2. SITE 502: COLOMBIA BASIN, WESTERN CARIBBEAN SEA[1]

Shipboard Scientific Party[2]

HOLE 502

Date occupied: 16 August 1979

Date departed: 19 August 1979

Time on hole: 72 hr.

Position: 11°29.42′N, 79°22.78′W

Water depth (sea level; corrected m; echo-sounding): 3051.5

Water depth (rig floor; corrected m; echo-sounding): 3061.5

Penetration (m): 214.10

Number of cores: 50

Total length of cored section (m): 214.10

Total cores recovered (m): 154.35

Core recovery (%): 72.1

Oldest sediment cored:
Depth sub-bottom: 210.26
Nature: Calcareous clay
Age: Late Miocene
Measured velocity (km/s): 1.5841 (209.92 m)
Shear strength (g/cm^2): 3069.6 (198.6 m)

HOLE 502A

Date occupied: 19 August 1979

Date departed: 23 August 1979

Time on hole: 88 hr.

Position: 11°29.46′N, 79°22.74′W

Water depth (sea level; corrected m; echo-sounding): 3051.5

Water depth (rig floor; corrected m; echo-sounding): 3061.5

Penetration (m): 215.00

Number of cores: 68

Total length of cored section (m): 215.00

Total cores recovered (m): 176.50

Core recovery (%): 82.2

Oldest sediment cored:
Depth sub-bottom: 215.00
Nature: Calcareous clay
Age: Late Miocene
Measured velocity (km/s): 1.5529 (214.43 m)
Shear strength (g/cm^2): 2490.38 (197.21 m)

HOLE 502B

Date occupied: 23 August 1979

Date departed: 25 August 1979

Time on hole: 36 hr.

Position: 11°29.51′N, 79°22.69′W

Water depth (sea level; corrected m; echo-sounding): 3051.5

Water depth (rig floor; corrected m; echo-sounding): 3061.5

Penetration (m): 98.55

Number of cores: 23

Total length of cored section (m): 98.55

Total core recovered (m): 86.31

Core recovery (%): 87.6

Oldest sediment cored:
Depth sub-bottom: 97.64
Nature: Foraminifer-bearing nannofossil marl
Age: Mid-Pliocene
Measured velocity (km/s): 1.5473 (98.6 m)
Shear strength (g/cm^2): 802.26 (98.5 m)

HOLE 502C

Date occupied: 25 August 1979

Date departed: 27 August 1979

Time on hole: 45 hr.

Position: 11°29.48′N, 79°22.70′W

Water depth (sea level; corrected m; echo-sounding): 3051.5

Water depth (rig floor; corrected m; echo-sounding): 3061.5

Penetration (m): 227.81

Number of cores: 37

Total length of cored section (m): 130.70

Total core recovered (m): 112.70

Core recovery (%): 86.2

Oldest sediment cored:
Depth sub-bottom: 227.81
Nature: Calcareous clay
Age: Late Miocene
Measured velocity (km/s): 1.5506 (226.45 m)
Shear strength (g/cm^2): 2397.72 (214.96 m)

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[1] Prell, W. L., Gardner, J. V., et al., *Init. Repts. DSDP*, 68: Washington (U.S. Govt. Printing Office).

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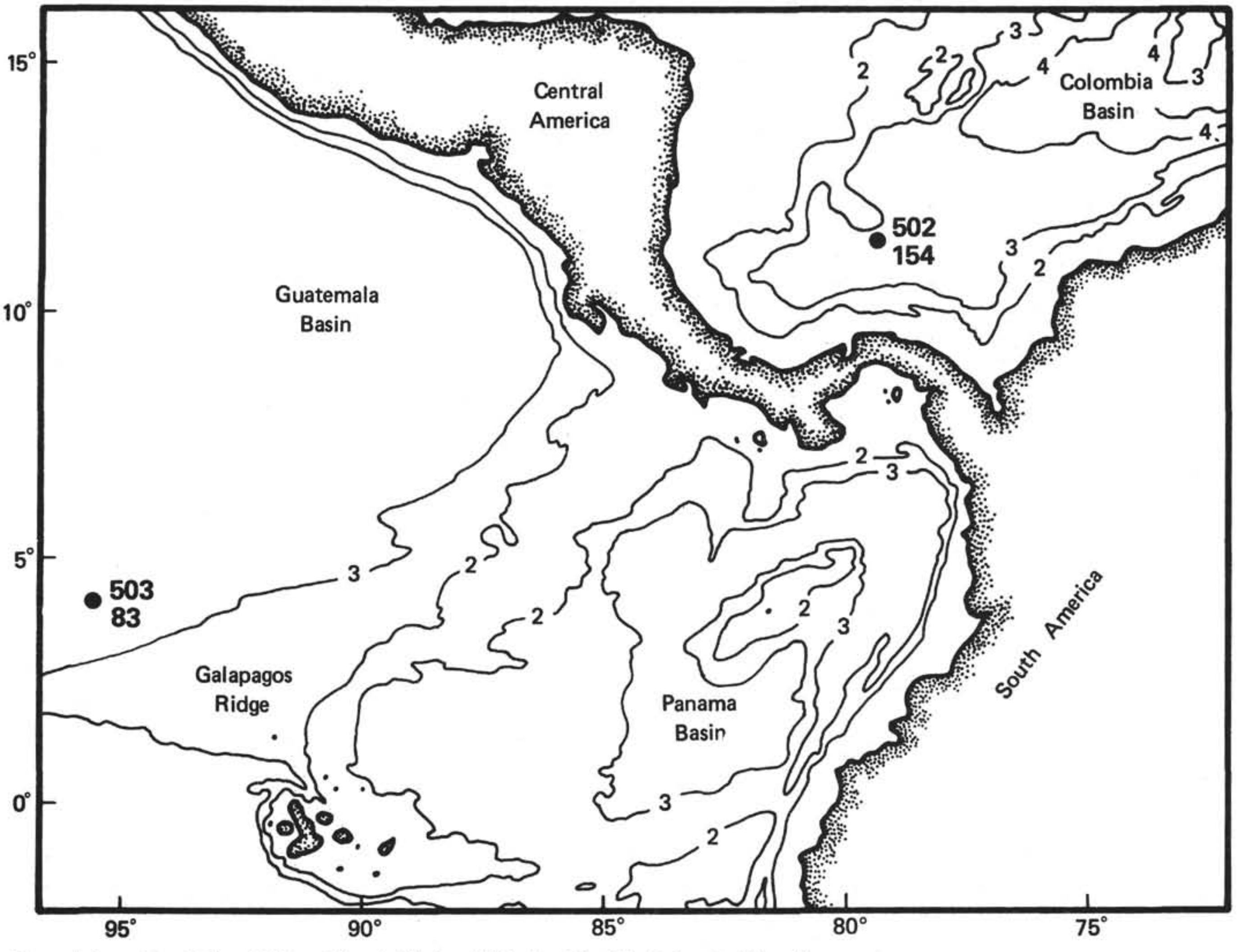


Figure 1. Location of Sites 502 (Leg 68) and 154 (Leg 15) in the Colombia Basin, Caribbean Sea.

COLOMBIA BASIN, WESTERN CARIBBEAN SEA, SITE 502 BACKGROUND AND OBJECTIVES

Site 502 is located in the Caribbean Sea, Colombia Basin (Fig. 1), on a small fault block that rises above the surrounding seafloor (Fig. 2). The location of Site 502 was based on the results from Site 154, which was drilled approximately 100 km to the southwest. Site 154 recovered a 153-meter section of nannofossil marl and calcareous clay of Pleistocene and Pliocene age overlying a volcanic–terrigenous sequence. The volcanic–terrigenous sequence forms a prominent reflector that was the prime target for the drilling of Site 154. Sediment accumulation rates in the pelagic–hemipelagic section at Site 154 are 4 to 5 cm/ky (Edgar, Saunders, et al., 1973) and are similar to rates that occur in the upper Pleistocene sections from the Colombia Basin (Prell, 1978).

We chose the location of Site 502 to avoid the terrigenous sands encountered at Site 154 and to recover a thick sequence of the hemipelagic to pelagic facies. We expected accumulation rates at Site 502 to range from 3 to 4 cm/ky, somewhat slower than rates at the deeper Site 154 and adjacent piston cores.

Our specific objective at Site 502 was to recover an undisturbed, complete section that could be used as a Neogene and Quaternary reference section. A complete record such as this would allow intercorrelations between (1) paleomagnetic stratigraphy, (2) calcareous biostratigraphy, (3) cyclic accumulation of sediment, (4) paleoceanographic changes, (5) oxygen and carbon isotope stratigraphies, (6) the chronology of Central American volcanism, (7) the timing and effects of the emergence of the Isthmus of Panama, and (8) the timing and effects of the initiation of Northern Hemisphere glaciation.

In addition to the scientific objectives, this cruise was designed to accomplish several engineering objectives. We hoped to determine (1) the maximum penetration of the HPC, (2) the physical properties of the sediment that stop penetration of the HPC, and (3) how much sediment is lost and/or disturbed between HPC cores because of coring operations. Site 502 should therefore provide important data on the capabilities of the HPC in calcareous hemipelagic sediment.

To meet these objectives, we attempted to recover at least three closely spaced, continuous sections by staggering the depth interval of the cores. Staggered coring

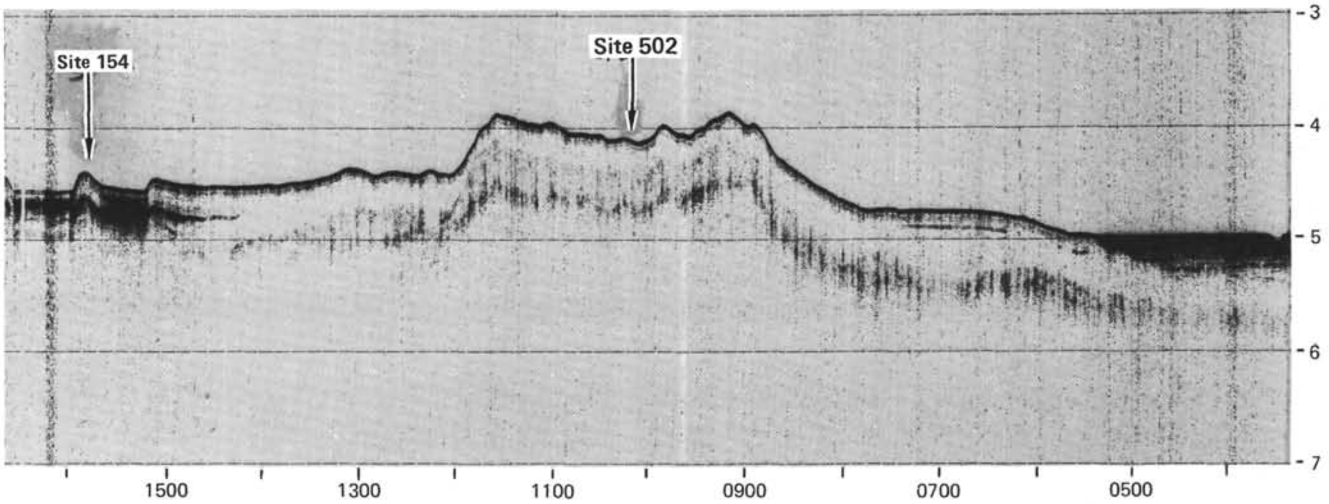


Figure 2. A seismic profile (GC-15) of the western Colombia Basin showing the relative position of Sites 154 and 502. Note that the strong sub-bottom reflector at Site 154 is absent at Site 502.

places the core break in one hole midway in the recovered section of an adjacent hole. These offset cores enabled us to construct a composite section of the site and avoid potential hiatuses due to coring.

OPERATIONS

We departed Curaçao on 13 August at 1056 hr. for sea trials and completed them by 1430 hr. We were underway for Site 502 at 1600 hr. and tested the positioning system (1907–2010 hr.) en route. The area of Site 502 was approached on 15 August at 2300 hr. on a course of 260°. Our course was changed to 198° so that we could obtain a seismic profile across the prospective site on a course of 300° that bisects the *Vema* 3208 and *Glomar Challenger* (GC-15) lines (Fig. 3). We continued to profile on this course for approximately two hours to ensure that we chose an optimum location. Our course was then changed to 206° to intersect the GC-15 line. Once on the GC-15 line, we followed it on a course of 067° and dropped a presoaked beacon (ORE #504) at 1425 hr. local time. Figure 4 shows our crossing of Site 502. We were positioned over the beacon by 1508 hr.

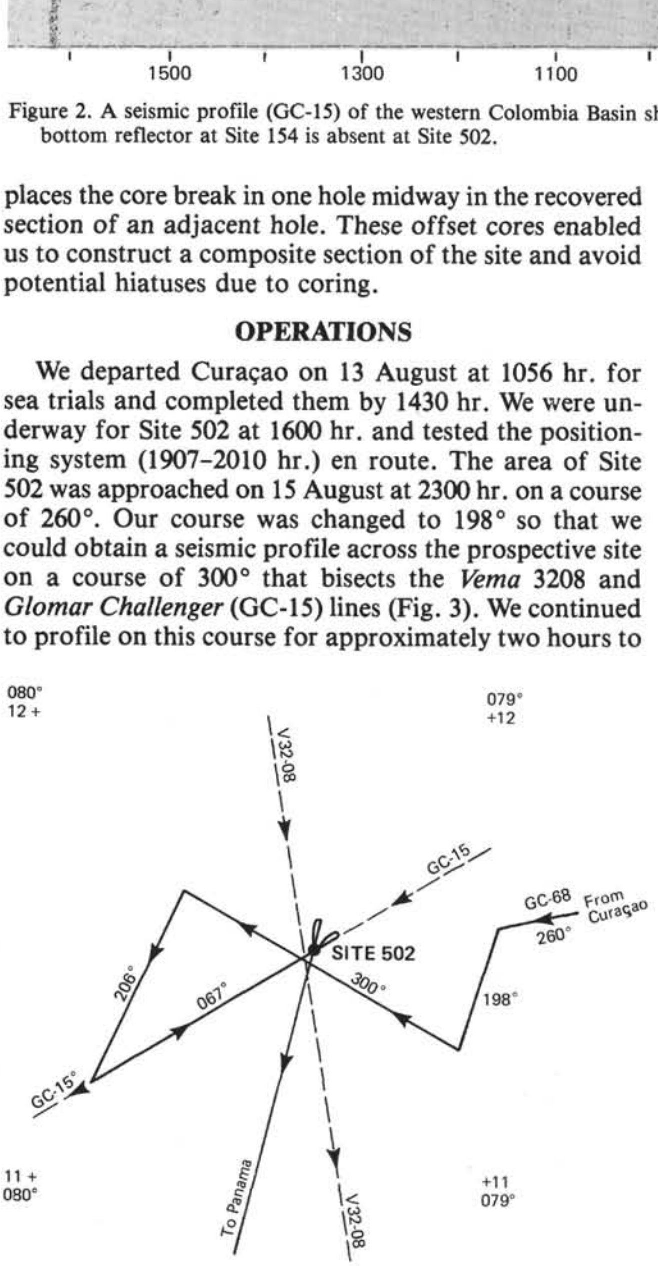


Figure 3. Tracklines of approach and departure of GC-68 from Site 502. The GC-68 track is a solid line and the tracks for V32-08 and GC-15 are dashed lines.

Continuous coring began with the HPC at 1753 hr. Fifty-three HPC attempts were made at Hole 502 that penetrated to a depth of 214.10 meters with recovery of 154.35 meters of sediment (Table 1). We attempted to recore several intervals where we initially got no recovery, but we were unsuccessful. Although total recovery was 72.1%, it was 82.4% in the upper 100 meters, where the HPC fully extended. Full extension of the HPC (indicated by a decrease in water pressure) stopped at Core 30 (122.8–125.8 m sub-bottom), but we continued to core at 4.4-meter intervals. Hole 502 was abandoned after Core 50 because recovery was less than 1 meter.

The ship was moved 100 meters northeast of Hole 502, and coring of Hole 502A was underway at 2045 hrs on 19 August. Hole 502A was continuously cored to a maximum depth of 215.0 meters sub-bottom. The HPC ceased fully extending at about 116 meters sub-bottom (Core 28). At this point, instead of washing down 4.4 meters as we did at Hole 502, we measured the length of recovered core, then washed to the nearest 0.5 meters *less* than the recovery. As an example, if Core 17 recovered 3.25 meters of sediment, we washed down 3.0 meters before extending the HPC for Core 18. Hole 502A was abandoned at 1315 hr. on 23 August at 215.0 meters sub-bottom, when recovery was less than 2 meters per attempt. Total recovery was 82.2% (Table 1).

We moved the ship about 100 meters northeast of Hole 502A and spudded in Hole 502B. Hole 502B was started at 1525 hr. on 23 August and penetrated to a depth of 98.55 meters before the HPC became stuck in the inner barrel. Set screws that hold the upper assembly oriented with the lower assembly had sheared, and one had jammed between the inner core barrel and the drill string. All attempts to free the HPC were unsuccessful. We

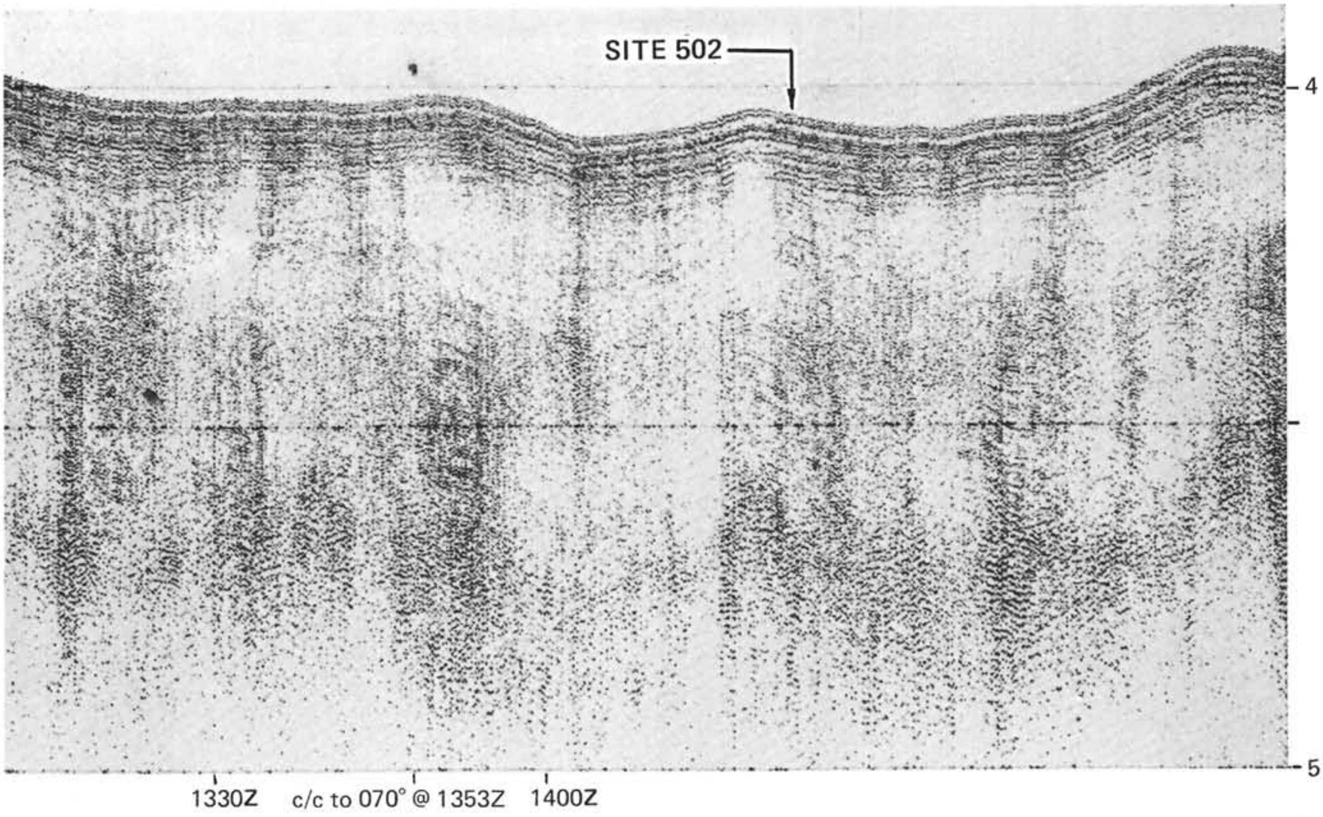


Figure 4. The *Glomar Challenger*, Leg 68 airgun seismic profile (filtered at 80/640 Hz) across Site 502.

abandoned Hole 502B at 1900 on 24 August after 86.31 meters of sediment was recovered for a recovery of 87.6%. (Table 1).

Hole 502C was cored at the same location as Hole 502B. The seafloor was reached at 1050 hr. on 25 August, and washed down to 32 meters sub-bottom. We commenced continuous coring from 32.0 meters to 144.2 meters, using the same strategy as on Holes 502A and 502B. The 66-meter interval from 144.2 to 210.2 meters was washed, and we again continuously cored from 210.2 meters to 227.8 meters. Hole 502C was abandoned at 0920 hr. on 27 August because of time constraints on our arrival in Panama. However, our recovery dropped off sharply after 225.7 meters sub-bottom, and the last core only recovered 10 cm of sediment. Table 1 is a summary of our coring operations at Site 502.

The drill string was recovered by 1600 hr. on 27 August. We were underway at 2142 hr., streaming the geophysical gear on a course of 014°. Once the geophysical gear was in operation, we changed course to 191° and profiled across Site 502, then continued profiling on a track to Cristobal, Panama. The geophysical gear were secured at 0446 hr. on 28 August owing to ship traffic.

LITHOSTRATIGRAPHY

We divided the section into four lithologic units (Table 2). The major facies is hemipelagic with foraminifer and nannofossil marl in the upper portion, grading into marl and clay in the lower sections. The division into four units is based on carbonate content, color, and mineral and biogenic constituents.

Major Lithofacies

Unit A (0–7 m sub-bottom)

Unit A consists of foraminifer-bearing nannofossil marl with subsidiary foraminifer–nannofossil marl. The marl is yellowish brown grading into a light brownish gray with depth. Sediment from Holes 502 and 502B exhibits a distinct cyclical color pattern at the base of the unit. Sediment from Hole 502A shows no color cycles; instead, a long transition section of light brownish gray sediment leads directly into the underlying unit. The unit is structureless, with only occasional faint laminations and minor mottling. A visible coarse component of foraminifers is scattered throughout.

The major constituents (Table 3, Appendix, this chapter) are abundant nannofossils and undifferentiated clay minerals and common to abundant foraminifers. Micronodules are rare to common, whereas siliceous microfossils, volcanic glass shards, quartz, heavy mineral grains, and pyrite are present in trace amounts. The coarse fraction contains subhedral to euhedral grains of quartz, potash and plagioclase feldspar, green and red hornblende, and, rarely, brown mica. X-ray diffraction data show the presence of minor amounts of the zeolites clinoptilolite and phillipsite. The clay mineral component consists of abundant montmorillonite, common to

Table 1. Coring summary for Site 502.

Core No.	Date (August 1979)	Time (hr.)	Depth from Drill Floor (m) Top Bottom	Depth below Seafloor (m) Top Bottom	Length Cored (m)	Length Recovered (m)	Recovery (%)
Hole 502							
1	16	1829	3047.5–3051.9	0.0–0.4	0.4	0.20	50.0
2	16	2010	3051.9–3056.3	0.4–4.8	4.4	4.45	101.1
3	16	2122	3056.3–3060.7	4.8–9.2	4.4	4.05	92.0
4	16	2248	3060.7–3065.1	9.2–13.6	4.4	4.42	96.9
5	16	2358	3065.1–3069.5	13.6–18.0	4.4	4.13	97.9
6	17	0115	3069.5–3073.9	18.0–22.4	4.4	3.92	89.1
7	17	0236	3073.9–3078.3	22.4–26.8	4.4	4.50	102.3
8	17	0358	3078.3–3082.7	26.8–31.2	4.4	4.14	94.1
9	17	0502	3082.7–3087.1	31.2–35.6	4.4	4.20	95.4
10	17	0614	3087.1–3091.5	35.6–40.0	4.4	4.22	95.9
11	17	0713	3091.5–3095.9	40.0–44.4	4.4	1.41	32.0
12	17	0811	3095.9–3100.3	44.4–48.8	4.4	—	—
13	17	0910	3100.3–3104.7	48.8–53.2	4.4	4.20	95.4
14	17	1127	3104.7–3109.1	53.2–57.6	4.4	2.63	59.8
15	17	1238	3109.1–3113.5	57.6–62.0	4.4	3.83	87.0
16	17	1341	3113.5–3117.9	62.0–66.4	4.4	2.59	58.9
17	17	1502	3117.9–3122.3	66.4–70.8	4.4	3.10	70.4
18	17	1605	3122.3–3126.7	70.8–75.2	4.4	2.39	54.3
19	17	1810	3126.7–3131.1	75.2–79.6	4.4	3.67	83.4
20	17	1920	3131.1–3135.5	79.6–84.0	4.4	3.93	89.3
21	17	2050	3135.5–3139.9	84.0–88.4	4.4	3.44	78.2
22	17	2153	3139.9–3144.3	88.4–92.8	4.4	3.92	89.1
23	17	2258	3144.3–3148.7	92.8–97.2	4.4	4.56	103.6
24	18	0014	3148.7–3153.1	97.2–101.6	4.4	4.35	98.9
25	18	0115	3153.1–3157.5	101.6–106.0	4.4	4.34	98.6
26	18	0228	3157.5–3161.9	106.0–110.4	4.4	4.05	92.0
27	18	0548	3161.9–3166.3	110.4–114.8	4.4	1.82	41.4
28	18	0818	3166.3–3168.8	114.8–117.3	2.5	2.40	96.0
29	18	1000	3168.8–3173.2	117.3–121.7	4.4	4.19	95.2
30	18	1117	3173.2–3177.6	121.7–126.1	4.4	4.06	92.3
31	18	1300	3177.6–3182.0	126.1–130.5	4.4	3.24	73.6
32	18	1439	3182.0–3186.4	130.5–134.9	4.4	3.46	78.6
33	18	1617	3186.4–3190.8	134.9–139.3	4.4	2.04	46.4
34	18	1727	3190.8–3195.2	139.3–143.7	4.4	4.14	94.1
35	18	1841	3195.2–3199.6	143.7–148.1	4.4	2.88	65.5
36	18	2003	3199.6–3204.0	148.1–152.5	4.4	3.43	78.0
37	18	2314	3204.0–3208.4	152.5–156.9	4.4	3.25	73.9
38	19	0037	3208.4–3212.8	156.9–161.3	4.4	2.78	63.2
39	19	0216	3212.8–3217.2	161.3–165.7	4.4	2.65	60.2
40	19	0452	3217.2–3221.6	165.7–170.1	4.4	2.36	53.6
41	19	0611	3221.6–3226.0	170.1–174.5	4.4	3.18	72.3
42	19	0833	3226.0–3230.4	174.5–178.9	4.4	3.72	84.5
43	19	0937	3230.4–3234.8	178.9–183.3	4.4	2.71	61.6
44	19	1115	3234.8–3239.2	183.3–187.7	4.4	2.11	48.0
45	19	1219	3239.2–3243.6	187.7–192.1	4.4	2.13	48.4
46	19	1335	3243.6–3248.0	192.1–196.5	4.4	1.96	44.5
47	19	1442	3248.0–3252.4	196.5–200.9	4.4	2.47	56.1
48	19	1611	3252.4–3256.8	200.9–205.3	4.4	1.72	39.1
49	19	1721	3256.8–3261.2	205.3–209.7	4.4	0.45	10.2
50	19	1840	3261.2–3265.6	209.7–214.1	4.4	0.56	12.7
Total					214.1	154.35	72.1
Hole 502A							
1	19	2155	3049.0–3053.4	0.0–1.9	1.9	1.62	85.3
2	19	2300	3053.4–3057.8	1.9–6.3	4.4	3.86	87.7
3	20	0005	3057.8–3062.2	6.3–10.7	4.4	4.20	95.4
4	20	0200	3062.2–3066.6	10.7–15.1	4.4	4.03	91.6
5	20	0503	3066.6–3071.0	15.1–19.5	4.4	4.34	98.6
6	20	0906	3071.0–3075.4	19.5–23.9	4.4	4.21	95.7
7	20	1005	3075.4–3079.8	23.9–28.3	4.4	4.41	100.2
8	20	1126	3079.8–3084.2	28.3–32.7	4.4	3.25	73.9
9	20	1345	3084.2–3088.6	32.7–37.1	4.4	0.19	4.3
10	20	1440	3088.6–3093.0	37.1–41.5	4.4	4.32	98.2
11	20	1652	3093.0–3097.4	41.5–45.9	4.4	0.20	4.5
12	20	1755	3097.4–3101.8	45.9–50.3	4.4	3.96	90.0
13	20	1900	3101.8–3106.2	50.3–54.7	4.4	0.18	4.1
14	20	2015	3106.2–3110.6	54.7–59.1	4.4	0.00	0.0
15	20	2130	3110.6–3115.0	59.1–63.5	4.4	0.00	0.0
16	20	2254	3115.0–3119.4	63.5–67.9	4.4	3.46	78.6
17	21	0005	3119.4–3123.8	67.9–72.3	4.4	4.63	105.2
18	21	0114	3123.8–3128.2	72.3–76.7	4.4	0.04	0.9
19	21	0240	3128.2–3132.6	76.7–81.1	4.4	4.10	93.2
20	21	0347	3132.6–3137.0	81.1–85.5	4.4	4.46	101.4
21	21	0509	3137.0–3141.4	85.5–89.9	4.4	4.18	95.0
22	21	0621	3141.4–3145.8	89.9–94.3	4.4	4.55	103.4
23	21	0734	3145.8–3150.2	94.3–98.7	4.4	4.64	105.4
24	21	0848	3150.2–3154.6	98.7–103.1	4.4	4.58	104.1
25	21	0957	3154.6–3159.0	103.1–107.5	4.4	4.38	99.5
26	21	1112	3159.0–3163.4	107.5–111.9	4.4	4.53	103.0
27	21	1215	3163.4–3167.8	111.9–116.3	4.4	4.27	97.0
28*	21	1333	3167.8–3170.8	116.3–119.3	3.0	3.19	106.3
29	21	1434	3170.8–3174.3	119.3–122.8	3.5	3.60	102.9
30	21	1539	3174.3–3177.3	122.8–125.8	3.0	3.26	108.7
31	21	1739	3177.3–3179.8	125.8–128.3	2.5	0.00	0.0
32	21	1851	3179.8–3182.8	128.3–131.3	3.0	3.32	110.7
33	21	1953	3182.8–3185.8	131.3–134.3	3.0	3.16	105.3
34	21	2100	3185.8–3188.8	134.3–137.3	3.0	3.11	103.7
35	21	2205	3188.8–3192.3	137.3–140.8	3.5	3.92	112.0
36	21	2313	3192.3–3194.8	140.8–143.3	2.5	2.53	101.2
37	22	0042	3194.8–3197.3	143.3–145.8	2.5	2.69	107.6
38	22	0202	3197.3–3198.8	145.8–147.3	1.5	2.01	134.0
39	22	0315	3198.8–3201.8	147.3–150.3	3.0	2.88	96.0
40	22	0439	3201.8–3204.3	150.3–152.8	2.5	2.72	108.8
41	22	0606	3204.3–3207.3	152.8–155.8	3.0	3.31	110.3
42	22	0712	3207.3–3209.8	155.8–158.3	2.5	2.65	106.0
43	22	0821	3209.8–3212.8	158.3–161.3	3.0	2.86	95.3
Hole 502A (cont)							
44	22	0929	3212.8–3215.3	161.3–163.8	2.5	2.47	98.8
45	22	1028	3215.3–3217.8	163.8–166.3	2.5	2.47	98.8
46	22	1134	3217.8–3219.8	166.3–168.3	2.0	2.26	113.0
47	22	1235	3219.8–3222.8	168.3–171.3	3.0	3.34	111.3
48	22	1341	3222.8–3224.8	171.3–173.3	2.0	1.94	97.0
49	22	1444	3224.8–3226.8	173.3–175.3	2.0	0.00	0.0
50	22	1546	3226.8–3229.8	175.3–178.3	3.0	2.58	86.0
51	22	1654	3229.8–3232.3	178.3–180.8	2.5	2.17	72.3
52	22	1809	3232.3–3234.3	180.8–182.8	2.0	1.71	85.5
53	22	1919	3234.3–3236.3	182.8–184.8	2.0	1.54	77.0
54	22	2014	3236.3–3238.8	184.8–187.3	2.5	2.48	99.2
55	22	2125	3238.8–3240.8	187.3–189.3	2.0	2.11	105.5
56	22	2225	3240.8–3242.8	189.3–191.3	2.0	2.15	107.5
57	22	2329	3242.8–3244.8	191.3–193.3	2.0	1.96	98.0
58	23	0037	3244.8–3246.8	193.3–195.3	2.0	2.01	100.5
59	23	0144	3246.8–3248.8	195.3–197.3	2.0	0.60	30.0
60	23	0257	3248.8–3250.8	197.3–199.3	2.0	1.87	93.5
61	23	0409	3250.8–3252.8	199.3–201.3	2.0	1.51	75.5
62	23	0535	3252.8–3254.8	201.3–203.3	2.0	0.51	25.5
63	23	0647	3254.8–3256.8	203.3–205.3	2.0	1.60	80.8
64	23	0815	3256.8–3258.8	205.3–207.3	2.0	0.00	0.0
65	23	0924	3258.8–3260.8	207.3–209.3	2.0	2.36	118.0
66	23	1039	3260.8–3262.8	209.3–211.3	2.0	1.84	92.0
67	23	1154	3262.8–3264.3	211.3–212.8	1.5	1.02	68.0
68	23	1308	3264.3–3266.3	212.8–215.0	2.0	2.20	110.0
Total					215.00	176.50	82.2
Hole 502B							
1	23	1545	3050.0–3054.4	0.0–1.75	1.75	1.80	102.8
2	23	1650	3054.4–3058.8	1.75–6.15	4.4	3.71	84.3
3	23	1756	3058.8–3063.2	6.15–10.55	4.4	4.28	97.3
4	23	1859	3063.2–3067.6	10.55–14.95	4.4	4.38	99.5
5	23	1955	3067.6–3072.0	14.95–19.35	4.4	4.03	91.6
6	23	2100	3072.0–3076.4	19.35–23.75	4.4	4.40	100.0
7	23	2202	3076.4–3080.8	23.75–28.15	4.4	4.65	105.7
8	23	2324	3080.8–3085.2	28.15–32.55	4.4	3.66	83.2
9	24	0039	3085.2–3089.6	32.55–36.95	4.4	3.61	82.0
10	24	0257	3089.6–3094.0	36.95–41.35	4.4	2.46	55.9
11	24	0407	3094.0–3098.4	41.35–45.75	4.4	4.42	100.5
12	24	0617	3098.4–3102.8	45.75–50.15	4.4	3.56	80.9
13	24	0713	3102.8–3107.2	50.15–54.55	4.4	4.46	101.4
14	24	0824	3107.2–3111.6	54.55–58.95	4.4	4.28	97.3
15	24	0918	3111.6–3116.0	58.95–63.35	4.4	1.67	58.0
16	24	1016	3116.0–3120.4	63.35–67.75	4.4	1.23	28.0
17	24	1129	3120.4–3124.8	67.75–72.15	4.4	4.20	95.5
18	24	1230	3124.8–3129.2	72.15–76.55	4.4	4.37	99.3
19	24	1334	3129.2–3133.6	76.55–80.95	4.4	4.16	94.5
20	24	1441	3133.6–3138.0	80.95–85.35	4.4	4.55	103.4
21	24	1542	3138.0–3142.4	85.35–89.75	4.4	4.32	98.2
22	24	1642	3142.4–3146.8	89.75–94.15	4.4	4.62	105.0
23	25	0330	3146.8–3151.2	94.15–98.55	4.4	3.49	79.3
Total					98.55	86.31	87.6
Hole 502C							
1	25	1243	3083.5–3087.9	32.0–36.4	4.4	4.42	100.4
2	25	1343	3087.9–3092.3	36.4–40.8	4.4	4.47	101.6
3	25	1443	3092.3–3096.7	40.8–45.2	4.4	3.67	83.4
4	25	1545	3096.7–3101.1	45.2–49.6	4.4	1.65	37.5
5	25	1645	3101.1–3105.5	49.6–54.0	4.4	4.28	97.3
6	25	1749	3105.5–3109.9	54.0–58.4	4.4	4.42	100.4
7	25	1852	3109.9–3114.3	58.4–62.8	4.4	0.76	17.3
8	25	1958	3114.3–3118.7	62.8–67.2	4.4	4.52	102.7
9	25	2110	3118.7–3123.1	67.2–71.6	4.4	4.41	100.2
10	25	2213	3123.1–3127.5	71.6–76.0	4.4	4.55	103.4
11	25	2312	3127.5–3131.9	76.0–80.4	4.4	4.50	102.3
12	26	0026	3131.9–3136.3	80.4–84.8	4.4	2.01	45.7
13	26	0129	3136.3–3140.7	84.8–89.2	4.4	4.68	106.4
14	26	2039	3140.7–3145.1	89.2–93.6	4.4	4.60	104.5
15	26	0353	3145.1–3149.5	93.6–98.0	4.4	4.65	105.7
16	26	0459	3149.5–3153.9	98.0–102.4	4.4	4.57	103.9
17	26	0620	3153.9–3158.3	102.4–106.8	4.4	4.48	101.8
18	26	0727	3158.3–3162.7	106.8–111.2	4.4	4.06	92.3
19	26	0830	3162.7–3167.1	111.2–115.6	4.4	2.03	46.1
20	26	0942	3167.1–3171.5	115.6–120.0	4.4	3.68	83.6
21	26	1044	3171.5–3175.9	120.0–124.4	4.4	3.09	70.2
22	26	1137	3175.9–3176.9	124.4–125.4	1.0	0.89	89.0
23	26	1257	3176.9–3181.3	125.4–129.8	4.4	4.29	97.5
24	26	1526	3181.3–3185.7	129.8–134.2	4.4	3.29	74.8
25	26	1627	3185.7–3188.7	134.2–137.2	3.0	1.24	41.3
26	26	1749	3188.7–3192.2	137.2–140.7	3.5	3.40	97.1
27	26	1857	3192.2–3195.7	140.7–144.2	3.5	3.03	96.6
	Wash		3195.7–3261.7	144.2–210.2			
28	26	2236	3261.7–3264.7	210.2–213.2	3.0	3.01	100.3
29	26	2350	3264.7–3266.7	213.2–215.2	2.0	2.02	101.0
30	27	0107	3266.7–3268.2	215.2–216.7	1.5	1.61	107.3
31	27	0211	3268.2–3270.7	216.7–219.2	2.5	2.38	95.2
32	27	0315	3270.7–3273.2	219.2–221.7	2.5	2.19	87.6
33	27	0410	3273.2–3275.2	221.7–223.7	2.0	2.26	113.0
34	27	0520	3275.2–3277.2	223.7–225.7	2.0	2.11	105.5
35	27	0629	3277.2–3278.2	225.7–226.7	1.0	0.93	93.0
36	27	0742	3278.2–3279.2	226.7–227.7	1.0	0.48	48.0
37	27	0920	3279.2–3280.2	227.7–227.81	1.0	0.11	11.0
Total					130.7 227.81	112.7	86.2

Table 2. Lithostratigraphic summary for Site 502.

Unit	Hole/Core	Sub-bottom Depth (m)	Age	Description
A	502, 1 to 3 502A, 1 to 3 502B, 1 to 2	0–7	Holocene–late Pleistocene	Foraminifer-bearing nannofossil marl; yellowish brown to light brownish gray; generally structureless.
B	502, 3 to 25–27 502A, 3 to 24–27 502B, 2 to 23 502C, 1 to 16–18	7–110	late Pleistocene–early Pliocene	Foraminifer-bearing nannofossil marl; gray to olive gray; generally structureless with occasional ash beds, foraminifer cycles and foraminifer content greater than 10%.
C	502, 25–27 to 50 502A, 24–27 to 67 502C, 16–18 to 27	110–210	early Pliocene–Miocene	Foraminifer-bearing nannofossil marl; to calcareous clays, light gray to olive gray to dark greenish gray; foraminiferal content less than 10%; pyritic ash layers and distinct burrowing are common.
D	502A, 68 502C, 28 to 37	210–228	late Miocene	Calcareous and ash-bearing clay, pale green to grayish green; pyritic ash layers are common and biosiliceous remains are present.

abundant illite, and common amounts of chlorite and kaolinite (see Zimmerman, this volume). Calcium carbonate content ranges from 35 to 60% (see Gardner, this volume).

Unit B (7–110 m sub-bottom)

The upper contact of Unit B with Unit A is transitional, based on a color gradation in Core 3A, but is marked by cyclical color variations in Holes 502 and 502B. The lower boundary is marked by a decrease in the content of foraminifers to below 10%. The lower contact is located between Cores 25 and 27 in Hole 502 and between Cores 24 and 27 in Hole 502A. The base of the unit in Hole 502C is in Core 18 at approximately 109 meters (Table 2).

The sediment of Unit B is predominantly foraminifer-bearing nannofossil marl and nannofossil marl with minor amounts of nannofossil-bearing foraminifer marl. Colors range from gray to olive and light olive gray. The sediment is generally homogeneous with few primary structures, faintly burrowed and mottled, and exhibits indistinct black and grayish green lamina. The upper 60 meters has irregular cycles of foraminifer-rich zones.

Major constituents (Table 3) of Unit B are abundant nannofossils and clay. Foraminifers are abundant to common; estimates of foraminifer content range from 35 to 10%, but as the basal contact is approached, abundances fall in the lower part of the range. Calcium carbonate content ranges from 35 to 55%. Quartz, heavy minerals, and micronodules are present in trace amounts, and zeolite minerals occur in rare to trace amounts. Rare pyrite is dispersed throughout and occasionally concentrated as nodules. Glass shards are often found dispersed in rare amounts, and bedded vitric ashes (1–8 cm thick) are present but not abundant (Cores 502-8 and 502A-10). The coarse fraction mineral component is similar to that found in Unit A, with the addition of green pellets (glauconite, celadonite), phillipsite, and pyrite. The lower half of Unit B (approximately 60–110 m sub-bottom) also contains abundant chitoniferous biogenic material (Fig. 5). X-ray diffraction studies show the occasional presence of rare amounts of phillipsite and clinoptilolite. The clay mineral component consists of abundant montmorillonite with common amounts of illite, chlorite, and kaolinite. Mixed layer clays are present in rare amounts.

Unit C (110–210 m sub-bottom)

The upper contact of Unit C is marked by a decrease in foraminifer content to below 10%. The lower boundary is placed at the first occurrence of siliceous microfossils in Cores 502C-28 (210 m) and 502A-68 (215 m).

The sediment consists of foraminifer-bearing nannofossil marl in the upper portion grading into calcareous clay and ash and pyrite-bearing clay in the lower section. Colors in the upper section are gray to light gray but gradually change to olive gray and dark greenish gray in the lower section. The colors vary irregularly but become consistently darker with depth. Cyclical color patterns become prevalent with depth through this unit.

The marl is structureless but faintly mottled and burrowed in the upper section with only an occasional area of distinct burrows where changes in sediment color allow contrast between the burrows and the surrounding sediment. Burrowing is more intense in the lower section, with *Zoophycos* common in the middle to lower section. Foraminifers are visible but very sparsely scattered.

The major constituent (Table 3) of Unit C is clay that is abundant and shows a gradual increase with depth. Nannofossils are common throughout and are sometimes abundant in the upper sections. Foraminifers range from trace to common amounts but are restricted to less than 10% throughout. Quartz and heavy minerals are persistent but in trace amounts. Pyrite nodules are randomly distributed, whereas dispersed pyrite crystals are present throughout in common to trace amounts. Ash layers 1–8 cm thick, some of which are partially devitrified, are more common in this unit than in the sediment above. They increase in abundance with depth and consistently occur with abundant concentrations of pyrite and/or zeolites. Abundant quartz, potash and plagioclase feldspar, and hornblende occur in pulses in the coarse fraction. Volcanic glass, a green mineral that may be celadonite, and pyrite are common throughout. Montmorillonite dominates the clay mineral component, but illite and kaolinite are common and chlorite common to rare. X-ray diffraction studies show occasional small amounts of clinoptilolite.

Unit D (210–227 m sub-bottom)

Unit D is represented by the bottom 18 meters of the recovered section. The upper contact is defined by the appearance of siliceous microfossils at 210 to 213 meters in Cores 502C-28 and 502A-68, respectively. This unit consists of calcareous and ash-bearing clay interspersed with black beds of pyrite and ash (1–10 cm thick). Colors range from pale green to grayish green and grayish blue green and are often arranged in cyclic patterns. The sediment is intensely burrowed and mottled in various shades of green and light olive brown.

Clay is a dominant to abundant constituent of this unit. Carbonate nannofossils and foraminifers are common to rare and generally constitute less than 10% of the total sediment. Radiolarians, sponge spicules, and, more rarely, diatoms are persistent throughout in common to rare amounts. Heavy minerals are found only in trace amounts, and zeolites are rare. Dispersed pyrite and shards of volcanic glass are common to rare throughout and often occur together in black beds of pyrite and ash mixtures. The clay mineral component is dominated by montmorillonite; illite and kaolinite occur in common to rare abundance, whereas chlorite and zeolites are rare.

Discussion

Volcanic ash layers are found consistently in Units C and D and less frequently in Unit B (Fig. 5). They vary from approximately 1 to 5 cm in thickness but may be as thick as 10 cm. Their lower contacts are relatively sharp but bioturbated, whereas upper contacts are gradational, extending as much as 10 cm above the ash bed. The ash layers are often black to olive and are almost exclusively a mixture of light-colored glass shards and abundant pyrite. Trace to rare amounts of celadonite and dark glass are also present. Euhedral crystals of zeolite are common in the gradational zone above the ash or as separate laminae and suggest a high degree of diagenetic alteration. Devitrification of the volcanic shards has occurred in some instances (Cores 502A-46, 52, 57, and 58). Dispersed ash shards commonly occur in Units C and D and in the upper portion of Unit B (see Ledbetter, this volume, for details of ash abundance).

Two doublets of ash are of special significance; both consist of two separate but closely spaced ash layers. These doublets are easily recognized and provide distinctive lithologic horizons for correlation between holes. Each doublet consists of a thin ash layer approximately 10 cm below a larger ash bed (Fig. 6). The first set in Cores 502-32, 502A-32, and 502C-23 occurs at about 132, 130, and 128 meters sub-bottom, respectively. The second doublet is found in Cores 502-40 and 502B-44 at sub-bottom depths of about 166 and 162 meters, respectively. All other ash layers are single beds or irregular concentrations of volcanic shards or zeolite minerals. A distinctive layer of light gray ash occurs in Cores 502-8 and 502B-8 at about 30 meters sub-bottom. Ash occurrence was occasionally noted in the upper section at Site 154, but correlation between Site 154 and 502 is impossible because ash layers were thoroughly disturbed by rotary drilling at Site 154 (Edgar, Saunders, et al., 1973).

Chitoniferous biogenic material (Fig. 7) was found scattered in trace abundances throughout the section. These biogenic "parts" were photographed from residual sediment that was acidified to remove calcareous material and then sieved through a 63-mm sieve. Material similar to that shown in Figure 7 was found only in sediment that contains appreciable amounts of pyrite. The most common type is identified as a squid hook (Figure 7E), even though the one shown in Figure 7E is from Site 503 in the equatorial Pacific. Material of a similar nature has been noted from Sites 494, 496, 497, 499, and 500 on the inner slope and floor of the Middle America Trench and at Site 251 in the southwestern Indian Ocean (J. Westberg, personal communication).

We attempted to visually correlate relative sediment texture between holes. A "coarse" texture reflects an abundance of foraminifers that are generally visible. Figure 8 shows areas in which the foraminiferal component was either prominent or absent. In general, prominent to coarse bands occur only above about 60 meters sub-bottom, and the coarse foraminifer component is rare beneath about 110 meters sub-bottom, the lower boundary of Unit B.

Colors in the top 7 meters of the sequence are banded in shades of brown and yellow (Fig. 8). This zone represents oxidized conditions, and smear slide observations indicate that micronodules (possibly Fe–Mn) are present. The greens and grays below 7 meters sub-bottom indicate reduced conditions where pyrite becomes ubiquitous in at least trace amounts, and below 20 meters micronodules disappear. The sediment between 7 meters and about 50 meters is generally olive gray and olive, and below 50 meters gray and greenish gray become prominent. The sediment darkens with depth; the dominant color becomes green to dark green at about 200 meters sub-bottom.

The texture and color changes do not correlate in detail between holes but do outline areas of similar cyclicity on a broad scale. This lack of correlation may be due in part to localized effects that cause these features to lack significant lateral extension.

Carbonate content decreases irregularly with depth in each hole, with an average of 40 to 50% in Unit A to less than 20% in Unit D (Fig. 9). Well-defined cyclic variations of carbonate are superimposed on this trend of decreased carbonate with depth. Gardner (this volume) presents a detailed discussion of the carbonate stratigraphy. Bulk accumulation rates for the carbonate and noncarbonate fractions suggest that the decrease is caused primarily by a large terrigenous and volcanic influx in the lower sections and a gradual decrease of this component with time (see Accumulation Rates section for details).

Several observations aboard ship and during subsequent studies suggest that an abrupt change in sediment type occurs below 200 to 210 meters sub-bottom. Sediment below this level is characterized by the presence of siliceous microfossils, high percentages of smectite relative to the other clay minerals, poor smectite crystallinity, low ratio of quartz to plagioclase, low bulk density, high water content, low carbonate content, and high porosity. Sediment above 200 to 210 meters sub-bottom has just the opposite characteristics. Also, a shift in $\delta^{13}C$ that can be correlated to a similar event

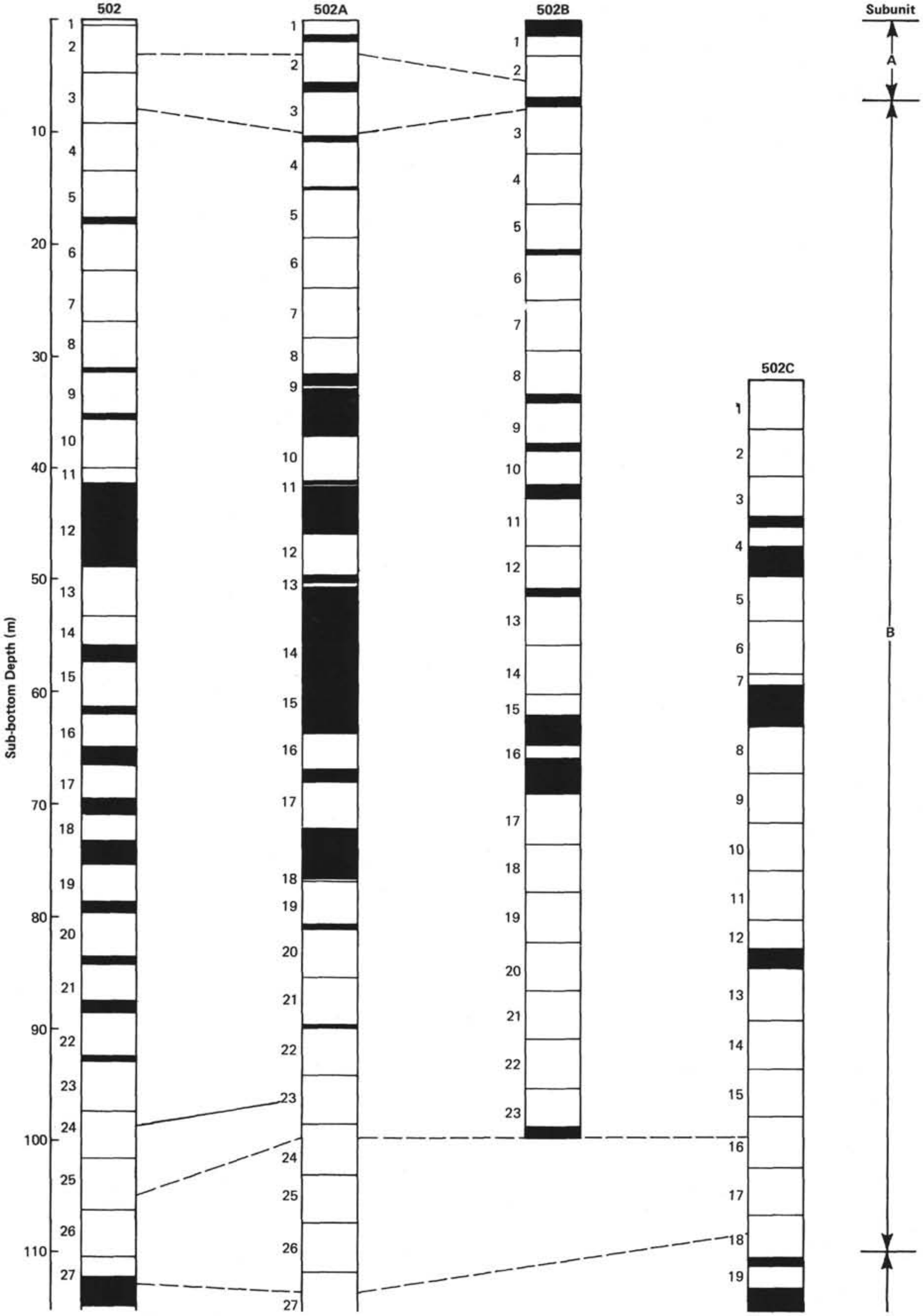


Figure 5. Correlation of megascopic volcanic ash layers between Holes 502, 502A, 502B, and 502C. Note ash doublets near 130 and 160 meters sub-bottom. Lithologic units are given in the righthand margin. Areas of no recovery are shown by black zones. Dashed lines are problematic correlations.

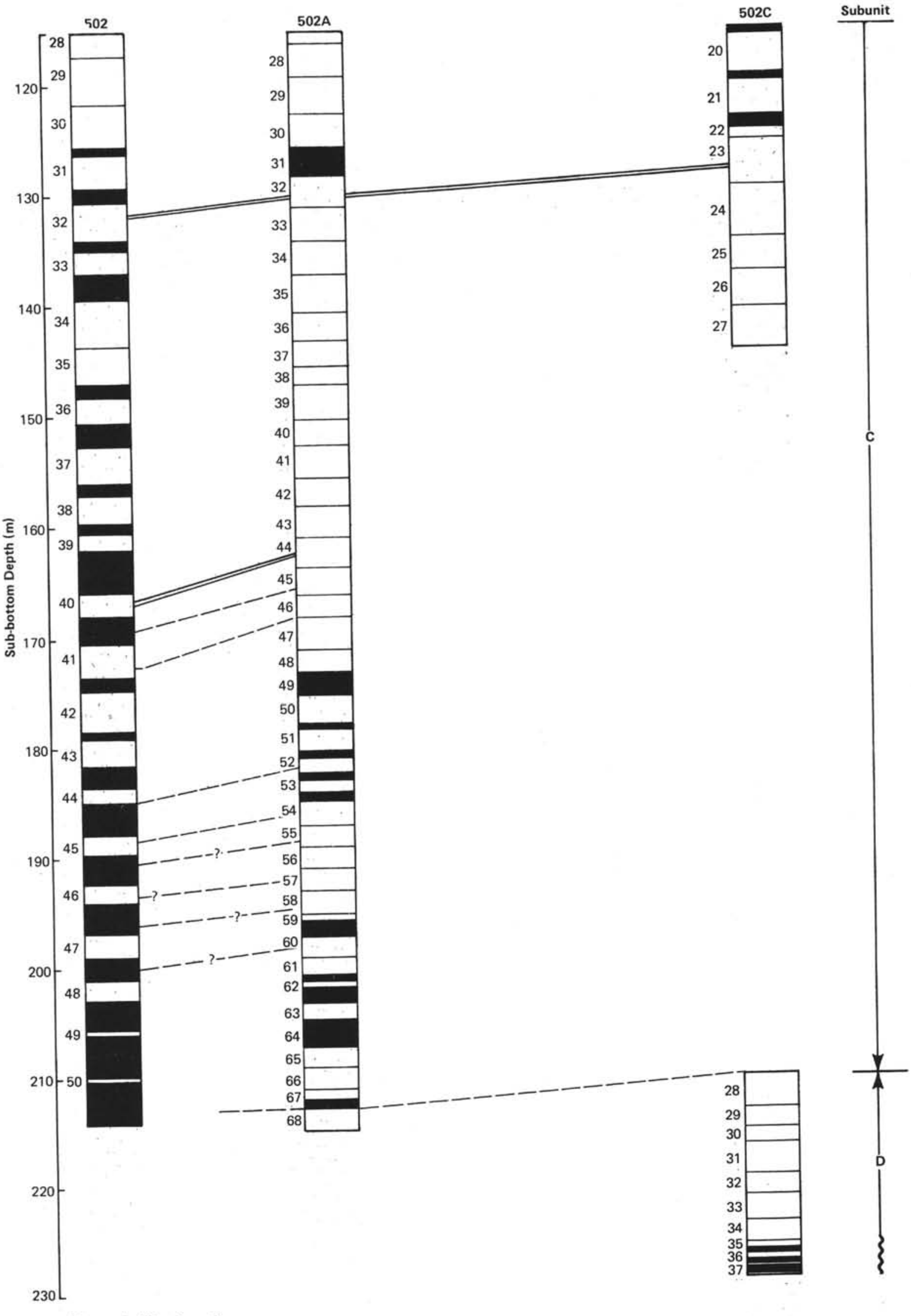


Figure 5. (Continued).

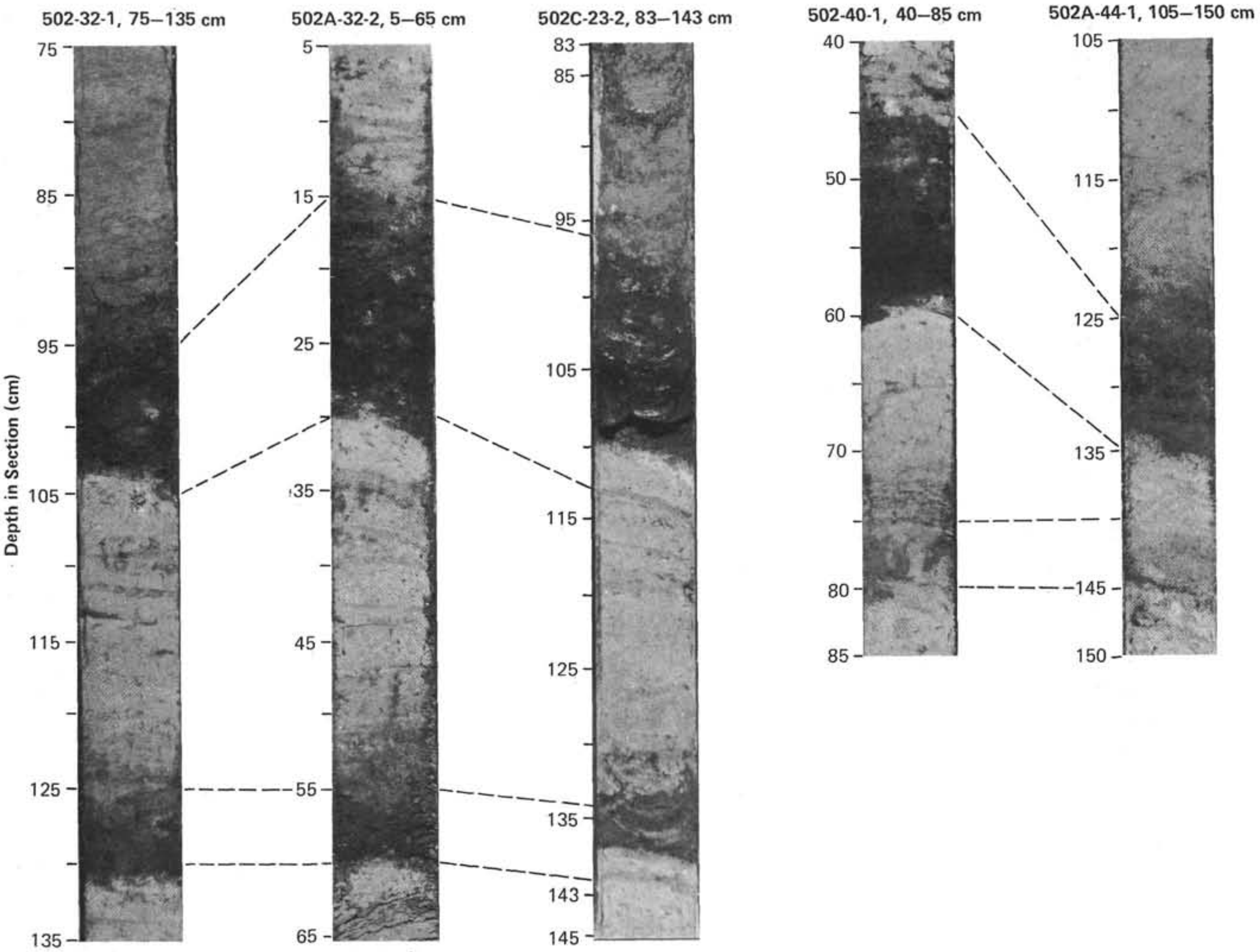


Figure 6. Photograph and location within holes of ash doublets used for correlation between holes.

dated 6.5 Ma (Keigwin, this volume) occurs between 196 and 199 meters sub-bottom (Keigwin, this volume). The section below this depth is similar to a "Pacific-type" marine sediment (Heath, 1969), whereas the section above this level is similar to an "Atlantic-type" sediment with terrigenous components.

PHYSICAL PROPERTIES

Since its inception, DSDP has maintained a program to measure physical properties of deep sea sediment to complement the geological, geophysical, and technological investigations carried out aboard *Glomar Challenger*. Unfortunately, rotation of the drill bit around the sediment often results in severe disturbance of these physical properties (Demars and Nacci, 1978; Lee, 1973). The HPC, however, recovers a continuous section of relatively undisturbed sediment to a maximum depth of greater than 200 meters sub-bottom. Therefore we undertook a detailed program of physical property analyses on Leg 68. The major objectives of this program were to understand the downcore variations in physical properties and relate them to geologic and paleoceanographic parameters, observe the behavior of a compacting sediment column, establish the engineering limits of the HPC and the degree and nature of disturbance it causes, and to use the physical properties data to help interpret the seismic records collected in the region.

The physical properties determined at Site 502 include shear strength; sonic velocity—both through the liner and on chunk samples; wet-bulk density, grain density, porosity, and water content on chunk samples; and saturated bulk density by the continuous scan gamma-ray attenuation porosity evaluation (GRAPE). The interested reader is referred to Mayer (this volume) for a full discussion of the physical properties of the recovered sediment.

We found a general trend of increased shear strength with depth (Fig. 10) that is the result of increased overburden and compaction. Calculated effective overburden pressure, derived from saturated bulk density data, is 11,500 g/cm^2 at 206 meters sub-bottom (Mayer, this volume). Shear strength values range from near zero in the uppermost sediment to a maximum of over 3000 g/cm^2 at 194 meters. A rapid increase in shear strength occurs at about 88 meters and between 110 and 130 meters (Fig. 10). High-frequency fluctuations of shear strength (1-2 m wavelengths) occur in all four holes and may reflect subtle changes in lithology. Shear strength values

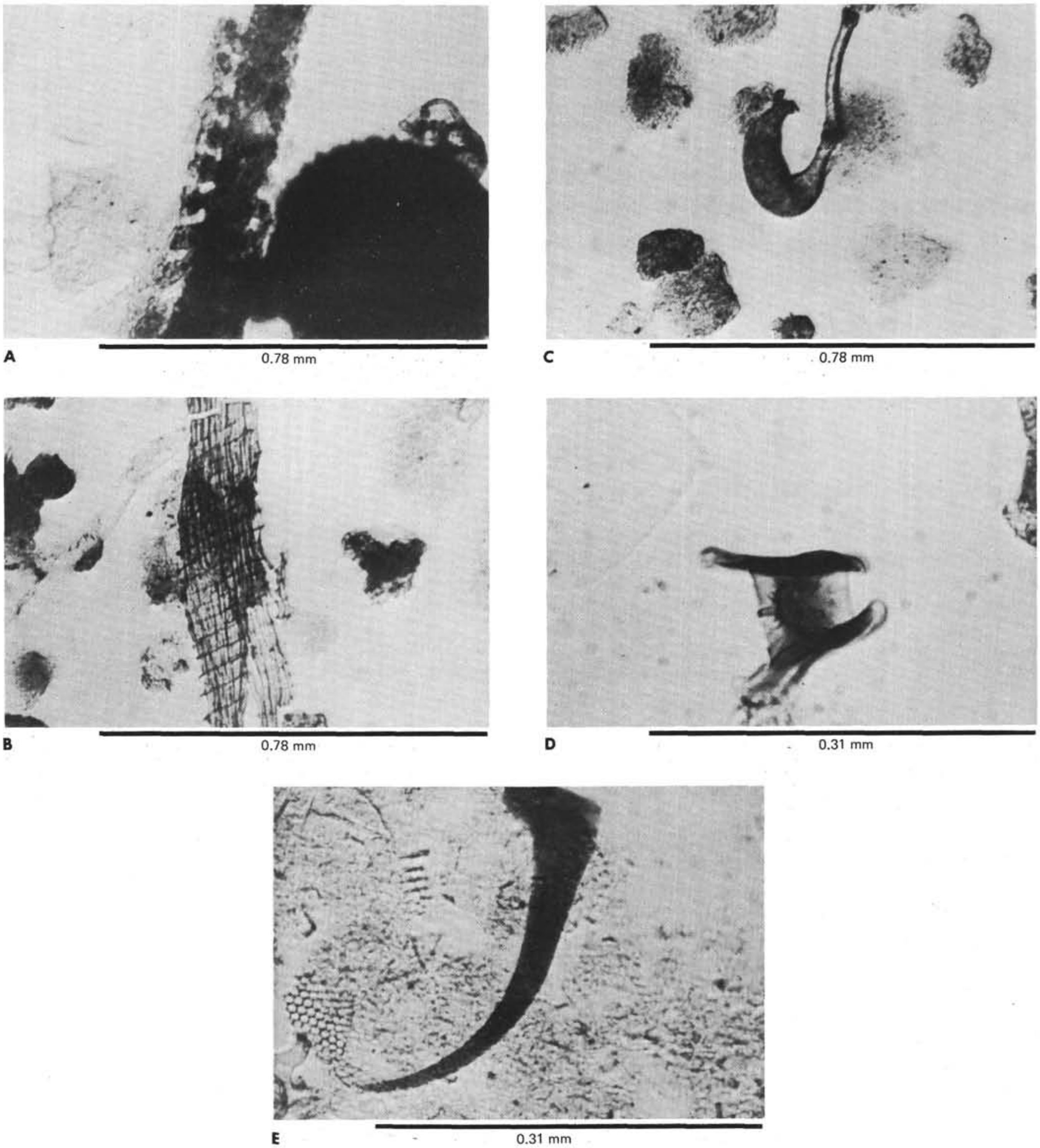


Figure 7. Photographs of biogenic parts found in sediment from Sites 502 and 503. A. Sample 502A-8-2, approx. 30 meters sub-bottom. Unidentified. B. Sample 502A-16-2, approx. 65 meters sub-bottom. C. B. Miller (personal communication) suggests a bit of wood or other vegetable fiber, whereas A. Hutchinson (personal communication) identified it as a piece of chitonous tintinid lorica (test). C. Sample 502A-17-3, approx. 71 meters sub-bottom. C. B. Miller says it is reminiscent of a crustacean spermatophore. D. Sample 502A-21-2, approx. 87 meters sub-bottom. J. K. Thompson (personal communication) identified this as a chitonous mouth part of a crustacean, whereas C. B. Miller suggests it is a larval stage of an echinoderm. E. Sample 503B-25-2, approx. 106 meters sub-bottom. C. B. Miller identified this as a hook from a squid arm.

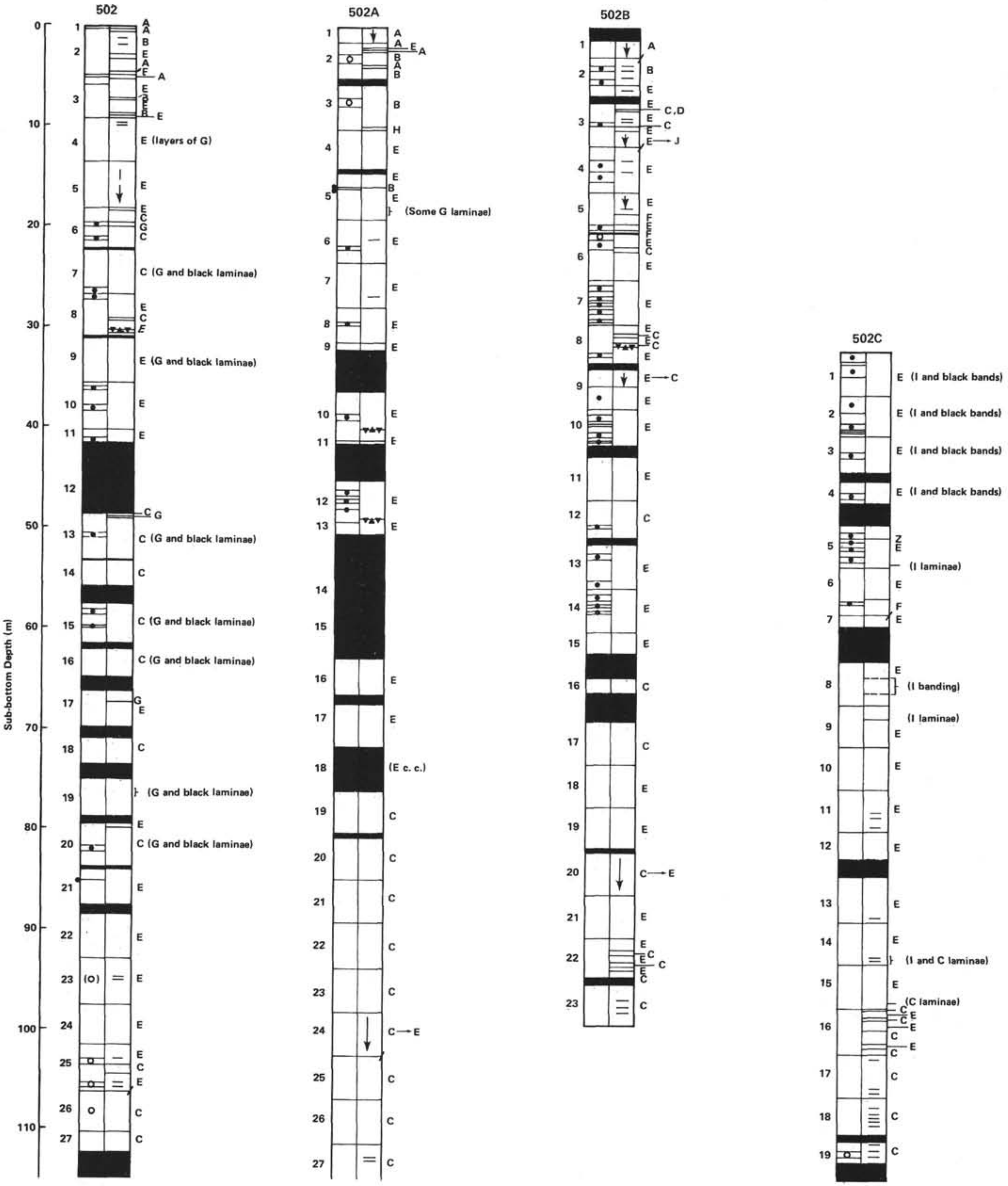


Figure 8. Log of textural and color variations versus sub-bottom depth in Holes 502, 502A, 502B, and 502C.

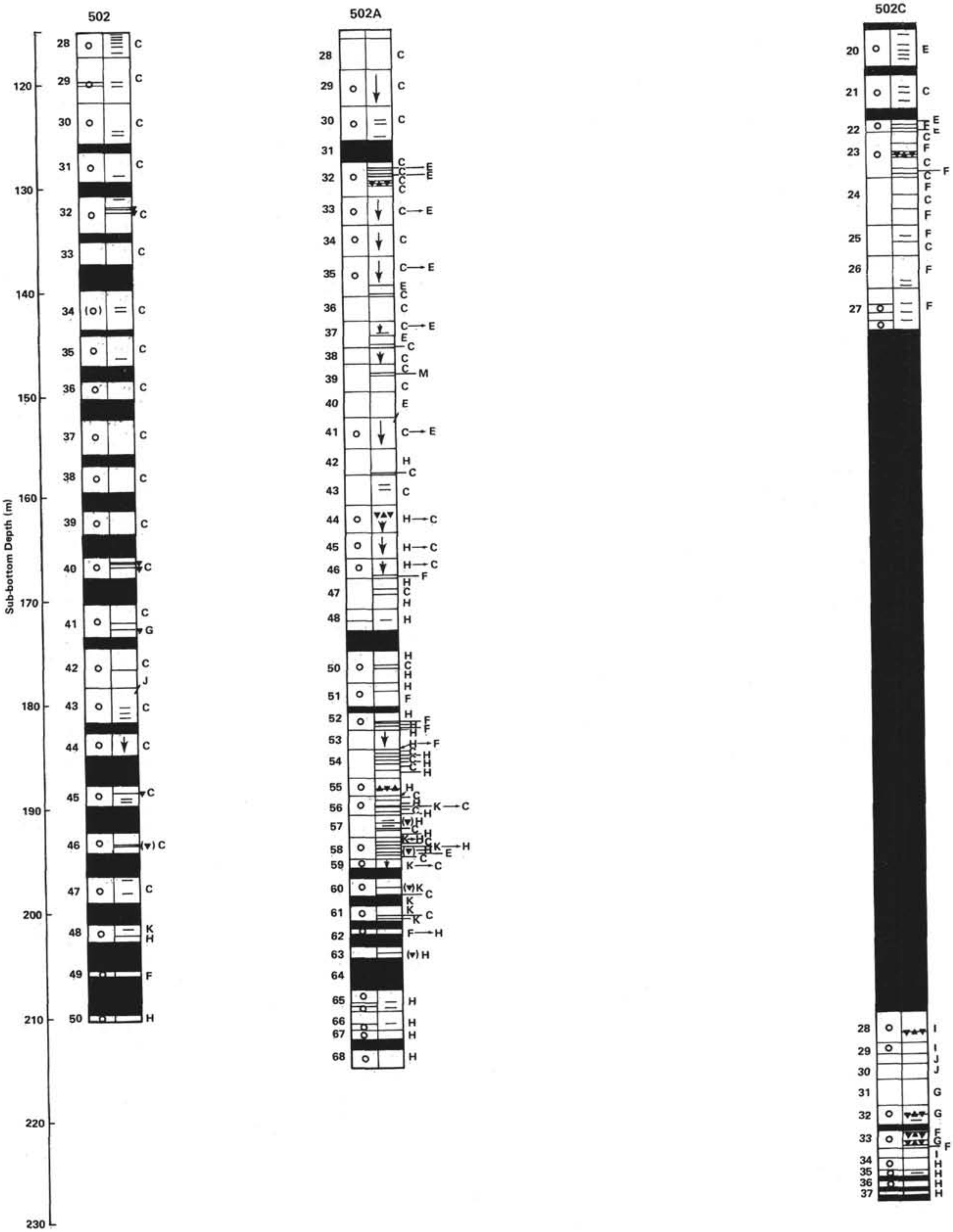
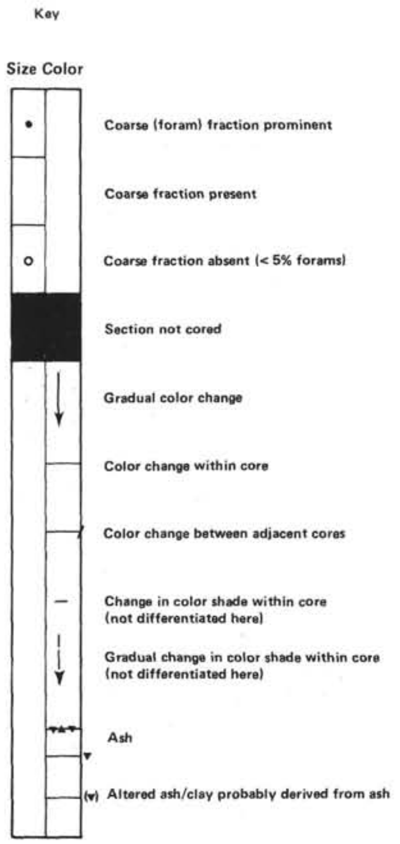


Figure 8. (Continued).



Colors	
A	Browns (10YR 4/3, 5/6, 5/4, 6/6)
B	Brown/yellows (2.5Y 5/4, 5/6, 6/2, 6/4, 6/6)
C	Grays (5Y 5/1, 6/1, 7/2, 7/1)
D	Pale yellow (5Y 7/3)
E	Olive grays and olives (5Y 3/2, 4/2, 5/3, 5/2, 6/4, 6/3, 6/2, 10Y 6/2)
F	Greenish grays (5GY 4/1, 5/2, 5/1, 6/1)
G	Greens (10GY 3/2, 5/2)
H	Greenish grays (5G 4/1, 4/2, 6/1)
I	Greens (10G 4/2, 6/2)
J	Grayish blue green (5BG 5/2)
K	Bluish gray (5B 5/1, 7/1)

Figure 8. (Continued).

for samples from deeper than 100 meters sub-bottom are two to three times greater than any values previously determined on rotary-drilled material from an equivalent depth. Lee (1973) used the method of Ladd and Lambe (1963) to calculate *in situ* shear strength for a drilled section. The values from Site 502 closely resemble Lee's calculated *in situ* values rather than his raw data, implying that the HPC has caused minimal disturbance.

The needle penetrometer is a simple device that produced surprisingly consistent results. The data reveal a gradual decrease in penetration with increasing depth (Fig. 11) that can be attributed to compaction, but some of the secondary structure is probably due to lithologic variations. The large number of measurements provide an interesting insight into the nature of HPC disturbance. The penetration values for the upper 100 meters of the sediment show an imbricate structure; the top of each core gives anomalously high penetration that suggests disturbance in the upper part of each core. This pattern occurs despite the attempt to avoid obviously disturbed intervals. High penetration values in the uppermost section of each core become infrequent below about 100 meters, where increased induration minimizes disturbance.

P-wave velocities (Fig. 12) were measured both through the liner and on chunk samples used for gravimetric analyses. Surprisingly, the two values correlate reasonably well, probably because the cores completely filled the liner. Velocities range between 1.520 and 1.665 km/s. A cyclic variation in velocity can be seen in the top 70 to 80 meters of the sediment column. These cycles continue across core boundaries and are probably real. The velocity values are fairly constant from about 80 to 130 meters sub-bottom, with a baseline value of about 1.550 km/s, but the baseline shifts at 130 meters to about 1.580 km/s. We attempted to determine velocities on several ash layers but found it difficult to transmit sound through them. Successful measurements on an ash from about 173 meters sub-bottom reveals a maximum velocity of 1.81 km/s.

We collected density data on both continuous GRAPE and chunk samples (see Introduction). Saturated bulk density values vary from a minimum of about 1.44 g/cm^3 at 4 meters to a maximum of 1.75 g/cm^3 at 198.3 meters sub-bottom (Fig. 13). Density increases with depth, but with numerous high-frequency fluctuations. Water content (Fig. 14) and porosity show the same trends, but with a sign opposite from that of saturated bulk density. A decrease in water content (increase in density and decrease in porosity) occurs at about 85 meters, coincident with an increase in shear strength. Unexpectedly high (about 50%) water contents and low saturated bulk densities (about 1.50 g/cm^3) were measured on several of the ashes.

An interesting change in density, water content, and porosity occurs below 200 meters sub-bottom. Density significantly decreases below this level, but water content and porosity increase. Despite 200 meters of overburden, the material below this level has the lowest saturated bulk density of any material from the site (Mayer,

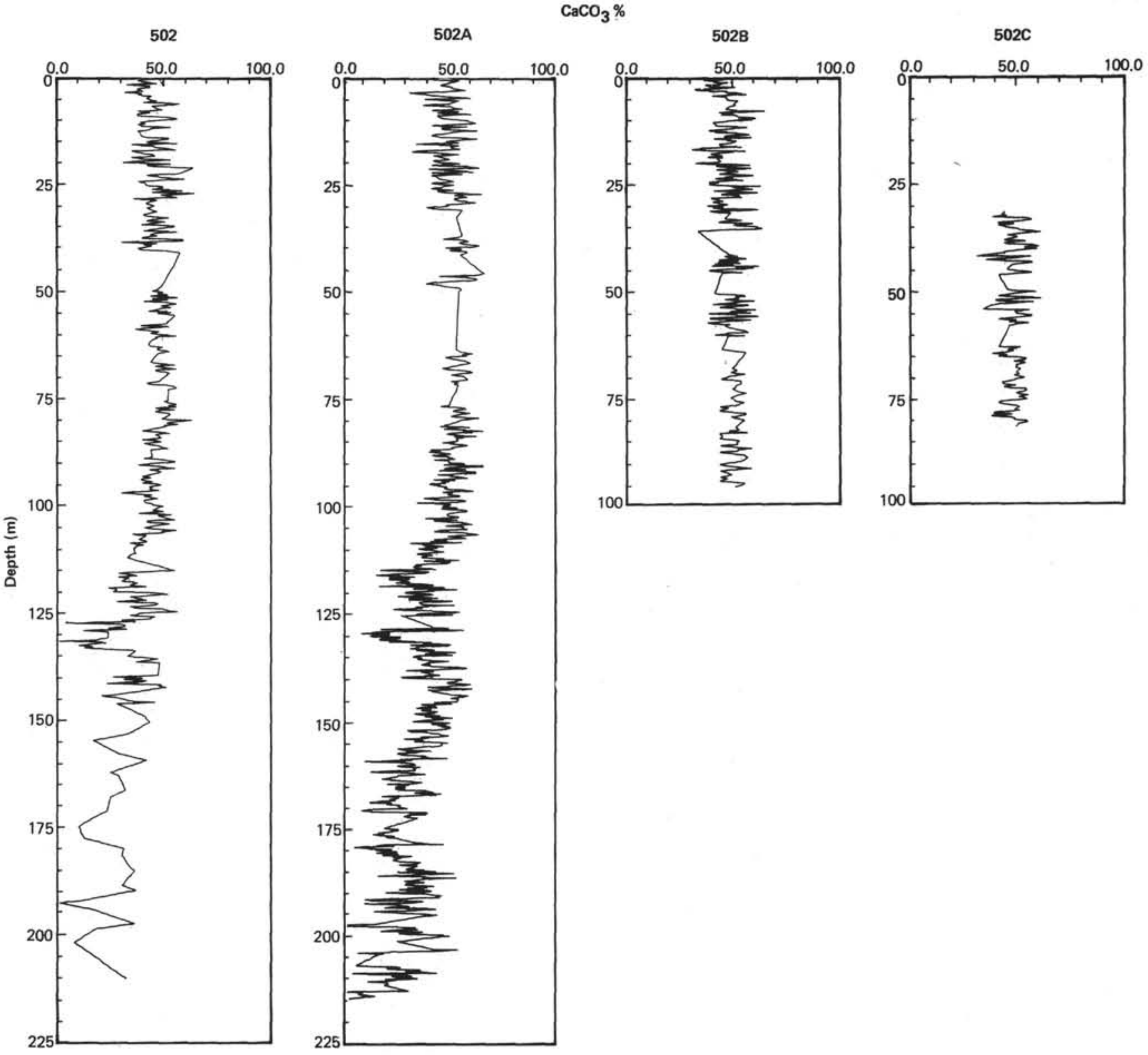


Figure 9. Calcium carbonate content versus sub-bottom depth for Holes 502, 502A, 502B, and 502C. (From Gardner, this volume.)

this volume). This change appears to be related to changes in the crystallinity of clay minerals, nannofossil preservation, and occurrence of siliceous microfossils.

CORRELATION OF THE SEISMIC PROFILE AND CORED SECTION

We approached Site 502 with a 40- and a 5-in.^{3} airgun array firing at 10-s intervals. A slave recorder was delayed 5 s and filtered at 80/640 Hz. Figure 4 is an enlargement of the slave record of Site 502. Sediment thicknesses were calculated using a velocity of 1550 m/s (see Physical Properties section).

Three acoustic units were recognized in the upper 250 meters: (1) an upper acoustically stratified layer, 0 to 85 meters sub-bottom; (2) an acoustically transparent section, 85 to 200 meters sub-bottom; and (3) a faintly stratified layer, below 200 meters sub-bottom. Figure 15 shows a correlation between the seismic section converted to depth and the recovered section. Measured *P*-wave velocities on bulk samples and cores show larger variations of velocity in the 0 to 85 meter interval than below. The range varies from a minimum of 1.520 to a maximum of 1.665 km/s. The velocity of the section below 85 meters averages 1.550 km/s, with less variation about the mean. This might explain why the acoustic section above 85 meters is acoustically stratified and the section below this level is acoustically transparent.

We found a rough agreement between the acoustic units and the lithologic units, but a better correlation exists with the profile of shear strength. Shear strength increases linearly from 30 to about 400 g/cm^2 between 0 and 120 meter sub-bottom but shows an increase to greater than 1000 g/cm^2 at about 85 meters. Water content decreases linearly in the top 100 meters from 50 to

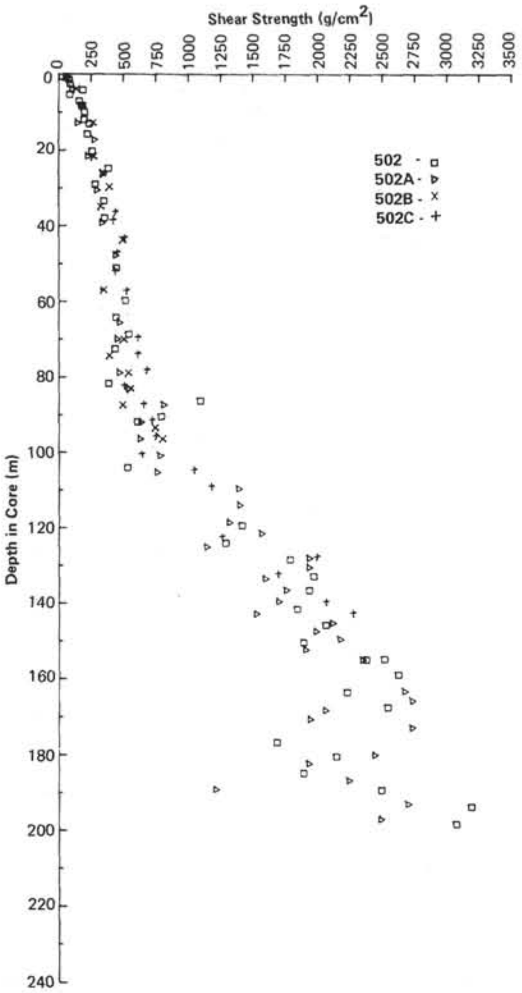


Figure 10. Shear strength (g/cm²), versus sub-bottom depth for Site 502.

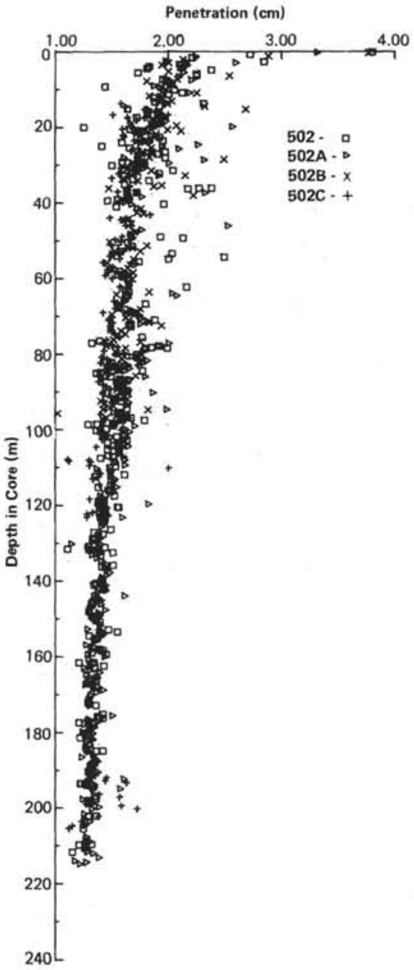


Figure 11. Penetrometer penetration (cm) versus sub-bottom depth for Site 502.

45%, but at 85 meters the baseline shifts to about 40%. The bulk density baseline also shifts from 1.5 g/cm³ above 85 meters to 1.6 g/cm³ below 85 meters. This level is coincident with the contact between Acoustic Units 1 and 2, and this correlation is similar to that found by Mayer (1979).

BIOSTRATIGRAPHY

Foraminifers, calcareous nannofossils, radiolarians, and diatoms were found at Site 502. Foraminifers and nannofossils are present throughout, but siliceous microfossils are found only at the top and near the base of the section. Good preservation and high abundances of calcareous microfossils characterize the Quaternary and upper Pliocene section. A decrease in preservation and abundances occurs below approximately 110 meters sub-bottom. This decrease is coupled with the presence of a cold-water(?) planktonic foraminiferal species (sinistral *Neogloboquadrina pachyderma*) associated with an otherwise tropical-subtropical fauna and the absence of uniquely tropical nannofossils. Preservation of calcareous microfossils is poor to moderate in upper Miocene sediment, and abundance decreases near the base of the section, where siliceous microfossils occur. A detailed discussion of the stratigraphic relationships among foraminifers, calcareous nannofossils, radiolarians, and diatoms is found in Kent and Keigwin (this volume).*

We identified most major epoch boundaries by foraminiferal horizons. However, we use the last appearance of *Discoaster brouweri* to define the Pliocene–Pleistocene boundary. Biostratigraphic resolution is poor in the mid-Pliocene for both nannofossils and foraminifers. The informal boundary between lower and upper Pliocene was chosen as the last appearance of *Sphaeroidinellopsis* sp. at approximately 81 meters.

The Miocene/Pliocene boundary was identified at about 146 meters sub-bottom on the basis of the first appearance of *Globorotalia tumida*. This boundary is not precisely determined by calcareous nannofossil zones, but the lowest occurrence of *Ceratolithus acutus* at 141 meters correlates well with the foraminiferal boundary. The upper Miocene sequence has poor stratigraphic resolution. Calcareous microfossils are rare and poorly preserved, so that only one foraminiferal zone and three calcareous nannofossil zones can be identified in this interval. The base of the section is early–late Miocene in age. Radiolarians characteristic of the *Didymocyrtis antepenultima* Zone are found below 211 meters. Diatom biohorizons suggest that this interval may be correlative

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* This chapter does not appear in this volume.

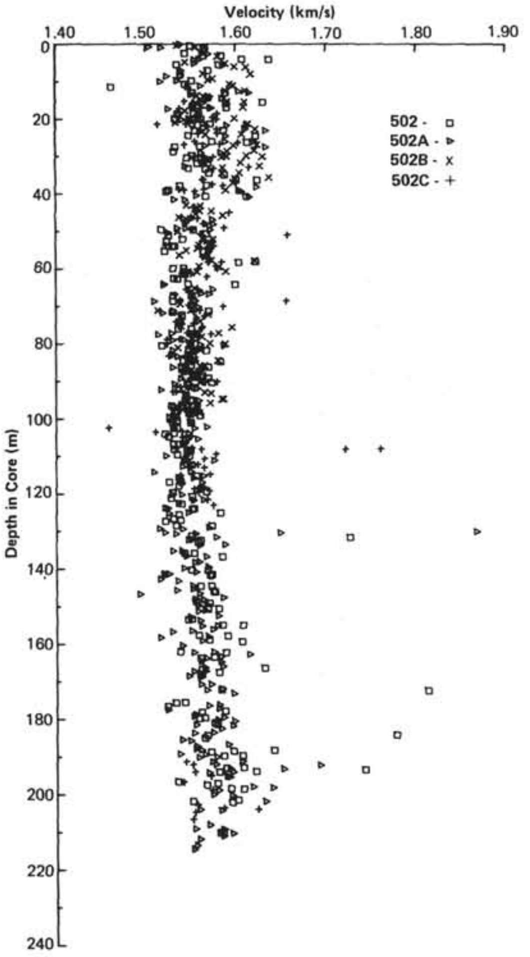

Figure 12. Sonic velocity (km/s) versus sub-bottom depth for Site 502.

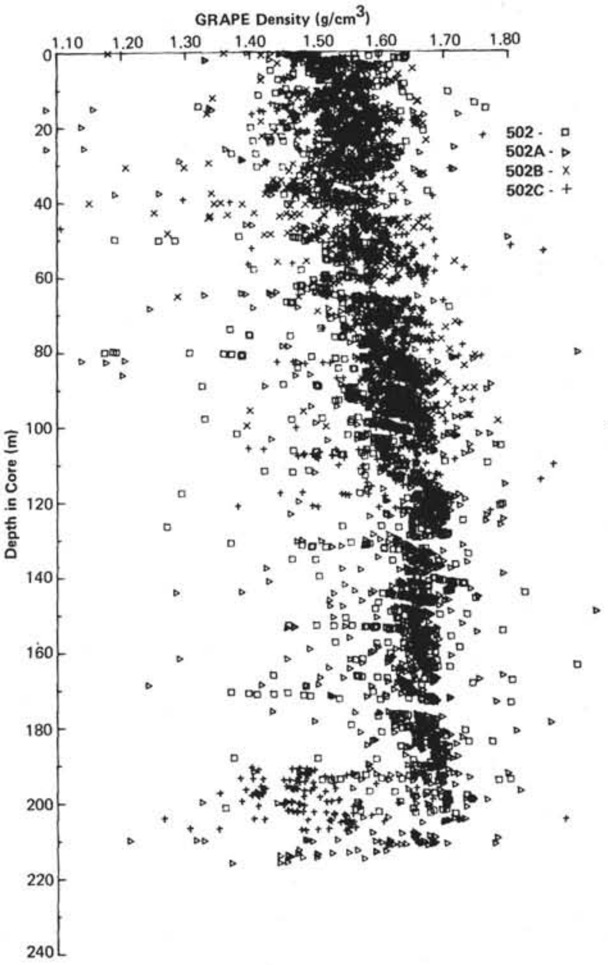

Figure 13. Saturated bulk density (g/cm^3) versus sub-bottom depth for Site 502.

with paleomagnetic Chrons 7 and 8, ranging from 7.5 to 8.5 Ma.

Figure 16 includes the major biostratigraphic zonations identified at Site 502. The details of each biotic group are given in the following.

Calcareous Nannofossils

Calcareous nannofossils occur throughout the sediments of Site 502. Preservation of calcareous nannofossils is generally good, but the abundance and preservation slightly decrease below 115 meters sub-bottom (mid-Pliocene). However, nannofossils continue to be common to abundant with good to moderate preservation down to approximately 214 meters, where another drop in abundance, but not preservation, occurs. The nannofloral assemblage from Quaternary to the mid-Pliocene is characterized by an abundance of warm water taxa, such as *Scyphosphaera* and discolithinids, as well as abundant and diverse discoasters in the upper Pliocene. These diagnostic taxa are absent or less abundant below the mid-Pliocene. A complete sequence of all Quaternary, Pliocene, and upper Miocene nannofossil zones was recovered and is described in part by Rio (this volume). Here, we summarize the shipboard nannofloral biostratigraphy, with emphasis on the zonal and epoch boundaries (Figs. 16 and 19).

Nannofloral assemblages are diverse and well preserved throughout the Quaternary sequence, and all zones except the *Emiliania huxleyi* Acme Zone (Holocene) of Gartner (1977) are present at this site. *Pseudoumbilica lacunosa* is relatively rare in the upper part of its range but becomes dominant in the early Pleistocene assemblages. The short range of the small *Gephyrocapsa* is distinctive in this interval, in which larger forms of this genus are quite sparse. The highest occurrence of *Cyclococcolithus macintyrei* was consistently found above the last occurrence of *discoasters*.

The Pliocene/Pleistocene boundary can be defined at this site by the last occurrence of *Discoaster brouweri*, which occurs in Sections 502A-12-2, 71 cm; 502B-11-1, 101 cm; and 502C-2-2, 31 cm, between 48 and 38 meters, respectively (Burnett and Prell, this volume*). Rio (this volume) uses the appearance of *Gephyrocapsa oceanica* to define the Pliocene/Pleistocene boundary. The completeness of the recovered sections allows the differentiation of all short upper Pliocene nannofossil zones that are based on discoaster succession. Biostratigraphic resolution in the mid- and lower Pliocene is somewhat poorer than in the upper Pliocene. The last occurrence

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* This chapter does not appear in this volume.

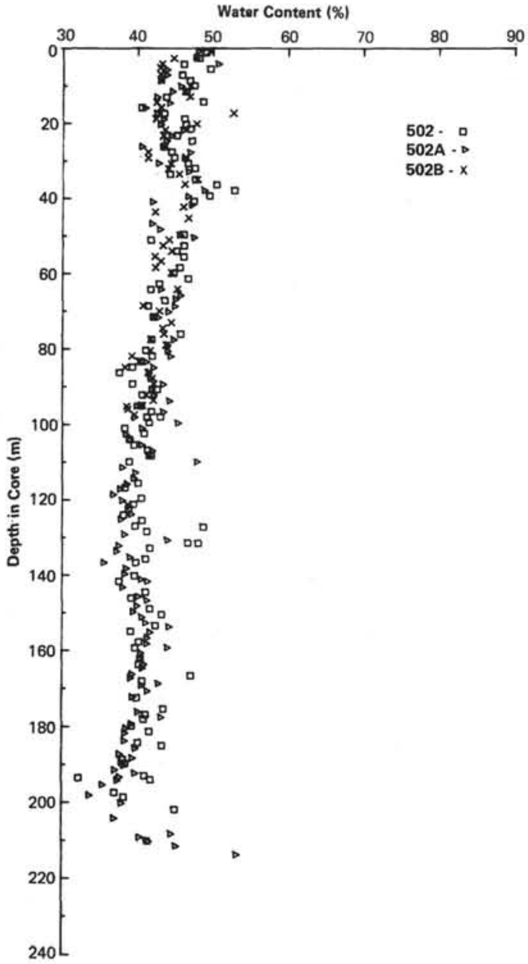

Figure 14. Water content versus sub-bottom depth for Site 502.

of *D. tamalis* (between Sections 502-17,CC and 502-18,CC, 502A-16,CC and 502A-17,CC, 502B-16,CC and 502B-17,CC, and 502C-8,CC and 502C-9,CC) provides a reliable datum to differentiate upper from lower Pliocene. However, *D. tamalis* is fairly sparse in this section, particularly near the top and bottom of its range.

The lower Pliocene is subdivided using primarily ceratoliths, which are generally rare in this section. The last occurrence of *Amaurolithus tricorniculatus* is somewhat difficult to determine because of its sparsity. *Ceratolithus rugosus* is rare at the base of its range, so we used the highest occurrence of *C. acutus* (Samples 502-31-1, 75 cm to 502-31-2, 75 cm; 502A-31,CC to 502A-32,CC; and 502C-21,CC to 502C-22,CC) at nearly the same level or slightly lower in this section to define the base of the *C. rugosus* Zone. *A. primus* provides a reliable datum, with its uppermost occurrence just above the Miocene/Pliocene boundary. The base of *C. acutus* was consistently above the Miocene/Pliocene boundary (as defined by foraminiferal evidence) at approximately 140 meters depth. This boundary occurs within the lowermost Pliocene nannofossil zone in most standard calcareous nannofossil zonations. We used the base of *C. acutus* (Samples 502-34-1, 75 cm to 502-34-2, 75 cm; 502A-35,CC to 502A-36,CC; and 502C-25,CC to 502C-26,CC) to approximate the Miocene/Pliocene boundary.

Two subzones of the *D. quinqueramus* Zone of the uppermost Miocene are recognized at this site. The *A. primus* subzone extends through most of the *D. quinqueramus* Zone, with the *D. berggreni* Subzone in the lowermost part (Fig. 15). *D. quinqueramus, D. berggreni, D. surculus, D. pentaradiatus*, and *Reticulofenestra pseudoumbilica* are common throughout the *A. primus* Subzone, whereas A. primus is relatively sparse. The first occurrence of *R. pseudoumbilica* occurs near the base of this subzone. The base of the *D. quinqueramus* Zone was encountered at about 214 meters sub-bottom. The nannofloral assemblage occurring at the base of the section is characteristic of the lowermost upper Miocene and includes *D. bellus, D. variabilis*, and *D. neohamatus*.

Planktonic Foraminifers

Planktonic foraminifers occur throughout Site 502 but are most abundant in the Quaternary and upper Pliocene. The lower part of upper Miocene sediments is characterized by intervals of carbonate dissolution and consequently rare foraminifers. A complete discussion of the biostratigraphy, including the sample location of foraminiferal datums and zonal boundaries and biogeography of the Neogene planktonic foraminifers, is given in Keigwin (this volume). Here, we summarize their biostratigraphy, with emphasis on the epoch and zonal boundaries.

We generally follow the biostratigraphic framework developed by Jenkins and Orr (1972) because it is applicable to both the Atlantic and Pacific faunas. The planktonic foraminiferal zonation is summarized in Figures 16 and 19. The Pliocene/Pleistocene boundary as defined by the first appearance of *Globorotalia truncatulinoides* occurs in Samples 502A-12-3, 59 cm, 502B-11-2, 111 cm, and 502C-2-3, 41 cm (Burnett and Prell, this volume) near the last appearance of *Discoaster brouweri* at about 45 meters sub-bottom. The lower/upper Pliocene boundary is informally defined by the last appearance of *Sphaeroidinellopsis* sp., which occurs in Samples 502-20-1, 100 cm, 502A-20-2, 50 cm, 502B-19-2, 75 cm, and 502C-10-3, 70 cm. The Miocene-Pliocene boundary is defined by the first appearance of *G. tumida* in Sample 502-35,CC, 502A-37,CC, and 502C-26,CC. The upper Miocene has proven impossible to zone. Either important marker species are absent (such as the first appearance of *Pulleniatina* sp.) or they are difficult to identify with certitude (such as the first appearance of *G. plesiotumida*).

An interesting faunal change appears in the mid Pliocene. Sediment from DSDP Hole 154A in the Colombia Basin contains abundant sinistral *Neogloboquadrina pachyderma* within a predominantly tropical assemblage in an interval dated at about 3.6–3.7 Ma (Keigwin, 1978). This association is surprising because sinistral *N. pachyderma* is thought to the "coldest" phenotype of the "coldest" foraminifer species in Holocene distributions. This interval marks the bottom of the hemipelagic section of Hole 154A. Sediment at Site 502 is hemipelagic throughout, and this same assemblage is present in Cores 502-28 to 502-48. Thus the interval of sinistral *N.*

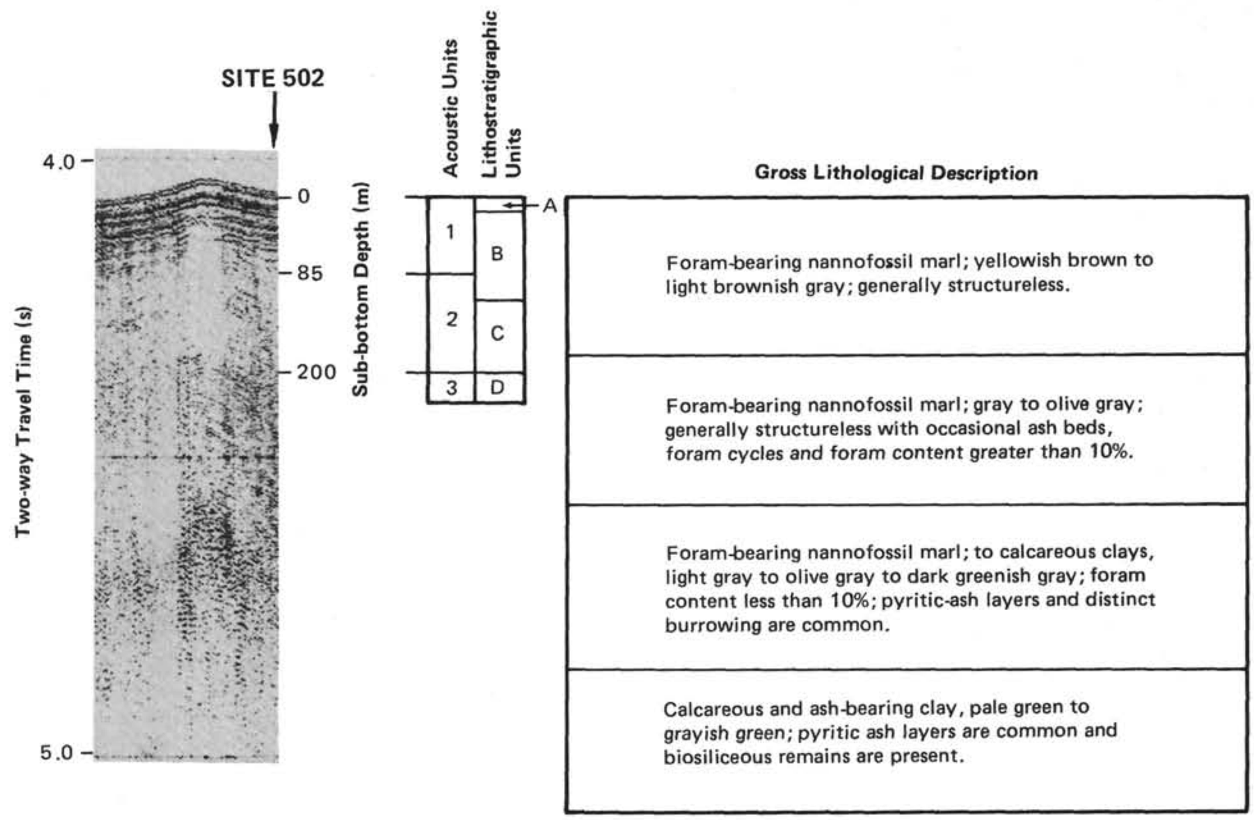

Figure 15. Correlation between the acoustic units recognized on the airgun seismic profile (filtered at 80/640 Hz) and the lithostratigraphic units at Site 502.

pachyderma occurrence is not short as assumed at Hole 154A but represents a fauna that spans about 1.5 m.y.

Diatoms

Diatoms are absent throughout most of the section. Scattered fragments occur only in the lowermost cores from Hole 502C. Diatoms are common and fairly well preserved in one sample, 502C-30-1, 18 cm. In addition to various long-ranging species, *Nitzschia porteri* and *Thalassiosira burkliana* are present. If the age ranges for these species are the same as in the Pacific, then the age of this sample is mid-late Miocene (7.5–8.5 m.y.)—within the *N. porteri* Zone of Burckle (1972) (Fig. 16).

Radiolarians

Radiolarians and indeed siliceous microfossils in general are not present in Tertiary sediments younger than about middle Miocene in the Gulf of Mexico and Caribbean (Riedel and Sanfilippo, 1973; Sanfilippo and Riedel, 1973, 1976). Cores from Site 502 were examined for radiolarians to establish whether this absence is continuous from mid-Miocene onward and to attempt to shed light on the reason for their absence. A channel sample of about 5 to 10 cc total volume was taken throughout the length of each core section from Hole 502A, disaggregated, sieved through a 63-μm mesh, and the coarse fraction acidified to remove the calcareous microfossils.

Siliceous radiolarian skeletons were found only in Cores 502A-1 and 502B-1 (increasingly corroded downward), of Quaternary age, and in 502A-67 and 502A-68 (less corroded downward), of early late Miocene age (*Didymocyrtis antepenultima* Zone) (see Figs. 16 and 19). Many samples between these two radiolarian intervals (notably from Cores 502A-50 and 51 and above) contain very rare, fragmentary radiolarians and sponge spicules replaced by an opaque mineral.

A few moderately well-preserved radiolarians occur in Cores 502-28 and 29. The abundance and state of preservation of radiolarians below 215 meters sub-bottom decline to a minimum in Core 502C-35. Preservation improves within a pyritized mass in Core 502-36, but radiolarians remain very rare as a result of dilution with volcanogenic components. The assemblage in Core 502C-36 represents the *D. antepenultima* Zone, but it is possible that the lump was displaced from higher in the hole and that the sediment at this depth is somewhat older. The worsening preservation in Samples 502C-30,CC to 502C-35,CC indicates that the transition from radiolarian-rich sediment of the middle Tertiary to radiolarian-absent sediment in the upper Tertiary section is irregular.

The well-preserved radiolarians at the top and bottom of the section represent diverse assemblages characteristic of tropical, open ocean conditions, and, as far as can be determined, the opaque fragments are the remnants of a normal oceanic assemblage (with orospaerids, *Lamprocyclas*, etc.). The evidence suggests that the absence of siliceous microfossils in sediments of this region is continuous from the early late Miocene to the Quaternary and that dissolution within the sediment,

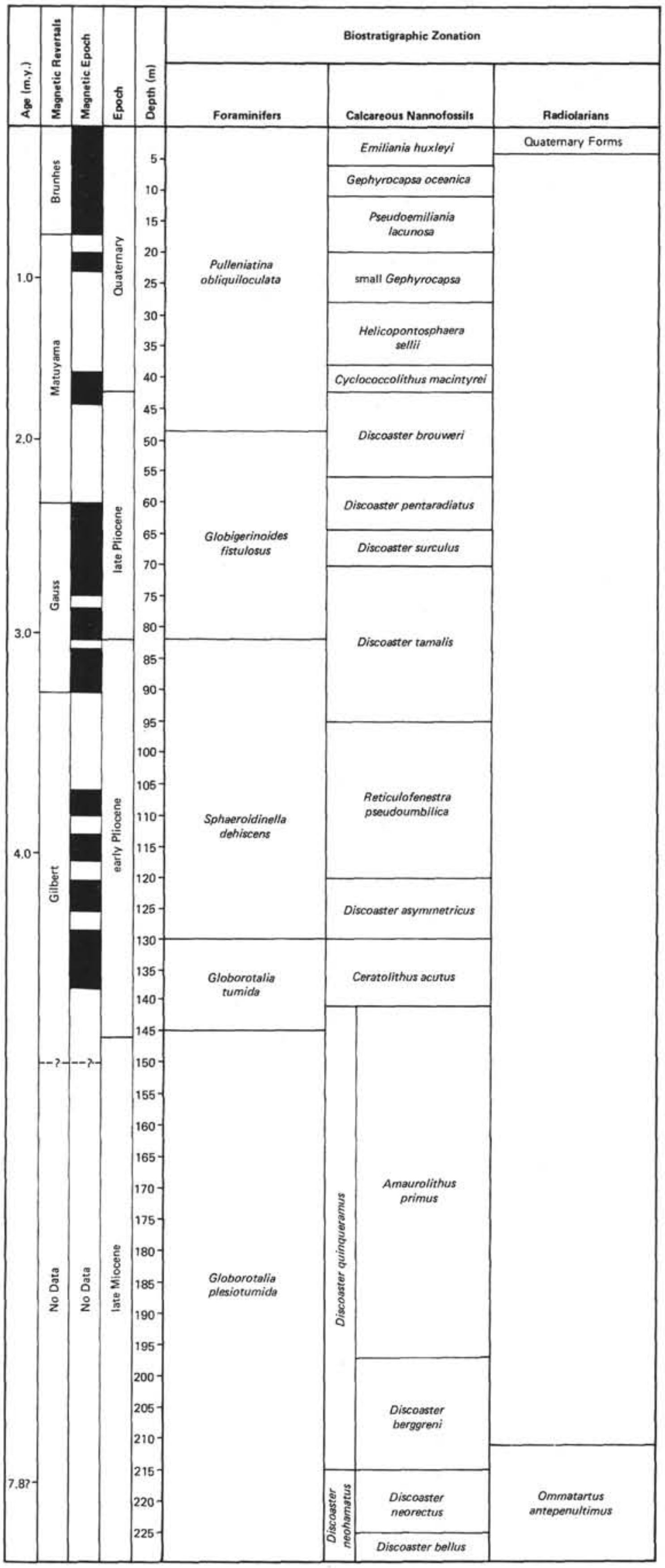

Figure 16. Summary of the biostratigraphic zonations of Site 502.

rather than absence from the waters above, was responsible.

PALEOMAGNETISM

The undisturbed nature of the HPC sediment allowed us to perform detailed paleomagnetic measurements on the section. Paleomagnetic measurements, using a long-core spinner magnetometer, were made at 15-cm intervals in Hole 502 and at 10-cm intervals in Holes 502A, 502B, and 502C. The long-core spinner magnetometer gives the direction of the declination component of natural remanent magnetization (NRM) of the sediment with respect to an orientation mark on the core liner. Unfortunately, the sense of the orientation mark was not always maintained from core to core, so the polarity of sediment magnetization (normal or reversed) was sometimes ambiguous. Additional information was obtained from measurement of individual sample cubes taken after the cores were split. Polarity could be established in most cases from the sign of the vertical component of the NRM. This information was used to interpret the polarity of intervals that have a similar declination within the rest of each core. An additional declination adjustment was applied to each core to align the determined polarities from core to core.

A magnetic polarity log was developed for each hole (Fig. 17; Table 4). No-recovery intervals and various degrees of core disturbance required the construction of a composite section by overlapping the best records from each hole. We can identify the following composite magnetozones: Brunhes, 0 to 17 meters; Matuyama, 17 to 60 meters; Gauss, 60 to 89 meters; Gilbert, 89 to at least 142 meters (Fig. 17; Table 4). The paleomagnetic polarity record below about 140 meters is complicated by a marked shallowing of the inclinations, combined with an increase in unstable magnetization.

We also identify all the recognized magnetosubchrons within the Matuyama (Jaramillo and Olduvai), Gauss (Kaena and Mammoth), and Gilbert (Cochiti, Nunivak, C_1, and C_2) Chrons. Additional short-term paleomagnetic features not universally recognized are tentatively identified within the Matuyama Chron. One of these may correlate to the Cobb Mt. Subchron and another to the Reunion Subchron. Correlation to the magnetic reversal time scale shows we recovered a virtually complete stratigraphic sequence for at least the past 4.5 m.y. A detailed discussion of the magnetostratigraphy for Site 502 is presented by Kent and Spariosu (this volume).

ACCUMULATION RATES

We used 12 horizons to generate sedimentation rate and accumulation rate curves for Site 502. These horizons represent the nine best magnetostratigraphic boundaries, the base of the *Amaurolithus primus* and *Discoaster neorectus* zones, and an assumed zero age for the sediment/water interface. The age and thickness of the 11 time intervals are given in Table 5. The thickness of each interval was computed in holes that contain both age boundaries so that differences in sub-bottom depth between holes are eliminated. Exceptions to this practice are Interval 9, from the top of Gilbert C_1 to the bottom of Gilbert C_2 Subchrons, and Interval 11, bounded by the biostratigraphic datums not recovered in one hole.

A sedimentation rate for each time interval was calculated from the age versus depth. Because sedimentation rate is a function of both sediment influx at the time of deposition and postdepositional compaction, bulk accumulation rates were calculated in order to remove some of the compaction effect. The calculated accumulation rate provides a better approximation of sediment influx rate, particularly in older compacted sediment (van Andel et al., 1975). Sedimentation rates at

Table 4. Location in each hole and the sub-bottom depths of the paleomagnetic boundaries found at Site 502.

	Hole 502		Hole 502A		Hole 502B		Hole 502C	
Paleomagnetic Chrons and Subchrons	Sample (interval in cm)	Sub-bottom Depth (m)	Sample (interval in cm)	Sub-bottom Depth (m)	Sample (interval in cm)	Sub-bottom Depth (m)	Sample (interval in cm)	Sub-bottom Depth (m)
Brunhes/Matuyama	—	—	5-2, 60–70	17.20 ± 0.05	5-1, 140–150	16.25 ± 0.05	—	—
top of Jaramillo	6-1, 110–145	19.27 ± 0.17	6-1, 80–90	20.90 ± 0.05	5-3, 110[a]	18.62	—	—
bottom of Jaramillo	6-3, 55–75	21.66 ± 0.10	6-3, 15–25	22.28 ± 0.05	6-2, 45–70	21.44 ± 0.13	—	—
top of Olduvai	10-2, 120–135	38.07 ± 0.07	10-2, 105–115	39.70 ± 0.05	—	—	—	—
bottom of Olduvai	—	—	12-1, 90–100	46.75 ± 0.05	11-1, 90–110	42.30 ± 0.07	—	—
Matuyama/Gauss	15-2, 115–130	60.21 ± 0.05	—	—	—	—	6-2, 125–140	55.47 ± 0.07
top of Kaena	—	—	19-1, 140–145	77.87 ± 0.02	18-1, 140 18-2, 15	73.36 ± 0.13	9-1, 100–130	68.30 ± 0.10
bottom of Kaena	—	—	19-3, 20–50	79.80 ± 0.15	18-3, 40–50	75.59 ± 0.05	9-2, 145 9-3, 20	70.28 ± 0.13
top of Mammoth	20-1, 90–105	80.54 ± 0.07	20-2, 90–100	83.42 ± 0.05	19-2, 110–120	79.20 ± 0.05	10-2, 60–100	73.72 ± 0.05
bottom of Mammoth	20-2, 145 20-3, 17	82.62 ± 0.11	—	—	—	—	—	—
Gauss/Gilbert	22-1, 90–105	89.37 ± 0.07	22-2, 30–70	91.91 ± 0.20	—	—	—	—
top of Cochiti	25-3, 75–80	105.30 ± 0.02	—	—	—	—	16-2, 115 16-3, 20	101.07 ± 0.13
bottom of Cochiti	26-3, 15–30	109.0 ± 0.07	—	—	—	—	17-2, 120–135	104.87 ± 0.07
top of Nunivak	—	—	28-1, 70–90	116.94 ± 0.10	—	—	18-2, 125–130	109.51 ± 0.03
bottom of Nunivak	—	—	29-1, 100–120	120.40 ± 0.10	—	—	19-1, 130–145	112.52 ± 0.07
top of C_1	—	—	—	—	—	—	20-2, 70–90	117.90 ± 0.10
bottom of C_1	30-3, 15–30	124.91 ± 0.07	—	—	—	—	21-1, 100 21-2, 20	121.35 ± 0.35
top of C_2	31-2, 45–60	128.12 ± 0.07	—	—	—	—	—	—
bottom of C_2	—	—	34-1, 90–100	135.25 ± 0.05	—	—	—	—

[a] The paleomagnetic record was not definitive in this hole, so correlation with oxygen isotope stratigraphy (Prell, this volume) was also used to confirm the location of this datum.

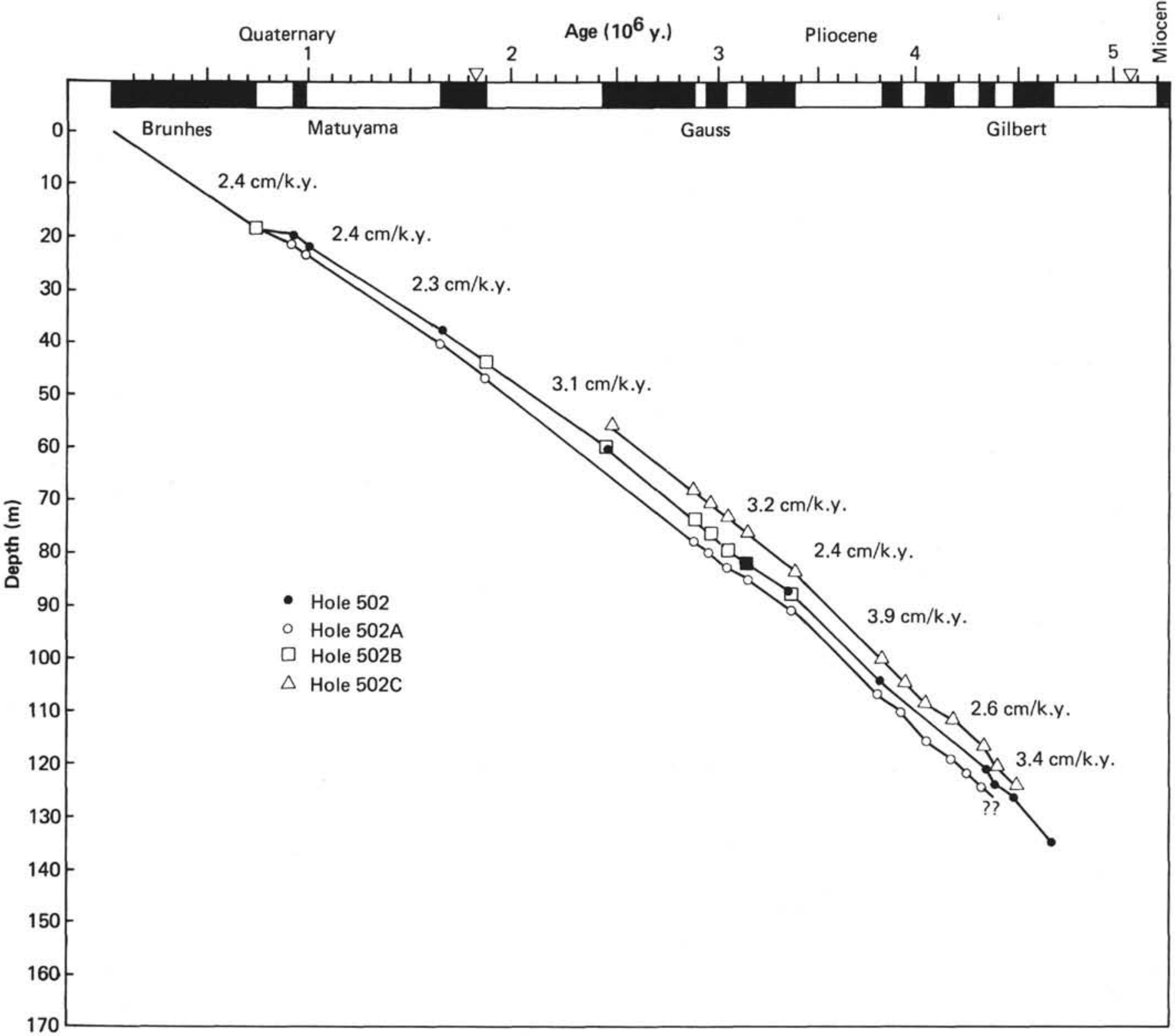

Figure 17. Age versus depth in hole for magnetostratigraphic boundaries in Site 502. Average sedimentation rates between selected magnetostratigraphic boundaries are also given.

Site 502 range from 1.8 to 4.8 cm/k.y. with an average of 3.0 cm/k.y. Highest sedimentation rates occur in the Pliocene to late Miocene, and lowest rates occur during the Pleistocene.

Wet-bulk density (GRAPE) and water content data were used to calculate bulk accumulation rates for each time interval used in the sedimentation rate curve (Table 5). Bulk accumulation rates (Fig. 18) show the same trend as sedimentation rate, with highest values for the intervals older than 1.8 m.y. The apparent increase in the mid-Pliocene may be an artifact of the time scale. A major change in the time scale, however, would be required to change substantially the pattern of decreased rates throughout the section. The decrease in rates may be due to several factors, including sediment influx from terrigenous sources, biogenic productivity, and carbonate preservation. Carbonate and noncarbonate accumulation rates were calculated in order to separate some of these components.

Carbonate accumulation rates were calculated from bulk density and average carbonate content (Table 5). The trend in carbonate accumulation rates is quite different from bulk rates and varies by a factor of two in the section (Fig. 18). The Pliocene is characterized by higher carbonate accumulation rates than in the late Miocene and Pleistocene. The high rates persist over a period from approximately 2 to 5 Ma. The noncarbonate accumulation rate decreases from late Miocene to Holocene. The decrease in noncarbonate material must be due to a reduction in terrigenous sediment influx.

Table 5. Measured and calculated parameters used to determine sedimentation and accumulation rates.

Time Interval	Age (m.y.)	Depth[a] (m)	Mean Thickness[b] (m)	Sed. Rate (cm/k.y.)	Mean δ$_w$[c] g/cm^3	W.C. (%)	Mean δ$_d$[d] (g/cm^3)	Bulk Accum. Rate[e] (g/cm^2/k.y.)	Mean CaCO$_3$ (%)	Accum. Rate[f] CaCO$_3$ (g/cm^2/k.y.)	Accum. Rate[f] Non-CaCO$_3$ (g/cm^2/k.y.)
		0–?									
0-Brunhes/Matuyama	0–0.73	0–17.2	16.7	2.3	1.6	46.5	1.1	2.5	47.1	1.2	1.3
		0–16.2			1.65	—			—		
		0–?									
		?–19.3									
Brunhes/Matuyama–	0.73–0.91	17.2–20.9	3.2	1.8	1.6	44.8	1.1	1.9	43.0	0.8	1.1
top of Jaramillo		16.2–21.4			1.65	—			—		
		?			—	—			—		
		19.3–38.1			1.6	48.4			47.7		
Top of Jaramillo–	0.91–1.76	20.9–39.7	18.8	2.2	1.6	47.0	1.1	2.4	49.6	1.2	1.2
top of Olduvai		21.4–?			—	—			—		
		?			—	—			—		
		38.1–60.2			1.6	47.5			47.6		
Top of Olduvai–	1.76–2.48	39.7–?	22.1	3.1	—	—	1.1	3.4	—	1.6	1.8
Matuyama/Gauss		?			—	—			—		
		?–55.5			—	—			—		
		60.2–80.5			1.65	44.8			49.9		
Matuyama/Gauss–	2.48–3.07	?–83.4	19.3	3.3	—	—	1.15	3.8	—	1.9	1.9
top of Mammoth		?–79.2			—	—			—		
		55.5–73.7			1.65				—		
		80.6–89.4			1.7	41.5			47.2		
Top of Mammoth–	3.07–3.40	83.4–91.9	8.6	2.6	1.7	43.6	1.2	3.1	50.5	1.5	1.6
Gauss/Gilbert		79.2–?			—	—			—		
		73.7–?			—	—			—		
		89.4–105.3			1.7	42.2			45.1		
Gauss/Gilbert–	3.40–3.83	91.9–?	15.9	3.7	1.75	43.0	1.2	4.4	49.2	2.1	2.3
top of Cochiti		?			—	—			—		
		?–101.1			—	—			—		
		105.3–?			1.7	41.5			38.0		
Top of Cochiti–	3.83–4.35	?	16.8	3.2	—	—	1.2	3.8	—	1.4	2.4
top of Gilbert C$_1$		?			—	—			—		
		101.1–117.9			1.75	—			—		
		?			1.75	43.7			31.3		
Top of Gilbert C$_1$–	4.35–4.71	?–135.2	17.3	4.8	—	—	1.2	5.75	—	1.75	4.0
bottom of Gilbert C$_2$		?			—	—			—		
		117.9–?			—	—			—		
		?–196.3			1.75	40.5			29.4		
Bottom of Gilbert C$_2$–	4.71–6.5	135.2–195.8	60.6	3.4	—	—	1.25	4.2	—	1.2	3.0
base of *A. primus*		?–			—	—			—		
		?–			—	—			—		
		196.3–?			—	—			—		
Base of *A. primus*–	6.5–7.3	195.8–?	30	3.8	—	—	1.2	4.5	—	0.9	3.6
base of *D. neorectus*		?			—	—			—		
		-226			1.6	38.0			20.0		

[a] Depth interval for each time slice is shown for each hole, in order; 502 through 502C.

[b] Mean thickness computed only when both boundaries of a time slice were recovered.

[c] Wet-bulk density from GRAPE data.

[d] Calculated dry-bulk density: $\delta_d - \delta_w/(1 + \%wc)$.

[e] Bulk accumulation rate = sedimentation × δ_d.

[f] Accumulation rate of CaCO$_3$ = bulk accumulation rate × %CaCO$_3$; noncarbonate rate = bulk − CaCO$_3$ rate.

GEOCHEMICAL MEASUREMENTS

Routine analyses were made only for salinity of interstitial water from Holes 502B and 502C. Salinity of interstitial water shows an increase in Hole 502B from an initial value of 35.5‰ at 2 meters sub-bottom to a maximum value of 39.6‰ at 14.5 meters. Salinity decreases to 37.4‰ between 14.5 and 27.5 meters and then increases to 38.2‰ below 27.5 meters. We can find no correlation of any observed parameter with these salinity changes.

Salinity remains fairly constant in Hole 502C from a sub-bottom depth of 37 down to 143.5 meters, with a range between 34.5‰ and 36.6‰. The one exception occurs at a depth of 135 meters, where it reaches the anomalously high value of 39.6‰.

SUMMARY AND CONCLUSIONS

Site 502 is located on a horst in the Colombia Basin in the vicinity of Site 154. The location of Site 502 was

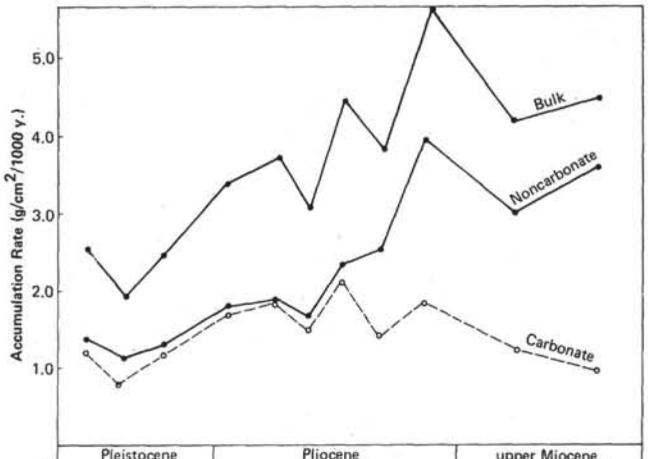

Figure 18. Bulk, noncarbonate, and carbonate accumulation rates (g/cm^2 1000 y.) versus time at Site 502.

chosen in an area that has a thick, acoustically transparent section without the distinct reflector that was found to be volcanogenic turbidites at Site 154. Site 502 consists of four holes, all cored within about 200 meters of each other to a maximum depth of 227 meters sub-bottom. The holes were all cored using the Hydraulic Piston Corer (HPC), and the sediment recovered represents in composite, a nearly continuous, almost totally undisturbed section for at least the past 7.8 m.y. (Holocene to early late Miocene).

Our objective at Site 502 was to recover an undisturbed, complete section of Quaternary and Neogene sediment that would permit a wide variety of detailed studies of the paleoclimatic, paleoceanographic, and tectonic history of the western Caribbean Sea. We recovered a nearly complete, undisturbed record that extends from early late Miocene through Holocene. Figure 19 shows a summary of core recovery, lithostratigraphy, magnetostratigraphy, biostratigraphy, age, and calculated accumulation rates of this section.

The sediment from Site 502 consists of foraminifer-bearing nannofossil marl that grades to calcareous clay with depth. The top seven meters of the section is yellowish brown, but the remainder is various shades of gray to greenish gray. The latter colors indicate reduced conditions, and because the upper section is oxidized, we feel that post depositional reduction of the sediment is pervasive. The sediment seldom exceeds 60% $CaCO_3$, indicating a significant influence from terrigenous sources throughout the Neogene and Quaternary. However, cyclic accumulation of carbonate is apparent throughout the entire section.

The succession of nannofossil and planktonic foraminiferal biostratigraphic zones and biohorizons at Site 502 (see Fig. 16) indicate that we recovered a complete biostratigraphic section from the late Miocene to the Holocene. All 19 major paleomagnetic chrons and subchrons of the Pliocene and Quaternary were also identified (Fig. 17). We believe this is the first time all magnetozones have been recognized in one section. In addition to the major paleomagnetic events, several excursions of the field were observed within the Matuyama Chron. These normal polarity excursions are up to 30 cm long, and two of them may correlate to the Cobb Mt. and Reunion Subchrons.

The combination of biostratigraphy and magnetostratigraphy reveals that deposition at Site 502 has been continuous over the past 7.5 m.y. and that accumulation rates have been relatively high (about 3 cm/k.y.). This high-quality record has enabled us to examine the detailed history of sedimentary components in the late Neogene and Quaternary.

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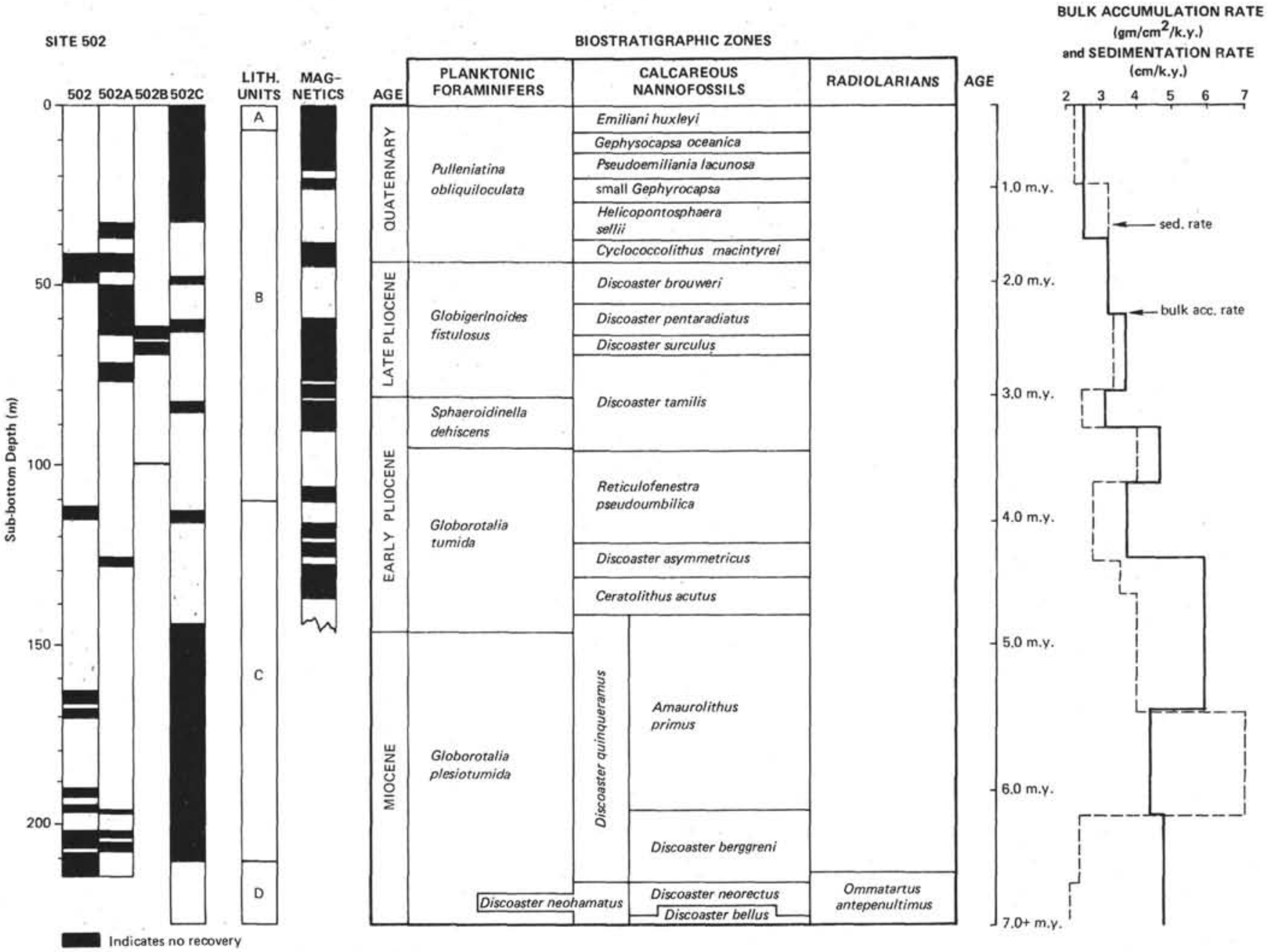


Figure 19. Summary of the recovery, lithostratigraphy, magnetostratigraphy, biostratigraphy, and sediment accumulation rates (given in Table 5) for Site 502.

APPENDIX

Table 3. Smear slide summary of major and minor lithologies for Site 502. The estimates are qualitative, using <5% estimate = rare, 5–25% = common, 25–75% = abundant, and >75% = dominant.

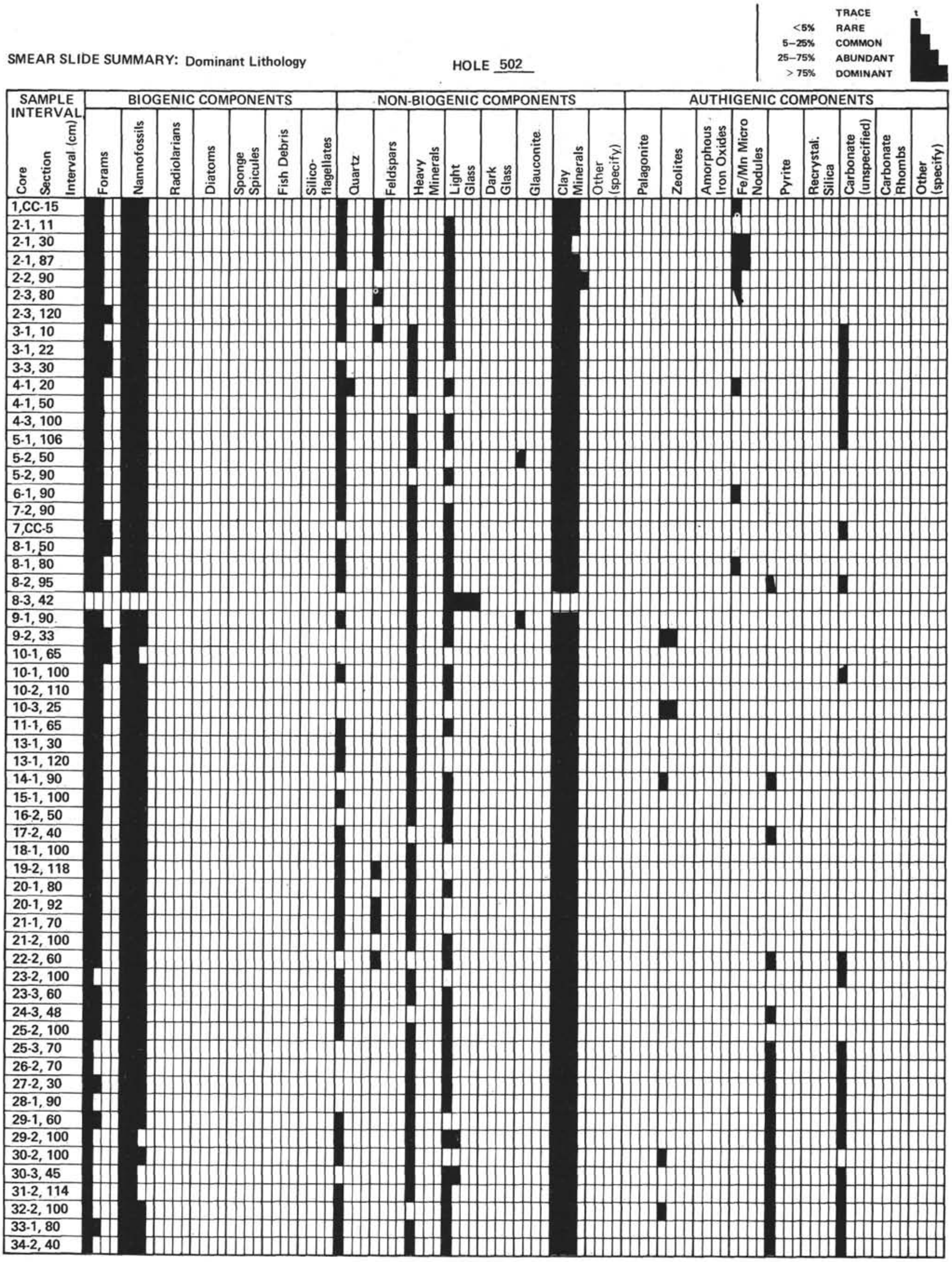


Table 3. (Continued).

SMEAR SLIDE SUMMARY: Dominant Lithology

HOLE 502

	TRACE	t
<5%	RARE	■
5–25%	COMMON	■■
25–75%	ABUNDANT	■■■
> 75%	DOMINANT	■■■■

SAMPLE INTERVAL	BIOGENIC COMPONENTS							NON-BIOGENIC COMPONENTS								AUTHIGENIC COMPONENTS								
Core Section Interval (cm)	Forams	Nannofossils	Radiolarians	Diatoms	Sponge Spicules	Fish Debris	Silico-flagellates	Quartz	Feldspars	Heavy Minerals	Light Glass	Dark Glass	Glauconite	Clay Minerals	Other (specify)	Palagonite	Zeolites	Amorphous Iron Oxides	Fe/Mn Micro Nodules	Pyrite	Recrystal. Silica	Carbonate (unspecified)	Carbonate Rhombs	Other (specify)
34-2, 90	■■	■■■						■			■	■		■■■						■		■		
35-1, 110	■	■■■						■		■	■			■■■						■		■		
36-1, 74	■	■■■						■		■				■■■						■		■		
37-1, 100	■	■■						■		■	■			■■■						■		■		
37-2, 90	■	■■■						■			■	■		■■■						■		■		
38-2, 60	■	■■■						■		■	■	■		■■■						■		■		
39-1, 70	■■	■■■						■		■	■			■■■						■		■		
40-1, 100	■■	■■■						■			■			■■■			■			■		■		
41-1, 130	■	■■■						■		■	■			■■■						■		■		
41-2, 110	■	■■■						■	■		■			■■■						■		■		
42-1	■	■■■						■			■	■		■■■			■			■		■		
42-2, 130	■	■■						■			■	■		■■■						■		■		
43-2, 70	■■	■■■						■		■	■			■■■	■					■		■		
43-2, 80	■■	■■■									■	■		■■■						■		■		
44-1, 80	■	■■■									■			■■■			■			■		■		
45-1, 80	■	■■■						■			■			■■■						■		■■		
45-1, 130	■	■■■									■			■■■						■		■		
46-1, 135		■								■	■■			■■■■						■		■		
46-1, 46		■									■			■■■■						■		■		
46-1, 75		■■								■	■	■		■■■■	■					■		■		
47-1, 80	■	■■■						■		■	■			■■■						■		■		
47-1, 140	■	■■■						■			■	■		■■■						■				
48-1, 60	■	■■■						■		■	■			■■■			■			■		■		
49-1, 25	■	■■								■	■			■■■■			■			■		■		
50-1, 20	■	■■■						■			■		■	■■■			■			■		■		

Table 3. (Continued).

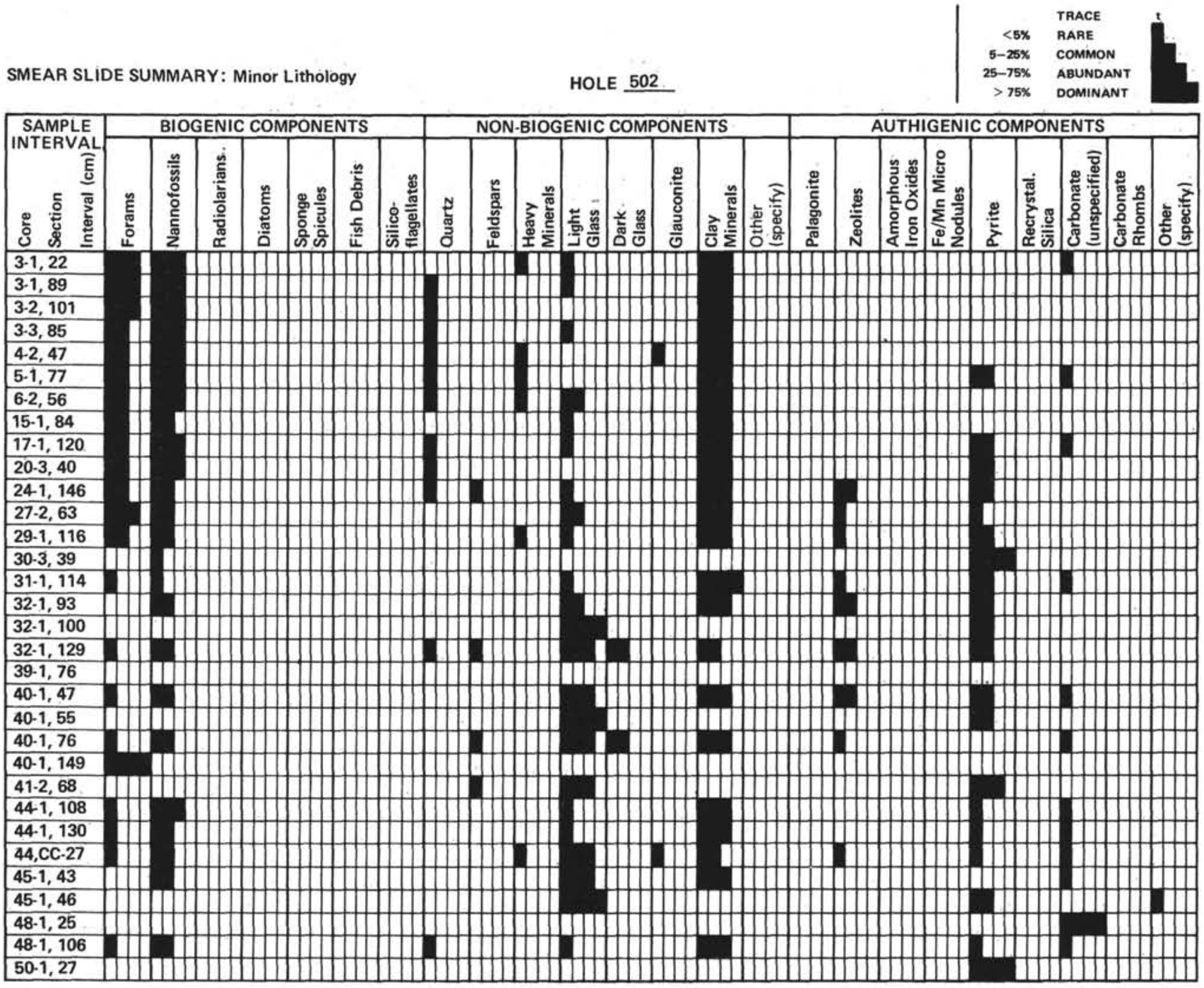


Table 3. (Continued).

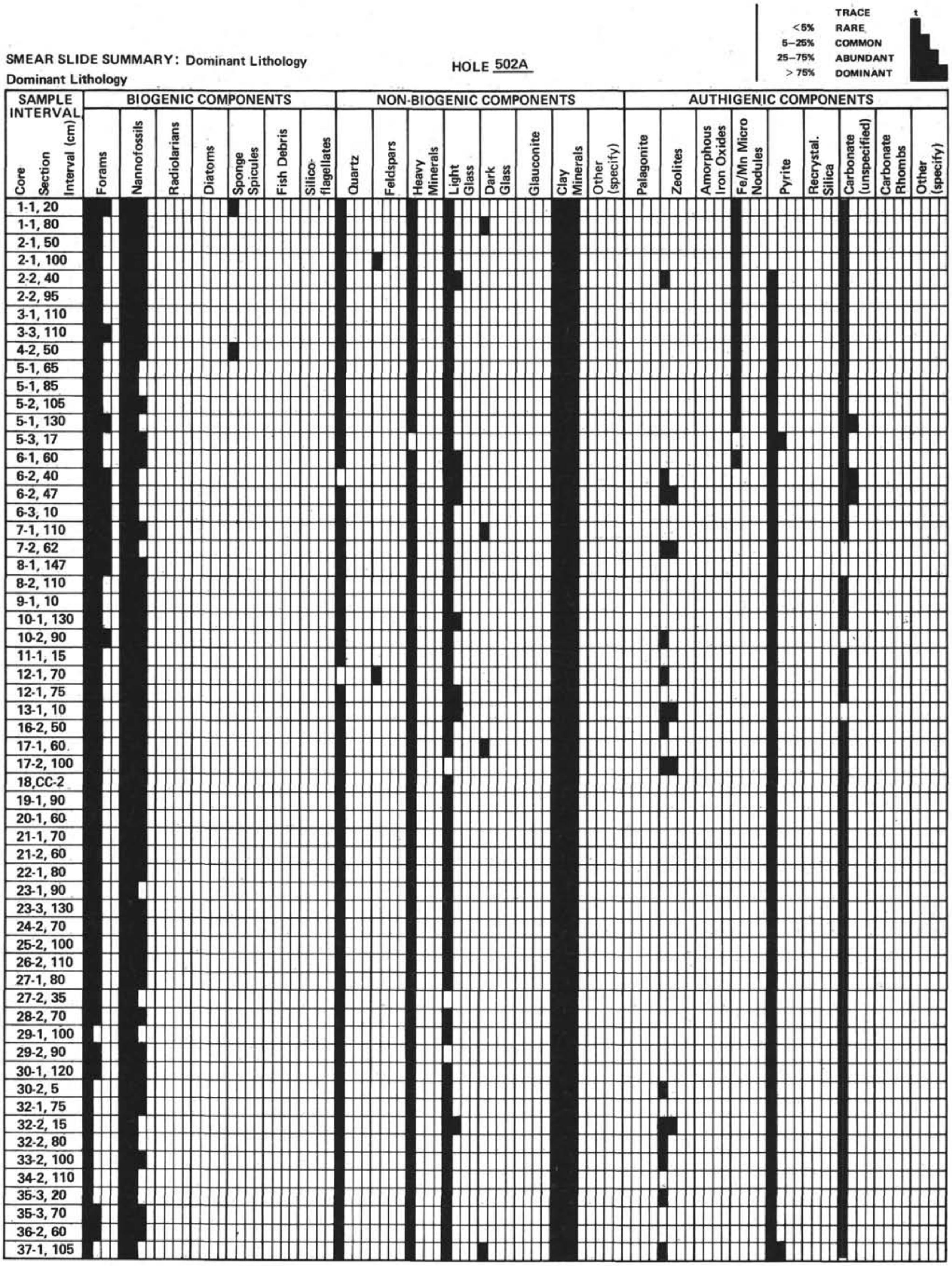


Table 3. (Continued).

SMEAR SLIDE SUMMARY: Dominant Lithology

HOLE 502A

	TRACE	t
<5%	RARE	R
5–25%	COMMON	C
25–75%	ABUNDANT	A
>75%	DOMINANT	D

SAMPLE INTERVAL	BIOGENIC COMPONENTS							NON-BIOGENIC COMPONENTS								AUTHIGENIC COMPONENTS								
Core Section Interval (cm)	Forams	Nannofossils	Radiolarians	Diatoms	Sponge Spicules	Fish Debris	Silico-flagellates	Quartz	Feldspars	Heavy Minerals	Light Glass	Dark Glass	Glauconite	Clay Minerals	Other (specify)	Palagonite	Zeolites	Amorphous Iron Oxides	Fe/Mn Micro Nodules	Pyrite	Recrystal. Silica	Carbonate (unspecified)	Carbonate Rhombs	Other (specify)
37-2, 90	C	A						R		R	R			A						R		R		
38-1, 90	C	A						R		R	R			A						R		R		
39-1, 110	C	A						R		R	R			A						R		R		
40-1, 100	C	C						R		R	R			A						R		R		
40-2, 90	C	C						R		R	R			A						C		R		
41-2, 100	C	C						R		R	R			A						R		R	R	
42-1, 100	C	C						R		R	R			A			R			R		R		
43-1, 70	C	A						R		R	R			A						R		R		
43-2, 5	R	C						R		R	C			A						R		R	R	
44-2, 60	C	C						R		R	R	R		A						R		R		
45-1, 80	R	A						R		R	R			A						R		C	R	
46-2, 15																								
46-2, 50	C	A						R		R	R			A						R		R		
47-1, 120	R	C						R		R	R			A						R		R		
47-2, 100	R	C						R		R	R			A						R		R		
48-1, 60	C	A						R		R	R			A						R		R		
48-1, 130	C	A						R		R	R			A						R		R		
50-1, 130	R	A						R		R	R			A						R		R		
50-2, 40	C	C						R		R	C			A						R		R		
51-1, 60	R	C						R		R	C			A						R		R		
51-2, 50	R	A						R		R	R			A						R		R		
52-1, 87	R	C						R		R	R			A						R		C		
52-1, 120	R	C						R		R	R	R		D						R		R		
53-1, 70	C	C						R		R	R			A						R		R		
54-2, 10	C	A						R		R	R			A						R		R		
54-2, 60	C	A						R		R	R			A						R		R		
55-1, 35	C	A						R		R	R			A						R		R		
55-1, 90	R	C						R		R	R			A			R			R		R		
55-1, 90	C	A						R		R	R			A						R		R		
55-1, 120	R	C						R		R	C			A						R		R		
57-1, 120	C	A						R		R	R			A						R		R		
57-2, 20	R	C						R		R	R			A		C				C		R		
58-1, 147	R	C						R		R	R			D			R			R		R		
58-1, 95	R	A						R		R	R			A						R		R		
59,CC-10	R	C						R		R	R			D						R		R		
59,CC-20	R	C						R		R	R			A						R		R		
60-1, 80	R	R						R		A	R			A			R			R		R		
60-1, 110	R	C						R		R	R			A			R			R		R		
61-1, 50	R	C						R		R	R			A					R	R		R		
61-1, 80	R	C						R		R	R			D						R		R		
62-1, 42	R	C						R		R	R	R		A					R	R		R		
63-1, 60	C	A						R		R	R			A						R		R		
63-1, 130	R	R						R		R	C	R		D						R		R		
65-1, 35	R	C						R		R	R			D						R		R	R	
65-2, 30	C	C						R		R	R			A					R	R		R		
66-1, 90	C	A						R		R	R			A						R		R		
66-2, 30	R	C						R		R	C			D			R			R		R		
67-1, 50	R	C						R		R	C			A			R			R		R	R	
68-1, 82	R	R			R					R	R			D			R			R		R		
68-2, 50	R	R	R		R					R	R			D						R		R		

Table 3. (Continued).

SMEAR SLIDE SUMMARY : Minor Lithology

HOLE 502A

TRACE t
<5% RARE
5–25% COMMON
25–75% ABUNDANT
> 75% DOMINANT

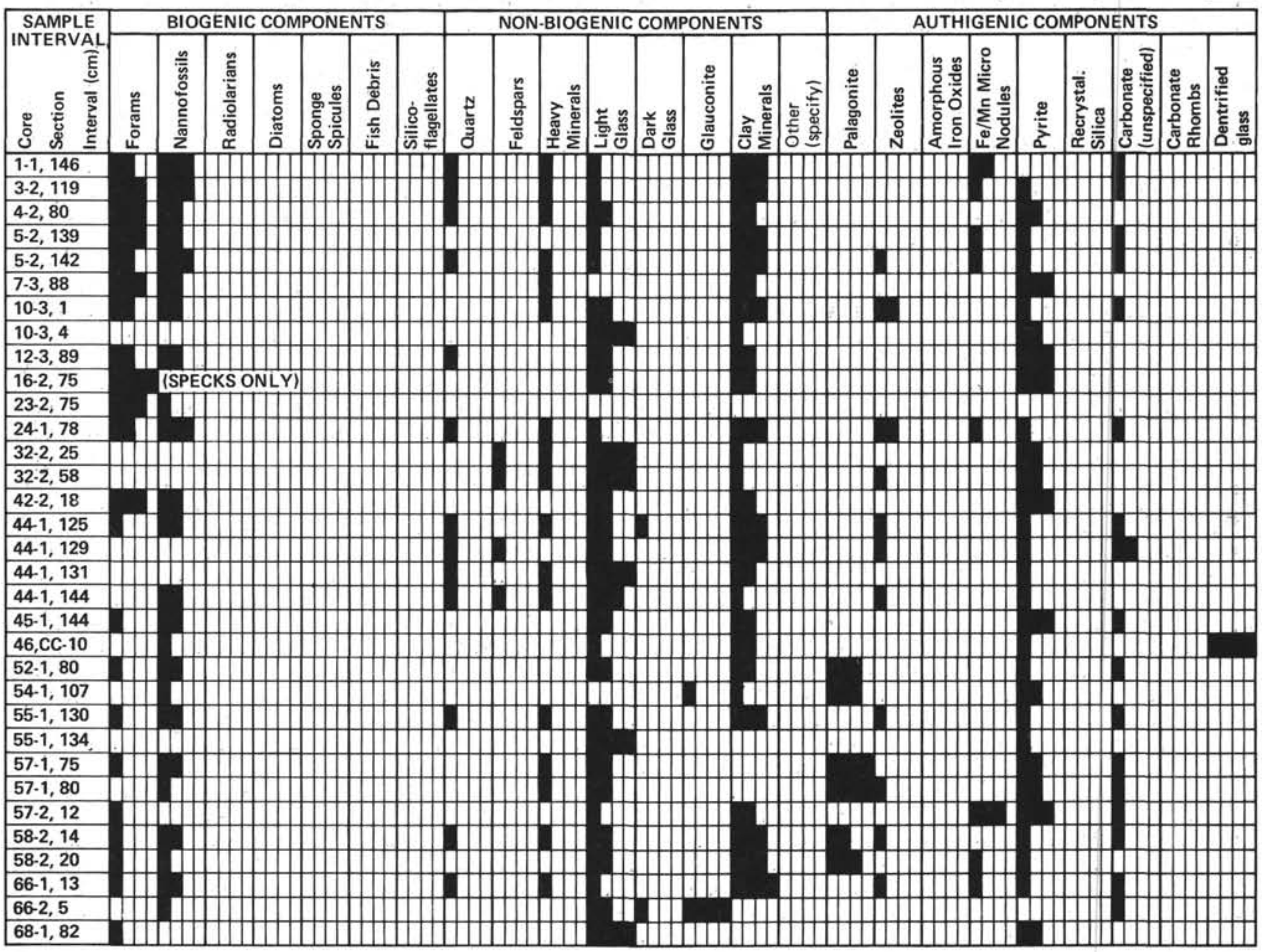
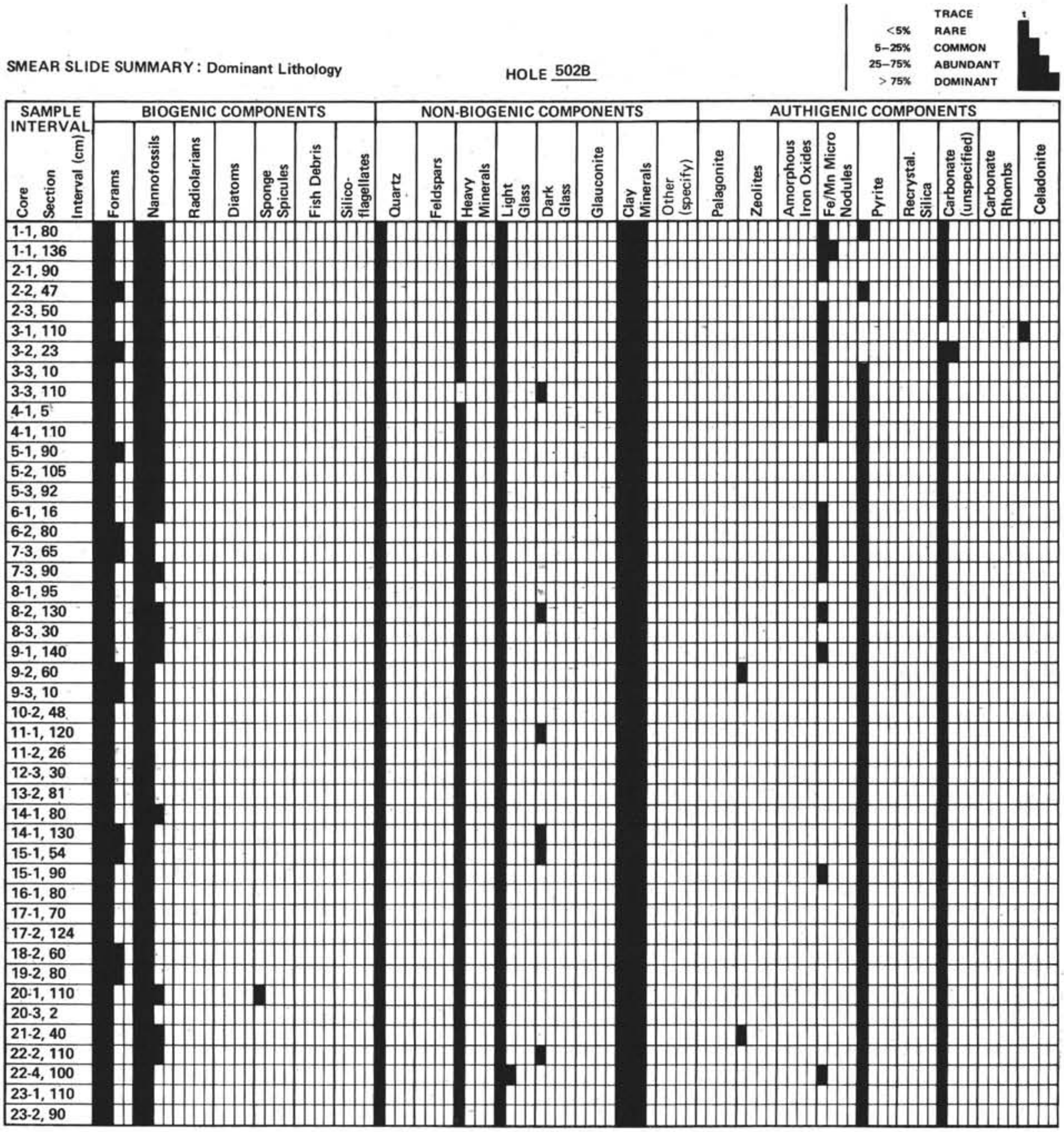


Table 3. (Continued).

SMEAR SLIDE SUMMARY: Dominant Lithology

HOLE 502B



SMEAR SLIDE SUMMARY: Minor Lithology

HOLE 502B

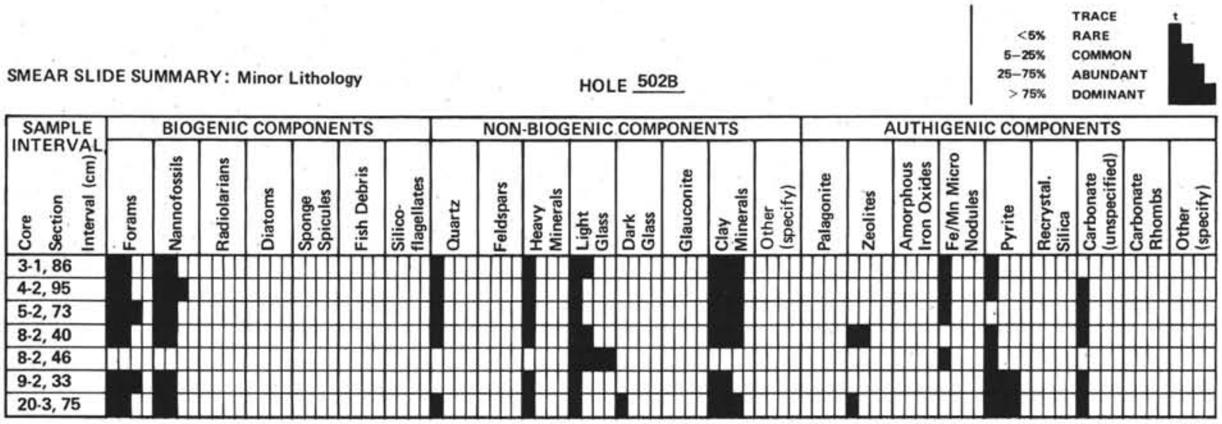
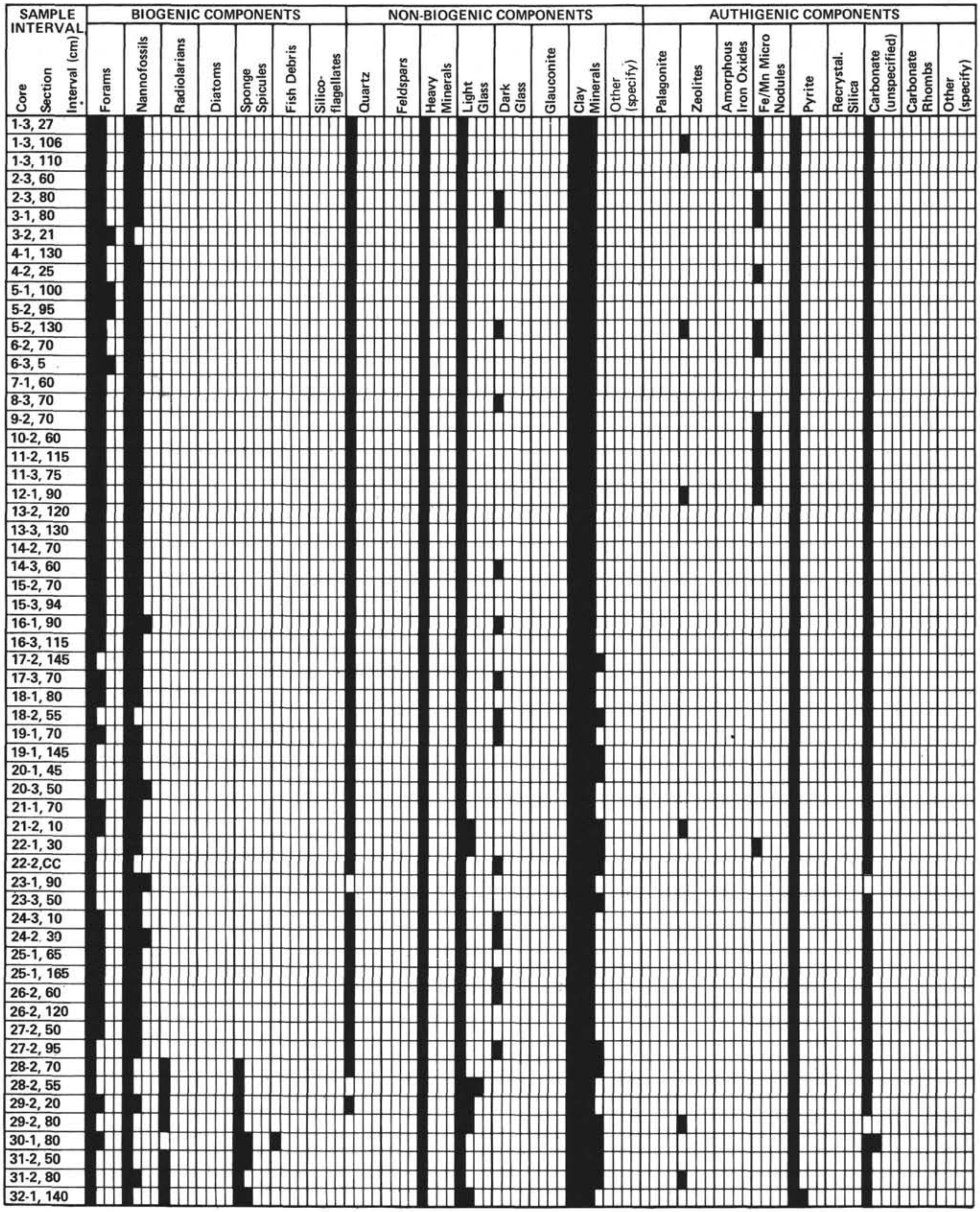


Table 3. (Continued).

TRACE t
<5% RARE
5–25% COMMON
25–75% ABUNDANT
> 75% DOMINANT

SMEAR SLIDE SUMMARY: Dominant Lithology

HOLE 502C



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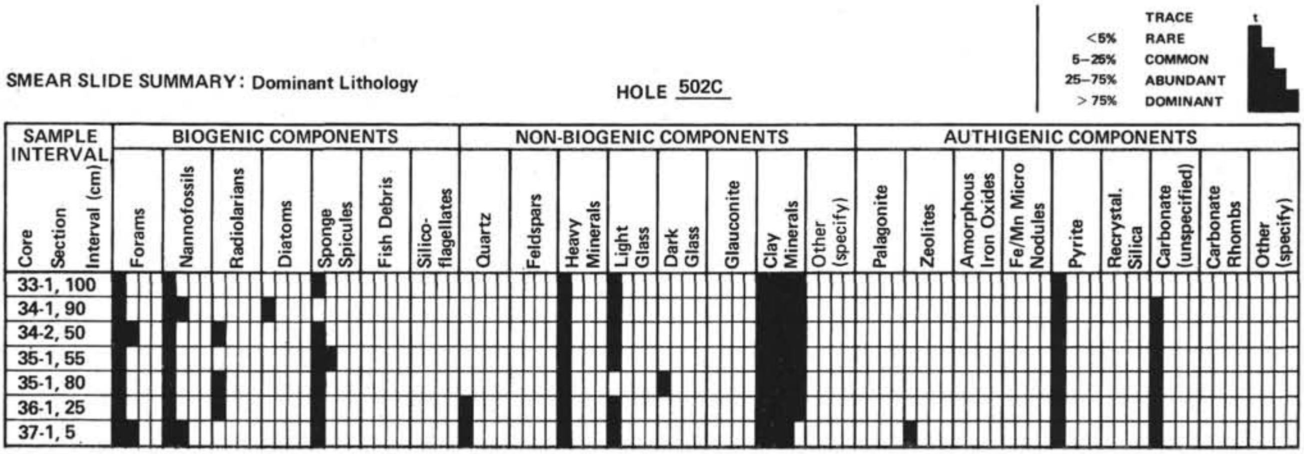
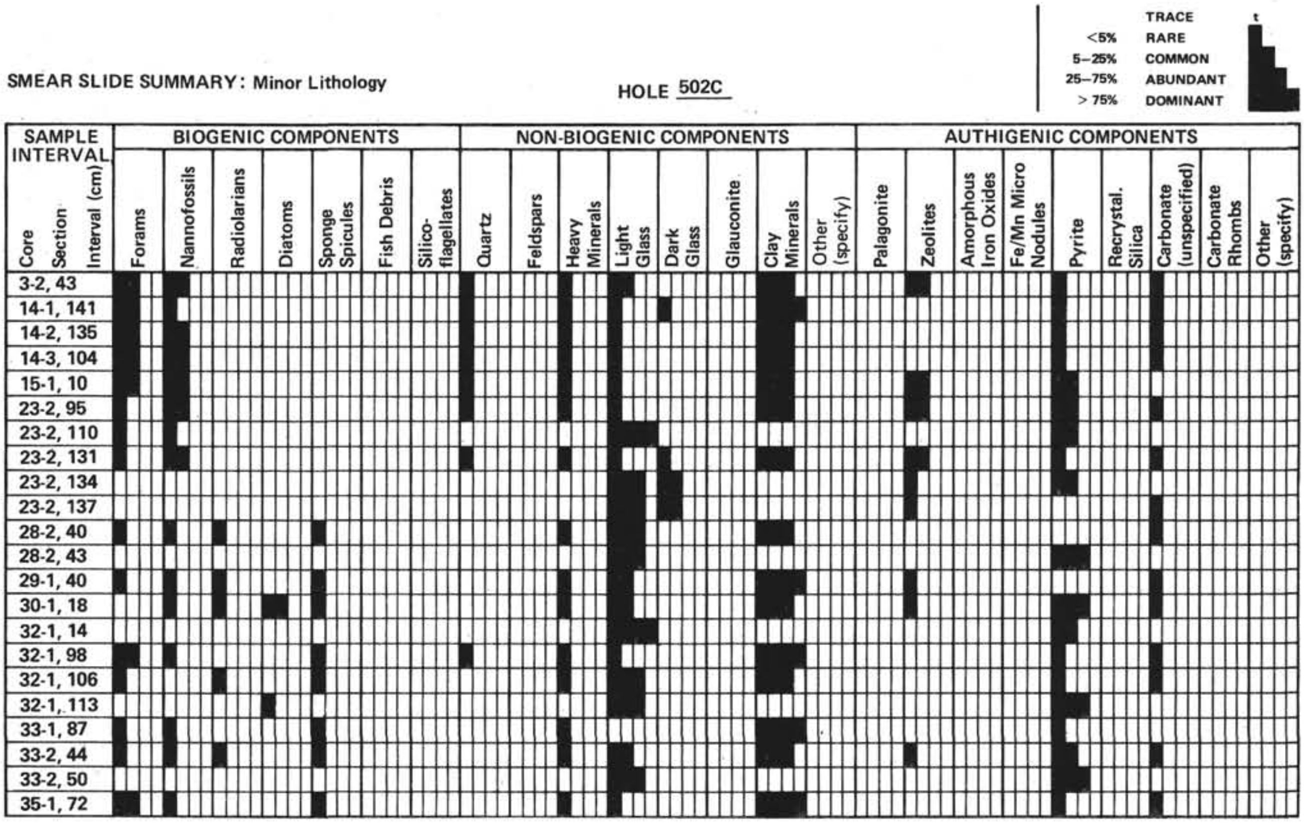
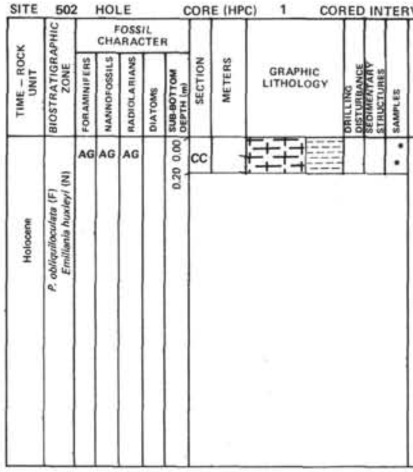




SITE 502 HOLE CORE (HPC) 1 CORED INTERVAL 0.0–0.4 m



LITHOLOGIC DESCRIPTION

10YR 4/3

10YR 5/4

FORAM-BEARING NANNO MARL, dark brown (10YR 4/3) to yellowish brown (10YR 5/4) in color. Only a Core-Catcher was recovered at the sediment-water interface.

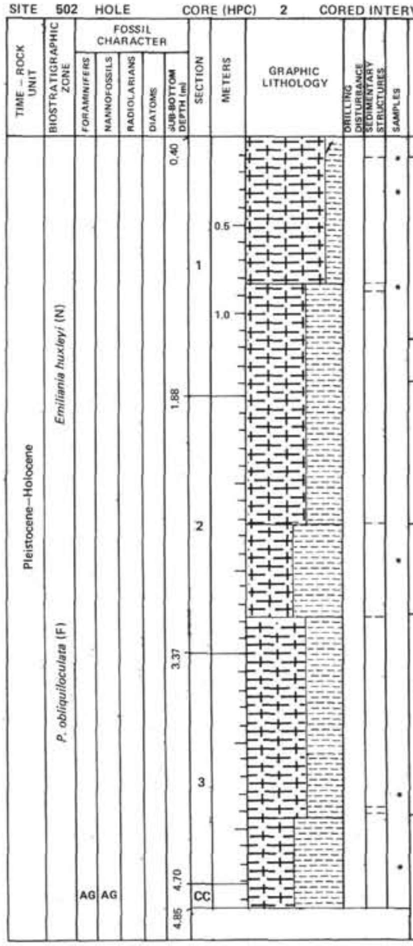
No obvious sediment structures were observed.

SMEAR SLIDE SUMMARY

	CC, 5	CC, 15
	D	D
Quartz	2/R	2/R
Feldspar	1/T	1/T
Amorphous iron-oxide	1/T	1/T
Clay minerals	35/C	35/C
Carbonate unspec.	2/R	2/R
Foraminifers	15/C	15/C
Calcareous nannofossils	40/A	40/A
Radiolarians	1/T	1/T
Sponge spicules	2/R	2/R

CARBONATE BOMB:
CC, 8 cm = 60%

SITE 502 HOLE CORE (HPC) 2 CORED INTERVAL 0.4–4.8 m



LITHOLOGIC DESCRIPTION

10YR 5/6

2.5Y 5/6

2.5Y 5/4

2.5Y 6/4

5Y 5/3

10YR 5/4

5Y 5/3

FORAM-BEARING NANNO OOZE TO FORAM-BEARING NANNO MARL

The core is generally structureless but color cycles are evident. These are:

A) yellowish brown (10YR 5/4) to light yellowish brown (2.5Y 6/4)

B) olive (5Y 5/3)

There are also dark layers with indistinct contacts (approximately 1 cm thick) present throughout (Section 1, 85–89 cm; Section 2, 22, 26, 35, 51, 55, 60, and 131 cm; and Section 3, 91–97 cm) that are presumed to be Mn-rich. Intervals containing coarse forams occur at Section 2, 38–32 and 110–130 cm, and Section 3, 115–131 cm.

SMEAR SLIDE SUMMARY

	1-11	1-30	1-87	2-90	3-80	3-120
	D	D	D	D	D	D
Quartz	1/T	1/T	1/T	–	2/R	1/T
Feldspar	1/T	1/T	1/T	–	1/T	–
Amorphous iron-oxide	2/R	1/R	–	–	–	–
Clay minerals	34/A	15/C	34/A	55/A	38/A	43/A
Volcanic glass (lt)	1/T	5/C	2/T	2/R	2/R	1/T
Micronodules	1/T	10/C	10/C	2/R	1/T	–
Carbonate unspec.	1/T	2/R	2/R	1/T	1/T	–
Foraminifers	15/C	20/C	15/C	10/C	15/C	25/A
Calcareous nannofossils	42/A	45/A	35/A	30/A	40/A	30/A
Radiolarians	1/T	–	–	–	–	–
Sponge spicules	1/T	–	–	–	–	–

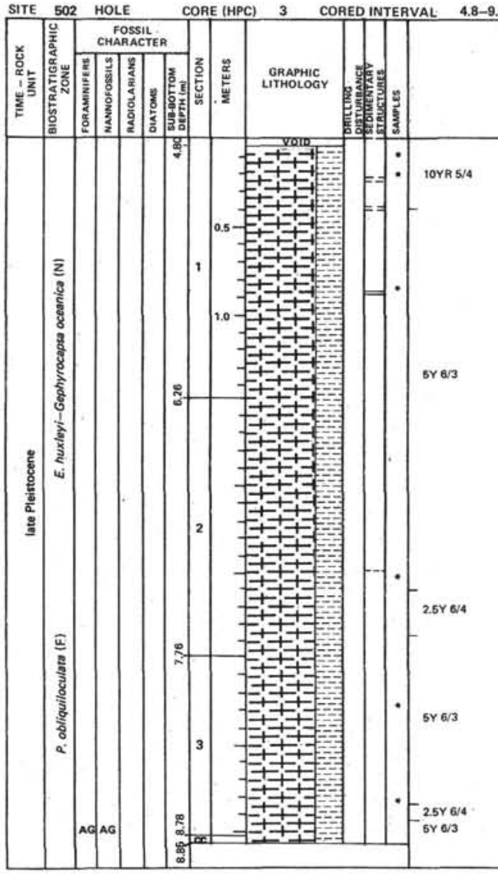
CARBONATE BOMB:

1-20 cm = 41%
1-50 cm = 38%
1-75 cm = 42%
1-110 cm = 47%
1-140 cm = 33%
2-20 cm = 44%
2-60 cm = 44%
2-80 cm = 38%
2-110 cm = 38%
2-140 cm = 41%
3-20 cm = 32%
3-50 cm = 40%
3-80 cm = 38%
3-110 cm = 45%

CLAY MINERALOGY (<2 μm): 3-110 cm

Smectite	21%
Illite	21%
Chlorite	24%
Kaolinite	34%

SITE 502 HOLE CORE (HPC) 3 CORED INTERVAL 4.8–9.2 m



LITHOLOGIC DESCRIPTION

FORAM-NANNO OOZE to FORAM-BEARING NANNO MARL, which is pale olive (5Y 6/3) in color except for the intervals 3–44 cm (Section 1) – which is yellowish brown (10YR 5/4) and Section 2 (111–132 cm) and Section 3 (84–92 cm) – light yellowish brown in color.

Somewhat coarser layers, 1 cm thick, occur at Section 1, 22 cm and 89 cm but are poorly defined.

There are dark layers (Hydrotroilyte?) at Section 1, 40–44 cm and Section 2, 101 cm.

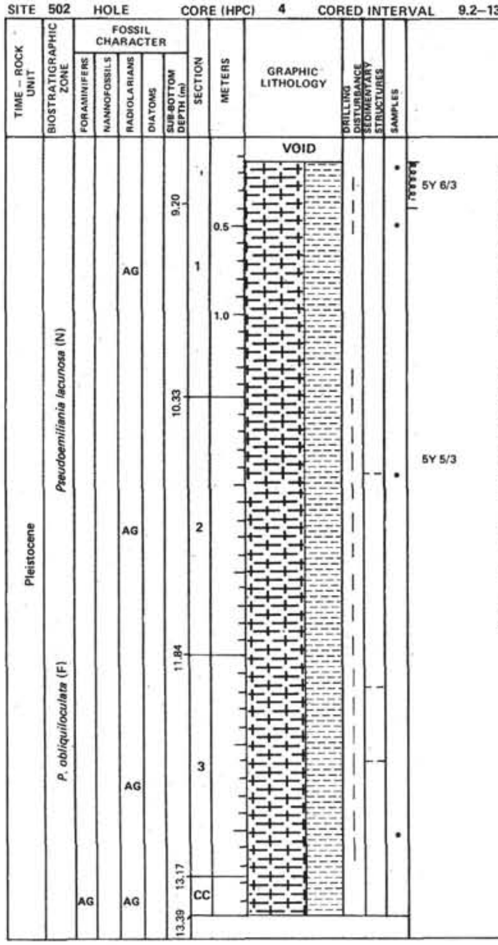
Coarse intervals enriched in forams are present at:
Section 1, 48–100 cm and 130–148 cm
Section 2, 13–43 cm and 61–83 cm
Section 2, 95 cm–Section 3, 14 cm
Section 3, 90–102 cm

SMEAR SLIDE SUMMARY

	1-10	1-22	1-89	2-101	3-30	3-85
	D	M	D	M	D	M
Quartz	1/T	–	1/T	1/T	1/T	1/T
Feldspar	1/T	–	–	–	–	–
Other heavy minerals	2/R	2/R	–	–	1/T	–
Clay minerals	37/A	25/A	33/A	29/A	25/A	45/A
Volcanic glass (lt)	3/R	2/R	1/T	–	–	1/T
Carbonate unspec.	1/T	1/T	–	–	2/R	–
Foraminifers	10/C	40/A	25/A	35/A	25/A	5/C
Calcareous nannofossils	45/A	30/A	40/A	30/A	45/A	50/A
Hydrotroilyte	–	–	–	5/C	–	–

CARBONATE BOMB:
1-20 cm = 42%
1-50 cm = 44%
1-80 cm = 47%
1-110 cm = 41%
1-140 cm = 58%
2-20 cm = 54%
2-50 cm = 45%
2-80 cm = 46%
2-110 cm = 47%
2-140 cm = 50%
3-20 cm = 38%
3-80 cm = 44%
3-110 cm = 38%

SITE 502 HOLE CORE (HPC) 4 CORED INTERVAL 9.2–13.6 m



LITHOLOGIC DESCRIPTION

NANNO MARL (Section 1, 13–40 cm), which is pale olive (5Y 6/3) in color with faint bedding showing minor deformation. The bottom contact is sharp but wavy.

FORAM-BEARING NANNO MARL makes up the remainder of the core. It is olive (5Y 5/3) in color. Indistinct black and grayish green (10GY 5/2) layers occur throughout.

Section 1, 100 cm–Section 3, 80 cm is soupy and fractured longitudinally. In Section 3 layers are displaced about 0.5 cm by a fracture.

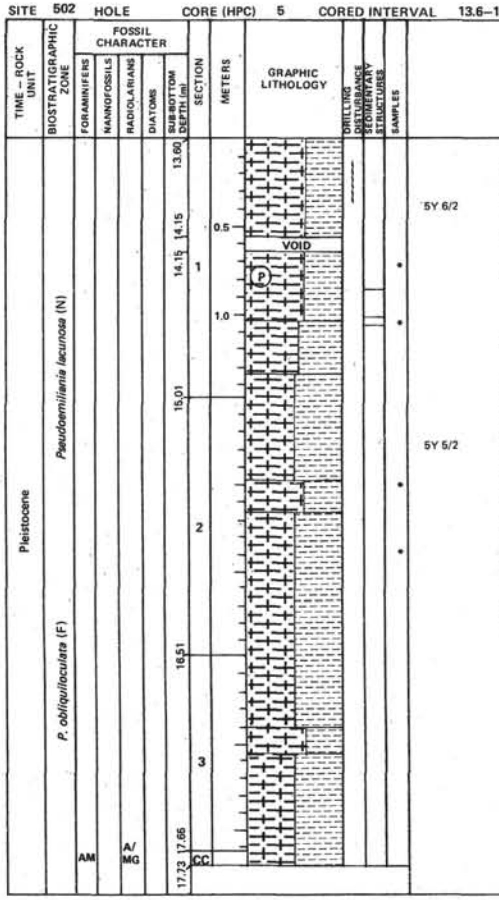
Coarse intervals enriched in forams are visible throughout the core.

SMEAR SLIDE SUMMARY

	1-20	1-50	2-47	3-100
	D	D	M	D
Quartz	5/C	1/T	1/T	2/R
Other heavy minerals	2/R	–	1/T	2/R
Clay minerals	35/A	43/A	46/A	38/A
Volcanic glass (lt)	1/T	–	–	2/R
Glauconite	–	–	1/T	–
Micronodules	1/T	–	–	–
Carbonate unspec.	1/T	1/T	–	1/T
Foraminifers	5/C	20/C	15/C	10/C
Calcareous nannofossils	50/A	35/A	35/A	45/A
Hydrotroilyte	–	–	1/T	–

CARBONATE BOMB:
1-20 cm = 38%
1-50 cm = 52%
1-80 cm = 57%
1-110 cm = 54%
1-140 cm = 43%
2-20 cm = 39%
2-50 cm = 42%
2-80 cm = 38%
2-110 cm = 40%
2-140 cm = 54%
3-20 cm = 44%
3-50 cm = 43%
3-80 cm = 38%
3-110 cm = 39%

SITE 502 HOLE CORE (HPC) 5 CORED INTERVAL 13.6–18.0 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) to olive gray (5Y 5/2) in color. It is generally homogeneous but there is minor faint layering.

A black pyrite nodule occurs at 77 cm (Section 1).

Light grayish green (10GY 5/2) lamina are at Section 1, 88 and 105–107 cm.

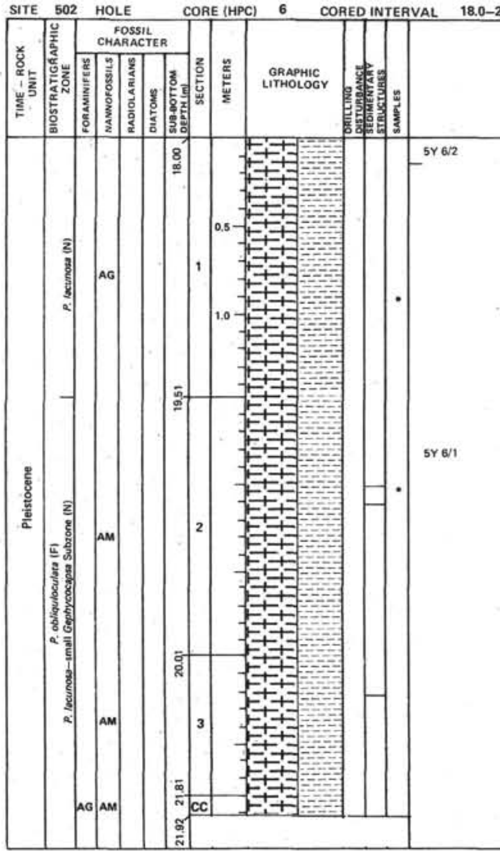
Coarse intervals enriched in forams are present at:
Section 1, 20–76 and 105–132 cm
Section 2, 48–65 cm
Section 3, 40–54 cm

SMEAR SLIDE SUMMARY

	1-77	1-106	2-50	2-90
	M	D	D	D
Quartz	2/R	1/T	1/T	1/T
Pyrite	5/C	–	–	–
Other heavy minerals	1/T	1/T	1/T	–
Clay mineral	41/A	40/A	49/A	53/A
Volcanic glass (lt)	–	–	–	3/R
Glauconite	–	–	1/T	–
Carbonate unspec.	1/T	1/T	–	–
Foraminifers	20/C	15/C	20/C	8/C
Calcareous nannofossils	30/A	40/A	30/A	35/A

CARBONATE BOMB:
1-20 cm = 40%
1-50 cm = 43%
1-80 cm = 53%
1-110 cm = 52%
1-140 cm = 45%
2-20 cm = 42%
2-50 cm = 57%
2-80 cm = 35%
2-110 cm = 46%
2-140 cm = 46%
3-20 cm = 52%
3-50 cm = 56%
3-80 cm = 36%
3-110 cm = 38%

SITE 502 HOLE CORE (HPC) 6 CORED INTERVAL 18.0–22.4 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) to gray (5Y 6/1) in color.

The core is faintly burrowed and mottled at:
Section 1, 70–139 cm
Section 2, 55–64 and 70–110 cm
Section 3, 50–80 cm

Hydrotroilyte blebs, approximately 1 cm-diameter, occur at Section 1, 141 cm and Section 2, 80, 82, and 108 cm.

A grayish-green layer (10GY 5/2) which is coarser in texture occurs at Section 2, 55–64 cm.

Coarse intervals enriched in forams are present at:
Section 1, 55–84 cm
Section 3, 5–40 cm

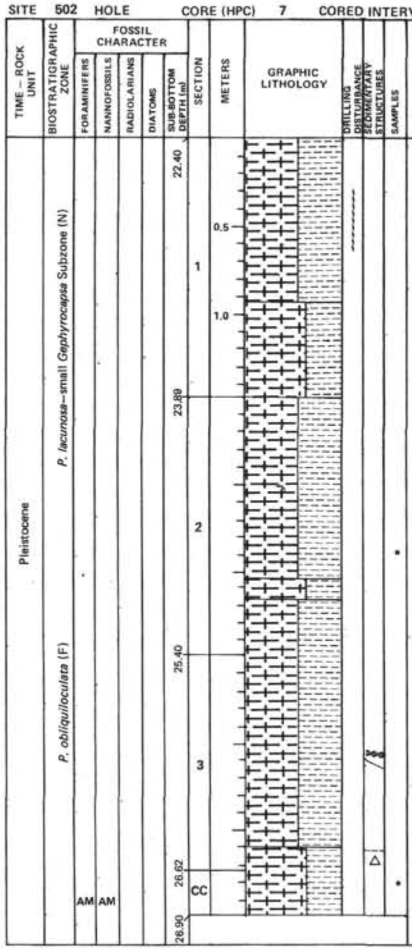
A faint dark lamina occurs at Section 3, 24 cm.

SMEAR SLIDE SUMMARY

	1-90	2-56
	D	M
Quartz	1/T	1/T
Other heavy minerals	2/R	2/R
Clay minerals	51/A	52/A
Volcanic glass (lt)	–	10/C
Micronodules	1/T	–
Foraminifers	10/C	5/C
Calcareous nannofossils	35/A	30/A

CARBONATE BOMB:
1-20 cm = 46%
1-50 cm = 46%
1-80 cm = 35%
1-110 cm = 40%
1-140 cm = 54%
2-20 cm = 38%
2-50 cm = 31%
2-80 cm = 54%
2-110 cm = 42%
2-140 cm = 46%
3-20 cm = 64%
3-50 cm = 63%

SITE 502 HOLE CORE (HPC) 7 CORED INTERVAL 22.4–26.8 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color.

Indistinct grayish green (10GY 5/2) and black laminae occur throughout the core.

Faint burrowing and mottling are present at:
Section 1, 30–50 cm
Section 2, 35–120 cm
Section 3, throughout.

Section 1, 25–75 cm: is deformed longitudinally because of liner damaged on retrieval.

Coarse intervals enriched in forams occur at:
Section 1, 95–150 cm
Section 2, 105–115 cm

A large burrow with a black halo, approximately 1.5 cm-diameter, is at Section 3, 57 cm and a distinct black layer, dipping at approximately 10° is at Section 3, 63 cm.

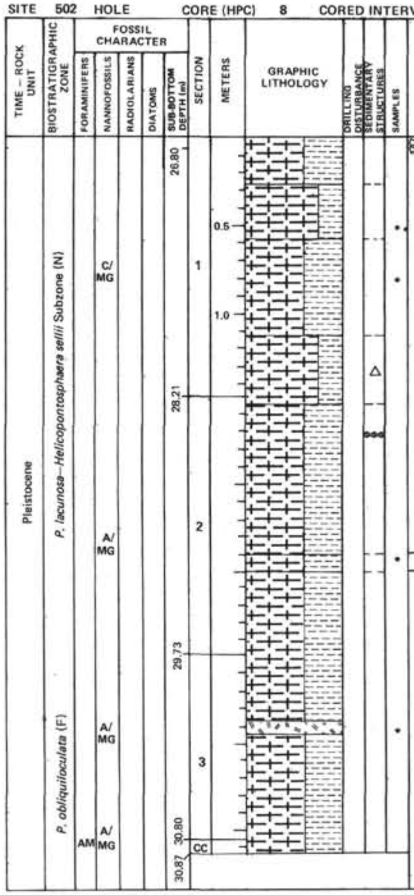
The interval, Section 3, 110 cm–7 cm in the Core-Catcher, fines upward, and has a high foram content.

SMEAR SLIDE SUMMARY

	2-90 D	CC, 5 D
Quartz	1/T	–
Other heavy minerals	4/R	2/R
Clay minerals	48/A	35/A
Volcanic glass (lt)	2/R	2/R
Carbonate unspec.	–	1/T
Foraminifers	15/C	30/A
Calcareous nannofossils	40/A	30/A

CARBONATE BOMB:
1-20 cm = 57%
1-50 cm = 42%
1-80 cm = 47%
1-110 cm = 50%
1-140 cm = 60%
2-20 cm = 49%
2-50 cm = 38%
2-80 cm = 47%
2-110 cm = 42%
2-140 cm = 42%
3-20 cm = 50%
3-50 cm = 50%
3-80 cm = 45%
3-110 cm = 59%

SITE 502 HOLE CORE (HPC) 8 CORED INTERVAL 26.8–31.2 m



LITHOLOGIC DESCRIPTION

5Y 6/2

5Y 7/1

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color.

FORAM NANNO OOZE with a coarser texture than the surrounding sediment is at Section 1, 30–60 cm.

The interval from Section 1, 115 cm–Section 2, 2 cm fines upwards and is faintly laminated, mottled and burrowed throughout.

Section 2, 20–25 cm contains 3 black vertical burrows.

A NANNO MARL which is light gray (5Y 7/1) occurs at Section 2, 91–100 cm.

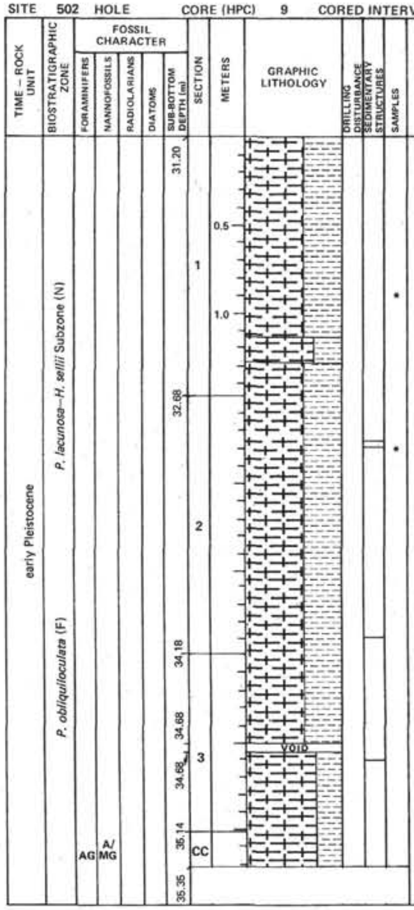
A VITRIC ASH which is olive gray (5Y 5/2) in color is in Section 3 at 39–45.5 cm.

SMEAR SLIDE SUMMARY

	1-50 D	1-80 D	2-95 D	3-42 M
Quartz	2/R	2/R	1/T	
Pyrite	–	–	2/R	–
Other heavy minerals	2/R	1/T	1/T	2/R
Clay minerals	30/A	40/A	43/A	–
Volcanic glass (lt)	1/T	1/T	4/R	98/D
Micronodules	–	1/T	–	–
Carbonate unspec.	–	–	1/T	–
Foraminifers	25/A	15/C	8/C	–
Calcareous nannofossils	40/A	40/A	40/A	–

CARBONATE BOMB:
1-20 cm = 45%
1-50 cm = 65%
1-80 cm = 49%
1-110 cm = 53%
1-140 cm = 57%
2-20 cm = 36%
2-50 cm = 47%
2-78 cm = 45%
2-110 cm = 42%
2-140 cm = 42%
3-20 cm = 46%
3-50 cm = 45%
3-80 cm = 42%

SITE 502 HOLE CORE (HPC) 9 CORED INTERVAL 31.2–35.6 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color.

It contains no prominent sedimentary structures except very faint grayish green (10GY 5/2) and black laminations.

The laminations of the upper 50 cm of Section 2 are somewhat more distinct.

ZEOLITE-BEARING NANNO FORAM OOZE occurs at Section 2, 30–34 cm which appears somewhat more indurated then surrounding sediment.

Section 2 is faintly mottled throughout and in Section 2, 140 cm there are distinct grayish green (10GY 5/2) laminae.

In Section 3 at 62 cm occurs a distinct grayish green (10GY 5/2) layer (0.5 cm thick).

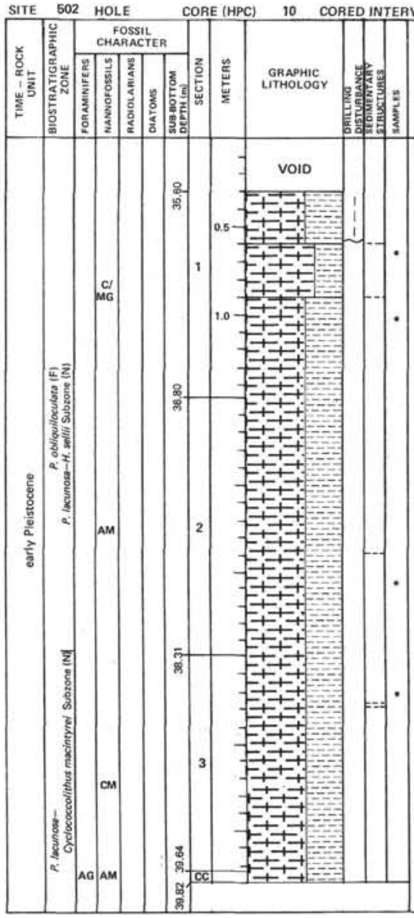
Coarse intervals enriched in forams are at:
Section 1, 118–133 cm
Section 3, 55–101 cm

SMEAR SLIDE SUMMARY

	1-90	2-33
	D	D
Quartz	1/T	–
Other heavy minerals	3/R	2/R
Clay minerals	38/A	27/A
Volcanic glass (lt)	2/T	1/T
Glauconite	1/T	–
Zeolite	–	10/C
Foraminifers	15/C	30/A
Calcareous nannofossils	40/A	30/A

CARBONATE BOMB:
1-20 cm = 47%
1-50 cm = 44%
1-80 cm = 41%
1-110 cm = 41%
1-140 cm = 46%
2-20 cm = 53%
2-50 cm = 46%
2-80 cm = 42%
2-110 cm = 51%
2-140 cm = 45%
3-20 cm = 40%
3-48 cm = 55%
3-80 cm = 55%

SITE 502 HOLE CORE (HPC) 10 CORED INTERVAL 35.6–40.0 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray in color and faintly laminated and mottled.

Section 1, 57–90 cm consists of NANNO-BEARING FORAM MARL which is differentiated by its coarser texture. It has an indistinct lower contact and well defined but deformed upper contact.

NANNO MARL is present in Section 1 at 100 cm according to a smear slide; but this sediment is not distinguished by eye.

Section 2, 90–120 cm has a coarser texture but the smear slide shows the interval to be enriched in clay.

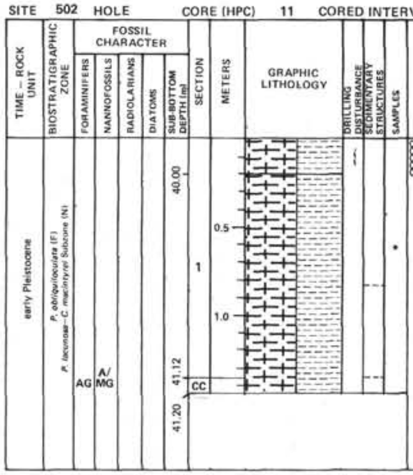
ZEOLITE AND FORAM-BEARING NANNO MARL occurs at Section 3, 25–26 cm in a layer which appears more indurated than surrounding sediment.

SMEAR SLIDE SUMMARY

	1-65	1-100	2-110	3-25
	D	D	D	D
Quartz	–	1/T	–	–
Other heavy minerals	1/T	1/T	1/T	4/R
Clay minerals	35/A	47/A	52/A	36/A
Volcanic glass (lt)	–	2/R	2/R	–
Zeolites	–	–	–	15/C
Carbonate unspec.	–	1/T	–	–
Foraminifers	45/A	8/C	15/C	15/C
Calcareous nannofossils	20/C	40/A	30/A	30/A

CARBONATE BOMB:
1-50 cm = 41%
1-80 cm = 57%
1-110 cm = 46%
1-140 cm = 44%
2-20 cm = 47%
2-50 cm = 41%
2-80 cm = 40%
2-110 cm = 59%
2-140 cm = 59%
3-20 cm = 30%
3-50 cm = 47%
3-80 cm = 41%
3-110 cm = 45%

SITE 502 HOLE CORE (HPC) 11 CORED INTERVAL 40.0–44.4 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color and faintly laminated and mottled throughout.

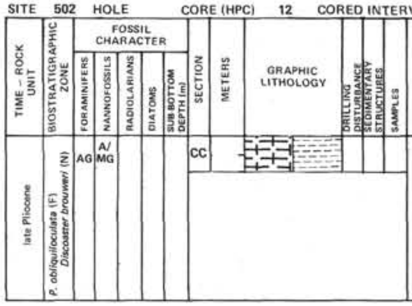
Section 1, 80–136 cm is somewhat coarser in texture than surrounding sediment.

SMEAR SLIDE SUMMARY

	1-65 D
Quartz	1/T
Other heavy minerals	1/T
Clay minerals	52/A
Volcanic glass (lt)	1/T
Foraminifers	10/T
Calcareous nannofossils	35/A

CARBONATE BOMB:
1-20 cm = 38%
1-50 cm = 40%
1-80 cm = 53%
1-110 cm = 58%

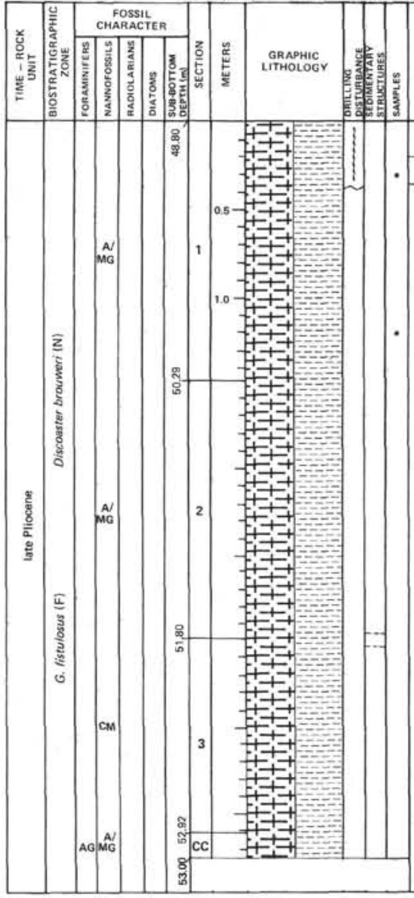
SITE 502 HOLE CORE (HPC) 12 CORED INTERVAL 44.4–48.8 m



LITHOLOGIC DESCRIPTION

No core retrieved – Biostratigraphy based on some sediments found on Core-Catcher.

SITE 502 HOLE CORE (HPC) 13 CORED INTERVAL 48.8–53.2 m



LITHOLOGIC DESCRIPTION

5Y 6/1
10GY 5/2
5Y 6/1

FORAM-BEARING NANNO MARL

The core is gray (5Y 6/1) in color with faint grayish green (10GY 5/2) and black laminations and mottling.

The top of the core (Section 1, 0–37 cm) is disturbed and between 20 and 37 cm is grayish green (10GY 5/2) NANNO MARL.

Grayish green (10GY 5/2) mottles occur at 96 cm in Section 1.

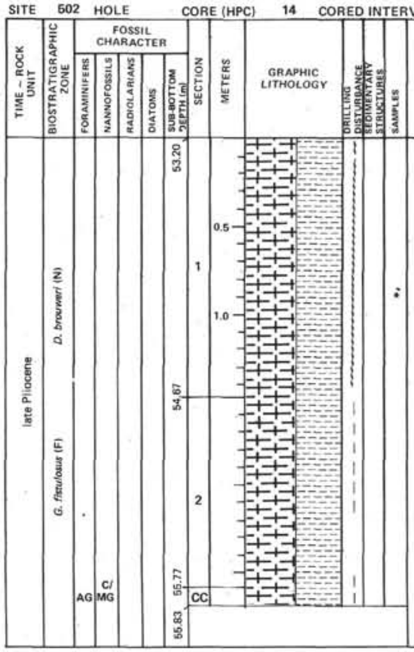
The sediment in Section 2 at 145–150 cm is somewhat coarser in texture than surrounding sediment.

SMEAR SLIDE SUMMARY

	1-30 D	1-120 D
Quartz	2/R	2/R
Other heavy minerals	1/T	2/R
Clay minerals	62/A	45/A
Volcanic glass (lt)	–	1/T
Foraminifers	5/C	15/C
Calcareous nannofossils	30/A	35/A

CARBONATE BOMB:
1-20 cm = 49%
1-50 cm = 48%
1-80 cm = 47%
1-110 cm = 45%
1-140 cm = 50%
2-20 cm = 47%
2-50 cm = 52%
2-80 cm = 44%
2-110 cm = 57%
2-140 cm = 45%
3-20 cm = 52%
3-50 cm = 41%
3-80 cm = 53%
3-110 cm = 56%

SITE 502 HOLE CORE (HPC) 14 CORED INTERVAL 53.2–57.6 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color.

All Section 1 is disturbed as is Section 2, 0–50 cm and 90–100 cm. Where the core is not disturbed it is laminated and mottled.

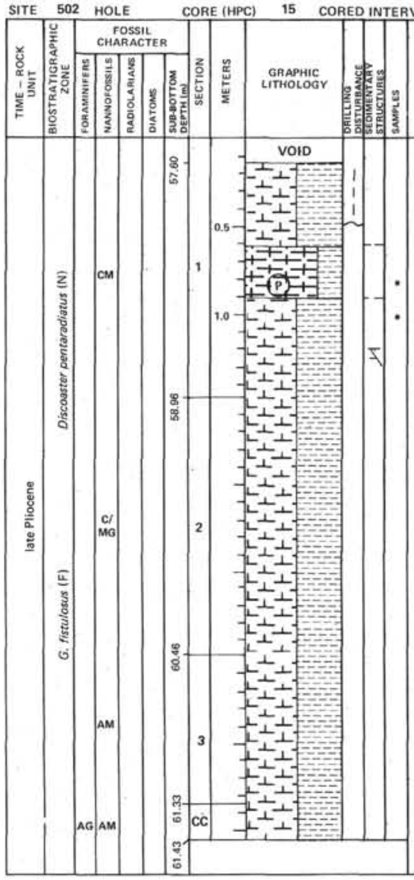
SMEAR SLIDE SUMMARY

	1-90
	D
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	49/A
Volcanic glass (lt)	2/R
Zeolites	1/T
Foraminifers	15/C
Calcareous nannofossils	30/A

CARBONATE BOMB:

1-20 cm = 49%
1-50 cm = 54%
1-80 cm = 49%
1-110 cm = 47%
1-140 cm = 43%
2-20 cm = 54%
2-50 cm = 47%
2-80 cm = 55%
2-109 cm = 55%

SITE 502 HOLE CORE (HPC) 15 CORED INTERVAL 57.6–62.0 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and has faint black and grayish green (10GY 5/2) laminations and faint mottling.

Section 1, 14–50 cm is moderately disturbed.

Section 1, 60–90 cm and Section 2, 140–150 cm is rich in forams and somewhat coarser than the surrounding sediment.

A pyritiferous nodule occurs in Section 1 at 85 cm.

A small fracture with approximately 0.5 cm displacement is present in Section 1 at 130–135 cm.

There is a partial void at Section 3, 80 cm.

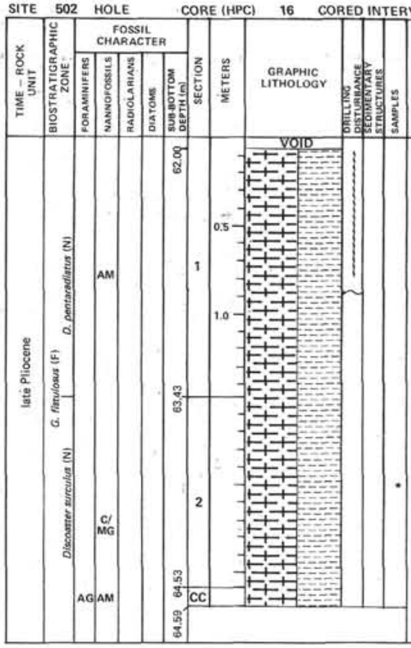
SMEAR SLIDE SUMMARY

	1-85	**1-100**
	M	**D**
Quartz	–	1/T
Pyrite	30/A	–
Other heavy minerals	–	2/R
Clay minerals	33/A	47/A
Volcanic glass (lt)	2/R	2/R
Foraminifers	20/C	8/C
Calcareous nannofossils	15/C	40/A

CARBONATE BOMB:

1-20 cm = 51%
1-50 cm = 39%
1-80 cm = 53%
1-110 cm = 41%
1-140 cm = 37%
2-20 cm = 44%
2-50 cm = 48%
2-80 cm = 44%
2-110 cm = 48%
2-139 cm = 56%
3-20 cm = 46%
3-50 cm = 47%
3-80 cm = 45%

SITE 502 HOLE CORE (HPC) 16 CORED INTERVAL 62.0–66.4 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and contains faint grayish green (10GY 5/2) and black laminations and mottles.

Section 1, 7–89 cm is disturbed.

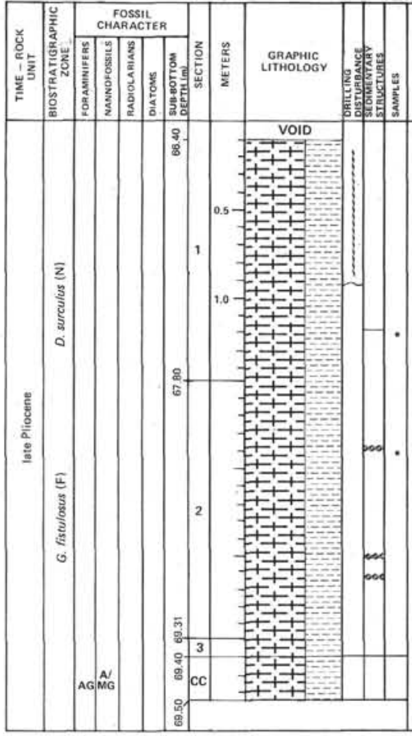
SMEAR SLIDE SUMMARY

	2-50
	D
Other heavy minerals	1/T
Clay minerals	47/A
Volcanic glass (lt)	2/R
Foraminifers	10/C
Calcareous nannofossils	40/A

CARBONATE BOMB:

1-20 cm = 43%
1-50 cm = 43%
1-80 cm = 44%
1-110 cm = 50%
1-139 cm = 47%
2-20 cm = 47%
2-50 cm = 53%
2-80 cm = 50%
2-108 cm = 47%

SITE 502 HOLE CORE (HPC) 17 CORED INTERVAL 66.4–70.8 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color, and moderately burrowed and mottled.

Section 1, 11–96 cm is disturbed.

A grayish green (10GY 5/2) pyritiferous layer occurs at Section 1, 120 cm.

Three indistinct vertical black burrows occur in Section 2 at 41–45, 105–108 cm, and 111–117 cm.

SMEAR SLIDE SUMMARY

	1-120	2-40
	D	D
Quartz	1/T	3/R
Pyrite	5/C	3/R
Clay minerals	43/A	38/A
Volcanic glass (lt0	1/T	1/T
Carbonate unspec.	1/T	–
Foraminifers	10/C	15/C
Calcareous nannofossils	40/A	40/A

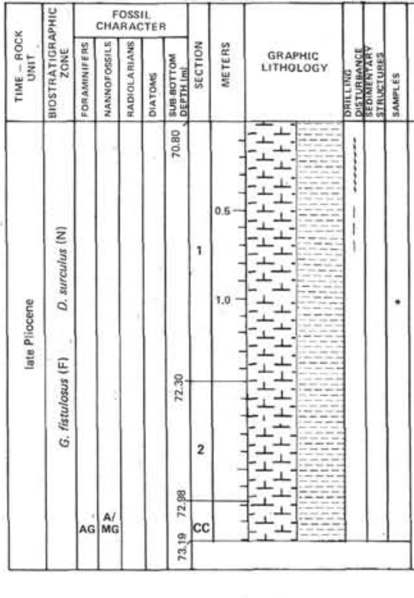
CARBONATE BOMB:

1-20 cm = 44%
1-50 cm = 48%
1-80 cm = 55%
1-110 cm = 46%
1-140 cm = 50%
2-20 cm = 56%
2-50 cm = 46%
2-80 cm = 47%
2-110 cm = 53%
2-140 cm = 52%

CLAY MINERALOGY (<2 μm): 1-114 cm

Smectite	36%
Illite	15%
Chlorite	16%
Kaolinite	33%

SITE 502 HOLE CORE (HPC) 18 CORED INTERVAL 70.8–75.2 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and moderately burrowed and mottled.

Section 1, 0–75 cm is moderately to slightly disturbed.

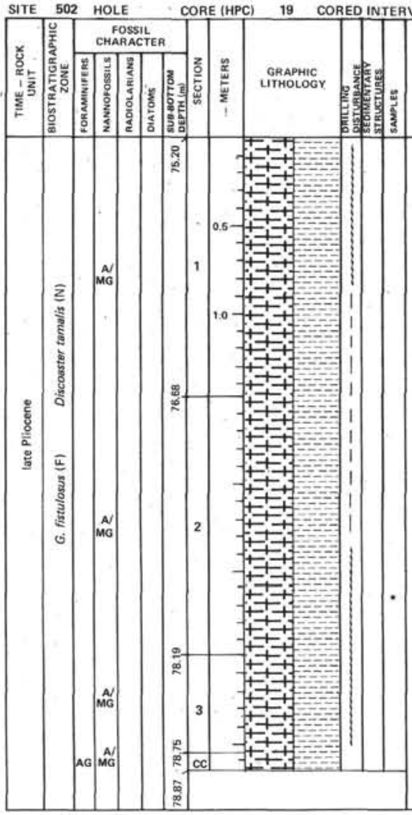
SMEAR SLIDE SUMMARY

	1-100
	D
Quartz	2/R
Other heavy minerals	1/T
Clay minerals	53/A
Foraminifers	5/C
Calcareous nannofossils	40/A

CARBONATE BOMB:

1-20 cm = 48%
1-50 cm = 42%
1-80 cm = 43%
1-110 cm = 54%
1-140 cm = 55%
2-20 cm = 56%
2-50 cm = 52%

SITE 502 HOLE CORE (HPC) 19 CORED INTERVAL 75.2–79.6 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally structureless.

This interval was cored twice as the first attempt had no recovery.

Section 1, 0–80 cm is highly disturbed and Section 1, 80–150 cm is slightly disturbed.

Section 2, 0–80 cm contains occasional indistinct grayish green (10GY 5/2) or black lamina which are displaced by micro-faults with about a 1 cm throw.

Between Section 2, 80 cm and the bottom of the core at Section 3, 56 cm deformation consists of 2 materials which are separated vertically.

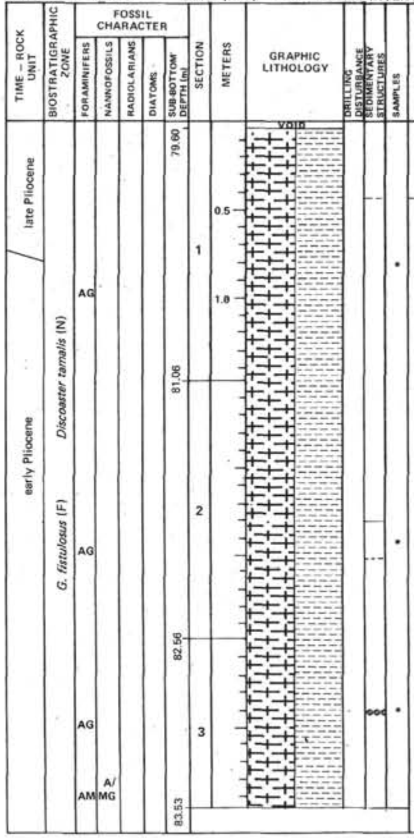
SMEAR SLIDE SUMMARY

	2-118 D
Quartz	3/R
Feldspar	1/T
Other heavy minerals	1/T
Clay minerals	50/A
Foraminifers	10/C
Calcareous nannofossils	35/A

CARBONATE BOMB:

1-20 cm = 52%
1-50 cm = 50%
1-80 cm = 54%
1-110 cm = 56%
1-140 cm = 52%
2-20 cm = 56%
2-50 cm = 46%
2-80 cm = 55%
2-110 cm = 47%
2-140 cm = 46%
3-20 cm = 53%
3-50 cm = 53%

SITE 502 HOLE CORE (HPC) 20 CORED INTERVAL 79.6–84.0 m



LITHOLOGIC DESCRIPTION

5Y 6/4

5Y 6/1

FORAM-BEARING NANNO MARL, which is pale olive (5Y 6/4) to gray (5Y 6/1) in color, and contains burrows, mottling and indistinct grayish green (10GY 5/2) and black lamina.

In Section 2, 79–100 cm the sediment appears slightly coarser than surrounding material.

In Section 2 from 60–70 cm the core liner is damaged.

A pyritic burrow occurs at Section 3, 40 cm.

No Core-Catcher sample was recovered.

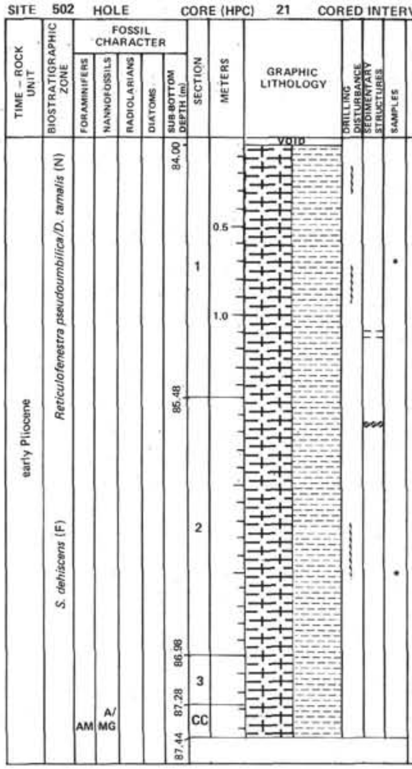
SMEAR SLIDE SUMMARY

	1-80 D	2-92 D	3-40 D
Quartz	2/R	2/R	1/T
Feldspar	–	1/T	–
Pyrite	–	–	5/C
Other heavy minerals	1/T	1/T	–
Clay minerals	45/A	58/A	54/A
Volcanic glass (lt)	1/T	–	–
Carbonate unspec.	1/T	–	–
Foraminifers	20/C	8/C	10/C
Calcareous nannofossils	30/A	30/A	30/A

CARBONATE BOMB:

1-20 cm = 49%
1-50 cm = 63%
1-80 cm = 54%
1-110 cm = 51%
1-140 cm = 57%
2-20 cm = 50%
2-50 cm = 51%
2-80 cm = 47%
2-110 cm = 44%
2-140 cm = 40%
3-20 cm = 47%
3-50 cm = 53%
3-80 cm = 46%

SITE 502 HOLE CORE (HPC) 21 CORED INTERVAL 84.0–88.4 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color and is faintly laminated and mottled.

The upper 40 cm of Section 1 is disturbed and between 80 and 100 cm the section has laminae smeared to 60° from horizontal.

Section 1, 60–80 cm is very slightly darker in color than the surrounding sediment.

Section 1, 110–115 cm appears slightly coarser than surrounding sediment.

Two vertical black burrows occur at Section 2, 13–22 cm.

In Section 2 at 65–110 cm the bedding and burrows smeared to approximately 70° from horizontal.

Sections 2 and 3 are moderately burrowed.

The core liner is damaged from 130–135 cm in Section 2.

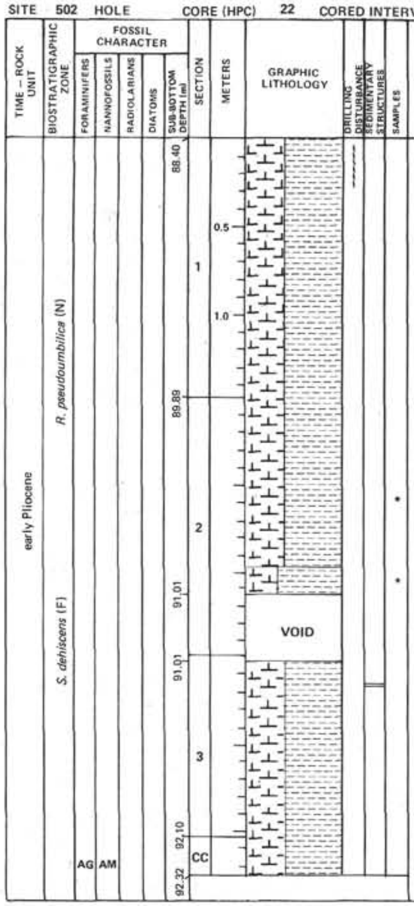
SMEAR SLIDE SUMMARY

	1-70 D	2-100 D
Quartz	2/R	1/T
Feldspar	1/T	–
Other heavy minerals	2/R	1/T
Clay minerals	60/A	47/A
Volcanic glass (lt)	–	1/T
Foraminifers	5/C	20/C
Calcareous nannofossils	30/A	30/A

CARBONATE BOMB:

1-20 cm = 49%
1-50 cm = 40%
1-80 cm = 47%
1-110 cm = 49%
1-140 cm = 41%
2-20 cm = 44%
2-50 cm = 48%
2-80 cm = 49%
2-110 cm = 52%
2-140 cm = 44%
3-20 cm = 44%

SITE 502 HOLE CORE (HPC) 22 CORED INTERVAL 88.4–92.8 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color and contains faint laminae and prominent burrows.

Section 1, 0–35 cm is disturbed.

Section 2, 98–113 cm appears to be coarser in texture than the surrounding sediment, but remains undifferentiated by smear slide.

In Section 3 from 55–70 cm the core liner was split.

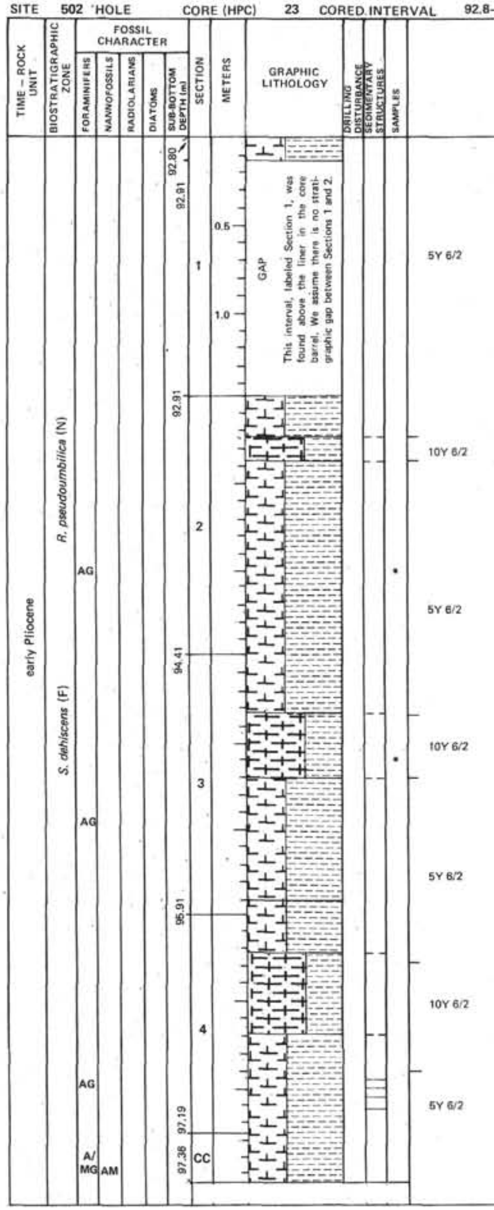
SMEAR SLIDE SUMMARY

	2-60 D	2-110 D
Quartz	–	1/T
Feldspar	1/T	–
Pyrite	2/R	–
Other heavy minerals	–	1/T
Clay minerals	55/A	67/A
Volcanic glass (lt)	1/T	–
Carbonate unspec.	1/T	2/R
Foraminifers	10/C	4/R
Calcareous nannofossils	30/A	25/A

CARBONATE BOMB:

1-20 cm = 45%
1-50 cm = 41%
1-80 cm = 49%
1-110 cm = 55%
1-140 cm = 55%
2-20 cm = 44%
2-50 cm = 38%
2-80 cm = 47%
2-110 cm = 51%
3-20 cm = 55%
3-50 cm = 43%
3-80 cm = 47%
3-107 cm = 49%

SITE 502 HOLE CORE (HPC) 23 CORED INTERVAL 92.8–97.2 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL TO NANNO MARL

The core is light olive gray (5Y 6/2) in color with minor areas of pale olive (10Y 6/2). The sediment is structureless in Section 1; Sections 2, 3, and 4 show faint laminae, mottling, and burrows.

The burrows are more apparent in lighter colored sediment (10Y 6/2).

In Section 4, light colored laminae (10Y 6/2) occur at 93, 99, 104, and 114 cm.

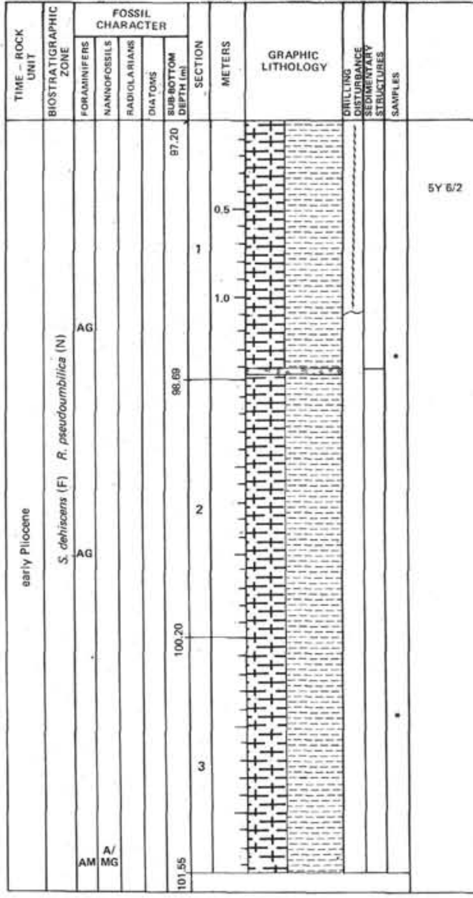
SMEAR SLIDE SUMMARY

	2-100	3-60
	D	D
Quartz	1/T	1/T
Other heavy minerals	1/T	1/T
Clay minerals	67/A	42/A
Volcanic glass (lt)	–	1/T
Carbonate unspec.	2/R	–
Foraminifers	4/R	15/C
Calcareous nannofossils	25/A	40/A

CARBONATE BOMB:

2-20 cm = 40%
2-50 cm = 44%
2-80 cm = 39%
2-110 cm = 40%
2-140 cm = 45%
3-20 cm = 40%
3-50 cm = 47%
3-80 cm = 49%
3-110 cm = 43%
3-140 cm = 45%
4-20 cm = 43%
4-50 cm = 48%
4-80 cm = 37%
4-110 cm = 47%

SITE 502 HOLE CORE (HPC) 24 CORED INTERVAL 97.2–101.6 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color.

Section 1, 0–110 cm is disturbed.

Indurated laminae occur at Section 1, 146 cm. They are 0.75 cm thick and black (2.5Y 5/0) in color. Smear slide shows them to consist of ash, pyrite and zeolite components.

The sediment is generally structureless, but contains some faint mottling and burrowing.

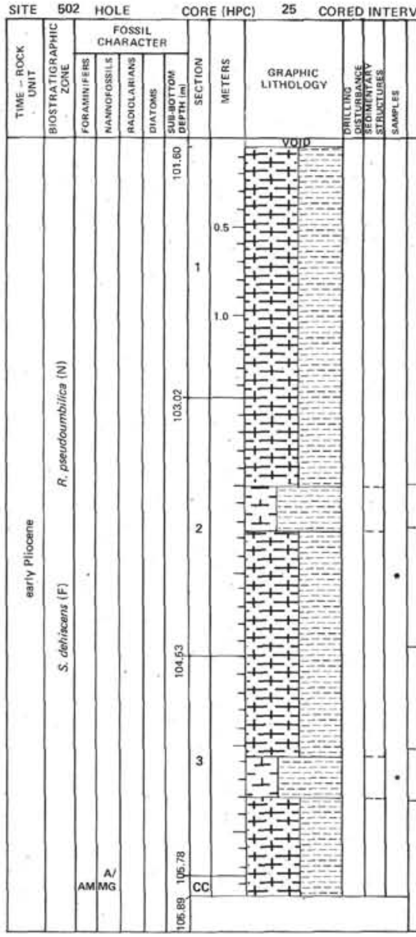
SMEAR SLIDE SUMMARY

	1-146	3-48
	D	D
Quartz	1/T	1/T
Feldspar	1/T	–
Pyrite	5/C	2/R
Clay minerals	42/A	60/A
Volcanic glass (lt)	10/C	2/R
Zeolites	5/C	–
Carbonate unspec.	–	2/R
Foraminifers	15/C	15/C
Calcareous nannofossils	20/C	20/C

CARBONATE BOMB:

1-20 cm = 45%
1-50 cm = 41%
1-80 cm = 44%
1-110 cm = 47%
1-140 cm = 41%
2-20 cm = 41%
2-50 cm = 41%
2-80 cm = 45%
2-110 cm = 45%
2-140 cm = 50%
3-20 cm = 47%
3-50 cm = 46%
3-80 cm = 45%
3-110 cm = 50%

SITE 502 HOLE CORE (HPC) 25 CORED INTERVAL 101.6–106.0 m



LITHOLOGIC DESCRIPTION

5Y 6/2

5Y 5/2

5Y 7/1

5Y 6/2

5Y 5/2

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color. It is generally structureless, but contains some faint burrows, mottling, and laminae. Faint Zoophycos burrows occur in Section 2.

Section 2, 50–75 cm and Section 3, 55–80 cm consist of slightly darker (olive gray (5Y 5/2) sediment which is NANNO MARL.

In Section 2, 75–150 cm the sediment is slightly lighter in color being light gray (5Y 7/1).

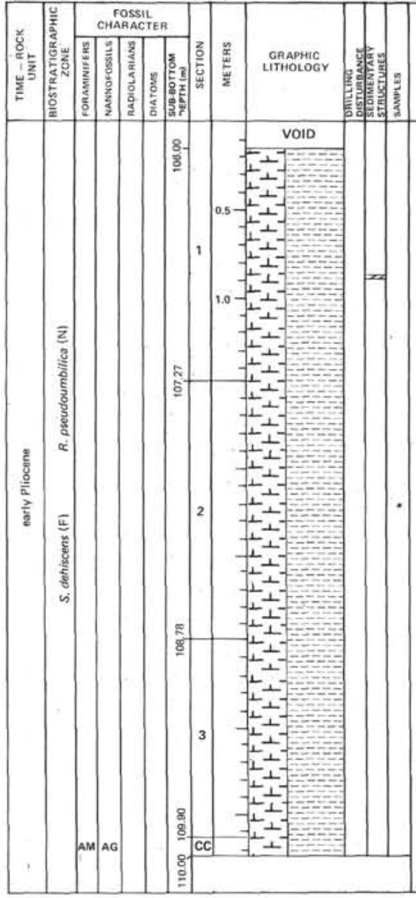
SMEAR SLIDE SUMMARY

	2-100 D	3-70 D
Quartz	1/T	–
Pyrite	–	2/R
Other heavy minerals	2/R	1/T
Clay minerals	51/A	59/A
Volcanic glass (lt)	1/T	2/R
Carbonate unspec.	–	2/R
Foraminifers	15/C	4/R
Calcareous nannofossils	30/A	30/A

CARBONATE BOMB:

1-20 cm = 38%
1-50 cm = 54%
1-80 cm = 47%
1-110 cm = 50%
1-140 cm = 52%
2-20 cm = 55%
2-50 cm = 47%
2-80 cm = 42%
2-110 cm = 53%
3-20 cm = 44%
3-80 cm = 41%
3-110 cm = 46%
3-140 cm = 56%

SITE 502 HOLE CORE (HPC) 26 CORED INTERVAL 106.0–110.4 m



LITHOLOGIC DESCRIPTION

5Y 6/1

NANNO MARL which is gray (5Y 6/1) in color. It is generally structureless with occasional burrows and mottling.

A small pyrite nodule occurs at Section 3, 22 cm.

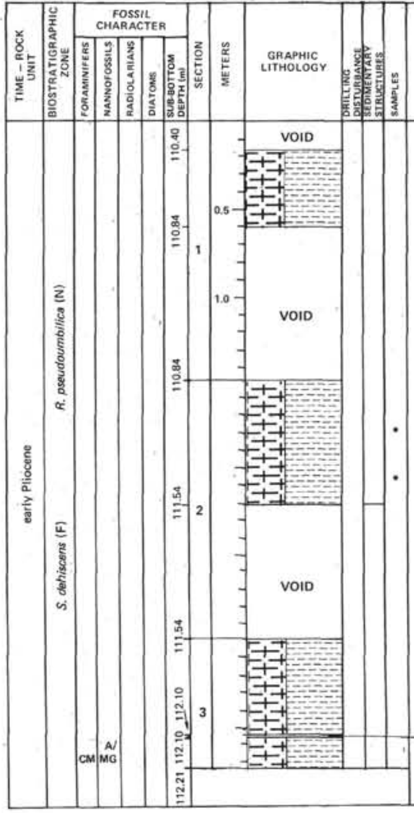
SMEAR SLIDE SUMMARY

	2-70 D
Pyrite	2/R
Other heavy minerals	2/R
Clay minerals	62/A
Volcanic glass (lt)	3/R
Carbonate unspec.	2/R
Foraminifers	4/R
Calcareous nannofossils	25/A

CARBONATE BOMB:

1-20 cm = 49%
1-50 cm = 50%
1-80 cm = 35%
1-110 cm = 42%
2-50 cm = 38%
2-80 cm = 42%
2-110 cm = 42%
2-140 cm = 34%
3-20 cm = 41%
3-50 cm = 37%
3-80 cm = 37%
3-110 cm = 36%

SITE 502 HOLE CORE (HPC) 27 CORED INTERVAL 110.4–114.8 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color, with very faint mottling and burrowing.

VOLCANIC ASH AND NANNO-BEARING FORAM MARL is present in an approximately 1 cm thick layer at Section 2, 63 cm.

SMEAR SLIDE SUMMARY

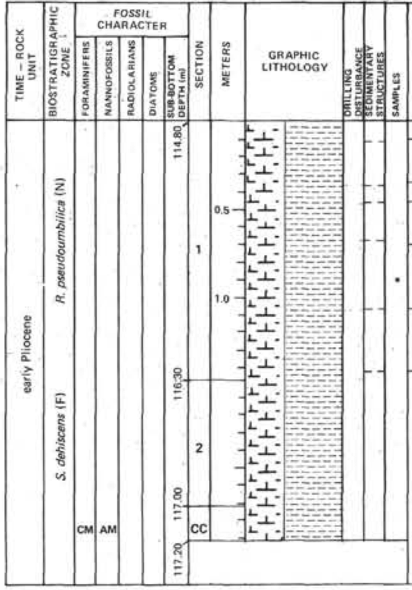
	2-30 D	2-63 D
Pyrite	1/T	3/R
Other heavy minerals	1/T	–
Clay minerals	59/A	45/A
Volcanic glass (lt)	2/R	10/C
Zeolites	–	2/R
Carbonate unspec.	2/R	–
Foraminifers	10/C	25/A
Calcareous nannofossils	25/A	15/C

CARBONATE BOMB:

2-20 cm = 32%
2-50 cm = 34%
3-20 cm = 34%
3-50 cm = 33%

VOID

SITE 502 HOLE CORE (HPC) 28 CORED INTERVAL 114.8–117.3 m



LITHOLOGIC DESCRIPTION

5Y 5/1
5Y 6/1
5Y 5/1
5Y 6/1
5Y 5/1
5Y 6/1
5Y 5/1

NANNO MARL, containing alternating shades of lighter (5Y 6/1) and darker (5Y 5/1) gray. Very faint laminae and mottling are present.

Section 2 may be disturbed as a very faint flow structure may be present.

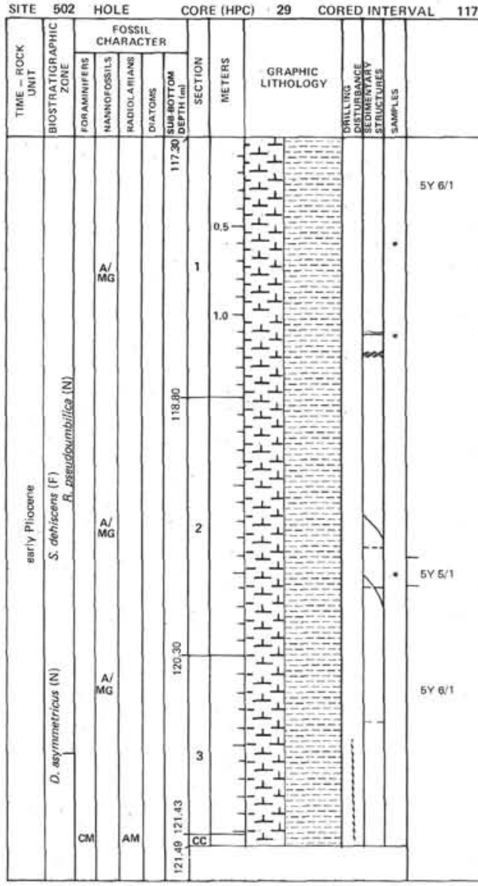
SMEAR SLIDE SUMMARY

	1-90 D
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	62/A
Volcanic glass (lt)	3/R
Carbonate unspec.	3/R
Foraminifers	4/R
Calcareous nannofossils	25/A

CARBONATE BOMB:

1-20 cm = 55%
1-50 cm = 40%
1-80 cm = 29%
1-110 cm = 34%
1-140 cm = 38%
2-20 cm = 29%
2-50 cm = 34%

SITE 502 HOLE CORE (HPC) 29 CORED INTERVAL 117.3–121.7 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color with mottling and burrows throughout.

In Section 1 at 116 cm a pair of grayish-green (10GY 5/2) laminae occur which consist of pyrite-bearing calcareous clay.

A prominent burrow with a halo is present at Section 1, 125 cm.

In Section 2 from 90–108 cm a NANNO-BEARING CLAY occurs which is gray (5Y 5/1) in color. This shade is slightly darker than surrounding sediment and contains 5% vitric ash.

Section 2 at approximately 70–80 and 104–114 cm contains a set of conjugate fractures.

Section 3 from 42 cm to the bottom of the core is disturbed by "flow-in".

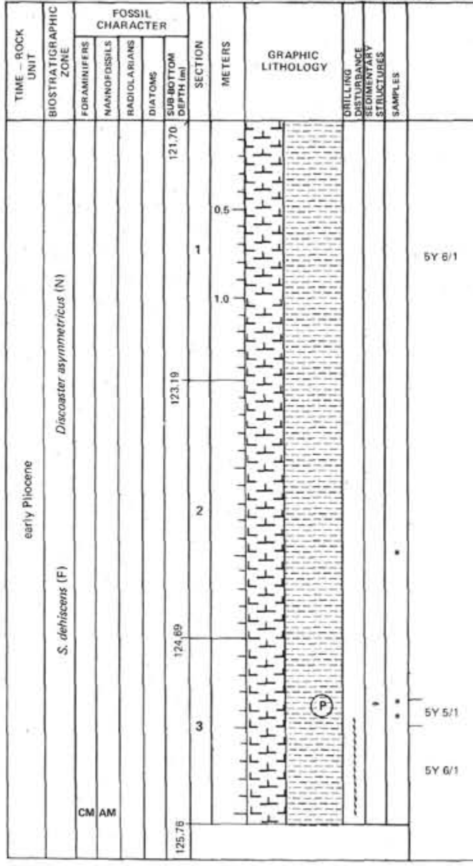
SMEAR SLIDE SUMMARY

	1-60 D	1-116 D	2-100 D
Quartz	1/T	–	1/T
Pyrite	1/T	8/C	2/R
Other heavy minerals	1/T	1/T	2/R
Clay minerals	56/A	68/A	68/A
Volcanic glass (lt)	–	1/T	5/C
Zeolites	–	2/R	–
Carbonate unspec.	1/T	–	2/R
Foraminifers	5/C	5/C	1/T
Calcareous nannofossils	35/A	15/C	20/C

CARBONATE BOMB:

1-20 cm = 30%
1-50 cm = 38%
1-110 cm = 34%
1-140 cm = 42%
2-20 cm = 24%
2-50 cm = 28%
2-80 cm = 28%
2-110 cm = 26%
2-140 cm = 46%
3-20 cm = 52%
3-80 cm = 34%

SITE 502 HOLE CORE (HPC) 30 CORED INTERVAL 121.7–126.1 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is gray (5Y 6/1) in color and generally structureless, but faintly mottled and burrowed throughout.

A pyrite nodule (~ 1 cm diameter) with a black halo occurs at Section 3, 39 cm.

Section 3, 33–50 cm is a slightly darker shade of gray (5Y 5/1) and consists of CALCAREOUS CLAY.

Section 3 from 65 cm to the bottom of the core is disturbed by "flow-in".

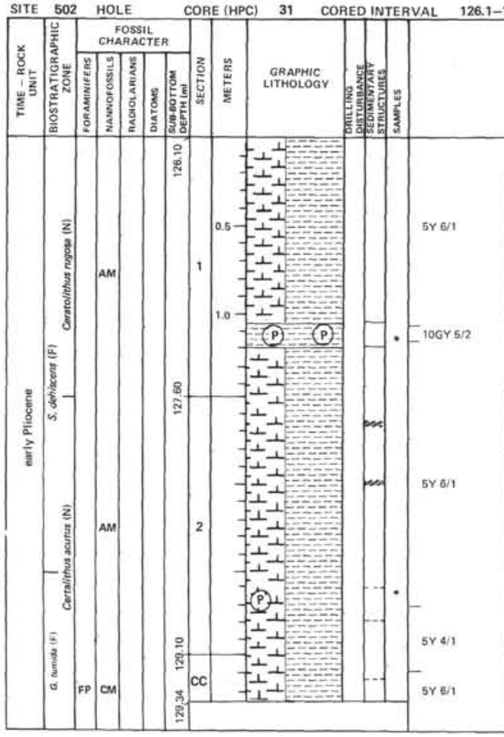
SMEAR SLIDE SUMMARY

	2-100 D	3-39 D	3-45 D
Quartz	1/T	–	–
Pyrite	1/T	99/D	3/R
Other heavy minerals	1/T	–	1/T
Clay minerals	62/A	–	64/A
Zeolites	1/T	–	–
Carbonate unspec.	–	–	1/T
Foraminifers	4/R	–	3/R
Calcareous nannofossils	30/A	1/T	20/C

CARBONATE BOMB:

1-20 cm = 42%
1-50 cm = 28%
1-80 cm = 46%
1-110 cm = 47%
1-140 cm = 46%
2-20 cm = 34%
2-50 cm = 37%
2-80 cm = 50%
2-110 cm = 52%
2-140 cm = 57%
3-20 cm = 38%
3-50 cm = 38%
3-80 cm = 34%
3-105 cm = 46%

SITE 502 HOLE CORE (HPC) 31 CORED INTERVAL 126.1–130.5 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is gray (5Y 6/1) in color and extensively mottled and burrowed.

Section 1, 109–118 cm consists of PYRITIC CLAY, which is grayish green (10GY 5/2) in color.

In Section 2 at 14 and 49 cm there are prominent burrows with halos.

A small pyrite nodule occurs in Section 2 at 116 cm.

A faint grayish green (10GY 5/2) lamina occurs in Section 2 at 107 cm.

Below Section 2, 125 cm the core gradually becomes darker in color (5Y 4/1).

SMEAR SLIDE SUMMARY

	1-115 D	2-114 D
Quartz	–	1/T
Pyrite	5/C	2/R
Other heavy minerals	–	1/T
Clay minerals	87/D	57/A
Volcanic glass (lt)	2/R	3/R
Zeolites	1/T	–
Carbonate unspec.	2/R	2/R
Foraminifers	1/T	4/R
Calcareous nannofossils	2/R	30/A

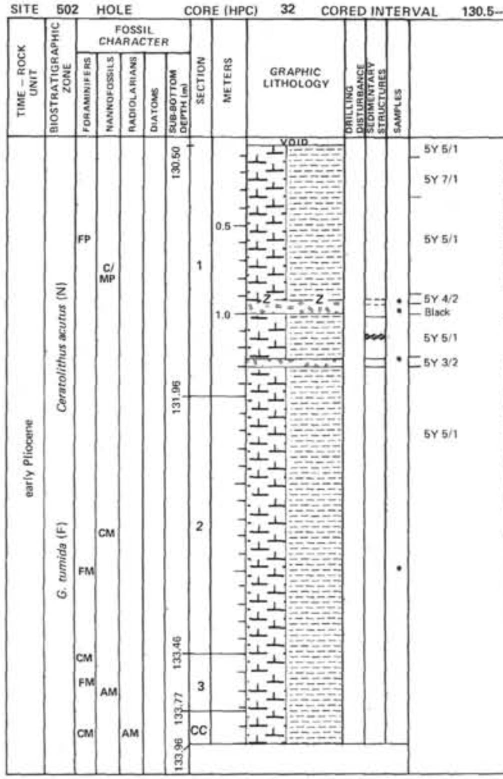
CARBONATE BOMB:

1-20 cm = 43%	2-20 cm = 32%
1-50 cm = 30%	2-50 cm = 32%
1-80 cm = 37%	2-80 cm = 24%
1-108 cm = 10%	2-110 cm = 33%
1-111 cm = 4%	2-140 cm = 12%
1-140 cm = 30%	3-20 cm = 24%

CLAY MINERALOGY (<2 μm): 1-92 cm

Smectite	56%
Illite	10%
Chlorite	11%
Kaolinite	24%

SITE 502 HOLE CORE (HPC) 32 CORED INTERVAL 130.5–134.9 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is gray (5Y 5/1) in color and thoroughly burrowed and mottled. Composite burrows are present.

In Section 1 at 95–103 cm is an indurated PYRITIC ASH which is black in color. A *ZEOLITIC CLAY* which is olive gray (5Y 4/2) in color is found directly above the ash at 92–95 cm.

In Section 1 at 126–130 cm a second volcanic ash which is dark olive gray (5Y 3/2) in color is present.

A Zoophycus burrow is present in Section 1 at 111 cm.

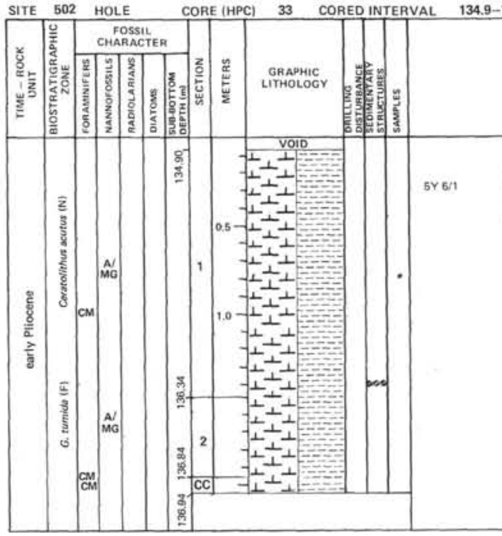
SMEAR SLIDE SUMMARY

	1-93 D	1-100 D	1-129 D	2-100 D
Quartz	–	–	1/T	1/T
Feldspar	–	–	2/R	–
Pyrite	5/C	10/C	8/C	2/R
Clay minerals	70/A	–	7/C	65/A
Volcanic glass (lt)	5/C	90/D	42/A	2/R
Volcanic glass (dk)	–	–	20/C	–
Zeolites	15/C	–	10/C	3/R
Carbonate unspec.	–	–	–	3/R
Foraminifers	–	–	1/T	4/R
Calcareous nannofossils	5/C	–	5/C	30/A
Mica	–	–	4/R	–

CARBONATE BOMB:

1-20 cm = 24%	2-20 cm = 17%
1-50 cm = 21%	2-50 cm = 10%
1-80 cm = 18%	2-80 cm = 17%
1-100 cm = 1%	2-110 cm = 13%
1-110 cm = 17%	2-140 cm = 25%
1-140 cm = 23%	3-20 cm = 37%

SITE 502 HOLE CORE (HPC) 33 CORED INTERVAL 134.9–139.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and faintly burrowed and mottled.

In Section 1 at 141 cm there is a prominent burrow with a grayish green (10GY 5/2) halo.

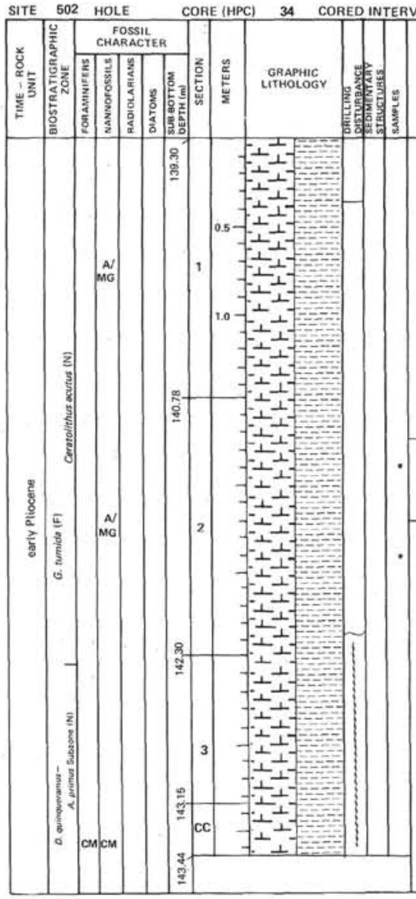
SMEAR SLIDE SUMMARY

	1-80 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	41/A
Volcanic glass (lt)	2/R
Carbonate unspec.	5/C
Foraminifers	8/C
Calcareous nannofossils	40/A

CARBONATE BOMB:

1-20 cm = 33%	1-110 cm = 42%
1-50 cm = 43%	1-140 cm = 37%
1-80 cm = 47%	2-20 cm = 48%

SITE 502 HOLE CORE (HPC) 34 CORED INTERVAL 139.3–143.7 m



LITHOLOGIC DESCRIPTION

5Y 6/1

5Y 5/1

5Y 6/1

NANNO MARL TO FORAM-BEARING NANNO MARL, which is gray (5Y 6/1 and 5Y 5/1) in color and generally structureless, but with occasional burrows and mottles.

The liner is damaged in the interval 0–33 cm in Section 1.

Below Section 2, 138 cm the sediment is disturbed by apparent flow-in.

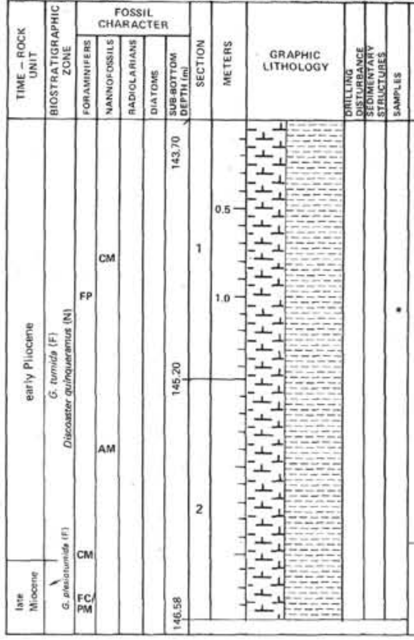
SMEAR SLIDE SUMMARY

	2-40	2-90
	D	D
Quartz	2/R	1/T
Pyrite	1/T	2/R
Other heavy minerals	1/T	–
Clay minerals	63/A	47/A
Volcanic glass (lt)	2/R	1/T
Volcanic glass (dk)	–	2/R
Carbonate unspec.	3/R	5/C
Foraminifers	3/R	7/C
Calcareous nannofossils	25/A	35/A

CARBONATE BOMB:

1-20 cm = 47%
1-50 cm = 26%
1-80 cm = 40%
1-110 cm = 31%
1-140 cm = 42%
2-20 cm = 39%
2-50 cm = 23%
2-80 cm = 49%
2-110 cm = 47%
2-140 cm = 51%

SITE 502 HOLE CORE (HPC) 35 CORED INTERVAL 143.7–148.1 m



LITHOLOGIC DESCRIPTION

5Y 5/1

5Y 6/1

NANNO MARL, which is gray (5Y 5/1) in color and generally structureless, except for some burrows and mottles.

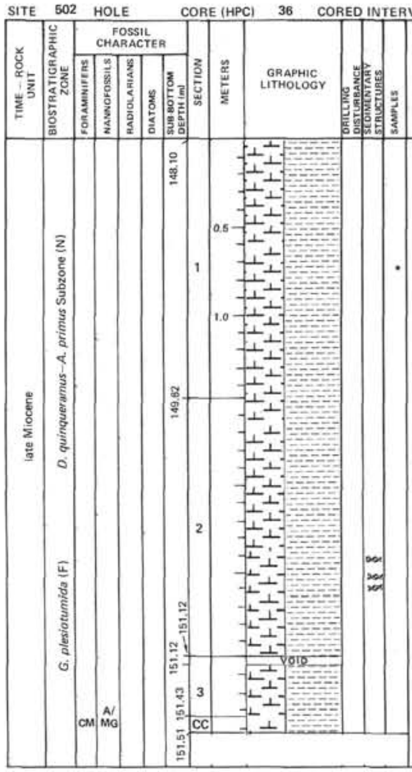
SMEAR SLIDE SUMMARY

	1-110
	D
Quartz	2/R
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	61/A
Volcanic glass (lt)	1/T
Carbonate unspec.	2/R
Foraminifers	2/R
Calcareous nannofossils	30/A

CARBONATE BOMB:

1-20 cm = 28%
1-50 cm = 21%
1-80 cm = 27%
1-110 cm = 30%
1-140 cm = 32%
2-20 cm = 34%
2-50 cm = 46%
2-80 cm = 28%

SITE 502 HOLE CORE (HPC) 36 CORED INTERVAL 148.1–152.5 m



LITHOLOGIC DESCRIPTION

5Y 6/1

NANNO MARL which is gray (5Y 6/1) in color and mottled and burrowed. Manganese micronodules are present.

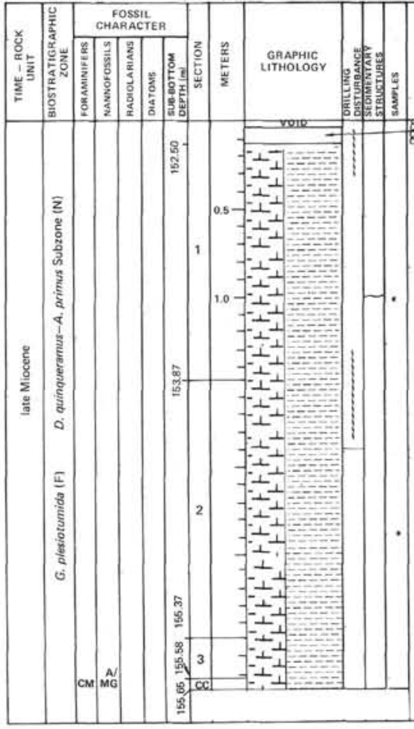
Zoophycus burrows occur at Section 2, 91, 108, 110, and 113 cm.

SMEAR SLIDE SUMMARY

	1-74 D
Quartz	1/T
Pyrite	3/R
Other heavy minerals	63/A
Carbonate unspec.	2/R
Foraminifers	1/T
Calcareous nannofossils	30/A

CARBONATE BOMB:
1-80 cm = 41%
2-80 cm = 43%

SITE 502 HOLE CORE (HPC) 37 CORED INTERVAL 152.5–156.9 m



LITHOLOGIC DESCRIPTION

Downhole contamination

5Y 6/1

CALCAREOUS CLAY TO NANNO MARL, which is gray (5Y 6/1) in color, mottled and burrowed. Micronodules are present. This interval was cored twice as no recovery was achieved on the first attempt.

In Section 1, the following disturbances occur: 0–35 cm is disturbed; 35–100 cm is approximately intact; at 103 cm is a deformed color contact; 103–130 cm appears intact; and 130–150 cm is disturbed.

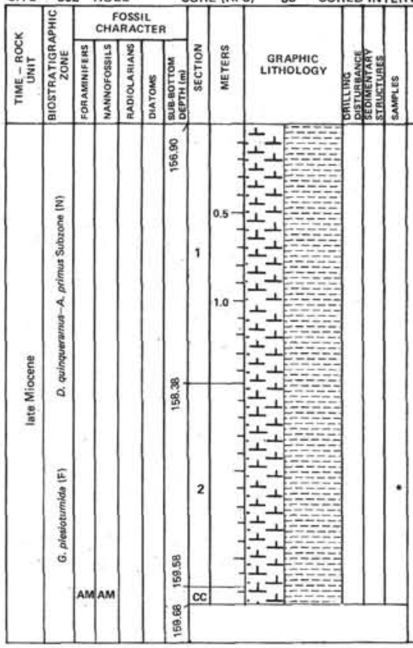
Section 2, 0–42 cm is disturbed, but below this level the core appears to be intact.

SMEAR SLIDE SUMMARY

	1-100 D	2-90 D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	–
Clay minerals	69/A	62/A
Volcanic glass (lt)	1/T	3/R
Volcanic glass (dk)	–	1/T
Carbonate unspec.	5/C	5/C
Foraminifers	1/T	2/R
Calcareous nannofossils	20/C	25/A

CARBONATE BOMB:
1-80 cm = 33%
2-80 cm = 17%

SITE 502 HOLE CORE (HPC) 38 CORED INTERVAL 156.9–161.3 m



LITHOLOGIC DESCRIPTION

5Y 6/1

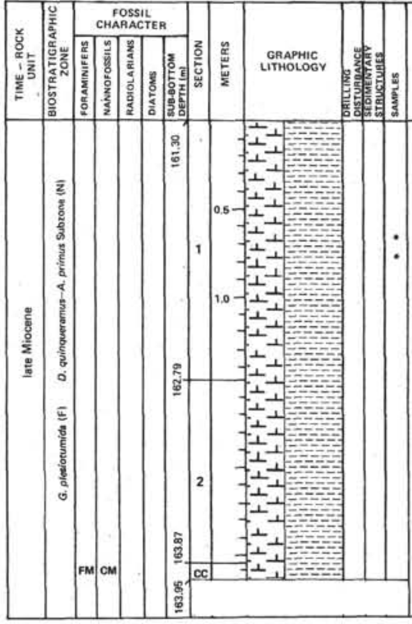
NANNO MARL, which is gray (5Y 6/1) in color and generally structureless except for some mottling and burrowing. Micronodules of Mn(?) are present.

SMEAR SLIDE SUMMARY

	2-60
	D
Quartz	2/R
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	59/A
Volcanic glass (lt)	1/T
Carbonate unspec.	4/R
Foraminifers	2/R
Calcareous nannofossils	30/A

CARBONATE BOMB:
1-80 cm = 29%
2-80 cm = 42%

SITE 502 HOLE CORE (HPC) 39 CORED INTERVAL 161.3–165.7 m



LITHOLOGIC DESCRIPTION

5Y 5/1

NANNO MARL, which is gray (5Y 5/1) in color and generally structureless, except for some faint mottling and burrowing. Occasional white specks of microcrystalline carbonate are also present.

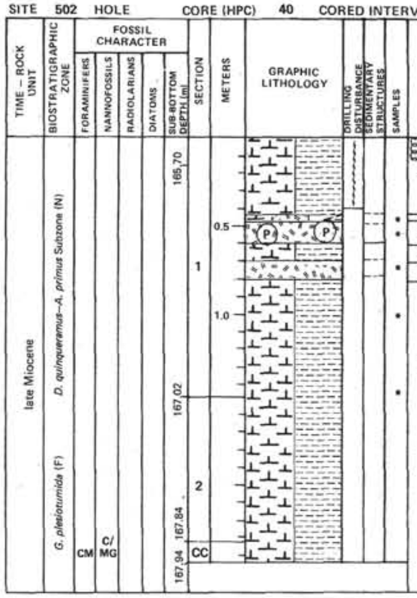
SMEAR SLIDE SUMMARY

	1-70	1-76[a]
	D	M
Quartz	1/T	–
Pyrite	2/R	–
Other heavy minerals	1/T	–
Clay minerals	57/A	–
Volcanic glass (lt)	1/T	–
Carbonate unspec.	3/R	100
Foraminifers	5/C	–
Calcareous nannofossils	30/A	–

[a] Microcrystalline carbonate

CARBONATE BOMB:
1-80 cm = 25%
2-80 cm = 29%

SITE 502 HOLE CORE (HPC) 40 CORED INTERVAL 165.7–170.1 m



LITHOLOGIC DESCRIPTION

5Y 5/1
5Y 5/2
Black
5Y 5/1
5Y 5/2
5Y 5/1

NANNO MARL, which is gray (5Y 5/1) in color and structureless, except for some mottling and burrowing. Large white forams are dispersed through the sediment and are visible by eye.

Section 1, 0–40 cm is intensely disturbed with the upper 18 cm a result of downhole contamination.

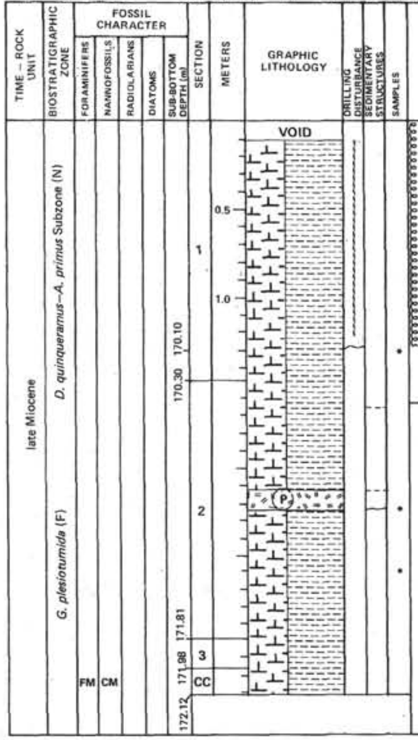
In Section 1 a black pyritic volcanic ash occurs at 58–50 cm; an ashy calcareous clay, olive gray (5Y 5/2) in color is at 47–50 cm; and dispersed ash (upper and lower contacts are diffused), olive gray (5Y 5/2) in color is at 71–80 cm.

SMEAR SLIDE SUMMARY

	1-47	1-55	1-76	1-100	1-149
	D	M	D	D	M
Quartz	–	–	–	1/T	–
Feldspar	–	–	1/T	–	–
Pyrite	5/C	20/C	–	2/R	–
Clay minerals	38/A	–	40/A	52/A	–
Volcanic glass (lt)	25/A	80/D	30/A	2/R	–
Volcanic glass (dk)	–	–	10/C	–	–
Zeolites	7/C	–	1/T	1/T	–
Carbonate unspec.	2/R	–	2/R	2/R	–
Foraminifers	3/R	–	1/T	5/C	100/D
Calcareous nannofossils	20/C	–	15/C	35/A	–

CARBONATE BOMB:
1-80 cm = 32%
2-80 cm = 25%

SITE 502 HOLE CORE (HPC) 41 CORED INTERVAL 170.1–174.5 m



LITHOLOGIC DESCRIPTION

5Y 6/1
5GY 5/2

NANNO MARL, which is gray (5Y 6/1) in color, mottled and faintly burrowed with Mn(?) micronodules throughout.

Section 1, 10–130 cm is intensely disturbed and appears to be downhole contamination.

In Section 2 at 18 cm the sediment becomes grayish green (10GY 5/2) in color. It remains a NANNO MARL, which is structureless, with faint burrowing and mottling. Micronodules become less prominent.

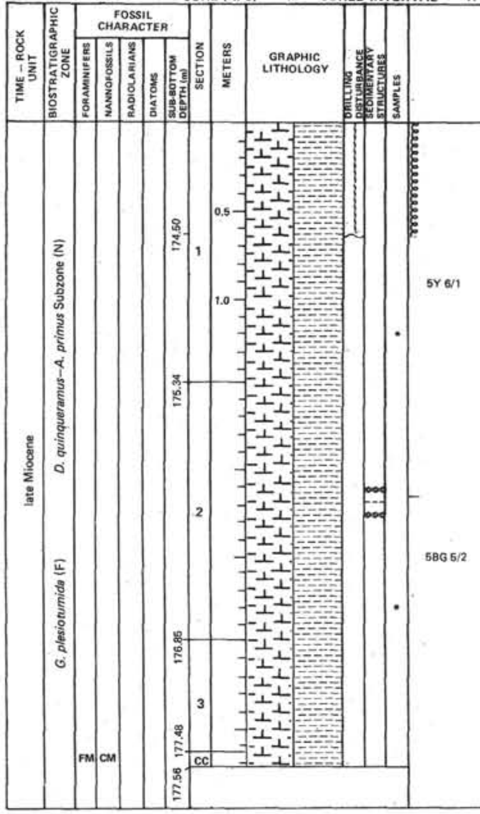
A black pyritic ash grading upward into normal sediment occurs in Section 2 at 63–75 cm. Within the ash layer there is an inclusion of the dominant marl.

SMEAR SLIDE SUMMARY

	1-130	2-68	2-110
	D	M	D
Quartz	1/R	2/R	1/T
Feldspar	–	–	1/T
Pyrite	3/R	35/A	2/R
Other heavy minerals	1/T	–	–
Clay minerals	59/A	–	59/A
Volcanic glass (lt)	1/T	63/A	2/R
Carbonate unspec.	3/R	–	3/R
Foraminifers	2/R	–	2/R
Calcareous nannofossils	30/A	–	30/A

CARBONATE BOMB:
2-80 cm = 23%

SITE 502 HOLE CORE (HPC) 42 CORED INTERVAL 174.5–178.9 m



LITHOLOGIC DESCRIPTION

CALCAREOUS CLAY, which is gray (5Y 6/1) to grayish blue green (5BG 5/2) in color. It is generally mottled and faintly burrowed and contains a significant proportion of ash (5–10%).

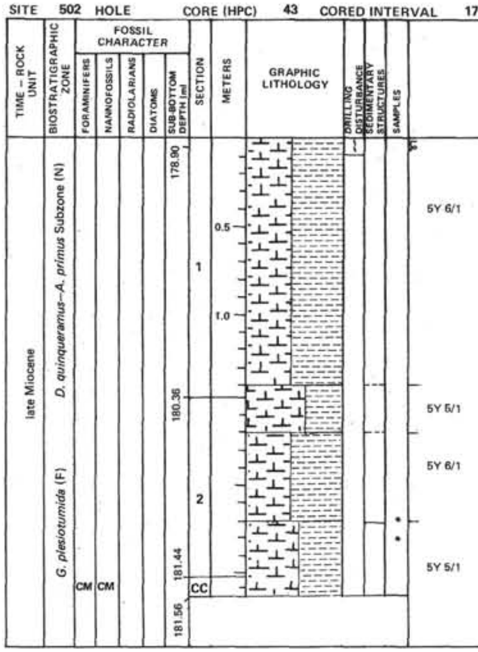
Burrowing is more prominent in area of a color change in Section 2 at approximately 65 cm.

SMEAR SLIDE SUMMARY

	1-120	2-130
	D	D
Quartz	1/T	1/T
Pyrite	5/C	3/R
Clay minerals	45/A	65/A
Volcanic glass (lt)	4/R	7/C
Volcanic glass (dk)	2/R	–
Zeolites	3/R	–
Carbonate unspec.	2/R	2/R
Foraminifers	3/R	2/R
Calcareous nannofossils	35/A	20/A

CARBONATE BOMB:
1-80 cm = 10%
2-80 cm = 11%
3-54 cm = 13%

SITE 502 HOLE CORE (HPC) 43 CORED INTERVAL 178.9–183.3 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is light to dark gray (5Y 6/1 and 5Y 5/1) in color and is mottled and extensively burrowed with some composite burrows. Black Mn(?) micronodules are present throughout.

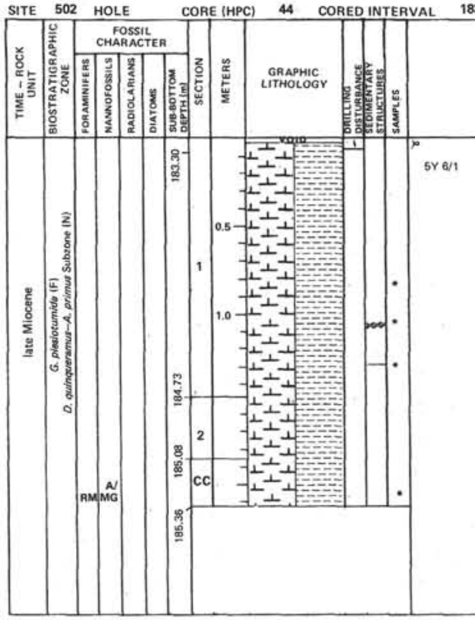
Section 1, 0–5 cm is disturbed and probably represents downhole contamination.

SMEAR SLIDE SUMMARY

	2-70	2-80
	D	D
Quartz	1/T	–
Pyrite	2/R	5/C
Other heavy minerasl	1/T	–
Clay minerals	52/A	41/A
Volcanic glass (lt)	2/R	3/C
Volcanic glass (dk)	–	1/T
Zeolites	1/T	–
Carbonate unspec.	2/R	3/C
Foraminifers	5/C	7/C
Calcareous nannofossils	35/A	40/A

CARBONATE BOMB:
1-80 cm = 31%
2-80 cm = 30%

SITE 502 HOLE CORE (HPC) 44 CORED INTERVAL 183.3–187.7 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is light to dark gray (5Y 6/1 to 5Y 5/1) in color and is mottled and burrowed throughout with occasional composite burrows.

In Section 1 from 0–7 cm the sediment is disturbed and may be downhole contamination.

A very prominent olive (5Y 5/3) burrow with a black halo is in Section 1 at 108–111 cm.

In Section 1, 120–131 cm there is a very prominent dusky yellowish green (10GY 3/2) layer with indistinct contacts, which is composed of CALCAREOUS CLAY.

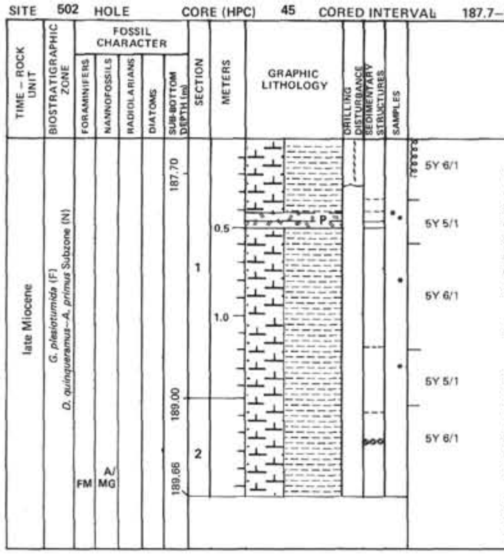
A color change in the Core-Catcher from lighter to darker gray occurs at 7 cm. The bottom 1 cm consists of NANNO-BEARING CLAYEY ASH.

SMEAR SLIDE SUMMARY

	1-80	1-108	1-130	CC, 27
	D	D	D	D
Pyrite	4/R	1/T	2/R	2/R
Other heavy minerals	–	–	–	1/T
Clay minerals	46/A	61/A	73/A	24/C
Volcanic glass (lt)	3/R	2/R	3/R	35/A
Zeolites	1/T	–	–	1/T
Carbonate unspec.	3/R	3/R	2/R	1/T
Foraminifers	3/R	3/R	2/R	1/T
Calcareous nannofossils	40/A	30/A	20/C	20/C
Celadonite	–	–	–	5/C

CARBONATE BOMB:
1-80 cm = 34%
2-10 cm = 36%

SITE 502 HOLE CORE (HPC) 45 CORED INTERVAL 187.7–192.1 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which consists of alternating light and dark gray (5Y 6/1 and 5Y 5/1) layers. Burrows and mottles are prominent.

Section 1, 0–24 cm is disturbed by coring with the upper 20 cm probably being downhole contamination.

Section 1, 45–47 cm consists of black PYRITIC ASH. This ash is mixed up into the overlying sediment forming ASHY CLAY at 42–45 cm.

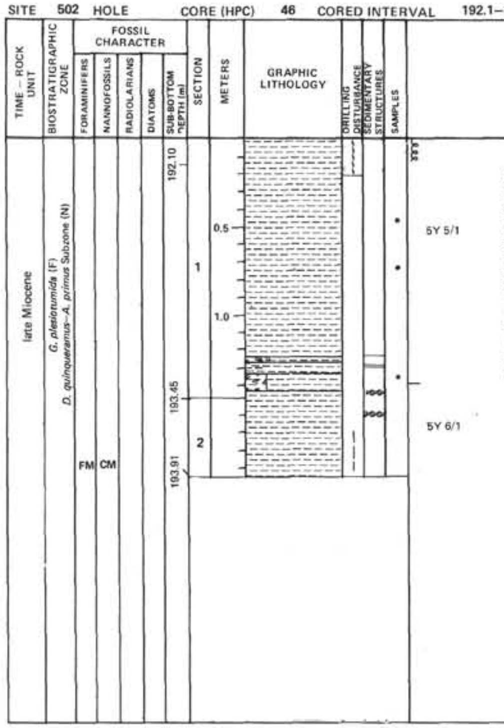
A prominent composite burrow occurs at Section 2, 20–24 cm.

SMEAR SLIDE SUMMARY

	1-43	1-46	1-80	1-130
	D	M	D	D
Quartz	–	–	1/T	–
Pyrite	–	10/C	2/R	3/R
Clay minerals	62/A	–	50/A	65/A
Volcanic glass (lt)	27/A	89/D	2/R	4/R
Carbonate unspec.	1/T	–	8/C	2/R
Foraminifers	–	–	2/R	1/T
Calcareous nannofossils	10/C	–	35/A	25/A
Barite	–	1/T	–	–

CARBONATE BOMB:
1-80 cm = 30%
2-40 cm = 37%

SITE 502 HOLE CORE (HPC) 46 CORED INTERVAL 192.1–196.5 m



LITHOLOGIC DESCRIPTION

CALCAREOUS CLAY, which is gray (5Y 5/1) in color and generally structureless.

Section 1, 0–20 cm is disturbed by coring. The upper 15 cm may represent downhole contamination.

Section 1, 25–27, 94–95, and 109 cm are areas of dusky yellowish green (10GY 3/2) CLAY.

Section 1, 129–132 and 133–142 cm consist of ASH-BEARING CLAY which is black in color.

Two very prominent almost vertical black burrows occur in Section 1 at 143 cm and in Section 2 at 5 cm.

From Section 2, 20 cm to the bottom of the core a vertical shear cuts the sediment. It is possibly a result of coring disturbance or is due to *in situ* soft sediment deformation.

SMEAR SLIDE SUMMARY

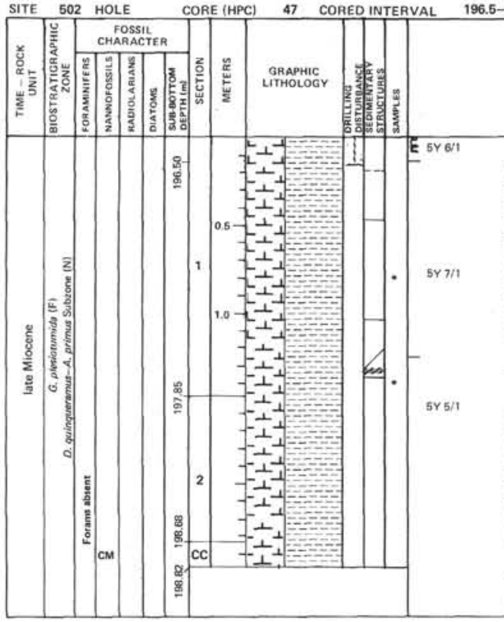
	1-46	1-74	1-135
	D	D	D
Pyrite	4/R	2/R	2/R
Other heavy minerals	–	1/T	1/T
Clay minerals	89/D	81/D	85/D
Volcanic glass (lt)	2/R	4/R	10/C
Carbonate unspec.	2/R	1/T	1/T
Calcareous nannofossils	3/R	10/C	1/T
Barite	–	1/T	–

CARBONATE BOMB:
1-80 cm = 12%
1-136 cm = 1%
2-30 cm = 16%

CLAY MINERALOGY (<2 µm): 1-68 cm

Smectite	75%
Illite	10%
Chlorite	5%
Kaolinite	11%

SITE 502 HOLE CORE (HPC) 47 CORED INTERVAL 196.5–200.9 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is gray to light gray (5Y 5/1, 6/1, and 7/1) in color, and is extensively mottled and burrowed.

Section 1,0–15 cm is intensely disturbed and consists of rotated fragments which are probably downhole contamination.

Section 1, 51, 103, and 142 cm contain grayish blue green (5BG 5/2) laminae.

In Section 1 at approximately 120 cm there is a sharp color break at a 60° angle.

A prominent composite black burrow occurs in Section 1 at 132–136 cm.

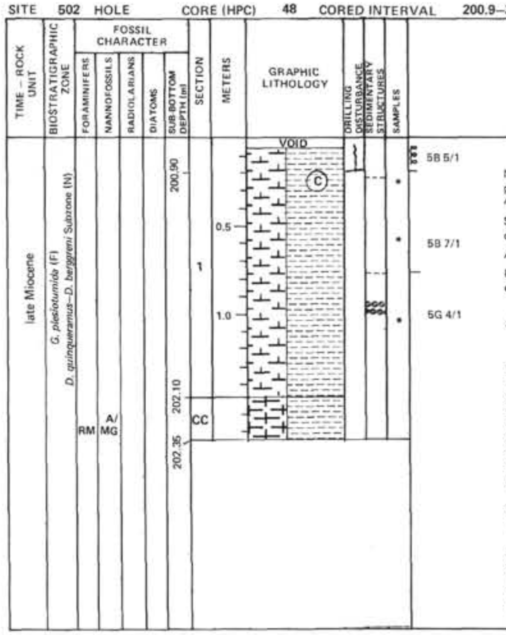
The Core-Catcher sediment is disturbed.

SMEAR SLIDE SUMMARY

	1-80	1-140
	D	D
Quartz	1/T	1/T
Pyrite	1/T	1/T
Other heavy minerals	1/T	–
Clay minerals	55/A	62/A
Volcanic glass (lt)	2/R	3/R
Volcanic glass (dk)	–	1/T
Zeolites	–	1/T
Carbonate unspec.	3/R	–
Foraminifers	2/R	1/T
Calcareous nannofossils	35/A	30/A

CARBONATE BOMB:
1-80 cm = 36%
2-45 cm = 18%

SITE 502 HOLE CORE (HPC) 48 CORED INTERVAL 200.9–205.3 m



LITHOLOGIC DESCRIPTION

NANNO MARL TO CALCAREOUS MARL, which is medium bluish gray (5B 5/1) to light bluish gray (5B 7/1) to dark greenish gray (5G 4/1) in color. It is distinctly mottled and burrowed.

Section 1, 5–20 cm is disturbed and probably represents downhole contamination.

A yellow carbonate nodule occurs at Section 1, 24–25 cm.

Prominent burrows are present in the area of Section 1, 96–106 cm.

SMEAR SLIDE SUMMARY

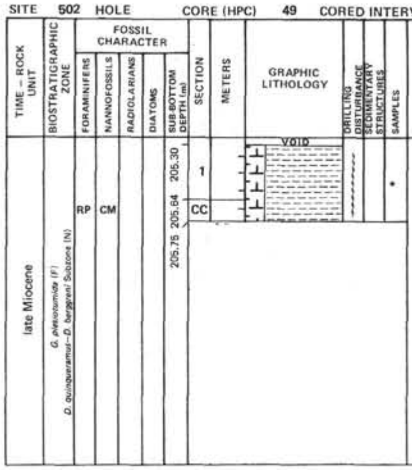
	1-25	1-60	1-105
	M	D	D
Quartz	–	1/T	1/T
Pyrite	–	2/R	3/R
Other heavy minerals	–	1/T	–
Clay minerals	–	57/A	61/A
Volcanic glass (lt)	–	2/R	4/R
Zeolites	–	1/T	–
Carbonate unspec.	100/D	3/R	15/C
Foraminifers	–	3/R	1/T
Calcareous nannofossils	–	30/A	15/C

CARBONATE BOMB:
1-80 cm = 8%

CLAY MINERALOGY (<2 µm): 1-53 cm

Smectite	72%
Illite	10%
Chlorite	6%
Kaolinite	12%

SITE 502 HOLE CORE (HPC) 49 CORED INTERVAL 205.3–209.7 m



LITHOLOGIC DESCRIPTION

5GY 4/1

CALCAREOUS CLAY, which is dark greenish gray (5GY 4/1) in color.

The entire core and Core-Catcher are disturbed by coring.

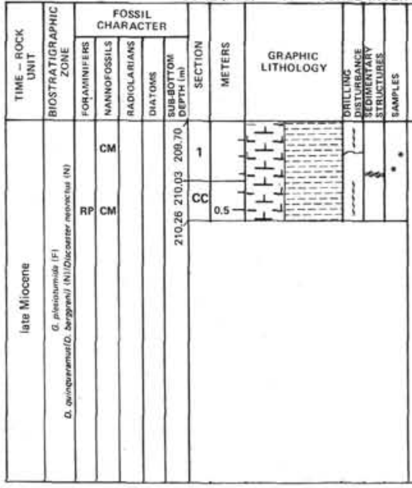
SMEAR SLIDE SUMMARY

	1-25
	D
Pyrite	4/R
Other heavy minerals	2/R
Clay minerals	78/D
Volcanic glass (lt)	2/R
Zeolites	1/T
Carbonate unspec.	3/R
Calcareous nannofossils	10/C

CLAY MINERALOGY ($<2\ \mu m$): 1-23 cm

Smectite	76%
Illite	8%
Chlorite	7%
Kaolinite	9%

SITE 502 HOLE CORE (HPC) 50 CORED INTERVAL 209.7–214.1 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is dark greenish gray (5G 4/1) in color and structureless.

Section 1, 0–18 cm and the Core-Catcher consist of fragments rotated during coring.

A small pyrite burrow with a halo occurs at Section 1, 27 cm.

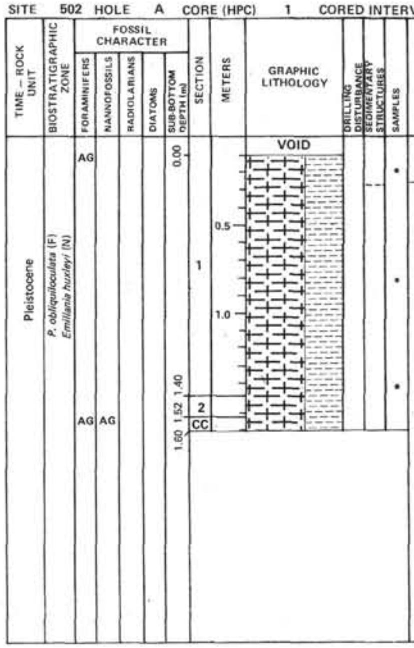
SMEAR SLIDE SUMMARY

	1-20	1-27
	D	M
Quartz	1/T	–
Pyrite	3/R	100/D
Clay minerals	59/A	–
Volcanic glass (lt)	4/R	–
Zeolites	1/T	–
Carbonate unspec.	4/R	–
Foraminifers	2/R	–
Calcareous nannofossils	25/A	–
Celadonite	1/T	–

CARBONATE BOMB:

1-27 cm = 32%

SITE 502 HOLE A CORE (HPC) 1 CORED INTERVAL 0.0–1.9 m



LITHOLOGIC DESCRIPTION

10YR 5/6

10YR 6/6

FORAM-NANNO MARL TO FORAM-BEARING NANNO MARL, which is yellowish brown (10YR 5/6) to brownish yellow (10YR 6/6) in color. The sediment is generally structureless, but with some faint laminations and indistinct dark banding. A coarse component (forams) is present throughout.

In Section 1 at 128–132 cm and at 145–149 cm there are areas with prominent black mottles (the smear slide at 146 cm shows 10% micronodules).

SMEAR SLIDE SUMMARY

	1-20	1-80	1-146
	D	D	D
Quartz	1/T	1/T	1/T
Other heavy minerals	1/T	2/R	1/T
Clay minerals	35/A	44/A	35/A
Volcanic glass (lt)	1/T	1/T	1/T
Volcanic glass (dk)	–	1/T	–
Micronodules	4/R	4/R	10/C
Carbonate unspec.	2/R	1/T	2/R
Forminifers	25/A	15/C	20/C
Calcareous nannofossils	30/A	30/A	30/A
Sponge spicules	1/T	–	–

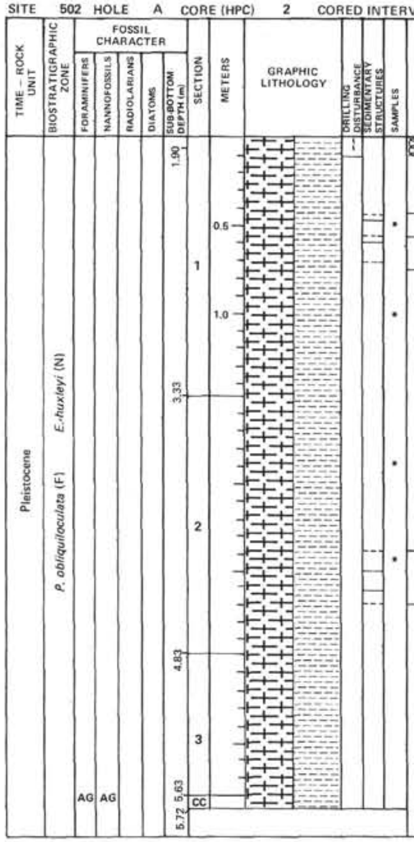
CARBONATE BOMB:

1-20 cm = 60%
1-50 cm = 39%
1-80 cm = 38%
1-110 cm = 53%
1-140 cm = 49%
2-20 cm = 49%

CLAY MINERALOGY ($<2\ \mu m$): 1-103 cm

Smectite	28%
Illite	24%
Chlorite	18%
Kaolinite	30%

SITE 502 HOLE A CORE (HPC) 2 CORED INTERVAL 1.9–6.3 m



LITHOLOGIC DESCRIPTION

10YR 5/6
10YR 6/2
10YR 5/6
2.5Y 6/2
10YR 6/6
2.5Y 6/2

FORAM-BEARING NANNO MARL, which is yellowish brown (10YR 5/6) to light brownish gray (2.5Y 6/2) in color. It is generally structureless, with very faint mottling. A coarse component of forams is visible throughout.

Areas with dark banding occur in Section 1 at 42–43, 44–45, and 59–60 cm and in Section 2 at 99–101 and 111–115 cm.

The sediment is finer in texture than the remainder of the core in the interval from 6–77 cm in Section 2.

The upper 11 cm of Section 1 is disturbed with the interval 0–7 cm possibly representing downhole contamination.

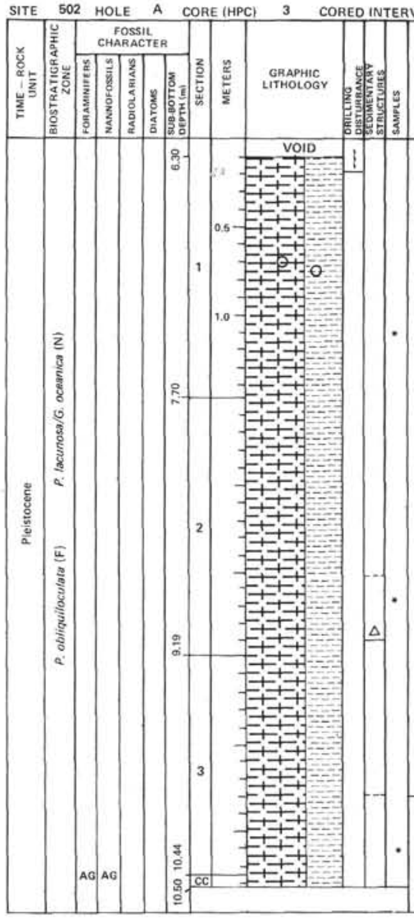
SMEAR SLIDE SUMMARY

	1-50	1-100	2-40	2-96
	D	D	D	D
Quartz	1/T	1/T	1/T	1/T
Feldspar	–	1/T	–	–
Pyrite	–	–	1/T	1/T
Other heavy minerals	1/T	1/T	1/T	1/T
Clay minerals	50/A	51/A	36/A	53/A
Volcanic glass (lt)	3/R	2/T	10/C	2/R
Zeolites	–	–	1/T	–
Micronodules	4/R	2/R	3/R	1/T
Carbonate unspec.	1/T	2/R	2/R	1/T
Foraminifers	10/C	10/C	15/C	15/C
Calcareous nannofossils	30/A	30/A	30/A	25/A

CARBONATE BOMB:

1-20 cm = 43%
1-50 cm = 48%
1-80 cm = 49%
1-100 cm = 50%
1-140 cm = 55%
2-20 cm = 45%
2-50 cm = 29%
2-80 cm = 36%
2-110 cm = 40%
3-20 cm = 58%
3-50 cm = 36%
3-80 cm = 52%

SITE 502 HOLE A CORE (HPC) 3 CORED INTERVAL 6.3–10.7 m



LITHOLOGIC DESCRIPTION

2.5Y 6/2

FORAM-BEARING NANNO MARL, which is light brownish gray (2.5Y 6/2) in color. It is generally structureless with some mottling throughout. A coarse component of forams is generally visible.

A black nodule about 1 cm in diameter is in Section 1 at 67 cm and another 2 cm in diameter is in Section 1 at 73 cm.

In the interval from Section 1, 140 cm to Section 2, 22 cm the coarse foram component is absent.

A black nodular band occurs in Section 2 at 26 cm.

The interval in Section 2 from 100–135 cm appears to fine upward, and is a NANNO FORAM OOZE.

Section 3, 78 cm to the Core-Catcher is a FORAM-NANNO MARL which is greenish gray (5G 6/1) in color and is faintly mottled and banded.

SMEAR SLIDE SUMMARY

	1-110	2-119	3-110
	D	D	D
Quartz	1/T	1/T	1/T
Pyrite	1/T	2/R	1/T
Other heavy minerals	1/T	1/T	1/T
Clay minerals	41/A	27/A	37/A
Volcanic glass (lt)	3/R	1/T	2/R
Micronodules	1/T	1/T	1/T
Carbonate unspec.	2/R	2/R	2/R
Foraminifers	20/C	35/A	25/A
Calcareous nannofossils	30/A	30/A	30/A

CARBONATE BOMB:

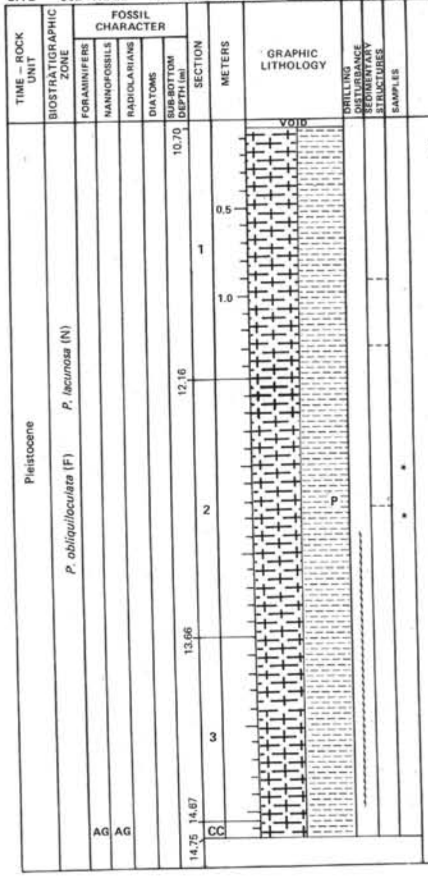
1-20 cm = 47%
1-50 cm = 35%
1-80 cm = 49%
1-110 cm = 49%
1-140 cm = 54%
2-20 cm = 39%
2-50 cm = 52%
2-80 cm = 42%
2-110 cm = 58%
2-140 cm = 42%
3-20 cm = 42%
3-50 cm = 44%
3-80 cm = 49%
3-110 cm = 56%

CLAY MINERALOGY (<2 μm): 2-53 cm

Smectite	28%
Illite	19%
Chlorite	17%
Kaolinite	36%

5G 6/1

SITE 502 HOLE A CORE (HPC) 4 CORED INTERVAL 10.7–15.1 m



LITHOLOGIC DESCRIPTION

5Y 5/2

FORAM-BEARING NANNO MARL, which is olive gray (5Y 5/2) in color and slightly mottled throughout. Black Mn(?) micronodules occur throughout.

Section 1, 98 and 133 cm and Section 2, 75 cm show black bands with indistinct contact.

In Section 2 at 80 cm there is a black nodule (1 cm diameter) composed of ASH AND PYRITE-BEARING FORAM MARL.

From Section 2, 110 cm to Section 3, 100 cm the sediment is disturbed and soupy; the last 10 cm and Core-Catcher are firmer (i.e. apparently intact).

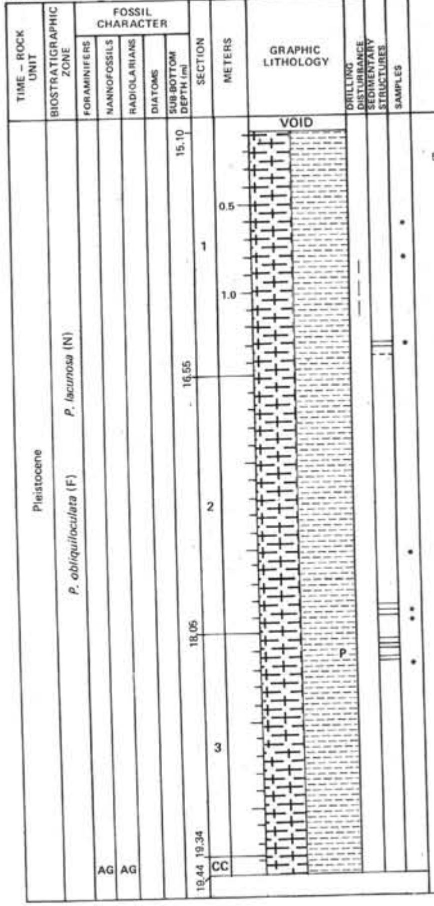
SMEAR SLIDE SUMMARY

	2-50 D	2-80 M
Quartz	1/T	–
Pyrite	2/R	20/C
Other heavy minerals	1/T	1/T
Clay minerals	46/A	14/C
Volcanic glass (It	2/T	15/C
Micronodules	1/T	–
Carbonate unspec.	1/T	–
Foraminifers	20/C	35/A
Calcareous nannofossils	25/A	15/C
Sponge spicules	1/T	–

CARBONATE BOMB:

1-20 cm = 60%	2-80 cm = 50%
1-50 cm = 54%	2-110 cm = 47%
1-80 cm = 39%	2-140 cm = 42%
1-110 cm = 56%	3-20 cm = 39%
1-140 cm = 44%	3-50 cm = 43%
2-20 cm = 44%	3-90 cm = 61%
2-50 cm = 61%	

SITE 502 HOLE A CORE (HPC) 5 CORED INTERVAL 15.1–19.5 m



LITHOLOGIC DESCRIPTION

5Y 5/3

FORAM-BEARING NANNO MARL, which is olive (5Y 5/3) in color and generally structureless with faint mottling. The coarse foram component is generally visible.

In Section 1, 80–105 cm a portion of the core missing; but the remainder is apparently intact.

A coarse band of NANNO-BEARING FORAM OOZE, which is olive yellow (2.5Y 6/6) in color occurs in Section 1 at 129–130 cm.

A band which is coarser in texture with a visible foram component is in Section 1 at 130–135 cm.

Section 2, 136–141 cm contains NANNO-BEARING FORAM OOZE, which is dusky yellowish green (10GY 3/2) in color.

A faint black band occurs in Section 2, 142 cm.

In Section 3 at 15–17 cm there are black laminae.

Dusky yellowish green (10GY 3/2) bands which are semi-indurated with pyrite occur in the interval from 0–15 cm in Section 3.

SMEAR SLIDE SUMMARY

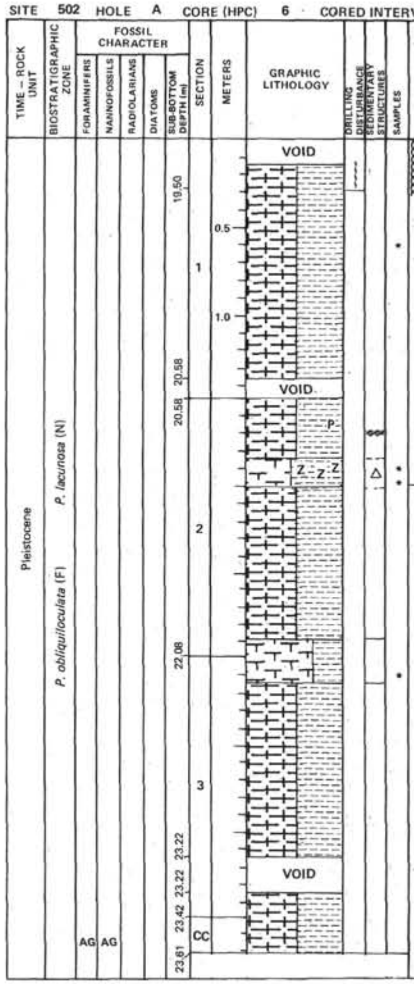
	1-65 D	1-85 D	1-130 D	2-105 D
Quartz	1/T	1/T	1/T	1/T
Pyrite	1/T	2/R	1/T	2/R
Other heavy minerals	1/T	1/T	1/T	1/T
Clay minerals	65/A	60/A	28/A	66/A
Volcanic glass (It)	3/R	4/R	2/R	3/R
Micronodules	–	1/T	2/R	1/T
Carbonate unspec.	4/R	1/T	5/C	1/T
Foraminifers	15/C	10/C	40/A	10/C
Calcareous nannofossils	20/A	20/C	20/C	25/A

	2-139 D	2-142 D	3-17 D
Quartz	1/T	1/T	1/T
Pyrite	1/T	2/R	10/C
Other heavy minerals	1/T	1/T	–
Clay minerals	30/A	41/A	38/A
Volcanic glass (It)	3/R	2/R	4/R
Zeolites	–	1/T	–
Micronodules	1/T	–	–
Carbonate unspec.	3/R	1/T	2/R
Foraminifers	40/A	15/C	20/C
Calcareous nannofossils	20/C	35/A	25/A

CARBONATE BOMB:

1-20 cm = 46%	2-80 cm = 35%
1-50 cm = 52%	2-110 cm = 30%
1-80 cm = 32%	2-140 cm = 45%
1-110 cm = 52%	3-20 cm = 52%
1-140 cm = 48%	3-50 cm = 40%
2-20 cm = 49%	3-80 cm = 44%
2-50 cm = 53%	3-110 cm = 46%

SITE 502 HOLE A CORE (HPC) 6 CORED INTERVAL 19.5–23.9 m



LITHOLOGIC DESCRIPTION

5Y 6/2

5Y 5/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) to olive gray (5Y 5/2) in color. It is generally structureless with minor dark streaks and faintly mottled.

The interval in Section 1 from 13–24 cm is disturbed and probably represents downhole contamination.

In Section 2, 14–17 cm, there is a vertically oriented pyrite tubular burrow.

Section 2, 33–48 cm is a fining upwards sequence of ASH AND ZEOLITE-BEARING FORAM MARL.

From Section 2, 48 cm through the remainder of the core it is faintly laminated and generally mottled.

From Section 2, 140 cm to Section 3, 15 cm there is NANNO-BEARING FORAM OOZE which appears as a coarser textured sediment owing to the presence of prominent forams.

In Section 3, 45–60 cm there is faint black mottling.

In Section 3 from 110–115 cm the liner is cracked.

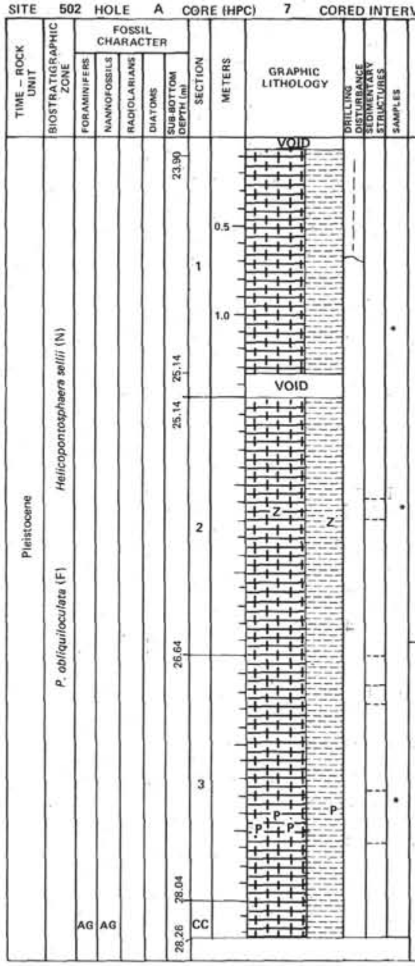
SMEAR SLIDE SUMMARY

	1-60	2-40	2-47	3-10
	D	D	D	D
Quartz	1/T	–	1/T	1/T
Pyrite	2/R	1/T	2/R	1/T
Other heavy minerals	1/T	1/T	1/T	1/T
Clay minerals	77/A	40/A	49/A	33/A
Volcanic glass (lt)	5/C	10/C	5/C	2/R
Zeolites	–	8/C	5/C	–
Micronodules	1/T	–	–	–
Carbonate unspec.	3/R	5/C	20/R	2/R
Foraminifers	15/C	30/A	25/A	45/A
Calcareous nannofossils	25/A	5/C	10/C	15/C

CARBONATE BOMB:

1-20 cm = 48%	2-80 cm = 62%
1-50 cm = 40%	2-110 cm = 38%
1-80 cm = 42%	3-20 cm = 59%
1-110 cm = 53%	3-50 cm = 39%
1-140 cm = 61%	3-80 cm = 54%
2-20 cm = 39%	3-110 cm = 39%
2-50 cm = 58%	3-140 cm = 42%

SITE 502 HOLE A CORE (HPC) 7 CORED INTERVAL 23.9–28.3 m



LITHOLOGIC DESCRIPTION

5Y 6/2

5Y 5/2

FORAM-NANNO MARL TO NANNO AND ZEOLITE-BEARING FORAM MARL, which is light olive gray (5Y 6/2) to olive gray (5Y 5/2) in color with very faint grayish green (10GY 5/2) and black laminae and mottling. There are occasional black "blebs" scattered throughout the core.

Section 1, 6–70 cm contains disturbed soft sediment. It may be intact between 35–55 cm(?). The sediment void at 132 cm Section 1 appears to be a coring artifact.

In Section 2 at 17–22 cm there is a vertically oriented group of black (Mn?) micronodules.

A coarse texture is visually evident in Section 2, 57–67 cm which is attributed to the presence of zeolites.

An area of dark banding occurs in Section 3 at 13–22 cm.

A pyrite-rich zone: NANNO-BEARING PYRITIC FORAM MARL. occurs in Section 3 at 75–105 cm and is visually evident as a coarser texture and banding.

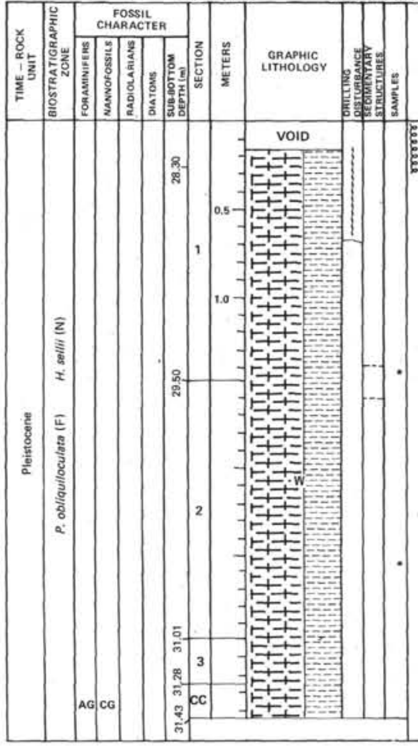
SMEAR SLIDE SUMMARY

	1-110	2-62	3-88
	D	D	M
Quartz	1/T	1/T	–
Pyrite	2/R	1/T	25/A
Other heavy minerals	1/T	1/T	1/T
Clay minerals	37/A	33/A	19/C
Volcanic glass (lt)	2/R	4/R	–
Volcanic glass (dk)	1/T	–	–
Zeolites	–	20/C	–
Carbonate unspec.	1/T	–	–
Foraminifers	25/A	25/A	40/A
Calcareous nannofossils	30/A	15/C	15/C

CARBONATE BOMB:

1-20 cm = 43%	2-80 cm = 44%
1-50 cm = 48%	2-100 cm = 39%
1-80 cm = 50%	2-140 cm = 50%
1-110 cm = 41%	3-20 cm = 42%
1-130 cm = 39%	3-50 cm = 47%
2-20 cm = 50%	3-80 cm = 63%
2-50 cm = 45%	3-110 cm = 50%

SITE 502 HOLE A CORE (HPC) 8 CORED INTERVAL 28.3–32.7 m



LITHOLOGIC DESCRIPTION

5Y 5/2

FORAM-BEARING NANNO MARL, which is olive gray (5Y 5/2) in color and generally structureless with faint mottling.

In Section 1 from 17–70 cm the sediment is disturbed with the upper 15 cm probably downhole contamination.

From Section 1, 140 cm to Section 2, 10 cm a higher concentration of forams creates a coraser texture: FORAM-NANNO MARL.

In Section 2 at 56 cm there is a wood fragment 1.cm in length (W).

The Core-Catcher is highly disturbed.

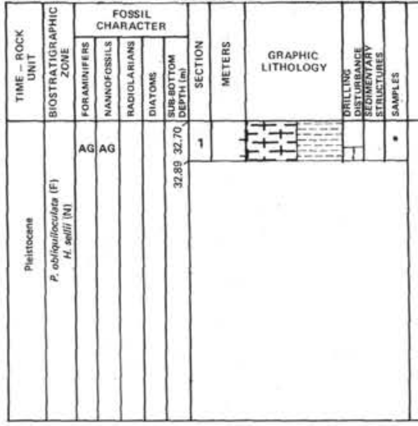
SMEAR SLIDE SUMMARY

	1-147	2-110
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	–
Clay minerals	40/A	37/A
Volcanic glass (lt)	1/T	4/R
Carbonate unspec.	–	1/T
Foraminifers	25/A	20/C
Calcareous nannofossils	30/A	35/A

CARBONATE BOMB:

1-20 cm = 56%
1-50 cm = 50%
1-80 cm = 50%
1-110 cm = 53%
1-140 cm = 60%
2-20 cm = 54%
2-50 cm = 46%
2-80 cm = 47%
2-110 cm = 37%
2-140 cm = 40%
3-20 cm = 54%

SITE 502 HOLE A CORE (HPC) 9 CORED INTERVAL 32.7–37.1 m



LITHOLOGIC DESCRIPTION

5Y 5/2

FORAM-BEARING NANNO MARL, which is olive gray (5Y 5/2) in color and generally structureless.

Section 1, 0–15 cm appears to be intact, but the bottom of the section (15–21 cm) is disturbed.

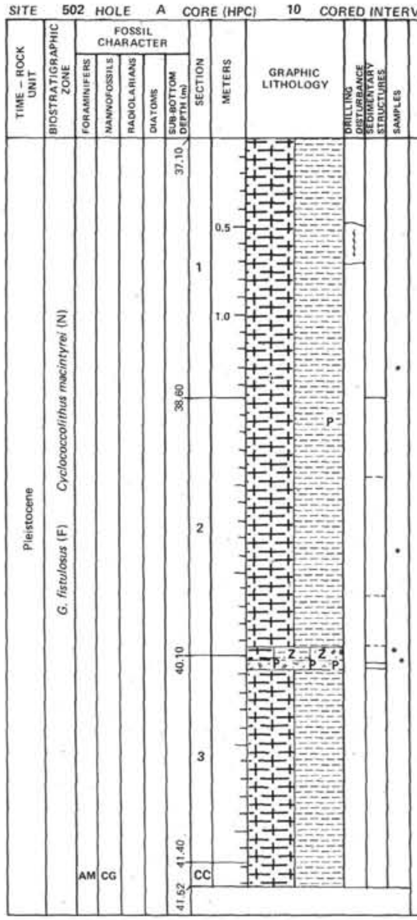
SMEAR SLIDE SUMMARY

	1-10
	D
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	48/A
Volcanic glass (lt)	2/R
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	30/A

CARBONATE BOMB:

1-10 cm = 51%

SITE 502 HOLE A CORE (HPC) 10 CORED INTERVAL 37.1–41.5 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color. It is generally structureless with faint mottles and with faint dark and dusky blue green (5BG 3/1) banding.

In Section 1, 60–80 cm a portion of core is missing.

A prominent dark band occurs in Section 1 at 145–146 cm.

A pyrite nodule, 1 cm in diameter is in Section 2 at 15 cm.

In Section 2 the interval 44–110 cm is coarser in texture due to the presence of forams; a NANNO FORAM OOZE.

Section 3, 3–4 cm contains black PYRITE-BEARING ASH.

Section 2, 145 cm to Section 3, 3 cm is a ASH AND ZEOLITE MARL.

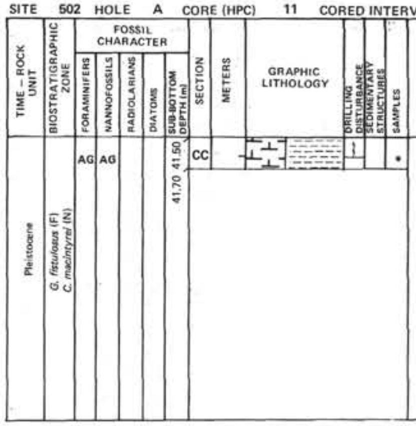
SMEAR SLIDE SUMMARY

	1-130	2-90	3-1	3-4
	D	D	D	M
Quartz	1/T	1/T	–	–
Pyrite	2/R	1/T	4/R	5/C
Other heavy minerals	1/T	1/T	1/T	–
Clay minerals	49/A	35/A	29/A	3/R
Volcanic glass (lt)	5/C	1/T	10/C	92/D
Zeolites	–	1/T	20/C	–
Carbonate unspec.	2/R	–	1/T	–
Foraminifers	15/C	30/A	20/C	–
Calcareous nannofossils	15/A	30/A	15/C	–

CARBONATE BOMB:

1-20 cm = 54%
1-50 cm = 51%
1-80 cm = 45%
1-110 cm = 55%
1-140 cm = 57%
2-20 cm = 52%
2-50 cm = 54%
2-80 cm = 62%
2-110 cm = 60%
2-140 cm = 46%
3-20 cm = 54%
3-50 cm = 48%
3-80 cm = 56%
3-110 cm = 56%

SITE 502 HOLE A CORE (HPC) 11 CORED INTERVAL 41.5–45.9 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color and structureless.

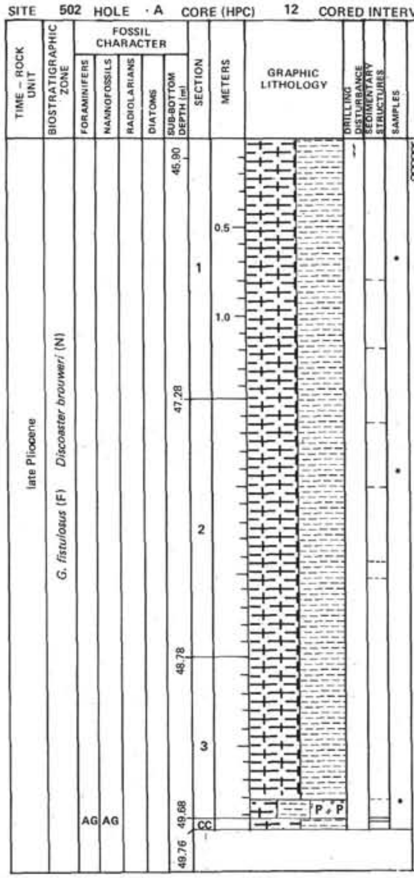
Section 1, 0–11 cm is disturbed.

SMEAR SLIDE SUMMARY

	1-15 D
Quartz	1/T
Pyrite	3/R
Other heavy minerals	1/T
Clay minerals	61/A
Volcanic glass (lt)	2/R
Carbonate unspec.	2/T
Foraminifers	5/C
Calcareous nannofossils	25/A

CARBONATE BOMB:
1-15 cm = 53%

SITE 502 HOLE · A CORE (HPC) 12 CORED INTERVAL 45.9–50.3 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL TO ASH AND FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color and generally structureless. There is occasional faint banding and scattered black blebs.

In Section 1, 85–120 cm the texture is coarser than the surrounding sediment.

In Section 2, 15–50 and 91–101 cm the texture is coarser than the surrounding sediment owing to an ash content of about 5–15%.

Section 3 contains grayish blue green (5BG 5/2) and black lamination. Mottles are more distinct.

Section 3, 80–90 cm is vitric ash mixed with marl.

Section 3, 90–91 cm is PYRITE AND ASH-BEARING MARL.

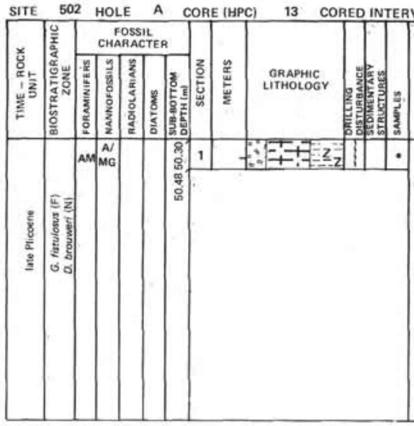
SMEAR SLIDE SUMMARY

	1-70 D	2-45 D	3-89 M
Quartz	–	1/T	1/T
Feldspar	1/T	–	–
Pyrite	2/R	2/R	35/A
Other heavy minerals	1/T	1/T	–
Clay minerals	46/A	47/A	14/C
Volcanic glass (lt)	2/R	8/C	15/C
Zeolites	1/T	–	–
Carbonate unspec.	2/R	1/T	–
Foraminifers	15/C	15/C	20/C
Calcareous nannofossils	30/A	25/A	15/C

CARBONATE BOMB:

1-20 cm = 64%
1-50 cm = 61%
1-80 cm = 43%
1-110 cm = 57%
1-140 cm = 61%
2-20 cm = 61%
2-50 cm = 49%
2-80 cm = 40%
2-110 cm = 37%
2-140 cm = 44%
3-20 cm = 46%
3-50 cm = 52%
3-80 cm = 54%

SITE 502 HOLE A CORE (HPC) 13 CORED INTERVAL 50.3–54.7 m



LITHOLOGIC DESCRIPTION

5Y 5/2

ASH, ZEOLITE, AND FORAM-BEARING NANNO MARL, which is olive gray (5Y 5/2) in color.

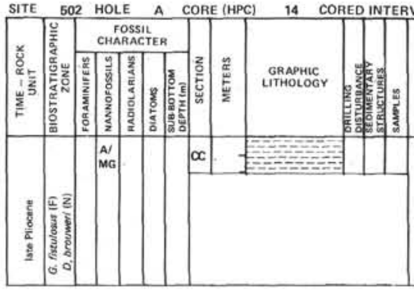
The entire core is disturbed.

SMEAR SLIDE SUMMARY

	1-10 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	36/A
Volcanic glass (lt)	5/C
Zeolites	10/C
Foraminifers	20/C
Calcareous nannofossils	25/A

CARBONATE BOMB:
1-12 cm = 52%

SITE 502 HOLE A CORE (HPC) 14 CORED INTERVAL 54.7–59.1 m

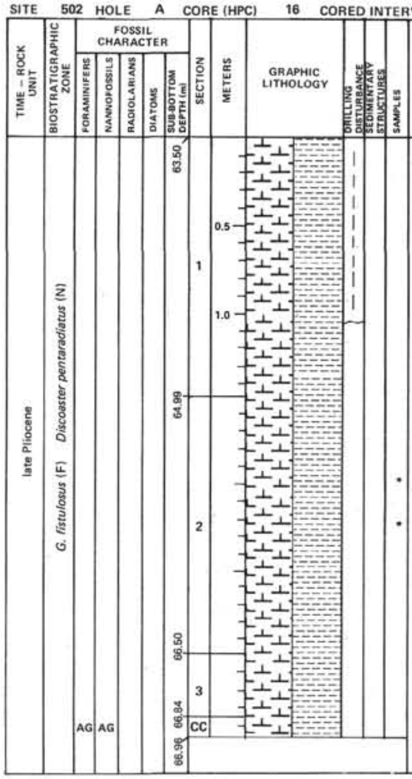


LITHOLOGIC DESCRIPTION

No core recovered. Biostratigraphy based upon some sediment found on Core-Catcher.

NOTE: Site 502A, Core 15, 59.1–63.5 m: No recovery.

SITE 502 HOLE A CORE (HPC) 16 CORED INTERVAL 63.5–67.9 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color. It is generally featureless with faint discolorations. White specks which are large forams are visible throughout. The core is disturbed from 0–110 cm in Section 1.

SMEAR SLIDE SUMMARY

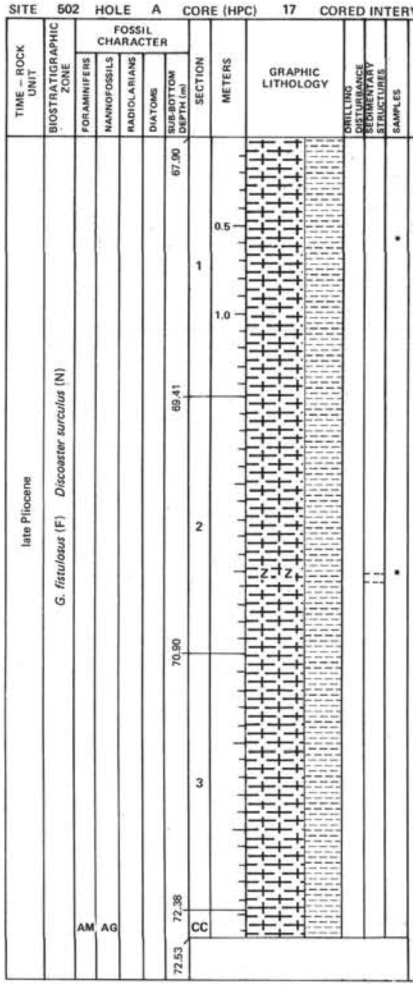
	2-50	2-75[a]
	D	M
Quartz	1/T	–
Pyrite	2/R	–
Other heavy minerals	1/T	–
Clay minerals	49/A	–
Volcanic glass (lt)	3/R	–
Zeolites	1/T	–
Carbonate unspec.	3/T	–
Foraminifers	5/C	100/D
Calcareous nannofossils	35/A	–

[a] White specks only

CARBONATE BOMB:

1-20 cm = 51%
1-50 cm = 52%
1-80 cm = 54%
1-110 cm = 59%
1-140 cm = 54%
2-20 cm = 56%
2-50 cm = 46%
2-80 cm = 49%
2-110 cm = 52%
2-140 cm = 56%
3-30 cm = 58%

SITE 502 HOLE A CORE (HPC) 17 CORED INTERVAL 67.9–72.3 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 6/2) in color and generally featureless with faint mottles and white forams visible throughout.

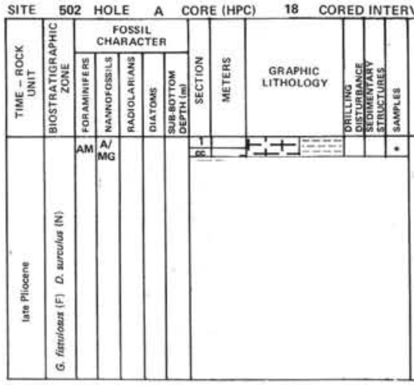
Section 2 is faintly banded.

In Section 2 at 100 cm there is a grayish olive (10Y 4/2) band, 1 cm thick; consisting of ZEOLITE-BEARING MARL.

SMEAR SLIDE SUMMARY

	1-60	2-100
	D	M
Quartz	1/T	1/T
Pyrite	1/T	1/T
Other heavy minerals	1/T	1/T
Clay minerals	42/A	43/A
Volcanic glass (lt)	2/R	–
Volcanic glass (dk)	1/T	–
Zeolites	–	5/C
Carbonate unspec.	2/R	4/R
Foraminifers	20/C	20/C
Calcareous nannofossils	30/A	25/A

SITE 502 HOLE A CORE (HPC) 18 CORED INTERVAL 72.3–76.7 m



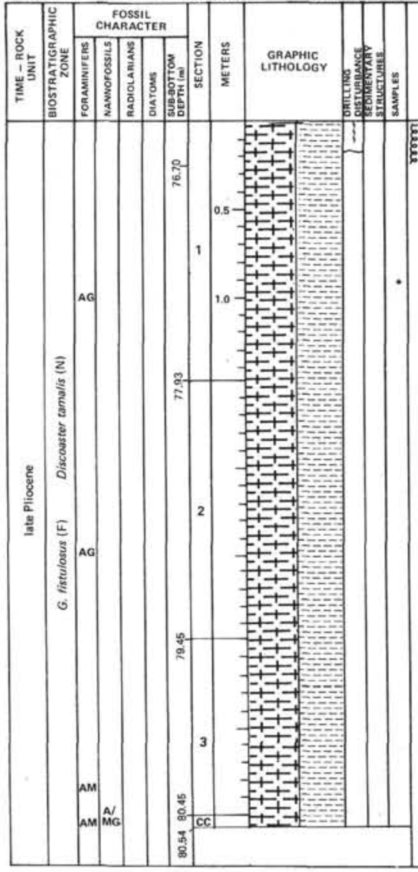
LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is light olive gray (5Y 5/2) in color and featureless.

SMEAR SLIDE SUMMARY

	CC, 2
	D
Quartz	1/T
Pyrite	3/R
Other heavy minerals	1/T
Volcanic glass (lt)	3/R
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	30/A

SITE 502 HOLE A CORE (HPC) 19 CORED INTERVAL 76.7–81.1 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and structureless with very faint banding and mottling.

SMEAR SLIDE SUMMARY

	1-90
	D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	45/A
Volcanic glass (lt)	2/R
Carbonate unspec.	4/R
Foraminifers	15/C
Calcareous nannofossils	30/A

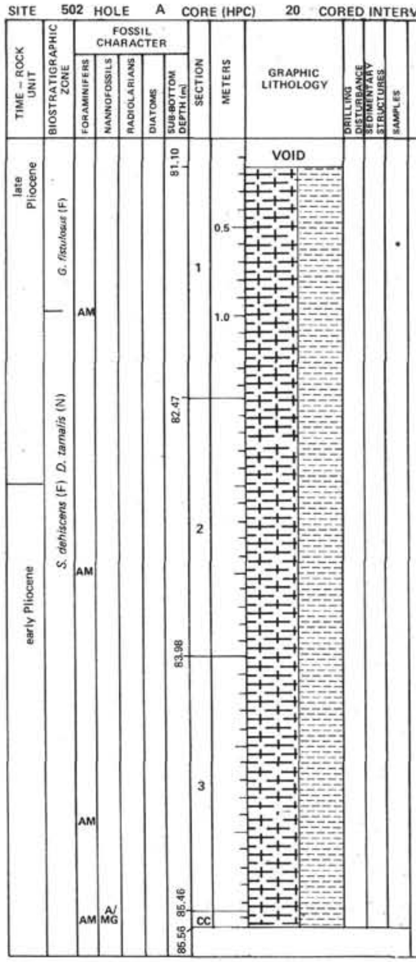
CARBONATE BOMB:

1-20 cm = 48%
1-50 cm = 44%
1-80 cm = 55%
1-110 cm = 56%
1-140 cm = 50%
2-20 cm = 50%
2-50 cm = 58%
2-80 cm = 54%
2-110 cm = 50%
2-140 cm = 49%
3-20 cm = 62%
3-50 cm = 55%
3-80 cm = 53%

CLAY MINERALOGY ($<2\ \mu m$): 2-104 cm

Smectite	31%
Illite	16%
Chlorite	12%
Kaolinite	41%

SITE 502 HOLE A CORE (HPC) 20 CORED INTERVAL 81.1–85.5 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and faintly banded and mottled.

In Section 1 at 19 and 84 cm the core liner is cracked.

SMEAR SLIDE SUMMARY

	1-60
	D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	51/A
Volcanic glass (lt)	4/R
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	25/A

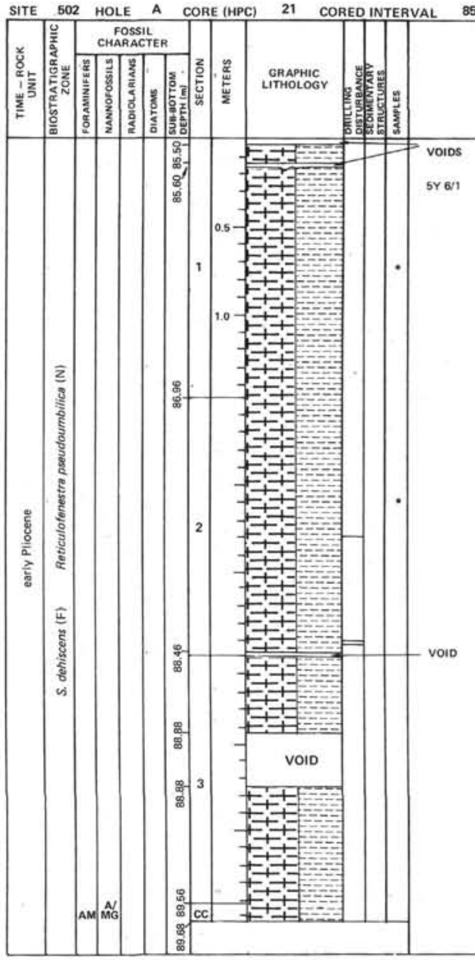
CARBONATE BOMB:

1-20 cm = 48%
1-50 cm = 47%
1-80 cm = 58%
1-110 cm = 50%
1-140 cm = 56%
2-20 cm = 68%
2-50 cm = 59%
2-80 cm = 48%
2-110 cm = 51%
2-140 cm = 61%
3-20 cm = 55%
3-50 cm = 51%
3-80 cm = 52%
3-110 cm = 52%
3-140 cm = 45%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	46	44	47	46
% Organic carbon	0.3	0.2	0.3	0.2
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	55	54	52	47
% Organic carbon	0.2	0.2	0.2	0.2
	2-125 cm	2-150 cm	3-0 cm	3-0 cm
% Carbonate	53	56	51	54
% Organic carbon	0.1	0.2	0.2	0.2
	3-0 cm	3-0 cm	3-0 cm	
% Carbonate	52	48	46	
% Organic carbon	0.2	0.2	0.2	

SITE 502 HOLE A CORE (HPC) 21 CORED INTERVAL 85.5–89.9 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally structureless with vague mottling.

In Section 2 at 79, 141, and 145 cm there are small breaks in sediment column.

Section 3 shows some faint banding.

SMEAR SLIDE SUMMARY

	1-70 D	2-60 D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	49/A	54/A
Volcanic glass (lt)	1/T	2/R
Carbonate unspec.	1/T	1/T
Foraminifers	15/C	10/C
Calcareous nannofossils	30/A	30/A

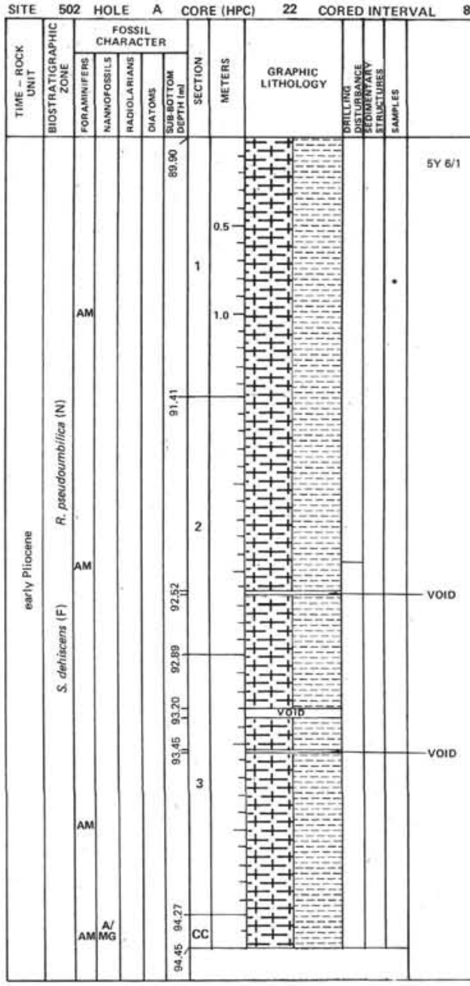
CARBONATE BOMB:

1-20 cm = 48%
1-50 cm = 57%
1-80 cm = 54%
1-110 cm = 49%
1-140 cm = 50%
2-20 cm = 39%
2-50 cm = 44%
2-80 cm = 45%
2-110 cm = 49%
2-140 cm = 40%
3-20 cm = 48%
3-80 cm = 50%
3-110 cm = 51%
3-140 cm = 48%

CARBON-CARBONATE:

	1-0 cm	1-0 cm	1-0 cm	1-0 cm
% Carbonate	48	55	47	51
% Organic carbon	0.2	0.2	0.2	0.3
	1-0 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	52	41	38	47
% Organic carbon	0.2	0.2	0.3	0.2
	2-125 cm	2-147 cm	3-35 cm	3-95 cm
% Carbonate	44	41	47	49
% Organic carbon	0.2	0.3	0.2	0.2
	3-95 cm	3-125 cm		
% Carbonate	49	41		
% Organic carbon	0.2	0.2		

SITE 502 HOLE A CORE (HPC) 22 CORED INTERVAL 89.9–94.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally structureless with some faint mottling, banding, and burrowing throughout.

In Section 2 at 94 cm there is a small break in the sediment column.

SMEAR SLIDE SUMMARY

	1-80 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	48/A
Volcanic glass (lt)	1/T
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	30/A

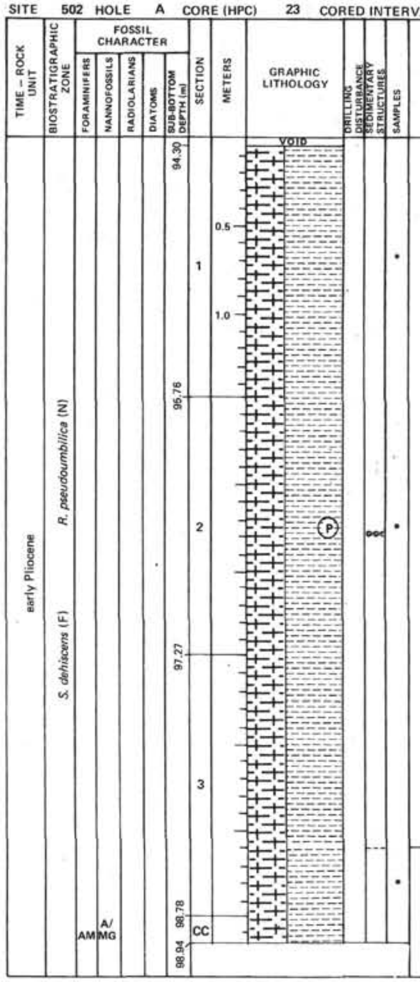
CARBONATE BOMB:

1-20 cm = 48%
1-50 cm = 53%
1-80 cm = 64%
1-110 cm = 64%
1-140 cm = 47%
2-20 cm = 56%
2-50 cm = 43%
2-80 cm = 61%
2-110 cm = 61%
2-140 cm = 48%
3-20 cm = 50%
3-50 cm = 52%
3-80 cm = 57%
3-110 cm = 47%
3-140 cm = 51%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	55	46	57	48
% Organic carbon	0.2	0.2	0.2	0.1
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	46	49	53	56
% Organic carbon	0.2	0.2	0.3	0.2
	2-125 cm	2-149 cm	3-37 cm	3-65 cm
% Carbonate	52	42	48	53
% Organic carbon	0.2	0.2	0.3	0.1
	3-95 cm	3-125 cm	3-145 cm	
% Carbonate	52	41	44	
% Organic carbon	0.2	0.2	0.2	

SITE 502 HOLE A CORE (HPC) 23 CORED INTERVAL 94.3–98.7 m



LITHOLOGIC DESCRIPTION

5Y 6/1

5Y 5/2

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally featureless with some faint mottles and discolorations, and scattered burrows.

Section 1 at 7 cm there is a small break in the sediment column.

In Section 1 at 18 cm the core liner is broken.

Section 1, 0–18 cm: soft sediment – probable disturbance by coring.

At Section 2, 75 cm there is a black nodule (0.5 cm diameter), of pyrite with common ash and forams.

Section 2, 70–79 cm shows vertically oriented black burrow.

SMEAR SLIDE SUMMARY

	1-70 D	2-75 M	3-130 D
Quartz	1/T	–	1/T
Pyrite	1/T	40/A	2/R
Other heavy minerals	1/T	–	1/T
Clay minerals	63/A	13/C	66/A
Volcanic glass (lt)	2/R	8/C	3/R
Carbonate unspec.	2/R	–	2/R
Foraminifers	10/C	35/A	10/C
Calcareous nannofossils	20/C	4/R	25/A

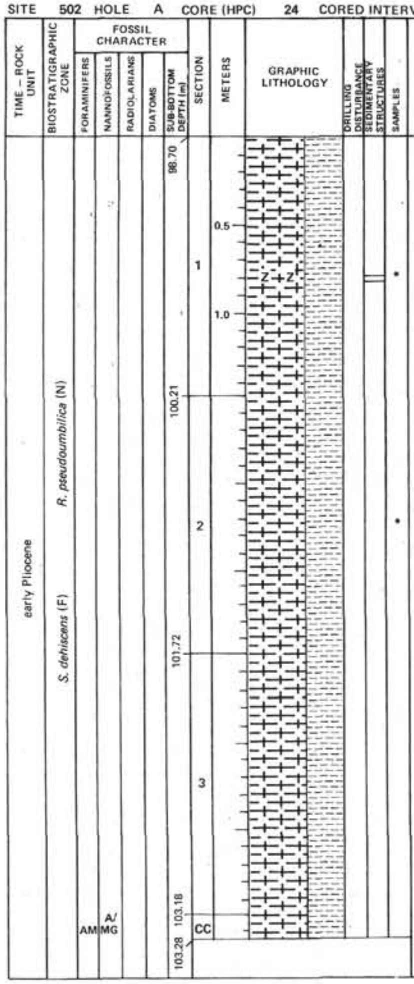
CARBONATE BOMB:

1-20 cm = 48%
1-50 cm = 44%
1-80 cm = 39%
1-110 cm = 44%
1-140 cm = 47%
2-20 cm = 47%
2-50 cm = 47%
2-80 cm = 59%
2-110 cm = 48%
2-140 cm = 50%
3-20 cm = 48%
3-50 cm = 53%
3-80 cm = 53%
3-110 cm = 39%
3-140 cm = 41%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	46	47	39	43
% Organic carbon	0.2	0.3	0.3	0.3
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	46	46	55	59
% Organic carbon	0.2	0.2	0.1	0.3
	2-125 cm	2-149 cm	3-35 cm	3-65 cm
% Carbonate	45	48	47	53
% Organic carbon	0.2	0.2	0.2	0.2
	3-95 cm	3-125 cm	3-149 cm	
% Carbonate	44	36	44	
% Organic carbon	0.2	0.3	0.3	

SITE 502 HOLE A CORE (HPC) 24 CORED INTERVAL 98.7–103.1 m



LITHOLOGIC DESCRIPTION

5Y 6/1
to
5Y 6/2

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) to light olive gray (5Y 6/2) in color and generally structureless with faint mottling and burrowing.

In Section 1 at 13 cm there is a core liner break.

Section 1 at 78 cm contains gray (2.5Y N5/0) laminae which are zeolite- and foram-bearing nanno marl.

In Section 3 at 133, 135, and 139 cm there are small breaks in the sediment column.

SMEAR SLIDE SUMMARY

	1-78 D	2-70 D
Quartz	1/T	1/T
Pyrite	4/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	37/A	62/A
Volcanic glass (lt)	3/R	1/T
Zeolites	7/C	–
Carbonate unspec.	2/R	3/R
Foraminifers	15/C	5/C
Calcareous nannofossils	30/A	25/A

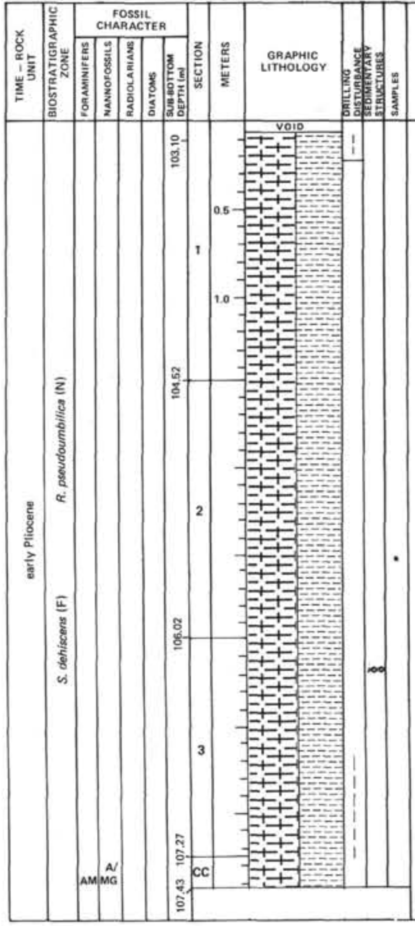
CARBONATE BOMB:

1-20 cm = 56%
1-50 cm = 55%
1-80 cm = 33%
1-110 cm = 48%
1-140 cm = 47%
2-20 cm = 45%
2-50 cm = 52%
2-80 cm = 49%
2-110 cm = 57%
2-140 cm = 55%
3-20 cm = 49%
3-50 cm = 47%
3-80 cm = 47%
3-110 cm = 53%
3-140 cm = 40%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	55	51	43	49
% Organic carbon	0.2	0.2	0.2	0.3
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	46	51	45	55
% Organic carbon	0.3	0.3	0.2	0.2
	2-125 cm	2-149 cm	3-35 cm	3-65 cm
% Carbonate	56	51	47	47
% Organic carbon	0.2	0.2	0.3	0.3
	3-95 cm	3-125 cm	3-145 cm	
% Carbonate	51	53	39	
% Organic carbon	0.2	0.2	0.2	

SITE 502 HOLE A CORE (HPC) 25 CORED INTERVAL 103.1–107.5 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and structureless with some faint mottles and faint burrows.

Section 1, 5–10 cm is disturbed.

There is a very faint zoophycus burrow in Section 3 at 16 cm.

In Section 3 from 65 cm to the bottom of core is slightly disturbed.

SMEAR SLIDE SUMMARY

	2-100 D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	49/A
Volcanic glass (lt)	1/T
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	30/A

CARBONATE BOMB:

1-20 cm = 49%
1-50 cm = 52%
1-80 cm = 47%
1-110 cm = 57%
1-140 cm = 59%
2-20 cm = 52%
2-50 cm = 55%
2-80 cm = 55%
2-110 cm = 57%
2-140 cm = 43%
3-20 cm = 41%
3-50 cm = 56%
3-80 cm = 62%
3-110 cm = 53%

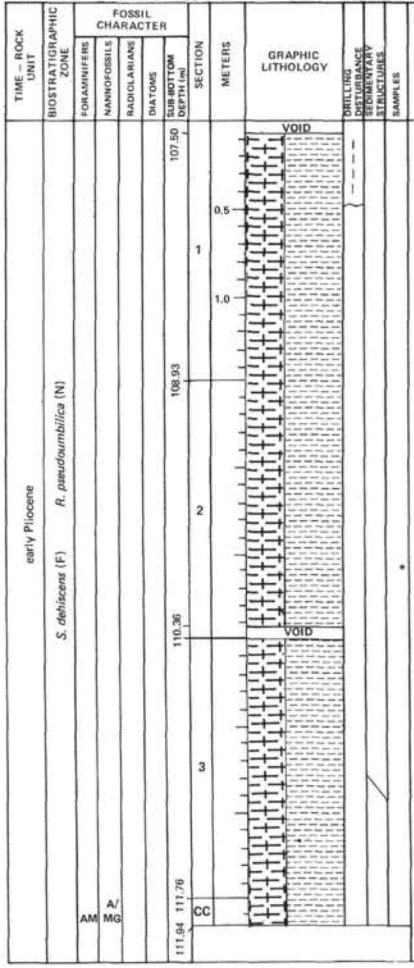
CLAY MINERALOGY ($<2\ \mu m$): 2-104 cm

Smectite	46%
Illite	12%
Chlorite	13%
Kaolinite	29%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	48	41	47	56
% Organic carbon	0.3	0.3	0.2	0.2
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	54	46	54	55
% Organic carbon	0.2	0.2	0.2	0.2
	2-124 cm	2-149 cm	3-35 cm	3-65 cm
% Carbonate	50	42	57	60
% Organic carbon	0.2	0.2	0.2	0.2
	3-95 cm	3-124 cm		
% Carbonate	59	47		
% Organic carbon	0.2	0.3		

SITE 502 HOLE A CORE (HPC) 26 CORED INTERVAL 107.5–111.9 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally structureless with faint mottles.

Section 1, 7–50 cm is disturbed.

In Section 3 from 80–94 cm there is a shear plane at about 60° dip.

SMEAR SLIDE SUMMARY

	2-110 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	55/A
Volcanic glass (lt)	3/R
Carbonate unspec.	3/R
Foraminifers	10/C
Calcareous nannofossils	25/A

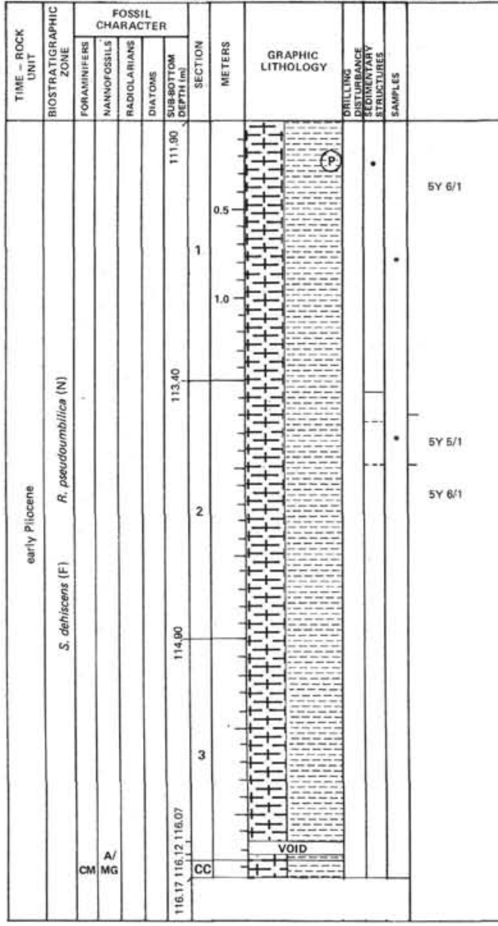
CARBONATE BOMB:

1-20 cm = 56%
1-50 cm = 41%
1-80 cm = 47%
1-110 cm = 39%
1-140 cm = 37%
2-20 cm = 39%
2-50 cm = 44%
2-80 cm = 37%
2-110 cm = 40%
2-140 cm = 37%
3-20 cm = 43%
3-50 cm = 46%
3-80 cm = 39%
3-110 cm = 33%
3-140 cm = 39%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	53	44	41	54
% Organic carbon	0.2	0.3	0.3	0.2
	1-147 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	30	36	46	43
% Organic carbon	0.2	0.3	0.2	0.3
	2-125 cm	2-149 cm	3-35 cm	3-65 cm
% Carbonate	34	38	42	42
% Organic carbon	0.3	0.4	0.2	0.3
	3-95 cm	3-125 cm	3-139 cm	
% Carbonate	34	39	41	
% Organic carbon	0.3	0.2	0.3	

SITE 502 HOLE A CORE (HPC) 27 CORED INTERVAL 111.9–116.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally structureless with some faint mottles and burrows.

In Section 1 at 22 cm there is a pyrite nodule.

Section 2, 6 cm shows grayish blue green (5BG 5/2) laminae.

Section 2, 20–44 cm is a FORAM AND NANNO-BEARING CALCAREOUS CLAY.

SMEAR SLIDE SUMMARY

	1-80	2-35
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	51/A	62/A
Volcanic glass (lt)	3/R	–
Carbonate unspec.	2/T	2/R
Foraminifers	15/C	7/C
Calcareous nannofossils	25/A	20/C

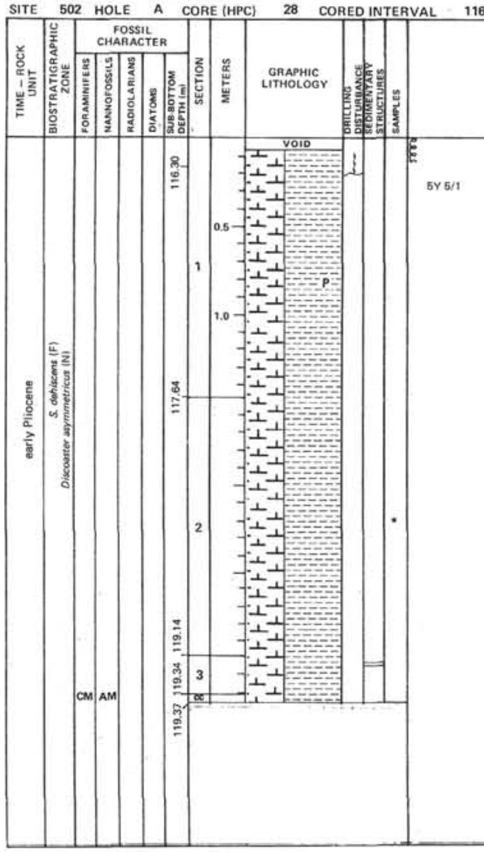
CARBONATE BOMB:

1-20 cm = 35%
1-50 cm = 46%
1-80 cm = 42%
1-110 cm = 36%
1-140 cm = 49%
2-20 cm = 47%
2-50 cm = 32%
2-80 cm = 38%
2-110 cm = 32%
2-140 cm = 39%
3-20 cm = 22%
3-50 cm = 30%
3-80 cm = 38%
3-110 cm = 30%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	35	42	53	45
% Organic carbon	0.2	0.3	0.4	0.3
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	47	37	34	31
% Organic carbon	0.2	0.2	0.2	0.3
	2-125 cm	2-149 cm	3-35 cm	3-65 cm
% Carbonate	33	42	16	39
% Organic carbon	0.3	0.3	0.3	0.3
	3-95 cm			
% Carbonate	37			
% Organic carbon	0.3			

SITE 502 HOLE A CORE (HPC) 28 CORED INTERVAL 116.3–119.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING-NANNO MARL, which is gray (5Y 5/1) in color and very faintly banded with disseminated pyrite crystals.

Section 1, 5–20 cm is deformed.

In Section 1 at 85 cm there is a pyrite nodule (1 cm diameter).

There is a break in the sediment column in Section 2 at 113 cm.

In Section 2 the interval from 115–130 cm is a slightly darker shade of gray.

In Section 3 at 5 and 8 cm there are dark bands.

SMEAR SLIDE SUMMARY

	2-70
	D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	58/A
Volcanic glass (lt)	3/R
Carbonate unspec.	2/R
Foraminifers	8/C
Calcareous nannofossils	25/A

CARBONATE BOMB:

1-20 cm = 14%
1-50 cm = 27%
1-80 cm = 23%
1-110 cm = 30%
1-140 cm = 29%
2-20 cm = 30%
2-50 cm = 23%
2-80 cm = 38%
2-110 cm = 31%
2-140 cm = 39%

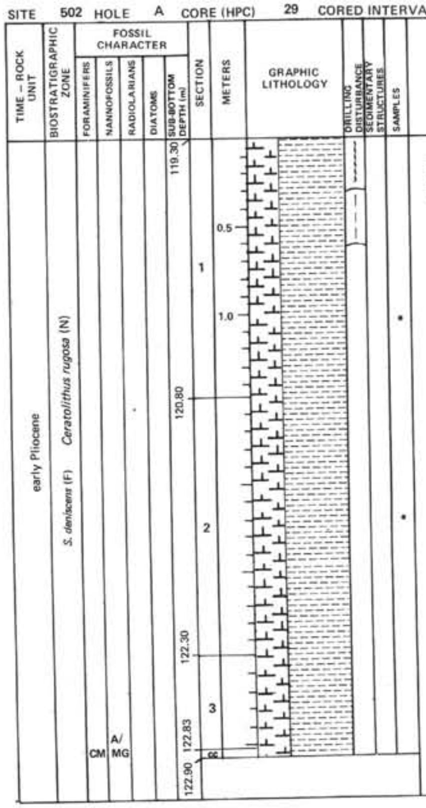
CLAY MINERALOGY ($<2\ \mu m$): 2-52 cm

Smectite	45%
Illite	14%
Chlorite	12%
Kaolinite	29%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	16	32	20	20
% Organic carbon	0.4	0.4	0.4	0.4
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	25	29	31	41
% Organic carbon	0.3	0.3	0.4	0.3
	2-125 cm	2-150 cm	3-12 cm	
% Carbonate	15	46	46	
% Organic carbon	0.5	0.3	0.3	

SITE 502 HOLE A CORE (HPC) 29 CORED INTERVAL 119.3–122.8 m



LITHOLOGIC DESCRIPTION

5Y 6/1
to
5Y 5/1

NANNO-BEARING CLAY TO NANNO MARL, which is gray (5Y 6/1 to 5Y 5/1) in color and generally structureless with faint mottling and occasional faint burrows.

Section 1, 0–32 cm is disturbed.

Section 1, 32–60 cm has cracks and is slightly deformed.

SMEAR SLIDE SUMMARY

	1-100 D	2-70 D
Quartz	2/R	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	67/A	65/A
Volcanic glass (lt)	2/R	–
Carbonate unspec.	2/R	2/R
Foraminifers	4/R	5/C
Calcareous nannofossils	20/C	25/A

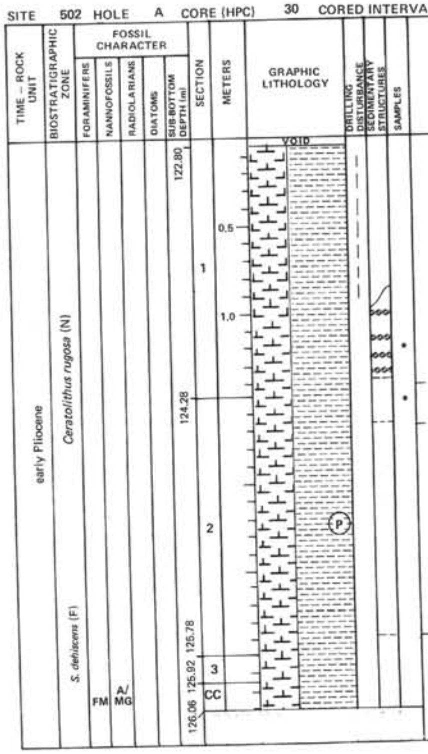
CARBONATE BOMB:

1-20 cm = 31%	2-50 cm = 24%
1-50 cm = 38%	2-80 cm = 43%
1-80 cm = 39%	2-110 cm = 35%
1-110 cm = 27%	2-140 cm = 43%
1-140 cm = 39%	3-20 cm = 44%
2-20 cm = 38%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	52	41	28	31
% Organic carbon	0.3	0.3	0.4	0.3
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	41	29	35	29
% Organic carbon	0.3	0.3	0.3	0.4
	2-121 cm	2-150 cm	3-36 cm	
% Carbonate	29	50	34	
% Organic carbon	0.3	0.3	0.3	

SITE 502 HOLE A CORE (HPC) 30 CORED INTERVAL 122.8–125.8 m



LITHOLOGIC DESCRIPTION

NANNO MARL which is gray (5Y 6/1 to 5Y 5/1) in color and structureless with faint mottling.

Section 1, 3–85 cm is disturbed.

5Y 6/1

Section 1, 78–85 cm has an irregular break in the sediment column.

In Section 1 from 100–150 cm burrows are distinct.

In Section 2 at 55 cm there is a pyrite nodule (approximately 2 cm diameter).

SMEAR SLIDE SUMMARY

	1-120 D	2-5 D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	57/A	62/A
Volcanic glass (lt)	2/R	3/R
Zeolites	–	1/T
Carbonate unspec.	2/R	2/R
Foraminifers	5/C	3/R
Calcareouns nannofossils	30/A	25/A

5Y 5/1

5Y 6/1

CARBONATE BOMB:

1-20 cm = 35%	2-20 cm = 30%
1-50 cm = 51%	2-50 cm = 47%
1-90 cm = 38%	2-80 cm = 49%
1-110 cm = 32%	2-110 cm = 33%
1-140 cm = 26%	2-140 cm = 35%

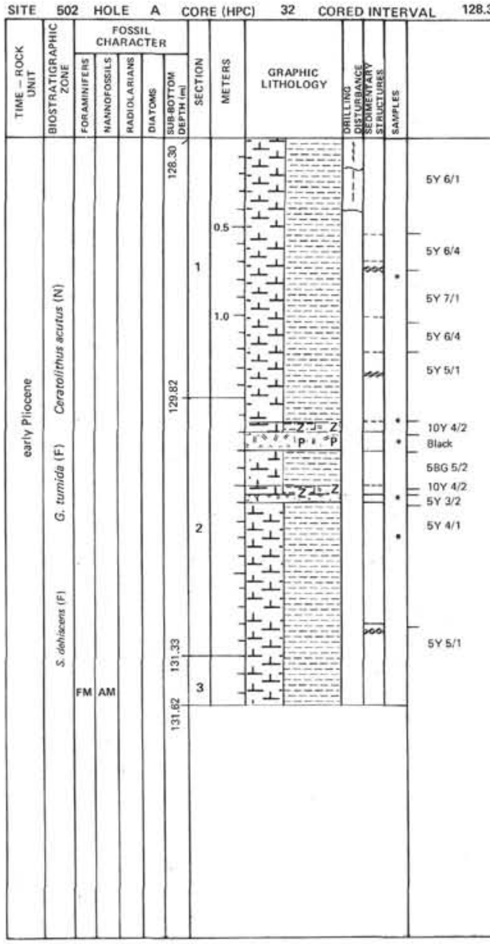
CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	35	39	33	35
% Organic carbon	0.3	0.3	0.3	0.4
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	22	45	54	36
% Organic carbon	0.4	0.4	0.3	0.3
	2-125 cm	2-150 cm	3-7 cm	
% Carbonate	50	26	27	
% Organic carbon	0.3	0.3	0.4	

5Y 5/1

Note: Site 502A, Core 31, 125.8–128.3 m: No recovery.

SITE 502 HOLE A CORE (HPC) 32 CORED INTERVAL 128.3–131.3 m



LITHOLOGIC DESCRIPTION

NANNO MARL TO NANNO-BEARING CLAY, which are dark to light shades of gray (5Y 6/1, 6/4, 7/1, 5/1, and 4/1) and generally mottled and burrowed.

In Section 1, 0–20 cm is highly disturbed and slightly disturbed from 20–40 cm.

Section 1, 67–77 cm is distinctly burrowed.

A distinct vertically oriented black burrow in Section 1 at 135–138 cm.

In Section 2 at 15–21 cm a grayish olive (10Y 4/2) ASH AND ZEOLITE CALCAREOUS CLAY overlies a black PYRITE-BEARING VITRIC ASH at Section 2, 21–29 cm.

Section 2, 29–52 cm is distinctly banded black and grayish blue green (5BG 5/2) and contains a possible zoophycus burrow.

In Section 2 at 52–59 cm a grayish olive (10Y 4/2) ASH AND ZEOLITE CALCAREOUS CLAY overlies an olive gray (5Y 3/2) VITRIC ASH.

A large burrow with dusky blue green (5BG 3/2) halo is in Section 2 at 134–135 cm.

SMEAR SLIDE SUMMARY

	1-75 D	2-15 D	2-25 M	2-58 M	2-80 D
Quartz	1/T	1/T	–	–	1/T
Feldspar	–	–	1/T	1/T	–
Pyrite	2/R	2/R	15/C	5/C	4/R
Other heavy minerals	1/T	1/T	2/R	3/R	1/T
Clay minerals	48/A	41	2/R	4/R	69/A
Volcanic glass (lt)	2/R	8/C	80/D	85/A	3/R
Zeolites	–	20/C	–	2/R	1/T
Carbonate unspec.	2/R	3/R	–	–	3/R
Foraminifers	4/R	4/R	–	–	3/R
Calcareous nannofossils	40/A	20/C	–	–	15/C

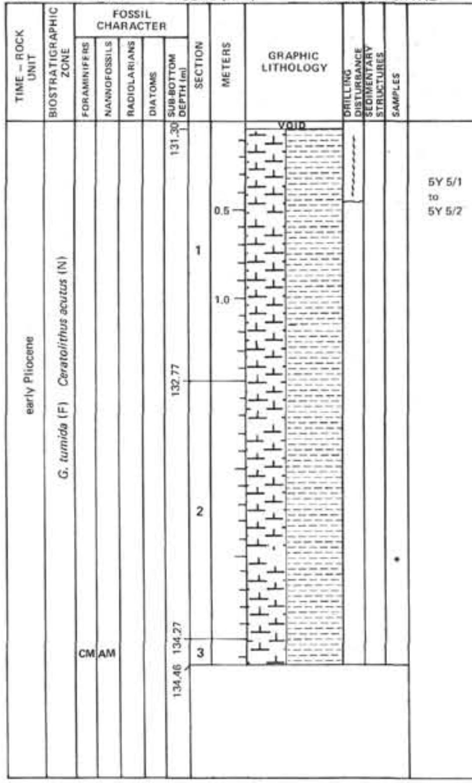
CARBONATE BOMB:

1-20 cm = 41%	2-50 cm = 16%
1-50 cm = 34%	2-80 cm = 11%
1-80 cm = 55%	2-110 cm = 17%
1-110 cm = 23%	2-140 cm = 22%
1-140 cm = 12%	3-20 cm = 22%
2-20 cm = 7%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	48	16	51	16
% Organic carbon	0.3	0.4	0.3	0.3
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	20	21	20	26
% Organic carbon	0.4	0.3	0.3	0.3
	2-125 cm	2-150 cm	3-15 cm	
% Carbonate	26	15	16	
% Organic carbon	0.3	0.3	0.4	

SITE 502 HOLE A CORE (HPC) 33 CORED INTERVAL 131.3–134.3 m



LITHOLOGIC DESCRIPTION

NANNO MARL which is gray to olive gray (5Y 5/1 to 5Y 5/2) in color and generally structureless with mottles and burrows and very vague banding.

Section 1, 3–45 cm is highly disturbed.

In Section 3 at approximately 7 cm there is a brass shear pin remnant visible through the liner.

SMEAR SLIDE SUMMARY

	2-100 D
Quartz	1/T
Pyrite	3/R
Other heavy minerals	1/T
Clay minerals	54/A
Volcanic glass (lt)	2/R
Zeolites	1/T
Carbonate unspec.	3/R
Foraminifers	5/C
Calcareous nannofossils	30/A

CARBONATE BOMB:

1-20 cm = 20%	2-20 cm = 33%
1-50 cm = 33%	2-50 cm = 34%
1-80 cm = 40%	2-80 cm = 34%
1-110 cm = 47%	2-110 cm = 33%
1-140 cm = 30%	2-140 cm = 42%

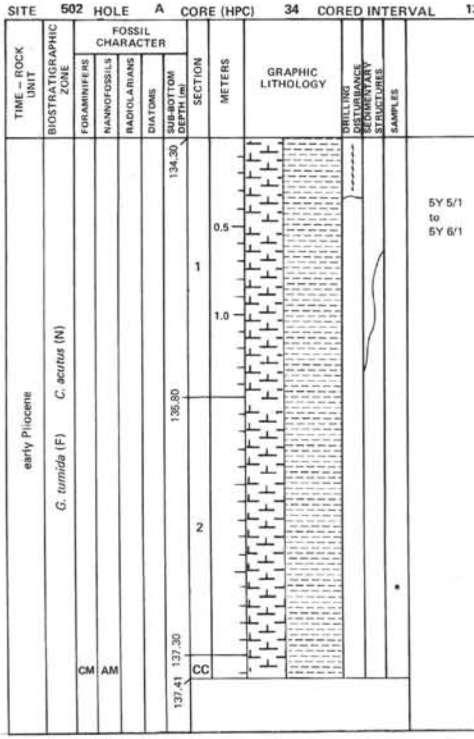
CLAY MINERALOGY (<2 μm): 1-102 cm

Smectite	66%
Illite	7%
Chlorite	8%
Kaolinite	19%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	23	20	36	50
% Organic carbon	0.4	0.3	0.3	0.3
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	48	33	30	42
% Organic carbon	0.3	0.4	0.3	0.3
	2-125 cm	2-150 cm	3-4 cm	
% Carbonate	37	49	51	
% Organic carbon	0.3	0.3	0.2	

SITE 502 HOLE A CORE (HPC) 34 CORED INTERVAL 134.3–137.3 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is gray (5Y 5/1 to 5Y 6/1) in color and generally structureless with some faint mottling.

Section 1, 0–35 cm is highly disturbed.

An irregular shear probably a result of coring disturbance is in Section 1 from 65–133 cm. Each half appears intact.

In Section 2 the burrows become slightly more distinct owing to a color change from a light to a darker shade.

SMEAR SLIDE SUMMARY

	2-110 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	2/R
Clay minerals	66/A
Volcanic glass (lt)	2/R
Carbonate unspec.	3/R
Foraminifers	4/R
Calcareous nannofossils	20/C

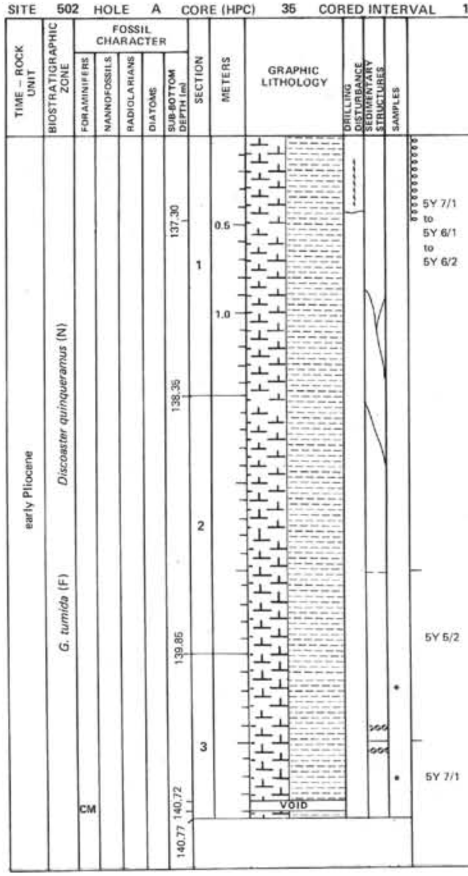
CARBONATE BOMB:

1-20 cm = 41%	2-20 cm = 34%
1-50 cm = 46%	2-50 cm = 48%
1-80 cm = 34%	2-80 cm = 39%
1-110 cm = 31%	2-110 cm = 39%
1-140 cm = 35%	2-140 cm - 35%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	37	50	31	36
% Organic carbon	0.3	0.3	0.3	0.4
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	33	39	45	38
% Organic carbon	0.4	0.3	0.3	0.4
	2-125 cm	2-150 cm		
% Carbonate	37	40		
% Organic carbon	0.4	0.3		

SITE 502 HOLE A CORE (HPC) 35 CORED INTERVAL 137.3–140.8 m



LITHOLOGIC DESCRIPTION

NANNO MARL which is light gray (5Y 7/1) to gray (5Y 6/1) to olive gray (5Y 5/2) in color and generally structureless with burrows and mottles.

Section 1, 0–47 cm is highly disturbed.

From Section 1, 88 cm to Section 2, 51 cm there are vertically oriented shears at various angles which are probably coring induced.

The core is extensively burrowed in vicinity of color change at Section 3, 40–60 cm.

SMEAR SLIDE SUMMARY

	3-20 D	3-70 D
Quartz	1/T	1/T
Pyrite	4/R	2/R
Other heavy minerals	2/T	1/T
Clay minerals	61/A	60/A
Volcanic glass (lt)	3/R	3/R
Zeolites	1/T	–
Carbonate unspec.	3/R	3/R
Foraminifers	5/C	5/C
Calcareouns nannofossils	20/C	25/A

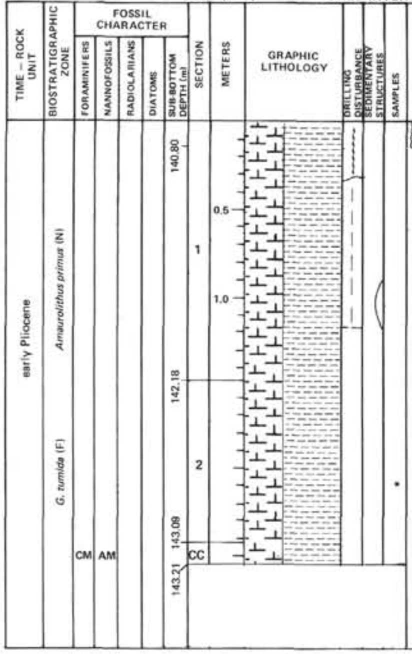
CARBONATE BOMB:

1-20 cm = 36%	2-80 cm = 39%
1-50 cm = 37%	2-110 cm = 43%
1-80 cm = 48%	2-140 cm = 37%
1-110 cm = 57%	3-20 cm = 26%
1-140 cm = 43%	3-50 cm = 38%
2-20 cm = 28%	3-80 cm = 53%
2-50 cm = 35%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	43	42	66	53
% Organic carbon	0.4	0.3	0 2	0.3
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	39	41	36	39
% Organic carbon	0.3	0.3	0.4	0.3
	2-125 cm	2-150 cm	3-35 cm	3-65 cm
% Carbonate	44	41	26	55
% Organic carbon	0.3	0.3	0.4	0.2
	3-95 cm			
% Carbonate	54			
% Organi carbon	0.3			

SITE 502 HOLE A CORE (HPC) 36 CORED INTERVAL 140.8–143.3 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color, structureless, and faintly mottled.

Section 1, 0–32 cm is highly disturbed.

Section 1, 32–118 cm: possible coring disturbance. An approximately vertical shear in Section 1 at 100–118 cm is probably a result of coring.

The Core-Catcher is sheared.

SMEAR SLIDE SUMMARY

	2-60
	D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	59/A
Volcanic glass (lt)	2/R
Carbonate unspec.	3/R
Foraminifers	8/C
Calcareous nannofossils	25/A

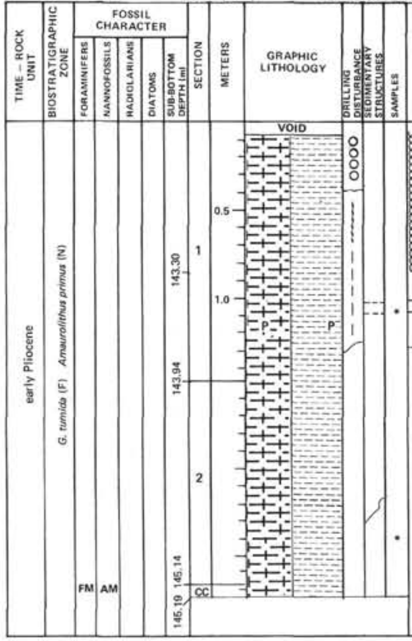
CARBONATE BOMB:

1-20 cm = 51%	1-140 cm = 48%
1-50 cm = 49%	2-20 cm = 38%
1-80 cm = 48%	2-50 cm = 59%
1-110 cm = 56%	2-80 cm = 46%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	53	47	59	54
% Organic carbon	0.3	0.3	0 2	0.3
	1-150 cm	2-35 cm	2-65 cm	2-90 cm
% Carbonate	48	45	56	38
% Organic carbon	0.3	0.3	0.3	0.4

SITE 502 HOLE A CORE (HPC) 37 CORED INTERVAL 143.3–145.8 m



LITHOLOGIC DESCRIPTION

5Y 6/1
to
5Y 6/2

5Y 5/3

5Y 5/1

5Y 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) to light olive gray (5Y 6/2) in color with occasional burrowing and mottling.

Section 1, 104–109 cm is a disturbed layer, but still recognizable, of olive (5Y 5/3) PYRITE-BEARING NANNO CLAY.

Section 1, 0–approximately 130 cm is disturbed by shearing and fragmentation.

In Section 2 from 63–78 cm there is an irregular shear. The sediment appears intact below this point.

SMEAR SLIDE SUMMARY

	1-105	2-90
	D	D
Quartz	1/T	1/T
Pyrite	10/C	3/R
Other heavy minerals	1/T	1/T
Clay minerals	55/A	43/A
Volcanic glass (lt)	4/R	3/R
Zeolites	3/R	–
Carbonate unspec.	3/R	4/R
Foraminifers	3/R	15/C
Calcareous nannofossils	20/C	30/A

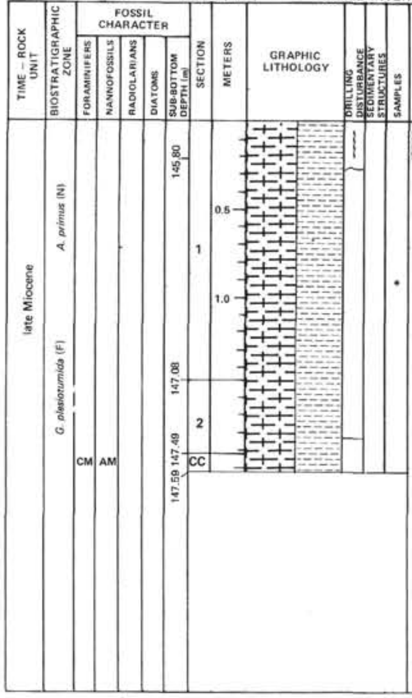
CARBONATE BOMB:

2-20 cm = 50%	2-80 cm = 52%
2-50 cm = 55%	2-110 cm = 50%

CARBON-CARBONATE:

	2-35 cm	2-65 cm	2-100 cm	2-118 cm
% Carbonate	58	55	49	53
% Organic carbon	0.2	0.3	0.2	0.3

SITE 502 HOLE A CORE (HPC) 38 CORED INTERVAL 145.8–147.3 m



LITHOLOGIC DESCRIPTION

5Y 6/1
to
5Y 5/1

FORAM-BEARING NANNO MARL, which is gray (5Y 5/1) to light gray (5Y 6/1) in color. It is structureless with faint mottling and burrowing. Scattered forams are visible.

Section 1, 0–27 cm is highly disturbed.

In Section 2 at 32 cm there is a small break in the sediment column.

SMEAR SLIDE SUMMARY

	1-90
	D
Quartz	1/T
Pyrite	4/R
Other heavy minerals	1/T
Clay minerals	48/A
Volcanic glass (lt)	2/R
Carbonate unspec.	3/R
Foraminifers	15/C
Calcareous nannofossils	25/A

CARBONATE BOMB:

1-20 cm = 52%	1-110 cm = 42%
1-50 cm = 45%	1-140 cm = 38%
1-80 cm = 35%	2-20 cm = 33%

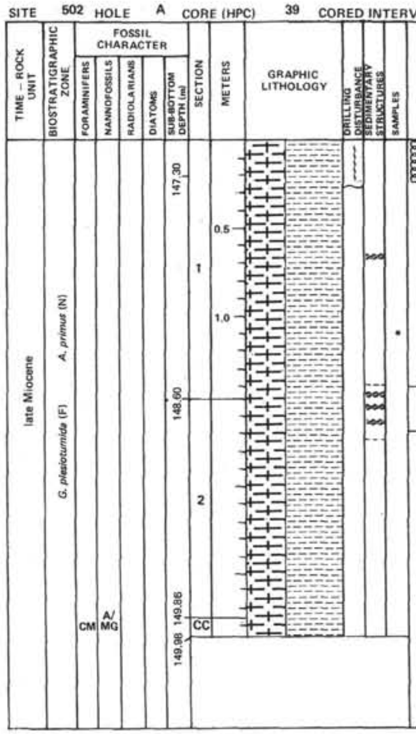
CLAY MINERALOGY (<2 μm): 1-102 cm

Smectite	59%
Illite	10%
Chlorite	12%
Kaolinite	19%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	41	60	38	42
% Organic carbon	0.4	0.3	0.3	0.4
	1-150 cm	2-5 cm	2-35 cm	
% Carbonate	43	35	36	
% Organic carbon	0.3	0.3	0.3	

SITE 502 HOLE A CORE (HPC) 39 CORED INTERVAL 147.3–150.3 m



LITHOLOGIC DESCRIPTION

5Y 5/1

FORAM-BEARING NANNO MARL, which is gray (5Y 5/1) to olive gray (5Y 5/2) in color and structureless with mottles and burrows. Scattered forams are visible.

Section 1, 0–26 cm is high disturbed.

A large burrow with black halo is in Section 1 at 67 to 68 cm.

A zoophycos burrow is in Section 1 at 140–150 cm.

In Section 2 the interval from 0–20 cm is distinctly burrowed.

5Y 5/2

5Y 5/1

SMEAR SLIDE SUMMARY

	1-110
	D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	65/A
Volcanic glass (lt)	3/R
Carbonate unspec.	4/R
Foraminifers	10/C
Calcareous nannofossils	25/A

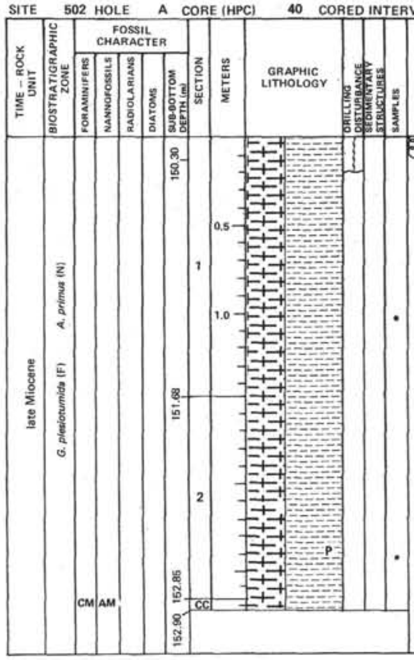
CARBONATE BOMB:

1-20 cm = 35%	2-20 cm = 35%
1-50 cm = 39%	2-50 cm = 44%
1-80 cm = 35%	2-80 cm = 45%
1-110 cm = 39%	2-110 cm = 40%
1-140 cm = 37%	

CARBON-CARBONATE:

	1-35 cm	1-66 cm	1-95 cm	1-125 cm
% Carbonate	40	40	43	42
% Organic carbon	0.4	0.4	0.4	0.4
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	32	43	37	50
% Organic carbon	0.4	0.6	0.3	0.3
	2-125 cm			
% Carbonate	46			
% Organic carbon	0.2			

SITE 502 HOLE A CORE (HPC) 40 CORED INTERVAL 150.3–152.8 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) in color, with 2–10% pyrite. The sediment is mottled and burrowed but otherwise structureless. Forams are visible.

Section 1, 0–19 cm is disturbed.

SMEAR SLIDE SUMMARY

	1-100	2-90
	D	D
Quartz	1/T	1/T
Pyrite	2/R	7/C
Other heavy minerals	1/T	1/T
Clay minerals	57/A	56/A
Volcanic glass (lt)	2/R	2/R
Carbonate unspec.	2/R	3/R
Foraminifers	15/C	10/C
Calcareous nannofossils	20/C	20/C

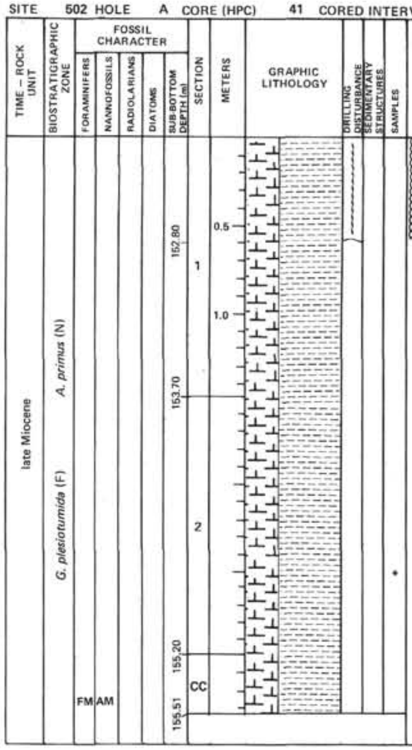
CARBONATE BOMB:

1-20 cm = 31%	2-20 cm = 49%
1-50 cm = 49%	2-50 cm = 47%
1-80 cm = 40%	2-80 cm = 29%
1-110 cm = 43%	2-110 cm = 30%
1-140 cm = 45%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	41	45	47	48
% Organic carbon	0.4	0.3	0.3	0.3
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	49	47	39	30
% Organic carbon	0.3	0.4	0.4	0.4

SITE 502 HOLE A CORE (HPC) 41 CORED INTERVAL 152.8–155.8 m



LITHOLOGIC DESCRIPTION

5Y 5/1
to
5Y 6/2

NANNO-BEARING CLAY, which is gray (5Y 5/1) to light olive gray (5Y 6/2), in color with burrows and mottles but otherwise structureless. Scattered forams are visible.

SMEAR SLIDE SUMMARY

	2-100
	D
Quartz	1/T
Pyrite	4/R
Other heavy minerals	1/T
Clay minerals	66/A
Volcanic glass (lt)	2/R
Foraminifers	5/C
Calcareous nannofossils	20/A
Dolomite	1/T

CARBONATE BOMB:

1-80 cm = 37%	2-80 cm = 27%
1-110 cm = 44%	2-110 cm = 36%
1-140 cm = 46%	2-140 cm = 32%
2-20 cm = 43%	3-20 cm = 45%
2-50 cm = 39%	

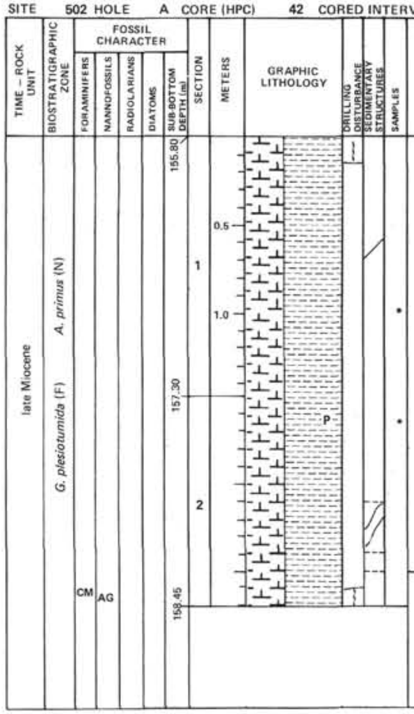
CLAY MINERALOGY (<2 μm): 2-49 cm

Smectite	66%
Illite	7%
Chlorite	10%
Kaolinite	17%

CARBON-CARBONATE:

	1-65 cm	1-95 cm	1-125 cm	1-150 cm
% Carbonate	38	43	44	48
% Organic carbon	0.3	0.3	0.3	0.4
	2-35 cm	2-65 cm	2-95 cm	2-125 cm
% Carbonate	35	35	34	35
% Organic carbon	0.3	0.3	0.4	0.2
	2-150 cm	3-15 cm		
% Carbonate	43	48		
% Organic carbon	0.3	0.3		

SITE 502 HOLE A CORE (HPC) 42 CORED INTERVAL 155.8–158.3 m



LITHOLOGIC DESCRIPTION

5G 6/1

5Y 6/1

FORAM AND NANNO-BEARING CLAY, greenish gray (5G 6/1) to light gray (5Y 6/1) in color which is mottled and burrowed. Forams are visible, but very sparsely scattered.

Section 1, 0–14 cm is disturbed.

In Section 1, 55–65 cm the sediment column is sheared.

In Section 2, 18 cm there is a black nodule consisting of pyrite and ash.

Section 2, 60–90 cm the sediment column is irregularly sheared.

SMEAR SLIDE SUMMARY

	1-100	2-18
	D	M
Quartz	1/T	–
Pyrite	3/R	40/A
Other heavy minerals	1/T	–
Clay minerals	63/A	10/C
Volcanic glass (lt)	2/R	15/C
Zeolites	1/T	–
Carbonate unspec.	4/R	–
Foraminifers	5/C	25/A
Calcareous nannofossils	20/A	10/C

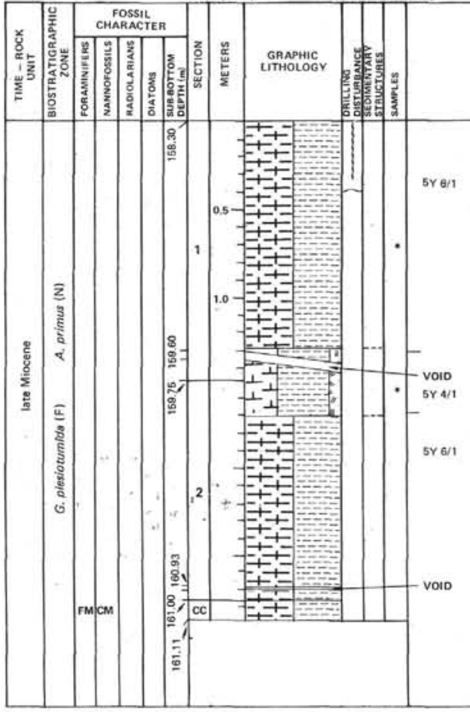
CARBONATE BOMB:

1-20 cm = 45%	2-20 cm = 28%
1-50 cm = 35%	2-50 cm = 25%
1-80 cm = 30%	2-80 cm = 25%
1-110 cm = 24%	2-110 cm = 35%
1-140 cm = 33%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	42	35	27	30
% Organic carbon	0.4	0.3	0.5	0.4
	1-150 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	40	34	24	31
% Organic carbon	0.4	0.3	0.4	0.4

SITE 502 HOLE A CORE (HPC) 43 CORED INTERVAL 158.3–161.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is gray (5Y 6/1) in color and generally structureless but mottled.

Section 1, 0–37 cm is disturbed.

From Section 1, approximately 128 cm to Section 2, 17 cm the sediment is ASH AND NANNO-BEARING CLAY which is dark gray (5Y 4/1) in color.

SMEAR SLIDE SUMMARY

	1-70	2-5
	D	D
Quartz	1/T	1/T
Pyrite	2/R	3/R
Other heavy minerals	1/T	1/T
Clay minerals	47/A	64/A
Volcanic glass (lt)	4/R	8/C
Carbonate unspec.	4/R	4/R
Foraminifers	10/C	3/R
Calcareous nannofossils	25/A	15/C
Dolomite	–	1/T

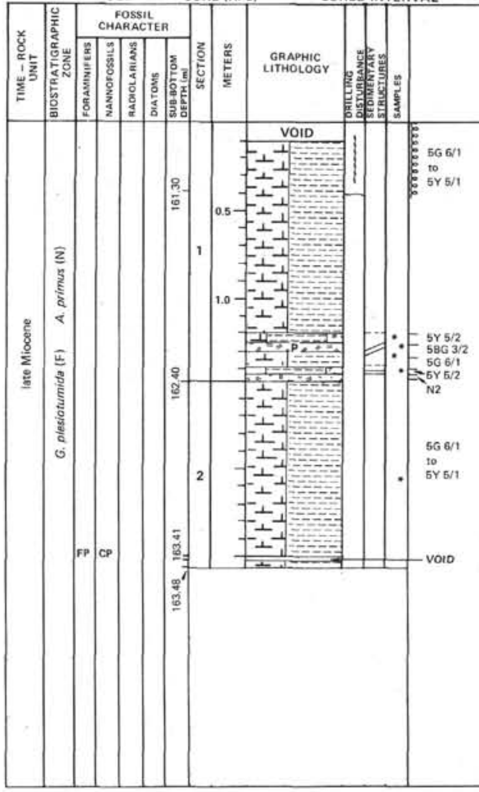
CARBONATE BOMB:

1-20 cm = 38%	2-20 cm = 23%
1-50 cm = 35%	2-50 cm = 32%
1-80 cm = 35%	2-80 cm = 33%
1-110 cm = 31%	2-110 cm = 24%
1-140 cm = 20%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	36	48	26	27
% Organic carbon	0.3	0.3	0.3	0.4
	1-150 cm	2-35 cm	2-66 cm	2-95 cm
% Carbonate	9	30	32	26
% Organic carbon	0.5	0.4	0.4	0.3
	2-100 cm	2-125 cm		
% Carbonate	28	29		
% Organic carbon	0.4	0.3		

SITE 502 HOLE A CORE (HPC) 44 CORED INTERVAL 161.3–163.8 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is greenish gray (5G 6/1) to gray (5Y 5/1) in color and veguely mottled, burrowed, and banded.

Section 1, 67–80 cm is possibly sheared.

Section 1, 120–127 cm is ASH-BEARING NANNO CLAY, olive gray (5Y 5/2) in color.

Section 1, 127–134 cm is black PYRITE-BEARING ASH, with inclusions of NANNO AND ASH-BEARING CLAY which is dusky blue green (5BG 3/2) in color.

Section 1, 134–141 cm is NANNO CLAY, like the surrounding sediment.

Section 1, 141–144 cm is NANNO AND ASH-BEARING CLAY, olive gray (5Y 5/2) in color.

Section 1, 144 cm is NANNO-BEARING ASH which is black in color.

SMEAR SLIDE SUMMARY

	1-125	1-129	1-131	1-144	2-60
	M	M	M	M	D
Quartz	1/T	1/T	–	1/T	1/T
Feldspar	–	1/T	–	2/R	–
Pyrite	3/R	4/R	5/C	4/R	3/R
Other heavy minerals	1/T	–	2/R	1/T	1/T
Clay minerals	60/A	65/A	–	4/R	63/A
Volcanic glass (lt)	7/C	15/C	85/D	70/A	3/R
Zeolites	1/T	2/R	–	1/T	–
Carbonate unspec.	3/R	5/C	–	–	4/R
Foraminifers	4/R	2/R	–	–	5/C
Calcareous nannofossils	20/C	5/C	–	16/C	20/C

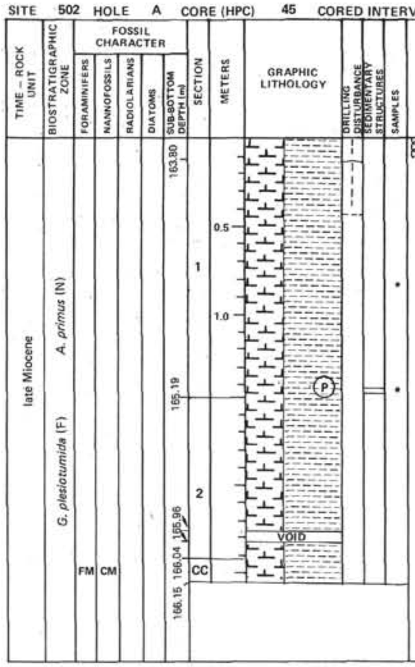
CARBONATE BOMB:

1-20 cm = 35%	2-20 cm = 30%
1-80 cm = 31%	2-50 cm = 30%
1-110 cm = 23%	2-80 cm = 24%
1-140 cm = 17%	

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	31	33	33	11
% Organic carbon	0.3	0.4	0.4	0.2
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	33	38	24	24
% Organic carbon	0.3	0.3	0.3	0.4

SITE 502 HOLE A CORE (HPC) 45 CORED INTERVAL 163.8–166.3 m



LITHOLOGIC DESCRIPTION

5G 6/1
to
5Y 5/1

NANNO MARL, which is greenish gray (5G 6/1) to gray (5Y 5/1) in color with mottling, burrowing, and faint baoding.

Section 1, 0–12 cm is disturbed.

Section 1, 12–40 cm may be sheared.

Section 1, 142–145 cm contains a dark band which is a nanno and ash-bearing pyrite nodule.

SMEAR SLIDE SUMMARY

	1-80	1-144
	D	M
Quartz	1/T	–
Pyrite	2/R	60/A
Other heavy minerals	1/T	–
Clay minerals	57/A	23/C
Volcanic glass (lt)	4/R	10/C
Carbonate unspec.	5/C	1/T
Foraminifers	4/R	1/T
Calcareous nannofossils	25/A	5/C
Dolomite	1/T	–

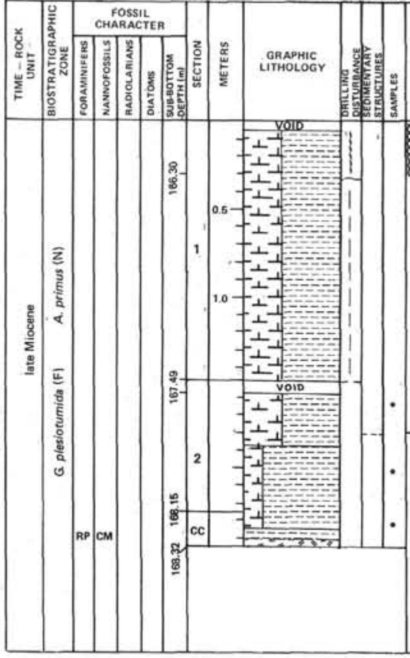
CARBONATE BOMB:

1-20 cm = 17%
1-50 cm = 21%
1-80 cm = 31%
1-110 cm = 33%
1-140 cm = 19%
2-20 cm = 25%
2-50 cm = 23%
2-80 cm = 26%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	23	32	36	28
% Organic carbon	0.4	0.4	0.3	0.3
	1-149 cm	2-35 cm	2-65 cm	
% Carbonate	30	28	28	
% Organic carbon	0.3	0.4	0.3	

SITE 502 HOLE A CORE (HPC) 46 CORED INTERVAL 166.3–168.3 m



LITHOLOGIC DESCRIPTION

5G 6/1
to
5Y 5/1

NANNO MARL TO NANNO-BEARING CLAY, which is grayish green (5G 6/1) and gray (5Y 5/1) to dark greenish gray (5GY 4/1) in color. It is generally mottled and burrowed.

Section 1, 6–37 cm is disturbed.

Section 1, 37–150 cm shows sediment shear.

The Core-Catcher contains devitrified ash, which is dark greenish gray (5GY 4/1) in color.

5GY 4/1

SMEAR SLIDE SUMMARY

	2-15	2-50	CC, 10
	D	D	M
Quartz	1/T	1/T	–
Pyrite	1/T	2/R	5/C
Other heavy minerals	1/T	1/T	–
Clay minerals	55/A	70/A	9/C
Volcanic glass (lt)	3/R	3/R	4/R
Devitrified ash	–	–	80/D
Carbonate unspec.	2/R	5/C	–
Foraminifers	4/C	3/R	–
Calcareous nannofossils	30/A	15/C	2/R

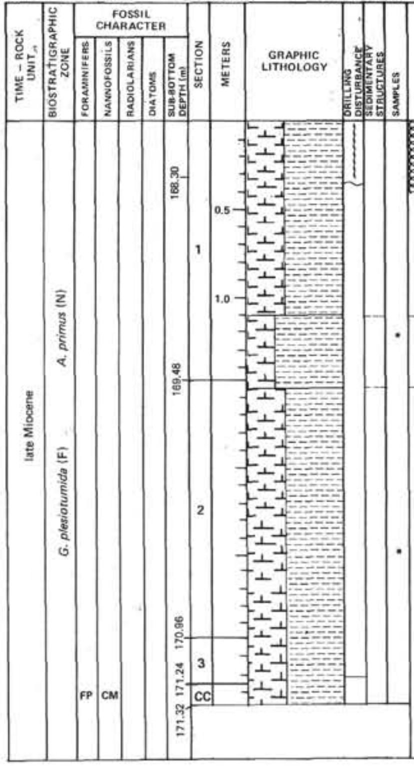
CARBONATE BOMB:

1-20 cm = 23%
1-50 cm = 38%
1-80 cm = 41%
1-110 cm = 32%
1-140 cm = 36%
2-20 cm = 36%
2-50 cm = 17%
2-80 cm = 23%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	25	37	41	45
% Organic carbon	0.3	0.6	0.3	0.3
	1-149 cm	2-35 cm	2-65 cm	
% Carbonate	43	.30	25	
% Organic carbon	0.3	0.3	0.4	

SITE 502 HOLE A CORE (HPC) 47 CORED INTERVAL 168.3–171.3 m



LITHOLOGIC DESCRIPTION

5G 6/1

NANNO MARL, which is greenish gray (5G 6/1) in color and NANNO-BEARING CLAY, which is gray (5Y 5/1) in color. Both are mottled and faintly banded.

Section 1, 0–34 cm is disturbed.

In Section 3 at 20 cm there is a break in the sediment column.

5Y 5/1

5G 6/1

SMEAR SLIDE SUMMARY

	1-120	2-100
	D	D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minrals	65/A	60/A
Volcanic glass (lt)	4/R	4/R
Carbonate unspec.	3/R	3/R
Foraminifers	2/R	5/C
Calcareous nannofossils	20/C	25/A

CARBONATE BOMB:

1-50 cm = 23%
1-80 cm = 23%
1-110 cm = 16%
1-140 cm = 11%
2-20 cm = 19%
2-50 cm = 26%
2-80 cm = 25%
2-110 cm = 28%
2-140 cm = 13%

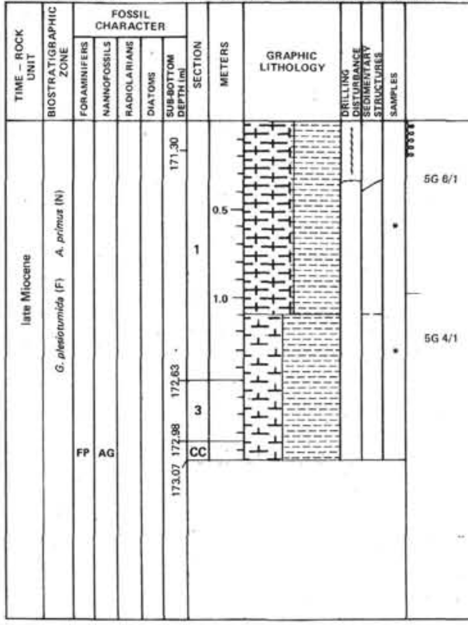
CLAY MINERALOGY (<2 μm): 1-102 cm

Smectite	61%
Illite	13%
Chlorite	11%
Kaolinite	15%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	25	20	23	12
% Organic carbon	0.4	0.4	0.4	0.5
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	22	19	24	26
% Organic carbon	0.5	0.4	0.4	0.5
	2-125 cm			
% Carbonate	29			
% Organic carbon	0.5			

SITE 502 HOLE A CORE (HPC) 48 CORED INTERVAL 171.3–173.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, greenish gray (5G 6/1) in color, and NANNO MARL, dark greenish gray. (5G 4/1) in color. Both are extensively burrowed with many burrows approximately at a 30° dip.

Section 1, 0–35 cm is disturbed.

There is a shear plane at approximately a 30° dip in Section 1 at 35 cm.

SMEAR SLIDE SUMMARY

	1-60 D	1-130 D
Quartz	1/T	1/T
Pyrite	3/R	3/R
Other heavy minerals	1/T	1/T
Clay minerals	49/A	60/A
Volcanic glass (lt)	3/R	4/R
Carbonate unspec.	3/R	2/R
Foraminifers	10/C	4/R
Calcareous nannofossils	30/A	25/A

CARBONATE BOMB:

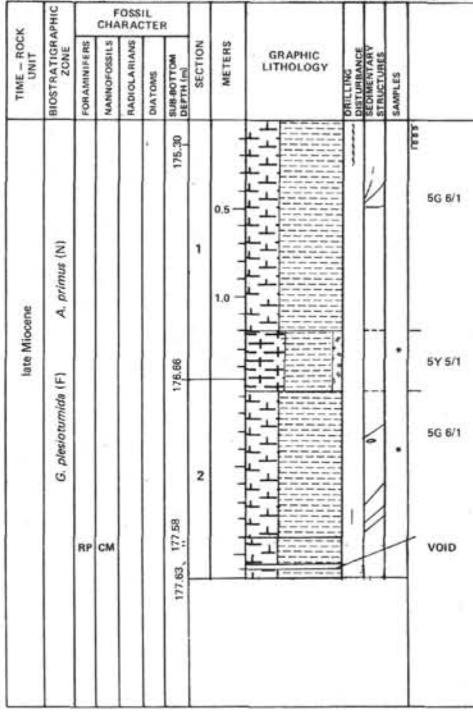
1-20 cm = 7%
1-50 cm = 38%
1-80 cm = 30%
1-110 cm = 29%
1-140 cm = 27%
2-20 cm = 29%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	21	39	38	30
% Organic carbon	0.4	0.4	0.4	0.4
	1-149 cm	2-32 cm		
% Carbonate	30	34		
% Organic carbon	0.4	0.4		

Note: Site 502A, Core 49, 173.3–175.3 m: No recovery.

SITE 502 HOLE A CORE (HPC) 50 CORED INTERVAL 175.3–178.3 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is greenish gray (5G 6/1) in color, and ASH-, FORAM-, AND NANNO-BEARING MARL, which is gray (5Y 5/1) in color. Both are extensively burrowed and mottled.

Section 1, 0–49 cm is disturbed and sheared.

In Section 2 between 23–34 cm there is a shear trace of approximately 60° dip.

A nodule with a grayish blue green (5BG 5/2) halo is in Section 2 at about 35 cm.

In Section 2 from 74–84 cm the sediment column is disturbed by shearing.

SMEAR SLIDE SUMMARY

	1-130 D	2-40 D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	46/A	70/A
Volcanic glass (lt)	7/C	5/C
Carbonate unspec.	3/R	4/R
Foraminifers	10/C	2/R
Calcareous nannofossils	20/C	15/C

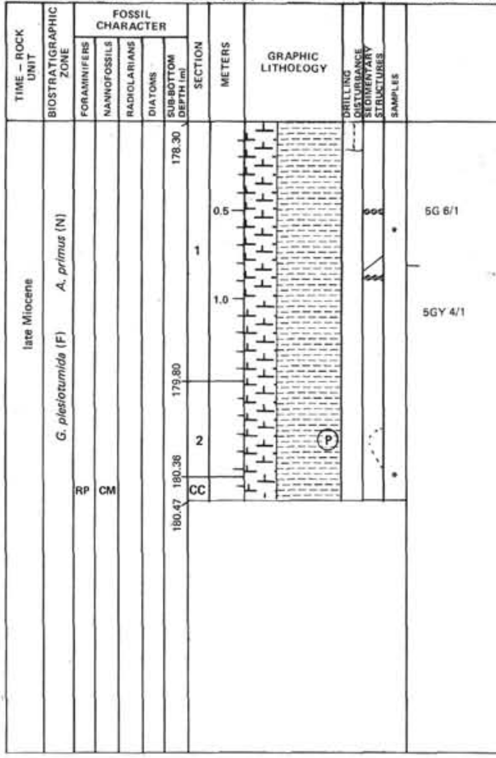
CARBONATE BOMB:

1-20 cm = 18%
1-50 cm = 25%
1-70 cm = 21%
1-110 cm = 15%
1-140 cm = 17%
2-20 cm = 16%
2-50 cm = 23%
2-60 cm = 22%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	21	24	22	18
% Organic carbon	0.4	0.4	0.4	0.4
	1-149 cm	2-35 cm	2-65 cm	2-95 cm
% Carbonate	13	22	19	24
% Organic carbon	0.3	0.3	0.4	0.4

SITE 502 HOLE A CORE (HPC) 51 CORED INTERVAL 178.3–180.8 m



LITHOLOGIC DESCRIPTION

NANNO MARL, which is greenish gray (5G 6/1) in color, and NANNO-BEARING CLAY, which is dark greenish gray (5GY 4/1) in color. Both are thoroughly burrowed with scattered forams visible.

Section 1, 0–18 cm is disturbed.

In Section 1 at 80 cm there is a color change which occurs at a shear plane (probably *in situ* deformation).

Zoophycos burrows are in Section 1 at 52 and 88 cm.

A pyrite crystal with a wide halo is in Section 2 at 38 cm.

SMEAR SLIDE SUMMARY

	1-60	2-50
	D	D
Quartz	1/T	1/T
Pyrite	1/T	1/T
Other heavy minerals	1/T	1/T
Clay minerals	64/C	73/A
Volcanic glass (lt)	2/R	2/R
Carbonate unspec.	3/R	5/C
Foraminifers	3/R	2/R
Calcareous nannofossils	25/A	15/C

CARBONATE BOMB:

1-20 cm = 32%
1-50 cm = 37%
1-80 cm = 19%
1-110 cm = 23%
1-140 cm = 4%
2-20 cm = 11%
2-50 cm = 14%

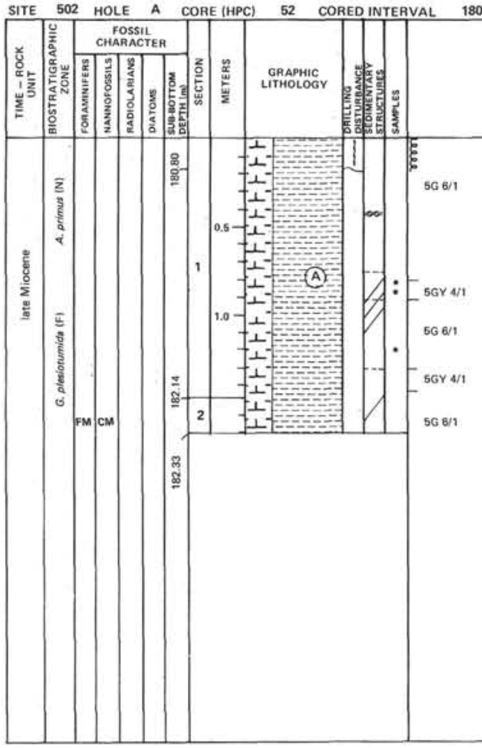
CLAY MINERALOGY (<2 μm): 1-102 cm

Smectite	52%
Illite	14%
Chlorite	14%
Kaolinite	20%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	34	46	14	10
% Organic carbon	0.3	0.3	0.4	0.4
	1-149 cm	2-35 cm	2-55 cm	
% Carbonate	8	22	18	
% Organic carbon	0.4	0.3	0.3	

SITE 502 HOLE A CORE (HPC) 52 CORED INTERVAL 180.8–182.8 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is greenish gray (5G 6/1) to dark greenish gray (5GY 4/1) in color and extensively burrowed and mottled.

Section 1, 0–19 cm is disturbed.

A zoophycos burrow is in Section 1 at 44 cm.

A grayish blue green (5BG 5/2) nodule of devitrified ash is in Section 1 at 80 cm.

In Section 1 from 88–105 cm there is irregular shear deformation.

From Section 1, 145 to Section 2, 115 cm there is a large shear which marks a color change in the core.

SMEAR SLIDE SUMMARY

	1-80	1-87	1-120
	M	D	D
Quartz	–	1/T	1/T
Pyrite	3/R	3/R	2/R
Other heavy minerals	–	1/T	1/T
Clay minerals	15/C	78/D	66/A
Volcanic glass (lt)	5/C	3/R	2/R
Volcanic glass (dk)	–	1/R	–
Devitrified ash	70/A	–	–
Carbonate unspec.	1/T	1/T	3/R
Foraminifers	1/T	1/T	5/C
Calcareous nannofossils	5/C	10/C	20/C

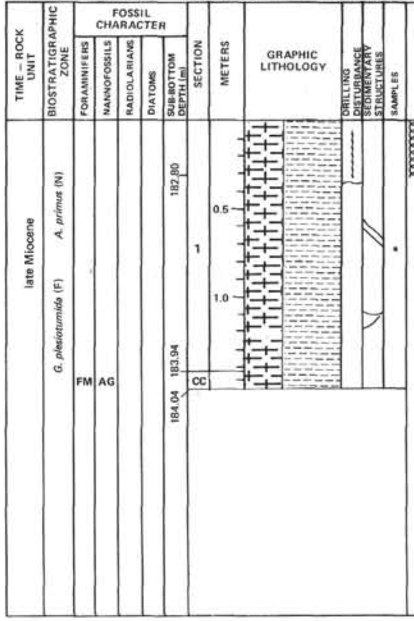
CARBONATE BOMB:

1-20 cm = 24%
1-50 cm = 18%
1-80 cm = 19%
1-110 cm = 31%
1-140 cm = 22%

CARBON-CARBONATE:

1-35	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	14	25	18	30
% Organic carbon	0.3	0.3	0.3	0.3
	1-149 cm			
% Carbonate	26			
% Organic carbon	0.3			

SITE 502 HOLE A CORE (HPC) 53 CORED INTERVAL 182.8–184.8 m



LITHOLOGIC DESCRIPTION

5G 6/1
to
5GY 6/1

FORAM-BEARING NANNO MARL, which is greenish gray (5GY 6/1 to 5G 6/1) in color and burrowed and mottled.

Section 1, 0–35 cm is disturbed.

In Section 1 at 60–70 cm there are a pair of shear planes and at 110 cm there is a deformed contact with a shear plane below.

A small break in the sediment column is in Section 1 at 137 cm.

SMEAR SLIDE SUMMARY

	1-76
	D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	56/A
Volcanic glass (lt)	4/R
Carbonate unspec.	3/R
Foraminifers	8/C
Calcareous nannofossils	25/A

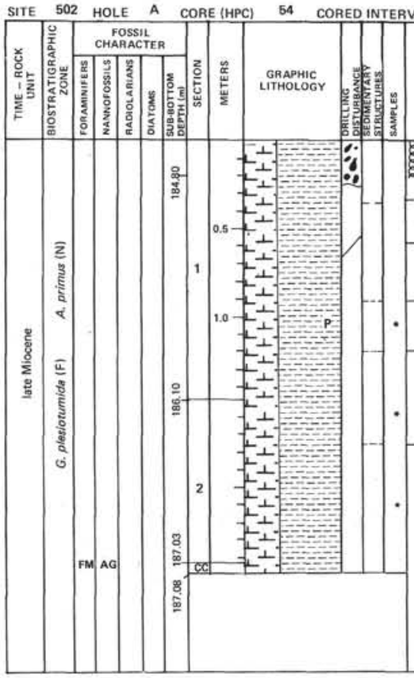
CARBONATE BOMB:

1-20 cm = 22%
1-50 cm = 25%
1-80 cm = 33%
1-110 cm = 32%
1-140 cm = 31%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	24	35	34	25
% Organic carbon	0.4	0.3	0.4	0.3
	1-149 cm			
% Carbonate	34			
% Organic carbon	0.3			

SITE 502 HOLE A CORE (HPC) 54 CORED INTERVAL 184.8–187.3 m



LITHOLOGIC DESCRIPTION

5Y 5/1
5G 6/1
5Y 5/1
5G 6/1
5Y 5/1
5G 6/1

FORAM-BEARING NANNO MARL, which is gray (5Y 5/1) in color and FORAM NANNO-BEARING CLAY, which is greenish gray (5G 6/1) in color. Both are extensively burrowed and mottled.

Section 1, 0–22 cm is disturbed.

In Section 1 at 107 cm there is a black bleb of pyrite-bearing ash.

SMEAR SLIDE SUMMARY

	1-107	2-10	2-60
	M	D	D
Quartz	–	1/T	1/T
Pyrite	10/C	2/R	1/T
Other heavy minerals	–	1/T	1/T
Clay minerals	4/R	65/A	65/A
Volcanic glass (lt)	50/A	3/R	1/T
Devitrified ash	30/A	–	–
Glauconite	2/R	–	–
Carbonate unspec.	–	3/R	3/R
Foraminifers	–	5/C	5/C
Calcareous nannofossils	4/R	20/C	25/A

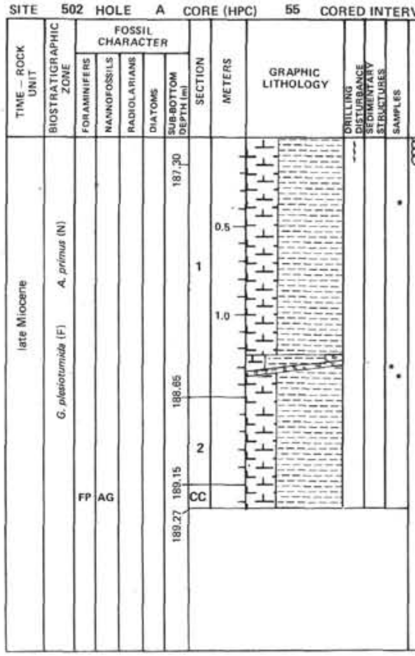
CARBONATE BOMB:

1-20 cm = 28%
1-50 cm = 29%
1-80 cm = 24%
1-110 cm = 51%
1-140 cm = 33%
2-20 cm = 15%
2-50 cm = 36%
2-80 cm = 39%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	37	42	38	37
% Organic carbon	0.4	0.4	0.3	0.2
	1-149 cm	2-35 cm	2-65 cm	2-92 cm
% Carbonate	33	37	62	37
% Organic carbon	0.3	0.2	0.2	0.3

SITE 502 HOLE A CORE (HPC) 55 CORED INTERVAL 187.3–189.3 m



LITHOLOGIC DESCRIPTION

5G 6/1

NANNO-BEARING CLAY, which is greenish gray (5G 6/1) in color and burrowed and mottled.

Section 1, 0–17 cm is disturbed.

Section 1, 133–134 cm contains an ash lamina at 20°dip. It is devitrified, and not obviously mixed into the overlying sediment.

SMEAR SLIDE SUMMARY

	1-35	1-130	1-134
	D	D	M
Quartz	1/T	1/T	–
Pyrite	2/R	1/T	4/R
Other heavy minerals	1/T	1/T	–
Clay minerals	65/A	58/A	–
Volcanic glass (lt)	1/T	20/C	46/D
Zeolites	1/T	1/T	–
Carbonate unspec.	2/R	3/R	–
Foraminifers	3/R	1/T	–
Calcareous nannofossils	20/C	15/C	–

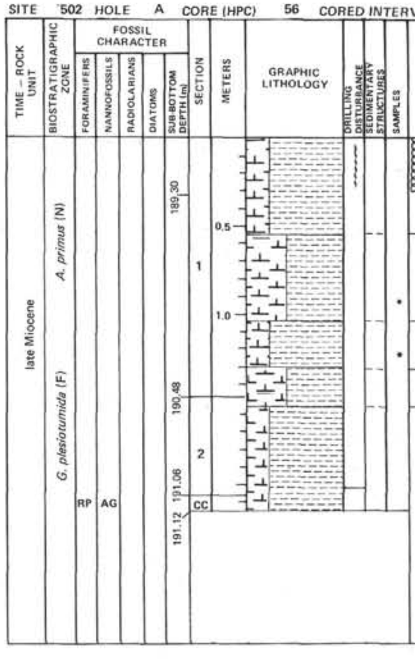
CARBONATE BOMB:

1-20 cm = 32%
1-50 cm = 34%
1-80 cm = 32%
1-110 cm = 29%
1-140 cm = 35%
2-20 cm = 33%
2-48 cm = 29%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	27	37	28	27
% Organic carbon	0.3	0.3	0.3	0.1
	1-149 cm	2-35 cm		
% Carbonate	42	38		
% Organic carbon	0.2	0.3		

SITE 502 HOLE A CORE (HPC) 56 CORED INTERVAL 189.3–191.3 m



LITHOLOGIC DESCRIPTION

5Y 5/1
5G 6/1
5B 5/1
to
5Y 5/1
5Y 5/1
5G 6/1

NANNO MARL, greenish gray (5G 6/1) in color to NANNO-BEARING CLAY, gray (5Y 5/1) to medium bluish gray (5B 5/1) in color. The sediment is thoroughly mottled and burrowed.

Section 1, 0–34 cm is disturbed.

In Section 2 at 51 cm there is a small break in the sediment column.

SMEAR SLIDE SUMMARY

	1-90	1-123
	D	D
Quartz	1/T	2/R
Pyrite	1/T	3/T
Other heavy minerals	1/T	2/R
Clay minerals	62/A	74/A
Volcanic glass (lt)	2/R	7/C
Carbonate unspec.	3/R	3/T
Foraminifers	5/C	1/T
Calcareous nannofossils	25/A	8/C

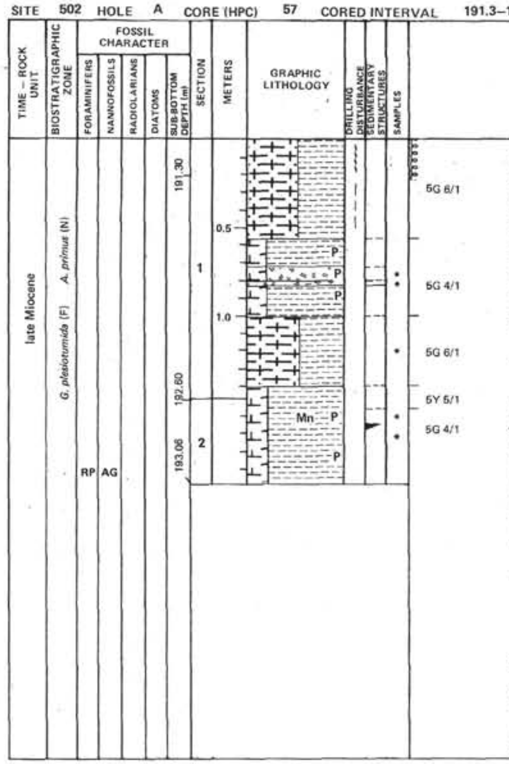
CARBONATE BOMB:

1-20 cm = 37%
1-50 cm = 25%
1-80 cm = 40%
1-110 cm = 31%
1-140 cm = 35%
2-20 cm = 42%
2-45 cm = 42%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	32	40	39	18
% Organic carbon	0.3	0.2	0.2	0.2
	1-149 cm	2-35 cm		
% Carbonate	37	45		
% Organic carbon	0.2	0.2		

SITE 502 HOLE A CORE (HPC) 57 CORED INTERVAL 191.3–193.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is greenish gray (5G 6/1) to gray (5Y 5/1) in color, and NANNO, ASH, AND PYRITE-BEARING CLAY, which is dark greenish gray (5G 4/1) in color. Both are generally mottled and burrowed.

Section 1, 0–22 cm is deformed and the interval from 22–54 cm appears smeared out, possibly a coring disturbance.

In Section 1 from 1–80 cm ash and sediment are extensively burrowed and mixed. From 80–81 cm there is a PYRITE-BEARING DEVITRIFIED ASH which is black, its upper contact is extensively burrowed.

In Section 2 at 12 cm there is a discontinuous black lamina of pyrite and Mn-oxides.

SMEAR SLIDE SUMMARY

	1-75	1-80	1-120	2-12	2-20
	M	M	D	M	D
Quartz	–	–	1/T	–	1/T
Pyrite	7/C	5/C	2/R	40/A	20/C
Other heavy minerals	1/T	1/T	1/T	–	1/T
Clay minerals	–	–	50/C	10/C	51/A
Volcanic glass (lt)	5/C	10/C	3/R	2/R	3/R
Devitrified ash	75/A	80/D	–	–	5/C
Zeolites	–	2/R	–	–	–
Micronodules	–	–	–	40/A	–
Carbonate unspec.	1/T	1/T	3/R	4/R	3/R
Foraminifers	1/T	–	10/C	–	1/T
Calcareous nannofossils	10/C	1/T	30/A	4/R	5/C

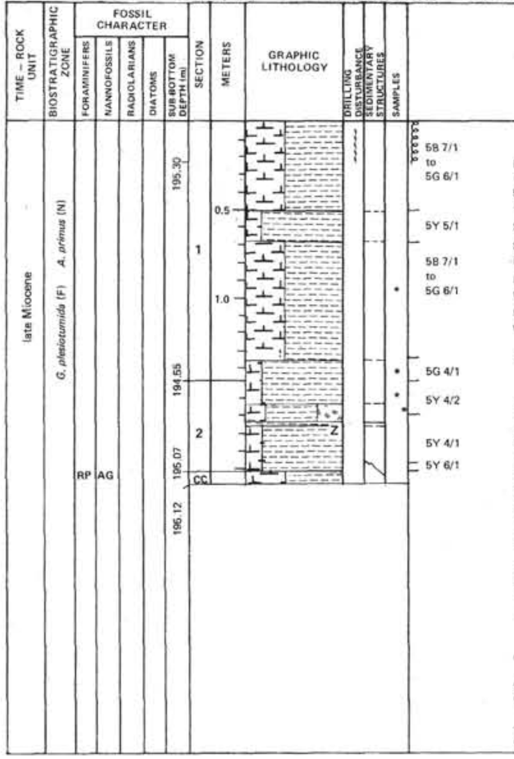
CARBONATE BOMB:

1-20 cm = 44%
1-50 cm = 28%
1-80 cm = 9%
1-110 cm = 35%
1-140 cm = 31%
2-20 cm = 9%
2-40 cm = 23%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	32	15	14	36
% Organic carbon	0.2	0.2	0.3	0.3
	1-149 cm			
% Carbonate	30			
% Organic carbon	0.2			

SITE 502 HOLE A CORE (HPC) 58 CORED INTERVAL 193.3–195.3 m



LITHOLOGIC DESCRIPTION

NANNO-MARL, which is light bluish gray (5B 7/1) to greenish gray (5G 6/1) in color and NANNO-BEARING CLAY, which is gray (5Y 5/1) to dark greenish gray (5G 4/1), dark gray (5Y 4/1) and olive gray (5Y 4/2) in color. Both are extensively burrowed.

Section 1, 0–36 cm is disturbed.

Section 2, 9–19 cm is a NANNO AND ASH-BEARING CLAY, which is extensively mottled and burrowed.

In Section 2 at 20–21 cm there is a layer of ZEOLITIC CLAY, 1 cm thick with a 10° dip.

In Section 2 at approximately 45–50 cm there is an irregular shear which has smeared the sediment.

SMEAR SLIDE SUMMARY

	1-95	1-147	2-14	2-20
	D	D	D	M
Quartz	1/T	1/T	1/T	–
Pyrite	1/T	1/T	2/R	4/R
Other heavy minerals	1/T	1/T	1/T	–
Clay minerals	63/A	84/D	54/A	45/A
Volcanic glass (lt)	3/R	4/R	8/C	5/C
Devitrified ash	–	–	20/C	–
Zeolites	–	1/T	1/T	40/A
Micronodules	–	–	–	3/R
Carbonate unspec.	3/R	2/R	3/R	–
Foraminifers	3/R	1/T	2/R	1/T
Calcareous nannofossils	25/A	5/C	8/C	2/R

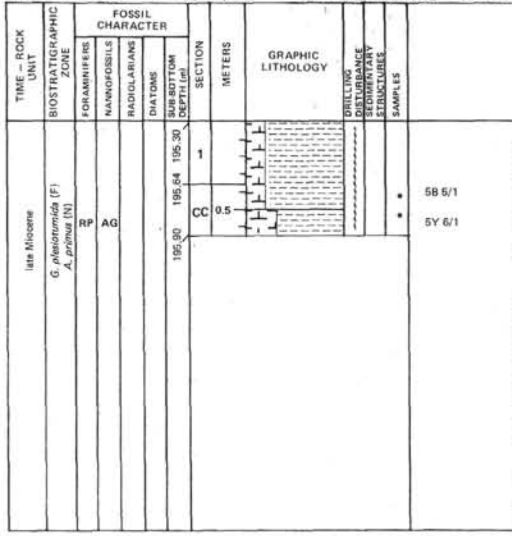
CARBONATE BOMB:

1-50 cm = 22%
1-80 cm = 42%
1-110 cm = 36%
1-140 cm = 21%
2-5 cm = 15%
2-50 cm = 30%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	30	18	43	31
% Organic carbon	0.2	0.3	0.2	0.2
	1-149 cm			
% Carbonate	13			
% Organic carbon	0.3			

SITE 502 HOLE A CORE (HPC) 59 CORED INTERVAL 195.3–197.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING CLAY, which is medium bluish gray (5B 5/1) in color and NANNO-BEARING CLAY, which is gray (5Y 6/1) in color.

The entire core is highly disturbed.

In the Core-Catcher there is a very sharp color contact at 11 cm with foram-bearing clay overlying nanno clay.

SMEAR SLIDE SUMMARY

	CC, 10	CC, 20
	D	D
Quartz	2/R	1/T
Pyrite	2/R	3/R
Other heavy minerals	2/R	1/T
Clay minerals	84/D	68/A
Volcanic glass (lt)	4/R	2/R
Carbonate unspec.	1/T	4/R
Foraminifers	5/C	1/T
Calcareous nannofossils	–	20/C

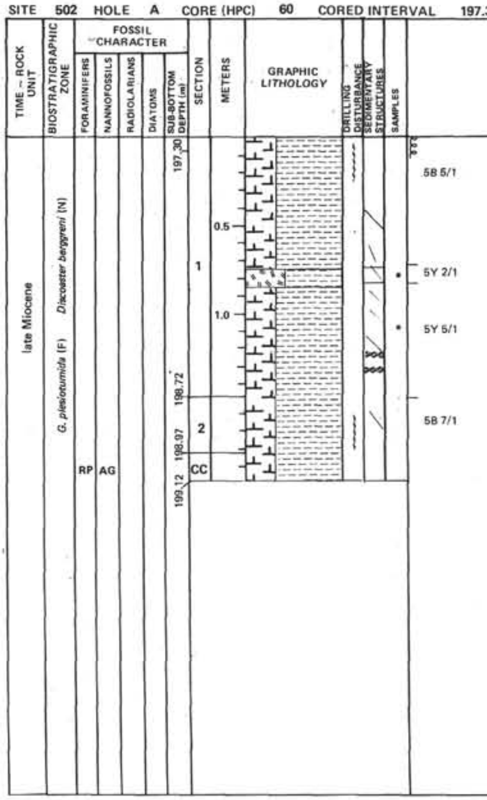
CARBONATE BOMB:

1-5 cm = 43%

CARBON-CARBONATE:

	1-34 cm
% Carbonate	37
% Organic carbon	0.3

SITE 502 HOLE A CORE (HPC) 60 CORED INTERVAL 197.3–199.3 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is light bluish gray (5B 7/1) to medium bluish gray (5B 5/1) to gray (5Y 5/1).in color and thoroughly burrowed.

Section 1, 0–33 cm is disturbed.

In Section 1 from 74–83 cm there is an ASHY CLAY, which is olive black (5Y 2/1) in color.

Section 1, 120–135 cm: two zoophycos burrows ~47 °dip.

Section 1 contains many faint shear traces. They have a somewhat variable dip, but are approximate 30°.

SMEAR SLIDE SUMMARY

	1-80	1-110
	M	D
Quartz	1/T	1/T
Pyrite	4/R	3/R
Other heavy minerals	2/R	1/T
Clay minerals	54/A	69/A
Volcanic glass (lt)	33/A	4/R
Zeolites	1/T	1/T
Carbonate unspec.	3/R	2/R
Foraminifers	2/R	4/R
Calcareous nannofossils	–	15/C

CARBONATE BOMB:

1-20 cm = 16%
1-50 cm = 0%
1-80 cm = 0%
1-110 cm = 33%
1-140 cm = 30%
2-10 cm = 34%

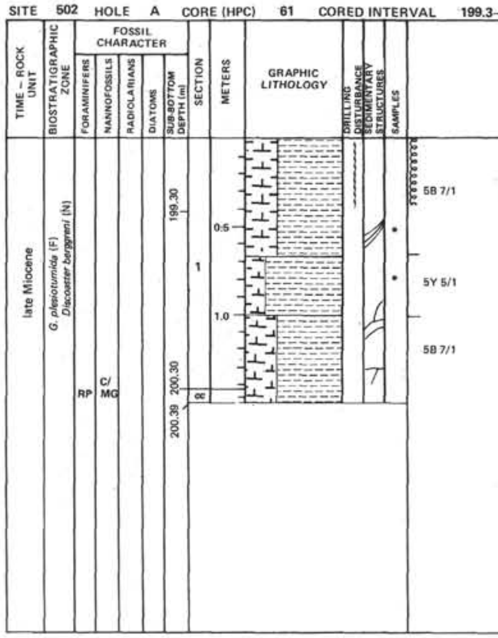
CLAY MINERALOGY (<2 μm): 1-102 cm

Smectite	80%
Illite	6%
Chlorite	4%
Kaolinite	10%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	13	7	18	26
% Organic carbon	0.3	0.2	0.2	0.2
	1-149 cm	2-20 cm		
% Carbonate	27	26		
% Organic carbon	0.2	0.3		

SITE 502 HOLE A CORE (HPC) 61 CORED INTERVAL 199.3–201.3 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is light bluish gray (5B 7/1) in color and NANNO-BEARING MARL, which is gray (5Y 5/1) in color. Both are thoroughly burrowed.

Section 1, 0–47 cm is disturbed.

Shear traces, which are probably coring induced, are found at: 50–55, 90–111, 108–113, 110–120, 135 cm to Core-Catcher.

SMEAR SLIDE SUMMARY

	1-50	1-80
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	69/A	78/D
Volcanic glass (lt)	2/R	3/R
Micronodules	1/T	–
Carbonate unspec.	3/R	3/R
Foraminifers	1/T	2/R
Calcareous nannofossils	20/C	10/C

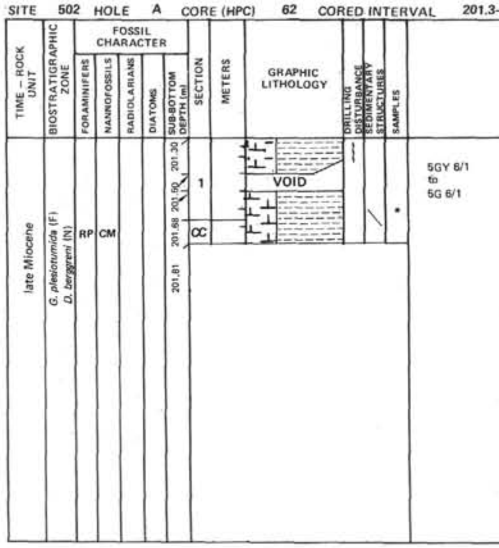
CARBONATE BOMB:

1-50 cm = 36%
1-82 cm = 25%
1-110 cm = 46%
1-140 cm = 49%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	17	33	30	43
% Organic carbon	0.3	0.2	0.2	0.2
	1-149 cm			
% Carbonate	46			
% Organic carbon	0.2			

SITE 502 HOLE A CORE (HPC) 62 CORED INTERVAL 201.3–203.3 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is greenish gray (5GY 6/1 to 5G 6/1) in color and burrowed.

Section 1, 0–8 cm is disturbed.

In Section 1 from 44–48 cm there is a shear trace.

SMEAR SLIDE SUMMARY

	1-42
	D
Quartz	1/T
Pyrite	3/R
Other heavy minerals	1/T
Clay minerals	69/A
Volcanic glass (lt)	4/R
Micronodules	1/T
Carbonate unspec.	2/R
Foraminifers	1/T
Calcareous nannofossils	20/A

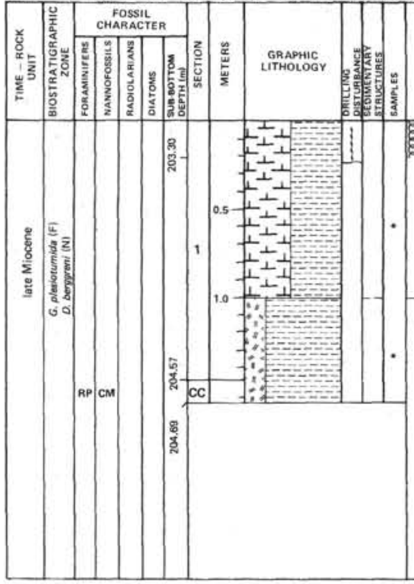
CARBONATE BOMB:

1-36 cm = 24%

CARBON-CARBONATE:

	1-35 cm
% Carbonate	25
% Organic carbon	0.3

SITE 502 HOLE A CORE (HPC) 63 CORED INTERVAL 203.3–205.3 m



LITHOLOGIC DESCRIPTION

5G 6/1

5G 4/1

FORAM-BEARING NANNO MARL, which is greenish gray (5G 6/1) in color and ASH-BEARING CLAY, which is dark greenish gray (5G 4/1) in color. Both are thoroughly mottled.

Section 1, 0–24 cm is disturbed and the core liner is damaged through the entire cored section.

SMEAR SLIDE SUMMARY

	1-60	1-130
	D	D
Quartz	1/T	1/T
Pyrite	2/T	2/R
Other heavy minerals	1/T	1/T
Clay minerals	52/A	84/D
Volcanic glass (lt)	3/R	6/C
Carbonate unspec.	3/R	3/R
Foraminifers	8/C	1/T
Calcareous nannofossils	30/A	2/R

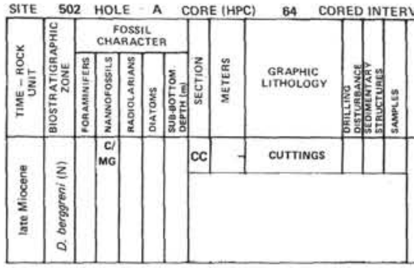
CARBONATE BOMB:

1-50 cm = 53%	1-110 cm = 21%
1-80 cm = 37%	1-140 cm = 18%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	41	45	21	6
% Organic carbon	0.2	0.3	0.3	0.3
	1-149 cm			
% Carbonate	15			
% Organic carbon	0.3			

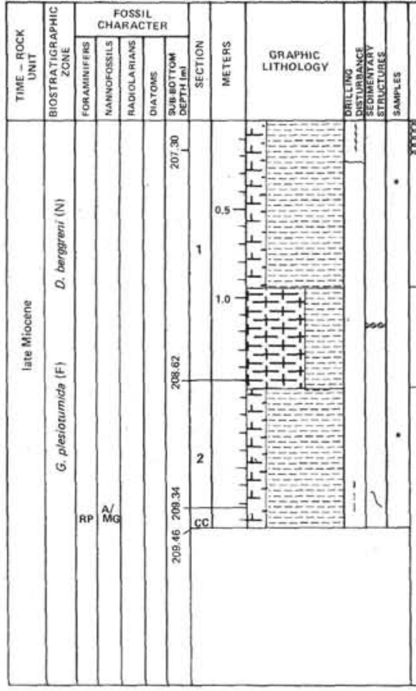
SITE 502 HOLE A CORE (HPC) 64 CORED INTERVAL 205.3–207.3 m



LITHOLOGIC DESCRIPTION

No core recovered. Biostratigraphy is based upon traces of sediment on the Core-Catcher.

SITE 502 HOLE A CORE (HPC) 65 CORED INTERVAL 207.3–209.3 m



LITHOLOGIC DESCRIPTION

5G 4/1

5G 6/1

5G 4/1

NANNO-BEARING CLAY, which is dark greenish gray (5G 4/1) in color and FORAM- AND NANNO-BEARING MARL, which is greenish gray (5G 6/1) in color. Both are burrowed with faint banding.

Section 1, 0–27 cm is disturbed.

A prominent Zoophycos burrow is in Section 1 at 116–120 cm and a vertical burrow is in Section 1 at 123–126 cm.

In Section 2 from 63–72 cm there is a shear trace at approximately 45°dip. The sediment is smeared in its vicinity.

SMEAR SLIDE SUMMARY

	1-35	2-30
	D	D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	77/D	61/A
Volcanic glass (lt)	4/R	3/R
Micronodules	–	1/T
Carbonate unspec.	2/R	2/R
Foraminifers	2/R	8/C
Calcareous nannofossils	10/C	20/C
Dolomite	1/T	–

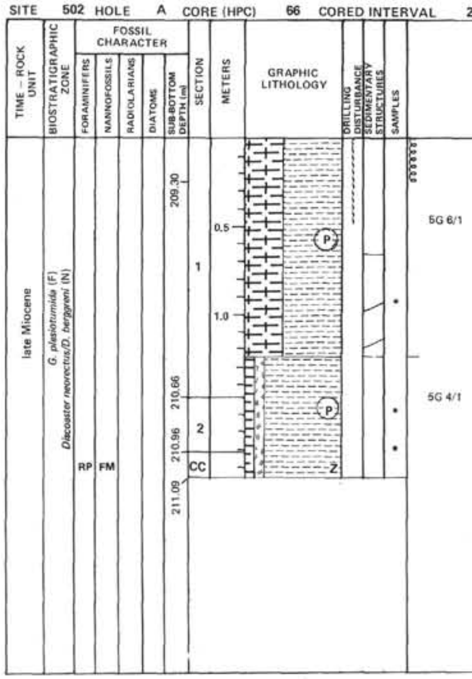
CARBONATE BOMB:

1-20 cm = 5%	1-110 cm = 35%
1-50 cm = 26%	1-140 cm = 28%
1-80 cm = 19%	2-20 cm = 40%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	15	24	20	35
% Organic carbon	0.3	0.3	0.3	0.3
	1-149 cm	2-35 cm		
% Carbonate	29	43		
% Organic carbon	0.3	0.2		

SITE 502 HOLE A CORE (HPC) 66 CORED INTERVAL 209.3–211.3 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is grayish green (5G 6/1) in color and NANNO-AND ASH-BEARING CLAY, which is dark greenish gray (5G 4/1) in color. Both are mottled and burrowed.

In Section 1 from 0–55 cm the sediment is loose and soupy.

In Section 1 at 74 cm there is a small pyrite nodule with grayish blue green (5BG 5/2) halo and a large pyrite nodule, 2 cm in diameter, is in Section 2 at 4 cm. There are small breaks in the sediment column in Section 1 at 70, 100, and 120 cm.

SMEAR SLIDE SUMMARY

	1-90 D	2-5 M	2-30 D
Quartz	1/T	–	1/T
Pyrite	1/T	82/D	1/T
Other heavy minerals	1/T	–	1/T
Clay minerals	68/A	–	80/D
Volcanic glass (lt)	4/R	15/C	5/C
Zeolites	–	–	3/R
Carbonate unspec.	3/R	1/T	1/T
Foraminifers	7/C	–	3/R
Calcareous nannofossils	25/A	2/R	5/C

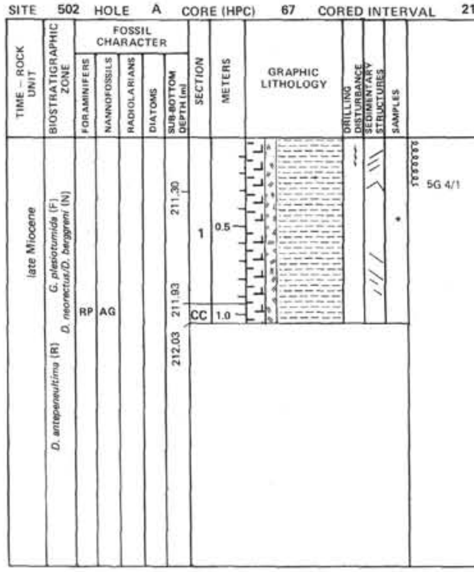
CARBONATE BOMB:

1-50 cm = 31%
1-80 cm = 31%
1-110 cm = 34%
1-140 cm = 24%
2-20 cm = 19%
2-50 cm = 19%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	30	22	29	18
% Organic carbon	0.3	0.2	0.2	0.3
	1-149 cm	2-29 cm		
% Carbonate	23	10		
% Organic carbon	0.3	0.4		

SITE 502 HOLE A CORE (HPC) 67 CORED INTERVAL 211.3–212.8 m



LITHOLOGIC DESCRIPTION

ASH- AND NANNO-BEARING CLAY, which is dark greenish gray (5G 4/1) in color and burrowed.

Section 1, 0–10 cm is disturbed. From 10 to approximately 30 cm the sediment is sheared. There are breaks in the sediment column at 70, 85, and 90 cm.

SMEAR SLIDE SUMMARY

	1-50 D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	69/A
Volcanic glass (lt)	5/C
Zeolites	1/T
Carbonate unspec.	2/R
Foraminifers	3/R
Calcareous nannofossils	15/C
Dolomite	2/R

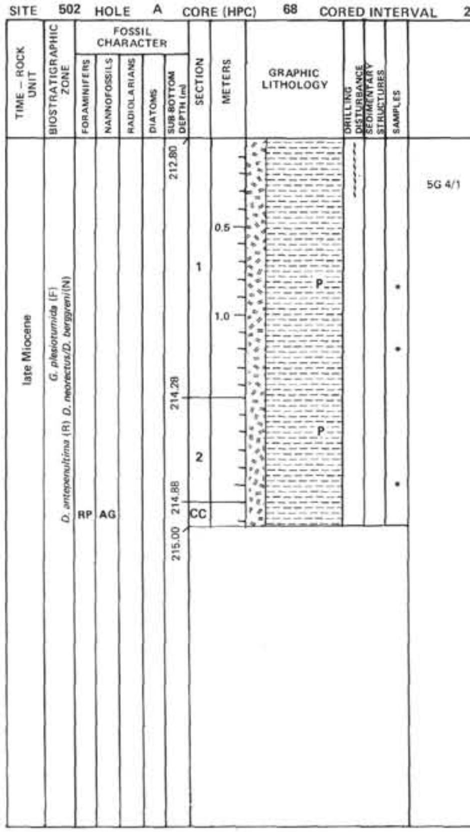
CARBONATE BOMB:

1-80 cm = 18%

CARBON-CARBONATE:

	1-35 cm	1-65 cm
% Carbonate	20	19
% Organic carbon	0.4	0.4

SITE 502 HOLE A CORE (HPC) 68 CORED INTERVAL 212.8–214.8 m



LITHOLOGIC DESCRIPTION

ASH-BEARING CLAY, which is dark greenish gray (5G 4/1) in color and distinctly burrowed, with many faint shears throughout (1 cm displacement measured at 57 cm).

Section 1, 0–35 cm is disturbed.

In Section 1 at 80–82 cm there are three black blebs of pyrite-bearing vitric ash.

In Section 2 at 19 cm there is an area of indistinct black blebs of pyrite (approximately 2 cm diameter).

In Section 2 the texture appears coarser than the preceding sediment – note the presence of radiolaria and sponge spicules.

SMEAR SLIDE SUMMARY

	1-82 M	1-120 D	2-50 D
Pyrite	8/C	3/R	3/R
Other heavy minerals	–	1/T	1/T
Clay minerals	–	85/D	77/D
Volcanic glass (lt)	91/D	5/C	4/R
Zeolites	–	1/T	–
Carbonate unspec.	–	1/T	2/R
Foraminifers	1/T	1/T	3/R
Calcareous nannofossils	–	1/T	3/R
Radiolarians	–	–	4/R
Sponge spicules	–	2/R	3/R

CARBONATE BOMB:

1-50 cm = 0%
1-70 cm = 6%
1-110 cm = 2%

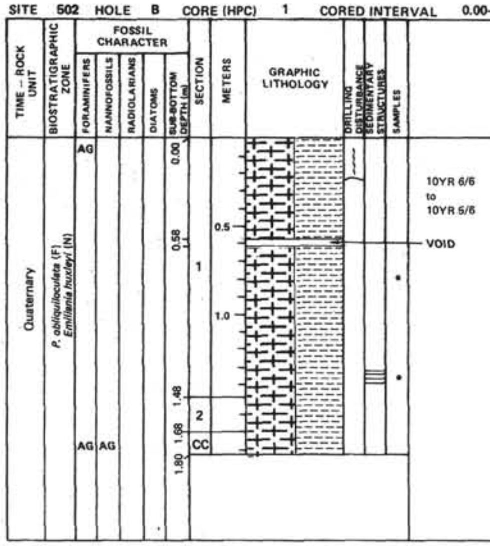
CLAY MINERALOGY ($<2\ \mu m$): 1-102 cm

Smectite	79%
Illite	8%
Chlorite	6%
Kaolinite	7%

CARBON-CARBONATE:

	1-35 cm	1-65 cm	1-95 cm	1-125 cm
% Carbonate	30	8	7	6
% Organic carbon	0.6	0.7	0.6	0.6
	1-149 cm			
% Carbonate	14			
% Organic carbon	0.6			

SITE 502 HOLE B CORE (HPC) 1 CORED INTERVAL 0.00–1.75 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is brownish yellow (10YR 6/6) to yellowish brown (10YR 5/6) in color and generally the sediment is loose, but apparently intact. There is very faint dark banding and occasional mottling, but it is otherwise homogeneous. A coarse foram component is visible throughout.

Section 1, 0–22 cm is disturbed.

In Section 1 at 134–140 cm dark banding is a result of concentrations of micronodules.

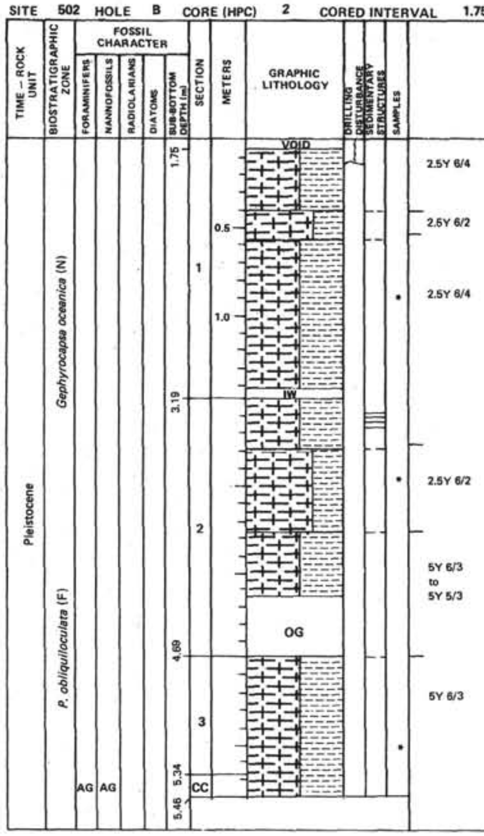
SMEAR SLIDE SUMMARY

	1-80	1-136
	D	D
Quartz	1/T	1/T
Pyrite	1/T	–
Other heavy minerals	1/T	1/T
Clay minerals	51/A	48/A
Volcanic glass (lt)	3/R	2/R
Micronodules	2/R	7/C
Carbonate unspec.	1/T	1/T
Foraminifers	15/C	15/C
Calcareous nannofossils	25/A	25/A

CARBONATE BOMB:

1-20 cm = 65%	1-110 cm = 49%
1-50 cm = 37%	2-18 cm = 38%

SITE 502 HOLE B CORE (HPC) 2 CORED INTERVAL 1.75–6.15 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light yellowish brown (2.5Y 6/4) to pale olive (5Y 6/3) and olive (5Y 5/3) in color and FORAM-NANNO OOZE which is light brownish gray (2.5Y 6/2) in color. Both are faintly mottled. A coarse component of forams is visible throughout and occasionally concentrated into coarse bands.

Section 1, 5–14 cm is disturbed.

In Section 2 from 12–17 cm dark banding is prominent.

Forams are visible in Section 1, 41–53 cm and in Section 2, 27–75 cm.

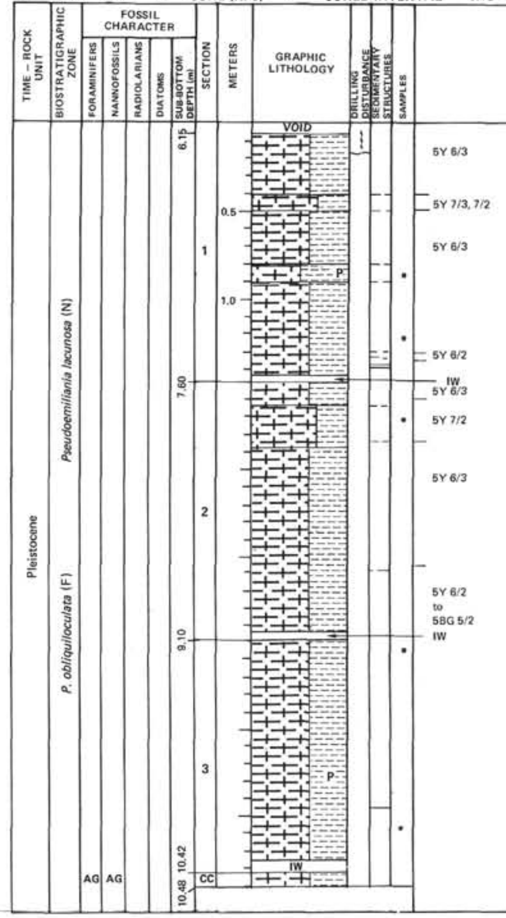
SMEAR SLIDE SUMMARY

	1-90	2-47	3-50
	D	D	D
Quartz	1/T	1/T	1/T
Pyrite	–	2/R	–
Other heavy minerals	1/T	1/T	1/T
Clay minerals	47/A	30/A	43/A
Volcanic glass (lt)	3/R	3/R	2/R
Micronodules	2/R	–	2/R
Carbonate unspec.	1/R	3/T	1/T
Foraminifers	20/C	30/A	20/C
Calcareous nannofossils	25/A	30/A	30/A

CARBONATE BOMB:

1-20 cm = 40%	2-50 cm = 49%
1-50 cm = 52%	2-110 cm = 47%
1-110 cm = 34%	3-20 cm = 48%
1-135 cm = 40%	3-50 cm = 48%
2-20 cm = 47%	

SITE 502 HOLE B CORE (HPC) 3 CORED INTERVAL 6.15–10.55 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is pale olive (5Y 6/3) to light olive gray (5Y 6/2) to grayish blue green (5BG 5/2) in color and NANNO-FORAM OOZE which is light gray (5Y 7/2) to pale yellow (5Y 7/3) in color. The sediment is subtly banded in cycles. A coarse component of forams is visible throughout.

Section 1, 5–17 cm is disturbed.

In Section 1, 79–90 cm there is ASH, FORAM, AND NANNO-BEARING MARL concentrated in black blebs.

Section 1, 134–142 cm shows very faint laminations.

Section 1, 146–Section 2, 35 cm coarse forams are especially prominent.

From Section 2, 110 cm–Section 3, bottom banding and laminations are prominent. They are black and grayish blue green (5BG 5/2) in color.

In Section 3 at 68 cm there is a tubular pyrite burrow, 3 cm in length and 0.7 cm diameter.

In Section 3 at 92 cm there is a prominent dark layer (1 cm thick).

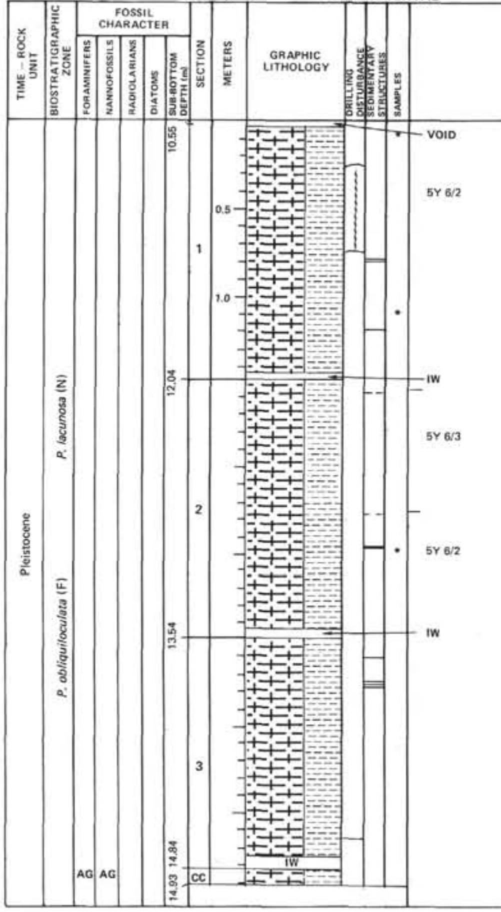
SMEAR SLIDE SUMMARY

	1-86 M	1-120 D	2-23 D	3-10 D	3-110 D
Quartz	1/T	1/T	1/T	1/T	1/T
Pyrite	3/R	–	–	1/T	2/R
Other heavy minerals	1/T	1/T	1/T	1/T	–
Clay minerals	51/A	39/A	34/A	44/A	41/A
Volcanic glass (lt)	5/C	3/R	3/R	2/R	2/R
Volcanic glass (dk)	–	–	–	–	1/T
Celadonite	–	1/T	–	–	–
Micronodules	2/R	2/R	1/T	1/T	1/T
Carbonate unspec.	–	–	5/C	3/R	1/T
Foraminifers	15/C	20/C	30/A	20/C	20/C
Calcareous nannofossils	20/C	30/A	25/A	25/A	30/A

CARBONATE BOMB:

1-20 cm = 51%
1-50 cm = 50%
1-110 cm = 47%
1-140 cm = 52%
2-20 cm = 66%
2-50 cm = 44%
2-110 cm = 52%
2-140 cm = 56%
3-20 cm = 60%
3-50 cm = 53%
3-110 cm = 48%

SITE 502 HOLE B CORE (HPC) 4 CORED INTERVAL 10.55–14.95 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) to pale olive (5Y 6/3) in color. Vague banding and mottling are common throughout, otherwise the core is structureless. A coarse component of forams is visible throughout except for Section 2 from 5–75 cm.

Section 1, 25–75 cm is disturbed.

In Section 1 at 79 and 118 cm there are prominent black bands.

From Section 2, 85 cm–Section 3, 50 cm the coarse foram component is especially prominent.

In Section 3 at 62–70 cm there is a vertical black burrow.

In Section 3 at 10 cm and 20–23 cm there are bands of grayish blue green (5BG 5/2) color.

A black mottle is in Section 3, 27–30 cm.

Section 3 at 114 cm there is a small break in the sediment column.

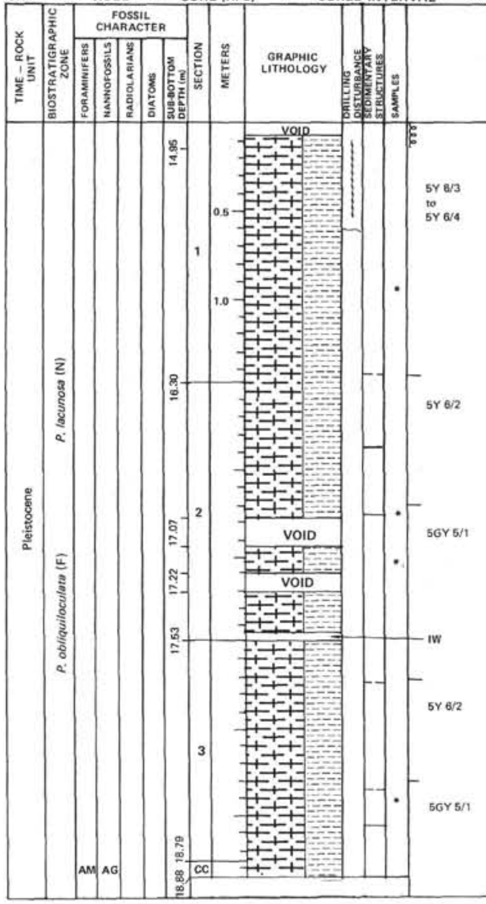
SMEAR SLIDE SUMMARY

	1-5 D	1-110 D	2-95 M
Quartz	1/T	1/T	1/T
Pyrite	2/R	1/T	4/R
Other heavy minerals	1/T	1/T	1/T
Clay minerals	41/A	48/A	39/A
Volcanic glass (lt)	2/R	2/R	2/R
Micronodules	1/T	1/T	1/T
Carbonate unspec.	2/R	1/T	2/R
Foraminifers	20/C	20/C	20/C
Calcareous nannofossils	30/A	25/A	30/A

CARBONATE BOMB:

1-50 cm = 42%
1-110 cm = 54%
1-140 cm = 50%
2-20 cm = 39%
2-50 cm = 48%
2-110 cm = 60%
2-140 cm = 49%
3-20 cm = 46%
3-50 cm = 57%
3-110 cm = 48%

SITE 502 HOLE B CORE (HPC) 5 CORED INTERVAL 14.95–19.35 m



LITHOLOGIC DESCRIPTION

NANNO-FORAM MARL TO FORAM-BEARING NANNO MARL which is pale olive (5Y 6/3 and 5Y 6/4) to light olive gray (5Y 6/2) to green-gray (5GY 5/1) in color. Very vague mottling and forams are visible throughout; otherwise the core is structureless.

Section 1, 0–60 cm is disturbed.

In Section 2 at 31 cm there is a prominent black lamina.

Section 2, 72–73 cm contains NANNO-BEARING FORAM MARL in a grayish blue green (5BG 5/2) layer.

In Section 2 the interval from 72–138 cm is generally more banded and mottled than the surrounding sediment.

No forams are visible in Section 3 from 35–80 cm.

In Section 3 at 104 cm there is a prominent black band.

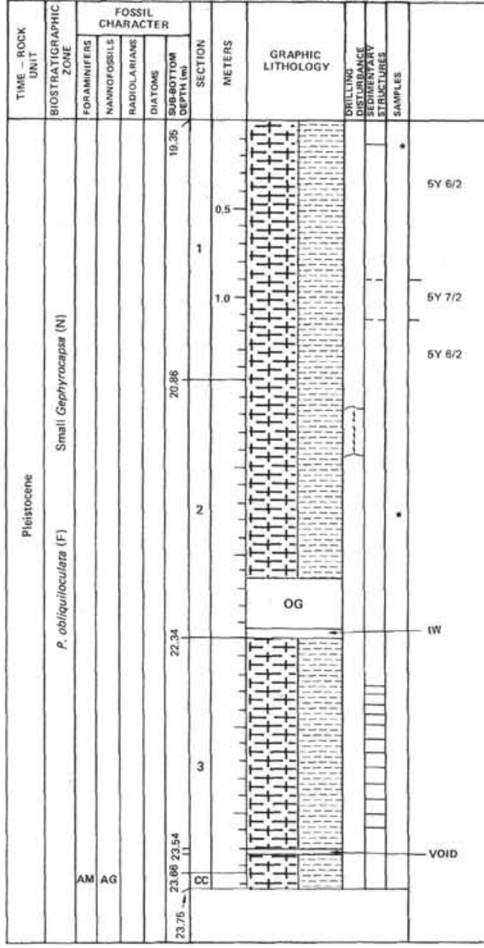
SMEAR SLIDE SUMMARY

	1-90	2-73	2-105	3-92
	D	M	D	D
Quartz	1/T	1/T	1/T	1/T
Pyrite	1/T	–	1/T	2/R
Other heavy minerals	1/T	2/R	1/T	1/T
Clay minerals	37/A	51/A	43/A	52/A
Volcanic glass (lt)	2/R	2/R	3/R	3/R
Micronodules	–	2/R	–	–
Carbonate unspec.	3/R	2/R	1/T	1/T
Foraminifers	30/A	30/A	20/C	15/C
Calcareous nannofossils	25/A	10/C	30/A	25/A

CARBONATE BOMB:

1-60 cm = 49%	2-108 cm = 57%
1-110 cm = 46%	2-140 cm = 51%
1-140 cm = 55%	3-20 cm = 40%
2-20 cm = 36%	3-50 cm = 44%
2-50 cm = 31%	3-110 cm = 46%

SITE 502 HOLE B CORE (HPC) 6 CORED INTERVAL 19.35–23.75 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING FORAM MARL which is light olive gray (5Y 6/2) to light gray (5Y 7/2) in color. The core is vaguely banded and mottled throughout with visible forams.

In Section 1, 15–17 cm there is a light olive (10Y 5/4) semi-indurated layer.

Section 2, 16–42 cm is disturbed and partially missing.
A pyrite nodule is at Section 2, 74 cm.

In Section 3 from 28–112 cm grayish blue green (5BG 5/2) and black banding is common.

In Section 3 from 0–30 cm the visible foram component is absent, whereas from 30–95 cm the foram component is especially prevalent.

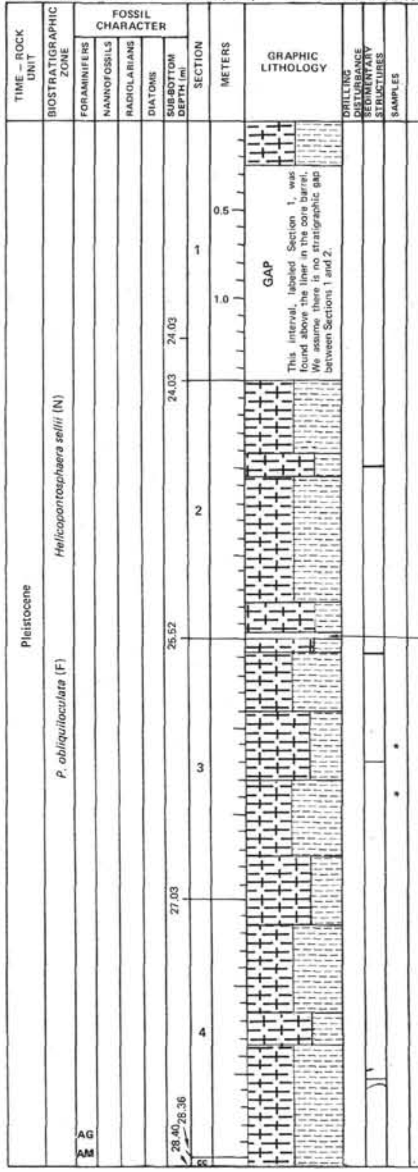
SMEAR SLIDE SUMMARY

	1-16	2-80
	D	D
Quartz	1/T	1/T
Pyrite	1/T	1/T
Other heavy minerals	1/T	1/T
Clay minerals	46/A	52/A
Volcanic glass (lt)	3/R	2/R
Micronodules	1/T	1/T
Carbonate unspec.	2/R	2/R
Foraminifers	20/C	25/A
Calcareous nannofossils	25/A	15/C

CARBONATE BOMB:

1-20 cm = 45%	2-50 cm = 55%
1-50 cm = 40%	2-110 cm = 53%
1-110 cm = 59%	3-20 cm = 44%
1-140 cm = 44%	3-50 cm = 60%
2-15 cm = 51%	3-110 cm = 51%

SITE 502 HOLE B CORE (HPC) 7 CORED INTERVAL 23.75–28.15 m



This interval, labeled Section 1, was found above the liner in the core barrel. We assume there is no stratigraphic gap between Sections 1 and 2.

5Y 5/2

—IW

LITHOLOGIC DESCRIPTION

NANNO-BEARING FORAM MARL and FORAM-BEARING NANNO MARL which are olive gray (5Y 5/2) in color and cyclically repeated. There is faint mottling throughout.

A grayish blue green (5BG 5/2) layer is prominent in Section 2 at 49 cm.

Prominent black layers are present in Section 3 at 5–6 and 67 cm.

A prominent black burrow is in Section 4 at 99 cm and irregular black laminations occur at 107–108 cm.

Coarse cycles enriched in forams occur in:
- Section 2, 128 cm–Section 3, 6 cm
- Section 3, 40–80 cm
- Section 3, 124 cm–Section 4, 13 cm
- Section 4, 66–84 cm

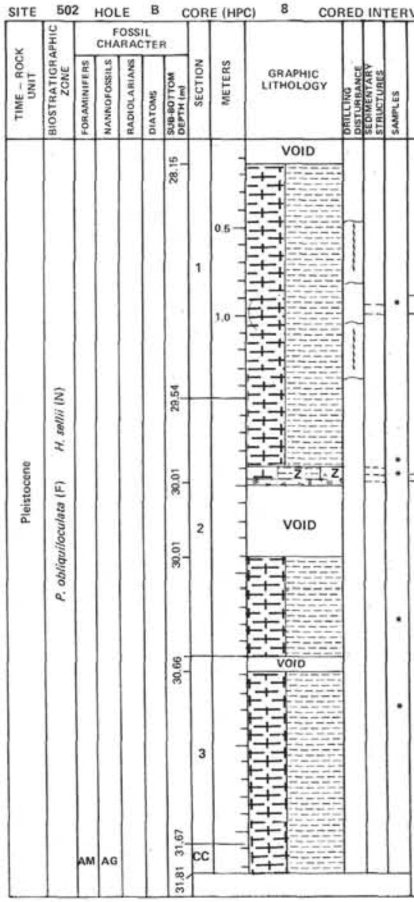
SMEAR SLIDE SUMMARY

	3-65	3-90
	D	D
Quartz	1/T	1/T
Pyrite	1/R	3/R
Other heavy minerals	2/R	1/T
Clay minerals	33/A	50/A
Volcanic glass (lt)	4/R	3/R
Micronodules	1/T	1/T
Carbonate unspec.	3/R	1/T
Foraminifers	35/A	15/C
Calcareous nannofossils	20/C	25/A

CARBONATE BOMB:

1-25 cm = 55%
2-20 cm = 45%
2-50 cm = 44%
2-110 cm = 44%
2-140 cm = 63%
3-20 cm = 51%
3-50 cm = 58%
3-110 cm = 50%
3-140 cm = 62%
4-20 cm = 45%
4-50 cm = 54%
4-110 cm = 40%

SITE 502 HOLE B CORE (HPC) 8 CORED INTERVAL 28.15–32.55 m



5Y 6/2

5Y 6/1

5Y 6/2

5Y 6/1

5Y 6/2

LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) in color and faintly burrowed, mottled, and banded.

Section 1, 45–80 and 105–138 cm is disturbed.

Section 2, 39–45 cm contains a ZEOLITE, ASH, NANNO AND FORAM-BEARING MARL grading downward into VITRIC ASH, light gray (5Y 6/1) in color, from 45–48 cm.

Section 3, 18–47 cm appears coarser owing to the presence of visible forams.

SMEAR SLIDE SUMMARY

	1-95	2-40	2-46	2-130	3-20
	D	M	M	D	D
Quartz	1/T	1/T	–	1/T	1/T
Pyrite	2/R	1/T	2/R	2/R	1/T
Other heavy minerals	1/T	1/T	–	1/T	1/T
Clay minerals	62/A	42/A	–	55/A	58/A
Volcanic glass (lt)	3/R	15/C	97D	3/R	1/T
Volcanic glass (dk)	–	–	–	1/T	–
Zeolites	–	5/C	–	–	–
Micronodules	–	–	1/R	1/T	–
Carbonate unspec.	1/T	2/R	–	1/T	3/R
Foraminifers	10/C	15/C	–	10/C	10/C
Calcareous nannofossils	20/C	15/C	–	25/A	25/A

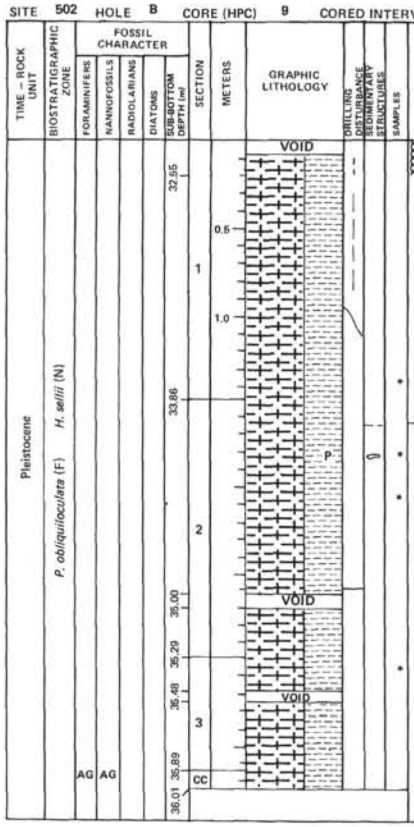
CARBONATE BOMB:

1-90 cm = 46%
1-105 cm = 41%
1-140 cm = 44%
2-20 cm = 48%
2-40 cm = 38%
2-110 cm = 46%
2-140 cm = 45%
3-20 cm = 59%
3-40 cm = 62%
3-110 cm = 50%

CLAY MINERALOGY (<2 μm): 3-52 cm

Smectite	48%
Illite	14%
Chlorite	11%
Kaolinite	27%

SITE 502 HOLE B CORE (HPC) 9 CORED INTERVAL 32.55–36.95 m



LITHOLOGIC DESCRIPTION

5Y 6/2
to
5Y 6/1

FORAM-BEARING NANNO MARL which is light gray (5Y 6/1) to light olive gray (5Y 6/2) in color and NANNO-BEARING FORAM MARL which is light olive gray (5Y 6/2) in color. Both are moderately banded, burrowed, and mottled.

Section 1, 5–120 cm is disturbed and sheared.

In Section 1 from 98–120 cm there is an irregular break in the sediment column.

From Section 2, 12 cm to the bottom of the core, a coarse component of forams is especially evident.

There is an irregular band of pyrite-enriched sediment which is dusky blue green (5BG 3/2) in color in Section 2 at 33 cm.

A small break in the sediment column occurs in Section 2 at 107 cm.

5Y 6/2

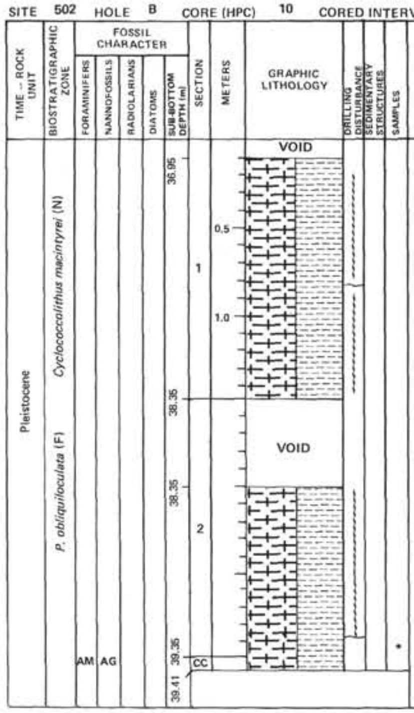
SMEAR SLIDE SUMMARY

	1-140 D	2-33 M	2-60 D	3-10 D
Quartz	1/T	–	1/T	1/T
Pyrite	1/T	40/A	1/T	1/T
Other heavy minerals	1/T	1/T	1/T	1/T
Clay minerals	46/A	21/C	35/A	49/A
Volcanic glass (lt)	2/R	1/T	3/R	1/T
Zeolites	–	–	2/R	–
Micronodules	1/T	–	–	–
Carbonate unspec.	3/R	2/R	2/R	2/R
Foraminifers	20/C	25/A	40/A	30/A
Calcareous nannofossils	25/A	10/C	15/C	15/C

CARBONATE BOMB:

1-110 cm = 51%	2-100 cm = 62%
1-140 cm = 44%	2-140 cm = 62%
2-20 cm = 60%	3-15 cm = 63%
2-40 cm = 55%	

SITE 502 HOLE B CORE (HPC) 10 CORED INTERVAL 36.95–41.35 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) in color.

This interval was cored twice. Almost the enitre core is disturbed.

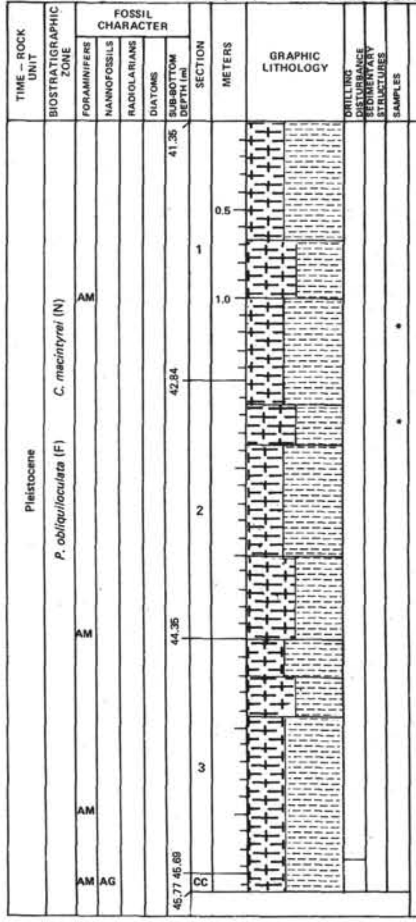
In Section 1 from 85–150 cm there are two vertically separated sections.

In Section 2 below 135 cm the sediment is somewhat firmer and may be in place.

SMEAR SLIDE SUMMARY

	2-148 D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	52/A
Volcanic glass (lt)	2/R
Carbonate unspec.	3/R
Foraminifers	20/C
Calcareous nannofossils	15/C

SITE 502 HOLE B CORE (HPC) 11 CORED INTERVAL 41.35–45.75 m



LITHOLOGIC DESCRIPTION

5Y 6/2

NANNO AND FORAM-BEARING MARL which is light olive gray (5Y 6/2) in color. It is faintly mottled, banded, and burrowed throughout. The bands are black and grayish blue green (5BG 5/2) in color.

Coarse cycles enriched in forams are in:
Section 1, 67–100 cm
Section 2, 11–32 and 100–145 cm
Section 3, 18–40 cm

In Section 3 at 126 cm there is a small break in the sediment column.

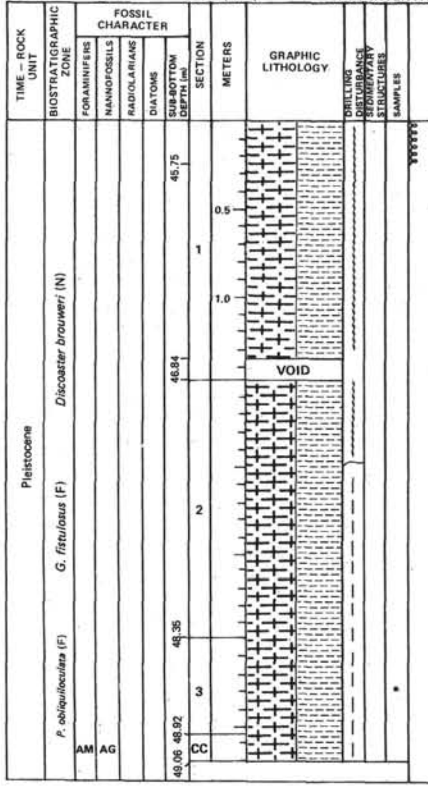
SMEAR SLIDE SUMMARY

	1-120	2-26
	D	D
Quartz	1/T	1/T
Pyrite	–	1/T
Other heavy minerals	1/T	1/T
Clay minerals	59/A	52/A
Volcanic glass (lt)	1/T	2/R
Volcanic glass (dk)	1/T	–
Carbonate unspec.	1/T	3/R
Foraminifers	15/C	20/C
Calcareous nannofossils	20/C	20/C

CARBONATE BOMB:

1-20 cm = 49%
1-45 cm = 46%
1-110 cm = 49%
1-140 cm = 53%
2-10 cm = 51%
2-20 cm = 54%
2-40 cm = 47%
2-50 cm = 54%
2-100 cm = 51%
2-110 cm = 41%
2-130 cm = 56%
2-140 cm = 51%
3-20 cm = 58%
3-50 cm = 44%
3-110 cm = 55%
3-130 cm = 45%

SITE 502 HOLE B CORE (HPC) 12 CORED INTERVAL 45.75–50.15 m



LITHOLOGIC DESCRIPTION

10Y 6/2

FORAM AND NANNO-BEARING MARL which is pale olive (10Y 6/2) in color. This interval was cored twice as a result of there being no recovery on first attempt.

Section 1 is disturbed throughout as is Section 2, 0–45 cm.

In Section 2, 45–150 cm the sediment is somewhat more coherent but badly smeared near the liner.

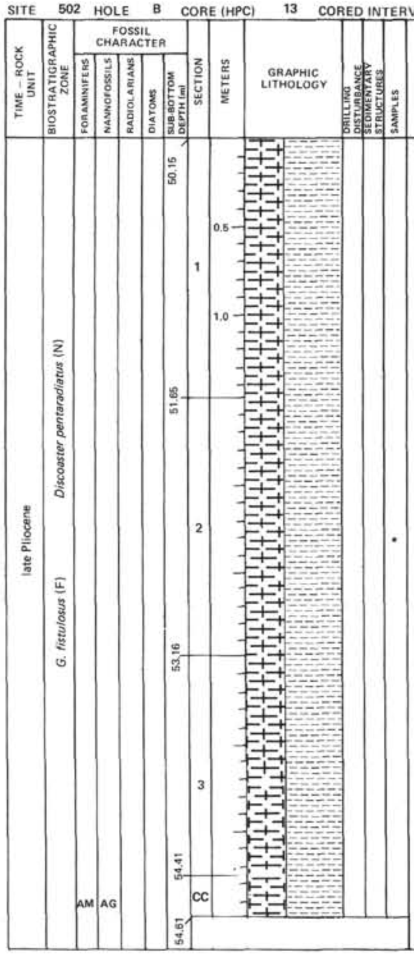
In Section 2 from 95–108 cm a coarse component of forams is visible.

Section 3 is slightly deformed and the sediment is burrowed, mottled, and faintly banded.

SMEAR SLIDE SUMMARY

	3-30
	D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	53/A
Volcanic glass (lt)	1/T
Carbonate unspec.	3/R
Foraminifers	20/C
Calcareous nannofossils	20/C

SITE 502 HOLE B CORE (HPC) 13 CORED INTERVAL 50.15–54.55 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM AND NANNO-BEARING MARL which is light olive gray (5Y 6/2) in color and uniformly mottled and burrowed with very faint laminations, black and grayish blue green (5BG 5/2) in color.

Coarse intervals enriched in forams are in:
- Section 1, 60–130 cm
- Section 2 in irregular areas
- Section 3, 105 cm to the bottom of the core

SMEAR SLIDE SUMMARY

	2-81
	D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	58/A
Volcanic glass (lt)	2/R
Carbonate unspec.	1/T
Foraminifers	15/C
Calcareous nannofossils	20/C

CARBONATE BOMB:

1-20 cm = 42%
1-50 cm = 49%
1-110 cm = 51%
1-140 cm = 53%
2-20 cm = 46%
2-50 cm = 60%
2-110 cm = 48%
2-140 cm = 56%
3-20 cm = 53%
3-50 cm = 44%
3-110 cm = 61%

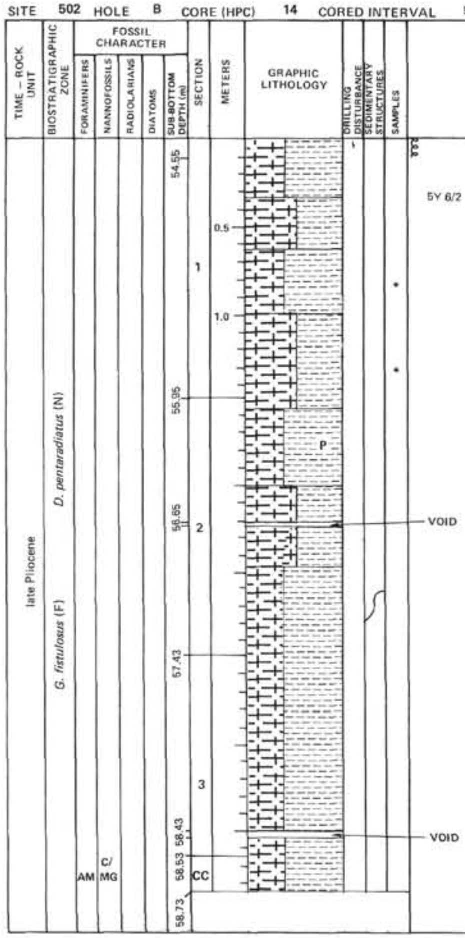
CLAY MINERALOGY (<2 μm): 2-47 cm

Smectite	39%
Illite	15%
Chlorite	18%
Kaolinite	28%

CARBON-CARBONATE:

	1-36 cm	1-65 cm	1-95 cm	1-125 cm	1-149 cm
% Carbonate	43	55	56	51	52
% Organic carbon	0.3	0.2	0.2	0.2	0.2
	2-35 cm	2-65 cm	2-95 cm	2-125 cm	2-149 cm
% Carbonate	51	54	50	41	58
% Organic carbon	0.2	0.2	0.2	0.3	0.3
	3-38 cm	3-66 cm	3-96 cm	3-126 cm	
% Carbonate	47	50	53	55	
% Organic carbon	0.3	0.3	0.2	0.2	

SITE 502 HOLE B CORE (HPC) 14 CORED INTERVAL 54.55–58.95 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL and NANNO-BEARING FORAM MARL which are light olive gray (5Y 6/2) in color. Both are faintly mottled, banded, and burrowed.

Section 1, 0–11 cm is disturbed.

Coarse cycles enriched in forams are in:
- Section 1, 33–63 cm
- Section 1, 100 cm–Section 2, 7 cm
- Section 2, 50–95 cm

These consist of NANNO-BEARING FORAM MARL.

In Section 2, from 107–124 cm there is a very faint and irregular crack which is marked by black discoloration. It has an approximately vertical orientation.

SMEAR SLIDE SUMMARY

	1-80	1-130
	D	D
Quartz	1/T	1/T
Pyrite	1/T	1/T
Other heavy minerals	1/T	1/T
Clay minerals	57/A	54/A
Volcanic glass (lt)	3/R	1/T
Volanic glass (dk)	–	1/T
Carbonate unspec.	2/R	1/T
Foraminifers	10/C	25/A
Calcareous nannofossils	25/A	15/C

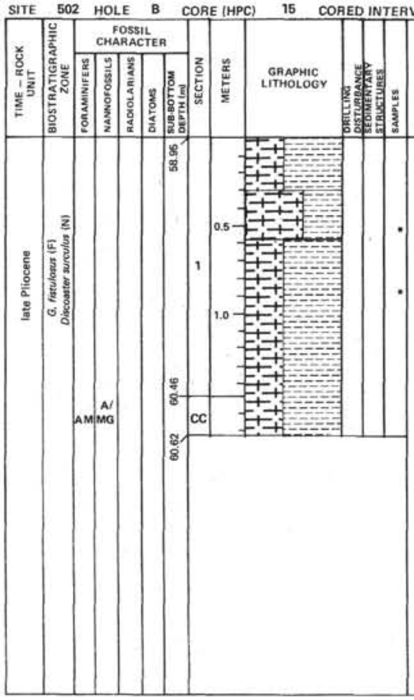
CARBONATE BOMB:

1-20 cm = 49%
1-50 cm = 59%
1-110 cm = 53%
1-140 cm = 62%
2-20 cm = 39%
2-50 cm = 54%
2-110 cm = 44%
3-20 cm = 49%
3-50 cm = 46%
3-110 cm = 50%
3-140 cm = 37%

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm	1-150 cm
% Carbonate	49	38	52	61	53
% Organic carbon	0.2	0.2	0.3	0.2	0.3
	2-36 cm	2-66 cm	2-96 cm	2-126 cm	2-150 cm
% Carbonate	39	59	8	38	41
% Organic carbon	0.3	0.2	0.2	0.2	0.3
	3-36 cm	3-66 cm	3-96 cm		
% Carbonate	47	46	49		
% Organic carbon	0.3	0.3	0.3		

SITE 502 HOLE B CORE (HPC) 15 CORED INTERVAL 55.95–63.35 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM AND NANNO-BEARING MARL to NANNO-BEARING FORAM MARL which is light olive gray (5Y 6/2) in color. It is banded, mottled, and occassionally burrowed, and contains widely scattered pyrite crystals.

In Section 1 at 30 cm there is a small break in the sediment column.

SMEAR SLIDE SUMMARY

	1-54 D	1-90 D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	45/A	63/A
Volcanic glass (lt)	2/R	1/T
Volcanic glass (dk)	1/T	–
Micronodules	1/T	–
Carbonate unspec.	2/R	2/R
Foraminifers	30/A	10/C
Calcareous nannofossils	15/C	20/C

CARBONATE BOMB:
1-20 cm = 56%
1-110 cm = 42%
1-140 cm = 49%

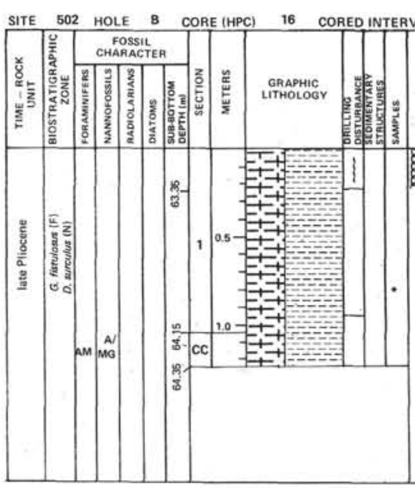
CLAY MINERALOGY (<2 μm): 1-102 cm

Smectite	41%
Illite	14%
Chlorite	13%
Kaolinite	32%

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm	1-150 cm
% Carbonate	56	48	46	55	47
% Organic carbon	0.2	0.2	0.3	0.3	0.3

SITE 502 HOLE B CORE (HPC) 16 CORED INTERVAL 63.35–67.75 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM AND NANNO-BEARING MARL which is light gray (5Y 6/1) in color, and mottled, burrowed, and faintly banded.

Section 1, 0–25 cm is disturbed.

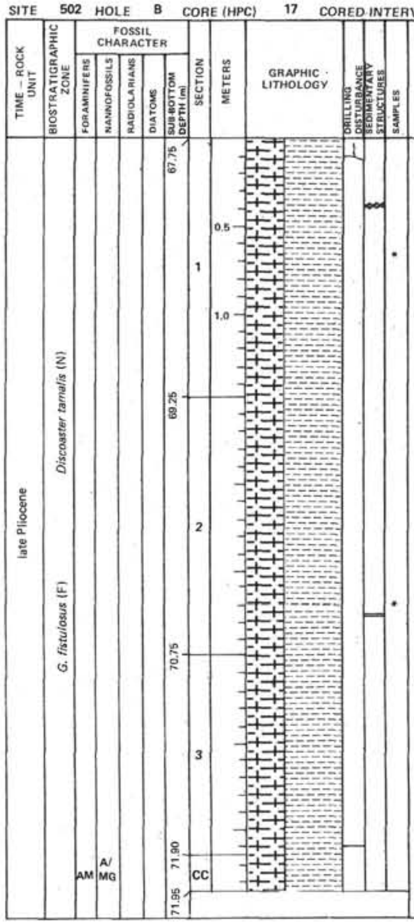
In Section 1 at 97 cm there is a small break in the sediment column.

SMEAR SLIDE SUMMARY

	1-80 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	63/A
Volcanic glass (lt)	1/T
Carbonate unspec.	2/R
Foraminifers	10/C
Calcareous nannofossils	20/C

CARBONATE BOMB:
1-40 cm = 45%
1-100 cm = 56%

SITE 502 HOLE B CORE (HPC) 17 CORED INTERVAL 67.75–72.15 m



LITHOLOGIC DESCRIPTION

5Y 6/1

FORAM AND NANNO MARL which is light gray (5Y 6/1) in color and mottled, burrowed, and banded. The bands are faint and pale green (10G 6/2) in color. Widely scattered pyrite crystals are present.

Section 1, 0–10 cm is disturbed.

A prominent black burrow, almost vertical in orientation is in Section 1 at 35–42 cm.

In Section 2 at 124 cm there is a distinct pale green (10G 6/2) layer.

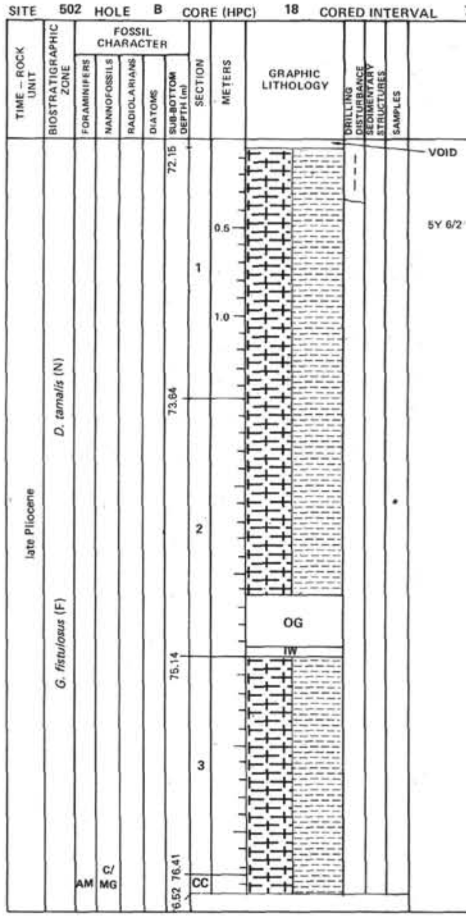
A small break in the sediment column is in Section 3 at 117 cm.

SMEAR SLIDE SUMMARY

	1-70 D	2-124 M
Quartz	1/T	1/T
Pyrite	1/T	4/R
Other heavy minerals	1/T	1/T
Clay minerals	58/A	53/A
Volcanic glass (lt)	2/R	3/R
Carbonate unspec.	2/R	3/R
Foraminifers	15/C	15/C
Calcareous nannofossils	20/C	20/C

CARBONATE BOMB:
1-20 cm = 50%
1-50 cm = 52%
1-110 cm = 49%
1-140 cm = 56%
2-20 cm = 51%
2-50 cm = 48%
2-110 cm = 45%
2-140 cm = 54%
3-20 cm = 54%
3-60 cm = 54%
3-110 cm = 51%

SITE 502 HOLE B CORE (HPC) 18 CORED INTERVAL 72.15–76.55 m



LITHOLOGIC DESCRIPTION

5Y 6/2

NANNO-BEARING FORAM MARL which is light olive gray (5Y 6/2) in color, mottled and burrowed. It is faintly banded by pale green (10G 6/2) layers. Widely scattered pyrite crystals are present.

Section 1, 0–35 cm is disturbed.

In Section 3 from 10–20 cm the core liner is damaged.

SMEAR SLIDE SUMMARY

	2-60 D
Quartz	1/T
Pyrite	2/T
Other heavy minerals	1/T
Clay minerals	48/A
Volcanic glass (lt)	1/T
Carbonate unspec.	2/R
Foraminifers	25/A
Calcareous nannofossils	20/C

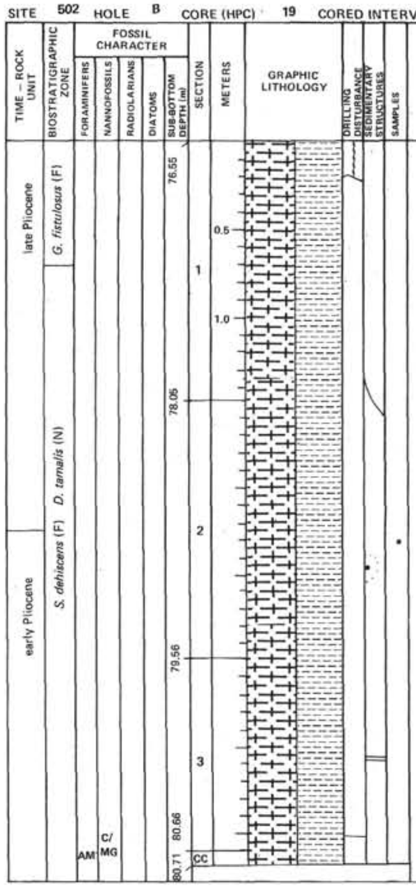
CARBONATE BOMB:

1-20 cm = 51%
1-50 cm = 58%
1-80 cm = 50%
1-110 cm = 53%
1-140 cm = 56%
2-60 cm = 51%
2-110 cm = 49%
2-140 cm = 51%
3-20 cm = 51%
3-50 cm = 55%
3-120 cm = 52%

CLAY MINERALOGY (<2 µm): 2-52 cm

Smectite	44%
Illite	10%
Chlorite	15%
Kaolinite	31%

SITE 502 HOLE B CORE (HPC) 19 CORED INTERVAL 76.55–80.95 m



LITHOLOGIC DESCRIPTION

5Y 6/2

NANNO-BEARING FORAM MARL which is light olive gray (5Y 6/2) in color. It shows indistinct mottling and banding and widely scattered pyrite crystals.

Section 1, 0–20 cm is probably disturbed.

From Section 1 137 cm–Section 2, 6 cm there is a shear trace.

In Section 2 at 98 cm there is a nodule with a diagenetic front which is indicated by concentric dark lines.

A distinct pale green (10G 6/2) band is in Section 3 at 56 cm.

In Section 3 at 101 cm there is a small break in the sediment column.

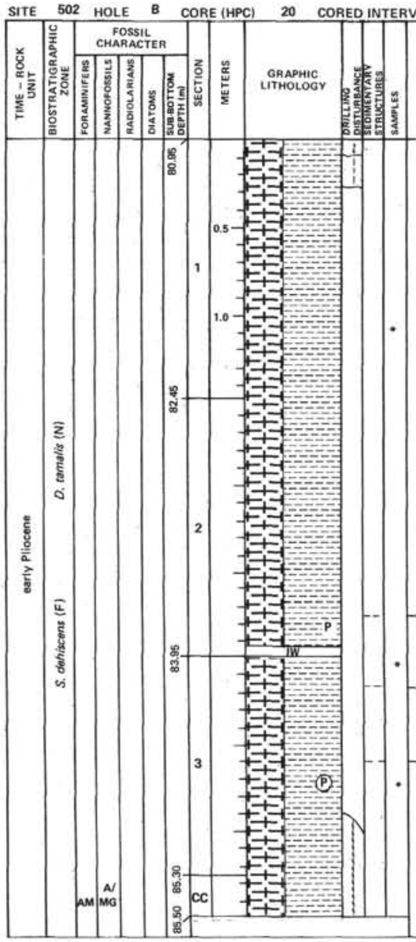
SMEAR SLIDE SUMMARY

	2-80 D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	47/A
Volcanic glass (lt)	2/R
Carbonate unspec.	3/R
Foraminifers	30/A
Calcareous nannofossils	20/C

CARBONATE BOMB:

1-20 cm = 44%
1-50 cm = 48%
1-110 cm = 44%
1-140 cm = 50%
2-20 cm = 56%
2-50 cm = 55%
2-50 cm = 56%
2-110 cm = 49%
2-140 cm = 53%
3-20 cm = 55%
3-105 cm = 53%

SITE 502 HOLE B CORE (HPC) 20 CORED INTERVAL 80.95–85.35 m



LITHOLOGIC DESCRIPTION

5Y 6/1
to
5Y 6/2

5GY 6/1

5Y 6/2

5GY 6/1

FORAM-BEARING NANNO MARL which is light gray (5Y 6/1) to light olive gray (5Y 6/2) to yellow green (5GY 6/1) in color. It is mottled, burrowed, and banded-with widely scattered forams visible. Light/dark color cycles are evident.

Section 1, 0–10 cm is disturbed and 10–25 cm is possibly disturbed.

In Section 3 the core is disturbed from 95 cm to the bottom.

In Section 2 at 134 and 135 cm there are small pyritized burrows, and a pyrite-rich nodule is in Section 3 at 76 cm.

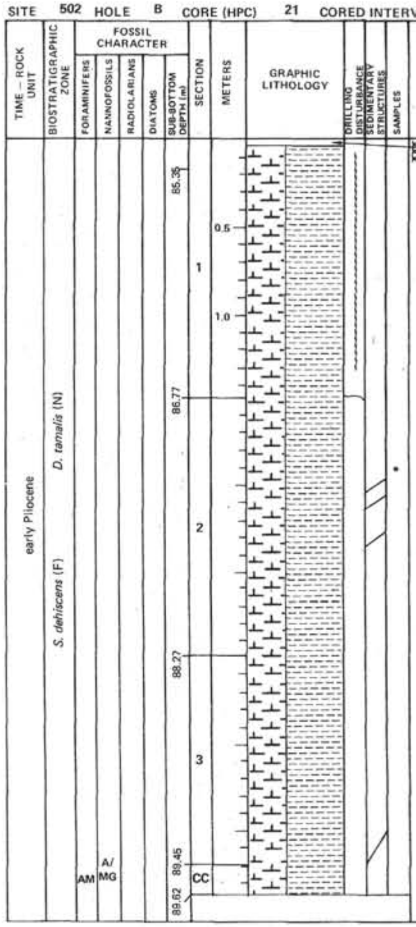
SMEAR SLIDE SUMMARY

	1-110	3-2	3-75
	D	D	M
Quartz	1/T	1/T	1/T
Pyrite	1/T	3/R	30/A
Other heavy minerals	1/T	1/T	1/T
Clay minerals	60/A	61/A	40/A
Volcanic glass (lt)	4/R	3/R	3/R
Volcanic glass (dk)	–	–	1/T
Zeolites	–	–	1/T
Carbonate unspec.	3/R	2/R	3/R
Foraminifers	5/C	8/C	5/C
Calcareous nannofossils	25/A	20/C	15/C
Sponge spicules	–	1/T	–

CARBONATE BOMB:

1-20 cm = 52%	2-110 cm = 45% .
1-80 cm = 51%	2-140 cm = 48%
1-110 cm = 53%	2-140 cm = 42%
1-140 cm = 48%	3-20 cm = 44%
2-20 cm = 57%	3-50 cm = 53%
2-50 cm = 44%	3-110 cm = 52%

SITE 502 HOLE B CORE (HPC) 21 CORED INTERVAL 85.35–89.75 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) in color and extensively burrowed and mottled.

Section 1 is entirely disturbed.

In Section 2 from 50–90 cm there are three shear traces at 45° dip. There is a shear trace in Section 3 from 100 cm to the bottom of the core.

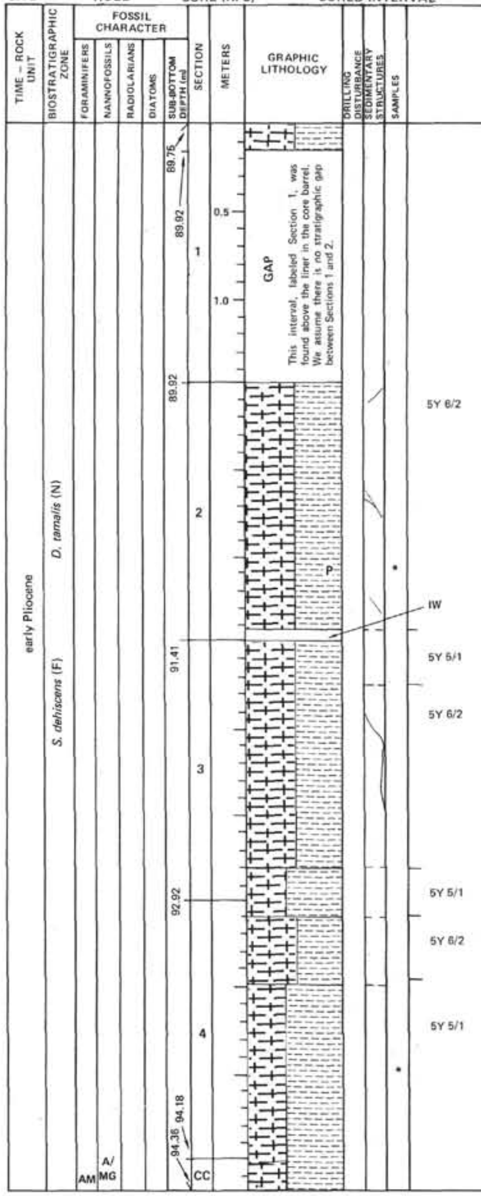
SMEAR SLIDE SUMMARY

	2-40
	D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	57/A
Volcanic glass (lt)	3/R
Zeolites	1/T
Carbonate unspec.	3/R
Foraminifers	7/C
Calcareous nannofossils	25/A

CARBONATE BOMB:

1-20 cm = 52%	2-50 cm = 44%
1-50 cm = 44%	2-110 cm = 55%
1-110 cm = 59%	3-20 cm = 57%
1-140 cm = 52%	3-80 cm = 56%
2-20 cm = 52%	3-110 cm = 54%

SITE 502 HOLE B CORE (HPC) 22 CORED INTERVAL 89.75–94.15 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL which is light olive gray (5Y 6/2) in color and ASH-, NANNO-, AND FORAM-BEARING MARL which is gray (5Y 5/1) in color. Both are distinctly mottled and burrowed and faintly banded.

Shear traces occur in Section 2 at 5–14, 65–80, and 127–136 cm, and in Section 3 at 40–70 cm with some sediment smeared to 105 cm.

In Section 3 at 77–79 cm there are indistinct areas of pyrite and Mn-oxides.

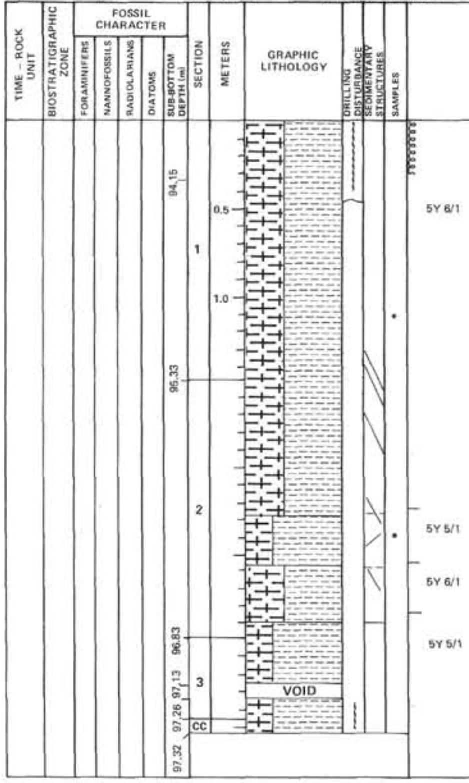
SMEAR SLIDE SUMMARY

	2-110	4-100
	D	D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	50/A	58/A
Volcanic glass (lt)	2/R	5/C
Volcanic glass (dk)	1/T	–
Micronodules	–	1/T
Carbonate unspec.	3/R	3/R
Foraminifers	15/C	15/C
Calcareous nannofossils	25/A	15/C

CARBONATE BOMB:

2-20 cm = 44%
2-50 cm = 47%
2-110 cm = 59%
2-135 cm = 51%
3-20 cm = 44%
3-50 cm = 46%
3-110 cm = 50%
3-140 cm = 47%
4-20 cm = 44%
4-50 cm = 47%
4-110 cm = 44%

SITE 502 HOLE B CORE (HPC) 23 CORED INTERVAL 94.15–98.45 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL which is light gray (5Y 6/1) in color and FORAM AND NANNO-BEARING CLAY which is gray (5Y 5/1) in color. Both are subtly banded, mottled, and burrowed. Bands are pale green (10G 6/2) in color. Burrows are black and light brownish gray (2.5Y 6/2) in color.

Section 1, 0–44 cm is disturbed, as is the interval from 34 cm to the base of the core in Section 3.

Shear traces are present throughout the core.

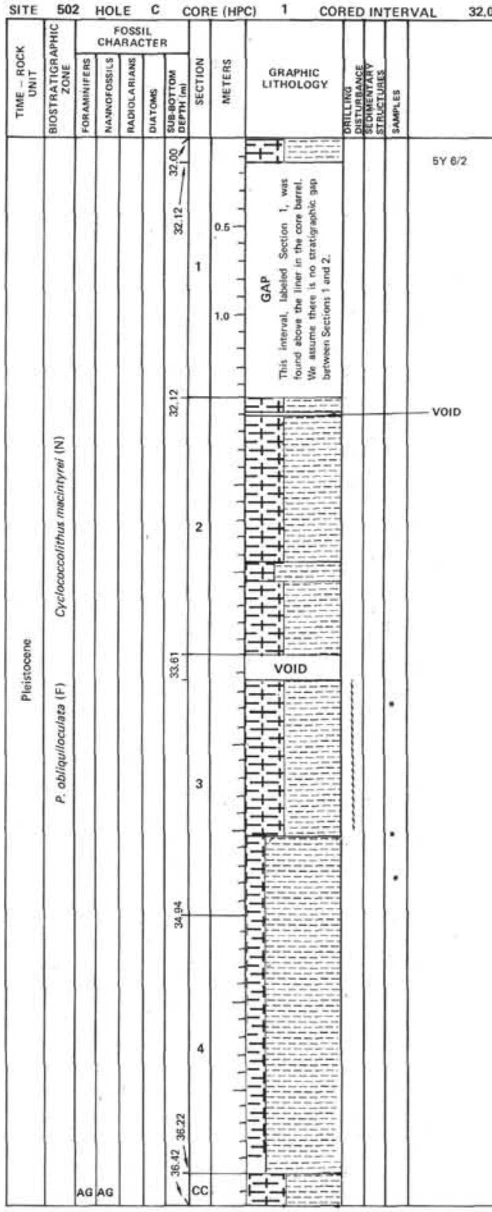
SMEAR SLIDE SUMMARY

	1-110	2-90
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	59/A	67/A
Volcanic glass (lt)	1/T	2/R
Carbonate unspec.	1/T	2/R
Foraminifers	15/C	10/C
Calcareous nannofossils	20/C	15/C

CARBONATE BOMB:

1-50 cm = 55%
1-110 cm = 54%
1-140 cm = 51%

SITE 502 HOLE C CORE (HPC) 1 CORED INTERVAL 32.0–36.4 m



This interval, labeled Section 1, was found above the liner in the core barrel. We assume there is no stratigraphic gap between Sections 1 and 2.

LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL and NANNO AND FORAM-BEARING CLAY, which are light olive gray (5Y 6/2) in color, faintly banded, black and pale green (10G 6/2) in color, and indistinctly burrowed and mottled. Forams are visible in cycles downcore.

Coarse interval, enriched in forams are:
  Section 1, 0 cm–Section 2, 94 cm
  Section 2, 104 cm–Section 3, approximately 107 cm
  Core-Catcher, 15 cm to the bottom.

Section 2, 55–107 cm is disturbed owing to core liner damaged.

Pale green (10G 6/2) lamina in Section 3 at 77–78, 103–104, and 120–121 cm.

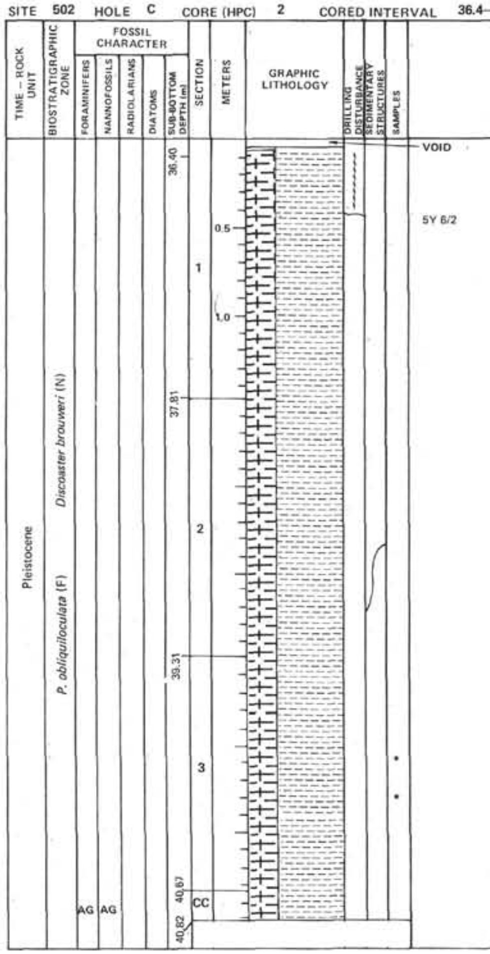
SMEAR SLIDE SUMMARY

	3-27	3-106	3-130
	D	M	D
Quartz	1/T	1/T	1/T
Pyrite	4/T	1/T	2/R
Other heavy minerals	2/R	1/T	2/R
Clay minerals	62/A	53/A	70/A
Volcanic glass (lt)	2/R	3/R	2/R
Zeolites	–	2/R	–
Micronodules	1/T	1/T	1/T
Carbonate unspec.	1/T	2/R	2/R
Foraminifers	15/C	20/C	10/C
Calcareous nannofossils	15/C	10/C	10/C

CARBON-CARBONATE:

	1-5 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	46	44	47	40
% Organic carbon	0.1	0.1	0.1	0.1
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	56	57	59	53
% Organic carbon	0.1	0.2	0.2	0.2
	3-96 cm	3-126 cm	3-150 cm	4-36 cm
% Carbonate	43	50	43	46
% Organic carbon	0.1	0.2	0.2	0.2
	4-66 cm	4-96 cm	4-126 cm	
% Carbonate	48	53	52	
% Organic carbon	0.2	0.2	0.2	

SITE 502 HOLE C CORE (HPC) 2 CORED INTERVAL 36.4–40.8 m



LITHOLOGIC DESCRIPTION

NANNO AND FORAM-BEARING CLAY, which is light olive gray (5Y 6/2) in color. It is generally mottled, burrowed, and banded, black and pale green (10G 6/2) in color. Forams are visible in cycles downcore.

Section 1, 5–45 cm is disturbed.

Coarse cycles enriched in forams occur at:
  Section 1, 140 cm–Section 2, 127 cm
  Section 3, 34–70 cm
  Section 3, 115 cm to the bottom of the core

An irregular crack occurs in Section 2 from 87–127 cm.

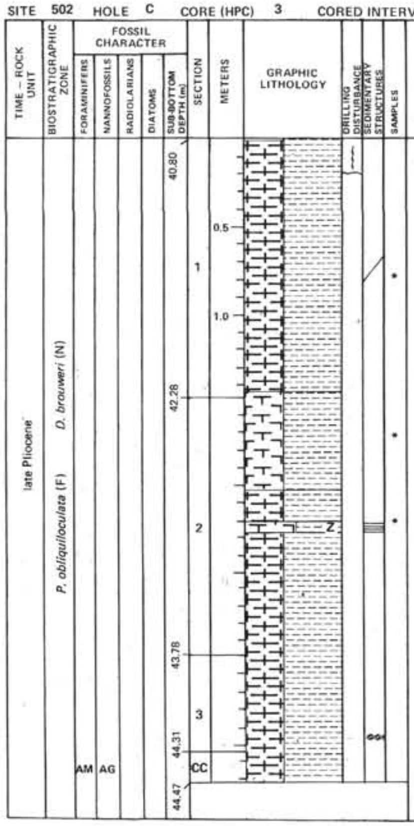
SMEAR SLIDE SUMMARY

	3-60	3-80
	D	D
Quartz	1/T	1/T
Pyrite	1/T	2/R
Other heavy minerals	1/T	1/T
Clay minerals	73/A	66/A
Volcanic glass (lt)	1/T	1/T
Volcanic glass (dk)	–	1/T
Micronodules	–	1/T
Carbonate unspec.	3/R	2/R
Foraminifers	15/C	15/C
Calcareous nannofossils	5/C	10/C

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	63	53	47	51
% Organic carbon	0.2	0.4	0.2	0.2
	1-150 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	52	48	45	55
% Organic carbon	0.2	0.2	0.2	0.2
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	45	46	58	61
% Organic carbon	0.1	0.2	0.2	0.2
	3-96 cm	3-126 cm		
% Carbonate	55	61		
% Organic carbon	0.3	0.2		

SITE 502 HOLE C CORE (HPC) 3 CORED INTERVAL 40.8–45.2 m



LITHOLOGIC DESCRIPTION

5Y 6/2

NANNO AND FORAM-BEARING MARL to FORAM MARL, which is light olive gray (5Y 6/2) in color and generally mottled and burrowed. A coarse component of forams is present throughout. The core is faintly banded a pale green (10G 6/2) in color.

Section 1, 0–23 cm is disturbed.

A coarse interval enriched in forams occurs at:
Section 1, 145 cm–Section 2, 50 cm

Section 1, 60–68 cm – *in situ* shear.

A series of diffuse lamina and black mottling are in Section 2, 70–75 cm which is a ZEOLITE, ASH, CALCAREOUS CLAY.

In Section 3, 40–53 cm there is a prominent black burrow in approximately a vertical orientation.

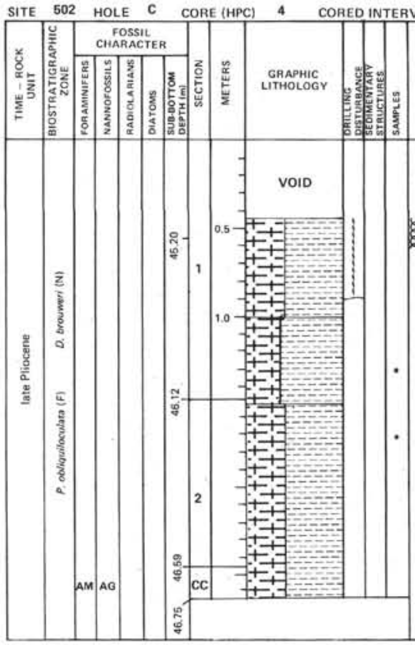
SMEAR SLIDE SUMMARY

	1-80	2-21	2-73
	D	D	M
Quartz	1/T	1/T	1/T
Pyrite	3/R	1/T	4/R
Other heavy minerals	1/T	1/T	1/T
Clay minerals	61/A	60/A	47/A
Volcanic glass (lt)	3/R	1/T	5/C
Volcanic glass (dk)	1/T	–	–
Zeolites	–	–	15/C
Micronodules	1/T	–	–
Carbonate unspec.	4/R	3/R	2/R
Foraminifers	15/C	30/A	20/C
Calcareous nannofossils	10/C	3/R	5/C

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	45	46	38	32
% Organic carbon	0.2	0.3	0.2	0.2
	1-150 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	58	50	36	44
% Organic carbon	0.2	0.2	0.1	0.2
	2-126 cm	2-150 cm	3-36 cm	
% Carbonate	57	59	49	
% Organic carbon	0.2	0.2	0.2	

SITE 502 HOLE C CORE (HPC) 4 CORED INTERVAL 45.2–49.6 m



LITHOLOGIC DESCRIPTION

5Y 6/2

NANNO AND FORAM-BEARING MARL and NANNO AND FORAM-BEARING CLAY, which are light olive gray (5Y 6/2) in color. Both are generally mottled and burrowed, and a coarse foram component is present throughout. Parts of the core are indistinctly banded black and pale green (10G 6/2) in color.

Section 1, 47–90 cm is disturbed.

A coarse interval enriched in forams occurs at:
Section 1, 100 cm–Section 2, 2 cm.

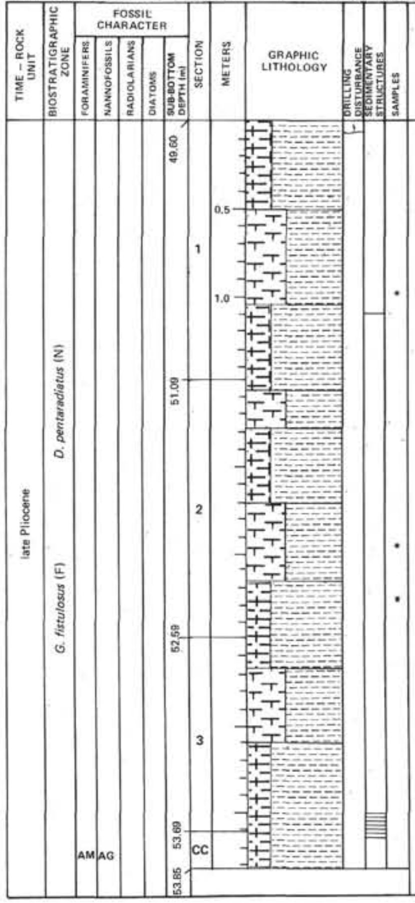
SMEAR SLIDE SUMMARY

	1-130	2-25
	D	D
Quartz	1/T	1/T
Pyrite	2/R	3/R
Other heavy minerals	1/T	1/T
Clay minerals	55/A	59/A
Volcanic glass (lt)	4/R	2/R
Micronodules	–	1/T
Carbonate unspec.	2/R	3/R
Foraminifers	15/C	15/C
Calcareous nannofossils	10/C	15/C

CARBON-CARBONATE:

	1-66 cm	1-96 cm	1-126 cm	1-150 cm
% Carbonate	46	51	56	58
% Organic carbon	0.1	0.2	0.2	0 2
	2-36 cm			
% Carbonate	43			
% Organic carbon	0.2			

SITE 502 HOLE C CORE (HPC) 5 CORED INTERVAL 49.6–54.0 m



5Y 6/2

LITHOLOGIC DESCRIPTION

NANNO-BEARING FORAM MARL and NANNO AND FORAM-BEARING CLAY, which is light olive gray (5Y 6/2) in color, mottled, burrowed, and faintly banded. A coarse foram component is generally visible throughout.

Section 1, 0–4 cm is disturbed.

A prominent pale green (10G 6/2) lamina with indistinct contacts is in Section 1 at 106 cm.

Coarse intervals enriched in forams occur in:
Section 1, 50–107 cm
Section 2, 5–25 and 70–115 cm
Section 3, 15–60 cm.

Section 3, 98–112 cm is regularly laminated in a pale green (10G 6/2) color.

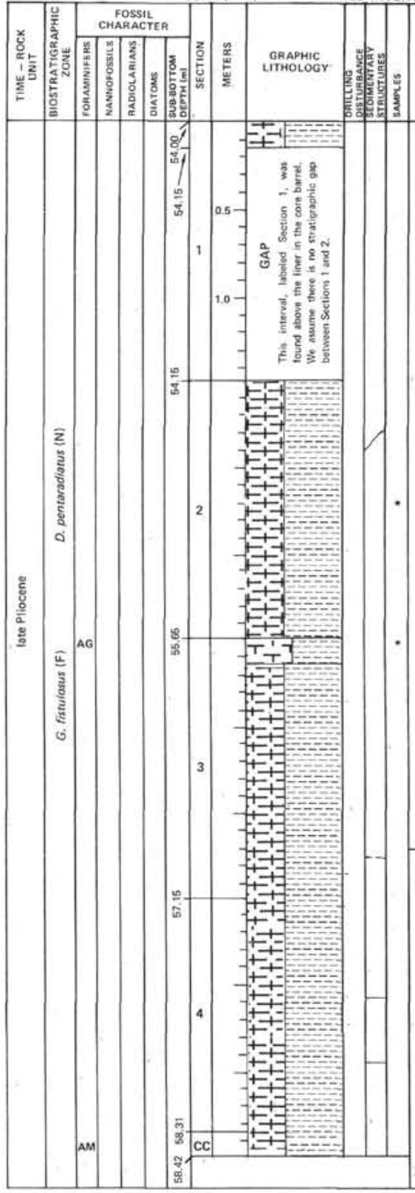
SMEAR SLIDE SUMMARY

	1-100 D	2-95 D	2-130 D
Quartz	1/T	1/T	1/T
Pyrite	2/R	1/T	1/T
Other heavy minerals	1/T	1/T	1/T
Clay minerals	57/A	53/A	70/A
Volcanic glass (lt)	1/T	1/T	3/R
Zeolites	–	–	2/R
Micronodules	–	1/T	1/T
Carbonate unspec.	3/R	3/R	1/T
Foraminifers	25/A	25/A	10/C
Calcareous nannofossils	10/C	15/C	10/C

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	47	49	60	50
% Organic carbon	0.3	0.3	0.2	0.2
	1-150 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	47	42	53	62
% Organic carbon	0.2	0.2	0.2	0.2
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	41	41	59	43
% Organic carbon	0.1	0.2	0.1	0.2
	3-96 cm			
% Carbonate	39			
% Organic carbon	0.1			

SITE 502 HOLE C CORE (HPC) 6 CORED INTERVAL 54.0–58.4 m



This interval, labeled Section 1, was found above the liner in the core barrel. We assume there is no stratigraphic gap between Sections 1 and 2.

5Y 6/2

5GY 6/1

LITHOLOGIC DESCRIPTION

NANNO AND FORAM-BEARING CLAY AND NANNO-BEARING FORAM MARL, which are light olive gray (5Y 6/2) in color gradually darkening in Section 3 to greenish gray (5GY 6/1). The sediment is generally homogeneous with some mottling, and very faint banding. It is faintly burrowed, except for Section 2 which is moderately burrowed.

From Section 2, 148 cm–Section 3, 12 cm a coarse component of forams is visible.

Irregular breaks occur in the sediment column in Section 2 from 30–38 cm and in Section 4 at 57 and 93 cm.

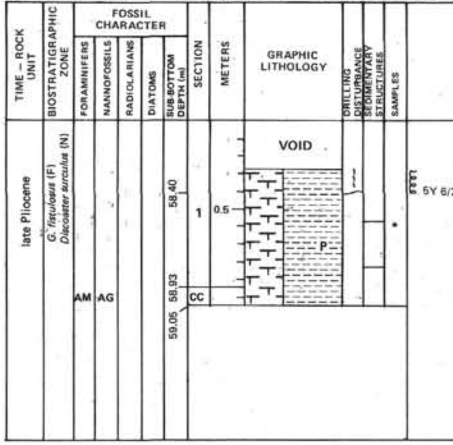
SMEAR SLIDE SUMMARY

	2-70 D	3-5 D
Quartz	1/T	1/T
Pyrite	2/R	4/R
Other heavy minerals	1/T	1/T
Clay minerals	65/A	48/A
Volcanic glass (lt)	2/R	3/R
Micronodules	1/T	–
Carbonate unspec.	3/R	3/R
Foraminifers	15/C	30/A
Calcareous nannofossils	10/C	10/C

CARBON-CARBONATE:

	1-11 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	36	35	57	50
% Organic carbon	0.2	0.2	0.3	0.3
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	50	52	58	58
% Organic carbon	0.2	0.3	0.2	0.3
	3-96 cm	3-126 cm	3-150 cm	4-36 cm
% Carbonate	46	42	50	47
% Organic carbon	0.3	0.3	0.3	0.2
	4-66 cm	4-96 cm		
% Carbonate	56	50		
% Organic carbon	0.2	0.2		

SITE 502 HOLE C CORE (HPC) 7 CORED INTERVAL 58.4–62.8 m



LITHOLOGIC DESCRIPTION

NANNO AND FORAM-BEARING CLAY, which is light olive gray (5Y 6/2) in color and burrowed, mottled, and faintly banded.

Section 1, 29–42 cm is disturbed.

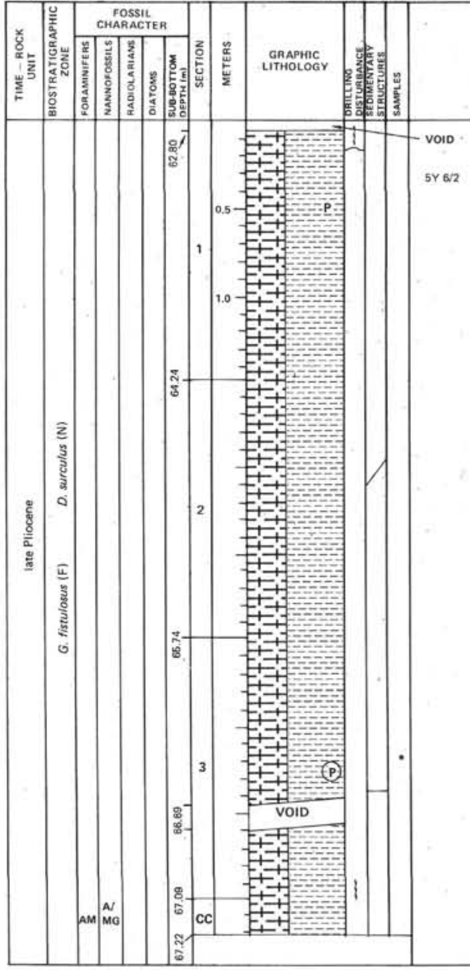
In Section 1 at 55 and 87 cm there are small breaks in the sediment column.

A pyrite nodule is in Section 1 at 75 cm.

SMEAR SLIDE SUMMARY

	1-60 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	67/A
Volcanic glass (lt)	2/R
Carbonate unspec.	2/R
Foraminifers	20/C
Calcareous nannofossils	5/C

SITE 502 HOLE C CORE (HPC) 8 CORED INTERVAL 62.8–67.2 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) in color, burrowed, mottled, and faintly banded.

Section 1, 6–14 cm is disturbed.

Section 1, 6–28 cm was originally found above the liner in the core barrel.

In Section 2 banding is more prominent and is black to pale green (10G 6/2) in color.

In Section 2 from 40–60 cm there is a shear trace which may be *in situ* in origin.

A large pyrite nodule (2 cm diameter) is in Section 3 at 80 cm.

Section 3, 140–150 cm may be disturbed.

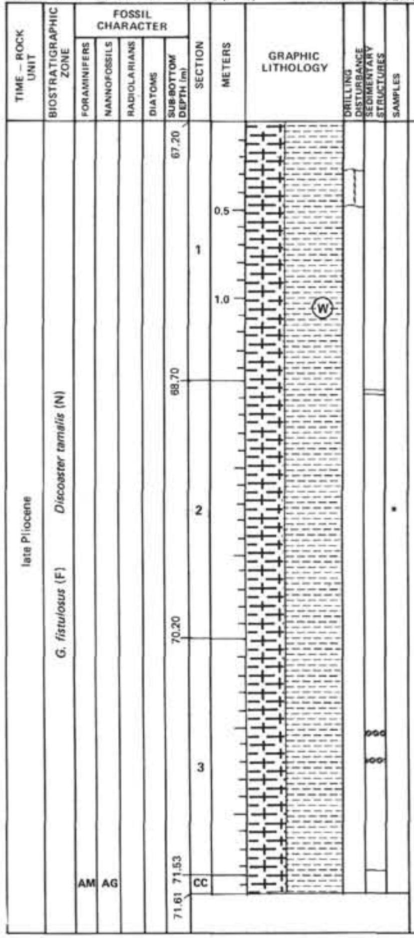
SMEAR SLIDE SUMMARY

	3-70 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	2/R
Clay minerals	61/A
Volcanic glass (lt)	1/T
Volcanic glass (dk)	1/T
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	15/C

CARBON-CARBONATE:

	1-37 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	3	52	50	46
% Organic carbon	0.2	0.2	0.2	0.2
	1-150 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	49	45	39	46
% Organic carbon	0.2	0.2	0.2	0.3
	2-126 cm	2-150 cm	3-36 cm	3-65 cm
% Carbonate	42	51	55	54
% Organic carbon	0.2	0.3	0.2	0.3
	3-90 cm	3-126 cm	3-150 cm	
% Carbonate	49	53	54	
% Organic carbon	0.1	0.2	0.2	

SITE 502 HOLE C CORE (HPC) 9 CORED INTERVAL 67.2–71.6 m



LITHOLOGIC DESCRIPTION

5Y 6/2

NANNO AND FORAM-BEARING MARL, which is light olive gray (5Y 6/2) in color and generally homogeneous with faint burrows and mottling.

Section 1, 25–46 cm is disturbed.

In Section 1 at 112 cm there is a wood fragment (W), 1 cm in diameter.

A prominent pale green (10G 6/2) lamina in Section 2 at 5 cm.

In Section 3 from 45–80 cm there are four vertical burrows.

There is a small sediment column break in Section 3 at 135 cm.

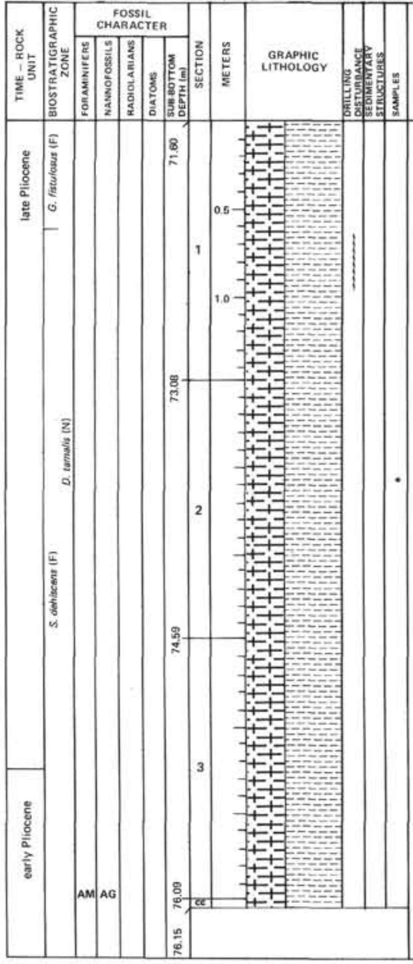
SMEAR SLIDE SUMMARY

	2-70 D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	62/A
Volcanic glass (lt)	1/T
Micronodules	1/T
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	15/C

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	50	51	49	52
% Organic carbon	0.1	0.2	0.2	0.2
	1-150 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	52	51	50	52
% Organic carbon	0.2	0.2	0.2	0.2
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	49	52	54	49
% Organic carbon	0.2	0.2	0.3	0.2
	3-96 cm	3-126 cm		
% Carbonate	48	43		
% Organic carbon	0.3	0.2		

SITE 502 HOLE C CORE (HPC) 10 CORED INTERVAL 71.6–76.0 m



LITHOLOGIC DESCRIPTION

5Y 6/2

FORAM AND NANNO-BEARING CLAY, which is light olive gray (5Y 6/2) in color and generally homogeneous with faint burrows and mottles.

Section 1, 0–10 cm is sediment which was found above the liner in the core barrel.

Section 1, 60–95 cm is disturbed.

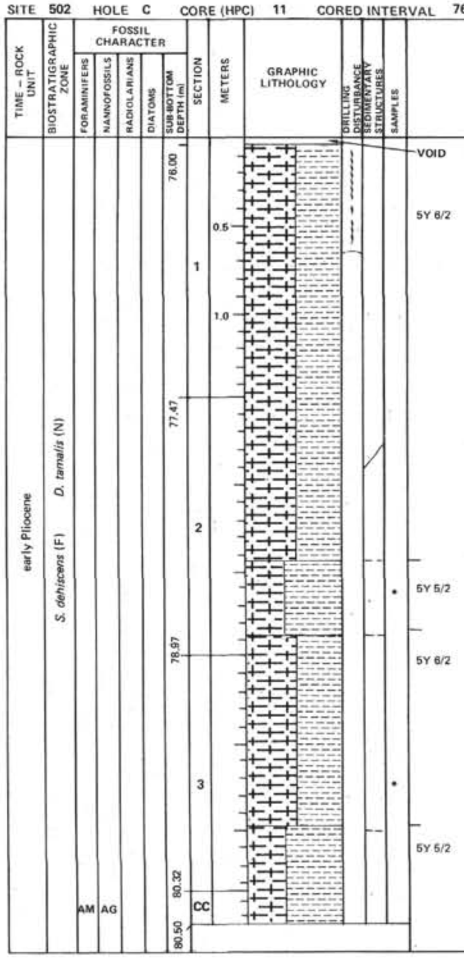
SMEAR SLIDE SUMMARY

	2-60 D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	67/A
Volcanic glass (lt)	2/R
Micronodules	1/T
Carbonate unspec.	2/T
Foraminifers	10/C
Calcareous nannofossils	15/C

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	44	50	44	47
% Organic carbon	0.3	0.2	0.3	0.2
	1-150 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	55	55	53	50
% Organic carbon	0.2	0.2	0.3	0.2
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	51	56	51	54
% Organic carbon	0.2	0.2	0.2	0.3
	3-96 cm	3-126 cm	3-150 cm	
% Carbonate	55	43	42	
% Organic carbon	0.2	0.3	0.3	

SITE 502 HOLE C CORE (HPC) 11 CORED INTERVAL 76.0–80.4 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) to olive gray (5Y 5/2) in color, and burrowed, mottled, and faintly laminated.

Section 1, 2–65 cm is disturbed.

In Section 2 from 20–35 cm there are shear traces which may be *in situ* deformation.

In Section 3 at 132 cm there is a small break in the sediment column.

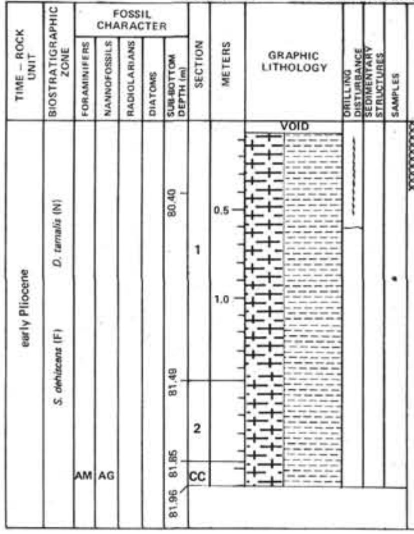
SMEAR SLIDE SUMMARY

	2-115 D	3-75 D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	62/A	55/A
Volcanic glass (lt)	1/T	3/R
Micronodules	1/T	1/T
Carbonate unspec.	2/R	3/R
Foraminifers	10/C	15/C
Calcareous nannofossils	20/C	20/C

CARBON-CARBONATE:

	1-36 cm	1-66 cm	1-96 cm	1-126 cm
% Carbonate	41	46	49	51
% Organic carbon	0.2	0.2	0.3	0.2
	1-148 cm	2-36 cm	2-66 cm	2-96 cm
% Carbonate	51	49	52	40
% Organic carbon	0.3	0.2	0.2	0.3
	2-126 cm	2-150 cm	3-36 cm	3-66 cm
% Carbonate	39	48	37	48
% Organic carbon	0.3	0.2	0.3	0.3
	3-96 cm	3-126 cm		
% Carbonate	49	48		
% Organic carbon	0.2	0.3		

SITE 502 HOLE C CORE (HPC) 12 CORED INTERVAL 80.4–84.8 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) in color, burrowed and mottled, but otherwise structureless. Scattered forams are visible throughout.

Section 1, 5–60 cm is disturbed.

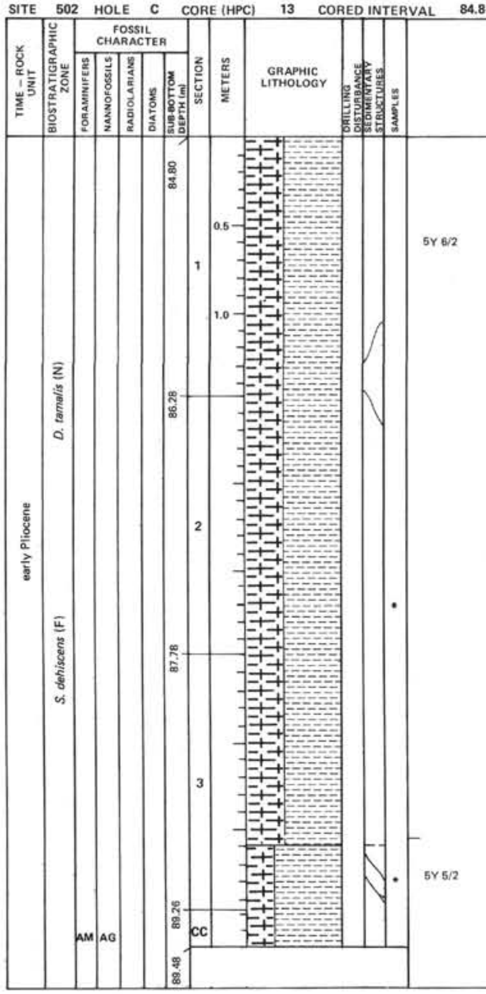
SMEAR SLIDE SUMMARY

	1-90 D
Quartz	1/T
Pyrite	1/T
Other heavy minerals	1/T
Clay minerals	57/A
Volcanic glass (lt)	1/T
Zeolites	1/T
Micronodules	1/T
Carbonate unspec.	2/R
Foraminifers	15/C
Calcareous nannofossils	20/C

CARBON-CARBONATE:

	1-66 cm	1-96 cm	1-126 cm	2-36 cm
% Carbonate	55	55	51	49
% Organic carbon	0.2	0.1	0.2	0.2

SITE 502 HOLE C CORE (HPC) 13 CORED INTERVAL 84.8–89.2 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) in color and grades into FORAM AND NANNO-BEARING CLAY, which is olive gray (5Y 5/2) in color near the base of the core. The core is mottled, burrowed, and faintly graded with scattered forams visible throughout.

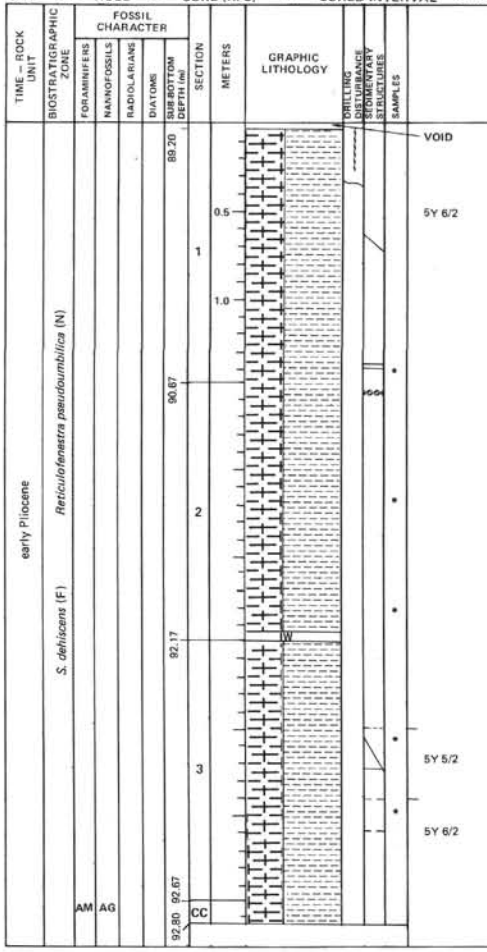
Section 1, 0–19 cm is sediment found above the liner in the core barrel.

Shear traces occur in:
Section 1 107–127 cm
Section 1, 143 cm–Section 2, 13 cm
Section 3, 115 cm to the bottom of the core

SMEAR SLIDE SUMMARY

	2-120	3-130
	D	D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	57/A	68/A
Volcanic glass (lt)	2/R	2/R
Carbonate unspec.	2/R	2/R
Foraminifers	15/C	10/C
Calcareous nannofossils	20/C	15/C

SITE 502 HOLE C CORE (HPC) 14 CORED INTERVAL 89.2–93.6 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) to olive gray (5Y 5/2) in color. It is burrowed, mottled, and faintly banded with faint Zoophycos burrows.

Section 1, 2–36 cm is disturbed.

In Section 1 from 65–72 cm there is a very subtle break in the sediment column.

A grayish green (10G 4/2) clay layer is in Section 1 at 141 cm.

A prominent vertical burrow is in Section 2 at 0–17 cm.

Section 2 is more distinctly burrowed than the surrounding sediment. Some burrows are light brownish gray (2.5Y 6/2) in color but show no change in lithology.

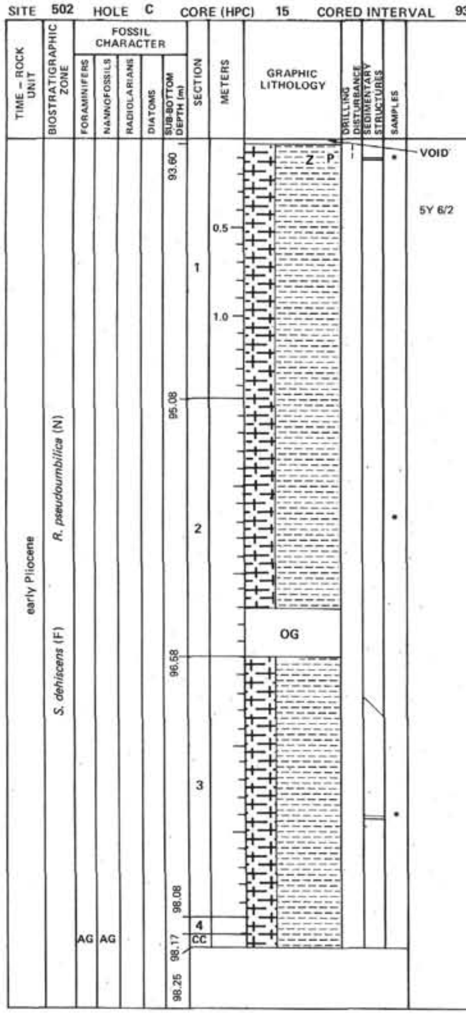
A microfault with < 1 cm displacement is in Section 3 at 60–80 cm.

Section 3, 70–71 cm contains a prominent pale green (10G 6/2) lamina and at 106 cm there is a light gray (5Y 7/1) lamina.

SMEAR SLIDE SUMMARY

	1-141	2-70	2-135	3-60	3-107
	M	D	M	D	M
Quartz	1/T	1/T	1/T	1/T	1/T
Pyrite	3/R	1/T	2/R	2/R	2/R
Other heavy minerals	2/R	1/T	1/T	1/T	1/T
Clay minerals	85/D	61/A	61/A	60/A	71/A
Volcanic glass (lt)	1/T	4/R	2/R	2/R	3/R
Volcanic glass (dk)	1/T	–	–	1/T	–
Carbonate unspec.	2/R	2/R	2/R	2/R	2/R
Foraminifers	3/R	15/C	15/C	10/C	10/C
Calcareous nannofossils	2/R	15/C	16/C	20/C	10/C

SITE 502 HOLE C CORE (HPC) 15 CORED INTERVAL 93.6–98.0 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING CLAY, which is light olive gray (5Y 6/2) in color, mottled, burrowed, and very faintly banded. Faint Zoophycos burrows are occasionally recognized.

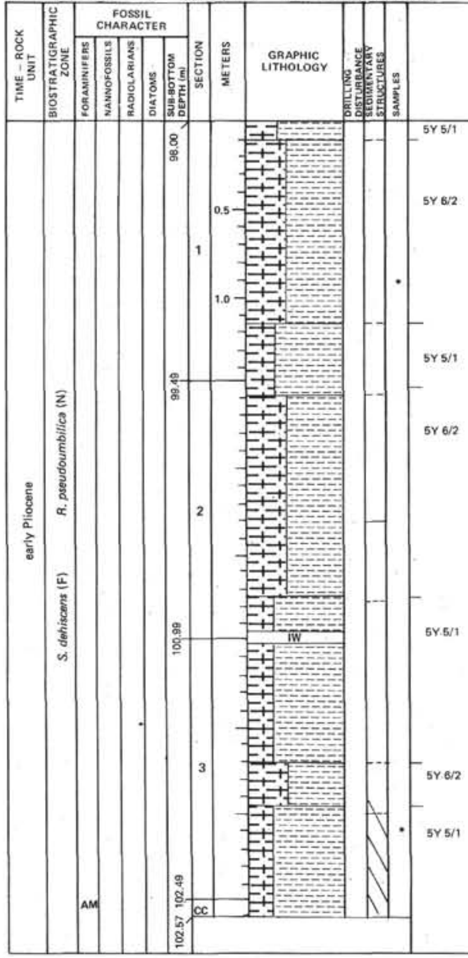
Section 1 at 10–11 cm contains a gray (5Y 5/1) lamina of nanno-, foram-, and zeolite-bearing clay.

In Section 3 from 22–29 cm there is a shear trace and at 93 cm there is a prominent gray (5Y 5/1) lamina of foram- and nanno-bearing marl.

SMEAR SLIDE SUMMARY

	1-10 M	2-70 D	3-94 M
Quartz	1/T	1/T	1/T
Pyrite	5/C	1/T	1/T
Other heavy minerals	2/R	1/T	1/T
Clay minerals	56/A	68/A	64/A
Volcanic glass (lt)	2/R	2/R	1/T
Zeolites	15/C	–	–
Carbonate unspec.	–	2/R	2/R
Foraminifers	10/C	10/C	10/C
Calcareous nannofossils	10/C	15/C	20/C

SITE 502 HOLE C CORE (HPC) 16 CORED INTERVAL 98.0–102.4 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING MARL, which is light olive gray (5Y 6/2) in color, and NANNO AND FORAM-BEARING CLAY, which is gray (5Y 5/1) in color. The sediment is burrowed and mottled with many Zoophycos and very faint banding.

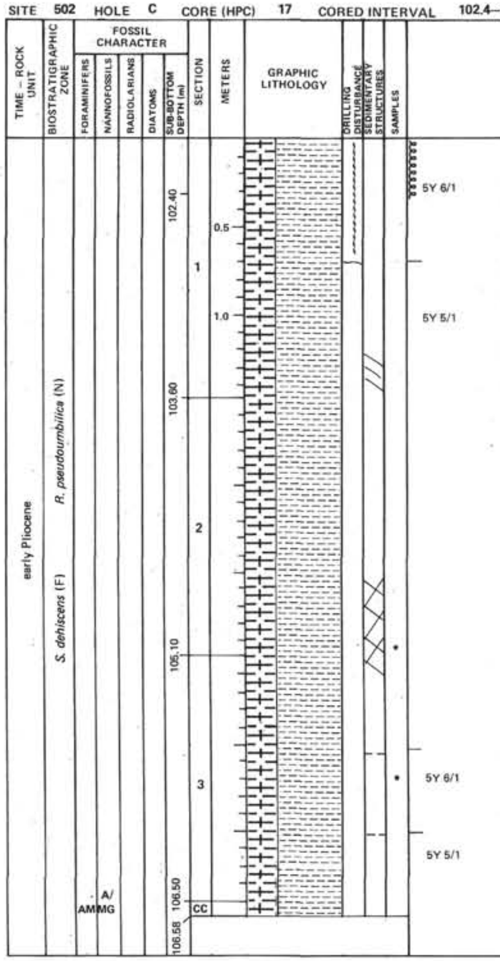
In Section 2 at 77 cm there is a prominent lamina, grayish olive green (5GY 3/2) in color.

Shear traces are in Section 3 from 93 cm to the bottom.

SMEAR SLIDE SUMMARY

	1-90 D	3-115 D
Quartz	1/T	1/T
Pyrite	1/T	2/R
Other heavy minerals	1/T	1/T
Clay minerals	61/A	68/A
Volcanic glass (lt)	1/T	3/R
Volcanic glass (dk)	1/T	–
Carbonate unspec.	2/R	2/R
Foraminifers	12/C	8/C
Calcareous nannofossils	20/A	5/C

SITE 502 HOLE C CORE (HPC) 17 CORED INTERVAL 102.4–106.8 m



LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING CLAY, which is light gray (5Y 6/1) to gray (5Y 5/1) in color, mottled, faintly banded, and burrowed.

Section 1, 0–70 cm is disturbed.

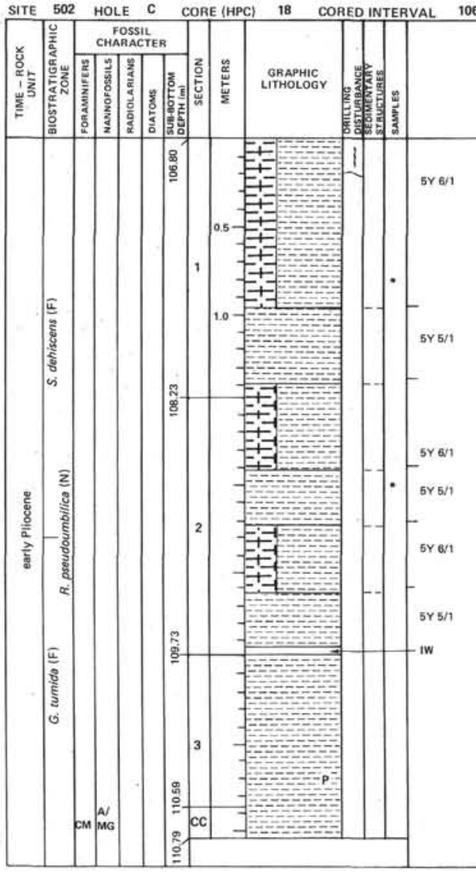
In Section 1 from 130–150 cm there is a set of shear traces, some having a slight displacement (1–2 mm).

From Section 2, 90 cm–Section 3, 10 cm also contains a faint set of shear traces with small displacements (< 1 cm).

SMEAR SLIDE SUMMARY

	2-145	3-70
	D	D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	76/D	69/A
Volcanic glass (lt)	4/R	1/T
Volcanic glass (dk)	–	1/T
Carbonate unspec.	3/R	3/R
Foraminifers	4/R	8/C
Calcareous nannofossils	8/C	15/C

SITE 502 HOLE C CORE (HPC) 18 CORED INTERVAL 106.8–111.2 m



LITHOLOGIC DESCRIPTION

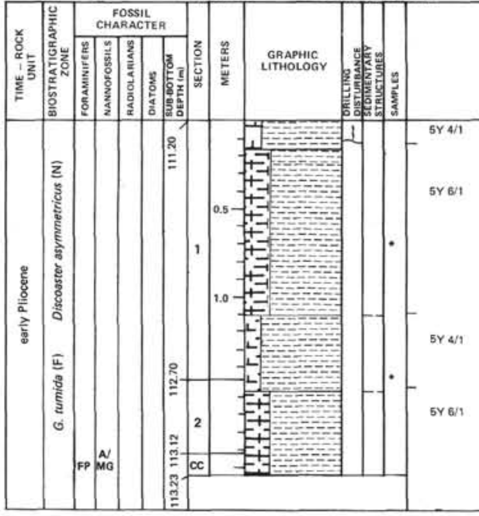
FORAM AND NANNO-BEARING CLAY, light gray (5Y 6/1) in color grading downward to CLAY which is gray (5Y 5/1) in color. Both are generally homogeneous with faint banding, mottling, and burrowing. The core is sheared throughout with displacements of up to 0.5 cm.

Section 1, 0–18 cm is disturbed.

SMEAR SLIDE SUMMARY

	1-80	2-55
	D	D
Quartz	1/T	1/T
Pyrite	1/T	1/T
Other heavy minerals	1/T	2/T
Clay minerals	65/A	89/D
Volcanic glass (lt)	4/R	1/T
Volcanic glass (dk)	–	1/T
Carbonate unspec.	3/R	1/T
Foraminifers	10/C	1/T
Calcareous nannofossils	15/C	3/R

SITE 502 HOLE C CORE (HPC) 19 CORED INTERVAL 111.2–115.6 m



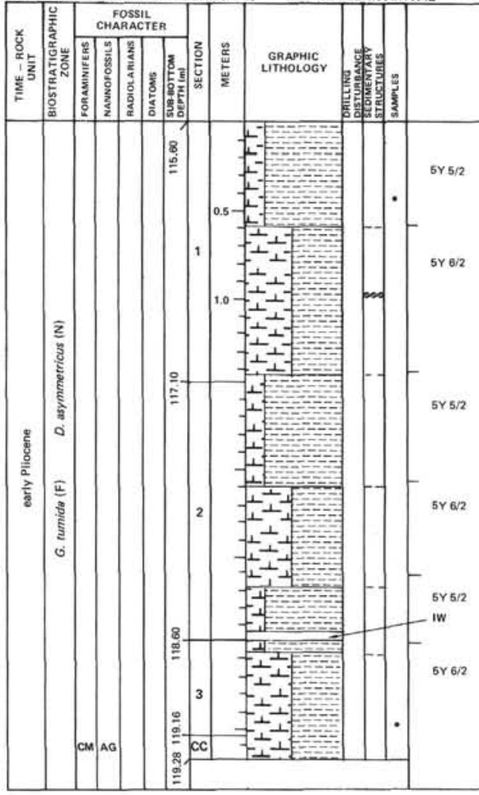
LITHOLOGIC DESCRIPTION

FORAM AND NANNO-BEARING CLAY, which is light gray (5Y 6/1) in color, and NANNO-BEARING CLAY, which is dark gray (5Y 4/1) in color. Both are generally homogeneous, burrowed, and mottled, but sheared extensively with many orientations and displacements of up to 1 cm.

SMEAR SLIDE SUMMARY

	1-70	1-145
	D	D
Quartz	1/T	1/T
Pyrite	1/T	3/R
Other heavy minerals	1/T	2/R
Clay minerals	69/A	78/D
Volcanic glass (lt)	1/T	4/R
Volcanic glass (dk)	1/T	–
Carbonate unspec.	3/R	2/R
Foraminifers	7/C	2/R
Calcareous nannofossils	15/C	8/C

SITE 502 HOLE C CORE (HPC) 20 CORED INTERVAL 115.6–120.0 m



LITHOLOGIC DESCRIPTION

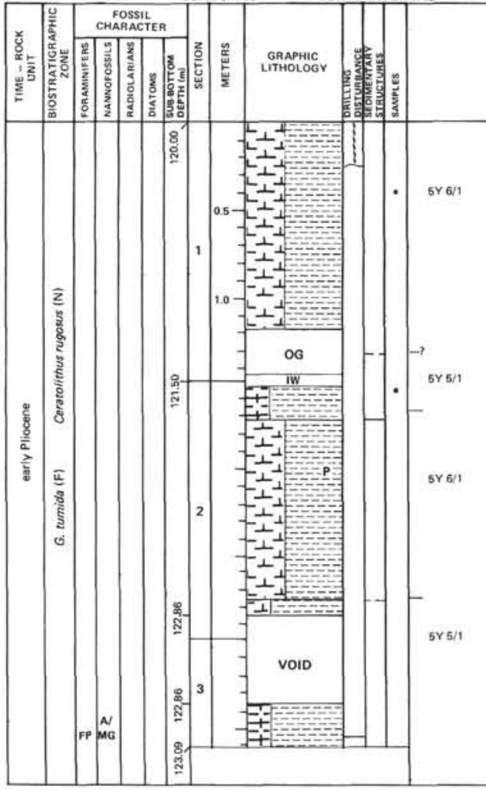
NANNO MARL, which is light olive gray (5Y 6/2) in color and NANNO-BEARING CLAY, which is olive gray (5Y 5/2) in color. Both are mottled, burrowed, and faintly banded. They are irregularly sheared throughout.

A prominent Zoophycos burrow is in Section 1 at 99 cm.

SMEAR SLIDE SUMMARY

	1-45	3-50
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	83/D	63/A
Volcanic glass (lt)	2/R	2/R
Carbonate unspec.	2/R	2/R
Foraminifers	2/R	4/R
Calcareous nannofossils	7/C	25/A

SITE 502 HOLE C CORE (HPC) 21 CORED INTERVAL 120.0–124.4 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is light gray (5Y 6/1) in color, and ASH AND NANNO-BEARING CLAY, which is gray (5Y 5/1) in color. Both are mottled, burrowed, and faintly sheared in many orientations.

Section 10–27 cm is disturbed.

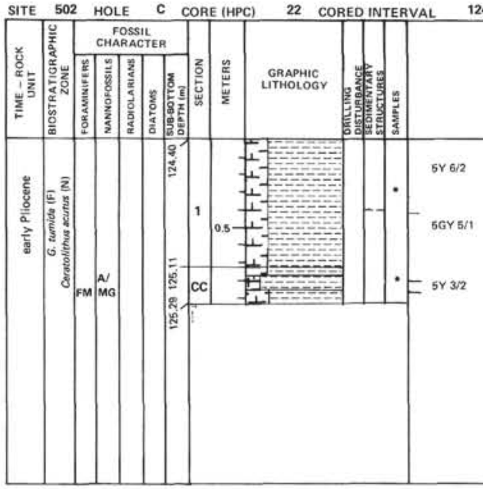
In Section 2 at 19 cm there is a shear trace which cuts both color boundary and burrows.

In Section 3 at 53 cm there is a small break in the sediment column.

SMEAR SLIDE SUMMARY

	1-40	2-10
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	1/T
Clay minerals	67/A	75/D
Volcanic glass (lt)	2/R	5/C
Zeolites	–	1/T
Carbonate unspec.	2/R	3/R
Foraminifers	5/C	5/C
Calcareous nannofossils	20/C	7/C

SITE 502 HOLE C CORE (HPC) 22 CORED INTERVAL 124.4–125.4 m



LITHOLOGIC DESCRIPTION

ASH AND NANNO-BEARING CLAY, which is light olive gray (5Y 6/2) and dark greenish gray (5GY 5/1) in color. The sediment is mottled and burrowed.

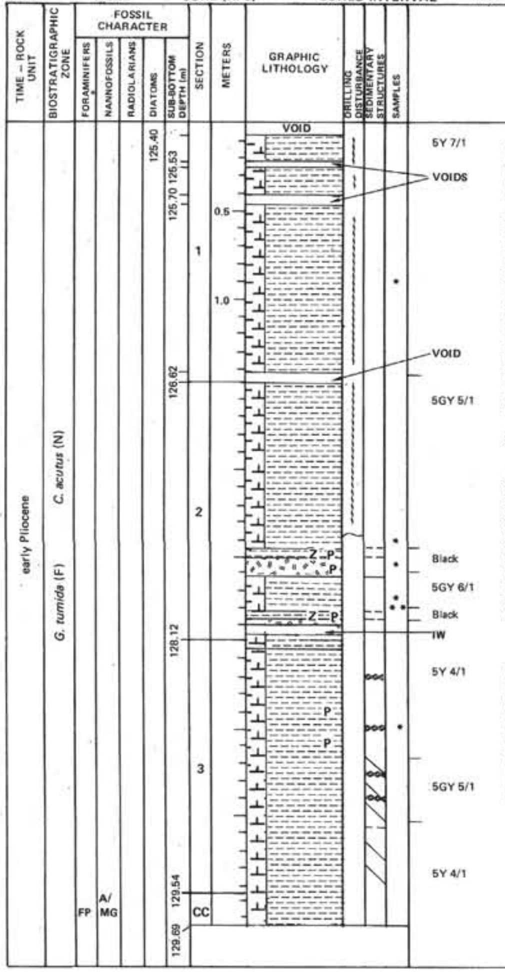
Section 1, 22 and 27 cm, contains prominent mottles, dusky green (5G 3/2) in color.

From 3–9 cm in the Core-Catcher there is a band of CLAY; dark olive gray (5Y 3/2) in color.

SMEAR SLIDE SUMMARY

	1-30	CC, 9
	D	D
Quartz	1/T	2/R
Pyrite	1/T	2/R
Other heavy minerals	1/T	2/R
Clay minerals	78/D	82/D
Volcanic glass (lt)	5/C	3/T
Volcanic glass (dk)	–	1/R
Micronodules	1/T	–
Carbonate unspec.	2/R	2/R
Foraminifers	3/R	2/R
Calcareous nannofossils	8/C	4/R

SITE 502 HOLE C CORE (HPC) 23 CORED INTERVAL 125.4–129.8 m



LITHOLOGIC DESCRIPTION

NANNO OOZE, which is light gray (5Y 7/1) in color and NANNO-BEARING CLAY, which is dark gray (5Y 4/1) to dark greenish gray (5GY 5/1) in color. Ash beds are present. Much of this interval was cored twice.

Section 1, 0 cm–Section 2, 88 cm is highly disturbed. The sediment is smeared and convoluted and broken into sections, portions of which appear intact, but fragmented.

Section 2, 95–100 cm is a ZEOLITE-NANNO-PYRITE-BEARING CLAY, which overlies in Section 2 at 100–111 cm a PYRITE-BEARING ASH, which is black in color and indurated with some burrow-mixing in the upper portion. Similarly in Section 2 at 130–134 cm a NANNO AND ZEOLITE-BEARING CLAY overlies a black, PYRITE-BEARING ASH at 134–137 cm.

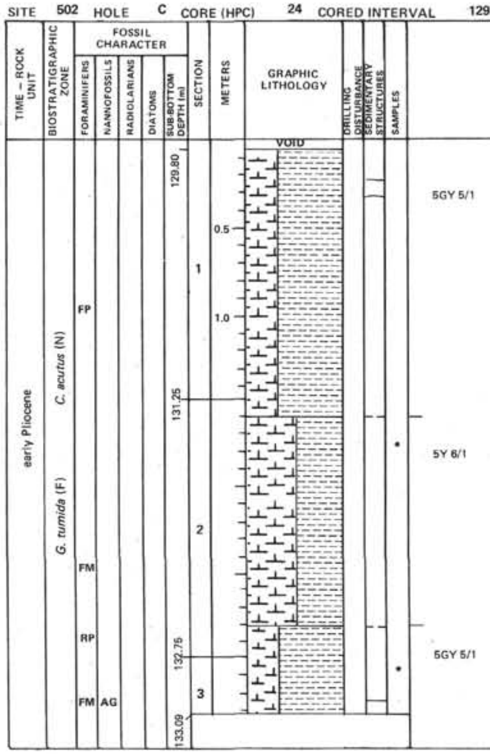
In Sections 2 and 3 the nanno-bearing clay is thoroughly sheared, mottled, banded, and burrowed. Zoophycos is common, with the burrows at 30° dip. The shear traces are common in the opposite direction and at higher angles. There is approximately a 1 cm displacement on the shears.

SMEAR SLIDE SUMMARY

	1-90	2-96	2-110	2-131	2-134
	D	M	M	M	M
Quartz	–	1/T	–	1/T	–
Pyrite	2/R	8/C	15/C	3/R	5/C
Other heavy minerals	1/T	1/T	–	1/T	–
Clay minerals	31/A	68/A	–	62/A	–
Volcanic glass (lt)	2/R	3/R	83/D	2/R	72/A
Volcanic glass (dk)	–	–	–	2/R	20/C
Zeolites	–	5/C	–	20/C	3/R
Carbonate unspec.	–	3/R	–	2/R	–
Foraminifers	4/R	4/R	1/T	2/R	–
Calcareous nannofossils	60/A	7/C	1/T	5/C	–

	2-137	3-50
	M	D
Quartz	–	1/T
Pyrite	5/C	4/R
Other heavy minerals	–	2/R
Clay minerals	–	75/D
Volcanic glass (lt)	72/A	3/R
Volcanic glass (dk)	20/C	–
Zeolites	2/R	–
Carbonate unspec.	1/T	3/R
Foraminifers	–	2/R
Calcareous nannofossils	–	10/C

SITE 502 HOLE C CORE (HPC) 24 CORED INTERVAL 129.8–134.2 m



LITHOLOGIC DESCRIPTION

FORAM-BEARING NANNO MARL, which is light gray (5Y 6/1) in color, and FORAM AND NANNO-BEARING CALCAREOUS CLAY, which is dark greenish gray (5GY 5/1) in color. Both are generally homogeneous, intensely burrowed and mottled, and faintly sheared throughout.

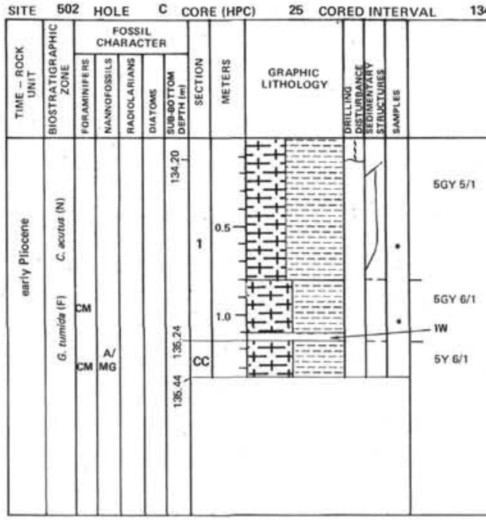
Section 1, 4–12 cm is disturbed.

Small breaks in the sediment column occur in:
Section 1, 21 and 24 cm
Section 3 at 27 cm

SMEAR SLIDE SUMMARY

	2-30	3-10
	D	D
Quartz	1/T	1/T
Pyrite	2/R	2/R
Other heavy minerals	1/T	2/R
Clay minerals	57/A	71/A
Volcanic glass (lt)	2/R	4/R
Volcanic glass (dk)	1/T	1/T
Zeolites	–	1/T
Carbonate unspec.	3/R	5/R
Foraminifers	8/C	5/C
Calcareous nannofossils	25/A	10/C

SITE 502 HOLE C CORE (HPC) 25 CORED INTERVAL 134.2–137.2 m



LITHOLOGIC DESCRIPTION

FORAM and NANNO-BEARING CLAY, which is dark greenish gray (5GY 5/1) in color and FORAM AND NANNO-BEARING MARL, which is greenish gray (5GY 6/1) and light gray (5Y 6/1) in color. Both are generally burrowed and mottled.

Section 1, 0–16 cm is disturbed.

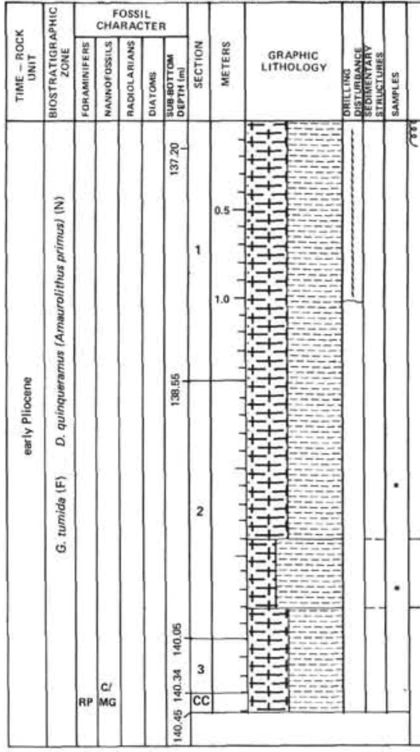
In Section 1 from 16–62 cm there is a large shear.

Section 1, 75 cm to the bottom of the core is very distinctly burrowed in dusky yellowish green (10GY 3/2) and light brownish gray (2.5Y 6/2) colors.

SMEAR SLIDE SUMMARY

	1-65	1-105
	D	D
Quartz	1/T	1/T
Pyrite	3/R	1/T
Other heavy minerals	1/T	1/T
Clay minerals	63/A	56/A
Volcanic glass (lt)	3/R	3/R
Volcanic glass (dk)	–	1/T
Carbonate unspec.	4/R	3/R
Foraminifers	10/C	15/C
Calcareous nannofossils	15/C	20/C

SITE 502 HOLE C CORE (HPC) 26 CORED INTERVAL 137.2–140.7 m



LITHOLOGIC DESCRIPTION

5GY 6/1

FORAM AND NANNO-BEARING MARL, which is greenish gray (5GY 6/1) in color and FORAM AND NANNO-BEARING CLAY, which is dark greenish gray (5GY 5/1) in color. Both are generally homogeneous, burrowed, and mottled; and contain occasional irregular shears.

Section 1, 0–103 cm is disturbed.

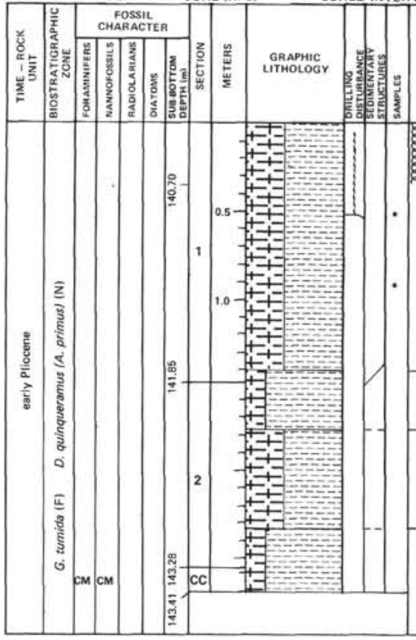
SMEAR SLIDE SUMMARY

	2-60 D	2-120 D
Quartz	1/T	1/T
Pyrite	1/T	2/R
Other heavy minerals	1/T	1/T
Clay minerals	57/A	69/A
Volcanic glass (lt)	1/T	1/T
Volcanic glass (dk)	1/T	–
Carbonate unspec.	3/R	3/R
Foraminifers	15/C	8/C
Calcareous nannofossils	20/C	15/C

5GY 5/1

5GY 6/1

SITE 502 HOLE C CORE (HPC) 27 CORED INTERVAL 140.7–144.2 m



LITHOLOGIC DESCRIPTION

5GY 6/1

NANNO AND FORAM-BEARING MARL, which is greenish gray (5GY 6/1) in color, and NANNO-BEARING CLAY, which is dark greenish gray (5GY 5/1) in color. Both are generally homogeneous, burrowed, and mottled throughout, with irregular shear traces at various angles.

Section 1, 0–52 cm is disturbed.

A sharp color change at the boundary of a shear trace is in Section 1 at 135–150 cm.

SMEAR SLIDE SUMMARY

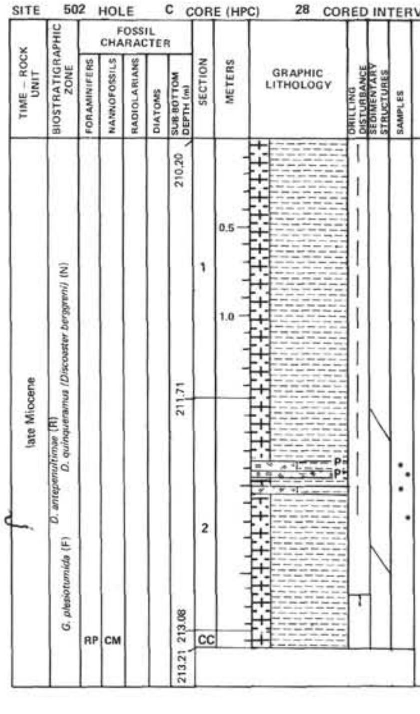
	2-50 D	2-95 D
Quartz	1/T	1/T
Pyrite	2/R	1/T
Other heavy minerals	1/T	2/R
Clay minerals	61/A	81/D
Volcanic glass (lt)	2/R	3/R
Carbonate unspec.	3/R	3/R
Foraminifers	15/C	4/R
Calcareous nannofossils	15/C	5/C

5GY 5/1

5GY 6/1

5GY 5/1

SITE 502 HOLE C CORE (HPC) 28 CORED INTERVAL 210.2–213.2 m



LITHOLOGIC DESCRIPTION

10G 4/2

CLAY, which is grayish green (10G 4/2) in color. The core is fragmented with large portions intact. It is intensely burrowed and mottled in various shades of green and light olive brown (2.5Y 5/4).

In Section 1 from 65–75 cm the liner is distorted.

Shear traces are in Section 2, 10–40 and 80–105 cm.

Section 2, 38–42 cm contains a PYRITE-BEARING CLAYEY ASH overlying black PYRITIC ASH at 42–45 cm.

In Section 2 at approximately 53 cm there is an ASHY CLAY light olive brown (2.5Y 5/4) in color but not in a clearly defined layer.

Section 2, 114–119 cm is disturbed.

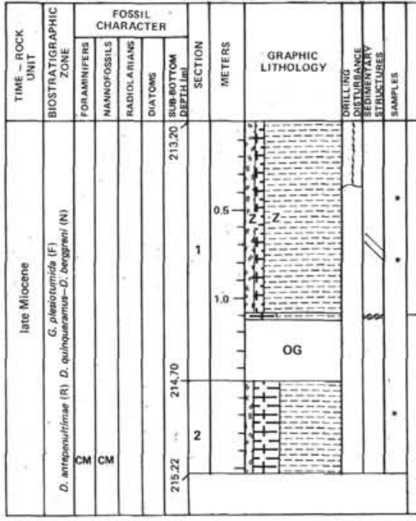
SMEAR SLIDE SUMMARY

	2-40 M	2-43 M	2-53 M	2-70 D
Quartz	–	–	–	1/T
Pyrite	6/C	45/A	3/R	2/R
Other heavy minerals	1/T	–	1/T	1/T
Clay minerals	38/A	–	81/D	45/A
Volcanic glass (lt)	45/A	55/A	40/A	2/R
Carbonate unspec.	–	–	3/R	4/R
Foraminifers	3/R	–	1/T	2/R
Calcareous nannofossils	4/R	–	4/R	2/R
Radiolarians	1/T	–	1/T	1/T
Sponge spicules	2/R	–	2/R	4/R

CLAY MINERALOGY (<2 μm): 1-103 cm

Smectite	77%
Illite	8%
Chlorite	5%
Kaolinite	10%

SITE 502 HOLE C CORE (HPC) 29 CORED INTERVAL 213.2–215.2 m



LITHOLOGIC DESCRIPTION

10G 4/2

ASH-BEARING CLAY which is medium grayish green (10G 4/2) in color and ASH, FORAM- AND NANNO-BEARING CLAY, which is grayish blue green (5BG 5/2) in color. Both are intensely mottled and burrowed.

Section 1, 0–36 cm is disturbed.
Section 1, 60–78 cm contains a complex set of shears.

In Section 1 at 110 cm the burrows are more distinct.

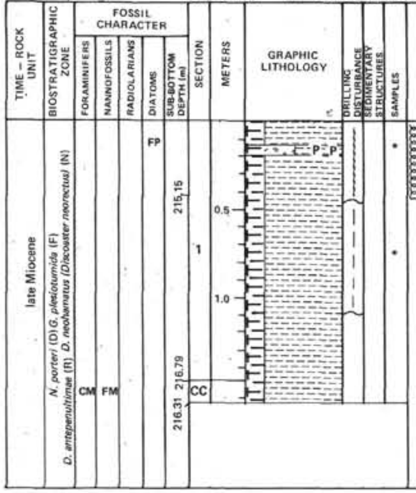
The sediment column is fragmented in Section 2 at 42 cm.

5BG 5/2

SMEAR SLIDE SUMMARY

	1-49	1-80	2-20
	M	D	D
Quartz	–	–	1/T
Pyrite	–	2/R	2/R
Other heavy minerals	1/T	1/T	1/T
Clay minerals	77/D	82/D	65/A
Volcanic glass (lt)	8/C	5/C	5/C
Zeolites	3/R	2/R	–
Carbonate unspec.	2/R	–	3/R
Foraminifers	1/T	2/R	8/C
Calcareous nannofossils	1/T	2/R	10/C
Radiolarians	3/R	1/T	3/R
Sponge spicules	4/R	3/R	2/R

SITE 502 HOLE C CORE (HPC) 30 CORED INTERVAL 215.2–216.7 m



LITHOLOGIC DESCRIPTION

5BG 5/2

SPICULE- AND FORAM-BEARING CLAY, which is grayish blue green (5BG 5/2) in color, and burrowed and mottled.

Section 1, 0–46 cm is disturbed.

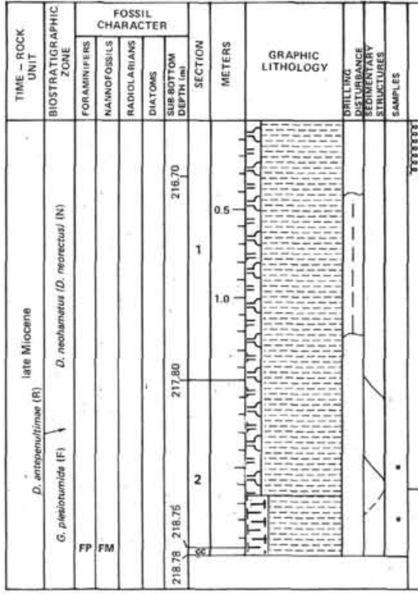
Section 1, 46–110 cm is finely fragmented, but apparently intact.

In Section 1 at 15–19 cm there is a DIATOM AND ASH-BEARING PYRITIC CLAY.

SMEAR SLIDE SUMMARY

	1-18	1-80
	M	D
Pyrite	25/A	2/R
Other heavy minerals	1/T	1/T
Clay minerals	41/A	77/D
Volcanic glass (lt)	15/C	4/R
Zeolites	2/R	–
Carbonate unspec.	3/R	5/C
Foraminifers	–	5/C
Calcareous nannofossils	4/R	3/R
Diatoms	5/C	–
Radiolarians	1/T	–
Sponge spicules	3/R	5/C
Fish debris	–	1/T

SITE 502 HOLE C CORE (HPC) 31 CORED INTERVAL 216.7–219.2 m



LITHOLOGIC DESCRIPTION

SPICULE-BEARING CLAY, which is grayish green (10GY 5/2) in color and NANNO-BEARING CLAY, which is greenish gray (5GY 6/1) in color. Both are burrowed and mottled.

Section 1, 0–40 cm is highly disturbed. The interval from 40–120 cm is finely fragmented in local areas, but generally intact.

10GY 5/2

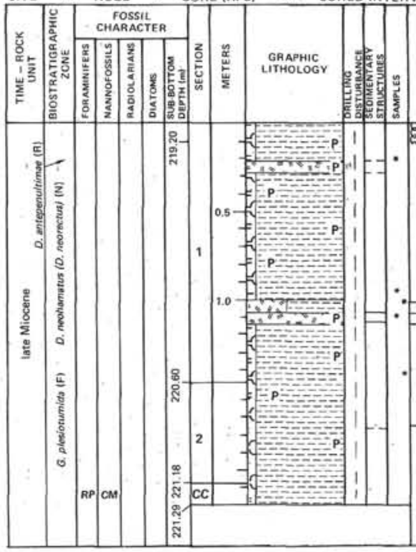
Shear traces occur in:
- Section 2, 0–12 and 47–57 cm
- Section 2, 60–70 cm, there is a microfault with a 1.5 cm displacement

SMEAR SLIDE SUMMARY

	2-50	2-80
	D	D
Pyrite	1/T	2/R
Other heavy minerals	1/T	1/T
Clay minerals	83/D	78/D
Volcanic glass (lt)	3/R	3/R
Zeolites	–	1/T
Carbonate unspec.	2/R	3/R
Foraminifers	2/R	2/R
Calcareous nannofossils	2/R	7/C
Radiolarians	1/T	1/T
Sponge spicules	5/C	2/R

10GY 6/1

SITE 502 HOLE C CORE (HPC) 32 CORED INTERVAL 219.2–221.7 m



LITHOLOGIC DESCRIPTION

5GY 5/2

ASH, SPICULE, and PYRITE-BEARING CLAY, which is dusky yellow green (10GY 3/2) to light dusky yellow green (5GY 5/2) in color. It is burrowed and mottled. The entire core is fragmented, but apparently in place.

In Section 1 at approximately 24 cm there is a PYRITE-BEARING ASH with indistinct contacts. At approximately 100–109 cm an ashy clay, olive gray (5Y 4/2) in color overlies a mixed and burrowed black PYRITIC ASH layer at 109–114 cm.

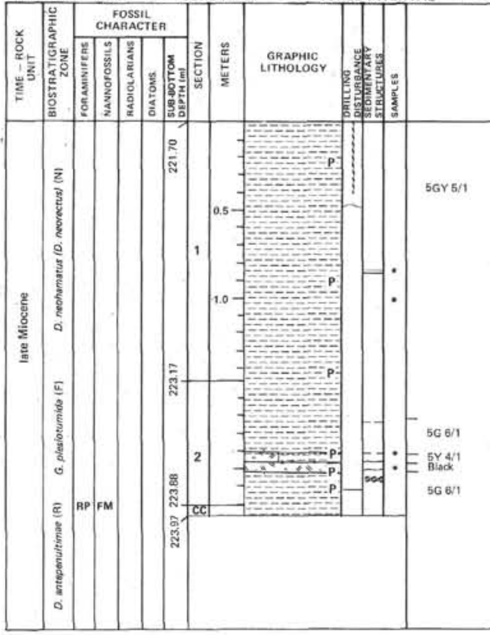
5Y 4/2
N1
10GY 3/2

SMEAR SLIDE SUMMARY

	1-24	1-98	1-106	1-13	1-140
	M	M	M	M	D
Quartz	–	1/T	–	–	–
Pyrite	10/C	1/T	2/R	44/A	20/C
Other heavy minerals	–	1/T	1/T	–	1/T
Clay minerals	–	81/D	54/A	–	63/A
Volcanic glass (lt)	90/D	3/R	35/A	55/A	5/C
Carbonate unspec.	–	3/R	2/R	–	1/T
Foraminifers	–	5/C	2/R	–	1/T
Calcareous nannofossils	–	3/R	–	–	3/R
Diatoms	–	–	–	1/T	–
Radiolarians	–	–	2/R	–	1/T
Sponge spicules	–	2/R	2/R	–	5/C

5GY 5/2

SITE 502 HOLE C CORE (HPC) 33 CORED INTERVAL 221.7–223.7 m



LITHOLOGIC DESCRIPTION

CLAY, which is greenish gray (5G 6/1) to dark greenish gray (5GY 5/1) in color. It is mottled and burrowed with some composite burrows, and burrows of various shades of green and light yellowish brown (2.5Y 6/4) color. The core is irregularly sheared throughout. Section 1, 0–47 cm is disturbed.

A prominent gray lamina of CLAY is in Section 1 at 87 cm.

Section 2, 42–48 cm is PYRITE AND ASH-BEARING CLAY, dark gray (5Y 4/1) in color.

Section 2, 48–51 cm is black PYRITIC ASH, with very irregular contacts and some burrowing.

A small break in the sediment column is at 64 cm in Section 2.

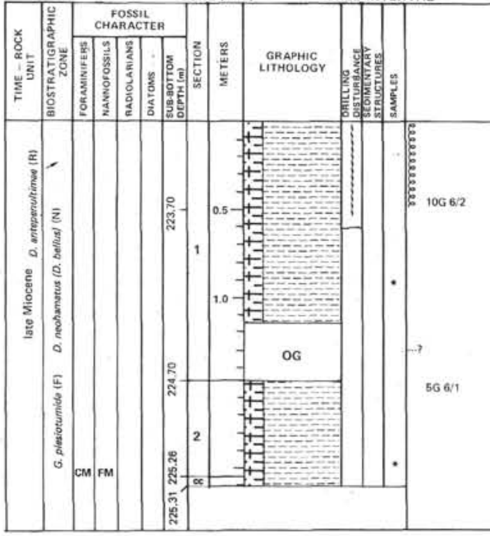
SMEAR SLIDE SUMMARY

	1-87	1-100	2-44	2-60
	M	D	M	M
Pyrite	3/R	4/R	8/C	48/A
Other heavy minerals	1/T	1/T	1/T	–
Clay minerals	90/D	83/D	74/A	–
Volcanic glass (lt)	–	4/R	10/C	52/A
Zeolites	–	–	1/T	–
Carbonate unspec.	–	–	2/R	–
Foraminifers	1/T	2/R	1/T	–
Calcareous nannofossils	2/R	3/R	1/T	–
Radiolarians	–	–	1/T	–
Sponge spicules	3/R	3/R	2/R	–

CLAY MINERALOGY (<2 μm): 1-82 cm

Smectite	71%
Illite	9%
Chlorite	9%
Kaolinite	11%

SITE 502 HOLE C CORE (HPC) 34 CORED INTERVAL 223.7–225.7 m



LITHOLOGIC DESCRIPTION

NANNO-BEARING CLAY, which is pale green (10G 6/2) in color and FORAM-BEARING CLAY, which is greenish gray (5G 6/1) in color. Both are mottled and burrowed, more extensively in Section 2, with composite burrows, and to a lesser degree in Section 1.

Section 1, 0–60 cm is disturbed.

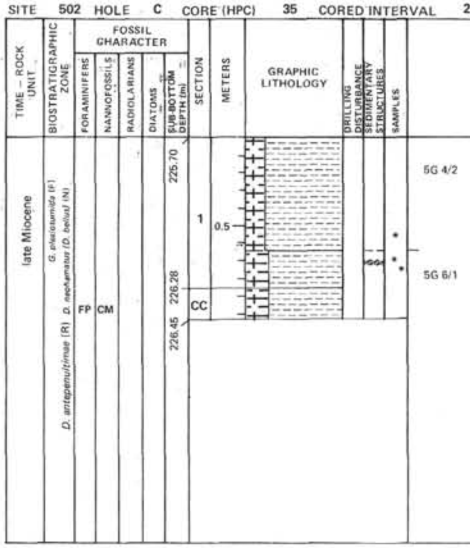
Section 1, 0–45 cm the liner is damaged.

In Section 2 light olive brown (2.5Y 5/3) burrows are prominent.

SMEAR SLIDE SUMMARY

	1-90	2-50
	D	D
Pyrite	1/T	1/T
Other heavy minerals	1/T	1/T
Clay minerals	87/D	78/D
Volcanic glass (lt)	2/R	3/R
Carbonate unspec.	3/R	3/R
Foraminifers	1/T	8/C
Calcareous nannofossils	5/C	4/R
Diatoms	3/R	–
Radiolarians	–	1/T
Sponge spicules	–	2/R

SITE 502 HOLE C CORE (HPC) 35 CORED INTERVAL 225.7–226.7 m



LITHOLOGIC DESCRIPTION

CLAY, which is greenish gray (5G 6/1) in color and SPICULE-BEARING CLAY, which is medium grayish green (5G 4/2) in color. Both are mottled and burrowed.

In Section 1 at 71–72 cm there is a very prominent burrow, light olive brown (2.5Y 5/3) in color.

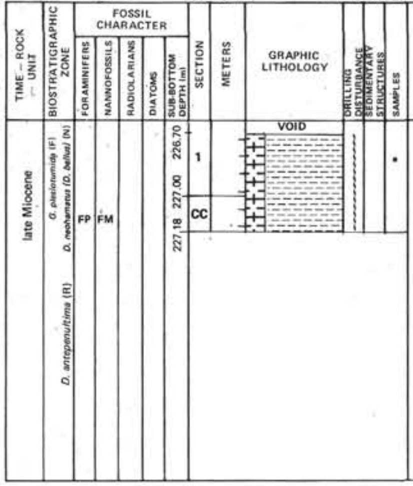
SMEAR SLIDE SUMMARY

	1-55	1-72	1-80
	D	M	D
Pyrite	1/T	3/R	2/R
Other heavy minerals	1/T	1/T	1/T
Clay minerals	85/D	81/D	83/D
Volcanic glass (lt)	4/R	2/R	–
Volcanic glass (dk)	–	–	3/R
Carbonate unspec.	1/T	3/R	2/R
Foraminifers	1/T	5/C	3/R
Calcareous nannofossils	2/R	3/R	3/R
Radiolarians	–	–	1/T
Sponge spicules	5/C	2/R	2/R

CLAY MINERALOGY (<2 μm): 1-47 cm

Smectite	81%
Illite	5%
Chlorite	5%
Kaolinite	8%

SITE 502 HOLE C CORE (HPC) 36 CORED INTERVAL 226.7–227.7 m



LITHOLOGIC DESCRIPTION

5G 4/1

CARBONATE-BEARING CLAY, which is dark grayish green (5G 4/1) in color. The entire core is rubble.

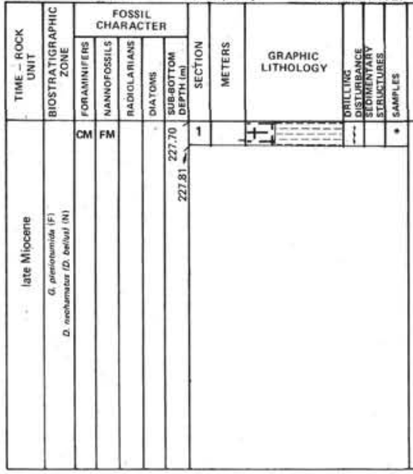
SMEAR SLIDE SUMMARY

	1-25
	D
Quartz	1/T
Pyrite	2/R
Other heavy minerals	1/T
Clay minerals	80/D
Volcanic glass (lt)	2/R
Carbonate unspec.	3/R
Foraminifers	4/R
Calcareous nannofossils	3/R
Radiolarians	1/T
Sponge spicules	3/R

CLAY MINERALOGY ($<2\ \mu m$): 1-32 cm

Smectite	79%
Illite	8%
Chlorite	4%
Kaolinite	9%

SITE 502 HOLE C CORE (HPC) 37 CORED INTERVAL 227.7–228.7 m



LITHOLOGIC DESCRIPTION

5G 4/1

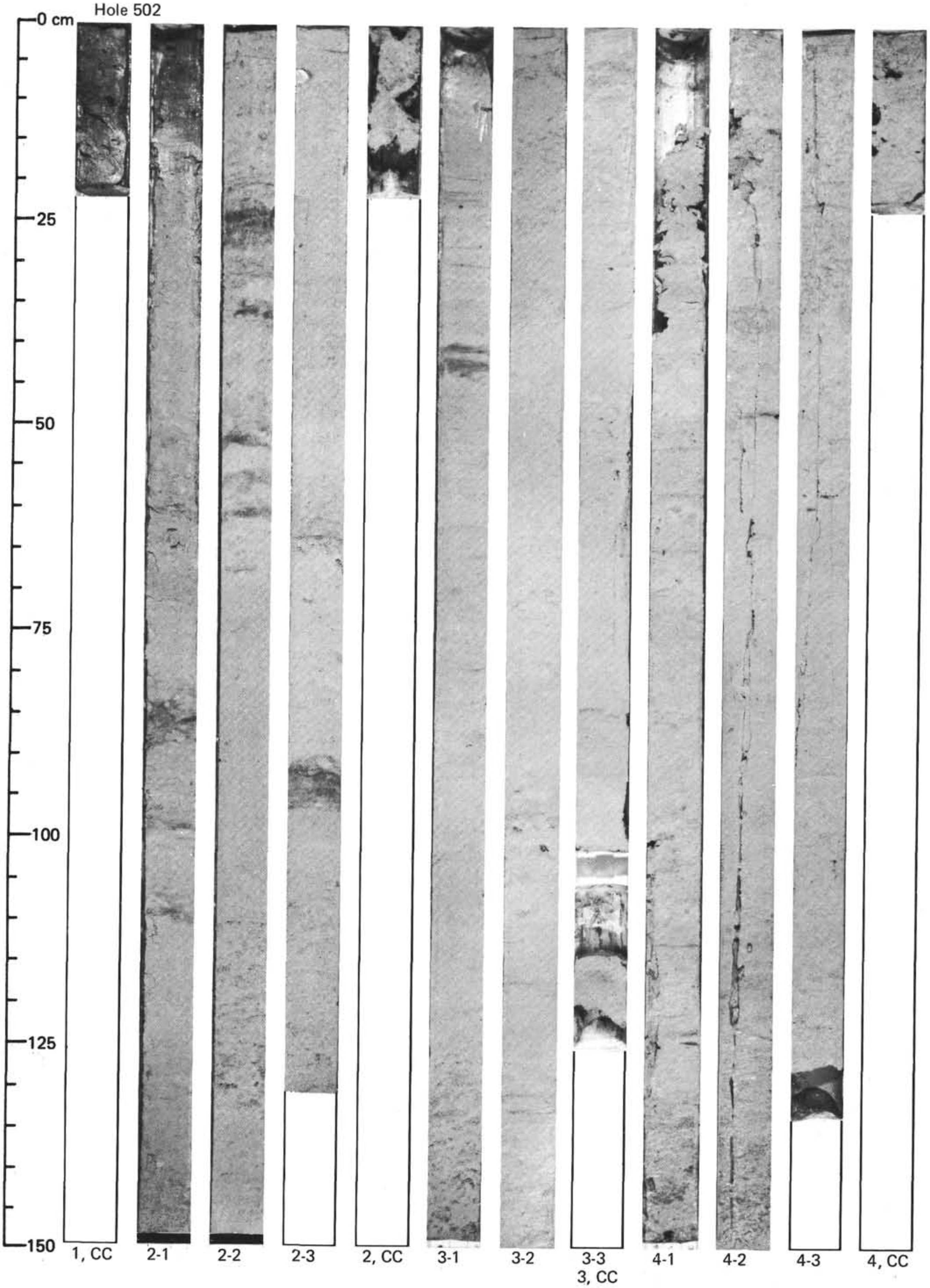
NANNO- AND FORAM-BEARING CLAY, which is dark grayish green (5G 4/1) in color and completely disturbed.

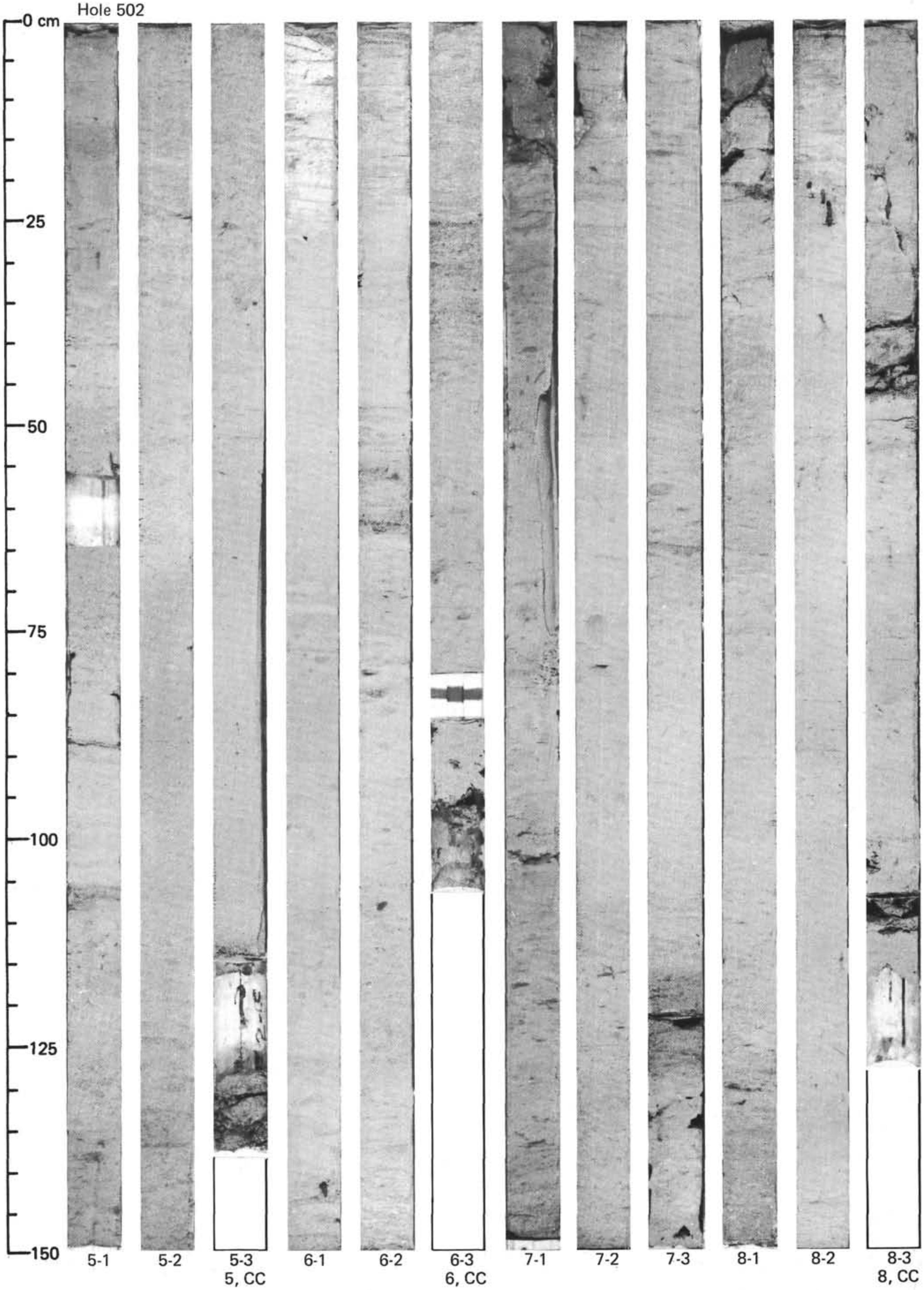
SMEAR SLIDE SUMMARY

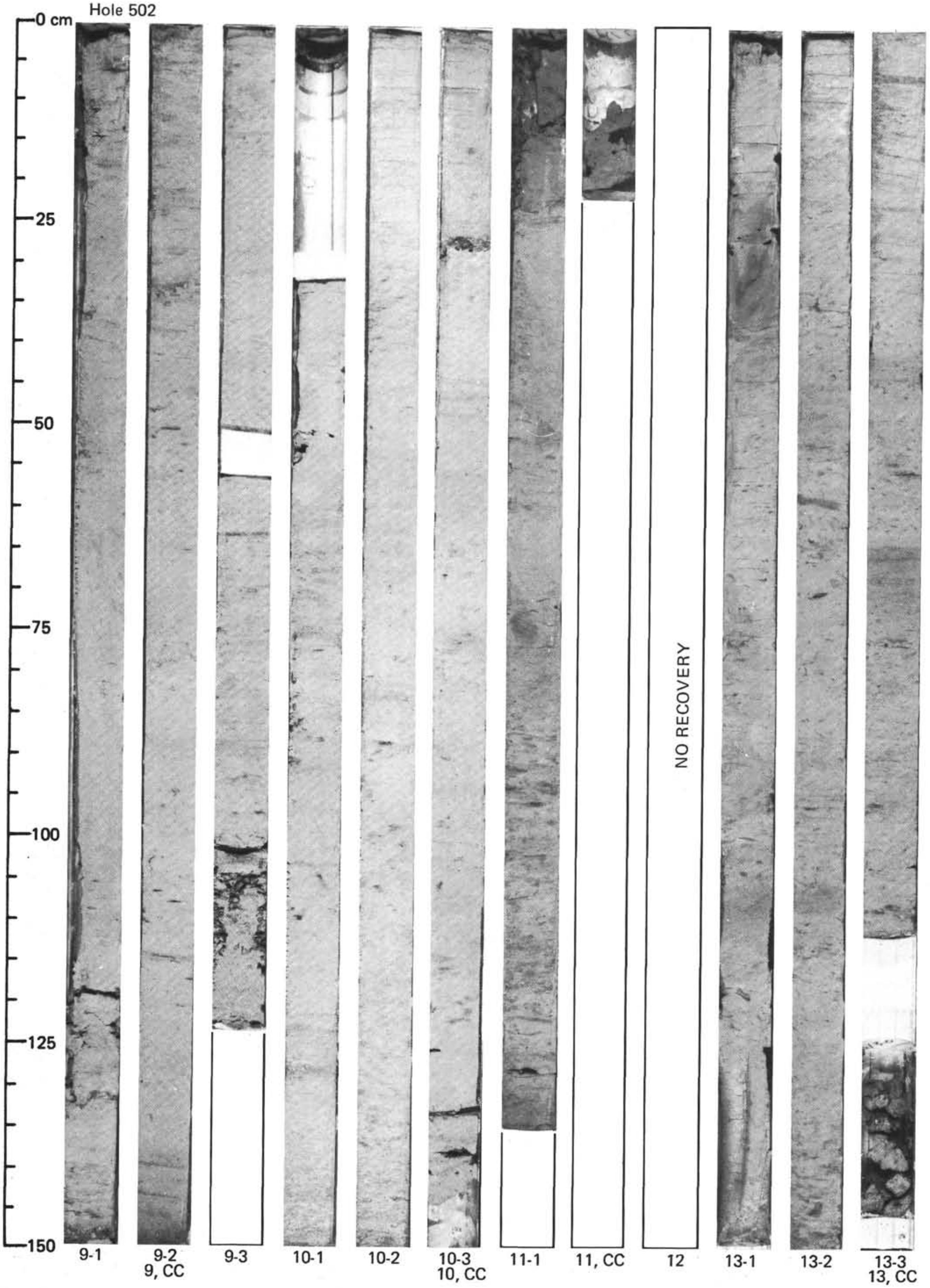
	1-5
	D
Quartz	1/T
Pyrite	3/R
Other heavy minerals	1/T
Clay minerals	72/A
Volcanic glass (lt)	3/R
Zeolites	2/R
Carbonate unspec.	3/R
Foraminifers	8/C
Calcareous nannofossils	5/C
Sponge spicules	2/R

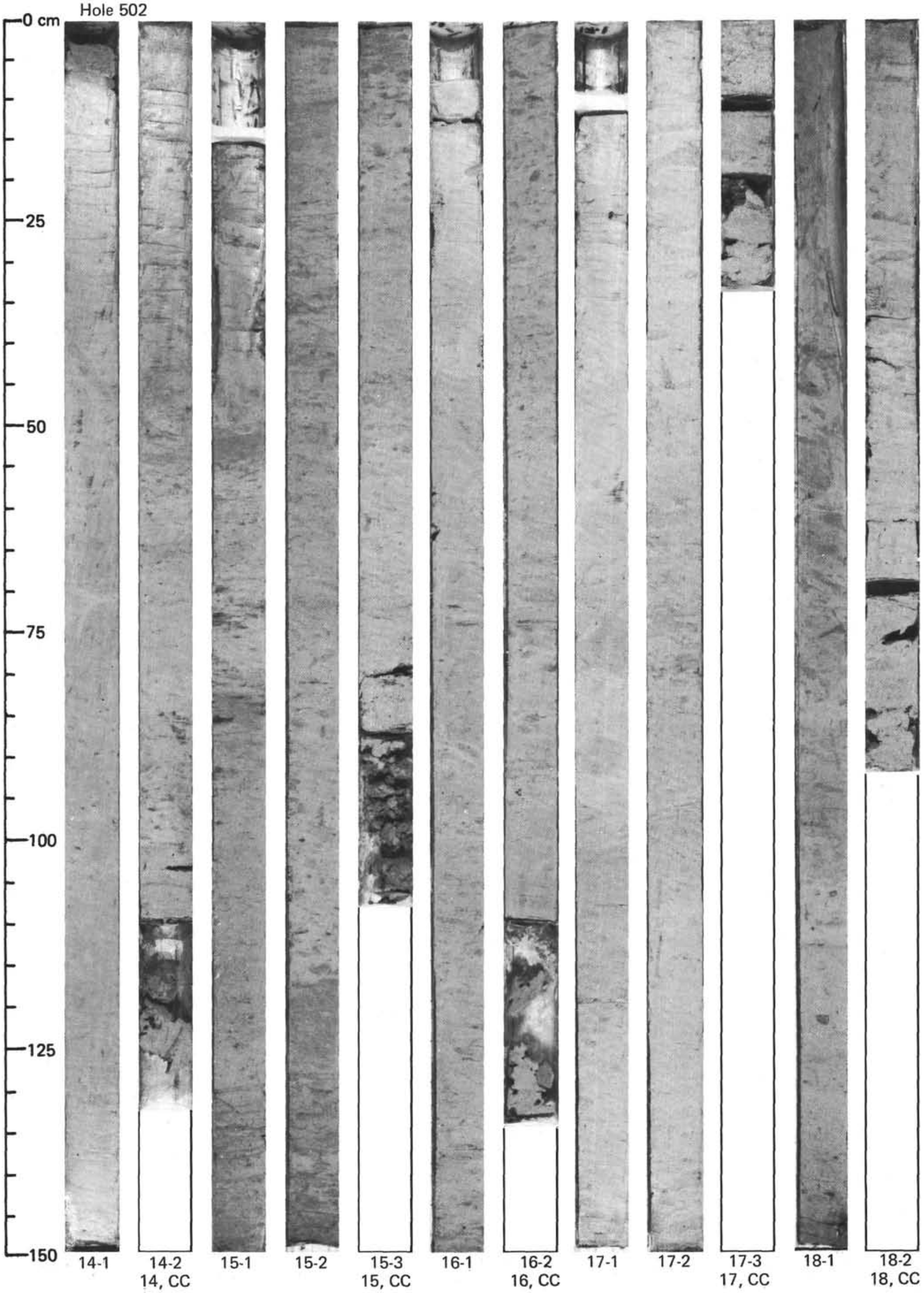
CLAY MINERALOGY ($<2\ \mu m$): 1-7 cm

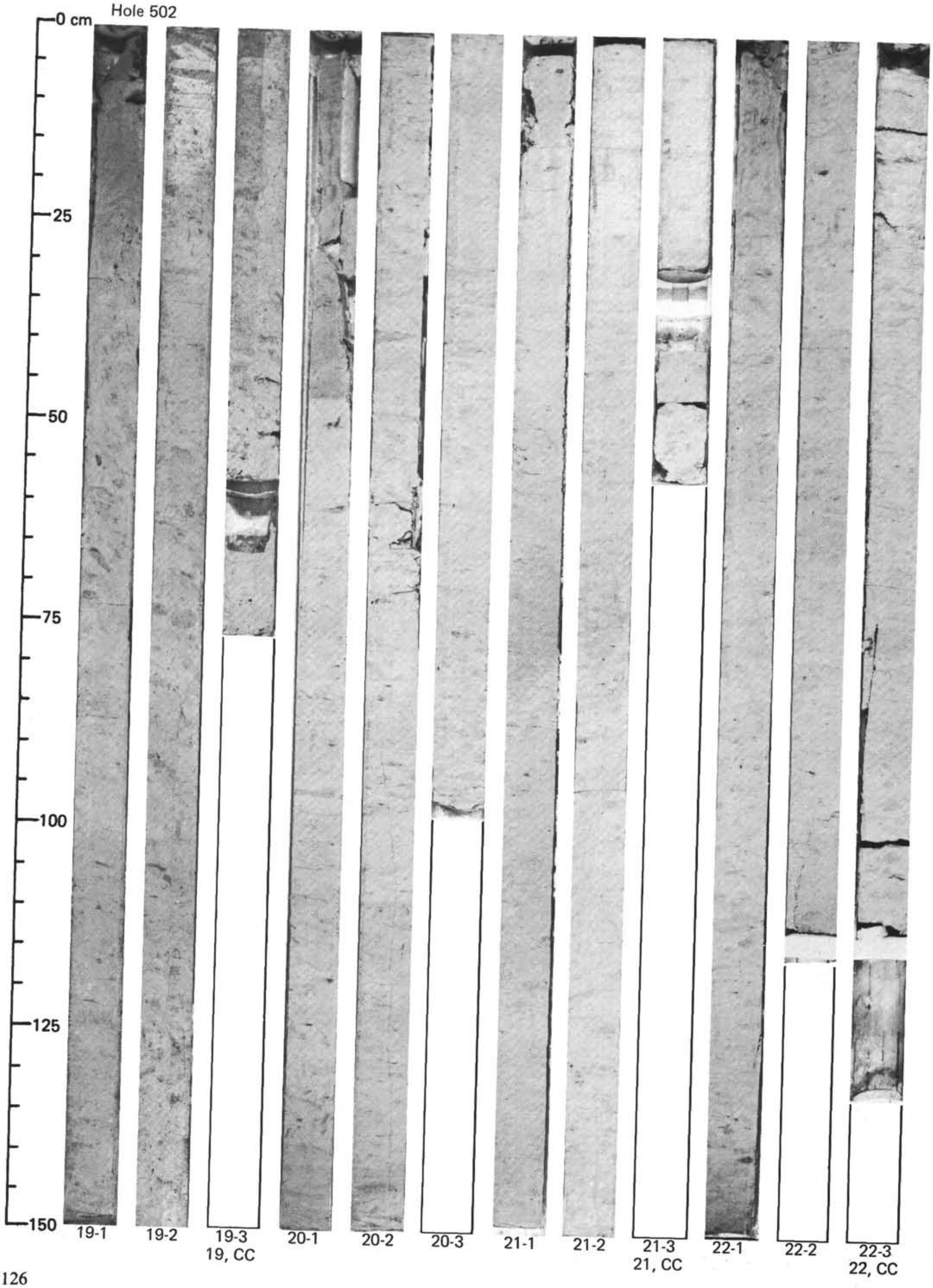
Smectite	77%
Illite	7%
Chlorite	5%
Kaolinite	11%

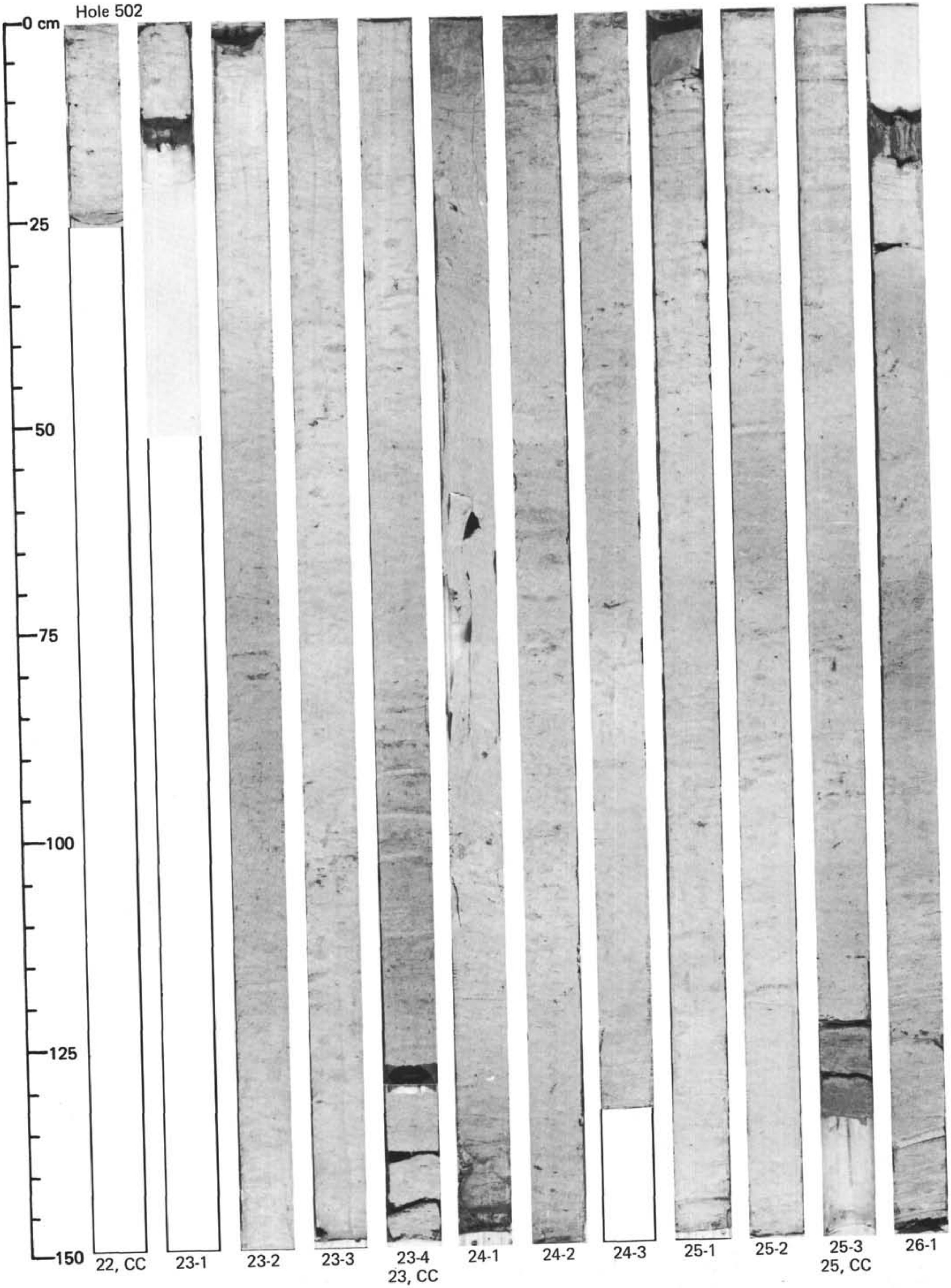

Hole 502
0 cm
25
50
75
100
125
150
1, CC
2-1
2-2
2-3
2, CC
3-1
3-2
3-3
3, CC
4-1
4-2
4-3
4, CC

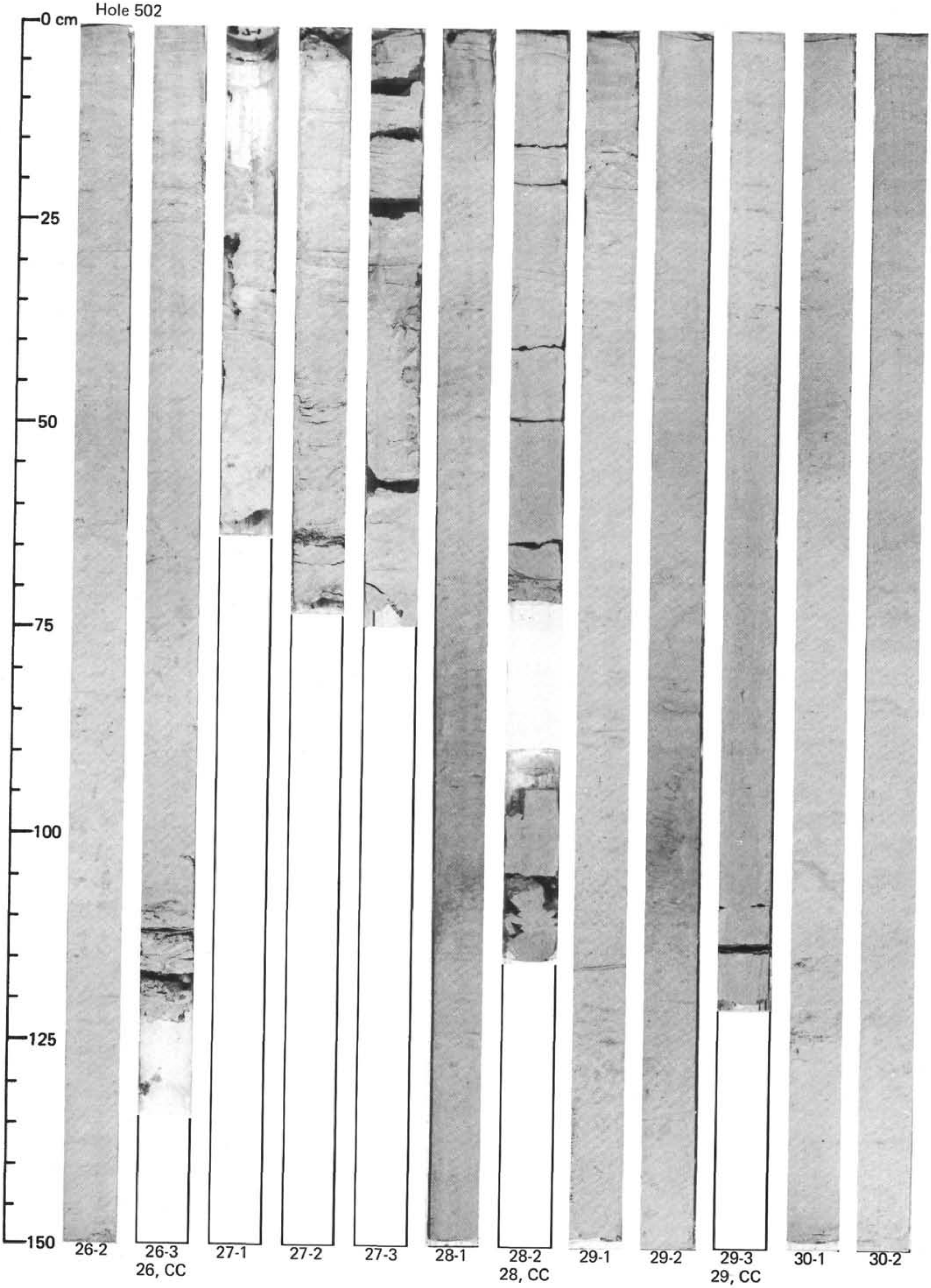

Hole 502
0 cm
25
50
75
100
125
150
5-1
5-2
5-3
5, CC
6-1
6-2
6-3
6, CC
7-1
7-2
7-3
8-1
8-2
8-3
8, CC

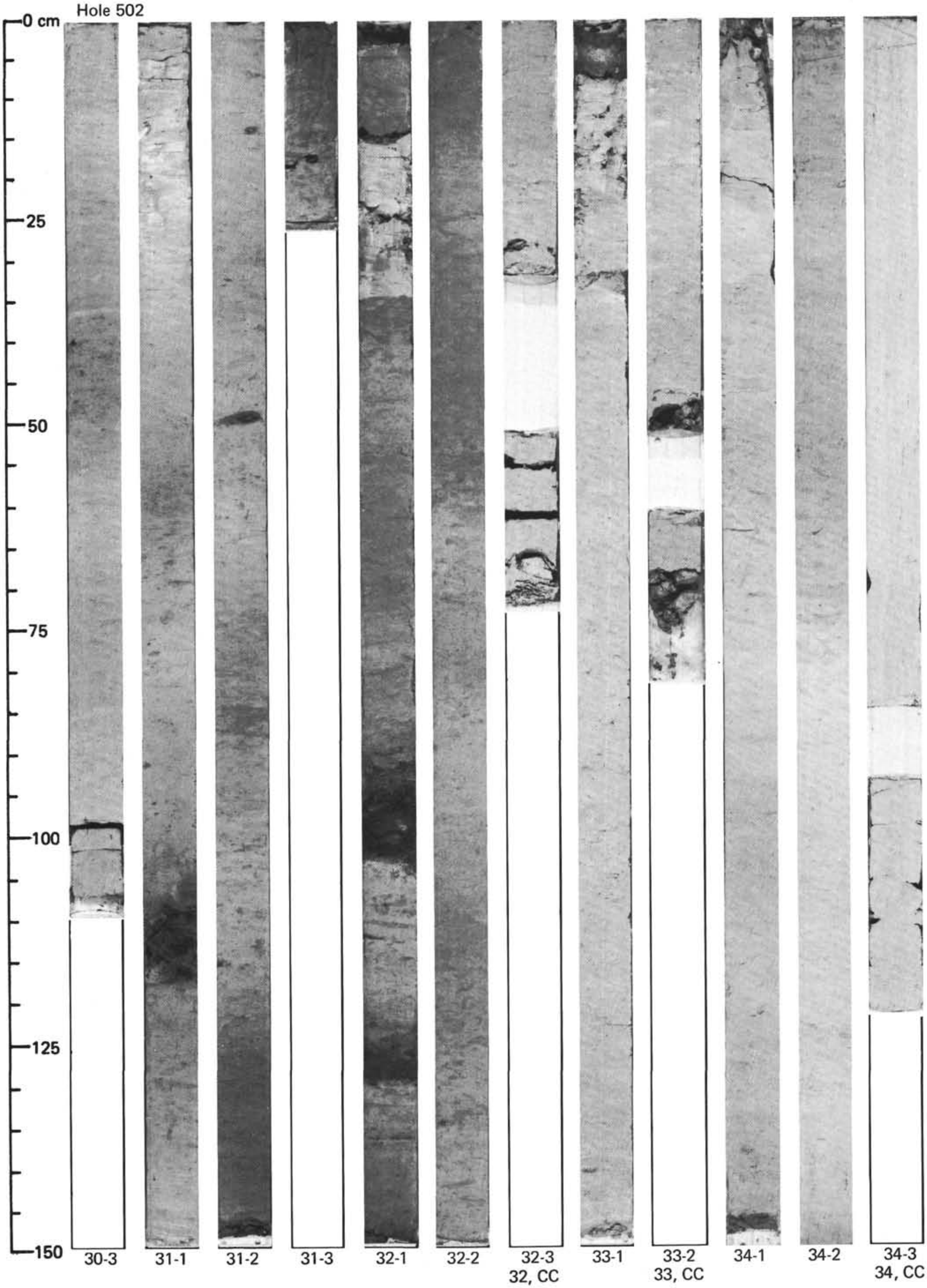

Hole 502
0 cm
25
50
75
100
125
150
9-1
9-2
9, CC
9-3
10-1
10-2
10-3
10, CC
11-1
11, CC
12
NO RECOVERY
13-1
13-2
13-3
13, CC

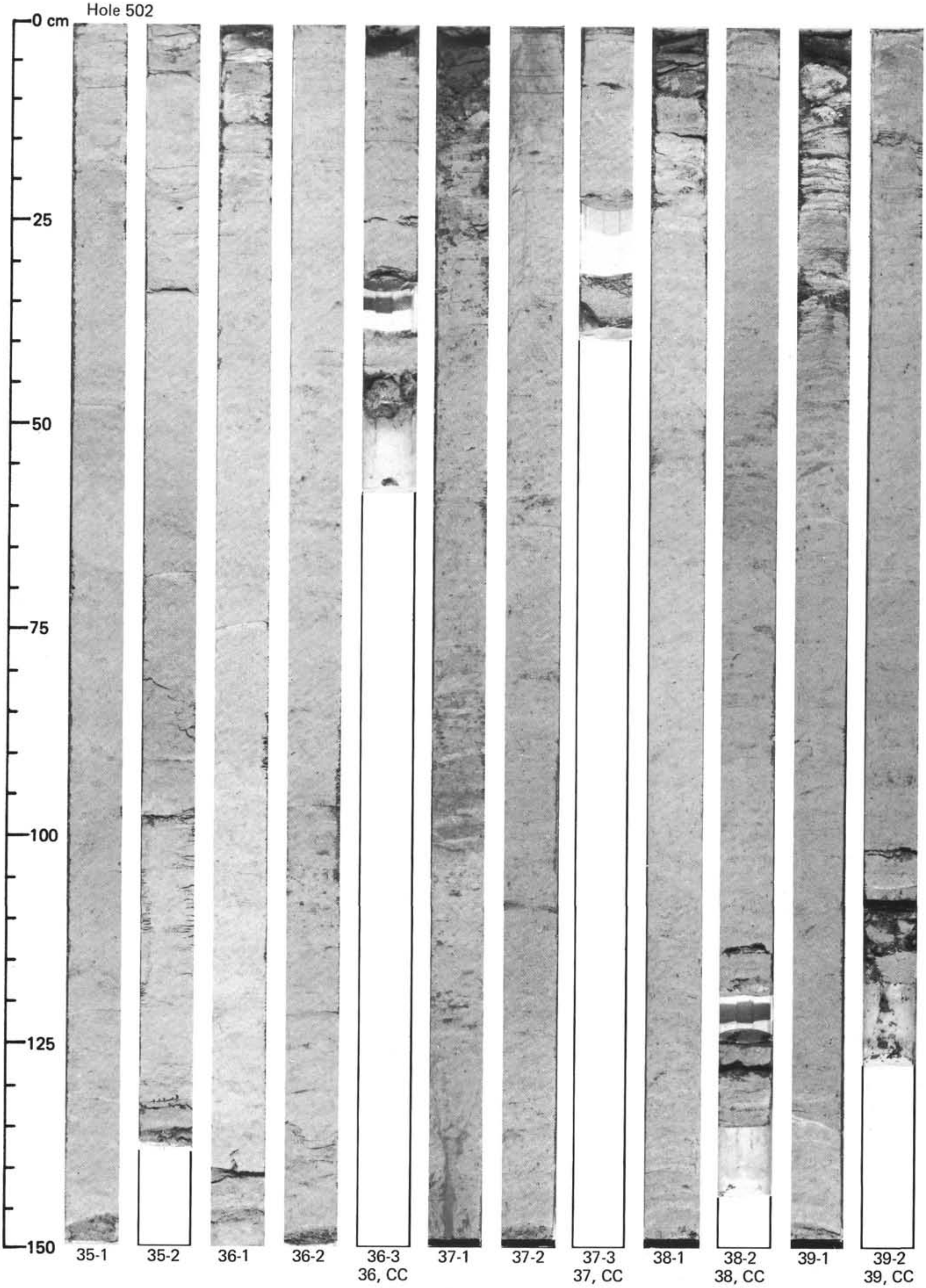

Hole 502
0 cm
25
50
75
100
125
150
14-1
14-2
14, CC
15-1
15-2
15-3
15, CC
16-1
16-2
16, CC
17-1
17-2
17-3
17, CC
18-1
18-2
18, CC

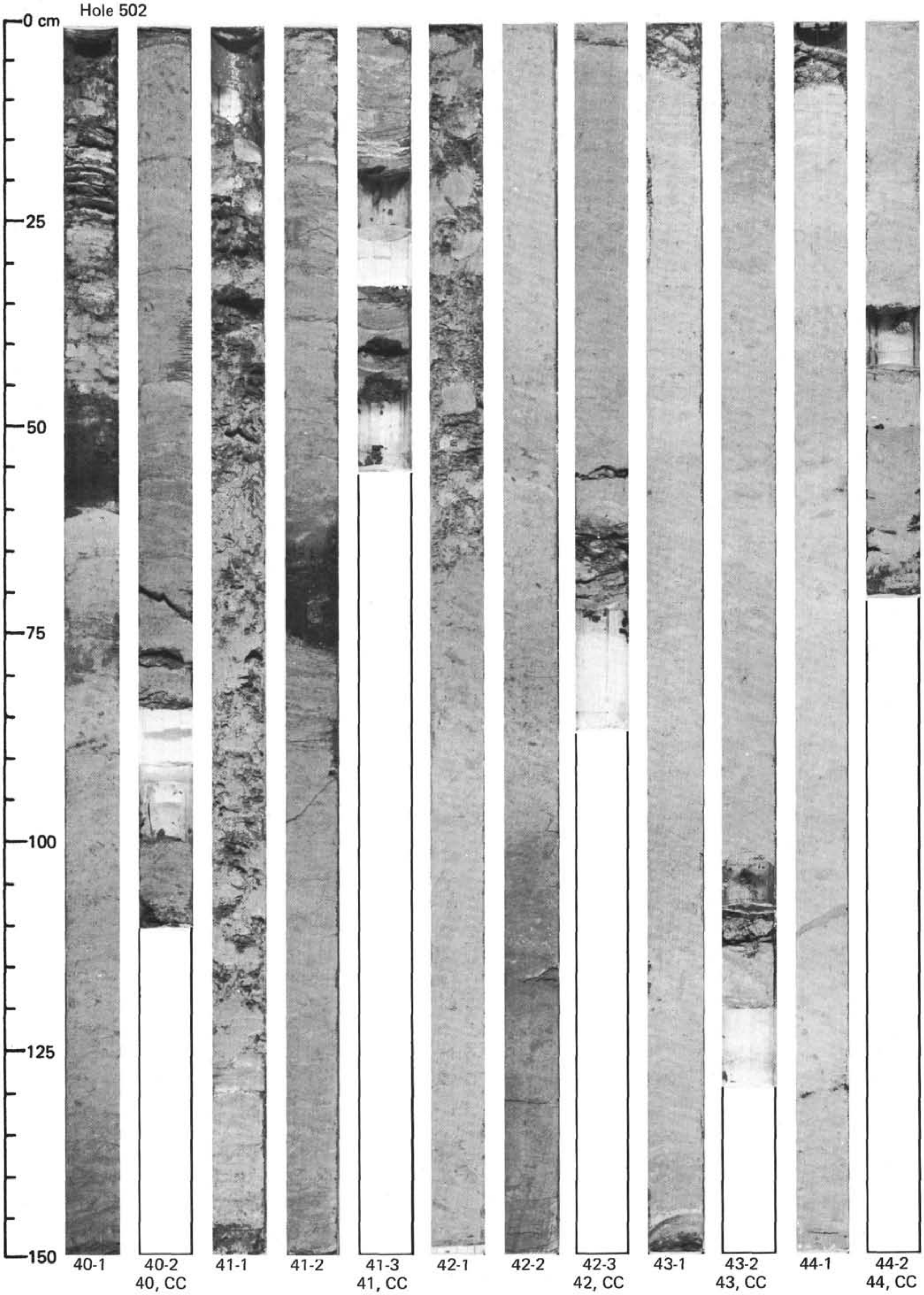

Hole 502
0 cm
25
50
75
100
125
150
19-1
19-2
19-3
19, CC
20-1
20-2
20-3
21-1
21-2
21-3
21, CC
22-1
22-2
22-3
22, CC

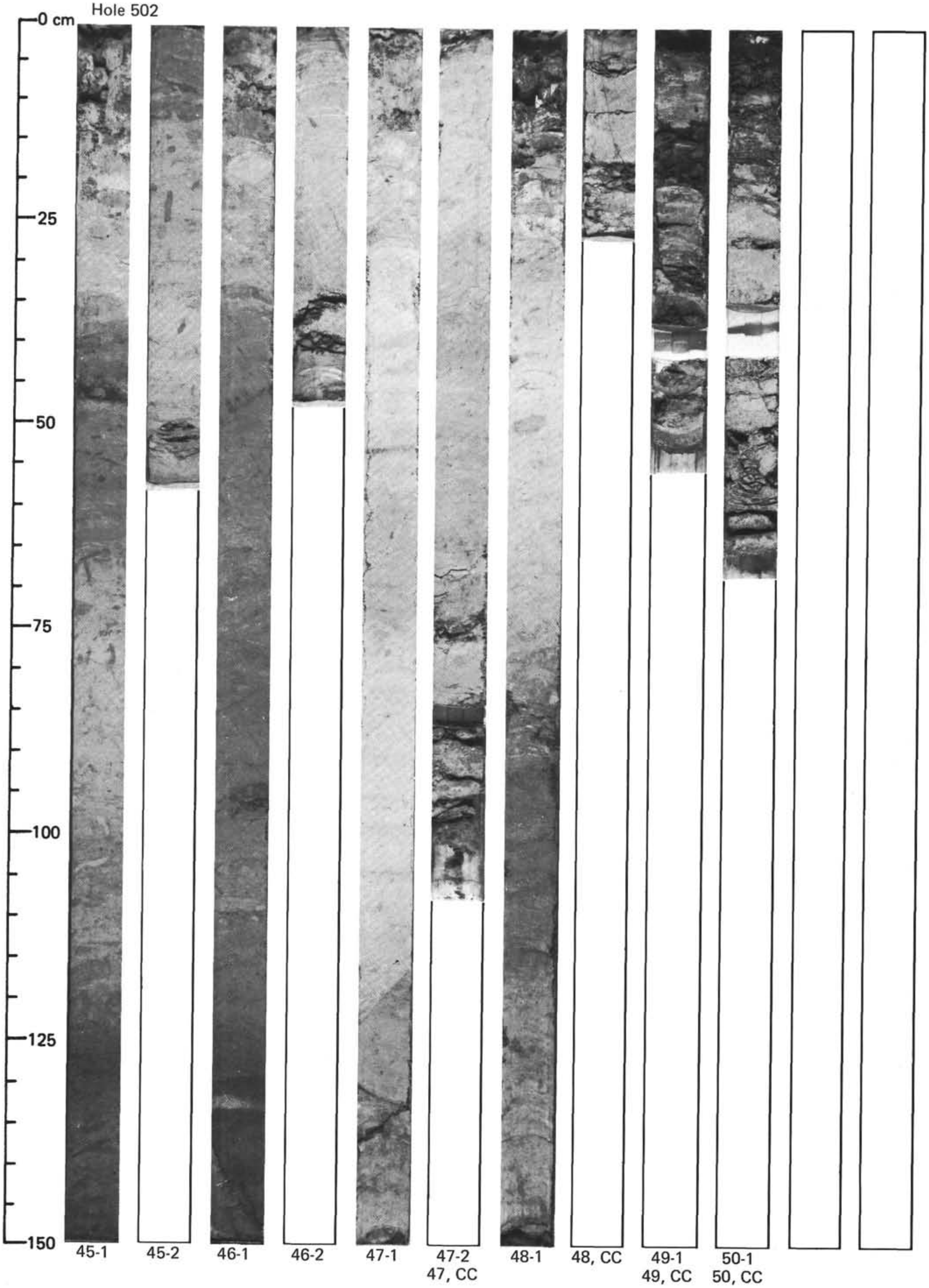

Hole 502
0 cm
25
50
75
100
125
150
22, CC
23-1
23-2
23-3
23-4
23, CC
24-1
24-2
24-3
25-1
25-2
25-3
25, CC
26-1

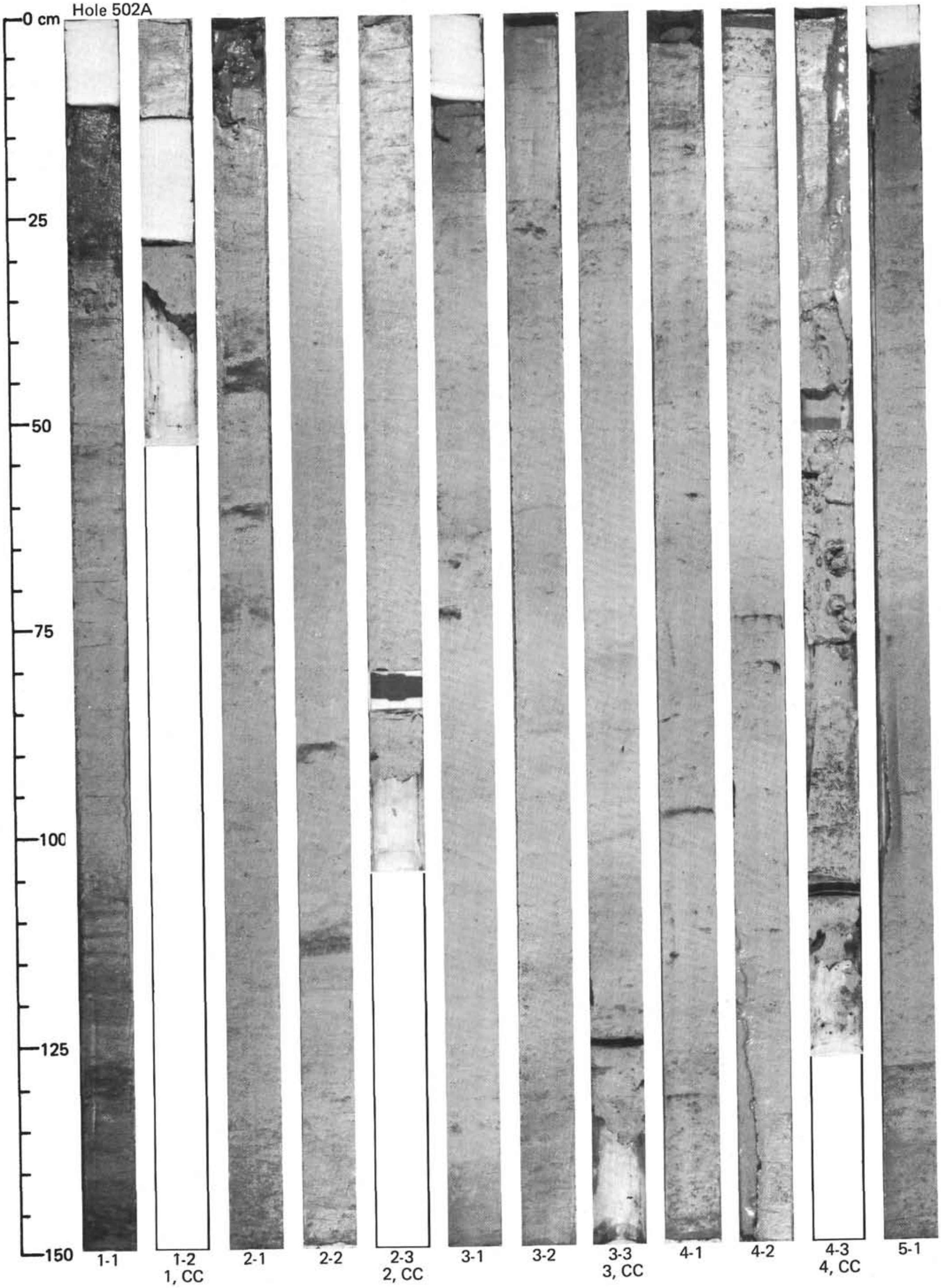

Hole 502
0 cm
25
50
75
100
125
150
26-2
26-3
26, CC
27-1
27-2
27-3
28-1
28-2
28, CC
29-1
29-2
29-3
29, CC
30-1
30-2

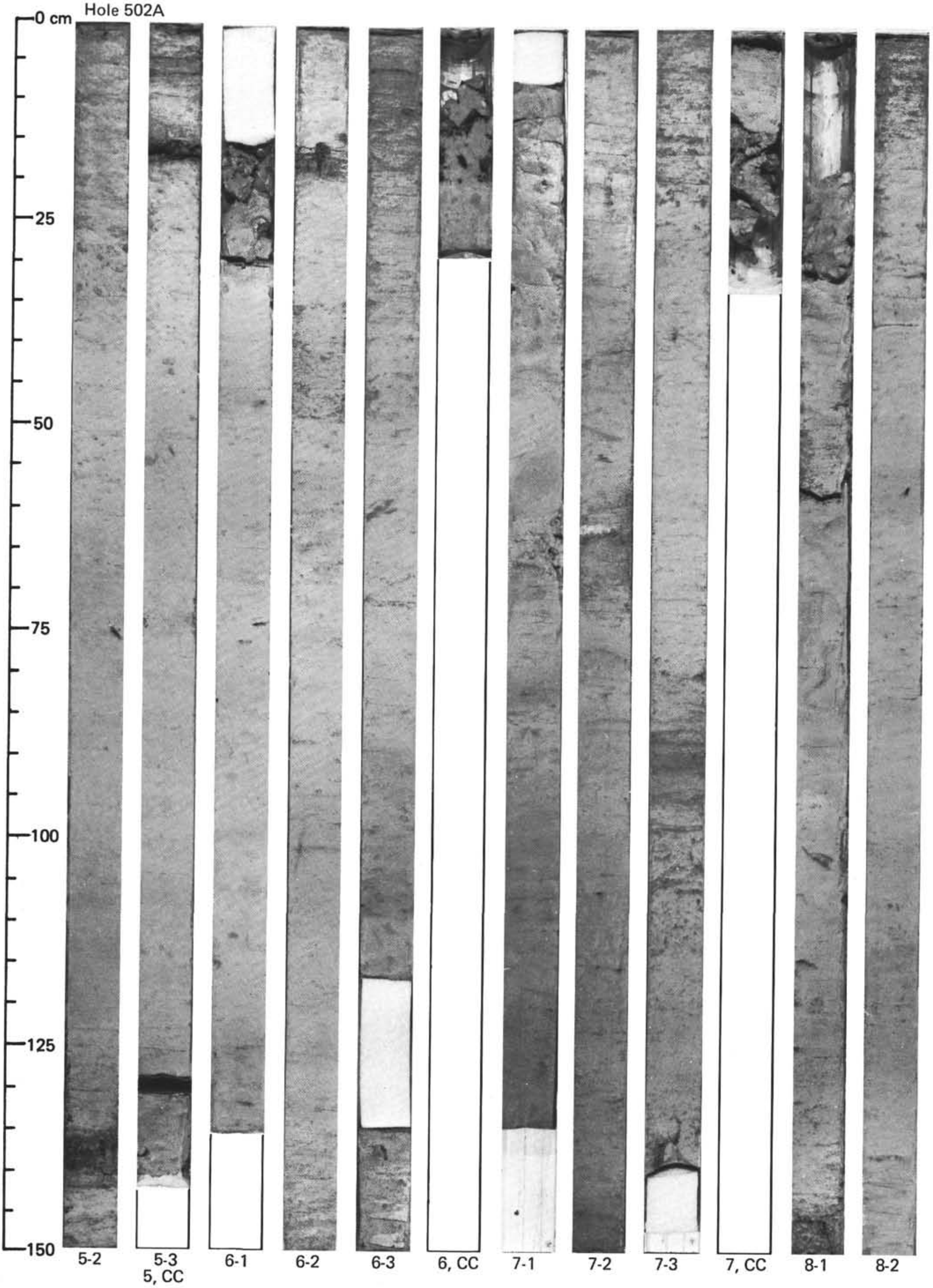

Hole 502
0 cm
25
50
75
100
125
150
30-3
31-1
31-2
31-3
32-1
32-2
32-3
32, CC
33-1
33-2
33, CC
34-1
34-2
34-3
34, CC

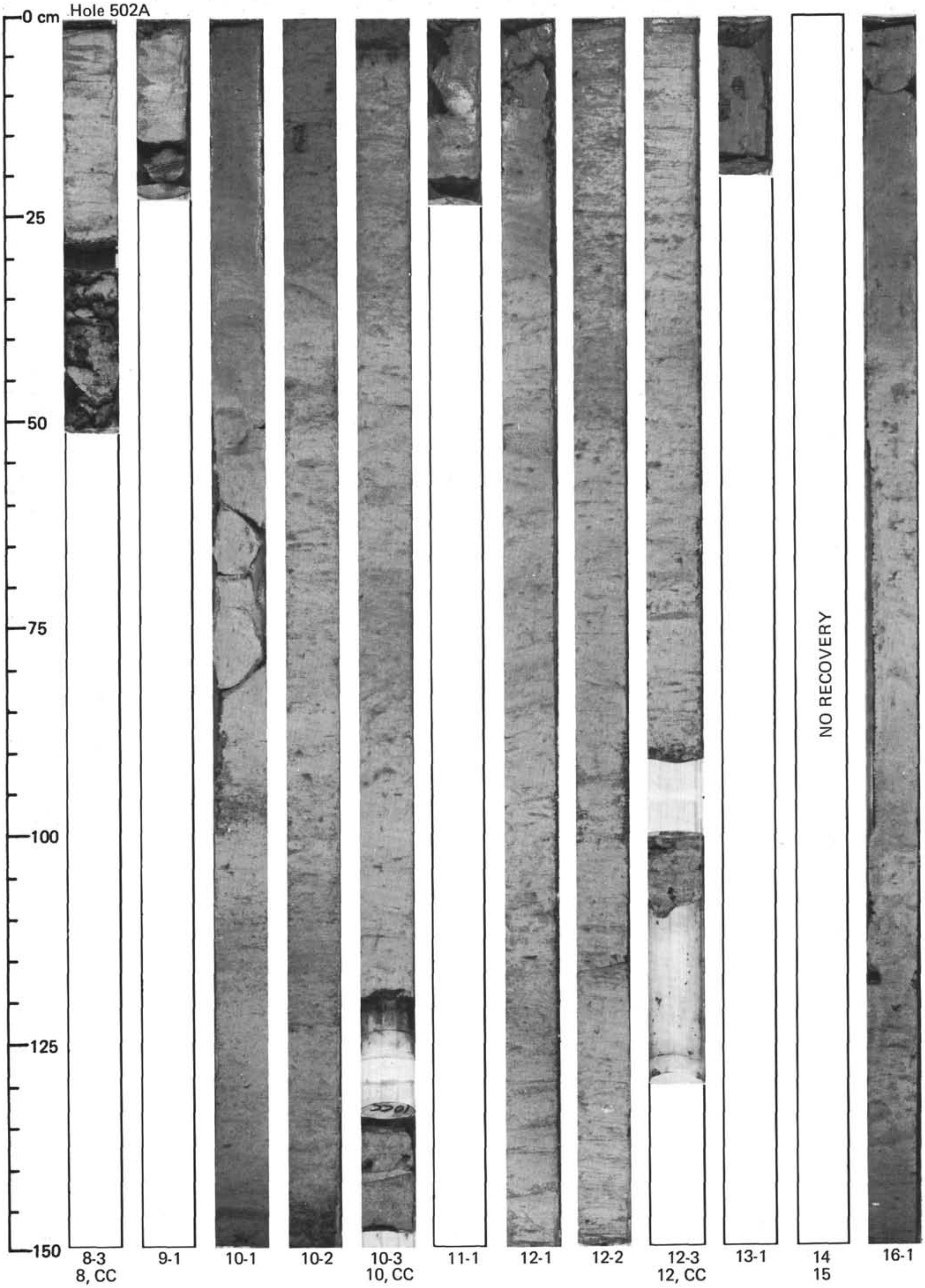

Hole 502
0 cm
25
50
75
100
125
150
35-1
35-2
36-1
36-2
36-3
36, CC
37-1
37-2
37-3
37, CC
38-1
38-2
38, CC
39-1
39-2
39, CC


Hole 502
0 cm
25
50
75
100
125
150
40-1
40-2
40, CC
41-1
41-2
41-3
41, CC
42-1
42-2
42-3
42, CC
43-1
43-2
43, CC
44-1
44-2
44, CC


Hole 502
0 cm
25
50
75
100
125
150
45-1
45-2
46-1
46-2
47-1
47-2
47, CC
48-1
48, CC
49-1
49, CC
50-1
50, CC


Hole 502A
0 cm
25
50
75
100
125
150
1-1
1-2
1, CC
2-1
2-2
2-3
2, CC
3-1
3-2
3-3
3, CC
4-1
4-2
4-3
4, CC
5-1


Hole 502A
0 cm
25
50
75
100
125
150
5-2
5-3
5, CC
6-1
6-2
6-3
6, CC
7-1
7-2
7-3
7, CC
8-1
8-2


Hole 502A
0 cm
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100
125
150
NO RECOVERY
8-3
8, CC
9-1
10-1
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10, CC
11-1
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12-2
12-3
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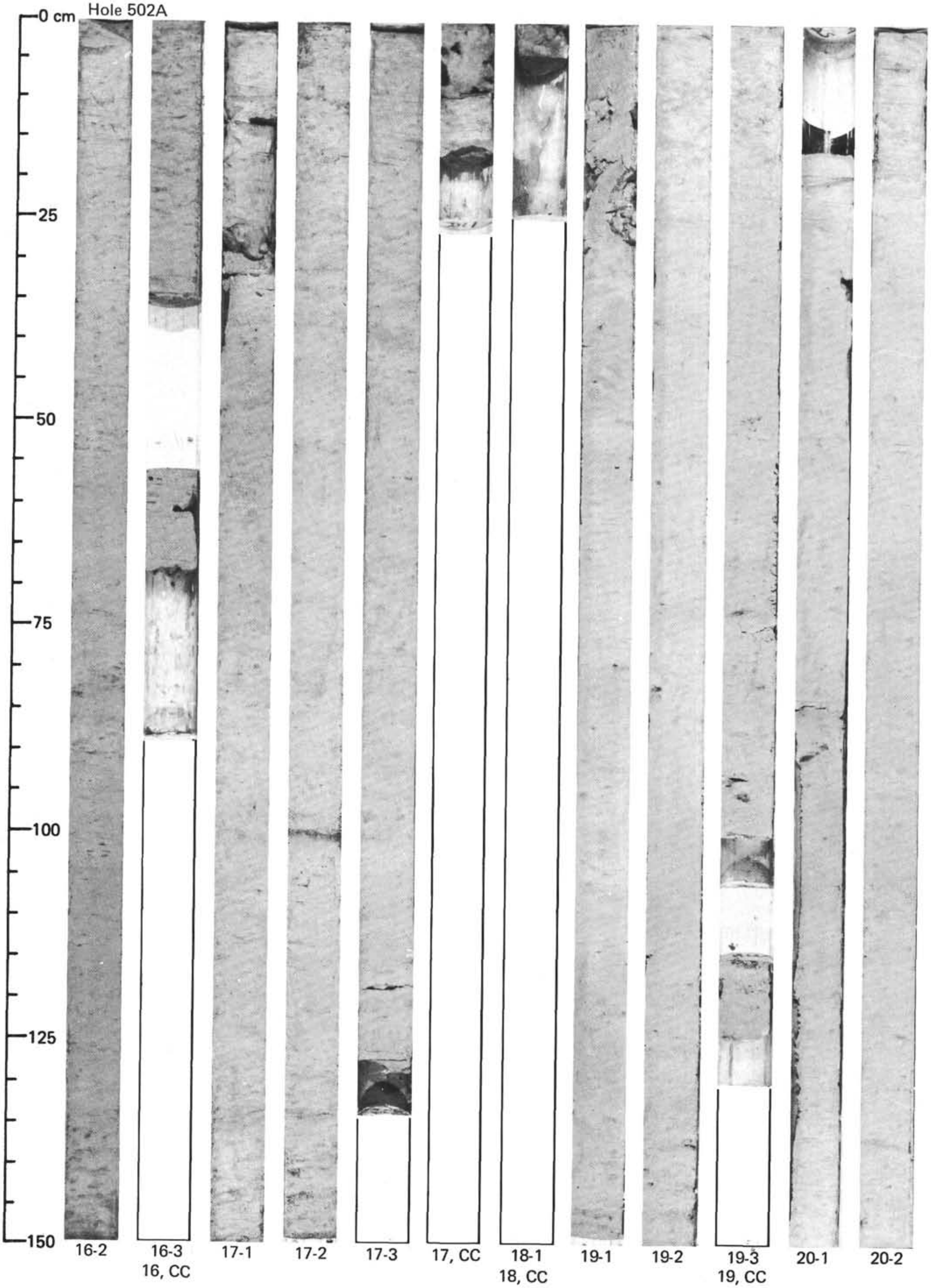
13-1
14
15
16-1


Hole 502A
0 cm
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100
125
150
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16-3
16, CC
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17-3
17, CC
18-1
18, CC
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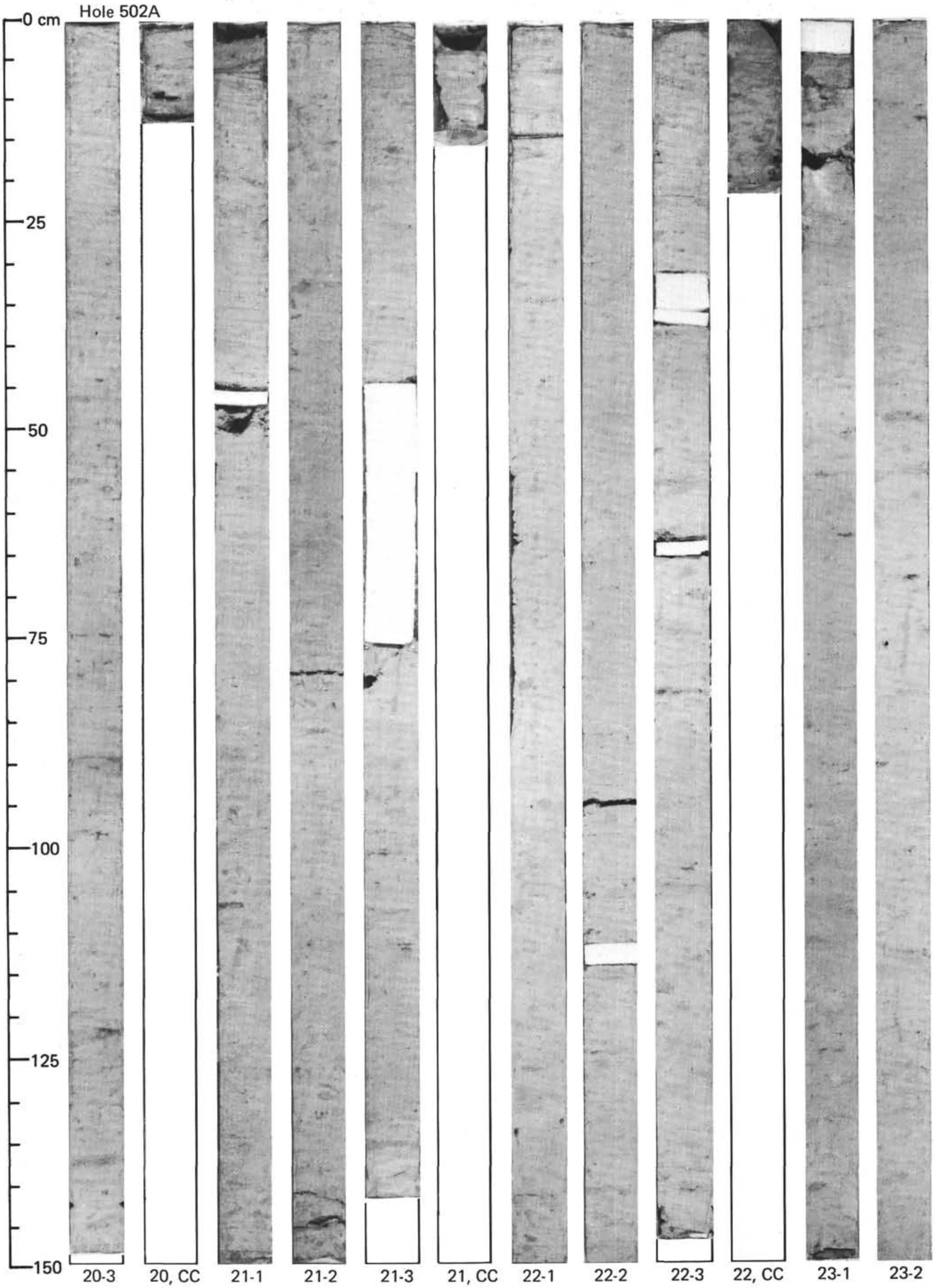
19-2
19-3
19, CC
20-1
20-2


Hole 502A
0 cm
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75
100
125
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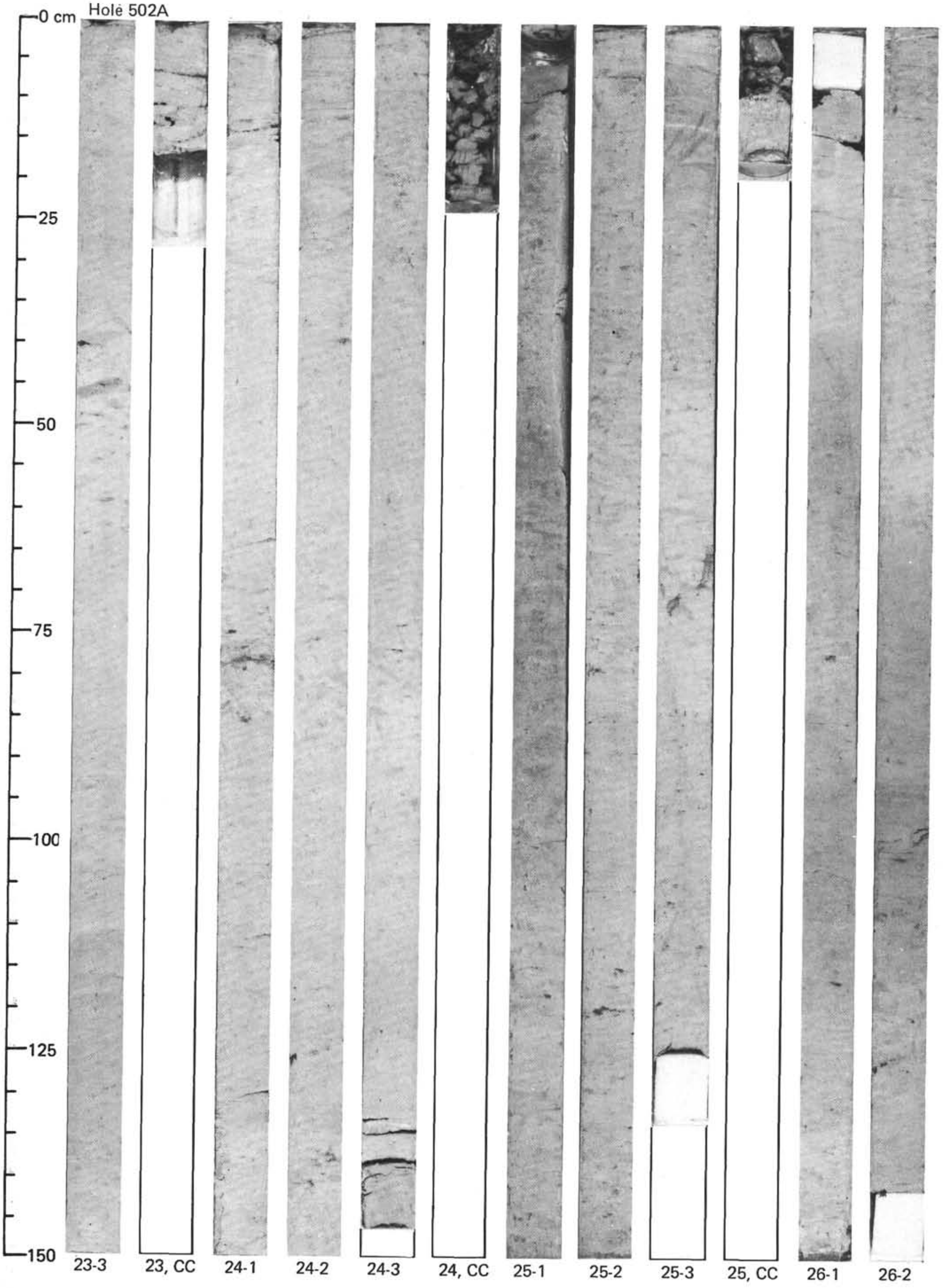
21-2
21-3
21, CC
22-1
22-2
22-3
22, CC
23-1
23-2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24-3
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25-3
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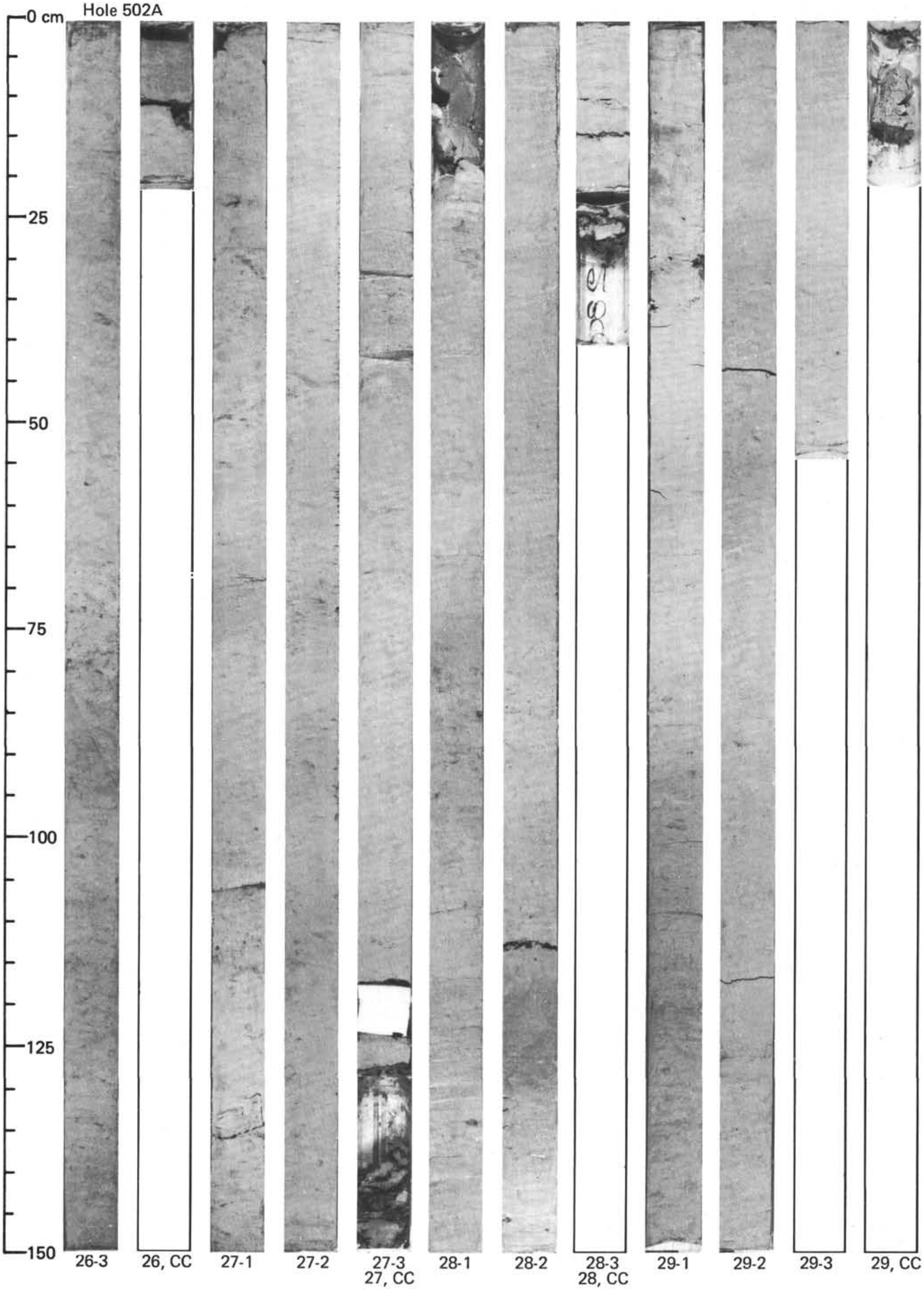
26-1
26-2


Hole 502A
0 cm
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125
150
26-3
26, CC
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27, CC
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28-2
28-3
28, CC
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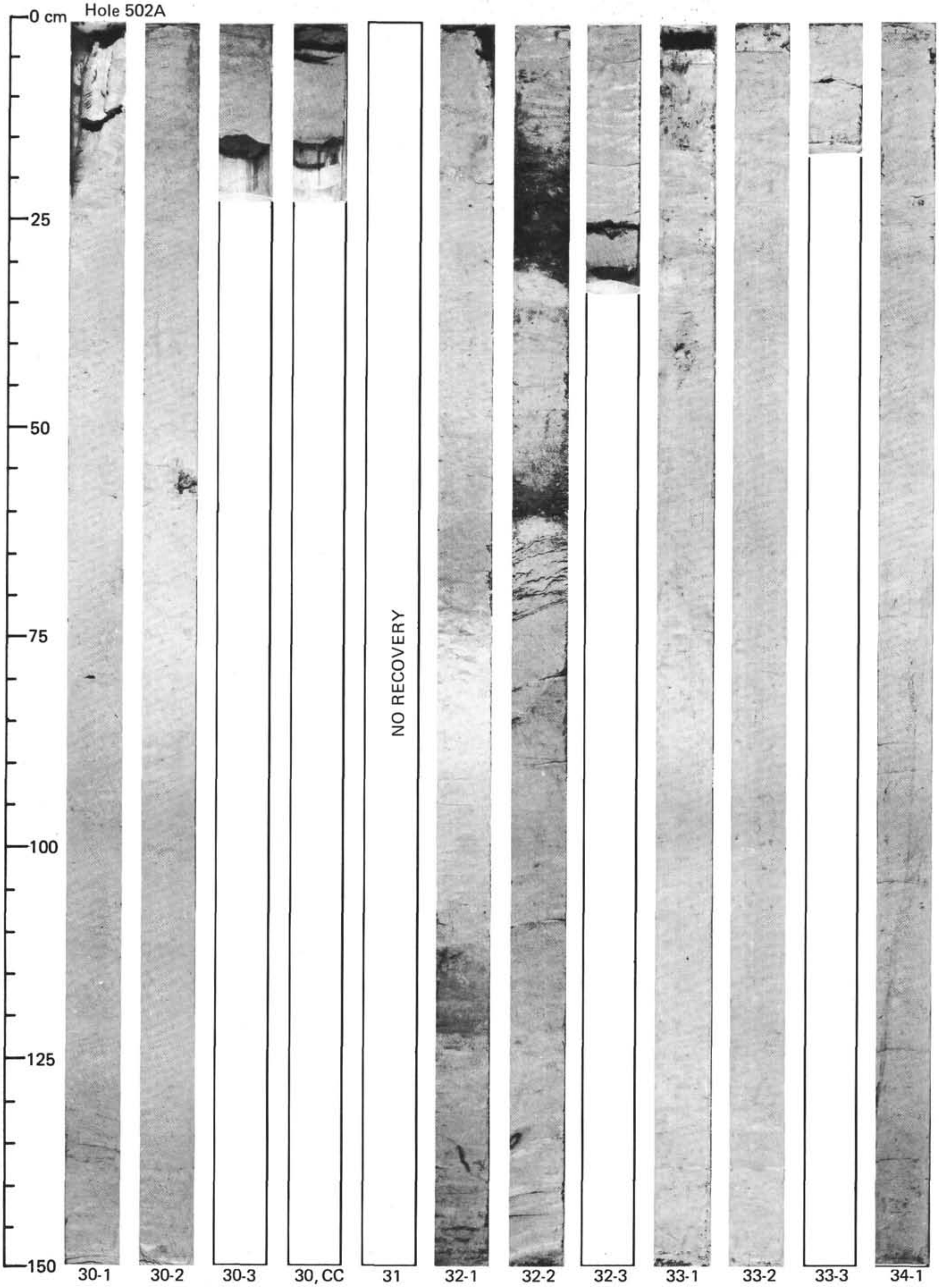
29-2
29-3
29, CC


Hole 502A
0 cm
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75
100
125
150
NO RECOVERY
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30, CC
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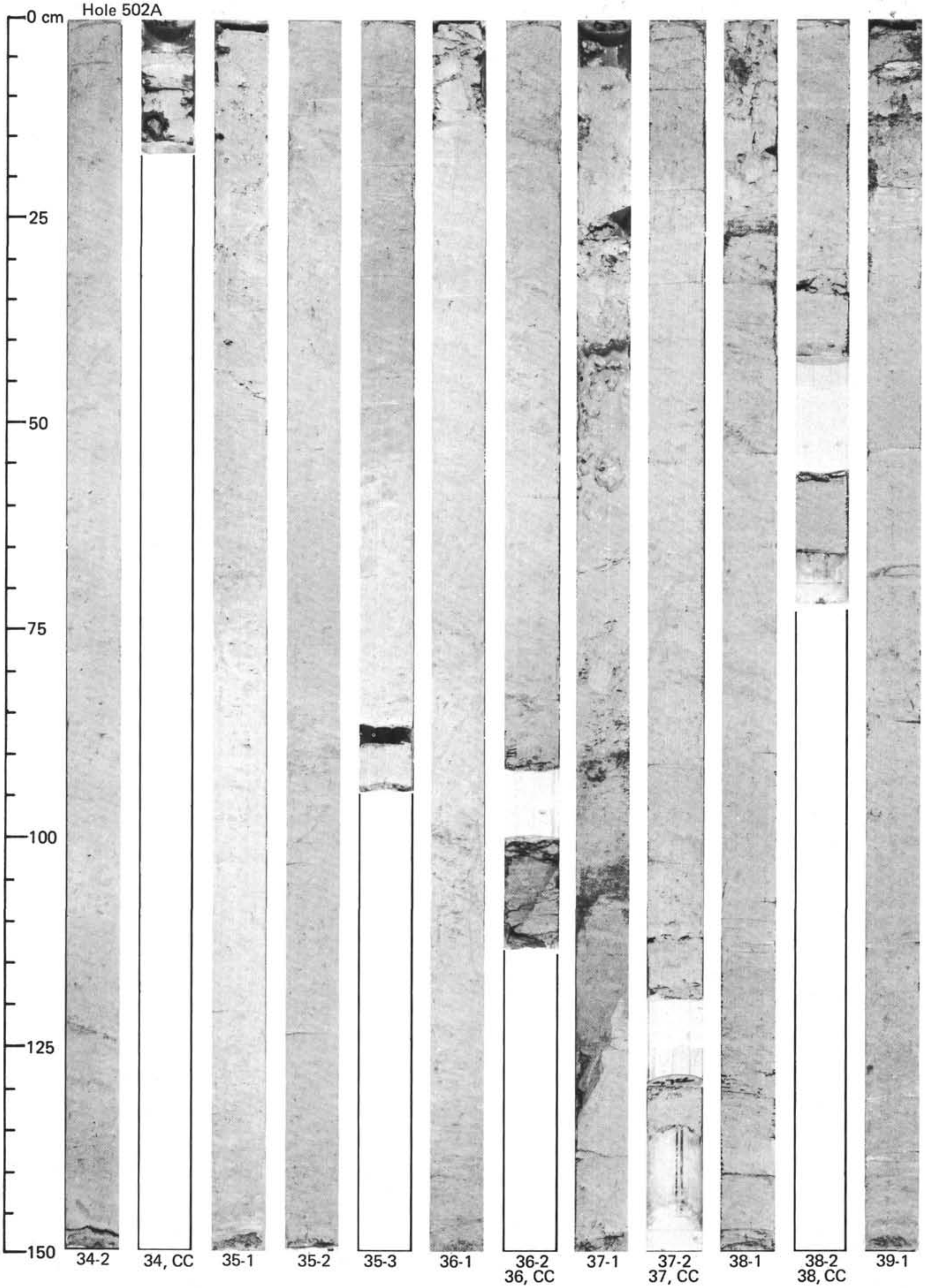
32-2
32-3
33-1
33-2
33-3
34-1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0 cm
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34-2
34, CC
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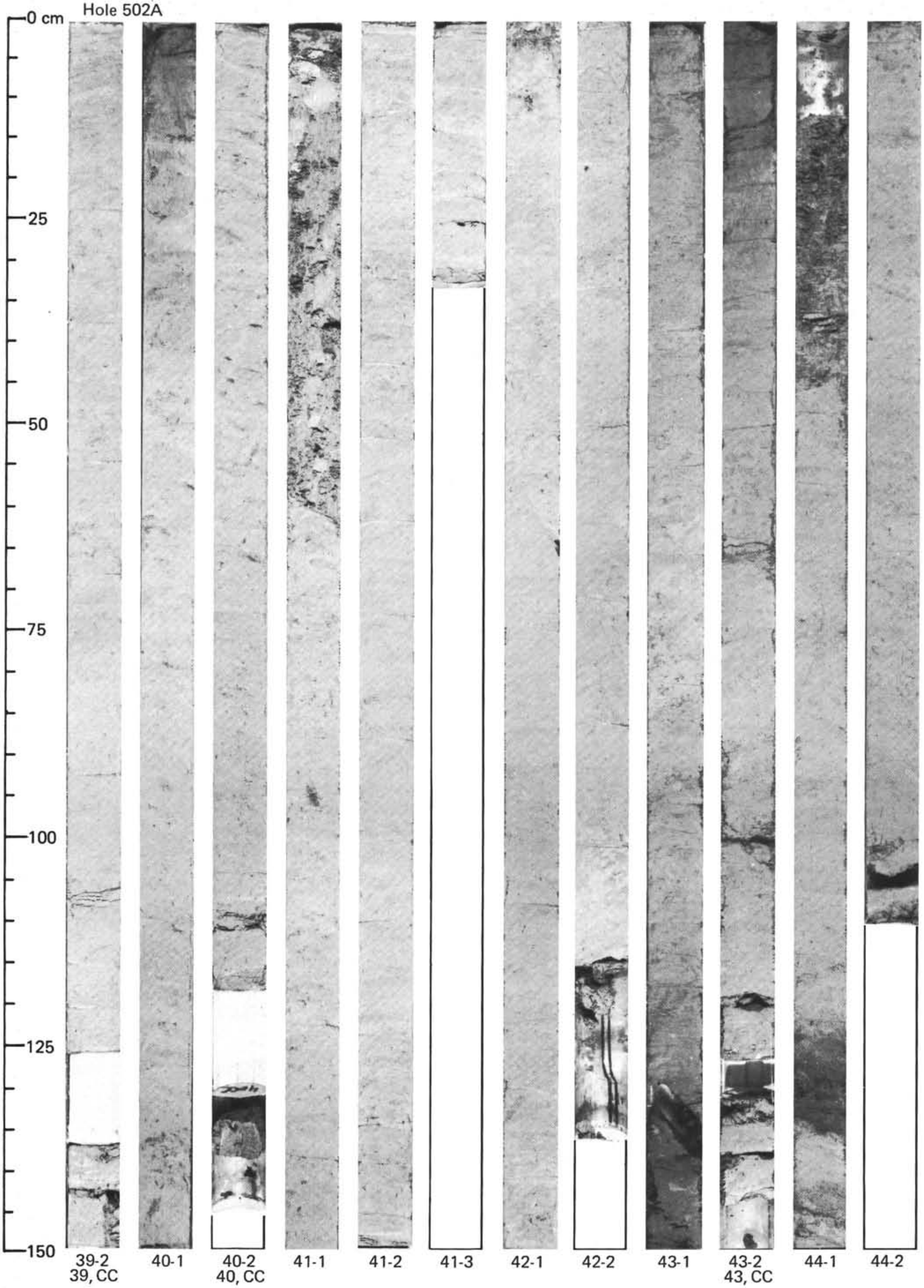
36, CC
37-1
37-2
37, CC
38-1
38-2
38, CC
39-1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0 cm
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39, CC
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41-2
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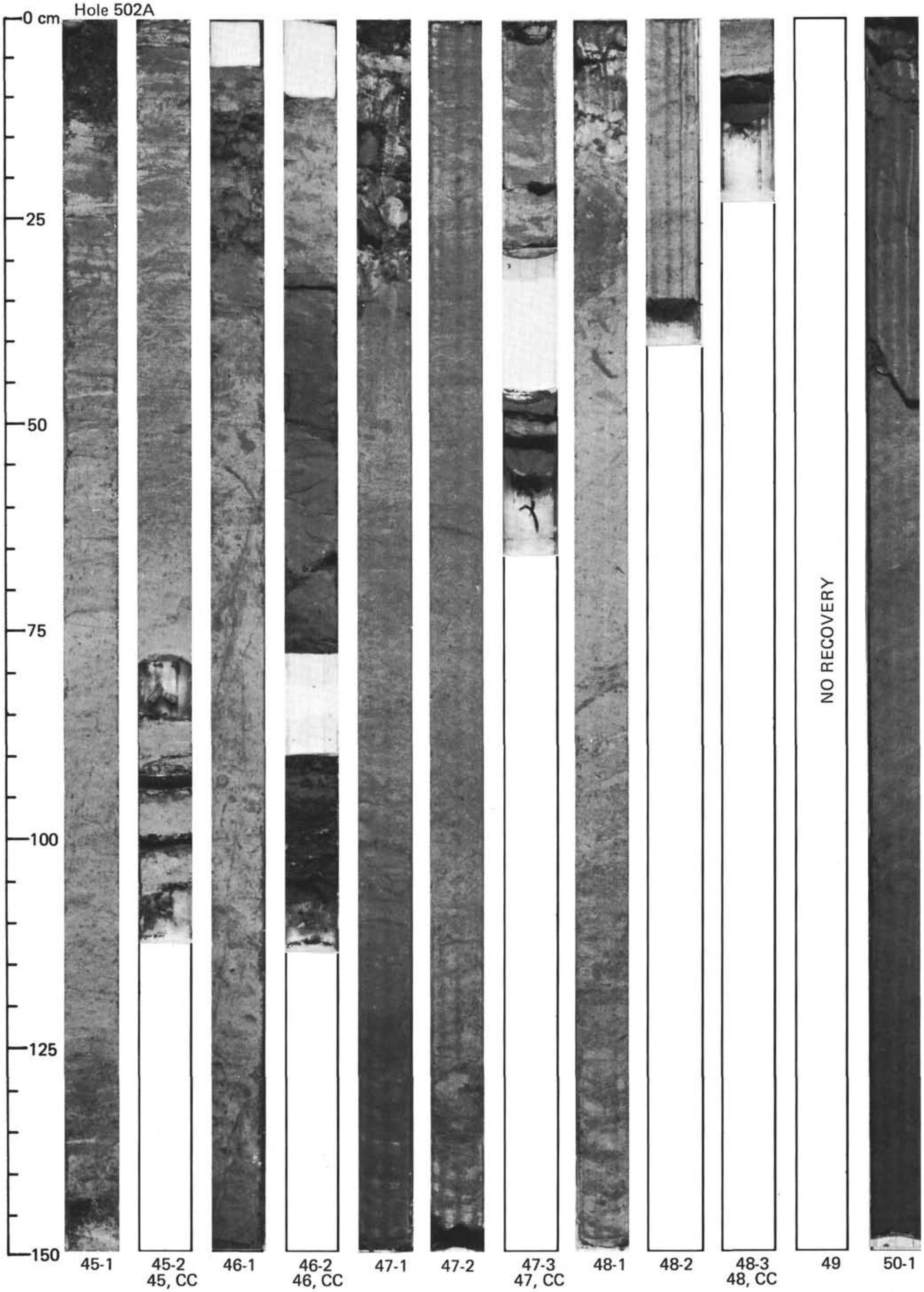
42-1
42-2
43-1
43-2
43, CC
44-1
44-2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0 cm
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125
150
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45, CC
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47, CC
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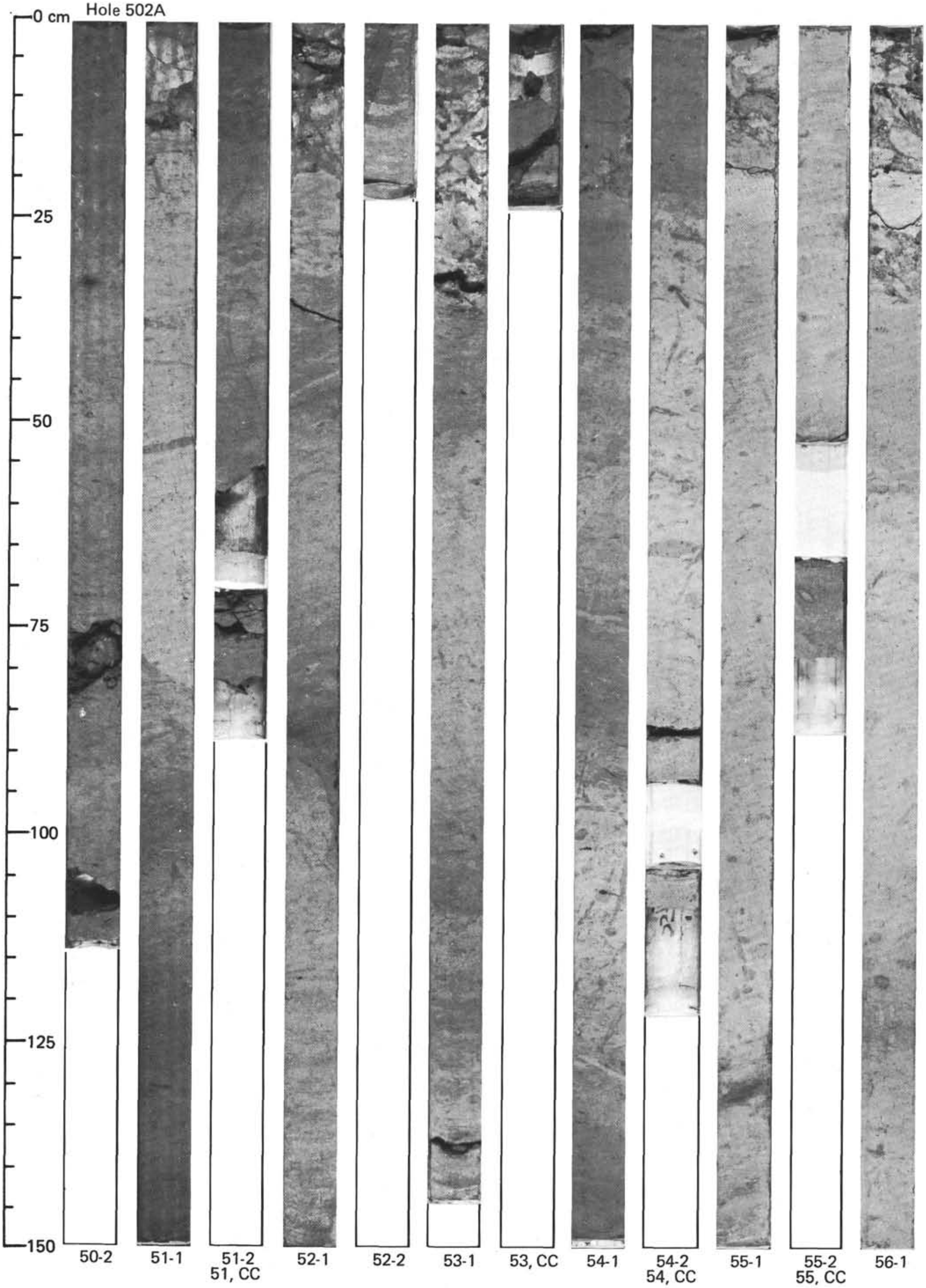
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53-1
53, CC
54-1
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54, CC
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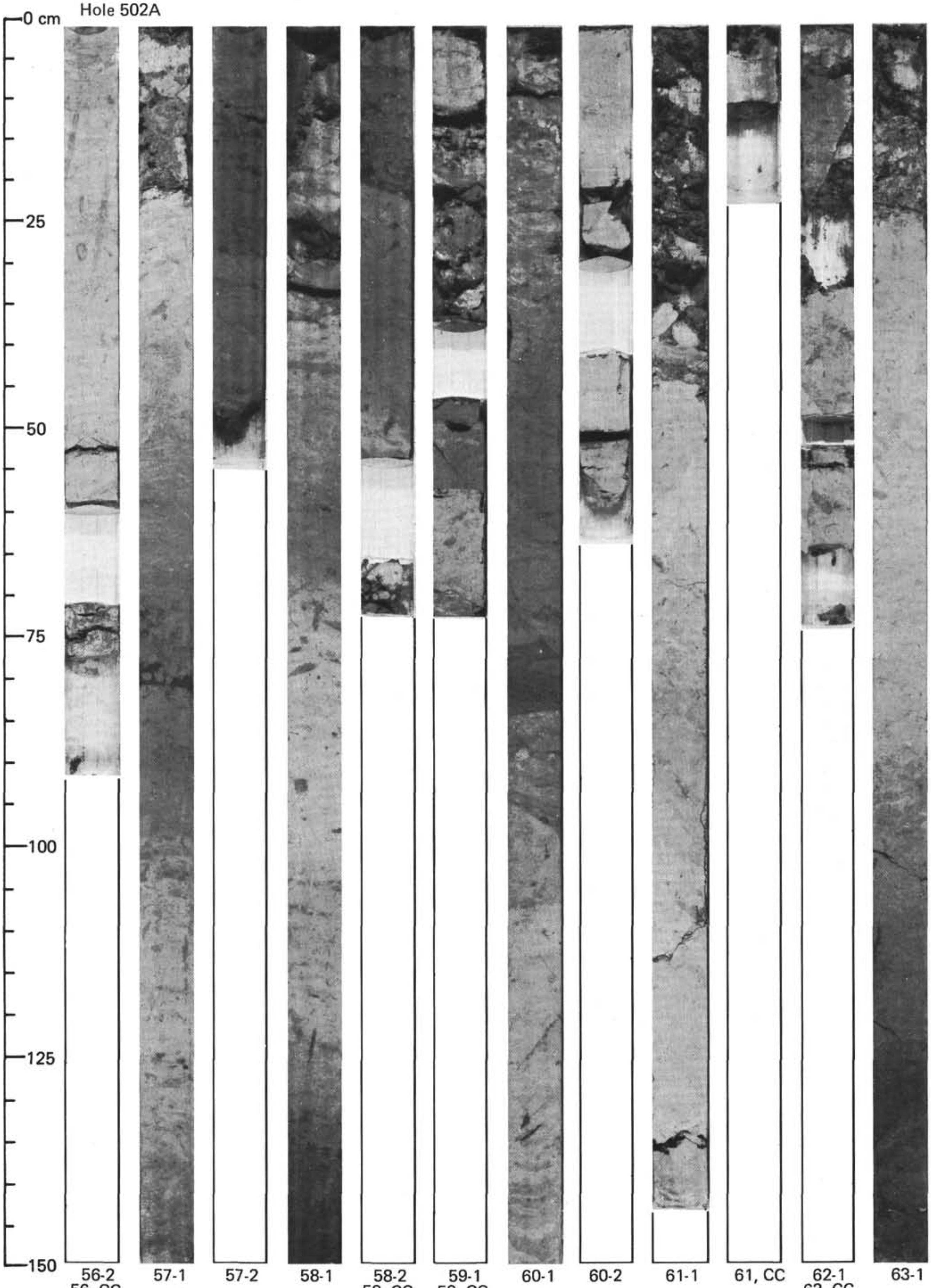
55, CC
56-1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75
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56-2
56, CC
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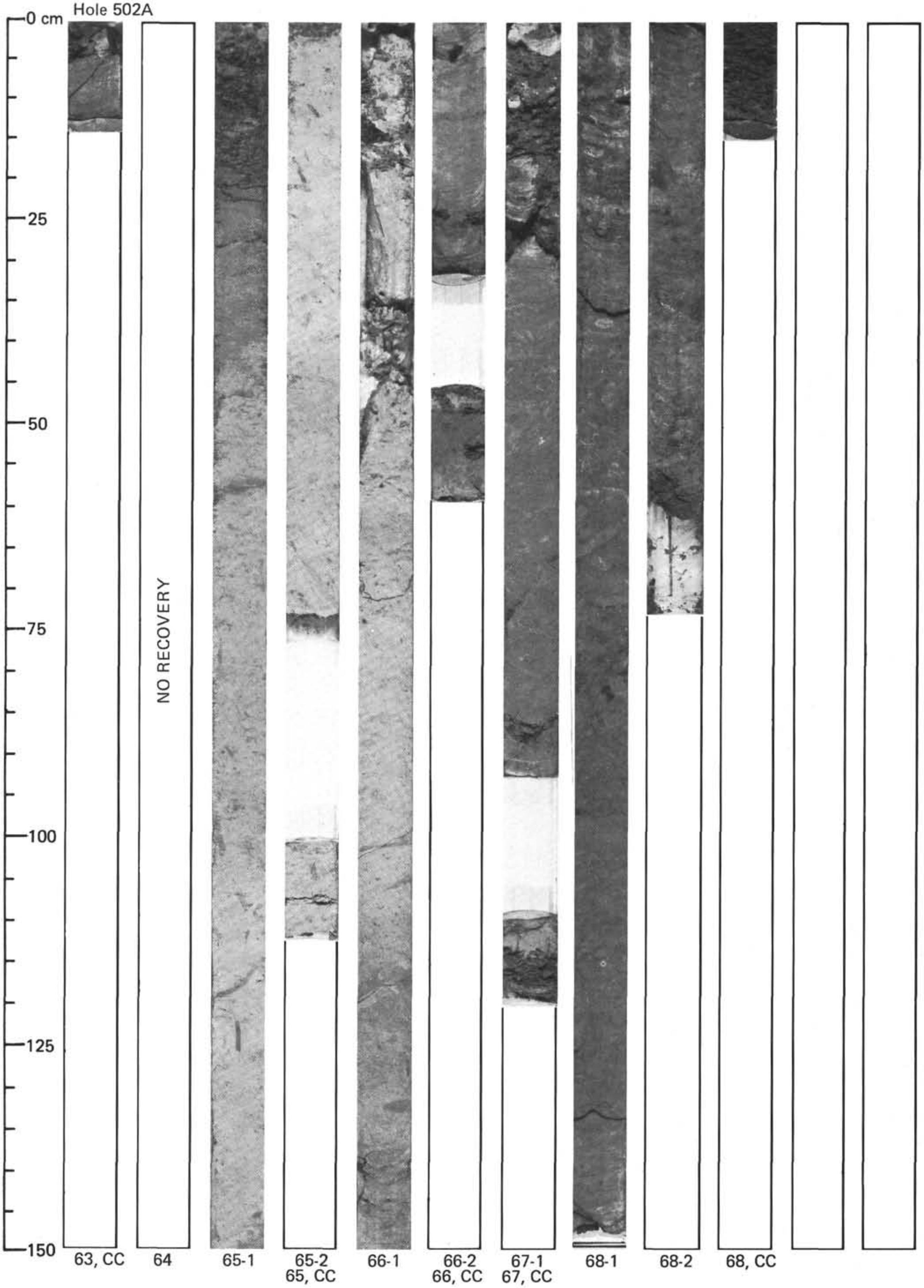
62, CC
63-1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100
125
150
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66-2
66, CC
67-1
67, CC
68-1
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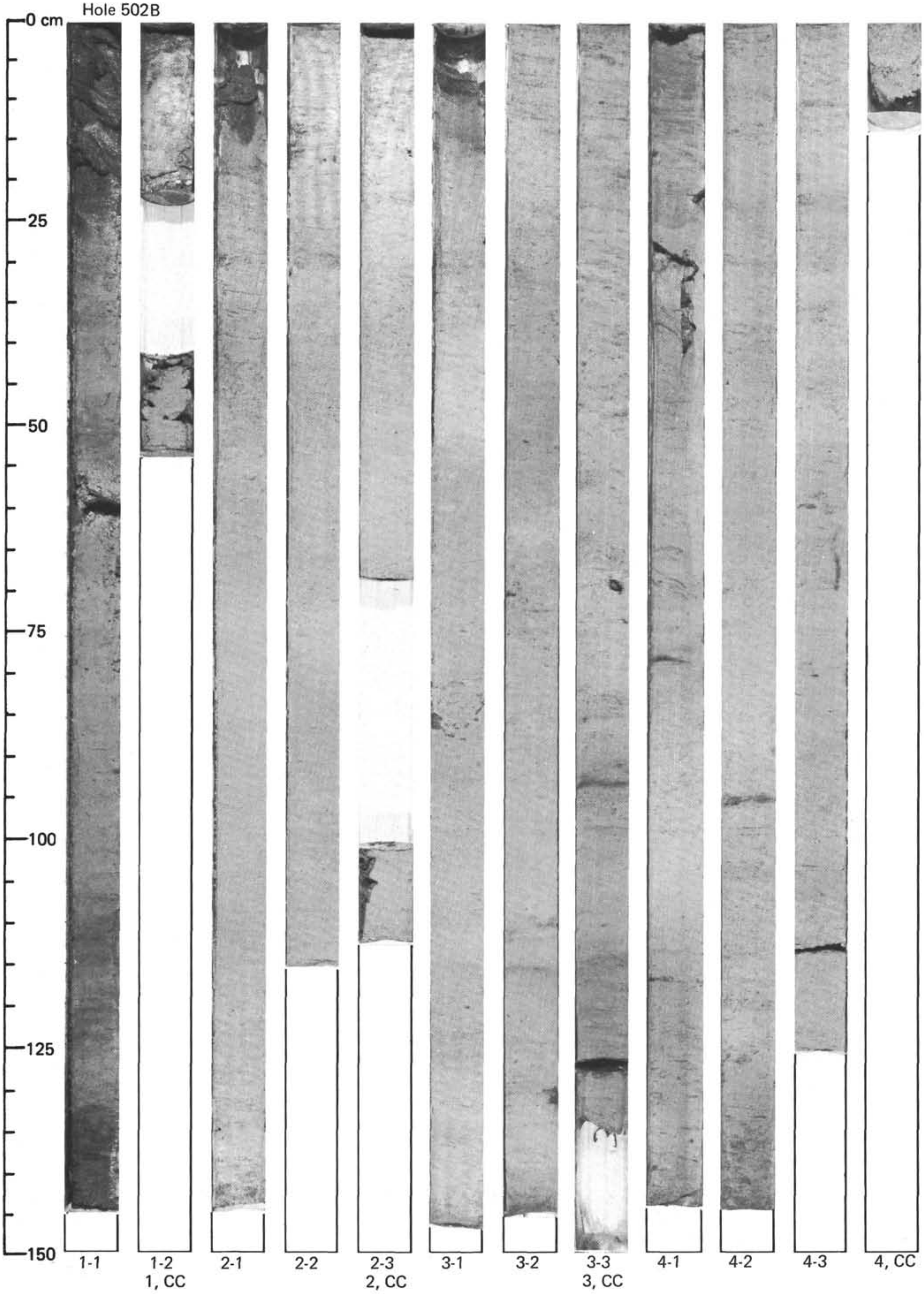
68, CC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125
150
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1, CC
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2, CC
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3, CC
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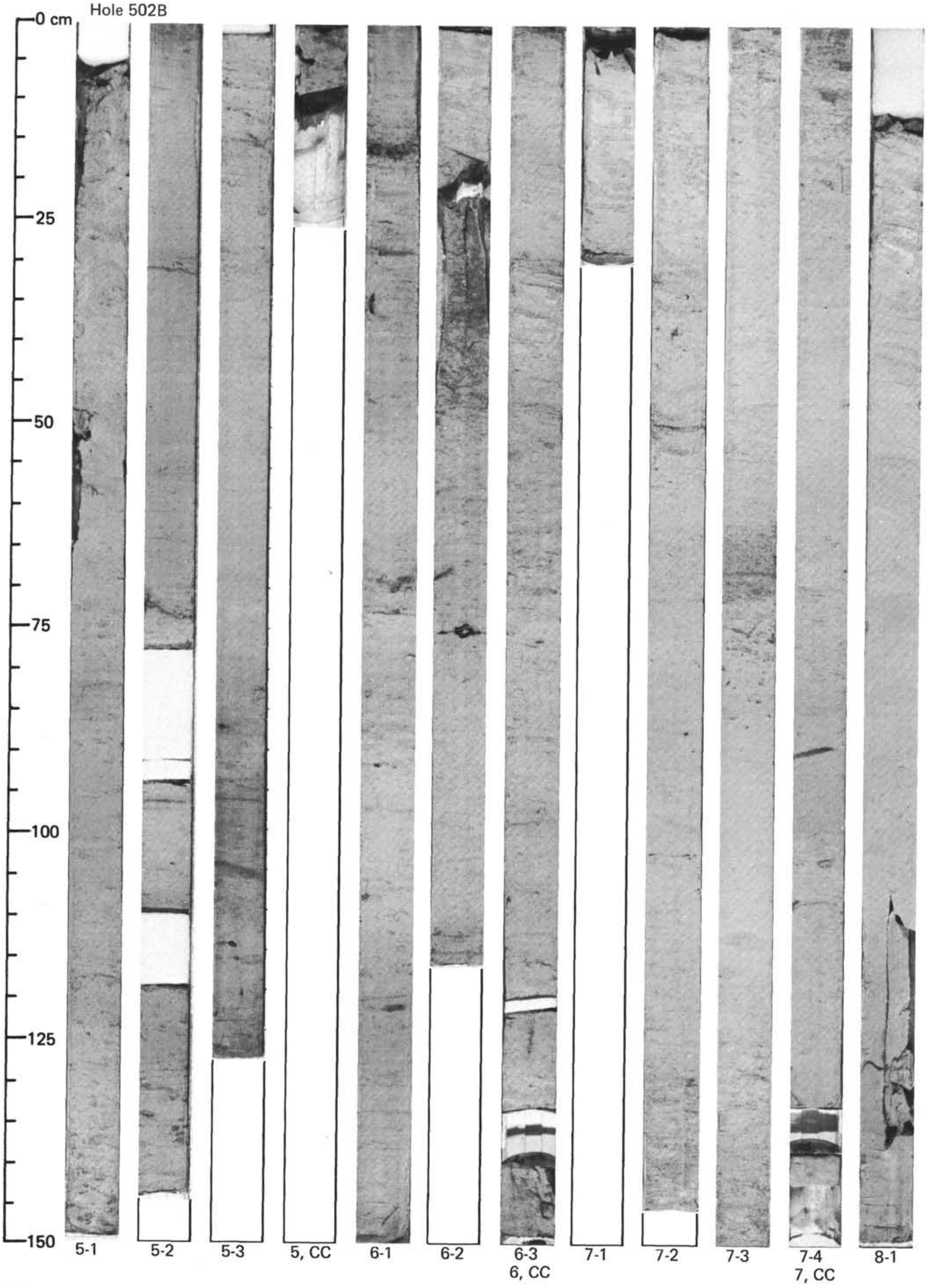
4-3
4, CC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125
150
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6-2
6-3
6, CC
7-1
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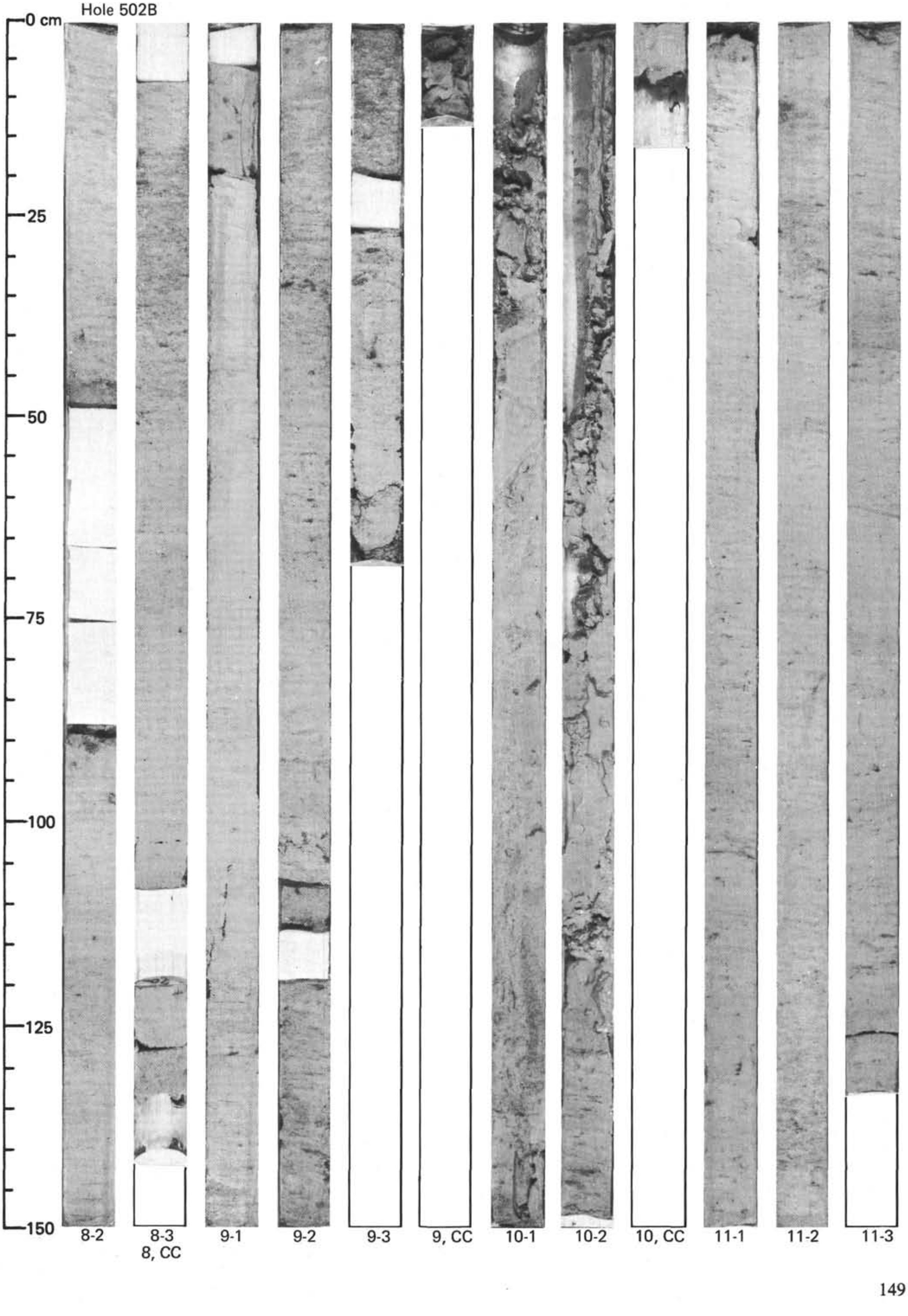
7-3
7-4
7, CC
8-1


Hole 502B
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125
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9-2
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9, CC
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10-2
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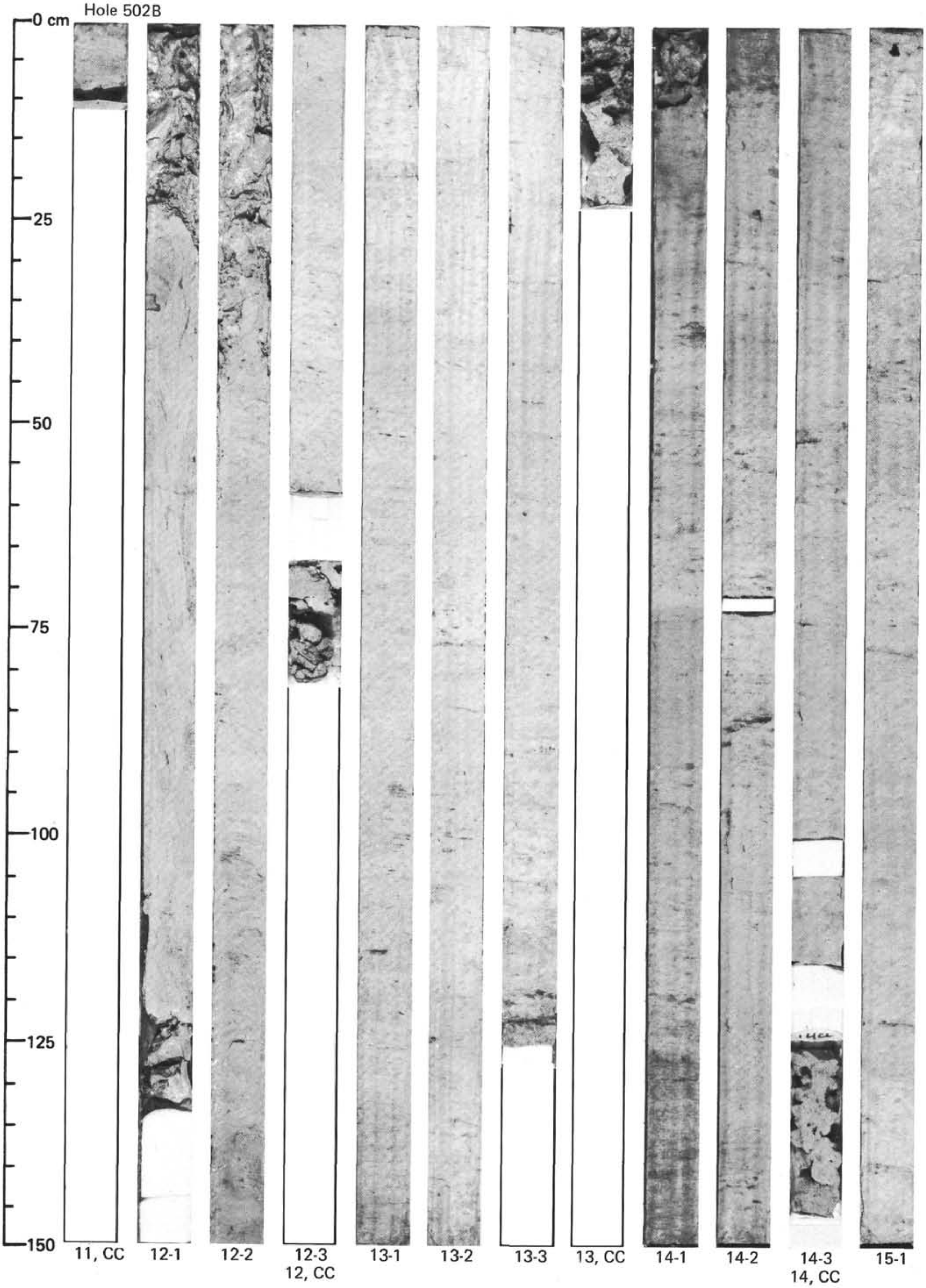
11-3


Hole 502B
0 cm
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50
75
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125
150
11, CC
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12, CC
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13-2
13-3
13, CC
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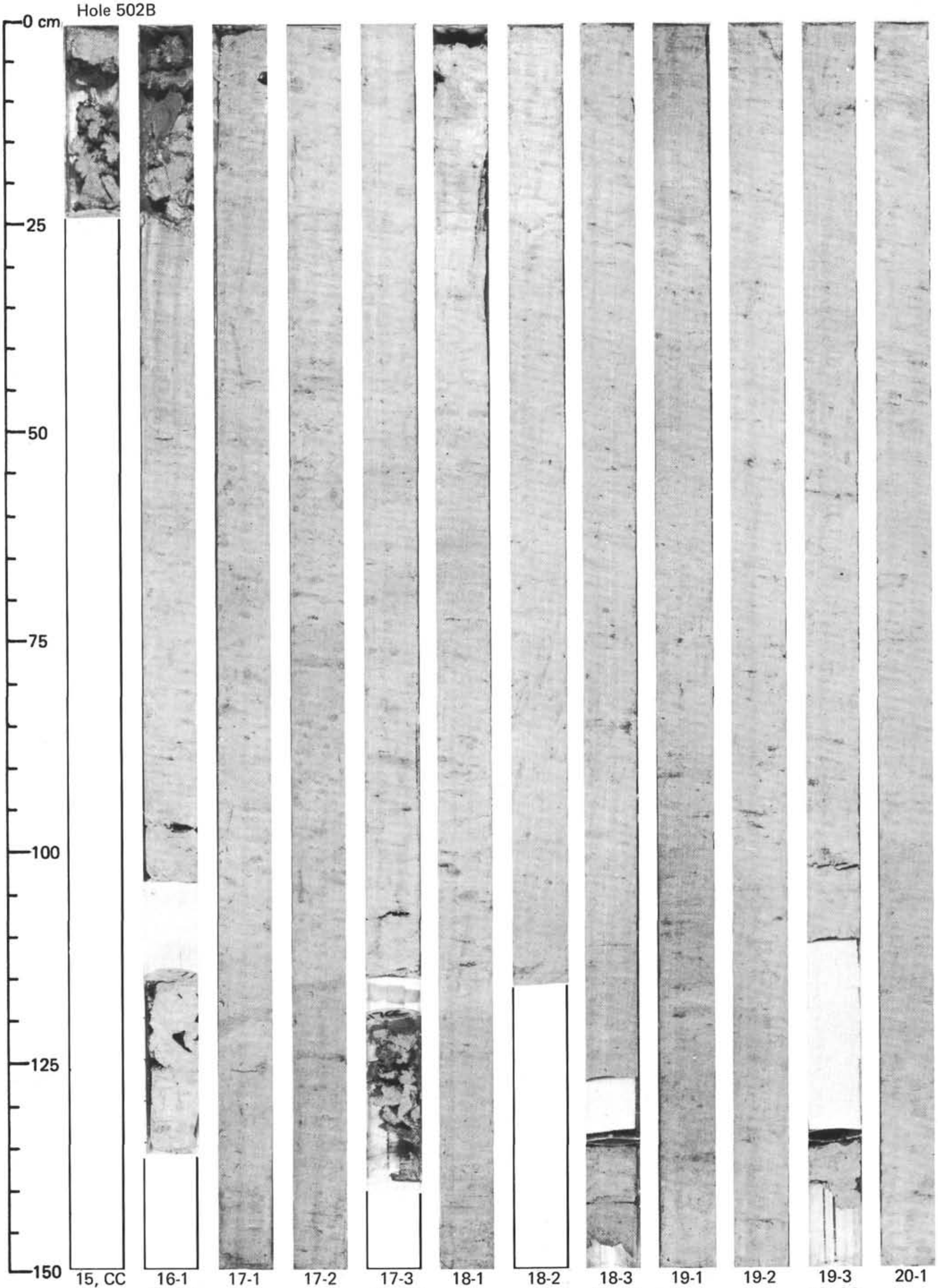
Hole 502B
0 cm
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75
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125
150
15, CC
16-1
16, CC
17-1
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17, CC
18-1
18-2
18-3
18, CC
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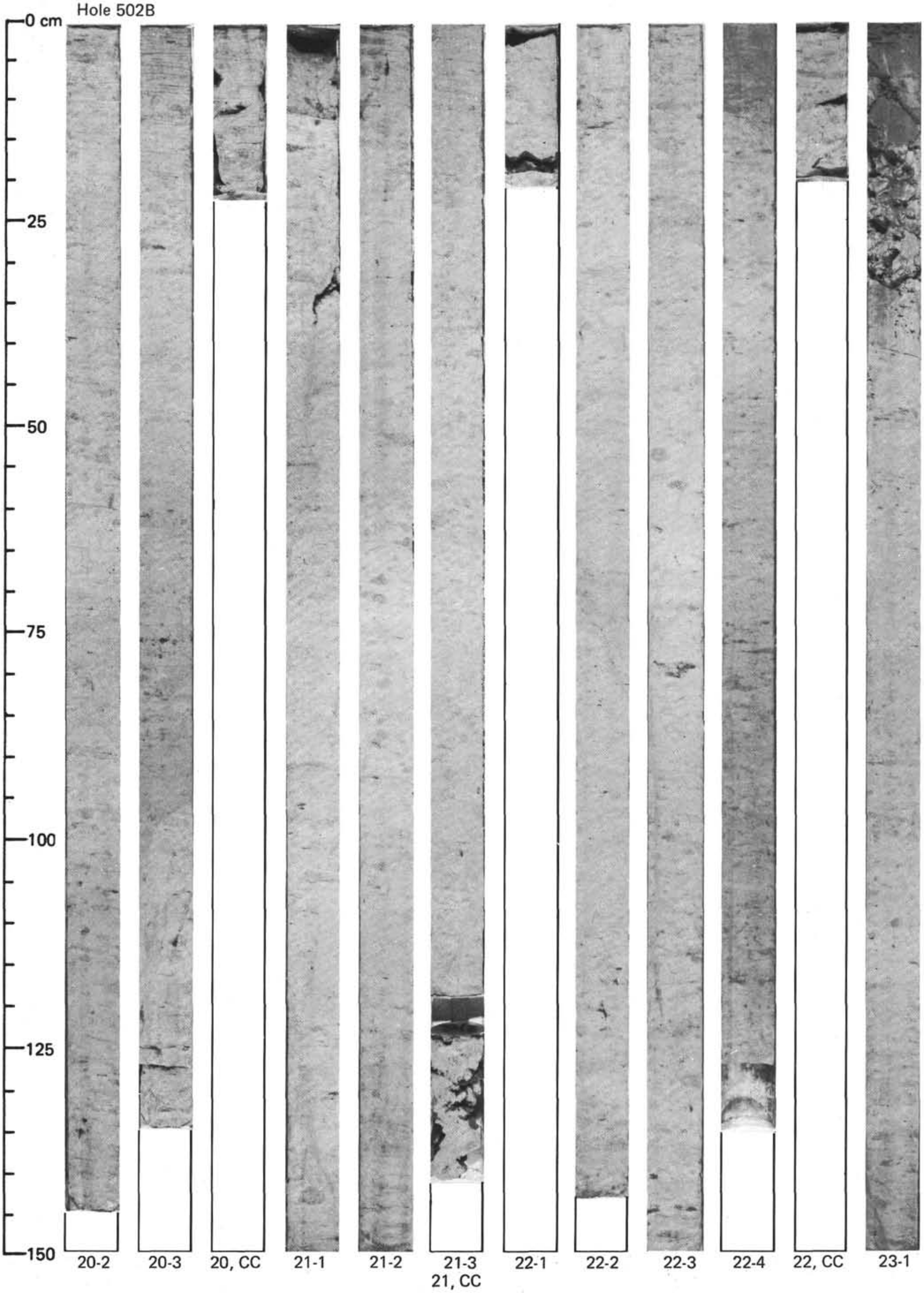
19, CC
20-1



Hole 502B
0 cm
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20, CC
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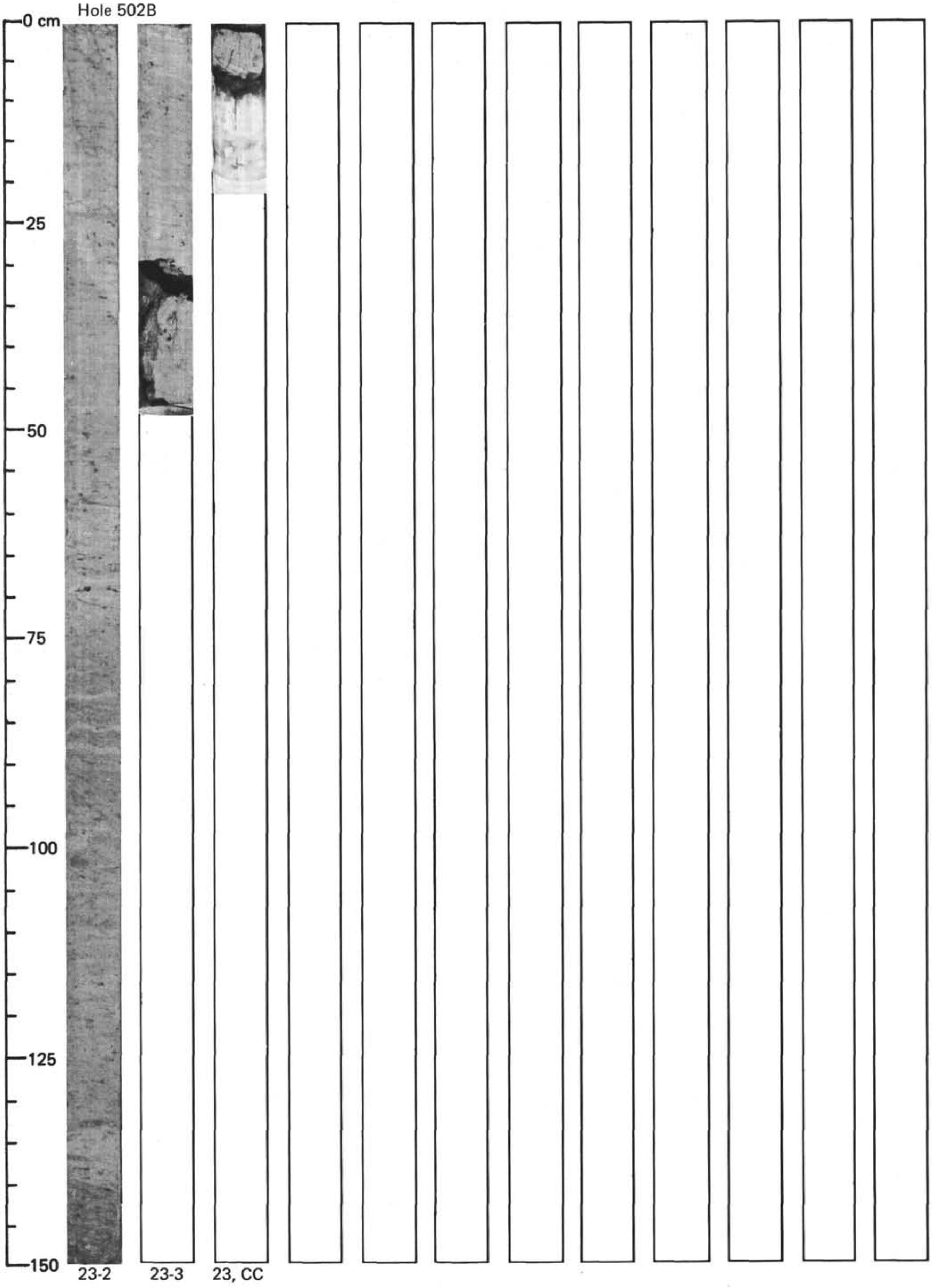
21-2
21-3
21, CC
22-1
22-2
22-3
22-4
22, CC
23-1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75
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150
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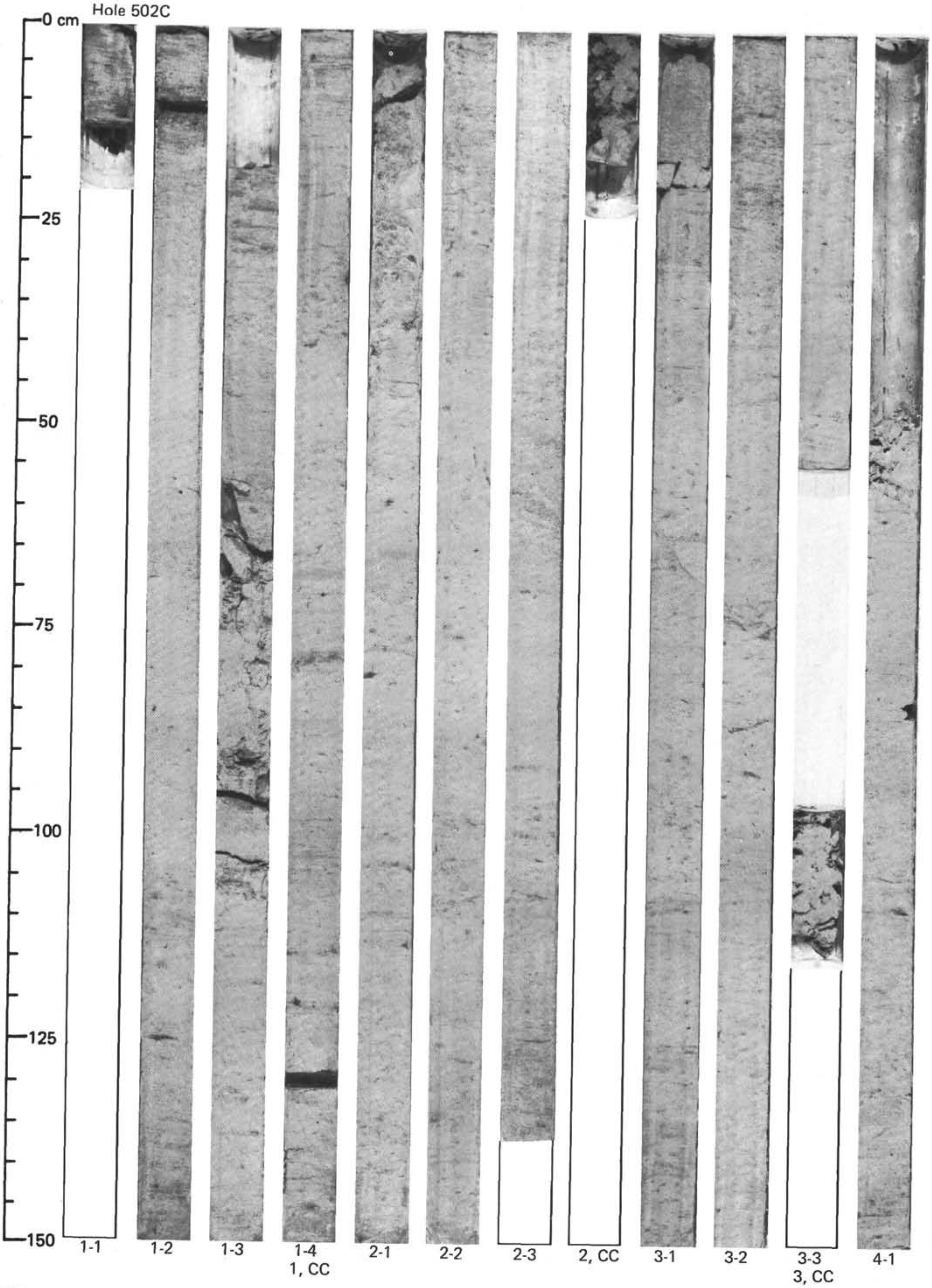
23-3
23, CC


Hole 502C
0 cm
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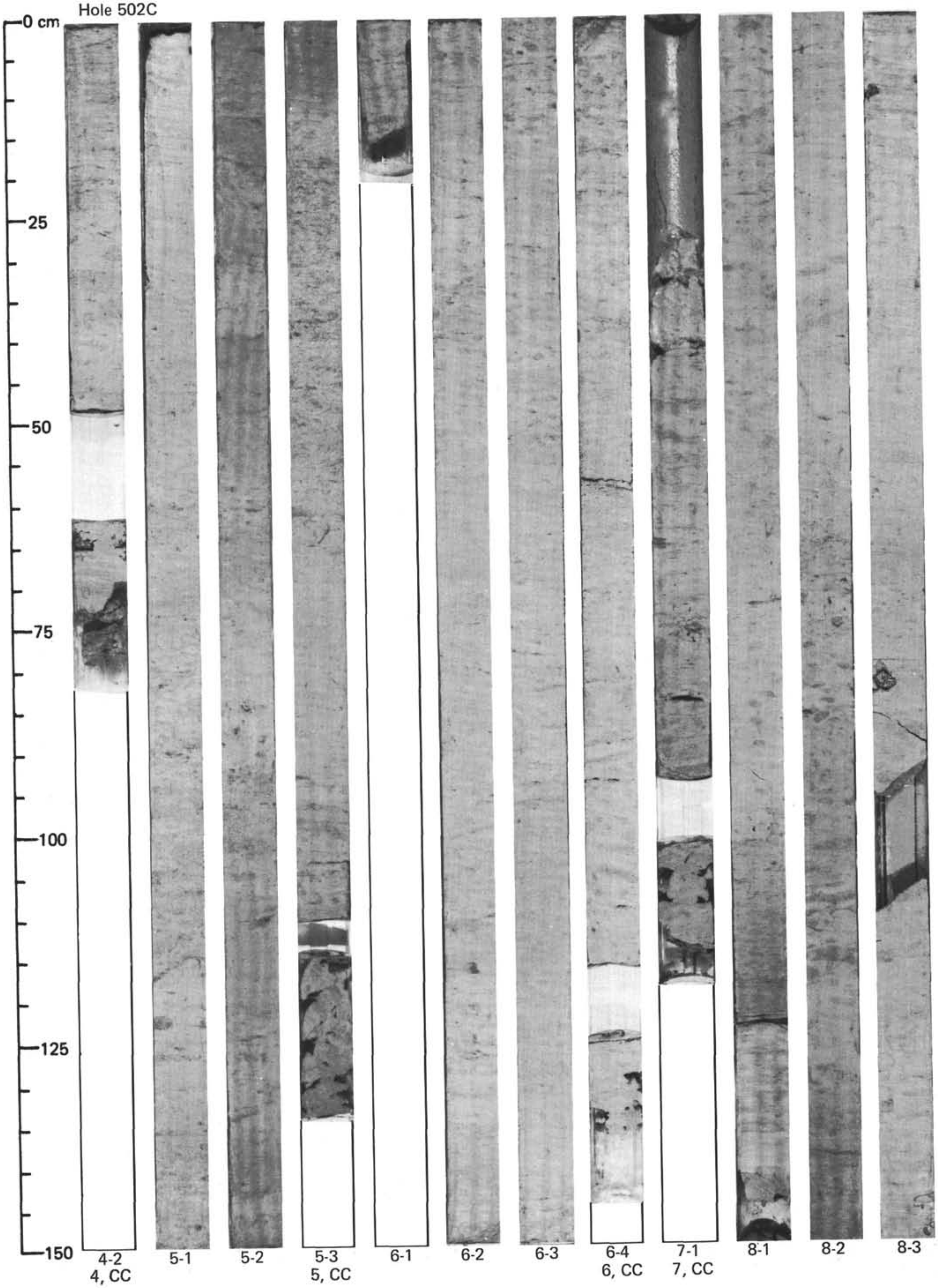
50
75
100
125
150
1-1
1-2
1-3
1-4
1, CC
2-1
2-2
2-3
2, CC
3-1
3-2
3-3
3, CC
4-1



Hole 502C
0 cm
25
50
75
100
125
150
4-2
4, CC
5-1
5-2
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6-2
6-3
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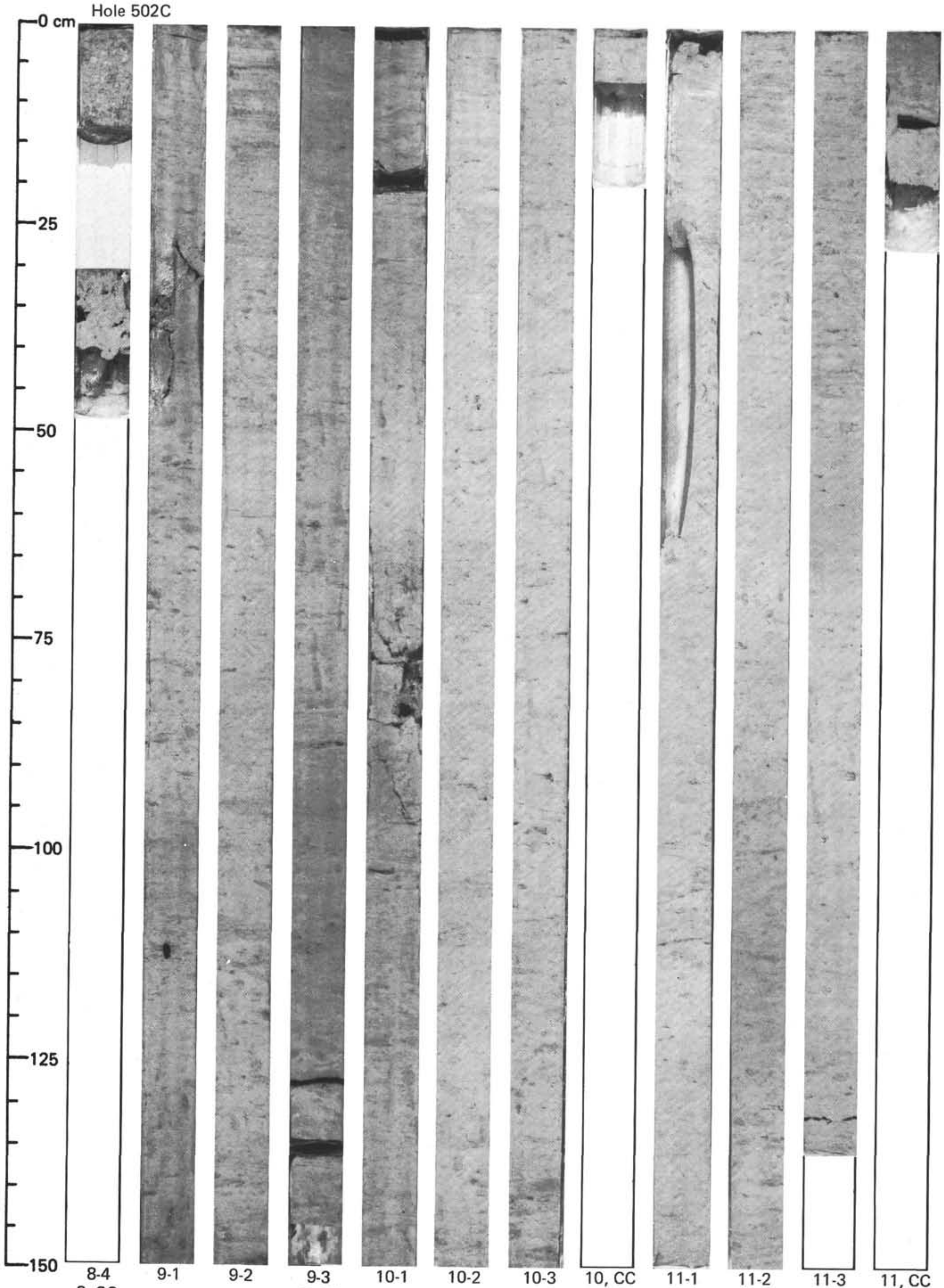
6, CC
7-1
7, CC
8-1
8-2
8-3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125
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8-4
8, CC
9-1
9-2
9-3
9, CC
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10-2
10-3
10, CC
11-1
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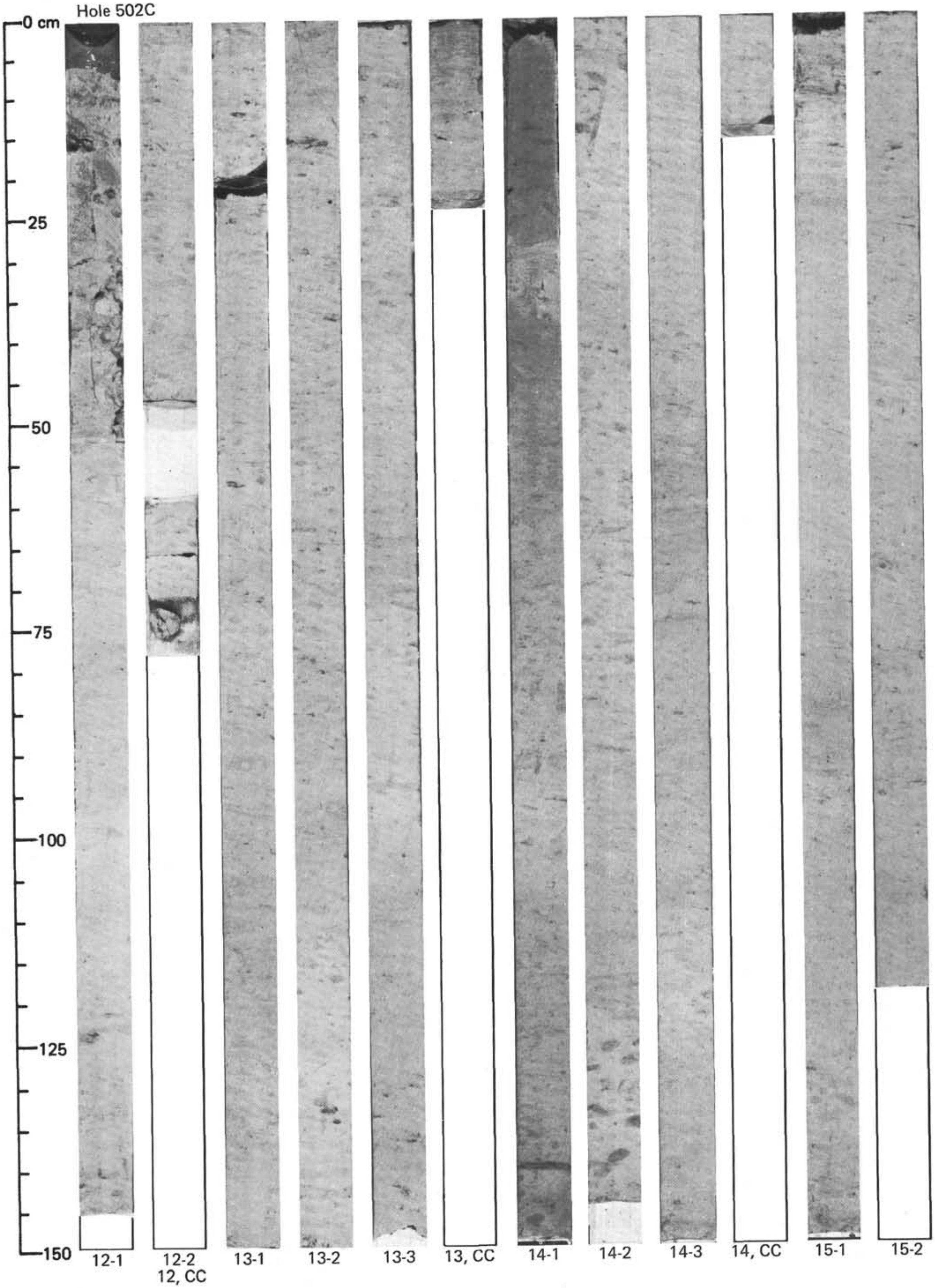
11-3
11, CC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12-1
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12, CC
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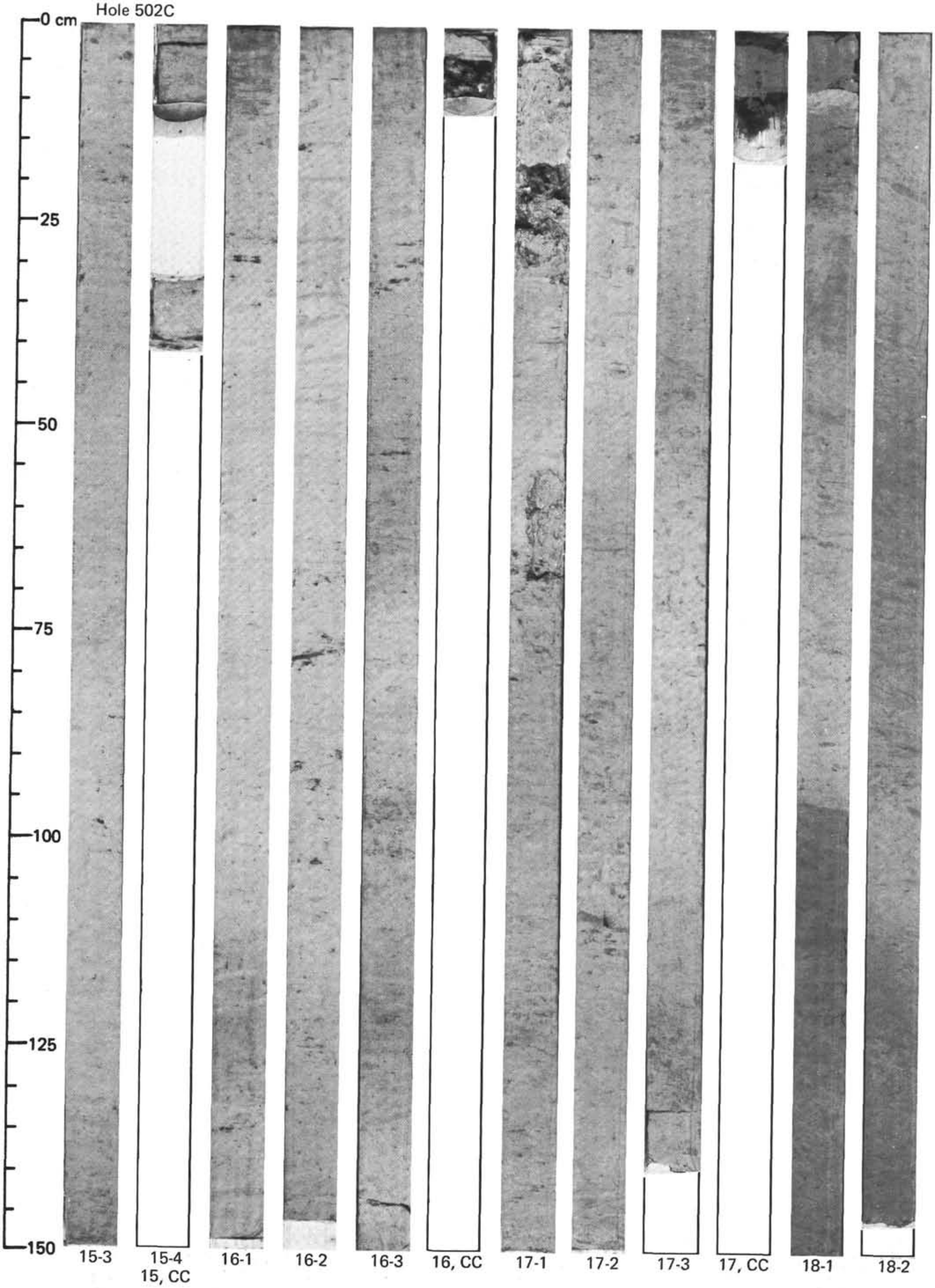
15-2


Hole 502C
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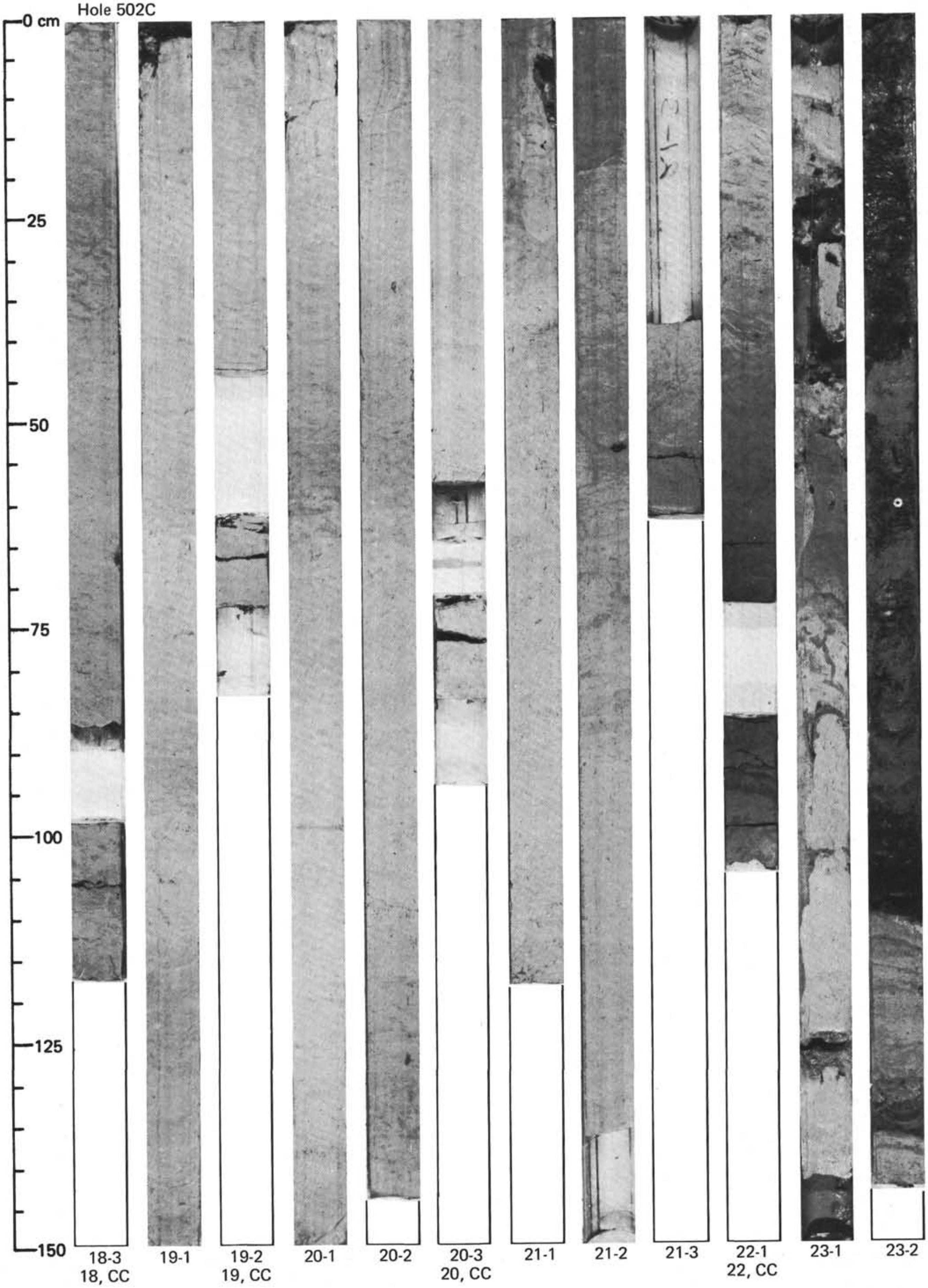
18-2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22, CC
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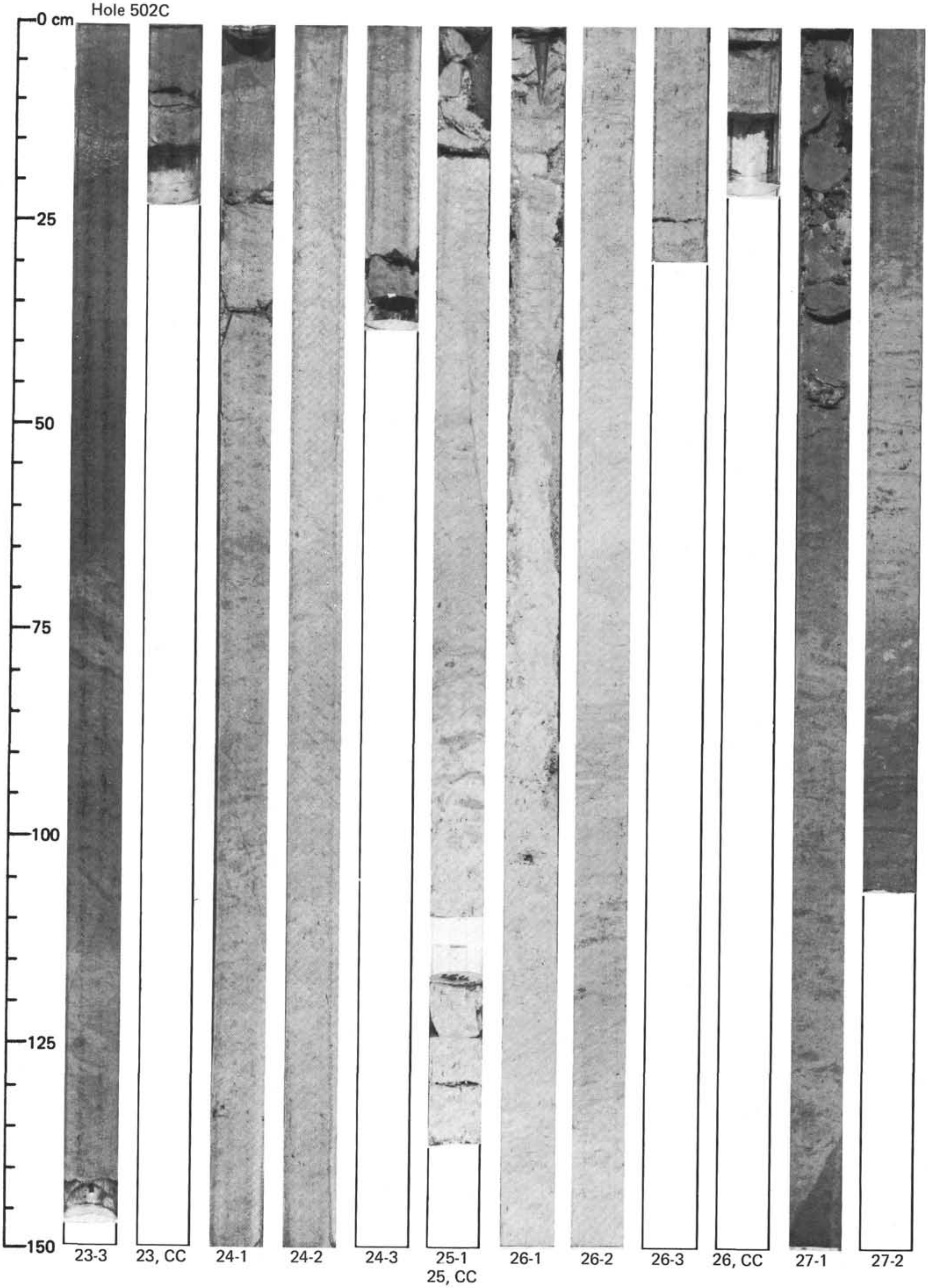
23-2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26, CC
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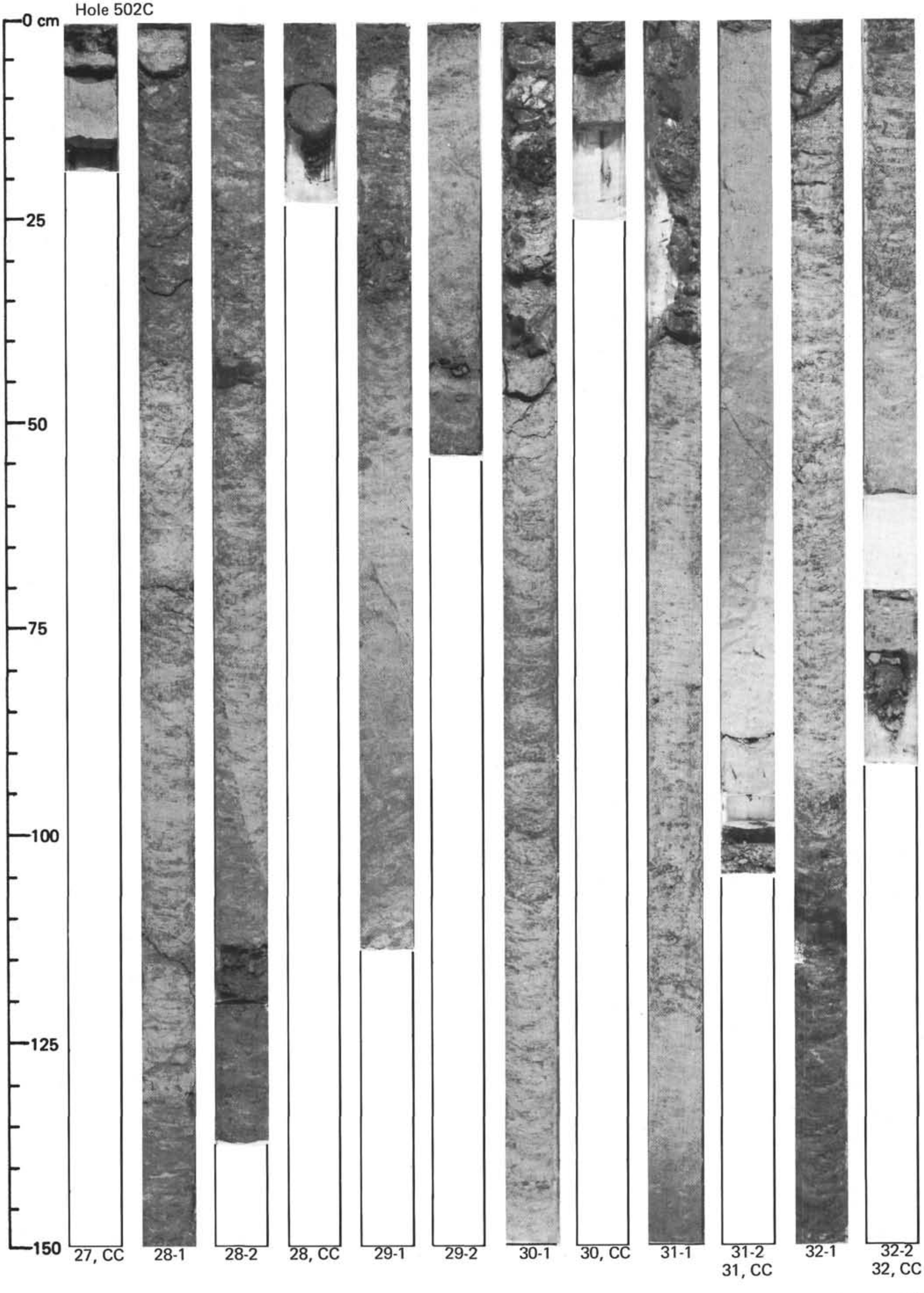
27-2


Hole 502C
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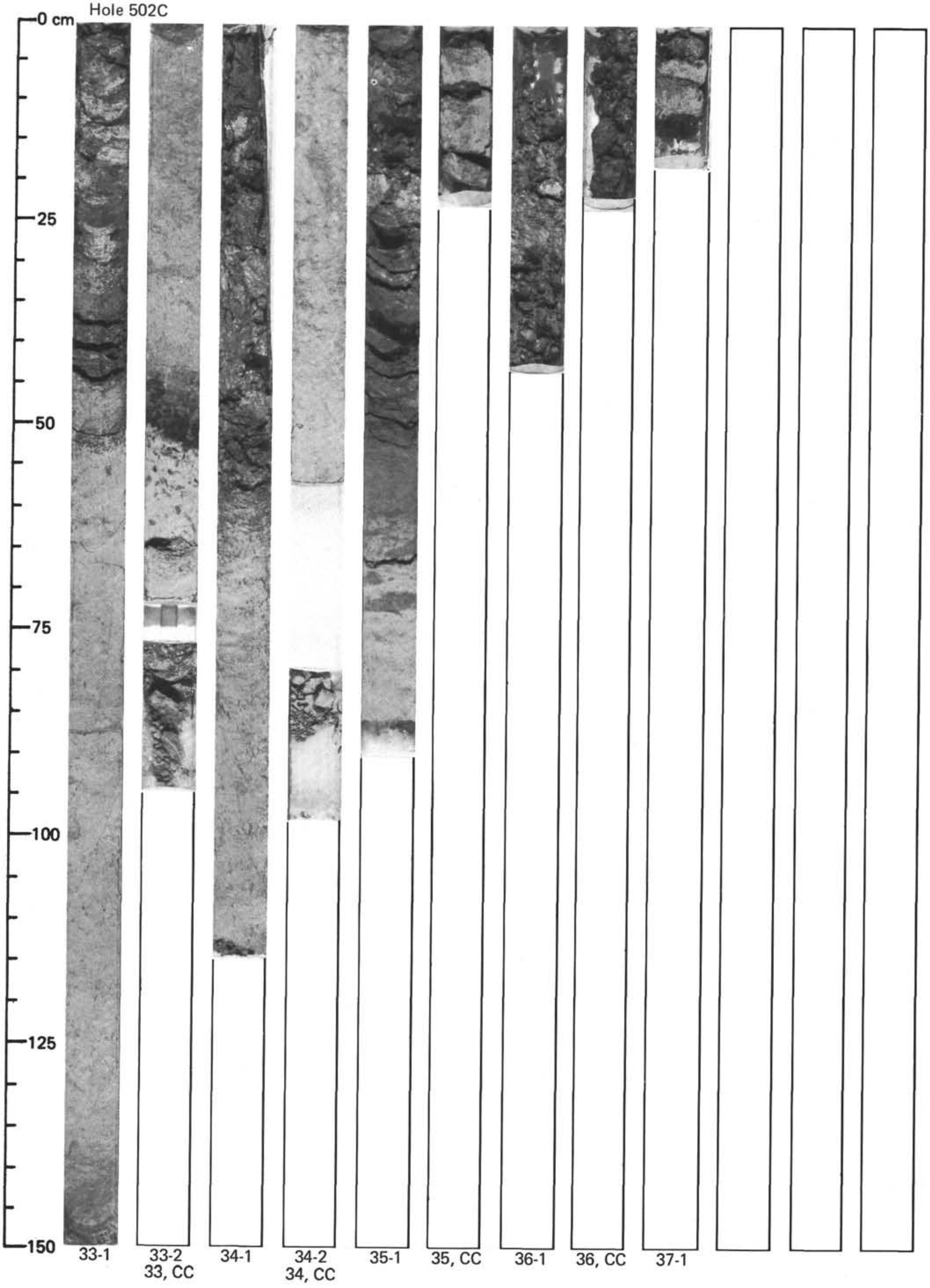
32, CC


Hole 502C
0 cm
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35, CC
36-1
36, CC
37-1