3. SITE 8

The Shipboard Scientific Party[1]

SITE REPORT

Objectives

The Atlantic Advisory Panel proposed that Site 8 should be drilled on the rise between the Hatteras and Sohm Abyssal Plains (lat 35° 21′N., long 67° 31′W.). This location was considered to offer the best opportunity for realizing two primary objectives. The first of these objectives was to sample and date the oldest available rock in a region adjacent to the North American continent and as far as possible from the Mid-Atlantic Ridge. If crustal spreading had occurred, as was discussed in the Introduction (Chapter 1), some of the oldest sedimentary and igneous rocks underlying the North Atlantic Ocean should be obtained by drilling here. The second objective relates to the potential paleobiological and paleoecological information that could be derived from the sedimentary column in this general area. Examination of deep cores from this site would contribute to our understanding of the biostratigraphic and biogeographic distributions of Cretaceous and Tertiary calcareous microfossils in northern latitudes. As a result of these studies, it might be possible to determine the history of the influence of the Gulf Stream on the indigenous biota.

From previous investigations and the site surveys of *Vema* and *Glomar Challenger,* the following seismic information and lithologic predictions were available before the drilling (see Figure 1). Horizons A, β and B (see Introduction) were all identified on the seismic records for the site. Horizons A and β, suspected to represent chert layers based on the date of Leg 1, were present here at estimated depths below the ocean floor of 800 to 1300 feet (244 and 396 meters), respectively. After analyzing this information and the preliminary results of Leg 1, it was decided to attempt to core both Horizons A and β as well as the sediment directly above Horizon B and Horizon B itself. The available well-logging procedure was to be followed. The actual depths to Horizons A, β and B and their composition were additional objectives.

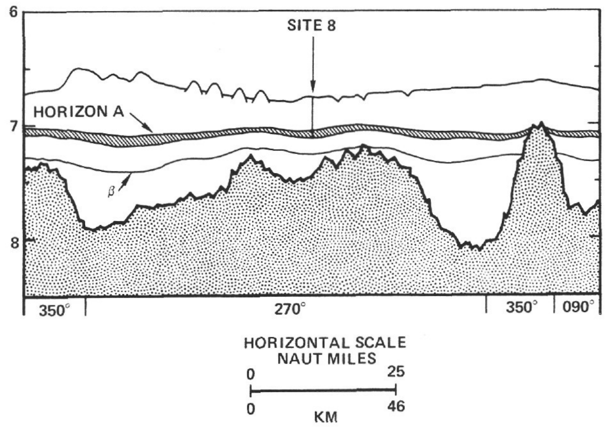

Figure 1. *Line drawing of profiler record made by* Vema *of Lamont-Doherty Geological Observatory showing typical acoustical subbottom features in the region of Site 8.*

Drilling and Coring Log

The *Glomar Challenger* arrived on location at 1742 hours on October 2, but the positioning system malfunctioned and the vessel drifted off station before a beacon was lowered. At 2110 hours the vessel steamed south to relocate the site and at 2358 hours, October 2, final positioning for Hole 8 was accomplished in 5169 meters (corrected) of water at a location defined by the coordinates: latitude 35° 23.00′N. and longitude 67° 33.20′W (Figure 2). The reflection times to Horizons A and Beta was accurately established by activating the profiling system while on station (Figure 3). Assembly of the drill string was initiated immediately, and it included a Hycalog full-faced diamond bit, 14 drill collars, and two bumpersubs. The reader is referred to Tables 1 and 2 for a summary of the coring operations. The bit entered the sea floor at 2300 hours, October 3, and a section of 521 feet (172 meters) of soft sediment was drilled. At this point a 30 foot core was cut, but the inner core barrel was recovered empty. Another core was attempted immediately, and a 30 foot core was cut at a rate of 90 feet per hour. On October 4, Core 1 was recovered, and it contained three feet of grey-green radiolarian mud of upper Middle Miocene age. The center bit was replaced and drill-

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ing continued. At approximately 800 feet (244 meters) below the sea floor, two thin hard layers were penetrated. At 817 feet (249 meters) below the sea floor, a 30 foot core was cut at a rate of 125 feet per hour. During the normal procedure for recovery of the inner core barrel, a length of core retrieved (sand line) may have been lowered into the outer drill pipe after the overshot made contact with the core barrel. As this line was being retrieved, it became lodged in the pipe. The line was broken and it was necessary to retrieve the entire drill string. Hole 8 was abandoned. At 1630 hours, October 5, Core 2 was recovered from the termination of the drill string. This barrel, Core 2, contained 12.5 feet (3.8 meters) of sediment including silty clay, turbidite, radiolarian ooze, and brecciated spiculite silt. The Radiolaria are Eocene.

Hole 8 terminated at a depth below the floor that was about 100 feet (33 meters) above Horizon A, according to calculations based on seismic reflection records. It was decided to make a second attempt to sample this reflector at this same site. For Hole 8A, the drill string was reassembled, and drilling proceeded to a depth of 913 feet (278 meters) below the sea floor. At this level, resistent layers were encountered, and they were suspected to consist of chert. Continuous coring procedures were initiated, based on the belief that penetration of chert would be facilitated by coring instead of drilling and also to recover material through the reflecting horizon. On the first coring attempt, a 30 foot length of core was cut at 150 feet per hour. At 0110 hours, October 7, Core 1 was recovered, and it contained eight feet of spiculite silty mud with clayey mud clasts. Radiolaria in the clasts are Eocene in age. On the second coring attempt, a very hard layer impeded the drilling, and a 25 foot core was cut at the rate of eight feet per hour. At 0745 hours, October 7, Core 2 was recovered, and it contained 1.5 feet of alternating beds of chert and silty claystone. Poorly preserved Eocene Radiolaria are present. On the third coring attempt, a 30 foot core was cut at 16 feet per hour; it was retrieved at 1445 hours, October 7, and contained two feet of core. On the fourth coring attempt, a 30 foot core was cut at an average rate of 50 feet per hour. The top two feet were penetrated slowly, but rapid progress was made in the lower 28 feet indicating that the resistant chert layer had been penetrated. At 1730 hours, October 7, the inner core barrel was retrieved, but the core catcher was missing and no core was recovered. The core catcher had become detached from the inner core barrel, and remained at the bottom of the drill string, thus permitting the core to slide out. Because of the probable presence of chert above the core catcher, no attempts were made for its retrieval, and drilling operations were terminated. The lower part of the bottom hole assembly including the diamond bit and outer core barrel, were lost. The ship was underway to Bermuda at 2130 hours, October 8.

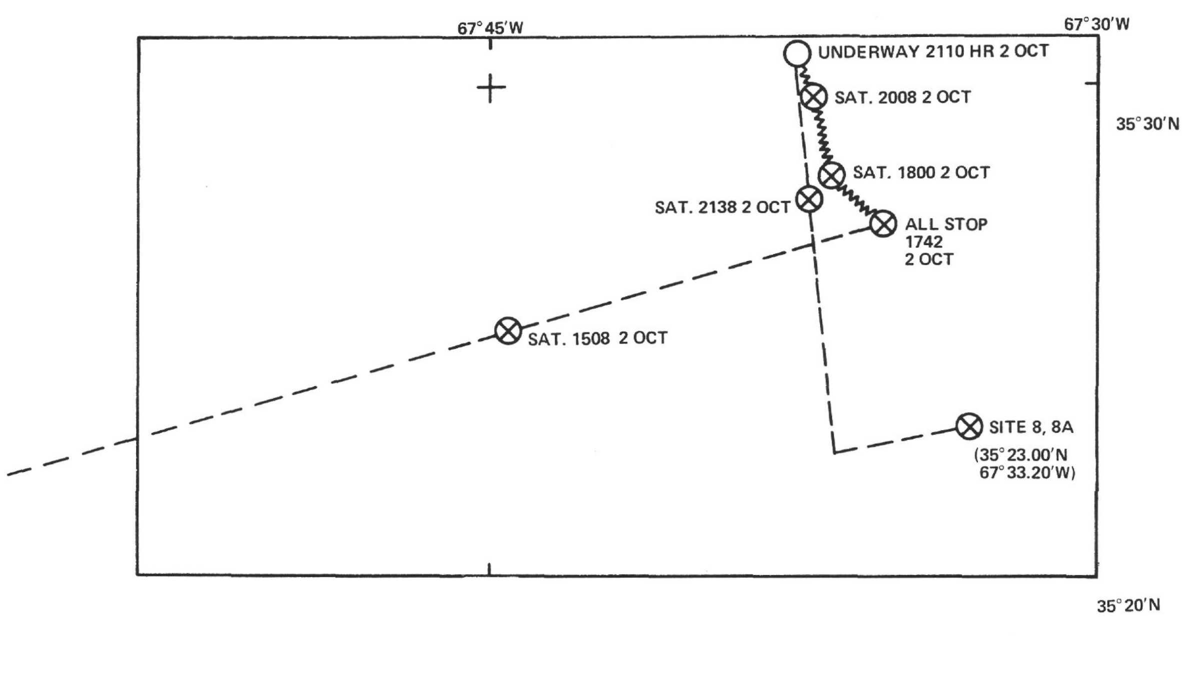


Figure 2. *Chart showing* Glomar Challenger's *approach to Site 8.*

TABLE 1
Drilling Summary

Hole 8
(lat 35° 23.00′N., 67° 33.20′W., depth 5169 meters)

Hour/Date Recov.	Core No.	Depth Below Sea Floor m	Depth Below Sea Floor ft	Depth Below Sea Surface m	Depth Below Sea Surface ft	Core Cut m	Core Cut ft	Core Recov. m	Core Recov. ft	% Core Recov.
0535	1	158.8	521	5342	17527					
4 Oct.		167.9	551	5352	17557	9.14	30	0	0	0.0
0735	2	167.9	551	5352	17557					
4 Oct.		177.1	581	5361	17587	9.14	30	.91	3.0	10.0
1630	3	249.0	817	5433	17823					
5 Oct.		258.2	847	5442	17853	9.14	30	3.81	12.5	42.0
				Total		27.42	90	4.72	15.5	Average 17.2

Hole 8A
(lat 35° 25.00′N., long 67° 33.20′W., depth 5169 meters)

Hour/Date Recov.	Core No.	Depth Below Sea Floor m	Depth Below Sea Floor ft	Depth Below Sea Surface m	Depth Below Sea Surface ft	Core Cut m	Core Cut ft	Core Recov. m	Core Recov. ft	% Core Recov.
0110		278.3	913	5463	17919					
7 Oct.	1	287.4	943	5472	17949	9.14	30	2.44	8.0	27.0
0745		287.8	944	5472	17950					
7 Oct.	2	295.4	969	5480	17975	7.62	25	.30	1.5	4.0
1445		295.4	970	5480	17976					
7 Oct.	3	304.8	1000	5489	18006	9.14	30	.30	2.0	3.0
1730		305.1	1001	5489	18007					
7 Oct.	4	314.2	1031	5498	18037	9.14	30	0	0	1.0
				Total		35.04	115	3.04	11.5	Average 8.7

TABLE 2
Coring Rates

Core No.	Drilling Time	Depth Cored ft	Average Coring Rate (ft/hr)	Remarks
Hole 8				
1	22 minutes	30	90	
2	15 minutes	30	125	
Hole 8A				
1	12 minutes	30	150	
2	3 hours	25	8	Contact with hard (chert) layer at top of Core 2
3	1-1/2 hours	30	16	
4	35 minutes	30	50	Top 2 feet slow penetration; very rapid beneath this level

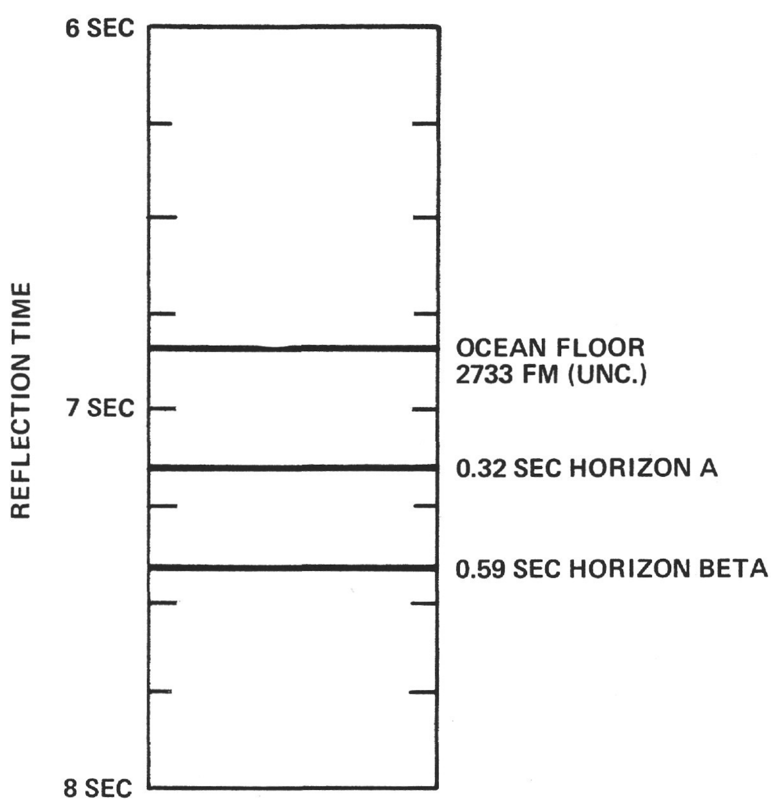


Figure 3. *Line drawing of profiler record made on station by* Glomar Challenger *at Site 8.*

Summary of Drilling and Coring at Site 8

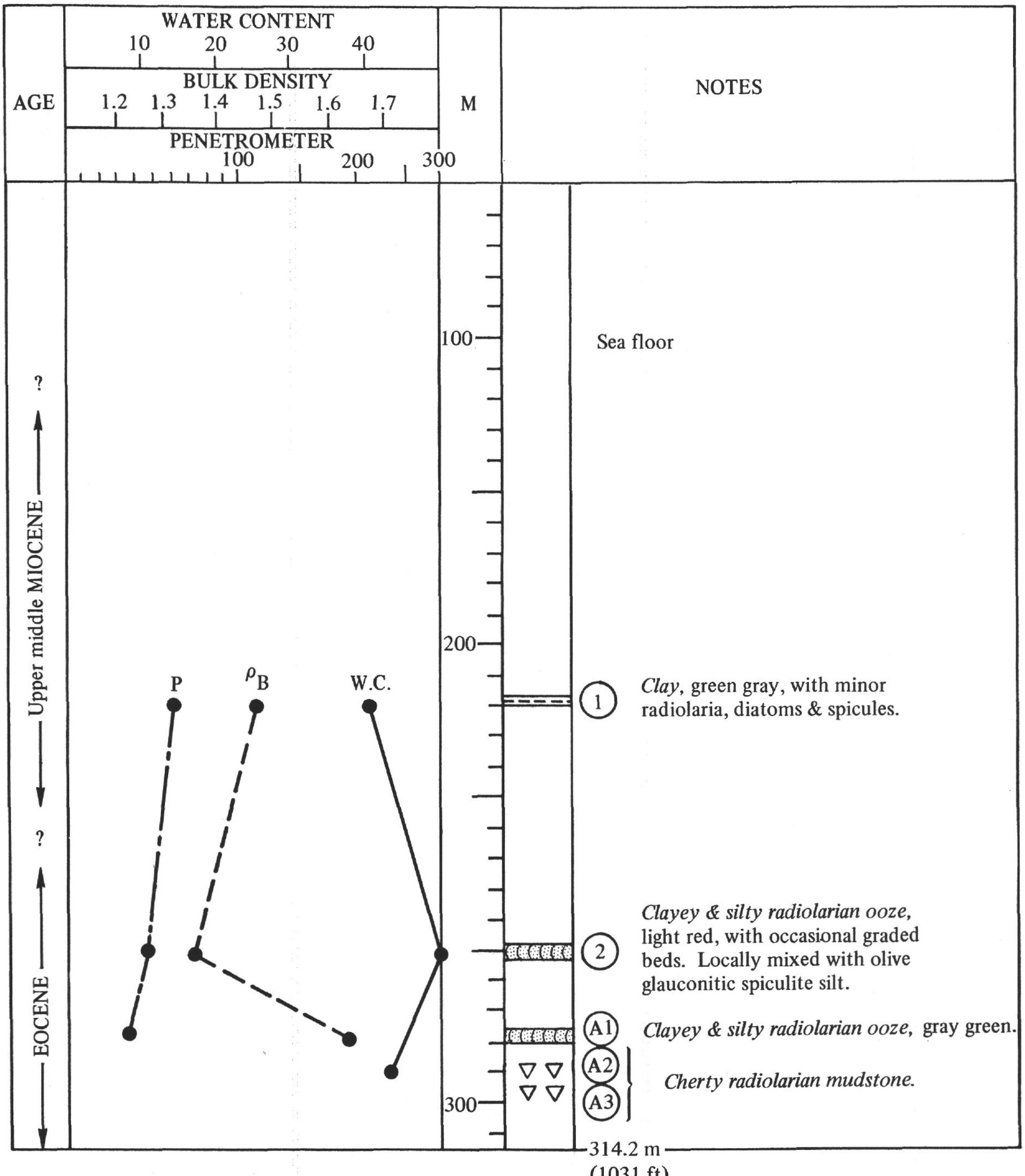


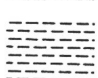
Figure 4. *Summary of drilling and coring at Site 8.*

The Cores Recovered from Site 8

Figures 5 through 9 are the graphic summaries of the cores recovered at Site 8.

These figures show, for each core:

(1) The stratigraphic age.
(2) The natural gamma radiation
(3) The bulk density was determined by the GRAPE (Gamma Ray Attenuation Porosity Evaluation) equipment
(4) The length of the core in meters measured from the top of the core and the subbottom depth of the top of the cored interval.
(5) The lithology (see key below).
(6) The positions of the tops of each core section.
(7) Some notes on the lithology.

	LITHOTYPE REPRESENTED
	FORAM.-NANNOFOSSIL OOZE
	NANNOFOSSIL OOZE
	SILICEOUS OOZE (RADS. A/OR DIATS. A/OR SPICULES)
	CLAYEY ZEOLITE SILT
	NON-BIOGENIC SAND - (MED-COARSE)
	NON-BIOGENIC SILT
	CLAY
	ASH BED, OR ZONE RICH IN VOLC. MINS.
	IGNEOUS
	CHERT (HAND-DRAWN)

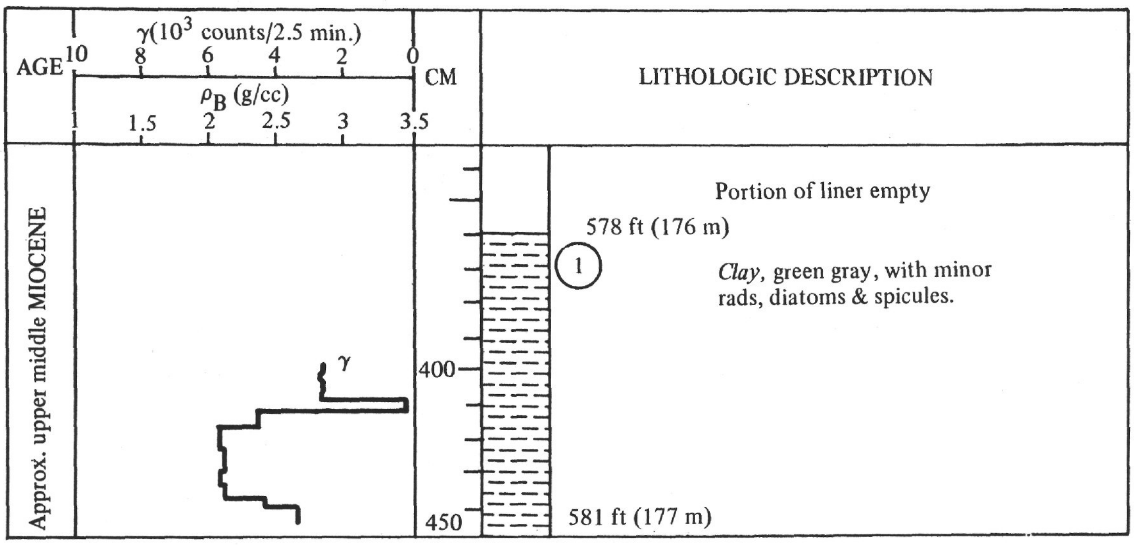


Figure 5. *Hole 8 Core 1.*

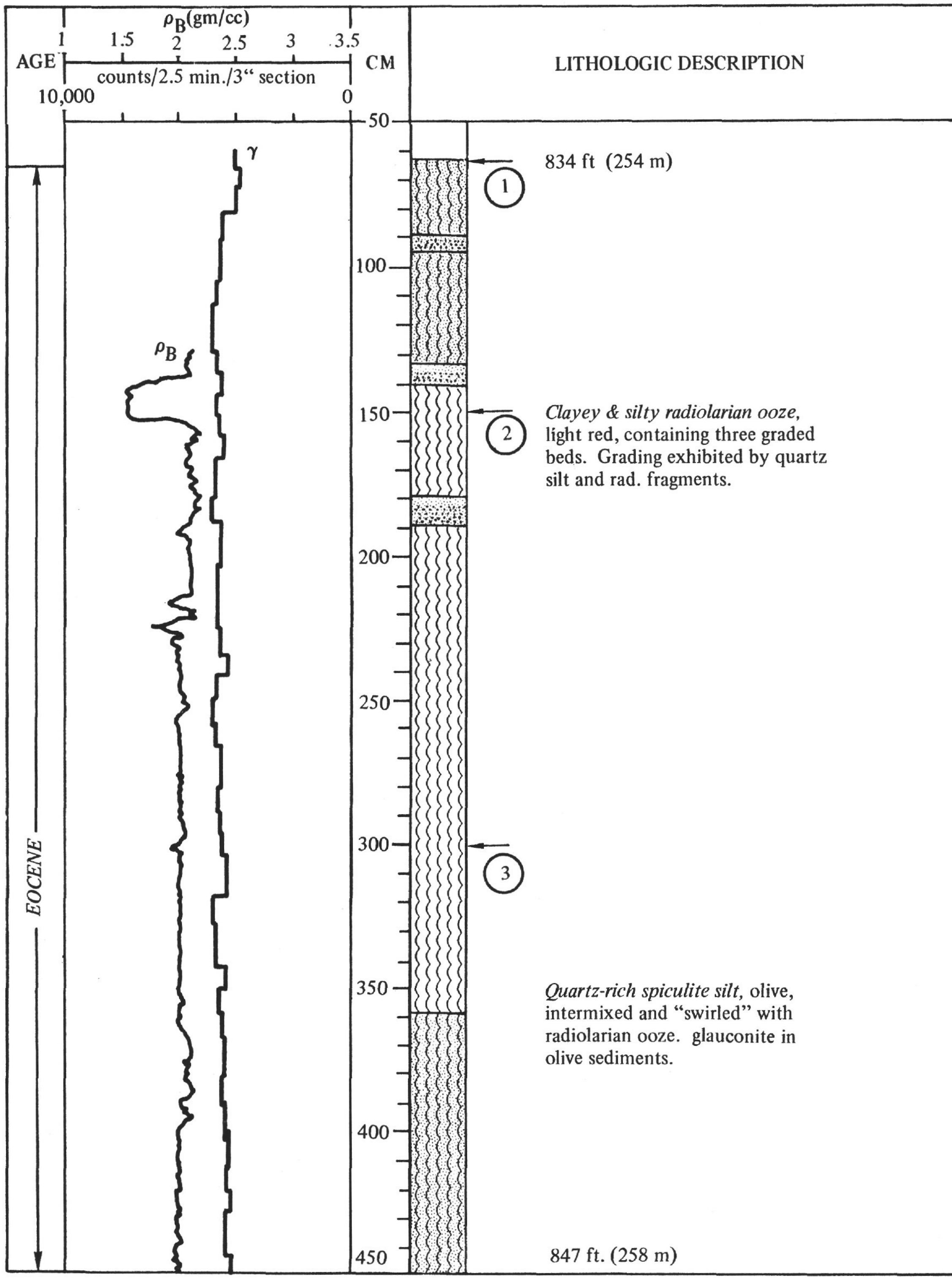


Figure 6. *Hole 8 Core 2.*

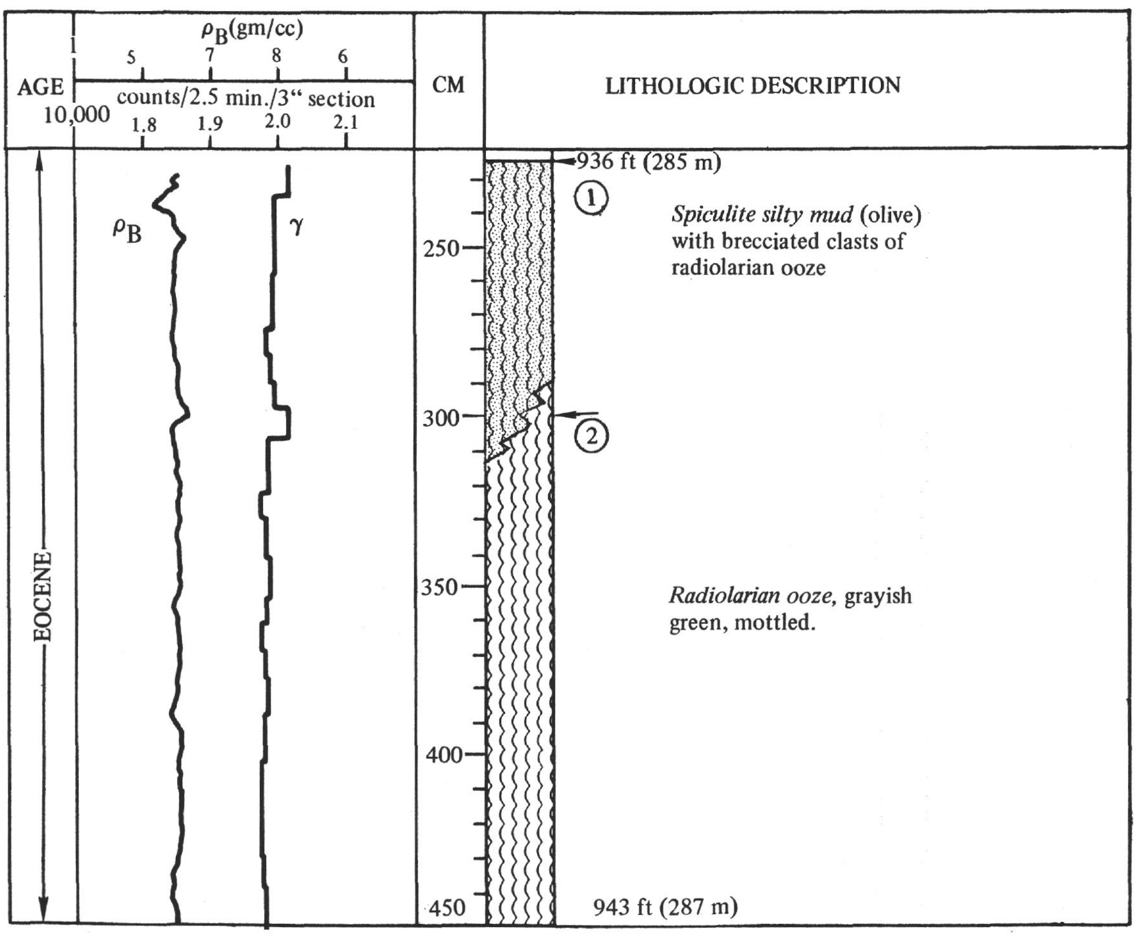


Figure 7. *Hole 8A Core 1.*

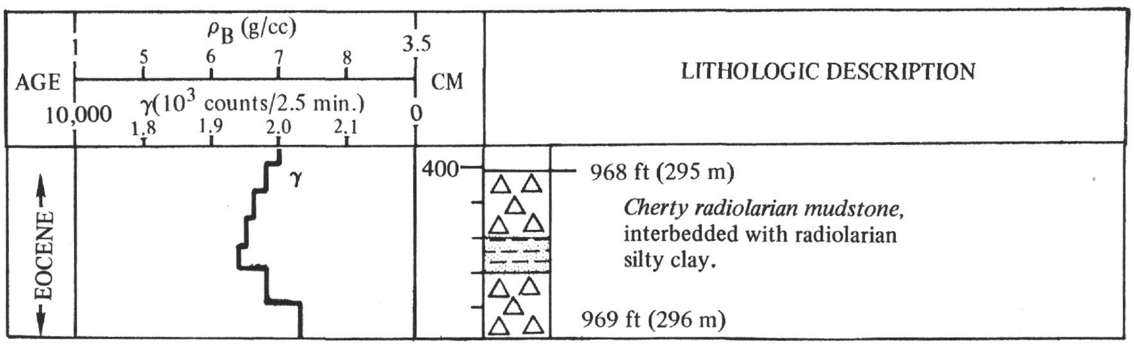


Figure 8. *Hole 8A Core 2.*

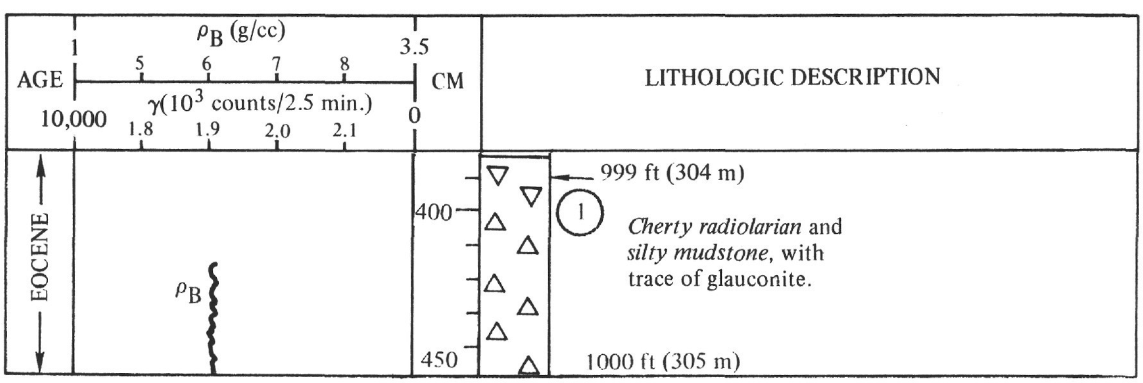


Figure 9. *Hole 8A Core 3.*

The Cores Recovered from Site 8

Figures 10 through 17 show details of the individual core sections of the cores from Site 8.

Each figure shows:

(1) A scale of centimeters from the top of each section.
(2) A photograph of the core section.
(3) The lithology (see key).
(4) The positions of smear slides (x).
(5) Notes on the lithology, X-ray mineralogy, carbon content, expressed as a percentage of total sediment (see Chapter 9), the water content and the grain size (see Chapter 8). Colors are given with reference to the GSA Rock Color Chart.

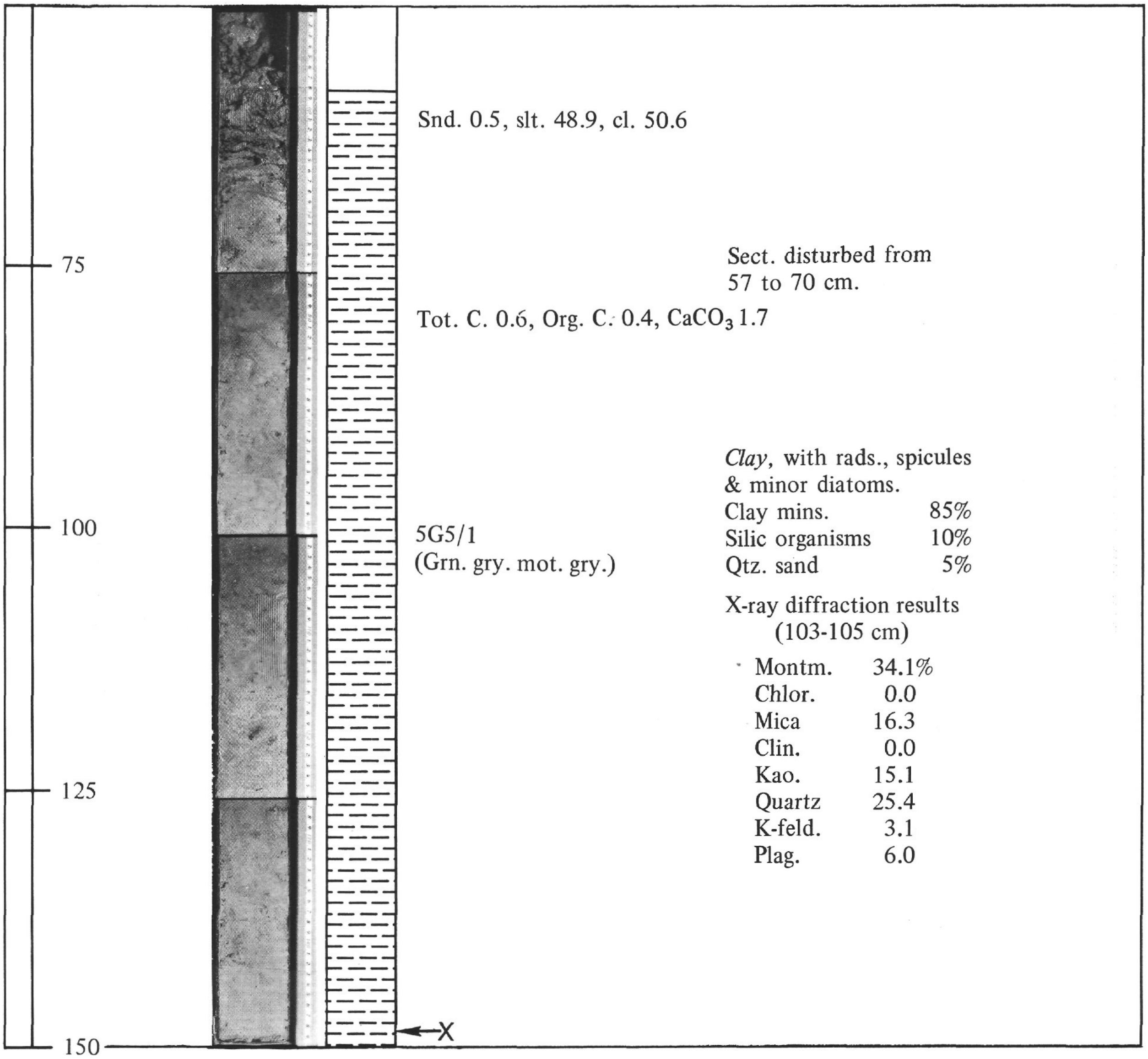


Figure 10. *Hole 8 Core 1 Section 1.*

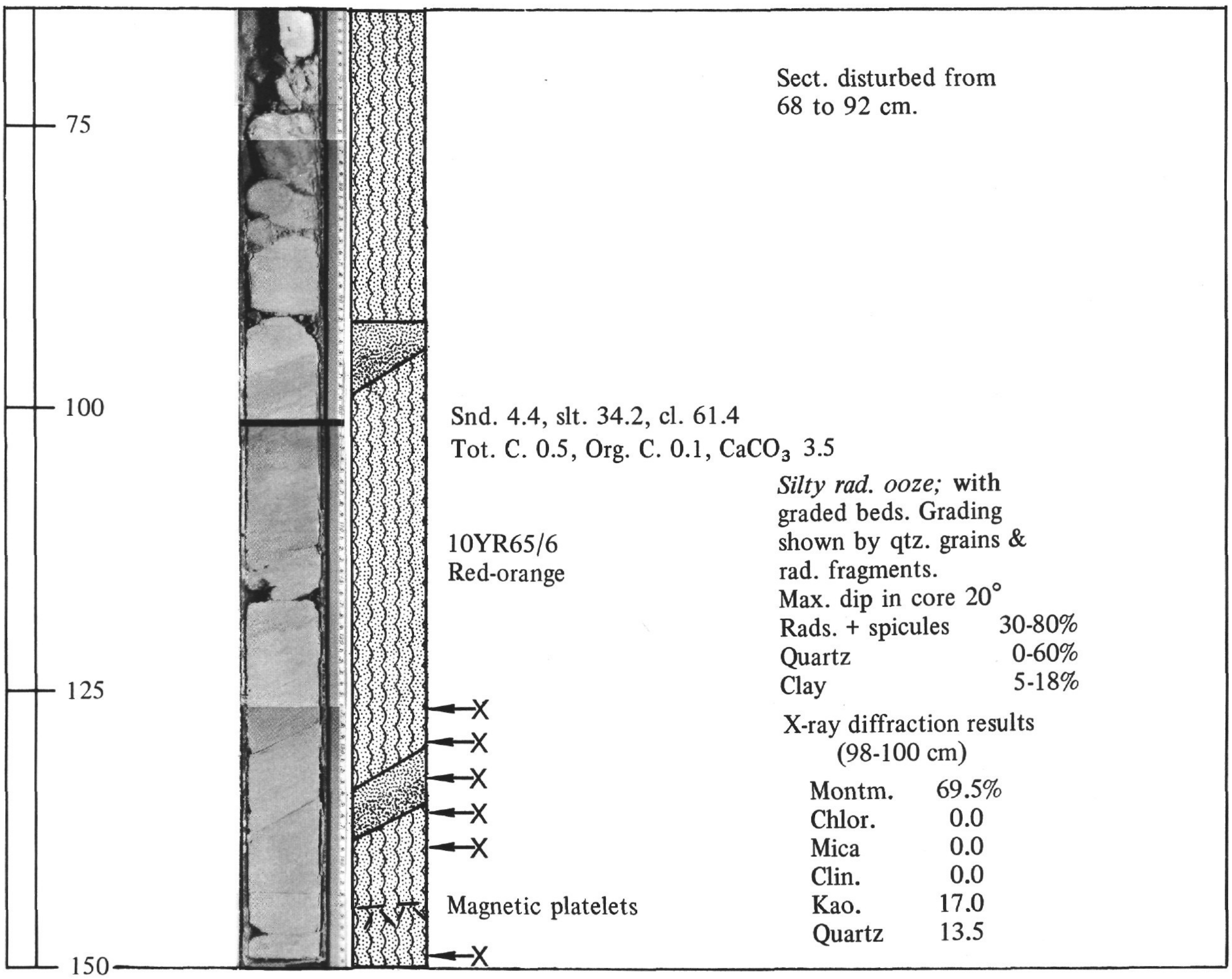


Figure 11. *Hole 8 Core 2 Section 1.*

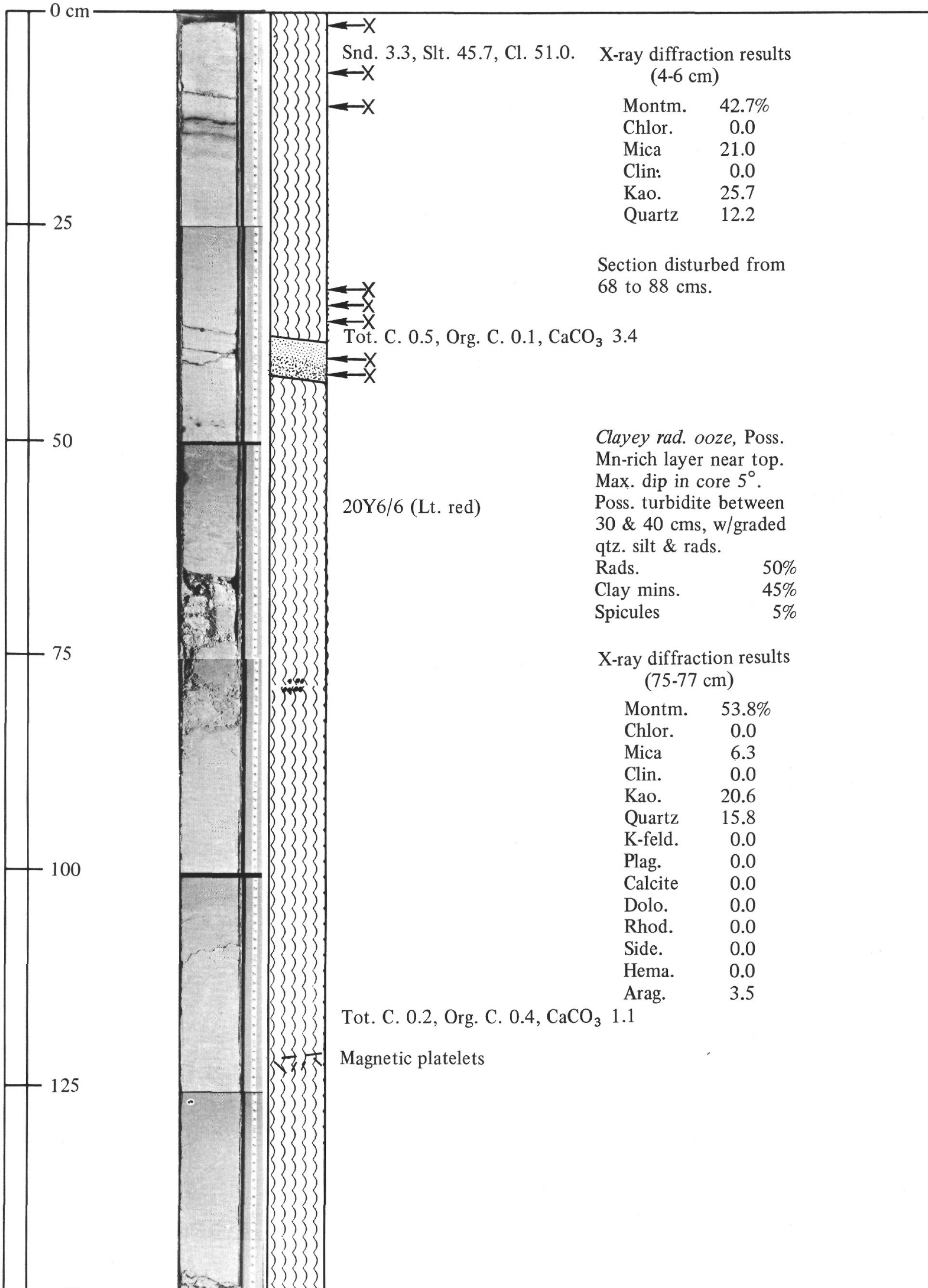
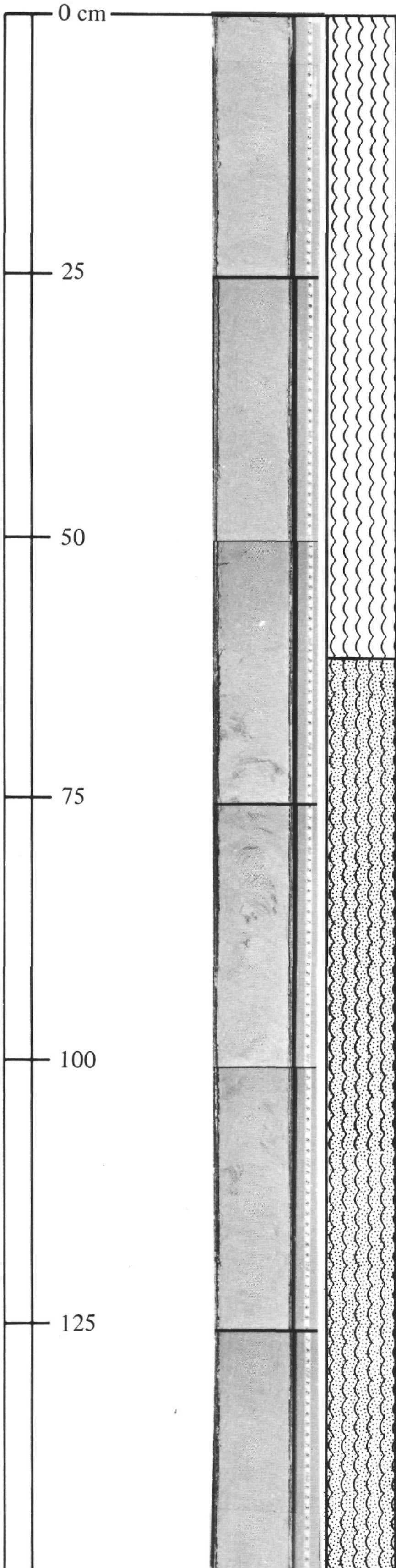


Figure 12. *Hole 8 Core 2 Section 2.*



X

Tot. C. 0.4, Org. C. 0.1, $CaCO_3$ 2.5

Snd. 4.9, slt. 30.5 cl. 64.6

5YR6/6
(Reddish-yell.)

X-ray diffraction results
(10-12 cm)

Montm.	39.4%
Chlor.	0.0
Mica	9.3
Clin.	0.0
Kao.	10.8
Quartz	11.7
K-feld.	5.2
Plag.	3.9
Calcite	0.0
Dolo.	7.2
Rhod.	0.0
Side.	0.0
Hema.	0.0
Arag.	12.5

Rad. ooze. (not burrowed)

Rads.	48%
Clay	46%

Snd. 5.2, slt. 61.0, cl. 33.8

X

5YR6/6
5YR8/4
(Pink)
5Y5/4
(Olive)

X-ray diffraction results
(70-72 cm)

Montm.	18.6%
Chlor.	0.0
Mica	6.0
Clin.	0.0
Kao.	6.2
Quartz	48.0
K-feld.	4.1
Plag.	3.3
Arag.	13.8

Qtz.-rich spiculite silt
Slump structures either natural or due to coring. Highly deformed whirls and fragments of reddish yell., Pink & olive seds.

Olive sed:

Qtz. sand	45%
Spicules	30%
Rads	5%
Glauconite	5%

Matrix:

Rads.	48%
Clay	46%

Figure 13. *Hole 8 Core 2 Section 3.*

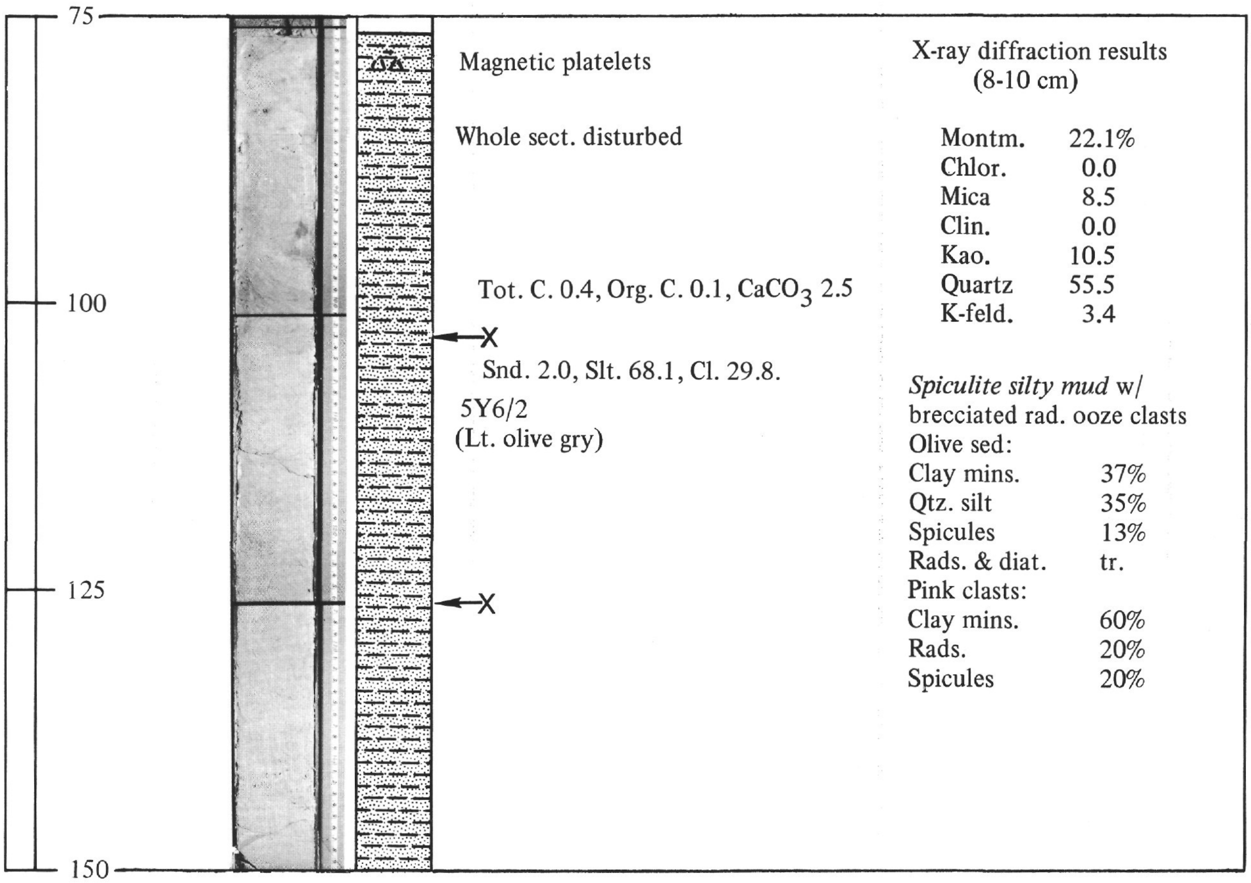


Figure 14. *Hole 8A Core 1 Section 1.*

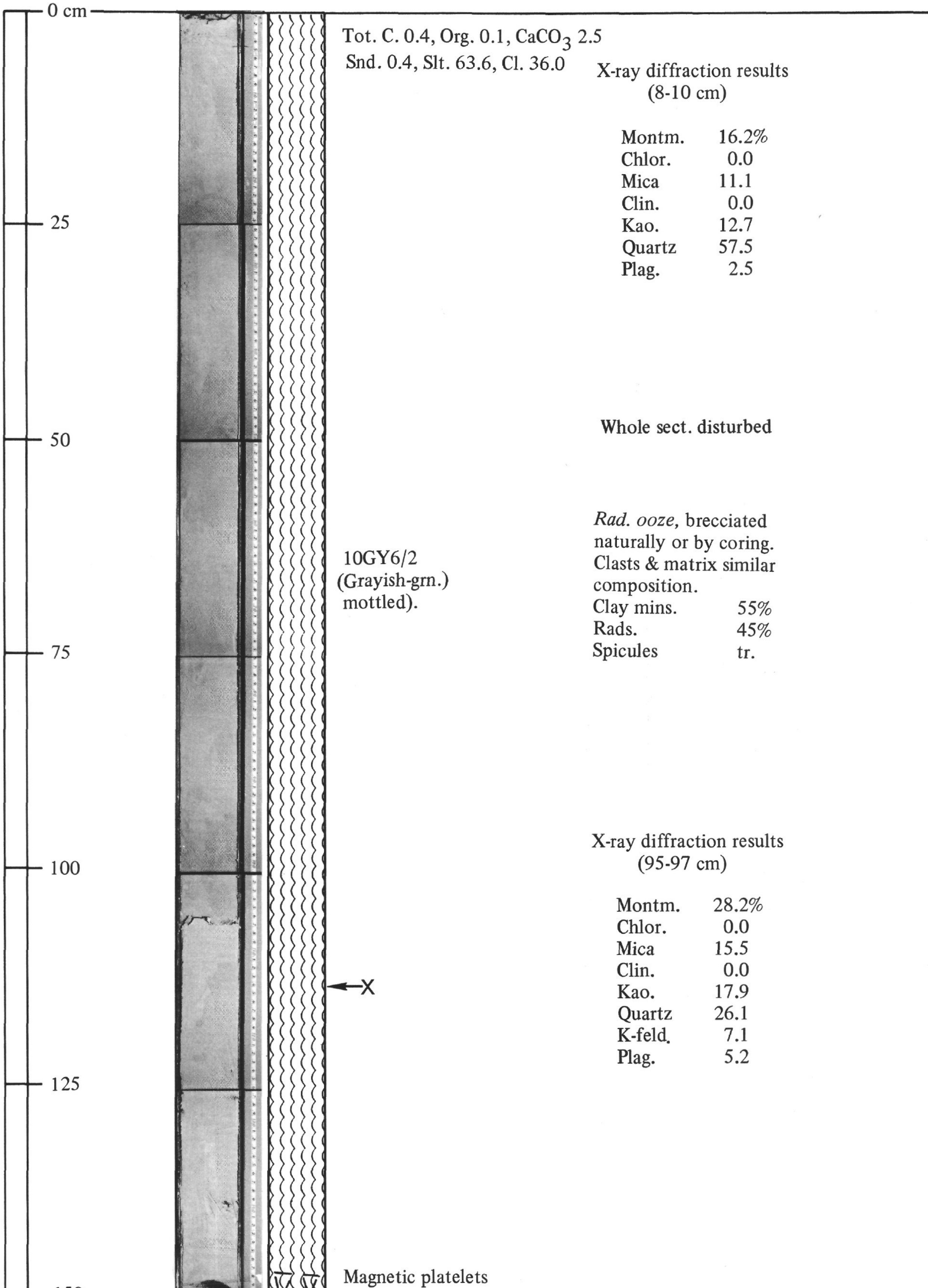
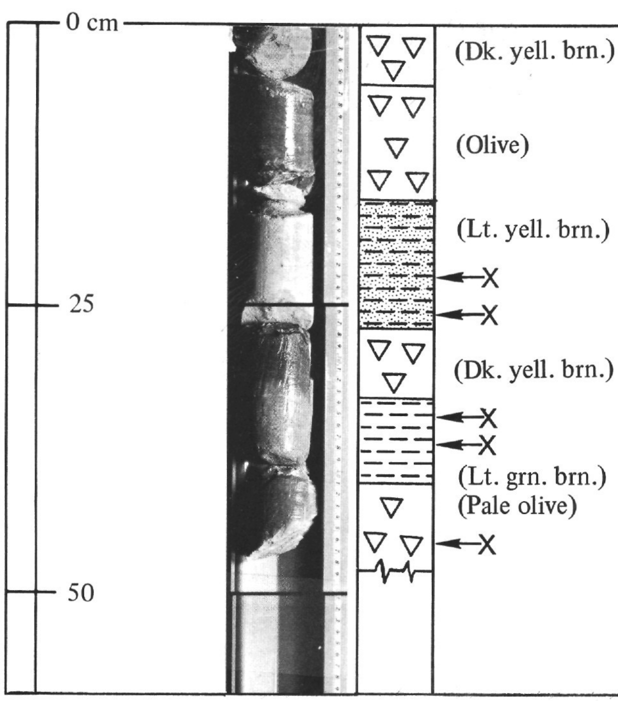


Figure 15. *Hole 8A Core 1 Section 2.*



0-6 cm: - *Cherty rad. mudstone*
Rad "ghosts". Matrix optically continuous.

Rad "ghosts"	20%

6-15 cm: - *Cherty mudstone.*

16-27 cm: - *Rad. silty clay,* semi-consolidated.

Clay	50%
Rads	25%
Qtz. silt	20%
Spicules	5%

28-33 cm: - *Cherty rad. mudstone.*

33-39 cm: - *Silty mud,* semi-consolidated zeolitic.

39-47 cm: - *Cherty rad. mudstone.*
Rad. "ghosts".

Rad. "ghosts"	20%
Matrix	75%
Qtz. silt	5%

Max. dip in core 20°

Figure 16. *Hole 8A Core 2 Section 1.*

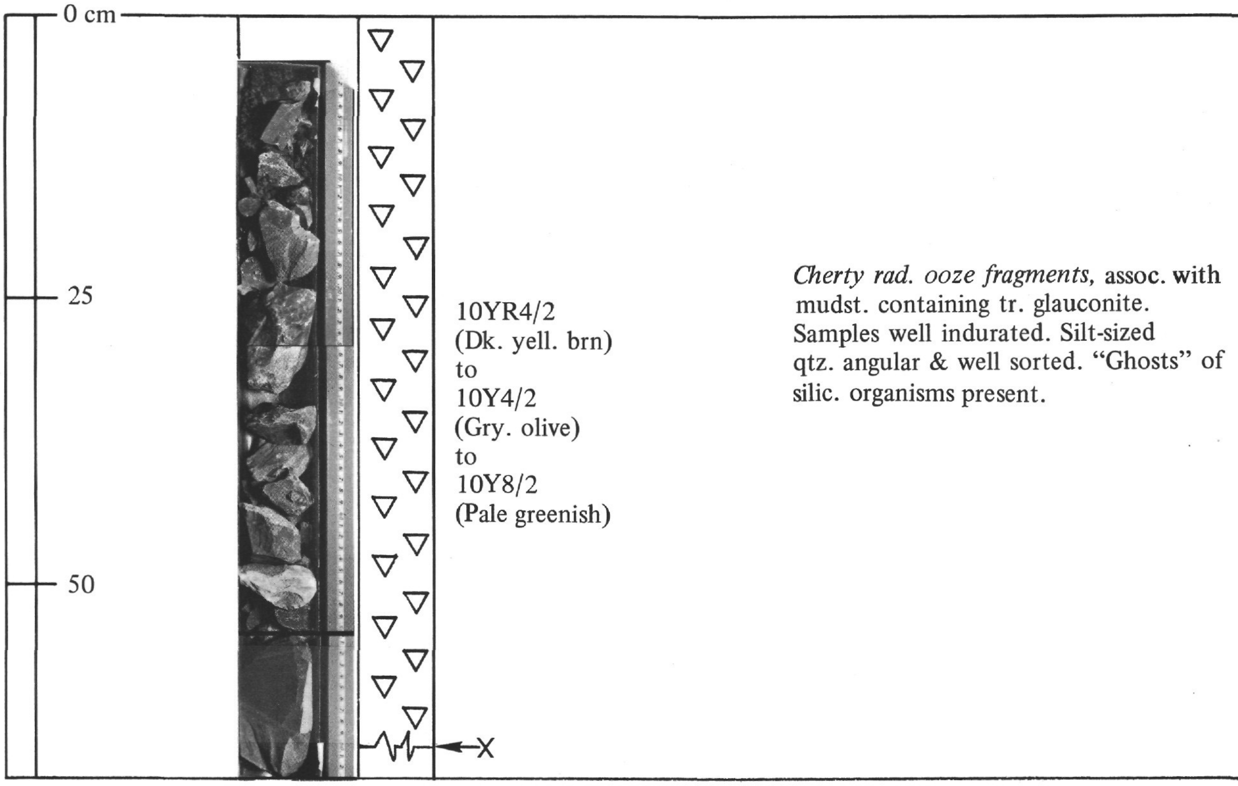


Figure 17. *Hole 8A Core 3 Section 1.*

Lithology

Sediments encountered in cores from Holes 8 and 8A range from relatively pure siliceous oozes to muds containing up to 90 per cent non-skeletal detrital material, or authigenic derivatives, such as glauconite. Middle Miocene grey-green muds, containing sparse siliceous skeletal material, contrast with the multicolored radiolarian oozes of the Middle Eocene. Beds of Eocene chert occur, apparently formed by the silicification of some of these sediments.

Disturbed zones were observed in several cores from this site. Such zones show brecciation-structures in which irregular clasts of coherent sediment are set in a structureless matrix. In other cases, there are swirls of spicule-rich glauconitic silt, mixed with radiolarian ooze. The question remains unresolved whether such structures are the result of a mudflow or turbidity current origin, or whether they are artifacts produced by the coring operations. The latter origin is favored by the authors, although a few undisturbed thin graded beds of radiolarian ooze occur within the sequence.

A notable fact with respect to the sediments cored at Site 8 is the complete absence of calcareous sedimentary components. A study of sediment smeared on the outside of the drill collars and outer core barrel indicated Recent coccolith ooze to be present somewhere in the upper part of the hole. No significant amounts of volcanic debris were observed in any of the samples.

Cementation by silica, to form cherty sediments, has occurred in beds containing appreciable amounts of fine grained terrigenous debris. The chert in some examples exhibits a flint-like conchoidal fracture and appears to be a cherty radiolarian mudstone. In other cases it is present in the form of a silicified siltstone showing varying degrees of induration.

There is strong evidence that hematitic mud was encountered beneath the chert in Hole 8A. At the time the last of the drill string was brought aboard, the drill collars and upper part of the outer core barrel were seen to be smeared with bright red material. On closer examination, it was clear that the color was from a thin layer of red mud clinging to the surface of sticky Recent sediment that was smeared on the surface of the drill string. This red material closely resembles hematite in color, and if, as believed, it was encountered beneath the chert, it would be at approximately the same stratigraphic level as that from which hematitic red clay was described at Hole 7A, Leg 1.

The bumper-subs, located in the drill string a little way above the lower end were found to contain very coarse sand composed of quartz, abundant heavy minerals and shallow water pelecypod fragments. Planktonic foraminifera and nannofossils associated with this sand indicate a Quaternary age. This sediment must have been caught in the drill string near the surface of the sediment, either during entry into the hole or during the pulling of the drill string.

At several narrowly restricted stratigraphic levels (found in 8/2/1; 8/2/2; 8A/1/2, 8A/2/1) numerous small platelets were observed on the X-radiographs. These are small plates of magnetic material which are either concentrated along bedding planes or randomly positioned in the sediment. They may be maghemite.

Manganese micronodules and organisms impregnated with manganese are present—commonly concentrated on bedding planes—but, in general, they are not very abundant.

Physical Measurements

Ship Laboratory Measurements

Natural Gamma Radiation

Natural gamma-radiation systematically varied from 280 to 370 counts per minute above background for relatively pure radiolarian ooze, to 1080 to 1160 cpm for sediment poor in opaline skeletal material. Potassium, present in clay minerals and feldspars, probably accounts for most of the observed natural gamma-ray activity. Where measured, cherty sediments frequently produce higher than average readings, possibly due to the terrigenous component present in some samples.

X-Radiography

The time for correct exposure for X-radiography was determined automatically by a counter placed beneath the core section being photographed. Exposure time was found to vary systematically with the relative proportions of skeletal opal and non-opaline debris. More precisely, the exposure largely varied with bulk density. Exposure times were found to be less for oozes rich in opaline silica.

Gamma Ray Attenuation Porosity Evaluation (GRAPE)

Bulk density and porosity, measured by the GRAPE, show small variations, in correspondence with variations in relative proportions of skeletal opal and non-skeletal debris. Porosity values range from 68 to 75 per cent for relatively pure radiolarian oozes and from 66 to 73 per cent for impure radiolarian ooze. Silty sediment closely associated with chert horizons has a porosity of 59 per cent. Small systematic increases in density, determined by the GRAPE, follow decreases in proportion of opaline skeletal components.

Chert layers were easily distinguished by the GRAPE. Typical values obtained from solid cores yielded densities from 2.2 to 2.25 and porosities from 30 to 34 per cent for hard chert and 40 to 44 per cent for soft

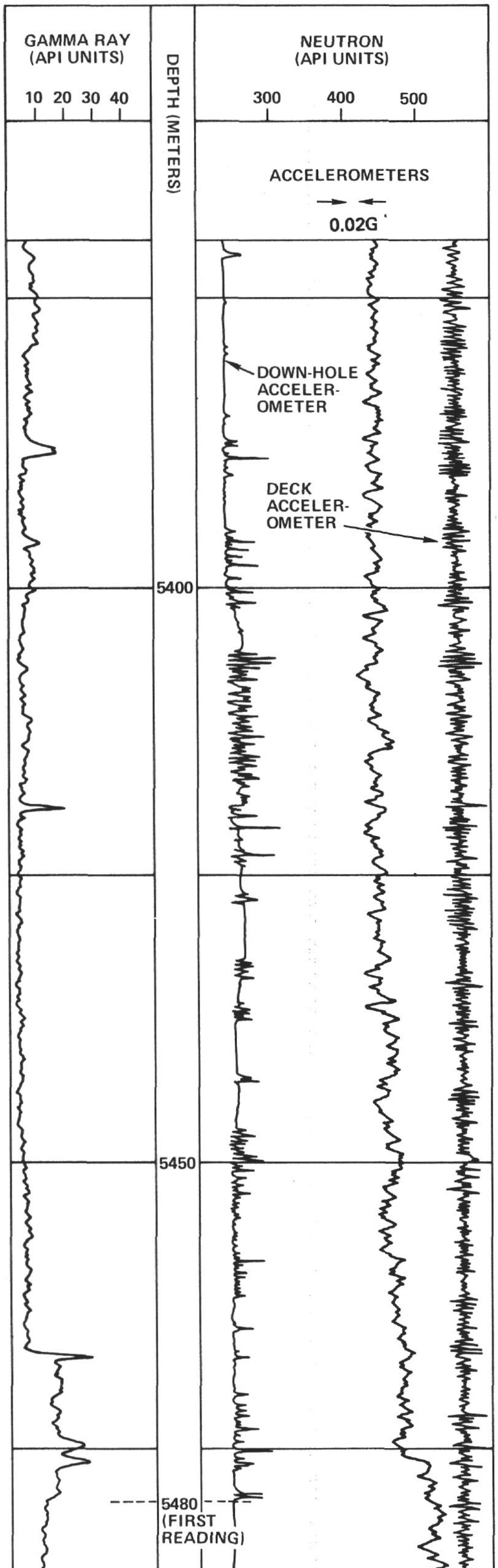


Figure 18. *Natural Gamma and Neutron Logs obtained at Site 8.*

cherty sediment. These values are compared with densities of 1.5 to 1.7 and porosities of 65 to 74 per cent obtained for average unsilicified sediments. It should be noted that the instrument was calibrated for quartz, thus the water-bearing components, such as, opaline silica and some crsitobalites will yield porosity values somewhat in excess of true values.

Penetrometer

Measurements by penetrometer or unconsolidated sediments, indicate a general decrease in penetrability which can be correlated with an increase in the proportion of siliceous organisms.

Sonic Velocity

Velocity of sound propagation, measured on core sections by the Winokur method (see Appendix 2), appears systematically low compared to average values for the sediment column determined by a combination of seismic profiling and coring. The values measured on cores vary from 1.48 to 1.57 km/sec for radiolarian ooze, and are of the order of 2.8 km/sec for hard chert.

Bulk Density

Values of density, determined by the method of total core section weight, were generally consistently lower than density values determined by the GRAPE. It is considered that density obtained by weighing is inherently more accurate than density determined by the GRAPE, but the latter has the advantage that it shows—on a continuous scale—relative density variations.

Down-Hole Logging

Hole 8A was logged in the pipe with gamma ray and neutron logging tools, surface and down-hole accelerometers and a drill collar locator. The logs are illustrated in Figure 18.

The first reading at the bottom of the hole was at 17,975 feet (5480 meters) or 60 feet (18 meters) shallower than the total depth estimated from the rig floor. The drill string was raised about 30 feet (9 meters) prior to logging and the remaining discrepancy may possibly be accounted for by the unrecovered sediment core lodged in the outer core barrel above the lost core catcher. The logging tools, therefore, may have found "bottom" on top of sediment trapped within the outer core barrel some 10 to 20 meters above the bottom of the hole.

According to the coring data the first 23 foot (7 meter) section of the logged hole is within the chert layer, above which is semi-consolidated radiolarian ooze. The neutron log shows a minor step of about 40 API units at 17,961 feet (5476.5 meters), or about 15 feet (4 1/2 meters) below the level of the chert—ooze contact, measured from the rig floor. However, this measurement is very sensitive to hole geometry and may reflect the different drilling properties of the radiolarian ooze and the chert, rather than the density or porosity properties of the sediment itself. It may, nonetheless, indicate the top of the chert layers.

The gamma-ray log shows a background reading of about 5 API units to a depth of about 17,919 feet (5463 meters) or about 46 feet (14 meters) above the neutron step, but beneath this level the counts increase by 2-1/2 times that value. The silicification of sediments would not change the count significantly, but the presence of terrigenous or volcanic components containing more potassium may cause such an increase. Measurements on the laboratory natural gamma-ray scanner of the chert samples containing terrigenous components show a rate about 2-1/2 times that recorded for radiolarian ooze, further suggesting that the increase in the down-hole gamma-ray count rate represents the presence of terrigenous components.

The data provided by these two logs suggest that unsilicified turbidites or turbidite derivatives may occur above the chert layer.

Paleontology and Biostratigraphy

Radiolaria

Hole 8, Core 1, Section 1:

Core 1 of Hole 8 is less than a meter in length. Samples for Radiolaria were taken from the top of the core and from the core catcher. The age of both assemblages is upper Middle Miocene as is indicated by the presence of common *Cannartus laticonus* Riedel, *Theocapsa cayeuxi* Vinassa and *Eucyrtidium delmontense* Campbell and Clark. All of these species are illustrated and described briefly in Part VII of the Core Description Manual. Probably owing to dissolution, however, the assemblage is dominated by a suite of collosphaerid forms with an apparent affinity to *Acrosphaera inflata* Haeckel (Plate 1, Figures A-C).

Reworked Eocene forms occur rarely. Orosphaerid fragments are abundant and include two distinctive species: 1) a hooked form (Plate 1, Figure D), and 2) a digitately branched form (Plate 1, Figure E), probably belonging to the genus *Oroscena* Haeckel (Friend and Riedel, 1967). The samples contain no calcareous microfossils.

Hole 8, Core 2, Sections 1, 2 and 3:

All samples taken from this core contain abundant, well-preserved Eocene Radiolaria (see further paleontological notes in Chapter 19). A few unidentified diatoms and sponge spicules occur in each sample, but again calcareous microfossils are absent. There is no faunal difference between samples taken from uniform and "disturbed" sections of the cores.

PLATE 1
Radiolaria

A *Acrosphaera* aff. *inflata* Haeckel, Sample 2-8-1, core catcher (R16/3), with relatively long spines, X 200.

B *Acrosphaera* aff. *inflata* Haeckel, Sample 2-8-1, core catcher (S38/0), X 200.

C *Acrosphaera* aff. *inflata* Haeckel, Sample 2-8-1, core catcher (R51/1), with short spines, X 200.

D Hooked Orosphaerid spine, Sample 2-8-1, core catcher (P18/3), X 200.

E Digitately branched Orosphaerid spine, Sample 2-8-1, core catcher (Y15/2)

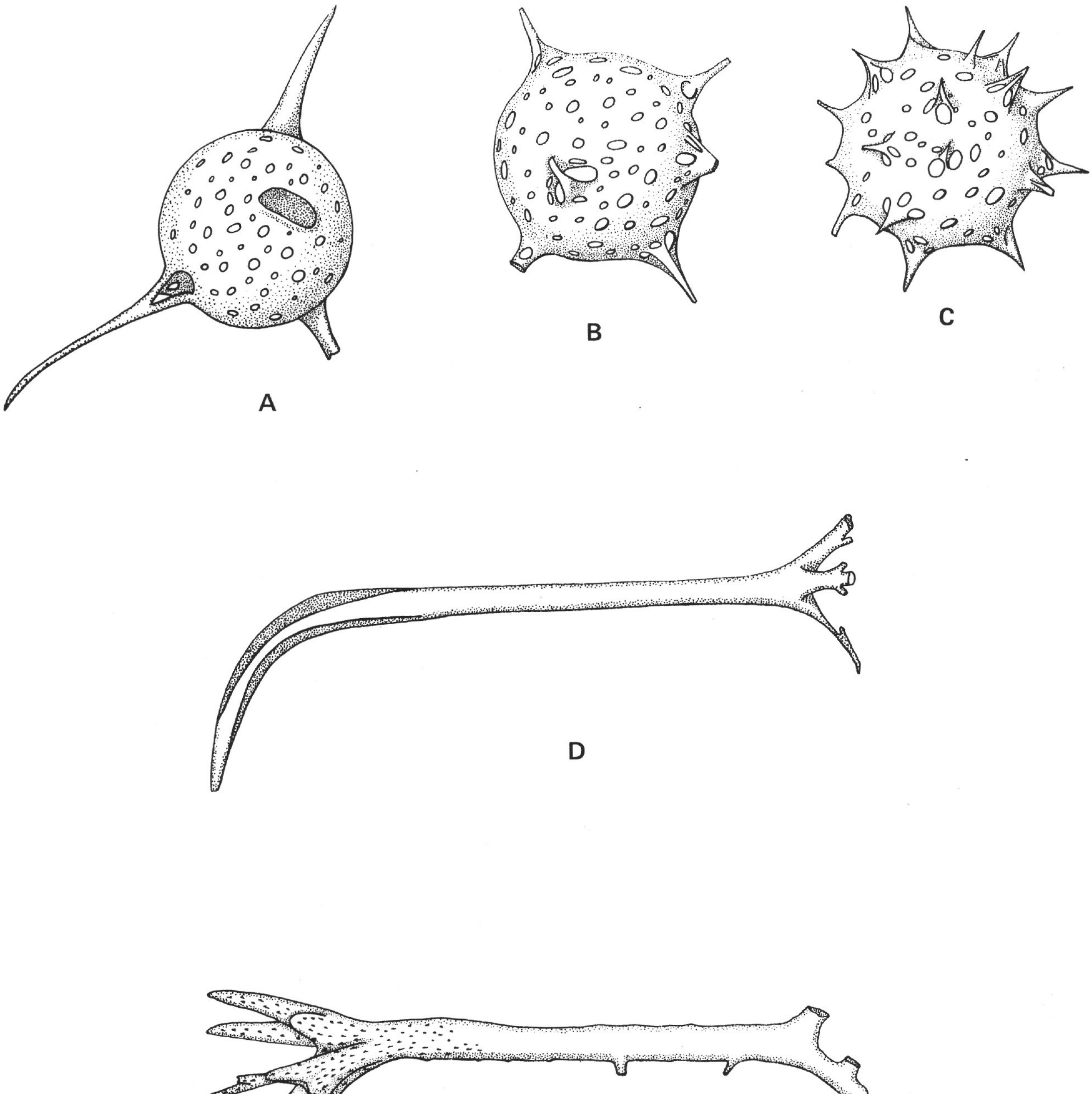


Plate 1.

Hole 8A, Core 1, Sections 1 and 2:

Samples taken from this core contain an abundant, well-preserved Eocene radiolarian fauna (see further paleontological notes).

Hole 8A, Core 2, Section 1:

The sample from this core consisted of sediments scraped from between chert layers. It contains a few, quite well-preserved Eocene Radiolaria (see further paleontological notes). Some specimens are heavily silicified. The sample contains no calcareous microfossils.

Hole 8A, Core 3, Section 1:

A few sedimentary fragments were taken from the catcher of this otherwise entirely cherty core. The sample contains a rather poor radiolarian fauna. Specimens are frequently heavily silicified, making specific recognition difficult. Eocene forms such as *Podocyrtis papalis* are present (see further paleontological notes). The sample contains no calcareous microfossils.

Hole 8A, Core 4:

The sample recovered from Core 4 consisted of approximately 0.5 cc of sediment. The entire sample was preserved in ten smear slides. Both sponge spicules and diatoms are quite abundant in the sample. Eocene Radiolaria are also present, but they are often difficult to recognize in smear slides (see further paleontological notes).

Nannofossils

Hole 8A

Red stain and ooze from drill collar: *Gephyrocapsa* sp., of *Coccolithus cricotus.*
Age: Middle Quaternary.

SUMMARY

Rates of Sediment Accumulation

The reader is referred to the Cruise Leg Synthesis for discussion of the basic assumptions involved in these calculations.

Two calculations have been made for Site 8. From the top of the sedimentary section at Site 8 to the first cored interval, which is late Middle Miocene, the rate of sediment accumulation is between 1.0 and 2.1 cm/1000 years (assuming that the sediment at 550 feet (168 meters) is not younger than eight million years nor older than 16 million years; see Berggren, 1968. Table 1). Similarly, the interval from 550 feet (167.9 meters) to 820 feet (249 meters) is Middle Eocene in age (44-49 my) and yields a partial rate of sediment accumulation of 0.21 to 0.33 cm/1000 years.

In the first instance the rate of sedimentation approximates values commonly obtained for foraminiferal-coccolith oozes, whereas in the second instance the sedimentation rate is much closer to values commonly cited for siliceous oozes. In both cases, however, the sediments are similar—consisting chiefly of fine clays and the remains of silica-secreting planktonic organisms.

It may be concluded from the above that extrapolating ages from rates of sedimentation at Site 8 would lead to gross inaccuracies, because the values obtained based on the two cored intervals differ by nearly an order of magnitude, even though similar sediments are present at both the cored levels. The presence of beds of possibly slumped material in the cores would imply rapid local deposition and also removal of sediment from other places.

Discussion

Horizon A has been designated the uppermost of three seismic reflectors (A, β and B) (Ewing *et al.,* 1966; Windisch *et al.,* 1968) that lie within otherwise acoustically transparent sediments in the western North Atlantic. It is characteristically a strong smooth reflector that can be traced from the lower continental rise to the eastern flank of the Bermuda Rise. Horizon A refers only to the top of a thin layer composed of a number of reflectors. A piston core recovered in the outcrop area of Horizon A east of San Salvador was identified as an Upper Cretaceous turbidite sequence (Saito *et al.,* 1966). However, on Leg 1 of the Deep Sea Drilling Project, a sequence of Eocene chertified turbidites was drilled and cored at Holes 6, 7 and 7A on the Bermuda Rise. Age determinations in Holes 6 and 7 were based on nannofossils and Foraminifera and are more precise than the age determination for Hole 8A, which were based on Radiolaria. However, all three fossil groups indicate an Eocene age for the chert layer. Comparative studies after Leg 2, employing known land based Eocene and Cretaceous samples may refine the shipboard interpretation.

The reflection profiles indicated that Horizon A was 0.32 seconds (reflection time) beneath the sea floor. Assuming 1.80 km/sec for average sound velocity in sediments, which is a commonly accepted value, the reflector should lie at a depth of about 945 feet (288 meters). The first hard chert layer was encountered by the bit at 945 feet (288 meters), suggesting that Horizon A at Hole 8A represents a reflection from the upper section of the chert interval.

Some of the cherty sediments sampled at Hole 8A contain significant silt-sized quartz and glauconite grains. These cherty siltstones occur at about the same stratigraphic level as turbidites which were sampled at Site 7, suggesting that the material from Hole 8A may also be of turbidity current origin, but reworked after transport to the deep ocean floor. However, unlike the turbidites at Site 7, biogenous calcite is not present in the Hole 8A cores. It is therefore possible that the silt-sized detritus observed in some of the Hole 8A cherts may have been derived from a northerly source area on the continental margin, while the calcareous turbidites of Site 7 may have come from carbonate banks and islands to the south.

Drilling rates indicate that the chert at Hole 8A was most difficult to penetrate in its upper 25 feet (7.6 meters), but it became somewhat easier to drill and was apparently interbedded with soft sediment in the next 30 feet (9.1 meters). It was penetrated after 57 feet (17.4 meters) of combined coring and drilling. Soft sediment was penetrated 28 feet (9.0 meters) below the chert; and, it is possible that the complete chert horizon was drilled. Thickness of the chert formation at Hole 8A contrasts with the 130 feet (40 meters) penetrated at Hole 7A. The intensity of Horizon A as a reflector diminishes generally northward, appearing weak at Site 8 in accord with observed thickness variations measured by drilling.

Brecciated and slumped sediment noted in both holes at this site form a surprisingly large proportion of the total sediment recovered. The observed disturbances were most probably caused by coring operations. However, the possibility remains that mud-flow type emplacement of sediment may have occurred at times in the area, perhaps in the form of slumps off local topographic highs.

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