.32 | 56.35 | 13.63 | 2.09 |
| 7.49 | 8.3 | 23.22 | 12.6 | 3.25 | 1.03 |
| 1.52 | 3.28 | 7.22 | 2.1 | 1.01 | 0.51 |

| <u>Ireland Interglac Beach</u> | <u>Edinburgh Raised Sand</u> | <u>Edinburgh Fluvio- Glacial</u> | <u>Edinburgh Raised Marine</u> | <u>Edinburgh Raised Marine</u> |
|--|--------------------------------------|--|--|--|
| - | - | - | - | - |
| 0.05 | 0.01 | - | 0.01 | - |
| 0.96 | 0.02 | 0.1 | 0.06 | 0.18 |
| 2.32 | 0.11 | 0.24 | 0.06 | 0.22 |
| 8.5 | 0.92 | 1.28 | 0.07 | 0.23 |
| 21.31 | 16.62 | 15.77 | 1.6 | 4.08 |
| 24.26 | 37.31 | 38.8 | 23.7 | 26.91 |
| 23.8 | 27.49 | 31.07 | 45.6 | 48.92 |
| 10.3 | 11.29 | 7.8 | 21.95 | 13.31 |
| - | 2.1 | 2.14 | 3.27 | 2.51 |

APPENDIX 5Mineralogical DataSamples used in Factor Analysis 2

| 1) <u>Heavy Minerals</u> (Weights in Grams) | | | | |
|---|---------------|---------------------------------|------------------------------------|----------------------|
| <u>Beach</u> | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro-Magnet</u> | <u>% Weight Loss</u> |
| <u>Seaton Carew Beach 2</u> | | | | |
| B. S. Sieves | | | | |
| 72 | 22.859 | 22.843 | 22.643 | 0.945 |
| 100 | 61.53 | 61.477 | 60.640 | 1.419 |
| 150 | 12.674 | 12.612 | 11.742 | 7.354 |
| 200 | -- | -- | -- | -- |
| Saltburn Beach | | | | |
| 72 | 36.317 | 36.271 | 35.427 | 2.451 |
| 100 | 46.561 | 46.550 | 45.513 | 2.251 |
| 150 | 2.453 | 2.411 | 2.025 | 17.448 |
| 200 | -- | -- | -- | -- |
| Beach North of Saltburn | | | | |
| 72 | 41.501 | 41.475 | 40.740 | 1.834 |
| 100 | 21.570 | 21.560 | 21.064 | 2.346 |
| 150 | 0.603 | 0.600 | 0.545 | 9.618 |
| 200 | 0.029 | 0.028 | 0.021 | 27.586 |
| Marske Beach (1) | | | | |
| 72 | 32.300 | 32.265 | 31.724 | 1.783 |
| 100 | 34.842 | 34.807 | 34.379 | 1.329 |
| 150 | 2.016 | 2.008 | 1.849 | 8.284 |
| 200 | -- | -- | -- | -- |
| South Gare 10 | | | | |
| 72 | 38.506 | 38.490 | 38.081 | 1.104 |
| 100 | 52.395 | 52.379 | 51.889 | 0.966 |
| 150 | 4.654 | 4.650 | 4.226 | 9.196 |
| 200 | -- | -- | -- | -- |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|----------------------------|---------------|---|---|------------------------------|
| Redcar Beach (3) | | | | |
| 72 | 26.014 | 26.007 | 25.697 | 1.218 |
| 100 | 56.864 | 56.830 | 56.308 | 0.978 |
| 150 | 7.819 | 7.812 | 6.974 | 10.807 |
| 200 | -- | -- | -- | -- |
| Musselborough Beach | | | | |
| 72 | 38.732 | 38.621 | 36.694 | 5.262 |
| 100 | 42.550 | 42.464 | 41.166 | 3.253 |
| 150 | 2.460 | 2.397 | 2.060 | 16.260 |
| H.Y.C. Beach 3 | | | | |
| 72 | 41.114 | 40.990 | 40.219 | 2.177 |
| 100 | 39.735 | 39.614 | 38.669 | 2.683 |
| 150 | 10.388 | 10.273 | 9.914 | 4.563 |
| H.Y.C. Beach 1 | | | | |
| 72 | 40.507 | 40.352 | 39.618 | 2.195 |
| 100 | 37.691 | 37.623 | 36.760 | 2.470 |
| 150 | 10.106 | 10.076 | 9.575 | 5.254 |
| Crimdon Beach 1 | | | | |
| 72 | 28.432 | 28.399 | 27.807 | 2.198 |
| 100 | 3.641 | 3.630 | 3.463 | 4.889 |
| 150 | 0.076 | 0.076 | 0.054 | 28.947 |
| Crimdon Beach 3 | | | | |
| 72 | 35.265 | 35.240 | 34.536 | 2.067 |
| 100 | 5.027 | 5.017 | 4.739 | 5.729 |
| 150 | 0.175 | 0.172 | 0.136 | 22.286 |
| Droman Beach A | | | | |
| 72 | 44.168 | 44.167 | 44.045 | 8.278 |
| 100 | 17.067 | 17.067 | 16.978 | 0.521 |
| 150 | 1.379 | 1.379 | 1.337 | 3.045 |
| 200 | 0.781 | 0.781 | 0.467 | 41.844 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|--------------------------------|---------------|---|---|------------------------------|
| S. Gare Dune D | | | | |
| 72 | 42.570 | 42.550 | 42.209 | 0.848 |
| 100 | 50.477 | 50.453 | 50.085 | 0.776 |
| 150 | 2.249 | 2.238 | 2.166 | 3.690 |
| S. Gare Dune A | | | | |
| 72 | 51.254 | 51.210 | 50.527 | 1.418 |
| 100 | 39.725 | 39.685 | 39.221 | 1.269 |
| 150 | 2.039 | 2.017 | 1.945 | 4.610 |
| Cliff Slip. Huntcliff | | | | |
| 72 | 40.100 | 40.089 | 39.503 | 1.489 |
| 100 | 50.448 | 50.437 | 49.755 | 1.374 |
| 150 | 2.895 | 2.870 | 2.541 | 12.228 |
| Musselborough Sand Dune | | | | |
| 72 | 40.379 | 40.292 | 39.081 | 3.214 |
| 100 | 44.123 | 44.002 | 42.501 | 3.676 |
| 150 | 1.704 | 1.634 | 1.316 | 22.770 |
| 200 | 0.107 | 0.092 | 0.052 | 51.402 |
| Crimdon Dune 2 | | | | |
| 72 | 64.030 | 64.003 | 63.376 | 1.021 |
| 100 | 24.977 | 24.951 | 24.228 | 2.999 |
| 150 | 1.275 | 1.253 | 1.098 | 13.882 |
| Crimdon Dune 18' | | | | |
| 72 | 59.396 | 59.356 | 58.597 | 1.345 |
| 100 | 3.691 | 3.684 | 3.482 | 5.662 |
| 150 | 0.064 | 0.062 | 0.042 | 34.375 |
| Crimdon Dune 33' | | | | |
| 72 | 64.912 | 64.891 | 64.192 | 1.109 |
| 100 | 23.223 | 23.193 | 22.188 | 4.457 |
| 150 | 1.053 | 1.027 | 0.834 | 20.798 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|--------------------------------------|---------------|---|---|------------------------------|
| Crimdon Dune 5' | | | | |
| 72 | 60.407 | 60.382 | 59.891 | 0.854 |
| 100 | 30.582 | 30.563 | 29.908 | 2.204 |
| 150 | 1.785 | 1.766 | 1.616 | 9.468 |
| Droman Dune B | | | | |
| 72 | 42.062 | 42.055 | 41.572 | 1.164 |
| 100 | 18.976 | 18.967 | 18.077 | 4.737 |
| 150 | 2.686 | 2.676 | 1.360 | 49.367 |
| 200 | 0.257 | 0.255 | 0.013 | 94.941 |
| Droman Dune A | | | | |
| 72 | 43.788 | 43.781 | 43.354 | 0.991 |
| 100 | 20.732 | 20.727 | 20.070 | 3.193 |
| 150 | 2.375 | 2.368 | 1.175 | 50.526 |
| 200 | 0.198 | 0.195 | 0.009 | 95.454 |
| Saltburn River Sand | | | | |
| 72 | 40.302 | 40.249 | 37.260 | 7.548 |
| 100 | 21.173 | 21.083 | 20.007 | 5.507 |
| 150 | 8.912 | 8.890 | -- | -- |
| 200 | 2.103 | 2.094 | 1.856 | 0.427 |
| Thorpe Thewles River Sand (4) | | | | |
| 72 | 13.965 | 13.954 | 13.712 | 1.812 |
| 100 | 6.042 | 6.032 | 5.938 | 1.721 |
| 150 | 3.826 | 3.818 | 3.750 | 1.986 |
| 200 | 1.615 | 1.608 | 1.577 | 2.353 |
| Saltburn River Sand | | | | |
| Oct. 1967 Flood | | | | |
| 72 | 38.143 | 38.040 | 35.082 | 8.025 |
| 100 | 21.451 | 21.379 | 20.240 | 5.645 |
| 150 | 8.478 | 8.447 | 7.959 | 6.122 |
| 200 | 1.926 | 1.917 | 1.833 | 31.776 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|-------------------------|---------------|---|---|------------------------------|
| Thorpe Thewles Beck (1) | | | | |
| 72 | 9.074 | 9.061 | 8.814 | 2.865 |
| 100 | 5.776 | 5.765 | 5.664 | 1.939 |
| 150 | 4.191 | 4.182 | 4.091 | 2.386 |
| 200 | 1.941 | 1.932 | 1.837 | 5.358 |
| Thorpe Thewles Beck (2) | | | | |
| 72 | 12.848 | 12.830 | 12.549 | 2.327 |
| 100 | 7.126 | 7.116 | 6.977 | 2.091 |
| 150 | 4.916 | 4.909 | 4.832 | 1.709 |
| 200 | 2.188 | 2.180 | 2.151 | 1.691 |
| Billingham Beck (1) | | | | |
| 72 | 25.490 | 25.464 | 25.254 | 1.428 |
| 100 | 16.325 | 16.311 | 16.072 | 1.550 |
| 150 | 9.908 | 9.891 | 9.714 | 1.958 |
| 200 | 3.452 | 3.446 | 3.412 | 1.159 |
| Billingham Beck 2 | | | | |
| 72 | 8.196 | 8.185 | 8.029 | 2.037 |
| 100 | 3.050 | 3.045 | 2.989 | 2.000 |
| 150 | 1.328 | 1.324 | 1.238 | 6.777 |
| 200 | 0.455 | 0.455 | 0.446 | 1.978 |
| Offshore S.L.S. 10 | | | | |
| 72 | 2.046 | 2.030 | 1.954 | 4.496 |
| 100 | 13.307 | 13.277 | 12.932 | 2.818 |
| 150 | 47.931 | 47.902 | 46.769 | 2.424 |
| 200 | 20.745 | 20.704 | 20.283 | 2.227 |
| Offshore S.L.S. 4 | | | | |
| 72 | 19.397 | 19.386 | 19.200 | 1.016 |
| 100 | 19.974 | 19.960 | 19.746 | 1.141 |
| 150 | 33.719 | 33.693 | 33.002 | 2.126 |
| 200 | 13.040 | 13.013 | 12.833 | 1.587 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|---------------------------|---------------|---|---|------------------------------|
| Offshore Loc. 2. | | | | |
| 72 | 2.174 | 2.161 | 2.099 | 3.450 |
| 100 | 18.114 | 18.101 | 17.770 | 1.899 |
| 150 | 57.856 | 57.805 | 56.690 | 2.015 |
| Offshore S.L.S. 3. | | | | |
| 72 | 17.924 | 17.918 | 17.659 | 1.478 |
| 100 | 21.590 | 21.555 | 21.047 | 2.515 |
| 150 | 28.413 | 28.367 | 27.554 | 3.058 |
| 200 | 11.124 | 11.065 | 10.896 | 2.050 |
| Offshore Loc. 12 | | | | |
| 72 | 49.629 | 49.629 | 48.826 | 1.618 |
| 100 | 28.804 | 28.797 | 27.678 | 3.909 |
| 150 | 3.118 | 3.095 | 2.714 | 12.957 |
| 200 | 0.127 | 0.123 | 0.097 | 23.622 |
| Offshore R.5. | | | | |
| 72 | 16.519 | 16.519 | 16.273 | 1.489 |
| 100 | 57.488 | 57.488 | 56.766 | 1.256 |
| 150 | 17.549 | 17.543 | 17.093 | 2.598 |
| 200 | 0.619 | 0.616 | 0.592 | 4.361 |
| Offshore R.1. | | | | |
| 72 | 9.709 | 9.709 | 9.516 | 1.988 |
| 100 | 65.582 | 65.582 | 64.911 | 1.023 |
| 150 | 20.380 | 20.380 | 19.876 | 2.473 |
| 200 | 0.434 | 0.430 | 0.409 | 5.760 |
| Offshore Loc. 16. | | | | |
| 72 | 43.284 | 43.268 | 42.730 | 1.280 |
| 100 | 27.240 | 27.240 | 26.351 | 3.263 |
| 150 | 4.120 | 4.086 | 3.941 | 4.345 |
| Offshore S.L.S. 9. | | | | |
| 72 | 3.082 | 3.065 | 2.996 | 2.790 |
| 100 | 18.661 | 18.648 | 18.256 | 2.170 |
| 150 | 57.585 | 57.533 | 55.767 | 3.157 |
| 200 | 14.251 | 14.165 | 13.370 | 6.182 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|--------------------------|---------------|---|---|------------------------------|
| Offshore R.2. | | | | |
| 72 | 12.302 | 12.293 | 12.104 | 1.609 |
| 100 | 57.979 | 57.962 | 55.184 | 4.821 |
| 150 | 22.331 | 22.319 | 21.925 | 1.818 |
| 200 | 0.889 | 0.878 | 0.863 | 2.925 |
| Offshore R.8. | | | | |
| 72 | 1.783 | 1.781 | 1.723 | 3.365 |
| 100 | 25.096 | 25.088 | 24.708 | 1.546 |
| 150 | 60.470 | 60.402 | 58.126 | 3.876 |
| 200 | 9.409 | 9.364 | 8.864 | 5.792 |
| Offshore Loc.7. | | | | |
| 72 | 21.362 | 21.336 | 20.987 | 1.755 |
| 100 | 37.560 | 37.512 | 35.863 | 4.518 |
| 150 | 31.385 | 31.271 | 29.424 | 6.248 |
| 200 | 1.701 | 1.664 | 1.543 | 9.289 |
| Offshore Loc.1. | | | | |
| 72 | 6.937 | 6.726 | 6.453 | 6.977 |
| 100 | 8.455 | 8.430 | 8.151 | 3.595 |
| 150 | 34.143 | 34.054 | 33.371 | 2.261 |
| 200 | 21.789 | 21.651 | 21.124 | 3.051 |
| Offshore S.L.S.6. | | | | |
| 72 | 11.379 | 11.369 | 10.971 | 3.585 |
| 100 | 18.288 | 18.271 | 17.517 | 4.216 |
| 150 | 47.719 | 47.662 | 46.453 | 2.653 |
| 200 | 12.492 | 12.427 | 12.207 | 2.281 |
| Offshore Loc.10. | | | | |
| 72 | 44.807 | 44.766 | 44.127 | 1.518 |
| 100 | 26.821 | 26.783 | 25.955 | 3.229 |
| 150 | 5.800 | 5.774 | 5.531 | 4.638 |
| 200 | 0.288 | 0.288 | 0.264 | 8.333 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|----------------------------|---------------|---|---|------------------------------|
| Offshore R.9. | | | | |
| 72 | 18.350 | 18.330 | 18.170 | 0.981 |
| 100 | 64.021 | 63.996 | 63.602 | 0.654 |
| 150 | 14.255 | 14.242 | 13.918 | 2.364 |
| 200 | 0.275 | 0.267 | 0.253 | 8.000 |
| Droman Offshore A. Site 1. | | | | |
| 72 | 34.336 | 34.336 | 33.837 | 1.453 |
| 100 | 10.551 | 10.547 | 10.202 | 3.307 |
| 150 | 1.484 | 1.480 | 1.330 | 10.377 |
| 200 | 0.232 | 0.228 | 0.202 | 12.931 |
| Droman Offshore B. Site 1. | | | | |
| 72 | 36.300 | 36.300 | 36.098 | 0.556 |
| 100 | 15.525 | 15.525 | 15.402 | 0.792 |
| 150 | 2.187 | 2.187 | 2.120 | 3.063 |
| 200 | 0.286 | 0.285 | 0.270 | 5.594 |
| Droman Offshore A. Site 2. | | | | |
| 72 | 40.927 | 40.925 | 40.591 | 0.820 |
| 100 | 17.552 | 17.548 | 17.242 | 1.766 |
| 150 | 2.705 | 2.701 | 2.487 | 8.059 |
| 200 | 0.310 | 0.310 | 0.274 | 11.612 |
| Droman Offshore B. Site 2. | | | | |
| 72 | 37.235 | 37.234 | 36.888 | 0.931 |
| 100 | 13.271 | 13.270 | 13.018 | 1.906 |
| 150 | 2.759 | 2.757 | 2.646 | 4.095 |
| 200 | 0.480 | 0.480 | 0.449 | 6.458 |
| Droman Offshore C. Site 2. | | | | |
| 72 | 37.883 | 37.883 | 37.641 | 0.638 |
| 100 | 14.699 | 14.698 | 14.510 | 1.285 |
| 150 | 3.159 | 3.157 | 3.065 | 2.975 |
| 200 | 0.433 | 0.431 | 0.411 | 5.080 |

| | Weight | Weight After Hand Magnet | Weight After Electro- Magnet | % Weight Loss |
|------------------------------|--------|-----------------------------------|---------------------------------------|---------------------|
| Coatham Stob Yellow Sand (1) | | | | |
| 72 | 29.581 | 29.547 | 28.883 | 2.360 |
| 100 | 29.903 | 29.846 | 29.179 | 2.421 |
| 150 | 18.590 | 18.564 | 18.045 | 2.932 |
| 200 | 5.200 | 5.188 | 4.880 | 6.154 |
| Coatham Stob Yellow Sand 3. | | | | |
| 72 | 33.048 | 33.026 | 32.279 | 2.327 |
| 100 | 27.777 | 27.743 | 27.119 | 2.369 |
| 150 | 13.569 | 13.551 | 13.230 | 2.498 |
| 200 | 3.227 | 3.196 | 3.138 | 2.758 |
| Coatham Stob 4. | | | | |
| 72 | 25.219 | 25.175 | 24.594 | 2.478 |
| 100 | 20.168 | 20.133 | 19.753 | 0.173 |
| 150 | 11.861 | 11.838 | 11.389 | 3.979 |
| 200 | 3.209 | 3.190 | 3.147 | 1.932 |
| Coatham Stob 1. | | | | |
| 72 | 23.945 | 23.908 | 23.247 | 2.915 |
| 100 | 12.490 | 12.438 | 12.068 | 3.379 |
| 150 | 4.914 | 4.868 | 4.564 | 7.122 |
| 200 | 1.452 | 1.429 | 1.410 | 2.892 |
| Coatham Stob Same as 3. | | | | |
| 72 | 41.154 | 41.112 | 39.781 | 3.336 |
| 100 | 15.714 | 15.690 | 15.253 | 2.934 |
| 150 | 5.181 | 5.069 | 4.972 | 4.034 |
| 200 | 1.045 | 1.036 | 0.984 | 5.837 |
| Coatham Stob. 4 (2) | | | | |
| 72 | 37.616 | 37.602 | 36.414 | 3.195 |
| 100 | 30.516 | 30.501 | 29.704 | 2.660 |
| 150 | 13.874 | 13.862 | 13.491 | 2.760 |
| 200 | 2.690 | 2.680 | 2.614 | 2.825 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|--------------------|---------------|---|---|------------------------------|
| Coatham Stob 4 (2) | | | | |
| 72 | 29.626 | 29.606 | 28.894 | 2.471 |
| 100 | 32.204 | 32.181 | 31.552 | 2.024 |
| 150 | 18.705 | 18.698 | 18.324 | 2.037 |
| 200 | 4.242 | 4.232 | 4.150 | 2.169 |
| Coatham Stob 5 (2) | | | | |
| 72 | 7.953 | 7.944 | 7.453 | 6.287 |
| 100 | 4.174 | 4.160 | 3.951 | 5.007 |
| 150 | 0.669 | 0.669 | 0.633 | 5.381 |
| Coatham Stob 3. | | | | |
| 72 | 30.928 | 30.899 | 30.164 | 2.470 |
| 100 | 30.351 | 30.321 | 29.917 | 1.430 |
| 150 | 19.460 | 19.441 | 18.876 | 3.001 |
| 200 | 6.189 | 6.161 | 5.934 | 4.120 |
| Brierton Top 3A. | | | | |
| 72 | 30.060 | 30.037 | 29.295 | 2.545 |
| 100 | 27.080 | 27.060 | 26.452 | 2.319 |
| 150 | 14.227 | 14.218 | 13.854 | 2.622 |
| 200 | 4.074 | 4.070 | 3.992 | 2.013 |
| Brierton 2C. | | | | |
| 72 | 12.638 | 12.572 | 11.727 | 7.208 |
| 100 | 6.662 | 6.641 | 6.395 | 4.008 |
| 150 | 3.249 | 3.241 | 2.827 | 12.989 |
| 200 | 0.838 | 0.834 | 0.811 | 3.222 |
| Brierton M18 3B | | | | |
| 72 | 20.260 | 20.223 | 19.744 | 2.547 |
| 100 | 21.019 | 20.995 | 20.556 | 2.203 |
| 150 | 24.211 | 24.203 | 23.569 | 2.652 |
| 200 | 11.320 | 11.256 | 11.154 | 1.466 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|----------------------|---------------|---|---|------------------------------|
| Brierton 3C Bottom | | | | |
| 72 | 17.481 | 17.466 | 17.175 | 1.750 |
| 100 | 27.782 | 27.761 | 27.169 | 2.206 |
| 150 | 25.136 | 25.113 | 24.731 | 1.611 |
| 200 | 11.759 | 11.727 | 11.623 | 1.156 |
| Brierton 4C above 3C | | | | |
| 72 | 33.329 | 33.295 | 32.420 | 2.727 |
| 100 | 28.594 | 28.587 | 27.983 | 2.137 |
| 150 | 15.499 | 15.494 | 15.289 | 1.355 |
| 200 | 3.402 | 3.398 | 3.359 | 1.264 |
| Brierton A2 | | | | |
| 72 | 25.116 | 25.077 | 24.164 | 3.790 |
| 100 | 14.115 | 14.097 | 13.690 | 3.011 |
| 150 | 7.500 | 7.492 | 7.302 | 2.640 |
| 200 | 2.518 | 2.514 | 2.464 | 2.144 |
| Brierton C2 | | | | |
| 72 | 41.935 | 41.310 | 40.079 | 4.426 |
| 100 | 19.894 | 19.854 | 19.114 | 3.921 |
| 150 | 5.023 | 5.014 | 4.794 | 4.559 |
| 200 | 1.094 | 1.094 | 1.035 | 5.393 |
| Brierton C5 | | | | |
| 72 | 45.775 | 45.759 | 44.411 | 2.980 |
| 100 | 23.654 | 23.625 | 22.824 | 3.509 |
| 150 | 6.026 | 6.016 | 5.785 | 3.999 |
| 200 | 1.099 | 1.099 | 1.075 | 2.184 |
| Wynyard Basal Sand | | | | |
| 72 | 3.041 | 3.038 | 2.958 | 2.729 |
| 100 | 21.238 | 21.221 | 20.937 | 1.417 |
| 150 | 33.090 | 33.052 | 32.506 | 1.765 |
| 200 | 13.153 | 13.136 | 10.870 | 17.357 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|--------------------|---------------|---|---|------------------------------|
| Wynyard C. | | | | |
| 72 | 19.759 | 19.676 | 18.495 | 6.397 |
| 100 | 5.795 | 5.771 | 5.544 | 4.331 |
| 150 | 1.740 | 1.734 | 1.687 | 3.046 |
| 200 | 0.310 | 0.310 | 0.295 | 4.839 |
| Wynyard A. | | | | |
| 72 | 22.857 | 22.785 | 21.749 | 4.847 |
| 100 | 4.326 | 4.305 | 4.118 | 4.808 |
| 150 | 1.312 | 1.301 | 1.269 | 3.277 |
| 200 | 0.274 | 0.272 | 0.267 | 2.555 |
| Wynyard 3 | | | | |
| 72 | 19.203 | 19.155 | 18.166 | 5.400 |
| 100 | 5.960 | 5.948 | 5.732 | 3.825 |
| 150 | 2.133 | 2.126 | 2.077 | 2.625 |
| 200 | 0.636 | 0.636 | 0.621 | 2.358 |
| Wynyard 2. | | | | |
| 72 | 18.887 | 18.824 | 17.667 | 6.459 |
| 100 | 5.584 | 5.565 | 5.332 | 4.513 |
| 150 | 1.991 | 1.984 | 1.538 | 22.752 |
| 200 | 0.604 | 0.603 | 0.590 | 2.318 |
| Hurworth 3 | | | | |
| 72 | 54.259 | 54.233 | 52.896 | 2.512 |
| 100 | 31.583 | 31.565 | 30.450 | 3.587 |
| 150 | 5.384 | 5.374 | 5.115 | 4.996 |
| 200 | 0.614 | 0.612 | 0.572 | 6.840 |
| Hurworth H3 | | | | |
| 72 | 0.356 | 0.351 | 0.335 | 5.899 |
| 100 | 14.052 | 14.034 | 13.700 | 2.505 |
| 150 | 48.625 | 48.597 | 47.802 | 1.692 |
| 200 | 21.703 | 21.681 | 21.367 | 1.548 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|-----------------|---------------|---|---|------------------------------|
| Hurworth 1 | | | | |
| 72 | 56.685 | 56.662 | 54.698 | 3.505 |
| 100 | 25.107 | 25.074 | 23.164 | 7.739 |
| 150 | 4.306 | 4.289 | 4.009 | 6.897 |
| 200 | 0.556 | 0.556 | 0.522 | 6.115 |
| Hurworth 5 | | | | |
| 72 | 51.631 | 51.614 | 50.163 | 2.843 |
| 100 | 33.415 | 33.407 | 31.997 | 4.244 |
| 150 | 6.162 | 6.154 | 6.021 | 2.288 |
| 200 | 0.873 | 0.873 | 0.834 | 4.467 |
| Hurworth H6 | | | | |
| 72 | 0.255 | 0.222 | 0.215 | 4.444 |
| 100 | 11.846 | 11.845 | 11.659 | 1.578 |
| 150 | 42.892 | 42.874 | 41.869 | 2.385 |
| 200 | 22.861 | 22.837 | 22.336 | 2.296 |
| Newton Bewley 2 | | | | |
| 72 | 13.145 | 13.116 | 12.711 | 3.299 |
| 100 | 9.639 | 9.629 | 9.460 | 1.857 |
| 150 | 10.968 | 10.948 | 10.892 | 0.693 |
| 200 | 5.618 | 5.581 | 5.557 | 1.086 |
| Girsby Flat | | | | |
| 72 | 15.581 | 15.549 | 15.301 | 1.797 |
| 100 | 19.390 | 19.390 | 19.115 | 1.418 |
| 150 | 17.813 | 17.813 | 17.714 | 0.556 |
| 200 | 8.328 | 8.324 | 8.238 | 1.081 |
| Eaglescliffe 3 | | | | |
| 72 | 1.841 | 1.833 | 1.530 | 16.893 |
| 100 | 9.832 | 9.827 | 9.593 | 2.431 |
| 150 | 44.400 | 44.398 | 43.846 | 1.248 |
| 200 | 23.268 | 23.250 | 22.854 | 1.779 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|------------------------------|---------------|---|---|------------------------------|
| Eaglescliffe 4 | | | | |
| 72 | 1.882 | 1.872 | 1.804 | 4.144 |
| 100 | 23.846 | 23.839 | 22.678 | 4.898 |
| 150 | 56.412 | 56.398 | 55.426 | 1.748 |
| 200 | 12.641 | 12.630 | 11.800 | 6.653 |
| Rockcliffe | | | | |
| 72 | 27.072 | 27.071 | 26.570 | 1.854 |
| 100 | 46.709 | 46.705 | 45.942 | 1.642 |
| 150 | 13.686 | 13.674 | 12.535 | 8.410 |
| 200 | 3.267 | 3.256 | 3.137 | 3.979 |
| Stockton-Norton 1 | | | | |
| 72 | 12.409 | 12.400 | 12.023 | 3.111 |
| 100 | 4.555 | 4.547 | 4.374 | 3.974 |
| 150 | 2.091 | 2.084 | 1.994 | 4.639 |
| 200 | 1.037 | 1.034 | 1.005 | 0.289 |
| Ireland Beach | | | | |
| 72 | 21.369 | 21.330 | 20.995 | 1.750 |
| 100 | 24.317 | 24.303 | 23.605 | 2.928 |
| 150 | 23.854 | 23.844 | 23.202 | 2.733 |
| 200 | 10.311 | 10.298 | 10.197 | 1.106 |
| Edinburgh Raised Sand | | | | |
| 72 | 3.949 | 3.938 | 3.748 | 5.090 |
| 100 | 34.439 | 34.354 | 33.224 | 3.527 |
| 150 | 43.647 | 43.537 | 42.221 | 3.267 |
| 200 | 12.276 | 12.167 | 11.533 | 6.052 |
| Edinburgh Raised Sand | | | | |
| 72 | 3.414 | 3.405 | 3.273 | 4.130 |
| 100 | 36.275 | 36.083 | 35.206 | 2.947 |
| 150 | 46.379 | 46.282 | 45.104 | 2.749 |
| 200 | 10.229 | 10.138 | 9.493 | 7.195 |

| | <u>Weight</u> | <u>Weight After Hand Magnet</u> | <u>Weight After Electro- Magnet</u> | <u>% Weight Loss</u> |
|---------------------------------|---------------|---|---|------------------------------|
| Edinburgh Raised Sand | | | | |
| 72 | 1.620 | 1.609 | 1.547 | 4.506 |
| 100 | 29.627 | 29.566 | 28.849 | 2.626 |
| 150 | 48.607 | 48.533 | 47.305 | 2.679 |
| 200 | 13.894 | 13.834 | 13.480 | 2.980 |
| Edinburgh Fluvio-Glacial | | | | |
| 72 | 20.457 | 20.397 | 19.053 | 6.863 |
| 100 | 38.272 | 38.223 | 36.364 | 4.985 |
| 150 | 28.437 | 28.067 | 26.595 | 6.477 |
| 200 | 7.346 | 7.198 | 6.655 | 9.406 |

Other Sedimentary Data

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|-----------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| <u>Seaton Carew Beach 2</u> | | | | | |
| B.S. Standard Sieves | | | | | |
| 72 | 0.0 | 15 | 1 | 138 | 18 |
| 100 | 0.0 | 2 | 1 | 140 | |
| 150 | 0.0 | 2 | 2 | 120 | |
| 200 | trace | 0.0 | 34 | 60 | |
| Saltburn Beach | | | | | |
| 72 | 0.0 | 28 | 10 | 182 | 19 |
| 100 | 0.0 | 19 | 10 | 170 | |
| 150 | 0.0 | 11 | 20 | 400 | |
| 200 | 0.0 | 0.0 | 0.0 | 79 | |
| Beach North of Saltburn | | | | | |
| 72 | 0.0 | 32 | 0.0 | 103 | 20 |
| 100 | 0.0 | 31 | 0.0 | 79 | |
| 150 | 0.0 | 28 | 10 | 68 | |
| 200 | 0.0 | | | | |
| Marske Beach (1) | | | | | |
| 72 | 0.0 | 41 | 0.0 | 303 | 17 |
| 100 | 0.0 | 5 | 0.0 | 130 | |
| 150 | 1.0 | 4 | 0.0 | 114 | |
| 200 | | | | | |
| South Gare 10 | | | | | |
| 72 | 0.0 | 4 | 0.0 | 310 | 18 |
| 100 | 3 | 3 | 0.0 | 203 | |
| 150 | 0.0 | 2 | 0.0 | 123 | |
| 200 | | | | | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|---------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Redcar Beach (3) | | | | | |
| 72 | 0.0 | 38 | 10 | 413 | 19 |
| 100 | 0.0 | 20 | 8 | 158 | |
| 150 | 1 | 4 | 2 | 123 | |
| 200 | 0.0 | 3 | 2 | 98 | |
| Musselborough Beach | | | | | |
| 72 | 0.0 | 83 | 3 | 242 | 17 |
| 100 | 0.0 | 62 | trace | 149 | |
| 150 | 0.0 | 42 | 0.0 | 82 | |
| H.Y.C. Beach (3) | | | | | |
| 72 | 0.0 | 15 | 40 | 220 | |
| 100 | 1 | 10 | 9 | 19 | |
| 150 | 8 | 0.0 | 7 | 3 | |
| H.Y.C. Beach (1) | | | | | |
| 72 | trace | 22 | 110 | 610 | 16 |
| 100 | trace | 12 | 26 | 441 | |
| 150 | 20 | 3 | 39 | 101 | |
| Crimdon Beach (1) | | | | | |
| 72 | 0.0 | 0.0 | 7 | 30 | 19 |
| 100 | 0.0 | 0.0 | 10 | 20 | |
| 150 | 0.0 | 0.0 | 11 | 19 | |
| Crimdon Beach (3) | | | | | |
| 72 | trace | 5 | 10 | 40 | 17 |
| 100 | trace | 2 | 53 | 41 | |
| 150 | trace | 2 | 79 | 40 | |
| Droman Beach A. | | | | | |
| 72 | 1 | 8 | 0.0 | 908 | 18 |
| 100 | 2 | 3 | 0.0 | 878 | |
| 150 | 0.0 | 3 | 0.0 | 803 | |
| 200 | - | - | - | - | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|-------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Droman Beach B. | | | | | |
| 72 | 3 | 2 | 0.0 | 623 | 20 |
| 100 | 2 | 1 | 0.0 | 568 | |
| 150 | 0.0 | 2 | 0.0 | 610 | |
| 200 | - | - | - | - | |
| S. Gare Dune D. | | | | | |
| 72 | 0.0 | 5 | 0.0 | 155 | 13 |
| 100 | 0.0 | 8 | 1 | 89 | |
| 150 | 0.0 | 2 | 0.0 | 152 | |
| S. Gare Dune A. | | | | | |
| 72 | 0.0 | 4 | 0.0 | 84 | 10 |
| 100 | 0.0 | 32 | 4 | 121 | |
| 150 | 0.0 | 2 | 0.0 | 89 | |
| Cliff Slip Huntcliff | | | | | |
| 72 | 0.0 | 2 | 1 | 7 | 8 |
| 100 | 0.0 | 10 | 0.0 | 7 | |
| 150 | 0.0 | 3 | 20 | 20 | |
| Musselborough Sand Dune | | | | | |
| 72 | 0.0 | 72 | 10 | 101 | 13 |
| 100 | 0.0 | 50 | 2 | 109 | |
| 150 | 0.0 | 4 | 1 | 111 | |
| 200 | 0.0 | 2 | 2 | 45 | |
| Crimdon Dune 2 | | | | | |
| 72 | 0.0 | 18 | 0.0 | 32 | 12 |
| 100 | 0.0 | 18 | 15 | 38 | |
| 150 | 0.0 | 24 | 25 | 56 | |
| Crimdon Dune 18' | | | | | |
| 72 | 0.0 | 3 | 0.0 | 3 | 11 |
| 100 | 0.0 | 21 | 12 | 98 | |
| 150 | 0.0 | 23 | 2 | 82 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|---------------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Crimdon Dune 33' | | | | | |
| 72 | 0.0 | 5 | 0.0 | 110 | 14 |
| 100 | 0.0 | 0.0 | 3 | 80 | |
| 150 | 0.0 | 10 | 20 | 110 | |
| Crimdon Dune 5' | | | | | |
| 72 | 0.0 | 10 | 0.0 | 101 | 12 |
| 100 | 0.0 | 20 | 2 | 70 | |
| 150 | 0.0 | 15 | 15 | 48 | |
| Droman Dune B. | | | | | |
| 72 | 0.0 | 3 | 0.0 | 586 | 14 |
| 100 | 0.0 | 2 | 0.0 | 632 | |
| 150 | 0.0 | 0.0 | 0.0 | 203 | |
| 200 | 0.0 | 4 | 0.0 | 58 | |
| Droman Dune A | | | | | |
| 72 | 0.0 | 1 | 0.0 | 678 | 11 |
| 100 | 0.0 | 5 | 0.0 | 312 | |
| 150 | 0.0 | 3 | 0.0 | 88 | |
| 200 | 0.0 | 2 | 0.0 | 59 | |
| Saltburn River Sand | | | | | |
| 72 | 0.0 | 140 | Trace | 0.0 | 8 |
| 100 | 8 | 130 | 28 | 0.0 | |
| 150 | 7 | 40 | 25 | 0.0 | |
| 200 | 10 | 28 | 29 | 0.0 | |
| Thorpe Thewles River Sand 4. | | | | | |
| 72 | 1 | 33 | 8 | 0.0 | 9 |
| 100 | 1 | 14 | 9 | 0.0 | |
| 150 | 4 | 12 | 10 | 0.0 | |
| 200 | 8 | 0.0 | 4 | 0.0 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|-------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Saltburn River Sand | | | | | |
| Oct. 1967 Flood | | | | | |
| 72 | trace | 30 | 0.0 | 0.0 | 9 |
| 100 | 1 | 11 | 0.0 | 0.0 | |
| 150 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 200 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Thorpée Thewles Beck 1. | | | | | |
| 72 | 0.0 | 530 | 0.0 | 0.0 | 7 |
| 100 | 0.0 | 361 | 0.0 | 0.0 | |
| 150 | 1 | 239 | 38 | 0.0 | |
| 200 | 0.0 | 219 | 36 | 0.0 | |
| Thorpée Thewles Beck 2. | | | | | |
| 72 | 0.0 | 90 | 0.0 | trace | 10 |
| 100 | 0.0 | 50 | 0.0 | trace | |
| 150 | 0.0 | 26 | 5 | 0.0 | |
| 200 | 0.0 | 8 | 27 | 0.0 | |
| Billingham Beck (1) | | | | | |
| 72 | 2 | 130 | 10 | 0.0 | 9 |
| 100 | 0.0 | 30 | 2 | 0.0 | |
| 150 | 2 | 34 | 2 | 0.0 | |
| 200 | 1 | 40 | 11 | 0.0 | |
| Billingham Beck 2. | | | | | |
| 72 | 0.0 | 40 | 0.0 | 0.0 | 8 |
| 100 | 0.0 | 10 | 0.0 | 0.0 | |
| 150 | 6 | 65 | 21 | 0.0 | |
| 200 | 2 | 73 | 18 | 0.0 | |
| Offshore S.L.S.10 | | | | | |
| 72 | 22 | 20 | 434 | 251 | 13 |
| 100 | 2 | 7 | 272 | 107 | |
| 150 | 1 | 3 | 181 | 84 | |
| 200 | 2 | 0.0 | 140 | 61 | |

| | <u>Micra</u> <u>(grains</u> <u>/1000)</u> | <u>Rock</u> <u>Frag-</u> <u>ments</u> <u>(grains</u> <u>/1000)</u> | <u>Coal</u> <u>(grains</u> <u>/1000)</u> | <u>Shell</u> <u>(grains</u> <u>/1000)</u> | <u>Surface</u> <u>Texture</u> |
|--------------------------|---|--|--|---|----------------------------------|
| Offshore S.L.S. 4 | | | | | |
| 72 | 0.0 | 30 | 10 | 168 | 14 |
| 100 | 0.0 | 31 | 8 | 111 | |
| 150 | 3 | 13 | 7 | 71 | |
| 200 | 9 | 2 | 173 | 4 | |
| Offshore LOC 2. | | | | | |
| 72 | 10 | 0.0 | 513 | 335 | 12 |
| 100 | 1 | 38 | 270 | 104 | |
| 150 | 19 | 0.0 | 218 | 114 | |
| Offshore S.L.S.3 | | | | | |
| 72 | 0.0 | 11 | 62 | 359 | 14 |
| 100 | 0.0 | 3 | 20 | 203 | |
| 150 | 3 | 4 | 85 | 110 | |
| 200 | 14 | 4 | 90 | 18 | |
| Offshore LOC.12 | | | | | |
| 72 | 2 | 11 | 7 | 160 | 15 |
| 100 | 8 | 11 | 13 | 90 | |
| 150 | 3 | 8 | 43 | 92 | |
| 200 | 5 | 23 | 80 | 41 | |
| Offshore R.5 | | | | | |
| 72 | 0.0 | 10 | 10 | 362 | 9 |
| 100 | 0.0 | 7 | 8 | 158 | |
| 150 | trace | 3 | 4 | 92 | |
| 200 | trace | trace | 3 | 78 | |
| Offshore R.1 | | | | | |
| 72 | 5 | 8 | 12 | 303 | 12 |
| 100 | 2 | trace | 2 | 212 | |
| 150 | trace | 4 | 2 | 83 | |
| 200 | 3 | 0.0 | 23 | 91 | |
| Offshore LOC.16 | | | | | |
| 72 | 0.0 | 40 | 31 | 310 | 14 |
| 100 | 0.0 | 10 | 30 | 150 | |
| 150 | 0.0 | 3 | 45 | 111 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|-------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Offshore S.L.S.9 | | | | | |
| 72 | 0.0 | 37 | 142 | 264 | 12 |
| 100 | 0.0 | 36 | 15 | 111 | |
| 150 | 2 | 20 | 11 | 61 | |
| 200 | 1 | 18 | 49 | 2 | |
| Offshore R.2 | | | | | |
| 72 | 0.0 | 10 | 0.0 | 170 | 8 |
| 100 | 0.0 | 0.0 | 0.0 | 10 | |
| 150 | 0.0 | 19 | 17 | 0.0 | |
| 200 | 0.0 | 7 | 2 | 3 | |
| Offshore R.8 | | | | | |
| 72 | 0.0 | 3 | 11 | 372 | 11 |
| 100 | 1 | 5 | 7 | 103 | |
| 150 | 3 | 0.0 | 5 | 58 | |
| 200 | 5 | 0.0 | 2 | 20 | |
| Offshore LOC.7 | | | | | |
| 72 | 0.0 | 29 | 21 | 60 | 13 |
| 100 | 0.0 | 19 | 50 | 68 | |
| 150 | 0.0 | 22 | 41 | 32 | |
| 200 | trace | 12 | 38 | 28 | |
| Offshore LOC 1 | | | | | |
| 72 | 12 | 32 | 177 | 165 | 13 |
| 100 | 7 | 23 | 434 | 89 | |
| 150 | 70 | 15 | 111 | 48 | |
| 200 | 3 | 25 | 72 | 23 | |
| Offshore S.L.S.6 | | | | | |
| 72 | 9 | 43 | 50 | 210 | 13 |
| 100 | 1 | 12 | 45 | 54 | |
| 150 | trace | 11 | 29 | 10 | |
| 200 | trace | 8 | 10 | 10 | |
| Offshore LOC.10 | | | | | |
| 72 | 0.0 | 8 | 32 | 34 | 12 |
| 100 | 0.0 | 19 | 18 | 140 | |
| 150 | trace | 38 | 31 | 17 | |
| 200 | 0.0 | 12 | 4 | 51 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|-----------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Offshore R.9 | | | | | |
| 72 | trace | 1 | 1 | 300 | 10 |
| 100 | trace | 0.0 | 1 | 51 | |
| 150 | trace | 0.0 | 3 | 30 | |
| 200 | trace | 0.0 | 5 | 11 | |
| Droman Offshore A Site 1. | | | | | |
| 72 | 5 | 9 | 0.0 | 450 | 12 |
| 100 | 4 | 48 | 0.0 | 500 | |
| 150 | 3 | 28 | 0.0 | 410 | |
| 200 | 4 | 12 | 0.0 | 420 | |
| Droman Offshore B.Site 1 | | | | | |
| 72 | 8 | 25 | 0.0 | 580 | 14 |
| 100 | 0.0 | 12 | 0.0 | 420 | |
| 150 | 1 | 19 | 0.0 | 520 | |
| 200 | 0.0 | 135 | 0.0 | 350 | |
| Droman Offshore A.Site 2. | | | | | |
| 72 | 0.0 | 80 | 0.0 | 400 | 15 |
| 100 | 0.0 | 55 | 0.0 | 425 | |
| 150 | 0.0 | 36 | 0.0 | 350 | |
| 200 | 0.0 | 142 | 0.0 | 284 | |
| Droman Offshore B.Site 2. | | | | | |
| 72 | 0.0 | 11 | 0.0 | 743 | 11 |
| 100 | 0.0 | 4 | 0.0 | 648 | |
| 150 | 0.0 | 5 | 0.0 | 724 | |
| 200 | 0.0 | 35 | 0.0 | 803 | |
| Droman Offshore C. Site 2. | | | | | |
| 72 | 2 | 17 | 0.0 | 621 | 10 |
| 100 | 1 | 13 | 0.0 | 785 | |
| 150 | 0.0 | 15 | 0.0 | 652 | |
| 200 | 0.0 | 65 | 0.0 | 429 | |
| Coatham Stob Yellow Sand 1. | | | | | |
| 72 | 0.0 | 41 | 8 | 0.0 | 11 |
| 100 | 0.0 | 10 | 3 | 0.0 | |
| 150 | 5 | 50 | 0.0 | 0.0 | |
| 200 | 12 | 15 | 0.0 | trace | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|-----------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Coatham Stob Yellow Sand 3. | | | | | |
| 72 | trace | 23 | 2 | 0.0 | 7 |
| 100 | 0.0 | 30 | 31 | 0.0 | |
| 150 | trace | 20 | 4 | 0.0 | |
| 200 | trace | 13 | 10 | 0.0 | |
| Coatham Stob 4 | | | | | |
| 72 | 10 | 83 | 23 | 0.0 | 14 |
| 100 | 10 | 41 | 17 | 0.0 | |
| 150 | 11 | 18 | trace | 0.0 | |
| 200 | 10 | 0.0 | 4 | 0.0 | |
| Coatham Stob 1. | | | | | |
| 72 | 0.0 | 39 | 2 | 0.0 | 11 |
| 100 | 0.0 | 21 | 38 | 0.0 | |
| 150 | 0.0 | 17 | 57 | 0.0 | |
| 200 | 5 | 0.0 | 78 | 0.0 | |
| Coatham Stob, Same as 3. | | | | | |
| 72 | 0.0 | 14 | 11 | 0.0 | 8 |
| 100 | 0.0 | 5 | 2 | 0.0 | |
| 150 | 0.0 | 3 | 0.0 | 0.0 | |
| 200 | 31 | 0.0 | 5 | 0.0 | |
| Coatham Stob 4.(2) | | | | | |
| 72 | 0.0 | 54 | 22 | trace | 10 |
| 100 | 0.0 | 23 | 8 | 0.0 | |
| 150 | 0.0 | 15 | 2 | 0.0 | |
| 200 | 0.0 | 11 | 1 | trace | |
| Coatham Stob 4(1) | | | | | |
| 72 | 1 | 37 | 22 | trace | 9 |
| 100 | 3 | 32 | 20 | trace | |
| 150 | 10 | 33 | 20 | trace | |
| 200 | 11 | 3 | 21 | trace | |
| Coatham Stob 5(2) | | | | | |
| 72 | 0.0 | 70 | 32 | trace | 12 |
| 100 | trace | 42 | 25 | trace | |
| 150 | 1 | 41 | 10 | trace | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|----------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Coatham Stob 3 | | | | | |
| 72 | trace | 18 | 10 | 0.0 | 11 |
| 100 | trace | 15 | 7 | 0.0 | |
| 150 | 1 | 2 | 27 | 0.0 | |
| 200 | 1 | 2 | 1 | 0.0 | |
| Brierton, Top 3A | | | | | |
| 72 | 0.0 | 165 | 3 | 0.0 | 7 |
| 100 | 0.0 | 45 | 15 | 0.0 | |
| 150 | 2 | 3 | 9 | 0.0 | |
| 200 | 5 | 2 | 12 | 0.0 | |
| Brierton 2C | | | | | |
| 72 | 0.0 | 130 | 11 | 0.0 | 6 |
| 100 | 1 | 42 | 12 | 0.0 | |
| 150 | 7 | 20 | 10 | 0.0 | |
| 200 | 5 | 0.0 | 10 | 0.0 | |
| Brierton Mid 3B | | | | | |
| 72 | 1 | 52 | 40 | 0.0 | 10 |
| 100 | 20 | 30 | 21 | 0.0 | |
| 150 | 8 | 19 | 11 | 0.0 | |
| 200 | 11 | 3 | 6 | 0.0 | |
| Brierton 3C.Bottom | | | | | |
| 72 | 0.0 | 61 | 27 | 0.0 | 8 |
| 100 | 4 | 40 | 30 | 0.0 | |
| 150 | 9 | 12 | 20 | 0.0 | |
| 200 | 8 | 2 | 10 | 0.0 | |
| Brierton 4C above 3C | | | | | |
| 72 | 1 | 71 | 28 | 0.0 | 9 |
| 100 | 2 | 22 | 10 | 0.0 | |
| 150 | 1 | 11 | 8 | 0.0 | |
| 200 | trace | 2 | 8 | 0.0 | |
| Brierton A2 | | | | | |
| 72 | trace | 28 | 0.0 | 0.0 | 8 |
| 100 | 10 | 28 | trace | 0.0 | |
| 150 | 9 | 7 | 1 | 0.0 | |
| 200 | 11 | 0.0 | 2 | 0.0 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|---------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Brierton C2 | | | | | |
| 72 | 10 | 28 | 10 | 0.0 | 8 |
| 100 | 0.0 | 31 | 11 | 0.0 | |
| 150 | 3 | 30 | 8 | 0.0 | |
| 200 | 5 | 5 | 3 | 0.0 | |
| Brierton C5 | | | | | |
| 72 | 0.0 | 62 | trace | 0.0 | 7 |
| 100 | 0.0 | 54 | trace | 0.0 | |
| 150 | 1 | 41 | trace | 0.0 | |
| 200 | 5 | 13 | trace | 0.0 | |
| Wynyard Basal Sand | | | | | |
| 72 | 2 | 332 | 10 | 0.0 | 13 |
| 100 | 1 | 96 | 3 | 0.0 | |
| 150 | 1 | 72 | 1 | 0.0 | |
| 200 | 2 | 60 | 20 | 0.0 | |
| Wynyard C. | | | | | |
| 72 | trace | 240 | trace | 0.0 | 6 |
| 100 | trace | 180 | 0.0 | 0.0 | |
| 150 | trace | 150 | trace | 0.0 | |
| 200 | trace | 160 | trace | 0.0 | |
| Wynyard A. | | | | | |
| 72 | 0.0 | 168 | 0.0 | 0.0 | 7 |
| 100 | 0.0 | 99 | trace | 0.0 | |
| 150 | 0.0 | 71 | 0.0 | 0.0 | |
| 200 | 1 | 41 | 0.0 | 0.0 | |
| Wynyard 3. | | | | | |
| 72 | 0.0 | 200 | 0.0 | 0.0 | 8 |
| 100 | 0.0 | 309 | 0.0 | 0.0 | |
| 150 | 0.0 | 260 | trace | 0.0 | |
| 200 | 0.0 | 260 | trace | 0.0 | |
| Wynyard 2. | | | | | |
| 72 | 0.0 | 180 | 0.0 | 0.0 | 7 |
| 100 | 0.0 | 130 | 5 | 0.0 | |
| 150 | trace | 103 | 0.0 | 0.0 | |
| 200 | trace | 71 | 0.0 | 0.0 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Hurworth 3 | | | | | |
| 72 | trace | 98 | 100 | 0.0 | 10 |
| 100 | trace | 10 | 20 | 0.0 | |
| 150 | trace | 10 | 15 | 0.0 | |
| 200 | 1 | 9 | 11 | 0.0 | |
| Hurworth H.3 | | | | | |
| 72 | 111 | 233 | 183 | 0.0 | 11 |
| 100 | 84 | 70 | 53 | 0.0 | |
| 150 | 2 | 25 | 32 | 0.0 | |
| 200 | 2 | 0.0 | 10 | 0.0 | |
| Hurworth 1. | | | | | |
| 72 | 0.0 | 90 | 20 | 0.0 | 10 |
| 100 | 0.0 | 60 | 30 | 0.0 | |
| 150 | 0.0 | 170 | 11 | 0.0 | |
| 200 | 0.0 | 41 | 17 | 0.0 | |
| Hurworth 5. | | | | | |
| 72 | 0.0 | 39 | 11 | 0.0 | 12 |
| 100 | 0.0 | 31 | 10 | 0.0 | |
| 150 | 0.0 | 29 | 19 | 0.0 | |
| 200 | 0.0 | 42 | 23 | 0.0 | |
| Hurworth H6 | | | | | |
| 72 | 106 | 100 | 75 | 0.0 | 14 |
| 100 | 29 | 30 | 45 | 0.0 | |
| 150 | 9 | 0.0 | 15 | 0.0 | |
| 200 | 2 | 0.0 | 15 | 0.0 | |
| Newton Bewley 2. | | | | | |
| 72 | trace | 250 | 0.0 | 0.0 | 8 |
| 100 | trace | 58 | trace | 0.0 | |
| 150 | 2 | 80 | 0.0 | 0.0 | |
| 200 | 2 | 8 | 0.0 | 0.0 | |
| Girsby Flat | | | | | |
| 72 | 234 | 521 | 178 | 0.0 | 10 |
| 100 | 92 | 183 | 42 | 0.0 | |
| 150 | 41 | 72 | 19 | 0.0 | |
| 200 | 10 | 20 | 2 | 0.0 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|------------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Eaglescliffe 3. | | | | | |
| 72 | 50 | 341 | 149 | 0.0 | 12 |
| 100 | 20 | 110 | 28 | 0.0 | |
| 150 | 2 | 67 | 2 | 0.0 | |
| 200 | 11 | 6 | 1 | 0.0 | |
| Eaglescliffe 4. | | | | | |
| 72 | 70 | 682 | 73 | 0.0 | 14 |
| 100 | 59 | 151 | 20 | 0.0 | |
| 150 | 27 | 32 | 5 | 0.0 | |
| 200 | 1 | 2 | 3 | 0.0 | |
| Rockcliffe | | | | | |
| 72 | 1 | 41 | 30 | 0.0 | 11 |
| 100 | 1 | 24 | 19 | 0.0 | |
| 150 | 3 | 17 | 21 | 0.0 | |
| 200 | 1 | 7 | 61 | 0.0 | |
| Stockton-Norton 1. | | | | | |
| 72 | 0.0 | 18 | 8 | 0.0 | 12 |
| 100 | 2 | 3 | 1 | 0.0 | |
| 150 | 8 | 0.0 | 1 | 0.0 | |
| 200 | 22 | 0.0 | 0.0 | 0.0 | |
| Ireland Beach | | | | | |
| 72 | 0.0 | 2 | 0.0 | 1 | 17 |
| 100 | 0.0 | 1 | 0.0 | 2 | |
| 150 | 4 | 0.0 | 0.0 | 3 | |
| 200 | 2 | 0.0 | 0.0 | 3 | |
| Edinburgh Raised Sand | | | | | |
| 72 | 300 | 89 | 310 | 0.0 | 9 |
| 100 | 1 | 112 | 31 | 0.0 | |
| 150 | 5 | 13 | 50 | 0.0 | |
| 200 | 1 | 51 | 40 | 0.0 | |
| Edinburgh Raised Sand | | | | | |
| 72 | 70 | 90 | 61 | 0.0 | 10 |
| 100 | 2 | 20 | 15 | 0.0 | |
| 150 | 7 | 20 | 39 | 0.0 | |
| 200 | 2 | 4 | 3 | 0.0 | |

| | <u>Micra</u> (grains /1000) | <u>Rock</u> <u>Frag-</u> <u>ments</u> (grains /1000) | <u>Coal</u> (grains /1000) | <u>Shell</u> (grains /1000) | <u>Surface</u> <u>Texture</u> |
|----------------------------|-----------------------------------|--|----------------------------------|-----------------------------------|----------------------------------|
| Edinburgh Raised Sand | | | | | |
| 72 | 62 | 89 | 120 | 0.0 | 8 |
| 100 | 23 | 41 | 42 | 0.0 | |
| 150 | 3 | 52 | 60 | 0.0 | |
| 200 | 3 | 51 | 50 | 0.0 | |
| Edinburgh Fluvial-glacial. | | | | | |
| 72 | 5 | 72 | 72 | 0.0 | 11 |
| 100 | 1 | 40 | 18 | 0.0 | |
| 150 | 2 | 15 | 10 | 0.0 | |
| 200 | 3 | 4 | 7 | 0.0 | |

