11. SITE 258

The Shipboard Scientific Party[1]

SITE DATA

Locality: Northern flank of Naturaliste Plateau

Position:
lat 33°47.69'S
long 112°28.42'E

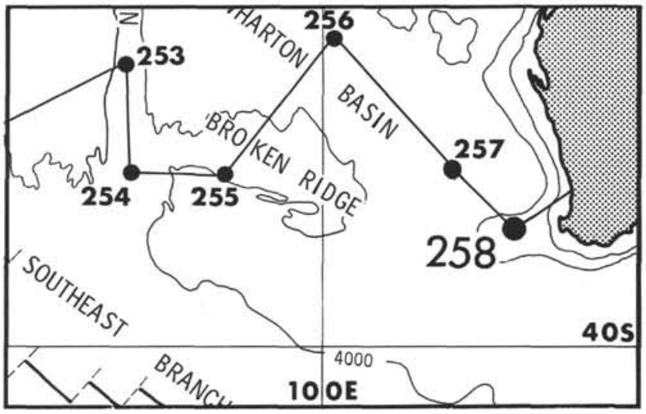
Dates Occupied: 25-29 October 1972

Water Depth: 2793 meters

Penetration: 258, 525 meters; 258A, 123.5 meters

Number of Cores: 34

Oldest Datable Sediment Cored:
Depth (subbottom): 435-444.5 meters (Core 22)
Nature: Ferruginous clay
Age: Mid Albian



Principal Results: Miocene to Recent nannofossil ooze (114 m) overlies a thick Cretaceous section (at least 411 m). Basement was not reached at this site. The Cretaceous section consists of 149 meters of Cenomanian to Santonian nannofossil chalk and silicified limestone above 251 meters of mid Albian to Cenomanian ferruginous detrital clay. The lowermost 11 meters of section sampled consist of unfossiliferous detrital sandstone and silty clay. There is a major disconformity between Santonian and late Miocene sediments.

BACKGROUND AND OBJECTIVES

Site 258 is located in 2793 meters of water atop an apparent high on the northern flank of the Naturaliste Plateau (Figure 1). The Naturaliste Plateau is a submerged western extension of the southwest Australian continental margin. Summit depths of the plateau are near 2500 meters. Its southern edge is rather steep and trends east-west, parallel to the southern Australian margin and the Diamantina Fracture Zone (Heezen and Tharp, 1965). The northern slope of the Plateau is, by contrast, rather gentle. The Naturaliste Plateau and Broken Ridge to its west, seem to lie on a single trend parallel to the Diamantina Fracture Zone and Ob Trench but are separated by a deep-water gap about 600 km wide. Burkle et al. (1967) have reported retrieving an Upper Cretaceous (Turonian) core from the plateau near Site 258. This sample was a pale orange to white pelagic chalk. They concluded that, in the Cretaceous, limestone was laid down in water depths similar to those of today.

The stratigraphy of the Naturaliste Plateau is important for the understanding of the early history of the Indian Ocean and the breakup of Gondwanaland. In particular, the oldest sediment of marine facies retrieved from the plateau might give a maximum age for the Indian Ocean. We also hoped to sample an equivalent of the Santonian limestone retrieved from Broken Ridge (Site 255), thereby linking the history of the two structures. Further, because of the critical location of the plateau at the southwestern tip of Australia, we expected that the effects of the initiation of the Circumpolar Current in the Oligocene (?) would be reflected in the stratigraphy of the site.

The seismic profiles near the site (Figure 2) and the published profiles in Burkle et al. (1967), show about 0.85 sec DT of sediment conformably overlying a rough acoustic basement. Profiles onto and away from the site (Chapter 12, this volume, fig. 14 and 15) show that this basement return is discontinuous atop the plateau and is not necessarily correlated with the basement reflection in the Wharton Basin. An intermediate reflector at the site, at 0.3 sec DT, crops out to the north and to the east.

OPERATIONS

Site 258 was approached from the northwest. Our approach was somewhat delayed by very strong head-

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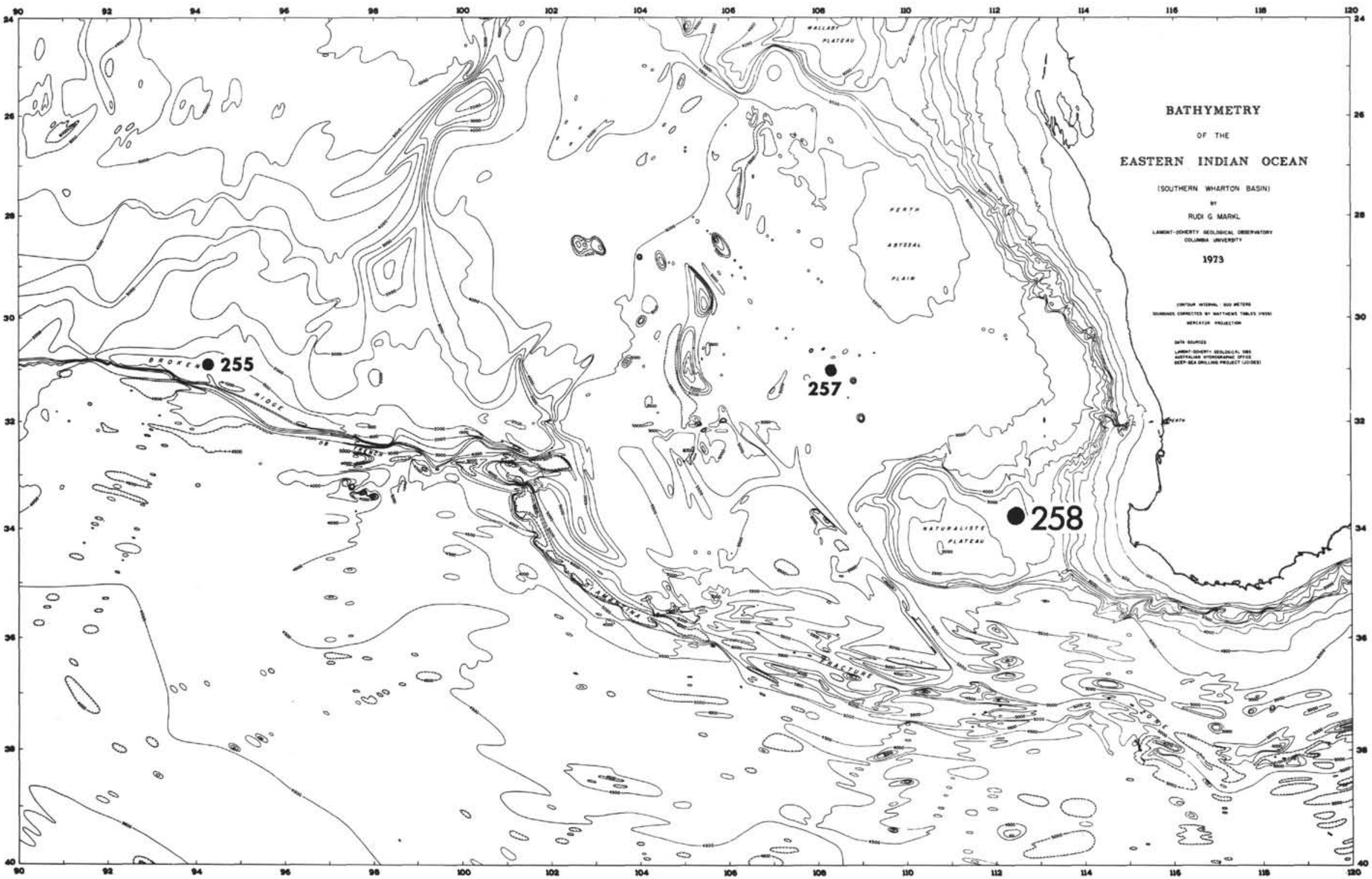

Figure 1. *Base chart and locality of Site 258. (Compiled and contoured by R. Markl, Lamont-Doherty Geological Observatory.)*

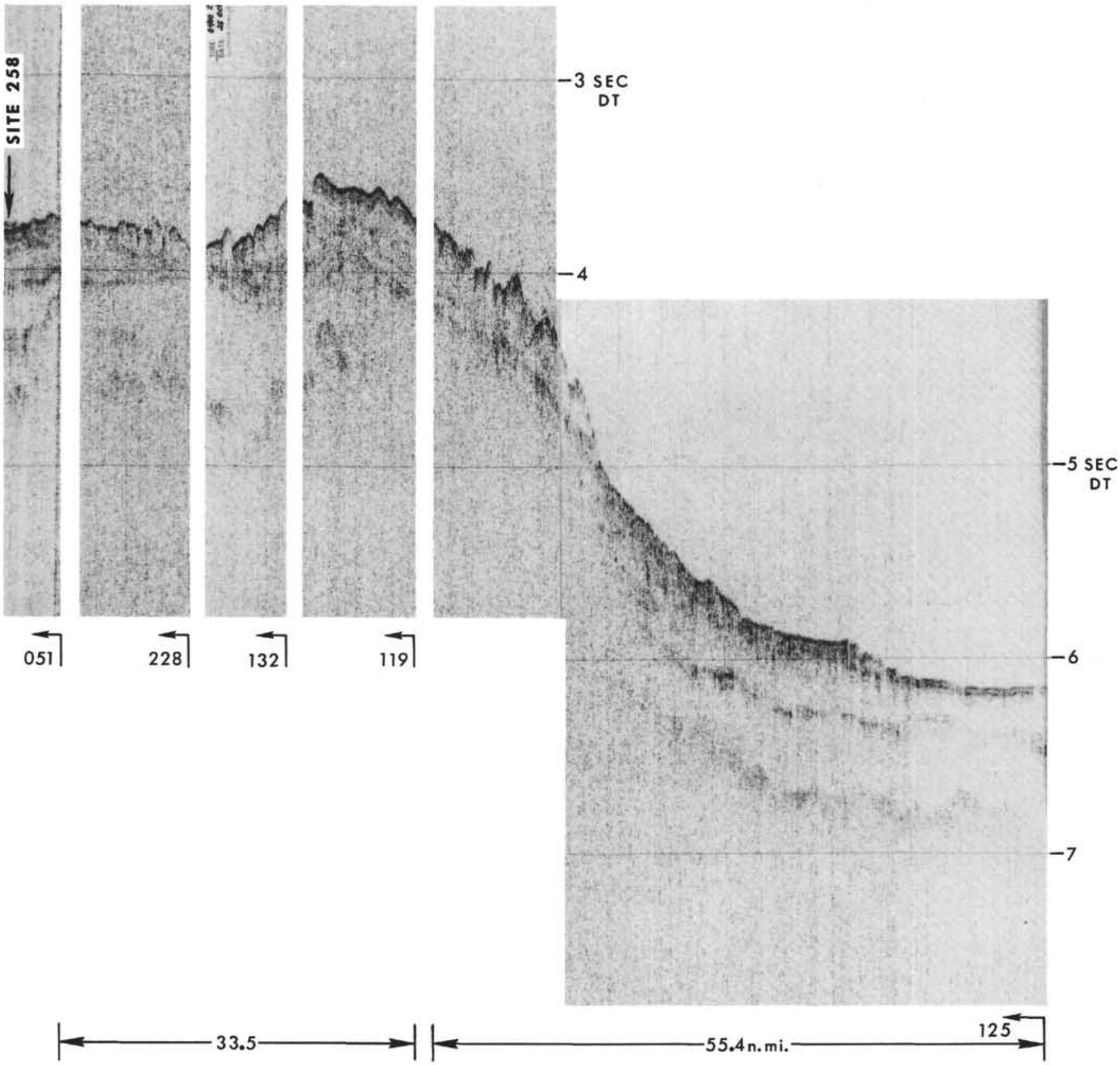

Figure 2. *Seismic reflection profile approaching Site 258, taken from D/V* Glomar Challenger.

winds and swells. At one time on passage from Site 257 our forward speed was reduced to 6.9 knots from a nominal 10 knots. Arriving at a point about 8.05 km (5 miles) northeast of the site, we turned onto a southwesterly course for our final approach, passing over the site in the early afternoon of 25 October. We then turned back over the site and dropped the beacon, while underway at 5 knots, at 1412, 25 October. By the time of our arrival on site, the winds had dropped to 10 mph, but confused swells from three different directions gave us considerable initial problems in positioning since the ship would not take up a stable heading. The water depth at the site was 2793 meters (corrected).

Bottom was reached and the first core brought onboard at 2310, after which we cored discontinuously down to a subbottom depth of 525 meters. Table 1 gives vital statistics for the cores cut at Site 258. No downhole temperature measurements were attempted at this site and operations proceeded with all possible speed through 26 October. The weather remained calm and sunny, although weather forecasts and satellite photos showed a complex depression approaching from the west. By the morning of 27 October it was quite apparent that the storm was going to pass very close to us and that operations might be somewhat hampered. However, it was equally clear that time was very short

TABLE 1
Cores Cut at Site 258

Core	Date (Oct. 1972)	Time	Depth from Drill Floor (m)	Depth Below Sea Floor (m)	Length Cored (m)	Length Recovered (m)	Recovery (%)
Hole 258							
1	25	2310	2803.0-2812.5	0-9.5	9.5	9.6	101
2	26	0005	2812.5-2822.0	9.5-19.0	9.5	4.0	42
Drilled			2822.0-2850.5				
3	26	0115	2850.5-2860.0	47.5-57.0	9.5	9.0	95
Drilled			2860.0-2888.5				
4	26	0225	2888.5-2898.0	85.5-95.0	9.5	0.6	6
Drilled			2898.0-2926.5				
5	26	0340	2926.5-2936.0	123.5-133.0	9.5	4.2	44
Drilled			2936.0-2945.5				
6	26	0456	2945.5-2955.0	142.5-152.0	9.5	6.1	64
7	26	0600	2955.0-2964.5	152.0-161.5	9.5	3.7	39
Drilled			2964.5-2974.0	152.0-161.5	9.5	3.7	
8	26	0713	2974.0-2983.5	171.0-180.5	9.5	CC	0
9	26	0835	2983.5-2994.0	280.5-290.0	9.5	1.3	14
Drilled			2994.0-3002.5				
10	26	1104	3002.5-3009.0	199.5-206.0	6.5	2.0[a]	31
Drilled			3009.0-3018.5				
11	26	1253	3018.5-3028.0	215.5-225.0	9.5	4.0[a]	42
Drilled			3028.0-3037.5				
12	26	1410	3037.5-3047.0	234.5-244.0	9.5	9.5[a]	100
Drilled			3047.0-3056.5				
13	26	1555	3056.5-3066.0	253.5-263.0	9.5	5.0[a]	53
15	26	1755	3066.0-3075.5	263.0-272.5	9.5	1.5[a]	16
Drilled			3075.5-3085.0				
15	26	1940	3085.0-3094.5	282.0-291.5	9.5	8.0[a]	84
Drilled			3094.5-3104.0				
16	26	2135	3104.0-3113.5	301.0-310.5	9.5	7.6[a]	80
Drilled			3113.5-3123.0				
17	26	2325	3123.0-3132.0	320.0-329.0	9.0	7.5[a]	79
Drilled			3132.0-3142.0				
18	27	0205	3142.0-3151.5	339.0-348.5	9.5	5.5[a]	58
Drilled			3151.5-3161.0				
19	27	0425	3161.0-3170.5	358.0-367.5	9.5	CC[a]	0
Drilled			3170.5-3180.0				
20	27	0651	3180.0-3189.5	377.0-386.5	9.5	0.8[a]	9
Drilled			3189.5-3208.5				
21	27	0900	3208.5-3218.0	405.5-415.0	9.5	4.5[a]	47
Drilled			3218.0-3237.0				
22	27	1030	3237.0-3246.5	435.0-444.5	9.5	6.7	71
Drilled			3245.5-3275.0				
23	27	1245	3275.0-3284.5	472.0-481.5	9.5	1.6	17
Drilled			3284.5-3313.0				
24	27	1542	3313.0-3322.5	510.0-519.5	9.5	7.5	79
25	28	0700	3322.5-3328.0	519.5-525.0	5.5	5.3	96
Total[c]					230.5	115.55	50
Hole 258A							
1[b]	28	1105	2803.0-2812.5	0-9.5	9.5	1.5	16
1A	28	1155	2803.0-2812.5	0-9.5	9.5	1.7	18
Drilled			2812.5-2822.0				
2	28	1312	2822.0-2831.5	19.0-28.5	9.5	4.5	47
3	28	1430	2831.5-2844.0	28.5-38.0	9.5	9.5	100
4	28	1548	2844.0-2850.5	38.0-47.5	9.5	8.5	89
5	28	1653	2850.5-2860.0	47.5-57.0	9.5	9.1	96
Drilled			2860.0-2869.5				
6	28	1848	2869.5-2879.0	66.5-76.0	9.5	9.3	98
Drilled			2879.0-2898.0				
7	28	1957	2898.0-2907.5	95.0-104.5	9.5	7.0	74
8	28	2107	2907.5-2917.0	104.5-114.0	9.5	8.0	84
9	28	2220	2917.0-2926.5	114.0-123.5	9.5	7.9	83
Total[c]					85.5	65.5	77

TABLE 1 – *Continued*

[a]Core was overcored to the depth of the top of the following core.

[b]Two cores were cut from the interval 0-9 meters subbottom. Due to confusion in the laboratory, these were designated 258A-1 and 258A-1A, rather than the correct designations 258A-1 and 258B-1. Core 258A-1 is essentially the same as 258A-1A and has not been considered in subsequent discussions.

[c]Totals do not include figures from Core 258-A.

and that Site 258 was giving up some surprising and extremely valuable information. With the goodwill of the drilling crews, operations were continued into extreme weather conditions. The ship performed excellently and at the time we, reluctantly, suspended operations we were operating in winds of 50-60 mph and breaking 15- 20-foot seas. In these conditions there was simply not enough power available to hold the ship on site over the hole and at the same time work pipe, besides which the motion of the ship was such that it was becoming impossible to work safely on the rig floor.

The decision to pull out of the hole was made at 1630 27 October. At first we pulled pipe to within 30 meters of the sea bed in the hope of being able to retain the hole and wait out the worst of the storm. However, by 1800 it was obvious that conditions were not going to improve in the immediate future, so we let go of the hole and held position over the beacon with the pipe suspended about 200 meters above the bottom through the night. Wind and sea showed little sign of abating by midnight but soon after dawn, conditions began to moderate to the point where we could consider drilling a second hole.

At 0700, 28 October we started down again for Hole 258A. Time was very short, so rather than attempt deeper penetration, we decided to use the available time to sample some of the gaps in the coring of the upper portion of Hole 258. Nine cores were cut. The last core of Leg 26 was brought aboard at 2220, 28 October. We then pulled pipe and got underway at 0535, 29 October. After a brief postsite survey we departed for Fremantle at 0630.

LITHOLOGY

At Hole 258, 525 meters of sediment were drilled and discontinuously cored. Recovery totaled 115.5 meters from the 230.5 meters cored, or approximately 50%. A second hole, 258A, was drilled in order to study in detail the Tertiary-Quaternary and Cretaceous-Tertiary boundaries at the site. In addition to a mudline core, Hole 258A was cored in two continuous sequences: from 19 to 76 meters and from 95.0 to 123.5 meters below the sea floor. Five lithostratigraphic units are recognized. The youngest consists of coccolith ooze. Unit 2, consisting of interbedded chalk and siliceous limestone, can be subdivided conveniently into two subunits according to the distribution of the siliceous limestone and the petrography of the chalk. The third unit is a transitional sequence passing down into the detrital clay of the fourth stratigraphic unit. The succession is completed by a lowermost unit of glauconitic sand and silty mudstone (Table 2).

Unit 1

Unit 1 consists of 114 meters of foram-bearing, micarb-bearing, or sponge-bearing coccolith ooze. The color of the sediments varies from light gray, greenish-gray, and yellow-gray to bluish-gray. The sediments show no obvious compositional trends with stratigraphic depth, although foram-, micarb-, and sponge-rich varieties were recorded below 95 meters. The detrital clay component makes up approximately 2% of the ooze. Other accessories include trace amounts of glauconite, quartz, pyrite, and submicroscopic opaque and translucent ferruginous aggregates. Core 1 contains 16% aragonite, the only occurrence of this polymorph of calcium carbonate in the Leg 26 cores. This may indicate rapid accumulation of sediment leading to the preservation of the metastable form. Some gypsum is found in the $<2\mu$ fraction from the lower part of Unit 1.

Unit 2

Subunit 2a consists mostly of light gray, very light gray, or yellowish-gray micarb and/or foram-bearing chalk. The uppermost 5 meters of the unsilicified component of the subunit include a few intervals which are still sufficiently unconsolidated to be termed ooze. Numerous beds less than 5 cm thick of silicified limestone occurring throughout the unit show the same sedimentary structures as the chalk and obviously are derived from them by diagenesis. The silicified limestone and much rarer chert constitute approximately 13% of the recovered material; this may be greater than the true value because of preferential recovery of harder rock. The contact with Unit 1 was not cored in Hole 258; however, examination of the Geolograph drilling records indicated that resistant silicified strata were encountered first at 112 meters below the sea floor. This boundary was cored in Hole 258A, where the uppermost chert occurred at a depth of 114 meters. At approximately 124 meters in Hole 258 fragments of dark brown and light olive-gray chert containing *Inoceramus* sp. fragments were observed. Diagenesis of most of the silicified limestone is incomplete, and all effervesce at least moderately in dilute hydrochloric acid.

Within the chalk, foraminiferal content ranges from approximately 2% to 7%, and microcrystalline calcite forms 5% to 20% of the sediment. In general, the microcrystalline calcite averages less than 10%.

Subunit 2b consists of the basal 60 meters of micarb coccolith chalk and coccolith micarb chalk. Microcrystalline carbonate is much more abundant than in the

TABLE 2
Lithologic Summary, Site 258

Unit/ Subunit	Hole/ Core	Depth Below Sea Floor (m)	Thickness (m)	Description
1	258/1-4 258/1-9	114	114	Light gray, greenish-gray, bluish-grey, and yellow-gray sponge-, micarb-, and foram-bearing coccolith ooze
2a	258/5-10 258A/9	114-203	89	Yellowish-gray and very light gray foram- and micarb-bearing chalk and silicified limestone
2b	258/11-13	203-263	60	Light greenish-gray and yellowish-gray coccolith micarb and micarb coccolith chalk
3	258/14, 15	263-285	22	Interstratified dark greenish-gray zeolite-rich detrital clay, olive-black ferruginous clay, light olive-green coccolith detrital clay, and light olive-green coccolith-rich micarb chalk
4	258/15-24	285-514	229	Brownish-black and olive-black ferruginous detrital clay
5	258/24, 25	514-525	11	Olive-gray and greenish-gray fine-grained glauconite detrital sandstone; dusky brown glauconitic detrital silty clay

younger subunit 2a and ranges from 25% to 70%. Foraminifera generally are present only in trace amounts and rarely exceed 2%. Accessory components include glauconite, submicroscopic opaque and translucent ferruginous aggregates, pyrite, and dolomite rhombs, all in trace proportions. Very rare traces of quartz and mica were noted. Detrital clay makes up about 2% of the sediment. Throughout Subunit 2b bioturbation was extensive.

The uppermost Subunit 2b sediments were not recovered. However, in view of the reliability of the Geolograph drilling records, proven in positioning the top of Subunit 2a, the top of Subunit 2b can be placed confidently at 203 meters below the sea floor.

Unit 3

Unit 3 consists of 22 meters of passage bed lithologies transitional between the biogenic ooze of Unit 2 and the older detrital clay of Unit 4. The upper part of the unit above approximately 282 meters consists of dark greenish-gray zeolite-rich detrital clay and olive-black, black, or greenish-black ferruginous detrital clay, interbedded with light olive-green foram-bearing coccolith-rich micarb chalk. Cristobalite is a major component of the sediments of Unit 3. The zeolite-rich clay contains up to 20% clinoptilolite. The prominence of the zeolite component is understandable in view of the very low sedimentation rates obtained paleontologically for this part of the Cretaceous section. In smear slides the ferruginous clay contains well over 20% pyritic and otherwise ferruginous amorphous translucent and opaque aggregates. The basal 3 meters of Unit 3 consist of light olive-green zeolite and micarb-bearing coccolith-rich and coccolith detrital clay.

Unit 4

Unit 4 consists of 229 meters of brownish-black to olive-black ferruginous detrital clay. This clay varies compositionally between zeolite-, coccolith-, and micarb-bearing varieties according to the particular accessory component. Both the top and the bottom of the unit were observed in the recovered core at 285 and 514 meters, respectively. The upper boundary is transitional and the lower abrupt.

Throughout, Unit 4 shows very little lithologic variation. Bioturbation is ubiquitous, in the form of prolific horizontal or subhorizontal burrowing. With apparent increase in compaction, the bioturbation in older horizons becomes more difficult to recognize and is easily mistaken for lamination.

The precise nature of the ferruginous material cannot be determined at this stage. Finely divided pyrite, responsible for the unit's coloration, is widely disseminated, as is subordinate silt-sized framboidal pyrite. However, much of the ferruginous material is in the form of submicroscopic opaque and translucent aggregates. X-ray analysis is necessary for its precise identification. The total ferruginous component averages about 5%-8%. Scattered pyrite nodules, up to 3 cm in diameter, occur below 408 meters. Zeolite throughout the unit ranges from trace amounts up to 10%. It appears to be particularly concentrated within lighter olive-black bioturbated areas. Coccoliths are also widespread, but are absent in at least the basal 40 meters. On the average they form less than 10% of the detrital clays. Foraminifera are present in trace amounts, or at the very most 2%-3%. Microcrystalline calcite, in amounts varying from 1% to 10% was noted at rare intervals in this unit. Siderite occurs widely in trace amounts beneath 323-meter depths in the hole. At 325.3 meters a 10-cm band of medium-sand grade siderite was recovered, but in all other instances this carbonate occurs only as dispersed minute specks or very thin veinlets and nodules.

Unit 5

The basal 12 meters of the drilled sequence consists of fine-grained and minor medium-grained, very well-sorted glauconitic sandstone overlying dusky brown silty mudstone (Figure 3). The sandstone contains abundant carbonate cements and veinlets, in places calcitic, but commonly sideritic or dolomitic. Macrofossil debris is not uncommon, and the sand shows some bioturbation, including vertical burrows. Some of the very fine-grained sandstone has a chert-like degree of induration, and some of these sediments have been fractured and infilled by either the overlying sediments or by sedimentary dikes. The fine-grained sand also displays finely developed lamination and grading in units varying from a few millimeters up to 6 cm in thickness. Much of the well-sorted graded sand also displays dispersed pebble and granule grade black or brown fine-grained lithic fragments. Slight load-casting of the sand down into thin silty interbeds was observed at 517 meters. Irregular dark laminae less than 0.5 cm thick with splendent pyrite granules occur at 515.5 meters down the hole. The basal 9.5 meters of Unit 5 constst almost entirely of dusky brown ferruginous detrital clay with some laminae of very fine silty sand. More than half of the clay is kaolinite (57%), accompanied by montmorillonite (13%), potash feldspar (16%), and detrital quartz (3%). The rest of the sediment consists of hematite (11%) and a trace of magnetite. Pyrite is common, as separate nodules up to 7 mm in diameter, and as 1-mm-thick horizontal stringers up to 1.5 cm long situated in black laminae of similar thickness. The petrography of both the silty ferruginous clay and the sand appears to be the same. Much of the sediments of Units 4 and 5 was apparently derived from the erosion of basaltic volcanic rocks.

Figure 3. *Volcanogenic sandstone. The sediment framework consists of fine-grained porphyritic basaltic volcanic fragments, variably turbid grains of brown and green basaltic glass, and iron oxides set in an abundant calcite cement. Plain light; field width 0.8 mm.*

SHIPBOARD GEOCHEMICAL MEASUREMENTS

Routine analyses for salinity, *p*H, and alkalinity were conducted on interstitial water samples squeezed from 10 sediment samples taken at depths in Hole 258 from 17.5 meters to 481.5 meters below the sea floor. In addition, *p*H was measured on the uppermost two samples of unsqueezed sediment by the punch-in method before the core recoveries became too stiff for the electrodes. No geochemical sampling was performed on sediment from Hole 258A. The sampling and analytical techniques are described in the report for Site 250. The results for Site 258 are summarized in Table 3 and are illustrated in Figure 4.

Results

The regional near-bottom salinity at 3000 meters cited by Wyrtki et al. (1971) is 34.7 ‰. Salinities in the interstitial waters exceed this value and remained relatively constant, ranging from 34.9 to 35.5 ‰ throughout the hole down to and including the 260.0-meter level. Salinity values obtained from the four lowermost samples (below 290 m) are lower than any of the values above, ranging from 27.8 (at 481.5 m maximum depth) to 34.2 ‰ at 345.5 meters below the sea floor.

pH

The coupled punch-in and flow-through *p*H measurements differed by 0.38-0.4 *p*H unit, punch-in values being consistently higher. Flow-through *p*H in the uppermost sample was 7.29, below the normal range for seawater of 7.8-8.2. Values decreased with depth to a minimum of 6.71 at 260 meters below the sea floor. In the next lower sample, at 290 meters, *p*H increased to 7.26 and remained constant at 7.14 for the lowermost three samples. Thus, the ferruginous detrital clay sequence appears to be characterized by a distinct preferred *p*H value.

Alkalinity

The uppermost two samples from the hole had a maximum alkalinity of 3.23 meq/kg. From this depth, values decreased down the hole consistently to a minimum of 0.98 meq/kg at 290 meters. The two samples below this depth had higher alkalinities, 1.47 and 1.34 meq/kg, respectively, both values being lower than any value above 290 meters. No measurement was taken on the lowermost sample.

PHYSICAL PROPERTIES

The physical properties measured at Site 258 were porosity, acoustic velocity, bulk density, and thermal conductivity. The methods are described in the Explanatory Notes (Chapter 2). The results are shown in the hole summary diagram.

Density, Porosity, and Water Content

The mean bulk density of the upper carbonate ooze layers was 1.63 g/cc. The density increased slowly in the

TABLE 3
Summary of Shipboard Geochemical Measurements, Site 258

Sample (Interval in cm)	Depth Below Sea Floor (m)	Lab Temp (°C)	*p*H Punch-in/ Flow-through	Alkalinity (meq/kg)	Salinity (°/₀₀)
(Reference seawater)	–	–	8.19/8.14	2.38	35.8
2-2, 144-150	17.5	22.3	7.66/7.29	3.23	35.2
3-5, 144-150	57.0	22.3	7.67/7.27	3.23	35.2
5-2, 144-150	131.5	22.3	/7.06[a]	2.93	35.5
7-3, 144-150	161.5	22.5	/6.95[a]	2.66	34.9
11-3, 144-150	225.0	22.2	/6.91[a]	1.66	35.2
13-2, 144-150	260.0	22.2	/6.71[a]	1.76	35.2
15-5, 143-150	290.0	22.0	/7.26[a]	0.98	33.6
18-2, 140-150	345.5	22.2	/7.14[a]	1.47	34.2
21-1, 0-10	405.5	21.6	/7.14[a]	1.34	34.0
23-2, 140-150	481.5	22.1	/7.16[a]	–	27.8

[a]Too stiff to measure punch-in.

underlying sediments to 1.75 g/cc at the bottom of the hole. Porosity and water content decrease irregularly with increasing depth.

Acoustic Velocity and Acoustic Impedance

The acoustic velocities are very irregular, following the varied lithology. The average velocity of the upper unconsolidated ooze section is 1.58 km/sec. The velocity in the underlying sediments generally ranges from 1.6 to 1.9 km/sec. Lithified chalk and silicified limestone layers near 85 meters have velocities between 1.7 and 2.1 km/sec, near 118 meters a velocity of 3.0 and near 191 meters a velocity of 3.7. An indurated glauconite sandstone at 517 meters has a velocity of 3.3 km/sec.

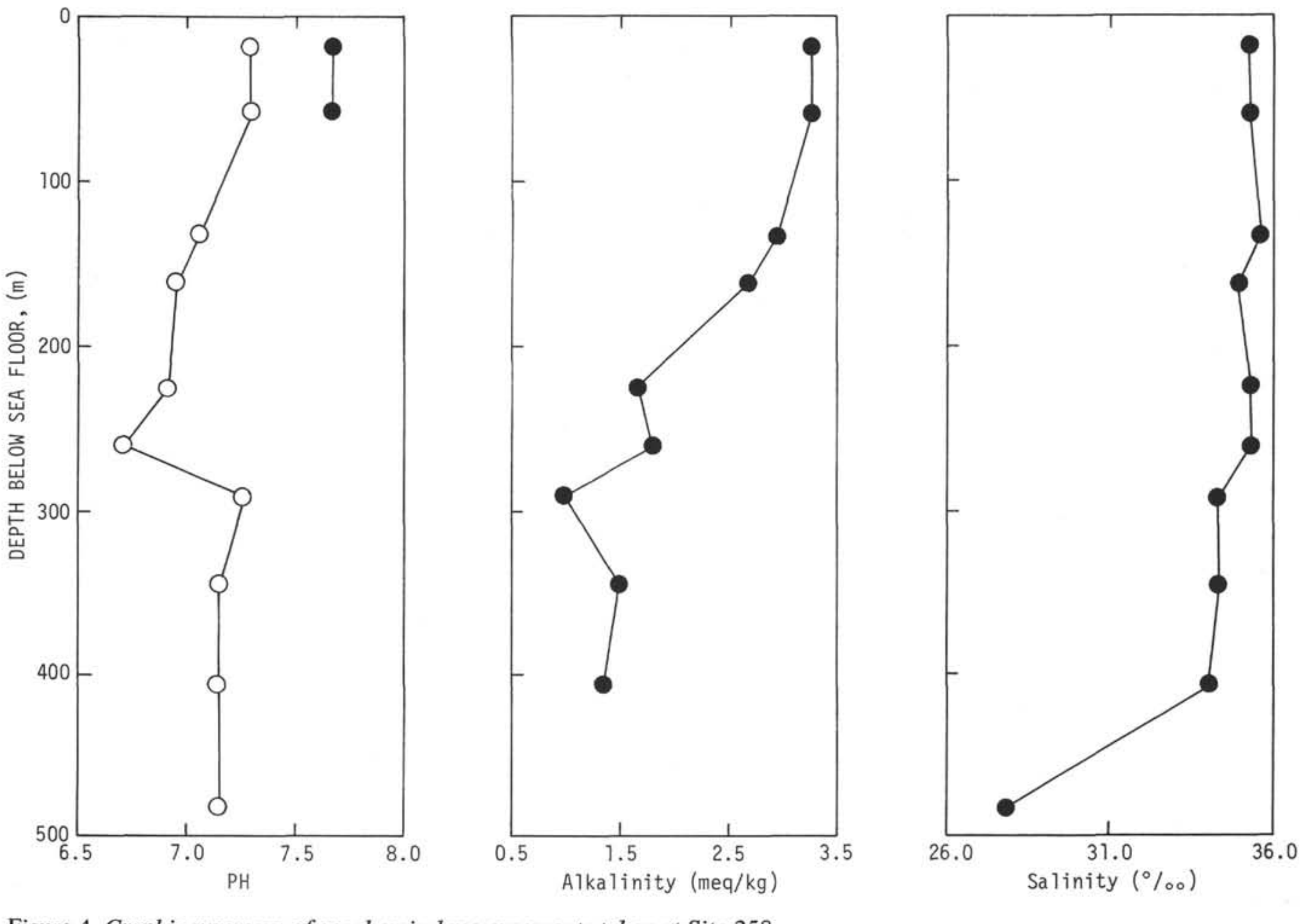

Figure 4. *Graphic summary of geochemical measurements taken at Site 258.*

Most of the consolidated sediments have a significant anisotropy.

The acoustic impedance increases generally with pronounced breaks for the hard indurated layers. A weak seismic reflection at about 0.09 sec DT may be associated with the thin high-velocity silicified limestone layers near 85 meters. There is an obvious decrease in acoustic impedance at about 270 meters for the strong reflector at 0.30 sec DT. The reflector at 0.55 sec DT likely arises from the contact between the ferruginous clay and underlying sandy mudstones at about 514 meters. There is a high velocity glauconite sandstone layer in the latter section at 517 meters.

CORRELATION OF SEISMIC REFLECTION PROFILE AND DRILLING RESULTS

An on-site sonobuoy profile was run at Site 258 (Figure 5). Four prominent reflections are seen at 0.09, 0.30, 0.55, and 0.84 sec DT subbottom. We believe that Hole 258 penetrated to the 0.55 sec DT reflection before weather won out.

Table 4 shows a correlation between depths of lithologic contrasts, impedance contrasts, and reflection times, plus a calculation of the average velocity to reflection depth. The upper reflection corresponds to an increase in induration in Unit 1 and not to the boundary (unconformity) between Units 1 and 2 at 114 meters. The 0.3 sec DT reflection corresponds to the contact between Units 3 and 4 at 285 meters, and the 0.55 sec DT reflector is the contact with the indurated sands at 514 meters. Using an average velocity of 1.9 km/sec, the implied basement depth is 798 meters. There may be a very weak impedance contrast at or near 285 meters. It seems that at this site reflections are composed of returns from sequences of high-velocity stringers, such as silicified limestones and sands, rather than massive lithologic changes. With limited recovery of these hard stringers, it is very hard to deduce changes in impedance contrast.

PALEONTOLOGY

Biostratigraphic Summary

In the two holes at Site 258, 114 meters of upper Miocene-Recent overlying 411 meters of middle Albian to Santonian sediments were penetrated. The Tertiary

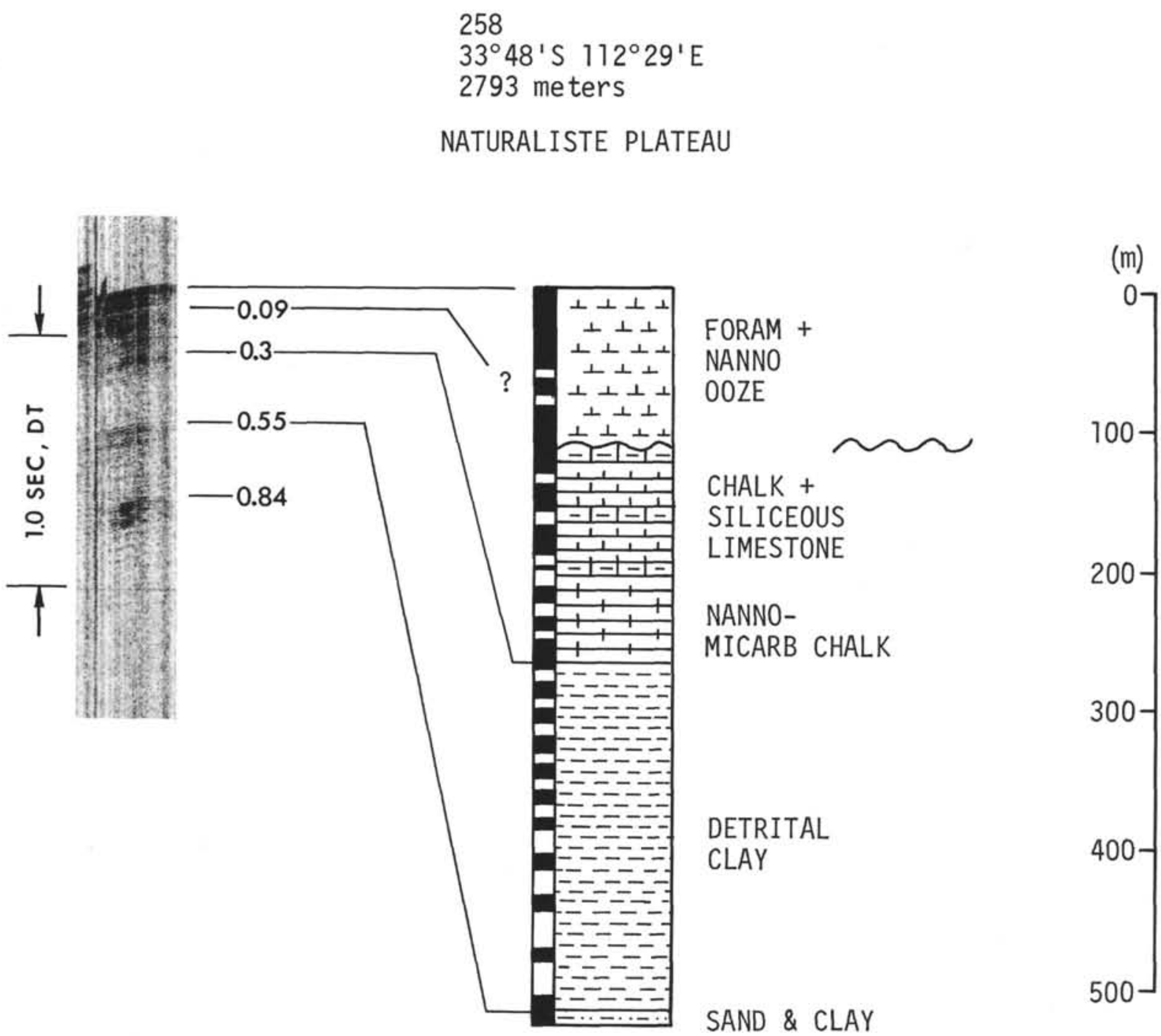

Figure 5. *Correlation of seismic reflection record and drilling results from Site 258.*

TABLE 4
Seismic Reflectors and Lithologic Changes at Site 258

Reflection Time (msec DT)	Depth of Lithologic Contrast (m)	Depth of Impedance Contrast (m)	Average Velocity (km/sec)
90	–	85-200	1.89
300	285	270	1.90
550	514	514	1.87
840[a]			

[a]Not sampled.

part of the section has yielded a Pliocene/Pleistocene foraminiferal and nannoplankton sequence of a temperate environment with 29-45 meters of Quaternary and 23-56 meters of Pliocene. Upper Miocene was reached at the base of the Tertiary sequence.

PALEONTOLOGY

Biostratigraphic Summary

In the two holes at Site 258, 114 meters of upper Miocene-Recent overlying 411 meters of middle Albian to Santonian sediments were penetrated. The Tertiary part of the section has yielded a Pliocene/Pleistocene foraminiferal and nannoplankton sequence of a temperate environment with 29-45 meters of Quaternary and 23-56 meters of Pliocene. Upper Miocene was reached at the base of the Tertiary sequence.

Benthonic foraminifera indicate a considerable decrease in water depth during lower Pliocene and uppermost Pliocene.

The Cretaceous part of the section consists of a pelagic chalk sequence of Turonian to upper Santonian age. It is rich in well-preserved planktonic foraminifera in the Santonian, but these are scarce and poorly preserved in the Turonian and most of the Coniacian. Radiolaria and nannoplankton are abundant and well preserved throughout this unit. Dark shales of middle Albian to Cenomanian age occur below the chalks. They contain etched assemblages of foraminifera, nannoplankton, and some Radiolaria. These are less abundant, and become poor in the lower part of this unit. The samples at the bottom of the hole are devoid of microfossils. Deposition below the carbonate compensation depth is most probable for the lowermost sediment drilled at this site. At the same time an increase in sedimentation rate and, at the base, an accumulation of slightly coarser detrital material can be observed.

Foraminiferal and nannoplankton assemblages indicate a cool to temperate environment during the Upper Cretaceous.

The Cretaceous part of the section at this site gives an opportunity for correlating biostratigraphic data for the three main groups of planktonic microfossils in a mid to higher latitude area of the Southern Hemisphere.

Foraminifera

Neogene: This is the site where the Quaternary section could be divided into Recent and Pleistocene. For this subdivision the criterion suggested by Parker (1973) (see detailed discussion in Chapter 30) was used. The oldest sample which contained *Globigerinoides ruber (f. rosea)* is Sample 1-6, 110-112 cm. In the same material also one pink-walled *Globigerina rubescens* was found. This sample was found 8.5 meters below the bottom surface. Thus, if we accept Parker's criterion, the uppermost 8.5 meters of Quaternary sediments are Recent. The underlying 20.5 meters are Pleistocene, and the whole thickness of the Quaternary sequence is 29 meters. However, some doubts about the validity of this criterion are expressed in Chapter 30. The Pleistocene/Recent boundary is therefore indicated with a question mark.

The Quaternary/Pliocene boundary was located utilizing the *Globorotalia truncatulinoides: G. tosaensis* ratio and the extinction of *Globorotalia crotonensis* and *Globigerinoides obliquus, s.l.*

The limit between upper and middle Pliocene is given, among other criteria, by the extinction of *Globoquadrina altispira* and the appearance of *Globorotalia truncatulinoides. G. tosaensis, Pulleniatina obliquiloculata, s.s., P. obliquiloculata praecursor, Globigerinoides pyramidalis* appear in the lowermost middle Pliocene.

The most characteristic species of the lower Pliocene is *Globorotalia margaritae.*

For the location of the Miocene/Pliocene boundary, the distribution of *Globorotalia inflata s.l.* and *G. crassaformis* was used. The sporadic records of rare or isolated specimens of the former species in the upper Miocene are in marked contrast to the abundant (or frequent) and uninterrupted appearance of specimens of the same species in the Pliocene. More or less the same phenomenon (but not as well pronounced) was observed with respect to *Globorotalia crassaformis.*

The following typical upper Miocene species were encountered somewhat lower than the Miocene/Pliocene boundary: *Orbulina suturalis, Globigerinoides amplus, Globigerinita unicava,* and *Globorotalia petaliformis.* It is interesting to note that, as at Sites 253 and 254, these assemblages contain a great number of very small, unidentifiable, planktonic foraminifera.

Quaternary foraminiferal assemblages at Site 258 are typical of the temperate zone. *Globorotalia inflata s.l.* strongly predominates, and *G. menardii s.l.* is recorded sporadically and as isolated individuals.

Site 258 showed a rather enigmatic stratigraphic range for *Globigerinoides sicanus.* For details see Chapter 30, this volume.

No Neogene sediments older than upper Miocene were encountered at this site.

Cretaceous: Foraminiferal assemblages in the Upper Cretaceous chalk unit are characterized by a relatively low diversity. Species of the genera *Hedbergella, Archaeoglobigerina, Globigerinelloides,* and *Heterohelix* strongly predominate over the relatively few species of *Globotruncana* and *Praeglobotruncana.* The age determinations based on these assemblages are generally not as precise as would be desirable for the establishment of a detailed biozonation. In addition, the indurated nature of the chalk in Cores 11-13 has prevented the isolation of satisfactory foraminiferal assemblages.

Well-preserved assemblages of abundant planktonic foraminifera were found in the upper part of the chalk unit (Hole 258A, Core 8, Section 6 to Hole 258, Core 10, Section 1). Double-keeled species of *Globotruncana* form, as mentioned, quantitatively a subordinate portion of the assemblages. The presence of *G.* cf. *ventricosa* (probably an early evolutionary stage in the development of this species) together with rare *G. fornicata manaurensis* and the absence of single-keeled forms indicate a Santonian, possibly upper Santonian age for the uppermost part of this unit. The Coniacian/Santonian boundary is tentatively placed between Cores 258-5 and 6, based on the occurrence and relative frequency of *G. angusticarinata* and *G. fornicata manaurensis.* The absence of representatives of the *G. concavata* group, important index forms for the Coniacian-Santonian interval, is probably due to the temperate character of these assemblages, as discussed below.

In the lower part of Core 10, in Core 11, and in the upper part of Core 12, only very few specimens of planktonic foraminifera could be isolated. This interval has tentatively been placed in the Coniacian based on the scattered occurrence of double-keeled *Globotruncana.*

Few specimens of moderately preserved *Praeglobotruncana (P. stephani, P.* cf. *algeriana, P. helvetica)* were found in highly liquified sediments of Core 12, Section 3 and Core 13, Sections 3 and 4. Although these samples cannot be considered reliable with respect to the true core depth, they indicate that this portion of the chalk unit has to be at least as old as middle to upper Turonian. The Turonian/Coniacian boundary has tentatively been placed above section 3 of Core 12. However, since the Coniacian assemblages above were also collected in a highly liquified sample, this boundary is not very reliable and may eventually be placed slightly higher in the section.

Assemblages of the interstratified clay unit in the lowermost part of Sample 13, CC and in Core 14 are characterized by the association of *Hedbergella planispira, H. delrioensis, H. simplicissima, Globigerinelloides caseyi,* and rare *Schackoina cenomana.* The Cenomanian age of this assemblage is supported by one single specimen of *Rotalipora reideli* in Sample 14, CC.

The assemblage found in Core 15 does not differ essentially from the one found in Core 14. A single occurrence of *Praeglobotruncana delrioensis* in Section 3 of Core 15 is noteworthy. Based on these foraminiferal assemblages, the Albian/Cenomanian boundary cannot be located precisely. *Praeglobotruncana delrioensis* is known in the upper Albian as well as in the Cenomanian.

No planktonic foraminifera occur in Core 16 and most of Core 17. Cores 18 to 20 are characterized by the association of *Hedbergella* sp. aff. *infracretacea, H. planispira,* and *Globigerinelloides casey.* This corresponds to the Albian age determined by the nannoplankton. No planktonic foraminifera have been found below Core 20. The assemblages are reduced to few arenaceous and clacareous benthonic forms in Core 21, and to primitive arenaceous psecies in Cores 22 and 23. No ages can be deduced from them. In Cores 24 and 25 no foraminifera have been found at all.

The restricted diversity of the Albian and Cenomanian assemblages, particularly the virtual absence of the genera *Rotalipora* and *Praeglobotruncana,* are interpreted to indicate a cool environment during this time span. The diversity is slightly higher in the Turonian and Coniacian, and particularly in the Santonian, where an increase in the abundance of globotruncanid species is observed. These species, however, still constitute a low proportion of the total planktonic assemblages. The absence of such a typical warm-water species as *Globotruncana concavata* also suggests that the site was located in a cool to temperate environment. For further paleoecologic discussion see Chapter 32, this volume.

The distribution of planktonic and benthonic foraminifera suggests a steady decrease of the water depths from levels below the carbonate compensation depth in the lowermost part of the section (Cores 2-5) to depths within and above that depth during the Albian. A further decrease of the water depth must be assumed for the Turonian to Santonian chalk unit. However, the strong domination of planktonic foraminifera over benthonic forms still indicates a distinctly pelagic environment.

Calcareous Nannoplankton

Stratigraphy: Nannoplankton assemblages of middle Albian through Santonian and upper Miocene through Quaternary age were encountered at this site. The almost continuous Cretaceous sequence includes abundant nannofossils of Albian (Hole 258, Cores 15-22); Cenomanian (Hole 258, Core 14); Turonian (Hole 258, Cores 12, 13); Coniacian (Hole 258, Cores 6-12); and Santonian (Hole 258, Core 5; Hole 258A, Cores 8, 9) ages, with a minor unconformity between the Cenomanian and the Turonian. The Santonian/Miocene unconformity was recovered in Hole 258A, Core 8, Section 6. The age of the sediments in Cores 6 through 8 is based upon nannofossil samples taken from pebbles and is considered to be upper Miocene. Although many Pliocene foraminifera were encountered, these foraminiferal samples often had to be taken from liquified parts, which apparently were downhole contaminated. As at Sites 251 and 255 an overlap of the uppermost occurring *Discoaster* sp. and the lowermost occurring *Gephyrocapsa* sp. is observed. Again the foraminifera are considered to be of Pliocene age; in fact, the Pliocene/Quaternary boundary as determined by foraminifera lies 17 meters above the extinction of discoasters. In most of the Neogene samples reworked Upper Cretaceous and upper Eocene nannofossils have been found.

Preservation: Most of the Neogene nannofossils are well preserved. Some signs of overgrowth are observed in the lower Pliocene and upper Miocene samples. The Cretaceous assemblages from the Turonian to Santonian chalk sequence are well preserved to moderately overgrown. Downwards, increasing dissolution effects are observed in the Cenomanian to middle Albian clays. The lowermost, strongly etched nannofossils are found in Core 23.

Paleoecology: The preservation of the nannofossils in the Cretaceous sequence indicates a continuous shallowing of this site from middle Albian through Santonian time. The species compositions of the assemblages point to a transitional to cool environment, although a typically Tethyan species (*Lithraphidites alatus*) has been found in Core 14 (Cenomanian). The depositional depth at Site 258 during the Santonian was greater than that of the Gingin Chalk in the Perth Basin, based upon the absence of *Tetralithus obscurus, T. ovalis,* and the scarcity of *Lucianorhabdus cayeuxi.* All three are restricted to nearshore or shallow-water paleoenvironment and are abundant in the Gingin Chalk. The Neogene assemblages indicate temperate paleotemperatures.

SEDIMENTATION RATES

The sedimentation rate in the Pliocene-Quaternary was about 14-17 m/m.y., depending on the interpretation of the Pliocene/Miocene boundary. The disconformity encountered in Hole 258A, Core 8 encompasses a period of at least 66 m.y. The sedimentation rate during the Santonian and Coniacian was 12.6 m/m.y. The relatively slow sedimentation during the Turonian and Cenomanian (1.8 m/m.y.) might be due to a disconformity between the upper Turonian and the upper Cenomanian. During the Albian the sedimentation rate was at least as high as 45 m/m.y.

SUMMARY AND CONCLUSIONS

Summary of Results

Site 258 is situated on the northern slope of the Naturaliste Plateau. The water depth is 2793 meters, and seismic profiles show the sediment thickness to be about 0.85 sec DT. Two holes were drilled. The first penetrated 525 meters before rough weather forced us to suspend operations for about 15 hr. A second hole was drilled to 123.5 meters in order to fill in some gaps in the sampling of the upper parts of the section. The oldest precisely datable sediment reached was middle Albian, found at 444 meters in Hole 258.

Five lithologic units can be recognized. From the surface down to 114 meters is a sequence of white and gray soft oozes ranging from late Miocene to Recent in age. Most of the section is Plio-Pleistocene. Towards the bottom of this unit, especially in the Miocene, planktonic and shallow-water (slope facies) benthonic foraminifera appear. Reworked littoral forms also are found. Unit 2, from 114 to 263 meters, is silicified limestones and chalks overlying micarb (recrystallized) chalks (Subunit 2b) ranging from Cenomanian to Santonian in age. The boundary between Units 1 and 2 is sharp and well defined. Representatives of all three microfossil groups are abundant and well preserved in Unit 2. Unit 3, 263-285 meters is a transitional unit with interbeds of chalk and the dark ferruginous clays of Unit 4 (285-514 m). The clays of Unit 4 are almost black and contain many diagenetic minerals (alkali feldspar, siderite, zeolites, etc.). This unit is middle and late Albian in age. Unit 5 is a Lower Cretaceous (undefined range) sequence of glauconitic sands and muddy silts, well sorted, and in many cases showing graded bedding. The sediments become coarser downwards. There is common, but as yet indeterminate, macrofossil debris and many deep-water benthonic foraminifera. The planktonic foraminifera are represented by only one species.

Sedimentation rates were high in the Early Cretaceous and in the Late Cretaceous and Tertiary but clearly very much lower in the Cenomanian-Turonian transition beds of Unit 3. The unconformity between the Santonian and the Miocene represents a gap in sedimentation of at least 66 m.y.

Preliminary Conclusions

Drilling at Site 258 did not penetrate deep enough for us to resolve the continental or oceanic nature of the crust here. We can say, however, that deep-water marine sediments have been accumulating here since at least middle Albian times. Unit 5 accumulated below the carbonate compensation depth and in cold water (high latitude) conditions as suggested by the low foraminiferal species diversity. Unit 4 accumulated within the lysocline and in more temperate conditions. Thus, there is a history of gradual shoaling of the sea floor or deepening of the carbonate compensation depth through the Cretaceous. The Upper Cretaceous flora and fauna are essentially similar to those seen at Broken Ridge in the Upper Cretaceous limestone unit, which may or may not be significant.

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APPENDIX A
Grain-Size Determinations for Site 258

Core, Section, Top of Interval (cm)	Subbottom Depth (m)	Sand (%)	Silt (%)	Clay (%)	Classification
Hole 258					
1-2, 90	2.4	22.4	50.1	27.5	Sand-silt-clay
1-2, 90	2.4	22.4	50.1	27.5	Sand-silt-clay
1-5, 44	6.4	46.4	23.4	30.2	Sand-silt-clay
2-2, 80	11.8	4.0	17.6	78.5	Clay
3-1, 90	48.4	9.9	33.9	56.2	Silty clay
3-3, 90	51.4	8.9	32.2	58.9	Silty clay
3-5, 90	51.4	16.8	37.2	46.0	Silty clay
4-1, 130	86.8	40.6	37.6	21.8	Sand-silt-clay
5-2, 90	125.9	7.0	21.1	71.9	Silty clay
6-2, 90	144.9	0.4	28.4	71.2	Silty clay
6-5, 90	149.4	0.5	28.3	71.3	Silty clay
7-2, 90	154.4	1.3	36.2	62.6	Silty clay
9-1, 81	181.3	0.2	15.9	83.9	Clay
10-2, 71	201.7	0.2	11.0	88.9	Clay
10-2, 84	201.8	0.6	33.0	66.4	Silty clay
12-2, 75	236.8	0.1	29.4	70.5	Silty clay
12-4, 86	239.9	0.0	31.6	68.4	Silty clay
12-6, 91	242.9	0.4	45.1	54.5	Silty clay
13-2, 45	255.4	0.1	35.2	64.7	Silty clay
14-1, 3	263.0	0.7	29.1	70.2	Silty clay
15-2, 135	284.9	0.0	19.9	80.1	Clay
15-5, 120	289.2	0.0	28.6	71.4	Silty clay
16-2, 100	303.5	0.0	20.0	80.0	Clay
16-5, 90	307.9	0.0	26.0	74.0	Silty clay
17-2, 90	322.4	4.2	25.6	70.2	Silty clay
17-5, 18	326.2	0.4	20.1	79.5	Clay
18-2, 101	341.5	0.0	13.2	86.8	Clay
18-4, 93	344.4	0.0	9.6	90.4	Clay
20-1, 101	378.0	0.0	16.1	83.9	Clay
21-1, 60	406.1	0.0	16.7	83.3	Clay
21-3, 90	409.4	0.0	17.6	82.4	Clay
22-2, 100	437.5	0.1	16.8	83.1	Clay
22-5, 88	441.9	0.1	3.2	96.7	Clay
23-2, 88	474.4	0.0	12.1	87.9	Clay
24-2, 128	512.8	0.1	6.7	93.2	Clay
Hole 258A					
1-1, 14	.1	27.2	39.5	33.4	Sand-silt-clay
1A-2, 90	2.4	29.8	34.2	36.0	Sand-silt-clay
1-2, 90	2.4	29.8	34.2	36.0	Sand-silt-clay
2-2, 15	20.6	26.4	24.7	48.9	Sand-silt-clay
3-2, 90	31.9	29.7	27.3	43.0	Sand-silt-clay
3-5, 100	35.5	22.2	27.7	50.1	Sand-silt-clay
3-2, 90	30.9	13.2	27.2	59.6	Silty clay
4-5, 100	45.0	23.7	31.4	45.0	Sand-silt-clay
5-2, 90	49.9	12.6	33.5	53.9	Silty clay
5-5, 90	54.4	9.8	38.8	51.4	Silty clay
6-3, 122	70.7	4.3	30.4	65.3	Silty clay
6-5, 90	73.4	7.6	35.5	56.9	Silty clay
7-3, 90	98.9	21.9	53.6	24.5	Sand-silt-clay
7-5, 90	101.9	33.9	51.8	14.3	Sandy silt
8-5, 30	110.8	60.7	25.1	14.2	Silty sand
9-2, 118	116.7	26.0	21.4	52.6	Sand-silt-clay
9-5, 70	120.7	6.2	29.5	64.3	Silty clay

APPENDIX B
Carbon-Carbonate Determinations for Site 258

Core, Section Top of Interval (cm)	Sub bottom Depth (m)	Total Carbon (%)	Organic Carbon (%)	$CaCO_3$ (%)
Hole 258				
1-2, 88	2.38	10.5	2.5	67
1-5, 88	6.88	10.6	1.0	80
2-2, 85	11.85	11.2	1.3	83
3-1, 78	48.28	11.2	0.2	92
3-3, 88	51.38	11.2	1.9	77
3-5, 88	54.38	10.9	1.9	75
4-1, 130	86.80	8.6	0.1	70
5-2, 88	125.88	9.3	0.5	74
6-2, 88	144.88	10.7	1.2	79
6-5, 88	149.38	10.5	1.2	78
7-2, 88	154.38	10.3	1.0	77
9-1, 80	181.30	7.8	0.4	62
10-2, 70	201.70	7.3	0.3	59
11-2, 75	217.75	5.2	0.1	42
12-2, 74	236.74	8.1	0.1	67
12-4, 85	239.85	8.8	0.1	72
12-6, 89	242.89	6.2	0.1	51
13-2, 44	255.44	8.1	0.1	67
13-4, 90	258.90	5.7	0.3	45
14-1, 103	264.03	0.1	0.1	0
15-2, 140	284.90	1.2	1.1	1
15-5, 119	289.19	1.6	1.5	1
16-2, 103	303.53	1.8	1.2	5
16-5, 90	307.90	1.3	1.1	2
17-2, 88	322.38	1.1	0.8	3
17-5, 72	326.72	2.7	1.3	11
18-2, 100	341.50	1.6	0.5	10
18-4, 90	344.40	2.5	1.0	13
20-1, 107	378.07	1.7	0.8	7
21-1, 41	405.91	1.6	1.1	4
21-3, 88	409.38	2.1	1.5	5
22-2, 99	437.49	3.3	2.6	6
22-5, 91	441.91	3.6	2.7	8
23-2, 90	474.40	1.6	1.6	0
24-2, 95	512.45	1.3	1.3	0
24-5, 50	516.50	2.5	0.5	16
25-2, 85	521.85	0.3	0.3	0
25-4, 55	524.55	0.2	0.3	0
Hole 258A				
1-1, 4	.04	10.8	0.1	89
3-2, 88	30.88	10.9	0.1	90
3-5, 99	35.49	10.4	0.1	86
4-4, 80	43.30	10.9	0.1	90
5-5, 88	54.38	11.0	0.1	91
6-3, 126	70.76	10.7	0.1	88
6-5, 88	73.38	11.0	0.1	91
7-3, 88	98.88	8.6	0.1	71
7-5, 88	101.88	8.6	0.1	70
8-5, 29	110.79	9.5	0.1	79
9-2, 117	116.67	8.2	0.1	68
9-5, 68	120.68	9.8	0.1	81

APPENDIX C
X-Ray Analyses for Site 258

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Arag.	Quar.	Cris.	K-Fe.	Plag.	Kaol.	Mica	Mont.	Trid.	Clin.	Hema.	Pyri.	Gyps.	Bari.	Hali.	Magn.	$U-\delta^a$
Bulk Samples																						
1	0.0-9.5	6.5	63.1	42.4	76.3	16.1	1.8	–	3.7	–	–	–	–	–	–	–	2.0	–	–	–	–	–
3	47.5-57.0	48.4	57.2	33.2	95.4	–	4.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	85.5-95.0	86.8	63.7	43.3	78.5	–	14.3	–	5.9	–	1.3	–	–	–	–	–	–	–	–	–	–	–
6	142.5-152.0	149.7	56.9	32.6	83.2	–	0.7	3.1	–	–	–	–	10.2	–	–	–	2.7	–	–	–	–	–
10	199.5-206.0	201.6	60.1	37.7	69.1	–	0.6	8.0	–	–	–	–	18.0	0.5	–	–	2.3	–	1.4	–	–	–
12	234.5-244.0	240.3	77.0	64.1	22.8	–	1.6	40.8	–	–	–	–	30.2	2.2	–	–	0.7	–	1.8	–	–	–
14	263.0-272.5	263.0	83.0	73.4	–	–	2.4	55.9	–	2.0	2.5	2.5	11.0	4.1	16.8	–	0.4	–	2.3	–	–	–
		263.5	82.7	73.0	–	–	3.8	46.9	–	–	3.5	2.3	19.1	0.7	19.4	–	–	–	4.3	–	–	–
15	282.0-291.5	284.7	79.5	67.9	6.4	–	3.7	20.0	–	–	6.9	4.6	55.6	0.6	1.2	–	–	–	1.0	–	–	–
16	301.0-310.5	308.1	73.7	58.9	18.3	–	3.8	6.5	–	–	9.2	3.8	56.2	–	2.2	–	–	–	–	–	–	–
17	320.0-329.0	327.4	80.7	69.8	10.1	–	4.3	27.4	–	–	6.4	6.7	43.8	1.3	–	–	–	–	–	–	–	–
18	339.0-348.5	341.5	83.7	74.5	8.6	–	2.7	59.5	–	–	3.5	3.9	17.9	3.2	0.7	–	–	–	–	–	–	–
21	405.5-415.0	405.7	79.6	68.1	–	–	12.0	39.2	1.7	–	4.7	7.4	30.8	4.1	–	–	–	–	–	–	–	–
22	435.0-444.5	441.7	77.1	64.2	–	–	17.8	–	–	–	5.1	4.6	71.3	–	–	–	1.2	–	–	–	–	–
23	472.0-481.5	474.4	76.1	62.7	–	–	5.5	–	–	–	16.1	6.5	71.9	–	–	–	–	–	–	–	–	–
24	510.0-519.5	516.5	81.6	71.2	57.6	–	1.4	–	6.3	–	5.8	–	23.3	–	–	–	5.6	–	–	–	–	–
25	519.5-525.0	521.9	90.6	85.3	–	–	3.3	–	15.6	–	57.2	–	13.0	–	–	10.9	–	–	–	–	–	P
2-20μ Fraction																						
1	0.0-9.5	6.5	80.0	68.7	–	–	41.1	–	22.5	6.8	7.5	11.4	–	–	4.5	–	6.3	–	–	–	–	–
3	47.5-57.0	48.4	78.9	67.0	–	–	57.3	–	15.8	5.3	7.4	11.1	–	–	3.1	–	–	–	–	–	–	–
4	85.5-95.0	86.8	77.6	65.0	–	–	55.9	–	20.3	–	11.9	8.9	–	–	2.9	–	–	–	–	–	–	–
6	142.5-152.0	149.7	71.4	55.2	–	–	29.6	9.2	3.3	1.4	–	14.7	10.0	2.7	8.1	–	6.2	–	15.0	–	–	–
10	199.5-206.0	201.6	80.3	69.3	–	–	7.4	34.4	–	–	–	4.5	38.2	3.7	0.9	–	0.9	–	10.0	–	–	–
12	234.5-244.0	240.3	79.7	68.3	–	–	7.3	64.1	1.5	1.0	–	4.5	12.5	3.3	0.8	–	–	–	5.1	–	–	–
14	263.0-272.5	263.0	70.7	54.2	–	–	3.6	57.3	–	–	1.5	1.8	–	4.6	22.0	–	0.8	–	8.3	–	–	–
		263.5	70.7	54.3	–	–	6.3	34.1	–	–	2.0	2.3	–	2.7	41.5	–	2.5	–	8.6	–	–	–
15	282.0-291.5	284.7	68.0	50.0	–	–	14.6	–	2.8	–	18.2	6.8	27.8	–	28.0	–	–	–	1.7	–	–	–
16	301.0-310.5	308.1	77.8	65.4	–	–	14.3	23.2	3.2	–	13.8	9.7	31.5	–	1.5	–	–	–	2.9	–	–	–
17	320.0-329.0	327.4	79.3	67.7	–	–	13.3	17.8	4.6	–	16.0	16.2	26.7	2.1	–	–	1.1	–	2.3	–	–	–
18	339.0-348.5	341.5	80.2	69.1	–	–	9.1	65.9	3.1	0.9	6.3	6.7	–	3.1	2.3	–	0.6	–	2.0	–	–	–
21	405.5-415.0	405.7	74.8	60.6	–	–	23.2	24.9	7.5	1.5	9.0	9.9	22.5	–	–	–	–	–	1.5	–	–	–
22	435.0-444.5	441.7	70.4	53.7	–	–	32.9	–	11.0	1.7	11.5	12.4	25.8	–	–	–	4.8	–	–	–	–	–
23	472.0-481.5	474.4	67.8	49.8	–	–	11.3	–	5.0	1.3	25.5	15.3	39.8	–	–	–	1.8	–	–	–	–	–
24	510.0-519.5	516.5	80.7	69.8	–	–	8.5	–	31.7	–	4.4	1.9	44.3	–	–	–	9.2	–	–	–	–	–
25	519.5-525.0	521.9	84.9	76.3	–	–	6.1	–	31.4	–	11.6	–	7.8	–	–	19.8	–	–	–	–	23.2	P

APPENDIX C – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Arag.	Quar.	Cris.	K-Fe.	Plag.	Kaol.	Mica	Mont.	Trid.	Clin.	Hema.	Pyri.	Gyps.	Bari.	Hali.	Magn.	U–8[a]
<2μ Fraction																						
1	0.0-9.5	6.5	92.2	87.7	–	–	9.5	–	–	–	42.0	14.0	30.6	–	–	–	3.9	–	–	–	–	–
3	47.5-57.0	48.4	86.9	79.5	–	–	11.8	–	–	–	48.0	17.5	16.0	–	–	–	–	6.7	–	–	–	–
4	85.5-95.0	86.8	85.1	76.8	–	–	7.4	–	–	–	36.2	14.9	39.0	–	–	–	–	2.5	–	–	–	–
6	142.5-152.0	149.7	85.1	76.7	–	–	3.5	38.9	–	–	–	4.7	38.4	2.0	1.2	–	0.9	–	7.4	2.9	–	–
10	199.5-206.0	201.6	82.4	72.5	–	–	3.9	42.5	–	–	–	2.6	28.3	1.5	–	–	0.3	–	10.9	10.1	–	–
12	234.5-244.0	240.3	81.7	71.4	–	–	0.3	50.6	–	–	–	2.4	37.9	1.7	–	–	0.4	–	1.8	4.9	–	–
14	263.0-272.5	263.0	85.0	76.6	–	–	2.0	64.0	–	–	1.7	1.4	19.8	5.8	0.5	–	–	–	1.4	3.6	–	–
		263.5	89.0	82.9	–	–	5.5	64.9	–	–	2.2	–	15.2	6.5	–	–	0.6	–	3.0	2.0	–	–
15	282.0-291.5	284.7	79.4	67.9	–	–	12.5	10.3	–	–	13.5	4.0	40.2	–	6.5	–	–	–	4.4	8.6	–	–
16	301.0-310.5	308.5	84.0	74.9	–	–	5.0	30.0	–	–	6.7	15.2	32.2	–	–	–	–	–	2.2	8.7	–	–
17	320.0-329.0	327.4	81.8	71.6	–	–	8.7	42.5	–	–	4.9	3.0	29.8	1.7	–	–	–	–	1.7	7.7	–	–
18	339.0-348.5	341.5	84.3	75.5	–	–	1.9	67.0	–	–	1.7	0.8	17.3	4.0	–	–	–	–	0.9	6.5	–	–
21	405.5-415.0	405.7	80.6	69.7	–	–	11.0	38.8	–	–	2.5	14.4	10.4	–	–	–	–	–	–	22.8	–	–
22	435.0-444.5	441.7	84.7	76.1	–	–	43.8	–	–	–	8.2	4.6	12.7	–	–	–	–	–	–	30.6	–	–
23	472.0-481.5	474.4	80.2	69.1	–	–	8.9	–	–	–	19.0	6.6	52.2	–	–	–	–	–	–	13.4	–	–
24	510.0-519.5	516.5	94.2	90.0	–	–	–	–	–	–	12.4	11.8	59.2	–	–	–	–	–	–	16.6	–	–
25	519.5-525.0	521.9	93.0	89.0	–	–	2.1	–	–	–	59.5	–	21.4	–	–	11.9	–	–	–	5.0	–	–

[a]Narrow peaks at 2.753Å and 3.006Å among others. P = present.

Site 258 | Hole | Core 1 | Cored Interval: 0.0-9.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	LITHOLOGY	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
QUATERNARY	N22-N23	NN20	AG	0	AG		1		*	
			AG	0			1		*	
							1	VOID		Pred. N7 (lt gy); few chunks 5YR 8/1 (pink)
			AG	0			2		HO *	
			AG	0			2		CC GZ	
							2	VOID		
			AG	0	AG		3		*	N7 [2 cm stretched 5YR 8/1 chunk]
			AG	0			3		*	
							3	VOID		
			AG	0			4		*	5Y 8/1, with very fine ss dark grains
			AG	0			4		*	N7
			AG	0			5		GZ XM HO KE	[rel. coarser; sl. darker]
			AG	0	AG		5		*	
			AG	0			6		*	
			AG	0			6			
			AG	0	AG		Core Catcher			

Light gray FORAM-BEARING COCCOLITH OOZE, with minor pinkish gray patches and yellowish gray intervals of FORAM RICH COCCOLITH OOZE and FORAM COCCOLITH OOZE.

TEXTURE: Sand 22-46%
Silt 23-50%
Clay 28-30%

COMPOSITION:

A. Predominant:

82-90% coccoliths
1- 8% forams
2- 3% diatoms
Tr radiolarians
Tr sponge spicules
5- 6% detrital clay

B. Minor (FRCO & FCO):

63-90% coccoliths
10-15% forams
Tr- 1% diatoms
Tr radiolarians
2- 5% sponge spicules
5% detrital clay
Tr glauconite
Rare traces of quartz, mica, and dolomite rhombs

Total Carbon: 10.5-10.6%
Organic Carbon: 1.0-2.5%
Calcium Carbonate: 67-80%

CONSOLIDATION: Soft.

Explanatory notes in chapter 2

Site 258 | Hole | Core 2 | Cored Interval: 9.5-19.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	LITHOLOGY	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
QUATERNARY	N22-N23	NN20					1	VOID		
			AG	0			1		*	N7 [1 cm N3 (dk gy) layer with sharp upper bound., gradational lower bound.]
					AG		1		*	
			AG	0			2			
			AG	0			2		GZ *CC	
		NN19	AG	0	AG		3		*	[2 cm N6 patch]
			AG	0			3		* KE HO *	Mixed N7 and 5GY 6/1; 5GY 6/1 lt ol gy, coarser than N7; N7
			AG	0	AG		Core Catcher			

Except for 28 cm interval near the base of the core, the material is light gray SPONGE AND FORAM BEARING COCCOLITH OOZE with rare dark layers and deformed laminae which are colored by traces of very finely divided pyrite.

The 28 cm interval in Section 3 consists of SPONGE, MICARB AND FORAM RICH COCCOLITH OOZE and SPONGE RICH MICARB FORAM OOZE, greenish gray in color.

TEXTURE:

A. Predominant (SFBCO):

Sand 4.0%
Silt 18%
Clay 78%

B. Minor (MFRCO and SRMFO)(Smear slide):

30-55% sand
15-20% silt
25-55% clay

COMPOSITION:

A. Predominant (SFBCO):

79-88% coccoliths
3- 8% forams
Tr- 2% radiolarians
3- 6% sponge spicules
common traces of diatoms

3- 5% detrital clay
Traces of glauconite
Section 3 only: 3% micarb

B. Minor (MFRCO and SRMFO):

20-35% forams
6-43% coccoliths
10-20% sponge spicules
1- 2% radiolarians
Tr diatoms
25-30% micarb
5% detrital clay
Tr- 1% glauconite
1% quartz

Total Carbon: 11.2%
Organic Carbon: 1.3%
Calcium Carbonate: 83%

CONSOLIDATION: Soft to stiff.

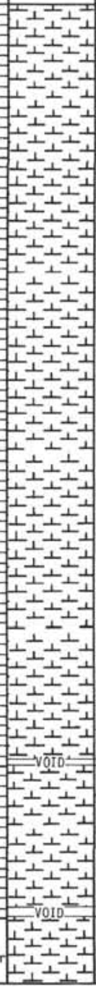
Explanatory notes in chapter 2

Site 258 Hole Core 3 Cored Interval: 47.5-57.0 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION
UPPER PLIOCENE	N21	NN16	AG	0	AGO		1
			AG	0			1
			AG	0			2
			AG	0			2
MIDDLE PLIOCENE	N20		AG	0			3
			AG	0	AG		3
			AG	0			4
			AG	0			4
			AG	0	AG		5
			AG	0			5
			AG	0			6
			AG	0			6
			AG	0	AG		Core Catcher

METERS: 0.5, 1.0

LITHOLOGY



LITHO. SAMPLE: * * CC GZ XM * HO * * CC GZ * * CC GZ * * * KE HO

LITHOLOGIC DESCRIPTION

5Y 8/1 yellow-gray mass clay
5RP 8/2 pale pinkish gray clay
5Y 8/1 patches in 5RP 8/2
5RP 8/2, grading gradually to

5RP 7/2 with very diffuse N6 patches

5RP 8/2

[faint N6 lamina, 1 cm]

N9 with very minor scattered 5RP 7/2 patches (less than 1%)

[same as unit below]
N7 (lt gy) with diffuse N6
N9 white

Predominantly pale and very pale grayish pink and white COCCOLITH OOZE, variably micarb-, sponge-spicule-, and/or foram-bearing. Gray colors due to traces of very finely divided pyrite. In Section 5, one 5-cm and one 15-cm interval of light gray sponge-spicule bearing FORAM AND MICARB RICH COCCOLITH OOZE.

TEXTURE:

A. Predominant:

Sand 9-17%
Silt 32-37%
Clay 46-59%

B. Minor:

40% sand
10% silt
50% clay

COMPOSITION:

A. Predominant:

84-94% coccoliths
2- 8% foraminifera
1- 3% sponge spicules
Tr- 1% discoasters
Tr radiolarians (ubiquitous)
Tr-10% authigenic carbonate (micarb)
2- 3% detrital clay
Tr glauconite
Rare traces of mica and quartz.

B. Minor:

47% coccoliths
20% foraminifera
25% micarb
5% sponge spicules
Tr discoasters, Radiolaria
2% detrital clay
1% glauconite
Tr mica

Predominant:

Total Carbon: 10.9-11.2%
Organic Carbon: 0.2-1.9%
Calcium Carbonate: 75-92%

CONSOLIDATION: Grading downward from soft to "semi-stiff" where less deformed.

Explanatory notes in chapter 2

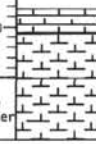
Site 258 Hole Core 4 Cored Interval: 85.5-95.0 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION
UPPER MIOCENE	N18	NN14-NN15	AG	0	CMO		1
		NN11	AG	0	CG		Core Catcher

METERS: 0.5, 1.0

LITHOLOGY

VOID



LITHO. SAMPLE: * *HO *KE *CC *GZ *XM

LITHOLOGIC DESCRIPTION

Semilith, finely laminted dark gray, overall color N9 (white) and 5RP 8/2 (very pale pink), 2 6 cm pieces.

N9 (white), semilith, bioturbated, gritty (silica), unlaminated, 2 4 cm pieces.
N9 soft silty clay
Stiff, 5GY 6/1 (greenish gray)
N7 (lt gy) semi-stiff, fine ss text; faintly laminated
5GY 6/1 greenish gray, fine ss text

Sequentially down the core:

1. 2 pieces each 6 cm long of semilithified white to very pale pink, finely laminated (gray laminations) of MICARB COCCOLITH CHALK
2. 2 pieces each 4 cm long of semilithified white bioturbated and unlaminated FORAM AND MICARB RICH COCCOLITH CHALK
3. 7 cm of white stiff FORAM RICH COCCOLITH OOZE
4. 10 cm of greenish gray sponge-spicule-rich MICARB FORAM COCCOLITH OOZE
5. 20 cm of light gray FORAM RICH COCCOLITH OOZE
6. 8 cm of the same lithology as (4)

COMPOSITION:

A. Chalk:

62-66% coccoliths
5-10% forams
20-30% micarb
1% sponge spicules
Tr radiolarians
2- 3% detrital clay
Rare traces of quartz, glauconite and dolomite rhombs

B. #3 (white ooze):

81% coccoliths
15% forams
1% discoasters
1% sponge spicules
Tr radiolarians
2% detrital clay
TR quartz, glauconite

TEXTURE:
Sand 41%
Silt 38%
Clay 22%

Total Carbon: 8.6%
Organic Carbon: .1%
Calcium Carbonate: 70%

C. Rest of core:

34-50% coccoliths
25-30% forams
5-10% sponge spicules
5- 6% detrital clay
2- 3% quartz
1- 2% glauconite

Explanatory notes in chapter 2

Site 258 Hole Core 5 Cored Interval: 123.5-133.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION
SANTONIAN	Globotruncana fornicata	M. furcatus	AG	O	AGE		1
			AG	O			2
			AM	O	AG		3
			AG	O	AG		Core Catcher

LITHOLOGY: VOID (top of Section 1)

Litho. sample: CC, GZ, HO, KE (Section 2); TS (Core Catcher)

LITHOLOGIC DESCRIPTION

6 cm fragment dark brown and light olive gray CHERT containing *Inoceramus* sp. fragments.

5Y 8/1 yellow gray clay texture, mottled,
5Y 8/1 siliceous limestone fragments
5Y 8/1 clay with siliceous limestone fragments
Siliceous limestone fragments
5Y 8/1 yellow gray, slight to moderately mottled
mottles light olive gray

At top of core, CHERT as detailed above.

Rest of core is yellowish gray, locally micarb rich FORAM BERAING COCCOLITH CHALK with scattered fragments of silicified limestone brecciated by drilling. Three intervals in the core are composed only of such fragments in voids.

TEXTURE OF SEMILITHIFIED (SOFTER) MATERIAL:

Sand 7%
Silt 21%
Clay 72%

COMPOSITION:

74-98% coccoliths
5-20% micarb
2- 5% forams
Tr sponge spicules
Rare trace of discoasters
1% detrital clay
Local traces of opaque ferruginous material

Total Carbon: 9.3%
Organic Carbon: 0.5%
Calcium Carbonate: 74%

COMPOSITION OF SILICIFIED LIMESTONE IN CORE CATCHER:

Chalcedony 60%, micarb 40%

N3

NOTE: the silicified limestones are merely the silicified equivalents of the semi-lithified sediments and contain delicate sedimentologic features such as details of bioturbation.

Explanatory notes in chapter 2

Site 258 Hole Core 6 Cored Interval: 142.5-152.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION
CONIACIAN	Coniacian	M. furcatus					1
			AG	O	AG		2
							3
					AG		4
			AG	O			5
			AG	O	AG		Core Catcher

LITHOLOGY: VOID (Section 1)

Litho. sample: CC, GZ (Section 2); CC, GZ, HO, XM, KE (Section 5)

LITHOLOGIC DESCRIPTION

Fragments of 5Y 8/1 light yellowish gray SILICIFIED LIMESTONE
N8 very light gray soft COCCOLITH OOZE with drilling chips of silicified limestone
[2 x 3 cm chip, N6 light gray]
[8 cm N6 silicified limestone]
[-do-]
[2 x 4 cm, same]

Very light gray and light gray FORAM AND MICARB BEARING COCCOLITH CHALK, with their brecciated (by drilling) silicified equivalents. Some of the limestones are laminated, others bioturbated. The entire core has very minor gray and dark gray slight mottling and streaks, colored by silt-sized framboidal pyrite.

TEXTURE: Sand 0.4-0.5%
Silt 28%
Clay 71%

COMPOSITION:

83% coccoliths
5% foraminifera
10% micarb
2% detrital clay
Traces of quartz, mica, glauconite and radiolarians

Total Carbon: 10.5-10.7%
Organic Carbon: 1.2%
Calcium Carbonate: 78-79%

CONSOLIDATION:

Lithified (silicified) limestone, stiff to semilithified CHALK.

[brecciated N7 limestone horizon]
[N4 streak]

N8
Base: brecciated N7 silicified limestone

Explanatory notes in chapter 2

Site 258 Hole Core 7 Cored Interval: 152.0-161.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
CONIACIAN	Coniacian	M. furcatus	AG	0			1	0.5, 1.0	VOID		*	
					AGO		2				* CC GZ, HO KE	
			AG	0	AGO		3		VOID		*	
			AG	0	AG		Core Catcher					

Fragments N7 silicified limestone drilling breccia

N8 very light gray with minor N7 streaks chalk

N7 silicified limestone

N7 chalk

N7 silicified limestone

N8 chalk with very minor N5 streaks

Light gray to very light gray FORAM BEARING COCCOLITH CHALK, locally also micarb-bearing, with very minor (less than 1% areally) darker gray streaks colored by trace amounts of framboidal pyrite; with 10-25 cm intervals of SILICIFIED LIMESTONE brecciated by drilling into fragments as large as 5 cm.

TEXTURE: Sand 1.3%
Silt 36%
Clay 63%

COMPOSITION:
90-95% coccoliths
3- 7% foraminifera
5% micarb in Section 3 and core catcher only
2% detrital clay
Ubiquitous traces of glauconite and sponge spicules
Tr framboidal pyrite and amorphous translucent ferruginous aggregates

Rare traces of mica and fish debris

Total Carbon: 10.3%
Organic Carbon: 1.0%
Calcium Carbonate: 77%

CONSOLIDATION: Very stiff.

Explanatory notes in chapter 2

Site 258 Hole Core 8 Cored Interval: 171.0-180.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
CONIACIAN	Coniacian	M. furcatus	AG	0	AGO		Core Catcher				TS	N7

RECOVERY: Core-catcher only.

Light gray SILICIFIED LIMESTONE, composed of 60% chalcedony, 40% micarb, with traces of foraminifera.

Explanatory notes in chapter 2

Site 258 Hole Core 9 Cored Interval: 180.5-190.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
CONIACIAN	Coniacian	M. furcatus	AM	0	AGO		1	0.5, 1.0	VOID		* KE, CC GZ	
			AG	0	AG							
			AM	0	AG		Core Catcher				TS	

N7 silicified limestone fragments

N7 chalk

Intense laminated or horizontal burrowing

N6 chalk

N7 light gray silicified limestone fragments

N7 light gray chalk

Light gray pyrite, foram and micarb bearing COCCOLITH CHALK and its lithified equivalent, SILICIFIED LIMESTONE. Intensely laminated and/or burrowed from 50-90 cm.

TEXTURE OF CHALK: Sand 0.2%
Silt 16%
Clay 84%

COMPOSITION (Smear slide):
89% coccoliths
5% micarb
2% foraminifera
2% silt-sized pyrite framboids
2% detrital clay
Tr sponge spicules

Total Carbon: 7.8%
Organic Carbon: 0.4%
Calcium Carbonate: 62%

CONSOLIDATION: Semilithified chalk, lithified siliceous limestone

Explanatory notes in chapter 2

Site 258 Hole Core 10 Cored Interval: 199.5-206.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
CONIACIAN		M. furcatus	AG	0	AG		1	0.5, 1.0	VOID			
			AG	0	AGO		2				HO XM CC GZ KE	
			AG	0	AGO		Core Catcher					

N7 and N8 limestone

3-8 cm fragments

N8 chalk

N7 chalk

N7 limestone

N8 limestone

N6 chalk

N7 chalk

[2-3 cm limestone]

N7 limestone

Light gray and very light gray COCCOLITH CHALK and lithified equivalent SILICIFIED LIMESTONE, typically micarb and foram bearing, locally pyritiferous as well, the pyrite occurring as framboids and radiolarian replacements. Abundant bioturbation.

TEXTURE: Sand 0.2-0.6%
Silt 11-33%
Clay 66-89%

COMPOSITION:
88-89% coccoliths
3- 5% micarb
5- 7% foraminifera
2% detrital clay
Local traces of quartz and sponge spicules; locally up to 2% pyrite.

Total Carbon: 7.3%
Organic Carbon: 0.3%
Calcium Carbonate: 59%

CONSOLIDATION: Semi-lithified chalk, lithified limestone.

N.B.: Silicification and resultant hardness is variable in the limestones.

Explanatory notes in chapter 2

Site 258 Hole Core 11 Cored Interval: 215.0-225.0 m

Age	Forams zone	Nannos zone	Forams	Dissol. effects	Nannos	Siliceous foss. etc.	Section	Meters	Lithology	Deformation	Litho. sample
CONIACIAN	Coniacian?	K. magnificus-M. furcatus						0.5, 1.0	VOID		
			FP	0	CGO		1			▲▲	
					AGO						
			FP	0			2			▲▲	CC GZ KE
					AGO		3		VOID		* *
			CM	0	AGO		Core Catcher				

N8 chalk

5GY 6/1 & 5GY 7/1

Same, brecciated

N8 chalk

N8 brecciated chalk

N8 chalk, fragments up to 6 cm

Interdigitated 90% 5GY 6/1 & 10% 5Y 5/1 light olive gray ch

Same, severely brecciated by drilling

Chalk, N8 with many N7 burrows, fragments 6-10 cm long. Section 3: 50% 5GY 6/1 & 50% N8 chalk alternating pieces 6-8 cm long. Contacts are gradational. 5 mm wide sub-horizontal burrows of N8 in 5GY 6/1 intervals and vice versa, with 5Y 6/1 burrows in both colored types.

LITHOLOGIC DESCRIPTION

MICARB-RICH COCCOLITH CHALK, locally high enough in foram content to be foram bearing; at the top of the core predominantly very light gray with fewer inter-digitations of greenish gray, but with depth in the core the greenish gray intervals become more prominent, attaining 50% of the core in Section 3. Contacts between the colored intervals are gradational, and burrows of one color are found in intervals of the other color, together with light olive gray burrows in both colors. The burrows are generally horizontal to sub-horizontal.

The whole core is made up of 6-10 cm long pieces, with a few severely brecciated intervals as indicated.

TEXTURE: Sand Tr-2%
Silt 2-4%
Clay 94-98%
(Smear Slide)

COMPOSITION:

71-72% coccoliths
25% micarb
1- 2% foraminifera
2% detrital clay
Rare traces of mica, glauconite and sponge spicules

Total Carbon: 5.2%
Organic Carbon: .1%
Calcium Carbonate: 42%

CONSOLIDATION: Semi-lithified.

NOTE: The silicification which has lithified intervals in the previous cores appears to be totally lacking in Core 11.

Explanatory notes in chapter 2

Site 258 Hole Core 12 Cored Interval: 234.5-244.0 m

Age	Forams zone	Nannos zone	Forams	Dissol. effects	Nannos	Siliceous foss. etc.	Section	Meters	Lithology	Deformation	Litho. sample
CONIACIAN	Coniacian?	K. magnificus			AGO		1	0.5, 1.0			*
			FP	0							
			FP	0							
			FP	0			2				* CC GZ HO
					AM						
			FP	0	AM		3				*
											*
TURONIAN	Turonian						4				* CC GZ
			FP	0	AM						XM
			FP	0	AM		5				* *
			FP	0							
							6				* CC GZ KE *
			FP	0	AM						
			FP	0	AM		Core Catcher				*

WHOLE CORE: 5GY 8/1 to 5Y 8/1, varying but not distinct in alternation

[slightly darker green]

[5Y 5/2 light olive gray, with 2-5 cm 5Y 4/1 olive gray lense at base]

[5Y 4/1] [darker than overall color]

[darker than average]

[-do-]

[5YR 8/1]

[-do-]

[same]

darkest burrow

5Y 8/1 & 5GY 8/1

LITHOLOGIC DESCRIPTION

COCCOLITH-RICH MICARB CHALK, in part foram-bearing, but foram content only traces in Section 6 and core catcher; whole core subtly varying from light greenish gray to yellowish gray with no distinct alternations; abundantly bioturbated and burrowed, the burrows of one of the predominant colors occurring in the other predominant color; also light olive gray burrows, which make up about 5% of the core. The burrows are sub-horizontal, possibly as a result of compaction of formerly more randomly oriented features. A few darker intervals are indicated; these are no more than 20 cm in length.

The whole core consists of pieces 6 cm to 40 cm long, averaging about 10 cm.

TEXTURE: Sand 0.0-0.4%
Silt 29-45%
Clay 54-71%

COMPOSITION:

20-30% coccoliths
70-75% micarb; locally as high as 94%
Tr- 3% forams, decreasing irregularly down the core
2% detrital clay
Tr pyrite (finely divided)
Common traces of ?dolomite rhombs
Rare traces of quartz and mica
1% zeolite from Section 5 down

Total Carbon: 8.8%
Organic Carbon: .1%
Calcium Carbonate: 72%

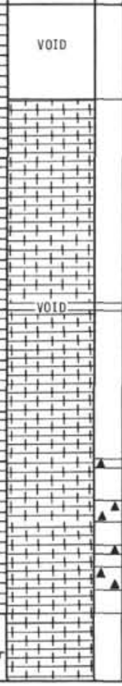
CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 13 Cored Interval: 253.5-263.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	LITHO. SAMPLE
TURONIAN	Praeglobotruncana helvetica	G. obliquum-K. magnificus	FP	0	AM		1	
			FP	0	AMO, AM		2	CC GZ HO, *
			FP	0			3	*
					CME, CME		4	CC GZ KE
			FP	0				
CENOMANIAN	?		CM	0	AGE		Core Catcher	

METERS: 0.5, 1.0



all 5GY 7/1 light greenish gray

5Y 8/1 & 5GY 7/1 (yellowish gray & light greenish gray)

[slightly darker]
[siliceous limestone fragment]

Predominately 5GY 7/1
N8 very light gray to 5Y 8/1 yellowish gray

Predominately 5GY 5/1

N8 to 5Y 8/1

Predominately [5Y 6/1]
5Y 8/1 to 5GY 7/1

[5Y 6/1]

5GY 8/1 over N4

LITHOLOGIC DESCRIPTION

COCCOLITH-RICH MICARB CHALK, largely foram-bearing; most of the core subtly varying from light greenish gray to yellowish gray, these colors distinctly alternating only in Section 3; abundantly bioturbated and burrowed throughout, the burrows mainly subhorizontal as in Core 12.

Whole core consists of semilithified pieces 4 cm to 20 cm long, averaging about 6 to 10 cm.

TEXTURE: Sand 0.1%
Silt 35%
Clay 65%

COMPOSITION:

65% micarb; one greenish gray interval (Sec. 3) has 88%
30-31% coccoliths
1- 3% foraminifera
2% detrital clay
Common traces: microscopic ferrug. aggreg., glauconite, sponge spicules
Rare traces: quartz, mica

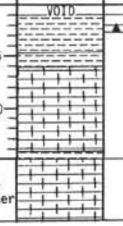
Total Carbon: 5.7-8.1%
Organic Carbon: 0.1-0.3%
Calcium Carbonate: 45-67%

Explanatory notes in chapter 2

Site 258 Hole Core 14 Cored Interval: 263.0-272.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	LITHO. SAMPLE
CENOMANIAN	Cenomanian	L. alatus-G. obliquum			B		1	CC GZ XM KE HO, XM, *, *
			RM	0	AGE			
			CG	0				
			FG	0	AGE		Core Catcher	

METERS: 0.5, 1.0



LITHOLOGIC DESCRIPTION

5GY 4/1 dark greenish gray ZEOLITE-RICH CLAY

N1-N2 black-grayish black PYRITE RICH FERRUGINOUS CLAY
5GY 4/1 ZEOLITE-RICH CLAY
5Y 5/1 light olive gray foram-bearing COCCOLITH-RICH
N5 5Y 5/1 light olive gray foram-bearing COCCOLITH-RICH MICARB CHALK
5Y 5/1 light olive gray foram-bearing COCCOLITH-RICH MICARB CHALK
N5 COCCOLITH-RICH MICARB CHALK
5Y 5/1 light olive gray foram-bearing COCCOLITH-RICH MICARB CHALK

5 cm 5Y 2/1 olive black PYRITE-RICH FERRUGINOUS CLAY, overlying 3 cm 5Y 5/1 light olive gray foram-bearing COCCOLITH-RICH MICARB CHALK
5Y 6/1

A. <u>Zeolite-rich clay</u>:

TEXTURE: Sand 1%
Silt 3%
Clay 9 6%

COMPOSITION:

79% detrital clay
20% zeolite
1% fish debris

B. <u>Pyrite-rich ferruginous clay</u>:

TEXTURE: Sand 2%
Silt 10%
Clay 88%
(Smear Slide)

COMPOSITION:

60% detrital clay
30% microscopic ferruginous aggregates
Tr pyrite, finely divided
1% glauconite
5% zeolite
1% ferruginous aggregates

Total Carbon: .1%
Organic Carbon: .1%
Calcium Carbonates
Calcium Carbonate: 0%

C. <u>Coccolith-rich Micarb Chalk</u>:

TEXTURE: 1-2% sand, 2-4% silt, 94-97% clay (smear slide)

COMPOSITION:

62-66% micarb
30% coccoliths
1- 6% foraminifera
2% detrital clay
Tr- 2% pyrite
Tr mica, zeolite, fish remains

CONSOLIDATION: Semilithified.

Explanatory notes in chapter 2

Site 258 Hole Core 15 Cored Interval: 282.0-291.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
LATE ALBIAN	Albian-Cenomanian	L. alatus; Eiffellithus turriseiffeli	FG	0	AGE		1	0.5, 1.0	VOID		*
					AME		2				* KE HO XM GZ CC
			CG	0	CME		3				* **
			FM	0	CPE		4				* *
			FG	0	FPE		5		VOID		* CC GZ KE HO
			FM	0	AME		6				*
			FG	0	AME		Core Catcher				*

LITHOLOGIC DESCRIPTION

5Y 6/1 light olive gray zeolite and micarb bearing COCCOLITH-RICH CLAY
N2 grayish black FERRUGINOUS CLAY
5Y 6/1 zeolite & micarb bearing COCCOLITH CLAY with vertical 7 mm N3 burrows 2 cm long
Alternating N3 pyrite & micarb bearing COCCOLITH RICH CLAY and 5Y 6/1 light olive gray zeolite & micarb bearing COCCOLITH RICH CLAY
5Y 6/1 zeolite & micarb bearing COCCOLITH RICH CHALK
N3 pyrite & micarb bearing COCCOLITH RICH CLAY
5Y 6/1 light olive gray and 5Y 4/1 olive gray zeolite & micarb bearing COCCOLITH RICH CLAY
5GY 6/1 greenish gray zeolite & micarb bearing COCCOLITH RICH CLAY
5Y 3/1 olive gray to 5Y 2/1 olive black pyrite & micarb bearing COCCOLITH RICH CLAY
5Y 4/1 grading to 5GY 6/1 micarb bearing COCCOLITH RICH CLAY
%
5Y 2/1 olive black pyrite & zeo;ite bearing COCCOLITH RICH CLAY
same; 5Y 3/1 olive black
same; 5Y 2/1 olive black

; 5Y 3/1 olive black zeolite bearing FERRUGINOUS CLAY
NOTE: Speckled with fine sand-sized zeolites, which are also concentrated in burrows.

← few mm thick green band zeolite & coccolith bearing CLAY
← -do-; some concentrated white zeolite specks

Predominantly olive black FERRUGINOUS CLAY, colored by black amorphous finely divided ferruginous material (1-20%, average 5%) and fine pyrite, locally framboidal (1-8%); variously zeolite and/or micarb-bearing. Light olive gray and greenish gray intervals down to the upper portion of Section 3 are zeolite and micarb rich COCCOLITH SILTY CLAY or COCCOLITH RICH SILTY CLAY. Bioturbation and sub-horizontal burrowing are prominent; in addition, a few vertical burrows occur in which zeolites are found.

TEXTURE: Sand 0%
Silt 20-29%
Clay 71-80%

Total Carbon: 1.2-1.6%
Organic Carbon: 1.1-1.5%
Calcium Carbonate: 1.0%

COMPOSITION:
62-92% clay (around 85% in lower half)
Tr-20% ferrug. aggreg.
· 1% pyrite
1-10% micarb (light-colored layers only)
1% zeolite
Tr- 1% mica, forams, glauconite
1- 2% fish debris, black material only

← [10YR 5/4] .75x3 cm concretion of zeol. bearing ferrug. CLAY

Explanatory notes in chapter 2

Site 258 Hole Core 16 Cored Interval: 301.0-310.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
LATE ALBIAN	Albian-Cenomanian	Eiffellithus turriseiffeli					1	0.5, 1.0	VOID		KE
			RG	0	CPE		2				* GZ CC HO
			RG	0			3				*
			RG	0			4				* *
			RG	0	CPE		5				CC GZ XM KE MY
							6				* *
			FP	0	CME		Core Catcher				

LITHOLOGIC DESCRIPTION

1 4 cm piece
← 5GY 6/1
Caving?
5Y 2/1 = 30%
5YR 2/1 = 70%

Black FERRUGINOUS DETRITAL CLAY, pyrite-bearing and variably coccolith, zeolite and/or foram bearing; locally (core catcher) coccolith-rich, intensely bioturbated and burrowed. The burrows tend to contain concentrations of white zeolite specks, which occur in lesser abundance scattered throughout the material. The burrows are invariably sub-horizontal and up to 7.5 mm wide.

TEXTURE: Sand 0%
Silt 20-26%
Clay 74-80%

COMPOSITION:

69-87% detrital clay (average 81%; but 58% in core catcher)
4- 7% coccoliths (25% in catcher)
3- 5% amorph. microscopic ferrug. material
Tr pyrite, including framboids
1- 5% zeolite
Tr- 1% mica
2% micarb
Rare traces to 1% occurrences of quartz, also fish debris
Rare traces of glauconite
4% forams in core catcher

Total Carbon: 1.3-1.8%
Organic Carbon: 1.1-1.2%
Calcium Carbonate: 2.0-5.0%

CONSOLIDATION: Semi-lithified.

5Y 2/1

Explanatory notes in chapter 2

Site 258 Hole Core 17 Cored Interval: 320.0-329.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
LATE ALBIAN	Albian	Eiffellithus turriseiffeli	CP	1			1	0.5, 1.0			* , *
			CP	1	FPE		2				*, CC, GZ, KE, HO
			RM	1	FPE		3				*
			RM	1	RPE		4				*
			CG	o	AGE		5				GZ, CC, XM
			RG	o	AGE		Core Catcher				

5YR 2/1 & 5Y 2.5/1, admixed by bioturbation

[5YR 2/1 dom.]

[-do-]

[-do-]

5Y 2/1 olive black with minor 5Y 4/1 olive gray

5YR 2/1 with minor (30%) 5Y 2/1; strongly bioturbated. Sudden dec. in zeolite compared to Section 2.

5YR 2/1 with very minor (5%) 5Y 2/1; very little zeolite

5Y 5/1 siderite

5YR 2/1 with very minor (5%) 5Y 2/1; only Tr of zeolite

[1.5x2 cm pyrite nodule in place]

5YR 2/1

Brownish black FERRUGINOUS CLAY with minor olive black intervals throughout and minor olive gray intervals in Section 2. The lighter colored intervals are due to more abundant zeolites. The lower half of the core has very poorly defined distinctions between the major brownish black and minor olive black, due to intense bioturbation, which is especially evidenced by sub-horizontal burrows. One 10-cm interval of pure medium sand-sized SIDERITE in Section 4.

TEXTURE: Sand 0.4-4.2%
Silt 20-26%
Clay 70-80%

COMPOSITION:

64-83% detrital clay
Tr pyrite, including some silt-sized framboids
3- 5% amorphous ferruginous material
1% zeolite; up to 15% in some burrows
Tr- 3% coccoliths typically; however, some smears show 13 to 20%!
Tr- 4% sporadic occurrences of forams
Ubiquitous traces: mica, glauconite, collophanous fish debris
Tr- 1% quartz
Rare traces of zircon

Total Carbon: 1.1-2.7%
Organic Carbon: 0.8-1.3%
Calcium Carbonate: 11%

CONSOLIDATION: Lithified authigenic carbonate; semilithified rest of core.

Explanatory notes in chapter 2

Site 258 Hole Core 18 Cored Interval: 339.0-348.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
LATE ALBIAN	Albian	Eiffellithus turriseiffeli	RM	1	AGE		1	0.5, 1.0	VOID		*
			FG	1	AGE		2		VOID		*, CC, GZ, XM, KE
					AGE		3				CC, GZ, KE, HO, *
			FG	1	CGE		4				*
			CG	o	CGE		Core Catcher				

5YR 2/1 brownish black with minor 5Y 2/1, bioturbated; practically no zeolite seen

[5Y 4/1 olive gray with minor 5Y 2/1 burrows]

[-do-]

[-do-]

very bioturbated 5Y 2/1 olive black & 5Y 5/1 olive gray

5Y 3/1 olive black

Brownish black to olive black FERRUGINOUS CLAY, pyrite bearing and variably coccolith-bearing or coccolith rich, with a basal 15-cm layer which is a bioturbated mixture of olive gray and olive black FERRUGINOUS CLAY that owes its lighter colors to a minor (3%) component of micarb. Unlike the preceding cores, zeolites are much less abundant, being virtually absent in visible specks and only present in smear slides in amounts varying from traces to 1%. The entire core is intensely bioturbated, as in previous cores.

TEXTURE: Sand 0%
Silt 10-13%
Clay 87-90%

COMPOSITION:

78-88% detrital clay
Tr pyrite, framboidal in part
1- 5% amorphous ferruginous material
5-11% coccoliths
Tr- 1% collophanous fish debris
Tr- 1% zeolite, decreasing down the core (Tr. in Sec. 3; absent in Sec. 4)
Ubiquitous traces of mica
Rare traces of zircon, amphibole, quartz, radiolarians, glauconite
Tr forams in Sec. 3, 1% in Sec. 4
3% micarb in Sec. 4

Total Carbon: 1.6-2.5%
Organic Carbon: .5-1.0%
Calcium Carbonate: 10-13%

CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 19 Cored Interval: 358.0-367.5 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	FOSSIL CHARACTER: DISSOL. EFFECTS	FOSSIL CHARACTER: NANNOS	FOSSIL CHARACTER: SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE ALBIAN	Albian	Eiffellithus turriseffeli	CG	0	CGE		Core Catcher			* *	

LITHOLOGIC DESCRIPTION

5Y 3/1 with patches of 5YR 8/1 pinkish gray

RECOVERY: CORE CATCHER ONLY

Olive black coccolith-rich FERRUGINOUS CLAY, colored by finely disseminated amounts of black amorphous ferruginous particles and aggregates and pyrite; containing patches of pinkish gray authigenic carbonate.

TEXTURE: (Smear Slide)
Sand Tr
Silt 2%
Clay 98%

COMPOSITION: (Less authigenic carbonate patches):

76% detrital clay
2% ferruginous aggregates
Tr pyrite
20% coccoliths
Tr forams
Tr collophanous fish debris
Tr mica
Tr zeolite
Tr quartz

Total Carbon: 1.7%
Organic Carbon: 0.8%
Calcium Carbonate: 7%

CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 20 Cored Interval: 377.0-386.5 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	FOSSIL CHARACTER: DISSOL. EFFECTS	FOSSIL CHARACTER: NANNOS	FOSSIL CHARACTER: SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE
MIDDLE ALBIAN	Albian	Prediscosphaera cretacea					1	0.5	VOID		*
								1.0		▲▲ ▲▲	GZ CC
			FG	1	CGE						* KE
			FG	1	CGE		Core Catcher				

LITHOLOGIC DESCRIPTION

5Y 2/1 olive black clay drilling breccia
5Y 2/1 clay heavily charged with up to 2 mm diameter
5Y 4/1 olive gray micarb blebs
Drilling breccia
5YR 2/1 brownish black clay with rare patches of
5YR 8/1 pinkish gray patches up to 1 x 2 mm in size

5Y 2/1 olive black

Brownish black and olive black pyrite-bearing FERRUGINOUS CLAY, coccolith bearing or coccolith rich, locally micarb-bearing, locally with rare pinkish gray patches of authigenic carbonate up to 1 x 2 cm in size.

TEXTURE: Sand 0%
Silt 16%
Clay 84%

COMPOSITION:

76-87% detrital clay
2- 3% amorphous ferruginous material
Tr pyrite, including silt-sized framboids
7-20% coccoliths
Tr foraminifera
Tr mica
Tr quartz
Tr glauconite
Rare-Tr collophanous fish debris
2% micarb in Sec. 1 at 90 cm only
Rare-Tr amphibole, zeolite

Total Carbon: 1.6-2.1%
Organic Carbon: 0.8%
Calcium Carbonate: 7%

CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 21 Cored Interval: 405.5-415.0 m

AGE	FORAMS ZONE	NANNOS ZONE	FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE ALBIAN		Prediscosphaera cretacea			CGE		1	0.5, 1.0	VOID	▲▲	XM, CC, GZ, *, *, KE	5Y 2/1 olive black & 5YR 2/1 brownish black; bioturbated throughout; [1 x 3 mm pink specks of siderite]
							2				*	5Y 2/1 pred.; 5YR 2/1, very homogeneous
					CGE		3				CC, GZ, KE, HO	[1.5 cm pyrite]; [1 cm pyrite]; [3 x 2 cm pyrite]
			FG	3	CGE		Core Catcher					5Y 2/1

FERRUGINOUS CLAY, mostly brownish black, with very minor olive black in the top half of the core; pyrite bearing, coccolith bearing or coccolith rich; locally (smear slide, Sec. 2) zeolite bearing. The lower half of the core is very homogeneous brownish black, and consequently, if bioturbation is present it cannot be seen. Rare 1-3 cm pyrite nodules.

TEXTURE: Sand 0%
Silt 17-18%
Clay 82-83%

COMPOSITION:

82-86% detrital clay (62% in core catcher)
3% ferruginous amorphous aggregates
Tr pyrite, including framboids (10% in core catcher)
6-20% coccoliths
Tr- 3% quartz
Tr- 1% mica
Ubiquitous traces of glauconite
Tr zeolite (Secs. 2 and 3 only)
1- 5% micarb
Occasional traces of forams and fish debris

Total Carbon: 2.1%
Organic Carbon: 1.5%
Calcium Carbonate: 5%

CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 22 Cored Interval: 435.0-444.5 m

AGE	FORAMS ZONE	NANNOS ZONE	FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
MIDDLE ALBIAN		Prediscosphaera cretacea			RPE		1	0.5, 1.0	VOID		*, *	[2 mm wide 5Y 4/1 olive gray burrow]
							2				CC, GZ, KE	Frag. of BELEMNITE; 1 cm pyrite; 0.4 x 1 cm pyrite; 0.1 x 0.4 cm pyrite
					FME		3				*	0.8 cm burrow
							4				*	
							5				XM, GZ, CC, HO, KE, *	2 pyrite nodules, 1.5 x 3 cm; 3 1 to 3 mm; N8 very light gray patches of authigenic feldspar
			RP	4	FME		Core Catcher					N1

Brownish black FERRUGINOUS CLAY, pyrite bearing and locally coccolith bearing; with localized pyrite nodules 0.4 to 3.0 cm in size, and very rare authigenic alkali feldspar blebs 1 to 3 mm in size. Bioturbation throughout, but very difficult to discern due to uniform color of the sediment.

TEXTURE: Sand 0.1%
Silt 3-17%
Clay 83-97%

COMPOSITION:

73-88% detrital clay
1% pyrite, in part framboidal
4-10% amorphous ferruginous material
3- 5% coccoliths
1% quartz
Tr- 1% mica
Ubiquitous traces of glauconite and collophanous fish debris
Rare traces of amphibole, hypersthene and zircon
Rare traces of zeolite and foraminifera

Total Carbon: 3.3-3.6%
Organic Carbon: 2.6-2.7%
Calcium Carbonate: 6-8%

CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 23 Cored Interval: 472.0-481.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
LOWER CRETACEOUS							1	0.5, 1.0	VOID			Brownish black to black FERRUGINOUS CLAY, pyrite-bearing; homogeneous throughout.
					B		2				* GZ CC XM KE HO	5YR 2/1 to N1; homogeneous throughout
			RM	4	FME		Core Catcher		VOID			

TEXTURE: Sand 0%
Silt 12%
Clay 88%

COMPOSITION:

94% detrital clay
Tr pyrite
6% amorphous ferruginous material
Tr quartz, mica

Total Carbon: 1.6%
Organic Carbon: 1.6%
Calcium Carbonate: 0%

CONSOLIDATION: Semi-lithified.

Explanatory notes in chapter 2

Site 258 Hole Core 24 Cored Interval: 510.0-519.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					B		1	0.5, 1.0	VOID	▲▲	HO CC GZ KE	5YR 2/1 to N1 (brownish black to black)
							2				*	Well srtd fn ss, 5GY 2/1 gnsh blk; abund glauc. +white carb cement, lithified
					B		3				* *	Dolomitic-glauconitic well srtd v. fn ss, 5Y 4/1 ol gy; some burrowing; [calcite veins]; [macrofossil fragments]
							4					5GY 6/1 gnsh gy fine & v. fine glauconitic sands, cemented with abundant white dolomite; Semi-lithified 5Y4/1 ol gy glauconitic well-sorted very fine sands
					B		5				KE CC GZ XM * HO	Semilith 5Y 4/1 ol gy glauconitic carb-cemented crse-med ss; 5Y 4/1 semilith lamin. well srtd gl. ss /w/sm calcite vein; Same glauc. ss, 5Y 2/1 ol blk; Lith 5Y 4/1; v fn crsly lam (0.5-2 cm), w/macrofoss debris, bur.; Lith 5Y 2/1 grdd, lam, fossilif., brecciated & recemented; Same; 5YR 3/1 ol blk, w/silts; load-casts; 4-6 cm alternately lithified and semi-lithified 5Y 2/1 ol blk SILTY MUD, burrowed.
			B		B		Core Catcher					5Y 2/1

TOP UNIT: Same pyrite-bearing FERRUGINOUS CLAY as previous core; few specks of carbonate; faintly bioturbated; brownish black to black.

TEXTURE: Sand Tr-1%
Silt 1-2%
Clay 97-99%
(Smear Slide)

COMPOSITION:

94% detrital clay
3% pyrite
3% ferruginous amorphous material
Tr quartz, mica, glauconite

CONSOLIDATION: Semi-lithified.

MIDDLE UNIT: Lithified and semi-lithified predominantly fine-grained GLAUCONITIC SAND; predominantly olive gray with lesser greenish gray and greenish black; in part with abundant siderite and/or dolomite cement; in part laminated, in part graded, in part burrowed; with local macrofossil debris; locally coarse to medium grained. The sands appear to have the same general provenance, possibly of volcanic tuff.

BOTTOM UNIT: Alternating 4-6 cm intervals of lithified and semi-lithified olive black SILTY MUD; pyrite rich to pyrite bearing, locally glauconite-bearing; barren.

Top Unit	Bottom Unit
Total Carbon: 1.3%	Total Carbon: 2.5%
Organic Carbon: 1.3%	Organic Carbon: 0.5%
Calcium Carbonate: 0%	Calcium Carobnate: 16%

Explanatory notes in chapter 2

Site 258 Hole Core 25 Cored Interval: 519.5-525.0 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
					B		1	0.5, 1.0	VOID		* *	Pred. 5YR 2/2 dusky brown FERRUGINOUS CLAY with 0.3-1.3 cm N3 dark gray clayey silt & fine sand laminae = 20%; load casting Homogeneous 5Y 2/2 FERRUGINOUS CLAY with very minor silty and very fine sand laminae as above.
							2		VOID		CC GZ XM KE	Predominantly 5YR 2/2 dusky brown FERRUGINOUS CLAY [2 graded fine-med sand 5Y 4/1 ol gy intervals] [0.3 x 0.7 cm horizontal pyrite nodule] Several sand intervals, 5Y 4/1 ol gy, 0.5 to 3 cm, 1.5-5 mm apart [3 cm silty sand interval] [1 x 15 mm pyrite body in 1 mm thick black lamina] [4 mm silty fine sand lamina] [v. faint silty fine sand intervals up to 1.5 cm thick] [black lamina less than 1 mm thick w/ 2 1 x 10 mm pyrite stringers] [3.5 cm fine sand layer, calcite-rich, with load cast top] Massive 5YR 2/2 dusky brown FERRUGINOUS CLAY
							3		VOID		*	Massive 5YR 2/2 dusky brown FERRUGINOUS CLAY, calcite-rich and part silicified Very fine to fine SAND, 5Y 4/1 olive gray, calcareous. Mainly dusky brown FERRUGINOUS CLAY, with few mm to 1 cm fine sand laminae indicated by short arrows [10G 4/4 gysh gn cly, 4 mm thick]
							4		VOID		HO CC GZ KE *	
			B				Core Catcher					5YR 2/2

Dusky brown FERRUGINOUS CLAY with graded very fine sand and very fine silty sand and minor fine-to-medium sand laminae and interbeds which make up only about 5% of the sediment in Secs. 1 and 2 and only about 1% in Secs. 3 and 4. One chunk of very fine to fine glauconitic calcareous sand in Sec. 3. Local pyrite stringers.

CLAY:

A. Texture: Sand 2%, Silt 5-6%, Clay 92-93% (Smear Slide)

B. Composition:
- 79-90% detrital clay
- 4- 8% ferruginous amorphous material
- Tr pyrite
- 1- 2% mica
- 1- 2% glauconite
- Tr feldspar, quartz, zeolite, coccoliths, fish debris

Total Carbon: 0.2-0.3%
Organic Carbon: .3%
Calcium Carbonate: 0%

CONSOLIDATION: Lithified; top 13 cm of Sec. 3 partially silicified.

SAND in Sec. 3: 60% micarb, 27% detrital clay, 10% ferruginous amorphous matter + pyrite; Tr quartz, feldspar, and collophanous fish debris.

Explanatory notes in chapter 2

Site 258 Hole A Core 1 Cored Interval: 0.0-9.5 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
QUATERNARY	N22-N23	NN20	AG AG AG AG	0 0 0 0	AG CG		1	0.5, 1.0			CC GZ * * KE	10YR 8/2 v. pale orange 5Y 8/1 yellowish gray [5YR 8/1 pinkish gray 4 x 5 cm patch] N9 white to v. light gray N7 light gray
			AG AG AG	0 0 0			2		VOID			5Y 7/1 lt ol gy & N8 v. lt gy
			AG	0	AG		Core Catcher					

FORAM RICH COCCOLITH OOZE, variously very pale orange, yellowish gray, pinkish gray, white, very light gray and light gray.

TEXTURE: Sand 27-30%
Silt 34-40%
Clay 33-36%

COMPOSITION:
- 66-73% coccoliths
- 15-25% forams
- 5% sponge spicules
- 5% authigenic carbonate (micarb)
- 2% detrital clay
- Tr mica present throughout
- Rare-Tr quartz, amorphous ferruginous material, glauconite

Total Carbon: 10.8%
Organic Carbon: .1%
Calcium Carbonate: 89%

CONSOLIDATION: Very soft.

Explanatory notes in chapter 2

Site 258 Hole A Core 1A Cored Interval: 0.0-9.5 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS., ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
QUATERNARY	N22-N23	NN20			AG		1	0.5, 1.0	VOID		*	5YR 8/1 pnksh gy
							2		VOID		KE * CC * GZ XM * *	[5 mm layer 5PB 3/2 dsky blu] 7.5YR 7/1-6/1 lt gy-gy 10YR 8/3 v. pale bn 5GY8/1 lt gnsh gy 10YR 8/4 v. pale bn 5GY 8/1 lt gnsh gy 5Y 6/1 lt gy
		NN19	AG	0	AG		Core Catcher					N8 lt gy

COCCOLITH OOZE, variably sponge spicule-, micarb-, and/or foram-bearing; variably pinkish gray, light gray, gray, very pale brown or light greenish gray. Core shows virtually no coring disturbance, once again justifying use of the extended core barrel for coring at the mudline.

TEXTURE: Sand 30%
Silt 34%
Clay 36%

COMPOSITION:
- 62-81% coccoliths
- 5-20% forams
- 5- 7% sponge spicules
- 5- 7% micarb
- Tr glauconite common
- Tr ferrug. amorphous material; 1% in minor dusky blue band of Sec. 2.
- 2% detrital clay
- 1% quartz, only in one smear slide
- Tr mica, only in 1 smear slide
- Tr pyrite, only 1 smear slide

CONSOLIDATION: Very soft.

Explanatory notes in chapter 2

Site 258 Hole A Core 2 Cored Interval: 19.0-28.5 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
QUATERNARY	N22-N23		AG	0			1	0.5 / 1.0	VOID			
			AG	0							CC GZ	5G 8/1 lt gnsh gy
			AG	0	AG						*	7.5YR 7/0 lt gy
							2		VOID			
			AG	0								N7 lt gy w/ minor 5GY 8/1 lt gnsh gy
			AG	0					VOID			5GY 4/1 dk gnsh gy & 5GY 7/1 gnsh gy
			AG	0								
			AG	0			3		VOID			
		NN19	AG	0	AG		Core Catcher				*	N7 to N8

Light gray, light greenish gray, and minor dark greenish gray COCCOLITH OOZE, sponge spicule- and micarb-bearing and locally foram-bearing.

TEXTURE: Sand 26%
Silt 25%
Clay 49%

COMPOSITION:

84-88% coccoliths
1- 7% forams
2- 4% sponge spicules
5% micarb
2% detrital clay
Tr amorphous ferruginous aggregates

CONSOLIDATION: Very soft.

Explanatory notes in chapter 2

Site 258 Hole A Core 3 Cored Interval: 28.5-38.0 m

AGE	FORAMS ZONE	NANNOS ZONE	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
QUATERNARY	N22-N23		AG	0			1	0.5	VOID		*	2.5Y 7.5/0 lt gy
			AG	0				1.0	VOID			
									VOID			2.5Y 7.5/0
UPPER PLIOCENE	N21	NN19	AG	0			2					
			AG	0							* CC GZ	
			AG	0							*KE HO	5Y 8/1.5 yel-wh
			AG	0	AG							2.5Y 7.5/0 lt gy
			AG	0								
			AG	0								
			AG	0	AG		3				*	[5GY 5/1 3 x 2 cm patch]
			AG	0								
			AG	0								
			AG	0								
			AG	0								
			AG	0	AG		4					
			AG	0								
			AG	0								
			AG	0								
			AG	0								
			AG	0			5				*	
			AG	0							CC GZ	[2 x 5 cm 5Y 8/1.5 patches]
			AG	0								
			AG	0	AG							5GY 5/1 gnsh gy
			AG	0			6					2.5Y 7.5/0
			AG	0							*	[6 x 3 cm 5Y 8/1.5]
			AG	0					VOID			
			AG	0	AG							
			AG	0							*	[typical 5Y 6/2 lt ol gy mottle, 1 x 2 cm
			AG	0	AG		Core Catcher				*	5GY 8/1 + 5G 8/1

COCCOLITH OOZE, predominantly light gray, with very minor light gray, yellowish white and greenish gray; in part mottled light olive gray (mottles 1 x 2 cm); sponge spicule bearing, and variably micarb- and/or foram-bearing.

TEXTURE: Sand 13-30%
Silt 27-28%
Clay 43-60%

COMPOSITION:

62-89% coccoliths
6-20% forams
2- 5% micarb
3- 8% sponge spicules
2- 3% detrital clay
Tr glauconite
Tr ferrug. aggreg. in Sec. 6 and core catcher, less common traces of mica
One trace occurrence of radiolarians.

Total Carbon: 10.4-10.9%
Organic Carbon: .1%
Calcium Carbonate: 86-90%

CONSOLIDATION: Soft.

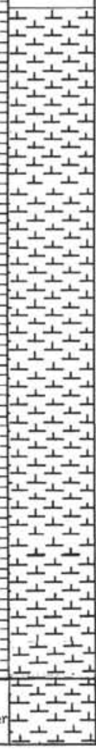
Explanatory notes in chapter 2

Site 258 Hole A Core 4 Cored Interval: 38.0-47.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS
UPPER PLIOCENE	N21	NN19	AG	0	AG		1	0.5, 1.0
			AG	0			2	
			AG	0				
			AG	0				
			AG	0	AG			
			AG	0				
			AG	0	AG			
			AG	0			3	
			AG	0				
			AG	0				
			AG	0				
			AG	0				
			AG	0			4	
			AG	0				
			AG	0				
MIDDLE PLIOCENE	N20		AG	0				
			AG	0				
			AG	0			5	
			AG	0				
			AG	0				
			AG	0	AG		Core Catcher	

LITHOLOGY

VOID



DEFORMATION

LITHO. SAMPLE: * ; * ; *KE HO CC GZ ; * ; * ; * ; *CC GZ XM ; * ; *

LITHOLOGIC DESCRIPTION

N8 v. lt gy
5YR 7/1 purp gy
5B 9/1 bluish wh
5GY 8/1 lt gnsh gy & N6 med lt gy
5B 9/1 bluish white
5GY 6/1 gnsh gy
N8 to 5B 9/1
5GY 6/1
N8 to 5B 9/1
5B 7/1
N7

Predominantly bluish white and very light gray, with very minor light greenish gray and medium light gray COCCOLITH OOZE, foram-bearing to foram-rich; sponge spicule-bearing and locally micarb-bearing. If mottles are present they are obscured by the severe drilling deformation.

TEXTURE: Sand 24%
Silt 31%
Clay 45%

COMPOSITION:

54-86% coccoliths
6-25% forams
4- 8% micarb
2-10% sponge spicules
Tr- 1% glauconite
Tr ferruginous aggregates
2% detrital clay
Common traces of mica
Less common trace to 1% quartz
Pyrite framboid traces in core catcher

Total Carbon: 10.9%
Organic Carbon: .1%
Calcium Carbonate: 90%

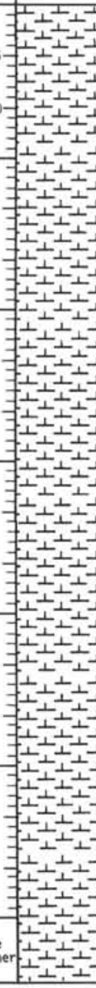
CONSOLIDATION: Soft.

Explanatory notes in chapter 2

Site 258 Hole A Core 5 Cored Interval: 47.5-57.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	METERS
MIDDLE PLIOCENE	N20	NN16	AG	0	AG		1	0.5, 1.0
			AG	0				
			AG	0				
			AG	0				
			AG	0			2	
			AG	0				
			AG	0				
			AG	0	AG			
			AG	0				
			AG	0	AG			
			AG	0				
			AG	0				
			AG	0			3	
			AG	0				
			AG	0				
			AG	0				
			AG	0	AG		4	
			AG	0				
			AG	0				
			AG	0				
			AG	0				
			AG	0				
			AG	0	AG		5	
			AG	0				
			AG	0				
			AG	0				
			AG	0				
			AG	0			6	
			AG	0	AG			
			AG	0				
			AG	0	AG		Core Catcher	

LITHOLOGY



DEFORMATION

LITHO. SAMPLE: * ; * ; CC GZ KE ; * ; * ; * ; CC GZ XM ; HO ; * ; *

LITHOLOGIC DESCRIPTION

5B 9/1 bluish white throughout; whole core intensely disturbed and homogenized

[patch of N6 med lt gy 2 x .5 cm]

5B 9/1

Bluish white COCCOLITH OOZE, predominantly foram-rich (foram-bearing in Secs. 1 and 6 and core catcher); sponge spicule - and micarb-bearing.

TEXTURE: Sand 10-13%
Silt 34-39%
Clay 51-54%

COMPOSITION:

81-87% coccoliths
2- 7% forams
5-10% micarb
1- 4% sponge spicules; less in lower half of core
2% detrital clay
Common traces of glauconite
Common traces of ferruginous aggregates
Rare traces of heavy minerals and pyrite framboids
Tr quartz

NOTE: Throughout core, traces of DISCOASTERS; in core catcher, 1%.

Total Carbon: 11.0%
Organic Carbon: .1%
Calcium Carbonate: 91%

CONSOLIDATION: Soft.

Explanatory notes in chapter 2

Site 258 Hole A Core 6 Cored Interval: 66.5-76.0 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	LITHOLOGY	LITHO. SAMPLE	COLOR / NOTES
	N19	NN13	AG	0			1	VOID	*	5B 9/1 bluish white
			AG	0						[1 cm N4]
			AG	0						[.5 cm N4]
			AG	0					*	[.5 x 1 cm N4]
			AG	0						[2 x 4 cm semilith chunk]
			AG	0			2	VOID		5B 9/1
			AG	0			3	VOID		5B 9/1
			AG	0	AMO				GZ CC XM	5G 8/1 lt gn gy
			AG	0					*	5GY 6/1 gnsh gy
			AG	0					*	
			AG	0						
		NN12	AG	0	AMO		4		*	5YR 7/1
			AG	0					*	5B 9/1, sl mott w/5P 4/2 lt prplsh gy [5P 5/2 pale gysh purple]
			AG	0						
			AG	0						
			AG	0						
			AG	0	AGO		5		CC GZ XM HO KE	5B 9/1, no mottling
			AG	0						
			AG	0						5GY 6/1 gnsh gy
			AG	0						[3 x 7 cm 5B 9/1]
			AG	0			6			5B 9/1 w/intense 5GY 6/1 mottling, mottles 1-2 cm dia.
			AG	0	CMO				*	
			AG	0						
			AG	0	AGO		Core Catcher		*	5G 7/1 lt gnsh gy

LITHOLOGIC DESCRIPTION

Predominantly bluish gray COCCOLITH OOZE, typically foram-bearing and locally micarb rich; with minor grayish green COCCOLITH OOZE, micarb rich and sponge and foram bearing.

TEXTURE: Sand 4-8%
Silt 30-36%
Clay 57-65%

COMPOSITION:

68-99% coccoliths (ave. 80%); Tr-1% Discos.
1-10% forams (ave. 5%)
Tr-20% micarb (ave. 9%)
Tr- 3% sponge spicules (ave. 2%)
1- 4% detrital clay (ave. 2%)
Tr- 1% glauconite
Tr- 1% pyrite, in part silt-sized framboids
Tr- 2% quartz
Rare traces of mica

Total Carbon: 10.7-11.0%
Organic Carbon: .1%
Calcium Carbonate: 88-91%

CONSOLIDATION: "Semi-stiff".

Explanatory notes in chapter 2

Site 258 Hole A Core 7 Cored Interval: 95.0-104.5 m

AGE	ZONE: FORAMS	ZONE: NANNOS	FOSSIL CHARACTER: FORAMS	DISSOL. EFFECTS	NANNOS	SILICEOUS FOSS. ETC.	SECTION	LITHOLOGY	LITHO. SAMPLE	COLOR / NOTES
UPPER MIOCENE	N18		AG	0			1	VOID	*	[Mixed 5B 9/1] 5GY 8/1 lt gnsh gy
			AG	0						[moderately mottled w/ 5B 9/1, 0.5 cm mottles]
			AG	0						
			AG	0			2	VOID		
			AG	0						5GY 8/1
			AG	0	CGO		3		CC GZ KE XM	
			AG	0						
			AG	0						
			AG	0					*	5GY 7/1 gnsh gy
			AG	0						
			AG	0			4			
			AG	0						
			AG	0					*	
			AG	0						5GY 6/1
			AG	0						
			AG	0	CGO		5		CC GZ	
			AG	0						
			AG	0					*	
			AG	0-1	CGO		Core Catcher		*	5G 8/1 lt gnsh gy

LITHOLOGIC DESCRIPTION

COCCOLITH OOZE. In sections 1, 2 and 3, light greenish gray, foram-bearing and sponge spicule- and micarb-rich. In Secs. 4 and 5, greenish gray, foram-, micarb- and sponge spicule-rich.

SECTIONS 1-3:

TEXTURE: Sand 22-34%
Silt 52-54%
Clay 14-24%

COMPOSITION:

73-74% coccoliths
10-12% micarb
2- 4% forams
10% sponge spicules
2% detrital clay
Traces: glauconite, pyrite
One 1% quartz occurrence
One trace of mica
One trace of discoasters

SECTIONS 4 and 5:

TEXTURE: Sand 35%
Silt 15%
Clay 50%

COMPOSITION:

43-44% coccoliths
12% micarb
10% forams
25% sponge spicules
2- 3% quartz
5- 6% detrital clay
Tr- 1% glauconite
Traces of mica, pyrite and discoasters

Total Carbon: 8.6%
Organic Carbon: .1%
Calcium Carbonate: 70-71%

CONSOLIDATION: Stiff where less deformed.

Explanatory notes in chapter 2

Site 258 Hole A Core 8 Cored Interval: 104.5-114.0 m

AGE | ZONE (FORAMS, NANNOS) | FOSSIL CHARACTER (FORAMS, DISSOL. EFFECTS, NANNOS, SILICEOUS FOSS. ETC.) | SECTION | METERS | LITHOLOGY | DEFORMATION | LITHO. SAMPLE | LITHOLOGIC DESCRIPTION

Age: UPPER MIOCENE (Forams zone N18); SANTONIAN (Core Catcher)

Fossil character (top to bottom): AG 0-1 AG; AG 0-1; AG 1; AG 1; AG 1 CM; AG 1; AG 1 CM; AG 1; AG 1; AG 1; AG 1; AG 1; AG 1; AG 1 CMO; AG 1; AG 1; AG 1; AG 1; AG 1; AG 1 AGO; AG; AM 1 AG

Section 1: 0.5, 1.0 — VOID
Section 2 — VOID (lower part)
Section 4 — VOID (top)
Litho. samples: CC GZ XM (Sec. 4–5); KE HO (Sec. 5)
Core Catcher

Mixed 5B 9/1 bluish wh N8 v. lt gy 5P 6/2 pale purp. (last minor)

Dom. N8 to N7, lesser 5B 9/1

5B 9/1

5GY 7/1 -6/1 greenish gray

At contact: 2 pieces 2 x 3 cm 5Y 7/2 CHERT

10YR 8/2 very pale orange; stiff; numerous small drill cuttings of chert.

10YR 8/2

COCCOLITH OOZE, light gray and very light gray in the upper half, greenish gray in the lower half except for the basal 20 cm interval. Variably sponge-spicule bearing or rich, micarb-bearing or rich, and/or foram bearing; locally, rich enough in micarb to be a MICARB-COCCOLITH OOZE in the greenish-gray interval. At 130 cm in Sec. 6, two 3 x 2 cm pieces of fractured yellowish gray CHERT beneath which is the basal 20 cm of very pale orange foram and micarb bearing COCCOLITH OOZE, which differs from the material above in having no sponge spicules, pyrite or glauconite.

TEXTURE (major part of core):
Sand 61%
Silt 25%
Clay 14%

COMPOSITION:

71-85% coccoliths (37-52% in gnsh gy ooze)
5-12% forams
5-15% micarb (20-35% in greenish gray ooze)
2- 3% sponge spic. (10% in gnsh gy ooze)
Tr discoasters
Tr pyrite
Tr glauconite
2- 5% detrital clay
Tr quartz (2% in greenish gray ooze)
Rare traces feldspar, mica, fish debris.

Total Carbon: 9.5%
Organic Carbon: .1%
Calcium Carbonate: 79%

CONSOLIDATION: Stiff where undeformed.

Explanatory notes in chapter 2

Site 258 Hole A Core 9 Cored Interval: 114.0-123.5 m

AGE | ZONE (FORAMS, NANNOS) | FOSSIL CHARACTER (FORAMS, DISSOL. EFFECTS, NANNOS, SILICEOUS FOSS. ETC.) | SECTION | METERS | LITHOLOGY | DEFORMATION | LITHO. SAMPLE | LITHOLOGIC DESCRIPTION

Age: SANTONIAN

Fossil character (nannos, top to bottom): AGO; AGO; AGE; AG; AGE; AGE; AGE; AG

Section 1: 0.5, 1.0 — VOID
Section 5 — VOID (base)
Litho. samples: KE HO XM CC GZ (Sec. 2); CC GZ (Sec. 5)
Core Catcher

10YR 8/2 v. pale orange
5GY 8/1 lt grnsh gy with mixed minor 10YR 8/2
[2-3 cm patches 5GY 5/1 gnsh gy]

[2 x 7 cm SILIC LST 5Y 7/2 yelsh gy]

10YR 8/2 v. pale orange
[sl. mottl. 5Y 7/2 2 x 2 cm avg.]

5Y 7/2 yelsh-brnsh gy
[deformed layer 2.5Y 7/2 - 6/2 lt brnsh gy]

10YR 8/2 with fragments of 5Y 7/2 silic. lst.

10YR 8/2

Foram bearing COCCOLITH OOZE, predominantly light greenish gray in Secs. 1-3, predominantly very pale orange in Sections 4-6. In Sec. 3, one 2 cm thick layer of yellowish gray SILICIFIED LIMESTONE which delicately preserves the bioturbation of the unconsolidated lithologically equivalent matrix. Small drill cuttings of the same SILICIFIED LIMESTONE occur throughout the badly deformed core.

TEXTURE: Sand 6-26%
Silt 21-30%
Clay 53-64%

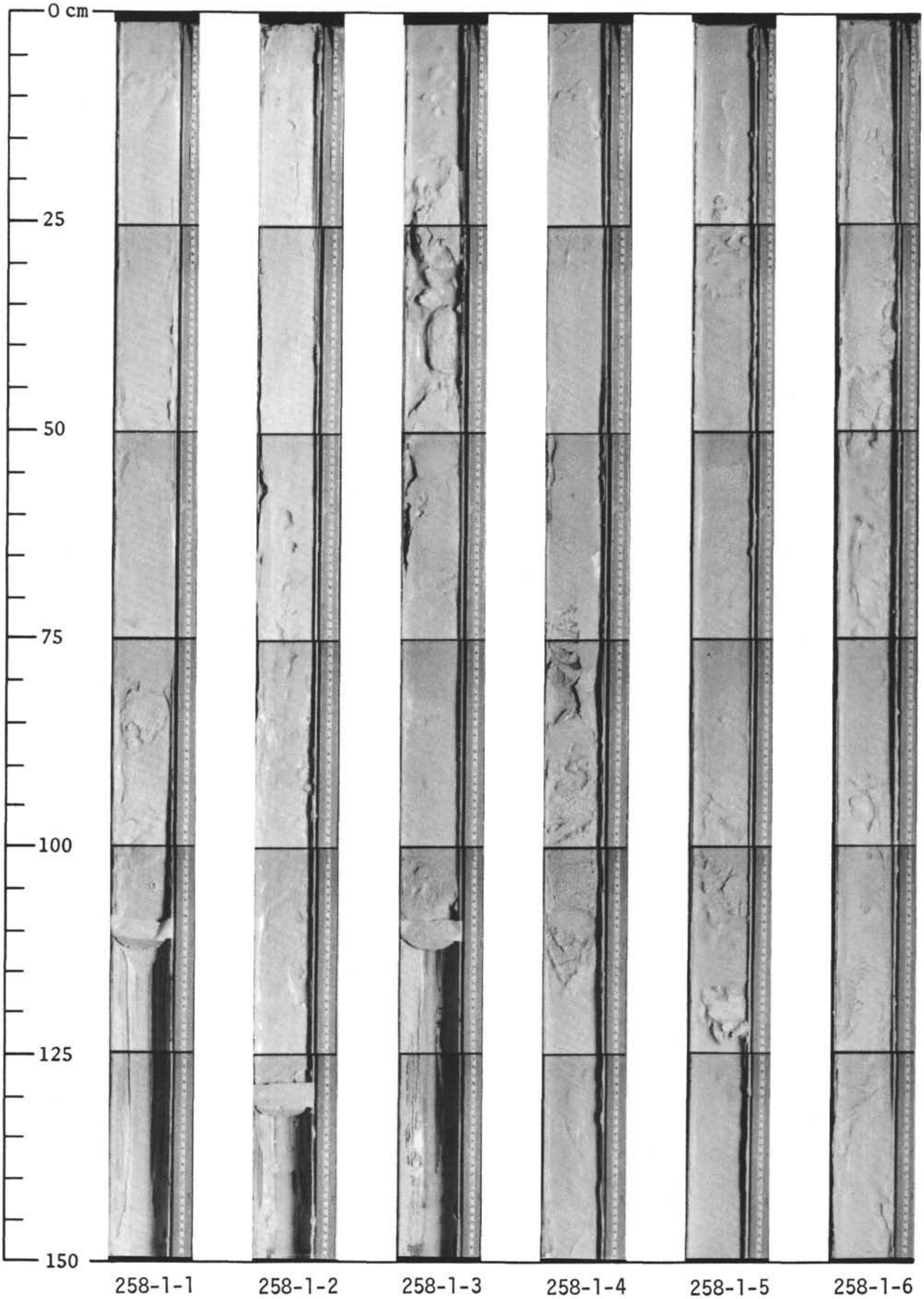
COMPOSITION:

88-91% coccoliths
3- 5% forams
6% micarb
1% detrital clay
Tr finely divided pyrite throughout
Uncommon traces of quartz
Rare traces of ferruginous amorphous matter
One 1% occurrence of zeolite
Very rare trace of glauconite
Single trace occurrences of sponge spicules and collophanous fish debris

Total Carbon: 8.2-9.8%
Organic Carbon: .1%
Calcium Carbonate: 68-81%

CONSOLIDATION: Stiff ooze; lithified silicified limestone.

Explanatory notes in chapter 2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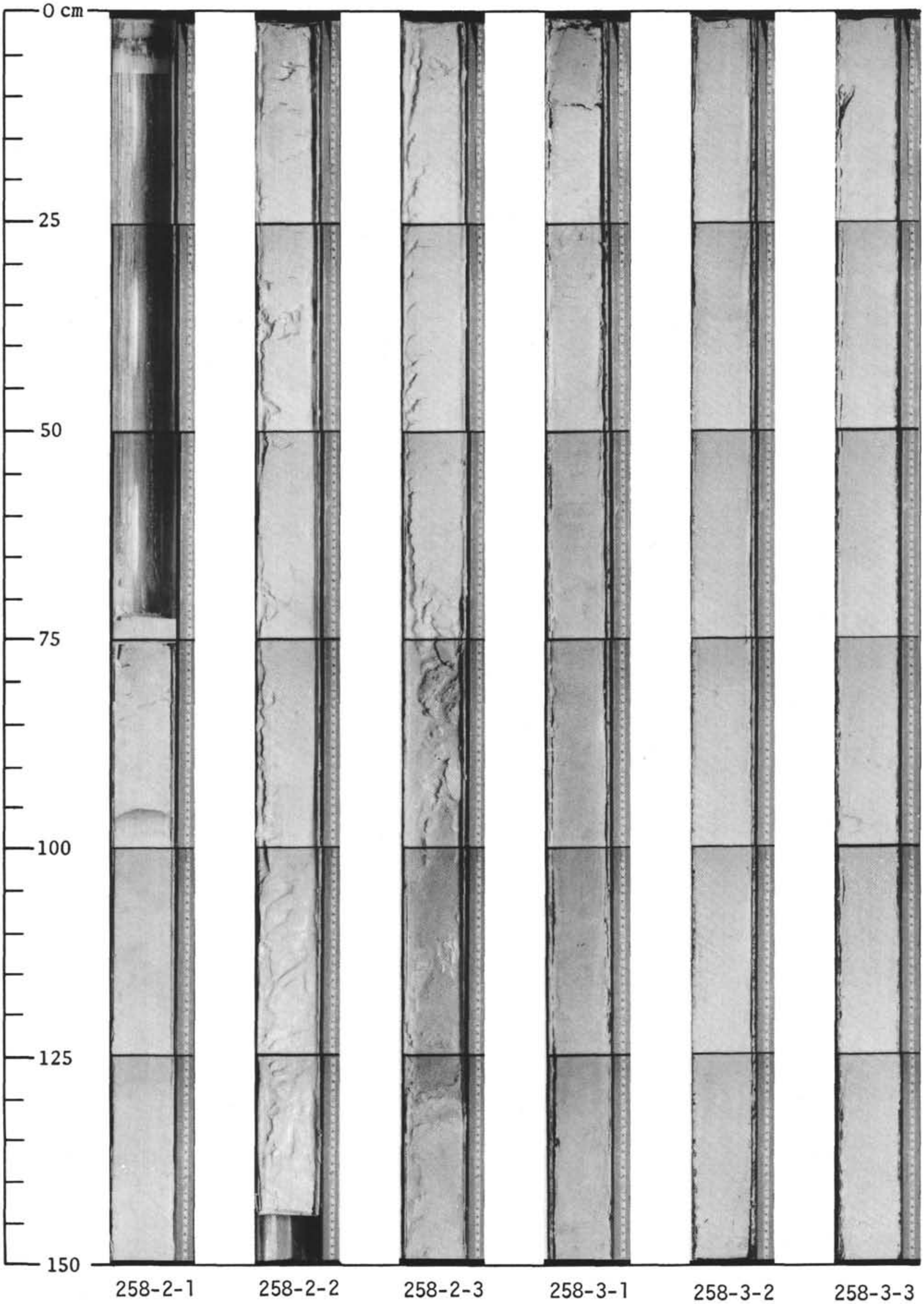
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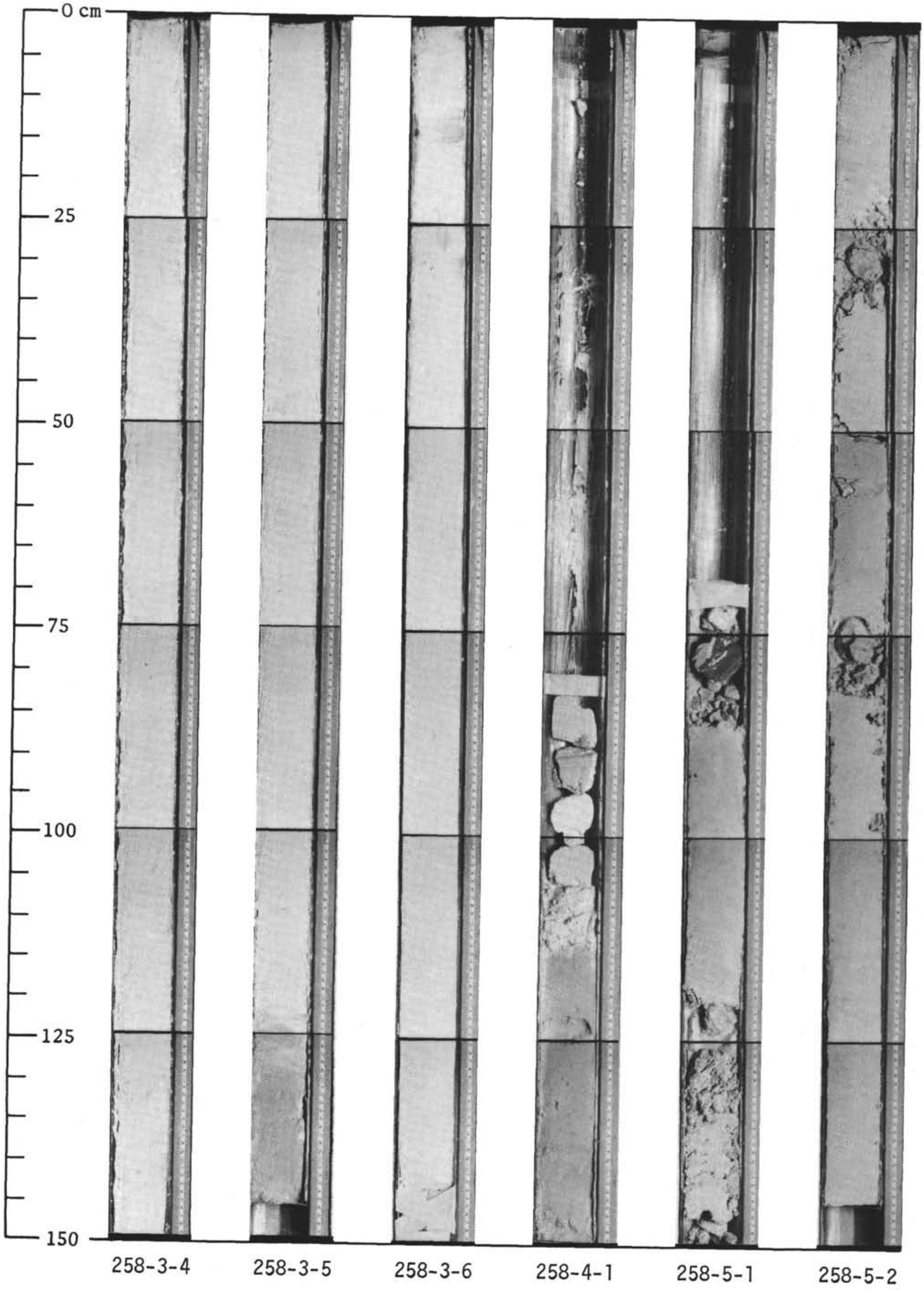
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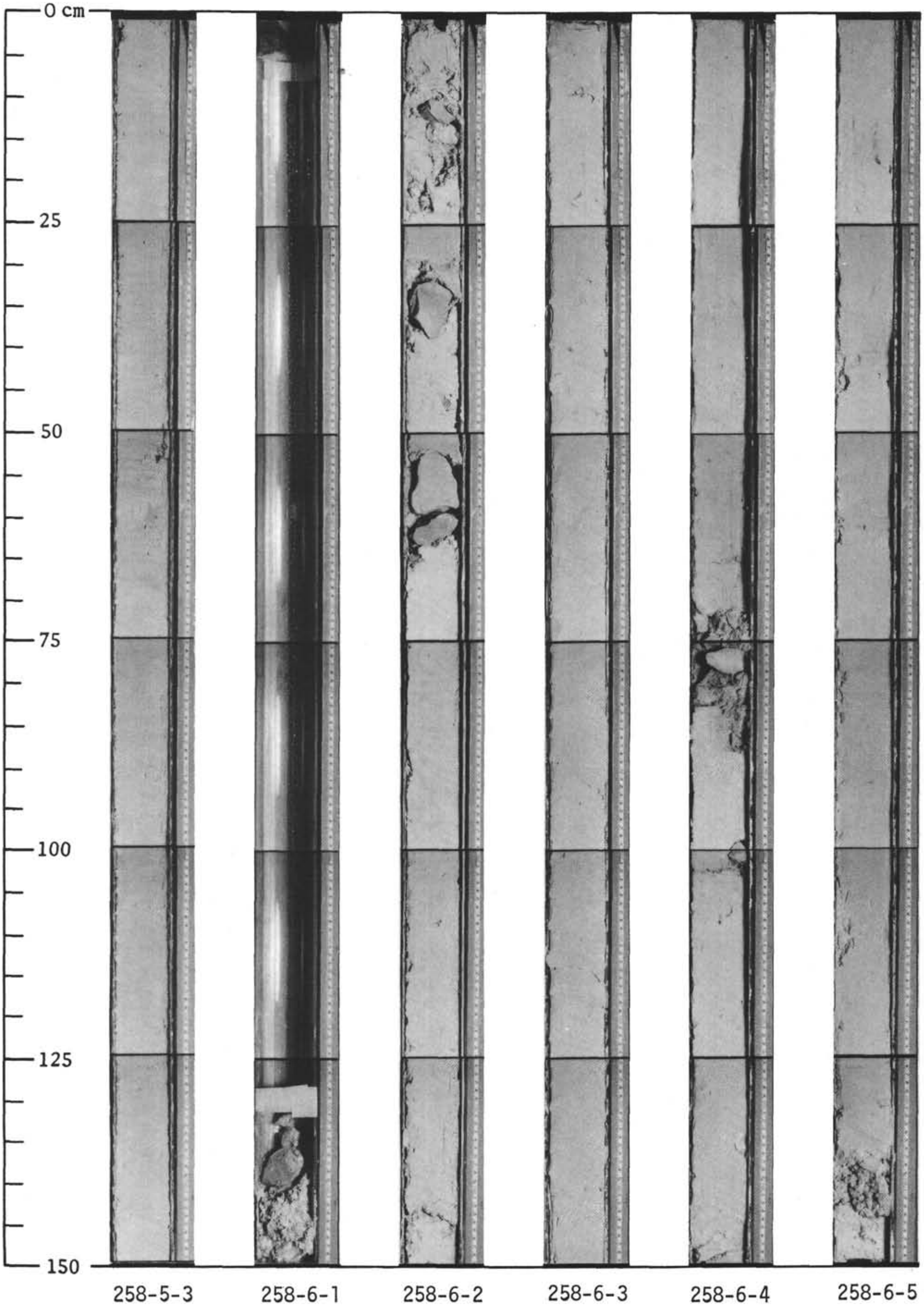
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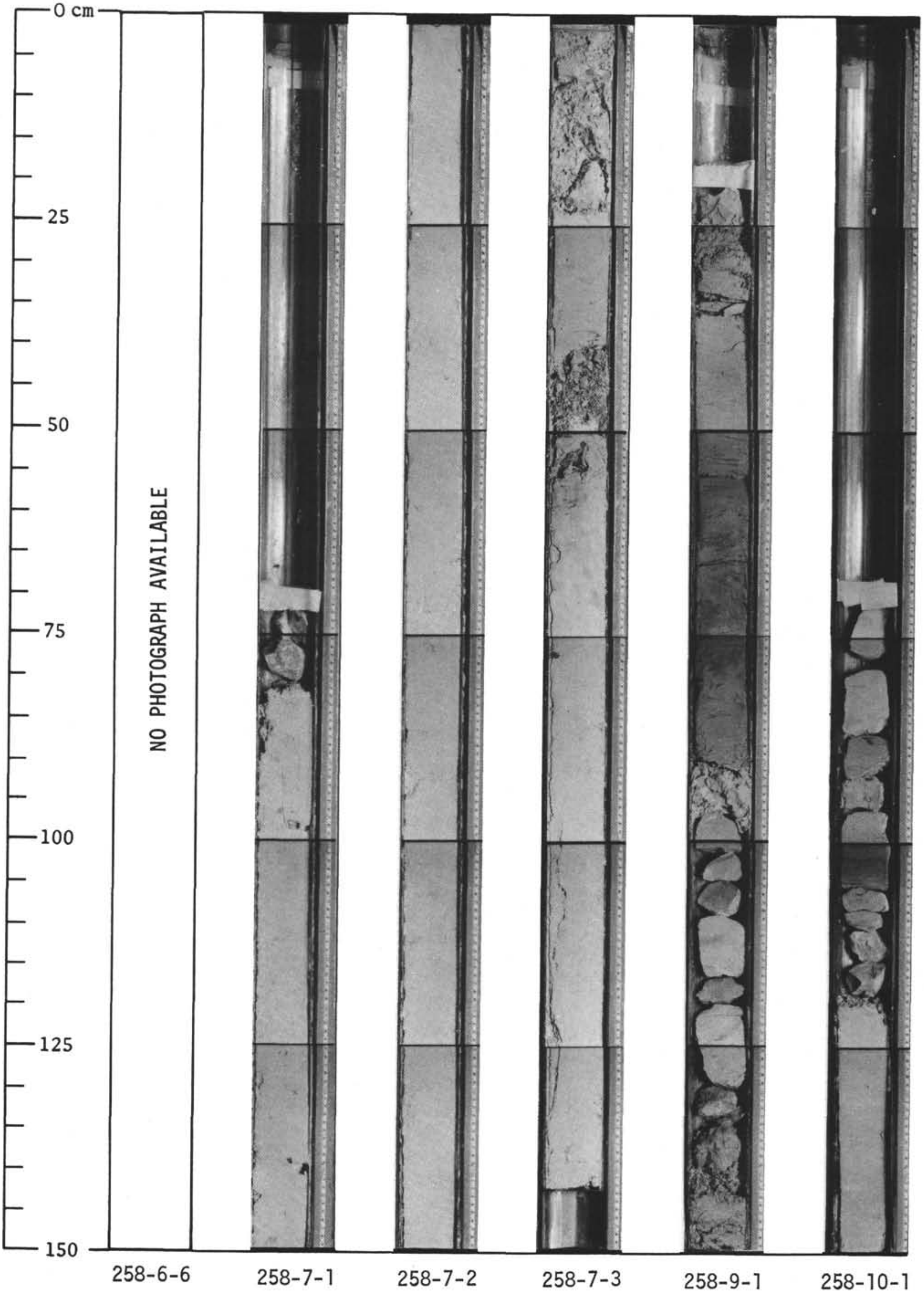
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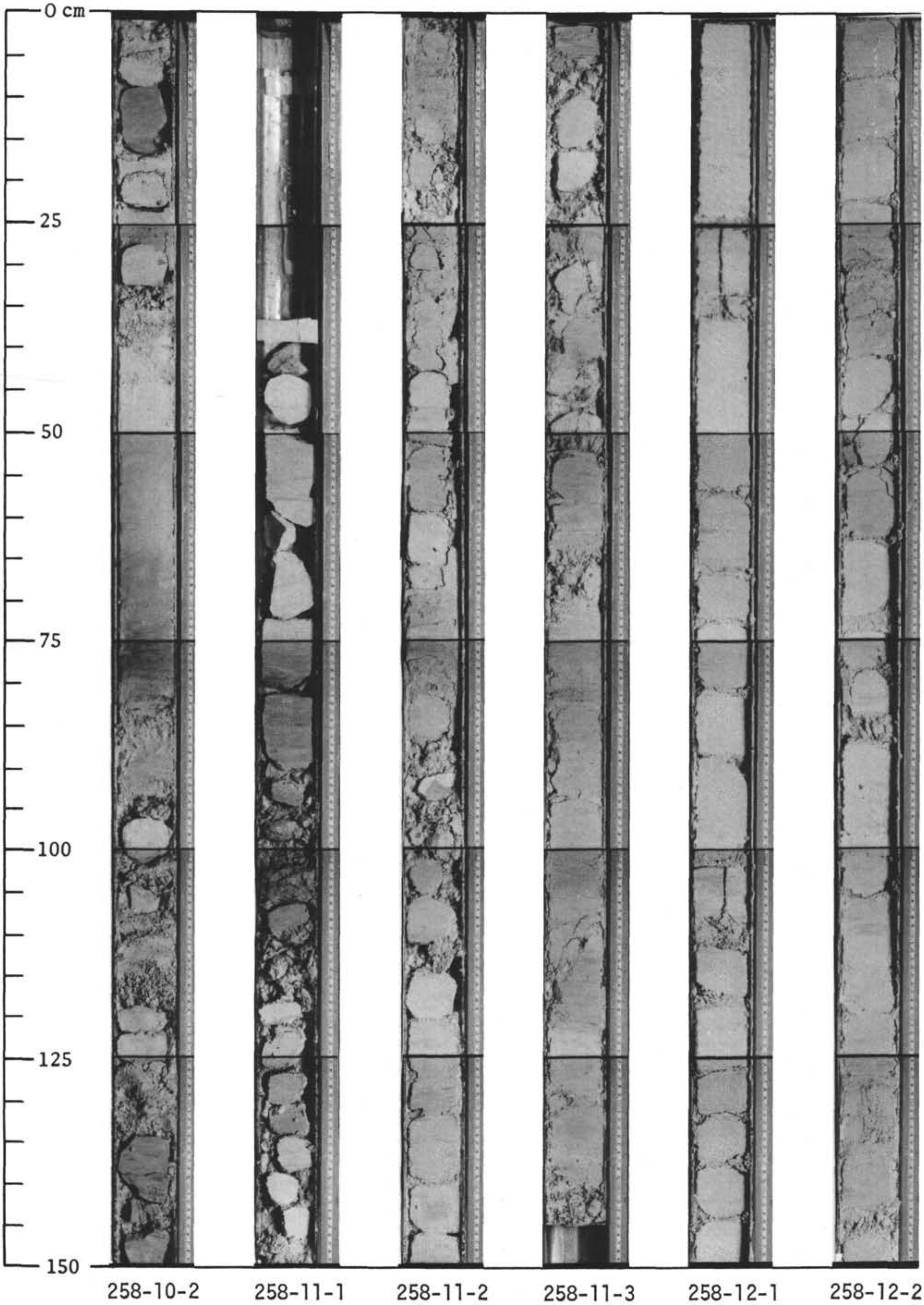
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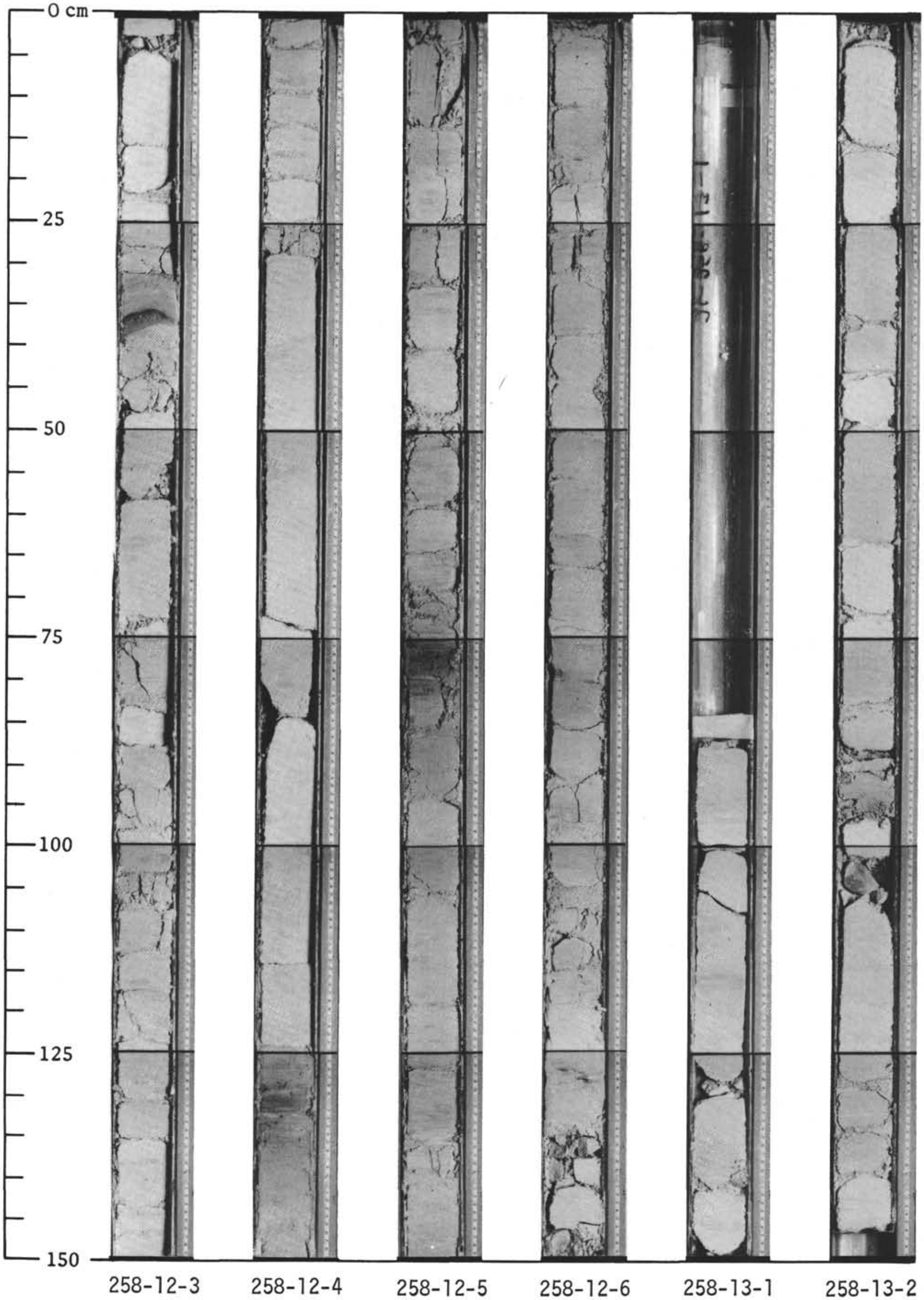
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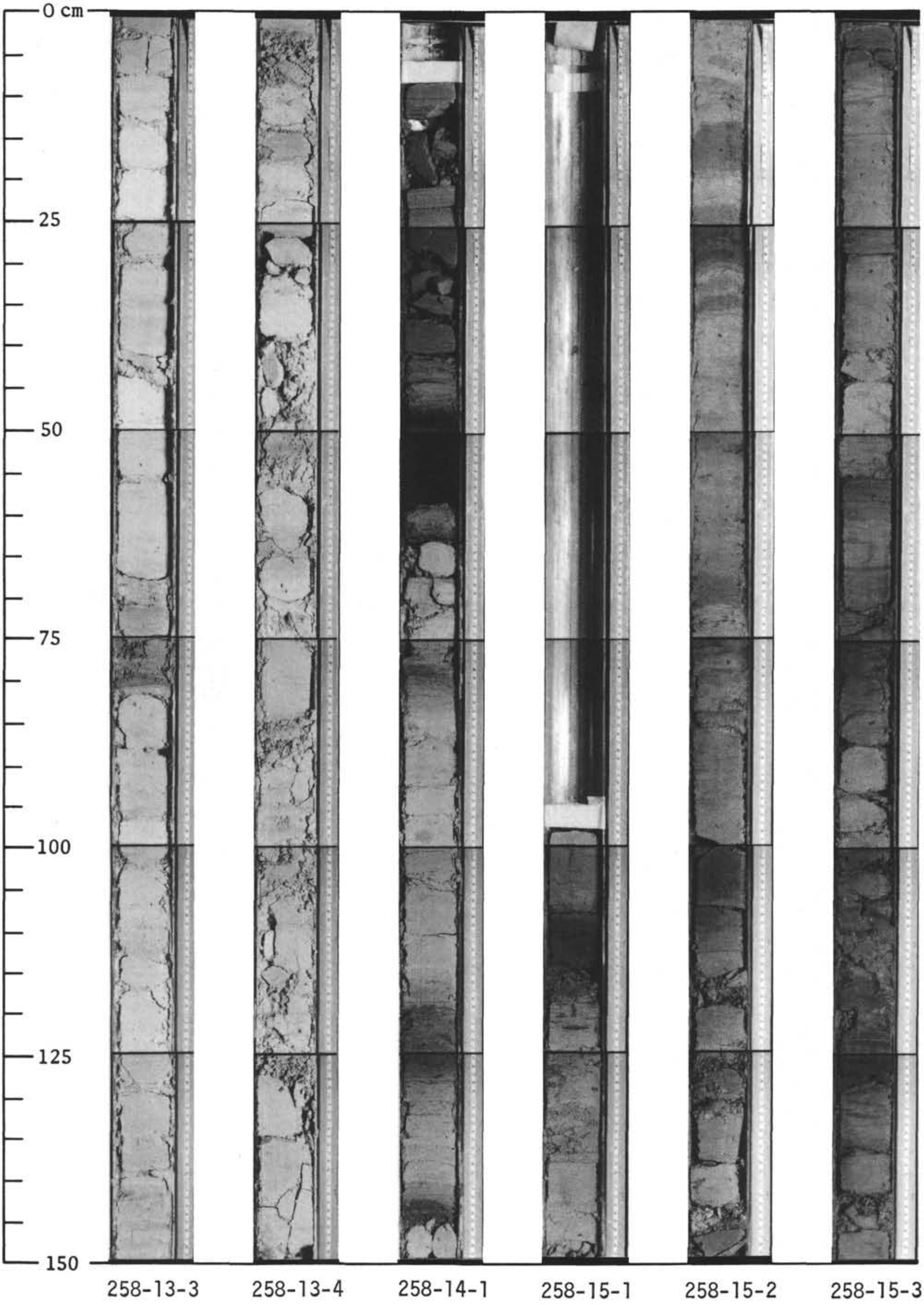
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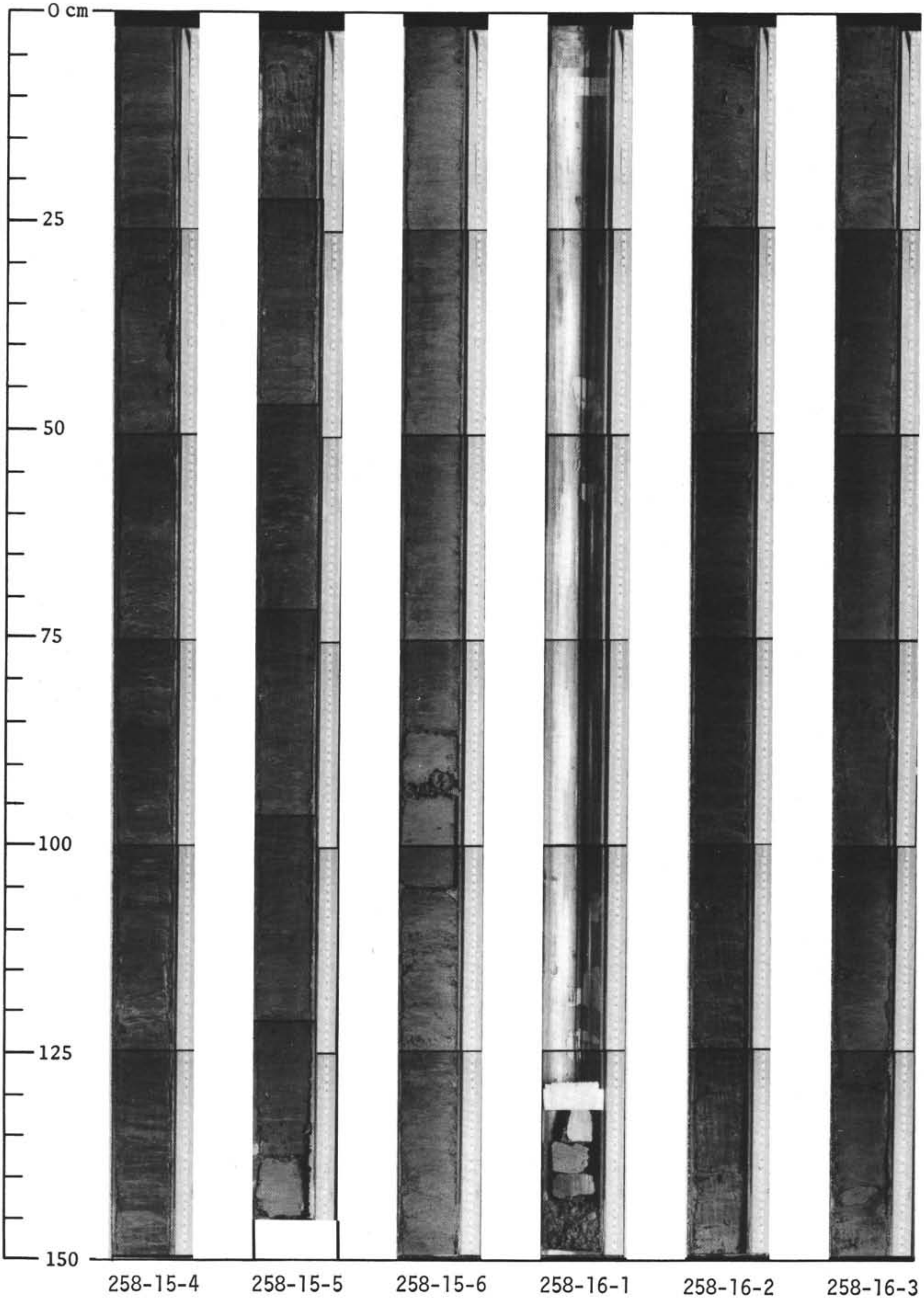
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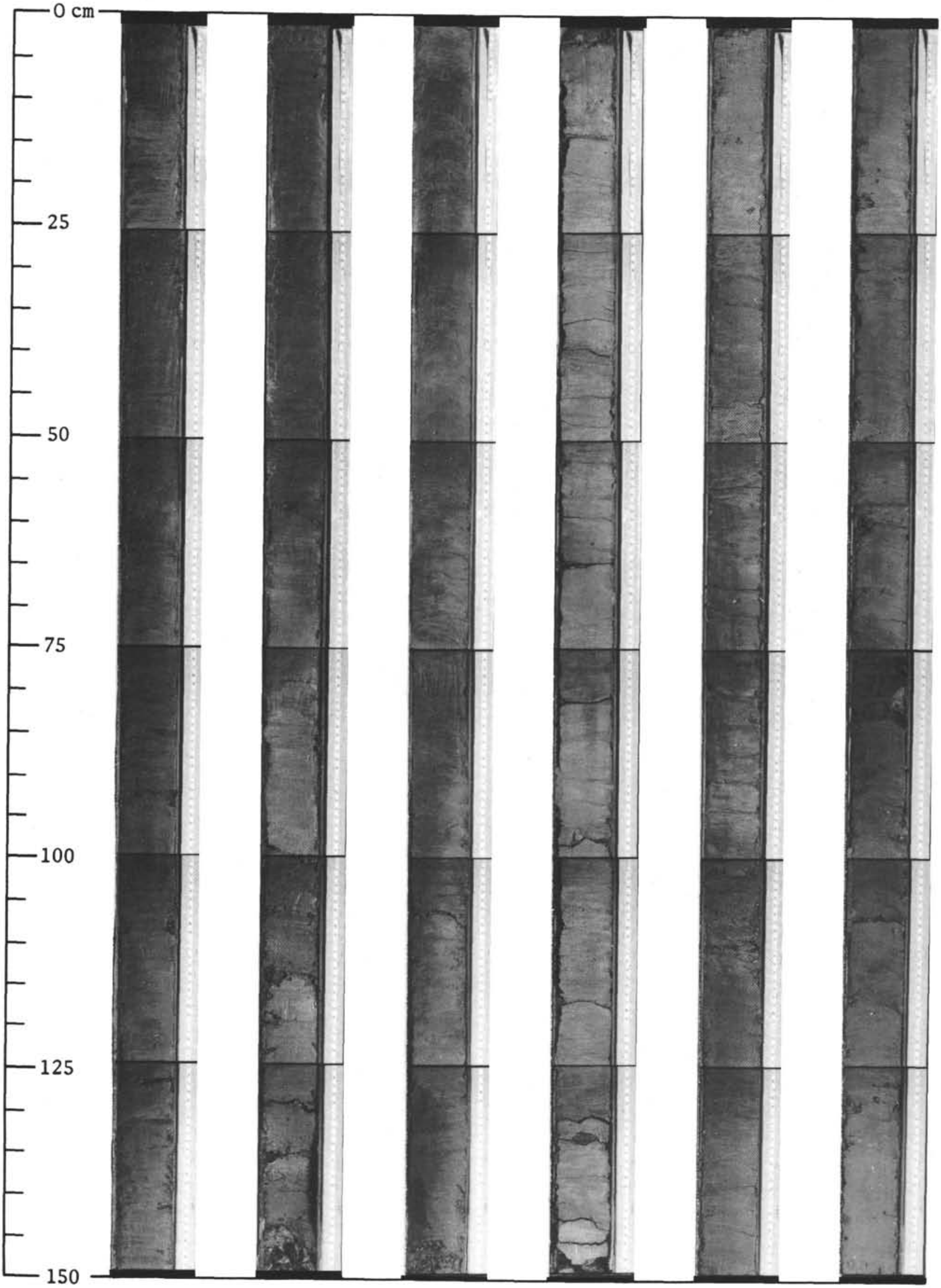

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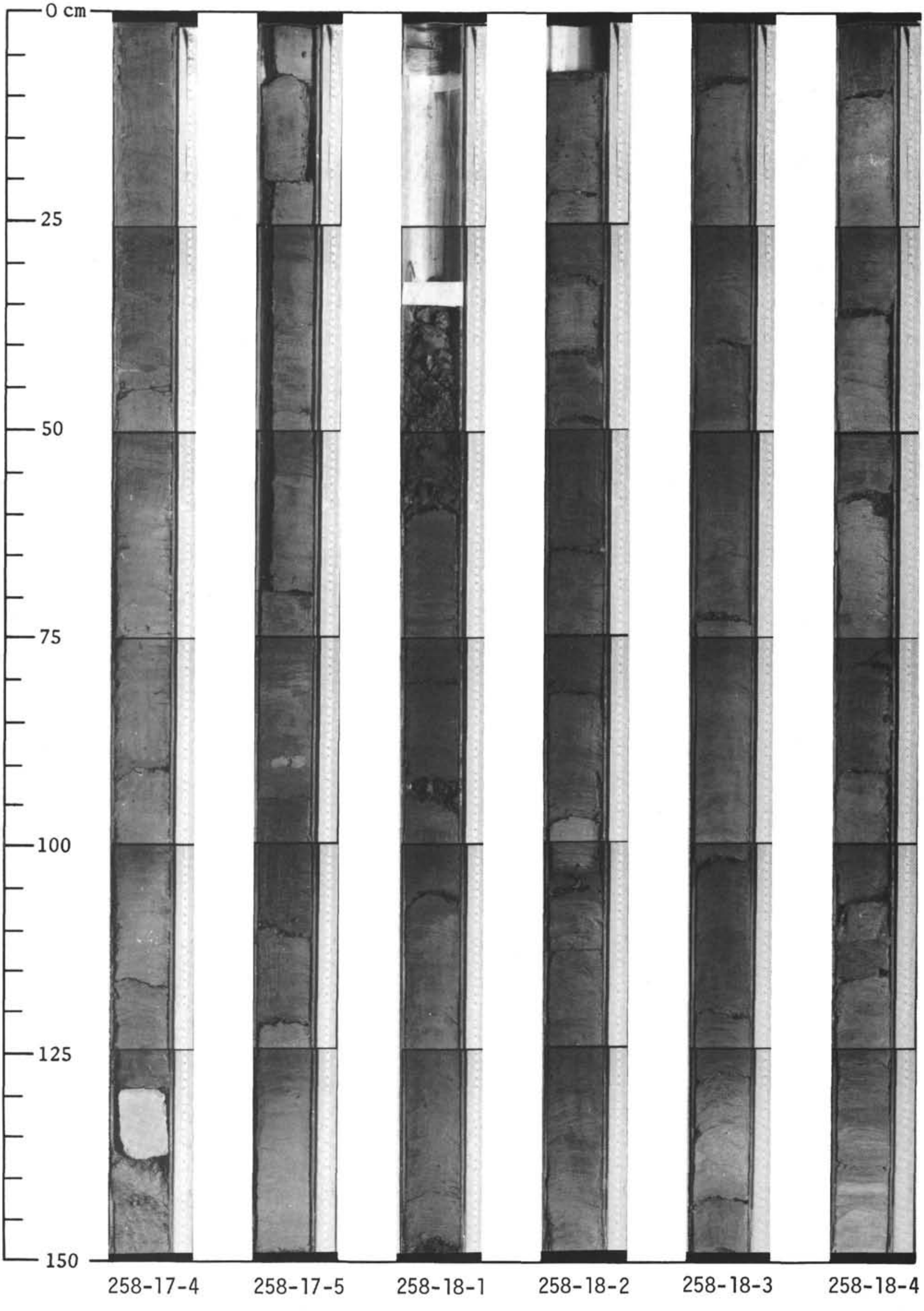
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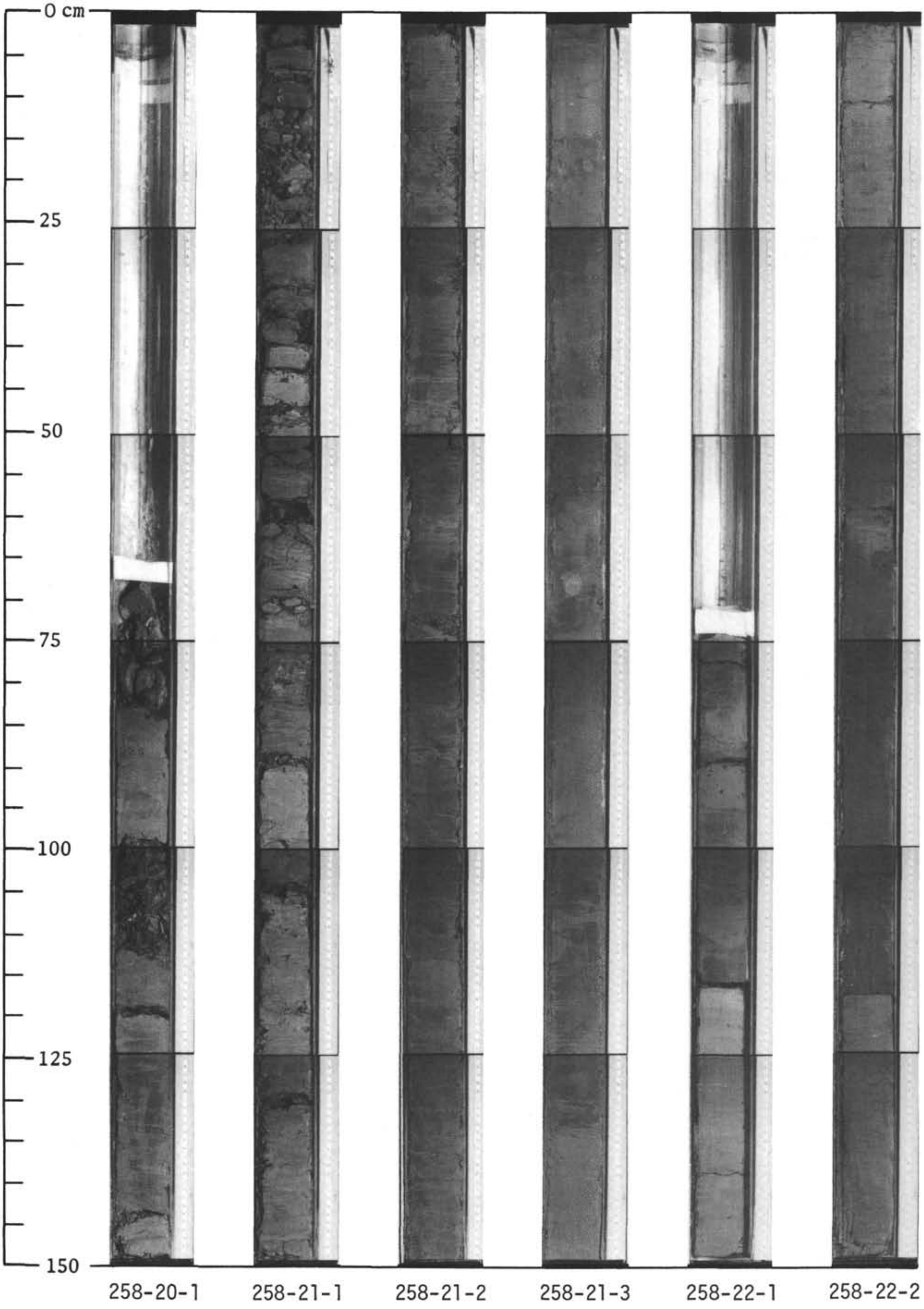
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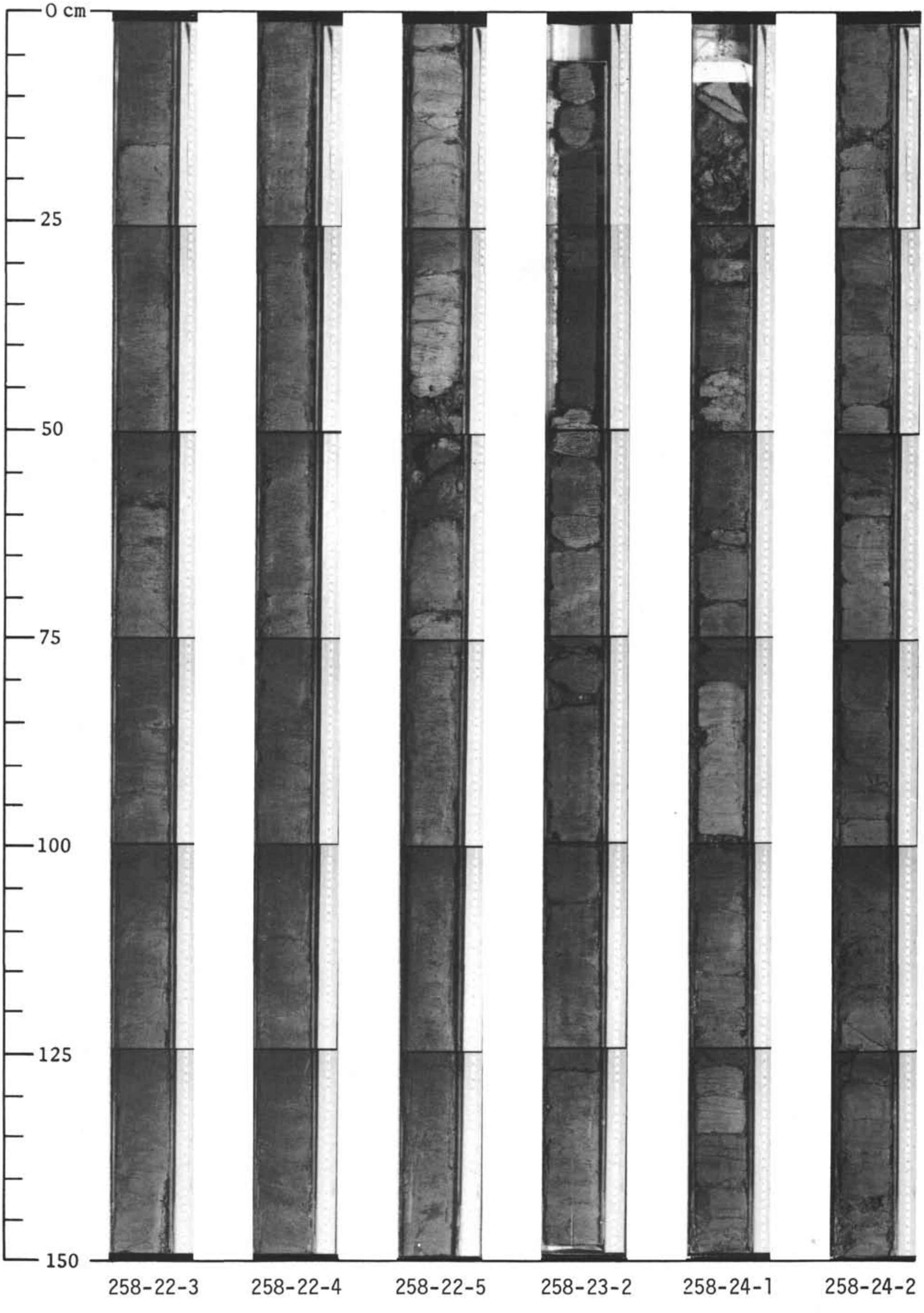
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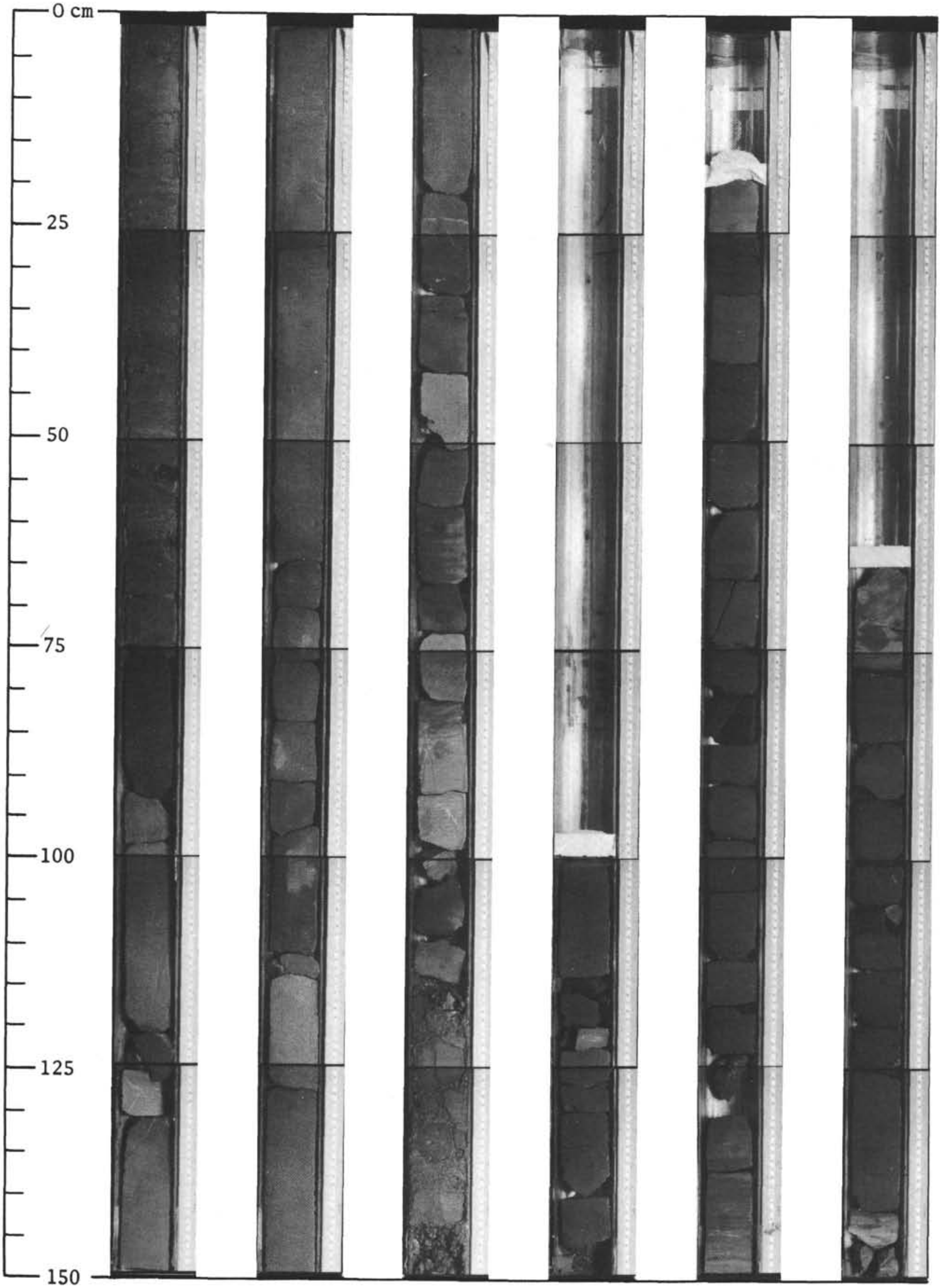

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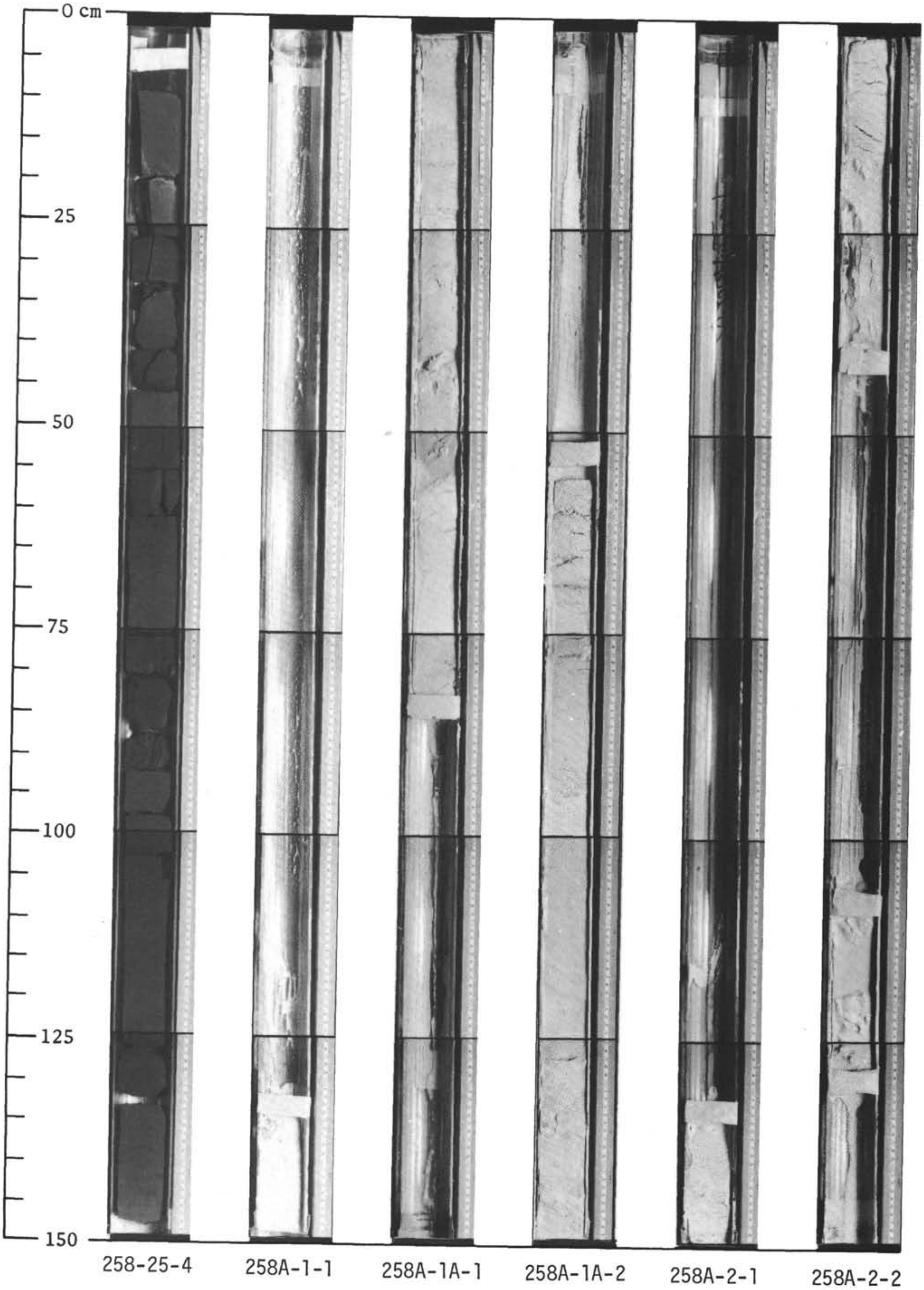
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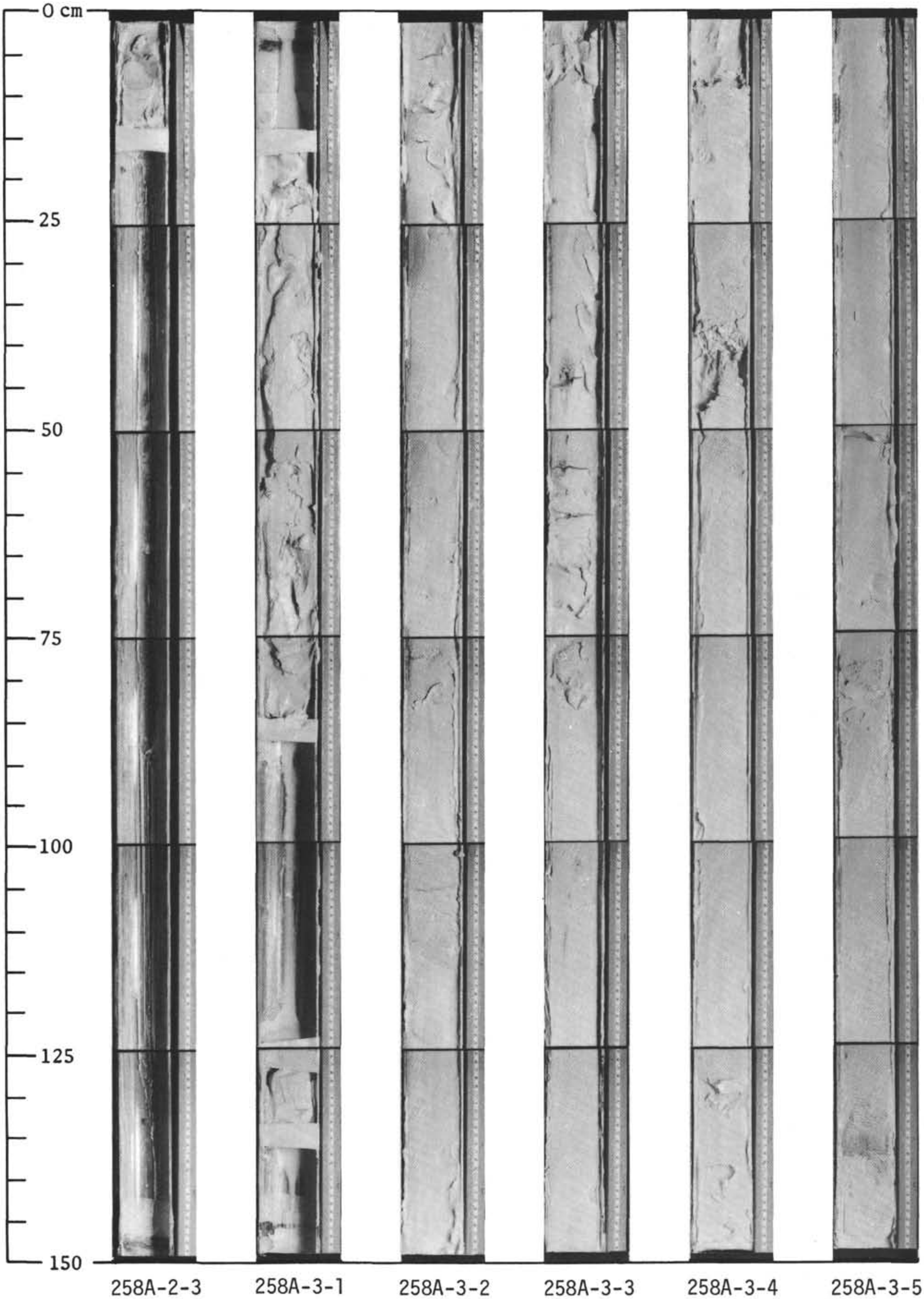
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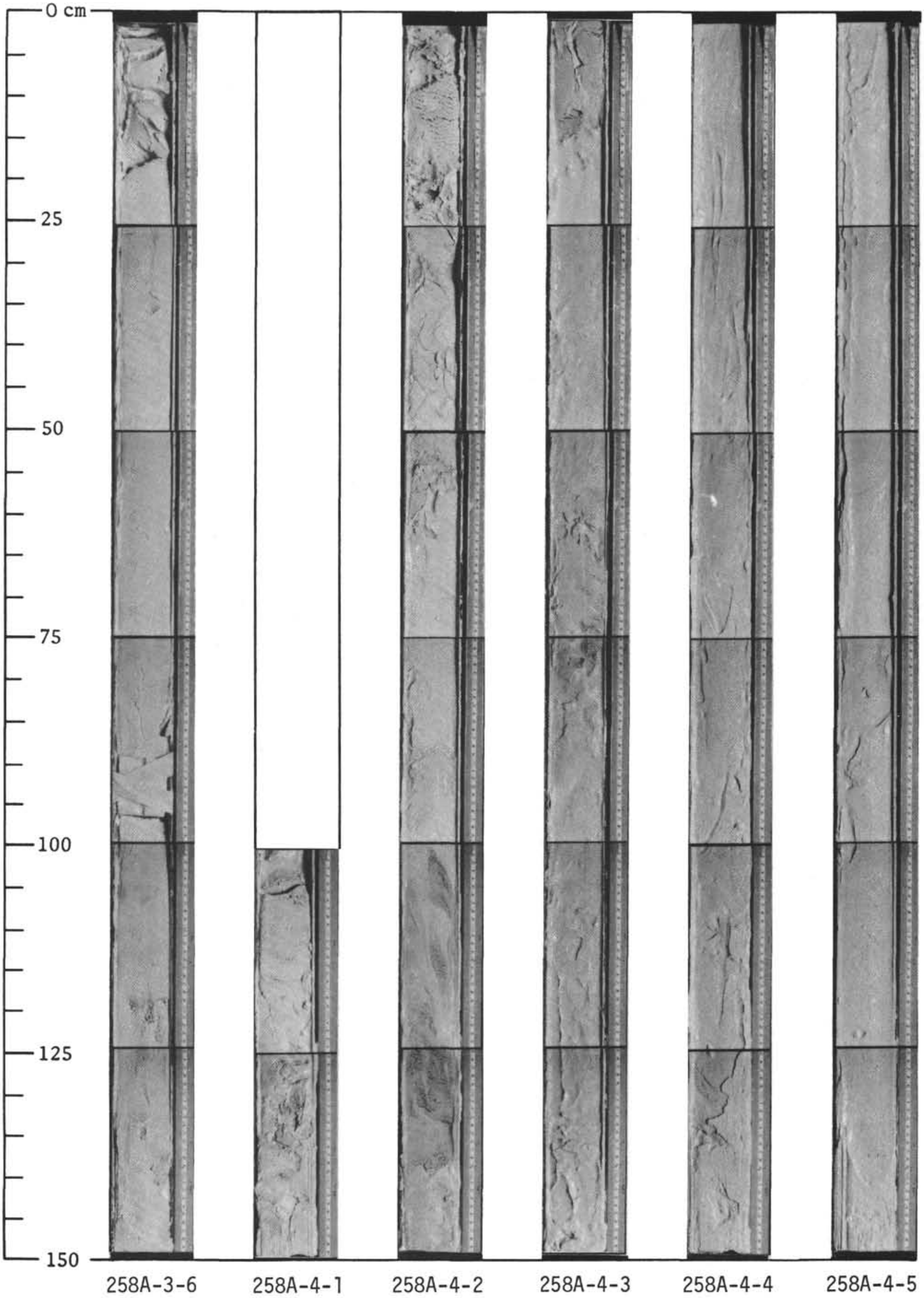
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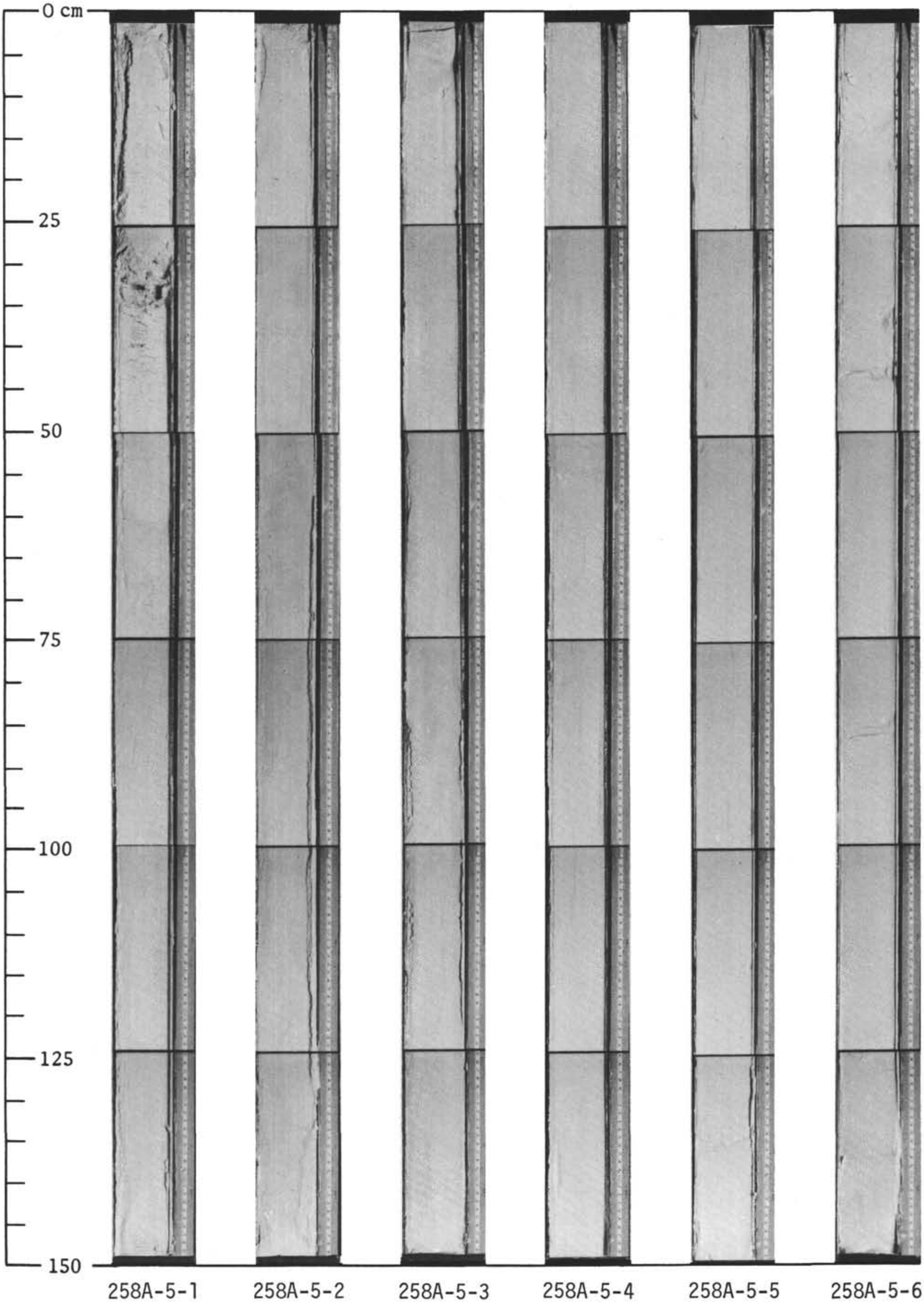
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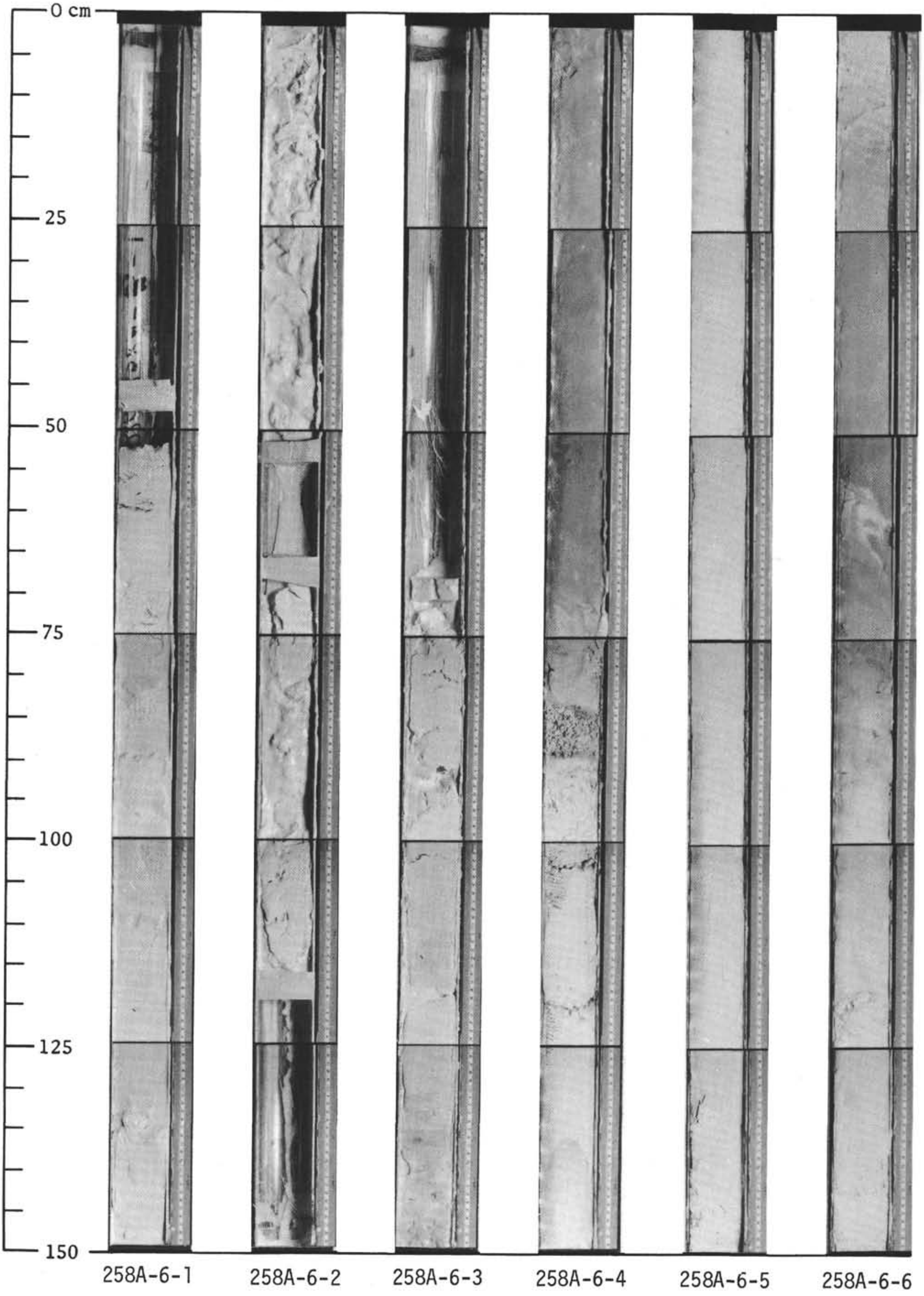
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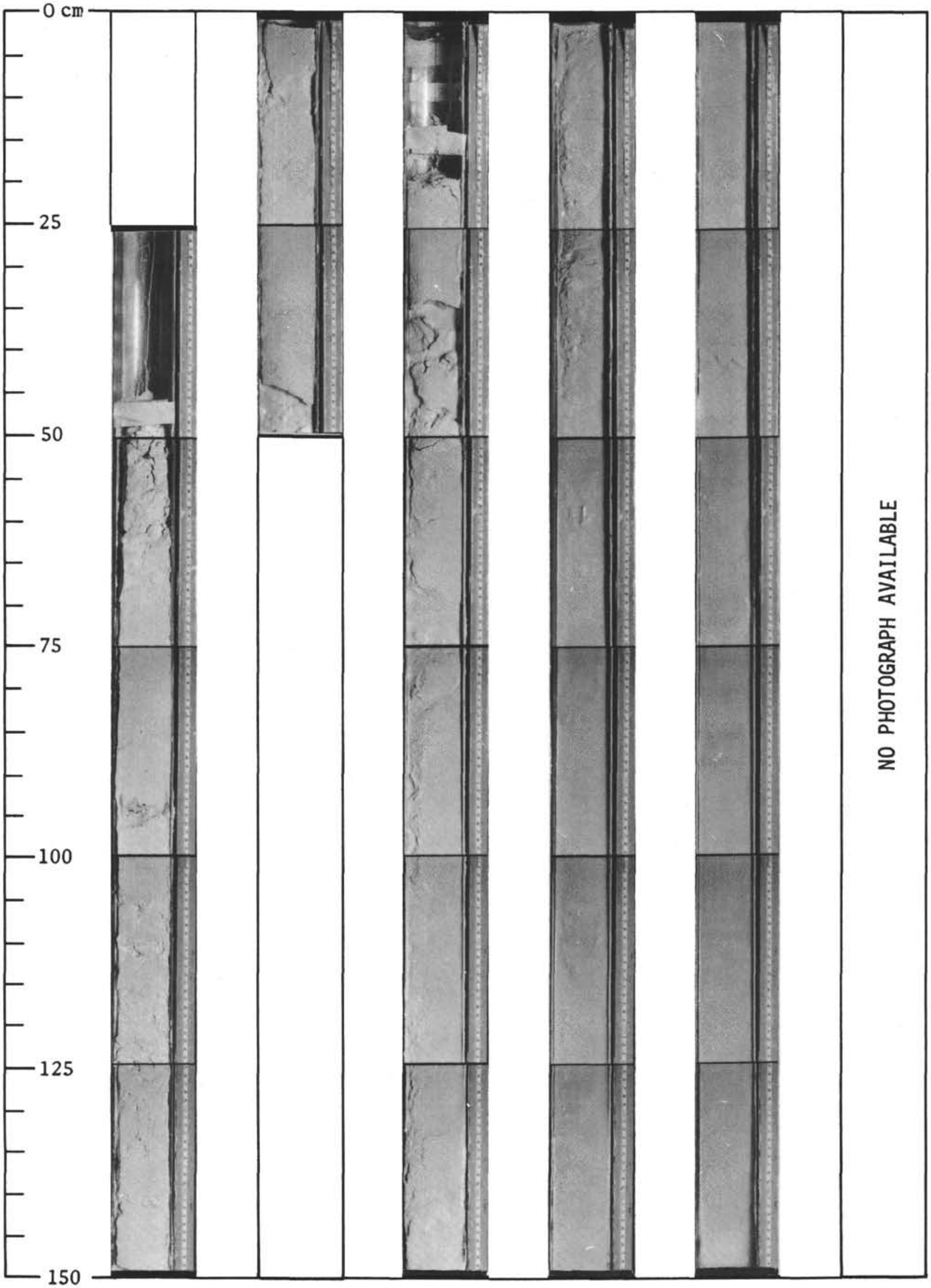

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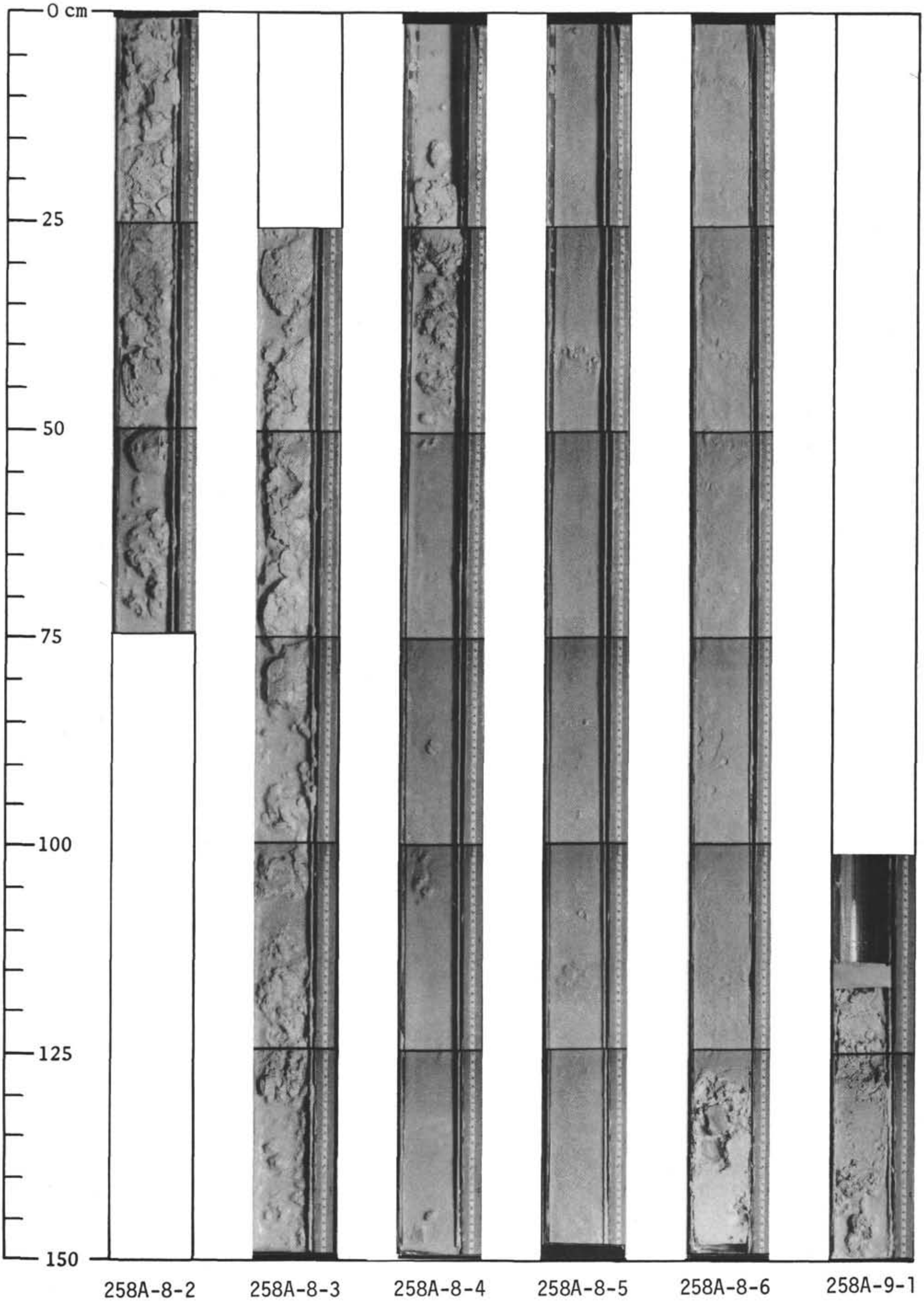
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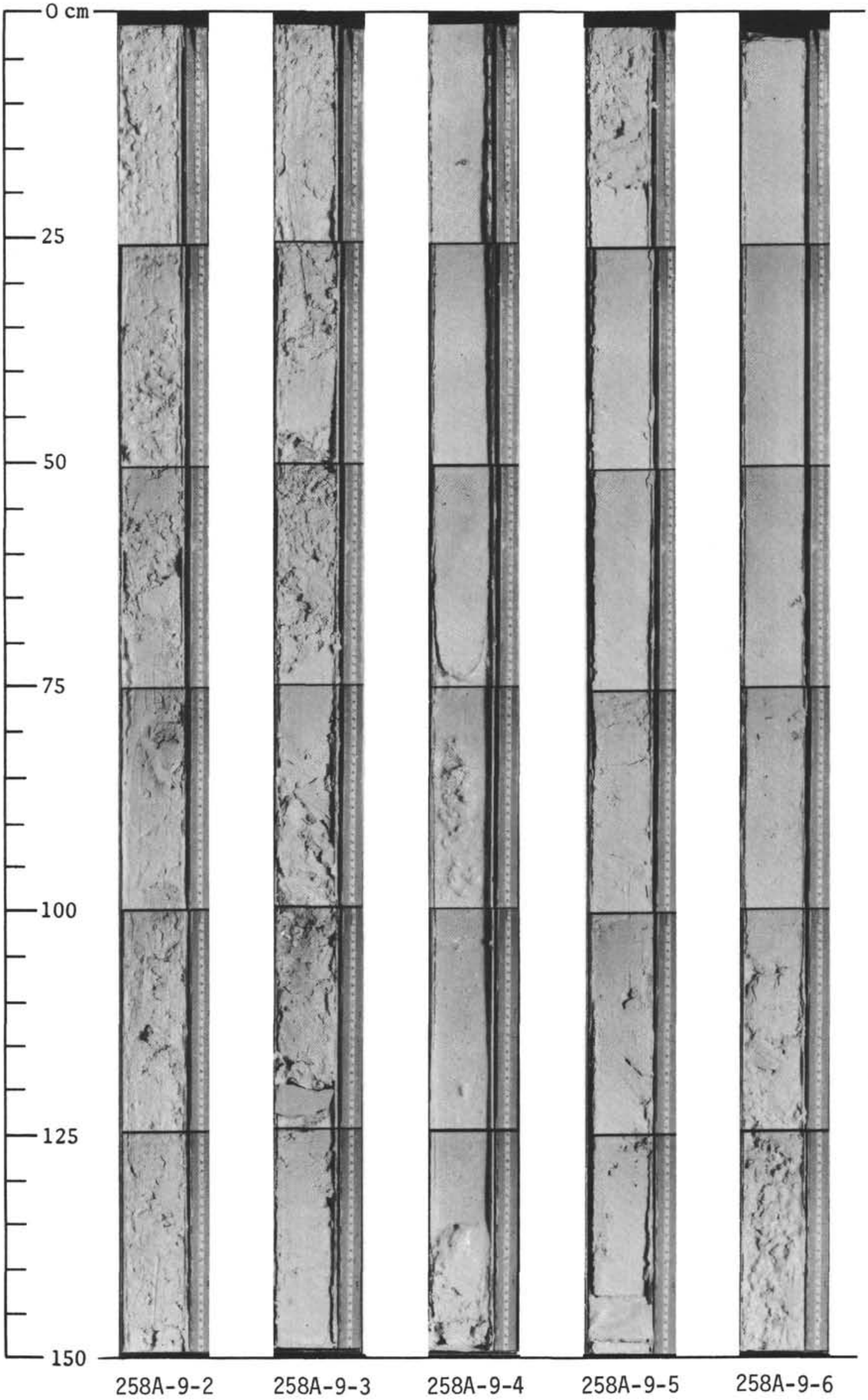
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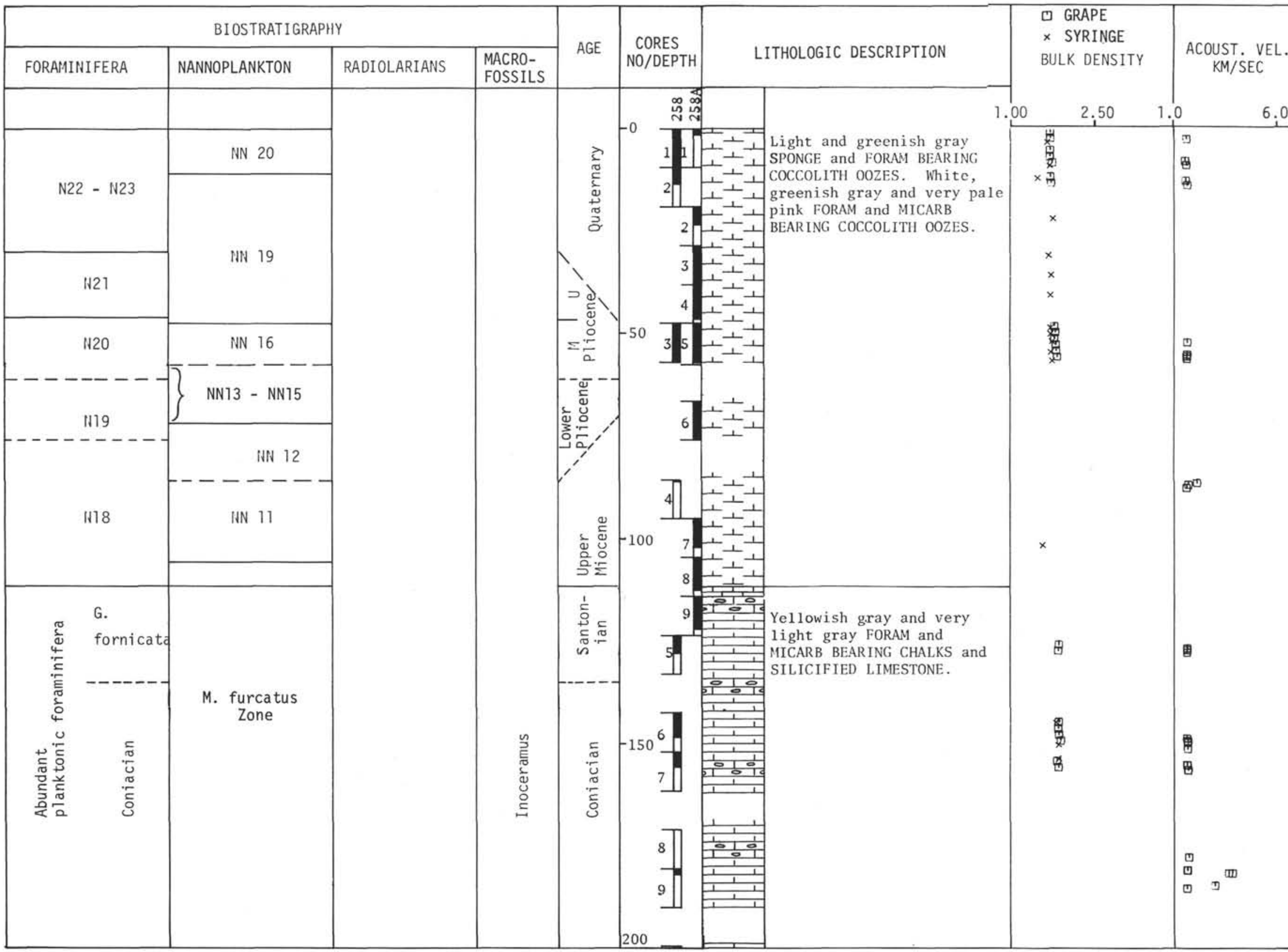
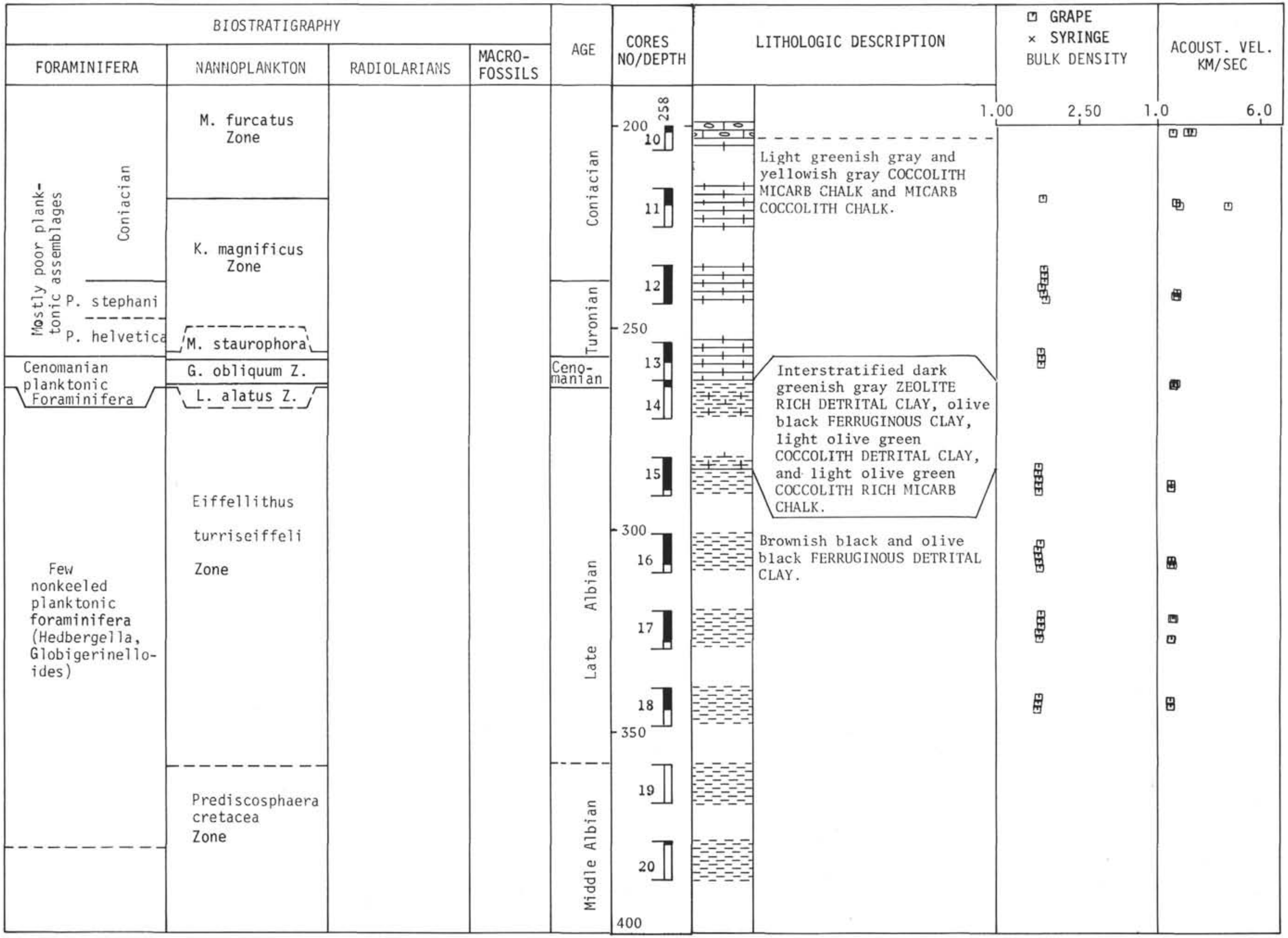
SUMMARY OF DRILLING RESULTS: SITE 258/0 - 200 m



SUMMARY OF DRILLING RESULTS: SITE 258/200 - 400 m



SUMMARY OF DRILLING RESULTS: SITE 258/400 - 600 m

BIOSTRATIGRAPHY: FORAMINIFERA	BIOSTRATIGRAPHY: NANNOPLANKTON	BIOSTRATIGRAPHY: RADIOLARIANS	BIOSTRATIGRAPHY: MACRO-FOSSILS	AGE	CORES NO/DEPTH	LITHOLOGIC DESCRIPTION
Few benthonic foraminifera	Prediscosphaera cretacea Zone			Middle Albian	258; 400; 21	[1 to 3 cm diameter pyrite nodules]
Rare arenaceous foraminifera			Belemnite		22	[0.4 to 1.0 cm diameter pyrite nodules]
	W. barnesae C. margereli W. britannica W. communis			Indeterminate Cretaceous	450; 23	
					500; 24; 25	Olive gray and greenish gray fine-grained GLAUCONITE DETRITAL SANDSTONE underlain by dusky brown laminated GLAUCONITIC DETRITAL SILTY CLAY. Several 1 mm thick black laminae in the clay merge into pyrite stringers.
					550; 600