8. SITE 492[1]

Shipboard Scientific Party[2]

HOLE 492

Date occupied: 20 April 1979

Date departed: 23 April 1979

Time on hole: 72.5 hours

Position: 16°04.73′N; 98°56.72′W

Water depth (sea level; corrected m, echo-sounding): 1935

Water depth (rig floor; corrected m, echo-sounding): 1945

Bottom felt (m, drill pipe): 1972.5

Penetration (m): 279.0

Number of cores: 31

Total length of cored section (m): 279.0

Total core recovered (m): 189.60

Core recovery (%): 68

Oldest sediment cored:
Depth sub-bottom (m): 279
Nature: Siltstone and sand
Age: Late Miocene

Principal results (Holes 492, 492A, and 492B): At Site 492, we penetrated 290 meters and recovered 43 cores (Table 1, Fig. 1). Eleven hydraulic piston cores from Hole 492A resampled parts of the initial 72 meters of Hole 492, which was cored by standard rotary techniques. The recovered cores comprise two lithologic units. Unit 1 extends from 0 to 247 meters and consists predominantly of upper Miocene to Quaternary silt-siltstone. Upper Miocene muddy siltstone with interbedded sand and granular gravel constitutes Unit 2 between 247 and 290 meters. Bedding in Unit 1 ranges from horizontal to overturned and locally defined folds. Muddy siltstone intervals below 250 meters show stratal discontinuity and are scaly where they are cut by slickensided and anastomosing fractures. The interbedded sands and mudstones of Unit 2 probably represent uplifted trench or lower slope deposits and correlate with the landward-dipping reflectors evident on the seismic profile through the site. Frozen sediments encountered at 141 and 170 meters produced a volume of gas more than 7 and 20 times, respectively, that of pore volume, suggesting the occurrence of hydrate.

HOLE 492A

Date occupied: 23 April 1979

Date departed: 24 April 1979

Time on hole: 25.2 hours

Position: 16°04.73′N; 98°56.72′W

Water depth (sea level; corrected m, echo-sounding): 1935

Water depth (rig floor; corrected m, echo-sounding): 1945

Bottom felt (m, drill pipe): 1971.5

Penetration (m): 70.8

Number of cores: 11

Total length of cored section (m): 51.8

Total core recovered (m): 30.3

Core recovery (%): 58

Oldest sediment cored:
Depth sub-bottom (m): 70.8
Nature: Muddy siltstone
Age: Late Miocene

Principal results: See Hole 492.

HOLE 492B

Date occupied: 29 April 1979

Date departed: 30 April 1979

Time on hole: 41.2 hours

Position: 16°04.73′N; 98°56.72′W

Water depth (sea level; corrected m, echo-sounding): 1942

Water depth (rig floor; corrected m, echo-sounding): 1952

Bottom felt (m, drill pipe): 1971.5

Penetration (m): 290.0

Number of cores: 1

Total length of cored section (m): 9.5

Total core recovered (m): 6.4

Core recovery (%): 68

Oldest sediment cored:
Depth sub-bottom (m): 290
Nature: Sand and muddy siltstone
Age: Mid-late Miocene

Principal results: See Hole 492.

BACKGROUND AND OBJECTIVES

Site 492 is located in the midslope region of the Middle America Trench at 16°04.73′N and 98°56.72′W in 2 km of water (Fig. 2). The site lies 3 km above and 20

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[1] *Initial Reports of the Deep Sea Drilling Project*, Volume 66.

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Table 1. Coring summary, Site 492.

Core	Cored Interval below Bottom (m)	Cored (m)	Recovered (m)	Recovered (%)	Remarks
Hole 492					
1	0.0–3.5	3.5	3.41	97	
2	3.5–13.0	9.5	6.16	65	
3	13.0–22.5	9.5	6.89	73	
4	22.5–32.0	9.5	9.67	102	
5	32.0–41.5	9.5	6.42	68	
6	41.5–51.0	9.5	8.41	89	
7	51.0–60.5	9.5	3.67	39	
8	60.5–70.0	9.5	5.60	59	
9	70.0–79.5	9.5	3.60	38	
10	79.5–89.0	9.5	5.70	60	
11	89.0–98.5	9.5	5.70	60	
12	98.5–108.0	9.5	8.12	85	
13	108.0–117.5	9.5	5.22	55	
14	117.5–127.0	9.5	8.52	90	
15	127.0–136.5	9.5	8.05	85	
16	136.5–146.0	9.5	6.44	68	
17	146.0–155.5	9.5	5.79	61	
18	155.5–165.0	9.5	7.02	74	
19	165.0–174.5	9.5	4.32	45	
20	174.5–184.0	9.5	9.91	104	
21	184.0–193.5	9.5	5.13	54	
22	193.5–203.0	9.5	7.07	74	
23	203.0–212.5	9.5	8.28	87	
24	212.5–222.0	9.5	4.03	42	
25	222.0–231.5	9.5	7.42	78	
26	231.5–241.0	9.5	7.01	74	
27	241.0–250.5	9.5	6.68	70	
28	250.5–260.0	9.5	0.12	01	
29	260.0–265.0	5.0	6.50	130	
30	265.0–269.5	4.5	3.40	76	
31	269.5–279.0	9.5	5.34	56	
Hole 492A					
1	0.0–4.25	4.25	4.03	95	
2	4.25–9.00	4.75	4.10	96	
3	9.00–13.75	4.75	4.03	95	
4	13.75–18.50	4.75	2.25	53	
5	18.50–23.25	4.75	3.85	91	
6	23.25–28.00	4.75	3.15	74	
7	28.00–32.75	4.75	3.80	89	
8	32.75–37.50	4.75	1.47	35	
9	37.50–42.25	4.75	1.14	27	
10	42.25–47.00	4.75	1.95	46	
11	67.00–71.75	4.75	0.52	12	washed interval: 47–66 m
Hole 492B					
1	280.5	9.5	6.42	68	

km north–northeast of the adjacent trench floor on a steep slope of about 9°. The multichannel seismic reflection profile adjacent to the site (Fig. 3) shows a slope blanket extending to about 0.2 s below the mudline over a series of well-defined landward-dipping reflectors.

Sites 488 and 491 yielded trench or lowermost slope sediments which were deformed and uplifted during the Neogene. Ages of these deposits increase landward and upslope from the modern trench in accord with a simple accretionary model of a subduction zone. Since Site 492 is located upslope from both Sites 488 and 491, a prime goal of drilling here is to test for the continuance of this age progression.

An imbricate stack of landward-dipping thrust faults constitutes one of the most popular structural models of accretion for the lower trench slope (e.g., Karig, 1974; Seely, et al., 1974). The data supporting this model consists primarily of landward-dipping reflectors that can be interpreted as thrust faults or landward-tilted bedding in fault-bounded sedimentary sequences. Prior to Leg 66 none of the drilling at active margins established the origin of landward-dipping reflectors of trench slopes, and this remained a prime goal at Site 492. Drilling at Sites 488 and 491 penetrated poorly defined zones of landward-dipping reflectors correlatable with an interbedded sand and mudstone sequence. The seismic reflection profile at Site 492 shows an exceptionally well-defined set of landward-dipping reflectors at about 0.2 s sub-bottom.

Intense deformation variously attributed to slumping before accretion and subsequent uplift characterizes subaerially exposed subduction complexes. At Site 492 we hoped to appraise the type and magnitude of deformation in slope and trench sediments at shallow depths of burial for comparison to the deformed deposits recovered from Sites 488 and 491. To best attain this objective, we intended to hydraulically piston core selected intervals, to minimize artificial deformation and both clarify the geometry of the natural structural features and provide a least disturbed physical properties profile.

OPERATIONS

Hole 492

Site 492 was located 3.5 miles north–northeast of Site 491. The transit and attendant profiling consumed one hour before the new positioning beacon was dropped. After the vessel was offset 410 meters to the south–southwest and the pipe trip started, a momentary loss of ship's AC power caused the dynamic positioning computer to dump its program. Difficulty in reloading the program resulted in a one-hour delay.

The first sediment was recovered from a depth of 1972.5 meters, 33.5 meters deeper than the PDR reading. A uniform section of mud and muddy siltstones was cored to a total depth of 279 meters, with sand beds occurring below 247 meters. No hole problems resulted. Coring operations were terminated owing to scheduling considerations.

A temperature-density-gamma ray log was planned, but the hydraulic bit release again failed to operate. The bit release go-devil was retrieved and the hole plugged with cement to about 85 meters below the seafloor before the drill string was pulled.

Hole 492A

After recovering the pipe from Hole 492, we modified the bottom hole assembly for hydraulic piston coring operations and ran the drill string back to just above the seafloor. The first piston core recovered sediment from one meter shallower than the depth measured at Hole 492. Continuous piston coring proceeded to a

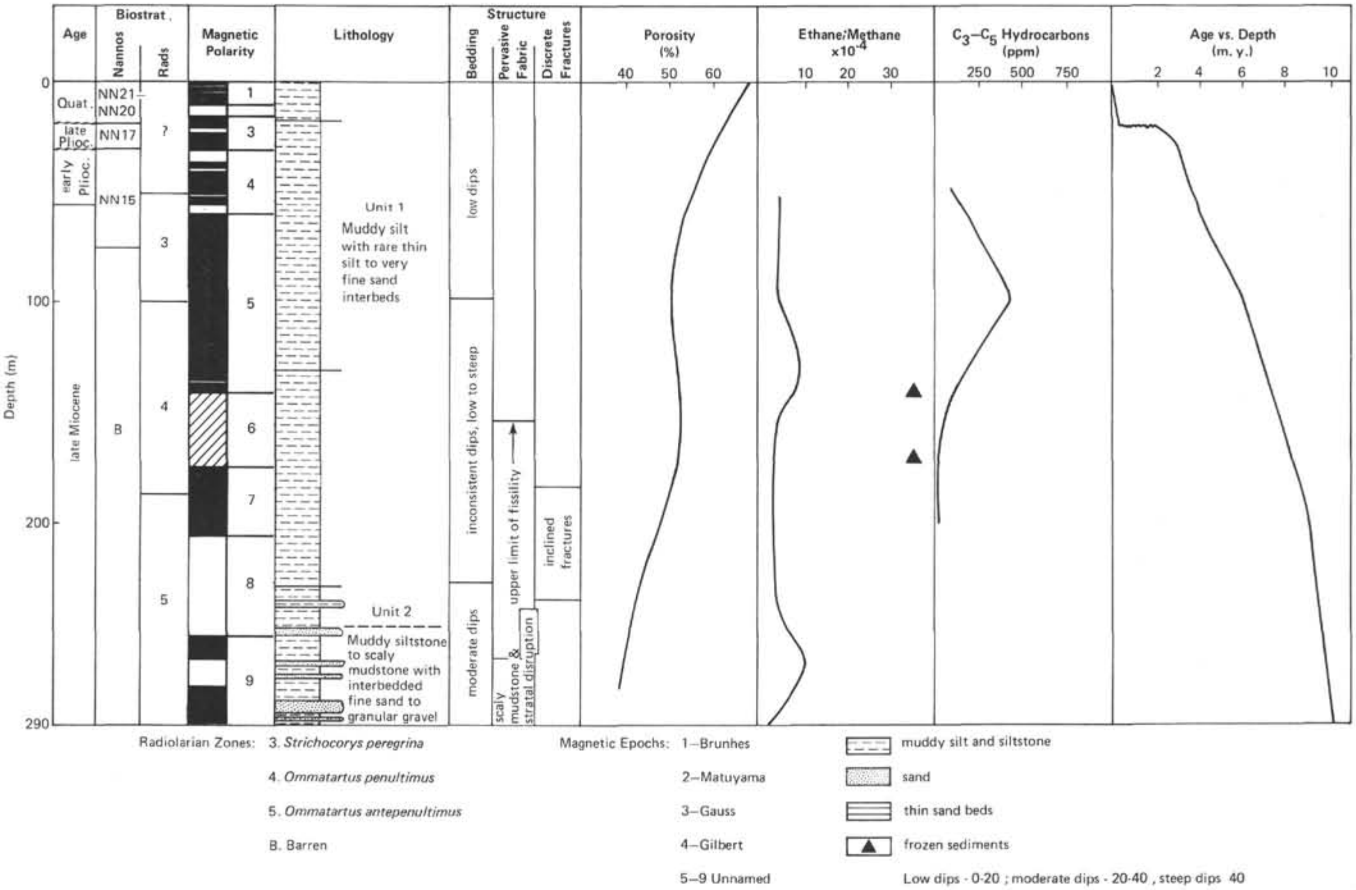

Figure 1. Site summary diagram. Radiolarian and nannofossil boundaries are based on Berggren and Van Couvering (1974); paleomagnetic epoch age boundaries are after Ryan et al. (1974).

depth of 47 meters BSF. At about 18 meters, the degree of compaction of the sediment exceeded the design limitations of the piston coring system, resulting in poor recovery and marginal core quality.

An attempt was made to "wash" to about 100 meters so that a through-bit temperature log could be run, though the large-throated piston core bit proved quite inefficient for drilling. We stopped washing at 67 meters to piston core but recovered only one-half meter of fractured siltstone. The hole was filled with weighted mud and the drill string retrieved.

Hole 492B

Rapid progress and an unexpectedly thin sediment section at Site 493 combined to provide time for additional drilling before the end of the voyage. We considered the most time-effective action to be a return to Site 492 for a final attempt at open-hole logging and determination of the geothermal gradient. Since no appreciable sand had been found in Hole 492, we felt confident that the mechanical bit release could be operated and a full logging program be carried out.

The profiling gear was not deployed, and transit time was cut to 2¼ hours from getting underway to acquisition of the signal of the beacon dropped nine days earlier. The offsets for Holes 492 and 492A were entered into the positioning system, and the ship was in stable position 30 minutes after acquiring the beacon signal.

Hole 492B was spudded at 1100 hours, April 29 and was drilled without coring to a depth of 280 meters BSF in 13 hours. This was the total depth of Hole 492, and the schedule permitted cutting one core beyond that depth. Six meters of loose, coarse sand were recovered in that core. Hole fill was noted for the first time, and the hole was given an extra mud flush in preparation for logging.

An inner core barrel, with shifting tool attached, was pumped down and the overshot was run to engage it and shift the bit release sleeve. The barrel was found to be stuck with the shifting tool, apparently engaged in the sleeve, which was immobilized by sand. Three attempts were made to shift the sleeve and/or dislodge the inner barrel, but the overshot pin sheared on all three tries.

The logging sheaves were rigged up and through-pipe gamma ray–neutron and temperature logs were run, producing useful gamma ray correlation and geothermal gradient curves. The neutron curve was of no value owing to an equipment malfunction. Four and one-half hours were lost to electrical problems in a logging tool connector and in the cable head.

The shifting tool/inner barrel assembly in the pipe prevented logging through the bit, plugging the hole

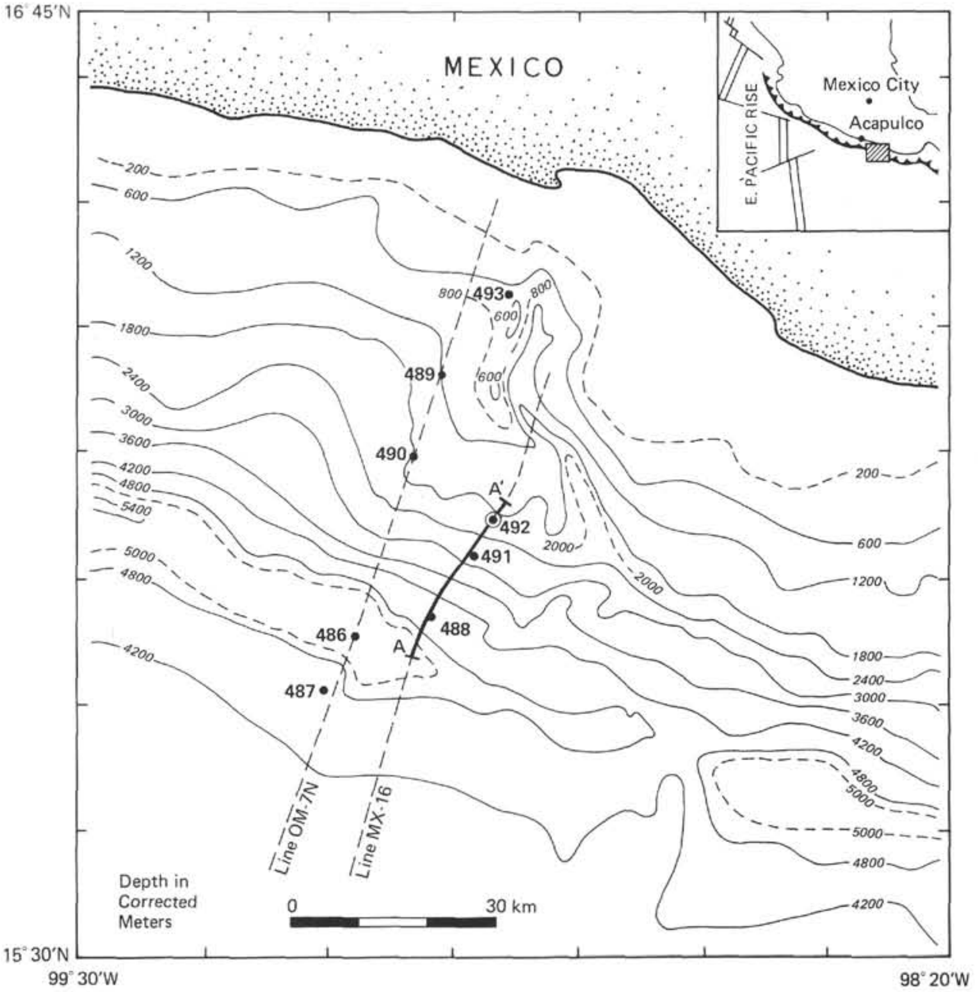

Figure 2. Site location map and index. A-A′ indicates location of Figure 3.

with cement and making further coring attempts impossible. The hole was therefore filled with heavy mud, and the drill string was pulled about 12 hours ahead of schedule.

The *Challenger* departed Site 492 for Manzanillo at 2215 hours, April 30.

LITHOLOGIC SUMMARY

Site 492 is located at mid-slope in a water depth of 1972.5 meters. Following penetration of 279 meters of Quaternary to upper Miocene sediments through conventional drilling in Hole 492, we hydraulically piston cored through 71 meters of Quaternary to upper Miocene sediments in Hole 492A, then washed to 280.5 meters and cut one 9.5-meter core of upper Miocene sediments using conventional rotary drilling in Hole 492B. Major lithologic changes in the three holes define two lithostratigraphic units (Fig. 4, Chart 1, back pocket).

Unit 1, Quaternary to upper Miocene (Cores 492-1 to 492-27 and 492A-1 to 492A-11, 0–247 m sub-bottom), is predominantly muddy silt and muddy siltstone. Calcareous muddy silt occurs at 0 to 3.5 meters in Hole 492, but not in Hole 492A. Thin beds of glauconitic and glauconite-rich muddy silt occur sporadically at 17.5 to 43.5 meters in Hole 492 and at 14 to 15 and at 30 meters in Hole 492A. A strong hydrogen sulfide odor in the sediment of the uppermost 40 meters at both holes coincides with concentrations of pyrite that darken glauconitic layers. Ash layers and pods are interbedded sporadically throughout Unit 1, as are micritic calcareous ooze and chalk. The carbonate pods and layers rarely contain identifiable biogenic components, are generally composed of clay-size material, and are probably of diagenetic origin. Thin silt and fine sand layers are rare except in the basal 20 meters of Unit 1, where they comprise about 25% of the sediment.

Below 80 meters, indurated sediment of Unit 1 exhibits slight to intense bioturbation. Parallel lamination is present only locally at 13, 23, 61, and 141 meters in Hole 492 and at 19 to 21 and at 24 meters in Hole 492A. One overturned graded bed occurs at 130 meters. In addition to numerous *Chondrites* traces, *Teichichnus* and *Zoophycos* traces are present at 118 and 124 meters, respectively.

Bedding in Unit 1 dips 0° to 90° with wide variation in individual cores (Fig. 4). Shipboard paleomagnetic

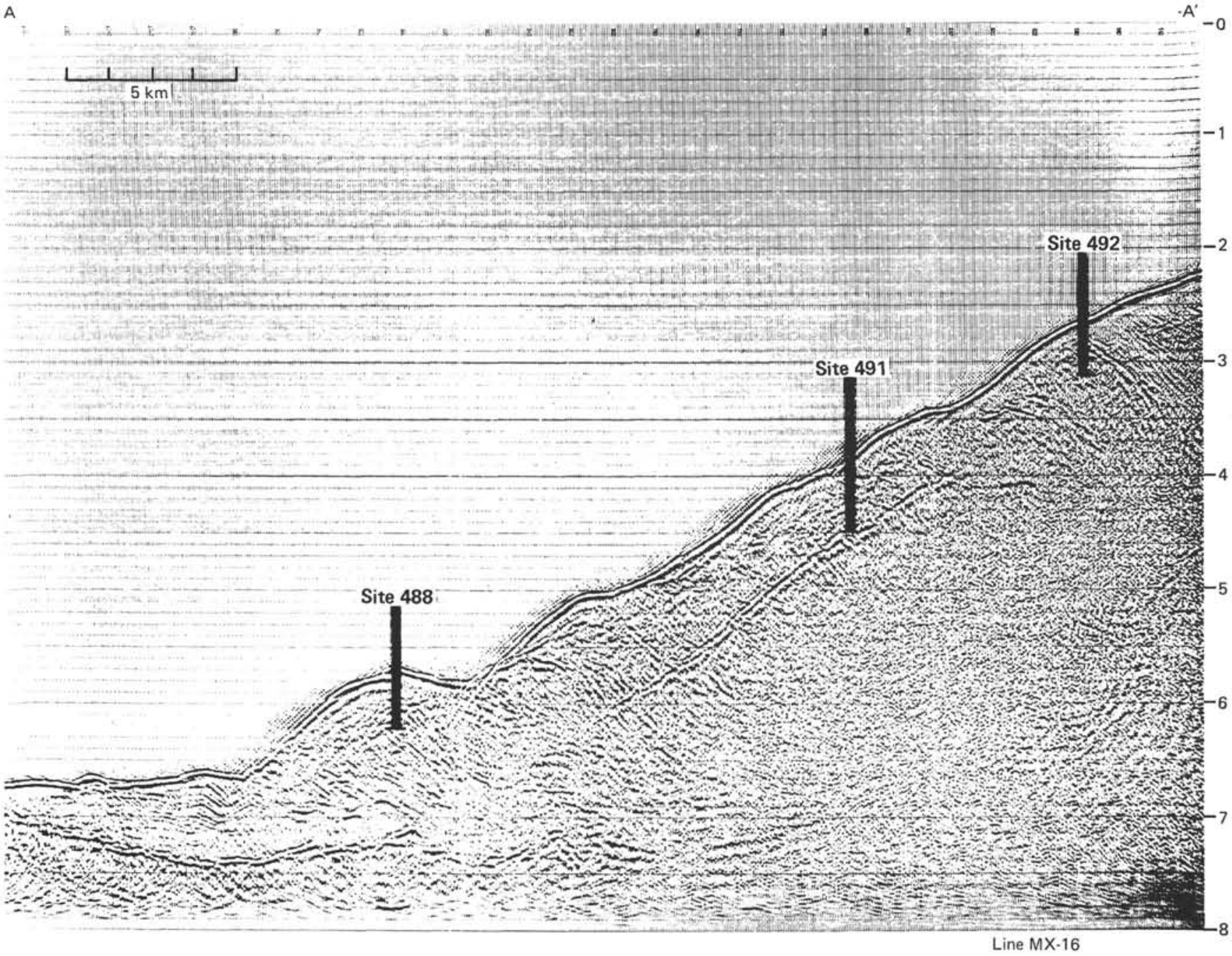

Figure 3. Migrated time section through Sites 488, 491, and 492. See Figure 2 for location.

work indicates that many of the measured beds dip west-northwest, or parallel to the strike of the margin, and several oriented beds dip either south or east.

Much of Unit 1 below 100 meters exhibits disrupted and/or discontinuous bedding. The sediment is generally mottled, often with a crude banding. Small-scale mottling is sharply defined and is clearly due to bioturbation, wheras larger-scale (several centimeters) disruption may be produced by folding of poorly indurated sediment and/or bioturbation.

Discrete inclined fractures are common only in the lowermost 50 meters of Unit 1, whereas more pervasive hackly fracturing, incipient fissility, or strong, shaly fissility are well developed in much of the sediment below 110 meters (see Fig. 4).

Unit 2, upper Miocene (Cores 492-27–492-31 and 492B-1, 247–290 m sub-bottom), consists of fine sand to granular gravel interbedded with more predominant muddy siltstone. Slight to intense bioturbation is present in the muddy siltstone, and the sands of Hole 492 exhibit graded bedding at 247.5 and 264 meters and parallel laminations at 268 meters. The core recovered in Hole 492B contains the lower 5 meters of a graded sand bed, underlain by an interval of interbedded sand and scaly mudstone. The sand (Fig. 5) is medium to coarse-grained, clean, and contains small clasts of shale. Muddy siltstone intervals throughout Unit 2 exhibit pervasive anastomosing fractures with polished surfaces constituting a scaly mudstone. Stratal discontinuity occurs locally (Fig. 6). In contrast to the muddy silt of Unit 2, sand intervals have remained unconsolidated (Hole 492) to poorly consolidated (Hole 492B). A single measured dip 31°; shipboard paleomagnetic work indicates that the dip direction is N85W.

Conclusions

Unit 1 records predominantly hemipelagic deposition of muddy silt, with rare sand layers attesting to infrequent deposition by turbidity currents carrying coarser sediment. The lack of foraminiferal tests and calcareous nannofossils below about 50 meters suggests deposition below the CCD below this level in the section.

The relatively abundant sands of Unit 2 suggest significant deposition by turbidity currents. Overall the

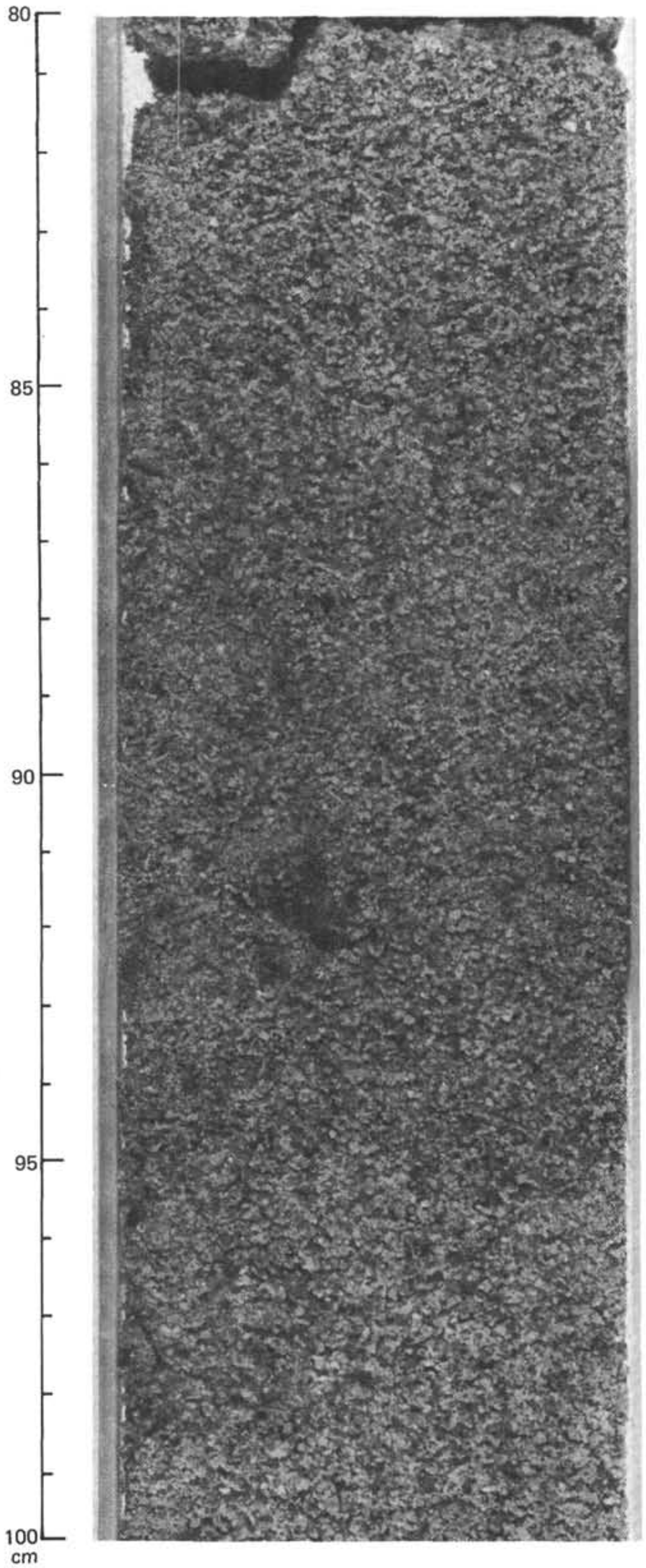

Figure 5. Coarse, massive sand (Sample 492B-1-3, 80–100 cm) of Unit 2, Site 492.

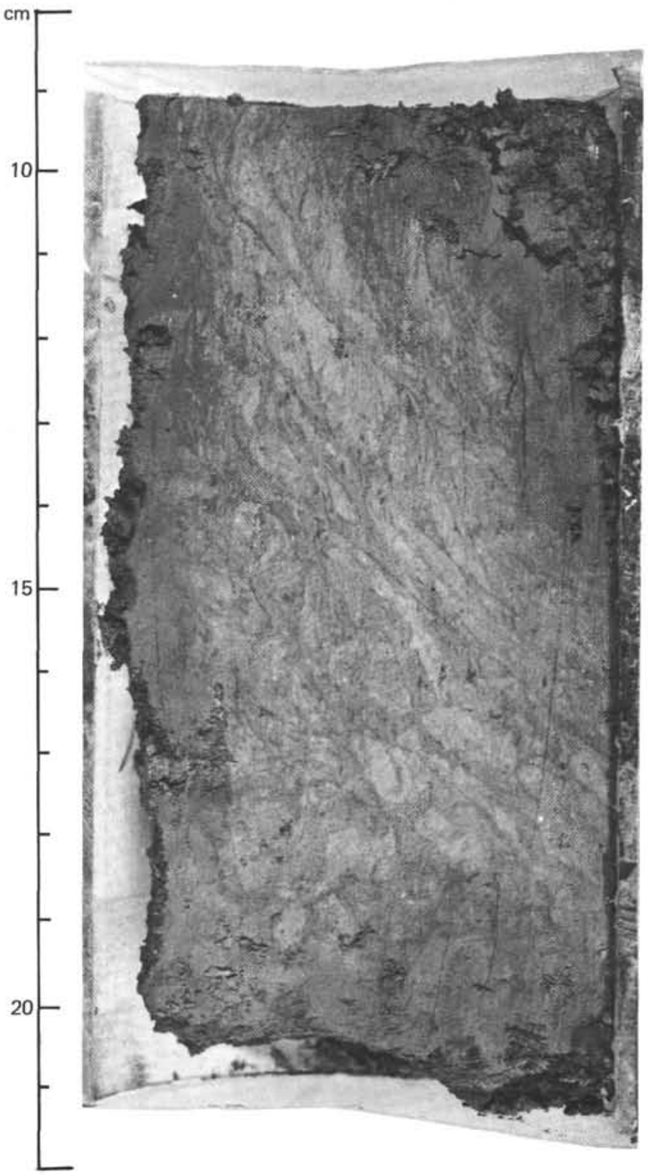

Figure 6. Stratal discontinuity (Sample 492-30-2, 9–21 cm) in consolidated sediment of Unit 2.

sands recovered from Unit 2 are comparable to those cored in the trench (Site 486) and in the deeper portions of Sites 488 and 491 on the lower slope. Based on their lithologic similarity to the modern trench sediments, we favor accumulation of Unit 2 in the late Miocene trench, through deposition in a sizeable lower slope basin cannot be precluded.

BIOSTRATIGRAPHY

Site 492 penetrated an upper Miocene through Quaternary section of mid- and lower slope, and possibly trench sediments (Fig. 1). As at Site 490, there is a miscorrelation between upper Miocene and Pliocene nannofossil and radiolarian zones. The upper Miocene NN11 Zone extends into the lower Pliocene *Spongaster* *pentas* zone, probably as a result of reworking. Redeposition of reworked lower Miocene radiolarians occurs throughout Holes 492 and 492A. In addition, reworked upper Miocene nannoplankton may occur in the Pliocene, and reworked upper Miocene and Pliocene radiolarians occur in the Pliocene and Quaternary.

Radiolarians

Well-preserved radiolarians are common to abundant in nearly all samples in Holes 492 and 492A. Zones range from the middle to late Miocene *Ommatartus antepenultimus* zone to the Quaternary (Fig. 1).

Hole 492

The thin Quaternary section in Cores 1 and 2 is unzoned, but *Axoprunum angelinum* and *Anthocyrtidium angulare* are absent, suggesting an age less than 0.4 m.y. Cores 3 through 8 might be in the *Spongaster pentas* Zone, based on the occurrence of *Spongaster pentas*, *Stichocorys peregrina*, *Ommatartus penultimus*, *Spongaster tetras*, and *O. penultimus* (Riedel and Sanfilippo, 1971; Dinkelman, 1973). Cores 8 through 11 are in the *Stichocorys peregrina* zone, based on the presence of *S. peregrina* and *O. penultimus* and on the lack of *Spongaster pentas* (Riedel and Sanfilippo, 1971). Cores 12 to 21 are in the *O. penultimus* Zone, based on the presence of *Stichocorys delmontensis*, *O. antepenultimus*, *O. hughesi* and on the lack of *S. peregrina* (Dinkelman, 1973). Finally, Cores 21 through 31 are in the *O. antepenultimus* zone, based on the presence of *O. antepenultimus*, the absence of *O. penultimus*, and the appearances of *Cannartus laticonus* and *C. peterssoni* at Cores 27 and 29, respectively (Riedel and Sanfilippo, 1971).

Hole 492A

The radiolarian biostratigraphy of Hole 492A differs somewhat from that of Hole 492, despite the close position of the two sites. Samples 492A-1,CC through 492A-4-1, 30–32 cm are Quaternary, based on the abundance of *Amphirhopalum ypsilon* and *Ommatartus tetrathalamus* and on correlation with the NN20 nannoplankton zone. Samples 492A-4,CC to 492A-7-1, 78–80 cm are early Quaternary or late Pliocene, based on abundant *Anthocyrtidium angulare* and on the presence of *Theocorythium ventulum, Axoprunum angelium*, and *Amphirhopalum ypsilon*. A hiatus exists between late Pliocene/early Quaternary Sample 492A-7-1, 78–80 cm and early Pliocene Sample 492A-7-2, 58–60 cm. The *Spongaster pentas* Zone seems to be missing.

Reworked radiolarians commonly occur in the upper part of Site 492, especially in the Pliocene section of Site 492A. Not only reworked lower Miocene forms, but upper Miocene and Pliocene forms as well, occur. Erosion of these late Miocene, early Pliocene sediments must have taken place very soon after their deposition and was progressive, such that a newly deposited unit was subjected to erosion after a few million years, suggesting the presence of slope currents or downslope instability.

Foraminifers

At Site 492, Cores 1 through 31 penetrated Miocene through Quaternary. In Hole 492 foraminifers are abundant in Cores 1 through 2, rare in Cores 3 through 4, and rare to very rare in Cores 5 through 7. On account of the general scarcity of foraminifers, no biozonal scheme of planktonic foraminifers can be used. In Cores 1 and 2 the following upper Quaternary foraminiferal species are present: *Globorotalia frimbriata, G. menardii, G. tumida, G. ungulata, Globigerinoides ruber, G. triloba, G. sacculifer, Globigerina bulloides, G. falconensis, Neogloboquadrina dutertrei*, and *Pulleniatina obliquiloculata*. Cores 3 through 4 contain the following Pliocene species: *Globorotalia pleistotumida, G. acostaensis, Neogloboquadrina humerosa*, and *Globigerinoides extremes*. The Miocene part of the sedimentary section is barren of foraminifers.

Depositional Environment

In Hole 492 the total absence of the planktonic foraminifers in the Miocene through lower Pliocene (Cores 5–31) indicates deposition below the CCD. Lack of benthic foraminifers indicates unfavorable living conditions on the seafloor, such as a high rate of sedimentation. The upper Pliocene sediments (Cores 3–4) contain relatively abundant and partially preserved planktonic foraminifers, which suggests deposition near the CCD, whereas abundant and well-preserved Quaternary foraminifers indicate deposition above the CCD. The Quaternary benthic foraminifers indicate a lower bathyal association. Typical species are *Planulina wuellerstorfi, Melonis pompiliodes, Hoeglundina elegans* (very large specimens), *Oridosalis umbonatus, Gyroidina soldanii, Sphaeroidina bulloides, Uvigerina hispida*, and *Laticarinina* (large specimens).

Calcareous Nannoplankton

Coccoliths and discoasters contained in the fine fraction of the core catcher samples at Site 492 can be subdivided into four different age groups:

1) Quaternary nannoplankton (0.15–0.6 Ma): In Cores 1 and 2 of Hole 492 and 1 to 3 of Hole 492A, a middle to upper Quaternary nannoplankton assemblage with dominant *Gephyrocapsa oceanica* is assigned to the NN20 (*Gephyrocapsa oceanica* Nannoplankton Zone). Common species are *Gephyrocapsa oceanica, Cyclococcolithus leptoporus, Helicosphaera carteri, Thoracosphaera imperforata, T. heimi, Syracosphaera pulchra*, and *Ceratolithus cristatus*.

2) Upper Pliocene nannoplankton (2.5–2.7 Ma [Perch-Nielsen, 1977]): In Core 3 of Hole 492 and in Core 4 of Hole 492A, an assemblage with common discoasters and without sphenoliths indicates the upper Pliocene NN17 Nannoplankton Zone. Common species are *Discoaster pentaradiatus, D. brouweri, Cyclococcolithus macintyrei, Gephyrocapsa doronicoides, Discolithina* cf. *japonica*, and *Helicosphaera carteri*.

An hiatus occurs above and below the NN17 Nannoplankton Zone, as the NN18 Zone (1.8–2.5 Ma) and the

NN16 Zone (2.7–3.5 Ma) were absent. Below the occurrence of NN17 at Site 492 only sediments with common sphenoliths indicating lower Pliocene age (NN15 and down) are found.

3) Lower Pliocene nannoplankton: From Core 4, Hole 492 and Core 5, Hole 492A to total depth the sphenoliths with *Sphenolithus abies* and *S. neoabies* are those nannofloral elements that endure corrosion in an unfavorable environment best. Nannoplankton assemblages, if present at all, are meager, with occasional *Reticulofenestra pseudoumbilica* and *Discoaster pentaradiatus*. Siliceous microfossils indicate that there has been reworking from upper Miocene up into the lower Pliocene, so that a boundary by means of nannofossils and other microfossils is difficult to draw.

4) Typical index species of Miocene nannoplankton are missing at Site 492. Samples are practically devoid of coccoliths from Core 8 down, except for a few rare sphenoliths, which can be of Miocene or Pliocene age.

Silicoflagellates

At Site 492 three cores in Hole 492 contain abundant silicoflagellates. Comparison with the radiolarian fauna suggests reworking of these assemblages, especially in Core 7. Nevertheless the silicoflagellate assemblages cast light on the origin of the reworked sediment. The assemblages are

Core 7: *Dictyocha rhombica* and *D. fibula* in a ratio of 2:1, which should indicate *D. rhombica* Zone, middle to upper Miocene.

Core 14: *Naviculopsis navicula* permits comparison of this sediment with Site 158/11,CC of Leg 16, described by Bukry, 1973. Upper Miocene.

Core 26: Assemblage with predominant *Dictyocha rhombica*. *Dictyocha rhombica* Zone (Martini, 1976), middle to upper Miocene.

SEDIMENT ACCUMULATION RATE

A sediment accumulation rate curve, based on biostratigraphic data (Fig. 7), shows low but variable rates of sediment accumulation. The accumulation rate of Quaternary sediments in Hole 492 in Cores 1 to 3 is 36.4 m/m.y. A hiatus separates these sediments from Pliocene Cores 4 through 9. The accumulation rate in this interval is low (4.2 m/m.y.) below the hiatus but increases downhole at 24. m/m.y. The late Miocene accumulation rate is also relatively low at 38.2 m/m.y. Site 492 differs from the other two lower slope sites overlying the zone of dipping reflectors (Site 488 and 491) in that the sediment accumulation rate is relatively low for the entire section above inferred uplifted trench deposits. Some of the greater lower slope accumulation rates at Sites 488 and 491 could be due to slumping, but the sparseness of the planktonic microfossil content at these two sites suggests that this process has not been the primary cause of rapid sedimentation. Instead, there has probably been a real difference in the processes of lower slope deposition in late Miocene sediments at Site 492, as compared to Pliocene and Pleistocene lower slope processes at Sites 491 and 488.

PALEOBATHYMETRY AND VERTICAL TECTONICS

The paleobathymetry of Site 492 is based on the following points: The present water depth of 1975 meters, a point where the seafloor passes through the CCD at 3 km 5.5 Ma, the occurrence of a trace fossil assemblage composed of *Teichichnus, Chondrites*, and *Zoophycos* in Core 492-14 of inferred water depth of 4 km or greater and inferred 10 m.y. old trench sediments deposited at 6 km (McMillen and Bachman, this volume) (Fig. 8). Uplift, determined by subtracting sediment thickness from the seafloor curve, yields 180 m/m.y. down to 5.5 Ma and increases to 500 to 710 m/m.y. in sediments older than 5.5 m.y.

PALEOMAGNETISM

Paleomagnetic analyses at Site 492 established magnetostratigraphy and determined dips of beds. Cores from the upper 32 meters in Hole 492 are disturbed by drilling and show laminations concave downward along core margins. Cores deeper than 70 meters in Hole 492 are separated into pieces of several centimeters in thickness which are rotated relative to one another. Cores from 100 to 225 meters have irregular bedding possibly caused by slumping or tectonic folding. Cores from the upper 15 meters in Hole 492A are not disturbed, although cores from the lower part show flow-in. Forty-six and 33 oriented samples were collected from less disturbed portions of core in Holes 492 and Hole 492A, respectively.

Stability of remanent magnetization of selected samples was examined with stepwise AF demagnetization (Niitsuma, this volume). All samples were cleaned with 15 mT AF demagnetization. Average intensity of magnetization of samples of $10^{-6.6\pm0.6}$ emu/cc after 15 mT AF demagnetization, and noise level was $10^{-8.0\pm0.8}$ emu/cc. There are two intervals with weak intensity ($10^{-7.6\pm0.4}$ emu/cc) in Hole 492, ranging from 20 meters to 35 meters and from 60 meters to 70 meters.

The measured inclinations are corrected for dip. Inclination of upper 60 meters in Hole 492 changes sign frequently and is accompanied by declination changes of about 180°. Cores from 60 meters to 183 meters of the hole have mainly positive inclination (Fig. 1). Cores from 183 to 260 meters show both positive and negative inclination. Cores in Hole 492A have mainly positive inclination with four small intervals where inclination is negative and declination changes about 180°. The upper 60 meters of Hole 492 correlates with the interval from the Brunhes normal polarity Epoch 1 and to the Gilbert reversed polarity Epoch 4, and the interval with positive inclination below 60 meters in Hole 492 with Epoch 5. Polarity Epochs 5 through 9 are apparently represented in sediments from 130 meters to 260 meters. The difference in magnetic polarity sequence between Hole 492

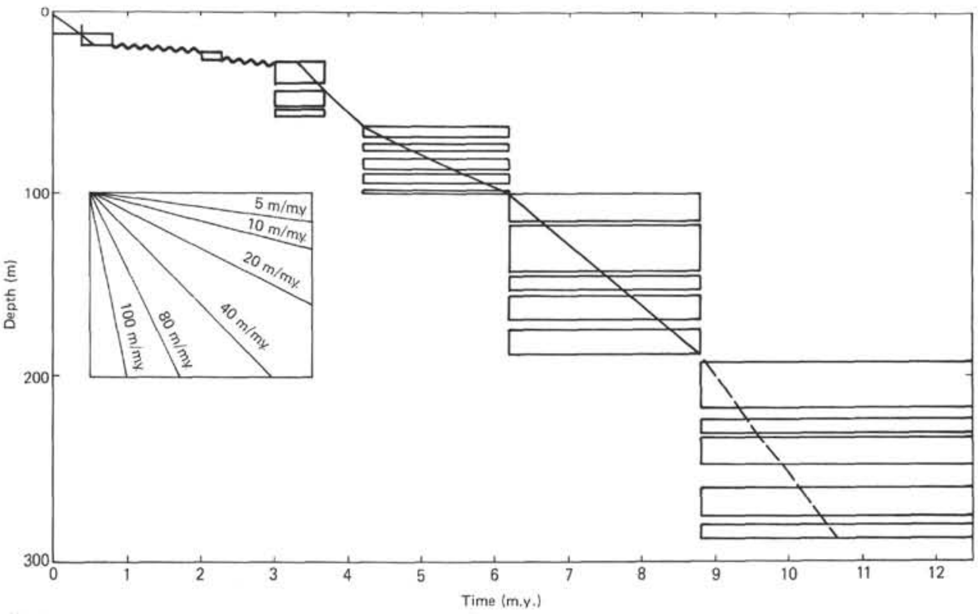

Figure 7. Sediment accumulation rates for Site 492.

Figure 8. Paleobathymetry (dashed line) and vertical tectonics (solid line) for Site 492. Control points: CCD is the carbonate compensation depth level at 5.4 m.y., TF is the location of the *Zoophycos-Chondrites-Teichichnus* trace fossil assemblage indicative of water depths in excess of 4 km, and SF is the location of the sandy facies interpreted as trench fill. The tectonic uplift curve is derived from bathymetry by subtracting the thickness of sediment accumulation at any given time. See McMillen and Bachman (this volume) for details.

and Hole 492A suggests the existence of a hiatus in the latter hole (see Niitsuma, this volume).

Dip of Bedding Plane

Sediments of Hole 492 dip from 14° to 74° with overturning in depth of 120 meters. Dips calculated from magnetic inclination and declination are generally southeastern direction (Niitsuma, this volume). The scattered direction of dips is probably caused by slumping or possibly tectonic folding.

ORGANIC GEOCHEMISTRY

The shipboard organic geochemistry monitoring program consisted of analysis of gases released in core liners; determination of organic carbon, hydrogen, nitrogen, and carbonate content of selected sediment samples; and visual inspection for fluorescence in split core.

Gases

Moderate amounts of gas were released in core liners from depths of about 30 meters and below. The gas initially contained methane, CO_2, and small amounts of H_2S. The last, detectable by its distinctive odor, was present down to depths of about 40 meters. Methane content remained fairly constant with depth (Fig. 9) except for minima in the vicinity of 50, 115, 215, and 275 meters. These intervals correspond closely with intervals of friable sediments, which resulted in substantial gas and sediment loss from washout and dilution of core liner gas with air gases.

At depths shallower than about 40 meters, ethane content was below the detection limit of the Carle gas chromatograph but then increased rapidly and maintained a concentration of about 0.03% by volume. The methane to ethane ratio (Fig. 9) maintained a value of about 4×10^{-4} throughout the cored section, with two

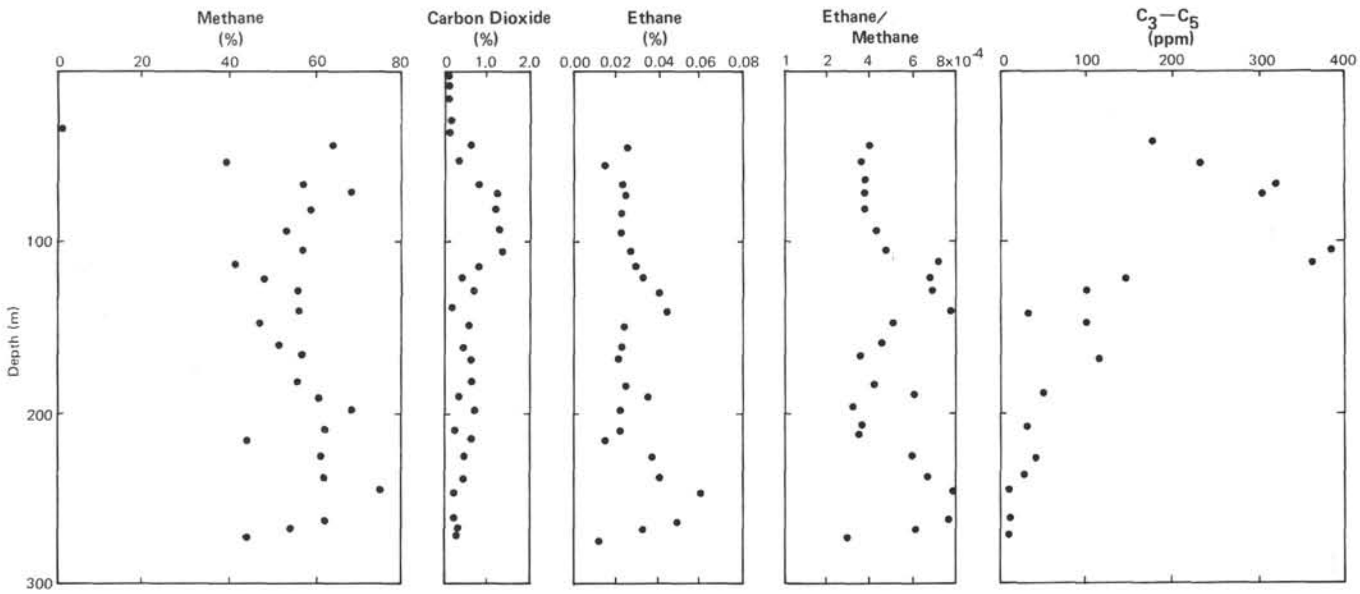

Figure 9. Composition of core liner gas, Site 492.

notable exceptions, one in an interval at about 125 meters and another at 250 meters. Except for the occurrences of the highest concentrations of ethane in these intervals, there is no clear explanation for the high ratios.

CO_2 content in core liner gases varied from 0.03% to 1.27%, with the highest concentrations occurring in the interval from 75 to 100 m.

Hydrocarbons in the C_3 to C_5 range were monitored on the Hewlett-Packard 5710-A gas chromatograph from a depth of 40 meters to TD. Their abundance was found to begin at moderate concentrations, reach a maximum in the zone from 75 to 100 meters, and then decrease rapidly with depth, as shown in Figure 9.

Gas Hydrate

In Hole 492, upon splitting of Cores 16 and 19, a frozen, gas-releasing ash aggregate was observed (Fig. 10). Prompt confinement of different fragments of this ash in closed containers permitted determination of the composition of gas evolved from fragments from Core 16. The gas composition is very similar to the gases collected from the core liner for the respective depth interval. The porosity of the ash, 46%, gives a gas content of up to 7 times the volume of pore fluids in Core 16 and 20 times in Core 19. Considering the pressure and temperature conditions (~207 atm and ~5.9°C) for the Core 16 interval, the gas content of the interstitial fluids of the frozen ash aggregate are above methane saturation and well within the gas hydrate stability field. The amount of gas released by the frozen ash layer, as detected on the surface and after core splitting, is lower than the maximum *in situ* gas content. The higher than saturation gas content of pore fluids existing under hydrate stability conditions in Core 16 seems to indicate the probable presence of gas hydrates in this ash layer.

Fluorescence

Split cores showed no evidence of fluorescence due to crude oil or bitumen impregnation.

Organic Carbon, Hydrogen, Nitrogen, and Carbonate

Samples for CHN and carbonate analysis were taken from selected cores and analyzed as indicated in the report for Site 487. Within the cored sequence, the organic carbon content varied from 0.53% to 2.31% and the total nitrogen content from 0.05% to 0.22%. The organic potential of the sediments decreased with depth.

The C/N ratio varied from 12.1 to 16.3, remaining approximately constant throughout the hole. This is in the range for organic matter associated with recent sediments (Fairbridge, 1972) and suggests that the organic matter present in these sediments has a low degree of thermal maturation. Carbonates were detected throughout the whole cored interval, ranging from 1% to 51% and higher for the upper portion of the hole.

Conclusions

Gases, mainly of biogenic origin, were detected throughout this hole, causing a low to moderate degassing of the cores. The organic potential of the sediments stayed at an intermediate level through the hole and was marginally higher for the upper section. The C/N ratio of the organic matter suggests a low degree of geothermal maturation. No evidence of petroleum or bitumen impregnation was detected.

Heavier hydrocarbons C_3 to C_5 varied erratically with depth without evidence of an increase in geothermal maturation. The origin of these gases is not known. They may originate in more geothermally matured sedi-

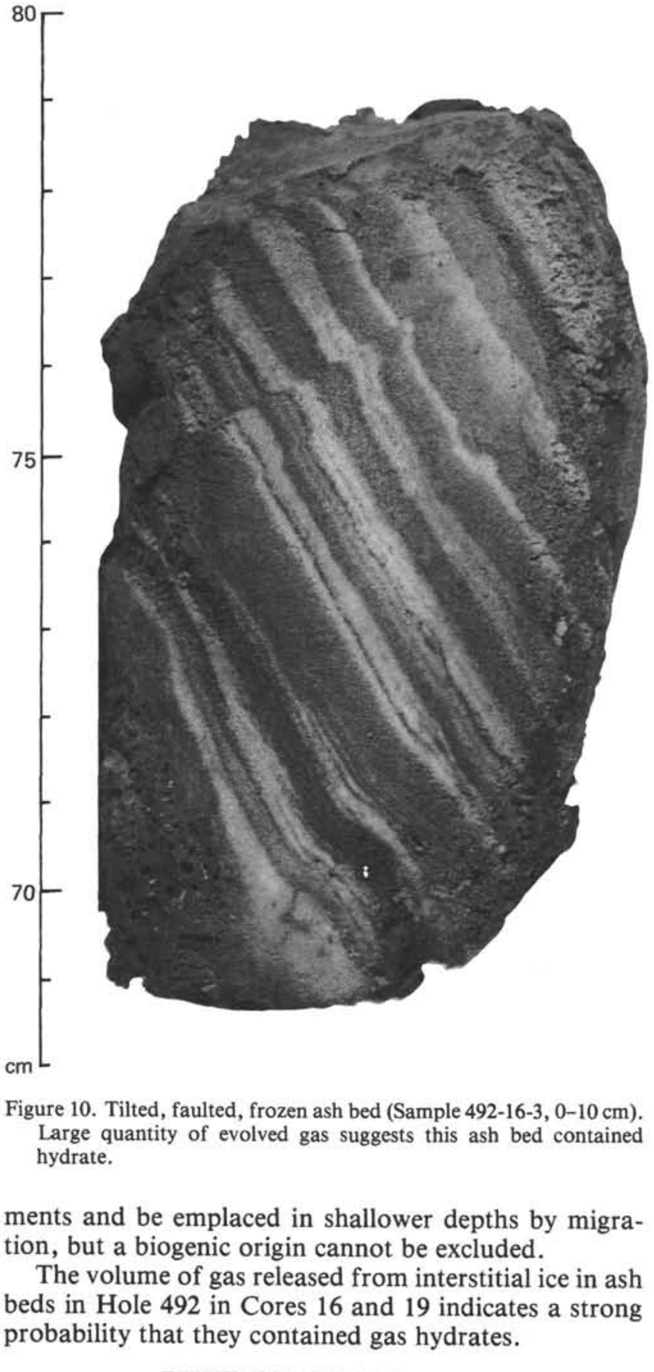

Figure 10. Tilted, faulted, frozen ash bed (Sample 492-16-3, 0–10 cm). Large quantity of evolved gas suggests this ash bed contained hydrate.

ments and be emplaced in shallower depths by migration, but a biogenic origin cannot be excluded.

The volume of gas released from interstitial ice in ash beds in Hole 492 in Cores 16 and 19 indicates a strong probability that they contained gas hydrates.

PHYSICAL PROPERTIES

Physical property analyses of Site 492 sediments included porosity, water content, wet bulk density, and undrained shear strength (Figs. 11 and 12) (see Boyce, 1976, for discussion of methods). Gas attenuation limited compressional sound velocity measurements. Physical property measurements are summarized separately for Hole 492, cored by standard rotary techniques, and Hole 492A, cored with the hydraulic piston corer. No physical property measurements were performed on the single sand-rich core from Hole 492B.

Hole 492

Two trends are evident in the physical properties of Hole 492: gradual decrease in porosity and water content and an increase in density occurs to 110 meters subbottom, which, if interpolated, would connect with data below 200 meters. Between 100 meters and 160 meters the reversal in physical property trends may result from increasing amounts of gas expansion, although this alone cannot account for the anomalies in water content.

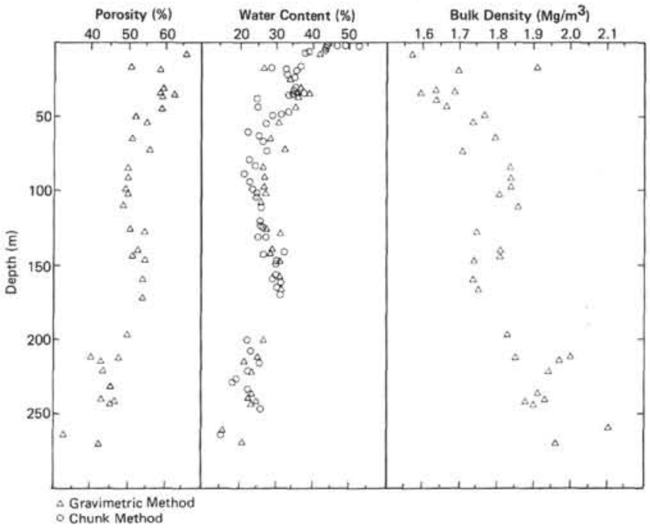

Figure 11. Physical properties summary profiles, Hole 492.

Porosity decreases from 66% at 8.0 meters to 49% at 110 meters (Fig. 11). Below 110 meters porosity increases (54% at 160 m), then decreases to a minimum of 42% at 272 meters. Water content decreases from 35% at 0.50 meters to 25% at 100 meters. Below 110 meters, water content increases, then decreases to 27% at 272 meters. Bulk density increases gradually from 1.57 Mg/m^3 at 8.0 meters to 1.86 Mg/m^3 at 110 meters. Below 110 meters density decreases to 1.74 Mg/m^3 at 160 meters, then increases to a maximum of 1.96 Mg/m^3 at 272 meters.

Shear strength increases from 5.9 kPa at 1.40 meters to 119.6 kPa at 47.9 meters (Fig. 12). Scatter in the shear strength profile results from variations in silt:clay ratios and degree of drilling disturbance.

Hole 492A

Physical property results of Hole 492A, drilled by hydraulic piston corer, are very similar to those obtained in the upper 50 meters of Hole 492 (Fig. 12). Only subtle variations are evident in porosity, water content, and bulk density; however, shear strength results are less scattered and generally higher, suggesting decreased disturbance due to the coring procedure. Detailed comparison of the physical property results, including consolidation testing, using both the rotary drilling and piston core technique can be found in Shephard et al., this volume.

The unusually high shear strengths of Hole 492A sediments at shallow depths severely limited the capability of the hydraulic piston corer. When shear strengths exceeded 75 kPa, core liner collapse and "flow-in," evident as smeared vertical laminations, reduced the amount of undisturbed core recovered. In areas with

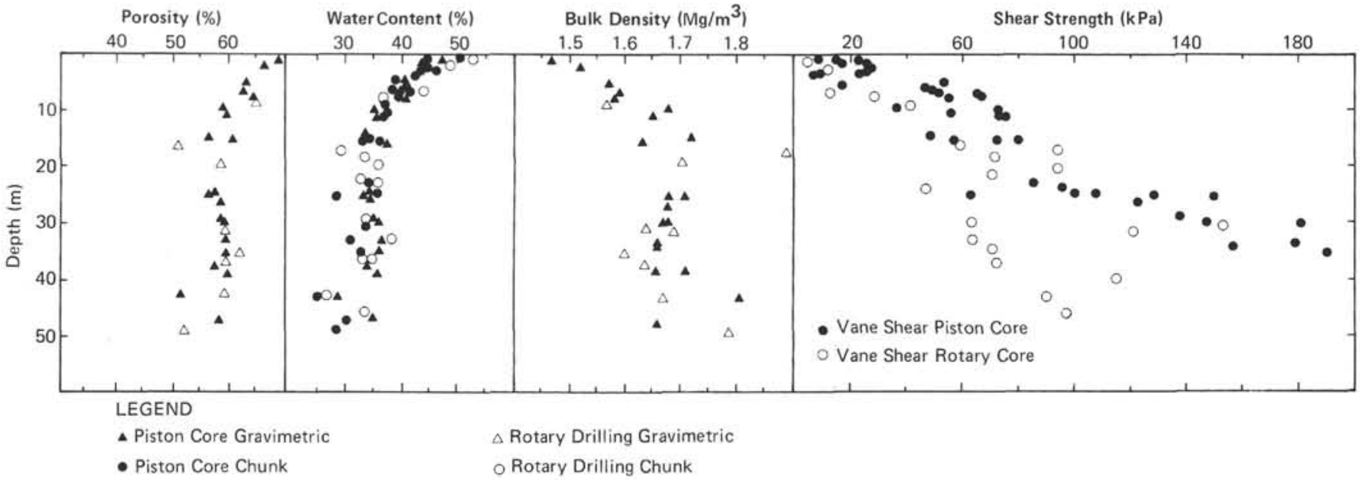

Figure 12. Physical property summary comparing samples obtained by rotary drilling (Hole 492) with those from piston coring (Hole 492A).

dicted from conventional heat flow data (Langseth and Von Herzen, 1970). This value places the strong reflection subparallel to the seafloor (at about 0.6 s sub-bottom) near the phase boundary for methane hydrates. The gradient is similar to the minimum gradient predicted by Shipley et al. (1979) for this area (2.1°C/100 m) and further supports the argument that the reflection represents the change from hydrated sediments above the reflector to nonhydrated sediments below. See Shipley and Shephard (this volume) for a discussion of the logging data.

CORRELATION OF SEISMIC REFLECTION DATA AND DRILLING RESULTS

At Site 492 we penetrated the shallow-dipping reflectors of seismic Line MX-16 which, as at Sites 488, 490, and 491, are used to define the zone of landward-dipping reflectors. Multichannel seismic reflection records that cross over Site 492 (Figs. 13 and 14) show numerous high-amplitude subparallel landward-dipping reflectors up to about one kilometer in length. The suspected base of the methane hydrate reflection (Shipley et al., 1979) is subparallel to the slope at about 0.6 s sub-bottom.

The multichannel data gives a velocity of about 2.1 km/s from the seafloor to the reflector at 0.6 s sub-bottom. Using this velocity, the first landward-dipping reflection occurs at 220 meters (0.21 s) and a second, weaker reflection at 262 meters (0.25 s). The total depth of Site 492 is 290 meters, or 0.28 s sub-bottom (Fig. 13). The first strong reflection at 220 meters might correlate with the silty transition zone at about 230 meters (Unit 1), it should probably be correlated with the sand beds beginning at the top of Unit 2 at 247 meters (Fig. 15).

As at earlier sites, the dipping reflectors correlate in a general way with the first occurrence of significant sands. These reflections may originate from interbedded muddy silts and sands, presumably uplifted trench deposits. The inexact correlation with the seismic data may be caused by velocity errors, location errors, or by the thickness of some of the beds or groups of beds which produce the reflections.

SUMMARY AND CONCLUSIONS

Site 492 is located in 2 km of water on the inner slope of the Middle America Trench. Here we penetrated 290 meters and recovered 43 cores comprising two lithologic units. Unit 1 extends from 0 to 247 meters and consists predominantly of upper Miocene to Quaternary muddy silt–siltstone. Upper Miocene muddy siltstone with interbedded sand and granular gravel constitutes Unit 2, cored between 247 and 290 meters. The maximum sediment accumulation rate for most of Unit 1 is 35 m/m.y.; the sedimentation rate for Unit 2 is unknown because of limited penetration.

The level of distribution of calcareous microfossils and depth diagnostic trace fossils define a paleobathymetric curve, indicating that Site 492 underwent an initial uplift rate of 500 to 700 m/m.y. until about 5.5 Ma, after which the uplift slowed to a rate of about 180 m/m.y. The higher rate is comparable to that observed at Site 488 at the base of the slope, and the lower rate approaches that observed at Site 490 upslope.

At Site 492 the intensity of deformation is greater at shallow depths than at any other mid- or lower-slope site. Bedding in Unit 1 ranges from horizontal to overturned and locally defines several folds. Discrete inclined fractures occur commonly only below 200 meters, whereas hackly fractures and fissility are well developed below 110 meters. Muddy siltstone intervals below 250 meters resemble "scaly mudstone" where they are cut by slickensided anastomosing fractures. Stratal discontinuity occurs locally.

The multichannel seismic reflection profile through Site 492 shows a series of poorly defined slope-parallel reflectors from 0.0 to 0.2 s sub-bottom covering numerous high-amplitude landward-dipping reflectors. The dipping reflectors correlate with the first occurrence of significant sand beds, as is the case at Sites 488 and 491.

The interpretation of the depositional environment of Site 492 hinges on both lithology and paleontology, with appropriate comparisons to the modern setting and the results at Site 488. The muddy silts of Unit 1 above

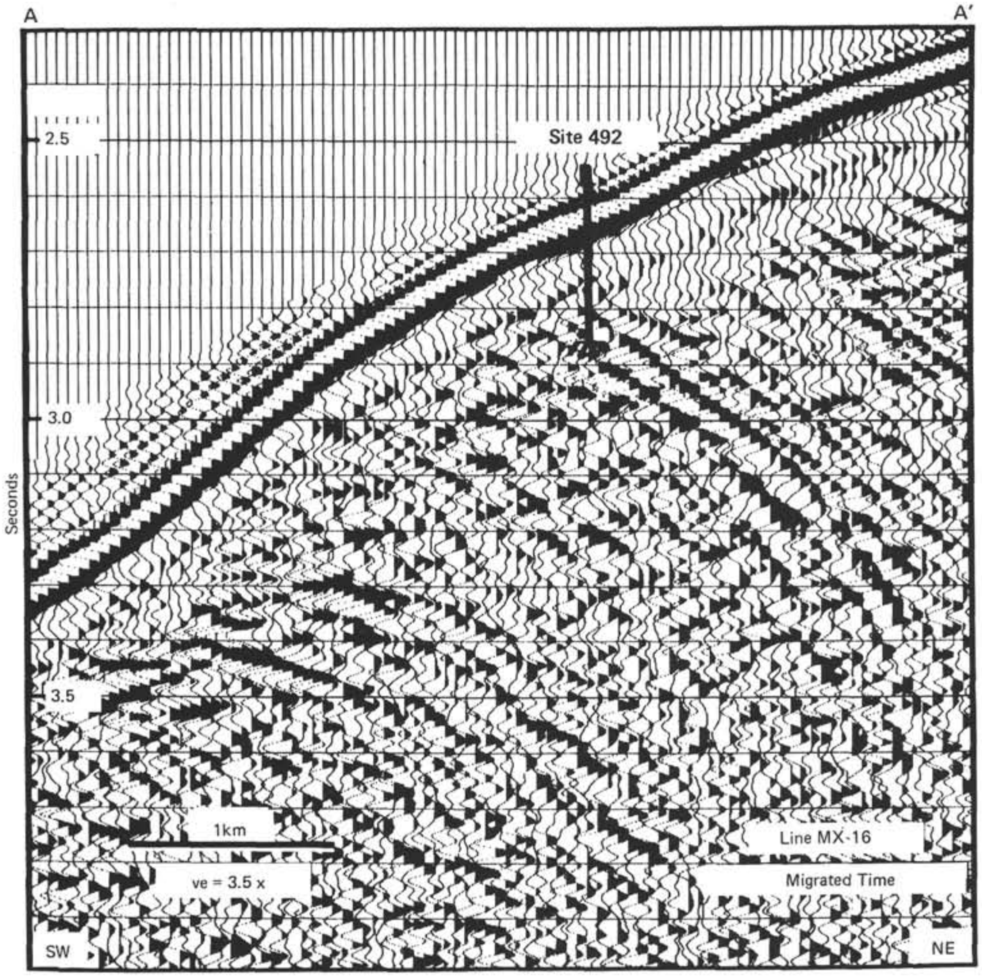

Figure 13. Migrated time section oriented northeasterly (downslope) through Site 492. Location of this line shown in Figure 2.

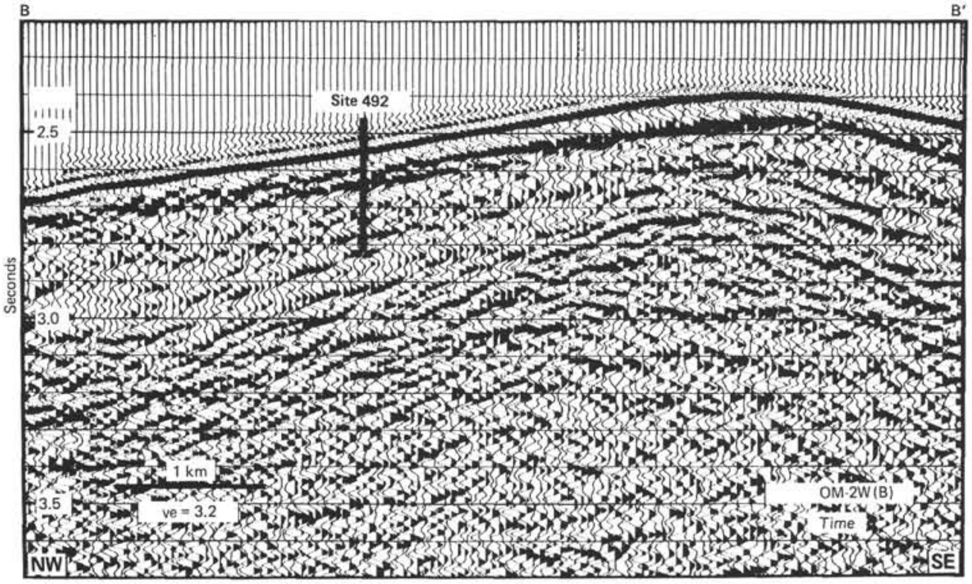

Figure 14. Migrated time section oriented northwesterly (along slope) through Site 492. Location of this line shown in Figure 2.

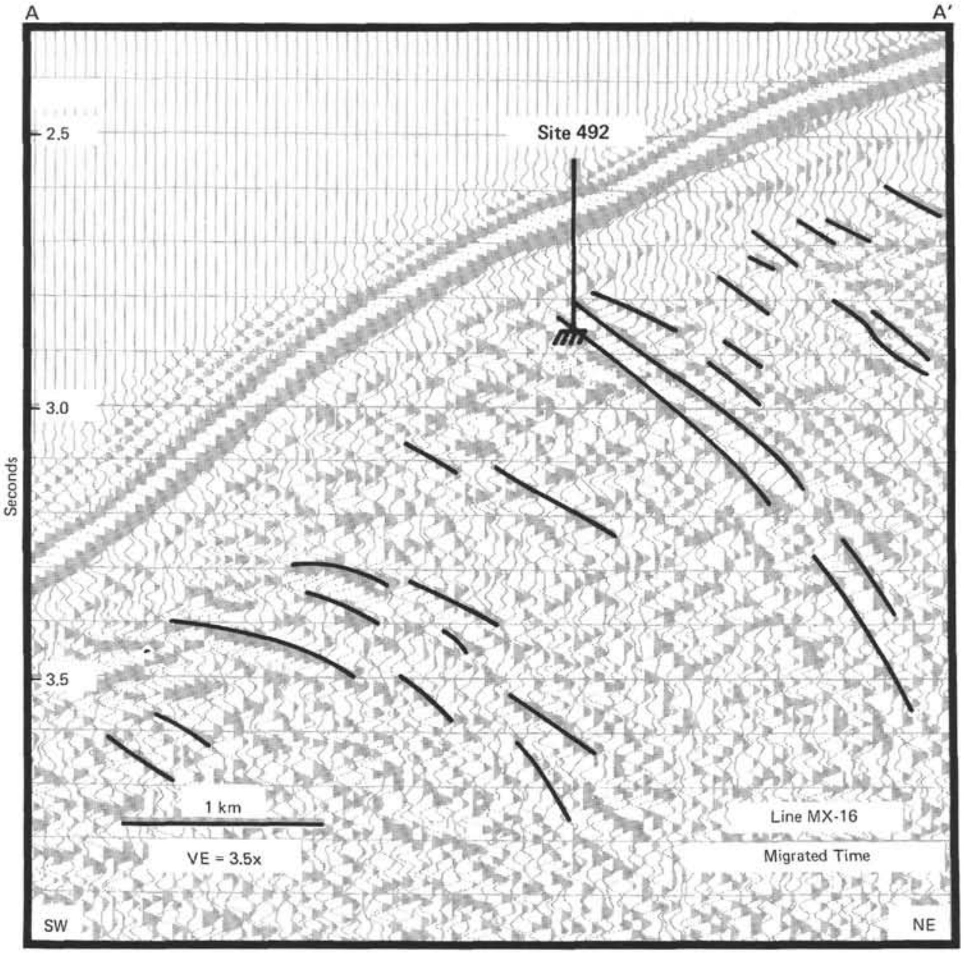

Figure 15. Line drawing interpretation of seismic profiles through Site 492.

shear strength profiles more typical of normally consolidated sediments, the difference in physical properties using these two techniques would probably be much more pronounced.

DOWNHOLE INSTRUMENTS

Failure of the bit release and our inability to remove the go-devil used for releasing the bit made open hole logging at Hole 492B impossible. Gamma-ray, neutron, and temperature logs were run inside the pipe to a total depth of 255 meters sub-bottom. The neutron log failed, and the gamma-ray log is difficult to interpret because of the various pipe joints, drill collars, and bumper subsections.

The temperature log records a thermal gradient of about 2.2°C/100 m. The gradient is higher than pre-50 meters accumulated near the CCD, probably within 1 km of their current depth on the midslope. The trace fossil assemblage and sediments barren of calcareous microfossils in Unit 1 suggest deposition at depths of 4 km or greater. The barren mudstones and associated sand with granular gravel of Unit 2 accumulated below the CCD in a channel or turbidite basin of the lower slope or trench. The interbedded sand and mudstone at Site 492 correlate with the landward-tilted reflectors, as do similar lithologies at Site 488, which were interpreted as trench deposits. The sediment accumulation rate for the lower portion of Unit 1 is less than that of comparable sequences at Site 488 and 491, suggesting that in the late Miocene the sediment flux to the trench and lower slope was lower than in the Pliocene and Pleistocene.

Deformation occurred before 5 Ma in probable lower slope and/or trench deposits that were undergoing relatively rapid uplift. The contact with the overlying undeformed lower to midslope deposits is gradational. As at Site 491, the results here suggest early complex deformation during the initial deposition of trench and/or lower slope deposits with diminishing intensity of tectonism as this sequence is elevated to midslope.

Hydrocarbon gases in the C_1 to C_5 range were detected throughout this hole, causing a low to moderate degassing of the cores. The C_3–C_5 content decreases in the lower sections of the hole, with a maximum near 120 meters. Gas-releasing frozen sediments were observed at the 140.95 to 141.0 meter and 169.5 to 169.57 meter intervals. The respective gas-generating ratios (volume gas released/volume fragment) of 3.3 and 9.4 suggest the presence of hydrate sediments.

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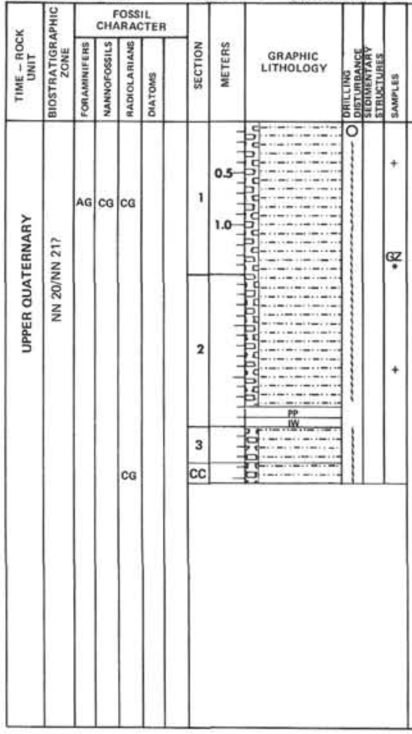
SITE 492 HOLE CORE 1 CORED INTERVAL 0.0–3.5 m



LITHOLOGIC DESCRIPTION

Grayish olive green (5GY 3/2) soupy to soft CALCAREOUS MUDDY SILT. Locally FORAMINIFERAL MUDDY SILT (up to 10% foraminifers).

SMEAR SLIDES

	Carbonaceous muddy silt 1-145 (D)
TEXTURE:	
Sand	5
Silt	47
Clay	48
COMPOSITION:	
Quartz	39
Feldspar	10
Mica	5
Heavy minerals	3
Pyrite	2
Clay	25
Glass	TR
Carb. unspec.	5
Foraminifers	5
Nannofossils	4
Diatoms	1
Sponge spicules	1
Plant fragments	TR

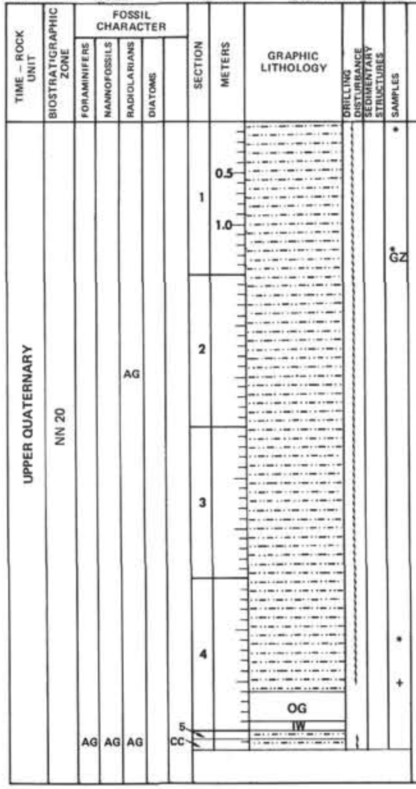
GRAIN SIZE

	1-140
Sand	4.3
Silt	57.6
Clay	38.1

ORGANIC CARBON AND CARBONATE

	1-44	2-98
% Organic Carbon	–	2.3
% $CaCO_3$	9	2.0

SITE 492 HOLE CORE 2 CORED INTERVAL 3.5–13.0 m



LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), soft to firm, mottled slightly where firm with minor amounts of lighter-colored (dusky yellow green, 5GY 5/2) muddy silt. Occasional small (1–2 mm) concentrations of sponge spicules. Section 2, 60 cm: 4 mm spot of pyrite crystals.

SMEAR SLIDES

	Muddy silt 1-10 (D)	Muddy silt 1-130 (D)	Pyrite concentration 4-60 (M)
TEXTURE:			
Sand	5	5	–
Silt	50	48	–
Clay	45	47	–
COMPOSITION:			
Quartz	60	50	–
Feldspar	10	15	–
Mica	4	5	–
Heavy minerals	2	3	–
Pyrite	2	2	100
Clay	15	20	–
Glass	1	1	–
Carb. unspec.	3	2	–
Foraminifers	2	1	–
Nannofossils	TR	TR	–
Radiolarians	TR	TR	–
Diatoms	TR	TR	–
Sponge spicules	1	1	–
Silicoflagellates	–	TR	–
Plant fragments	TR	TR	–

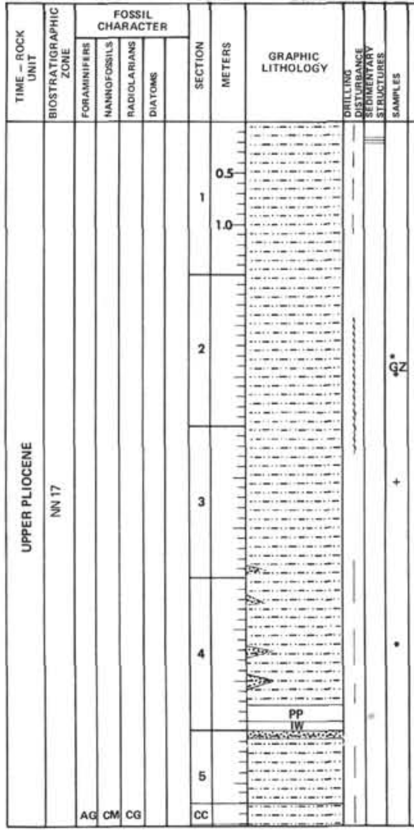
GRAIN SIZE

	1-130
Sand	3.6
Silt	60.0
Clay	36.4

ORGANIC CARBON AND CARBONATE

	4-105
% Organic Carbon	–
% $CaCO_3$	8

SITE 492 HOLE CORE 3 CORED INTERVAL 13.0–22.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILT grayish olive green (5GY 3/2), soft to firm, vague broad parallel laminations of lighter (dusky yellow green, 5GY 5/2) muddy silt at Section 1, 15–20 cm. Minor VITRIC MUDDY SILT at Section 2, 91 cm. Mottled Section 1, 80 cm to Section 2, 40 cm with irregular rounded lumps of firm muddy silt set in soft muddy silt – possibly due to coring. Minor amounts of interbedded olive gray (5Y 3/2) GLAUCONITIC MUDDY SAND below Section 3, 140 cm. Occasional sponge remains.

SMEAR SLIDES

	Muddy silt 2-90 (D)	Vitric muddy silt 2-91 (M)	Glauconitic muddy sand 4-69 (M)
TEXTURE:			
Sand	2	TR	35
Silt	53	60	25
Clay	45	40	40
COMPOSITION:			
Quartz	58	48	49
Feldspar	10	10	5
Mica	2	2	3
Heavy minerals	2	1	2
Pyrite	3	1	1
Clay	20	25	20
Glass	1	10	TR
Glauconite	TR	–	12
Carb. unspec.	3	1	4
Foraminifers	–	TR	1
Nannofossils	TR	TR	3
Diatoms	TR	1	–
Sponge spicules	1	1	TR
Plant fragments	TR	–	–

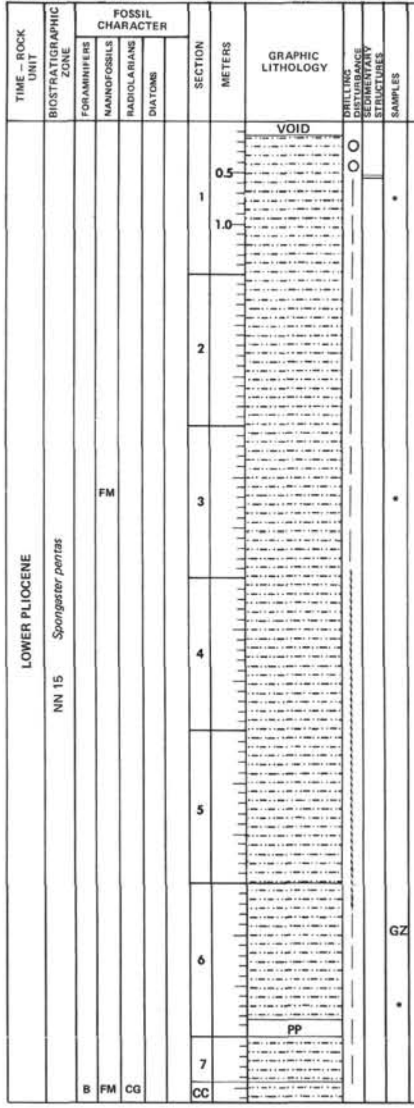
GRAIN SIZE

	2-90
Sand	10.3
Silt	52.0
Clay	37.7

ORGANIC CARBON AND CARBONATE

	3-58
% Organic Carbon	1.8
% $CaCO_3$	5.0

SITE 492 HOLE CORE 4 CORED INTERVAL 22.5–32.0 m



LITHOLOGIC DESCRIPTION

5GY 3/2

MUDDY SILT grayish olive green (5GY 3/2), firm to soft. Minor irregular lighter colored (light olive, 10Y 5/4) areas of slightly calcareous muddy silt. Lens of greenish black (5G 2/1) GLAUCONITIC MUDDY SILT at Section 1, 80 cm. At Section 5, 52 cm 2 mm light olive brown (5Y 5/6) nodule-zeolite(?). Section 6 is MUDDY SILT, grayish olive green (5GY 3/2).

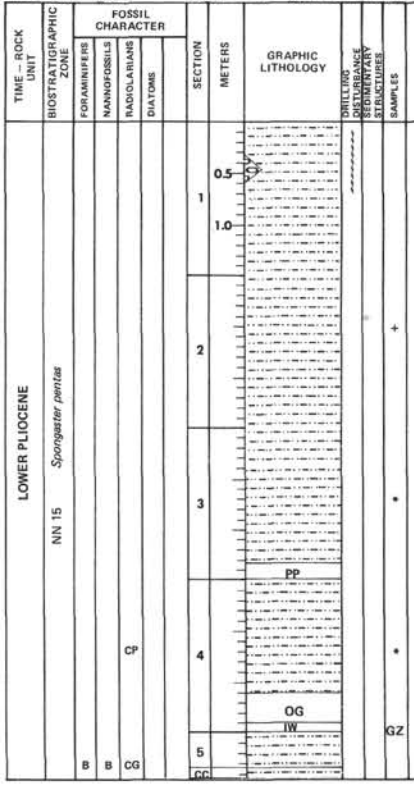
SMEAR LSIDES

	Glauconitic muddy silt 1-80 (M)	Mud 3-74 (D)	Muddy silt 6-127 (D)
TEXTURE:			
Sand	15	1	3
Silt	55	39	57
Clay	30	60	40
COMPOSITION:			
Quartz	53	38	51
Feldspar	4	6	5
Mica	1	3	3
Heavy minerals	TR	TR	TR
Pyrite	12	2	2
Clay	20	50	35
Glass	–	TR	–
Glauconite	10	TR	–
Foraminifers	–	TR	–
Nannofossils	TR	TR	TR
Radiolarians	TR	–	TR
Diatoms	TR	TR	2
Sponge spicules	TR	1	2
Silicoflagellates	TR	–	TR

GRAIN SIZE

	6-55
Sand	5.5
Silt	64.0
Clay	30.5

SITE 492 HOLE CORE 5 CORED INTERVAL 32.0–41.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILT grayish olive green (5GY 3/2), soft to firm. Small (2 cm) spots of grayish yellow green (5GY 7/2) slightly calcareous material at Section 1, 45 and 66 cm. Slight mottling with grayish blue green (5BG 5/2) below Section 4, 70 cm.

SMEAR SLIDES

	Muddy silt 3-70 (D)	Muddy silt 4-72 (M)
TEXTURE:		
Sand	3	1
Silt	52	69
Clay	45	30
COMPOSITION:		
Quartz	52	61
Feldspar	5	5
Mica	3	2
Heavy minerals	TR	TR
Pyrite	1	1
Clay	35	30
Glauconite	–	TR
Nannofossils	TR	–
Radiolarians	TR	TR
Diatoms	3	1
Sponge spicules	1	TR
Silicoflagellates	TR	–

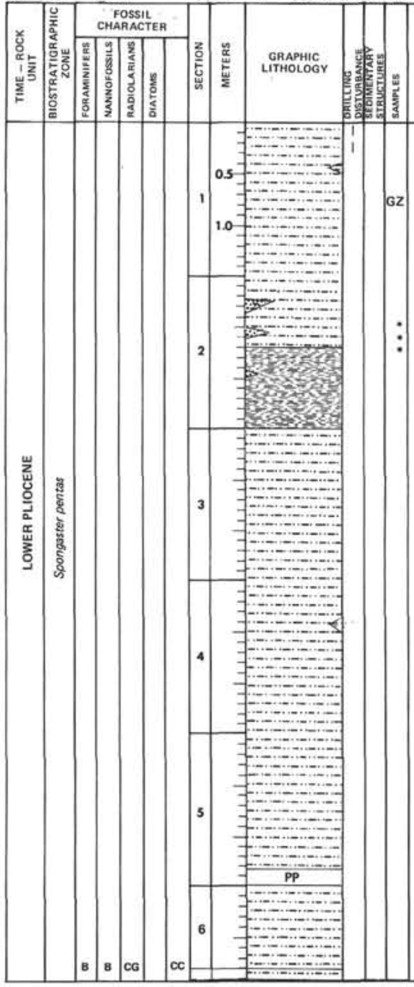
GRAIN SIZE

	5-7
Sand	6.6
Silt	62.1
Clay	31.3

ORGANIC CARBON AND CARBONATE

	2-50
% Organic Carbon	1.8
% $CaCO_3$	4.0

SITE 492 HOLE CORE 6 CORED INTERVAL 41.5–51.0 m



LITHOLOGIC DESCRIPTION

MUDDY SILT grayish olive green (5GY 3/2), soft to very firm. Minor ASH spot at Section 1, 40 cm and Section 4, 50 cm, dispersed in Section 6. Glauconite concentrations interbedded at Section 2, 30 cm, 55 cm, and 95 cm. MUD interbed at Section 2, 70–150 cm. Scattered wood fragments at Section 4, 35–90 cm and Section 5, 0–45 cm. At Section 6, 0–3 cm 4.5x3 cm LIMESTONE nodule, grayish green (10GY 5/2) with internal mottling – probably bioturbated.

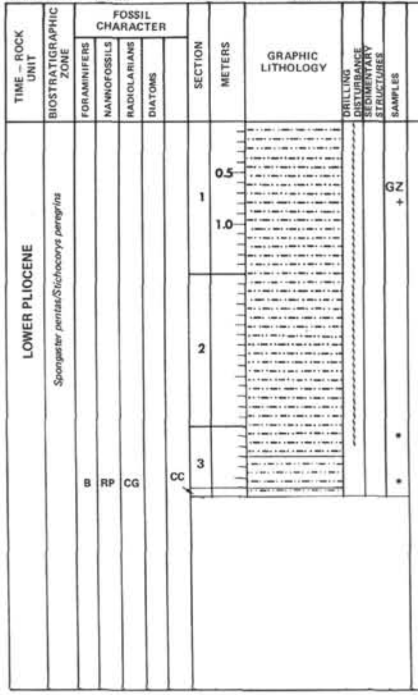
SMEAR SLIDES

	Muddy sand 2-56 (M)	Muddy silt 2-64 (D)	Mud 2-78 (D)
TEXTURE:			
Sand	40	2	1
Silt	20	53	40
Clay	40	45	59
COMPOSITION:			
Quartz	49	48	36
Feldspar	5	5	6
Mica	2	2	2
Heavy minerals	TR	TR	TR
Pyrite	4	2	1
Clay	35	40	50
Glauconite	5	TR	TR
Foraminifers	TR	–	–
Nannofossils	TR	TR	–
Radiolarians	TR	TR	TR
Diatoms	TR	1	2
Sponge spicules	TR	2	3
Silicoflagellates	–	–	TR

GRAIN SIZE

	1-80
Sand	17.9
Silt	60.9
Clay	21.2

SITE 492 HOLE CORE 7 CORED INTERVAL 51.0–60.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILT grayish olive green (5GY 3/2), soft and very firm grayish olive green (5GY 3/2) MUDDY SILT with minor pale olive areas (10Y 6/2).

SMEAR SLIDES

	Mud	Muddy silt
	3-17 (D)	3-57 (D)
TEXTURE:		
Sand	2	4
Silt	30	66
Clay	68	30
COMPOSITION:		
Quartz	28	56
Feldspar	6	5
Mica	2	3
Heavy minerals	TR	TR
Pyrite	1	2
Clay	58	30
Nannofossils	TR	TR
Radiolarians	TR	TR
Diatoms	2	1
Sponge spicules	3	3
Silicoflagellates	TR	–

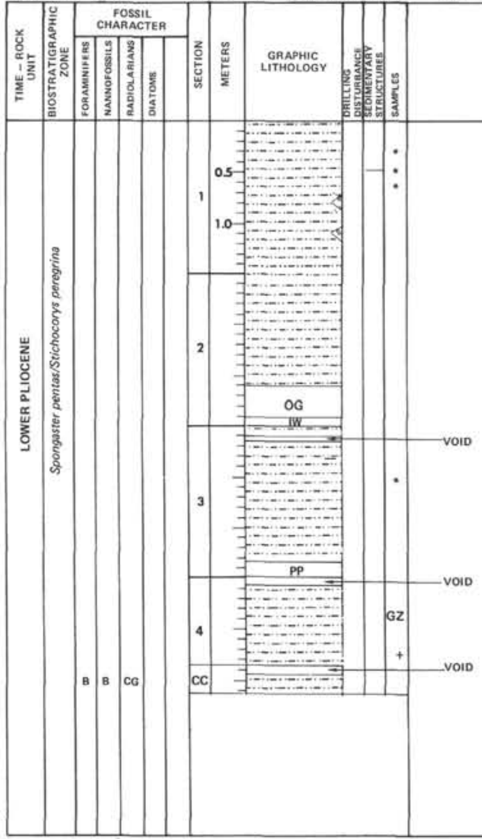
GRAIN SIZE

	1-70
Sand	6.8
Silt	55.0
Clay	38.1

ORGANIC CARBON AND CARBONATE

	1-80
% Organic Carbon	1.3
% $CaCO_3$	6.0

SITE 492 HOLE CORE 8 CORED INTERVAL 60.5–70.0 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, grayish olive green (5GY 3/2) with muddy silt, Section 1, 0–20 cm. ASH spots at Section 1, 70 and 105 cm. Pumice fragments, 1 cm across, at Section 2, 108 cm and Section 3, 34 cm; pumice is bluish black with moderate brown (5YR 4/4) light, hard and porous zeolite crystals on surface. Zeolite concentrations, moderate brown (5YR 4/4 to 5YR 3/4) and pale yellowish orange (10YR 8/6) at Section 2, 95 cm; Section 4, 20 cm, 103 cm, and 105 cm. Indurated clast (concretion?), light olive (10Y 5/4) at Section 4, 63–68 cm.

SMEAR SLIDES

	Muddy silt	Muddy silt	Ash	Muddy silt
	1-31 (D)	1-53 (D)	1-69 (M)	3-53 (D)
TEXTURE:				
Sand	10	–	–	2
Silt	50	85	–	68
Clay	40	15	–	30
COMPOSITION:				
Quartz	51	74	1	57
Feldspar	6	8	TR	7
Mica	4	1	TR	3
Heavy minerals	1	TR	–	TR
Pyrite	2	1	–	1
Clay	35	15	–	30
Glass	–	TR	99	–
Glauconite	TR	–	–	–
Carb. unspec.	1	1	–	–
Nannofossils	–	TR	–	–
Radiolarians	TR	–	–	TR
Diatoms	TR	–	–	TR
Sponge spicules	TR	–	–	1

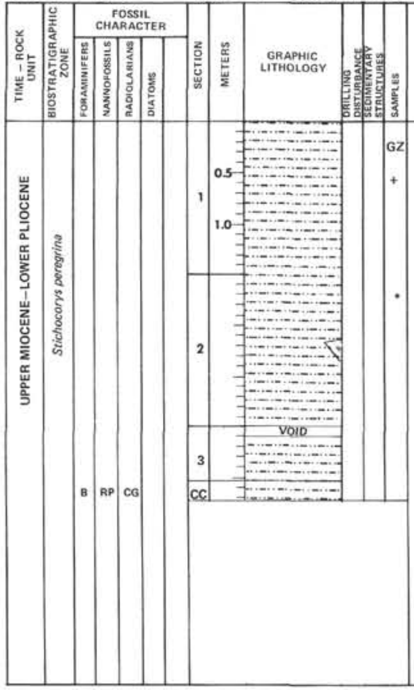
GRAIN SIZE

	4-42
Sand	1.4
Silt	61.8
Clay	36.8

ORGANIC CARBON AND CARBONATE

	4-65
% Organic Carbon	2.2
% $CaCO_3$	51.0

SITE 492 HOLE CORE 9 CORED INTERVAL 70.0–79.5 m



5GY 3/2

0° true dip

0° true dip

LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2), with soft MUDDY SILT at Section 1, 0–20 cm and 46–56 cm. White ASH spots at Section 1, 88 cm and Section 2, 66 cm. Horizontal bedding evident at Section 1, 81 cm and Section 3, 42 cm.

SMEAR SLIDES

	Mud 2-25 (D)
TEXTURE:	
Sand	–
Silt	45
Clay	55
COMPOSITION:	
Quartz	40
Feldspar	6
Mica	3
Heavy minerals	TR
Pyrite	1
Clay	45
Carb. unspec.	2
Radiolarians	TR
Diatoms	1
Sponge spicules	2

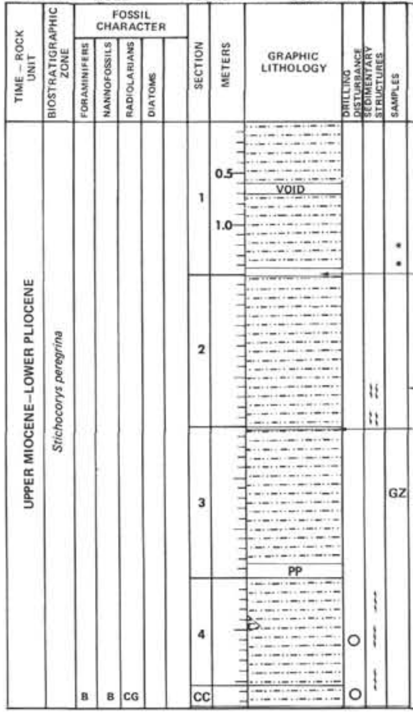
GRAIN SIZE

	1-30
Sand	1.2
Silt	55.0
Clay	43.8

ORGANIC CARBON AND CARBONATE

	1-60
% Organic Carbon	1.6
% $CaCO_3$	2.0

SITE 492 HOLE CORE 10 CORED INTERVAL 79.5–89.0 m



VOID

Possible 20° dip

VOID

LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2). Drilling laminations throughout Section 2, occasionally in Section 3. Bioturbation moderate at Section 2, 100–150 cm and slight and vague throughout Section 4. Irregular hackly fractures present in lower Section 2, and upper Section 4. Dusky yellow (5Y 6/4) calcareous area, possibly disrupted sub-horizontal layer at Section 4, 30 cm.

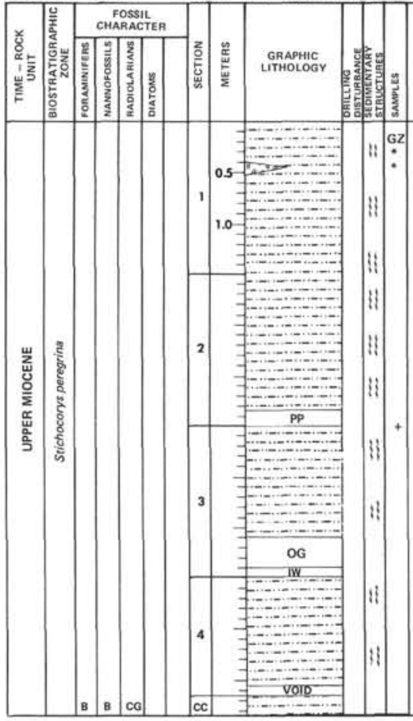
SMEAR SLIDES

	Muddy silt 1-126 (M)	Muddy silt 1-141 (D)
TEXTURE:		
Sand	1	1
Silt	74	69
Clay	25	30
COMPOSITION:		
Quartz	65	59
Feldspar	5	6
Mica	3	3
Heavy minerals	TR	TR
Pyrite	2	2
Clay	25	30
Glass	TR	TR
Glauconite	TR	–
Carb. unspec.	TR	TR
Radiolarians	–	TR
Diatoms	TR	TR
Sponge spicules	TR	TR

GRAIN SIZE

	3-70
Sand	2.9
Silt	61.8
Clay	35.3

SITE 492 HOLE CORE 11 CORED INTERVAL 89.0–98.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2). Mottled with horizontal bands of dark greenish gray (5G 4/1) material. Abundant pyrite nodules, up to 2 mm across, below Section 1, 75 cm. Also in frequent pyritized burrows. Section 1, 45–46 cm: 1 cm ash layer. Moderately bioturbated throughout. Drilling laminations throughout.

SMEAR SLIDES

	Muddy silt	Ash
	1-30 (D)	1-45 (M)
TEXTURE:		
Sand	2	–
Silt	73	–
Clay	25	–
COMPOSITION:		
Quartz	64	TR
Feldspar	7	–
Mica	2	TR
Pyrite	1	–
Clay	25	–
Glass	–	100
Foraminifers	TR	–
Radiolarians	TR	–
Diatoms	TR	–
Sponge spicules	TR	–

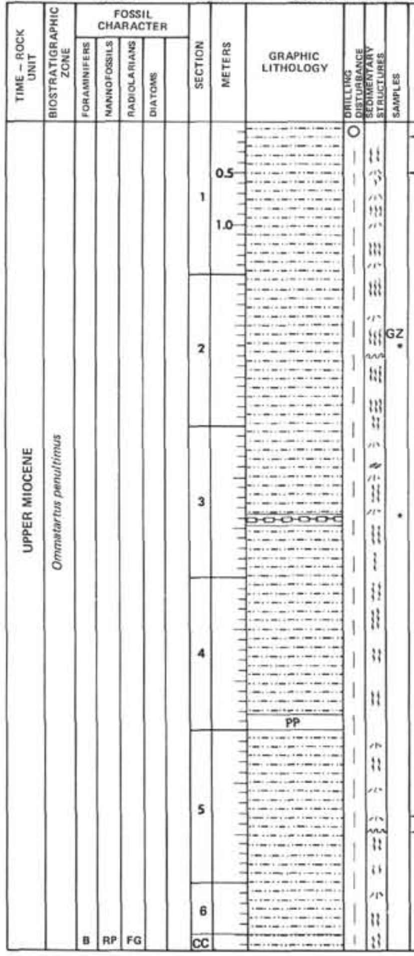
GRAIN SIZE

	1-30
Sand	3.3
Silt	48.7
Clay	48.0

ORGANIC CARBON AND CARBONATE

	3-0
% Organic Carbon	1.2
% $CaCO_3$	4.0

SITE 492 HOLE CORE 12 CORED INTERVAL 98.5–108.0 m



Drilling breccia

Chondrites trace fossil

Burrow

Possible 28° apparent dip

Possible 29° apparent dip (equivocal bedding)

LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2). Moderate to intense bioturbation. Bedding very discontinuous; mostly due to bioturbation, but occasional wispy beds suggest deformation. Pyrite nodules (small, to 2 mm) scattered throughout below 5.2 cm and 115 cm. MICRITIC CHALK layer (6 cm) at Section 3, 88–94 cm. Well indurated, dark yellowish brown (10YR 3/2). No obvious biogenic origin, probably diagenetic. Drilling laminations throughout.

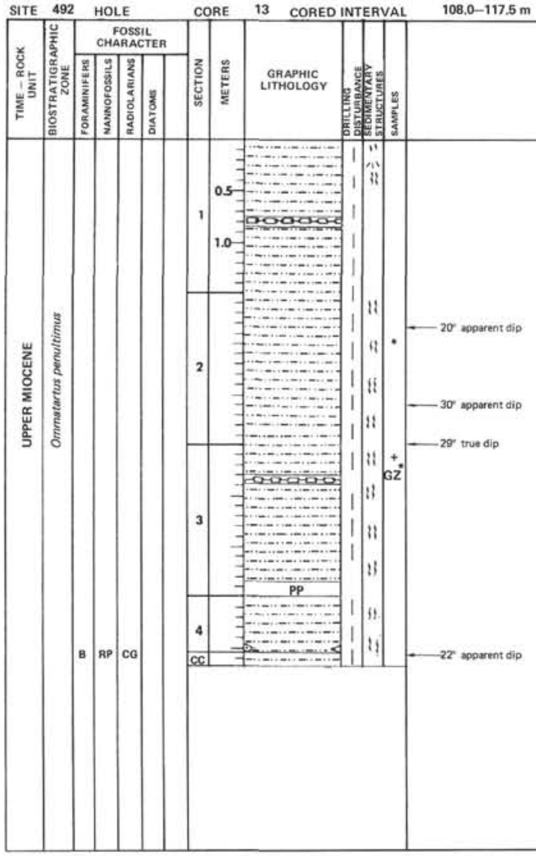
SMEAR SLIDES

	Muddy silt	Carbonate
	2-70 (D)	3-90 (M)
TEXTURE:		
Sand	2	–
Silt	58	–
Clay	40	–
COMPOSITION:		
Quartz	48	–
Feldspar	6	–
Mica	3	–
Pyrite	1	–
Clay	40	–
Glass	2	–
Carb. unspec.	TR	100
Nannofossils	TR	–
Diatoms	TR	–
Sponge spicules	TR	–
Silicoflagellates	TR	–
Plant fragments	TR	–

GRAIN SIZE

	2-68
Sand	1.6
Silt	58.9
Clay	39.6

SITE 492 HOLE CORE 13 CORED INTERVAL 108.0–117.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2). Moderately bioturbated throughout. Incipient fissility developed locally below Section 1, 50 cm (breaks along polished surfaces). Some discontinuous, wispy bedding, some of which appears not to be due to bioturbation nor drilling disturbance. Well indurated CHALK layers at Section 1, 75–85 cm and Section 3, 32–39 cm. Chalk and muddy siltstone are intermixed by bioturbation. VITRIC MUDDY SILTSTONE bed at Section 4, 55 cm. Very fine SAND bed at Section 4, 51 cm. Drilling laminations throughout.

SMEAR SLIDES

	Muddy silt 2-50 (D)	Carbonate 3-35 (M)
TEXTURE:		
Sand	2	–
Silt	63	–
Clay	35	100
COMPOSITION:		
Quartz	60	–
Feldspar	5	–
Mica	2	–
Heavy minerals	TR	–
Pyrite	1	–
Clay	35	–
Glass	1	–
Glauconite	TR	–
Carb. unspec.	TR	100
Nannofossils	TR	–
Radiolarians	TR	
Diatoms	TR	
Sponge spicules	1	–
Silicoflagellates	TR	–

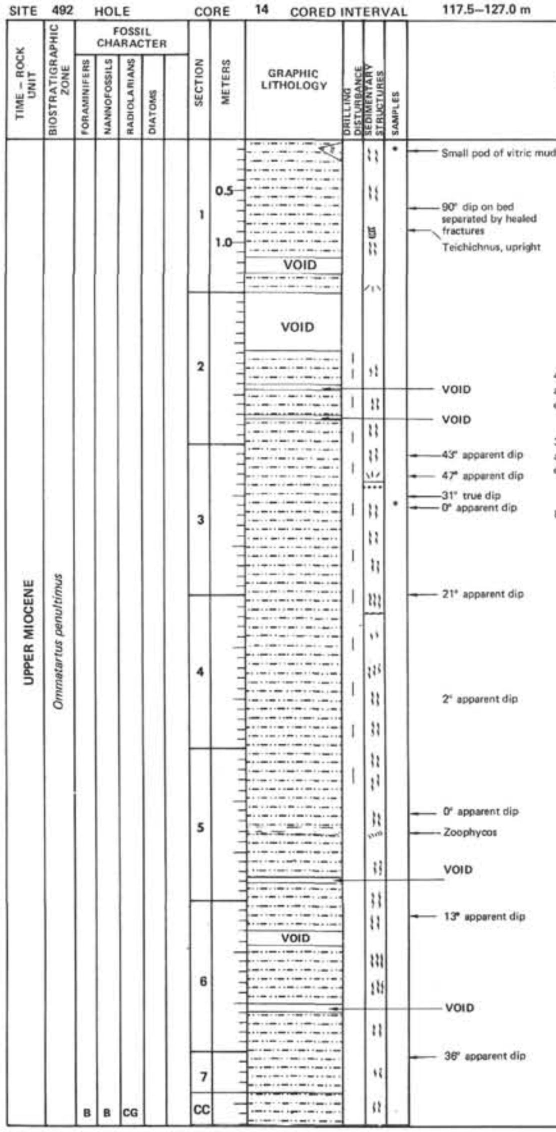
GRAIN SIZE

	3-18
Sand	1.2
Silt	60.4
Clay	38.5

ORGANIC CARBON AND CARBONATE

	3-14
% Organic Carbon	1.3
% $CaCO_3$	3.0

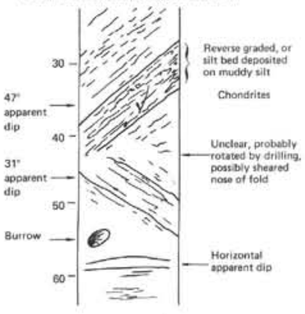
SITE 492 HOLE CORE 14 CORED INTERVAL 117.5–127.0 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2). Fissile, bioturbated, discontinuous and wispy deformation. Calcareous fragments at Section 6, 145 cm and Section 7, 25 cm. Drilling laminations abundant locally throughout core.

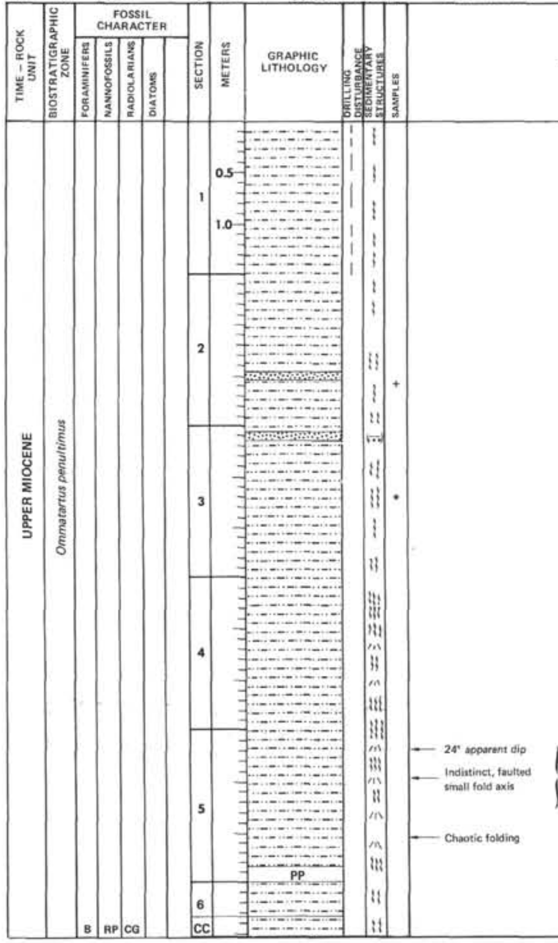
Possible overturned fold in upper Section 3:



SMEAR SLIDES

	Vitric mud 1-10 (M)	Muddy silt 3-60 (D)
TEXTURE:		
Sand	–	3
Silt	40	72
Clay	60	25
COMPOSITION:		
Quartz	20	60
Feldspar	2	5
Mica	2	2
Heavy minerals	–	TR
Pyrite	–	TR
Clay	60	25
Glass	10	3
Carb. unspec.	2	2
Nannofossils	TR	1
Radiolarians	TR	TR
Diatoms	2	1
Sponge spicules	2	1

SITE 492 HOLE CORE 15 CORED INTERVAL 127.0–136.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2) fissile (polished surfaces, locally slickensided). Slightly to intensely bioturbated throughout core, chondrites traces common. Bedding is discontinuous and wispy. Calcareous fragments at Section 2, 45–50 cm, 120–125 cm, and 130–135 cm and Section 3, 25 cm, Very fine to fine SAND at Section 2, 99–106 cm (7 cm thick). Fine sand at 5–13 cm, Section 3, with sharp top and gradational base, possibly graded upside down – probably overturned. Drilling laminations throughout core.

SMEAR SLIDES

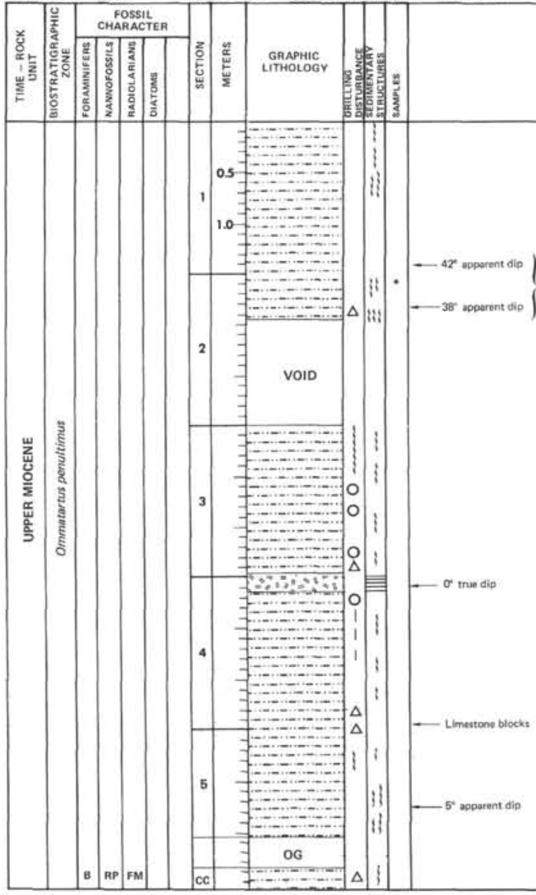
	Muddy silt
	3-70 (D)
TEXTURE:	
Sand	3
Silt	72
Clay	30
COMPOSITION:	
Quartz	51
Feldspar	6
Mica	5
Pyrite	2
Clay	30
Glass	TR
Carb. unspec.	2
Nannofossils	TR
Radiolarians	TR
Diatoms	2
Sponge spicules	2
Silicoflagellates	TR

ORGANIC CARBON AND CARBONATE

	2-110
% Organic Carbon	0.7
% $CaCO_3$	4.0

Apparently drill-induced features

SITE 492 HOLE CORE 16 CORED INTERVAL 136.5–146.0 m



Measurements made on drill biscuits apparently tilted during drilling

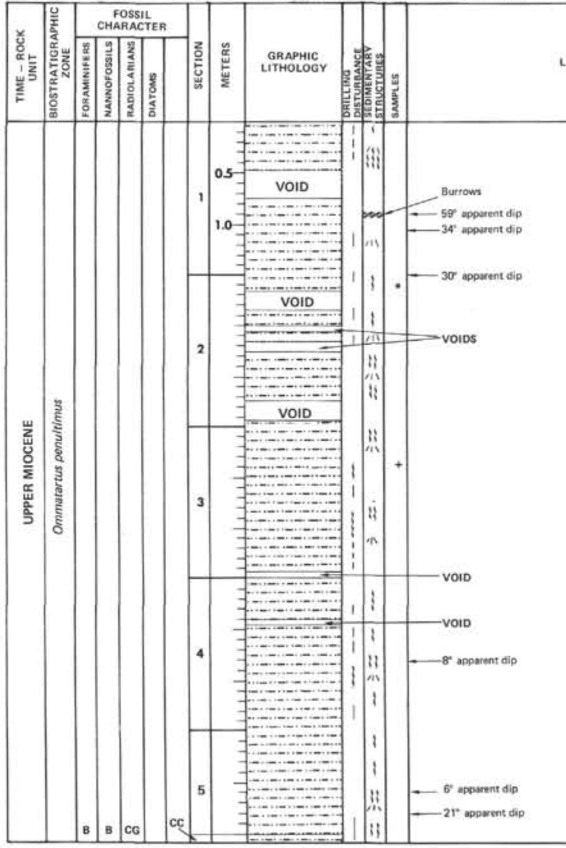
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2); fissile, bioturbated; bedding occasionally contorted and/or discontinuous. Block of dipping beds (42° apparent dip) between drilling laminations at Section 1, 130–135 cm. ASH bed, 16 cm thick, banded white (N9) ash and pale brown (5YR 5/2) muddy ash. Ash layers (2 mm) and muddy ash layers (8 mm). Small normal fault in ash, FROZEN. LIMESTONE blocks at Section 4, 135–140 cm. Calcareous fragments at Section 2, 10–20 cm. Drilling laminations abundant throughout core.

SMEAR SLIDES

	Muddy silt
	2-10 (D)
TEXTURE:	
Sand	2
Silt	73
Clay	20
COMPOSITION:	
Quartz	59
Feldspar	3
Mica	1
Pyrite	1
Clay	25
Glass	5
Carb. unspec.	1
Nannofossils	TR
Radiolarians	TR
Diatoms	3
Sponge spicules	2
Silicoflagellates	TR

SITE 492 HOLE CORE 17 CORED INTERVAL 146.0–155.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, olive gray (5Y 3/2), fissile, bioturbated; bedding often discontinuous, "wispy". Chondrites traces abundant, represented diagrammatically. Drilling laminations common.

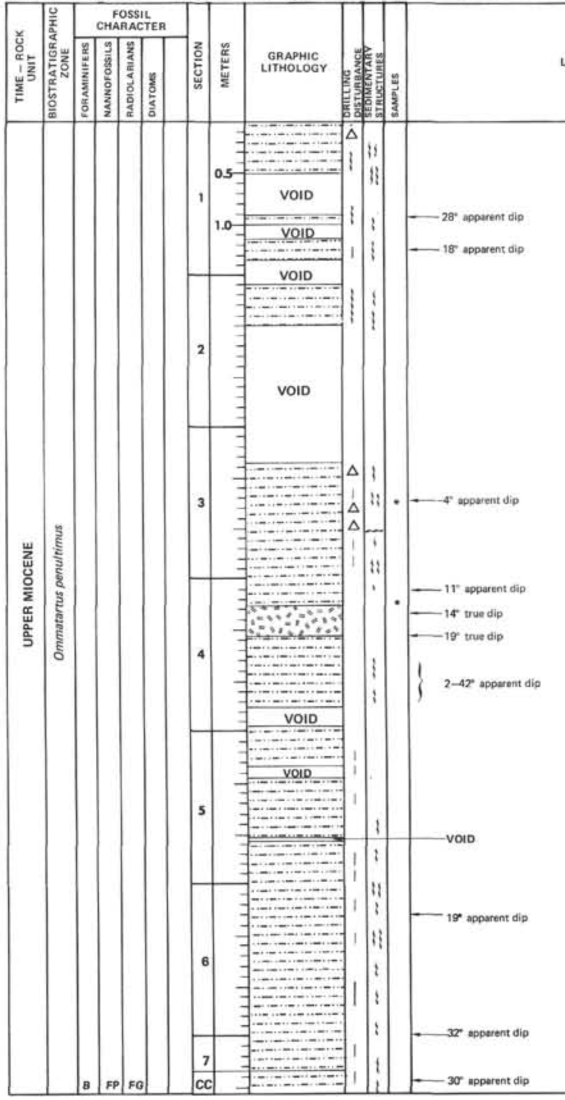
SMEAR SLIDES

	Muddy silt
	2-10 (D)
TEXTURE:	
Sand	2
Silt	63
Clay	35
COMPOSITION:	
Quartz	52
Feldspar	4
Mica	2
Pyrite	1
Clay	35
Glass	TR
Carb. unspec.	1
Nannofossils	TR
Radiolarians	TR
Diatoms	3
Sponge spicules	2
Silicoflagellates	TR

ORGANIC CARBON AND CARBONATE

	3-40
% Organic Carbon	1.5
% $CaCO_3$	2.0

SITE 492 HOLE CORE 18 CORED INTERVAL 155.5–165.0 m



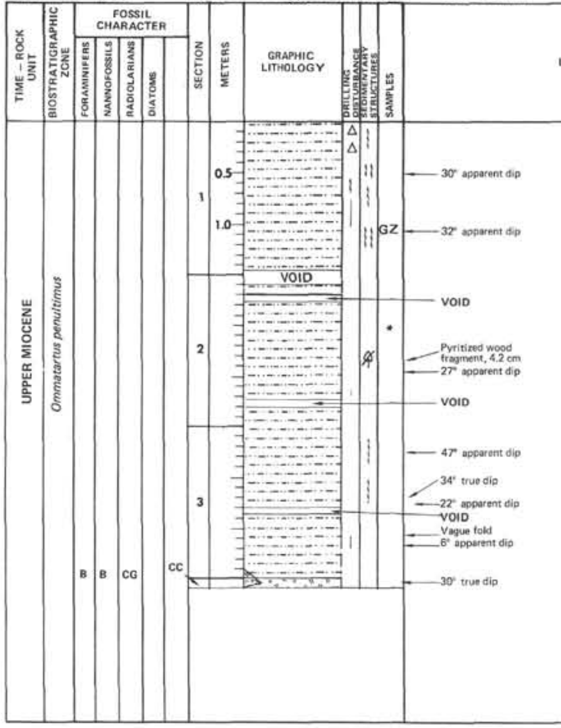
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, grayish olive green (5GY 3/2) and olive gray (5Y 3/2), bioturbated, fissile (slickensides common), bedding discontinuous and wispy. Section 2 exhibits extreme fracturing, with well developed slickensides along anastomosing polished surfaces, pervasive on a mm- to cm-scale. Essentially a scaly argillite, broken up by drilling. Calcareous lenses at Section 4, 7 and 69 cm. Dispersed calcite rhombs at Section 1, 10–15 cm. ASH bed at Section 4, 21–59 cm (38 cm thick): interbedded ash and muddy ash, decreasing in ash content and thickness of ash layers (several cm to 2 mm) towards top. Drilling laminations abundant.

SMEAR SLIDES

	Muddy silt	Ash
	3-72 (D)	4-24 (M)
TEXTURE:		
Sand	1	–
Silt	54	95
Clay	45	5
COMPOSITION:		
Quartz	42	5
Feldspar	4	–
Mica	3	–
Heavy minerals	TR	–
Pyrite	1	1
Clay	45	5
Glass	TR	89
Carb. unspec.	1	–
Nannofossils	TR	–
Radiolarians	TR	–
Diatoms	2	–
Sponge spicules	2	–
Silicoflagellates	TR	–

SITE 492 HOLE CORE 19 CORED INTERVAL 165.0–174.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2), slightly bioturbated, fissile. Some discontinuous, "wispy" bedding; anastomosing fractures on small scale, with slickensides on all fractured pieces. Seven cm-thick laminated ASH and muddy ash bed, frozen, 0.8°C measured, at Core-Catcher. Drilling laminations common.

SMEAR SLIDES

	Muddy silt 2-52 (D)
TEXTURE:	
Sand	–
Silt	70
Clay	30
COMPOSITION:	
Quartz	55
Feldspar	5
Mica	4
Heavy minerals	TR
Pyrite	1
Clay	30
Carb. unspec.	TR
Radiolarians	TR
Diatoms	2
Sponge spicules	3

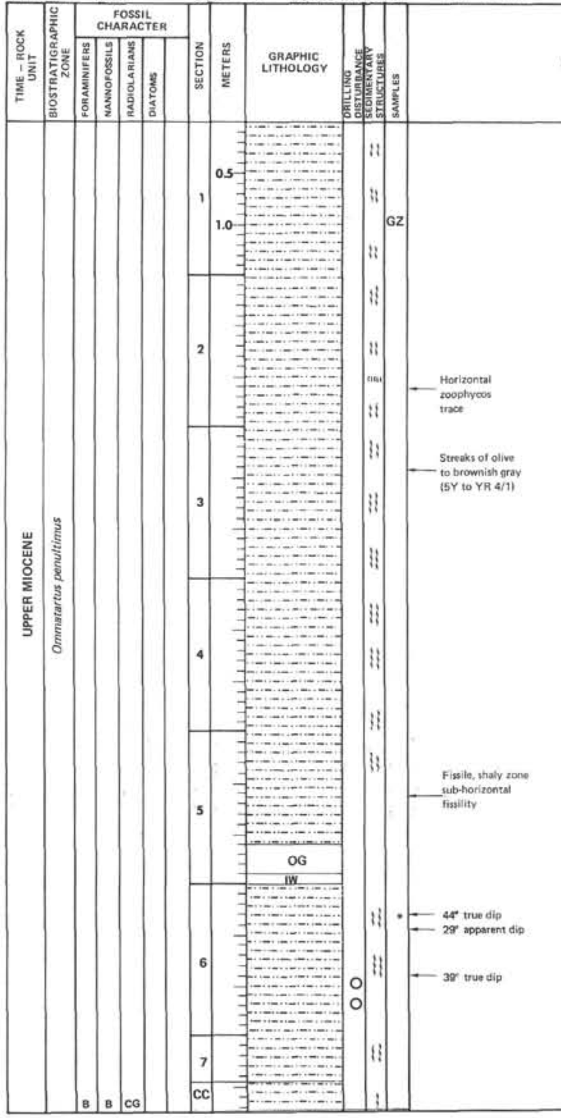
GRAIN SIZE

	1-110
Sand	0.9
Silt	56.6
Clay	42.5

ORGANIC CARBON AND CARBONATE

	3-113
% Organic Carbon	1.1
% $CaCO_3$	2.0

SITE 492 HOLE CORE 20 CORED INTERVAL 174.5–184.0 m



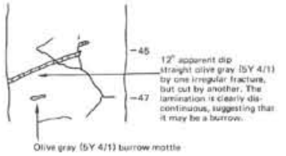
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, moderately grayish olive green (5GY 3/2) bioturbated. Small scale anastomosing hackly fractures to incipient fissility present locally, more abundant lower in core, intense in Sections 5, 6, and 7. Slickensides common on polished surfaces. Drilling laminations common locally.

Fractures:

Section 1	Section 2	Section 5	Section 6
53° true dip	53° true dip	sub-horizontal	77° true dip
		fissility locally	18° true dip
		developed	18° true dip
			28° true dip
			54° true dip

Detail of fractures and mottling in Section 4:



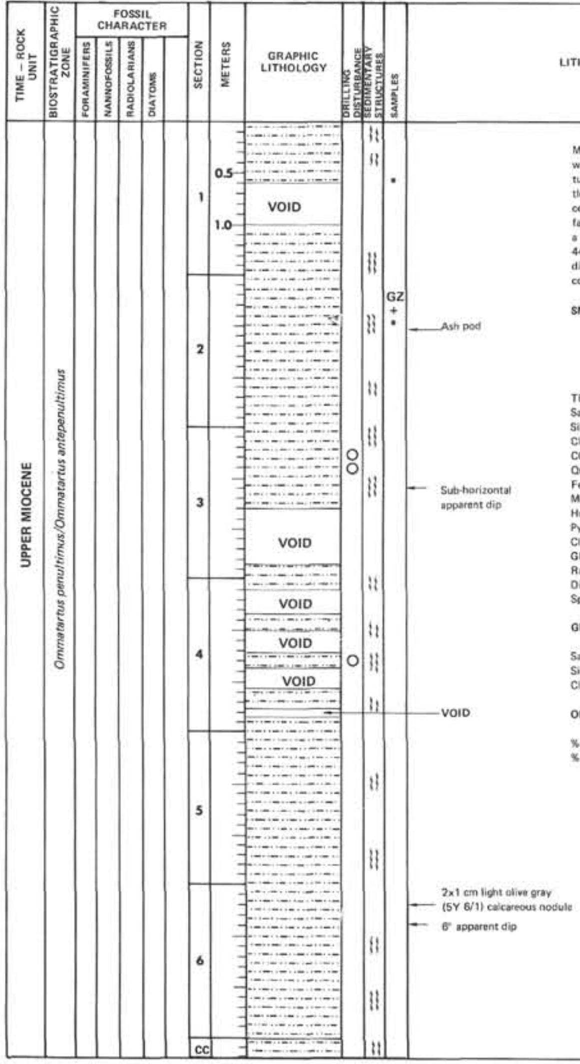
SMEAR SLIDES

	Muddy silt 6-33 (D)
TEXTURE:	
Sand	1
Silt	69
Clay	30
COMPOSITION:	
Quartz	64
Feldspar	5
Mica	2
Heavy minerals	TR
Pyrite	1
Clay	25
Glass	TR
Carb. unspec.	TR
Radiolarians	TR
Diatoms	1
Sponge spicules	2

GRAIN SIZE

	1-105
Sand	7.0
Silt	1.4
Clay	91.6

SITE 492 HOLE CORE 21 CORED INTERVAL 184.0–193.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2), with minor areas of dark greenish gray (5GY 4/1). Bioturbated throughout; streaky, mottled banding, and mottled appearance where unfractured. Hackly fracturing common, locally intensely developed with polished surfaces. Less indurated in Section 4, 0–86 cm, becoming a muddy silt. Mottled ash pod (5 cm across) at Section 2, 44–49 cm. Calcareous nodule at Section 6, 24 cm. Fracture dips: Section 6, one at 32° true dip. Drilling laminations common to abundant throughout.

SMEAR SLIDES

	Muddy silt	Ash
	1-54 (D)	2-49 (M)
TEXTURE:		
Sand	1	97
Silt	64	3
Clay	35	–
COMPOSITION:		
Quartz	59	5
Feldspar	6	2
Mica	2	1
Heavy minerals	TR	TR
Pyrite	1	2
Clay	30	1
Glass	TR	89
Radiolarians	TR	TR
Diatoms	TR	TR
Sponge spicules	2	TR

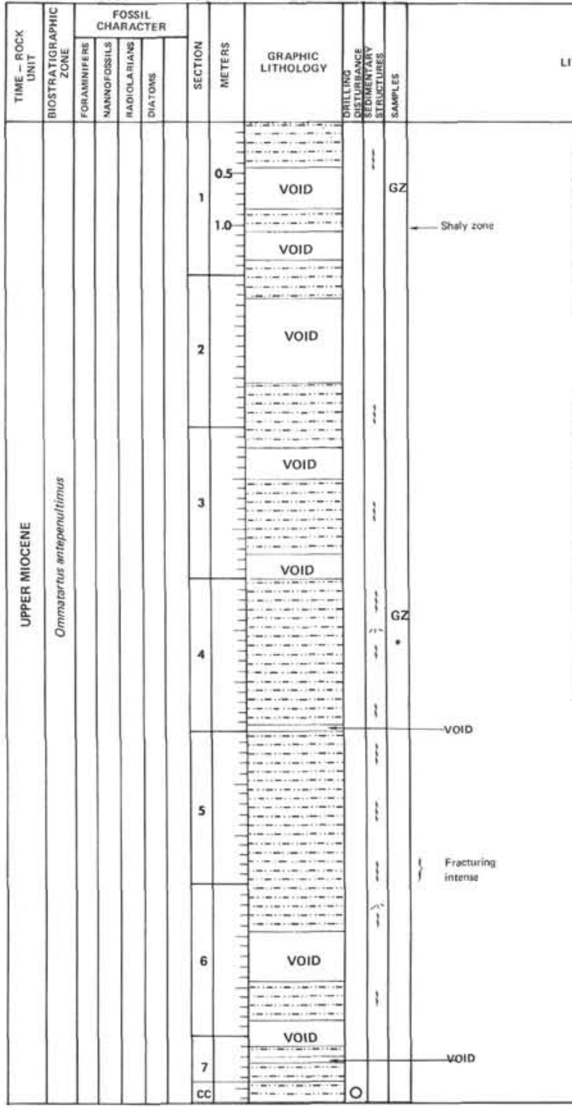
GRAIN SIZE

	2-29
Sand	1.3
Silt	56.4
Clay	42.4

ORGANIC CARBON AND CARBONATE

	2-35
% Organic Carbon	0.6
% $CaCO_3$	1.0

SITE 492 HOLE CORE 22 CORED INTERVAL 193.5–203.0 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, grayish olive green (5GY 3/2); streaky, mottle banded and mottled appearance throughout, streaks and mottles generally olive gray (5Y 4/1). Small scale (1–2 mm) mottles, due to Chondrites-type bioturbation, usually more sharply defined; larger features (cm-scale) may be disrupted bedding, larger-scale bioturbation, and/or vague folds. Minor fracturing, only rarely intensely developed with polished surfaces. Less indurated muddy silt alternates with muddy siltstone in upper 3 sections.

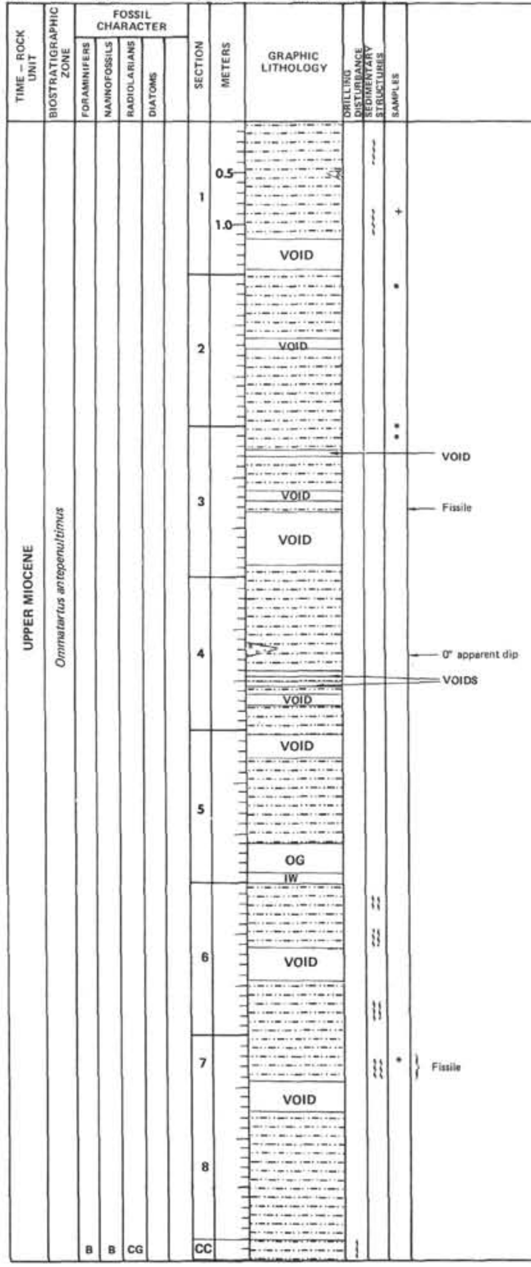
SMEAR SLIDES

	Muddy silt
	4-66 (D)
TEXTURE:	
Sand	1
Silt	74
Clay	25
COMPOSITION:	
Quartz	64
Feldspar	5
Mica	3
Heavy minerals	1
Pyrite	1
Clay	25
Glass	TR?
Carb. unspec.	TR
Radiolarians	TR
Diatoms	TR
Sponge spicules	1

GRAIN SIZE

	1-70	4-40
Sand	10.0	4.1
Silt	62.3	61.5
Clay	27.7	34.4

SITE 492 HOLE CORE 23 CORED INTERVAL 203.0–212.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, olive gray (5Y 3/2), streaky, mottle-banded and mottled appearance; small scale (several mm) mottles clearly due to bioturbation, larger scale (cm-scale) may be larger burrow traces or disrupted bedding (vague folds). Less indurated MUDDY SILT in Sections 1, 4, and 8. Gas expansion voids common. Fracturing locally intense, in Sections 1, 3, 4, 6, 7, and 8, with some polished surfaces and an incipient fissility and shaly zones in Section 3, 74–86 cm and Section 7, 20–38 cm. Small ASH pod at Section 1, 63 cm and 1.5 cm horizontal ash bed, light greenish gray (5GY 8/1) at Section 4, 70–71.5 cm. Drilling laminations occasionally present. Section 8 forcibly extruded from core barrel. Described on sheet 1.

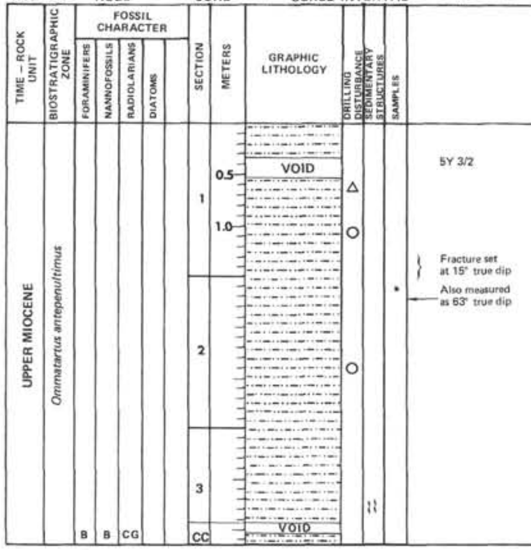
SMEAR SLIDES

	Muddy silt	Very fine sand	Muddy silt	Muddy silt
	2-15 (D)	3-7 (M)	3-15 (M)	7-28 (D)
TEXTURE:				
Sand	3	70	10	–
Silt	62	20	60	80
Clay	35	10	30	20
COMPOSITION:				
Quartz	56	80	55	65
Feldspar	6	4	6	6
Mica	2	1	3	2
Heavy minerals	1	4	1	TR
Pyrite	2	1	1	TR
Clay	30	10	30	20
Glass	TR	–	TR	5
Carb. unspec.	TR	–	–	–
Radiolarians	TR	TR	TR	TR
Diatoms	TR	TR	TR	TR
Sponge spicules	3	TR	4	2
Silicoflagellates	TR	–	–	TR

ORGANIC CARBON AND CARBONATE

	1-90
% Organic Carbon	1.0
% $CaCO_3$	2.0

SITE 492 HOLE CORE 24 CORED INTERVAL 212.5–222.0 m



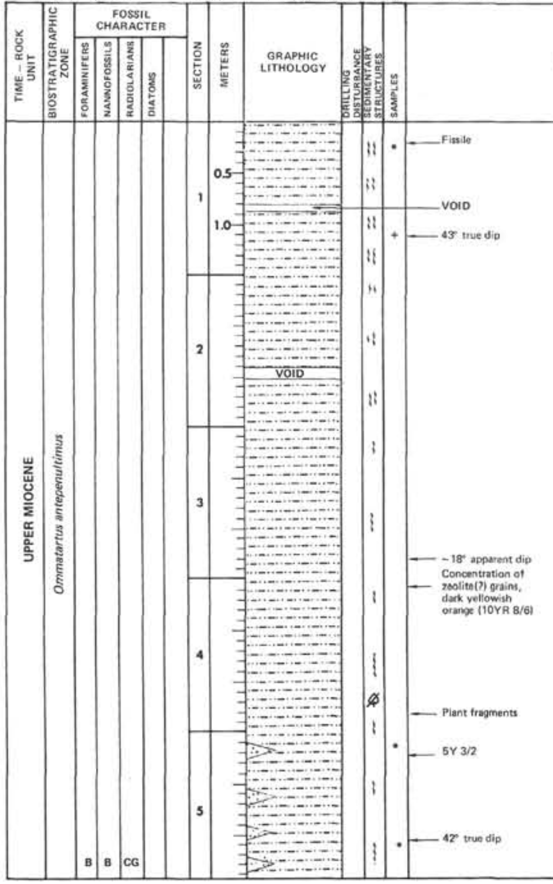
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE (very well indurated), olive gray (5Y 3/2), fracturing commonly well-developed with slickensided planar surfaces. Locally less indurated (soft muddy silt); streaky, mottled appearance in Section 3.

SMEAR SLIDES

	Muddy silt
	2-19 (D)
TEXTURE:	
Sand	5
Silt	75
Clay	20
COMPOSITION:	
Quartz	73
Feldspar	5
Mica	4
Heavy minerals	1
Pyrite	1
Clay	15
Radiolarians	TR
Diatoms	TR
Sponge spicules	1

SITE 492 HOLE CORE 25 CORED INTERVAL 222.0–231.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, grayish olive green (5GY 3/2) and olive gray (5Y 3/2). Less indurated MUDDY SILT in portions of Section 1. Fine sand dispersed in muddy siltstone (20–30%) and in vague concentrations, probably bedding, below Section 1. Section 5 contains vague siltstone interbeds, shown diagrammatically. Occasional sponge remains. Bioturbated throughout. Streaky, mottled-banded and mottled appearance; small scale (mm) mottling due to bioturbation, large scale (cm) possibly bioturbation, possibly disrupted bedding or vague folds. Fracturing is only locally intense, with fissility developed at Section 1, 8–20 cm.

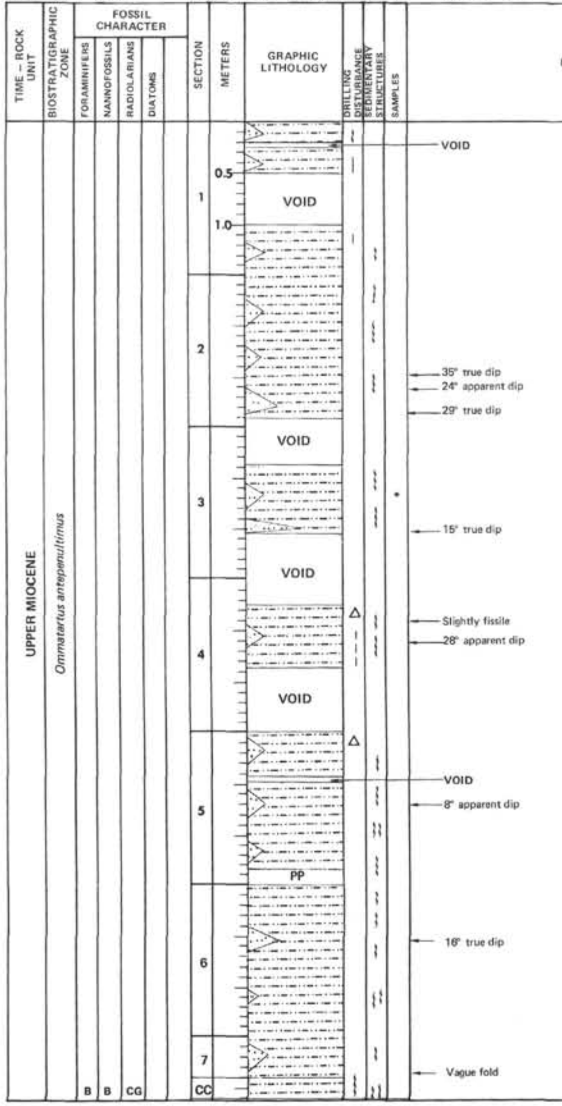
SMEAR SLIDES

	Muddy silt 1-25 (D)	Silt/ muddy silt 5-12 (M)	Muddy silt 5-110 (D)
TEXTURE:			
Sand	4	30	20
Silt	66	60	65
Clay	30	10	15
COMPOSITION:			
Quartz	61	77	73
Feldspar	6	7	8
Mica	3	1	3
Heavy minerals	TR	2	2
Pyrite	2	2	TR
Clay	25	10	15
Glass	TR	–	–
Radiolarians	TR	TR	TR
Diatoms	TR	TR	TR
Sponge spicules	3	1	4

ORGANIC CARBON AND CARBONATE

	1-110
% Organic Carbon	0.8
% $CaCO_3$	3.0

SITE 492 HOLE CORE 26 CORED INTERVAL 231.5–241.0 m



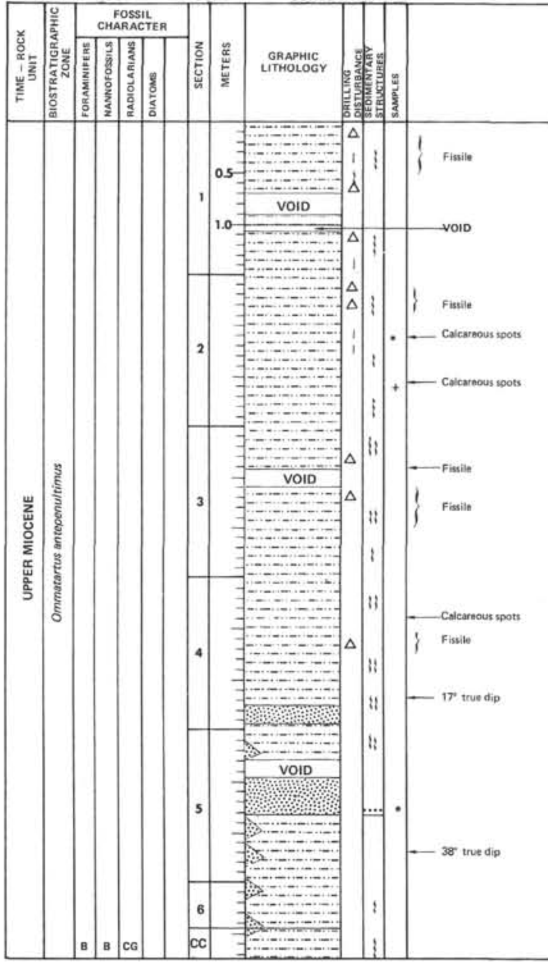
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE olive gray (5Y 3/2) with 5–30% interbeds of olive gray (5Y 3/2) SILTSTONE. Bioturbated; bedding discontinuous and wispy. Siltstone beds vague and disrupted in Sections 1 and 2; discrete and better defined in Sections 3 and 4. Vague and disrupted again below Section 4. Drilling laminations occasionally present, with contemporaneous high-angle fractures.

SMEAR SLIDES

	Muddy silt 3-70 (D)
TEXTURE:	
Sand	3
Silt	67
Clay	40
COMPOSITION:	
Quartz	48
Feldspar	5
Mica	3
Heavy minerals	TR
Pyrite	1
Clay	40
Nannofossils	TR
Diatoms	1
Sponge spicules	2

SITE 492 HOLE CORE 27 CORED INTERVAL 241.0–250.5 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, olive gray (5Y 3/2). Bioturbated; some discontinuous, wispy bedding. Locally fissile, with slickensided fractures pervasive on a mm-scale. Fine to medium SAND beds in Sections 4 and 5, up to 17 and 38 cm thick respectively. Very subtle grading in latter. Thin sand beds interbedded below 38 cm sand of Section 5, comprising approximately 10–20% of section. Drilling laminations present in Sections 5 and 6.

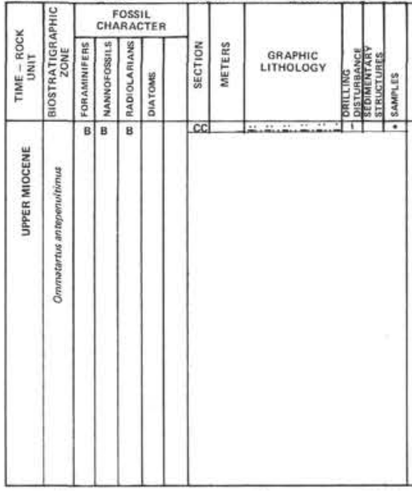
SMEAR SLIDES

	Muddy silt 2-65 (D)	Fine sand 5-80 (D)
TEXTURE:		
Sand	4	75
Silt	66	20
Clay	30	5
COMPOSITION:		
Quartz	56	78
Feldspar	5	10
Mica	4	3
Heavy minerals	TR	2
Pyrite	1	2
Clay	30	5
Glauconite	–	TR
Carb. unspec.	TR	–
Nannofossils	TR	–
Radiolarians	TR	–
Diatoms	2	–
Sponge spicules	2	–
Silicoflagellates	TR	–

ORGANIC CARBON AND CARBONATE

	2-110
% Organic Carbon	0.7
% $CaCO_3$	2.0

SITE 492 HOLE CORE 28 CORED INTERVAL 250.5–260.0 m



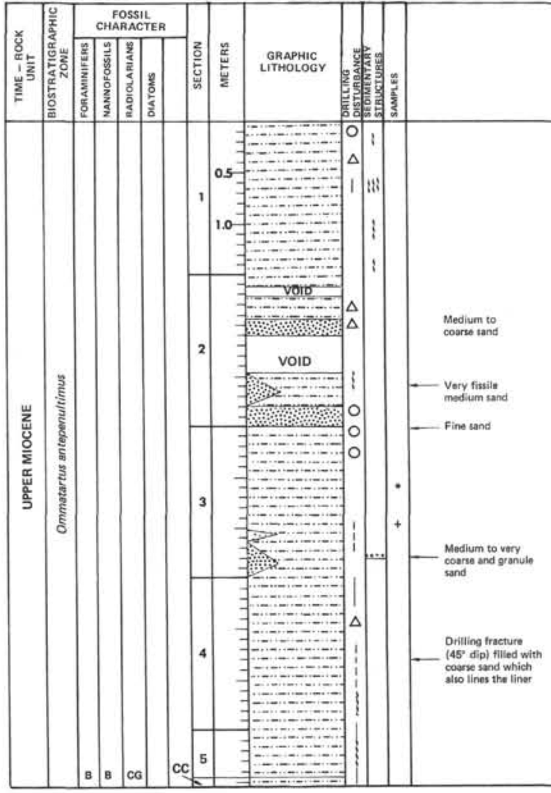
LITHOLOGIC DESCRIPTION

MUDDY SILT olive gray (5Y 3/2). Core-Catcher only – soft, non-indurated nature of sediment may be due to drilling disturbance.

SMEAR SLIDES

	Muddy silt CC (D)
TEXTURE:	
Sand	3
Silt	72
Clay	25
COMPOSITION:	
Quartz	61
Feldspar	5
Mica	3
Heavy minerals	TR
Pyrite	2
Clay	25
Radiolarians	TR
Diatoms	1
Sponge spicules	3

SITE 492 HOLE CORE 29 CORED INTERVAL 260.0–265.0 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2). Interbeds to 20 cm thick of fine to coarse SAND. Bioturbated; discontinuous wispy bedding. Fissile, especially lower Section 2, Sections 4 and 5 – breaks into very small slickensided and/or polished chips – a "scaly argillite".

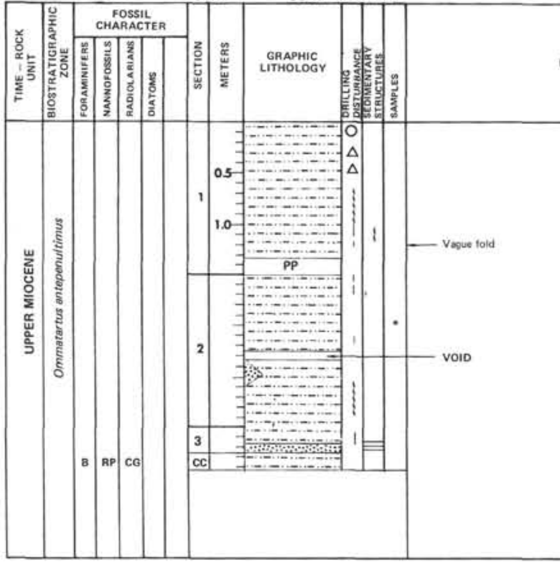
SMEAR SLIDES

	Muddy silt 3-60 (D)
TEXTURE:	
Sand	15
Silt	65
Clay	20
COMPOSITION:	
Quartz	65
Feldspar	10
Mica	2
Heavy minerals	TR
Pyrite	3
Clay	20
Carb. unspec.	TR
Nannofossils	TR
Diatoms	TR
Sponge spicules	TR

ORGANIC CARBON AND CARBONATE

	3-98
% Organic Carbon	0.5
% $CaCO_3$	2.0

SITE 492 HOLE CORE 30 CORED INTERVAL 265.0–269.5 m



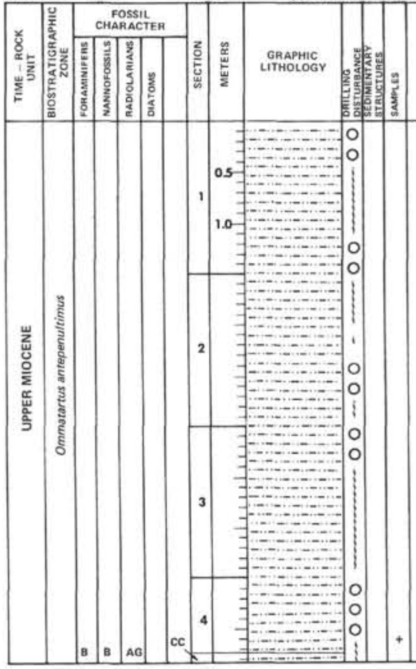
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE, grayish olive green (5GY 3/2), slightly bioturbated with medium and fine to medium SAND beds at Section 2, 89–95 cm and Section 3, 13–23 cm, Muddy siltstone is fissile throughout, generally with slickensided anastomosing fractures, a "scaly argillite". Locally broken by drilling into mm-size chips.

SMEAR SLIDES

	Muddy silt 2-50 (D)
TEXTURE:	
Sand	2
Silt	58
Clay	40
COMPOSITION:	
Quartz	48
Feldspar	3
Mica	2
Heavy minerals	TR
Pyrite	2
Clay	40
Carb. unspec.	TR
Nannofossils	TR
Diatoms	2
Sponge spicules	3

SITE 492 HOLE CORE 31 CORED INTERVAL 269.5–279.0 m



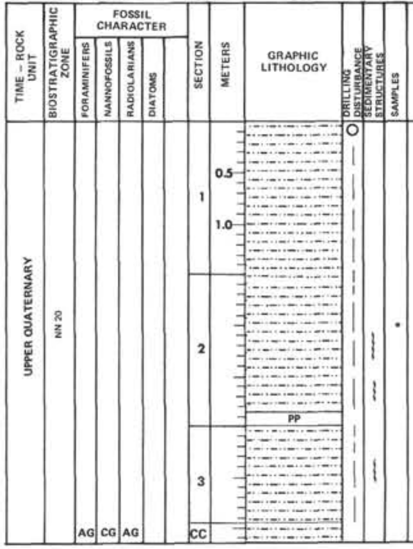
LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE grayish olive green (5GY 3/2), broken into small chips which float in soupy or very soft mud.

ORGANIC CARBON AND CARBONATE

	4-60
% Organic Carbon	0.9
% $CaCO_3$	3.0

SITE 492 HOLE A CORE 1 CORED INTERVAL 0.00–4.25 m



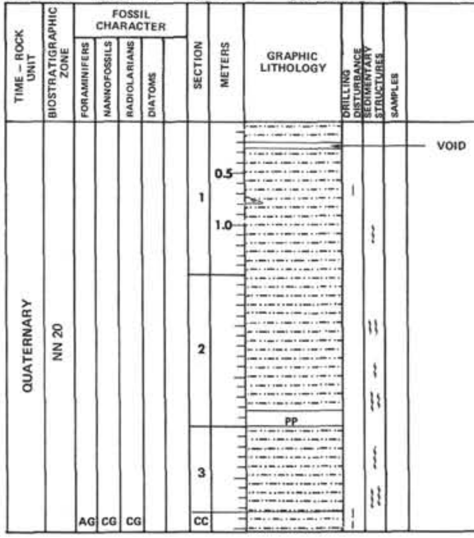
LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), soft, locally calcareous. Slight bioturbation.

SMEAR SLIDES

	Muddy silt
	2-50 (D)
TEXTURE:	
Sand	5
Silt	60
Clay	35
COMPOSITION:	
Quartz	50
Feldspar	4
Mica	2
Heavy minerals	TR
Pyrite	3
Clay	35
Glauconite	3
Carb. unspec.	2
Foraminifers	1
Nannofossils	TR
Diatoms	1
Sponge spicules	2
Fish remains	TR

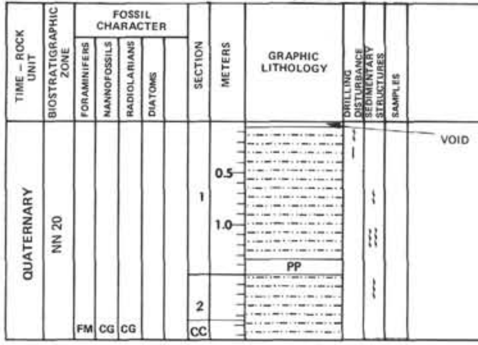
SITE 492 HOLE A CORE 2 CORED INTERVAL 4.25–9.00 m



LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), soft, locally calcareous. Thin ASH bed at Section 1, 73 cm. Carbonized woody material at Section 3, 20 and 54 cm. Occasional sponge spicule concentrations. Bioturbated, slight to moderate.

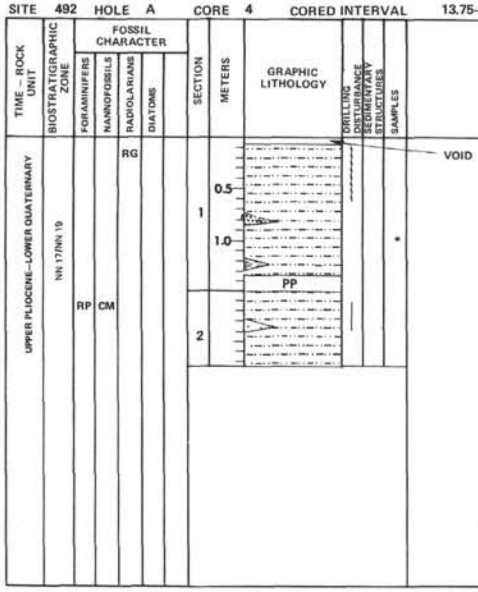
SITE 492 HOLE A CORE 3 CORED INTERVAL 9.00–13.75 m



LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), soft. Bioturbated, occasional sponge spicule concentrations.

SITE 492 HOLE A CORE 4 CORED INTERVAL 13.75–18.50 m



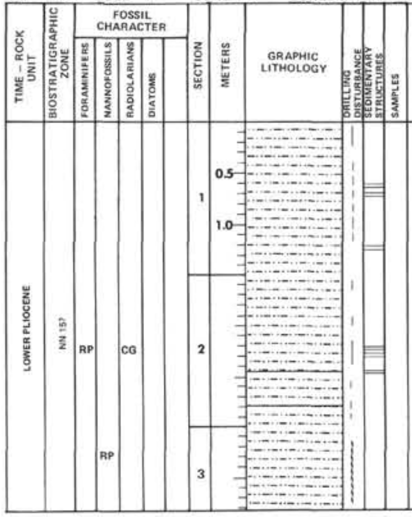
LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), soft. Thin layers of GLAUCONITIC MUDDY SAND at Section 1, 80–86 cm, 99–101 cm, and 103–109 cm. MUD at Section 1, 120–125 cm. Occasional sponge spicules. Shell (bivalve?) at Section 1, 120 cm.

SMEAR SLIDES

	Muddy silt
	1-100 (D)
TEXTURE:	
Sand	2
Silt	63
Clay	35
COMPOSITION:	
Quartz	51
Feldspar	5
Mica	2
Heavy minerals	TR
Pyrite	3
Clay	35
Glauconite	TR
Foraminifers	1
Nannofossils	TR
Radiolarians	TR
Diatoms	TR
Sponge spicules	1

SITE 492 HOLE A CORE 5 CORED INTERVAL 18.50–23.25 m

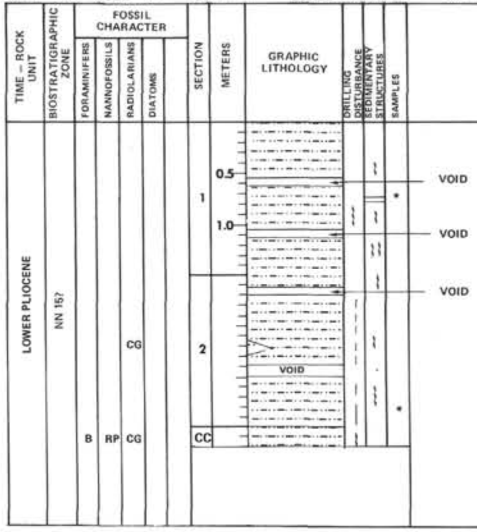


LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), firm. Olive gray (5Y 3/2) MUDDY SILT interbed.

5GY 3/2

SITE 492 HOLE A CORE 6 CORED INTERVAL 23.25–28.00 m



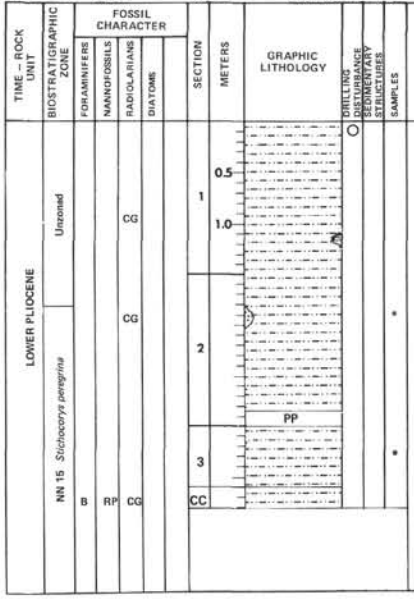
LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), firm. ASH spots at Section 2, 120 cm. SILT layer, discontinuous, at Section 2, 5 cm. Slight bioturbation.

SMEAR SLIDES

	Muddy silt 1-77 (D)	Muddy silt 2-130 (D)
TEXTURE:		
Sand	2	1
Silt	68	59
Clay	30	40
COMPOSITION:		
Quartz	62	51
Feldspar	6	7
Mica	4	3
Heavy minerals	1	TR
Pyrite	1	1
Clay	25	35
Nannofossils	TR	TR
Radiolarians	TR	TR
Diatoms	TR	1
Sponge spicules	1	2
Silicoflagellates	–	TR

SITE 492 HOLE A CORE 7 CORED INTERVAL 28.00–32.75 m



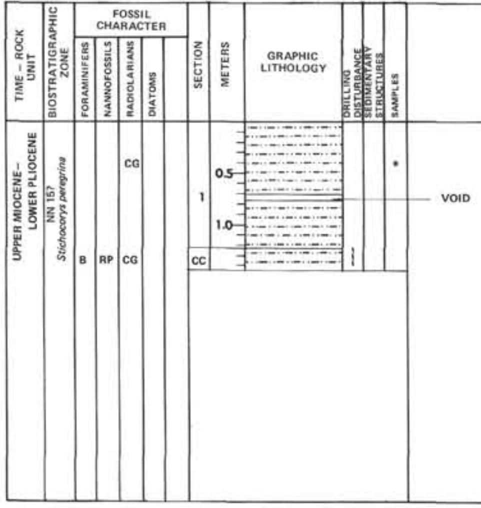
LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), hard. Small calcareous area at Section 1, 110 cm, and Section 2, 30–35 cm. FINE GLAUCONITIC SANDS at Section 2, 35–50 cm.

SMEAR SLIDES

	Fine to medium muddy sand 2-40 (M)	Muddy silt 3-30 (D)
TEXTURE:		
Sand	75	2
Silt	5	58
Clay	20	40
COMPOSITION:		
Quartz	70	57
Feldspar	4	5
Mica	2	2
Heavy minerals	1	1
Pyrite	3	TR
Clay	20	30
Glass	–	TR
Glauconite	TR	–
Foraminifers	TR	–
Nannofossils	–	TR
Radiolarians	–	TR
Diatoms	–	2
Sponge spicules	–	3
Silicoflagellates	–	TR

SITE 492 HOLE A CORE 8 CORED INTERVAL 32.75–37.50 m



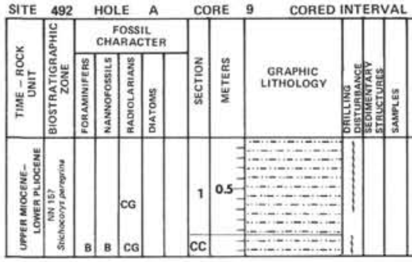
LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), soft to firm to hard.

SMEAR SLIDES

	Muddy silt 1-40 (D)
TEXTURE:	
Sand	3
Silt	62
Clay	35
COMPOSITION:	
Quartz	59
Feldspar	7
Mica	2
Heavy minerals	TR
Pyrite	1
Clay	30
Glass	TR
Radiolarians	TR
Diatoms	TR
Sponge spicules	1
Plant fragments	TR

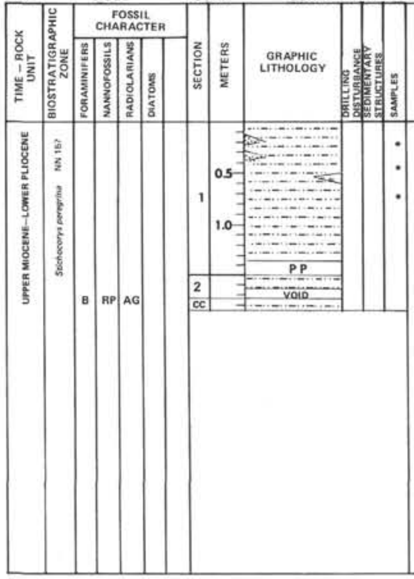
SITE 492 HOLE A CORE 9 CORED INTERVAL 37.50–42.25 m



LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), hard.

SITE 492 HOLE A CORE 10 CORED INTERVAL 42.25–47.00 m



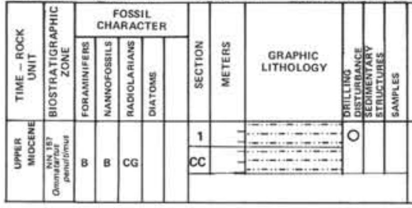
LITHOLOGIC DESCRIPTION

MUDDY SILT, grayish olive green (5GY 3/2), hard. ASH concentration at Section 1, 48–51 cm. FINE SAND layers at Section 1, 15 and 28 cm; sand spots at Section 1, 90–100 cm.

SMEAR SLIDES

	Fine sand 1-28 (M)	Ash 1-47 (M)	Muddy silt 1-77 (D)
TEXTURE:			
Sand	80	1	2
Silt	15	94	68
Clay	5	5	30
COMPOSITION:			
Quartz	79	8	64
Feldspar	8	5	5
Mica	1	1	3
Heavy minerals	2	TR	TR
Pyrite	2	1	1
Clay	5	5	25
Glass	–	80	TR
Glauconite	3	–	–
Foraminifers	TR	–	–
Nannofossils	–	TR	TR
Radiolarians	–	–	TR
Diatoms	–	TR	TR
Sponge spicules	–	–	2

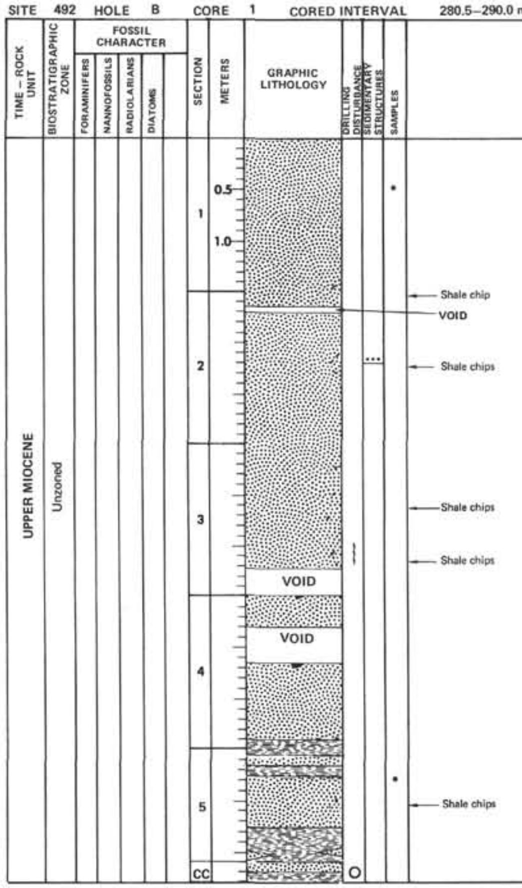
SITE 492 HOLE A CORE 11 CORED INTERVAL 66.00–70.75 m



LITHOLOGIC DESCRIPTION

MUDDY SILTSTONE TO MUDDY SILT, grayish olive green (5GY 3/2). Indurated at Core-Catcher, 45–50 cm. Shaly throughout, broken into slightly polished angular fragments less than 1 cm across.

SITE 492 HOLE B CORE 1 CORED INTERVAL 280.5–290.0 m



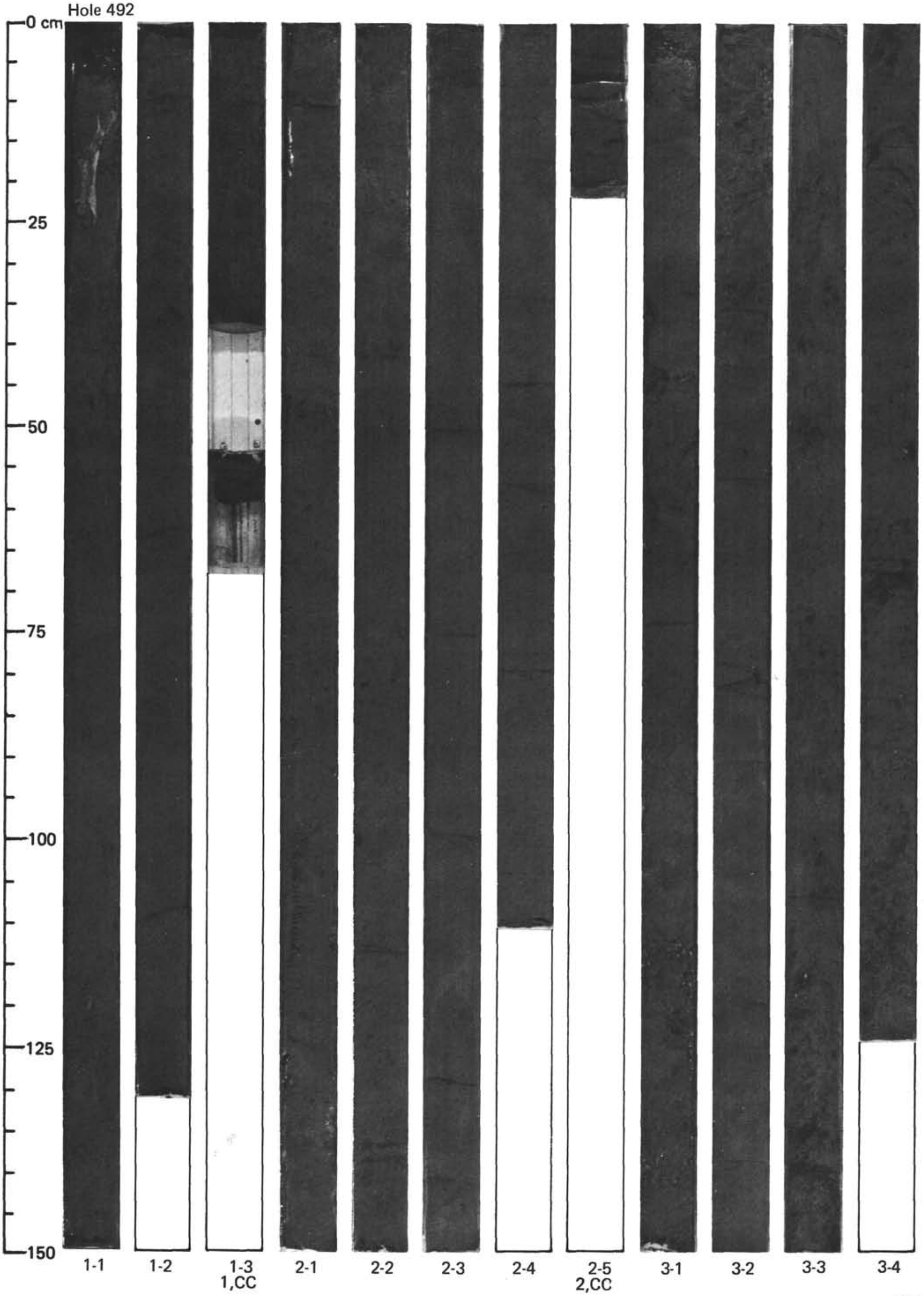
LITHOLOGIC DESCRIPTION

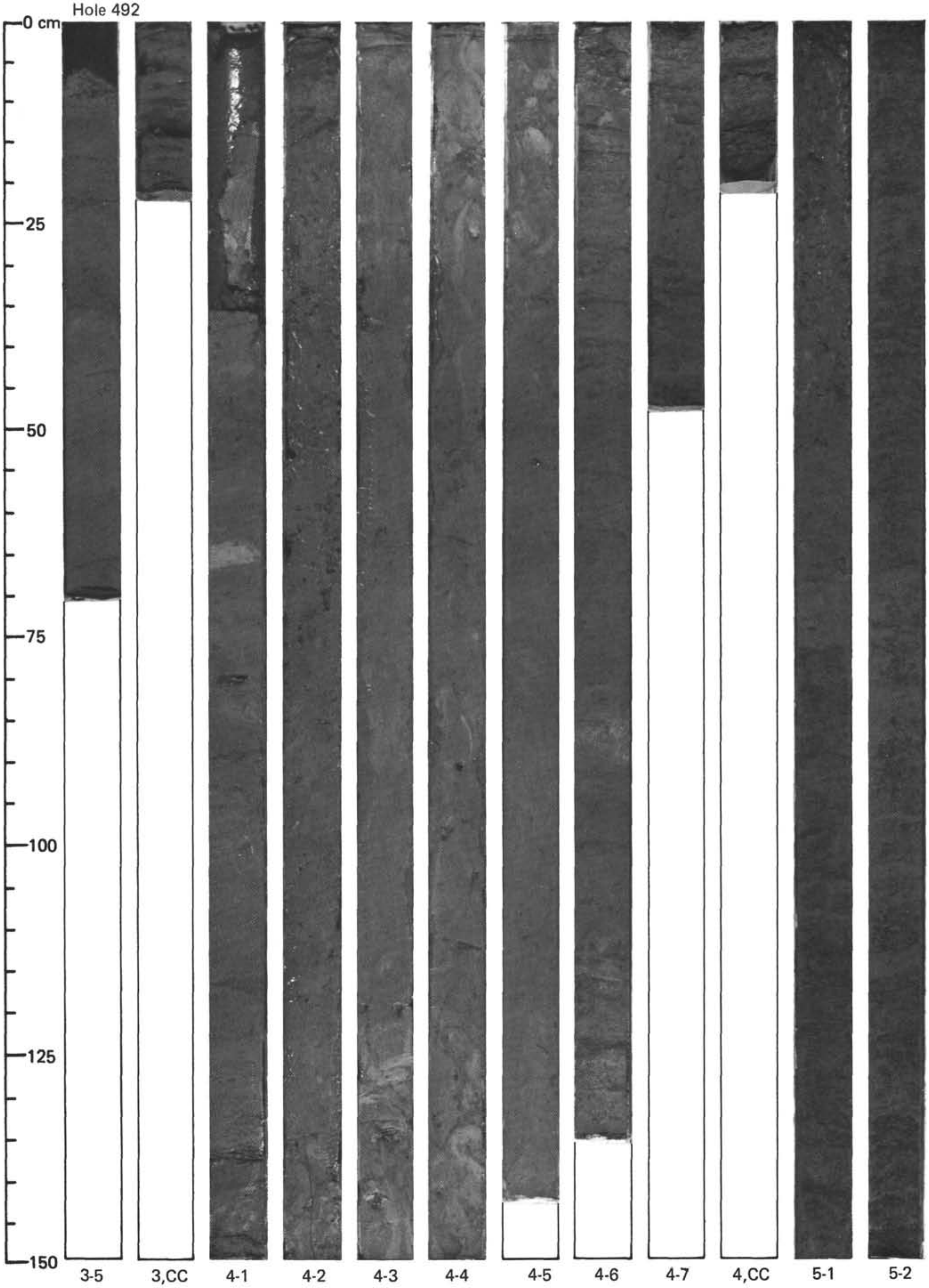
MEDIUM TO COARSE VERY CLEAN SAND, medium light gray (N6), one graded bed through the first four sections, with small (to 3 cm) clasts of fractured shaly MUDSTONE with shiny polished fractures. Sand is massive, grading is the only visible interval structure. This core appears to not have been affected seriously by drilling (except Core-Catcher) and structures present are probably primary – depositional or tectonic structures.

Below Section 4, 140 cm, interlayered medium to coarse sand as above and scaly argillite, a well-lithified mudstone with a pervasive fabric of anastomozing polished and lineated fracture surfaces. Section 5, 84–108 cm, scaly argillite with wispy stringers of medium to coarse sand (stratal disruption).

SMEAR SLIDES

	Medium sand (fine to coarse)	Mud
	1-50 (D)	5-28 (M)
TEXTURE:		
Sand	90	5
Silt	10	45
Clay	–	50
COMPOSITION:		
Quartz	93	97
Feldspar	1	–
Heavy minerals	5	1
Pyrite	1	TR
Glass	–	1
Glauconite	TR	TR?
Diatoms	–	TR
Sponge spicules	–	TR


Hole 492
0 cm
25
50
75
100
125
150
1-1
1-2
1-3
1,CC
2-1
2-2
2-3
2-4
2-5
2,CC
3-1
3-2
3-3
3-4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0 cm
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75
100
125
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3,CC
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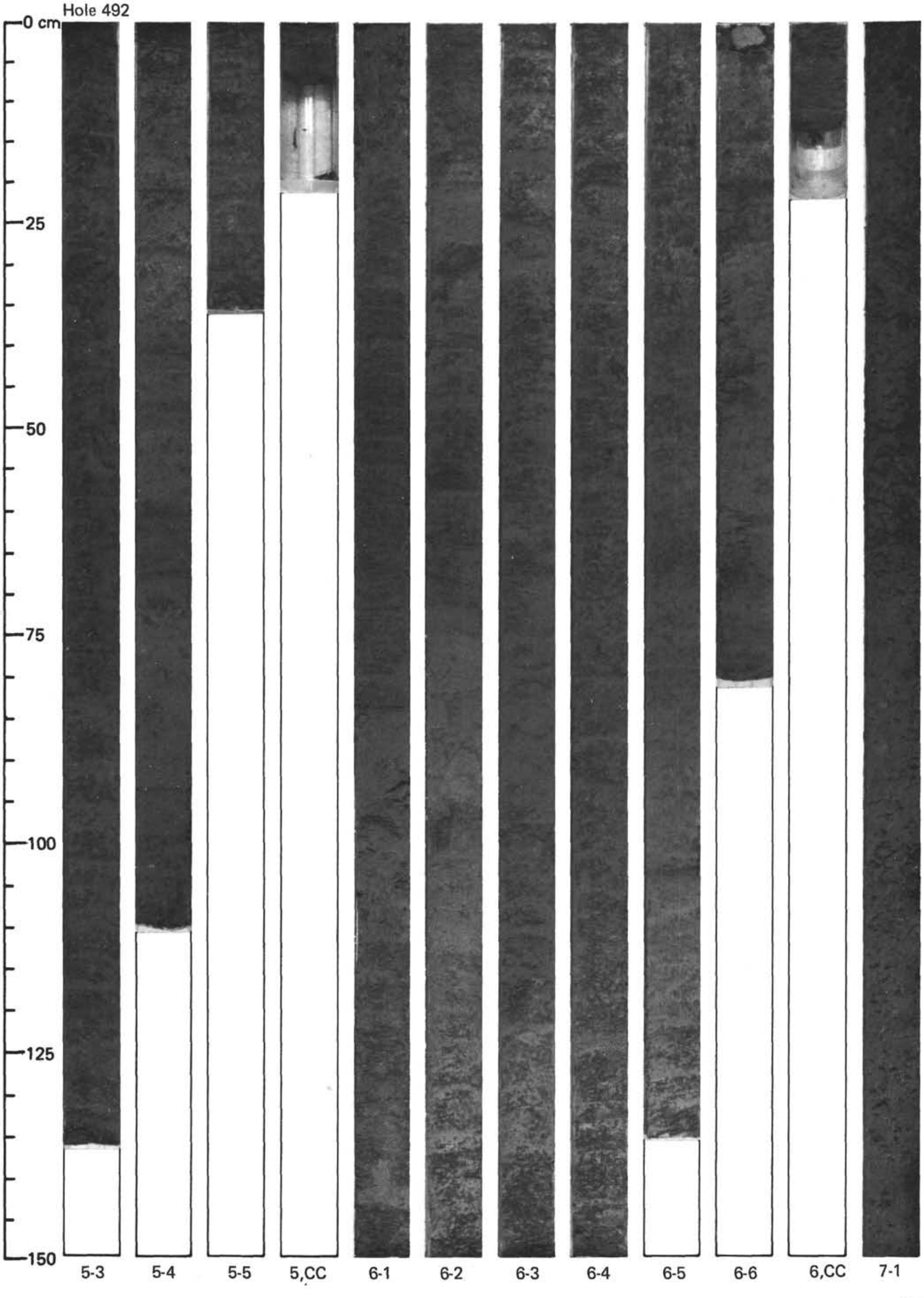
4-2
4-3
4-4
4-5
4-6
4-7
4,CC
5-1
5-2


Hole 492
0 cm
25
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75
100
125
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5-4
5-5
5,CC
6-1
6-2
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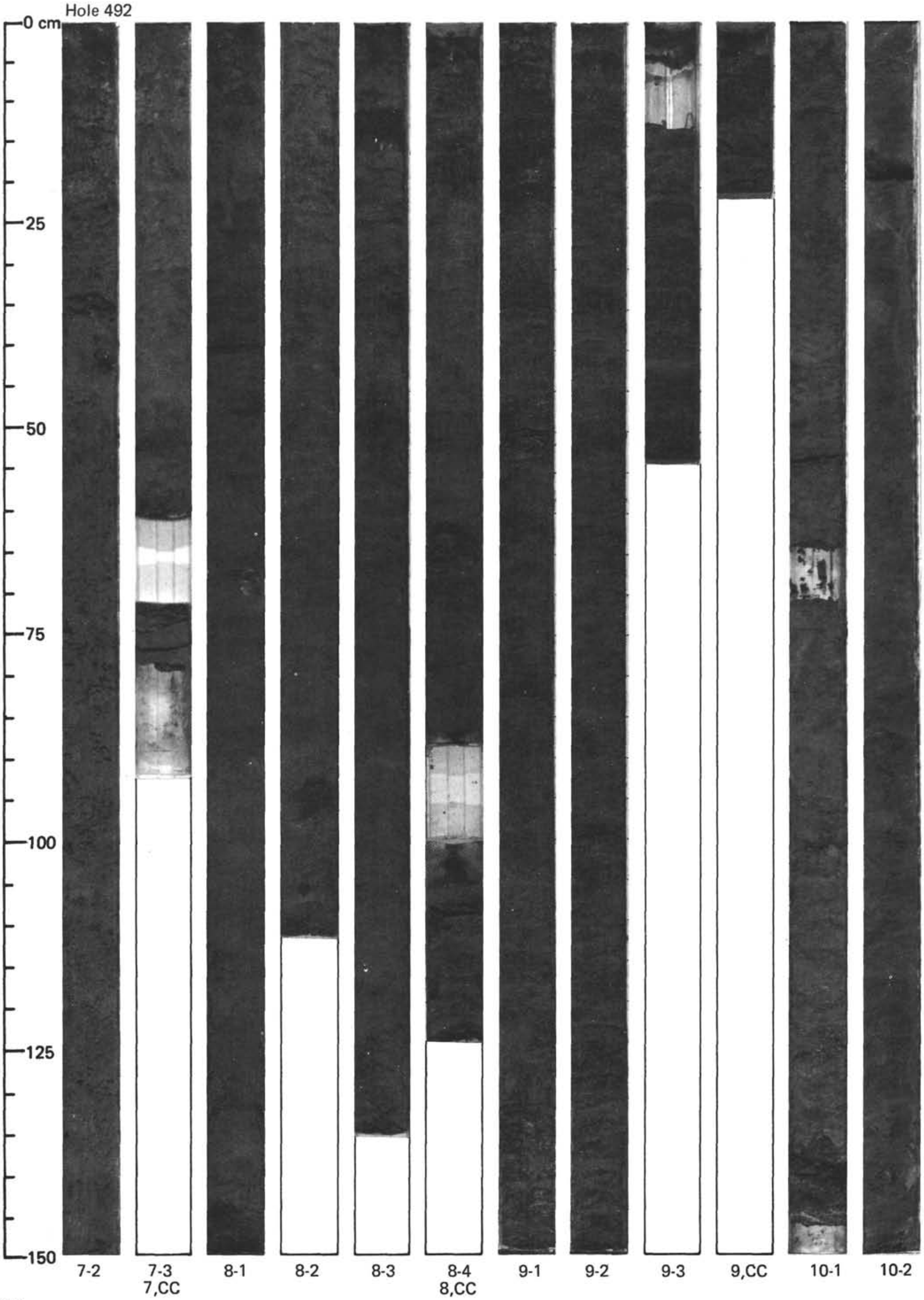
6-5
6-6
6,CC
7-1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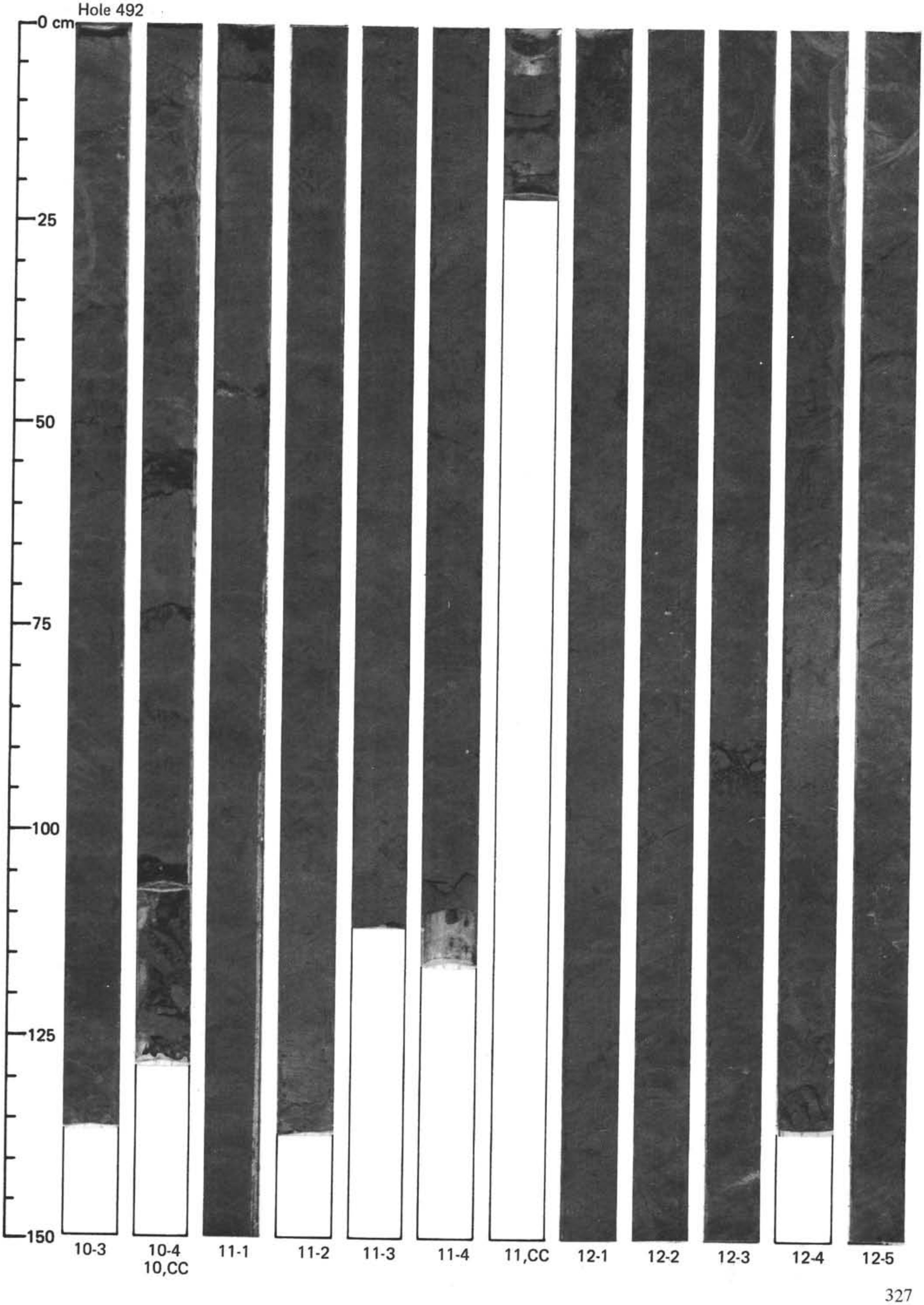
50
75
100
125
150
7-2
7-3
7,CC
8-1
8-2
8-3
8-4
8,CC
9-1
9-2
9-3
9,CC
10-1
10-2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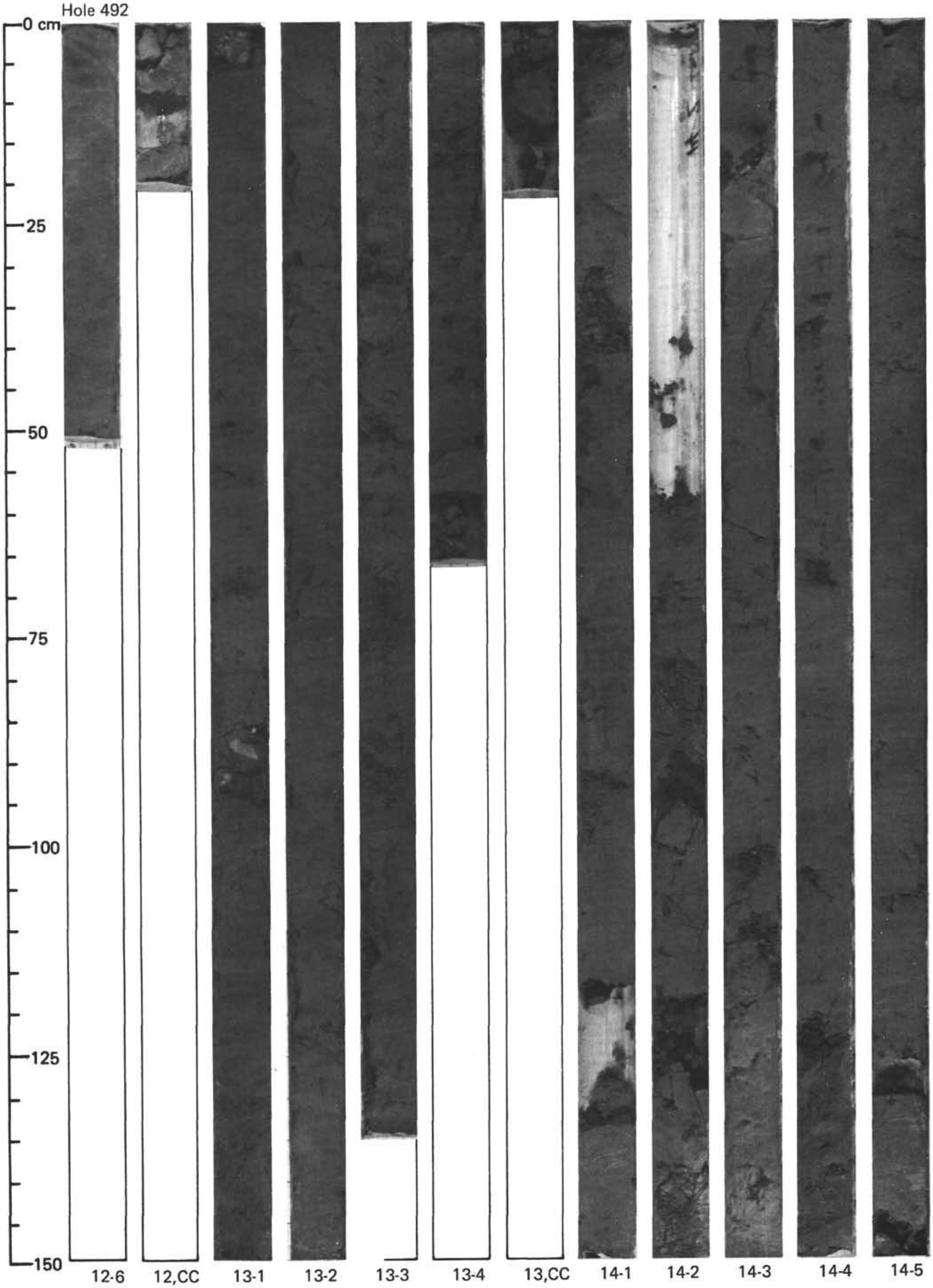
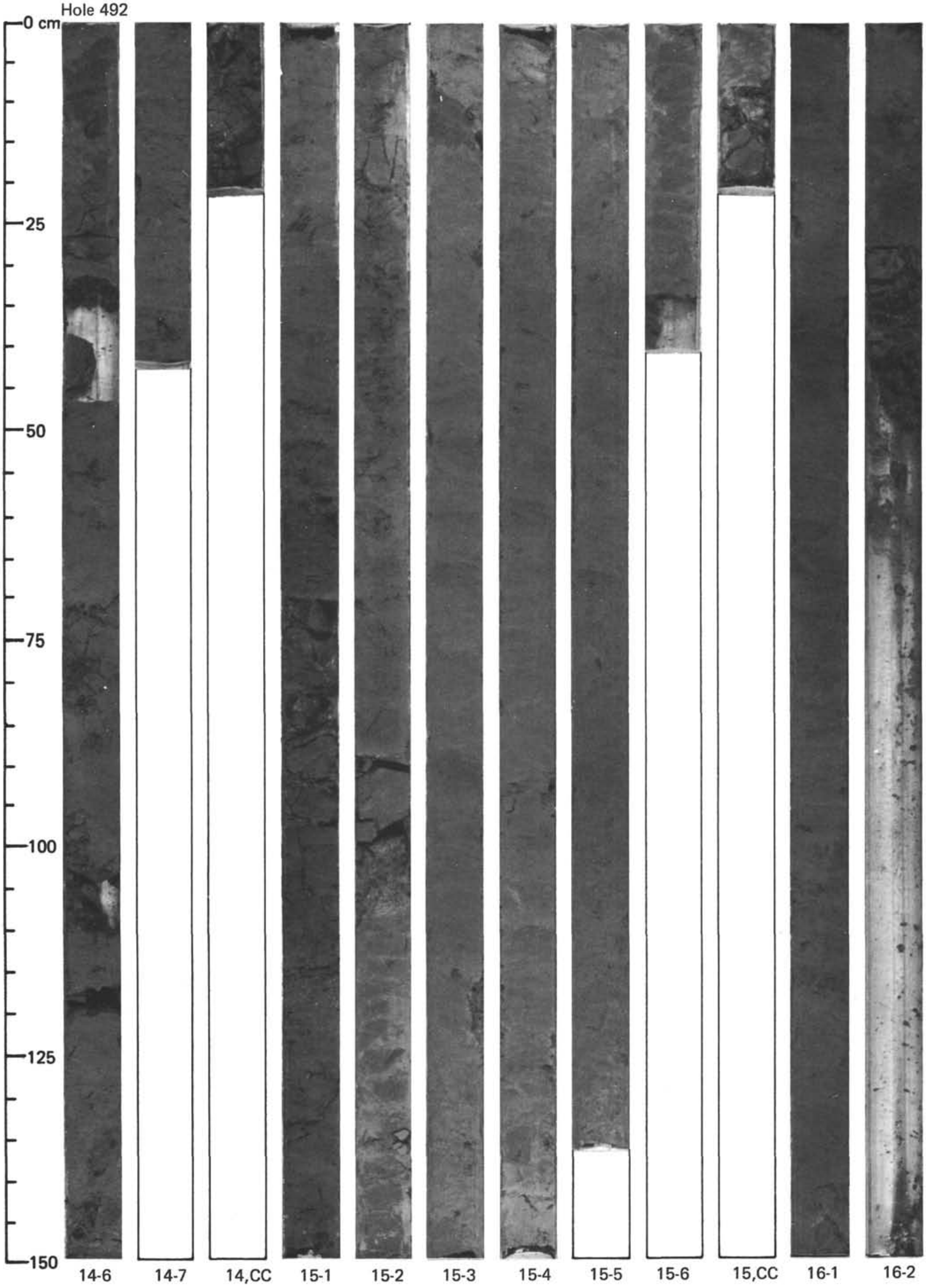
0 cm
25
50
75
100
125
150
10-3
10-4
10,CC
11-1
11-2
11-3
11-4
11,CC
12-1
12-2
12-3
12-4
12-5


Hole 492
0 cm
25
50
75
100
125
150
12-6
12,CC
13-1
13-2
13-3
13-4
13,CC
14-1
14-2
14-3
14-4
14-5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0 cm
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50
75
100
125
150
14-6
14-7
14,CC
15-1
15-2
15-3
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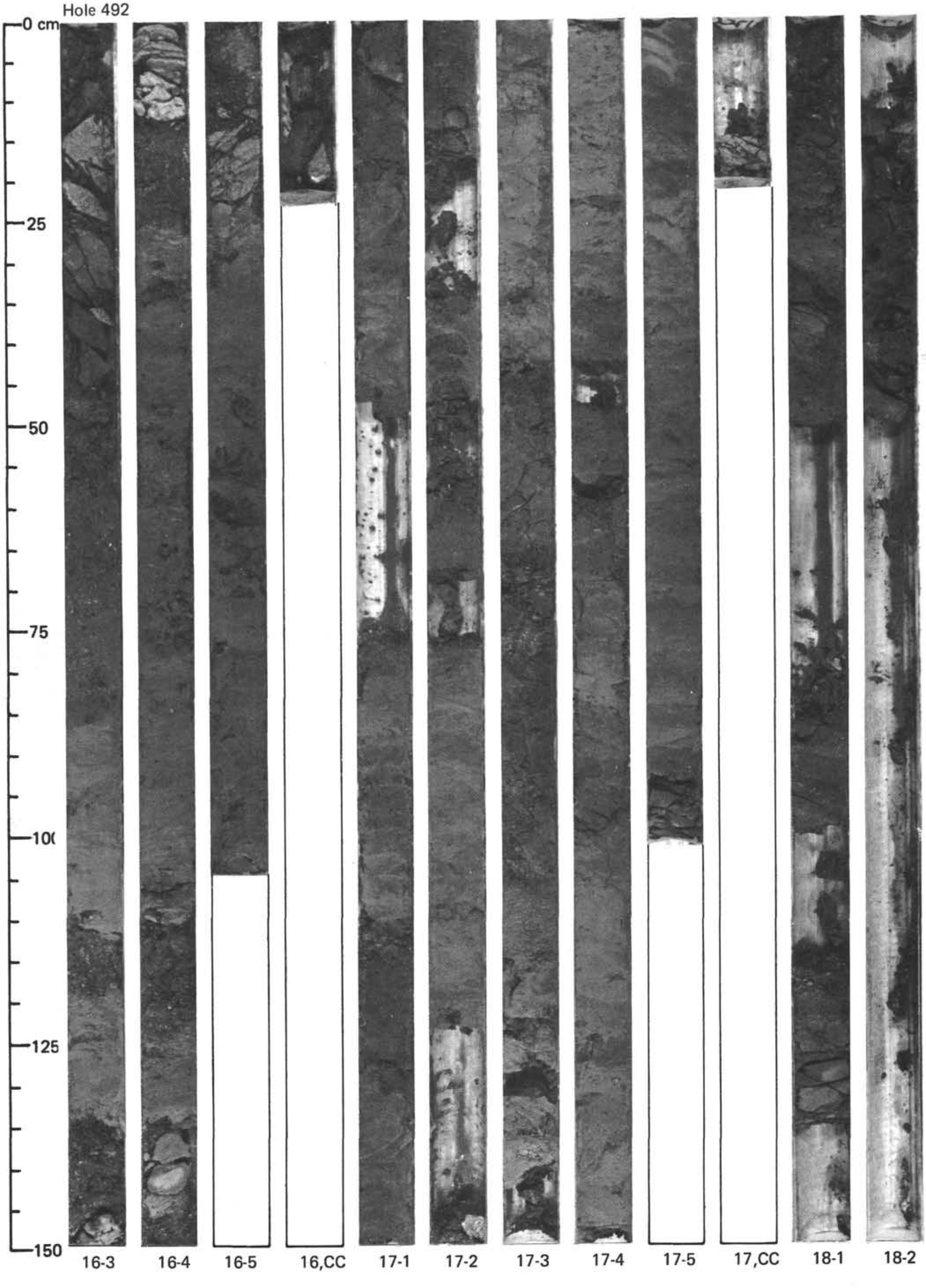
15-5
15-6
15,CC
16-1
16-2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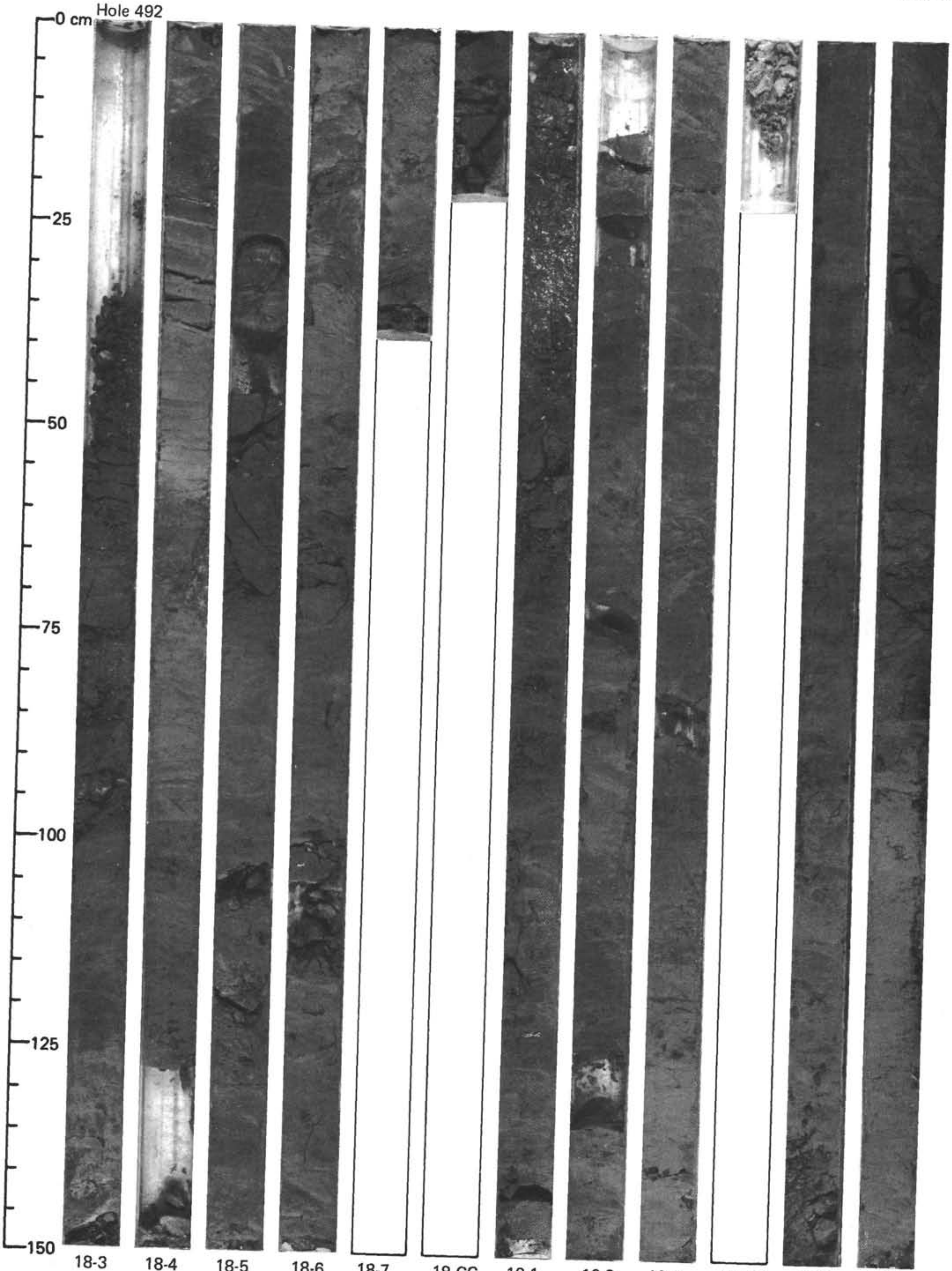
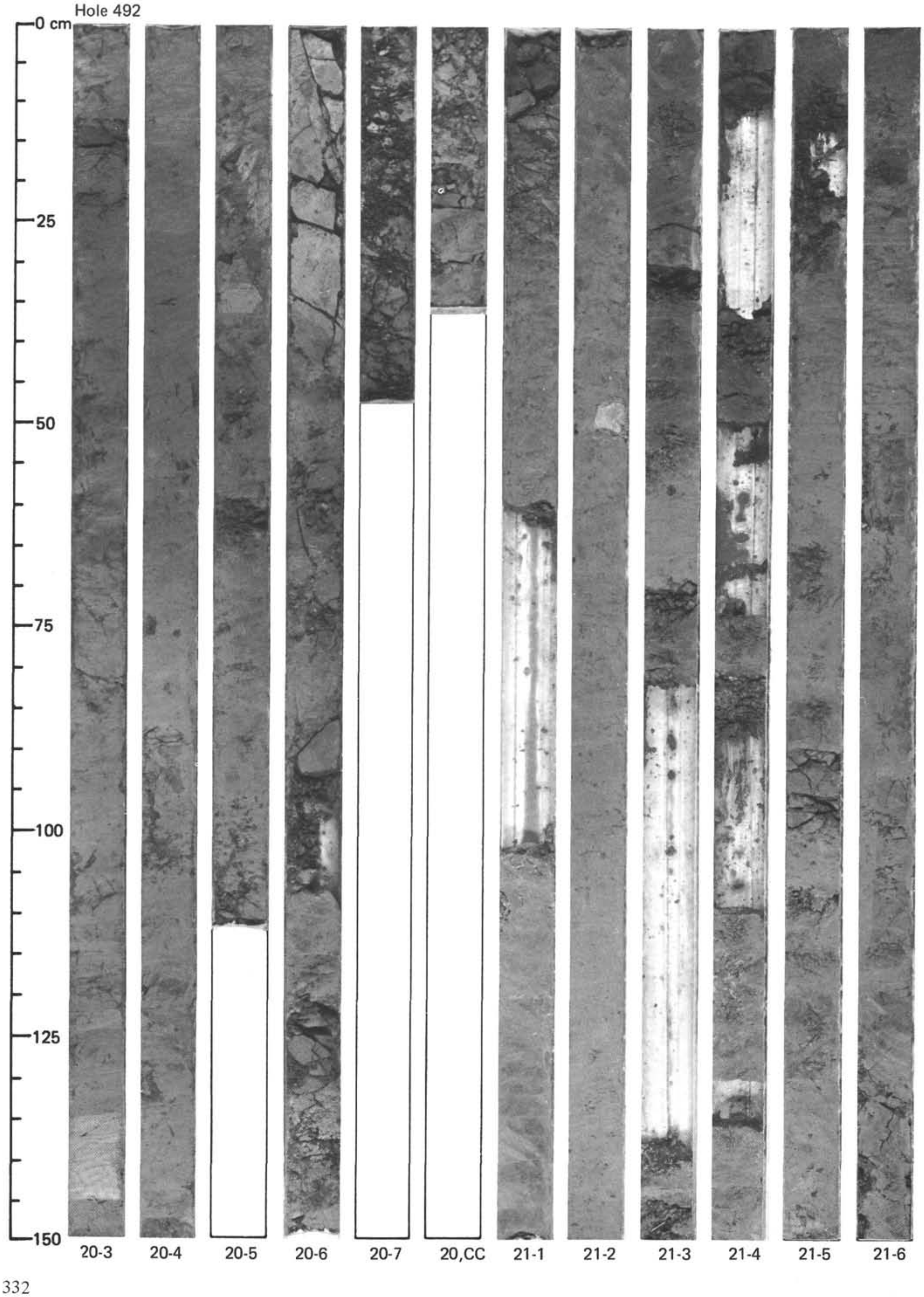
0 cm
25
50
75
100
125
150
16-3
16-4
16-5
16,CC
17-1
17-2
17-3
17-4
17-5
17,CC
18-1
18-2



0 cm
Hole 492
25
50
75
100
125
150
18-3
18-4
18-5
18-6
18-7
18,CC
19-1
19-2
19-3
19,CC
20-1
20-2


Hole 492
0 cm
25
50
75
100
125
150
20-3
20-4
20-5
20-6
20-7
20,CC
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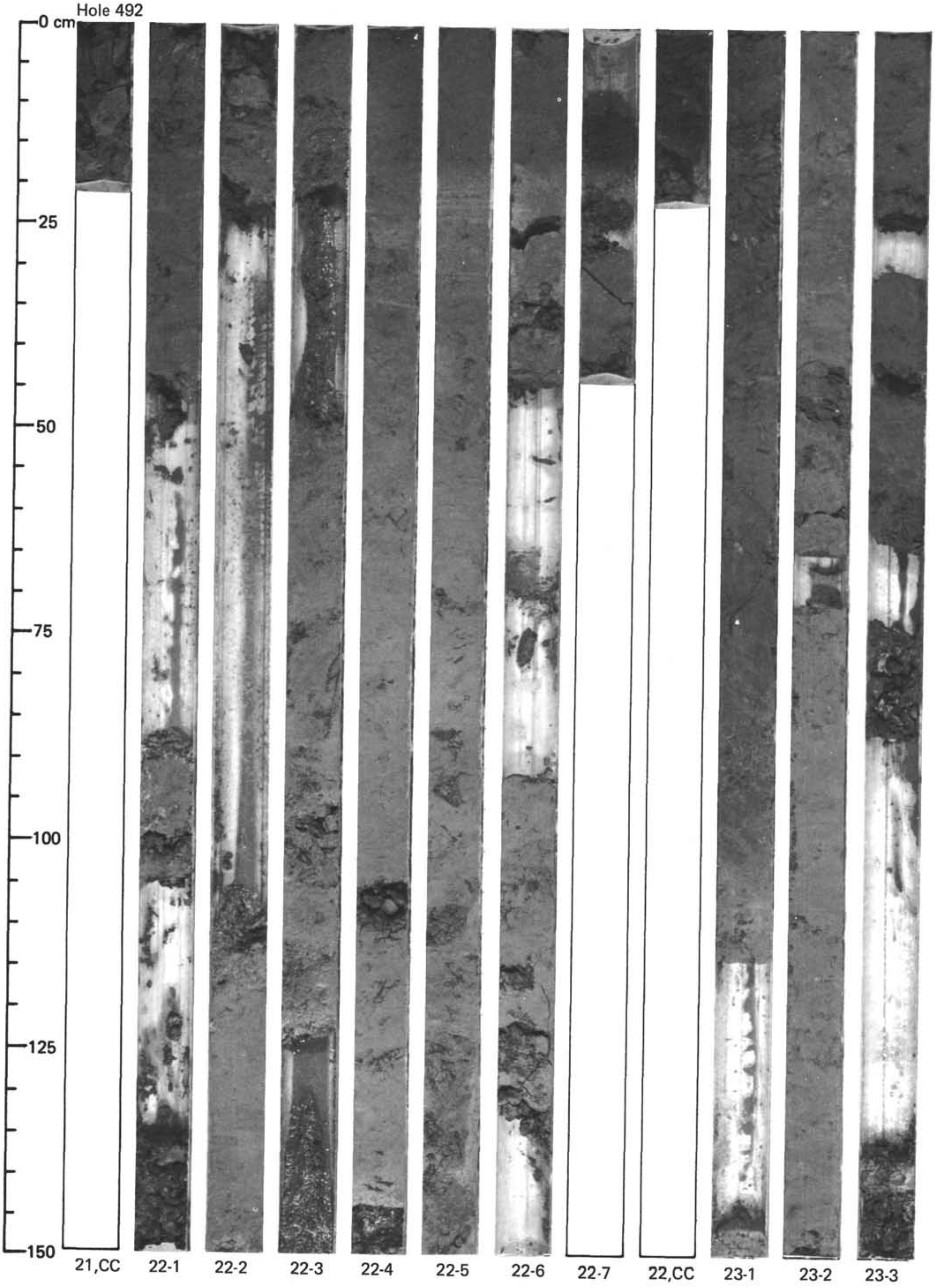
21-2
21-3
21-4
21-5
21-6


Hole 492
0 cm
25
50
75
100
125
150
21,CC
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22-2
22-3
22-4
22-5
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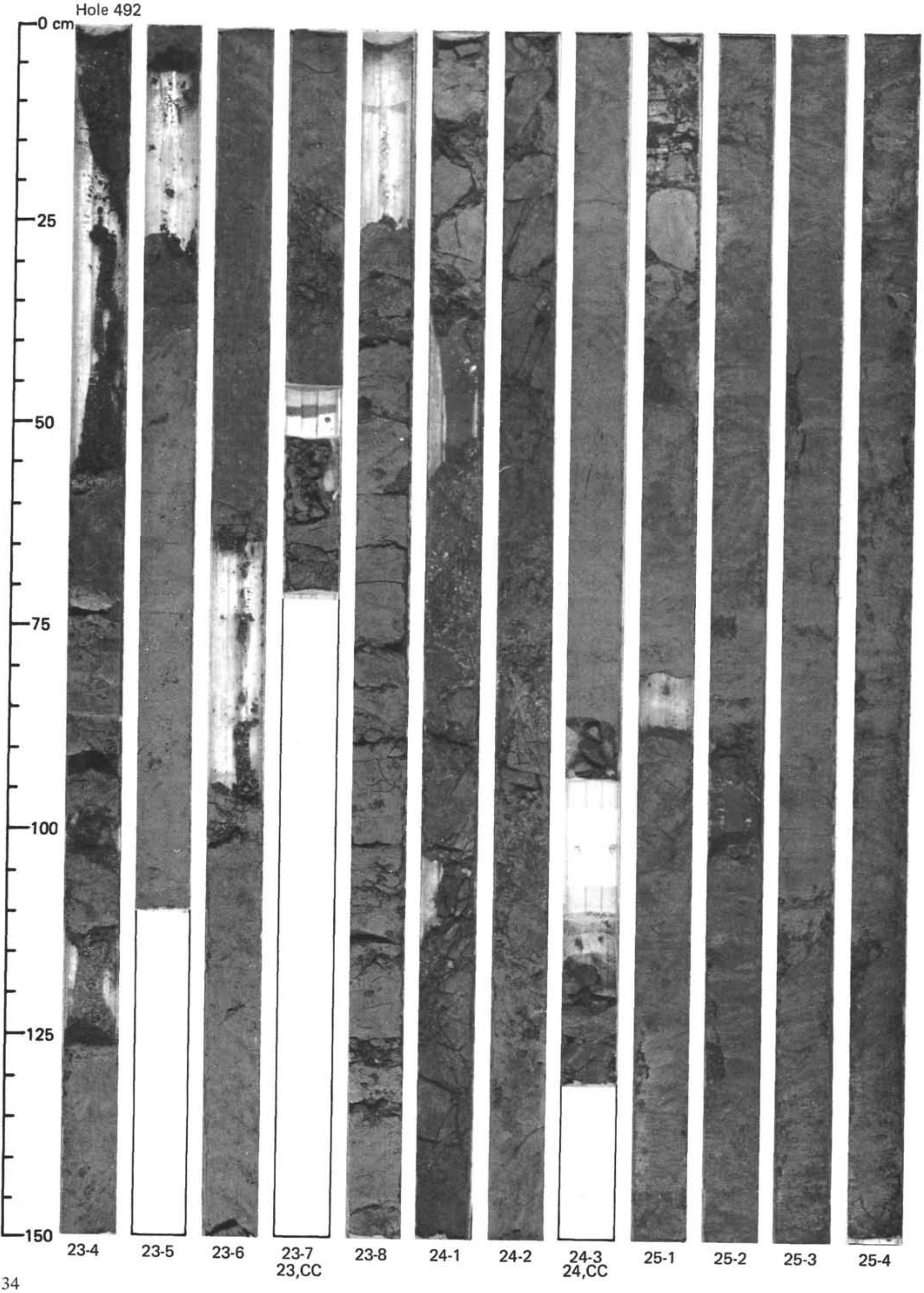
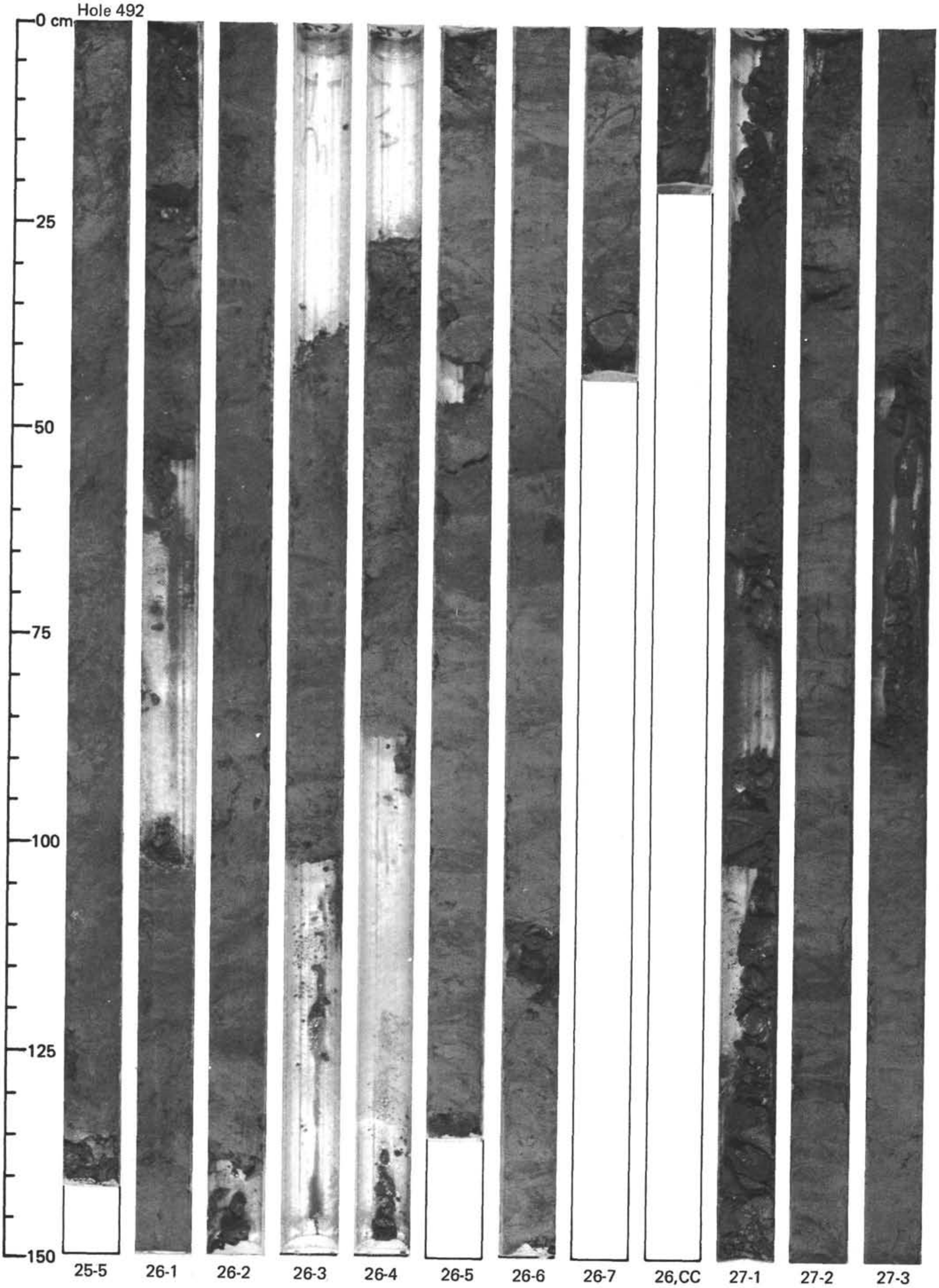
23-1
23-2
23-3


Hole 492
0 cm
25
50
75
100
125
150
23-4
23-5
23-6
23-7
23,CC
23-8
24-1
24-2
24-3
24,CC
25-1
25-2
25-3
25-4


Hole 492
0 cm
25
50
75
100
125
150
25-5
26-1
26-2
26-3
26-4
26-5
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26-7
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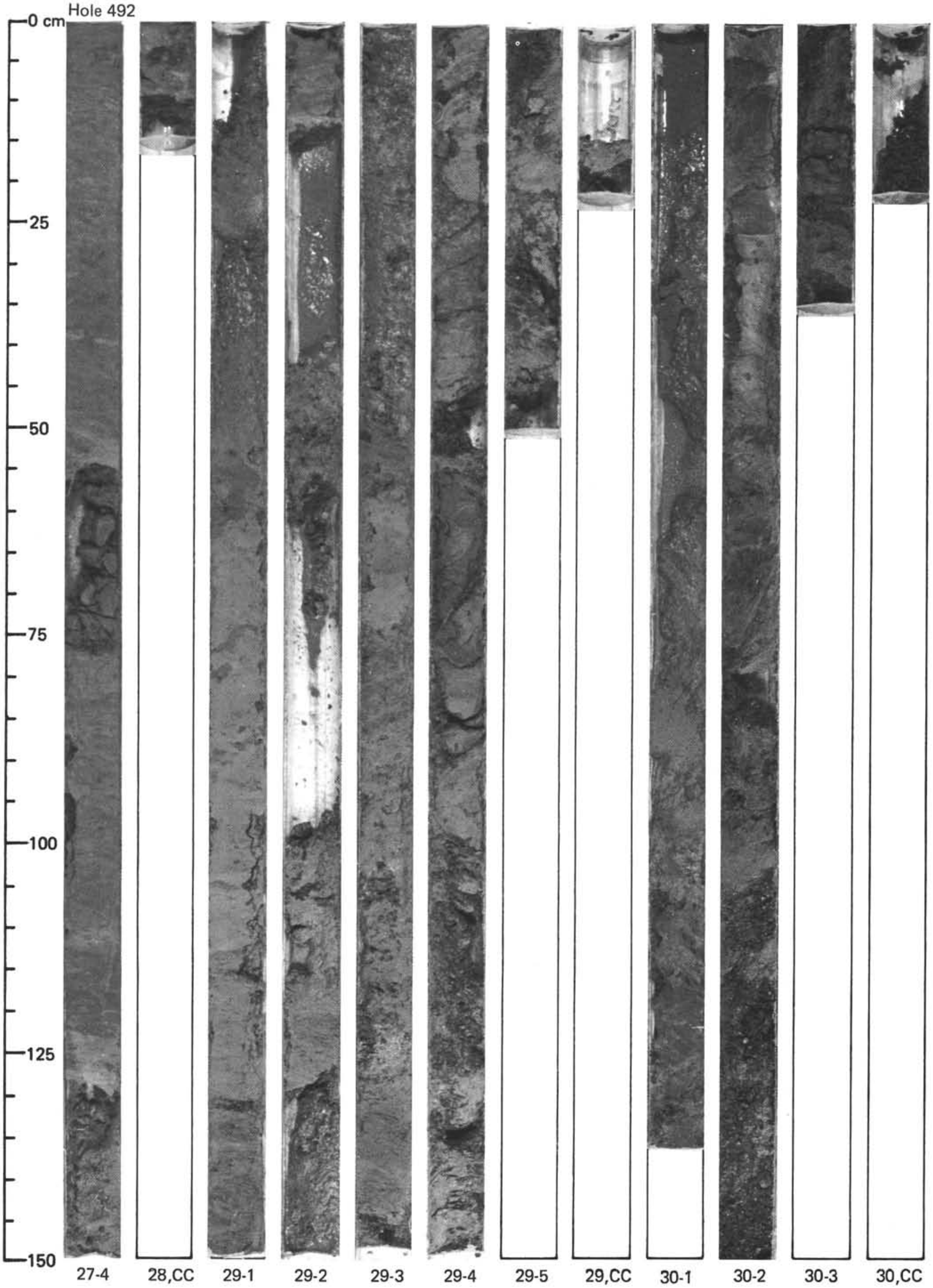
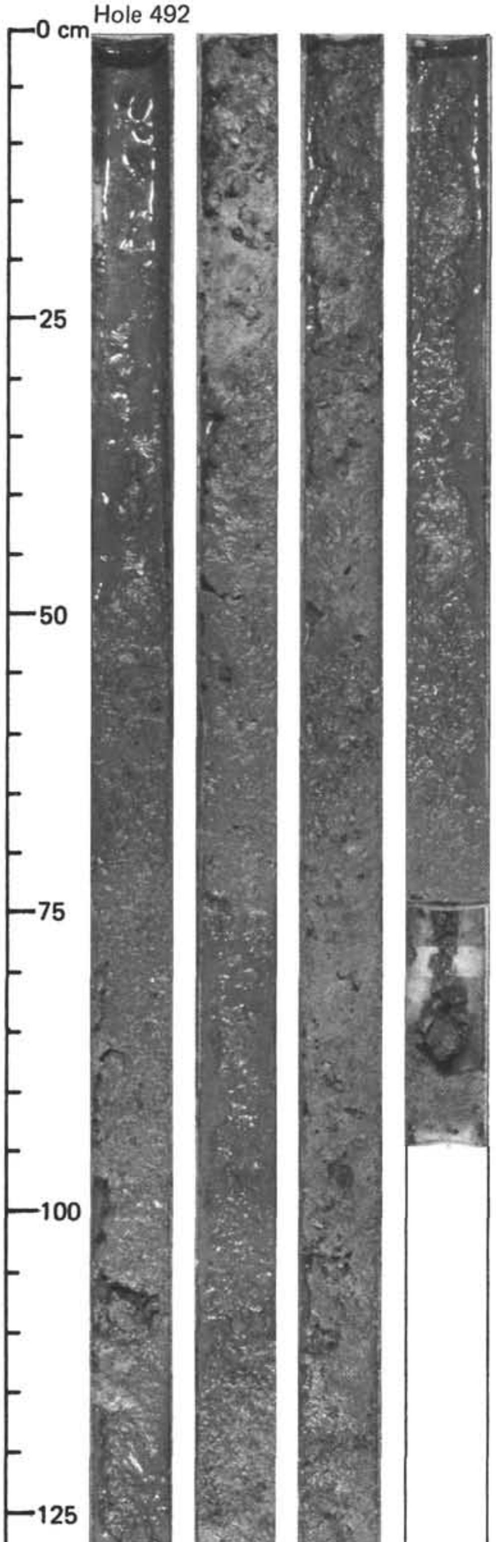
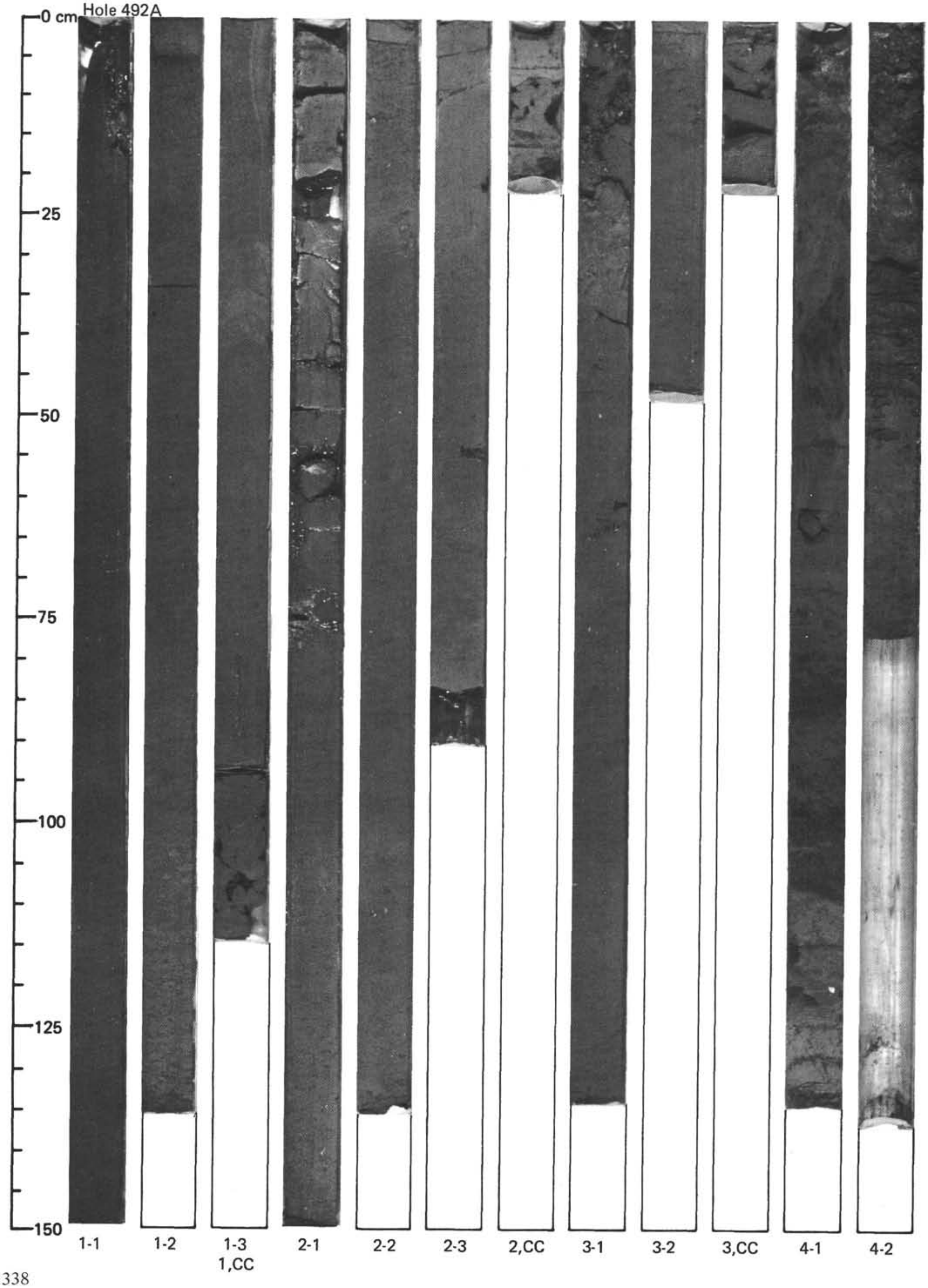
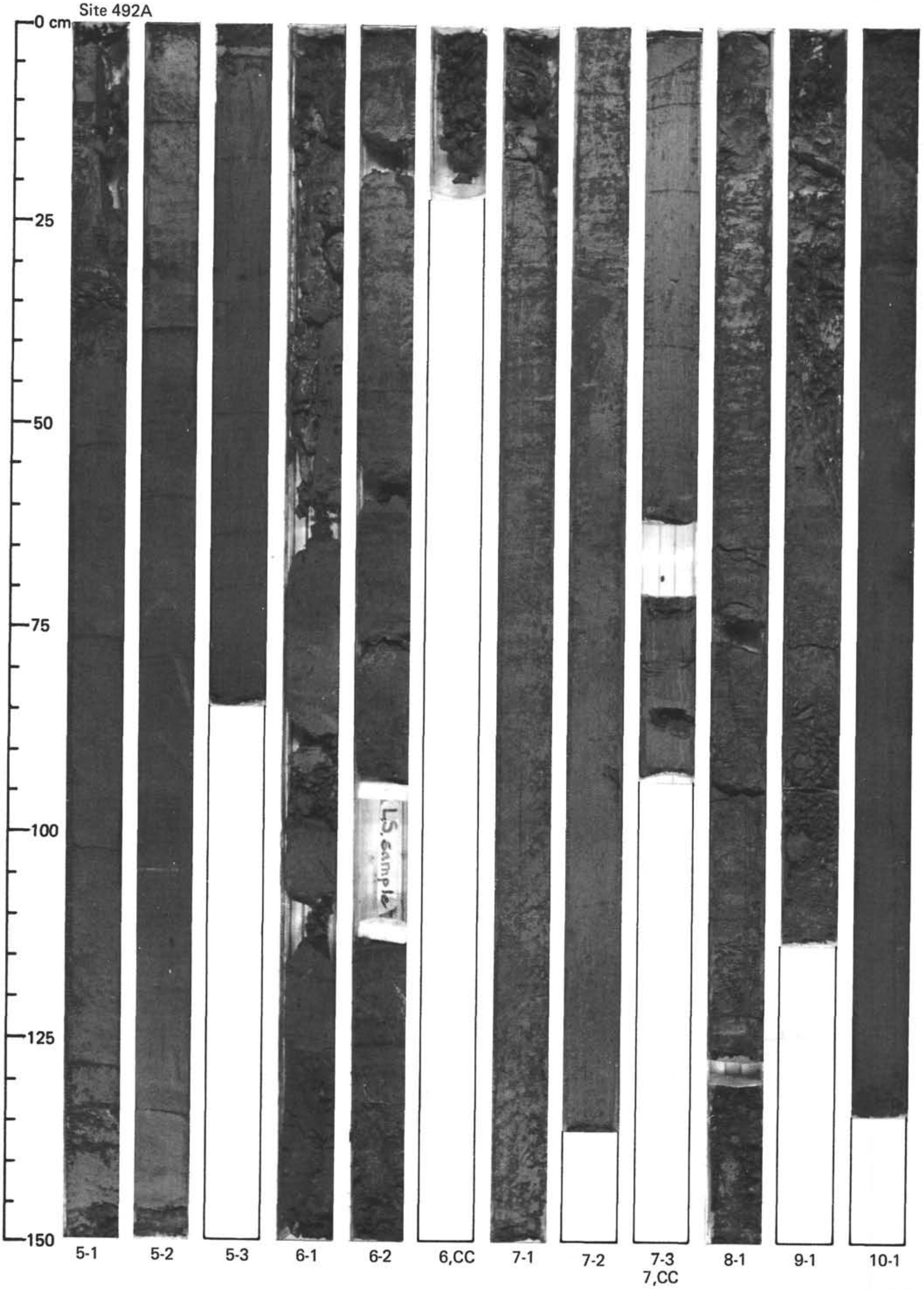
27-1
27-2
27-3


Hole 492
0 cm
25
50
75
100
125
150
27-4
28,CC
29-1
29-2
29-3
29-4
29-5
29,CC
30-1
30-2
30-3
30,CC


Hole 492
0 cm
25
50
75
100
125
150
31-1
31-2
31-3
31-4
31,CC


0 cm
Hole 492A
25
50
75
100
125
150
1-1
1-2
1-3
1,CC
2-1
2-2
2-3
2,CC
3-1
3-2
3,CC
4-1
4-2


Site 492A
0 cm
25
50
75
100
125
150
LS. sample
5-1
5-2
5-3
6-1
6-2
6,CC
7-1
7-2
7-3
7,CC
8-1
9-1
10-1

Hole 492A