3. SITE 184

The Shipboard Scientific Party[1]

SITE DATA

Dates Occupied:
184: 0700, 30 Jul 71 to 0330, 1 Aug 71
184A: 0330, 1 Aug 71 to 0330, 2 Aug 71
184B: 0330, 2 Aug 71 to 1530, 4 Aug 71.

Position:
53°42.64'N
170°55.39'W.

Water Depth: 1910 meters.

Penetration:
184: 603 meters
184A: 669 meters
184B: 973 meters.

Number of Holes: Three.

Number of Cores:
184: 23
184A: 0
184B: 14.

Total Core Recovered:
184: 123.2 meters
184A: 0
184B: 50.2 meters.

Acoustic Basement:
Depth: 1.6 seconds (approx. 1500 m)
Nature: Unknown
Velocity: Unknown.

Age of Oldest Sediment: Not determinable, but must be upper Miocene or older.

Basement: Not determinable.

SUMMARY

Site 184 is located at the southwestern corner of Umnak Plateau, southeastern Bering Sea, in water 1910 meters deep.

The 973-meter thick sediment and sedimentary rock sequence drilled and cored comprises two basic lithologic units designated A and B. Unit A consists of Pleistocene to upper Miocene clay-rich diatom ooze (0-603 m) with a variable admixture of sand and silt layers, volcanic ash beds, and pumice pebbles. The microflora is typical of a neritic environment in the Pliocene section. Unit B (603-973 m) is a sparsely fossiliferous clayey siltstone (or mudstone) with sporadic occurrences of typically non-age-diagnostic coccoliths and diatoms, and foraminifera. Thin beds of calcite- and silica-cemented (?) size-graded, volcanic sandstone and siltstone and lithified glass ash are present.

The occurrence of neritic diatoms in beds of Pliocene age is of considerable interest because it implies cycles of uplift and subsidence of Umnak Plateau. However, the cooccurrence of deep-water foraminifera, and the absence of lithofacies typical of a shelf environment, indicate that the neritic flora is allochthonous and presumably derived from the summit platform of the nearby Aleutian Ridge, possibly during episodes of glacially lowered sea level or tectonic elevation of the ridge. The finding of *Melonis pompilioides* in diatomaceous beds of late Miocene age, and again in slightly older beds within the underlying mudstone sequence, suggests that the Umnak Plateau has remained at or below its present summit depth (near 2000 m) during the last 8 to 10 m.y.

The perplexing bottom-simulating reflection horizon (BSR), one that mimics changes in bathymetry and crosses bedding plane reflections at low to moderate angles, was found to correspond closely to the top of the lower siltstone or mudstone unit. Gas, which could be indicative of the base of a clathrated section (Bryan and Stoll, 1971), was not detected in the vicinity of the BSR. The apparent implication is that the BSR was formed by the shingle-like burial of the lower mudstone unit by the upper pelagic unit. Geometrically, this is difficult to accept because the upper sequence is principally a pelagic unit of diatomaceous debris, which should depositionally conform to preexisting topography rather than be deposited at angles to it. There is little age control in the lower mudstone unit, but calcareous foraminifera recovered 145 meters below the BSR are no older than late Miocene and thereby suggest that the BSR does not represent a major hiatus. The BSR may represent an acoustically traceable diagenetic boundary (see Scholl and Creager, this volume).

BACKGROUND AND OBJECTIVES

Site Description

Site 184 is located on the extreme southwestern corner of Umnak Plateau, which is a platform connecting the Aleutian Ridge and the Bering continental margin (Fig. 1). The surface of the plateau is at a depth near 1900 meters. It is underlain by 1500 to 3000 meters of stratified deposits, which were thought to be hemipelagic units of diatomaceous, terrigeneous, and volcanic debris and turbidites

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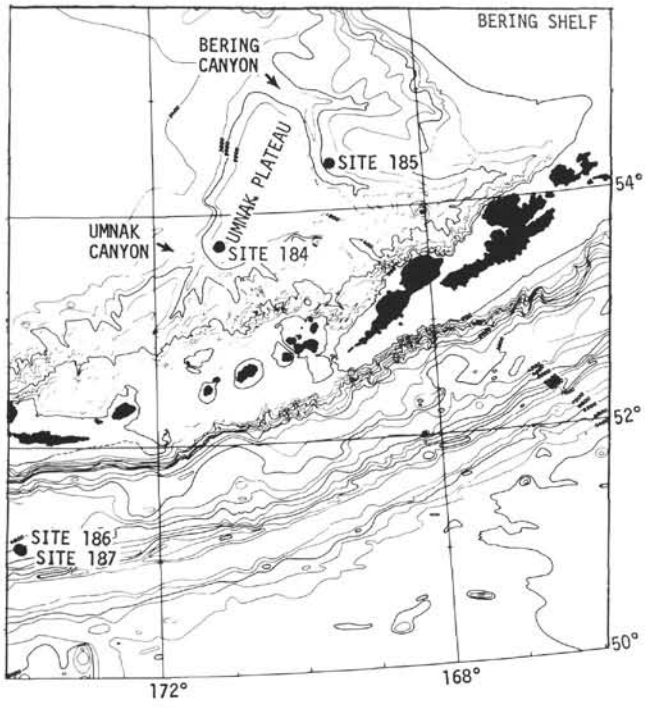

Figure 1. *Base map showing location of Site 184.*

derived from the Aleutian Ridge. The plateau is thought to be underlain by a foundered continental crustal block that was thickly mantled with Cenozoic (Eocene and younger) deposits contemporaneous with subsidence.

Seismic reflection profiles taken across the sloping flanks of the plateau reveal a "strange reflecting horizon resembling an angular unconformity (See Fig. 2). Structurally this "unconformity is extremely difficult to understand because the overlying layers appear to project or stick out of the surface of the unconformity. Although a geometry of this type is typically developed where turbidite sequences abut buried topography, it is difficult to understand how such an unconformity can be so widely developed in hemipelagic units. It seems likely that the "unconformity is an acoustic effect, possibly related to the clathrate phenomenon, rather than a structural or stratigraphic feature.

Objectives

The objectives fell into three general categories:

1) To determine the origin of the presumably spurious (in a geologic sense) reflector located approximately 900 meters below bottom. Special efforts were made to determine if the reflecting horizon is attributable to the presence of gas hydrates (clathrate). Temperature data were collected and downhole measurement systems were tested.
2) To collect stratigraphic and biostratigraphic data in an attempt to establish the geologic history of the plateau and the history of the Aleutian Ridge as a source of terrigenous and volcanic debris.
3) To drill, if possible, through the entire section beneath the plateau (approximately 1600 m at Site 184) in order to penetrate into, and sample, the acoustic basement. Samples of basement rock were to provide important information about the early history of the plateau. Also, sampling of the deeper sedimentary layers of the plateau was to aid in determining if there are deeply buried clay sequences here that might be deforming plastically to produce the numerous diapir-like folds underlying the plateau.

OPERATIONS

Pre- and Post-drilling Survey

Site 184 was approached with a ship's heading of 240°T, which is approximately normal to the track of the reference seismic profile (Figure 3) collected by D. W. Scholl, 19 Sep 70. As a safety precaution, this track (Figure 4) was continued to a point downslope where it could be seen on the seismic profile that no significant structural closure was present in the subbottom strata. The air gun profile (Figure 2) taken crossing the selected site and then returning to it revealed a stratigraphic section virtually identical to that of the reference profile. The beacon was dropped on the fly at 0705 hrs on 30 Jul 71 during the second pass over the site. The accepted position of Site 184 is: 53°42.64′N; 170°55.39′W. Hole 184A is located on a bearing of 350°T from Hole 184 at a distance of 60 meters; Hole 184B is 160 meters from Hole 184, on a bearing of 308°T.

No post-drilling survey was deemed necessary, however, it should be noted that the indicated DR position on the *Glomar Challenger* airgun profile (Figure 2) for Site 184 is approximately 1.5 miles to the northwest of the actual site location; also, the site position picked from the reference profile (Figure 3) is about 1 mile northwest of the actual drilling position.

An attempt was made to run a sonobuoy profile with the *Challenger* over Hole 184B. Figure 5 is a copy of this record, which while helpful for stratigraphic purposes, is useless for construction of a velocity profile owing to erratic ship motion and premature self-scuttling of the buoy. A chart showing the track of the *Glomar Challenger* in the vicinity of Site 184 is given on Figure 4.

Drilling Program

Again, as at Site 183, the sonic depth corrected using Matthews Tables and the more recent information from the U.S. Navy Undersea Research and Development Center differed from the drill string length by 15 to 20 meters. The sonic depth of 1026 fm corrects to 1896 meters below sea level or 1906 meters below drill floor. This compares with 1920 meters below drill floor established on the basis of the first core which recovered sediment. The 1920 meters below drill floor or 1910 meters below sea level, is the depth used for this hole.

Hole 184 was occupied from 0700 hrs, 30 Jul 71 (beacon away) until 0330 hrs, 1 Aug 71 with alternating coring and washing from the sea floor to a subbottom depth of about 600 meters. Where a sandstone capped mudstone sequence was encountered that could not be penetrated more than 3 meters with the Williams diamond bit being used. This bit had been selected to permit better core recovery in an area in which lithified sediments were

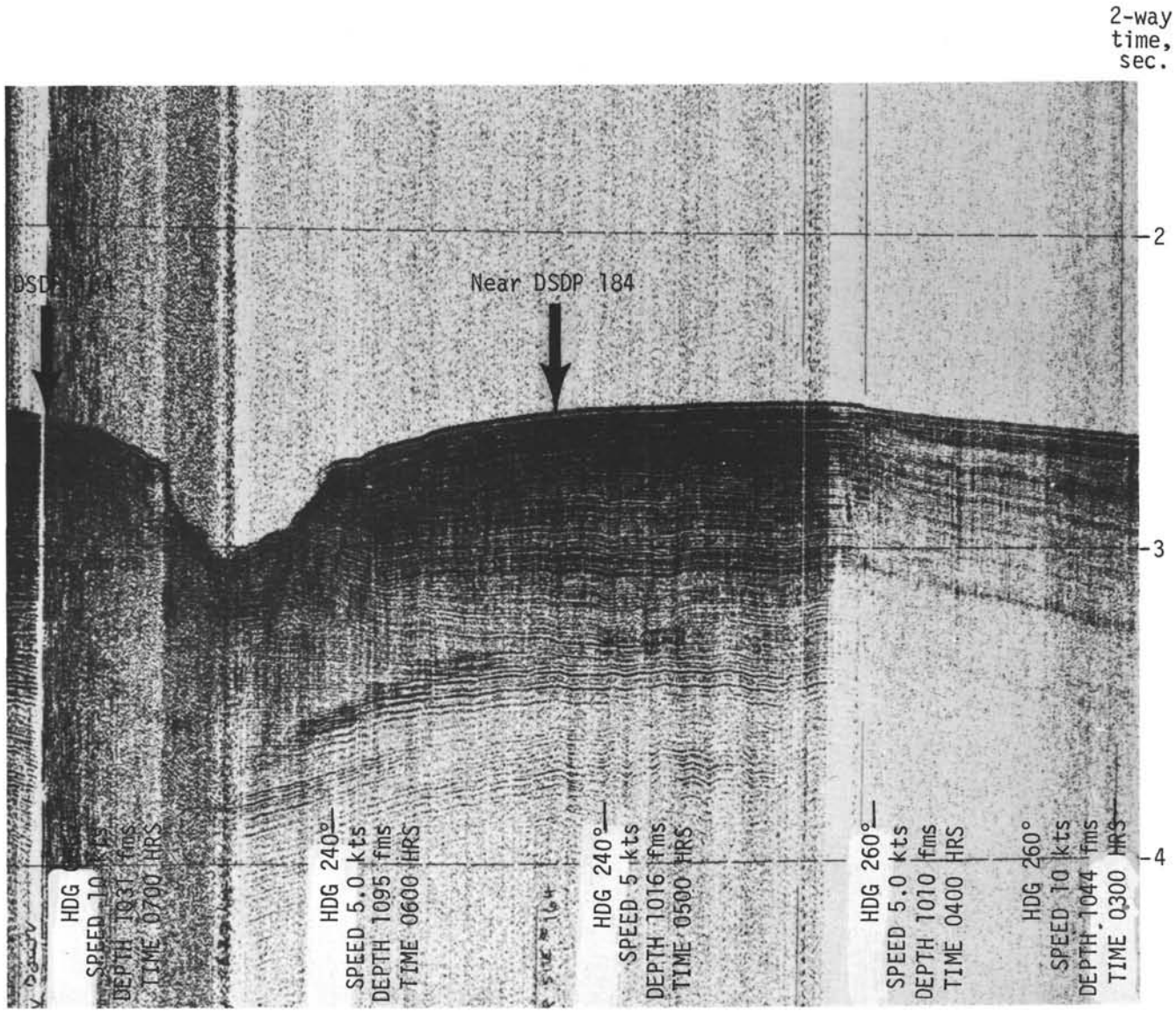

Figure 2. Glomar Challenger *airgun profile taken coming onto Site 184.*

not expected. The hole was abandoned at a total subbottom depth of 603 meters.

The entire section penetrated from the bottom to about 600 meters consisted of diatomaceous ooze and diatom-rich silty clay with volcanic debris and occasional thin limestone layers. Coring was relatively easy. Recovery was good in the upper section, becoming poorer with depth. Core 22 has an extremely large recovery percentage which is explained as resulting from continual working and pounding during drilling of the sandstone.

Hole 184A was occupied from 0330 hrs, 1 Aug 71 to 0330 hrs, 2 Aug 71. This hole was continuously washed to a subbottom depth of 669 meters, at which time the center bit was pulled and a core barrel dropped. The core barrel became irretrievably jammed, resulting in abandonment of Hole 184A.

Hole 184B was occupied from 0330 hrs, 2 Aug 71 to 1530 hrs, 4 Aug 71. This hole was continuously washed to a subbottom depth of 669 meters and then alternately cored and washed to a total depth of 973 meters, where the hole had to be abandoned because of lack of penetration. The last two cores cut were under gauge. On recovery it was noted that the bit bearings were very bad and that the cones were quite loose.

The entire section penetrated consisted of a clayey siltstone which was difficult to core, requiring 25 to 30 pump strokes per minute.

Lithostratigraphy

Three holes were drilled at Site 184, the deepest penetrating 973 meters of sediment. The lithologic sequence consists of two sedimentary units.

Unit A, from 0 to 603 meters below bottom, is olive gray clay-rich diatom ooze, with a variable admixture of sand and silt layers, light gray volcanic ash beds, and occasional pumice pebbles. The lower part of Unit A is slightly higher in clay content and is indurated.

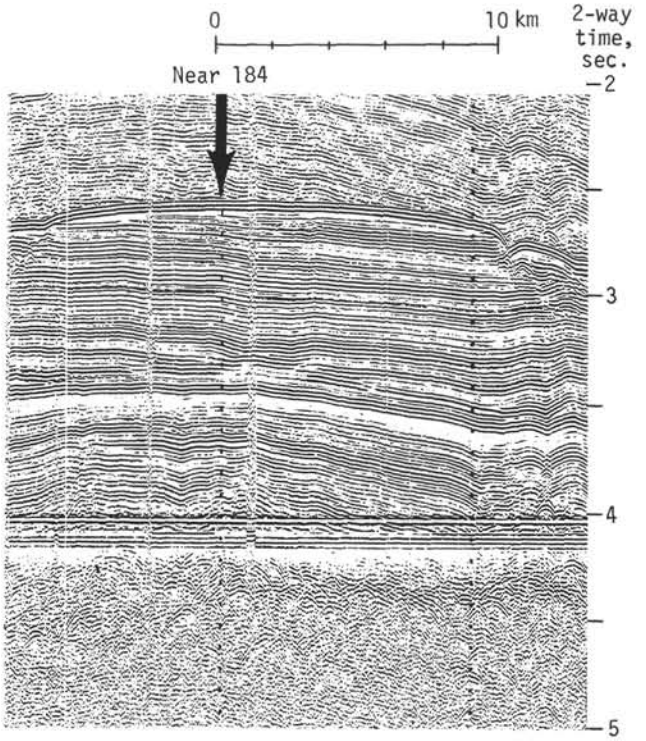

Figure 3. *Reference seismic profile, collected 19 Sep 70, by D. W. Scholl.*

Unit B, from 603 to 973 meters below bottom, is a mudstone with only sporadic occurrences of nondiagnostic coccoliths and diatoms, and containing only a few foraminifera. Thin beds of calcite- and silica-cemented volcanic sandstone and lithified glass ash are present.

Unit A – 0 to 603 meters

Unit A is mainly diatom ooze with a stratigraphically variable admixture of terrigenous material. The sediment is grayish olive and dark olive gray and contains an average of ~80% diatoms, ~10% clay, and ~5 to 10% silt-sized feldspar and quartz. Core 1 contains the greatest amount of terrigenous sediment mixed with the diatom ooze. The following occur as discrete layers:

1) Gray glass ash, in layers 1 to 10 cm thick, comprised of virtually 100% glass shards, but in various stages of alteration to clays.
2) Dusky brown and black sand and silt beds containing typically up to 20% recognizable glass, 30% feldspar, 10% quartz, 10% clay, and ~5% pyroxene, chlorite, and amphibole, the remaining 25% is largely devitrified and altered glass, some lithic fragments, and altered feldspar.

Pumice pebbles, up to 3 by 3 cm, are common in Unit A. Toward the base of Unit A, there is a slight and gradual increase in clay content, decrease in the number of pumice pebbles, and the unit becomes increasingly indurated.

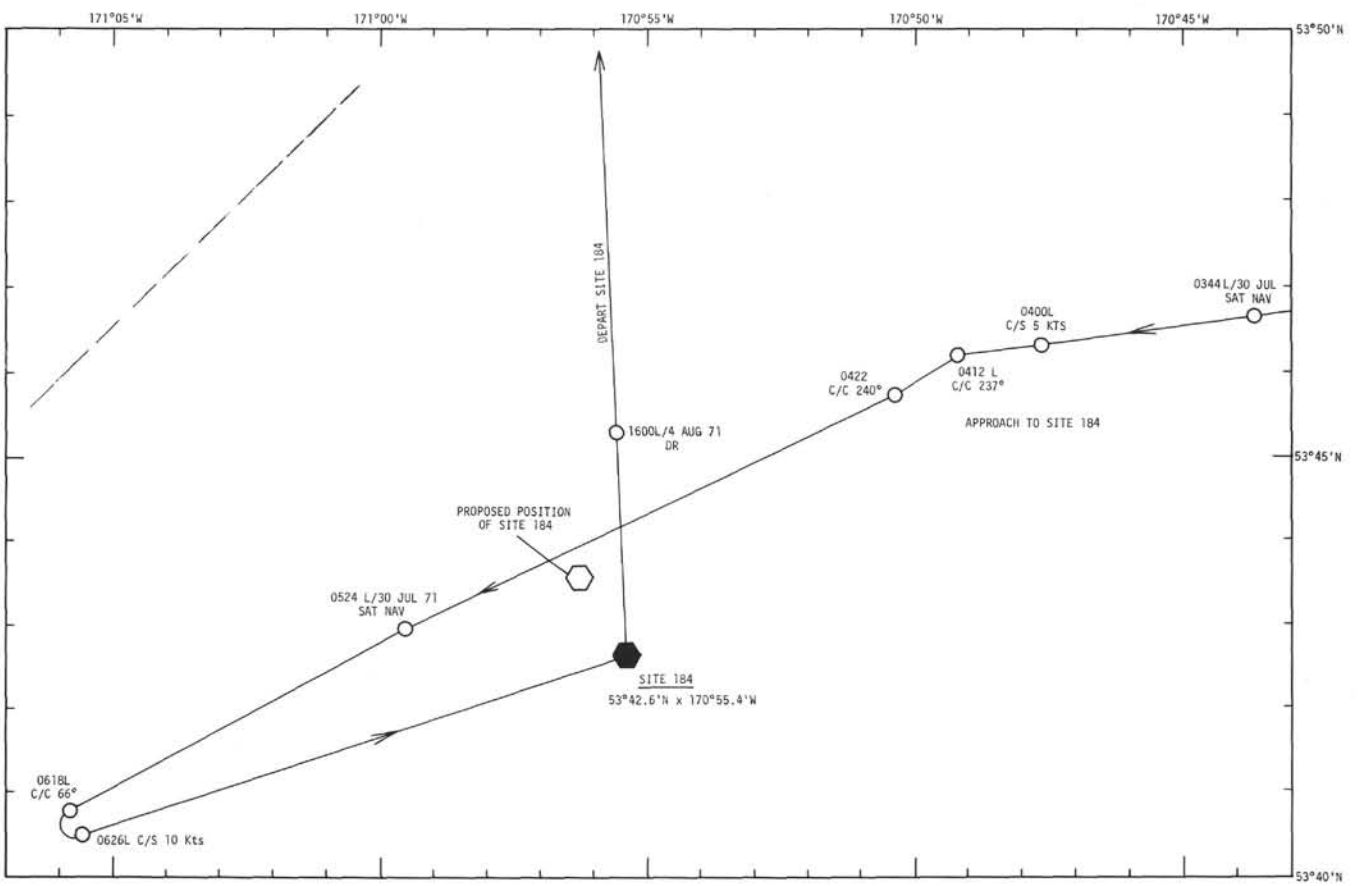

Figure 4. Glomar Challenger *pre- and post-drilling survey tracks, Site 184.*

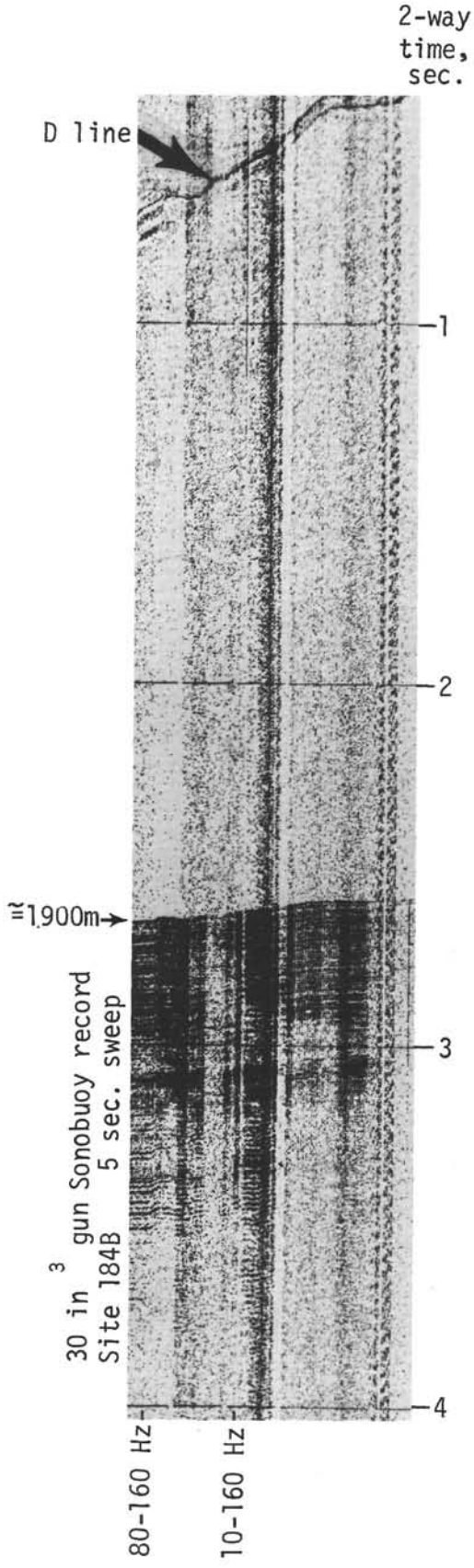

Figure 5. *Sonobuoy record, Site 184.*

The core catcher of Core 22 contains a massive black mudstone, underlying a thin (5 cm) layer of calcite-cemented sandstone. Unfossiliferous mudstone continues throughout Core 23.

Unit B – 603 to 973 meters

Unit B is a dark olive gray clayey siltstone containing layers of light gray lithified glass ash and size-graded, black, carbonate- and silica-cemented sandstone (Figure 6) and siltstone. In addition to volcanic sandstones, Core B1 also contains layers of terrigenous sandstone, with abundant quartz grains and chert fragments.

Below about 750 meters, the siltstone is laminated and intensively burrowed. The burrowers appear to have followed bedding planes, leaving horizontal structures resembling en echelon chevron folds (Figure 7). Pyrite and marcasite are locally present.

Calcium carbonate occurs as calcite microspar or spar cement in both diatom ooze and sand.

PHYSICAL PROPERTIES

Physical properties measured at Site 184 included bulk density, water content, natural gamma radiation, acoustic velocity, and vane shear strength. Bulk densities were measured with the GRAPE system and were also calculated from the results of tests on shore laboratory samples. For the harder sediments, bulk density was measured by the water displacement method.

Bulk densities and acoustic velocities are presented on the site summary sheet.

Bulk Density

GRAPE densities were measured to a sediment depth of 600 meters, below which the material did not fill the core liners completely. For the first 600 meters, the mean GRAPE density does not deviate significantly from 1.5 g/cm^3. On a core basis, however, there are significant deviations in the vicinity of ash layers, as noted in the Site 183 discussion. The material from 800 to 925 meters has a density of about 2.0 g/cm^3 as determined by the water displacement method.

Acoustic Velocity

The acoustic velocities measured with the Hamilton Frame are approximately constant and equal to about 1.6 km/sec to a sediment depth of 400 meters. Below this point, the velocity increases approximately linearly to a value of about 2.6 km/sec at a sediment depth of 900 meters. Significant deviations from this trend occurred at several points at which sandstone and limestone layers were observed.

Summary

The physical property measurements disclose two zones. The first extends from 0 to 600 meters and has a relatively uniform, low density, and acoustic velocity. The second (600-900 meters) has a uniform, much higher density, and a steadily increasing sonic velocity.

TABLE 1
Coring Summary–Site 184

Core	Cored Interval Below Bottom (m)	Cored (m)	Recovered (m)	Recovered (%)
Hole				
1	0-4	4	3.8	95.0
Wash				
2	128-137	9	8.0	88.0
Wash				
3	146-155	9	9.3	103.0
Wash				
4	165-174	9	9.3	103.0
5	174-183	9	CC	00.0
Wash				
6	202-211	9	9.3	103.0
Wash				
7	221-230	9	9.3	103.0
Wash				
8	240-249	9	9.3	103.0
9	249-256	7	7.9	112.8
Wash				
10	277-286	9	6.2	68.9
Wash				
11	296-305	9	4.7	52.0
Wash				
12	333-342	9	4.1	45.0
13	342-351	9	4.4	48.0
Wash				
14	380-389	9	5.2	57.0
15	389-398	9	2.7	30.0
Wash				
16	427-436	9	2.7	30.0
Wash				
17	464-473	9	3.3	36.0
Wash				
18	502-511	9	3.0	33.3
19	511-518	7	1.9	27.0
Wash				
20	539-548	9	6.4	71.1
Wash				
21	567-576	9	3.3	36.7
Wash				
22	595-599	4	7.6	190.0
23	599-601	2	1.5	75.0
Drill				
	Total/Average	186	123.2	66.2
Hole				
Wash	Cavings from the equivalent of the portion of Site 184 between Cores No. 12 and No. 20 recovered at 669 m			
Hole				
Wash				
1	669-678	9	2.0	22.2
Wash				
2	707-716	9	1.0	11.1
Wash				
3	744-753	9	1.0	11.1
Wash				
4	781-790	9	2.6	28.9
Wash				
5	819-828	9	3.1	34.4
Wash				
6	865-874	9	4.5	50.0
7	874-884	10	4.2	42.0
8	884-893	9	6.7	74.4
9	893-903	10	6.4	64.0
10	903-912	9	5.5	61.1
11	912-921	9	3.2	35.6
12	921-930	9	1.7	18.9
Wash				
13	959-968	9	7.6	84.4
Wash				
14	971-973	2	0.7	35.0
	Total/Average	121	50.2	41.5

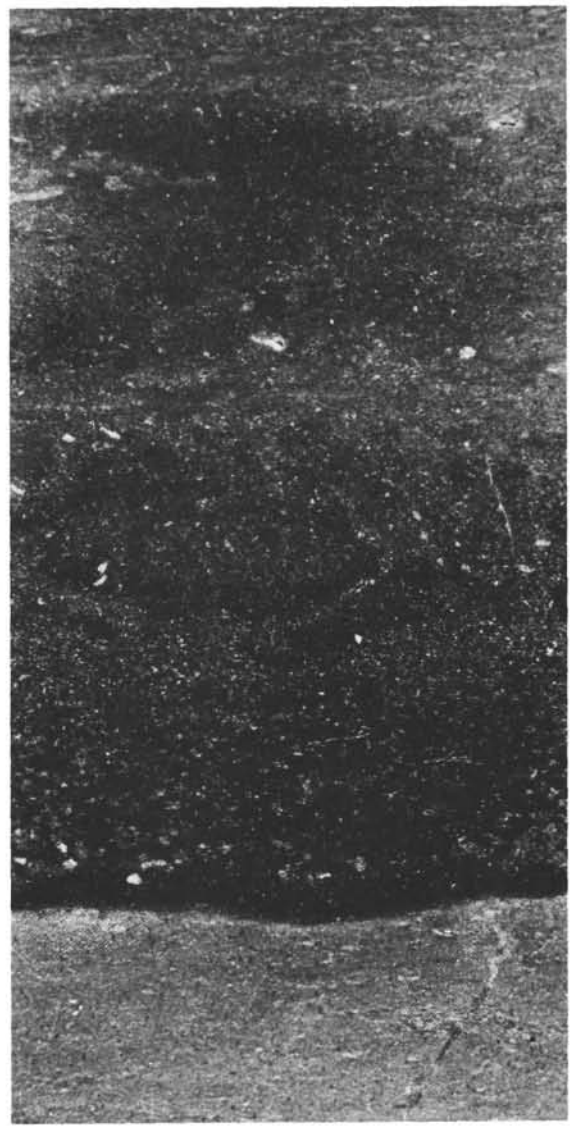

Figure 6. *Graded sand (volcanic), silica cemented. Full core width (184B-1-2).*

Figure 7. *Burrows, showing their parallel planar nature and their en echelon chevron back-fill. Full core width.*

PALEONTOLOGY

Deep-sea sediments at Site 184 consist of Pleistocene to upper Miocene diatom ooze above and a siltstone sequence below.

A significant portion of the Pliocene diatom thanatocoenosis consists of neritic subarctic forms. Yet, deep-sea benthonic foraminiferal assemblages in the same section preclude the possibility of deposition at shallow depths. Instead, conditions for displacement of large numbers of frustules from the shelf to the adjacent deep-sea is required. A narrow continental shelf would facilitate displacement, as evidenced by high frequencies of neritic diatoms found associated with deep-sea sediments deposited in the Sea of Okhotsk at times of glacially lowered sea level (Jouse, 1967).

The sole basis for dating the siltstone is a single specimen of *Globorotalia (T.) pachyderma*. It suggests that the upper part of the siltstone is upper Miocene like the overlying diatom ooze.

Foraminifera

A few arenaceous forminifera are present in most samples and are often the only forms present. Calcareous benthonic and planktonic foraminifera occur sporadically. The lowest two samples examined, the catcher of Core 8 and interval 127-129 cm in Section 5, Core 9, both of Hole 184B, are barren of foraminifera. Sample designations refer to Hole 184, unless Hole 184B is specified.

Core 1, Section 1 contains a sinistral *Globorotalia (T.) pachyderma* population typical of the modern Bering Sea. Core 7, Section 3, Pliocene according to diatoms, contains rare dextral *G. (T.) pachyderma*. Core 14, Section 4, and Core 16, Section 2, spanning the Pliocene-Miocene boundary according to diatoms, lack *G. (T.) pachyderma,* but have common *G. (T.)* cf. *G. (T.) subcretacea.* This assemblage is of uncertain age significance, but differs markedly from modern assemblages. Core 3, Section 1, in Hole 184B contains three planktonic specimens, one of which is a sinistral *G. (T.) pachyderma*. This latter occurrence, although rare, is interesting because it occurs in Unit B below the deepest level of identifiable siliceous fossils. It indicates an age no older than upper Miocene.

Calcareous benthonic assemblages down to Core 7 differ from those below Core 14. Between these two levels no calcareous foraminifera were found. Down to Core 7 the dominant species are *Islandiella teretis* and *Elphidium batialis*. In Core 16 of Hole 184 and Core 3 of Hole 184B (which contain the only common occurrences of calcareous benthonics in deeper levels of the sites), the two species do not occur. Instead there are diverse assemblages including *Melonis pompilioides*. Most species of the genus *Elphidium* inhabit sublittoral regions, but *E. batialis* appears to be a true deep-sea representative. Saidova (1961) gives a depth range for this species in the northwest Pacific Ocean and adjacent seas of 1400 to 3500 meters. A single specimen of *Buccella frigida* in Core 7 is the only certain example of displacement.

Martinottiella communis has its highest occurrence in Core 11, within the Pliocene according to diatoms, and is the dominant arenaceous species below that level. In Unit B, tests of this, and other arenaceous species, are deformed by compression, but in the overlying Unit A they are not.

Calcareous Nannoflora

With the exception of the Pleistocene Core 184-1 and Pliocene Core 184-8, Site 184 is essentially barren of age diagnostic nannofossils. Cores 184B-2 and 3 contain a few nondiagnostic species, e.g., *Reticulofenestra* sp., *C. pelagicus*. Coccoliths are very rare even in the fossiliferous cores.

Radiolaria and Silicoflagellates

At Site 184, Radiolaria and silicoflagellates occur in Cores 1 to 22 of Hole 184 in the diatom ooze lithologic unit, but are absent below Core 23 and Cores 1 through 14 of Hole 184B. As at Site 183, Radiolaria at this site (Table 3, Chapter 28) are moderately preserved, but occur only sporadically. Core 1 of Hole 184 contains the modern Bering Sea (surface sediments) assemblage reported previously by Ling, et al. (1971). Between Cores 2 and 22, no index taxa were observed.

Sediments at Hole 184 yield fewer silicoflagellate species than the previous site but have a definite microfloral succession (Table 3, Chapter 27). In descending order, Core 1 contains *Distephanus octangulatus,* together with *Dist. speculum.,* indicative of the late Pleistocene. Absence of *Dist. cruv* var. *stauracanthus* and *Dictyocha subarctios* suggests that sediments of middle to early Pleistocene were not recovered. Occurrence of *Ammodochium rectangulare*

in the Pliocene interval is significant because the previous known range of this species is from Paleocene to Miocene. The joint occurrence of *Ebriopsis antiqua* (spineless form) and *Cannopilus hemisphaericus* in Core 12 indicates a Pliocene age. Unlike Site 183, no middle Miocene specimens are found at this site.

Diatoms

The local stratigraphic sequence at Site 184 can be divided into four zones (Table 1, Chapter 30). The highest consists mostly of extant species of the subarctic assemblage. The second zone is distinguished from the subjacent zone by the presence of *Coscinodiscus pustulatus* and *Denticula hustedtii*, and is characterized by many other Pliocene indicators. These are also reported from the Pribilof Islands in the Bering Sea. The third zone is distinguished from the underlying zone by the presence of *Denticula kamtchatica*. The fourth zone is characterized by *Coscinodiscus marginatus* (Forma) and *Thallassiosira zabelina* without other diatoms.

Diatom thanatocoenoses found at this site commonly include the genus *Stephanopyxis* and *Thallassiosira*, both of which are indicative of a neritic environment of deposition.

CORRELATION BETWEEN REFLECTION PROFILE AND STRATIGRAPHIC COLUMN

The reflection profile taken by the *Challenger* on her approach to Site 184 is shown in Figure 8 (see also Figure 2) along with the stratigraphic column and physical properties. The record shows fine-scale internal stratification and two stronger zones of reflection at .50 and .72 seconds. The deeper zone of strong reflection increases in depth from .72 to 1.0 second from right to left; it was originally thought to be a "clathrate horizon. However, this reflector appears to correlate well with the boundary between lithologic Units A and B at Site 184. The shallower reflector at .50 second is not clearly indicated in the lithologic summary or physical properties. However, the first appearance of thin (10-30 cm) strings of microcrystalline limestone occurs at 420 meters and continues intermittently to the base of Unit A. It appears that these thin limestone layers (3.7-5.3 km/sec) in Unit A may be responsible for the .50 second reflector.

Interval velocities within Unit A are near 1.6 km/sec according to the laboratory measurements, but the observed travel time (.72 sec, roundtrip) and depth (603 m) give a velocity of 1.68 km/sec. A similar discrepancy was noted at Site 183, and again, this may be caused by sample disturbance and the lack of confining pressure in the laboratory. Interval velocities within Unit B increase from 1.6 to 2.6 km/sec according to the laboratory data, but they cannot be checked because there are no distinct reflectors or lithologic breaks within Unit B.

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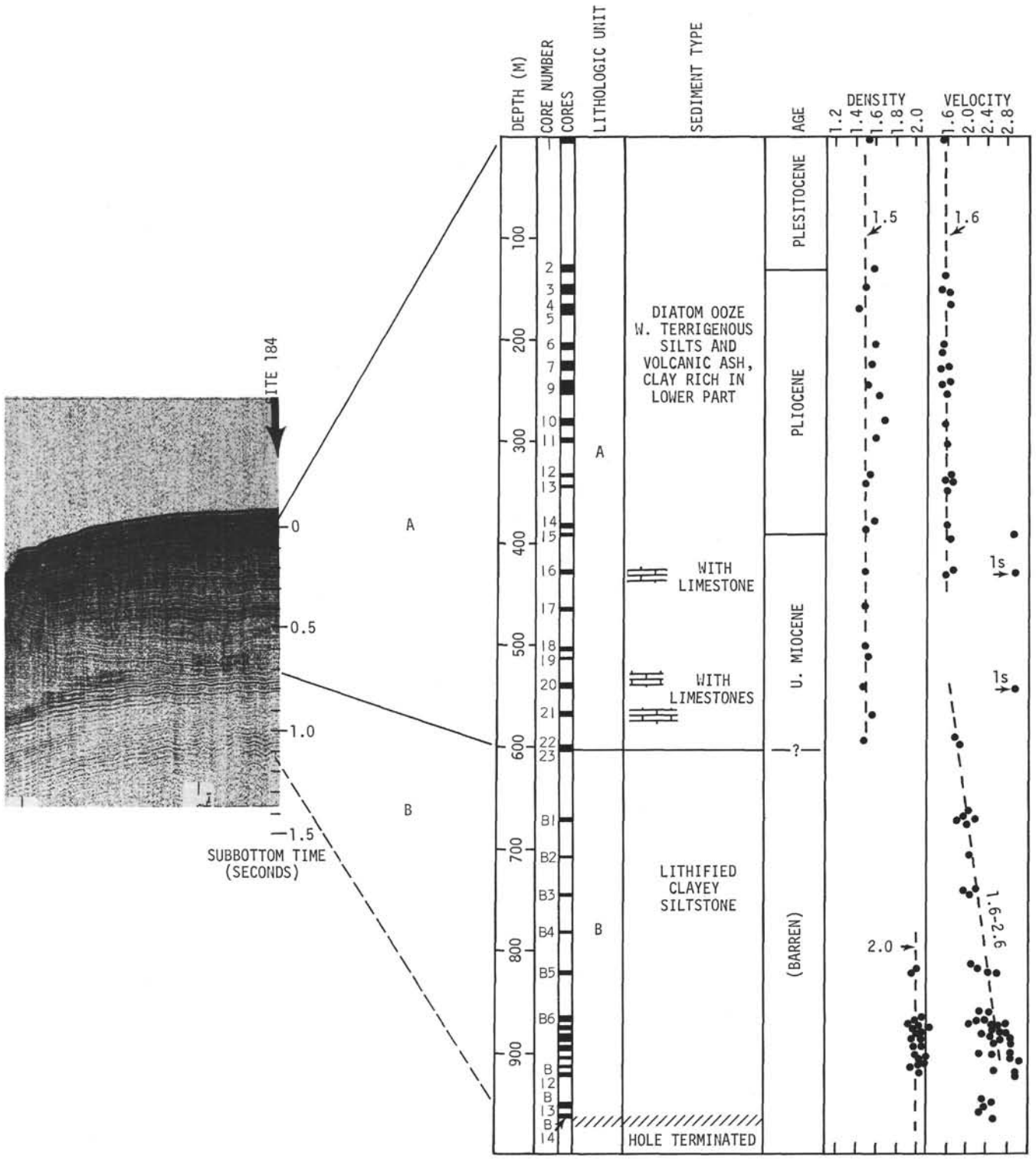
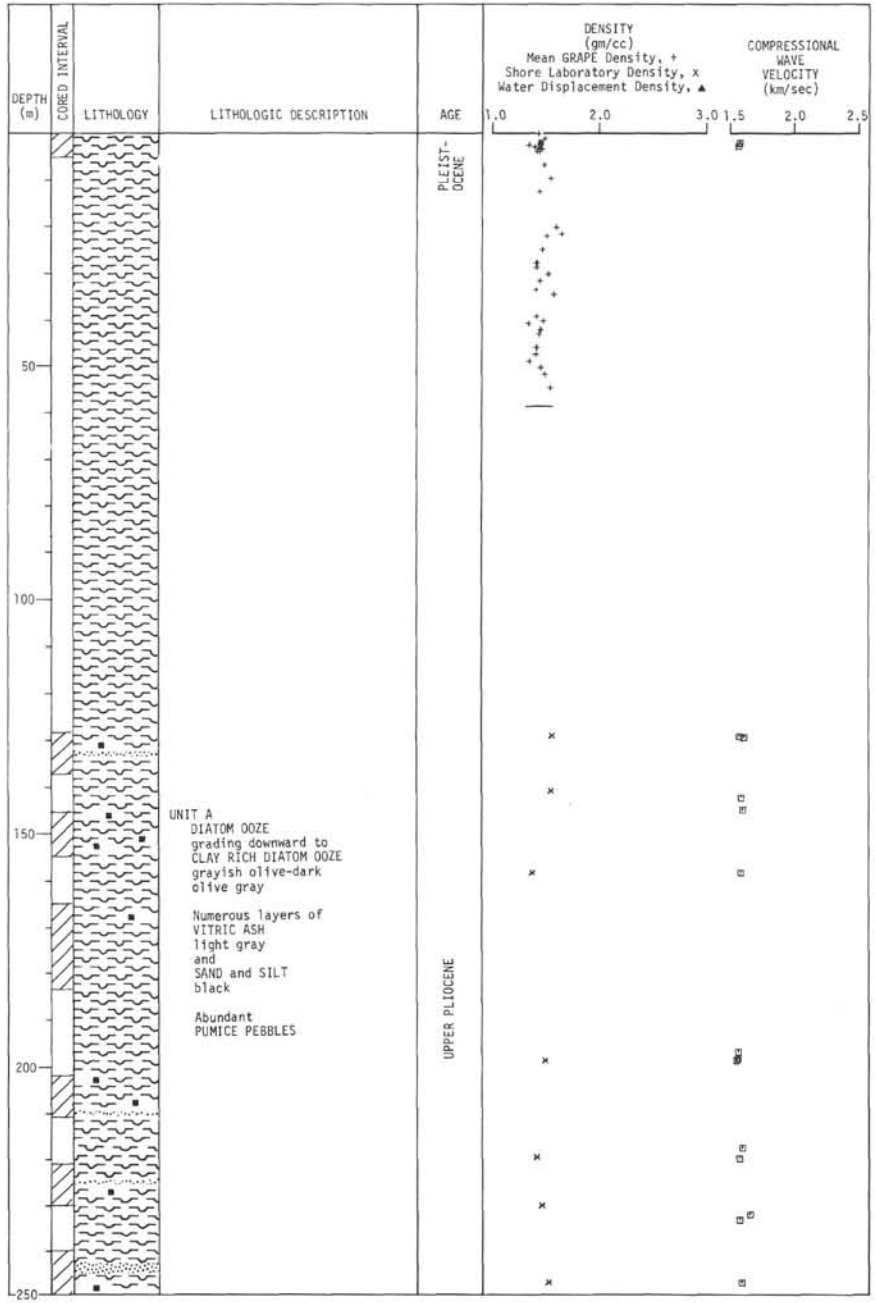
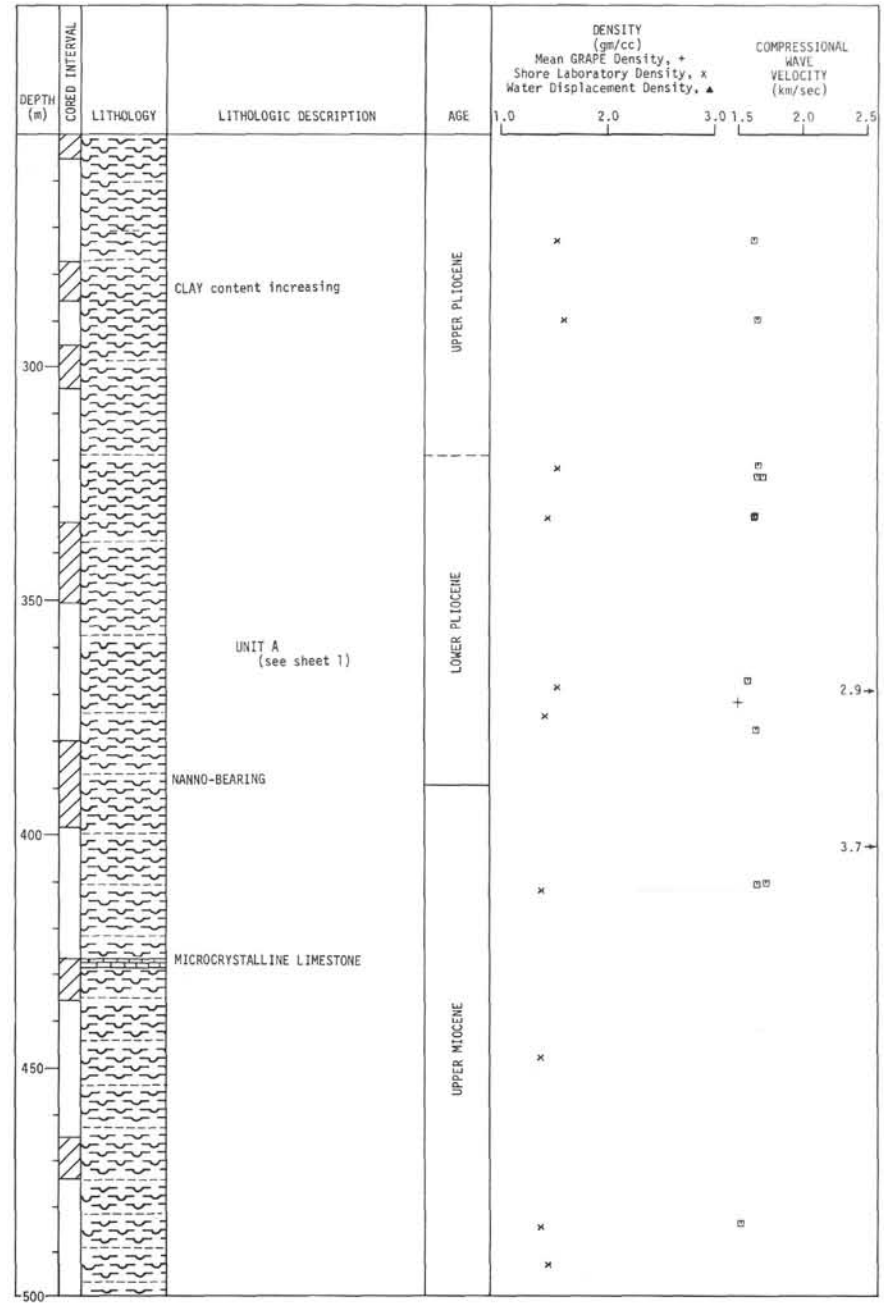


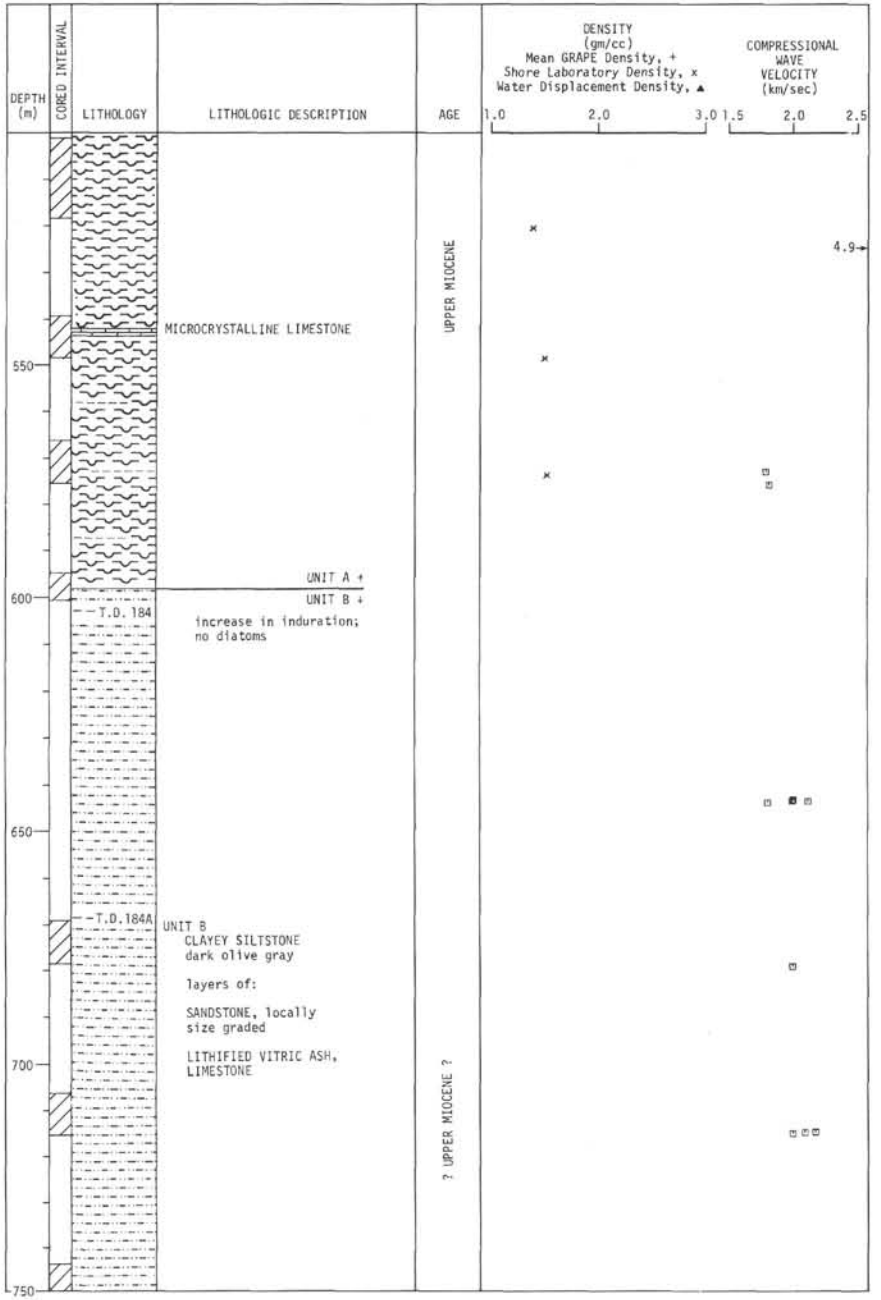
Figure 8. *Correlation of Site 184 seismic reflection profile with physical properties and lithologic column (184B-13-3).*

SITE 184

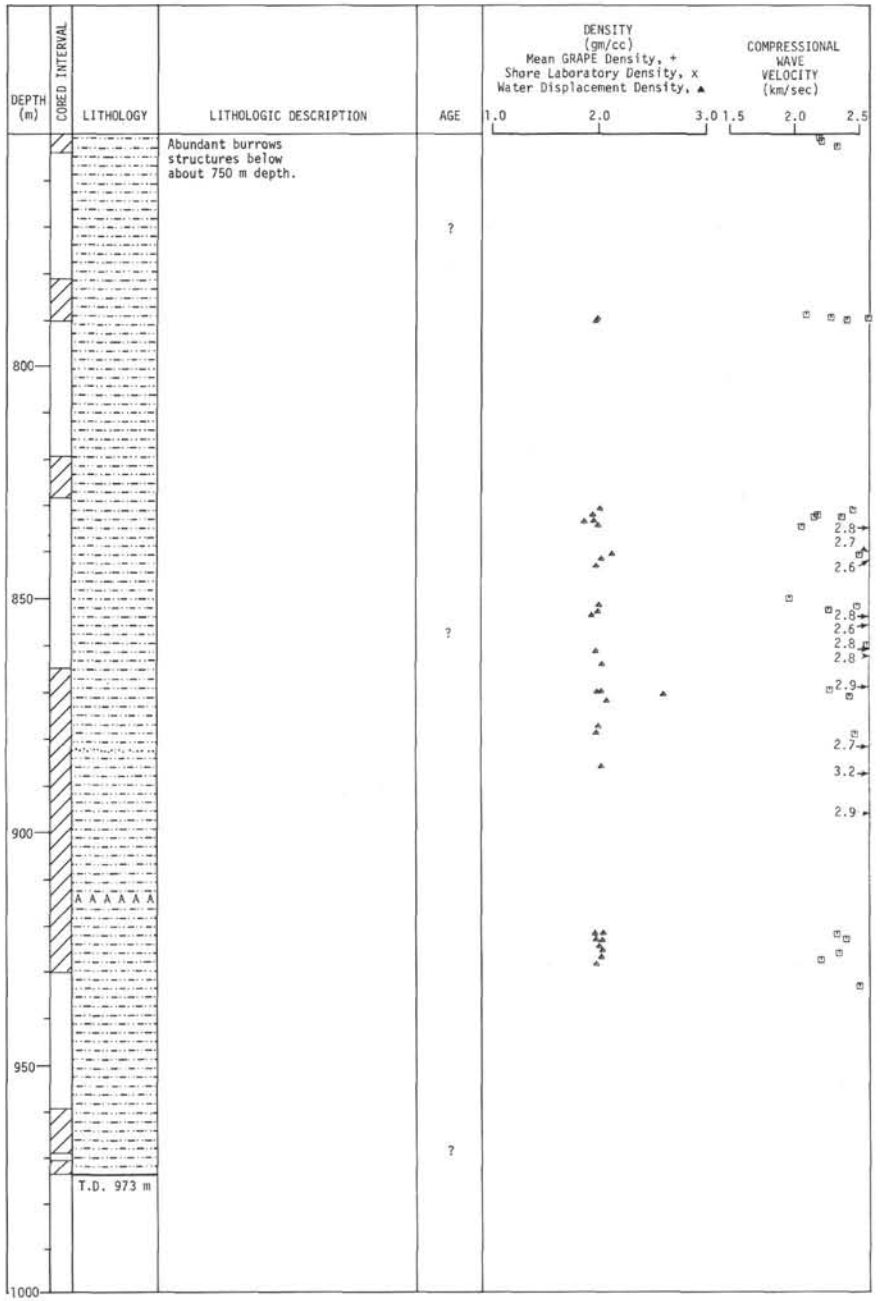


SITE 184

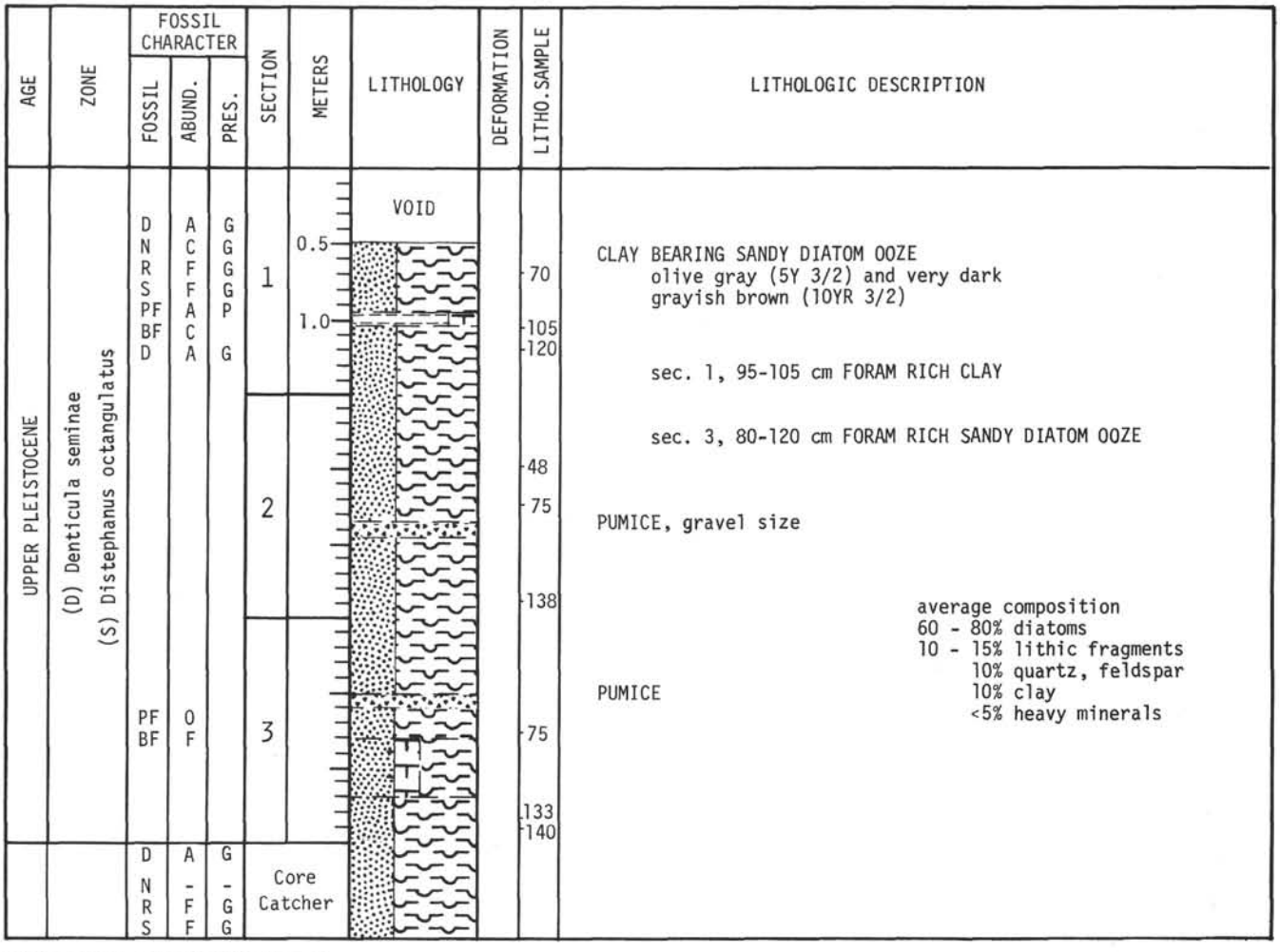



DEPTH (m)
CORED INTERVAL
LITHOLOGY
LITHOLOGIC DESCRIPTION
AGE
DENSITY (gm/cc)
Mean GRAPE Density, +
Shore Laboratory Density, x
Water Displacement Density, ▲
1.0 2.0 3.0
COMPRESSIONAL WAVE VELOCITY (km/sec)
1.5 2.0 2.5
MICROCRYSTALLINE LIMESTONE
UNIT A +
UNIT B +
T.D. 184
increase in induration; no diatoms
T.D. 184A
UNIT B
CLAYEY SILTSTONE
dark olive gray
layers of:
SANDSTONE, locally size graded
LITHIFIED VITRIC ASH, LIMESTONE
UPPER MIOCENE
? UPPER MIOCENE ?
4.9
550
600
650
700
750

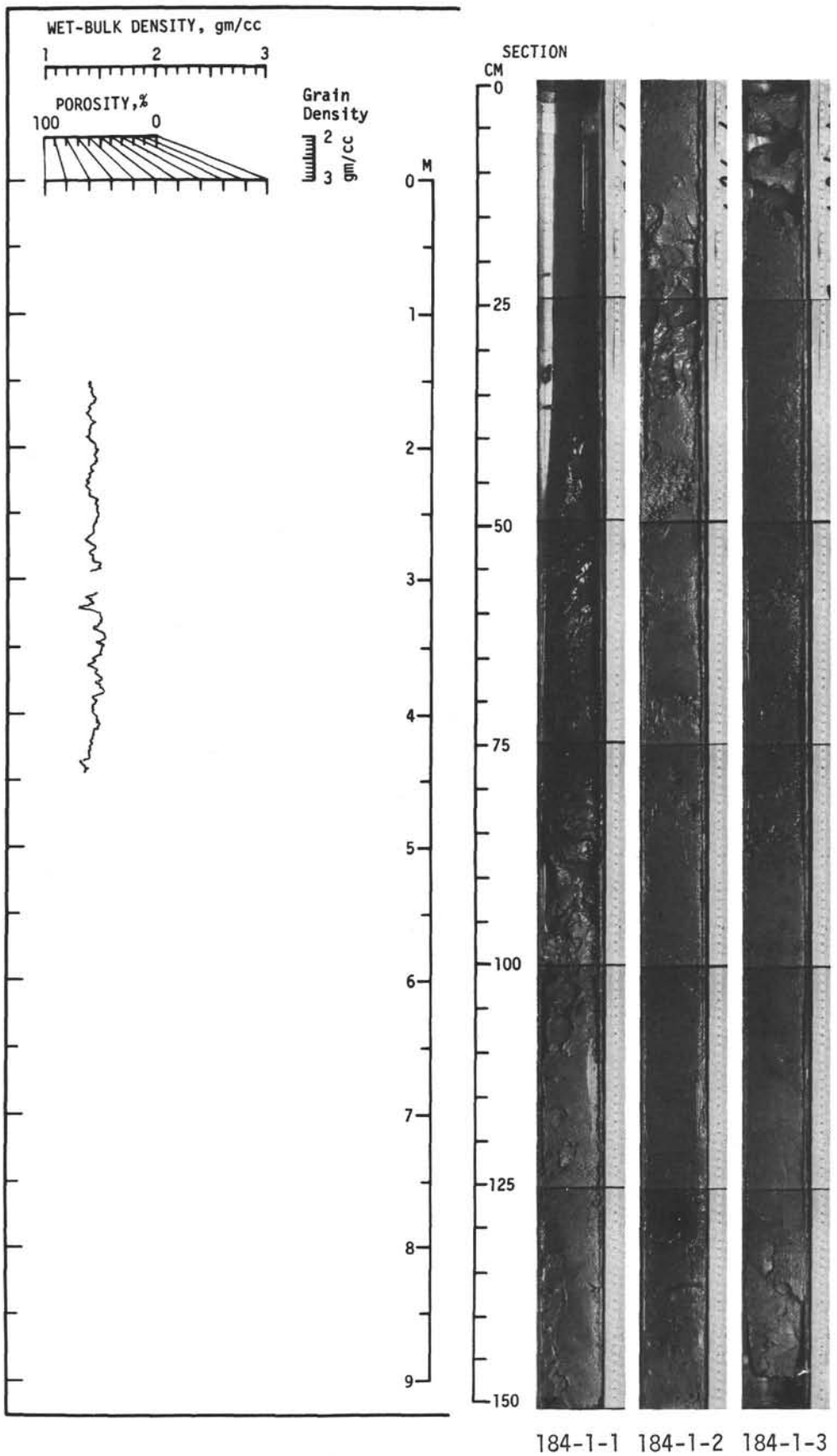
SITE 184


DEPTH (m)
CORED INTERVAL
LITHOLOGY
LITHOLOGIC DESCRIPTION
AGE
DENSITY (gm/cc)
Mean GRAPE Density, +
Shore Laboratory Density, x
Water Displacement Density, ▲
1.0 2.0 3.0
COMPRESSIONAL WAVE VELOCITY (km/sec)
1.5 2.0 2.5
Abundant burrows structures below about 750 m depth.
?
?
?
T.D. 973 m
800
850
900
950
1000
2.8
2.7
2.6
2.8
2.6
2.8
2.8
2.9
2.7
3.2
2.9

Site 184 Hole Core 1 Cored Interval: 0-4

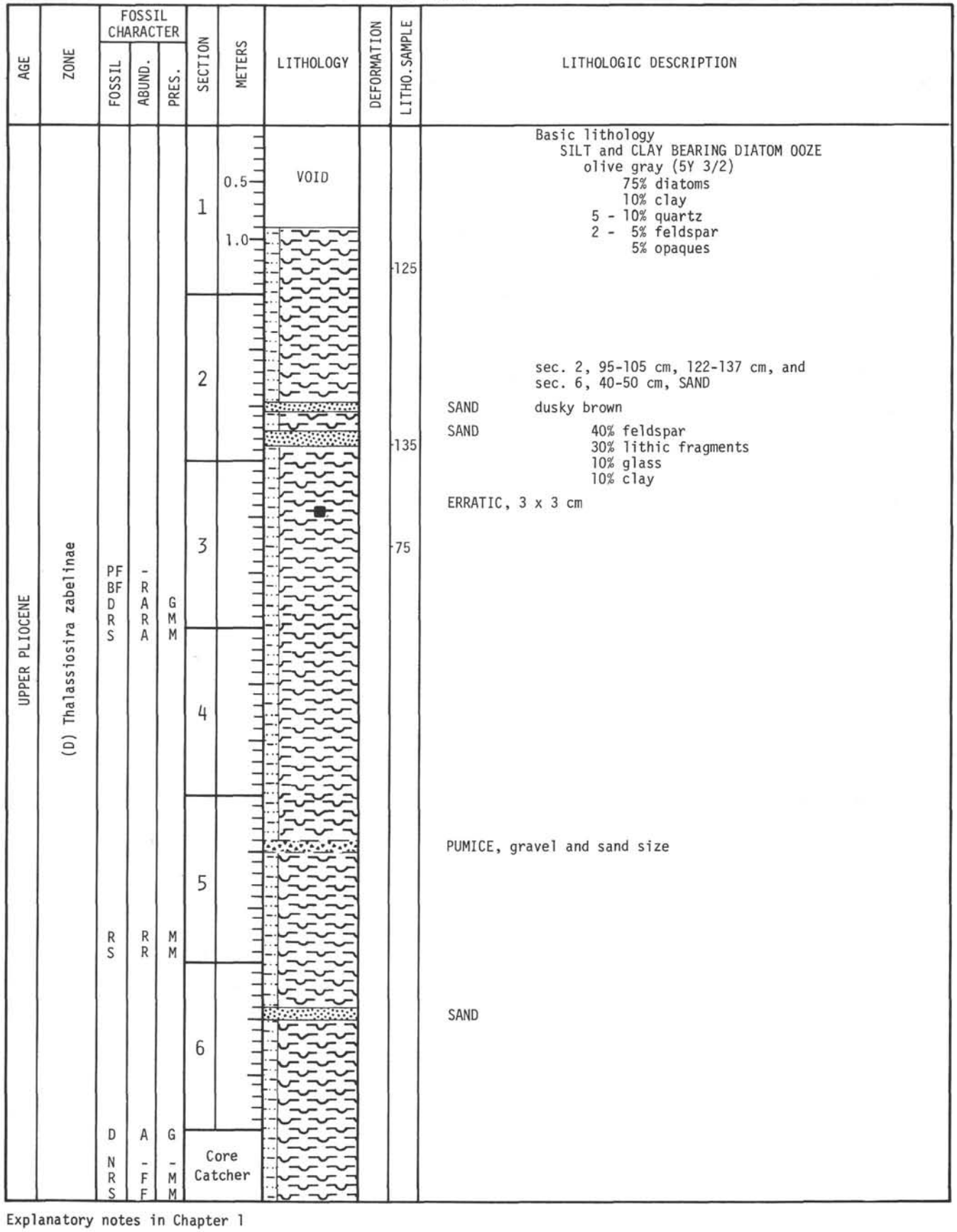


Explanatory notes in Chapter 1

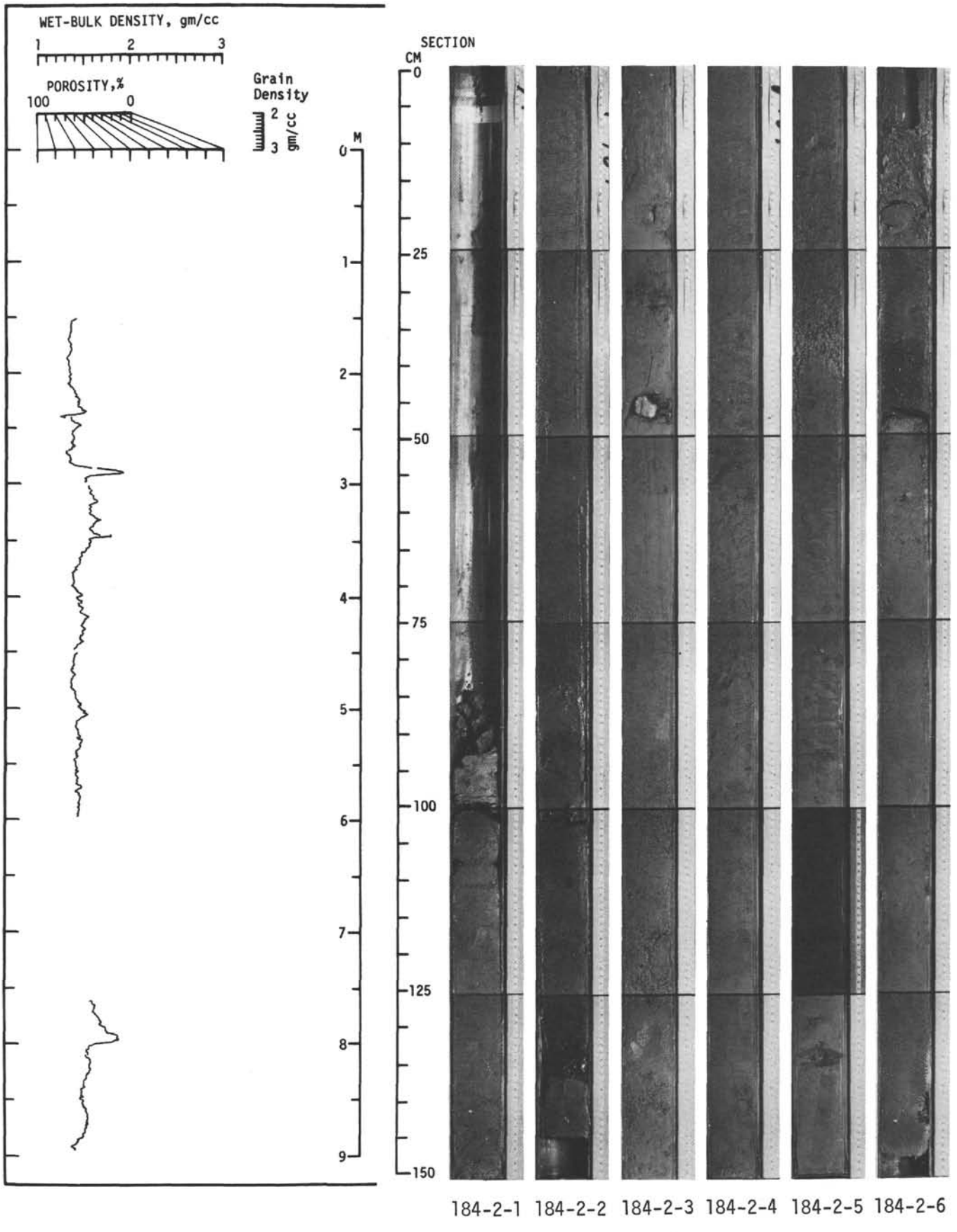

WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9

SECTION
CM
0
25
50
75
100
125
150
184-1-1
184-1-2
184-1-3

Site 184 Hole Core 2 Cored Interval: 128-137



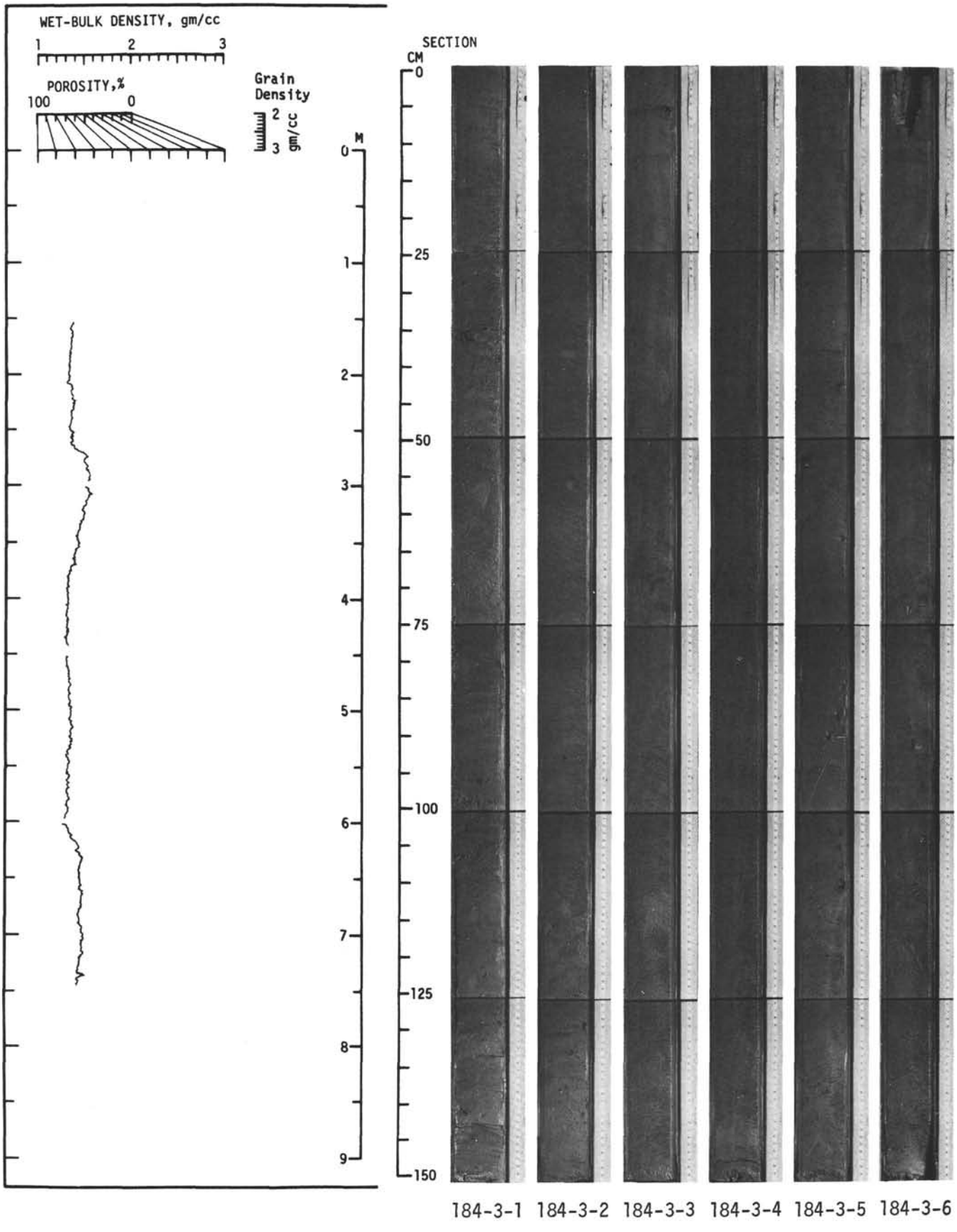
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-2-1
184-2-2
184-2-3
184-2-4
184-2-5
184-2-6

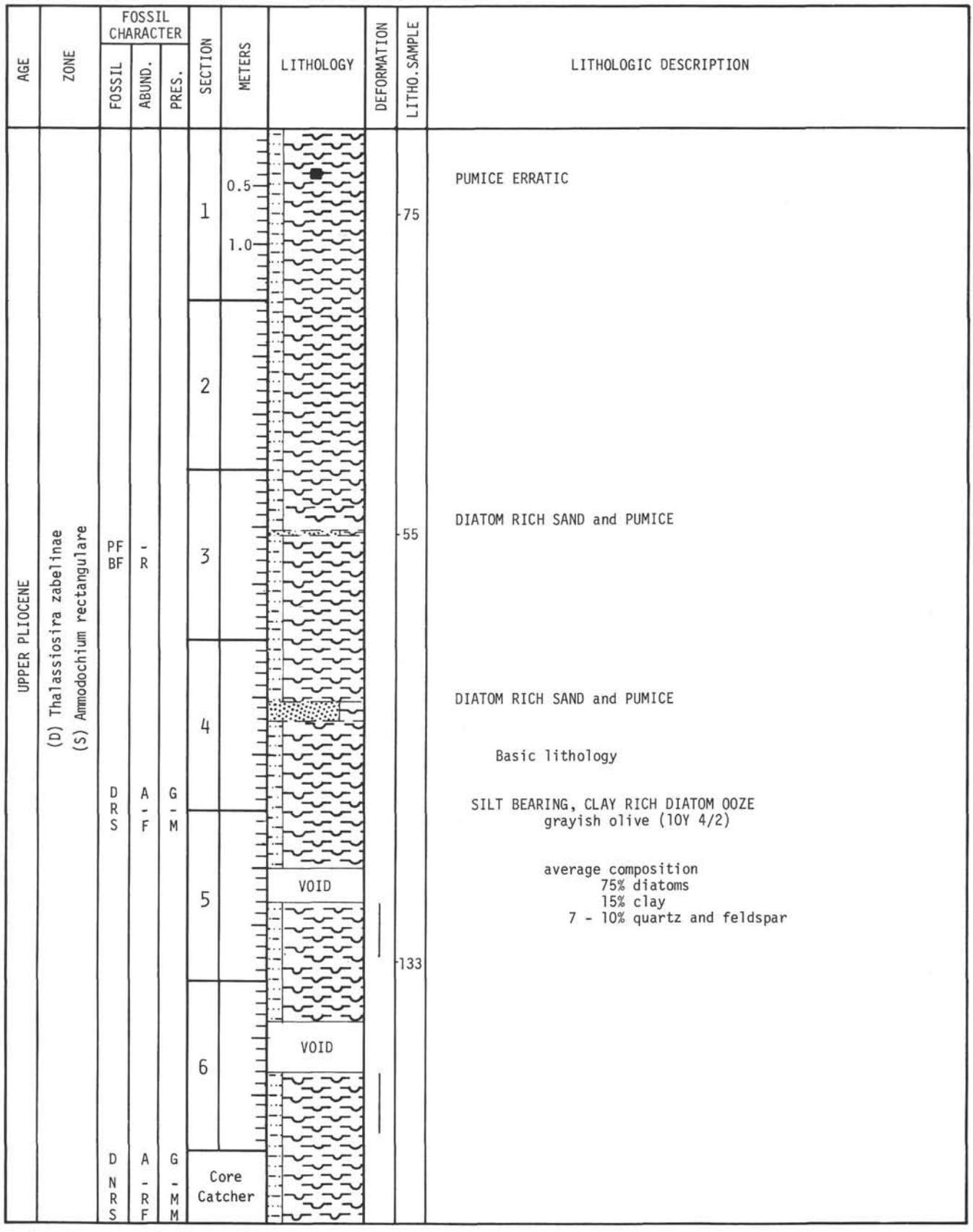
Site 184 Hole Core 3 Cored Interval: 146-155

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER PLIOCENE	(D) Thalassiosira zabelinae (S) Ammodochium rectangulare	N	-	-	1	0.5			30	
						1.0			101	SILT
									140	
					2					
										SILT BEARING, CLAY RICH DIATOM OOZE grayish olive (10Y 4/2)
		PF BF D R S	- R A R A	G M M	3					dark silt admixed 70 - 80% diatoms ~10% quartz, feldspar 10 - 20% clay
					4					core contains scattered rafted erratics and is locally more clay rich (~20% clay)
		R S	R C	M M	5					
					6				75	
		D N R S	A - R F	G - M M	Core Catcher					

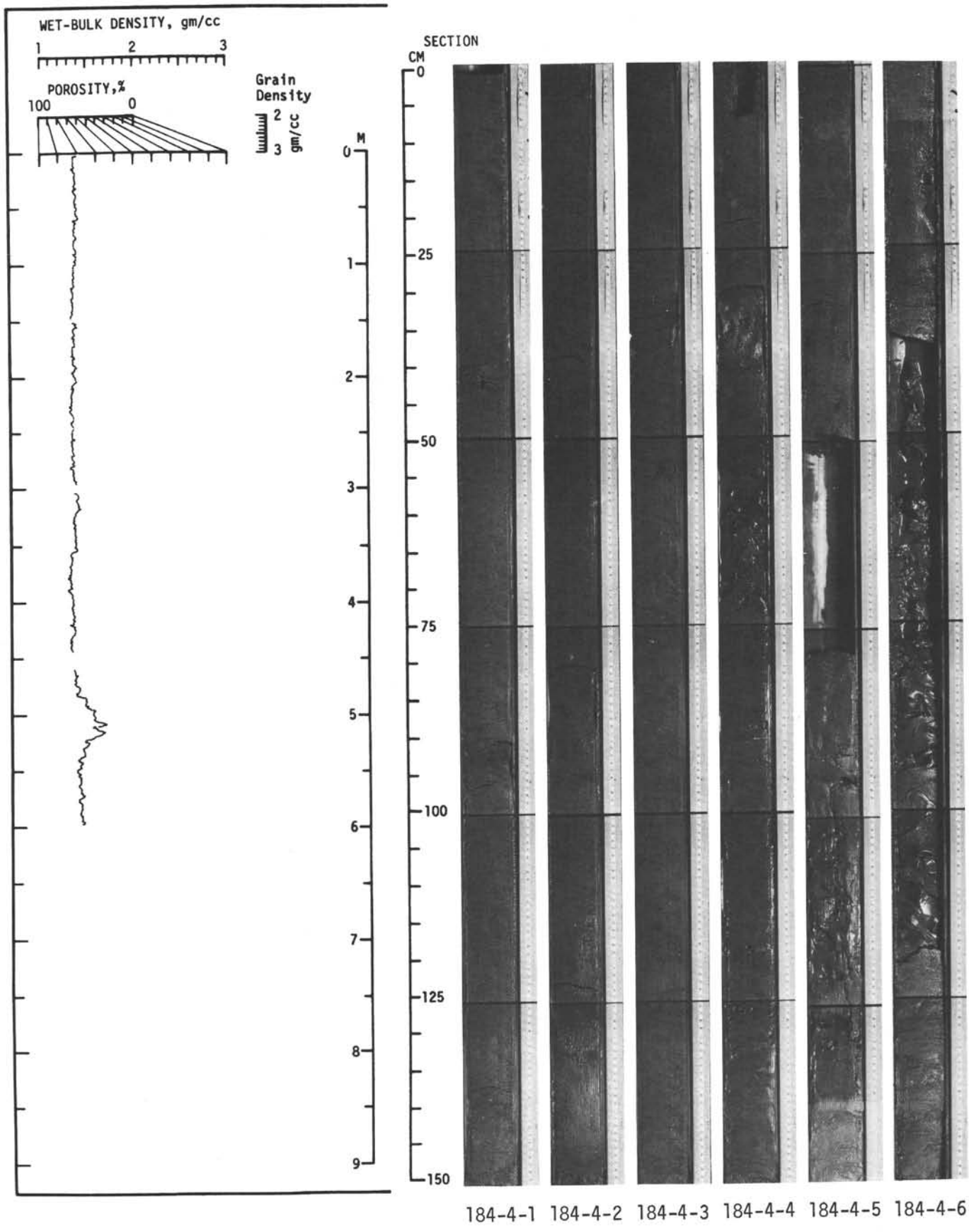
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-3-1
184-3-2
184-3-3
184-3-4
184-3-5
184-3-6

Site 184 Hole 4 Core Cored Interval: 165-174



Explanatory notes in Chapter 1

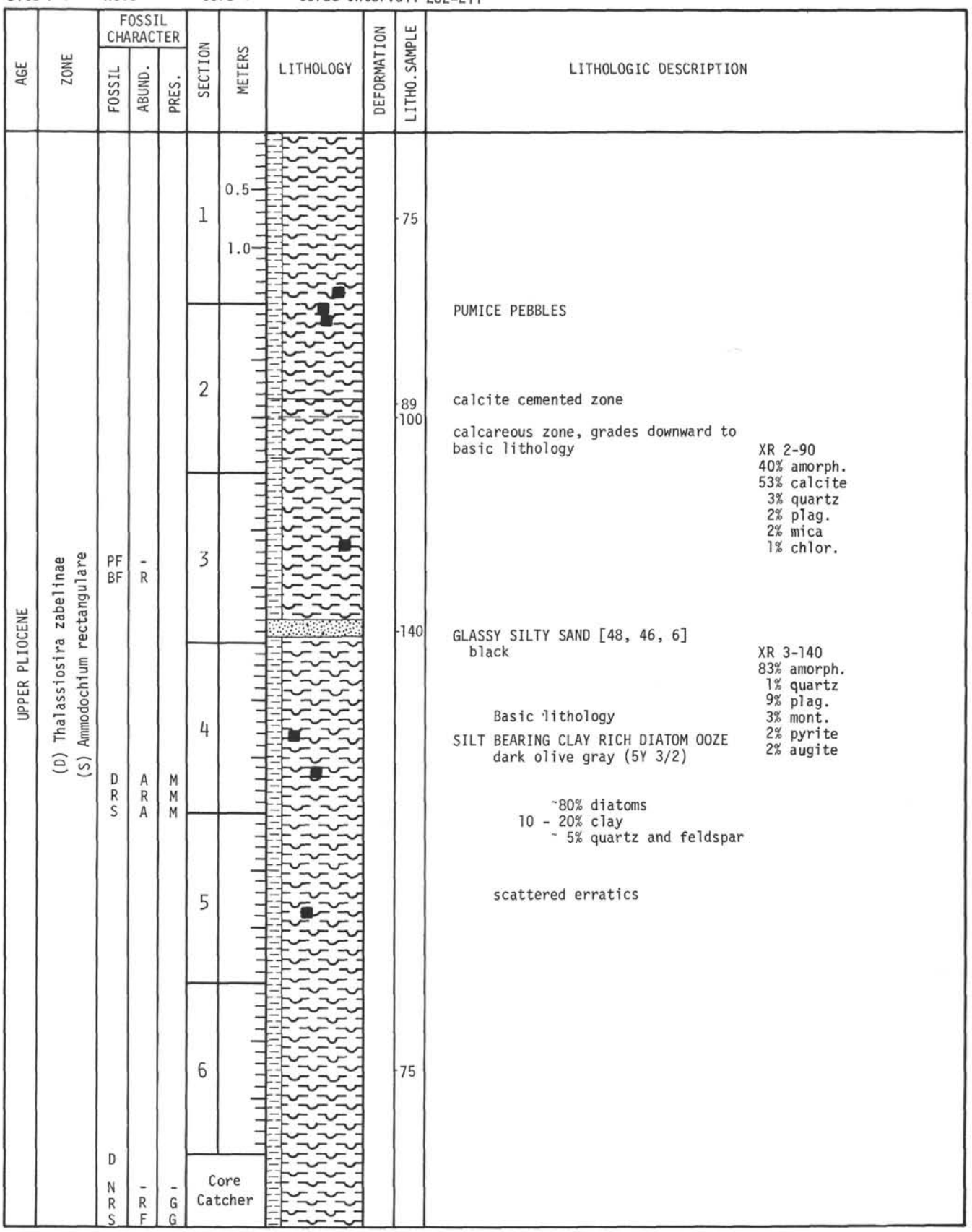

WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-4-1
184-4-2
184-4-3
184-4-4
184-4-5
184-4-6

Site 184 Hole Core 5 Cored Interval: 174-183

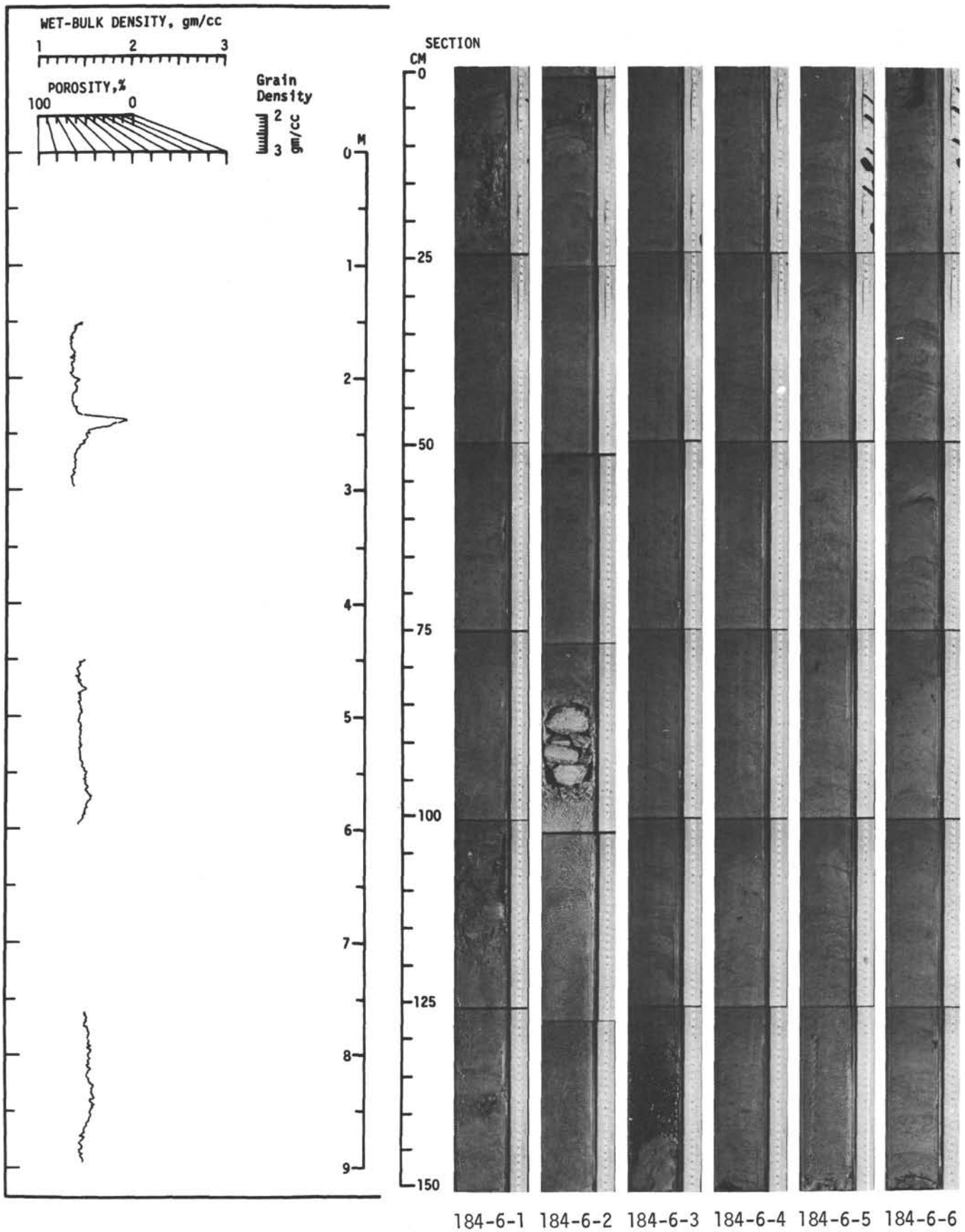
AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER PLIOCENE	(D) Thalassiosira zabelinae (S) Ammodochium rectangulare	D N R S	A - R C	G - G G	Core Catcher					Core Catcher recovery only: DIATOM OOZE grayish olive (10Y 4/2)

Explanatory notes in Chapter 1

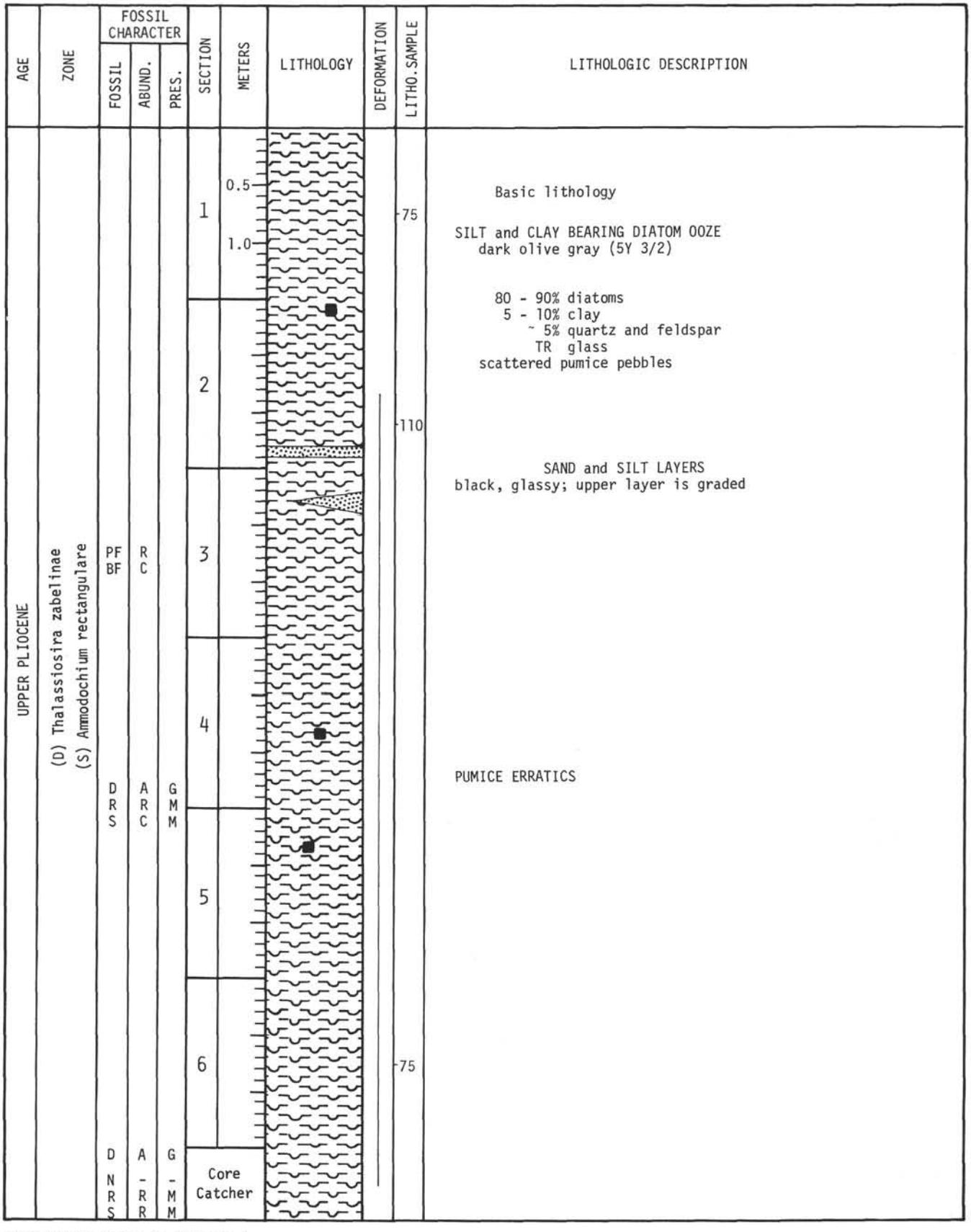
Site 184 Hole Core 6 Cored Interval: 202-211



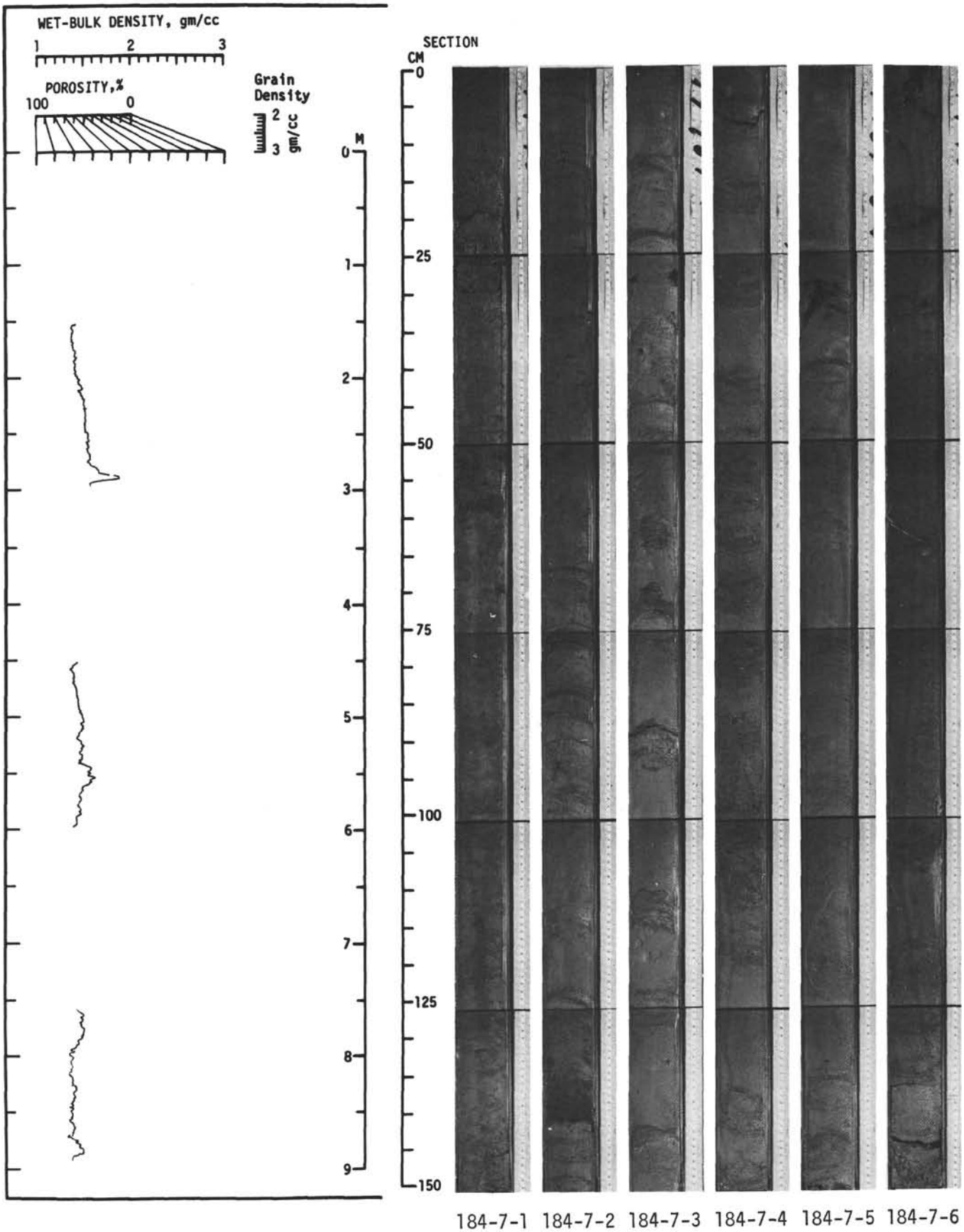
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-6-1
184-6-2
184-6-3
184-6-4
184-6-5
184-6-6

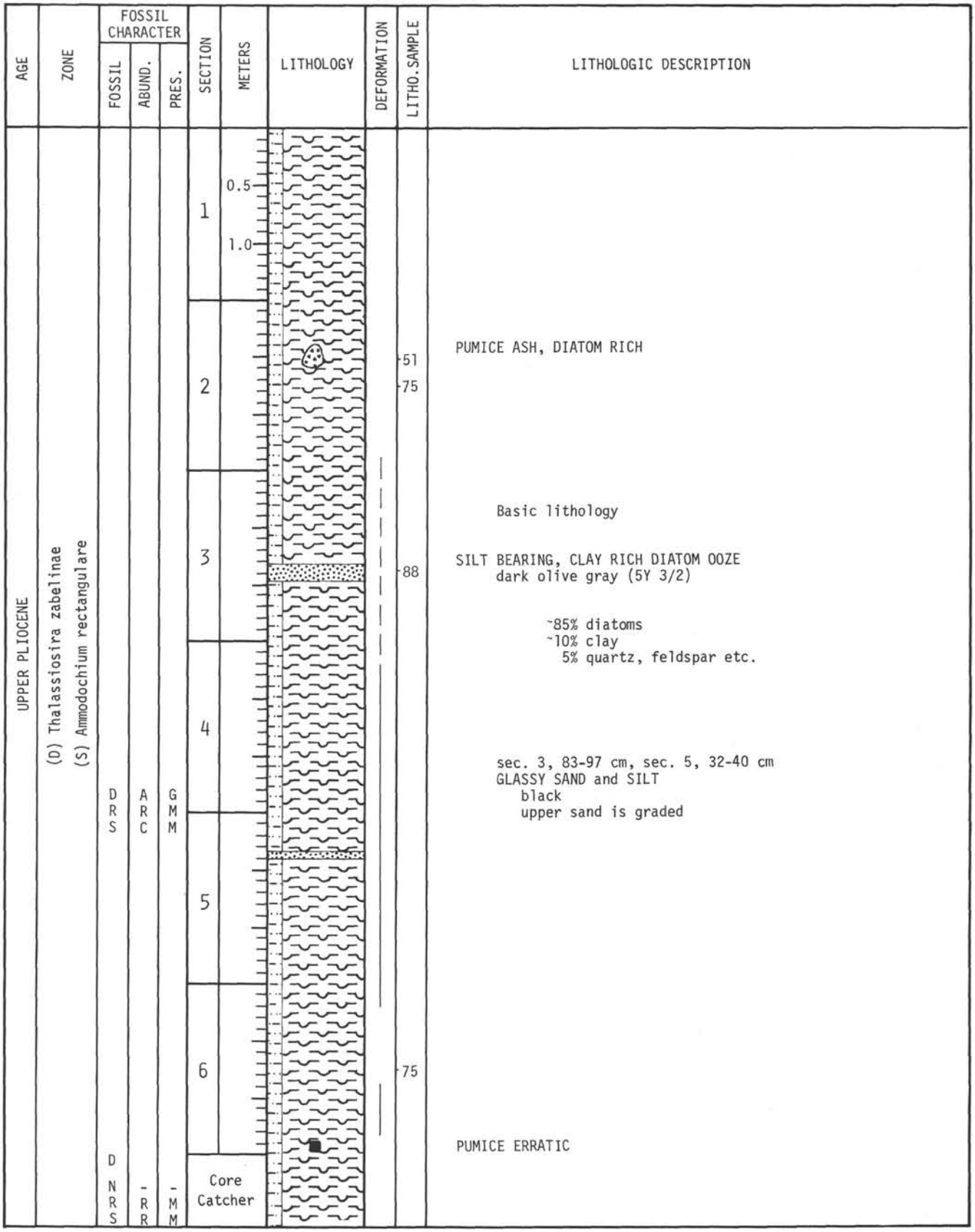
Site 184 Hole Core 7 Cored Interval: 221-230



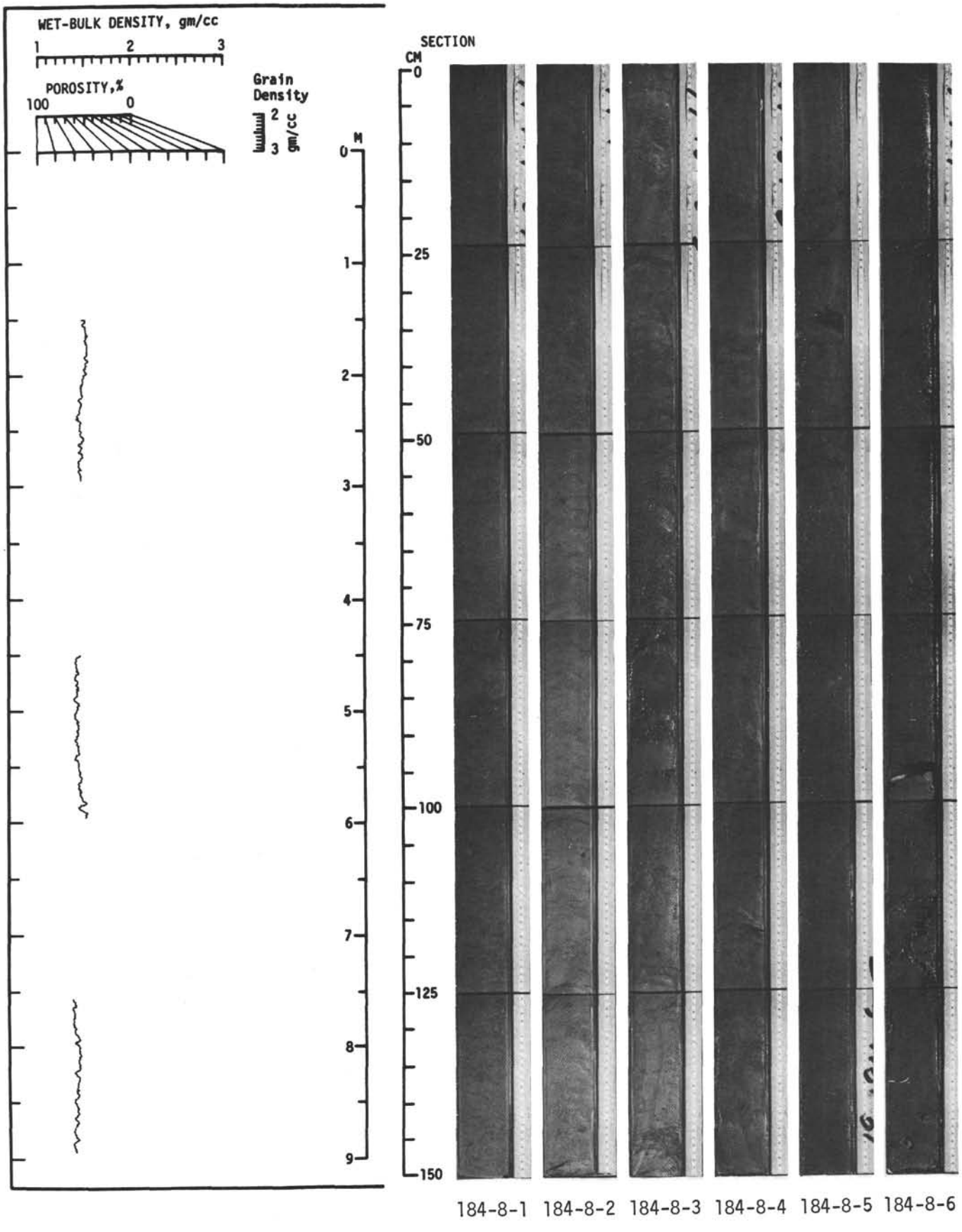
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-7-1
184-7-2
184-7-3
184-7-4
184-7-5
184-7-6

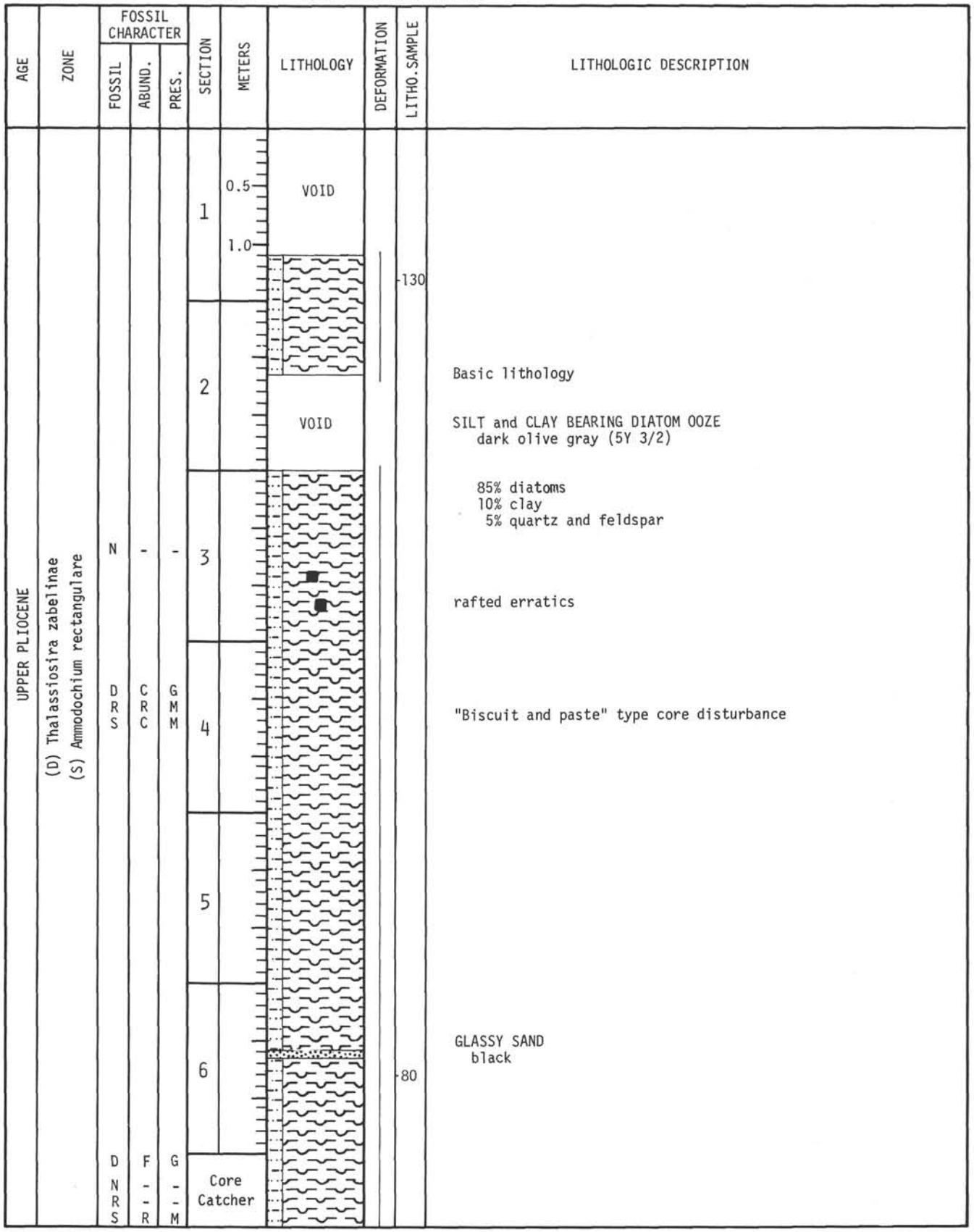
Site 184 Hole Core 8 Cored Interval: 240-249



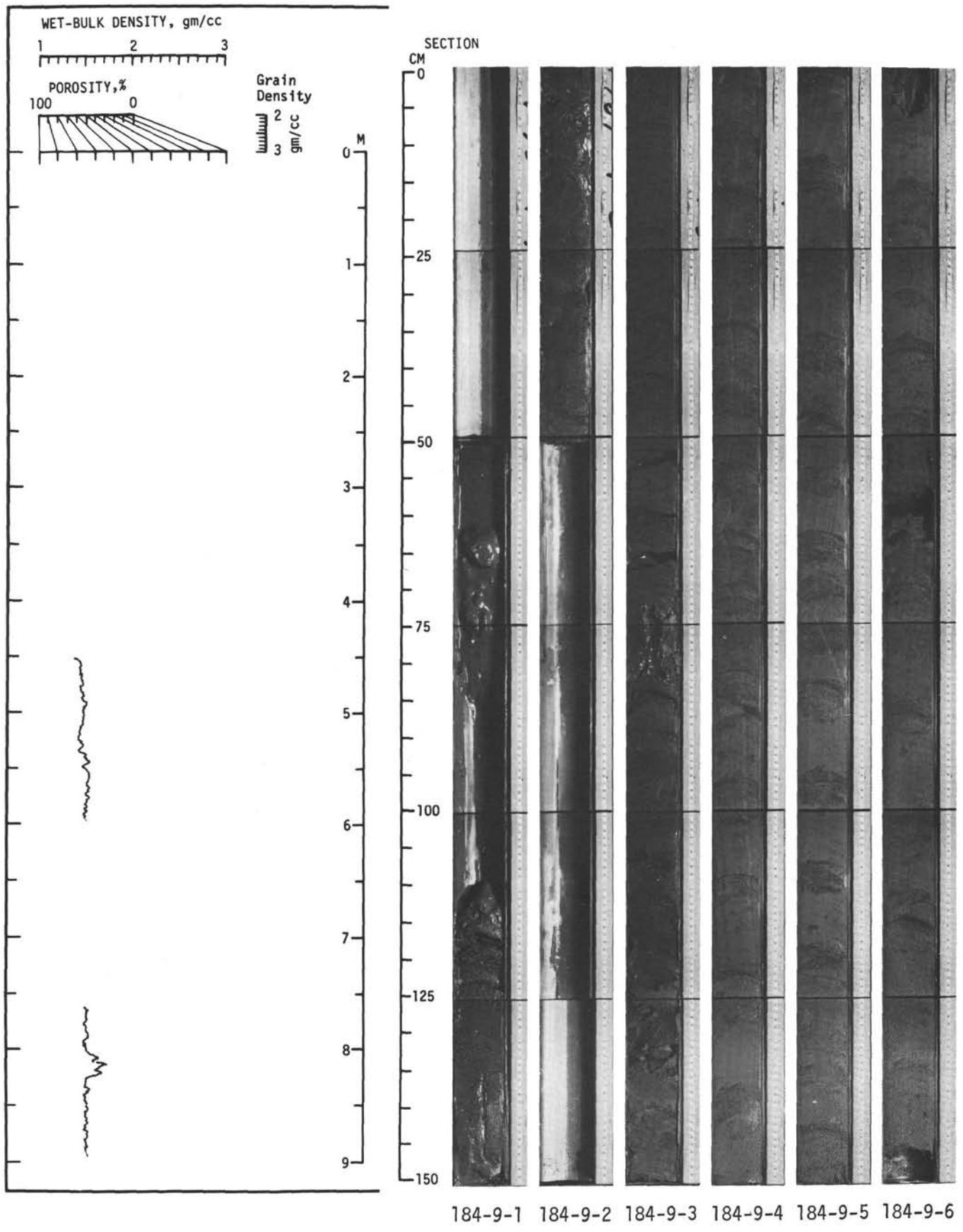
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-8-1
184-8-2
184-8-3
184-8-4
184-8-5
184-8-6

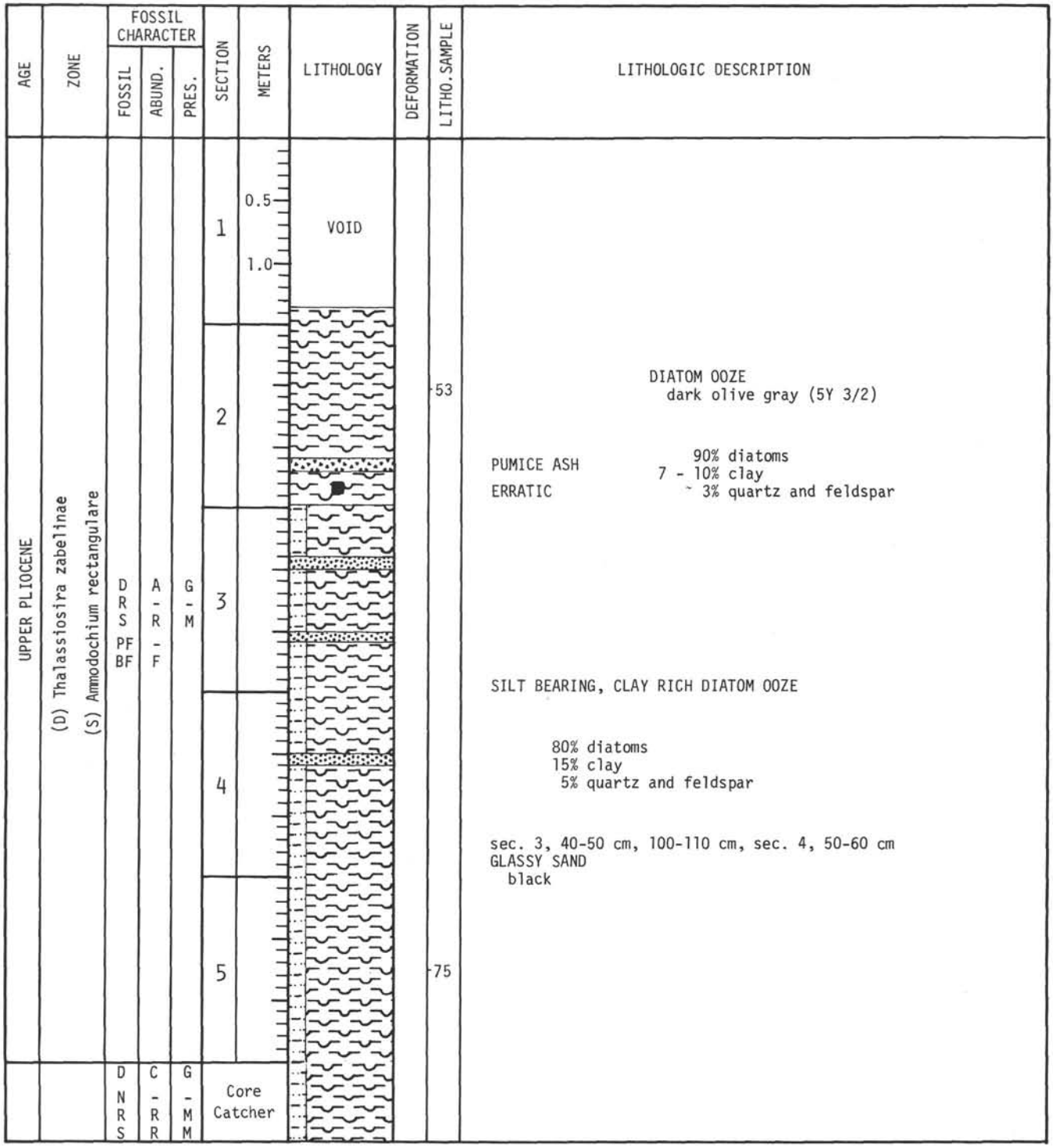
Site 184 Hole Core 9 Cored Interval: 249-256



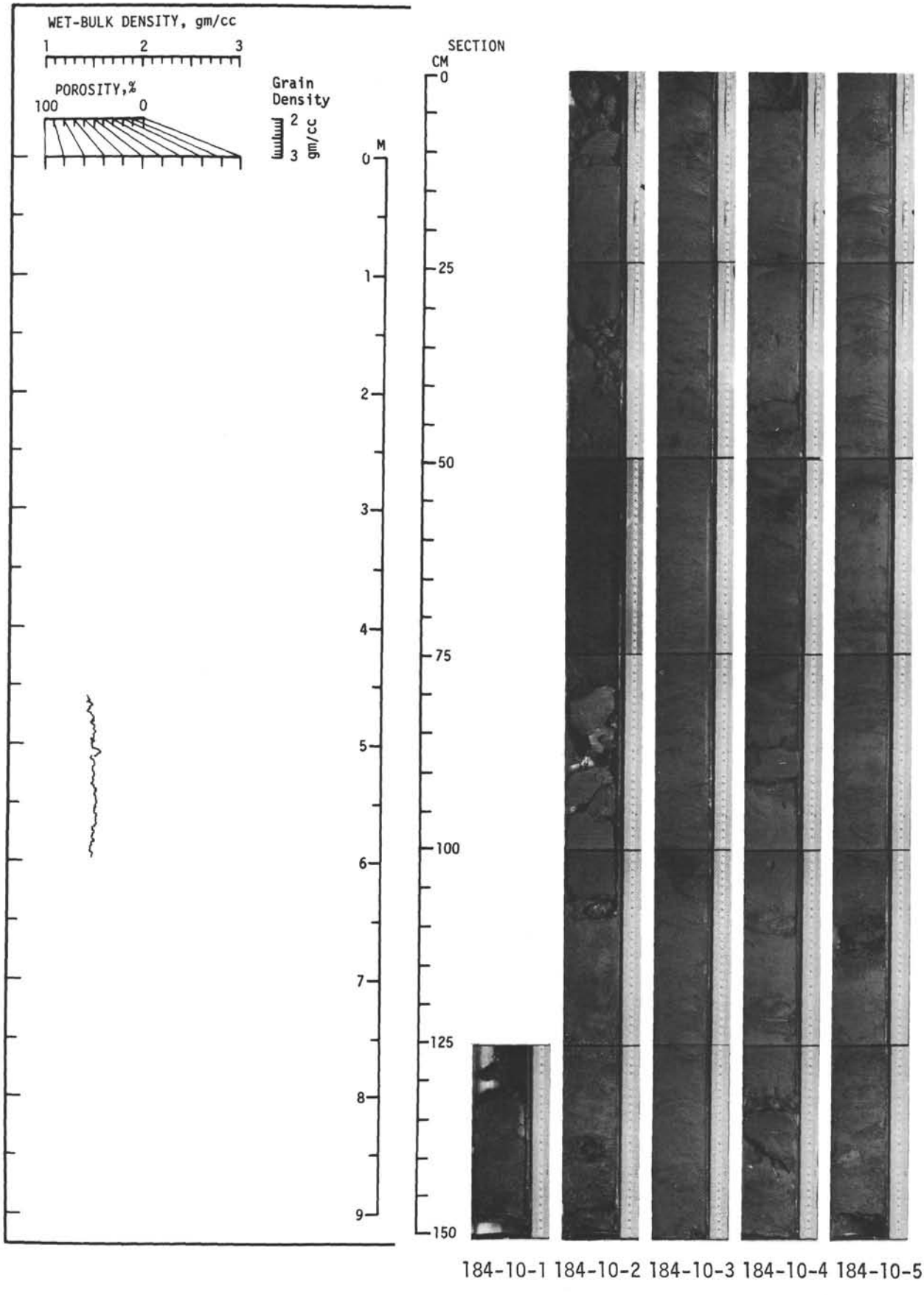
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-9-1
184-9-2
184-9-3
184-9-4
184-9-5
184-9-6

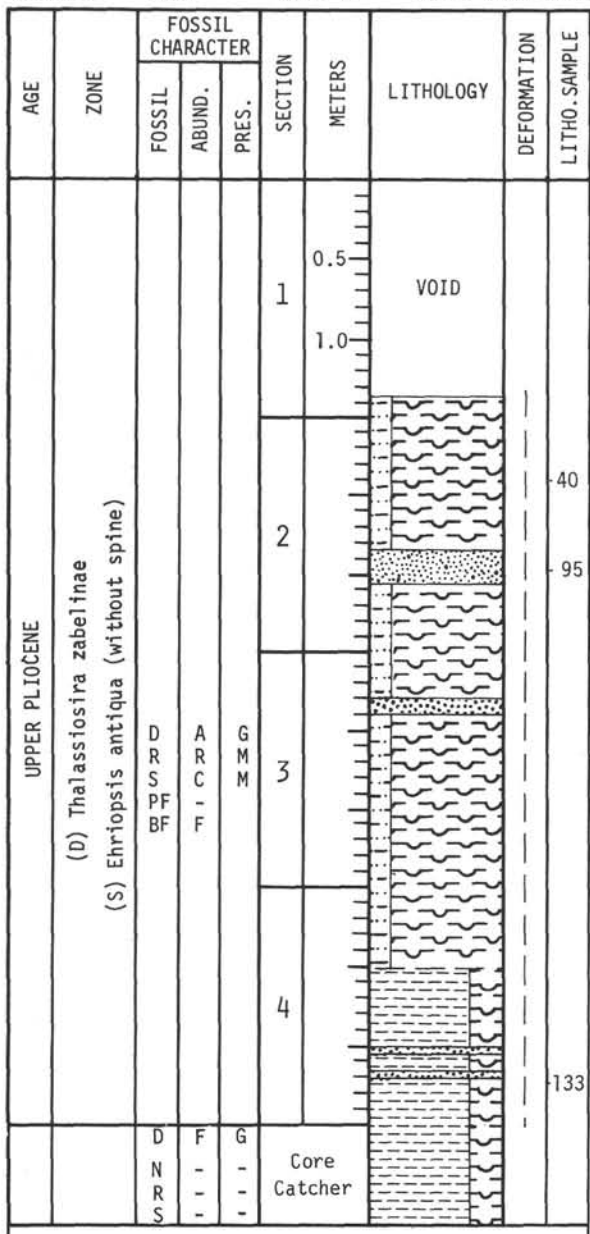
Site 184 Hole Core 10 Cored Interval: 277-286



Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-10-1
184-10-2
184-10-3
184-10-4
184-10-5

Site 184 Hole Core 11 Cored Interval: 296-305



LITHOLOGIC DESCRIPTION

Basic lithology

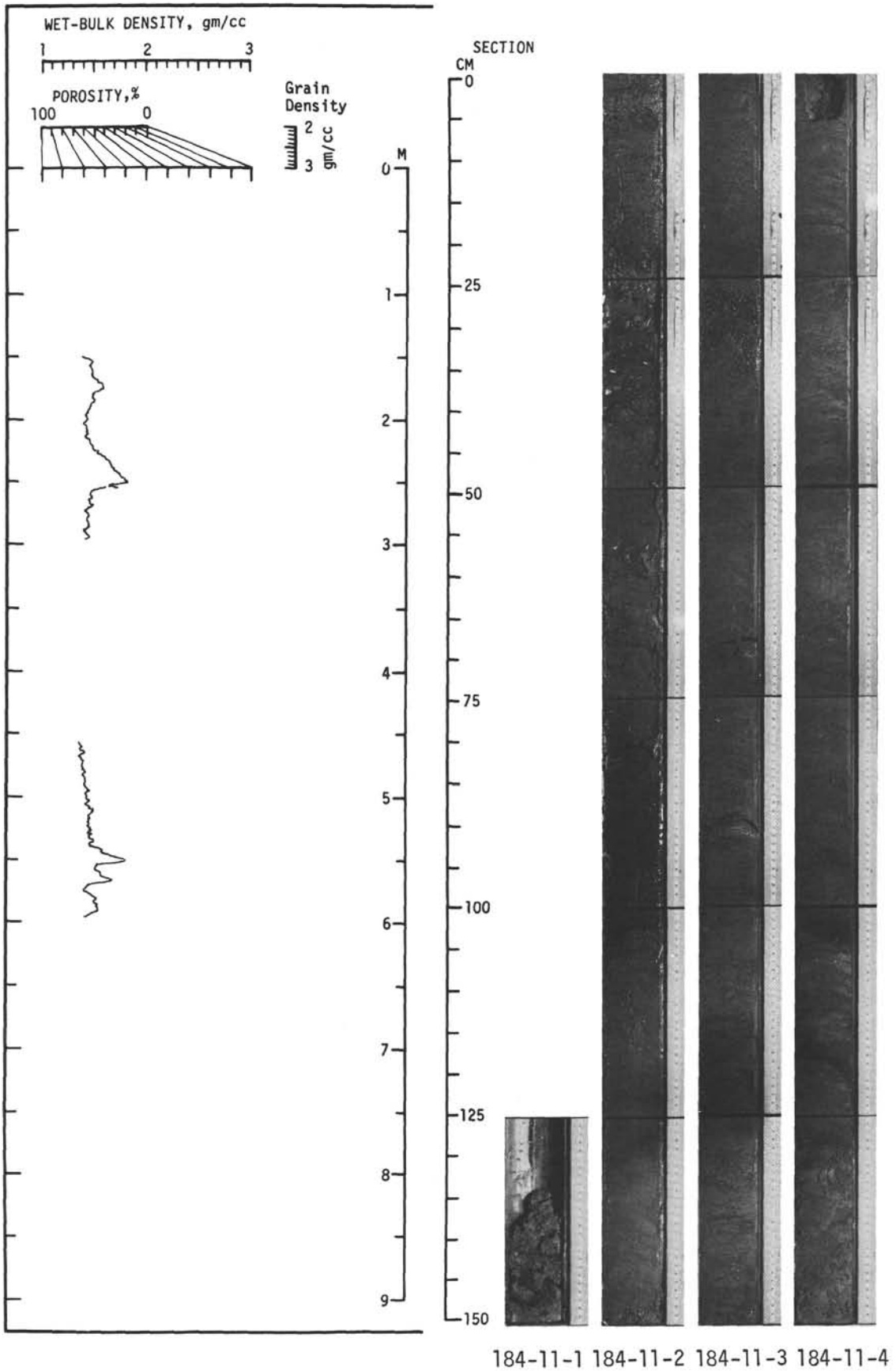
SILT and CLAY BEARING DIATOM OOZE
dark olive gray (5Y 3/2)

85 - 90% diatoms
5 - 10% clay
~ 5% quartz and feldspar

DIATOM RICH CLAY
dark olive gray (5Y 3/2)

sec. 2, 84-106 cm; sec. 3, 30-40 cm;
sec. 4, 100-105 cm, 117-120 cm: layers of
GLASSY SAND and SILT
black
layer in sec. 2 is graded
average composition
~45% glass
30% feldspar
10% quartz
10% clay
2% pyroxene
2% mica, chlorite
1% chert fragments

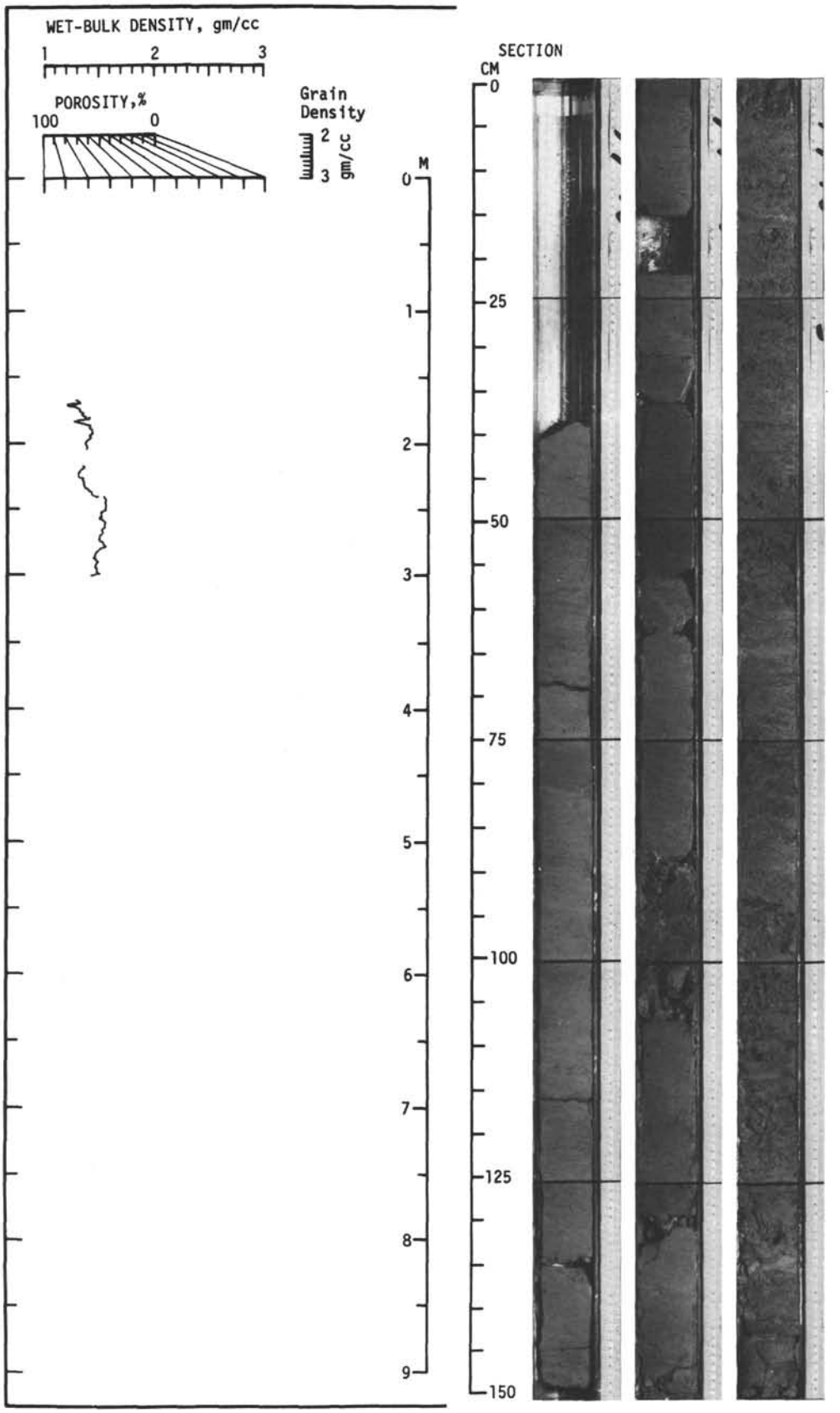
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-11-1
184-11-2
184-11-3
184-11-4

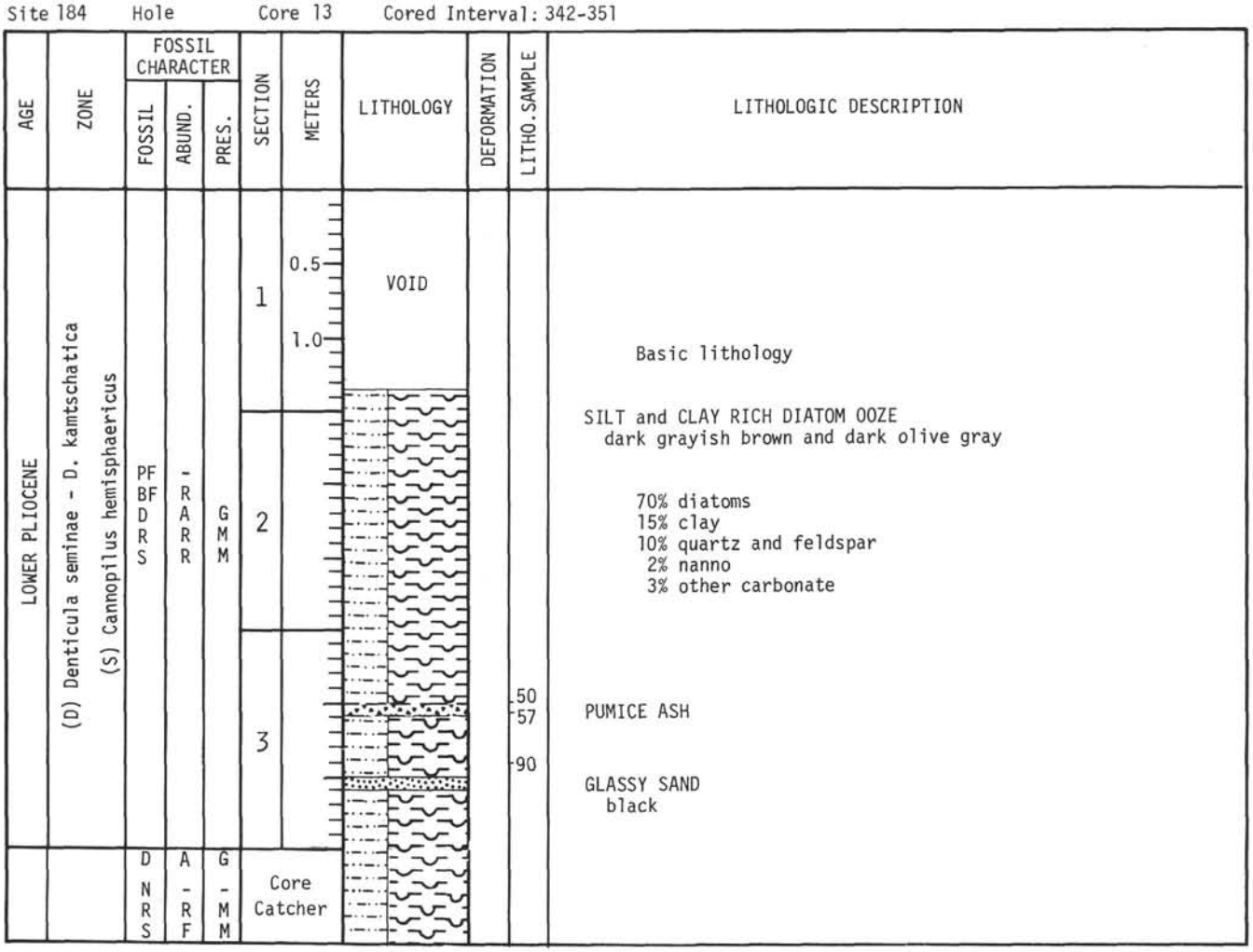
Site 184 Hole Core 12 Cored Interval: 333-342

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LOWER PLIOCENE	(D) Denticula seminae - D. kamtschatica (S) Cannopilus hemisphaericus	R S	R A	M M	1	0.5 – 1.0	VOID		75	Basic lithology SILT and CLAY RICH DIATOM OOZE dark olive gray (5Y 3/2) 55% diatoms 25% clay 10% feldspar 5% quartz 5% heavy minerals, opaques slight increase in clay content toward bottom of core.
		PF BF D R S	- F A R R	G M M	2				75	
		R S	R F	M M	3				75	VITRIC ASH XR 3-50 79% amorph. 6% quartz 6% plag. 4% mica 1% chlor. 5% mont.
									133	PUMICE ERRATIC
		D N R S	C - R F	G - M M	Core Catcher					

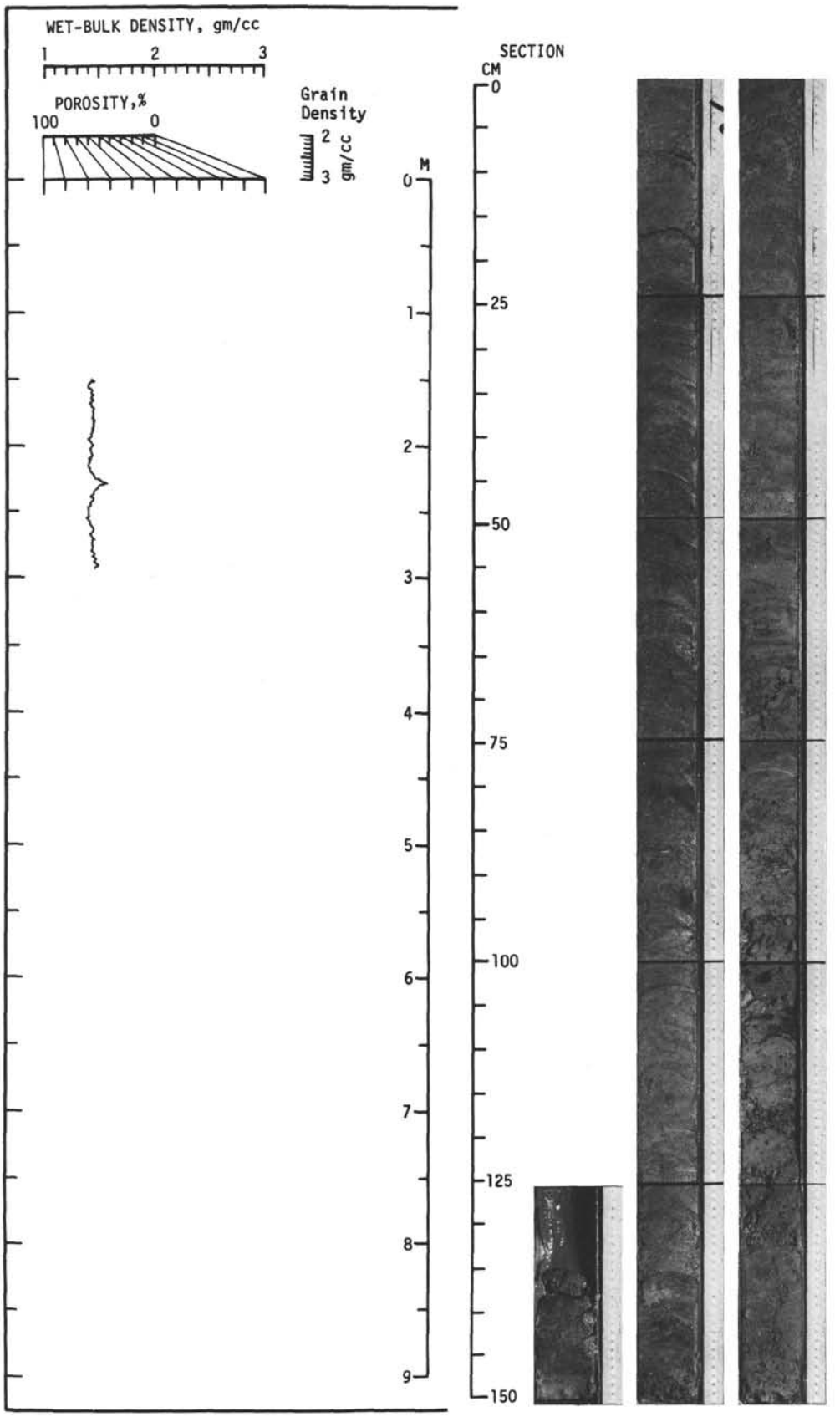
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-12-1
184-12-2
184-12-3

Site 184 Hole Core 13 Cored Interval: 342-351



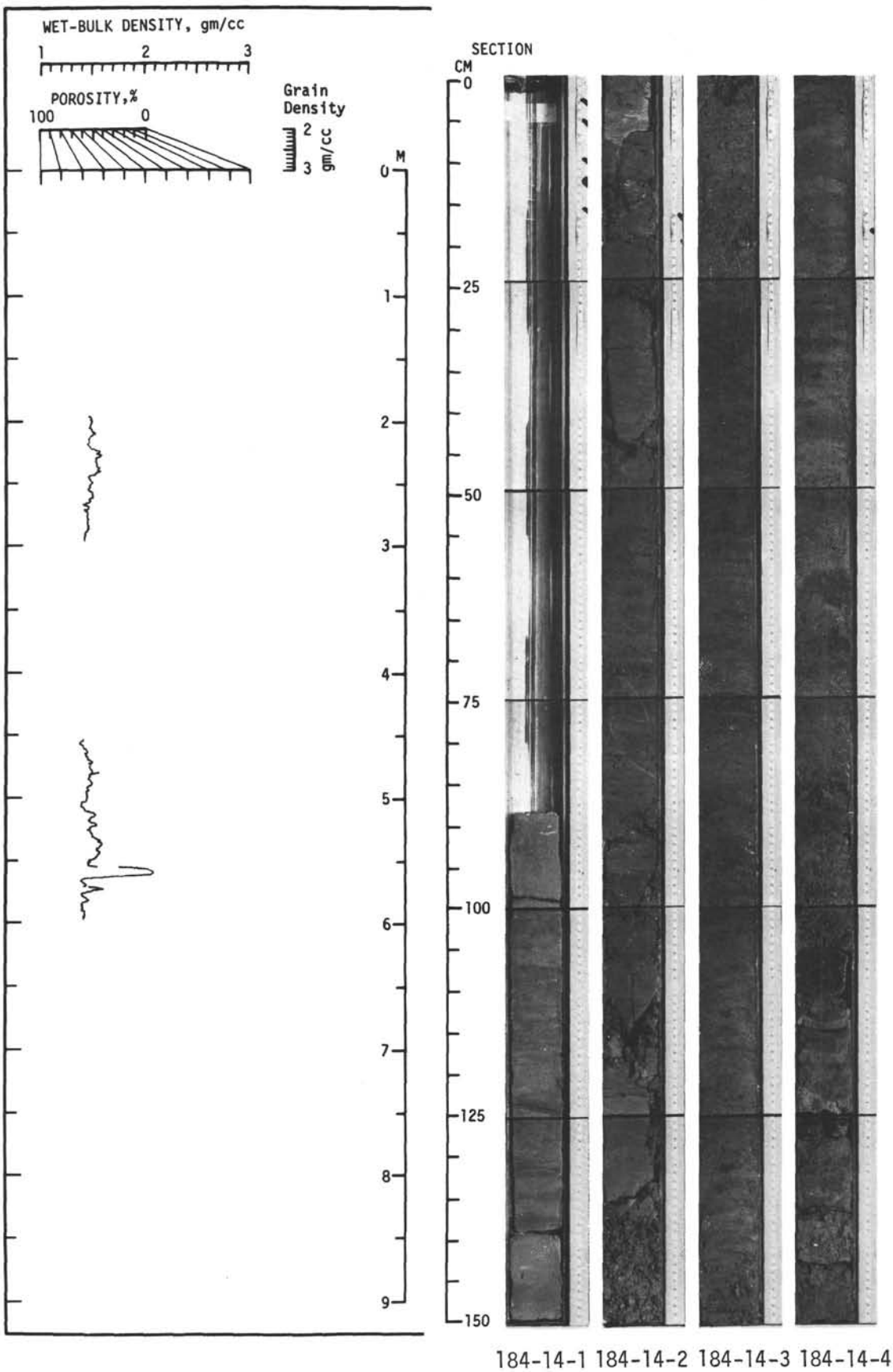
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain
Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-13-1
184-13-2
184-13-3

Site 184 Hole Core 14 Cored Interval: 380-389

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LOWER PLIOCENE	(D) Denticula seminae - D. kamtschatica (S) Cannopilus hemisphaericus				1	0.5	VOID			
		N	-	-		1.0			130	
		N	-	-	2					PUMICE ERRATIC Basic lithology CLAY RICH DIATOM OOZE dark olive gray (5Y 3/2)
		R S	R C	M M	3				75	VITRIC ASH section 4, 50-83 cm and 107-150 NANNO BEARING CLAY RICH DIATOM OOZE dark grayish brown
		PF BF	C R	M	4				55	
		N	R	M					118 126	ASH, black, calcite cemented
		D N R S	A - R F	G - M M	Core Catcher					

Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150
184-14-1
184-14-2
184-14-3
184-14-4

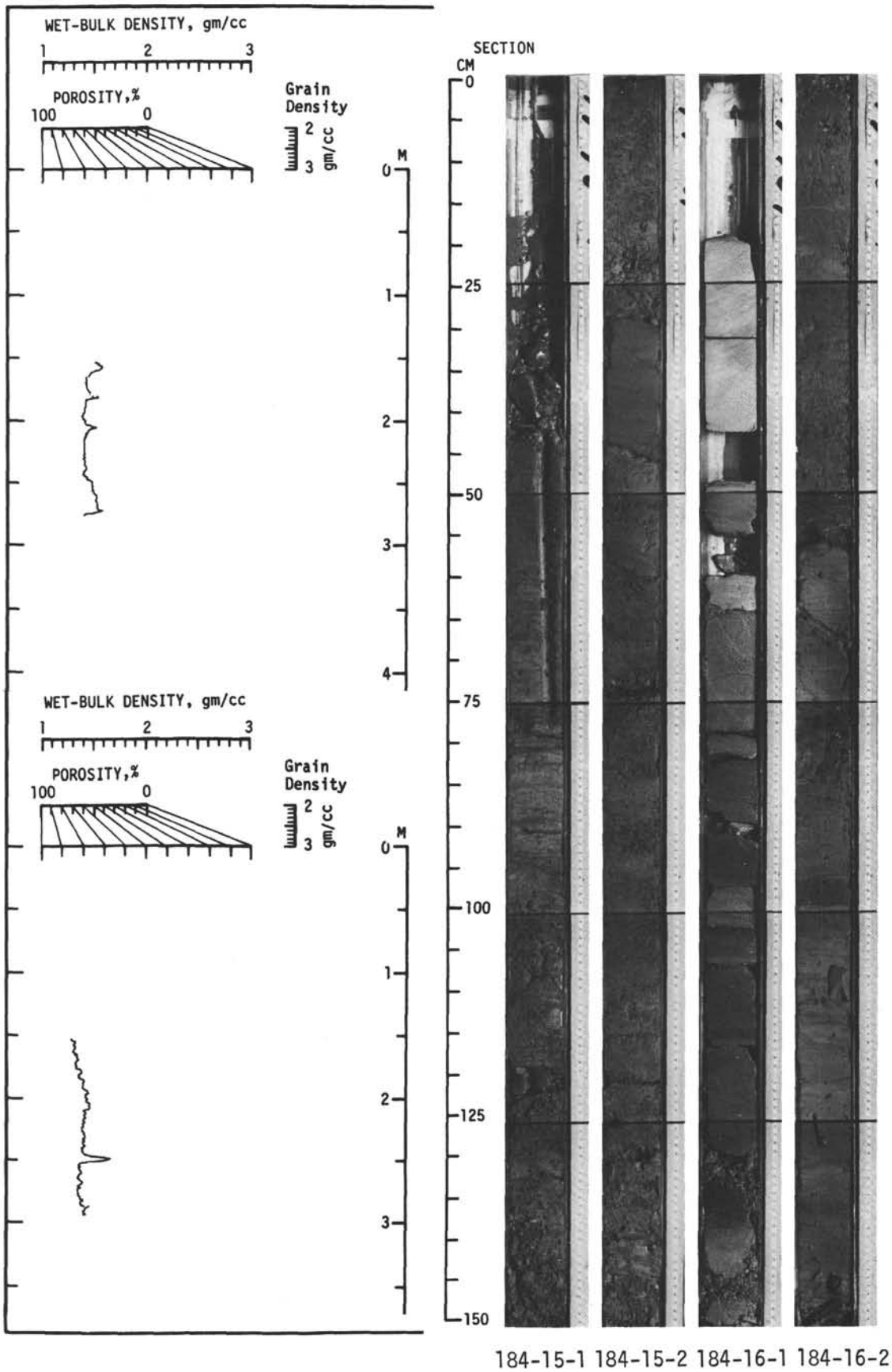
Site 184 Hole Core 15 Cored Interval: 389-398

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	(D) Denticula kamtschatica	R S	R C	M M	1	0.5 1.0	VOID		90	Basic lithology SILT and CLAY RICH DIATOM OOZE dark olive gray (5Y 3/2) average composition 65 - 70% diatoms 15 - 25% clay ~10% quartz and feldspar
					2				10 35 77	sec. 2, 60-82 cm CLAYEY DIATOM OOZE Core Catcher: D C G F N - - R R M S R M
					Core Catcher					

Site 184 Hole Core 16 Cored Interval: 427-436

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	(D) Denticula kamtschatica	N PF BF R S	R C C R F	M M M M M	1	0.5 1.0	VOID		40 70 110 134	LIMESTONE contains diatom fragments olive gray (5Y 5/2) Basic lithology CLAY RICH DIATOM OOZE olive gray and dark olive gray (5Y 4/2 - 5Y 3/2)
					2				20 97	sec. 1, 103-150 ±cm: CLAY BEARING DIATOM OOZE dark grayish brown (2.5Y 4/2) to olive gray (5Y 4/2) VITRIC ASH
		D N R S	A - R R	G - M M	Core Catcher					

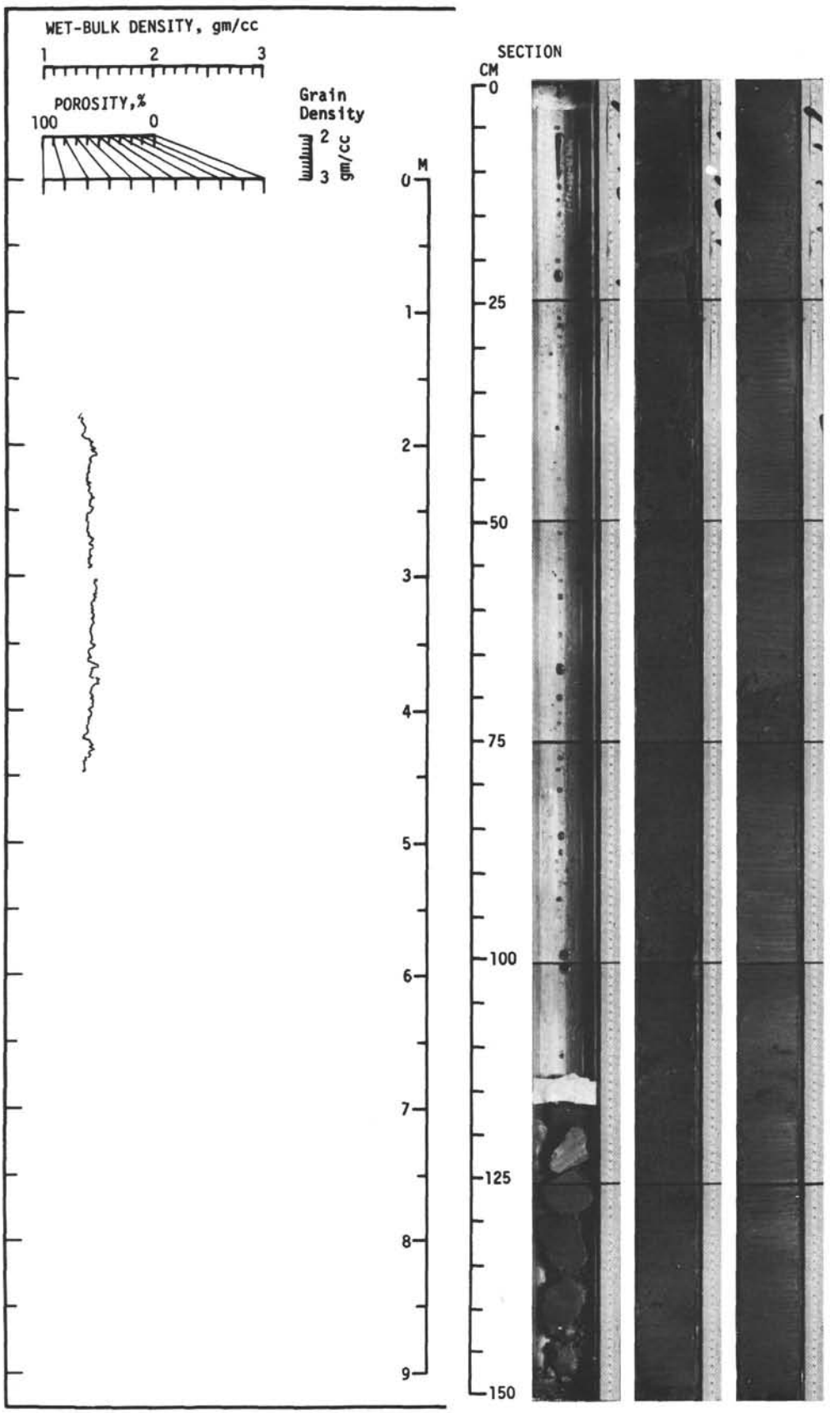
Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
4
WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain Density
2
3
gm/cc
M
0
1
2
3
SECTION
CM
0
25
50
75
100
125
150
184-15-1
184-15-2
184-16-1
184-16-2

Site 184 Hole Core 17 Cored Interval: 464-473

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	(D) Denticula kamtschatica (S) Cannopilus hemisphaericus	D R S	A F F	G M M	1	0.5 1.0	VOID			
					2				83	SILT BEARING CLAY RICH DIATOM OOZE dark olive gray (5Y 3/2) average composition 80% diatoms 15% clay 5% quartz and feldspar
		R S	R R	M M	3				71	sec. 3 - color grades downwards to olive gray (5Y 4/2)
	*	D N R S	A - R F	G - M M	Core Catcher					

Explanatory notes in Chapter 1 *(S) Distephanus speculum var. pentagonus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184-17-1
184-17-2
184-17-3

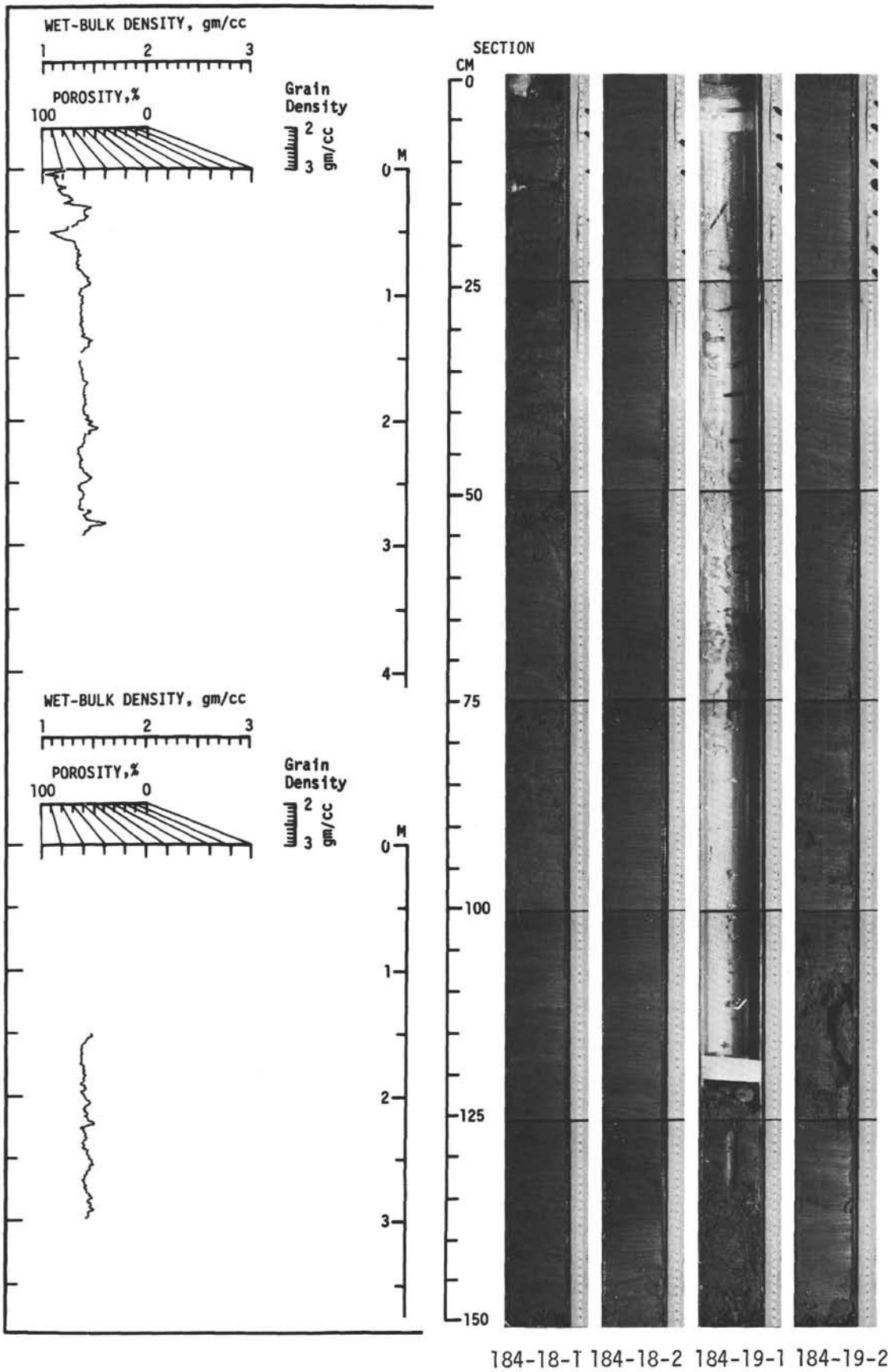
Site 184 Hole Core 18 Cored Interval: 502-511

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	(D) Denticula kamtschatica (S) Distephanus speculum var. pentagonus	D R S PF BF	- R C - R	- M M	1	0.5 1.0			40 85	GLASSY SAND SILT BEARING CLAY RICH DIATOM OOZE olive gray and dark olive gray (5Y 4/2 - 5Y 3/2)
					2				131	SAND, black
		D N R S	A - R F	G - M M	Core Catcher					

Site 184 Hole Core 19 Cored Interval: 511-518

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	(D) Denticula kamtschatica (S) Distephanus speculum var. pentagonus				1	0.5 1.0	VOID			
					2				80	SILT BEARING CLAY RICH DIATOM OOZE dark olive gray (5Y 3/2) average composition ~80% diatoms ~15% clay 5% quartz and feldspar
		D N R S	A - R F	G - M M	Core Catcher					

Explanatory notes in Chapter 1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SECTION
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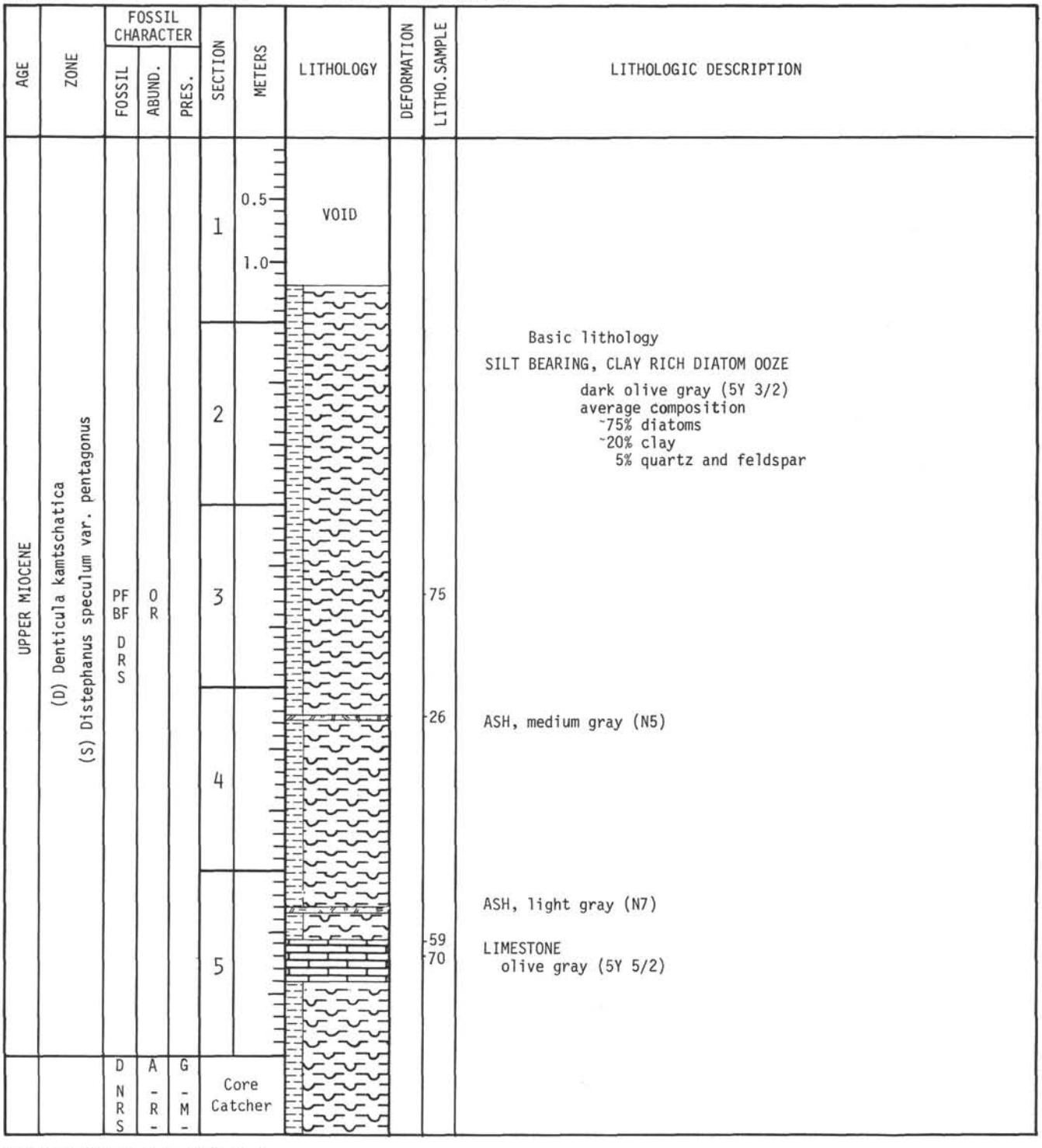
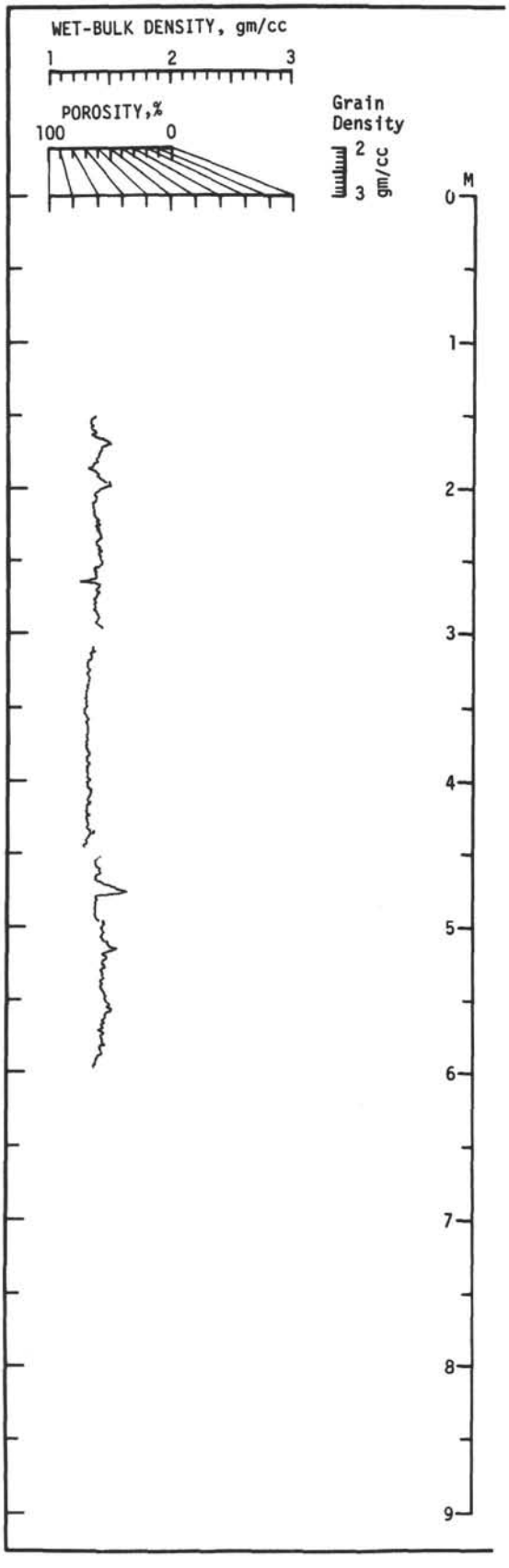
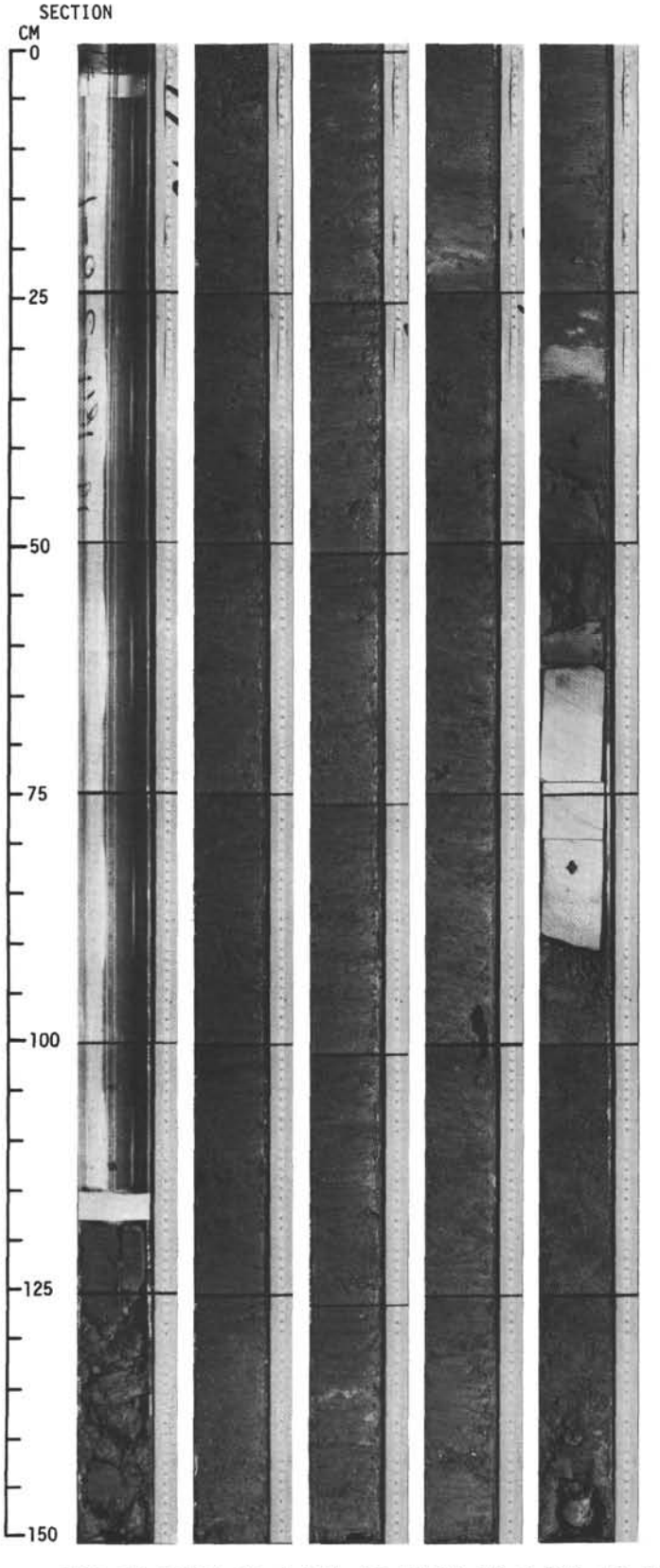
184-18-2
184-19-1
184-19-2

Site 184 Hole Core 20 Cored Interval: 537-548



Explanatory notes in Chapter 1





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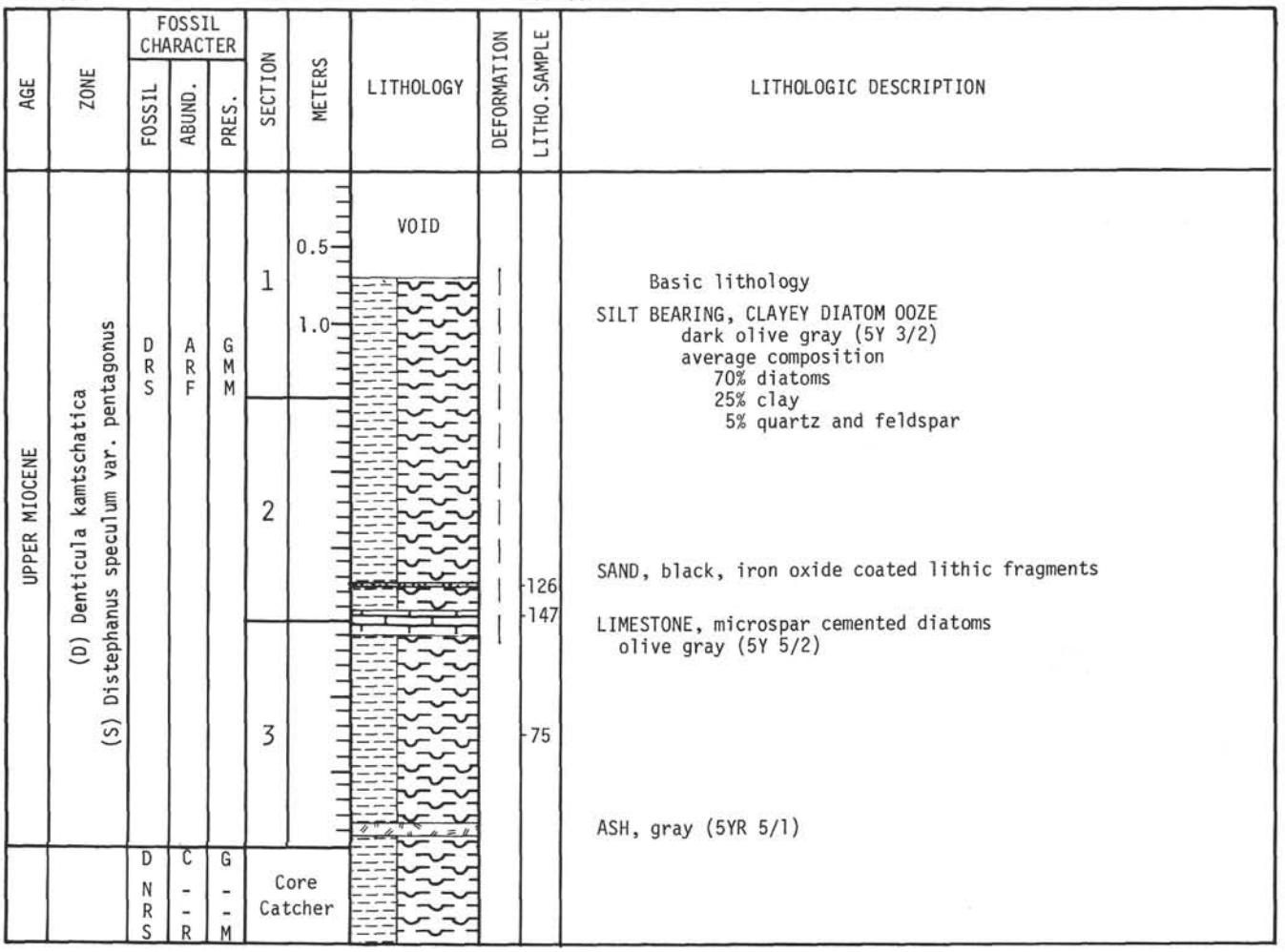
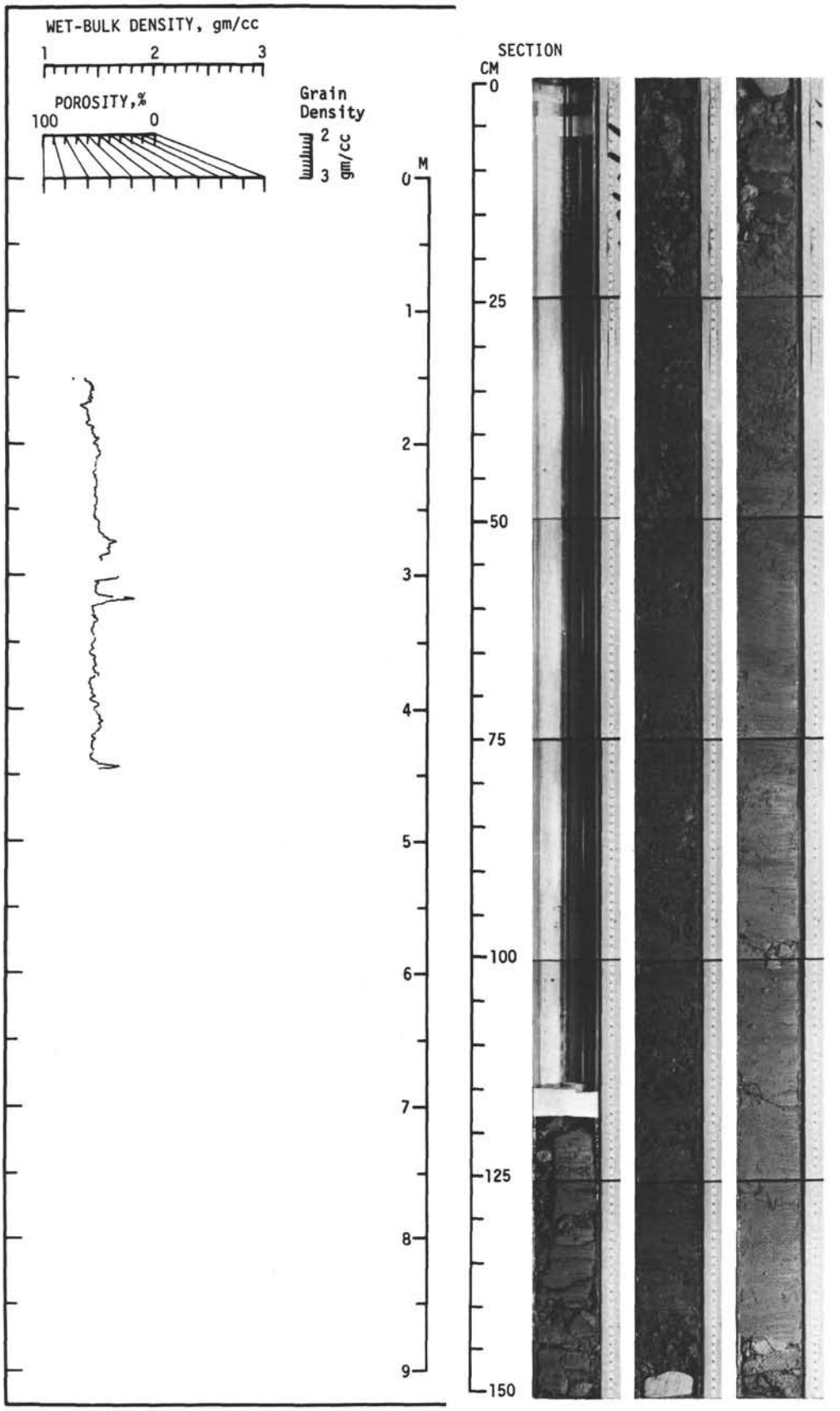
Site 184 Hole Core 21 Cored Interval: 567-576



Explanatory notes in Chapter 1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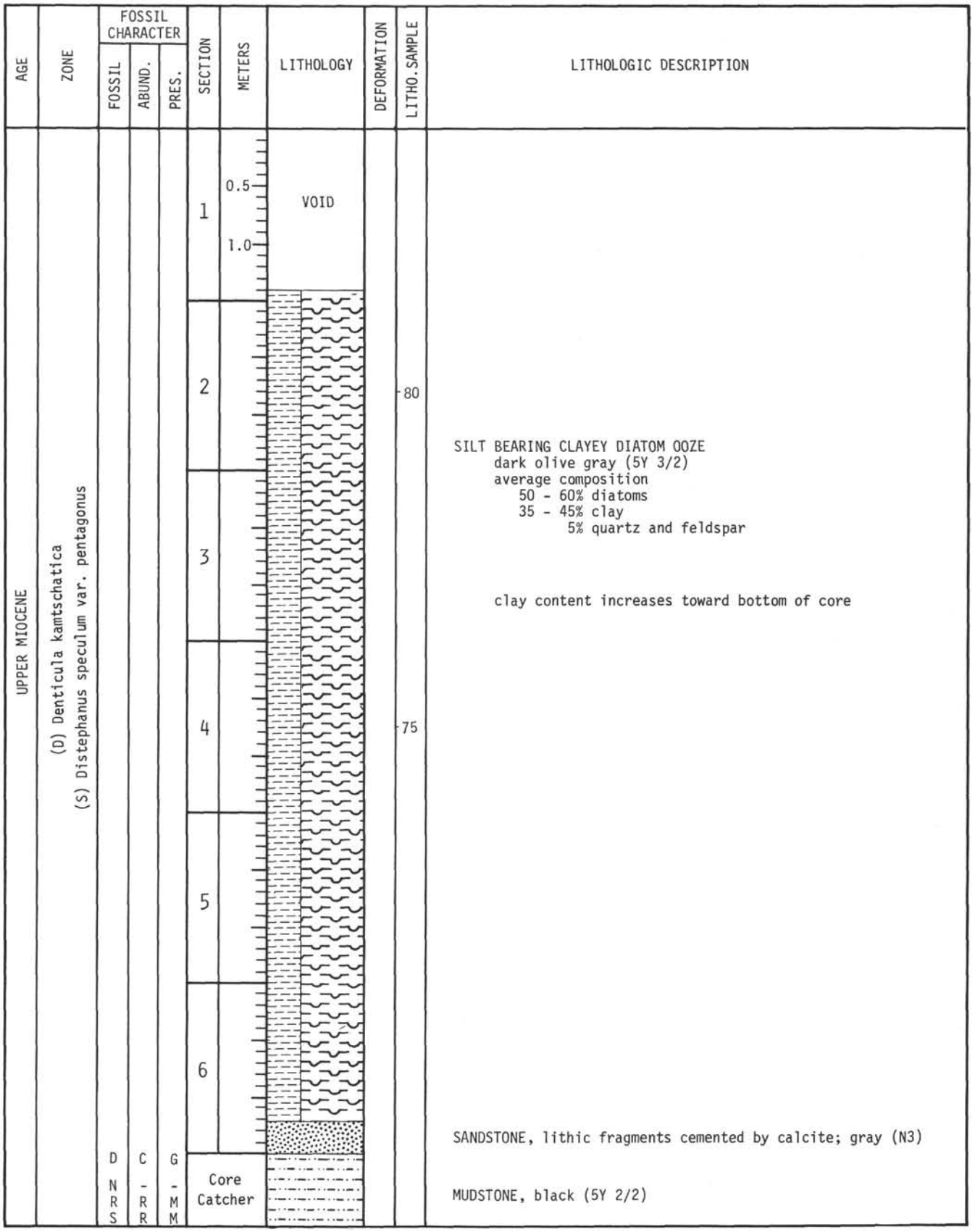
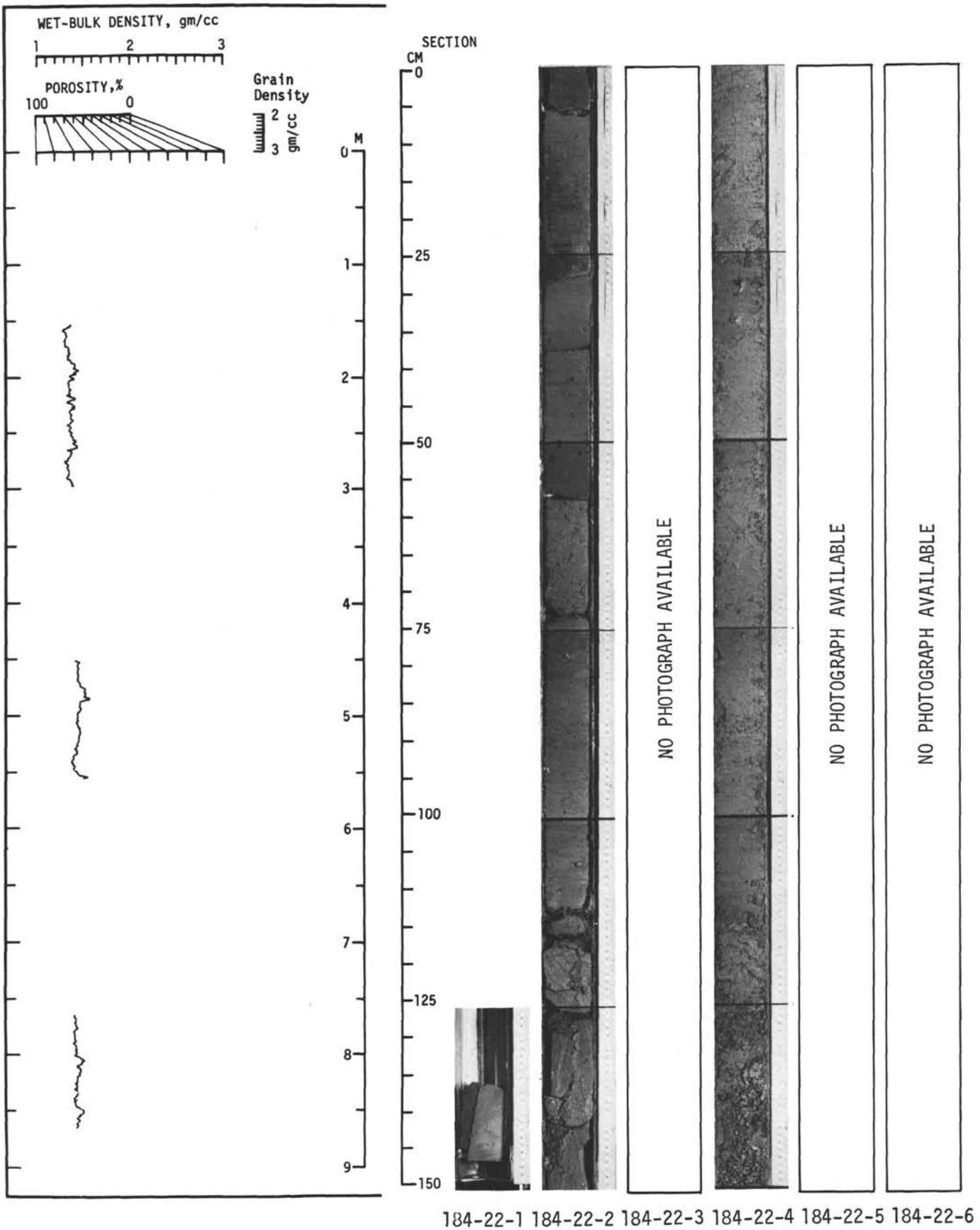
184-21-3

Site 184 Hole Core 22 Cored Interval: 595-599



Explanatory notes in Chapter 1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gm/cc
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7
8
9
SECTION
CM
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75
100
125
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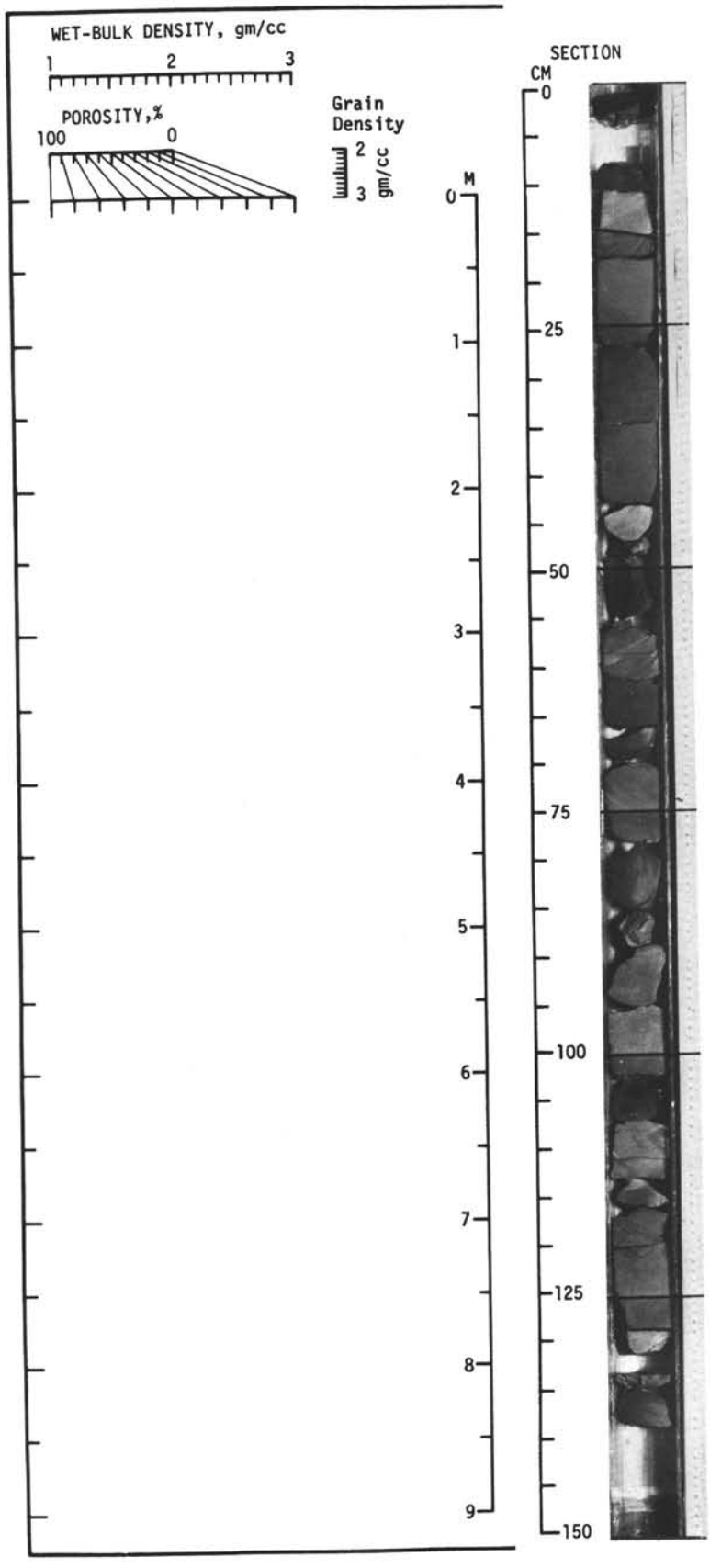
NO PHOTOGRAPH AVAILABLE
NO PHOTOGRAPH AVAILABLE
NO PHOTOGRAPH AVAILABLE
184-22-1
184-22-2
184-22-3
184-22-4
184-22-5
184-22-6

Site 184 Hole Core 23 Cored Interval: 599-601

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0			93	MUDSTONE black (5Y 2/2) slide, sec. 1, 93 cm 10% silt (quartz, feldspar) 90% clay
		D N R S	- - - -	- - - -	Core Catcher					

Explanatory notes in Chapter 1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POROSITY,%
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Grain
Density
2
3
gm/cc
M
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1
2
3
4
5
6
7
8
9
SECTION
CM
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25
50
75
100
125
150

184-23-1

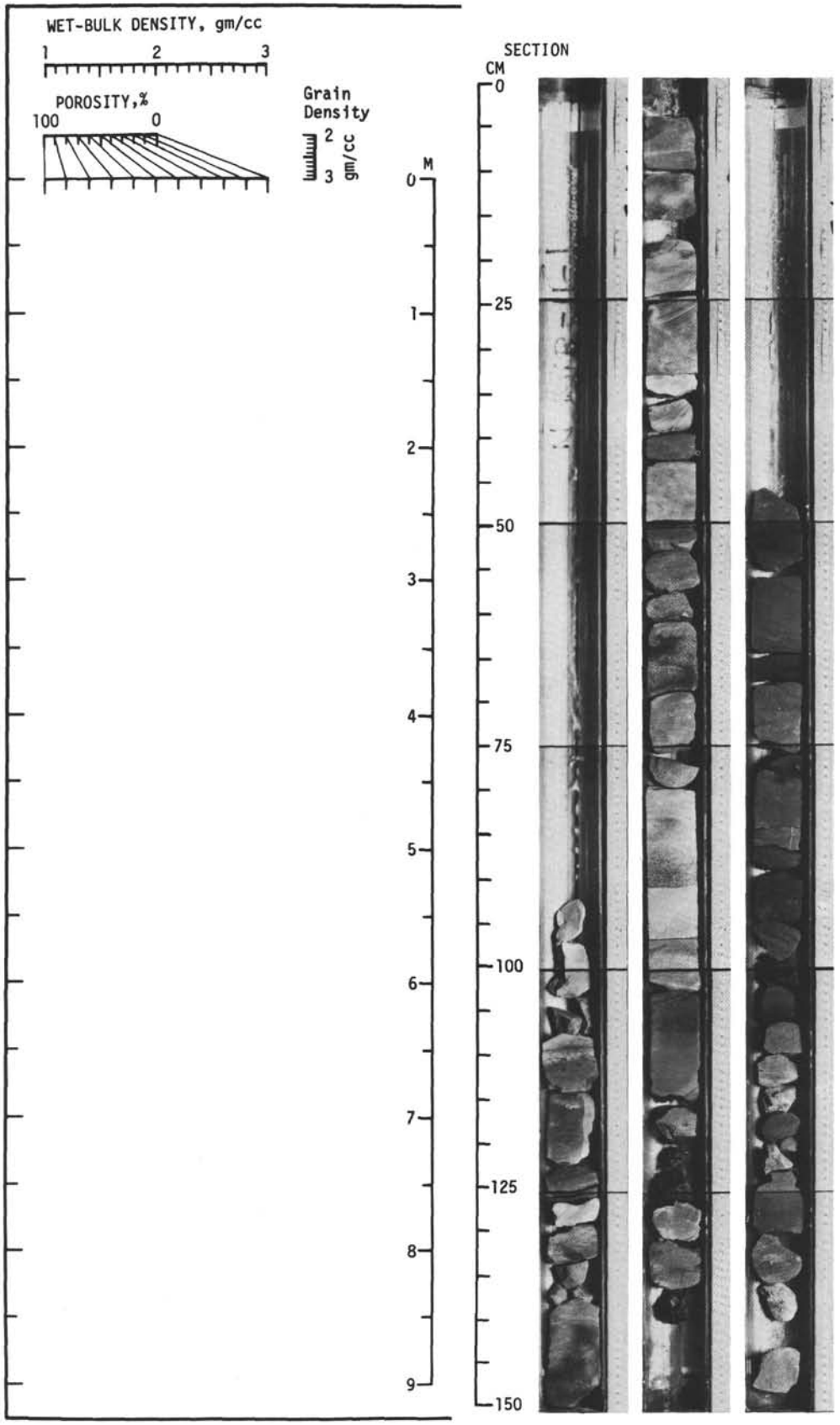
Site 184 Hole B Core 1 Cored Interval: 669-678

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		N	R	M	1	0.5 1.0	VOID			Basic Lithology MUDSTONE olive gray (5Y 3/2) Silt particles appear largely to be altered glass fragments ASH, sand size particles SANDSTONE, silica cemented quartz, feldspar, and chert fragments, graded SANDSTONE, carbonate cemented, dusky yellowish brown (10YR 2/2)
					2				98	
		D N R S	- R - -	- M - -	Core Catcher					

Site 184 Hole B Core 2 Cored Interval: 707-716

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		PF BF	- F		1	0.5 1.0	VOID		92	MUDSTONE dark olive gray (5Y 3/2) Silt particles appear largely to be altered glass ASH (TUFF), with pyrite slide 92: glass, altered and devitrified 90% K feldspar, plagioclase (?), quartz, chlorite 10%
		D N R S	- R - -	- M - -	Core Catcher					

Explanatory notes in Chapter 1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gm/cc
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2
3
4
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7
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9
SECTION
CM
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25
50
75
100
125
150
184B-1-1
184B-1-2
184B-2-1

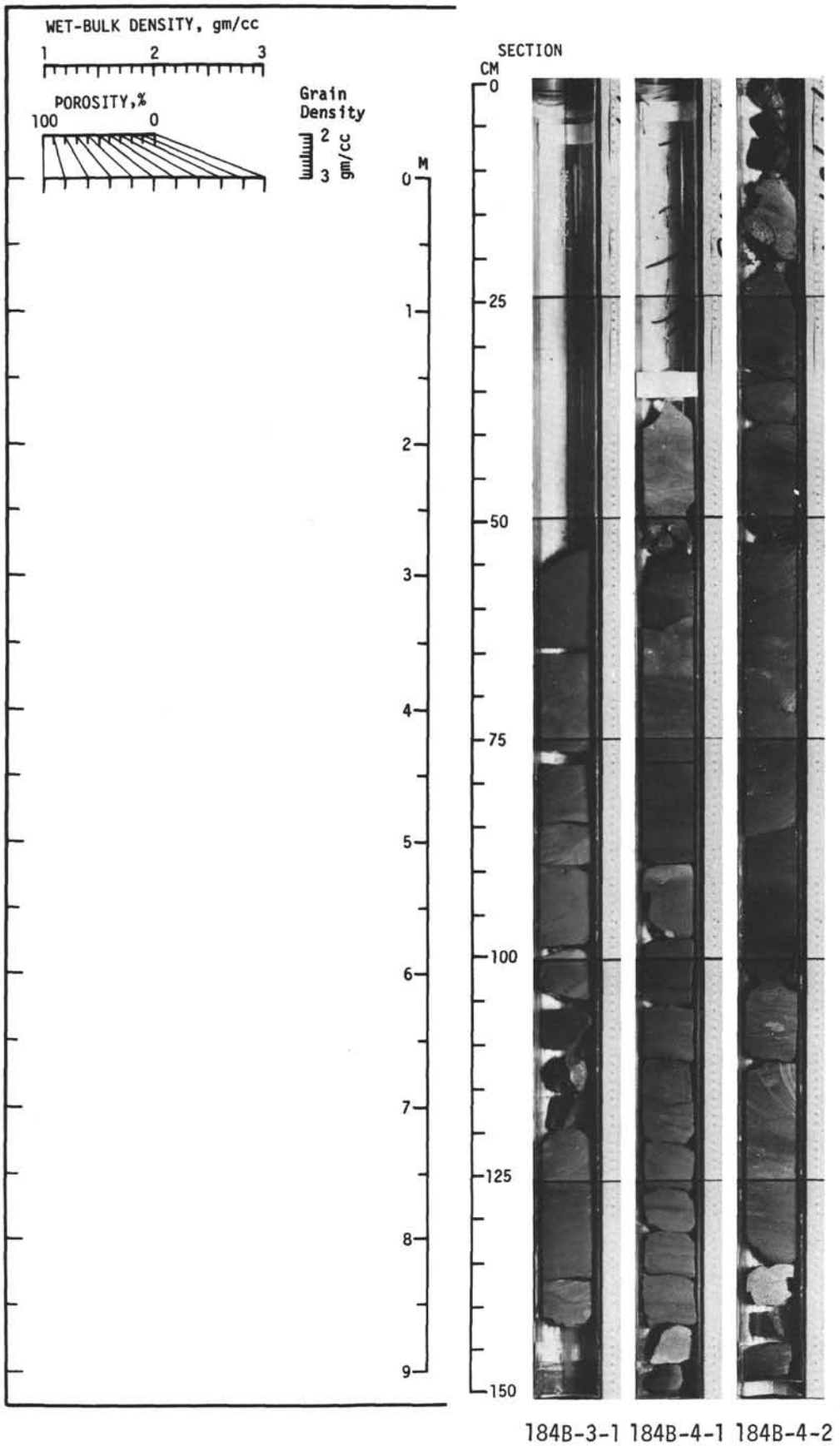
Site 184 Hole B Core 3 Cored Interval: 744-753

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
UPPER MIOCENE ?	*	N PF BF	- R C	-	1	0.5 1.0	VOID		100	MUDSTONE dark olive gray (5Y 3/2) scattered forams Core Catcher: D - - F N - - R - - S - - Slide 100 cm: clay 90% silt ~10%
					Core Catcher					

Site 184 Hole B Core 4 Cored Interval: 781-790

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0	VOID ··Z·· ··Z··		45	MUDSTONE medium olive gray (5Y 4/1) ZEOLITIC SAND, graded, mineralogy indicates volcanic provenance
					2				75	pods of authigenic calcite sand patches (burrows?)
		D N R S	- - - -	- - - -	Core Catcher					XR 2-140 73% amorph. 2% quartz 16% cristo. 3% plag. 1% mica 1% mont. 1% tridg. 2% clin.

Explanatory notes in Chapter 1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gm/cc
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2
3
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SECTION
CM
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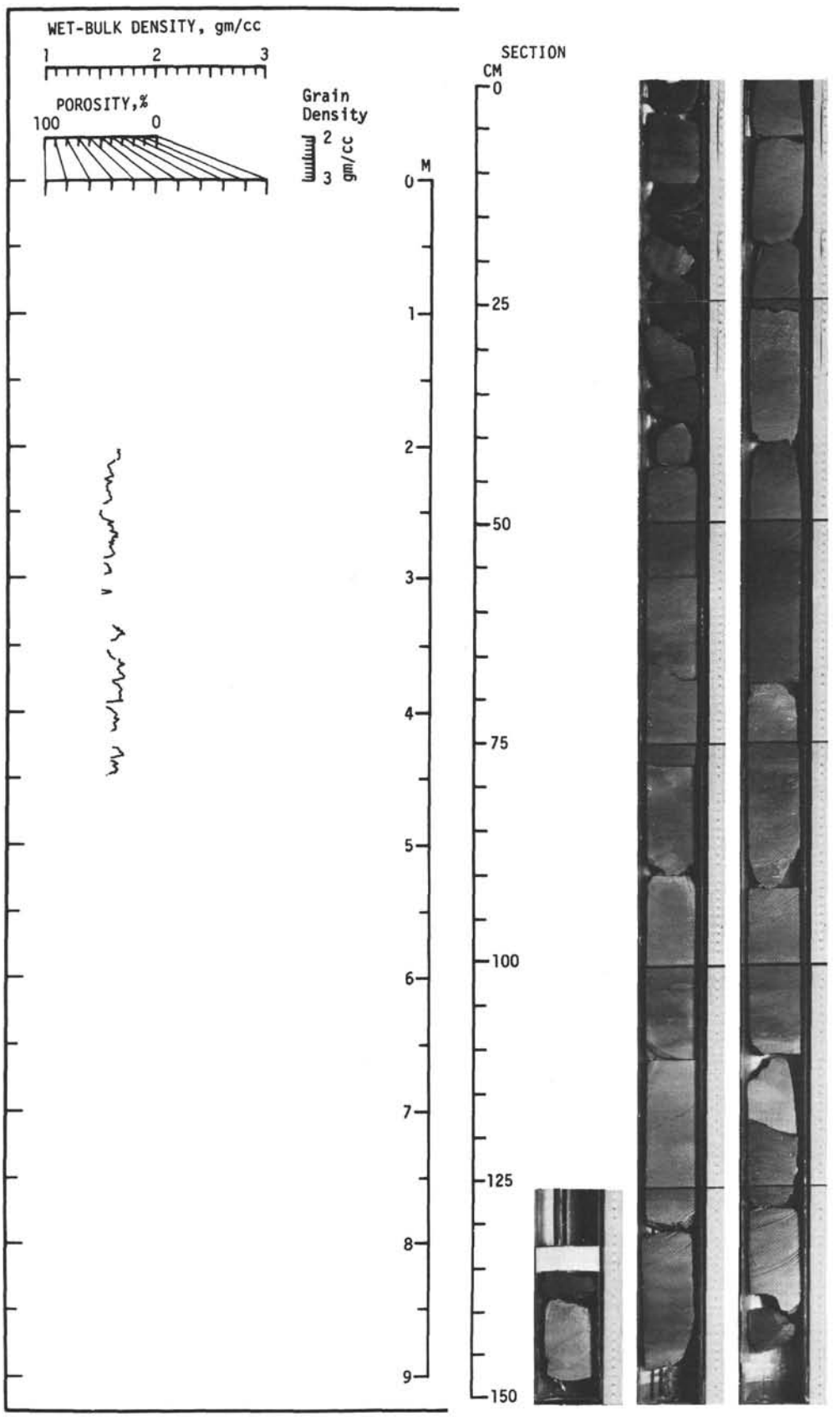
184B-3-1
184B-4-1
184B-4-2

Site 184 Hole B Core 5 Cored Interval: 819-828

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5	VOID			MUDSTONE dark olive gray (5Y 3/2)
						1.0				clay and silt particles appear largely to be alteration of volcanic glass and debris
					2					Entire core burrowed on a fine scale
										sand lens
		PF BF	- R		3					occasional forams and small (~5 mm) sponges (?)
					Core Catcher					Core Catcher: D - - F N - - R - - S - -

Explanatory notes in Chapter 1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gm/cc
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2
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9
SECTION
CM
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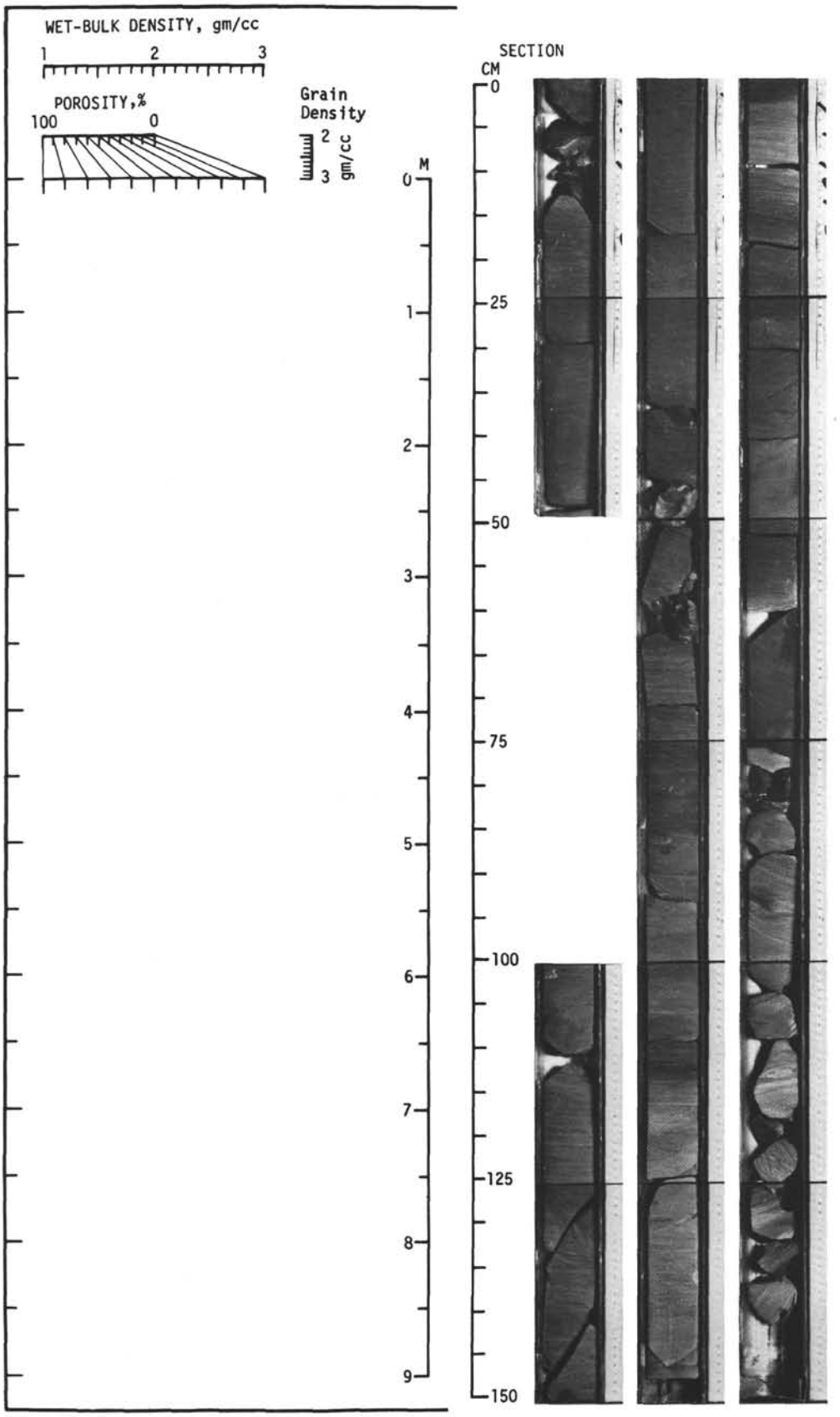
75
100
125
150
184B-5-1
184B-5-2
184B-5-3

Site 184 Hole B Core 6 Cored Interval: 865-874

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0				MUDSTONE basic color very dark gray (5Y 3/2) PYRITE entire core contains abundant layers (planes) ~0.5 cm thick, containing *en echelon* chevron folds, i.e.
					2				100	 0.5 cm these are interpreted as being back filled worm burrows
					3					
		D N R S	- - - -	- - - -	Core Catcher					

Explanatory notes in Chapter 1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gm/cc
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7
8
9
SECTION
CM
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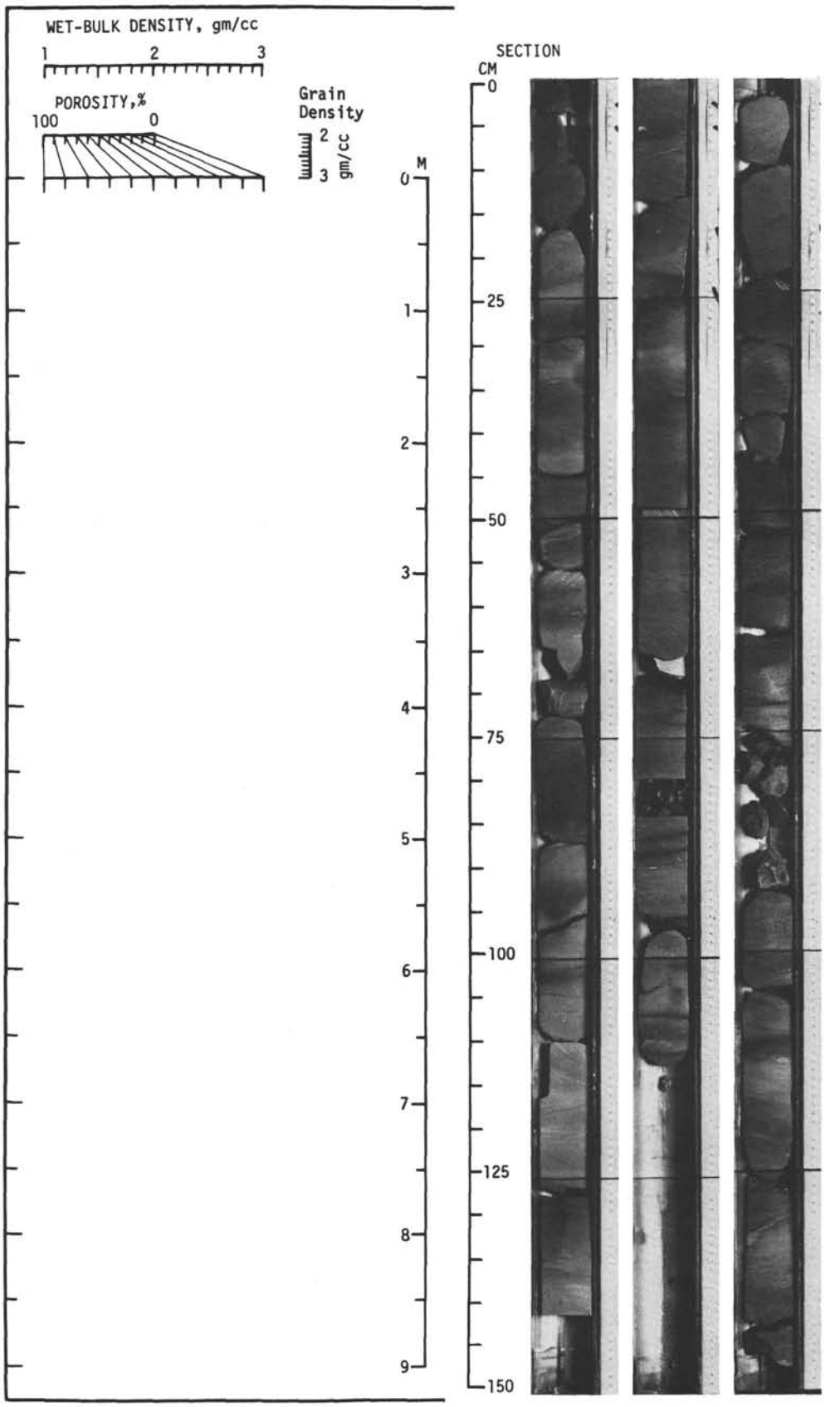
50
75
100
125
150
184B-6-1
184B-6-2
184B-6-3

Site 184 Hole B Core 7 Cored Interval: 874-884

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		PF BF	- R		1	0.5 1.0				MUDSTONE dark olive gray (5Y 3/2) SAND mottled and burrowed throughout, with scattered white, non-calcareous flecks (sponge remains?)
					2					
		PF BF	- F		3					SAND - deformed (?) or eroded base slope cast or flute cast. (3 cm layer) XR 2-150 63% amorph. 14% quartz 9% plag. 2% mica 1% chlor. 9% mont. 3% clin.
		D N R S	- R - -	- M - -	Core Catcher					

Explanatory notes in Chapter 1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gm/cc
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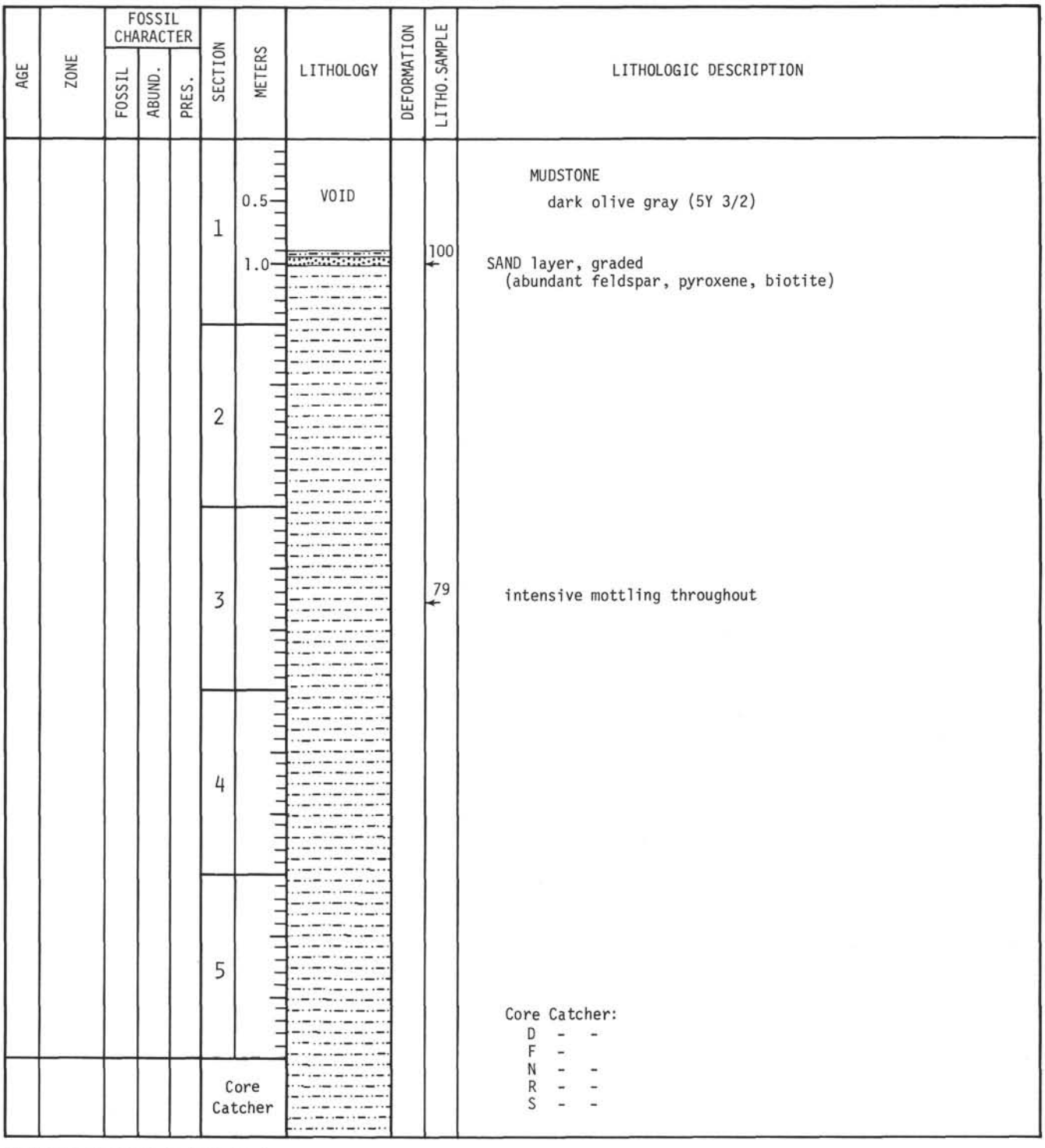
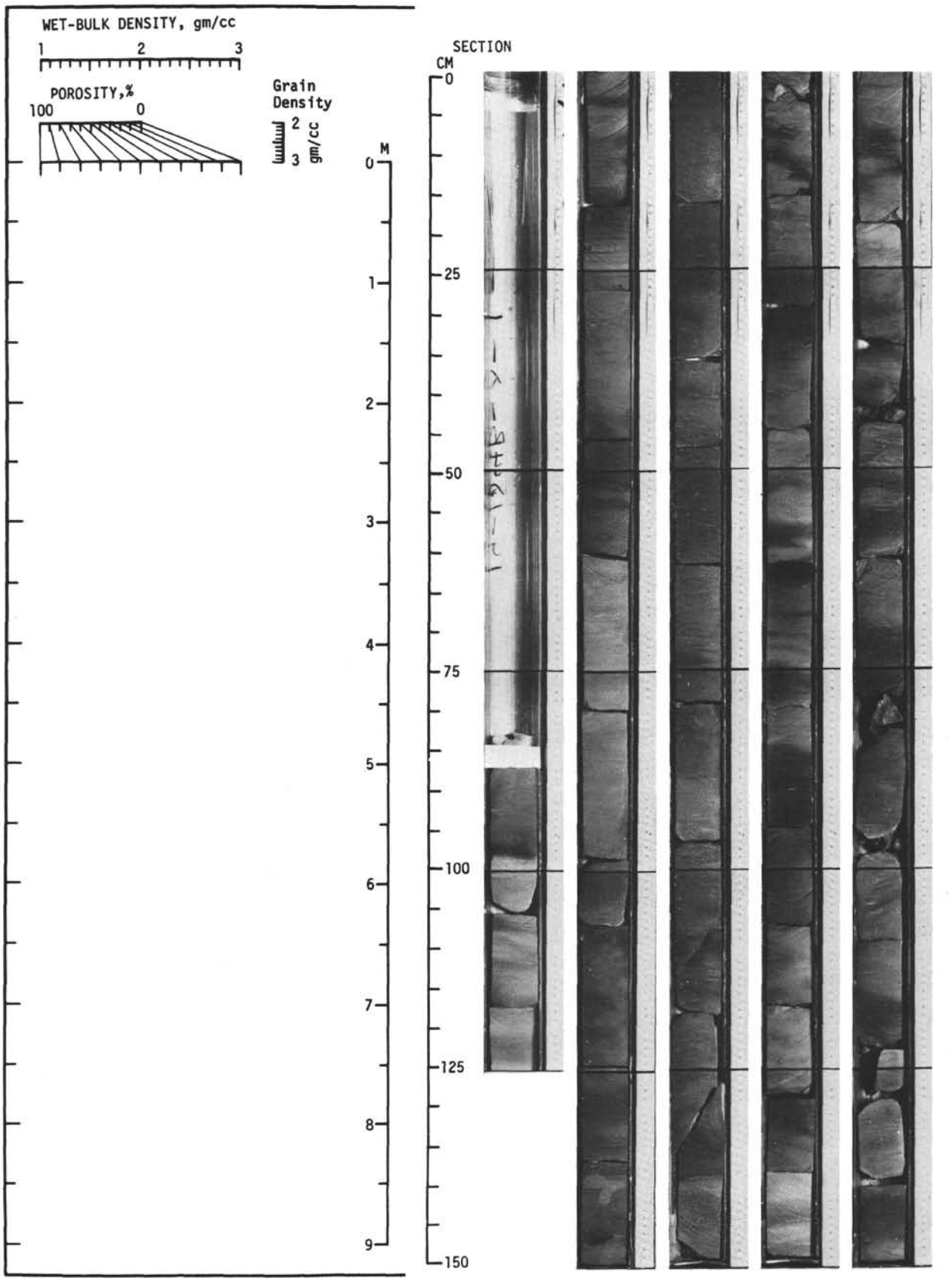
184B-7-3

Site 184 Hole B Core 8 Cored Interval: 884-893



Explanatory notes in Chapter 1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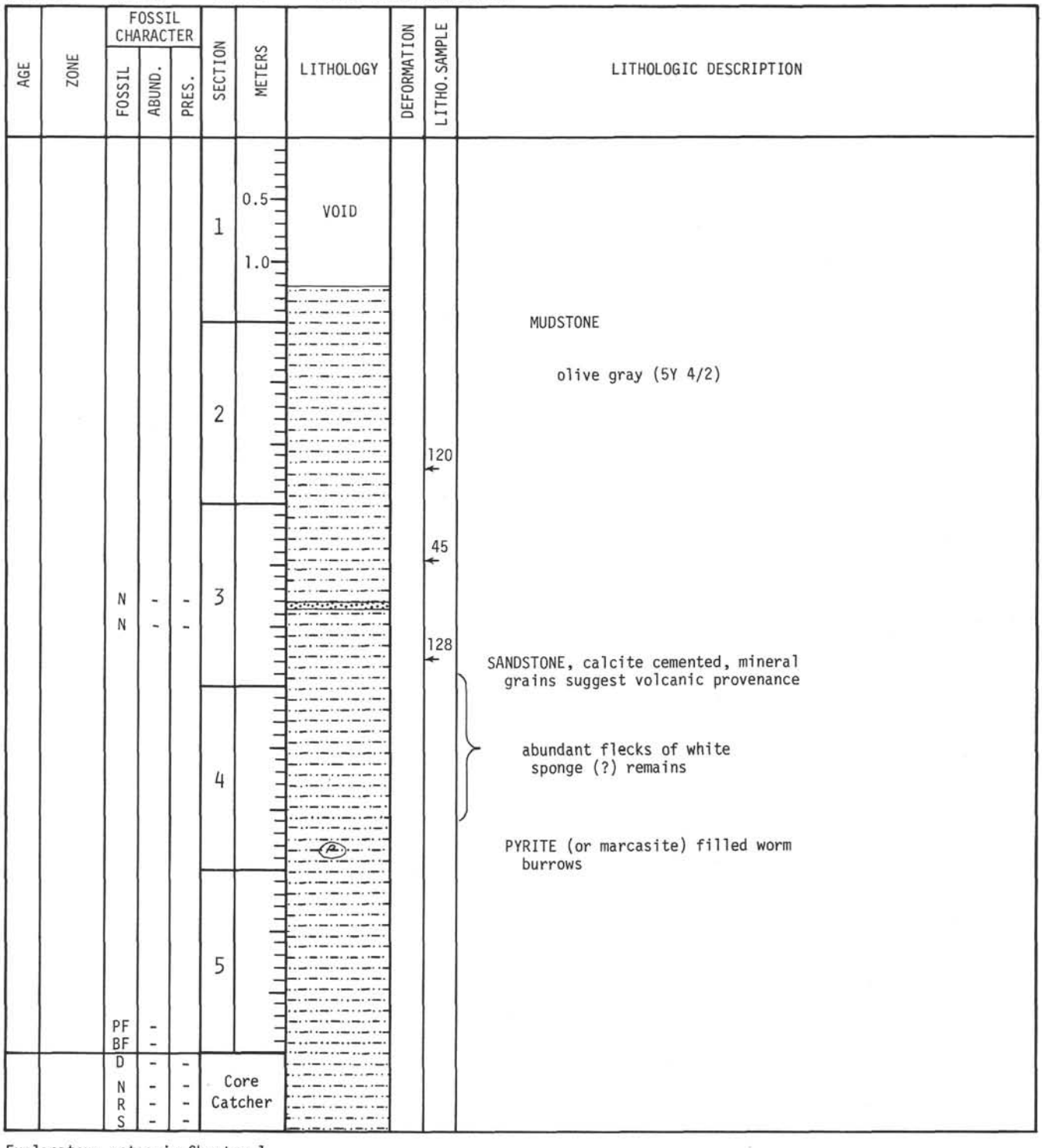
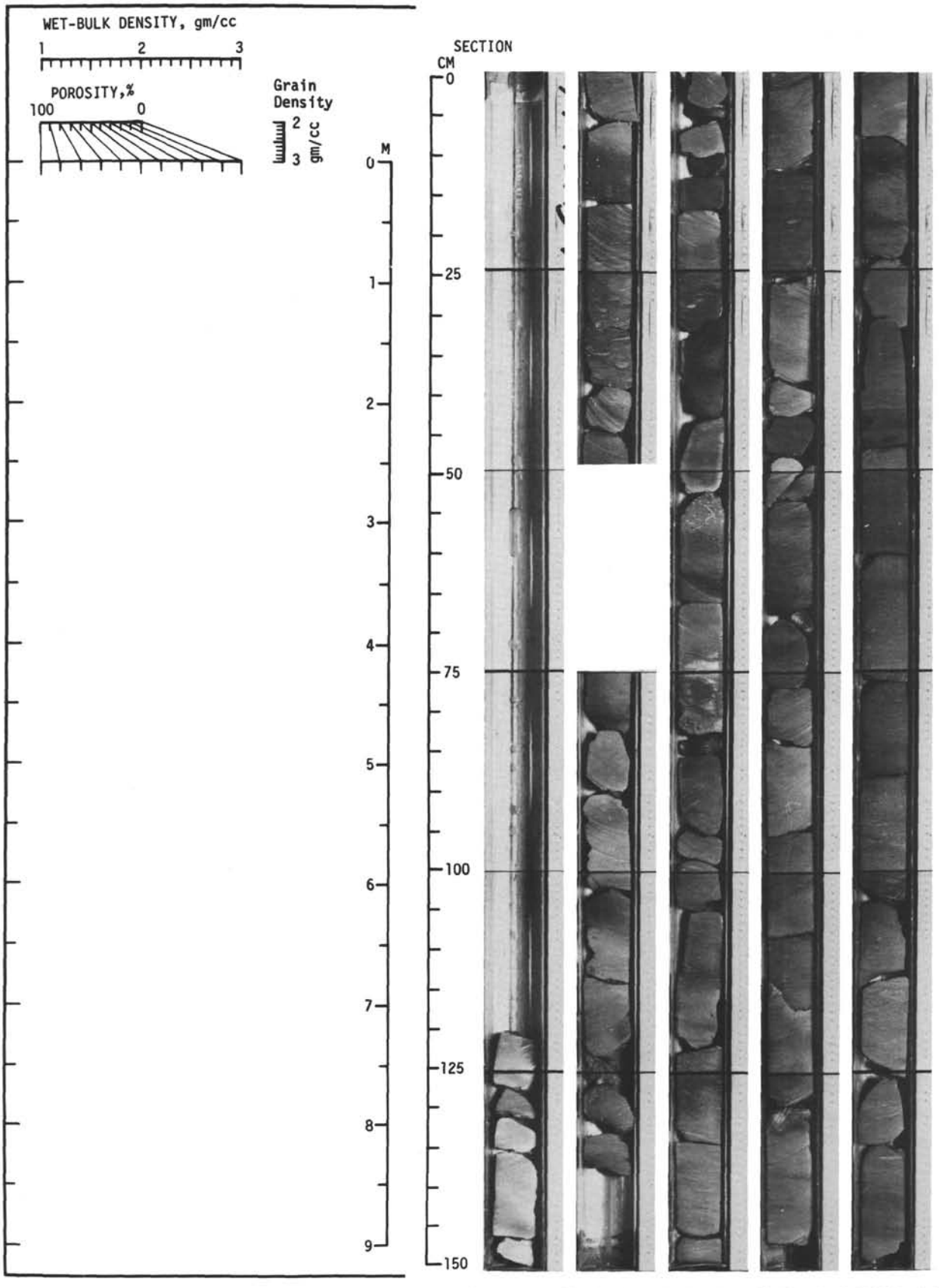
184B-8-5

Site 184 Hole B Core 9 Cored Interval: 893-903



Explanatory notes in Chapter 1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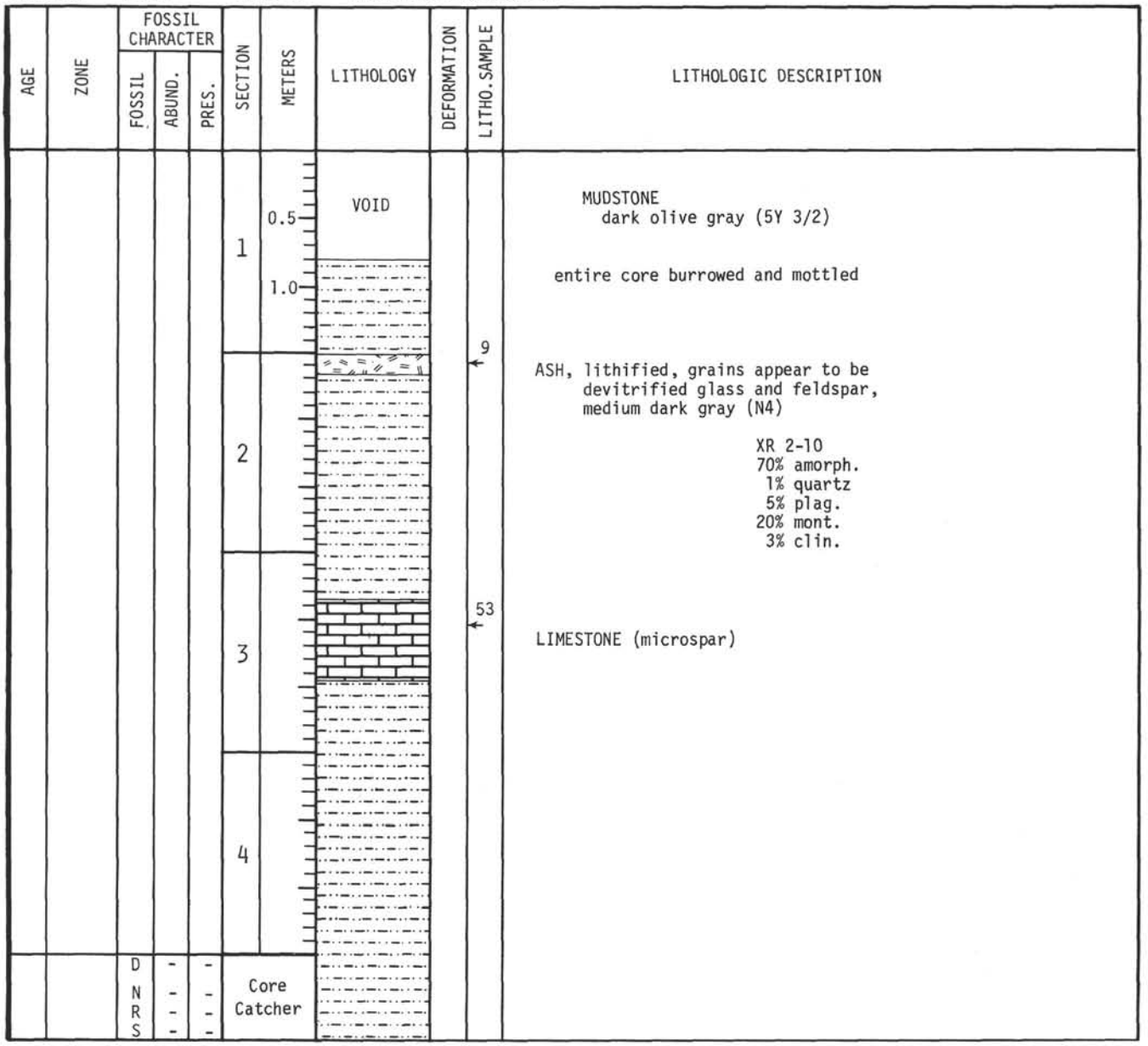
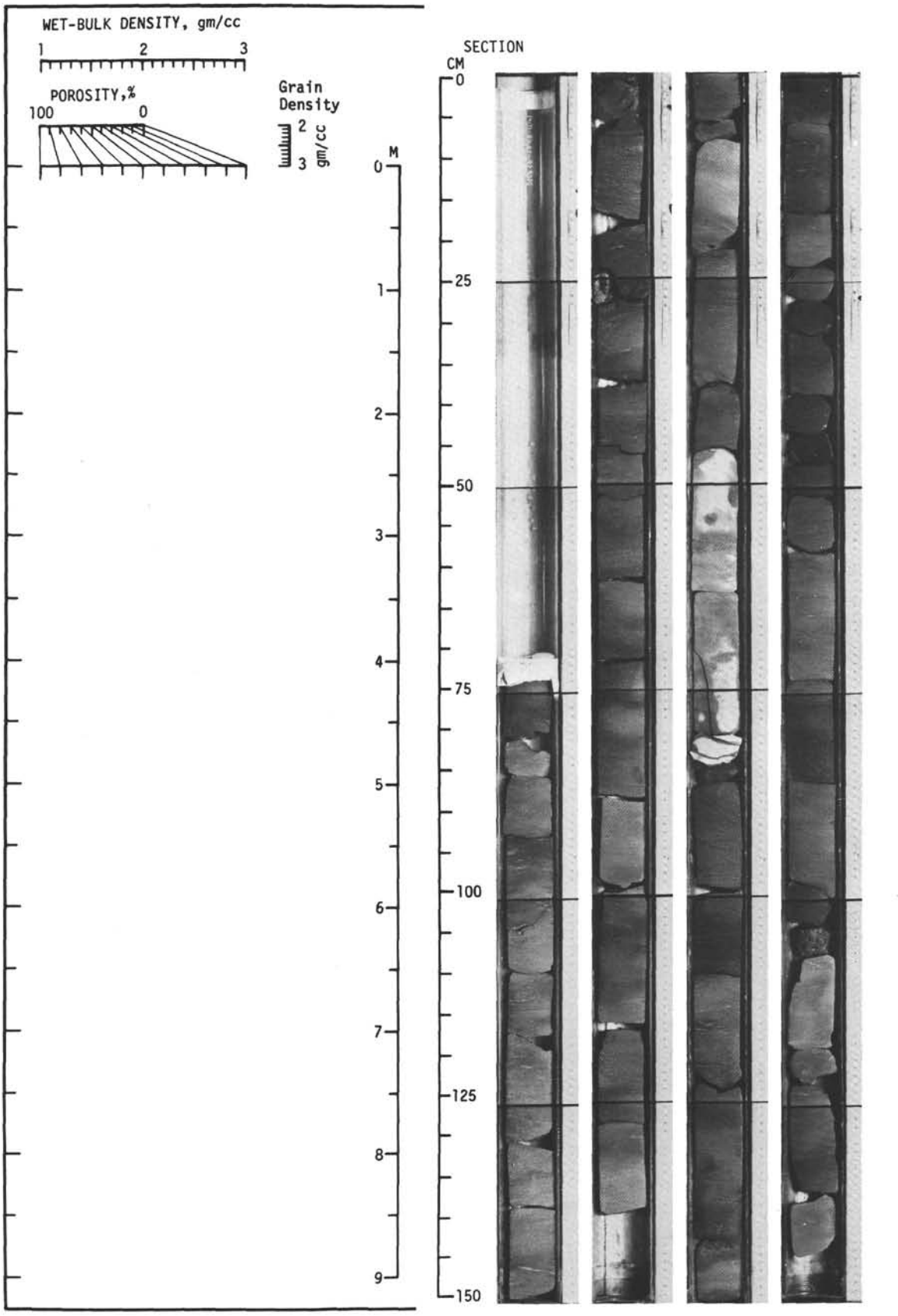
184B-9-5

Site 184 Hole B Core 10 Cored Interval: 903-912



Explanatory notes in Chapter 1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184B-10-1
184B-10-2
184B-10-3
184B-10-4

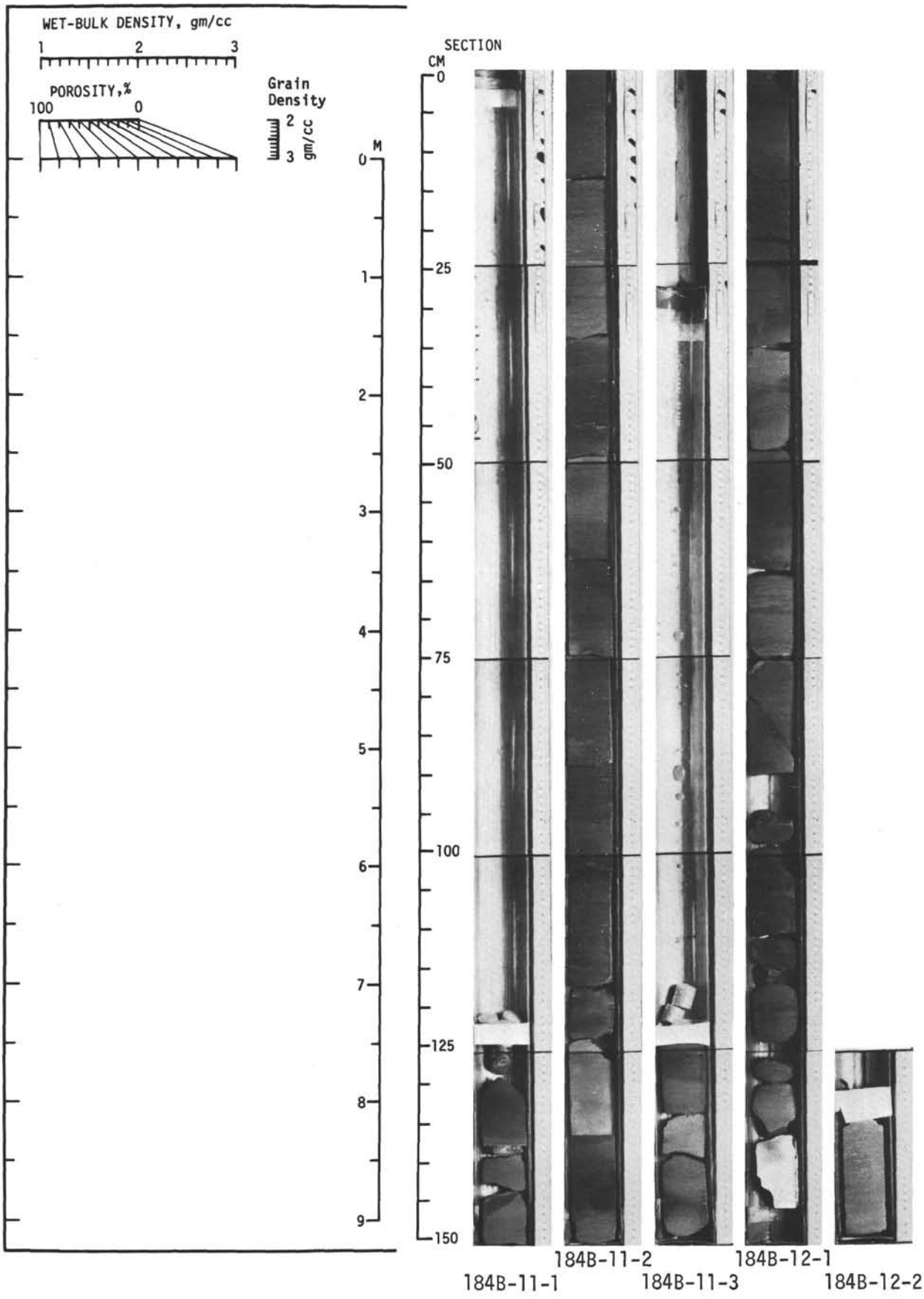
Site 184 Hole B Core 11 Cored Interval: 912-921

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0	VOID			MUDSTONE dark olive gray (5Y 3/2)
					2					ASH, lithified, dark gray (N4), grains appear to be devitrified glass and feldspar
					3					
		D N R S	- - - -	- - - -	Core Catcher					

Site 184 Hole B Core 12 Cored Interval: 921-930

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0	VOID			MUDSTONE dark olive gray (5Y 3/2)
					2					
		D N R S	- - - -	- - - -	Core Catcher					

Explanatory notes in Chapter 1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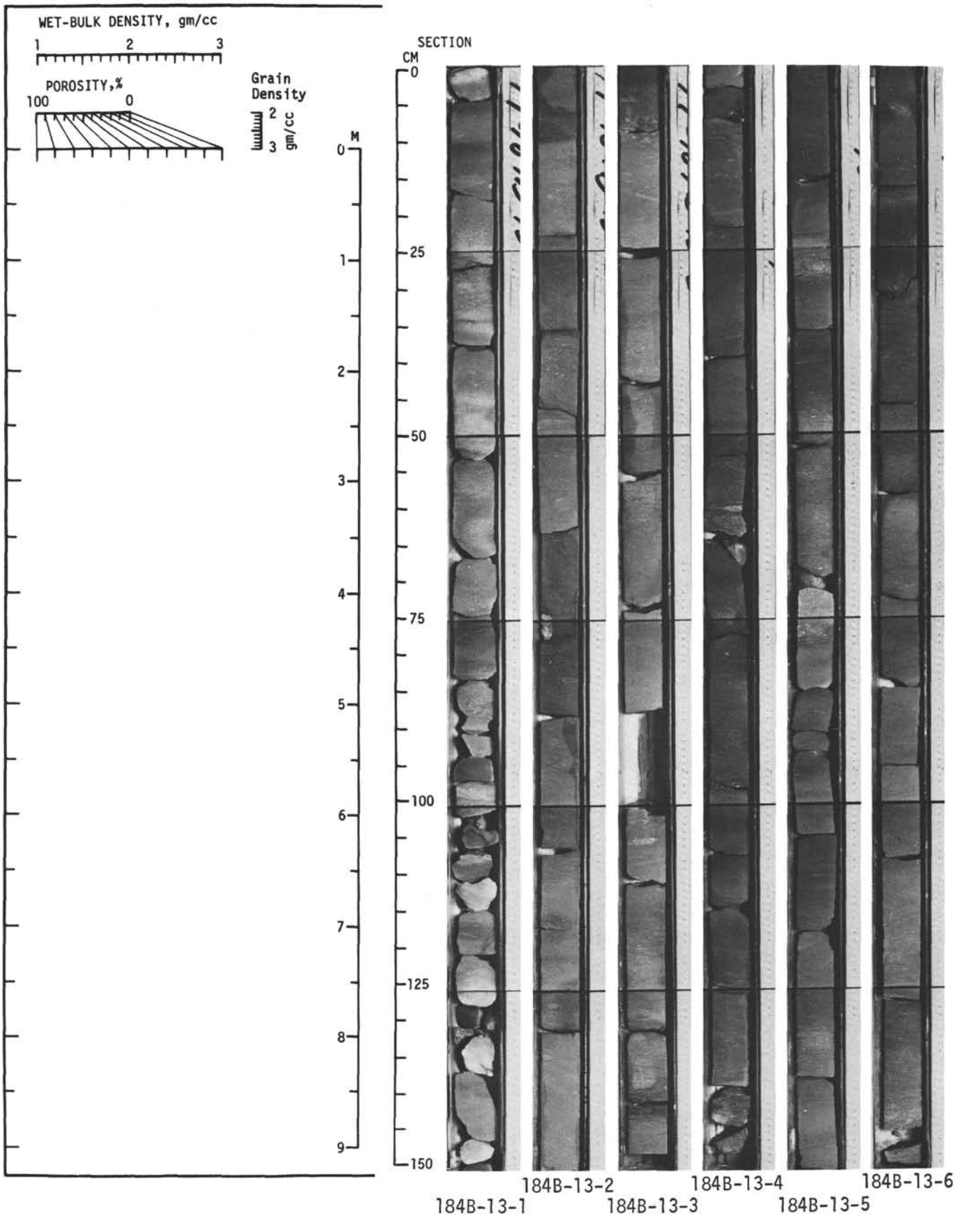
184B-11-3
184B-12-1
184B-12-2

Site 184 Hole B Core 13 Cored Interval: 959-968

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0	VOID			
					2					PYRITE (or marcasite)
					3					MUDSTONE dark olive gray to olive gray (5Y 3/2 - 5Y 4/1)
					4					extensive mottling and burrowing
					5					
					6					
		D N R S	- - - -	- - - -	Core Catcher					

Explanatory notes in Chapter 1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3
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7
8
9
SECTION
CM
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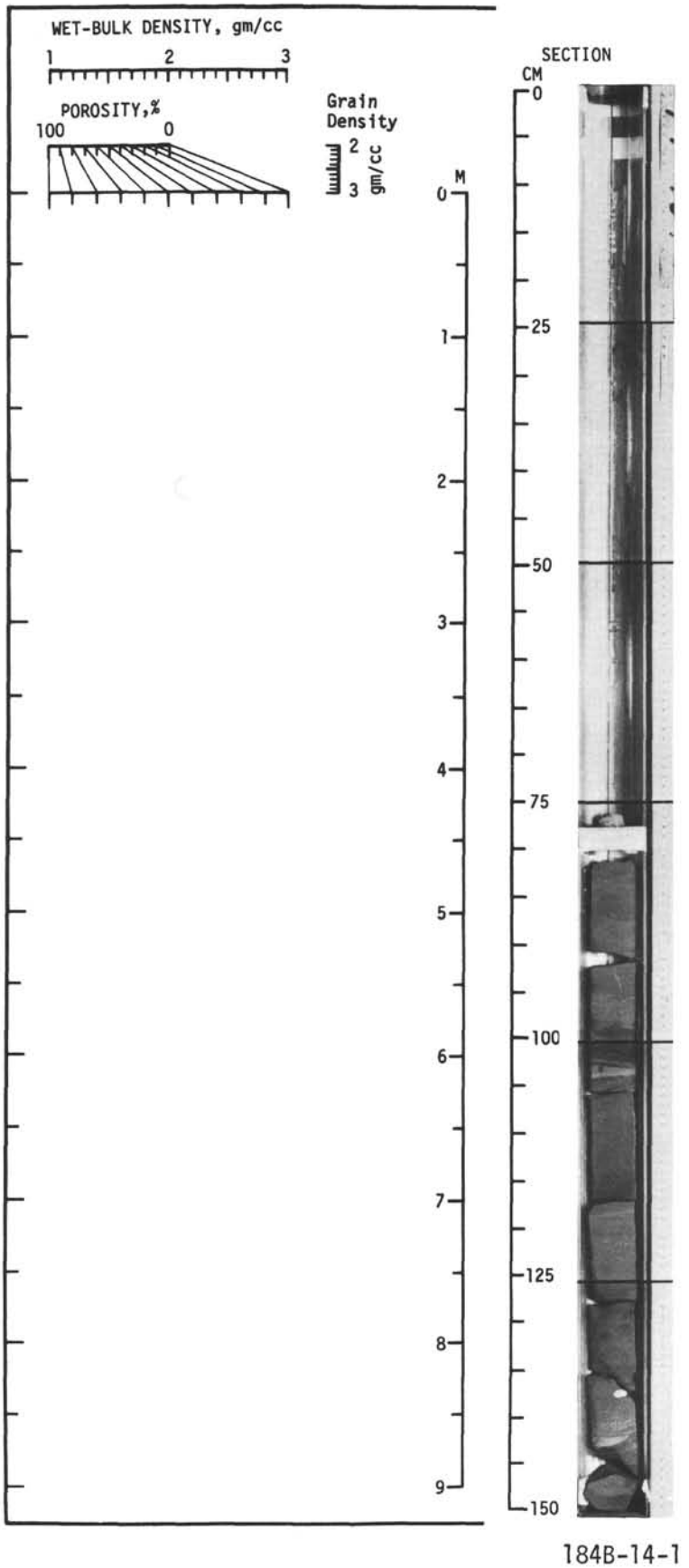
184B-13-1
184B-13-2
184B-13-3
184B-13-4
184B-13-5
184B-13-6

Site 184 Hole B Core 14 Cored Interval: 971-973

AGE	ZONE	FOSSIL CHARACTER: FOSSIL	FOSSIL CHARACTER: ABUND.	FOSSIL CHARACTER: PRES.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					1	0.5 1.0	VOID			MUDSTONE dark olive gray (5Y 3/2) PYRITE
		D N R S	- - - -	- - - -	Core Catcher					

Explanatory notes in Chapter 1


WET-BULK DENSITY, gm/cc
1
2
3
POROSITY,%
100
0
Grain
Density
2
3
gm/cc
M
0
1
2
3
4
5
6
7
8
9
SECTION
CM
0
25
50
75
100
125
150

184B-14-1