9. SITE 623[1]

Shipboard Scientific Party[2]

HOLE 623

Date occupied: 1 November 1983, 0434 LCT

Date departed: 2 November 1983, 2130 LCT

Time on hole: 1 day, 17 hr.

Position: 25°46.09′N, 86°13.84′W

Water depth (sea level; corrected m, echo-sounding): 3177

Water depth (rig floor; corrected m, echo-sounding): 3187

Bottom felt (m, drill pipe): 3188

Penetration (m): 202.2

Number of cores: 20

Total length of cored section (m): 110.2

Total core recovered (m): 89.24

Core recovery (%): 81

Oldest sediment cored:
Depth sub-bottom (m): 202.2
Nature: Clay/silt
Age: Pleistocene (Ericson Zone Y)
Measured velocity (km/s): N/A

Basement: N/A

BACKGROUND AND OBJECTIVES

The drilling results from both the midfan and the lower fan areas clearly suggest that the central channel on the midfan acted as a conduit for coarse-grained sediments, leaving only an aggradational lag behind. The data obtained at Sites 614 and 615 show a high sand/clay ratio of the turbidites that constructed the deposits at the channel terminations (see Site 614 and 615 chapters, this volume). As both the channel dimensions and the sinuosity decrease downfan, at some point on the lower fan, the channel ceases to confine the density currents and the small channel depth can no longer contain all the sand-sized material. Consequently, at this location, the conduit system changes into a "dispersal" system. However, the presence of abandoned channels more or less parallel and adjacent to the youngest channel suggests that shifting to a new position is common, very likely because of the low gradient and easy infilling of the channels. The fact that those abandoned channels are detectable on side-scan sonar means that lateral movement of sediment away from the channel cannot be too large. If the concept of frequent channel shifting is acceptable, we should be able to find a vertical sequence in which both channel deposits of minor thickness and overbank deposits are stacked vertically. Although these deposits could all be rather sandy with a decreasing sand/clay ratio from channel to levee to overbank, the vertical changes should nevertheless indicate what environment was cored.

Only one line was run in the vicinity of Site 623 by the *Conrad* during the site survey cruise. This line was duplicated by the *Glomar Challenger* and the final Site 623 location was chosen after finishing a track at 90° through the proposed site.

A 200-m hydraulic piston corer (HPC) program was designed to satisfy the following objectives:

1. To drill and core through the side of a buried channel overlain and underlain by levee and overbank deposits to obtain the sedimentological, paleontological, and geotechnical characteristics of those sediments;
2. To utilize the lithologies, sedimentary structures, and paleontological information to determine the mode(s) of sediment transport and deposition, and the source of those sediments;
3. To determine the characteristics of the channel, levee, and overbank deposits for comparison with the middle fan;
4. To determine from this data and from Site 624 data if the channel is migratory or frequently shifts its location laterally; and
5. To establish the sedimentation rates for this area of the fan.

OPERATIONS

Site 622 to Site 623

With most of the middle fan objectives accomplished, scientific priorities toward the end of Leg 96 again shift-

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[1] Bouma, A. H., Coleman, J. M., Meyer, A. W., et al., *Init. Repts. DSDP*, 96: Washington (U.S. Govt. Printing Office).

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ed to the lower fan area. The area near Site 623, an alternate site bypassed earlier, was chosen as the best location to spend the voyage's remaining site time. The transit of 300 km east-southeast from Site 622 was slowed by choppy seas and adverse currents, with an average speed of only 7 to 8 knots. On arrival in the area, a 3½-hr. preliminary survey was made to pinpoint the two final planned drill sites (Sites 623 and 624). A positioning beacon was dropped at 0434 hr., 1 November.

Site 623

After a routine pipe trip, the initial spud attempt was unsuccessful and resulted in a "water core." The second variable length hydraulic piston core (VLHPC) found the seafloor at 3188.0 m, 11 m below precision depth record (PDR) depth (Table 1). Clay and silty muds were cored to about 150 m below seafloor, with beds of sand appearing at about 45 m sub-bottom and becoming thicker and more numerous with depth. Incomplete VLHPC strokes began at about 55 m sub-bottom. Below 150 m sub-bottom, corer penetration and recovery dropped to very small amounts in apparent silt and fine sand. Cores were attempted with little success after intervening drilled intervals of about 10 m to the total depth at 3390.2 m pipe depth.

The inability to recover core again made logs the only real source of information about the lower portion of the penetrated section. After the usual preparations, the long-spaced sonic/gamma ray/caliper (LSS/GR/CAL) sonde was run for a single log attempt. The tool met no obstruction until it came to rest on apparent solid fill at 3371 m below sea level. A good log was recorded and, when the tool was lowered for a repeat log, an additional 6 m of fill had accumulated.

Following the logging operation, the drill string was pulled for the move to nearby Site 624.

Table 1. Site 623 coring summary.

Core[a]	Date (Nov. 1983)	Time	Depth from drill floor (m)	Depth below seafloor (m)	Length cored (m)	Length recovered (m)	Amount recovered (%)
Hole 623							
1H	1	1430	3188.0–3194.6	0.0–6.6	6.6	6.52	99
2H	1	1535	3194.6–3204.2	6.6–16.2	9.6	8.69	91
3H	1	1635	3204.2–3213.8	16.2–25.8	9.6	7.48	78
4H	1	1735	3213.8–3223.4	25.8–35.4	9.6	8.08	84
5H	1	1830	3223.4–3233.0	35.4–45.0	9.6	6.75	70
6H	1	1945	3233.0–3242.6	45.0–54.6	9.6	7.92	83
7H	1	2049	3242.6–3246.7	54.6–58.7	4.1	4.08	99
Wash	1		3246.7–3252.2	58.7–64.2	—	—	—
8H	1	2200	3252.2–3257.5	64.2–69.5	5.3	5.28	99
Wash	1		3257.5–3261.8	69.5–73.8	—	—	—
9H	1	2314	3261.8–3267.8	73.8–79.8	6.0	5.67	95
Wash	1		3267.8–3271.4	79.8–83.4	—	—	—
10H	2	0015	3271.4–3276.3	83.4–88.3	4.9	4.23	86
Wash	2		3276.3–3281.0	88.3–93.0	—	—	—
11H	2	0120	3281.0–3286.1	93.0–98.1	5.1	5.02	99
Wash	2		3286.1–3290.6	98.1–102.6	—	—	—
12H	2	0217	3290.6–3297.1	102.6–109.1	6.5	6.08	94
Wash	2		3297.1–3300.0	109.1–112.0	—	—	—
13H	2	0401	3300.0–3301.0	112.0–113.0	1.0	0.82	82
Wash	2		3301.0–3309.4	113.0–121.4	—	—	—
14H	2	0508	3309.4–3313.2	121.4–125.2	3.8	3.74	98
Wash	2		3313.2–3318.8	125.2–130.8	—	—	—
15H	2	0622	3318.8–3320.3	130.8–132.3	1.5	1.50	100
Wash	2		3320.3–3328.1	132.3–140.1	—	—	—
16H	2	0719	3328.1–3332.4	140.1–144.4	4.3	3.97	92
Wash	2		3332.4–3337.4	144.4–149.4	—	—	—
17H	2	0815	3337.4–3340.7	149.4–152.7	3.3	3.28	99
Wash	2		3340.7–3350.7	152.7–162.7	—	—	—
18H	2	1016	3350.7–3360.1	162.7–172.1	9.4	0.00	0
19H	2	1128	3360.1–3360.3	172.1–172.3	0.2	0.11	55
Wash	2		3360.3–3379.0	172.3–191.0	—	—	—
20H	2	1357	3379.0–3379.2	191.0–191.2	0.2	0.02	10
Wash	2		3379.2–3390.2	191.2–202.2	—	—	—
					110.2	89.24	81

[a] H following core number indicates hydraulic piston core.

SEISMIC STRATIGRAPHY AND ACOUSTIC FACIES

Site 623 is located about 2.5 km west of the most recent channel on the lower Mississippi Fan. The locations of seismic lines at this site are shown in Figure 1. No detailed site survey was conducted for this site.

Three reflectors (A–C) were identified as marking major changes in seismic facies (Fig. 2). These reflectors bound four seismic units that can be distinguished from each other (Table 2).

Correlation with lithologic and gamma-ray logs suggests that the transparent facies of seismic Units 1 and 3 corresponds to relatively muddy sediments, whereas seismic Units 2 and 4 (discontinuous to semicontinuous reflectors) correspond to sediments with an increased silt (or sand) content. A more detailed evaluation of the seismic stratigraphy of this part of the lower fan is presented by Stelting et al. (this volume).

BIOSTRATIGRAPHY AND SEDIMENTATION RATES

Biostratigraphy

The section penetrated in Hole 623 is Quaternary, correlating with the planktonic foraminifer Zone N23 and the calcareous nannofossil Zone NN21. The interval includes the Holocene (Ericson Zone Z; Ericson and Wollin, 1968) and the late Wisconsin glacial (Ericson Zone Y) (Fig. 3). The warm interstadial of the Wisconsin glacial (Ericson Zone X or *Globorotalia flexuosa* Zone) was not encountered to a total depth of 202.2 m.

The late Wisconsin glacial (Ericson Zone Y) contains a very poorly developed foraminiferal fauna with rare shallow-water (neritic) benthic species. Reworked Cretaceous calcareous nannofossils and rare Cretaceous foraminifers also occur throughout the interval.

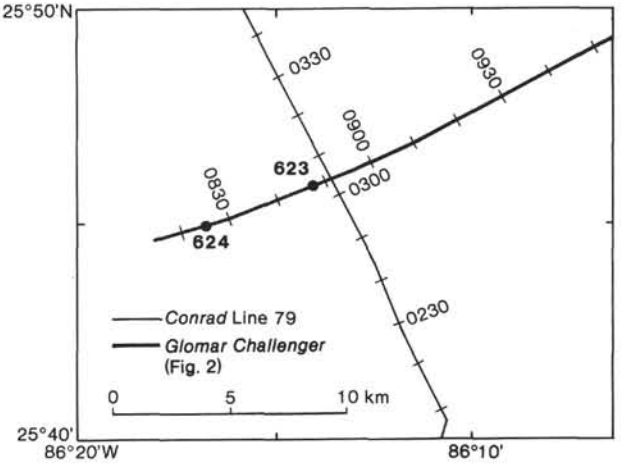

Figure 1. Location of seismic survey lines near Sites 623 and 624.

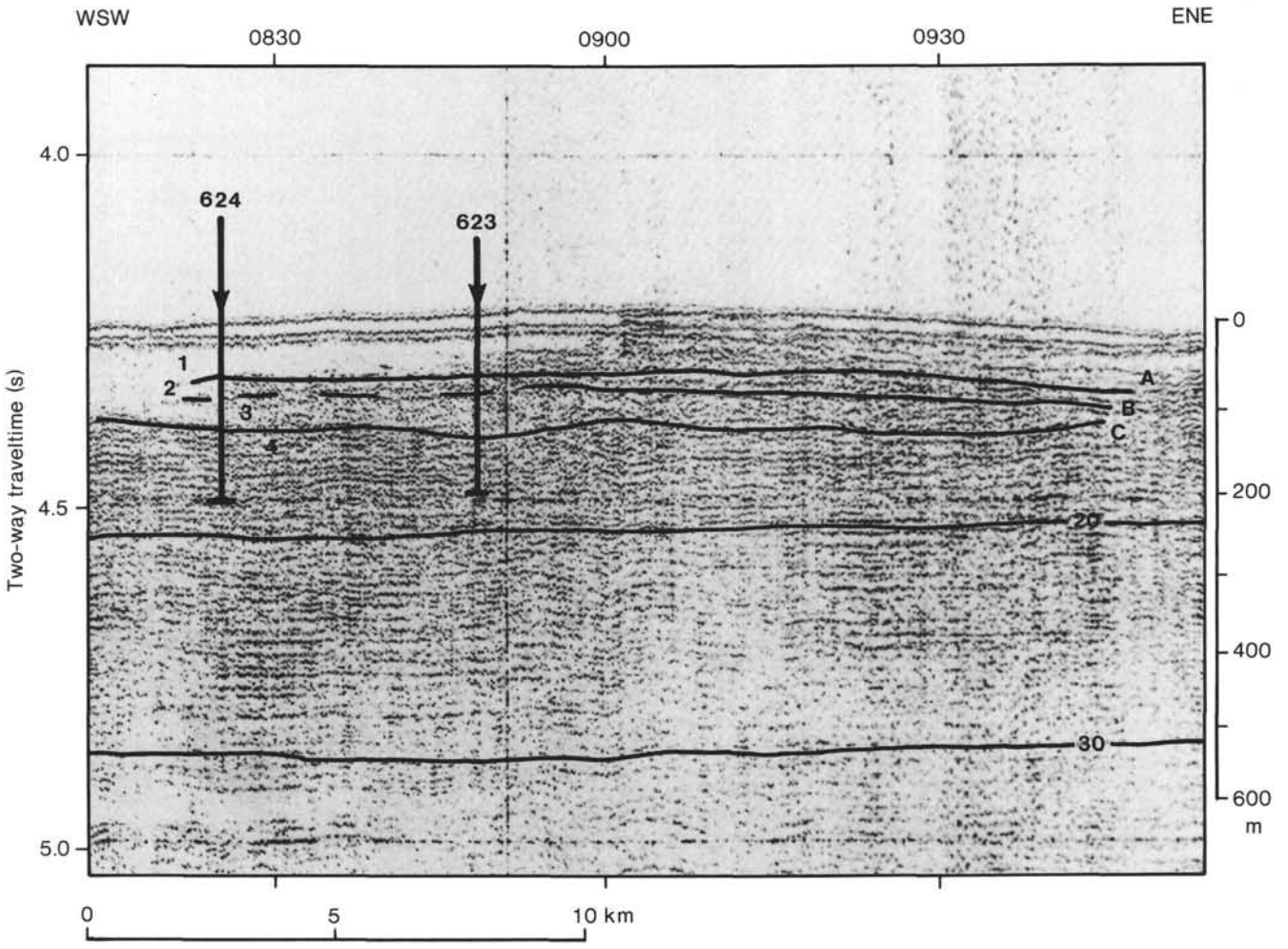

Figure 2. *Glomar Challenger* air-gun (40-in.^{3}) seismic profile across Sites 623 and 624 showing major reflectors and the seismic units in the cored interval and locations of seismic Horizons "20" and "30" (see introductory chapter, this volume). See Figure 1 for location of seismic profile.

Table 2. Site 623 seismic reflectors and units.

Reflectors	Sub-bottom depth (m)	Sub-bottom depth (ms)	Seismic units	Seismic facies
Seafloor	0	0		
			1	Transparent
A	62	80		
			2	Strong discontinuous reflectors
B	86	110		
			3	Semitransparent
C	126	160		
			4	Strong (semi-) continuous reflectors
Seismic Horizon "20"[a]	218	271		

[a] See introductory chapter, this volume.

Foraminifers

Foraminifers from Hole 623 are Quaternary, Zone N23 (Blow, 1969). The warm-water Holocene planktonic ooze was not seen at this site. Core 623-1 probably does not contain the sediment/water interface. The fauna at the top of Section 623-1-1, however, is Holocene (Zone Z) containing common *Globorotalia menardii* and *G. tumida*, along with associated bathyal benthic species *Cibicides wuellerstorfi, C. kullenbergi*, and rare *Melonis pompilioides*.

Zone Y (late Wisconsin glacial) extends from Section 623-1-2 through Core 623-20 (total depth) and consists of muds with interbedded sands and silts. There is a very

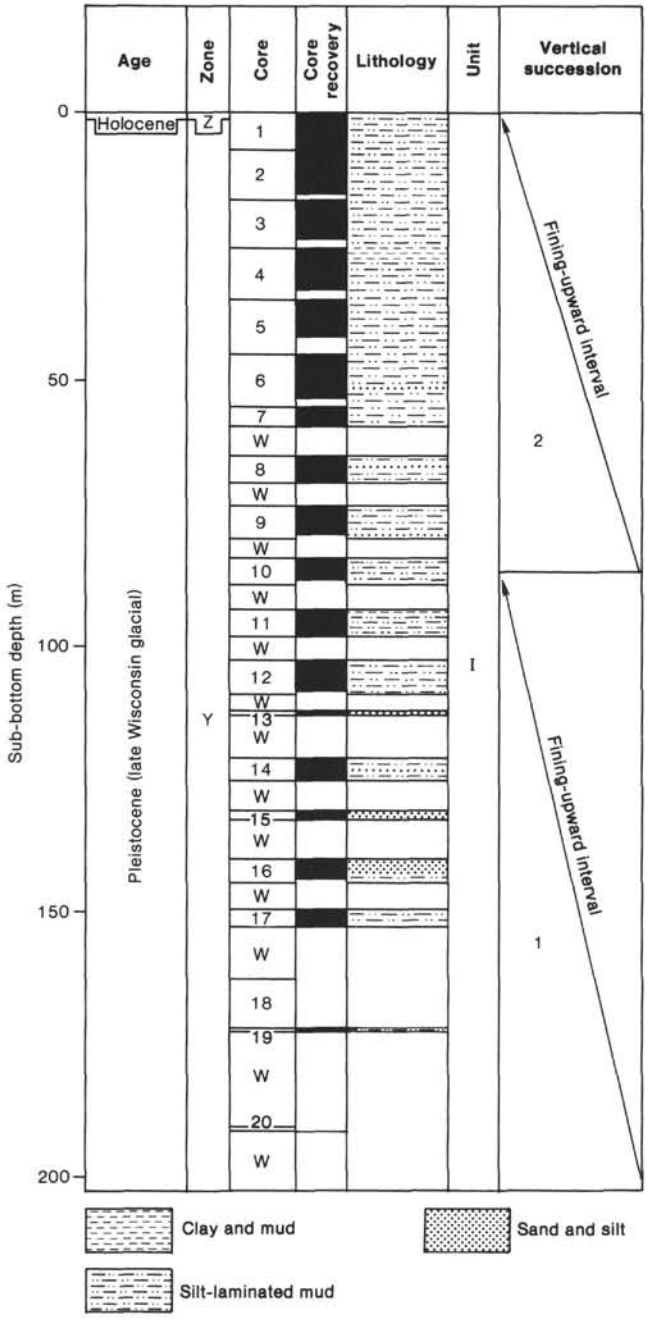

Figure 3. Lithostratigraphic summary for Site 623, showing age, core recovery, graphic lithology, and lithologic units and intervals. W = washed interval (see Table 1).

poorly developed foraminiferal fauna with the cool-water planktonic foraminifer *G. inflata* occurring only in Core 623-16. Rare sporadic occurrences of shallow-water (neritic) benthic foraminifers, low frequencies of bathyal benthics, and rare planktonic foraminifers suggest very rapid deposition of displaced sediment at this site. Rare reworked Cretaceous foraminifers occur throughout this zone.

Calcareous Nannofossils

All cores recovered from this site are interpreted to be in the *Emiliania huxleyi* Zone (NN21) of Martini (1971). No Holocene foraminiferal ooze was recovered at this site and abundant, well-preserved Quaternary nannofossils were not observed. Calcareous nannofossils are generally few in number and well-preserved reworked Cretaceous nannofossils are dominant. Pleistocene nannofossils are absent or rare in most samples examined, but an increase in their abundance is noted in Sample 623-16,CC.

Sedimentation Rates

The sedimentation rates are based on two datums. An age of 0.012 Ma is used for the Holocene/Pleistocene boundary (Z/Y zonal boundary) and 0.085 Ma for the Y/X zonal boundary (see Explanatory Notes, this volume).

A sedimentation rate of 2.1 cm/1000 yr. is calculated for the Holocene. This is a minimum rate assuming complete Holocene recovery (see Fig. 4).

The Y/X zonal boundary was not encountered. By using a seismic projection to the top of the X Zone (537 m for seismic Horizon "30"; see introductory chapter, this volume), a projected minimum sedimentation rate of 735.3 cm/1000 yr. is computed for the Y Zone.

These calculations are based on nondecompacted sediment thicknesses.

LITHOSTRATIGRAPHY

At Site 623, only one lithologic unit has been defined in the 202.2 m of drilled section (Fig. 3). The average recovery was 81%, although in the deepest 50 m recovery averaged even lower (Samples 623-17,CC through 623-20,CC).

Lithologic Unit I: Mud, Silt, and Sand

Lithologic Unit I forms the entire drilled interval from 0 to 202.2 m sub-bottom (Section 623-1-1 through Sample 623-20,CC). Three facies were recognized: (1) clay and mud, (2) silt-laminated mud, and (3) sand and silt.

Clay and Mud Facies

This facies accounts for 20 to 25% of the retrieved core. It is typified by color-banded clays and muds that are otherwise essentially structureless. The colors range from olive green brown, red brown, light gray to black, in bands less than 1 mm to a few centimeters thick. Contacts between bands vary from gradational to sharp, without any definable color trends. Bioturbation is most evident in the black bands. Rare, thin silt laminae occur within this facies.

Silt content typically ranges from 25 to 40%, with clay content from 60 to 75%. The coarse-grained fraction consists mainly of subrounded to subangular quartz, with minor amounts of secondary carbonate, feldspar, and mica. Accessory minerals generally form less than 2%. Microfauna is scarce although up to 2% calcareous nannofossils were recorded.

Silt-Laminated Mud

The facies consists of silty muds constituting about 60 to 65% of the retrieved cores at Site 623. The silty muds and silts occur as laminae and beds as much as 5 cm thick. They show normal grading, parallel, subpar-

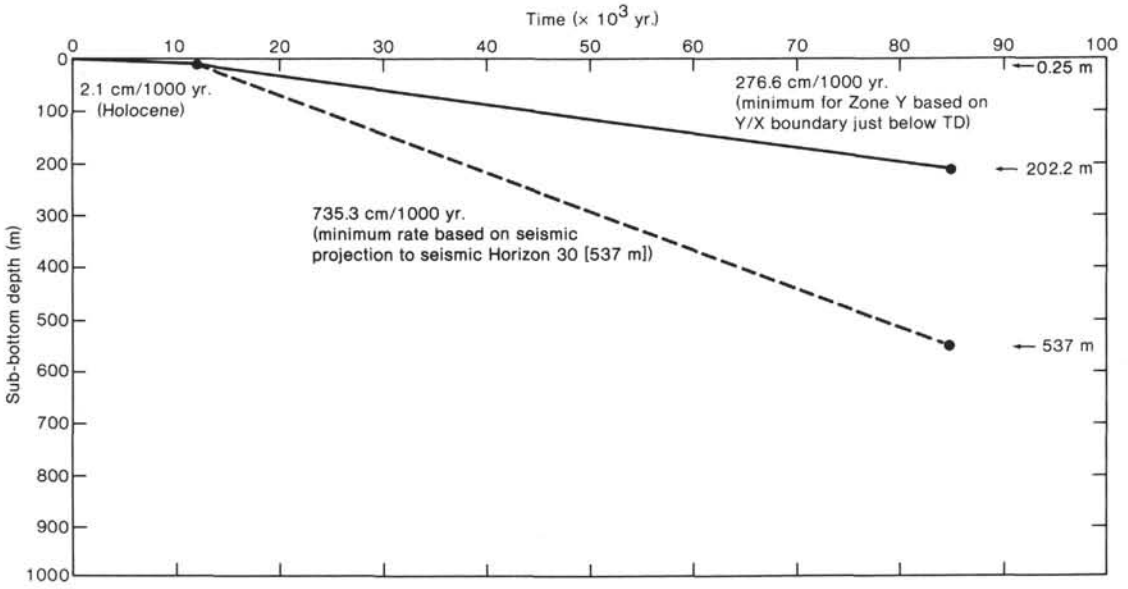

Figure 4. Site 623 sedimentation rates.

allel, and low-angle cross-lamination above a sharp scoured or microloaded base. Individual silt laminae are generally less than 1 mm thick (Fig. 5).

The silt-laminated muds typically contain 40 to 90% silt and 10 to 60% clay, although up to 20% very fine sand-grade sediment may be present. Quartz is the main constituent. In some silt laminae, heavy minerals are more abundant (up to 8%). Microfauna is rare, and when present it is predominantly calcareous nannofossils.

Sand and Silt Facies

The silty sands and sands of this facies account for less than 5% of the recovered sediments at Site 623. Beds range from 1 to 70 cm in thickness. The relatively thin beds show normal grading and parallel, subparallel, and low-angle cross-lamination above a sharp base. The thicker beds appear structureless, although a poorly developed normal grading may be visible in the uppermost few centimeters.

Sand content ranges from 30 to 75%, silt from 30 to 50% and clay from 5 to 20%. The sand is typically fine to medium grained. Quartz is the dominant sand-sized component, with minor amounts of feldspar, mica, and accessory minerals. Microfauna is extremely rare.

The sands show internally structureless, diapirlike structures of fine- to very-fine-grained sand. These structures vary from 1 to 10 cm in width, with a maximum recorded length of 80 cm (Section 623-1-4). Their shape ranges from smooth-sided and helical about the axis of the core, to gashlike and tabular suggesting that coring induced deformation.

Vertical Succession

From the lithologic and gamma-ray log data, two intervals are defined (Fig. 3). Both intervals show an overall fining upward sequence of facies:

Interval 1, from 202 to 86 m sub-bottom (Section 623-10-3 through Sample 623-20,CC), grades from sand and silt facies to silt-laminated mud facies.

Interval 2, from 86 to 0 m sub-bottom (Sections 623-1-1 through 623-10-2), grades from silt-laminated mud facies and sand and silt facies to clay and mud facies.

GEOCHEMISTRY

Organic Geochemistry

No gas was found at this site for the reasons explained in the Site 621 chapter (this volume). No other shipboard organic geochemistry was performed at this site. Samples were taken for shore-based analysis.

Inorganic Geochemistry

This site had long vertical intervals between sampling depths (one sample per two or three cores). Interpretation is difficult and is probably not very reliable because of random and irregular pH values and other interstitial water data. Results are detailed in Presley et al.; Ishizuka, Kawahata, et al.; and Ishizuka, Ittekkot, et al. (all this volume) and can be summarized as follows:

1. The pH value ranges from 6.7 to 7.2 in a very irregular way.
2. Total alkalinity has a maximum value (11.2 mEq/L) in Core 623-3 and is approximately constant (6.3 to 8.1 mEq/L) from Cores 623-5 to 623-17.
3. Salinity is 35 to 36‰, which is similar to that of seawater.

PHYSICAL PROPERTIES

Wet-bulk density ranges from a low of 1.45 g/cm^3 to a high of 2.16 g/cm^3. Bulk density increases at a steady rate of 0.005 g/cm^3 · m to a depth of 70 m, beyond which the value of wet-bulk density remains constant at 2.16 g/cm^3. The scattering of the data (Fig. 6A) is a result of variations in the amount of sand and silt present.

Wet water content decreases from a seafloor value of 52.5% to a low of 16.8% at a depth of 132 m (Fig. 6B). Dry water content decreases downhole with the major decrease occurring in the upper 70 m (Fig. 6C). The av-

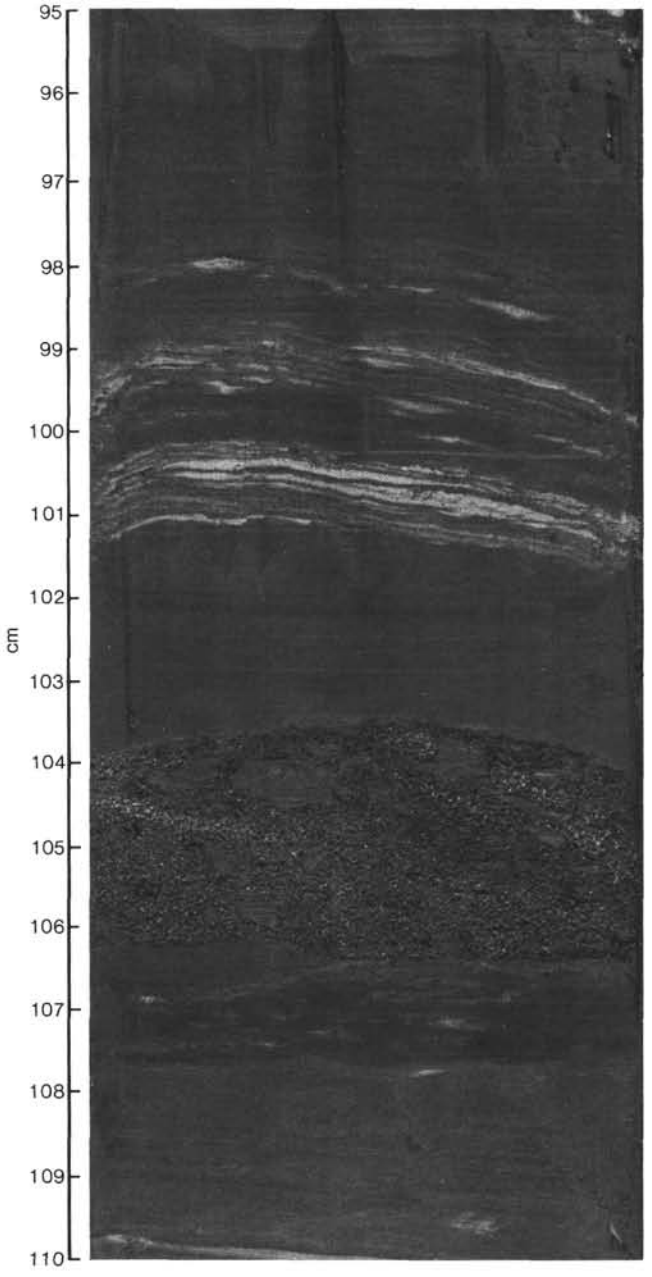

Figure 5. Photograph of characteristic facies in lithologic Unit I: silty mud with thin muddy sand layer and silt-laminated unit (Sample 623-6-4, 95–110 cm).

erage rate of decrease is 0.368%/m down to the 70-m level and 0.043%/m below 70-m depth. The sands had a water content between 20 and 30%. The profile of water content versus depth is a typical example of the decrease with depth of water content for a rapidly deposited undisturbed gas-free silty clay found in the Gulf of Mexico.

Porosity decreases from a seafloor value of 74.3% to a low of 41.7% at the 150-m level for the silty clays and 35.4% for the sands found at 132 m (Fig. 6D). The average rate of decrease of porosity of muds is 0.359%/m for the upper 70 m and 0.099%/m below this level.

The average grain density varies around the value of 2.70 g/cm^3.

All measured values of undrained shear strength are plotted against depth in Figure 6E. Undrained shear strength increases at a steady rate downhole.

The results of the sonic velocity measurements perpendicular to the bedding are plotted against depth in Figure 6F. The acoustic anisotropy is rather small.

SUMMARY AND CONCLUSIONS

Site 623 was drilled in the lower fan about 55 km north-northwest of Site 615. The major objective was to analyze whether the much smaller and less sinuous central channel still acted as an effective conduit for coarse-grained sediments, spilled a large quantity of the sandy material over its banks, or was a rather effective but short-lived phenomenon, switching its position during the aggradational process. Drilling a single hole would not provide conclusive answers but certainly should aid in evaluating the various possibilities.

Core recovery at Site 623 was excellent down to a sub-bottom depth of about 55 m, below which it decreased rapidly. Below Core 623-17 (149.4–152.7 m sub-bottom) recovery was negligible, which suggests the presence of sand or slightly clayey sand. The gamma log appeared to confirm this suggestion. The caliper log shows that practically the entire hole had a larger diameter than the instrument could measure. As a result, conclusions made from the gamma log are tenuous. The sonic log responded much better and it was valuable in providing information over areas of poor core recovery.

The gamma log, supported by recovered cores, shows that the entire section from 187 to 52 m sub-bottom can be interpreted in several ways (see Constans et al., this volume):

1. The entire logged interval represents one upward-fining sequence with a number of minor interruptions.
2. The entire interval can be divided into about six sequences;

a. 187–156 m sub-bottom: Muds with sandy and silty intervals suggestive of levee and overbank deposits.

b. 156–120 m sub-bottom: A generally fining-upward sequence representing channel fill that begins with a lag deposit but does not end with a clayey passive upper fill.

c. 120–92 m sub-bottom: A fining-upward sequence typifying a channel fill. This sequence terminates with clayey muds.

d. 92–83 m sub-bottom: A possible fining-upward channel fill.

e. 83–65 m sub-bottom: A possible thin channel fill overlain by levee deposits.

f. 65–57 m sub-bottom: The basal part of a fining-upward sequence representing a channel fill.

On the basis of core lithology, sedimentary structures, wireline logs, and seismic data, we feel that the most likely interpretation is that there are many small alternating channel and overbank sequences present, but precisely picking the boundaries is extremely difficult. The sandy intervals are primarily fining-upward units, whereas the finer-grained intervals contain numerous thin sand

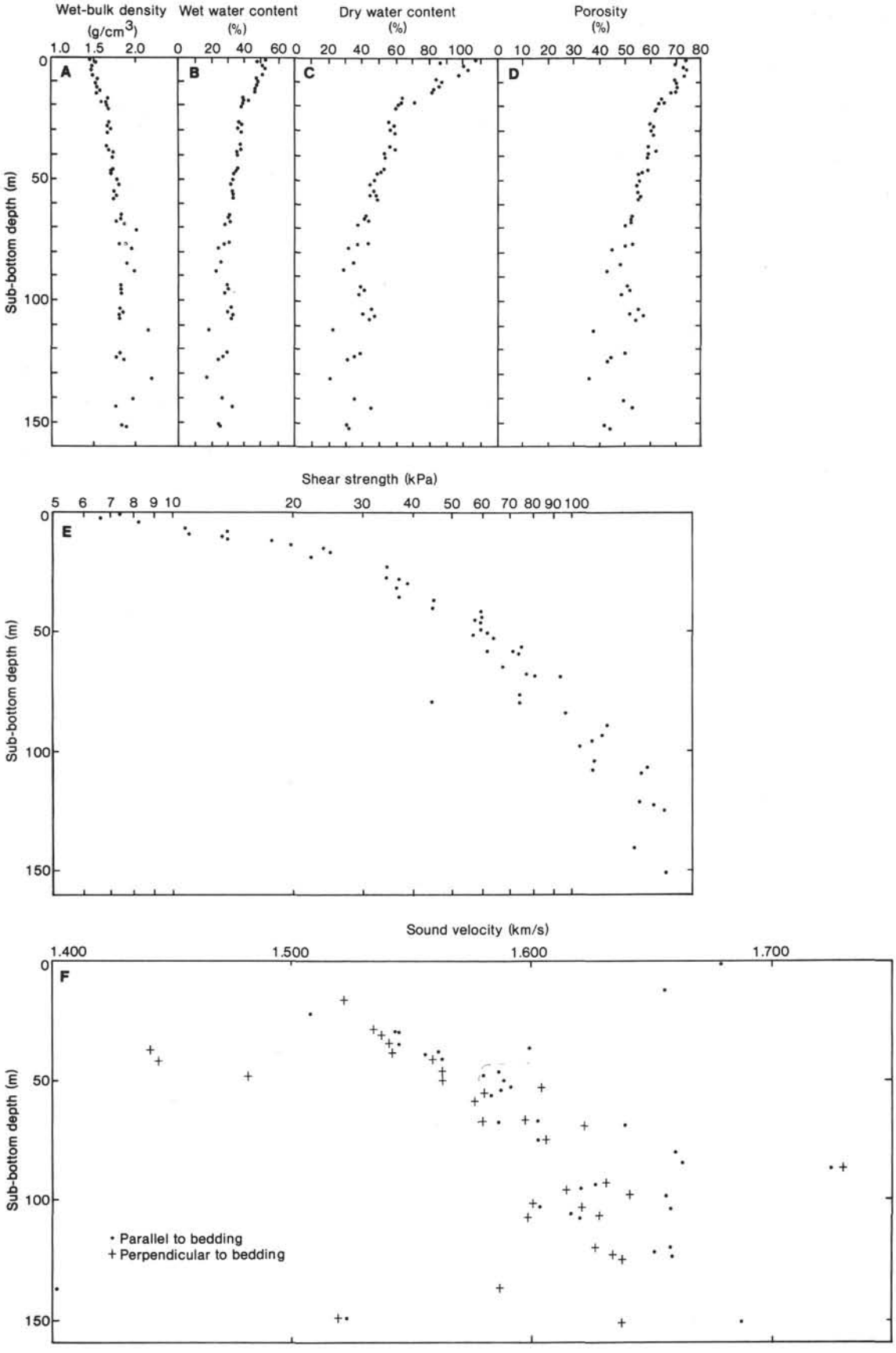

Figure 6. Mass physical properties of Site 623 sediments. A. Wet-bulk density. B. Water content related to weight of wet sediment. C. Water content related to weight of dry sediment. D. Porosity. E. Undrained shear strength. F. Sound velocity.

and silt interbeds and have a ragged appearance on wireline log response. We suggest that these alternating intervals represent channel fill and overbank deposits, respectively.

The major scientific conclusions were

1. The cored-logged interval shows an overall fining-upward tendency with much more variation than seen at Sites 621 and 622.

2. Combining the rather poor seismic records with the drilling results, it appears that more than one sequence should be distinguished, suggesting many thin channel fills and a number of zones representing levee-overbank deposits.

3. All the data combined seem to suggest that the channel neither actively migrated nor maintained a stable position throughout the late Wisconsin glacial stage. Instead, it seems that channels occupied different sites for short periods of time only, thus building a vertical sequence that displays alternating channel fills and overbank deposits. No one lithological sequence needs to be complete because proximity to the channel is variable at any one time.

4. Accumulation rates were high; 2.1 cm/1000 yr. for the thin Holocene sediments (Ericson Zone Z); and, on the basis of seismic correlation, 735.3 cm/1000 yr. for the upper Pleistocene deposits (Ericson Zone Y).

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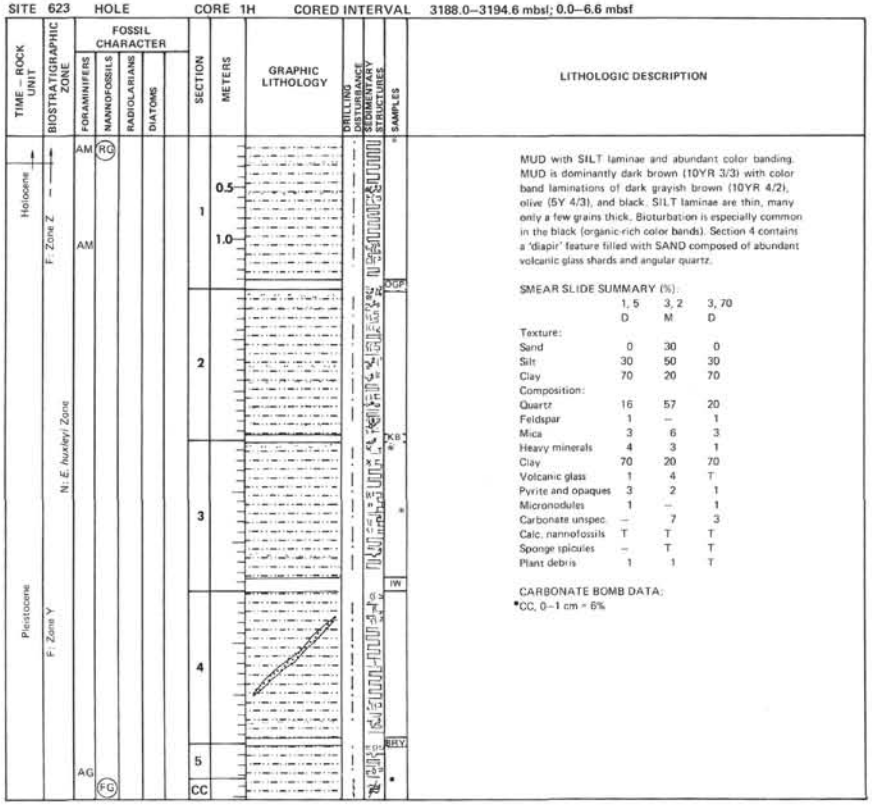
SITE 623 HOLE CORE 1H CORED INTERVAL 3188.0–3194.6 mbsl; 0.0–6.6 mbsf



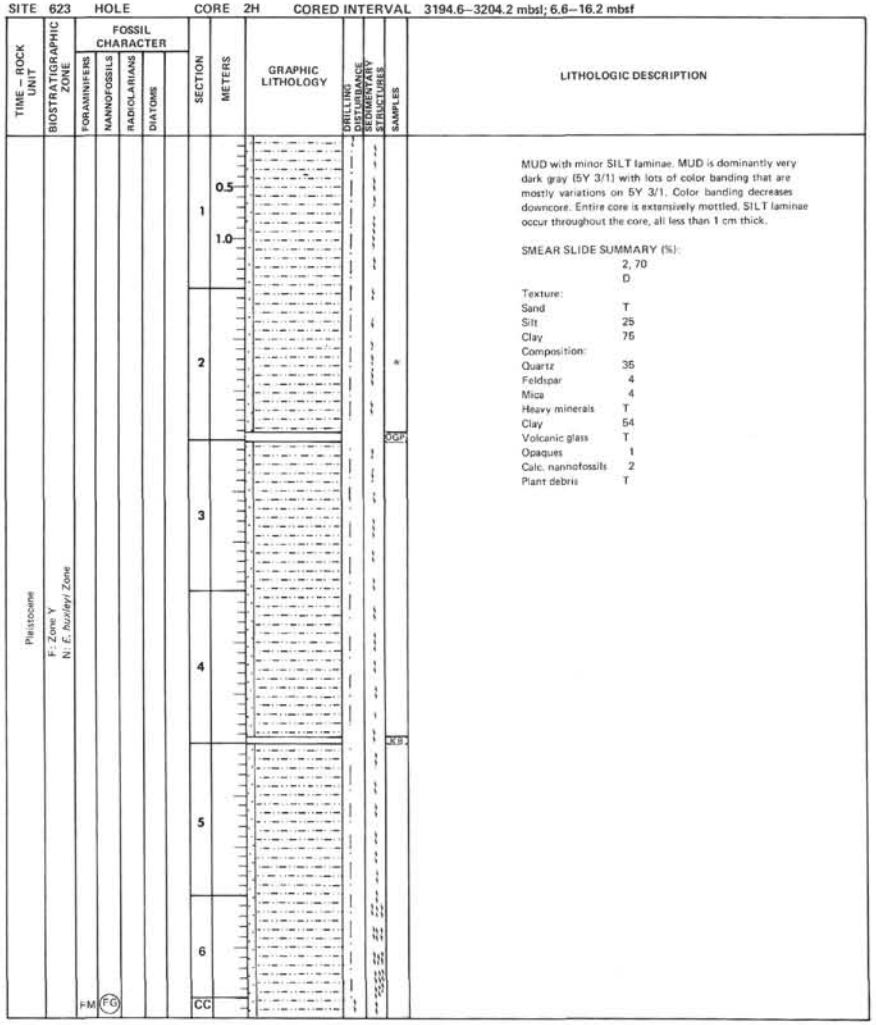
MUD with SILT laminae and abundant color banding. MUD is dominantly dark brown (10YR 3/3) with color band laminations of dark grayish brown (10YR 4/2), olive (5Y 4/3), and black. SILT laminae are thin, many only a few grains thick. Bioturbation is especially common in the black (organic-rich color bands). Section 4 contains a 'diapir' feature filled with SAND composed of abundant volcanic glass shards and angular quartz.

SMEAR SLIDE SUMMARY (%):

	1, 5 D	3, 2 M	3, 70 D
Texture:			
Sand	0	30	0
Silt	30	50	30
Clay	70	20	70
Composition:			
Quartz	16	57	20
Feldspar	1	–	1
Mica	3	6	3
Heavy minerals	4	3	1
Clay	70	20	70
Volcanic glass	1	4	T
Pyrite and opaques	3	2	1
Micronodules	1	–	1
Carbonate unspec.	–	7	3
Calc. nannofossils	T	T	T
Sponge spicules	–	T	T
Plant debris	1	1	T

CARBONATE BOMB DATA:
*CC, 0–1 cm = 6%

SITE 623 HOLE CORE 2H CORED INTERVAL 3194.6–3204.2 mbsl; 6.6–16.2 mbsf

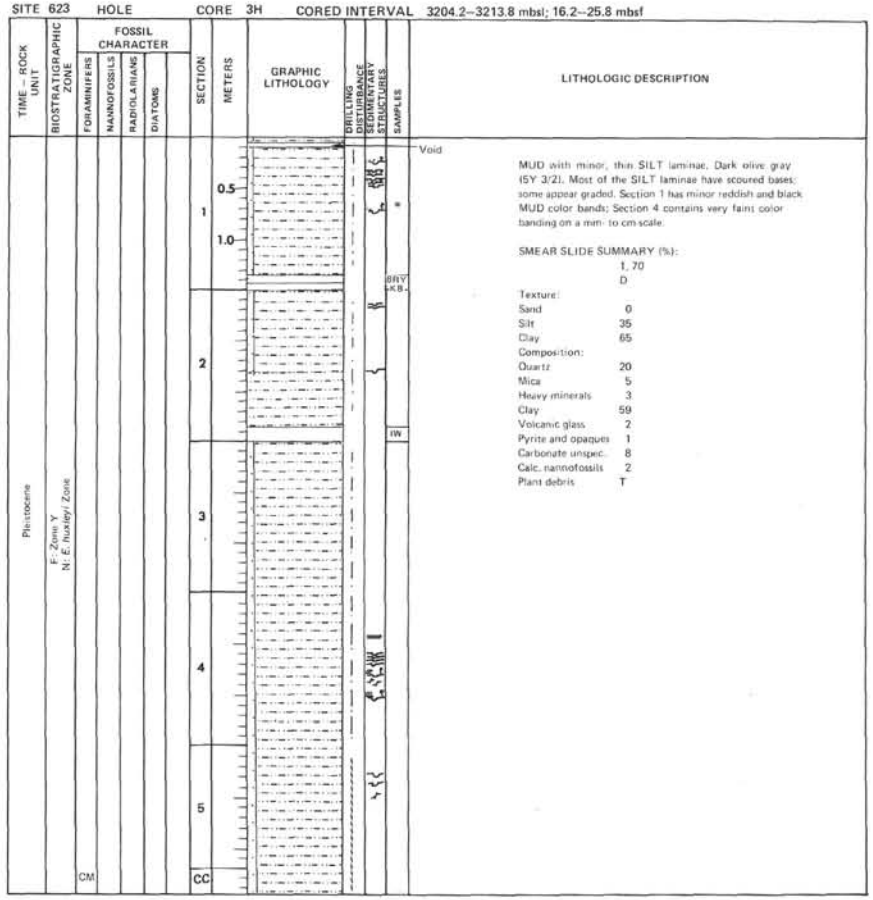


MUD with minor SILT laminae. MUD is dominantly very dark gray (5Y 3/1) with lots of color banding that are mostly variations on 5Y 3/1. Color banding decreases downcore. Entire core is extensively mottled. SILT laminae occur throughout the core, all less than 1 cm thick.

SMEAR SLIDE SUMMARY (%):

	2, 70 D
Texture:	
Sand	T
Silt	25
Clay	75
Composition:	
Quartz	35
Feldspar	4
Mica	4
Heavy minerals	T
Clay	54
Volcanic glass	T
Opaques	1
Calc. nannofossils	2
Plant debris	T

SITE 623 HOLE CORE 3H CORED INTERVAL 3204.2–3213.8 mbsl; 16.2–25.8 mbsf

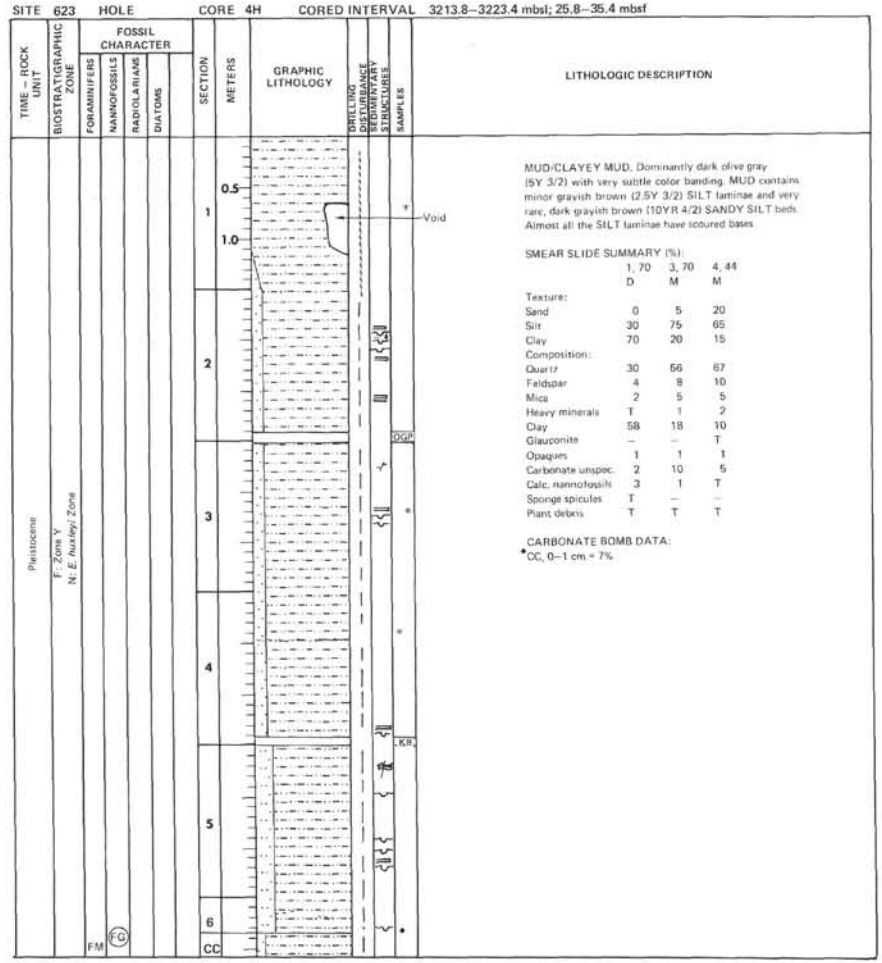


MUD with minor, thin SILT laminae. Dark olive gray (5Y 3/2). Most of the SILT laminae have scoured bases; some appear graded. Section 1 has minor reddish and black MUD color bands; Section 4 contains very faint color banding on a mm- to cm-scale.

SMEAR SLIDE SUMMARY (%):

	1, 70 D
Texture:	
Sand	0
Silt	35
Clay	65
Composition:	
Quartz	20
Mica	5
Heavy minerals	3
Clay	59
Volcanic glass	2
Pyrite and opaques	1
Carbonate unspec.	8
Calc. nannofossils	2
Plant debris	T

SITE 623 HOLE CORE 4H CORED INTERVAL 3213.8–3223.4 mbsl; 25.8–35.4 mbsf



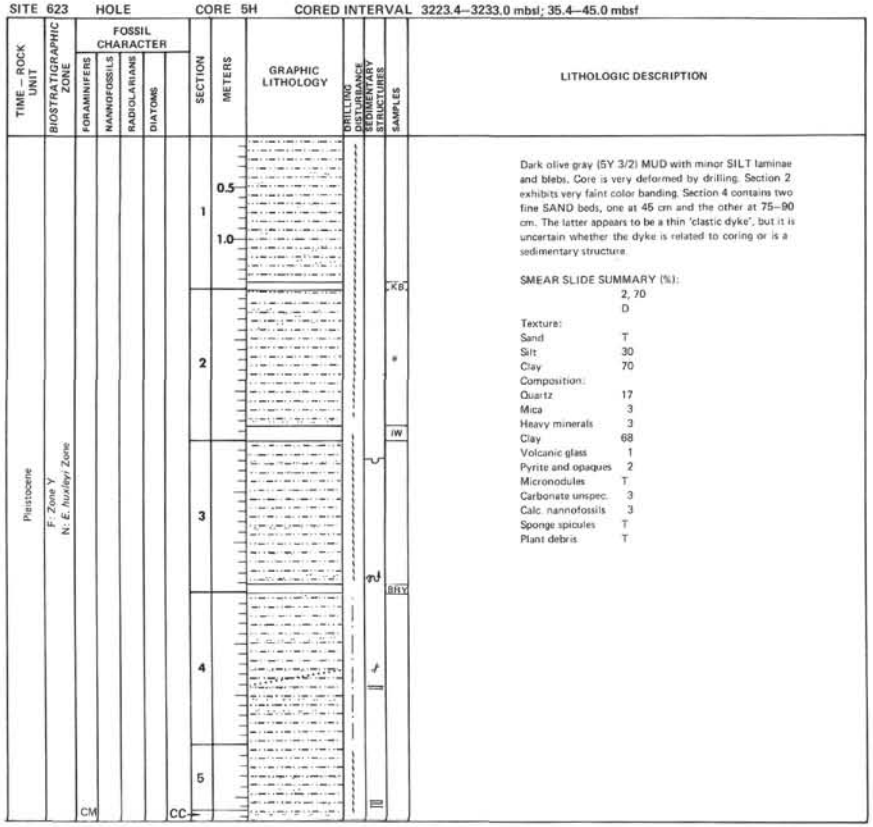
MUD/CLAYEY MUD. Dominantly dark olive gray (5Y 3/2) with very subtle color banding. MUD contains minor grayish brown (2.5Y 3/2) SILT laminae and very rare, dark grayish brown (10YR 4/2) SANDY SILT beds. Almost all the SILT laminae have scoured bases.

SMEAR SLIDE SUMMARY (%):

	1, 70 D	3, 70 M	4, 44 M
Texture:			
Sand	0	5	20
Silt	30	75	65
Clay	70	20	15
Composition:			
Quartz	30	56	67
Feldspar	4	8	10
Mica	2	5	5
Heavy minerals	T	1	2
Clay	58	18	10
Glauconite	–	–	T
Opaques	1	1	1
Carbonate unspec.	2	10	5
Calc. nannofossils	3	1	T
Sponge spicules	T	–	–
Plant debris	T	T	T

CARBONATE BOMB DATA:
*CC, 0–1 cm = 7%

SITE 623 HOLE CORE 5H CORED INTERVAL 3223.4–3233.0 mbsl; 35.4–45.0 mbsf



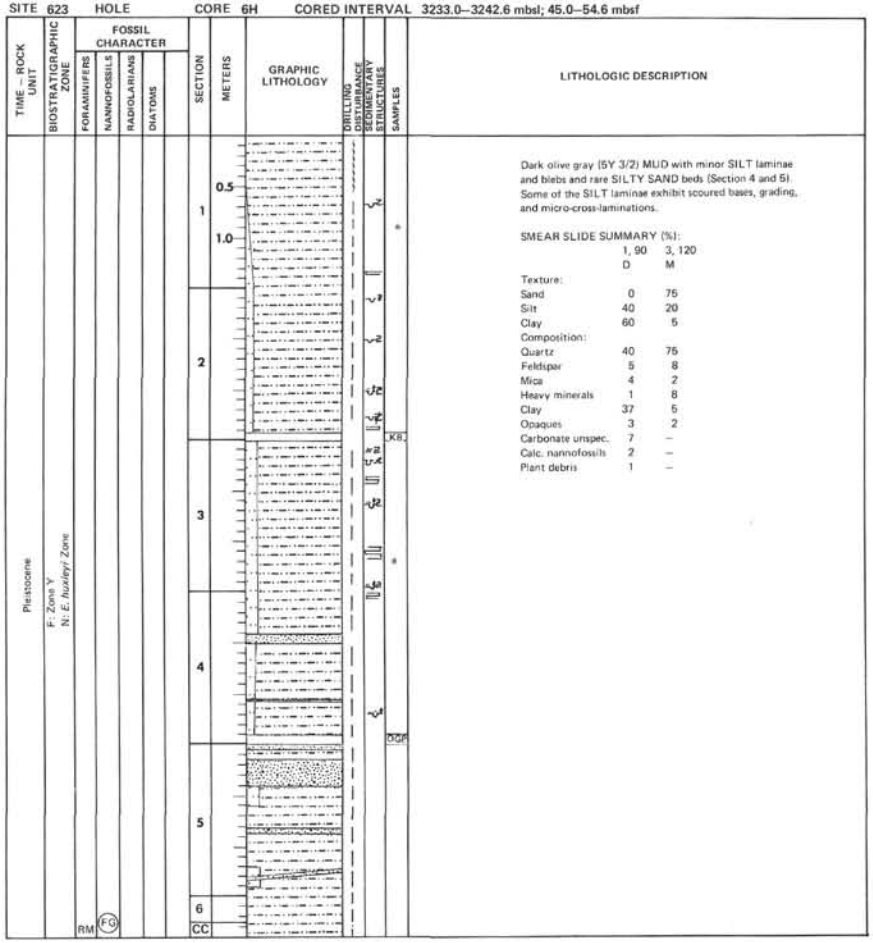
LITHOLOGIC DESCRIPTION

Dark olive gray (5Y 3/2) MUD with minor SILT laminae and blebs. Core is very deformed by drilling. Section 2 exhibits very faint color banding. Section 4 contains two fine SAND beds, one at 45 cm and the other at 75–90 cm. The latter appears to be a thin 'clastic dyke', but it is uncertain whether the dyke is related to coring or is a sedimentary structure.

SMEAR SLIDE SUMMARY (%):

	2, 70 D
Texture:	
Sand	T
Silt	30
Clay	70
Composition:	
Quartz	17
Mica	3
Heavy minerals	3
Clay	68
Volcanic glass	1
Pyrite and opaques	2
Micronodules	T
Carbonate unspec.	3
Calc. nannofossils	3
Sponge spicules	T
Plant debris	T

SITE 623 HOLE CORE 6H CORED INTERVAL 3233.0–3242.6 mbsl; 45.0–54.6 mbsf



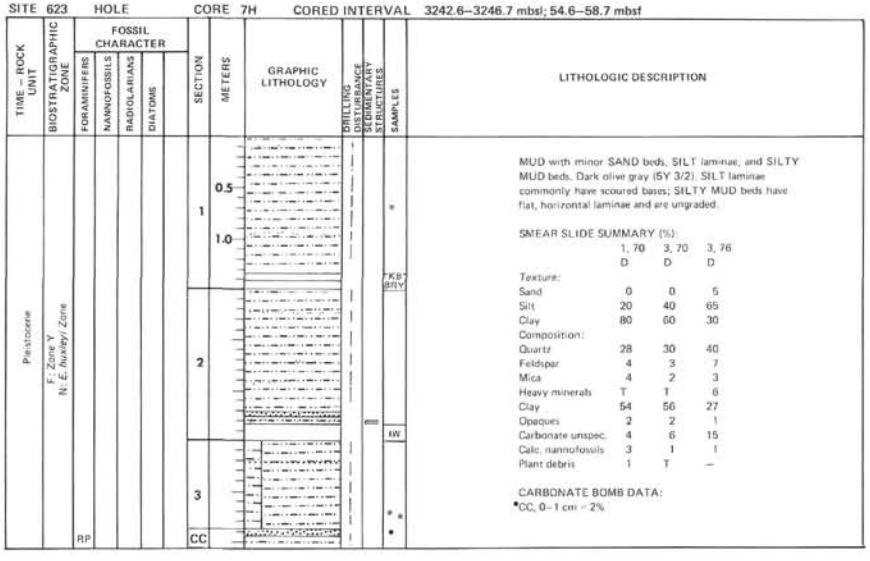
LITHOLOGIC DESCRIPTION

Dark olive gray (5Y 3/2) MUD with minor SILT laminae and blebs and rare SILTY SAND beds (Section 4 and 5). Some of the SILT laminae exhibit scoured bases, grading, and micro-cross-laminations.

SMEAR SLIDE SUMMARY (%):

	1, 90 D	3, 120 M
Texture:		
Sand	0	75
Silt	40	20
Clay	60	5
Composition:		
Quartz	40	75
Feldspar	5	8
Mica	4	2
Heavy minerals	1	8
Clay	37	5
Opaques	3	2
Carbonate unspec.	7	–
Calc. nannofossils	2	–
Plant debris	1	–

SITE 623 HOLE CORE 7H CORED INTERVAL 3242.6–3246.7 mbsl; 54.6–58.7 mbsf



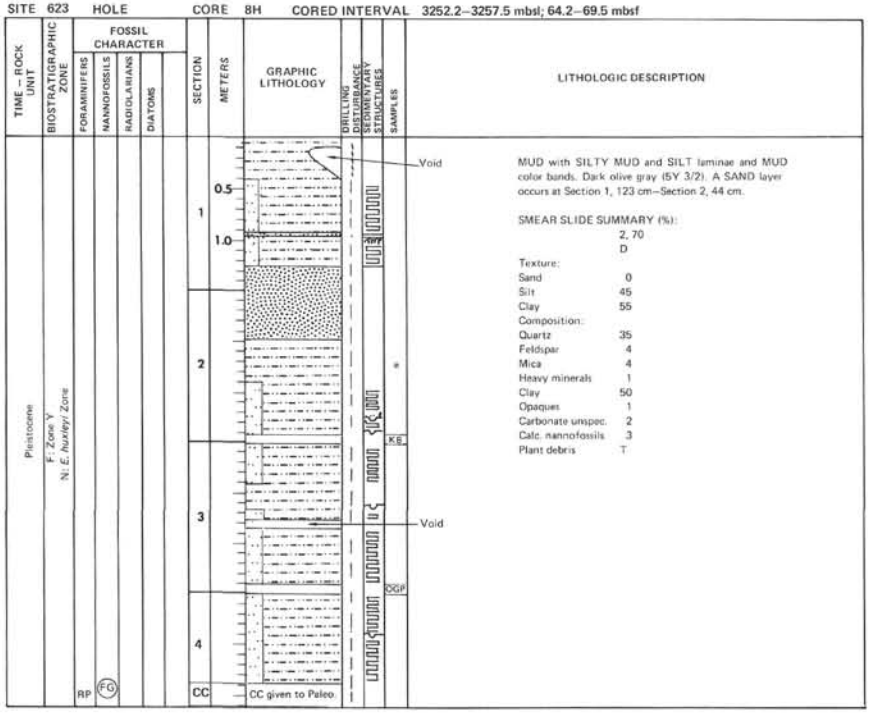
MUD with minor SAND beds, SILT laminae, and SILTY MUD beds. Dark olive gray (5Y 3/2). SILT laminae commonly have scoured bases; SILTY MUD beds have flat, horizontal laminae and are ungraded.

SMEAR SLIDE SUMMARY (%):

	1, 70 D	3, 70 D	3, 76 D
Texture:			
Sand	0	0	5
Silt	20	40	65
Clay	80	60	30
Composition:			
Quartz	28	30	40
Feldspar	4	3	7
Mica	4	2	3
Heavy minerals	T	T	6
Clay	54	56	27
Opaques	2	2	1
Carbonate unspec.	4	6	15
Calc. nannofossils	3	1	1
Plant debris	1	T	–

CARBONATE BOMB DATA:
*CC, 0–1 cm = 2%

SITE 623 HOLE CORE 8H CORED INTERVAL 3252.2–3257.5 mbsl; 64.2–69.5 mbsf

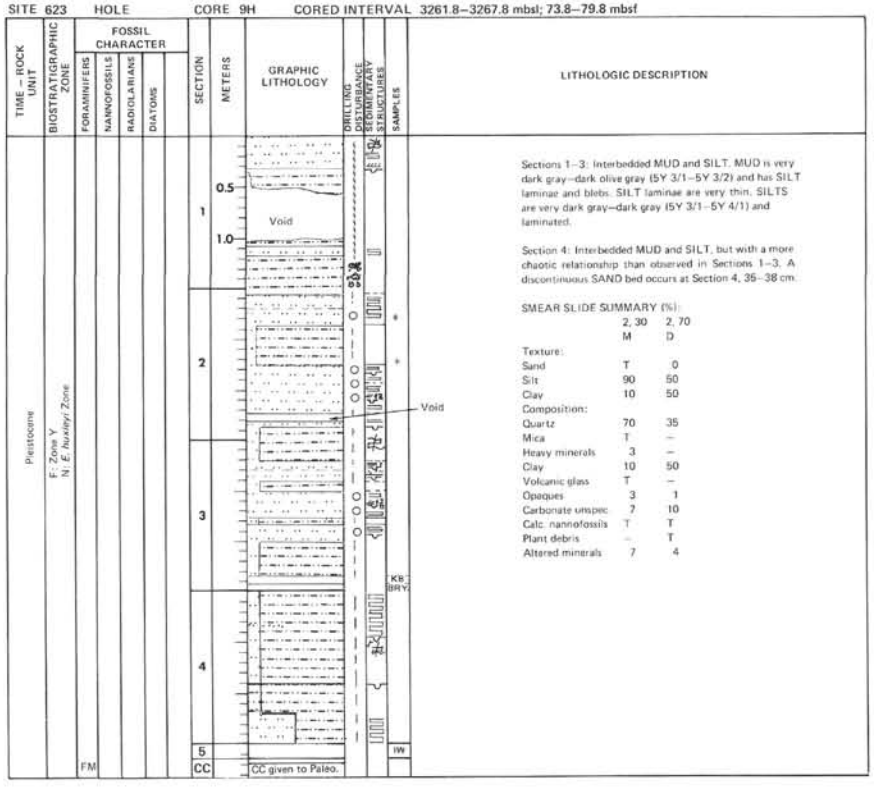


MUD with SILTY MUD and SILT laminae and MUD color bands. Dark olive gray (5Y 3/2). A SAND layer occurs at Section 1, 123 cm–Section 2, 44 cm.

SMEAR SLIDE SUMMARY (%):

	2, 70 D
Texture:	
Sand	0
Silt	45
Clay	55
Composition:	
Quartz	35
Feldspar	4
Mica	4
Heavy minerals	1
Clay	50
Opaques	1
Carbonate unspec.	2
Calc. nannofossils	3
Plant debris	T

SITE 623 HOLE CORE 9H CORED INTERVAL 3261.8–3267.8 mbsl; 73.8–79.8 mbsf



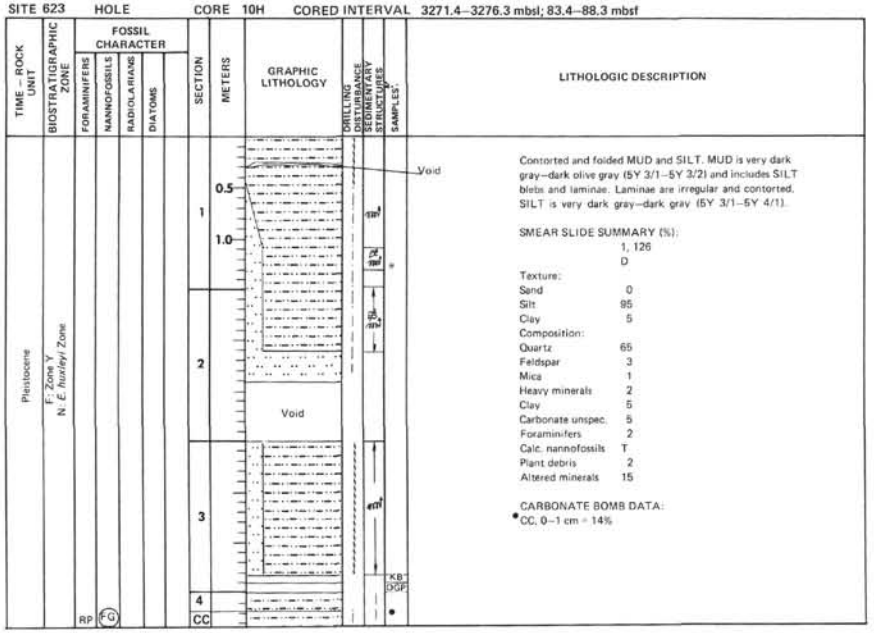
Sections 1–3: Interbedded MUD and SILT. MUD is very dark gray–dark olive gray (5Y 3/1–5Y 3/2) and has SILT laminae and blobs. SILT laminae are very thin. SILTS are very dark gray–dark gray (5Y 3/1–5Y 4/1) and laminated.

Section 4: Interbedded MUD and SILT, but with a more chaotic relationship than observed in Sections 1–3. A discontinuous SAND bed occurs at Section 4, 35–38 cm.

SMEAR SLIDE SUMMARY (%):

	2, 30 M	2, 70 D
Texture:		
Sand	T	0
Silt	90	50
Clay	10	50
Composition:		
Quartz	70	35
Mica	T	–
Heavy minerals	3	–
Clay	10	50
Volcanic glass	T	–
Opaques	3	1
Carbonate unspec.	7	10
Calc. nannofossils	T	T
Plant debris	–	T
Altered minerals	7	4

SITE 623 HOLE CORE 10H CORED INTERVAL 3271.4–3276.3 mbsl; 83.4–88.3 mbsf



LITHOLOGIC DESCRIPTION

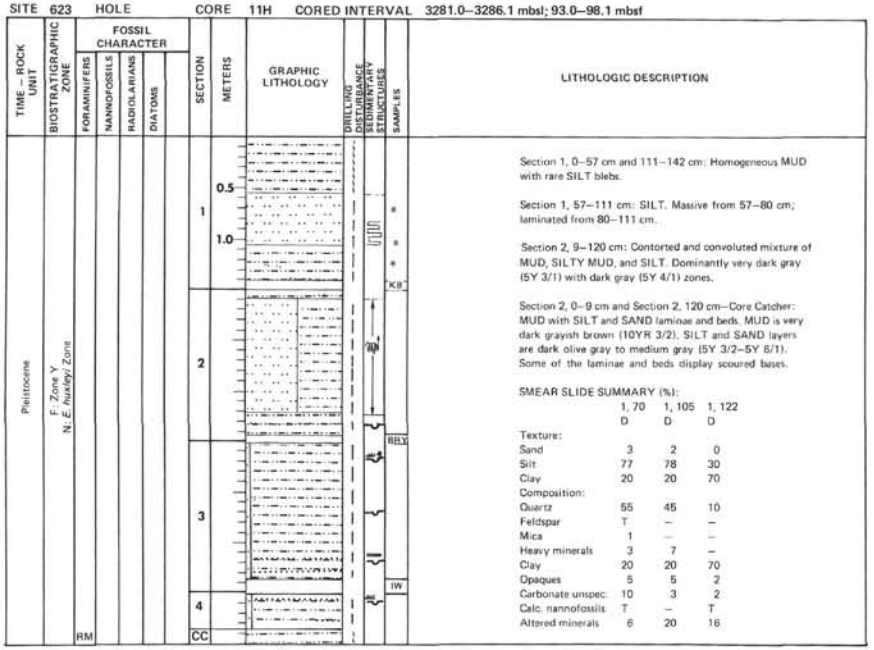
Contorted and folded MUD and SILT. MUD is very dark gray–dark olive gray (5Y 3/1–5Y 3/2) and includes SILT blebs and laminae. Laminae are irregular and contorted. SILT is very dark gray–dark gray (5Y 3/1–5Y 4/1).

SMEAR SLIDE SUMMARY (%):

	1, 126 D
Texture:	
Sand	0
Silt	95
Clay	5
Composition:	
Quartz	65
Feldspar	3
Mica	1
Heavy minerals	2
Clay	5
Carbonate unspec.	5
Foraminifers	2
Calc. nannofossils	T
Plant debris	2
Altered minerals	15

CARBONATE BOMB DATA:
•CC, 0–1 cm = 14%

SITE 623 HOLE CORE 11H CORED INTERVAL 3281.0–3286.1 mbsl; 93.0–98.1 mbsf



LITHOLOGIC DESCRIPTION

Section 1, 0–57 cm and 111–142 cm: Homogeneous MUD with rare SILT blebs.

Section 1, 57–111 cm: SILT. Massive from 57–80 cm; laminated from 80–111 cm.

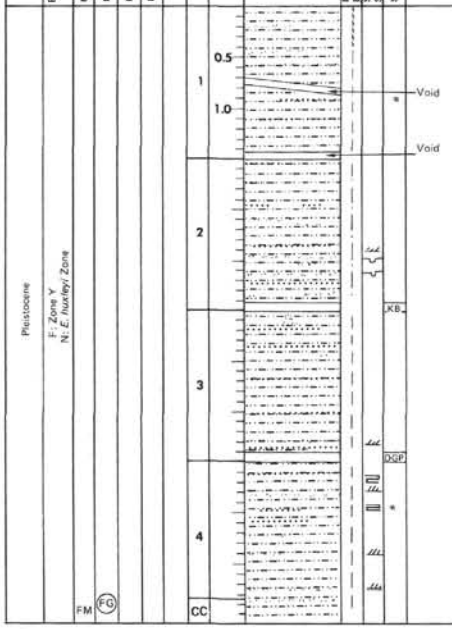
Section 2, 9–120 cm: Contorted and convoluted mixture of MUD, SILTY MUD, and SILT. Dominantly very dark gray (5Y 3/1) with dark gray (5Y 4/1) zones.

Section 2, 0–9 cm and Section 2, 120 cm–Core Catcher: MUD with SILT and SAND laminae and beds. MUD is very dark grayish brown (10YR 3/2). SILT and SAND layers are dark olive gray to medium gray (5Y 3/2–5Y 6/1). Some of the laminae and beds display scoured bases.

SMEAR SLIDE SUMMARY (%):

	1, 70 D	1, 105 D	1, 122 D
Texture:			
Sand	3	2	0
Silt	77	78	30
Clay	20	20	70
Composition:			
Quartz	55	45	10
Feldspar	T	–	–
Mica	1	–	–
Heavy minerals	3	7	–
Clay	20	20	70
Opaques	5	5	2
Carbonate unspec.	10	3	2
Calc. nannofossils	T	–	T
Altered minerals	6	20	16

SITE 623 HOLE CORE 12H CORED INTERVAL 3290.6–3297.1 mbsl; 102.6–109.1 mbsf



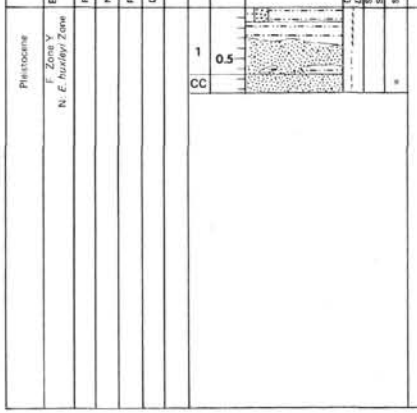
LITHOLOGIC DESCRIPTION

Stiff MUD with SILTY SAND clasts, lens, and fragments, and with SILT laminae and blebs. Sedimentary structures are occasionally preserved in the SILTS and SILTY SANDS, but they typically occur as irregular inclusions with no preferred orientation. MUD is very dark gray (5Y 3/1) (very dark olive gray [5Y 3/2] in the Core Catcher). SILT laminae are dark olive gray–gray (5Y 3/2–5Y 5/1); SILTY SANDS are dark olive gray (5Y 3/2). Section 4 contains an oxidized zone at 119–130 cm.

SMEAR SLIDE SUMMARY (%):

	1, 90 D	4, 45 M
Texture:		
Sand	0	58
Silt	40	40
Clay	60	2
Composition:		
Quartz	26	78
Feldspar	1	2
Mica	T	3
Heavy minerals	4	2
Clay	58	2
Volcanic glass	T	3
Carbonate unspec.	2	–
Foraminifers	T	–
Calc. nannofossils	2	T
Plant debris	3	–
Altered minerals	4	10

SITE 623 HOLE CORE 13H CORED INTERVAL 3300.0–3301.0 mbsl; 112.0–113.0 mbsf



LITHOLOGIC DESCRIPTION

Section 1, 0–15 cm: Very deformed mixture of SILT, SAND, and MUD. Deformation probably due to core disturbance.

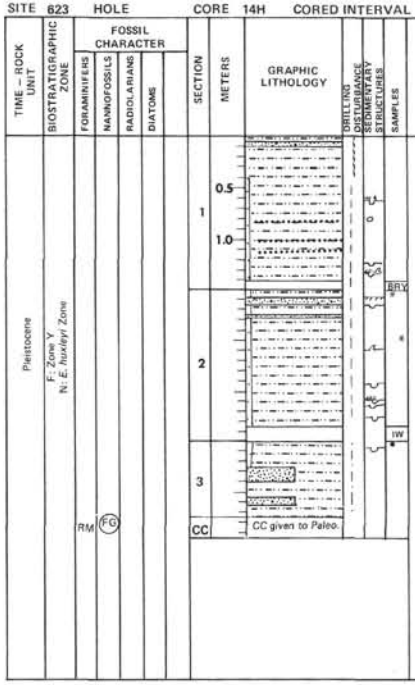
Section 1, 15–30 cm: Homogeneous, very dark gray (5Y 3/1), very deformed MUD.

Section 1, 30 cm–Core Catcher: Dark olive gray (5Y 4/2), structureless SILTY SAND. Several MUD balls occur at Section 1, 60–85 cm.

SMEAR SLIDE SUMMARY (%):

	CC, 10 D
Texture:	
Sand	50
Silt	30
Clay	20
Composition:	
Quartz	60
Feldspar	T
Clay	20
Volcanic glass	T
Opaques	5
Carbonate unspec.	3
Altered minerals	12

SITE 623 HOLE CORE 14H CORED INTERVAL 3309.6–3313.2 mbsl; 121.4–125.2 mbsf



LITHOLOGIC DESCRIPTION

MUD with SILT laminae and SILTY SAND beds.

MUD is very dark gray (5Y 3/1) and stiff. There are very subtle color bands throughout the MUD, especially in Section 2.

SILT laminae are gray/medium gray (10YR 6/1) and very thin. Laminae occasionally show scoured bases and micro-cross-laminations. SILT laminae are most abundant in Section 2.

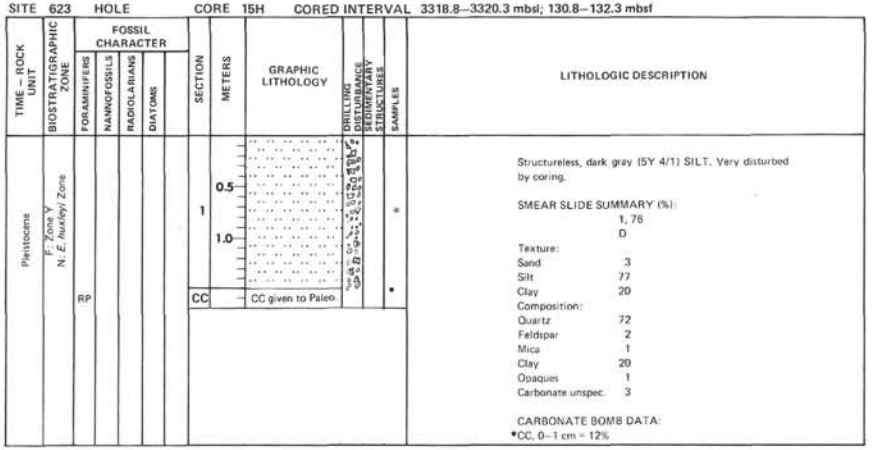
SILTY SAND beds are dark gray–dark olive gray (5Y 4/1–5Y 4/2) and range from 1–10 cm thick; "beds" in Section 3 are quite contorted.

SMEAR SLIDE SUMMARY (%):

	2, 9 M	2, 50 D
Texture:		
Sand	65	0
Silt	34	50
Clay	1	50
Composition:		
Quartz	70	25
Feldspar	1	T
Mica	2	1
Heavy minerals	2	7
Clay	1	45
Volcanic glass	–	2
Micronodules	–	13
Calc. nannofossils	–	5
Altered minerals	24	2

CARBONATE BOMB DATA:
*3, 1–3 cm = 12%

SITE 623 HOLE CORE 15H CORED INTERVAL 3318.8–3320.3 mbsl; 130.8–132.3 mbsf



LITHOLOGIC DESCRIPTION

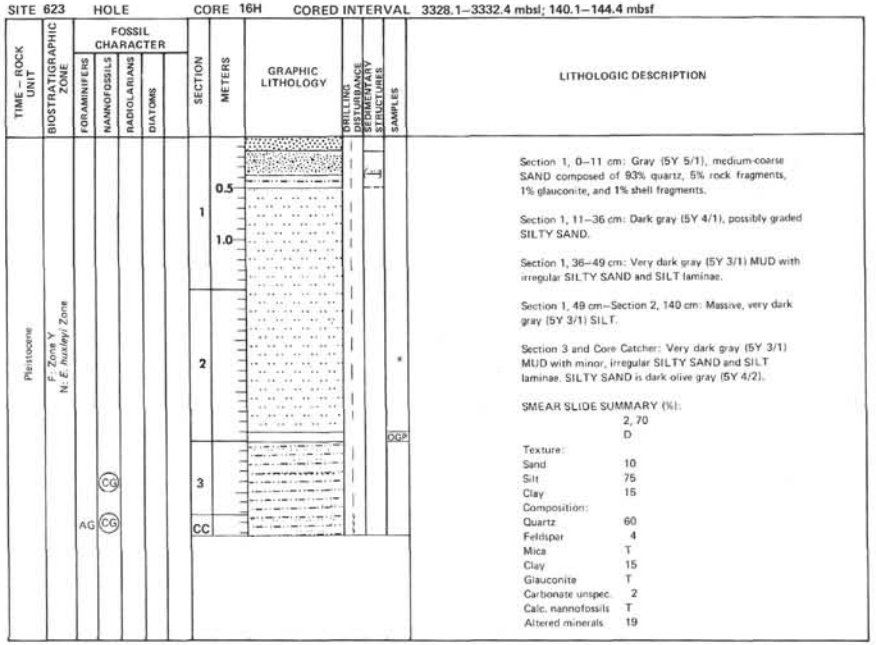
Structureless, dark gray (5Y 4/1) SILT. Very disturbed by coring.

SMEAR SLIDE SUMMARY (%):

	1, 78 D
Texture:	
Sand	3
Silt	77
Clay	20
Composition:	
Quartz	72
Feldspar	2
Mica	1
Clay	20
Opaques	1
Carbonate unspec.	3

CARBONATE BOMB DATA:
*CC, 0–1 cm = 12%

SITE 623 HOLE CORE 16H CORED INTERVAL 3328.1–3332.4 mbsl; 140.1–144.4 mbsf



LITHOLOGIC DESCRIPTION

Section 1, 0–11 cm: Gray (5Y 5/1), medium-coarse SAND composed of 93% quartz, 5% rock fragments, 1% glauconite, and 1% shell fragments.

Section 1, 11–36 cm: Dark gray (5Y 4/1), possibly graded SILTY SAND.

Section 1, 36–49 cm: Very dark gray (5Y 3/1) MUD with irregular SILTY SAND and SILT laminae.

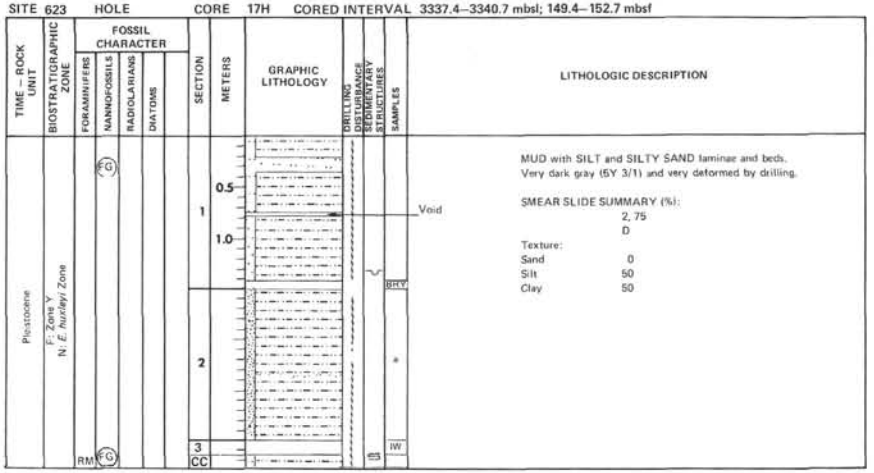
Section 1, 49 cm–Section 2, 140 cm: Massive, very dark gray (5Y 3/1) SILT.

Section 3 and Core Catcher: Very dark gray (5Y 3/1) MUD with minor, irregular SILTY SAND and SILT laminae. SILTY SAND is dark olive gray (5Y 4/2).

SMEAR SLIDE SUMMARY (%):

	2, 70 D
Texture:	
Sand	10
Silt	75
Clay	15
Composition:	
Quartz	60
Feldspar	4
Mica	T
Clay	15
Glauconite	T
Carbonate unspec.	2
Calc. nannofossils	T
Altered minerals	19

SITE 623 HOLE CORE 17H CORED INTERVAL 3337.4–3340.7 mbsl; 149.4–152.7 mbsf



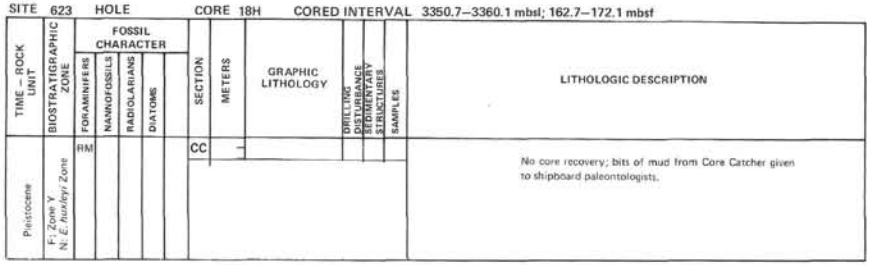
LITHOLOGIC DESCRIPTION

MUD with SILT and SILTY SAND laminae and beds. Very dark gray (5Y 3/1) and very deformed by drilling.

SMEAR SLIDE SUMMARY (%):

	2, 75 D
Texture:	
Sand	0
Silt	50
Clay	50

SITE 623 HOLE CORE 18H CORED INTERVAL 3350.7–3360.1 mbsl; 162.7–172.1 mbsf



LITHOLOGIC DESCRIPTION

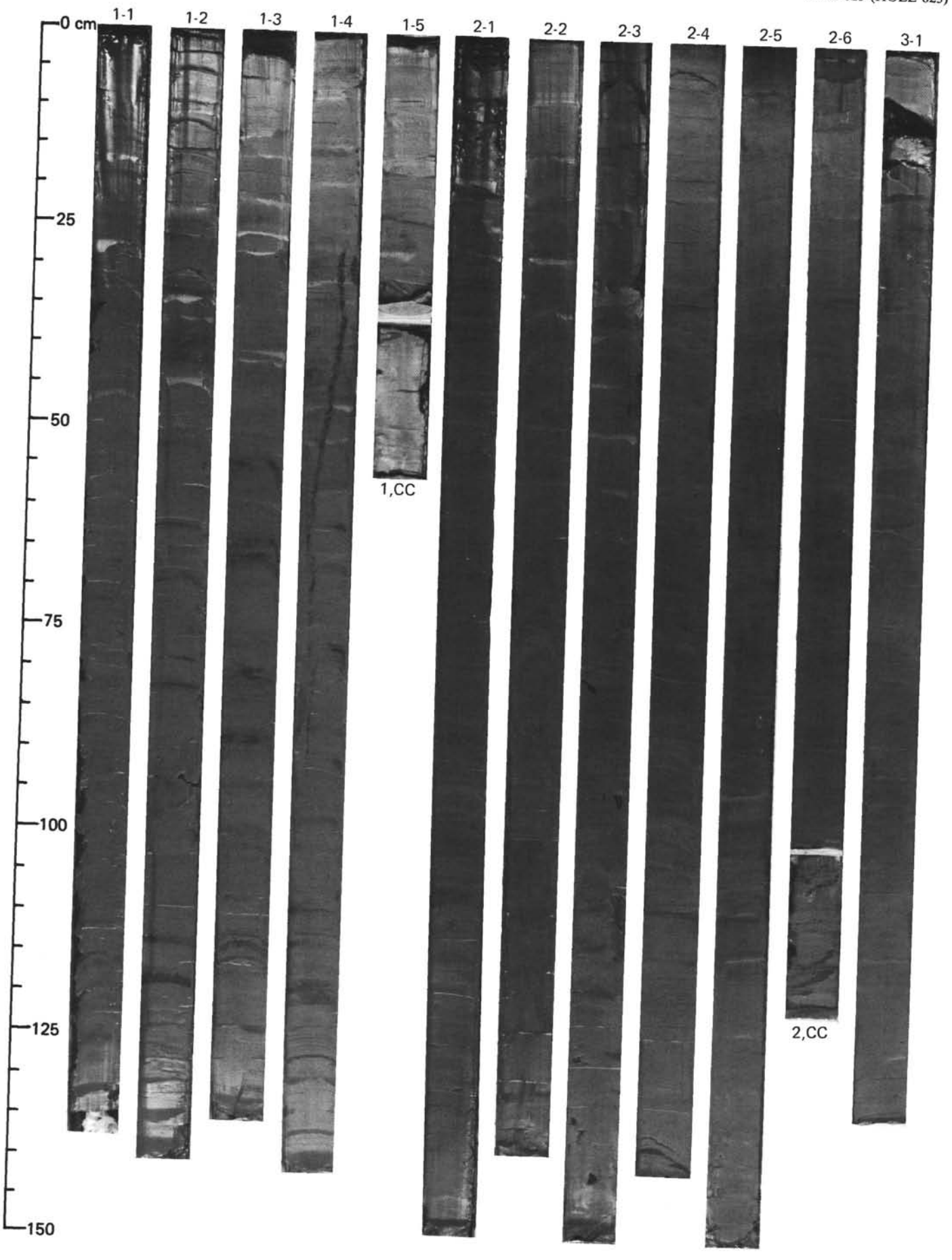
No core recovery; bits of mud from Core Catcher given to shipboard paleontologists.

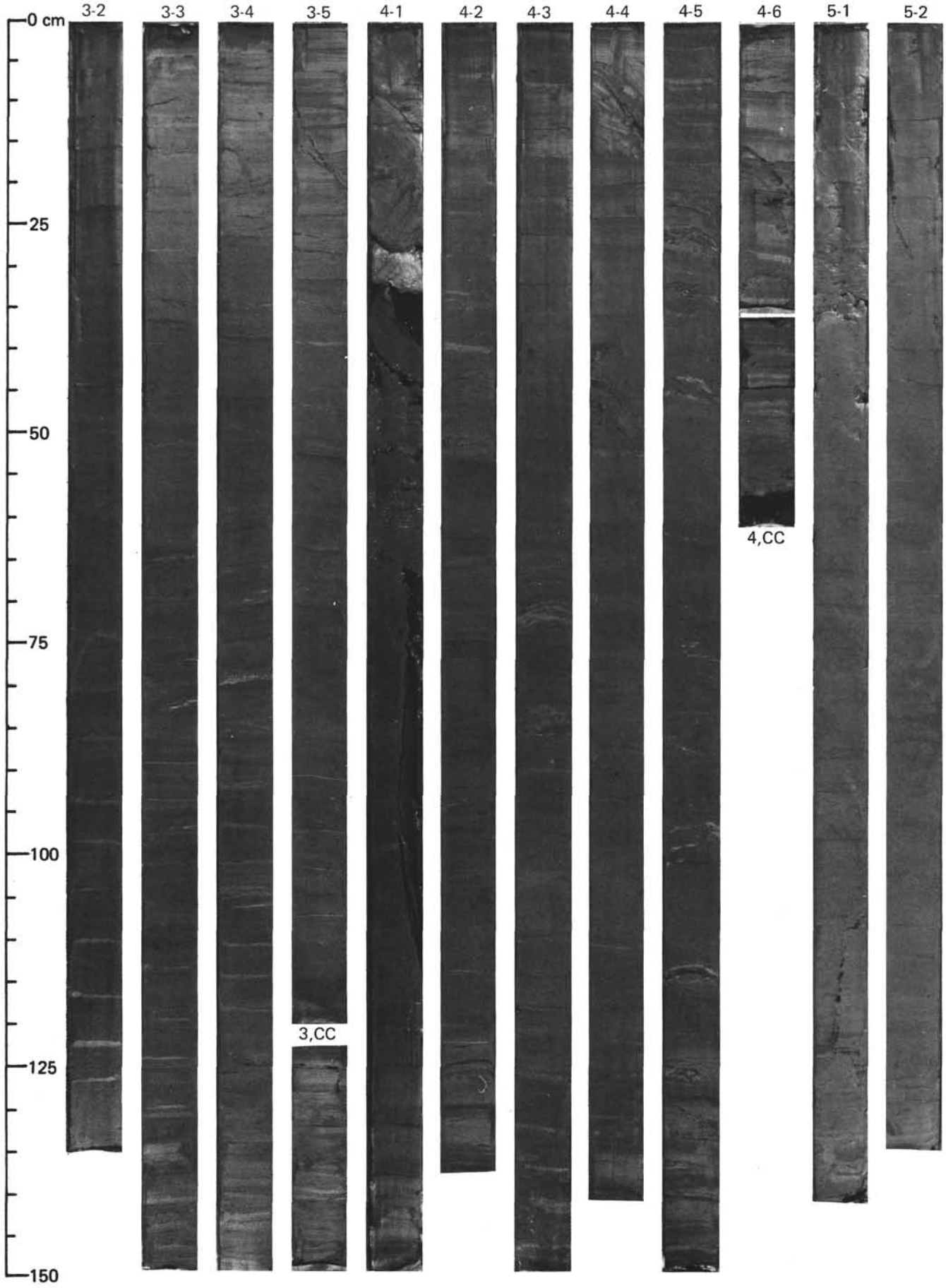
SITE 623 HOLE CORE 19H CORED INTERVAL 3360.1–3360.3 mbsl; 172.1–172.3 mbsf

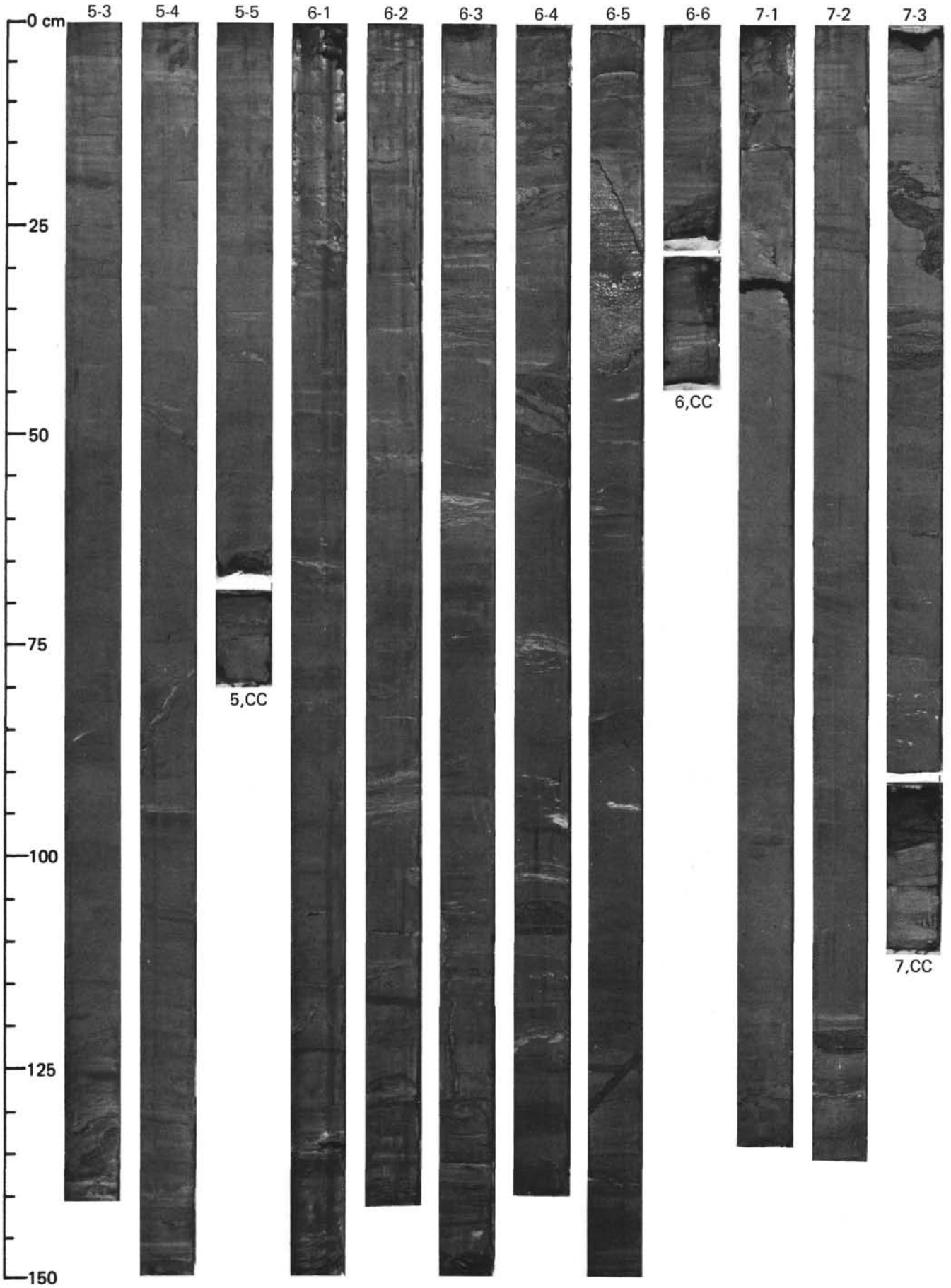
TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y N: *E. huxleyi* Zone	RP	F,C			CC						MUD with rare SILT laminae and blebs. Very dark gray (5Y 3/1). Sediment was recovered in the Core Catcher; rest of the core was empty. SMEAR SLIDE SUMMARY (%): CC, 5 D Texture: Sand 1 Silt 30 Clay 69 Composition: Quartz 21 Mica 4 Heavy minerals 4 Clay 68 *Pyrite and opaques* 1 Carbonate unspec. 1 Calc. nannofossils 1 Plant debris T

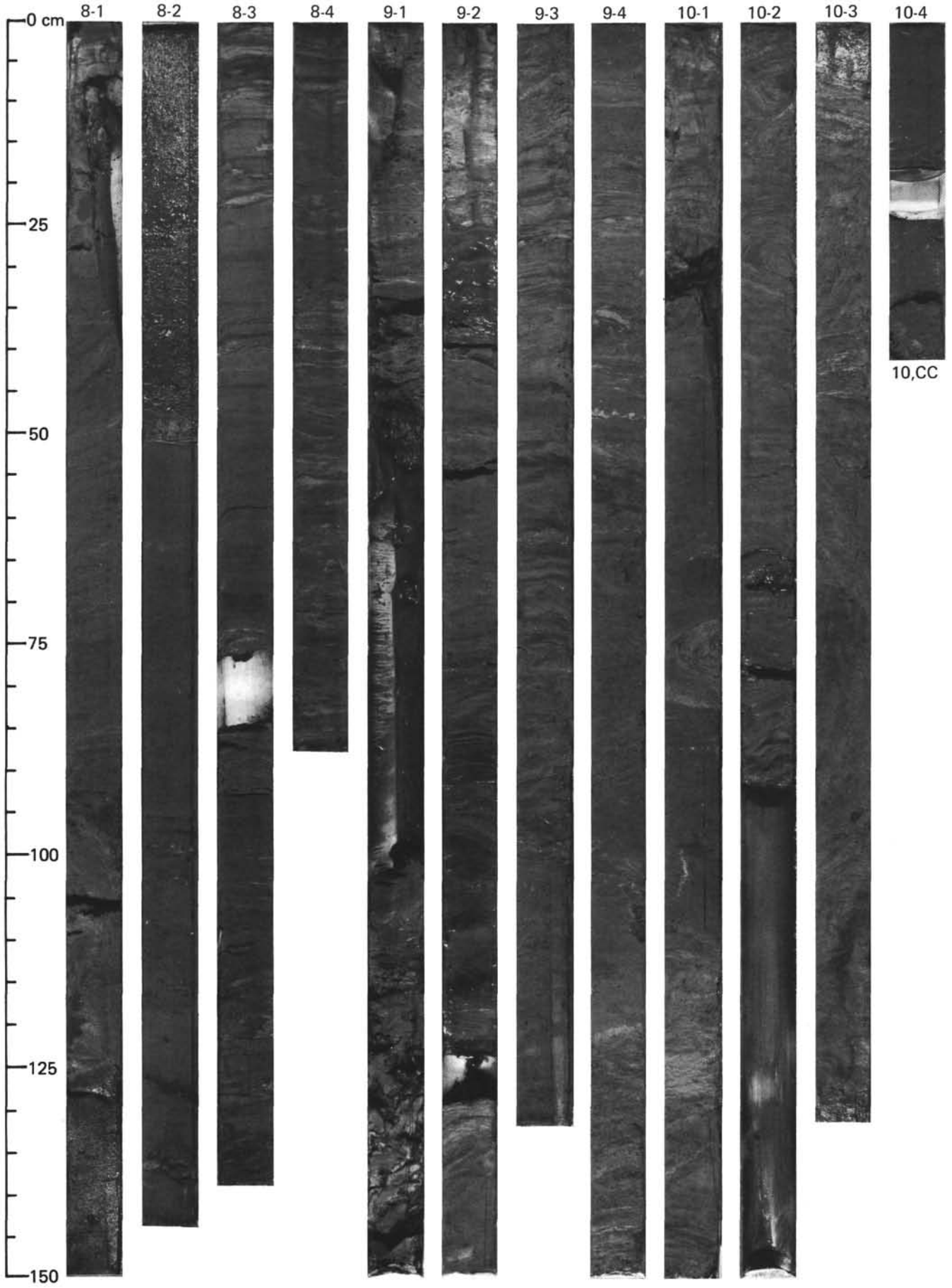
SITE 623 HOLE CORE 20H CORED INTERVAL 3379.0–3379.2 mbsl; 191.0–191.2 mbsf

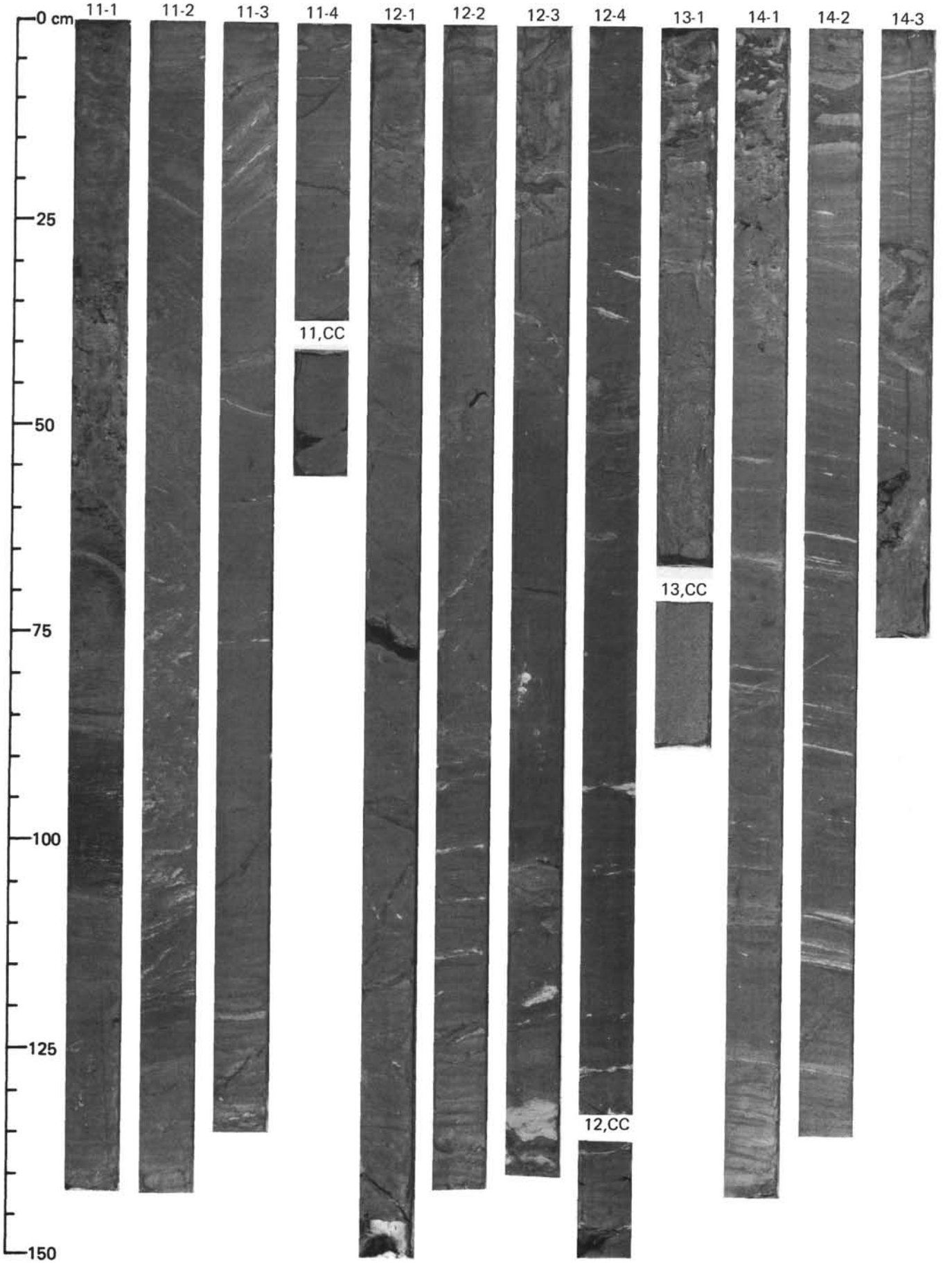
TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURBANCE	SEDIMENTARY STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
Pleistocene	F: Zone Y N: *E. huxleyi* Zone		F,C			1						Core was EMPTY, but drillers say interval cored was probably coarse-grained (sandy). Bits of material in core liner given to shipboard paleontologists.

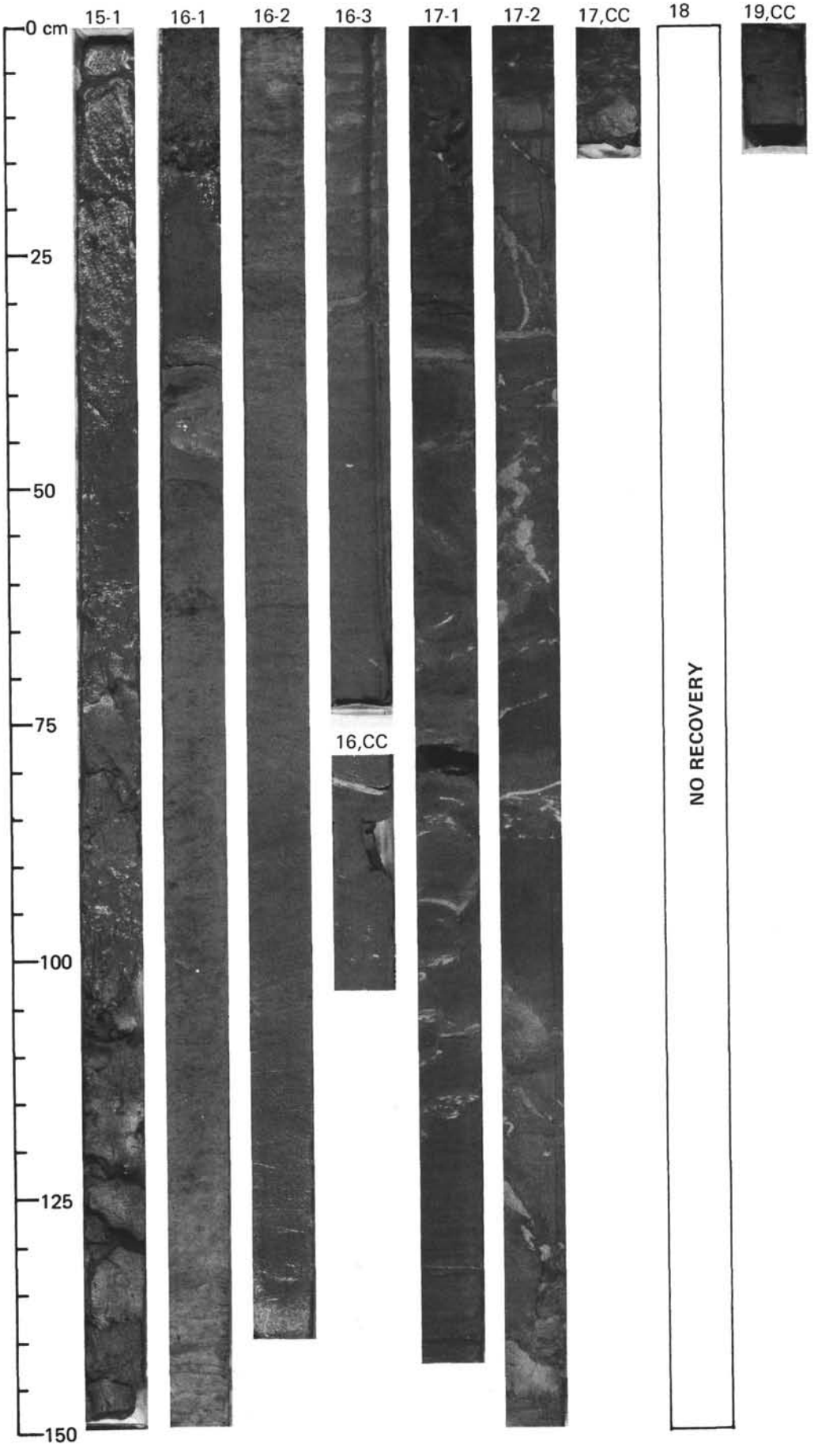

0 cm
25
50
75
100
125
150
1-1
1-2
1-3
1-4
1-5
1,CC
2-1
2-2
2-3
2-4
2-5
2-6
2,CC
3-1


3-2
3-3
3-4
3-5
4-1
4-2
4-3
4-4
4-5
4-6
5-1
5-2
0 cm
25
50
75
100
125
150
3,CC
4,CC


0 cm
25
50
75
100
125
150
5-3
5-4
5-5
5,CC
6-1
6-2
6-3
6-4
6-5
6-6
6,CC
7-1
7-2
7-3
7,CC


0 cm
25
50
75
100
125
150
8-1
8-2
8-3
8-4
9-1
9-2
9-3
9-4
10-1
10-2
10-3
10-4
10,CC


0 cm
25
50
75
100
125
150
11-1
11-2
11-3
11-4
11,CC
12-1
12-2
12-3
12-4
12,CC
13-1
13,CC
14-1
14-2
14-3


15-1
16-1
16-2
16-3
17-1
17-2
17,CC
18
19,CC
0 cm
25
50
75
100
125
150
16,CC
NO RECOVERY