5. SITE 63

Shipboard Scientific Party[1]

Occupied: August 23-28, 1969.

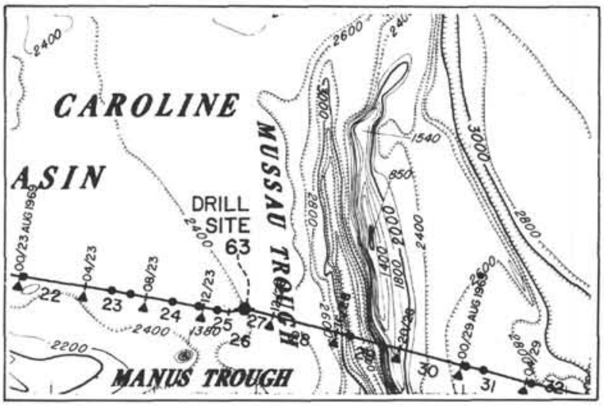
Position: 0° 50.16′N., 147° 53.25′E.

Water Depth: 4472 meters.

Total Depth: 566 meters, in basalt.

Holes Drilled: Three holes.

Cores Taken: Twenty-eight cores.



Main results: A nearly complete section, from middle Oligocene to Quaternary, unconformably overlies basalt containing middle Oligocene chalk xenoliths. The sediments consist of chalk and chalk ooze in the Oligocene and Miocene, and of marl ooze and calcareous clay in the Pliocene and Quaternary. The rate of accumulation was about 20 m/m.y. up until near the end of the Miocene, and since then has slowed to about 7 m/m.y.

BACKGROUND AND OBJECTIVES

The sedimentary section at Site 62 on Eauripik Ridge can be traced eastward (Figure 1 and Records 15 through 25, in Reflection Seismology Chapter) into the East Caroline Basin, though individual reflectors cannot be correlated with any certainty down the flanks of the Ridge. The prominent set of reflectors at about 0.4 seconds at Site 62 appears to rise eastward within the section to a level as shallow as 0.1 seconds beneath the ocean floor at a few places in the Basin. The total thickness of sediment above seismic basement remains about the same in the Basin as on the Ridge, that is, 0.5 to 0.6 seconds, thickening to as much as 0.8 seconds in basins and thinning to the vanishing point over at least one basement high. Assuming that reflectors represent isochronous surfaces, the shallowness of the strong reflector and its distance above basement (0.4 seconds), imply that beds older than any present at Site 62 may lie on basement in the Basin. Because rates of accumulation should be slower in the Basin than on the Ridge—the Basin is now mainly deeper than the compensation depth for calcium carbonate—the hypothesis looks attractive. The possibility that basement might become progressively older eastwards from Eauripik Ridge suggests a further notion: that the Ridge may be an old rise that acted as a center of sea-floor spreading, becoming extinct in the late Oligocene.

We decided to drill a hole to basement in the eastern part of East Caroline Basin to determine the age of the upper strong reflectors and to test the hypothesis that sediments older than any at Site 62 are present here. The Pacific Panel had suggested a site in the Basin, to learn the nature of the strong reflectors in the upper part of the section, and it was necessary only to shift their recommended site eastwards, farther from Eauripik Ridge. Our experience at Site 62 strongly suggested that indurated chalks rather than cherts were the most likely rocks to occur as shallow reflectors in this region, and we had little fear of finding strata too hard to penetrate near the surface, where the bottom hole assembly might twist off if unsupported.

OPERATIONS

Site Survey and Approach

With the intention of drilling in the thickest sediments between basement highs on the basal reflector, we approached Site 63. The initial site survey (1st and 2nd crossings) was uneventful, but at the chosen site the first beacon failed. While preparing a second beacon, depth changes on the echo sounder records indicated that we were drifting over the slopes of a hill in an

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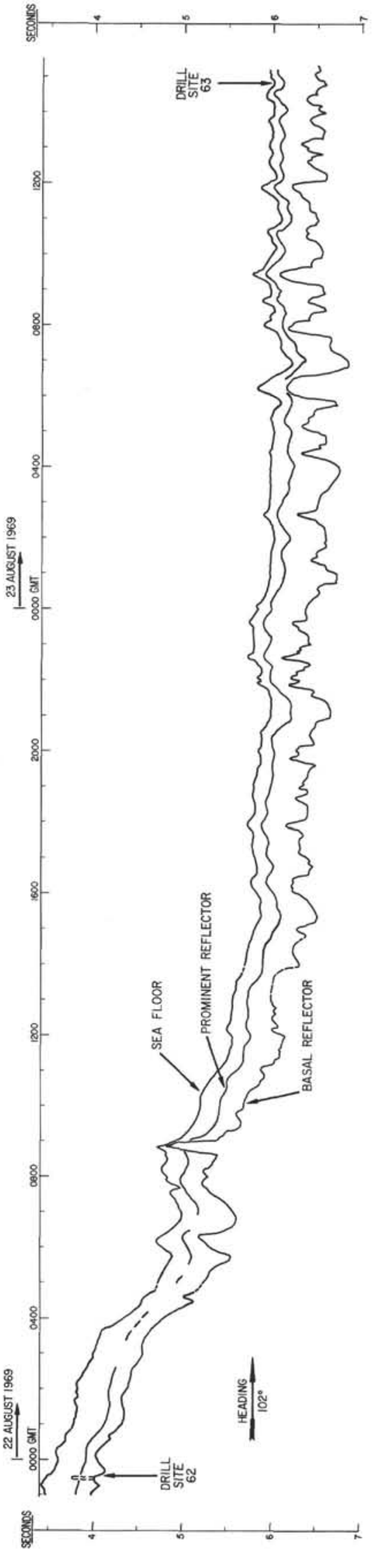


Figure 1. *Profile between Site 62 on Eauripik Ridge, and Site 63 in East Caroline Basin, based on seismic reflection profiles Nos. 15 to 26 (see Reflection Seismology Chapter). The prominent interval reflector rises relative to the sea floor between the two sites.*

unknown direction, and we therefore streamed the profiling gear and recommenced the site survey. Within the hour a new site was selected and the second beacon dropped.

The final approach to the site (Figure 2) shows reflectors at 0.11, 0.16, 0.32, 0.36 and 0.57 seconds of reflection time, and this sequence is also observed on the air-gun record taken on leaving the site after completion of the drilling (Figure 3).

Drilling Operations

The second beacon was dropped at 1738 hours on August 23rd. A roller-type bit with tungsten carbide teeth on the cones was chosen for this site because we anticipated some cherty layers or nodules. After a core was taken at the surface, the drill string was washed down to 61 meters for the second core. Down through Core 5 from 352 to 359 meters, the cores were cut with little rotation or circulation. In Core 5 a piece of chert was found jammed in the bottom of the barrel, so thereafter we began circulating while coring. At Core 7–at 534 meters–continuous coring was begun, and continued to basement at 561 meters where two cores were cut in basalt, recovering a total of 12 feet (3.7 meters) in 18 feet (5.5 meters) penetrated.

A second hole was drilled to obtain continuous cores of the uppermost part of the sedimentary section across the Pliocene-Pleistocene boundary, and from the Middle and lower Miocene, a part of the column not cored continuously at Site 62. Recovery was poor for the set of four shallow cores, but was satisfactory for the lower set.

To obtain the shallow samples, a third hole was cored from 11 to 39 meters with good recovery. The site was abandoned at 0930 hours on August 28.

A list of the intervals drilled and cored at this site is given on the following table. (Table 1)

SITE SUMMARY

Lithology

The rock types cored at Site 63 fall into two general classes: (1) pelagic sediments ranging from clay at the surface to chalk ooze and chalk at depth, with chert stringers and a marl unit near the base of the section; and (2) finely porphyritic basalt with associated baked carbonate sediments.

The interval 0 to 21 meters consists of intensely mottled yellow-brown and brown pelagic clay. The concentrations of calcareous (0 to 30 per cent) and siliceous microfossils are quite variable. The variation appears to be random at the scale examined (smear slides at 1 to 2 meter intervals). Ferromanganese

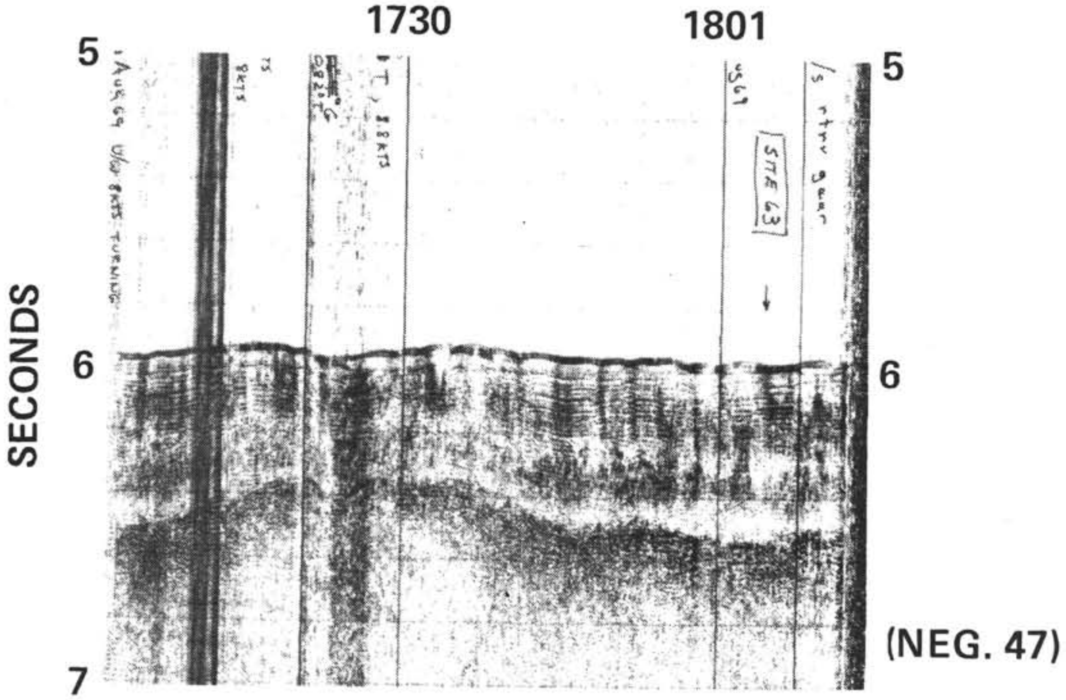


Figure 2. *East-west reflection profile in East Caroline Basin, and a line-drawing interpretation of the profile. Site 63 is at 1805 hours, near the right (east) end of the profile. Taken from D/V* Glomar Challenger. *Location shown on Plate 1. (Record No. 26)*

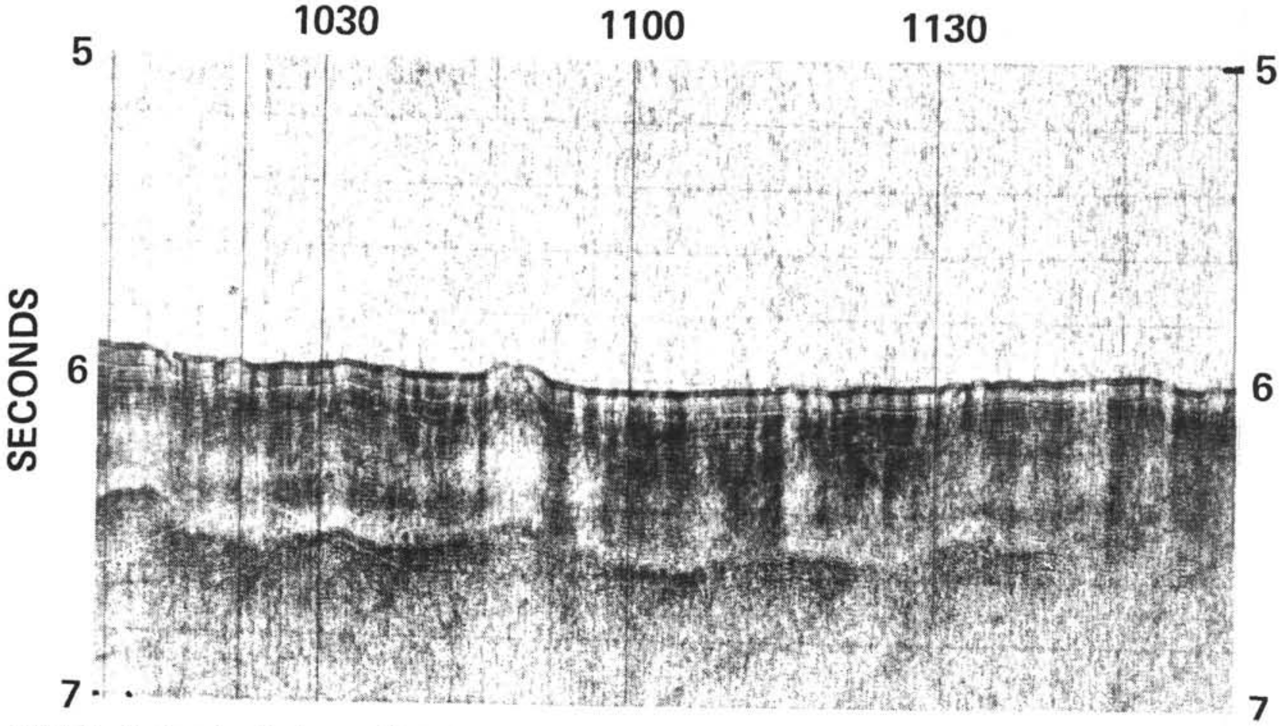


Figure 3. *East-west reflection profile in East Caroline Basin, and a line-drawing interpretation of the profile. Site 63 is at 1023 hours, near left (west) end of profile. Taken from D/V* Glomar Challenger. *Location shown on Plate 1 (Record No. 27)*

TABLE 1
Site 63, Leg 7

Hole	Interval (ft)	(m)	Cores Drilled	Core Cut (ft)	Core Cut (m)	Core Recovered (ft)	Core Recovered (m)	Core %	Recovery %
63.0	0-30	0-9	Core 1	30	9.1	30	8.2		
	30-199		Drilled						
	199-229	61-70	Core 2	30	9.1	27	8.2		
	229-448		Drilled						
	448-479	137-146	Core 3	31	9.5	19	5.8		
	479-756		Drilled						
	756-786	230-240	Core 4	30	9.1	10	3.1		
	786-1155		Drilled						
	1155-1178	352-359	Core 5	23	7.0	9	2.7		
	1178-1502		Drilled						
	1502-1532	458-467	Core 6	30	9.1	30	9.1		
	1532-1752		Drilled						
	1752-1783	534-543	Core 7	31	9.5	31	9.5		
	1783-1813	543-553	Core 8	31	9.5	14	4.3		
	1813-1814		Drilled						
	1814-1840	553-561	Core 9	26	7.9	21	6.4		
	1840-1846	561-563	Core 10	6	1.8	4	1.2		
	1846-1858	563-566	Core 11	12	3.7	8	2.4		
	1858 (566m)	Totals	11	280		203		15	73
63.1	0-11		Drilled						
	11-42	3-13	Core 1	31		29	8.8		
	42-73	13-22	Core 2	31		2	0.6		
	73-104	22-32	Core 3	31		9	2.7		
	104-135	32-41	Core 4	31		8	2.4		
	135-330		Drilled						
	330-361	101-110	Core 5	31		18	5.5		
	361-392	110-119	Core 6	31		28	8.5		
	392-423	119-129	Core 7	31	9.5	16	4.9		
	423-454	129-138	Core 8	31	9.5	26	7.9		
	454-485	138-148	Core 9	31	9.5	31	9.5		
	485-510	148-155	Core 10	25		25			
	510-541	155-165	Core 11	31	9.5	31	9.5		
	541-572	165-174	Core 12	31	9.5	9	2.7		
	572-603	174-184	Core 13	31	9.5	31	9.5		
	603-634	184-193	Core 14	31	9.5	31	9.5		
	634 (193m)	Totals	14	428	130.5	294	89.6	67%	69%

TABLE 1 – *Continued*

Hole	Interval		Cores Drilled	Core Cut		Core Recovered		Core	Recovery
	(ft)	(m)		(ft)	(m)	(ft)	(m)	%	%
63.2	0-36		Drilled						
	36-67	11-20	Core 1	31	9.5	20	6.1		
	67-98	20-30	Core 2	31	9.5	31	9.5		
	98-129	30-39	Core 3	31	9.5	20	6.1		
	129 (39m)	Totals	3	93	28.4	71	21.6	72	76
	2621 (795m)	Site Totals	28	801	244.1	568	173.1	72%	71%

micronodules are abundant above 15 meters, but are generally absent below. Colorless volcanic glass of intermediate composition is common to abundant in most of the samples examined. Brown glass of basic composition is rare or absent. Other clearly identifiable volcanic debris is rare, although plagioclase is present in most samples, and pyroxene was also detected in several cases. Three 1 to 2 centimeter pumice lapilli were observed in the top 10 meters of sediment.

The base of the pelagic clay is ill-defined, and the boundary at 21 meters has been placed at the prominent color change from browns and yellows (oxidized, and with less than 30 per cent calcite) to grays and greens (reduced, and with more than 30 per cent calcite). Foraminiferal nannofossil marl ooze and pelagic clay makes up the ill-defined interval 21 to 35 meters. The greenish-gray marl ooze, like the overlying clay, is intensely mottled. It generally contains 20 to 60 per cent calcite (locally as little as 5 or as much as 70 per cent), with the concentration showing a general increase from top to bottom. Black patches of iron sulfide are ubiquitous above 31 meters, and pyrite (both dispersed and as framboids) is common below this depth. Clear glass of intermediate composition as well as brown basic glass are present in most samples, but are usually rare. The highest concentrations of clear glass occur above 22 meters–at 24.5 meters a 2-centimeter ash bed is formed; the brown glass is most abundant in the interval 28.5 to 29.5 meters.

The upper boundary of the nannofossil chalk ooze at about 35 meters is poorly defined and quite arbitrary–sediments above generally contain less than 60 per cent calcite, those below contain more. The upper chalk ooze sampled (Hole 63.2, Core 3) is grayish-yellow green or light greenish-gray (color values generally 7 or 8). Pyrite flecks are common. At 60 to 70 meters, the color is generally lighter (values of 9, such as greenish white, are common), but the sediment is otherwise similar.

Below 100 meters pyrite becomes rare, and the first signs of induration appear. From 100 to about 145 meters, both chalk ooze and chalk are present, whereas below 145 meters chalk dominates.

The interval 101 to 193 meters, cored continuously, is slightly to intensely mottled (the intensity decreasing with increasing depth and induration). Pyrite is rare. Volcanic glass is usually rare, although ash beds (1 and 3 centimeters thick) occur at 112 and 114.4 meters.

The three cores at 230 to 234, 352 to 359, and 458 to 467 meters are all pale colored (usually greenish-white, lesser yellowish-gray), slightly pyritic chalk, showing slight faint mottling. They contrast strikingly with the orange-pink ("terra cotta") chalk sampled from 534 to 553 meters. The orange-pink chalk is moderately mottled, well indurated, and contains fragments of flinty chert at 536.7 meters. Faint lensoid laminae are visible in many fragments of core, and these show stylolitic interpenetration at 543.8 meters.

At 553 meters, the orange-pink chalk gives way abruptly to well indurated, olive gray, slightly mottled nannofossil marl, which becomes yellowish-brown below about 557.5 meters. This material is somewhat cristobalitic.

At 561 meters, the drill penetrated basalt containing xenoliths of baked calcareous sediment.

The basalt is finely porphyritic, with plagioclase (bytownite) and lesser clinopyroxene phenocrysts up to 2 millimeters in diameter in a groundmass of the same minerals and altered glass. Comparison of basalt samples taken 5 and 320 centimeters below the sediment show that the deeper material is less vesicular, has a much higher ratio of feldspar and pyroxene crystals to chloritized glass in the groundmass, and contains much fresher plagioclase phenocrysts than the shallower sample.

Basalt in contact with sediment was originally glassy (now altered to brown chlorite and pale green montmorillonite), with both perlitic and variolitic textures. The plagioclase phenocrysts are intensely altered to pale green montmorillonite. The 200-micron zone directly below the contact is a vermiform mass of acicular chlorite and possible montmorillonite crystals. The actual contact is marked by an iron-manganese oxide film, usually 10 but up to 40 microns thick. Within 100 microns of the contact, the chalk is recrystallized, but is otherwise little affected. Locally, small skarn patches, up to 1 millimeter thick, having developed at the sediment-basalt boundary. These patches contain montmorillonite pseudomorphs of 40-micron scapolite (?) prisms, surrounded by radiating masses of brilliant blue-green acicular chlorite crystals, which become browner away from the pseudomorphs. The chalk directly above the basalt includes altered glass shards of the igneous rock, with perfectly preserved morphologies, in a slightly montmorillonite-impregnated but otherwise unaltered foraminiferal nannofossil chalk or chalky limestone. Chalk masses engulfed by the basalt are discolored (pale greens and reds) and intensely recrystallized, culminating in a specimen found 3.6 meters below the top of the basalt in which rare coccoliths and mosaics of coarser calcite pseudomorphing foraminifera (and occasionally showing the original "pseudoisogyre" extinction) are the only recognizable primary components of a dense, montmorillonite- and clinoptilolite-bearing pale red-brown marble.

The absence of dolomitization of the overlying sediments, the presence of shards of basalt glass and uninverted cristobalite in the chalk directly overlying the basalt, and the evidence of slower cooling and less contamination of the deeper part of the cored igneous rock all suggest that this basalt, in contrast to that cored at Site 62, is extrusive.

Physical and Chemical Properties

The physical and chemical properties of cores obtained at Site 63 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 and Biostratigraphic Summary

Foraminifera

The drilling site is located below the present lysocline, and thus the tests of foraminifera in the surface sediments are a residue of species most resistant to dissolution of calcium carbonate. This condition evidently persisted to a greater or somewhat lesser extent during the time represented by the section cored. The foraminiferal biostratigraphy at this site is therefore dependent upon the resistance of the tests of the index species, as populations are most certainly incomplete. This presents extreme difficulty below 100 meters penetration, where ages can only be estimated within the span of several N. Zones and material of questionable age consists of deep water benthics as the only foraminiferal representatives, in company with floods of radiolarians.

The following faunal boundaries can be recognized approximately: the base of Zone N. 21 between 63.2-1 and 63.2-2 (at about 20 meters below the sea floor); the base of Zone N. 19 within 63.2-2 (at about 25 meters); the base of Zone N. 18 between 63.2-3 and 63.0-2 (at about 40 to 60 meters); the base of Zone N. 16 between 63.0-2 and 63.1-5 (at about 70 to 100 meters); the base of Zone N. 14 within 63.1-6 (at about 115 meters), the base of Zone N. 13 within 63.1-8 (at about 135 meters), the base of Zone N. 10 within 63.1-9 (at about 145 meters), the base of Zone N. 9 within 63.1-10 (at about 155 meters); the base of Zone N. 8 between 63.1-11 and 63.1-13 (at about 165 to 175 meters); and, the base of Zone N. 2 between 63.0-6 and 63.0-7 (at about 465 to 535 meters).

Calcareous Nannofossils

Two continuous sequences were drilled in Hole 63.1 with Pliocene nannoplankton (Zone NN 18 to NN 14) in the upper four cores, and Middle to Lower Miocene nannoplankton (Zones NN 9 to NN 4) in the lower ten cores. Sediment from above the basalt yielded calcareous nannoplankton of Zone NP 23. Three cores of Hole 63.2 repeated down to 39 meters the Pliocene sequence of Hole 63.1.

In the upper 65 meters of this site, both discoasters and coccoliths have suffered slight to moderate solution, but species are easily recognizable. Between 65 and 140 meters, preservation is excellent for both groups, but below this, discoasters show increasing recrystallization and secondary calcification with depth. They become moderately overgrown at about 350 meters and remain so until the terminal depth of 566 meters. However, the more distinctive species are always recognizable.

Radiolaria

Radiolarians are only moderately common, and sometimes poorly preserved, in the continuously cored section from the sea floor to 41 meters (63.0-1, 63.1-1 to 63.1-4, and 63.2-1 to 63.2-3). From 62 to 361 meters (63.0-2 to 63.0-5, and 63.1-5 to 63.1-14), they are common to abundant and generally well-preserved; none are present in the deeper samples.

Recognition of radiolarian zones in the upper part of the section is difficult, but it appears that the top of the *Pterocanium prismatium* Zone may be at about 4 to 7 meters (between 63.1-1-1 and 63.1-1-3), the base of the *P. prismatium* Zone may be at about 22 to 23 meters (between 63.1-2-CC and 63.1-3-1), the base of the *Spongaster pentas* Zone is at about 31 to 35 meters (between 63.2-3-1 and 63.2-3-4), and the base of the *Stichocorys peregrina* Zone is at 39 to 63 meters (between 63.2-3-CC and 63.0-2-2). Older zonal boundaries can be recognized more confidently—the base of the *Ommatartus penultimus* Zone is at 66 to 69 meters (between 63.0-2-4 and 63.0-2-6), the base of the *Ommatartus antepenultimus* Zone is at 102 to 105 meters (between 63.1-5-1 and 63.1-5-3), the base of the *Cannartus* (?) *petterssoni* Zone is at 131 to 134 meters (between 63.1-8-2 and 63.1-8-4), the base of the *Dorcadospyris alata* Zone is at 149 to 152 meters (between 63.1-10-1 and 63.1-10-3), the base of the *Calocycletta costata* Zone is at 183 to 185 meters (between 63.1-13-CC and 63.1-14-1), and the base of the *Calocycletta virginis* Zone and the entire *Lychnocanium bipes* Zone are in the interval 239 to 353 meters (between 63.0-4 and 63.0-5). The lowest radiolarian core (63.0-5), at about 350 to 360 meters, is in the *Dorcadospyris ateuchus* Zone.

Practically no reworked older radiolarians were observed in the samples examined from this site.

DISCUSSION

Age of Basement

The basalt at the bottom of the hole is interpreted as extrusive, and as overlain unconformably by marly sediments of late early Oligocene age, which are thus either of the same age or only very slightly older than the oldest sediments (intruded by basalt) sampled at Site 62. Since beds older than those actually encountered at Site 62 may well be present nearby on Eauripik Ridge, the basement may very well be of the same age in East Caroline Basin as it is on the Ridge. Any age difference is much too uncertain to provide a clear unquantitative test of the idea that the Ridge may have been a spreading center during early Tertiary times.

The region underlain by basalt of Oligocene age would now appear to include most of the Caroline Ridge and Caroline Basins—an area of more than 10 degrees on a side—covering much of the Pacific salient between the Mariana Trench and the borders of Melanesia. Any older sediments and crust lie buried and beneath a layer of basalt of unknown thickness.

The emplacement of this basalt created both rough (Caroline Basin, Eauripik Ridge) and smooth (parts of Caroline Ridge) surfaces, and included flows over (Site 63) and intrusions into (Site 62) pelagic sediments of Oligocene age. Individual small volcanoes or plugs are visible on the reflection profile between Sites 62 and 63 (See Reflection Record #17 in Reflection Seismology Chapter), and in the bathymetry on Eauripik Ridge. Large volcanoes surmount parts of Caroline Ridge. The smooth flows on Caroline Ridge were faulted, creating a north-sloping staircase, probably before much sediment had accumulated on them.

Rate of Accumulation of Sediments

A graph showing age of sediments plotted against their depth below the sea floor is presented as Figure 4. The rate of sediment accumulation, neglecting compaction, had gradually slowed from about 30 m/m.y. during the Oligocene to only about 7 m/m.y. during latest Miocene to Quaternary times. Breaks in the curve at about 20 and 9 million years ago may well be merely an artifice of the method of constructing the curve, which depends on certain absolute age assignments for each of the many paleontological zones identified in the cores. The general shape of the curve will not be affected much by minor changes in these ages, nor by minor reevaluations of the zonal assignments of cores.

The general shape of the curve, when taken together with the increasing clay and decreasing carbonate content toward the top of the section, and the relatively large amounts of dissolution of foraminiferal tests in the upper part of the column as compared to the lower, strongly suggests a gradual shift of the lysocline from a depth at or near the depth of sediment accumulation at this site during the Oligocene to a depth well above the sea floor at the present time. What is more difficult to decide is whether or to what extent the change in the depth of the lysocline has been modified by vertical movement of the sea floor.

A comparison of the rates of accumulation at Sites 62 and 63 may help to discriminate the effects of local tectonism from more general secular changes in the position of the lysocline. The rates for the two sites are very alike for the lower and middle Miocene parts of the section, but are markedly different for the Oligocene and for the uppermost Miocene to Recent segments. The slowness of the Oligocene rate for Site 62 may be partly due to very local topographic effects close to the site; on the other hand, reflection profiles taken both along and across Eauripik Ridge (Reflection Records 10 to 15 in Reflection Seismology Chapter) show the prominent group of reflectors identified as an interval extending from near the base of the middle Miocene through much of the lower Miocene at both Sites 62 and 63 to be much closer to basement on the Ridge than in the adjacent basins (Figure 1). This is taken as an indication of a relatively slower rate of accumulation over the Ridge as compared to the Basins during Oligocene times.

TABLE 2

Physical Properties of Cores From Site 63

		Physical Properties								
	Lithology	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 63.0										
Core 1-1	Pelagic Clay	1.341	1.418	2.71	76.7	20.0	79.1	1.54	1449	1581
1-2	Pelagic Clay	1.340	1.412	2.71	77.0	20.0	77.6	1.22	1492	906
1-3	Calcareous Pelagic Clay	1.398	1.448	2.71	74.8	20.0	80.3	0.93	1465	721
1-4	Calcareous Pelagic Clay	1.270	1.375	2.71	79.2	20.0	82.1	1.05	1469	614
1-5	Pelagic Clay		1.334	2.71	81.6	20.0	86.1	1.05		
1-6	Calcerous Pelagic Clay					29.0	79.9	2.09		
Core 2-1	Nannofossil Chalk Ooze								1572	
2-2	Nannofossil Chalk Ooze	1.611	1.627	2.71	64.2	20.0	61.8	0.32	1584	298
2-3	Nannofossil Chalk Ooze	1.672	1.685	2.71	60.8	20.0	59.6	0.38	1562	216
2-4	Nannofossil Chalk Ooze	1.602	1.628	2.71	64.2	20.0	65.9	0.40	1559	266
2-5	Nannofossil Chalk Ooze	1.677	1.674	2.71	61.4	20.0	61.6	0.51	1560	260
2-6	Nannofossil Chalk Ooze	1.664	1.699	2.71	59.9	20.0	61.8	0.41	1568	268
Core 3-1	Nannofossil Chalk Ooze					60.0	61.2	0.52	1582	219
3-2	Nannofossil Chalk Ooze	1.683	1.717	2.71	58.9	20.0	60.0	0.25	1576	258
3-3	Nannofossil Chalk Ooze	1.728	1.730	2.71	58.1	20.0	61.0	0.17	1632	262
3-4	Nannofossil Marl Ooze	1.685	1.711	2.71	59.3	20.0	63.0	0.14	1800	323
Core 4-1	Nannofossil Chalk Ooze		1.795	2.71	54.3	20.0	50.2	0.02	1822	193
4-2	Nannofossil Chalk Ooze	1.866	1.877	2.71	49.4			0.07	2092	194
Core 5-1	Nannofossil Chalk		1.811	2.71	53.3			0.00	1566	
5-2	Nannofossil Chalk	1.845	1.909	2.71	47.5				2411	181
Core 6-1	Nannofossil Chalk	1.954	1.939	2.71	45.7				1692	172
6-2	Nannofossil Chalk	1.926	1.903	2.71	47.9				1712	170
6-3	Nannofossil Chalk	1.947	1.959	2.71	44.6				1682	181

[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 column 4; ρ_G is from column 5; $\rho_f = 1.024$.

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 %
	3.0	3.7	22.8	73.5	Silty Clay	21.0	3.6	0.2					
	7.0	0.7	38.4	60.8	Silty Clay	21.0	8.0	0.2					
						21.0	10.6	0.1					
	2.0	1.5	36.6	61.9	Silty Clay	21.0	12.0	0.2					
	10.0	5.3	48.4	46.3	Clayey Silt	21.0	8.3	0.1	40-50	7.57	+147	25	34.1
	4.0	4.3	40.4	55.3	Silty Clay	30.0	10.1	0.4					
	2.0	1.8	20.7	77.5	Clay	21.0	67.0	0.0					
						21.0	81.0	0.0	40-50	7.41	+163	24	34.4
						21.0	79.6	0.0					
						21.0	81.0	0.0					
	1.0	2.6	23.7	73.7	Silty Clay	21.0	61.0	0.2					
	56.0	2.6	34.1	63.3	Silty Clay	61.0	72.0	0.0					
	4.0	1.7	30.7	67.6	Silty Clay	21.0	64.0	0.0	80-91	7.28	-242	23	34.7
	2.0	4.8	40.6	54.6	Silty Clay	21.0	79.1	0.0					
	1.0	2.0	36.2	61.8	Silty Clay	21.0	56.6	0.0					
	7.0	1.0	36.7	62.3	Silty Clay	21.0	76.4	0.0					
	1.0	0.3	43.4	56.3	Silty Clay	21.0	77.8	0.0	80-90	7.41	-457		34.4
	14.0	2.6	43.6	53.8	Silty Clay	36.0	76.6	0.0					
	4.0	5.1	37.2	57.7	Silty Clay	21.0	80.6	0.0					
	2.0	16.4	38.3	45.3	Silty Clay	26.0	88.6	0.0					
	2.0	10.2	38.4	51.5	Silty Clay	21.0	90.6	0.0					
	2.0	6.4	31.8	61.8	Silty Clay	26.0	90.0	0.0					

[e] Water content is from 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 63.0 – *Continued*										
Core 6-4	Nannofossil Chalk	2.004	1.947	2.71	45.3				1750	176
6-5	Nannofossil Chalk	2.029	1.974	2.71	43.6				1725	193
6-6	Nannofossil Chalk	1.943	1.959	2.71	44.5				1736	149
Core 7-1	Nannofossil Chalk	1.988	1.968	2.71	44.0				1807	126
7-2	Nannofossil Chalk	2.004	1.965	2.71	44.2				1852	127
7-3	Nannofossil Chalk	2.007	2.007	2.71	41.7				1800	146
7-4	Nannofossil Chalk	2.008	2.014	2.71	41.3				1729	129
7-5	Nannofossil Chalk	2.018	2.037	2.71	39.9				1822	132
7-6	Nannofossil Chalk	2.006	2.048	2.71	39.3				1723	125
Core 8-1	Nannofossil Chalk		1.960	2.71	44.5					
8-2	Nannofossil Chalk	1.993	1.994	2.71	43.8				1796	135
8-3	Nannofossil Chalk	1.989	2.019	2.71	42.4				1917	137
Core 9-1	Nannofossil Chalk		2.081	2.71	38.8				1962	124
9-2	Nannofossil Chalk	2.062	2.111	2.71	38.5				1972	139
9-3	Nannofossil Chalk	2.122	2.156	2.71	35.9				1999	126
9-4	Nannofossil Chalk	2.158	2.166	2.71	35.3				2337	151
Core 10-1	Nannofossil Chalk and Basalt									
Core 11-1	Basalt									
11-2	Basalt									
Hole 63.1										
Core 1-1	Calcareous Pelagic Clay		1.344	2.71	81.9			1.25		566
1-2	Calcareous Pelagic Clay	1.344	1.340	2.71	81.2			0.93		637
1-3	Calcareous Pelagic Clay	1.330	1.337	2.71	81.5			1.41		568
1-4	Calcareous Pelagic Clay		1.257	2.71	86.2			1.17		515
1-5	Calcareous Pelagic Clay		1.208	2.71	89.1					394
1-6	Calcareous Pelagic Clay		1.283	2.71	84.6					469
Core 2-1	(not opened)									
Core 3-1	Nannofossil-Foraminiferal Marl Ooze		1.369	2.71	79.5	90.0	78.7	0.27		446
3-2	Calcareous Pelagic Clay	1.336	1.401	2.71	77.6	20.0	79.5	0.23	1443	707
Core 4-1	(not opened)									
4-2										

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 %
	2.0	6.2	33.1	60.8	Silty Clay	23.0	94.1	0.0					
	2.0	7.2	37.3	55.5	Silty Clay	23.0	90.0	0.0					
	1.0	6.3	32.8	60.9	Silty Clay	20.0	97.8	0.0					
	1.0	5.0	35.8	59.2	Silty Clay	25.0	87.2	0.0					
	2.0	3.8	39.4	56.8	Silty Clay	20.0	89.2	0.2					
	1.0	4.5	38.3	57.2	Silty Clay	20.0	86.3	0.0					
	3.0	2.5	35.7	61.8	Silty Clay	25.0	87.5	0.0					
	1.0	3.2	39.3	57.5	Silty Clay	20.0	88.0	0.0					
	4.0	3.6	36.8	59.6	Silty Clay	20.0	94.0	0.0					
	50.0	14.7	41.5	43.8	Silty Clay	90.0	91.0	0.0					
	3.0	4.9	40.3	54.8	Silty Clay	28.0	89.1	0.0					
	2.0	5.0	39.7	55.3	Silty Clay	21.0	85.0	0.0					
	18.0	4.5	50.2	45.3	Clayey Silt	21.0	91.3	0.0					
						20.0	91.6	0.0					
	0.0	0.3	77.7	21.9	Silt	20.0	91.8	0.1					
	0.0	3.0	34.0	63.1	Silty Clay	58.0	89.1	0.0					
	46.0	6.8	34.1	59.1	Silty Clay	60.0	22.7	0.0					
	2.0	3.8	29.3	66.9	Silty Clay	20.0	12.2	0.1					
	1.0	3.2	42.4	54.4	Silty Clay	20.0	21.5	0.1					
						20.0	11.0	0.1					
	55.0	3.4	34.8	61.8	Silty Clay	90.0	30.5	0.2					
	1.0	9.6	35.8	54.6	Silty Clay	20.0	29.7	0.2					

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 63.1 – *Continued*										
Core 5-1	Nannofossil Chalk Ooze		1.545	2.71	69.1	90.0	69.9	0.30	1438	227
5-2	Nannofossil Chalk Ooze	1.569	1.611	2.71	65.2	20.0	68.9	0.18	1489	313
5-3	Nannofossil Chalk Ooze	1.608	1.619	2.71	64.7	20.0	65.4	0.32	1445	284
5-4	Nannofossil Marl Ooze	1.558	1.570	2.71	67.6	20.0	73.8	0.10	1500	323
Core 6-1	Nannofossil Marl Ooze		1.500	2.71	71.8					286
6-2	Nannofossil Marl Ooze	1.499	1.519	2.71	70.7			0.50	1469	429
6-3	Nannofossil Marl Ooze	1.523	1.525	2.71	70.3			0.32	1436	379
6-4	Nannofossil Marl Ooze	1.509	1.542	2.71	69.3			0.72	1440	402
6-5	Nannofossil Marl Ooze	1.554	1.574	2.71	67.4			0.27	1452	403
6-6	Nannofossil Marl Ooze	1.618	1.624	2.71	64.4			0.34	1464	362
Core 7-1										
7-2	Chalk Ooze	1.511	1.524	2.71	70.3	20.0	65.2	0.17		336
7-3	Marl Ooze	1.524	1.531	2.71	69.9	20.0	70.7	0.16	1467	364
7-4	Marl Ooze	1.532	1.530	2.71	70.0	20.0	69.7	0.31	1485	385
Core 8-1	Nannofossil Chalk Ooze									
8-2	Nannofossil Chalk Ooze		1.252	2.71	86.5					287
8-3	Nannofossil Chalk Ooze		1.199	2.71	89.6					257
8-4	Nannofossil Chalk Ooze	1.564	1.375	2.71	79.2	80.0	66.0	0.34	1459	293
8-5	Nannofossil Marl Ooze	1.592	1.416	2.71	76.8	51.0	62.4	0.16	1488	316
8-6	Nannofossil Marl Ooze	1.652	1.514	2.71	70.9	10.0	65.2	0.24	1551	256
Core 9-1	Nannofossil Chalk	1.641	1.618	2.71	64.8	130.0	63.2	0.43		277
9-2	Nannofossil Chalk	1.660	1.674	2.71	61.4	46.0	62.2	0.02		299
9-3	Nannofossil Chalk	1.654	1.663	2.71	62.1	19.0	58.5	0.15	1554	317
9-4	Nannofossil Chalk	1.723	1.751	2.71	56.9	38.0	61.6	0.20	1465	236
9-5	Nannofossil Chalk	1.688	1.696	2.71	60.1	55.0	62.4	0.16	1472	281
9-6	Nannofossil Chalk	1.723	1.728	2.71	58.3	25.0	57.2		1528	244

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 %
					90.0	62.4	0.1					
					20.0	63.0	0.0	60-70	7.34	-332	24	34.4
1.0	0.2	35.9	64.0	Silty Clay	20.0	71.2	0.1					
3.0	0.5	33.5	66.0	Silty Clay	20.0	45.3	0.2					
61.0	0.6	35.1	64.3	Silty Clay	69.0	53.2	0.1					
1.0	1.3	37.3	61.4	Silty Clay	20.0	36.4	0.0					
4.0	0.9	39.3	59.8	Silty Clay	22.0	45.5	0.1					
3.0	2.9	44.5	52.7	Silty Clay	20.0	53.3	0.1					
3.0	0.6	31.7	67.7	Silty Clay	20.0	44.5	0.1					
1.0	0.9	30.5	68.6	Silty Clay	20.0	54.8	0.0					
1.0	2.0	45.7	52.3	Silty Clay	20.0	71.0	0.0	79-90	7.22	-336	23	34.7
1.0	4.5	37.0	58.5	Silty Clay	20.0	56.5	0.0	80-150				
					20.0	44.9	0.1					
10.0	4.3	34.8	60.9	Silty Clay								
13.0	2.1	40.8	57.1	Silty Clay	25.0	61.6	0.0					
1.0	3.9	38.0	58.1	Silty Clay	80.0	62.8	0.0					
2.0	1.6	42.7	55.7	Silty Clay	51.0	59.3	0.0					
1.0	1.5	45.9	52.6	Silty Clay	10.0	53.5	0.1					
10.0	1.0	36.6	62.4	Silty Clay	130.0	73.6	0.0					
2.0	1.1	39.4	59.5	Silty Clay	46.0	68.6	0.0	82-90	7.27	-350	24	34.4
2.0	1.7	39.0	59.3	Silty Clay	19.0	77.6	0.0					
6.0	2.1	42.2	55.6	Silty Clay	38.0	71.3	0.0					
2.0	1.0	40.4	58.5	Silty Clay	55.0	63.5	0.1					
2.0	8.5	37.5	54.0	Silty Clay	26.0	81.1	0.1					

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 63.1 – *Continued*										
Core 10-1	Nannofossil Chalk	1.669	1.705	2.71	59.6	115.0	55.7	0.20	1511	281
10-2	Nannofossil Marl	1.696	1.723	2.71	58.6	38.0	64.0	0.09	1559	257
10-3	Nannofossil Chalk	1.622	1.669	2.71	61.7	29.0	38.6	0.10	1530	317
10-4	Nannofossil Chalk	1.700	1.749	2.71	57.0	24.0	60.2	0.11	1552	251
10-5	Nannofossil Chalk	1.718	1.755	2.71	56.6			0.07	1497	249
11-1	Nannofossil Chalk	1.675	1.704	2.71	59.6			0.11	1492	262
11-2	Nannofossil Chalk	1.642	1.657	2.71	62.5			0.08	1526	286
11-3	Nannofossil Chalk	1.714	1.729	2.71	58.2			0.10	1533	247
11-4	Nannofossil Chalk	1.738	1.760	2.71	56.3			0.12	1511	213
11-5	Nannofossil Chalk	1.745	1.764	2.71	56.1			0.07	1630	235
11-6	Nannofossil Chalk	1.763	1.793	2.71	54.4			0.04	1727	266
Core 12-1	Nannofossil Chalk		1.764	2.71	56.1				1795	190
12-2	Nannofossil Chalk	1.759	1.797	2.71	54.1			0.00	1643	243
Core 13-1	Nannofossil Chalk	1.726	1.745	2.71	57.2	17.0	54.3	0.07	1671	244
13-2	Nannofossil Chalk	1.660	1.684	2.71	60.9	23.0	53.7	0.07	1686	288
13-3	Nannofossil Chalk	1.774	1.771	2.71	55.7			0.04	1772	275
13-4	Nannofossil Chalk	1.650	1.642	2.71	63.3			0.05	1684	335
13-5	Nannofossil Chalk	1.757	1.743	2.71	57.4			0.05	1777	232
13-6	Nannofossil Marl	1.617	1.619	2.71	64.7			0.03	1721	357
Core 14-1	Nannofossil Chalk	1.652	1.685	2.71	60.8			0.04	1630	275
14-2	Nannofossil Chalk	1.738	1.776	2.71	55.4	18.0	54.5	0.07	1539	247
14-3	Nannofossil Chalk	1.698	1.722	2.71	58.6			0.03	1767	301
14-4	Nannofossil Marl	1.729	1.749	2.71	57.0	20.0	74.0	0.06	1646	241
14-5	Nannofossil Chalk	1.749	1.791	2.71	54.5	12.0	45.5	0.20	1551	213
14-6	Nannofossil Chalk	1.758	1.785	2.71	54.8			0.04	1566	235
Hole 63-2										
Core 1-1	Calcareous Pelagic Clay	1.293	1.319	2.71	82.5			0.80	1390	546
1-2	Calcareous Pelagic Clay	1.328	1.390	2.71	78.3			1.04	1403	580
1-3	Calcareous Pelagic Clay	1.357	1.371	2.71	79.4			1.26	1388	531
1-4	Calcareous Pelagic Clay	1.285	1.322	2.71	82.3			1.32	1395	586
Core 2-1	Calcareous Pelagic Clay	1.340	1.359	2.71	80.1			0.72	1367	526
2-2	Calcareous Pelagic Clay	1.293	1.318	2.71	82.5			0.81	1374	531
2-3	Calcareous Pelagic Clay	1.266	1.298	2.71	83.8	20.0	83.5	0.38	1421	543
2-4	Calcareous Pelagic Clay	1.280	1.296	2.71	83.9			0.67	1380	522

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 %
	10.0	0.5	45.2	54.2	Silty Clay	115.0	70.4	0.0					
	2.0	1.5	45.4	53.2	Silty Clay	38.0	53.3	0.1					
						29.0	71.7	0.9					
						24.0	65.2	0.1					
	4.0	2.5	55.1	42.5	Clayey Silt	25.0	79.6	0.0					
	1.0	5.3	35.2	59.5	Silty Clay	20.0	82.1	0.0					
	1.0	1.3	41.9	56.8	Silty Clay	45.0	65.6	0.1					
	1.0	1.7	46.2	52.1	Silty Clay	36.0	70.6	0.0					
	7.0	7.1	43.6	49.3	Silty Clay	26.0	78.0	0.0					
	1.0	6.4	43.2	50.4	Silty Clay	20.0	82.6	0.0	39-44	7.47	-305	24.0	34.1
	1.0	1.1	39.8	59.1	Silty Clay	20.0	70.6	0.0					
						20.0	82.1	0.1					
	1.0	0.5	36.6	62.9	Silty Clay	17.0	76.5	0.1					
	2.0	3.4	43.6	53.0	Silty Clay	23.0	73.9	0.1					
	1.0	5.0	39.1	55.9	Silty Clay	56.0	78.0	0.0	32-35	7.36	+172	25.0	34.1
	2.0	1.2	43.5	55.4	Silty Clay	24.0	60.8	0.0					
	8.0	5.4	37.7	56.9	Silty Clay	25.0	72.3	0.0					
	3.0	8.5	43.2	48.3	Silty Clay	23.0	46.3	0.1					
	2.0	1.9	37.4	60.7	Silty Clay	16.0	68.0	0.1					
	1.0	0.8	46.2	53.0	Silty Clay	18.0	80.3	0.1					
	3.0	1.7	44.6	53.6	Silty Clay	29.0	73.8	0.2					
	3.0	3.3	31.9	64.8	Silty Clay	20.0	58.1	0.1					
	0.0	1.8	49.5	48.7	Clayey Silt	12.0	83.2	0.1					
	4.0	8.5	52.4	39.1	Clayey Silt								
	2.0	5.9	31.8	62.3	Silty Clay								
	1.0	14.6	42.0	43.4	Silty Clay								
	1.0	2.8	42.3	54.9	Silty Clay	10.0	26.9	0.3					
	5.0	5.3	30.6	64.1	Silty Clay	20.0	17.8	0.3					
	2.0	1.9	38.7	59.4	Silty Clay	20.0	5.9	0.3					
	1.0	2.2	40.0	57.8	Silty Clay	20.0	27.8	0.4					
	1.0	0.9	33.9	65.1	Silty Clay	20.0	17.3	0.4	30-38	7.58	+132	24.0	34.4
	1.0	1.7	30.6	67.7	Silty Clay	20.0	21.1	0.4					

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 63-2 – *Continued*										
Core 2-5	Calcareous Pelagic Clay									
2-6	Calcareous Pelagic Clay		1.220	2.71	88.4			0.92		498
Core 3-1	Calcareous Pelagic Clay		1.353	2.71	80.5			0.47	1443	534
3-2	Calcareous Pelagic Clay	1.355	1.390	2.71	78.3			0.26	1406	515
3-3	Nannofossil Marl Ooze	1.445	1.458	2.71	74.2			0.28	1424	449
3-4	Nannofossil Marl Ooze	1.519	1.552	2.71	68.7			0.38	1421	381

The rate difference could arise from various causes. (1) the Ridge was present as a topographic feature, and was swept by currents strong enough to slow long-term sediment accumulation rates. The only evidence that the basic topographic features may have mainly formed prior to the beginning of sedimentation is the reflection profile data shown on Reflection Records #1 and #2 (Reflection Seismology Chapter), showing that post-basalt, pre-sediment faults on Caroline Ridge account for the major relief. It should be underlined that Caroline and Eauripik Ridges are separated by a major zone of faulting, and, therefore, the two regions may have unlike histories. (2) A second cause might be differences in the rate of production of calcium carbonate debris in the overlying waters, for oceanographic reasons.

The relative importance of tectonism and lysocline migration as causes for the contrast in rates at the top of the columns is most at this time. It is clear at Site 63 that the lysocline has moved relatively upward from a position near the sediment surface during Oligocene through middle Miocene times to a position above the sea floor at present. In fact, the calcite compensation depth must now be close to the present sea floor. Evidence for subsidence at many places in the region is given by the abundance of atolls over the whole length of Caroline Ridge and along an arc extending southeast from the Ridge onto the Ontong Java Plateau (See Plate 1). Although the details of the extent and amounts of fluctuations in the depth of the lysocline brought about by changes in deep-water circulation associated with changes in climates near the close of the Cenozoic are still imperfectly known to us, the known trends of such changes are quite capable of explaining the observed sequence of sediments at Site 63.

Possible Changes in Surface Currents

As is pointed out in the paleontological reports, the upper (Pliocene) part of the column at both Sites 62 and 63 contains cooler-water pelagic species of nannofossils, radiolarians, and foraminifers, suggesting a shifting of current patterns that had prevailed up until that time, to bring cooler, less productive waters over the sites. A possible clue to the Pliocene paleocurrent system may lie in the pattern of currents north of New Guinea today. During the Northern Hemisphere winter, the Caroline Basin region lies near the western limit of the South Equatorial current, where the current turns toward the Solomon Islands in a confused pattern. During Northern Hemisphere summer, the currents are radically changed, and a strong current flows northwest over the same region (Wyrtki, 1958), bringing water from farther southeast, from the Solomon Sea and New Hebrides.

Were such a pattern to be intensified and perhaps broadened, it might bring cooler water species from the South Pacific central water mass, or from the Tasman Sea, to latitudes much farther north than these species range today. During glacial times, one might expect increased intensity of such a pattern; but, perhaps of equal importance is the fact that much of the Solomon Island region has been so recently uplifted. Most of the relief is of Quaternary age, and during Miocene and parts of Pliocene times the region was largely submerged and did not constitute the important barrier to surface currents that it is today.

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$^{\circ}$C	Salinity %
	1.0	1.0	38.5	60.5	Silty Clay	20.0	17.0	0.5					
	39.0	1.3	38.1	60.5	Silty Clay	50.0	17.0	0.2					
	1.0	1.1	33.1	65.8	Silty Clay	20.0	14.1	0.2					
	1.0	3.3	22.9	73.9	Silty Clay	20.0	52.2	0.1					
	2.0	2.3	25.1	72.6	Silty Clay	20.0	54.2	0.1					

Velocity Depth Relations

Site 63 was drilled to 566 meters and terminated in basalt. After departure, Site 63 was crossed (Record 27, Figure 3) bearing 193° at a distance of 20 feet (6.1 meters). Prominent reflectors were observed at 0.10, 0.16, and 0.36 seconds of reflection time. Less coherent, fainter reflectors were observed at 0.44 and 0.52 seconds with a very prominent basalt reflector occurring at 0.55 seconds.

Based on the results of the drilling at Site 63, the following tentative velocity depth relation is proposed. The relation is similar to the one proposed for Site 62:

	Reflection Time	Depth Below Sea Floor
1.7 km/sec	0-0.16 seconds	0-136 meters
2.1 km/sec	0.16-0.36 seconds	136-346 meters
2.3 km/sec	0.36-0.55 seconds	346-564 meters

This velocity-depth relation gives depths to the reflectors of: 85 meters (0.10 seconds), 136 meters (0.16 seconds), 346 meters (0.36 seconds), 426 meters (0.44 seconds), 530 meters (0.52 seconds), 564 meters (0.55 seconds).

Basaltic basement at 561 meters is correlated with the prominent basal reflector at 0.55 seconds, giving an average velocity for the column of 2.04 km/sec.

REFERENCE

Wyrtki, Klaus, 1958. The water exchange between the Pacific and the Indian Oceans in relation to upwelling processes. *Proc. 9th Pac. Sci. Cong. (1957)*. **16**, 61.

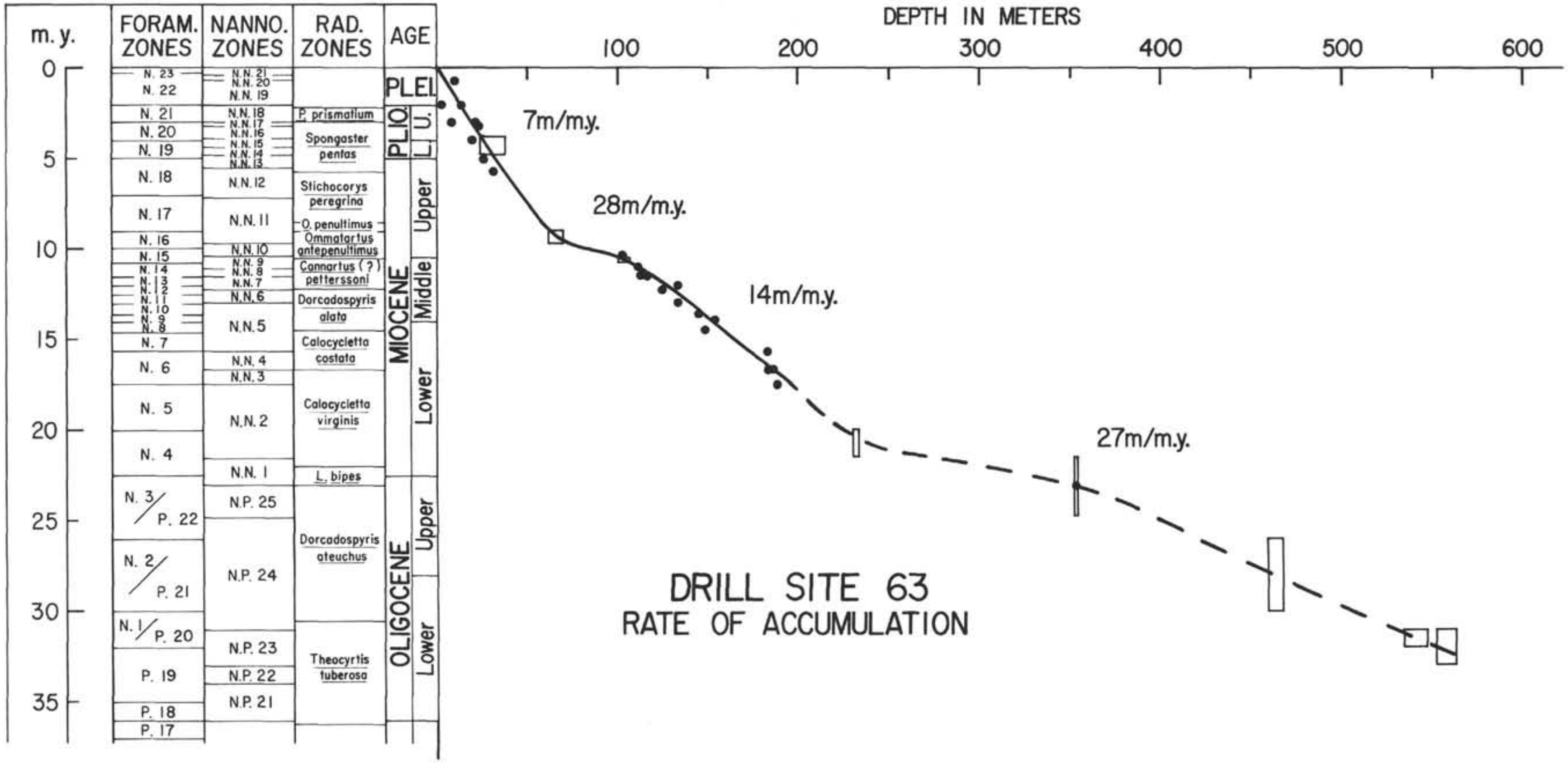
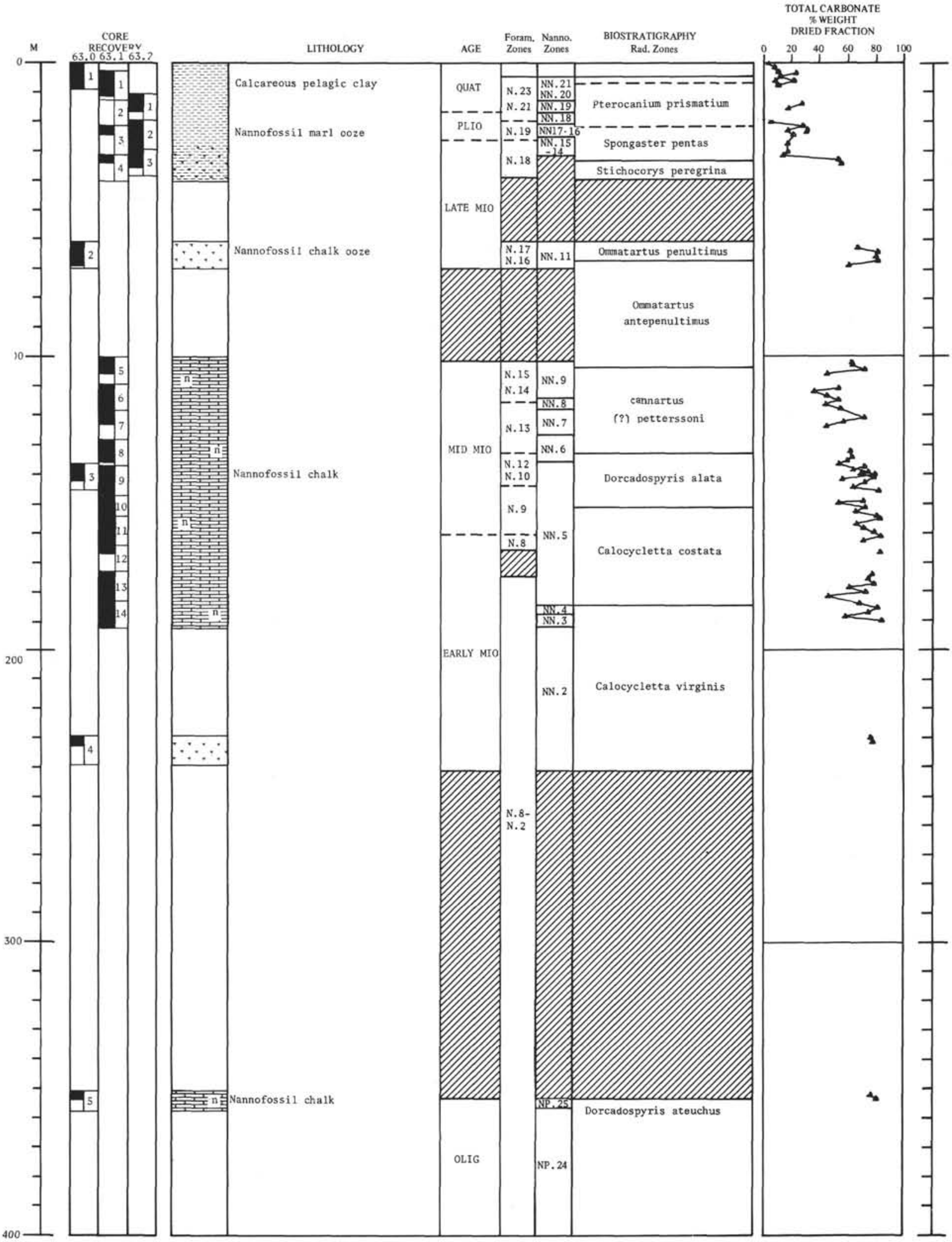
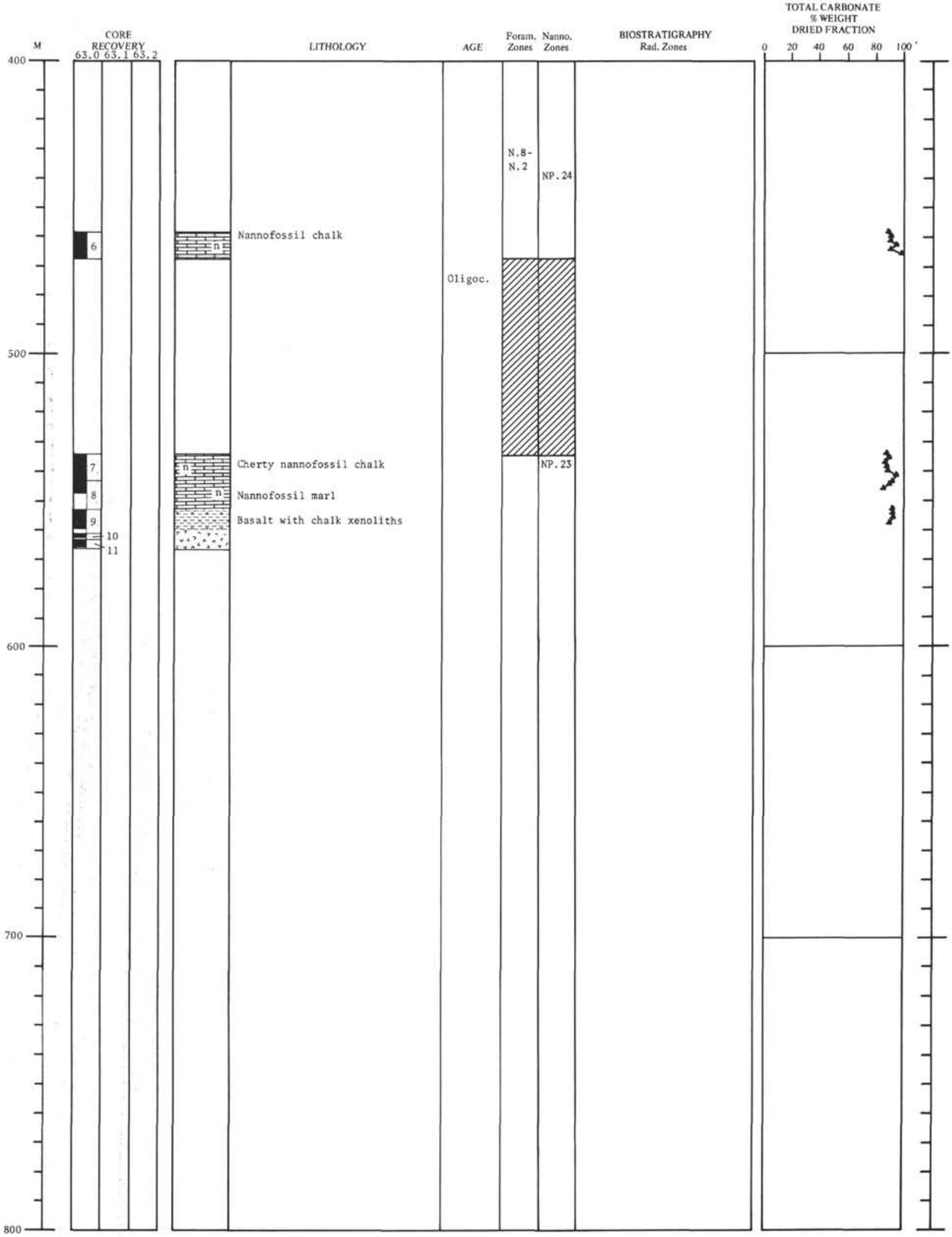


Figure 4. *Rate of sediment accumulation at Site 63.*

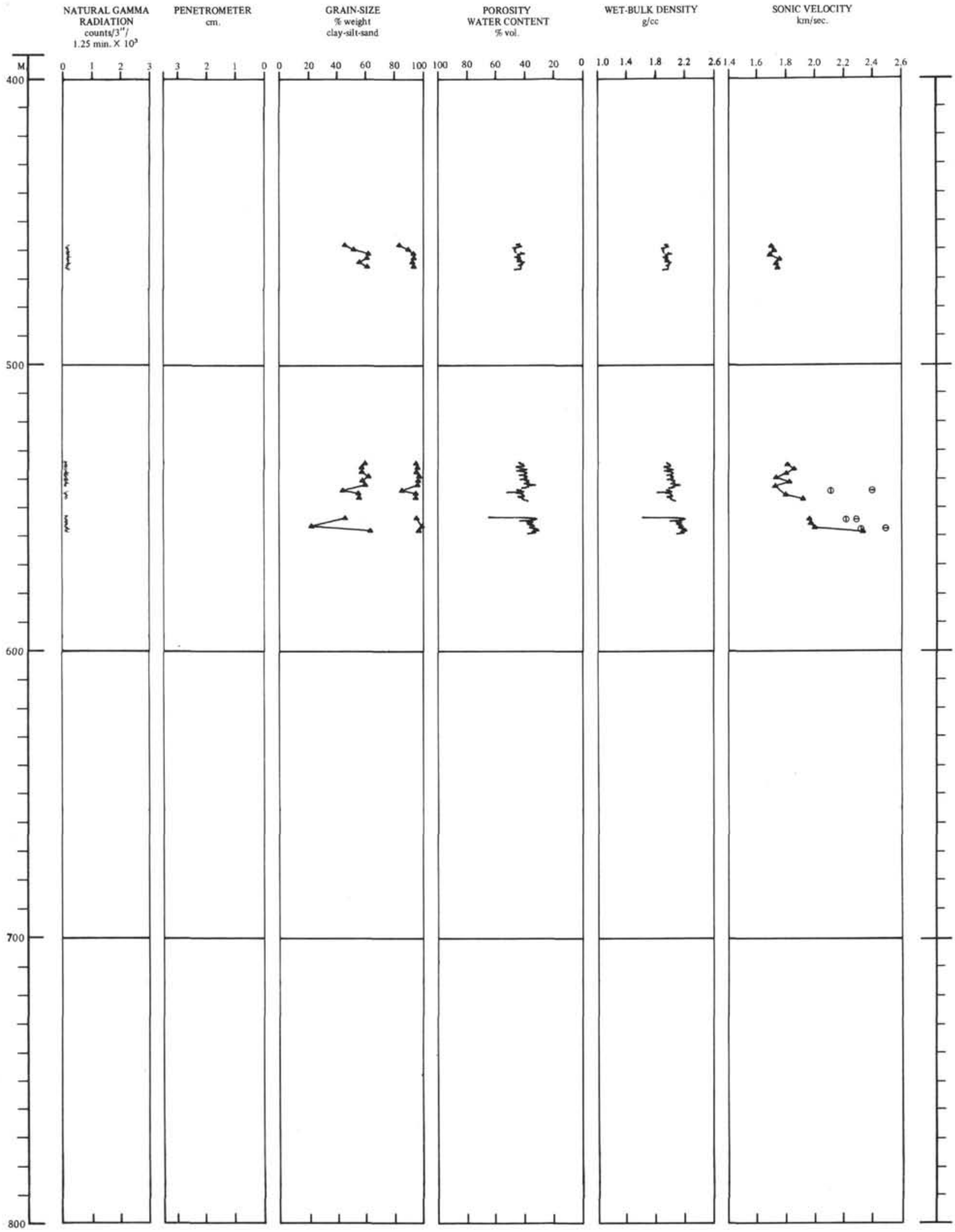


Lithology and biostratigraphy of Site 63, 0-400 m.

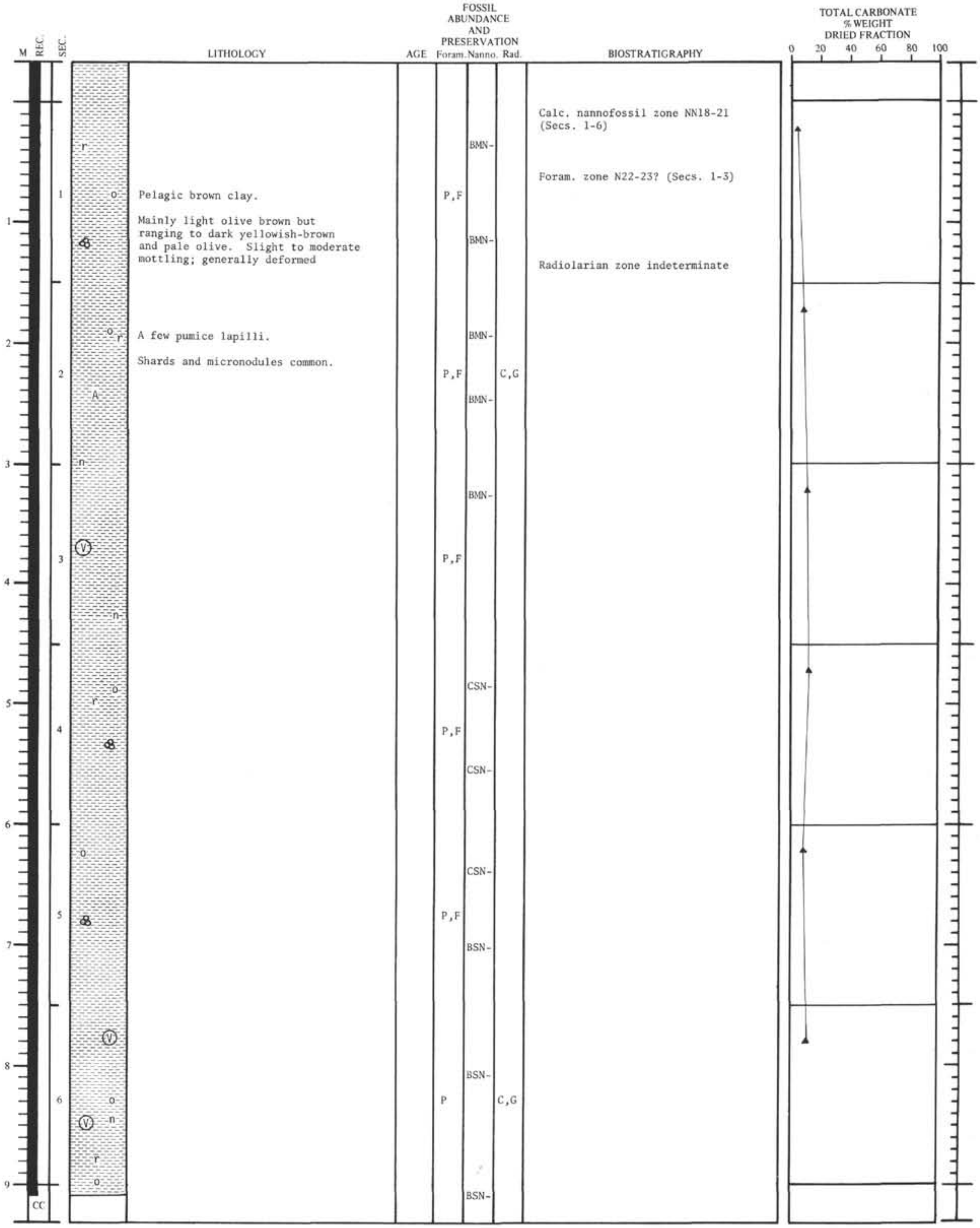
Physical properties of Site 63, 0-400 m.



Lithology and biostratigraphy of Site 63, 400-800 m.



Physical properties of Site 63, 400-800 m.



Pelagic brown clay.

Mainly light olive brown but ranging to dark yellowish-brown and pale olive. Slight to moderate mottling; generally deformed

A few pumice lapilli.

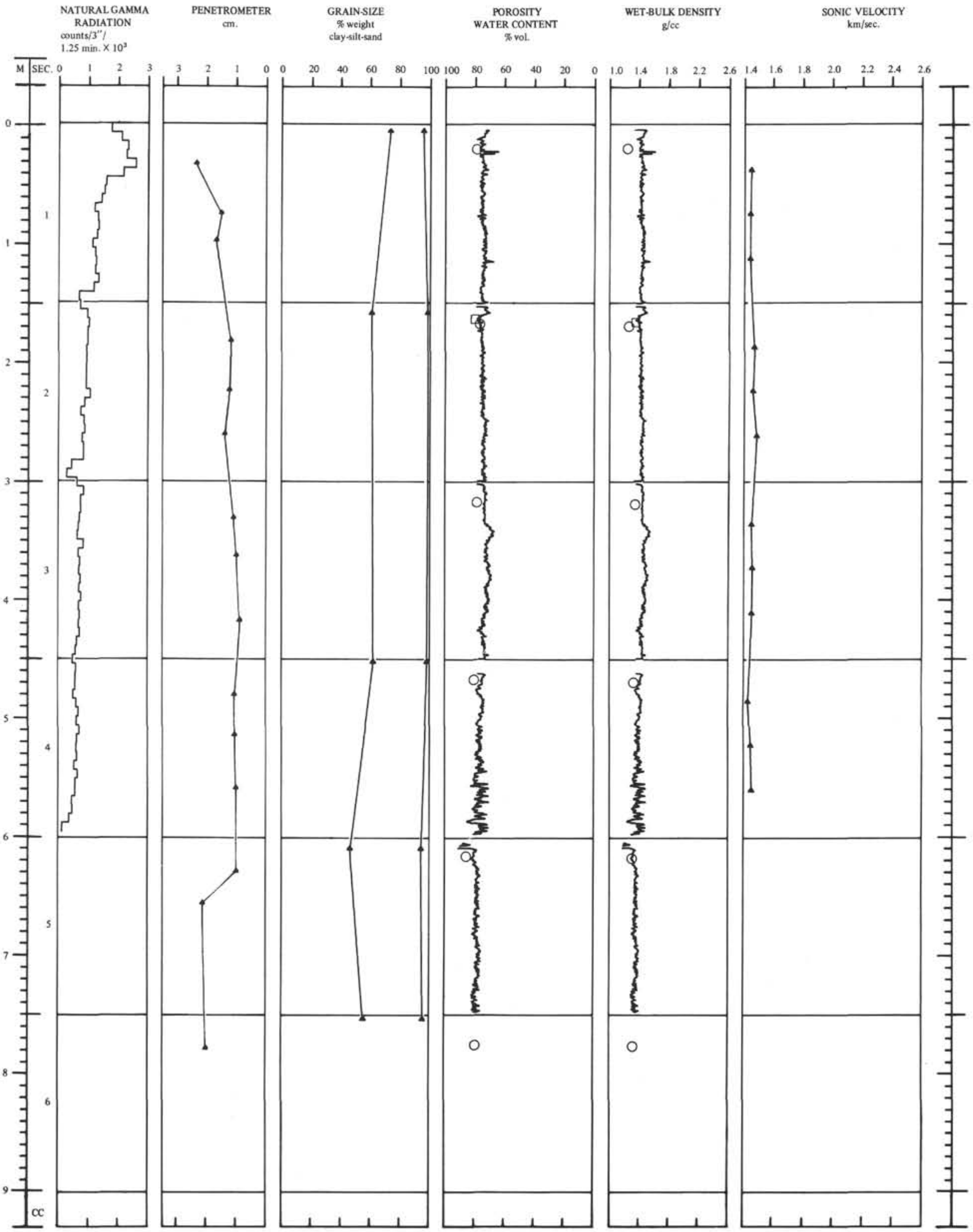
Shards and micronodules common.

Calc. nannofossil zone NN18-21 (Secs. 1-6)

Foram. zone N22-23? (Secs. 1-3)

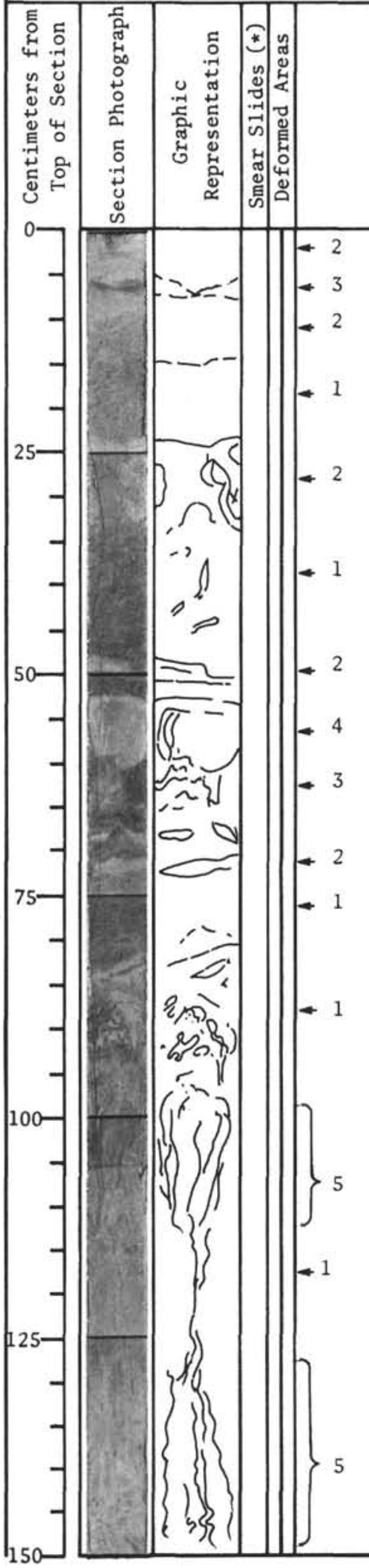
Radiolarian zone indeterminate

Lithology and biostratigraphy of Core 1, Hole 63.0.



Physical properties of Core 1, Hole 63.0

Hole 63.0 Core 1
Section 1

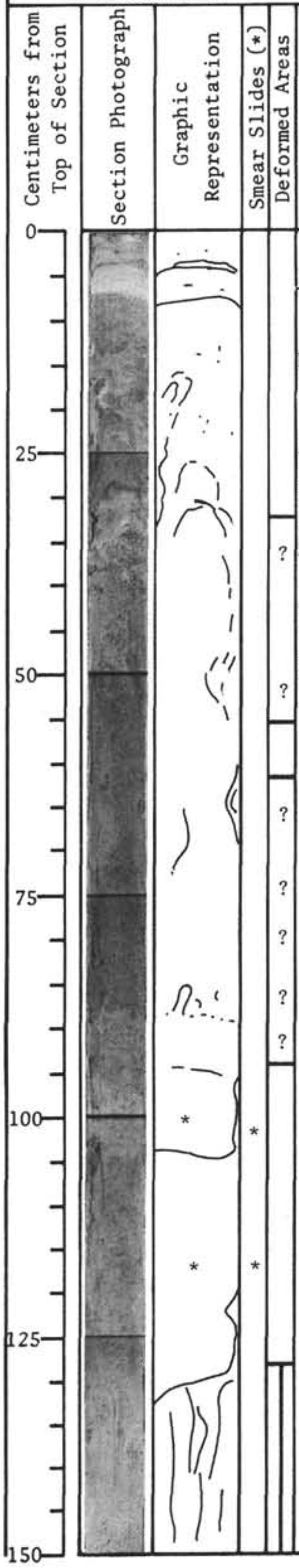


Description

PELAGIC BROWN CLAY
("RED CLAY")

Main color is (1) dark yellowish brown (10YR4/4), with (2) lighter and greener (to olive brown 5Y-5/3) as well as (3) darker (to 5YR3/2) beds? and slight to moderate mottles. (4) dusky yellow (5Y6/4) (5) vertically contorted beds.

Hole 63.0 Core 1
Section 2



Description

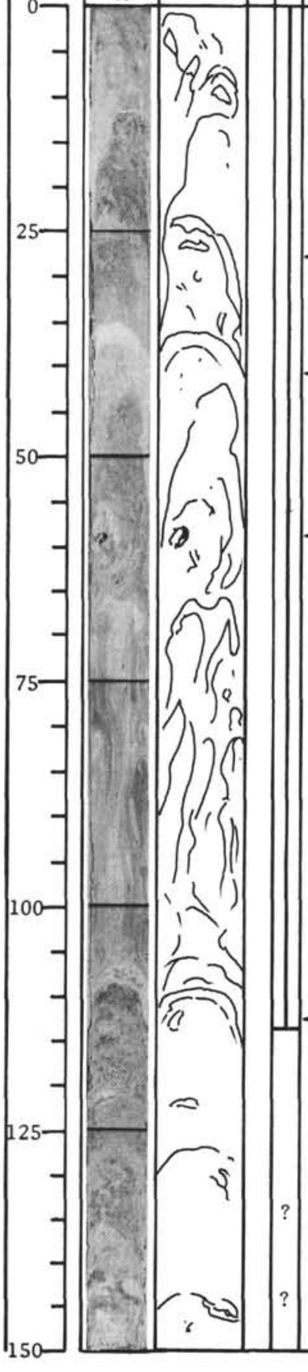
PELAGIC BROWN CLAY

"RED CLAY"

Main color of mud is light olive brown (2 1/2 Y5/4), but darker [to dark yellowish brown (10YR4/4) from 8 to ∿ 20cm and ∿ 70 to 88cm] and lighter [to pale olive (5Y6/3) from ∿ 3 to ∿ 8 and 88 to ∿ 104cm]. Slight to moderate mottling of these colors. Below 130cm core is streaked vertically, probably from coring process.

Hole 63.0 Core 1
Section 3

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



PELAGIC BROWN CLAY

"RED CLAY"

Main color of mud is light olive brown (2 1/2 Y5/4, but with both $(^{1})$ lighter (to

← 2 darker

← 1

← 3

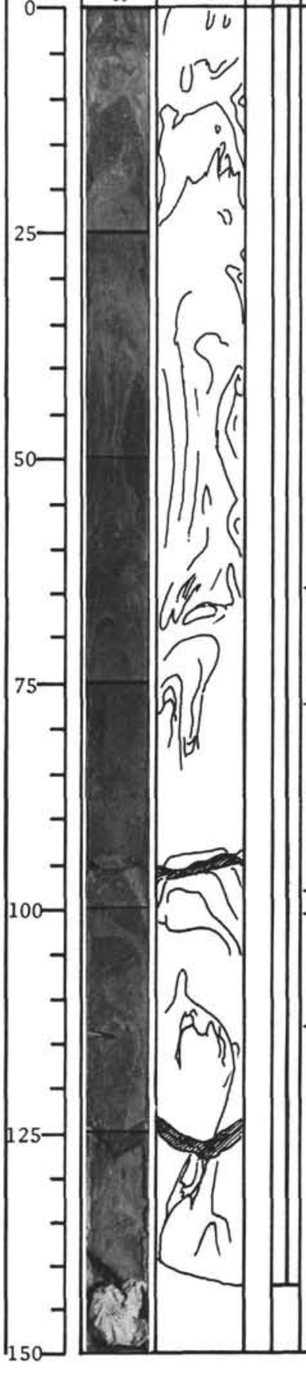
pale olive 5Y6/3) and $(^{2})$ darker (to dark yellowish brown 10YR4/4) mottles and beds.

3 At 61cm depth, a ∿ 1cm dia pumice lapillus, probably sanidine biotite latite ? dacite?

← 2

Hole 63.0 Core 1
Section 4

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



PELAGIC BROWN CLAY

"RED CLAY"

Main color of mud is light olive brown (2 1/2 Y5/4), but with both $(^{1})$ lighter (to pale olive 5Y6/3) and $(^{2})$ darker (to dark yellowish brown 10YR-4/4) mottles and beds.

Very watery at 95 and 126cm.

← 2

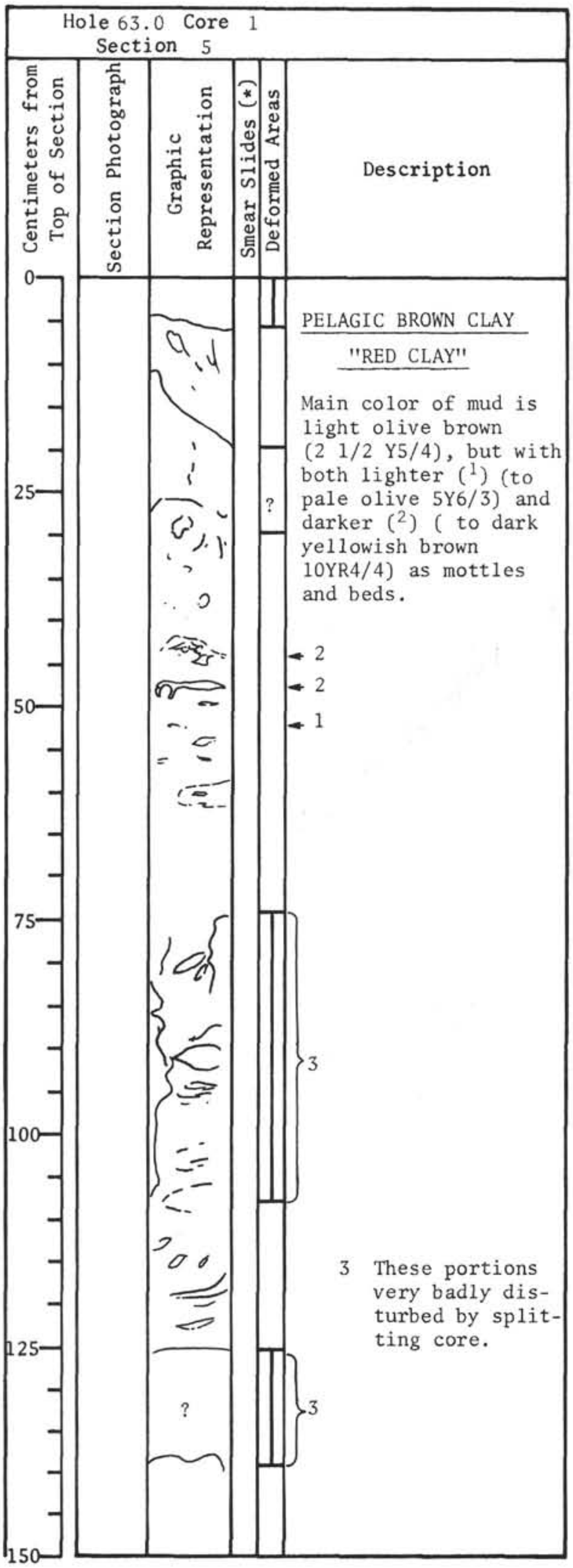
← 2

← 1

← 1

← 1

Hole 63.0 Core 1
Section 5



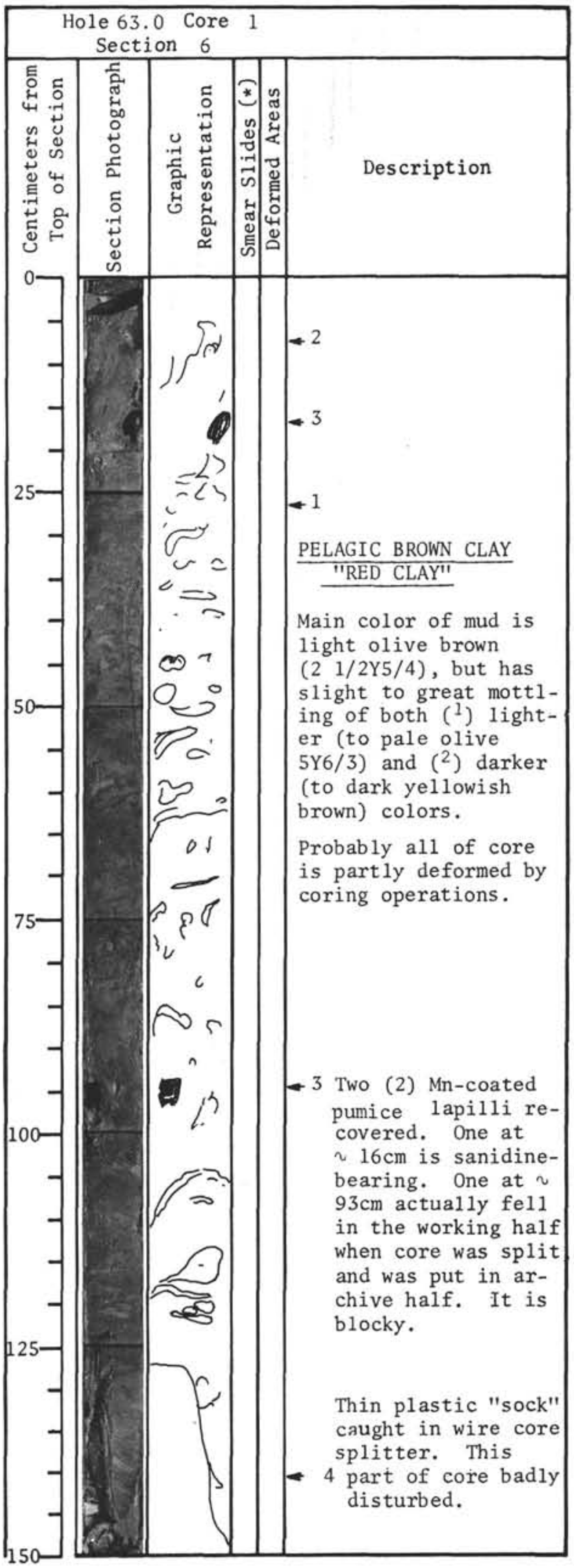
PELAGIC BROWN CLAY

"RED CLAY"

Main color of mud is light olive brown (2 1/2 Y5/4), but with both lighter (^{1}) (to pale olive 5Y6/3) and darker (^{2}) (to dark yellowish brown 10YR4/4) as mottles and beds.

3 These portions very badly disturbed by splitting core.

Hole 63.0 Core 1
Section 6



PELAGIC BROWN CLAY

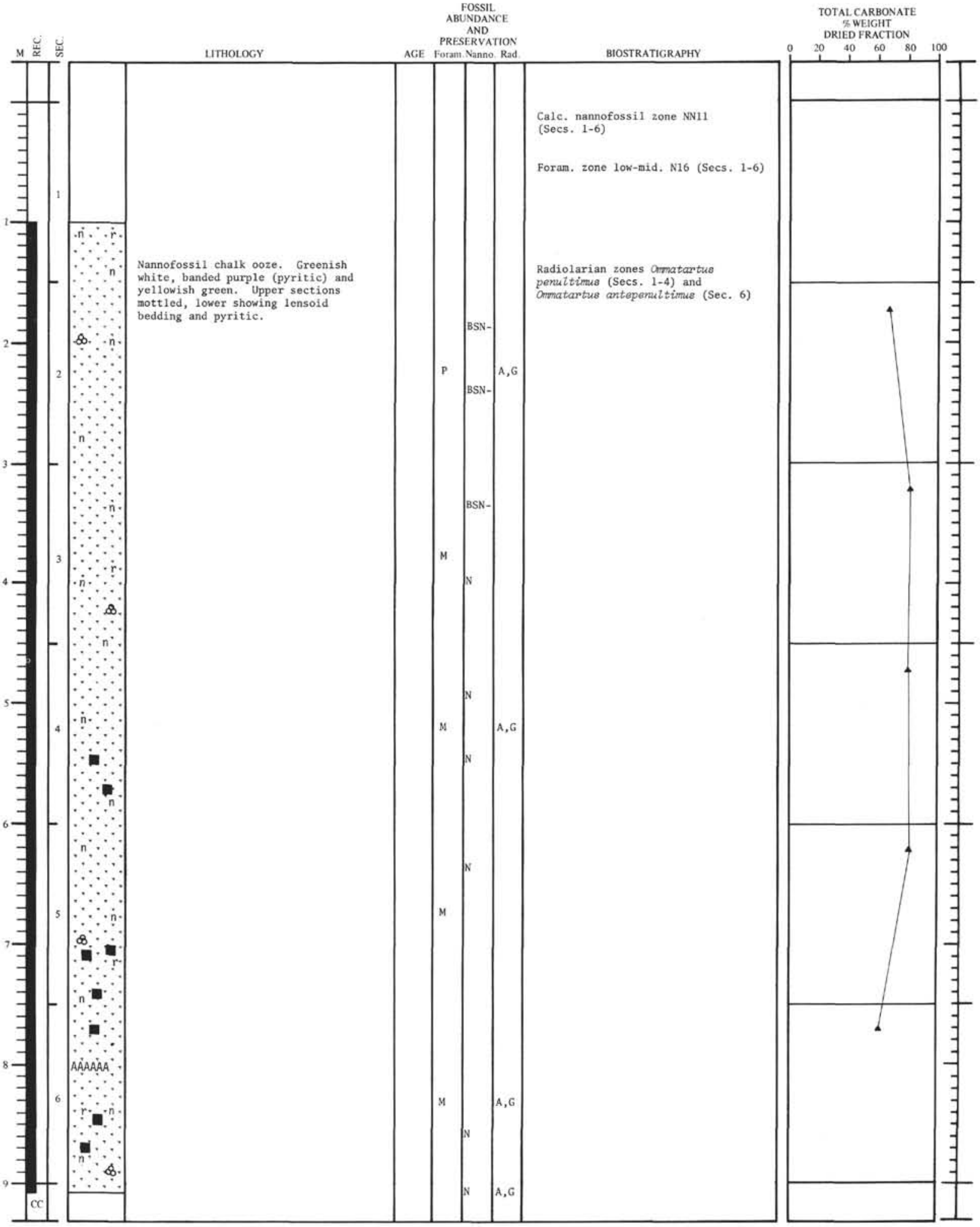
"RED CLAY"

Main color of mud is light olive brown (2 1/2Y5/4), but has slight to great mottling of both (^{1}) lighter (to pale olive 5Y6/3) and (^{2}) darker (to dark yellowish brown) colors.

Probably all of core is partly deformed by coring operations.

3 Two (2) Mn-coated pumice lapilli recovered. One at ∿ 16cm is sanidine-bearing. One at ∿ 93cm actually fell in the working half when core was split and was put in archive half. It is blocky.

Thin plastic "sock" caught in wire core splitter. This 4 part of core badly disturbed.



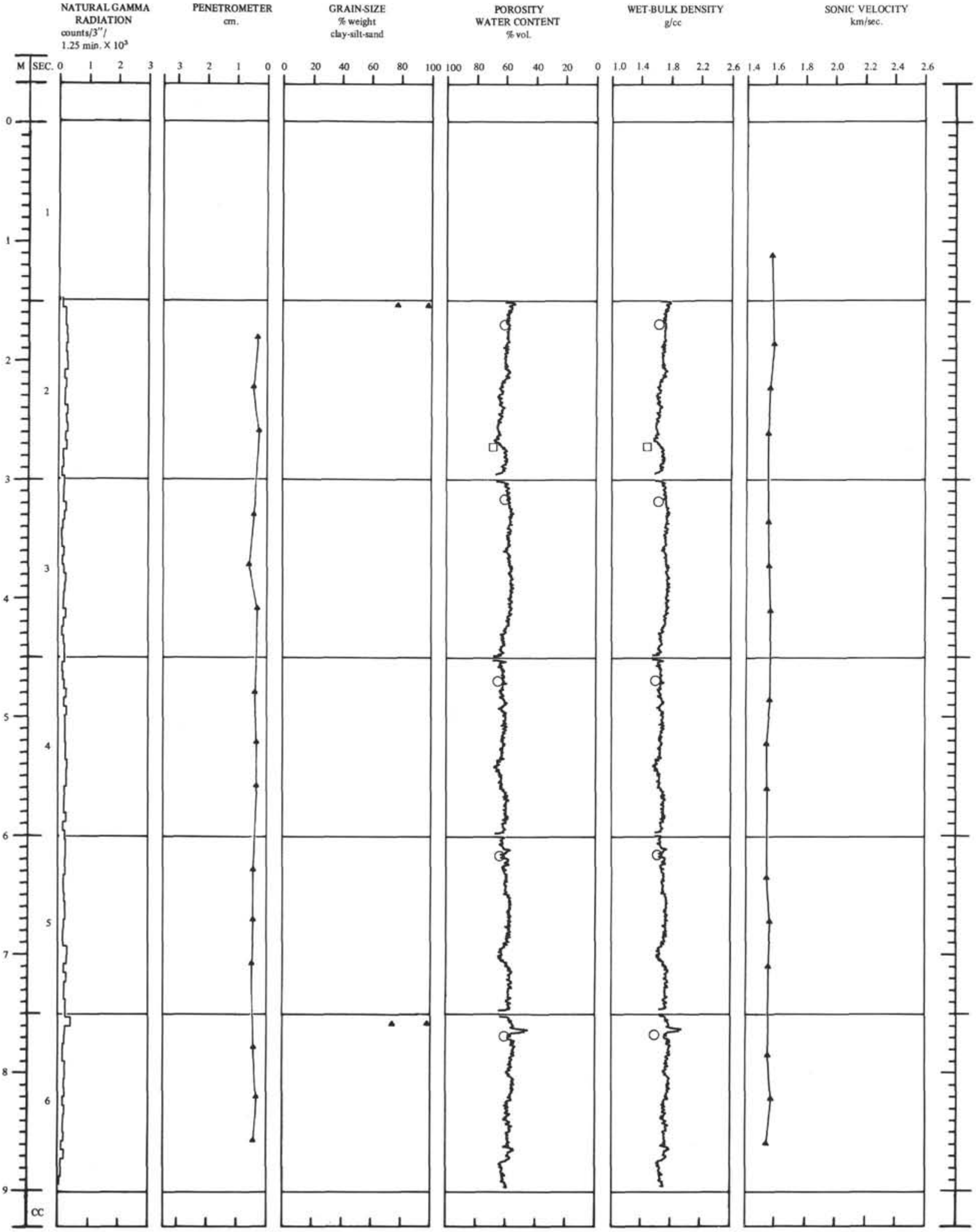
Nannofossil chalk ooze. Greenish white, banded purple (pyritic) and yellowish green. Upper sections mottled, lower showing lensoid bedding and pyritic.

Calc. nannofossil zone NN11 (Secs. 1-6)

Foram. zone low-mid. N16 (Secs. 1-6)

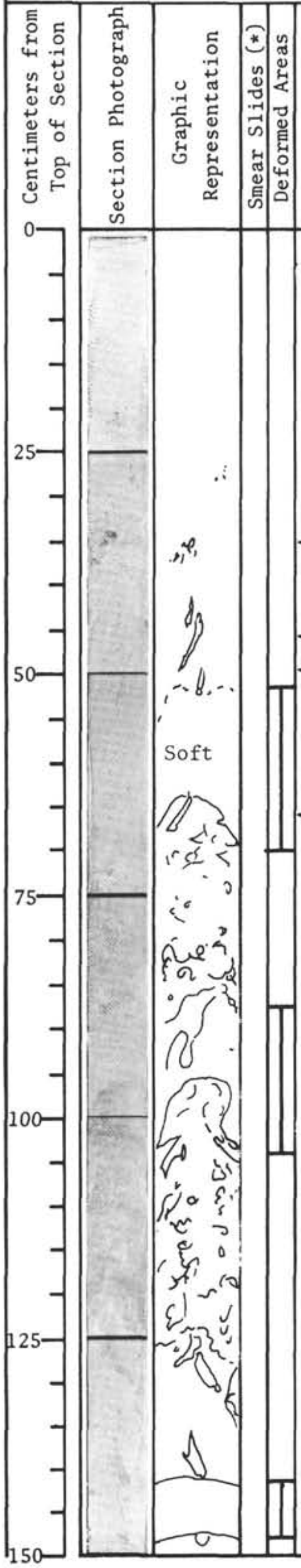
Radiolarian zones *Ommatartus penultimus* (Secs. 1-4) and *Ommatartus antepenultimus* (Sec. 6)

Lithology and biostratigraphy of Core 2, Hole 63.0.



Physical properties of Core 2, Hole 63.0.

Hole 63.0 Core 2
Section 2



Description

NANNOFOSSIL CHALK OOZE

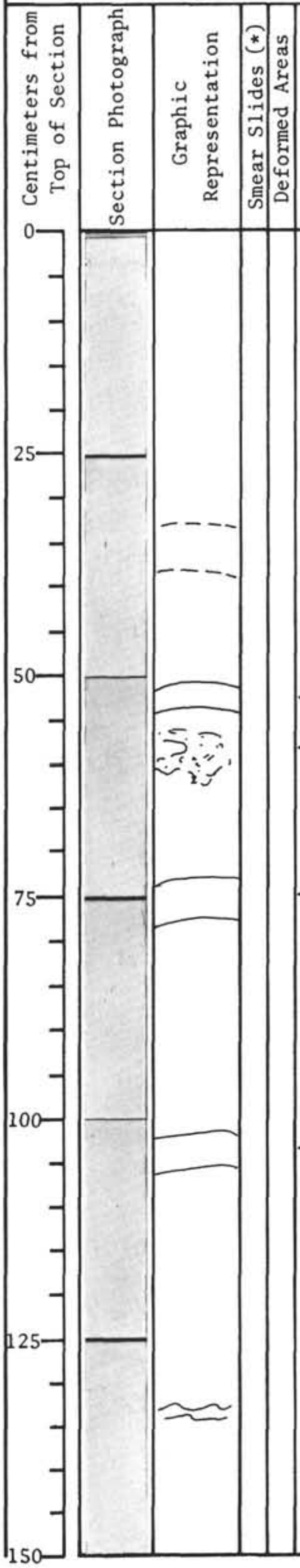
Mainly greenish white (5GY9/1) calcareous ooze, moderately (68-88cm), heavily (96-122 cm), and slightly (122-141cm) mottled with greenish gray (10G6/1) ooze.

← 1 Dark olive gray 5Y4/1 specks.

← 2 A few pale yellow
← 2 (21/2Y8/2) mottles.

← 2

Hole 63.0 Core 2
Section 3



Description

NANNOFOSSIL CHALK OOZE

Soft areas homogenized by drilling.

Very uniform firm greenish white 5GY9/1 with rare pyritic very dusky purple 5P2/2 1-2mm spots.

Bedding indistinct, more or less homogeneous. Very faint moderate mottling dusky yellow 5Y6/4 band at 134cm.

← 2

← 1

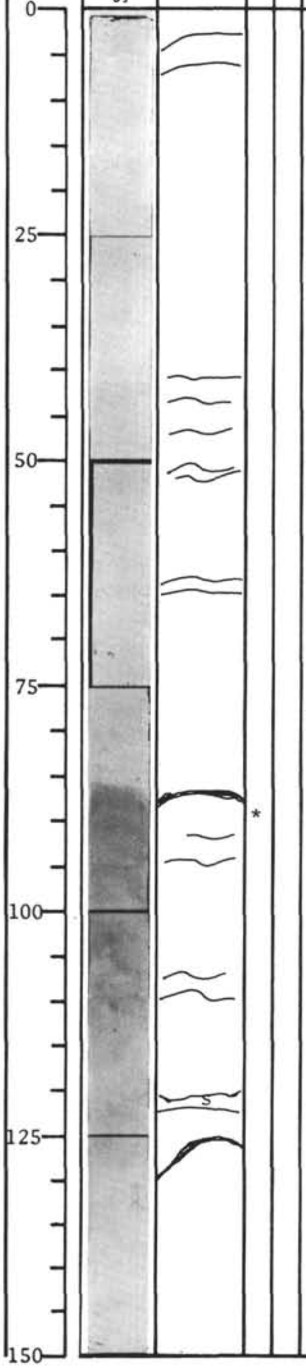
← 2

1) Zebra spots
2) Soft bands

← 2

Hole 63.0 Core 2
Section 4

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



NANNOFOSSIL CHALK OOZE

0-86cm:
Greenish white 5G9/1 with faint 1/2-2cm horizontal layering and rare very dusky purple 5P2/2 spots.

Firm.

Sharp boundary at 86cm.

86-126cm:
Purple 5P5/2, becoming paler at depth. Structure as above. Color source not apparent in thin section.

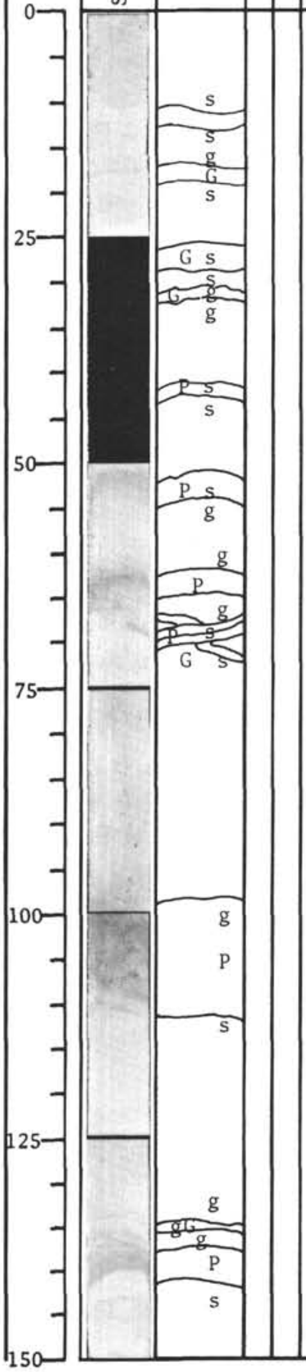
Gradational boundary at 126cm.

126-150cm:
Pale violet 5P7/2, structure as above.

s= soft

Hole 63.0 Core 2
Section 5

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



NANNOFOSSIL CHALK OOZE

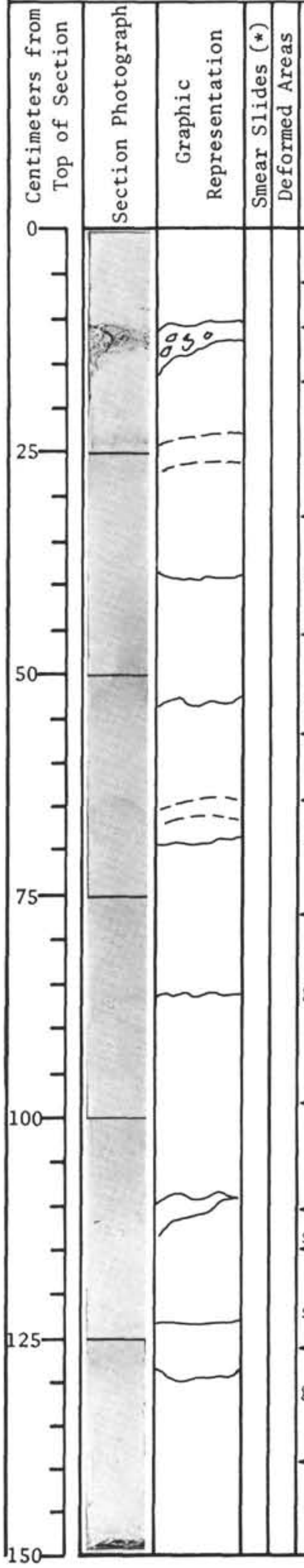
0-17cm:
Pale purple 5P7/2.

17-150cm:
Greenish white 5G9/1 with marked banding:
P=Purple, 5P5/2
G=Pale yellowish green 10GY7/2.

Boundaries:
s=sharp
g=gradational

Firm texture, horizontal rather lensoid bedding.

Hole 63.0 Core 2
Section 6



Description

2 NANNOFOSSIL CHALK OOZE

3 Purple layer with pyrite concretions.

2 Pale purple 5P7/2.

g

g

1

g

2

g

1 Light greenish gray 5GY8/1.

4 ? Altered ash.

5 Greenish gray 5G6/1.

1

Firm texture, horizontal bedding.

g

s= sharp boundaries
g= gradational boundaries.

2

6 Light greenish gray 5G8/1.

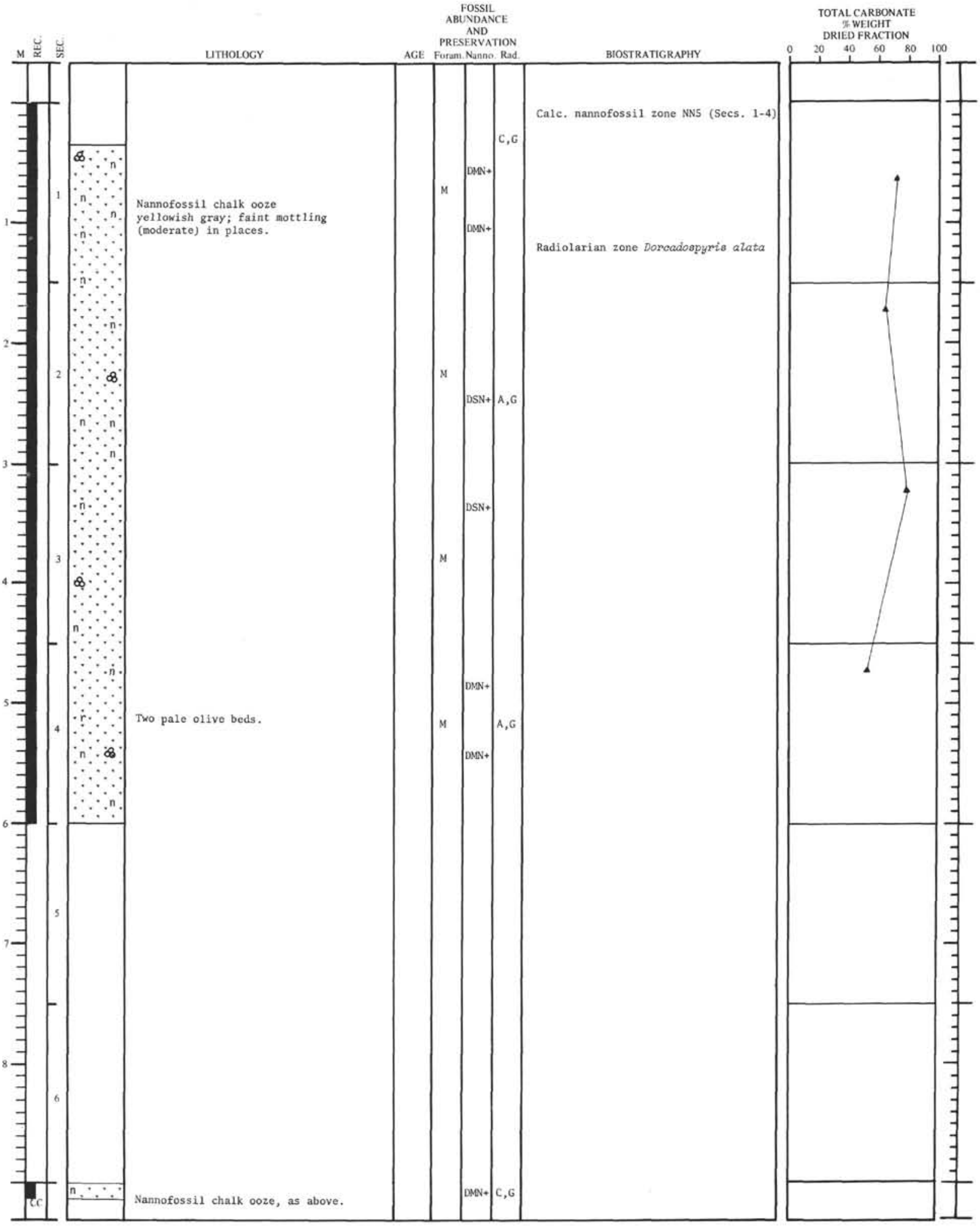
s 8

s

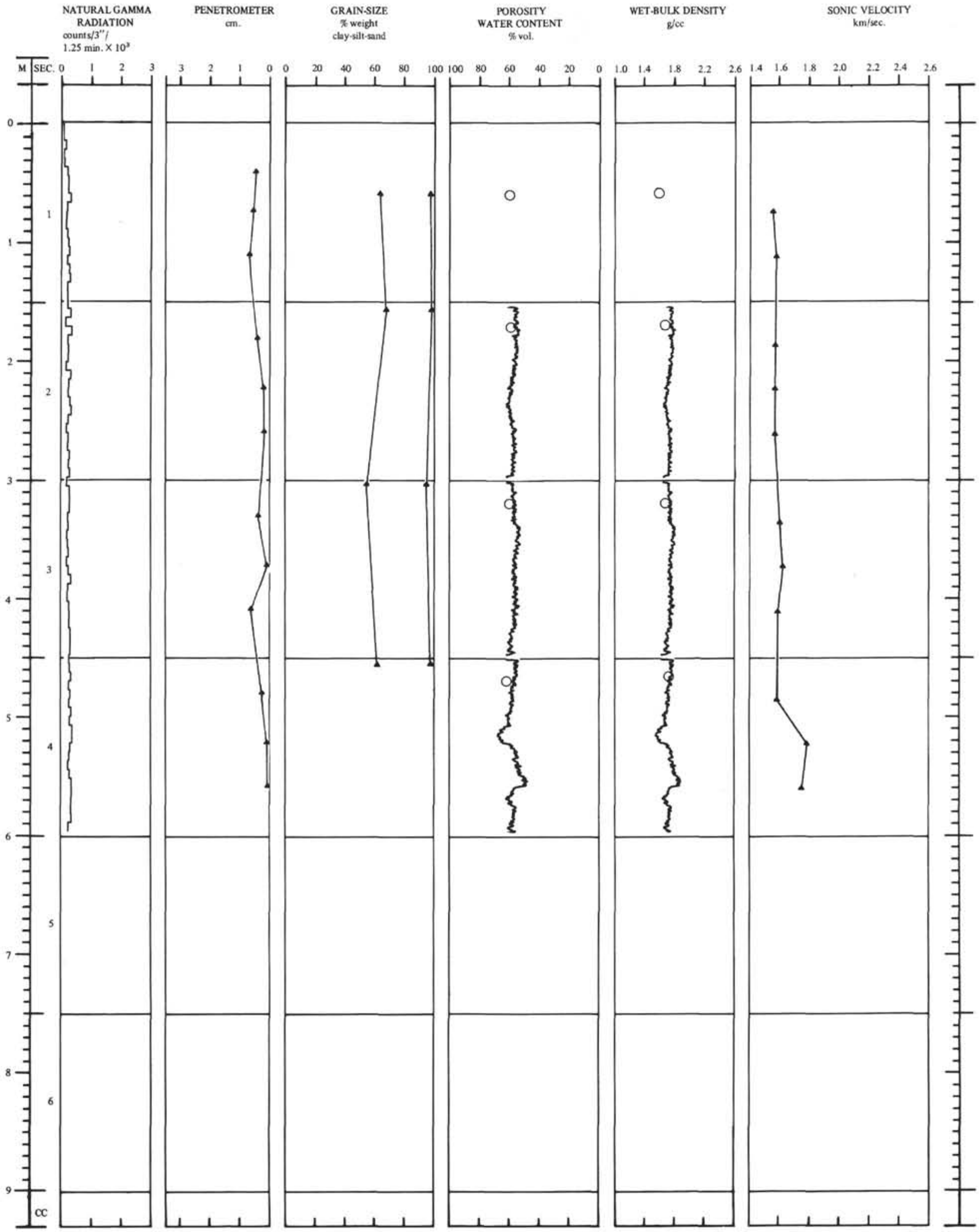
7 Pale olive 10Y7/2.

g

8



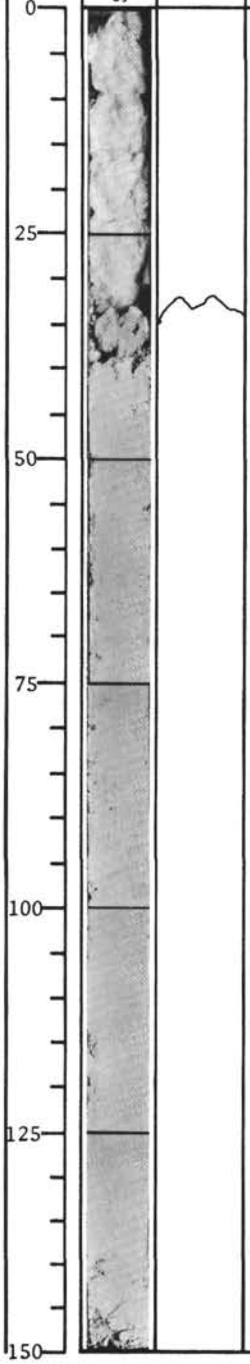
Lithology and biostratigraphy of Core 3, Hole 63.0.



Physical properties of Core 3, Hole 63.0.

Hole 63.0 Core 3
Section 1

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



NANNOFOSSIL CHALK OOZE

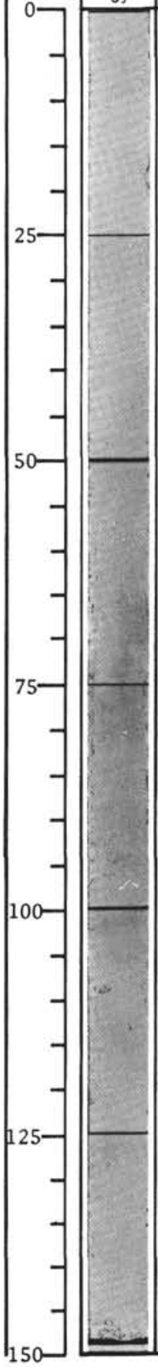
Very firm to semi-consolidated, very uniform, yellowish gray 5Y8/1.

No structures.

0-33cm: Void

Hole 63.0 Core 3
Section 2

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

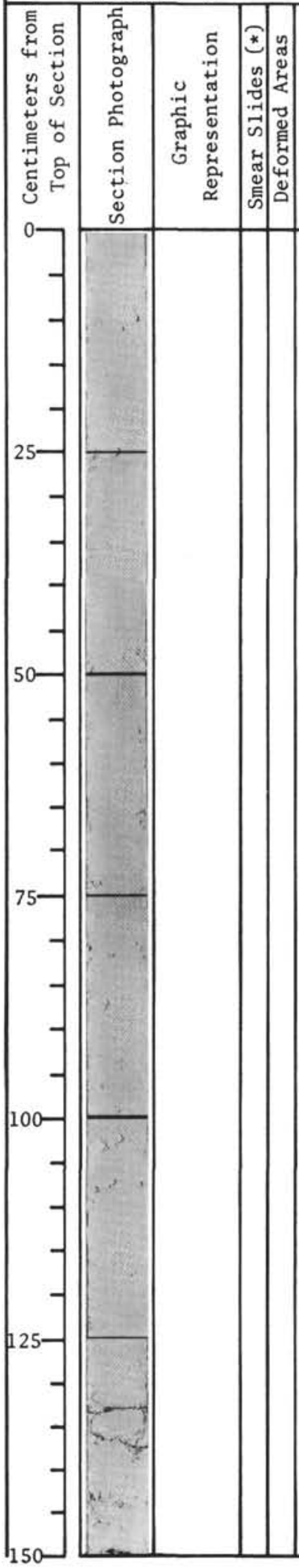


NANNOFOSSIL CHALK OOZE

Very firm to semi-consolidated, very uniform yellowish gray 5Y8/1.

Very faint moderate mottling.

Hole 63.0 Core 3
Section 3



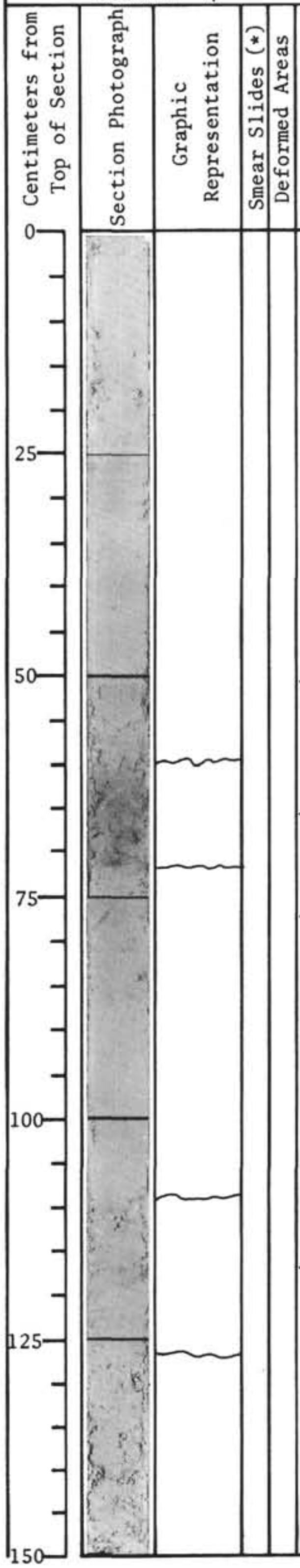
Description

NANNOFOSSIL CHALK OOZE

Very uniform, very firm to semi-indurated 5Y8/1 yellowish gray.

Very faint moderate mottling.

Hole 63.0 Core 3
Section 4



Description

NANNOFOSSIL CHALK OOZE

Uniformly very firm to semi-indurated throughout.

All boundaries gradational (g).

Bedding horizontal.

← 1

g

← 2

g

← 1

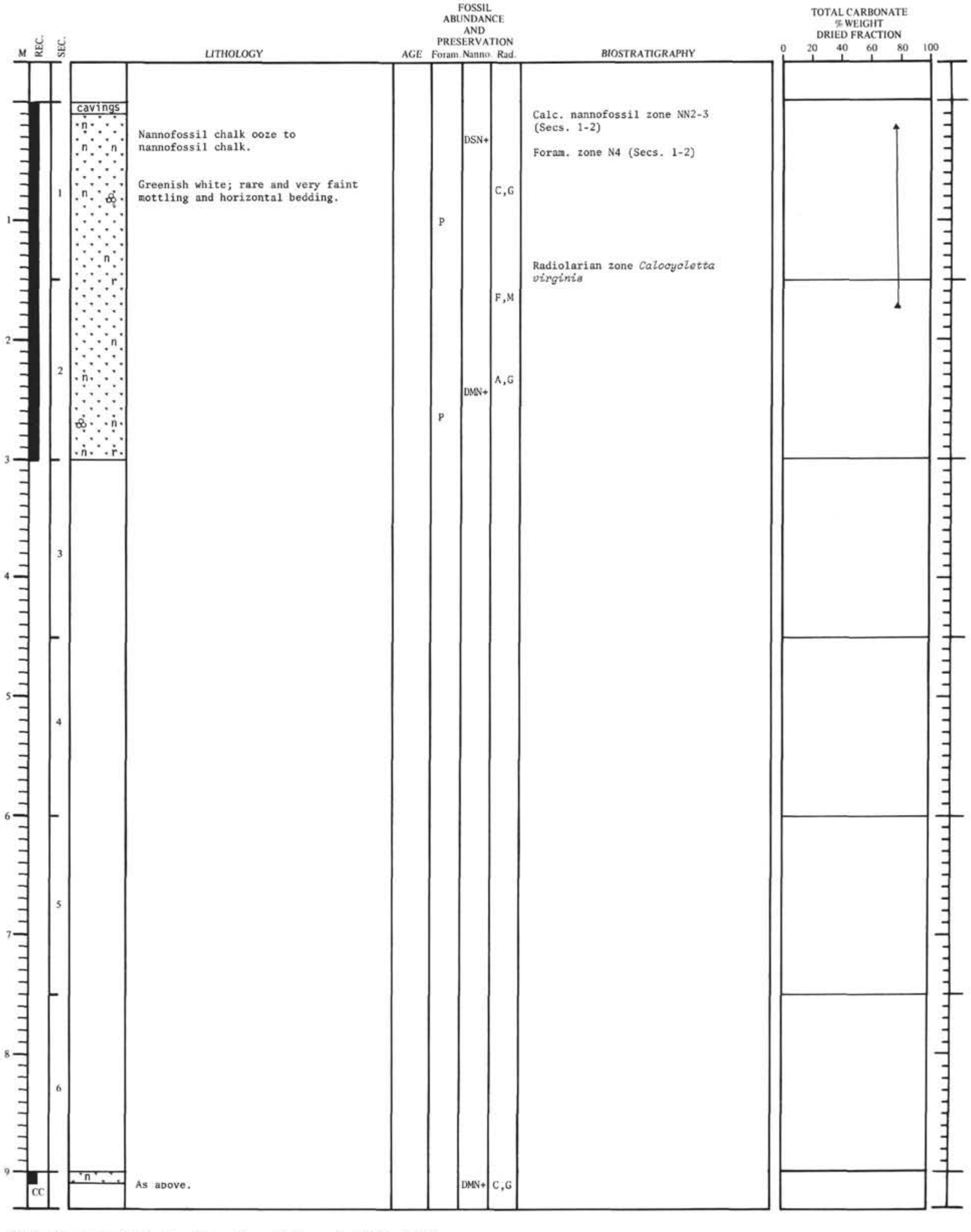
(1) 5Y8/2 yellowish gray, with minor 5Y6/2 pale olive mottling.

(2) 5Y6/2 pale olive with moderate 5Y8/2 yellowish gray mottling.

g

← 2

g



Nannofossil chalk ooze to nannofossil chalk.

Greenish white; rare and very faint mottling and horizontal bedding.

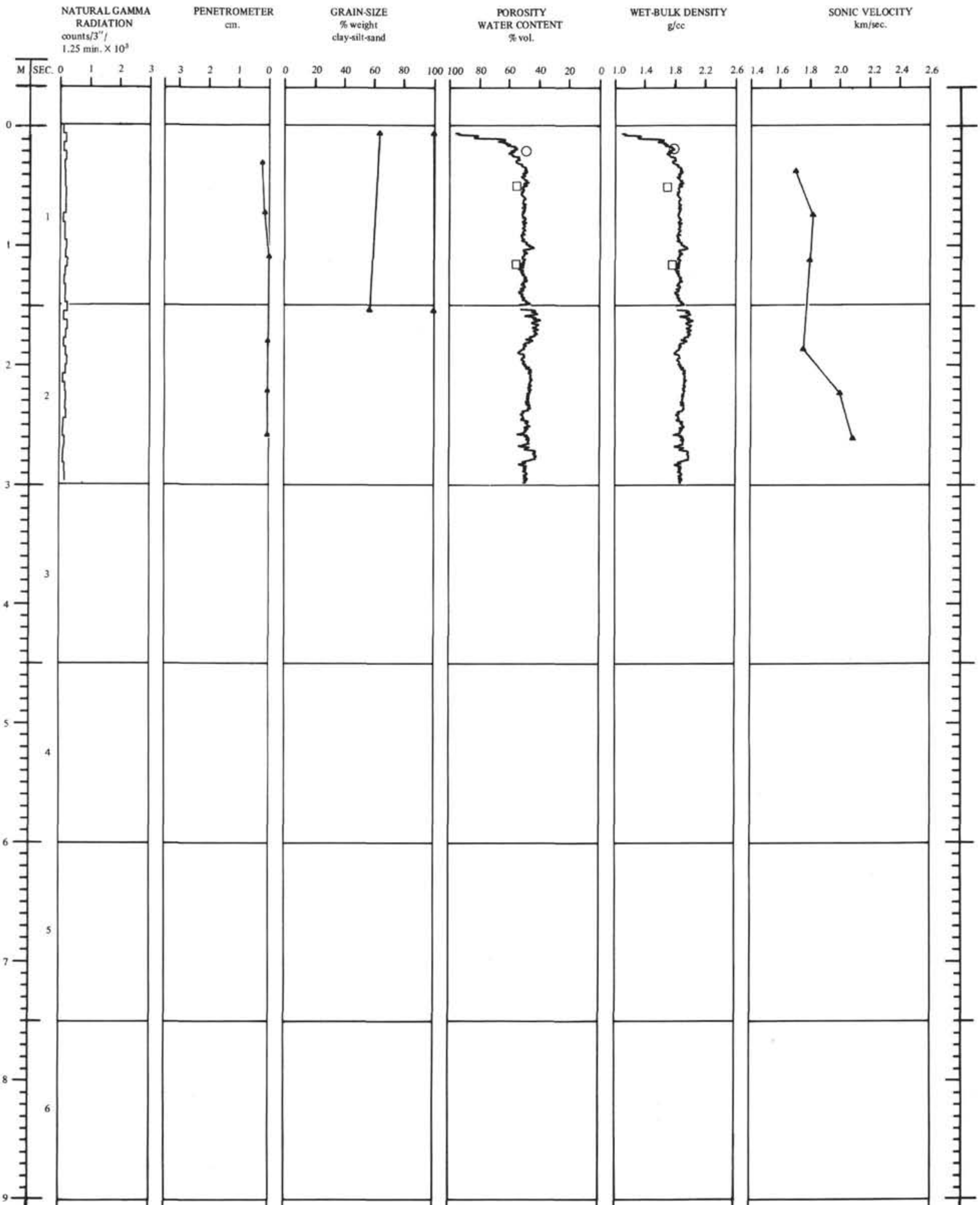
As above.

Calc. nannofossil zone NN2-3 (Secs. 1-2)

Foram. zone N4 (Secs. 1-2)

Radiolarian zone *Calocycletta virginis*

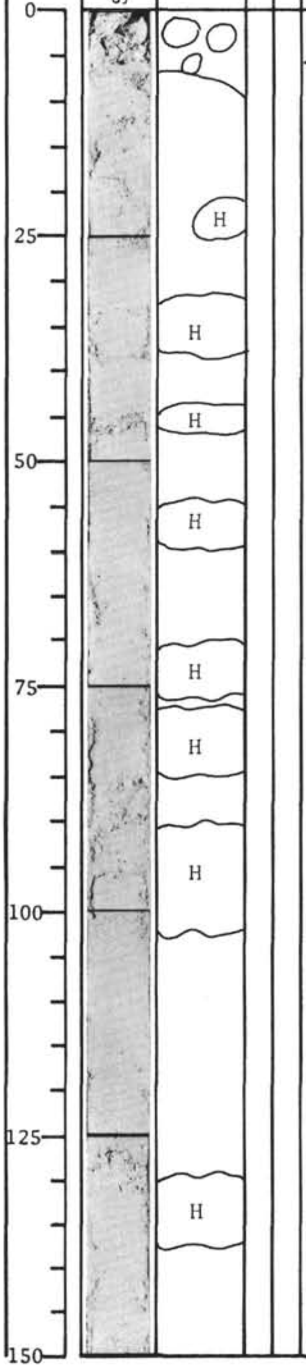
Lithology and biostratigraphy of Core 4, Hole 63.0.



Physical properties of Core 4, Hole 63.0.

Hole 63.0 Core 4
Section 1

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



← 1 Cavings.

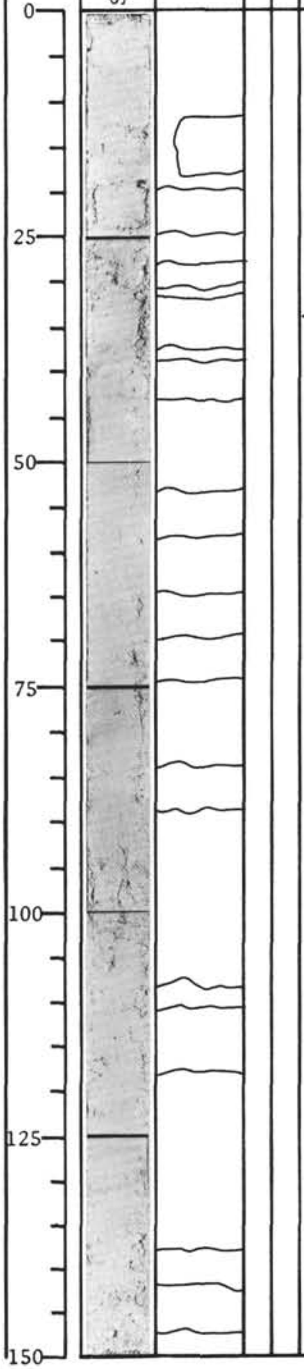
NANNOFOSSIL CHALK OOZE to CHALK

Very uniform semi-indurated to indurated ("H" lumps) greenish white 5GY9/1.

Rare, very faint mottling, and horizontal bedding.

Hole 63.0 Core 4
Section 2

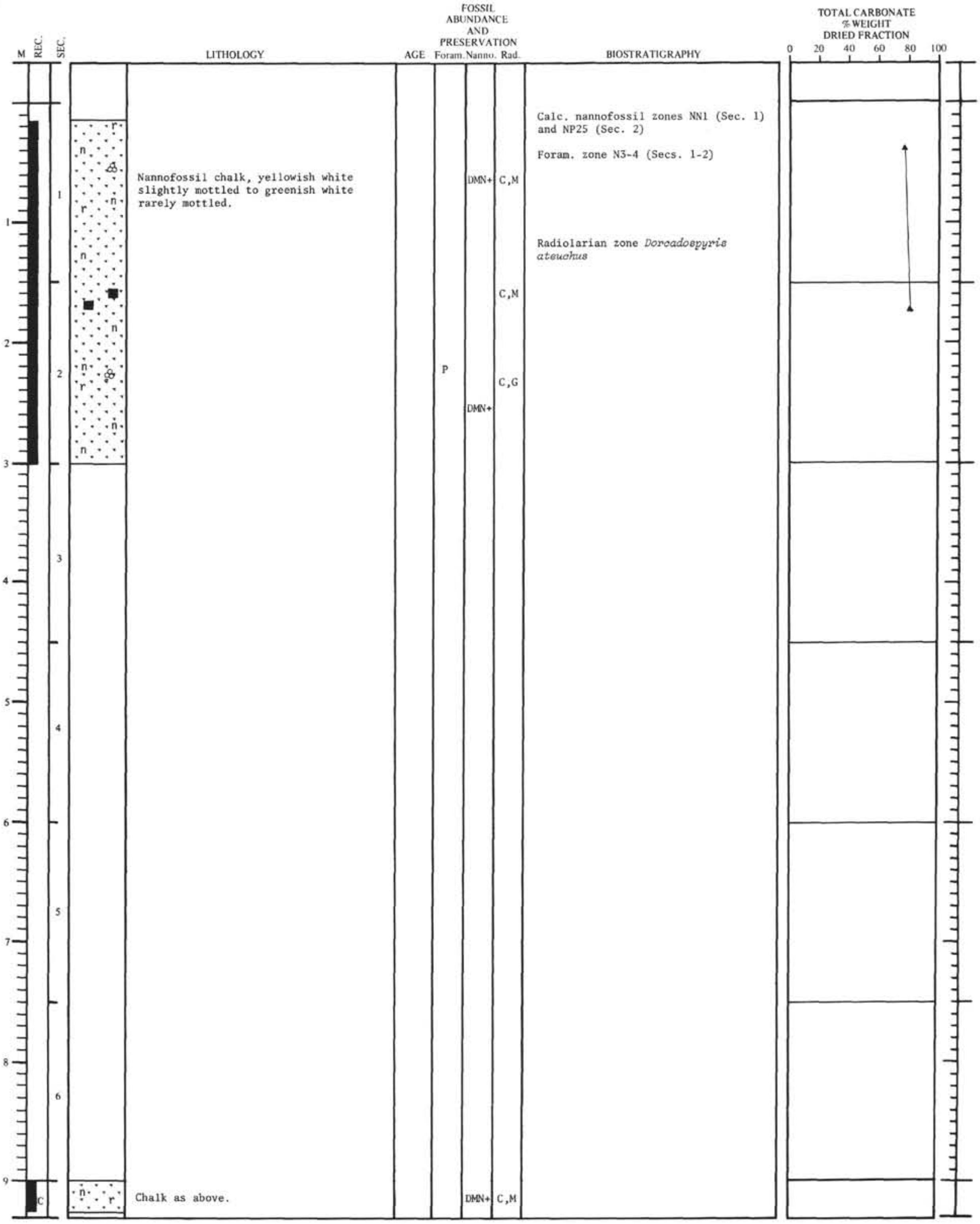
Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



NANNOFOSSIL CHALK or CHALK OOZE

← 1 5Y7/2 pale olive band.

Very uniform indurated ("H") to semi-indurated very uniform greenish white 5GY9/1.



Nannofossil chalk, yellowish white slightly mottled to greenish white rarely mottled.

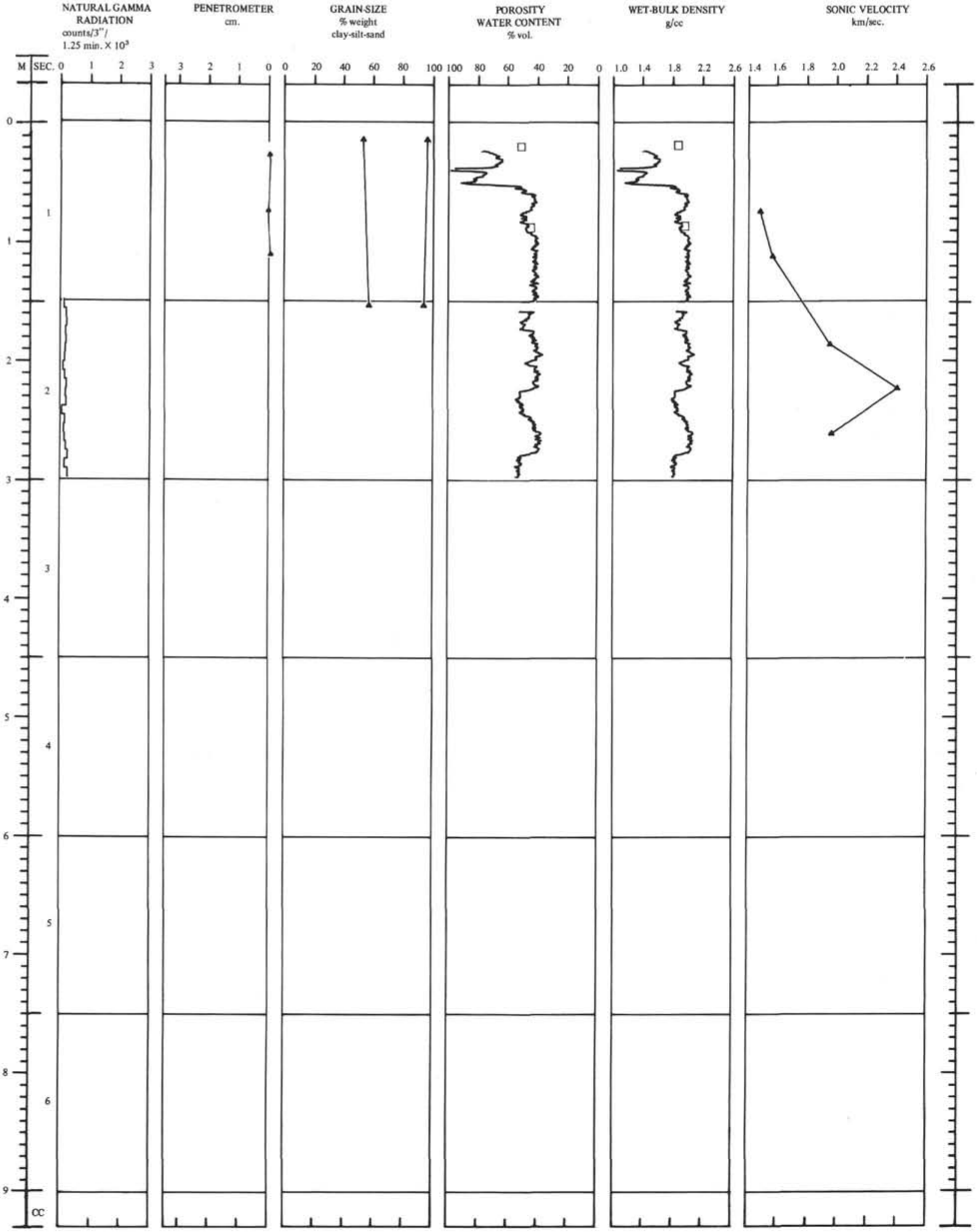
Chalk as above.

Calc. nannofossil zones NN1 (Sec. 1) and NP25 (Sec. 2)

Foram. zone N3-4 (Secs. 1-2)

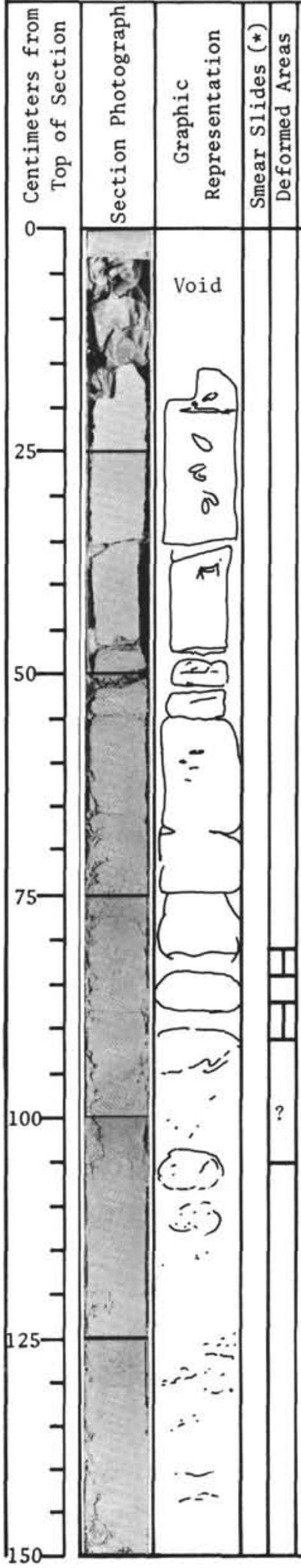
Radiolarian zone *Dorcadospyris ateuchus*

Lithology and biostratigraphy of Core 5, Hole 63.0.



Physical properties of Core 5, Hole 63.0.

Hole 63.0 Core 5
Section 1



Description

CHALK

Was cut on band saw; pieces rotated slightly, so not perfect halves.

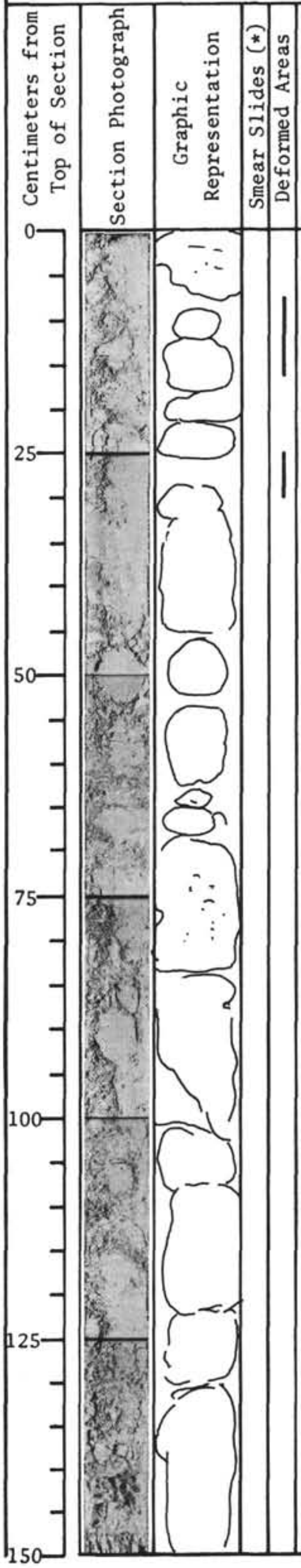
0-15cm:
Void; top of Core 5.

15-46cm:
Yellowish white (5Y8/1) indurated chalk, slightly mottled, the mottles are lined with Mn. A horizontal mottle or a bed at 19cm. Basal contact broken.

46-88cm: or 93?
Light gray (N7) fairly firm chalk. A few faint mottles and Mn stains 47-63cm. Broken into pieces by drilling. Gradational tilted contact.

88 or 93-150cm:
Light grayish blue 5PB7/2 fairly firm chalk; fine mottling especially around 95 and 128cm. Some pieces broken by drilling

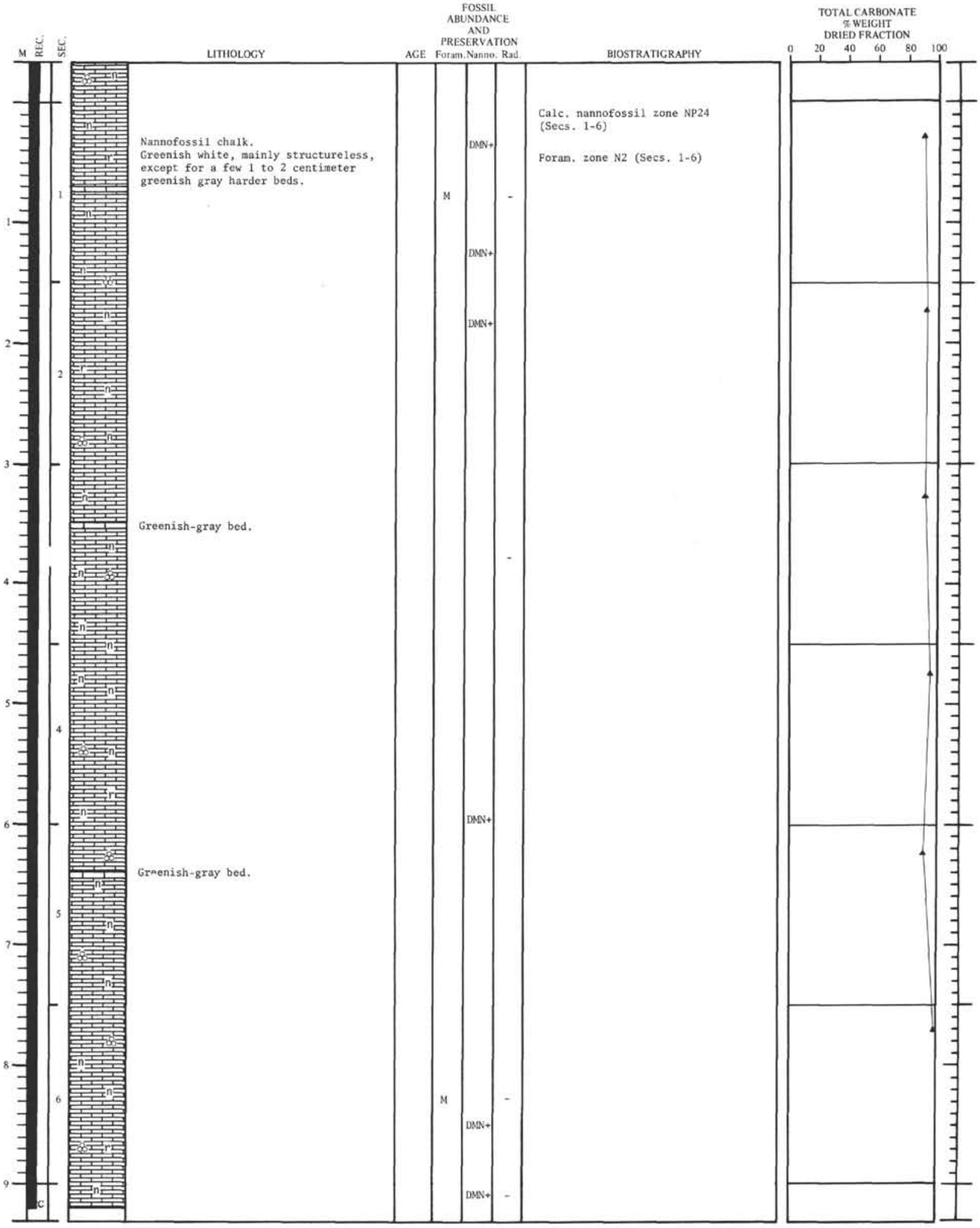
Hole 63.0 Core 5
Section 2



Description

CHALK

Greenish white (5GY8/1) chalk, in lumps broken by the coring process. Uppermost few cm with faint bluish purple (5PB) mottles and some gray mottles near 78cm otherwise no apparent structures.



Nannofossil chalk.
Greenish white, mainly structureless, except for a few 1 to 2 centimeter greenish gray harder beds.

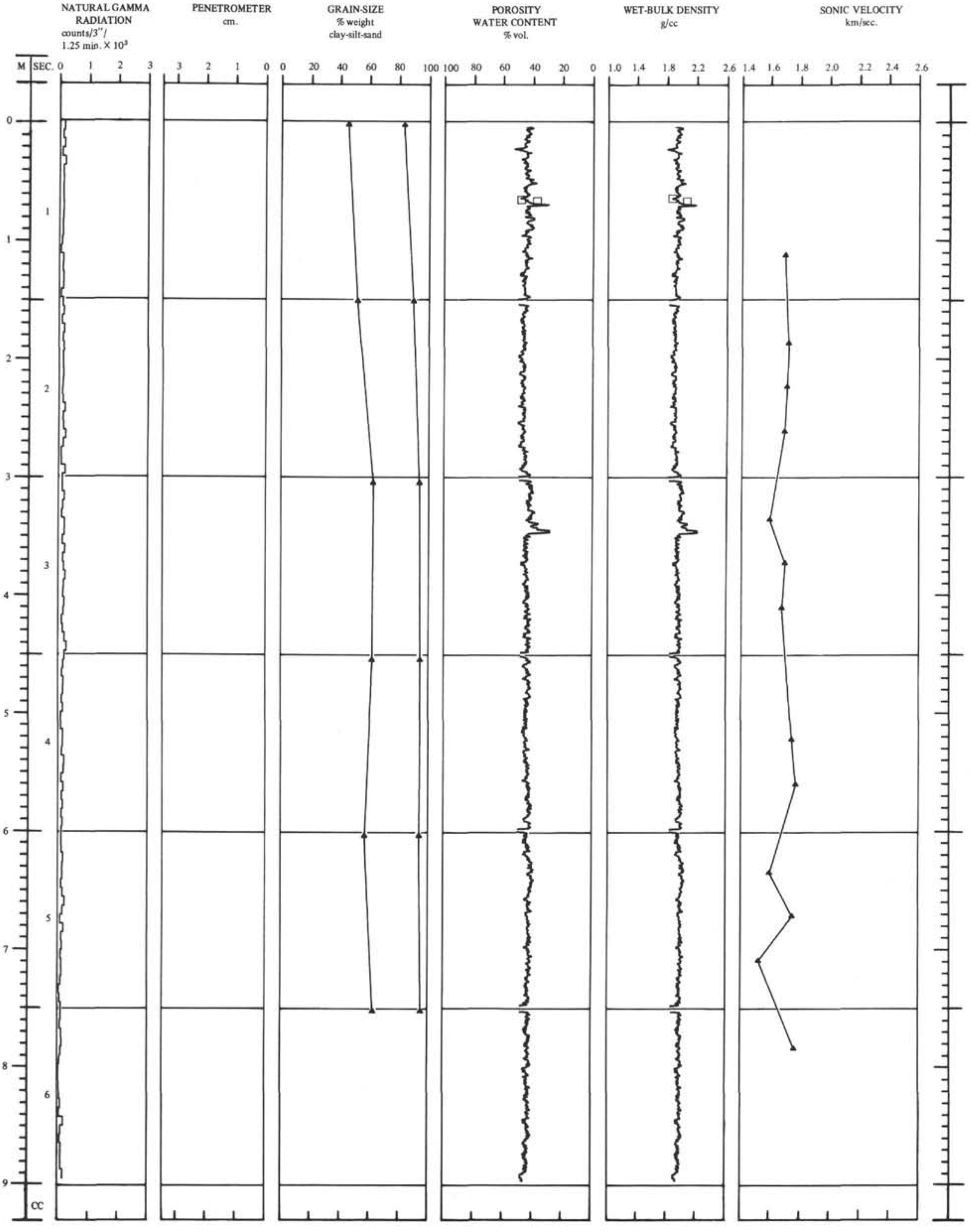
Greenish-gray bed.

Grᵉenish-gray bed.

Calc. nannofossil zone NP24 (Secs. 1-6)

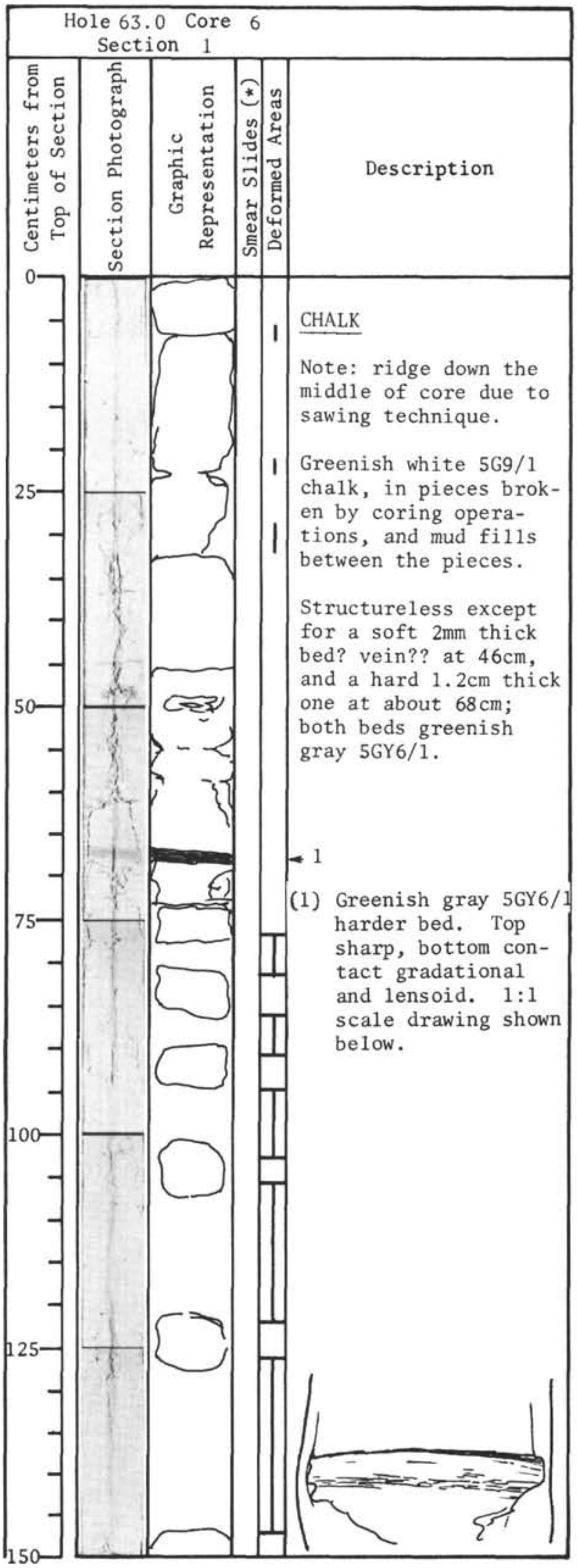
Foram. zone N2 (Secs. 1-6)

Lithology and biostratigraphy of Core 6, Hole 63.0.



Physical properties of Core 6, Hole 63.0.

Hole 63.0 Core 6
Section 1



CHALK

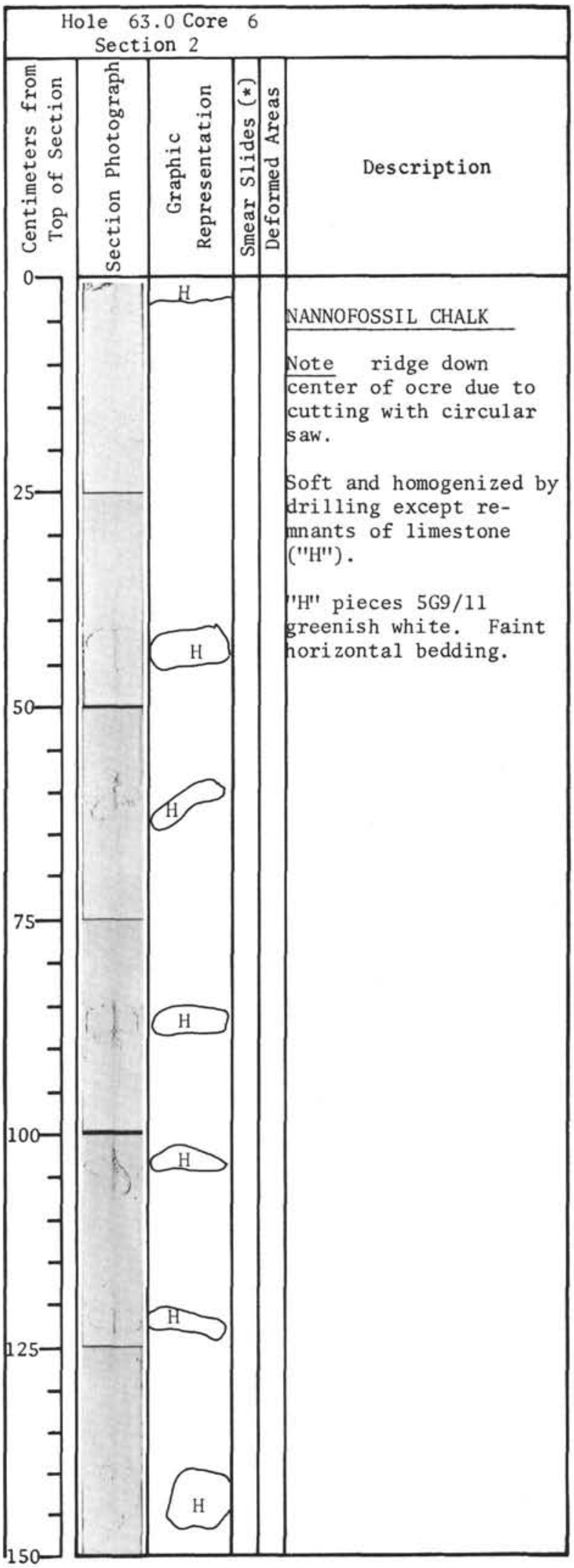
Note: ridge down the middle of core due to sawing technique.

Greenish white 5G9/1 chalk, in pieces broken by coring operations, and mud fills between the pieces.

Structureless except for a soft 2mm thick bed? vein?? at 46cm, and a hard 1.2cm thick one at about 68cm; both beds greenish gray 5GY6/1.

(1) Greenish gray 5GY6/1 harder bed. Top sharp, bottom contact gradational and lensoid. 1:1 scale drawing shown below.

Hole 63.0 Core 6
Section 2



NANNOFOSSIL CHALK

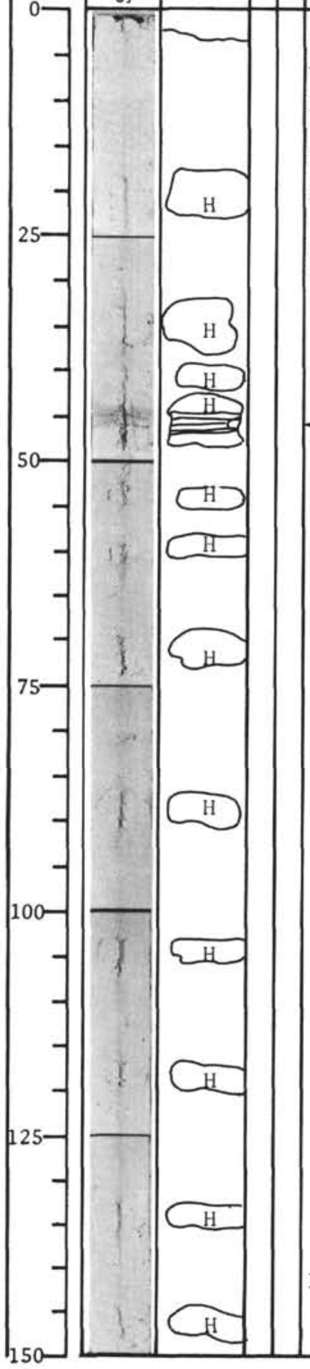
Note ridge down center of ocre due to cutting with circular saw.

Soft and homogenized by drilling except remnants of limestone ("H").

"H" pieces 5G9/11 greenish white. Faint horizontal bedding.

Hole 63.0 Core 6
Section 3

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



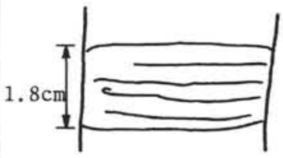
NANNOFOSSIL CHALK

Hard lumps of original rock (H) in homogenized matrix.

Hard lumps (H) are 5G9/1 greenish white. No structure visible except below.

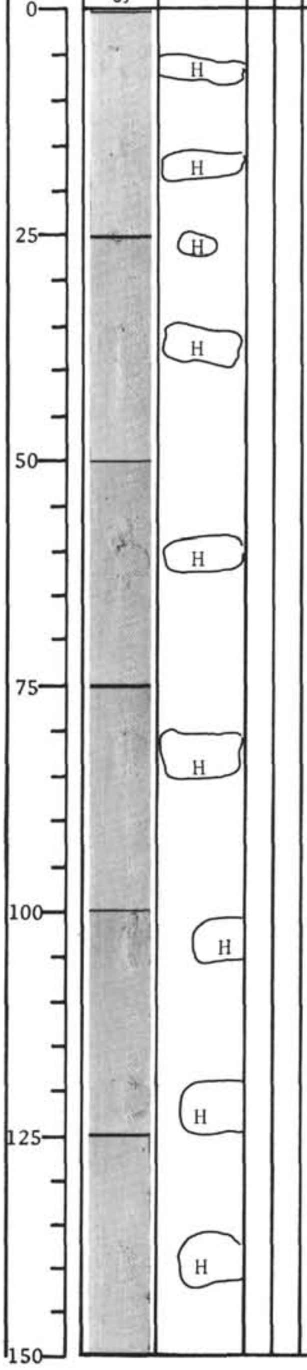
(1) 1.8cm of horizontally bedded greenish gray 596-7/1.

Detail of layers at 45cm.



Hole 63.0 Core 6
Section 4

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



NANNOFOSSIL CHALK

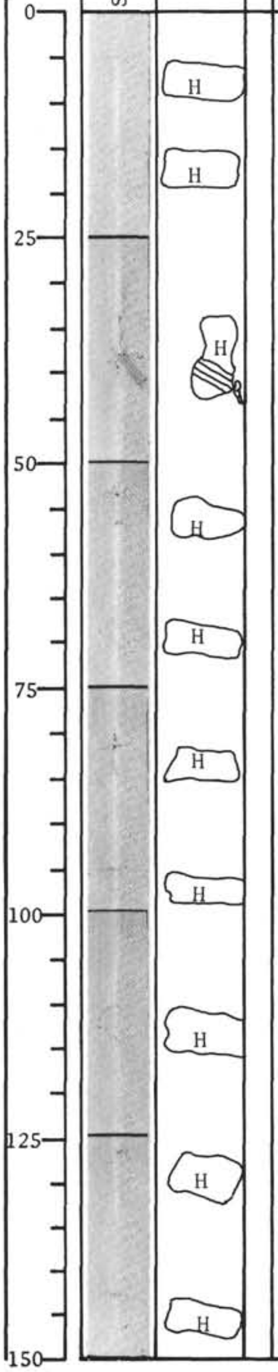
Hard lumps of 5G9/1 original rock (H) in matrix homogenized by drilling.

Very faint horizontal layering in "H" lumps.

Note step in center of core due to cutting with circular saw.

Hole 63.0 Core 6
Section 5

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



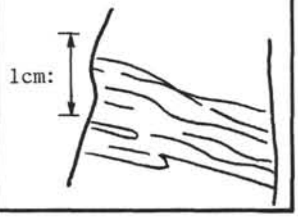
NANNOFOSSIL CHALK

As Section 4 plus 1cm greenish gray 5G6/1 horizontal bed with lensoid laminations (1).

← 1

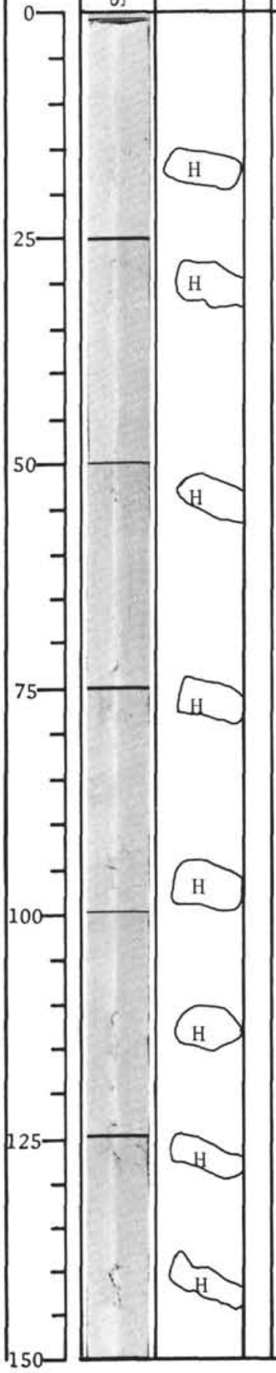
Note step in center of core due to cutting with circular saw.

Detail of beds at 40cm:



Hole 63.0 Core 6
Section 6

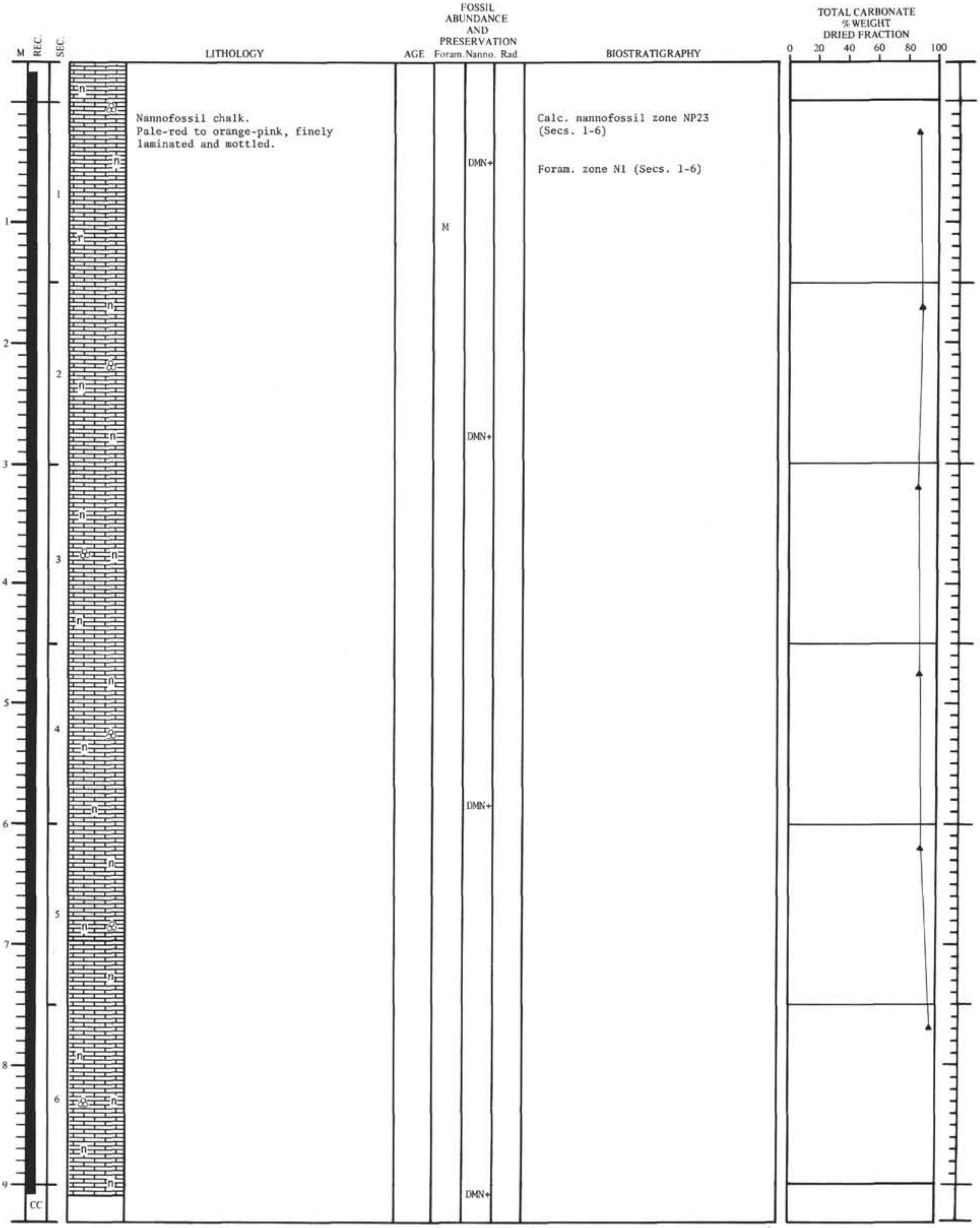
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



NANNOFOSSIL CHALK

As Section 4 of this core.

H=Hard

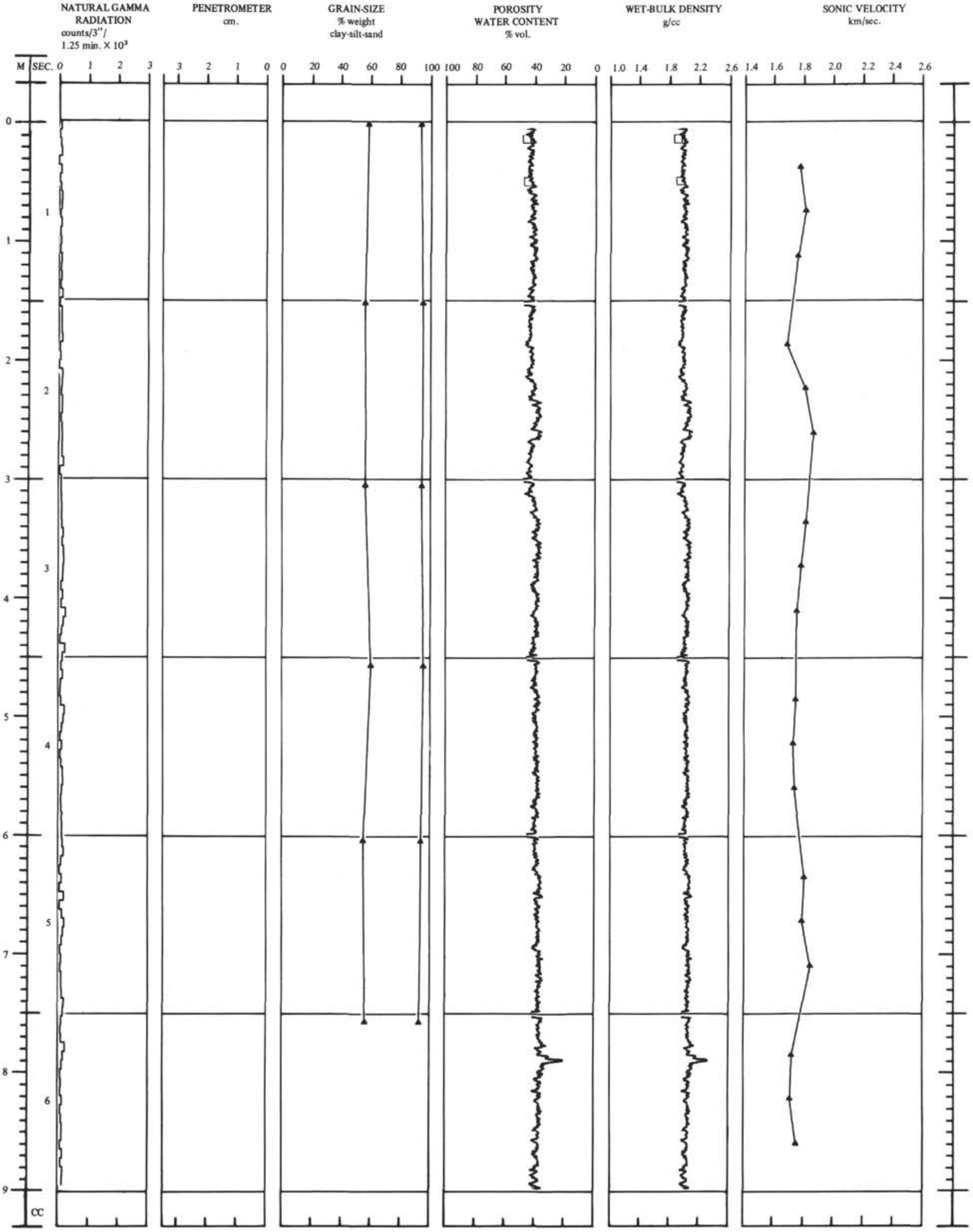


Nannofossil chalk.
Pale-red to orange-pink, finely laminated and mottled.

Calc. nannofossil zone NP23 (Secs. 1-6)

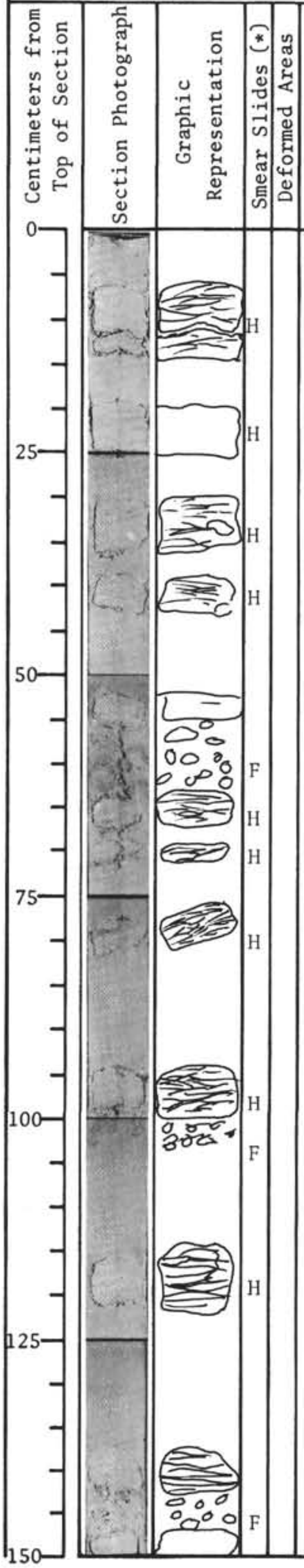
Foram. zone N1 (Secs. 1-6)

Lithology and biostratigraphy of Core 7, Hole 63.0.



Physical properties of Core 7, Hole 63.0.

Hole 63.0 Core 7
Section 1



Description

NANNOFOSSIL CHALK

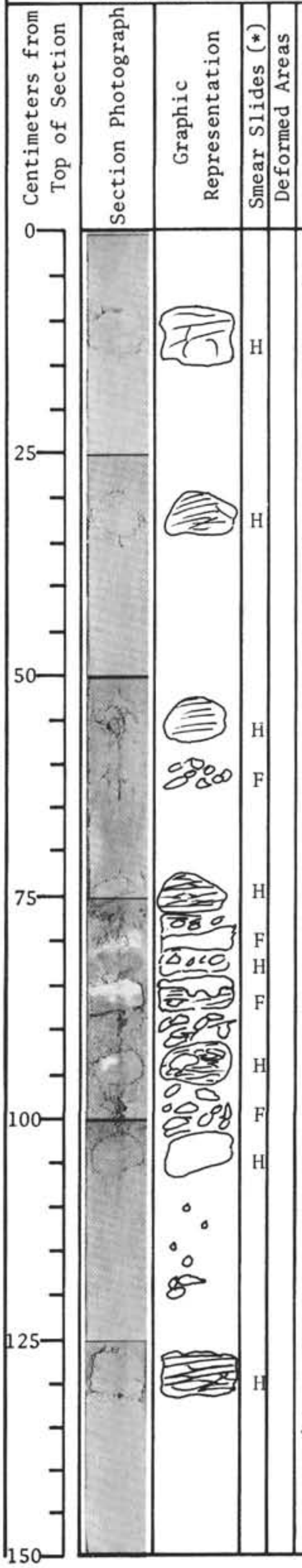
Hard lumps (H) and fragments (F) in homogenized 10R6/4 orange pink matrix.

Lumps 10R6/3 pale red with fine (1mm) lensoid lamination and moderate mottling. Rare pale spots. Color due to iron oxide flecks.

Bedding horizontal.

Note line down center of core due to cutting with circular saw.

Hole 63.0 Core 7
Section 2



Description

PINK NANNOFOSSIL CHALK

Basically hard lumps H and fragments F in homogenized 10R6/4 orange pink matrix.

Lumps H are 10R6/3 pale red with fine (∿ 1mm) lensoid laminae and moderate mottling.

Horizontal bedding.

81cm 86cm:

81cm - 86cm:

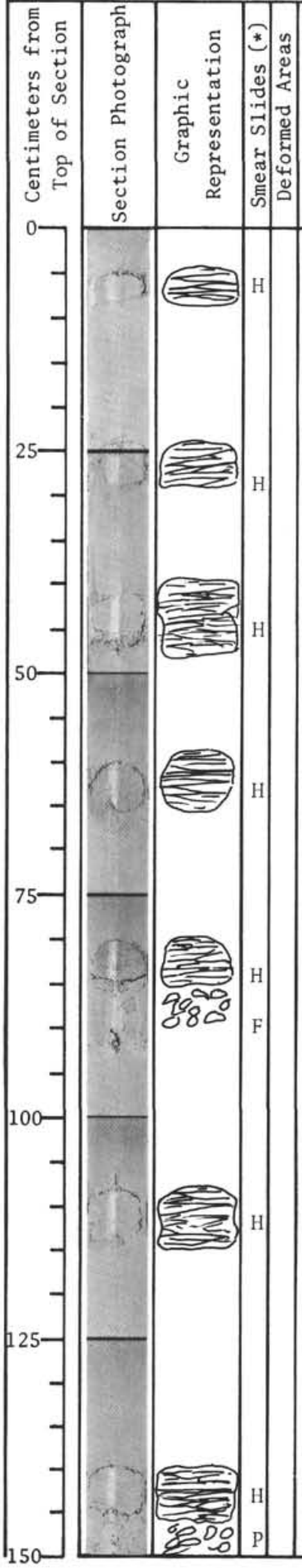
Bleached patches N9 white.

110 - 120cm:

Chert fragments up to 5mm diameter 10YR3/2 dark yellow brown.

Note line down core axis due to circular saw.

Hole 63.0 Core 7
Section 3



Description

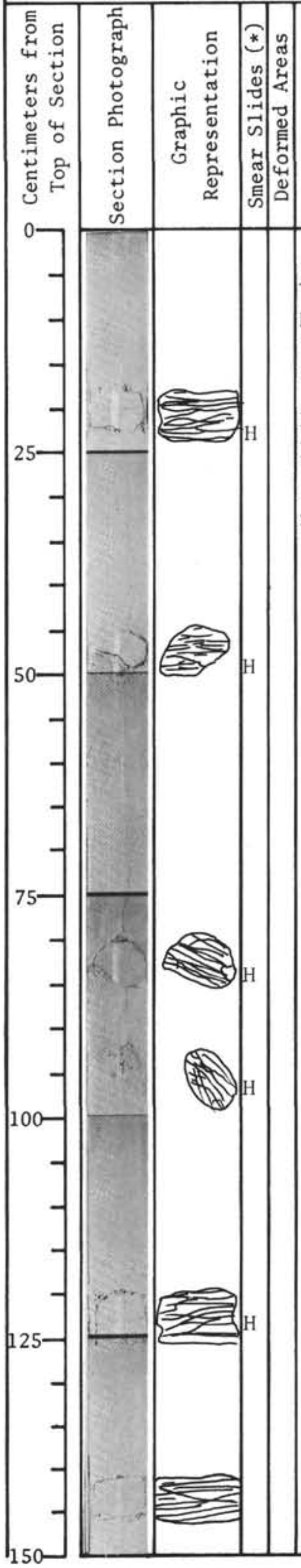
PINK NANNOFOSSIL CHALK

Hard lumps H and fragments F in matrix homogenized by drilling.

Hard fragments H and pieces P in matrix homogenized by drilling.

Pieces H are 10R6/3 pale red with fine (~ 1-2mm) horizontal lensoid laminae and moderate mottling.

Hole 63.0 Core 7
Section 4



Description

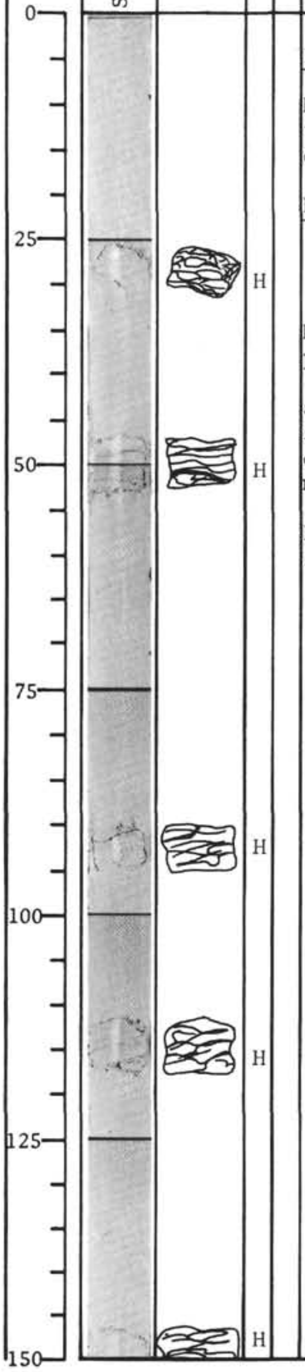
PINK NANNOFOSSIL CHALK

Hard blocks (H) in matrix homogenized by drilling.

H fragments are 10R6/3 pale red with fine (~ 1mm) horizontal lensoid laminae and moderate mottling.

Hole 63.0 Core 7
Section 5

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



PINK NANNOFOSSIL CHALK

Hard blocks H in matrix homogenized by drilling.

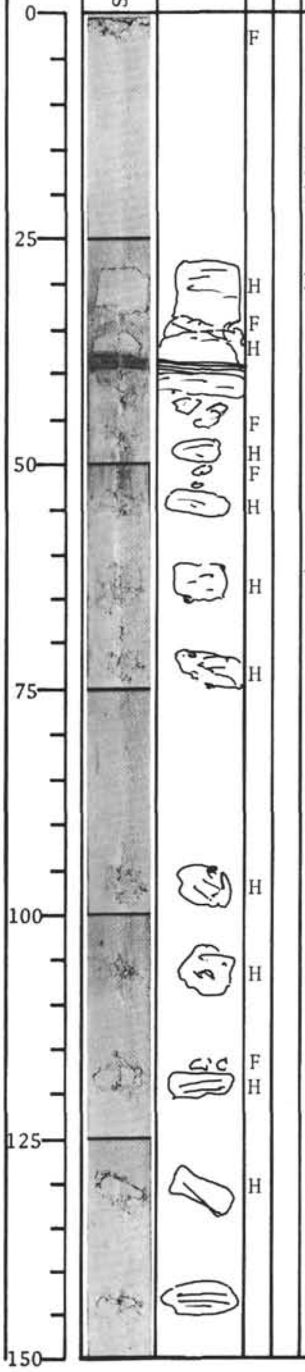
Note line down axis of core due to cutting with circular saw.

Hard blocks are 10R6/3 pale red with fine (∿ 1mm) horizontal wavy and lensoid laminae, some 10R3/3 dark reddish brown and faint moderate mottling.

Rare N9 white bleached spots, as at 26cm.

Hole 63.0 Core 7
Section 6

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



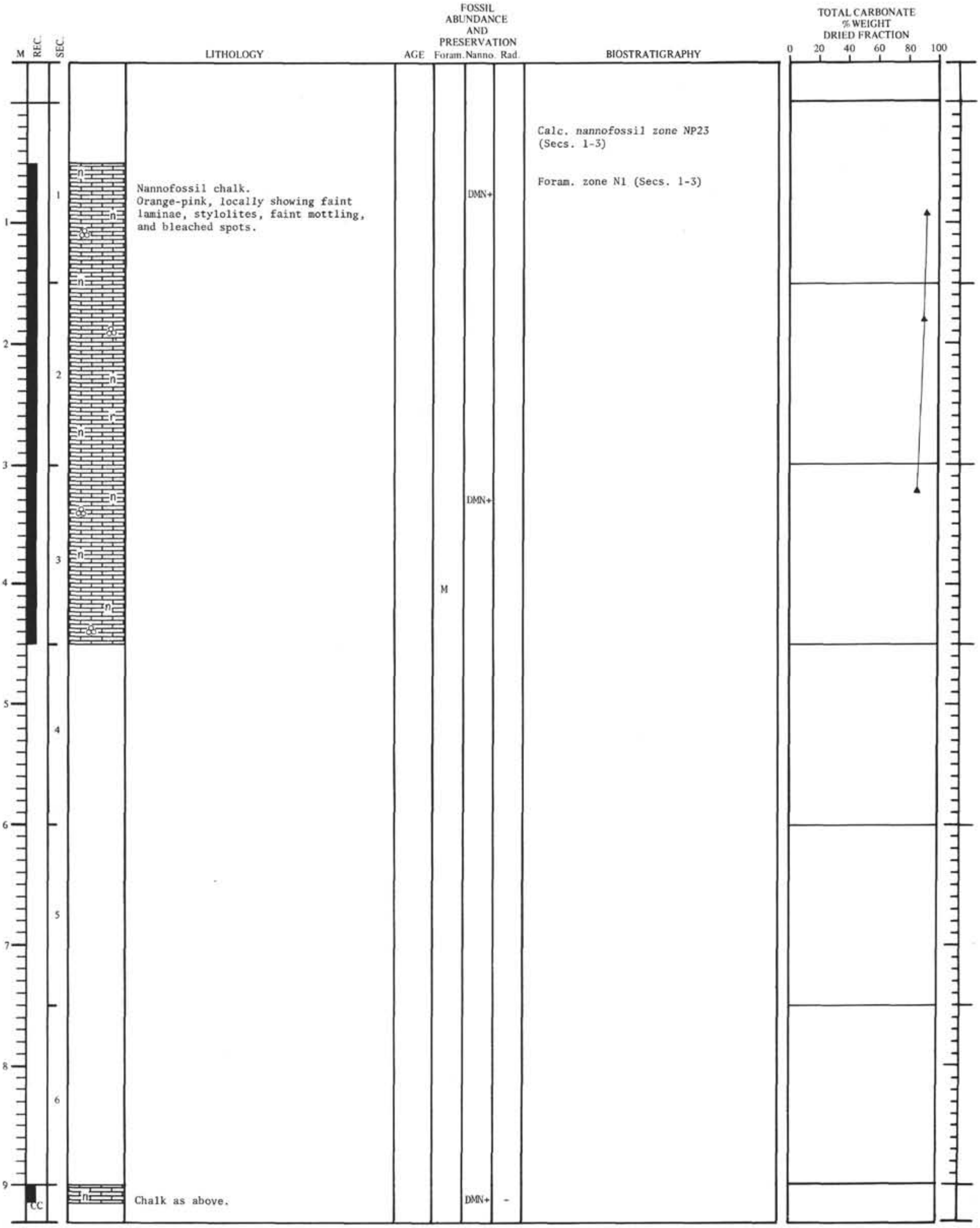
PINK NANNOFOSSIL CHALK

Hard larger pieces (H) and hard smaller fragments (F) of orange pink chalk in a matrix of orange pink (10R6/1) calcareous mud homogenized by the coring process

A ∿ 1.2cm thick grayish red (10R4/2) bed at 38-39cm.

Hard pieces have very faint and fine lensoid laminae (< 1mm) and very faint mottling.

Note irregular line down core axis due to cutting on circular saw.



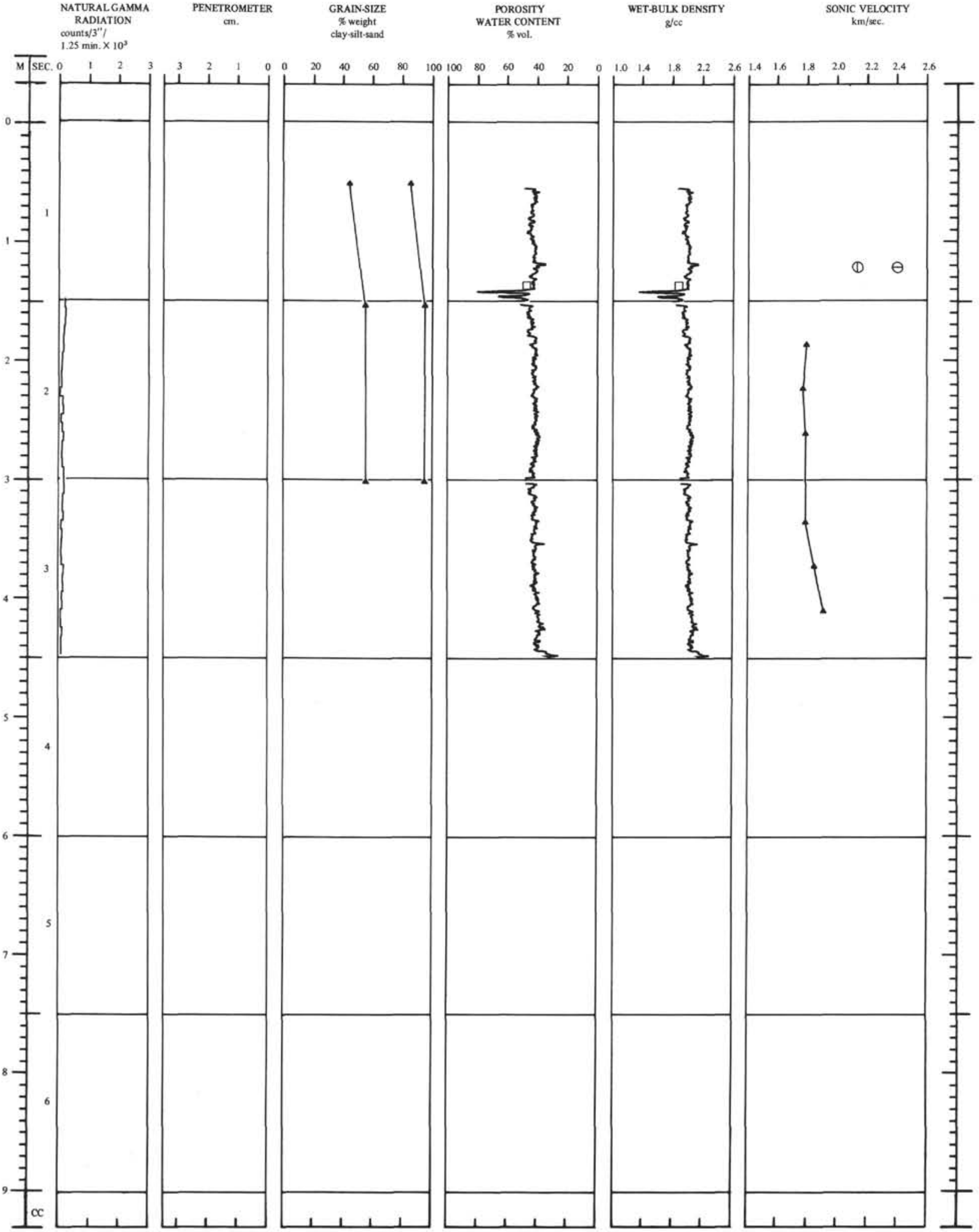
Nannofossil chalk.
Orange-pink, locally showing faint laminae, stylolites, faint mottling, and bleached spots.

Chalk as above.

Calc. nannofossil zone NP23 (Secs. 1-3)

Foram. zone N1 (Secs. 1-3)

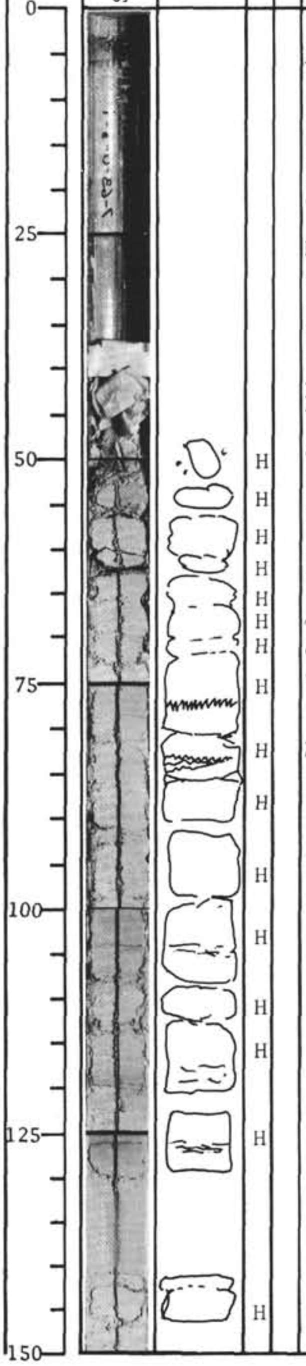
Lithology and biostratigraphy of Core 8, Hole 63.0.



Physical properties of Core 8, Hole 63.0.

Hole 63.0 Core 8
Section 1

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



PINK NANNOFOSSIL CHALK

A few ∿ 1cm fragment of chert (dark brown) - X-ray suggests scattered through section, concentrated at top.

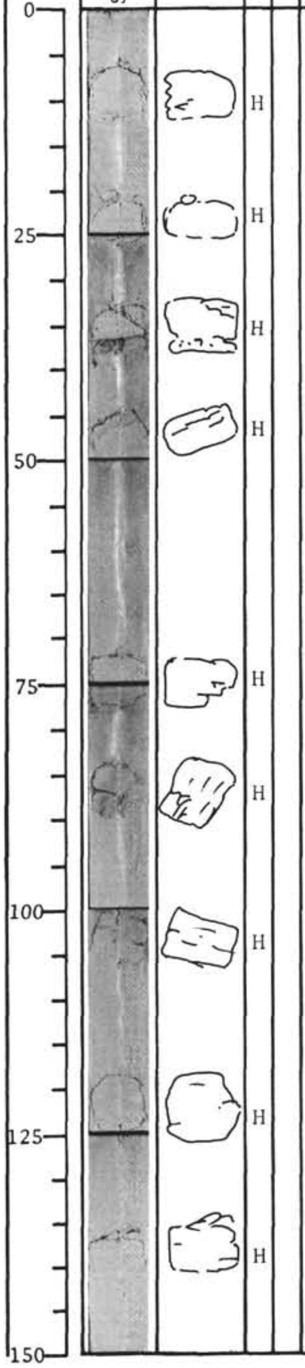
Hard (H) large pieces of orange pink (10R6/4) chalk in a matrix of orange pink (10R6/4) calcareous mud homogenized by the drilling process.

Some hard pieces show faint and lensoid laminae, especially at 104, 119, and 125cm, and stylolites (78 and 83cm), of grayish red (10R4/2) color. A few ∿ 1cm fragments of dark brown chert at 52 cm.

Note: irregular line down axis of core due to cutting on circular saw.

Hole 63.0 Core 8
Section 2

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



PINK NANNOFOSSIL CHALK

Hard (H) larger pieces (and some small fragments) of orange pink (10R6/4) chalk in a matrix of orange pink (10R6/4) calcareous mud homogenized by the drilling process.

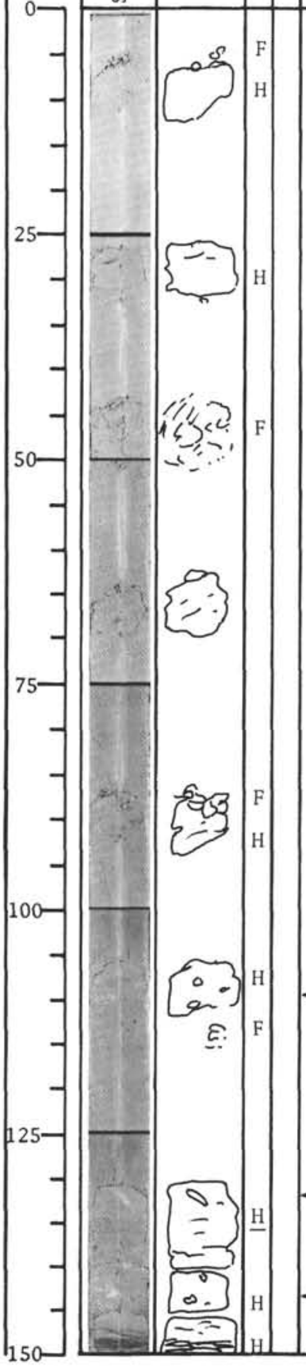
Some hard pieces show faint and lensoid laminae (or at 38, 47, and 104cm) of grayish red (10R4/2) color.

Notes:

1. Irregular line down axis of core due to cutting on circular saw.
2. Black marks on outside of liner were put on after sonic velocity testing and before cutting, as being places where measurements were worthless.

Hole 63.0 Core 8
Section 3

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



PINK NANNOFOSSIL CHALK

Hard (H) larger pieces and fragments (F) of orange pink 10R6/4 chalk in a matrix of orange pink (10R6/4) calcareous mud homogenized by the drilling process.

Some hard pieces show faint lensoid laminae and most show fine and faint mottling.

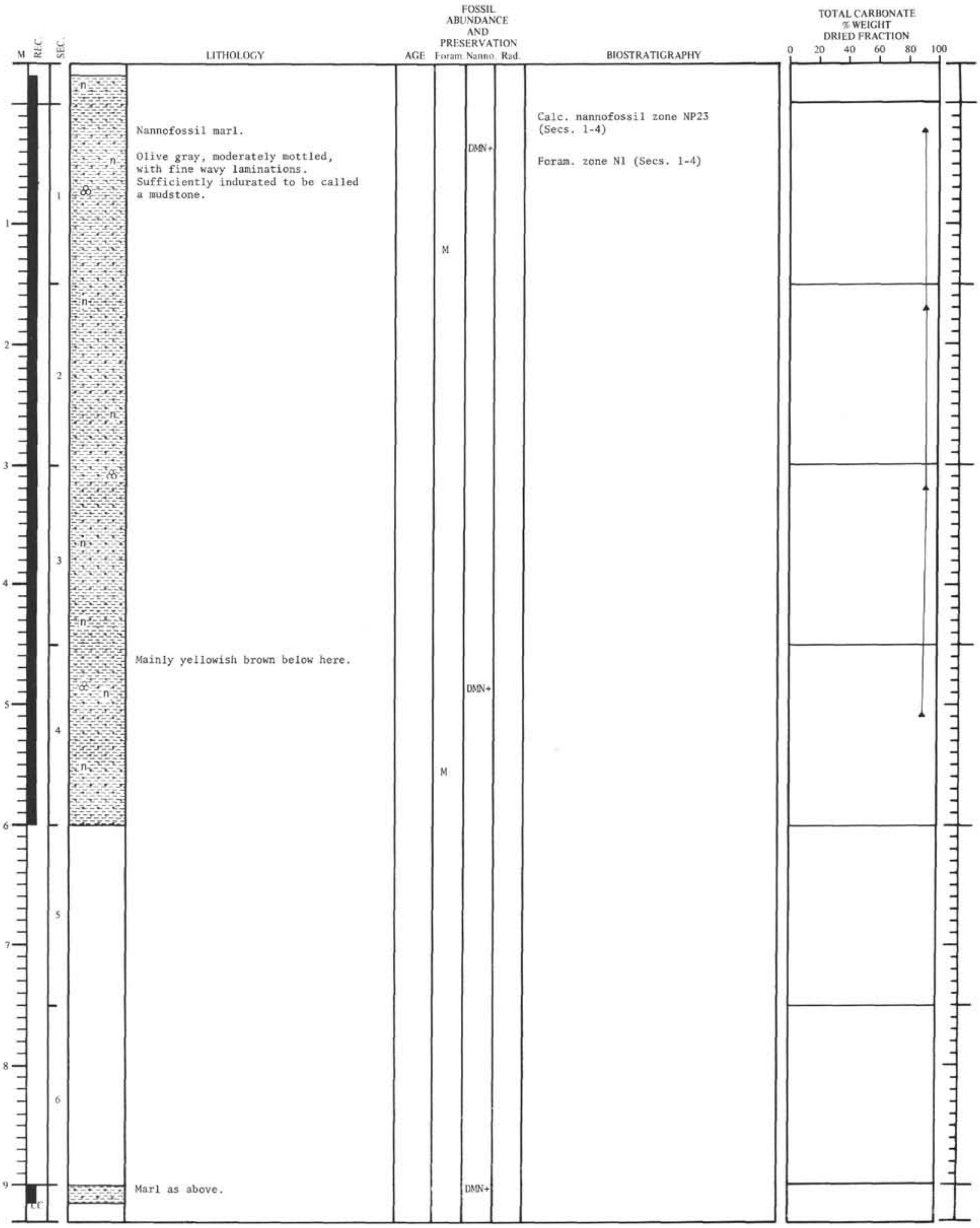
147 - 149cm distinctly darker grayish red 10R4/3.

Note: Irregular line down axis of core due to cutting on circular saw.

1 Bleached spots

1

1



Nannofossil marl.

Olive gray, moderately mottled, with fine wavy laminations. Sufficiently indurated to be called a mudstone.

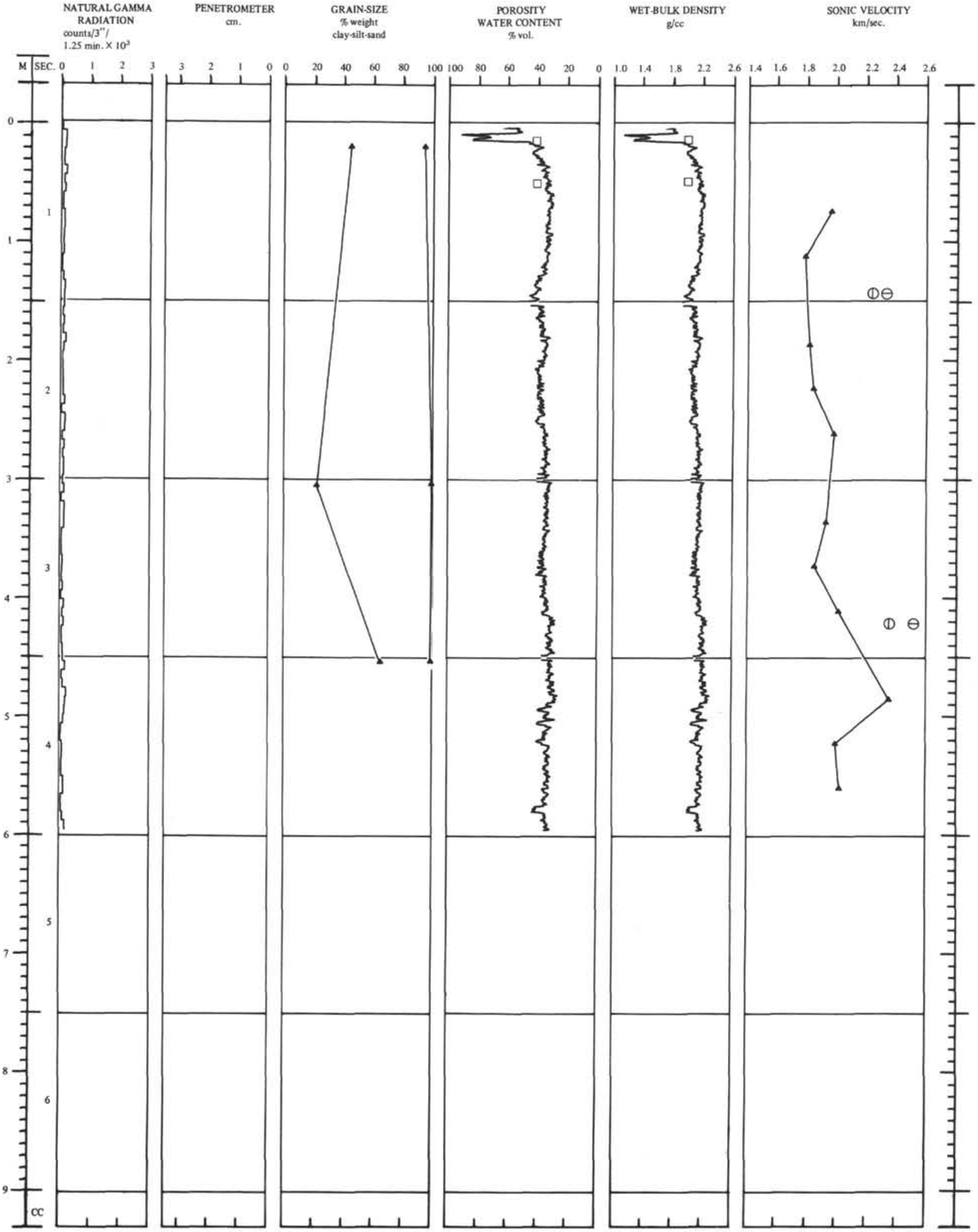
Mainly yellowish brown below here.

Marl as above.

Calc. nannofossil zone NP23 (Secs. 1-4)

Foram. zone N1 (Secs. 1-4)

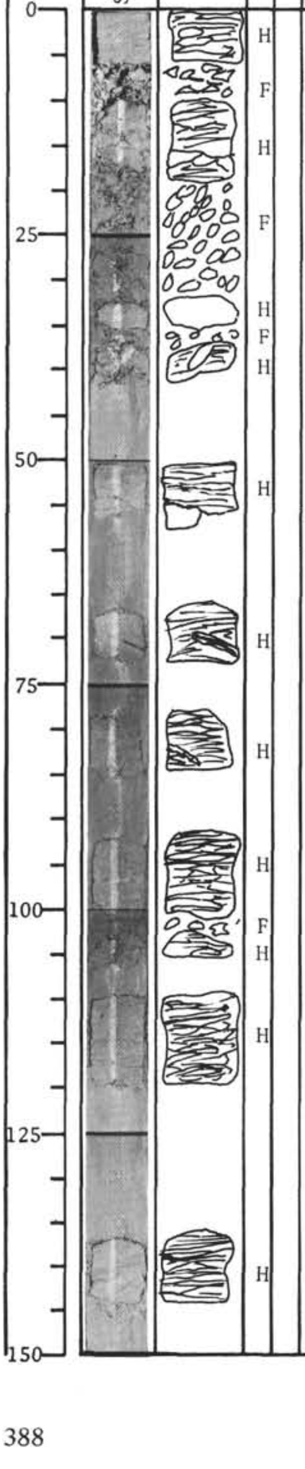
Lithology and biostratigraphy of Core 9, Hole 63.0.



Physical properties of Core 9, Hole 63.0.

Hole 63.0 Core 9
Section 1

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



NANNOFOSSIL MARL

Consists of hard blocks (H) and fragments in matrix homogenized by drilling.

Matrix is 2.5Y4/2 olive gray.

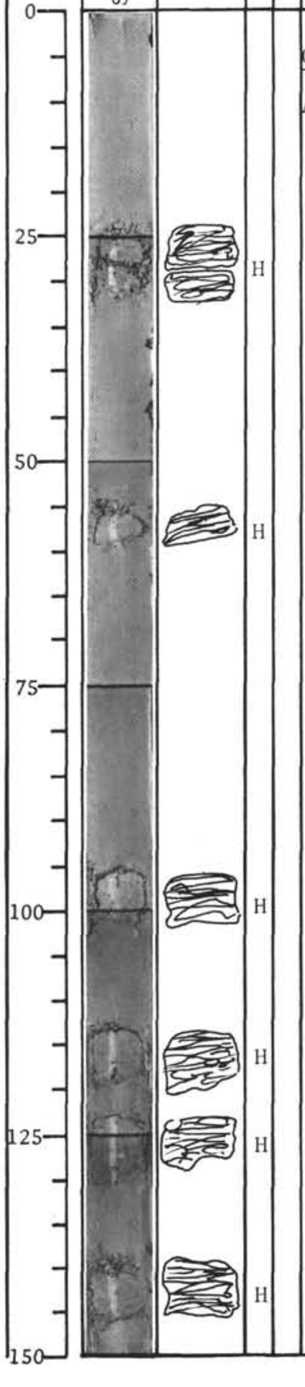
Blocks H are 2.5Y4-5/2 olive gray with wavy fine laminae and great mottling of 2.5Y6/2 to 5Y2/1 pale to very dusky olive.

Rock is zeolitic nannoplankton marl.

Note: Step down core axis due to circular saw.

Hole 63.0 Core 9
Section 2

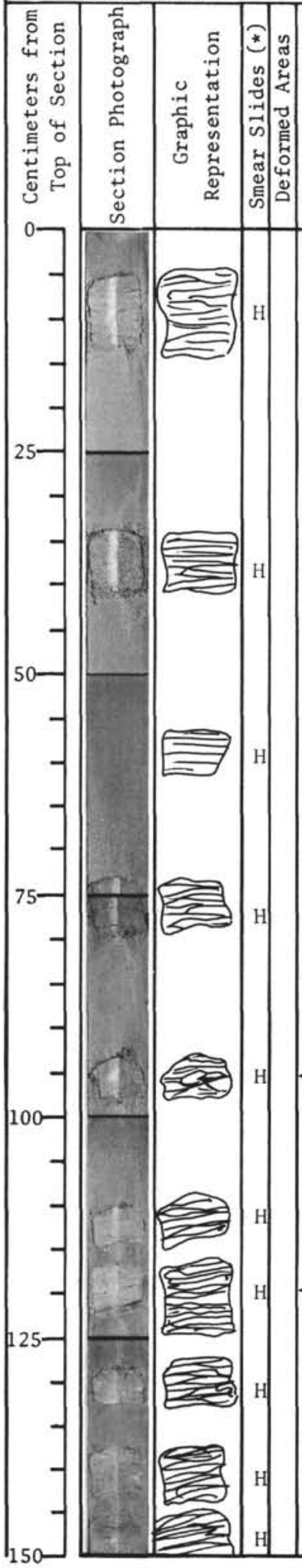
Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



OLIVE NANNOFOSSIL MARL

As Section 1

Hole 63.0 Core 9
Section 3



Description

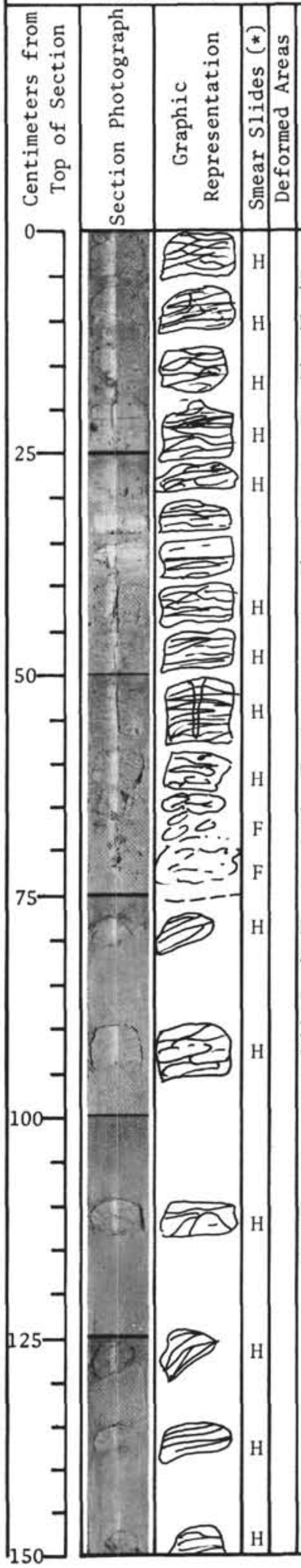
OLIVE NANNOFOSSIL MARL

As Section 1, in general.

Laminated patch from 56-61cm visible on X-ray.

1 Grayish orange pink 10R8/2 bleached spots and 5mm layer showing wavy laminae.

Hole 63.0 Core 9
Section 4



Description

OLIVE NANNOFOSSIL MARL

Hard (H) and fragmental (F) lumps in matrix homogenized by drilling

0-76cm

"H" lumps 10YR5/1 yellowish brown with moderate mottling of 10YR4/2 dark yellowish brown.

33-38cm:

Light orange pink 5YR8/2 interval with fine wavy laminations. Gradational contacts.

0-76cm:

Matrix 2.5Y3/2 dark olive gray.

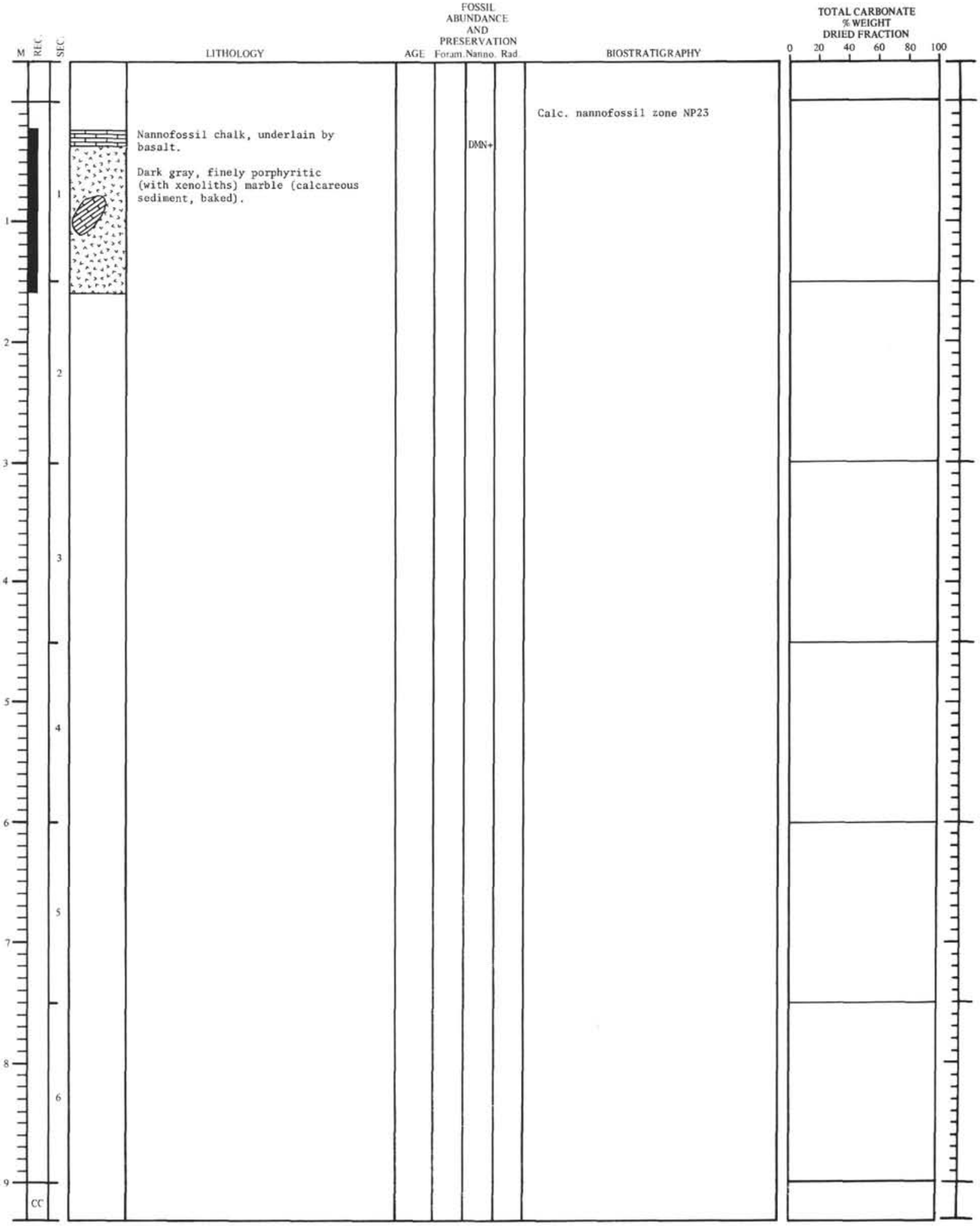
76-150cm:

Matrix 2.5Y4/2 olive gray.

"H" lumps 10YR6/2 pale yellowish brown with dark yellowish brown 10YR4/2 moderate mottling.

30-40cm:

Matrix laminated 10YR5/4 moderate yellowish brown.



Nannofossil chalk, underlain by basalt.

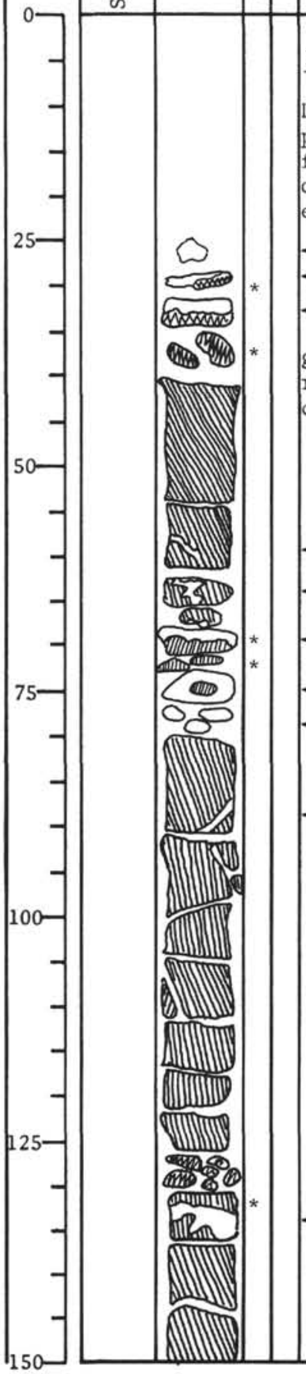
Dark gray, finely porphyritic (with xenoliths) marble (calcareous sediment, baked).

Calc. nannofossil zone NP23

Lithology and biostratigraphy of Core 10, Hole 63.0.

Hole 63.0 Core 10
Section 1

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



BASALT

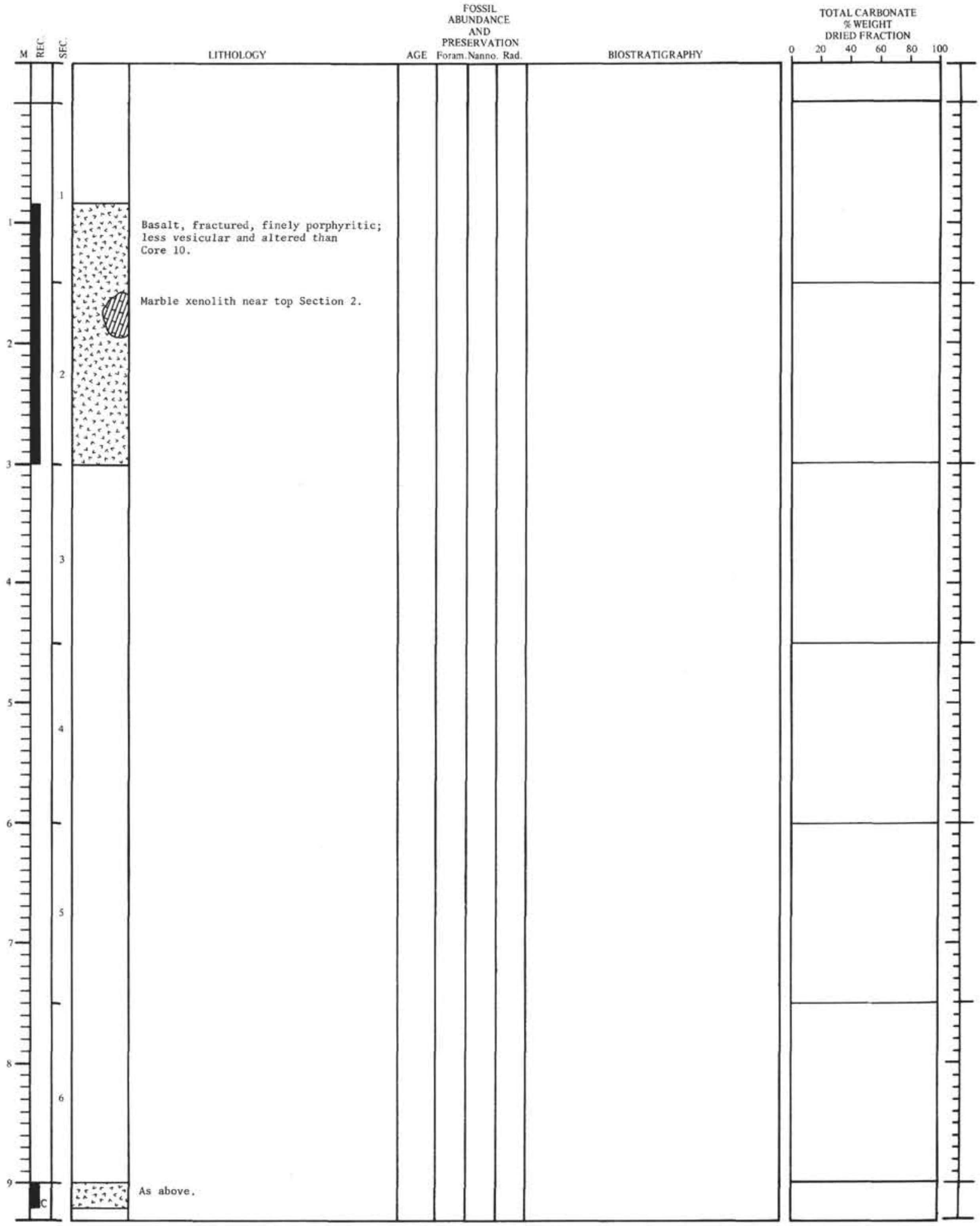
Dark gray (N3) finely porphyritic (1-2mm feldspars) basalt, with overlying, little-altered nanno chalk and ingested pale green and red recrystallized chalk.

← 1
← 2 basalt and sedi-
← 2 ment
THIN SECTION

← 3 white vein
← 4 green veins
THIN SECTION
← 5 green and pink veins
← 6 yellow brown
← 7 pink and yellow

← 3 white vein

← 3 white vein



Basalt, fractured, finely porphyritic; less vesicular and altered than Core 10.

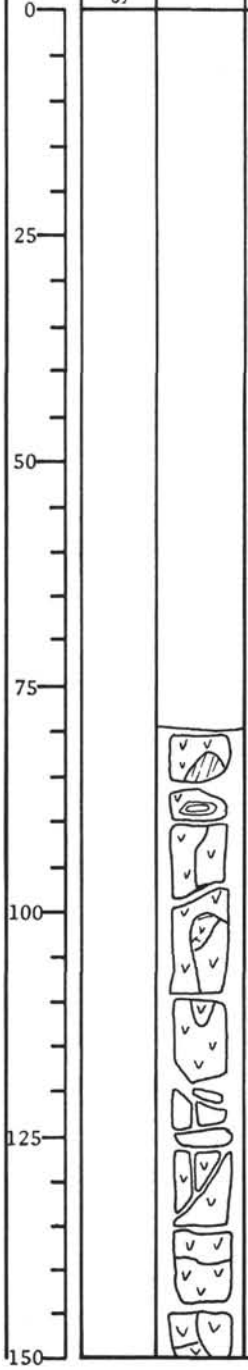
Marble xenolith near top Section 2.

As above.

Lithology and biostratigraphy of Core 11, Hole 63.0.

Hole 63.0 Core 11
Section 1

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



<u>Tholeiitic Basalt</u>

Fairly fresh, but strongly fractured porphyritic (∿ 1mm plagioclase phenocrysts) basalt.

Double lines show boundaries of separate fragments. Single lines within fragments are cracks.

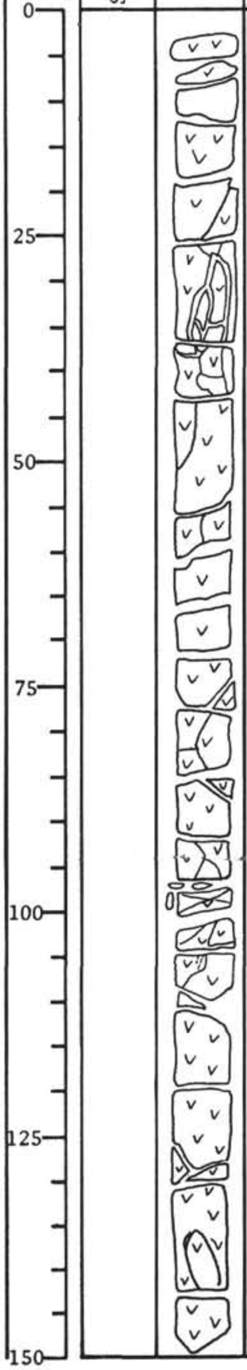
0-80cm:

Void

* Thin Section

Hole 63.0 Core 11
Section 2

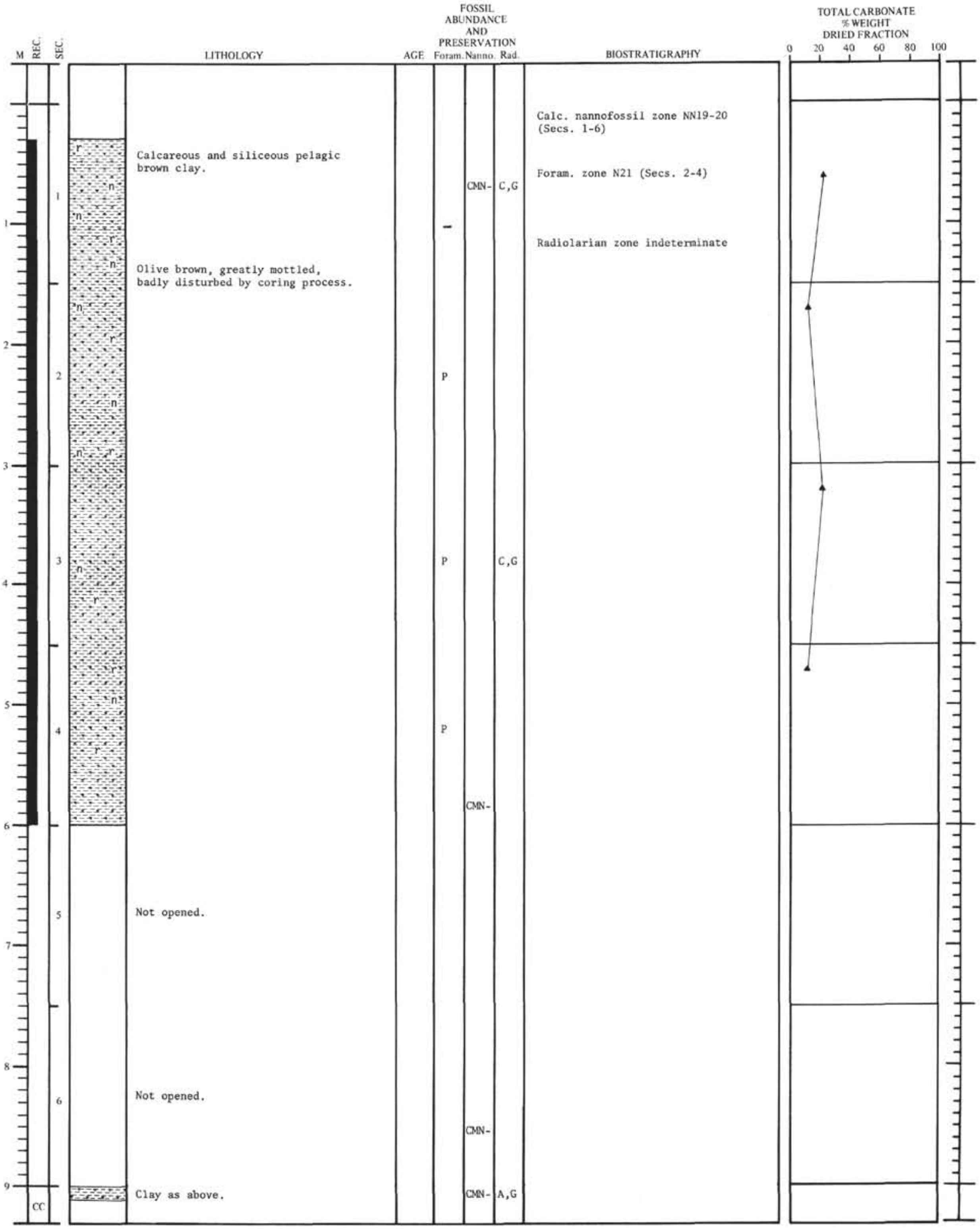
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



← 1 Pale reddish brown 10R6/4 limestone (recryst) (Thin section)

Tholeiitic basalt, porphyritic (1-3mm plagioclase phenocrysts). Fairly fresh but heavily fractured. Fracture surfaces coated with chlorite.

Single lines = cracks
Double lines = fragment boundaries



Calcareous and siliceous pelagic brown clay.

Olive brown, greatly mottled, badly disturbed by coring process.

Not opened.

Not opened.

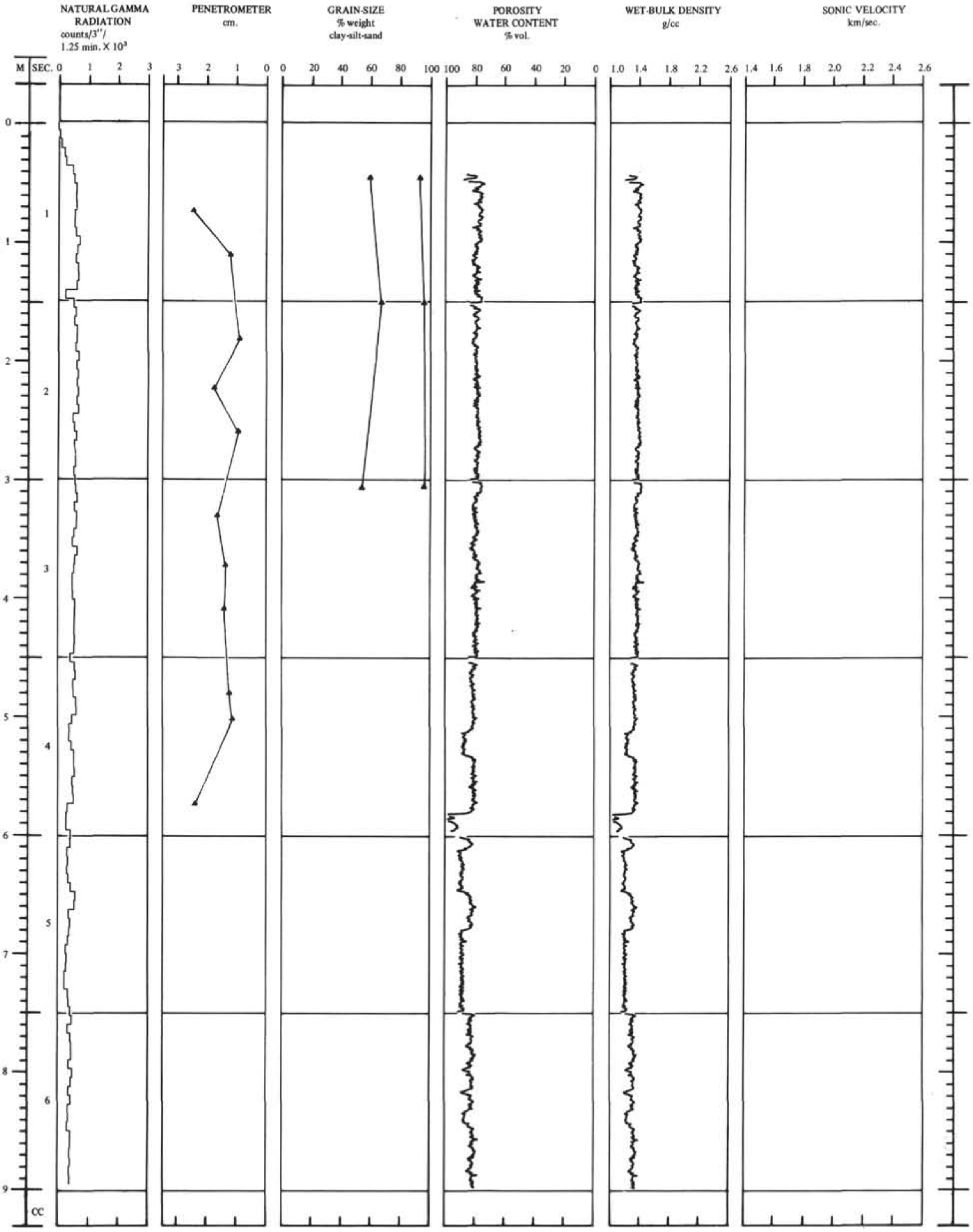
Clay as above.

Calc. nannofossil zone NN19-20 (Secs. 1-6)

Foram. zone N21 (Secs. 2-4)

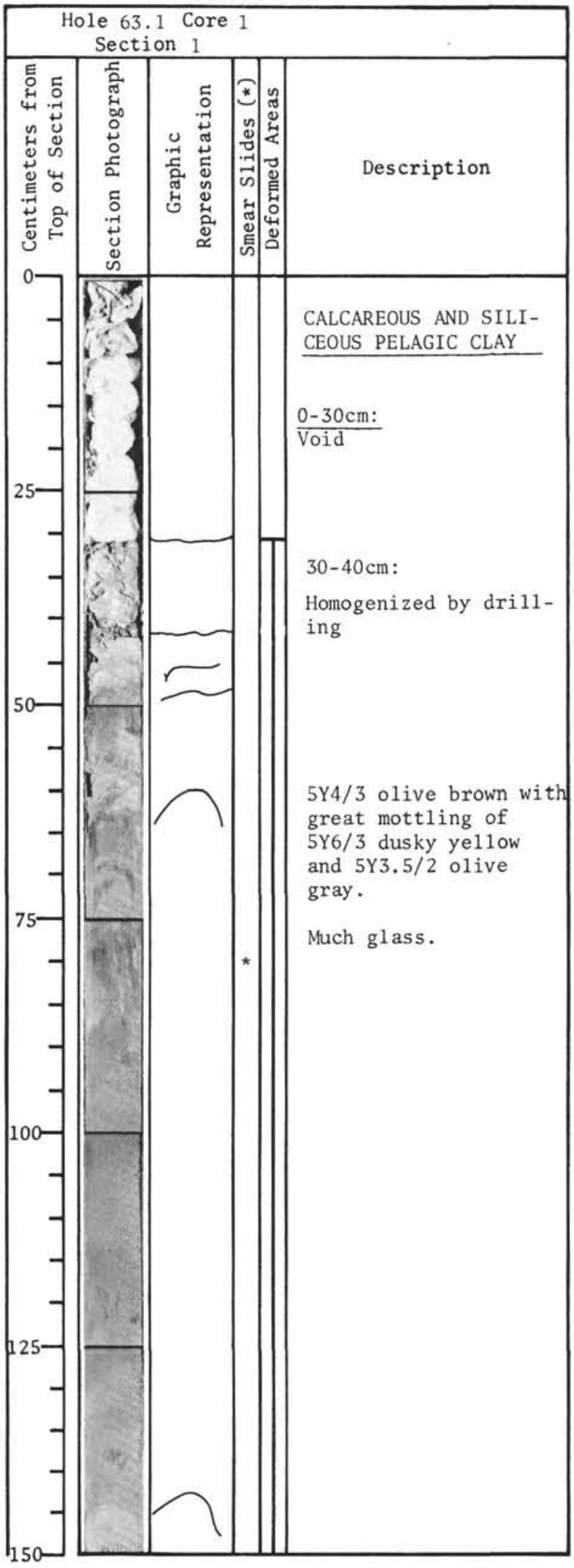
Radiolarian zone indeterminate

Lithology and biostratigraphy of Core 1, Hole 63.1.



Physical properties of Core 1, Hole 63.1.

Hole 63.1 Core 1
Section 1



CALCAREOUS AND SILICEOUS PELAGIC CLAY

0-30cm:
Void

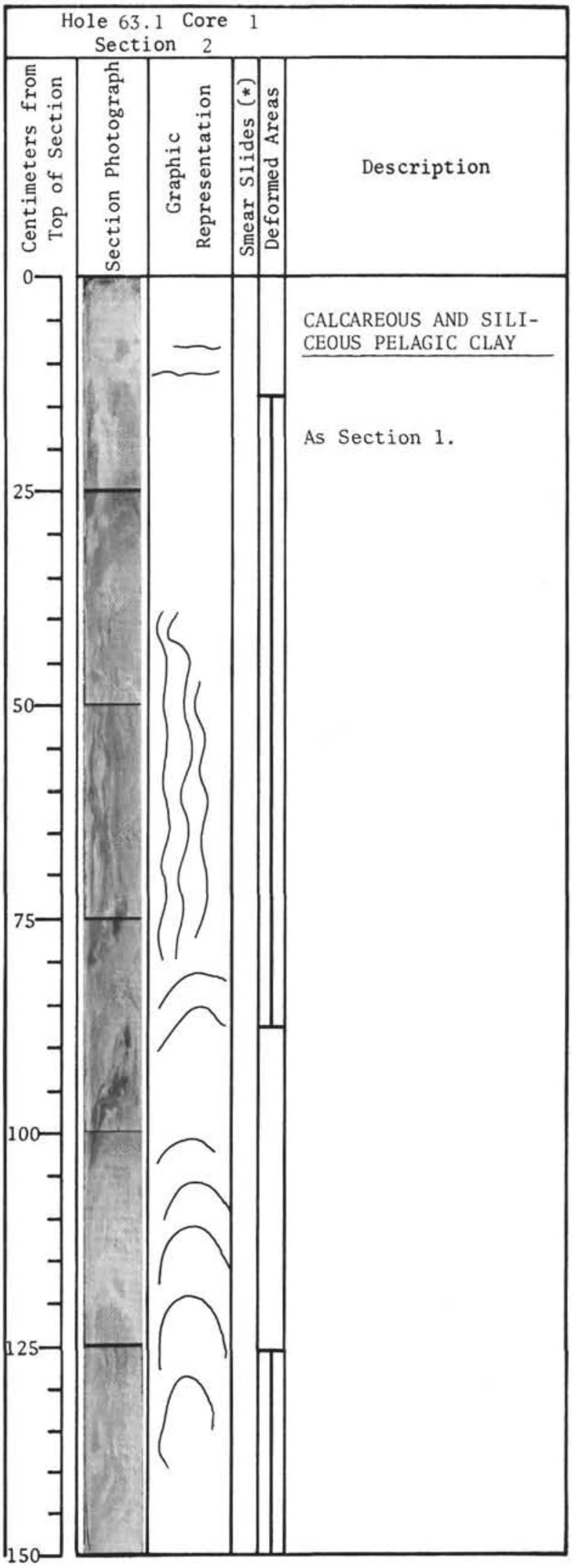
30-40cm:

Homogenized by drilling

5Y4/3 olive brown with great mottling of 5Y6/3 dusky yellow and 5Y3.5/2 olive gray.

Much glass.

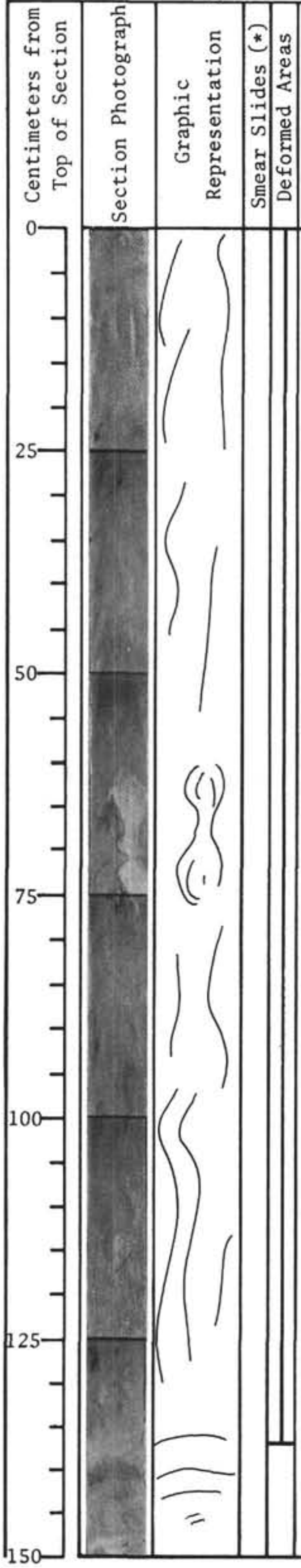
Hole 63.1 Core 1
Section 2



CALCAREOUS AND SILICEOUS PELAGIC CLAY

As Section 1.

Hole 63.1 Core 1
Section 3

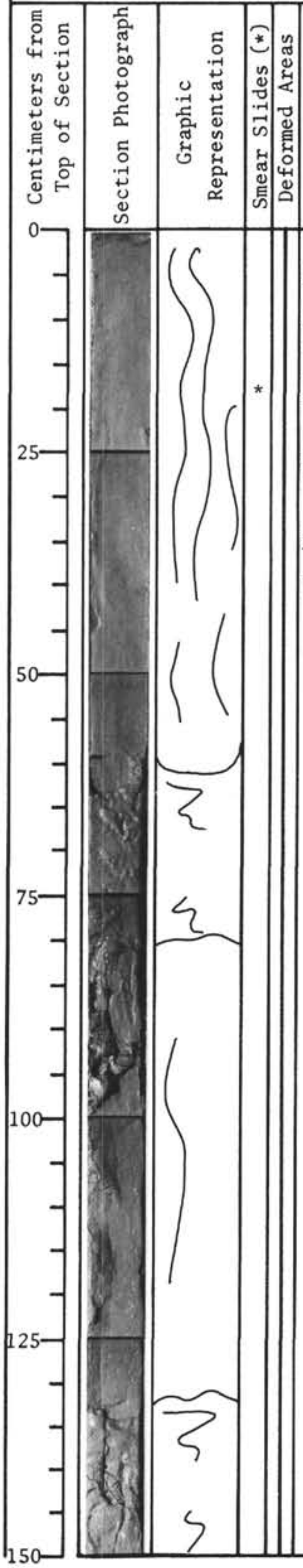


Description

CALCAREOUS AND SILICEOUS PELAGIC CLAY

As Section 1.

Hole 63.1 Core 1
Section 4



Description

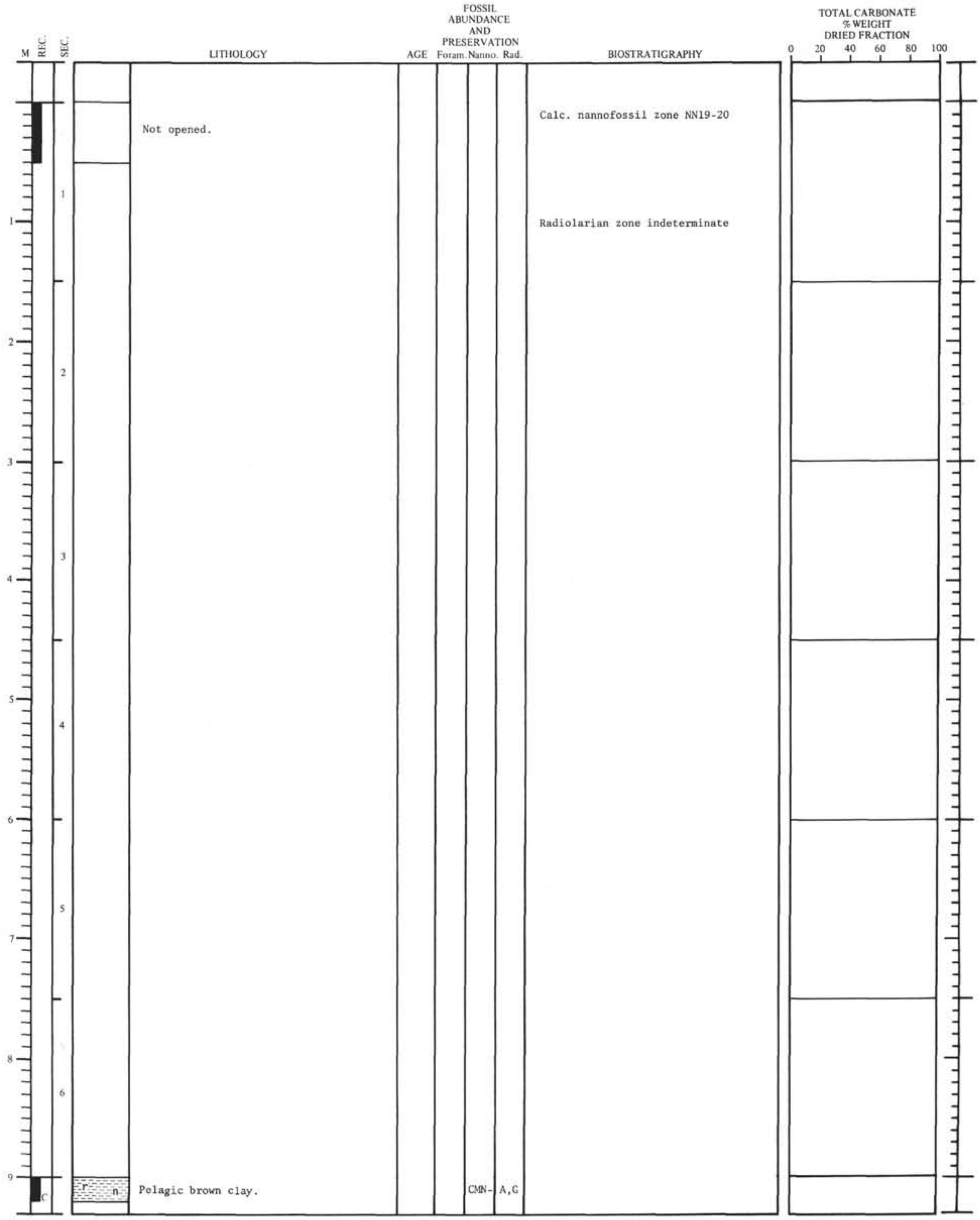
SILICEOUS PELAGIC CLAY

Same as Section 1, but severly disturbed by drilling, and containing fewer nannoplankton

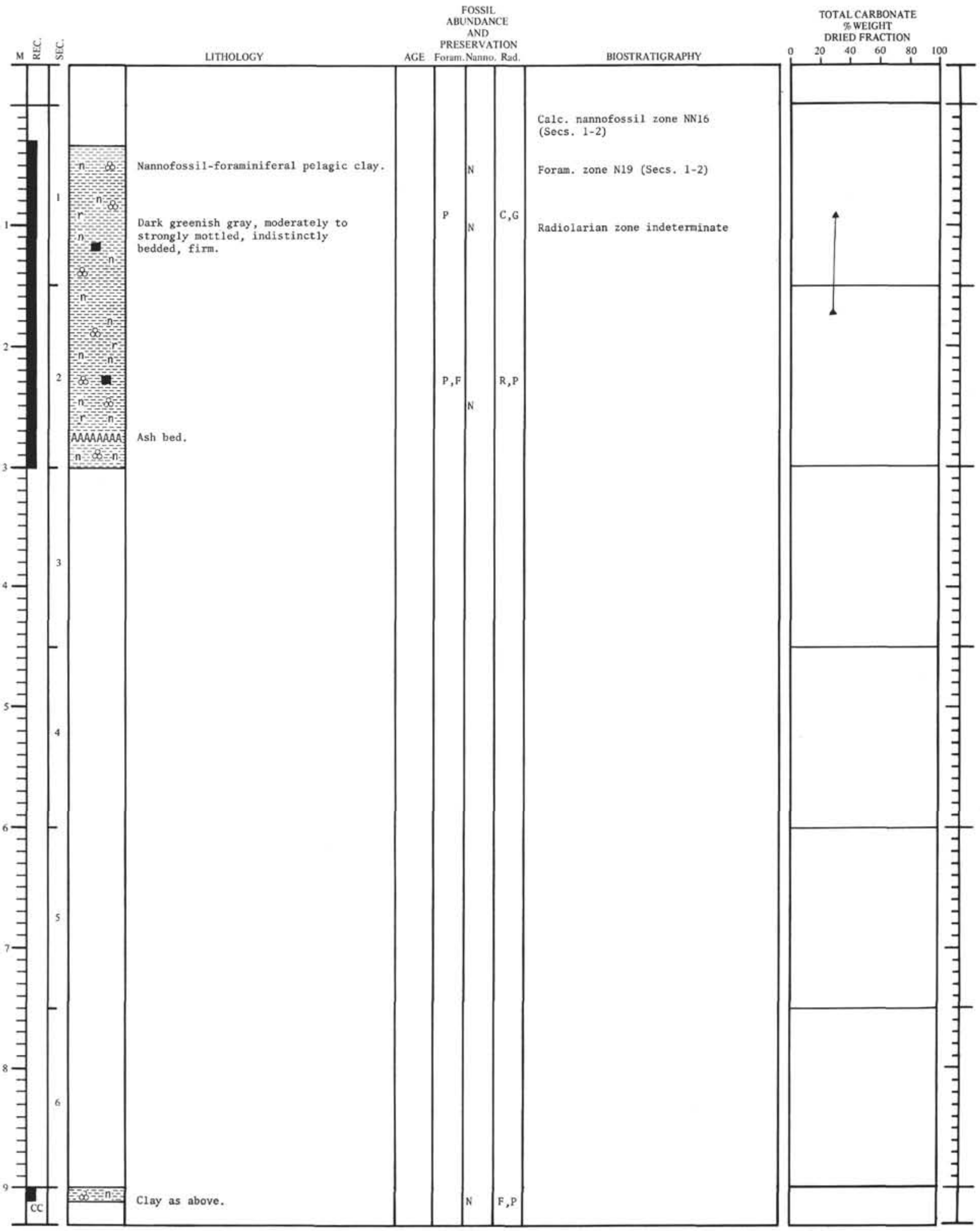
About 5Y5/4 dusky olive brown.

60-80cm:

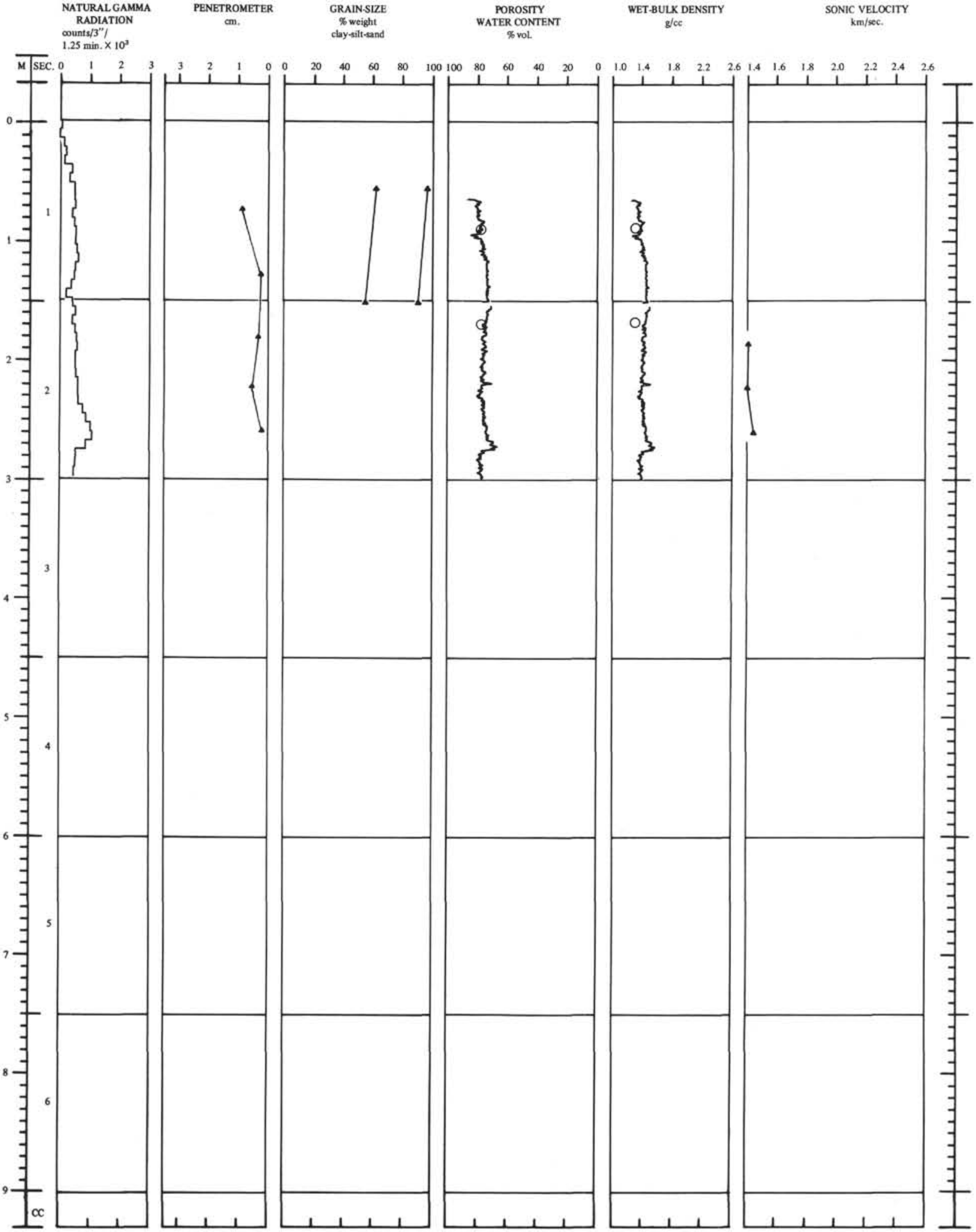
Very watery.



Lithology and biostratigraphy of Core 2, Hole 63.1.

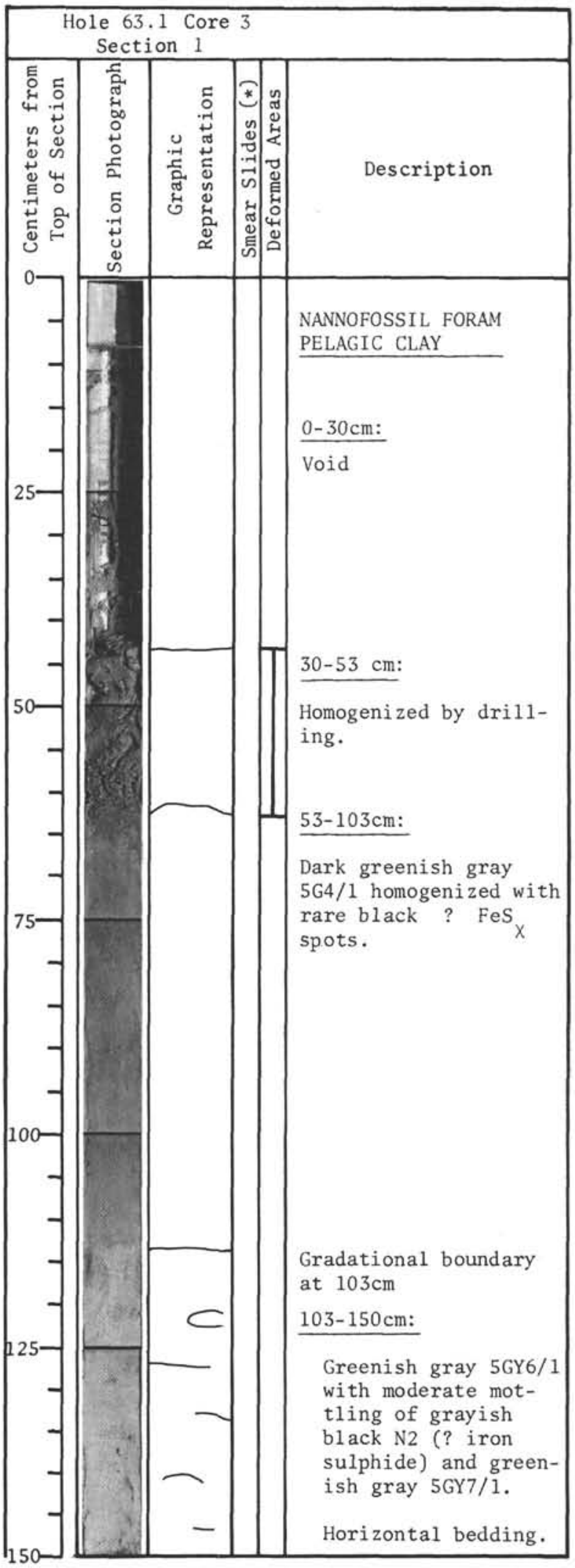


Lithology and biostratigraphy of Core 3, Hole 63.1.



Physical properties of Core 3, Hole 63.1.

Hole 63.1 Core 3
Section 1



NANNOFOSSIL FORAM PELAGIC CLAY

0-30cm:

Void

30-53 cm:

Homogenized by drilling.

53-103cm:

Dark greenish gray 5G4/1 homogenized with rare black ? FeS$_X$ spots.

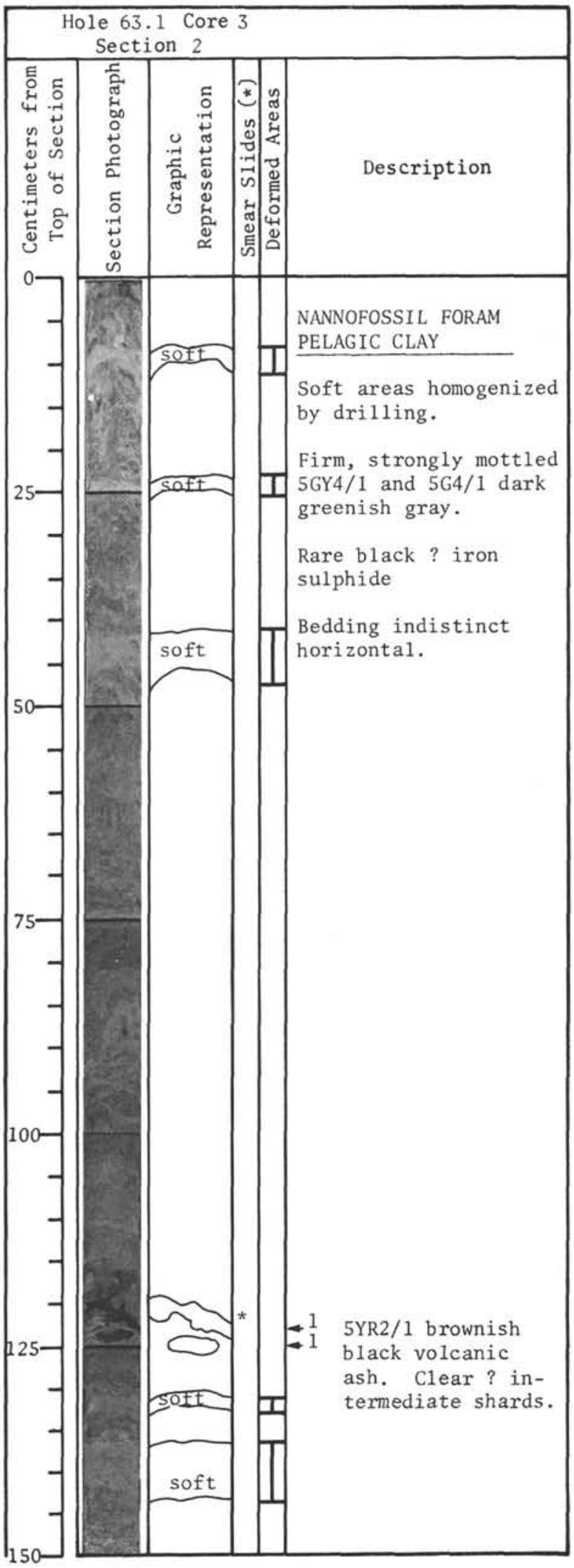
Gradational boundary at 103cm

103-150cm:

Greenish gray 5GY6/1 with moderate mottling of grayish black N2 (? iron sulphide) and greenish gray 5GY7/1.

Horizontal bedding.

Hole 63.1 Core 3
Section 2



NANNOFOSSIL FORAM PELAGIC CLAY

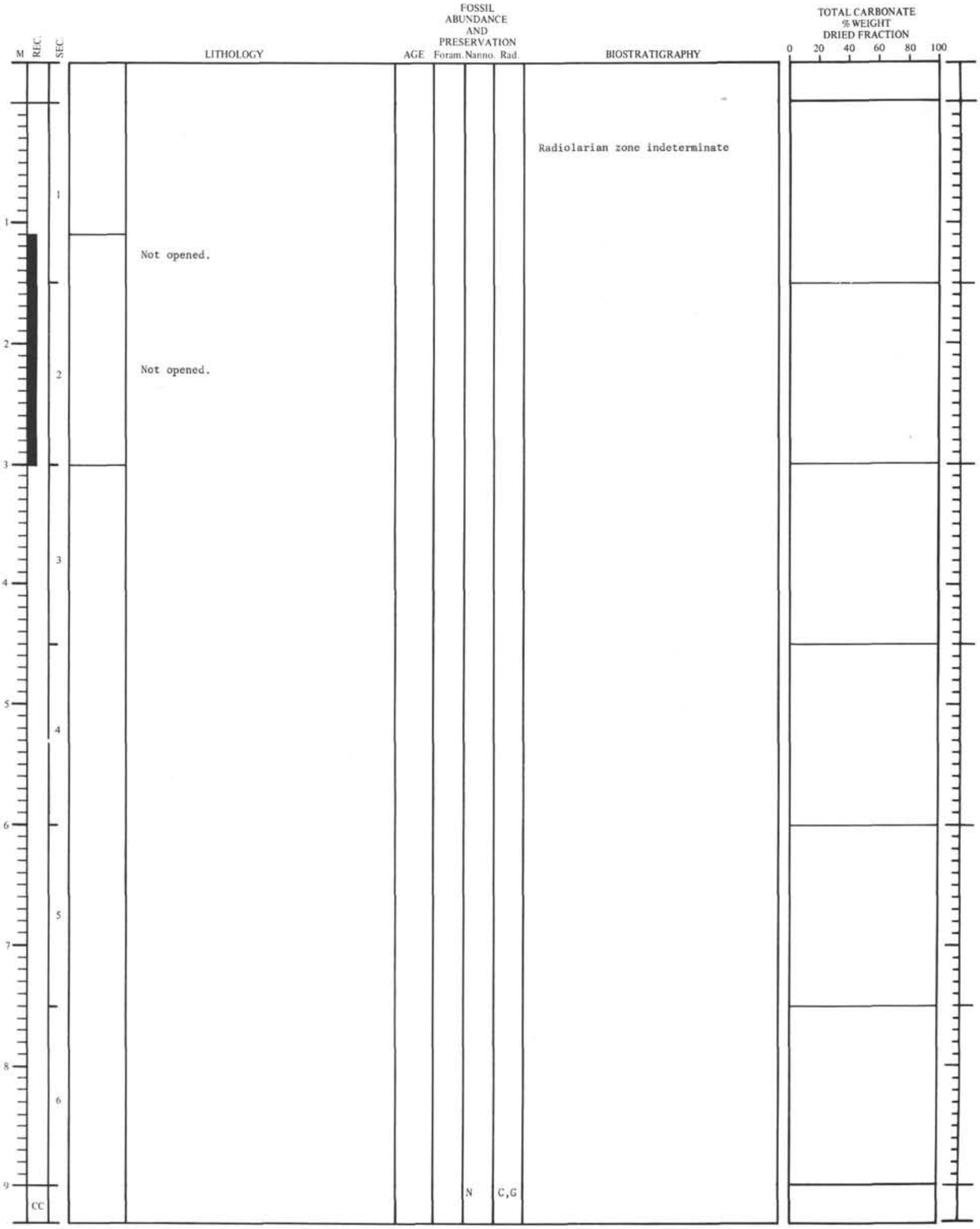
Soft areas homogenized by drilling.

Firm, strongly mottled 5GY4/1 and 5G4/1 dark greenish gray.

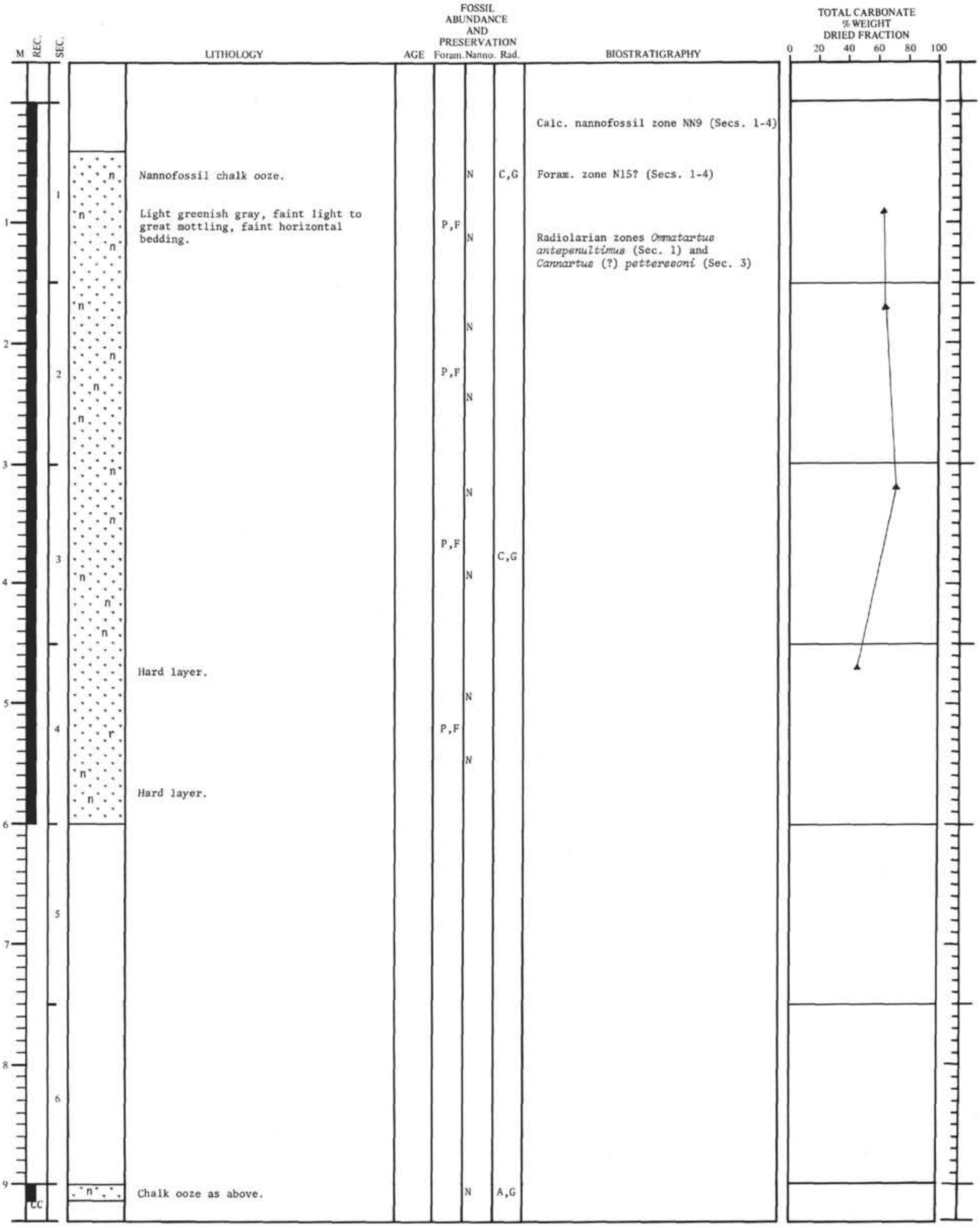
Rare black ? iron sulphide

Bedding indistinct horizontal.

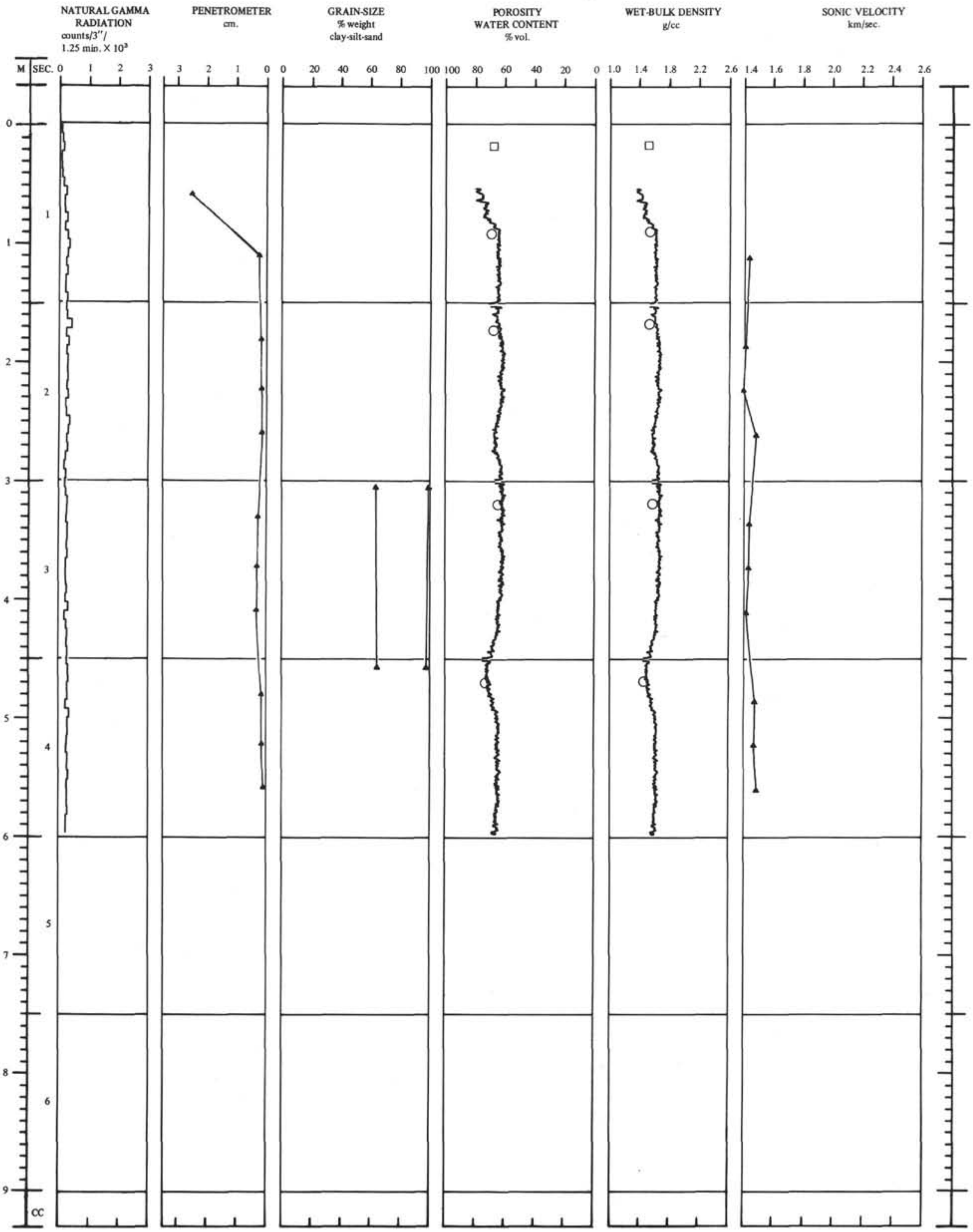
5YR2/1 brownish black volcanic ash. Clear ? intermediate shards.



Lithology and biostratigraphy of Core 4, Hole 63.1.



Lithology and biostratigraphy of Core 5, Hole 63.1.

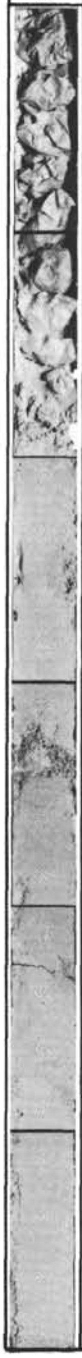


Physical properties of Core 5, Hole 63.1.

Hole 63.1 Core 5
Section 1

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

0 25 50 75 100 125 150



?
?
?
?
?
?

NANNOFOSSIL CHALK OOZE

Firm. Horizontal bedding.

40-50cm:

cavings

50-85cm:

Very uniform light greenish gray 5GY8/1

Irregular boundary at 80cm.

80-120cm:

Greenish gray 5GY7/1 with great mottling of 5GY8/1 light greenish gray.

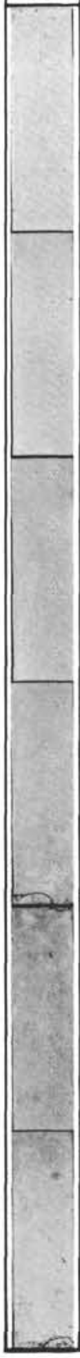
Irregular boundary at 120cm.

Light greenish gray 5GY8/1 with slight 5GY7/1 greenish gray mottling.

Hole 63.1 Core 5
Section 2

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

0 25 50 75 100 125 150



NANNOFFOSIL CHALK OOZE

Faint horizontal bedding.

0-99cm:

Light greenish gray 5GY8/1, with faint pale greenish gray. 5GY8.5/1 moderate mottling.

Gradational boundary at 99cm.

99-128cm:

Greenish gray 5GY6/1 with great mottling of light greenish gray 5GY8/1.

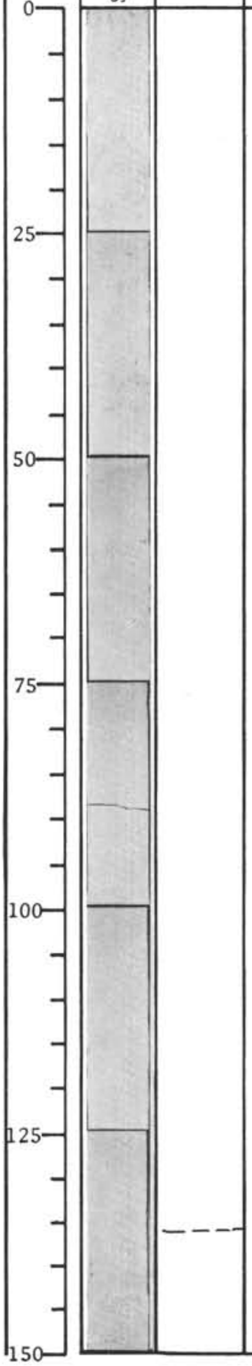
Gradational boundary at 128cm.

128-150cm:

As 0-99, with some greenish gray 5GY6/1 mottling.

Hole 63.1 Core 5
Section 3

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



NANNOFOSSIL CHALK OOZE

0-136cm:

Very uniform light greenish gray 5GY8/1 with faint mottling of 5GY7-9/1 greenish gray to pale greenish gray.

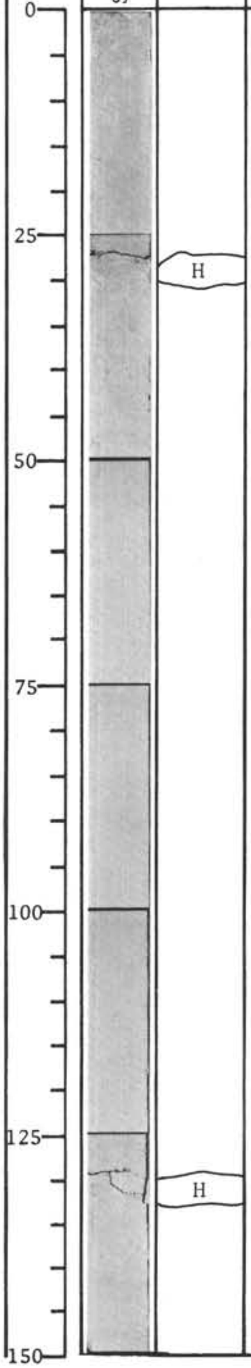
Very gradational boundary at 136cm.

136-150cm:

As above, but basically 5GY7-5/1 light greenish gray.

Hole 63.1 Core 5
Section 4

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



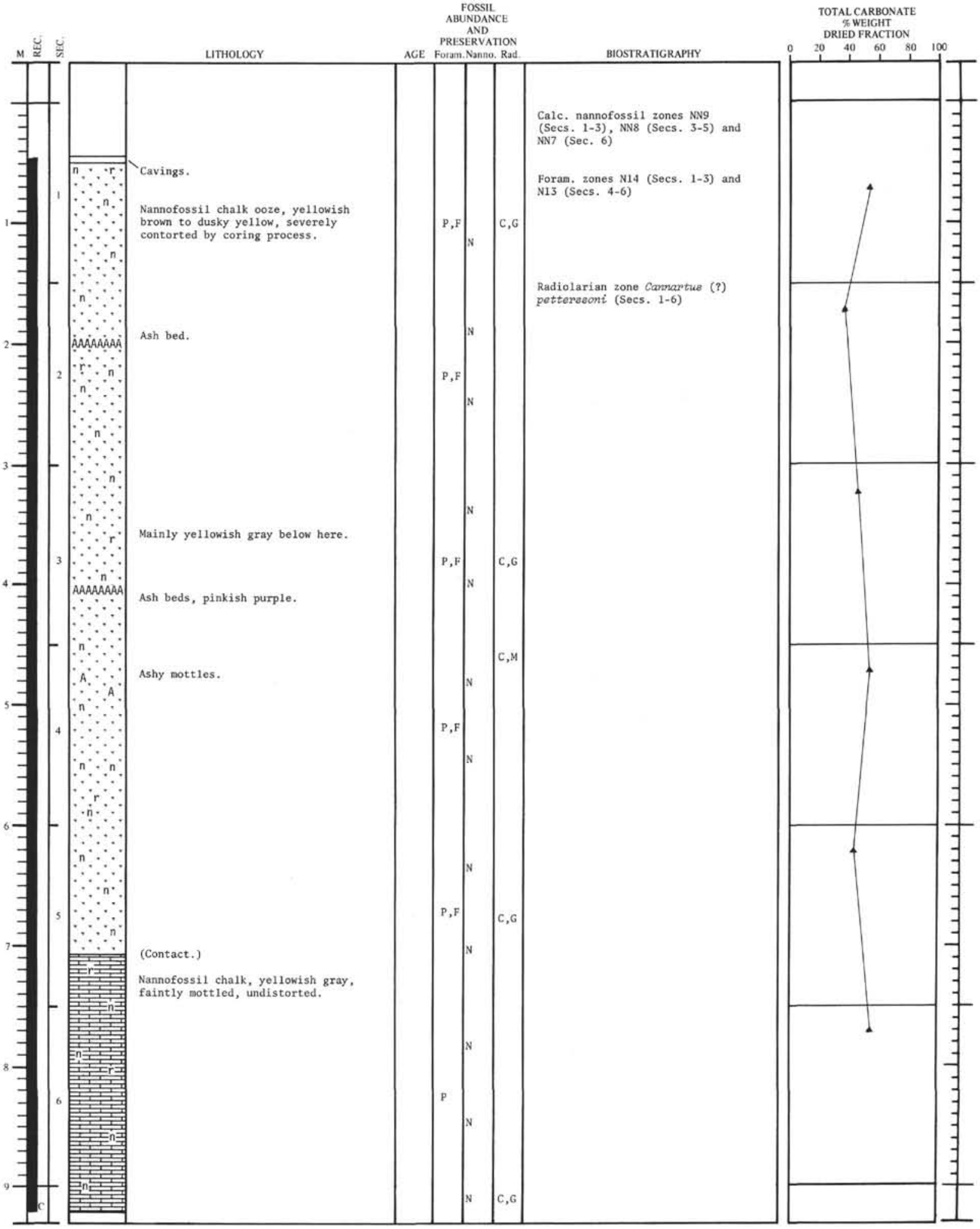
NANNOFOSSIL CHALK OOZE

Very uniform very firm to semi-consolidated (first hard lumps).

Light greenish gray 5GY8/1 with very faint pale greenish gray 5GY8-5/1 and lesser greenish gray 5GY7/1 slight mottling.

Above 30cm, basic color slightly darker (5GY7-5/1).

H = Hard



Cavings.

Nannofossil chalk ooze, yellowish brown to dusky yellow, severely contorted by coring process.

Ash bed.

Mainly yellowish gray below here.

Ash beds, pinkish purple.

Ashy mottles.

(Contact.)

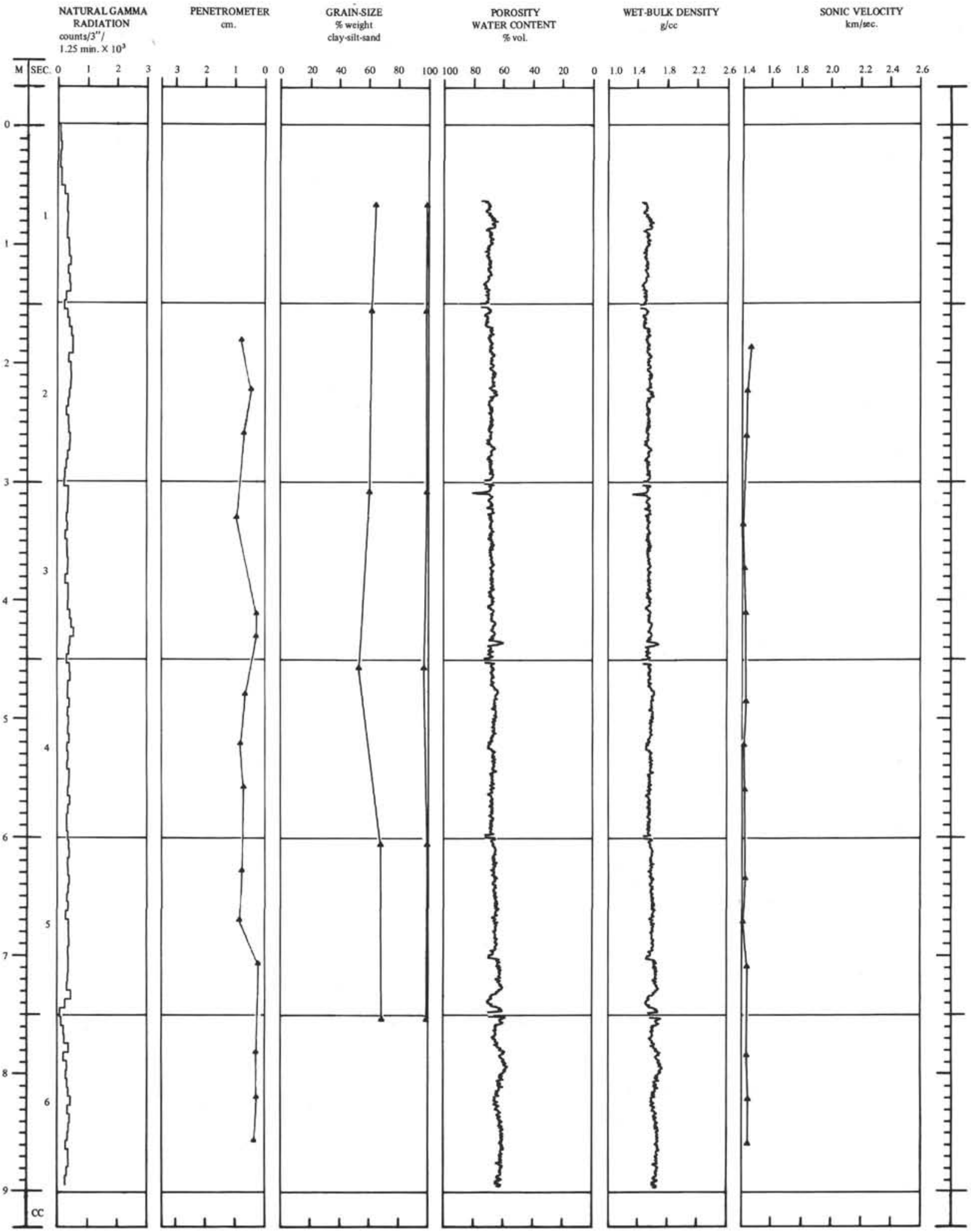
Nannofossil chalk, yellowish gray, faintly mottled, undistorted.

Calc. nannofossil zones NN9 (Secs. 1-3), NN8 (Secs. 3-5) and NN7 (Sec. 6)

Foram. zones N14 (Secs. 1-3) and N13 (Secs. 4-6)

Radiolarian zone *Cannartus* (?) *petterssoni* (Secs. 1-6)

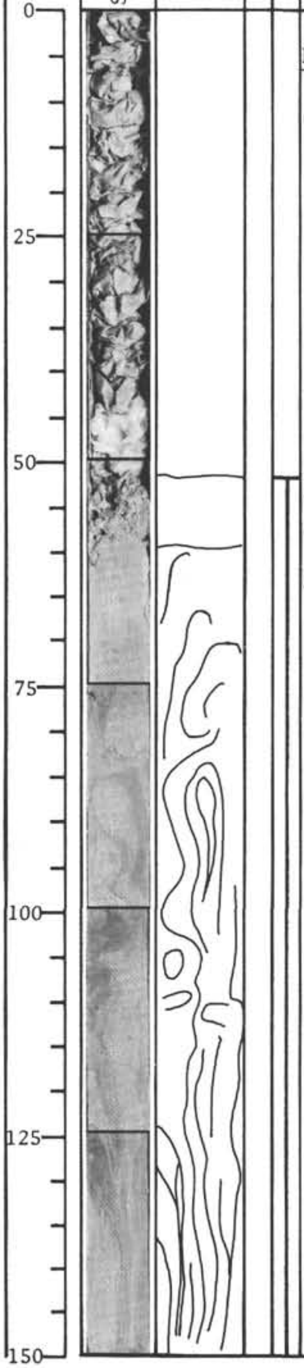
Lithology and biostratigraphy of Core 6, Hole 63.1.



Physical properties of Core 6, Hole 63.1.

Hole 63.1 Core 6
Section 1

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



NANNOFOSSIL CHALK OOZE

0-51cm: Void

51-59cm:

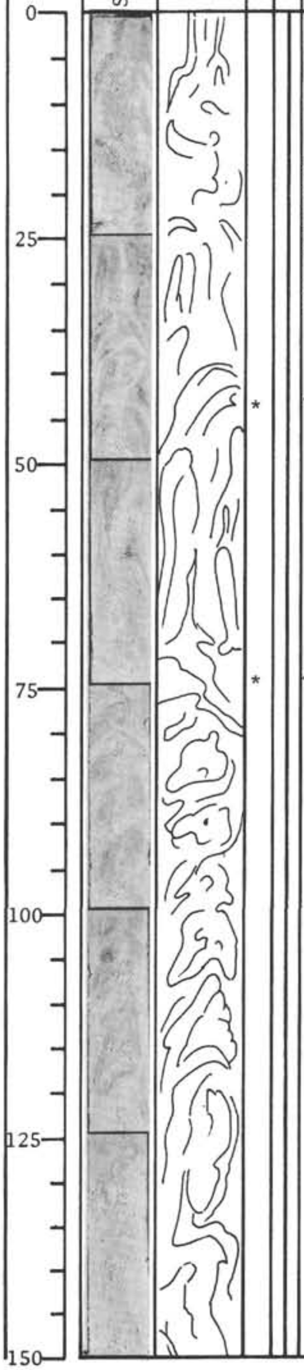
cavings

59-150cm:

About equal parts of 5Y7/2 yellowish gray and 5Y6/3 dusky yellow severely contort- by drilling.

Hole 63.1 Core 6
Section 2

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



NANNOFOSSIL CHALK OOZE

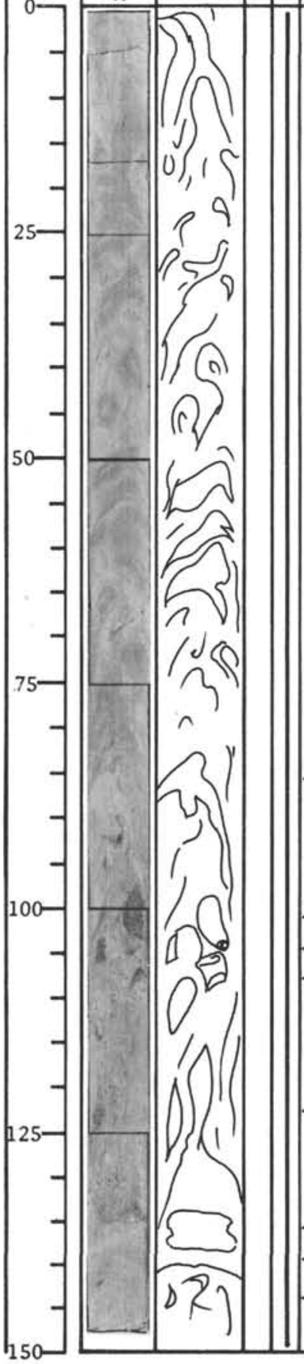
Mainly yellowish gray (5Y7/2) and dusky yellow (5Y6/4) chalk ooze, contorted severely by coring process. Some deformed mottles? beds? of light brown gray (5YR6/1) between 24 and 61cm.

← 1 42cm, from a light brownish gray mottles? bed?

← 2 75cm, from yellowish gray.

Hole 63.1 Core 6
Section 3

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

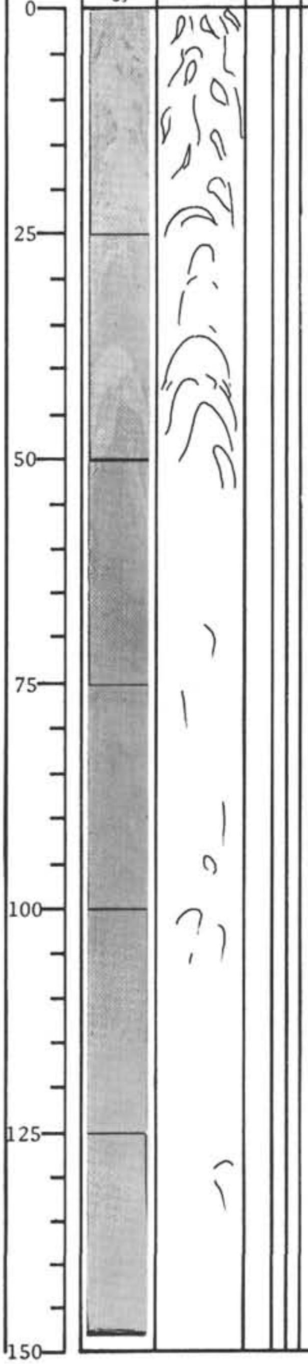


NANNOFOSSIL CHALK OOZE (and ash)

Mainly yellowish gray (5Y7/2) and dusky yellow 5Y6/4 chalk ooze, contorted by coring process. A lighter yellowish gray (5Y8/1) area (1) near 90 cm, and some darker areas (2) (light olive gray 5Y5/2) near 107 cm. Pinkish purple (5RP7/2) area ash bed 106-109 cm and smaller lenses (3) above and below. Sharply overlies grayish orange (10YR7/4) bed (4), then back to the contorted yellowish gray and dusky yellow.

Hole 63.1 Core 6
Section 4

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



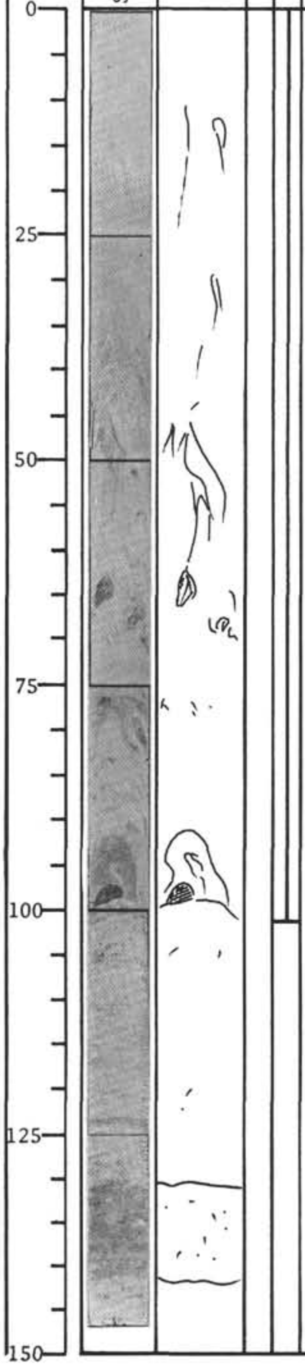
NANNOFOSSIL CHALK OOZE

0-20cm contorted, yellowish gray (5Y7/2), dusky yellow (5Y6/4), and pinkish purple (5RP7/2) (the purple same as larger masses in next overlying sect

same as larger masses in next overlying section) ∿ 20-60cm, yellowish gray and dusky yellow. ∿ 60-150cm only traces of dusky yellow; almost entirely the yellowish gray.

Hole 63.1 Core 6
Section 5

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



NANNOFOSSIL CHALK OOZE

(Below ∿ 105cm, Nannofossil chalk).

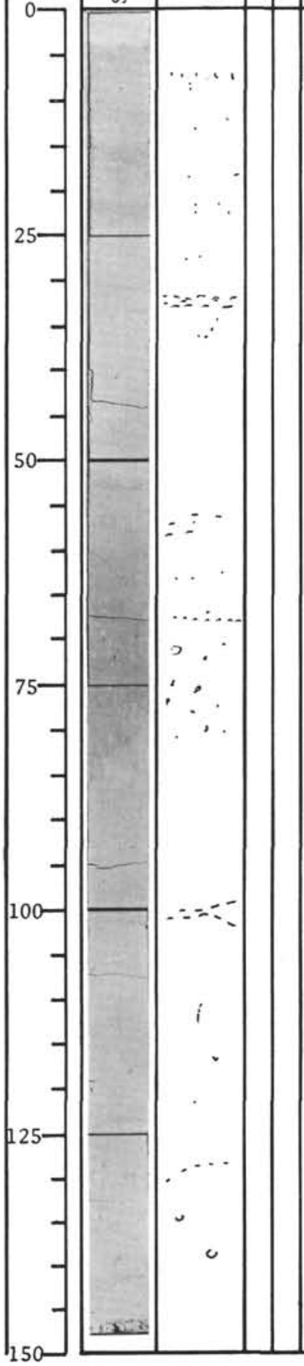
0-∿ 105cm yellowish gray 5Y7/2 chalk ooze like lower 3/5 of overlying section; some lighter and darker areas. Light olive gray 5Y5/2 at 104cm.

105-151cm:

Yellowish gray (5Y8/1) chalk, faintly mottled lighter and darker 135-146cm darker (5Y 5/3 olive), with yellowish gray mottles.

Hole 63.1 Core 6
Section 6

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

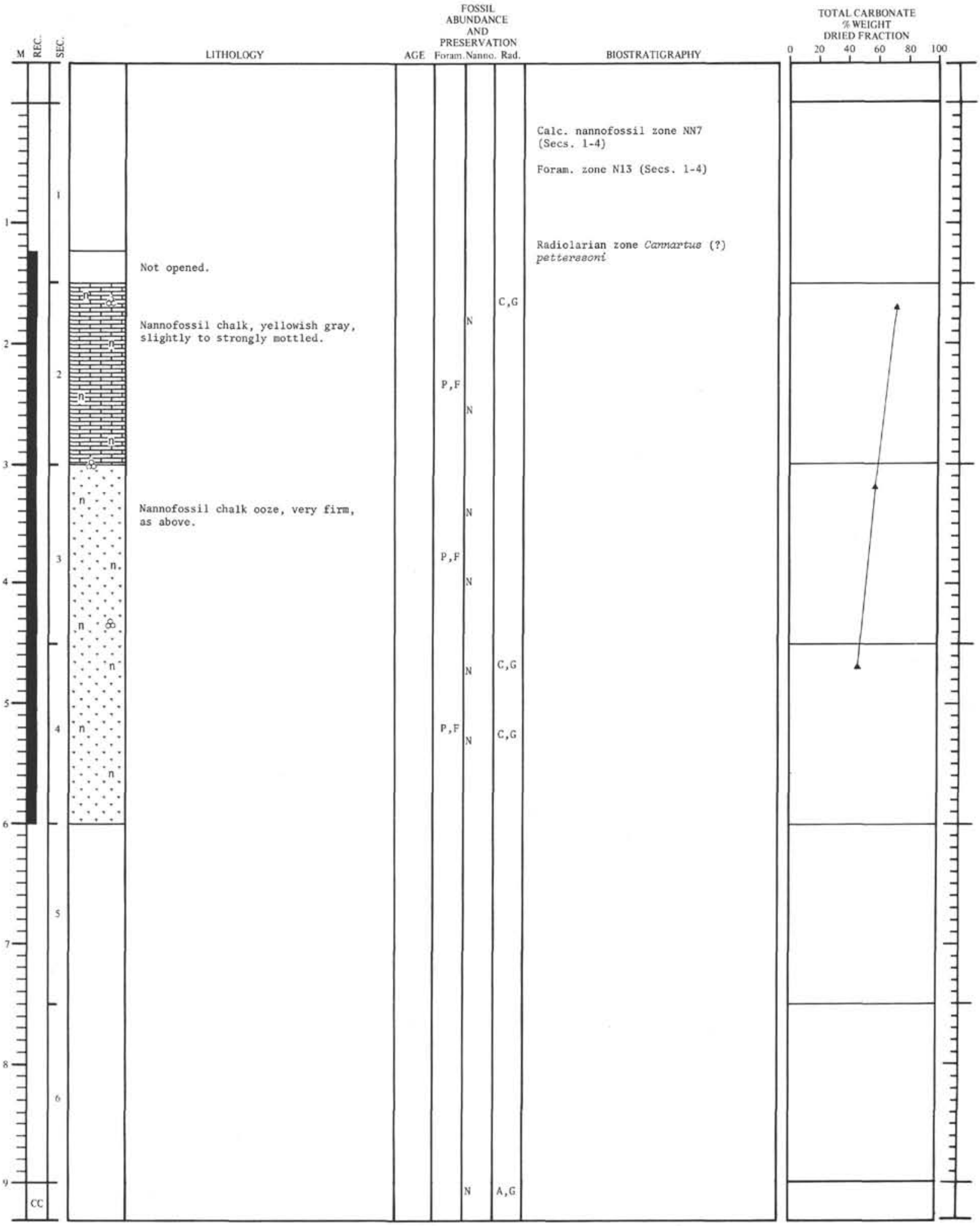


NANNOFOSSIL CHALK

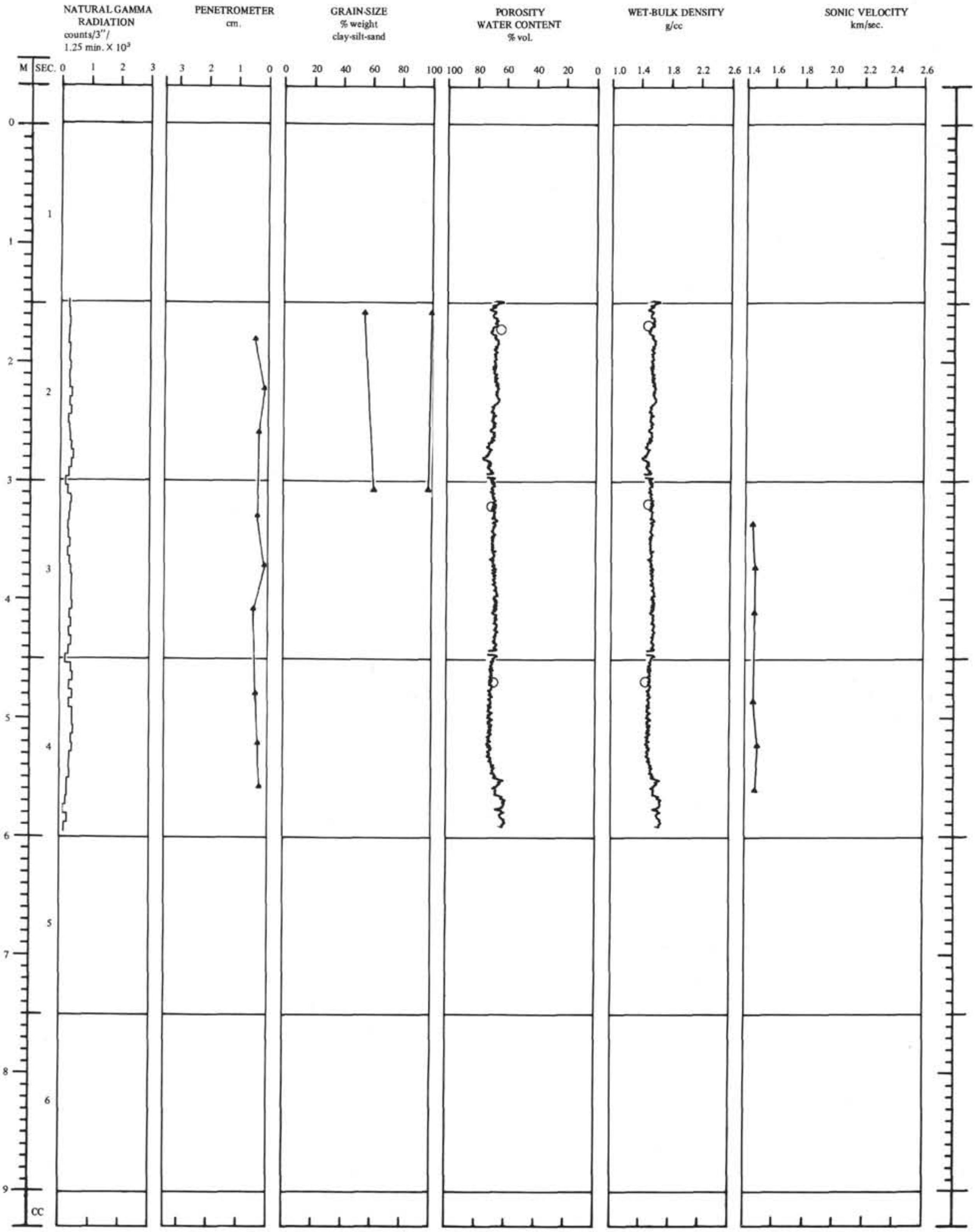
Yellowish gray (5Y8/1 to 5Y7/2) chalk - these faintly mottling into one another.

0-7 no mottles.

7-29, 55-57, 63-88, light mottles on dark. Rest, dark on light.



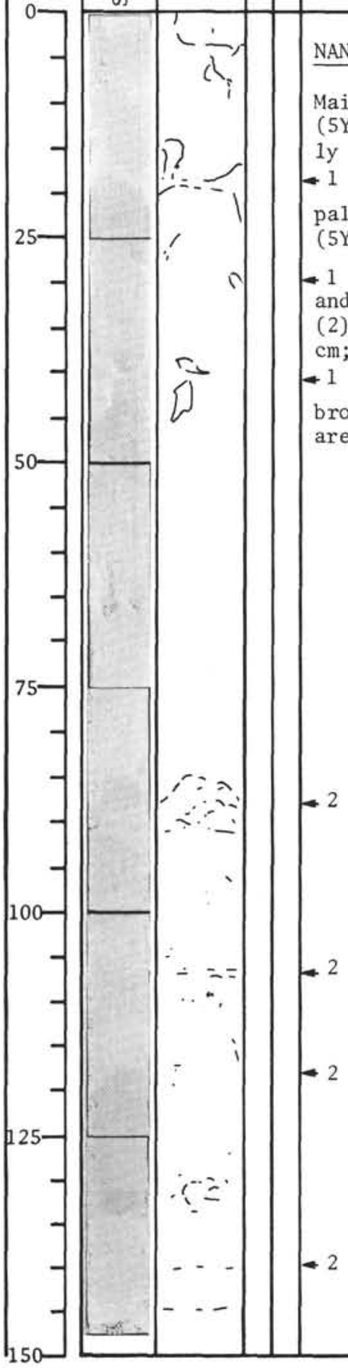
Lithology and biostratigraphy of Core 7, Hole 63.1.



Physical properties of Core 7, Hole 63.1.

Hole 63.1 Core 7
Section 2

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

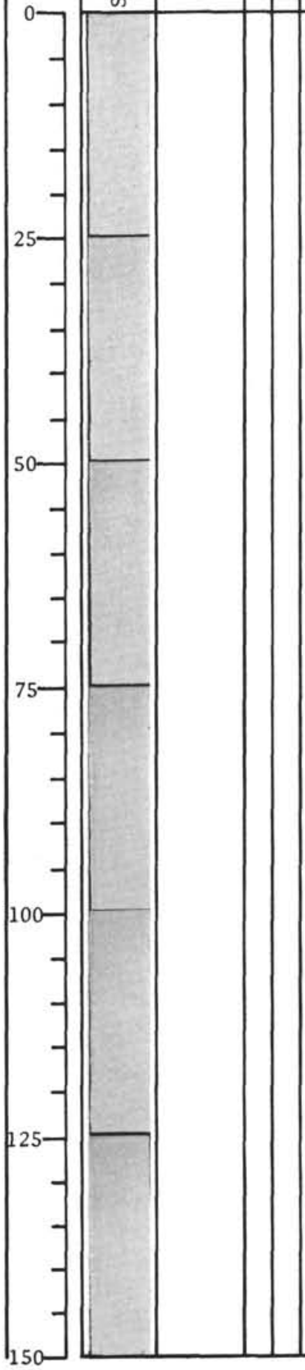


NANNOFOSSIL CHALK

Mainly yellowish gray (5Y7/2) chalk, slightly mottled (1) with pale yellowish gray (5Y8/2) above 50cm, and with dusky yellow (2) (5Y6/4) below 90 cm; a pale olive brown 5Y6/3 mottled area ∿ 135cm.

Hole 63.1 Core 7
Section 3

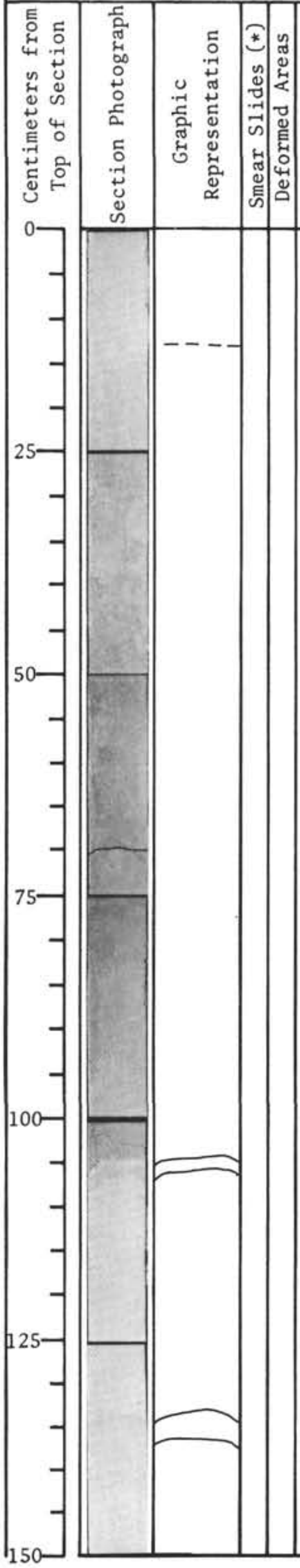
Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



NANNOFOSSIL CHALK OOZE

Extremely uniform firm yellowish gray 5Y7/2 with faint moderate mottling of pale yellowish gray 5Y8/2.

Hole 63.1 Core 7
Section 4



Description

NANNOFOSSIL CHALK OOZE

0-13cm:

As Section 3.

Very gradual boundary at 13cm.

13-104cm:

Very firm 5Y6/3 dusky yellow with strong 5Y7/2 yellowish gray mottling.

Horizontal bedding.

135-150cm:

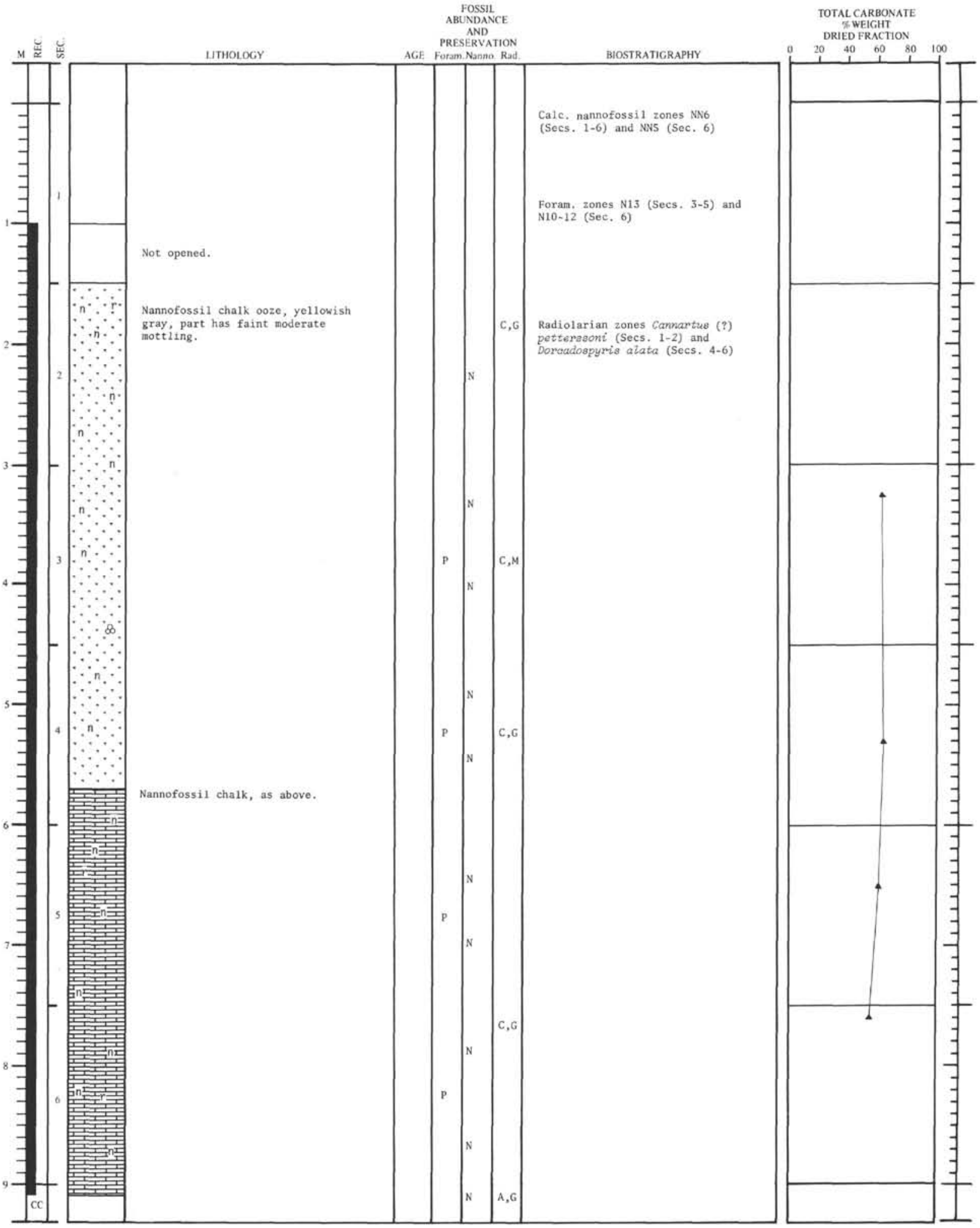
As 104-133cm.

Fairly sharp boundary at 104cm.

104-132cm:

5Y7/2 yellowish gray with slight 5Y6/3 dusky yellow mottling.

Sharp boundary at 132 cm. Gradual boundary at 135cm. 132-135cm. As 13-104cm.



Not opened.

Nannofossil chalk ooze, yellowish gray, part has faint moderate mottling.

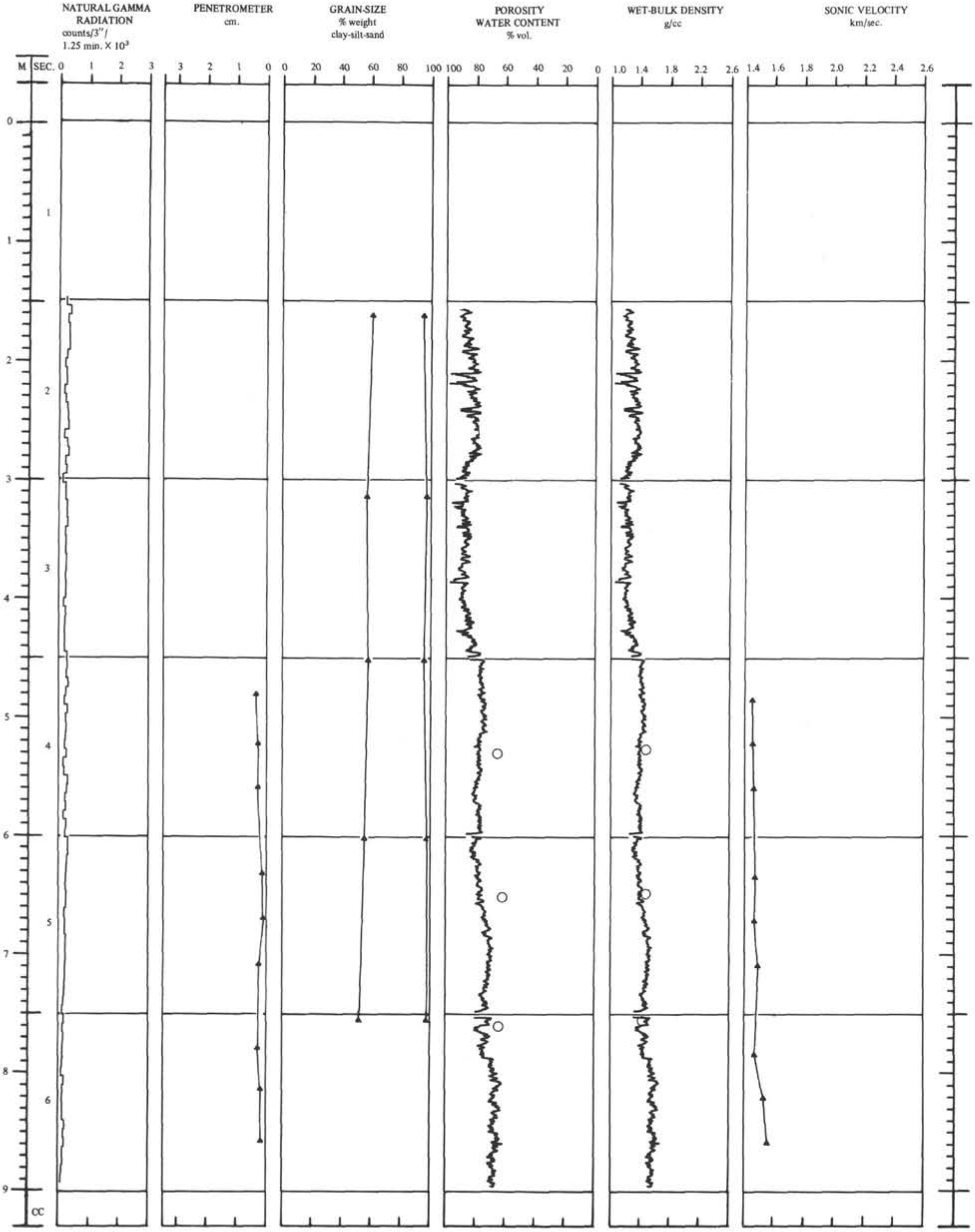
Nannofossil chalk, as above.

Calc. nannofossil zones NN6 (Secs. 1-6) and NN5 (Sec. 6)

Foram. zones N13 (Secs. 3-5) and N10-12 (Sec. 6)

Radiolarian zones *Cannartus* (?) *petterssoni* (Secs. 1-2) and *Dorcadospyris alata* (Secs. 4-6)

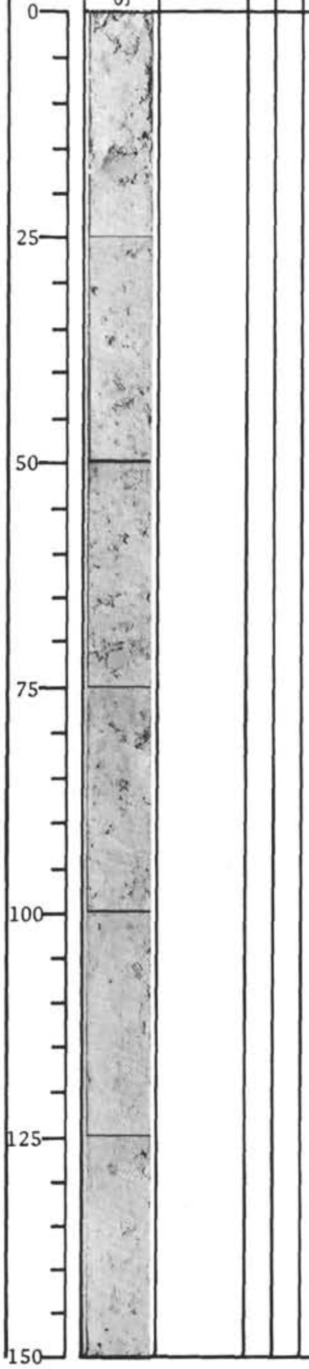
Lithology and biostratigraphy of Core 8, Hole 63.1.



Physical properties of Core 8, Hole 63.1.

Hole 63.1 Core 8
Section 2

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



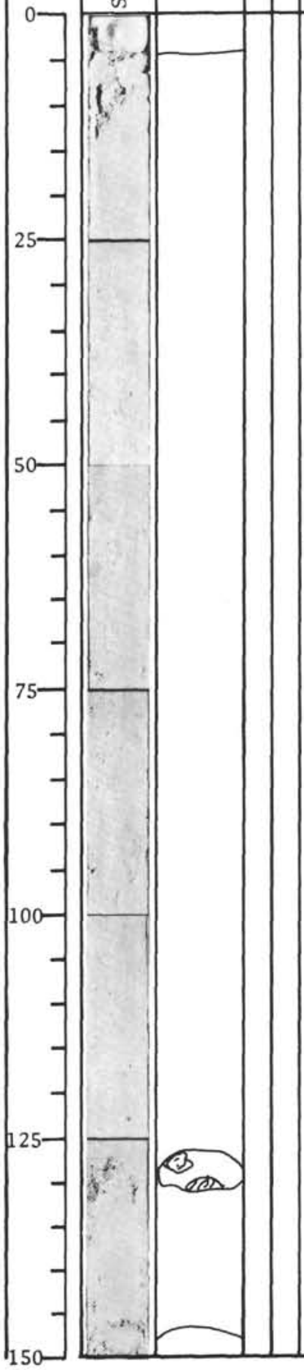
NANNOFOSSIL CHALK OOZE

Entire section disrupted by drilling.

1-3cm chunks of semi-indurated 5Y8/2 pale yellowish gray 5Y7/2 yellowish gray and 2.5Y7/4 dusky yellow.

Hole 63.1 Core 8
Section 3

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



0-6cm: Void

NANNOFOSSIL CHALK OOZE

Soft, heavily gas cut, probably churned by drilling.

5Y7/2 yellowish gray rare patches (∿ 2cm diameter) of 5Y6/3 dusky yellow.

123cm:

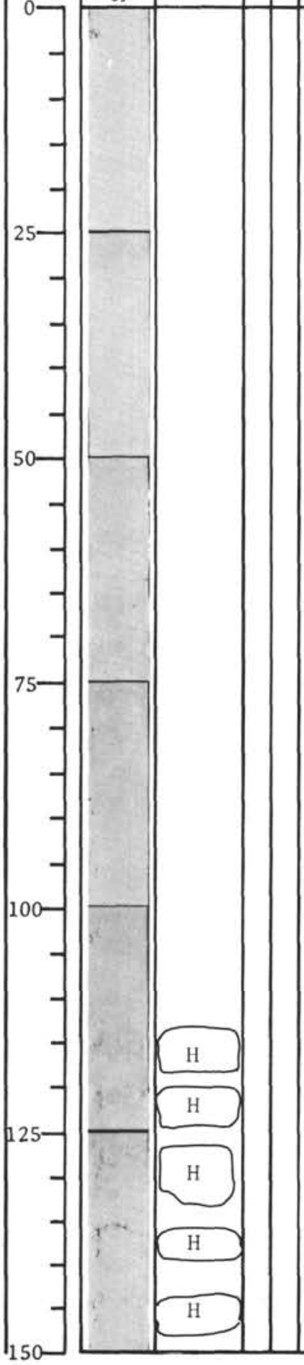
Hard lump, matrix color plus 5Y6/3 dusky yellow 1cm mottles.

148cm:

Hard lump - colors as matrix.

Hole 63.1 Core 8
Section 4

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



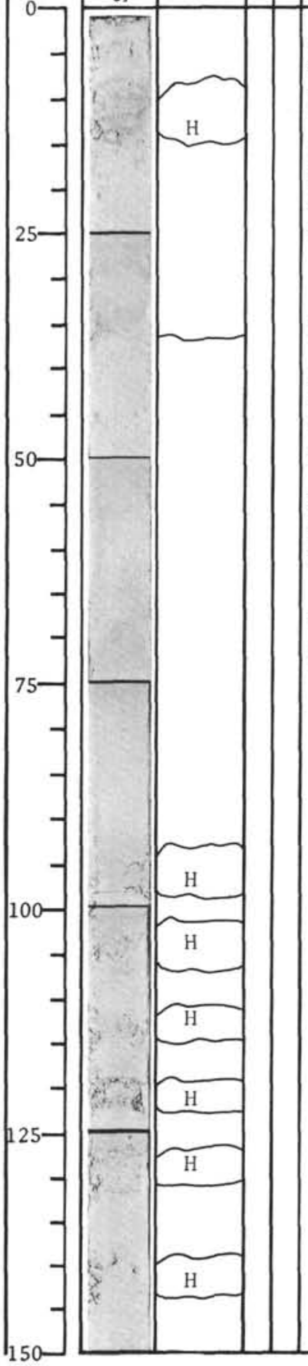
NANNOFOSSIL CHALK OOZE TO CHALK

Firm to semi-indurated (H).

5Y7/3 yellowish gray to 5Y7.5/2 yellowish gray with moderate mottling of 5Y8/2 pale yellowish gray and 5Y6/3 dusky yellow.

Hole 63.1 Core 8
Section 5

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



NANNOFOSSIL CHALK

0-35cm:

Very firm to indurated 5Y7/3 yellowish gray with moderate mottling of 5Y5/3.

35-150cm:

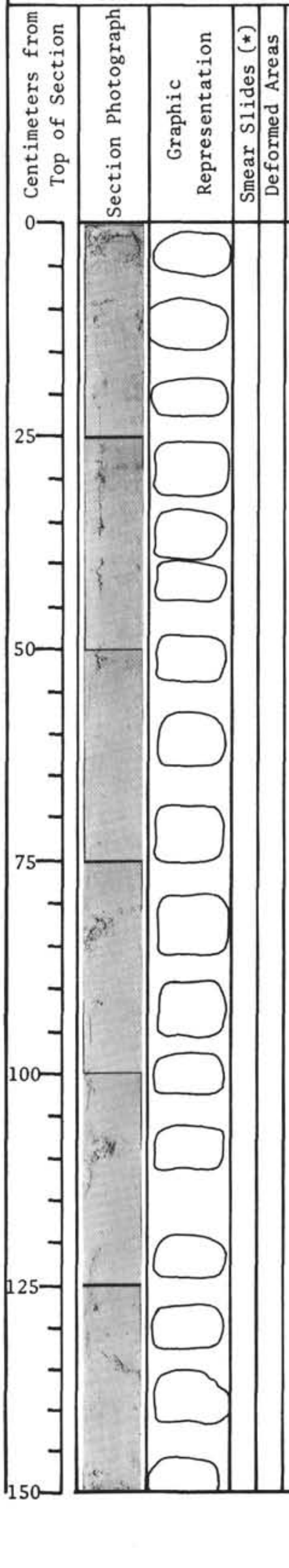
Firm upper portion with "biscuits" (H) in matrix of homogenized sediment.

5Y8/2 pale yellowish gray with very faint moderate mottling.

35cm:

Gradual boundary.

Hole 63.1 Core 8
Section 5

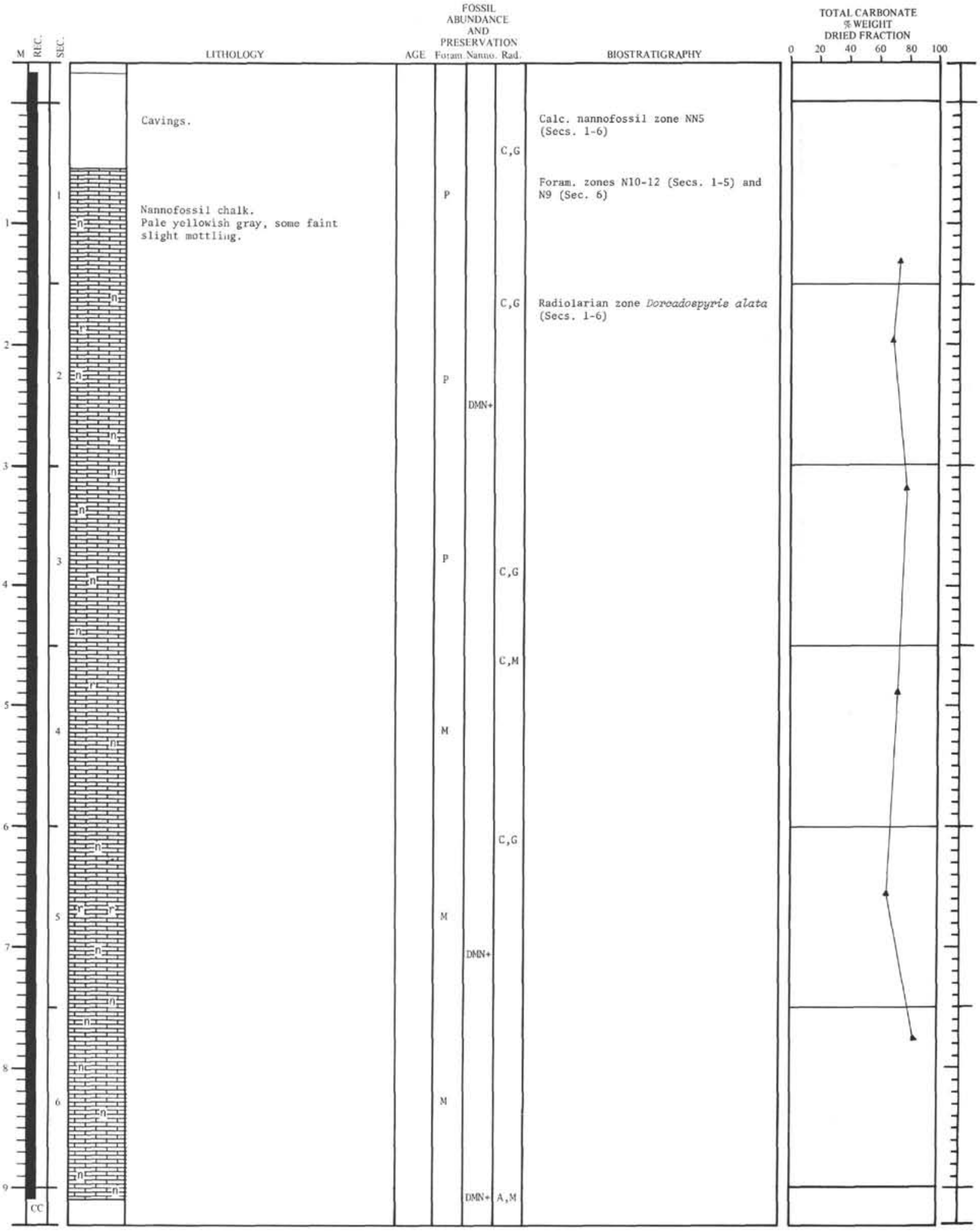


Description

NANNOFOSSIL CHALK

Hard indurated 5Y7/2 yellowish gray "biscuits" in matrix of same color.

Hard blocks have minor slight 5Y5/3 dusky yellow mottling.



Cavings.

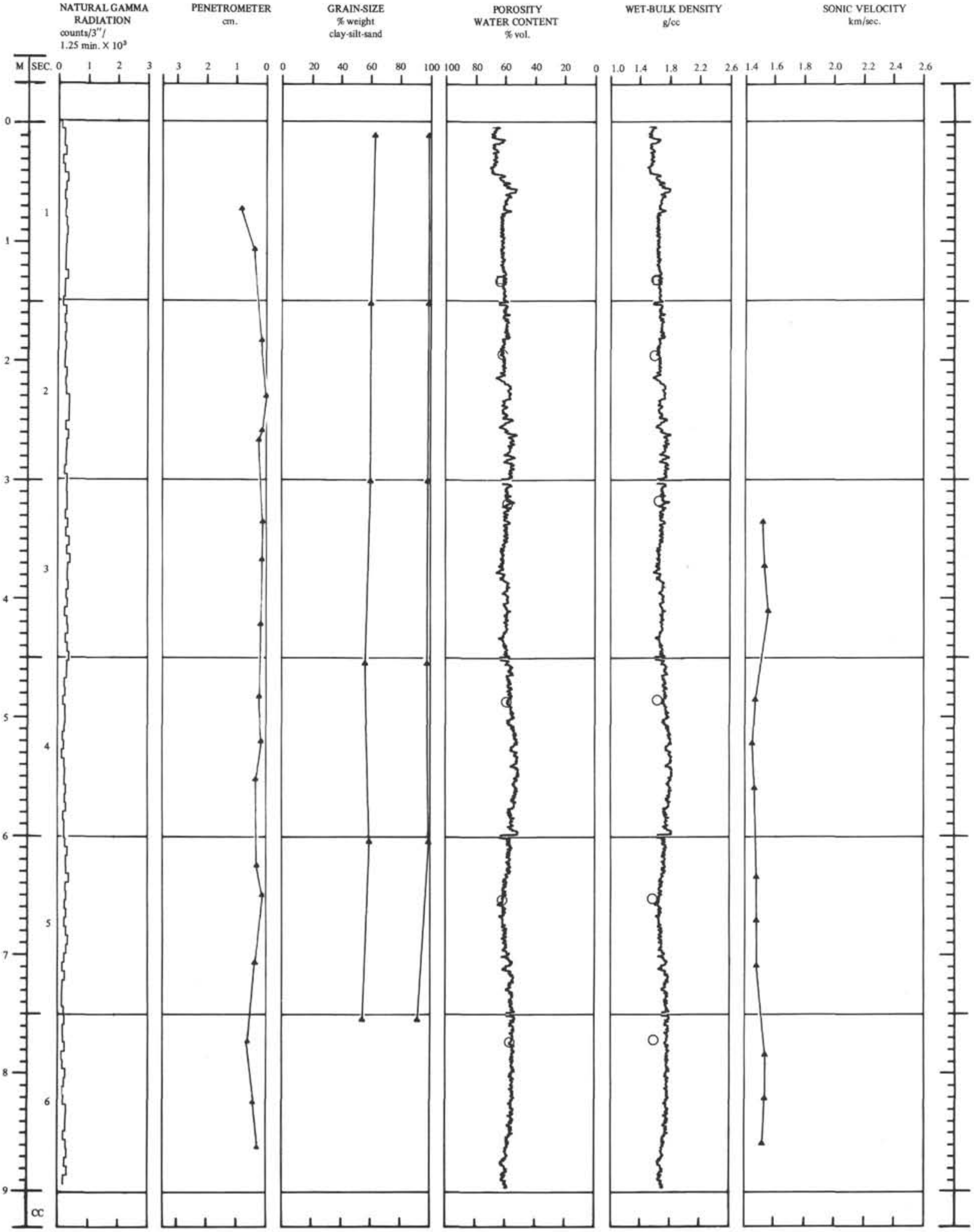
Nannofossil chalk.
Pale yellowish gray, some faint slight mottling.

Calc. nannofossil zone NN5 (Secs. 1-6)

Foram. zones N10-12 (Secs. 1-5) and N9 (Sec. 6)

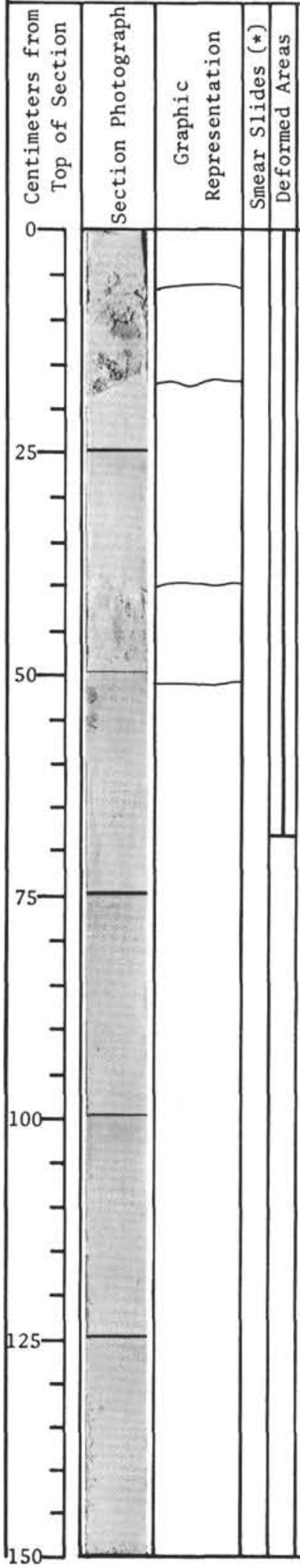
Radiolarian zone *Dorcadospyris alata* (Secs. 1-6)

Lithology and biostratigraphy of Core 9, Hole 63.1.



Physical properties of Core 9, Hole 63.1.

Hole 63.1 Core 9
Section 1



Description

NANNOFOSSIL CHALK

0-9, 19-41cm:

Very watery.

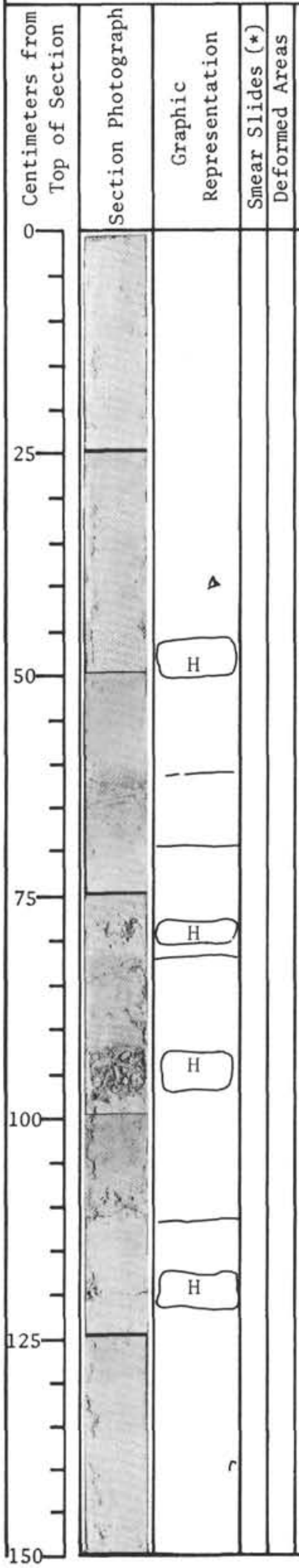
9-19, 41-53cm:

cavings, yellowish gray 5Y7/2 with 2.5Y 6/4 dusky yellow lumps.

53-150cm:

Very firm to indurated 5Y7-5/2 yellowish gray with slight very faint mottling.

Hole 63.1 Core 9
Section 2



Description

NANNOFOSSIL CHALK

Small pumice fragment at 40cm.

Very firm throughout, with local indurated (H) blocks.

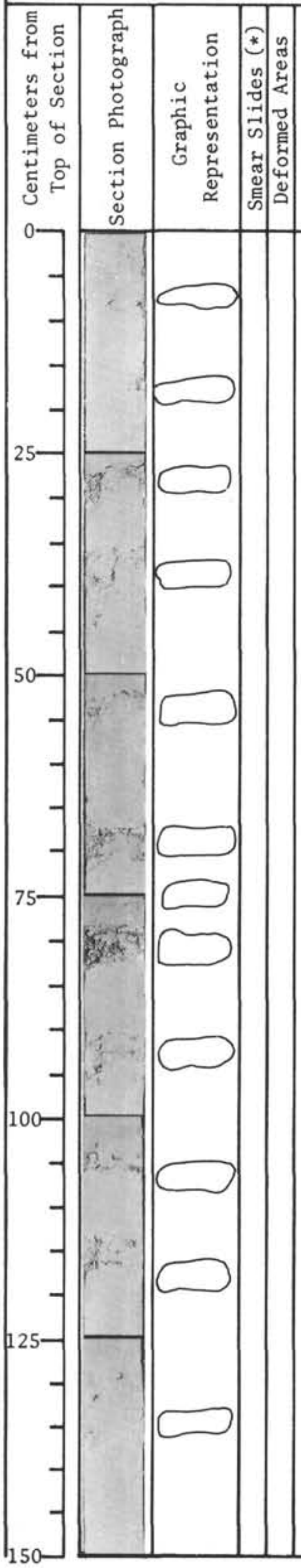
0-61, 69-82, 111-150cm:

5Y7/2 yellowish gray with faint moderate mottling.

61-69, 82-111cm:

5Y7/3 dusky yellow with moderate 5Y7/2 yellowish gray and 5Y5/3 dusky yellow mottling.

Hole 63.1 Core 9
Section 3



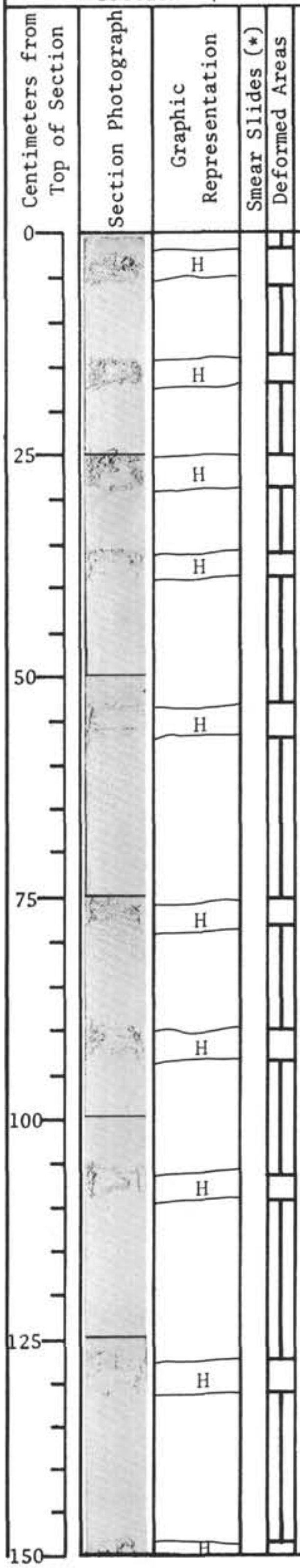
Description

NANNOFOSSIL CHALK

Semi indurated "biscuits" in a very firm matrix somewhat disturbed by drilling.

Very uniform 5Y7/2 yellowish gray.

Hole 63.1 Core 9
Section 4



Description

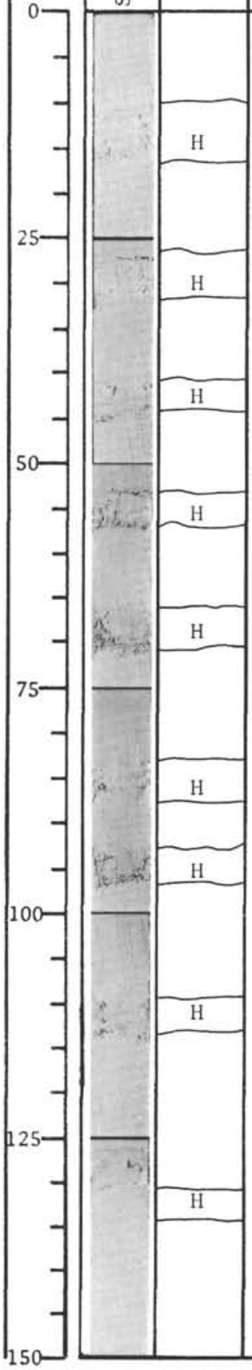
NANNOFOSSIL CHALK

Heavily fractured indurated hard blocks (H) in matrix of soft sediment homogenized by drilling.

H blocks very uniform 5Y8/2 pale yellowish gray.

Hole 63.1 Core 9
Section 5

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



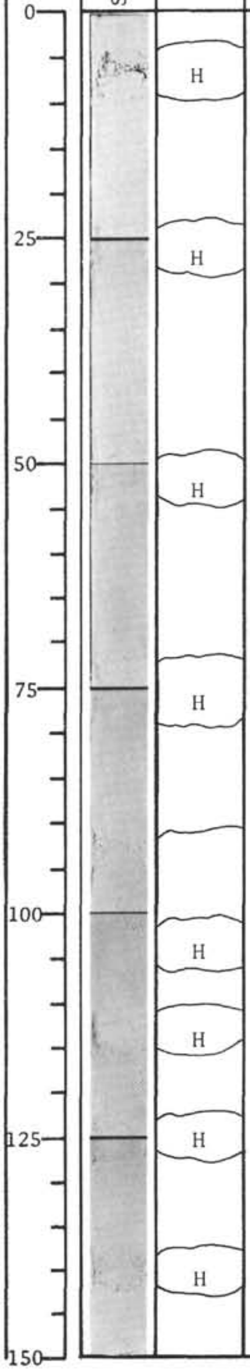
NANNOFOSSIL CHALK

As Section 4.

Hard blocks (H) show faint mottling one value higher and lower than basic 5Y8/2 pale yellowish gray.

Hole 62.1 Core 9
Section 6

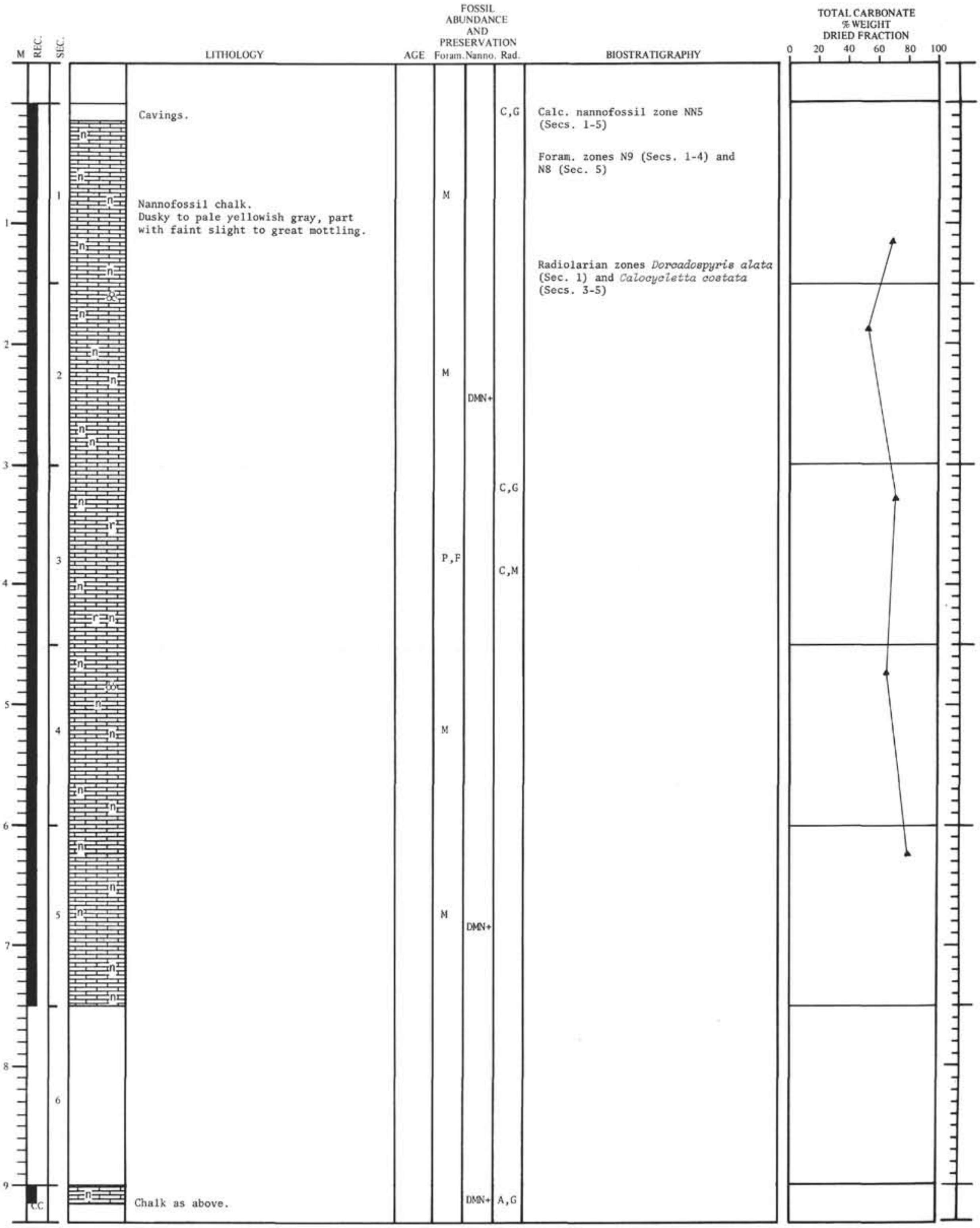
Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description



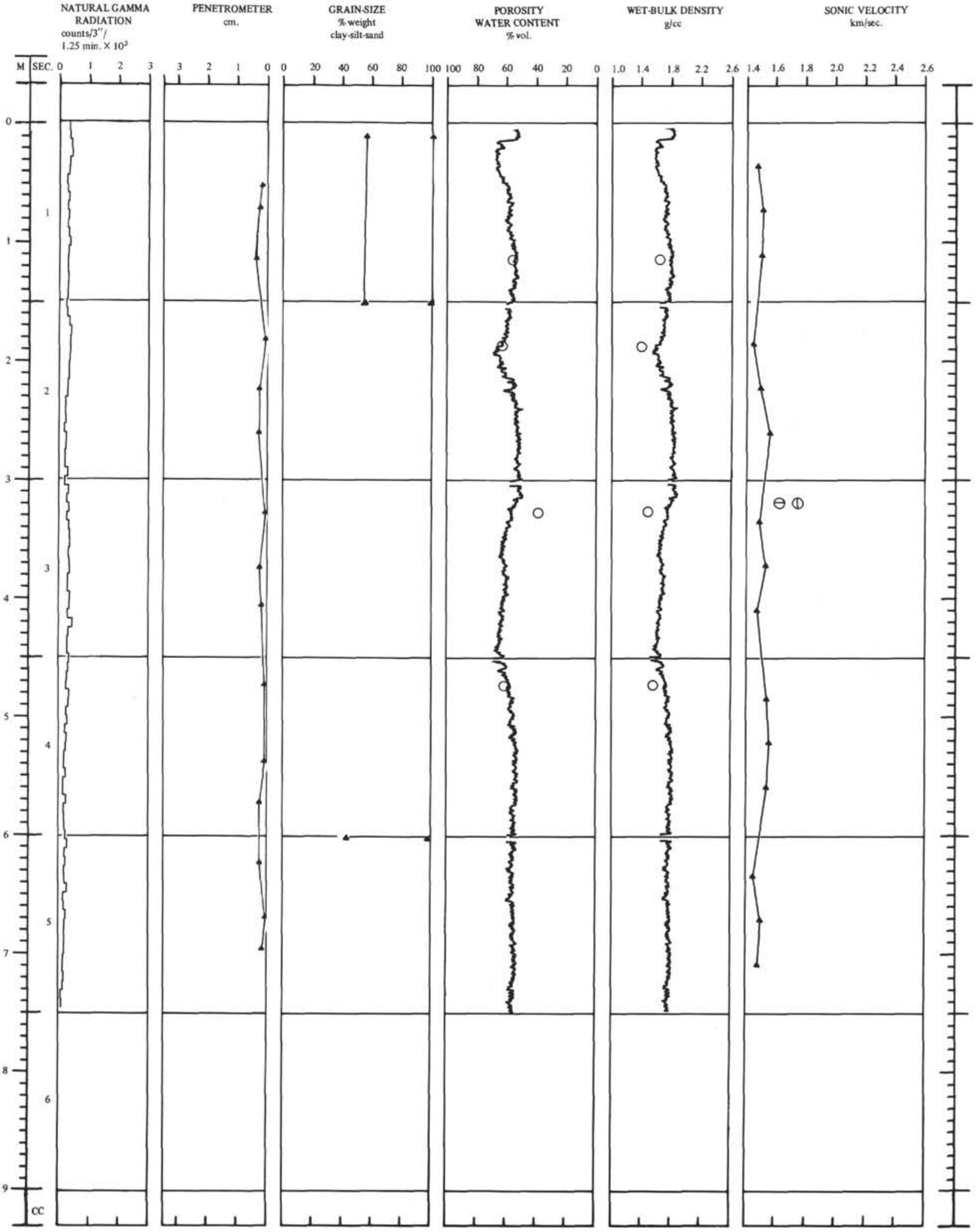
NANNOFOSSIL CHALK

As Section 5

H= Hard

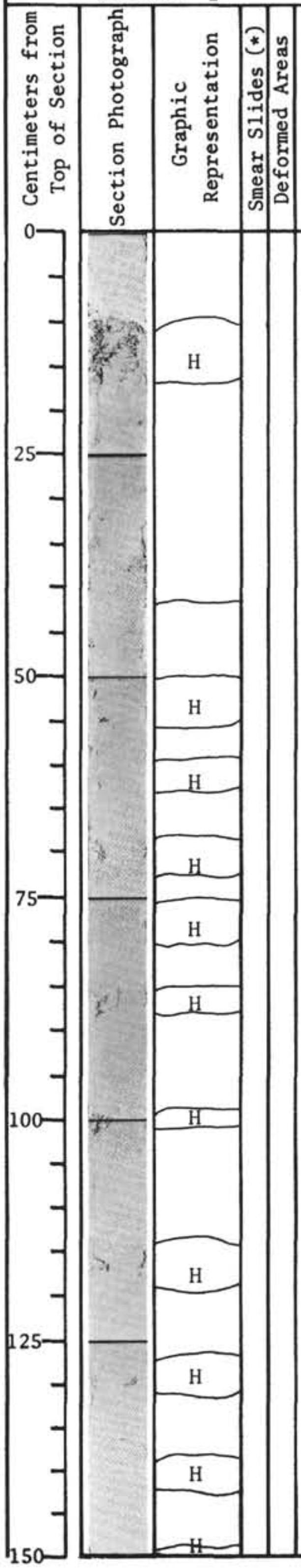


Lithology and biostratigraphy of Core 10, Hole 63.1.



Physical properties of Core 10, Hole 63.1.

Hole 63.1 Core 10
Section 1



Description

NANNOFOSSIL CHALK

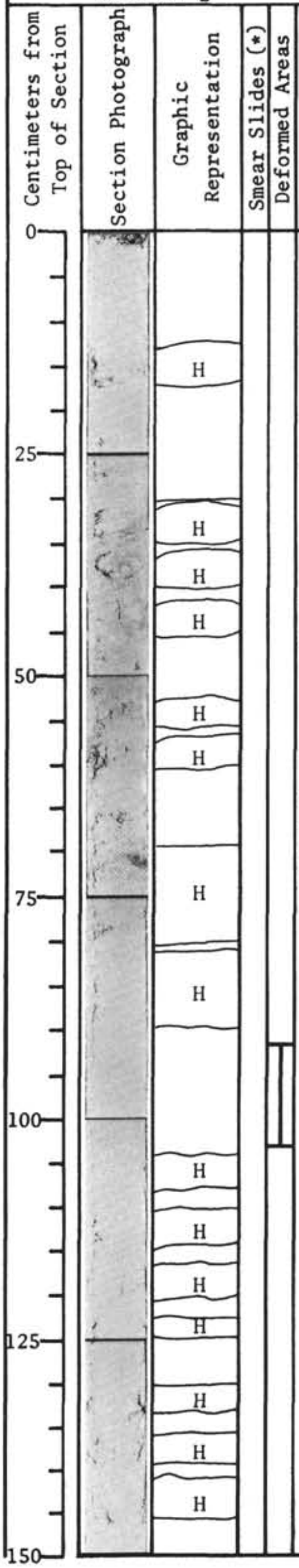
0-9cm: cavings

9-41cm: 5Y7/3 yellowish gray fading downward.

41-150cm: 5Y8/2 pale yellowish gray with faint yellowish gray 5Y7/2 slight mottling.

Hard lumps (H) of sediment in matrix homogenized by drilling.

Hole 63.1 Core 10
Section 2



Description

NANNOFOSSIL CHALK

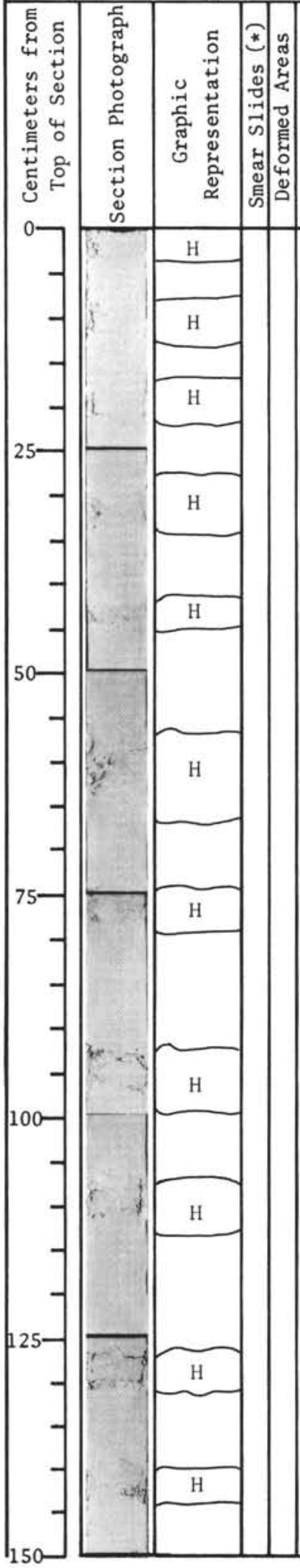
0-30cm: 5Y8/3 pale yellowish gray with very faint moderate mottling.

30-61cm: 2.5Y6/4 dusky yellow with great mottling of 5Y8/2 pale yellowish gray.

61-150cm:5Y8/2-9/2 very pale yellowish gray with very faint mottling

Hard lumps (H) in matrix broken up but little displaced by drilling.

Hole 63.1 Core 10
Section 3



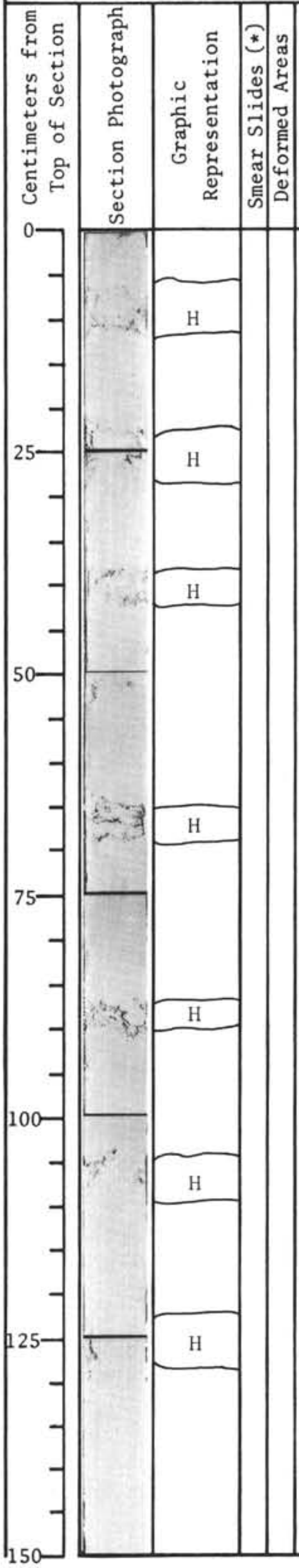
Description

NANNOFOSSIL CHALK

Hard blocks (H) in soft matrix disturbed but not much displaced by drilling.

Very uniform 5Y8/2 and 5Y6/3 (pale yellowish gray and dusky yellow) greatly mottled. Irregular horizontal laminations in part.

Hole 63.1 Core 10
Section 4

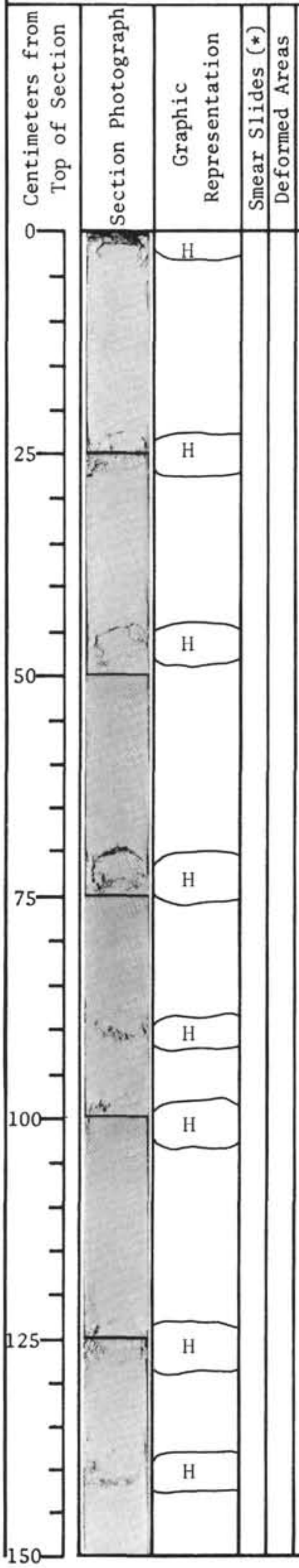


Description

NANNOFOSSIL CHALK

As Section 3.

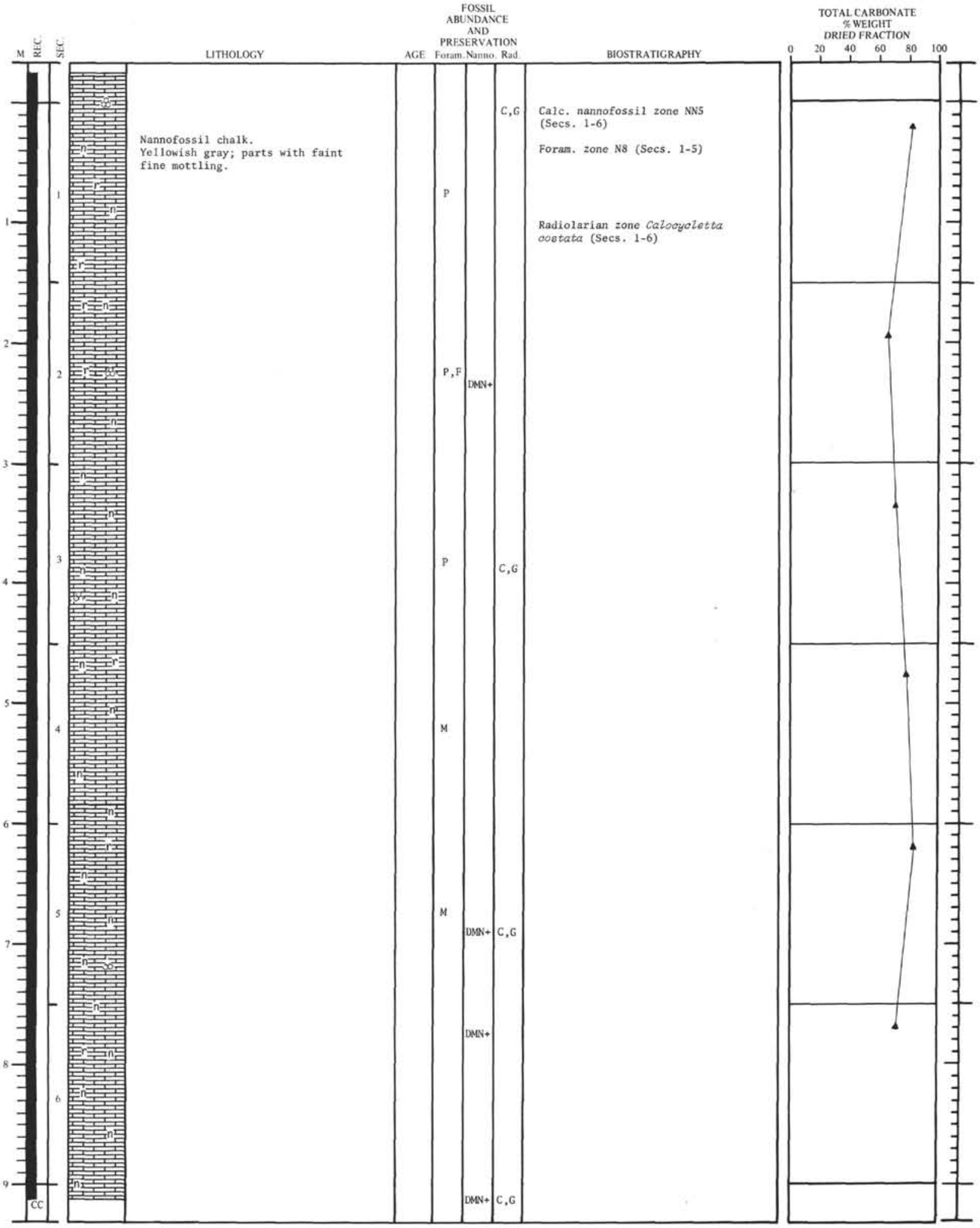
Hole 63.1 Core 10
Section 5



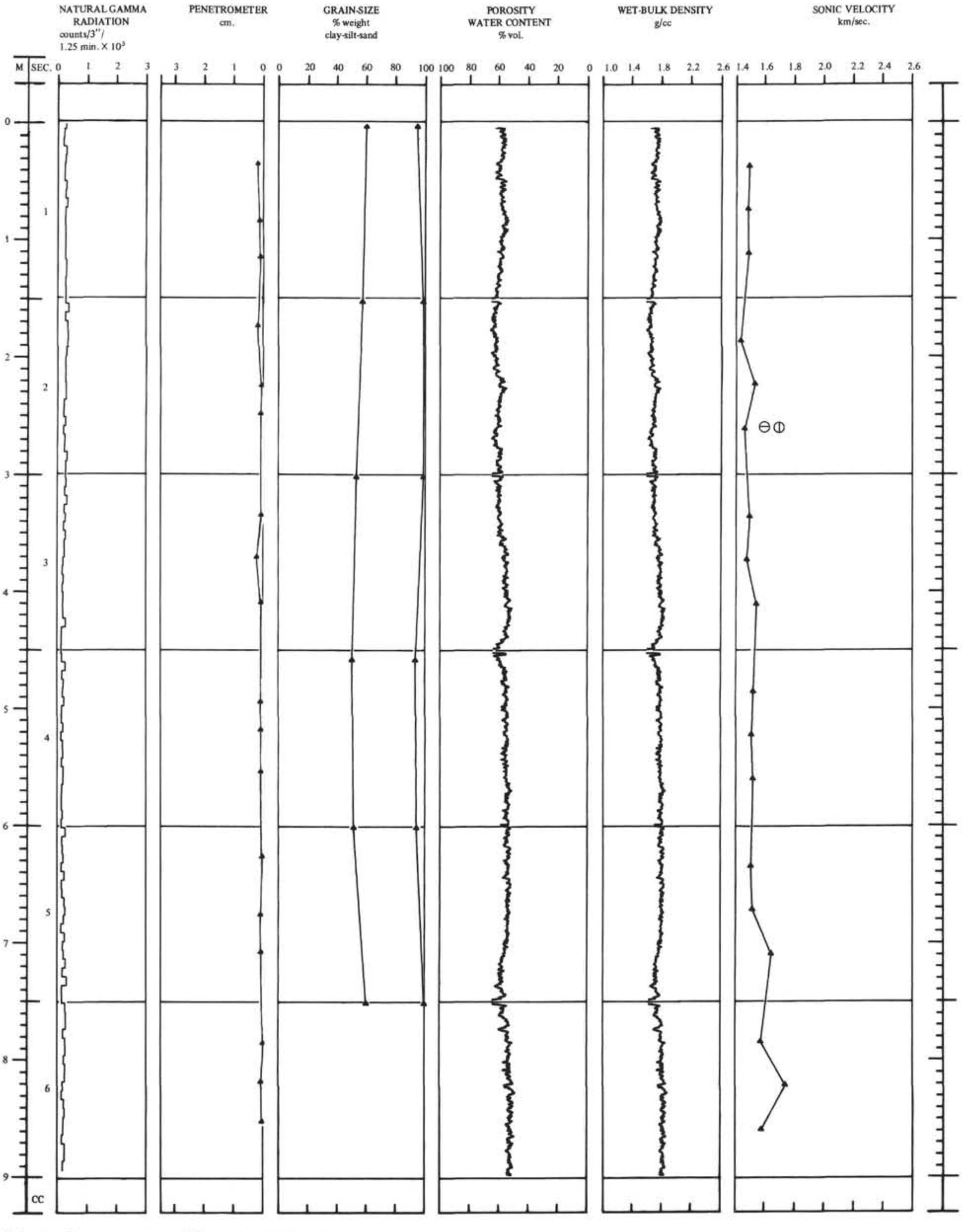
Description

NANNOFOSSIL CHALK

As Section 3.

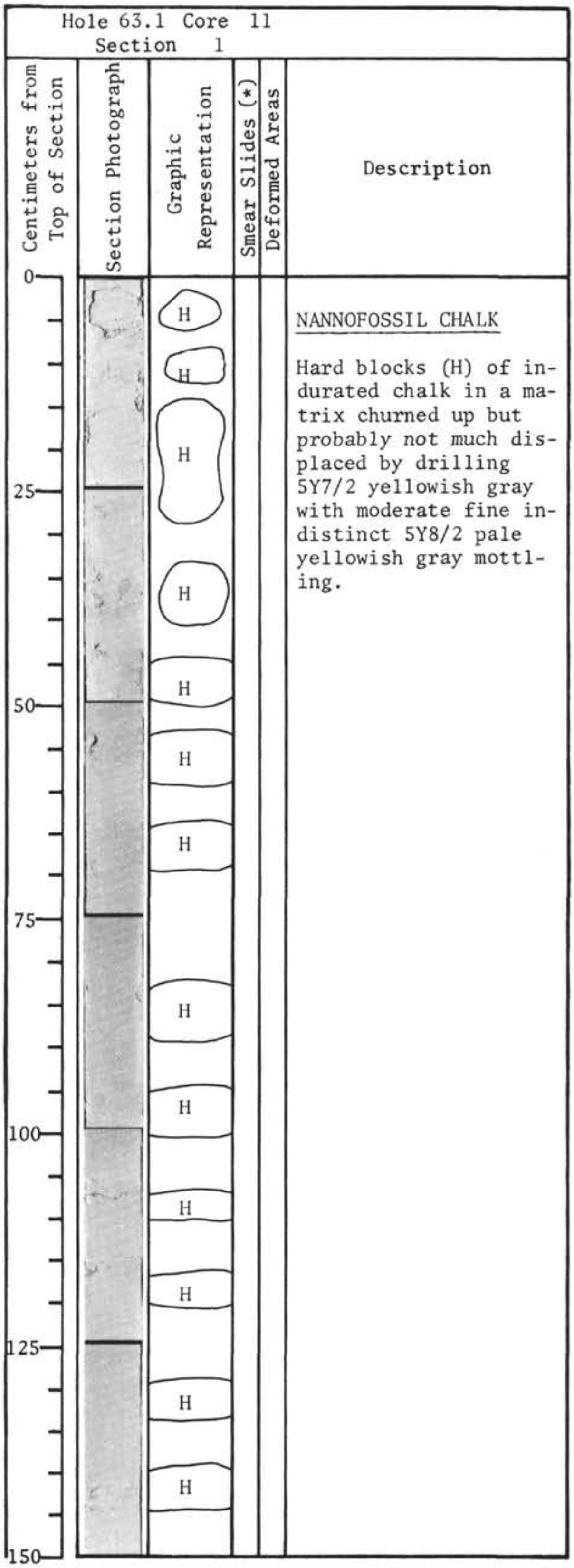


Lithology and biostratigraphy of Core 11, Hole 63.1.



Physical properties of Core 11, Hole 63.1.

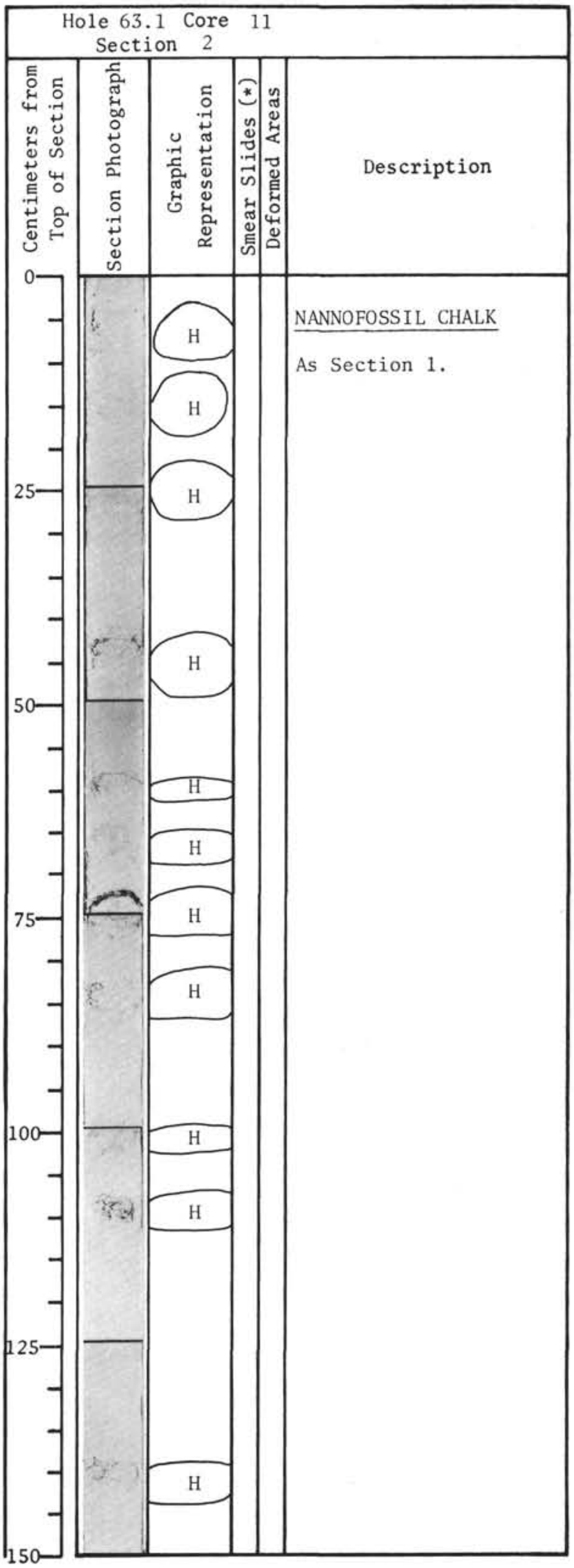
Hole 63.1 Core 11
Section 1



NANNOFOSSIL CHALK

Hard blocks (H) of indurated chalk in a matrix churned up but probably not much displaced by drilling 5Y7/2 yellowish gray with moderate fine indistinct 5Y8/2 pale yellowish gray mottling.

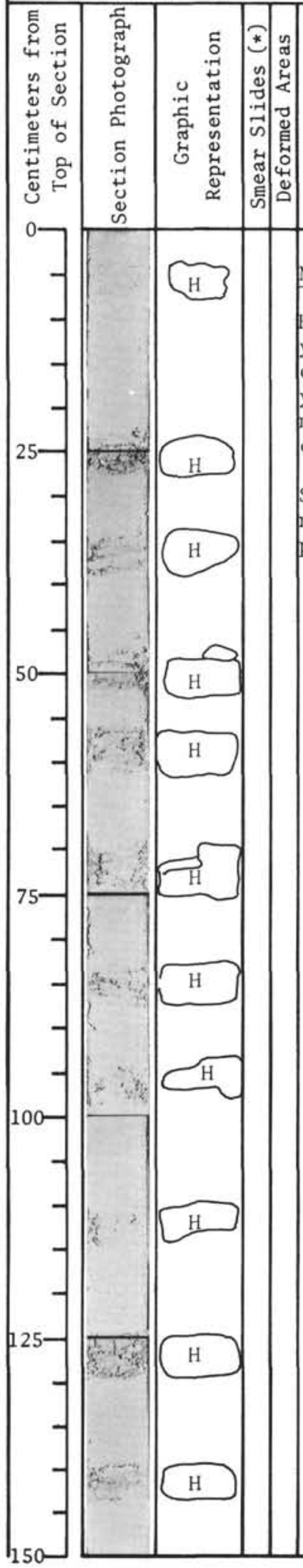
Hole 63.1 Core 11
Section 2



NANNOFOSSIL CHALK

As Section 1.

Hole 63.1 Core 11
Section 3



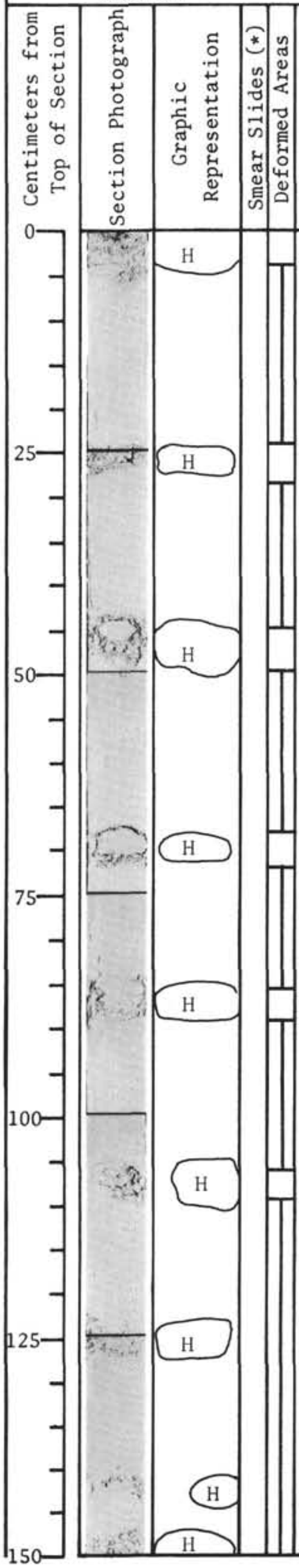
Description

NANNOFOSSIL CHALK

Harder (H) pieces of yellowish gray (5Y8/2) chalk in a matrix of yellowish gray (5Y8/2) mud homogenized by the coring process.

Some fine to indistinct mottling in harder pieces.

Hole 63.1 Core 11
Section 4



Description

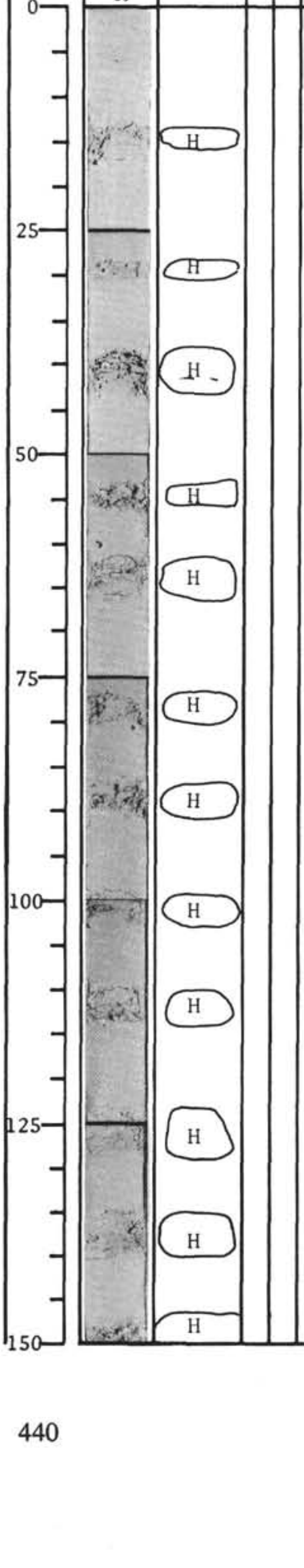
NANNOFOSSIL CHALK

Harder (H) pieces of yellowish gray (5Y8/2) chalk, in a matrix of mud of same composition and color, homogenized by the coring process.

No apparent structures.

Hole 63.1 Core 11
Section 5

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

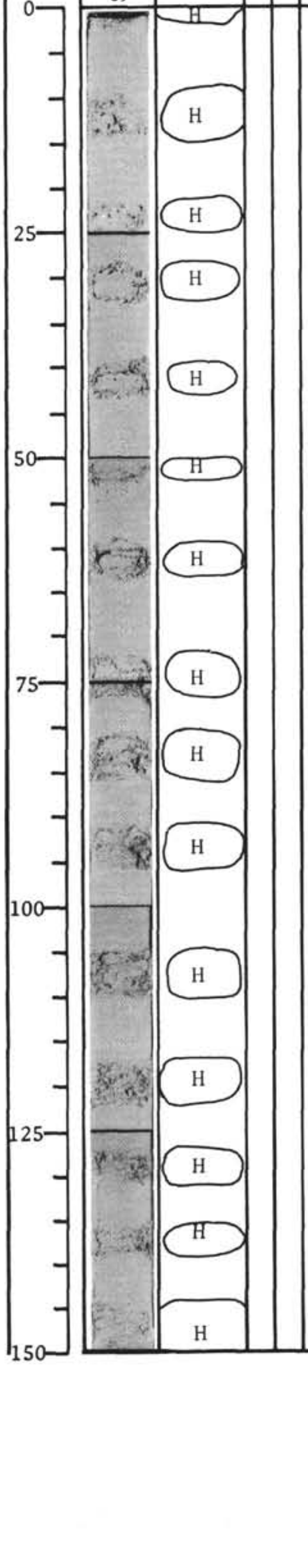


NANNOFOSSIL CHALK

Harder pieces (H) of yellowish gray (5Y8/1) chalk in a matrix of mud of same composition and color, homogenized by the coring process. Rare fine mottling.

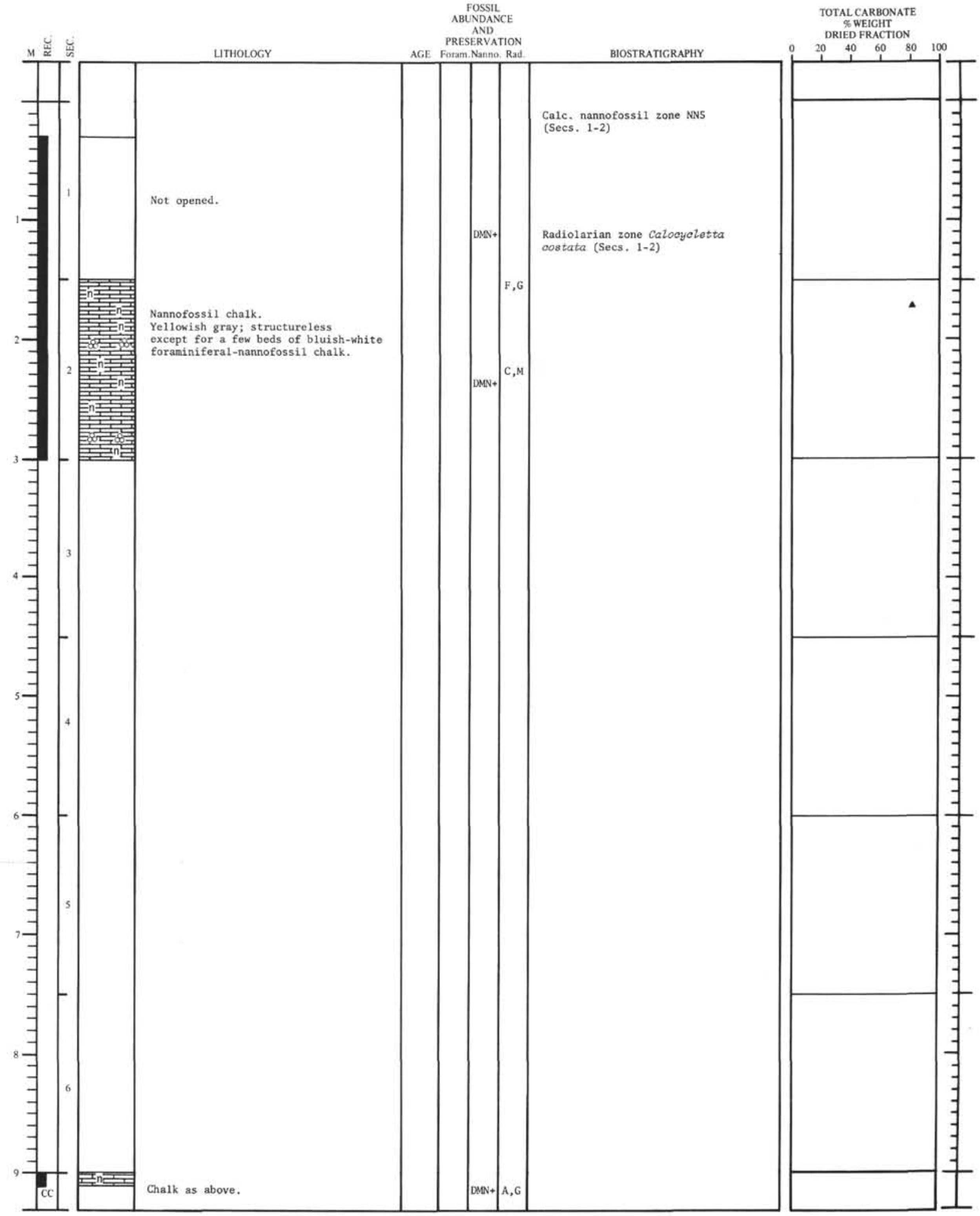
Hole 63.1 Core 11
Section 6

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



NANNOFOSSIL CHALK

Harder pieces (H) of yellowish gray (5Y8/1) chalk in a matrix of mud of the same composition and color, homogenized by the coring process.
No apparent structures.



Not opened.

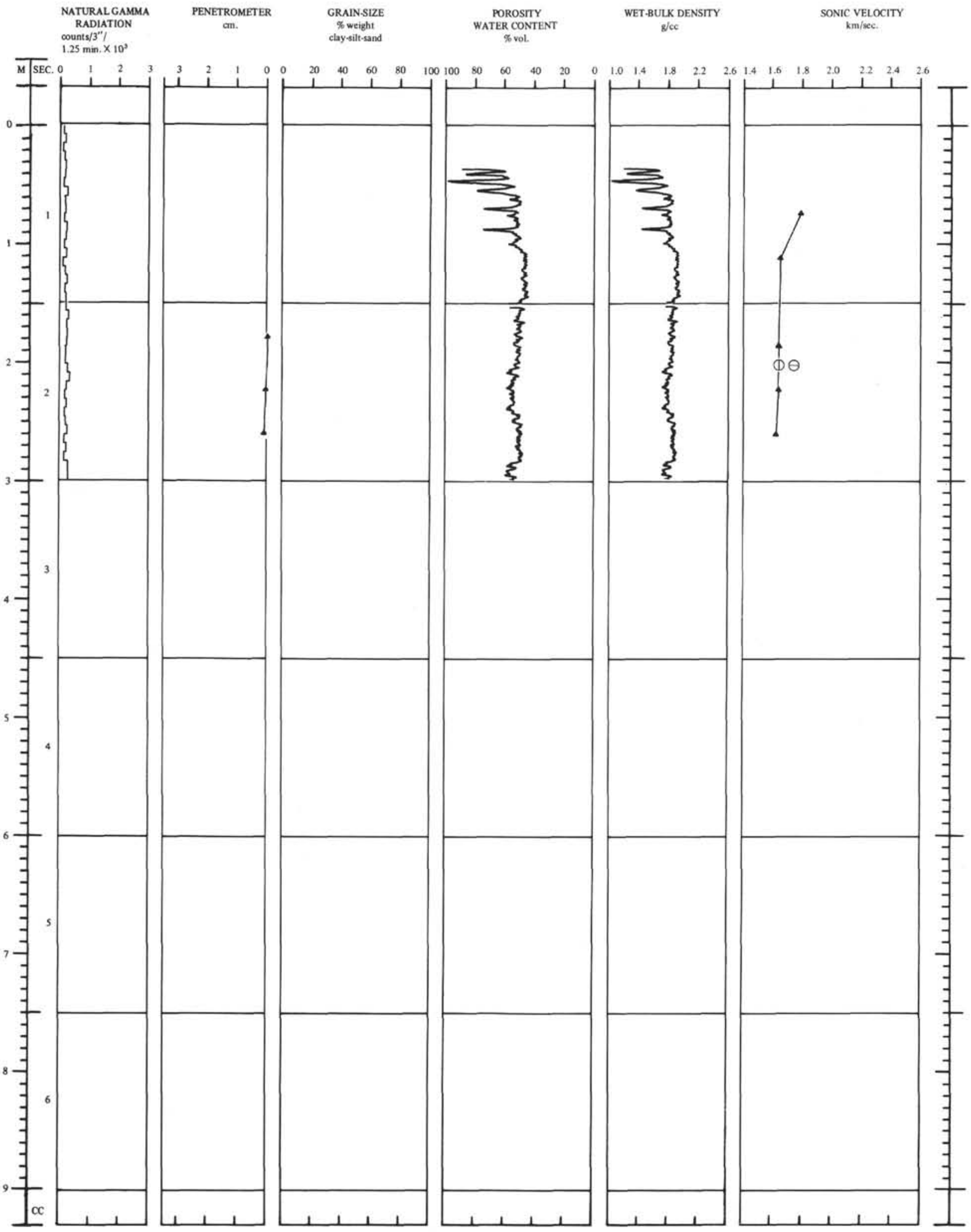
Nannofossil chalk.
Yellowish gray; structureless except for a few beds of bluish-white foraminiferal-nannofossil chalk.

Chalk as above.

Calc. nannofossil zone NN5 (Secs. 1-2)

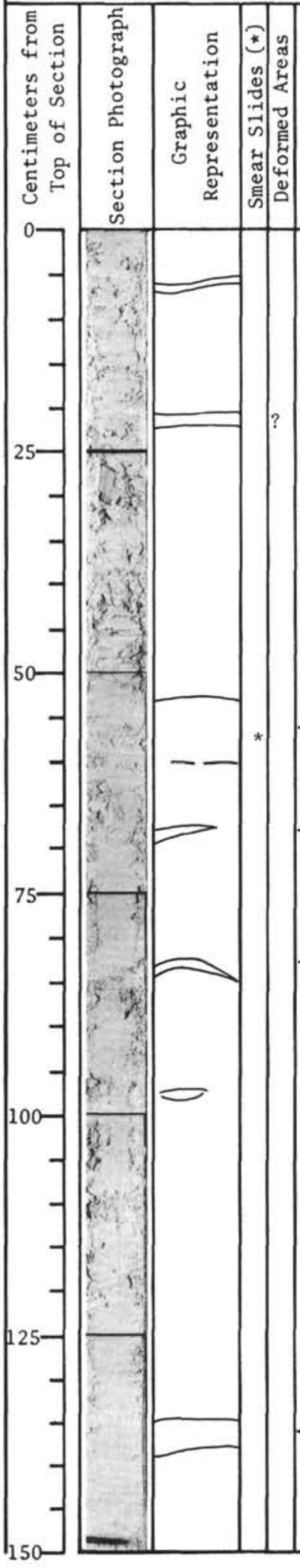
Radiolarian zone *Calocycletta costata* (Secs. 1-2)

Lithology and biostratigraphy of Core 12, Hole 63.1.



Physical properties of Core 12, Hole 63.1.

Hole 63.1 Core 12
Section 2



Description

NANNOFOSSIL CHALK

Less if any, homogenized mud from coring, and better indurated than Core 11.

Yellowish gray (5Y8/1) chalk, structureless except for 5 beds (1) of bluish white (5B 9/1) foraminiferal nannofossil chalk.

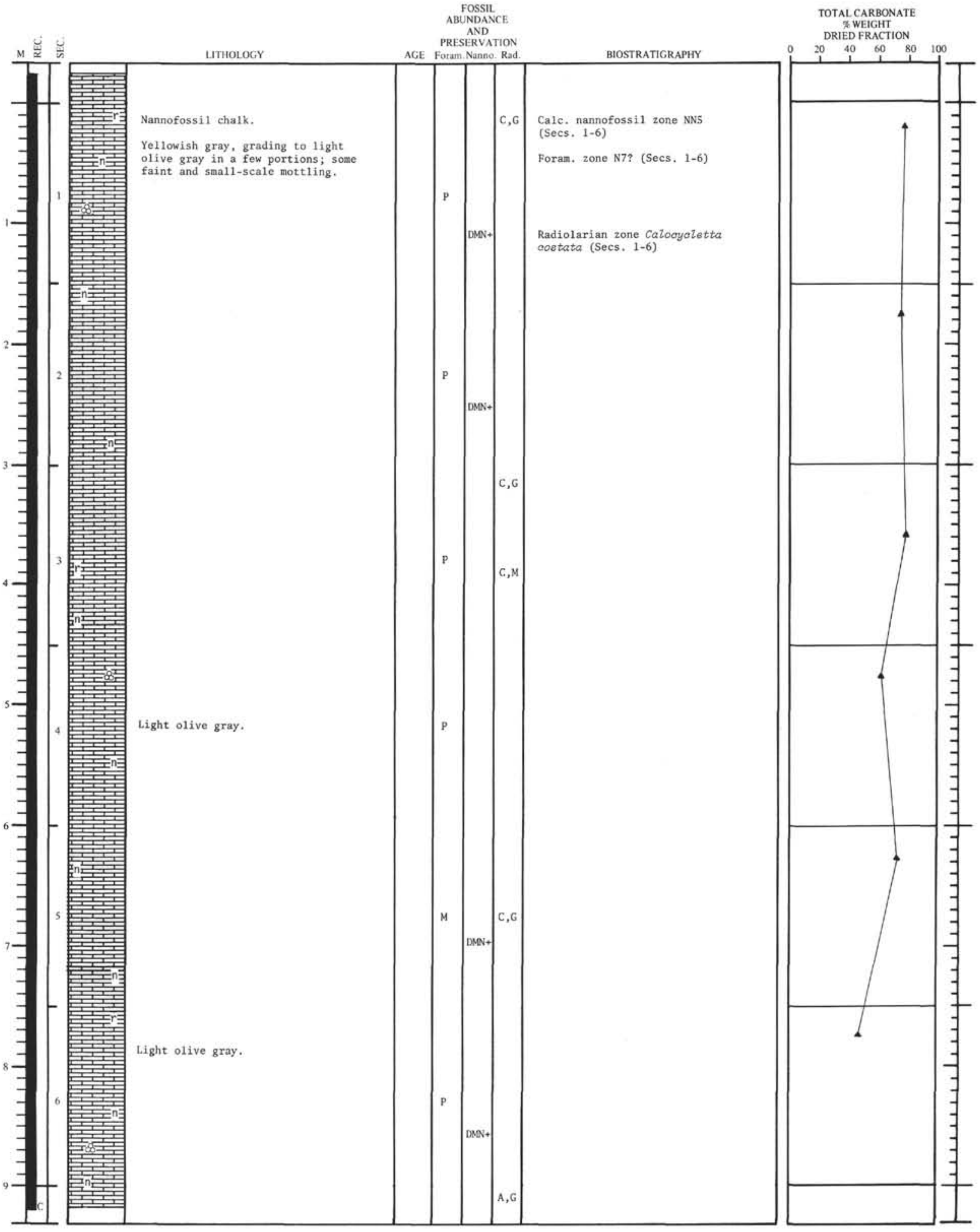
Mn markings at 145cm.

←1

←1

←1

←1



Nannofossil chalk.

Yellowish gray, grading to light olive gray in a few portions; some faint and small-scale mottling.

Light olive gray.

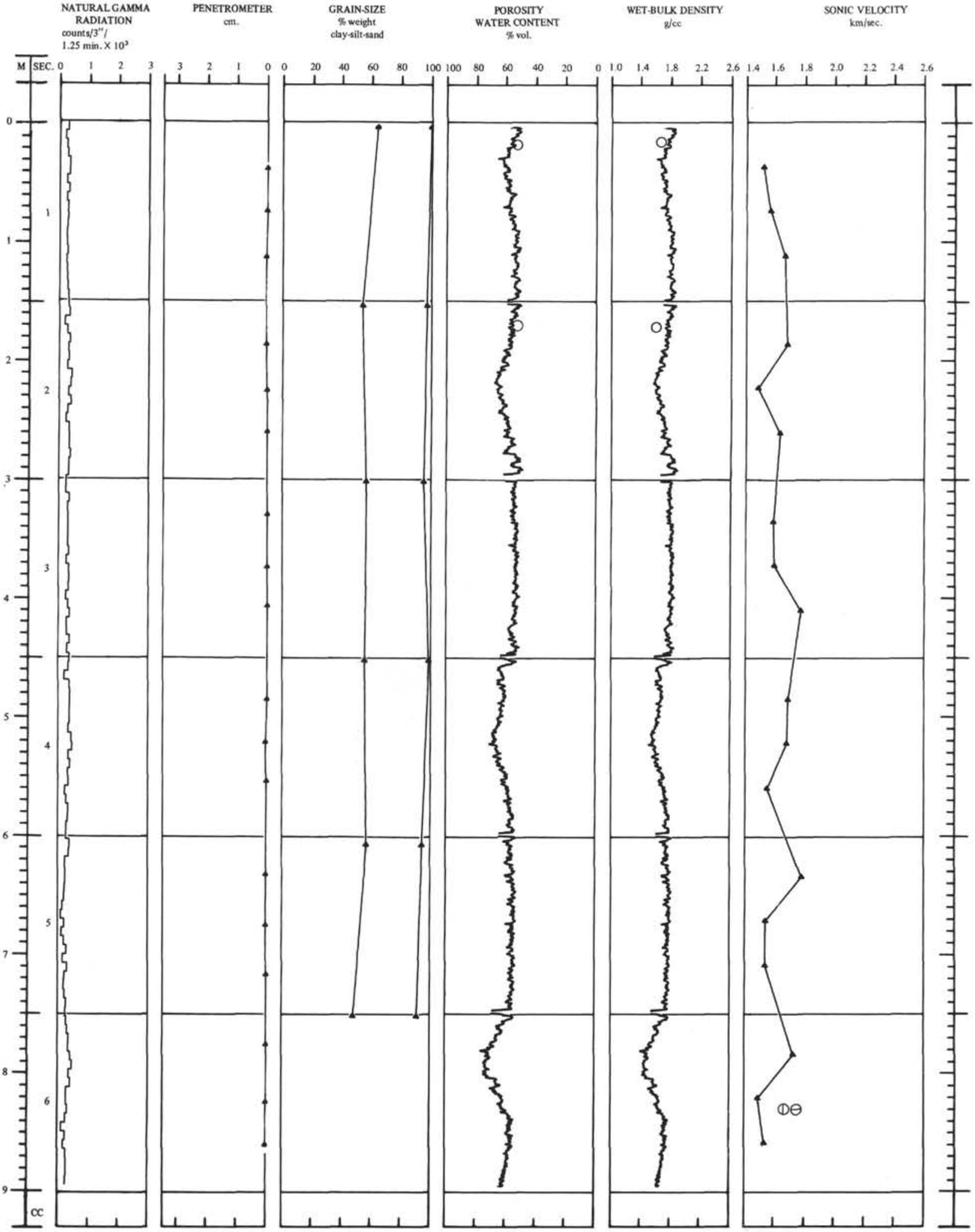
Light olive gray.

Calc. nannofossil zone NN5 (Secs. 1-6)

Foram. zone N7? (Secs. 1-6)

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

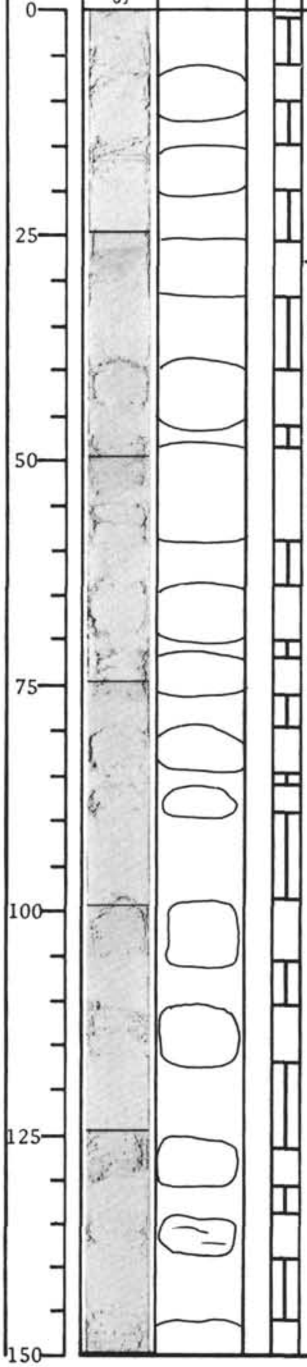
Lithology and biostratigraphy Core 13, Hole 63.1.



Physical properties of Core 13, Hole 63.1.

Hole 63.1 Core 13
Section 1

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



NANNOFOSSIL CHALK

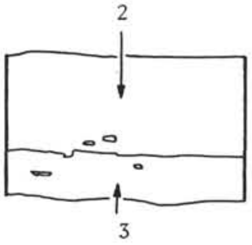
◄1

Hard+ (H)
Pieces of indurated yellowish gray (5Y8/1) chalk in a matrix of mud same color and composition, homogenized by coring process. Some faint mottles, and one sharp lithologic contact at 27.5cm

Scale drawing shown below.

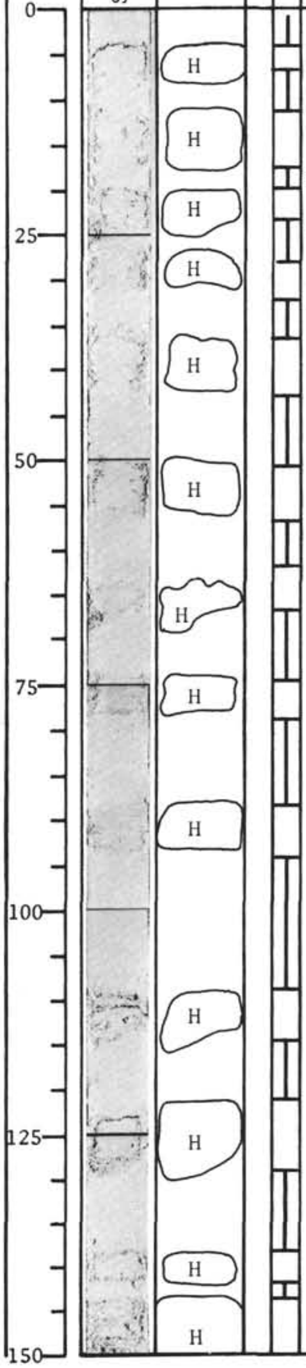
(2) Yellowish white 5Y9/1 to white N9.

(3) Greenish gray 5GY 6/1.



Hole 63.1 Core 13
Section 2

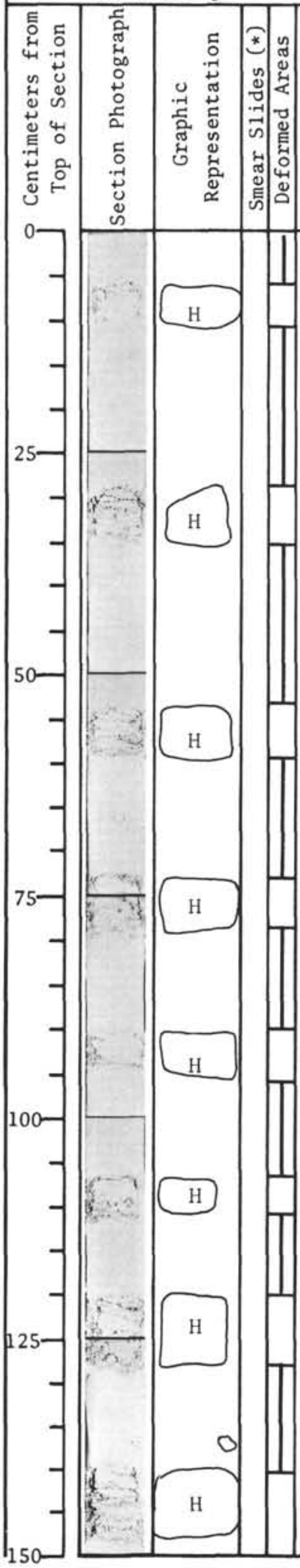
Centimeters from Top of Section | Section Photograph | Graphic Representation | Smear Slides (*) | Deformed Areas | Description



NANNOFOSSIL CHALK

Hard (H) pieces of indurated yellowish gray (5Y8/1) chalk, in a matrix of mud of same color and composition homogenized by the drilling process. Some faint mottles, e.g. pieces at 66, 76, and 91cm.

Hole 63.1 Core 13
Section 3

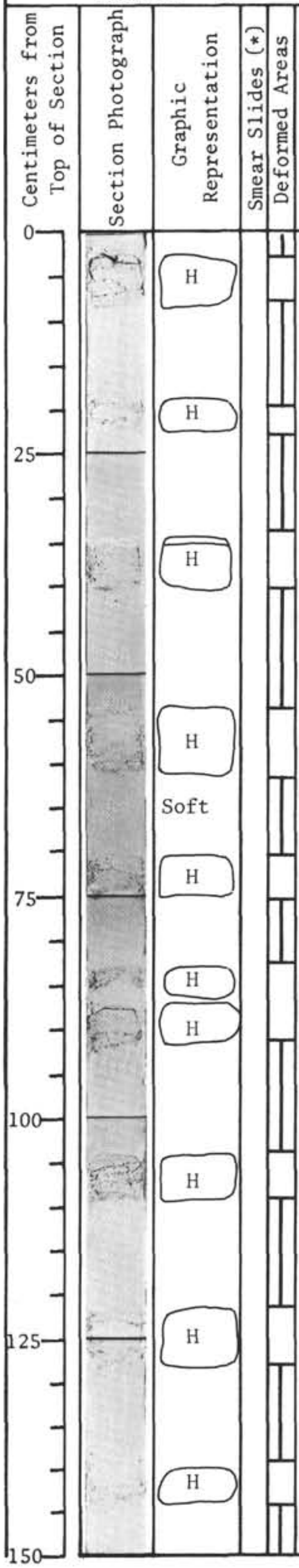


Description

NANNOFOSSIL CHALK

Hard (H) pieces of yellowish gray (5Y8/1) chalk, in a matrix of mud of same color and composition, homogenized by the coring process. No apparent structures.

Hole 63.1 Core 13
Section 4

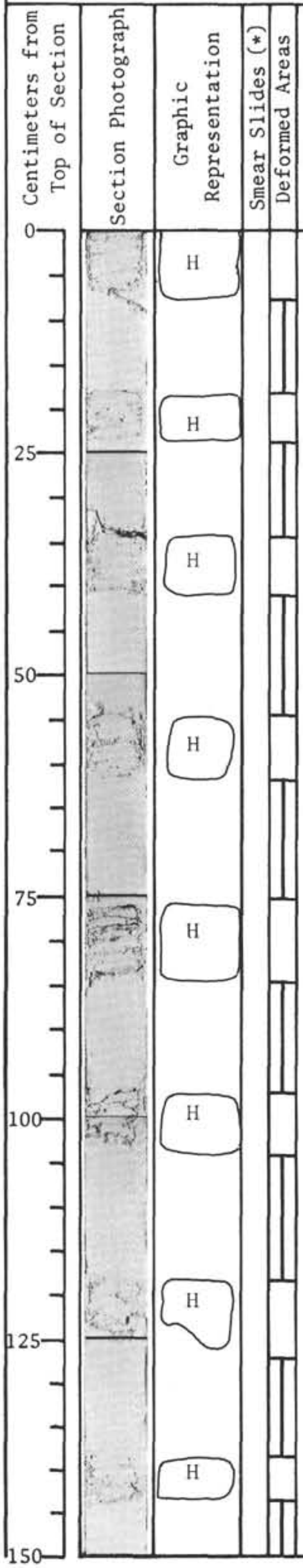


Description

NANNOFOSSIL CHALK

Hard (H) pieces of chalk in a matrix of mud of same color and composition, homogenized by the coring process. Color is lighter at the top and the bottom and more olive in the middle. Except for a 0.5cm thick very light gray (N8) bed at ∿ 36cm, the colors are gradational from yellowish white (5Y9/11) at the top, passing through yellowish gray (5Y8/1) by about 30cm to darkest (light olive gray 5Y6/1) at ∿ 75cm, back to 8/1 by 110cm and to 9/1 by 130cm.

Hole 63.1 Core 13
Section 5

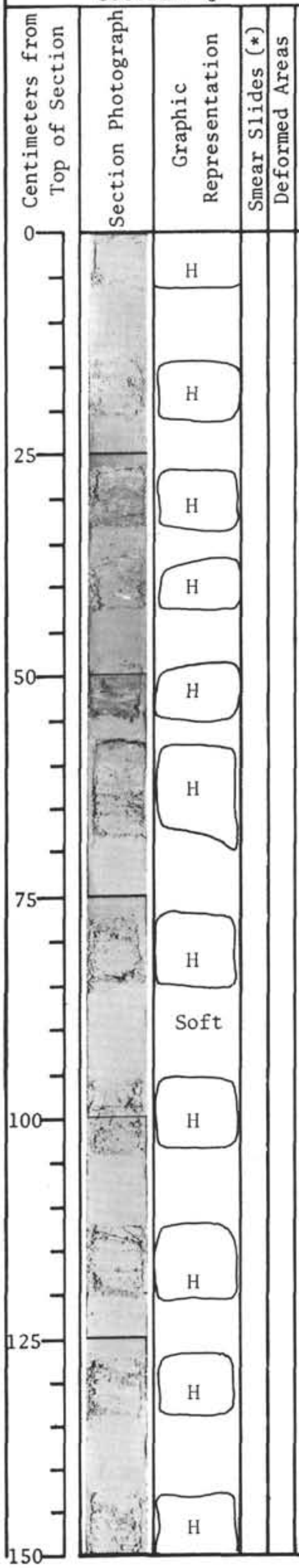


Description

NANNOFOSSIL CHALK

Pieces of hard (H) yellowish gray (5Y8/1) to yellowish white (5Y9/1) chalk, in a matrix of mud of the same color and composition homogenized by the coring process. No apparent structure.

Hole 63.1 Core 13
Section 6

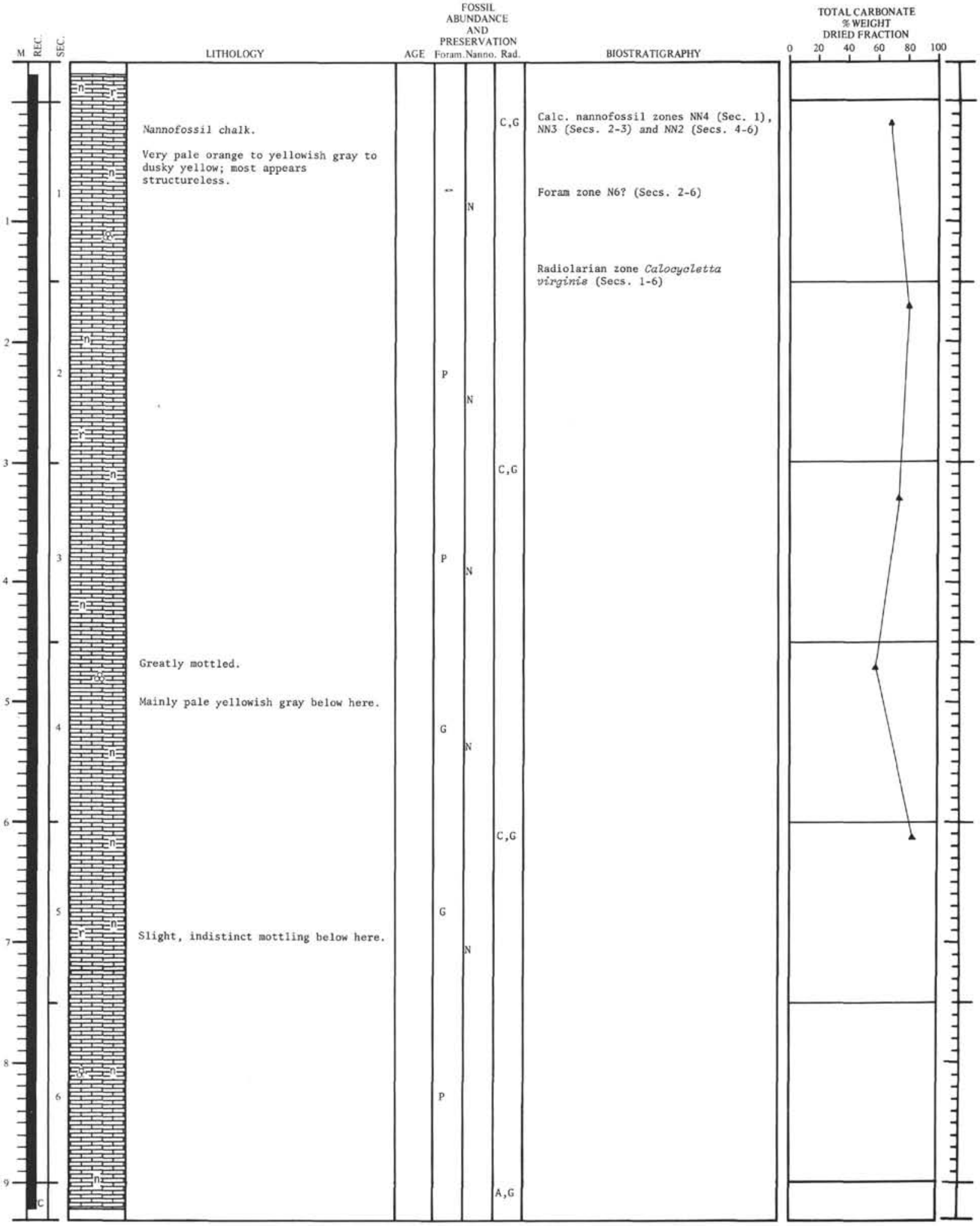


Description

NANNOFOSSIL CHALK

Hard (H) pieces of chalk in a matrix of mud of same color and composition, homogenized by the coring process.

Color is ∿ yellowish white (5Y9/1) at top, darkening to yellowish gray (5Y8/1) by ∿ 8cm, to light olive gray by 24 to (at darkest olive gray 5Y5/2 in some of the mottles 30-55 cm., then gradationally lighter to yellowish white by 85 and same to bottom.



Nannofossil chalk.

Very pale orange to yellowish gray to dusky yellow; most appears structureless.

Greatly mottled.

Mainly pale yellowish gray below here.

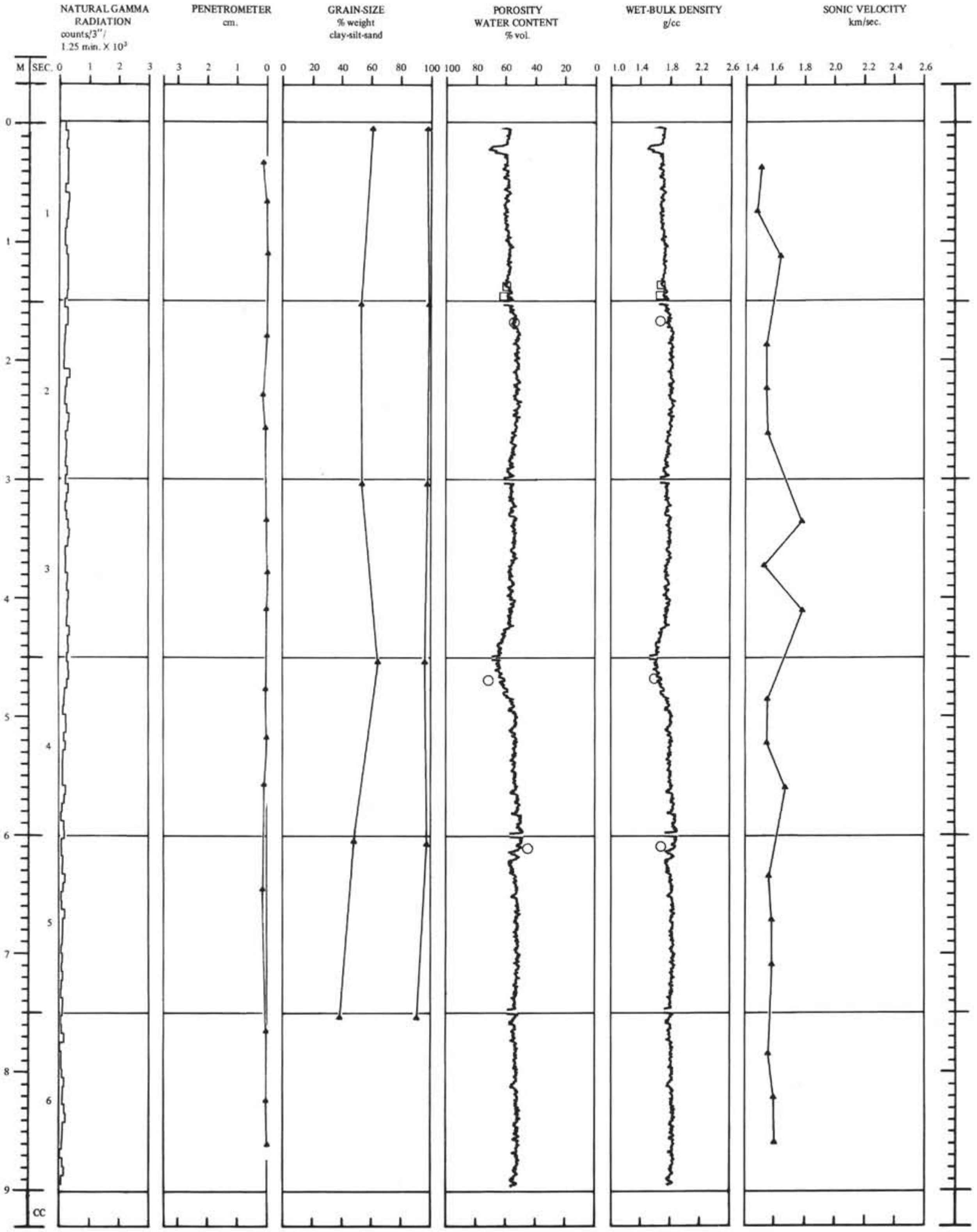
Slight, indistinct mottling below here.

Calc. nannofossil zones NN4 (Sec. 1), NN3 (Secs. 2-3) and NN2 (Secs. 4-6)

Foram zone N6? (Secs. 2-6)

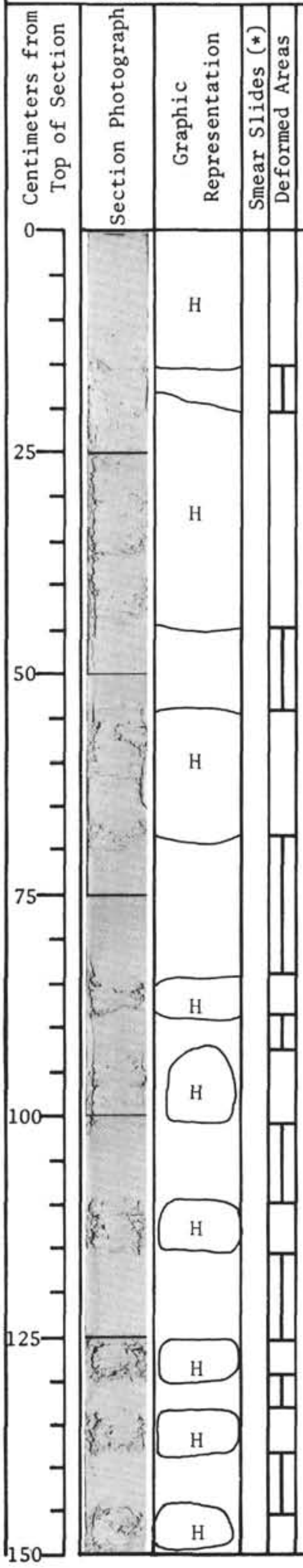
Radiolarian zone *Calocycletta virginis* (Secs. 1-6)

Lithology and biostratigraphy of Core 14, Hole 63.1.



Physical properties of Core 14, Hole 63.1.

Hole 63.1 Core 14
Section 1

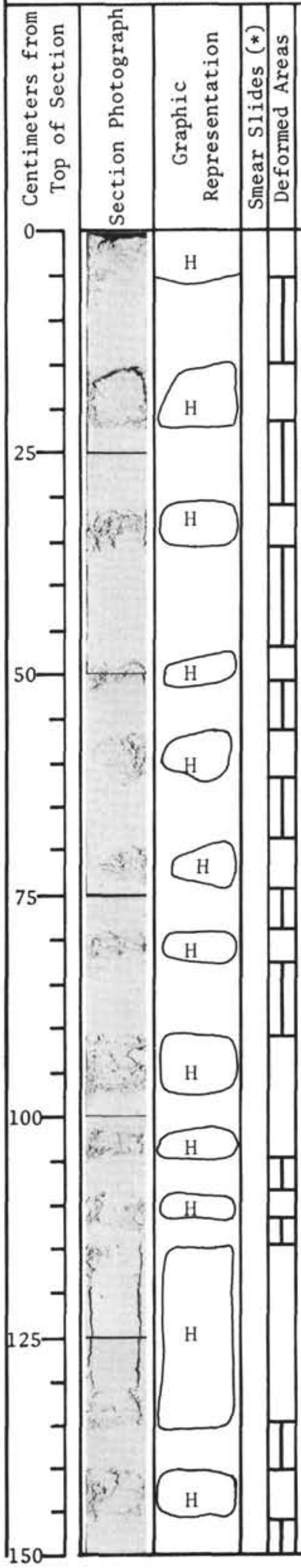


Description

NANNOFOSSIL CHALK

Hard (H) pieces of very pale orange 10YR 8/2 to yellowish gray (5Y8/1) chalk in a matrix of mud of same color and composition, homogenized by the coring process.
No apparent structues.

Hole 63.1 Core 14
Section 2

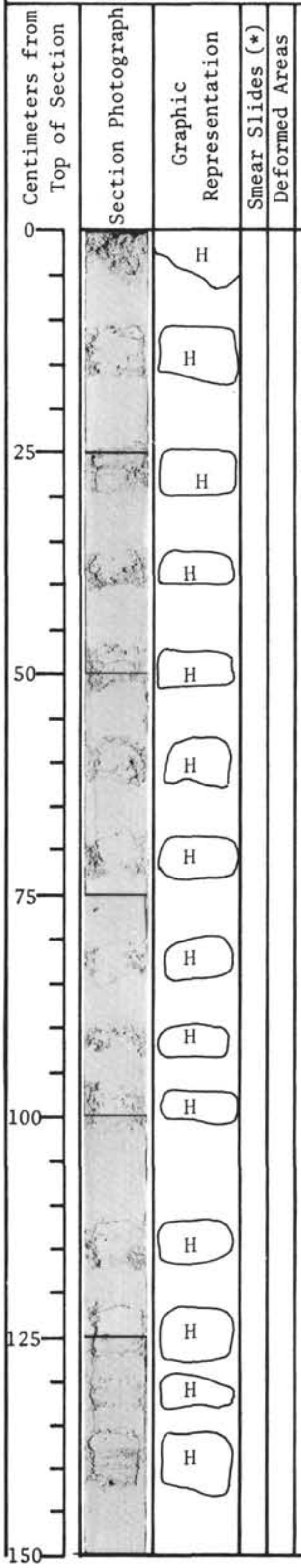


Description

NANNOFOSSIL CHALK

Hard (H) pieces of very pale orange (10YR8/2) chalk in a matrix of mud, of same color and composition homogenized by the coring operations. No apparent structures.

Hole 63.1 Core 14
Section 3

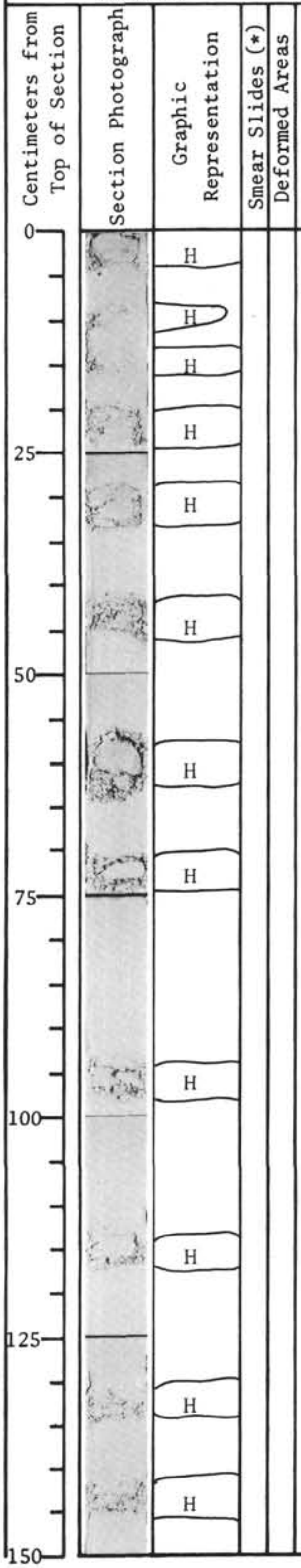


Description

NANNOFOSSIL CHALK

Hard (H) pieces of very pale orange (10YR 8/2) chalk in a matrix of mud, of same color and composition, homogenized by the coring operations. No apparent structure.

Hole 63.1 Core 14
Section 4



Description

NANNOFOSSIL CHALK

0-33cm:

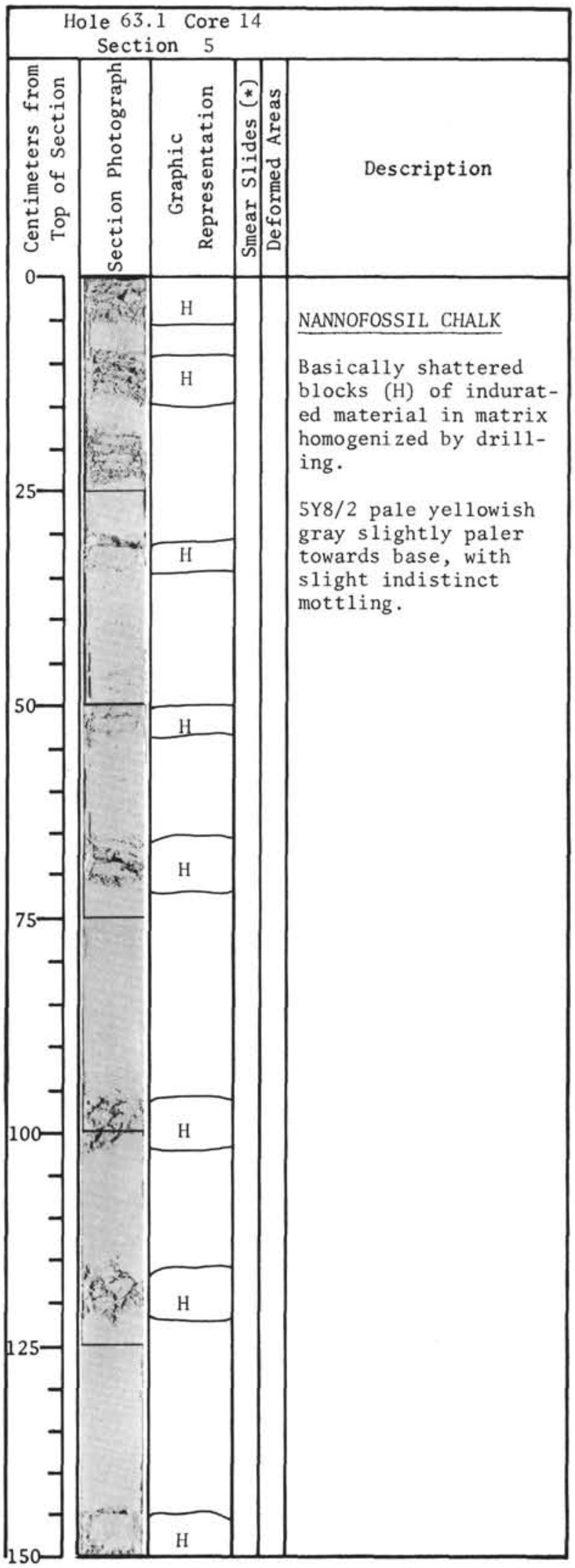
5Y6/3 dusky yellow with great 5Y8/2 pale yellowish gray and 5Y5/3 olive gray mottling.

33-150cm:

5Y8/2 pale yellowish gray with slight 5Y5/3 dusky yellow mottling.

Basically hard blocks (H) of indurated chalk in a matrix churned up but little disturbed by drilling.

Hole 63.1 Core 14
Section 5

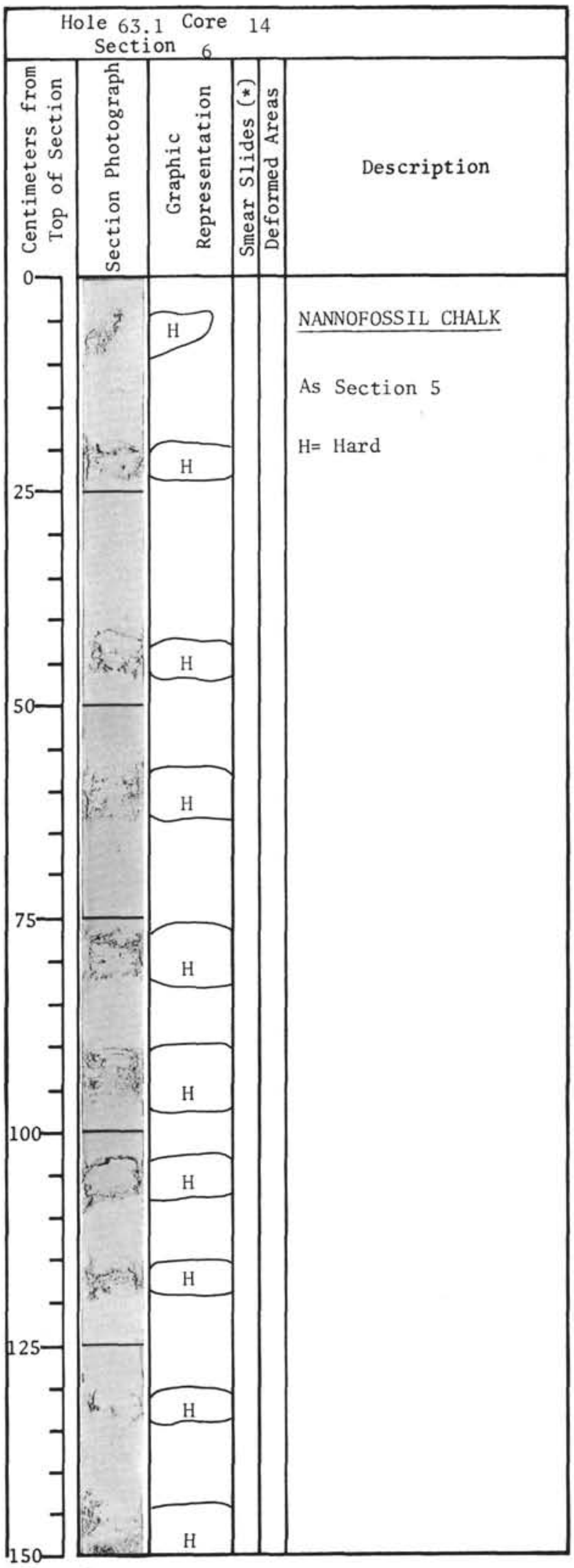


NANNOFOSSIL CHALK

Basically shattered blocks (H) of indurated material in matrix homogenized by drilling.

5Y8/2 pale yellowish gray slightly paler towards base, with slight indistinct mottling.

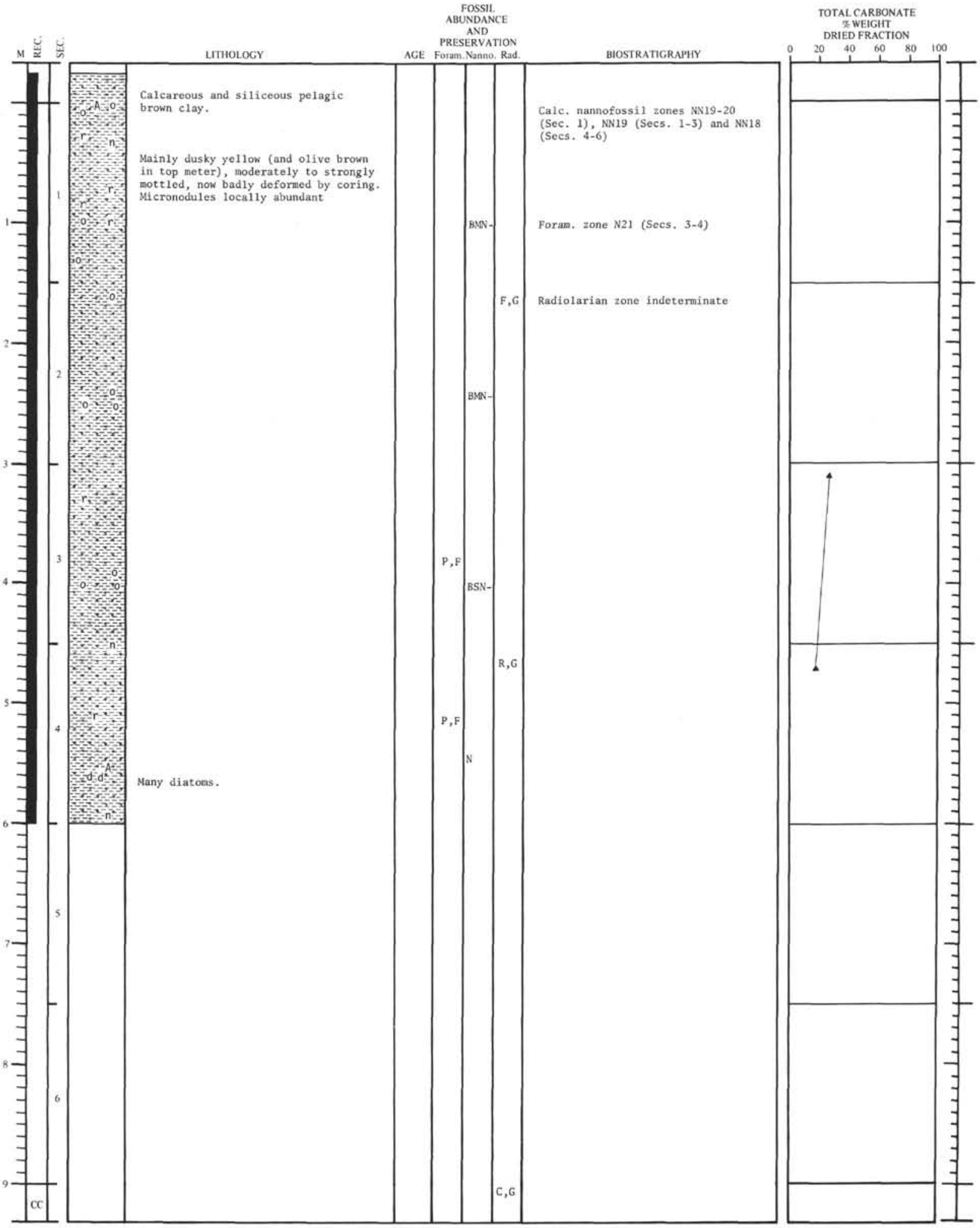
Hole 63.1 Core 14
Section 6



NANNOFOSSIL CHALK

As Section 5

H= Hard



Calcareous and siliceous pelagic brown clay.

Mainly dusky yellow (and olive brown in top meter), moderately to strongly mottled, now badly deformed by coring. Micronodules locally abundant

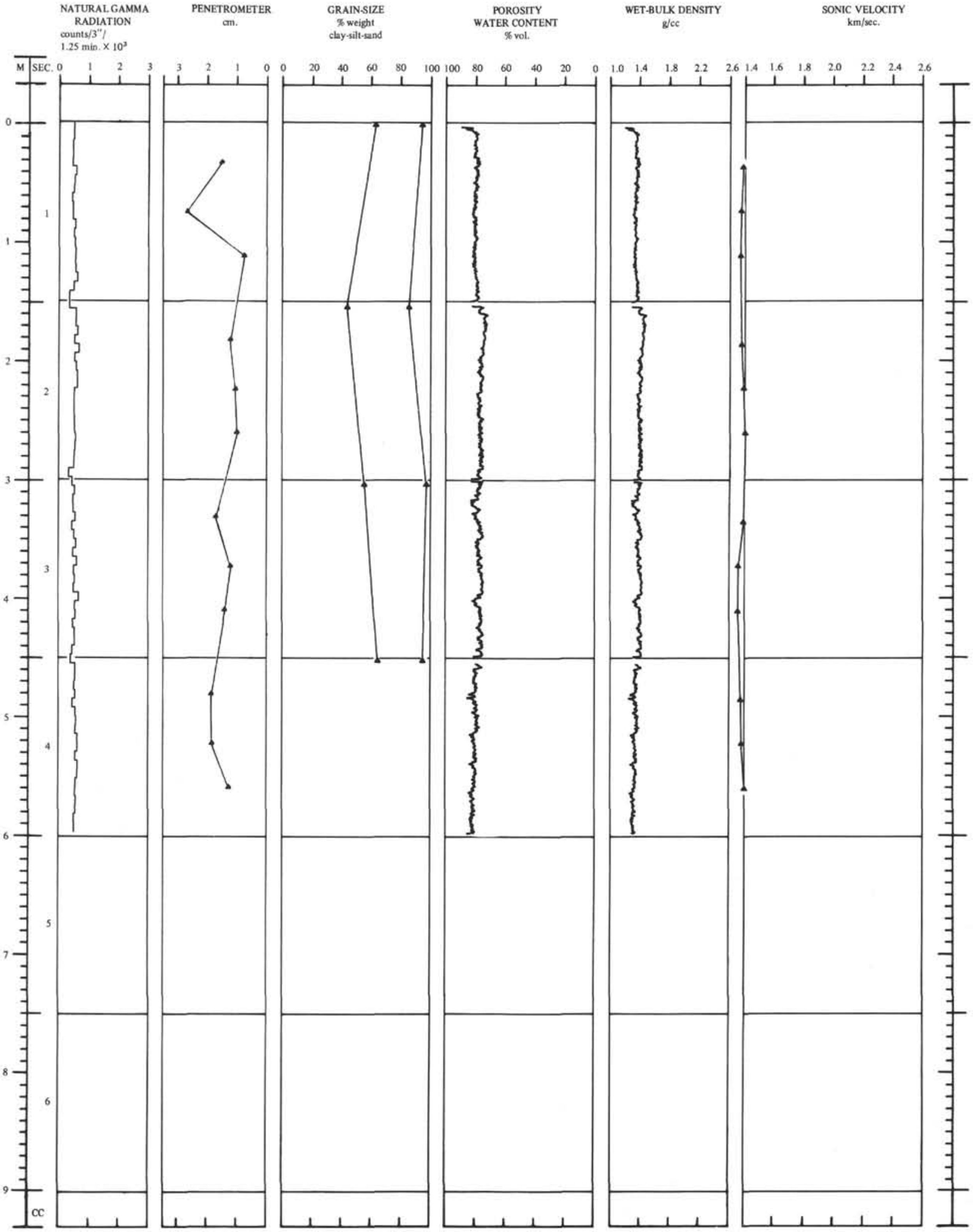
Many diatoms.

Calc. nannofossil zones NN19-20 (Sec. 1), NN19 (Secs. 1-3) and NN18 (Secs. 4-6)

Foram. zone *N21* (Secs. 3-4)

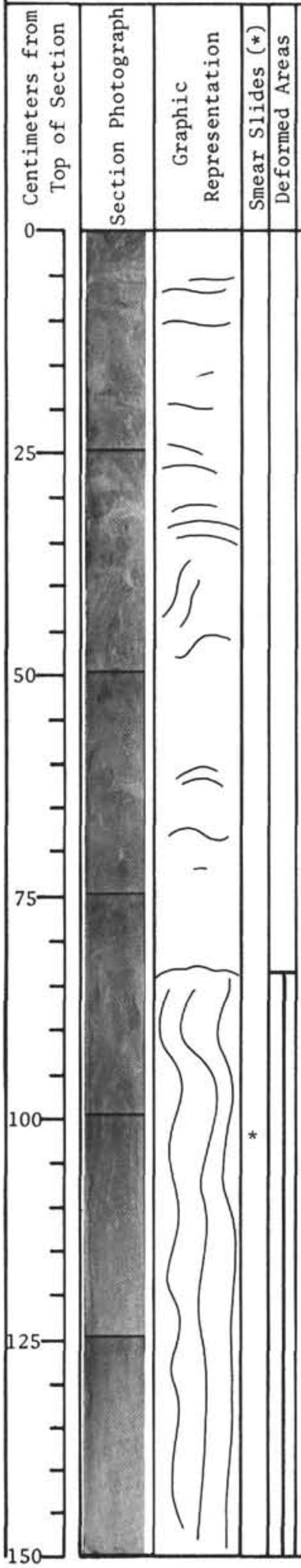
Radiolarian zone indeterminate

Lithology and biostratigraphy of Core 1, Hole 63.2.



Physical properties of Core 1, Hole 63.2.

Hole 63.2 Core 1
Section 1



Description

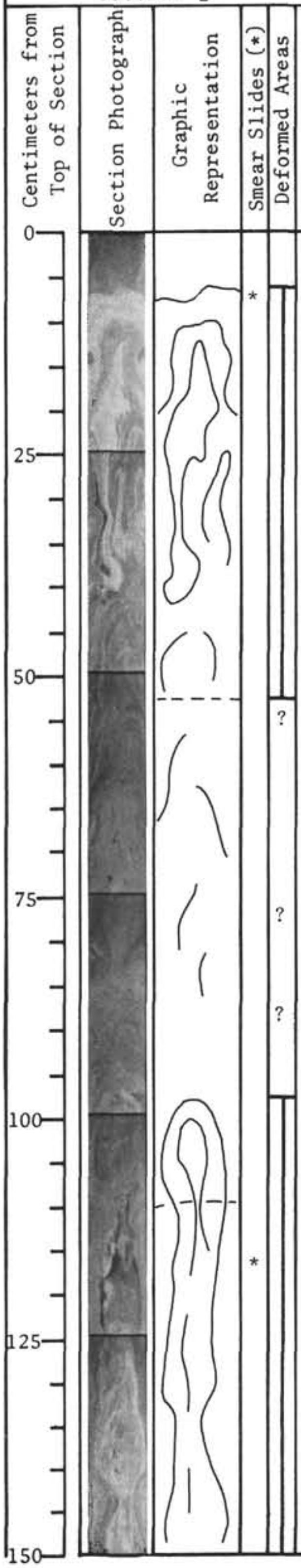
CALCAREOUS SILICEOUS PELAGIC CLAY

5Y5/4 olive brown with strong mottling of 5Y6.5/3 dusky yellow and 5Y4/2 dark olive brown.

Rather "sugary" texture below 97cm due to more radiolarians (?).

Somewhat contorted by drilling throughout - severe below 82cm.

Hole 63.2 Core 1
Section 2



Description

CALCAREOUS SILICEOUS PELAGIC CLAY

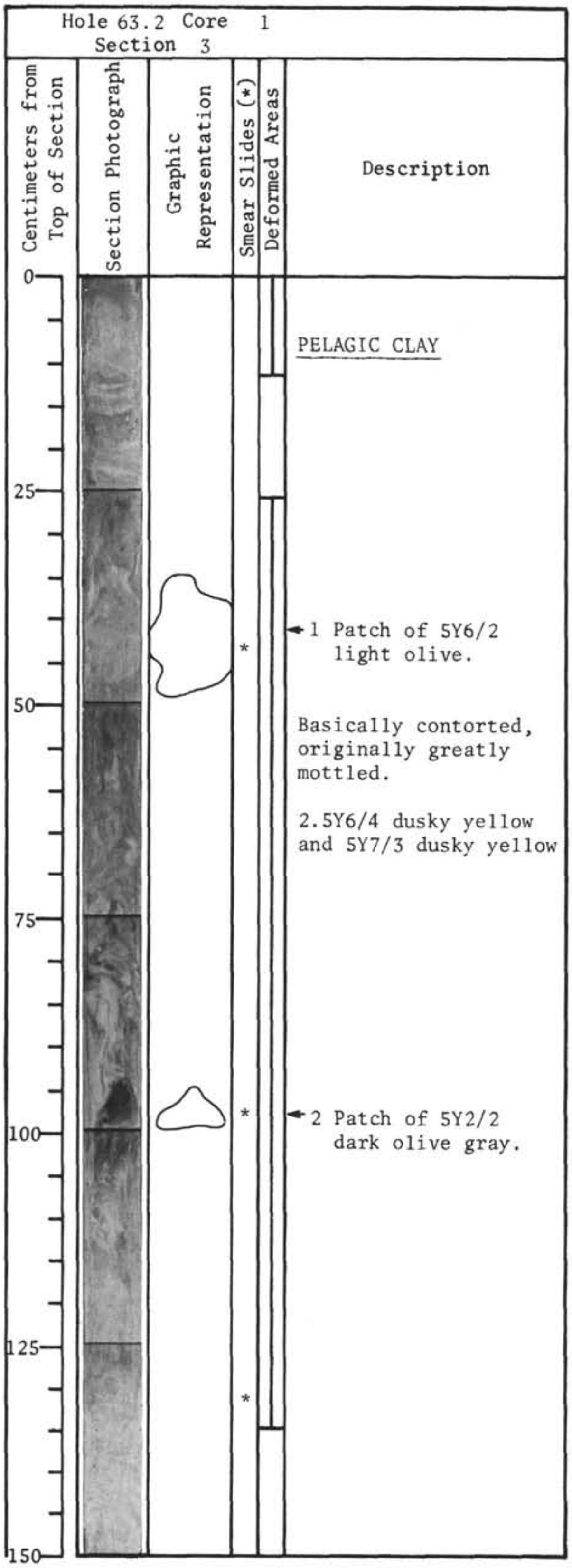
0-53cm:
About equal parts of 5Y7/3 yellowish gray and 5Y5.5/3 dusky yellow with minor 2.5Y4/2 brown.

53-110cm:
Dominantly 2.5Y5.5/4 dusky yellow with moderate mottling of above colors.

110-150cm:
5Y5/3 olive yellow with lesser 2.5Y4/2 brown and 5Y7/3 yellowish gray.

Disturbed throughout. Probably strongly mottled originally.

Hole 63.2 Core 1
Section 3



PELAGIC CLAY

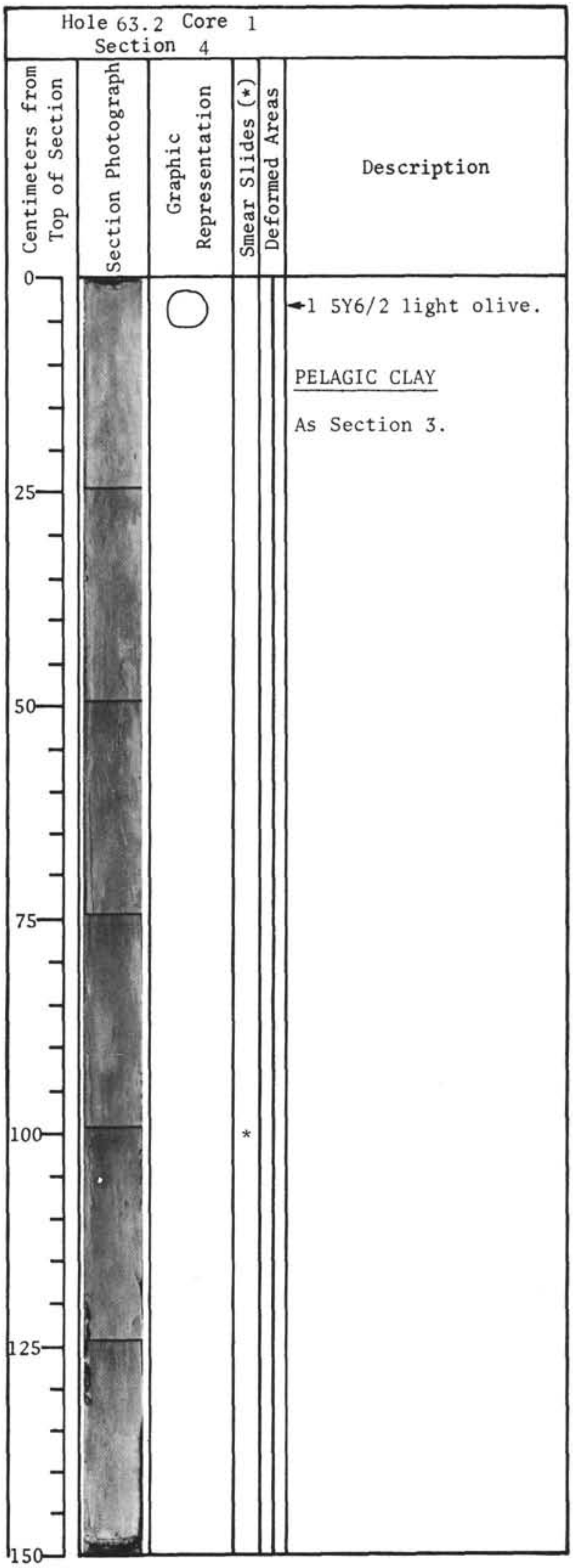
1 Patch of 5Y6/2 light olive.

Basically contorted, originally greatly mottled.

2.5Y6/4 dusky yellow and 5Y7/3 dusky yellow

2 Patch of 5Y2/2 dark olive gray.

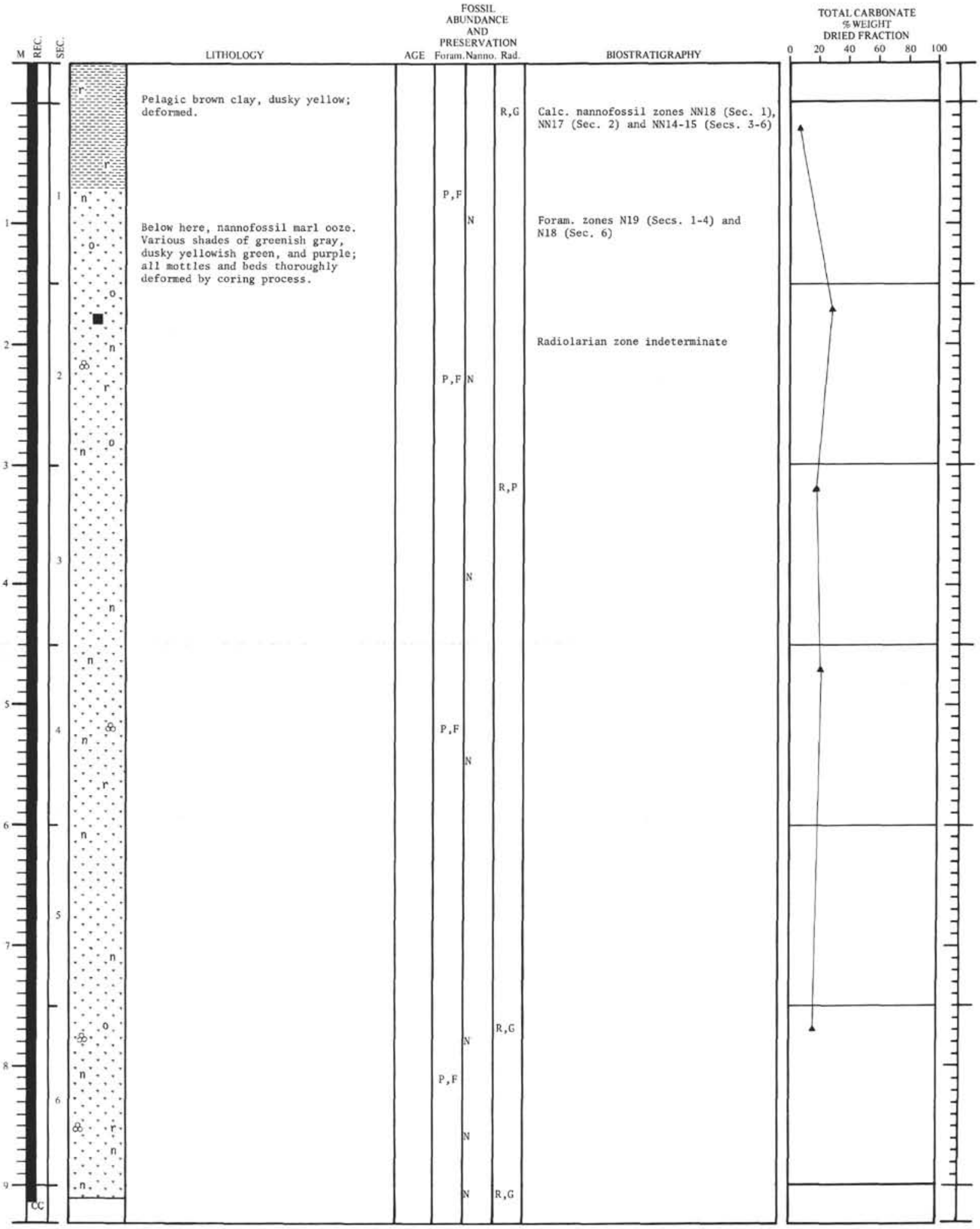
Hole 63.2 Core 1
Section 4



1 5Y6/2 light olive.

PELAGIC CLAY

As Section 3.



Pelagic brown clay, dusky yellow; deformed.

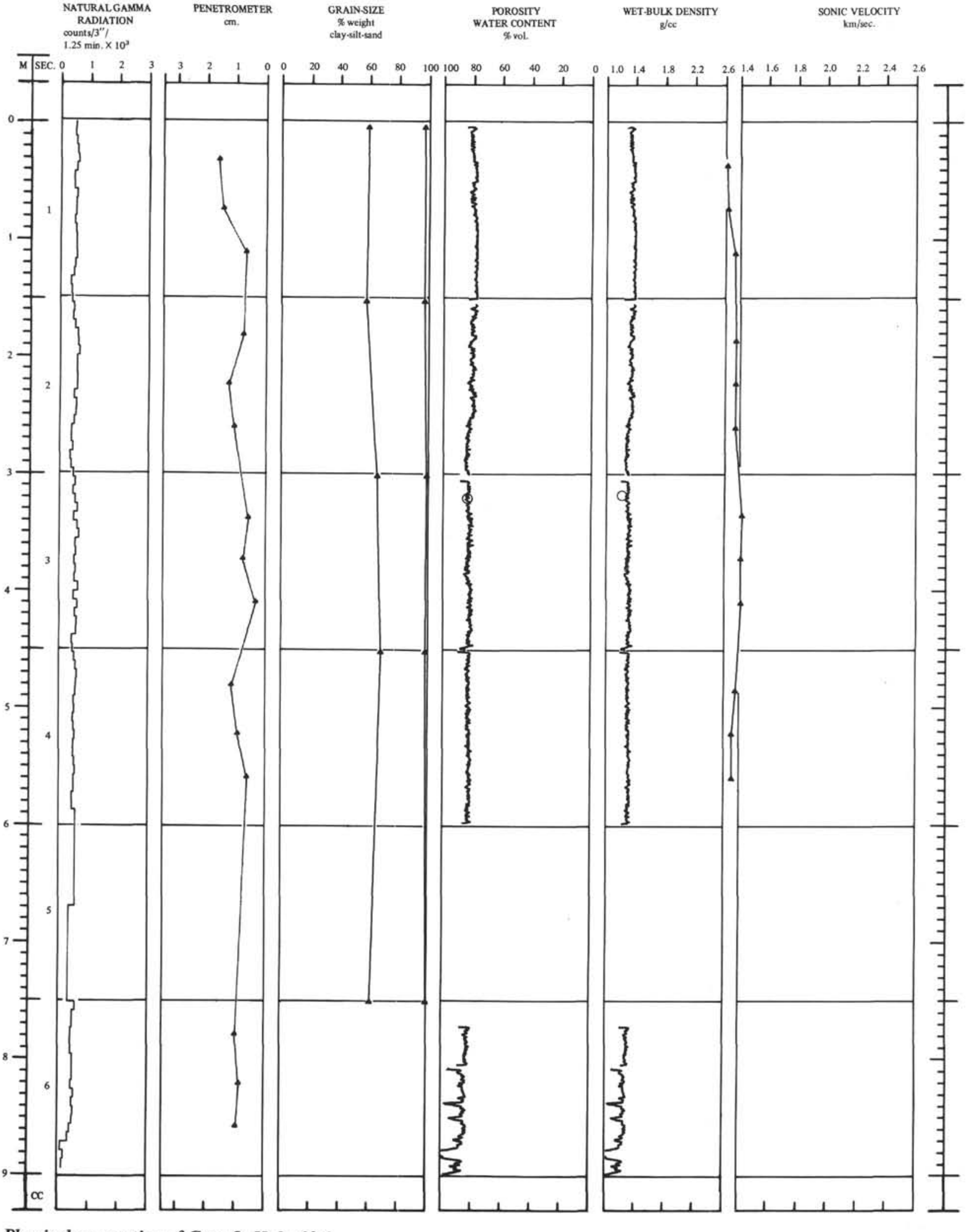
Below here, nannofossil marl ooze. Various shades of greenish gray, dusky yellowish green, and purple; all mottles and beds thoroughly deformed by coring process.

Calc. nannofossil zones NN18 (Sec. 1), NN17 (Sec. 2) and NN14-15 (Secs. 3-6)

Foram. zones N19 (Secs. 1-4) and N18 (Sec. 6)

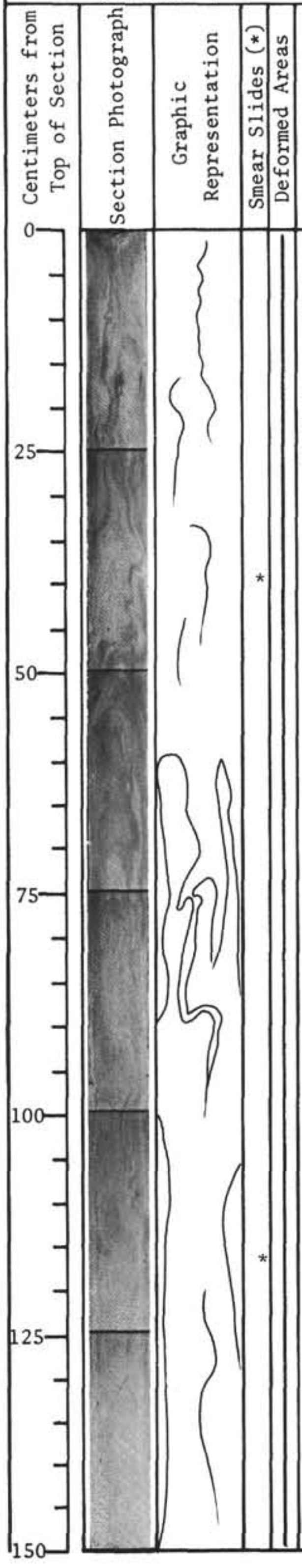
Radiolarian zone indeterminate

Lithology and biostratigraphy of Core 2, Hole 63.2.



Physical properties of Core 2, Hole 63.2.

Hole 63.2 Core 2
Section 1



Description

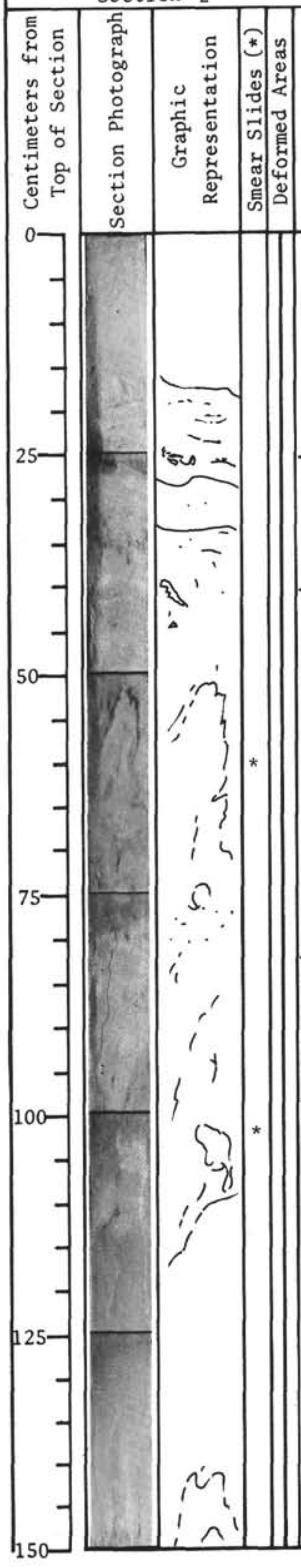
PELAGIC BROWN CLAY and NANNOFOSSIL MARL OOZE

All deformed. Upper part mainly dusky yellow (5Y6/4) to moderate olive brown (5Y4/4) clay in contorted near vertical flow bands caused by the coring process.

Bottom part mainly greenish gray (5GY6/1) to moderate yellow green (5GY6/2) calcareous mud or marl ooze, also highly contorted.

Contact near 75cm, is sketched; other graphic representation is diagrammatic.

Hole 63.2 Core 2
Section 2



Description

NANNOFOSSIL MARL OOZE

←1

←3

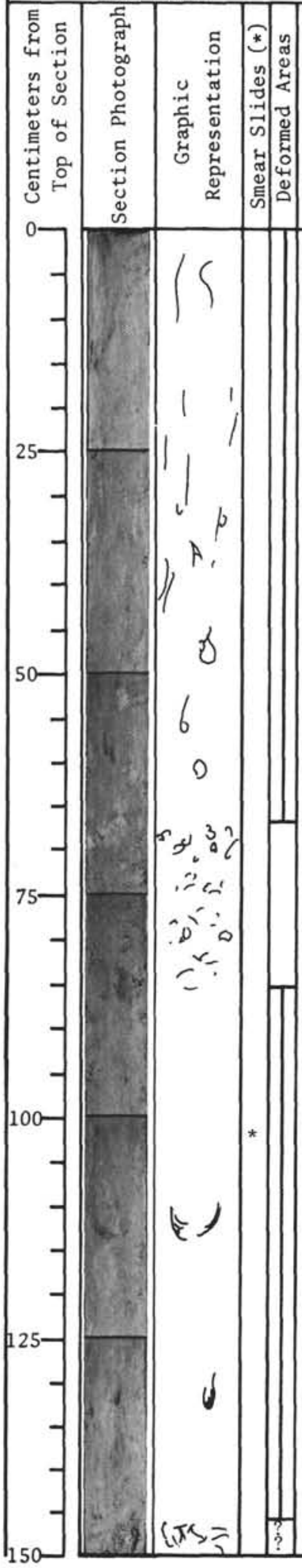
0-17cm:
Mainly light olive gray (10Y5/2).

←2

17-150cm:
Mainly dark greenish gray (5GY4/1) with streaks (1) of purplish black (5P2/1), and mottled with (2) pale olive (10Y6/2) and some minor amounts (3) of dark yellowish orange (10YR6/6). Mottles and bedding all deformed by coring process.

Pyrite (?) on x-radiograph at 45cm. Very soft between 115 and 135cm.

Hole 63.2 Core 2
Section 3



Description

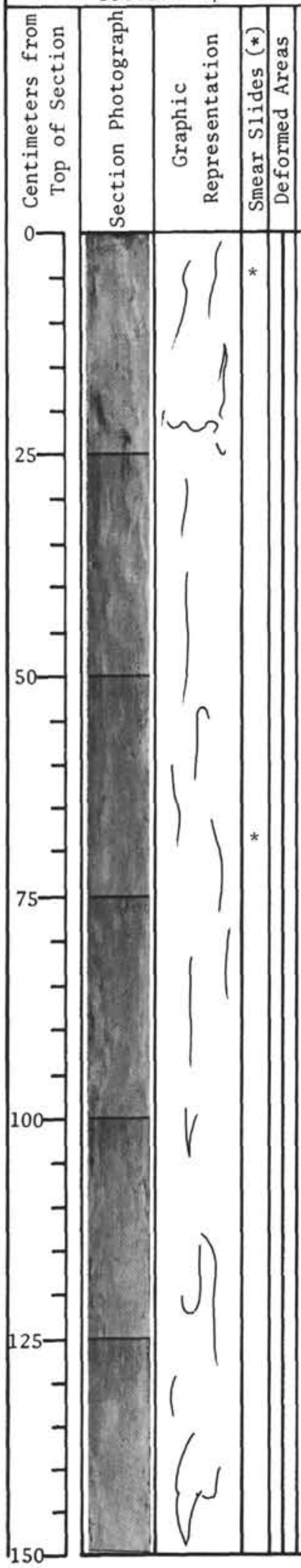
NANNOFOSSIL MARL OOZE

Mainly dark greenish gray (5GY4/1) at top grading to greenish gray (5GY6/1) at bottom, all with mottles of these two shades in each other, and minor amounts of purple shades (5P2/1 to 5P5/2) and of grayish yellow green (5GY7/2).

Layering visible on x-radiograph, 20-35cm. Soft and fragmented, 67-83cm.

1-5mm angular chips (rust scales?) visible on x-radiographs, 115-150cm.

Hole 63.2 Core 2
Section 4



Description

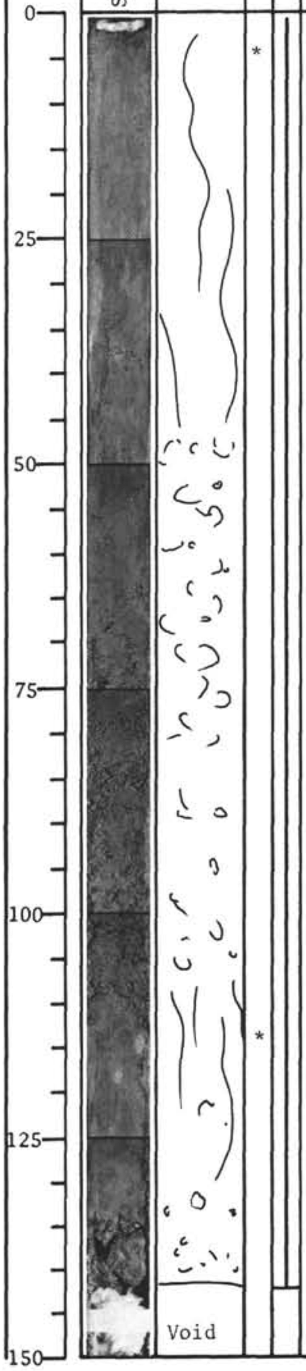
NANNOFOSSIL MARL OOZE

Mainly dusky yellow green 5GY5/2, but also abundant areas of purplish black (5P2/1) to grayish purple (5P5/2), grayish yellow green (5GY7/2) and some pale olive (10Y6/2), all in vertical streaks and flow folds; probably original mottles deformed by the coring process.

Hole 63.2 Core 2
Section 5

Centimeters from Top of Section	Section Photograph	Graphic Representation	Smear Slides (*)	Deformed Areas	Description
0–150					No visual description available.

Hole 63.2 Core 2
Section 6

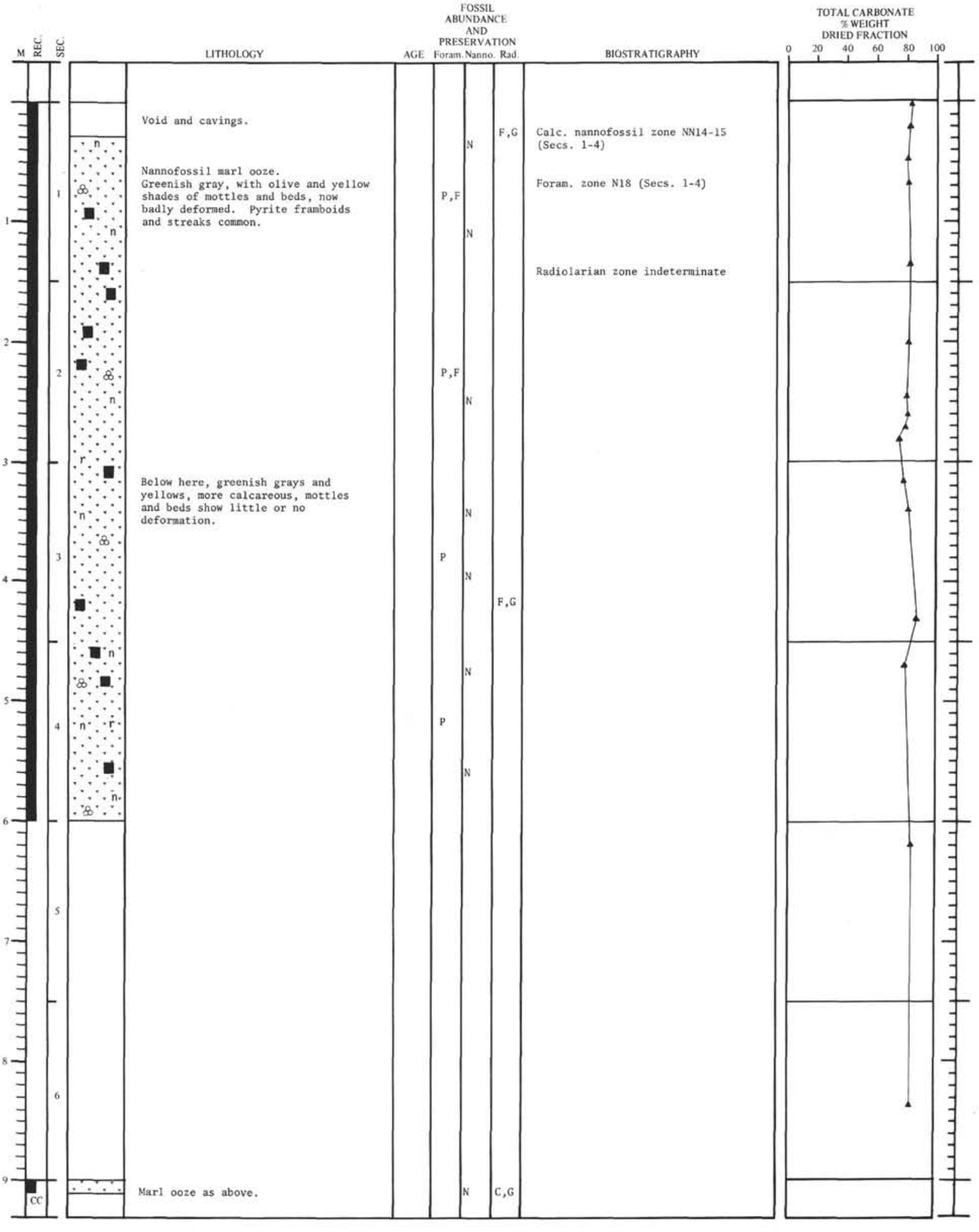


Description

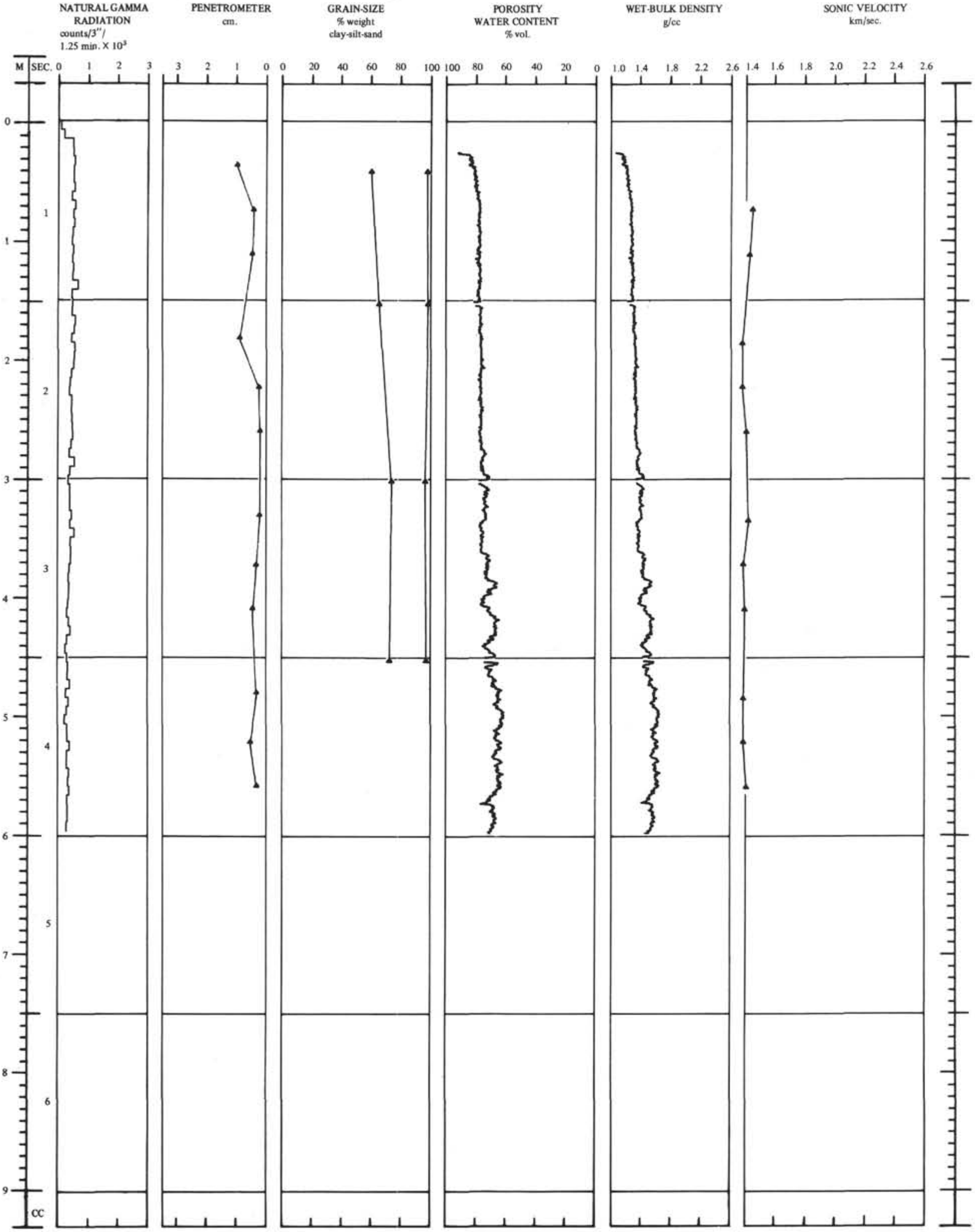
NANNOFOSSIL MARL OOZE

Dark greenish gray (5GY4/1), grayish purple (5P5/2), pale olive (10Y6/2), former mottles, now streaked vertically from 1 to ~50cm and from ~110-133cm. Portion between 50-110, and 133-142 is crumbly fragments. All is deformed by the coring process.

0-2, 141-150cm: Void.



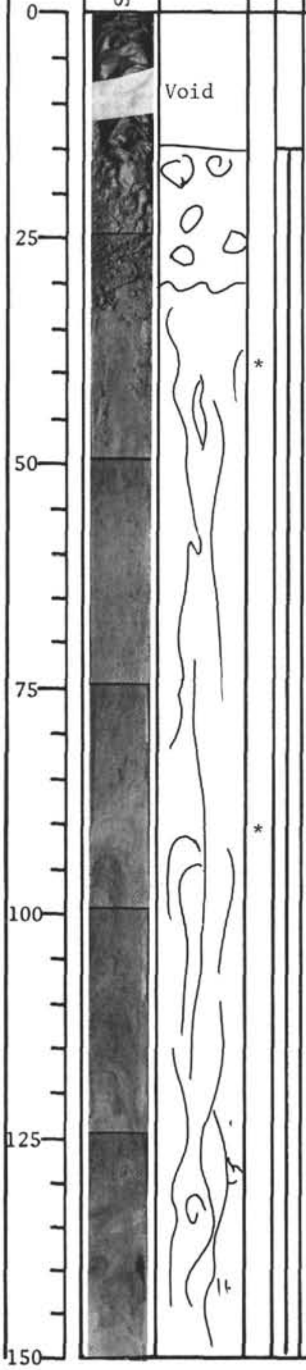
Lithology and biostratigraphy of Core 3, Hole 63.2.



Physical properties of Core 3, Hole 63.2.

Hole 63.2 Core 3
Section 1

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



NANNOFOSSIL MARL OOZE

Cavings?

Mainly greenish gray (5GY5/1) and light olive gray (5Y6/1) in mottles and streaks that probably once were mottles, now deformed by the coring process.

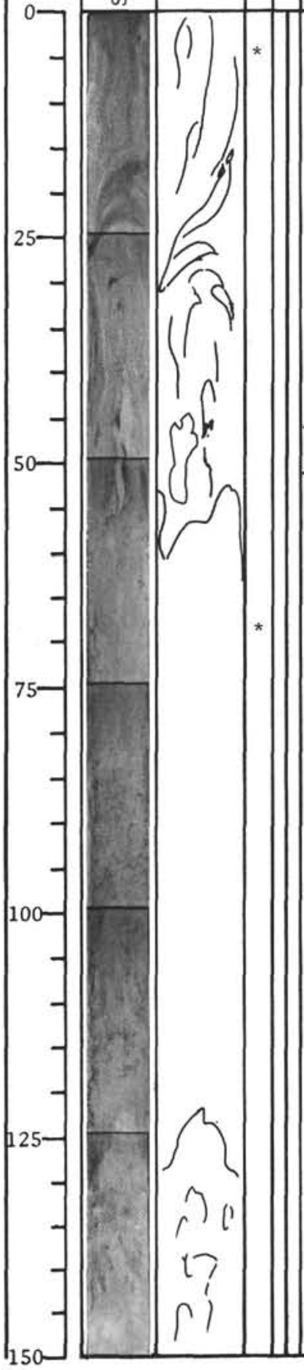
0-15cm: Void

15-30cm: Cavings (?)

142cm:
Purplish black (5P2/1) specks and streaks.

Hole 63.2 Core 3
Section 2

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



NANNOFOSSIL MARL OOZE

Streaks

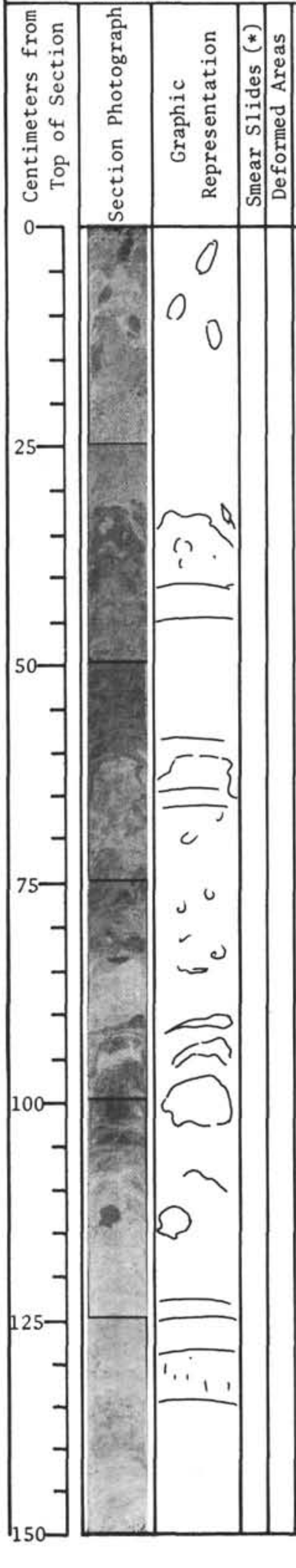
← 1

← 1

Greenish gray (from 5GY6/1 to 5GY4/1), with, above ∿55cm, grayish yellow green 5GY7/2 and purplish (5P2/1 to 5P5/2) flow folds and near vertical streaks (deformed mottles?) mid part mainly greenish gray, a few purplish streaks (1).

Below ∿120cm, mottles of grayish yellow green (5GY7/2) greenish gray (5GY5/1), and light greenish gray (5GY8/1).

Hole 63.2 Core 3
Section 3



Description

NANNOFOSSIL MARL OOZE

Apparently only midly disturbed. 0 ∿ 33 grayish yellow green 5GY7/2, with some 1-2 cm mottles of dusky yellow green (5Y5/2) near top.

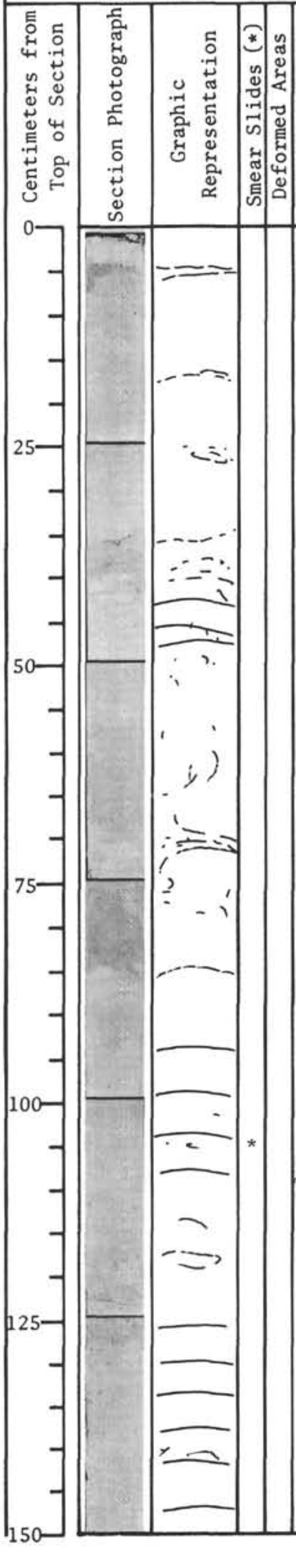
33 ∿ 62 dusky yellow green (5Y5/2) with mottles of gray yellow green (5GY7/2) near top and grades down into gray yellow green.

62-85 and 90-119 gray yellow green mottled with other 5GY shades.

85-90 and 119-150 light green gray (5GY8/1) with a few mottles of aforementioned colors.

Small purplish black specks (5P2/1) at 130 cm.

Hole 63.2 Core 3
Section 4



Description

NANNOFOSSIL MARL OOZE

Bedded and mottled; shades of greenish gray (5GY) marl ooze.

0-4:	Light greenish gray (5GY8/1), sharp, irregular contact.
4-5:	Grayish purple (5P5/2) over dark greenish gray (5GY4/1).
5-24:	Greenish gray (5GY6/1), somewhat mottled; lighter toward bottom of interval.
24-34:	as 0-4
∿ 34:	Purplish black 5P2/1 irregular thin bed.
34-39:	as 5-24.
39-56:	as 0-4, faint mottles.
56-84:	Light greenish gray (5GY7/1) with lighter mottles and beds.
84∿110:	as 39-56.
∿110-126:	as 56-84
126-139:	as 39-56.
139-140:	Indistinct bed of yellowish gray (5Y8/1).
140-150:	as 56-84

Very little deformation by coring.

X-radiograph shows ∿ 1mm denser layer every 3-4cm.