5. SITE 262

The Shipboard Scientific Party[1]
With Additional Contributions From
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SITE DATA

Date Occupied: 24 November 1972

Date Departed: 26 November 1972

Time on Site: 60 hours

Position:
lat 10°52.19′S
long 123°50.78′E

Water Depth (from sea level): 2298 corrected meters (echo sounding)

Water Depth (from drill floor): 2308 corrected meters (echo sounding)

Bottom Felt At: 2315 meters (drill pipe)

Penetration: 442 meters

Number of Holes: 1

Number of Cores: 47

Total Length of Cored Section: 442 meters

Total Core Recovered: 365.5 meters

Percentage Core Recovery: 82.69

Oldest Sediment Cored:
Depth below sea floor: 442 meters
Nature: Calcarenite
Age: Pliocene

Basement: Not penetrated

Principal Results: Site 262, near the axis of the western part of the Timor Trough, penetrated a wedge of flat-lying sediments that thickens towards Timor and overlies a north-dipping sequence from the southern flank of the Trough. The sediments comprise 414 meters of Quaternary and upper Pliocene planktonic ooze overlying 13 meters of upper Pliocene shallow marine foraminiferal dolomitic mud and 15 meters (to total depth) of Pliocene very shallow marine dolomitic shell calcarenite. The salinity of the interstitial water in the sediments increases downward to a measured recorded value of 53 parts per thousand, and is interpreted as possibly indicating a salt body a short distance below.

BACKGROUND AND OBJECTIVES

The island of Timor lies on the northern edge of the Australian continental plate. It is part of the Outer Banda Arc and is separated from the Inner Banda Arc on the north by the Wetar Strait which is only 30 km wide. The subduction zone to the north of the Australian plate is believed to lie at the Inner Banda Arc; however, there are few earthquakes and no post-Pliocene volcanic activity on the part of the Inner Arc immediately to the north of Timor.

The Timor Trough is located immediately to the south of Timor. It is believed to have developed along the leading edge of the Australian plate in response to resistance to underthrusting to the north. The Timor Trough itself has been mentioned as a zone of "limited incipient underthrusting." Seismic profiles of the trough axis reveal flat lying beds unconformably overlying north-dipping reflectors traceable from the southern part of the Timor Sea.

The objectives of drilling at this site were:

1) To date the initial folding of the Timor Trough by coring across the unconformity. The age of the basal terrigenous sediments above the unconformity will indicate a minimum age and the age of the uppermost (?calcareous) sediments beneath the unconformity will indicate a maximum age. Interpretations from seismic profiles suggested that the age of initial folding is late middle Miocene.

2) To determine if the prominent regional Cenozoic reflectors beneath the northwestern Australian margin are isochronous.

3) To determine whether or not the folded reflectors beneath the trough are infraneritic, as indicated by the lateral decrease in interval velocity of equivalent layers from the shelf edge to the trough axis.

4) To obtain a complete reference section of the marginal sedimentary sequence of northwestern Australia.

5) To obtain reliable downhole heat-flow measurements. This region has shown indications of high regional heat flow which might be related to incipient subduction.

SITE SURVEY

The general nature of this site in the Timor Trough (Figures 1, 2) was known from existing *Vema*-24 and *Diamantina* seismic profiles. An additional seismic line was run by the Bureau of Mineral Resources (BMR) shortly before this cruise was undertaken.

The approach to this site was along the Vema-24 track with a northerly turn along the BMR track. Although both of these existing tracks were made with satellite

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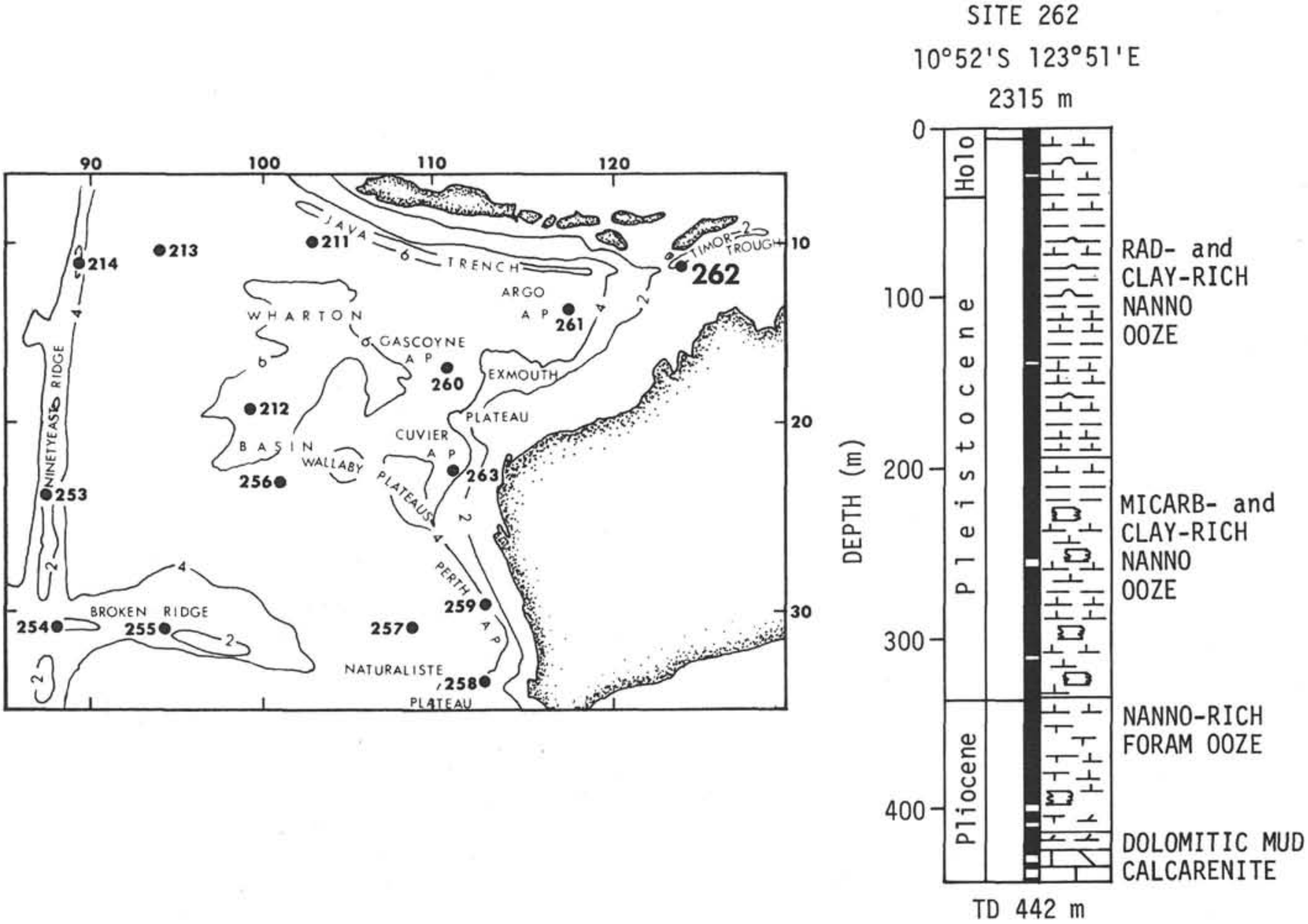

Figure 1. *Location of Site 262 and generalized stratigraphic column.*

navigation, *Glomar Challenger* apparently did not follow exactly along their lines.

A sharp topographic ridge marks the northerly side of the Timor Trough axis and that was an aid in adjusting navigation of the different tracks. Since the ridge and axis are two-dimensional features, the survey consisted essentially of a cross-axis profile.

Reflectors on the Australian flank to the south dip northward under the axis. Because the seismic profiles indicated flat-lying layers on the Trough floor, it was necessary to find a place where a deep reflector could be reached with minimum overburden. The north-to-south traverse which *Glomar Challenger* made at reduced speed (about 11 km/hr) showed several reflectors dipping to the north. Most of these reflectors did not retain their integrity for great distances but merged or split into other reflectors.

A prominent reflector at the base of a relatively transparent layer was mappable over the region. It is shown in Figure 3. Immediately after the beacon was dropped, a diffuse deep reflector appeared beneath the ship but it was believed that the drill site was to the north of it.

OPERATIONS

The proposed drilling site was approached from the southwest. This track was nearly parallel with the axis of the Timor Trough and along a *Vema*-24 track. When the ship was near the longitude of a track recently run by the Bureau of Mineral Resources (BMR), *Glomar Challenger* turned north, then south, and made a complete traverse of the floor of the trough and the base of the north and south walls. This traverse revealed a place where the horizontally stratified surface layers could be penetrated with relative ease and the deeper dipping reflectors could be reached. The beacon was dropped while underway at about 9 km/hr (5 knots) at 0200, 24 November 1972.

Immediately after the beacon was dropped and while the seismic gear was still streamed, a new steeply dipping reflector made its appearance which suggested that the beacon was dropped very near this reflector.

After retrieving survey gear, the ship was positioned over the beacon. The bottom hole assembly and drill pipe were run in and sea floor was tagged at 2315 meters. The hole was spudded at 0730, 24 November and continuously cored to a total depth of 2757 meters

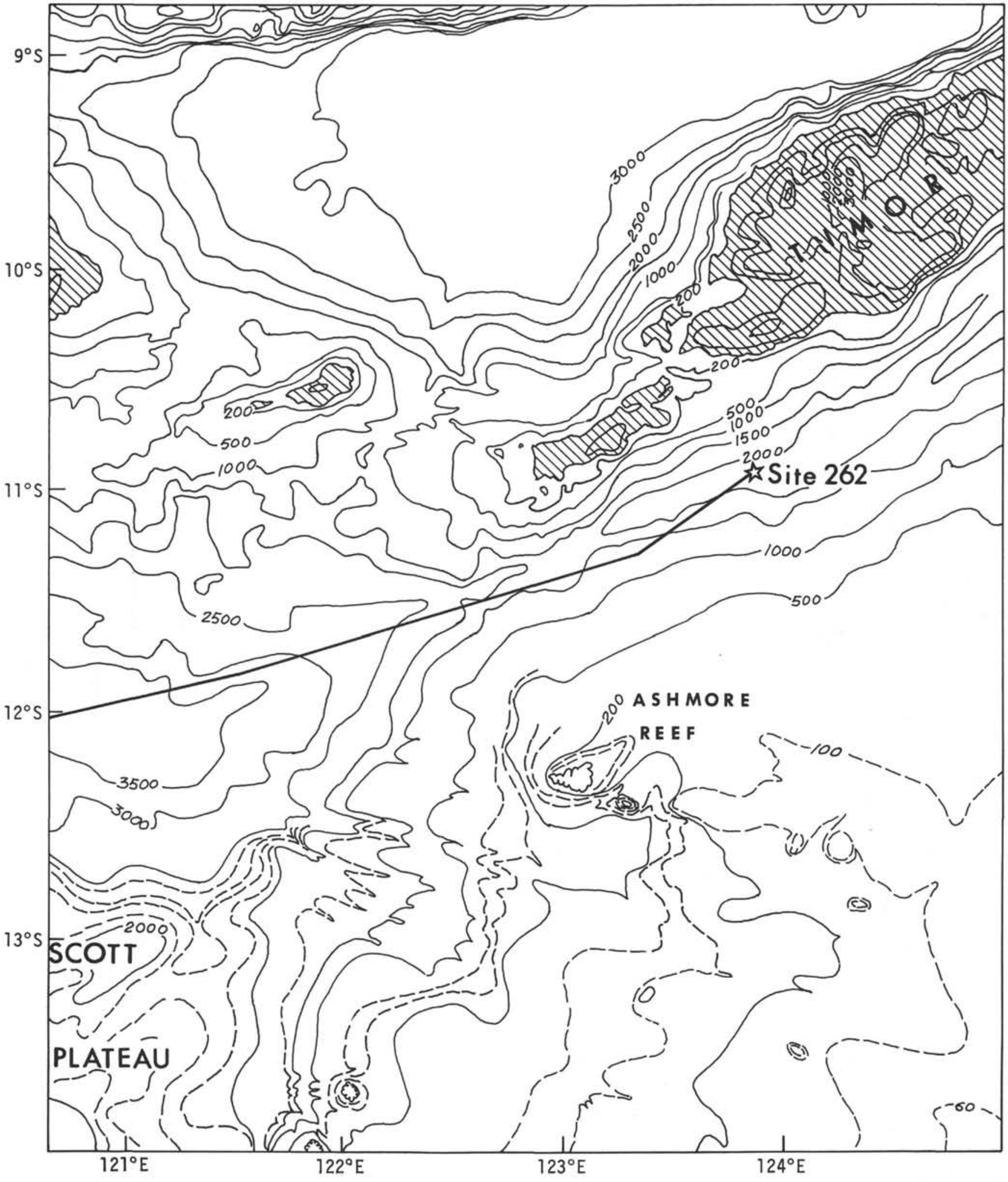

Figure 2. *General bathymetry of Site 262.*

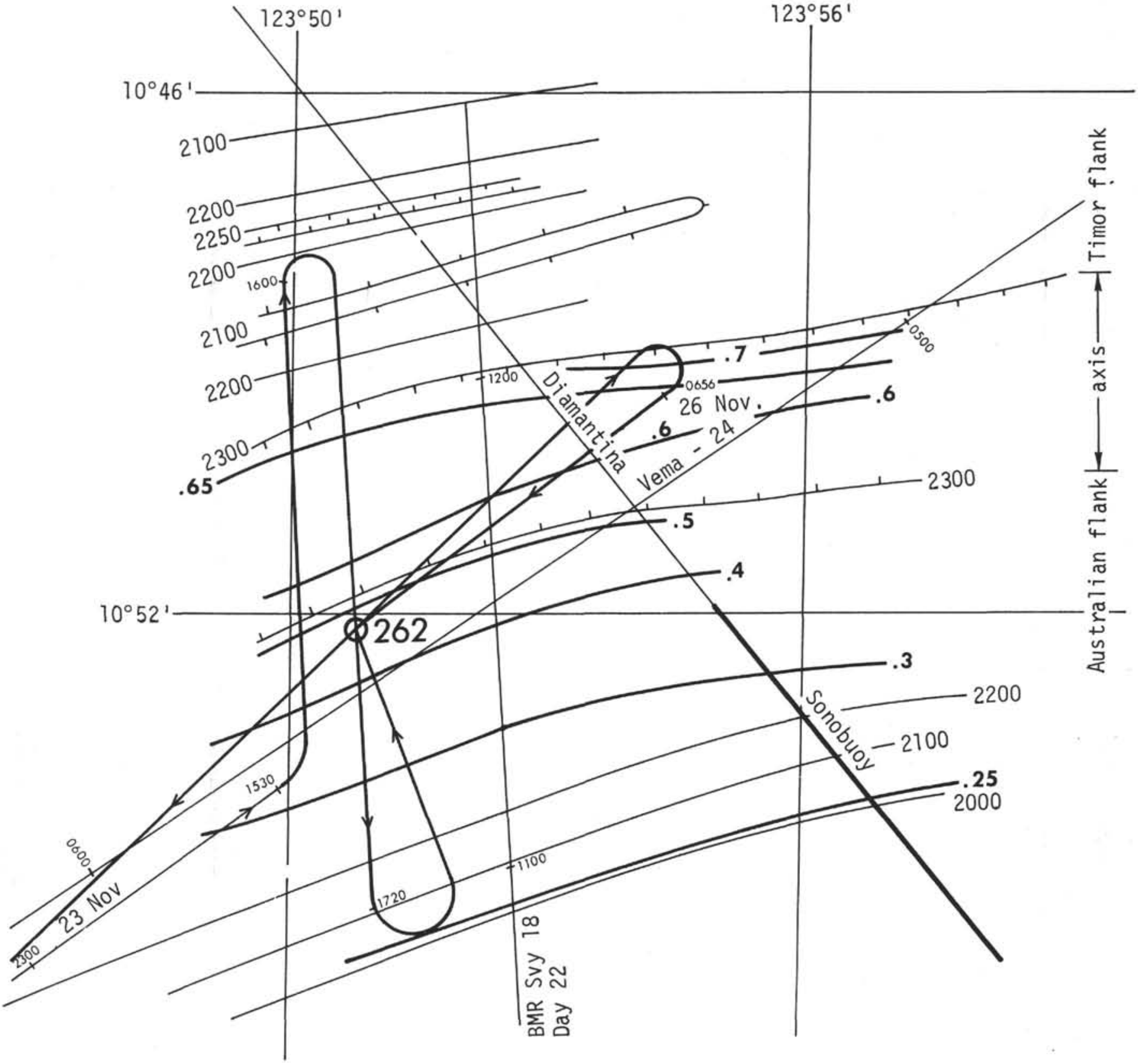

Figure 3. *Tracks, bathymetry, and reflection times to prominent reflector for Site 262.*

or 442 meters below sea floor. Details of the coring are included in the coring summary, Table 1.

Operations were routine with better-than-average recovery through Core 44 at 2738 meters. When Core 46 was cut from 2738.0-2747.5 meters, the hole sloughed and stuck the drill string on bottom. We were able to establish circulation and pumped in 50 barrels of mud. After circulating and working the pipe for 10 minutes, it came free. Core 47 was cut to 2757 meters and the drill string was again stuck for a few minutes before it was circulated and worked free. Since most of the scientific objectives of the site had been realized, we decided to terminate the hole rather than risking loss of the bottom hole assembly. The hole was filled with mud and abandoned.

Separate wire-line runs were made at 2548.0 meters and 2595.5 meters for heat-flow measurements. An inclinometer was included in the first run and recorded a deviation of 1.75° at 2540 meters. On the second heat-flow run, the extender was bent because the formation was too hard for penetration by the probe. No additional heat-flow runs were attempted because of hole conditions.

Weather conditions and positioning were exceptionally good during the time on site. After pulling and securing the drill string, we got underway to Site 263 at 1400, 26 November.

LITHOLOGY

At Site 262, 442 meters of sediment ranging from Holocene to Pliocene in age were penetrated and 82.5% of this recovered in cores. Five stratigraphic units are recognized on the basis of color, texture, and composition (Table 2).

TABLE 1
Coring Summary, Site 262

Core	Date (Nov 1972)	Time	Depth From Drill Floor (m)	Depth Below Sea Floor (m)	Cored (m)	Recovered (m)	Recovery (%)
1	24	0815	2315.0-2320.0	0.0-5.0	5.0	4.9	98
2		0920	2320.0-2329.5	5.0-14.5	9.5	4.5	47
3		1020	2329.5-2339.0	14.5-24.0	9.5	8.7	87
4		1055	2339.0-2348.5	24.0-33.5	9.5	5.4	57
5		1140	2348.5-2358.0	33.5-43.0	9.5	7.6	80
6		1225	2358.0-2367.5	43.0-52.5	9.5	9.0	95
7		1315	2367.5-2377.0	52.5-62.0	9.5	9.0	95
8		1400	2377.0-2386.5	62.0-71.5	9.5	9.5	100
9		1455	2386.5-2396.0	71.5-81.0	9.5	9.5	100
10		1540	2396.0-2405.5	81.0-90.5	9.5	9.5	100
11		1635	2405.5-2415.0	90.5-100.0	9.5	9.5	100
12		1730	2415.0-2424.5	100.0-109.5	9.5	9.5	100
13		1825	2424.5-2434.0	109.5-119.0	9.5	9.5	100
14		1920	2434.0-2443.5	119.0-128.5	9.5	9.5	100
15		2015	2443.5-2453.0	128.5-138.0	9.5	9.0	95
16		2110	2453.0-2462.5	138.0-147.5	9.5	7.2	76
17		2210	2462.5-2472.0	147.5-157.0	9.5	9.5	100
18		2310	2472.0-2481.5	157.0-166.5	9.5	9.5	100
19		2355	2481.5-2491.0	166.5-176.0	9.5	9.5	100
20	25	0040	2491.0-2500.5	176.0-185.5	9.5	9.2	97
21		0130	2500.5-2510.0	185.5-195.0	9.5	9.2	97
22		0220	2510.0-2519.5	195.0-204.5	9.5	6.2	65
23		0310	2519.5-2529.0	204.5-214.0	9.5	8.6	91
24		0400	2529.0-2538.5	214.0-223.5	9.5	9.0	95
25		0450	2538.5-2548.0	223.5-233.0	9.5	7.1	75
Heat-Flow Measurement 1							
26		0640	2548.0-2557.5	233.0-242.5	9.5	9.5	100
27		0730	2557.5-2567.0	242.5-252.0	9.5	9.5	100
28		0825	2567.0-2576.5	252.0-261.5	9.5	4.1	48
29		0910	2576.5-2586.0	261.5-271.0	9.5	9.5	100
30		1005	2586.0-2595.5	271.0-280.5	9.5	7.5	83
Heat-Flow Measurement 2							
31		1225	2595.5-2605.0	280.5-290.0	9.5	8.0	84
32		1315	2605.0-2614.5	290.0-299.5	9.5	9.5	100
33		1410	2614.5-2624.0	299.5-309.0	9.5	8.8	93
34		1500	2624.0-2633.5	309.0-318.5	9.5	6.0	63
35		1600	2633.5-2643.0	318.5-328.0	9.5	8.7	91
36		1645	2643.0-2652.5	328.0-337.5	9.5	9.3	98
37		1745	2652.5-2662.0	337.5-347.0	9.5	9.5	100
38		1830	2662.0-2671.5	347.0-356.5	9.5	7.5	79
39		1920	2671.5-1681.0	356.5-366.0	9.5	8.5	89
40		2020	2681.0-2690.5	366.0-375.5	9.5	7.0	74
41		2120	2690.5-2700.0	375.5-385.0	9.5	7.8	82
42		2215	2700.0-2709.5	385.0-394.5	9.5	7.4	78
43		2310	2709.5-2719.0	394.5-404.0	9.5	2.9	31
44	26	0005	2719.0-2728.5	404.0-413.5	9.5	3.9	38
45		0100	2728.5-2738.0	413.5-423.0	9.5	9.0	95
46		0220	2738.0-2747.5	423.0-432.5	9.5	0.1	1
47		0310	2747.5-2757.0	432.5-442.0	9.5	0.5	5

Note: Echo-sounding depth = 2308 meters; drill-pipe length to bottom = 2315 meters.

Unit 1 (0.0-261.5 m)

This 261-meter-thick unit consists dominantly of grayish-olive and pale-olive rad- and clay-rich nanno ooze, with subordinate foram- and micarb-rich nanno ooze, and detrital foram sand. Sediments are soft to stiff, slightly to moderately deformed, and typically thin bedded. The lower contact at 261.5 meters, is drawn where radiolarians disappear. Rad-rich nanno ooze, the dominant lithology, makes up 51% of Unit 1. Typically, the ooze consists of 50% nannos, 20% rads, 15% clay, and 10% micarb fragments. The remainder consists of forams, diatoms, sponge spicules, plant debris, and dolomite rhombs with trace amounts of quartz, feldspar, mica, heavy minerals, volcanic glass, iron oxides, glauconite, ostracods, silicoflagellates, echinoderm debris, and molluscan fragments. Texturally, the ooze is a silty clay. Bulk X-ray analysis shows that the rad-rich nanno ooze consists of 42% calcite, 20% quartz, 10% montmorillonite, 10% mica, 8% aragonite, 3% Mg-calcite, 3% kaolinite, 3% plagioclase, and 1% chlorite.

Clay-rich nanno ooze constitutes 30% of the unit and is lithologically similar to the rad-rich nanno ooze except that clay is more abundant than radiolarians.

TABLE 2
Major Lithologic Units of Site 262

Interval (m)	Unit	Description	Age	Thickness (including gaps) (m)	Cores
0.0-261.5	1	Grayish-olive rad- and clay-rich nanno ooze	Quaternary	261.5	1-28
261.5-337.5	2	Grayish-olive micarb- and clay-rich nanno ooze	Pleistocene	76.0	29-36
337.5-414.0	3	Grayish-olive nanno-rich foram ooze	Pliocene (based on planktonic foraminifera)	76.5	37-45
414.0-427.0	4	Greenish-gray foram-rich dolomitic mud	Pliocene	13.0	45-46
427.0-442.0	5	Yellowish-gray dolomitic shell calcarenite	Pliocene	15.0	46-47

This is the dominant lithology between 147 and 195 meters. Bulk X-ray analysis shows that the clay-rich nanno ooze consists of 44% calcite, 19% quartz, 10% mica, 8% montmorillonite, 8% aragonite, 4% kaolinite, 2% Mg-calcite, 2% plagioclase, 2% chlorite, and 1% pyrite. Texturally, the clay-rich nanno ooze is a silty clay.

Silty-clay micarb-rich nanno ooze forms 15% of the unit. Bulk X-ray analysis of this material shows that it consists of 43% calcite, 20% quartz, 10% mica, 8% montmorillonite, 7% aragonite, 6% kaolinite, 3% plagioclase, 1% Mg-calcite, 1% chlorite, and 1% pyrite.

Minor lithologies of Unit 1 are foram-rich nanno ooze (3% of the unit) and detrital foram sand (1% of the unit). The foram-rich nanno ooze occurs only in Core 1 (0.0-5.0 m) and is lithologically similar to the rad-rich nanno ooze except for the larger percentage of forams.

Most nanno oozes are grayish olive or pale olive with dark-gray streaks, layers, and lenses up to 5 mm thick. The dark-gray areas are relatively rich in clay, pyrite, and plant debris.

Greenish-gray massive-appearing detrital foram sands occur near the base of Cores 10, 11, 12, and 16. Typically, they consist of 85% broken and whole forams and 10% carbonate fragments. The remainder consists of quartz, heavy minerals, plant debris, calcareous nannos, and pyrite.

Total carbon averages 5% of Unit 1; organic carbon averages 1% and total $CaCO_3$ averages 33.9%.

Unit 2 (261.5-337.5 m)

Unit 2 consists chiefly of grayish-olive and pale-olive clay-rich nanno ooze, with subordinate foram- and micarb-rich nanno ooze. The lower contact with Unit 3 is gradational and is placed between Cores 36 and 37 where there is a change from nanno to foram ooze.

Average composition for the unit is: 60% nannos, 20% clay, 10% micarb, and 5% forams. The percentage of nannos decreases downward in this unit with a concomitant increase in the percentage of forams. The remainder consists mainly of (in order of decreasing abundance), radiolarians, sponge spicules, diatoms, pyrite, and dolomite rhombs. Trace amounts of quartz, feldspar, heavy minerals, volcanic glass, zeolite, molluscan fragments, echinoid spines and plates, fish remains, silicoflagellates, and glauconite occur sporadically throughout the unit. On the basis of bulk X-ray analysis this unit has the following average composition: 55% calcite, 2% Ca-dolomite, 16% aragonite, 10% quartz, 1% plagioclase, 2% kaolinite, 7% mica, 1% chlorite, and 5% montmorillonite. Total carbon averages 7.2% of Unit 2; organic carbon averages 0.8%, and total $CaCO_3$ averages 53.9%.

Three grayish-white volcanic ash layers occur in this unit. They are composed chiefly of ash-size glass shards with subordinate amounts of clay. Crystals include hornblende, hypersthene, opaques, and feldspar. One pumice fragment, 1.5 cm in diameter, occurs in Sample 33-4, 20 cm.

Bedding types, degree of induration, and types of drilling deformation are similar to those in Unit 1.

Unit 3 (337.5-414.0 m)

Grayish-olive and pale-olive nanno- and micarb-rich foram ooze with subordinate micarb-foram ooze and foram-rich micarb ooze comprise this unit which is 76.5 meters thick. Sediments are thickly bedded, stiff to semilithified, and usually slightly to moderately deformed.

Average composition is: forams 47%; carbonate fragments, 22%; nannos, 19%; clay, 8%; and quartz, 2%. Other constituents are dolomite rhombs, pyrite, sponge spicules, plant debris, heavy minerals, and glauconite. An average composition from bulk X-ray analysis is 61% calcite, 13% Ca-dolomite, 16% aragonite, 7% quartz, 2% mica, and trace amounts of K-feldspar, plagioclase, and kaolinite. Total carbon averages 9.1% of this unit; organic carbon forms 0.4%, and $CaCO_3$ averages 72.4%.

There is a notable increase in the percentage of carbonate fragments from 10% near the top to over 30% at the base. The percentage of clay, forams, and nannos systematically decreases downward.

The lower contact with Unit 4 is sharp and planar and is marked by a distinct lithologic change from foram ooze to dolomite.

Unit 4 (414.0-427.0 m)

This unit is a thick-bedded, greenish-gray and pale-olive foram-rich dolomitic mud. It is stiff to semilithified and is slightly deformed by drilling. The lower contact with Unit 5 was not observed and occurs in the area of no recovery between 423.0 and 432.4 meters. A slight decrease in penetration rate observed at 427 meters is interpreted as indicating the basal contact. Penetrated thickness ranges from a minimum of 8 meters to a maximum of 17 meters.

Dolomite rhombs form 83% of typical specimens with 14% forams and 2% clay. Trace constituents include pyrite, quartz, and glauconite. Total carbon averages 9.1% of Unit 4; organic carbon averages 0.2%; and $CaCO_3$ averages 99%.

Unit 5 (427.0-442.0 m)

Lithified yellowish-gray and light-greenish-gray dolomitic shell calcarenite is the basal unit. This lithology is represented only by material from Cores 46, CC and 47, CC. Thickness penetrated is between 10 meters and 19 meters. The unit is massively bedded. It consists of whole, broken, and worn shallow-marine forams, molluscs, echinoderms, and sponge spicules along with minor amounts of heavy minerals, quartz, and clay; these are set in a matrix of spar and dolospar.

Interpretation

Based on lithology, sedimentary structures, and types of fossils, the depositional environments are interpreted as follows (from oldest to youngest):

1) Unit 5, dolomitic shell calcarenite, was probably deposited in shallow marine water. This is indicated by the abundance of shallow-water benthonic foraminifera plus the broken and rounded character of the molluscan and echinoderm debris. Moderate sorting of the skeletal debris and the low clay content also suggest a high-energy shallow-water environment. The sparry-calcite cement is probably derived from external sources because none of the allochems have been dissolved. The origin of the dolomite is unknown, but may be a local replacement of original sparry-calcite cement, the Mg^{++} possibly being released from the inversion of high-Mg calcite to low-Mg calcite within echinoderm debris.

2) The foram-rich dolomitic mud of Unit 4, consists of 14% benthonic foraminifera set in a matrix of sand- and silt-size dolomite rhombohedra. The forams are very shallow-water benthonic forms. Either of the following origins is possible for this unit: (a) dolomitization of original micrite containing low-Mg foraminifera; or (b) deposition of primary dolomite that was later diagenetically recrystallized.

3) Unit 3, nanno-rich foram ooze, accumulated in shallow to deep water. Near the base of the unit, (Cores 43 and 44) the high proportion of shallow-water benthonic foraminifera indicates an inner-shelf environment with water depths less than 30 meters. The sudden disappearance of benthonic foraminifera and the appearance of abundant planktonic forms in Core 42 (at about 390 m) suggest a rapid and continual deepening of the trough, probably to a depth approaching that of today.

4) The nanno oozes of Units 1 and 2 are infraneritic deposits that formed above the regional carbonate compensation depth in an environment similar to that which exits in the Timor Trough today. This is indicated by the high proportion of pelagic organisms such as radiolarians, forams, and diatoms. The clay is probably terrigenous and derived from nearby Timor. The units have a combined thickness of 337.5 meters and were deposited less than 2 million years, thus yielding a sedimentation rate exceeding 150 m/m.y. The rapid rate of sediment accumulation along the trough axis is believed to result from a combination of normal pelagic sedimentation and slumping of pelagic deposits marginal to the trough axis into the deeper parts of the trough.

Volcanic ash layers in Cores 29 and 33 are ash-fall deposits derived from unknown sources.

Foram sands in Unit 1 are composed chiefly of planktonic foraminifera with little or no clay, and these do not display graded bedding. van Andel and Veevers (1967) noted similar sands and believed them to be products of local current winnowing which concentrates planktonic foraminifera and prevents clay deposition. Our data support this contention.

BIOSTRATIGRAPHY AND PALEONTOLOGY

General

The Timor Trough Site 262 penetrated 442 meters of Recent, Pleistocene, and Pliocene sediments, most of which are rich in plankton microfauna and flora. In the bottom 3-4 cores both sediments and fossils indicate an abrupt change from a relatively deep-water environment to a shallow near-shore, beach-like environment. The studied microplankton consists of usually abundant foraminifera, calcareous nannoplankton, Radiolaria, and diatoms. The siliceous group, Radiolaria and diatoms, is abundant only from Core 27 (252 m) upward, whereas the calcareous plankton, foraminifera and nannos are common to abundant from Core 44 (413.5 m) upward. More sporadic in distribution and less frequent are pteropods, ostracods, and particularly in the lower part of the section, benthonic molluscs (Figure 4).

The Recent-Pleistocene section is more than 300 meters thick. It is the most complete and fossiliferous tropical marine sequence of this age continuously cored at a DSDP site. It is comparable in thickness and lithology (euxinic bottom conditions) to the Recent-Pleistocene of Site 147 in the Cariaco Trough, off the north coast of Venezuela. Site 147, however, was terminated in the upper part of the Pleistocene at a depth (from sea bottom) of 162 meters.

A number of datum levels based on different taxa are currently used to determine the Pliocene-Pleistocene boundary. Depending on the criteria followed, the position of this boundary and its absolute age within a given section may vary considerably.

A number of authors, most recently Berggren (1973), have correlated this boundary in marine sections containing plankton, with the first appearance of *Globorotalia truncatulinoides truncatulinoides* at ±1.8 m.y. In many piston cores, this level coincides quite closely with the extinction of *Discoasters,* in particular *D. brouweri.* Other changes that occur at or close to 1.8 m.y. are a change in coiling from right to left in

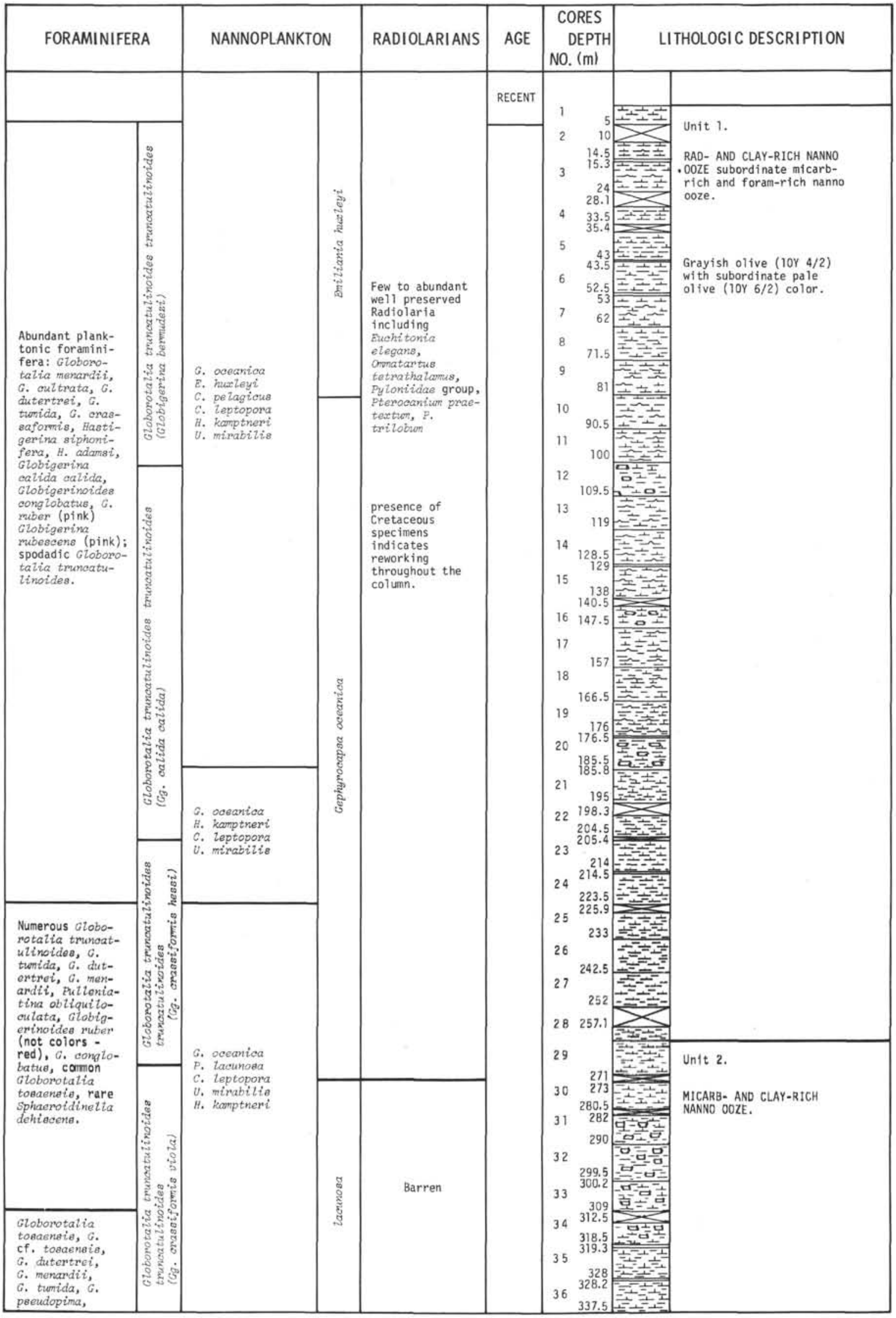

Figure 4. *Biostratigraphy column.*

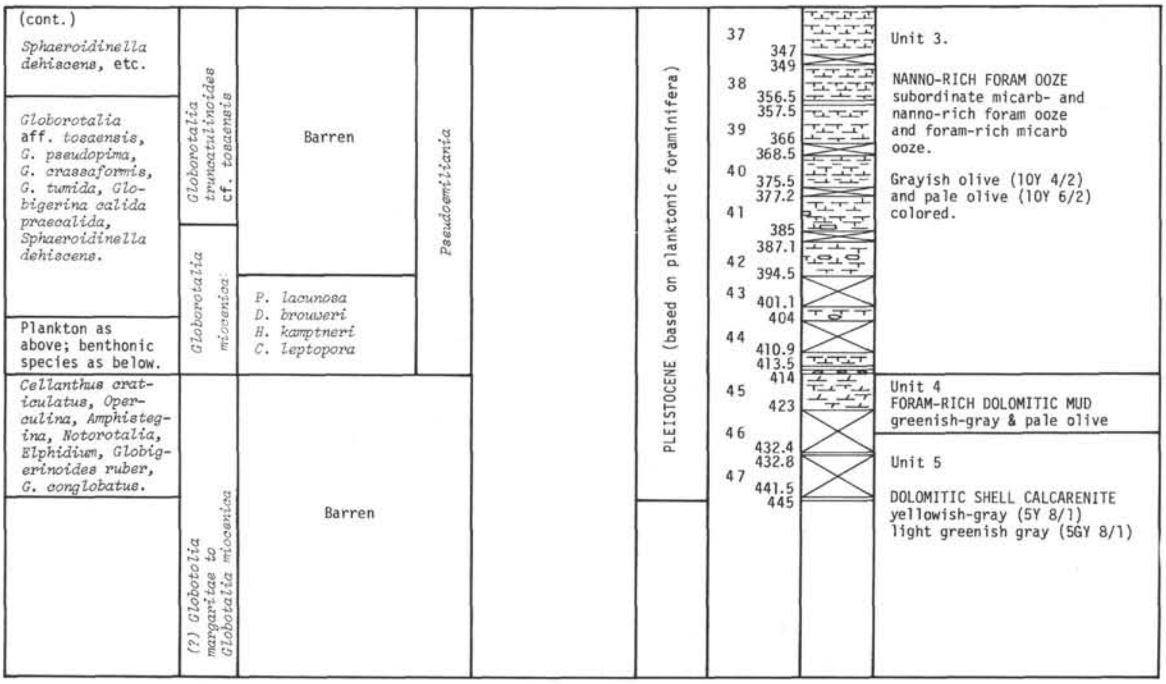

Figure 4. *(Continued).*

Globorotalia menardii s.l., the first appearance of *Hyalinea baltica*, and the extinction of *Globigerinoides obliquus extremus*.

These events seemingly take place more or less synchronously in condensed sections, where the Pleistocene may only be a few meters thick, as is often the case. The timing of these events, however, may not be the same in time with equivalent but thicker sections measuring tens or hundreds of meters. This has already been discussed and some examples given (DSDP Initial Report 4, p. 599-600).

Site 262 is a good example of the lack of synchronism in these events because the distinct *Discoaster brouweri* peak disappears in Core 44 at 407 meters, well in advance of the first appearance of *Globorotalia truncatulinoides truncatulinoides* at the base of Core 36, at 337.5 meters, or some 70 meters higher in the section.

Other authors (Lamb, 1969; Smith and Beard, 1973) apply criteria for placing the Pliocene-Pleistocene boundary that differ from those of Berggren (1973). According to them, the boundary is determined by the drastic reduction of *Discoasters* as a result of the beginning of a cooling period, at about 2.8 m.y. In Site 262 this level lies within Core 44 (Proto Decima, this volume, Table 7). Following these authors, *Discoasters*, including *D. brouweri*, do not become completely extinct at 2.8 m.y. but are only much reduced in number or they may temporarily disappear regionally due to the cooling. They reappear again in greater numbers shortly after the first occurrence of *Globorotalia truncatulinoides truncatulinoides* (Smith and Beard, 1973, p. 650, Fig. 5).

If the section at Site 262 is interpreted in this light one arrives at the following picture: the sharp drop in *Discoaster* abundance in Core 44 represents the beginning of a cooling period. The later erratic and much reduced occurrences of *D. brouweri* in Cores 43-34 could represent reworking, but they could also be authochtonous. The increase of the species in Cores 33 and 32, shortly after the first appearance of *Globorotalia truncatulinoides truncatulinoides* in Core 36, at a time of warming as indicated by the presence of *G. tumida*, would then correspond with the final increased occurrence of *Discoaster* in the Aftonian-Emilian (Upper Calabrian) of Smith and Beard, 1973. The much reduced *D. brouweri* occurring only erratically thereafter in the interval between Cores 31-5 would then be reworked. Strong reworking of older Paleocene and Cretaceous nannoplankton is observed, particularly in Cores 28-5. The base of this increased reworking approximately coincides with the influx of siliceous microfossils, particularly of Radiolaria and diatoms.

Depending on whether one uses the criteria of Berggren (1973) or Lamb (1969) and Smith and Beard (1973) for determining the Pliocene-Pleistocene boundary one can arrive at very different interpretations of the section at Site 262.

1) Based on the first occurrence of *Globorotalia truncatulinoides truncatulinoides* the Pliocene-Pleistocene boundary occurs in Core 36, CC at 337.5 meters (± 1.8 m.y.). Extrapolated average sedimentation rates for the Pleistocene are then about 19 cm/1000 y. Assuming similar rates of deposition also below 337.5 meters, between Cores 37 and 44, the abrupt decrease in frequency of *D. brouweri*, which lies 70 meters below the first *G. truncatulinoides truncatulinoides*, would have occurred 400,000 years earlier at ± 2.2 m.y.

2) Based on the abrupt decrease in *Discoaster* abundance the Pliocene-Pleistocene boundary occurs within Core 44, at 407 meters. Extrapolated average sedimentation rates for the Pleistocene in this case

would be about 15 cm/1000 y. Based on this the first occurrence of *G. truncatulinoides truncatulinoides* at 337.5 meters would have occurred at about 2.3 m.y. B.P. instead of ± 1.8 m.y. as postulated by Berggren (1973). The top of the weak *Discoaster brouweri* peak in Core 32 and the extinction of this species there would lie at about 2.0 m.y. marking according to Smith and Beard (1973), the upper Calabrian/Emilian-Kansas/Sizilian boundary.

The above extrapolation of absolute ages of last occurrence of frequent *D. brouweri* and first occurrence of *G. truncatulinoides truncatulinoides*, based on assumed constant sedimentation rates, leads to widely differing figures at Site 262. Paleomagnetic or absolute age dating of the sediments may eventually help in determining the correct figures.

Whatever the actual time gap is between the last occurrence of frequent *D. brouweri* and the first appearance of *G. truncatulinoides truncatulinoides*, it must be considerable for the Indian Ocean area of Site 262. This gap is not restricted to the Indian Ocean as is shown in the Caribbean DSDP Site 148 (Leg 15) where the top of frequent *D. brouweri* was recorded at 131 meters, and the base of *G. truncatulinoides truncatulinoides* 13 meters higher, at 118 meters.

The regional distribution of Pliocene-Pleistocene planktonic foraminifera and calcareous nannoplankton is controlled by environmental conditions, not only in cold and temperate, but also in tropical areas. This was shown by citing a few examples in DSDP Leg 4 Initial Report, p. 585, 586, 598, 599. The worldwide distribution pattern of the Pliocene-Pleistocene planktonic foraminifera and calcareous nannoplankton is complex because of the numerous climatic belts and frequent changes of them. Consequently, zonal schemes based on them are necessarily tied to geographically restricted areas, the limits of which are still to be investigated.

A subdivision of the Site 262 Pliocene and Pleistocene section can be subdivided fairly successfully on planktonic foraminiferal zonation and subzonation established in the Caribbean but certain problems exist. In the Pleistocene some zonal markers are more irregularly distributed compared with the Caribbean, and in the Pliocene extensive reworking is possible. The extended thickness of the Pleistocene and upper part of the Pliocene, rich in planktonic organisms, made possible a study of evolutionary trends in the *Globorotalia truncatulinoides* and *G. crassaformis* groups.

The most significant faunal-floral change within the Pleistocene takes place in Core 29 and very slightly above. The boundary between the foraminiferal subzones *Globorotalia crassaformis viola* and *Globorotalia crassaformis hessi* lies at the base of Core 29; that of the nannoplankton zones *Pseudoemiliania lacunosa* and *Gephyrocapsa oceanica*, within this core. From Core 29 down, ostracods and benthonic molluscs are regularly present; above Core 29, they occur only intermittently. Only slightly higher, at Cores 29 and 27 respectively, Radiolaria and diatoms appear and then continue to be present to the top of the section.

Biostratigraphy

Recent: Core 1 (0.0-5.0 m). Top parts of the *Globorotalia truncatulinoides truncatulinoides* and the *Emiliania huxleyi* zones. Age on planktonic foraminifera based on the extinction of *Globorotalia hessi. G. fimbriata*, characteristic for the Holocene in the Caribbean, is not present.

Pleistocene: Cores 2-36 (5.0-337.5 m). (Based on planktonic foraminifera.) *Globorotalia truncatulinoides truncatulinoides* Zone, with the following subzones, from top to bottom: *Globigerina bermudezi* (Cores 2-11); *Globigerina calida calida* (Cores 12-22); *Globorotalia crassaformis hessi* (Core 23-Core 29, Section 5); *Globorotalia crassaformis viola* (Core 29, CC-Core 36). Core 2-Core 44, Section 2 (5.0-407 m). (Based on nannoplankton.) Planktonic foraminifera are abundant throughout, some species are irregular in their occurrence indicating temperature fluctuations. The following nannoplankton zones are distinguished, from top to bottom: *Emiliania huxleyi* (Cores 1-9); *Gephyrocapsa oceanica* (Cores 10-29); *Pseudoemiliania lacunosa* (Core 30-Core 44, Section 2).

Pliocene: Cores 37-47 (337.5-442.0 m). (Based on planktonic foraminifera.) The following planktonic foraminiferal zones are distinguished, from top to bottom: *Globorotalia truncatulinoides* cf. *tosaensis* (Core 37-Core 41, Section 2); *Globorotalia miocenica* (Core 41, Section 5-Core 45, Section 1): *Globorotalia miocenica-?Globorotalia margaritae* (Core 45, Section 1-Core 47). Core 44, Section 3-Core 45, Section 1 (407.0-415.0 m). (Based on nannoplankton.) Nannoplankton: *Discoaster brouweri* (Core 44, Section 3-Core 45, Section 1). The abundance of planktonic foraminifera and nannoplankton decrease rapidly from common in Core 44 to rare or absent in Core 47. This is due to a very rapid shallowing of the depositional environment and a consequent replacement of the planktonic foraminifera by near-shore benthonic foraminifera and molluscs.

Paleontology

For more information on the individual fossil groups briefly discussed below, refer to the special reports in this volume.

Foraminifera

Planktonic foraminifera are abundant from Cores 1-43, common in Core 44, and scarce in Cores 45-47. Benthonic foraminifera are rare in Cores 1-28, frequent in 29-39, and common in 40-47.

Core 1 whose faunal composition differs from that below is probably Recent. *Globorotalia truncatulinoides truncatulinoides* is present in Core 1, but not in the cores immediately below. Absent also are subspecies of *Globorotalia crassaformis*, some of which—*G. crassaformis hessi*, and *G. crassaformis crassaformis*—range as high as Core 2.

Cores 2-36 are placed in the Pleistocene based on the first appearance of *Globorotalia truncatulinoides truncatulinoides*, evolving from *G. truncatulinoides tosaensis*. Though transitional forms between *G. truncatulinoides tosaensis* and *G. truncatulinoides truncatulinoides* are present in Cores 39-37, the boundary is placed with the appearance of the first fully evolved *G. truncatulinoides truncatulinoides*.

It was possible to subdivide the Pleistocene section based on the zonation proposed by Bolli and Premoli Silva (1973). Following this zonal scheme, Cores 2-11 are placed into the *Globigerina bermudezi* Subzone. All subspecies present of *Globorotalia crassaformis* coil dextrally in the upper part of this subzone (Cores 2-27), and sinistrally below. Further, *Globorotalia truncatulinoides truncatulinoides* is absent. These suggest that a warmer climate prevailed during this interval than immediately before or after. The base of the *Globigerina bermudezi* Subzone is tentatively placed with the top of *Globorotalia tumida flexuosa* which ranges from Core 41, Section 2-Core 12. Cores 12-22 are placed in the *Globigerina calida calida* Subzone, the subzonal marker occurring first at the base of this subzone.

Core 23-Core 29, Section 5 are assigned to the *Globorotalia crassaformis hessi* Subzone, with the zonal marker beginning at its base. The subspecies *Globorotalia truncatulinoides tosaensis* and *G. crassaformis ronda* disappear within this zone in Core 26.

The *Globorotalia crassaformis viola* Subzone, the lowermost of the Pleistocene, ranges from the base of Core 36 to Core 29, Section 5, its base being determined by the first evolutionary appearance of *Globorotalia truncatulinoides truncatulinoides.*

The Pliocene-Pleistocene boundary at the base of Core 36 coincides also with the top of *Globigerinoides fistulosus.* This species disappears in the Caribbean slightly earlier, the middle Pliocene. The boundary also coincides with a change in direction of coiling in some species, e.g., *Pulleniatina obliquiloculata obliquiloculata,* which from this level upward is consistently dextral, whereas at lower levels it alternates in short intervals between dextral and sinistral. Dextrally coiling *Globorotalia menardii s.l.* and *G. tumida* continue into the lower Pleistocene. In Cores 32-35 they occur in short intervals strongly alternating between dextral and sinistral. This is in contrast to other occurrences where the change from dextral to sinistral coincides approximately with the Pliocene-Pleistocene boundary, or with the first appearance of *Globorotalia truncatulinoides truncatulinoides.*

Cores 37-47 are placed in the Pliocene. Because zonal markers are absent or possibly reworked, a subdivision is difficult. The base of the *Globorotalia truncatulinoides* cf. *tosaensis* Zone is placed at Core 41, Section 2 with the first appearance of *Globorotalia truncatulinoides* cf. *tosaensis.* Core 41, Section 3-Core 45, Section 1 are placed in the *Globorotalia miocenica* Zone. *Globoquadrina altispira* (Core 45, Section 2) *Globorotalia multicamerata* (Core 42, CC) and *Globigerinoides obliquus extremus* (Core 41, Section 5) disappear within this Zone. Core 45, Section 2-Core 47 are regarded as of *Globorotalia miocenica* or *(?)Globorotalia margaritae* Zone age. Although *Globorotalia margaritae* is absent, this may be due to dissolution to which the species is particularly prone. Reworked specimens of *G. margaritae,* however, are present in Cores 41-42. Missing in these cores is *Globorotalia truncatulinoides tosaensis* which should be present from the base of the *Globorotalia miocenica* Zone onward.

Hyalinea balthica which has been claimed to make its first appearance at the Pliocene-Pleistocene boundary in the Mediterranean, straddles this boundary at Site 262 by occurring in Core 44, Section 2-Core 33, Section 2. In the Caribbean this species also first appears in the Pliocene. Of interest is the level of first occurrence of *Hyalinea balthica* in Core 44, Section 2 which coincides with the extinction of *Discoaster brouweri,* the nannoplankton index fossil claimed to become extinct at the Pliocene-Pleistocene boundary.

The interval of Core 44 through Core 45, Section 1, 95 cm has a rich planktonic and benthonic foraminiferal assemblage. The benthonic species are comparable to those of the interval below (Core 45, Section 1, 95 cm through Core 47), and together with rich plankton, indicate a deeper and quieter water condition. The fauna is regarded as ecologically intermediate between that of Cores 39-43 and Core 45, Section 1, 95 cm-Core 47. This interval is tentatively interpreted as a shelf environment with an approximate water depth of 100-200 meters.

Core 45, Section 1, 95 cm-Core 47 contains almost exclusively thick-shelled, rolled and often broken, large benthonic foraminifera and pelecypod fragments. Present are: *Cellanthus craticulatus, Operculina* sp., *Amphistegina* sp., Notorotalia sp., *Elphidium* sp. sp., Heterolepa sp., and *Heterostegina* sp.

The environment is interpreted as being shallow, close to shore with turbulent water and strong currents or wave action.

Nannoplankton

Calcareous nannoplankton are abundant at this site, good to moderately preserved, and range in age from upper Pliocene to Recent. They are associated with abundant siliceous skeletal remains from the top down to Core 29, and with Ascidian spicules throughout the sequence. Assemblages of the *Emiliania huxleyi* Zone have been established by SEM from Cores 1-9 (0.0-81.0 m). From Cores 10-29, (81.0-223.2 m), the calcareous nannoplankton belong to the *Gephyrocapsa oceanica* Zone. Reworked Cretaceous nannoplankton species are frequent from Core 29 upward. Core 30-Core 44, Section 2 contain nannoplankton assemblages of *Pseudoemiliania lacunosa* Zone age. The Pliocene-Pleistocene boundary based on the *Discoaster* extinction is placed between Core 44, Section 3 and Core 44, Section 2, 394 meters below the sea floor. From this point upward *Discoaster brouweri* is extremely rare. Core 44, Section 3-Core 45, Section 1 is referred to the *Discoaster brouweri* Zone, upper Pliocene. Following Smith and Beard (1973) the extinction of *D. brouweri* occurred after the first appearance of *Globorotalia truncatulinoides truncatulinoides* and the marked decrease of the species in Core 44 would be due to cooling. The samples of Core 45, Section 2-Sample 47, CC are barren of calcareous nannoplankton.

Higher evolved *Gephyrocapsa* species appear beginning with Core 36. Below this level the genus is represented by more primitive forms. This evolutionary change coincides with the Pliocene-Pleistocene boundary based on the first occurrence of *Globorotalia truncatulinoides truncatulinoides.*

Radiolaria

Samples from Cores 1-25 contain a moderately abundant assemblage of Quaternary radiolarians in which the preservation is good to moderate. Species diversity is high and includes, in order of decreasing abundance: *Dictyocoryne profunda, Euchitonia mülleri, Ommatartus tetrathalamus,* Pyloniidae group, *Pterocanium praetextum,* and *P. trilobum.*

Most samples show sparse contamination with reworked Cretaceous material including the species *Amphipyndex epiplatys*, and *Dictyophinus brouweri*.

In samples from Cores 26-28, the same assemblage of Quaternary radiolarians decreases rapidly in abundance and is absent in Core 29. Many specimens are broken.

Diatoms

Diatoms are present in Cores 1-27, approximately the same interval as the Radiolaria which appear only very slightly earlier, in Core 28. In Cores 26-27 diatoms are rare; in 23-25 frequent, and in 13-22 mainly common, occasionally abundant. Core 12 is poor in diatoms but they become common to abundant in Cores 1-11. These frequencies are based on the figures given in Table 1 of Jouse and Kazarina (this volume). In terms of actual counts, diatoms are, as a whole, not numerous in the examined samples because of a diluting effect by terrestrial and carbonate material. Diatoms are well preserved and sufficiently abundant to characterize the flora which is divided into 5 zones with upper, middle, and ?middle Pleistocene ages.

The majority of the 97 recognized species are oceanic with considerably fewer neritic and only some littoral species. The diatoms of the upper part of Site 262, Cores 1-11 (Zone I) correspond to the Recent warm-water tropical flora of the Indian Ocean. Core 12 (Zone II) is characterized by a nearly complete absence of diatoms. Cores 13-25 (Zone III) contain nearly all the species typical for Zone I but they are generally less frequent. Some, however, differ in morphology from the modern forms, indicating an older age for this zone. Further, the number of sublittoral species increases in Zone III, pointing towards shallower and also somewhat colder water conditions for Cores 13-25, as compared to Cores 1-11. The Zone IV and V diatoms (Cores 26, 27, respectively) are scarce; those of Core 27, Section 6 being comparable to those of Zone III.

Ostracods

Ostracods are rare or absent in the upper and middle part of the Pleistocene. In the lower part, from Core 29 down, they are regularly present but still rare, becoming frequent in some of the upper and middle Pliocene samples. In the basal part, Cores 44-47, they are again rare to absent. Apart from frequency counts, they have not been investigated for this report.

Molluscs

Frequency counts have been made separately for Pteropods and benthonic molluscs. The latter are irregularly and sparsely present in the upper part of the section, becoming regular and occasionally frequent in its lower part. Pteropoda are frequent in Cores 1 and 2, absent in the basal part, irregular and rare in between.

GEOCHEMICAL MEASUREMENTS

Sampling was undertaken at closer intervals at Site 262 than at other Leg 27 Sites to obtain a more coherent picture of geochemical variations than has been previously possible. One sample was obtained from every core length, generally from Sections 5 or 6 unless this position of the core was too highly disturbed or contained voids. Analytical methods were identical with those previously followed in the geochemical program, and detailed earlier in this report. Results are reported in Table 3 and presented graphically in Figure 5, Cook (this volume) discusses the porewater geochemistry of Site 262.

Alkalinity

The alkalinity values range from a minimum of 0.98 meq/kg to a maximum of 92.86 meq/kg, compared with a mean for surface seawater at this site of 2.49 meq/kg. The alkalinity maximum is considerably higher than any previously recorded alkalinity value in the DSDP program. The high alkalinities are probably the result of bacterial activity producing CO_2 which then dissolves in water, primarilv as the bicarbonate ion.

The high alkalinity is believed to be in part a reflection of a rapid sedimentation rate which resulted in the burial of abundant organic material prior to extensive oxidation. The progressive decrease in alkalinity with increased depth is believed to be the product of diagenesis and the availability of organic material. There is no obvious correlation between alkalinity and the main lithologic units.

pH

"Punch-in" *p*H values are only available to a depth of 184 meters and are generally 0.2 *p*H units lower than the "flow-through" values. "Flow-through" values range from a minimum of 7.12 (at the top of the hole) to a maximum value of 8.17 at a depth of 247 meters. The mean *p*H value for surface sea-water at this site is 8.23. There is no systematic change in *p*H in the core and it is not possible to relate changes in *p*H with any lithologic units.

Salinity

It is evident from Figure 5 that there is a marked increase in salinity with increasing depth, reaching a maximum value of 53.1 ‰ at a depth of 421 meters below the sediment surface (the maximum depth sampled). The curve crosses lithologic boundaries with no evident discontinuity, suggesting that the interstitial salinities are not related in any way to paleosalinity. The magnitude of the salinity, particularly as it is associated with a normal fauna, also argues against the salinity being a primary environmental feature. The only reasonable explanation at this stage for the salinity values would seem to be that there is a salt horizon located at depth with upward diffusion of saline brine. The rapid rate of deposition in the Timor Trough area would necessitate that the diffusion of the brines take place fairly rapidly. Consequently, the salt horizon may be located at no great depth below the bottom of Site 262, i.e., hundreds of meters below rather than thousands of meters below the base of the hole.

PHYSICAL PROPERTIES

Bulk-density, sound-velocity, porosity, and vane shear-strength measurements were made on sediments recovered at Site 262. Continuous coring enabled profiles of density and shear strength to be established although sound velocity could not be determined over most of the sedimentary column. Percentage of recovery

TABLE 3
Summary of Shipboard Geochemical Data, Site 262

Sample (Interval in cm)	Depth Below Sea Floor (m)	*p*H		Alkalinity (meq/kg)	Salinity (°/oo)	Remarks
		Punch-in	Flow-through			
		8.36	8.21	2.44	34.6	Reference seawater
1-4, 0-6	3.5-3.56	7.12	7.12	22.48	33.6	
2-4, 0-6	13.0-13.06	7.50	7.55	72.63	36.3	
3-5, 146-150	22.46-22.50	7.40	7.62	87.39	37.4	
4-3, 0-6	30.50-30.56	7.48	7.72	90.32	37.4	
5-4, 0-6	38.50-38.56	7.62	7.72	87.19	37.4	
6-6, 0-6	51.00-51.06	7.40	7.67	92.86	38.0	
7-1, 0-6	53.00-53.06	7.55	7.80	82.21	37.4	
8-6, 0-6	(68.08-68.14)	7.48	7.92	76.93	36.6	Depth uncertain due to gas expansion
9-5, 0-6	78.00-78.06	7.52	7.63	65.59	36.3	
10-1, 0-6	81.50-81.56	7.65	7.86	63.64	36.3	
11-6, 0-6	98.50-98.56	7.90	7.80	53.37	35.5	
12-6, 0-6	108.00-108.60	7.57	7.86	50.64	35.2	
13-1, 0-6	110.00-110.06	7.68	7.85	45.36	35.2	
14-1, 144-150	120.94-121.00	7.53	7.77	36.27	34.9	
15-6, 0-6	136.50-136.56	7.54	7.77	47.07	35.2	
16-6, 0-6	146.00-146.06	7.61	7.83	50.44	35.8	
17-6, 144-150	156.94-157.00	7.46	7.71	52.59	36.3	
18-4, 0-6	162.00-162.06	7.47	7.64	48.19	36.3	
19-5, 144-150	174.44-174.50	7.52	7.84	49.95	36.0	
20-3, 144-150	183.94-184.00	7.58	7.81	51.22	37.1	
21-6, 0-6	192.50-193.56	–	7.81	46.92	36.8	
22-5, 0-4	203.00-203.04	–	7.66	39.59	36.8	
23-6, 0-6	212.50-212.56	–	7.72	28.05	36.8	
24-6, 0-6	222.00-222.06	–	7.47	19.45	36.6	
25-4, 0-6	230.00-230.06	–	7.61	24.14	36.8	
26-5, 0-6	239.50-239.56	–	8.04	15.73	37.7	
27-4, 0-6	247.50-247.56	–	8.17	11.14	38.2	
28-3, 0-6	260.00-260.06	–	7.58	14.47	38.5	
29-5, 0-6	268.00-268.06	–	7.65	5.77	38.5	
30-5, 0-6	279.00-279.06	–	7.45	6.74	38.5	
31-6, 0-6	288.50-288.56	–	7.50	5.96	39.9	
32-6, 0-6	298.00-298.06	–	7.67	4.20	39.6	
33-6, 0-6	307.50-307.56	–	7.44	4.69	41.5	
34-4, 0-6	317.00-317.06	–	7.50	4.30	41.5	
35-6, 0-6	326.50-326.56	–	7.75	2.93	42.6	
36-6, 0-6	336.00-336.06	–	7.70	3.03	43.7	
37-6, 0-6	345.50-345.56	–	7.83	1.96	43.7	
38-5, 0-6	355.00-355.06	–	7.71	2.35	44.6	
39-5, 0-6	363.00-363.06	–	7.38	2.93	47.3	
40-5, 0-6	374.00-374.06	–	7.73	1.96	45.6	
41-6, 0-6	383.50-383.56	–	7.98	1.37	49.8	
42-5, 0-6	393.00-393.06	–	8.09	0.88	48.1	
43-2, 0-6	402.50-402.56	–	8.01	0.98	48.1	
44-3, 0-6	412.00-412.06	–	7.68	1.37	51.4	
45-6, 0-6	421.50-421.56	–	7.41	1.96	53.1	
		8.36	8.24	2.54	34.6	Reference seawater

was good in comparison with other holes but the percentage of relatively undisturbed materials was again very low. Sediment disturbance from gas expansion was common in Cores 3-33. However, even in cores of high gas content there was usually a small distance over which the sediments appear only mildly disturbed, as evidenced by little distortion of horizontal layering. Density, porosity, and sonic velocity are plotted alongside the site summary sheets. Continuous GRAPE density (and porosity) are plotted alongside the core photographs. A description of the testing procedures and discussion of wet bulk density determinations and vane shear results are included in later chapters in Part IV.

Density and Porosity

Continuous GRAPE, syringe, and water-displacement methods were used to determine wet bulk density. Static GRAPE measurements were also made on sample cylinders in soft material and on cubes cut from lithified sediment. A continuous profile of wet bulk density may be established by all three measurement methods. The water-displacement test is considered the most accurate and was used as a baseline for the site summary profile. Density increases from 1.50 g/cc at the surface to 2.10 g/cc at 422 meters. The increase is continuous over the entire hole, but the data show considerable scatter over the first 250 meters.

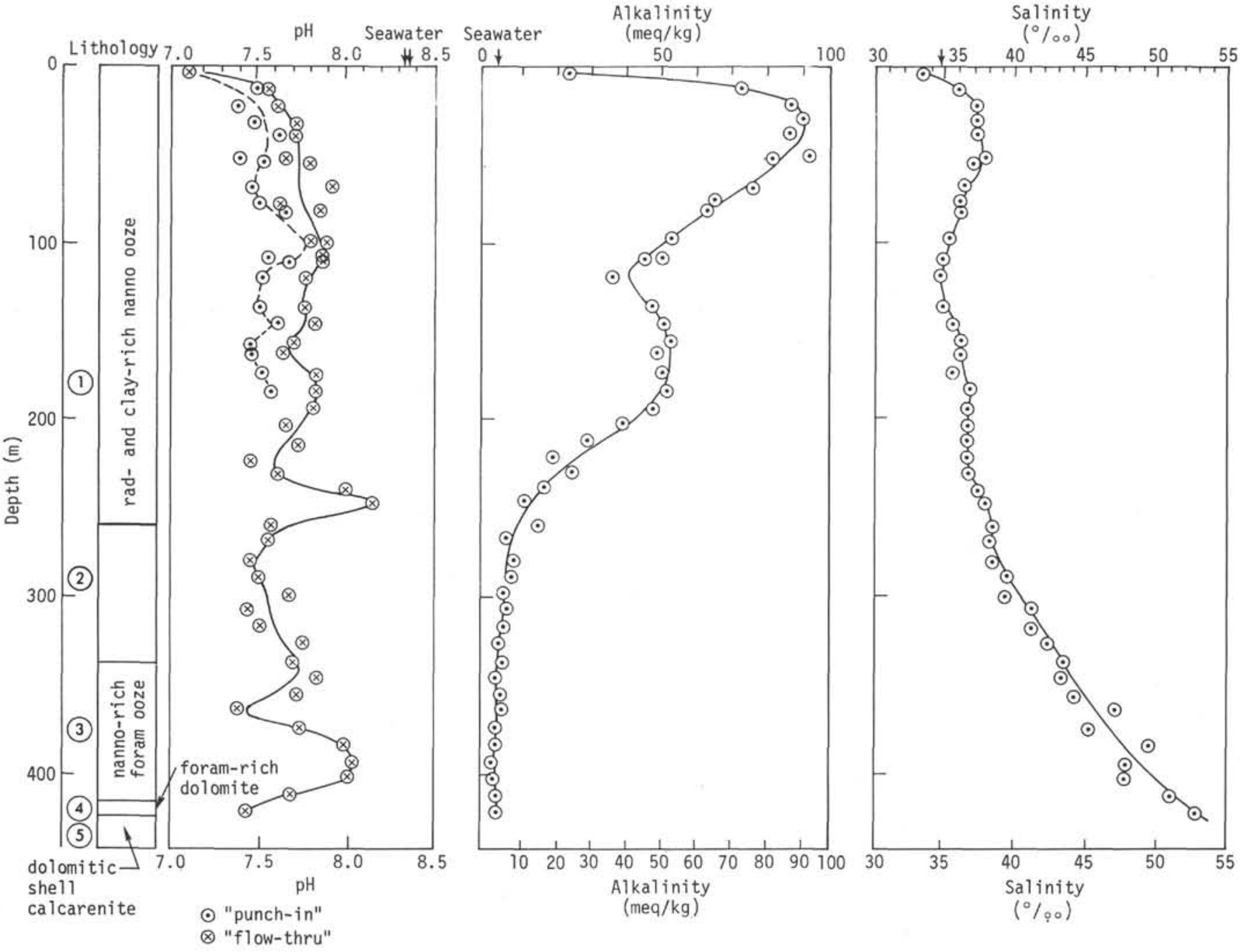

Figure 5. *Variations in* pH, *alkalinity, and salinity with depth at Site 262.*

Although this scatter is likely to represent actual in situ variation, the widespread occurrence of gas above Core 33 and resulting disturbance during core retrieval may have contributed. Data presented, however, are from tests made only where disturbance was not visually evident. The distinct layering characteristic of the first three sites visited is not present at Site 262. One 10-cm, coarse, detrital, foraminiferal-ooze layer is located at 4.5 meters. Otherwise, sediment in the top 338 meters is clay-, foram-, or rad-rich nanno ooze with traces of other materials. Below this level the sediment is primarily foram ooze.

It is notable that bulk density measurements made on heavily distorted sediment in areas of high gas disturbance within Cores 2-33 are not lower than densities in the least disturbed area of these cores where the sediment appeared relatively undisturbed. In several comparisons, density of the badly disturbed areas was significantly higher. If the volume of dissolved gas in these adjacent areas (of similar sediment) varied, this would indicate that the sediment containing more dissolved gas exists in situ at a higher density, or the identified density variations would be the result of disturbance which causes consolidation of the more gaseous sediments, a process which is difficult to explain. Porosity plotted on the site summary sheets was determined from continuous GRAPE readings and from syringe samples. Syringe porosity may be more accurate at Site 262 as evidenced from better-than-average agreement between syringe and water-displacement density at Site 262. A steady decrease in porosity from 68% at the sediment surface to 38% at 420 meters reflects the steady increase in density. A continuous plot of porosity is available from the GRAPE data by using the variable porosity scale to read the GRAPE density trace. Sediment mineral density determines the appropriate porosity scale.

Sonic Velocity

Sound velocity could not be measured on sediment from Cores 2-33. The acoustic signal was not picked up by the receiving transducer, evidently the result of gas in the sediment. This was true of even the materials which appeared relatively undisturbed. In the first core, sonic velocity was measured at 1.50 km/sec. Below Core 33 (310 m) velocity in soft sediments increases slowly and steadily from 1.65 km/sec to about 1.8 km/sec at 420 meters. Velocity in semilithified materials is somewhat

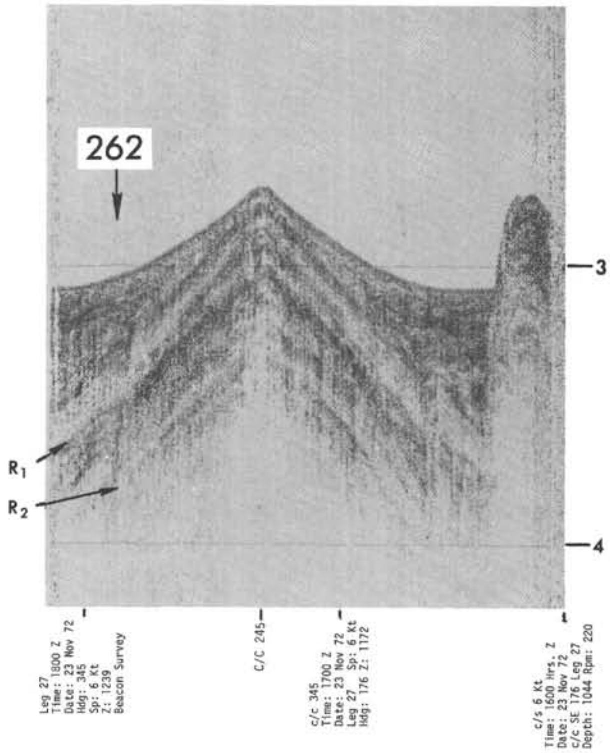

Figure 6. *Seismic Profile at Site 262.*

higher, up to 2.4 km/sec, at 413 meters. There appears to be little difference in sonic velocity of the semilithified material between the horizontal and vertical directions.

CORRELATION OF SEISMIC REFLECTION PROFILE WITH DRILLING RESULTS

The seismic profile of Site 262 and environs is given by the vertical incidence profiles, one of which is shown in Figure 6, and by the on-site drifting sonobuoy profile (Figure 7). From these, the following reflectors are interpreted (Table 4).

Reflectors 1 and 2 are the only readily traceable regional reflectors. Other reflectors are present in the vertical incidence profile, but do not show in the on-site sonobuoy record.

Reflector 1 is clearly identified with the decrease in the rate of drilling penetration at the boundary, at a depth of 427 meters, between Unit 5, a lithified shell calcarenite, and the overlying semilithified to unconsolidated sediment. The corresponding interval velocity for the overlying sediment is 1.9 km/sec. Reflector 2 was not reached.

Onboard measurements of seismic velocity were made on Cores 1 (1.5 km/sec) and 34-46 (1.7-2.0 km/sec, except a few specimens—see above. Between Cores 1 and 34, the sediment contained too much gas to yield a determination. With allowance for the differences between onboard and in situ velocities, and for the short section of the hole suitable for measurement, the interval velocity estimated from the profile and that from onboard determinations appear to agree.

The identification of Reflector 1 as the boundary, within the Pliocene, between very shallow and deeper marine sediments overturns the idea of Veevers et al. (1973) that Reflector 1 is a regional unconformity that expresses the middle Miocene Ramelauan orogeny of Timor. This matter is discussed further below.

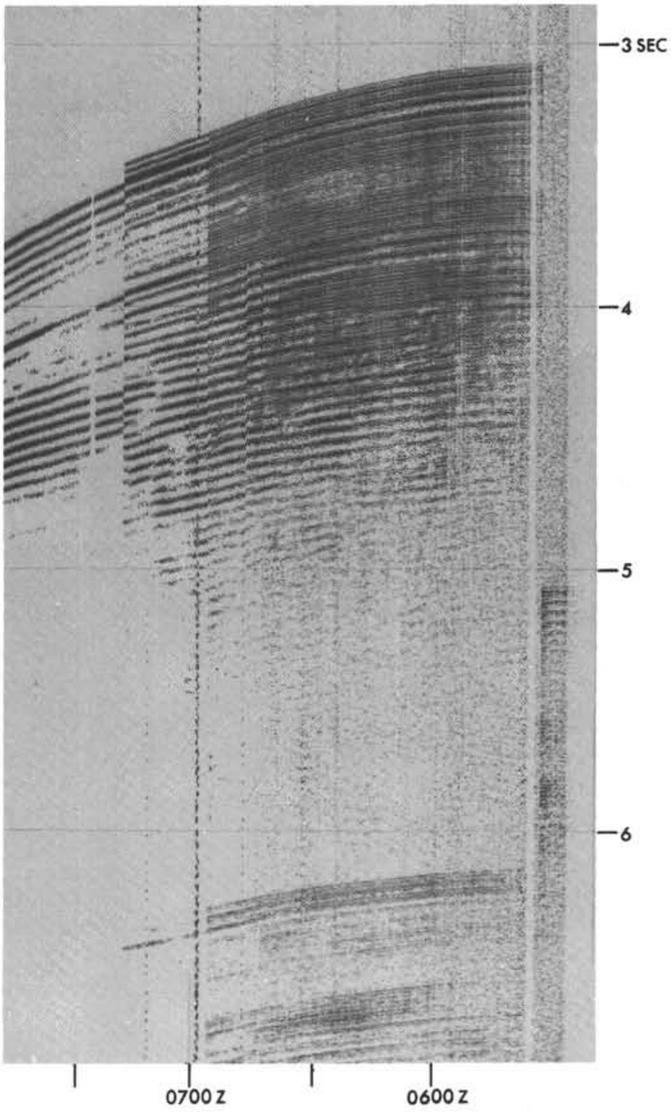

Figure 7. *On-site drifting sonobuoy profile.*

SUMMARY AND CONCLUSIONS

Site 262 is located in 2315 meters of water near the axis of the Timor Trough, 75 km south of the western tip of Timor, and 230 km northeast of Ashmore Reef. Seismic profiles of Lamont-Doherty Geological Observatory show two sequences near the site: (1) a wedge of flat-lying layers, thickening northward, unconformably resting on (2) a north-dipping set of parallel layers, with their top marked by a prominent reflector (R_1 of Veevers et al., 1973), and with a second prominent reflector (R_2) in them.

One hole was drilled at Site 262 just south of the flat floor axis of the Trough. A total of 442 meters of Pleistocene and Pliocene sediment was drilled.

Five sedimentary units are recognized. The top 261.5 meters consist of thin-bedded grayish-olive rad- and clay-rich nanno ooze, with subordinate foraminiferal

TABLE 4
Details of Reflectors at Site 262

Acoustic sequence	Reflector[a]	Reflection Time (sec)	Depth (m)	Interval Velocity (km/sec)
	Sea floor	0.00		
Low dipping	1(R_1)	0.45	427	1.9
Steeper dipping	2(R_2)	0.75	not reached	

[a] Reflectors in brackets after Veevers et al. (1973).

and micarb-rich nanno ooze, and detrital foraminiferal sand. Methane occurs throughout all but the upper 5 meters of this unit. In the second unit, from 261.5 to 337.5 meters forams increase downwards at the expense of the dominant nanno ooze. This trend continues to a depth of 337.5 meters to give a nanno-rich foraminiferal ooze, which continues to a depth of 414.0 meters. A marked change to 13 meters of greenish-gray foram-rich dolomitic mud occurs at this depth. The dolomitic mud passes downward into a yellowish-gray dolomitic shell calcarenite, 15 meters of which was penetrated to the total depth of 442 meters.

Microfossils indicate three biostratigraphical divisions: Holocene in the upper 5 meters, Pleistocene (based on planktonic foraminifera) from 5.0-337.5 meters; and Pliocene from 337.5-442.0 meters. All except the basal sedimentary unit are planktonic oozes, with planktonic foraminifera and nannoplankton throughout, and radiolarians and diatoms in the Pleistocene only. The great thickness of Pleistocene and upper Pliocene sediment registers many subtle taxonomic and ecological changes. Displaced nannofossil assemblages are conspicuous and include Cretaceous and Cenozoic forms in the top 280 meters, Neogene forms from 280 to 356 meters, but few from deeper cores.

Accumulation rates are roughly 185 m/m.y. in the Pleistocene, and 26 m/m.y. in the upper Pliocene (Figure 8).

Interstitial waters from the cores have very high alkalinity values (maximum 92.86 meq/kg, compared with 2.49 meq/kg for seawater at this site) which are interpreted as being the result of oxidation of abundant organic matter, due in turn to the rapid accumulation rate. Salinity values increase with depth to 53.1 ‰ in the deepest sample at 421 meters. This increase is interpreted as possibly indicating a salt horizon at a modest depth below the bottom of the hole.

Conclusions

The geological record shown by the drilling at Site 262 starts with the deposition during Pliocene of dolomitic shell calcarenite in very shallow water, probably no deeper than 5 meters. A salt bed below the total depth of the hole is suggested by a downward increase in the salinity of the interstitial water. The succeeding foram-rich dolomitic mud is of the same general age as the calcarenite and again was deposited in very shallow water or possibly in a supratidal environment in which microcrystalline dolomite, later enlarged diagenetically, was deposited. The overlying nanno-rich foraminiferal ooze contains at its base benthonic foraminifera that indicate water depths less than 30 meters. The appearance of abundant calcareous planktonic forams 24 meters above the base and their continuation above indicate a rapid deepening of the Trough axis in the lower part of the upper Pliocene, probably to a depth approaching that of today. Deposition of this kind continued throughout the rest of the Pliocene and was modified in the Pleistocene by the addition of radiolarians and diatoms, some displaced Cretaceous and Cenozoic nannoplankton, and clay, which is probably terrigenous. The rapid rate of accumulation along the Trough axis is presumably due to two separate contributions: (1) pelagic deposition, and (2) introduction of sediment from the flanks of the Trough, including the Sahul Shelf and the narrow shelf and coastal strip of southern Timor. Detrital foraminiferal sands in the upper 200 meters are probably winnowed deposits. The contribution to sedimentation by volcanic ash is minor.

In terms of the objectives of this site we conclude that:

1) the date of folding of the Timor Trough, as indicated by the age of the unconformity seen in the seismic profiles, is Pliocene;

2) the prominent regional reflector is apparently diachronous; it is Pliocene at Site 262, and middle Miocene on the Sahul Shelf;

3) the sequence immediately beneath the unconformity is of shallow-water origin, and not infraneritic;

4) a reference section deeper than Pliocene was not obtained due to drilling difficulties.

APPENDIX A
LEG 27 HEAT-FLOW DATA

Albert J. Erickson, Woods Hole Oceanographic Institution,
Woods Hole, Massachusetts

Two downhole temperature measurements were made at Site 262 near the axis of the western part of the Timor Trough during Leg 27. Although the instrumentation performed well on both measurements, the sediment was too hard for the thermistor probe to penetrate during the deeper measurement (280.5 m) and the probe bent, causing loss of reliable data after bottom contact.

Bottom-water temperature of 2.67°C ±0.05°C was recorded on both runs during passage of the heat probe through the drill pipe. Using this value for water temperature, and the value of 10.46°C recorded at a depth of 233.5 meters, subbottom, a thermal gradient of 0.0344°C/m can be calculated.

Thermal conductivity data were not obtained in the same interval over which the thermal gradient was determined.

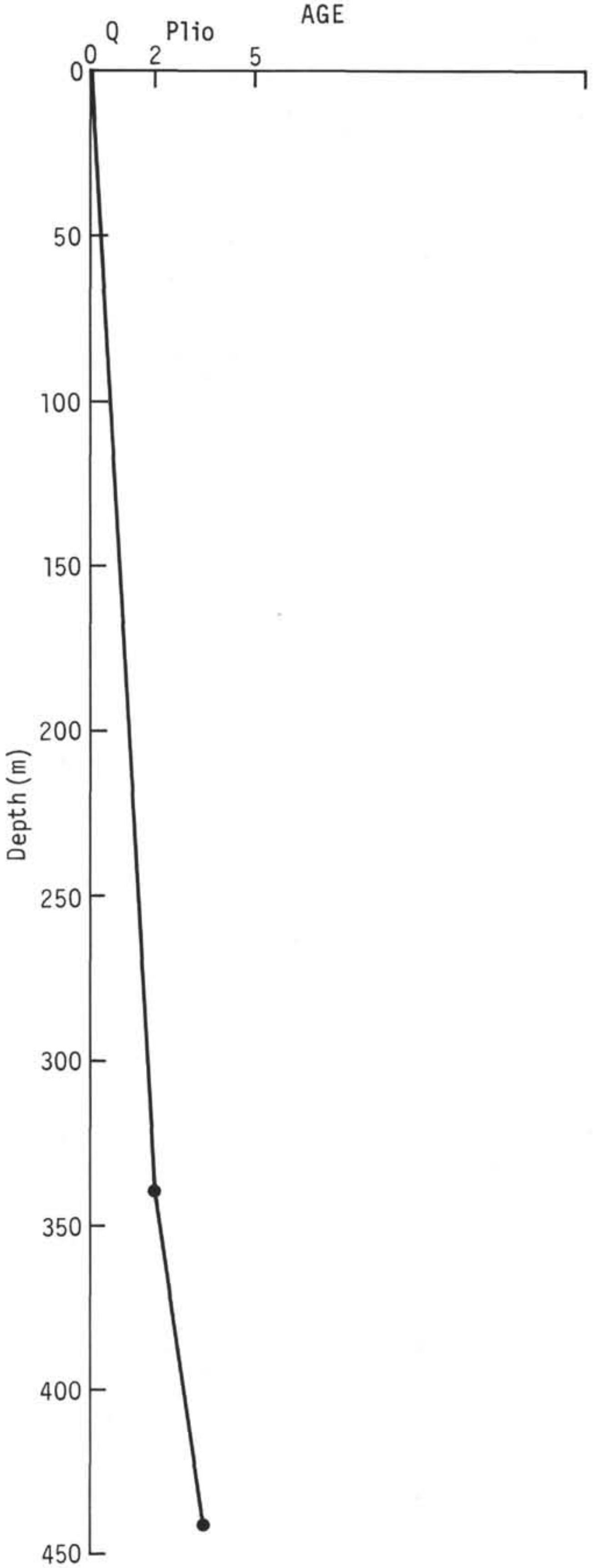

Figure 8. *Sediment accumulation rates at Site 262.*

However, the arithmetic mean of 11 values measured on sediment recovered from 229-290 meters, subbottom, is 0.00256 cal/cm sec °C (Table A). This value has been assumed to be representative of the conductivity of the same type of material (radiolarian- and clay-rich nannofossil ooze) recovered from the upper interval (0-233.5 m). Multiplying this value of the conductivity by the previously calculated gradient, a heat flow of 0.88×10^{-6} cal/cm^{2}sec results.

There are no nearby conventional heat-flow measurements with which to compare the values at Site 262. Two values of 1.59 and 1.63×10^{-6} cal/cm^{2}sec are located about 300 km east-northeast and west of Site 262, respectively. However, these are located in different tectonic provinces and, therefore, do not constitute a reasonable basis of comparison.

TABLE A1
Thermal Conductivity Measurements at Site 262

Sample (Interval in cm)	Conductivity (mcal/cm/sec °C)
25-5, 26	2.43
25-5, 73	2.37
25-5, 134	2.43
26-2, 65	2.49
26-4, 83	2.56
26-6, 128	2.49
30-2, 103	2.76
30-4, 68	2.47
30-5, 79	2.77
31-2, 35	2.59
31-6, 90	2.89
Average	2.56

Low heat-flow values are common in oceanic trenches, and are frequently attributed to the cooling effect of the downgoing lithospheric slab and/or to the effect of rapid sedimentation on the near-surface thermal gradient. Both processes may be important at Site 262. A Pleistocene sedimentation rate exceeding 18 cm/1000 yr was determined for the upper 337.5 meters, which would in itself cause a 10%-15% reduction in the steady-state flux. Thus the heat flow through the crust should be increased to about 1.0×10^{-6} cal/cm^{2}sec, in good agreement with the heat-flow values measured in oceanic trenches (Langseth and Von Herzen, 1971).

The presence of interstitial water having abnormally high salinity (53.1$^0/_{00}$) in the sediment recovered from below about 250 meters has been used to infer the presence of a salt horizon a few hundred meters below the bottom of the hole (421 m) (Leg 27, Hole Summary Book, Site 262, Geochemical Measurements). The presence of a localized mass of salt beneath, or in the immediate vicinity, of Site 262, would be expected to have a significant effect on the observed heat flux as a consequence of the very high thermal conductivity (5 to 6 times that of nannofossil ooze, for example) of rock salt (Clark, 1966). The presence of a body with anomalously high conductivity within the sediment would provide a "short circuit" for heat flow through the uppermost crust, with consequent distortion of the isotherms around the body and of the heat flux above the mass. If Site 262 were located above a localized salt mass, the measured heat flux would be increased relative to the regional flux measured at considerable distances away from the salt mass. Conversely, a salt body located near, but off to the side and below the drill hole would cause a subnormal flux and/or a seriously disturbed geothermal gradient, while still being near enough to the salt body to permit diffusion of the salt into the interstitial water. These interpretations are based upon a localized mass of salt, rather than a uniformly thick horizontally extensive, flat-lying salt layer which, while still producing high salt concentrations, would not affect the local heat flux. Although it is impossible, given the quality and amount of the downhole temperature data, to distinguish between the latter two possibilities, it seems likely, in view of the subnormal heat-flow measured, that the drill site was not located directly above a localized salt mass.

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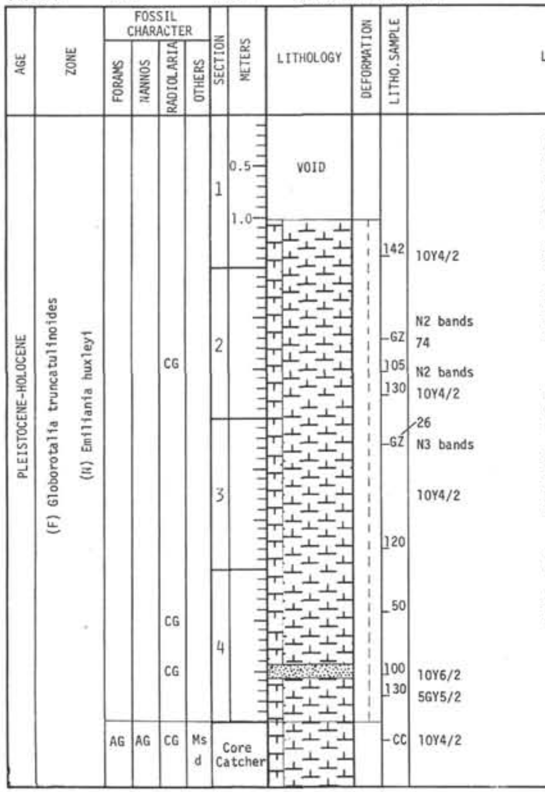
Site 262 Hole Core 1 Cored Interval: 0-5 m



LITHOLOGIC DESCRIPTION

Grayish olive nanno ooze with narrow bands (<1 cm) and streaks of grayish black foram rich clay. Rare slight mottling. Undisturbed. Soft in Sections 1-3; section 4 stiff. Pale olive detrital foram sandy silt that is graded occurs from 95 cm - 105 cm in Section 4.

FORAM RICH NANNO OOZE
Smear slides 2-130, 3-120, 4-50, 4-130, CC

Texture		Composition	
Clay	66%	Nannos	42%
Silt	33%	Forams	17%
Sand	1%	Carb. frags.	16%
		Clay	12%
		Rads	5%

Remainder consists of (in decreasing order) quartz, feldspar, diatoms, heavy minerals, pyrite, zeolite, and sponge spicules.

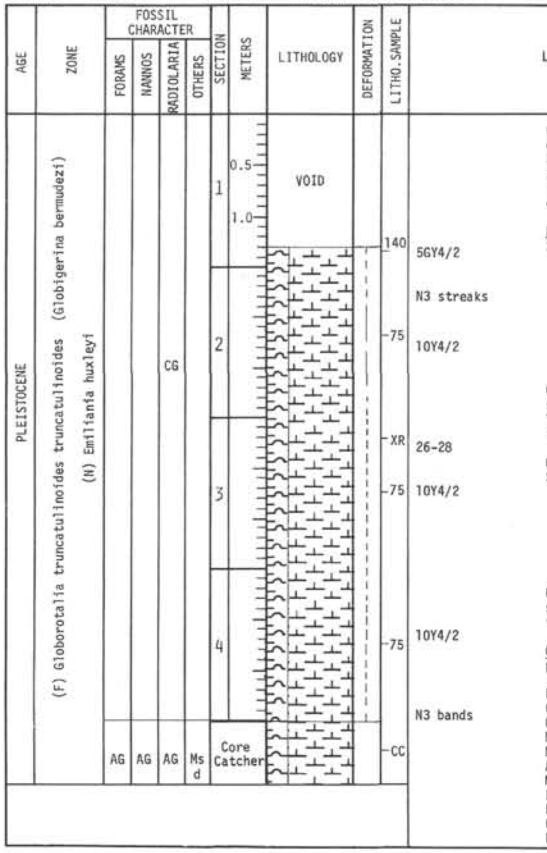
DETRITAL FORAM SANDY SILT
Smear slide 4-100

Texture		Composition	
Silt	70%	Forams	68%
Sand	30%	Carb. frags.	20%
		Quartz	5%

Others include heavy minerals, dolomite rhombs, rads, sponge spicules, and pyrite.

Coarse Fraction (>63µ): quartz, rads, sponge spicules, mollusca, forams and metallic spherules.

Site 262 Hole Core 2 Cored Interval: 5-14.5 m



LITHOLOGIC DESCRIPTION

Grayish olive nanno ooze with few dark gray streaks and bands of foram bearing clay. Slight deformation in Sections 1, 3, and 4; moderate in 2. Soft in Section 1; stiff in Sections 2, 3, and 4.

RAD RICH NANNO OOZE
Smear slides 2-75, 3-75, CC

Composition	
Nannos	51%
Rads	13%
Clay	11%
Carb. frags.	11%
Forams	5%
Sponge spicules	2%
Plant debris	2%

Others include: pyrite, diatoms, zeolite, silicoflag., dolomite rhombs, and quartz. Trace amounts of glauconite, feldspar, iron oxides, and mica.

CLAY RICH NANNO OOZE
Smear slide 4-75

Composition	
Nannos	45%
Clay	15%
Rads	10%
Carb. frags.	10%
Forams	5%

Others include: plant debris, sponge spicules, diatoms, zeolite, pyrite, feldspar, quartz, and heavy minerals.

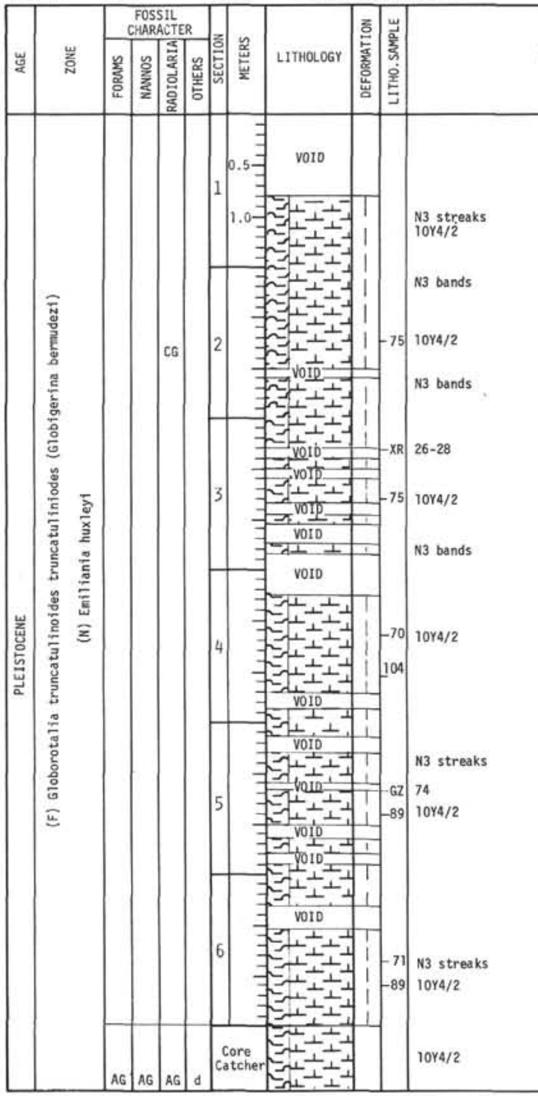
Coarse Fraction (>63µ): rads, diatoms, plant debris, forams, and pyrite.

BULK X-RAY (8.3 m)

Calcite	42%
Quartz	18%
Montmorillonite	13%
Mica	9%
Aragonite	6%
Mg-calcite	4%
Kaolinite	3%
Plagioclase	3%
Chlorite	1%
Pyrite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 3 Cored Interval: 14.5-24 m



LITHOLOGIC DESCRIPTION

Grayish olive nanno ooze with dark gray streaks and bands. Slight deformation in base of Sec. 1; moderate in Sec. 2, 3, 4, 5, and 6. White fossil fragments up to 4 mm long arranged parallel or sub-parallel to layering. Fossil wood in Section 4 at 135 cm. Stiff throughout.

RAD RICH NANNO OOZE
Smear slides 2-75, 3-75, 4-70, 4-104, 6-71, 6-89

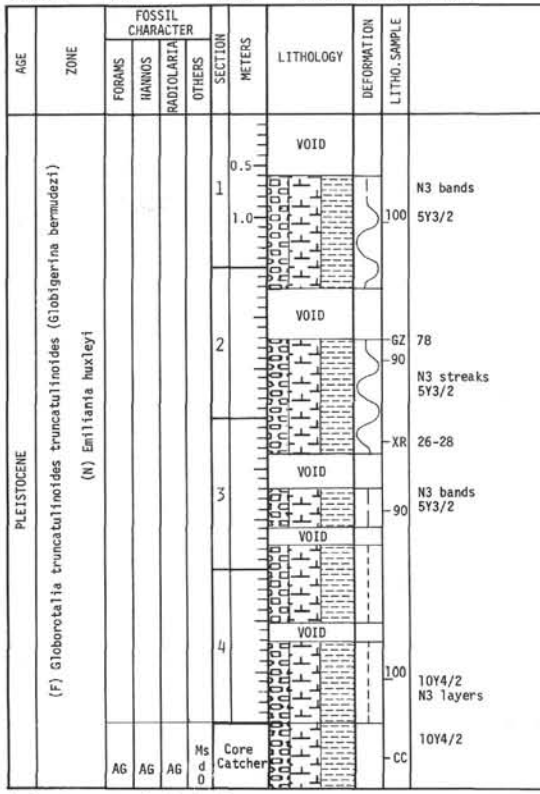
Texture		Composition	
Clay	62%	Nannos	54%
Silt	37%	Rads	12%
Sand	1%	Clay	11%
		Forams	7%
		Carb. frags.	5%
		Pyrite	3%
		Diatoms	2%
		Plant debris	1%

Others include: sponge spicules, zeolite, silicoflagellates, quartz, feldspar, heavy minerals, dolomite rhombs.

Coarse Fraction (>63μ): rads, forams, diatoms, sponge spicules, pyrite, and plant debris.

BULK X-RAY (17.8 m)	
Calcite	43%
Quartz	20%
Mica	10%
Montmorillonite	9%
Aragonite	7%
Plagioclase	3%
Kaolinite	3%
Mg-calcite	3%
Chlorite	1%
Pyrite	1%

Site 262 Hole Core 4 Cored Interval: 24-33.5 m



Explanatory notes in chapter 1

LITHOLOGIC DESCRIPTION

Grayish olive nanno clay with dark gray streaks and bands. Intense deformation in Sections 1 and 2 and upper part of 3; slight deformation in rest of 3 and 4. Stiff throughout. White and very light gray broken fossil fragments up to 5 mm scattered throughout.

MICARB RICH NANNO CLAY
Smear slides 1-100, 2-90, 3-90

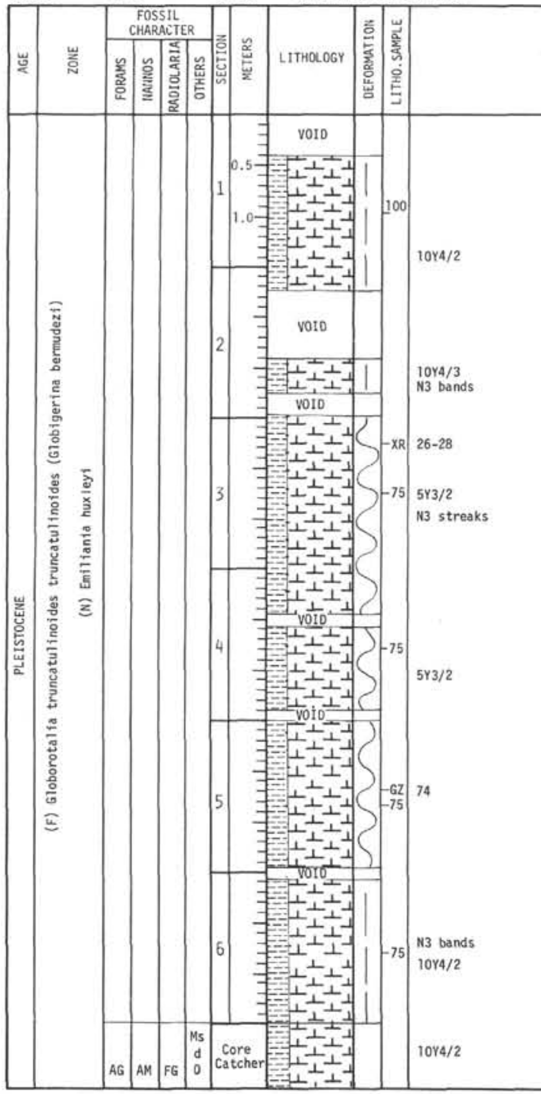
Texture		Composition	
Clay	65%	Clay	38%
Silt	34%	Nannos	26%
Sand	1%	Carb. frags.	12%
		Rads	9%
		Forams	5%

Other components are: quartz, zeolite, diatoms, sponge spicules, pyrite, plant debris, dolomite rhombs, feldspar, heavy minerals, and chert fragments.

Coarse Fraction (>63μ): forams, rads, sponge spicules, molluscs, plant debris, diatoms, and pyrite.

BULK X-RAY (27.3 m)	
Calcite	41%
Quartz	20%
Mica	10%
Aragonite	9%
Montmorillonite	9%
Kaolinite	4%
Plagioclase	3%
Mg-calcite	2%
Chlorite	1%
Pyrite	1%

Site 262 Hole Core 5 Cored Interval: 33.5-43 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive clay rich nanno ooze with dark gray streaks, bands, and blebs. Intense deformation in Sections 3, 4, and 5; moderate in 1 and 6. Clay and plant debris more abundant in dark layers.

CLAY RICH NANNO OOZE
Smear slides 1-100, 3-75, 4-75, 5-75, 6-75

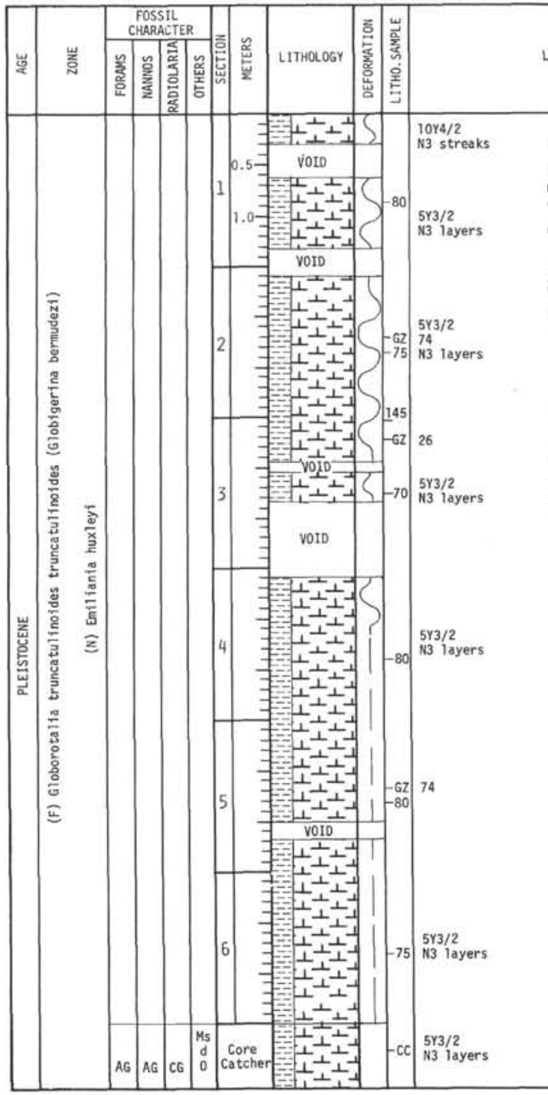
Texture		Composition	
Clay	65%	Nannos	36%
Silt	34%	Clay	23%
Sand	1%	Rads	18%
		Carb. frags.	10%
		Forams	5%
		Diatoms	3%
		Pyrite	2%

Other components are: quartz, dolomite rhombs, zeolite, feldspar, heavy minerals, sponge spicules, plant debris, silicoflagellates, and volcanic glass.

Coarse Fraction (>63μ): forams, rads, sponge spicules, diatoms, molluscs, plant debris, and pyrite.

BULK X-RAY (36.8 m)	
Calcite	40%
Quartz	19%
Montmorillonite	13%
Mica	10%
Aragonite	7%
Kaolinite	4%
Mg-calcite	3%
Plagioclase	3%
Chlorite	1%

Site 262 Hole Core 6 Cored Interval: 43-52.5 m



LITHOLOGIC DESCRIPTION

Stiff, olive gray clay rich nanno ooze. Dark gray streaks and bands of clay and plant debris. Intense deformation in Sections 1, 2, 3, and upper part of 4; moderate deformation in rest of 4 and 5 and 6.

CLAY RICH NANNO OOZE
Smear slides 1-80, 2-75, 3-70, 4-80, 5-80, CC

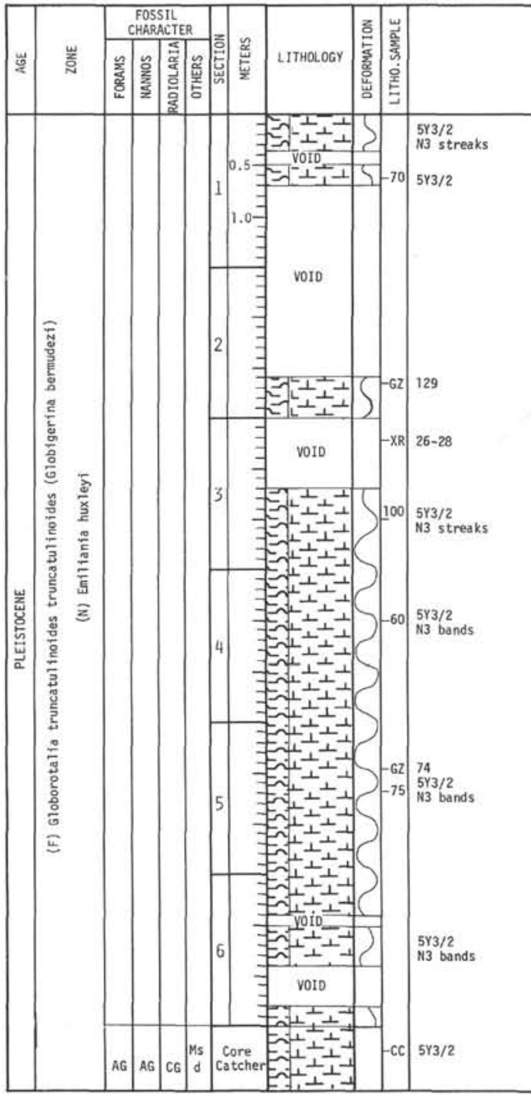
Texture		Composition	
Clay	67%	Nannos	35%
Silt	32%	Clay	20%
Sand	1%	Carb. frags.	14%
		Rads	13%
		Forams	7%
		Quartz	2%
		Pyrite	2%
		Diatoms	2%

Other components are: feldspar, chert, sponge spicules, plant debris, zeolite, heavy minerals, silicoflagellates, dolomite rhombs, and ostracods.

Coarse Fraction (>63μ): forams, rads, sponge spicules, diatoms, and pyrite.

Explanatory notes in chapter 1

Site 262 Hole Core 7 Cored Interval: 52.5-62 m



LITHOLOGIC DESCRIPTION

Stiff, olive gray nanno ooze with dark gray streaks that are rich in clay, plant fragments, and pyrite. Intense deformation throughout.

RAD RICH NANNO OOZE

Smear slides 1-70, 3-100, 4-60, 5-75, CC

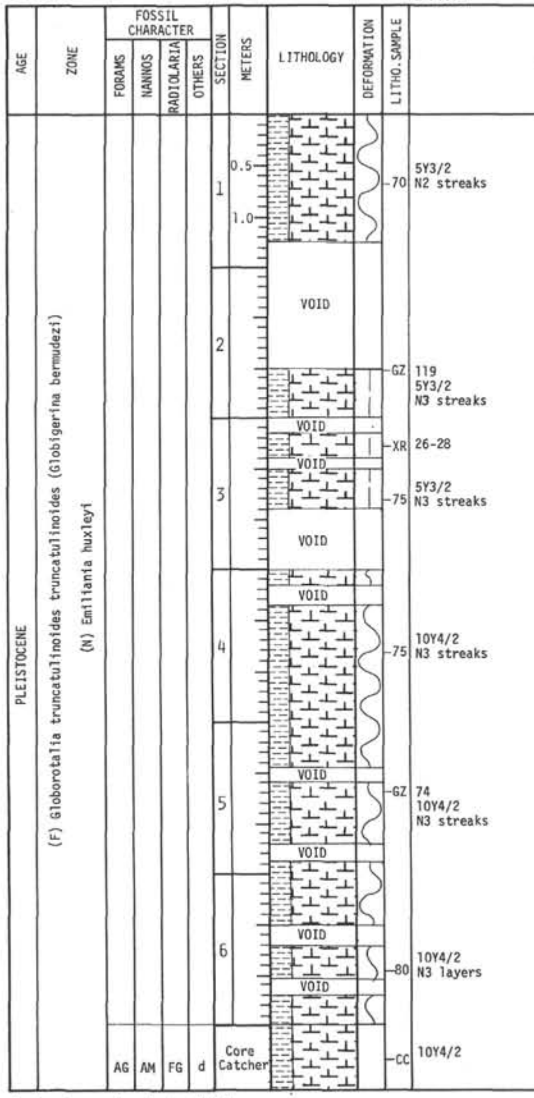
Texture		Composition	
Clay	70%	Nannos	53%
Silt	30%	Rads	14%
		Clay	12%
		Carb. frags.	10%
		Sponge spicules	2%
		Forams	2%
		Quartz	2%
		Pyrite	2%
		Diatoms	1%
		Plant debris	1%

Other components include: feldspar, zeolite, volcanic glass, dolomite rhombs, silicoflagellates, ostracods.

Coarse Fraction (>63μ): forams, rads, diatoms, sponge spicules, pyrite, plant debris, and molluscs.

BULK X-RAY (56.3 m)	
Calcite	43%
Quartz	15%
Aragonite	13%
Mica	9%
Montmorillonite	6%
Mg-calcite	5%
Plagioclase	3%
Kaolinite	3%
Chlorite	2%
Pyrite	1%

Site 262 Hole Core 8 Cored Interval: 62-71.5 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional 2 sections were recovered. They are not described here.

Stiff, olive gray and grayish olive nanno ooze with dark gray streaks, layers, and mottles that are rich in pyrite, clay, and plant debris. White and very light gray fossil fragments up to 0.4 mm scattered throughout. Intense deformation in Sections 1, 4, and 6; moderate in 2 and 3.

CLAY RICH NANNO OOZE

Smear slides 1-70, 3-75, 4-75, 6-80, CC

Texture		Composition	
Clay	67%	Nannos	38%
Silt	32%	Clay	20%
Sand	1%	Carb. frags.	16%
		Rads	15%
		Forams	3%
		Diatoms	2%

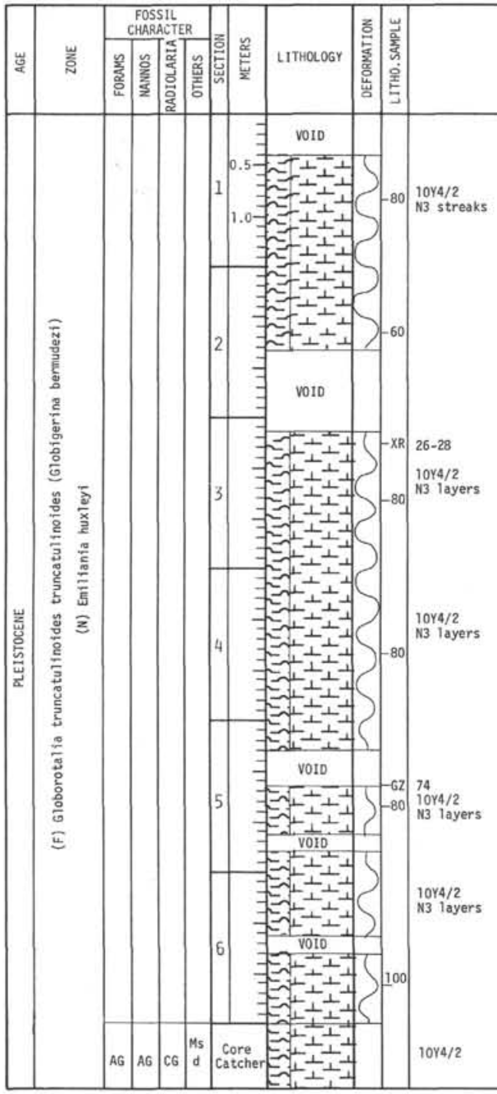
Other constituents include: pyrite, zeolite, quartz, sponge spicules, plant debris, dolomite rhombs, volcanic glass, silicoflagellates, heavy minerals, and fish remains.

Coarse Fraction (>63μ): forams, radiolarians, diatoms, echinoid spines and plates, and pyrite.

BULK X-RAY (65.3 m)	
Calcite	39%
Quartz	18%
Aragonite	15%
Mica	9%
Montmorillonite	7%
Kaolinite	4%
Mg-calcite	3%
Plagioclase	2%
Chlorite	2%
Pyrite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 9 Cored Interval: 71.5-81 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional section was recovered. It is not described here.

Stiff, grayish olive nanno ooze with dark gray layers, streaks, and slight mottles. Latter are richer in clay, plant debris, and pyrite. Very light gray fossil fragments up to 5 mm scattered throughout. All sections intensely deformed.

RAD RICH NANNO OOZE
Smear slides 1-80, 2-60, 3-80, 4-80, 5-80, 6-100

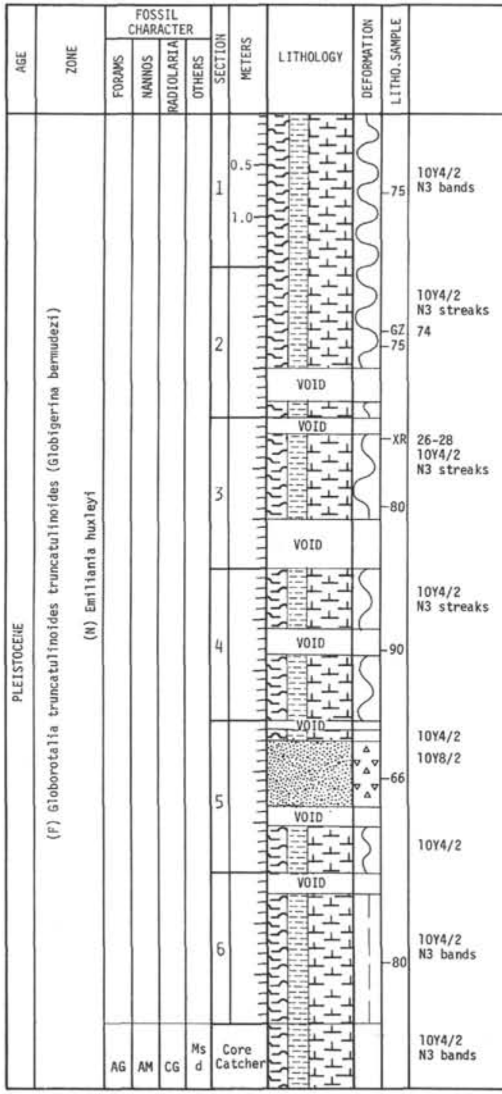
Texture		Composition	
Clay	66%	Nannos	57%
Silt	33%	Rads	21%
Sand	1%	Clay	8%
		Carb. frags.	8%
		Diatoms	3%
		Forams	2%
		Pyrite	1%

Other components are: zeolite, sponge spicules, dolomite rhombs, volcanic glass, glauconite, silicoflagellates, ostracods, quartz, heavy minerals, and plant debris.

Coarse Fraction (>63μ): Radiolaria, foraminifera, diatoms, sponge spicules, plant debris, and pyrite.

BULK X-RAY (74.8 m)	
Calcite	39%
Quartz	17%
Aragonite	14%
Mica	9%
Montmorillonite	9%
Kaolinite	4%
Mg-calcite	4%
Plagioclase	2%
Chlorite	1%
Pyrite	1%

Site 262 Hole Core 10 Cored Interval: 81-90.5 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional 55 cm of core was recovered. It is not described here.

Stiff grayish olive nanno ooze with dark gray layers, streaks, and slight mottles. Dark gray areas richer in clay, pyrite, and plant debris. Very light gray fossil fragments up to 4 mm scattered throughout. Detrital foram silty sand without graded bedding occurs in Section 5 at 10 cm to 84 cm. Sections 1-4 intensely deformed; Section 5 is brecciated and Section 6 moderately deformed.

RAD AND CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-80, 4-90, 6-80

Texture		Composition	
Clay	69%	Nannos	47%
Silt	30%	Clay	17%
Sand	1%	Rads	17%
		Carb. frags.	9%
		Forams	4%
		Diatoms	2%

Other constituents are: pyrite, plant remains, sponge spicules, zeolite, quartz, dolomite rhombs, heavy minerals, and silicoflagellates.

DETRITAL FORAM SILTY SAND
Smear slide 5-66

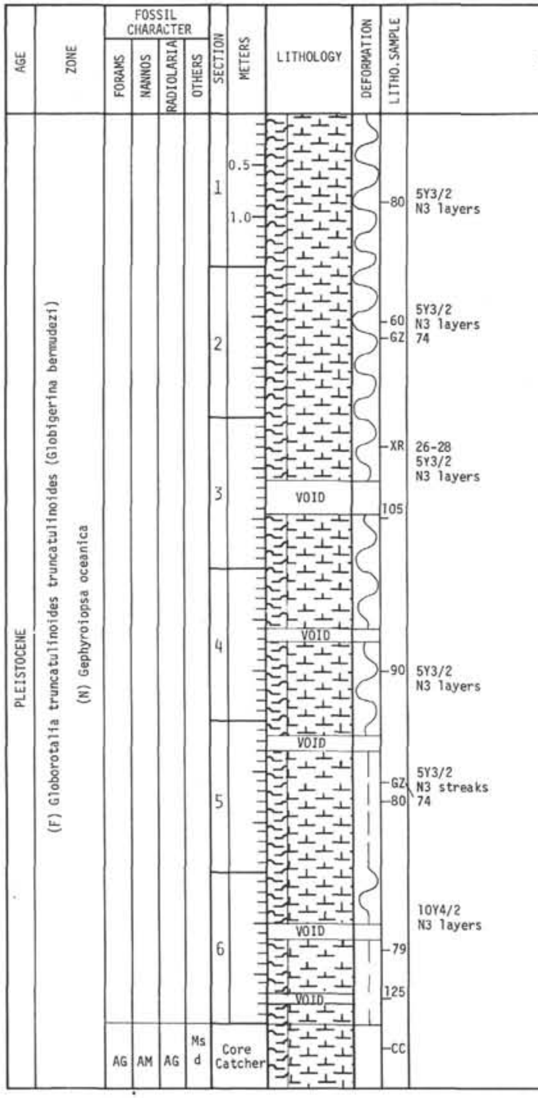
Texture		Composition	
Sand	70%	Forams	84%
Silt	30%	Carb. frags.	10%
		Nannos	5%
		Pyrite	1%

Coarse Fraction (>63μ): forams, rads, diatoms, micarb, pyrite, plant remains.

BULK X-RAY (84.3 m)	
Calcite	42%
Quartz	22%
Mica	9%
Montmorillonite	9%
Aragonite	8%
Kaolinite	3%
Plagioclase	3%
Mg-calcite	3%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 11 Cored Interval: 90.5-100 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional 50 cm of core was recovered. It is not described here.

Stiff, grayish olive nanno ooze with dark gray layers, streaks, and slight mottles. Dark gray areas richer in pyrite, clay, and plant debris. Very light gray fossil fragments up to 4 mm scattered throughout. Detrital foram silty sand between 130-140 cm in Section 6. Sections 1, 2, 3, and 4 intensely deformed; Sections 5 and 6 moderately deformed.

RAD RICH NANNO OOZE
Smear slides 1-80, 2-60, 3-105, 4-90, 5-80

Texture		Composition	
Clay	64%	Nannos	60%
Silt	35%	Rads	12%
Sand	1%	Micarb	10%
		Clay	8%
		Forams	4%
		Quartz	2%
		Diatoms	1%
		Sponge spicules	1%

Other constituents are: feldspar, zeolite, plant debris, dolomite rhombs. heavy minerals, ostracods, and silicoflagellates.

DETRITAL FORAM SILTY SAND
Smear slide 6-125

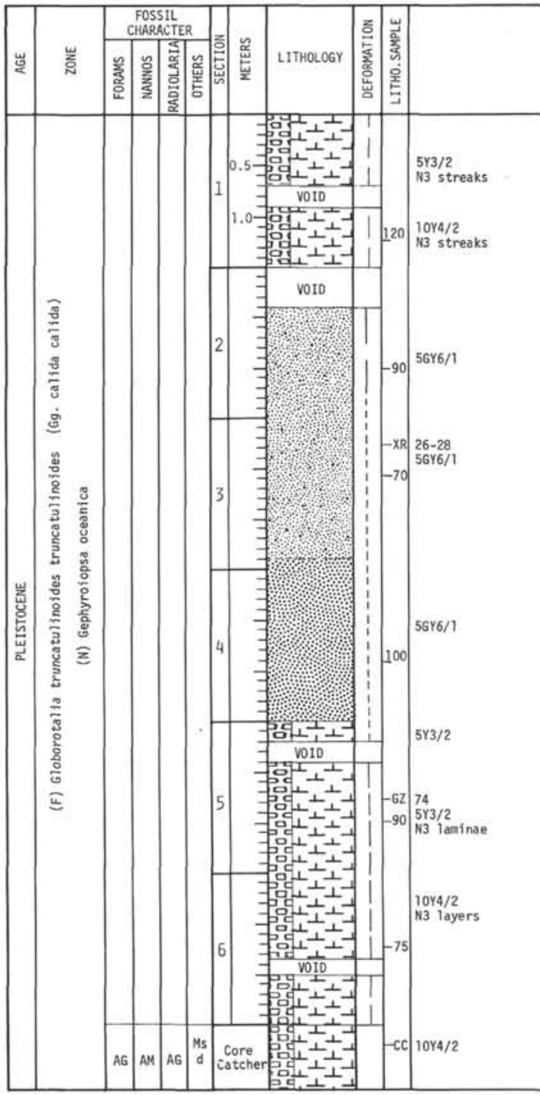
Texture		Composition	
Sand	60%	Forams	59%
Silt	40%	Nannos	10%
		Micarb	10%
		Quartz	5%

Rads, feldspar, heavy minerals, pyrite, sponge spicules, and plant debris constitute rest.

Coarse Fraction (>63μ): forams, rads, sponge spicules, diatoms, micarb, pyrite, and plant debris.

BULK X-RAY (93.8 m)	
Calcite	38%
Quartz	22%
Montmorillonite	15%
Mica	11%
Kaolinite	4%
Aragonite	4%
Plagioclase	3%
Mg-calcite	2%
Chlorite	1%

Site 262 Hole Core 12 Cored Interval: 100-109.5 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional 85 cm of core was recovered. It is not described here.

Soft to stiff greenish gray nanno ooze with dark gray layers, streaks, and slight mottles. Dark areas richer in pyrite, clay, and plant debris. Sections 2, 3, and 4 are detrital foram silty sands and sands that are graded. They probably represent multiple turbidites. Sections 1, 5, and 6 moderately deformed; Sections 2, 3, and 4 slightly deformed.

MICARB RICH NANNO OOZE
Smear slides 1-120, 6-75, CC

Composition	
Nannos	57%
Carb. frags.	18%
Clay	10%
Forams	5%
Rads	3%

Other components are: quartz, heavy minerals, pyrite, zeolite, diatoms and sponge spicules.

DETRITAL FORAM SILT AND CLAYEY SILT
Smear slides 3-70 (sand), and 4-100, 5-90 (silty sand)

Textures		Composition	
(clayey silt)		Forams	51%
Silt	54%	Nannos	20%
Clay	46%	Carb. frags.	15%
		Quartz	3%
		Rads	3%

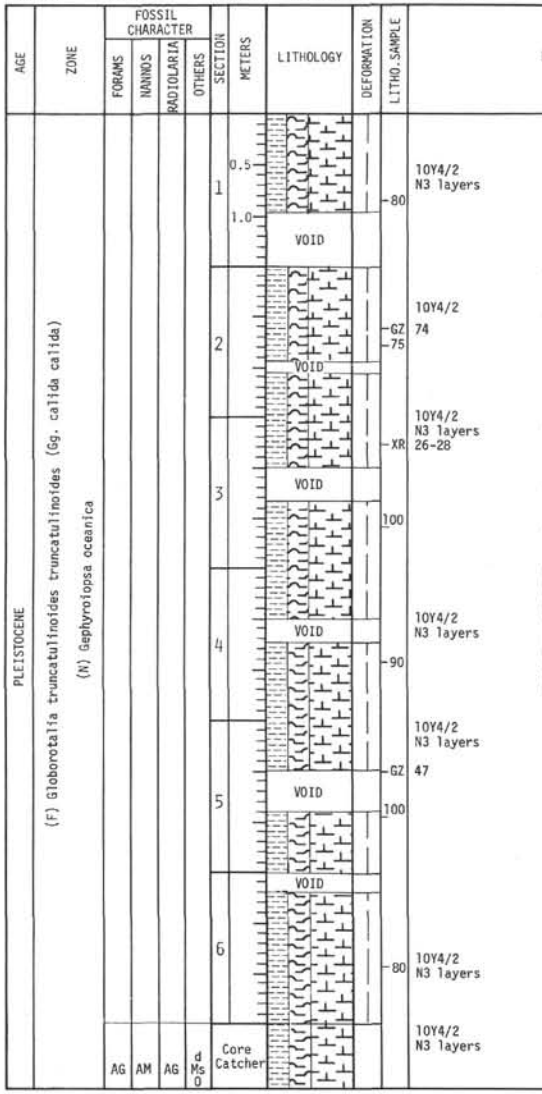
Other components are: quartz, heavy minerals, zeolite, diatoms, sponge spicules, plant debris, and pyrite.

Coarse Fraction (>63μ): forams, rads, micarb, diatoms, echinoid spines, and sponge spicules.

BULK X-RAY (103.3 m)	
Aragonite	42%
Calcite	37%
Mg-calcite	8%
Quartz	6%
Montmorillonite	3%
Mica	2%
Chlorite	1%
Clinoptilolite	1%
Kaolinite	Tr.
Pyrite	Tr.
Siderite	Tr.

Explanatory notes in chapter 1

Site 262 Hole Core 13 Cored Interval: 109.5-119 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional 55 cm of core was recovered. It is not described here.

Stiff grayish olive nanno ooze with dark gray layers and streaks. Dark areas rich in pyrite, clay, and plant debris. All sections moderately deformed.

CLAY AND RAD RICH NANNO OOZE
Smear slides 1-80, 2-75, 3-100, 4-90, 5-100, 6-80

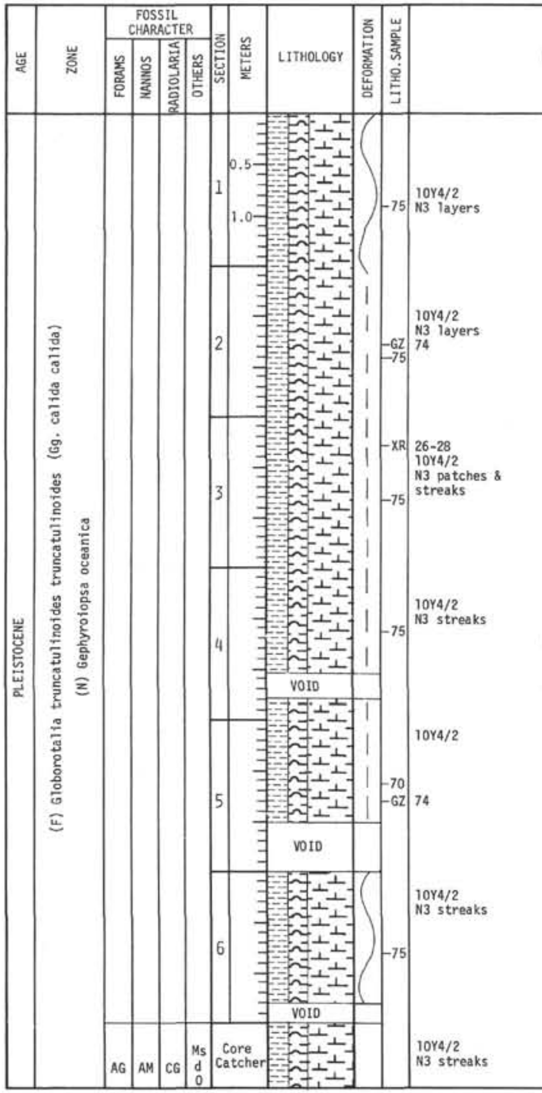
Texture		Composition	
Clay	63%	Nannos	37%
Silt	36%	Rads	21%
Sand	1%	Clay	20%
		Carb. frags.	13%
		Diatoms	5%
		Forams	3%

Other constituents are: zeolite, sponge spicules, pyrite, plant debris, quartz, volcanic glass, and dolomite rhombs.

Coarse Fraction (>63μ): forams, rads, rock fragments, pyrite, diatoms, sponge spicules, silicoflagellates, and plant debris.

BULK X-RAY (112.8 m)	
Calcite	38%
Quartz	21%
Mica	15%
Montmorillonite	13%
Kaolinite	4%
Plagioclase	4%
Chlorite	2%
Aragonite	2%
Mg-calcite	1%

Site 262 Hole Core 14 Cored Interval: 119-128.5 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an additional 50 cm of core was recovered. It is not described here.

Stiff grayish olive nanno ooze with dark gray layers, streaks, and slight mottles. Dark areas rich in pyrite, clay, and plant debris. Sections 2, 3, 4, and 5 moderately deformed. Sections 1 and 6 intensely deformed.

CLAY AND RAD RICH NANNO OOZE
Smear slides 2-75, 3-75, 4-75, 5-70, 6-75

Texture		Composition	
Clay	68%	Nannos	56%
Silt	31%	Rads	18%
Sand	1%	Clay	14%
		Carb. frags.	6%
		Forams	3%
		Diatoms	1%
		Sponge spicules	1%
		Pyrite	1%

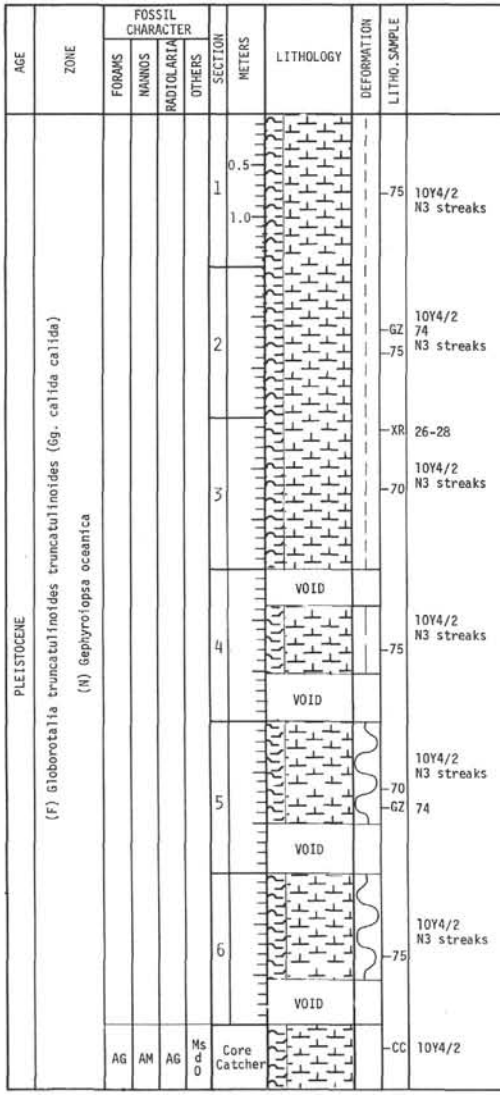
Other constituents are: dolomite rhombs, zeolite, silicoflagellates, ostracods, plant debris, heavy minerals, and quartz.

Coarse Fraction (>63u): forams, rads, pyrite, sponge spicules, plant debris, diatoms, and silicoflagellates.

BULK X-RAY (122.3 m)	
Calcite	44%
Quartz	26%
Mica	12%
Montmorillonite	10%
Kaolinite	3%
Chlorite	2%
Aragonite	2%
Mg-calcite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 15 Cored Interval: 128.5-138 m



LITHOLOGIC DESCRIPTION

Because of expansion due to gas an addition 14 cm of core was recovered. It is not described here.

Stiff grayish olive nanno ooze with dark gray layers, streaks, and slight mottles. Dark areas rich in pyrite, clay, and plant debris. Sections 1, 2, and 3 slightly deformed; Section 4 moderately deformed, and Sections 5 and 6 intensely deformed.

RAD RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-70, 4-75, 5-70, 6-75, CC

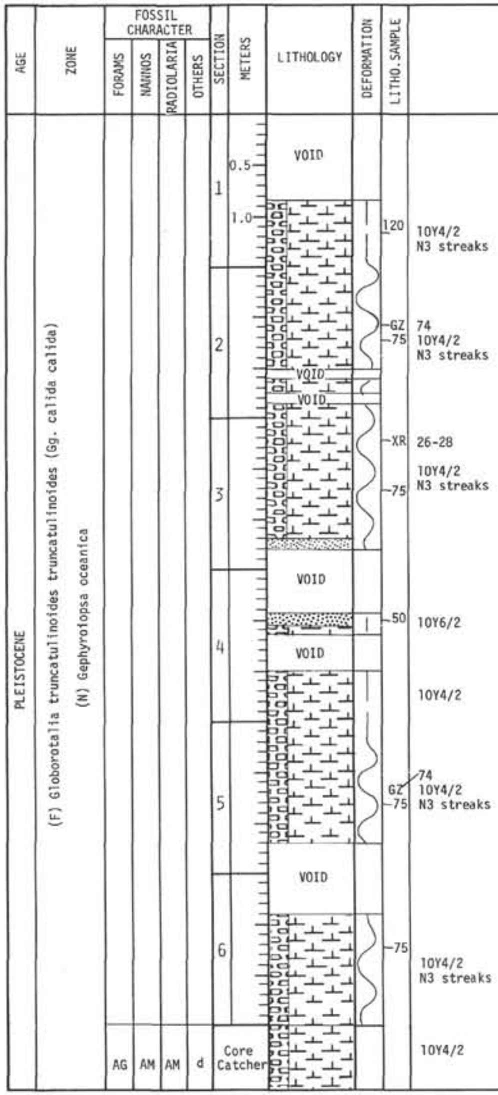
Texture		Composition	
Clay	69%	Nannos	58%
Silt	30%	Rads	14%
Sand	1%	Carb. frags.	9%
		Clay	8%
		Forams	6%
		Quartz	3%
		Pyrite	1%
		Sponge spicules	1%

Other constituents are feldspar, heavy minerals, volcanic glass, dolomite rhombs, diatoms, silicoflagellates, and plant debris.

Coarse Fraction (>63μ): forams, rads, sponge spicules, diatoms, ostracods, plant debris, and pyrite.

BULK X-RAY (131.8 m)	
Calcite	48%
Quartz	22%
Mica	9%
Montmorillonite	8%
Plagioclase	5%
Kaolinite	4%
Aragonite	2%
Chlorite	2%

Site 262 Hole Core 16 Cored Interval: 138-147.5 m



LITHOLOGIC DESCRIPTION

Grayish olive nanno ooze with dark gray layers, streaks, and slight mottles. Dark areas rich in pyrite, clay and plant remains. Scattered grayish white shell fragments up to 0.4 mm throughout. Detrital foram sands at base of 3 and at 45-56 cm in Section 4. These do not show graded bedding. Intensely deformed throughout except moderately deformed from 45-53 in Section 4 and from 100-150 cm in 4 and to 20 cm in 5. Upper part of core is soft to 80 cm in Section 3; below this depth the core is stiff.

MICARB RICH NANNO OOZE
Smear slides 1-120, 2-75, 3-75, 5-75, 6-75

Texture		Composition	
Clay	62%	Nannos	41%
Silt	35%	Carb. frags.	13%
Sand	3%	Clay	10%
		Rads	10%
		Forams	5%
		Quartz	2%
		Pyrite	1%
		Sponge spicules	1%
		Diatoms	1%

Other components are: heavy minerals, dolomite rhombs, silicoflagellates, and plant debris.

DETRITAL FORAM SAND
Smear slide 4-50

Texture		Composition	
Sand	80%	Forams	88%
Silt	20%	Carb. frags.	10%
		Pyrite	2%

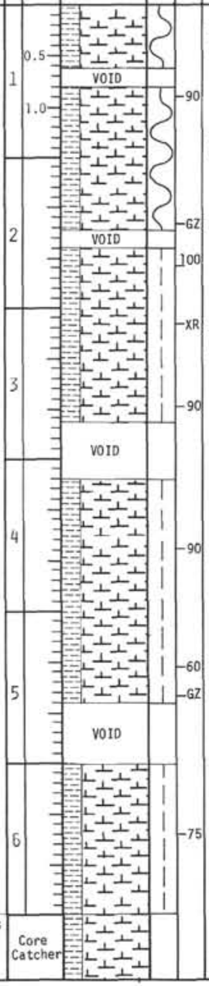
Coarse Fraction (>63μ): forams, rads, carb. fragments, diatoms, sponge spicules, silicoflagellates, pyrite, and plant debris.

BULK X-RAY (141.3 m)	
Calcite	44%
Quartz	21%
Mica	10%
Montmorillonite	8%
Kaolinite	7%
Aragonite	5%
Plagioclase	4%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 17 Cored Interval: 147.5-157 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS
PLEISTOCENE	(F) Globorotalia truncatulinoides truncatulinoides (Gg. calida calida) (N) Gephyroiopsa oceanica	AG	AM	AG	Ms d 0



10Y4/2
N3 streaks

10Y4/2
N3 streaks

70

26-28
10Y4/2
N3 streaks

10Y4/2
N3 streaks

10Y4/2
N3 streaks
74

10Y4/2
10Y6/2 streaks

10Y4/2

LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with dark gray layers, streaks, and lenses. Dark areas rich in pyrite, plant debris, and clay. Intense deformation in Section 1 and Section 2 to depth of 73 cm; remainder of sections are moderately deformed.

CLAY RICH NANNO OOZE
Smear slides 1-90, 2-100, 3-90, 4-90, 5-60, 6-60

Texture		Composition	
Clay	69%	Nannos	50%
Silt	29%	Clay	23%
Sand	2%	Rads	16%
		Carb. frags.	4%
		Forams	2%
		Pyrite	1%
		Diatoms	1%
		Sponge spicules	1%

Other components are: quartz, heavy minerals, volcanic glass, dolomite rhombs, plant debris, and ostracods.

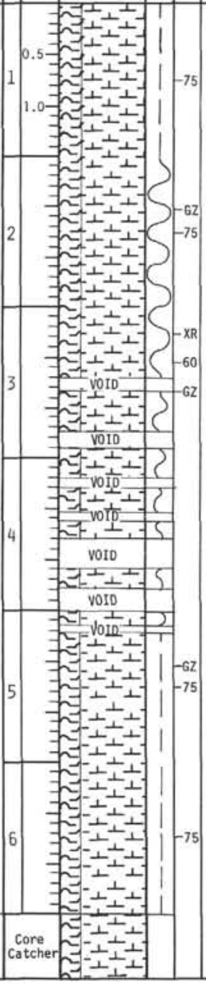
Coarse Fraction (>63μ): forams, rads, sponge spicules, plant debris, echinoderm fragments, diatoms, silicoflagellates, and pyrite.

BULK X-RAY (150.8 m)

Calcite	44%
Quartz	24%
Mica	11%
Montmorillonite	5%
Plagioclase	5%
Aragonite	3%
Kaolinite	3%
Mg-calcite	2%
Chlorite	2%
Pyrite	1%

Site 262 Hole Core 18 Cored Interval: 157-166.5 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS
PLEISTOCENE	(F) Globorotalia truncatulinoides truncatulinoides (Gg. calida calida) (N) Gephyroiopsa oceanica	AG	AM	CM	d



10Y4/2
N3 streaks

74
10Y4/2
N3 streaks

26-28

90

10Y4/2
N3 streaks

74
10Y4/2
N3 streaks

10Y4/2
N3 streaks

10Y4/2

LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with dark gray layers, streaks, and patches. Dark areas rich in pyrite, plant debris, and clay. Grayish white fossil shells to 5 mm scattered throughout. Moderately deformed in Sections 1, 5, and 6. Intensely deformed in Sections 2, 3, and 4.

RAD RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-60, 5-75, 6-45

Texture		Composition	
Clay	72%	Nannos	58%
Silt	27%	Rads	17%
Sand	1%	Clay	14%
		Carb. frags.	4%
		Diatoms	2%
		Forams	2%

Other components are: pyrite, dolomite rhombs, quartz, silicoflagellates, sponge spicules, plant debris, and heavy minerals.

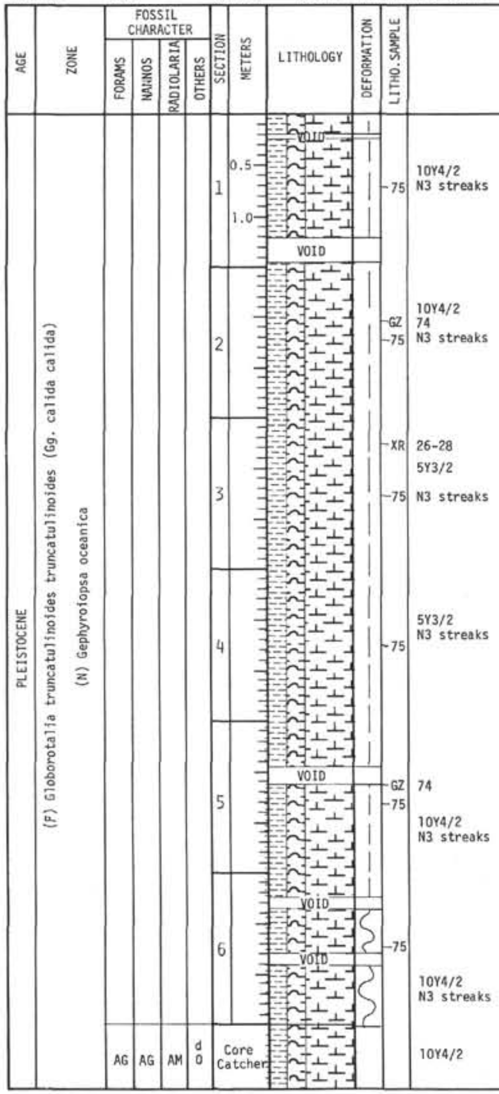
Coarse Fraction (>63μ): forams, rads, diatoms, pyrite, silicoflagellates, and plant debris.

BULK X-RAY (160.3 m)

Calcite	42%
Quartz	20%
Montmorillonite	10%
Mica	10%
Aragonite	8%
Kaolinite	3%
Mg-calcite	3%
Plagioclase	3%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 19 Cored Interval:166.5-176 m



LITHOLOGIC DESCRIPTION

Stiff, olive gray and grayish olive nanno ooze with dark gray streaks, layers, and slight mottles. Darker areas rich in pyrite, plant debris, and clay. Grayish white shells up to 4 mm scattered throughout. Moderately deformed in Sections 1-5; intensely deformed in Section 6.

CLAY AND RAD RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Clay	72%	Nannos	50%
Silt	27%	Rads	16%
Sand	1%	Clay	15%
		Carb. frags.	12%
		Sponge spicules	2%
		Forams	2%
		Diatoms	1%

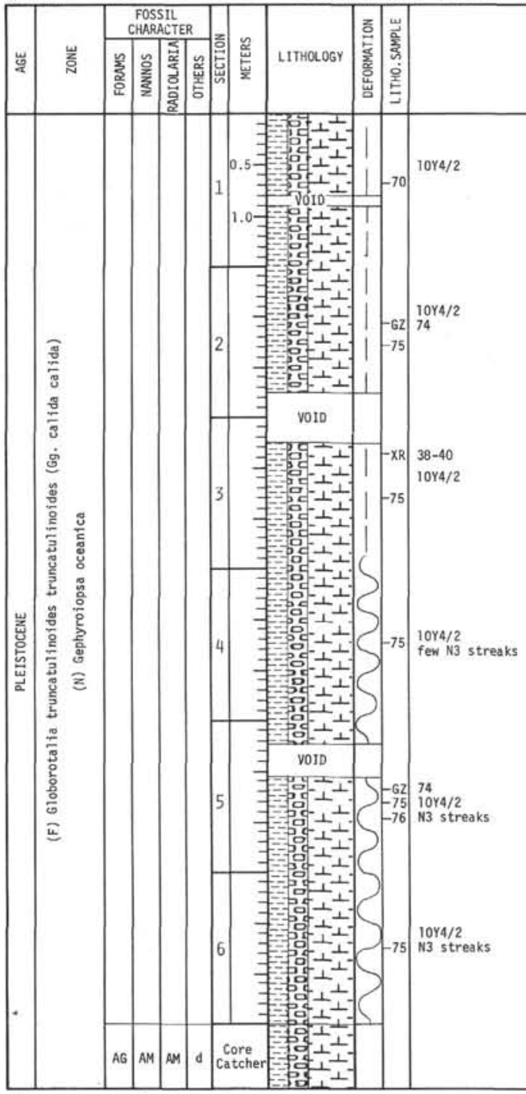
Other components are: pyrite, plant debris, silicoflagellates, heavy minerals, quartz, and dolomite rhombs.

Coarse Fraction (>63u): forams, rads, diatoms, sponge spicules, plant debris, and pyrite.

BULK X-RAY (169.8 m)

Calcite	42%
Quartz	22%
Mica	16%
Kaolinite	5%
Montmorillonite	5%
Plagioclase	4%
Chlorite	2%
K-feldspar	2%
Aragonite	2%

Site 262 Hole Core 20 Cored Interval:176-185.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with fewer dark streaks and layers than previous cores. Dark layers and streaks more abundant in Sections 5 and 6. Grayish white shells up to 4 mm scattered throughout. Moderately deformed in Cores 1, 2, and 3; intensely deformed in 4, 5, and 6.

CLAY AND MICARB RICH NANNO OOZE
Smear slides 1-70, 2-75, 3-75, 4-75, 5-76

Texture		Composition	
Clay	71%	Nannos	57%
Silt	28%	Carb. frags.	18%
Sand	1%	Clay	15%
		Forams	4%
		Rads	2%
		Diatoms	1%
		Sponge spicules	1%

Other components are: quartz, plant debris, pyrite, and heavy minerals.

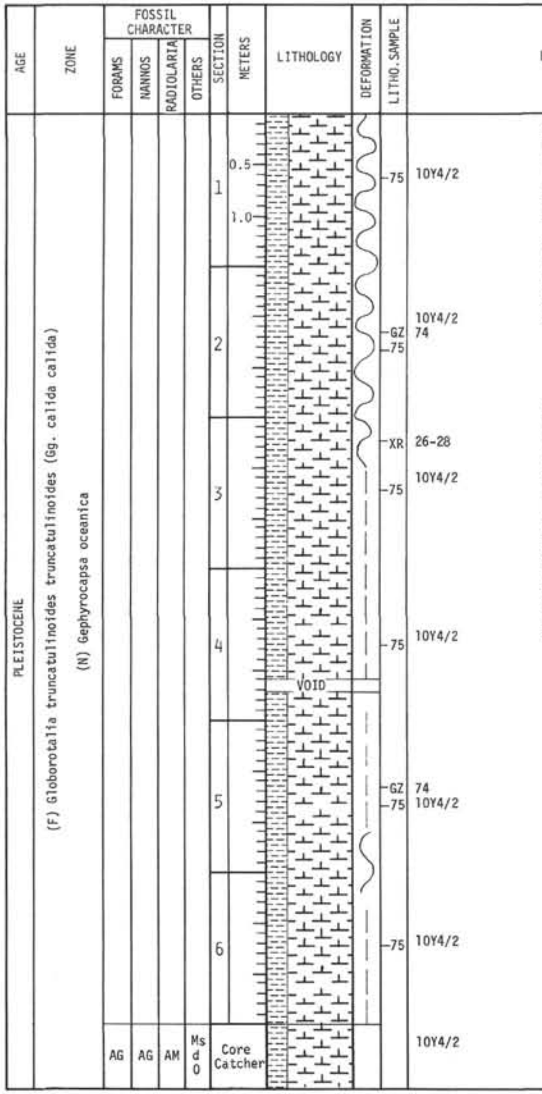
Coarse Fraction (>63u): forams, diatoms, rads, sponge spicules, plant debris, silicoflagellates, and iron oxides.

BULK X-RAY (179.4 m)

Calcite	47%
Quartz	19%
Mica	12%
Montmorillonite	8%
Plagioclase	5%
Aragonite	4%
Kaolinite	3%
Chlorite	2%

Explanatory notes in chapter 1

Site 262 Hole Core 21 Cored Interval: 185.5-195 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with very few dark streaks, layers, and mottles. Grayish white shells up to 4 mm scattered throughout. Moderately deformed in Sections 3, 4, and 5. Intensely deformed in Sections 1, 2, and the lower part of 5.

CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 6-75

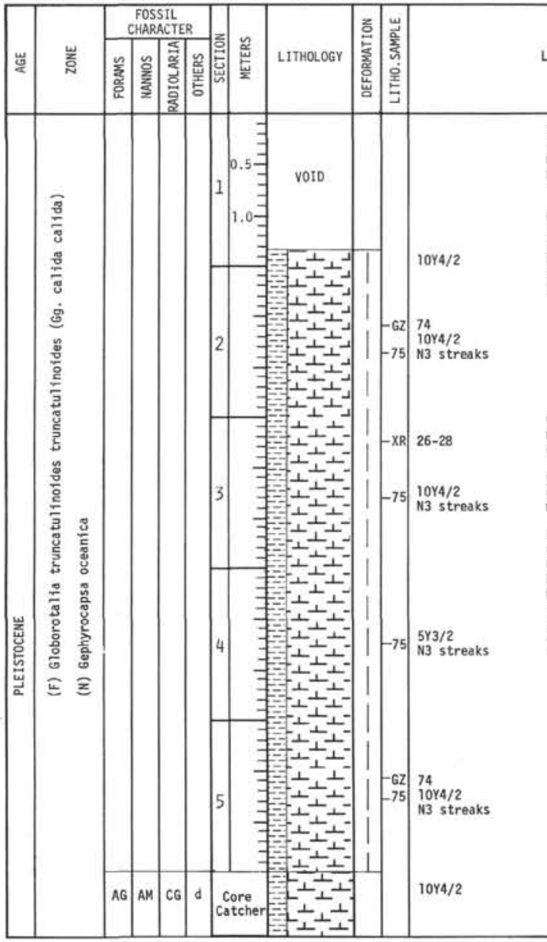
Texture		Composition	
Clay	70%	Nannos	54%
Silt	27%	Clay	22%
Sand	3%	Rads	14%
		Carb. frags.	4%
		Forams	2%
		Sponge spicules	2%
		Diatoms	1%

Other constituents are: quartz, heavy minerals, pyrite, dolomite rhombs, and plant debris.

Coarse Fraction (>63μ): forams, rads, sponge spicules, pyrite, fish remains, molluscan debris, and echinoderm fragments.

BULK X-RAY (188.8 m)	
Calcite	55%
Quartz	16%
Mica	9%
Montmorillonite	7%
Aragonite	6%
Plagioclase	3%
Kaolinite	3%
Chlorite	1%

Site 262 Hole Core 22 Cored Interval: 195-204.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with dark gray streaks, layers, and slight mottles. Grayish white shells up to 3 mm scattered throughout. Slight deformation in Sections 2, 3, 4, and 5.

CLAY RICH NANNO OOZE
Smear slides 2-75, 4-75, 5-75

Texture		Composition	
Clay	73%	Nannos	50%
Silt	26%	Clay	25%
Sand	1%	Carb. frags.	7%
		Rads	6%
		Authig. carbonates	3%
		Forams	3%
		Diatoms	3%
		Pyrite	2%
		Sponge spicules	1%
		Dolomite rhombs	1%

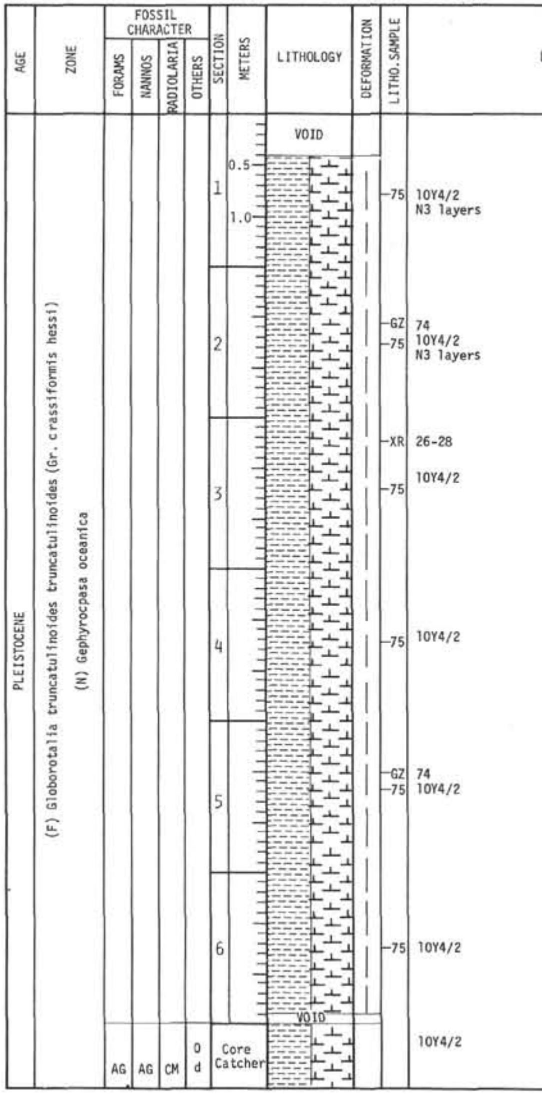
Other constituents are: quartz, heavy minerals, silicoflagellates, and plant debris.

Coarse Fraction (>63μ): forams, rads, diatoms, sponge spicules, pyrite, and mica.

BULK X-RAY (198.3 m)	
Calcite	43%
Quartz	20%
Montmorillonite	13%
Mica	13%
Kaolinite	5%
Plagioclase	3%
Aragonite	2%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 23 Cored Interval: 204.5-214 m



LITHOLOGIC DESCRIPTION

Stiff, grayish and green nanno ooze with few dark gray streaks and layers. Slight deformation throughout.

CLAY NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

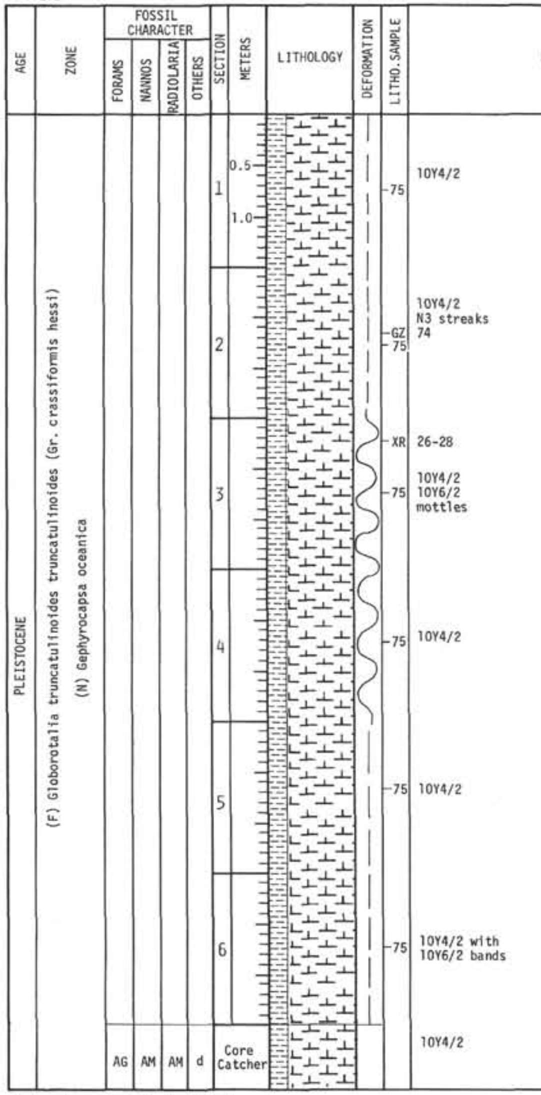
Texture		Composition	
Clay	74%	Nannos	60%
Silt	25%	Clay	27%
Sand	1%	Carb. frags.	5%
		Forams	3%
		Rads	3%

Other constituents are pyrite, diatoms, silicoflagellates, volcanic glass, heavy minerals, quartz, chlorite, dolomite rhombs, plant debris.

Coarse Fraction (>63μ): forams, rads, sponge spicules, silicoflagellates, molluscs, plant debris, pyrite, and mica.

BULK X-RAY (207.8 m)	
Calcite	58%
Quartz	13%
Mica	11%
Montmorillonite	10%
Aragonite	3%
Kaolinite	2%
Plagioclase	2%
Chlorite	1%

Site 262 Hole Core 24 Cored Interval: 214-223.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive and pale olive nanno ooze with few dark gray bands and streaks. Moderate deformation in Sections 1, 2, 5, and 6; intense deformation in Sections 3 and 4. Shell fragments up to 4 mm scattered throughout.

CLAY RICH NANNO OOZE
Smear slides 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Clay	72%	Nannos	67%
Silt	25%	Clay	23%
Sand	3%	Carb. frags.	3%
		Forams	2%
		Diatoms	1%
		Rads	1%
		Pyrite	1%

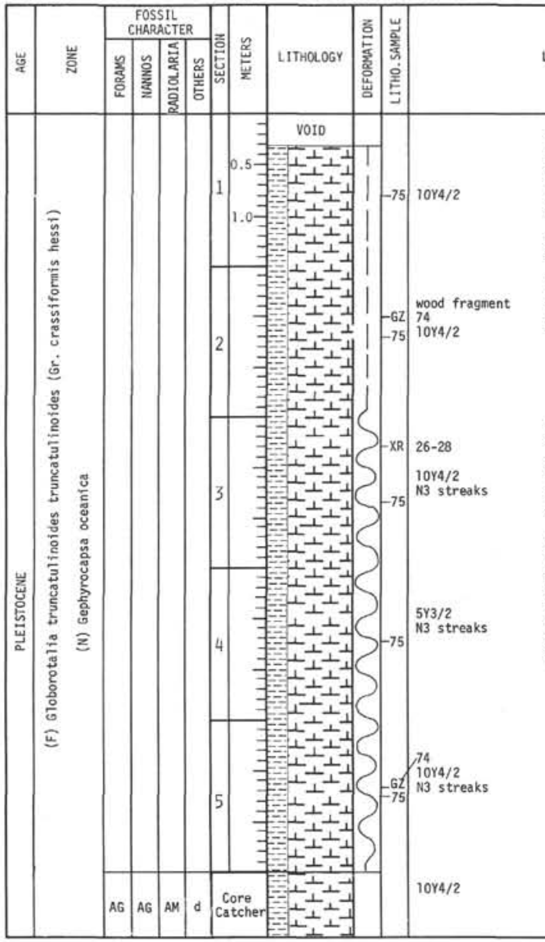
Other components are: sponge spicules, dolomite rhombs, chlorite, quartz, heavy minerals, silicoflagellates, and plant debris.

Coarse Fraction (>63μ): forams, diatoms, rads, sponge spicules, pyrite, plant debris, and echinoderm fragments.

BULK X-RAY (217.3 m)	
Calcite	55%
Quartz	16%
Mica	9%
Aragonite	7%
Montmorillonite	6%
Plagioclase	3%
Kaolinite	2%
Chlorite	2%

Explanatory notes in chapter 1

Site 262 Hole Core 25 Cored Interval: 223.5-233 m



LITHOLOGIC DESCRIPTION

Stiff grayish olive and olive gray nanno ooze with few dark bands and streaks. Shell fragments scattered throughout. Slight deformation in Sections 1 and 2; intense deformation in Sections 3, 4, and 5.

CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75

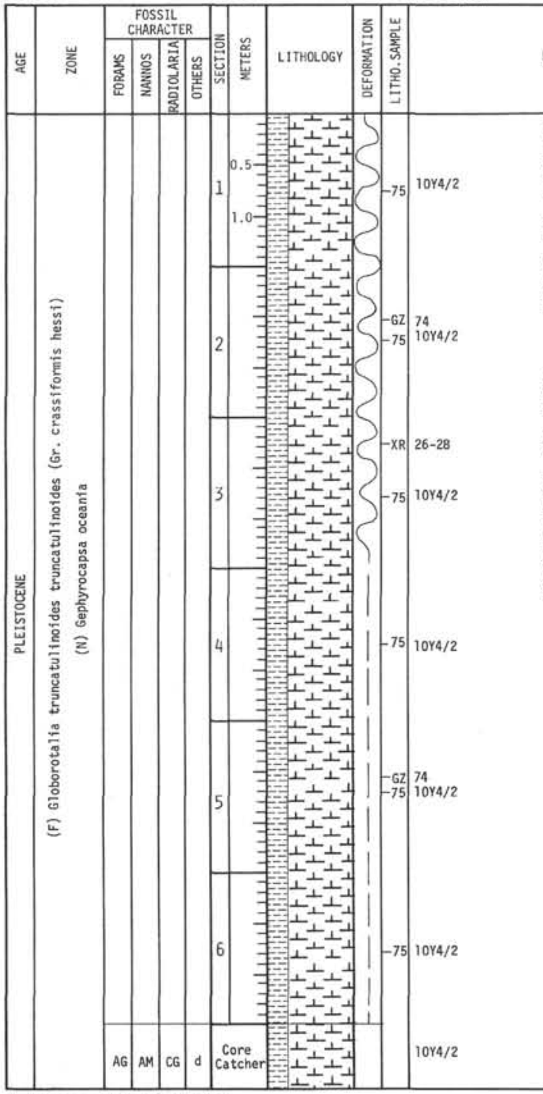
Texture		Composition	
Clay	72%	Nannos	68%
Silt	26%	Clay	18%
Sand	2%	Carb. frags.	4%
		Forams	4%
		Diatoms	3%
		Sponge spicules	1%
		Rads	1%
		Pyrite	1%

Other components are plant debris, dolomite rhombs, and silicoflagellates.

Coarse Fraction (>63μ): forams, diatoms, rads, sponge spicules, carbonate fragments, fish remains, and silicoflagellates.

BULK X-RAY (226.8 m)	
Calcite	54%
Quartz	15%
Montmorillonite	10%
Mica	8%
Aragonite	7%
Kaolinite	3%
Plagioclase	2%
Chlorite	1%

Site 262 Hole Core 26 Cored Interval: 233-242.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with shell fragments scattered throughout and a few dark gray bands. Intense deformation in Sections 1, 2, and 3. Moderate deformation in Section 4, 5, and 6.

CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Clay	71%	Nannos	72%
Silt	26%	Clay	12%
Sand	3%	Carb. frag.	7%
		Forams	4%
		Rads	3%
		Sponge spicules	2%

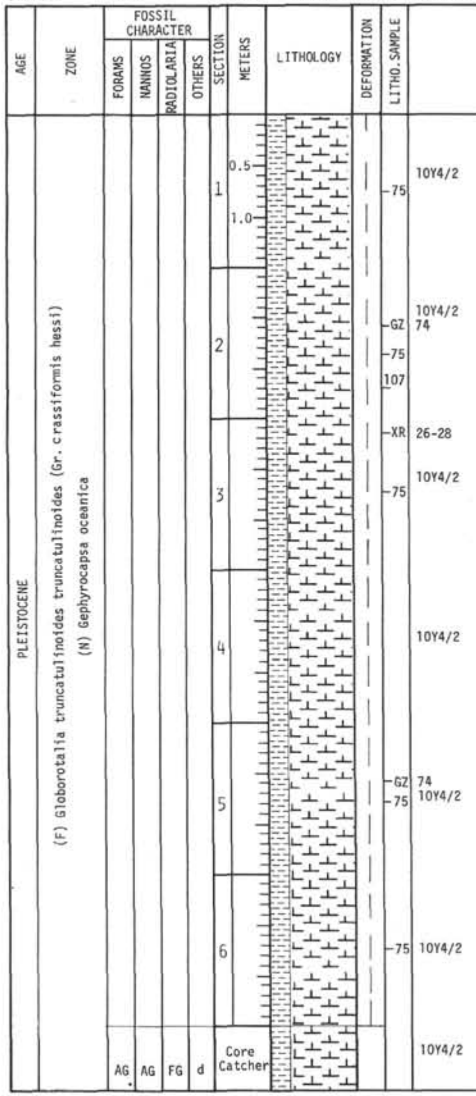
Other components are diatoms, plant debris, pyrite, quartz, heavy minerals, dolomite rhombs, and silicoflagellates.

Coarse Fraction (>63μ): forams, carbonate fragments, plant debris, and rads.

BULK X-RAY (236.3 m)	
Calcite	58%
Quartz	13%
Montmorillonite	8%
Mica	8%
Aragonite	8%
Plagioclase	2%
Kaolinite	2%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 27 Cored Interval: 242.5-252 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with shell fragments scattered throughout and a few dark gray bands. Slight deformation.

CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 2-107, 3-75, 5-75, 6-75

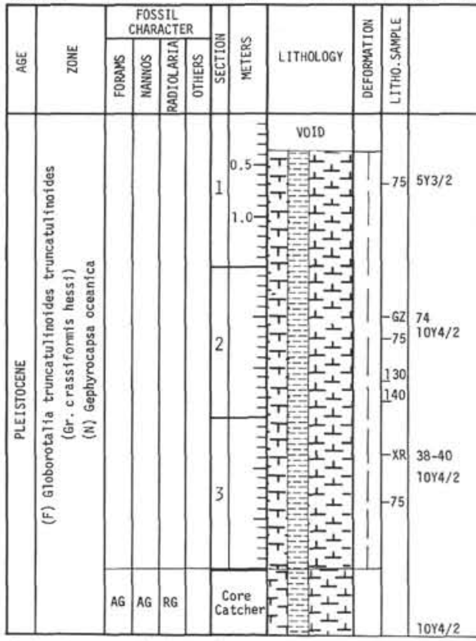
Texture		Composition	
Clay	73%	Nannos	69%
Silt	25%	Clay	14%
Sand	2%	Carb. frag.	5%
		Forams	5%
		Rads	2%
		Diatoms	1%
		Sponge spicules	1%

Other components are plant debris, pyrite, silicoflagellates, quartz, heavy minerals, dolomite rhombs.

Coarse Fraction (>63μ): forams, carbonate fragments, pyrite, rads, sponge spicules, plant debris, mica, and silicoflagellates.

BULK X-RAY (245.8 m)	
Calcite	51%
Quartz	12%
Mica	11%
Montmorillonite	11%
Aragonite	7%
Kaolinite	3%
Plagioclase	3%
Chlorite	1%
Clinoptilolite	1%

Site 262 Hole Core 28 Cored Interval: 252-261.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive, and olive gray nanno ooze with shell fragments. Very few dark gray layers. Slight deformation.

FORAM AND CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 2-130, 2-140, 3-75

Texture		Composition	
Clay	60%	Nannos	55%
Silt	31%	Clay	18%
Sand	9%	Forams	17%
		Carb. frag.	5%
		Pyrite	2%
		Rads	1%
		Sponge spicules	1%

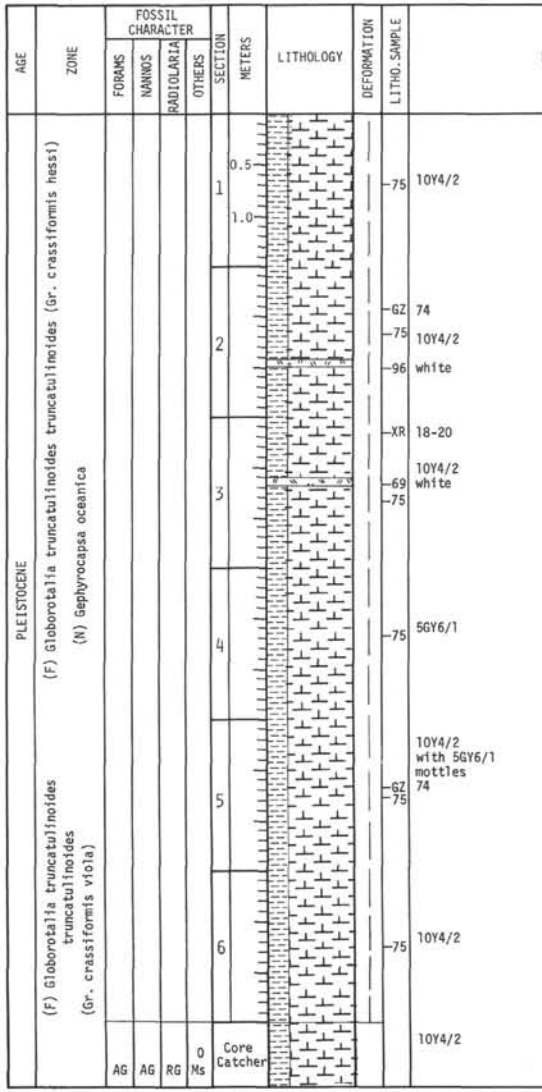
Other components are plant debris, dolomite rhombs, and diatoms.

Coarse Fraction (>63μ): forams, plant debris, sponge spicules, pyrite, echinoderms, and silicoflagellates.

BULK X-RAY (255.4 m)	
Calcite	62%
Quartz	13%
Aragonite	10%
Mica	8%
Plagioclase	3%
Kaolinite	2%
Chlorite	1%
Clinoptilolite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 29 Cored Interval: 261.5-271 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with slight mottles of greenish gray nanno ooze. Few dark gray bands. Shell fragments scattered throughout. Ash beds in Sections 2 and 3 are white.

CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Clay	71%	Nannos	60%
Silt	24%	Clay	17%
Sand	5%	Forams	11%
		Carb. frag.	8%
		Sponge spicules	2%
		Pyrite	1%

Other components are rads, diatoms, silicoflagellates, heavy minerals, plant debris, and volcanic ash.

VOLCANIC ASH
Smear slides 2-96, 3-69

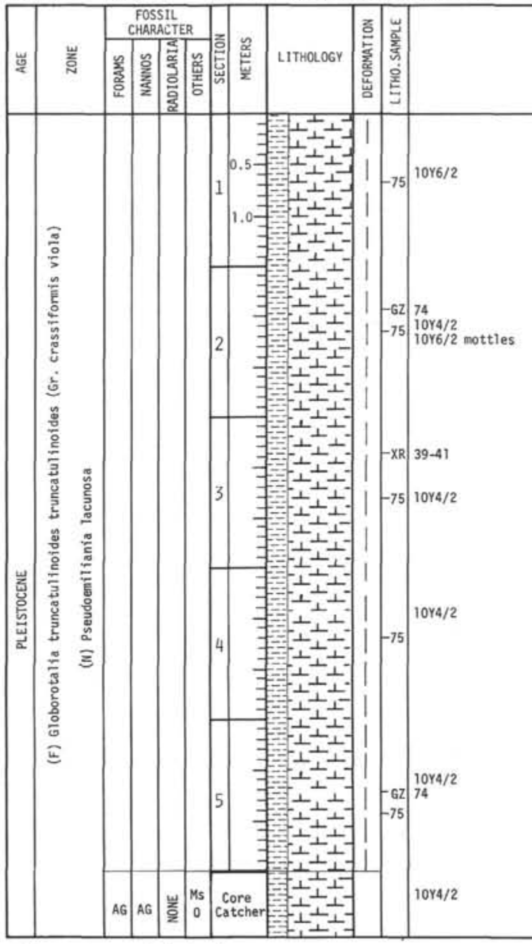
Texture		Composition	
Sand	70%	Glass	99%
Silt	30%		

Other minerals are hypersthene, hornblende, and opaques.

Coarse Fraction (>63µ): forams, pyrite, silicoflagellates, plant debris, molluscan debris, echinoderm fragments, and fish remains.

BULK X-RAY (264.7 m)	
Calcite	72%
Aragonite	9%
Quartz	5%
Mica	4%
Montmorillonite	3%
Ca-dolomite	3%
Kaolinite	2%
K-feldspar	2%

Site 262 Hole Core 30 Cored Interval: 271-280.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze with pale olive mottles. Grayish white shells scattered throughout. Slightly deformed.

CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75

Texture		Composition	
Clay	55%	Nannos	63%
Silt	34%	Clay	16%
Sand	11%	Forams	11%
		Carb. frag.	8%

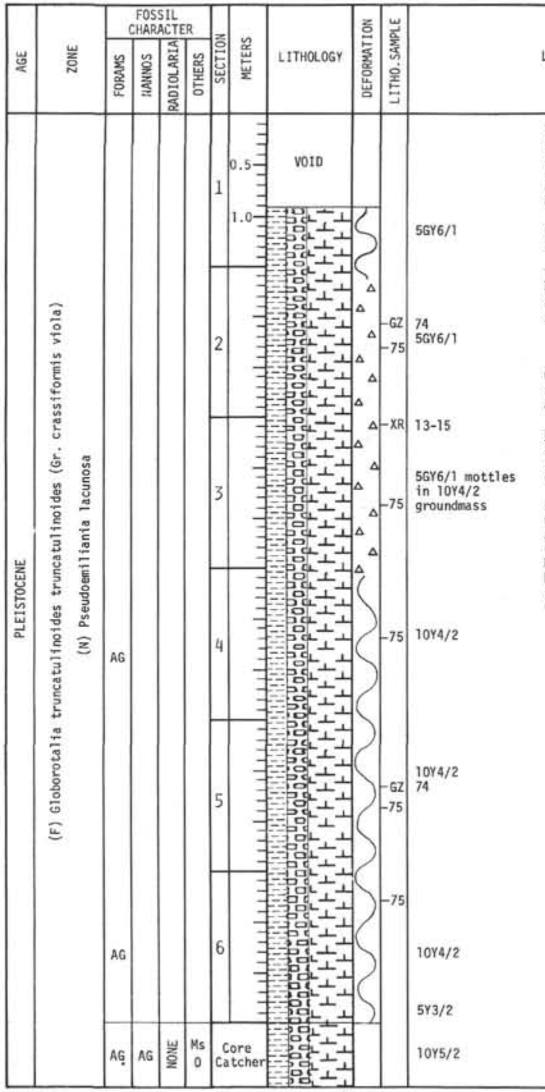
Other components are quartz, heavy minerals, pyrite, dolomite rhombs, rads, sponge spicules, and plant debris.

Coarse Fraction (>63µ): forams, plant debris, sponge spicules, pyrite, echinoderm fragments, silicoflagellates, and fish remains.

BULK X-RAY (274.4 m)	
Calcite	63%
Aragonite	20%
Mica	6%
Quartz	5%
Montmorillonite	3%
Plagioclase	1%
Kaolinite	1%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 31 Cored Interval: 280.5-290 m



LITHOLOGIC DESCRIPTION

Grayish olive nanno ooze with greenish gray mottles. Soft in SEctions 1, 2, and 3; stiff in Sections 4, 5, 6. Drilling breccia in Sections 1, 2, and 3; intensely deformed in Sections 4, 5, and 6. Calcareous shells throughout.

CLAY AND MICARB RICH NANNO OOZE
Smear slides 2-75, 3-75, 4-75, 5-75, 6-75

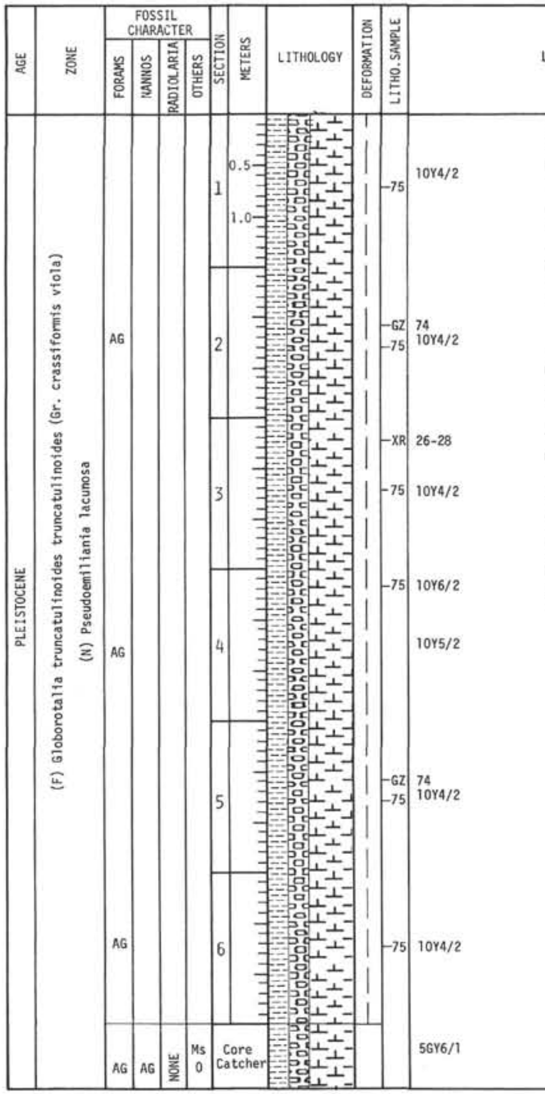
Texture		Composition	
Clay	62%	Nannos	62%
Silt	30%	Carb. frag.	15%
Sand	8%	Clay	14%
		Forams	8%
		Pyrite	1%

Other components are: dolomite rhombs, sponge spicules, silicoflagellates, rads, and plant debris.

Coarse Fraction (>63μ): forams, pyrite, sponge spicules, echinoderm fragments, fish remains, plant debris, and ostracods.

BULK X-RAY (283.6 m)	
Calcite	57%
Aragonite	23%
Quartz	6%
Mica	5%
Montmorillonite	5%
Kaolinite	3%
Chlorite	1%

Site 262 Hole Core 32 Cored Interval: 290-299.5 m



LITHOLOGIC DESCRIPTION

Stiff, grayish olive and pale olive nanno ooze with slight mottling. Moderately deformed. Calcerous shells up to 4 mm throughout.

CLAY AND MICARB RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Clay	59%	Nannos	71%
Silt	35%	Carb. frag.	12%
Sand	6%	Clay	10%
		Forams	4%
		Pyrite	1%

Other components are quartz, heavy minerals, dolomite rhombs, rads, sponge spicules, silicoflagellates, and plant debris.

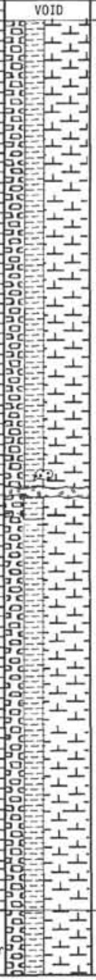
Coarse Fraction (>63μ): forams, pyrite, sponge spicules, echinoderm fragments, molluscan debris, and plant debris.

BULK X-RAY (293.3 m)	
Calcite	52%
Aragonite	29%
Quartz	7%
Mica	6%
Kaolinite	2%
Montmorillonite	2%
Chlorite	1%
Ca-dolomite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 33 Cored Interval: 299.5-309 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	(F) Globorotalia truncatulinoides (Gr. crassiformis viola) (N) Pseudoemiliania lacunosa					1	0.5 1.0	VOID		-75	10Y4/2
		AG				2				-GZ -75	74 10Y4/2
						3				-XR -75	20-22 10Y4/2
		AG				4				-35 -75	white white 10Y4/2
						5				-GZ -75	10Y4/2 74
		AG				6					10Y4/2 10Y5/2
		AG	AG	NONE	Ms 0	Core Catcher					10Y6/2



Stiff, grayish olive nanno ooze with very slight mottling. Few calcareous shell fragments up to 3 mm. Moderately deformed. Volcanic ash and piece of pumice in upper portion of Section 4.

MICARB AND CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75

Texture		Composition	
Clay	68%	Nannos	69%
Silt	30%	Clay	12%
Sand	2%	Carb. frag.	10%
		Forams	7%
		Pyrite	1%

Other constituents are rads, sponge spicules, plant debris, dolomite rhombs, quartz, feldspar, and heavy minerals.

VOLCANIC ASH
Smear slide 4-35

Texture		Composition	
Sand	80%	Volcanic glass	97%
Silt	20%	Clay	1%

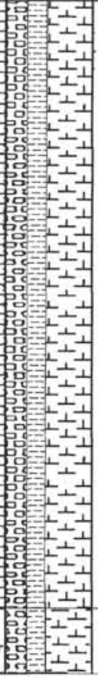
Others are hornblende, chlorite, opaques, and hypersthene.

Coarse Fraction (>63μ): forams, rads, plant debris, pyrite, and sponge spicules.

BULK X-RAY (302.7 m)	
Calcite	59%
Aragonite	24%
Quartz	6%
Mica	5%
Ca-dolomite	3%
Kaolinite	2%
Chlorite	1%

Site 262 Hole Core 34 Cored Interval: 309-318.5 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	(F) Globorotalia truncatulinoides (Gr. crassiformis viola) (N) Pseudoemiliania lacunosa	AG			Ms	1	0.5 1.0			-75	10Y4/2
						2				-GZ -75	74 10Y4/2
		AG				3				-XR -75	26-28 10Y4/2 10Y6/2
						4				-75	10Y5/2
		AG	AG	NONE	Ms d	Core Catcher					10Y5/2



Stiff, grayish olive and pale olive nanno ooze with very slight mottling. Few calcareous shell fragments up to 3 mm scattered throughout. Moderate deformation.

MICARB AND CLAY RICH NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75

Texture		Composition	
Clay	58%	Nannos	58%
Silt	41%	Clay	15%
Sand	1%	Carb. frag.	14%
		Forams	10%
		Pyrite	2%

Other components are dolomite rhombs, quartz, sponge spicules, rads, and plant debris.

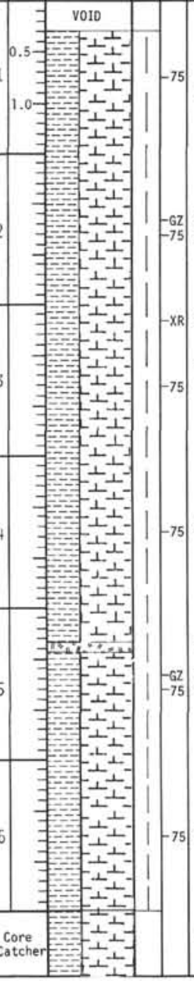
Coarse Fraction (>63μ): forams, sponge spicules, echinoderm fragments, molluscan debris, and pyrite.

BULK X-RAY (312.3 m)	
Calcite	46%
Aragonite	33%
Ca-dolomite	6%
Quartz	6%
Mica	5%
Kaolinite	1%
Plagioclase	1%
Pyrite	1%
Chlorite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 35 Cored Interval: 318.5-328 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	FOSSIL CHARACTER NANNOS	FOSSIL CHARACTER RADIOLARIA	FOSSIL CHARACTER OTHERS	SECTION	LITHO. SAMPLE	
PLEISTOCENE	(F) Globorotalia truncatulinoides (Gr. crassiformis viola) (N) Pseudoemiliania lacunosa					1	-75	10Y4/2
		AG				2	-GZ -75	74 5GY5/2
						3	-XR -75	26-28 5GY6/2
		AG			Ms	4	-75	5GY6/2
						5	-GZ -75	white 74 10Y4/2
		AG				6	-75	10Y4/2
		AG •	AG	NONE	Ms 0	Core Catcher		10Y4/2



LITHOLOGIC DESCRIPTION

Stiff and lithified grayish olive and greenish gray nanno ooze. Few calcareous shell fragments up to 4 mm scattered throughout. Moderate deformation. White volcanic ash layer 1 cm thick near top of Section 5.

CLAY NANNO OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Clay	62%	Nannos	54%
Silt	35%	Clay	28%
Sand	3%	Carb. frag.	8%
		Forams	5%
		Sponge spicules	1%
		Volcanic glass	1%
		Pyrite	1%

Other components are quartz, dolomite rhombs, Radiolaria, and plant debris.

VOLCANIC ASH
Smear slide 4-75

Texture		Composition	
Sand	80%	Glass	84%
Silt	20%	Carb. frag.	10%
		Forams	2%
		Nannos	2%
		Heavy minerals	1%

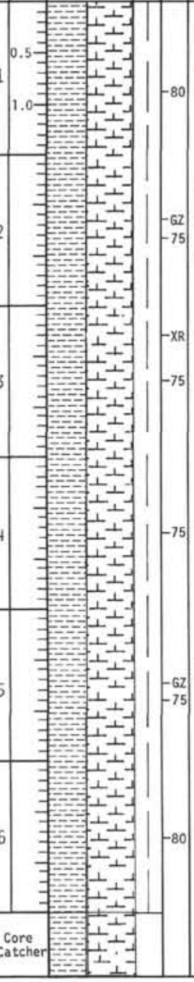
Coarse Fraction (>63μ): forams, plant debris, rads, sponge spicules, pyrite, silicoflagellates, and fish remains.

BULK X-RAY (321.8 m)

Calcite	51%
Aragonite	33%
Quartz	5%
Ca-dolomite	4%
Mica	4%
Kaolinite	2%
Chlorite	1%

Site 262 Hole Core 36 Cored Interval:328-337.5 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	FOSSIL CHARACTER NANNOS	FOSSIL CHARACTER RADIOLARIA	FOSSIL CHARACTER OTHERS	SECTION	LITHO. SAMPLE	
PLEISTOCENE	(F) Globorotalia truncatulinoides (Gr. crassiformis viola) (N) Pseudoemiliania lacunosa					1	-80	2 mm shell layer slickensides 10Y4/2
		AG				2	-GZ -75	5Y3/2 74 10Y4/2
						3	-XR -75	26-28 10Y4/2
		AG			0	4	-75	10Y4/2
						5	-GZ -75	10Y4/2 74
		AG				6	-80	10Y4/2
		AG	AG	NONE	0 Ms	Core Catcher		10Y3/2



LITHOLOGIC DESCRIPTION

Stiff, grayish olive nanno ooze. Calcareous shell fragments scattered throughout. Moderate deformation.

CLAY NANNO OOZE
Smear slides 1-80, 2-75, 3-75, 4-75, 5-75, 6-80

Texture		Composition	
Clay	63%	Nannos	38%
Silt	33%	Clay	30%
Sand	4%	Forams	19%
		Carb. frag.	9%
		Pyrite	1%

Other components are sponge spicules and plant debris.

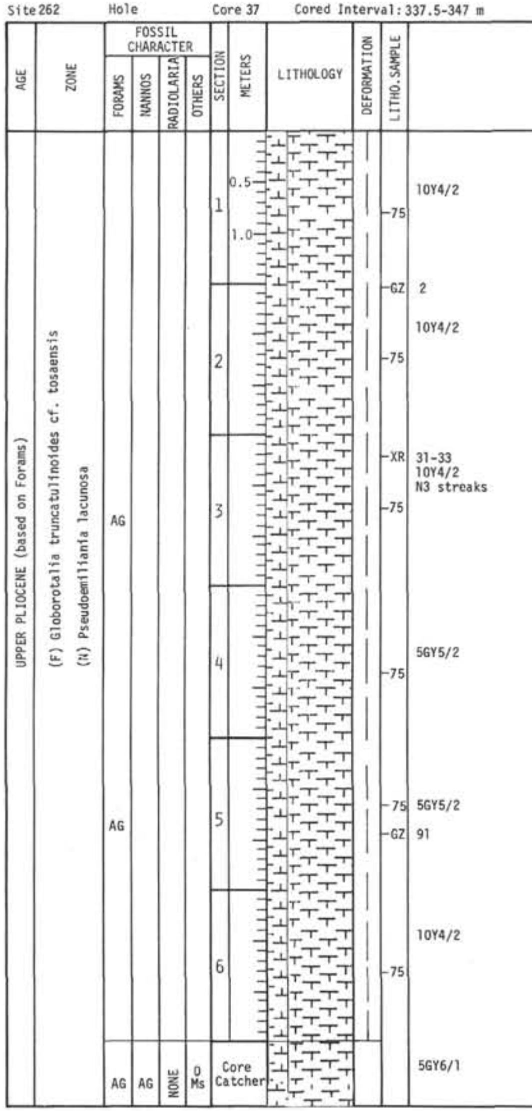
Coarse Fraction (>63μ): forams, pyrite, iron oxide, rads, sponge spicules, fish remains, plant debris, and molluscan debris.

BULK X-RAY (331.3 m)

Calcite	46%
Aragonite	28%
Quartz	9%
Ca-dolomite	8%
Mica	6%
Kaolinite	2%
Plagioclase	1%

Explanatory notes in chapter 1

Site 262 Hole Core 37 Cored Interval: 337.5-347 m



LITHOLOGIC DESCRIPTION

Stiff and semi-lithified grayish olive and greenish gray foram ooze. Moderately deformed in Sections 1-3; slightly deformed in Sections 4-6. Calcareous shell fragments up to 4 cm scattered throughout.

NANNO RICH FORAM OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

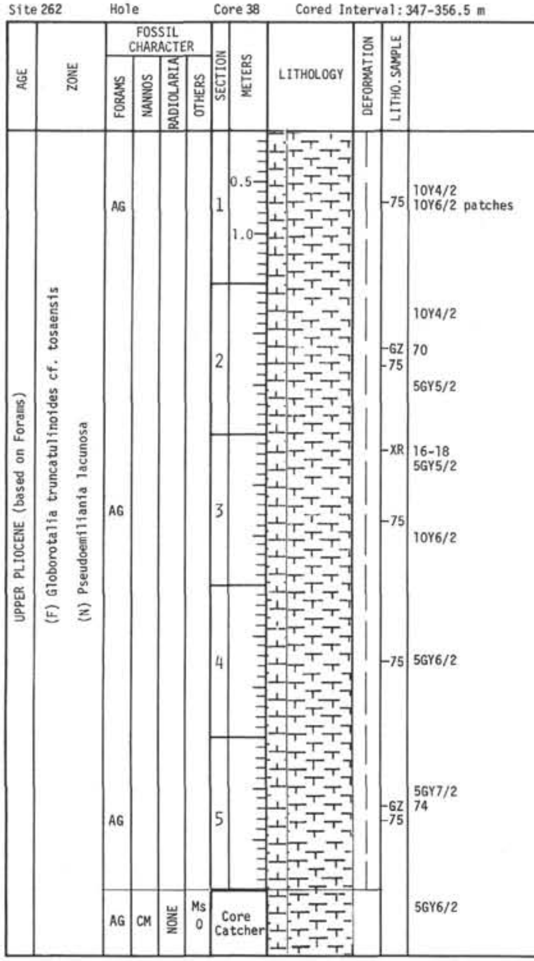
Texture		Composition	
Silt	50%	Forams	47%
Clay	43%	Nannos	25%
Sand	7%	Clay	12%
		Carb. frag.	11%
		Quartz	2%

Other components are dolomite rhombs, pyrite, sponge spicules, plant debris, heavy minerals, and glauconite.

Coarse Fraction (>63μ): forams, sponge spicules, plant debris, pyrite, molluscan debris, iron oxide, and quartz.

BULK X-RAY (340.8 m)	
Calcite	55%
Aragonite	23%
Quartz	10%
Ca-dolomite	6%
Mica	4%
Kaolinite	2%

Site 262 Hole Core 38 Cored Interval: 347-356.5 m



LITHOLOGIC DESCRIPTION

Stiff and semi-lithified grayish olive, pale olive, and pale greenish yellow foram ooze. Slightly deformed. Slightly mottled. Shell fragments up to 3 mm across scattered throughout.

NANNO RICH FORAM OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75

Texture		Composition	
Sec. 2, 70 cm		Forams	50%
Silt	48%	Nannos	25%
Clay	38%	Clay	19%
Sand	14%	Carb. frag.	5%
Sec. 5, 74 cm		Quartz	1%
Sand	53%		
Silt	28%		
Clay	19%		

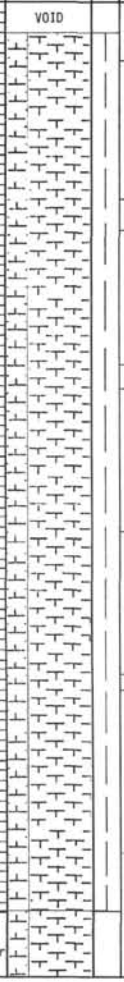
Trace amounts of sponge spicules, glauconite, and heavy minerals.

Coarse Fraction (>63μ): forams, quartz, heavy minerals, pyrite, sponge spicules, dolomite rhombs, and plant debris.

BULK X-RAY (350.2 m)	
Calcite	64%
Aragonite	24%
Ca-dolomite	6%
Quartz	4%
Mica	2%

Explanatory notes in chapter 1

Site 262 Hole Core 39 Cored Interval: 356.5-366 m



AGE	ZONE	FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
UPPER PLIOCENE (based on Forams)	(F) Globorotalia truncatulinoides cf. tosaensis (N) Pseudoemiliania lacunosa	AG				1	0.5 1.0	VOID		-75 5GY5/2
						2				-GZ 52 -75 10Y5/2
		AG				3				-XR 58-60 -75 10Y5/2
						4				-75 10Y5/2
		AG				5				-GZ 74 -75 10Y5/2
						6				10Y5/2 -75 10Y4/2
		AG	CM	NONE	Ms 0	Core Catcher				5GY4/2

LITHOLOGIC DESCRIPTION

Stiff to semi-lithified grayish olive and grayish green nanno foram ooze. Stiff to semi-lithified. Slight deformation.

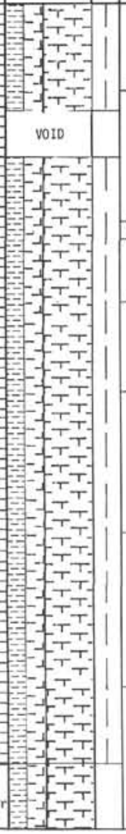
NANNO FORAM OOZE
Smear slides 1-75, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Sec. 2, 52 cm		Forams	53%
Sand	45%	Nannos	28%
Silt	32%	Clay	7%
Clay	23%	Carb. frag.	7%
Sec. 5, 74 cm		Quartz	2%
Silt	44%	Pyrite	1%
Clay	34%	Dolomite rhombs	1%
Sand	22%	Sponge spicules	1%

Coarse Fraction (>63μ): forams, carb. frag., quartz, heavy minerals, pyrite, iron oxide, molluscan debris.

BULK X-RAY (360.1 m)	
Calcite	65%
Aragonite	16%
Ca-dolomite	10%
Quartz	7%
Mica	2%

Site 262 Hole Core 40 Cored Interval: 366-375.5 m



AGE	ZONE	FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
UPPER PLIOCENE (based on Forams)	(F) Globorotalia truncatulinoides cf. tosaensis (N) Pseudoemiliania lacunosa					1	0.5 1.0	VOID		-75 10Y4/2
						2				-GZ 64 -75 10Y4/2 -XR 5-7
						3				-75
						4				-75 10Y4/2
						5				-75 10Y6/2
		AG	CM	NONE	Ms 0	Core Catcher				5GY5/2

LITHOLOGIC DESCRIPTION

Semi-lithified, grayish olive and dusky yellow green foram ooze. Layered and slightly mottled. Calcareous shell fragments up to 3 mm scattered throughout. Slightly deformed.

CLAY AND NANNO RICH FORAM OOZE
Smear slides 1-75, 2-75, 4-75, 5-75

Texture		Composition	
Clay	41%	Forams	63%
Silt	34%	Nannos	13%
Sand	25%	Clay	12%
		Carb. frag.	8%
		Quartz	2%
		Pyrite	1%

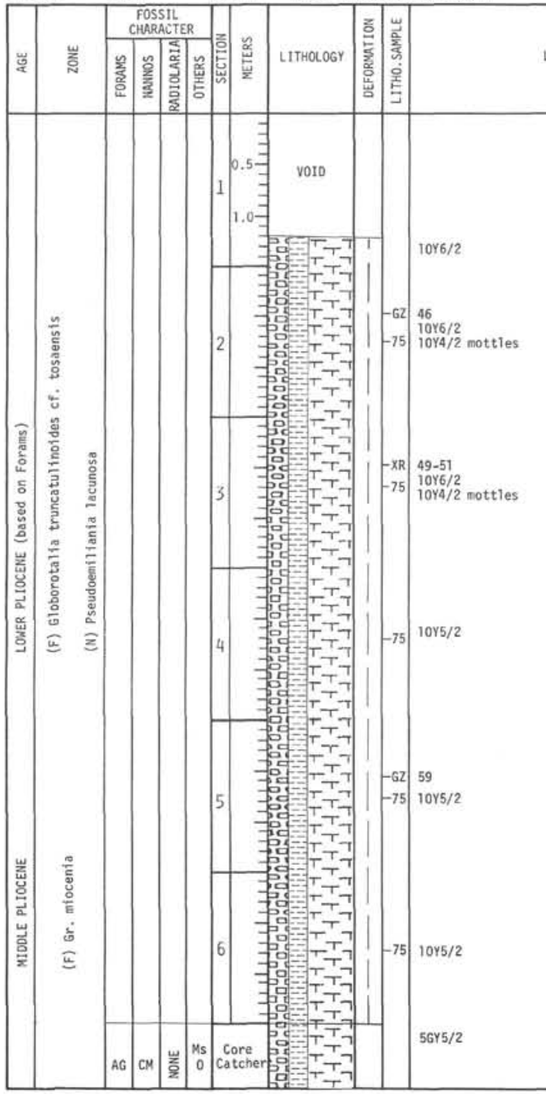
Other components are dolomite rhombs, sponge spicules, heavy minerals, and glauconite.

Coarse Fraction (>63μ): forams, dolomite rhombs, quartz, carbonate fragments, sponge spicules, plant debris, ostracods.

BULK X-RAY (369.0 m)	
Calcite	48%
Aragonite	19%
Quartz	12%
Mica	7%
Ca-dolomite	6%
Plagioclase	3%
K-feldspar	3%
Chlorite	1%
Pyrite	1%
Kaolinite	Tr.

Explanatory notes in chapter 1

Site 262 Hole Core 41 Cored Interval: 375.5-385 m



LITHOLOGIC DESCRIPTION

Semi-lithified pale olive and grayish olive foram ooze. Moderate mottling. Slight deformation. Shell fragments up to 3 mm scattered throughout.

<u>MICARB AND NANNO RICH FORAM OOZE</u>
Smear slides 2-75, 3-75, 4-75, 5-75, 6-75

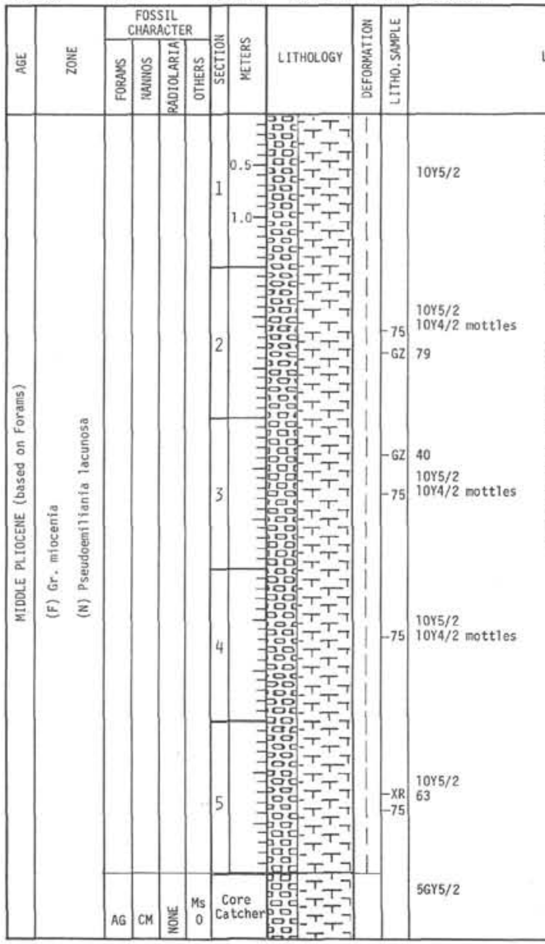
Texture		Composition	
Sand	51%	Forams	49%
Silt	28%	Nannos	22%
Clay	21%	Carb. frag.	19%
		Clay	7%
		Dolomite rhombs	1%
		Pyrite	1%

Other components are heavy minerals and glauconite.

Coarse Fraction (>63μ): forams, carbonate fragments, quartz, sponge spicules, plant debris, ostracods, and echinoid fragments.

BULK X-RAY (379.0 m)	
Calcite	75%
Aragonite	11%
Ca-dolomite	10%
Quartz	4%

Site 262 Hole Core 42 Cored Interval: 385-394.5 m



LITHOLOGIC DESCRIPTION

Semi-lithified pale olive micarb foram ooze with grayish olive mottles. Shell fragments scattered throughout. Slight deformation.

<u>MICARB FORAM OOZE</u>
Smear slides 2-75, 3-75, 4-75, 5-75

Texture		Composition	
Silt	42%	Forams	45%
Clay	31%	Carb. frag.	29%
Sand	27%	Nannos	15%
		Clay	7%
		Quartz	1%
		Dolomite rhombs	1%

Other components are heavy minerals, pyrite, sponge spicules.

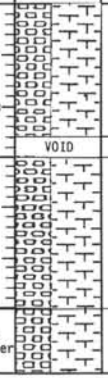
Coarse Fraction (>63μ): forams, carbonate fragments, quartz, gypsum, echinoid fragments.

BULK X-RAY (391.6 m)	
Calcite	55%
Aragonite	25%
Quartz	12%
Ca-dolomite	5%
Mica	2%
Kaolinite	1%

Explanatory notes in chapter 1

Site 262 Hole Core 43 Cored Interval: 394.5-404 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	
MIDDLE PLIOCENE	(F) Gr. miocenia (N) Pseudoemiliania lacunosa					1	0.5 1.0	VOID		-75	10Y5/2
						2				-75 -GZ	10Y5/2 80
		AG	CM	NONE	Ms 0	Core Catcher					5GY5/2



LITHOLOGIC DESCRIPTION

Semi-lithified, grayish olive foram ooze. Slight mottles. Slight deformation. Some shells up to 4 mm scattered throughout.

MICARB AND FORAM OOZE
Smear slides 1-75, 2-75

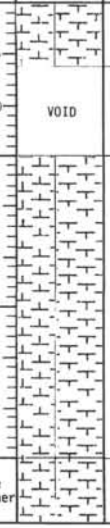
Texture		Composition	
Sand	46%	Forams	57%
Silt	34%	Carb. frag.	29%
Clay	20%	Nannos	10%
		Clay	2%
		Dolomite rhombs	1%
		Quartz	1%

Trace amounts of heavy minerals, pyrite, and sponge spicules.

Coarse Fraction (>63μ): forams, carbonate fragments, quartz, heavy minerals.

Site 262 Hole Core 44 Cored Interval: 404-413.5 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	
MIDDLE PLIOCENE (based on Forams)	(F) Gr. miocenia (N) Pseudoemiliania lacunosa					1	0.5 1.0	VOID			10Y5/2
		AG				2				-GZ -75	74 10Y5/2
		AG				3				-XR -75	29-31 10Y4/2
		AG	CG	NONE	0 Ms	Core Catcher					10Y4/2



LITHOLOGIC DESCRIPTION

Semi-lithified grayish olive and pale olive nanno foram ooze, Laminated and shelly throughout. Slight deformation.

NANNO FORAM OOZE
Smear slides 2-75, 3-75

Texture		Composition	
Sand	50%	Forams	34%
Silt	30%	Nannos	31%
Clay	20%	Carb. frag.	26%
		Clay	5%
		Quartz	2%
		Dolomite rhombs	1%
		Pyrite	1%

Other components are heavy minerals, glauconite, and sponge spicules.

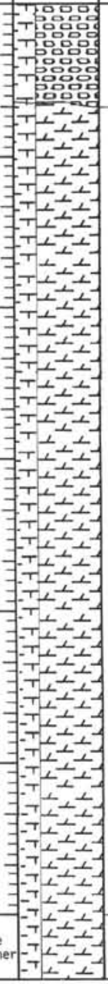
Coarse Fraction (>63μ): forams, carb. frag., dolomite rhombs, molluscan debris, fish remains, echinoid remains, quartz, and heavy minerals.

BULK X-RAY (407.3 m)

Calcite	70%
Ca-dolomite	14%
Aragonite	10%
Quartz	6%

Site 262 Hole Core 45 Cored Interval: 413.5-423 m

AGE	ZONE	FOSSIL CHARACTER FORAMS	NANNOS	RADIOLARIA	OTHERS	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	
MIDDLE PLIOCENE	(F) Gr. miocenia (N) D. brouweri	AG	FM			1	0.5 1.0			-40 93.5 -95 130	10Y5/2 and 10Y4/2 bands Sharp, planar, contact 10Y6/2
LOWER-MIDDLE PLIOCENE	(F) (?) Gr. margarita to Gr. miocenia	AG	NONE		Ms	2				-75 -GZ	5GY6/1 108
			NONE			3				-75 -XR	5GY6/1 129-131
		AG	NONE			4				-75	10Y6/2
			NONE			5				-GZ -75	75 10Y6/2
		AG	NONE			6					5GY6/1
		AM	RM	NONE	Ms	Core Catcher					10Y6/2



LITHOLOGIC DESCRIPTION

SECTION 1: 0-95 cm
Semi-lithified micarb ooze that is shelly and laminated on a fine scale (pale olive and grayish olive laminae). Crossbedded from 15-25 cm. Slight deformation.

FORAM RICH MICARB OOZE
Smear slides 1-40, 1-93.5

Composition	
Carb. frag.	61%
Forams	22%
Nannos	5%
Clay	5%
Quartz	3%
Pyrite	2%
Dolomite rhombs	1%

Trace of glauconite, plant debris, and heavy minerals.

SECTION 1 (below 95 cm) and SECTIONS 2, 3, 4, 5, 6
Soft, stiff, and semi-lithified greenish gray and pale olive foram rich dolomite. Slightly deformed. Generally massive, but laminated in places. Few shells near base of Section 6.

FORAM RICH DOLOMITE
Smear slides 1-95, 1-130, 2-75, 3-75, 4-75, 5-75, 6-75

Texture		Composition	
Silt	55%	Dolomite rhombs	83%
Sand	27%	Forams	14%
Clay	18%	Clay	3%

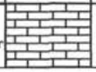
Traces of quartz, pyrite, glauconite.

BULK X-RAY (417.8 m)

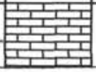
Calcite	53%
Ca-dolomite	45%
Quartz	1%
Aragonite	1%

Explanatory notes in chapter 1

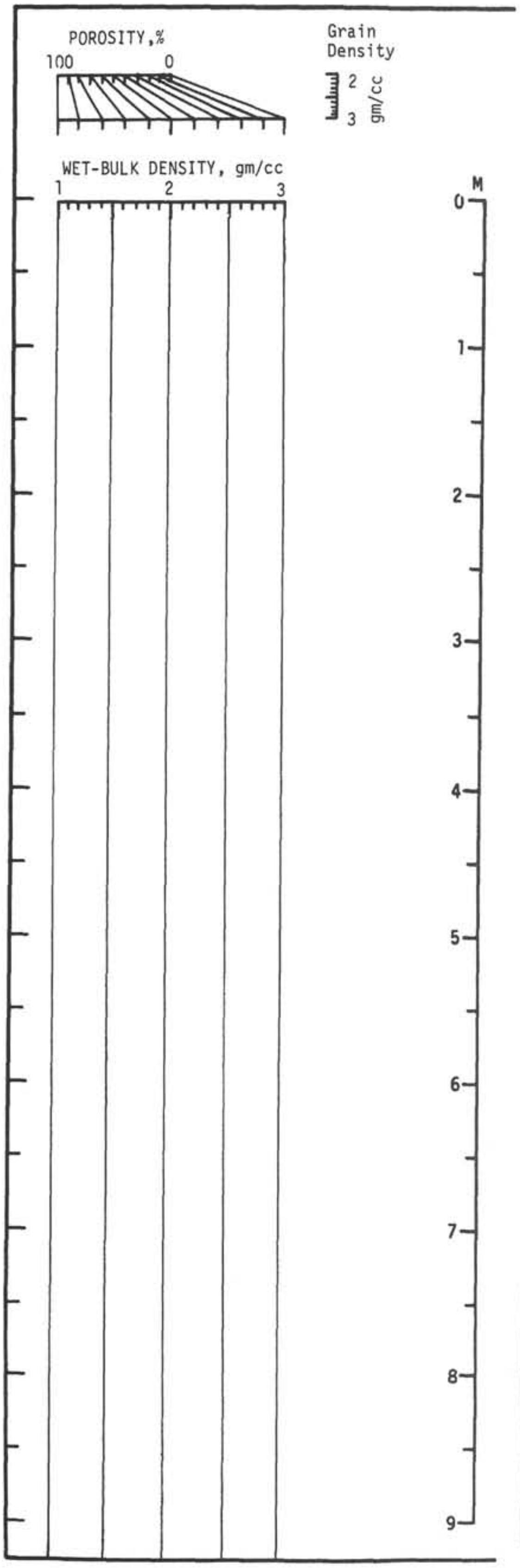
Site 262 Hole Core 46 Cored Interval: 423-432.4 m

AGE	ZONE	FOSSIL CHARACTER				SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAMS	NANNOS	RADIOLARIA	OTHERS						
LOWER-MIDDLE PLIOCENE		NONE	NONE	NONE		Core Catcher				CC	5GY8/1 DOLOMITIC SHELL CALCARENITE Lithified light greenish gray shell calcarenite. Composition Calcite fragments 82% Forams 10% Dolomite rhombs 5% Clay 3% Quartz Tr.

Site 262 Hole Core 47 Cored Interval: 432.5-442 m

AGE	ZONE	FOSSIL CHARACTER				SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
		FORAMS	NANNOS	RADIOLARIA	OTHERS						
LOWER-MIDDLE PLIOCENE	(F) Gr. margarita to Gr. miocenia	AP	NONE	NONE	Ms	Core Catcher					5Y8/1 Lithified, yellow gray shell calcarenite DOLOMITIC SHELL CALCARENITE Coarse Fraction (>63μ): carbonate fragments, dolomite rhombs, forams, quartz.

Explanatory notes in chapter 1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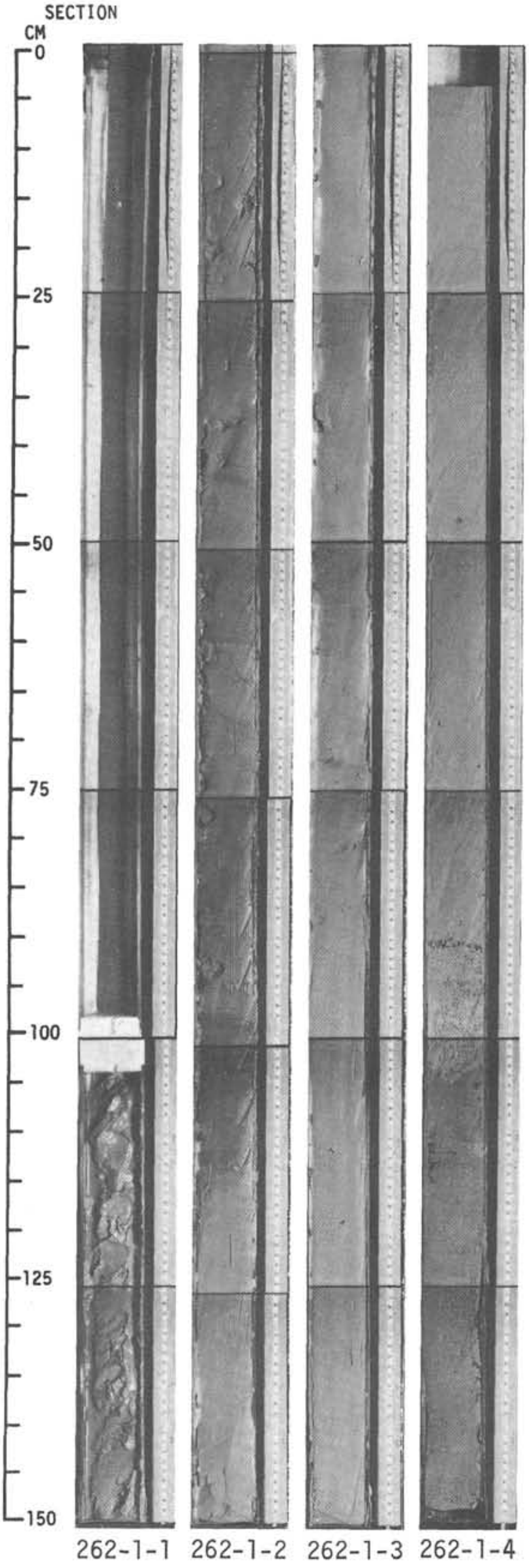
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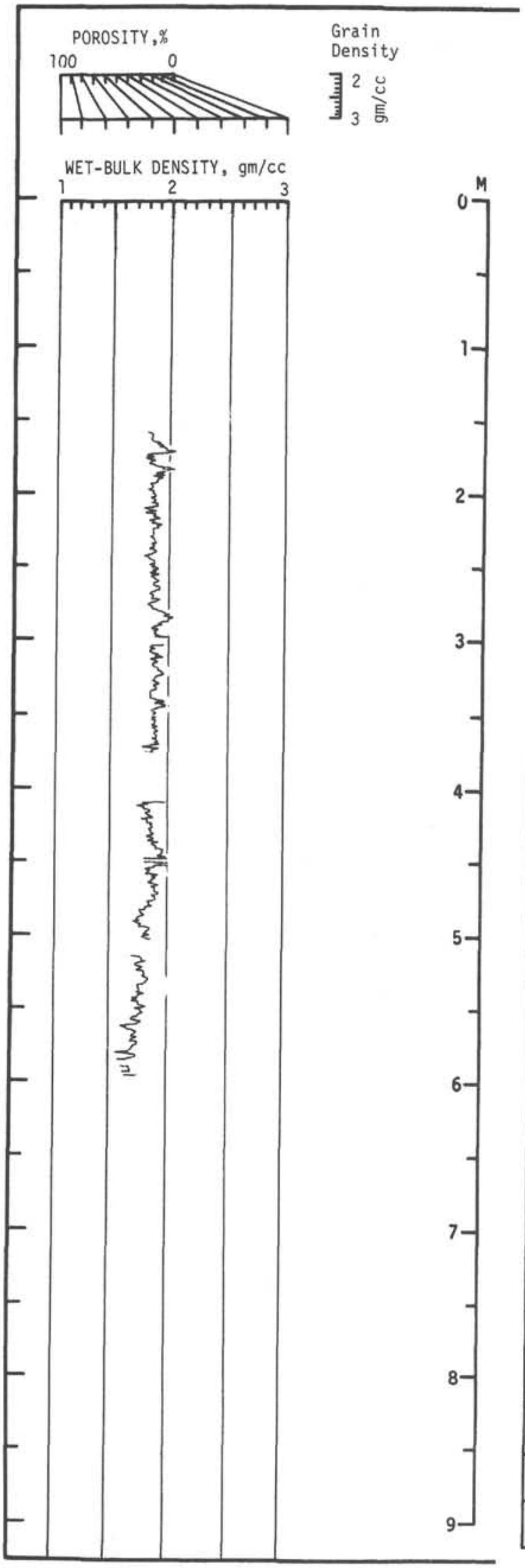
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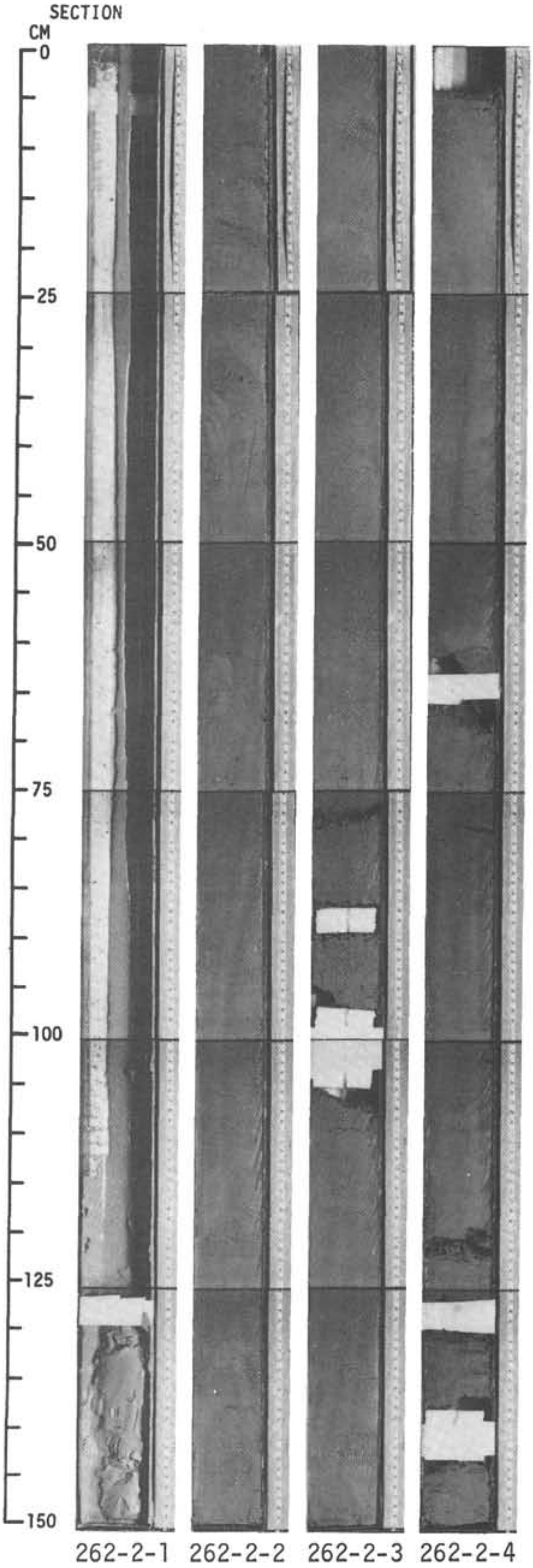
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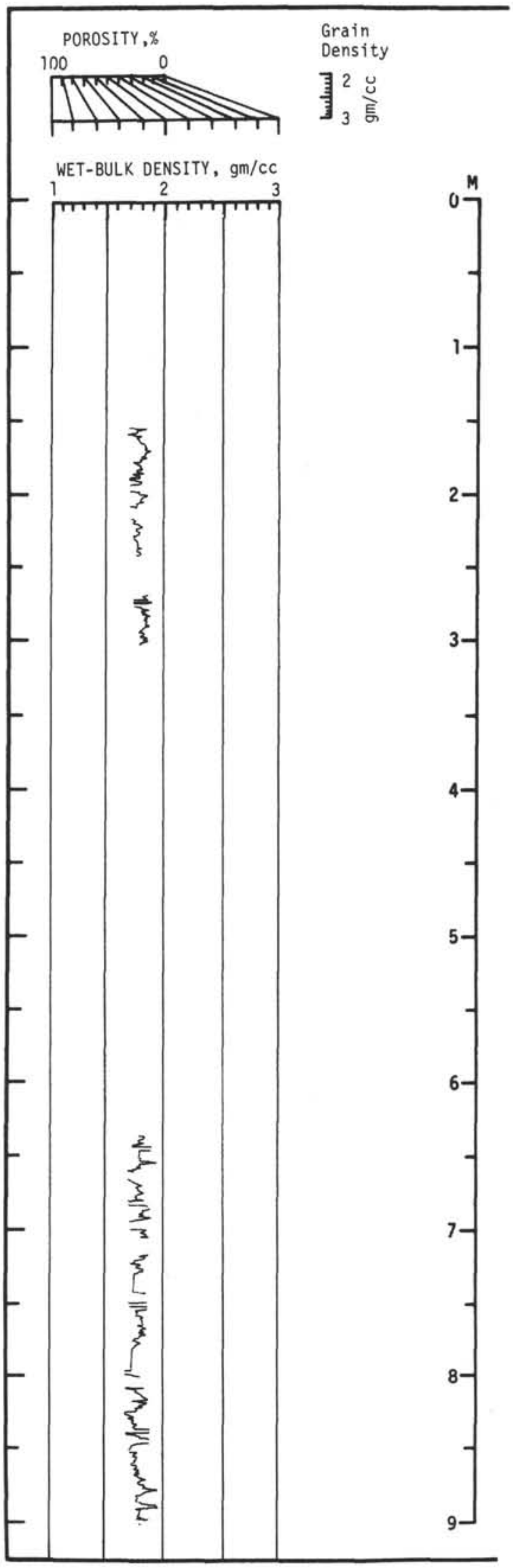
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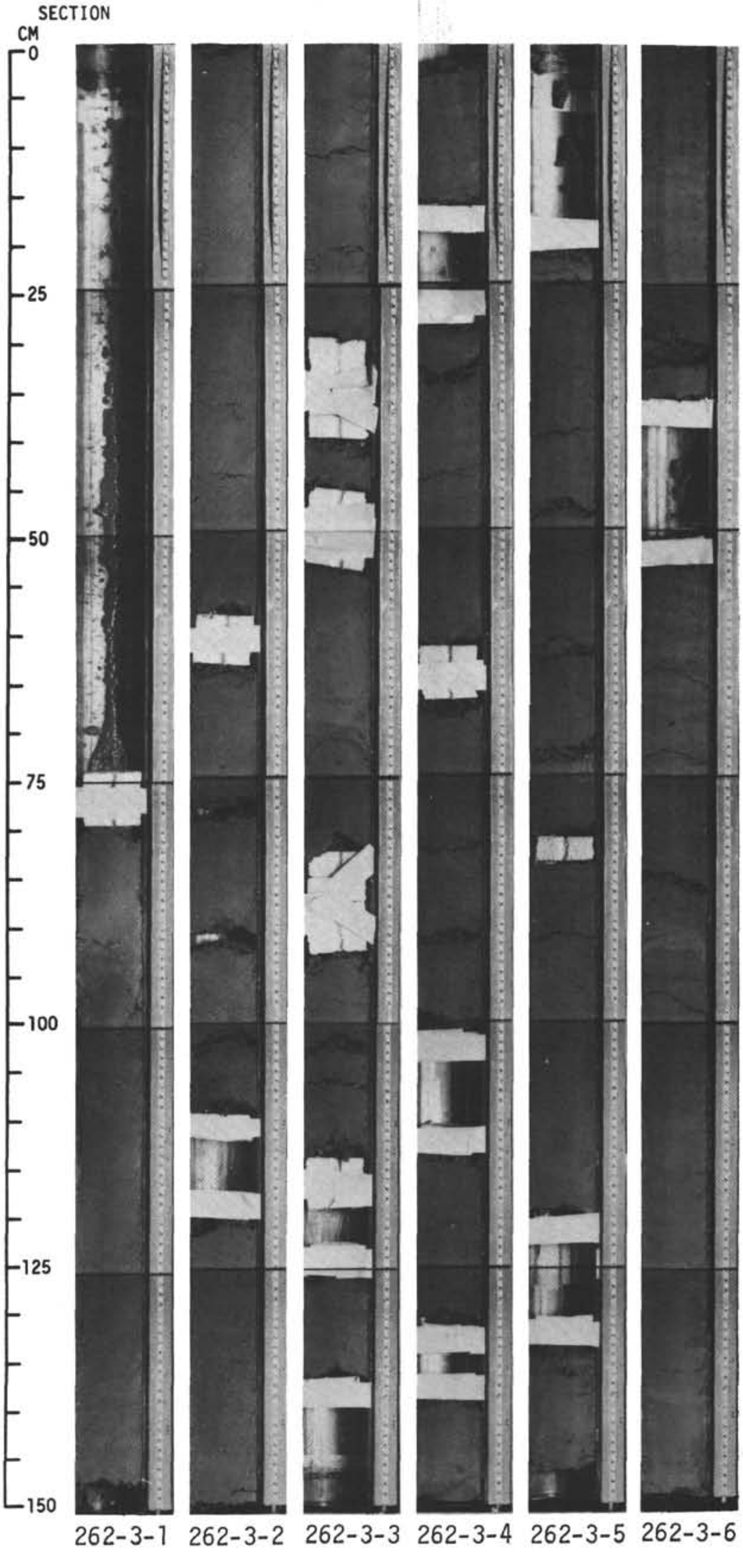
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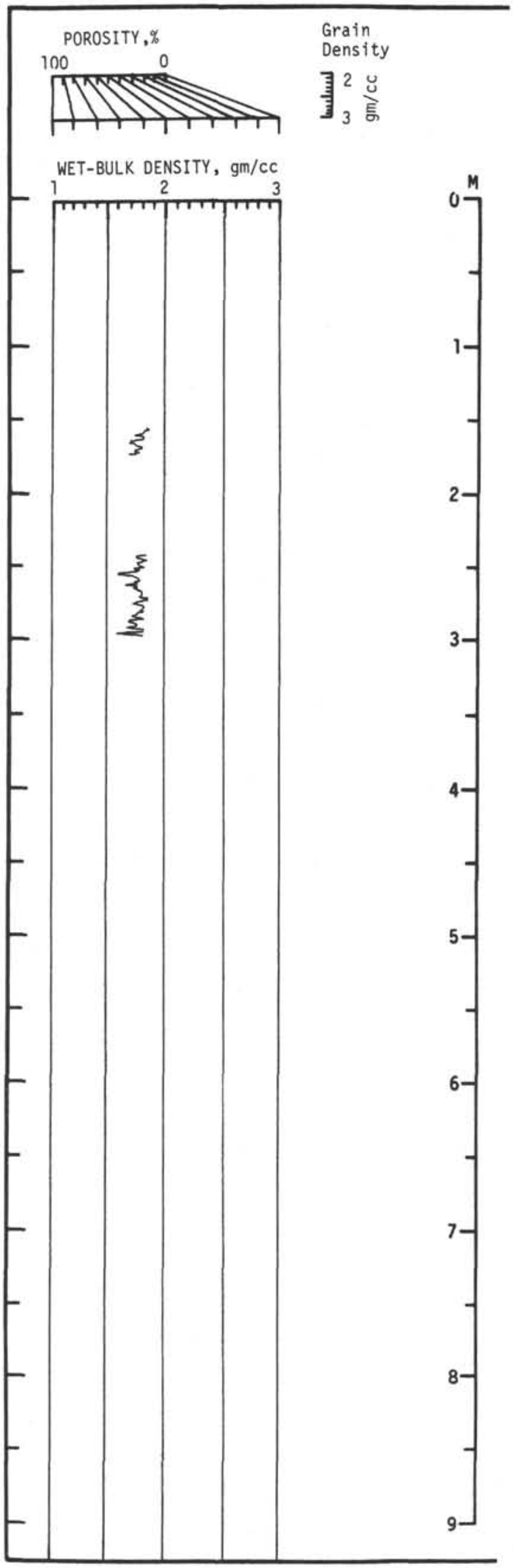
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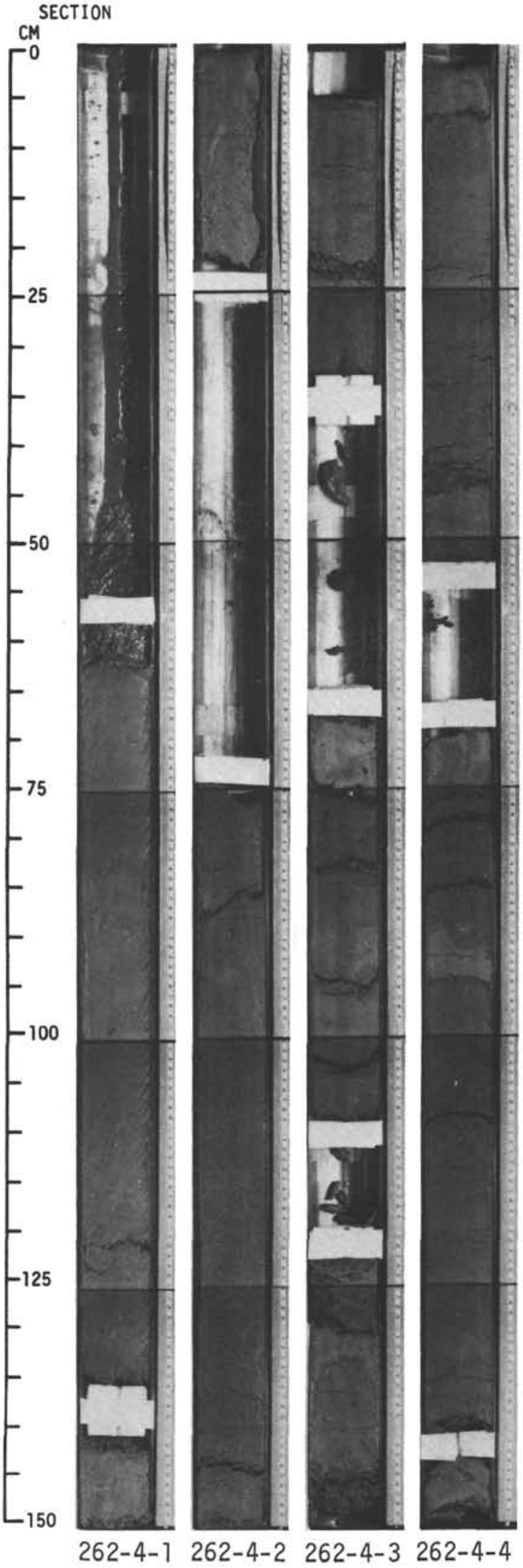
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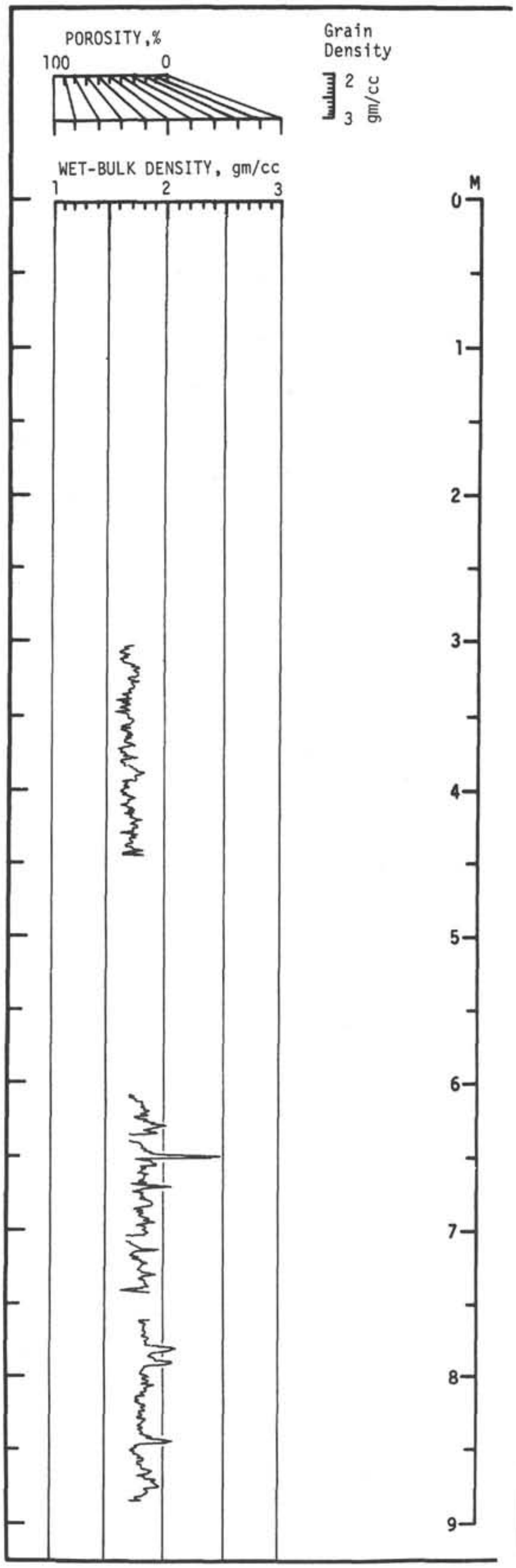
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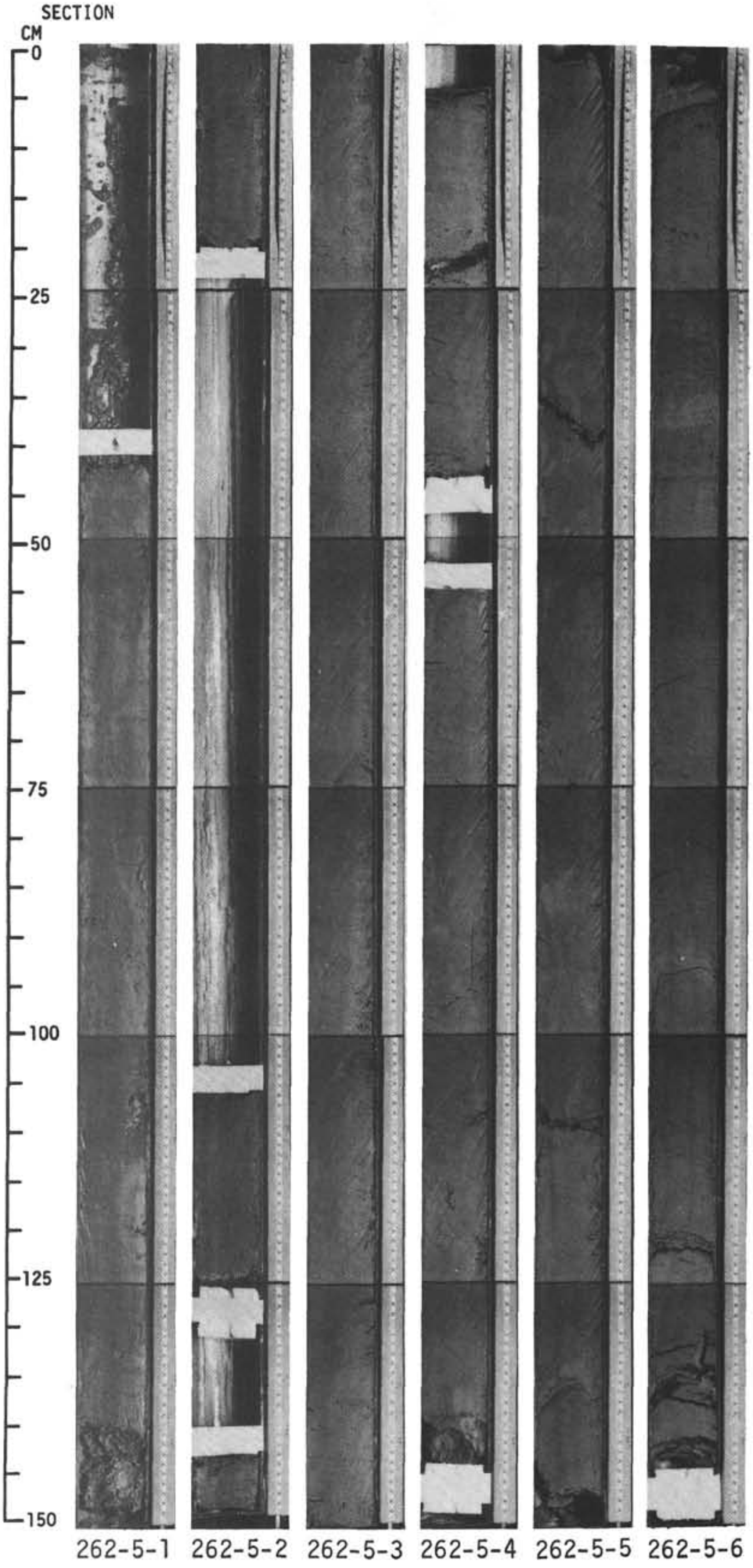
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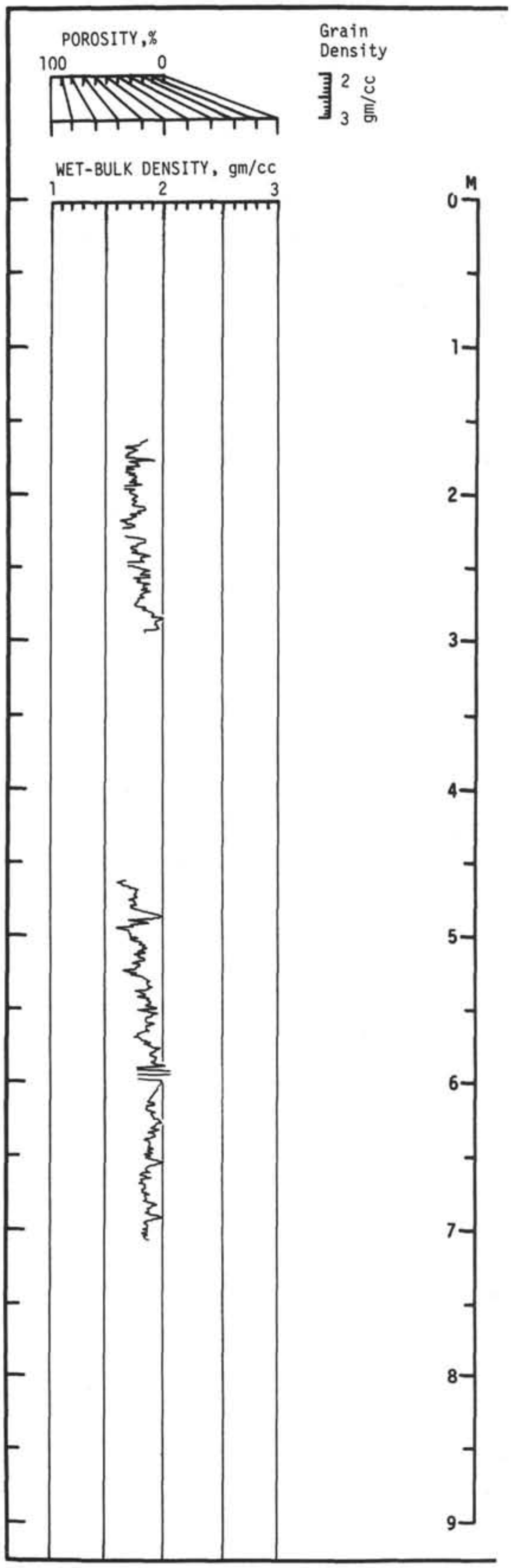
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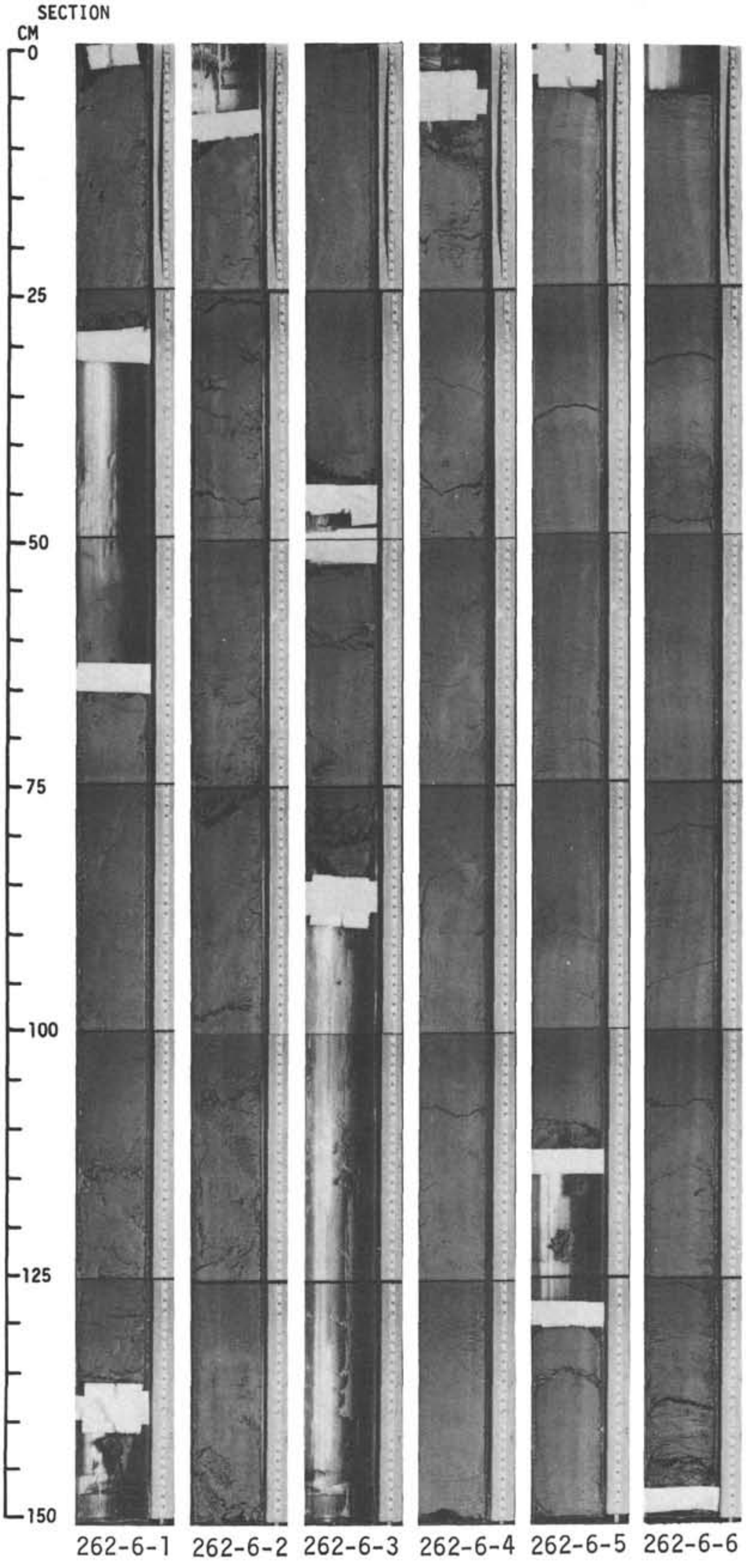
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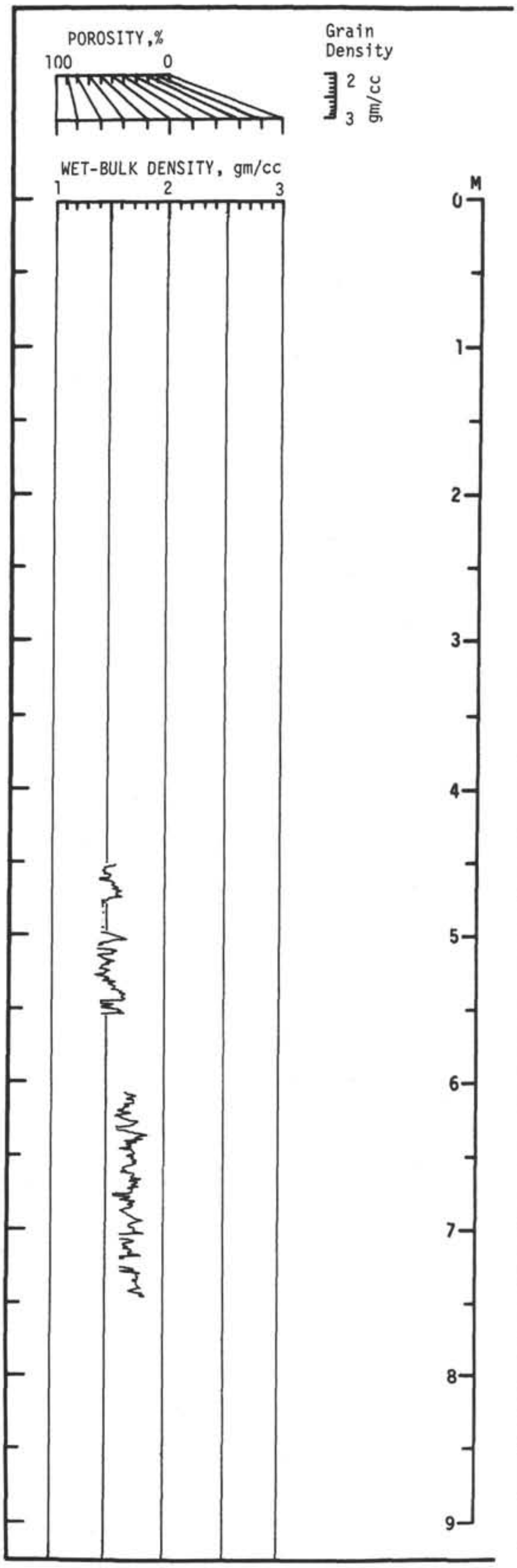
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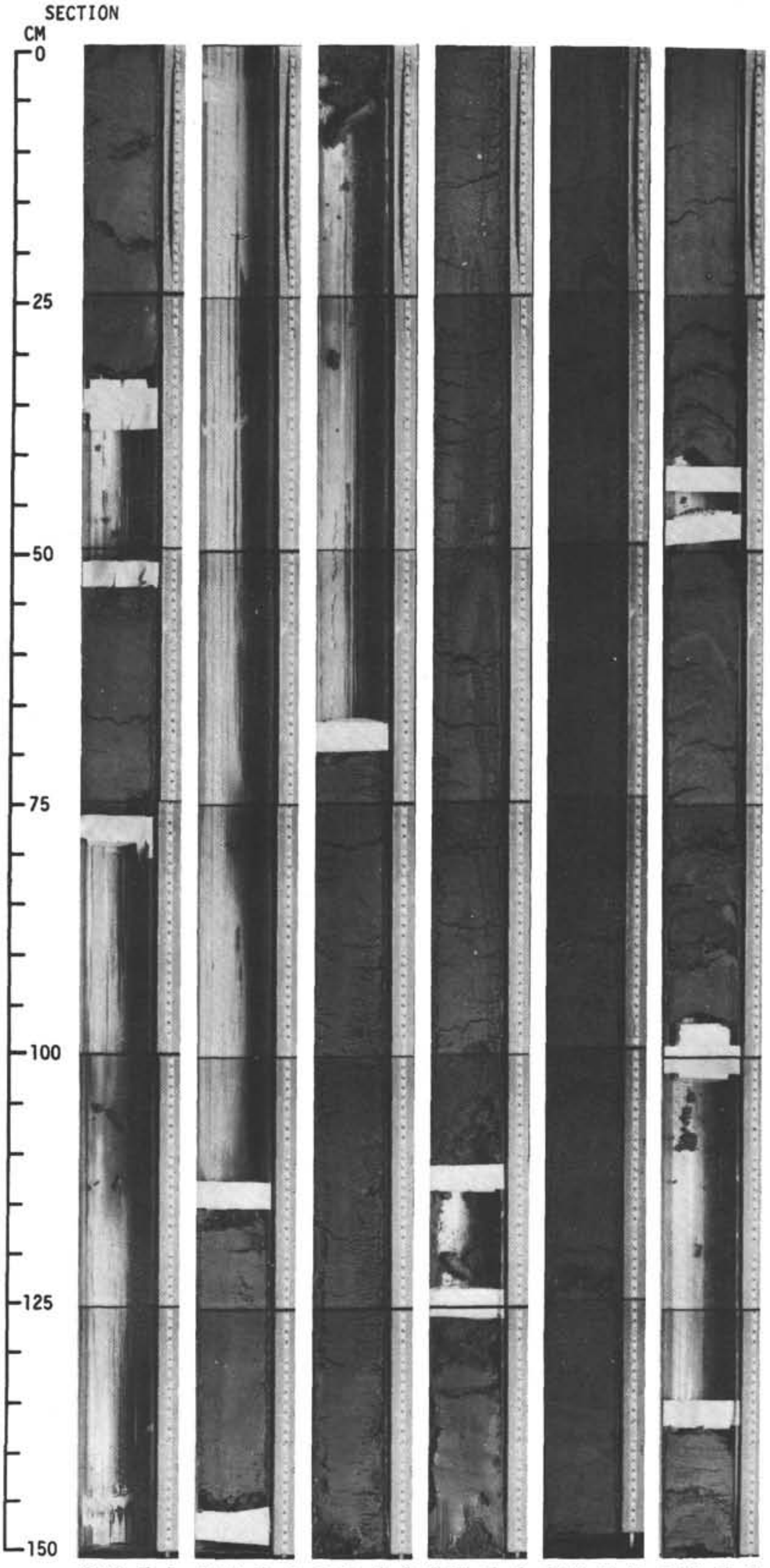
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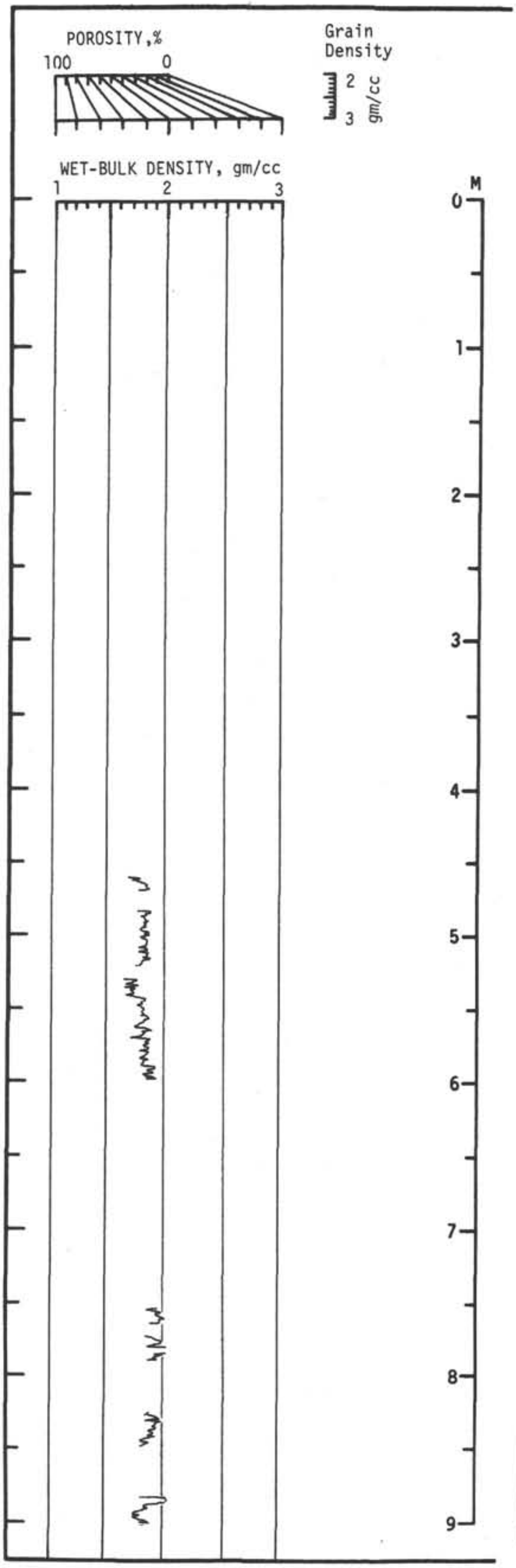
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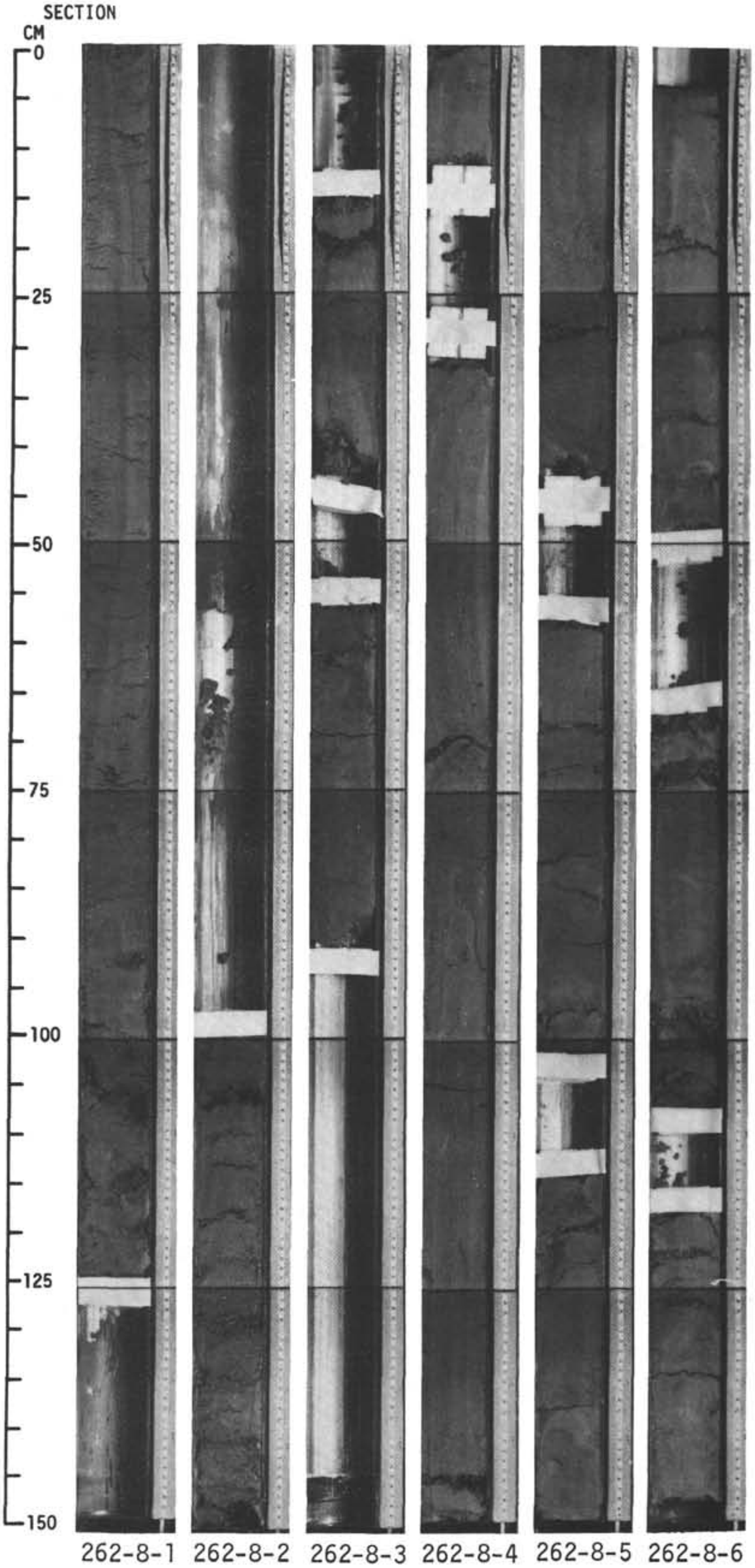
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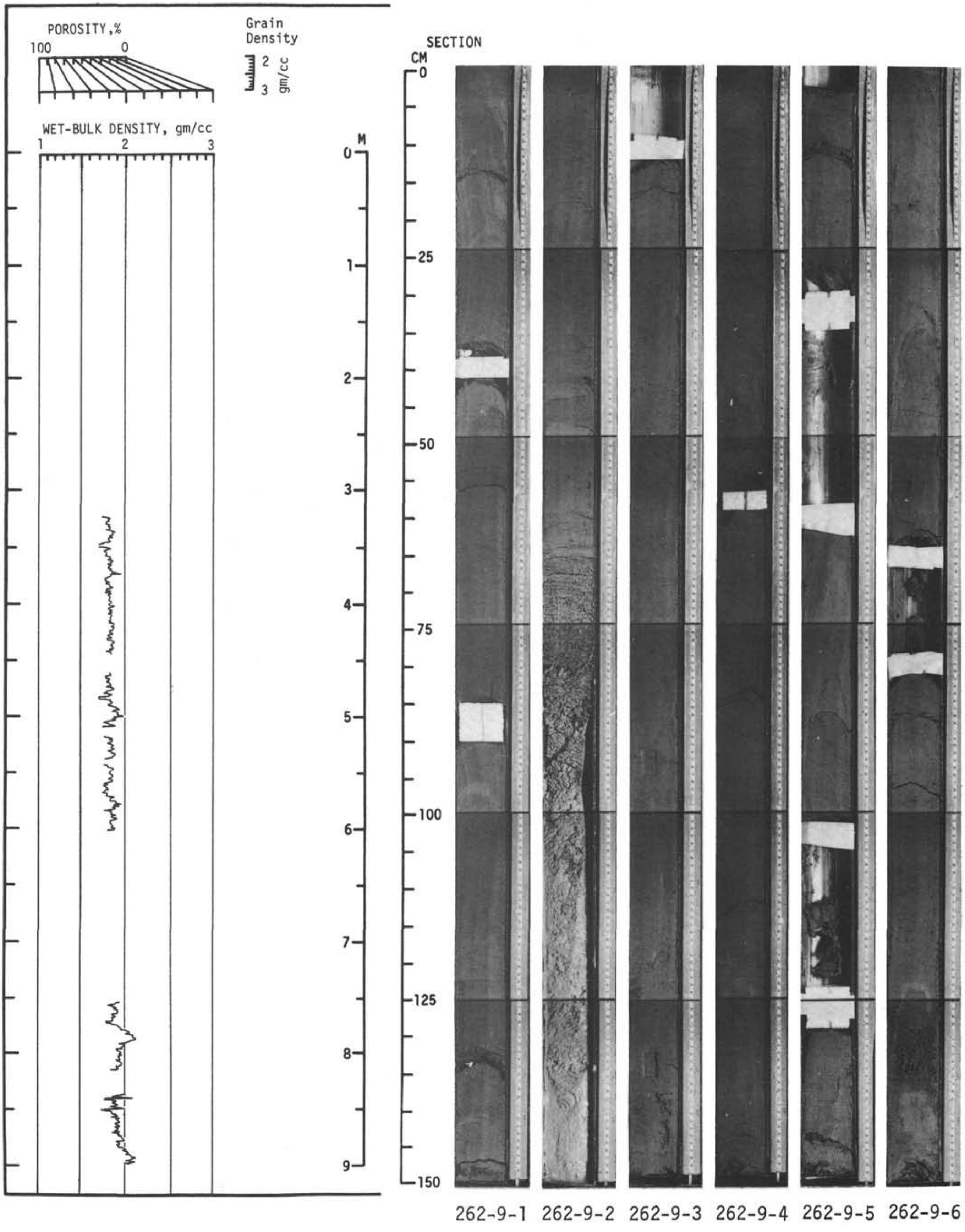
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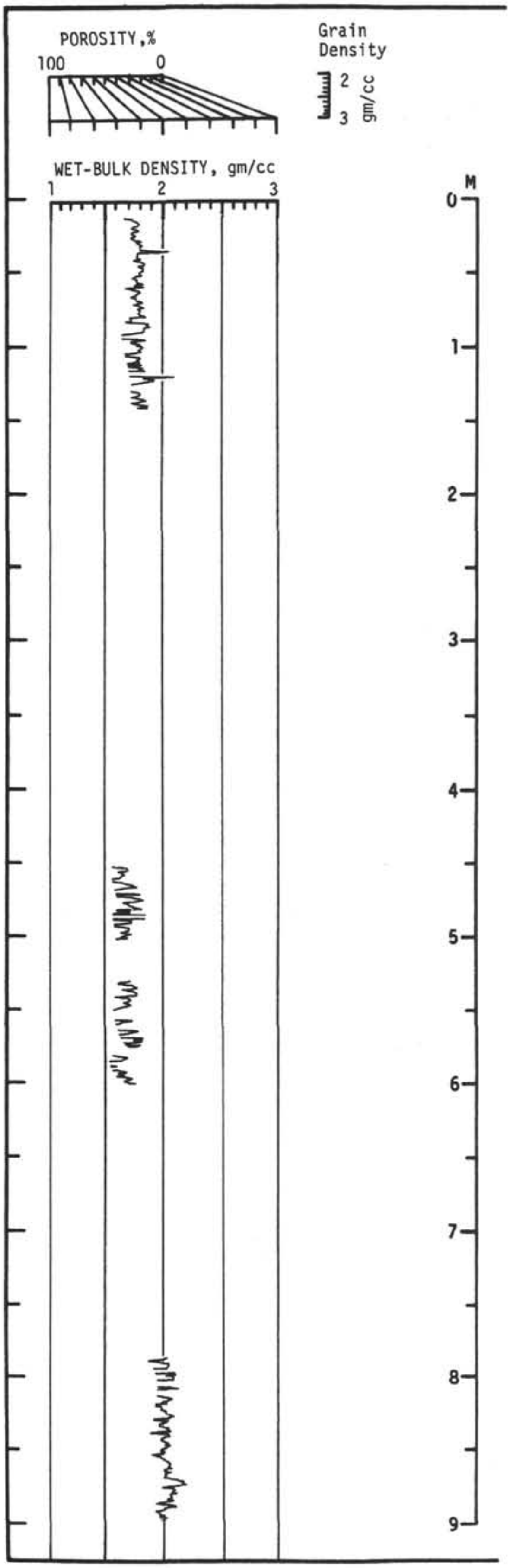
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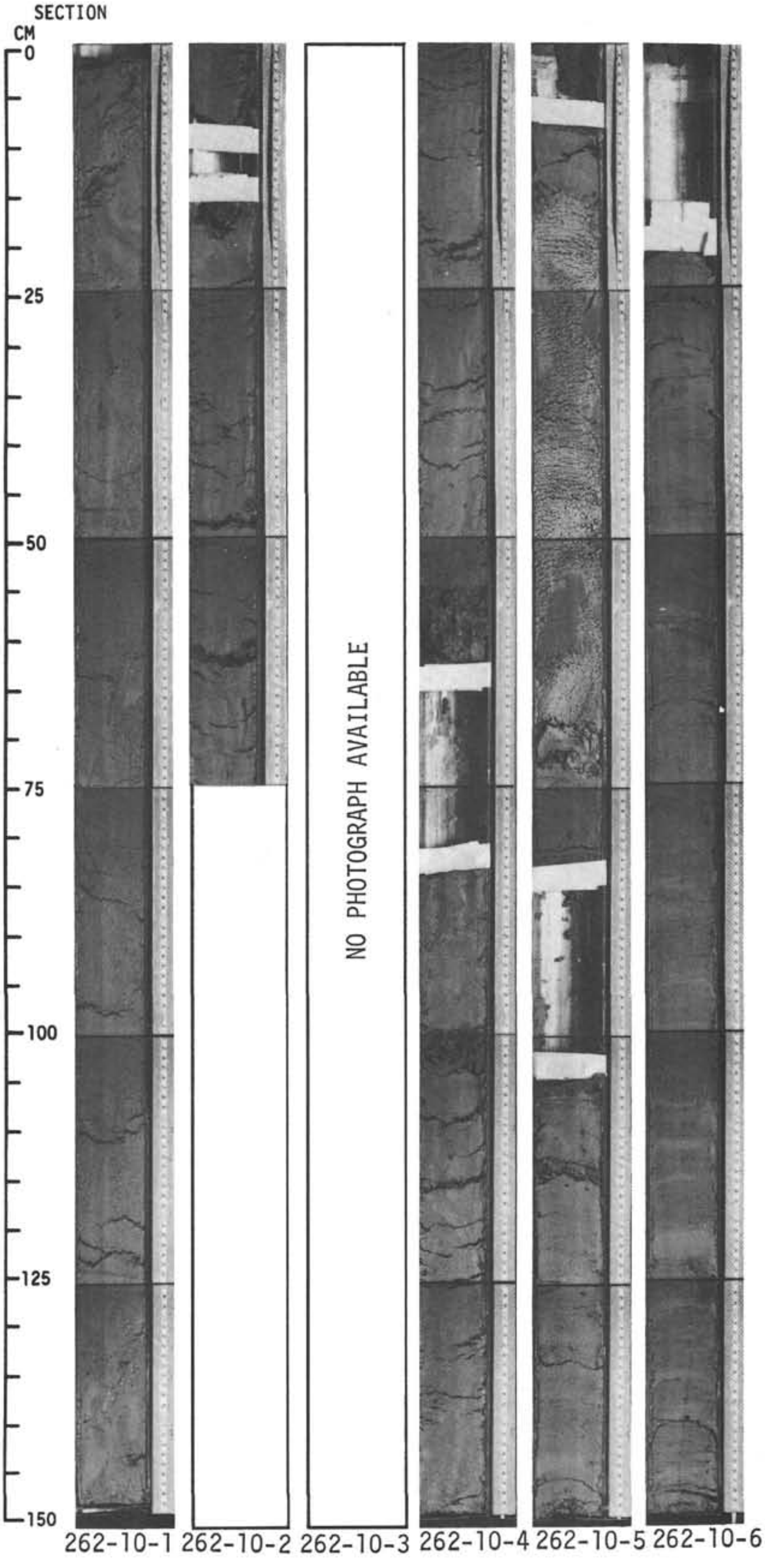
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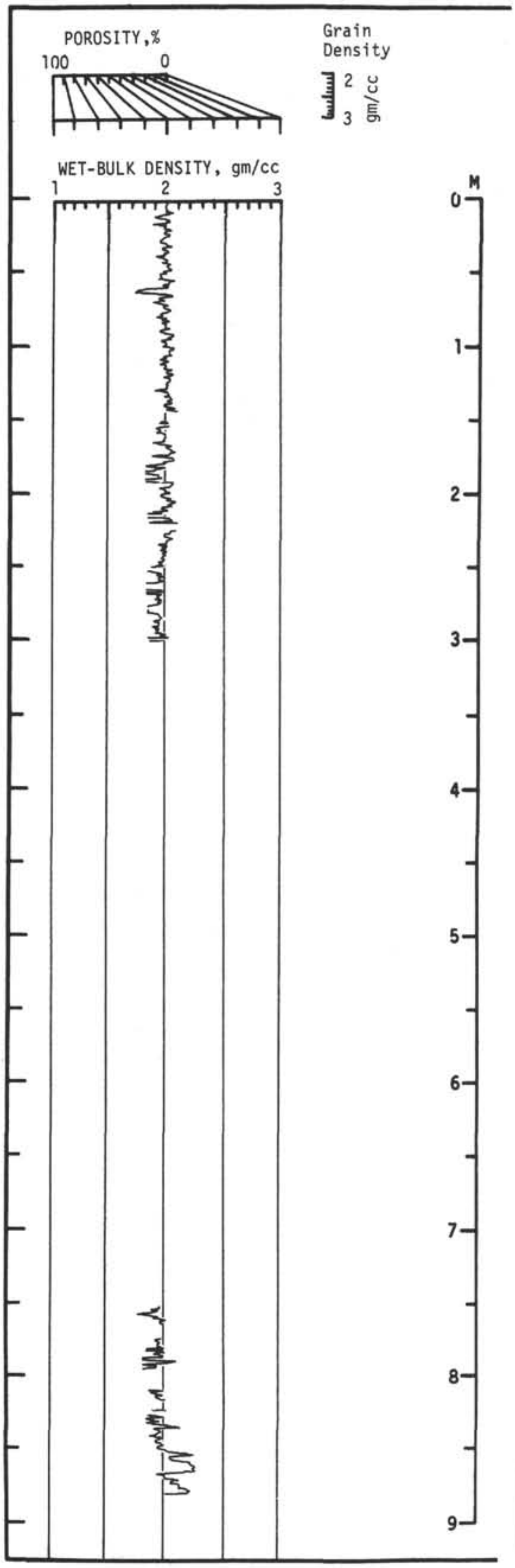
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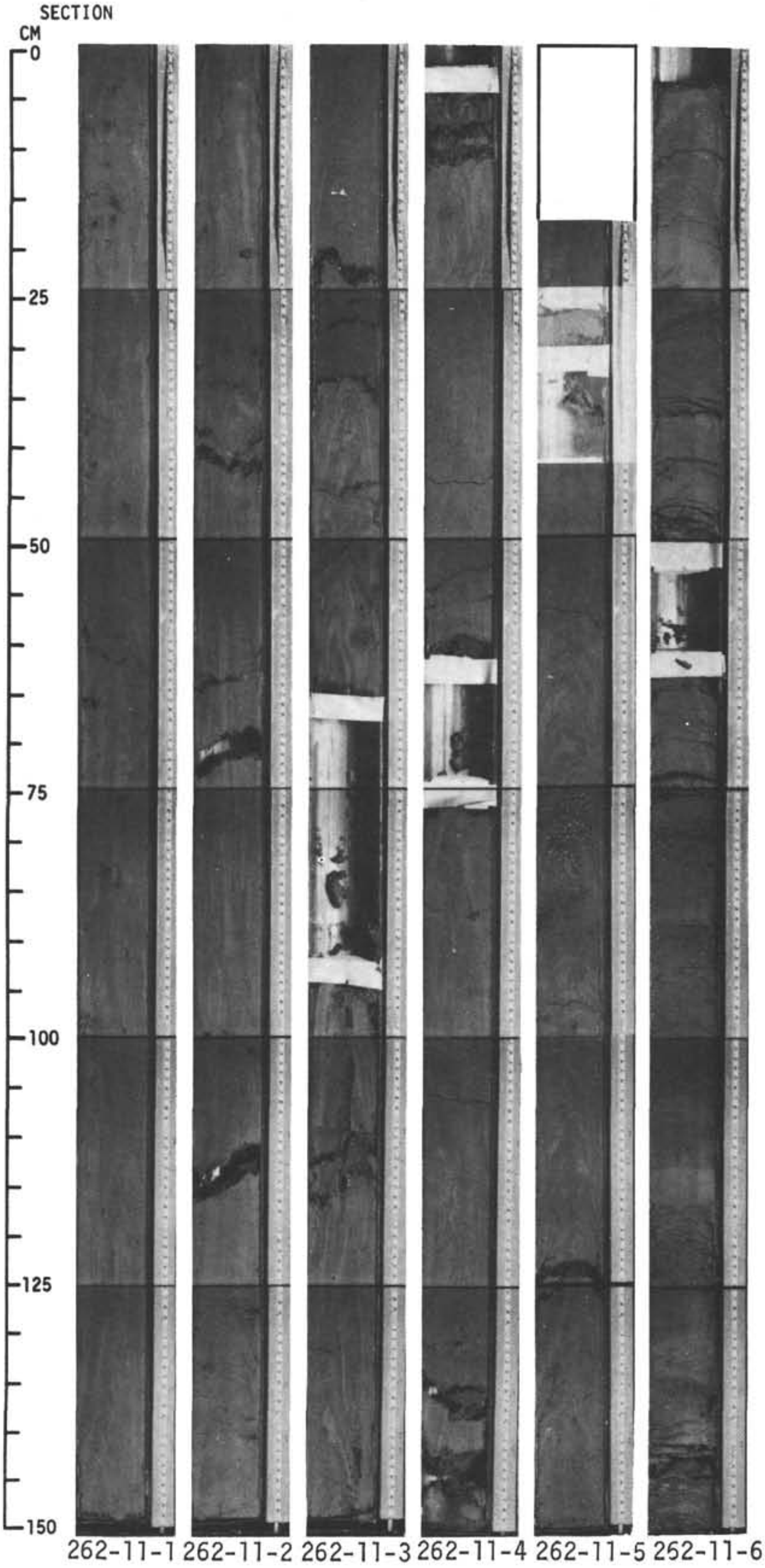
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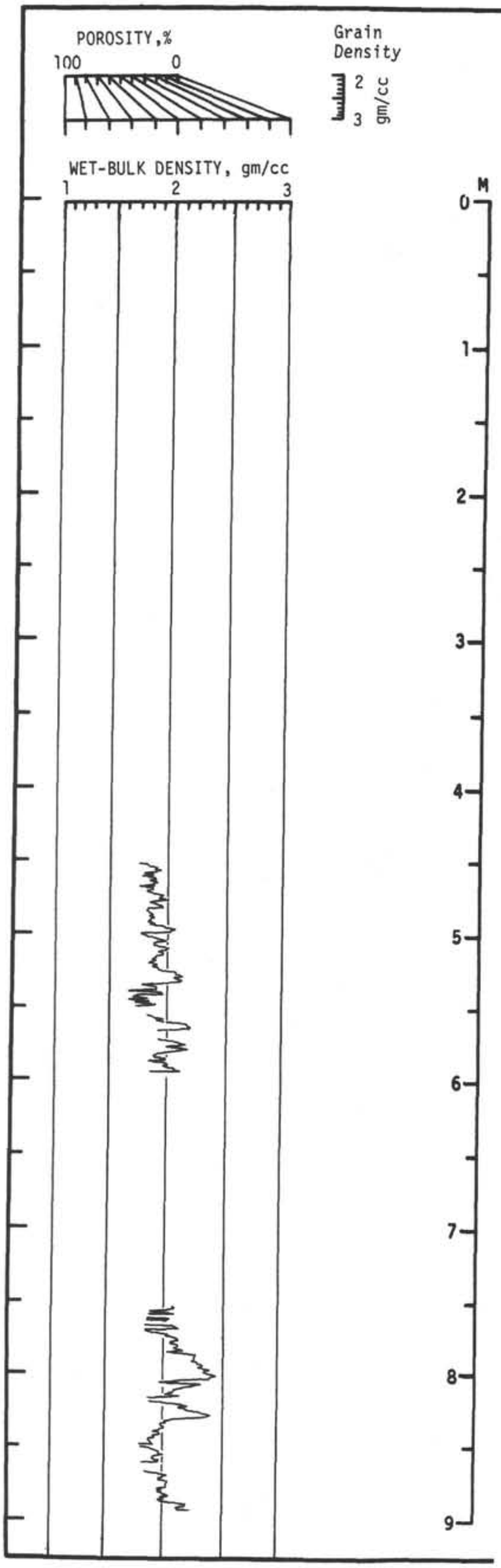
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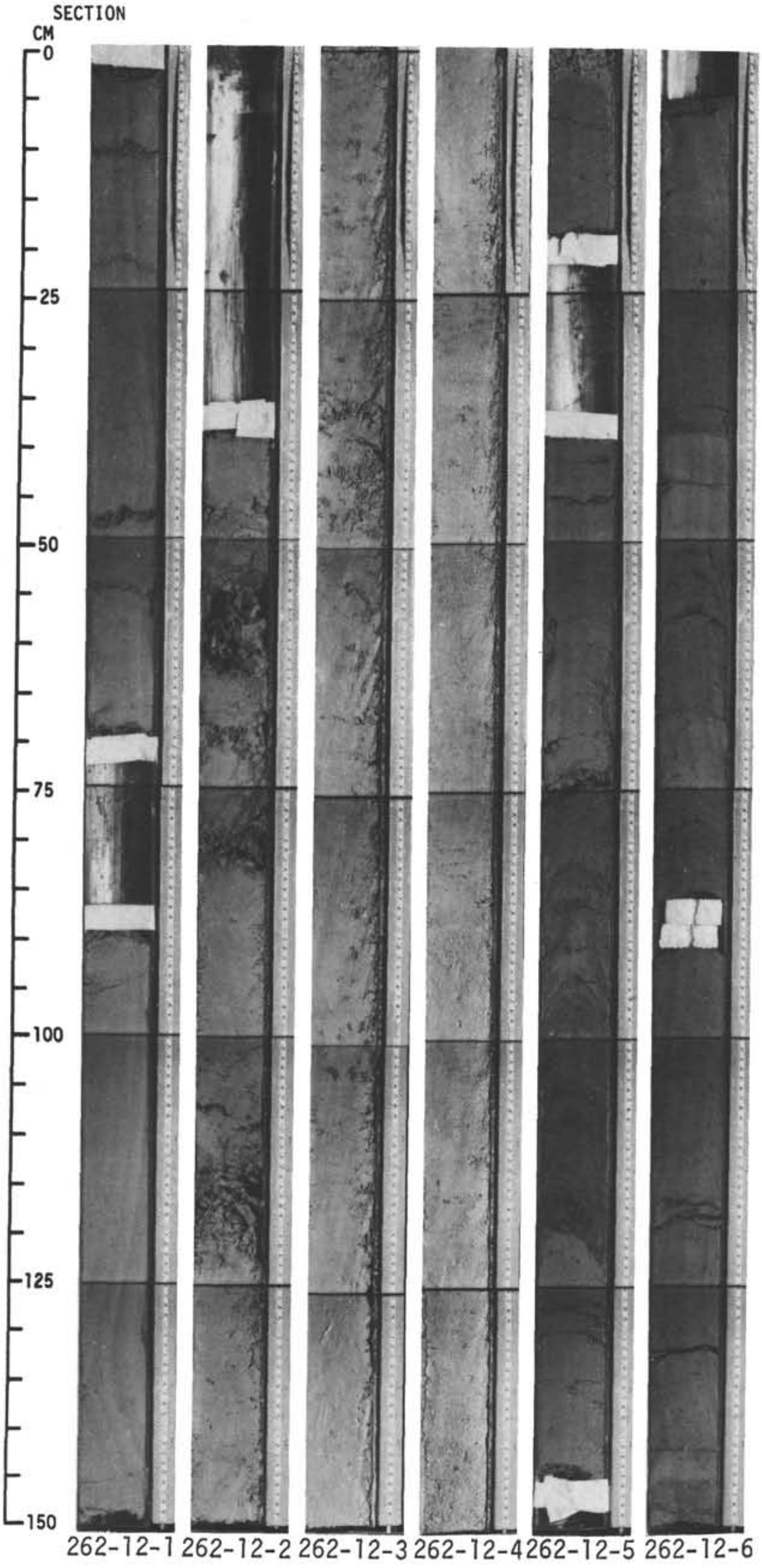
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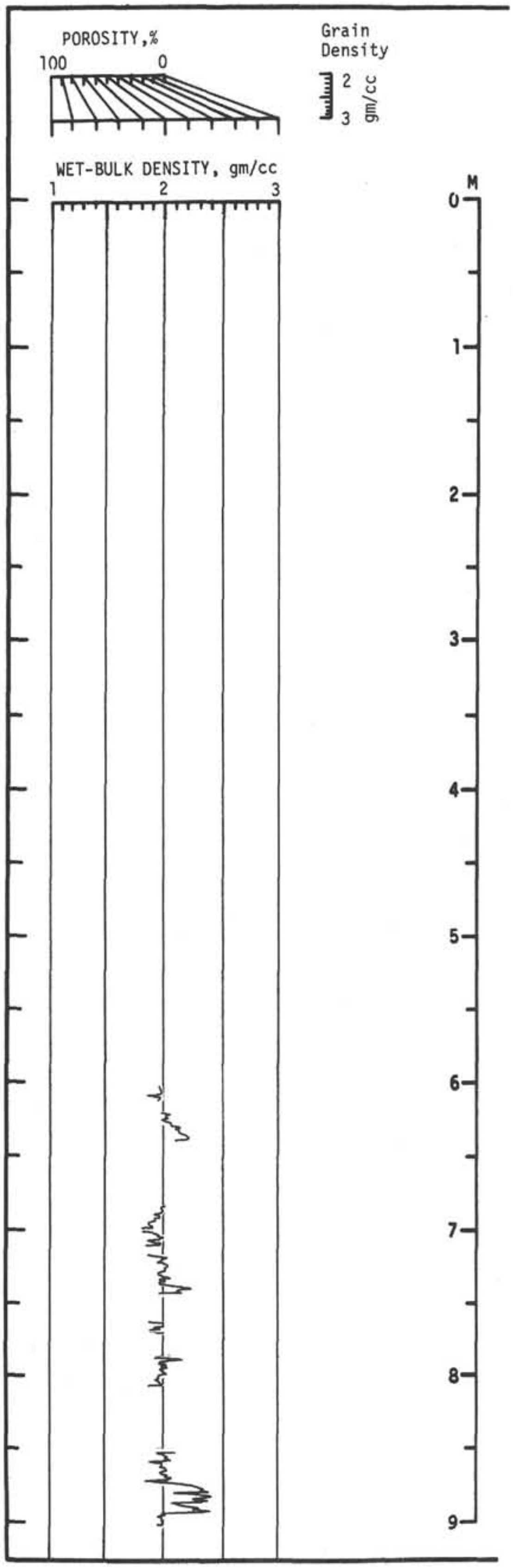
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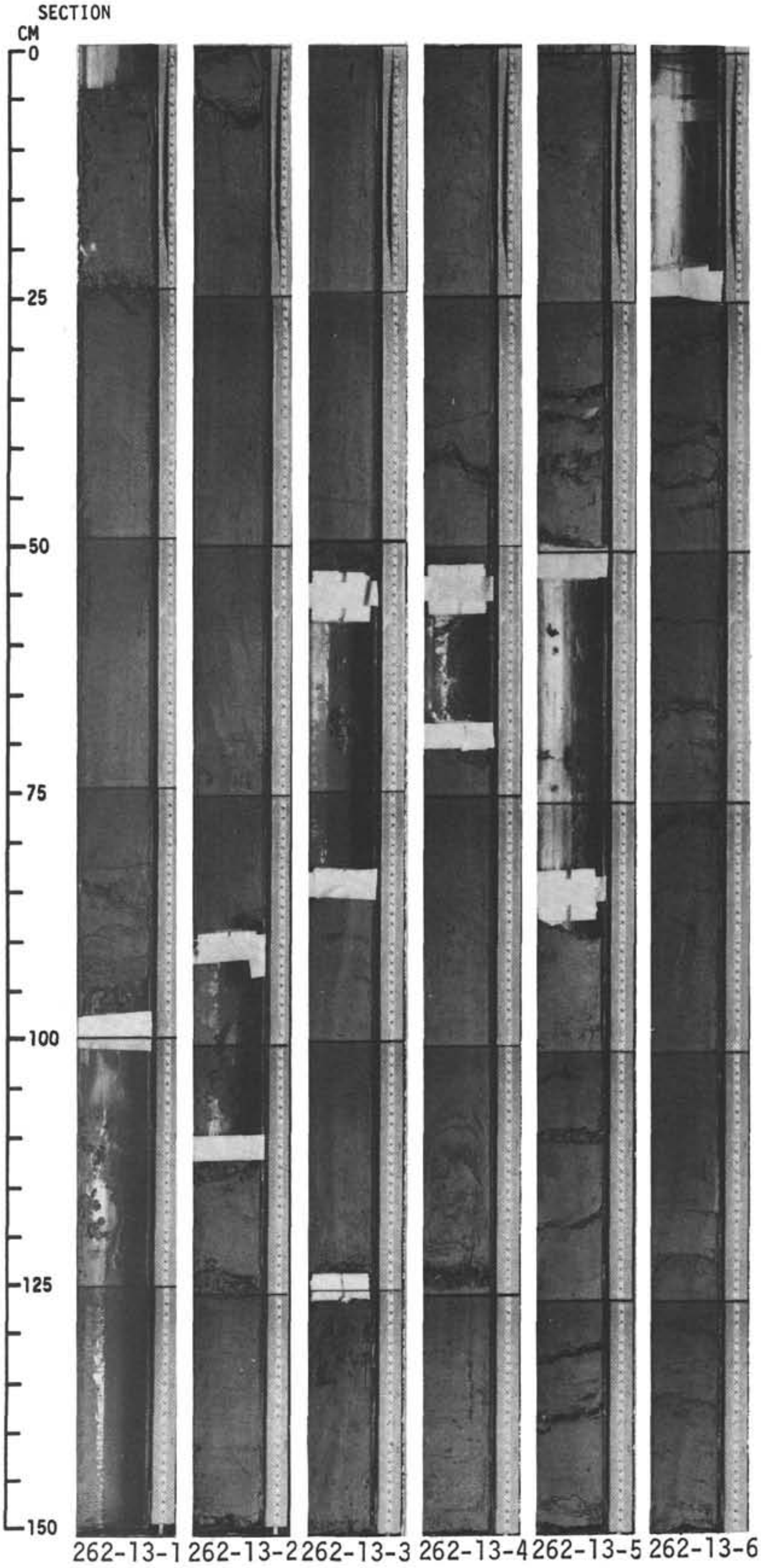
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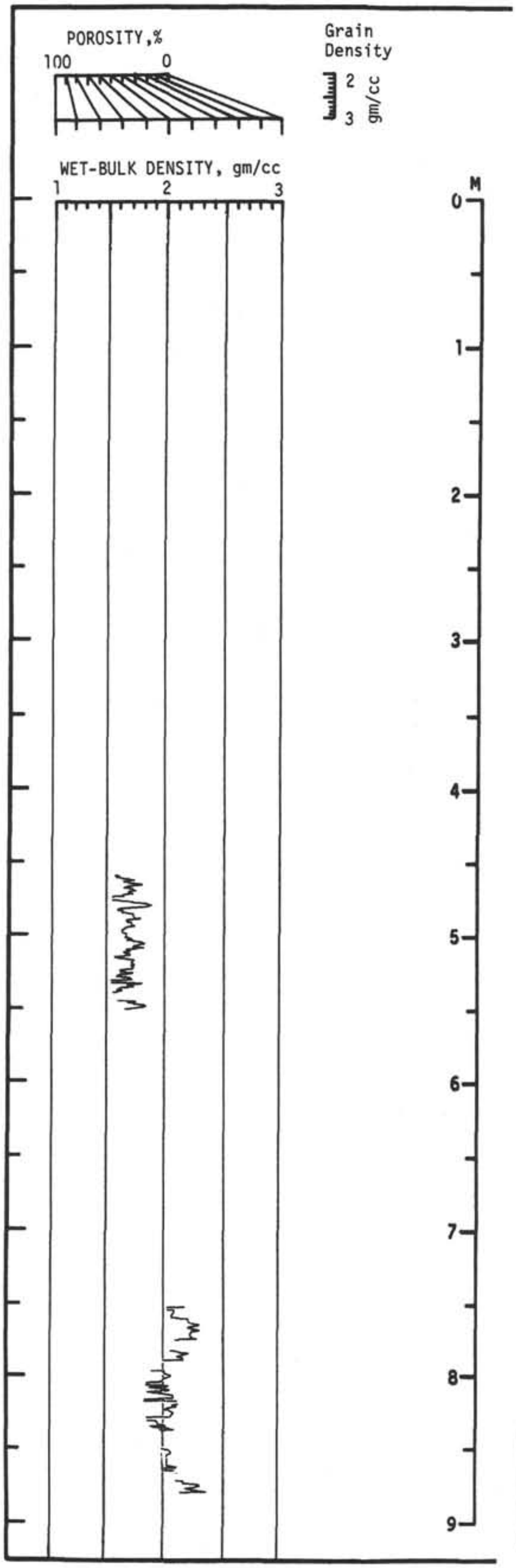
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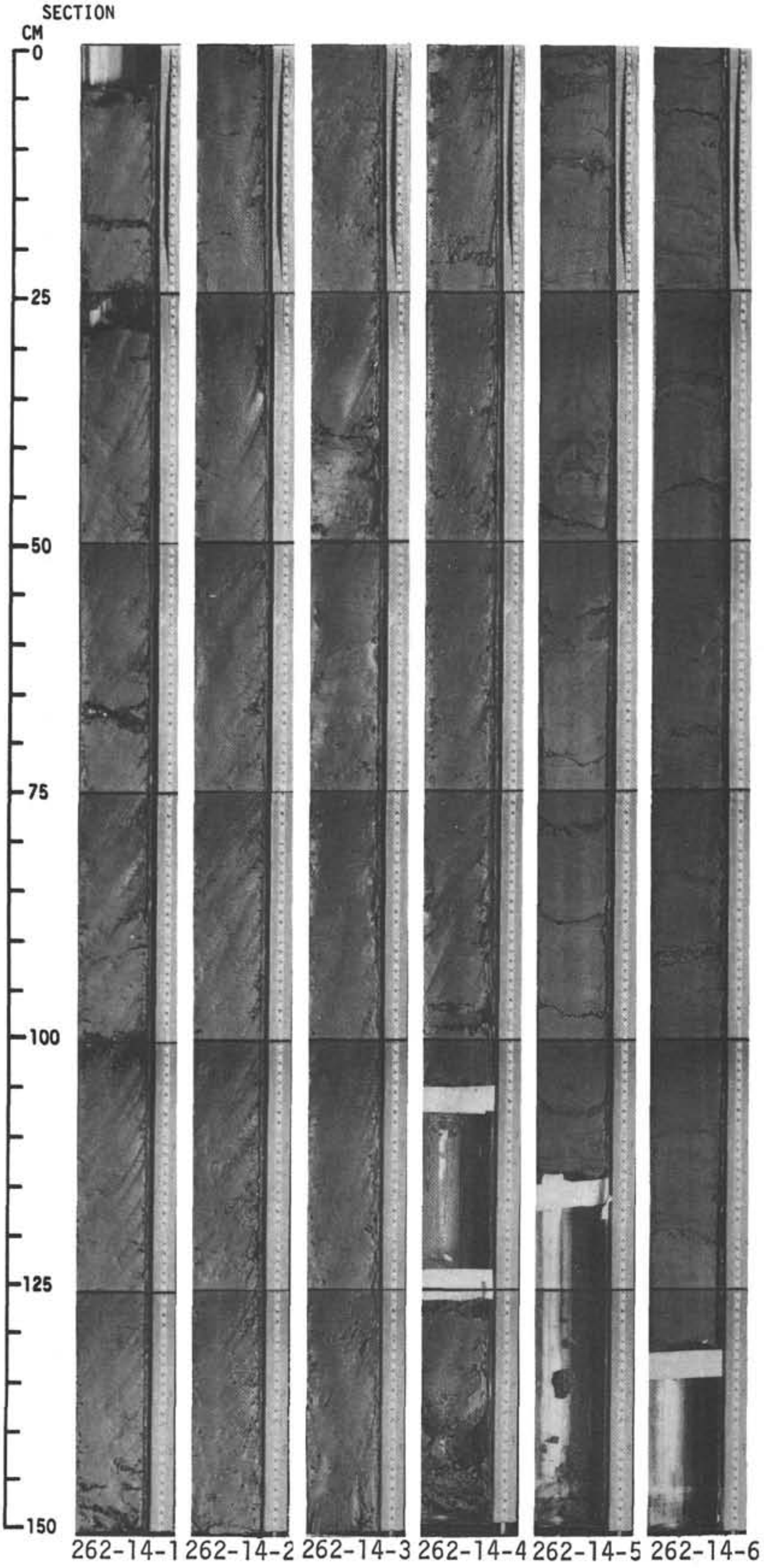
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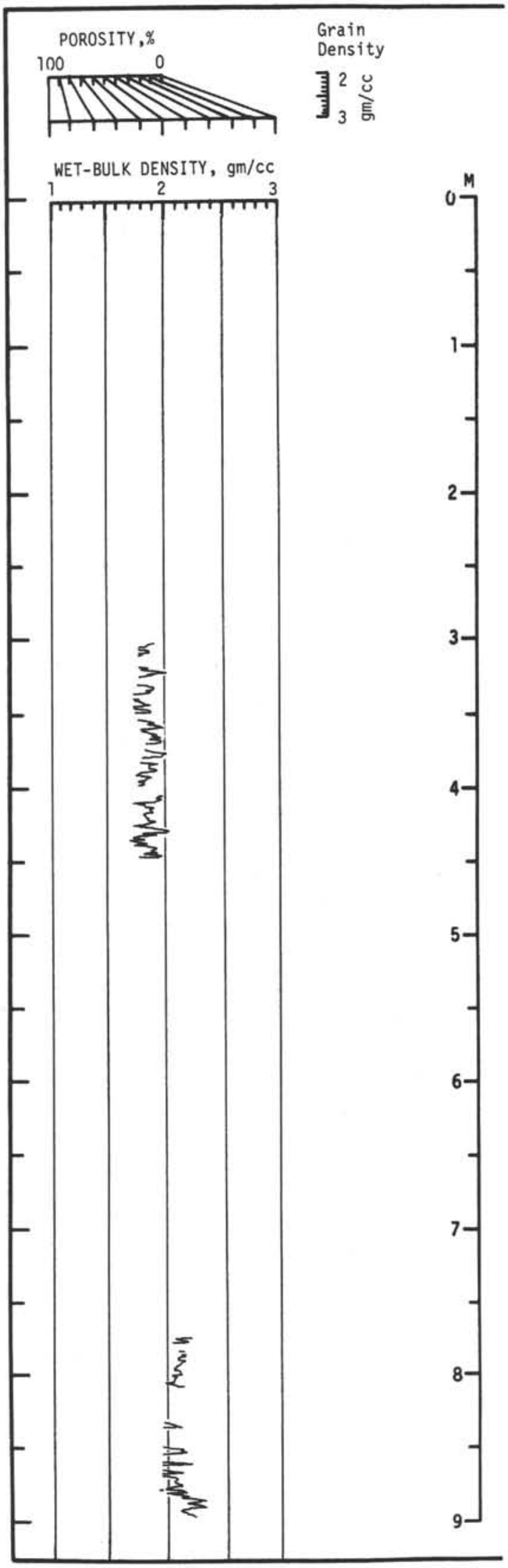
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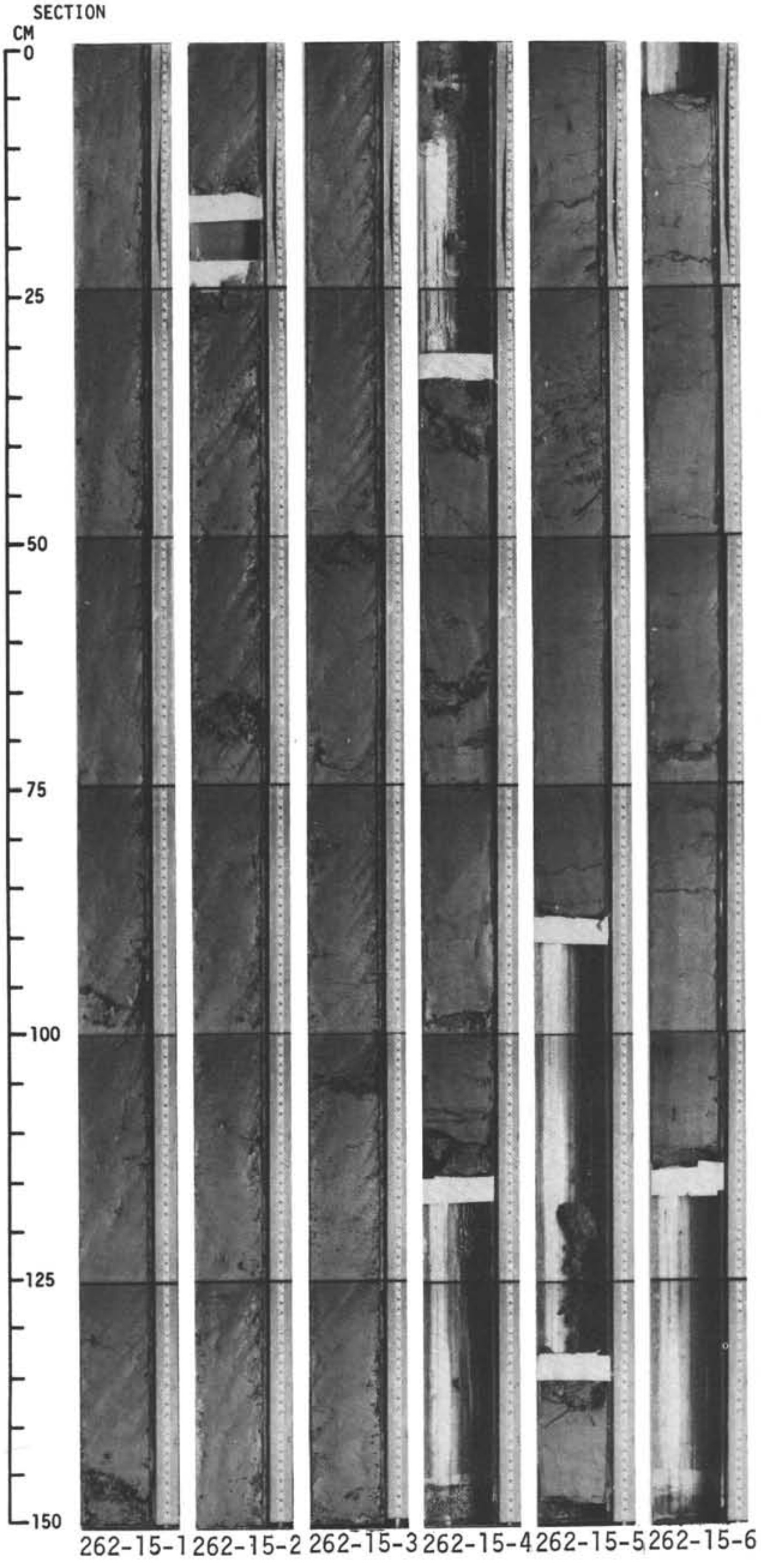
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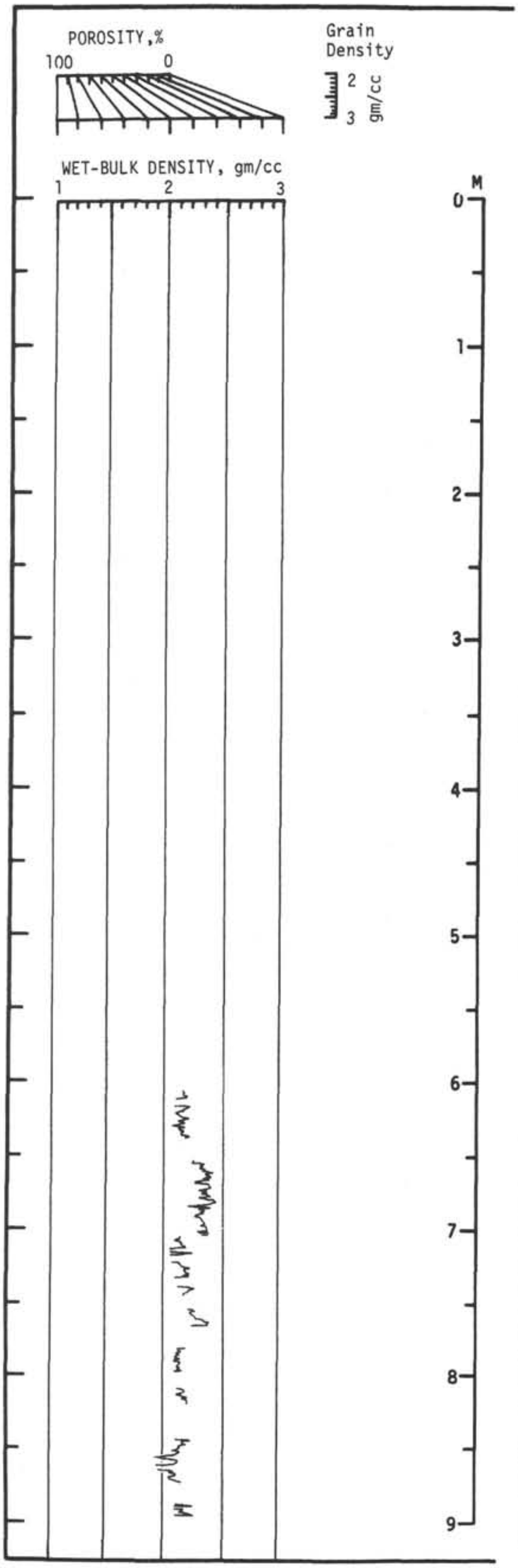
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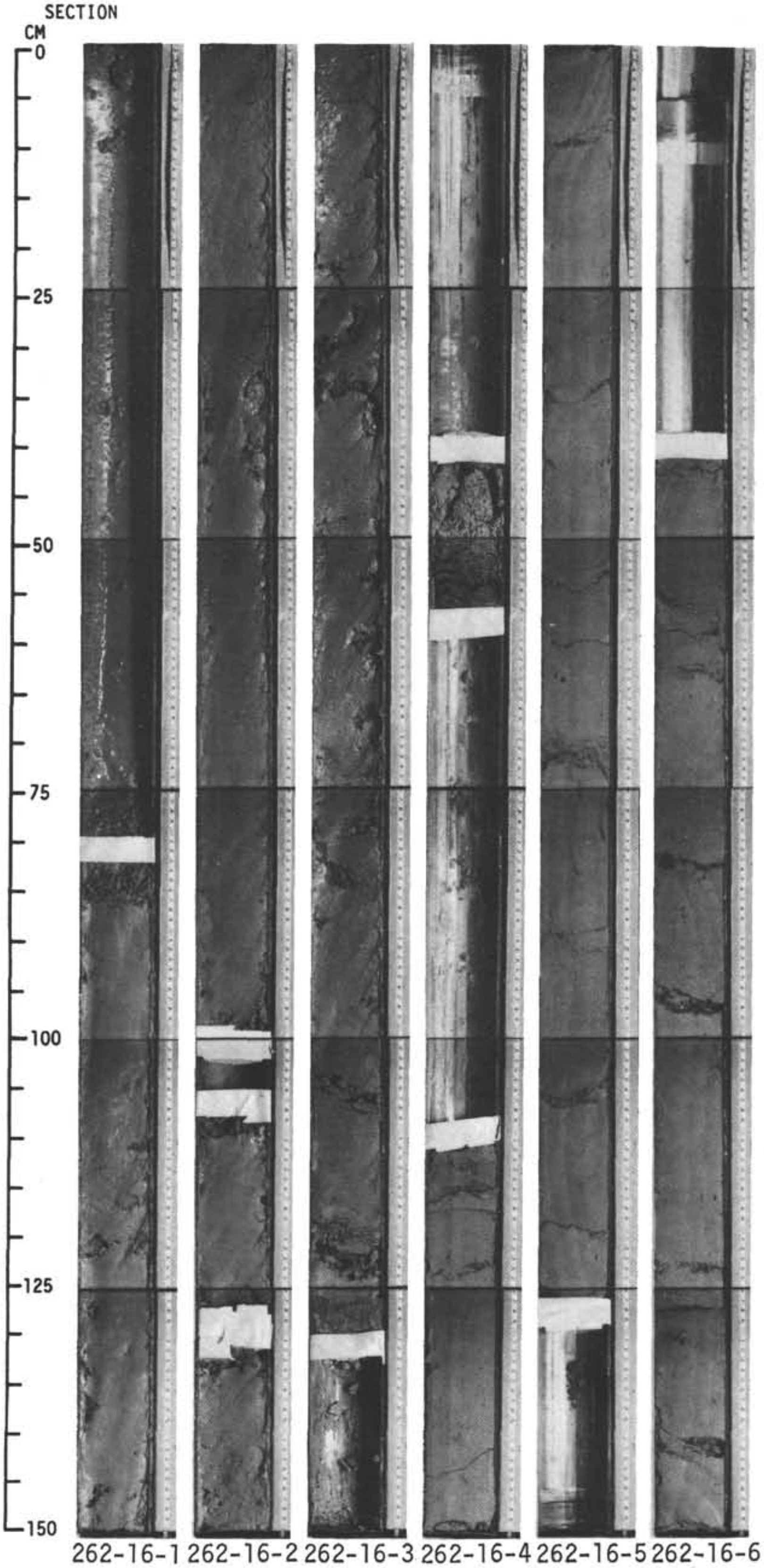
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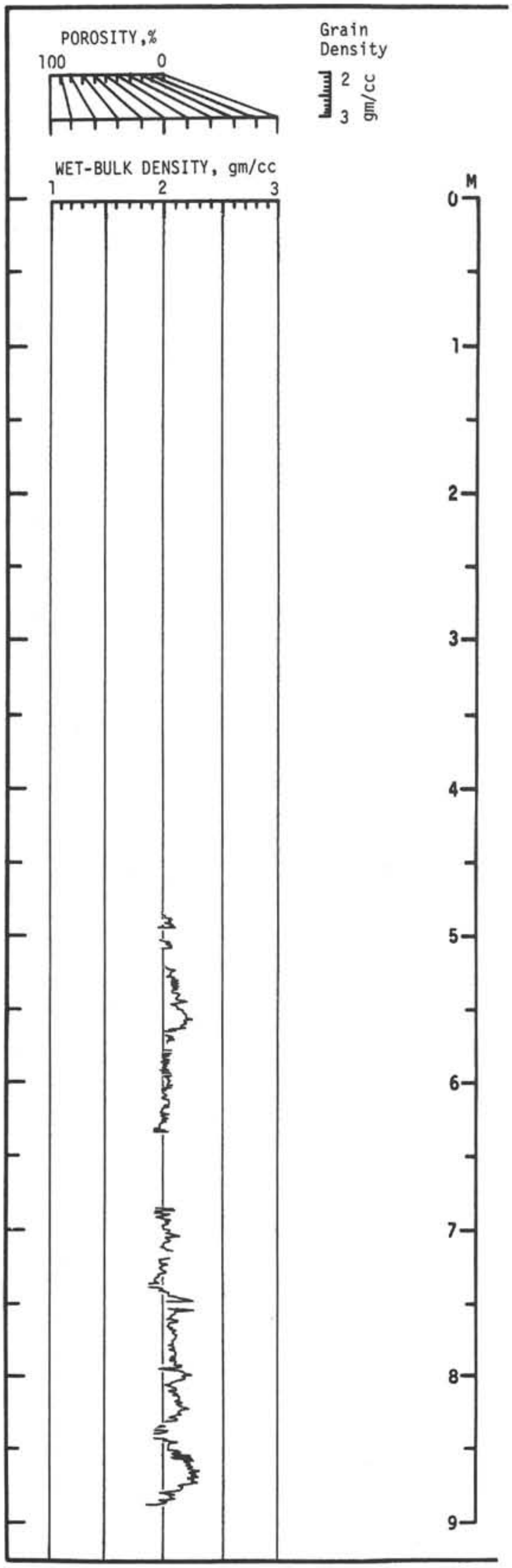
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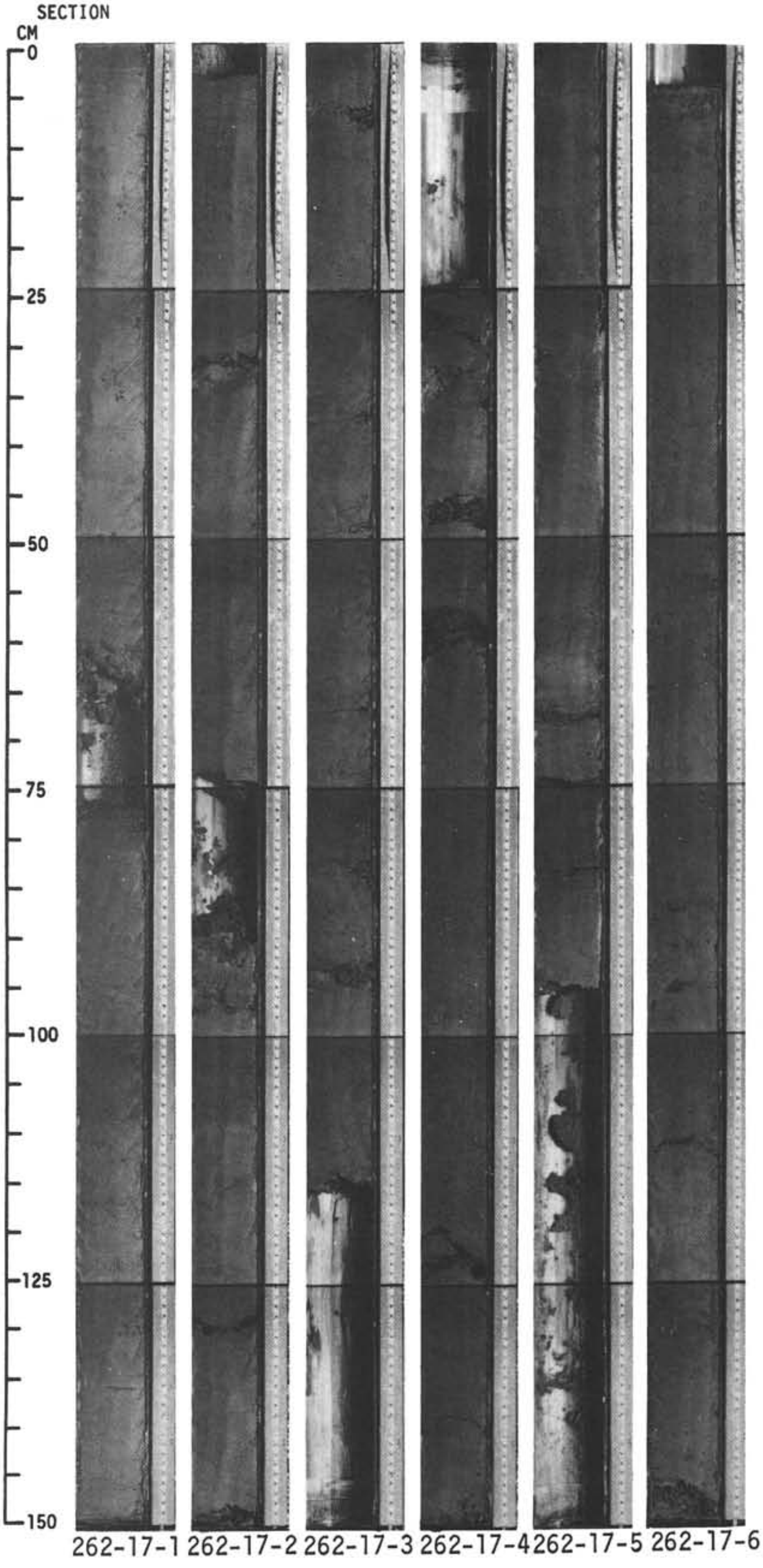
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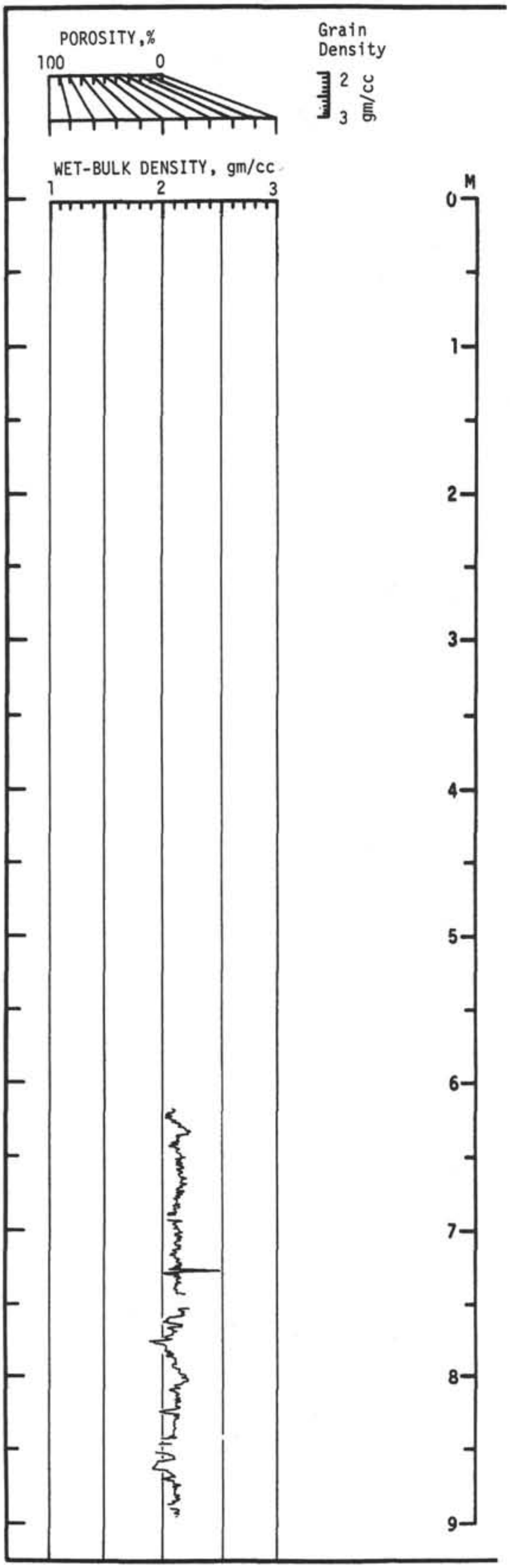
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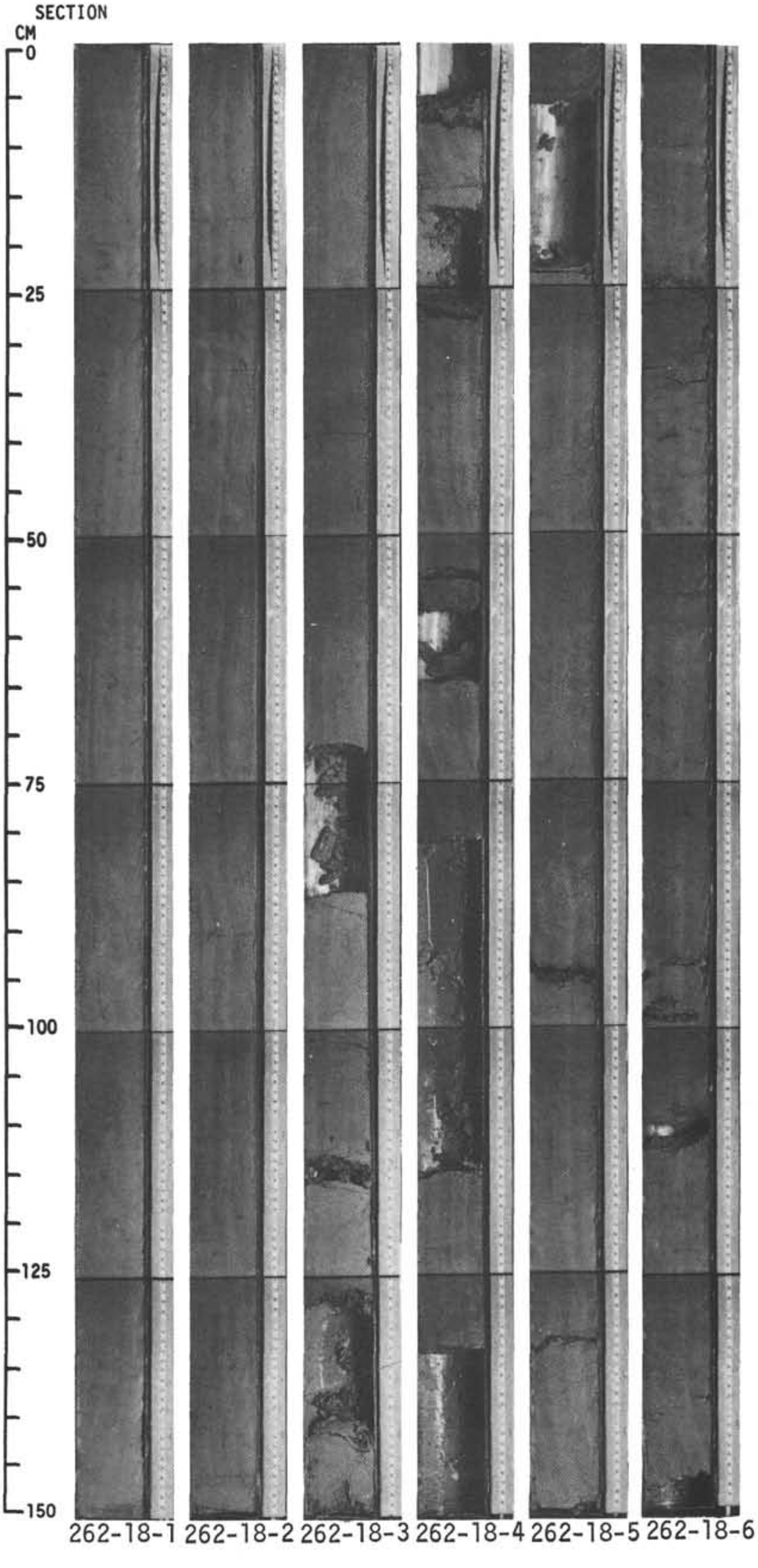
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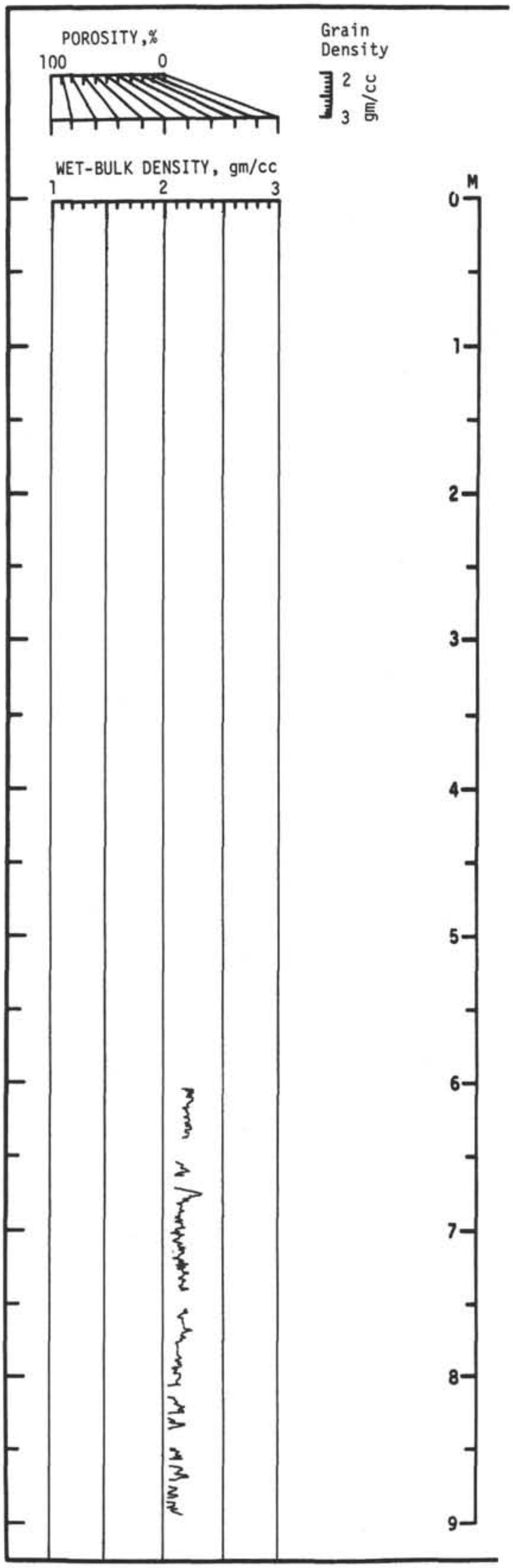
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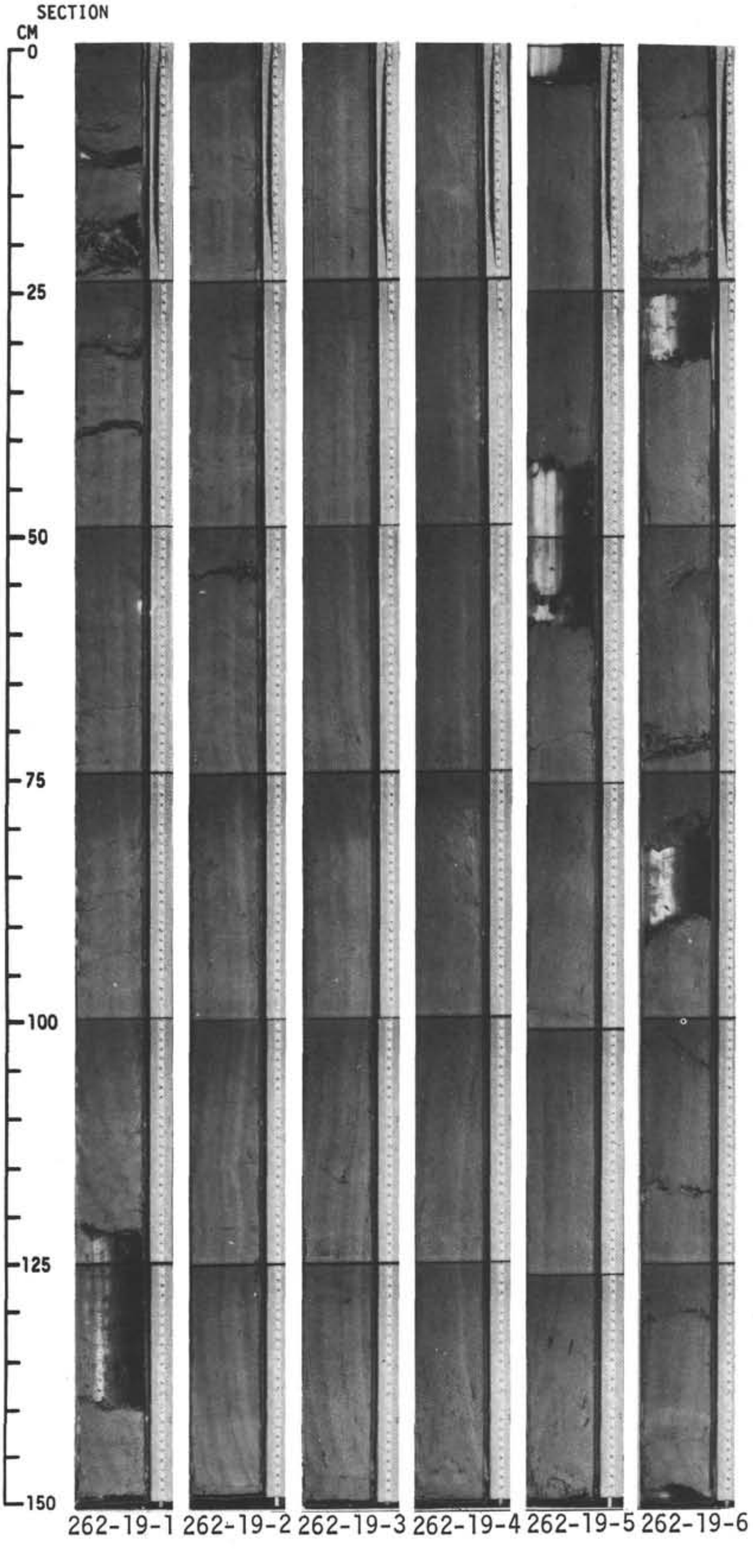
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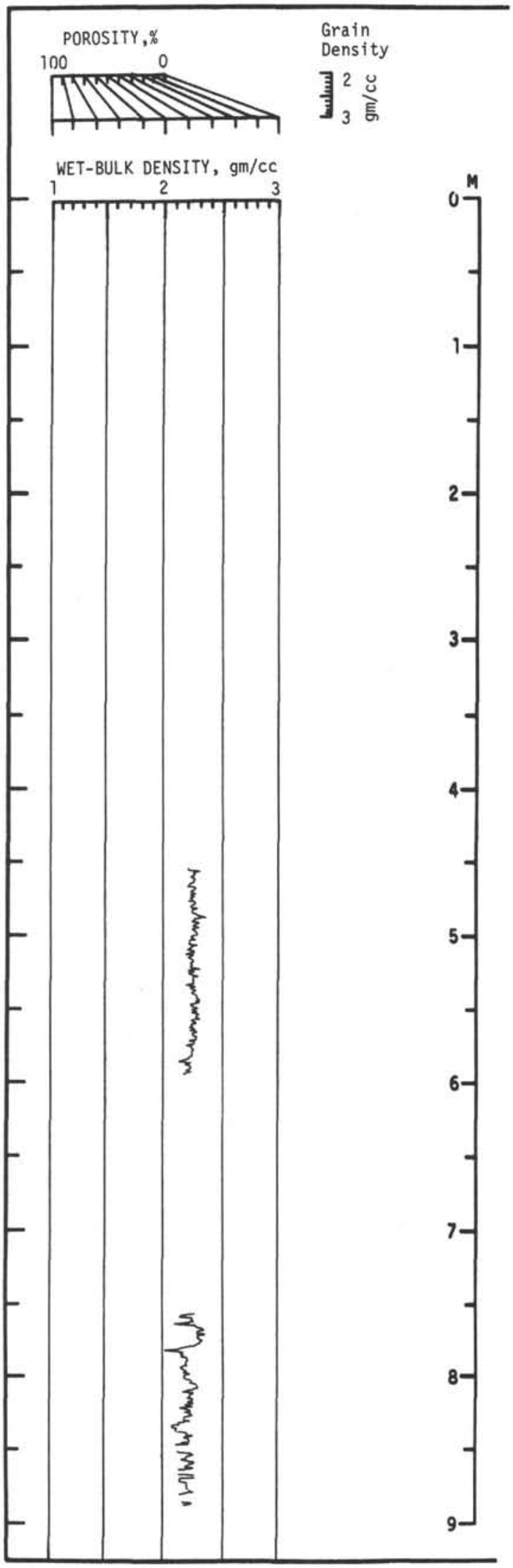

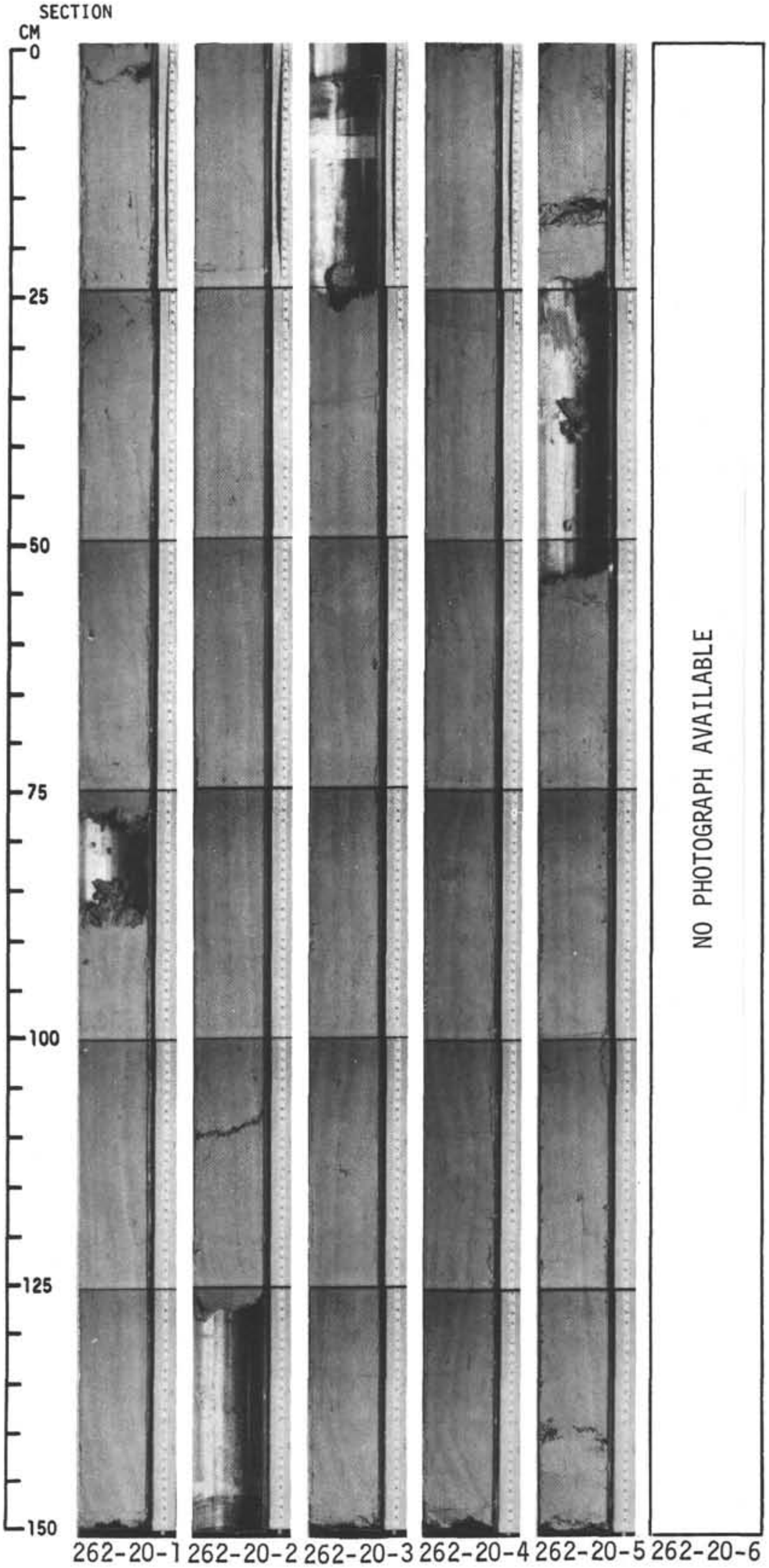

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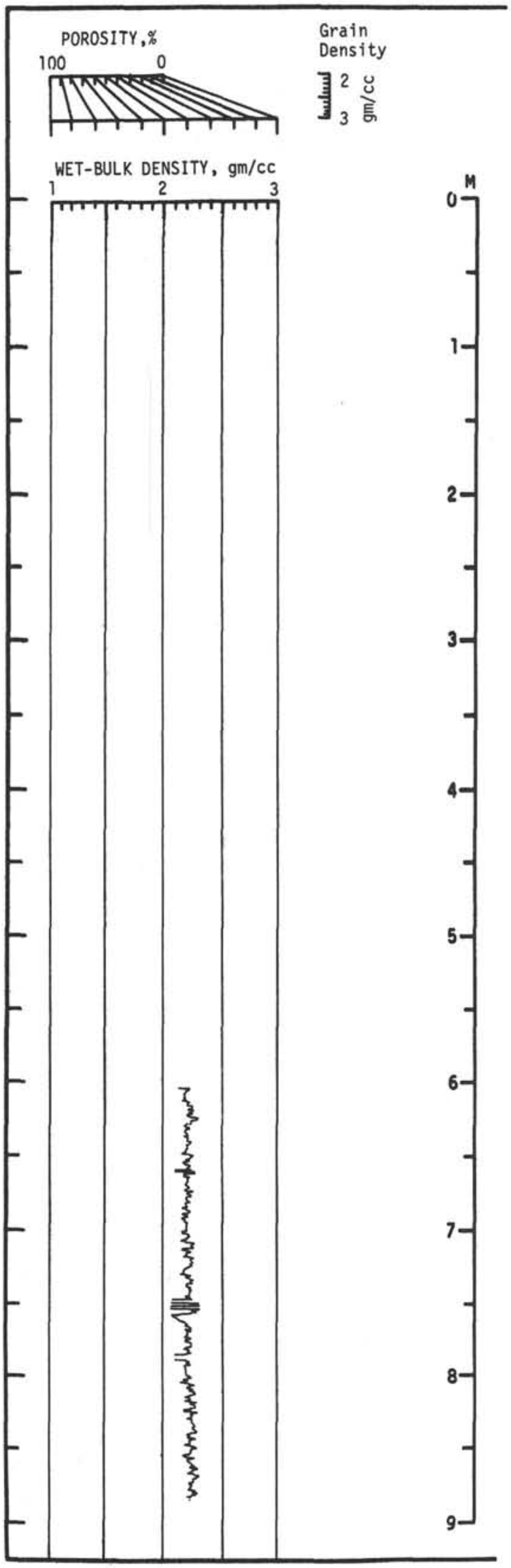
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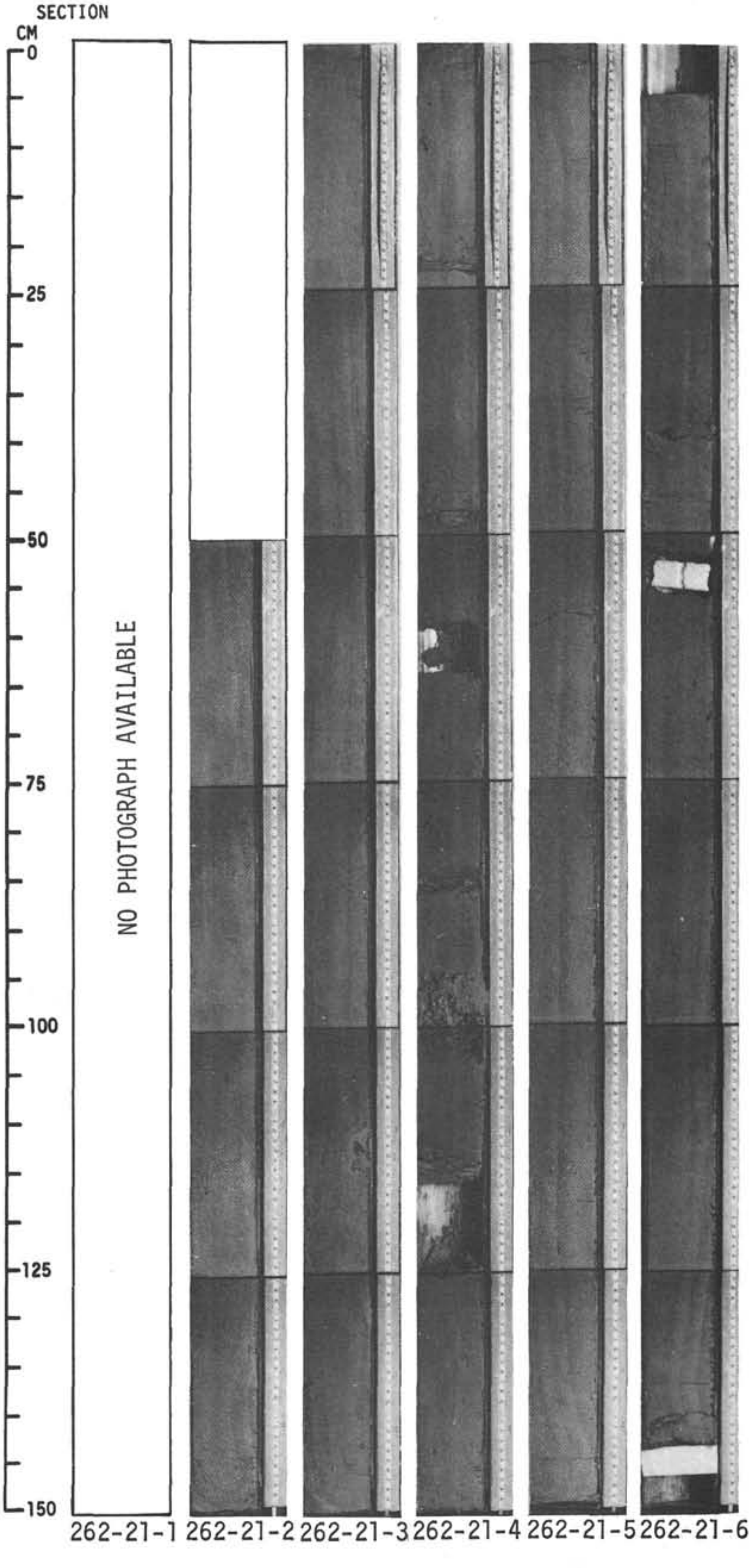
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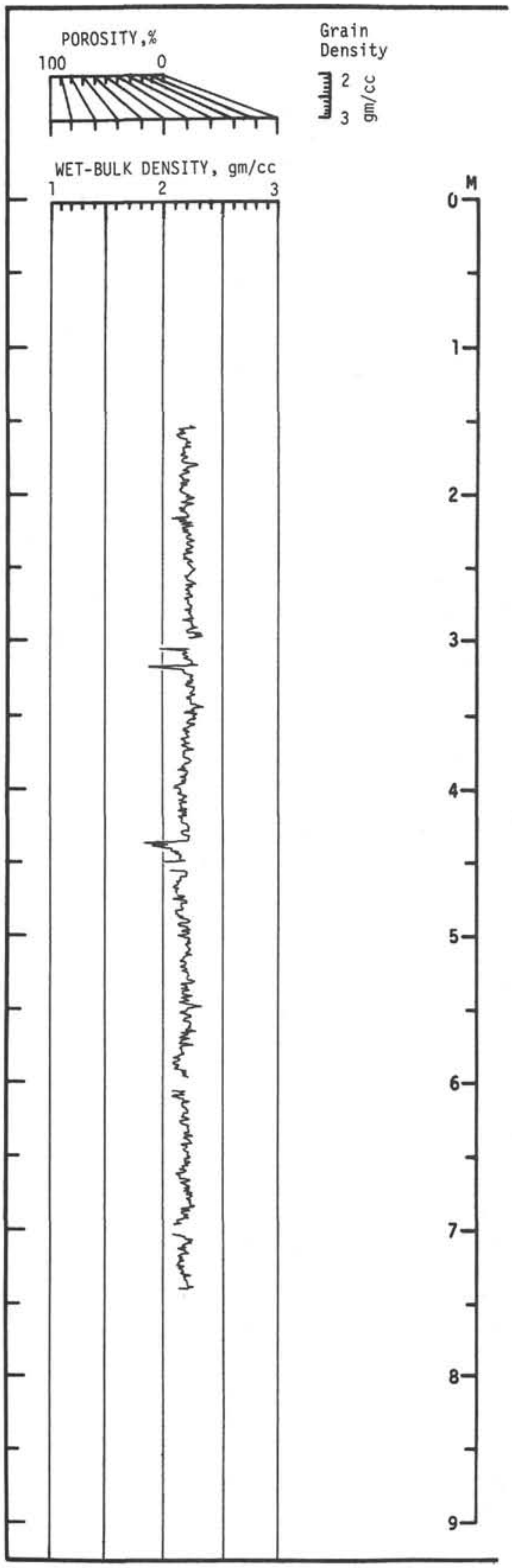
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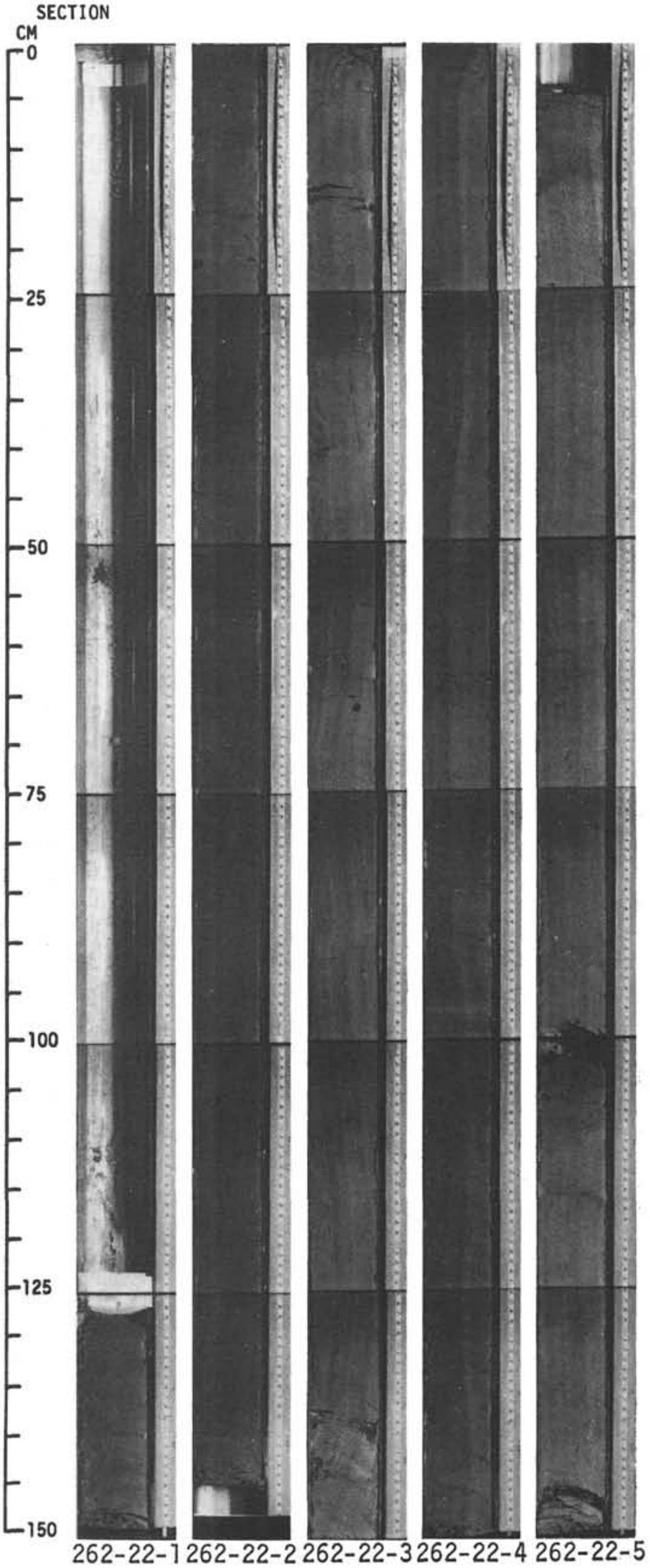
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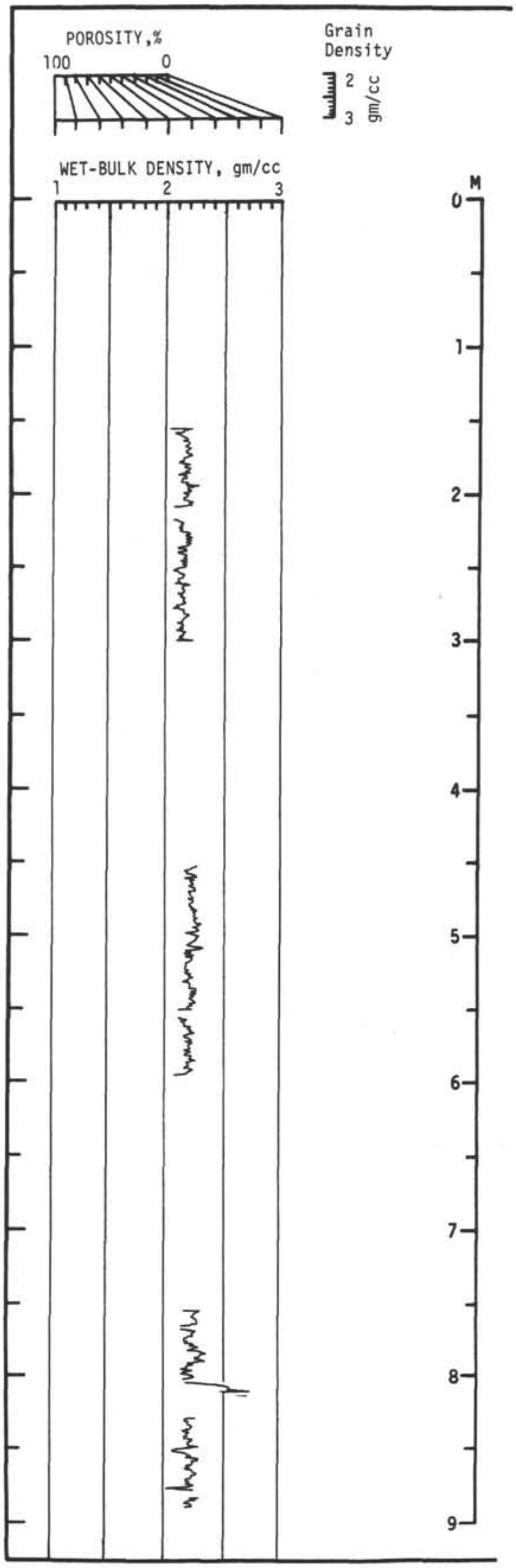
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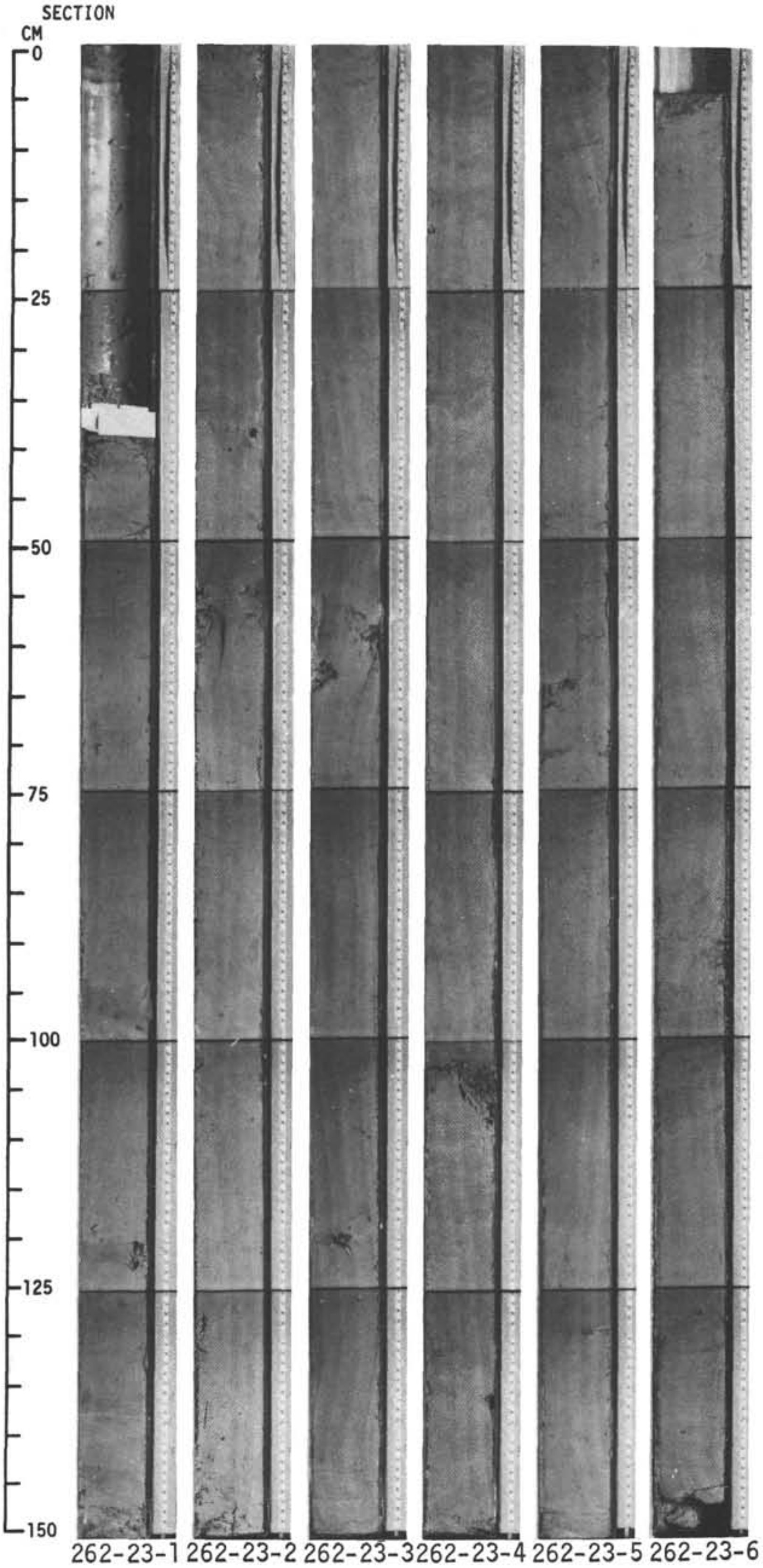
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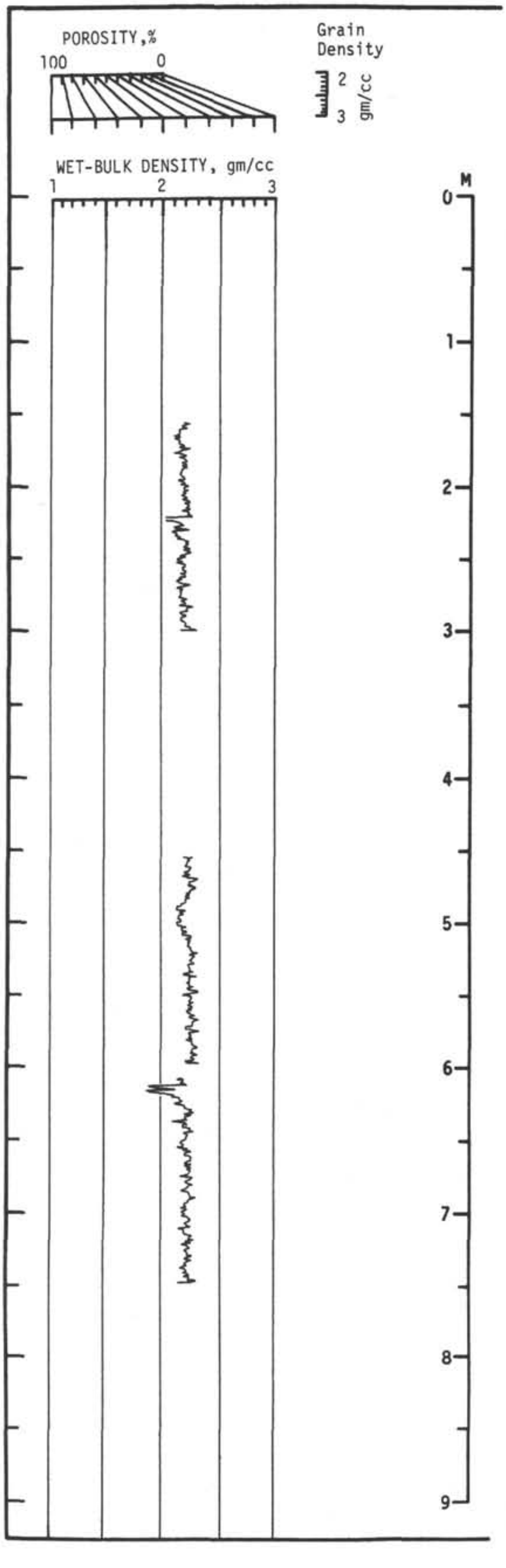
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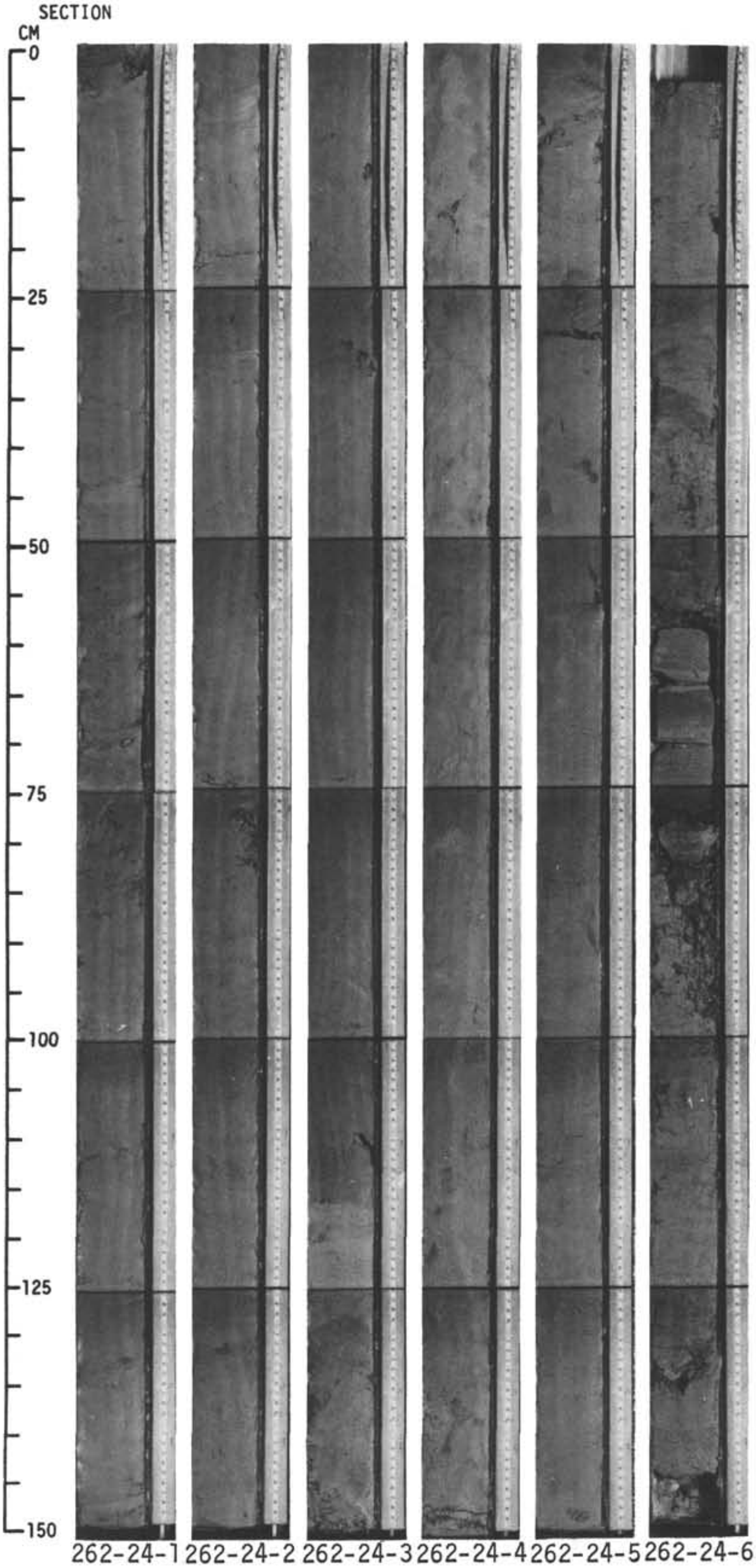
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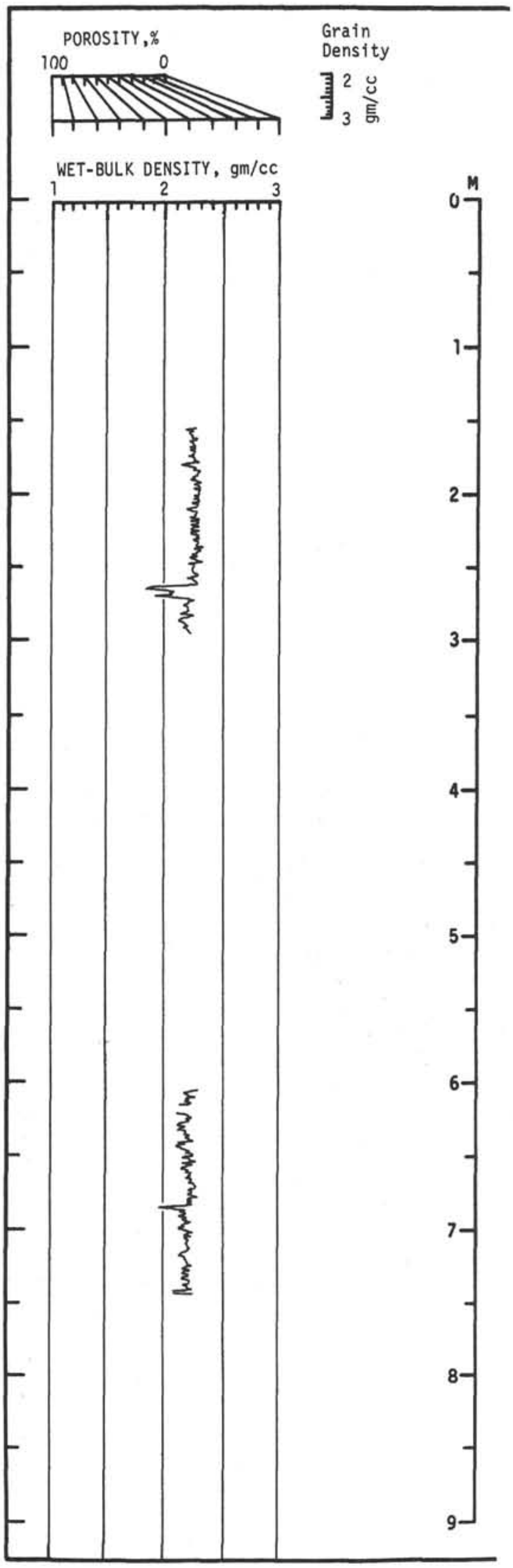
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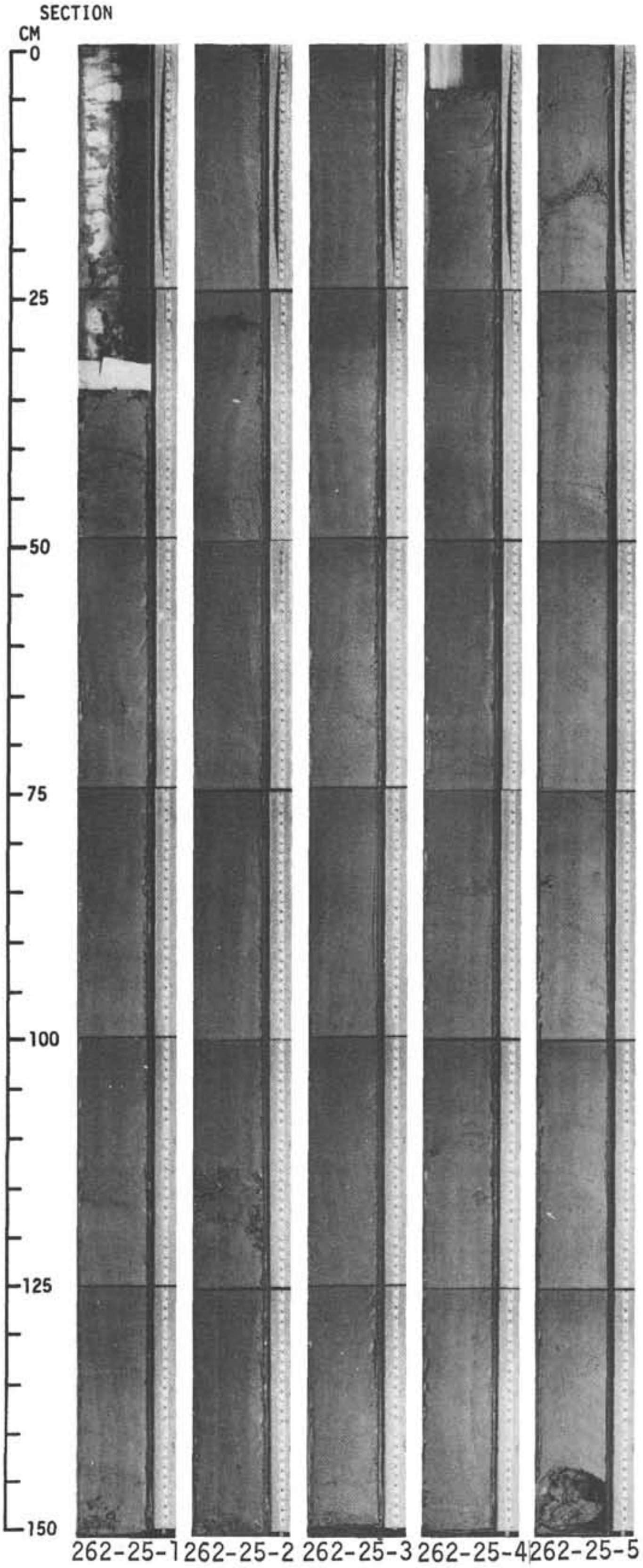
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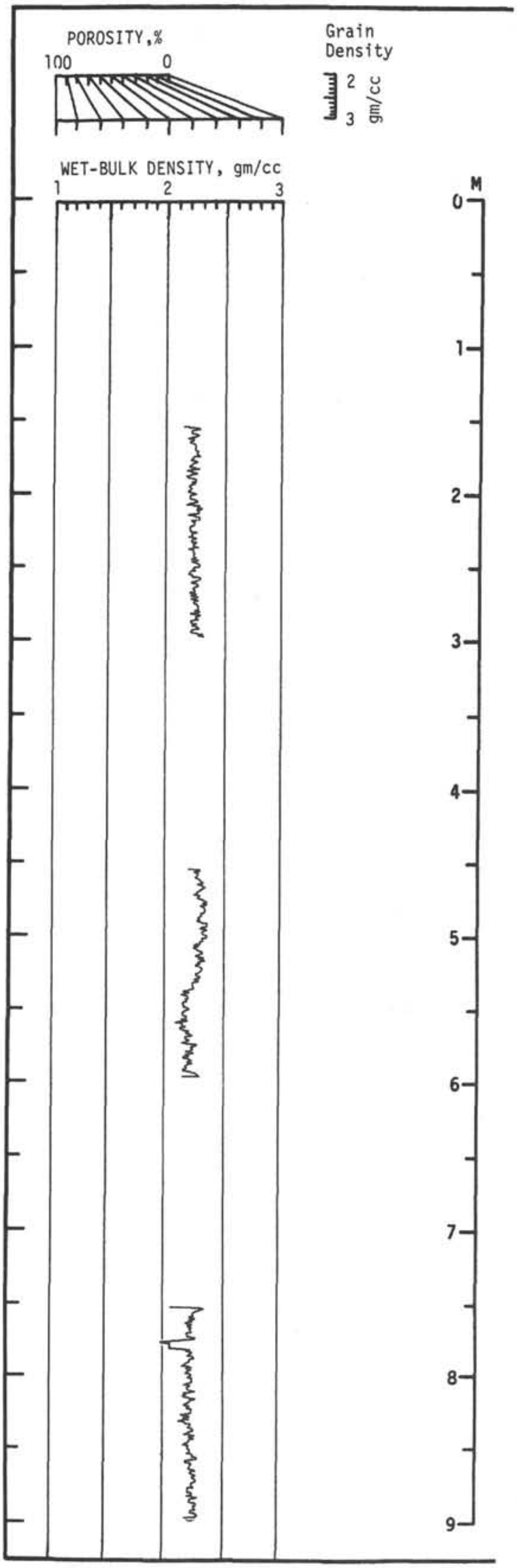
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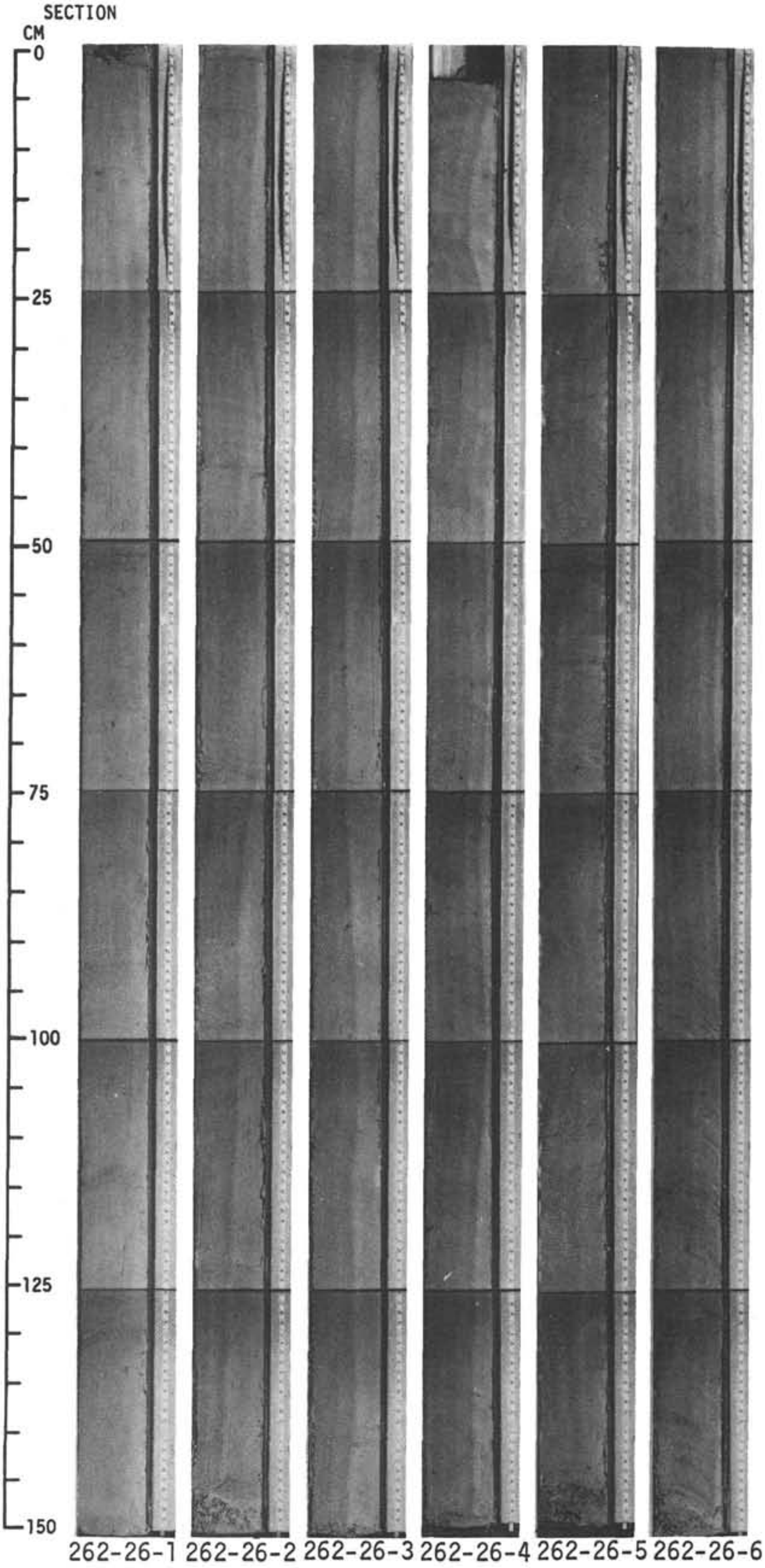
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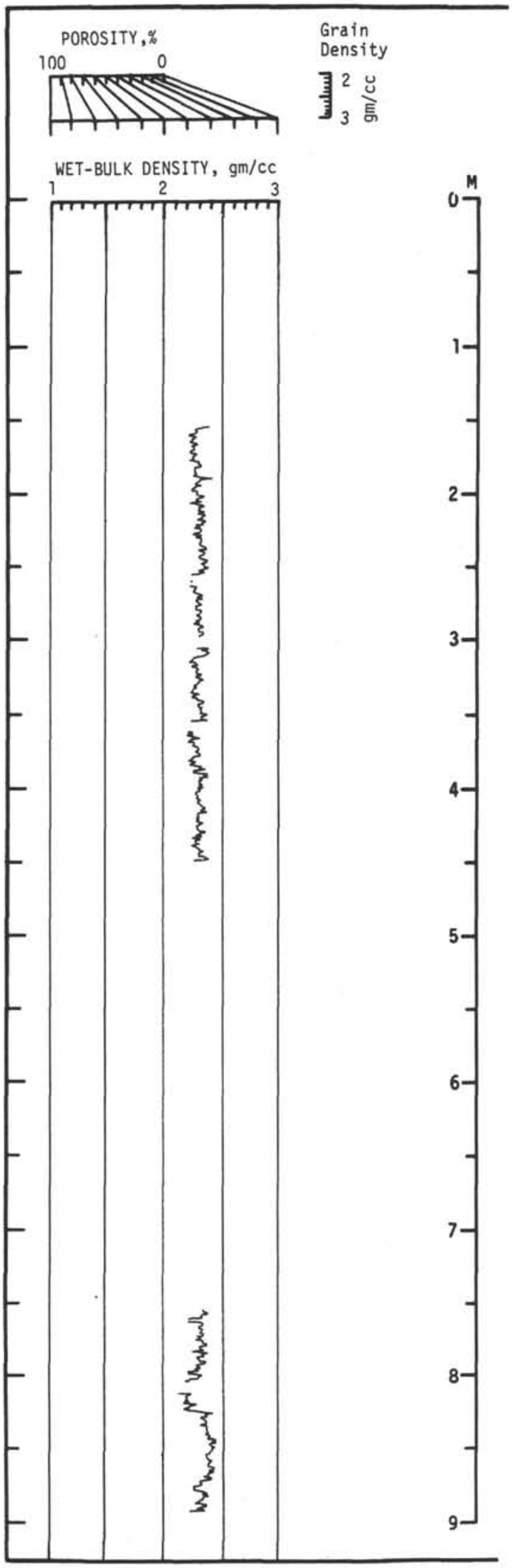
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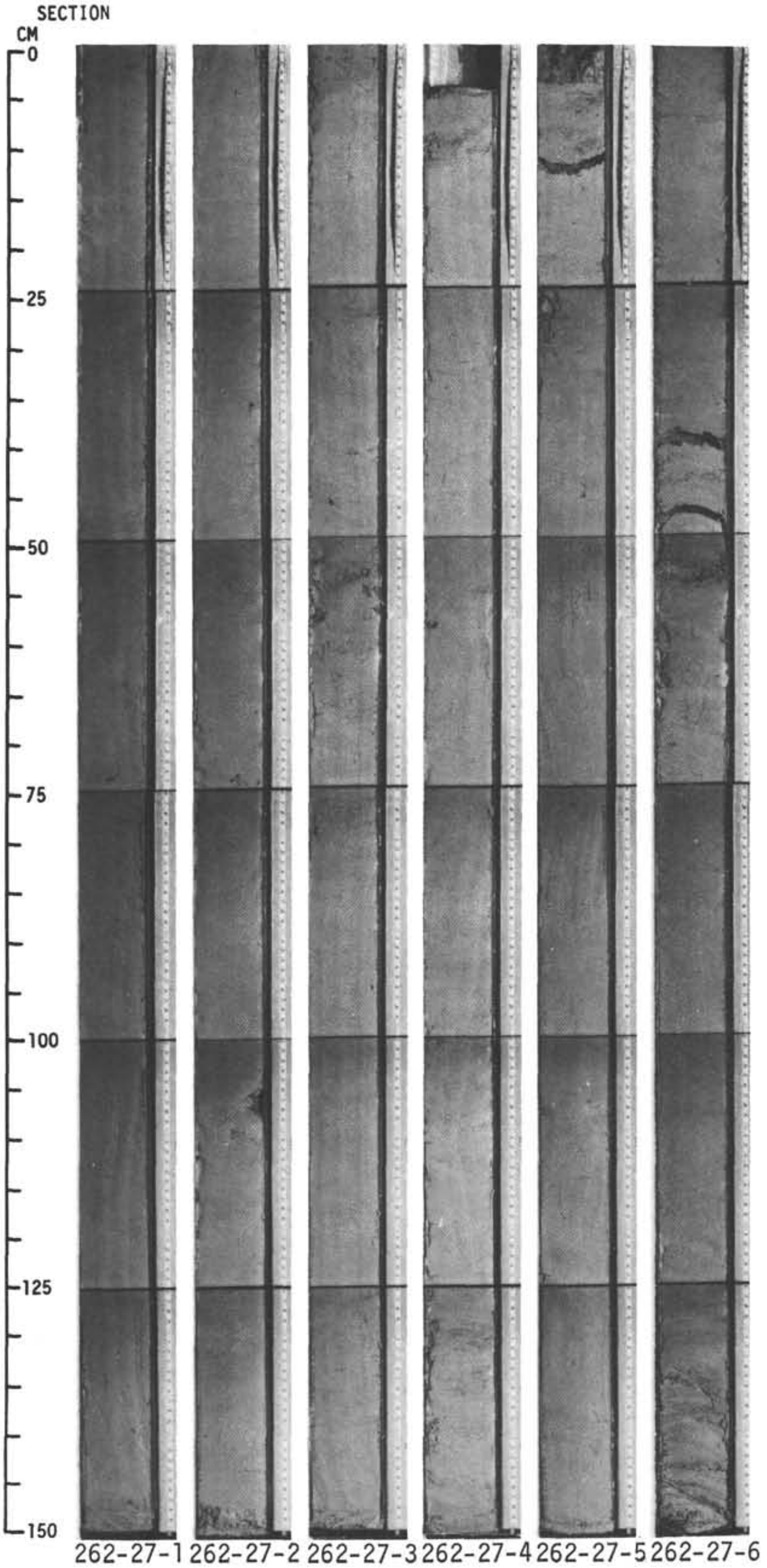
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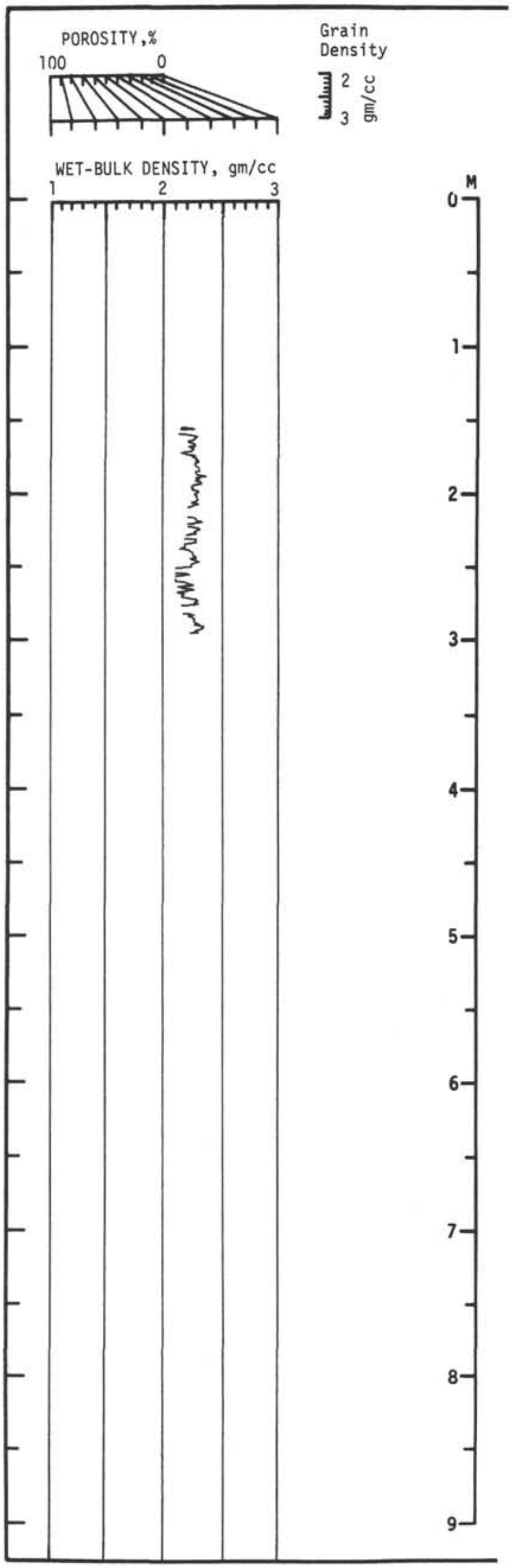
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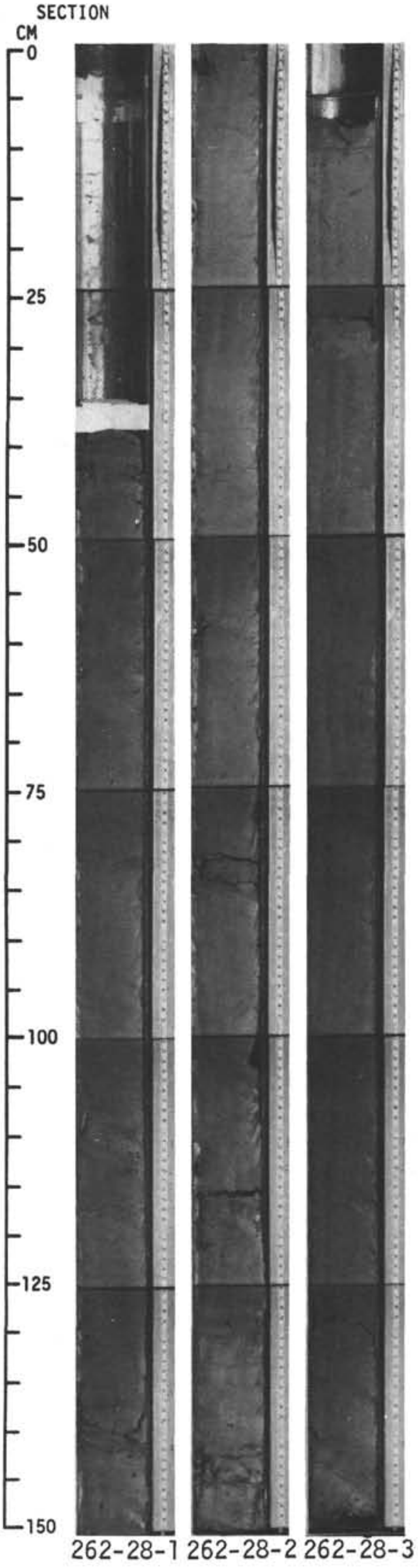
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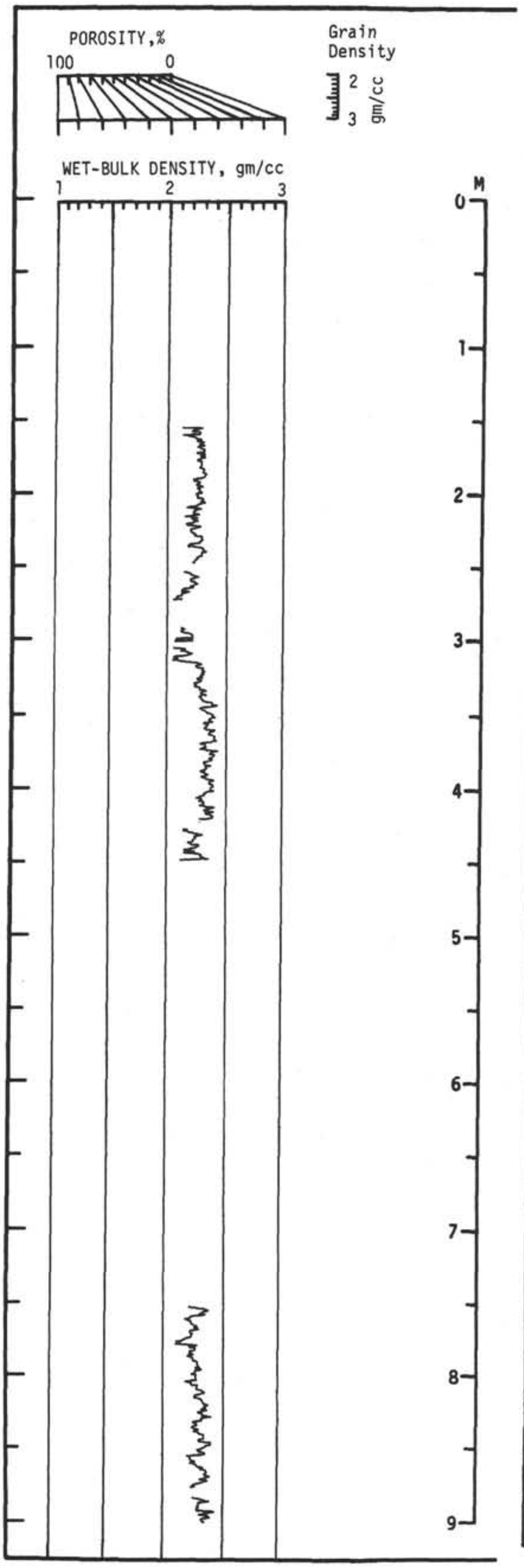
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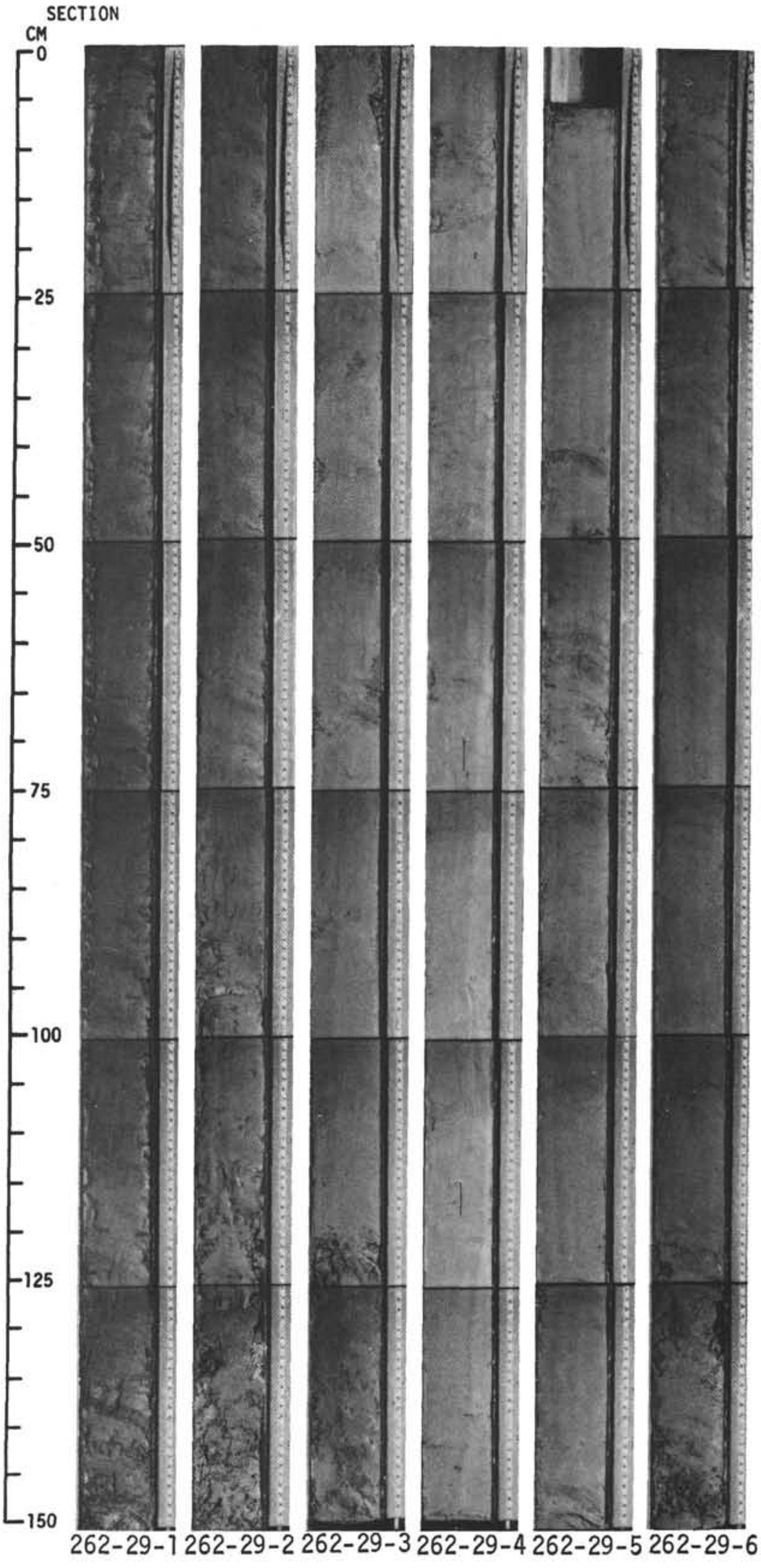
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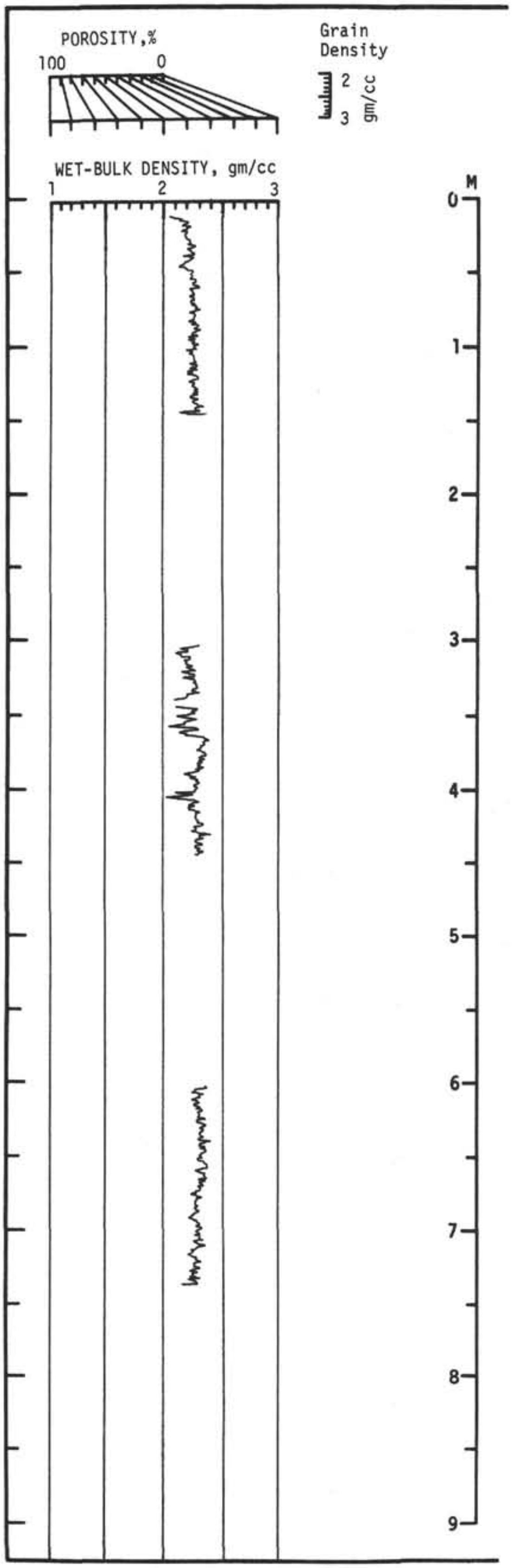
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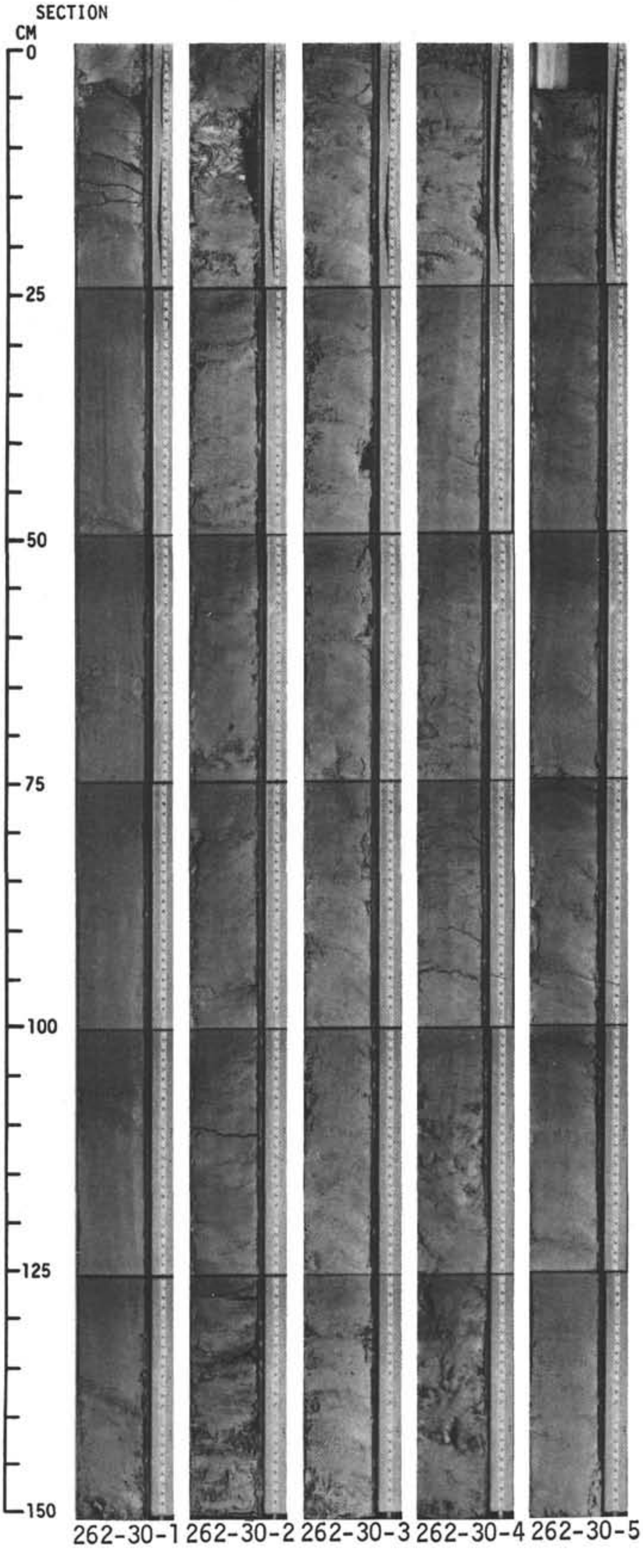
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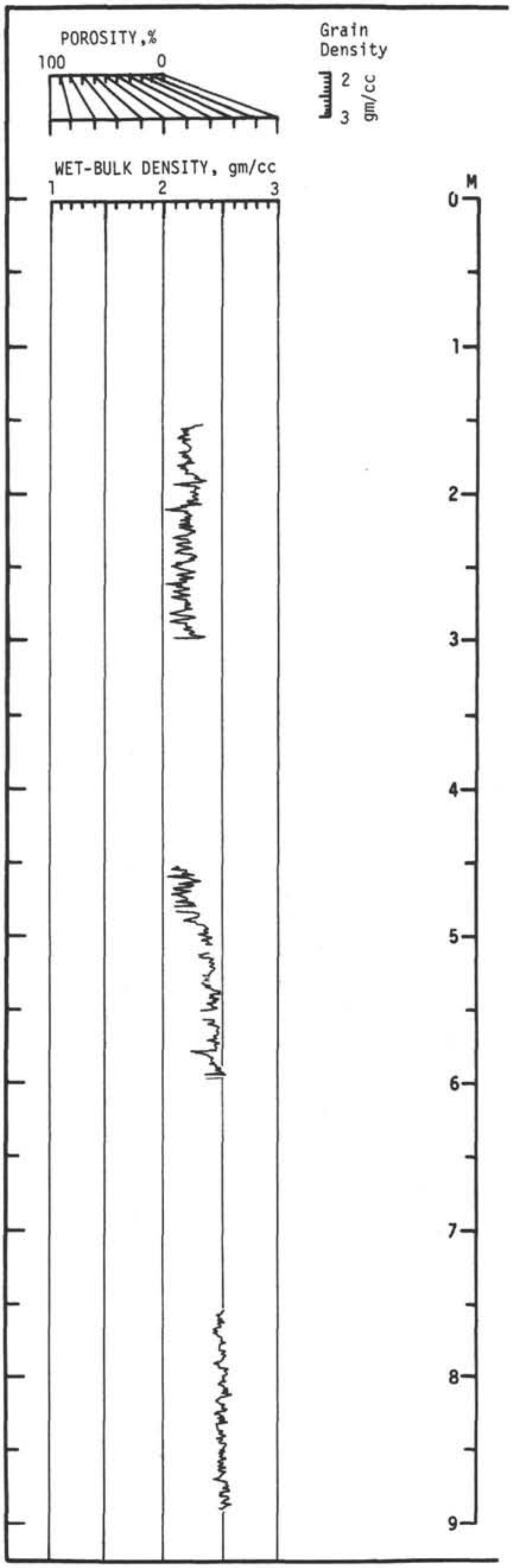
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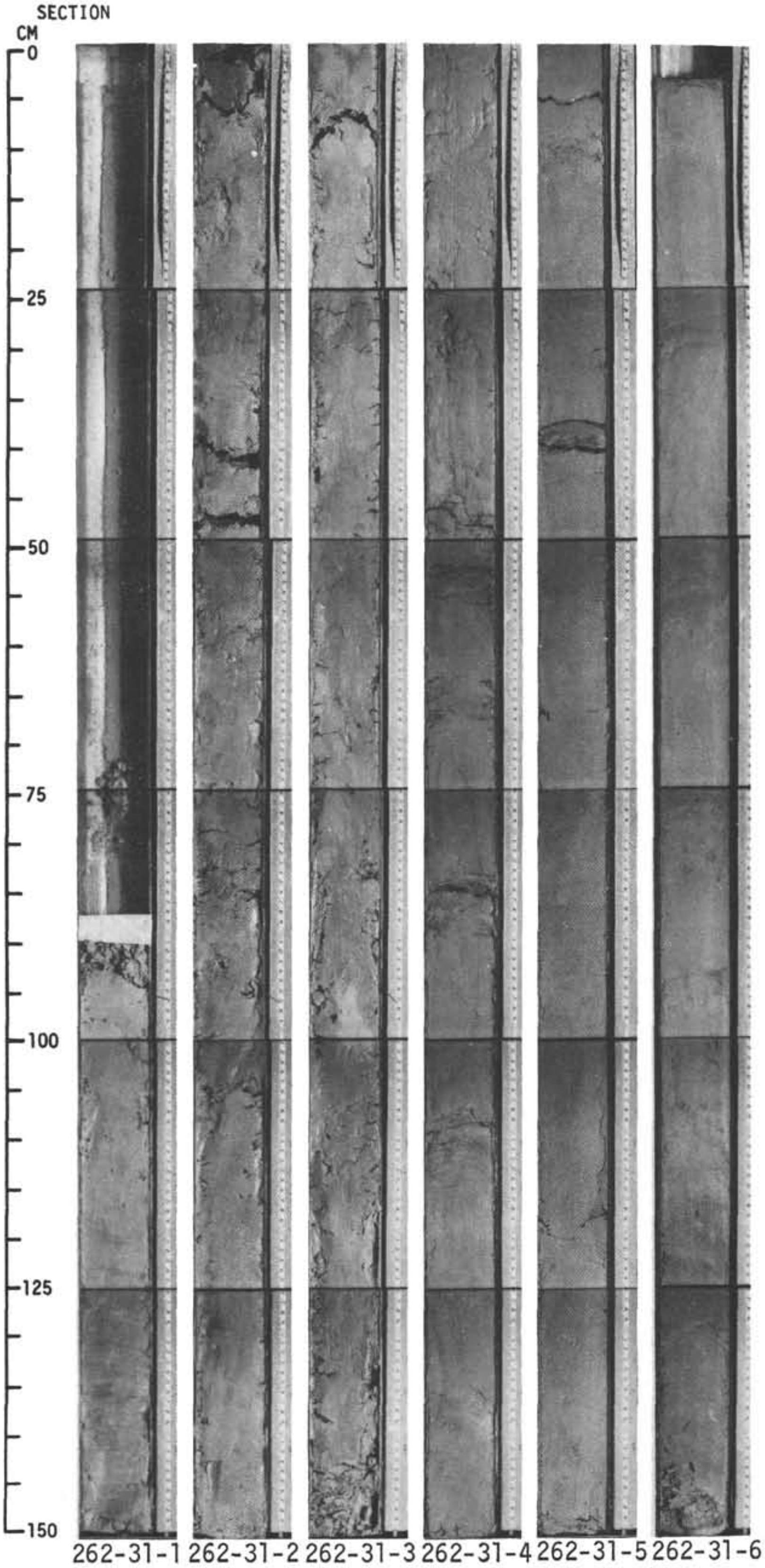
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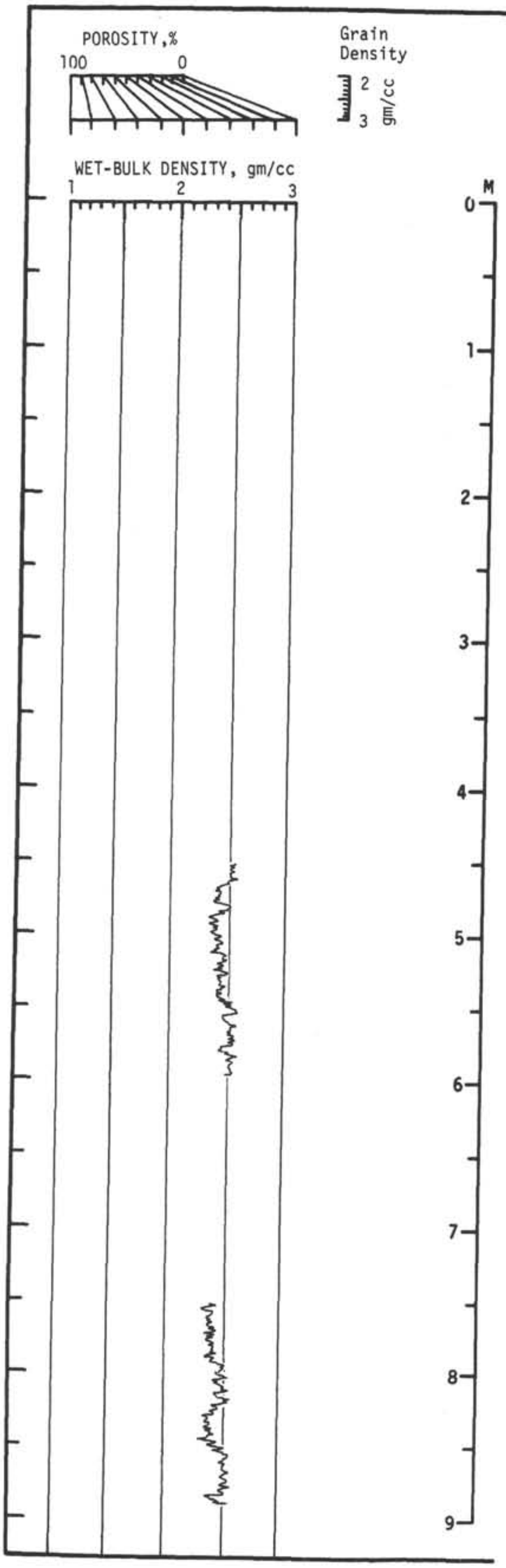
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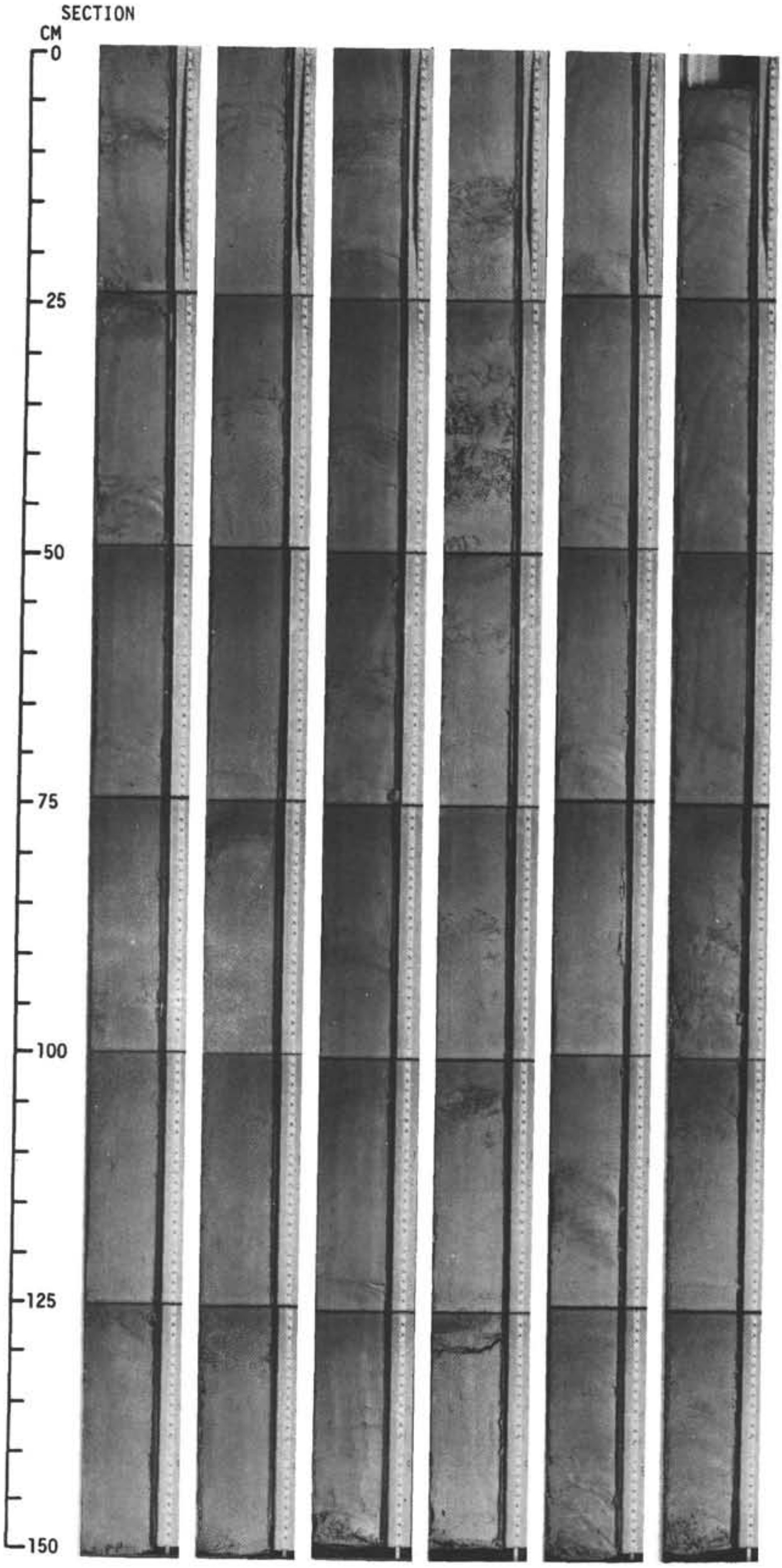
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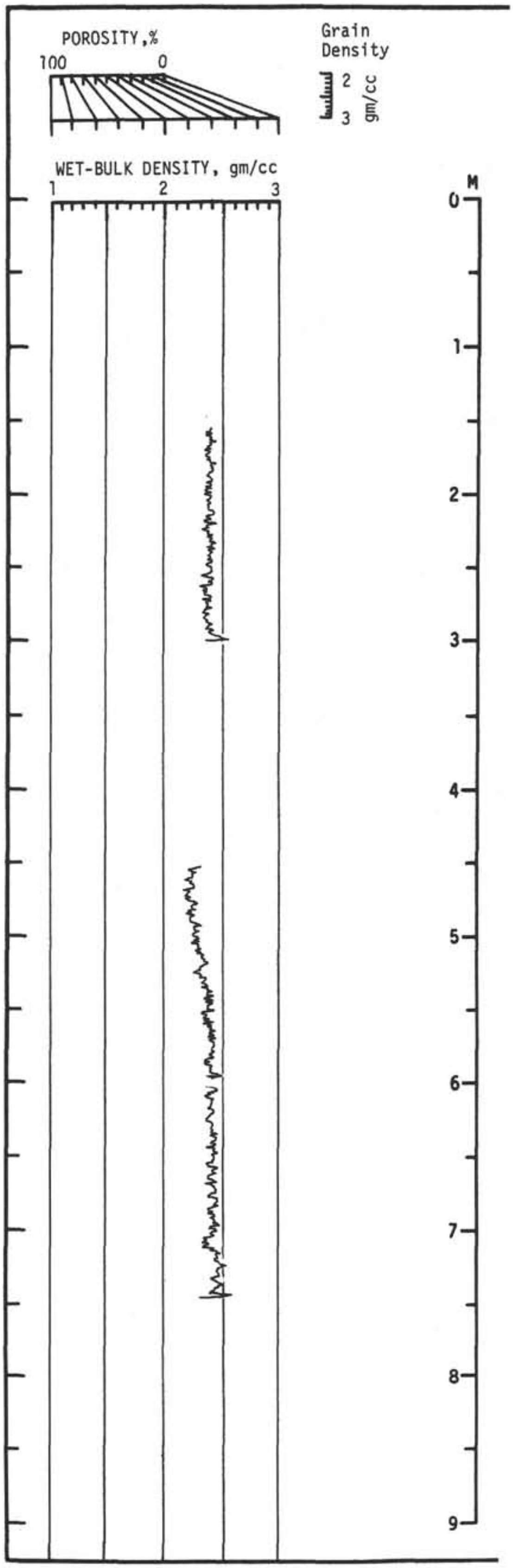
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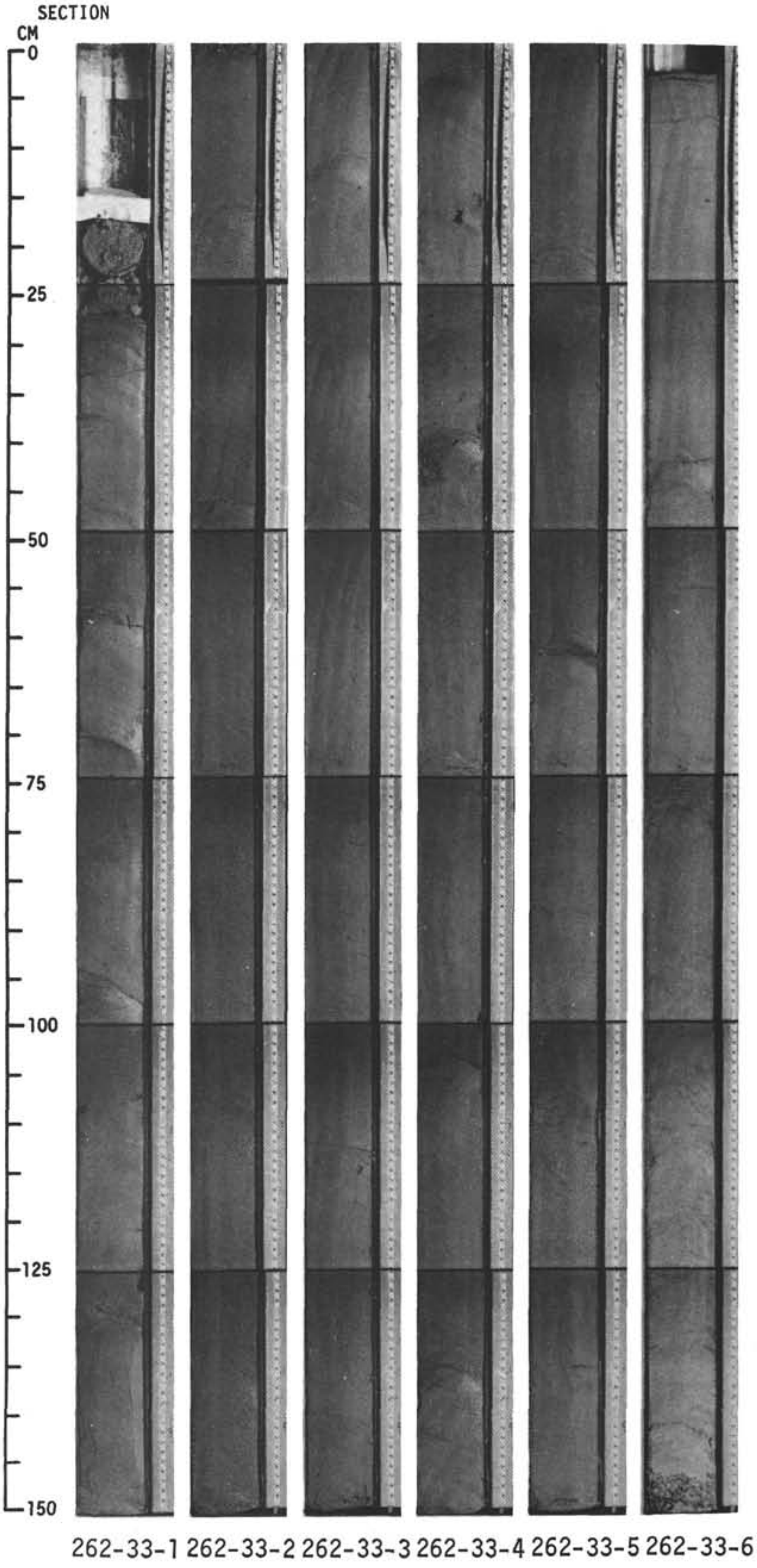
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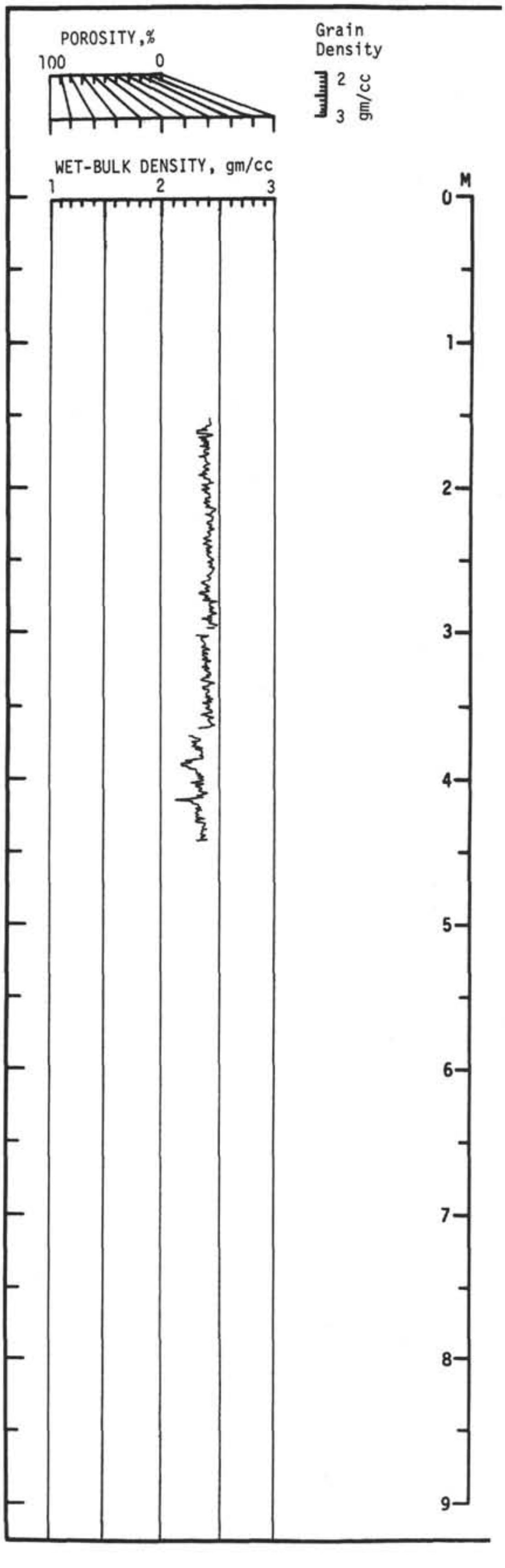
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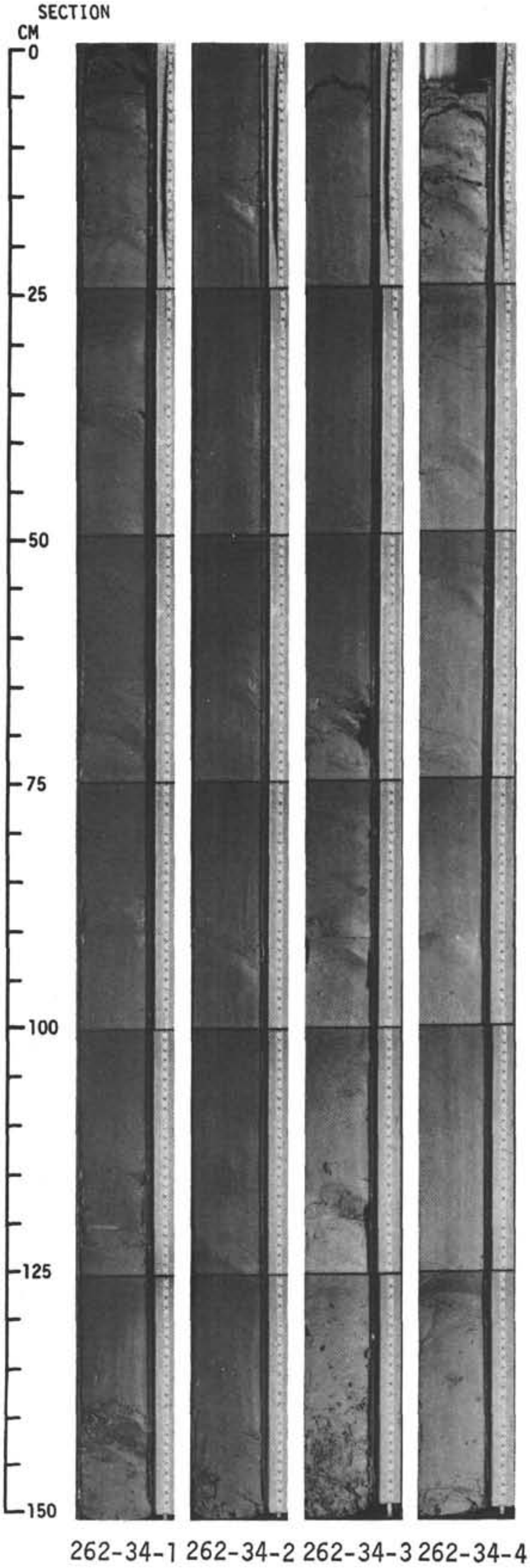
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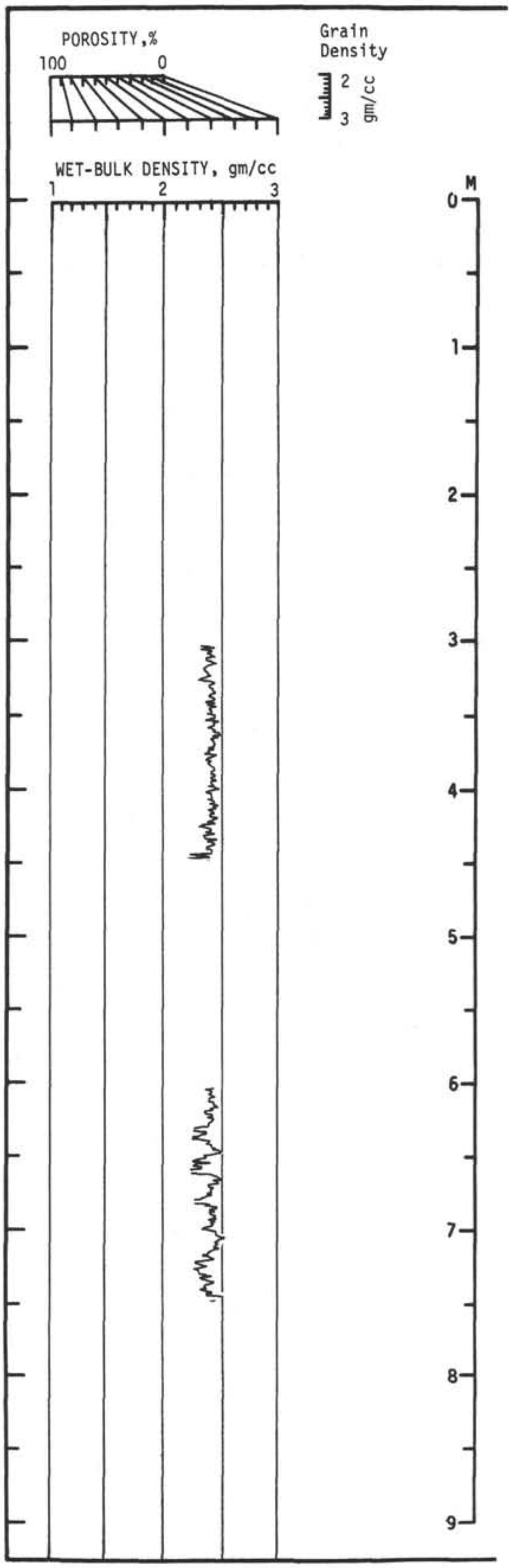
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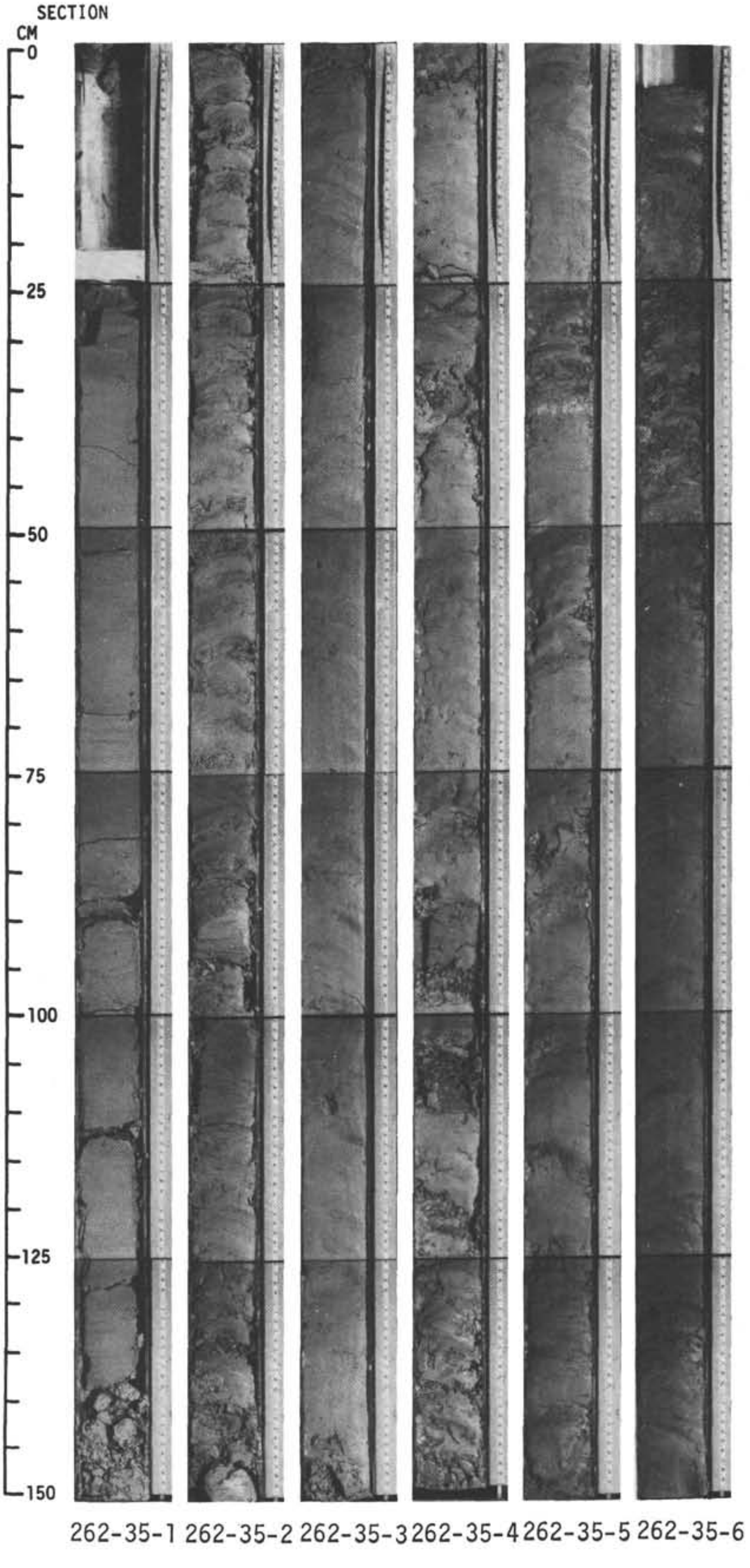
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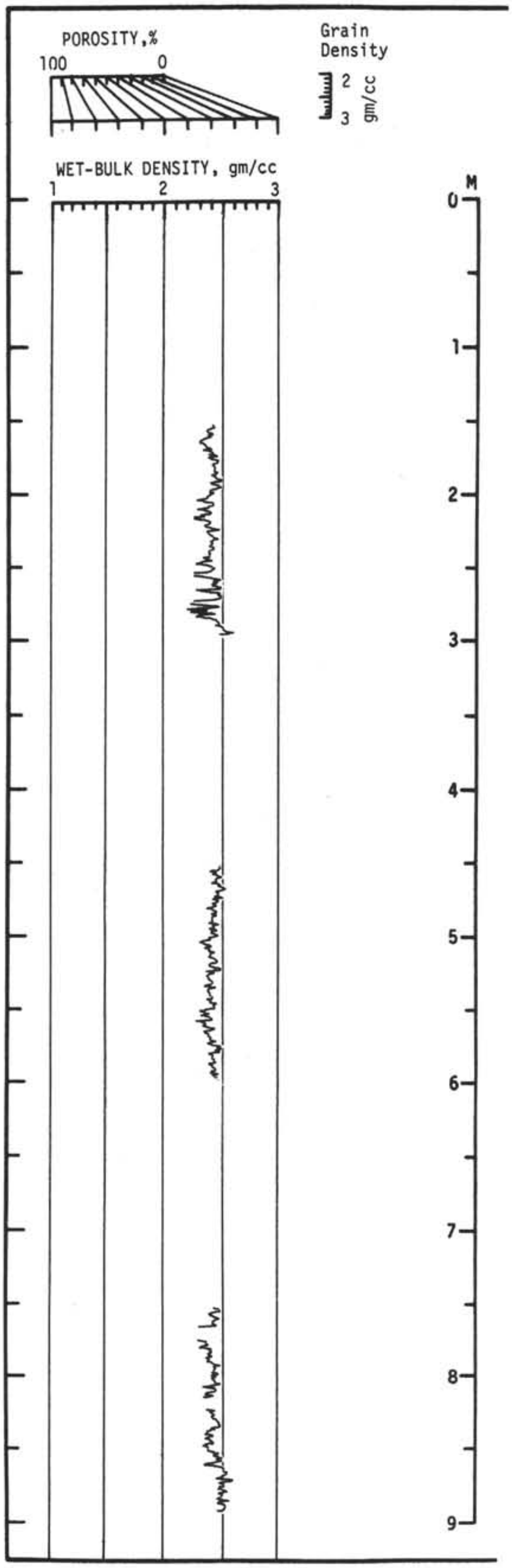
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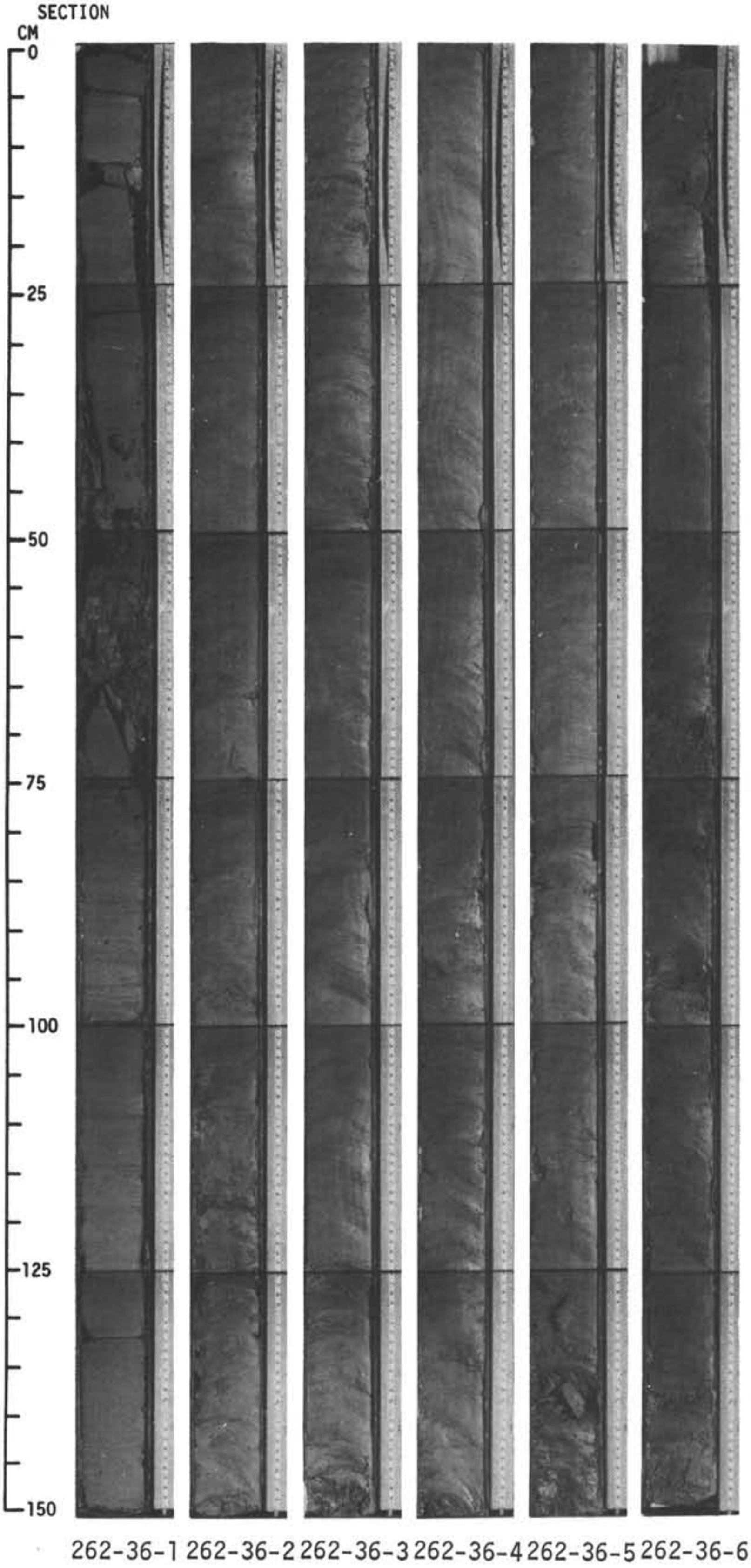
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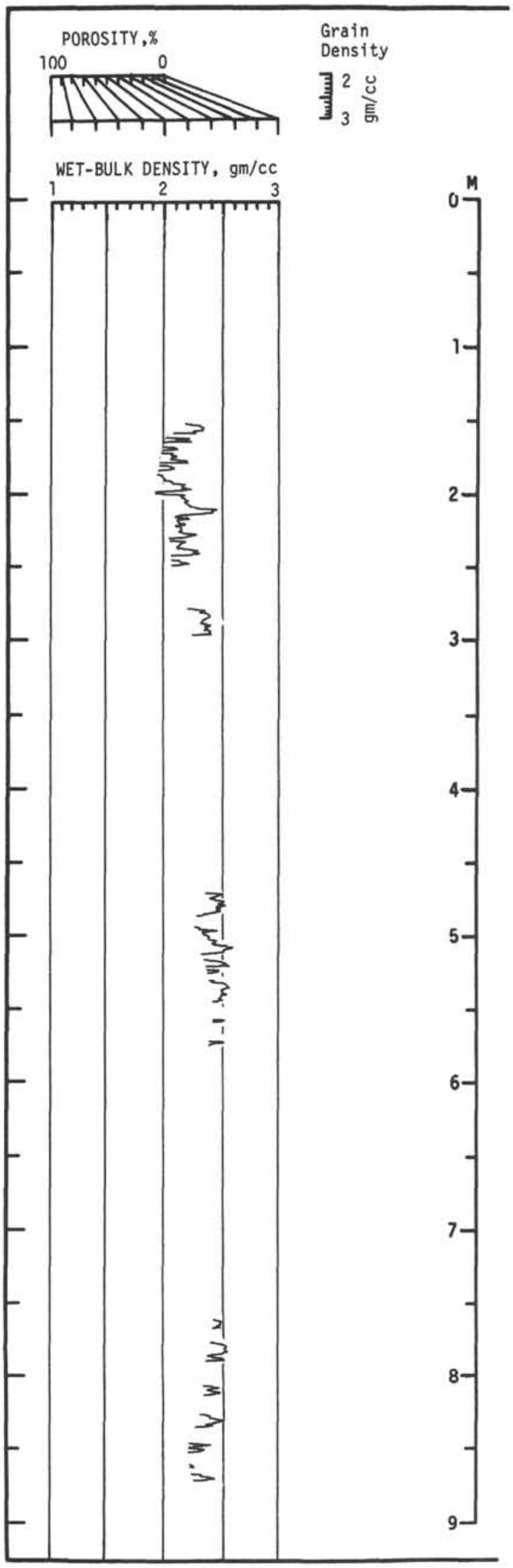
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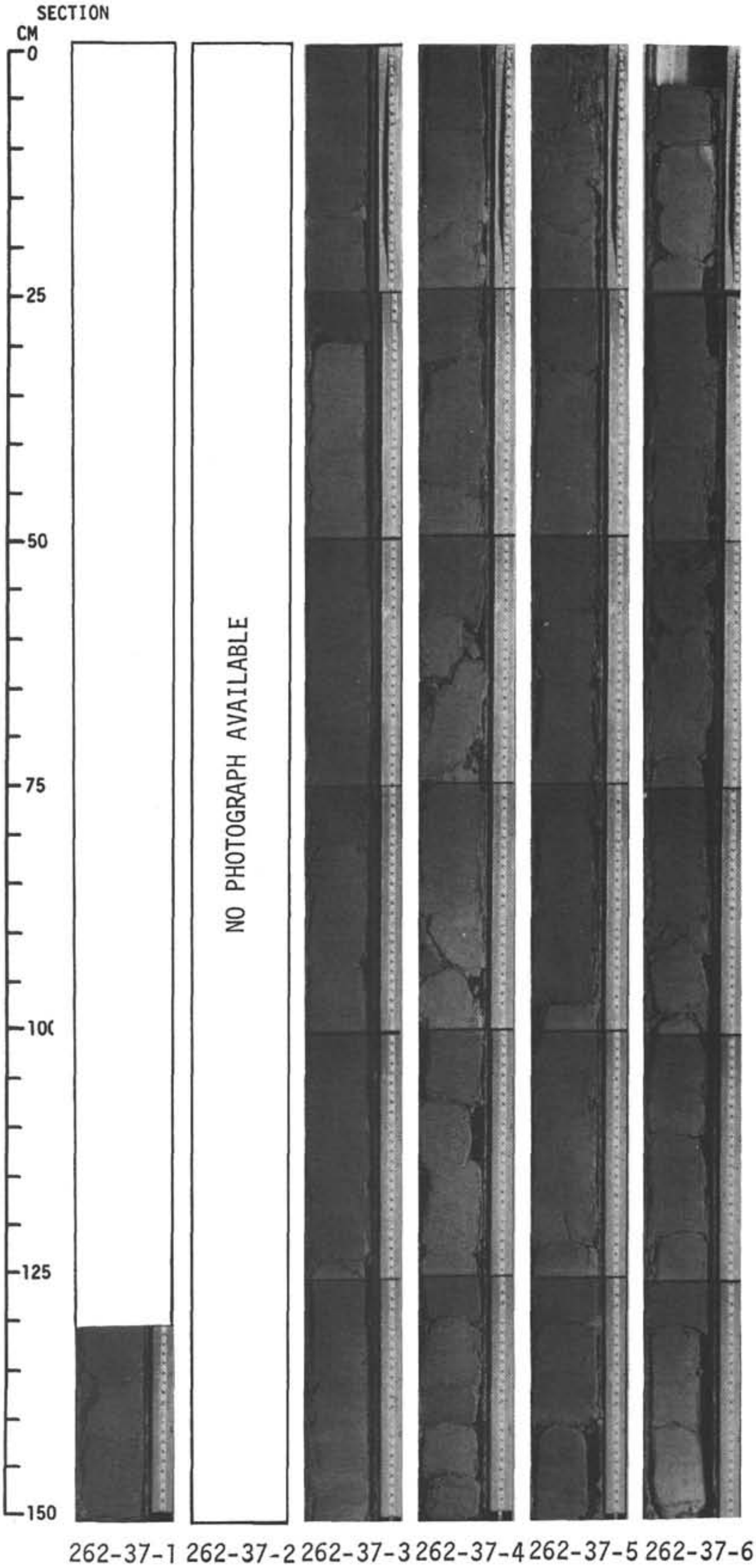
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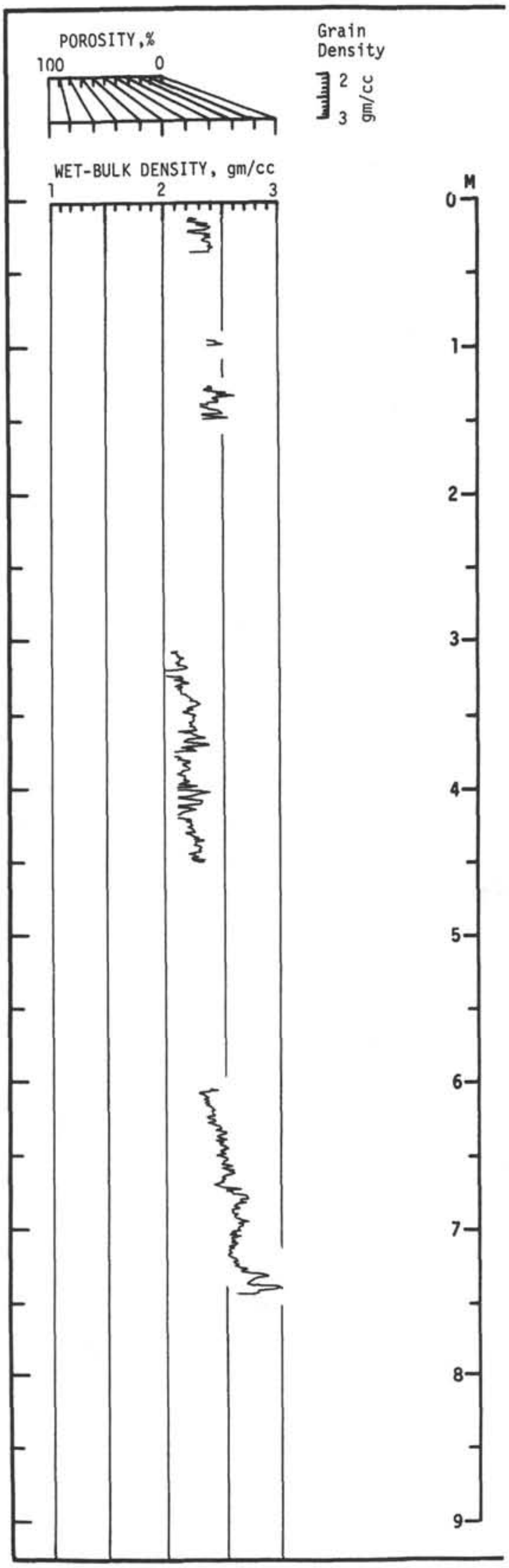

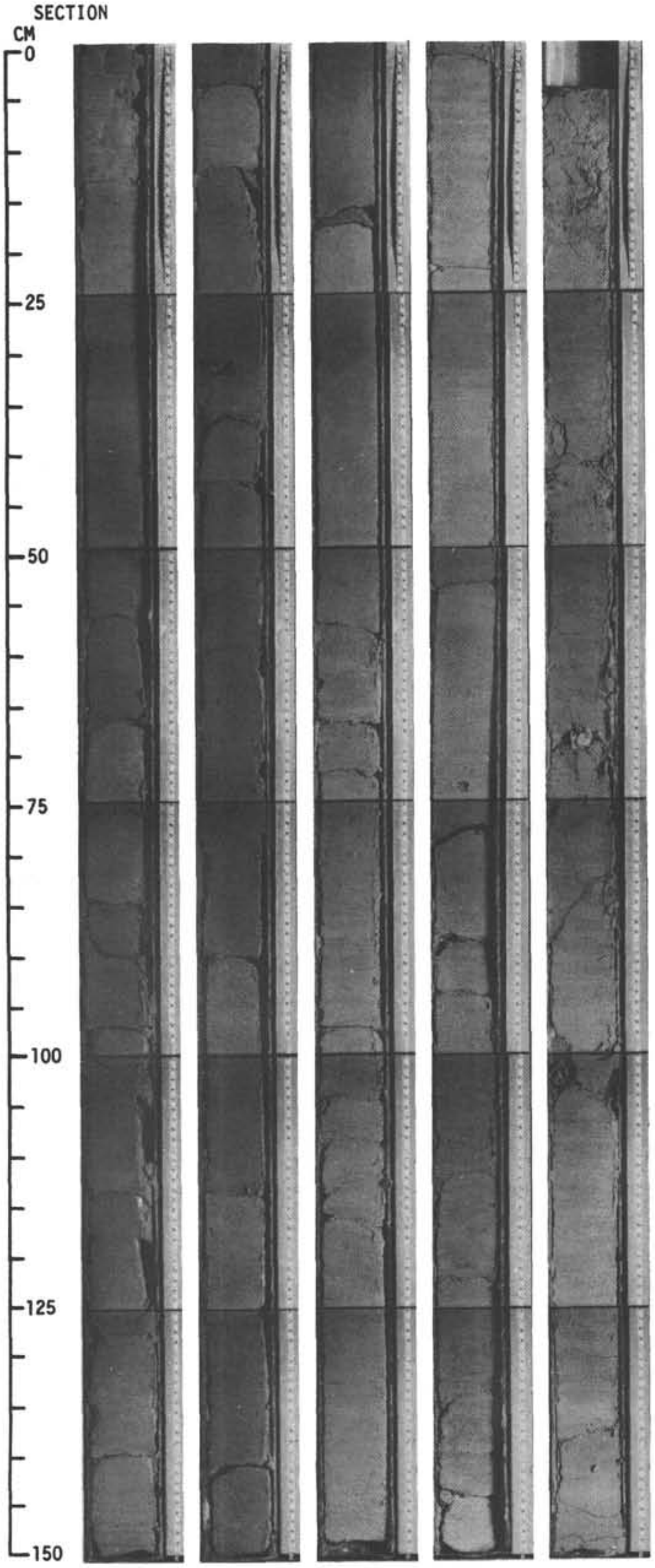

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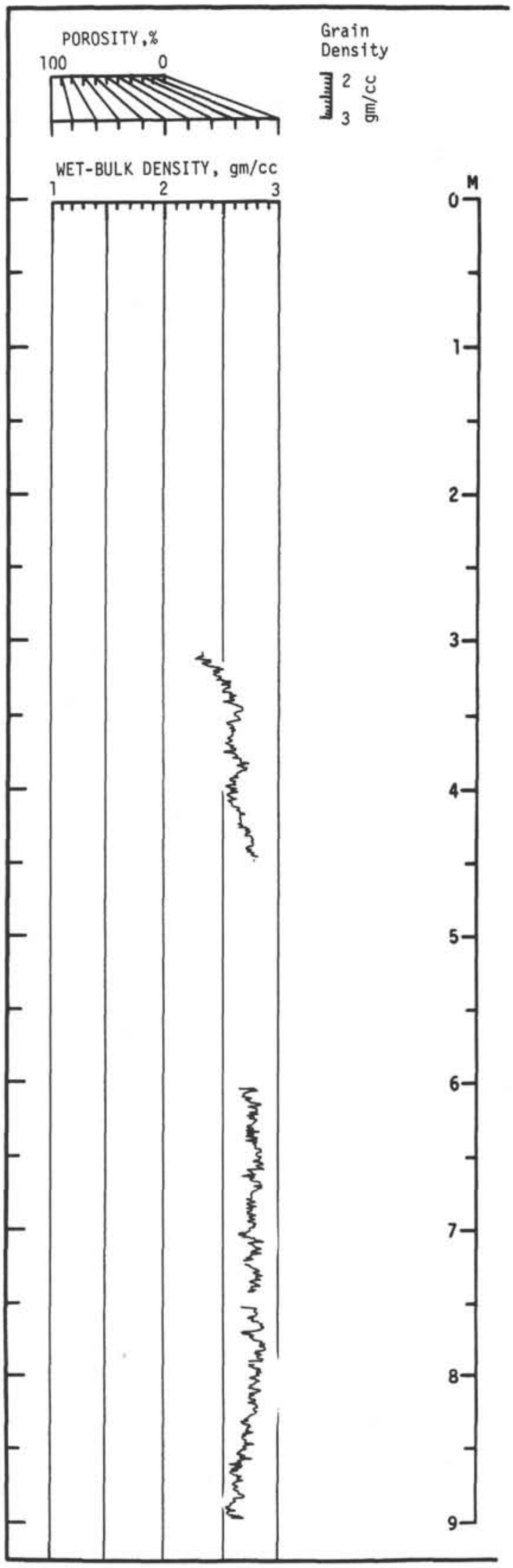
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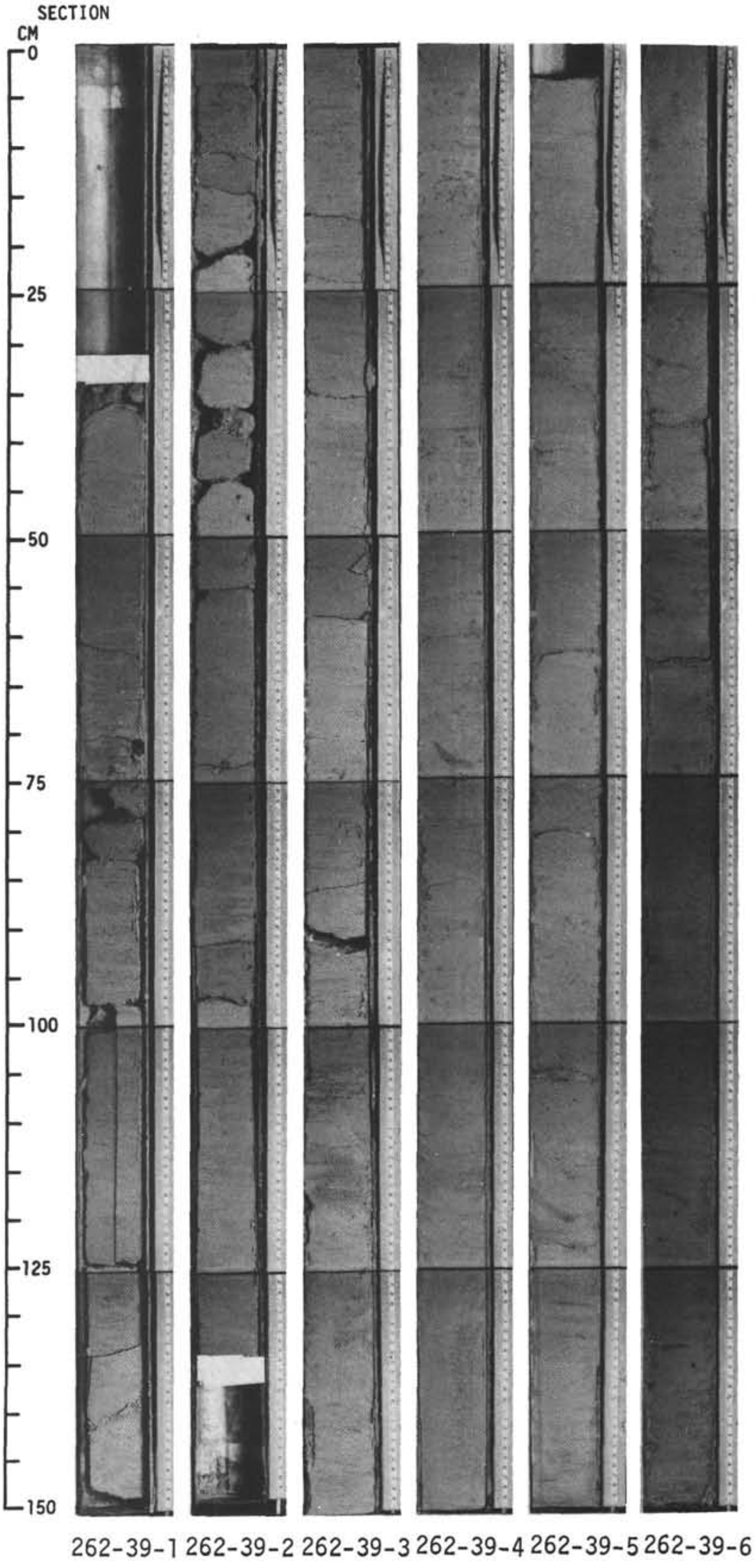
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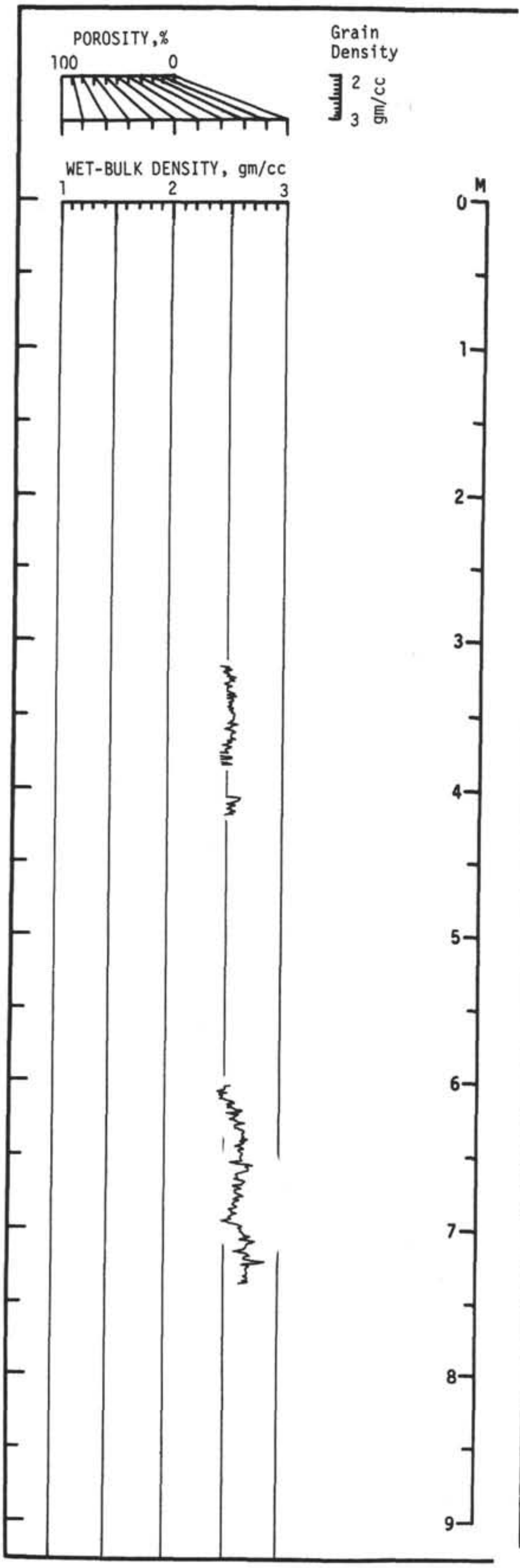
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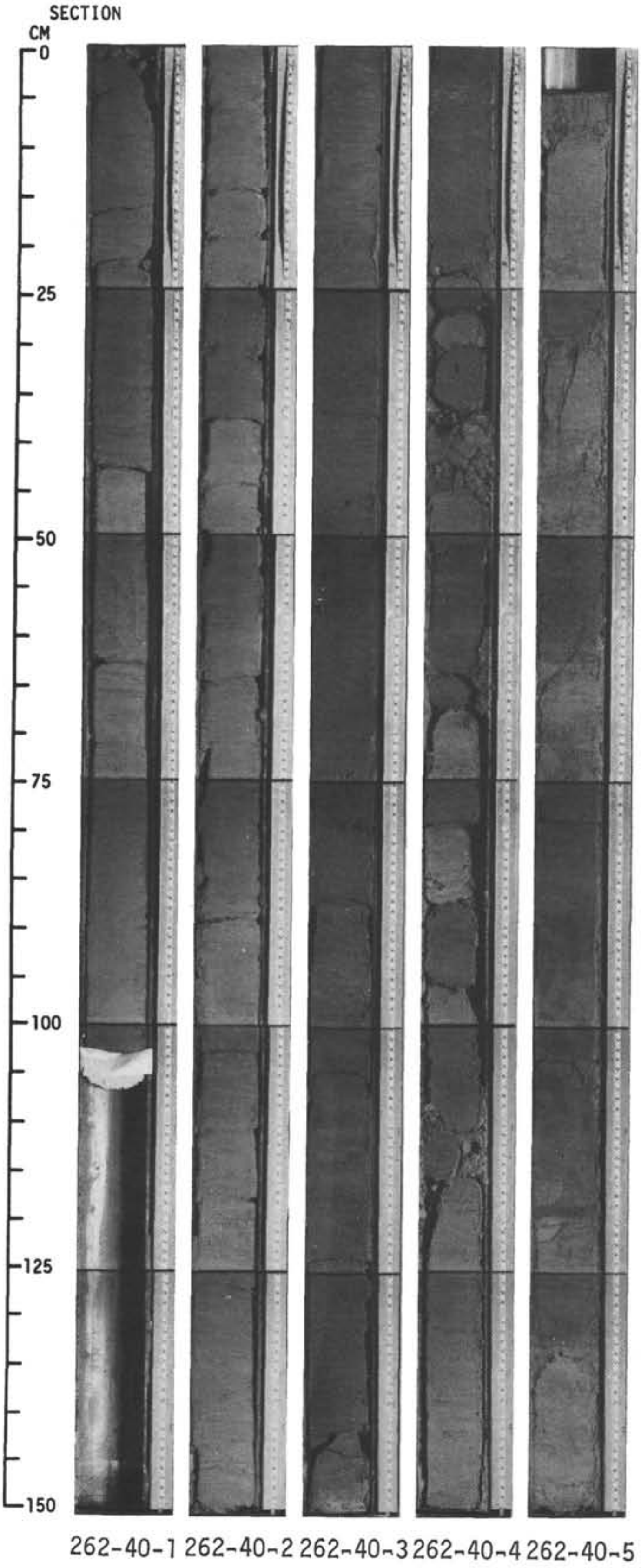
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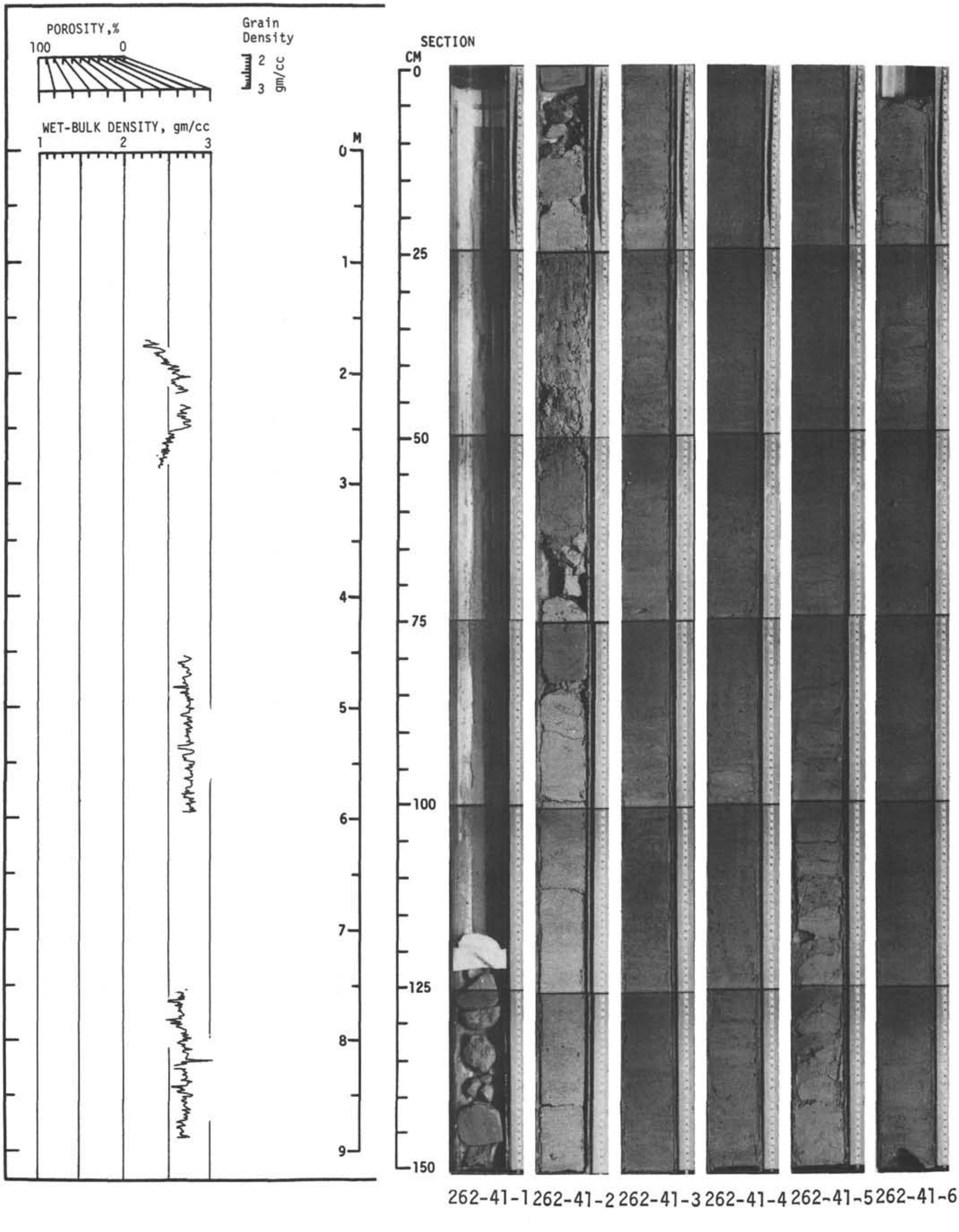
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9
SECTION
CM
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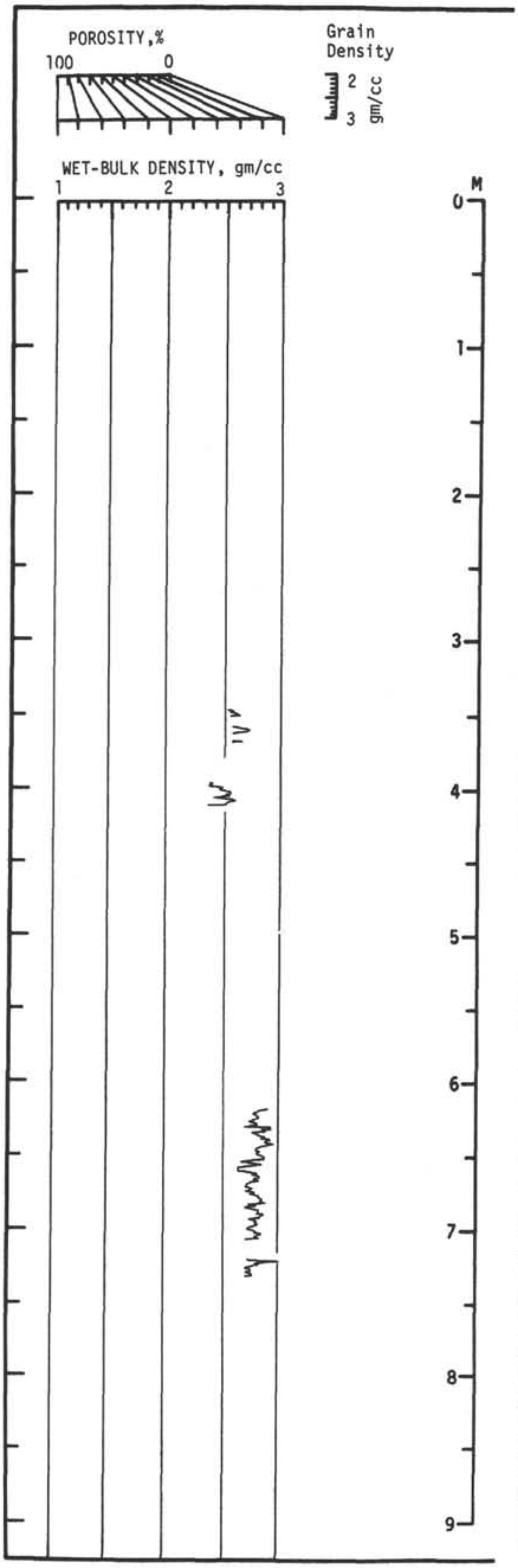
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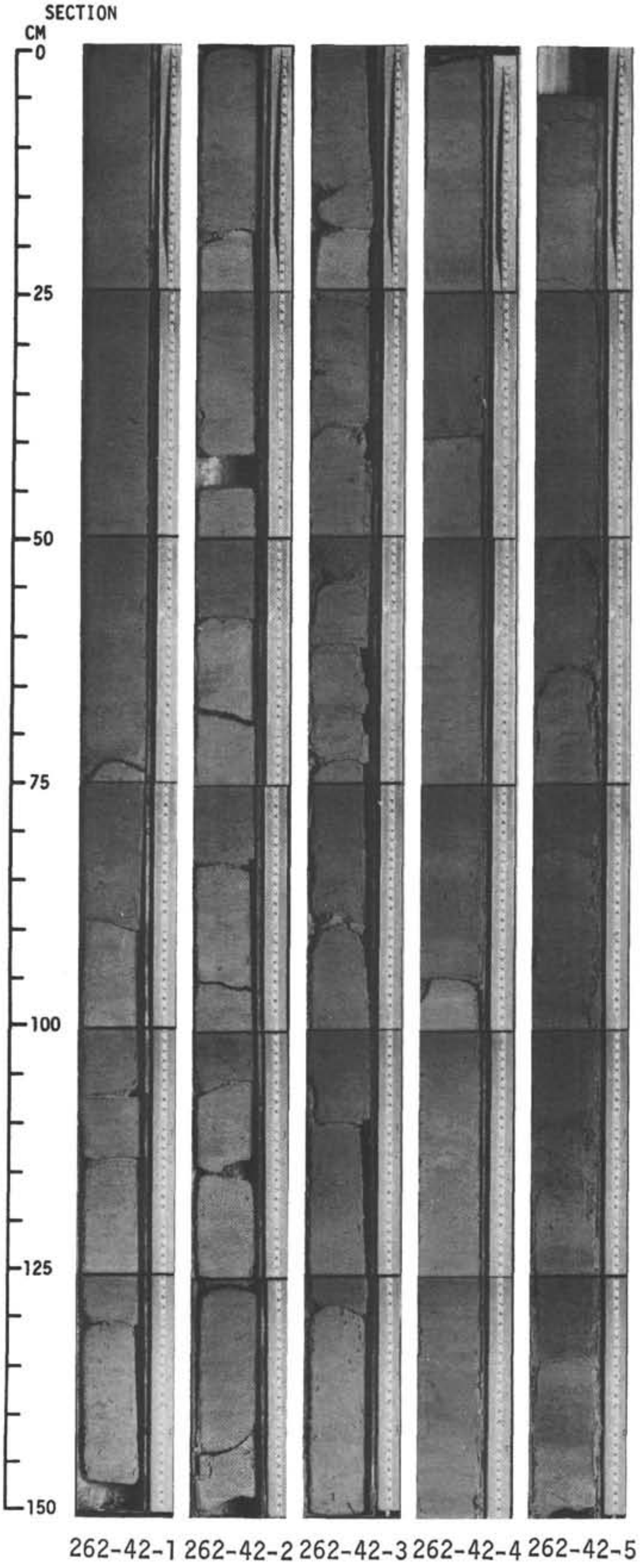
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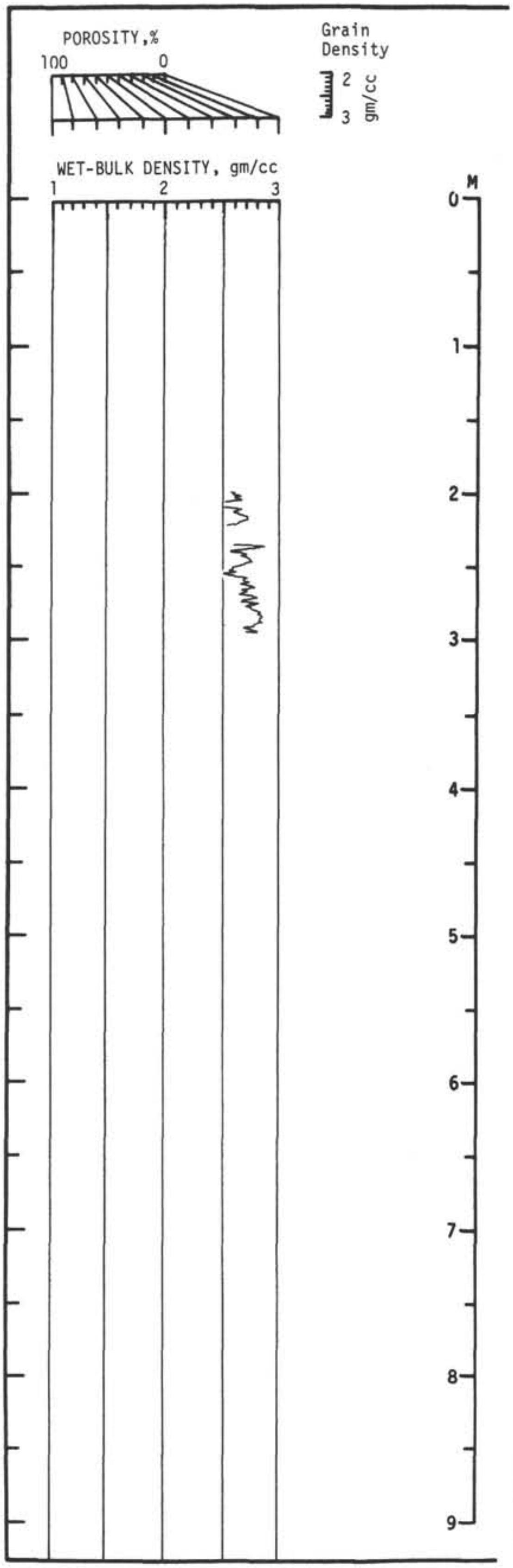
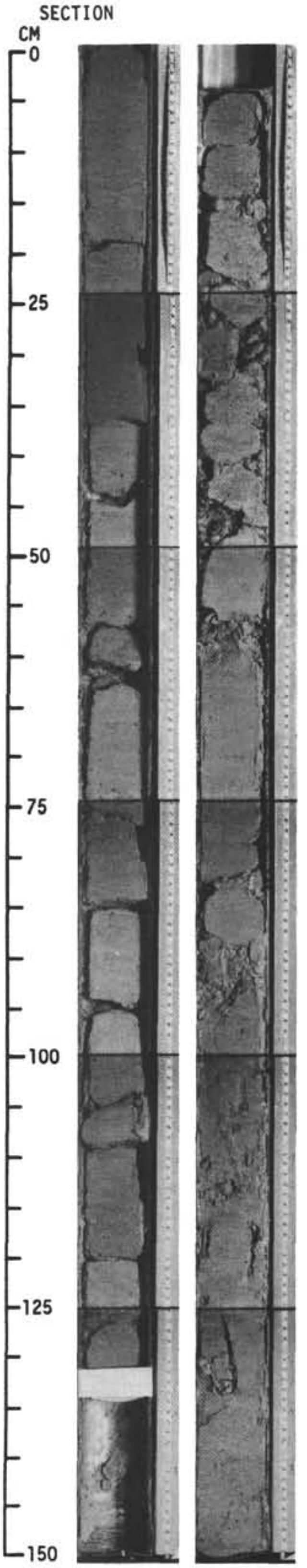
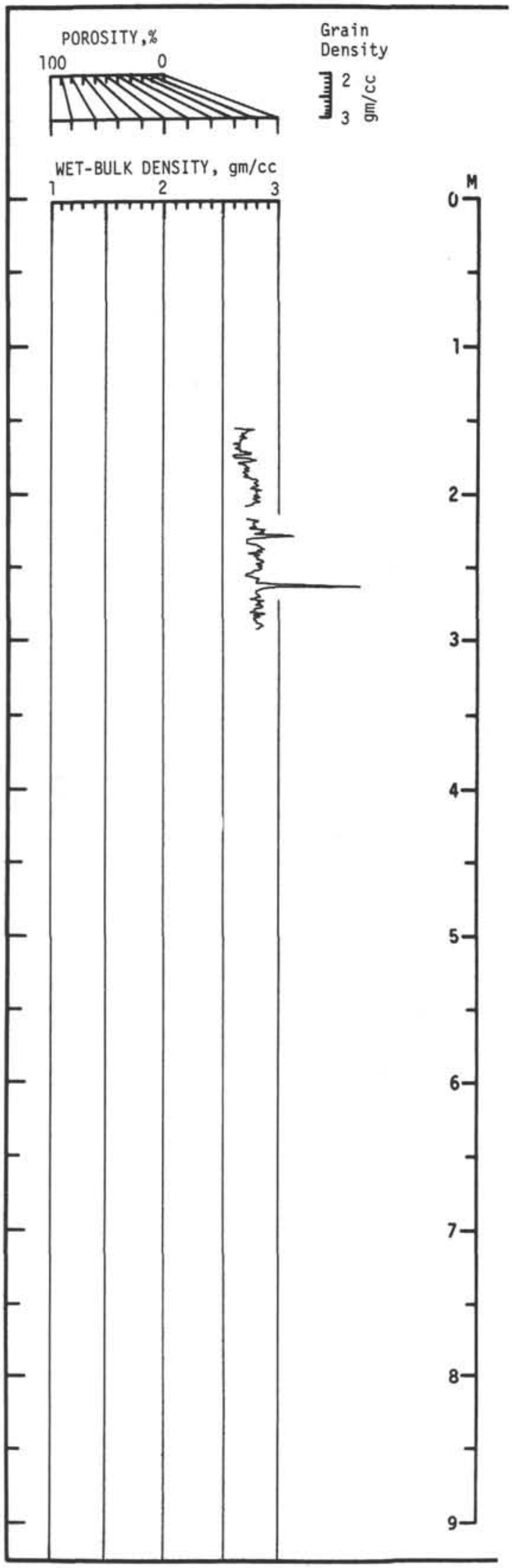
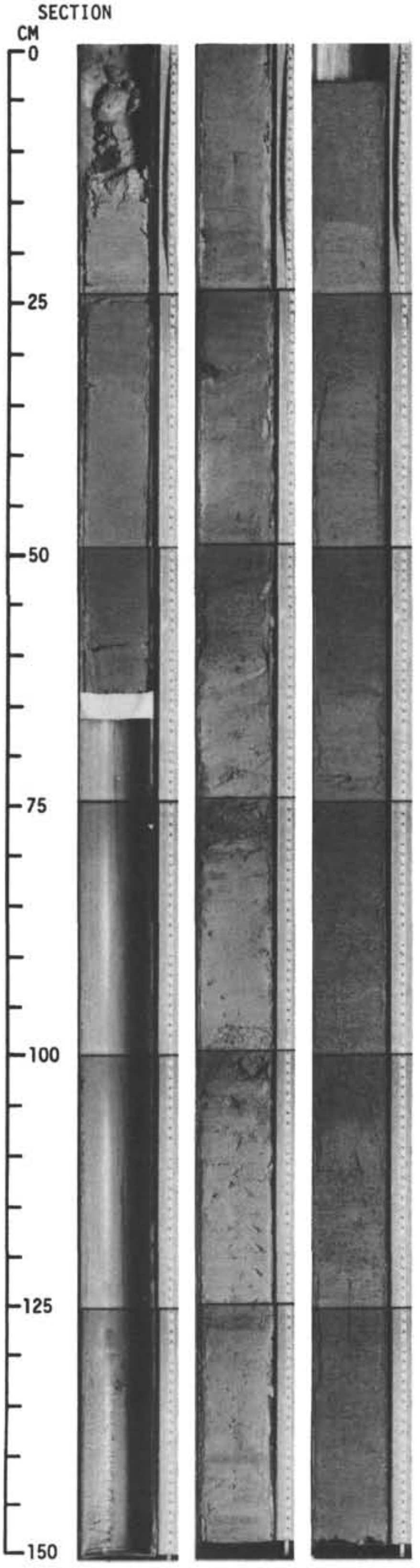




262-43-1 262-43-2





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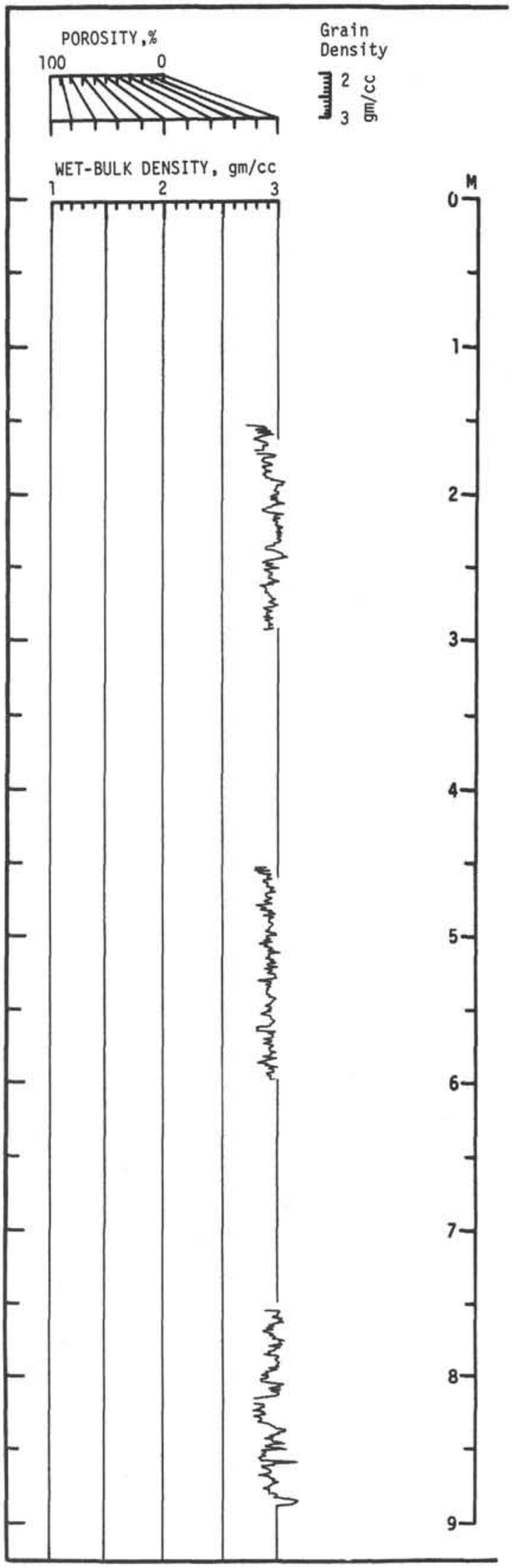

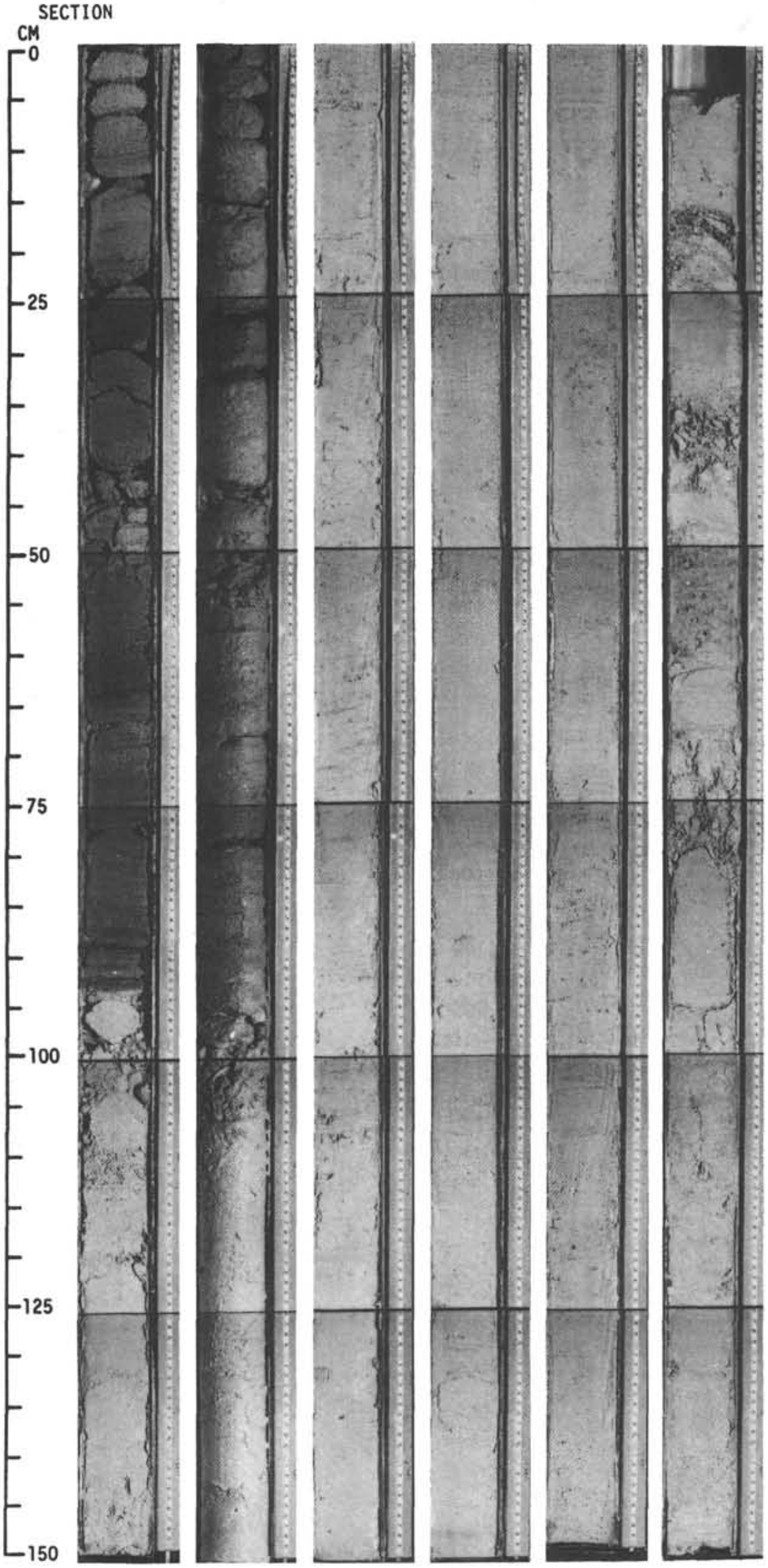

262-45-1 262-45-2 262-45-3 262-45-4 262-45-5 262-45-6