7. SITE 65

Shipboard Scientific Party[1]

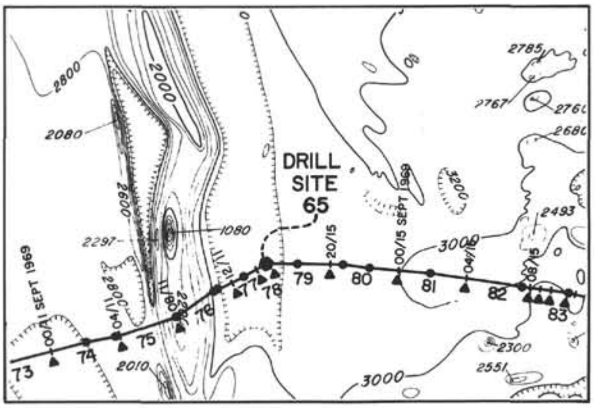
Position: 4° 21.21′N., 176° 59.16′E.

Water Depth: 6130 meters.

Total Depth: 187 meters, probably in middle Eocene chert.

Holes Drilled: Two holes.

Cores Taken: Twenty-five cores.



Main Results: A set of nearly continuous cores of an apparently uninterrupted section of radiolarian ooze ranging in age from middle Eocene to Recent was obtained, but the bit did not reach the deepest seismic reflector. Below depths of 127 meters, in the Oligocene and Eocene, thin chert and turbidite beds are sparsely interbedded with ooze. Calcareous nannofossils and detrital foraminifers, including specimens of late Cretaceous, Paleocene, and Eocene age, as well as grains of pyroclastic and hyaloclastic rocks and mudstone occur in the turbidites. The chert is commonly associated with the turbidites. Reworked radiolarians are present, sometimes very abundantly, in all samples younger than middle Eocene. Reworked Cretaceous Radiolaria are present in a sample from the upper Eocene. Average rates of accumulation were about 4 m/m.y. The upper 127 meters is identified as part of the upper very transparent layer on reflection profiles in this region, and is at least as old as the Oligocene at its base.

BACKGROUND AND OBJECTIVES

An acoustically very transparent layer is present over much of the deep basin—here termed the Central Basin—between the Gilbert and Marshall Islands on the west and the Line Islands on the east. The layer is generally only about 0.1 to 0.2 seconds thick, but is so transparent that conventional 12 kHz echo-sounders commonly show only the faintest echoes from the sea floor above this layer. Beneath the transparent zone is a strong reflector, generally showing only little relief. In some areas, still another transparent layer is discernible under this first strong set of reflectors, and below that a smooth basal reflector—Horizon B of Ewing *et al.* (1968).

The region lies within the crestal area of the supposed Darwin Rise (Menard, 1964). The sedimentary sequence and the age and petrology of the basement should aid in understanding the history of this region.

The Pacific Panel recommended drilling in this region to sample at least the upper transparent layer, and the first opaque layer beneath. Several possible sites were considered by the panel and by the shipboard party. Of paramount importance in choosing a particular site was a concern that sufficient sediments be present to bury the bottom-hole assembly (the drill collars and bumper subs) before the bit struck hard rock. A thickness of 100 meters, and preferably 150, of sediment was recommended. Most sites previously surveyed did not measure up to this standard, or else they were in areas of such variable sediment thickness that searching for a suitably thick section would take too much survey time on the part of *Glomar Challenger*?

The site originally selected is along the track of the Lamont-Doherty vessel *Robert Conrad* Figure 1. The *Conrad* reflection profile (Figure 2) shows as much as 0.4 seconds of nearly transparent material on a very strongly reflecting basement. No trace of a "lower transparent layer" can be seen on the *Conrad* profile, but many closely spaced reflectors show in the "basement" some 100 kilometers northeast of the

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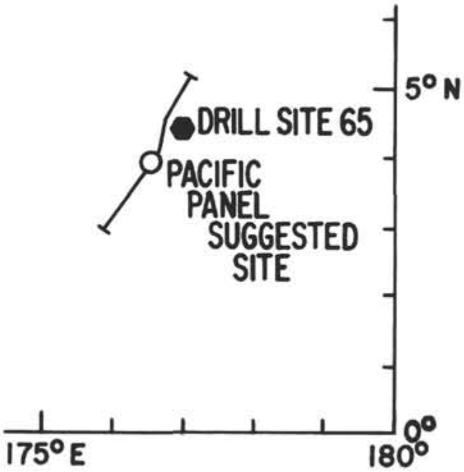

Figure 1. *Location of R/V* Robert Conrad *seismic reflection profile shown in Figure 1.*

target site, and suggest that sedimentary layers may be present beneath the transparent layer. Layering within the more opaque unit can also be seen on the *Glomar Challenger* Profiles 76 and 77 (Figures 3 and 4), immediately west of Site 65.

Near the original site recommended by the Pacific Panel, the *Glomar Challenger* air-gun profile (Figure 3) shows a high ridge only 20 kilometers to the west. Because this ridge was a probable source of slumped sediments, it was decided to relocate the site farther to the east, in more subdued topography.

OPERATIONS

Approach to Site 65

A faint reflector appears in the lower part of the transparent sequence to the east of the abyssal hill in Record 78 (Figure 5) and continues to Site 65. The top of the transparent layer is concealed in the outgoing pulse at Site 65 but the 12 kHz echo sounder indicated a water depth of 6130 meters (3235 fathoms). The first reflector (with the transparent sequence) appears to be about 0.14 seconds below the sea floor. Reflectors appear at about 0.14 seconds, 0.21 seconds and 0.27 seconds (basement).

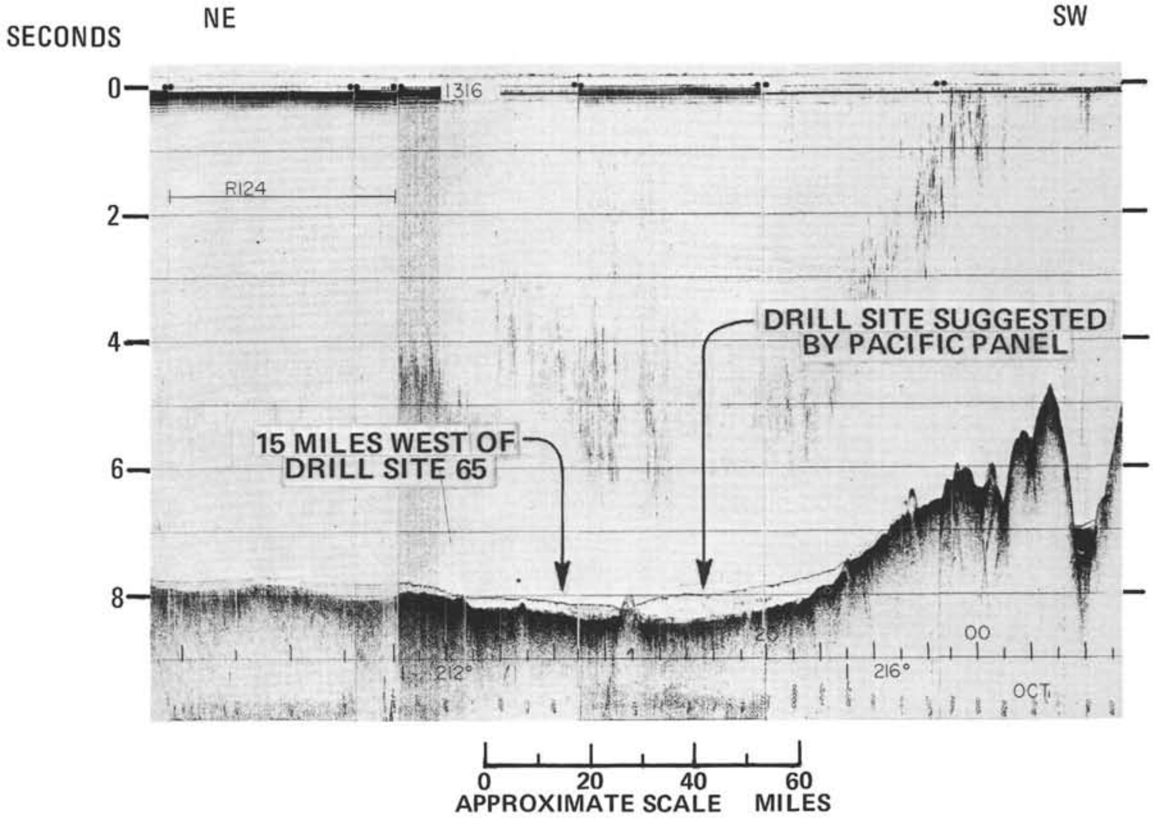

Figure 2. *Seismic reflection profile near Site 65 taken by R/V* Robert Conrad *of Lamont-Doherty Geological Observatory on Cruise RC-12.*

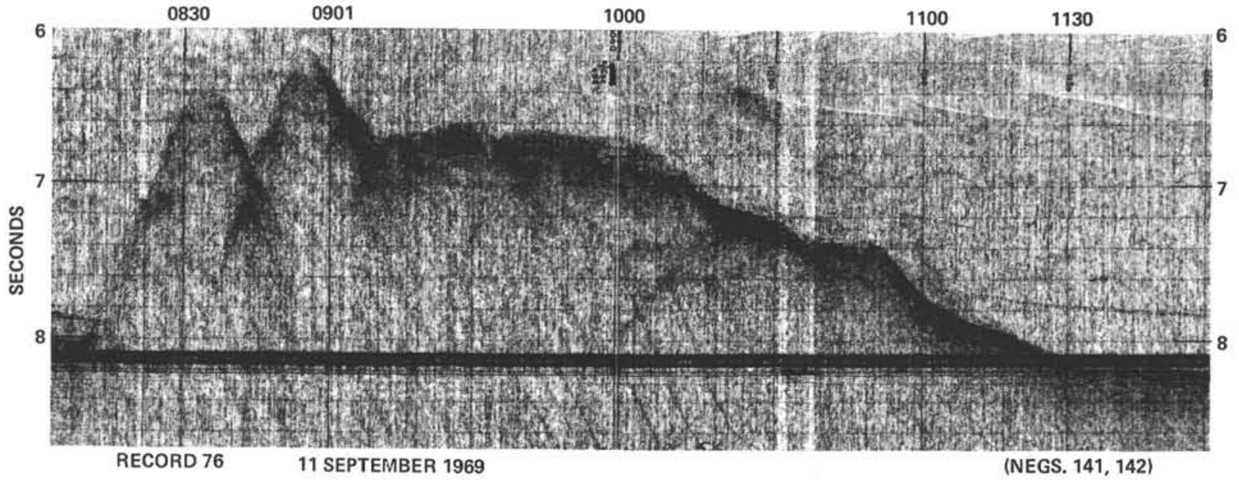

Figure 3. *Seismic reflection profile taken by D/V* Glomar Challenger *along line of approach to Site 65, showing relations of sediment layers to high ridge west of the site. See Plate 1 for location of the profile. (Record No. 76).*

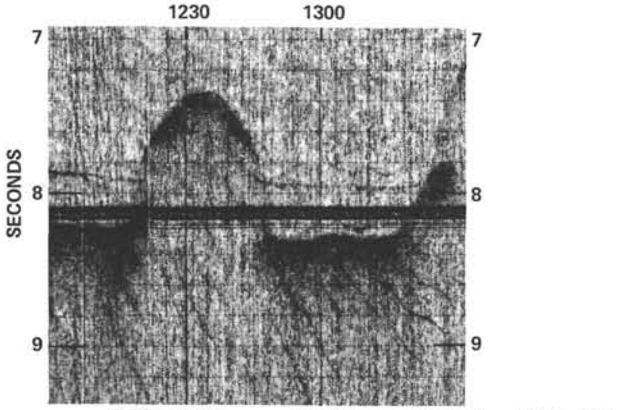

Figure 4. *Seismic reflection profile taken by D/V* Glomar Challenger *immediately west of Site 65. See Plate 1 for location of the profile. (Record No. 77)*

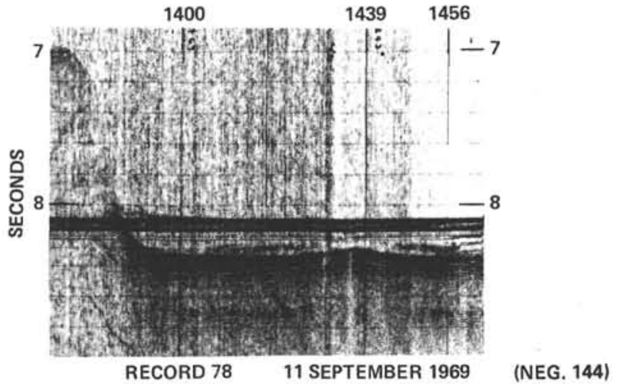

Figure 5. *Seismic reflection profile taken by D/V* Glomar Challenger *in vicinity of Site 65, which is located at the right (west) end of the profile. See Plate 1 for location. (Record No. 78)*

Drilling Operations

On arrival at the site at 1539 hours, September 11, a Burnett beacon was dropped and the drill string lowered to the sea floor at 6130 meters–the deepest water site yet occupied in the project. Because of the thin sedimentary column available, coring was begun at the sea floor and continued without break. Cores were punched rather than drilled, and the bit met no hard material until Core 14, where a thin, cherty layer was cored at about 126 meters. On attempting to cut Core 17 at 145 meters, the bit became plugged, and to help restore circulation the bit was pulled up above the sea floor. The maneuver succeeded, and a second hole was started. The drill string washed down easily to 129 meters where continuous coring was resumed. Recovery in some of the subsequent cores was poor, owing to the many thin, cherty layers which tended to jam in the core barrel and perhaps ahead of the bit, thereby preventing soft sediments from entering. In Cores 6 and 7, from 168 to 185 meters, recovery was almost nil. During the cutting of Core 7, the bit plugged again and the sudden surge of pressure caused the rotary hose in the derrick to burst, necessitating replacement of the hose. After pulling the pipe back up about 40 meters, circulation through the bit was restored and coring resumed. On Core 8, after two meters of penetration, the bit plugged again and the hole had to be abandoned.

TABLE 1
Drilling Summary, Site 65

Hole	Interval		Cores Drilled	Core Cut		Core Cut	Core Recovered		Core Recovered
	(ft)	(m)		(ft)	(m)	%	(ft)	(m)	%
65.0	0-2		Drilled						
	2-32	1-10	Core 1	30	9.1		28	8.5	
	32-62	10-19	Core 2	30	9.1		27	8.2	
	62-92	19-28	Core 3	30	9.1		30	9.1	
	92-122	28-37	Core 4	30	9.1		27	8.2	
	122-152	37-46	Core 5	30	9.1		28	8.5	
	152-182	46-55	Core 6	30	9.1		29	8.8	
	182-212	55-64	Core 7	30	9.1		24	7.3	
	212-242	64-74	Core 8	30	9.1		30	9.1	
	242-272	74-83	Core 9	30	9.1		30	9.1	
	272-302	83-92	Core 10	30	9.1		18	5.5	
	302-332	92-101	Core 11	30	9.1		30	9.1	
	332-362	101-110	Core 12	30	9.1		30	9.1	
	362-392	110-119	Core 13	30	9.1		29	8.8	
	392-422	119-127	Core 14	30	9.1		30	9.1	
	422-452	127-137	Core 15	30	9.1		17	5.2	
	452-479	137-145	Core 16	27	8.2		27	8.2	
	479-479	145-145	Core 17	0	0		1	0.3	
Totals	479	145	17	477	144.7	99.6	435	133.1	91
65.1	0-425		Drilled						
	425-455	129-139	Core 1	30	9.1		1.00	0.3	
	455-476		Drilled						
	476-483	145-147	Core 2	7	2.1		3.00	0.9	
	483-505	147-154	Core 3	22	6.7		1.00	0.3	
	505-533	154-162	Core 4	28	8.5		28.00	8.5	
	533-552	162-168	Core 5	19	5.8		19.00	5.8	
	552-578	168-176	Core 6	26	7.9		0.25	0.1	
	578-608	176-185	Core 7	30	9.1		Trace	–	
	608-614	185-187	Core 8	8	2.4		4.00	1.2	
Totals	614	187	8	170	51.6	27	56.25	17.1	33
Site Totals	1093	332	25	647	196.3	59	491.25	150.2	76

Examination of the bit on deck proved that the core head face discharge ports were plugged with chert fragments that had entered the ports from *above*, that is from inside the pipe. We concluded that the chert fragments had entered the ports because we started to core ahead before the core barrel had arrived on the bottom.

Another operational problem of immediate concern to the scientific party was the excessive quantity of rust scales in nearly all cores at this site caused by corrosion in the drill pipe, some of which had not been used for many weeks. The rust scales obscure the X-radiographs (see Leg I Report, p. 531, Figures C and D for good X-radiographs of rust scales), and are present in most samples taken in the laboratory for lithologic, paleontologic, physical, or chemical studies.

SITE SUMMARY

Lithology

Brown radiolarian ooze is the dominant sediment throughout the section drilled at this deep-water, Central Basin site. Below about 124 meters the radiolarian ooze also contains beds of porcelanite, silicified limestone, volcanic sandstone and chalk ooze, most of which are turbidites.

Tests of radiolarians constitute the bulk of the ooze. In most smear slides examined, whole and broken tests and spines make up more than 90 per cent of the sediment. A few slides contain only two or three per cent of other components. Of these others, whole and broken frustules of diatoms are most common, especially above 75 meters. Fragments of bones or other phosphatic remains of fish are moderately common to very common throughout the section cored. Sponge spicules, shards of both light and dark glass, grains of palagonite, micronodules, and silicified aggregates or lumps of clay (possibly fecal pellets) range from common to rare or absent in the section of radiolarian ooze. Shark's teeth, large, straight arenaceous foraminifers, and small ferromanganese nodules are rare components. Calcareous microfossils are present only in the uppermost cores and, as discussed below, in calcareous oozes within the lower section that contains the hard beds.

Ooze above about 50 meters is very soft to soft. At greater depths it becomes firmer. Its consistency fluctuates somewhat, and is very firm to stiff at about 85, 120 and 165 meters depth, but soft near about 145 meters. Near the surface the ooze is dark brown, but between about 20 and 90 meters it is lighter, ranging through values of light, moderate, and dark yellowish brown and grayish brown. Between about 90 meters and the hard beds at about 127 meters, the radiolarian ooze is uniformly dark brown, whereas below that point the colors vary more markedly, and include light olive browns, moderate to dark yellowish browns, and minor amounts of dark brown and grayish orange.

The most common mottles within the radiolarian ooze are grayish to yellowish orange. Above about 20 meters and below about 80 meters, very dark brown mottles are also present, but are generally fewer and smaller than the orange ones. The intensity of mottling is slight for most of the ooze; in fact, mottles are rare or absent through much of the cores. Above about 30 meters and below about 110 meters several portions of the cores examined were moderately mottled. At about 76 meters (near 50 centimeters in Hole 65.0, Core 9, Section 2) is a tuffaceous bed, graded from about 1-millimeter grains at the base to about 0.1-millimeter grains at the top. The base of the 5 centimeter-thick bed is rich in palagonite grains, silicified clay lumps, micronodules and spicules. Aside from this instance, the mottles discussed above and some rare suggestions of bedding or contacts shown by vague color contrasts, the radiolarian ooze section appears structureless.

A greater variety of sediments is present in the lower part of the section. Core 14 of Hole 65.0 (about 119 to 128 meters) is contorted, but the base of its Section 3 and Sections 4, 5 and 6 contain calcareous radiolarian ooze interlayered with the purer radiolarian ooze. In much of the calcareous part, nannofossils and tests of pelagic foraminifers make up a third, and radiolarians about two-thirds, of the organic remains (fresh and altered volcanic grains are also commonly present). However, locally the calcareous component is 90 per cent; the sediment at 107 meters in Section 5 is a foraminiferal nannofossil chalk ooze, and at 72 centimeters in Section 6 it is an ashy nannofossil chalk ooze. Nannofossils are common down through Core 2 of Hole 65.1, that is to say, in the interval 125 to 146 meters.

Below 127 meters the (Eocene) section is characterized by thin hard layers within the ooze. The rock type, spacing, and thickness of every individual layer between 127 and 187 meters (total depth) is unknown, because of poor recovery in some core barrels, and because in deeper cores, hard fragments of differing lithologies recovered as core-catcher samples were thoroughly mixed with one another. However, by noting the highest position from which a new lithology was recovered, and by making use of the drilling record, a fair approximation can be made.

The uppermost hard layer is a dark brownish-gray porcelanite at 127.7 meters, recovered as angular and conchoidally-fractured pieces in the core catcher of Hole 65.0, Core 1. The rock is composed of radiolarians, and lesser amounts of ash and palagonite grains, tightly cemented by cristobalite that is thickly charged with clay, microlites, and ferromanganese micronodules. The porcelanite is in contact with a coarse- to very-coarse-grained sandstone in many of the fragments, and with a sandy, siliceous mudstone in many others. Some pieces have all three lithologies, showing that the hardest porcelanite is only about 2 centimeters thick, or that more than one bed is present. The absolute positions of the three lithologies are not known, but grading in the sandstone suggests that the mudstone overlies the porcelanite which overlies the sandstone. Thin sections of the sandstone are especially instructive as to the probable origin of these hard layers within the radiolarian ooze section. A variety of palagonitized tuff grains, altered volcanic grains, foraminifers, silicified mudstone grains, and grains of other volcanogenic and organic rocks is present. Many grains show earlier structures cut by the grain boundaries–bedding and ripplemarks, colloform chalcedony, vesicle fillings–indicating that the original palagonitized tuffs, radiolarites, etc. were fragmented and then transported to Site 65. Silicification was enhanced in the neighborhood of these beds that differed from the surrounding ooze in their composition and permeability.

Fragments of these types of sandstone, mudstone, and especially of the brown porcelanite are found in core-catcher samples from all deeper cores and also are found (along with rust and paint chips and pieces of other hard rocks to be described below) within strongly contorted portions of the radiolarian ooze of deeper cores. The porcelanite fragments were the largest, hardest, and, excepting only the rust chips, the most dense material in the hole, and so could not be circulated out completely. Consequently they contaminate the deeper cores. Therefore, it is not known whether brown porcelanite is present only at 127.7 meters, where it first appeared, and at 169 meters, where an 8 centimeter-length was cored, or whether it also forms some of the other hard layers reported by drillers but not recovered intact.

Pieces of a pale yellowish-brown to light gray, distinctly laminated, possibly graded bed of siliceous rock were recovered in core catchers (and as fragments embedded in contorted ooze in deeper cores) below the hard layer reported at 137.2 to 137.8 meters. The rock was deposited as thin, well-sorted laminae of pelagic foraminifers of medium-grained sand-size with a small amount of micritic calcareous matrix. Palagonite grains and clay pellets are also present in some of the laminae. The calcareous components have been largely replaced by cristobalite.

Volcanic-rich sandstones are present at 146 meters and in deeper cores and core-catcher samples. The sandstones are yellowish to grayish brown, and range from coarse- to fine-grained, poorly-sorted and irregularly-bedded, to fine-grained, well-sorted and sharply-laminated. Grains of palagonite, altered and clear glass, altered lithic volcanic rocks, foraminifers, and silicified mudstone are abundant in these sandstones. They may be partly pyroclastic (tuffs) and partly epiclastic (volcanic sandstones), but the better-laminated ones that have both volcanic and non-volcanic grains of the same diameter within the same lamina have been so reworked and sorted that they can be termed epiclastic with little doubt.

The top two hard layers within the ooze are the brown porcelanite at 127.7 meters and the silicified foraminiferal calcarenite about 10 meters deeper. Below that, the thicker hard layers are more closely spaced, and the thinner ones are commonly only a meter or so apart. The thickest hard layer recovered as a core, that is, measurable in the laboratory, was the 8 centimeter-thick piece of dusky yellowish-brown porcelanite in the core catcher of Core 6, Hole 65.1. This is probably the hard layer reported by the driller at about 169 meters. The siliceous rocks at 127.7 and 137 meters mentioned above were probably only about 2 centimeters and 4 centimeters-thick, respectively, based on examination of fragments that are in contact with other lithologies. A two-foot thickness was reported for the latter by the driller. Perhaps the bit pushed the layer down into the soft ooze before breaking through it; possibly several 4-centimeter or thinner beds are present. Some of the beds of soft volcanic sandstone at about 140 to 160 meters are at least 3 centimeters thick, the diameter of their largest fragments. In summary, what is known of the thickness and spacing of the hard layers indicates that they are greatly subordinate in volume to radiolarian ooze throughout the thickness that was drilled.

Physical and Chemical Properties

The physical and chemical properties of cores obtained at Site 65 are summarized in Table 2 and are displayed as a function of depth in the Site Summary at the end of this chapter. The significance of these data is discussed in separate contributions elsewhere in this volume.

Paleontologic-Biostratigraphic Summary

Foraminifera

Foraminifera were represented in only three samples of this generally noncalcareous sequence of deposits. In Hole 65.0, Core 14, Section 5, a heterogeneous planktonic assemblage indicative of a turbidite contained the following components:

> Upper Cretaceous – *Globotruncana* cf. *G. fornicata;*
>
> Paleocene – *Globorotalia velascoensis* (to Eocene), *G. formosa* Gr.;
>
> Eocene – *Hantkenina alabamensis, Globorotalia centralis, Globigerina ampliapertura;*

Eocene-Oligocene – *Globigerina prasaepis, G. tripartita, Globorotalia opima nana, Pseudohastigerina barbadoensis.*

About 20 meters deeper in the hole, at the base of the cored section, a remarkable collection of large agglutinated tests of benthics with the morphology of *Bathysiphon* and *Reophax* was recovered.

Hole 65.1, Core 1, located between the above samples stratigraphically, contained a middle to late Eocene planktonic fauna showing solution effects.

Calcareous Nannofossils

Sediments recovered in the two holes at this site proved to be noncalcareous, except for an interval in the lower part of Hole 65.0 (terminal depth 145 meters), where in Cores 14 to 16 Lower Oligocene and Upper Eocene nannoplankton (Zones NP 21 and NP 17) have been found, and part of Hole 65.1 (Cores 2 and 3) with nannoplankton of Zone NP 17 present.

Radiolaria

Radiolarians are abundant and well-preserved in all cores from the sea floor to a depth of about 168 meters (65.1-5), but reworked forms of ages back to Middle Eocene are common throughout and hamper interpretation of the sequence. The sample recovered at about 180 meters (65.1-7) was too small for radiolarian separation, and that at about 186 meters (65.1-8) contains rather few, poorly preserved radiolarians of approximately the same age as those in 65.1-5-CC. Lumps of semiconsolidated sediment at about 135 meters (65.1-1) contain rare, altered radiolarians probably of Cretaceous age.

Because of the ubiquitous reworking, interpretation of the sequence depends upon the lower limits only of the ranges of taxa, and some zonal boundaries are not clear. The base of the *Spongaster pentas* Zone is probably at 19 to 21 meters (between 65.0-2 and 65.0-3), the base of the *Stichocorys peregrina* Zone is at 42 to 45 meters (between 65.0-5-4 and 65.0-5-6), the base of the *Ommatartus antepenultimus* Zone is at 57 to 60 meters (between 65.0-7-2 and 65.0-7-4), the base of the *Cannartus* (?) *petterssoni* Zone is at 60 to 68 meters (between 65.0-704 and 65.0-8-3), the base of the *Calocycletta costata* Zone is at 73 to 75 meters (between 65.0-8 and 65.0-9), the base of the *Calocycletta virginis* Zone is at 101 to 102 meters (between 65.0-11 and 65.0-12), the base of the *Lychnocanium bipes* Zone is at about 106 meters (within 65.0-12-4), the base of the *Dorcadospyris ateuchus* Zone is at 112 to 114 meters (between 65.0-13-2 and 65.0-13-3), the base of the *Theocyrtis tuberosa* Zone is at 126 to 128 meters (between 65.0-14-5 and 65.0-14-CC), the base of the *Thyrsocyrtis bromia* Zone is at about 145 meters (between 65.1-2-1 and 65.0-16-CC), the base of the *Thyrsocyrtis tetracantha* Zone is at 145 to 154 meters (between 65.1-2-1 and 65.1-2-CC), and the base of the *Podocyrtis chalara* Zone is below about 168 meters (65.1-5-CC).

At this site, the *Dorcadospyris alata* Zone can be no more than 5 meters thick (between 65.0-7-4 and 65.0-8-1, at 60 to 65 meters), and may be missing altogether, whereas at Site 62 it occupies at least 16 meters, and at both Site 63 and Site 66 it occupies approximately 20 meters.

DISCUSSION

Rates of Accumulation

The accompanying graph (Figure 6) shows that the rate of sediment accumulation has averaged about 4 m/m.y. since middle Eocene times, but perhaps was a little slower–say 2 m/m.y.–in the lower part of the column. Because all samples above the middle Eocene contain reworked radiolarians, and because the section includes a number of megascopically identifiable turbidites, it is clear that the rate combines both the rate of accumulation of radiolarian tests that settle from the surface waters over the site and the rate of accumulation of material transported to the site by bottom currents, including turbidity currents.

The site is atypical in having a greater-than-average thickness of the upper acoustically transparent layer. Perhaps this is because of the higher-than-average proportion of reworked detrital Radiolaria here as compared to other areas in the Central Basin, such as Site 66. Site 65 is located in an elongate basin next to a long narrow ridge (Plate 1 and Figure 3), the crest of which stands some 2000 meters above the basin floor. One peak on the ridge comes to within 2000 meters of the sea surface. Doubtless, some of the turbidites were derived from this nearby ridge. Additional detritus coming down the long smooth apron east of the Gilbert Islands (Reflection Profiles 71 through 75, in Reflection Seismology Chapter) can enter the basin around the ends of the ridge.

An additional possible source of detritus needs mention. Deep-water circulation patterns in this part of the Pacific (Reed, 1969) show a northward flow of bottom water from the South Pacific through a broad pass northeast of the Samoan Islands and thence northward through the Central Basin. Site 65, which lies in the deepest part of the Basin, is probably on the pathway of bottom water flow and is, therefore, a likely site of accumulation for any very fine sediments carried by this flow.

TABLE 2
Physical Properties of Cores from Site 65

Identification	Lithology	Physical Properties								
		Saturated Bulk Density (Sect. Wt.)[a] gm/cm^3	Saturated Bulk Density (GRAPE)[b] gm/cm^3	Mean Grain Density[c] gm/cm^3	Porosity (Calculated)[d] Per Cent	Porosity (Drying, Ship)[e]		Penetrometer[f] cm	Sonic Velocity[g] m/sec.	Natural Gamma Radiation[h]
						Interval cm	Per Cent			
Hole 65.0										
Core 1-1	Radiolarian Ooze (not opened)		1.107	2.35	95.1					349
1-2	Radiolarian Ooze (not opened)		1.083	2.35	95.6					268
1-3	Radiolarian Ooze (not opened)		1.120	2.35	92.7					234
1-4	Radiolarian Ooze (not opened)		1.096	2.35	94.6					262
1-5	Radiolarian Ooze (not opened)		1.081	2.35	95.7					273
Core 2-1	Radiolarian Ooze		1.137	2.34	91.5	62.0	89.0	3.05		322
2-2	Radiolarian Ooze		1.139	2.34	91.2	56.0	88.8	2.76	1488	339
2-3	Radiolarian Ooze		1.144	2.34	90.9	24.0	91.9	3.20	1485	341
2-4	Radiolarian Ooze		1.135	2.34	91.6	116.0	88.8	3.07	1478	333
2-5	Radiolarian Ooze		1.141	2.34	91.1	50.0	88.8	1.79	1513	302
2-6	Radiolarian Ooze		1.127	2.34	92.2					258
Core 3-1	Radiolarian Ooze		1.146	2.33	90.7	44.0	87.6	2.46	1492	326
3-2	Radiolarian Ooze		1.139	2.33	91.2	40.0	90.6	1.82	1484	312
3-3	Radiolarian Ooze		1.139	2.33	91.2	112.0	88.0	2.12	1478	369
3-4	Radiolarian Ooze		1.155	2.33	90.0	55.0	88.2	1.43	1471	343
3-5	Radiolarian Ooze	1.143	1.153	2.33	90.1	75.0	88.6	2.93	1469	368
3-6	Radiolarian Ooze		1.142	2.33	91.0					321
Core 4-1	Radiolarian Ooze		1.124	2.31	92.3					184
4-2	Radiolarian Ooze		1.167	2.31	88.9					309
4-3	Radiolarian Ooze		1.154	2.31	89.9					326
4-4	Radiolarian Ooze		1.145	2.31	90.6					311
4-5	Radiolarian Ooze		1.141	2.31	90.9					319
4-6	Radiolarian Ooze		1.126	2.31	92.1					334
Core 5-1	Radiolarian Ooze									
5-2	Radiolarian Ooze		1.154	2.30	89.8				1509	342
5-3	Radiolarian Ooze		1.153	2.30	89.9				1467	295
5-4	Radiolarian Ooze		1.159	2.30	89.4				1464	299
5-5	Radiolarian Ooze		1.142	2.30	90.8	40.0	87.8		1465	309
5-6	Radiolarian Ooze		1.124	2.30	92.2					283

[a] Saturated bulk density derived by dividing net section weight by volume.

[b] Saturated bulk density derived from gamma ray attenuation data (see text). Value given is average of all valid data points per section.

[c] Mean grain density is assigned, considering selected grain density measurements made and reported elsewhere in this volume, and gross mineralogy of the section.

[d] Porosity is calculated: $\phi = \frac{\rho_g - \rho_B}{\rho_g - \rho_f}$; ρ_B is from GRAPE, average per section ρ_g is from column 5; $\rho_f = 1.024$; units in per cent of total volume.

TABLE 2 – *Continued*

Grainsize[i]					Carbon/Calcium Carbonate			Interstitial Water				
Interval cm	Sand Per Cent	Silt Per Cent	Clay Per Cent	Classification	Interval cm	Calcium Carbonate Per Cent	Organic Carbon Per Cent	Interval cm	pH	Eh (mu)	Temp °C	Salinity %
					62.0	0.0	0.4					
2.0	11.0	29.7	59.3	Silty Clay	56.0	0.3	0.2					
18.0	14.7	26.2	59.1	Silty Clay	24.0	1.6	0.3					
19.0	6.3	32.9	60.8	Silty Clay	116.0	0.4	0.2					
42.0	3.9	31.3	64.8	Silty Clay	50.0	0.6	0.2					
15.0	2.5	32.1	65.3	Silty Clay	44.0	0.4	0.2					
31.0	12.4	31.0	56.6	Silty Clay	40.0	0.7	0.2					
2.0	4.2	32.7	63.1	Silty Clay	112.0	0.7	0.2					
20.0	5.9	37.8	56.3	Silty Clay	55.0	0.5	0.2		7.51	-242	25	35.2
2.0	7.2	33.9	58.8	Silty Clay	75.0	0.7	0.2					
12.0	13.9	30.5	55.6	Silty Clay								
4.0	10.7	36.1	53.2	Silty Clay								
4.0	5.0	28.4	66.5	Silty Clay								
38.0	12.0	36.4	51.5	Silty Clay	41.0	0.4	0.2					
59.0	11.6	38.4	50.0	Silty Clay	68.0	0.2	0.2					
1.0	11.8	38.8	49.4	Silty Clay	40.0	1.6	0.2					
21.0	11.5	39.3	49.3	Silty Clay	60.0	1.1	0.2					

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[e] Porosity is by drying (shipboard measurements) and is corrected for salt.

[f] Only the minimum penetrometer measurement per section is given.

[g] Sonic velocity measurements were made aboard ship and are corrected to 23°C. Maximum of three measurements per section is shown.

[h] Natural gamma radiation: Average of middle 16 of 20 counts/3 inch/1.25 minutes minus 1350 background.

[i] Grainsize: Sand per cent of total weight greater than .062 millimeter; clay per cent of total weight less than .0039 millimeter; silt remainder of total weight.

TABLE 2 – *Continued*

Identification	Lithology	Physical Properties								
		Saturated Bulk Density (Sect. Wt.)[a] gm/cm^3	Saturated Bulk Density (GRAPE)[b] gm/cm^3	Mean Grain Density[c] gm/cm^3	Porosity (Calculated)[d] Per Cent	Porosity (Drying, Ship)[e]		Penetrometer[f] cm	Sonic Velocity[g] m/sec.	Natural Gamma Radiation[h]
						Interval cm	Per Cent			
Hole 65.0 – *Continued*										
Core 6-1	Radiolarian Ooze		1.154	2.28	89.8					254
6-2	Radiolarian Ooze		1.151	2.28	89.9				1502	243
6-3	Radiolarian Ooze									280
6-4	Radiolarian Ooze		1.126	2.28	91.9					246
6-5	Radiolarian Ooze									213
6-6	Radiolarian Ooze								1468	257
Core 7-1	Radiolarian Ooze									
7-2	Radiolarian Ooze		1.160	2.27	89.1	91.0	88.6	1.19	1485	348
7-3	Radiolarian Ooze	1.170	1.169	2.27	88.4	43.0	86.2	0.91	1495	353
7-4	Radiolarian Ooze	1.193	1.145	2.27	90.3	39.0	87.6	0.94	1483	370
7-5	Radiolarian Ooze		1.135	2.27	91.1	14.0	87.0		1475	350
7-6	Radiolarian Ooze									
Core 8-1	Radiolarian Ooze		1.184	2.26	87.2	94.0	88.0		1468	324
8-2	Radiolarian Ooze	1.185	1.186	2.26	86.9	51.0	87.6	0.94	1482	331
8-3	Radiolarian Ooze	1.176	1.213	2.26	84.7	78.0	88.8		1478	302
8-4	Radiolarian Ooze	1.181	1.167	2.26	88.4	57.0	83.9	1.18	1475	322
8-5	Radiolarian Ooze	1.174	1.203	2.26	85.5	107.0	86.2	1.07	1482	305
8-6	Radiolarian Ooze	1.175	1.192	2.26	86.4	20.0	88.8	0.62	1492	332
Core 9-1	Radiolarian Ooze		1.217	2.25	84.3			1.27	1452	315
9-2	Radiolarian Ooze		1.207	2.25	85.0			0.93	1465	310
9-2	Radiolarian Ooze									
9-3	Radiolarian Ooze		1.214	2.25	84.5			0.69	1488	246
9-4	Radiolarian Ooze	1.165	1.187	2.25	86.7			0.71	1502	275
9-5	Radiolarian Ooze		1.205	2.25	85.3	92.0	87.6		1462	283
9-6	Radiolarian Ooze		1.217	2.25	84.2			0.55	1449	280
9-6	Radiolarian Ooze									
Core 10-1	Radiolarian Ooze		1.197	2.24	85.9			0.99		213
10-2	Radiolarian Ooze	1.145	1.210	2.24	84.7			1.02	1459	272
10-3	Radiolarian Ooze		1.212	2.24	84.5			1.43	1465	271
10-4	Radiolarian Ooze		1.210	2.24	84.7	115.0	89.0	1.00	1475	263
Core 11-1	Radiolarian Ooze		1.139	2.23	90.5					217
11-2	Radiolarian Ooze		1.157	2.23	89.0			0.92	1492	254
11-3	Radiolarian Ooze	1.149	1.161	2.23	88.7			0.58	1488	266
11-4	Radiolarian Ooze	1.173	1.149	2.23	89.7			1.19	1485	274
11-5	Radiolarian Ooze	1.171	1.128	2.23	91.3			0.88	1492	280
11-6	Radiolarian Ooze		1.116	2.23	92.3				1468	266

TABLE 2 – *Continued*

	Grainsize[i]					Carbon/Calcium Carbonate			Interstitial Water				
	Interval cm	Sand Per Cent	Silt Per Cent	Clay Per Cent	Classification	Interval cm	Calcium Carbonate Per Cent	Organic Carbon Per Cent	Interval cm	pH	Eh (mu)	Temp °C	Salinity %
	40.0	16.1	35.2	48.7	Silty Clay	134.0	1.0	0.2					
	82.0	15.4	34.4	50.1	Silty Clay	91.0	0.6	0.1					
	7.0	10.6	35.8	53.6	Silty Clay	43.0	1.0	0.1					
	29.0	13.1	36.8	50.1	Silty Clay	39.0	0.5	0.1					
	16.0	18.4	32.2	49.4	Silty Clay	14.0	0.4	0.1					
									0-10	7.52	-309	25	34.1
	3.0	21.8	34.3	43.9	Sand-Silt-Clay	94.0	0.8	0.1					
	53.0	23.5	32.3	44.1	Sand-Silt-Clay	51.0	0.4	0.1					
	66.0	39.5	27.6	32.9	Sand-Silt-Clay	78.0	3.0	0.1					
	2.0	18.3	36.5	45.2	Silty Clay	57.0	0.6	0.1					
	2.0	22.1	38.5	39.4	Sand-Silt-Clay	107.0	0.6	0.1					
	2.0	28.2	32.7	39.1	Sand-Silt-Clay	20.0	4.9	0.0					
	21.0	10.7	41.7	47.5	Silty Clay	32.0	0.3	0.1					
	2.0	16.9	32.7	50.5	Silty Clay	48.0	1.5	0.1	25-45 75-92 105-150				
									25-45 75-95 105-150				
	2.0	29.0	33.3	37.6	Sand-Silt-Clay	110.0	0.6	0.1					
	2.0	33.3	29.9	36.7	Sand-Silt-Clay								
	88.0	12.2	39.8	48.0	Silty Clay	92.0	0.3	0.1					
	10.0	14.2	41.3	44.5	Silty Clay				90-150				
									0-10	7.70	-362	24.1	34.4
	70.0	12.3	41.2	46.5	Silty Clay	90.0	1.2	0.1					
	2.0	21.8	37.0	41.3	Sand-Silt-Clay								
	53.0	26.7	31.0	42.3	Sand-Silt-Clay	21.0	1.8	0.1					
	2.0	22.2	35.2	42.7	Sand-Silt-Clay	115.0	0.0	0.2					
	65.0	27.3	34.2	38.6	Sand-Silt-Clay	120.0	1.0	0.1					
	2.0	4.6	50.9	44.5	Clayey Silt	40.0	0.3	0.1					
	51.0	17.9	43.9	38.1	Clayey Silt	58.0	0.4	0.1					
	41.0	16.8	39.2	44.0	Silty Clay	117.0	0.7	0.1	0-11	7.68	-350	24	34.7
	2.0	18.5	45.5	36.0	Clayey Silt	20.0	0.0	0.2					

TABLE 2 – *Continued*

Identification	Lithology	Physical Properties								
		Saturated Bulk Density (Sect. Wt.)[a] gm/cm3	Saturated Bulk Density (GRAPE)[b] gm/cm3	Mean Grain Density[c] gm/cm3	Porosity (Calculated)[d] Per Cent	Porosity (Drying, Ship)[e]		Penetrometer[f] cm	Sonic Velocity[g] m/sec.	Natural Gamma Radiation[h]
						Interval cm	Per Cent			
Hole 65.0 – *Continued*										
Core 12-1	Radiolarian Ooze		1.100	2.21	93.7				1488	293
12-2	Radiolarian Ooze	1.208	1.152	2.21	89.2	123.0	85.2	0.77	1499	317
12-3	Radiolarian Ooze	1.218	1.155	2.21	89.0				1516	293
12-4	Radiolarian Ooze	1.272	1.228	2.21	82.8			0.52	1446	503
12-5	Radiolarian Ooze	1.210	1.168	2.21	87.8			0.63	1492	288
12-6	Radiolarian Ooze		1.154	2.21	89.1			0.80	1492	270
Core 13-1	Radiolarian Ooze		1.119	2.19	92.0			0.69	1502	243
13-2	Radiolarian Ooze		1.127	2.19	91.2	65.0	88.4		1492	241
13-3	Radiolarian Ooze	1.196	1.154	2.19	88.8			0.56	1530	259
13-4	Radiolarian Ooze	1.204	1.154	2.19	88.9			0.56	1495	270
13-5	Radiolarian Ooze	1.200	1.159	2.19	88.4	20.0	86.2	0.76	1492	277
13-6	Radiolarian Ooze		1.168	2.19	87.7			0.85	1544	260
Core 14-1	Radiolarian Ooze	1.162	1.159	2.16	88.5			0.95	1492	262
14-2	Radiolarian Ooze	1.200	1.183	2.16	86.0			0.45	1516	266
14-3	Radiolarian Ooze	1.198	1.244	2.16	80.6				1521	293
14-4	Calcareous Radiolarian Ooze	1.223	1.287	2.16	76.9				1519	296
14-5	Nannofossil-Radiolarian Ooze		1.317	2.16	74.2			0.74	1475	273
14-6	Nannofossil-Radiolarian Ooze		1.387	2.16	68.1			1.01	1468	269
Core 15-1	Cherty Radiolarian Ooze									
15-2	Cherty Radiolarian Ooze									
15-3	Cherty Radiolarian Ooze									
15-4	Cherty Radiolarian Ooze									
Core 16-1	Impure Silicified Limestone and Calcareous Radiolarian Ooze									
16-2	Impure Silicified Limestone and Calcareous Radiolarian Ooze		1.248	2.12	79.6					254
16-3	Impure Silicified Limestone and Calcareous Radiolarian Ooze		1.273	2.12	77.3				1537	339
16-4	Radiolarian Ooze		1.214	2.12	82.7			0.98	1502	274
16-5	Radiolarian Ooze		1.186	2.12	85.2				1492	265
16-6	Radiolarian Ooze		1.198	2.12	84.2				1492	217

TABLE 2 – *Continued*

	Grainsize[i]					Carbon/Calcium Carbonate			Interstitial Water				
	Interval cm	Sand Per Cent	Silt Per Cent	Clay Per Cent	Classification	Interval cm	Calcium Carbonate Per Cent	Organic Carbon Per Cent	Interval cm	pH	Eh (mu)	Temp°C	Salinity %
	4.0	30.4	39.2	30.4	Sand-Silt-Clay	73.0	1.5	0.0					
	25.0	26.8	43.4	29.8	Sand-Silt-Clay	123.0	0.3	0.1					
	3.0	8.4	16.9	74.7	Silty Clay	9.0	0.3	0.1					
	36.0	31.3	30.8	37.9	Sand-Silt-Clay	71.0	0.5	0.1					
	1.0	31.2	36.4	32.5	Sand-Silt-Clay	30.0	0.5	0.1					
	8.0	38.3	37.9	23.8	Sand-Silt-Clay	135.0	0.4	0.1					
	30.0	45.5	34.9	19.6	Silty Sand	75.0	0.3	0.1					
	14.0	30.3	41.1	28.6	Sand-Silt-Clay	65.0	0.0	0.2					
	2.0	31.0	42.0	27.0	Sand-Silt-Clay	100.0	0.0	0.2					
	2.0	43.8	36.3	19.9	Silty Sand	20.0	0.6	0.1					
	2.0	41.5	32.8	25.7	Sand-Silt-Clay	20.0	0.4	0.1					
	9.0	38.3	40.0	21.7	Sand-Silt-Clay	20.0	0.7	0.1	0-11	7.63	-513	25	34.1
	3.0	29.9	40.0	30.1	Sand-Silt-Clay	130.0	0.6	0.0					
	2.0	43.9	33.0	23.1	Sand-Silt-Clay	125.0	0.3	0.1					
	2.0	52.3	29.6	18.1	Silty Sand	93.0	1.5	0.1					
	14.0	28.8	39.6	31.5	Sand-Silt-Clay	79.0 92.0 112.0 136.0	0.5 33.8 2.0 38.5	0.1 0.1 0.1 0.0					
	1.0	30.0	37.9	32.1	Sand-Silt-Clay	20.0	33.6	0.1					
	2.0	29.2	32.8	38.0	Sand-Silt-Clay	20.0	37.2	0.1					
	43.0	36.5	34.6	28.9	Sand-Silt-Clay	60.0	14.1	0.1					
	3.0	40.6	31.9	27.5	Sand-Silt-Clay	22.0	14.5	0.0					
	2.0	35.3	33.6	31.1	Sand-Silt-Clay	21.0	2.7	0.0					
	2.0	31.7	36.3	32.0	Sand-Silt-Clay	21.0	4.0	0.1	140-150	7.69	-321	25	34.1
	3.0	37.2	28.9	33.9	Sand-Silt-Clay	20.0	1.3	0.0					

TABLE 2 – *Continued*

Identification	Lithology	Physical Properties								
		Saturated Bulk Density (Sect. Wt.)^{a} gm/cm^{3}	Saturated Bulk Density (GRAPE)^{b} gm/cm^{3}	Mean Grain Density^{c} gm/cm^{3}	Porosity (Calculated)^{d} Per Cent	Porosity (Drying, Ship)^{e}		Penetrometer^{f} cm	Sonic Velocity^{g} m/sec.	Natural Gamma Radiation^{h}
						Interval cm	Per Cent			
Hole 65.1										
Core 1-1										
Core 2-1	Radiolarian Marl Ooze									
Core 3-1										
Core 4-1	Radiolarian Ooze		1.168	2.06	86.5	100.0	90.2		1502	181
4-2	Radiolarian Ooze	1.200	1.190	2.06	83.9			0.54	1509	239
4-3	Radiolarian Ooze	1.178	1.196	2.06	83.4	20.0	88.0		1523	219
4-4	Radiolarian Ooze	1.191	1.197	2.06	83.3	110.0	86.4		1534	221
4-5	Radiolarian Ooze	1.154	1.175	2.06	85.4			0.16	1509	213
4-6	Radiolarian Ooze		1.167	2.06	86.2			1.04	1516	194
Core 5-1	Radiolarian Ooze with Chert		1.232	2.03	79.9				1499	259
5-2	Radiolarian Ooze with Chert	1.184	1.179	2.03	84.6			0.82	1514	211
5-3	Radiolarian Ooze with Chert	1.187	1.193	2.03	83.2				1512	222
5-4	Radiolarian Ooze with Chert		1.204	2.03	82.1			0.31	1516	263

Tectonic Significance of the Turbidites

The most plausible source area for the sandy turbidites is the elongate ridge west of Site 65, and the petrology of the turbidites provides clues to composition and history of the ridge. An Oligocene turbidite–at 126 meters–contains detrital foraminifers of Late Cretaceous, Paleocene, Eocene and Oligocene age, along with volcanogenic and reworked mudstone grains, suggesting that volcanic and pyroclastic rocks in various stages of weathering are exposed on the ridge, and that these are overlain, perhaps in shallow depths–above the calcite compensation depth–by a sedimentary section that is at least partly calcareous, and that includes strata ranging in age from Late Cretaceous to Oligocene. Reflection profile records across the ridge (Figure 3) show what appears to be the lower reflectors at Site 65 extending up the east slopes of the ridge. On one flattish bench at 4850 meters (between 0930 and 1015 hours on the profile) these reflectors are overlain unconformably by a set of less reflective layers about 0.1 second thick.

The ridge was probably a source of sand-sized detritus for the adjacent basin from at least as early as Middle Eocene time until Oligocene time, and may have continued to provide finer-grained sediment to even younger layers in the basin.

What Lies Deeper than 187 Meters?

Evidence from the turbidites of Cretaceous and Paleocene calcareous sediments in the region suggests that beds of those ages may underlie the middle Eocene beds at the bottom of the hole. Correlation of the reflection profile with the layers drilled indicates that the deepest reflector at the site lies some 40 meters below the total depth reached. If the 4 m/m.y. average accumulation rate is projected downward another 40 meters, an age of about 60 million years (Paleocene) results, and still another 40 meters is required to get back to 70 million years, the minimum age of the *Globotruncana fornicata* in the turbidite. The rate curve, however, appears to be closer to 2 m/m.y. in the Eocene and Oligocene, and this rate puts us conveniently at 70 million years at a depth of 225 meters–keeping in mind the velocity of 1.5 km/sec assumed for all the sediments. Ignored in this argument is the

TABLE 2 – *Continued*

Grainsize^{i}					Carbon/Calcium Carbonate			Interstitial Water				
Interval cm	Sand Per Cent	Silt Per Cent	Clay Per Cent	Classification	Interval cm	Calcium Carbonate Per Cent	Organic Carbon Per Cent	Interval cm	pH	Eh (mu)	Temp°C	Salinity %
97.0	1.1	50.7	48.2	Clayey Silt	110.0	41.8	0.1					
33.0	28.9	39.2	32.0	Sand-Silt-Clay	100.0	0.9	0.1					
2.0	27.8	41.0	31.2	Sand-Silt-Clay	21.0	1.2	0.0					
2.0	32.3	37.0	30.7	Sand-Silt-Clay	20.0	0.8	0.0					
1.0	28.5	41.5	30.1	Sand-Silt-Clay	110.0	0.7	0.0					
13.0	21.9	46.0	32.2	Sand-Silt-Clay	30.0	0.8	0.0	0-10	7.69	-333	25	34.4
1.0	7.3	44.3	48.3	Silty Clay	20.0	1.0	0.0					
57.0	23.1	47.0	29.9	Sand-Silt-Clay	100.0	1.9	0.0					
3.0	23.2	42.7	34.1	Sand-Silt-Clay	20.0	0.9	0.0					
2.0	26.7	41.3	32.0	Sand-Silt-Clay	130.0	1.0	0.0					
3.0	32.0	37.5	30.5	Sand-Silt-Clay	20.0 132.0	0.7 0.8	0.0 0.0					

possibility that any unconformity, such as that seen on the reflection profile on the ridge to the west (Figure 3), interrupts the sequence.

In sum, the most plausible sequence of layers at this site is the following: A volcanic basement of pre-latest Cretaceous age, at about 225 meters below the sea floor, overlain by late Cretaceous to Middle Eocene sediments between 225 and 187 meters, succeeded by the sequence cored in the hole.

Paleobathymetry

The lithologic evidence at Site 65 neither supports nor opposes the existence of a Mesozoic Darwin Rise for the Central Pacific, but the paucity of calcareous ooze throughout the recovered section indicates that the sea floor at Site 65 has been near or below the calcite compensation depth since at least the Middle Eocene.

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APPENDIX – THIN SECTION DESCRIPTIONS

Leg 7, Site 65, Hole 0, Core 14, Core Catcher

Type A

Macro: The rock is a dark brownish-gray (5YR3/1) porcelanite or porcelaneous mudstone. It shows well developed conchoidal fracture, and develops a network of cracks if air dried. Bedding is faintly visible in some fragments.

Micro: The rock is basically extremely fine-grained somewhat clayey cristobalite (particles generally < 10 microns) in which "float" organic and volcanic debris of sand size. The rock owes its color to dispersed blebs (5 to 10 microns) of reddish-brown iron oxides.

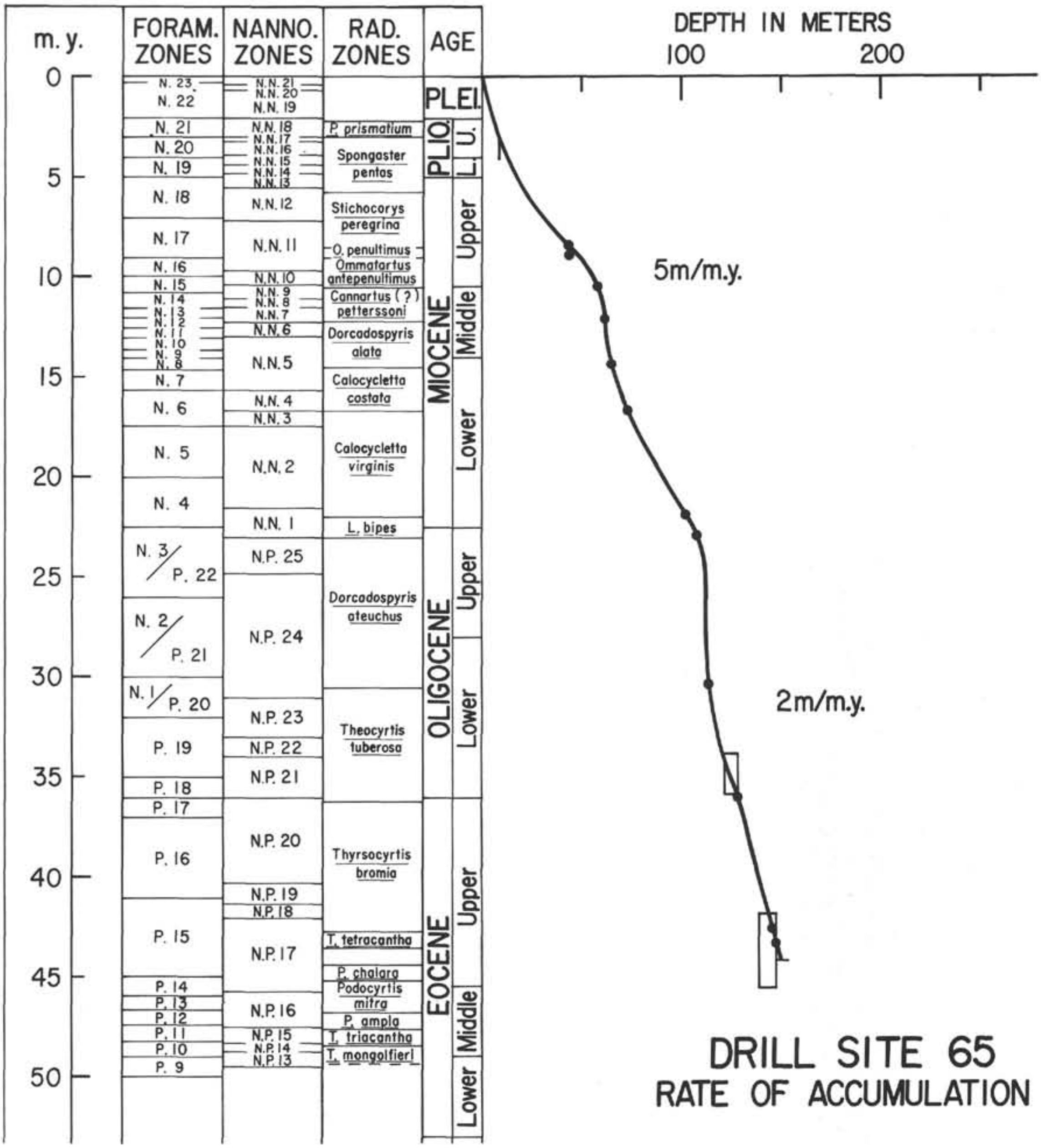


Figure 6. *Rate of sediment accumulation at Site 65.*

The grains which form the coarse fraction of the sediment are dominated by radiolarian tests (constituting perhaps 10 per cent of the rock). All gradations from sharply defined sections of tests (some filled and outlined by ferromanganese oxides) to faint "ghosts", barely visible in phase contrast illumination, are present. Many of the better preserved tests are now chalcedony.

The next most abundant coarse grains are siliceous spicules of indeterminate origin and phosphatic fish debris.

The volcanic debris, a minor component, is mostly highly altered to slightly altered (rare) vesicular glass. Most of the glass is now palagonitic or at least strongly iron-stained. Vesicules tend to be lined or filled with chalcedony, and less commonly ? montmorillonite. One grain of altered ? pyroxene (now shot through with iron-oxide needles (or ? bastite) and largely composed of ? chlorite) was also observed.

About as abundant as altered glass are rounded masses of silicified clay, distinguished from the matrix by a higher clay content. Some of these are altered feldspars (clay flakes are aligned parallel to original cleavage) and some are probably fecal pellets.

Although never close packed, the coarse particules tend to be concentrated in irregular blebs (? mottles) and perhaps laminae about 1 to 3 millimeters across.

Leg 7, Site 65, Hole 0, Core 17, Core Catcher

Type D

Macro: The rock is a pale yellowish-brown (10 YR 7/2) to pale olive gray (5Y 7/1) somewhat friable arenite. It shows indistinct banding at 4 to 5 millimeter intervals, the darker and possibly finer bands being more indurated and much less permeable than the lighter ones. At a finer scale, the rock shows laminae at 1 to 2 millimeter spacings, and some of these reveal the presence of low dipping (~ 5°) truncated cross beds. The specimen as a whole (~ 4 centimeters across) is crudely graded, with grading and truncation of cross beds yielding consistent directions.

Micro: The rock consists of 150 to 2000-micron grains in a fine calcareous and siliceous (apparently both cristobalitic and chalcedonic) matrix.

The framework was probably close packed initially, but has subsequently undergone some distortion. The main components are:

1. Volcanic debris. This component is dominated by various types of altered glass, ranging from pale brown, slightly anisotropic material through orange and brown banded palagonites to intensely altered vesicular shards of chloritized and chalcedonic (often variolitic) material fringed with 10 to 20 micron bands of radiating chalcedony, and heavily impregnated with iron oxides. Some vesicules are lined with radiating acicular montmorillonite, and a few are infilled with zeolites.

Primary minerals are extremely rare, either in the glass or as separate grains. A few plagioclase laths survive, and intensely altered pyroxene (now bastite, iron oxides and ? montmorillonite) can be recognized by its morphology and ghost cleavage planes. A few microlites survive in glass fragments, but most have been partly or completely replaced by chalcedony. The rarity of razor edges on glass shards suggest that much of the alteration pre-dates the deposition of this sediment.

2. Ovoid to round calcareous pellets, 100 to 300 microns in diameter. These pellets consist of 2 to 10 microns micrite, and are generally uniform and without internal structure. Some appear to be infilled foraminifera whose chamber walls have subsequently dissolved, but most are probably fecal pellets. Many of the pellets are elongated parallel to bedding, and some are so streaked out that they grade into the matrix, suggesting that much of the micrite matrix could have been introduced as relatively coarse aggregates.

Most of the fine calcareous debris is unidentifiable, but coccoliths are common enough to indicate an organic rather than a chemical origin.

The fine calcareous material is replaced by silica to varying degrees, and all gradations from little altered dirty calcareous pellets to clayey chalcedony or cristobalite can be observed. The degree of silicification may be slightly greater in the more indurated portions of the rock (see macro description), but the difference is subtle.

3. Clay-rich pellets up to 1500 microns in diameter. This group is probably polygenetic, but the various members grade into one another. Many of these pellets, like those of group 2, are deformed and elongated parallel to bedding, suggesting that they were not well indurated at the time of deposition.

Some pellets consist largely of clay (and perhaps sericite) flakes having two dominant orientation directions which are probably parallel to the cleavage planes of original feldspar grains. In one case, ghost twinning is revealed by slight differences in the crystal size of alteration products in different segments.

Other pellets are quite calcareous and contain siliceous spines and radiolarian skeletons. Members of this group are most commonly deformed, and are probably closely related to group 2 above.

4. Foraminifera. Calcareous tests with the characteristic radiating structure are common, and include both planktonic and benthonic species. Most tests are corroded to some extent. The fragile nature of some of the remaining skeletons suggests that dissolution post-dates deposition at this site.

Infilling of chambers with chalcedonic silica is fairly common, but the replacement of chamber walls by chalcedony having the orientation of the parent calcite, which is so common in other Leg 7 silicified deep-sea deposits, has not taken place.

5. Fish debris. Unaltered phosphorite (carbonate-apatite) is common throughout the rock. Much of the material is fragmental, but well-preserved teeth are common.

6. Siliceous skeletal material. Both siliceous spicules and radiolarian remains are extremely rare, and virtually absent outside some of the clayey (group 3) pellets. Presumably, the dissolution of such material provided the silica which now permeates the rock.

7. Ferro-manganese concretions or micro-nodules. These concretions, 100 to 500 microns in diameter, are a rare constituent of the rock. They have the characteristic rounded or botrioidal outlines, and often have nuclei of altered volcanic debris. The presence of broken micronodules indicates that they were introduced as clastic particles, rather than formed *in situ.*

Fabric: Virtually all elongate particles (spicules, fish debris, benthonic foraminifera, glass shards) show a very strong tendency to be oriented parallel to bedding planes. Together with the overall grading of the deposit (~ 1500 micron grains at the base of 700-micron grains at the top) and the presence of cross bedding, such orientation points to the importance of bottom currents on the nature of the rock.

Origin: The components of this rock were derived from at least two sources. The altered volcanic debris, micronodules, and common fish debris were probably part of a winnowed, very slowly accumulating deposit, prior to their displacement to the present site. The foraminiferal remains and calcareous pellets were deposited above the compensation depth (that is, above the site cored, which is under and overlain by carbonate-free siliceous ooze) and lay undisturbed long enough to become slightly indurated.

We can then suppose that a slump or turbidity current originated in the shallower, calcareous material, incorporated the winnowed sediments as it moved downslope, and ultimately deposited a graded bed over an area which included Site 65.

Leg 7, Site 65, Hole 0, Core 14, Core Catcher

Type A

Impure cristobalitic porcelanite. (Sample 1)

Rock is about 40 per cent grains of altered organic and volcanic origin (almost all of which appear to be "floating"), and 60 per cent groundmass that is largely cristobalite.

Of the grains, remains of radiolarians are most abundant. There is every range from sharp outlines, often accented by thin ferromanganese coatings on the walls of the radiolarians and interiors of slightly different-colored matrix, to ghostly remains whose walls interlock into the mosaic of the groundmass but still retain the overall shape of radiolarians. Rarely, the interiors or walls are partly replaced by chalcedony. Next most abundant are elliptical to irregular grains of the same general appearance as the opaline matrix, but with slightly lighter or darker color and slightly more or less microlites that thereby allow them to be distinguished. Many ovoid ones probably are silicified fecal pellets. Others almost certainly were originally volcanic grains because they grade toward grains the clearly are volcanic or palagonitized volcanic grains. The rock also contains unaltered grains of brown glass and of fish remains.

The groundmass is a fine mosaic of cristobalite cement. Abundant microlites of brownish-black opaque grains (some micronodules, some possibly magnetite?) and of greenish-brown birefringent grains (clay) attest to its impurity; they probably were deposited as matrix.

The original sediment was an ashy radiolarian ooze. Silica, precipitated in voids and replacing the nonradiolarian grains has indurated the rock.

Impure cristobalitic porcelanite (Sample 2)

This radiolarian porcelanite closely resembles that of thin section 7-65-0-14-CC (described above). The proportion of the radiolarian and volcanic grains to cristobalitic and clay groundmass is somewhat higher (about 50 per cent grains). The microlite impurities that color the rock are finer grained. A few of the volcanic grains have sheaf-like patches of chalcedony adjacent to them.

Leg 7, Site 65, Hole 1, Core 1, Core Catcher

Type B

Macro: Pale yellowish-brown (10YR 7/2) highly indurated rock, looking like an impure quartzite or arkose. Finer portions laminated (1 to 2 millimeters); no visible wedging or cross bedding. Includes coarser layer (grains ~ 1 millimeter) with high proportion of dark grains.

Micro: Basically a close-packed mass of partly to totally silicified planktonic foraminifera, filled and surrounded by a fine mosaic of chalcedony.

Coarser grains, mentioned above, are mainly angular to subrounded dirty mudstones, containing much iron oxide (mostly 5 to 10 micron flecks) with fine-grained clays and cristobalitic silica.

The wall structure of foraminifera is well preserved, regardless of whether it is calcite, chalcedony (with fibre packets mimicing the original calcite) or cryptocrystalline cristobalite. Calcite persists in small patches, up to 1 millimeter across, and includes micrite (no identifiable nannofossils) as well as foraminiferal tests. Voids in such areas are often filled with coarser than average (up to 30 microns versus < 5 microns average) sheaves of chalcedony.

Other framework components of the rock are radiolarians (altered to chalcedony), benthonic foraminifera, palagonite and other altered glass (including much iron oxides and acicular ? montmorillonite), silicified claystone (? in part fecal pellets), and fish debris.

Laminae mentioned in macro description are ~ 1 millimeter calcite-rich (largely unsilicified) layers of finer, and possibly denser grains (average ~ 150 microns versus 200 to 300 microns for rest of rock). May have formed by shear sorting. The laminae include much higher than average concentrations of spicules, fish debris and palagonite. Zeolite crystals which have grown into voids (later filled with silica) are a rare component.

Silicification of calcite is variable, but appears to be infilling of empty chambers, then micrite, then foraminiferal chamber walls in most cases. Pyroxene (with bastite alteration) is present in trace amounts.

Leg 7, Site 65, Hole 1, Core 3, Core Catcher

Type B

Cherty limestone, or silicified foraminiferal calcarenite

Grains, chiefly of partly silicified foraminifers, constitute about 85 per cent of the rock; the groundmass is both micritic carbonate that probably was original matrix, and silica cement.

The grains are mainly the tests of pelagic foraminifers, of about 0.3 to 0.4 millimeters diameter, or about of medium-grained sand-size. For the most part, the chamber walls are replaced by cristobalite. Some others have been replaced by chalcedony, some remain calcite, and the remainder, partly replaced, show combinations of these compositions. Other kinds of grains, and commonly concentrated within certain few laminae, are silicified, clay-rich ovoid pellets, and palagonite grains. The rock is very distinctly laminated, and within each lamina the grains are well-sorted. Laminae, all parallel, differ from one another in grain size, composition, and degree of silicification.

The groundmass is largely a mosaic of cryptocrystalline cristobalite, but in some laminae the cristobalite grades into microcrystalline chalcedony or calcite. Interiors of most foraminiferal tests are filled with cristobalite, chalcedony, or micrite, like the groundmass adjacent to the outside of the test. Those filled with chalcedony, however, are usually in carbonate-rich laminae.

The grains may have been carried from some higher ridge or sea-mount to Site 65 as turbidites. They became a well-sorted, well-laminated foraminiferal chalk ooze, with minor micritic matrix, probably of nannofossils. It may have been termed a foraminiferal calcarenite when first lithified. Now the rock shows varying degrees of silicification.

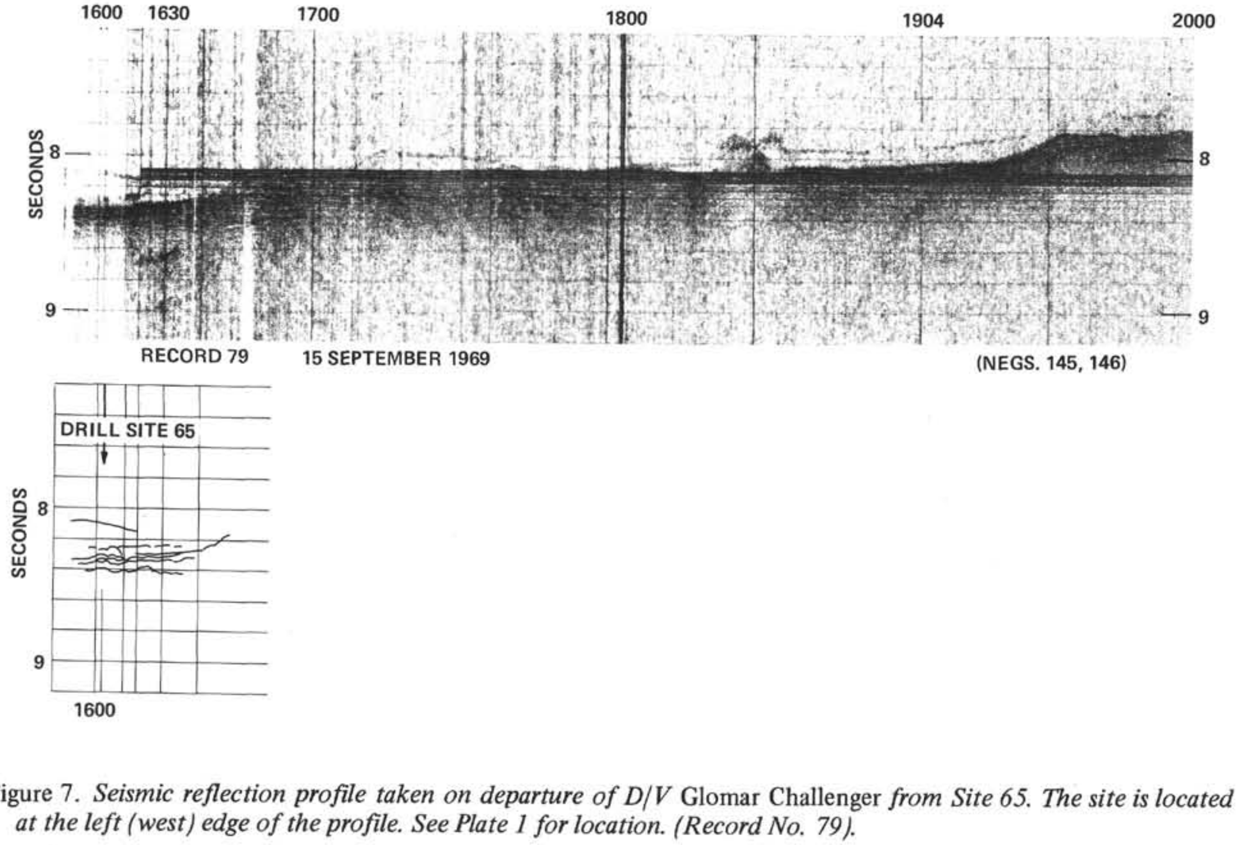
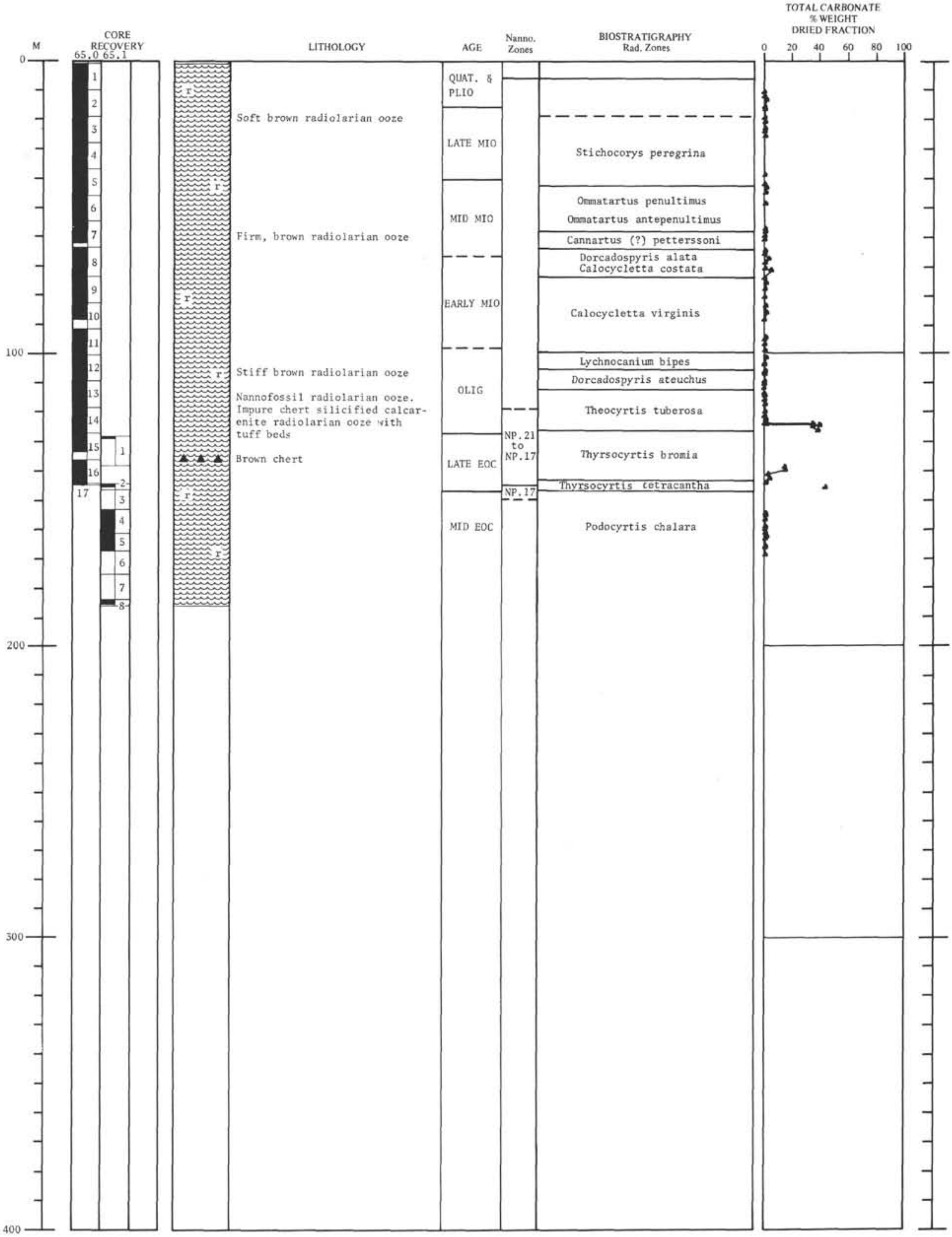
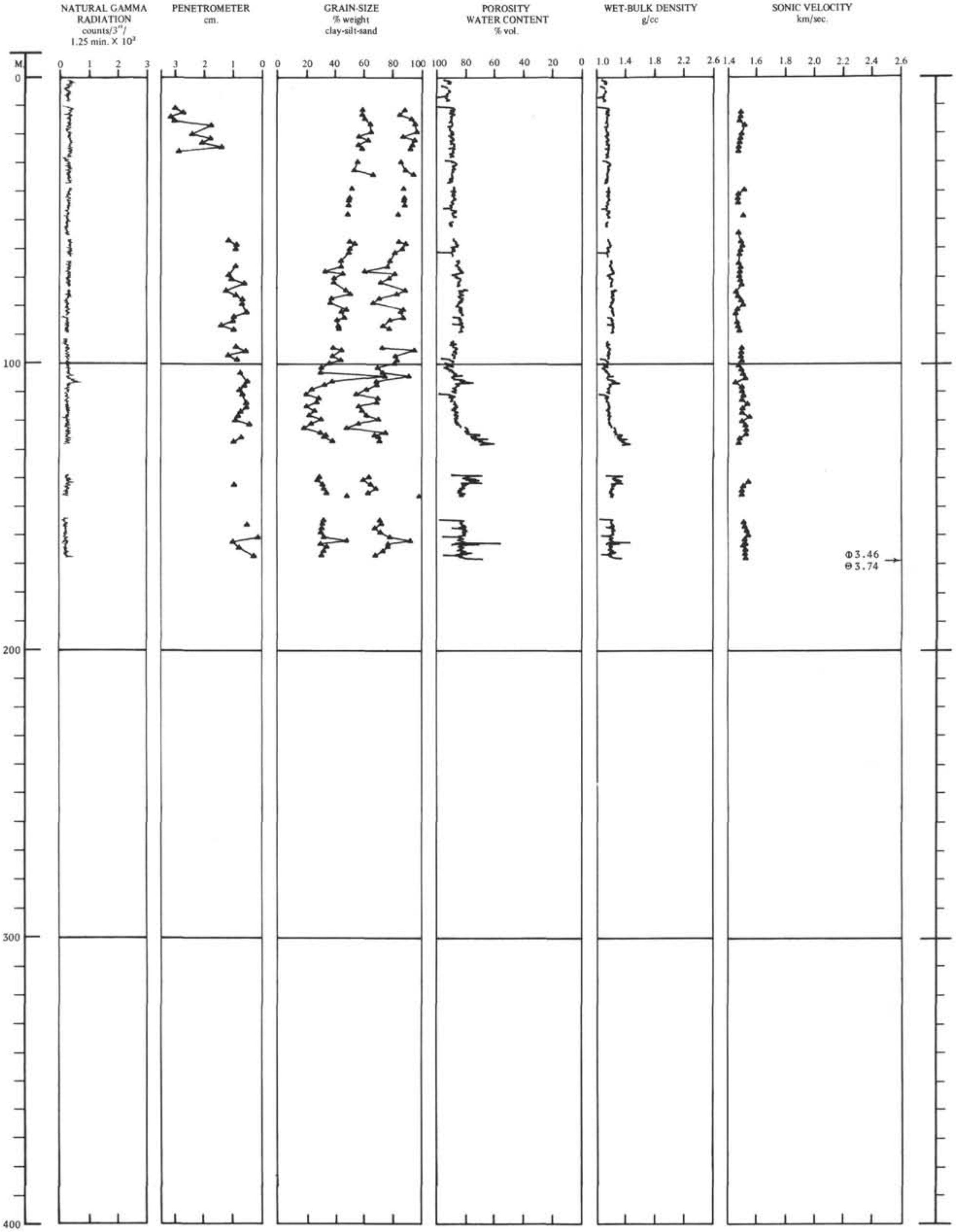


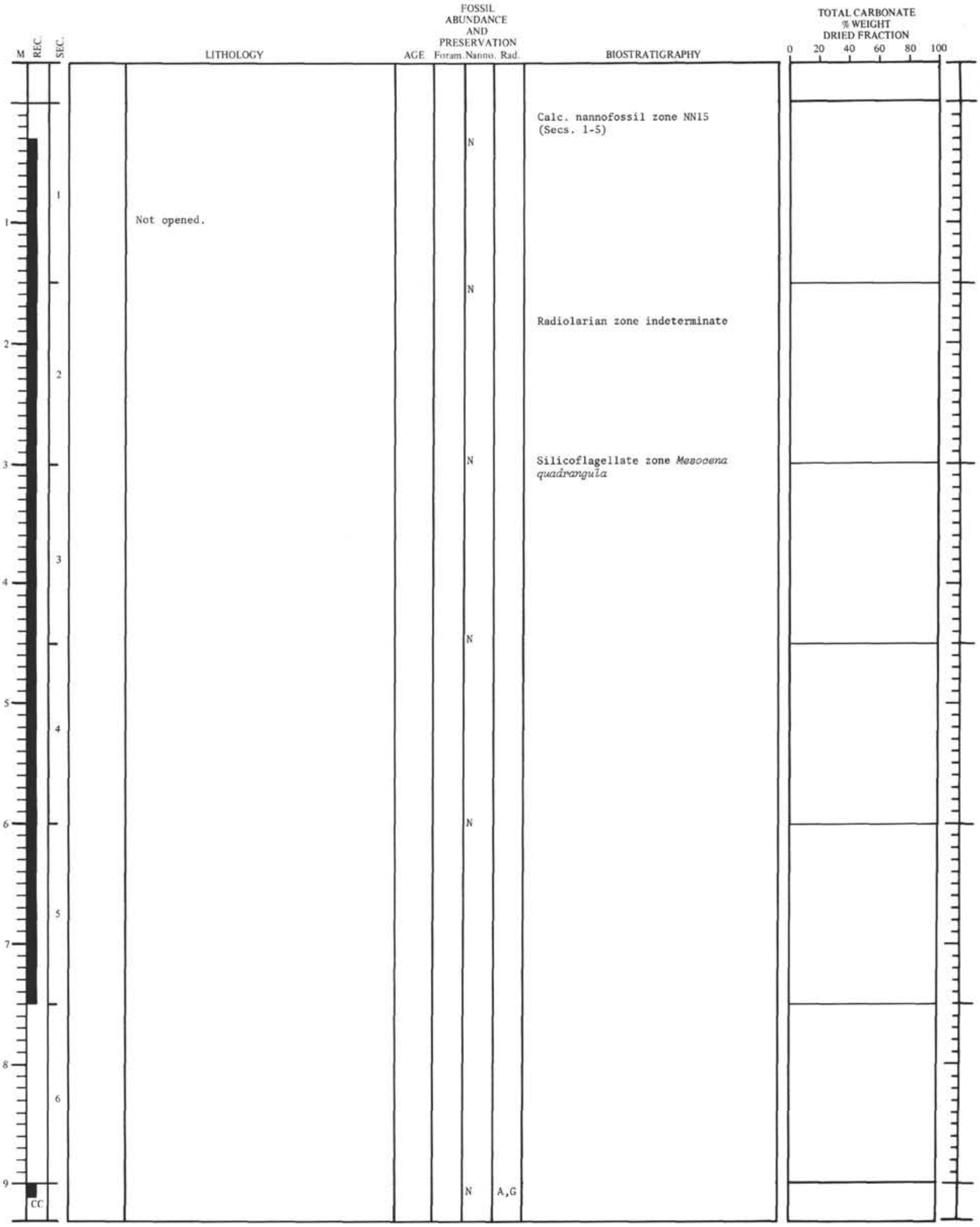
Figure 7. *Seismic reflection profile taken on departure of D/V* Glomar Challenger *from Site 65. The site is located at the left (west) edge of the profile. See Plate 1 for location. (Record No. 79).*



Lithology and biostratigraphy of Site 65.



Physical properties of Site 65.



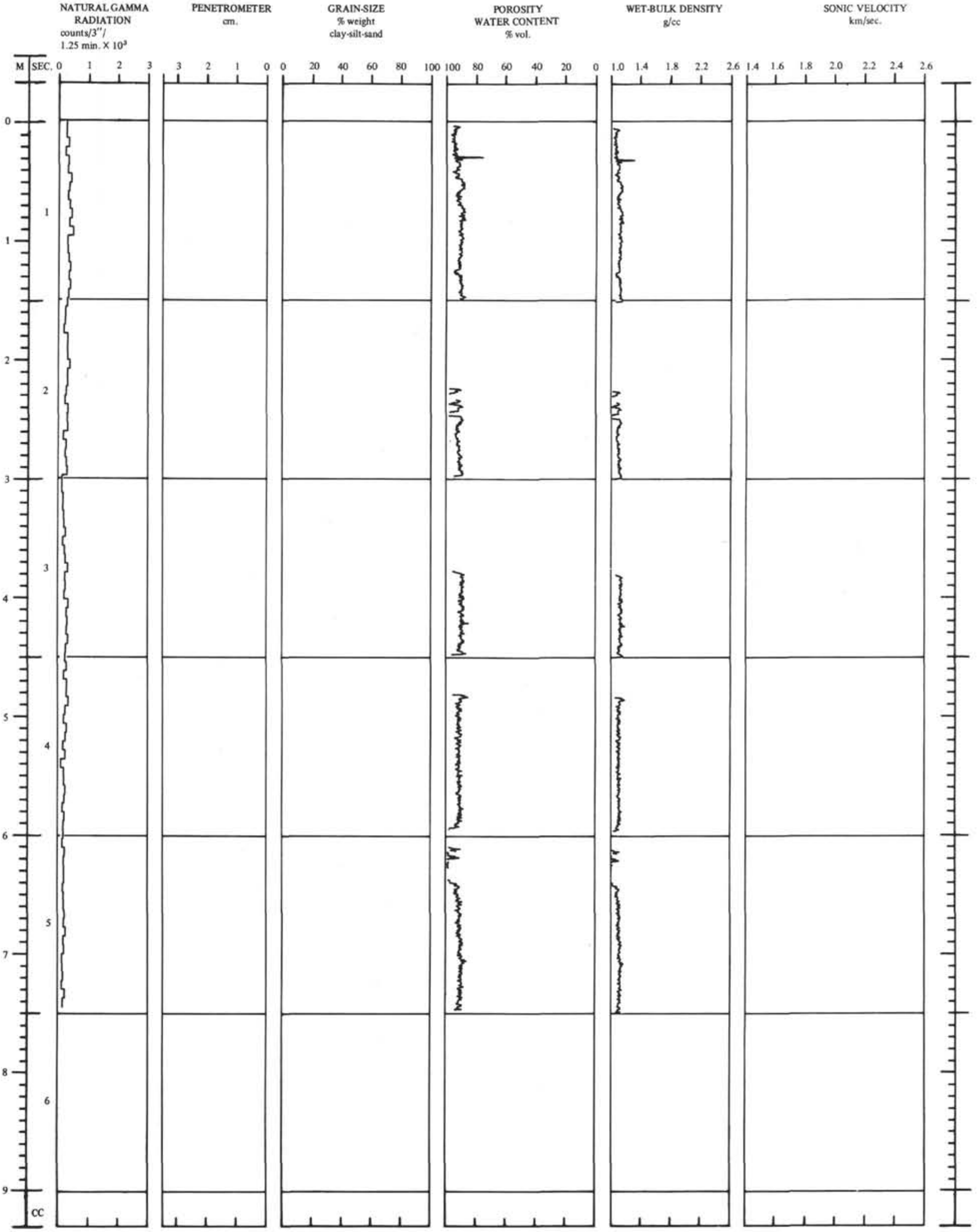
Not opened.

Calc. nannofossil zone NN15 (Secs. 1-5)

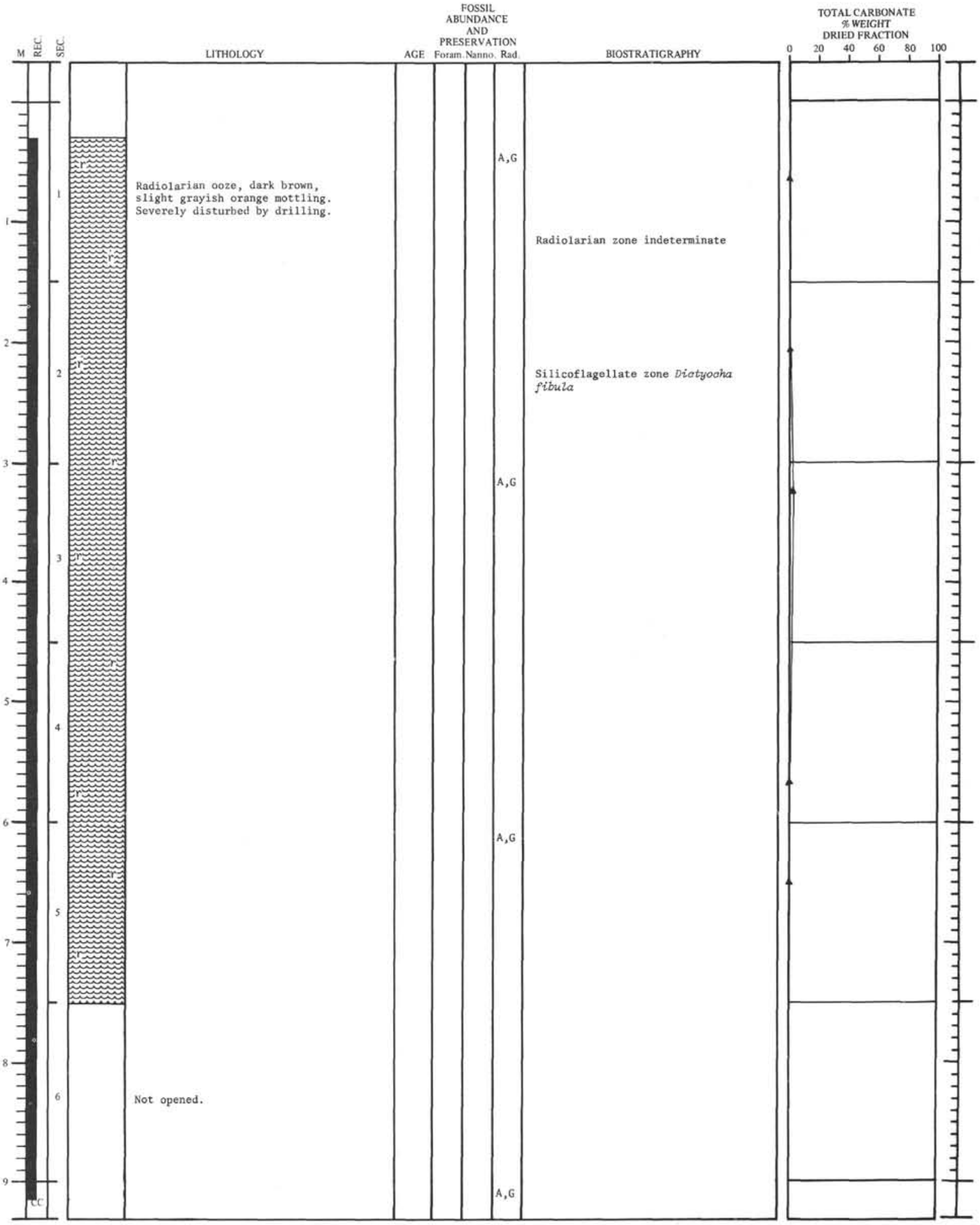
Radiolarian zone indeterminate

Silicoflagellate zone *Mesocena quadrangula*

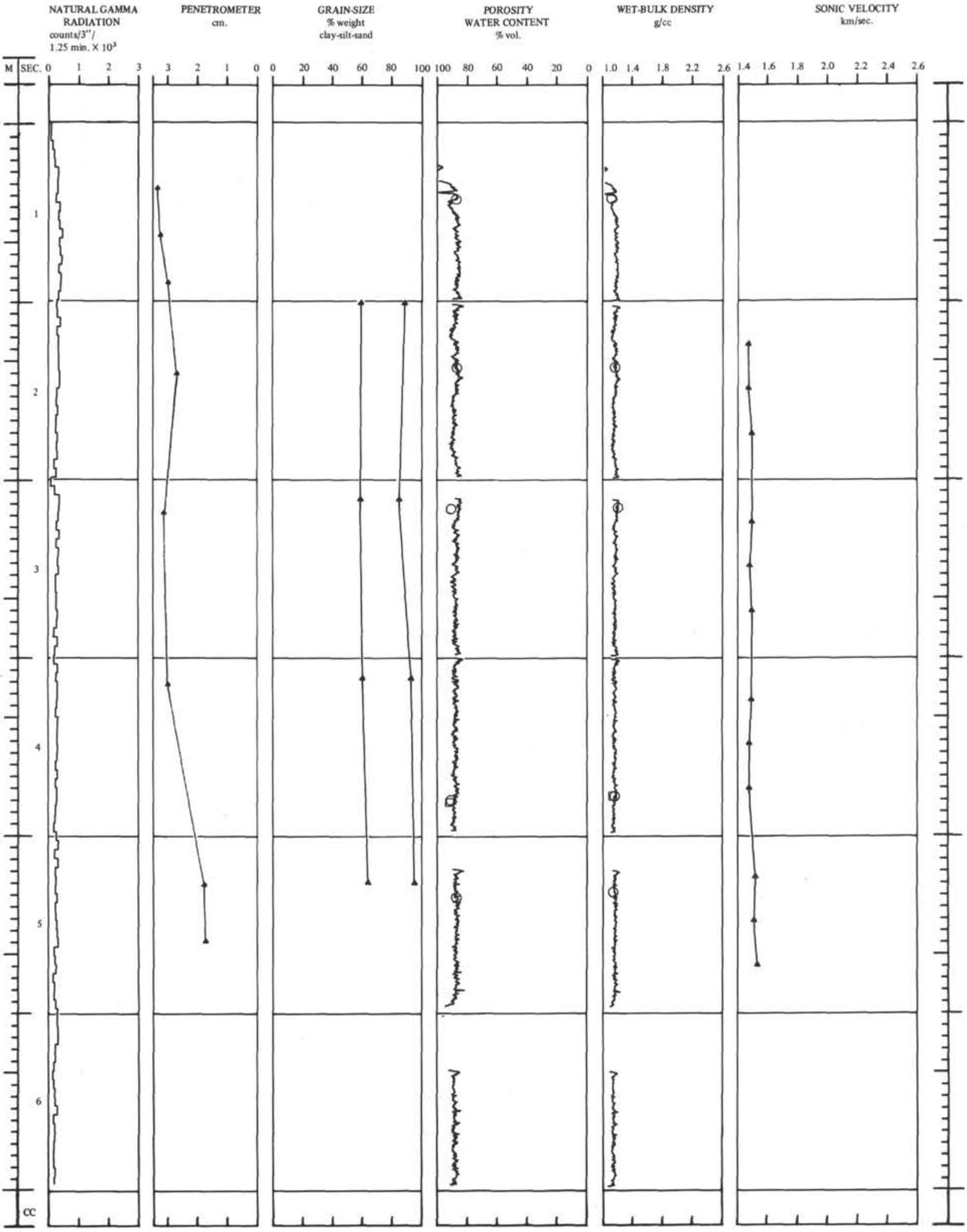
Lithology and biostratigraphy of Core 1, Hole 65.0.



Physical properties of Core 1, Hole 65.0.

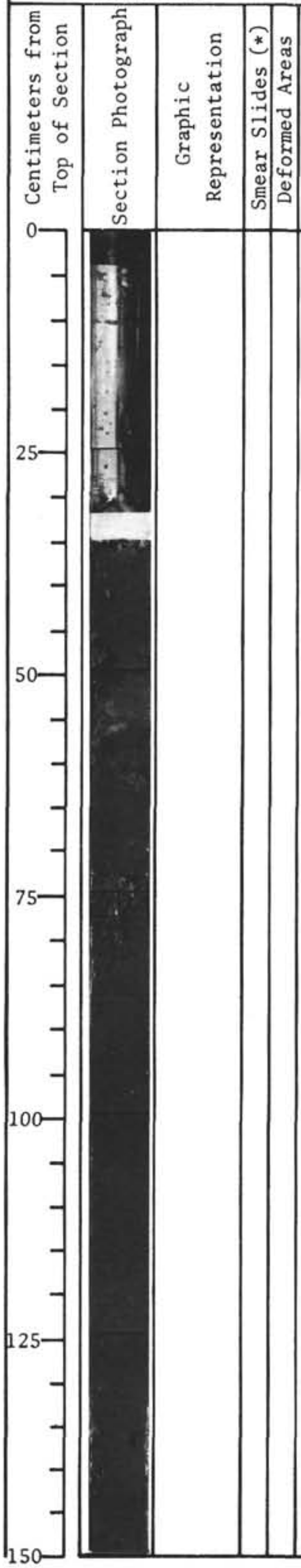


Lithology and biostratigraphy of Core 2, Hole 65.0.



Physical properties of Core 2, Hole 65.0.

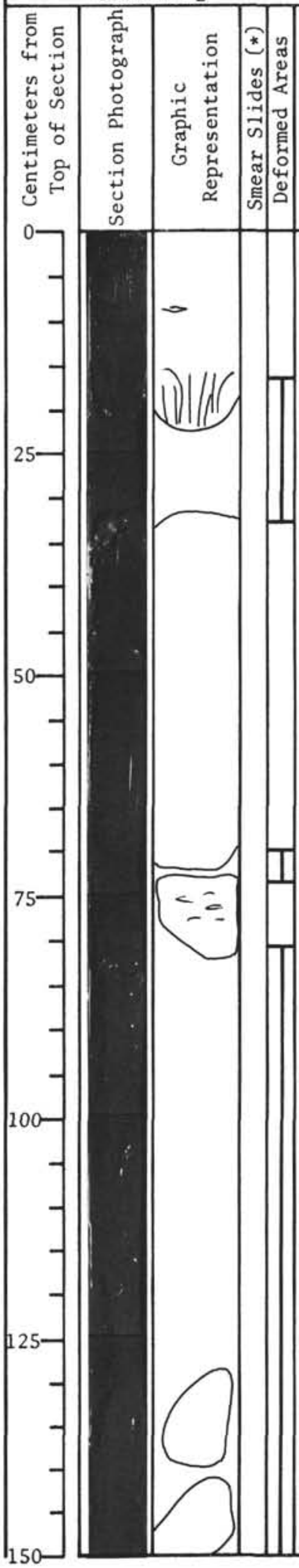
Hole 65.0 Core 2
Section 1



Description

No visual description available.

Hole 65.0 Core 2
Section 2



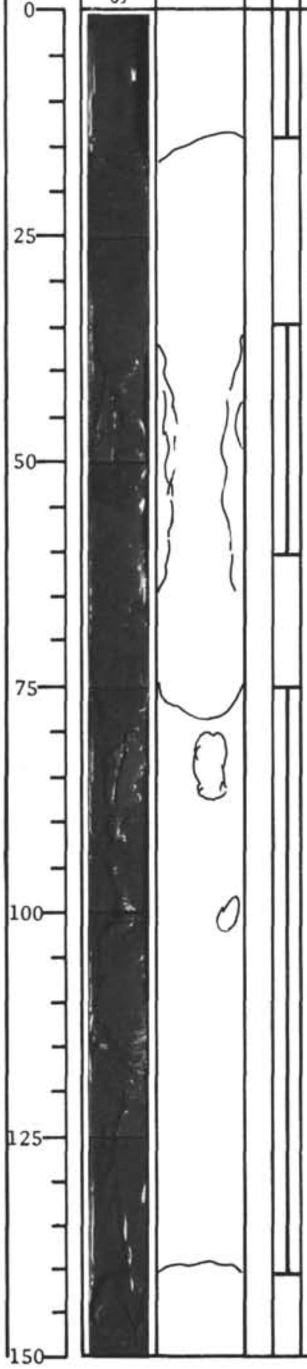
Description

RADIOLARIAN OOZE

Dark brown (7.5YR4/4) ooze, slightly mottled grayish orange (10YR 8/4) and dusky yellowish brown (10YR3/2). Some intervals of very fluid mud from drilling process.

Hole 65.0 Core 2
Section 3

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



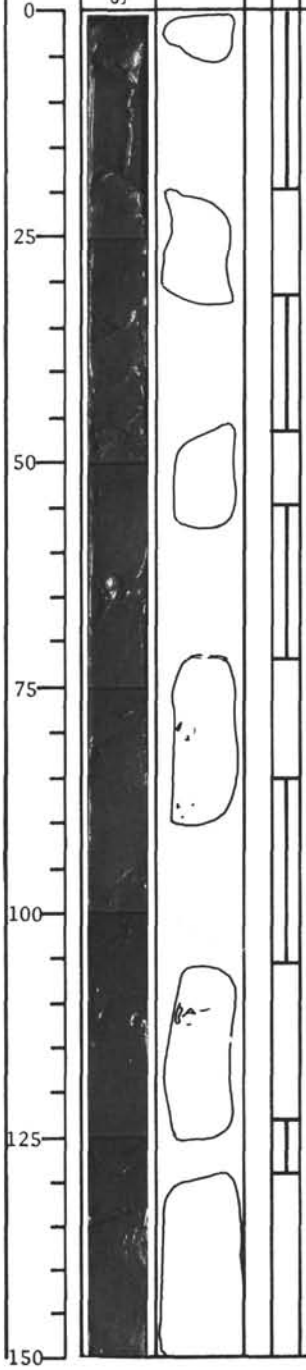
RADIOLARIAN OOZE

Dark brown (7.5YR4/4) ooze; slightly mottled grayish orange (10YR 8/4) and dusky yellowish brown (10YR3/2).

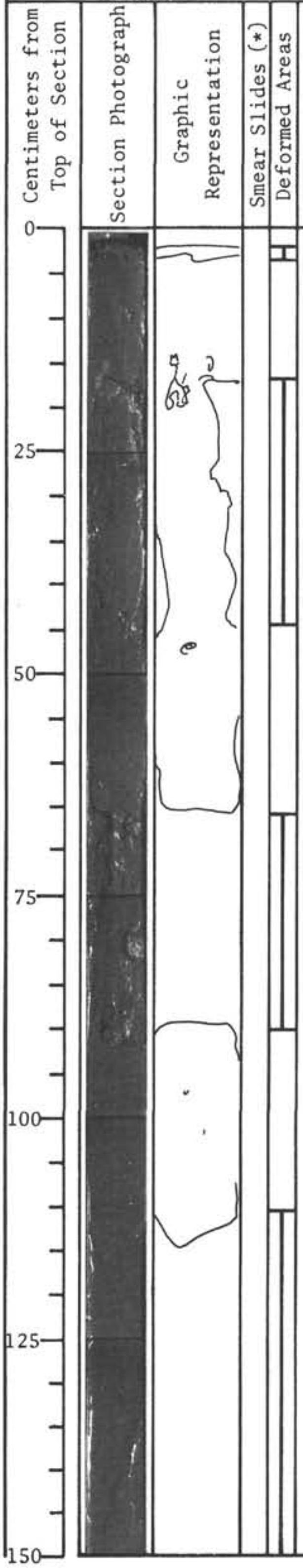
Badly deformed by water injection.

Hole 65.0 Core 2
Section 4

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



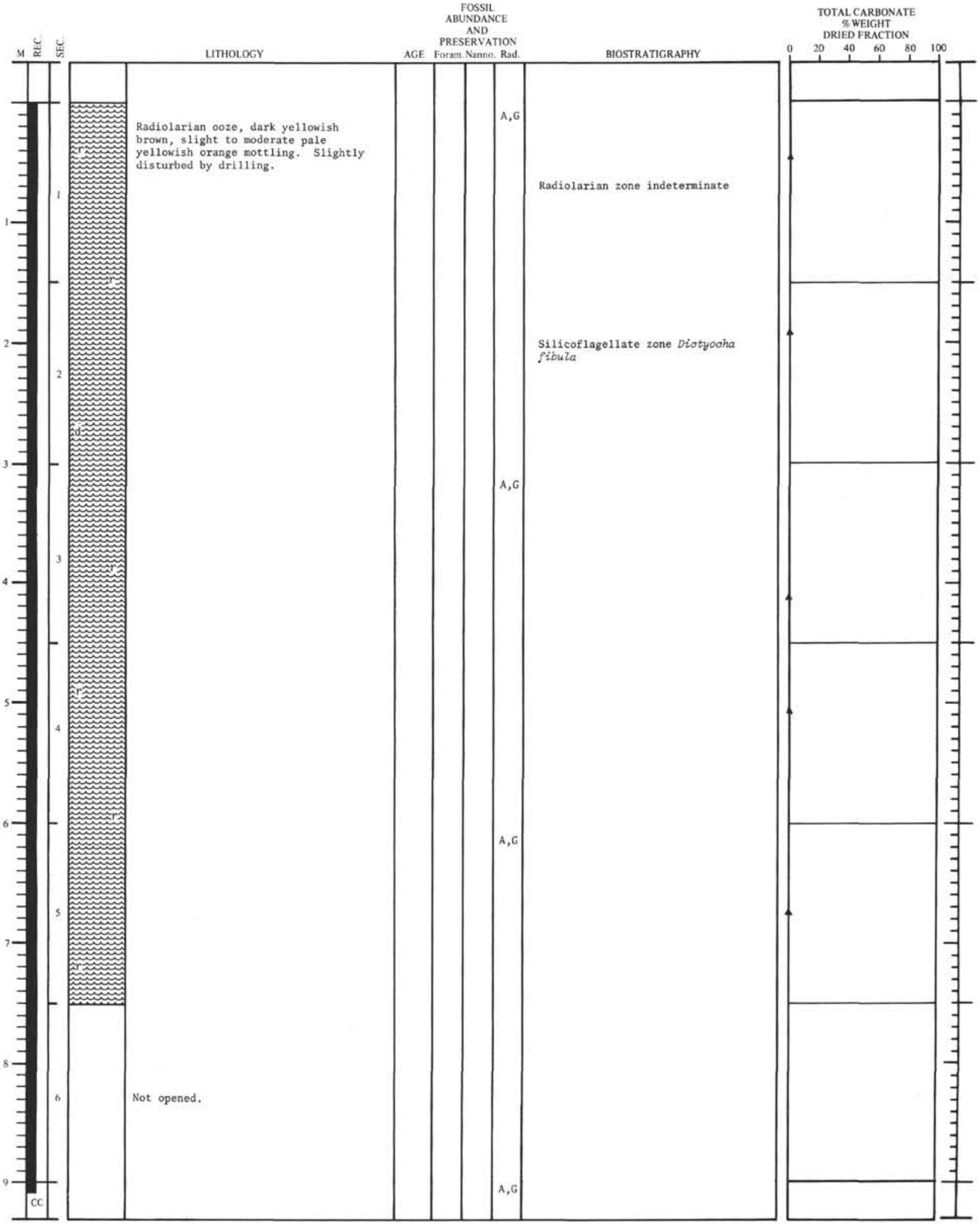
Hole 65.0 Core 2
Section 5



Description

RADIOLARIAN OOZE

Moderate yellowish brown (7.5YR5/4), moderate mottled at ∿15cm and slightly mottled elsewhere with grayish orange (10YR8/4).



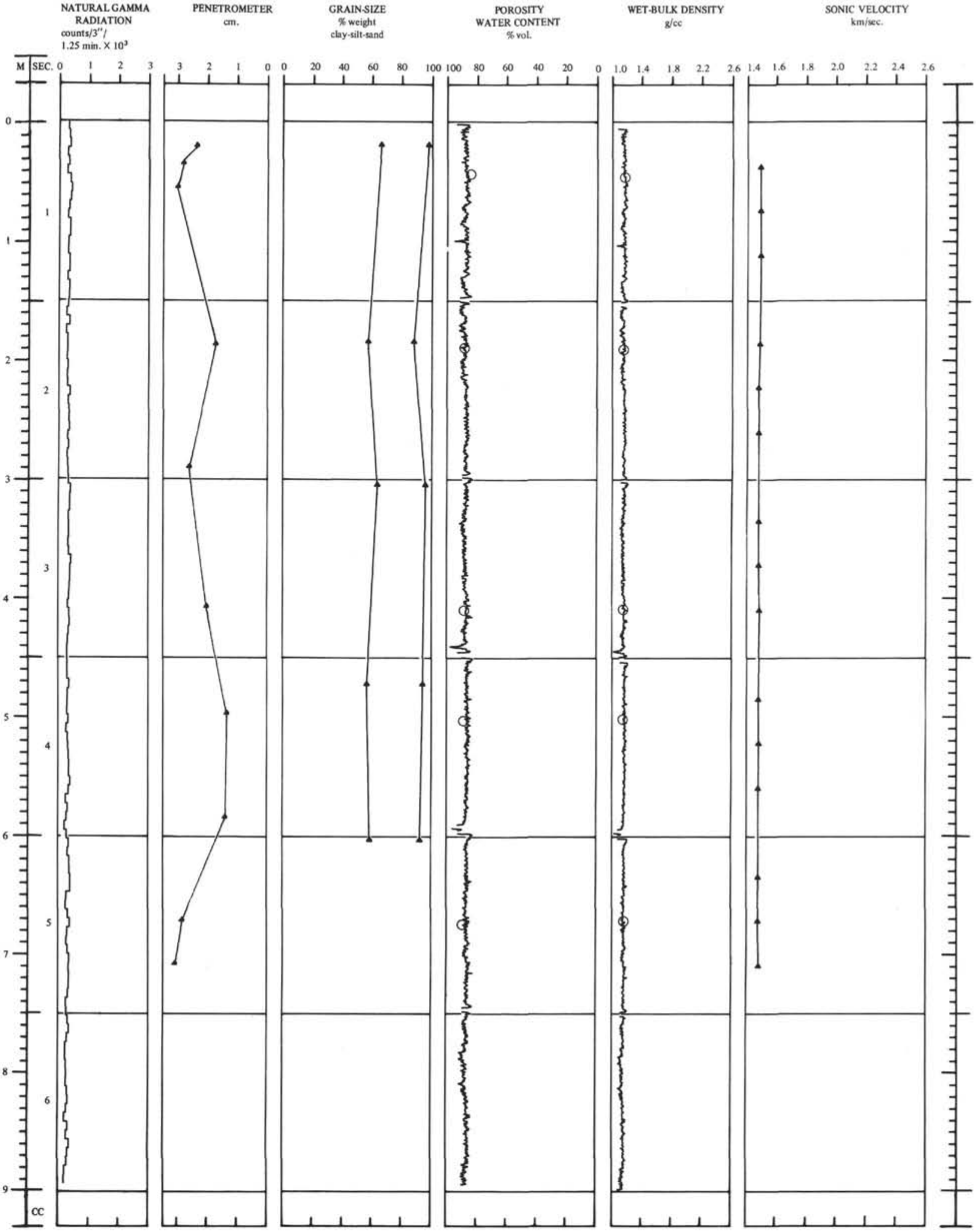
Radiolarian ooze, dark yellowish brown, slight to moderate pale yellowish orange mottling. Slightly disturbed by drilling.

Not opened.

Radiolarian zone indeterminate

Silicoflagellate zone *Dictyocha fibula*

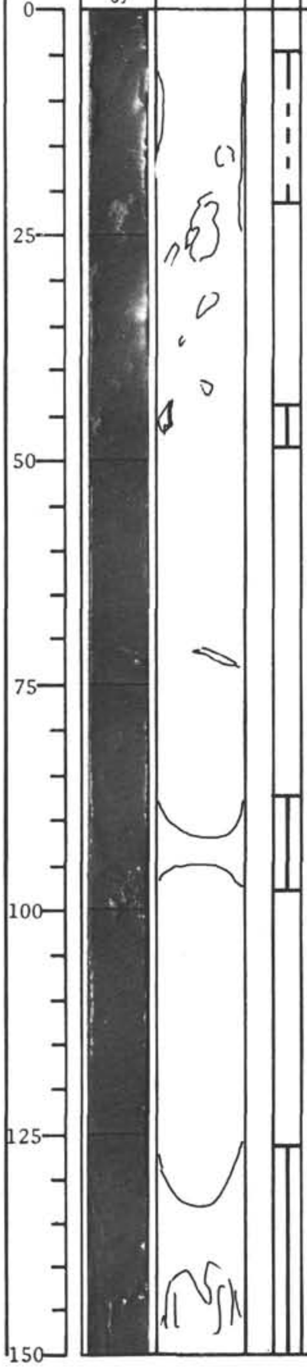
Lithology and biostratigraphy of Core 3, Hole 65.0.



Physical properties of Core 3, Hole 65.0.

Hole 65.0 Core 3
Section 1

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



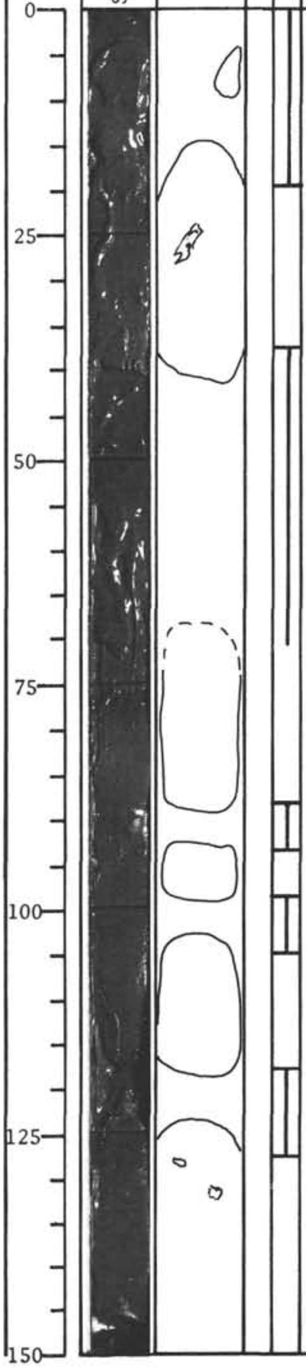
RADIOLARIAN OOZE

Dark yellowish brown (10YR4/3) ooze.

15-38cm:
Moderately mottled with pale yellowish orange (10YR8/6); a few other mottles further down.

Hole 65.0 Core 3
Section 2

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



RADIOLARIAN OOZE

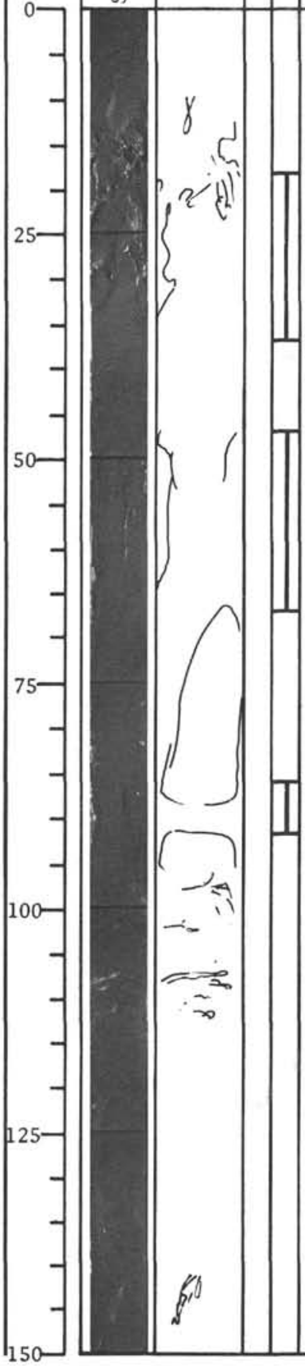
Dark yellowish brown (10YR4/3) ooze.

Slightly darker from 141-146cm (dark brown 10YR3/3).

A large pale yellowish orange (10YR8/6) mottle at 38cm and small ones at 132 and 139cm.

Hole 65.0 Core 3
Section 3

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



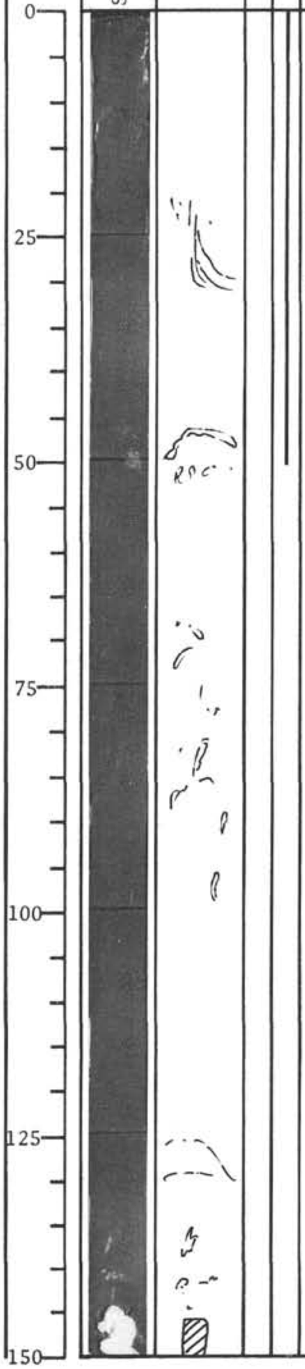
RADIOLARIAN OOZE

Dark yellowish brown (10YR4/3) ooze.

Moderately mottled pale yellowish orange (10YR8/6) between 13-30 and 99-113cm, and a few small pale yellowish orange and dusky yellowish brown (10YR 2/2) mottles from 113-123 and 143-148cm.

Hole 65.0 Core 3
Section 4

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description

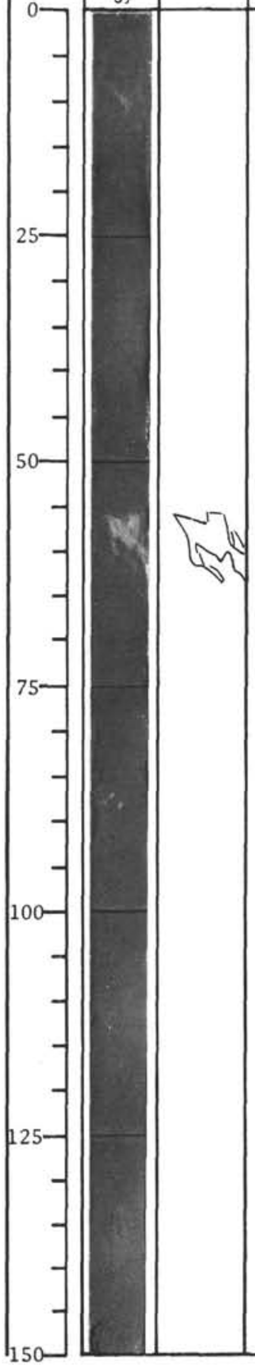


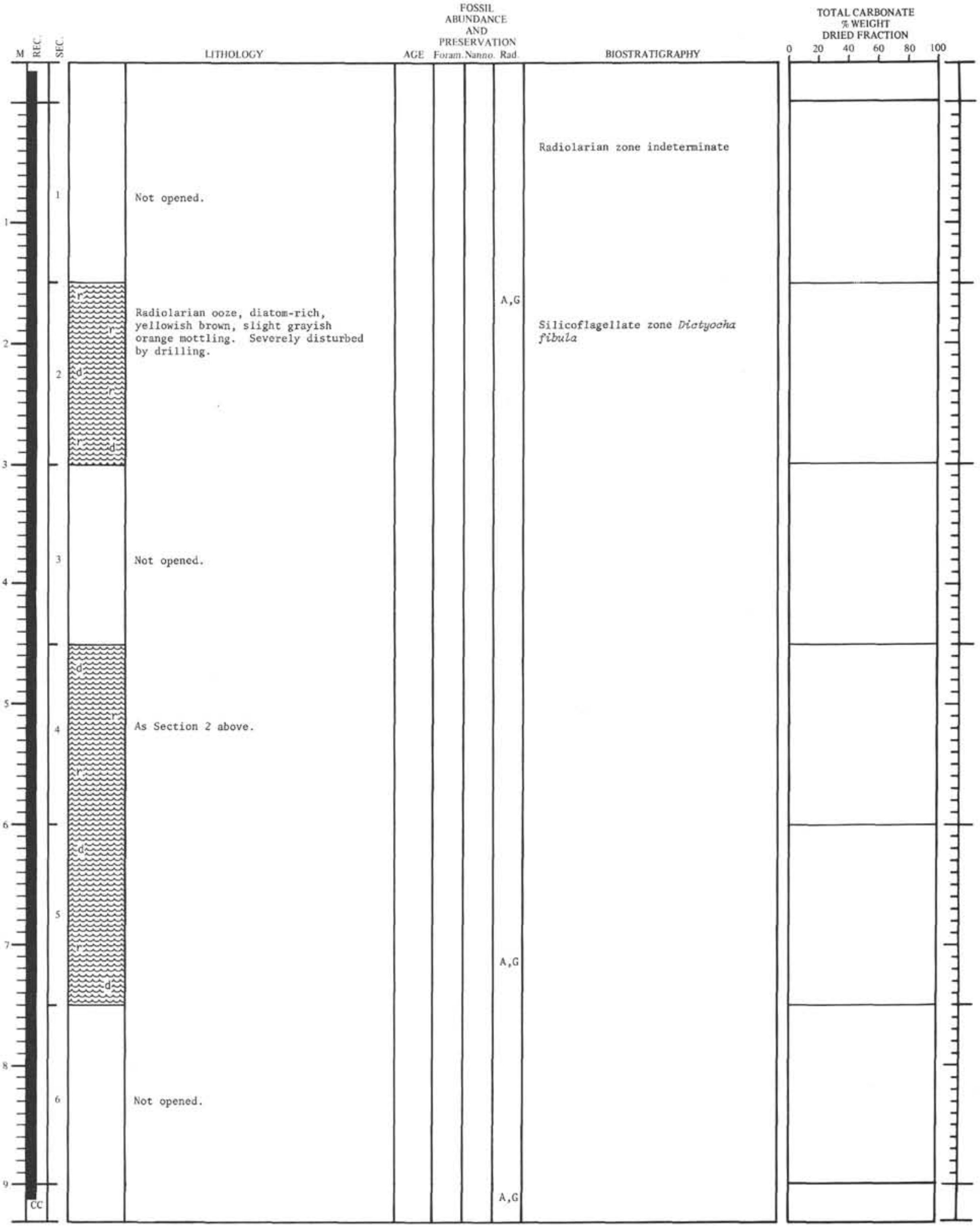
RADIOLARIAN OOZE

Dark yellowish brown (10YR4/3) ooze, moderately mottled pale yellowish orange (10YR 8/6) 135-150cm, and a few scattered other mottles.

A plug removed for interstitial water sample between 145 and 150cm.

Hole 65.0 Core 3
Section 5

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
					RADIOLARIAN OOZE Dark yellowish brown (10YR4/3) slightly mottled pale yellowish orange 10YR8/6. Probably slight distortion throughout. Only slight variations in firmness (soft to very soft, but not soupy).



Not opened.

Radiolarian ooze, diatom-rich, yellowish brown, slight grayish orange mottling. Severely disturbed by drilling.

Not opened.

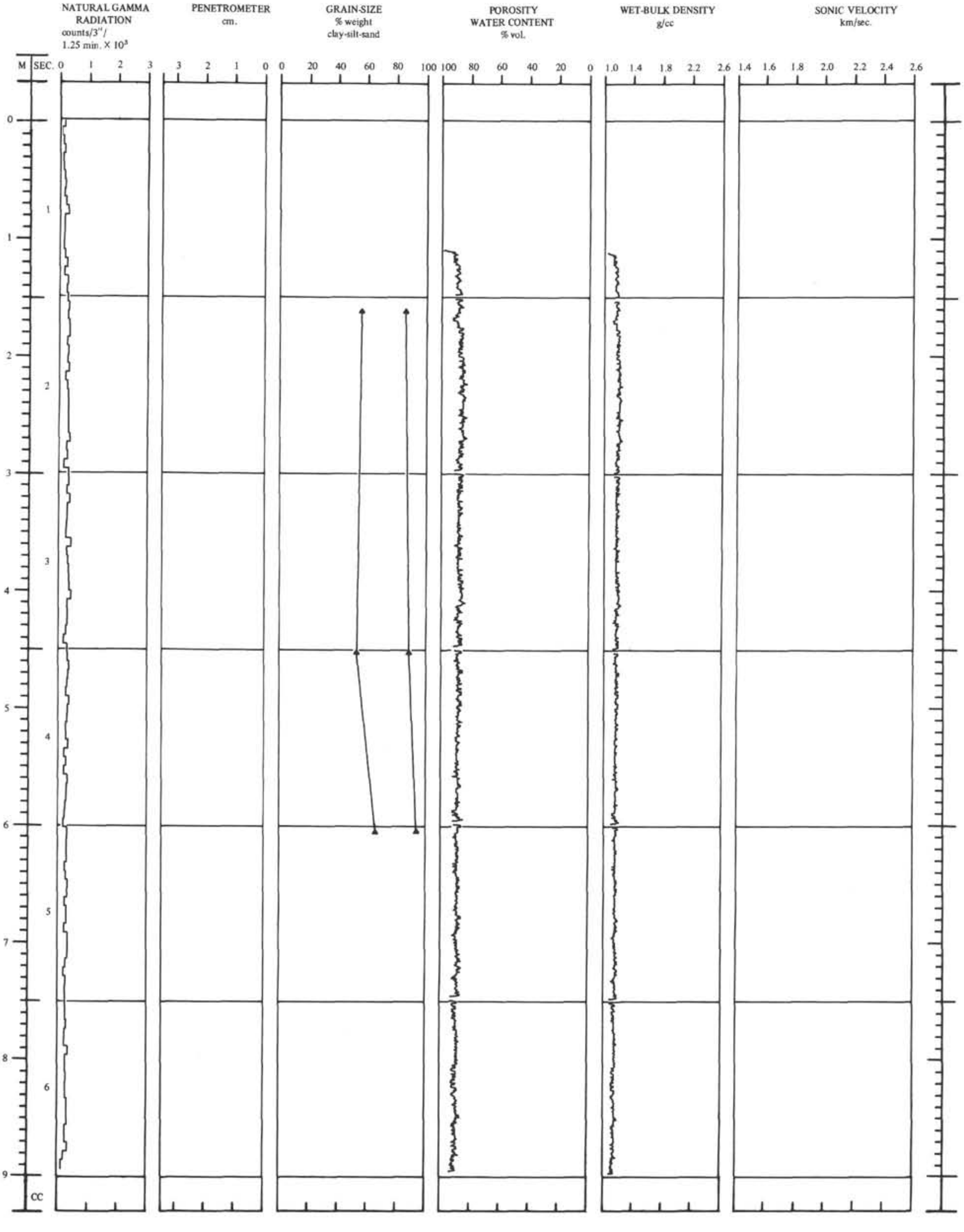
As Section 2 above.

Not opened.

Radiolarian zone indeterminate

Silicoflagellate zone *Dictyocha fibula*

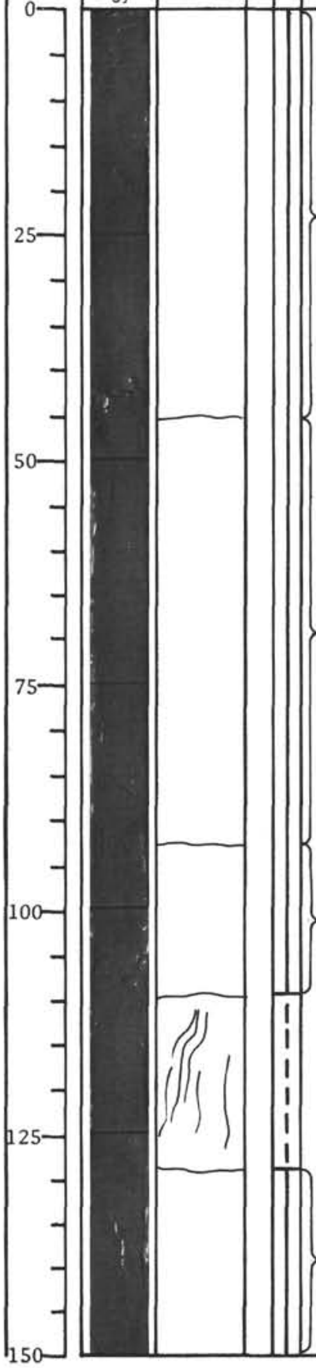
Lithology and biostratigraphy of Core 4, Hole 65.0.



Physical properties of Core 4, Hole 65.0.

Hole 65.0 Core 4
Section 2

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE

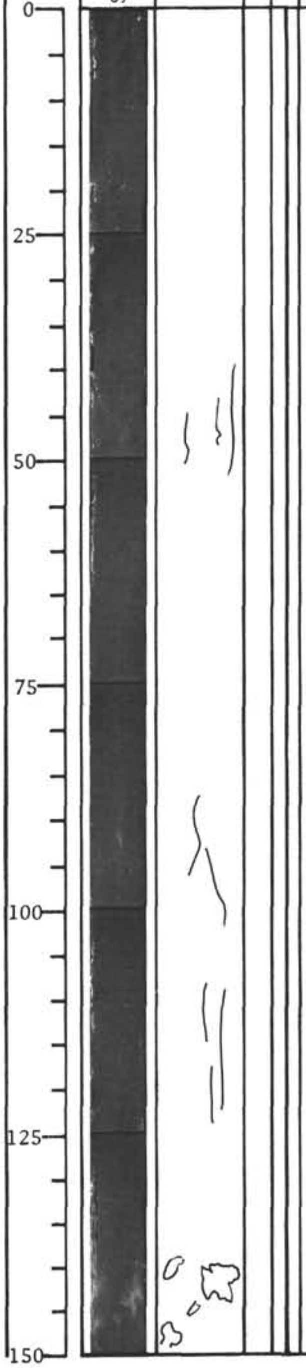
Yellowish brown 10YR 4/4 with minor grayish orange 10YR7/4 mottling.

Disturbed throughout by drilling. Watery (1) and very watery (2) areas with many rust flakes - probably cavings.

Soft (3) areas also contain rust flakes. Structure generally obliterated.

Hole 65.0 Core 4
Section 4

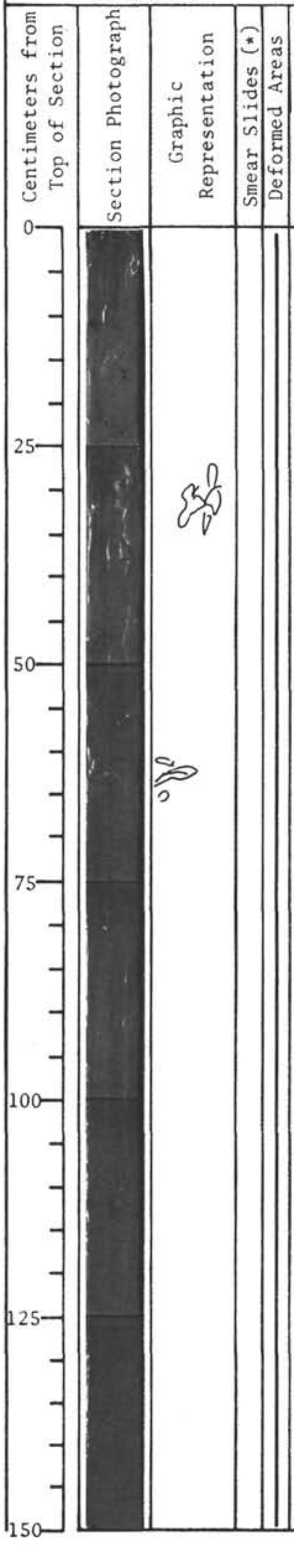
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE

Very soft thoroughly disturbed yellowish brown 10YR4/4 with slight streaked mottling of 10YR7/4 grayish orange (concentrated below 140cm).

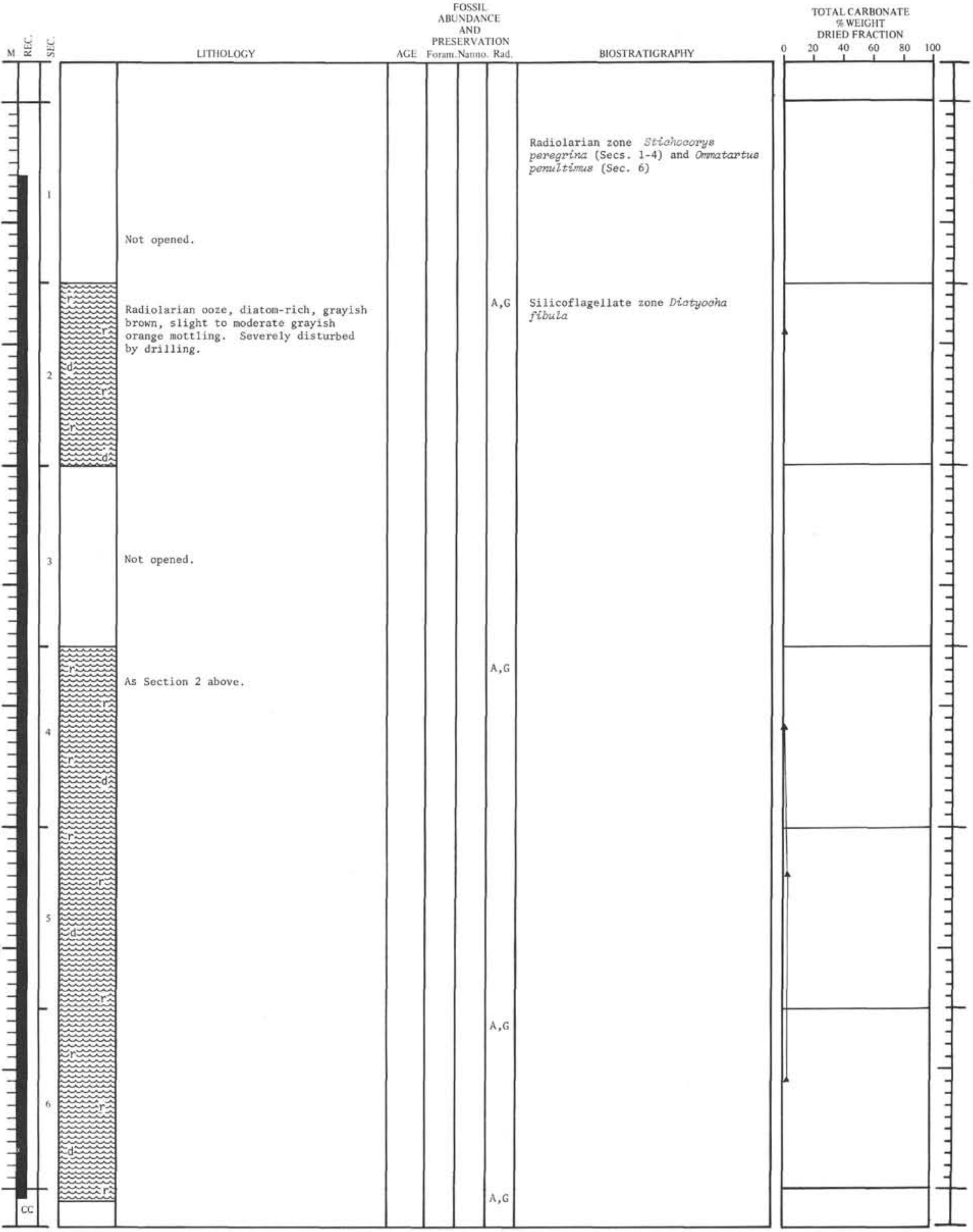
Hole 65.0 Core 4
Section 5



Description

RADIOLARIAN OOZE

Very soft thoroughly disturbed yellowish brown 10YR4/4 with slight deformed mottling of 10YR7/4 grayish orange (mainly at slightly firmer areas at 27-32cm and 60-65cm)



Not opened.

Radiolarian ooze, diatom-rich, grayish brown, slight to moderate grayish orange mottling. Severely disturbed by drilling.

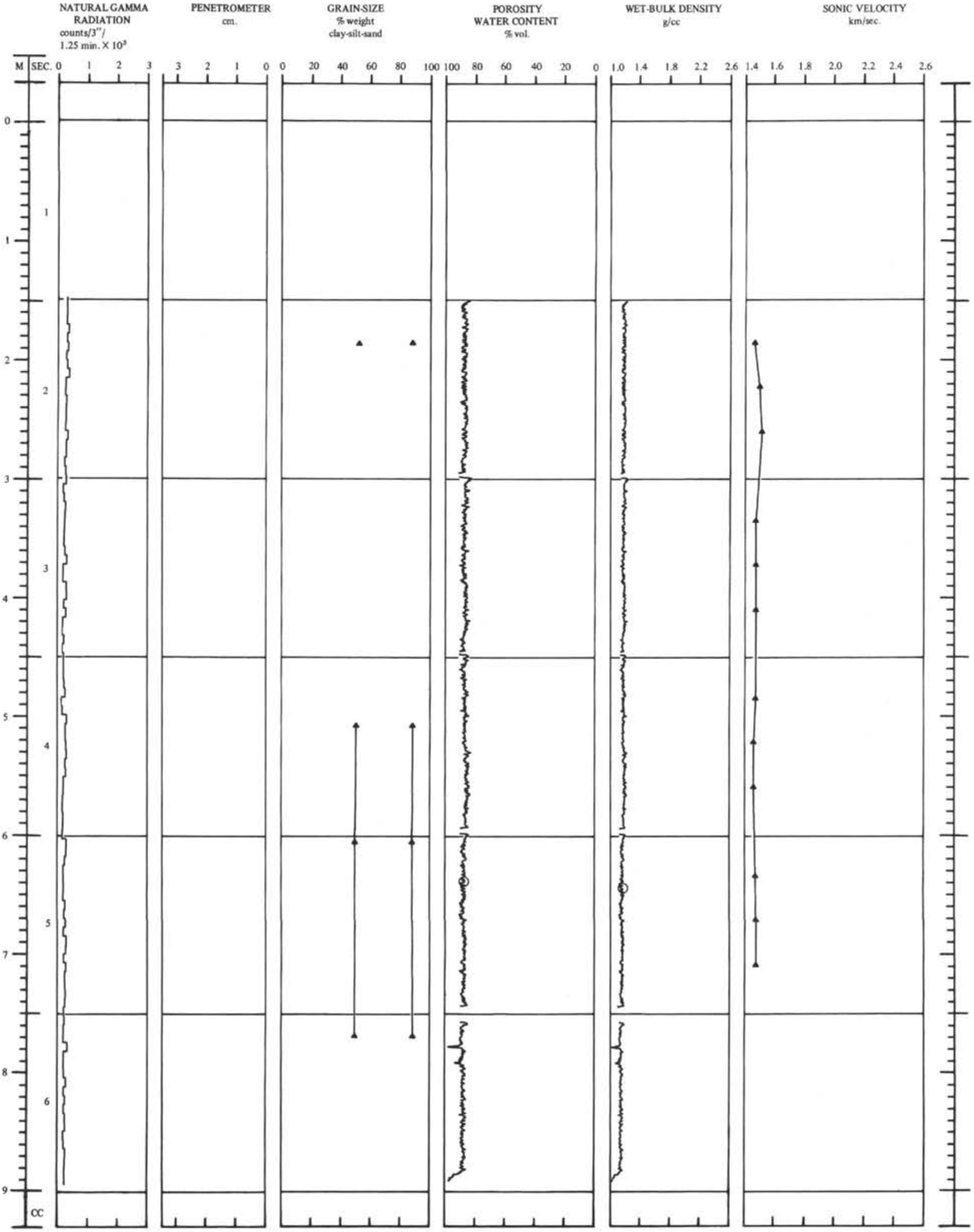
Not opened.

As Section 2 above.

Radiolarian zone *Stichocorys peregrina* (Secs. 1-4) and *Ommatartus penultimus* (Sec. 6)

Silicoflagellate zone *Dictyocha fibula*

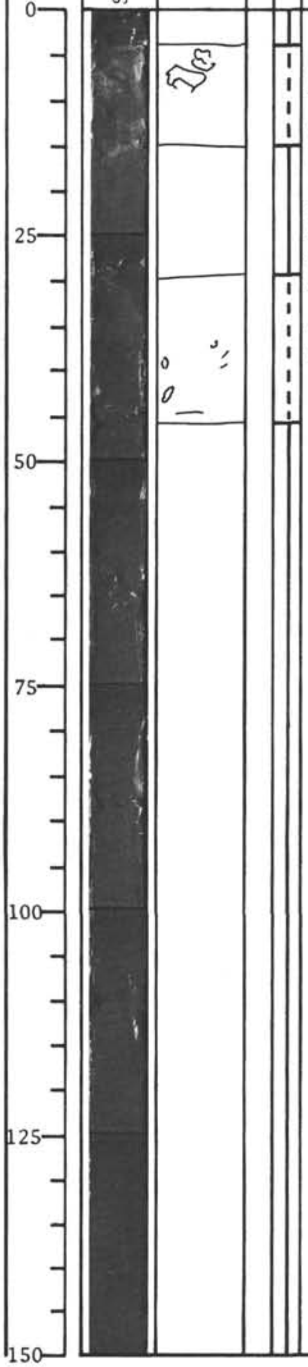
Lithology and biostratigraphy of Core 5, Hole 65.0.



Physical properties of Core 5, Hole 65.0.

Hole 65.0 Core 5
Section 2

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



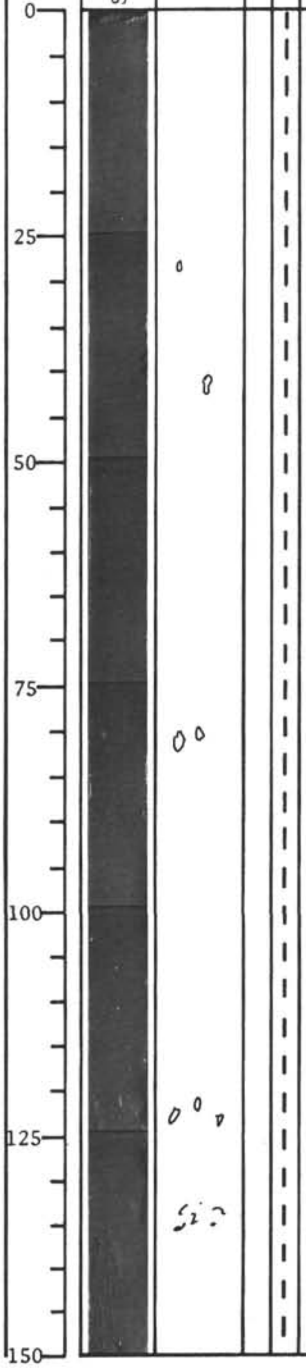
RADIOLARIAN OOZE

Soft 2.5Y4/2 grayish brown with moderate 10YR7/4 grayish orange mottling, mainly restricted to firmer areas 4-15cm and 29-45cm.

Thoroughly worked over by drilling.

Hole 65.0 Core 5
Section 4

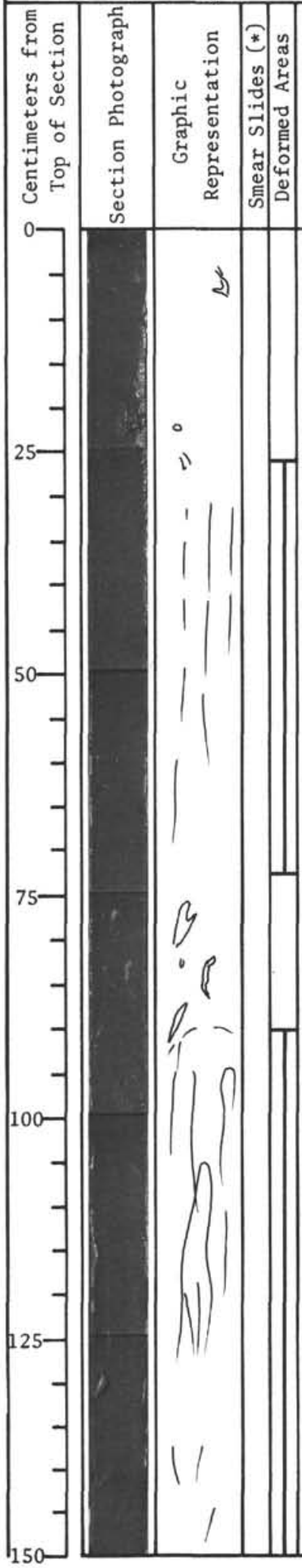
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE

Soft, somewhat disturbed grayish brown 2.5Y4/2 material with slight grayish orange 10YR7/4 mottling.

Hole 65.0 Core 5
Section 5

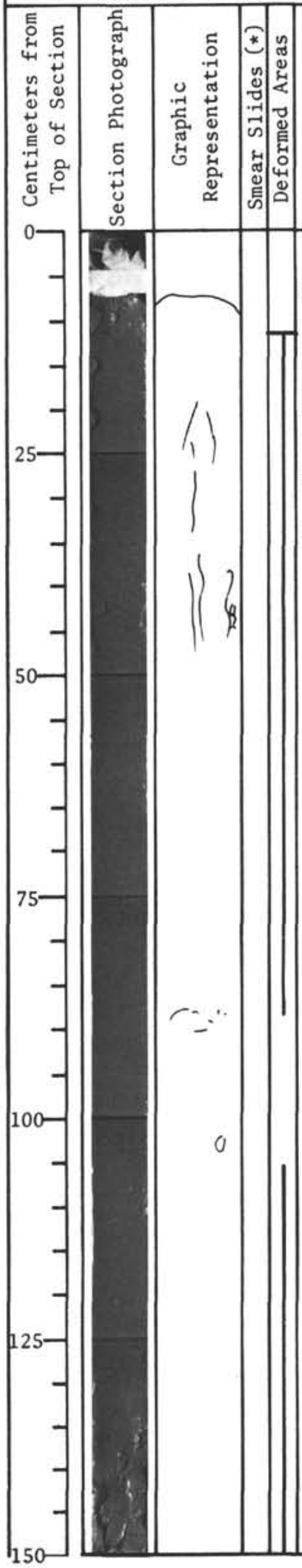


Description

RADIOLARIAN OOZE

Soft, grayish brown (2.5Y4/2) ooze. Mottles of grayish orange (10YR7/4) especially from 77-92cm. Some vertical streaks of grayish orange elsewhere, representing mottles deformed during coring.

Hole 65.0 Core 5
Section 6

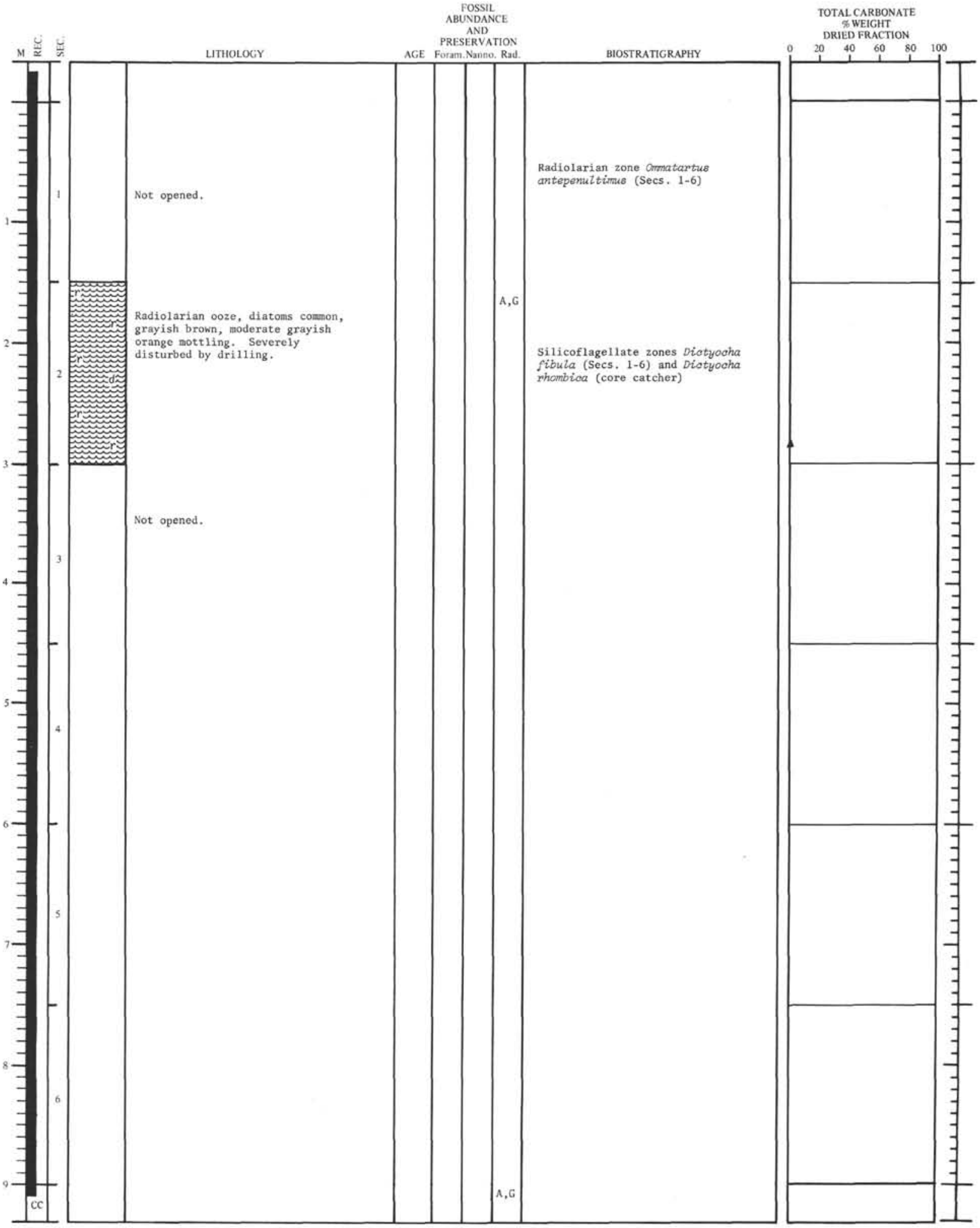


Description

RADIOLARIAN OOZE

Soft, grayish brown (2.5YR4/2) ooze. A few mottles of grayish orange (10YR7/4), e.g. near 46cm. Virtually all of core disturbed by coring.

0-10cm: Void



Not opened.

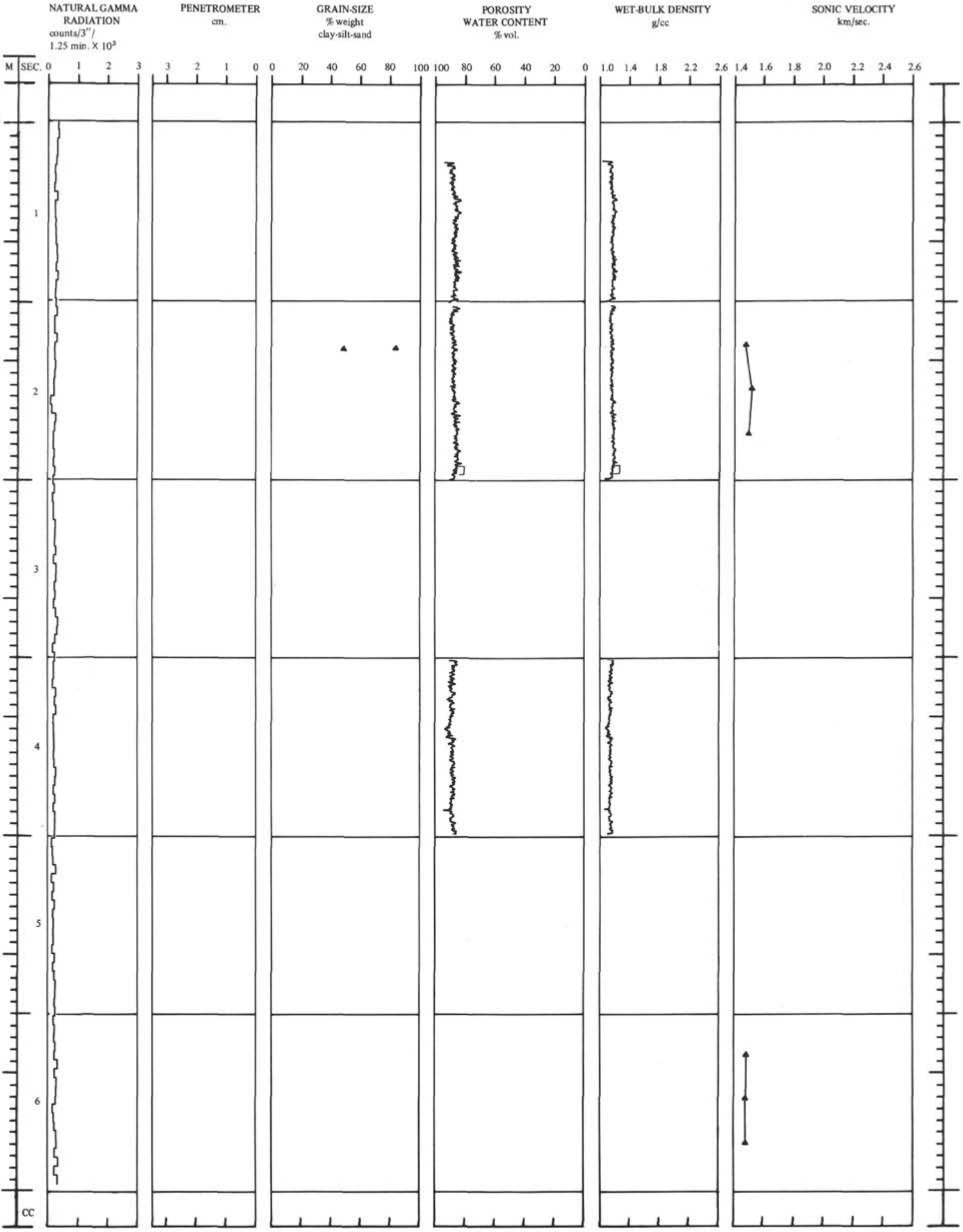
Radiolarian ooze, diatoms common, grayish brown, moderate grayish orange mottling. Severely disturbed by drilling.

Not opened.

Radiolarian zone *Ommatartus antepenultimus* (Secs. 1-6)

Silicoflagellate zones *Dictyocha fibula* (Secs. 1-6) and *Dictyocha rhombica* (core catcher)

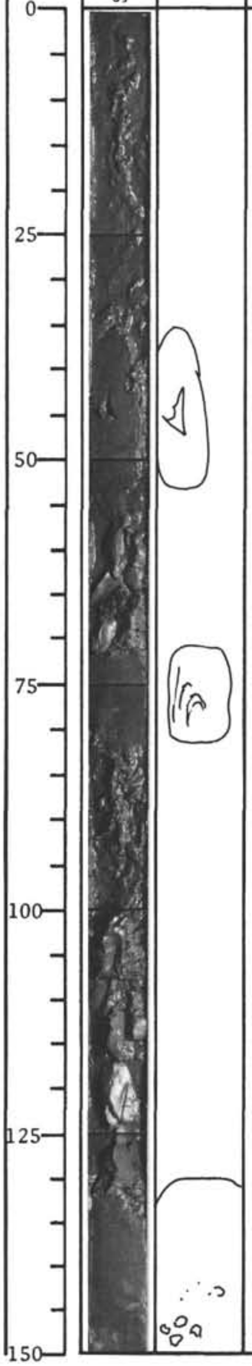
Lithology and biostratigraphy of Core 6, Hole 65.0.



Physical properties of Core 6, Hole 65.0.

Hole 65.0 Core 6
Section 2

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



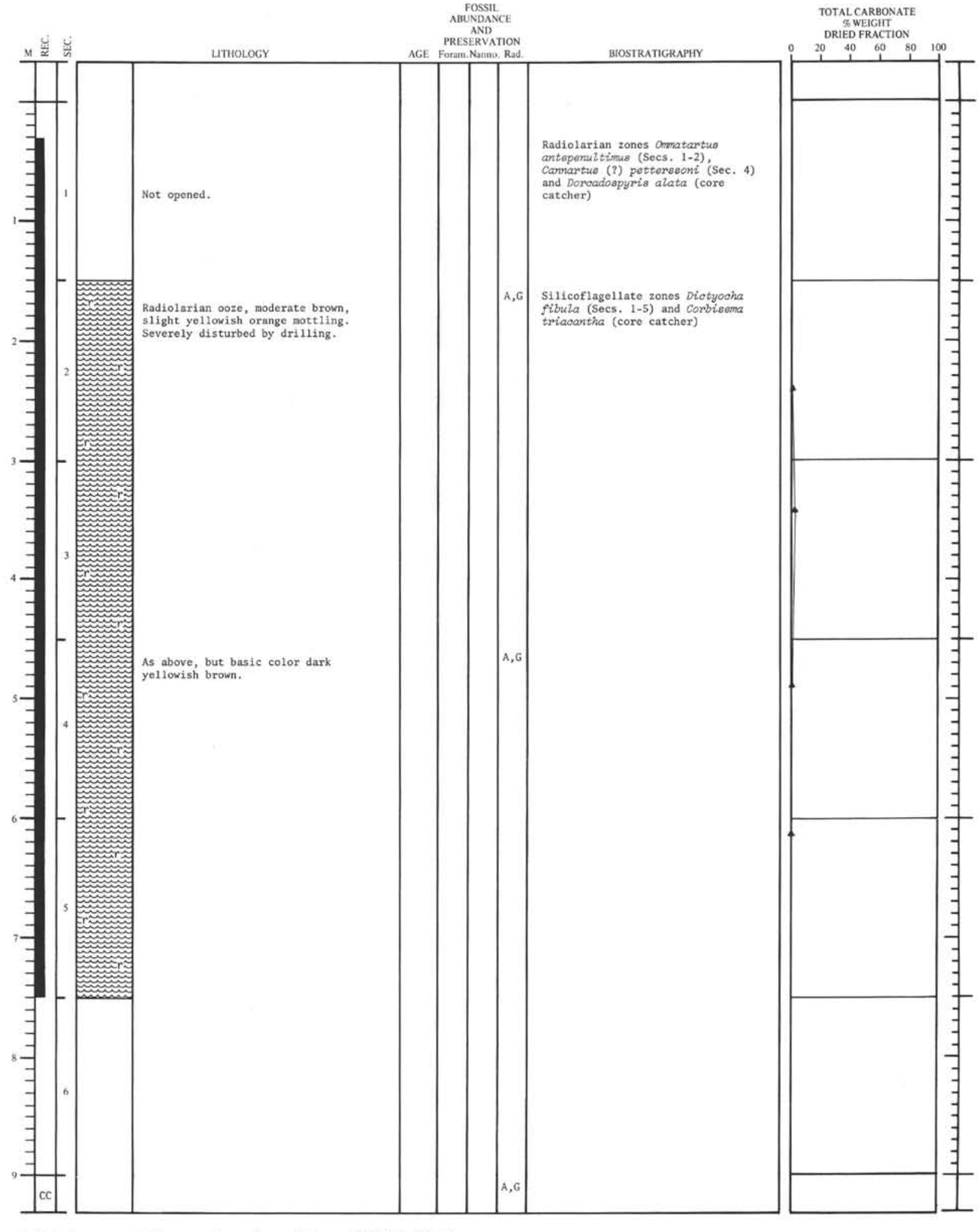
RADIOLARIAN OOZE

← 1 Tubular foraminifers (?).

Soft, grayish brown (2.5Y4/2) ooze, moderately mottled grayish orange (10YR7/4) below 140cm, and rarely elsewhere.

Most of core badly deformed by coring.

A darker clot (moderate brown 5YR4/3) at ~66cm within the soft material.



Not opened.

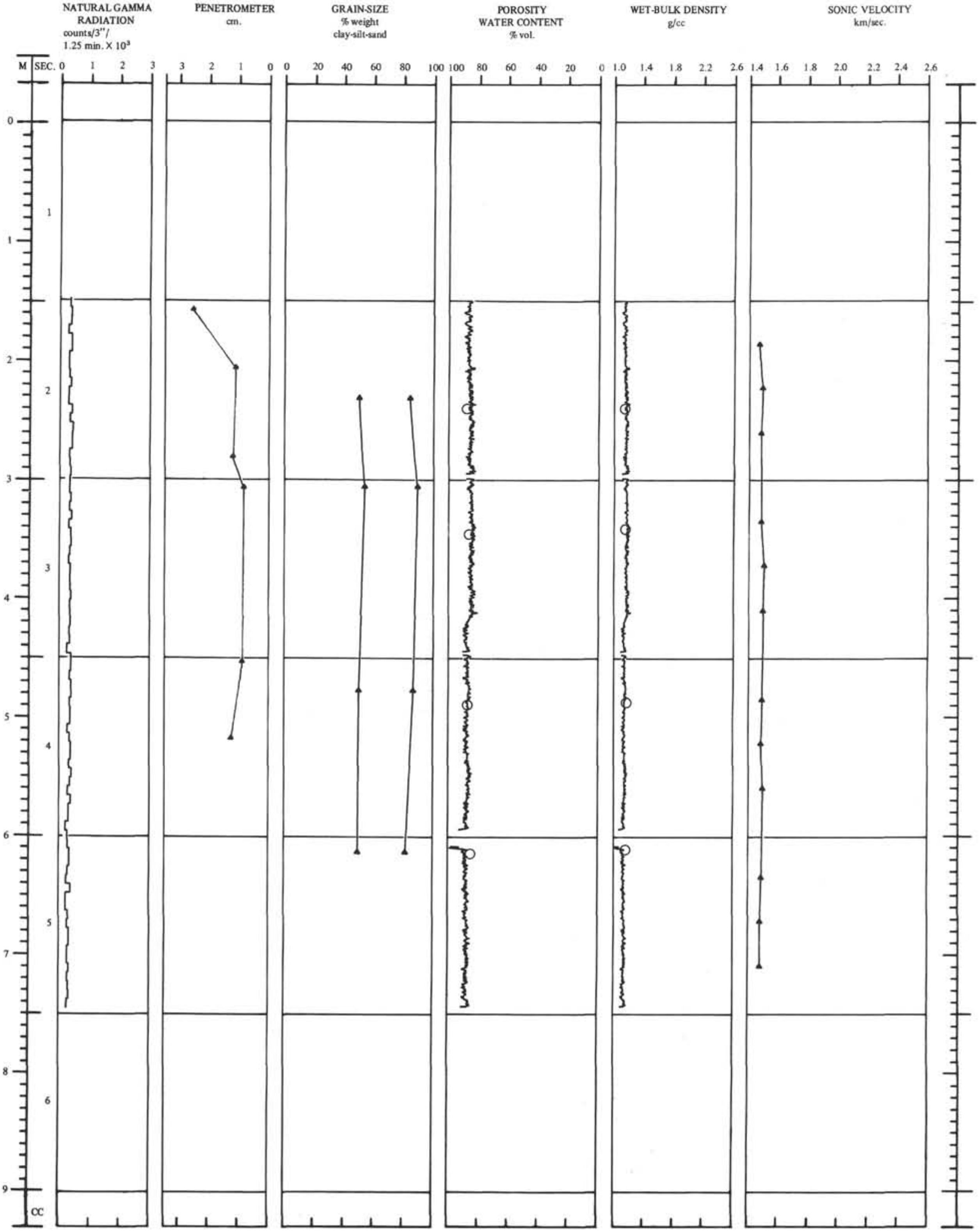
Radiolarian ooze, moderate brown, slight yellowish orange mottling. Severely disturbed by drilling.

As above, but basic color dark yellowish brown.

Radiolarian zones *Ommatartus antepenultimus* (Secs. 1-2), *Cannartus* (?) *petterssoni* (Sec. 4) and *Dorcadospyris alata* (core catcher)

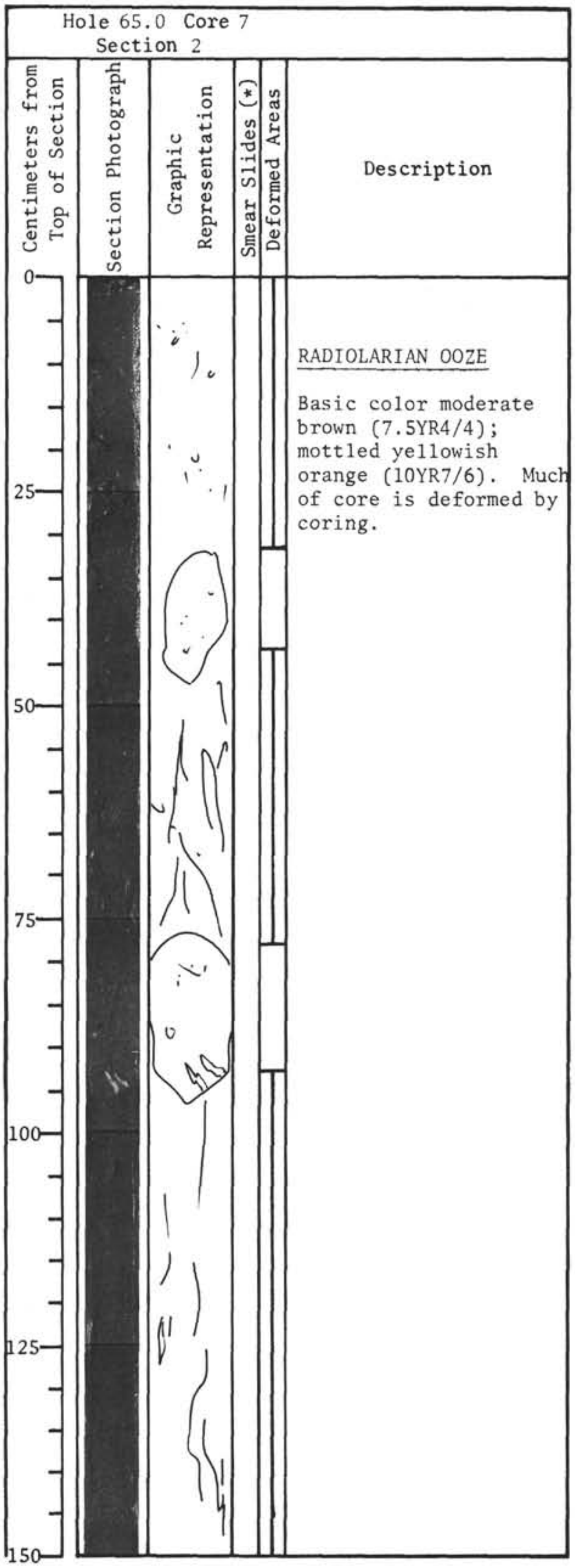
Silicoflagellate zones *Dictyocha fibula* (Secs. 1-5) and *Corbisema triacantha* (core catcher)

Lithology and biostratigraphy of Core 7, Hole 65.0.



Physical properties of Core 7, Hole 65.0.

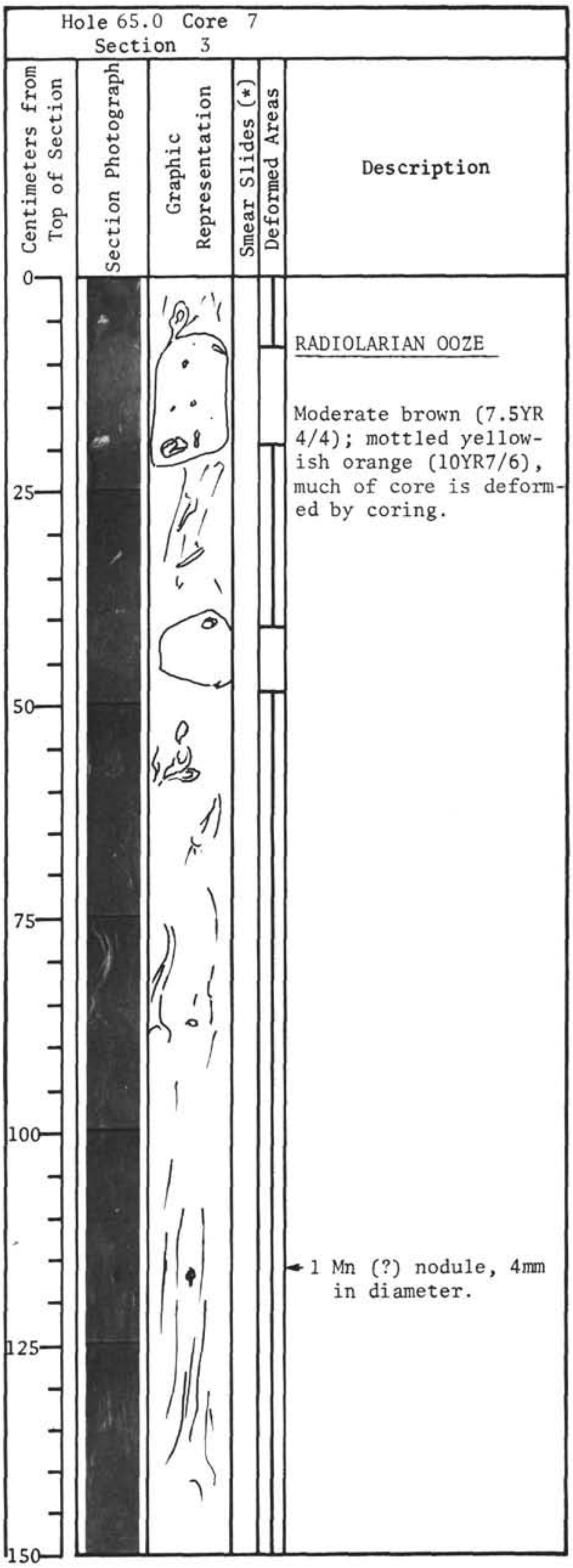
Hole 65.0 Core 7
Section 2



RADIOLARIAN OOZE

Basic color moderate brown (7.5YR4/4); mottled yellowish orange (10YR7/6). Much of core is deformed by coring.

Hole 65.0 Core 7
Section 3

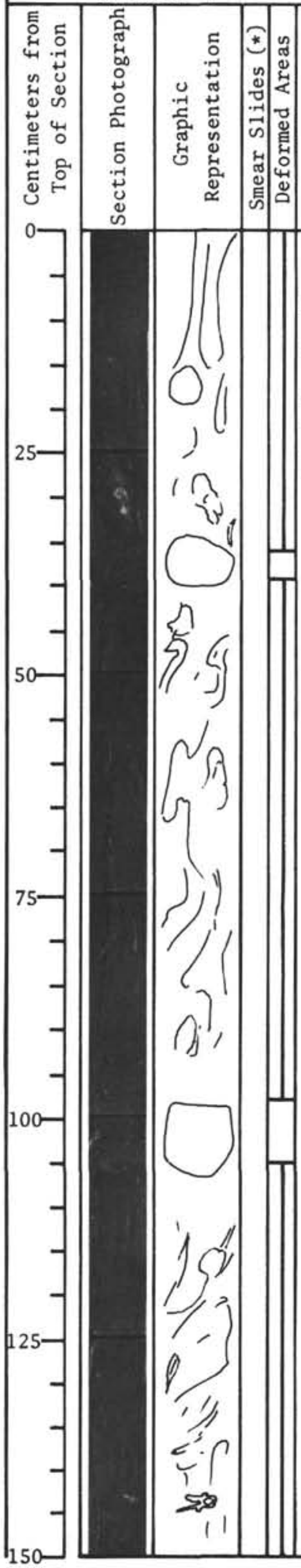


RADIOLARIAN OOZE

Moderate brown (7.5YR 4/4); mottled yellowish orange (10YR7/6), much of core is deformed by coring.

← 1 Mn (?) nodule, 4mm in diameter.

Hole 65.0 Core 7
Section 4

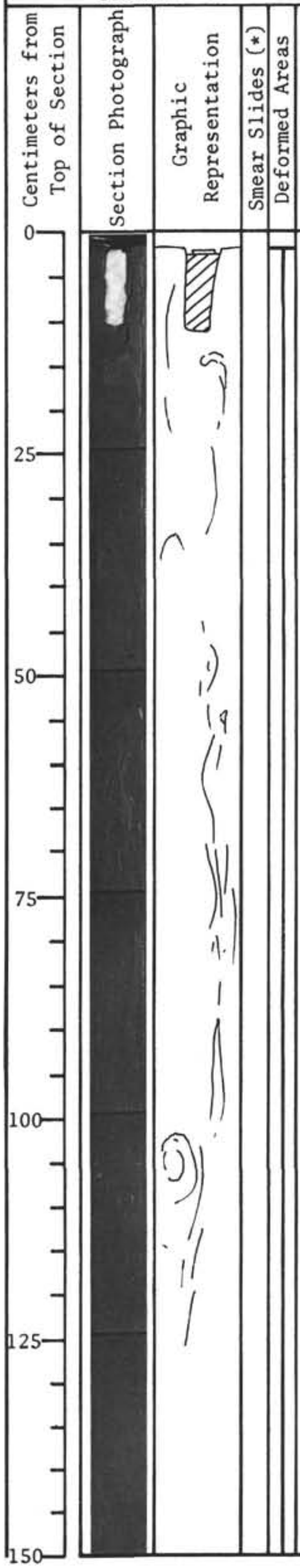


Description

RADIOLARIAN OOZE

Dark yellowish brown (10YR4/4) ooze; rare mottles (and vertical streaks where mottles are deformed by coring) of yellowish orange (10YR7/6).

Hole 65.0 Core 7
Section 5

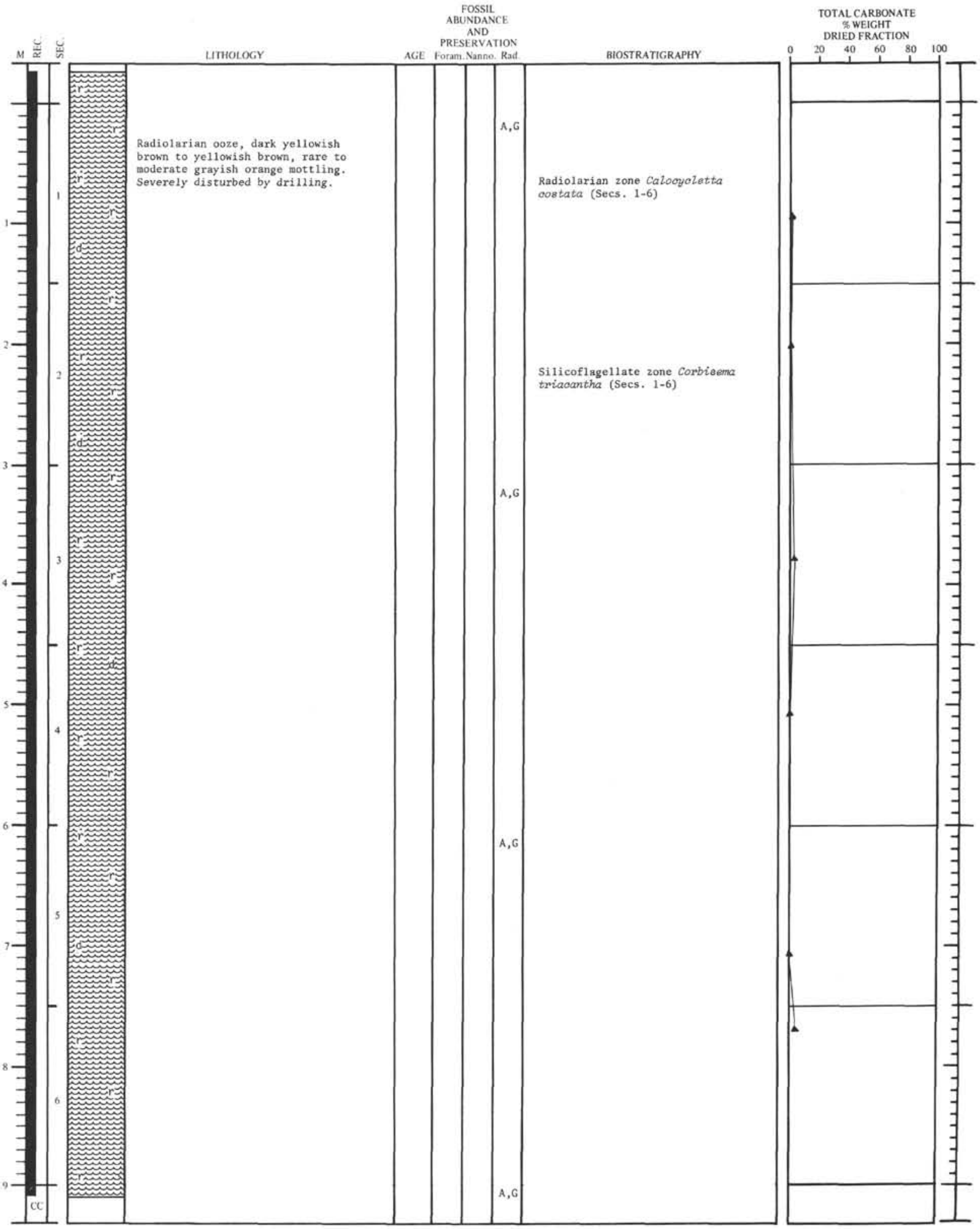


Description

RADIOLARIAN OOZE

Dark yellowish brown (10YR4/4), vertically streaked with other brownish shades, and with yellowish orange (10YR7/6), from mottles deformed during coring.

A sample for interstitial water removed from top.

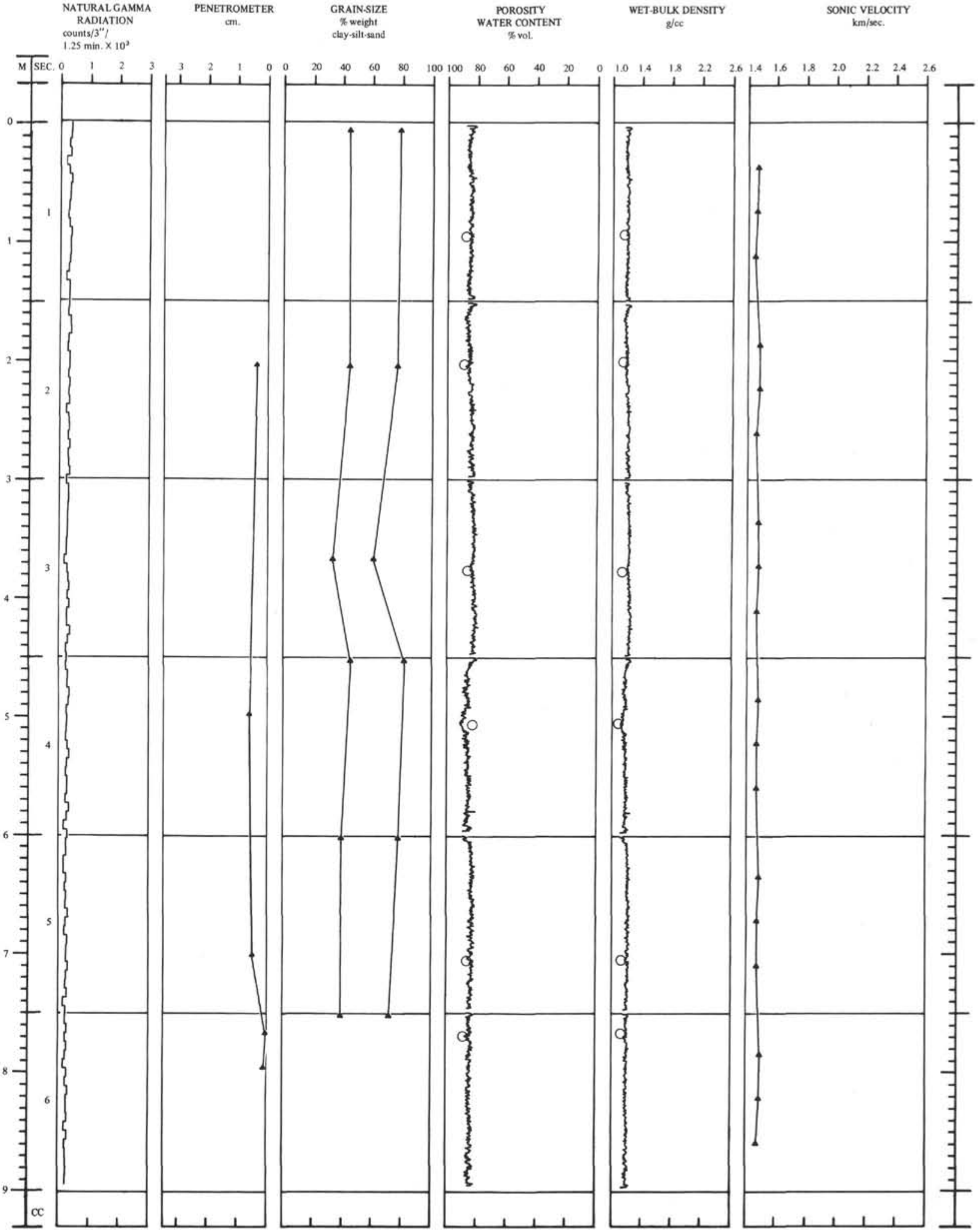


Radiolarian ooze, dark yellowish brown to yellowish brown, rare to moderate grayish orange mottling. Severely disturbed by drilling.

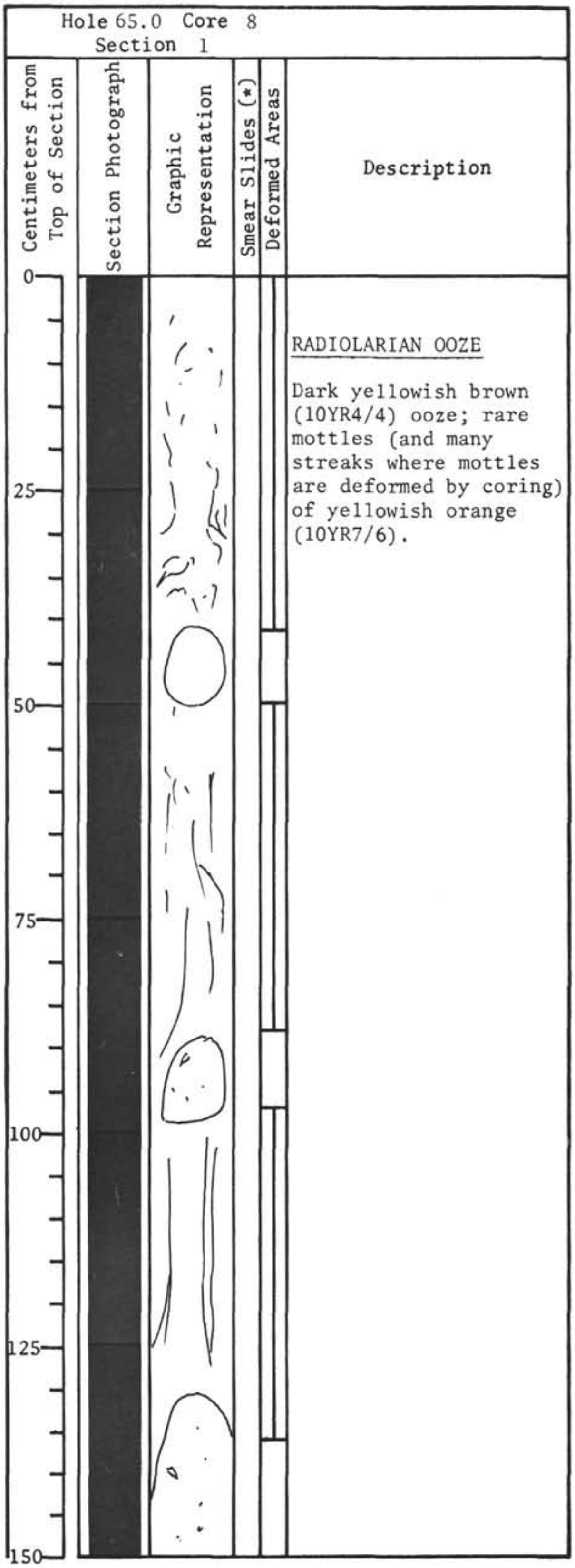
Radiolarian zone *Calocycletta costata* (Secs. 1-6)

Silicoflagellate zone *Corbisema triacantha* (Secs. 1-6)

Lithology and biostratigraphy of Core 8, Hole 65.0.



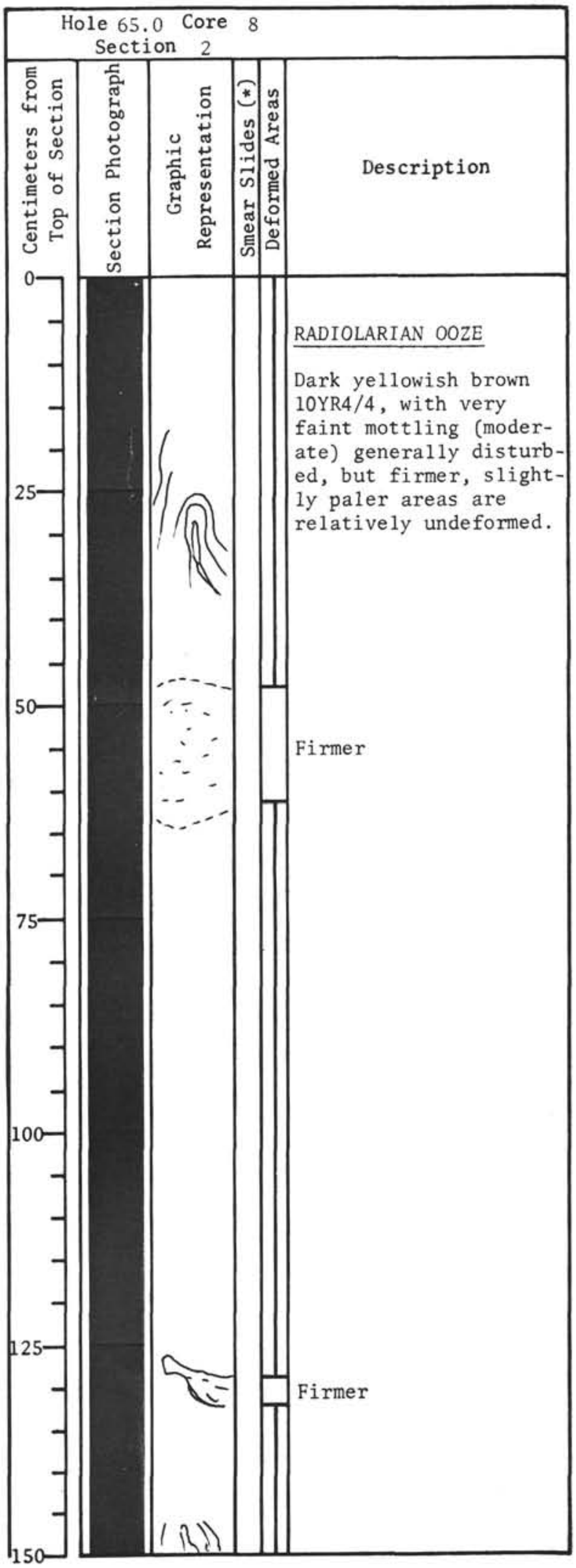
Physical properties of Core 8, Hole 65.0.



Hole 65.0 Core 8
Section 1

RADIOLARIAN OOZE

Dark yellowish brown (10YR4/4) ooze; rare mottles (and many streaks where mottles are deformed by coring) of yellowish orange (10YR7/6).



Hole 65.0 Core 8
Section 2

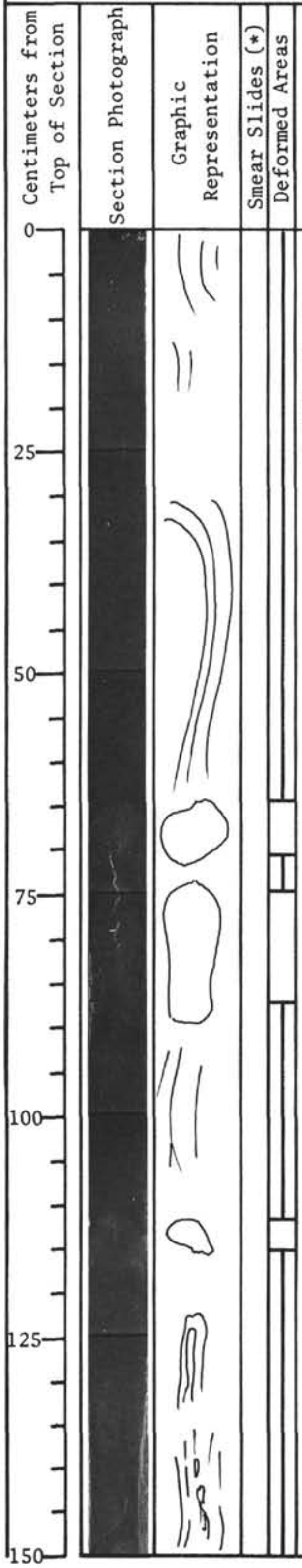
RADIOLARIAN OOZE

Dark yellowish brown 10YR4/4, with very faint mottling (moderate) generally disturbed, but firmer, slightly paler areas are relatively undeformed.

Firmer

Firmer

Hole 65.0 Core 8
Section 3



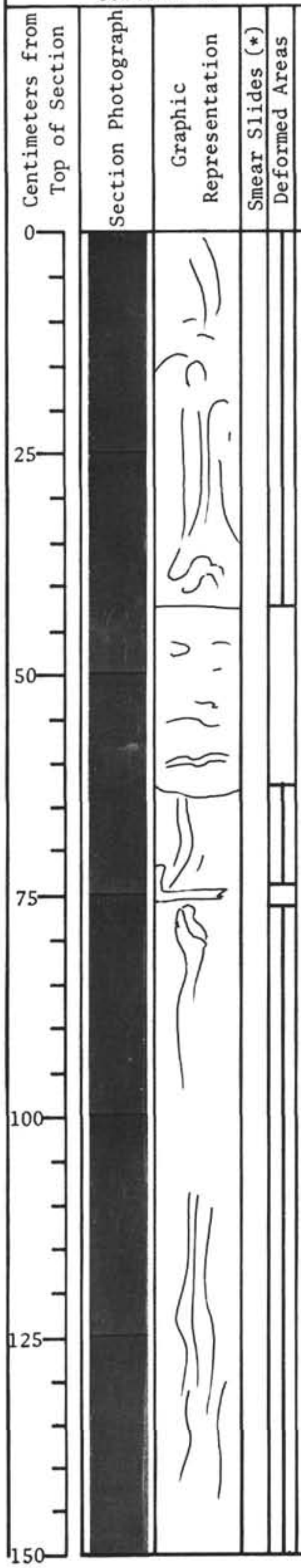
Description

RADIOLARIAN OOZE

As Section 2

Firmer, less disturbed areas are slightly paler than matrix.

Hole 65.0 Core 8
Section 4



Description

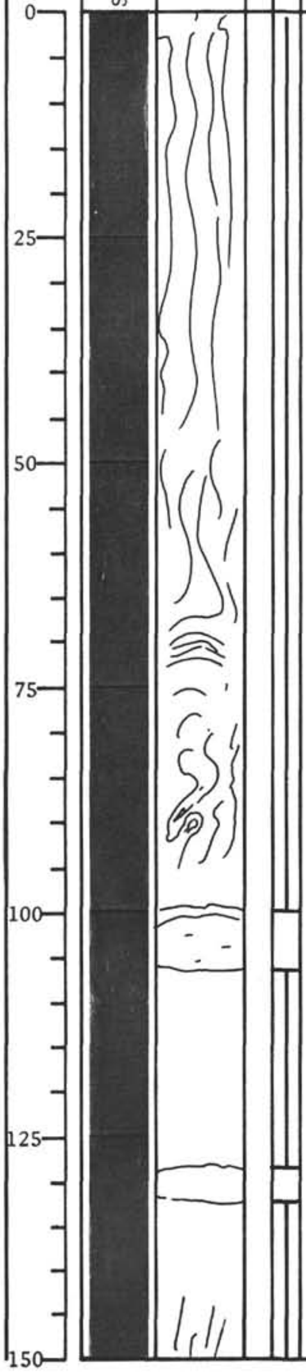
RADIOLARIAN OOZE

2.5Y4/4 yellowish brown with 10YR7/4 grayish orange; slight mottling.

Mostly shows vertical streaking, indistinct horizontal bedding in undisturbed area.

Hole 65.0 Core 8
Section 5

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description

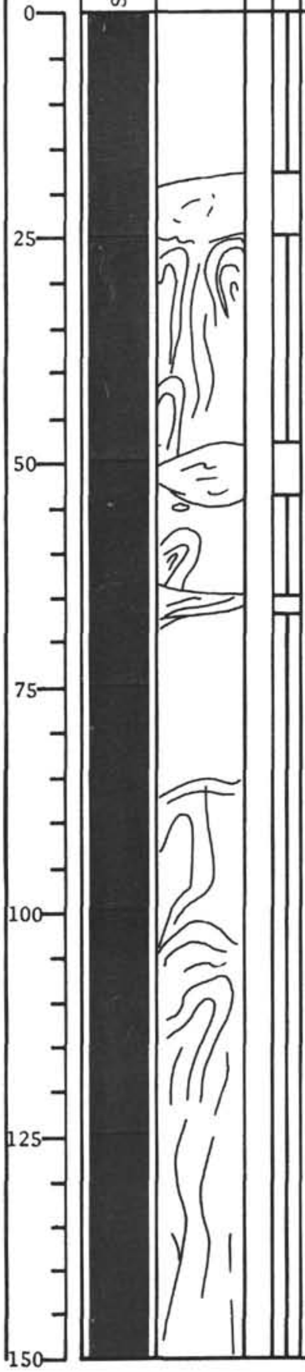


RADIOLARIAN OOZE

As Section 4.

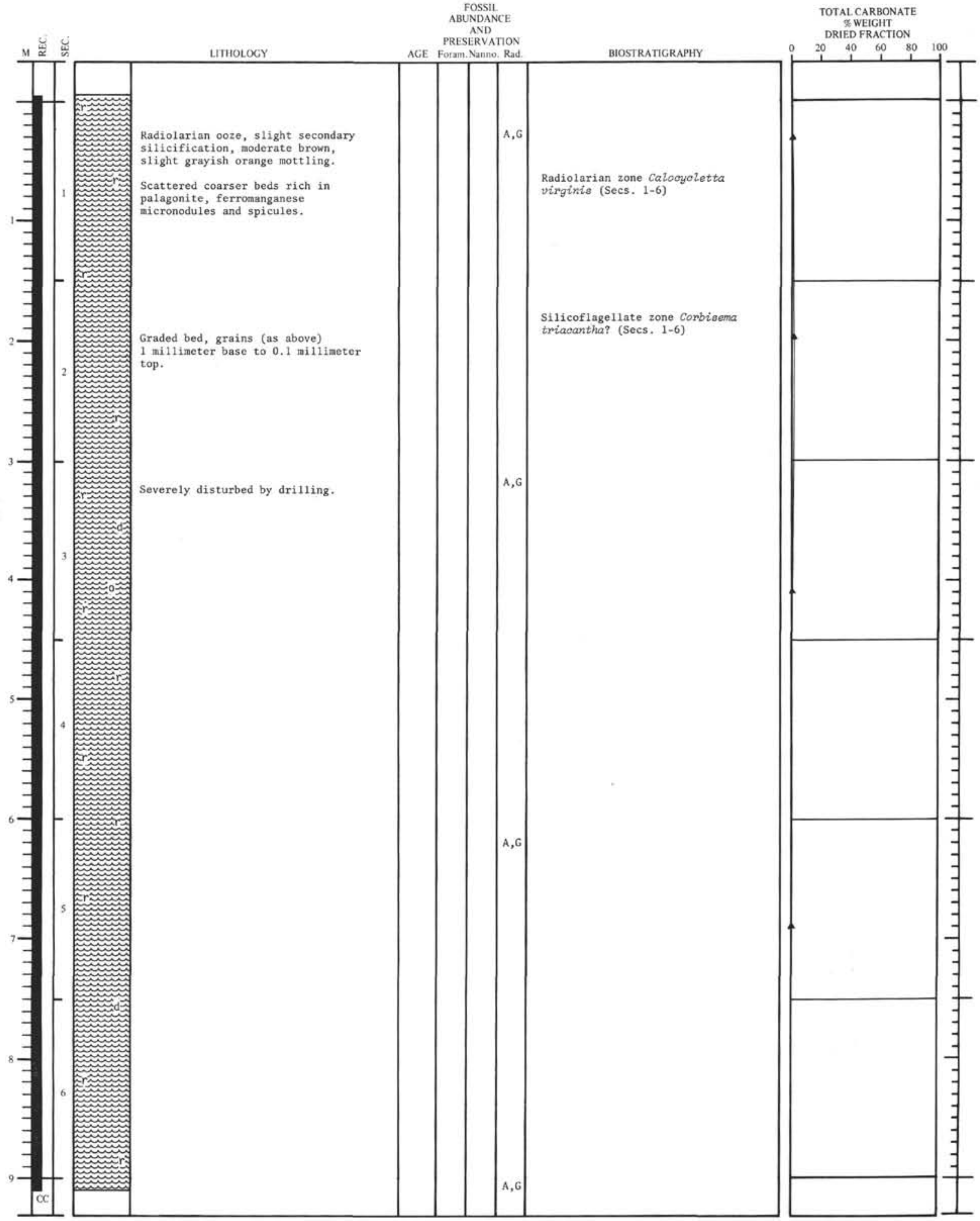
Hole 65.0 Core 8
Section 6

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE

As Section 4.



Radiolarian ooze, slight secondary silicification, moderate brown, slight grayish orange mottling.

Scattered coarser beds rich in palagonite, ferromanganese micronodules and spicules.

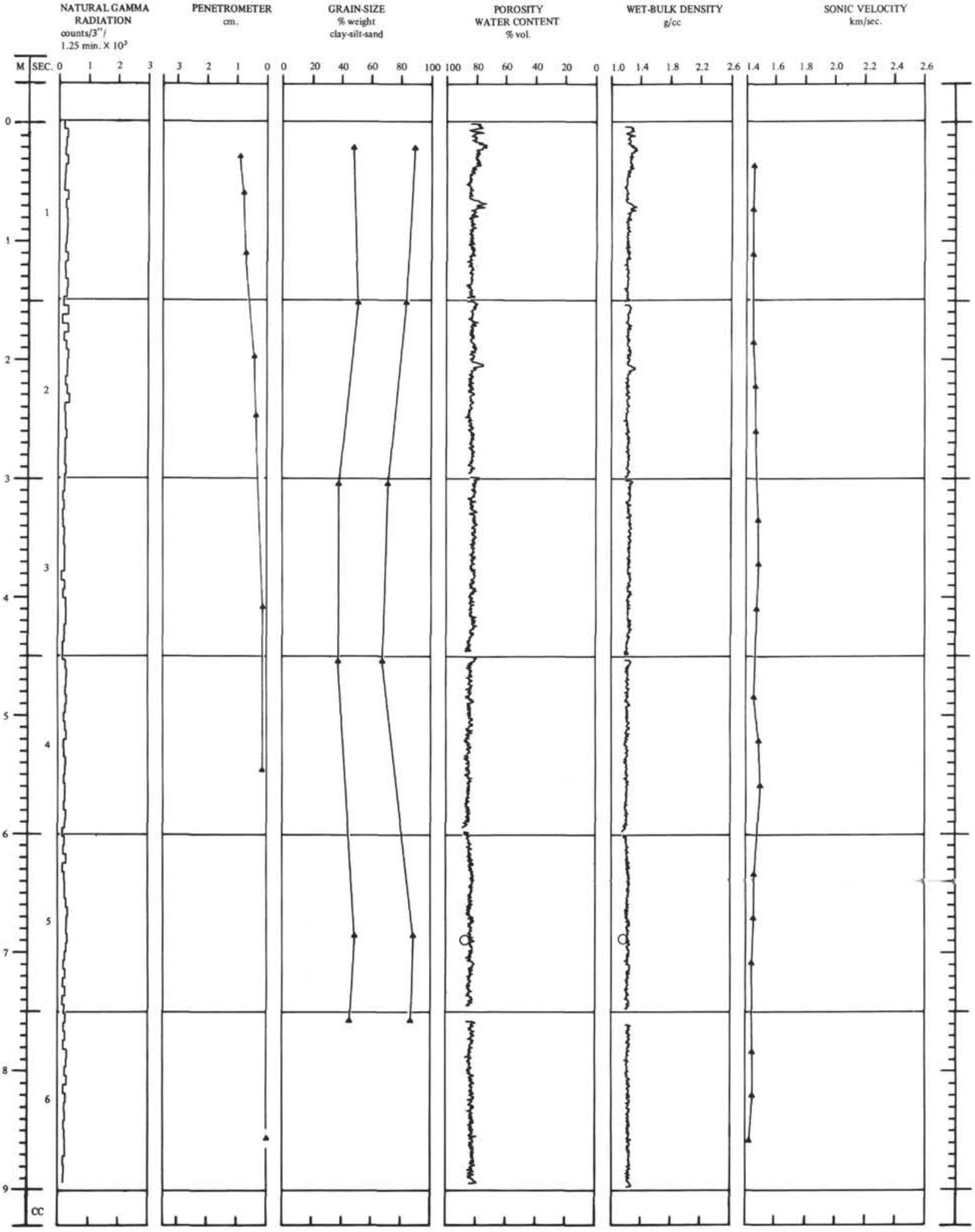
Graded bed, grains (as above) 1 millimeter base to 0.1 millimeter top.

Severely disturbed by drilling.

Radiolarian zone *Calocycletta virginis* (Secs. 1-6)

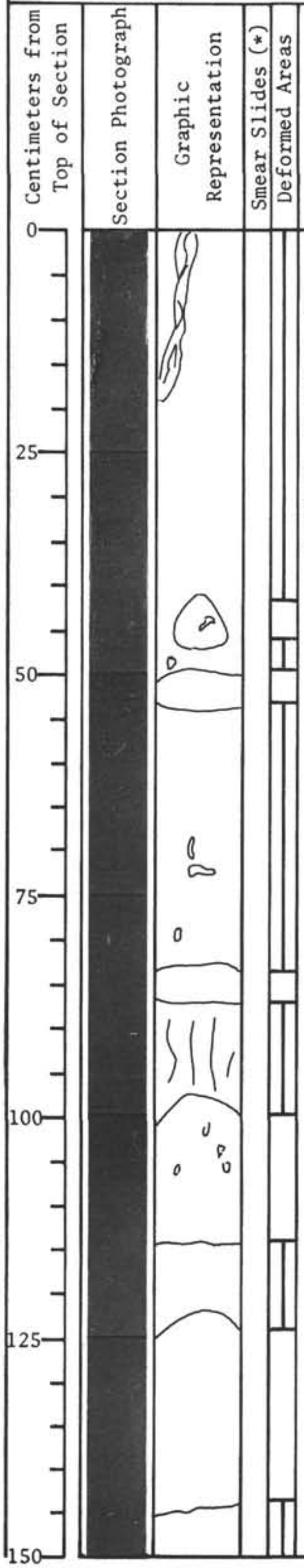
Silicoflagellate zone *Corbisema triacantha*? (Secs. 1-6)

Lithology and biostratigraphy of Core 9, Hole 65.0.



Physical properties of Core 9, Hole 65.0.

Hole 65.0 Core 9
Section 1



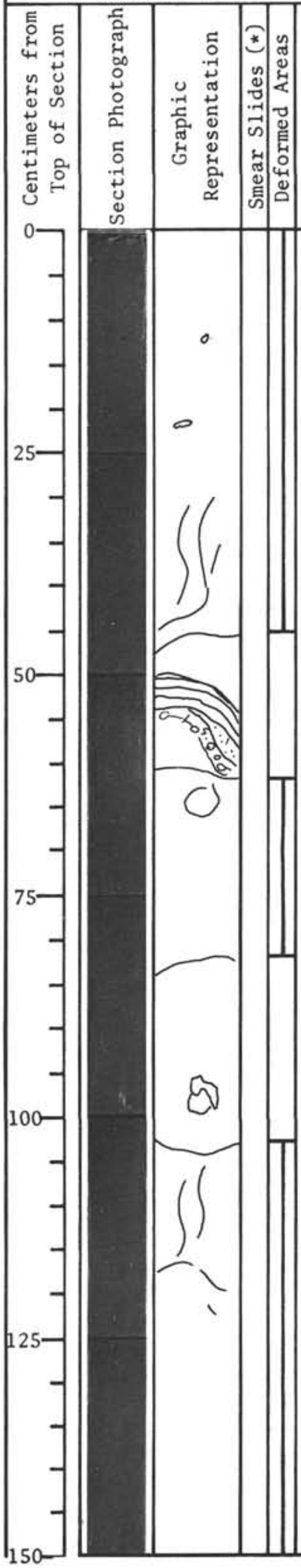
Description

RADIOLARIAN OOZE

2.5Y4/4 moderate brown moderately firm material with slight 10YR7/4 grayish orange mottling.

Rust fragments from drill pipe in streak between 0 and 18cm, and at 70 and 72cm.

Hole 62.0 Core 9
Section 2



Description

RADIOLARIAN OOZE

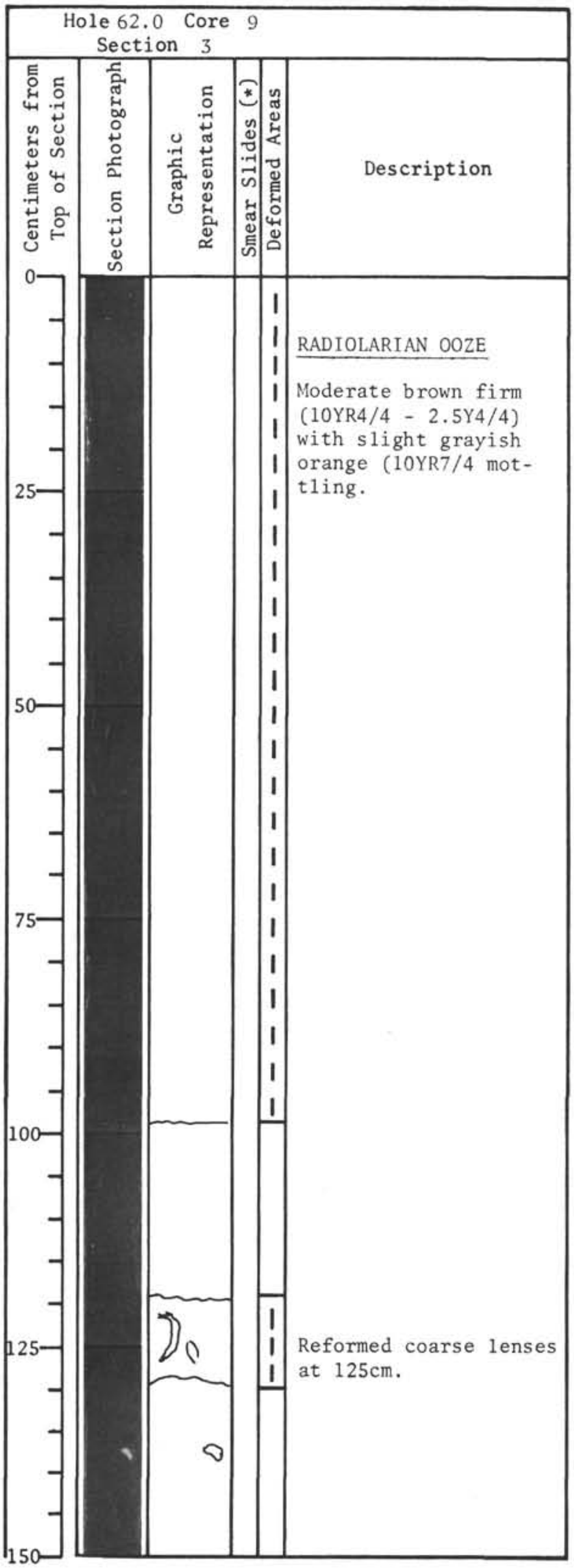
46-63cm:
Coarser bed (graded, ∿1mm at base to 100 at top), with ∿1/2mm palagonite, silicified clay lumps micronodules and spicules near base.

10YR4/4 to 2.5Y4/4 moderate brown, with slight 10YR7/4 grayish orange mottling.

Coarser beds tend to YR colors.

Rust flakes from drill pipe at 10 and 21 cm.

Hole 62.0 Core 9
Section 3

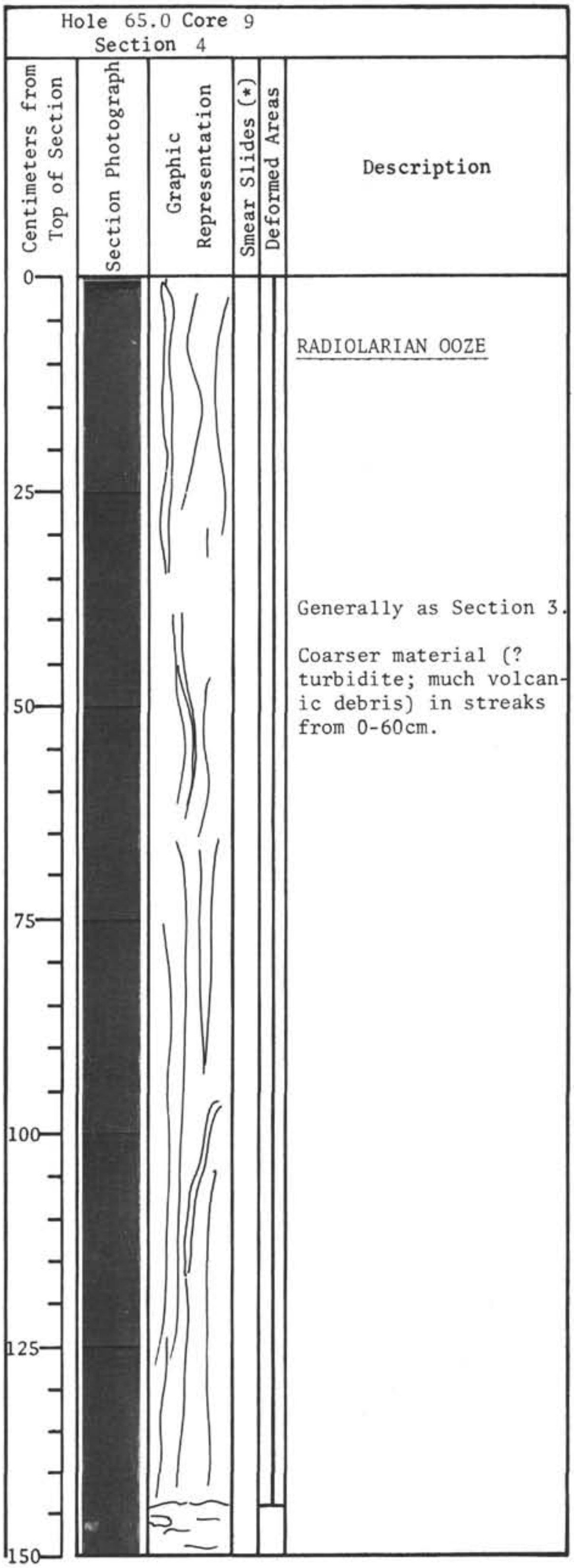


RADIOLARIAN OOZE

Moderate brown firm (10YR4/4 - 2.5Y4/4) with slight grayish orange (10YR7/4 mottling.

Reformed coarse lenses at 125cm.

Hole 65.0 Core 9
Section 4



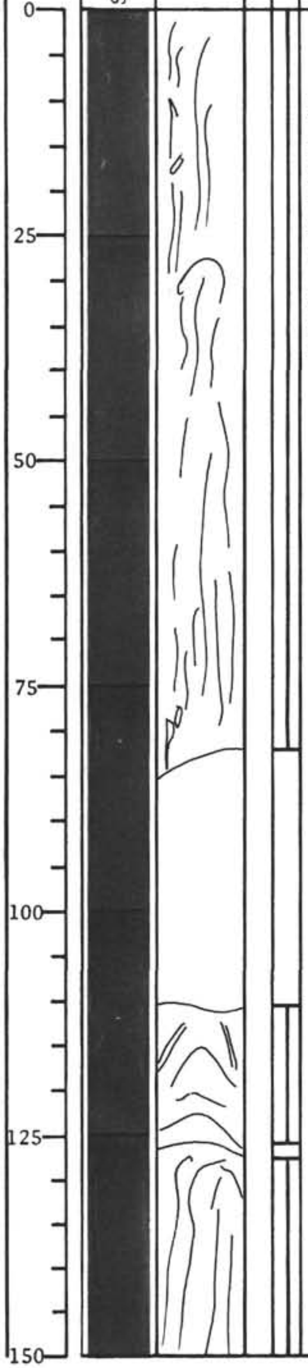
RADIOLARIAN OOZE

Generally as Section 3.

Coarser material (? turbidite; much volcanic debris) in streaks from 0-60cm.

Hole 62.0 Core 9
Section 5

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



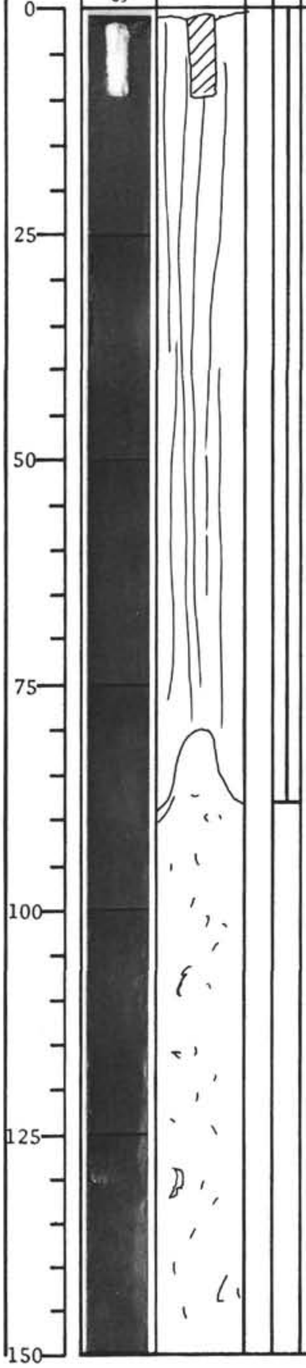
RADIOLARIAN OOZE

Firm to stiff ooze, moderate brown (10YR 4/4-2.5Y4/4) with slight grayish orange (10YR7/4) mottling.

Classic sugary texture in ooze between 85 and 110cm.

Hole 65.0 Core 9
Section 6

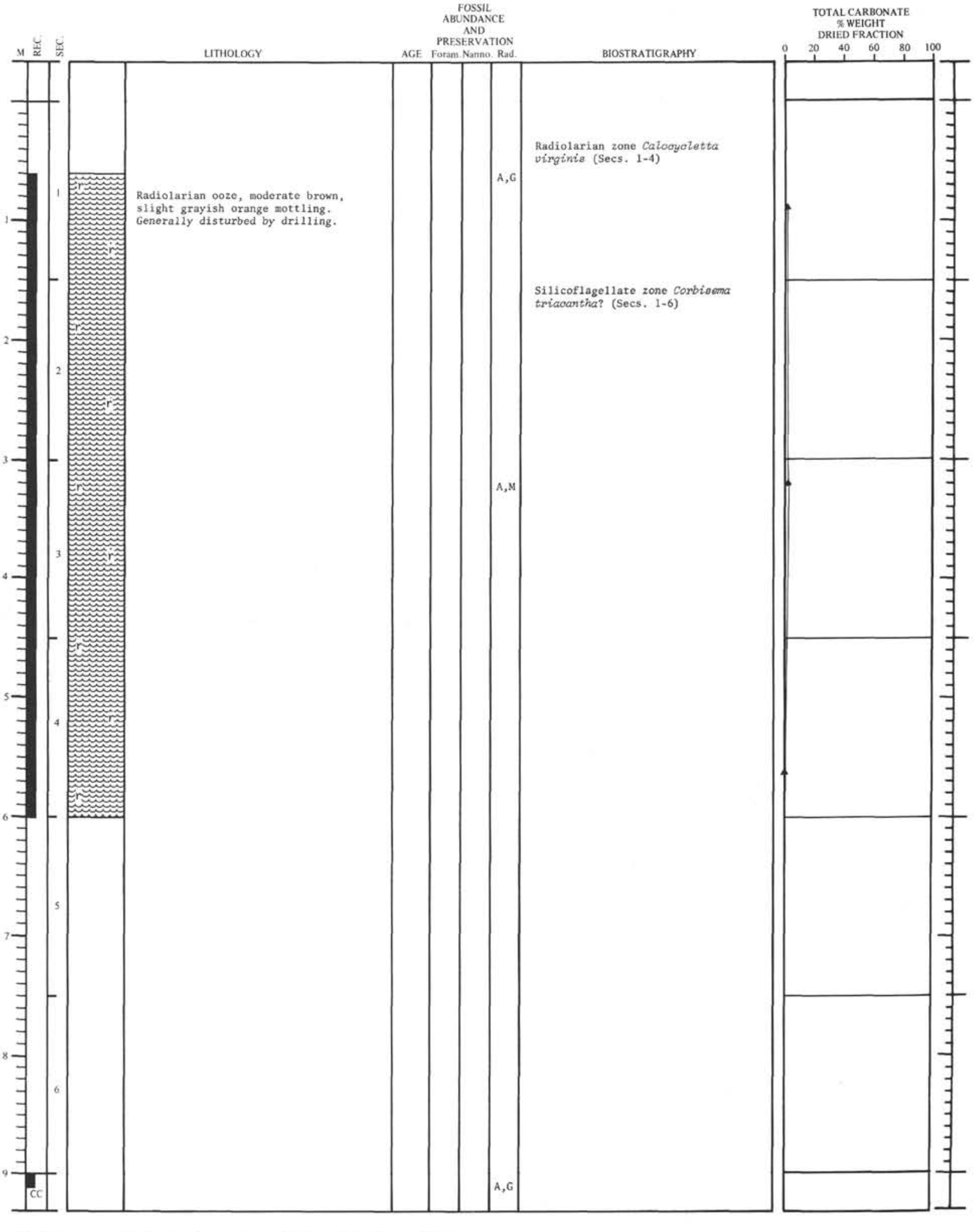
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE

As Section 5.

Plug removed for interstitial water sample at top of section.

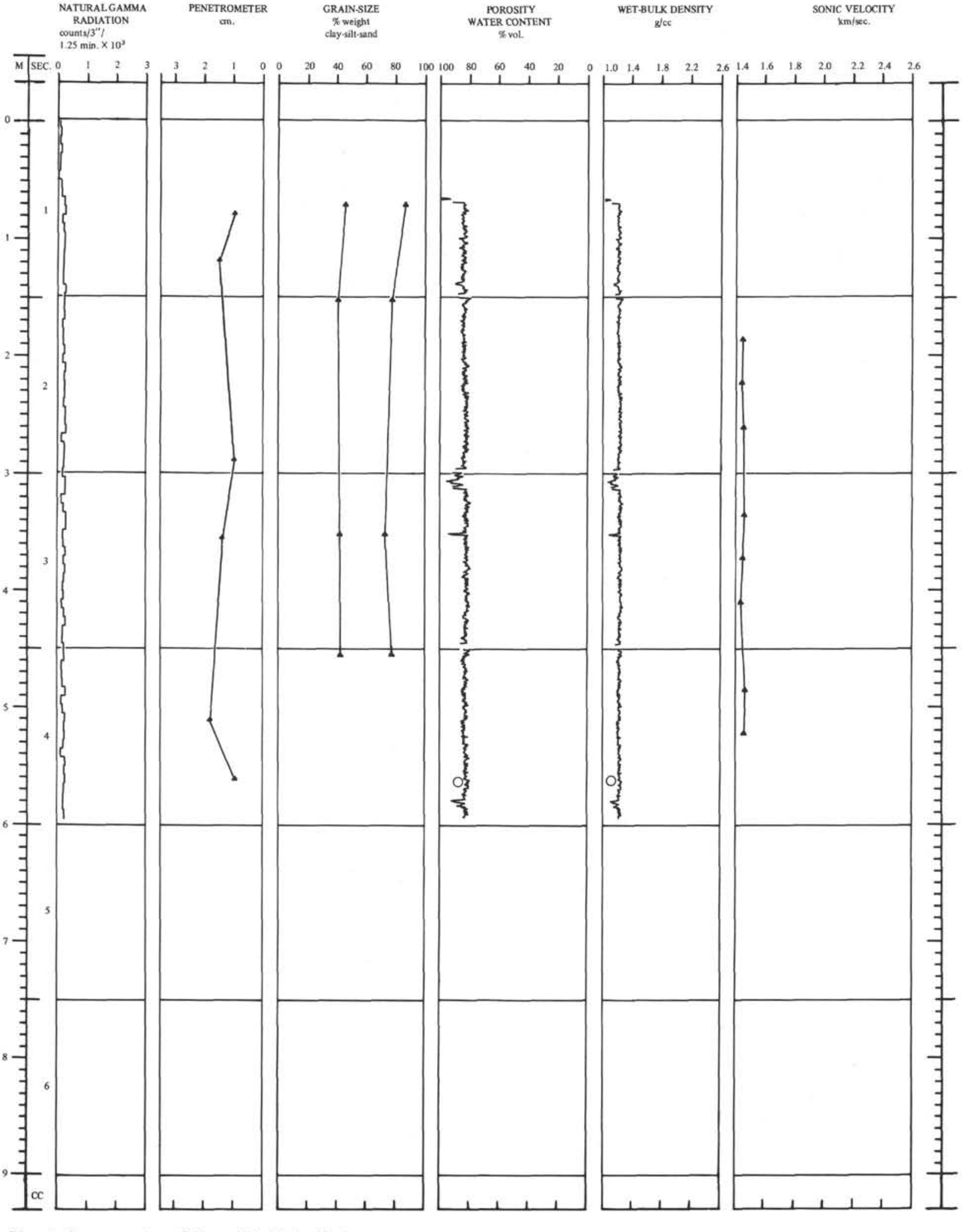


Radiolarian ooze, moderate brown, slight grayish orange mottling. Generally disturbed by drilling.

Radiolarian zone *Calocycletta virginis* (Secs. 1-4)

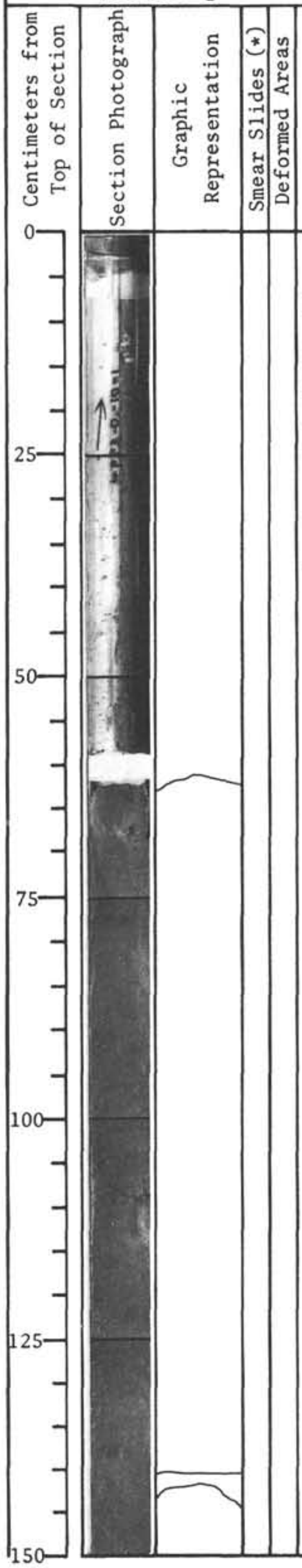
Silicoflagellate zone *Corbisema triacantha*? (Secs. 1-6)

Lithology and biostratigraphy of Core 10, Hole 65.0.



Physical properties of Core 10, Hole 65.0.

Hole 65.0 Core 10
Section 1



Description

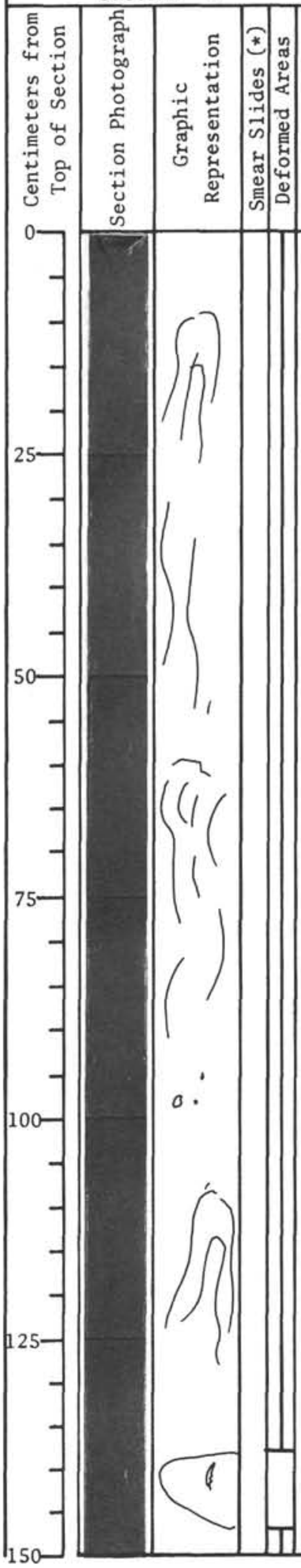
RADIOLARIAN OOZE

Firm to stiff moderate brown (10YR4/4-2.5Y4/4) with slight grayish orange (10YR7/4) and dark yellowish brown (10YR3/2) mottling.

Classic sugary texture.

Void between 0 and 60cm.

Hole 65.0 Core 10
Section 2

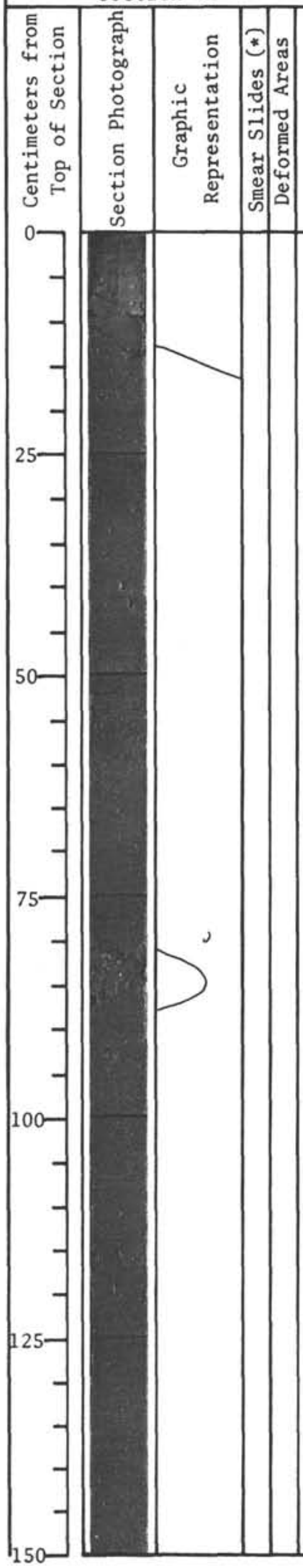


Description

RADIOLARIAN OOZE

As Section 1

Hole 65.0 Core 10
Section 3



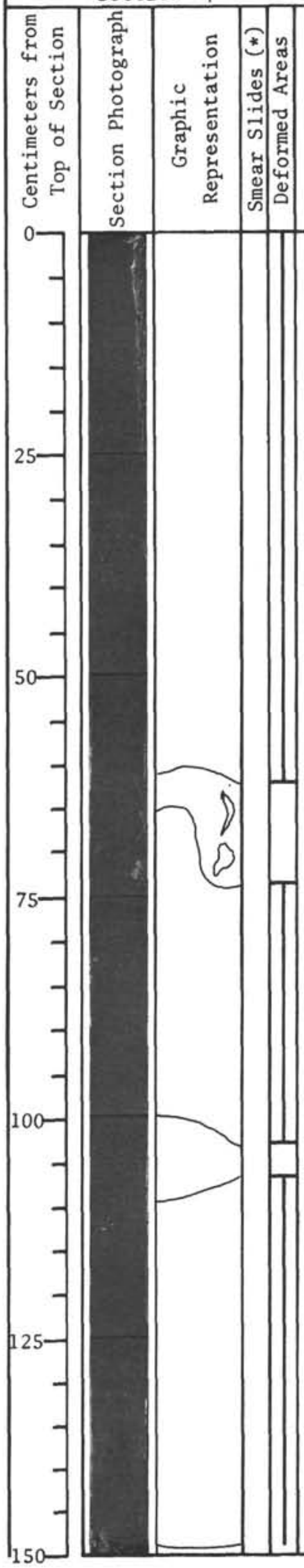
Description

RADIOLARIAN OOZE

Firm to stiff, moderate brown (10YR4/4) ooze. Rare mottles of pale yellowish orange (10YR8/6) at 80 and 95cm. Some slightly more indurated ∿2mm lumps throughout core (e.g. near 40-42cm).

0-15, 80-85cm:
Disturbed when splitting section.

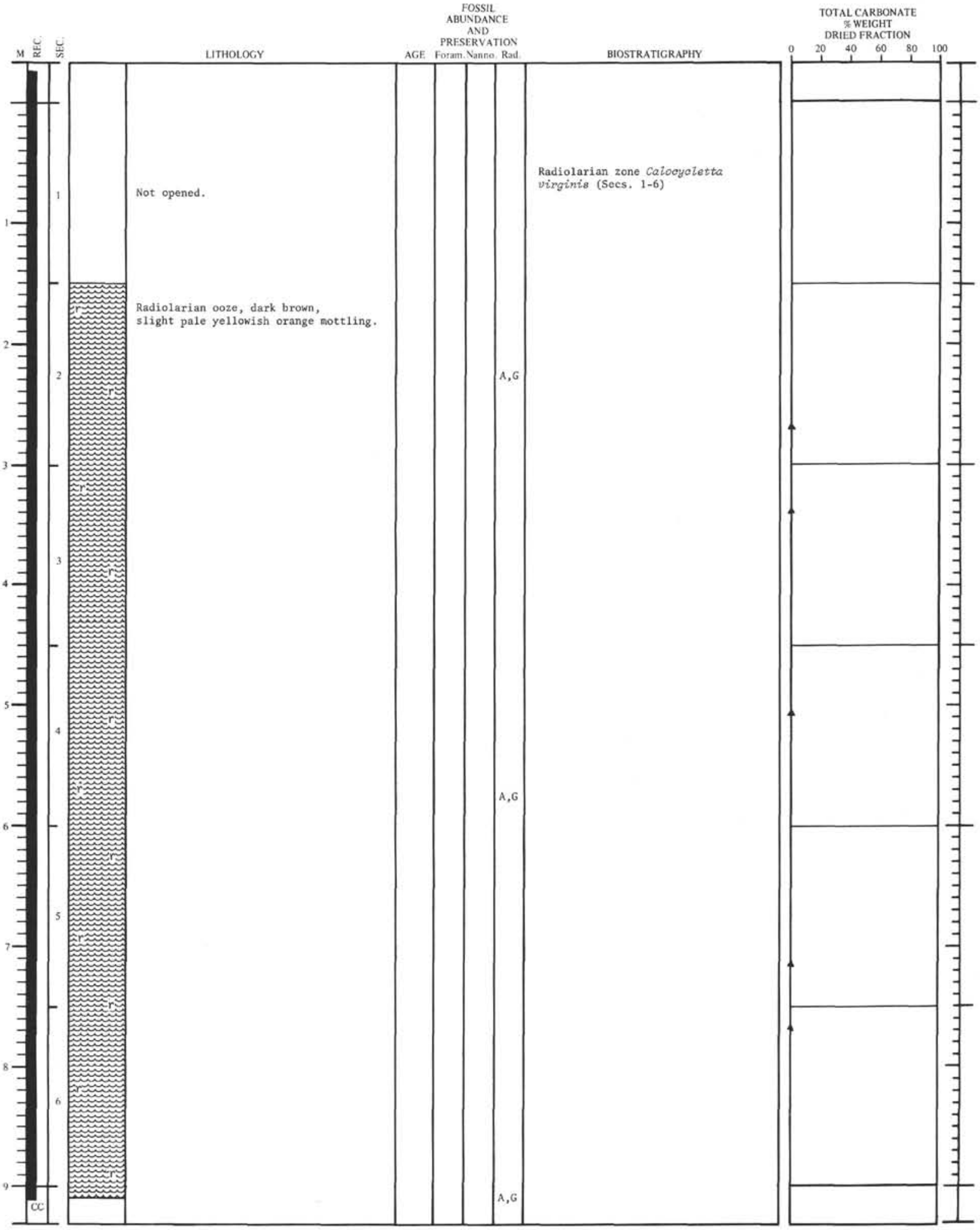
Hole 65.0 Core 10
Section 4



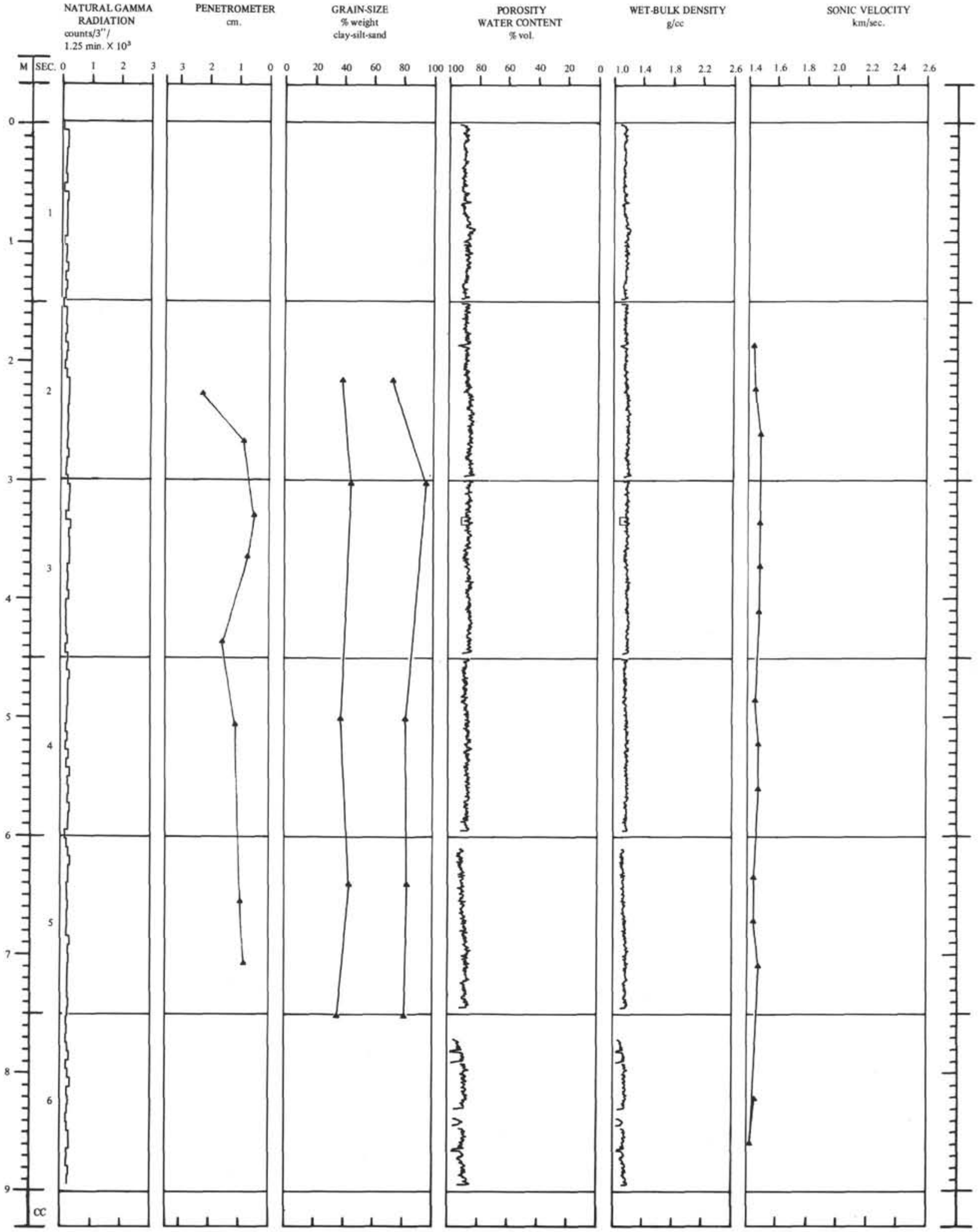
Description

RADIOLARIAN OOZE

Firm moderate brown (10YR4/4-2.5Y4/4) with slight grayish orange (10YR7/4) mottling at 65-75cm mainly.

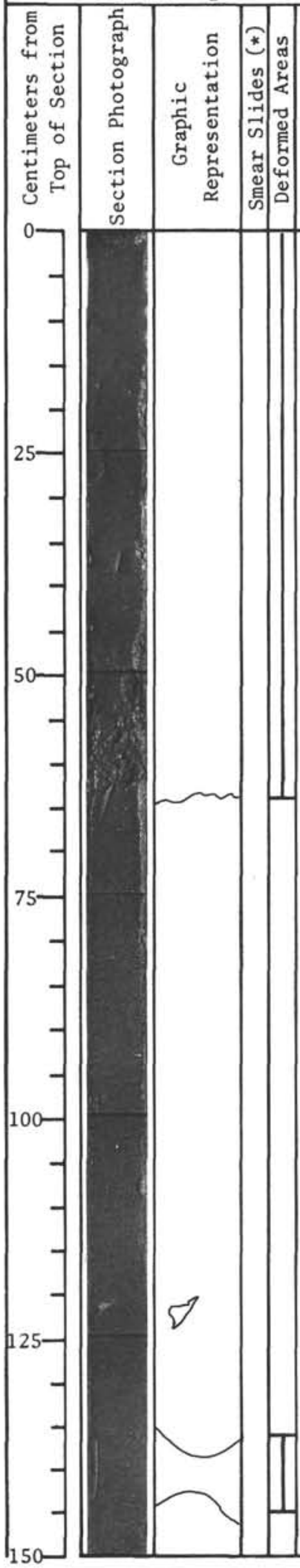


Lithology and biostratigraphy of Core 11, Hole 65.0.



Physical properties of Core 11, Hole 65.0.

Hole 65.0 Core 11
Section 2



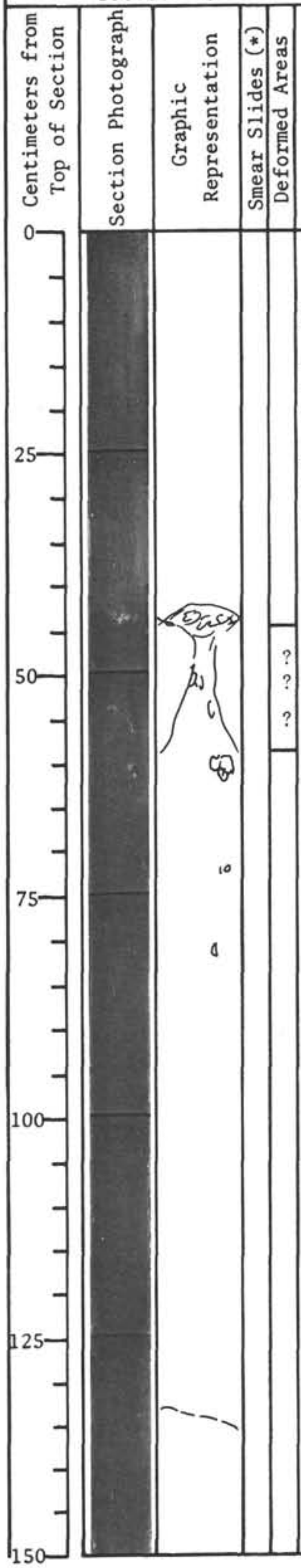
Description

RADIOLARIAN OOZE

Dark brown (10YR3/3) ooze. A large mottle of pale yellowish orange (10YR8/6) at 123cm. Some small waxy firm lumps throughout.

Above 63cm, disturbed in drilling (rust pieces; very watery).

Hole 65.0 Core 11
Section 3

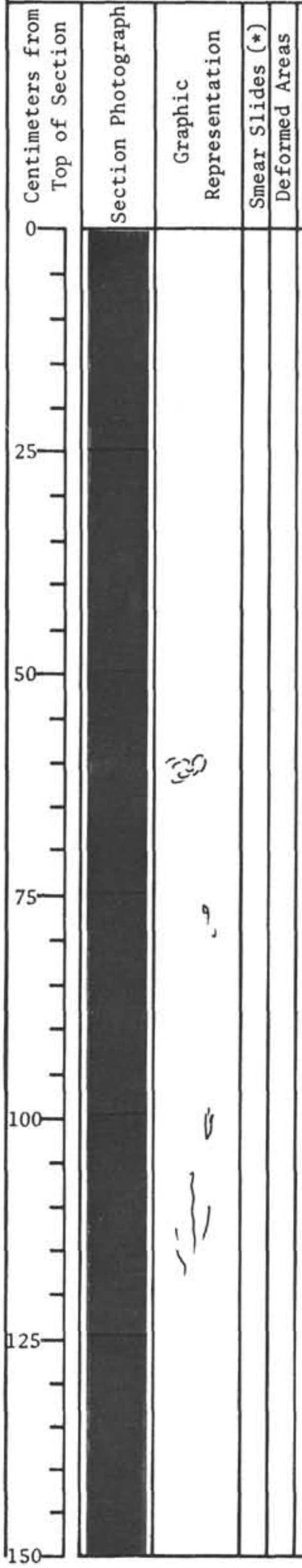


Description

RADIOLARIAN OOZE

Dark brown (10YR3/3), firm ooze. Mottles of pale yellowish orange (10YR8/6) and of dusky yellowish brown (10YR 3/2), especially 43-62cm.

Hole 65.0 Core 11
Section 4

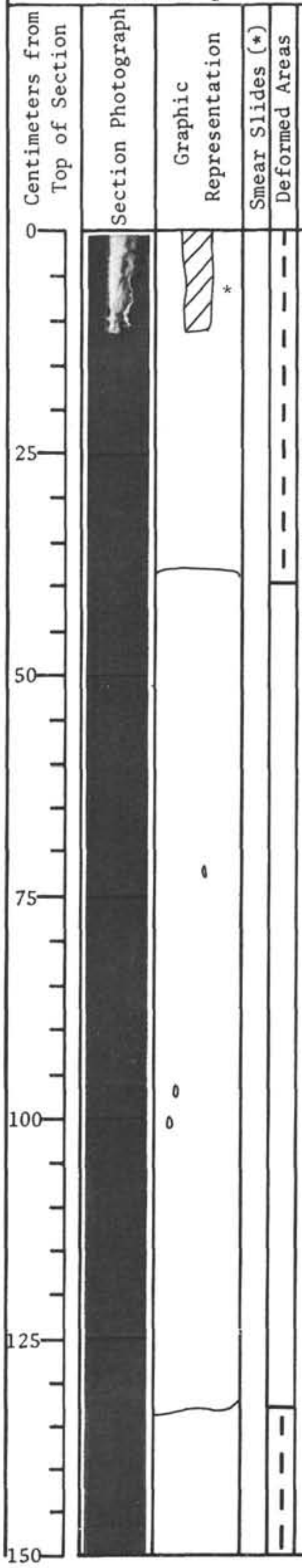


Description

RADIOLARIAN OOZE

Dark brown (10YR3/3), firm ooze. Indistinct mottle (pale yellowish orange 10YR8/6) near 60cm, and streaked vertically ∿100-120cm.

Hole 65.0 Core 11
Section 5



Description

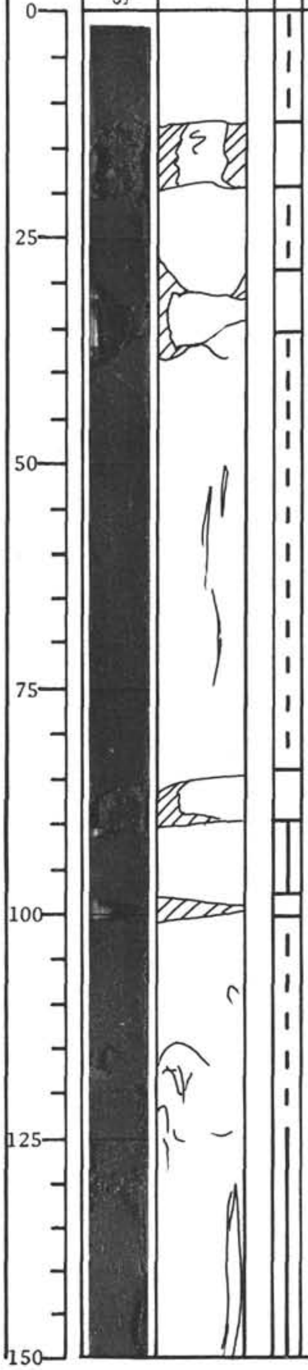
RADIOLARIAN OOZE

Dark brown (10YR3/3), firm ooze. Some tiny (∿1mm) and small (∿2 mm) mottles of pale yellowish orange (10YR8/6).

*A sample removed from top of section (for interstitial water analysis) when core was sectioned on deck.

Hole 65.0 Core 11
Section 6

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



RADIOLARIAN OOZE

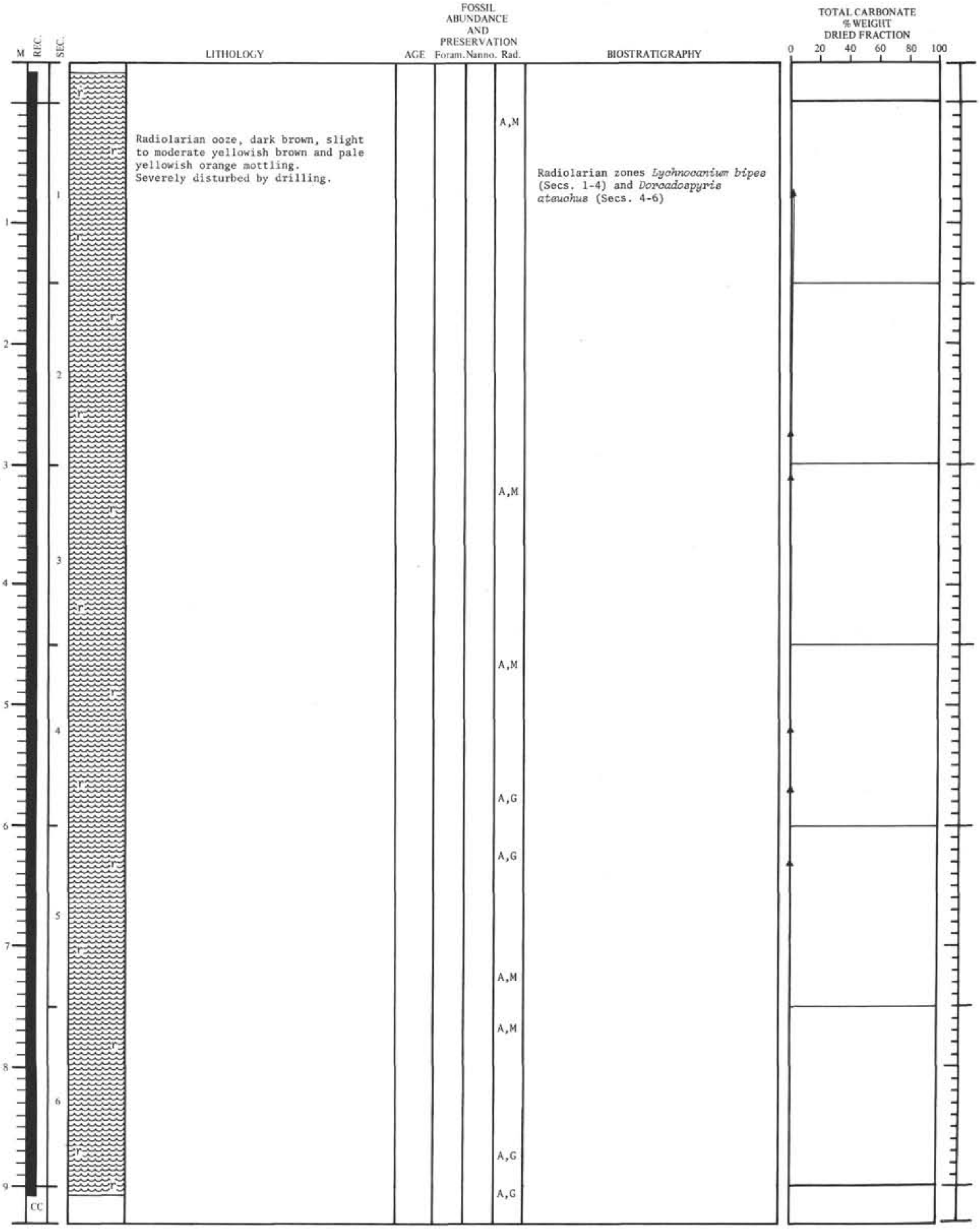
Voids

Voids

Dark brown (10YR3/3) firm ooze; a few vertically deformed mottles of grayish orange (10 YR7/4). Cracks and voids, when core was pulled out on deck. Below 113cm, considerable deformation by thin plastic "sock".

Voids

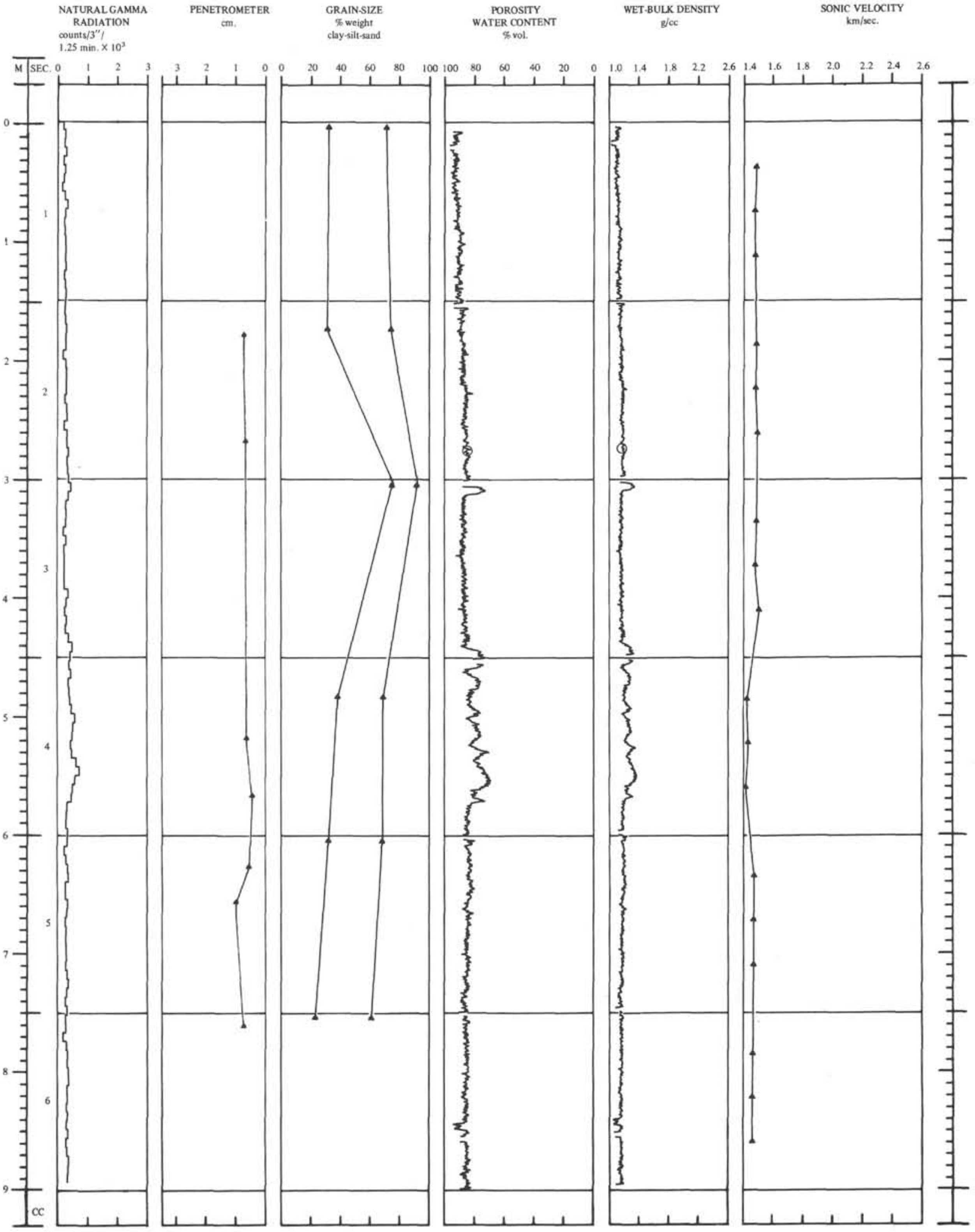
Voids



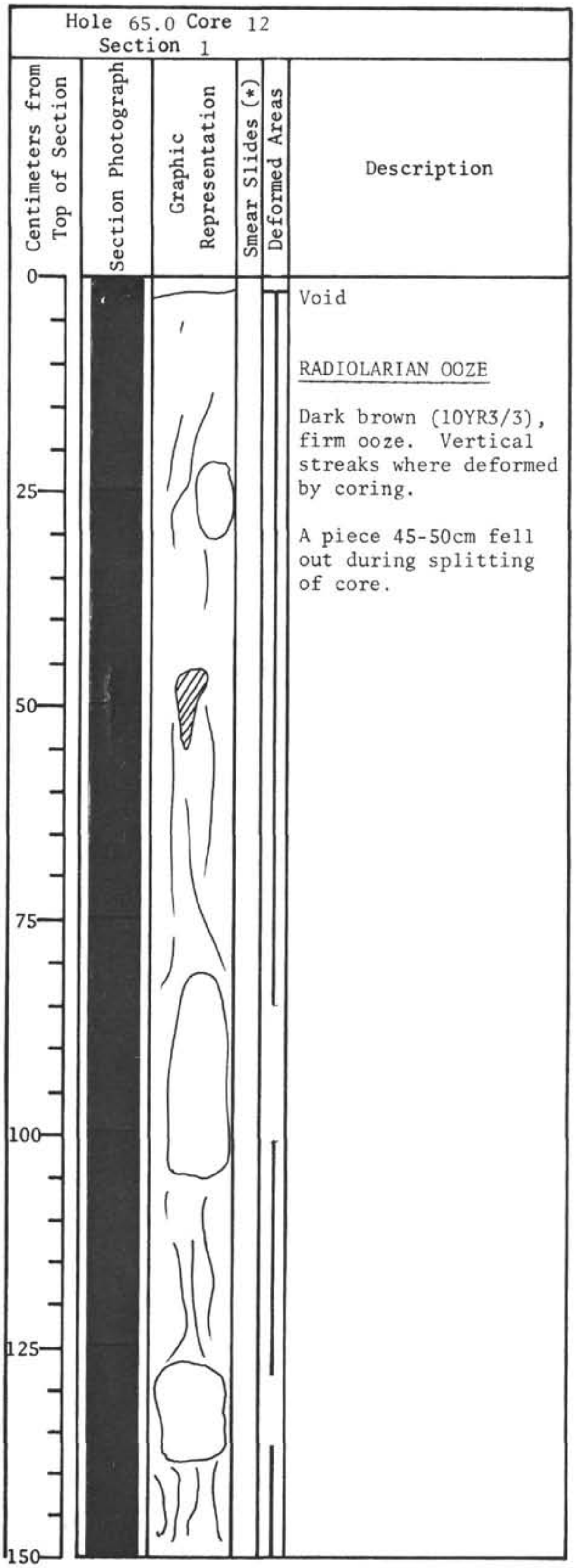
Radiolarian ooze, dark brown, slight to moderate yellowish brown and pale yellowish orange mottling.
Severely disturbed by drilling.

Radiolarian zones *Lychnocanium bipes* (Secs. 1-4) and *Dorcadospyris ateuchus* (Secs. 4-6)

Lithology and biostratigraphy of Core 12, Hole 65.0.



Physical properties of Core 12, Hole 65.0.



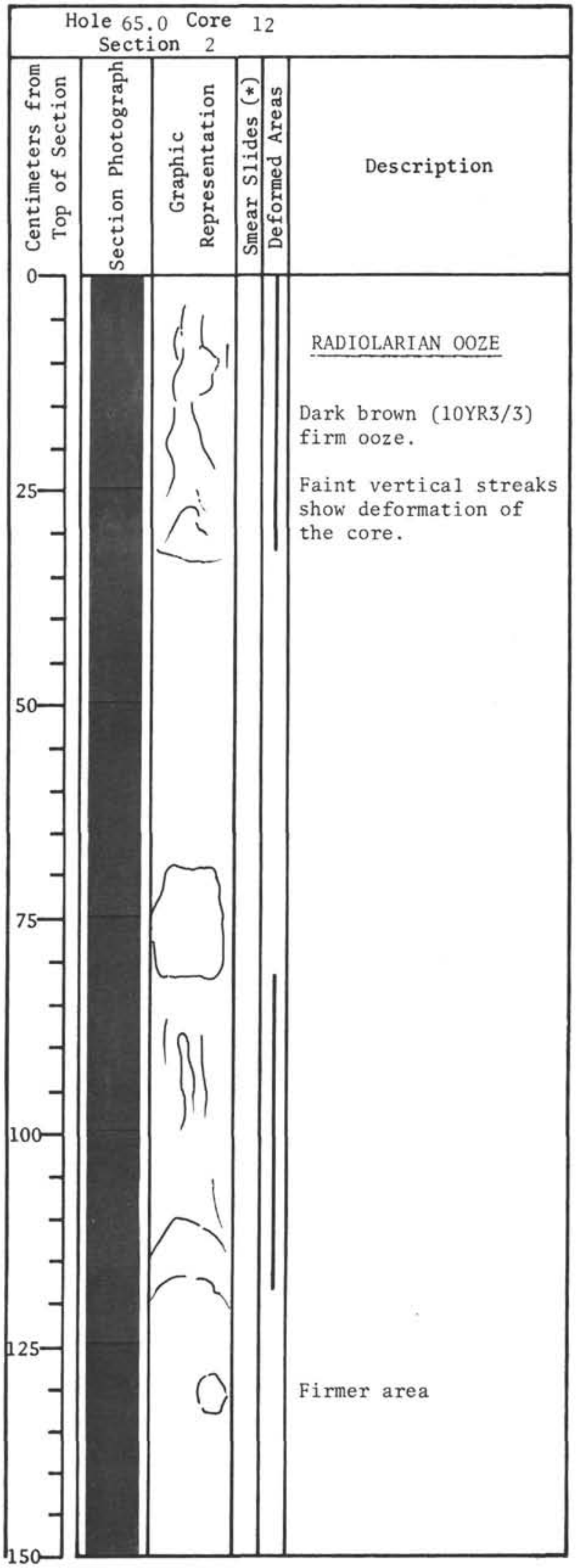
Hole 65.0 Core 12
Section 1

Void

RADIOLARIAN OOZE

Dark brown (10YR3/3), firm ooze. Vertical streaks where deformed by coring.

A piece 45-50cm fell out during splitting of core.



Hole 65.0 Core 12
Section 2

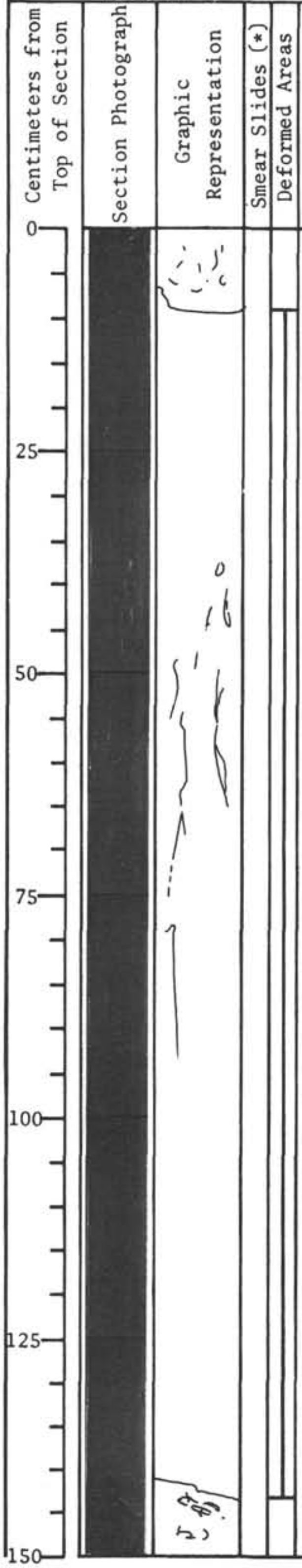
RADIOLARIAN OOZE

Dark brown (10YR3/3) firm ooze.

Faint vertical streaks show deformation of the core.

Firmer area

Hole 65.0 Core 12
Section 3



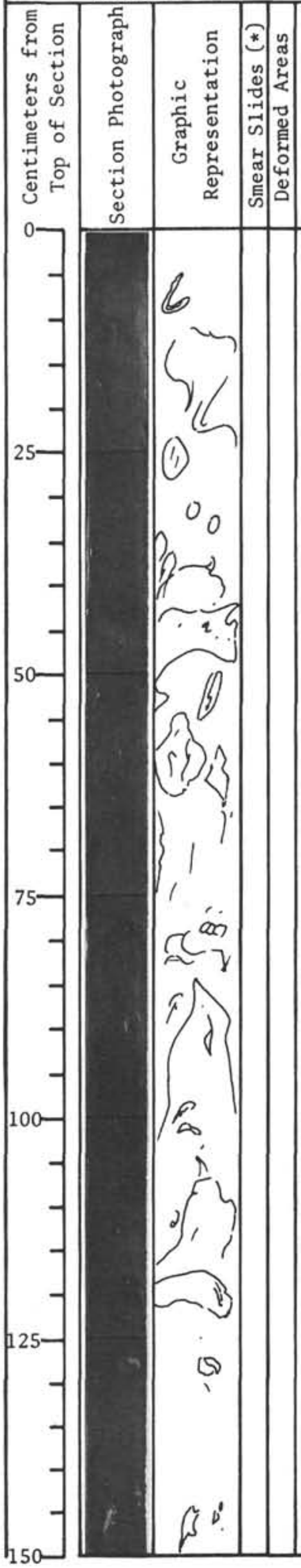
Description

RADIOLARIAN OOZE

Dark brown (10YR3/3) firm ooze. Most of core is deformed, as seen by vertical banding of mottles.

Some dark yellowish brown 10YR3/2 mottles above 9 and below 141 cm, and some pale yellowish orange (10YR8/6) below 141. Streaked out between 40 and 70cm.

Hole 65.0 Core 12
Section 4



Description

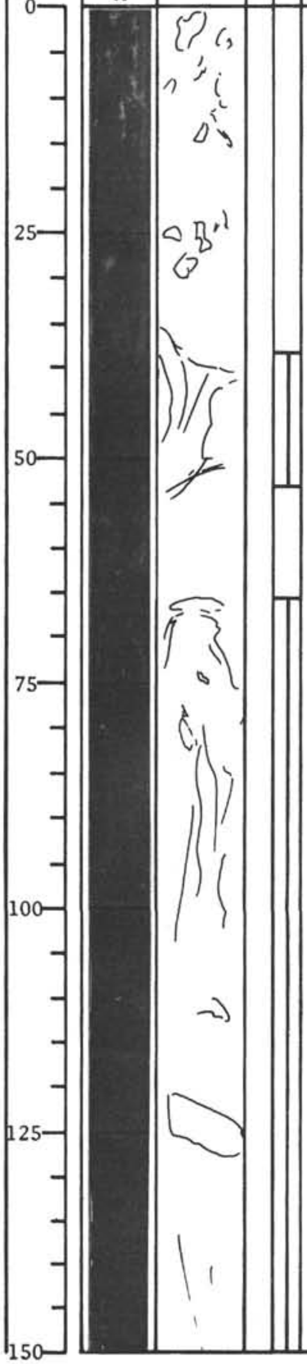
RADIOLARIAN OOZE

Sugary textured dark brown (10YR3/3) firm ooze, with contorted swirls and streaks of clayey appearing dusky yellowish brown (10YR 2/2). Streaks and mottles of pale yellowish orange (10YR8/6).

A cylindrical concretion ~5mm in diameter at 79cm.

Hole 65.0 Core 12
Section 5

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description

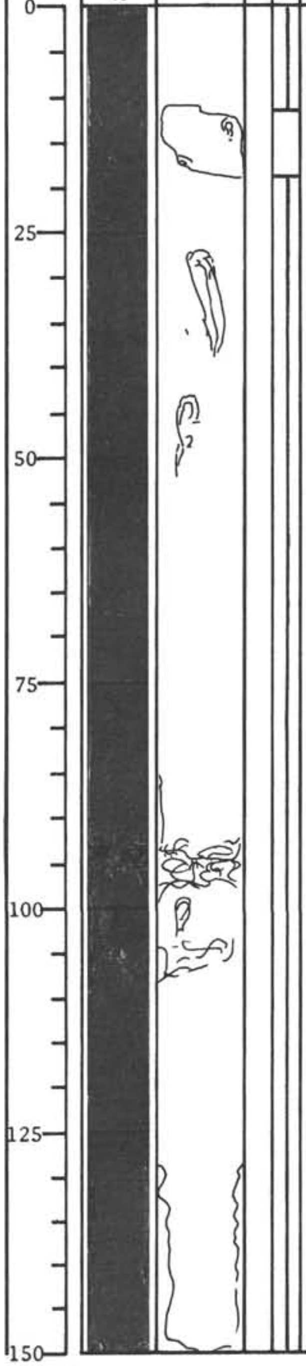


RADIOLARIAN OOZE

As Core 12-4 above, Moderately mottled above 40cm.

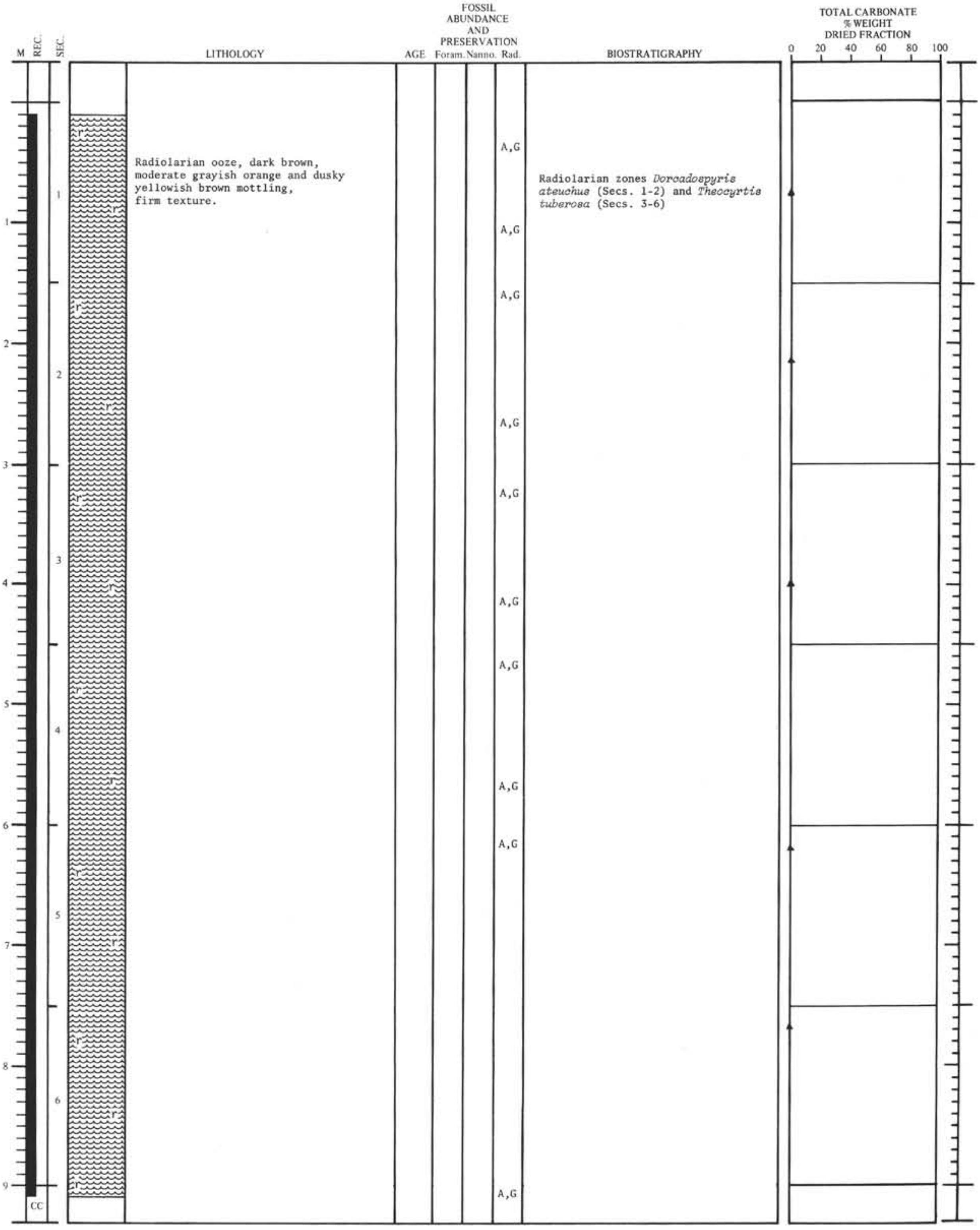
Hole 65.0 Core 12
Section 6

Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



RADIOLARIAN OOZE

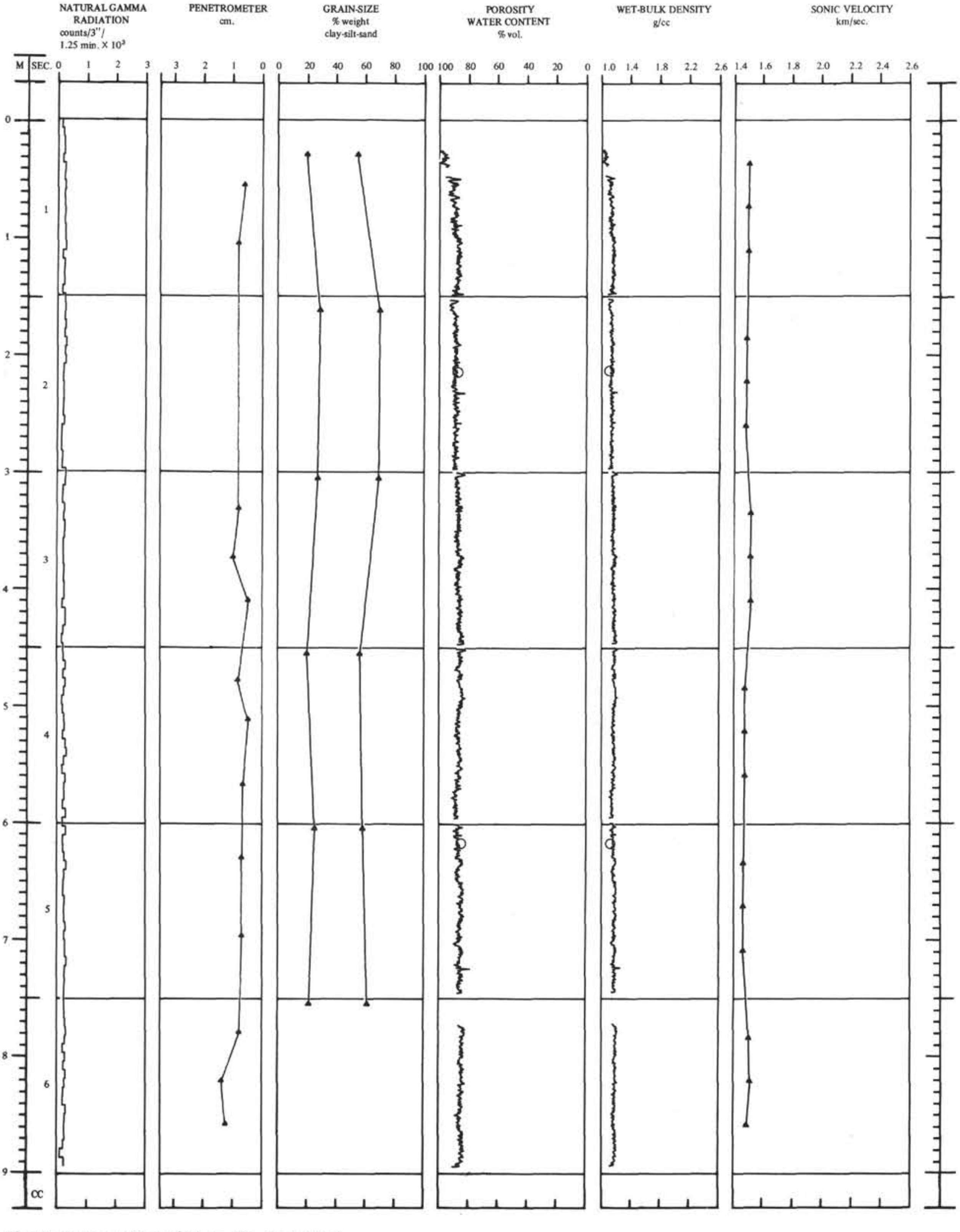
Dark brown (10YR3/3) ooze, as higher sections of this core.



Radiolarian ooze, dark brown, moderate grayish orange and dusky yellowish brown mottling, firm texture.

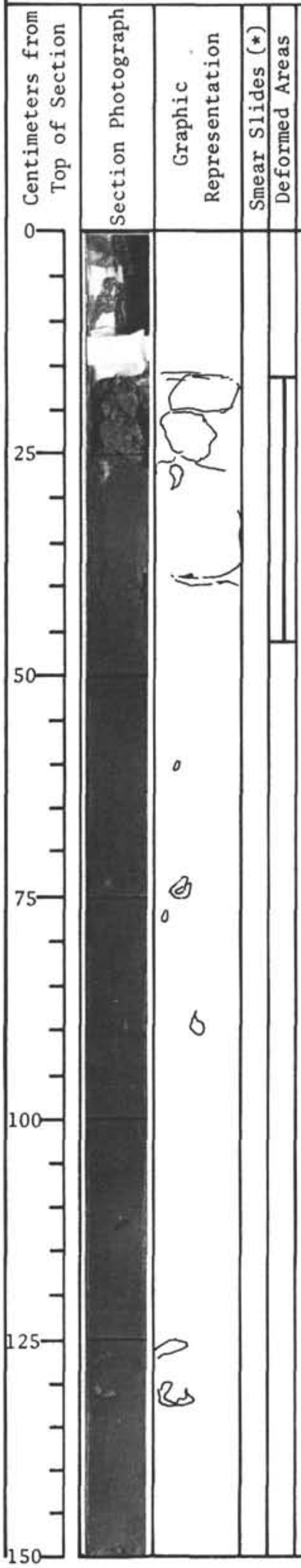
Radiolarian zones *Dorcadospyris ateuchus* (Secs. 1-2) and *Theocyrtis tuberosa* (Secs. 3-6)

Lithology and biostratigraphy of Core 13, Hole 65.0.



Physical properties of Core 13, Hole 65.0.

Hole 65.0 Core 13
Section 1



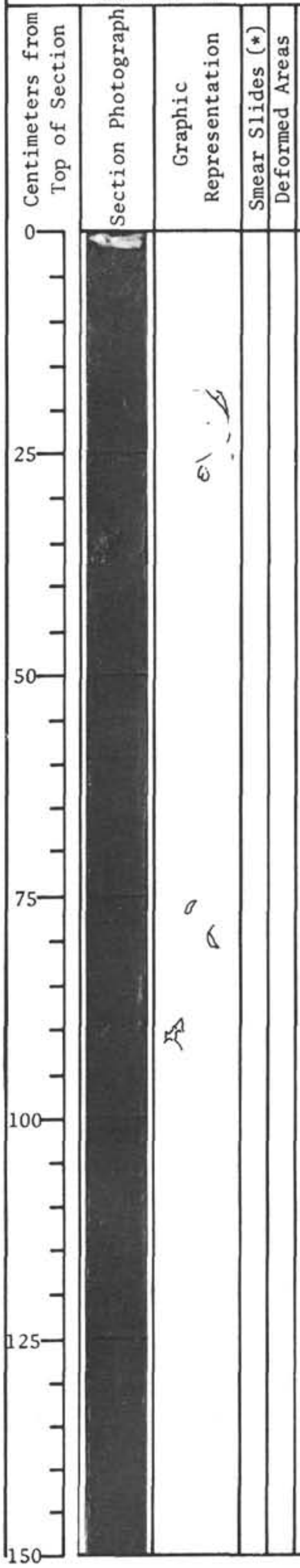
Description

RADIOLARIAN OOZE

Dark brown (10YR3/3) firm ooze. A few large mottles of pale yellowish orange (10YR8/6), e.g. 27, 75, ∿130cm.

0-15cm: Void

Hole 65.0 Core 13
Section 2

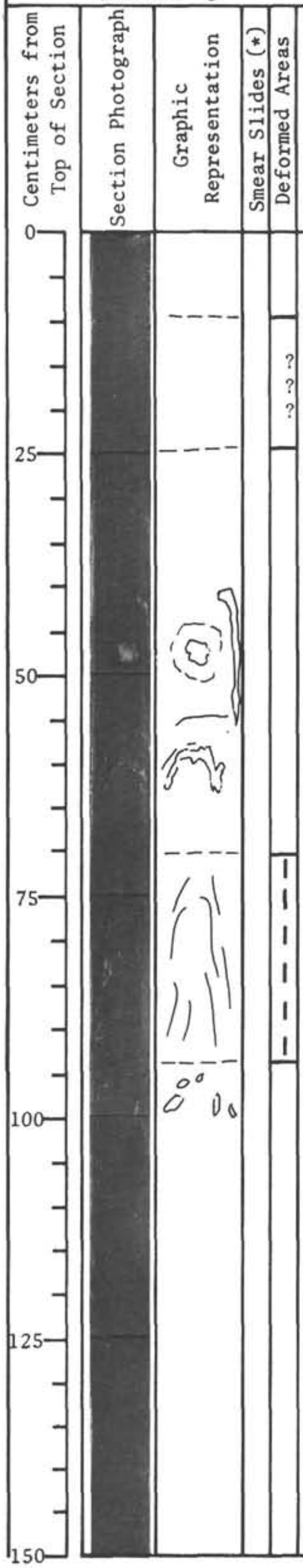


Description

RADIOLARIAN OOZE

Dark brown (10YR3/3) firm ooze, mottled sparsely with grayish orange (10YR7/4).

Hole 65.0 Core 13
Section 3



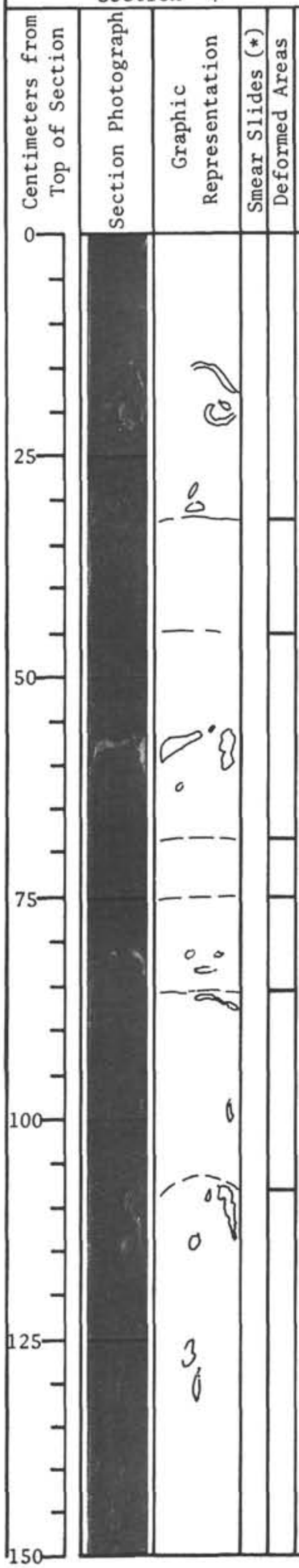
Description

RADIOLARIAN OOZE

Firm to very firm (10YR3/3) dark brown with moderate mottling of 10YR7/4 grayish orange and dusky yellowish brown 10YR2/2.

Classic sugary texture.

Hole 65.0 Core 13
Section 4

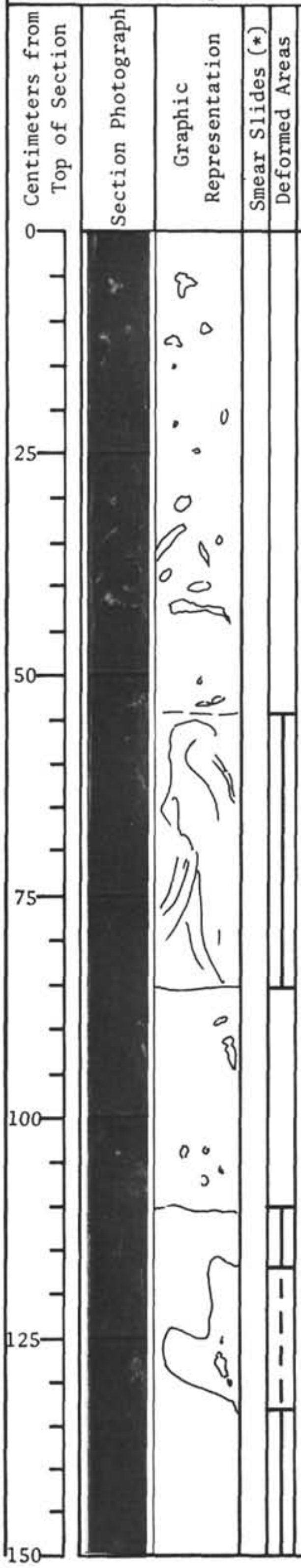


Description

RADIOLARIAN OOZE

As Section 3.

Hole 65.0 Core 13
Section 5

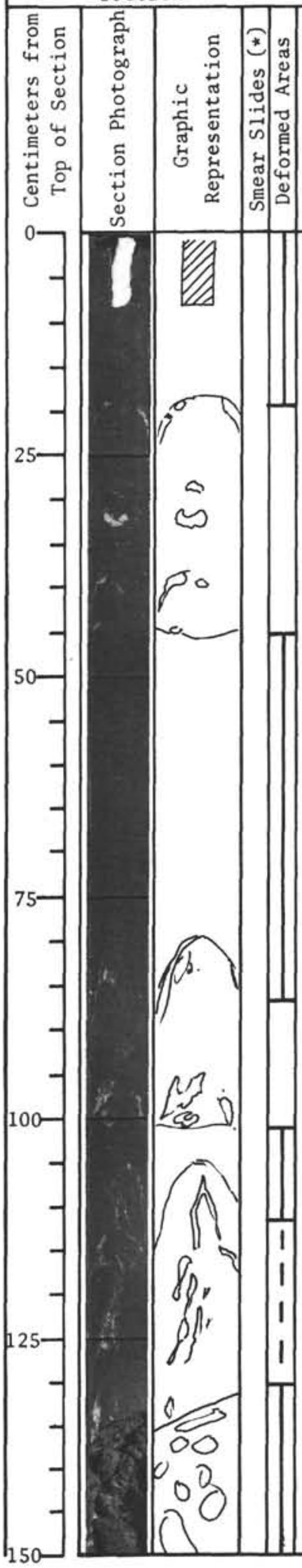


Description

RADIOLARIAN OOZE

As Section 3.

Hole 65.0 Core 13
Section 6



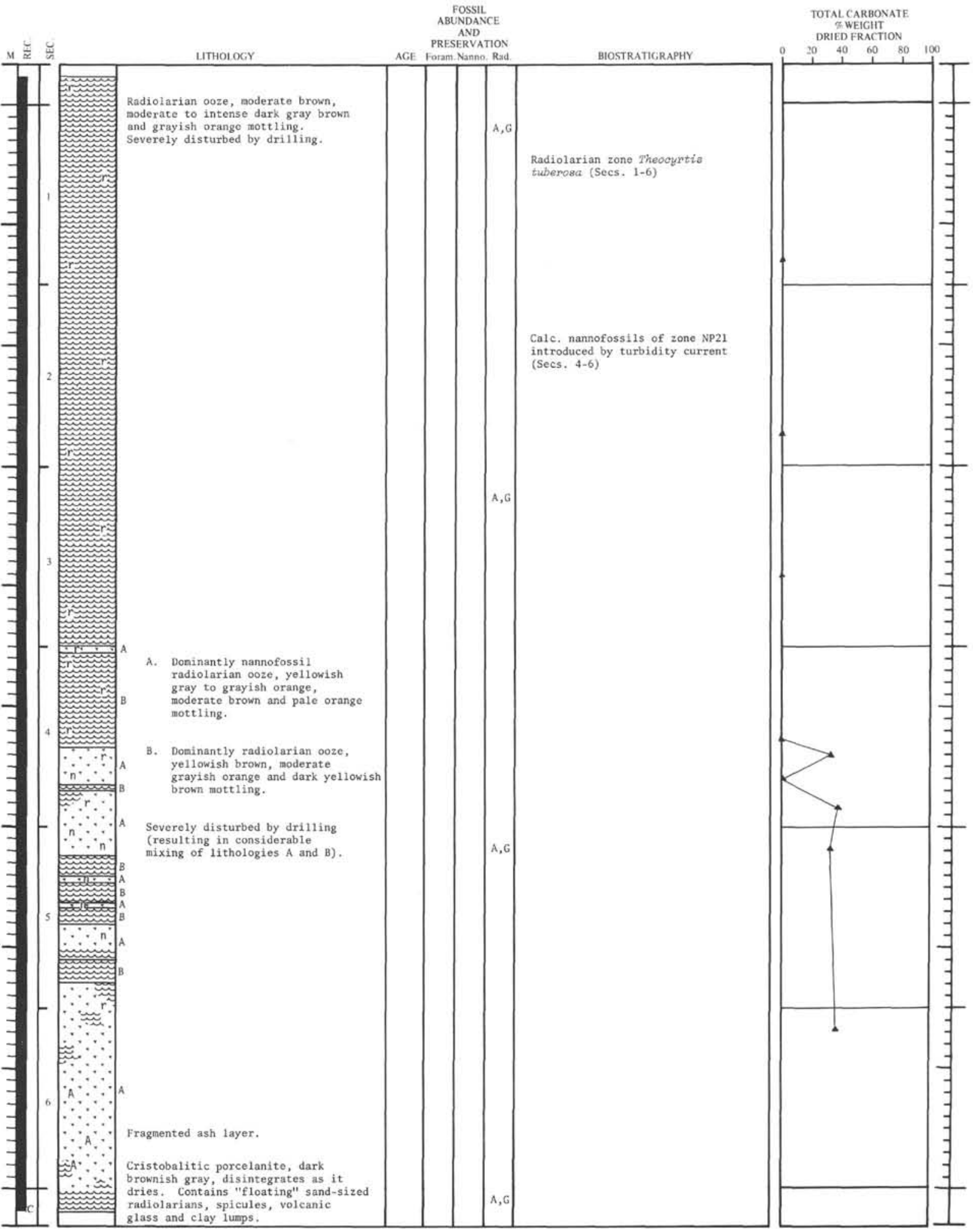
Description

RADIOLARIAN OOZE

As Section 3.

Plug removed for interstitial water sample at top of section.

135-150cm:
Disturbed area due to removal of plastic "sock" used to retain core.



Radiolarian ooze, moderate brown, moderate to intense dark gray brown and grayish orange mottling. Severely disturbed by drilling.

A. Dominantly nannofossil radiolarian ooze, yellowish gray to grayish orange, moderate brown and pale orange mottling.

B. Dominantly radiolarian ooze, yellowish brown, moderate grayish orange and dark yellowish brown mottling.

Severely disturbed by drilling (resulting in considerable mixing of lithologies A and B).

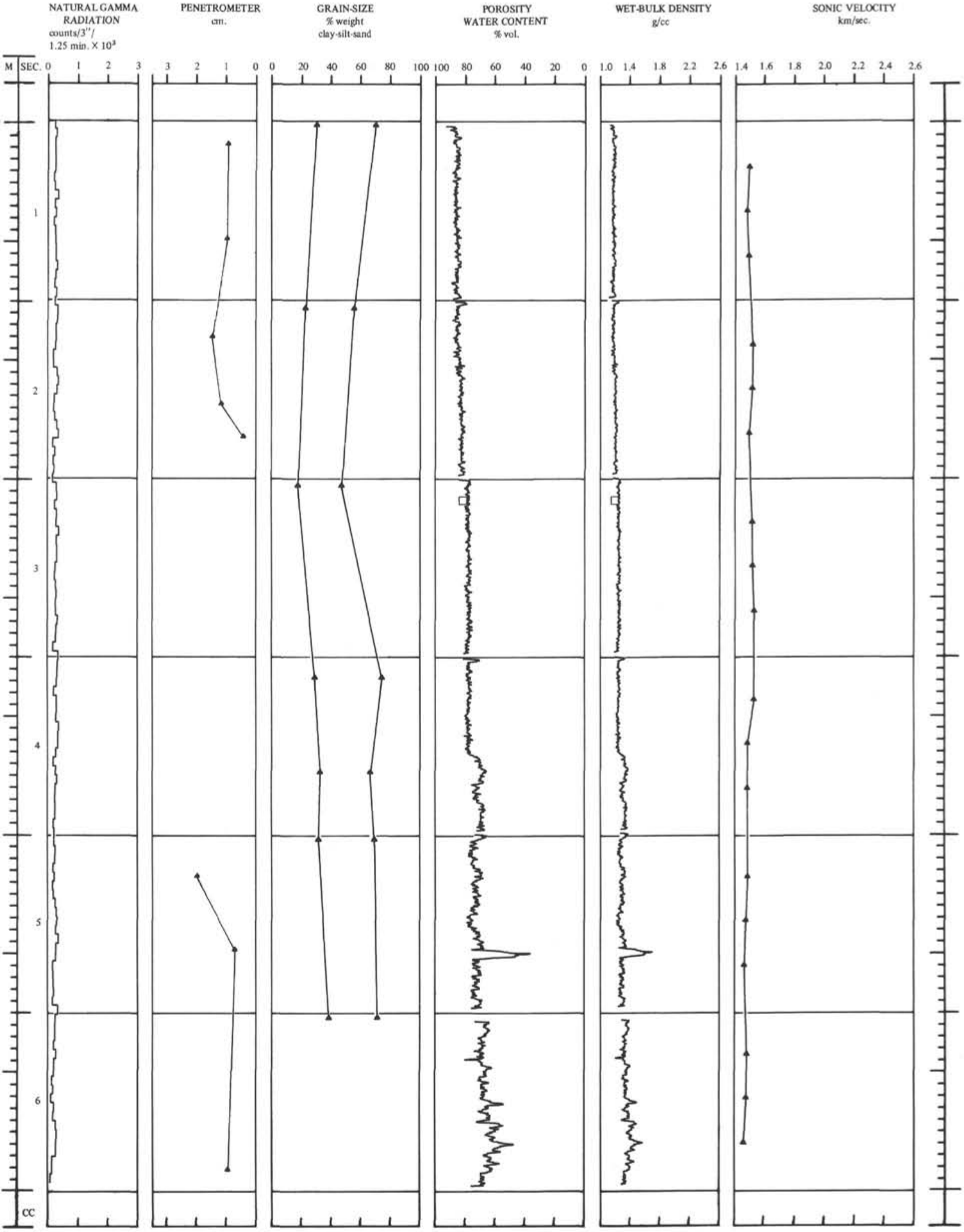
Fragmented ash layer.

Cristobalitic porcelanite, dark brownish gray, disintegrates as it dries. Contains "floating" sand-sized radiolarians, spicules, volcanic glass and clay lumps.

Radiolarian zone *Theocyrtis tuberosa* (Secs. 1-6)

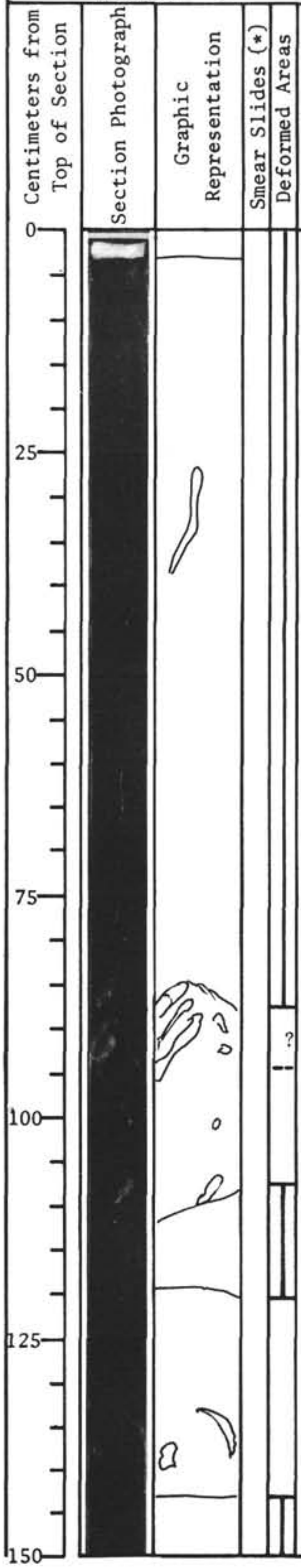
Calc. nannofossils of zone NP21 introduced by turbidity current (Secs. 4-6)

Lithology and biostratigraphy of Core 14, Hole 65.0.



Physical properties of Core 14, Hole 65.0.

Hole 65.0 Core 14
Section 1



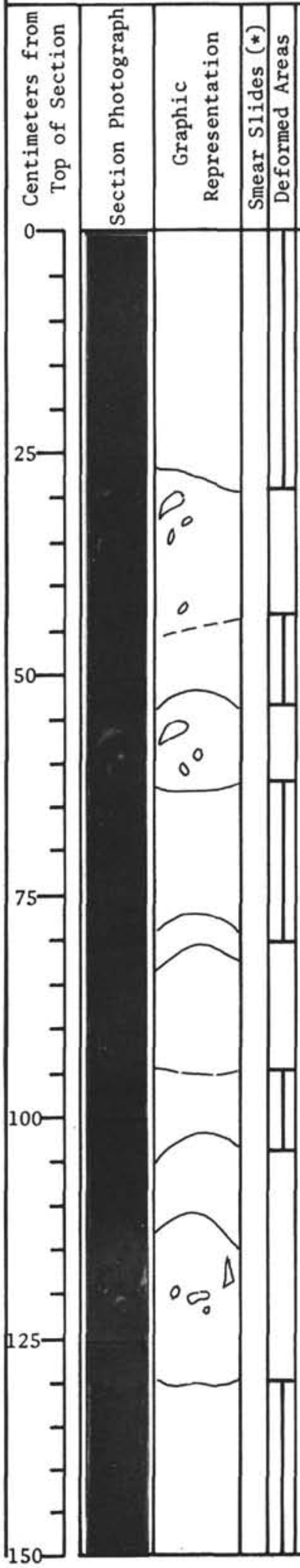
Description

RADIOLARIAN OOZE

Moderate brown 10YR3/3 very firm material with moderate grayish orange 10YR7/4 and lesser dark gray brown 10YR3/1 mottling.

Classic sugary texture.

Hole 65.0 Core 14
Section 2



Description

RADIOLARIAN OOZE

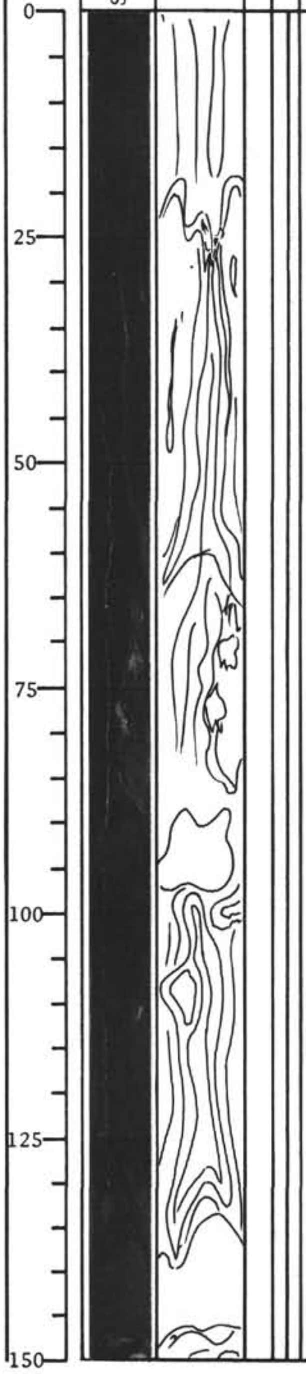
Generally as Section 1.

82-95cm:
Patch of 10YR4/3 brown between.

113-130cm:
Patch of 10YR5/4 moderate yellow brown with moderate grayish orange 10YR7/4 and dark gray brown 10YR3/1 mottling.

Hole 65.0 Core 14
Section 3

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE

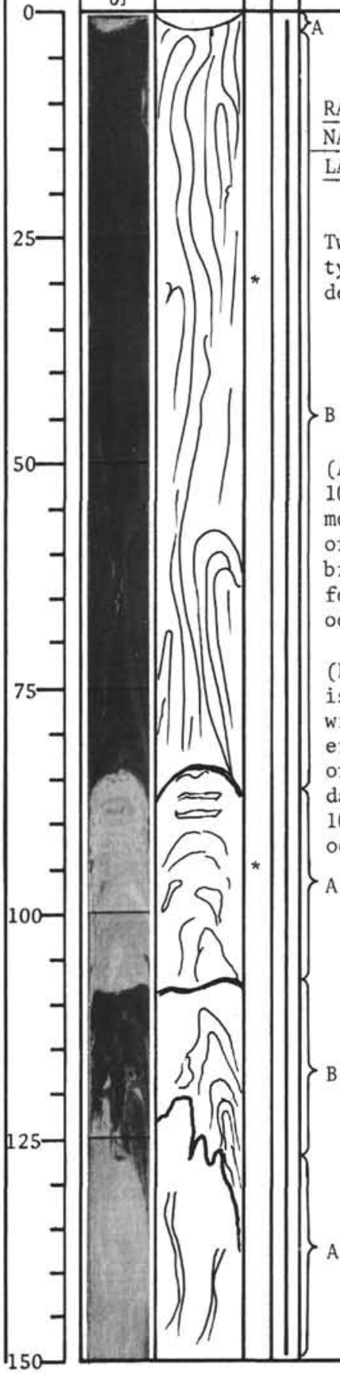
Intense travertinoid interbanding of brown 10YR4/3 dark gray brown 10YR3/1 grayish orange 10YR7/4 and moderate brown 10YR3/3.

90-95, 138-146cm: Moderate yellow brown 10YR5/4 patches.

Calcareous at 150cm.

Hole 65.0 Core 14
Section 4

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



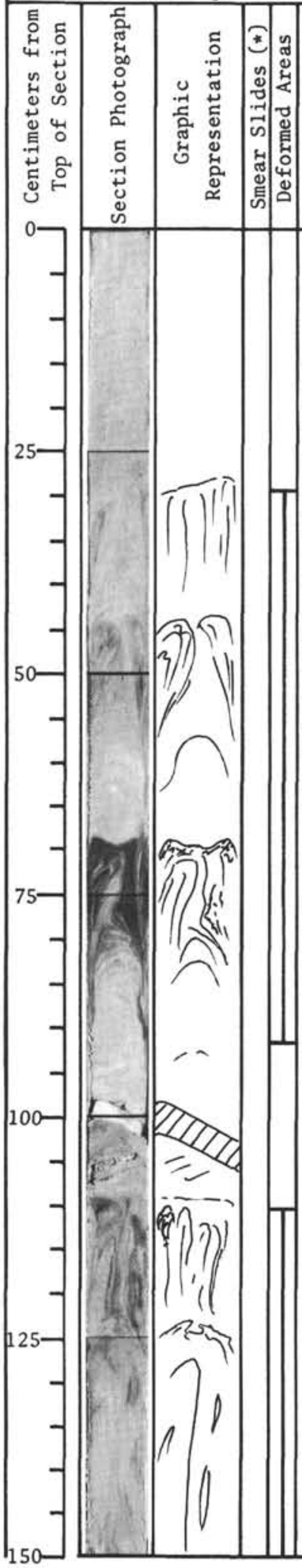
RADIOLARIAN OOZE AND NANNOFOSSIL RADIOLARIAN OOZE

Two distinct lithotypes - both severely deformed by drilling.

(A) Grayish orange 10YR7/4 with moderate mottling of very pale orange 10YR8/2 and brown 10YR5/3 nannofossil radiolarian ooze.

(B) Basically yellowish brown 10YR4/3 with lighter and darker streaks to grayish orange 10YR7/4 and dark yellowish brown 10YR3/3 radiolarian ooze.

Hole 65.0 Core 14
Section 5



Description

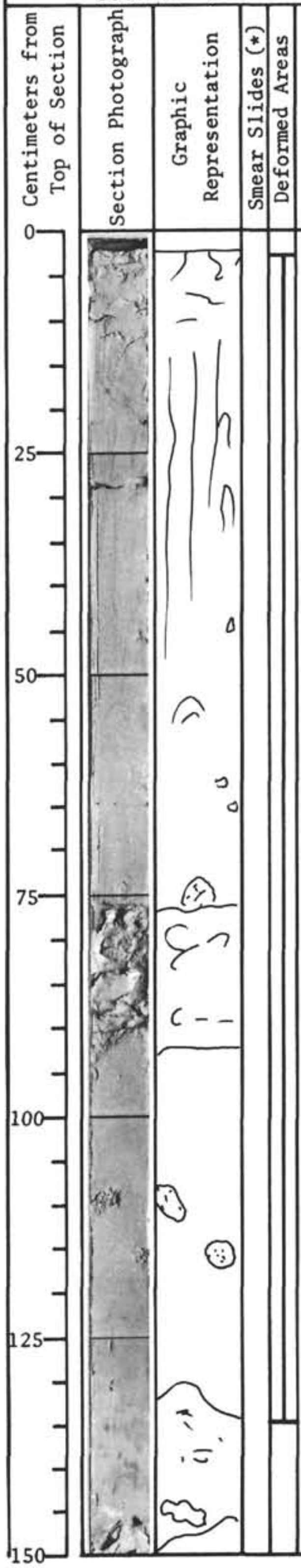
Mainly firm to stiff, yellowish gray (2.5Y6/2 to grayish orange (10 YR7/2) siliceous, nannofossil ooze (e.g., 0-∿27cm, 40-44, 60-70, 84-110, most of 130-151). Some dark yellowish brown (10YR4/3) non-calcareous radiolarian ooze (e.g., 70-80) badly deformed into vertical flow folds.

Considerable mixture of two above lithologies into vertical folds and stripes of various shades of brown (27-40, 44-60, 80-84, 110-130, part of 130-151).

Very stiff calcareous ooze at 107cm. (Foraminiferal nannofossil chalk ooze; rare rads.)

Diagonal void from 98-103cm.

Hole 65.0 Core 14
Section 6



Description

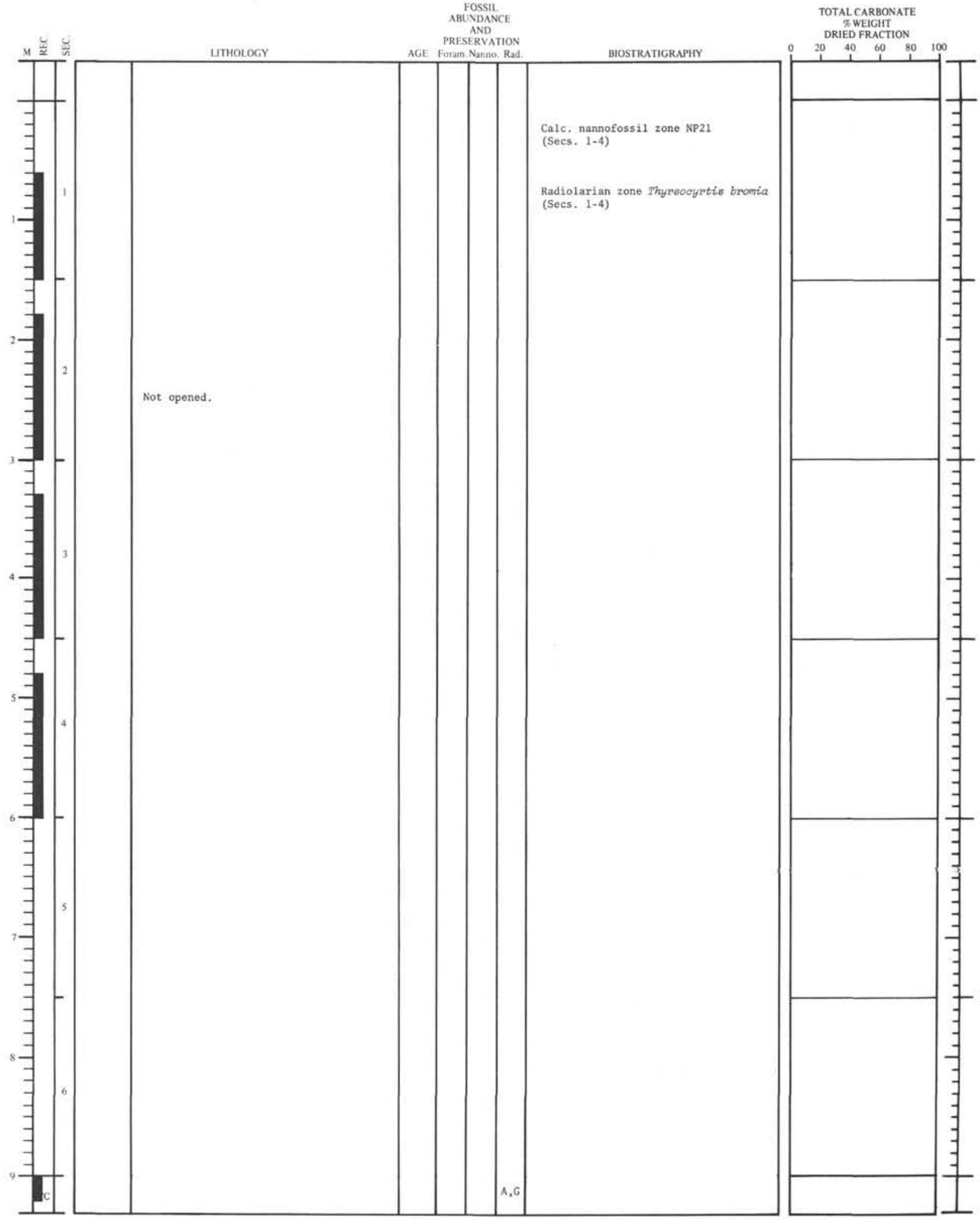
NANNOFOSSIL-RADIOLARIAN OOZE

Mainly yellowish gray (2.5Y6/2) to grayish orange (10YR7/2) siliceous nannofossil ooze, with vertical streaks and folds, accented by darker brown radiolarian rich streaks.

Section below ∿130cm moderately mottled (a large pale orange 10YR 8/4 mottle at 143cm; other moderate yellowish brown 10YR5/3 ones.)

Sandy-appearing (dark speckles) mottles or lumps at 72, 107, 114 (and smaller ones elsewhere), ash-rich.

Soft between 77 and 93cm. Void between 146 and 150cm.

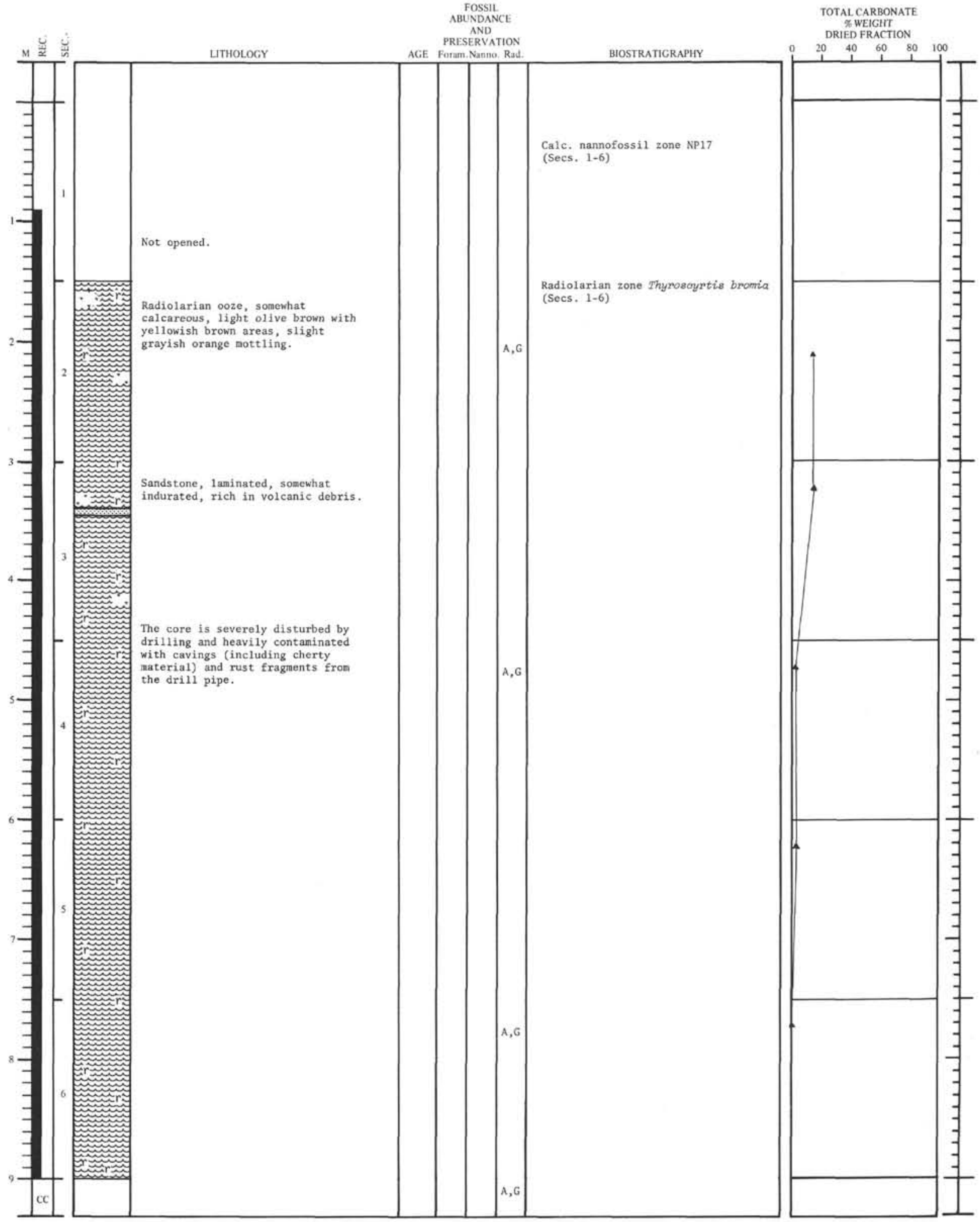


Not opened.

Calc. nannofossil zone NP21
(Secs. 1-4)

Radiolarian zone *Thyrsocyrtis bromia*
(Secs. 1-4)

Lithology and biostratigraphy of Core 15, Hole 65.0.



Calc. nannofossil zone NP17 (Secs. 1-6)

Radiolarian zone *Thyrsocyrtis bromia* (Secs. 1-6)

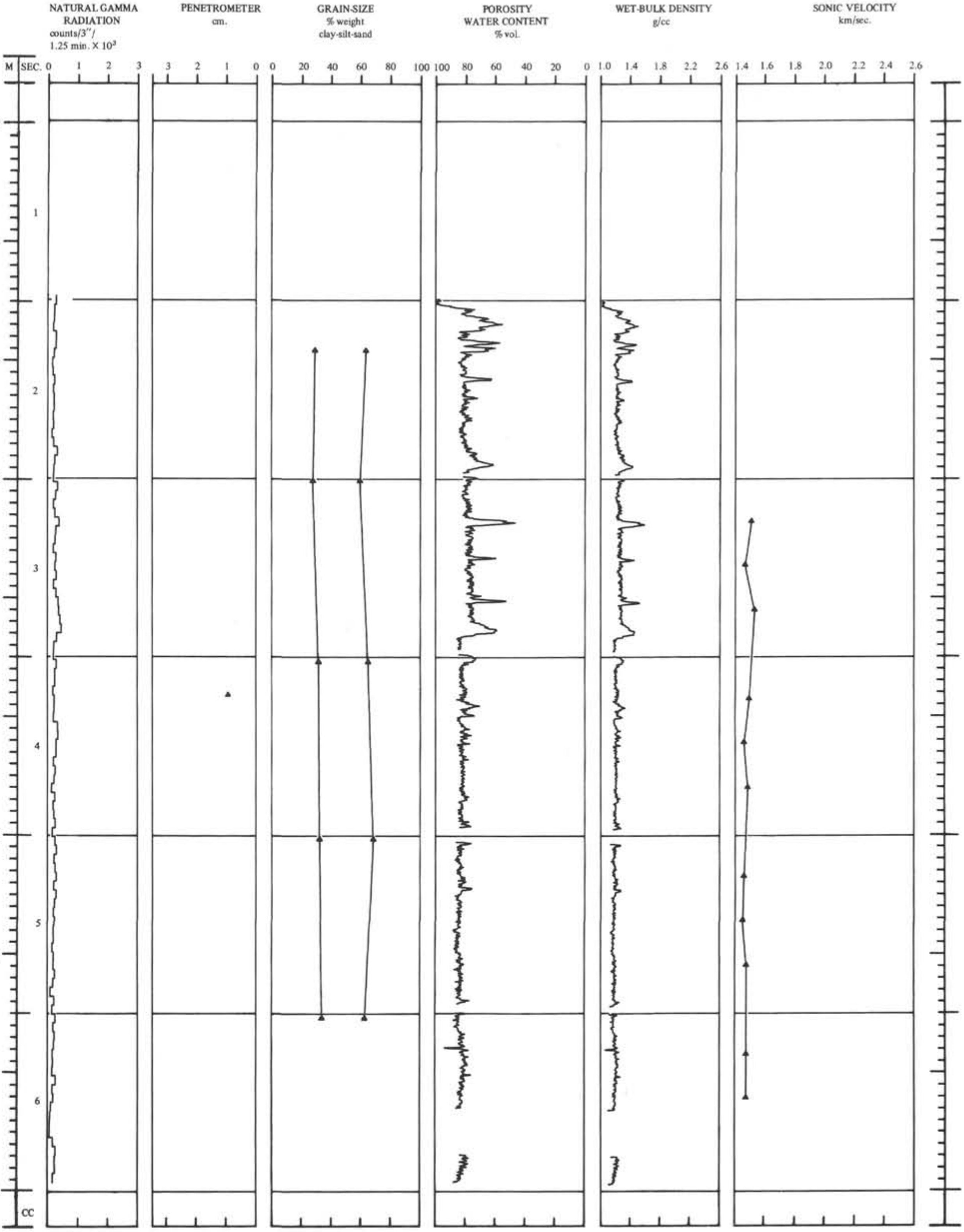
Not opened.

Radiolarian ooze, somewhat calcareous, light olive brown with yellowish brown areas, slight grayish orange mottling.

Sandstone, laminated, somewhat indurated, rich in volcanic debris.

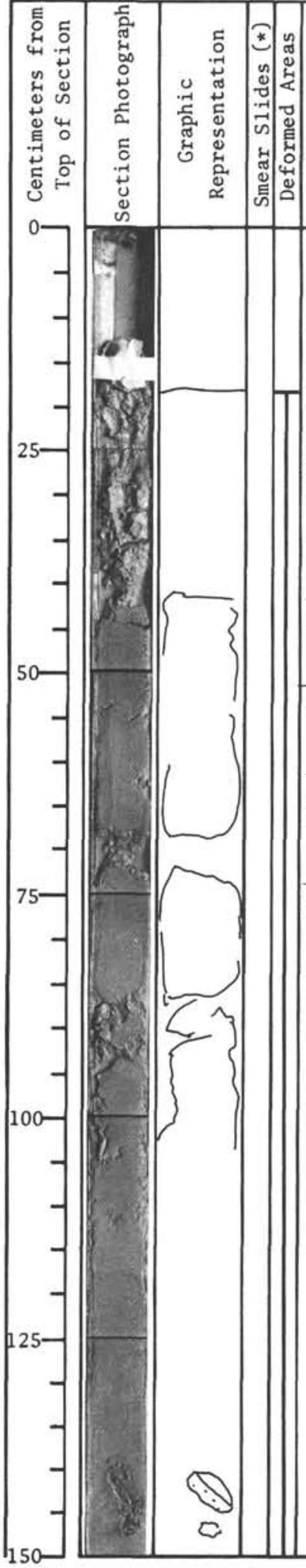
The core is severely disturbed by drilling and heavily contaminated with cavings (including cherty material) and rust fragments from the drill pipe.

Lithology and biostratigraphy of Core 16, Hole 65.0.



Physical properties of Core 16, Hole 65.0.

Hole 65.0 Core 16
Section 2



Description

CAVINGS AND RADIOLARIAN OOZE

Soft, light olive brown (2.5Y5/4) ooze, with rust flakes, fragments of chert, sandstone, mudstone, siliceous sandstone, etc. as cavings, churned together by coring.

0-20cm:

Void

20-40, 65-70cm:

Cavings

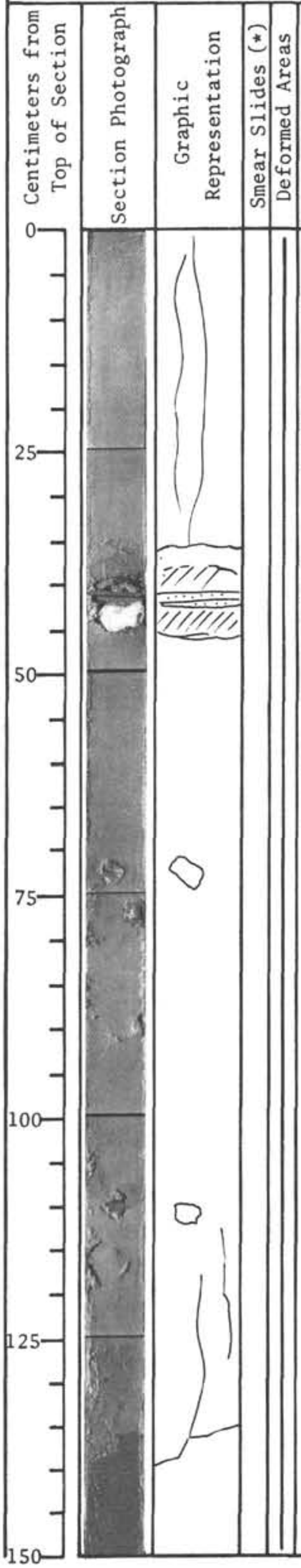
143cm:

Piece of mudstone and sandstone.

147cm:

Piece of chert.

Hole 65.0 Core 16
Section 3



Description

CAVINGS AND RADIOLARIAN OOZE

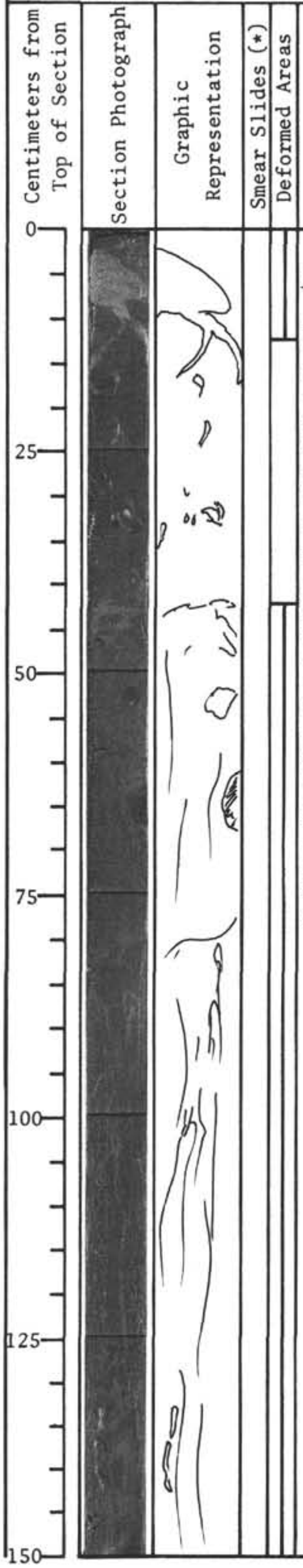
Soft, light olive brown (2.5Y5/4) ooze, mixed with rust flakes, fragments of chert, sandstone, etc., churned up by drilling.

Well laminated SS at 42cm moderate yellowish brown (10YR5/4) dark grains sprecked through out. Tuff? Includes shark teeth (cutting through SS disturbed ooze above and below).

Piece of similar sandstone at 110cm.
Piece of siliceous sandstone at 73cm.

Dark yellowish brown (10YR4/4) below about 137cm.

Hole 65.0 Core 16
Section 4



Description

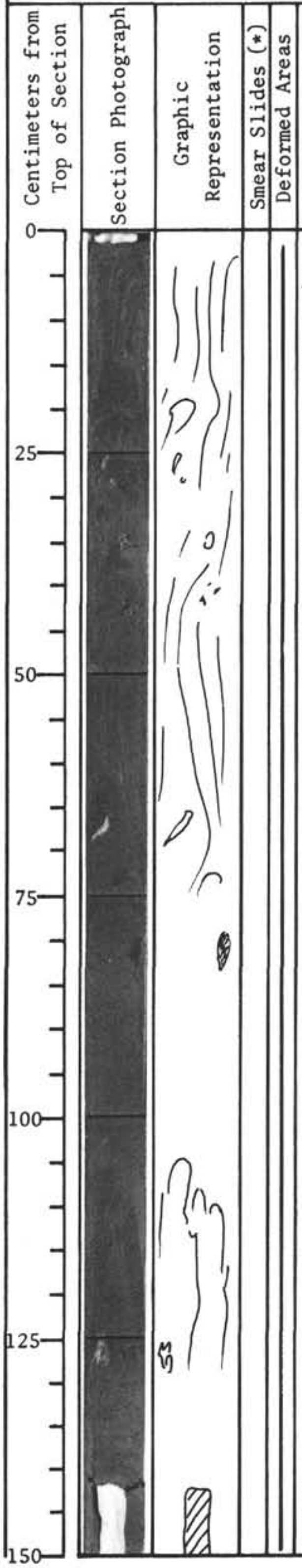
RADIOLARIAN OOZE

Mainly dark yellowish brown ooze (10YR4/4) above 42cm, with a large patch of grayish yellow ooze (2.5Y7/4) 2 to 8cm, and slightly mottled with yellowish orange (10YR7/6) and some brown (10YR3/3).

Mainly moderate yellowish brown (10YR5/4) ooze from 42-82cm, with 2 conspicuous inclusions of dark brown (10YR3/3), and faint vertical streaks.

Mainly light olive brown ooze (2.5Y5/4) below 82cm, with many lighter streaks from flow folds during coring, and a few deformed mottles of grayish orange (10YR7/4).

Hole 65.0 Core 16
Section 5



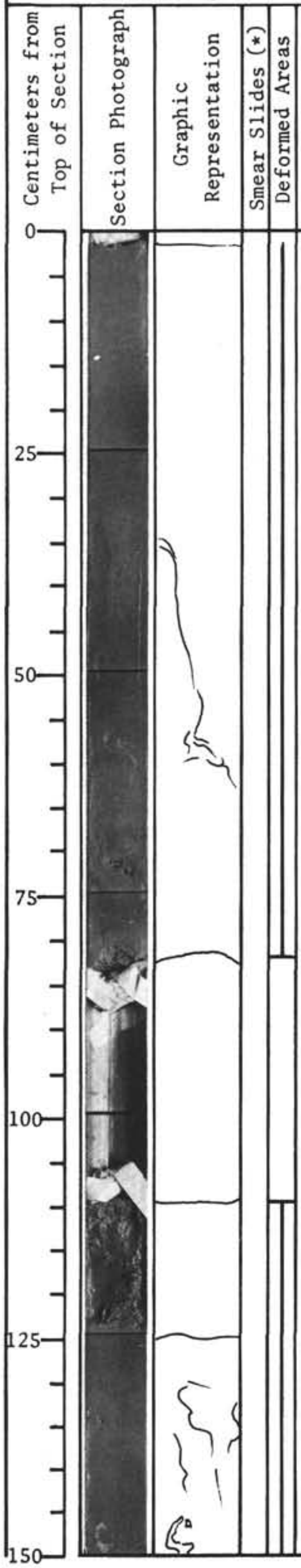
Description

RADIOLARIAN OOZE

Vertical streaks of moderate yellowish brown (10YR5/4) (especially from 80-105cm) and light olive brown (2.5Y5/4) ooze, with some grayish orange (10YR7/4) mottles and streaks, lots of rust chips and chert or sandstone fragments, and one dark brown (10YR3/3) inclusion. Deformation is from coring.

Sample taken at bottom of section for interstitial water analysis.

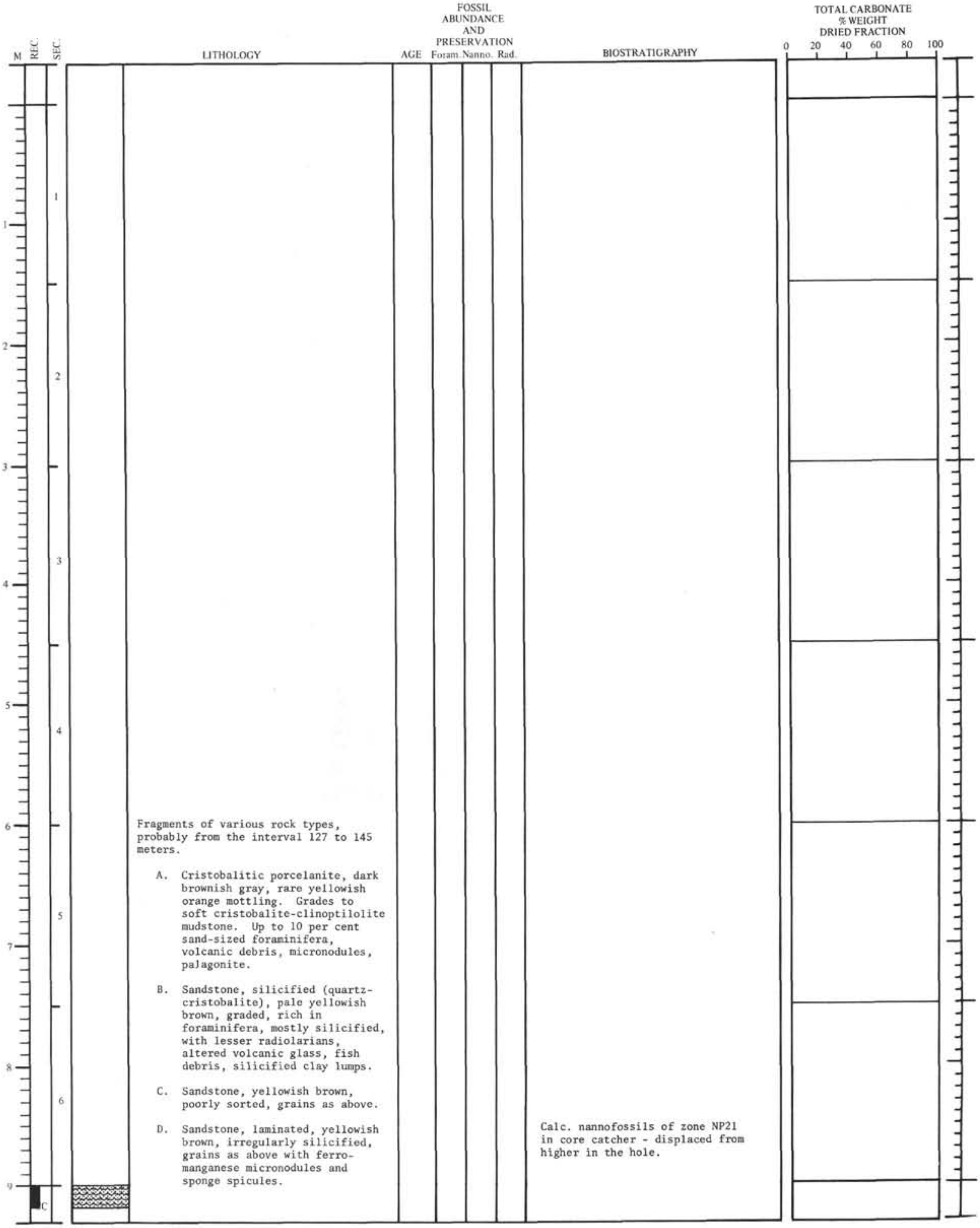
Hole 65.0 Core 16
Section 6



Description

RADIOLARIAN OOZE

Mainly olive brown (2.5Y4/4) ooze, faintly banded with lighter and darker brownish shades. A few grayish orange (10YR7/4) mottles. Void from 0-2 and 82-109cm. Very watery from 109-125cm.



Fragments of various rock types, probably from the interval 127 to 145 meters.

A. Cristobalitic porcelanite, dark brownish gray, rare yellowish orange mottling. Grades to soft cristobalite-clinoptilolite mudstone. Up to 10 per cent sand-sized foraminifera, volcanic debris, micronodules, palagonite.

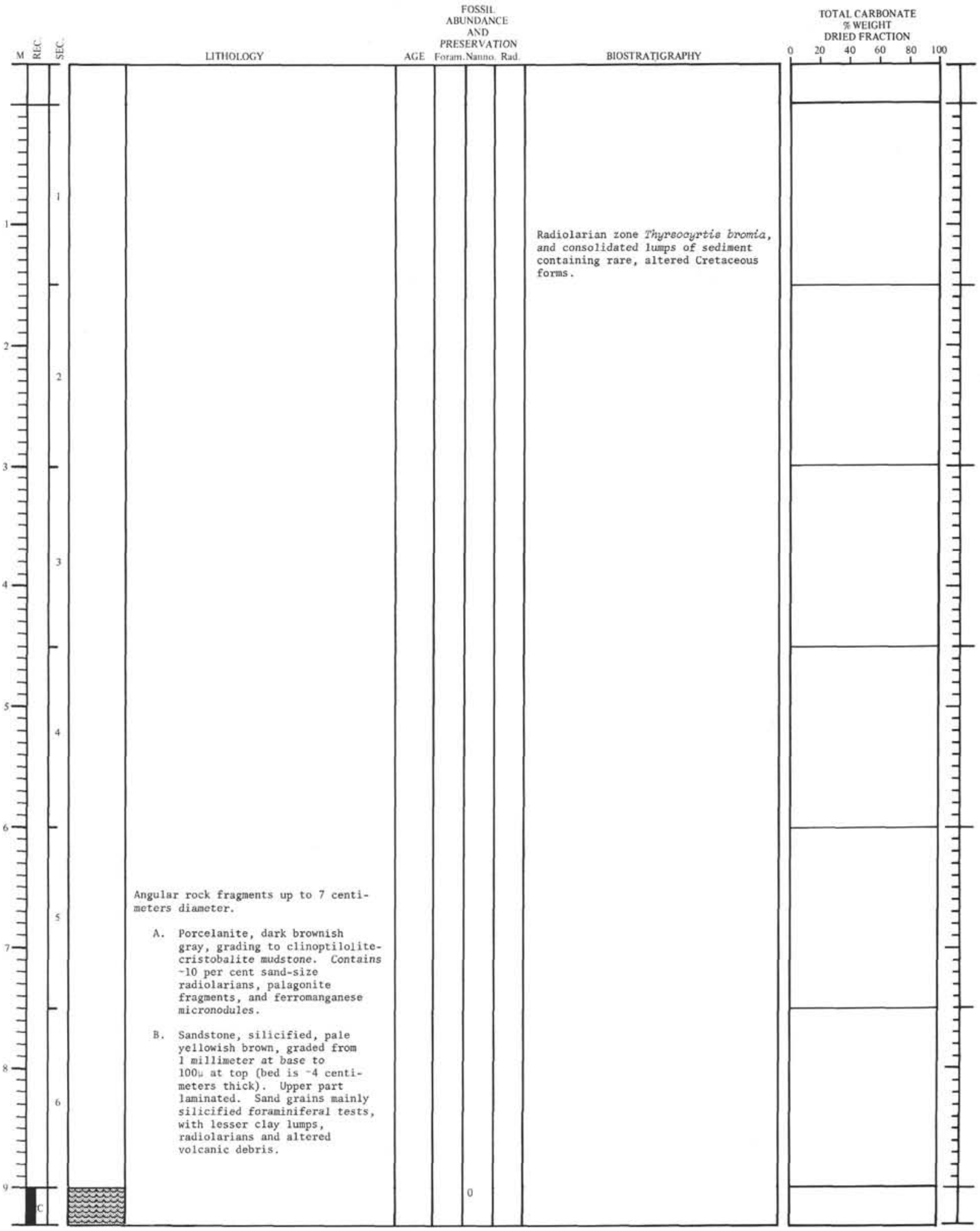
B. Sandstone, silicified (quartz-cristobalite), pale yellowish brown, graded, rich in foraminifera, mostly silicified, with lesser radiolarians, altered volcanic glass, fish debris, silicified clay lumps.

C. Sandstone, yellowish brown, poorly sorted, grains as above.

D. Sandstone, laminated, yellowish brown, irregularly silicified, grains as above with ferro-manganese micronodules and sponge spicules.

Calc. nannofossils of zone NP21 in core catcher - displaced from higher in the hole.

Lithology and biostratigraphy of Core 17, Hole 65.0.



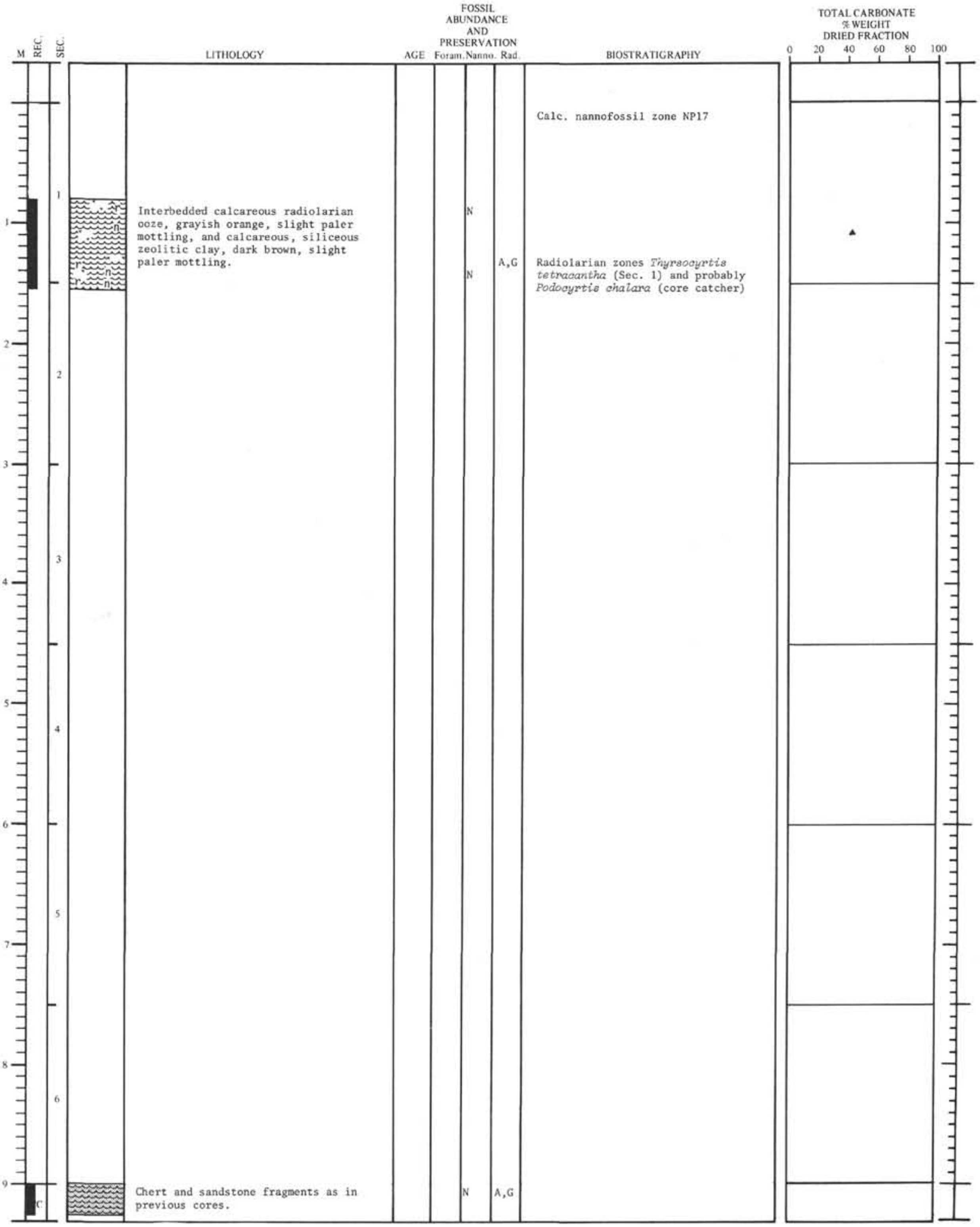
Radiolarian zone *Thyrsocyrtis bromia*, and consolidated lumps of sediment containing rare, altered Cretaceous forms.

Angular rock fragments up to 7 centimeters diameter.

A. Porcelanite, dark brownish gray, grading to clinoptilolite-cristobalite mudstone. Contains ~10 per cent sand-size radiolarians, palagonite fragments, and ferromanganese micronodules.

B. Sandstone, silicified, pale yellowish brown, graded from 1 millimeter at base to 100μ at top (bed is ~4 centimeters thick). Upper part laminated. Sand grains mainly silicified foraminiferal tests, with lesser clay lumps, radiolarians and altered volcanic debris.

Lithology and biostratigraphy of Core 1, Hole 65.1.



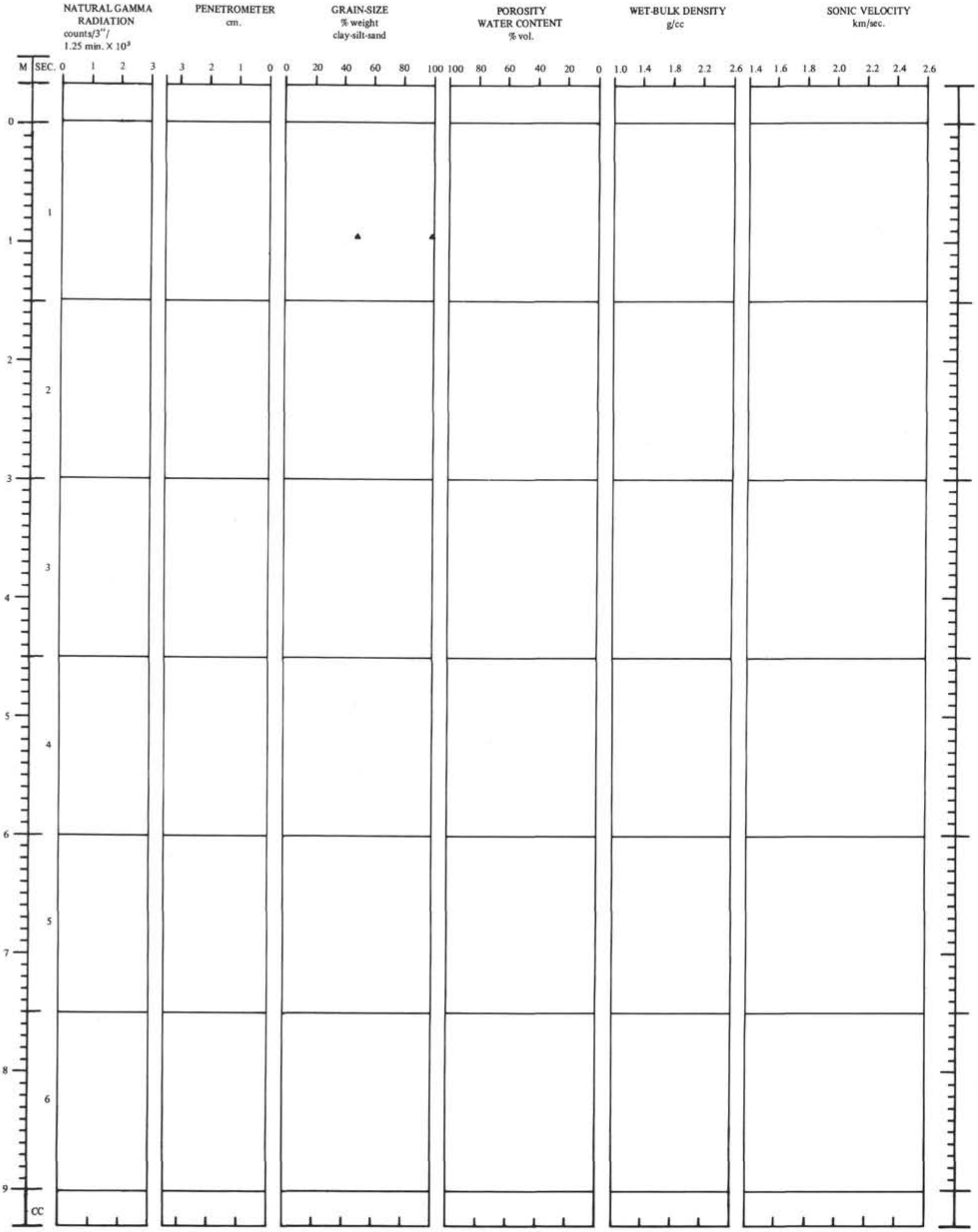
Calc. nannofossil zone NP17

Interbedded calcareous radiolarian ooze, grayish orange, slight paler mottling, and calcareous, siliceous zeolitic clay, dark brown, slight paler mottling.

Radiolarian zones *Thyrsocyrtis tetracantha* (Sec. 1) and probably *Podocyrtis chalara* (core catcher)

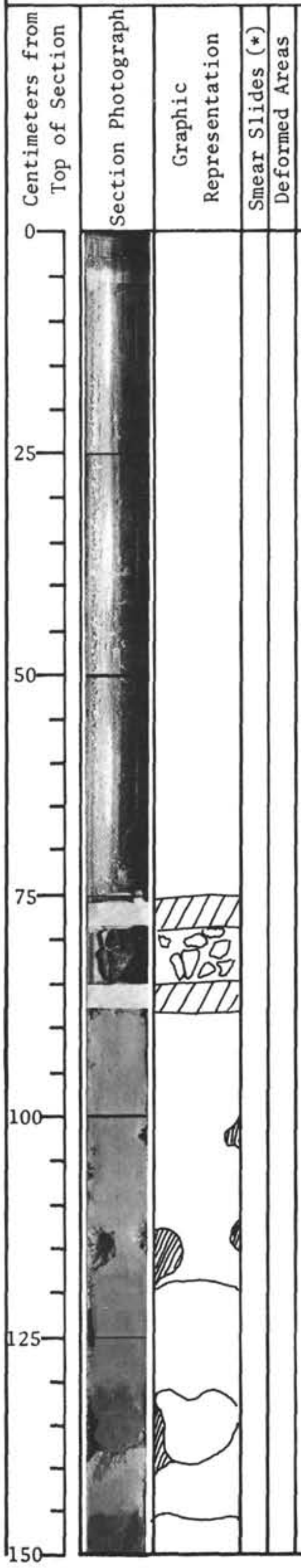
Chert and sandstone fragments as in previous cores.

Lithology and biostratigraphy of Core 2, Hole 65.1.



Physical properties of Core 2, Hole 65.1.

Hole 65.1 Core 2
Section 1



Description

RADIOLARIAN OOZE

0-78cm:

Void

78-88cm:

Rock chips (cavings). Types A, A (^{1}) and B of 7-65.0-17-cc description.

88-118, 137-145cm:

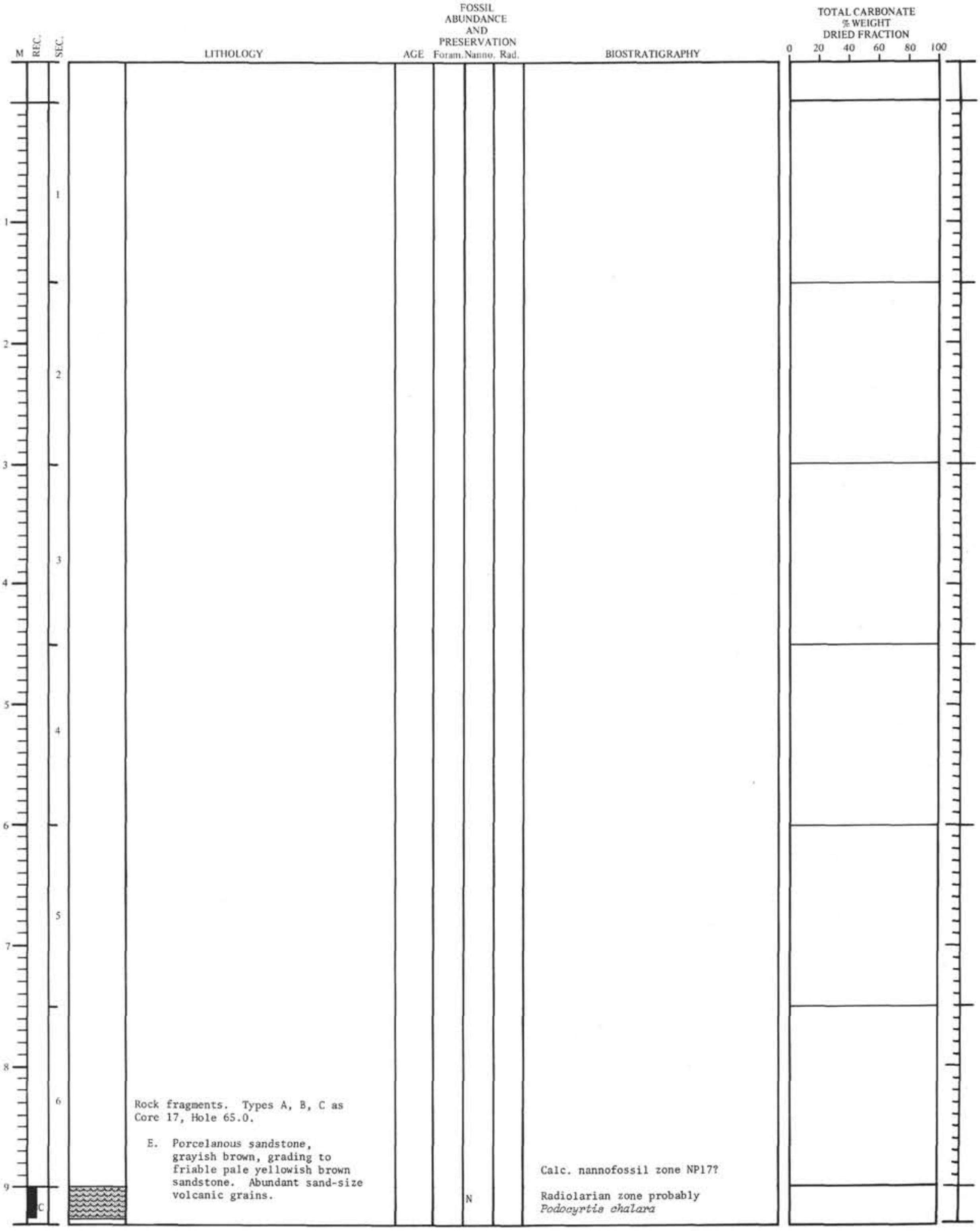
Grayish orange 10YR5/6 with slight paler mottling.

118-130cm:

Yellowish brown 10YR 5/6 with slight paler mottling.

130-137, 145-150cm:

Dark brown 10YR3/3 with faint lighter mottling.



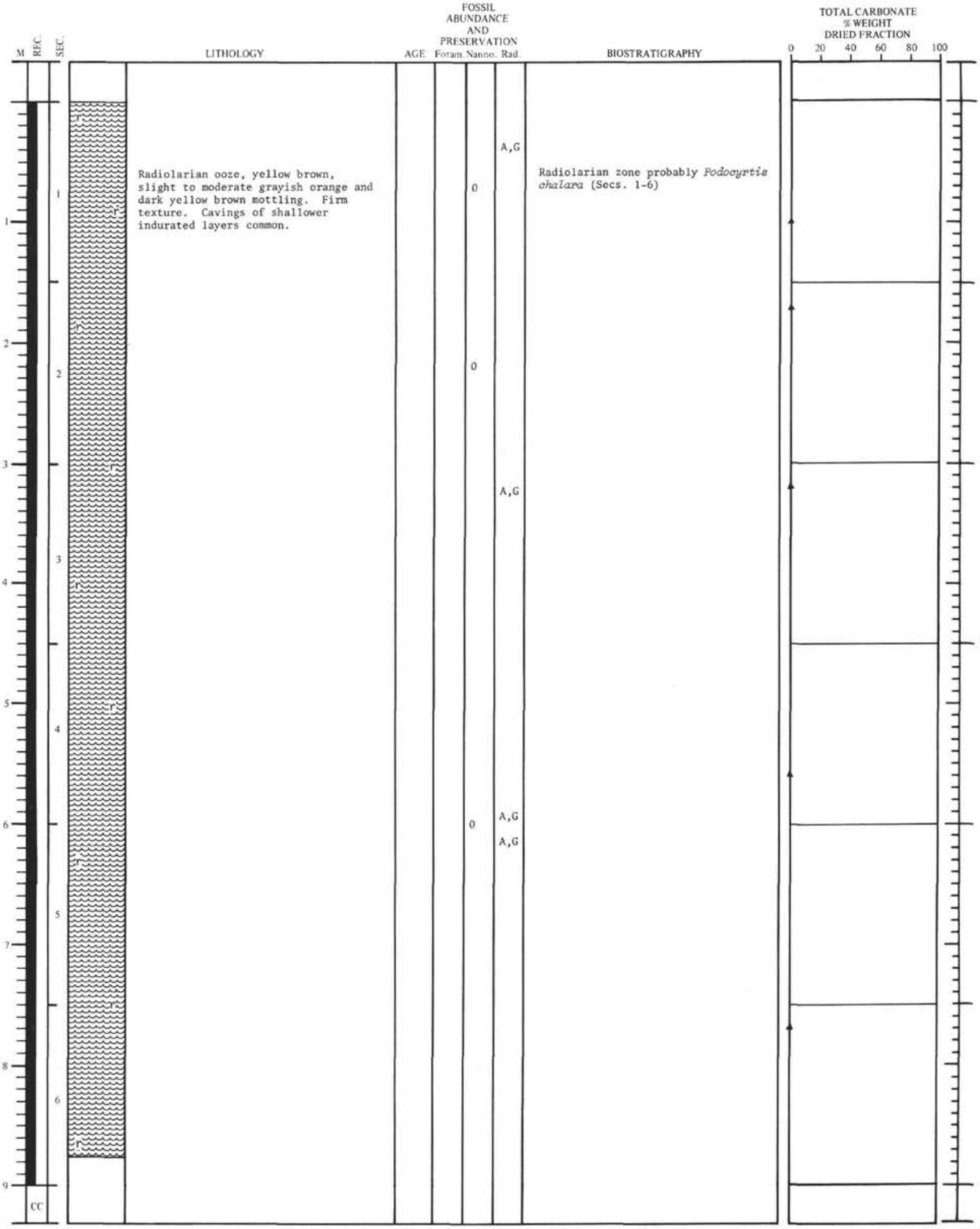
Rock fragments. Types A, B, C as Core 17, Hole 65.0.

E. Porcelanous sandstone, grayish brown, grading to friable pale yellowish brown sandstone. Abundant sand-size volcanic grains.

Calc. nannofossil zone NP17?

Radiolarian zone probably *Podocyrtis chalara*

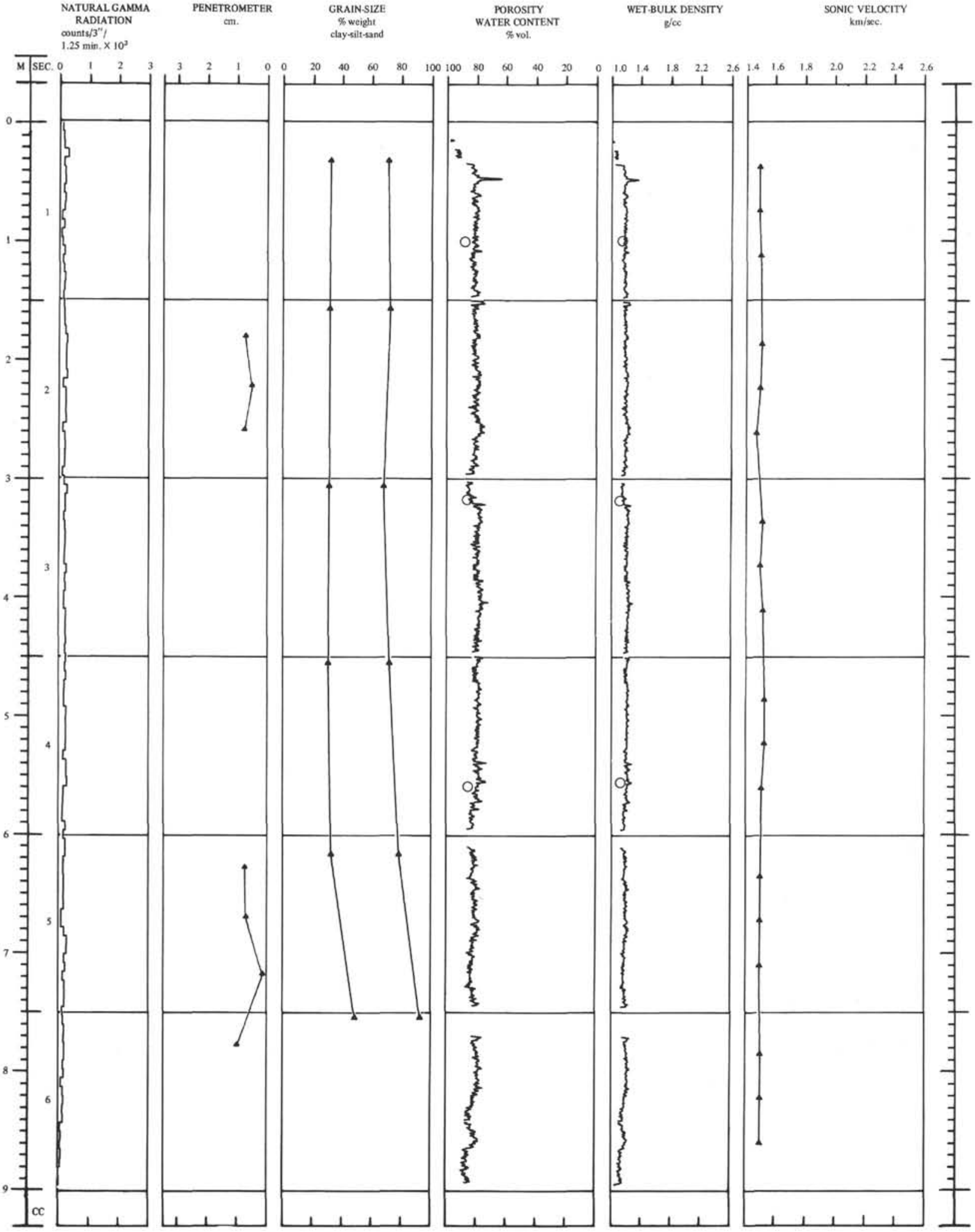
Lithology and biostratigraphy of Core 3, Hole 65.1.



Radiolarian ooze, yellow brown, slight to moderate grayish orange and dark yellow brown mottling. Firm texture. Cavings of shallower indurated layers common.

Radiolarian zone probably *Podocyrtis chalara* (Secs. 1-6)

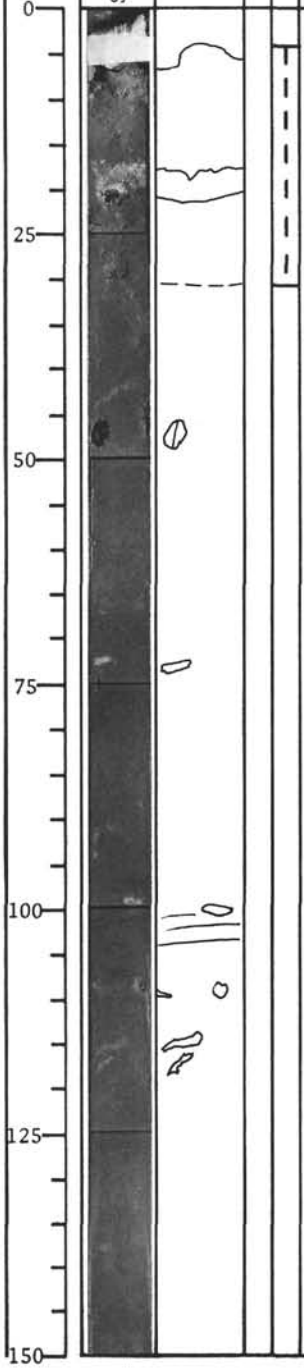
Lithology and biostratigraphy of Core 4, Hole 65.1.



Physical properties of Core 4, Hole 65.1.

Hole 65.1 Core 4
Section 1

Centimeters from Top of Section
Section Photograph
Graphic Representation
Smear Slides (*)
Deformed Areas
Description



RADIOLARIAN OOZE

0-5cm:

Void

5-30cm:

Portion disturbed by removal of core catcher plastic "sock".

48cm:

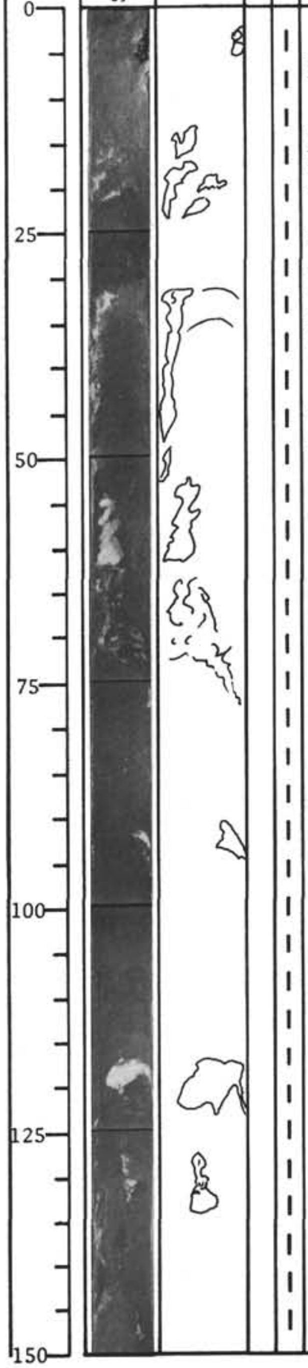
Rock chip (caving) type (1) of 7-65-0-17-cc description.

Moderate yellow brown 10YR5/4 with slight grayish orange 10YR7/4 mottling and layer at 17-21cm.

Classic sugary texture.

Hole 65.1 Core 4
Section 2

Centimeters from Top of Section
Section Photograph
Graphic Representation
Smear Slides (*)
Deformed Areas
Description



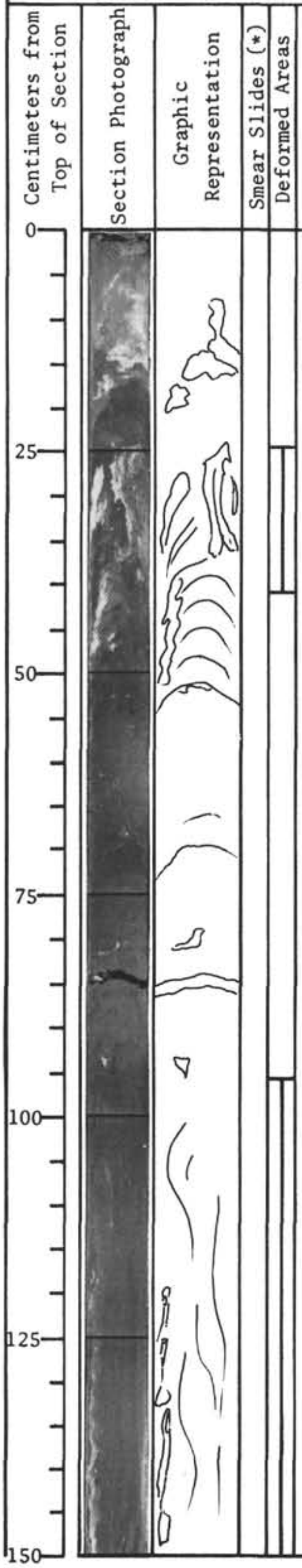
RADIOLARIAN OOZE

3-6cm:
Rock chips (cavings A of 7-65-0-17-cc).

Moderate yellow brown 10YR5/4 with moderate large mottles of grayish orange 10YR7/4 and dark yellowish brown 10YR3/2.

Classic sugary texture. Firm to stiff.

Hole 65.1 Core 4
Section 3



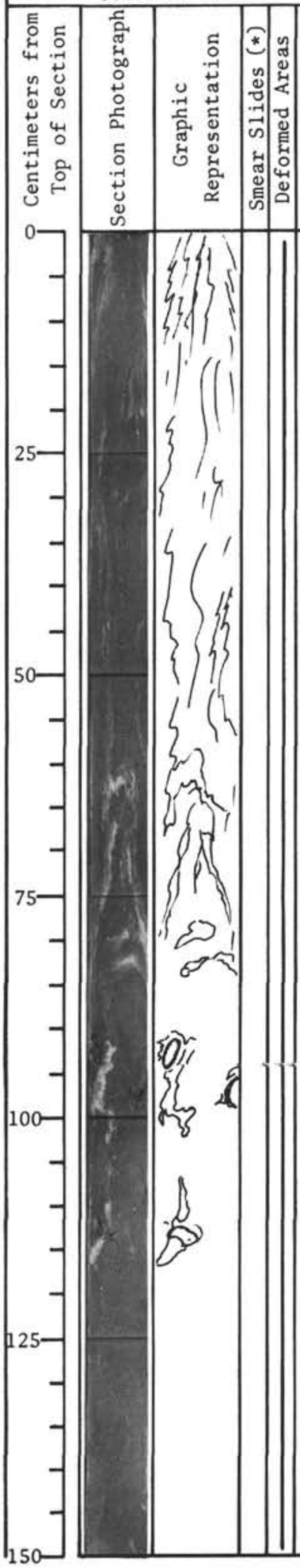
Description

RADIOLARIAN OOZE

As Section 2.

Void from 84-85cm.

Hole 65.1 Core 4
Section 4



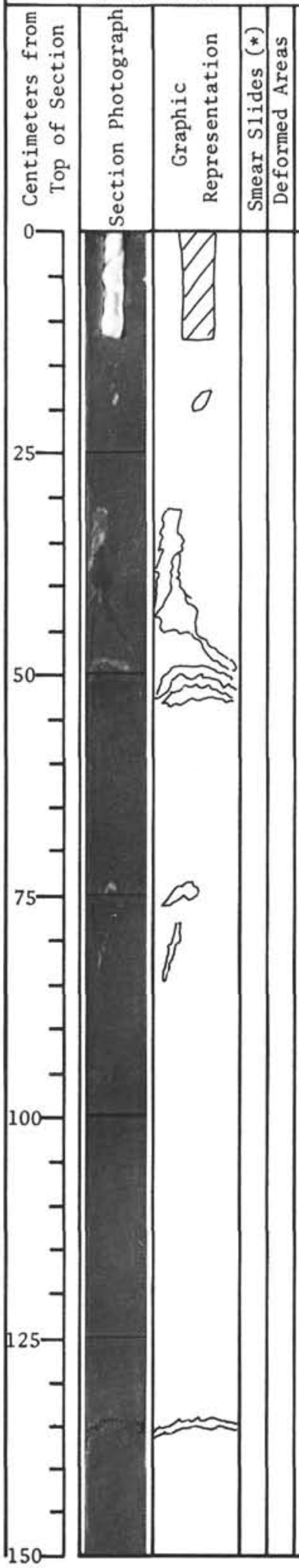
Description

RADIOLARIAN OOZE

As Section 2.

Rock chips (cavings, type A of 7-65-0-17-cc description) at 90, 97, and 113cm.

Hole 65.1 Core 4
Section 5



Description

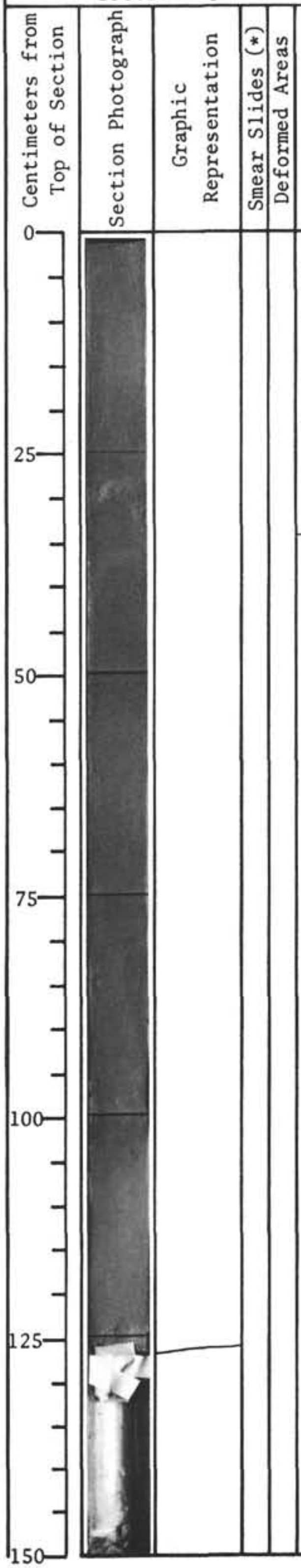
RADIOLARIAN OOZE

As Section 2.

Plug removed at top of section for interstitial water sample.

Crack

Hole 65.1 Core 4
Section 6



Description

RADIOLARIAN OOZE

Yellowish brown 10YR5/8

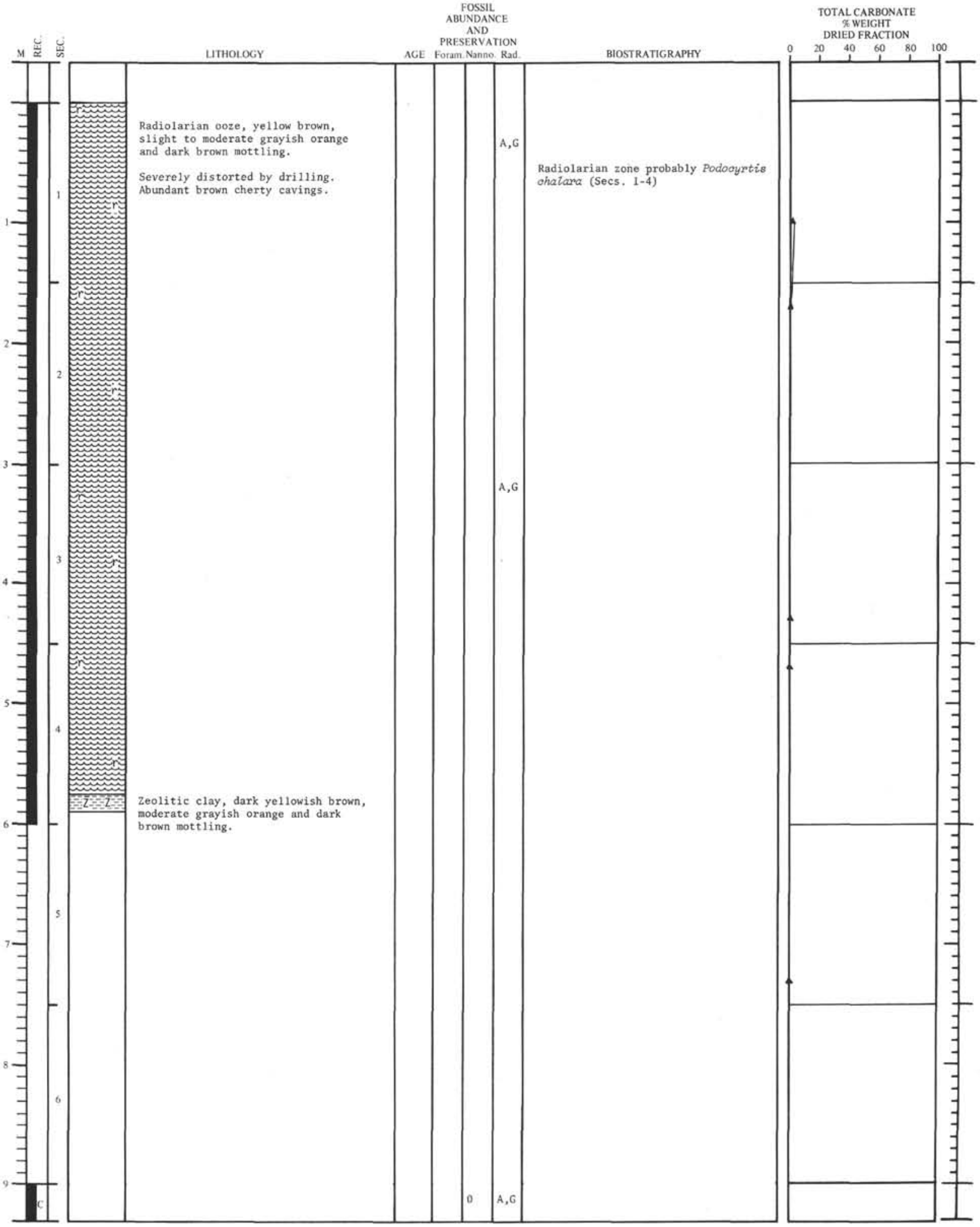
Stiff.

Structureless.

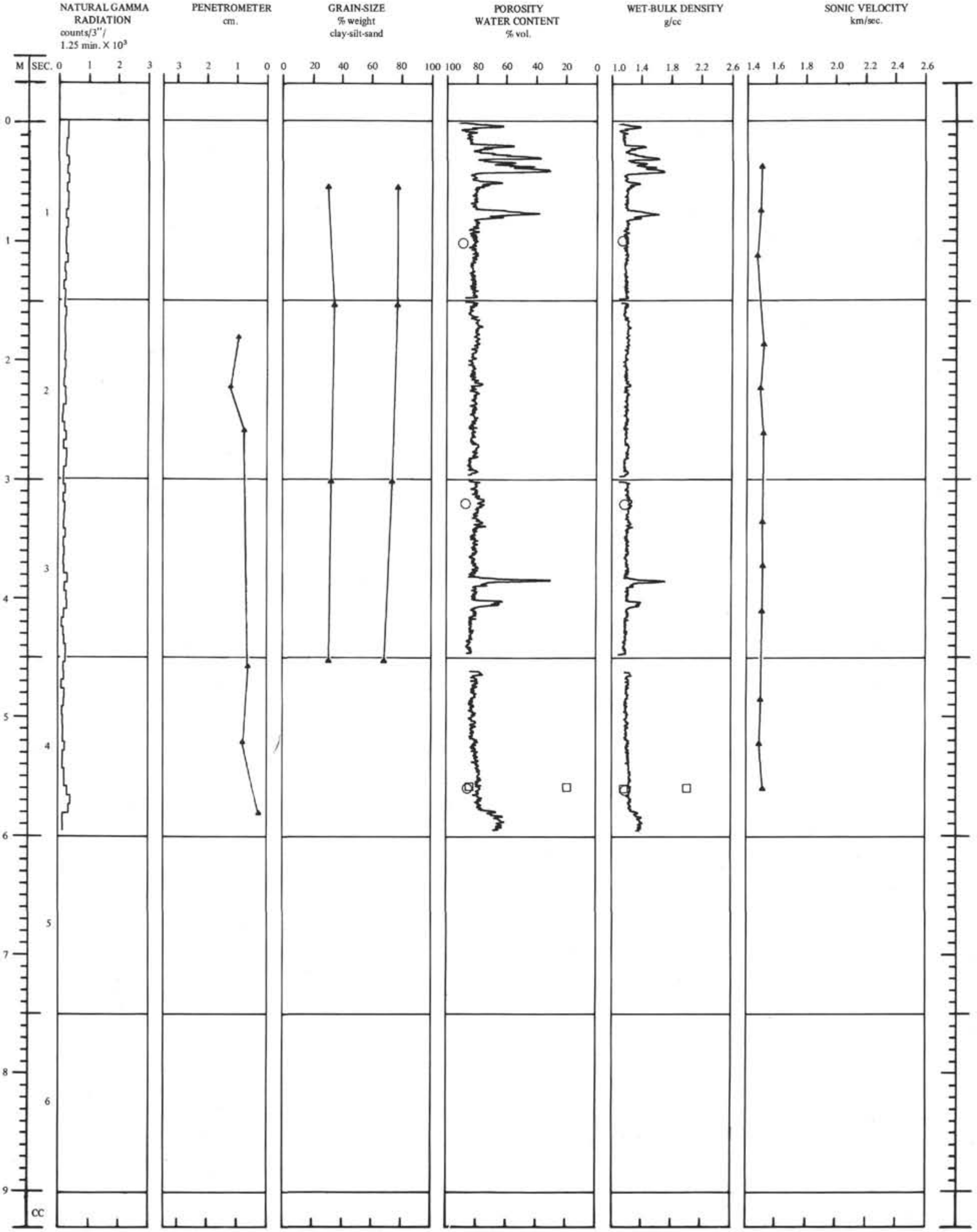
Classic sugary texture.

125-150cm:

Void

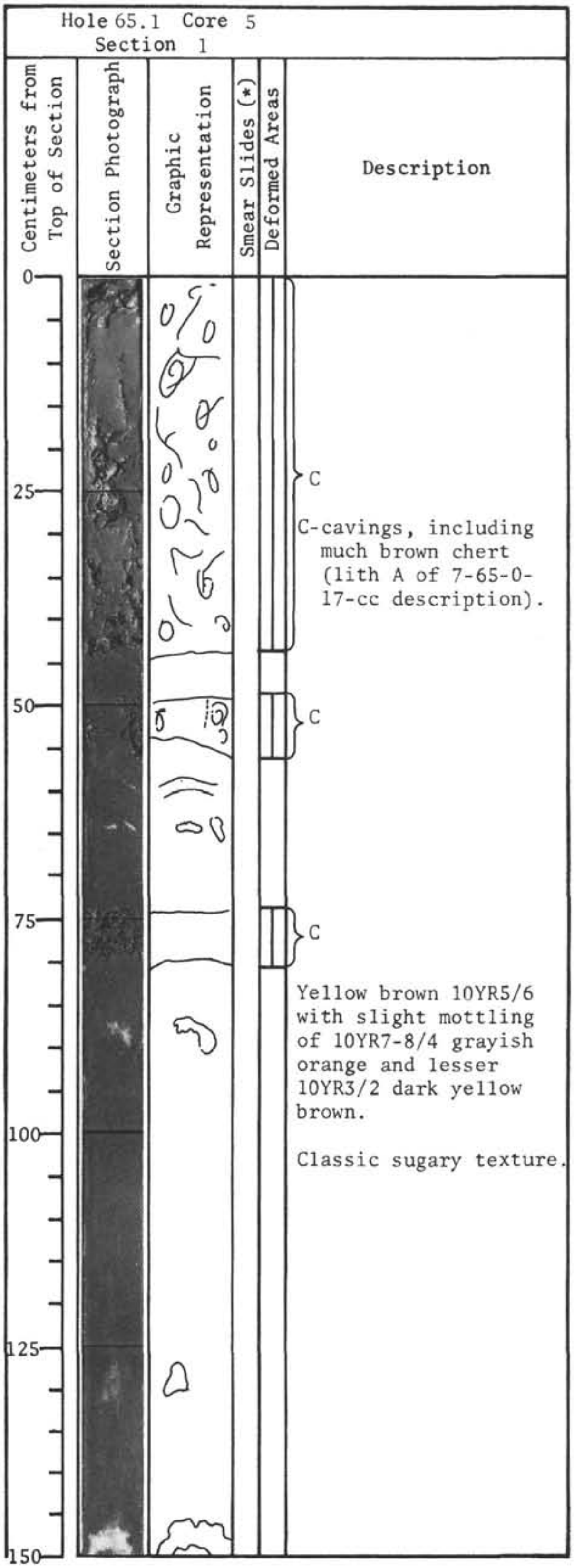


Lithology and biostratigraphy of Core 5, Hole 65.1.



Physical properties of Core 5, Hole 65.1.

Hole 65.1 Core 5
Section 1

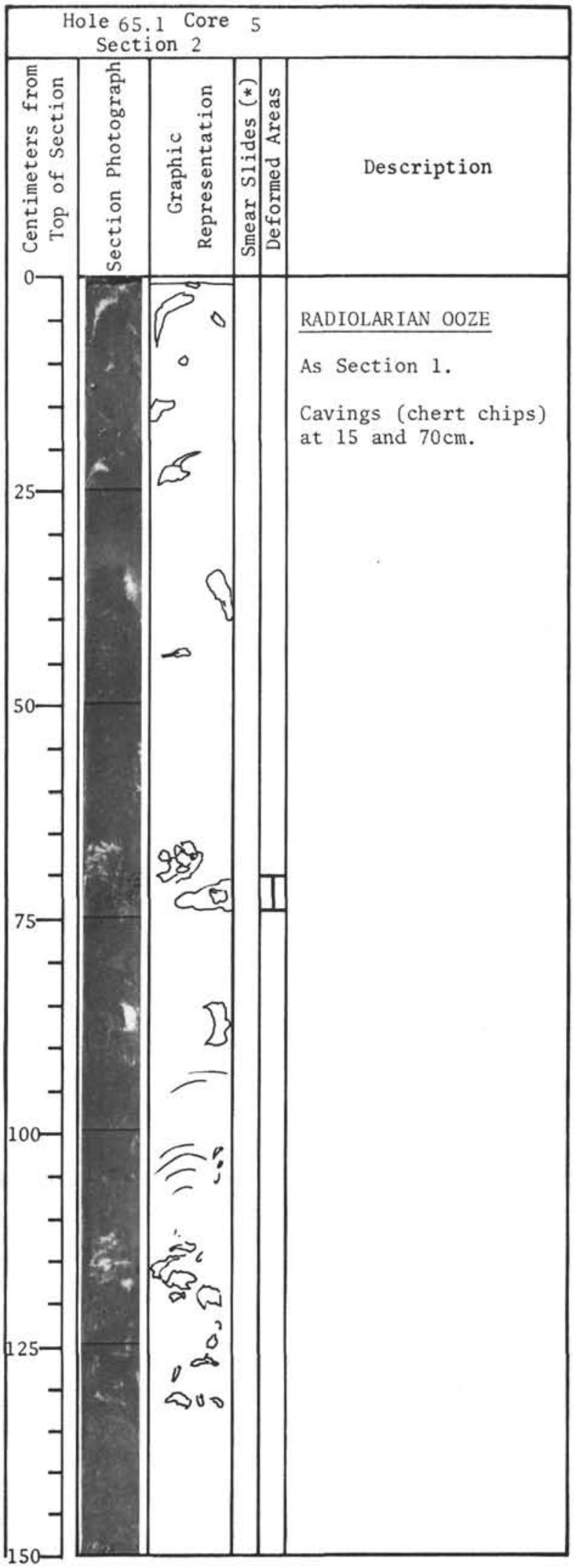


C-cavings, including much brown chert (lith A of 7-65-0-17-cc description).

Yellow brown 10YR5/6 with slight mottling of 10YR7-8/4 grayish orange and lesser 10YR3/2 dark yellow brown.

Classic sugary texture.

Hole 65.1 Core 5
Section 2



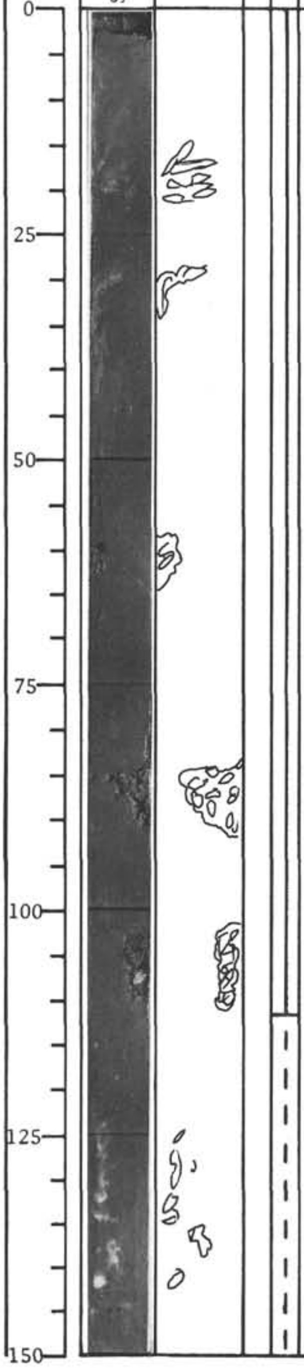
RADIOLARIAN OOZE

As Section 1.

Cavings (chert chips) at 15 and 70cm.

Hole 65.1 Core 5
Section 3

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



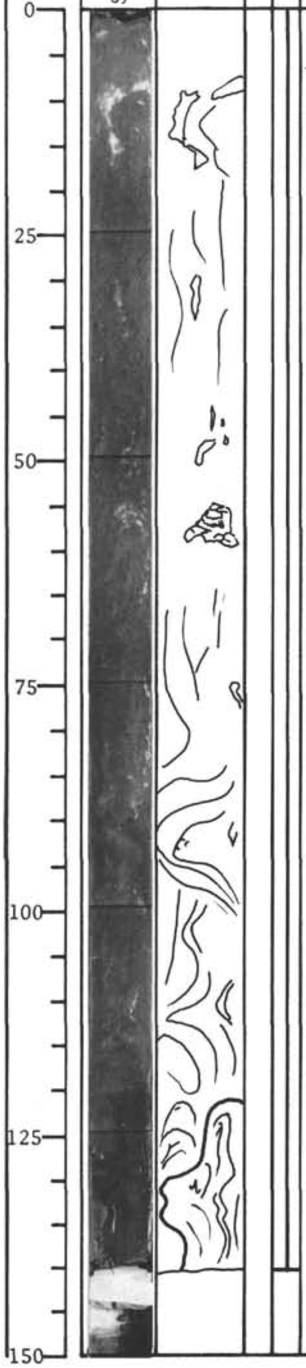
RADIOLARIAN OOZE

As Section 1.

Cavings with abundant brown chert (as 7-65-0-17-cc description) at 60, 85, and 105cm.

Hole 65.1 Core 5
Section 4

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



RADIOLARIAN OOZE AND ZEOLITIC BROWN CLAY

10YR5/6 yellowish brown with moderate mottling of 5YR7-8/4 grayish orange and 10YR4/3 dark brown.

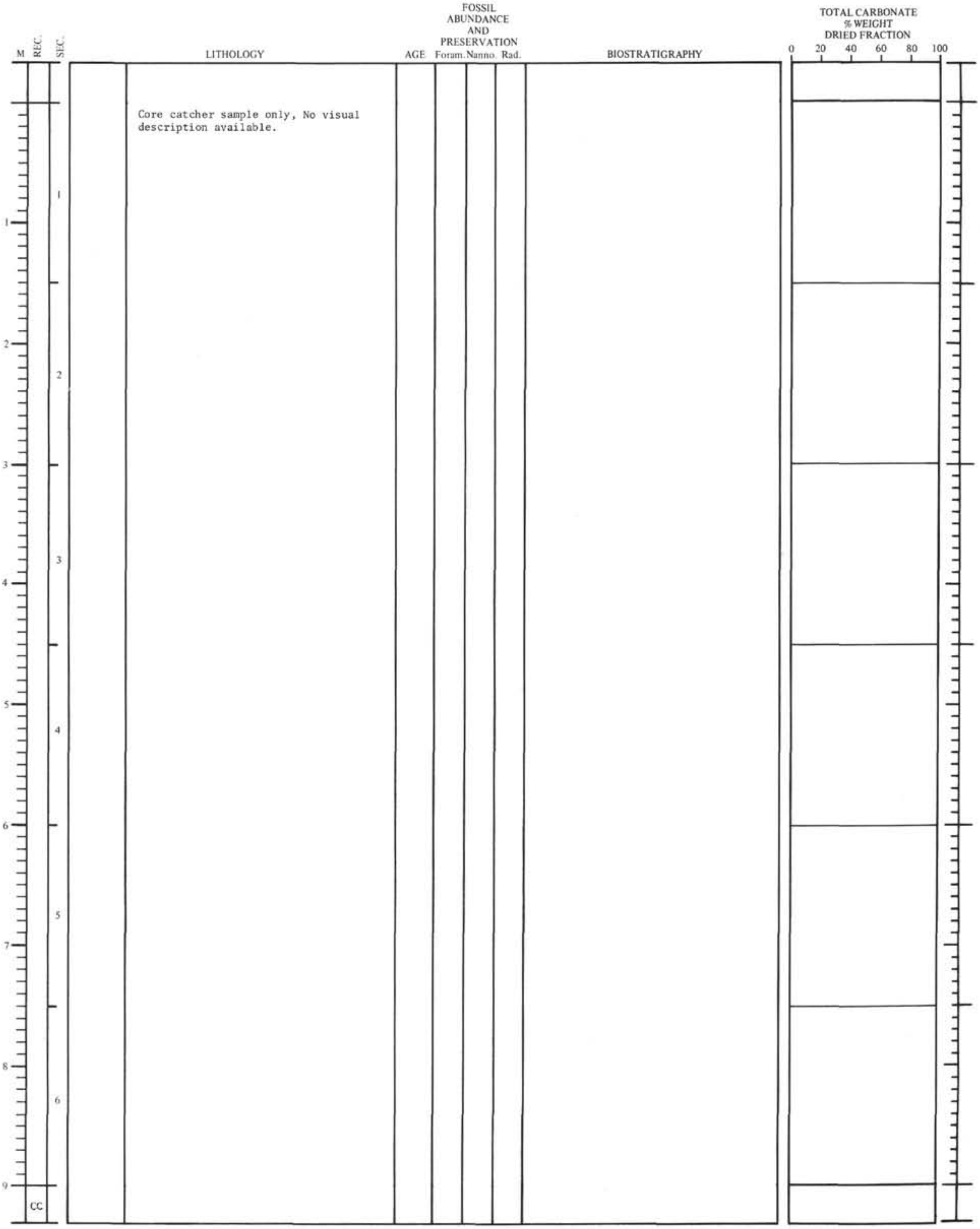
Classic sugary texture radiolarian ooze.

120-140cm:

10YR3/3 dark yellowish brown with streaked mottling as above. Zeolitic brown clay.

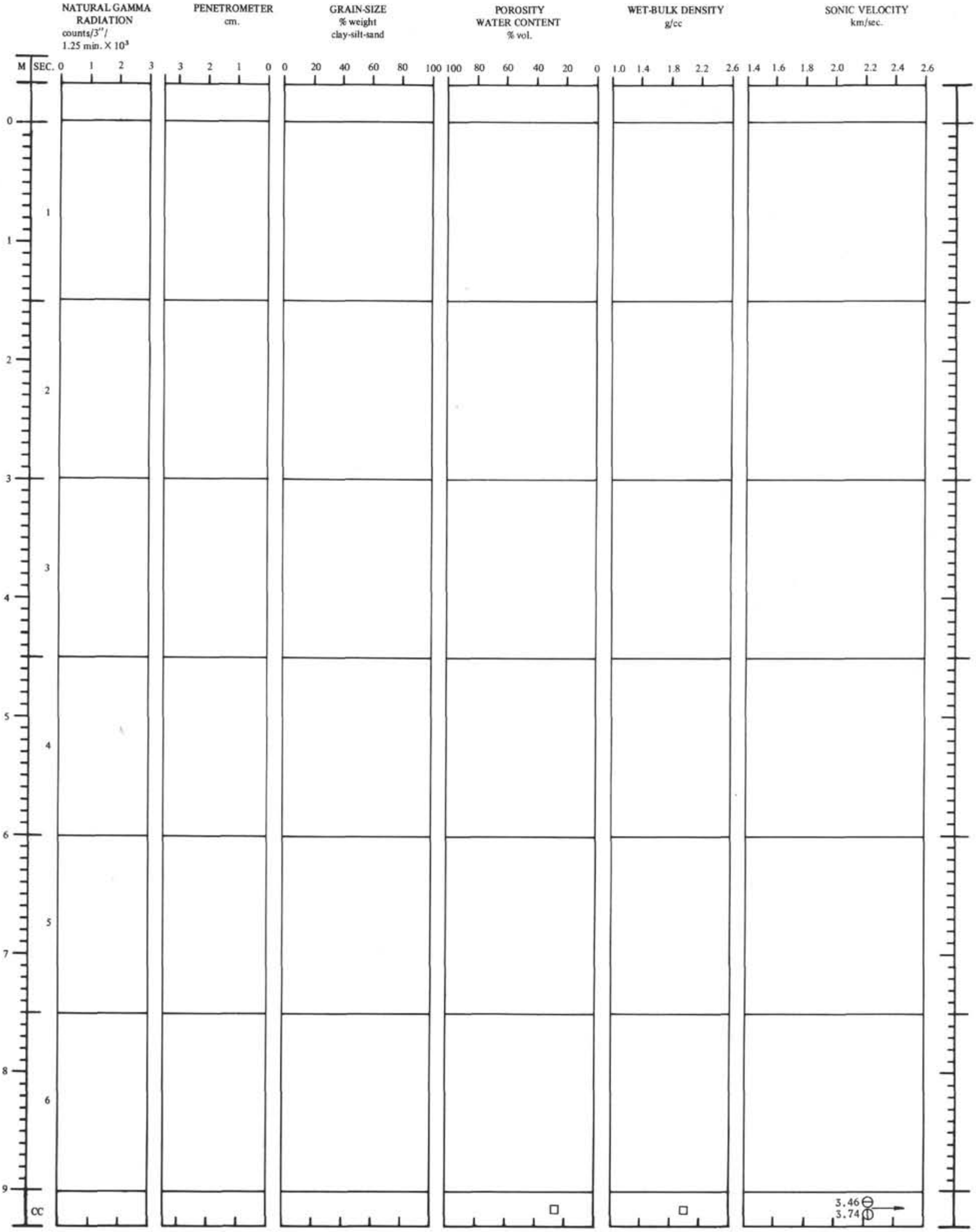
140-150cm:

Void

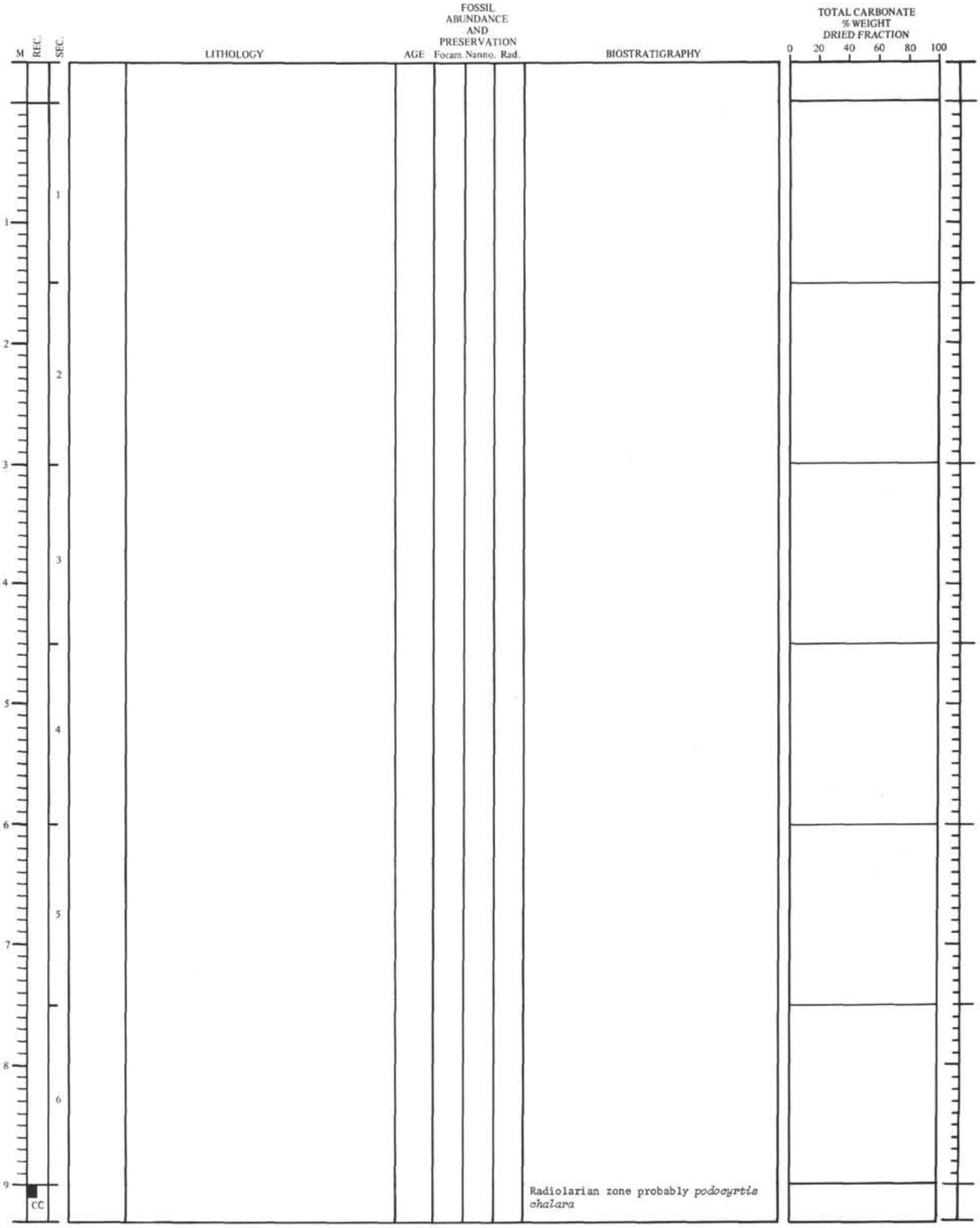


Core catcher sample only, No visual description available.

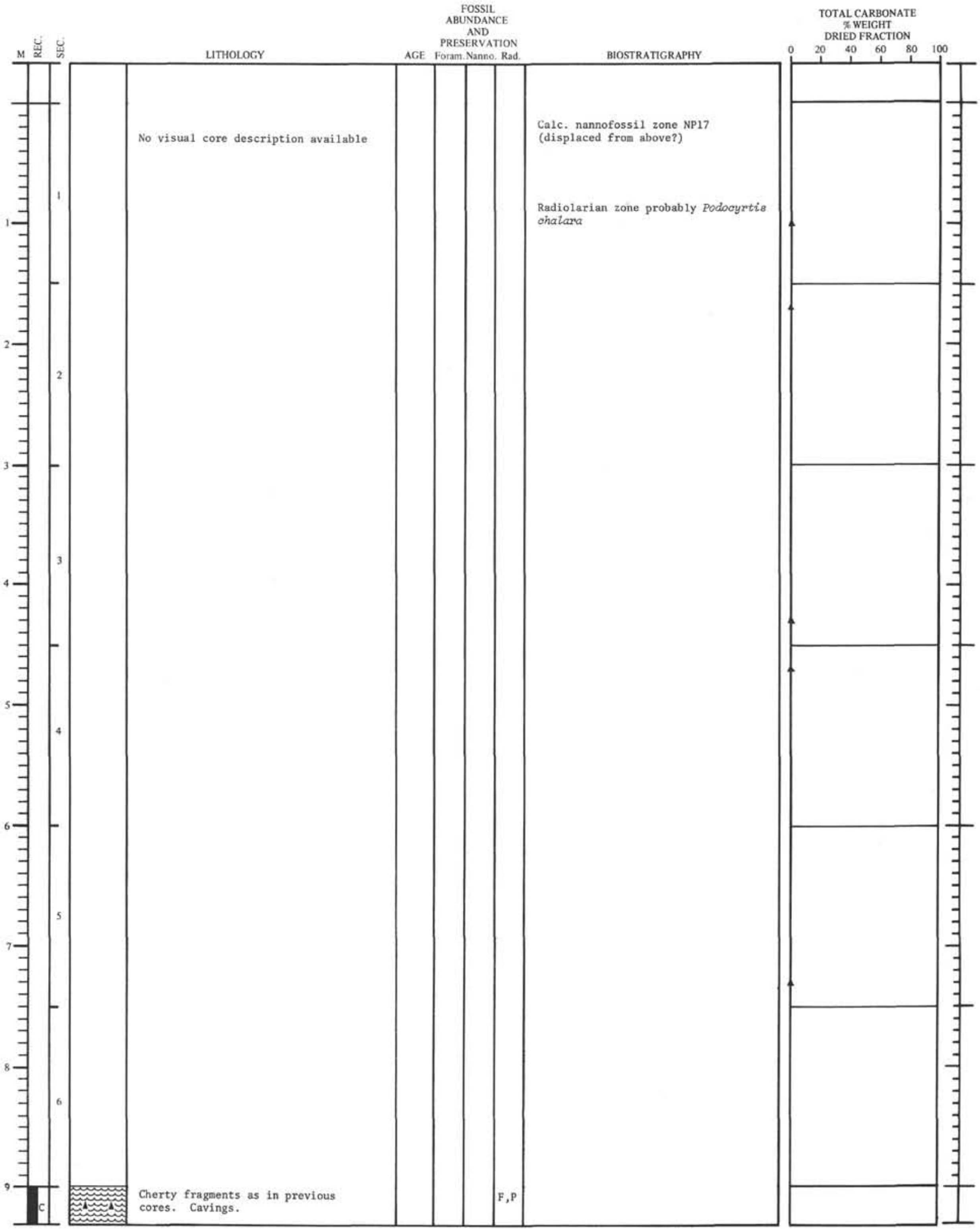
Lithology and biostratigraphy of Core 6, Hole 65.1.



Physical properties of Core 6, Hole 65.1.



Lithology and biostratigraphy of Core 7, Hole 65.1.



Lithology and biostratigraphy of Core 8, Hole 65.1.