6. SITE 175

The Shipboard Scientific Party[1]

ABSTRACT

The narrow synclinal trough drilled on the lower continental slope off Oregon consists of two Pleistocene lithologic units: a dark greenish gray silty clay (0-120 meters) and a dark greenish gray silty clay with interbedded medium gray silty clay (120-233 meters). Sand and silt turbidites are interbedded with the silty clays of the lower unit and lower part of the upper unit. Benthonic foraminifera indicate that the sediments cored on the lower slope were originally deposited on the adjacent abyssal plain, but were uplifted at least 200 meters and possibly 700 meters above the plain 0.3 to 0.45 million years ago.

SITE SUMMARY

Date Occupied: 19-20 June 1971.

Position (Loran A):
Latitude: 44°50.2′N;
Longitude: 125°14.5′W.

Number of Holes: 1.

Water Depth: 1999 meters.

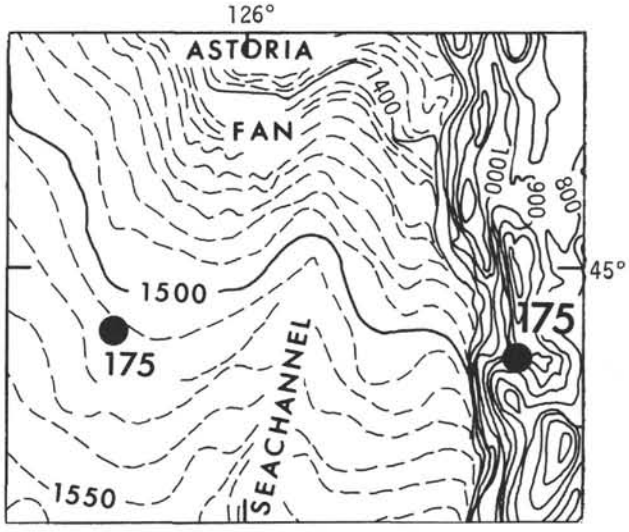
Penetration: 271 meters below sea floor.

Number of Cores: 25.

Total Core Recovered: 121 meters, 52.1%.

Age of Oldest Sediment: Pleistocene.

Acoustic Basement: None.



BACKGROUND AND OBJECTIVES

Site Description

A narrow synclinal trough on the lower continental slope off central Oregon is the location of Site 175 (Figures 1 and 2). The trough is filled with about 0.25 second of sediments (Figure 3) and occurs at a water depth of 1999 meters. The exact thickness of sedimentary fill is difficult to determine because of the steeply dipping limbs of adjacent anticlinal folds on either side of the trough. The lower continental slope of north-central Oregon is characterized by a series of prominent ridges and troughs which occur in more than 900 meters of water and strike in a general north-south direction. Such topography continues northward along the Washington continental slope.

This site was selected for drilling after a lengthy approach survey. After serious reconsideration, it was decided that bottom slopes shown by the *Yaquina* survey (Kulm et al., this volume) were too steep and that the sediment cover was too thin for *Challenger* to spud in on the side of an anticlinal structure. Potential petroleum-bearing structures were avoided as requested by the JOIDES Committee on Safety and Pollution. Thick sediment ponds landward were not drilled because of the thick section of young sediments cored at Site 174. Site 175 was selected as a substitute for two holes that were originally planned for the continental slope.

Many ridges of the lower continental slope have troughs with small ponded basins between them. Some seismic records display a marked angular unconformity between the ponded sediments and the underlying folded strata. It appears that the folding took place fairly recently in the geologic history of the area and that the sediment was deposited after the folding ceased. In some basins, the

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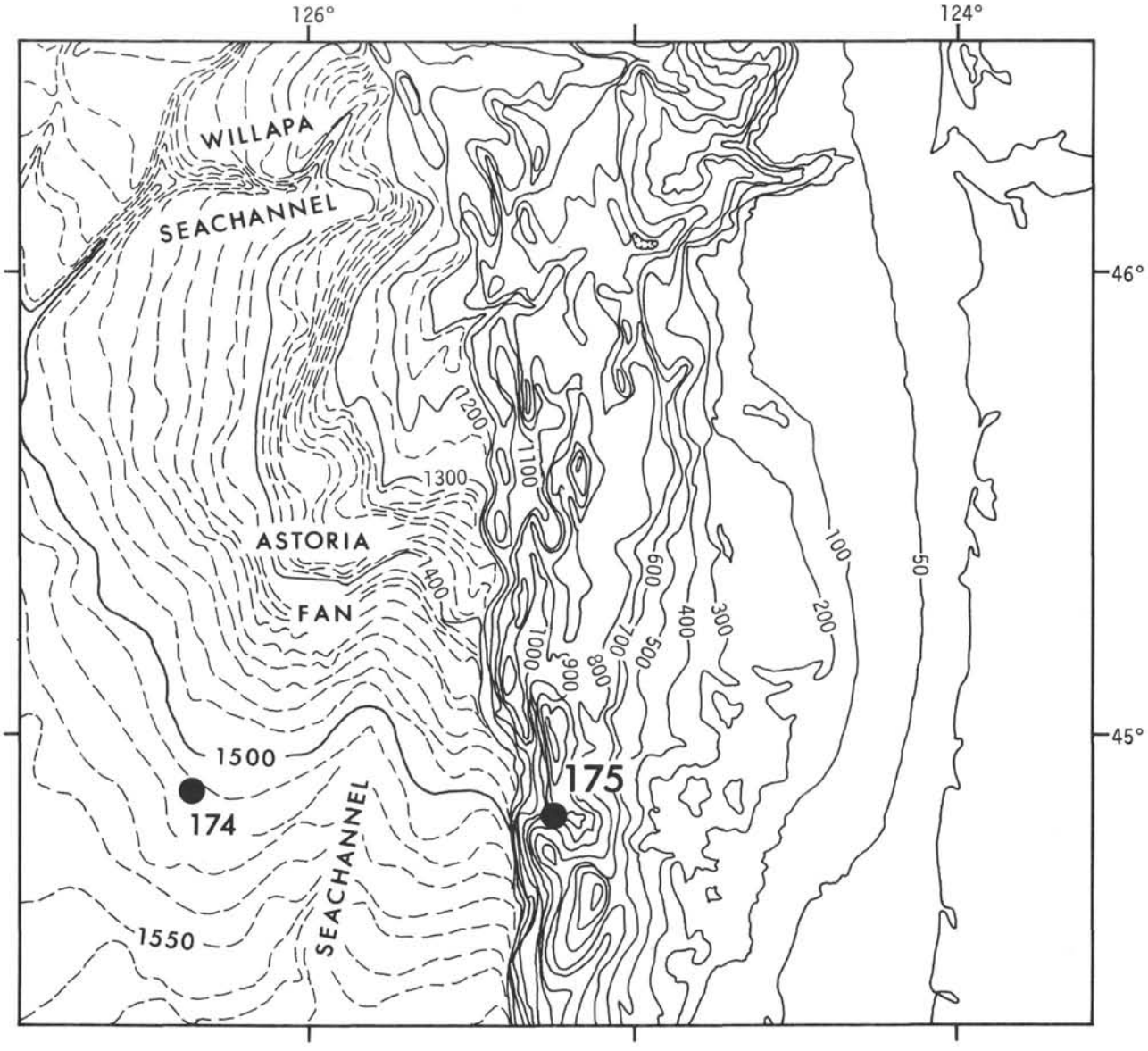

Figure 1. *Bathymetry in the vicinity of Site 175 (McManus, 1964). Contours in fathoms.*

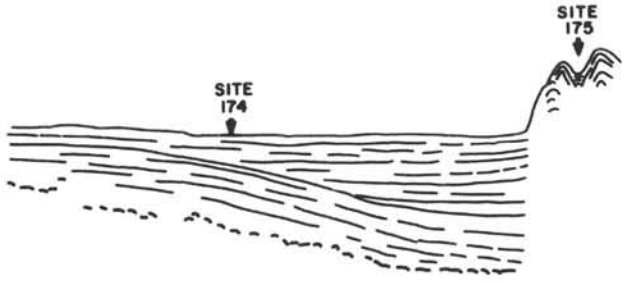

Figure 2. *Diagrammatic section (based on reflection records) of Site 175.*

deeper deposits have been pene-contemporaneously folded while deformation dies out in the upper strata. Thin basin accumulations show little or no deformation.

Preliminary studies of the lithologies and faunal content of rocks dredged from the lower continental slope off central Oregon suggest they were deposited at abyssal depths (Kulm and Fowler, in press). This implies that abyssal plain sediments were folded onto the lower continental slope, probably during Plio-Pleistocene time. Provenance studies and dispersal patterns of the heavy mineral sands of the lower continental slope rocks suggest that they may have been deposited on the abyssal plain off southern Oregon, or about 170 km to the south, and since have been moved northward relative to the North American continent and folded into the lower slope.

Site Objectives

Sites 174 and 175 were drilled as a pair to correlate the stratigraphic columns of both sites and relate this to the tectonics of the region. For example, if there is underthrusting of the North American Plate by the Juan de Fuca Plate, the sediments on the lower continental slope should show whether or not the latter plate is being scrapped off as it passes beneath the continental block. If the sediments of the lower slope were deposited on the flat abyssal plain, they should bear some resemblance, lithologically and mineralogically, to the Astoria Fan

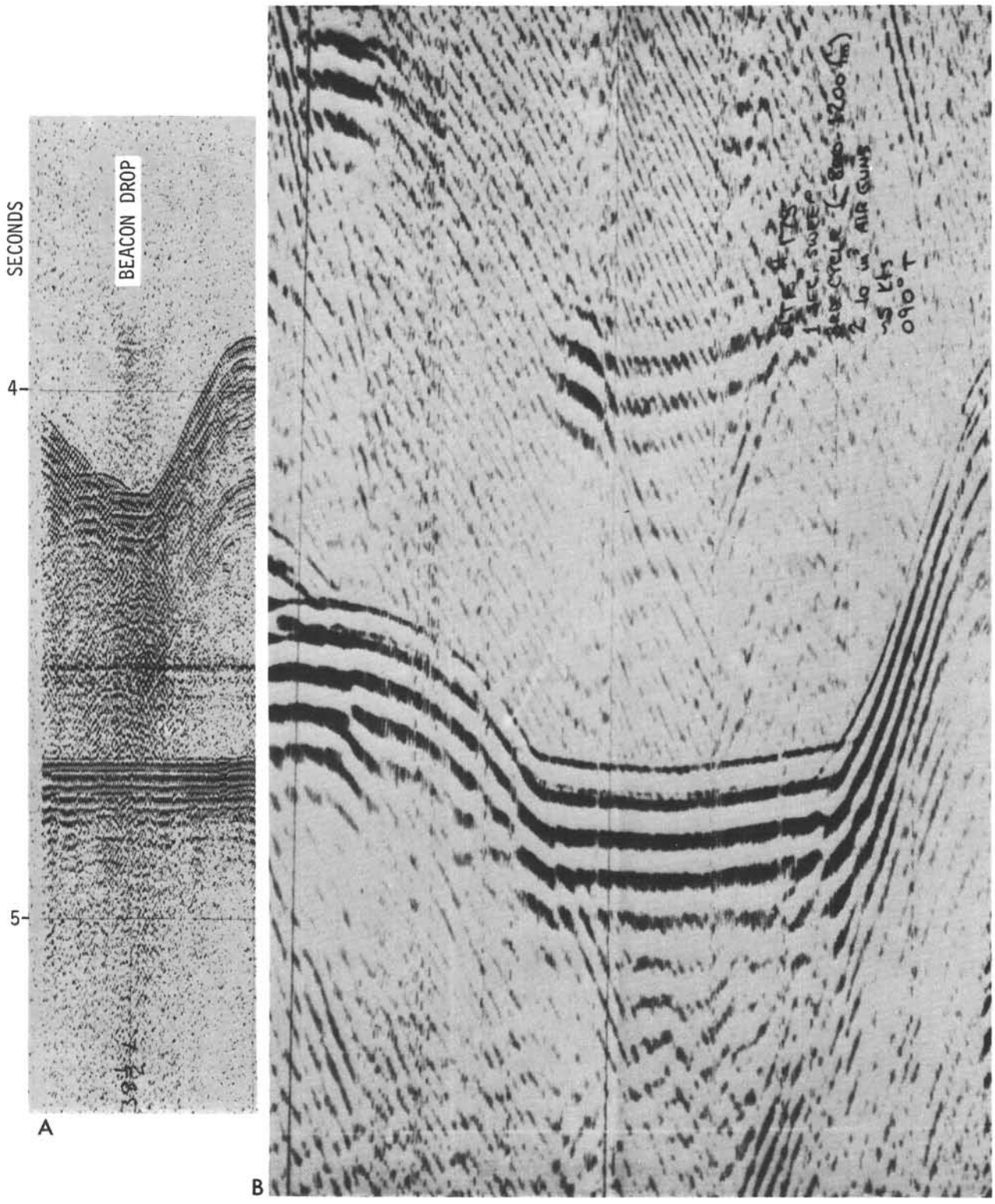

Figure 3. A. *Seismic reflection profile of Site 175 on the lower continental slope off central Oregon (from* Glomar Challenger). B. *Seismic reflection profile in the vicinity of Site 175 (from Yaquina, see Kulm et al, this volume, for site survey).*

deposits (Site 174), which are derived from the Columbia River. This would be true only if there has been less movement of the two plates past one another than postulated by Atwater (1970). The prime objective of Site 175 was to determine if the last stage of tectonism on the lower slope is coeval with the development of the acoustic discontinuity that occurs below the Astoria Fan deposits cored at Site 174. It is important to determine whether this discontinuity is caused by increased rates of sedimentation during the glacial Pleistocene or whether it represents a slowdown or termination of underthrusting by the Juan de Fuca Plate. A comparison of the heavy mineral and clay

mineral suites of the sediments from Sites 174 and 175 should determine their provenance. Relative plate motion, if any, may be inferred from these data.

LITHOLOGIC SUMMARY

General Statement

At this site, 233.0 meters of terrigenous sediments were cored almost continuously. Two lithologic units can be distinguished based on the relative amounts of dark greenish gray silty clay and medium gray carbonate-bearing silty clay.

Lithologic Units

Unit 1 (0-120 m; Core 1 to Core 14, Section 2)

This unit extends from 0 to 120 meters and consists predominantly of a dark greenish gray, fine-grained silty clay. Uniform color and texture produce a massively bedded unit with occasional mottling. The sediments are consistently firm except for the occasional semi-indurated layers in Cores 10 to 13 which qualify as mudstones. Diatoms are present in sufficient concentration to classify 50 percent of the sediments as diatom-bearing silty clay. Enough nannofossils occur with the diatoms in Section 6-6 to term the sediment a nannofossil diatom-bearing silty clay. Unconsolidated fine sand to coarse silt beds are interspersed within the silty clays. They range in thickness from a few millimeters to several centimeters. They are well-sorted and have sharp irregular upper and lower bedding contacts. Most irregular contacts are believed to be due to drilling deformation; however, some may be caused by burrowing as sand-filled burrows are locally present. Quantitatively, these coarse sediments are minor, constituting about 1 percent of Unit 1. They are significant, however, in having the aspects of a proximal turbidite facies.

One 25-cm interval of medium bluish gray carbonate-bearing silty clay, which characteristically appears in Unit 2, occurs in Section 7-3 of Unit 1. A 4-cm ash bed is found in Core 2 and several ash fragments are present in Core 7. Pyritized fecal pellets and burrows must be liberally dispersed throughout Unit 1 as they are common along the split surface of the cores.

The values for calcium carbonate in this unit average 3 to 4 percent, although values of 1 to 7 percent may occur. More of this carbonate is obviously visible on the smear slides. The amount of organic carbon generally ranges from 0.6 to 1.0 percent.

Unit 2 (120-233 m; Core 14, Section 2 to Core 25)

The remainder of the stratigraphic section consists of a dark greenish gray sediment which is interbedded with equal amounts of a medium gray to medium bluish gray carbonate-bearing sediment. The latter lithology is firm and massive, and typically contains 2 to 10 percent carbonate particles. In Core 19, 15 percent of the constituents are carbonate particles, which makes this deposit a carbonate-rich silty clay. Interestingly enough, the laboratory analysis for calcium carbonate shows no significant differences between the green versus the gray to bluish gray sediments. Average values for both are between 7 and 8 percent with extreme ranges of from 2 to 13 percent. There is a significant difference, however, in the organic carbon content between the two sediment types. The green sediments, as before, generally range from 0.6 to 1.0 percent, whereas the gray to bluish gray deposits average between 0.2 to 0.3 percent. Lithologically, the greenish gray material is similar to its counterparts in Unit 1, except that the diatom-bearing intervals are much scarcer and it has gradually become sufficiently consolidated to be termed a silty claystone throughout the unit. Fine sand and coarse silt layers occur in both facies; however, they are better sorted and contain less micaceous material in the green facies. Individual beds range up to 15 cm in thickness and continue to show sharp irregular bedding contacts. Graded bedding and faint lamination can be seen in some of the thicker sand beds in Core 20. The coarse clastics average 6 percent of the sediment section in the green silty claystone facies. In some cores, they constitute only one percent or less, whereas in Core 20 they make up 16 percent of the sediments. Again, a proximal turbidite aspect is exhibited by these coarse sediments which here in Unit 2 are more abundant than in Unit 1. Few sands are found in the carbonate-bearing silty clay except for several 20- to 50-cm-thick intervals which are sandy near the base and exhibit poorly developed graded bedding.

Pyritized sediments are rare in Unit 2 although some 1-cm-wide by 5-cm-long pyritized burrows were noted. A polished 2-inch pebble of hard devitrified volcanic rock was found in Core 19. It may represent a gastrolith.

The origin of the carbonate particles which are found in the gray carbonate-bearing silty clay is not known. Actually, they occur in the dark green silty clays as well but in lesser amounts. They are present as clay- to coarse silt-sized particles and have a sharp irregular outline.

The degree of induration of the two dominant sediment types differs at equivalent inhole depths. Dark green sediments exhibit progressively increasing induration with depth beginning with firm near the surface to very firm and finally becoming silty claystones throughout most of Unit 2. On the other hand, the gray carbonate-bearing sediments remain firm throughout the hole except for Core 22 where they too become silty claystones.

The gray carbonate sediments appear to have a more plastic nature which may account for a bedding characteristic which they exhibit. In several intervals, they have a rhythmic varied appearance with 1- to 4-mm-thick laminae of very fine dark gray material alternating with 1- to 3-cm-thick bands of medium gray, somewhat coarser detritus. Plasticity of the finer material could result in a lit-par-lit type of injection developing from the alternating high and low pressure exerted by the drill bit on the sediments. However, a natural depositional phenomenon as the causative agent cannot be ruled out at this time.

The sediments in general are not badly deformed except at the tops of cores and where the differing lithologies alternate. Where observed, bedding dips are low to flat suggesting that nearly horizontal strata were encountered. This aspect, plus the progressively increasing downhole induration recorded by the dark green sediments, suggests

that the strata encountered are relatively undeformed and in normal sequence.

PALEONTOLOGIC SUMMARY

Introduction

A relatively uniform series of muds and fine sands was penetrated to a depth of 261 meters at Site 175 Abundance of diatoms, foraminifers, and radiolarians varies from rare to common throughout the sequence penetrated whereas pollen and calcareous nannofossils are rare to absent. All fossil assemblages encountered at this site are interpreted as Pleistocene with the exception of rare reworked Pliocene species of diatoms. Correlation of NPD diatom zones and radiolarian zones with the paleomagnetic-radiometric scales of Donahue (1970) and Hays (1970) allows correlation of certain horizons at Site 175 with the following estimated radiometric ages; 51.5 meters = 0.26 m.y. B.P., 71.5 meters = 0.30 m.y. B.P. and 147.5 meters = 0.92 m.y. B.P. The base of Core 21 (195 meters) is thought to be older than 1.30 m.y. B.P.

Calcareous Nannoplankton

Coccoliths are sparse to absent in most of the cores taken at Site 175. Small placoliths, however, are abundant in parts of Cores 12 and 13. As at other sites drilled in this same area (Holes 174A and 176), species diversity is low, an indication of cool surface water conditions. The cold water indicator, *Coccolithus pelagicus*, is found in most fossiliferous samples recovered at this site. A warm interval is indicated in Core 11 (90.5 to 100 meters) where rare specimens of *Helicopontosphaera kamptneri* and rare to common specimens of *Cyclococcolithina leptopora* occur in several samples; this climatic interpretation is in agreement with planktonic foraminiferal data. The nearshore indicator, *Braarudosphaera bigelowi*, is conspicuous throughout the section, more so than at Site 174 which was drilled somewhat farther offshore. *B. bigelowi* is present in more than thirty-five samples from sixteen cores.

Cores 1 to 3 (0 to 24 meters) probably belong to the *Emiliania huxleyi* Zone. Cores 4 to 11 (24 to 100 meters) belong to the *Gephyrocapsa oceanica* Zone. A few small (2.5-4 μ) nondescript placoliths are present in Cores 10 and 11 and become abundant in Core 12 (100 to 109.5 meters). The top of Bukry's (1971) *Coccolithus doronicoides* Zone can probably be marked at this level. Well-preserved specimens of *Emiliania annula* (*Pseudoemiliania lacunosa* of Gartner, 1969) are moderately common in the core catcher of Core 15 and occur sporadically down to Core 20. Cores 15 to 20 (138 to 185.5 meters) are assigned to the lower Pleistocene *Emiliania annula* Zone. It should be noted that this is the northermost occurrence of *E. annula* recorded on Leg 18. The results of DSDP Leg 12 show that in the Atlantic Ocean this form ranges considerably further north (recorded at Site 114; 59° 56′N) due to the influence of the Gulf Stream.

Diatoms

Diatoms are common in the upper 100 meters of Hole 175 with decreasing abundance in the interval from 100 to 180 meters. Rare frustules are present from 180 to 220 meters. Only Pleistocene diatom assemblages were encountered in this hole along with small amounts of reworked Pliocene material. The base of North Pacific Diatom (NPD) Zone I (see Schrader, this volume for full discussion of NPD Zones utilized) was found at 51.5 meters (175-6-6, 87-89cm) and the base of NPD Zone II at 147.5 meters (175-16, CC) representing the base of the Late Pleistocene interval. The oldest diatom bearing sediment was encountered at 188 meters (175-21-2, 65-66cm) and was assigned to NPD Zone III which can be correlated with an estimated radiometric-paleomagnetic age of 0.92 to 1.3 m.y. B.P. (Early Pleistocene). Littoral marine species occur sporadically throughout this hole.

Foraminifera

Well-preserved Pleistocene planktonic foraminiferal faunas dominated by sinistral coiling populations of *Globigerina pachyderma* occur throughout most cores at Site 175. Foraminifera are common throughout this sequence with abundance increasing below Core 14. Only one relatively warm interval marked by the rare occurrence of *Globorotalia inflata* and dextral coiling specimens of *Globigerina pachyderma* was encountered in Core 11 (90.5 to 100 meters) although evidence of additional minor oscillations is present.

Middle and lower middle bathyal (see Chapter 14 for depth classification of marine environments) benthonic foraminiferal faunas are present in Cores 1 through 8 whereas Cores 9 through 17 contain a lower bathyal fauna characterized by significant percentages of *Melonis pompilioides*, a species indicative of depths in excess of 2000 meters today (Bandy, 1961; Asano et al., 1969; Ingle, 1967). Indeed, the shallowest Recent occurrences of this species hover near 1900 to 2000 meters, whereas more abundant populations do not appear above 2200 meters. By analogy, that portion of the sequence encountered below Core 9 (80 meters) at Site 175 was likely deposited at a depth in excess of 2200 meters, that is, deeper than the present sediment-water interface at this site (1999 meters) which implies uplift of this area during the late Pleistocene.

Radiolaria

Radiolaria occur in Cores 1 through 18 and 20 in Site 175. Preservation is moderate to good. Most samples contain sufficient numbers of specimens to permit correlation and assignment to the Pleistocene radiolarian zones proposed by Hays (1970) although tests are seldom abundant. Cores 1 through most of Core 11 represent the uppermost Pleistocene to Holocene *Artostrobium miralestense* Zone. The upper limit of *Drappatractus acquilonius* near the bottom of this zone (175-8-2, 88-90 to 175-8, CC) represents a radiometric-paleomagnetic age of 0.3 m.y. B.P. based upon correlation with Hays' (1970) zonation. The base of this zone is thought to represent an age of 0.4 m.y. B.P. Cores 12 through 20 represent the next lower *Stylatractus universus* Zone with a lower estimated age limit of 0.9 m.y. B.P. (Hays, 1970).

Spores and Pollen

Cores 3, 5, and 8 at Site 175 contain common to abundant spores and pollen. Cores 1 and 2 contain few

palynomorphs and Cores 13 through 22 are barren. The dominance of conifers observed at other sites was also encountered here. *Pinus, Tsuga,* and *Picea* occur in highest percentages with rare representation of deciduous trees and grasses. Rare, reworked specimens of *Ginkgo, Carya,* and *Ephedra* occur in Core 2. Although data in this hole are sparse, a *Tsuga* peak occurs which directly corresponds to a rise in diversity and a drop in the pine count (Core 3, Section 4, 38-40 cm). Six meters below this (Core 3, CC) the opposite trend is observed: pine rises to represent 65 percent of the sample, Tsuga disappears entirely, and the diversity drops sharply. It is possible that these extremes at 19.5 and 35 meters represent a warm period followed by a cool period; however, the marine microfossil data neither support nor contradict this.

It is not possible to draw conclusions about climate trends and events at this site due to the paucity of polleniferous sediment.

PHYSICAL PROPERTIES

Physical properties were measured in a routine fashion with the standard shipboard instruments and techniques on two to four sections of each core recovered at Site 175. Sonic velocity was measured on some cores from the freezer storage van about a week after drilling (Cores 1, 2, 8, 12, 15 16, 17 18, 19, 21, and 22) and no temperature corrections were made in the velocity calculations; however, the values fit well with the other sonic velocity measurements made previously in the same cores. Sonic measurements made on three muds and three sands in Core 21 gave velocities of 1.80±0.001 and 2.04±0.01 km/sec, respectively. Thus the range of velocity in one section of Core 21 is about one-half the total variation measured at this site.

Bulk density and porosity by the syringe technique were computed using the new factors (Benett factors) supplied earlier in the cruise. The computed values compare well with the value from the GRAPE; however, the accuracy of the GRAPE values is suspect until the observations of Adrian Richards have been evaluated.

Relative values of physical properties indicate two possible lithologic breaks. The first is between Cores 2 and 4 where all properties change values, which indicates a rapid transitional increase in consolidation. A second and more pronounced break occurs between Cores 13 and 15 which is near the reported lithologic change (i.e., boundary between Unit 1 and Unit 2) noted in the lithologic summary. Again, all physical properties measured here indicate a more rapid increase in consolidation.

CORRELATION BETWEEN REFLECTION RECORDS AND THE STRATIGRAPHIC COLUMN

Site 175 is in a narrow V-shaped valley whose floor occasionally has a small ponded sediment fill (Figure 3). The valley is a crease in an elongate ridge at the foot of the continental slope.

This site was chosen during the *Challenger* predrilling survey when the primary site proved undesirable. In all, four crossings of the valley were made and seismic records from the last two crossings are in Figure 3A.

The seismic records were run at 4 knots with two airguns and with a 3-second sweep and fire rate. One stylus of the EDO recorder was out of synchronization, which resulted in a somewhat fuzzy record.

The valley is so narrow that refraction patterns from each wall overlap in the center of the record and a depth of ponded sediment cannot be seen through the defractions. In the *Challenger* record, the reflector that appears as bedding in the ponded sediment is the multiple event in the outgoing airgun signal. In the *Yaquina* survey, the same refraction patterns were noted in the 1-second sweep record, but one may interpret a minimum thickness of 0.25 sec. of ponded sediment in the syncline (Figure 3B).

The valley appears to be a tight syncline or possibly a faulted syncline. On either side of the valley, the seismic record indicates broad folds in a stratified sequence of rock. The first definite reflective unit below the surface in layered sequences on either side of the valley occurs at about 240 meters, which is below the lowest core recovered in the lithologic Unit 2.

SUMMARY AND CONCLUSIONS

Site 175 is located in 1999 meters of water in a narrow synclinal trough on the lower continental slope off central Oregon. A sediment pond with approximately 0.25 second of sediment fills the trough. The limbs of adjacent anticlines dip steeply into the trough. This site was continuously cored to a depth of 195 meters below the sea floor with penetration to 271 meters. A malfunction in the drilling terminated the hole at this depth.

The sediment section consists of two terrigenous lithologic units which are Pleistocene in age. The upper unit (0-120 meters) is an upper Pleistocene dark greenish gray silty clay with occasional thin beds of fine sand and coarse silt. The lower unit (120-233 meters) is an Upper to Lower Pleistocene dark greenish gray silty clay with interbedded medium gray silty clay. Very fine sand and silt turbidites are interbedded with the silty clays of the lower unit and the lower portion of the upper unit. The gray silty clays contain up to 13 percent calcium carbonate. Visual descriptions and physical properties indicate the sediments become more consolidated downhole with a pronounced increase in consolidation near the boundary of upper and lower units.

The benthonic foraminiferal assemblage in the interval between 0 to 72 meters is characteristic of lower middle bathyal environments or the present water depth of the site (about 2000 meters). The interval from 72 to 157 meters contains an excellent paleobathymetric index species which is common to lower bathyal environments. Inferred paleodepths are at least 200 meters deeper than the present-day water depths at Site 175 and are similar to the 2800 meter water depth of the adjacent abyssal plain. Based upon the ages determined from diatom and radiolarian stratigraphy for Site 175, uplift of abyssal plain deposits occurred between 0.3 and 0.45 m.y. B.P. During this short interval of time there was sufficient uplift to produce the significant change in water depth noted in the benthonic foraminiferal assemblages.

A large anticlinal structure developed on the lower continental slope immediately adjacent to the flat-lying

sediments of abyssal plain. This outermost structure is the youngest in a series of anticlinal and synclinal folds that form the continental slope. When the last and youngest fold formed, a sediment pond developed between the two anticlines. The innermost anticlines are probably older and not involved in this relatively recent period of folding. Turbidity current deposition declined as the site was elevated above the abyssal plain out of the reach of bottom transporting currents originating higher on the continental slope. The upper 20 meters of the sedimentary section consists of diatom-bearing silty clay and represents hemipelagic sedimentation during the past 100,000 to 200,000 years. Slumps from the adjacent topographic highs produced little or no sediment grading, or other structures typical of turbidity current deposits, but contained displaced benthic fauna from the adjacent shallower environments.

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APPENDIX A. OPERATIONS

Pre-drilling Survey

Site 175 is located in the ridge-and-trough province on the lower continental slope off Oregon. A continuous seismic record was made between Sites 174 and 175. Record quality was poor at speeds greater than 6 knots. Site 175 was located with a great deal of difficulty (Figure 4) since we chose to change the strategy for drilling the continental slope site. This decision was made after we had a better understanding of the *Challenger's* drilling capabilities in relation to topography and after an exceptionally thick section of young sediments was drilled at Site 174.

After five hours of maneuvering, Site 175 was selected in a small ponded basin which strikes in a north-south direction. The vessel was offset 132 meters west and 132 meters south of the beacon. At the site, the calculated width of the basin is 400 meters in an east-west direction. The water is 1999 meters deep.

Drilling Program

The site was cored continuously down to a depth of 195 meters below the sea floor. Interval coring continued to a depth of 271 meters. See Table 1 for the coring summary. Muds were encountered throughout the bulk of the section with some interbedded sands. A consolidated silty sandstone was obtained in the last meter of core recovered in the hole (Core 22).

A float valve was added to the bottom hole assembly to prevent "flow back" and possible plugging of the bit. The rest of the bottom hole assembly was the same as that used at Hole 174A.

TABLE 1
DSDP Site 175 Coring Summary

Core	Cored Interval Below: Derrick Floor (m)	Cored Interval Below: Sea Floor (m)	Cored (m)	Recovered (m)	Recovered (%)
1	2011.0-2016.0	0-5.0	5.0	5.0	100.0
2	2016.0-2025.5	5.0-14.5	9.5	5.0	52.6
3	2025.5-2035.0	14.5-24.0	9.5	7.5	78.9
4	2035.0-2044.5	24.0-33.5	9.5	7.0	73.7
5	2044.5-2054.0	33.5-43.0	9.5	9.5	100.0
6	2054.0-2063.5	43.0-52.5	9.5	9.5	100.0
7	2063.5-2073.0	52.5-62.0	9.5	4.5	47.4
8	2073.0-2082.5	62.0-71.5	9.5	2.0	21.1
9	2082.5-2092.0	71.5-81.0	9.5	5.0	52.6
10	2092.0-2101.5	81.0-90.5	9.5	7.0	73.7
11	2101.5-2111.0	90.5-100.0	9.5	6.5	68.4
12	2111.0-2120.5	100.0-109.5	9.5	0.5	5.3
13	2120.5-2130.0	109.5-119.0	9.5	4.5	47.4
14	2130.0-2139.5	119.0-128.5	9.5	8.5	89.5
15	2139.5-2149.0	128.5-138.0	9.5	6.0	63.2
16	2149.0-2158.5	138.0-147.5	9.5	9.5	100.0
17	2158.5-2168.0	147.5-157.0	9.5	8.5	89.5
18	2168.0-2177.5	157.0-166.5	9.5	6.0	63.2
19	2177.5-2187.0	166.5-176.0	9.5	2.0	21.1
20	2187.0-2196.5	176.0-185.5	9.5	4.0	42.1
21	2196.5-2206.0	185.5-195.0	9.5	2.5	26.3
22	2234.5-2244.0	223.5-233.0	9.5	1.0	10.5
23	2253.5-2263.0	242.5-252.0	9.5	–	–
24	2263.0-2272.5	252.0-261.5	9.5	–	–
25	2272.0-2282.0	261.5-271.0	9.5	CC	–
		Totals	233.0	121.5	52.1

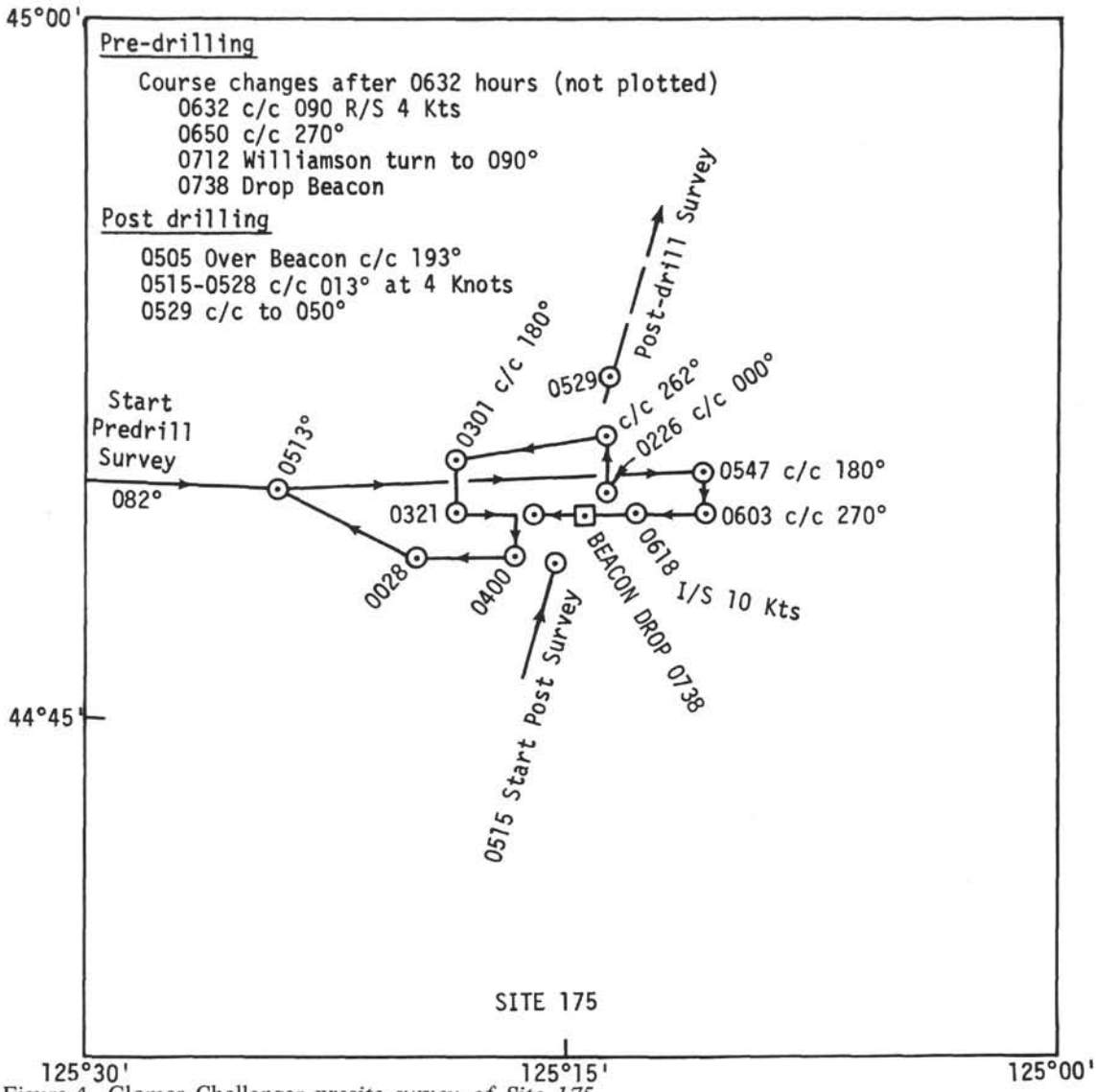


Figure 4. Glomar Challenger *presite survey of Site 175.*

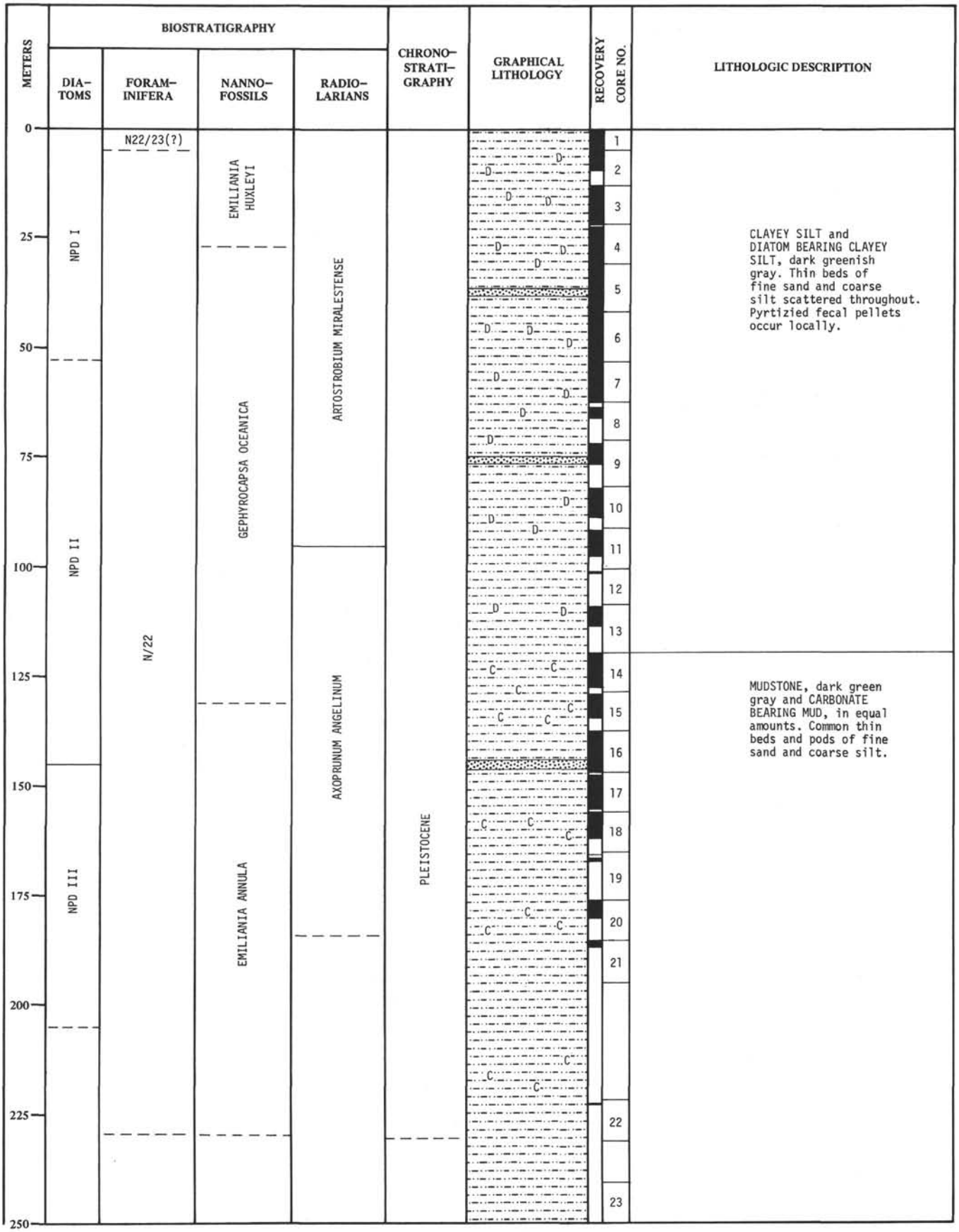
Hole conditions were excellent; however, loose silty sands were difficult to retain in the core barrel. Apparently a large percent of the cores were lost while retrieving the core barrel. On one occasion, a core was lost after the core barrel was retrieved; the unconsolidated sand slid through the core catchers while the barrel was being layed down.

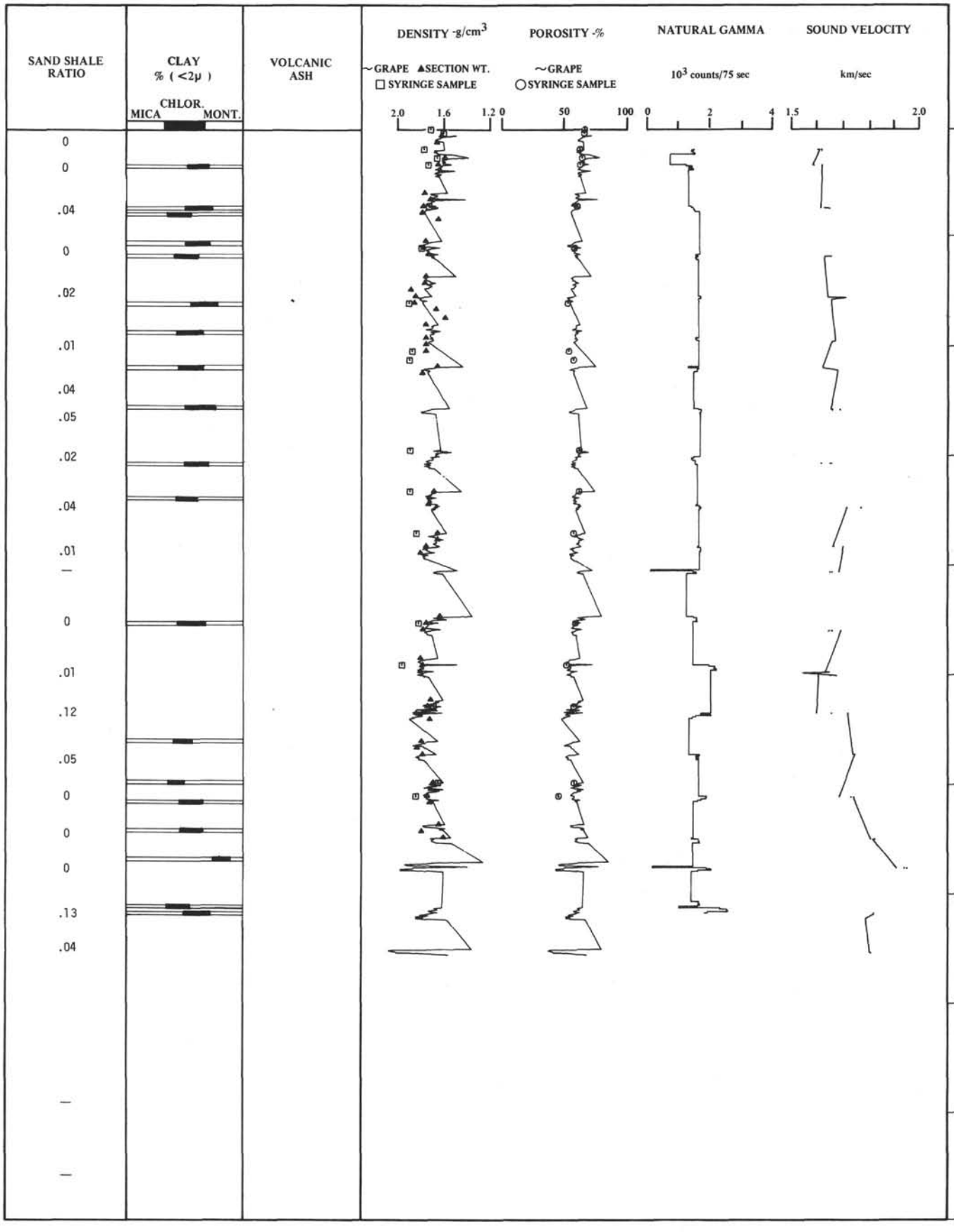
The coring operation was terminated after three core barrels (23, 24, and 25) were brought to the surface without recovery. Our first impression was that the core barrel was not latching in its coring position. Such a failure may be caused by a piece of rock wedging in the outer barrel or shearing of the pin in the float flapper, which allows the flapper to drop into the bearing section thereby preventing the core barrel from latching. A 2-inch extended sub was installed on the bottom of the last core barrel to dislodge any material caught in the bit. When the inner barrel was retrieved, a deep scratch was noted on the inner barrel extension which suggested that the flapper was in the bearing area. The hole was filled with mud and the bottom hole assembly brought on deck. There was no material lodged in the bearing area and the float valve was functioning properly. One can only speculate on the failure of the bottom hole assembly.

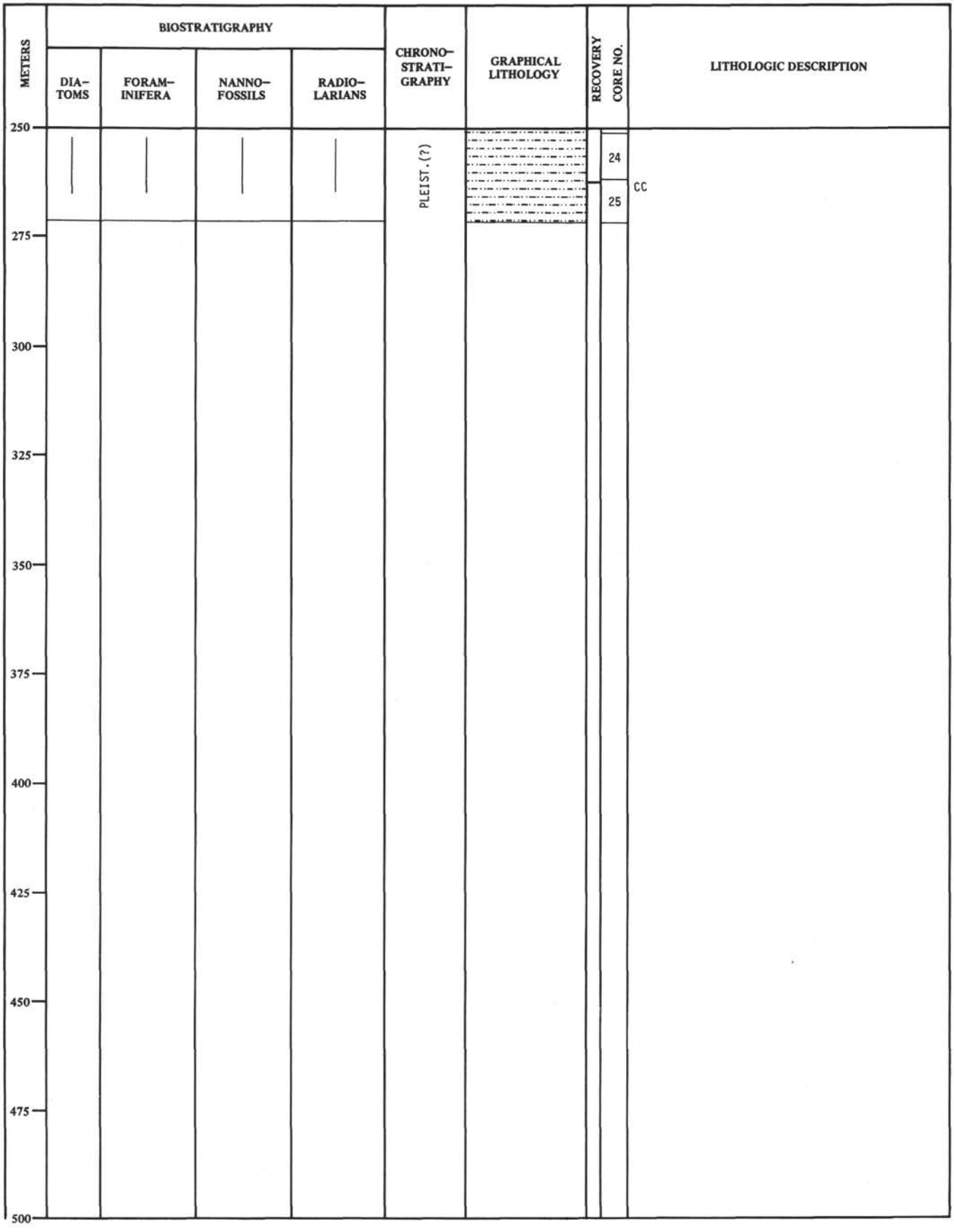
Post-drilling Survey

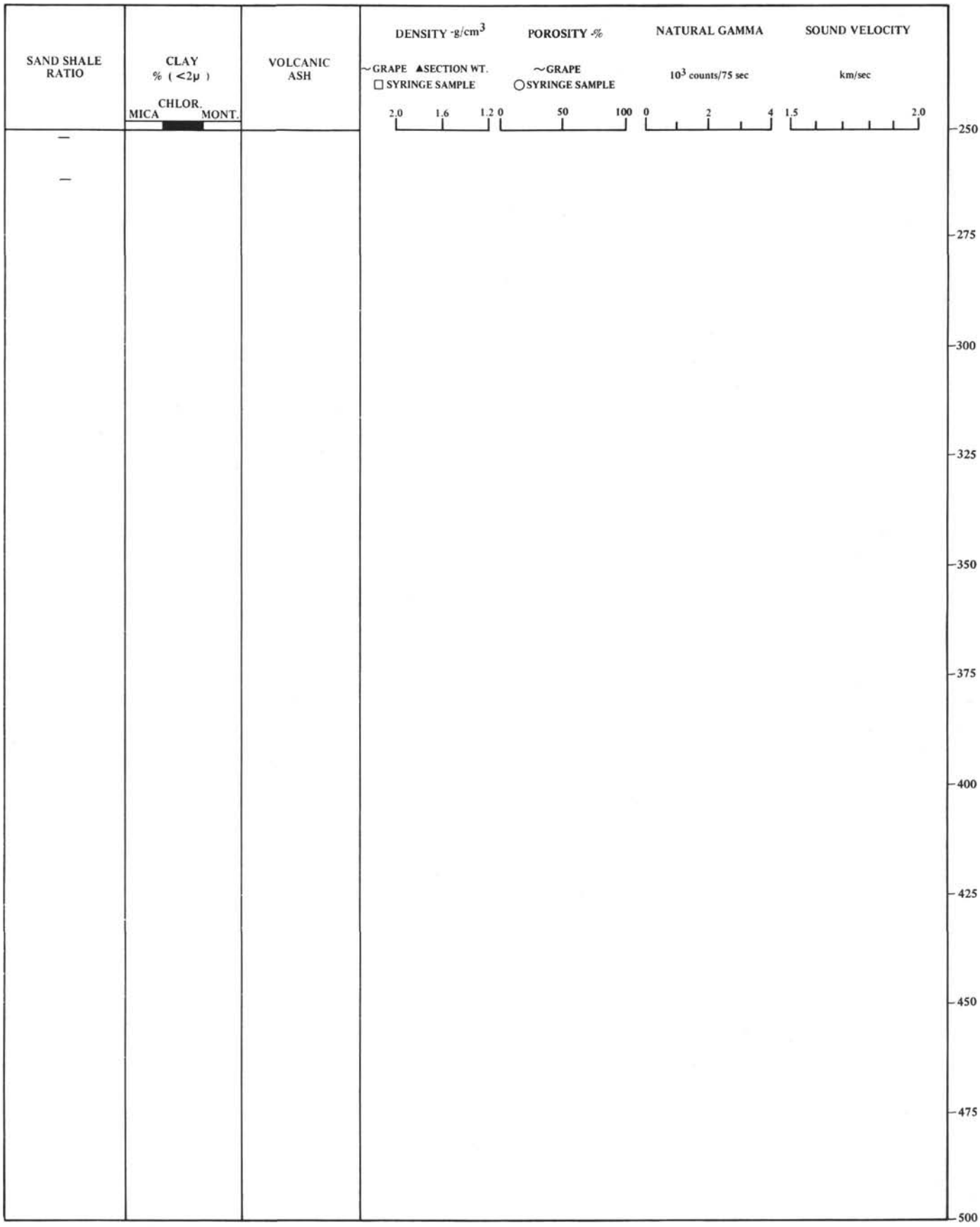
After Site 175 was drilled, a seismic survey was made parallel (north-south) to the strike of the basin. *Challenger* came to course 193° at 4 knots at 0504 hours on 21 June for about 1 km and at 0515 changed course to 013°. At 0529, the course changed to 064° to pass over the beacon offset that was drilled. The final course at 0531 was 050° and the vessel passed over the beacon at 0537 hours. The survey terminated at 0550.

From this survey it appeared that the basin was equidimensional but this may have been due to the heading selected for the survey. From the pre-drilling survey and the bathymetric map, it was determined that the basin is elongate in a north-south direction.


METERS
BIOSTRATIGRAPHY
DIA-TOMS
FORAM-INIFERA
NANNO-FOSSILS
RADIO-LARIANS
CHRONO-STRATI-GRAPHY
GRAPHICAL LITHOLOGY
RECOVERY
CORE NO.
LITHOLOGIC DESCRIPTION
0
25
50
75
100
125
150
175
200
225
250
NPD I
NPD II
NPD III
N22/23(?)
N/22
EMILIANIA HUXLEYI
GEPHYROCAPSA OCEANICA
EMILIANIA ANNULA
ARTOSTROBIUM MIRALESTENSE
AXOPRUNUM ANGELINUM
PLEISTOCENE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
CLAYEY SILT and DIATOM BEARING CLAYEY SILT, dark greenish gray. Thin beds of fine sand and coarse silt scattered throughout. Pyrtizied fecal pellets occur locally.
MUDSTONE, dark green gray and CARBONATE BEARING MUD, in equal amounts. Common thin beds and pods of fine sand and coarse silt.


SAND SHALE RATIO
CLAY % (<2μ)
CHLOR.
MICA
MONT.
VOLCANIC ASH
DENSITY -g/cm3
~GRAPE ▲SECTION WT.
□ SYRINGE SAMPLE
POROSITY -%
~GRAPE
○SYRINGE SAMPLE
NATURAL GAMMA
10^3 counts/75 sec
SOUND VELOCITY
km/sec
2.0 1.6 1.2
0 50 100
0 2 4
1.5 2.0
0 .04 0 .02 .01 .04 .05 .02 .04 .01 — 0 .01 .12 .05 0 0 0 .13 .04 — —
0 25 50 75 100 125 150 175 200 225 250


METERS
BIOSTRATIGRAPHY
DIA-TOMS
FORAM-INIFERA
NANNO-FOSSILS
RADIO-LARIANS
CHRONO-STRATI-GRAPHY
GRAPHICAL LITHOLOGY
RECOVERY
CORE NO.
LITHOLOGIC DESCRIPTION
250
275
300
325
350
375
400
425
450
475
500
PLEIST.(?)
24
25
CC


SAND SHALE RATIO
CLAY % (<2μ)
CHLOR.
MICA
MONT.
VOLCANIC ASH
DENSITY -g/cm3
~GRAPE ▲SECTION WT.
□ SYRINGE SAMPLE
2.0
1.6
1.2
POROSITY -%
~GRAPE
○ SYRINGE SAMPLE
0
50
100
NATURAL GAMMA
10^3 counts/75 sec
0
2
4
SOUND VELOCITY
km/sec
1.5
2.0
250
275
300
325
350
375
400
425
450
475
500

Site 175 Hole Core 1 Cored Interval: 0-5.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM*	NANNO	RAD	DIAMOT	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE N22/N23 (?) Emiliania huxleyi Artostrobium miralestense North Pacific Diatom Zone I		C/G			C/G	1	0.5 1.0	VOID			Green CLAYEY SILT becoming DIATOM BEARING CLAYEY SILT in section 4; dark greenish gray, firm, with massive bedding. Some carbonaceous silts and pyrite nodules in lower half of core. Moderate deformations in sec. 3; slight deformation throughout rest of core.
		A/M	F/M		C/G	2					
		C/M	F/M		C/G	3					
			R/M								
		C/P	F/M		C/G	4					
						Core Catcher					
		C/P	F/M	C/G	C/G						

Explanatory notes in chapter 1

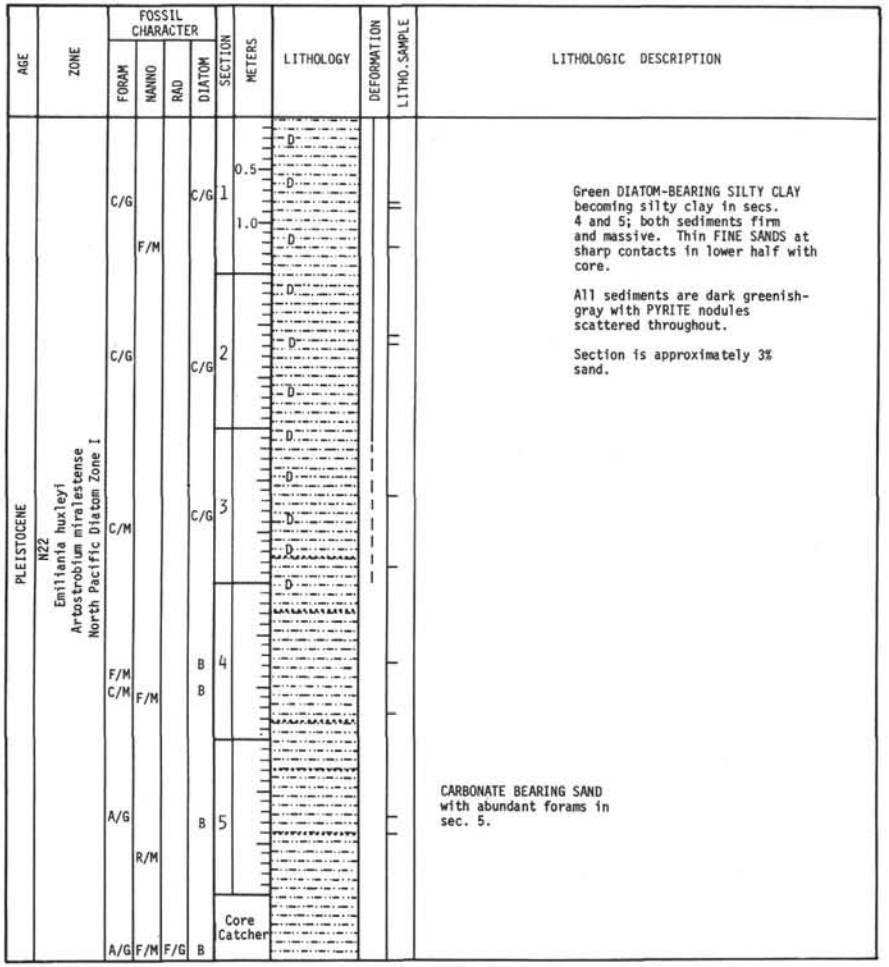
*PLANKTONIC FORAMINIFERA

Site 175 Hole Core 2 Cored Interval: 5.0-14.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE N22 Emiliania huxleyi Artostrobium miralestense North Pacific Diatom Zone I			F/M			1	0.5 1.0	VOID			Green CLAYEY SILT in section 1 becoming DIATOM-BEARING CLAYEY SILT in section 2. All sediments dark green gray, firm, with massive bedding. Pyrite nodules occur in upper part of core. Smear Slide DIATOM BEARING SILTY CLAY Silt 15% Clay 45% Feldspar Tr. Chlorite Tr. Carbonate 5% Diatoms 30% Section 2 moderately deformed; little or no deformation in rest of core.
		C/M C/M			C/G	2					
		A/M	R/M		C/G	3					
		A/P	R/M		C/G	4					
						Core Catcher					
		C/G	F/M	C/G	C/G						

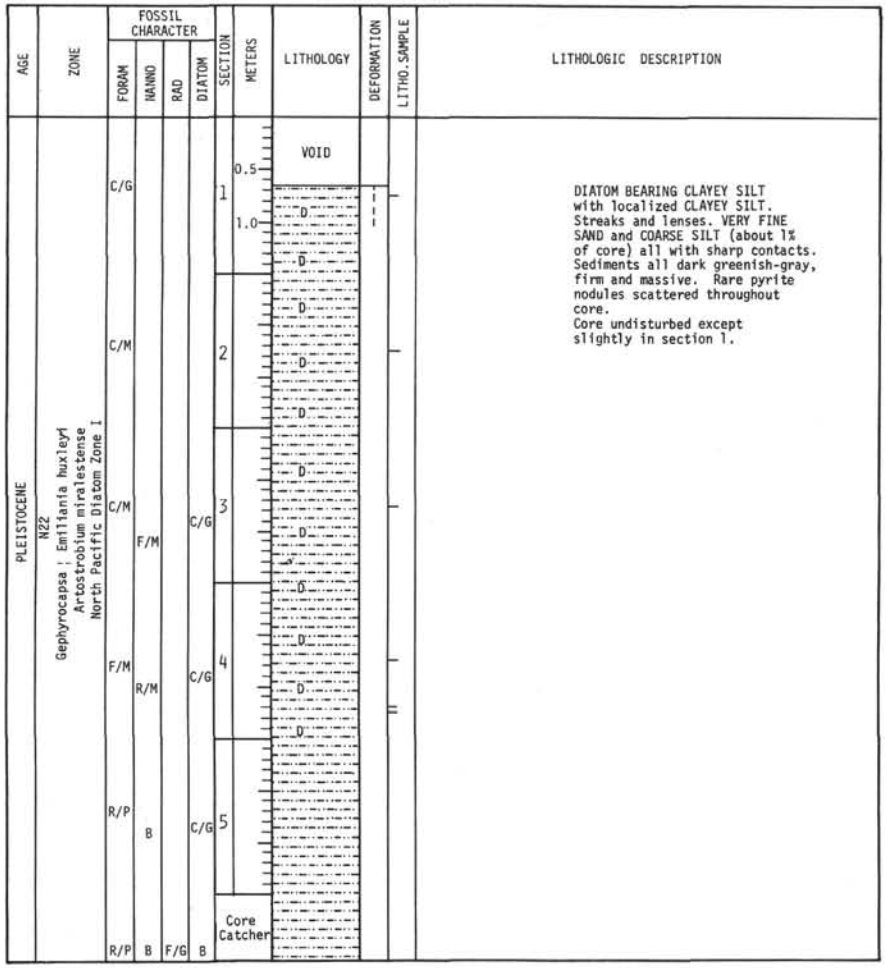
Explanatory notes in chapter 1

Site 175 Hole Core 3 Cored Interval: 14.5-24.0 m



Explanatory notes in chapter 1

Site 175 Hole Core 4 Cored Interval: 24-33.5 m



Explanatory notes in chapter 1

Site 175 Hole Core 5 Cored Interval: 33.5-43.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Artostrobium miralestense North Pacific Diatom Zone 1	B			B	1	0.5				Green SILTY CLAY and CLAYEY SILT becoming DIATOM BEARING SILTY CLAY in section 6. VERY COARSE SILT occurs in thin beds (3-7%) in sections 4 and 5. Occurs as scattered pods throughout rest of core. Coarse silt are in sharp contact with finer silts. All sediments are firm and massive.
							1.0				
		B			B	2					
			B								
		R/P			B	3					
						4					
			R/M		B						
		F/M			B	5					
			R/M								
		F/M				6					
			B								
		C/M	F/M	F/G	C/G	Core Catcher					

Explanatory notes in chapter 1

Site 175 Hole Core 6 Cored Interval: 43.0-52.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Artostrobium miralestense North Pacific Diatom Zone 1	F/M				1	0.5				Green DIATOM-BEARING SILTY CLAY in sec. 1, becoming SILTY CLAY in sec. 2-4, and again becoming DIATOM-BEARING SILTY CLAY in sec. 5 and NANNO DIATOM-BEARING SILTY CLAY in sec. 6.
							1.0				
			R/M								
		C/M				2					All sediments dark greenish-gray firm with massive bedding. Rare PYRITE nodules occur throughout core. SAND constituets 1% of core.
			F/M								
						3					
		C/M			C/G	4					
						5					
		C/M			C/G						
			R/M								
NPDZ 11					C/G	6					3% coarse silt occurring as beds and lenses in sec. 6. Sharp contacts with silty clay.
		C/G	B	C/M		Core Catcher					

Explanatory notes in chapter 1

Site 175 Hole Core 7 Cored Interval: 52.5-62.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	Gephyrocapsa oceanica Artostrobium miralestense North Pacific Diatom Zone II	C/G	B		C/G	1	0.5 1.0				Green DIATOM-BEARING and CARBONATE-BEARING SILTY CLAY in sec. 1, becoming SILTY CLAY in secs. 2 and 3. 10% VERY COARSE SILT in pods and streaks with sharp contacts, in sec. 2. Ash fragements also in same section at 8 and 45 cm. All sediments dark greenish-gray except for medium bluish gray interval in sec. 3 at 95 to 120 cm. Rare PYRITE nodules scattered throuhgout core. SAND constituets 2% of core.
						2					
		F/M			C/G	3					
		R/M	R/M	F/G	R/M	Core Catcher					

Site 175 Hole Core 8 Cored Interval: 62-71.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Artostrobium miralestense NPDZ II	F/M			C/G	1	0.5 1.0	VOID			Dark greenish-gray SILTY CLAY with thin COARSE SILT beds in sec. 1 and rare, coarse silt pods in sec 2. Sharp contacts between silt and silty clay. All sediments firm and massive. SAND constituets 2% of core.
			F/M	R/M		2					
		C/G	F/M	F/G	C/M	Core Catcher					

Explanatory notes in chapter 1

Site 175 Hole Core 9 Cored Interval: 71.5-81.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Artostrobium miralestense North Pacific Diatom Zone II	C/M	R/M	R/M	C/G	1	0.5 1.0	VOID			Green SILTY CLAY becoming DIATOM BEARING SILTY CLAY in secs. 2-4. All sediments greenish-gray, firm, with massive bedding. Rare, VERY COARSE SILT pods and thin beds in sec. 4. Rare PYRITE NODULES. SAND constituets 1% of core.
						2					
		F/M		F/M	C/G	3					
		C/M		F/M	C/G	4					
		A/G	B	F/M	C/G	Core Catcher					

Explanatory notes in chapter 1

Site 175 Hole Core 10 Cored Interval: 81.0-90.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Artostrobium miralestense North Pacific Diatom Zone II					1	0.5	VOID			Dark greenish-gray SILTY CLAY, firm with a few semi-indurated streaks. Pyrite nodules rare. Sand constitutes 2% of core.
			B				1.0				
		F/M		F/M	C/G	2					
		B			C/G	3					
		B	B								
		B			C/G	4					
		B			C/G	5					Friable VERY COARSE SILT (10% of sec.) in sec. 5. Appears in thin beds with sharp, irregular contacts.
			B								
		R/P	F/M	F/G	C/M	Core Catcher					

Explanatory notes in chapter 1

Site 175 Hole Core 11 Cored Interval: 90.5-100.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Artostrobium miralestense North Pacific Diatom Zone II					1	0.5	VOID			Green SILTY CLAY throughout except for DIATOM BEARING SILTY CLAY in sec. 4. Sediments are dark greenish-gray, firm to semi-indurated.
			F/M				1.0				
		R/M			C/G	2					Thin beds and burrow mottles of COARSE SAND (2%) with sharp, irregular contacts occur throughout core.
		F/M		C/M	C/G	3					PYRITE NODULES rare.
			R/M								4 cm ASH bed in sec. 5 (71-75 cm)
		R/P		R/M	C/G	4					
	A. angeltinum	C/M		R/M	C/G	5					
			R/M								
		C/G	F/M	F/M	C/G	Core Catcher					

Explanatory notes in chapter 1

Site 175 Hole Core 12 Cored Interval: 100-109.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica A. angelinum NPDZ II	F/G	F/M	R/M	C/G	1	0.5, 1.0	VOID			Dark greenish-gray. SILTY CLAY, firm to semi-indurated; bedding massive. Thin beds and burrow mottles of COARSE SILT, with sharp, irregular contacts (1% of core).
		A/G	C/G	F/G	C/G	Core Catcher					

Site 175 Hole Core 13 Cored Interval: 109.5-119.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Axoprunum angelinum North Pacific Diatom Zone II					1	0.5, 1.0	VOID			Green DIATOM BEARING SILTY CLAY in secs. 1 and 2, SILTY CLAY in secs. 3 and 4. All sediments dark greenish-gray, firm to semi-indurated; bedding massive. Thin beds and mottles of SAND (1%) with sharp, irregular contacts occur throughout core.
			C/G					D			
		F/M		F/M	C/G	2		D			
			C/M					D			
		C/M			C/G	3		D			
			F/M								
		C/M			C/G	4					
		F/M	R/M	F/G	C/G	Core Catcher					

Site 175 Hole Core 14 Cored Interval: 119.0-128.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Gephyrocapsa oceanica Axoprunum angelinum North Pacific Diatom Zone II		F/M			1	0.5, 1.0	VOID			Dark greenish-gray SILTY CLAY to 76 cm in sec. 2. CARBONATE BEARING SILTY CLAY, greenish gray, from 76 cm in sec. 2, becoming medium bluish gray at 120 cm in section 2. Sediments all firm and massive. SANDY SILT bed, 6 cm thick, in section 6 (125-131 cm) with flat dips. Core is 1% sand.
		R/M			C/G	2		C			
			B					C			
		F/M				3		C			
								C			
		R/M				4		C			
			B					C			
						5		C			
		B						C			
		F/M				6		C			
								C			
		F/M	R/M	F/G	B	Core Catcher		C			

Explanatory notes in chapter 1

Site 175 Hole Core 15 Cored Interval: 128.5-138.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE N22 Emiliania annula Gephyrocapsa oceanica Axoprunum angelinum North Pacific Diatom Zone II		F/M				1	0.5 1.0	VOID			Medium blue-gray CARBONATE-BEARING SILTY CLAY, in sec. 1, changing to dark-greenish gray SILTY CLAY in rest of core. Both lithologies mixed (drilling artifact) at top of sec. 2. Blue sediments are firm and massive; the green sediments very firm to semi-indurated. Thin beds of VERY COARSE SILT and FINE SAND occur throughout core below section 1. All have sharp irregular upper and lower contacts. Equal 8% of sediments. PYRITE nodules rare.
			F/M			2					
		C/M			C/G	3					
		C/M	R/M		C/G	4					
		C/G			C/G	5					
		F/G	C/G	F/G	C/G	Core Catcher					

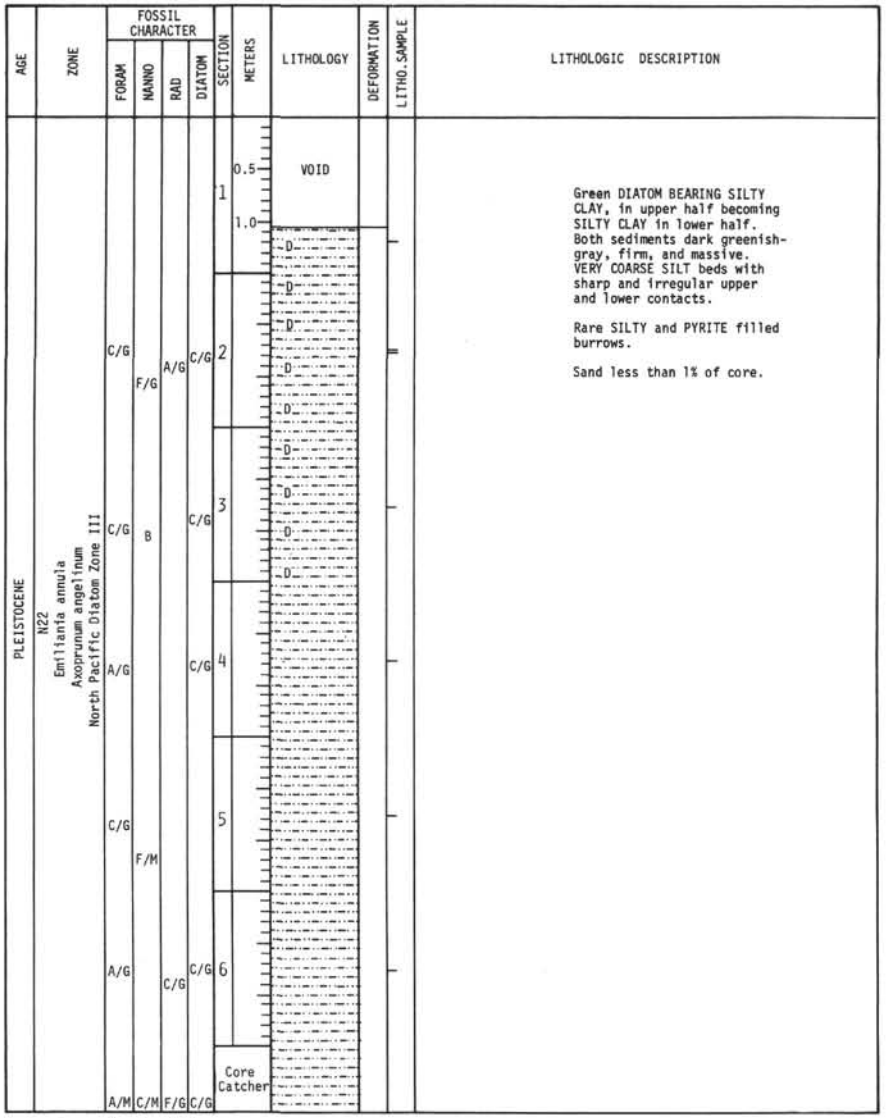
Explanatory notes in chapter 1

Site 175 Hole Core 16 Cored Interval: 138.0-147.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE N22 Emiliania annula Axoprunum angelinum North Pacific Diatom Zone II								VOID			
		C/G				1	0.5 1.0				Greenish-gray SILTY CLAY, firm to semi-indurated. Thin interbeds of FINE SAND and VERY COARSE SILT; sharp upper and lower contacts. Compose 6% of sediments.
		C/G	F/G			2					
		C/G	F/G			3					
		C/G	C/G			4					
						5					SILTY CLAY layer Med. bluish-gray, soft to firm.
		R/M	F/G			6					
		F/M	F/G	R/M	C/G	Core Catcher					

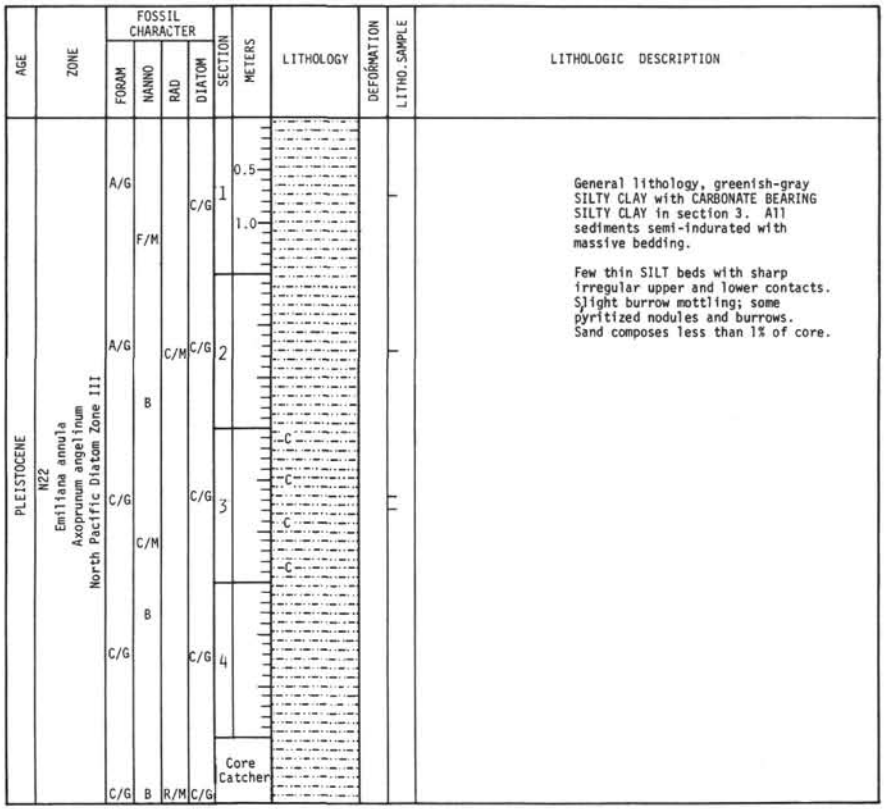
Explanatory notes in chapter 1

Site 175 Hole Core 17 Cored Interval: 147.5-157.0 m



Explanatory notes in chapter 1

Site 175 Hole Core 18 Cored Interval: 157.0-166.5 m



Explanatory notes in chapter 1

Site 175 Hole Core 19 Cored Interval: 166.5-176.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Emiliania annula Axoprunum angelinum NPDZ III	C/G	B B R	R/M	B	1 2 Core Catcher	0.5 1.0	VOID VOID			Medium gray CARBONATE RICH SILTY CLAY throughout except for 5 cm. of dark green SILTY CLAY in upper part of sec. 1 and similar amount in mid. sec. 2 (59-63 cm). The former exhibits imperfect graded bedding and poor sorting. Thin darker finer-grained laminae also in this lithologic type. One 5 cm VOLCANIC pebble. The sediments are all firm.

Site 175 Hole Core 20 Cored Interval: 176-185.5 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Emiliania annula Axoprunum angelinum North Pacific Diatom Zone III	F/M C/M	C/G F/P	F/M	C/G C/G	1 2 3 Core Catcher	0.5 1.0	VOID			Greenish-gray, SILTY CLAY, semi-indurated and massive. VERY FINE SAND to COARSE SILT in 1-12 cm beds; sharp irregular upper and lower contacts. Equal 16% of sediments. Graded bedding and faint laminae in sec. 3.
		R/M	R/M	F/G	C/G						

Explanatory notes in chapter 1

Site 175 Hole Core 21 Cored Interval: 185.5-195.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEISTOCENE	N22 Emiliania annula NPDZ III	F/M	B B B	R/P B	C/G B R/P B	1 2 Core Catcher	0.5 1.0	VOID		I II	Dark greenish-gray SILTY CLAY, semi-indurated with thin VERY COARSE SILT bed in upper half of sec. 1. SILTY CLAY in abrupt contact with CARBONATE BEARING SILTY CLAY, medium gray and firm. Contains 1-4 mm dark gray laminae in 1-3 cm. intervals; sharp contacts. One 3 cm. VERY COARSE SILT in sec. 1 (69-72 cm).

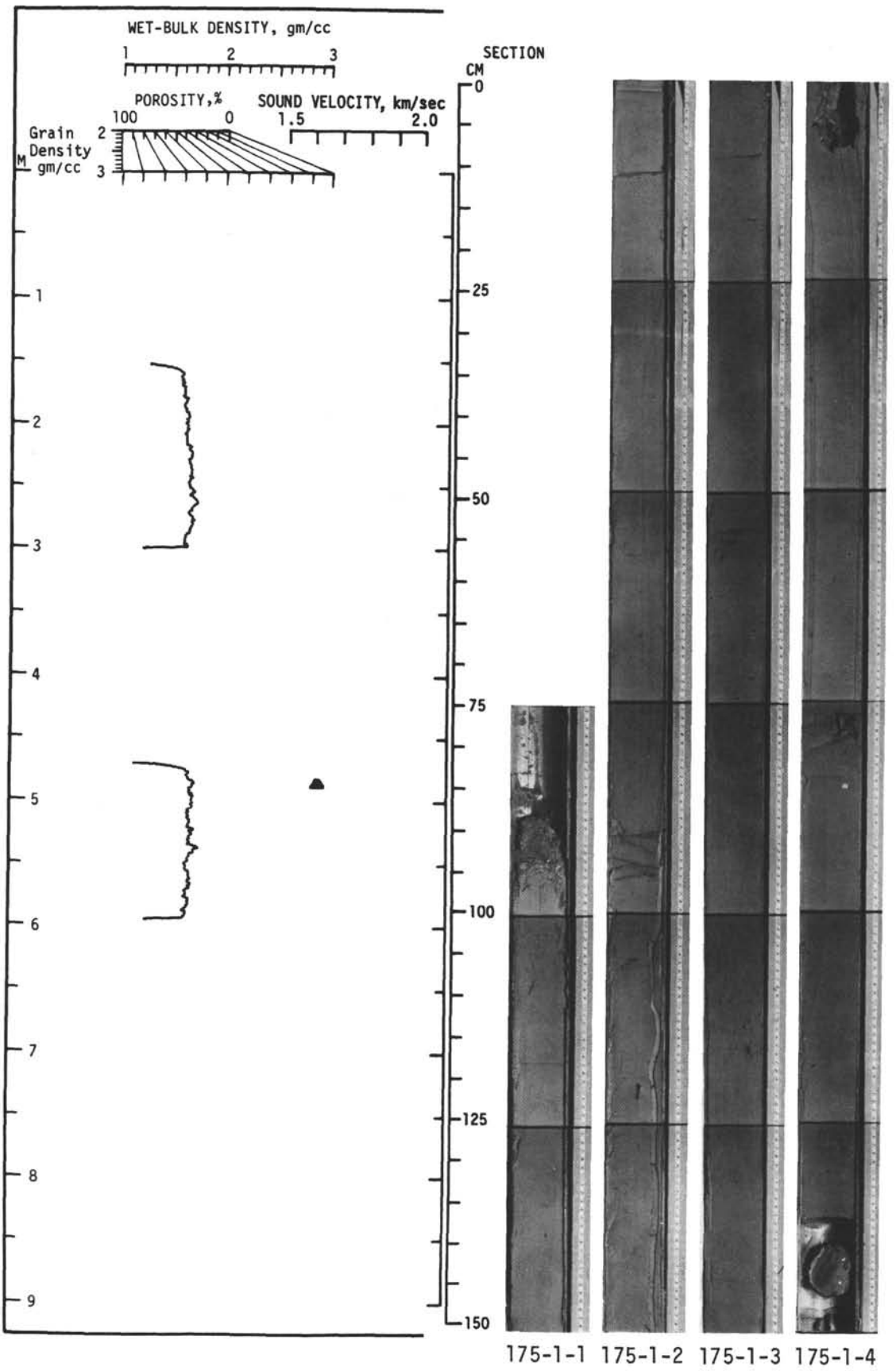
Site 175 Hole Core 22 Cored Interval: 223.5-233.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEIST.	N22 E. annula ?	R/P R/M	B B	B	B	1 Core Catcher	0.5 1.0	VOID		I	Gray CARBONATE BEARING SILTY CLAY, semi-indurated and massive, becoming coarser at bottom of section. Core 23: Water core; no recovery. Cored interval: 242.5-252.0 m Core 24: Water core; no recovery. Cored interval: 252.0-261.5 m

Site 175 Hole Core 25 Cored Interval: 261.5-271.0 m

AGE	ZONE	FOSSIL CHARACTER: FORAM	NANNO	RAD	DIATOM	SECTION	METERS	LITHOLOGY	DEFORMATION	LITHO. SAMPLE	LITHOLOGIC DESCRIPTION
PLEIST(?)	?	B	B	B	B	Core Catcher					Dark greenish-gray SILTY CLAY and VERY FINE SAND and med. gray COARSE SILT.

Explanatory notes in chapter 1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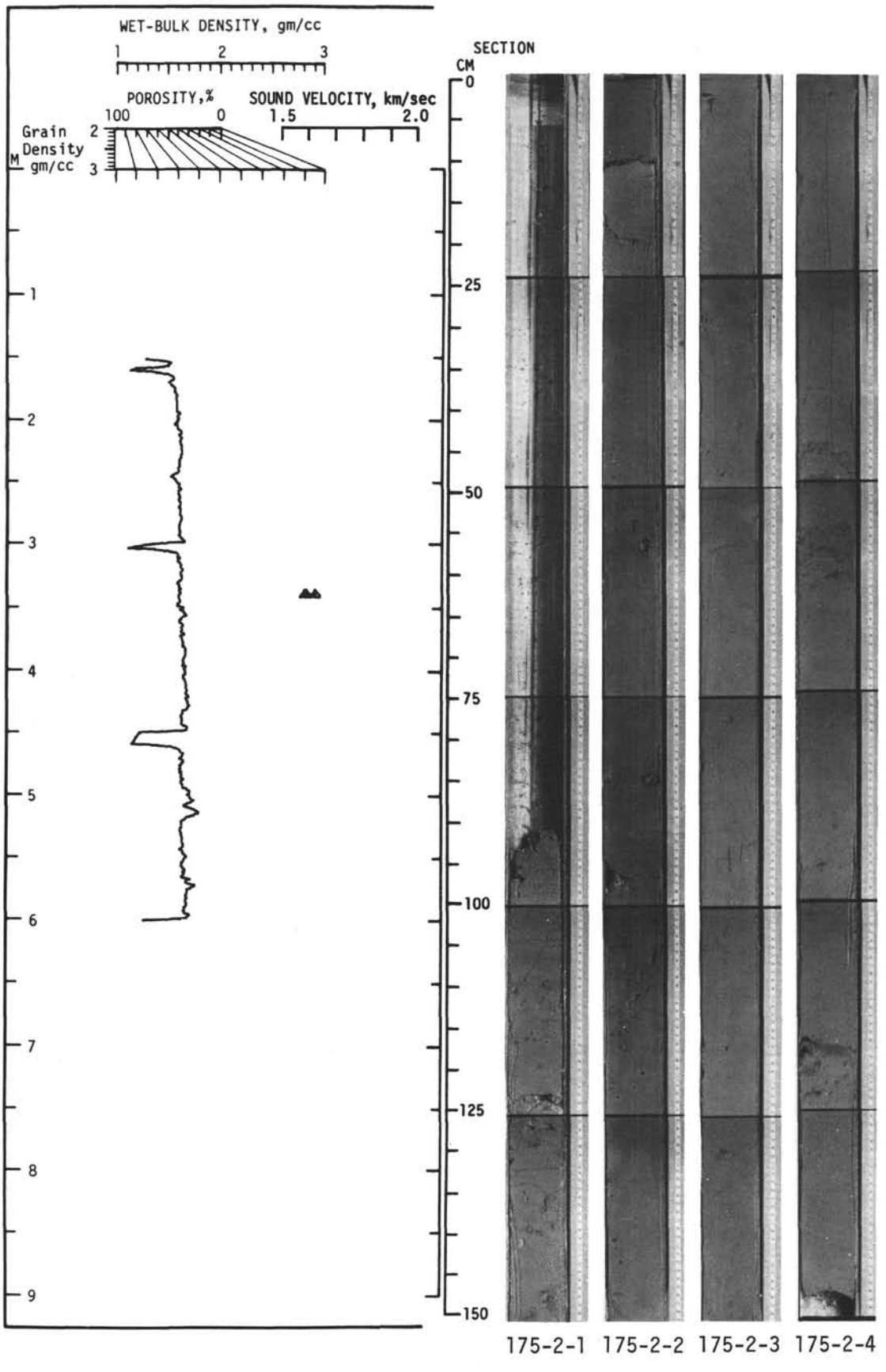
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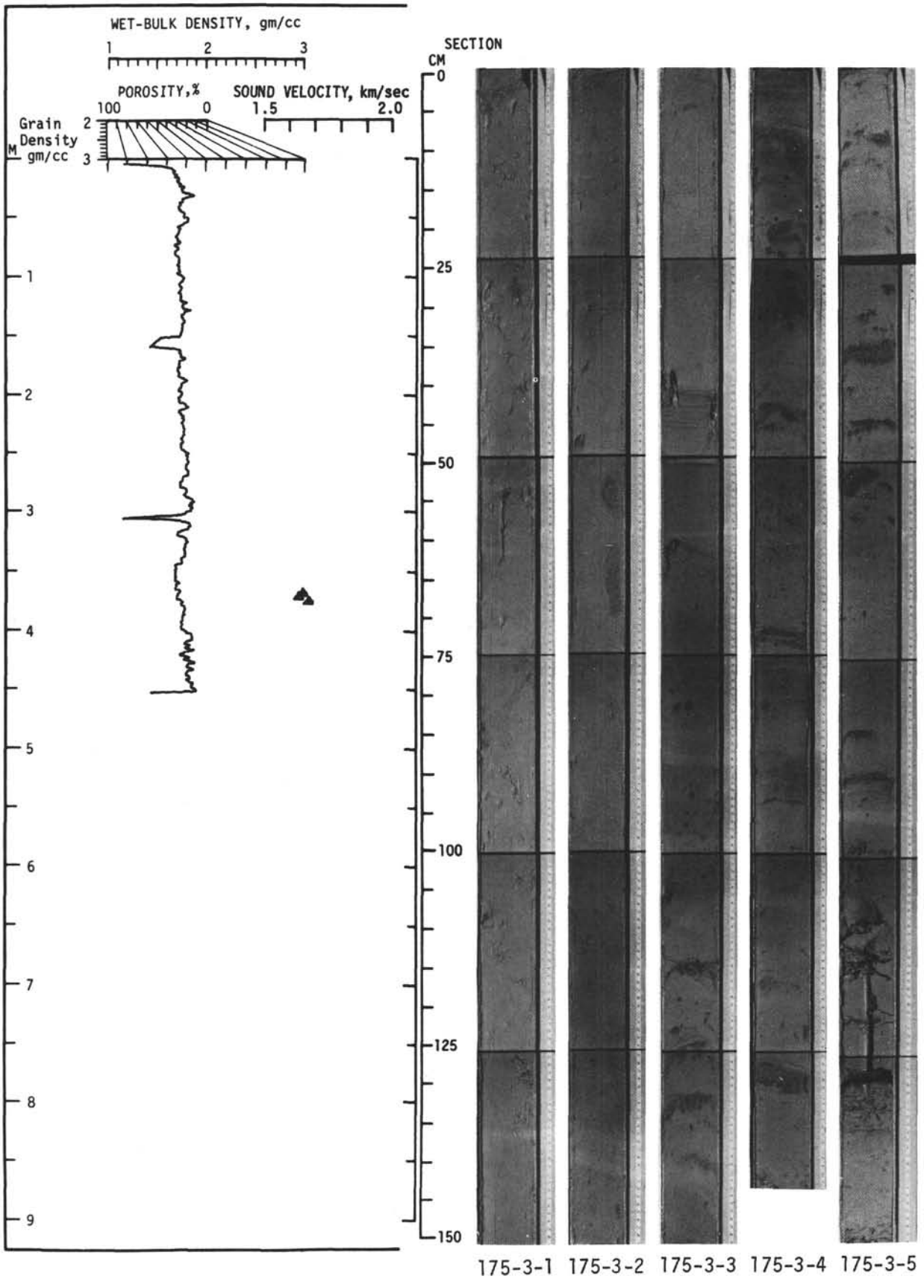
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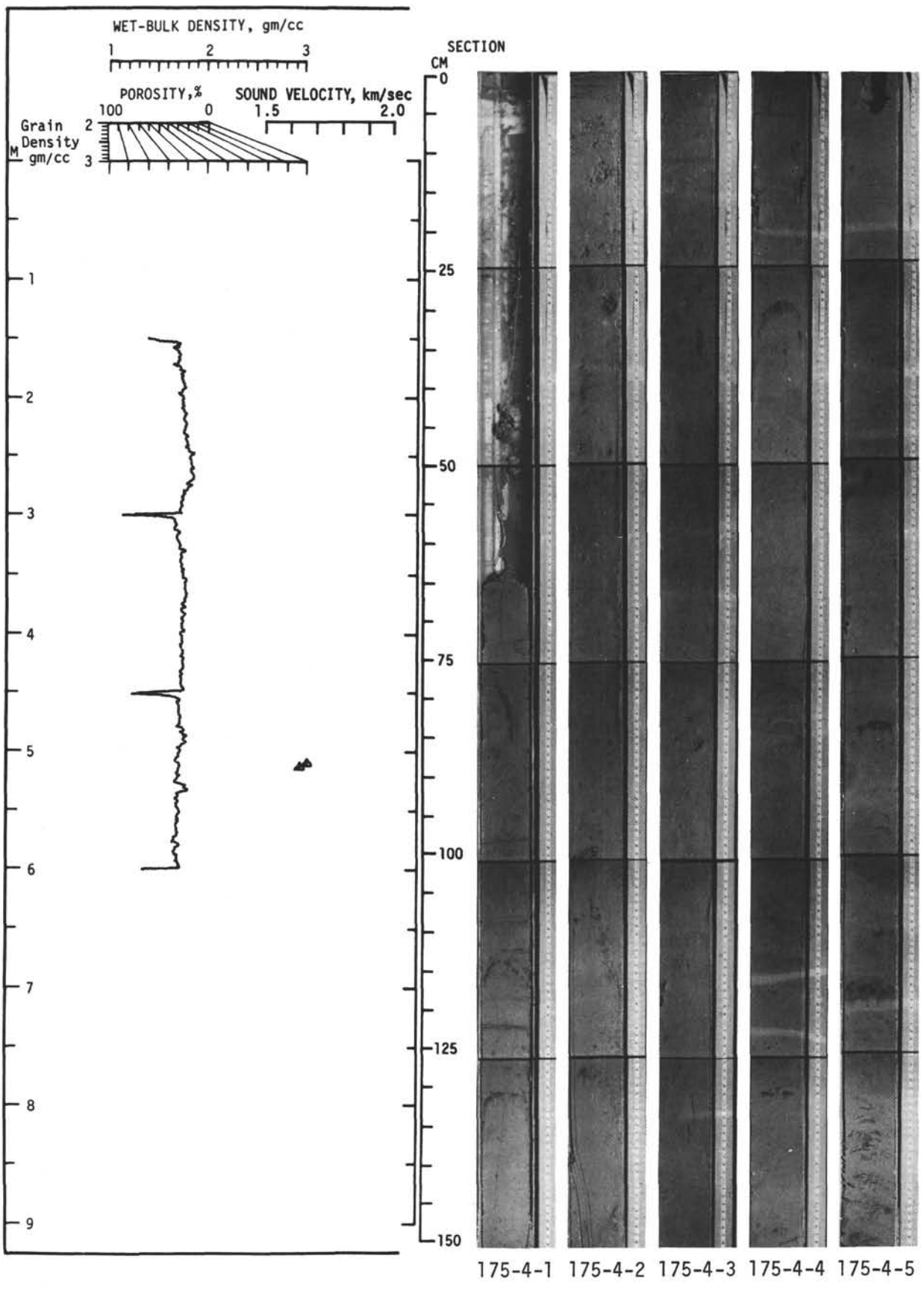
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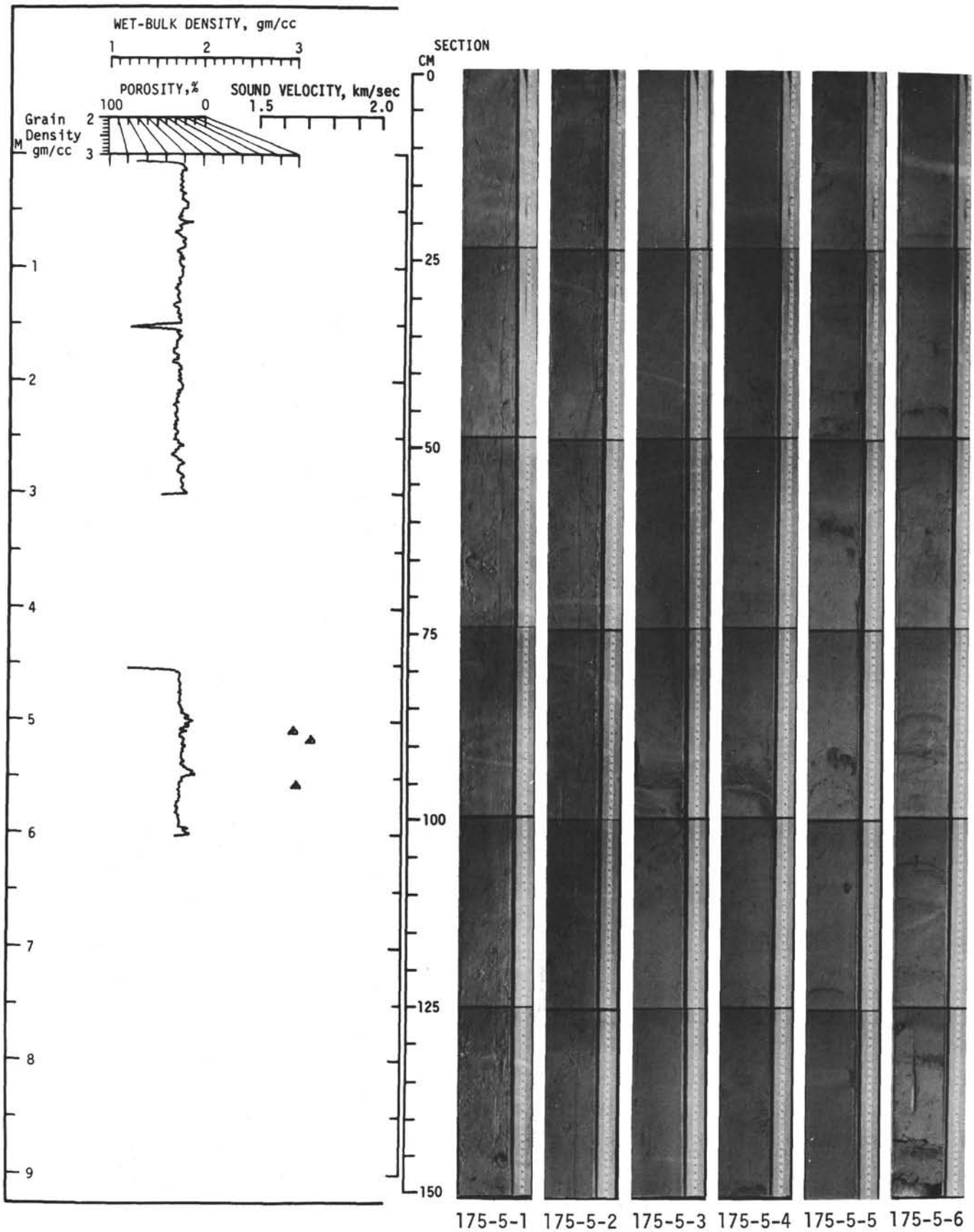
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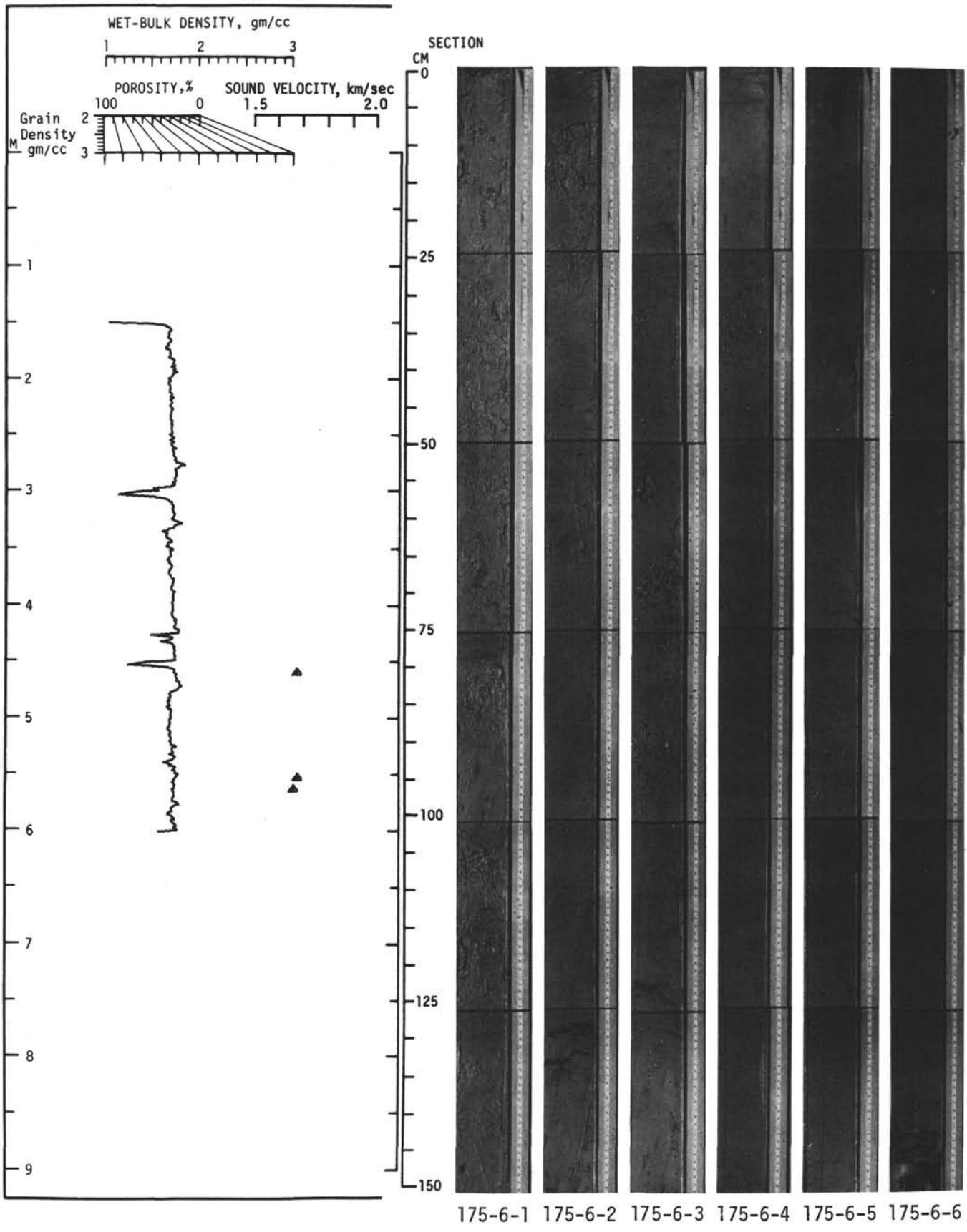
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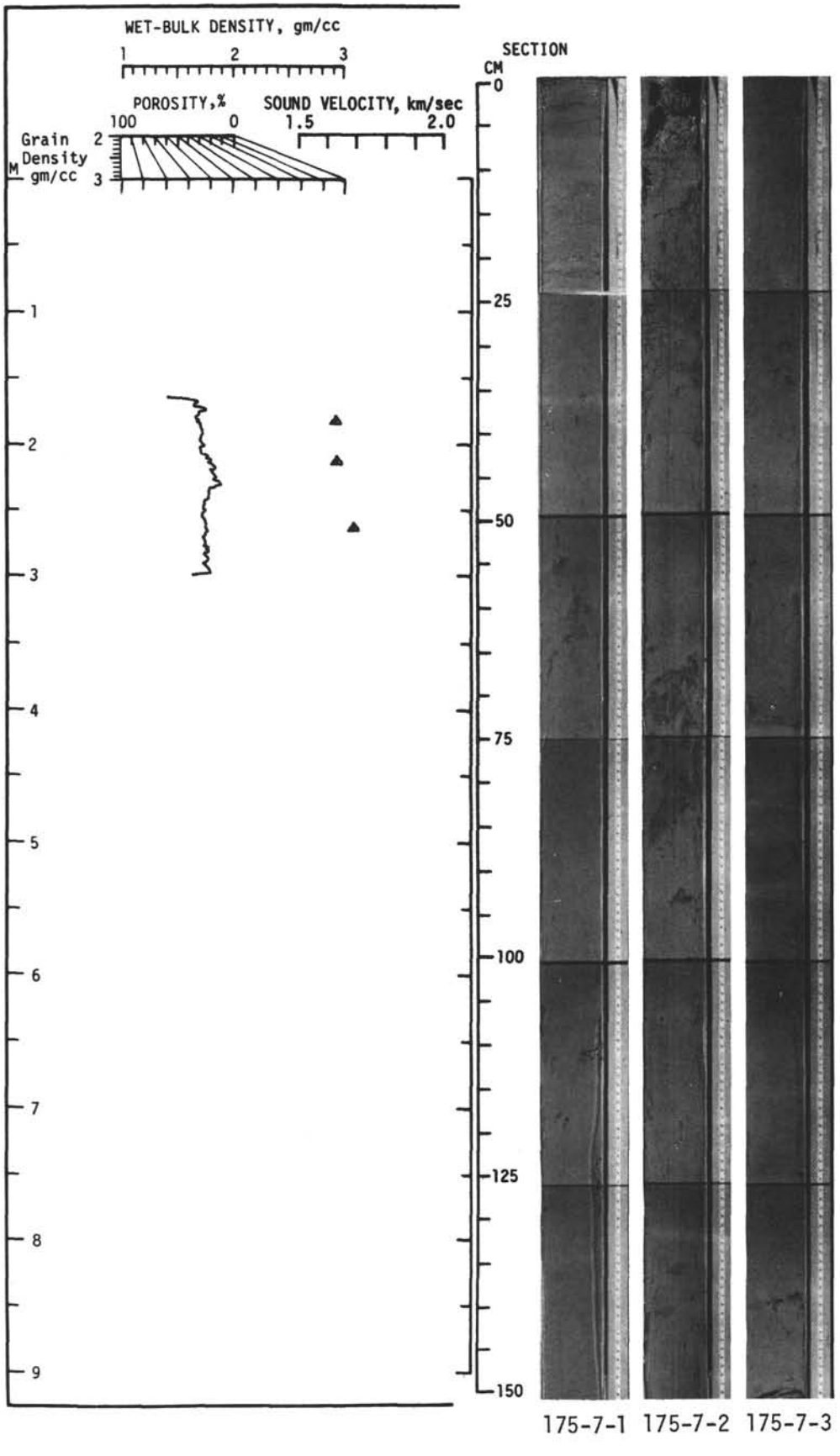
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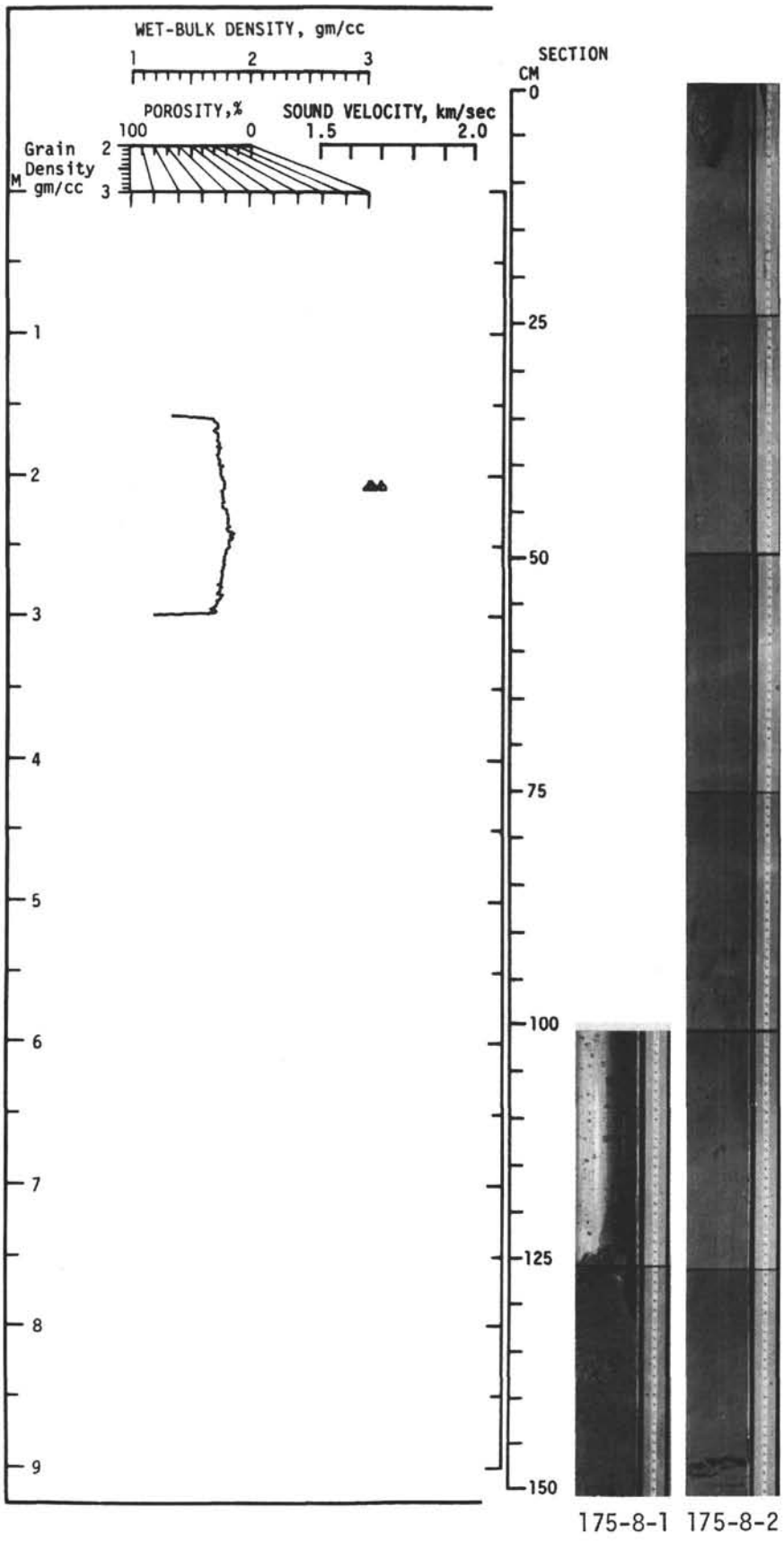
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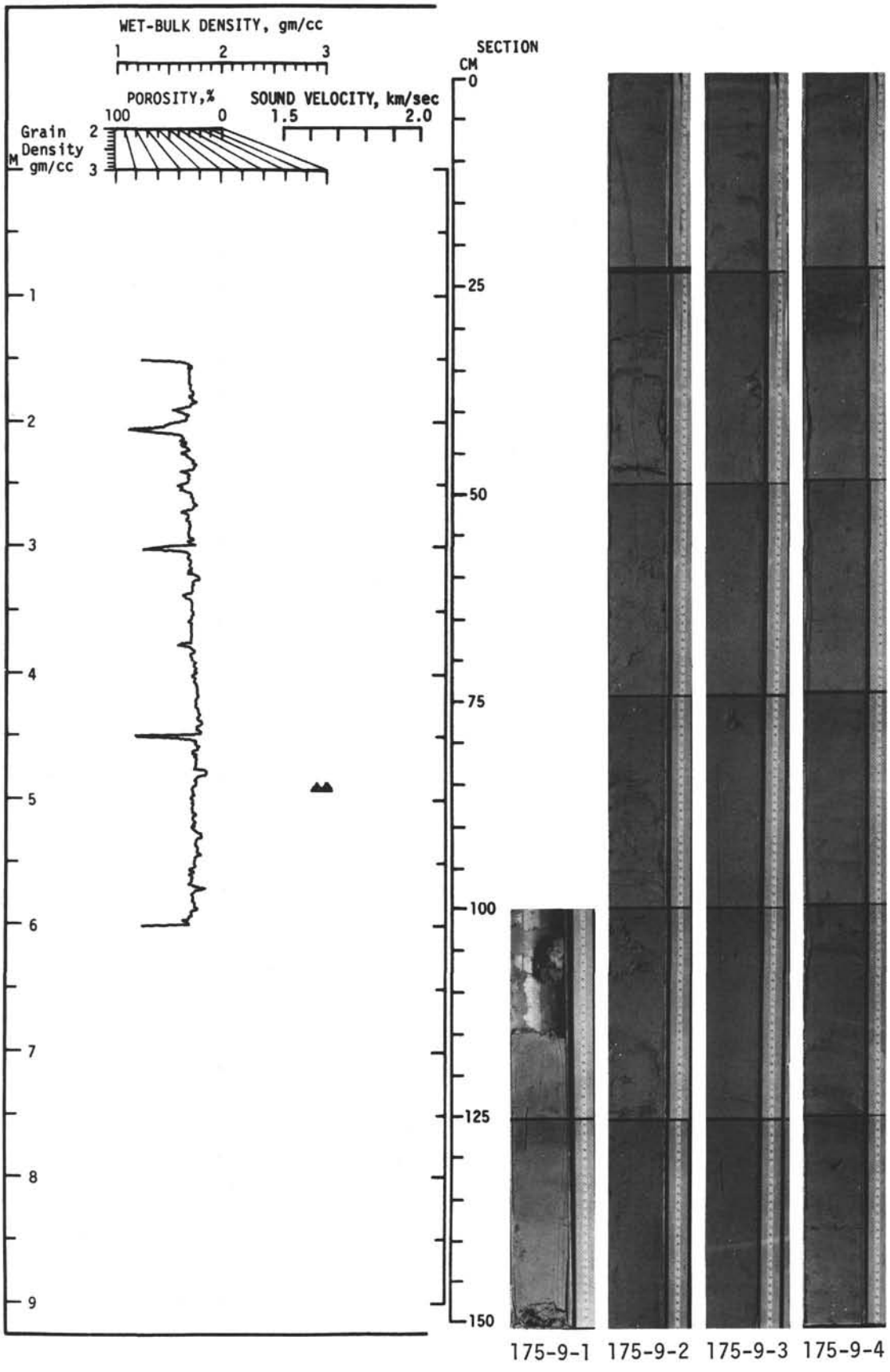
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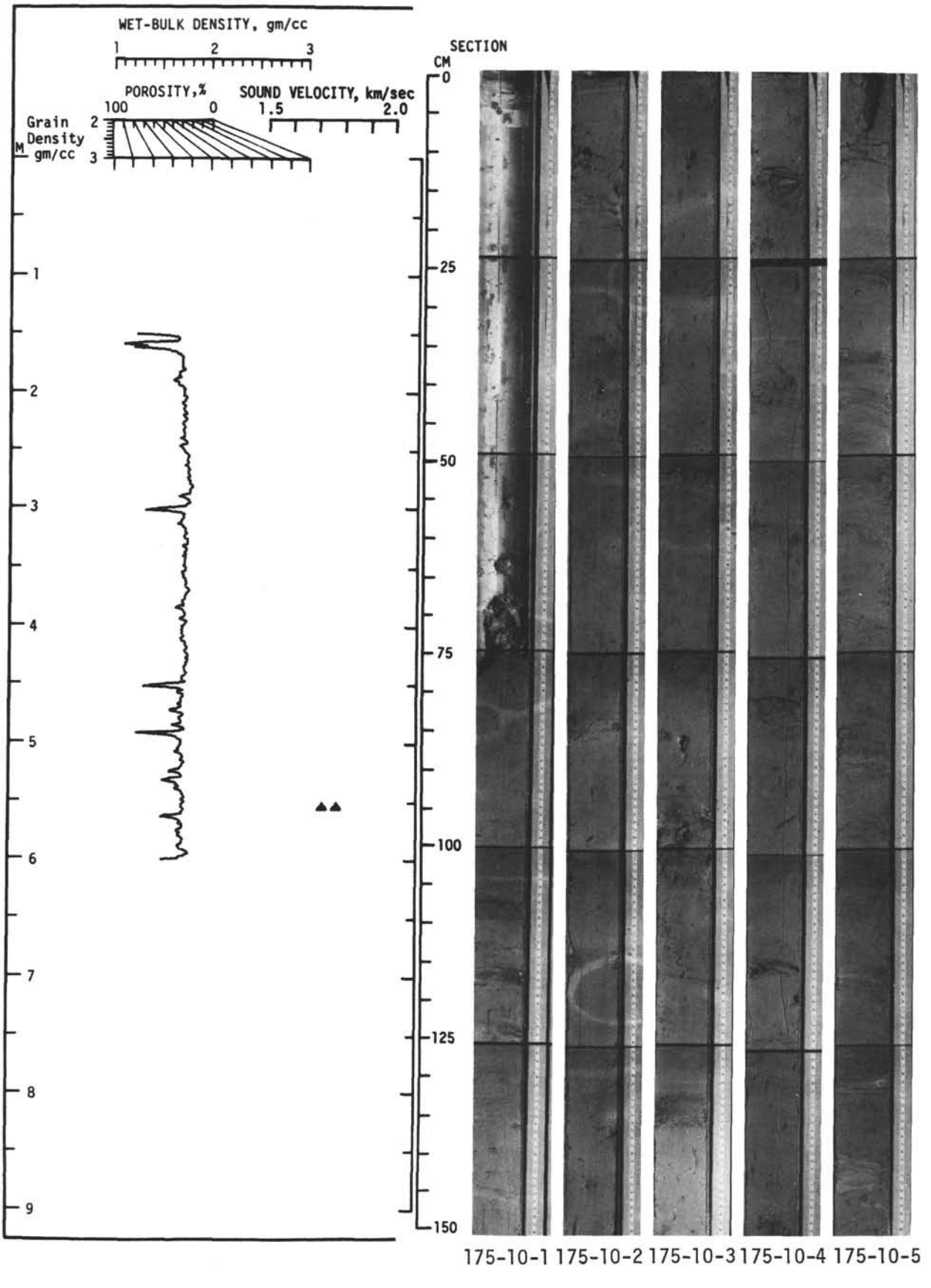
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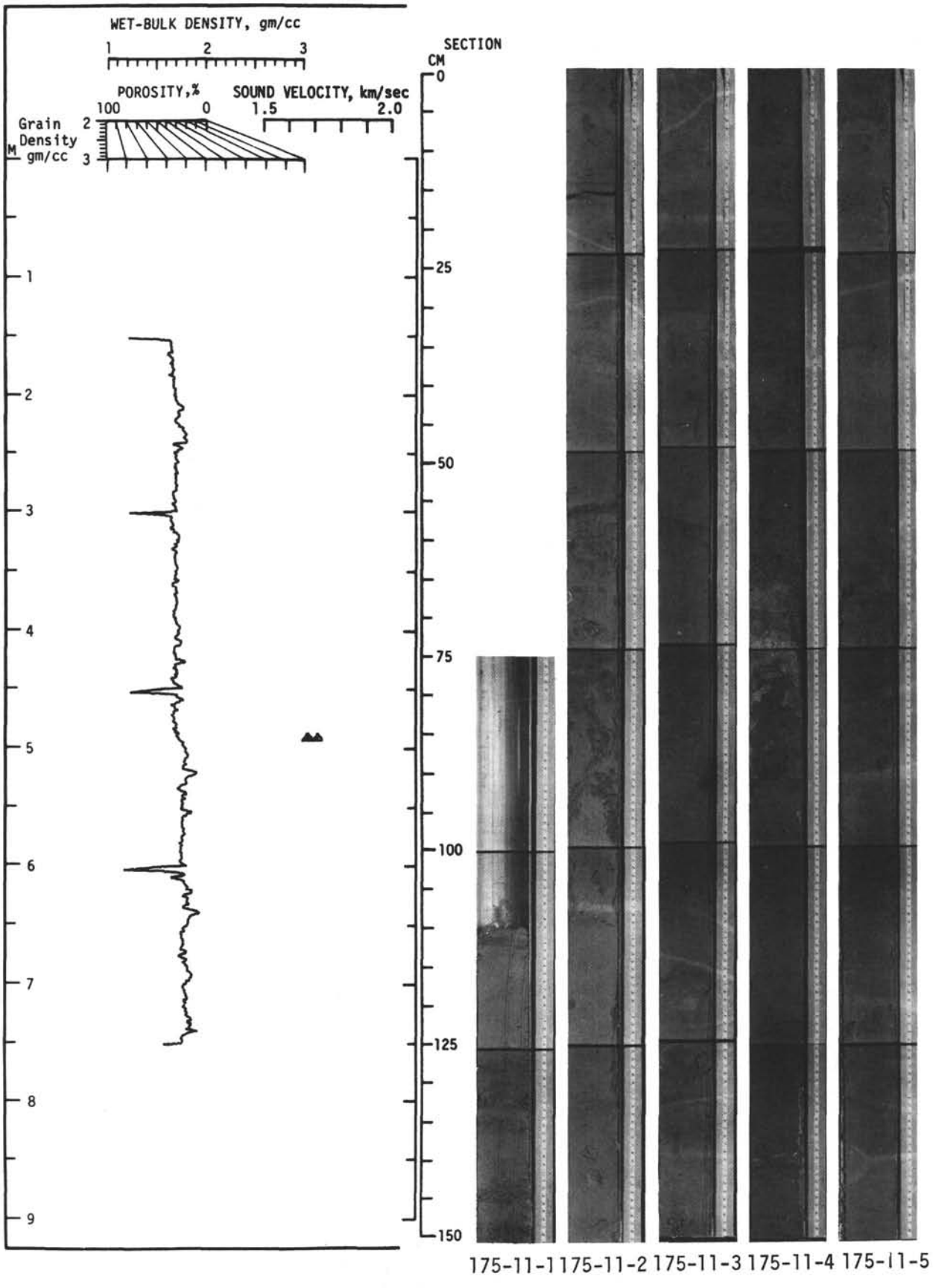
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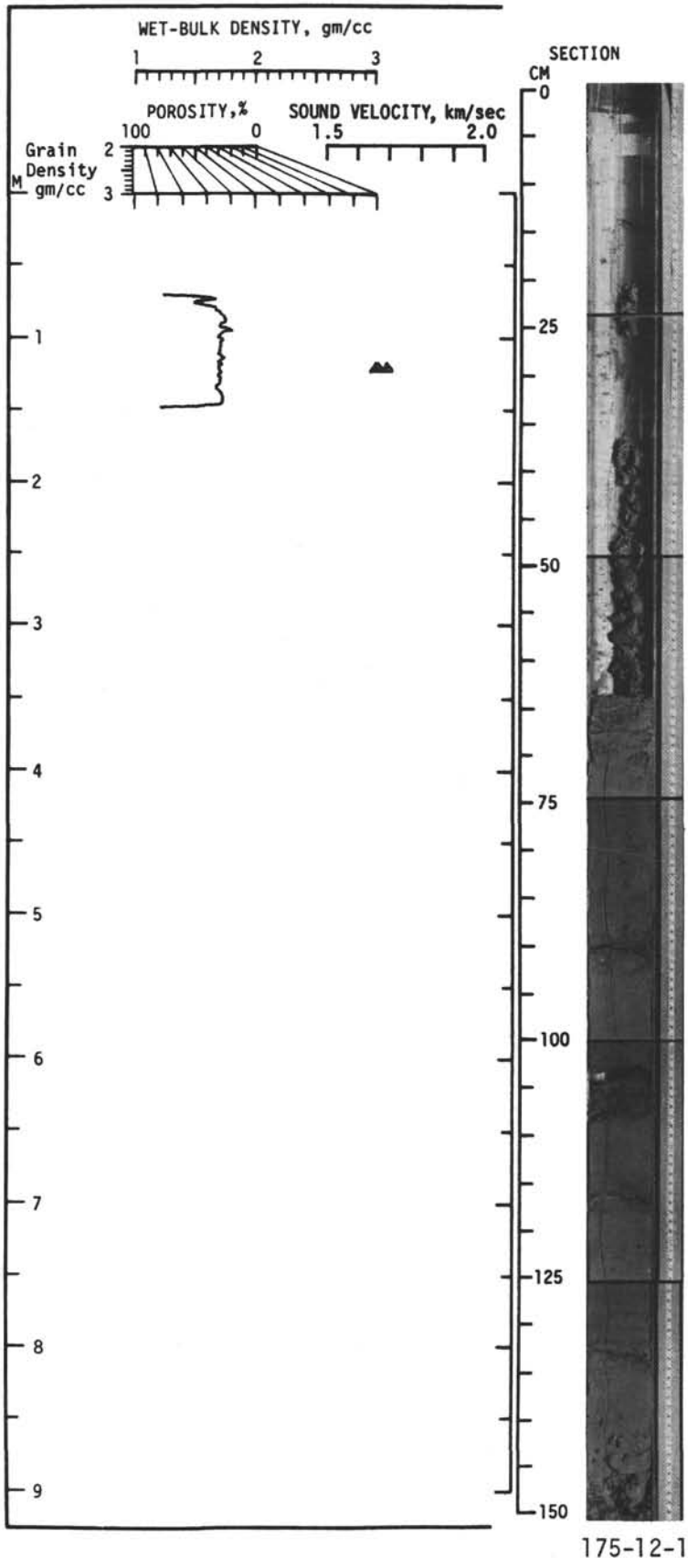
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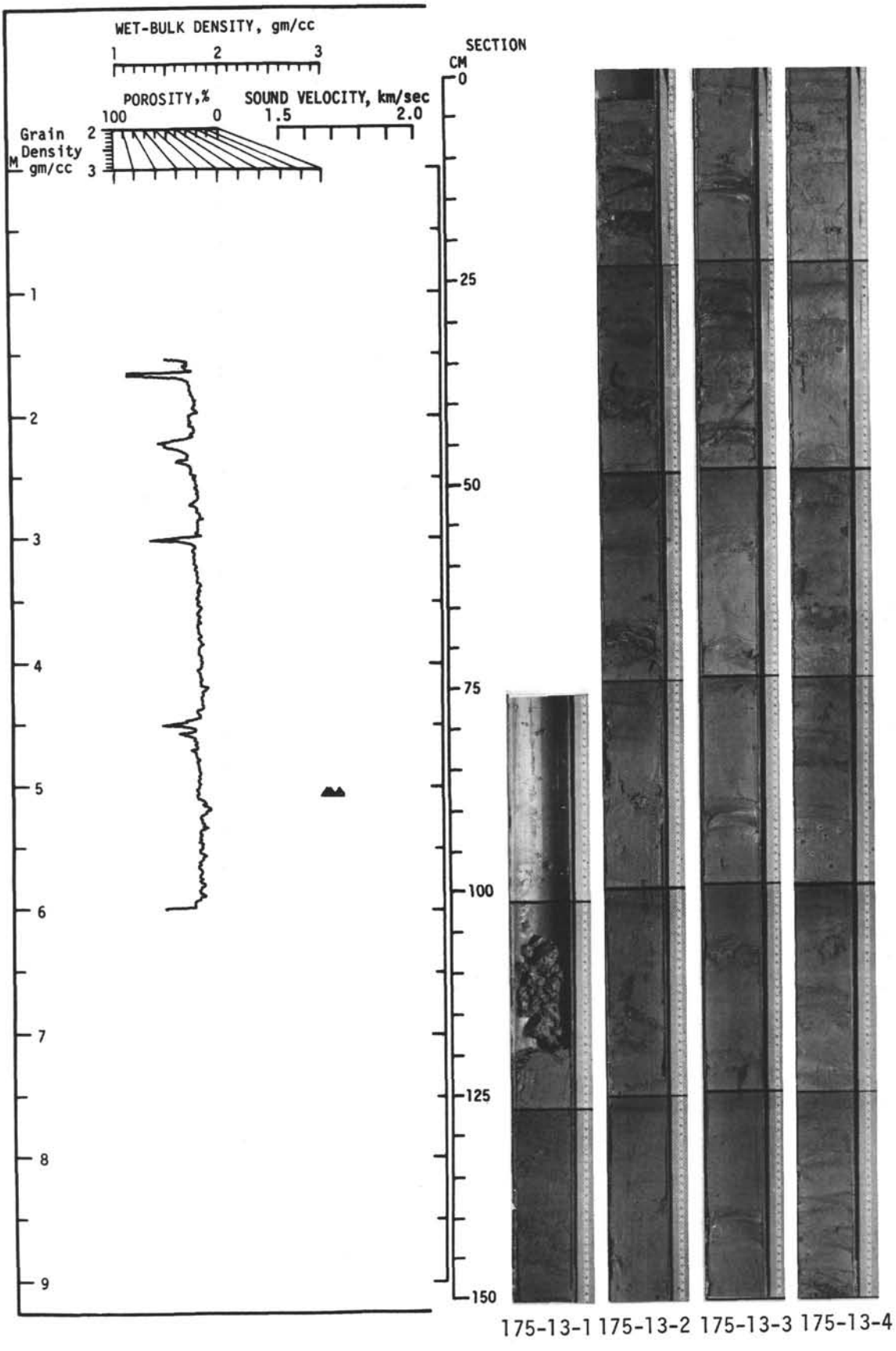
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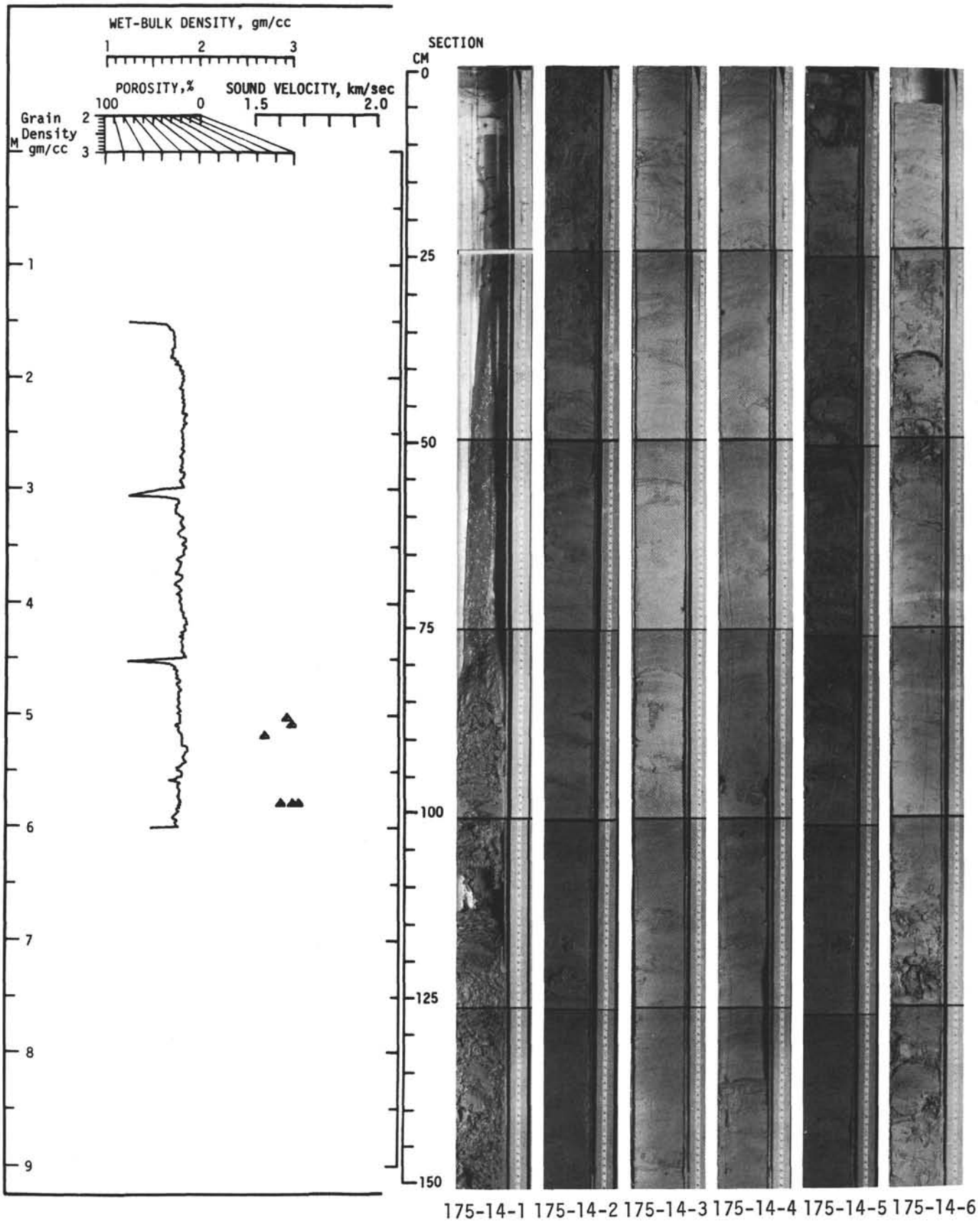
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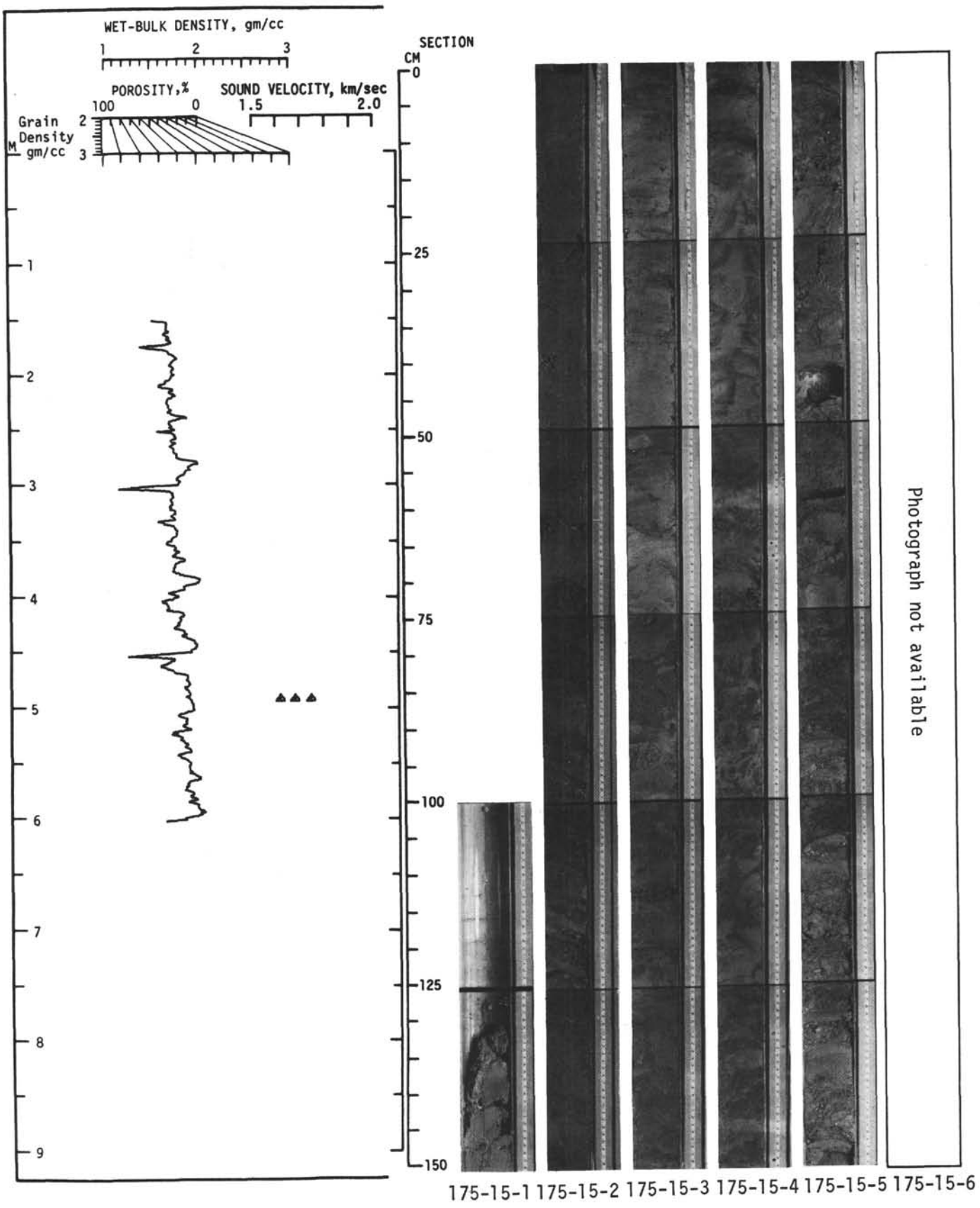
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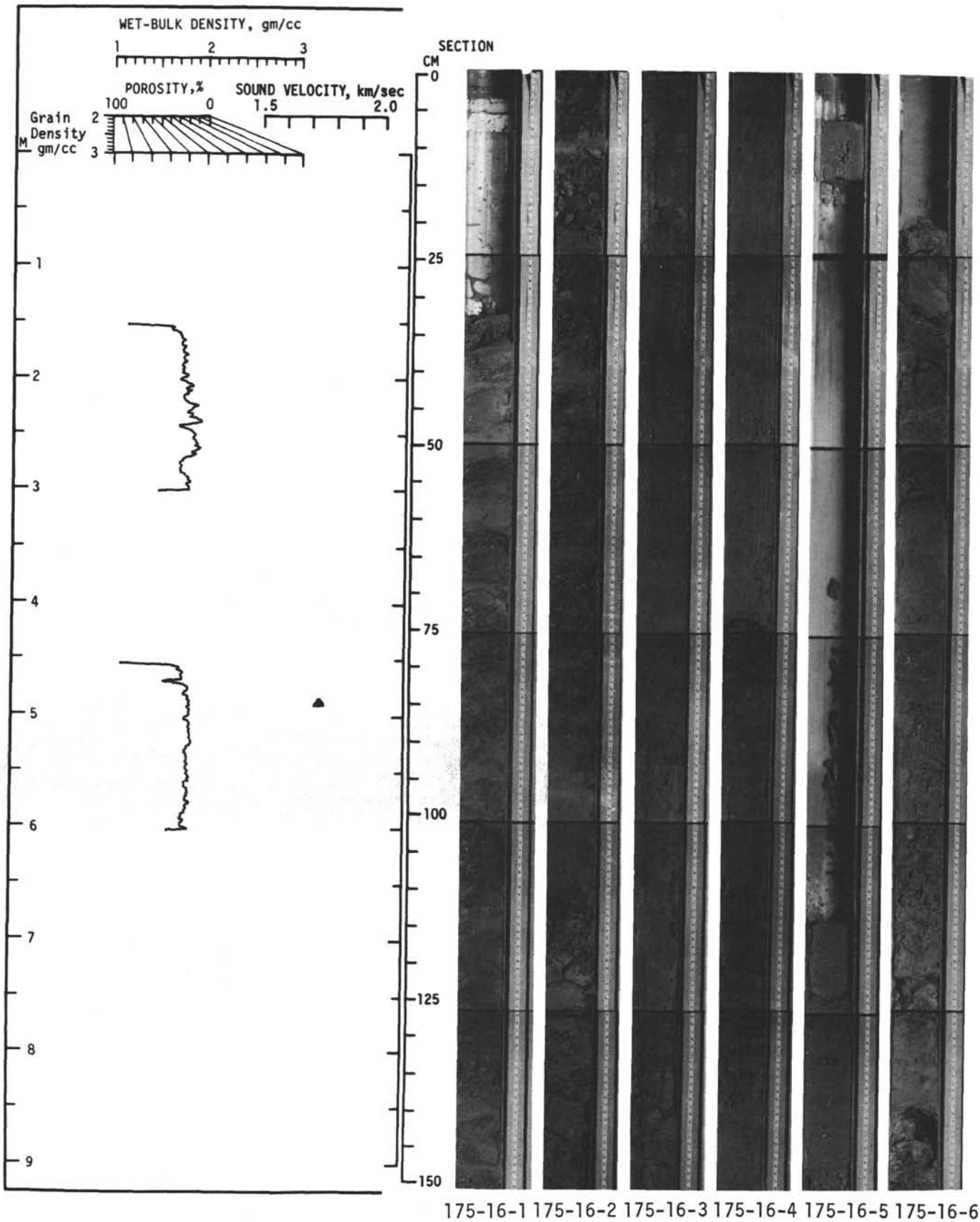
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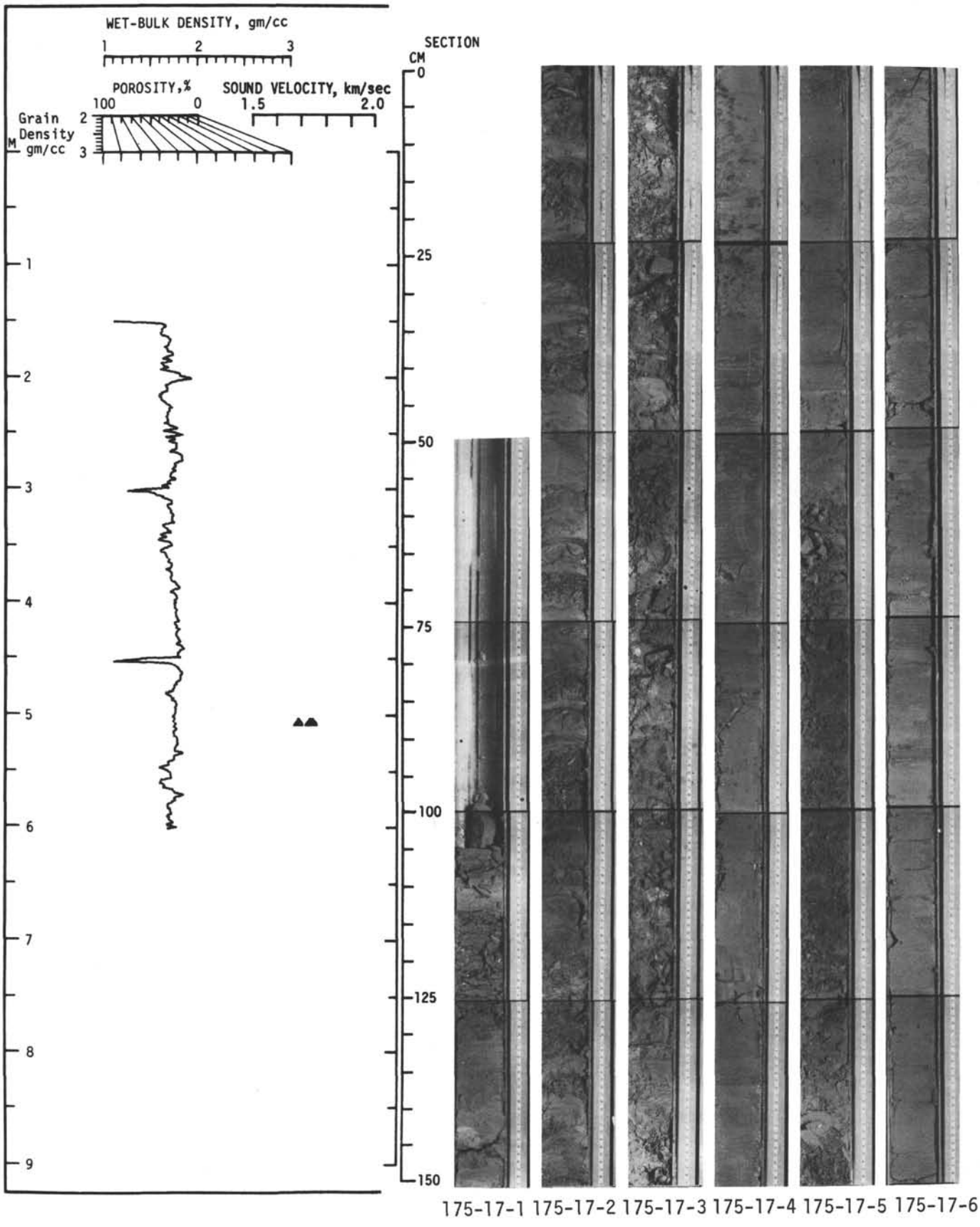
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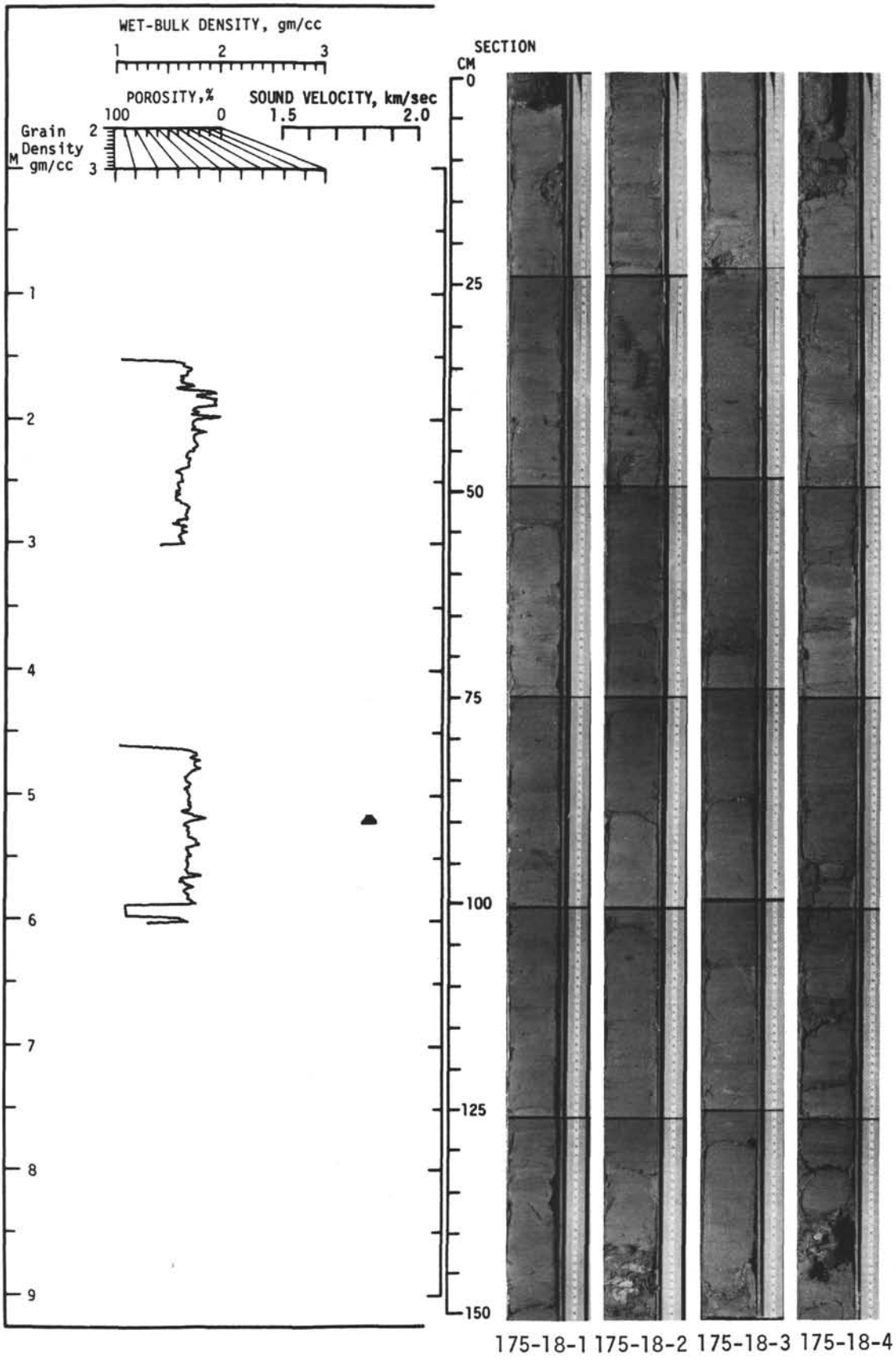
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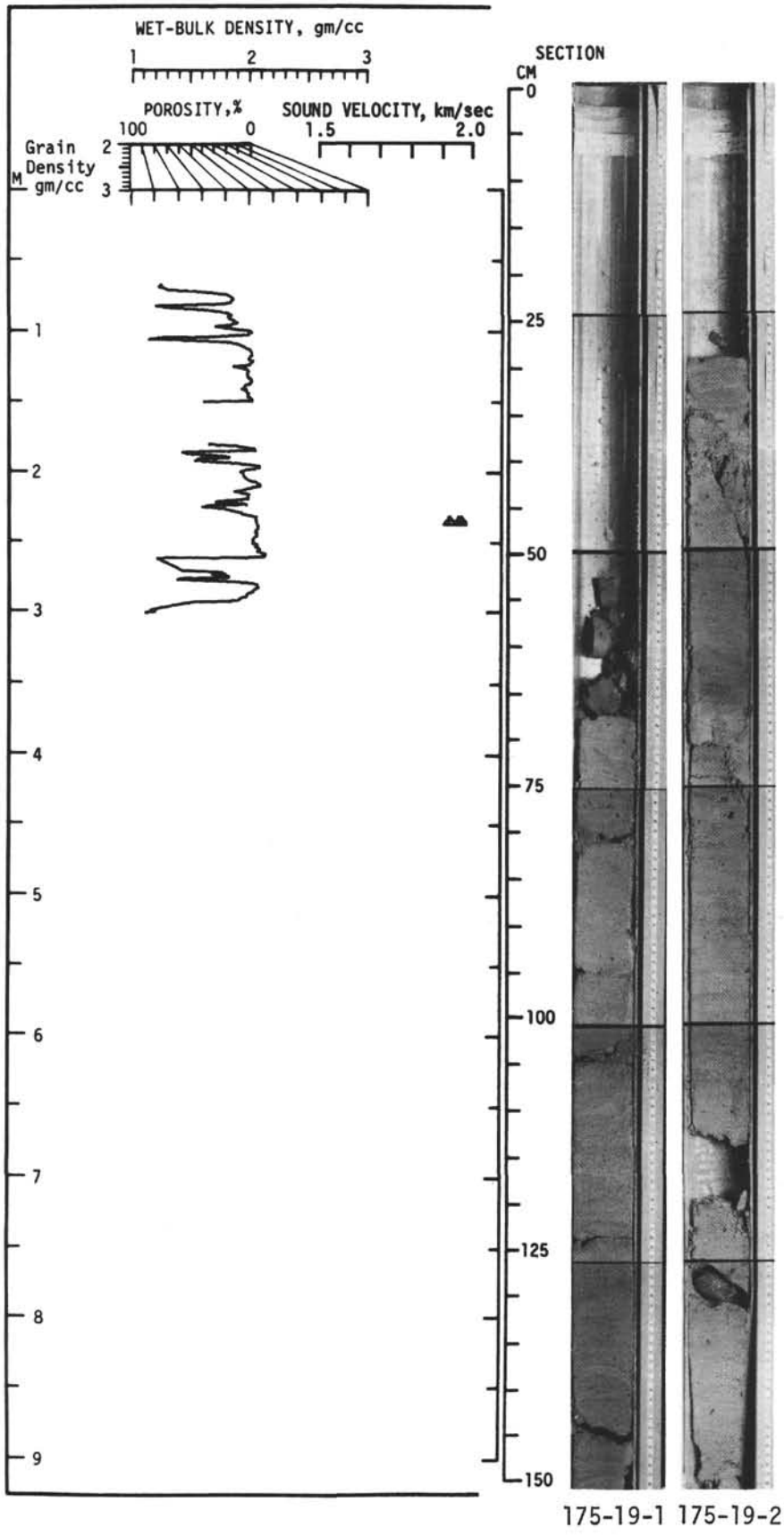
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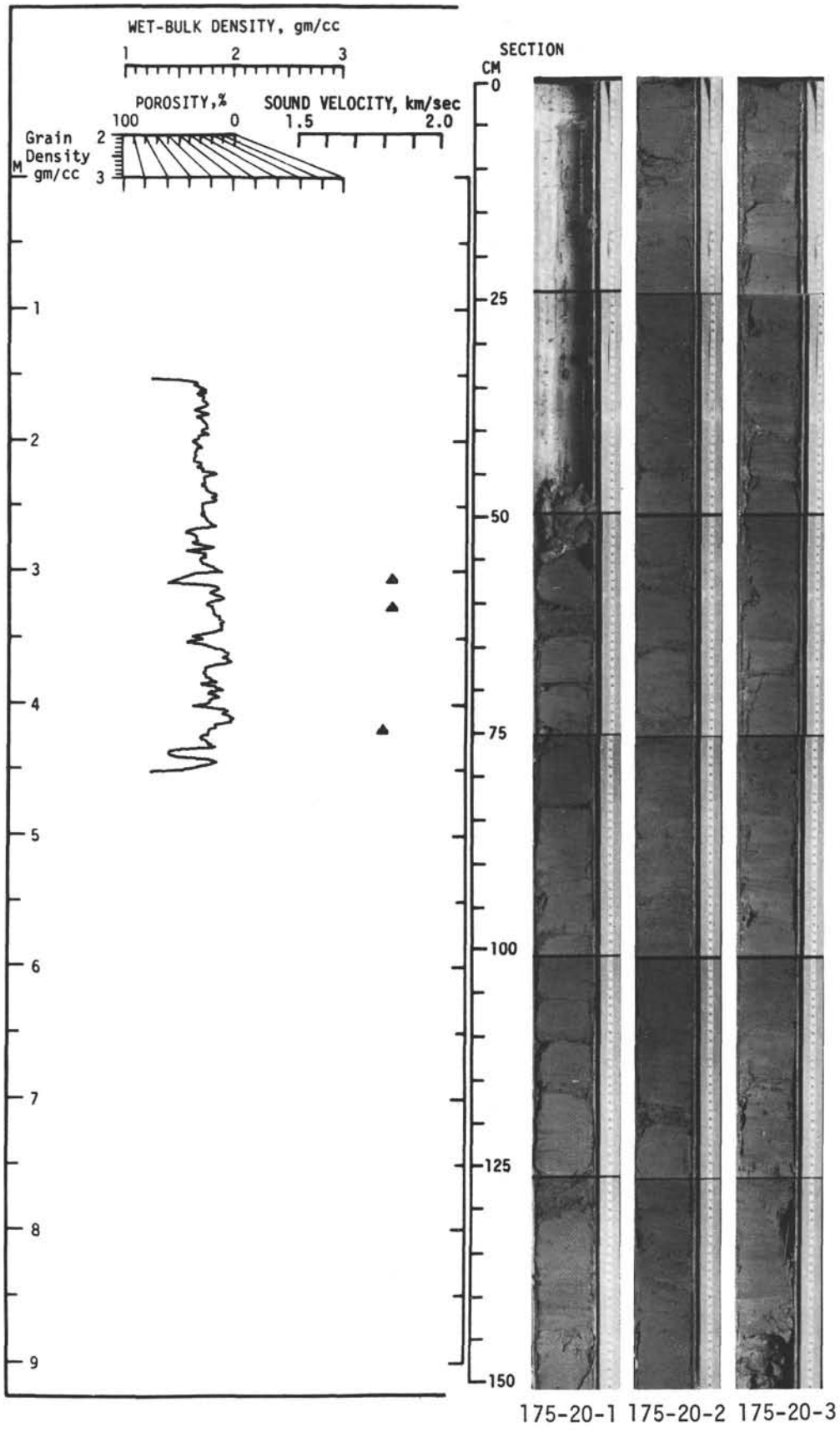
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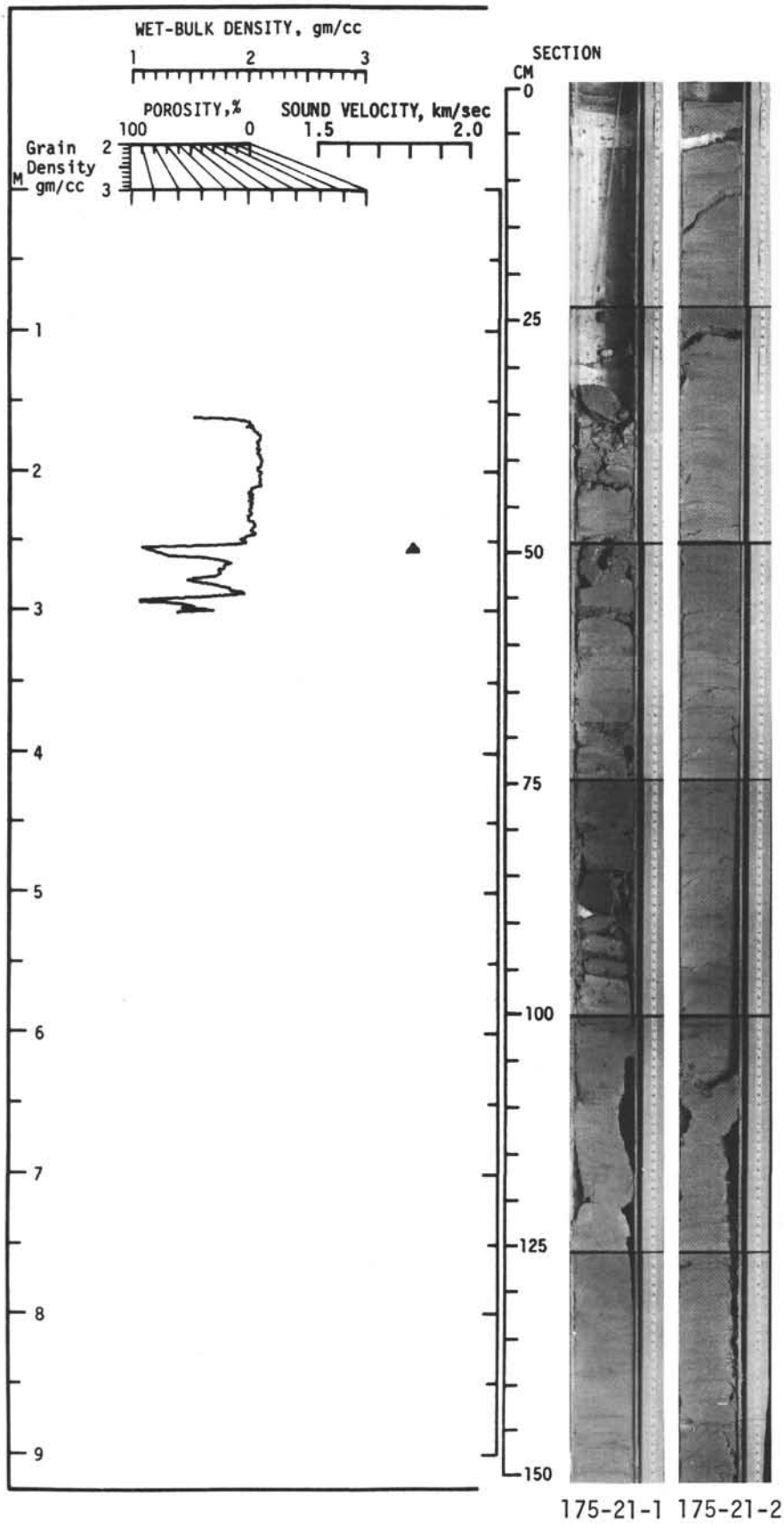
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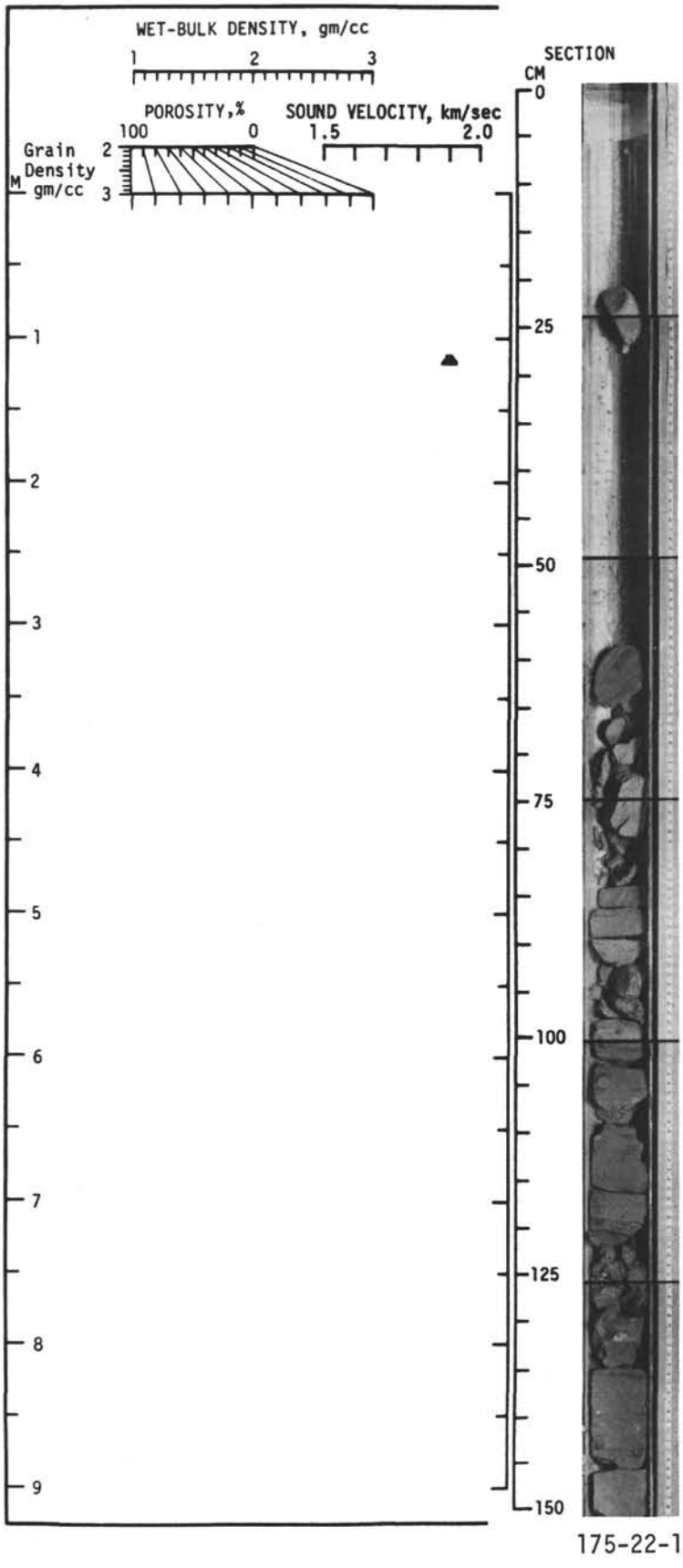
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