9. SITE 92

The Shipboard Scientific Party[1]

SITE DATA

Occupied: March 16-17, 1970.

Position: 25°50.69'N; 91°49.29'W.

Water Depth: 2573 meters.

Total depth: 282 meters.

Holes Drilled: Two.

Cores Taken: Eleven.

BACKGROUND AND OBJECTIVES

The pre-Mesozoic history of the continental shelf of the Texas-Louisiana Gulf Coast is essentially unknown, principally because of its depth of burial. The Jurassic is well represented by evaporites and shales obtained from drilled wells onshore and has been projected seaward by seismic reflection and refraction results. The Tertiary and Pleistocene sections represent the bulk of the continental shelf sediments, are largely clastic, and probably largely the products of the erosion that followed the Laramide revolution. The layers thicken and plunge gulfward and additional layers are frequently added as wedges into this configuration. Salt domes occur as diapirs in these overlying sediments (Shepard, 1937; Parker and Curray, 1956; Lankford and Curray, 1957; Neumann, 1958; Curray, 1960; and Halbouty, 1967). Gravity surveys have confirmed this interpretation (Joesting and Frautschy, 1947: Nettleton, 1957). Buried reefs along the shelf edge have also been suggested on the basis of seismic profiler records (Matthews, 1963).

The continental slope extends from the shelf edge, about 140 km from the present coastline, to the Sigsbee Scarp, approximately 180 km farther toward the Gulf. This is a broad and fairly gentle slope which has been described as hummocky and affected by slumping (Gealy, 1955; Ewing et al., 1955). This outbuilding and slumping must be a regular part of the slope building, as the contemporary faulting described by Hardin and Hardin (1961) and more recently by Lehner (1969) for the continental shelf edge suggest. The upper part of the continental slope, on the basis of seismic profiler and gravity data (Moore and Curray, 1963; Ewing and Antoine, 1966; and Jones and Antoine, 1968), has been interpreted as intruded by salt structures. More recently, salt domes have been outlined by seismic profiling and drilled (Lehner, 1969). This suggests that the hummocky terrain is due in part to slumping and in part to diapiric intrusion.

The seismic refraction studies first begun in 1953 and reported in a series of papers (Ewing et al., 1955; Ewing et al., 1960; Antoine and Ewing, 1963) showed that sediments with velocities in the range 2.3 to 3.6 km/sec range in thickness from 12 to 15 km beneath the shelf to about 6 to 7 km beneath the slope (just shoreward of the Sigsbee Scarp), under which a layer of 5.3 to 5.6 km/sec is found. Near the Sigsbee Scarp no further layering was encountered, although large shots were fired at intermediate and great distances. This lack of return was first interpreted as a salt or limestone layer underlain by a great thickness of lower velocity sediments (Ewing et al., 1955); later it was interpreted as a ridge of salt, possibly responsible for the Sigsbee Scarp (Ewing et al., 1960), and more recently as one of a series of successive ridges, each formed seaward of the previous one by lateral stresses engendered by the accumulating slope sediments (Antoine and Ewing, 1963; Ewing and Antoine, 1966).

Recent profiling by a number of investigators (Amery, 1969; and others, unpublished) suggests the presence of salt ridges whose tops are warped seaward by the lateral pressures of the accumulating slope sediments.

Site 92 was drilled on such a feature with the objective of proving or disproving its salt origins and, if possible, to select between the proposals of simple salt diapir and seaward-warped salt ridges.

Glomar Challenger drilled and cored at Site 92 on March 16 and 17. The hole was terminated at 282 meters below the sea floor in Pleistocene mudstone. A coring summary is presented in Table 1.

NATURE OF SEDIMENTS

General Description

Sediments recovered from Site 92 represent a highly consolidated, Pleistocene sequence of hemilaminite and hemipelagite clay and silty clay. In comparing results of Site 92 with Site 1 (of Leg 1) from just south of the Sigsbee Scarp, it can be readily ascertained that accumulation rates and degree of consolidation vary considerably between the two areas, Site 1 being much thicker stratigraphically and considerably less consolidated at comparable depths of burial.

Site 92 was drilled to test the presence of salt on the bathymetric feature known as the Sigsbee Scarp. The presence of salt at depth is supported by the abnormal rate of increase of pore water salinity measured on cored material

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TABLE 1
Core Inventory – Site 92

Core	No. Sections	Date	Time	Cored[a] Interval (m)	Cored (m)	Recovered (m)	Subbottom Penetration (m) Top	Subbottom Penetration (m) Bottom	Lithology	Age
1	1	3/16	1400	2573-2578	5.0	0.5	0	5.0	Silty clay	Late Pleistocene
2	5	3/16	1530	2602-2611	9.0	6.5	29.0	38.0	Silty clay	Late Pleistocene
3	5	3/16	1715	2660-2669	9.0	6.7	87.0	96.0	Silty clay	Late Pleistocene
4	5	3/16	1900	2698-2707	9.0	6.3	125.0	134.0	Silty clay	Late Pleistocene
5	6	3/16	2115	2746-2755	9.0	9.0	173.0	182.0	Silty clay	Middle Pleistocene
6	2	3/16	2315	2793-2802	9.0	2.0	220.0	229.0	Silty clay	Early Pleistocene
7	1	3/17	0145	2831-2835	4.0	0.4	258.0	262.0	Claystone	Early Pleistocene
8	1	3/17	0330	2835-2838	3.0	1.0	262.0	265.0	Mudstone	Early Pleistocene
9	3	3/17	0500	2838-2847	9.0	6.0	265.0	274.0	Mudstone	Early Pleistocene
10	–	3/17	0730	2847-2851	4.0	0.0[b]	274.0	278.0	Mudstone	Early Pleistocene
11	3	3/17	–	2851-2855	4.0	3.0	278.0	282.0	Mudstone	Early Pleistocene
Total	32				74.0	41.4		282.0		
% Cored					27.2%					
% Recovered						56.0%				

[a]Drill pipe measurement from derrick floor.
[b]Recovery in core catcher only.

(see accompanying summary chart), reaching approximately five times normal sea water salinity at 225 meters below the sea floor.

Other evidence of abnormality includes the consolidated nature of the sediments, as gathered from penetrometer and density data on cores. Study of the basal cores (Cores 8 through 11) show the presence of vertical fractures or shear planes which have been annealed, suggesting considerable stress release and/or dynamic readjustment of sediment/salt below. The moderately to highly consolidated mudstones further suggest that either originally greater depths of burial were operative or that stress through salt diffusion was somehow able to facilitate consolidation. Possibly both processes were operative. That relationship may help to explain the means by which the earlier configuration of salt may have changed through time so as to yield the presently poorly understood local structure of the scarp (which has generated considerable controversy). These various relationships obviously need further study.

In general, the sediment at Site 92 consists of two main types. The first is that of brownish gray to olive gray, finely laminated to vaguely laminated to massive, rarely fossiliferous silt or clay, sparsely burrowed with quartzose silt burrow-fill and often stained with fecal/FeS material as laminae or burrow-fill. Quartzose silt laminae are extremely rare. Cores 2, 3, 4, and 5 correspond to the above description and are summarized as hemilaminites. A short core taken at the surface contained clayey foraminiferal ooze of Holocene age. This pelagite lithology was not encountered below the surface zone.

The remainder of the cores consisted of mechanically disturbed, very faintly laminated to vaguely laminated to massive, dark olive gray to yellowish brown to brownish gray to greenish gray, moderately burrowed, nannofossil-bearing to nannofossil-rich mudstone/claystone. Minor clayey, nannofossil ooze was also noted. These sediments are categorized as hemipelagites or transitional hemipelagite/hemilaminites and represent a somewhat less terrigenous-dominated section as compared to the upper cores. It should be noted that the upper cores correspond to Late Pleistocene deposition, and appear to reflect higher sedimentation rates during Late Pleistocene time as noted at Sites 3 and 92 on the Sigsbee Abyssal Plain. Further paleontological study will be needed before detailed correlations can be attempted with Site 1 and Site 92.

Mineralogy of sediments at Site 92 are quite similar throughout, differing only near the base of the hole (in Lower Pleistocene sediments) where calcareous nanno-

plankton and foraminifera make up a higher percentage of the sediment. X-ray mineralogy indicates higher dolomite percentages (probably detrital as pointed out by Beall and Fischer, 1969) throughout Site 92 as compared to abyssal plain sites. Montmorillonite may also be present in higher than usual amounts.

Cores 7, 8, and 9 contain common to abundant amounts of well-sorted, silt-sized spherulites of carbonate. The spherulites are physically and optically similar to siderite spherulites noted from other studies. Optically the grains consist of single crystals which have syntaxially overgrown a rhombic nucleus. The mineral could thus be siderite, ankerite, or ferroan dolomite.

Sedimentological Interpretation

As outlined above, the Upper Pleistocene section in Site 92 represents a time of high sediment influx to the surrounding area. Empirical comparisons with Site 1 suggest that Site 92 represents a less turbidity current-dominated section, i.e., the scarp crest was accumulating sediment less rapidly than the nearby, bathymetrically lower rise area. This suggests that only dilute, low energy "tails" were able to accumulate on the scarp. The lack of discrete silt laminae, the sparsity of burrowing, and the unfossiliferous, clay-rich, terrigenous nature of the sediment suggests that low energy influx of sediment via turbidity currents dominated, but did not exclude, subsidiary pelagic processes of sedimentation. Late Pleistocene time was undoubtedly a time of accelerated sedimentation along the continental shelf edge and upper slope. It is conceivable that limited amounts of terrigenous clay could be delivered to the present site via pelagic processes. The lack of faunal remains suggests that either turbidity was too high or that colder temperatures somehow inhibited production, although this does not appear to have been substantiated by analysis of population count/sediment volume/depositional rate. Unfortunately, most of our sedimentological criteria in these types of sediment are ambiguous and further work is needed. It is conceivable that further detailed textural analysis could prove to be diagnostic.

The Lower Pleistocene section in Site 92 is definitely more pelagic than the Upper Pleistocene, containing significant faunal elements and often moderately burrowed. These sediments undoubtedly accumulated at a somewhat reduced rate over those of the Upper Pleistocene. Of special interest is a short segment of sediment core from the base of Core 6, which contains nannofossil ooze. This particular zone (see paleontological report) contains an abundant fauna of reworked older forms. The contemporaneity of the sediment suggests that the older faunal elements represent a local source of reworked, possibly resedimented ooze.

The consolidated and deformed state of Early Pleistocene mud/claystones could be considered as evidence of deeper burial than at present (see previous discussion). The more pelagic nature of the Lower Pleistocene sediment suggests accumulation on an isolated bathymetric high, although Lower Pleistocene sediment appears to be generally more pelagic where examined on the adjacent abyssal plain.

Physical Measurements

Both penetrometer measurements and bulk density measurements reflect the consolidation of the sediments. As in earlier holes, laboratory-determined bulk density values are considerably higher than GRAPE determinations. A significant change in sediment character takes place at around 250 meters, primarily in the presence of the vertical fractures previously mentioned. A few penetrometer measurements taken on sediment fragments all fall well below 10. This approximates the depth at which high pore water salinities appear to characterize the sediment. A drilling break was also noted at this depth.

Natural gamma measurements do not appear to vary significantly, possibly reflecting increasing consolidation with depth although disturbance at the bottom of the hole makes those determinations unreliable (Cores 6 and 11). Absolute gamma values for the clay-rich sediments of Site 92 are typical of terrigenous clays.

BIOSTRATIGRAPHY

The biostratigraphy of Site 92 is summarized in Figure 1. This interpretation is based on examination of the foraminifera and calcareous nannofossils. The samples were examined also for radiolarians, but no significant occurrences were noted.

Sample 1 (10-92-1, CC):
Globorotalia tumida, G. menardii (sinistral, common), *G. truncatulinoides, Globigerina inflata* (abundant), *Globigerinoides ruber* (pink), *Gephyrocapsa oceanica, G. aperta,* and Cf. *Emiliania huxleyi.*
Age: Late Pleistocene: (Wisconsinan): *Globorotalia truncatulinoides* Zone; *Pulleniatina finalis* Subzone.
Environment: Bathyal.
Remarks: Among the calcareous nannofossils, rare Cretaceous and Miocene-Pliocene forms were noted.

Sample 2 (10-92-2, CC):
Globigerina inflata, Globigerinoides ruber (pink), *Globorotalia truncatulinoides, Coccolithus pelagicus* s.s., *Cyclococcolithus leptoporus* s.s., and *Gephyrocapsa oceanica.*
Age: Late Pleistocene Wisconsinan (glacial): *Globorotalia truncatulinoides* Zone; *Pulleniatina finalis* Subzone.
Environment: Bathyal.

Sample 3 (10-92-3, CC):
Globigerina inflata, Globigerinoides ruber (pink), *Globorotalia truncatulinoides, Hastigerina aequilateralis, Coccolithus pelagicus* s.s., *Rhabdosphaera stylifer, Gephyrocapsa* sp., and *Pseudoemiliania* sp.
Age: Late Pleistocene (Wisconsinan, glacial): *Globorotalia truncatulinoides* Zone; *Pulleniatina finalis* Subzone.
Environment: Bathyal.

Sample 4 (10-92-4, CC):
Globigerinoides ruber (pink), *Globigerina inflata, Globorotalia truncatulinoides, Hastigerina aequilateralis, Gephyrocapsa oceanica, Helicopontosphaera sellii, Coccolithus pelagicus* s.s., and *Pseudoemiliania* sp.

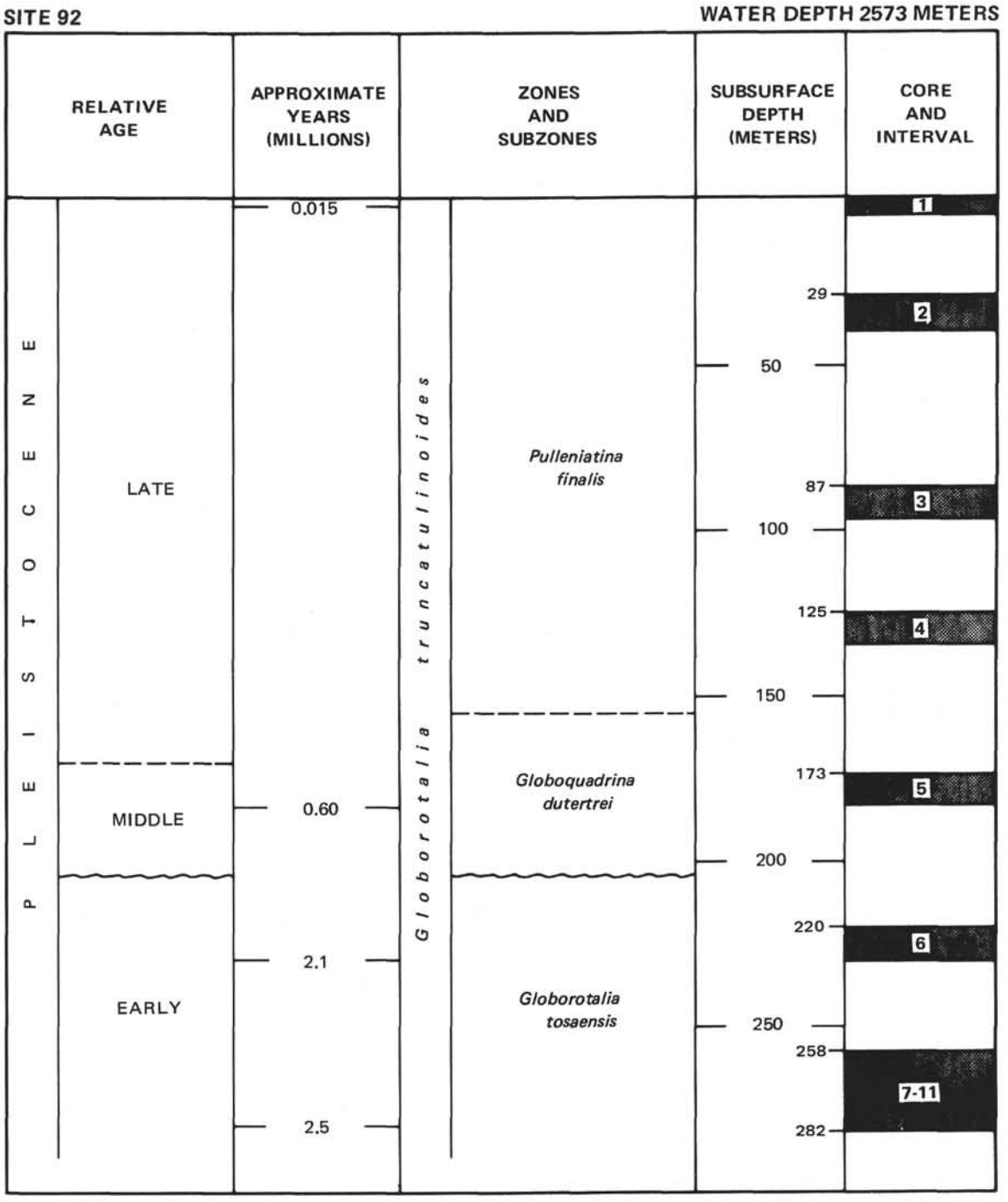


Figure 1. *Biostratigraphic summary of Site 92.*

Age: Late Pleistocene (probably middle Illinoian, glacial): *Globorotalia truncatulinoides* zone; *Pulleniatina finalis* subzone.
Environment: Bathyal.
Remarks: Rare reworked Oligocene, Miocene, and Pliocene calcareous nannofossils were noted.

Sample 5 (10-92-5, CC):
Globigerinoides ruber (white), *Globorotalia truncatulinoides, G. menardii* (sinistral, rare), *G. scitula, Coccolithus pataecus, Cyclococcolithus leptoporus* s.s., and *Gephyrocapsa caribbeanica.*

Age: Middle Pleistocene (probable early Illinoian): *Globorotalia truncatulinoides* Zone; probable *Globoquadrina dutertrei* Subzone.
Environment: Bathyal.
Remarks: The sample contains a quite diverse reworked Late Cretaceous assemblage of calcareous nannofossils.

Sample 6 (10-92-6, CC):
Globorotalia menardii (sinistral, very common), *G. truncatulinoides, Spaeroidinella dehiscens* (abundant), *Globigerinoides ruber* (white), *Pseudoemiliania*

lacunosa, Cyclococcolithus leptoporus macintyrei, Discoaster brouweri, D. pentaradiatus, D. surculus, Ceratolithus rugosus, and *Reticulofenestra pseudoumbilica.*

Age: Early Pleistocene (probable late Nebraskan): *Globorotalia truncatulinoides* Zone; *Globorotalia tosaensis* Subzone.

Environment: Bathyal.

Remarks: The sample also contains the foraminifera *Globorotalia miocenica* and *G. multicamerata,* but having more than 95 per cent sinistral *G. menardii* suggests that these have been reworked. A large number of reworked calcareous nannofossils also were noted, including: *Discoaster barbadiensis* (Eocene); *D. deflandrei* and *Cyclococcolithus neogammation* Oligocene-Miocene); *Discoaster challengeri, D. exilis, D. quinqueramus* (Miocene); and *Discoaster variabilis* and *Sphenolithus abies* (Pliocene).

Sample 7 (10-92-7, CC):

Globorotalia truncatulinoides, G. scitula, G. crassiformis, Globigerinoides ruber (white), *G. triloba, Coccolithus pelagicus* s.l., *Reticulofenestra pseudoumbilica,* and *Pseudoemiliania lacunosa.*

Age: Early Pleistocene (Nebraskan, glacial): *Globorotalia truncatulinoides* Zone; *Globorotalia tosaensis* Subzone.

Environment: Bathyal.

Remarks: Reworked forms include the calcareous nannofossils, *Discoaster barbadiensis* Eocene), *Cyclococcolithus neogammation* (Oligocene-Miocene), and the foraminifera *Globorotalia* sp. cf. *G. mayeri* (Miocene). The sample is predominantly terrigenous clastic debris and the fauna and flora are rare. The section is interpreted to be predominantly of turbidite origin and to have been deposited during the first low stand of sea level (glacial) during the Pleistocene (Nebraskan).

Sample 8 (10-92-8, CC):

Globorotalia tosaensis, G. crassiformis, Globigerina eggeri, Globigerinoides ruber (white), and *G. triloba.*

Age: Early Pleistocene (Nebraskan, glacial): *Globorotalia truncatulinoides* Zone; *Globorotalia tosaensis* Subzone.

Environment: Probable bathyal.

Remarks: Reworked fossils include the foraminifera *Globorotalia* sp. cf. *G. margaritae* (Pliocene), and *G.* sp. cf. *G. mayeri* (Miocene). The only calcareous nannofossils noted were *Discoaster kugleri* (Miocene).

Sample 9 (10-92-9, CC):

Sample 10 (10-92-10, CC):

Sample 11 (10-92-11, CC):

Age: Early Pleistocene (Nebraskan, glacial): *Globorotalia truncatulinoides* Zone; *Globorotalia tosaensis* Subzone.

Environment: Probable bathyal.

Remarks: These samples contain little by way of fauna or flora, but, based on superposition and the degree of dilution with terrigenous clastics, should still be Nebraskan in age.

DISCUSSION AND INTERPRETATION

Eleven cores were recovered over a depth range of 282 meters from Site 92 (Figure 2). The six deepest cores

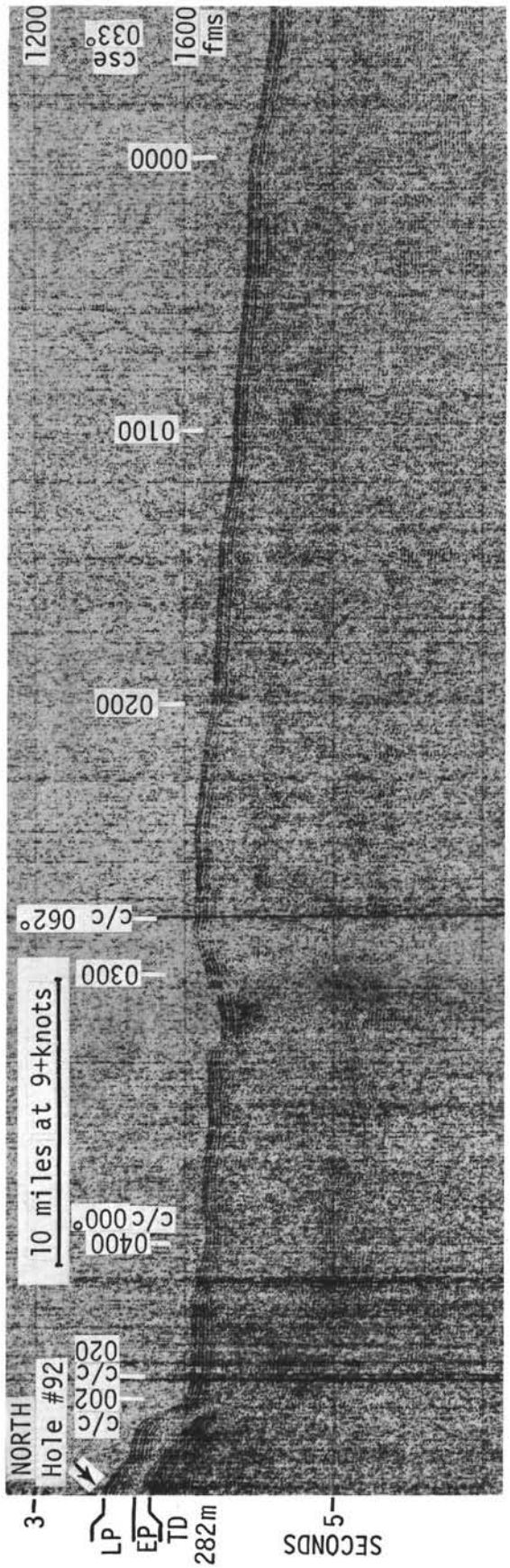


Figure 2. *Profile record, Site 92.*

from the depth range 220 to 282 meters are faintly laminated to massive dark olive gray to brownish gray coccolith mudstone/claystone of the Upper Pleistocene. The shallowest five cores are of brownish to olive gray, faintly laminated to massive silty clay to clay of the upper Pleistocene. All cores are predominantly of terrigenous clays and silts accompanied by significant amounts of quartz and detrital carbonates. Small amounts of mica and dolomite are present with opaque minerals including both heavy minerals and iron sulfide. The latter are frequently concentrated in worm burrows.

All of this material was laid down in a bathyal environment. Thin turbidite layers, probably of the low energy portion of turbidite flows are frequently present and contain terrigenous clastics. There are occasional reworked fossils of Cretaceous, Oligocene, Miocene, Pliocene, and Pleistocene age included. Pore water salinity increases to a high of about five times normal sea water for the deepest penetration. The section below 220 meters was greatly consolidated and showed vertical fractures, many of them annealed.

It was planned to drill this hole to a depth of at least 300 meters, where the deepest reflection recorded by the profiler was observed. The shipboard scientists expected to encounter intruded salt at this depth. Our goal was frustrated by equipment difficulties in the hole, probably brought about by a ship's power failure, necessitating recovering the core barrel and starting a new hole. Sticky sediments caused great problems in the new hole, and after much delay, when this seemed to have been finally overcome, an order was received from shore which caused termination of operations at this site. In considering the highly consolidated nature of the sediments below 220 meters and the rapid increase of salinity encountered, it is considered that salt would have been penetrated if the hole could have continued to greater depths.

Since (a) the Pleistocene section was found at Site 91 to be nearly 500-meters thick, (b) from the profiler records it can be estimated that the Pleistocene section has a greater thickness than 2000 meters just beyond the scarp, and (c) Site 1 (just 20 miles to the west and on the seaward side of the scarp) penetrated 770 meters of Late Pleistocene, it can reasonably be interpreted that most of the sediments of Site 92 were from a northerly source. Because thick and coarse turbidites are missing, it can be assumed that the site was located at the fringes of the main path of sediment travel, or that it was in an elevated position throughout the Pleistocene, so that only the lower energy portions of the turbidites were accumulated. The Lower Pleistocene has a more pelagic aspect than the Upper Pleistocene, which suggests this location was either at a greater relative elevation in the Late Pleistocene or that the turbidity flows were of lesser thickness then. In view of the observations at Sites 90 and 91, the former is preferred.

The degree of consolidation of the Upper Pleistocene section is quite comparable with the sections at similar depths in Sites 90 and 91. The Lower Pleistocene however, is greatly consolidated. The penetrometer measurements show the degree of consolidation to be similar to that of material found at depths of 800 to 900 meters in Sites 90 and 91. This could result from a considerable section of the Upper and perhaps Lower Pleistocene having been removed. This would argue for the Lower Pleistocene having been laid down on top of the scarp, with removal of about 700 meters of section by erosion and/or slumping with subsequent deposition of Upper Pleistocene in its present bathyal environment. An alternate view could be that a Pleistocene section of about 700-meters greater thickness was laid down at this site, later removed by erosion and/or slumping because of further uplift of the scarp, with subsequent deposition of the Upper Pleistocene sediments. This latter is the favored view and would most likely imply vertical motions of the section above the salt, which probably lies beneath, rather than horizontal motions. These movements were still going on at least as late as the Late Pleistocene. A third alternative exists, namely that the vertical and/or horizontal movements of the salt mass, which most probably underlies this section, carried these sediments from greater depth up to their present location as a cap riding on top of the salt mass.

The average rate of sedimentation in the Late Pleistocene was about 32 $cm/10^3y$, while the average rate of sedimentation from Early Pleistocene till the present has been 11 $cm/10^3y$.

REFERENCES

Amery, G.B., 1969. Structure of Sigsbee Scarp, Gulf of Mexico. Bull. Am. Assoc. Petrol. Geologists. **53,** 2480.

Antoine, J. and Ewing, J., 1963. Seismic refraction measurements on the margins of the Gulf of Mexico. J. Geophys. Res. **68** (7), 1975.

Beall, A.D., Jr. and Fischer, A.G., 1969. Sedimentology. *In* Ewing, W.M. and Worzel, J.L. et al., 1969. Initial Reports of the Deep Sea Drilling Project, Volume I. Washington (U.S. Government Printing Office), 521.

Curray, J.R., 1960. Sediments and history of Holocene transgression, continental shelf, northwest Gulf of Mexico. *In* Recent Sediments, Northwest Gulf of Mexico, F.P. Shepard, F.B. Phleger and Tj.H. van Andel (Eds.). Tulsa (Am. Assoc. Petrol. Geologists), 221.

Ewing, M. and Antoine, J., 1966. New seismic data concerning sediments and diapiric structures in Sigsbee Deep and upper continental slope, Gulf of Mexico. Bull. Am. Assoc. Petrol. Geologists. **50** (3), 479.

Ewing, M., Worzel, J.L., Ericson, D.B. and Heezen, B.C., 1955. Geophysical and geological investigations in the Gulf of Mexico, Part I. Geophysics. **20** (1), 1.

Ewing, J., Antoine, J. and Ewing, M., 1960. Geophysical measurements in the Western Caribbean Sea and in the Gulf of Mexico. J. Geophys. Res. **65** (12), 4087.

Gealy, E.L., 1955. Topography of the continental slope in northwest Gulf of Mexico. Bull. Geol. Soc. Am. **66,** 203.

Halbouty, M.T., 1967. Salt Domes Gulf Region, United States and Mexico. Houston (Gulf Publishing Co.), 425 p.

Hardin, F.R. and Hardin, G.C., Jr., 1961. Contemporaneous normal faults of Gulf Coast and their relation to flexures. Bull. Am. Assoc. Petrol. Geologists. **45,** 238.

Joesting, H.R. and Frautschy, J.D., 1947. Reconnaissance gravity survey in The Gulf of Mexico. U.S. Geol. Survey Geophys. Invest. Prelim. Map.

Jones, B. and Antoine, J., 1968. Geophysical survey of the Texas-Louisiana continental shelf and slope. (Abstract). Soc. Expl. Geophys. Regional Mtgs., Forth Worth, Texas.

Lankford, R.R. and Curray, J.R., 1957. Mid-Tertiary rock outcrop on continental shelf, northwest Gulf of Mexico. Bull. Am. Assoc. Petrol. Geol. **41,** 2113.

Lehner, P., 1969. Salt tectonics and Pleistocene stratigraphy on continental slope of northern Gulf of Mexico. Bull. Am. Assoc. Petrol. Geol. **53** 2431.

Matthews, R.K., 1963. Continuous seismic profiles of a shelf edge bathymetric prominence in northern Gulf of Mexico. Trans. Gulf Coast Assoc. Geol. Soc. **13** 49.

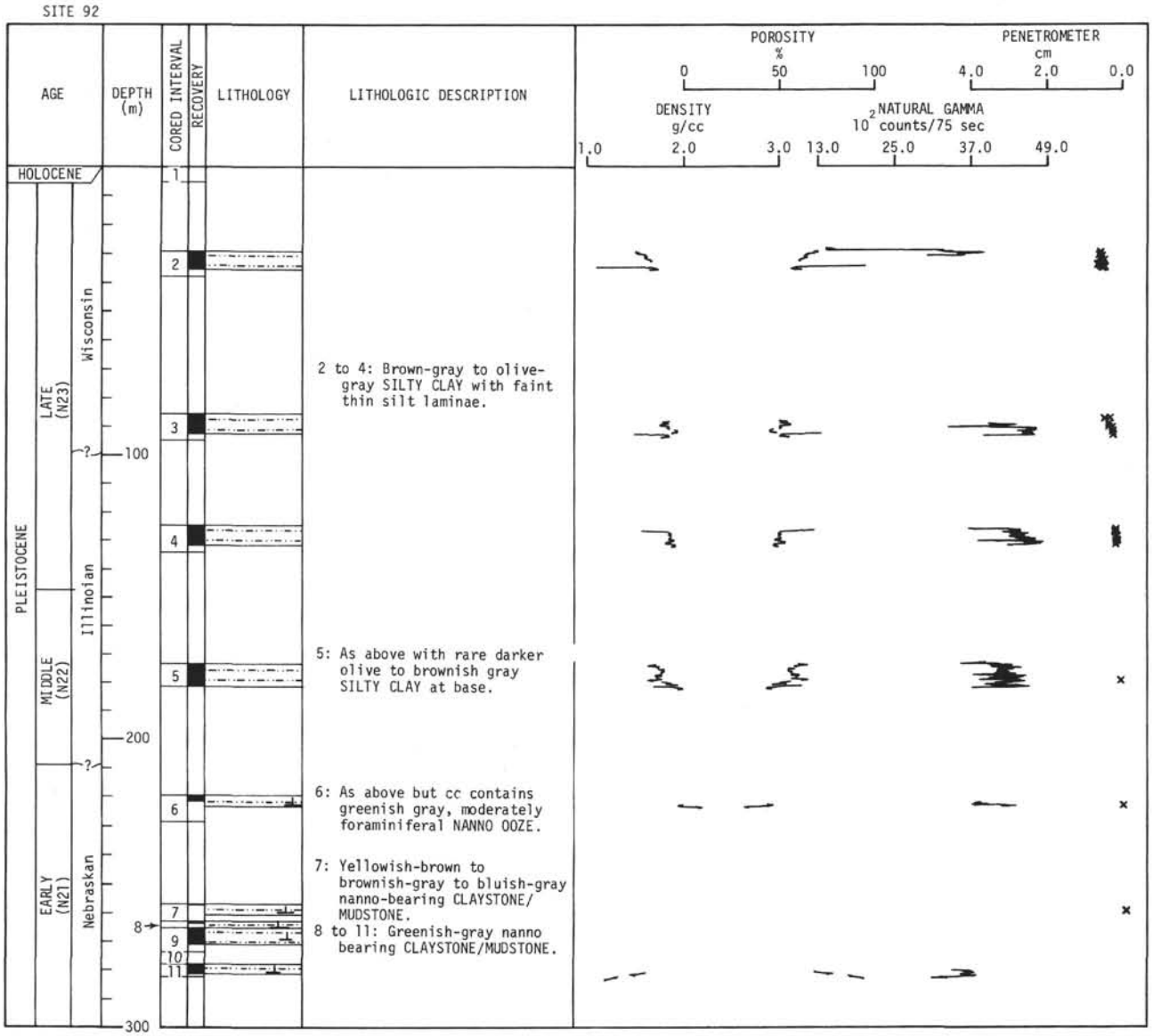
Moore, D.C. and Curray, J.R., 1963. Structural framework of the continental terrace, northwest Gulf of Mexico. J. Geophys. Res. 68 (6), 1725.

Nettleton, L.L., 1957. Gravity survey over a Gulf Coast continental shelf mount. Geophysics. 22 (3), 630.

Neuman, A.C., 1958. The configuration and sediment of Stetson Bank, northwestern Gulf of Mexico. Unpublished Tech. Rept.58-T. Univ. Texas. 125 p.

Parker, R.H. and Curray, J.R., 1956. Fauna and bathymetry of banks on continental shelf, northwest Gulf of Mexico. Bull. Am. Assoc. Petrol. Geologists. **40** 2428.

Shepard, F.P., 1937. Salt domes related to Mississippi Submarine Trough. Bull. Geol. Soc. Am. **48,** 1349.


SITE 92
AGE
DEPTH (m)
CORED INTERVAL
RECOVERY
LITHOLOGY
LITHOLOGIC DESCRIPTION
POROSITY %
0 50 100
PENETROMETER cm
4.0 2.0 0.0
DENSITY g/cc
1.0 2.0 3.0
NATURAL GAMMA 10² counts/75 sec
13.0 25.0 37.0 49.0
HOLOCENE
PLEISTOCENE
LATE (N23)
MIDDLE (N22)
EARLY (N21)
Wisconsin
Illinoian
Nebraskan
100
200
300
2 to 4: Brown-gray to olive-gray SILTY CLAY with faint thin silt laminae.
5: As above with rare darker olive to brownish gray SILTY CLAY at base.
6: As above but cc contains greenish gray, moderately foraminiferal NANNO OOZE.
7: Yellowish-brown to brownish-gray to bluish-gray nanno-bearing CLAYSTONE/ MUDSTONE.
8 to 11: Greenish-gray nanno bearing CLAYSTONE/MUDSTONE.

Site 92 Hole Core 1 Cored Interval: 0-5 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
LATE PLEISTOCENE	N22/N23	1	0.5	VOID						
			1.0	UNOPENED			Section 1 too disturbed, not opened.			
		Core Catcher					Brown silty clay in core catcher.			

Site 92 Hole Core 2 Cored Interval: 29.0-38.0 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
LATE PLEISTOCENE (Wisconsin)	*Globorotalia truncatulinoides (Pulleniatina finalis Subzone)*	1	0.5	VOID						
			1.0				SILTY CLAY Brown gray to olive gray (5Y4/1 mottled with 5YR4/1); finely laminated to massive with very faint, thin, silty clay and clayey silt laminae. Laminae are slightly darker - appear fecal stained (?).	0.0	25.2	74.8
		2								
								0.1	27.0	72.9
		3					As above with fewer observable laminations. 5Y4/1 with slight 5YR4/1 cast.			
								0.0	26.5	73.5
		4					As above. 5Y4/1-5YR4/1 olive-brown-gray. Faintly laminated. Silt burrow-fill throughout.			
								0.1	26.1	73.8
		5								
		Core Catcher								

Site 92 Hole Core 3 Cored Interval: 87.0-96.0 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
LATE PLEISTOCENE (Wisconsin)	*Globorotalia truncatulinoides* (*Pulleniatina finalis* Subzone)	1	0.5	VOID			SILTY CLAY 5Y4/1; massive to very faintly laminated. Speckled with N3-5.			
			1.0							
		2					As above - disturbed.	0.0	36.3	63.6
		3						0.1	28.1	71.9
		4					As above with slight 5YR4/1 hue. Scattered fecal/FeS stain throughout.	0.0	32.7	67.3
		5					As above. Faintly to moderately laminated with some vague and distorted laminae - fecal stain? (N4-N5).	0.0	31.6	68.3
		Core Catcher								

Site 92 Hole Core 4 Cored Interval: 125-135 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
LATE PLEISTOCENE (Illinoian)	*Globorotalia truncatulinoides* (*Pulleniatina finalis* Subzone)	1	0.5	UNOPENED			Section 1 not opened - too disturbed. Assumbed to be as below.			
			1.0							
		2					Brecciated-mechanically disturbed.	0.0	30.3	69.6
		3					SILTY CLAY Brownish gray (5YR4/1); massive to finely to vaguely laminated; with microburrow silt-fill infrequent. Few faint mottles of slightly siltier 5B5/1; with fecal stain (N3) sometimes as laminae.	0.0	28.6	71.4
		4								
		5						0.0	34.9	65.1
		Core Catcher								

Site 92 Hole Core 5 Cored Interval:173-182 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
MIDDLE PLEISTOCENE (Illinoian)	*Globorotalia truncatulinoides* (*Globoquadrina dutertrei* Subzone)	1	0.5				Brecciated-mechanically disturbed throughout core.			
			1.0							
		2						0.1	26.9	73.1
							SILTY CLAY Brownish-gray (5YR4/1); rare microburrows with silt fill, others with fecal-stain (N4) fill. Rare darker clay at base.			
		3						0.0	24.9	75.1
							Slightly higher % of silt microburrow fill, still sparse.			
		4						0.1	24.5	75.3
		5						0.0	25.9	74.1
		6						0.0	24.8	75.2
		Core Catcher								

Site 92 Hole Core 6 Cored Interval: 220-229 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
EARLY PLEISTOCENE (Nebraskan)	*Globorotalia truncatulinoides* (*Globorotalia tosaensis* Subzone)	1	0.5	UNOPENED			Not opened - too disturbed. Assumed to be as below.			
			1.0				SILTY CLAY Dark olive-gray (5Y3/1); very faintly laminated. Thin quartzose silt lamination at base. Fecal stain.			
		2					Core catcher contains ~20 cm of:			
							NANNO OOZE Greenish gray; moderately burrowed; moderately foraminiferal, with abundant reworked older fauna. May represent re-sedimented pelagite. Close to top of hard mudstone horizon.	6.0	36.9	57.1
		Core Catcher								

Site 92 Hole Core 7 Cored Interval: 258-262 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
EARLY PLEISTOCENE (Nebraskan)	*Globorotalia truncatulinoides* (*Globorotalia tosaensis* Subzone)	1	0.5	VOID			CLAYSTONE/MUDSTONE Yellowish brown to brownish gray to bluish gray. Irregularly and alternately bedded nanno-bearing (5B5/1-5G5/1) nanno-rich (5YR3/1 dominant) clays. Core catcher contains a trace of quartzose silt laminae.			
			1.0							
		Core Catcher								

Site 92 Hole Core 8 Cored Interval: 262-265 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
EARLY PLEISTOCENE (Nebraskan)	*Globorotalia truncatulinoides* (*Globorotalia tosaensis* Subzone)	1	0.5	VOID			Mechanical sand comprised of mudclasts of lithology below. Brecciated-mechanically disturbed.			
			1.0			1	CLAYSTONE/MUDSTONE 5G4/1 dominant mottled with 5Y8/1,5Y7/1, 5G5/1, 5YR4/1, 5GY6/1, moderately burrowed, rarely (?) laminated; nanno-bearing. Rock apparently contains sets of nearly vertical fractures/shear planes - annealed.	0.1	33.1	66.8
		Core Catcher								

Site 92 Hole Core 9 Cored Interval: 265-274 m

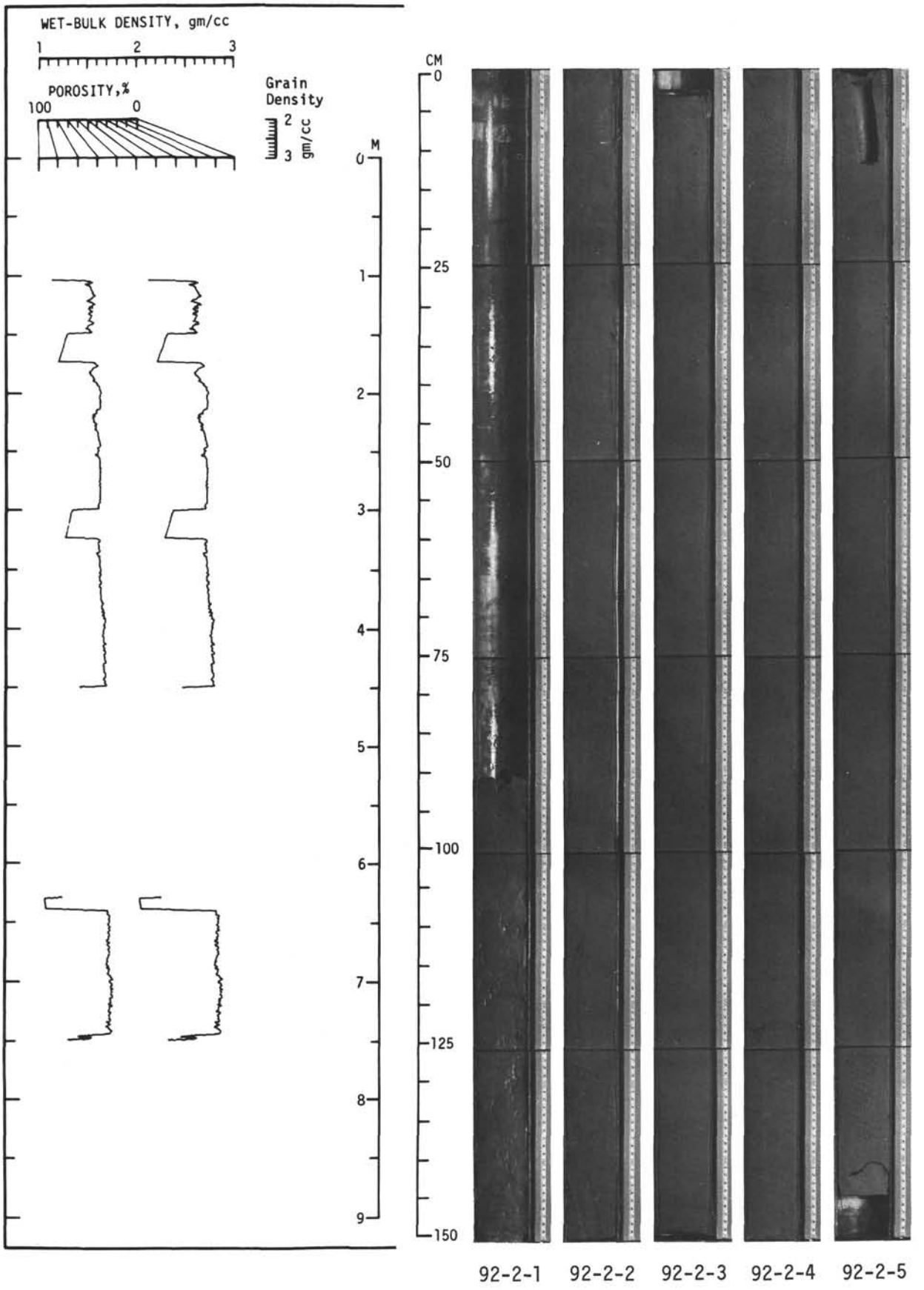
AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
EARLY PLEISTOCENE (Nebraskan)	*Globorotalia truncatulinoides* (*Globorotalia tosaensis* Subzone)	1	0.5				Mechanically disturbed fragments from base of barrel - same description as core 8.			
			1.0							
		2								
		3								
		Core Catcher								

Site 92 Hole Core 10 Cored Interval: 274-278 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
EARLY PLEISTOCENE (Nebraskan)	*Globorotalia truncatulinoides* (*Globorotalia tosaensis* Subzone)	Core Catcher					(Core catcher only) Mudstone as in Core 9.			

Site 92 Hole Core 11 Cored Interval: 278-282 m

AGE	ZONE	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION	GRAIN SIZE WEIGHT % SAND	SILT	CLAY
EARLY PLEISTOCENE (Nebraskan)	*Globorotalia truncatulinoides* (*Globorotalia tosaensis* Subzone)	1	0.5	UNOPENED			Not opened - too disturbed.			
			1.0							
		2					MUDSTONE 5G5/1; pea-sized gravel fragments with the same description as cores 8 and 9 above.			
		3		UNOPENED			Not opened - too disturbed.			
		Core Catcher								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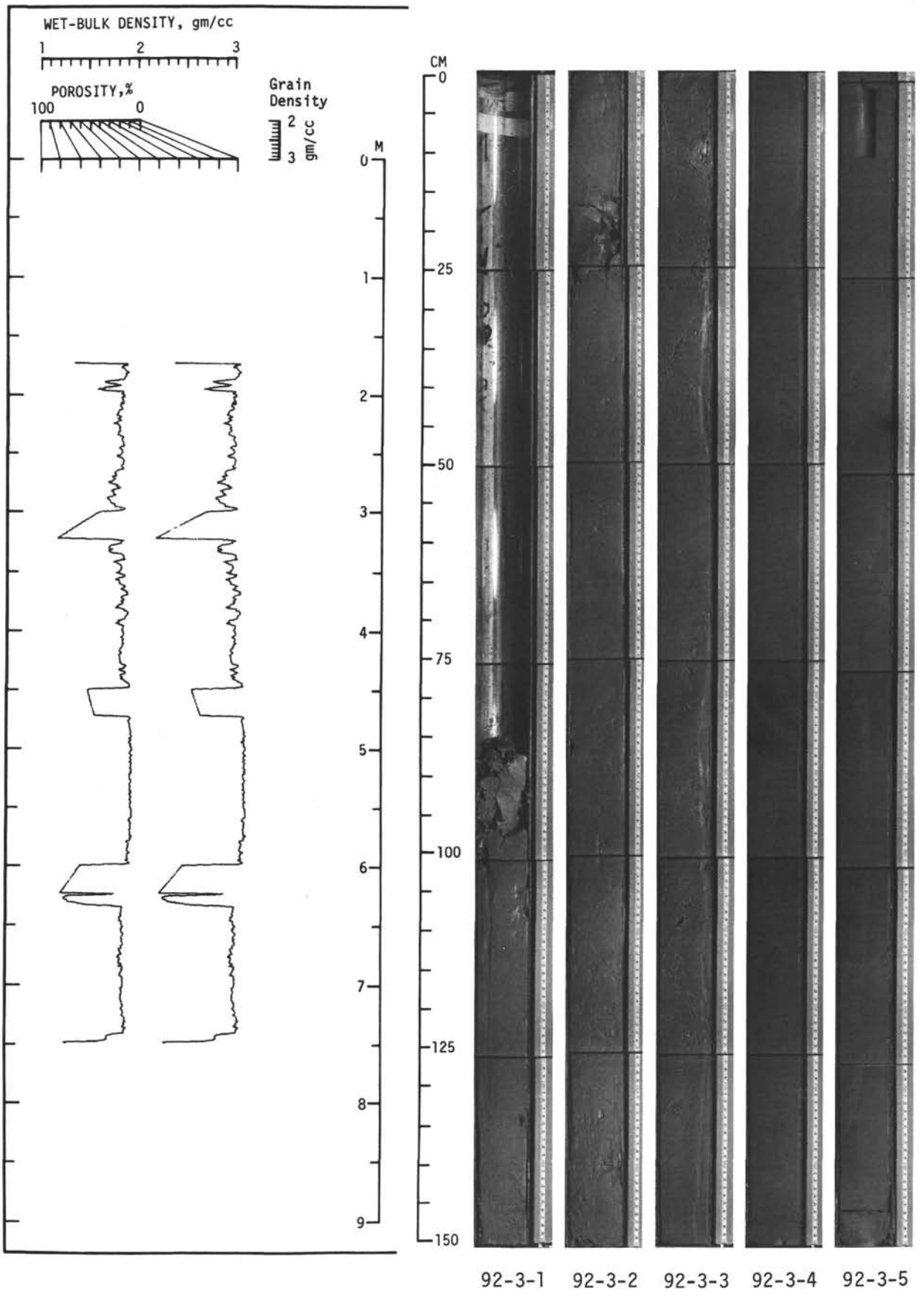
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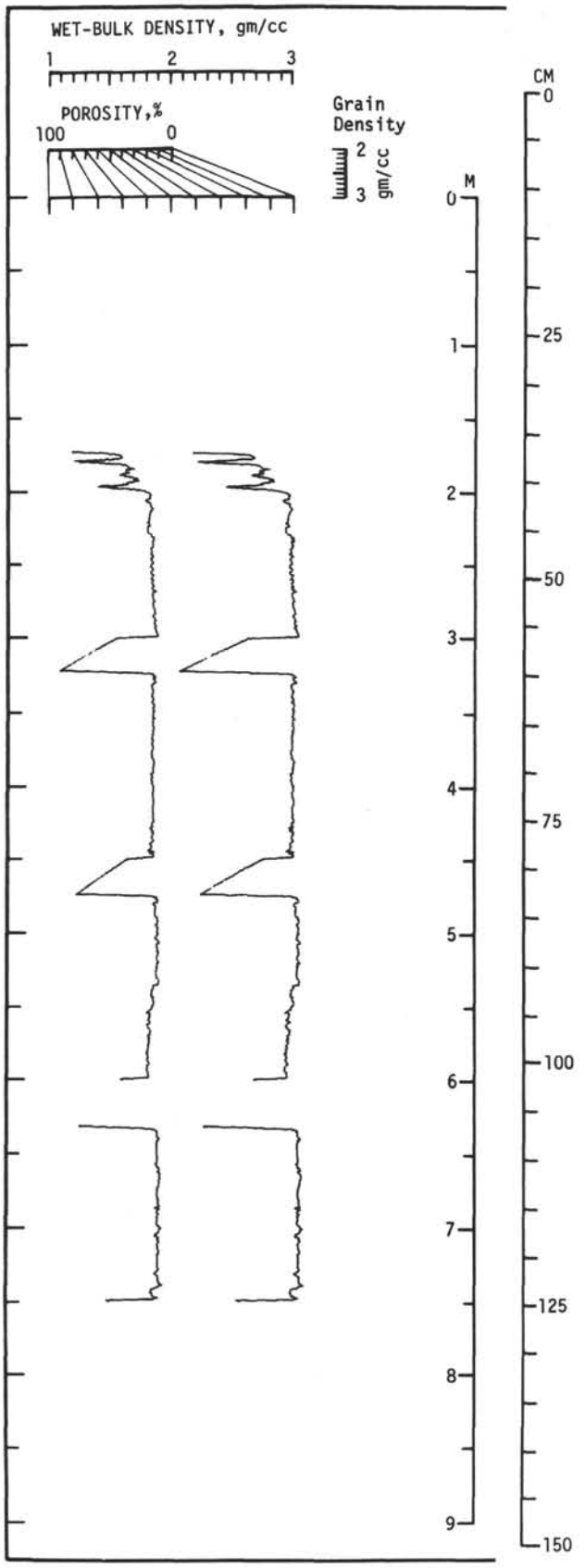

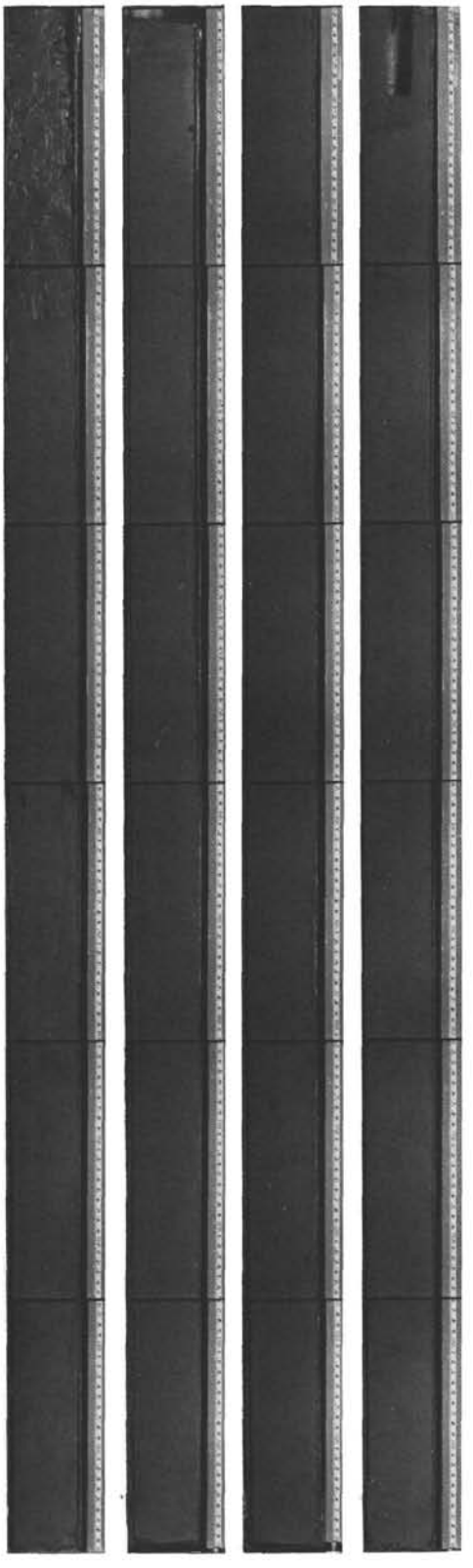

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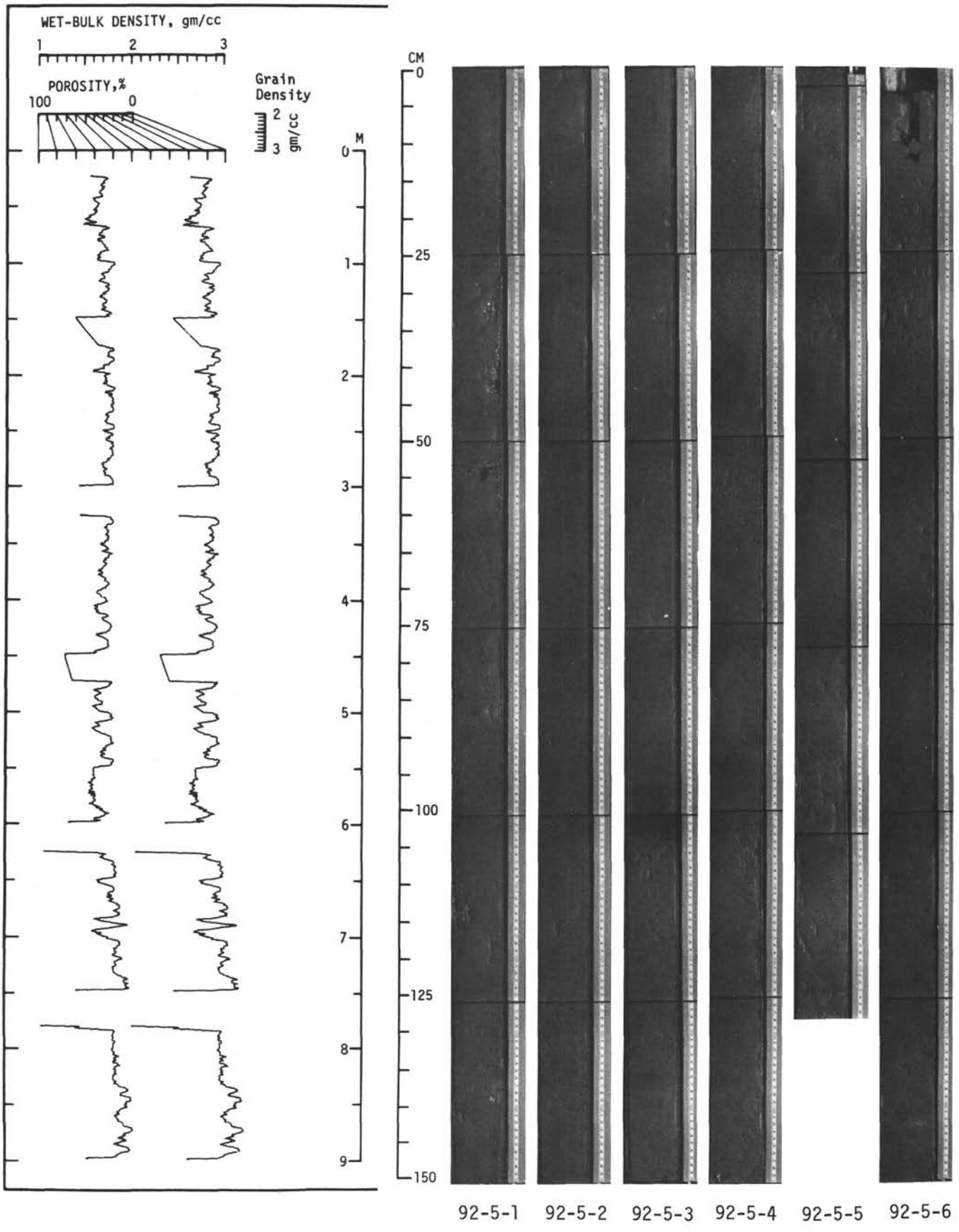
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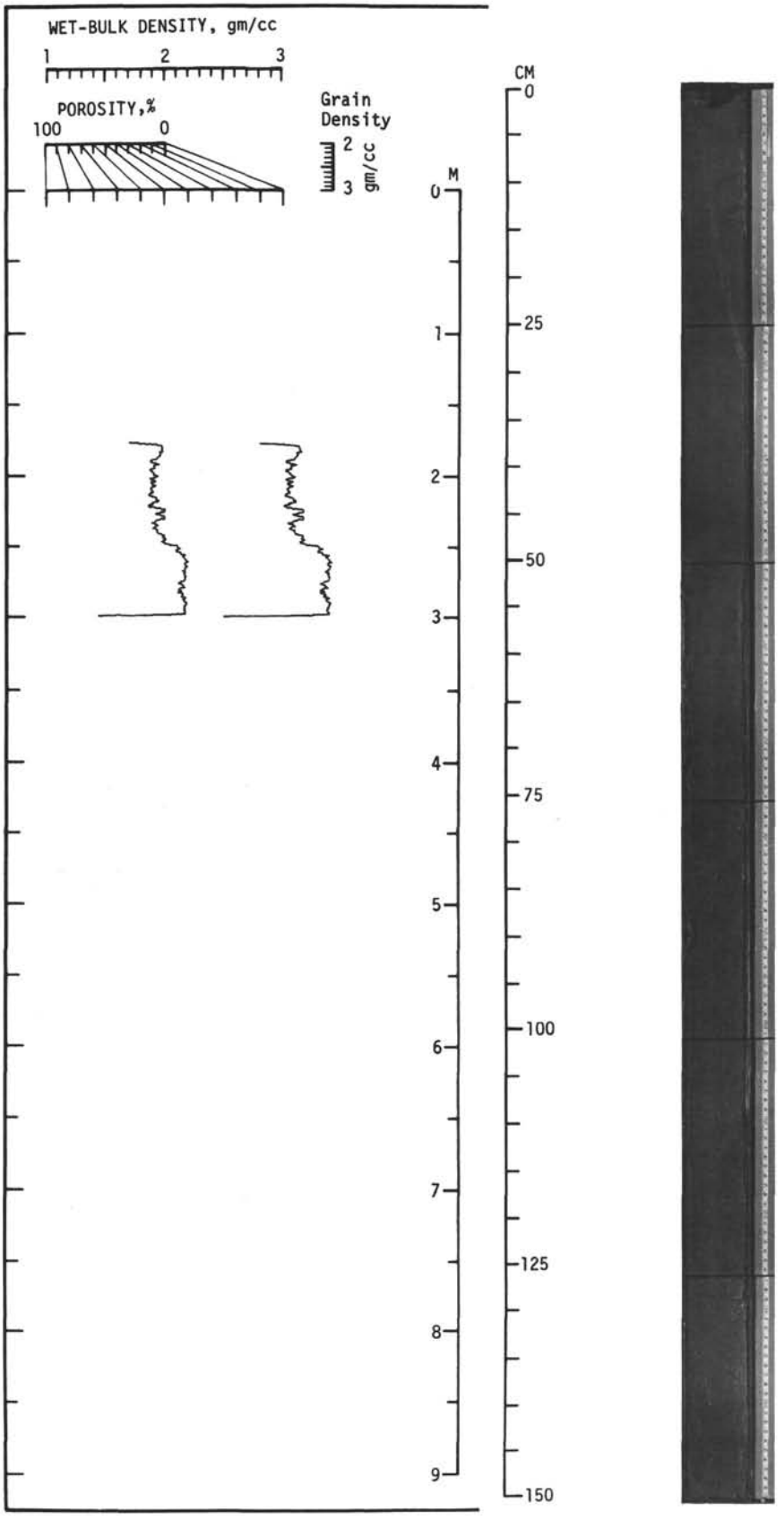
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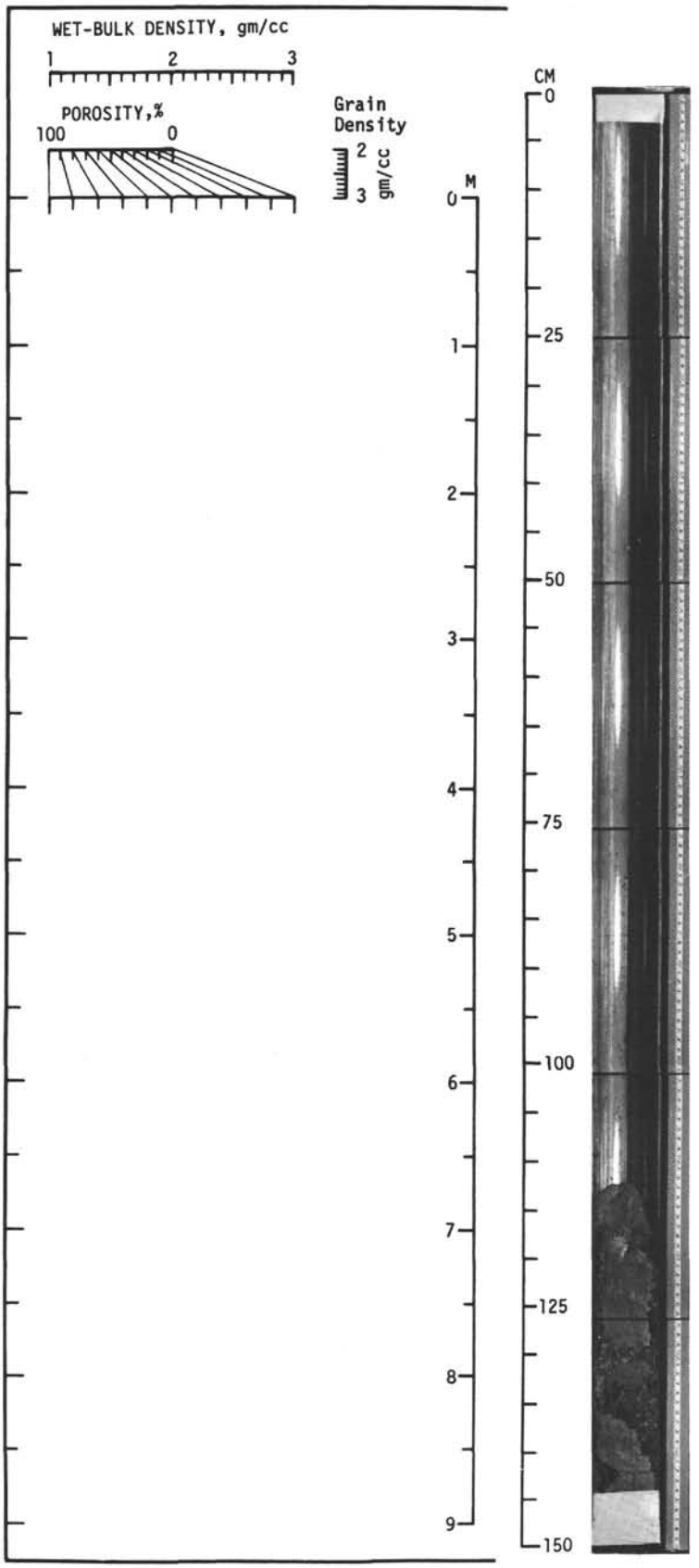
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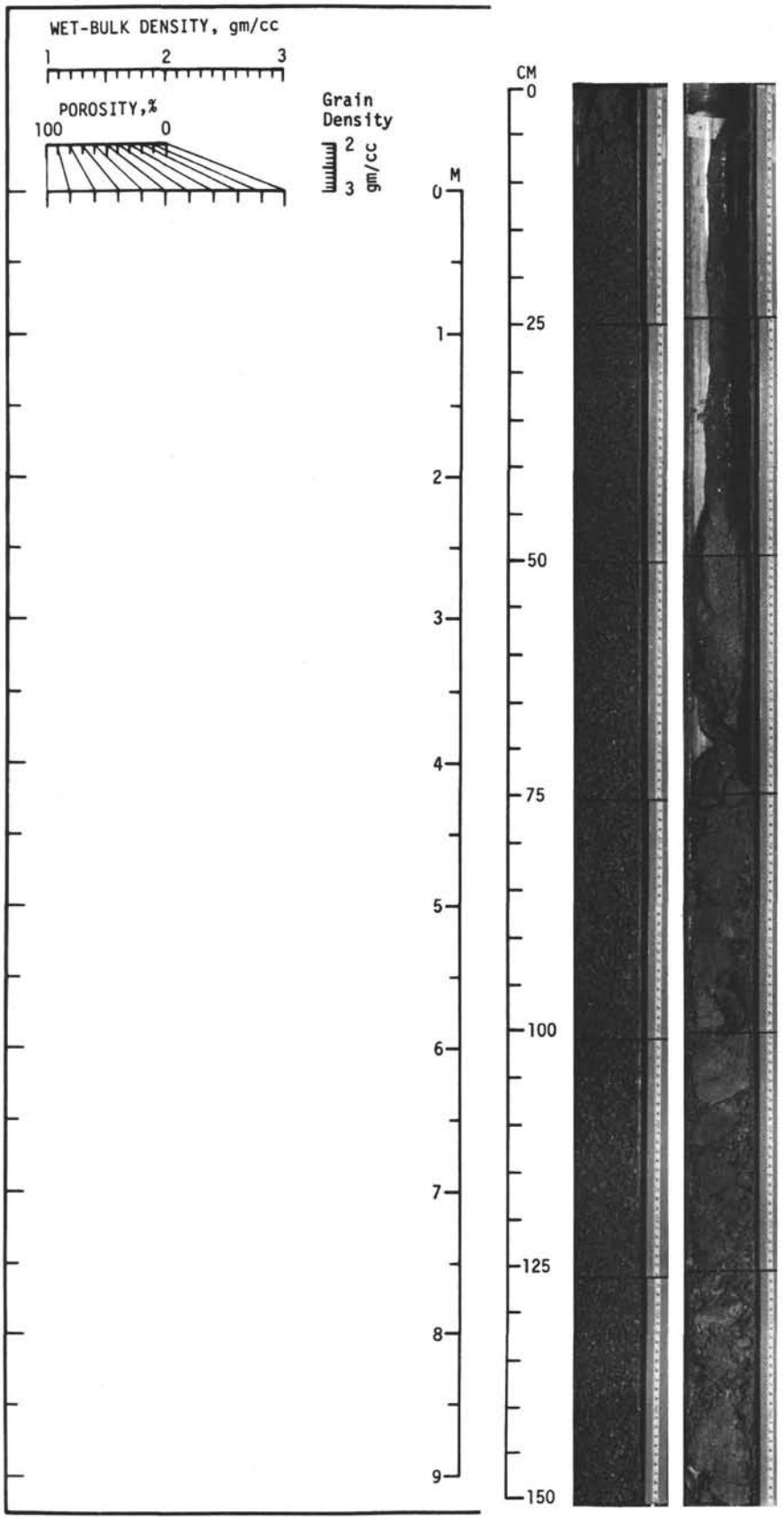
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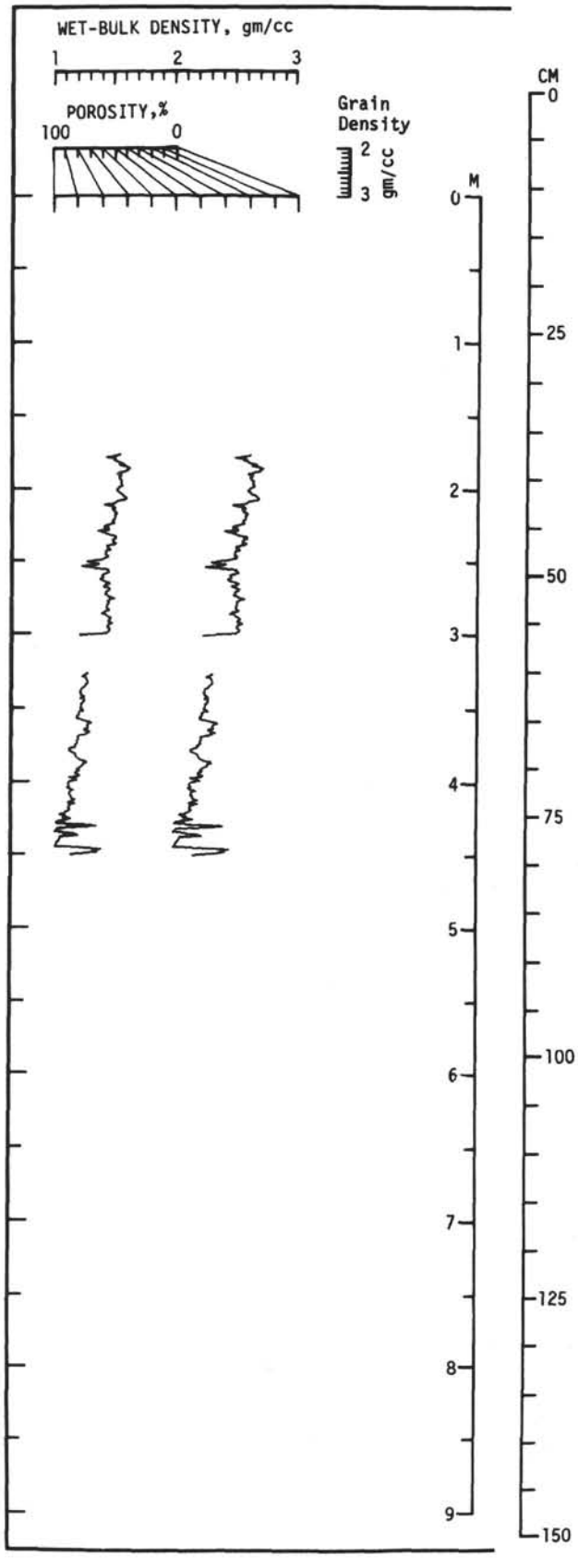

NO PHOTOGRAPH AVAILABLE

92-11