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LITHOTOPE ANALYSIS AT SEVEN TIME LEVELS WITHIN MISSISSIPPI SOUND

Summary Report for the period
January 1, 1982 - June 30, 1983

by

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MODERN AND ANCIENT SEDIMENTARY PROCESSES AND RESPONSES WITHIN THE MISSISSIPPI-ALABAMA LINEAR-BARRIER-COASTAL SYSTEM

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LITHOTOPE ANALYSIS AT SEVEN TIME
LEVELS WITHIN MISSISSIPPI SOUND

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INTRODUCTION

Modern day sedimentation response patterns are easily studied and readily identified within any dynamic sedimentation system such as Mississippi Sound. All to often we tend to assume when observing present day sedimentation systems that there has been little or no variation in response patterns through short spans of geologic time; about 5000 years.

The objective of this study is to examine variations in sedimentation patterns within the Mississippi Sound depositional system over the past 5500 years. Accomplishing this objective serves the purpose of determining any cyclicity and response characteristics in the depositional patterns which would allow the prediction of future sedimentary process-response patterns.

An objective as such can be accomplished by a lithotope analysis at arbitrarily selected time levels. A lithotope analysis is accomplished by reconstructing the lithofacies based on grain-size distribution of the sediment at each time level. The ultimate goal is the reconstruction of the lithotopes or depositional environments for each time level. Knowing the composition of the sediment facies at each level would enhance the reconstruction of lithofacies but basically is not absolutely necessary if dealing only with detrital clastics.

PROCEDURE

Seven equivalent and equally spaced subsurface levels were selected arbitrarily and sampled from cores taken at 39 sites within Mississippi Sound (Figure 1). Subsurface in the sense of this study means below the modern sediment-water interface. Seven levels were selected, however only 11 cores penetrated the lowermost level. Meager penetration as such did not provide an adequate number of samples from which information could be obtained for a complete lithofacies reconstruction. Only 23 cores penetrated the next to lowermost level which did provide an adequate number of samples enabling a lithofacies reconstruction. The area at this level for which reconstruction was not possible is the present central portion of the Sound.

Sampling intervals began at the arbitrarily selected depth of 20 cm.(7.87 inches) below the sediment-water interface. Each lithotope level from which sediment was sampled consisted of a 16 cm.(6.3 inches) interval. A 50 gram split was taken from each core at each level provided that level was penetrated. The interval thickness was calculated as an average adjustment for bottom irregularities that may have existed for each past depositional interface. Furthermore, the vertical position of the uppermost level, level A, was established based on an adjustment relative to present-day bathymetry at each core site and sea level (Figure 2). Finally, the vertical spacing between each lithotope level was arbitrarily selected at 91.4 cm. or three feet.

TABLE 1

Lithotope Level	Depth in cm	Lithotope Time in yrs
A	-20 to -36	230
B	-127 to -143	1170
C	-234 to -250	2018
D	-340 to -356	2854
E	-447 to -463	3732
F	-557 to -570	4634
G	-661 to -677	5487

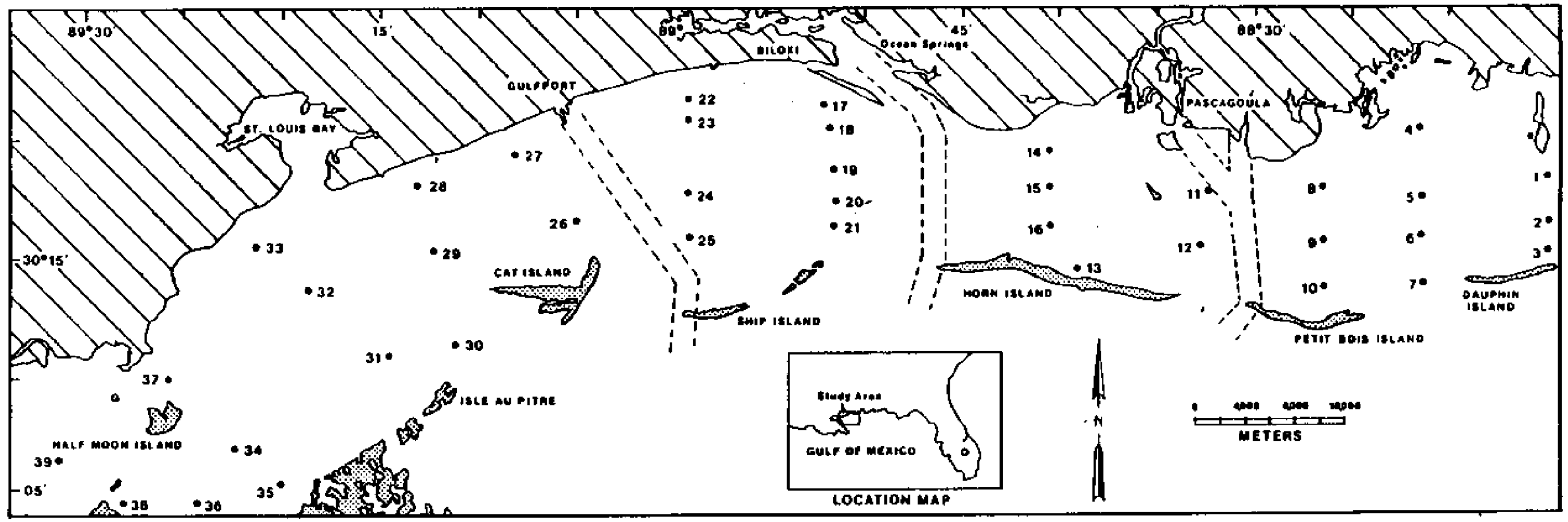


FIGURE 1

Core location: for MSC core number refere either to Table 7,8, or 9.

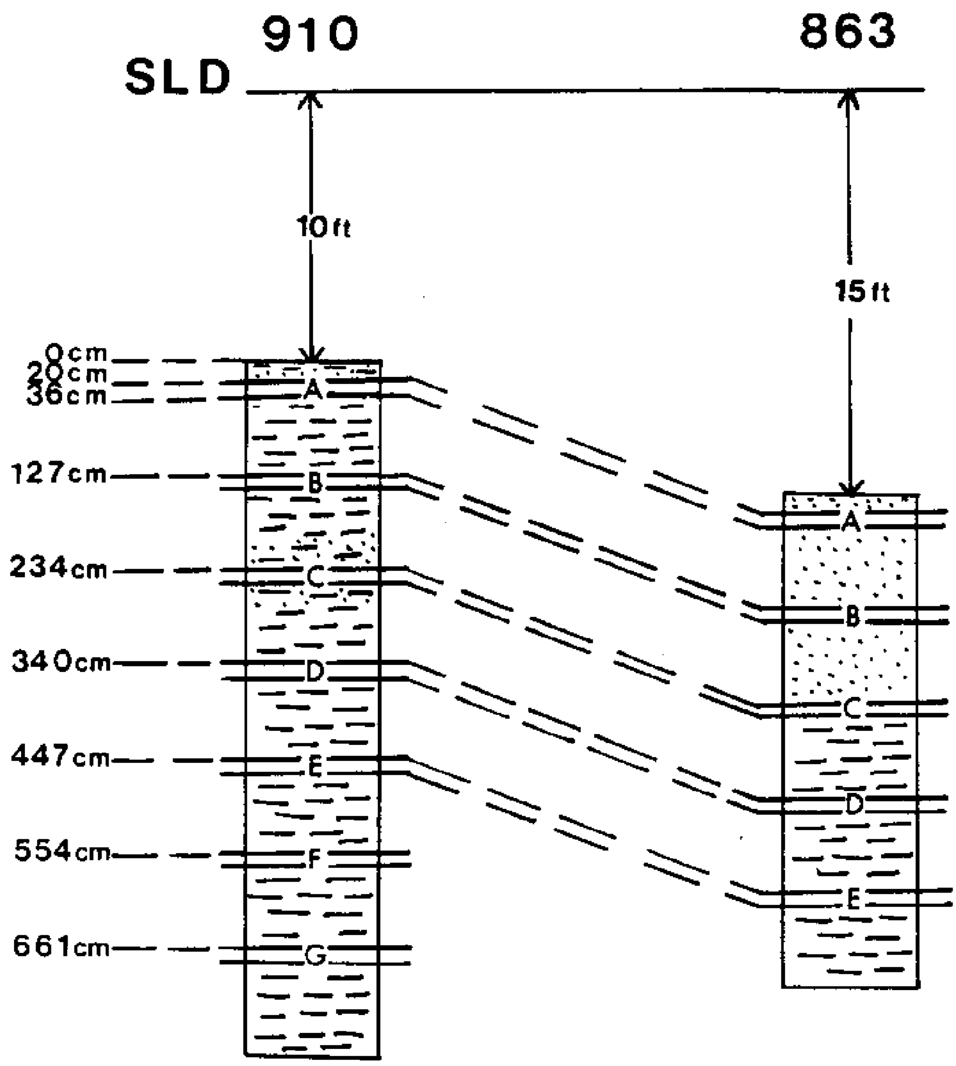


FIGURE 2

Adjustment of core surface penetration.

Six lithotope levels then include approximately 4700 years of sedimentation (122 cm per 1000 years, Rainwater, 1964). The lowermost or seventh lithotope, level G, where penetrated would add approximately another 877 years. The depth and intervals of the lithotope levels sampled are listed in Table 1.

Assesment of grain-size distribution as a function of sedimentation environment or lithotope at each of the seven time intervals (Table 1) was the main thrust of this study. Sediment composition, fabric or structure were not considered.

Initially, each sample was wet sieved and fractionated at 62 microns separating sand-size and coarser material from silt- and clay-size material. The fraction greater than 62 microns was oven dried and further fractionated at one-half phi intervals starting with -2 phi using a Ro-Tap and Tyler Screens. The less than 62 micron fraction also was further fractionated at one-half phi intervals as a function of viscosity controlled sedimentation rate in one liter of distilled water at constant temperature using calculated settling velocities based on Stokes Law. All derived size fractions were related to the standard but modified Wentworth Scale (Friedman and Sanders, 1978, p64) (Table 2).

Sediment grain-size distributions are most all log normal. However, both numerical and graphic statistical treatment of grain-size data assumes a normal distribution. Therefore, it is essential such data be log transformed before statistical treatment would be viable. A convenient transformation is the -log base 2 because the Wentworth scale is based upon a numerical regression by a factor of two. The negative log is also convenient as it produces even integers starting with large negative values for the larger grain diameters regressing to zero at 1 mm then progressing to larger positive values for the extremely small grain diameters (Table 2).

Even though 39 cores and seven lithotope levels were sampled 273 samples were not made available for analysis due to the differential in depths of core penetration. Only 11 cores penetrated to level G, 23 through level F, 33 through level E, and 37 through level D. All 39 cores penetrated levels A, B, and C. Consequently, the total number of samples available for analysis was 221.

The weight of the greater than 62 micron material collected on each one-half phi sieve from -2 to +4 phi after 20 minutes of agitation was considered equivalent to the number of grains within each one-half phi range. Pipette analyses were run on the less than 62 micron fraction of each sample. Here again, the weight of each dried aliquot was calculated to an equivalency of number of grains. In order to avoid, as much as possible, the common errors introduced during a pipette analysis (particle entrailing and attraction, and flocculation) each analysis was carried out with the sample cylinder placed in a constant temperature water bath and an equilibration period of 24 hours prior to the start of analysis. A peptizer was introduced into the sample cylinder if flocculation was noted to occur during the 24-hour equilibration period.

The full grain-size spectrum of each sample was determined by combining the sieve and pipette data as cumulative frequency distributions and subsequently plotted as the probability function of each sample distribution.

Sieving is the measurement of the long diameter of each grain and pipetting is the measurement of the settling velocity and the combination of both resulting sets of data produce probablility curves with two standard derivations or slopes with a distinct break at 62 microns. The resulting inflection point consequently is not significant and is unreal in terms of size distribution. Therefore, pipette analysis were overlapped onto the sieve analysis to avoid obtaining a 62 micron inflection point. The overlapping was accomplished by taking a 3.5 to 4.0 phi aliquot and accumulating the weight in the overall distribution using a method described by Galehouse (1971, p.87).

The resulting probability curves (221 in number) were grouped for each

TABLE 2

Grain Diameter			Size Class		
mm		Phi			
256		(-8)			
			Large	Cobbles	Gravel
128		(-7)			
			Small		
64		(-6)			
			V.Coarse	Pebbles	
32		(-5)			
			Coarse		
16		(-4)			
			Medium		
8		(-3)			
			Fine		
4		(-2)			
			V.Fine		
2		(-1)			
			V.Coarse	Sand	
1	Microns	(0)			
			Coarse		
1/2	500	(1)			
			Medium		
1/4	250	(2)			
			Fine		
1/8	125	(3)			
			V.Fine		
1/16	62	(4)			
			V.Coarse	Silt	Mud
1/32	31	(5)			
			Coarse		
1/64	16	(6)			
			Medium		
1/128	8	(7)			
			Fine		
1/256	4	(8)			
			V.Fine		
1/512	2	(9)			
				Clay	

lithotope level according to curve form, the graphic mean and standard deviation, the number of inflection points, and the slope of each mode. These groupings, (Figures 3 through 9) were then used for a lithofacies reconstruction and depositional environment interpretation at each lithotope level (Visher, 1969).

Textural classification of each sample at each lithotope level is based on a scheme developed by Folk (1954) (Figure 10), and presented as Figures 11 through 17. Isopleths of the median grain-size for each lithotope are also plotted and shown as Figures 18 through 24.

The graphic statistical parameters are based on statistical approximations of Folk and Ward (1957) and are tabulated in Tables 3 through 9. It should be noted that the reference core number (Column 1) is that designation that appears on the core site location map (Figure 1) rather than the actual MSC core designation. Also, Column 14 contains the probability plot group designation for each sample so that cross reference can be made with Figures 3 through 10.

Figures 25 through 30 are lithofacies maps for each lithotope level except level G for which there was insufficient information. The construction of these maps was based on the previous tabulated and figured data. Clay facies were not mapped because of the absence of this lithology as a homogenous unit. All of the clay-size material occurs with enough silt to include it as a mud lithology. On the figures, sand, silt and mud are mapped as separated lithologies and are shown as patterned areas whereas silty-sands and occasional sandy-silts are shown as unpatterned areas. Besides a lack of pure clay there is also no occurrence of clayey sand, sandy clay, sandy mud, and very few occurrences of muddy sand which were included as silty sands.

DATA INTERPRETATION

The probability plots based on the probability function of a cumulative-frequency distribution are truncated at the fine end of each distribution. The truncation is due to the fact that size fractionation analyses were not carried beyond 10 phi. Truncation of a cumulative curve at the extreme fine-grained end is not a serious matter as there is essentially no truncation at the coarse end.

There is some filtering of each sample size distribution due to weighing the sieved and pipetted increments but this can be ignored because the error would not exceed plus/minus 0.05. Furthermore, the overlapping of sieve and pipette data excludes suppressed measurements so there is essentially no censorship.

Addition or simple mixing (Tanner, 1964) exists in all of the sample distributions indicating each sample analyzed yields a probability distribution with more than one model component. Most samples have more than two. This means each distribution is actually composed of mini distributions each with a mean and variance or standard deviation.

Interpretation of depositional environment was based in part on comparing probability plots of Mississippi Sound material with those of Visher (1967). Visher's plots, however, covered only the sand-size portion of a cumulative distribution and consequently are truncated. Using only the 0 to 4 phi portion of each plot then a comparison can be made based only on the form of each curve and near coincidence of inflection points.

In about 50 percent of these comparisons a depositional environment could be assigned. For the remaining plots that did not seem to fit any of the Visher models, a depositional environment with innovated reasoning could only be surmised.

There are seven different curve types at level A representing at least seven interacting depositional environments (Figure 3). Curve A is distinctly the size distribution of a dune ridge. Curve B is representative of foreshore

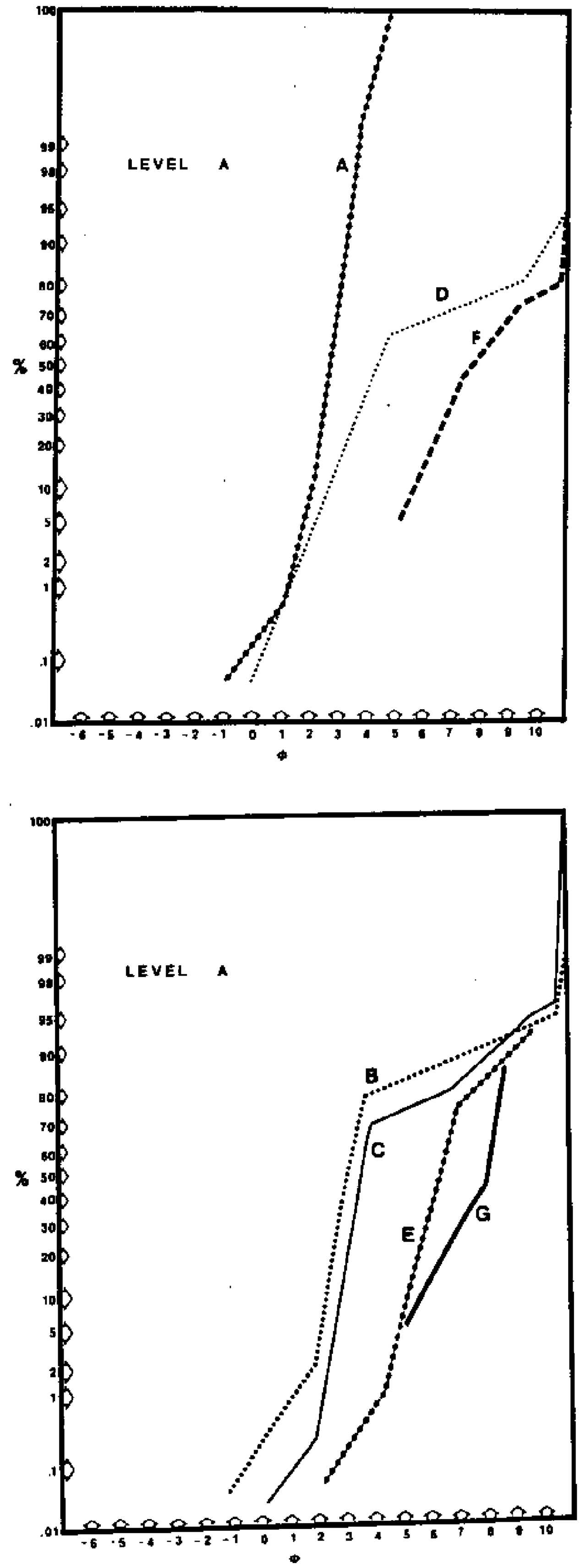


FIGURE 3

Cumulative frequency probability plots for level A.
(a) beach ridge dune, (b) forebeach wave zone, (c) nearshore, coarse-grained, (d) nearshore, fine-grained, possible back barrier forebeach, (e) foreshore, fine-grained, possible back barrier, (f) intersound distributary channel, (g) mud beach

wave zone showing a moderately sorted traction population, a well sorted saltation population and a poorly sorted suspension population. Curve E is also a foreshore distribution but shifted laterally to the finer grain size. Presumably curve E represents a much lower energy shore than curve B, possibly the beach zone on the back side of barriers. Curves C, D and G are nearshore and beach curves with moderate sorting of the traction and saltation populations and two suspension populations, both poorly sorted. Curve G shows better all-around sorting than either C or D and probably represents a mud beach. Curve F is a type representative of distribuatory channel deposition but only in silts and muds. Perhaps flow and circulation within a sound enclosed between a mainland sand beach and a partial sand barrier system is similar to that of a distributary channel but only operating upon finer materials.

At level B (Figure 4), Curve A is distinctly the distribution of a beach ridge dune complex. Curve B appears to represent a wave or even surf zone complex with two distinct but poorly sorted suspension populations. Curve C is a forebeach distribution, D a distributary channel distribution, G a distributary mouth bar population shifted to the finer grain size, and F again a mud beach distribution. Curve E is distributary-like and probably a unique distribution for lagoonal or sound muds and silts.

The depositional environment distribution patterns for level C (Figure 5) are complex and numerous as compared to all other levels. There are 10 patterns representative of 10 different interacting environments at probably a time of maximum marine regression. Curve A again represents a beach ridge dune complex. Curves B, C and D are nearshore populations with B being wave zone, C the surf zone and D the lower foreshore. In all three cases, the traction population is poorly sorted as is the suspension population with a well sorted saltation population for all three. Curves E, F and H best fit the model of a delta strand line. Curve G is a foreshore mud whereas I and J probably represent distributary deposition of lagoonal or sound silts and muds.

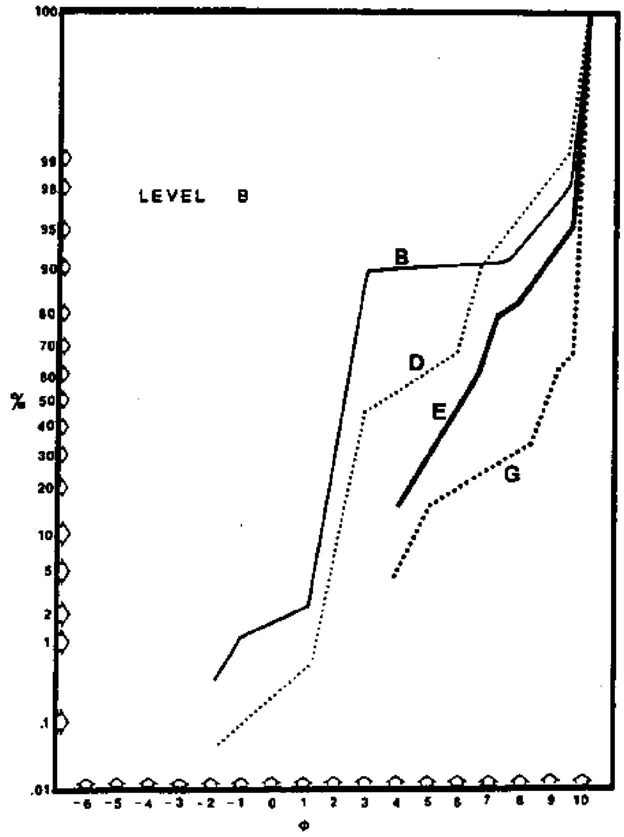
The probability patterns for level D (Figure 6) are much simpler than those of level C. For the same reasons given the probability plot interpretations of levels A, B and C, Curve A of level D is again a dune complex. Curves B and D represent the foreshore beach environment, C a distributary mouth bar environment, and E and F distributary channel-like muds and silts characteristic of inner lagoon or sound deposition.

At level E, Curves A and B are representative of distributary mouth and delta strand line environments, respectively, whereas curve C represents the beach ridge dune complex. Curves E and F again are typical of inner lagoon or sound deposition of silt and mud (Figure 7).

Curve A of level F (Figure 8) again typifies the beach ridge dune complex. Curve B is the foreshore beach probably the surf zone as it shows two saltation populations; one being well sorted and the other, the 2.5 to 3.5 phi population, being moderately sorted. The suspension population of this curve shows poor sorting. Curves C and D represent nearshore sands and silty sands; Curve D being finer grained than C. Curve E is a distributary channel-like mud whereas curves F and G are distributary mouth distributions with G depicting the silt and mud size range.

Curves C and D at level G (Figure 9) are again that type of curve configuration apparently unique in the distribution of lagoonal or sound silts and muds. Curve B is a distributary channel distribution and A a foreshore sand.

Tables 3 through 9 each include 11 graphic parameters and 3 reference keys. Column one contains core reference numbers which are found on the core location map (Figure 1) and the median diameter isopleth maps. Column two lists the actual MSC core designation. The third column lists phi 50 percentile values (median grain diameter for each sample). Columns four through nine list the phi 5, 16, 25, 75, 84 and 95 percentile values, respectively. Column 10 lists the graphic mean grain size, Mg, column 11 the inclusive graphic standard deviation,



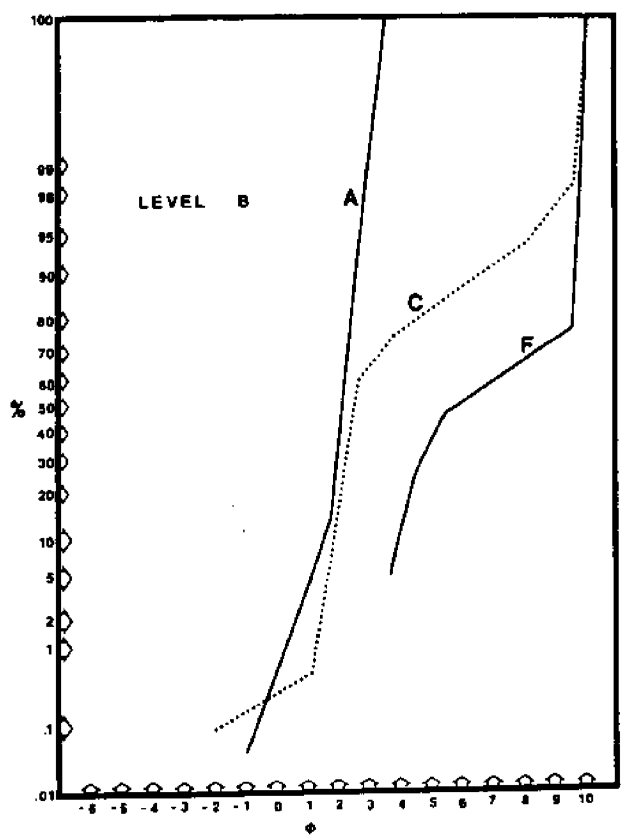


FIGURE 4

Cumulative frequency probability plots for level B.
(a) beach ridge dune, (b) forebeach wave zone, (c) forebeach, possibly back barrier, (d) distributary channel, (e) intersound distributary channel, (f) back barrier forebeach, (g) intersound distributary mouth.

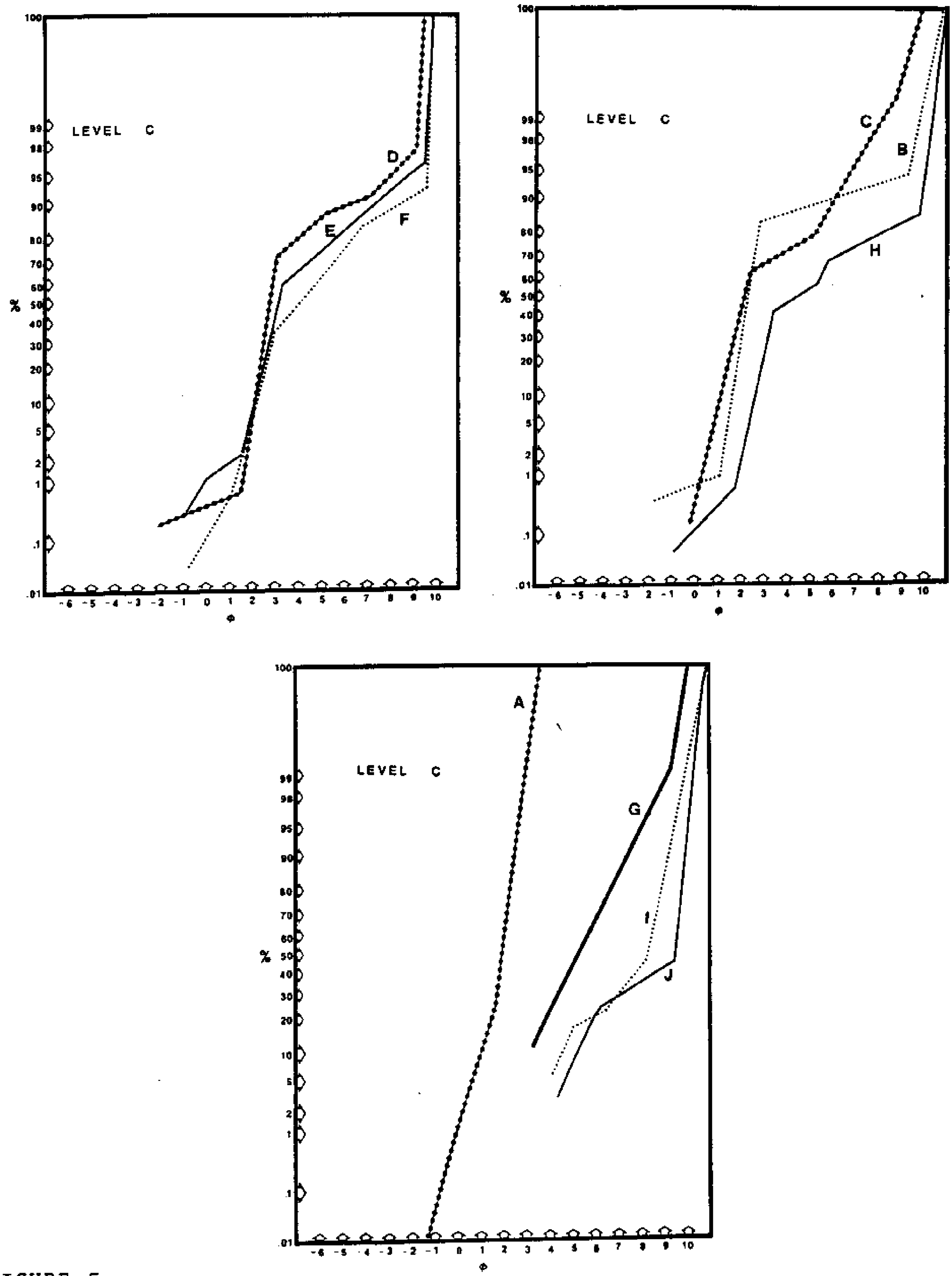


FIGURE 5

Cumulative frequency probability plots for level C.
(a) beach ridge dune, (b) forebeach wave zone, (c) foreshore surf zone, (d) lower foreshore or possible back barrier forebeach, (e, f and H) stand line, (g) foreshore mud, (i and j) intersound or lagoonal distributary channel.

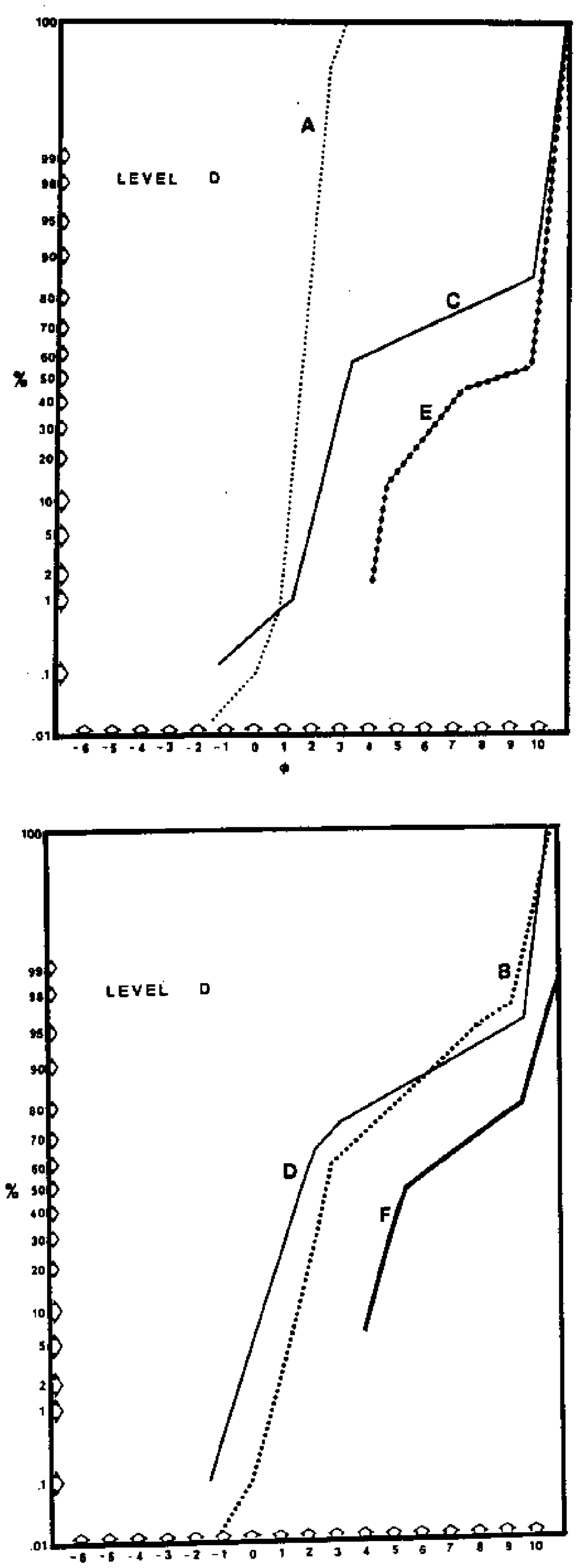


FIGURE 6

Cumulative frequency probability plots for level D
(a) beach ridge dune, (b) forebeach, (c) distributary mouth bar,
(d) nearshore, surf or wave zone, (e) inter sound distributary channel,
(f) inter sound distributary mouth bar or tidal channel

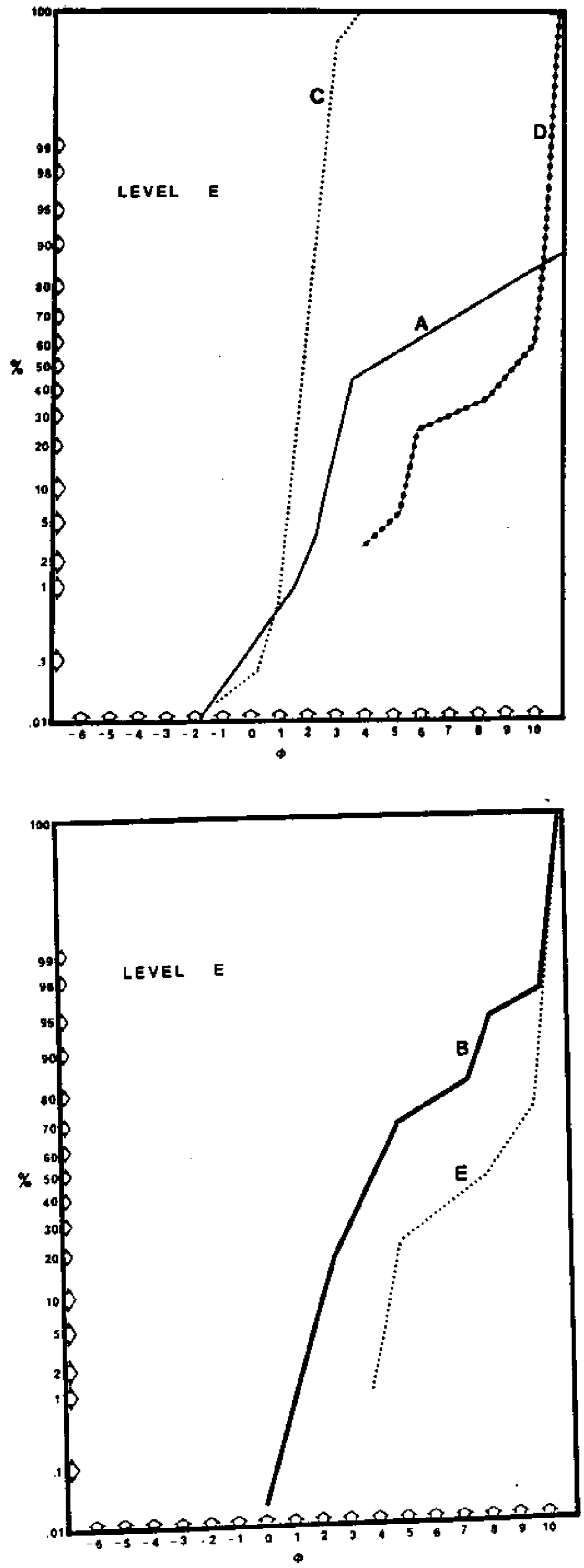


FIGURE 7

Cumulative frequency probability plots for level E.
(a) distributary mouth bar, (b) stand line, (c) beach ridge dune,
(d and e) inter sound distributary channel.

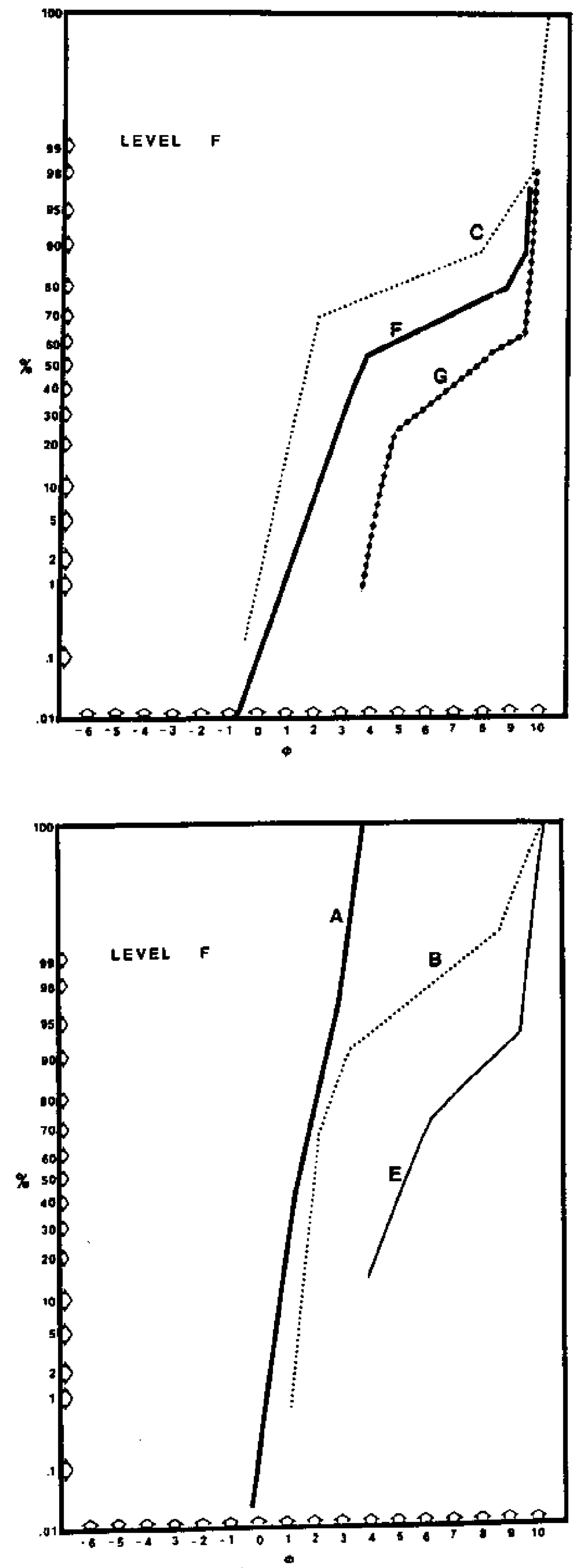
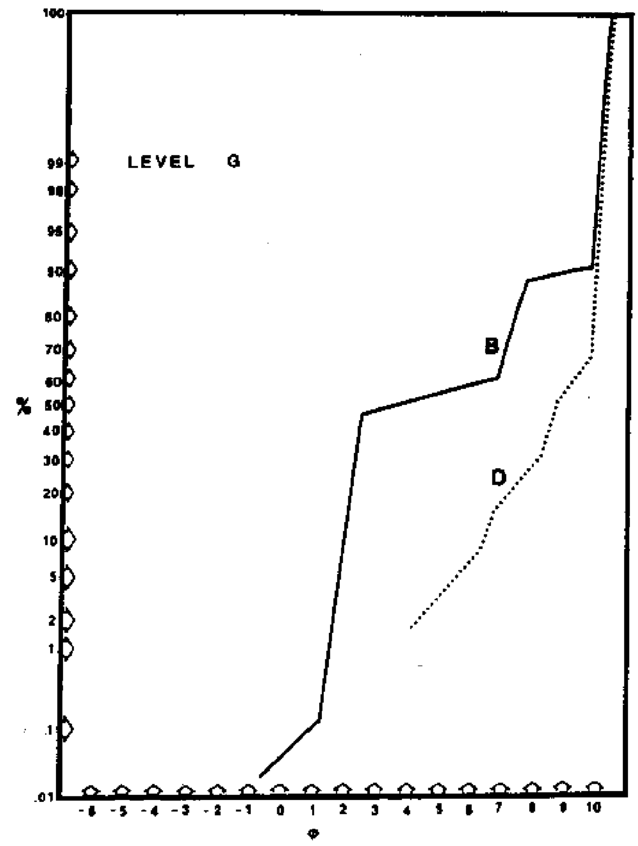


FIGURE 8

Cumulative frequency probability plots for level F.
(a) beach ridge dune, (b) surf zone-forebeach, (c) nearshore, coarse-grained, (d) nearshore, fine-grained, (e) inter sound distributary channel, (f) distributary channel, (g) inter sound distributary mouth bar.



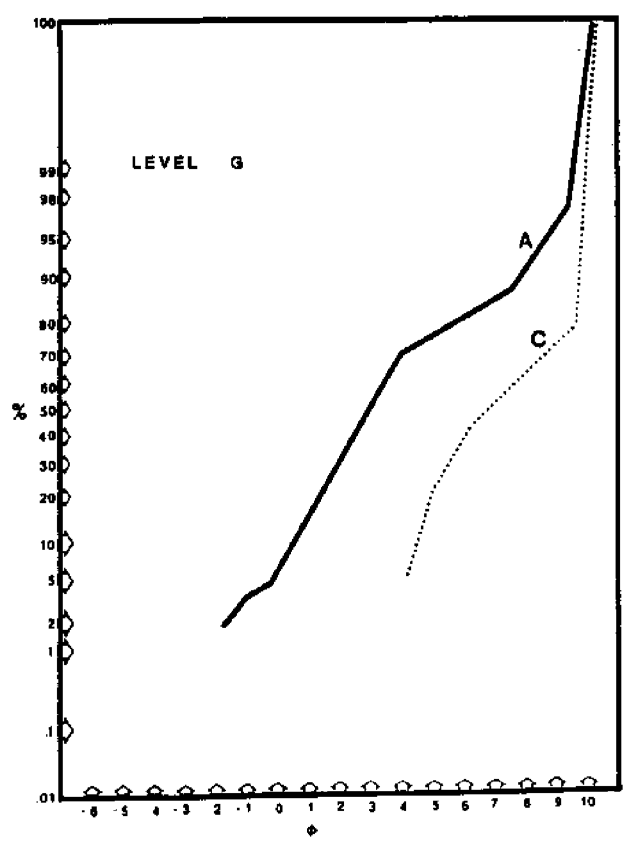


FIGURE 9

Cumulative frequency probability plots for Level G.
(a) foreshore, (b) distributary channel, (c and d) inter sound distributary silt and mud.

Si, column 12 the inclusive graphic skewness, SKi, and column 13 the graphic Kurtosis, KG.

The inclusive graphic standard deviation is an average of the 2.0 and 3.3 phi deviation intervals, or the respective intervals between the 16th and 84th percentiles and the 5th and 95th percentiles (Folk and Ward, 1957). This parameter is used as a measure of sorting and the following verbal scale, as suggested by Folk and Ward (op cit), is used to indicate the relative degree of sorting.

Si values (phi-units)	Verbal term
<0.35	Very well sorted
0.35-0.50	Well sorted
0.50-1.00	Moderately sorted
1.00-2.00	Poorly sorted
2.00-4.00	Very poorly sorted
>4.00	Extremely poorly sorted

Skewness is a measure of the symmetry, or degree of asymmetry of a normal distribution, or log normal in the case of sediment grain-size. In a skewed distribution, the mean diameter departs from the median, and the extent of departure is used as a measure of skewness. Skewness measures are independent of sorting and symmetrical curves have a skewness value of zero. The mathematical limits of skewness are -1.00 and +1.00; however, very few sediments have values greater than 0.80 or less than -0.80. If finer-grained sediment predominates the total distribution the skewness values will be positive. Conversely, a predominant coarse-grained sediment will have negative skewness.

The calculation of skewness is based on the expression derived by Folk and Ward. The following verbal limits have been suggested:

SKi, value	Verbal term
-1.0 to -0.30	Very negative skewed
-0.30 to -0.10	Negative skewed
-0.10 to +0.10	Symmetrical (nearly)
+0.10 to +0.30	Positive skewed
+0.30 to 1.00	Very positive skewed

Kurtosis is the ratio of the sorting in the extremes of a distribution to that in the central portion, and serves as a test for normalcy of the frequency distribution. Again, calculation of Graphic Kurtosis is based on the expression derived by Folk and Ward where KG=1.00 for a normal curve.

The following verbal limits are suggested for values of KG:

KG value	Verbal limit
<0.67	Very platykurtic (flat)
0.67 to 0.90	Platykurtic
0.90 to 1.11	Mesokurtic (normal)
1.11 to 1.50	Leptokurtic
1.50 to 3.00	Very leptokurtic (peaked)
> 3.00	Extremely leptokurtic

Distribution of Graphic Kurtosis values in nature is non-normal as these values will range from 0.50 to 8.00 with a mean centering around 1.00. Approximate normalization can be accomplished by using the transformation, KGi=KG/KG+1. The KG values in Tables 3 through 9 have not been normalized.

Resume of graphic parameters

At level A, pure sands are well sorted while muds and silts are poorly sorted and silty sands are very poorly sorted. There are no moderately, well, or extremely poorly sorted materials. Skewness values range from -0.26 to +0.38; negative to very positive skewed. Samples that have a symmetrical distribution are the pure sands and silts. Most of the muds have a slight negative skewness showing the predominence of silt over clay. The majority of samples have meso- to leptokurtic distributions which indicates the spreads are not as great as indicated by the sorting values. It is surmised that the depositional system at this level is one of low energy with local areas of higher energy input.

Pure sands of level B are moderately sorted with mesokurtic and symmetrical distributions except for sample 18 which is slightly leptokurtic. The silts are poorly sorted, platy- to mesokurtic, and symmetrical to negativly skewed. The muds are all negatively skewed, very poorly sorted and platykurtic. The silty sands are very poorly sorted with platy- to mesokurtic and positive skewed distributions. Overall, the depositional system energy is extremely low at this level.

At level C the pure sands again are moderately sorted, mesokurtic and symmetrical. The silts and muds are poorly sorted, slightly platykurtic and negatively skewed; likewise for the silty sands except these are positively skewed. Again, the overall deposition system energy at this level appears to be low.

The pure sands, sites 12, 13, 18, 28 and 29 at level D are moderately sorted and have symmetrical and mesokurtic distributions except sites 12 and 13 which are very slightly leptokurtic. Sites 5, 17, 24, and 33 are also sands but slightly silty and are poorly sorted, but with symmetrical and very leptokurtic distribution. These are more than likely surf or wave zone forebeach sands. The silts are poorly sorted with slight negative skewness and slightly platykurtic. The muds are poorly sorted with negative skewness and are slightly leptokurtic. The silty sands are very poorly sorted with symmetrical to slight positive skewed and leptokurtic distributions.

The beach ridge dune sands at level E (sites 12, 13 and 18) are well sorted whereas the nearshore sands (sites 5, 14, 24, and 29) are poorly sorted. Both sets of sands have symmetrical distributions with the beach ridge sands being mesokurtic and the nearshore sands being very leptokurtic. Both the silts and muds are very poorly sorted and negatively skewed. The silts are mesokurtic; however, the muds are not consistent and range from being platykurtic to leptokurtic.

At level F the pure sands are not all beach ridge dune sands. Sites 6 and 12 are dune sands being well sorted with symmetrical and mesokurtic distributions whereas site 5 is a foreshore sand, probably surf zone, that is well sorted with a symmetrical but very leptokurtic distribution. The remaining sands are nearshore sands, sites 1, 14, 27, and 29, which are poorly sorted, positively skewed and very leptokurtic. The muds and silts are poorly sorted. The silts have symmetrical distributions whereas the muds are negatively skewed. Both are meso- to slightly platykurtic.

LITHOFACIES RECONSTRUCTION

Lithotope level F (Figures 8, 12, 19, 25, and Table 4):

At this time level the predominant lithofacies is silty sand and sandy silt throughout most of the Sound. Mud and some silt were deposited over much of the extreme western portion of the Sound plus a substantial buildup of forebeach and nearshore sands in front of what is now Gulfport and St. Louis Bay. There is a

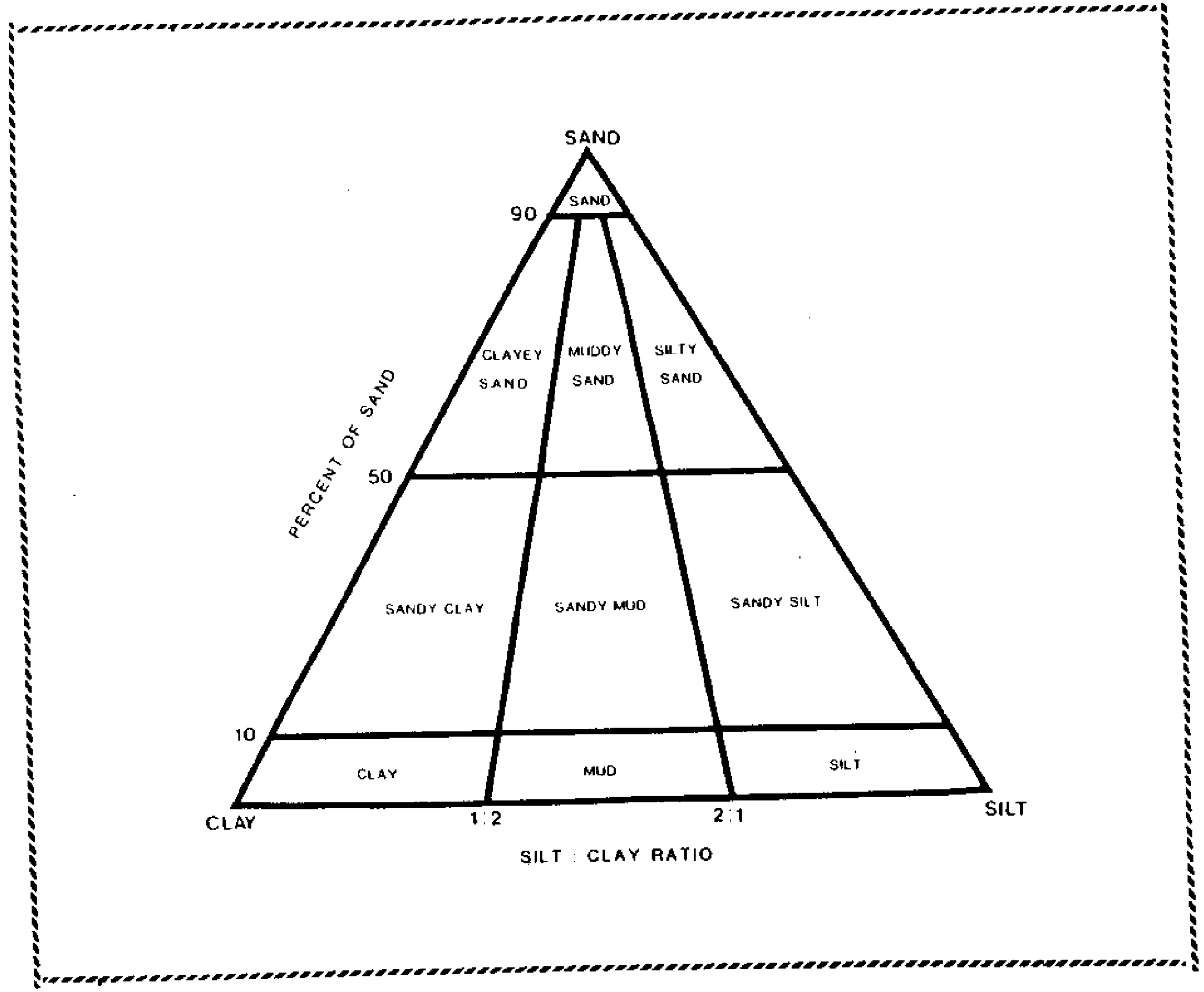


FIGURE 10

Sediment classification based on grain size exclusive of gravel. Textural groups are defined by the relative percentages of sand (Material between 0.0625 and 2 mm), silt (material between 0.00195 and 0.0625 mm), and clay (material less than 0.00195 mm) (Folk, R.L., 1954)

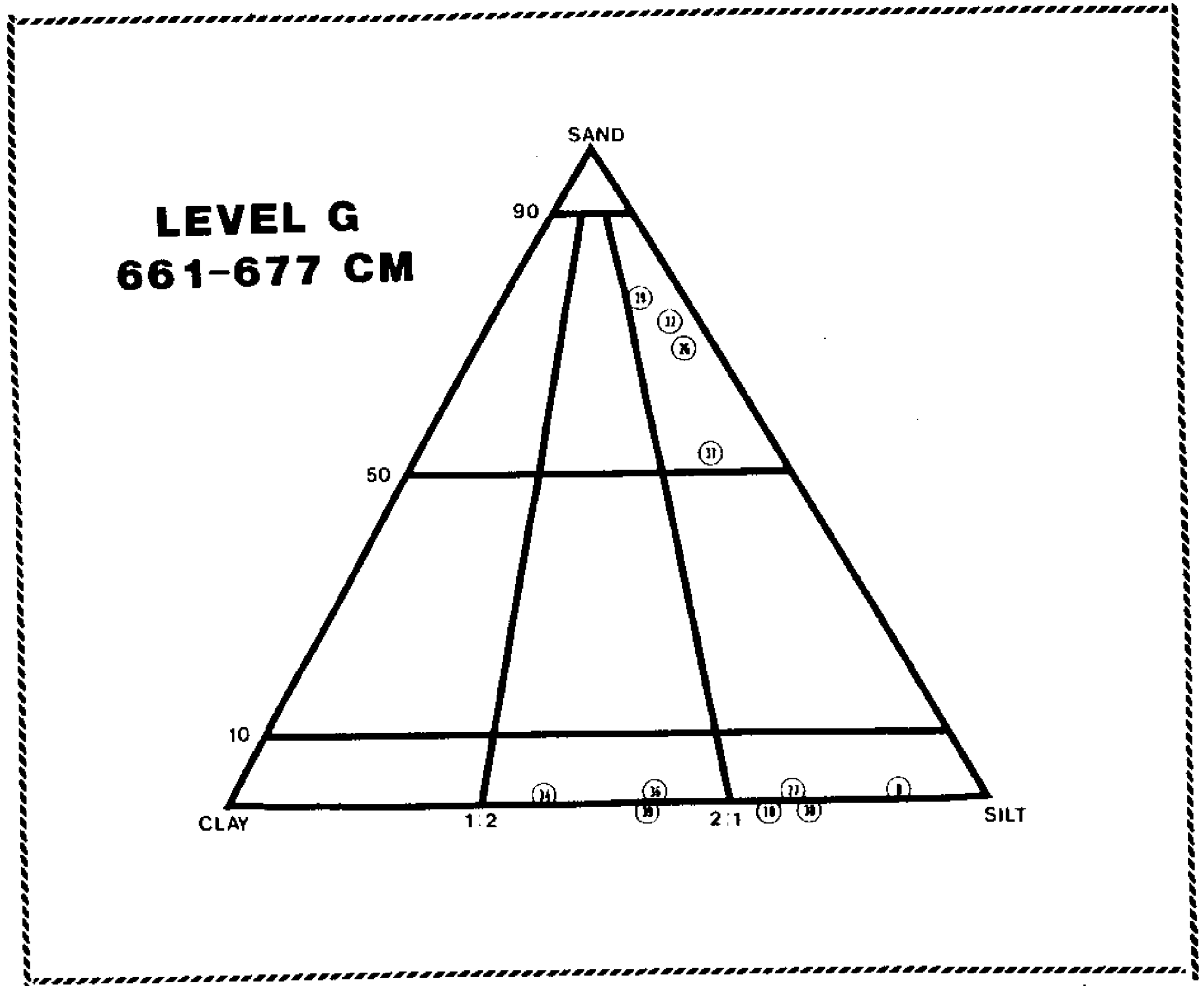


FIGURE 11

Sediment size and textural group spectrum for level G. (refere fig. 10)

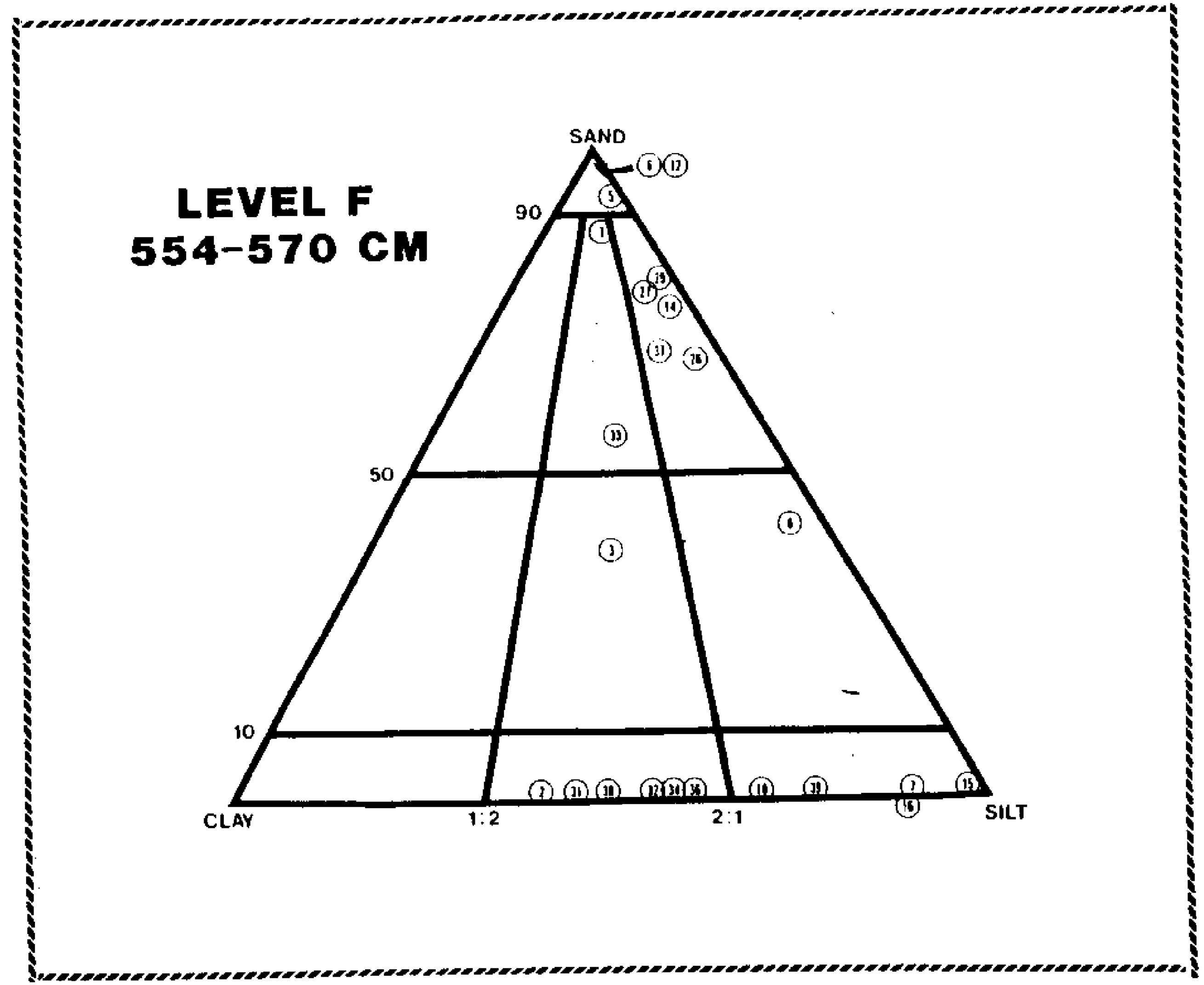


FIGURE 12

Sediment size and textural group spectrum for level F. (refer fig. 10)

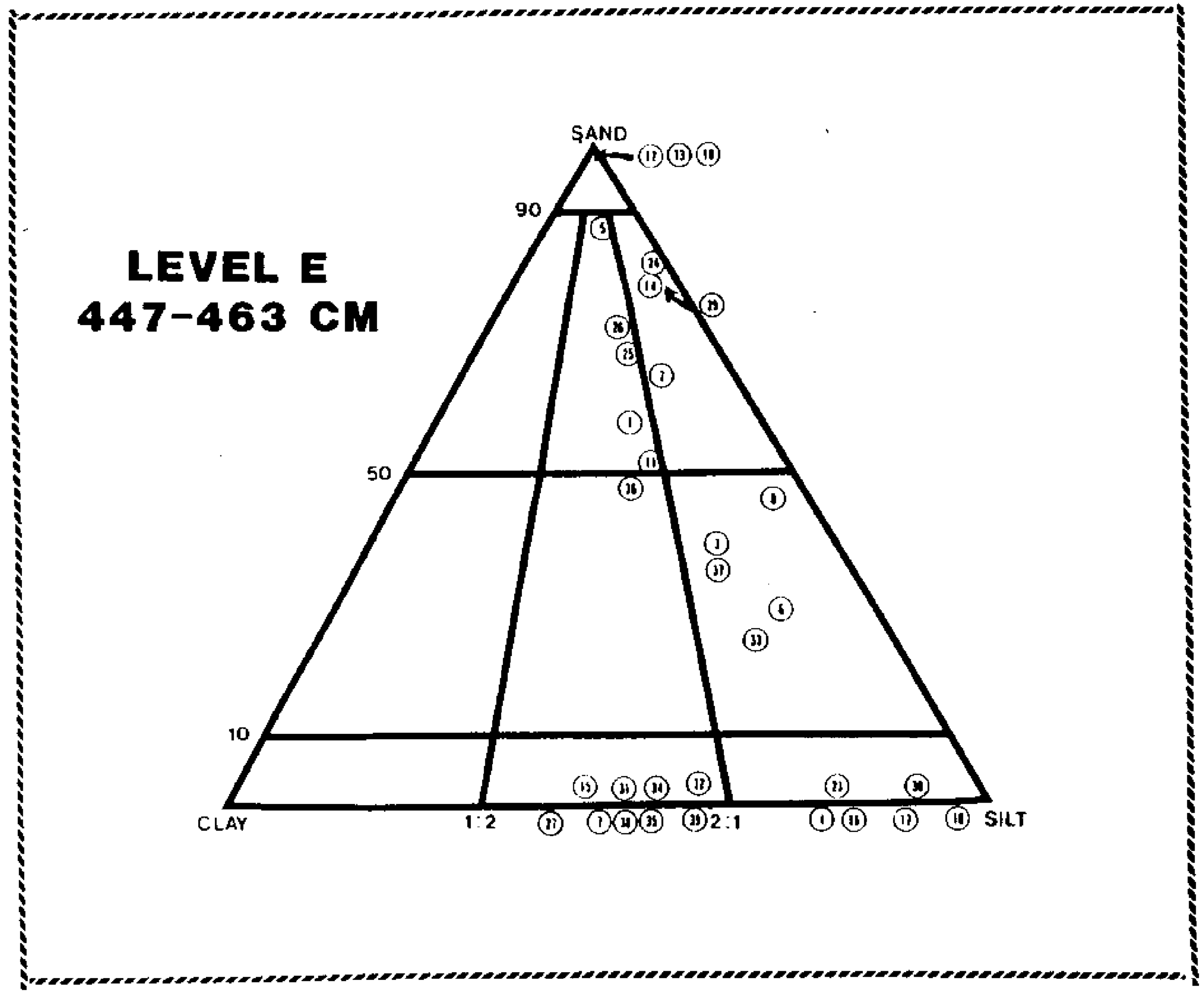


FIGURE 13

Sediment size and textural group spectrum for level E. (refere fig. 10)

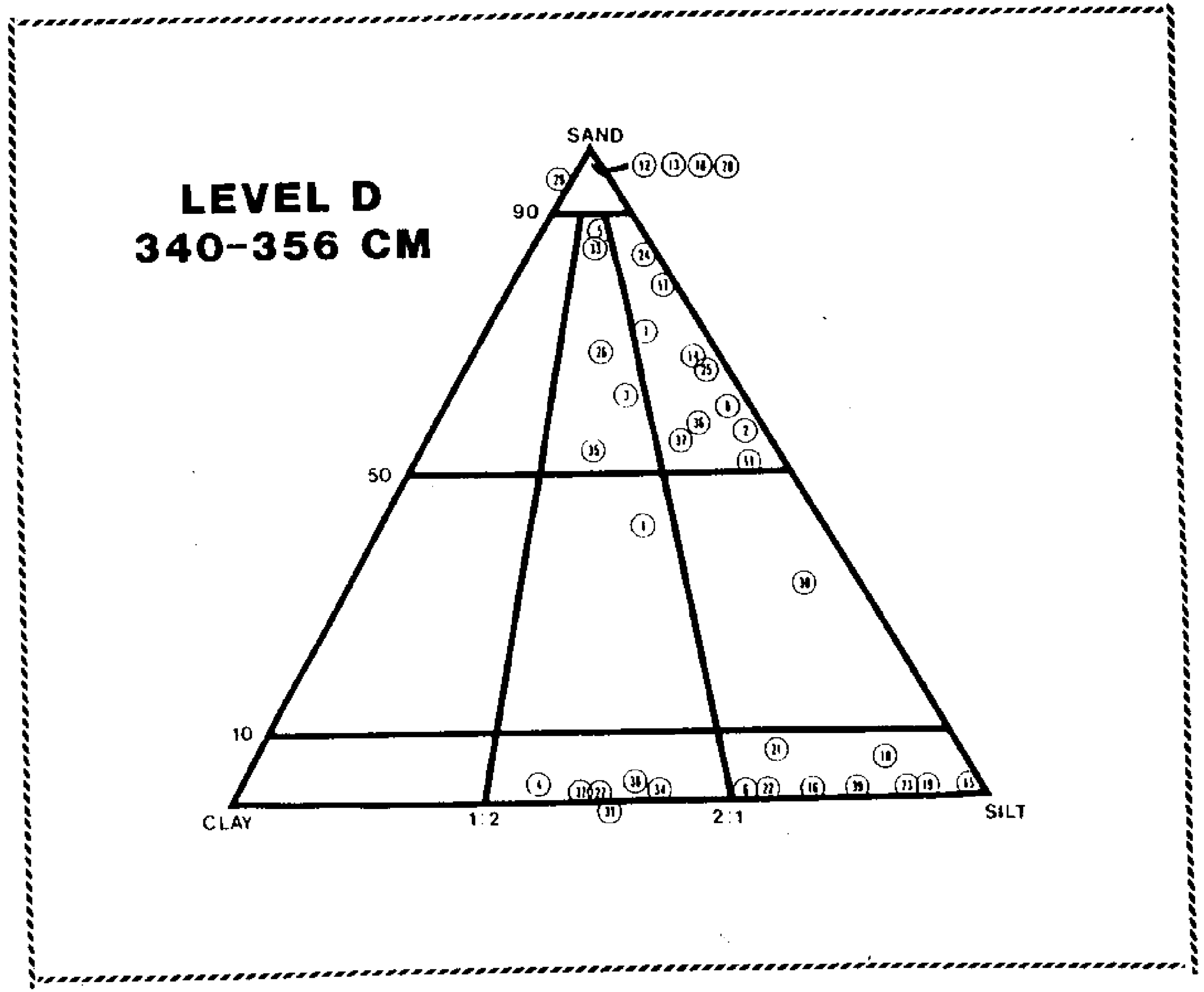


FIGURE 14

Sediment size and textural group spectrum for level D. (refere fig. 10)

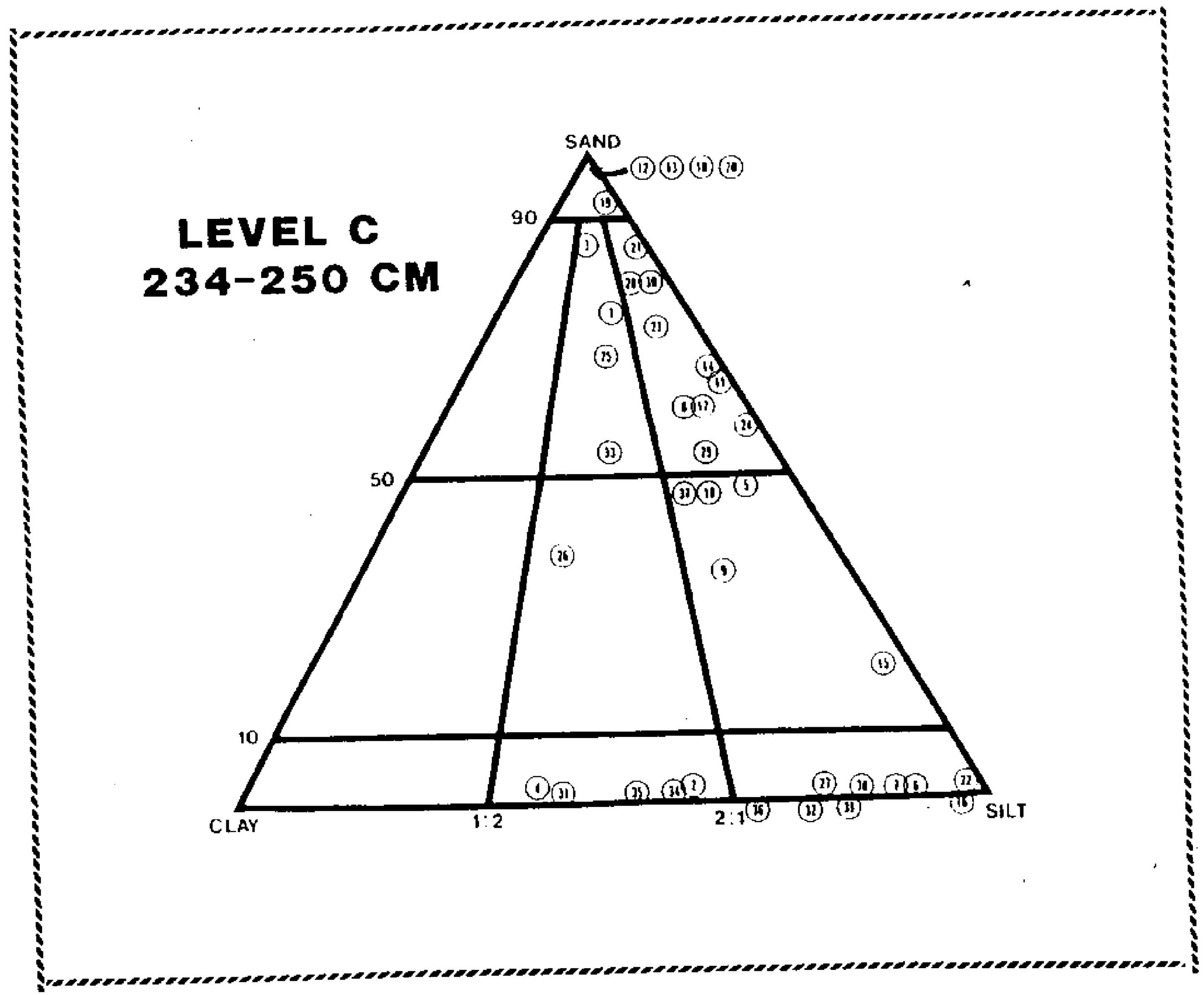


FIGURE 15

Sediment size and textural group spectrum for level C. (refere fig. 10)

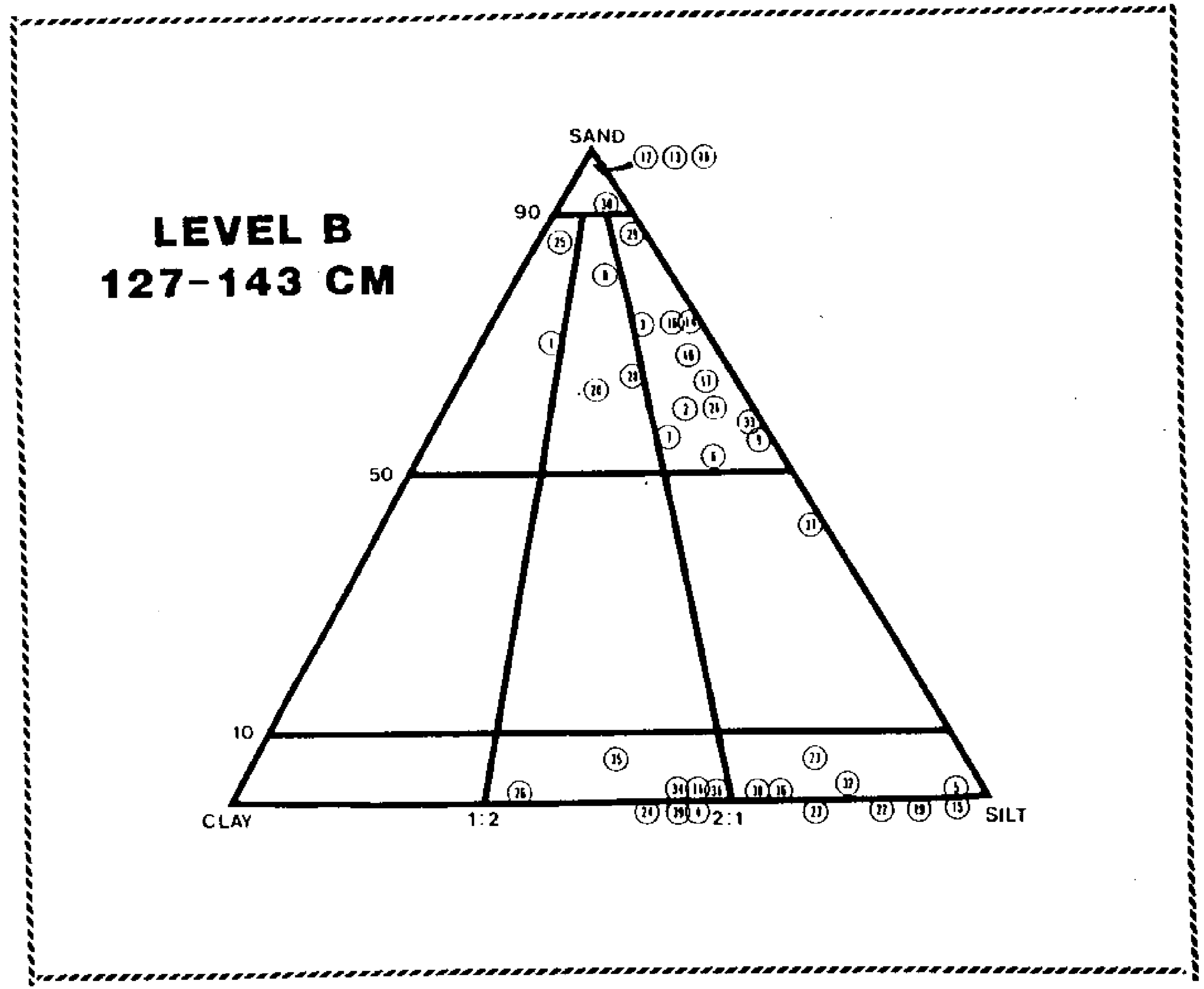


FIGURE 16

Sediment size and textural group spectrum for level B. (refere fig. 10)

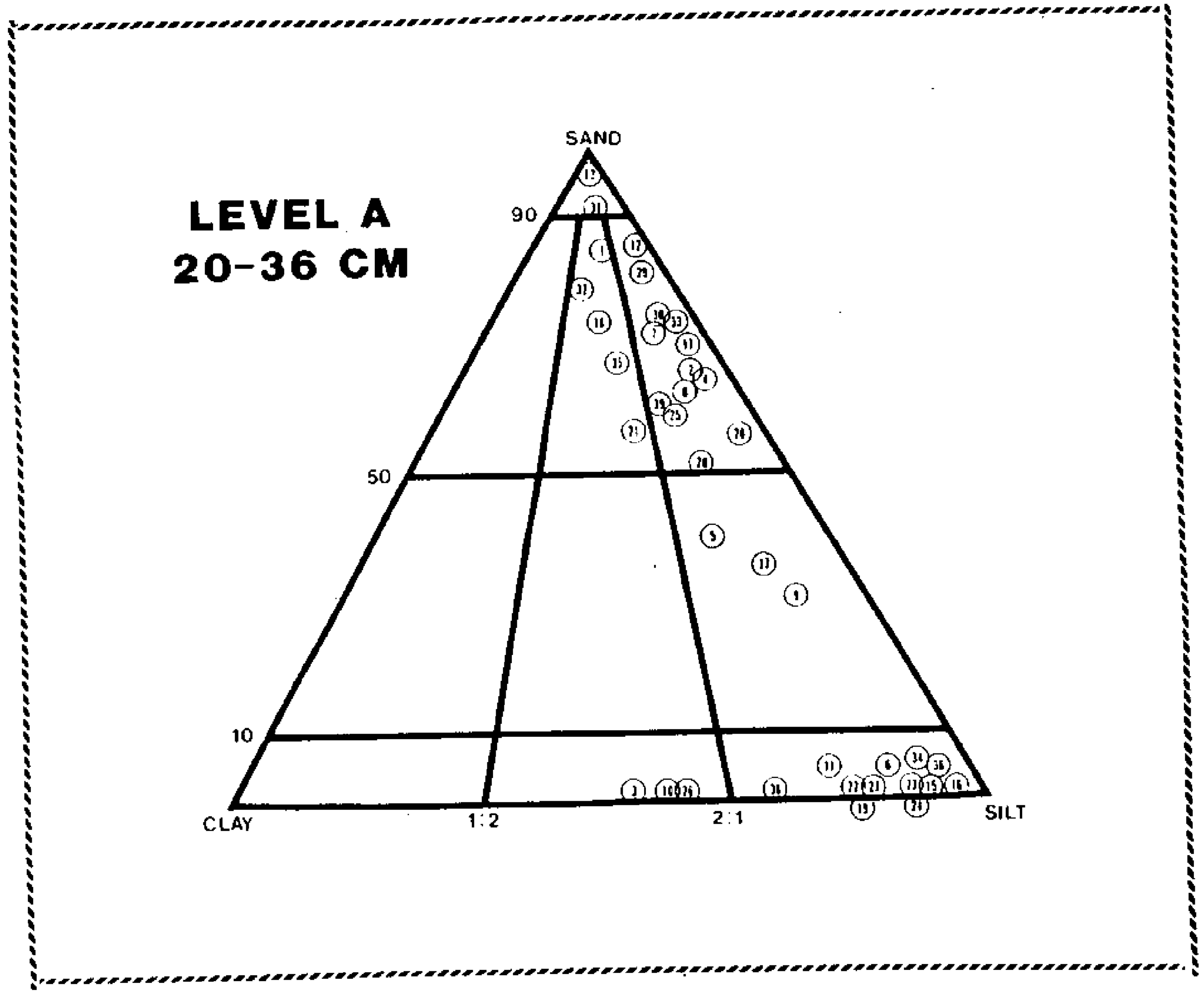


FIGURE 17

Sediment size and textural group spectrum for level A. (refere fig. 10)

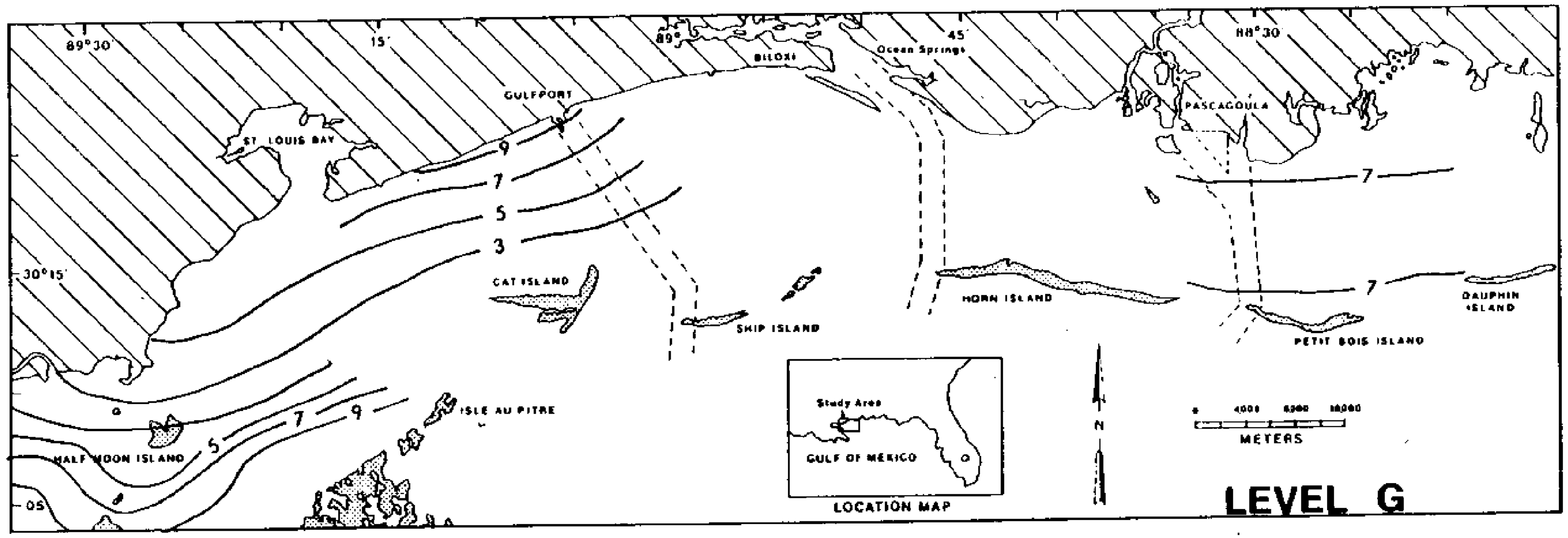


FIGURE 18

Isopleths of the Phi median grain diameter for Level G.

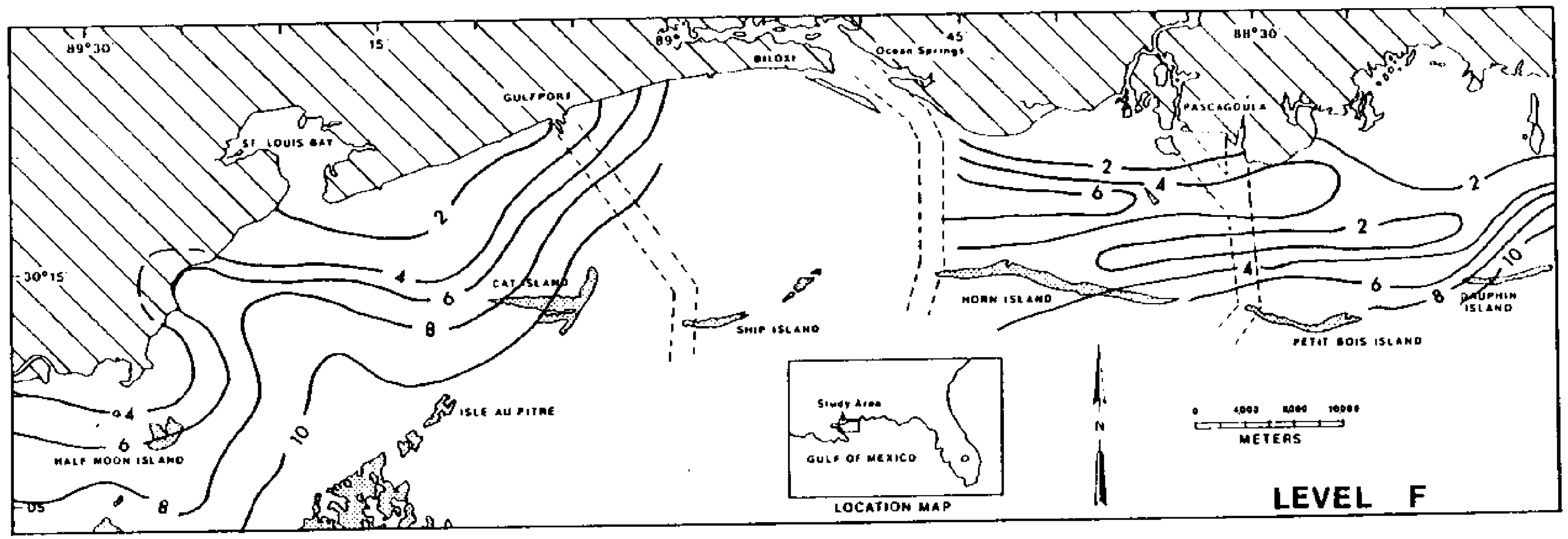


FIGURE 19

Isopleths of the Phi median grain diameter for level F.

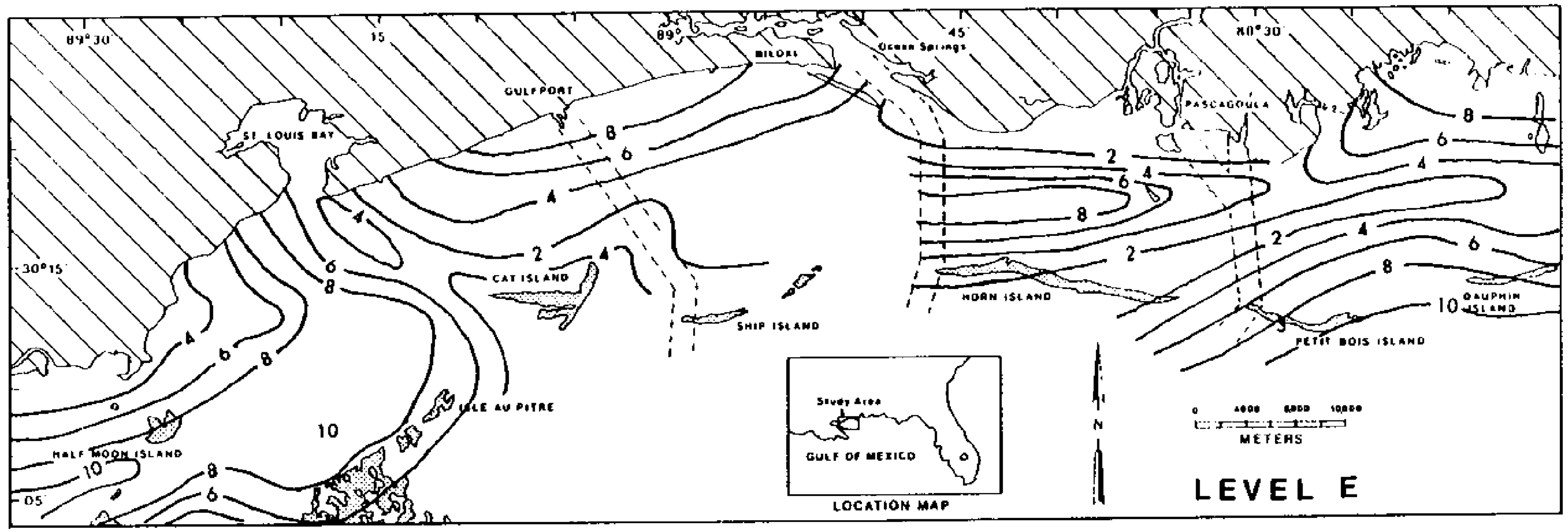


FIGURE 20

Isopleths of the Phi median grain diameter for level E.

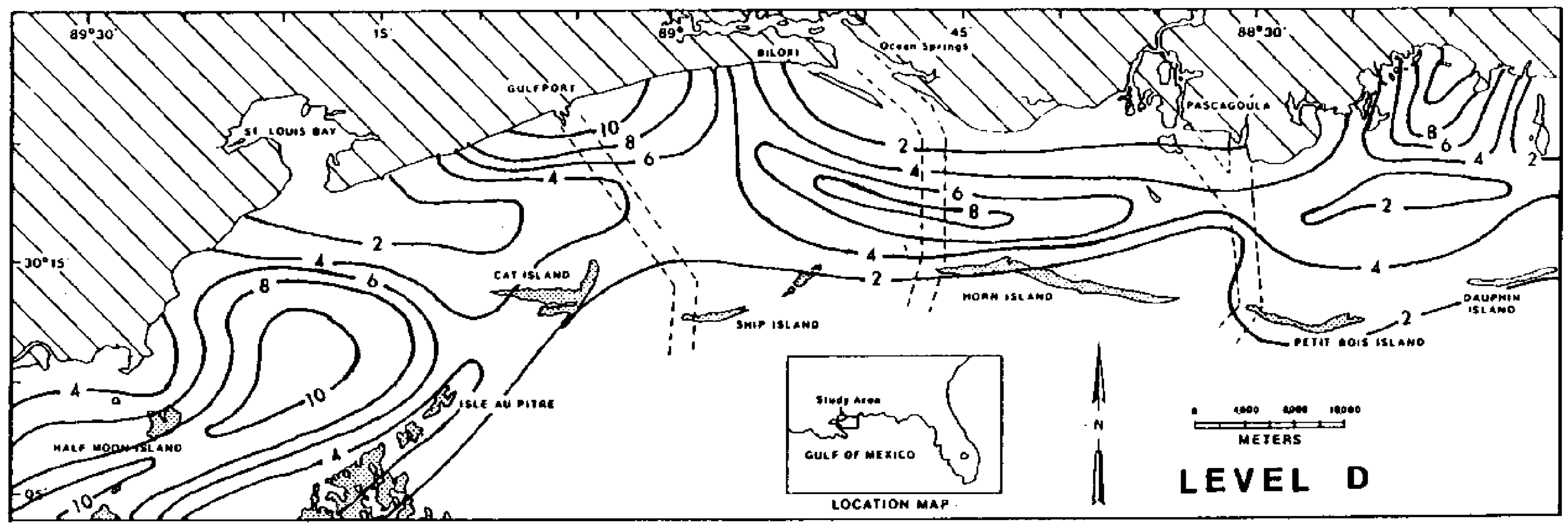


FIGURE 21

Isopleths of the Phi median grain diameter for level D.

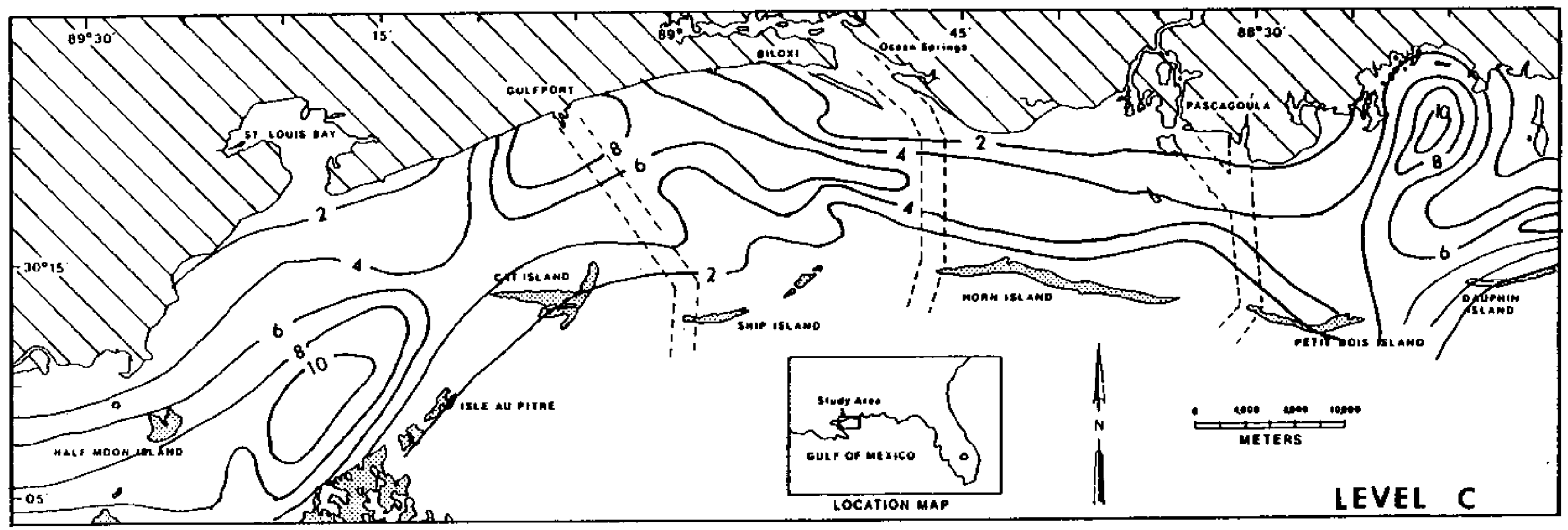


FIGURE 22

Isopleths of the Phi median grain diameter for level C.

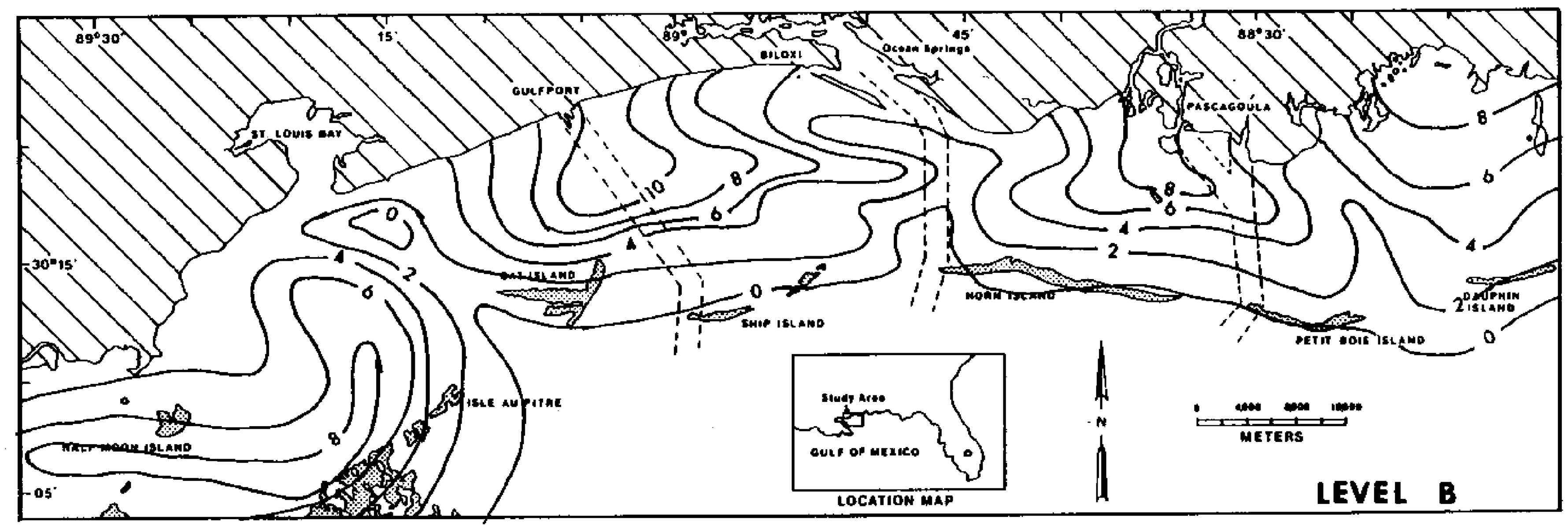


FIGURE 23

Isopleths of the Phi median grain diameter for level B.

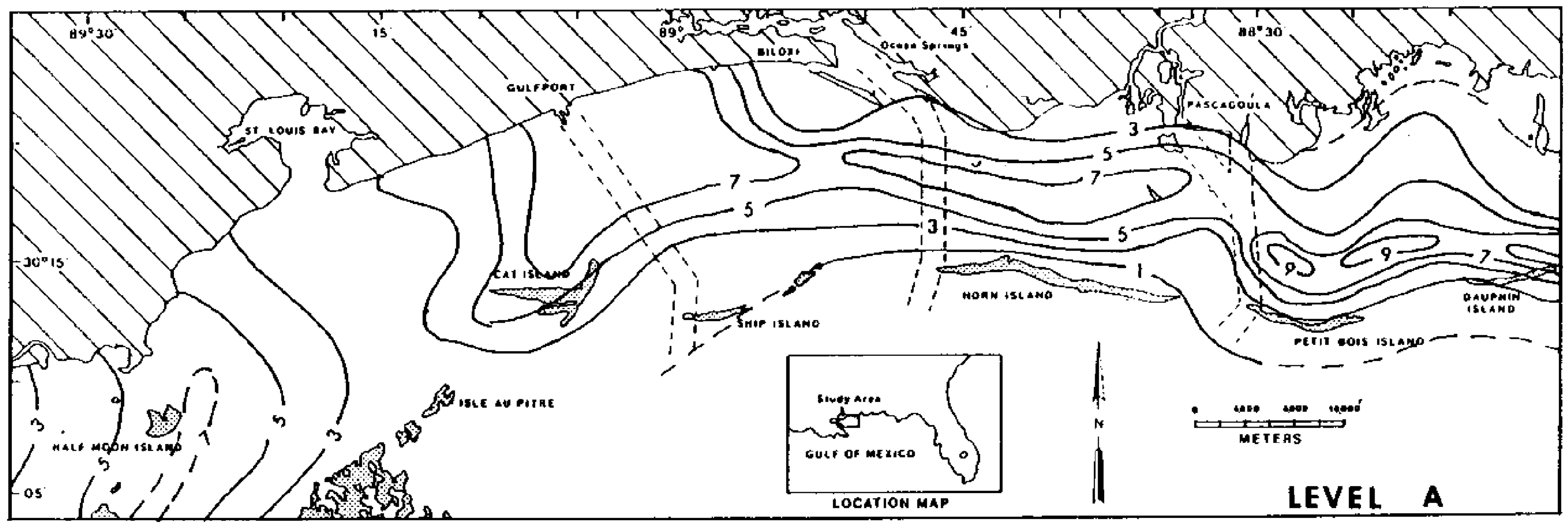


FIGURE 24

Isopleths of the Phi median grain diameter for level A.

total lack of information concerning the central portion of the Sound. In the area of the present Horn and Petit Bois Islands existed a larger single barrier unit behind which were deposited distributary silts and sands.

Lithotope level E (Figures 7, 13, 20, 23, and Table 5):

The sandy beach in front of what is now Gulfport and St. Louis Bay has drastically changed, being replaced by a lagoonal mud bank. In front of this is an offshore barrier bar. It is interesting to note at sites 24, 25, and 26 are forebeach sands, and at site 29 are wind blown beach ridge sands. The extreme western portion of the Sound again consists of lagoonal muds. An extensive beach system has developed in front of the present Biloxi Bay and extends eastward beyond Pascagoula. The Horn-Petit Bois system is still a large single barrier bar behind which were deposited lagoonal silts and muds.

Lithotope Level D (Figures 6, 14, 21, 27, and Table 6):

At this time level, it appears a marine regression is beginning to take place. Silty sands are replacing the heretofore episode of mud deposition in the extreme western Sound. A large sand platform is developing in front of the present St. Louis Bay with dune sands at sites 28 and 29, and forebeach sands at site 33. Mud deposition still persists in front of present Gulfport being hemmed in on the east and west by large beach wedges. In front of the Gulfport mud banks is an incipient barrier bar system consisting of nearshore sands. The large single Horn-Petit Bois barrier system still exists with a smaller sand barrier to the northeast. At this time, the predominant lithofacies is silty sand enclosing huge sand buildups with a diminutive amount of mud deposition.

Lithotope Level C (Figures 5, 15, 22, 25, and Table 7):

Sand and silty sands are the prominent lithofacies at this time level. Mud and silt deposition is slightly increased in the extreme western Sound. The sand platform still exists in front of Biloxi Bay but has diminished in size and muds have been replaced by silt eastward along the present shore to Biloxi. Sands poured into the Sound through the present Biloxi Bay system forming a massive beach complex eastward past the present Pascagoula River mouth and also coalescing with sand moving Gulfward from the east forming a barrier system completely enclosing the Sound except for a possible tidal pass between present Petit Bois and Dauphin Islands. Mud buildups are replacing silty sands in the extreme eastern portion.

It is interesting to note the variability in sand populations at this time level. Sites 12 and 13 remain beach ridge dune sands as are also sites 18 and 20. Sites 11 and 14 are forebeach sands whereas site 17 is a nearshore sand, site 19 an unusual distributary sand, and site 21 a back beach sand. Sites 25 and 30 have probability patterns unique to this study and are probably characteristic of sands developed on the back side of barriers. It is also intriguing to note that sites 16, 15 and 19 have the same pattern; distributary. However, 16 is a silt, 15 a sandy silt and 19 a sand.

Lithotope level B (Figures 4, 16, 23, 29, and Table 8):

Muds and silts are the main lithofacies throughout the Sound proper with sands being accumulated as a barrier system across the Gulf side. Fine-grained terrigenous sediments are being stored within the Sound as the transport of these sediments to the Gulf proper is blocked. Infilling of sediment is probably at a maximum as this is the ultimate stage of marine regression.

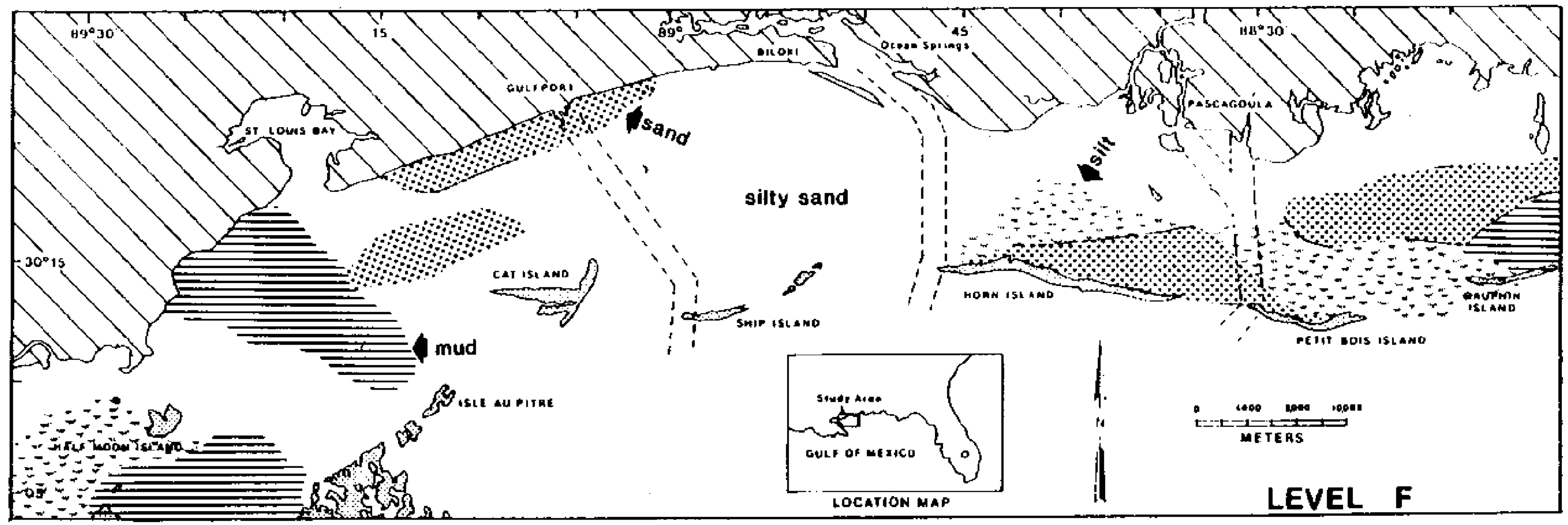


FIGURE 25

Level F lithofacies. Sand, silt and mud are patterned as indicated on the figure map. Silty sand, and sandy silt facies are combined and not patterned. Clay is not present therefore not represented.

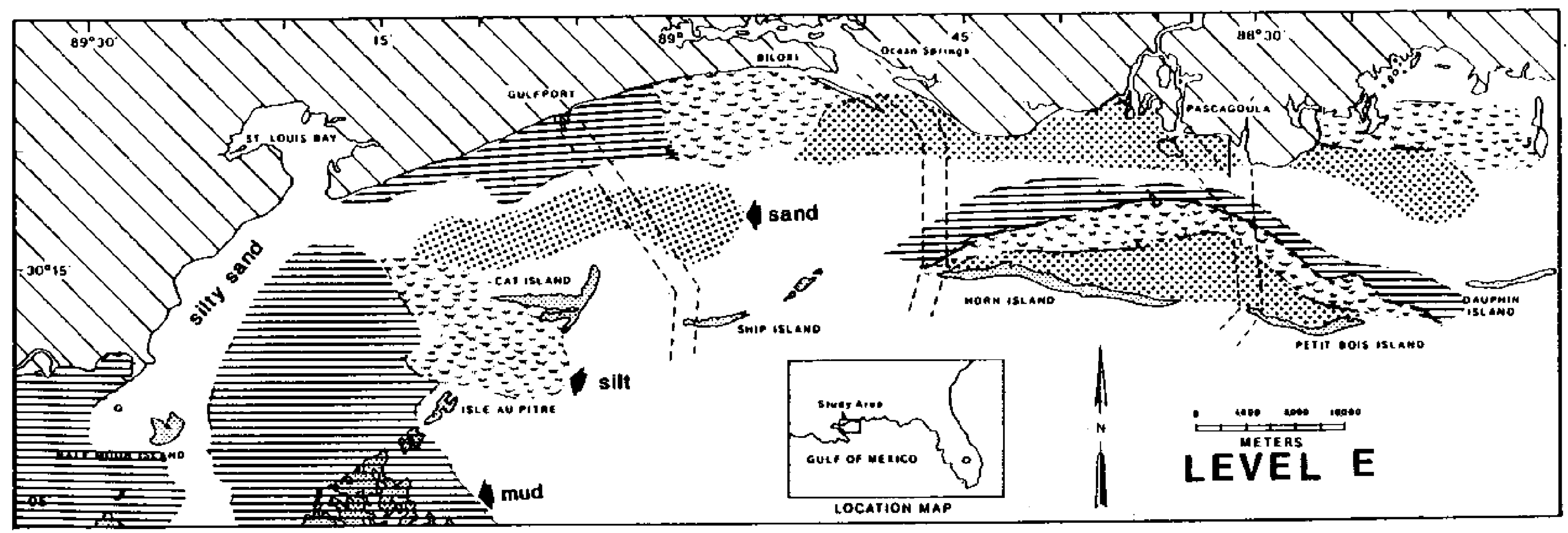


FIGURE 26

Level E lithofacies. Sand, silt and mud are patterned as indicated on the figure map. Silty sand, and sandy silt facies are combined and not patterned. Clay is not present therefore not represented.

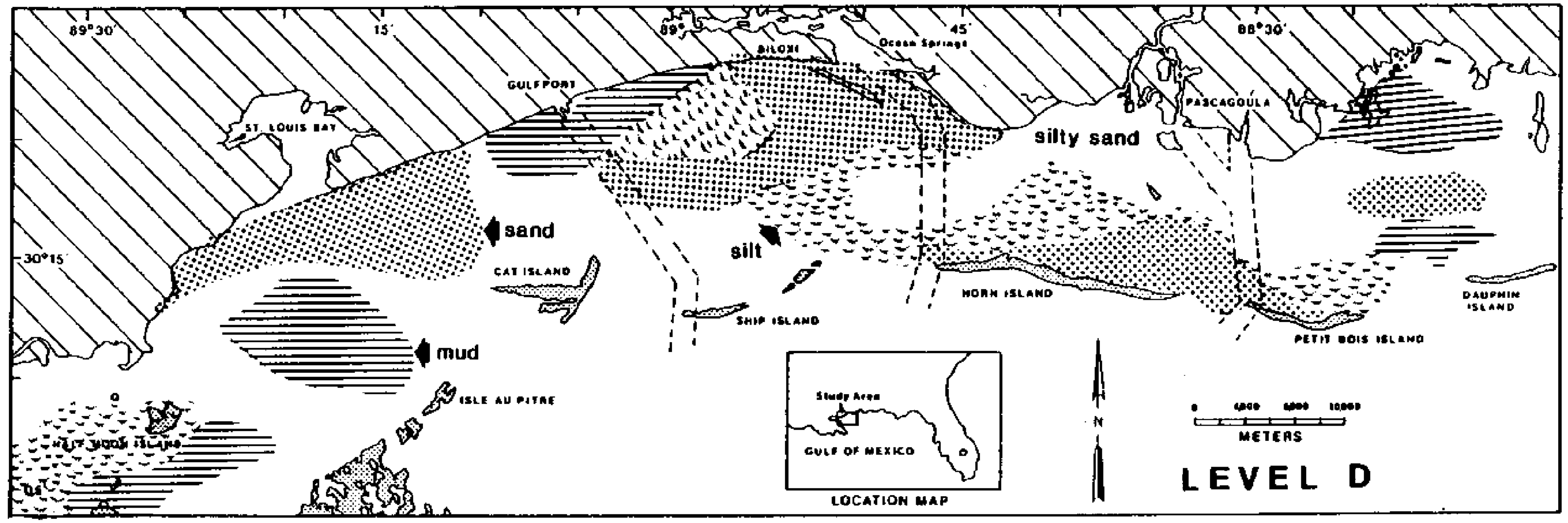


FIGURE 27

Level D lithofacies. Sand, silt and mud are patterned as indicated on the figure map. Silty sand, and sandy silt facies are combined and not patterned. Clay is not present therefore not represented.

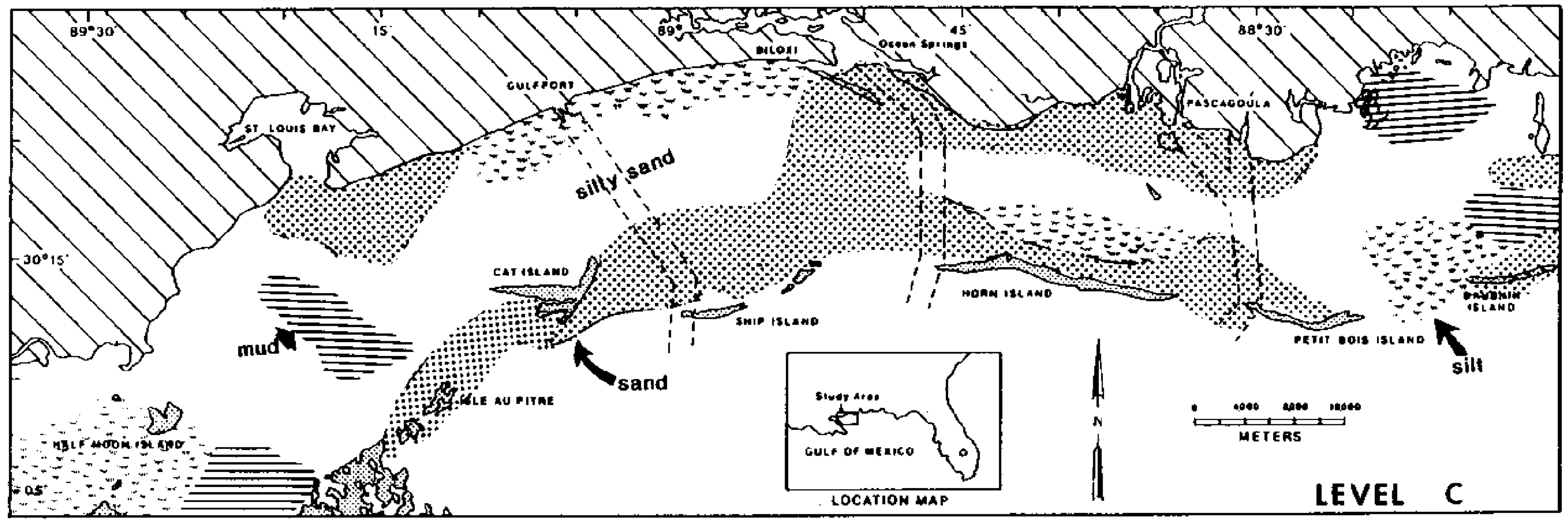


FIGURE 28

Level C lithofacies. Sand, silt and mud are patterned as indicated on the figure map. Silty sand, and sandy silt facies are combined and not patterned. Clay is not present therefore not represented.

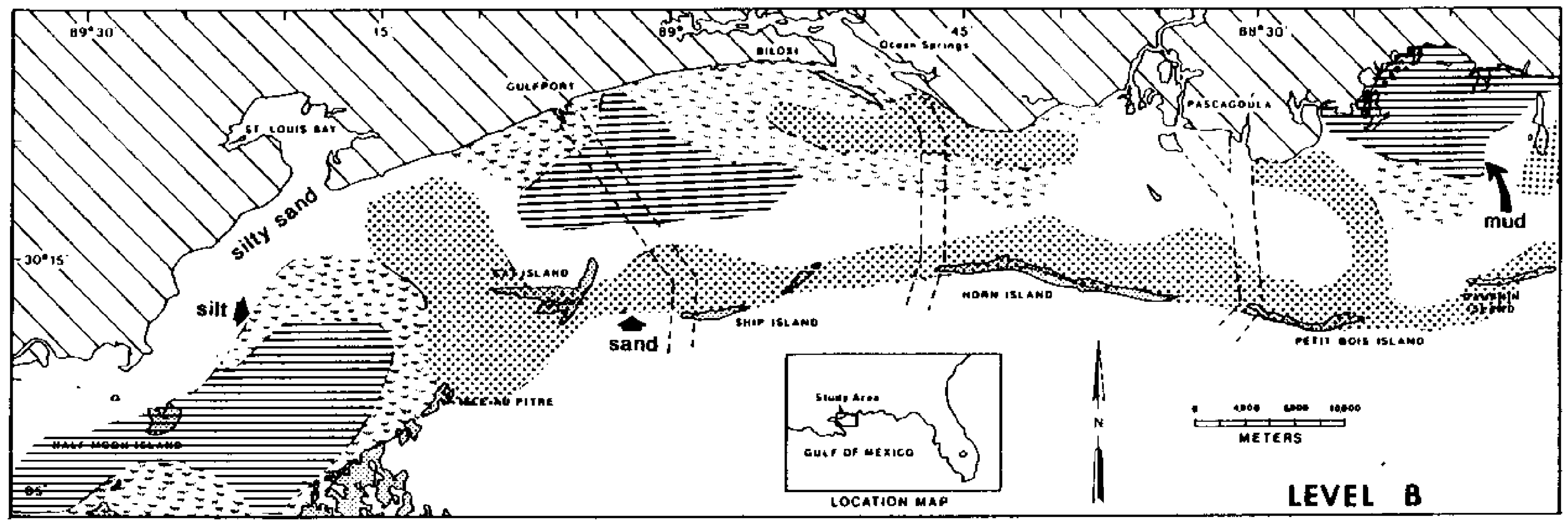


FIGURE 29

Level B lithofacies. Sand, silt and mud are patterned as indicated on the figure map. Silty sand, and sandy silt facies are combined and not patterned. Clay is not present therefore not represented.

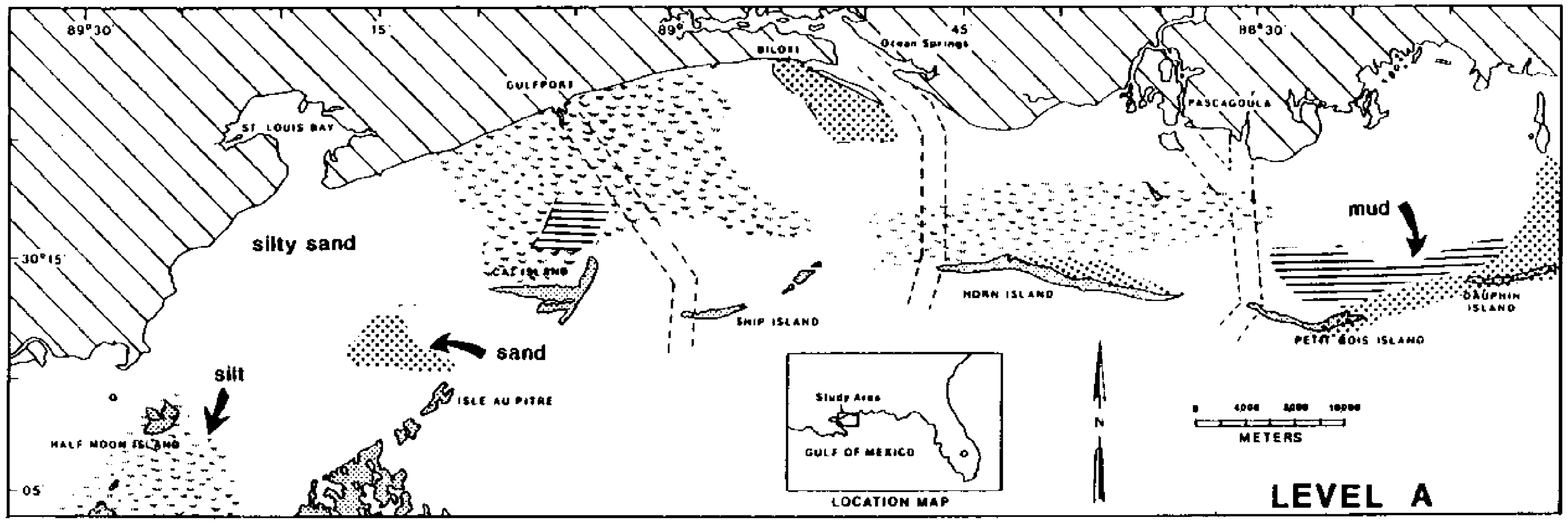


FIGURE 30

Level A lithofacies. Sand, silt and mud are patterned as indicated on the figure map. Silty sand, and sandy silt facies are combined and not patterned. Clay is not present therefore not represented.

Lithotope Level A (Figures 3, 17, 24, 38, and Table 9):

Prior to Time A and since Time B marine transgression has proceeded over the near recent Mississippi Sound. The huge barrier complex that lay on the Gulf side of the Sound has been destroyed leaving only the remnant barrier islands we see today. The dominant lithofacies is that of silty sand and sandy silt with large areas of silt deposition between Cat Island and Gulfport and just north of Horn Island.

Changes in lithofacies and lithotope increments for any one location can easily be seen using an amalgamated study of Tables 3 through 9 and the grouped probability plots. For example, site 18 was a dune sand, probably beach ridge, from level E up through level B. At level A site 18 became a nearshore muddy sand. At some sites there is no variability in the lithofacies such as 13 which was a beach ridge dune sand from level E through level A. This indicates site 13 was never under water. Obviously, this is not the situation today as the present barriers are rapidly, relative to geologic time, diminishing.

In the same aspect site 38 underwent little variation. From level G up through level A it has constantly been a lagoonal or estuarine mud, muddy silt or silt.

In the opposite sense site 5 shows considerable variation through time. At levels E and F this was the site of a nearshore sand, at level D a distributary sand, at level C a distributary silty sand, at level B an estuarine silt and at level A a nearshore sandy silt.

CONCLUSIONS

In much the same manner and given time for the utilization of a more sophisticated statistical treatment of the data, it would be possible to accomplish a lithotope reconstruction at each level.

However, by concertizing the fundamental graphic parameters, grain-size distribution plots both ratio and probability types and lithofacies reconstruction, a rudimentary but plausible scheme of depositional events through time can be constructed. A major marine regression was defined as beginning at level E and culminating at level B. The construction and distruction of lithofacies over specific areas can also be seen. Even though events could be somewhat defined, the source of material and transport routes could not because sediment composition was not considered as an intergal part of this study.

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TABLE 3

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL A (-) 20 cm TO (-) 36 cm

CORE REF.	CORE NO.	50ø Md.	5ø	16ø	25ø	75ø	84ø	95ø	Mg	S_1	SK_1	K_G	PPG
1	644	2.25	1.15	1.60	1.80	2.68	4.40	9.65	2.75	1.99	0.37	3.96	B
2	648	2.95	1.75	2.25	2.50	5.45	6.58	8.75	3.92	2.21	0.33	0.97	C
3	651	8.65	4.85	5.95	7.25	9.75	9.85	9.95	8.02	1.59	-0.24	0.84	G
4	005	3.40	1.95	2.52	2.78	4.85	6.05	8.30	3.95	1.84	0.27	1.26	C
5	669.5	3.95	2.05	2.80	3.15	7.45	8.45	9.80	5.07	2.59	0.25	0.74	C
6	666	7.60	2.72	4.57	5.55	8.55	8.65	9.40	6.93	2.04	-0.23	0.91	F
7	662	2.95	1.25	1.90	2.25	4.80	8.00	9.75	4.26	2.81	0.30	1.37	D
8	688	2.85	1.40	1.85	2.11	5.40	5.65	8.35	3.45	2.00	0.29	1.73	C
9	693	5.15	2.37	3.07	3.40	7.20	8.20	9.50	5.43	1.88	0.11	0.77	E
10	697	8.45	4.05	5.15	5.90	9.75	9.80	9.87	7.8	2.03	-0.26	0.62	F
11	716	6.3	3.71	4.64	5.15	8.35	9.75	9.85	6.9	2.21	0.08	0.79	F
12	003	2.05	0.52	1.15	1.45	2.67	4.55	6.85	3.12	1.81	0.26	2.13	B
13	741	1.65	0.77	1.25	1.37	1.95	2.05	2.45	1.65	0.45	-0.02	1.19	A
14	753	3.25	1.25	2.05	2.45	4.70	6.25	8.15	3.85	2.13	0.21	1.26	C
15	750	7.15	3.45	4.85	5.55	7.75	8.38	9.20	6.78	1.75	-0.14	1.07	G
16	746.5	6.90	4.15	4.65	5.20	7.70	8.38	8.80	6.70	1.58	-0.09	0.76	G
17	002	2.53	1.25	1.73	1.97	4.55	5.67	8.30	3.31	2.05	0.32	1.12	C
18	785	1.98	0.65	1.12	1.47	3.45	6.80	9.82	3.30	2.81	0.35	1.90	C
19	781	6.40	3.05	4.87	5.25	7.80	8.25	9.50	6.50	1.09	-0.02	1.04	G
20	778	3.4	1.45	2.05	2.35	5.63	6.45	9.38	3.95	2.30	0.25	0.99	C
21	775.5	3.15	1.65	2.25	2.55	7.25	8.85	9.85	4.75	2.89	0.32	0.72	D
22	001	7.25	3.65	4.58	5.25	8.25	9.05	9.77	6.97	2.00	-0.09	0.84	F
23	799	7.30	4.25	5.05	5.80	7.50	7.75	9.48	6.70	1.47	-0.08	1.26	G
24	805	7.05	3.75	4.03	5.75	8.28	8.65	9.65	6.90	1.79	-0.06	0.95	G
25	809	3.15	1.65	2.00	2.25	3.85	7.45	9.85	4.20	2.60	0.32	2.10	C
26	1090.5	8.45	5.05	5.55	5.85	9.77	9.85	10.20	7.95	1.83	-0.16	0.54	G
27	839	6.65	3.95	4.97	5.50	8.15	8.85	9.45	6.80	1.81	0.01	0.85	G
28	848	4.05	1.55	2.08	2.45	6.65	8.05	9.60	4.72	2.71	0.19	0.79	D
29	1077	2.45	1.30	1.65	1.95	2.97	5.25	8.36	3.12	1.38	0.34	2.84	B
30	863	3.10	1.95	2.05	2.62	4.07	5.60	9.05	3.85	1.86	0.34	2.01	C
31	870	2.00	0.93	1.35	1.56	2.45	2.60	8.38	1.98	1.44	0.36	3.43	B
32	1063	2.55	1.53	1.95	2.12	3.25	6.05	9.85	3.52	2.28	0.38	3.02	C
33	885	2.75	1.53	2.05	2.26	4.25	6.37	8.92	3.72	2.01	0.33	1.52	C
34	910	5.45	3.95	4.57	4.80	6.05	7.05	9.20	5.75	1.41	0.21	1.72	E
35	916	3.55	2.26	3.15	3.25	5.35	7.68	9.78	4.78	2.27	0.33	1.47	D
36	925	5.85	4.10	4.48	4.65	7.95	8.25	9.65	6.20	1.33	0.18	0.69	G
37	1048	6.20	2.10	3.00	3.45	7.10	7.40	9.35	5.52	2.21	-0.06	0.81	E
38	932	6.05	1.75	4.25	4.55	9.35	9.85	9.90	6.72	1.90	-0.03	0.70	F
39	1037	3.40	1.65	2.35	2.65	6.65	8.65	9.70	4.80	2.80	0.28	0.82	D
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TABLE 4

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL B
-127 cm TO -143 cm

CORE REF.	CORE NO.	50ø Md.	5ø	16ø	25ø	75ø	84ø	95ø	Mg	S_1	SK_1	K_G	PPG·
1	644	2.95	1.95	2.35	2.55	5.75	9.55	9.65	4.95	2.96	0.37	0.99	D
2	648	2.75	1.65	2.10	2.35	6.45	7.20	9.55	4.02	2.46	0.36	0.79	C
3	651	2.80	1.55	2.00	1.20	4.45	7.65	9.75	4.15	2.65	0.35	1.03	D
4	005	7.85	4.40	5.65	5.75	9.70	9.75	9.85	7.75	1.85	-0.13	0.56	F
5	669.5	4.95	3.60	4.15	4.40	6.25	6.65	8.65	5.25	1.39	0.23	1.12	E
6	666	3.25	1.45	2.00	2.45	6.10	7.20	9.45	4.15	2.50	0.27	0.90	D
7	662	3.45	1.95	2.30	2.55	7.05	7.95	8.85	4.55	2.42	0.28	0.63	D
8	688	2.45	1.15	1.80	2.05	2.95	5.25	9.85	3.18	2.02	0.35	3.96	C
9	693	3.45	1.85	2.35	2.60	6.25	6–65	7.85	4.15	1.98	0.23	0.67	D
10	697	2.35	1.45	1.85	1.95	4.75	5.25	8.35	3.15	1.89	0.37	1.01	C
11	716	7.85	4.45	5.10	5.75	9.75	9.80	9.85	7.53	2.00	-0.13	0.55	F
12	003	2.25	1.25	1.85	1.95	2.55	2.65	2.85	2.25	0.44	-0.12	1.09	A
13	741	1.30	0.65	0.85	0.95	1.45	1.55	2.0	1.57	0.62	0.02	1.11	A
14	753	2.25	0.85	1.40	1.65	4.15	5.65	7.0	3.08	2.00	0.27	1.08	C
15	750	5.60	3.00	4.00	4.55	6.55	7.00	8.35	5.53	1.56	0.01	1.10	E
16	746.5	2.75	1.80	2.20	2.35	4.35	5.65	8.55	3.53	1.88	0.36	1.38	C
17	002	2.55	1.35	1.75	2.05	5.25	6.70	8.95	3.67	2.39	0.34	0.97	C
18	785	1.45	-0.55	0.45	0.85	1.85	2.0	2.45	1.37	0.89	-0.17	1.23	A
19	781	6.15	3.15	4.15	4.75	7.15	8.15	9.80	6.15	2.00	0.05	1.00	E
20	778.5	2.35	1.25	1.65	1.85	7.95	9.15	9.85	4.38	3.17	0.37	0.58	D
21	775.5	3.35	1.95	2.40	2.60	5.35	7.35	9.45	4.37	2.37	0.31	1.12	D
22	001	6.25	3.45	4.75	5.15	8.35	8.65	9.65	6.55	2.21	0.05	0.79	E
23	799	7.65	4.45	5.35	6.15	9.15	9.85	10.00	7.62	1.96	-0.08	0.76	F
24	805	8.65	5.00	6.65	6.75	9.60	9.65	9.85	8.32	2.09	-0.25	0.70	F
25	809	2.65	1.75	2.15	2.25	3.05	3.25	6.75	2.68	1.03	0.32	2.56	B
26	1090.5	9.75	5.45	6.30	7.05	9.85	9.90	9.95	9.82	0.74	-0.47	0.66	G
27	839	7.47	-0.75	4.45	6.35	9.00	9.70	9.85	7.19	2.91	-0.27	1.64	F
28	848	2.85	1.65	7.15	2.35	6.15	8.00	9.85	4.33	2.70	0.35	0.88	D
29	1077	2.0	1.25	1.65	1.85	2.55	2.75	6.65	2.13	1.09	0.36	0.46	B
30	863	2.35	1.35	1.75	1.95	2.75	2.95	8.35	2.32	1.33	0.36	3.59	B
31	870	7.35	3.00	4.45	5.40	9.75	9.85	9.95	7.22	2.4	-0.12	0.65	F
32	1063	6.50	4.75	5.15	5.60	8.35	9.25	9.60	6.95	1.84	0.14	0.72	F
33	885	3.10	1.55	2.25	2.45	5.15	6.55	8.10	4.03	2.14	0.26	0.99	C
34	910	7.25	4.15	4.55	4.75	9.75	9.80	9.85	7.23	2.22	-0.04	0.47	F
35	916	8.85	4.05	5.03	6.85	9.80	9.85	9.95	7.90	2.11	-0.31	0.82	G
36	925	6.45	3.85	4.45	4.65	9.75	9.85	9.90	6.92	2.27	0.07	0.49	F
37	1048	4.35	2.55	3.25	3.55	5.55	6.35	8.00	4.65	1.61	0.17	1.12	D
38	932	6.85	2.65	5.15	5.75	9.55	9.60	9.75	7.20	2.18	-0.09	0.76	F
39	1037	8.15	3.90	5.00	5.15	9.75	9.85	9.95	7.67	2.12	-0.20	0.54	F
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TABLE 5

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL C
-234 cm TO -250 cm

CORE REF.	CORE NO.	50ø Md.	5ø	16ø	25ø	75ø	84ø	95ø	Mg	S_1	SK_1	K_G	PPG
1	644	2.90	1.80	2.25	2.45	3.45	7.65	9.80	4.27	2.55	0.36	3.28	E
2	648	8.25	4.20	5.62	6.45	9.70	9.76	9.85	7.92	1.87	-0.22	0.71	J
3	651	2.35	1.45	1.85	1.95	2.95	3.15	9.45	2.45	1.52	0.39	3.28	B
4	005	9.45	4.80	5.85	6.50	9.30	9.65	9.85	8.32	1.71	-0.42	0.74	J
5	669.5	4.10	1.85	2.55	2.85	6.15	7.05	9.80	4.63	2.37	0.22	0.99	F
6	666	5.25	4.05	4.85	4.95	7.15	8.15	9.85	6.08	1.71	0.29	1.08	G
7	662	6.15	0.00	0.00	3.95	7.95	8.55	9.80	7.15	3.62	-0.13	1.00	I
8	688	3.15	1.85	2.35	2.65	5.15	6.35	9.15	3.95	2.07	0.32	1.19	E
9	693	4.85	2.25	2.75	3.15	6.75	9.25	9.85	5.62	2.77	0.16	1.05	F
10	697	4.65	1.15	1.45	1.65	6.55	8.55	9.85	4.88	3.09	0.10	0.73	F
11	716	3.15	1.25	2.05	2.35	4.55	3.45	6.85	3.53	1.71	0.16	1.04	D
12	003	1.85	0.65	1.35	1.45	2.15	2.35	2.45	1.85	0.25	-0.17	1.05	A
13	741	1.45	0.85	1.05	1.25	1.80	1.85	2.15	1.43	.40	0.04	0.97	A
14	753	2.15	0.85	1.45	1.65	4.55	5.55	6.95	3.05	1.94	0.29	0.86	C
15	750	5.45	2.65	3.85	4.35	6.65	7.15	8.25	5.48	1.67	0.00	0.50	G
16	746.5	5.35	3.55	4.30	4.65	6.55	7.55	9.05	5.72	1.64	0.17	1.19	G
17	002	2.45	1.15	1.65	1.90	5.75	7.55	9.05	3.88	2.66	0.33	0.84	E
18	785	1.95	0.75	1.25	1.65	2.25	2.45	2.75	1.92	0.55	-0.10	1.37	A
19	781	6.75	4.20	5.05	5.45	7.35	7.70	9.55	6.48	1.47	0.02	1.15	G
20	778.5	1.85	1.05	1.35	1.55	2.20	2.40	2.70	1.85	0.51	0.02	1.04	A
21	775.5	2.55	1.65	2.05	2.15	2.95	3.80	5.45	2.80	1.03	0.26	1.95	C
22	001	6.0	3.95	4.85	5.25	6.95	7.35	8.25	6.07	1.27	0.02	1.04	G
23	799	7.55	4.35	4.75	5.55	8.95	9.70	9.90	7.33	2.06	1.00	0.67	I
24	805	3.25	1.95	2.45	2.70	5.90	6.45	8.40	4.05	1.97	0.30	0.83	E
25	809	3.97	2.05	2.35	2.50	4.45	7.55	9.25	4.62	2.39	0.73	1.51	F
26	1090.5	5.15	2.00	2.85	4.15	9.75	9.65	9.85	5.88	2.89	0.10	0.57	H
27	839	5.45	4.10	4.80	6.95	8.95	9.25	9.85	7.50	1.97	-0.26	1.18	I
28	848	2.75	1.40	1.95	2.15	3.35	5.55	9.15	3.42	2.57	0.32	2.65	D
29	1077	3.65	1.45	2.25	2.75	6.05	7.15	9.85	4.35	2.49	0.24	1.04	E
30	863	2.85	2.05	2.35	2.55	3.45	4.65	8.45	3.25	1.57	0.37	2.91	D
31	870	9.80	0.00	6.05	7.15	9.85	9.90	10.05	8.55	1.92	-0.47	1.52	J
32	1063	6.70	4.05	4.65	4.95	8.95	9.80	9.90	7.06	2.18	0.05	0.60	I
33	885	3.0	1.55	2.15	2.45	8.05	9.80	9.85	4.98	3.19	0.32	0.61	F
34	910	7.95	3.35	4.75	5.55	9.75	9.90	9.95	7.52	2.27	-0.20	0.64	I
35	916	8.30	4.45	5.00	5.85	9.55	9.60	9.80	7.65	1.96	-0.22	0.59	J
36	925	7.75	3.95	4.65	5.55	8.55	9.85	9.87	7.41	2.18	-0.14	0.81	I
37	1048	4.25	2.25	2.75	2.95	6.95	9.15	9.75	5.38	2.74	0.23	0.77	H
38	932	7.80	3.15	4.70	5.45	8.35	9.55	9.85	7.28	2.20	-0.19	0.95	I
39	1037	7.65	3.85	4.95	6.55	8.55	9.75	9.90	7.38	2.17	-0.13	1.24	I
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TABLE 6

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL D
-340 cm TO -356 cm

CORE REF.	CORE NO.	50ø Md.	5ø	16ø	25ø	75ø	84ø	95ø	Mg	S_1	SK_1	K_G	PPG
1	644	5.15	2.05	2.45	2.55	8.95	9.25	9.45	5.60	2.84	0.08	0.47	C
2	648	3.35	1.95	2.45	2.75	5.95	7.30	8.55	4.37	2.21	0.29	0.84	B
3	651	3.25	1.85	2.45	2.75	7.05	9.45	9.85	5.05	2.96	0.32	0.76	C
4	005	9.65	4.05	5.20	6.55	9.75	9.85	9.95	8.25	2.05	-0.45	0.75	E
5	669.5	2.25	1.35	1.75	1.85	2.85	3.45	8.65	2.48	1.52	0.38	2.99	D
6	666	6.0	3.95	4.55	4.75	9.75	9.85	9.95	6.8	2.22	0.16	0.49	F
7	662	3.10	1.65	2.25	2.55	3.15	7.65	9.65	4.32	2.54	0.32	1.26	B
8	688	3.50	2.35	2.85	3.05	5.35	6.45	8.45	4.27	1.97	0.31	1.09	B
9													
10	697	6.40	1.90	5.15	5.75	7.95	9.05	9.85	6.85	1.86	-0.07	1.48	F
11	716	4.00	2.05	2.65	2.95	5.75	6.15	8.95	4.22	1.89	0.22	1.01	B
12	003	1.00	-0.25	0.45	0.65	1.45	1.85	2.05	1.10	0.09	0.04	1.18	A
13	741	1.68	1.10	1.35	1.55	1.95	2.05	2.25	1.68	0.33	0.00	1.18	A
14	753	2.15	0.80	1.35	1.55	6.50	7.55	8.65	3.68	1.55	0.32	0.65	B
15	750	4.68	2.20	3.15	3.75	5.75	6.45	7.05	4.78	1.53	-0.01	0.99	G
16	746.5	7.43	4.15	5.05	5.75	9.15	9.85	9.90	7.42	2.07	-0.07	0.69	E
17	002	1.65	0.85	1.10	1.35	2.35	4.75	7.65	2.50	1.97	0.38	2.79	C
18	785	2.00	0.80	1.35	1.45	2.25	2.40	2.60	1.92	0.55	-0.17	0.92	A
19	781	6.42	3.55	4.75	5.25	6.55	8.15	9.15	6.42	1.71	-0.01	1.76	F
20													
21	775.5	5.65	3.95	4.65	4.95	8.95	9.55	10.05	6.62	2.14	0.22	0.62	F
22	001	7.95	4.55	5.45	5.90	9.55	9.85	9.95	7.75	1.92	-0.13	0.61	E
23	799	7.15	4.55	5.35	6.15	8.15	8.45	9.85	6.96	1.56	-0.85	1.09	F
24	805	2.60	1.30	1.95	2.15	3.05	3.25	6.05	2.60	1.03	0.23	2.16	D
25	809	2.85	1.45	2.05	2.30	4.55	5.75	8.05	3.53	1.93	0.29	1.20	B
26	1090.5	3.20	1.45	2.15	2.45	6.05	9.70	9.85	5.07	3.22	0.29	0.96	C
27	839	9.15	4.90	5.65	6.10	9.75	9.85	9.95	8.22	1.80	-0.34	0.57	E
28	848	2.50	2.25	2.45	2.55	2.95	3.05	3.15	2.62	0.30	0.22	0.92	A
29	1077	2.25	1.45	1.75	1.95	2.55	2.75	2.25	2.25	0.52	-0.50	0.54	A
30	863	5.25	2.75	3.35	3.55	7.35	7.85	9.05	5.48	2.20	0.10	0.68	C
31	870	9.25	5.10	7.20	8.35	9.65	9.85	9.95	8.77	1.39	-0.36	1.53	G
32	1063	9.45	4.80	5.85	6.45	9.75	9.85	9.95	8.38	1.78	-0.40	0.64	E
33	885	2.65	1.55	1.95	2.10	3.05	3.30	8.90	2.63	1.47	0.35	3.17	D
34	910	8.75	3.65	6.05	7.25	9.75	9.85	9.95	8.20	1.91	-0.31	1.03	G
35	916	3.65	2.05	2.25	3.45	9.15	9.45	9.75	5.47	2.53	0.29	0.55	C
36	925	3.55	2.65	3.05	3.15	5.95	7.75	9.55	4.77	2.23	0.37	1.01	B
37	1048	3.60	2.25	2.75	2.95	7.45	8.55	9.65	4.95	2.58	0.32	0.67	B
38	932	8.55	4.45	4.85	5.65	9.75	9.85	9.95	7.75	2.08	-0.24	0.55	E
39	1037	7.75	4.85	6.75	6.55	8.55	9.35	9.50	7.77	1.53	-0.07	1.03	E
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TABLE 7

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL E
-447 cm TO -463 cm

CORE REF.	CORE NO.	50ϕ Md.	5ϕ	16ϕ	25ϕ	75ϕ	84ϕ	95ϕ	Mz	S_1	SK_1	K_G	PPG
1	644	3.25	1.95	2.45	2.65	7.35	9.25	9.85	4.98	2.90	0.33	0.69	A
2	648	3.60	1.95	2.60	2.85	5.80	6.25	9.85	4.15	2.11	0.29	1.10	B
3	651	4.20	2.65	3.25	3.55	6.45	8.85	9.85	5.43	2.49	0.28	1.02	B
4	005	7.25	4.45	5.25	6.00	8.15	9.75	9.85	7.42	1.94	-0.02	1.03	D
5	669.5	1.65	1.25	1.45	1.55	2.45	2.85	8.25	1.98	1.41	0.44	3.19	B
6	666	5.65	2.85	3.15	3.35	8.15	8.95	9.25	5.92	2.42	0.06	0.55	B
7	662	9.95	3.95	4.75	5.55	9.75	9.85	9.95	8.18	2.18	-0.50	0.58	E
8	688	4.05	1.95	2.45	3.05	6.15	7.65	8.65	4.72	2.31	0.19	0.88	B
9													
10	697	8.00	4.55	5.45	6.75	8.45	8.65	9.05	7.37	1.48	-0.27	1.08	E
11	716	4.20	2.40	2.85	3.05	7.65	9.25	9.85	5.43	2.73	0.26	0.66	A
12	003	1.45	0.65	1.00	1.15	1.75	1.85	2.20	1.43	0.45	-0.02	1.06	C
13	741	1.80	1.25	1.45	1.55	1.95	2.20	2.35	1.82	0.35	0	1.13	C
14	753	2.05	0.35	1.25	1.55	2.65	3.85	7.85	2.38	1.79	0.27	2.79	A
15	750	8.85	4.85	5.75	6.25	9.80	9.85	9.95	8.15	1.80	-0.28	0.59	D
16	746.5	6.55	3.75	4.55	5.05	8.35	8.00	9.75	6.37	1.77	0.03	0.74	D
17	002	5.75	4.15	4.55	4.70	7.65	8.55	9.55	6.28	1.82	0.20	0.75	D
18	785	2.65	2.05	2.25	2.55	2.75	2.85	3.05	2.58	0.30	-0.10	2.05	C
19													
20													
21													
22													
23	799	7.45	4.05	5.40	6.05	8.55	9.05	9.85	7.30	1.79	-0.09	0.95	D
24	805	2.55	1.35	1.95	2.15	3.05	3.85	6.90	2.78	1.31	0.28	2.53	B
25	809	2.85	1.45	2.00	2.25	4.35	7.15	9.85	4.00	1.01	0.33	1.64	B
26	1090.5	2.85	1.25	1.85	2.15	3.55	6.85	9.35	3.85	2.48	0.30	2.37	B
27	839	7.85	3.55	5.35	6.75	9.55	9.60	9.85	7.60	2.02	-0.18	0.92	E
28													
29	1077	3.00	0.45	2.25	2.55	3.75	4.05	6.05	3.10	1.75	0.04	1.91	A
30	863	7.75	4.30	5.25	5.90	8.45	8.85	9.75	7.28	1.72	-0.13	0.87	D
31	870	9.75	4.55	7.85	8.25	9.25	9.85	9.95	9.15	1.32	-0.46	2.21	D
32	1063	7.85	0.00	5.05	5.55	9.45	9.65	9.95	7.52	2.66	-0.29	1.04	E
33	885	7.70	1.85	2.45	2.75	8.45	9.25	9.85	6.47	2.91	-0.23	0.57	B
34	910	8.40	4.85	5.75	6.45	9.55	9.65	9.85	7.93	1.73	-0.21	0.66	E
35	916	8.05	0.00	5.15	6.35	9.75	9.85	9.95	7.68	2.68	-0.31	1.20	E
36	925	4.15	2.65	3.05	3.25	7.15	9.75	9.85	5.65	2.76	0.29	0.76	B
37	1048	4.85	2.45	2.85	3.05	7.55	9.55	9.85	5.75	2.80	0.17	0.67	B
38	932	8.85	5.25	5.65	6.15	9.75	9.85	9.95	8.12	1.76	-0.26	0.53	E
39	1037	8.25	4.45	4.95	5.55	9.75	9.85	9.90	7.68	2.05	-0.20	0.53	E
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TABLE 8

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL F
-554 cm TO -570 cm

CORE REF.	CORE NO.	50ø Md.	5ø	16ø	25ø	75ø	84ø	95ø	Mg	S_1	SK_1	K_G	PPG
1	644	2.65	1.75	2.15	2.30	3.05	3.25	9.65	2.68	1.46	0.39	4.32	C
2	648	9.64	4.70	6.05	7.65	9.80	9.85	10.00	8.49	1.77	-0.43	1.01	G
3	651	4.25	1.50	2.85	3.18	9.75	9.80	9.85	5.62	2.95	0.17	0.52	F
4													
5	669.5	2.15	1.40	1.57	1.85	2.62	2.95	4.62	2.28	0.78	0.27	1.71	B
6	666	1.65	0.85	1.16	1.25	2.15	2.45	2.85	1.78	0.61	0.10	0.91	A
7	662	5.50	3.77	4.27	4.55	6.65	7.80	9.45	5.86	1.74	0.19	1.11	E
8	688	4.27	2.45	3.05	3.35	6.75	7.10	8.45	4.81	1.97	0.20	0.72	D
9													
10	697	7.45	4.53	5.22	5.85	9.65	9.75	9.85	7.57	1.86	-0.05	0.57	G
11													
12	003	1.75	0.35	0.95	1.25	2.10	2.25	2.60	1.65	0.36	-0.12	1.08	A
13													
14	753	1.85	0.45	1.05	1.30	3.65	6.44	8.97	3.16	2.70	0.34	1.49	C
15	750	6.25	4.18	4.60	4.80	7.80	7.85	8.05	6.23	1.42	-0.03	0.53	E
16	746.5	5.40	3.12	4.00	4.40	9.45	7.42	9.45	5.60	1.84	0.14	1.26	E
17													
18													
19													
20													
21													
22													
23													
24													
25													
26	1090.5	2.97	1.20	1.85	2.10	4.50	5.22	8.20	3.35	1.60	0.25	1.20	C
27	839	2.65	1.20	1.54	2.03	3.55	5.21	8.20	3.20	2.02	0.29	1.89	C
28													
29	1077	2.65	1.65	2.05	2.22	3.55	4.72	8.25	3.13	1.69	0.35	2.03	C
30													
31	870	9.25	3.60	5.85	7.45	9.80	9.85	9.93	8.32	1.97	-0.39	1.10	G
32	1063	8.65	4.52	5.72	6.85	9.80	9.85	9.95	8.07	1.85	-0.26	0.75	G
33	885	3.70	1.75	2.58	2.90	8.05	9.35	9.58	5.22	2.92	0.25	0.62	F
34	910	8.55	4.85	6.45	7.55	9.75	9.85	9.98	8.28	1.62	-0.22	0.96	G
35													
36	925	7.85	4.00	4.65	5.05	9.60	9.65	9.84	7.38	2.13	-0.16	0.53	G
37	1048	3.00	2.18	2.55	2.73	5.25	7.38	9.77	4.30	2.35	0.39	1.23	D
38	932	8.95	4.05	5.85	6.75	9.80	9.85	9.97	8.22	1.90	-0.33	0.79	G
39	1037	7.55	5.00	6.20	6.85	8.30	9.75	9.92	7.83	1.63	-0.02	1.39	G
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TABLE 9

CUMULATIVE-FREQUENCY GRAPHIC PARAMETERS FOR LITHOTOPE LEVEL G -768 cm TO -784 cm													
CORE REF.	CORE NO.	50ø Md.	5ø	16ø	25ø	75ø	84ø	95ø	Mg	S_I	SK_I	K_G	PPG
1													
2													
3													
4													
5													
6													
7													
8	688	7.25	4.15	5.15	5.65	7.75	8.45	9.77	6.95	1.66	-0.05	1.10	C
9													
10	697	6.89	4.05	4.78	5.25	9.35	9.80	9.90	7.15	2.14	0.01	0.58	C
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26	1090.5	2.89	-0.17	1.05	1.65	4.55	6.65	8.75	3.51	2.75	0.16	1.40	A
27	839	7.90	5.20	5.90	6.55	9.15	9.68	9.88	7.83	1.66	-0.08	0.74	C
28													
29	1077	2.95	1.33	1.95	2.25	4.05	6.11	9.15	3.63	2.19	0.29	1.78	A
30													
31													
32	1063	3.70	2.50	3.13	3.25	4.05	4.65	8.28	3.83	1.22	0.29	2.96	A
33													
34	910	9.75	5.36	6.47	7.55	9.80	9.85	10.00	8.68	1.58	-0.45	0.84	D
35													
36	725	8.65	5.45	6.77	7.65	9.75	9.82	9.93	8.55	1.57	-0.21	0.87	D
37	1048	3.25	1.65	2.05	2.20	7.15	7.45	9.80	4.23	2.59	0.30	0.67	B
38	932	6.75	5.45	5.75	6.35	9.05	9.80	9.88	7.42	1.77	0.21	0.67	C
39	1037	8.40	4.15	5.35	6.05	9.55	9.62	9.75	7.79	1.91	-0.26	0.65	D
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