APPENDIX IV. X-RAY MINERALOGY OF SEDIMENTS FROM THE NORTHEAST PACIFIC AND GULF OF ALASKA–LEG 18 DEEP SEA DRILLING PROJECT[1]

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ABSTRACT

X-ray diffraction analysis of bulk, 2-20μ and <2μ samples from Leg 18, Sites 172 to 181 was performed.

Site 172 sediments are rich in quartz, mica, plagioclase and amorphous iron oxides and are typical of north-central Pacific pelagic sediments.

Delgada Fan sediments (Sites 32, 33, 34, 173), Pleistocene to Middle Miocene, are quartz-rich with lesser amounts of plagioclase and mica. Excambia Trough sediments (Site 35), Pleistocene and Pliocene, are mica- and montmorillonite-rich with lesser quartz and plagioclase. In the Astoria Fan and Canyon (Sites 174, 176) Upper Pleistocene sediments are mica-rich; quartz and plagioclase occur in equivalent proportions; 1 to 2% dolomite and amphibole are present. Pleistocene sediments on the Oregon continental margin (Site 175) are quartz-rich with lesser mica and plagioclase; dolomite is absent. Vancouver Island continental margin Pleistocene sediments (Site 177) are plagioclase-rich; quartz and mica occur in equivalent concentrations. Pleistocene to Middle Miocene sediments on the Alaskan Abyssal Plain (Sites 178 to 181) are mica- and chlorite-rich; quartz and plagioclase occur in equivalent concentrations. Older sediments were recovered at Sites 32, 33, 34, 173, and 178 and have different mineral assemblages.

Although the geometry of these lithologic units is not fully known, they may represent lithosomes of rather limited lateral extent which owe their characteristic mineral assemblages to different sediment sources and mechanisms of sediment transport.

Mineral analysis and mapping of these mineralogically and structurally distinct sedimentary units could be useful toward a better understanding of marine sediment dispersal processes, climatic changes, and the movements of crustal plates.

METHODS

Semiquantitative determinations of the mineral composition in bulk samples, 2-20μ and <2μ fractions were performed according to the methods described in the reports of Legs 1 and 2 and in Appendix III of Volume IV. The mineral analyses of the 2-20μ and <2μ fractions were performed on $CaCO_3$-free residues.

The results are presented in Tables 1 to 10 and also in Figures 1 to 30. Sediment ages, lithologic units, and the nomenclature of the sediment types used in Figures 1 to 30 are from the DSDP Leg 18 Hole Summaries. Samples submitted for X-ray diffraction analysis from Leg 18 are listed in Table 11. The sample depths below the sea floor in the last column of Table 11 identify the samples as they are reported in Tables 1 to 10 and Figures 1 to 30. Two samples which were taken from identical depths (181-38-1, 120-123) were described as "dirty mud" and "laminated mud." These samples are plotted symetrically about their depth below the sea floor in Figures 28, 29, and 30. No samples were submitted for X-ray diffraction analysis from Site 182.

Several unidentified minerals were detected in Leg 18 samples. These were reported on a ranked, semiqualitative scale using a hypothetical mineral concentration factor of 3.0 and other semiquantitative criteria as outlined below:

- Trace (<5%): Diffraction pattern was weak and identification was made on the basis of two major diagnostic peaks.
- Present (5-25%): A number of peaks of the mineral are visible in the diffraction pattern.
- Abundant (25-65%): diffraction peaks of the mineral are prominent in the total diffraction pattern but the peaks of other minerals are of an equivalent intensity.
- Major (>65%): the diffraction peaks of the mineral predominate the diffraction pattern.

Although a certain quantity of the unidentified minerals is implied, their concentration is not included in the

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concentrations of the identified minerals which are summed to 100%.

The usage of drilling mud containing montmorillonite and barite on Leg 18 was as follows: Hole 174A, between Cores 37 and 38, 38 and 39, 40 and 41, 42 and 43; Hole 178, between Cores 57 and 58; Hole 179, between Cores 11 and 12; Hole 182, before Core 1. In most cases no samples were submitted for X-ray diffraction analysis from cores which might be affected by the drilling mud. Sample 174A-39-2, 28-29, however, shows a higher montmorillonite content than samples above and below it and may be contaminated by drilling mud.

RESULTS AND DISCUSSION

Site 172

Hole 172 was drilled in a small basin surrounded by hilly topography about 140 km south of the Murray Fracture Zone. A short section (23 m) of ferruginous, zeolitic, pelagic clay, Quaternary and Oligocene in age, was recovered (Figures 1, 2, 3). The sediments contain little or no biogenous calcite. Furthermore, there appears to be little biogenous silica as the amorphous scattering in these sediments is low by comparison with the pelagic sediments from the equatorial Pacific sites of Legs 8, 9, and 16 (Table 1). Its abundance cannot be quantified as appropriate mineral standards have not been obtained. The large quantities of phillipsite, mica, quartz, and plagioclase which are reported in this sample actually constitute only a small fraction of the total weight of the sample. Their concentration apperas exaggerated due to our method of reporting quantifiable species summed to 100%.

Site 173

Hole 173 was drilled in the northern part of the large physiographic feature south of the Mendocino Escarpment which is referred to as the Delgada Submarine Fan.

Samples from nine of twelve lithologic units described were submitted for X-ray diffraction analysis. The units are shown in the lithology column of Figures 4, 5, and 6. These sediments consist of green, fine-grained muds which become increasingly enriched with forams and diatoms with depth. The increasing biogenous content is reflected in the increasing calcite content and amorphous scattering (Figure 4).

Except for the calcite content, there are no obvious systematic changes in the mineral composition which can be associated with the different lithologic units in the bulk samples. These sediments are largely made up of quartz, plagioclase, and mica. Chlorite and montmorillonite occur in equivalent amounts in most bulk samples (Figure 4). Throughout the section the 2-20μ fraction is virtually constant in mineral composition (Figure 5). However, quartz, plagioclase, chlorite, and mica in the $<2\mu$ fraction gradually diminish with depth while montmorillonite increases with depth (Figure 6). Small quantities of pyrite were detected in nearly all of the samples analyzed.

Site 174

Site 174 was located in an intermediate position in the southern portion of the Astoria Submarine Fan which lies off the mouth of the Columbia River. Two holes were drilled but only Hole 174A was sampled for X-ray diffraction analysis.

The recovered section is Pleistocene to Pliocene and consists of a 284-meter unit which overlies a 645-meter unit. This upper unit is comprised of graded, fine-grained sands, silts, and clays in beds 5 to 730 cm thick, commonly 50 to 100 cm thick. The subjacent unit consists of thinner beds of graded silts and clays 2 to 60 cm thick, commonly 10 to 20 cm thick.

Sediments with a wide range of grain size were submitted for X-ray diffraction analysis. There appears to be a relationship between texture and mineralogy. In bulk samples the quartz content varies directly with the amount of sand-sized constituents and the mica content varies directly with the percentage of clay-sized material (Figure 7). The proportions of quartz, plagioclase, and mica in the 2-20μ fraction samples are variable throughout the section.

Mica is the predominant clay mineral in the $<2\mu$ fraction samples. Several montmorillonite-rich beds occur in the lower unit. A small amount of chlorite was consistently detected throughout the section and amphibole and dolomite were commonly detected in small amounts (Figures 7, 8, 9).

Site 175

Site 175 was located in a small trough in gentle folds near the base of the continental slope off the Oregon coast. Two lithologic units were defined: (1) massive, dark green-gray, fine-grained mud (0 to 120 m) and (2) alternating semi-indurated, green-gray mud and bluish gray, carbonate-bearing mud (120 to 233 m). Based on a study of paleobathymetric index species, shipboard scientists made the preliminary interpretation that Pleistocene and older sediments (i.e. below 72 m) were uplifted 500 to 1000 meters during the Middle or Late Pleistocene. No striking mineralogic contrast is observed accompanying either the boundary of the two units or the interpreted cessation of uplift (Figures 10, 11, 12 and Table 4).

The bulk sediment is primarily composed of quartz, mica, and plagioclase. Calcite and amphibole occur in small amounts throughout (Figure 10). Sediments at Site 175 contain almost no dolomite and have somewhat larger concentrations of chlorite than sediments at Site 174. These mineralogical differences suggest a difference in the source of the sediments at the two sites.

Site 176

Hole 176 was drilled on the outer continental shelf near the head of the Astoria Submarine Canyon. Those intervals in the top 41 meters which were sampled for X-ray diffraction analysis consist of greenish gray mud with occasional beds of sand identified by the shipboard scientists as glauconite-bearing. The presence of glauconite was not confirmed, however. Glauconite has a diffraction pattern that is difficult to distinguish from mica and additional work is needed to confirm the presence or absence of glauconite in these sands.

Mica, quartz, and plagioclase are the predominant minerals (Table 5 and Figure 13). Pyrite and amphibole were detected in small amounts throughout. Small amounts of dolomite and chlorite were detected in nearly all of the bulk samples. The presence of dolomite and the low amounts of chlorite are strikingly similar to the sediments found on the Astoria Submarine Fan at Site 174 implying that Sites 174 and 176 probably have the Columbia River as their source whereas Site 175 has a different source.

Site 177

Site 177 is located on the Paul Revere Ridge, a linear topographic feature that parallels the continental slope northwest of Vancouver Island. Samples were submitted for X-ray diffraction analysis from six of the seven described lithologic units. These units are shown in Figures 16, 17, and 18. The sediments consist of terrigenous constituents.

No unique mineralogical character can be ascribed to any of the lithologic units. Plagioclase is the predominant mineral in the bulk and 2-20μ fractions. Amphibole is rather prominent in the bulk and 2-20μ fractions in the two top units but diminishes with depth. Pyrite was only rarely detected at this site.

The reported occurrence of turbidites on the Paul Revere Ridge by shipboard scientists is a little puzzling as this depositional site is presumably out of reach of turbidity currents. Semiquantitative X-ray mineralogy data provide some clues regarding the origin of these sediments. First, provenance studies may be facilitated by the fact that the sediments have an unusually large plagioclase content in comparison with other continental margin sediments in the northeastern Pacific (cf. results of this study; Rex and Murray, 1970; White, 1970; Duncan and Kulm, 1970). Second, the 2-20μ fractions, in which the effect of varying grain size on the mineral concentration is normalized, have a remarkably uniform composition (Figure 17 and Table 6). This suggests that relatively uniform transport and depositional mechanisms may have been operative during the Pleistocene since sporadic sediment deposition would probably yield poorly sorted sediments and would result in fluctuating mineral ratios (see Site 174). However, until we better understand the selective sorting that may take place by various sedimentation processes, these interpretations are considered preliminary and are made only from the suite of samples submitted for X-ray diffraction analysis.

Site 178

Site 178 is located on the Alaskan Abyssal Plain, west of the Surveyor Channel where the plain dips toward the Aleutian Trench.

Four major lithologic units with numerous subunits were described by the shipboard scientists at Site 178: (1) a massive mud unit with glacial erratics and occasional silt laminae (0-170 m), (2) interbedded muds, diatomaceous muds with fine sand and silt turbidites with no erratics (270-748.5 m), (3) interbedded chalk and varicolored claystone (742-748.5 m), and (4) a barren brown and gray shale in contact with basalt basement (748.5-777.5 m).

No striking mineralogical differences exist between Units 1 and 2. The sediments are primarily composed of mica. Quartz and plagioclase occur in equivalent amounts (Table 7 and Figure 19). The montmorillonite content increases with depth in the bulk samples and in the $<2\mu$ fraction. Amphibole and chlorite generally diminish with depth (Figures 19, 20, 21).

Units 3 and 4 show a rather profound difference in their mineral assemblage as compared with the overlying units. In all three fractions Units 3 and 4 show a marked reduction in the quartz, mica, and chlorite content and a large increase in the montmorillonite content which is in contrast to Units 1 and 2 (Table 7 and Figures 19, 20, 21). Moreover, barite and kaolinite occur in notable concentrations in Units 3 and 4, whereas they were not detected in Units 1 and 2.

Site 179

Site 179 was located in an elevated basin between Giacomini Guyot and an unnamed seamount to the east in the middle of the Alaskan Abyssal Plain.

The top two lithologic units, which consist of diatomaceous mud, resemble one another mineralogically and do not differ significantly from the younger sediments at Site 178. Quartz, plagioclase, and mica constitute about 90% of the sample. Amphibole is persistant in all of the sample fractions. Chlorite is common throughout.

The diatomaceous muds overlie a very fine-grained, ash-bearing clay which was described by shipboard scientists as resembling pelagic sediments. This clay has an exceptionally high plagioclase and montmorillonite content. Only minor amounts of quartz and mica and some magnetite were detected. The mineral assemblage resembles other altered marine volcanic ash beds although no zeolites were detected.

Site 180

Site 180 is located on a possible turbidity current channel levee in the axis of the Eastern Aleutian Trench, downslope from Site 178. A section of graded silts and interbedded muds was recovered. Six lithologic units were defined by the shipboard scientists but only four were sampled for X-ray diffraction analysis. The units, which are presented in Figures 25, 26, and 27, differ insignificantly from one another in their mineralogy. The sequence at Site 180 lithologically correlates with the upper stratigraphic unit at Site 178 and strongly resembles the mineralogy at that site. The sediments at Site 180 are largely composed of mica, quartz, and plagioclase with persistent occurrences of chlorite and amphibole. Quartz and plagioclase occur in nearly equal concentrations in all three fractions. Montmorillonite is minor in the $<2\mu$ fraction.

Site 181

Site 181 is located on the lower part of the continental slope, about 2000 meters above the Aleutian Trench floor, upslope from Site 180.

Three lithologic units were described (Figures 28, 29, 30). Units 1 and 2 are composed of gray mud with occasional silt and fine sand beds. Unit 2 is distinguished from Unit 1 by being more diatomaceous. Unit 3 consists of gray mudstone which shows a high degree of contortion, microfractures, and highly variable dips in the bedding planes. The shipboard scientists tentatively interpreted these features as not being due to the coring process. There are no mineralogical changes which can be correlated with the induration and deformation of Unit 3. Rather, Unit 3 appears to be an indurated form of the mud found in Units 1 and 2.

SUMMARY AND CONCLUSIONS

The following interpretations are considered to be preliminary. Additional work by us is in progress.

Mineralogically the sediments at Site 172 are similar to the sediments at Sites 37 to 41, Leg 5 (Rex and Murray, 1970). These sediments, from intermediate latitudes of the northeast Pacific Ocean, are typically rich in quartz, mica, and plagioclase. The mica content commonly exceeds the quartz content. Montmorillonite is usually a minor constituent along with small amounts of kaolinite and chlorite. Phillipsite is found frequently in isolated horizons. The biogenous amorphous silica and calcite content is low by comparison with the sediments close to the equator. Cores taken near the major fracture zones contain large quantities of amorphous iron oxides which have been interpreted to be of a hydrothermal origin (von der Borch and Rex, 1970; Nayudu, 1964).

The sections cored at Sites 173 to 182 are composed of terrigenous detritus with only minor amounts of biogenous calcite and silica. There is little evidence of diagenetic activity except for pyrite formation and occasional occurrences of clinoptilolite in the lower portions of some sections. Mixed layer clays (not reported in this study) constitute only minor proportions of the samples.

Sites 32 to 35 on Leg 5 and Sites 173 to 181 on Leg 18 are within the Northeast Pacific Turbidite Province, as defined by Horn et al. (1970). This province borders the North American continental margin and consists of turbidites and associated mud and clay. From X-ray results of the cores from these sites, it is found that the individual sites on major structures contain mineral assemblages which differ substantially from one another both in the mineral ratios of the major components (those greater than 10%) and the content of minor components (less than 10%). Also the mineral assemblage changes very little with depth at each site. The constancy of the mineral assemblage is particularly striking in the decalcified 2-20μ and $<2\mu$ fractions. Here the effect of variation due to calcite dilution is eliminated and the variation caused by poor sorting of mineral grains is reduced. This suggests that the sediments in the Northeast Pacific Turbidite Province are being deposited in distinct subprovinces which results in the formation of lithosomes. These lithosomes maintain the details of their mineral assemblages to a considerable depth.

Considering that only thirteen sites from the turbidite province have been studied, it is likely that only a few lithosomes have been sampled. Nevertheless, the following lithosomes can be defined, largely on the basis of bulk mineral composition. Their total areal extent is unknown.

The Delgada Fan (Sites 32, 33, 34, 173)

Pleistocene to Middle Miocene sediments are quartz-rich with lesser amounts of plagioclase and mica. Montmorillonite and chlorite are present in small amounts throughout; kaolinite is absent at Site 173 but occurs in trace amounts at Sites 32, 33, and 34 on the outer reaches of the fan (reevaluated Leg 5 data). Pre-Middle Miocene sediments at all sites are enriched in montmorillonite with a corresponding reduction in mica; kaolinite is absent and chlorite is reduced.

Escambia Trough (Site 35)

The Pliocene and Pleistocene muds are rich in mica and montmorillonite and quantitatively predominate over quartz and plagioclase. Chlorite persists throughout but kaolinite is absent.

Astoria Canyon and Fan (Sites 174, 176)

In the Upper Pleistocene sediments, mica is the predominant mineral; quartz and plagioclase occur in equivalent concentrations; chlorite and montmorillonite persist in minor amounts. One to two percent of dolomite and amphibole occur in the Astoria sediments and are important in distinguishing the sediments derived from the discharge of the Columbia River from adjacent sediments.

The Lower Pleistocene and Pliocene sediments (below 284 m) contain beds which have the assemblage found in the Upper Pleistocene sediments but are intercalated with montmorillonite-rich sediments in which dolomite was not detected.

Oregon Continental Margin (Site 175)

Pleistocene sediments at Site 175 consist of quartz-rich muds. Mica and plagioclase are less abundant than in the Astoria sediments at Sites 174 and 176. Chlorite and amphibole occur in larger quantities and dolomite was not detected.

Vancouver Island Continental Margin (Site 177)

The Pleistocene sediments contain plagioclase in excess of quartz or mica. Quartz and mica occur in equivalent concentrations. The chlorite content is low. Amphibole diminishes with depth.

Gulf of Alaska (Sites 178 to 181)

Pleistocene to Middle Miocene sediments are rich in mica and chlorite. Quartz and plagioclase occur in equivalent amounts but are subordinate to the mica content. Montmorillonite is a minor constituent. Amphibole is persistent but diminishes with depth.

Lower Miocene sediments (only cored at Site 178) appear to have a pelagic-volcanic mineral assemblage which is distinctive from the overlying sediments. Plagioclase and montmorillonite are abundant whereas quartz and mica are minor.

The lower Miocene units contain a notable amount of barite (up to about 20%) which may be the most diagnostic mineral indicator of this lithosome.

The origin of the discrete lithosomes which occur along the western margin of North America can be explained, at least to a first order, in terms of the geological setting. First, the continental source areas of the sediments are highly varied in their petrology, topography, and climate. Second, there is a relatively small number of rivers which drain into the ocean. Third, communication with the deep-sea floor is via a small number of submarine canyons which channel the sediments into structurally isolated basins. Fourth, the nepheloid layer may be moderate to weak (Ewing and Connary, 1970) and probably does not contribute significantly to the sediment budget,especially south of the Mendocino Fracture Zone. This contrasts with the geological setting of the eastern margin of North America whehre the continental source area (i.e. Appalachian Mountains, Piedmont, and Atlantic Coastal Plain) is a longitudially extensive and petrologically homogeneous feature. The area is drained by numerous rivers and sediment deposition on the continental margin appears to occur in large megafans (Stanley et al., 1971). The X-ray mineralogy data of Legs 11 and 12 showed that sediments are deposited in relatively few lithosomes of probable large areal extent (Zemmels, et al. 1971; Fan and Zemmels, 1972).

The Gulf of Alaska forms a distinct sedimentary province, probably as a result of rather uniform petrologic and climatologic conditions on the continent and a strong nepheloid layer (Ewing and Connary, 1970).

Further sampling, mineral analysis and mapping of these mineralogically and structurally distinct sedimentary units could be useful toward a better understanding of marine sediment dispersal processes, climatic changes, and the movements of crustal plates.

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TABLE 1
Results of X-Ray Diffraction Analyses from Site 172

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Quar.	Plag.	Kaol.	Mica	Chlo.	Mont.	Phil.	Bari.	Amph.	Goet.
Bulk Samples														
1	0.0-8.0	4.10	83.7	74.6	29.4	17.21	1.5	41.0	5.6	2.4	–	2.7		–
2	8.0-17.0	16.60	77.5	64.8	5.1	–	–	10.6	–	2.3	82.0	–		–
3	17.0-22.0	18.10[a]	95.3	92.7	12.2	11.8	–	39.1	–	–	36.9	–		Abund.
2-20μ Fraction														
1	0.0-8.0	4.10	70.1	53.3	34.6	22.4	1.5	34.5	4.0		–	1.6	1.4	–
2	8.0-17.0	16.60	66.0	46.9	4.3	11.1	–	4.9	–		79.7	–	–	–
3	17.0-22.0	18.10[a]	91.1	86.1	4.9	11.0	–	9.2	–		75.0	–	–	Abund.
<2μ Fraction														
1	0.0-8.0	4.10	85.6	77.5	29.4	17.2	1.5	41.0	5.6	2.4	–	2.7		–
2	8.0-17.0	16.60	87.2	80.0	6.0	–	–	9.8	–	11.1	73.0	–		–
3	17.0-22.0	18.10[a]	93.3	89.5	44.8	55.2	–	–	–	–	–	–		Major

[a]Sample depth changed from 22.50 to 18.10 in proportion to cored depth. Nine meters were recovered for five meters cored.

TABLE 2
Results of X-Ray Diffraction Analyses from Site 173

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Kaol.	Mica	Chlo.	Mont.	Clin.	Phil.	Pyri.	Gyps.	Amph.	Bari.	U-1[a]	U-2[b]	U-3[c]
Bulk Samples																					
1	0.0-5.6	5.60	79.9	68.6	4.7	–	32.2	23.5		24.9	7.1	5.2	–		2.4	–		–	–		–
2	5.6-15.0	11.10	79.1	67.3	46.5	–	20.9	11.9		12.0	3.9	3.5	–		1.4	–		–	–		–
3	15.0-24.5	23.50	84.3	75.4	–	–	35.4	23.9		23.3	8.1	9.3	–		–	–		–	–		–
4	24.5-34.0	25.60	82.6	72.8	–	–	38.2	25.0		22.2	7.2	7.5	–		–	–		–	–		–
5	34.0-43.5	35.10	79.9	68.6	9.5	–	28.8	21.6		25.6	7.1	6.2	–		1.1	–		–	–		–
7	53.0-62.5	57.10	79.8	68.5	–	–	36.2	25.8		20.6	4.9	11.3	–		1.3	–		–	–		–
8	62.5-72.0	65.10	80.6	69.7	3.1	–	39.3	26.8		15.9	6.8	5.6	–		1.4	1.2		–	Trace		–
		69.60	79.6	68.2	–	–	42.1	29.4		15.1	4.6	6.1	–		2.6	–		–	Trace		–
9	72.0-81.5	76.10	80.9	70.1	11.4	–	35.2	25.3		14.3	5.8	5.6	–		2.4	–		–	Trace		–
11	91.0-100.5	93.60	79.7	68.3	–	–	43.5	33.0		12.7	3.5	6.1	–		1.3	–		–	Trace		–
12	100.5-110.0	104.60	79.4	67.8	24.9	–	29.0	21.2		13.2	4.2	5.7	–		1.8	–		–	–		–
13	110.0-119.5	112.60	80.3	69.3	15.8	–	34.6	26.2		13.6	3.7	4.8	–		1.3	–		–	Trace		–
		115.60	79.9	68.7	14.0	–	35.4	25.7		14.2	4.2	4.6	–		1.9	–		–	Trace		–
14	119.5-129.0	122.10	79.3	67.6	11.7	–	38.0	27.6		12.9	4.1	4.7	–		–	1.2		–	Trace		–
15	129.0-138.5	133.10	83.3	73.9	–	–	42.0	30.2		11.1	3.1	10.4	–		1.8	1.3		–	Trace		–
16	138.5-148.0	141.10	88.6	82.2	39.2	10.4	17.7	13.1		7.4	3.9	5.6	–		2.7	–		–	–		–
		142.60	87.5	80.4	28.0	–	23.8	22.2		11.4	4.5	8.5	–		1.6	–		–	–		–
18	157.5-167.0	163.10	84.4	75.7	32.9	–	26.0	19.8		6.8	2.1	10.2	–		2.3	–		–	–		Present
19	167.0-176.5	171.10	84.4	75.7	51.0	–	17.6	15.2		6.2	2.5	5.8	–		1.8	–		–	–		Trace
20	176.5-186.0	180.60	85.4	77.2	41.4	–	19.9	18.6		8.8	1.7	8.1	–		1.5	–		–	–		Present
21	186.0-195.5	188.60	89.8	84.1	25.0	–	24.6	14.7		10.6	3.8	18.6	–		2.8	–		–	–		Present
22	195.5-205.0	198.10	92.4	88.2	44.4	1.3	19.8	9.3		9.1	1.5	11.4	–		3.1	–		–	–		Present
		199.60	88.9	82.7	71.7	–	10.3	5.5		4.4	1.7	4.1	–		2.5	–		–	–		Present
25	224.0-233.5	226.60	85.8	77.8	70.0	–	9.9	7.0		4.7	–	6.2	–		2.2	–		–	–		Trace
26	233.5-243.0	237.60	81.2	70.6	73.9	–	7.1	6.7		5.3	1.2	4.3	–		1.4	–		–	–		–
30	271.5-281.0	271.70	96.0	93.7	–	–	26.0	29.2		12.4	–	17.1	–		8.0	–		7.2	–		–
35	310.5-320.0	313.10	81.0	70.4	15.2	4.3	14.7	20.3		24.1	1.5	11.7	6.8	1.5	1.5	–	–	–	–		–

TABLE 2 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Kaol.	Mica	Chlo.	Mont.	Clin.	Phil.	Pyri.	Gyps.	Amph.	Bari.	U-1[a]	U-2[b]	U-2[c]
2-20μ Fraction																					
1	0.0-5.6	5.60	65.8	46.6			38.2	33.7		17.7	6.6	–	–	–	2.7		1.1	–	–	–	
2	5.6-15.0	11.10	68.6	50.9			40.4	33.9		18.1	6.4	–	–	–	1.3		–		–		
3	15.0-24.5	23.50	69.3	52.0			34.4	33.4		23.3	7.4	–	–	–	–		1.6		Trace	Trace	
4	24.5-34.0	25.60	73.2	58.2			43.7	33.3		16.1	6.9	–	–	–	1.8		–		–	Trace	
5	34.0-43.5	35.10	67.7	49.6			41.7	35.0		14.7	6.7	–	–	–	1.8		–		–	–	
7	53.0-62.5	57.10	66.8	48.1			41.0	36.6		14.7	5.7	–	–	–	2.0		–		–	–	
8	62.5-72.0	65.10	71.6	55.7			39.3	33.8		18.8	6.7	–	–	–	1.3		–		–	Trace	
		69.60	71.4	55.2			38.9	33.1		16.5	6.3	3.1	–	–	2.1		–		–	Trace	
9	72.0-81.5	76.10	69.3	52.0			39.6	37.6		14.8	6.0	–	–	–	2.1		–		–	Trace	
11	91.0-100.5	93.60	72.1	56.4			39.0	37.7		17.5	5.7	–	–	–	–		–		–	–	
12	100.5-110.0	104.60	69.9	52.9			41.6	38.6		11.3	4.3	–	–	–	4.2		–		–	–	
13	110.0-119.5	112.60	70.5	53.9			40.9	38.6		13.5	5.6	–	–	–	1.5		–		–	Trace	
		115.60	70.0	53.1			42.1	38.9		11.0	6.2	–	–	–	1.8		–		–	Trace	
14	119.5-129.0	122.10	66.5	47.7			44.3	38.1		13.4	4.2	–	–	–	–		–		–	Trace	
15	129.0-138.5	133.10	76.2	62.8			41.5	36.6		14.9	5.1	–	–	–	2.0		–		–	Trace	
16	138.5-148.0	141.10	86.7	79.3			37.5	36.0		10.7	4.9	6.4	–	–	4.4		–		–	–	
		142.60	83.2	73.7			40.3	41.8		9.9	4.5	–	–	–	3.4		–		–	–	
18	157.5-167.0	163.10	81.3	70.8			63.0	–		19.2	5.7	8.2	–	–	3.8		–		–	–	
19	167.0-176.5	171.10	84.8	76.3			35.1	34.2		13.5	2.7	10.7	–	–	3.8		–		–	–	
20	176.5-186.0	180.60	85.5	77.3			35.4	36.8		12.1	4.1	9.5	–	–	2.1		–		–	–	
21	186.0-195.5	188.60	88.6	82.1			35.9	29.2		16.6	4.3	9.5	–	–	4.4		–		–	–	
22	195.50-205.0	198.10	92.4	88.2			37.7	33.6		11.0	5.6	5.9	–	–	6.1		–		–	–	
		199.60	92.7	88.7			38.6	33.1		14.8	5.6	–	–	–	7.9		–		Trace	–	
25	224.0-233.5	226.60	90.0	84.4			35.9	33.9		11.7	4.4	8.2	–	–	5.8		–		–	–	
26	233.5-243.0	237.60	92.9	88.9			36.9	17.6		8.3	4.0	10.1	–	17.3	5.9		–		–	–	
30	271.5-281.0	271.70	94.9	92.1			33.0	29.4		15.4	4.1	10.5	–	–	7.6		–		–	–	
35	310.5-320.0	313.10	70.8	54.4			27.7	31.3		24.5	3.2	–	10.4	–	2.8		–		–	–	

TABLE 2 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Kaol.	Mica	Chlor.	Mont.	Clin.	Phil.	Pyri.	Gyps.	Amph.	Bari.	U-1[a]	U-2[b]	U-3[c]
<2μ Fraction																					
1	0.0-5.6	5.60	80.9	70.1			19.5	9.2	–	35.8	19.2	14.6			1.7	–				–	
2	5.6-15.0	11.10	82.8	73.1			16.0	7.5	–	32.8	14.6	26.7			1.2	1.2				–	
3	15.0-24.5	23.50	80.7	69.8			17.4	9.6	–	30.9	13.0	27.9			–	1.2				–	
4	24.5-34.0	25.60	82.0	71.9			17.9	8.7	–	30.8	13.6	27.8			–	1.2				–	
5	34.0-43.5	35.10	81.0	70.4			22.1	10.4	–	28.8	16.1	21.1			1.6	–				–	
7	53.0-62.5	57.10	77.0	65.5			22.1	12.8	–	20.8	14.1	28.4			1.8	–				–	
8	62.5-72.0	65.10	82.1	72.0			19.6	10.1	–	25.0	11.4	31.0			1.2	1.7				–	
		69.60	82.6	72.8			14.4	8.4	–	26.3	10.5	37.5			1.9	1.0				Trace	
9	72.0-81.5	76.10	82.2	72.2			20.7	10.7	–	29.4	13.2	23.6			1.3	1.2				–	
11	91.0-100.5	93.60	83.8	74.7			23.0	13.3	–	23.6	10.3	29.8			–	–				Trace	
12	100.5-110.0	104.60	84.3	75.5			25.7	12.8	–	23.0	13.0	24.1			1.3	–				–	
13	110.0-119.5	112.60	82.6	72.8			18.5	10.1	–	27.6	14.1	28.6			–	1.1				Trace	
		115.60	82.7	72.9			17.3	9.2	–	32.9	13.1	24.5			–	3.0				–	
14	119.5-129.0	122.10	81.5	71.2			20.8	10.9	–	19.6	11.3	37.4			–	–				–	
15	129.0-138.5	133.10	84.6	75.9			20.1	9.8	–	15.3	7.7	47.1			–	–				–	
16	138.5-148.0	141.10	95.8	93.4			16.8	10.3	3.0	22.3	5.1	42.5			–	–				–	
		142.60	91.6	86.9			12.5	9.0	–	12.6	10.4	52.7			2.8	–				–	
18	157.5-167.0	163.10	89.2	83.1			15.6	10.5	–	13.8	6.8	52.0			–	1.3				–	
19	167.0-176.5	171.10	91.2	86.2			16.4	8.3	–	14.5	10.0	46.3			2.3	2.3				–	
20	176.5-186.0	180.60	90.4	84.9			13.5	7.5	–	11.9	8.1	57.3			1.7	–				–	
21	186.0-195.5	188.60	91.8	87.2			12.1	5.6	2.8	10.7	4.2	60.7			2.5	1.6				–	
22	195.5-205.0	198.10	93.4	89.7			10.9	3.8	–	17.0	9.9	52.6			–	5.8				–	
		199.60	95.6	93.1			10.9	3.8	–	12.8	12.2	56.2			2.8	1.3				–	
25	224.0-233.5	226.60	91.9	87.3			8.6	6.0	–	12.6.	10.0	56.8			–	6.0				–	
26	233.5-243.0	237.60	94.6	91.5			12.5	9.0	–	12.6	10.4	52.7			2.8	–				–	
30	271.5-281.0	271.70	94.0	90.7			10.4	6.0	–	11.8	5.6	62.6			3.7	–				–	
35	310.5-320.0	313.10	83.7	74.6			14.0	7.6	–	42.2	13.7	22.4			–	–				–	

[a]Peak at 12.1A.

[b]Peak at 9.5A.

[c]Peaks at 3.53A, 5.76A, and 8.12A.

TABLE 3
Results of X-Ray Diffraction Analyses from Site 174

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Mica	Chlo.	Mont.	Clin.	Bari.	Gyps.	Amph.	U-3[a]	U-1[b]	U-4[c]
Bulk Samples																		
4	56.5-66.0	64.90	80.8	70.1	3.4	1.5	27.0	18.8	32.6	4.9	11.7	–	–		–	Trace		
6	75.5-85.0	78.30	69.9	53.0	4.8	3.2	27.6	23.3	33.2	5.3	–	–	–		2.5	–		
8	94.5-104.0	100.80	79.0	67.2	4.6	2.5	25.6	21.7	32.4	5.1	6.1	–	–		2.0	–		
11	123.0-132.5	131.80	82.5	72.6	1.1	1.0	27.6	25.7	24.5	3.4	16.7	–	–		–	Trace		
13	142.0-151.5	146.70	82.7	72.9	2.7	–	23.5	22.6	34.9	3.8	10.5	–	–		1.9	–		
16	170.5-180.0	177.00	71.7	55.7	2.5	2.0	33.3	25.2	30.8	2.0	2.8	–	–		1.6	–		
17	180.0-189.5	184.40	71.8	55.9	3.5	1.1	22.3	26.2	36.9	6.4	1.1	–	–		2.4	–		
21	218.0-227.5	220.70	76.5	63.3	4.0	2.4	18.9	14.4	46.2	5.9	6.2	–	–		2.0	–		
23	237.0-246.5	242.10	75.2	61.2	–	1.6	19.0	12.1	55.9	7.0	2.8	–	–		1.4	–		
27	275.0-284.5	277.80	78.7	66.7	4.5	2.7	24.0	16.1	40.0	6.2	6.5	–	–		–	–		
29	294.0-303.5	296.30	70.8	54.4	3.9	1.5	17.3	9.2	58.9	7.9	–	–	–		1.3	–		
34	370.0-379.5	371.70	77.9	65.5	–	1.1	30.5	26.4	28.7	4.5	6.7	–	–		2.1	–		
		375.00	80.4	69.4	–	–	27.8	20.7	30.3	7.2	14.0	–	–		–	–		
37	503.0-512.5	503.60	79.2	67.4	–	–	20.6	14.4	45.0	6.3	10.6	1.7	–		1.4	–		
		505.50	70.9	54.6	4.6	3.3	32.9	19.6	30.5	2.9	3.1	1.0	2.1		–	–		
39	750.0-759.5	751.80	79.2	67.5	–	1.2	23.9	20.1	23.8	4.4	21.4	3.9	–		1.3	–		
40	769.0-778.5	775.40	67.9	49.8	5.4	3.7	28.3	24.0	26.3	5.4	3.1	2.3	–		1.5	–		
2-20μ Fraction																		
4	56.5-66.0	64.90	65.1	45.4			32.8	22.2	38.3	4.9	–	–			1.8		Trace	–
6	75.5-85.0	78.30	65.0	45.4			43.3	30.4	19.6	4.2	–	–			2.5		Trace	–
8	94.5-104.0	100.80	68.0	50.0			38.2	30.4	23.6	5.7	–	–			2.1		–	–
11	123.0-132.5	131.80	71.8	55.9			32.3	26.3	28.9	3.8	7.3	–			1.5		Trace	–
13	142.0-151.5	146.70	67.4	49.0			32.6	27.2	31.6	6.5	–	–			2.0		Trace	–
16	170.5-180.0	177.0	69.0	51.5			32.6	28.0	32.8	3.5	–	–			3.1		Trace	–
17	180.0-189.5	184.40	60.4	38.2			33.9	33.6	23.6	6.0	–	–			2.8		Trace	–
21	218.0-227.5	220.70	61.8	40.2			28.2	16.6	45.2	7.8	–	–			2.2		–	Present
23	237.0-246.5	242.10	61.6	40.1			28.6	22.9	39.0	7.8	–	–			1.6		Trace	–
27	275.0-284.5	277.80	62.3	41.0			30.1	19.5	41.5	6.2	–	–			2.8		Trace	–
29	294.0-303.5	296.30	55.3	30.2			27.3	16.2	43.7	10.9	–	–			1.8		Trace	–
34	370.0-379.5	371.70	63.9	43.6			31.0	28.2	32.2	5.8	–	–			2.7		Trace	–
		375.00	66.7	48.0			30.2	27.7	32.6	7.6	–	–			1.8		Trace	–
37	503.0-512.5	503.60	61.7	40.2			19.3	14.4	54.3	9.9	–	1.0			1.1		Trace	–
		505.50	66.9	48.2			27.7	19.3	41.6	6.9	–	2.0			2.5		Trace	–
39	750.0-759.5	751.80	68.3	50.4			29.5	26.8	26.2	6.5	5.4	4.3			1.3		–	–
40	769.0-778.5	775.40	60.6	38.4			32.8	29.4	25.4	7.9	–	1.9			2.6		Trace	–

TABLE 3 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Mica	Chlo.	Mont.	Clin.	Bari.	Gyps.	Amph.	U-3[a]	U-1[b]	U-4[c]
<2μ Fraction																		
4	56.5-66.0	64.90	81.5	71.1			14.0	9.4	39.0	7.1	27.9	–		1.2	1.5			
6	75.5-85.0	78.30	77.3	64.5			14.0	7.6	42.2	13.7	22.4	–		–	–			
8	94.5-104.0	100.80	81.6	71.2			14.8	12.7	34.7	8.5	27.4	–		–	1.9			
11	123.0-132.5	131.80	81.2	70.7			16.1	9.6	33.4	10.9	27.6	–		2.4	–			
13	142.0-151.5	146.70	80.1	69.0			14.0	13.2	38.7	8.9	23.6	–		–	1.5			
16	170.5-180.0	177.00	82.5	72.6			11.3	7.9	33.4	7.0	38.3	–		2.0	–			
17	180.0-189.5	184.40	76.8	63.8			15.3	14.8	43.4	14.9	10.1	–		–	1.5			
21	218.0-227.5	220.70	78.9	67.1			13.0	11.6	37.9	7.7	27.6	–		–	2.1			
23	237.0-246.5	242.10	79.4	67.8			15.9	8.5	46.5	13.8	14.2	–		–	1.0			
27	275.0-284.5	277.80	82.2	72.1			12.6	9.0	36.1	8.9	31.4	–		2.1	–			
29	294.0-303.5	296.30	78.3	66.1			15.8	20.5	59.7	10.3	3.7	–		–	–			
34	370.0-379.5	371.70	78.6	66.6			12.0	8.1	49.2	9.4	19.8	–		–	1.5			
		375.00	82.6	72.7			17.7	12.0	21.2	9.8	39.4	–		–	–			
37	503.0-512.5	503.60	81.6	71.3			13.6	8.6	29.2	6.7	40.4	1.5		–	–			
		505.50	77.7	65.1			14.3	8.3	52.5	11.7	13.2	–		–	–			
39	750.0-759.5	751.80	80.8	70.0			14.9	7.6	18.3	5.5	52.6	1.2		–	–			
40	769.0-778.5	775.40	78.2	65.9			9.9	6.0	25.9	8.0	43.0	7.0		–	–			

[a]Peaks at 3.53A, 5.76A, and 8.12A.

[b]Peak at 12.1A

[c]Peaks at 22.2A and 11.25A.

TABLE 4
Results of X-Ray Diffraction Analyses from Site 175

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Mica	Chlo.	Mont.	Pyri.	Gyps.	Amph.	U-1[a]
Bulk Samples															
2	5.0-14.5	9.10	81.7	71.5	7.0	–	31.5	20.8	25.0	7.6	6.5	–	–	1.6	
3	14.5-24.0	18.60	75.4	61.6	3.3	–	32.5	24.0	27.5	9.3	–	–	–	3.4	
		20.10	76.8	63.7	7.6	–	35.8	23.2	18.9	5.9	4.8	1.4	–	2.4	
4	24.0-33.5	26.60	77.5	64.8	1.9	–	31.9	27.1	24.8	6.1	6.0	–	–	2.1	
		29.60	80.6	69.7	–	–	30.4	22.7	26.4	8.7	9.8	–	–	1.9	
5	33.5-43.0	40.60	74.6	60.3	3.5	–	29.2	19.5	35.8	8.4	1.7	–	–	2.1	
6	43.0-52.5	47.10	80.3	69.1	4.8	–	32.3	21.1	24.5	7.8	7.6	–	–	2.0	
7	52.5-62.0	55.10	79.0	67.2	3.1	–	29.9	20.9	27.3	10.3	6.2	–	–	2.4	
8	62.0-71.5	64.20	76.2	62.8	4.2	–	26.9	18.2	32.9	10.6	5.3	–	–	1.8	
9	71.5-81.0	77.10	78.4	66.2	–	–	31.8	23.2	31.5	9.4	4.1	–	–	–	
10	81.0-90.5	85.10	79.4	67.8	–	–	31.1	21.2	31.0	9.3	5.4	–	–	2.0	
13	109.5-119.0	113.60	75.8	62.2	2.0	–	24.4	20.1	35.0	9.7	6.4	–	–	2.4	
16	138.0-147.5	140.60	77.3	64.6	7.8	1.0	32.2	23.9	21.5	7.0	3.6	–	0.7	2.2	
17	147.5-157.0	150.10	76.5	63.2	3.9	–	36.2	24.1	25.8	5.6	2.4	–	–	2.0	
		154.60	80.7	69.8	16.0	–	28.7	22.6	21.6	6.6	2.0	–	–	2.4	
18	157.0-166.5	161.10	78.4	66.3	15.2	–	32.1	21.3	20.0	5.5	3.4	–	–	2.5	

TABLE 4 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Mica	Chlo.	Mont.	Pyri.	Gyps.	Amph.	U-1[a]
19	166.5-176.0	167.60	59.1	36.1	7.6	3.7	23.5	13.8	43.8	6.4	–	–	–	1.2	
20	176.0-185.5	178.60	79.2	67.5	2.4	–	36.3	24.7	21.1	9.5	3.3	–	–	2.7	
		180.10	76.1	62.7	2.9	–	31.7	24.2	25.8	10.1	3.5	–	–	1.9	
2-20μ Fraction															
2	5.0-14.5	9.10	67.7	49.5			35.2	28.1	22.7	10.3		–		3.7	Trace
3	14.5-24.0	18.60	62.9	42.0			31.3	27.2	25.6	12.7		–		3.2	Trace
		20.10	65.2	45.7			33.9	30.0	22.6	9.5		0.8		3.3	Trace
4	24.0-33.5	26.60	66.4	47.5			34.0	26.9	25.9	9.7		–		3.5	Trace
		29.60	66.0	46.9			32.9	28.3	24.0	11.0		–		3.8	Trace
5	33.5-43.0	40.60	66.1	47.0			34.2	28.6	26.3	8.0		–		2.9	Trace
6	43.0-52.5	47.10	67.6	49.4			31.0	27.8	27.8	10.6		–		2.9	–
7	52.5-62.0	55.10	66.6	47.8			33.0	28.3	24.4	11.3		–		3.0	–
8	62.0-71.5	64.20	62.5	41.5			32.7	26.1	25.3	11.3		–		4.5	Trace
9	71.5-81.0	77.10	67.0	48.5			30.3	24.9	30.4	11.7		–		2.8	Trace
10	81.0-90.5	85.10	64.0	43.8			32.2	27.2	27.0	10.8		–		2.8	Trace
13	109.5-119.0	113.60	65.4	45.9			32.4	27.7	25.6	10.6		–		3.8	Trace
16	138.0-147.5	140.60	69.7	52.7			36.5	28.7	23.8	8.2		–		2.8	Trace
17	147.5-157.0	150.10	64.7	44.8			31.5	26.6	28.6	10.5		–		2.8	Trace
		154.60	70.1	53.2			32.2	27.0	27.3	9.6		–		4.0	Trace
18	157.0-166.5	161.10	69.8	52.7			35.0	26.1	25.7	9.1		1.0		3.0	Trace
19	166.5-176.0	167.60	57.9	34.2			29.7	13.8	45.0	9.4		–		2.0	–
20	176.0-185.5	178.60	69.5	52.4			35.0	26.8	23.3	10.0		–		4.8	Trace
		180.10	65.4	45.9			32.6	27.3	25.0	12.2		–		2.9	Trace
<2μ Fraction															
2	5.0-14.5	9.10	82.7	72.9			18.9	10.7	35.5	12.7	18.1	–	2.0	2.1	
3	14.5-24.0	18.60	80.8	70.0			18.6	9.2	36.9	17.7	17.6	–	–	–	
		20.10	84.1	75.1			17.2	8.8	25.3	14.9	30.6	1.3	2.0	–	
4	24.0-33.5	26.60	82.2	72.2			16.7	10.7	35.4	14.5	18.2	–	2.3	2.2	
		29.60	83.4	74.0			17.1	10.0	28.8	14.7	25.7	–	1.8	1.8	
5	33.5-43.0	40.60	77.9	65.5			17.0	9.6	41.5	17.2	14.7	–	–	–	
6	43.0-52.5	47.10	82.6	72.8			16.1	10.0	32.0	16.1	24.1	–	1.7	–	
7	52.5-62.0	55.10	82.0	71.8			15.5	8.0	34.1	16.1	24.7	–	1.6	–	
8	62.0-71.5	64.20	79.9	68.6			16.0	8.2	38.1	19.7	16.5	–	–	1.5	
9	71.5-81.0	77.10	83.3	73.9			15.4	8.3	37.0	15.4	20.9	–	3.0	–	
10	81.0-90.5	85.10	84.3	75.5			17.4	8.9	31.8	13.4	28.5	–	–	–	
13	109.5-119.0	113.60	79.9	68.5			20.4	11.0	30.4	17.1	21.1	–	–	–	
16	138.0-147.5	140.60	82.5	72.7			14.1	7.4	30.4	12.4	32.2	–	2.0	1.5	
17	147.5-157.0	150.10	84.2	75.4			20.5	13.5	22.7	9.2	31.7	–	–	2.4	
		154.60	82.7	73.0			17.8	11.0	32.7	13.6	23.3	–	–	1.6	
18	157.0-166.5	161.10	83.3	73.9			19.4	10.3	31.5	13.7	22.6	1.2	1.3	–	
19	166.5-176.0	167.60	75.1	61.1			13.6	3.3	62.3	12.5	8.3	–	–	–	
20	176.0-185.5	178.60	83.4	74.0			18.4	9.6	24.4	14.5	31.3	–	–	1.8	
		180.10	78.9	67.1			21.2	12.4	33.1	15.2	18.1	–	–	–	

[a]Peak at 12.1A.

TABLE 5
Results of X-Ray Diffraction Analyses from Site 176

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Quar.	Plag.	Mica	Chlo.	Mont.	Pyri.	Gyps.	Amph.	U-1[a]
Bulk Samples															
1	0.0-6.0	4.10	72.0	56.2	9.6	3.6	21.6	11.3	44.5	6.2	–	1.7		1.5	
2	6.0-15.0	8.60	73.6	58.8	6.8	3.1	19.3	10.7	52.5	6.3	–	–		1.3	
		11.60	79.8	68.5	–	2.6	33.9	24.3	30.4	4.6	–	2.0		2.1	
3	15.0-24.0	22.10	80.8	70.1	1.2	1.9	30.7	23.6	27.6	4.9	4.9	3.3		1.8	
4	24.0-32.0	28.10	81.0	70.4	2.4	1.9	25.3	20.6	33.3	7.5	7.7	1.4		–	
		31.10	75.3	61.3	2.0	–	25.3	28.7	32.4	6.7	–	1.3		3.6	
2-20μ Fraction															
1	0.0-6.0	4.10	57.4	33.5			26.0	13.4	47.8	9.4		1.9		1.4	Trace
2	6.0-15.0	8.60	55.1	29.8			27.0	16.1	45.9	9.3		–		1.7	Trace
		11.60	67.0	48.5			33.8	24.4	31.6	6.5		1.3		2.4	Trace
3	15.0-24.0	22.10	67.3	48.8			29.5	19.2	38.6	7.2		3.7		1.8	Trace
4	14.0-32.0	28.10	65.8	46.5			28.1	28.7	30.9	5.8		3.5		3.0	Trace
		31.10	64.6	44.7			30.6	33.1	25.5	7.6		–		3.2	Trace
<2μ Fraction															
1	0.0-6.0	4.10	79.8	68.4			14.2	6.8	54.9	9.4	13.3	–	–	1.3	
2	6.0-15.0	8.60	78.0	65.6			16.4	8.8	53.8	11.3	8.3	–	–	1.3	
		11.60	83.0	73.5			17.7	10.1	35.0	8.8	25.1	1.3	–	2.0	
3	15.0-24.0	22.10	84.6	75.9			17.4	9.4	26.0	8.3	37.0	1.9	–	–	
4	24.0-32.0	28.10	82.5	72.6			14.5	10.0	35.8	11.0	27.0	–	1.7	–	
		31.10	79.0	67.2			15.0	11.8	38.0	14.8	20.5	–	–	–	

[a]Peak at 12.1A.

TABLE 6
Results of X-Ray Diffraction Analyses from Site 177A

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Side.	Quar.	Plag.	Mica	Chlo.	Mont.	Clin.	Pyri.	Amph.	Gyps.	U-1[a]
Bulk Samples																	
2	18.0-27.0	26.60	73.1	58.0	–	–	–	18.2	36.3	28.3	5.1	–	–	–	12.1		–
3	27.0-36.0	31.10	74.1	59.5	–	–	–	23.7	48.0	14.8	1.6	–	–	–	11.8		–
5	45.0-54.0	50.60	74.4	60.1	–	–	–	19.4	45.2	18.2	2.1	2.1	–	–	13.1		–
7	61.0-70.0	63.70	74.9	60.8	–	–	–	21.7	41.2	20.3	1.7	4.2	–	–	10.9		Trace
8	79.5-89.0	82.20	81.5	71.0	–	–	–	24.6	29.3	26.0	5.5	11.1	–	–	3.6		–
		86.60	70.7	54.2	–	–	–	23.4	44.9	13.7	0.3	3.3	–	–	14.5		–
9	89.0-98.5	96.10	73.7	59.0	–	–	–	24.2	49.9	13.7	0.9	–	–	–	11.2		–
10	98.5-108.0	102.50	74.0	59.4	–	–	–	20.9	44.0	21.6	1.5	–	–	–	11.9		–
11	117.5-127.0	121.60	79.1	67.4	–	–	–	22.8	28.9	23.9	5.6	10.9	–	1.2	6.8		–
14	203.0-212.5	205.50	80.2	69.1	7.2	–	–	25.0	31.5	13.8	3.3	13.2	1.9	–	4.0		–
15	212.5-222.0	217.20	72.8	57.5	–	–	6.2	18.5	40.7	17.7	1.5	6.7	–	–	8.7		Trace
16	222.0-231.5	224.10	77.2	64.3	–	4.8	–	23.1	34.6	20.6	6.1	8.3	–	–	2.6		–
17	231.5-241.0	234.80	69.9	53.0	–	–	–	22.8	44.8	16.2	0.1	7.3	–	–	8.9		Trace
18	241.0-250.5	242.60	74.2	59.7	–	–	–	19.8	43.2	20.7	2.9	8.0	–	–	5.4		–

TABLE 6 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Dolo.	Side.	Quar.	Plag.	Mica	Chlo.	Mont.	Clin.	Pyri.	Amph.	Gyps.	U-1[a]
20	260.0-269.5	261.90	74.8	60.6	–	–	–	20.9	38.7	26.9	4.5	7.1	–	–	1.8		–
21	269.5-279.0	273.10	75.6	61.9	–	–	–	28.4	54.6	–	7.4	9.5	–	–	–		–
22	279.0-288.0	283.20	72.0	56.2	–	–	–	21.8	41.7	21.8	3.6	9.4	–	–	1.7		–
23	345.5-355.0	351.80	73.2	58.2	–	–	–	24.3	40.1	24.5	6.3	4.9	–	–	–		–
25	381.5-389.0	385.20	70.8	54.4	21.1	–	–	26.4	19.1	20.7	6.7	6.0	–	–	–		–
26	450.0-459.5	450.80	68.5	50.9	–	–	–	28.5	36.0	25.4	10.1	–	–	–	–		–
2-20μ Fraction																	
2	18.0-27.0	26.60	63.3	42.6				27.8	47.7	6.8	2.4	–	–	–	15.4		Trace
3	27.0-36.0	31.10	62.7	41.7				26.0	50.6	6.0	0.9	–	–	–	16.4		Trace
5	45.0-54.0	50.60	66.3	47.3				23.0	47.2	9.8	0.8	–	1.2	–	18.0		–
7	61.0-70.0	63.70	65.5	46.1				25.2	48.7	9.8	1.4	–	–	–	14.9		Present
8	79.5-89.0	82.20	71.3	55.2				28.2	32.5	27.8	7.2	–	–	–	4.3		Trace
		86.60	66.9	48.3				22.4	42.5	15.9	2.5	–	–	–	16.7		Trace
9	89.0-98.5	96.10	67.2	48.7				25.3	43.4	14.0	3.8	–	–	–	13.5		Trace
10	98.5-108.0	102.50	68.1	50.1				25.4	47.7	8.8	2.0	–	–	–	16.1		Present
11	117.5-127.0	121.60	72.7	57.4				25.4	34.6	17.7	3.7	9.6	–	1.2	7.8		Trace
14	203.0-212.5	205.50	70.3	53.6				27.7	31.2	17.5	6.0	11.6	3.6	–	2.3		Trace
15	212.5-222.0	217.20	66.2	47.2				20.1	46.5	14.7	2.7	–	–	–	16.0		Present
16	222.0-231.5	224.10	70.3	53.7				24.0	39.6	19.5	6.0	7.4	–	–	3.5		Trace
17	231.5-241.0	234.80	67.9	49.8				20.5	47.6	11.0	3.0	8.0	–	–	9.9		–
18	241.0-250.5	242.60	68.4	50.6				20.9	50.7	12.0	3.2	6.5	–	–	6.7		Trace
20	260.0-269.5	261.90	68.6	50.9				23.3	48.0	15.7	5.7	5.8	–	–	1.6		Trace
21	269.5-279.0	273.10	67.8	49.7				26.7	46.8	19.0	7.5	–	–	–	–		Present
22	279.0-288.0	283.20	67.8	49.6				22.6	46.4	15.5	5.8	7.4	–	–	2.3		Trace
23	345.5-355.0	351.80	64.1	44.0				30.8	44.6	16.5	8.1	–	–	–	–		Present
25	381.5-389.0	385.20	64.5	44.6				35.3	26.8	28.1	9.8	–	–	–	–		Trace
26	450.0-459.5	450.80	61.8	40.3				36.2	42.6	13.6	7.7	–	–	–	–		Trace
<2μ Fraction																	
2	18.0-27.0	26.60	80.9	70.1				15.2	39.3	15.4	13.4	6.0			10.7	–	
3	27.0-36.0	31.10	82.5	72.7				12.2	34.8	16.4	9.9	17.5			9.3	–	
5	45.0-54.0	50.60	84.1	75.1				11.4	39.2	13.4	9.3	17.1			9.7	–	
10	98.5-108.0	102.50	84.4	75.5				12.6	24.2	13.0	8.4	36.1			4.5	1.2	
11	117.5-127.0	121.60	85.0	76.6				18.5	19.6	12.1	6.7	43.1			–	–	
14	203.0-212.5	205.50	80.3	69.1				11.7	8.8	12.0	3.0	62.9			–	1.6	
15	212.5-222.0	217.20	85.9	78.0				16.1	38.7	14.5	8.6	20.0			–	2.1	
16	222.0-231.5	224.10	83.6	74.3				20.5	30.3	17.1	9.9	22.1			–	–	
17	231.50-241.0	234.80	83.9	74.8				9.8	24.1	8.9	4.0	51.9			–	1.3	
18	241.0-250.5	242.60	85.0	76.6				12.3	31.5	10.0	5.2	36.8			2.3	1.9	
20	260.0-269.5	261.90	83.4	74.1				13.3	28.4	18.9	7.1	27.3			–	5.0	
21	269.5-279.0	273.10	81.8	71.5				10.9	26.6	11.6	6.2	42.6			–	2.1	
22	279.0-288.0	283.20	84.9	76.3				10.8	26.5	14.2	5.5	39.7			–	3.3	
23	345.5-355.0	351.80	79.9	68.6				19.3	28.1	13.6	10.2	28.8			–	–	
25	381.5-389.0	385.20	80.9	70.2				22.7	18.9	20.3	10.0	28.2			–	–	
26	450.0-459.5	450.80	76.6	63.4				18.4	21.5	36.2	23.9	–			–	–	

[a]Peak at 12.1A.

TABLE 7
Results of X-Ray Diffraction Analyses from Site 178

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Quar.	Plag.	Kaol	Mica	Chlo.	Mont.	Pyri.	Bari.	Trid.	Gyps.	Amph.	Hali.	U-5[a]	U-1[b]	U-4[c]
Bulk Samples																				
2	6.0-15.0	8.30	69.3	52.0	–	22.4	23.6	–	35.5	13.7	–	–	–			4.8		Trace		
3	15.0-24.0	18.10	69.2	51.8	–	18.2	20.4	–	44.5	11.8	–	–	–			5.1		–		
11	87.0-96.0	89.30	69.5	52.3	–	23.5	25.2	–	32.4	13.0	–	–	–			5.9		–		
12	96.0-105.0	98.30	72.8	57.6	–	20.9	22.9	–	35.5	12.1	–	–	–			8.6		–		
15	123.0-132.0	125.30	73.3	58.3	–	21.5	23.8	–	34.0	11.9	–	1.1	–			7.7		–		
17	141.0-150.0	144.70	72.2	56.5	–	25.9	26.6	–	29.7	12.5	1.2	–	–			4.2		–		
20	168.0-177.0	173.18	74.7	60.5	–	22.5	25.8	–	34.5	8.3	3.8	–	–			5.1		–		
		173.91	69.9	53.0	–	26.1	24.3	–	32.6	13.1	1.4	–	–			2.5		–		
25	211.0-220.5	213.30	72.7	57.3	–	20.3	25.4	–	35.1	11.2	1.7	–	–			6.3		–		
28	239.5-249.0	241.71	75.6	61.9	–	22.9	23.9	–	32.3	9.4	6.5	–	–			5.0		–		
30	287.0-296.5	289.70	75.7	62.0	–	22.7	20.6	–	37.7	13.0	–	2.2	–			3.8		–		
32	306.0-315.5	309.55	73.7	58.9	–	21.6	25.4	–	28.4	11.4	5.8	–	–			7.4		–		
		310.45	83.7	74.5	6.8	23.1	24.5	–	26.5	9.2	5.7	–	–			4.2		–		
33	315.5-325.0	322.22	81.6	71.3	–	21.6	24.5	–	30.2	8.6	11.1	–	–			4.1		–		
44	456.0-465.5	459.23	77.3	64.5	–	24.5	24.5	–	32.2	10.8	4.3	–	–			3.6		–		
		460.35	89.2	83.2	–	25.7	27.5	–	27.5	9.8	9.5	–	–			–		–		
		461.00	90.4	85.0	–	26.2	28.0	–	27.4	9.7	8.7	–	–			–		–		
46	496.0-505.5	498.20	69.5	52.4	–	25.6	25.9	–	31.3	11.3	4.0	–	–			2.0		–		
50	629.0-638.5	629.41	75.5	61.7	–	23.6	19.4	–	33.9	10.4	12.7	–	–			–		–		
51	657.5-667.0	659.80	68.3	50.5	–	24.5	24.2	–	38.4	7.6	3.5	–	–			1.8		–		
		659.92	72.6	57.2	–	25.0	24.4	–	29.2	9.6	10.0	–	–			1.7		–		
53	716.0-720.0	716.60	86.8	79.3	–	26.8	28.0	–	27.9	5.1	12.2	–	–			–		–		
54	742.0-749.0	742.90	81.4	71.0	–	10.2	15.8	–	8.2	2.1	51.7	0.6	11.4			–		–		
		744.60	88.8	82.6	–	15.6	29.0	2.3	17.5	1.1	11.0	–	21.7			1.8		–		
		747.90	82.1	72.0	–	15.0	31.3	1.5	9.5	0.6	28.6	–	12.2			1.3		–		
		748.80	80.3	69.3	–	10.0	21.6	–	8.8	3.3	52.3	–	4.1			–		–		
57	768.0-777.5	769.26	81.1	70.4	–	42.2	42.1	–	–	9.7	–	–	6.0			–		–		
		769.46	80.2	69.1	–	14.2	10.8	1.0	11.5	2.2	58.3	–	2.0			–		–		

TABLE 7 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Quar.	Plag.	Kaol.	Mica	Chlo.	Mont.	Pyri.	Bari.	Trid.	Gyps.	Amph.	Hali.	U-5[a]	U-1[b]	U-4[c]
2-20μ Fraction																				
2	6.0-15.0	8.30	65.4	46.0		34.3	32.3		17.7	10.1	–		–			5.6			Trace	–
3	15.0-24.0	18.10	57.7	34.0		23.4	28.5		28.7	12.2	–		–			7.3			Present	–
11	87.0-96.0	89.30	59.3	36.4		31.0	27.0		21.3	12.5	–		–			8.1			Trace	–
12	96.0-105.0	98.30	65.4	45.9		29.3	31.8		15.0	10.7	–		–			13.2			Trace	–
15	123.0-132.0	125.30	67.1	48.5		27.2	32.2		19.2	12.1	–		–			9.3			Trace	–
17	141.0-150.0	144.70	60.4	38.1		32.6	31.5		18.7	11.5	–		–			5.8			Trace	–
20	168.0-177.0	173.18	64.2	44.0		27.9	33.1		22.8	8.7	–		–			7.5			Trace	–
		173.91	59.6	36.9		34.4	31.2		19.5	10.6	–		–			4.3			Trace	–
25	211.0-220.5	213.30	63.8	43.4		31.2	32.5		18.1	10.0	–		–			8.3			Trace	Present
28	239.5-249.0	241.71	68.8	51.3		29.1	30.6		24.5	8.5	–		–			7.2			Trace	–
30	287.0-296.5	289.70	68.3	50.5		24.7	24.2		31.6	14.5	–		–			4.9			Present	–
32	306.0-315.5	309.55	67.4	49.0		24.9	27.4		25.1	11.3	–		–			11.3			Trace	–
		310.45	80.9	70.1		29.9	31.5		22.7	10.2	–		–			5.7			Trace	–
33	315.5-325.0	322.22	79.0	67.2		23.9	27.0		26.3	7.2	10.9		–			4.7			Trace	–
44	456.0-465.5	459.23	74.1	59.5		29.6	29.4		25.6	10.0	–		–			5.4			Trace	–
		460.35	89.9	84.2		28.9	30.2		21.0	8.5	9.3		–			2.2			Trace	–
		461.00	90.0	84.4		34.2	34.0		14.9	9.6	5.4		–			2.0			–	–
46	496.0-505.5	498.20	66.2	47.2		30.6	31.0		23.9	11.5	–		–			3.0			Trace	–
50	629.0-638.5	629.41	69.4	52.2		25.8	24.1		27.5	11.9	9.2		–			1.5			Trace	–
51	657.5-667.0	659.80	63.7	43.2		33.2	31.0		25.5	7.0	–		–			3.3			Present	–
		659.92	69.7	52.7		36.2	33.0		19.5	9.4	–		–			1.9			Trace	–
53	716.0-720.0	716.60	84.1	75.1		27.2	27.9		28.4	5.4	9.6		–			1.5			Trace	–
54	742.0-749.0	742.90	82.4	72.5		16.9	29.3		13.5	4.8	24.7		10.8			–			–	–
		744.60	87.3	80.1		21.0	37.0		17.3	1.9	6.8		13.5			2.4			–	–
		747.90	77.6	65.1		20.0	39.4		15.1	2.1	14.9		5.7			2.7			–	–
		748.80	73.0	57.8		14.8	39.3		23.1	3.2	9.8		8.0			1.9			–	–
57	768.0-777.5	769.26	72.0	56.2		25.3	26.4		31.2	4.0	8.8		4.3			–			–	–
		769.46	72.7	57.3		24.8	24.2		31.7	4.9	10.6		3.8			–			–	–

TABLE 7 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Quar.	Plag.	Kaol	Mica	Chlo.	Mont.	Pyri.	Bari.	Trid.	Gyps.	Amph.	Hali.	U-5[a]	U-1[b]	U-4[c]
<2μ Fraction																				
2	6.0-15.0	8.30	76.8	63.7		13.3	12.7	–	38.8	23.9	8.5			–	–	2.8	–			–
3	15.0-24.0	18.10	75.5	61.7		13.4	14.9	–	41.2	24.5	2.4			–	–	3.6	–			–
11	87.0-96.0	89.30	77.6	65.0		13.9	14.5	–	41.4	23.3	3.0			–	–	4.1	–			–
12	96.0-105.0	98.30	77.2	64.4		12.1	15.2	–	35.7	21.2	8.7			–	1.5	5.6	–			Present
15	123.0-132.0	125.30	76.6	63.4		13.7	15.9	–	32.2	22.9	10.6			–	–	4.6	–			–
17	141.0-150.0	144.70	75.3	61.4		12.9	13.0	–	37.3	20.7	12.6			–	1.2	2.3	–			–
20	168.0-177.0	173.18	82.7	72.9		17.9	21.6	–	33.4	11.8	9.3			–	0.9	5.0	–			–
		173.91	76.6	63.4		14.3	12.6	–	40.7	19.4	11.2			–	1.8	–	–			–
25	211.0-220.5	213.30	79.9	68.6		14.2	16.7	–	36.7	19.1	8.9			–	–	4.4	–			–
28	239.5-249.0	241.71	80.4	69.4		17.3	18.7	–	27.4	12.7	18.1			–	1.8	4.1	–			–
30	287.0-296.5	289.70	77.6	65.0		18.6	17.2	–	32.4	19.5	9.5			–	–	2.7	–			–
32	306.0-315.5	309.55	79.1	67.4		12.3	17.2	–	27.3	12.8	25.7			–	1.9	2.8	–			–
		310.45	81.9	71.7		15.3	17.0	–	28.1	9.7	25.8			–	1.7	2.5	–			–
33	315.5-325.0	322.22	81.0	70.3		14.1	13.9	–	25.1	7.2	34.7			–	3.2	1.7	–			–
44	456.0-465.5	459.23	80.2	69.1		15.9	17.1	–	27.1	11.4	24.8			–	1.9	1.8	–			–
		460.35	82.6	72.8		13.1	14.1	–	30.0	9.9	29.5			–	3.5	–	–			–
		461.00	82.8	73.2		17.4	18.3	–	25.0	13.6	25.8			–	–	–	–			–
46	496.0-505.5	498.20	78.0	65.7		14.8	15.0	–	35.8	18.2	14.0			–	2.3	–	–			–
50	629.0-638.5	629.41	77.9	65.5		13.4	10.6	–	19.8	13.8	42.4			–	–	–	–			–
51	657.5-667.0	659.80	81.0	70.3		14.4	14.2	–	25.0	11.1	31.2			–	4.1	–	–			–
		659.92	78.7	66.8		8.2	6.7	–	21.0	6.5	54.2			–	3.5	–	–			–
53	716.0-720.0	716.60	86.2	78.8		17.8	19.0	–	22.8	7.0	33.3			–	–	–	–			–
54	742.0-749.0	742.90	77.2	64.3		4.4	5.7	0.6	5.3	1.8	82.2			–	–	–	–			–
		744.60	91.1	86.1		18.5	25.4	6.1	14.7	1.5	26.4			5.6	–	1.9	–			–
		747.90	82.8	73.2		8.9	12.5	1.7	5.3	1.2	68.9			–	–	1.5	–			–
		748.80	76.0	62.4		3.9	3.4	–	5.3	1.3	86.2			–	–	–	–			–
57	768.0-777.5	769.26	79.1	67.3		7.5	7.0	–	7.4	3.3	73.4			–	–	–	1.3			–
		769.46	85.0	69.6		8.4	6.9	1.4	6.4	1.6	75.3			–	–	–	–			–

[a]Peaks at 4.11, 6.18A, and 12.3A.

[b]Peak at 12.1A.

[c]Peak at 22.2A and 11.25A.

TABLE 8
Results of X-Ray Diffraction Analyses from Site 180

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Quar.	Plag.	Mica	Chlo.	Mont.	Gyps	Amph.	Magn.	U-1[a]
Bulk Samples														
2	3.5-13.0	5.30	74.2	59.7	3.0	27.5	26.4	27.3	7.8	–	2.4	5.6	–	
4	22.5-32.0	25.70	72.0	56.3	–	26.5	27.1	30.0	11.2	–	–	5.2	–	
8	60.5-70.0	65.60	75.3	61.3	–	23.6	23.0	35.4	9.8	4.2	–	4.0	–	
10	79.5-89.0	83.40	70.4	53.8	–	32.7	32.3	23.1	8.3	–	–	3.6	–	
11	89.0-98.5	92.50	81.2	70.7	–	3.1	65.7	2.9	1.2	20.9	–	–	6.2	
2-20μ Fraction														
2	3.5-13.0	5.30	66.1	47.0		35.0	34.1	16.4	7.4	–		7.1	–	Trace
4	22.5-32.0	25.70	65.3	45.7		32.5	31.4	20.2	8.6	–		7.3	–	Trace
8	60.5-70.0	65.60	67,8	51.4		30.6	28.9	25.9	9.3	–		5.3	–	Trace
10	79.5-89.0	83.40	60.5	38.2		32.0	32.1	19.4	11.4	–		5.1	–	Trace
11	89.0-98.5	92.50	75.8	62.2		3.9	69.9	4.8	2.4	13.3		–	5.6	–
<2μ Fraction														
2	3.5-13.0	5.30	66.1	47.0		35.0	34.1	16.4	7.4	–		7.1	–	Trace
4	22.5-32.0	25.70	65.3	45.7		32.5	31.4	20.2	8.6	–		7.3	–	Trace
8	60.5-70.0	65.60	68.9	51.4		30.6	28.9	25.9	9.3	–		5.3	–	Trace
10	79.5-89.0	83.40	60.5	38.2		32.0	32.1	19.4	11.4	–		5.1	–	Trace
11	89.0-98.5	92.50	75.8	62.2		3.9	69.9	4.8	2.4	13.3		–	5.6	–

[a]Peak at 12.1A.

TABLE 9
Results of X-Ray Diffraction Analyses from Site 180

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Quar.	Plag.	Mica	Chlo.	Mont.	Gyps.	Amph.	U-1[a]	U-4[b]
Bulk Samples														
2	9.5-19.0	11.80	63.5	42.9	1.4	30.8	34.5	21.1	7.4	–		4.8		
4	28.5-38.0	30.90	67.6	49.5	2.1	23.1	24.4	34.7	11.9	–		3.9		
5	38.0-47.5	41.40	73.8	59.1	2.01	20.6	24.9	32.5	12.2	–		7.9		
		41.60	72.5	57.0	3.6	20.9	24.4	30.8	11.2	–		9.3		
8	66.5-76.0	68.80	69.2	51.9	–	28.1	24.7	33.7	11.2	–		2.4		
12	147.5-157.0	150.20	67.0	48.4	4.9	19.1	25.4	11.4	10.0	–		9.2		
15	242.5-252.0	244.80	72.6	57.2	–	25.0	32.3	24.5	13.3	–		4.9		
17	261.5-271.0	263.90	75.0	60.9	–	20.6	24.9	29.9	16.3	–		8.3		
		264.60	68.4	50.7	1.1	23.7	27.0	28.8	11.3	–		8.2		
18	271.0-280.5	274.80	73.5	58.6	1.4	20.3	24.0	33.6	11.3	–		9.5		
20	413.5-423.0	415.40	68.1	50.2	–	27.8	23.9	32.1	12.7	–		3.4		
		417.30	72.5	57.1	–	21.2	21.2	37.4	15.1	1.9		3.3		
		418.30	71.9	56.1	–	22.6	25.3	27.5	14.6	4.0		6.0		
		418.90	75.7	62.0	–	20.9	24.6	32.5	12.2	3.2		6.5		
23	442.0-451.5	445.80	76.9	64.0	1.4	19.4	23.5	31.8	13.5	1.8		8.6		
24	451.5-461.0	453.50	73.5	58.5	–	23.6	24.2	34.3	12.3	–		5.6		

TABLE 9 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Calc.	Quar.	Plag.	Mica	Chlo.	Mont.	Gyps.	Amph.	U-1[a]	U-4[b]
2-20μ Fraction														
2	9.5-19.0	11.80	61.8	40.3		36.5	33.8	14.7	7.4			7.6	Trace	–
4	28.5-38.0	30.90	58.7	35.5		33.8	34.2	16.2	11.4			4.5	Present	–
5	38.0-47.5	41.40	67.3	48.9		30.5	33.0	16.5	7.8			12.1	Present	–
		41.60	66.7	48.0		31.6	37.4	11.6	7.5			11.8	–	Present
8	66.5-76.0	68.80	62.6	41.5		37.2	30.3	20.0	9.2			3.3	Present	–
12	147.5-157.0	150.20	60.5	38.3		30.7	38.6	11.9	8.1			10.8	Present	–
15	242.5-252.0	244.80	63.8	43.4		32.1	37.0	12.4	7.8			10.7	Trace	–
17	261.5-271.0	263.90	63.6	43.2		35.2	32.8	10.21	8.7			13.1	Trace	–
		264.60	63.8	43.5		32.7	37.1	13.2	6.3			10.8	Trace	–
18	271.0-280.5	274.80	64.7	44.9		29.6	34.9	15.6	6.6			13.3	Trace	Present
20	413.5-423.0	415.40	62.6	41.5		35.5	33.7	17.4	8.1			5.2	Trace	–
		417.30	60.5	38.3		33.1	32.1	19.1	10.7			5.0	Present	
		418.30	61.8	40.3		30.4	32.1	16.6	11.1				Trace	–
		418.90	65.1	45.4		32.7	36.7	12.3	7.0			11.4	Trace	Trace
23	442.0-451.5	445.80	62.1	40.8		30.7	33.2	13.2	7.1			15.9	Trace	Trace
24	451.5-461.0	453.50	61.1	39.2		32.4	33.5	15.8	9.3			9.0	Trace	–
<2μ Fraction														
2	9.5-19.0	11.80	61.8	40.3		36.5	33.8	14.7	7.4			7.6	Trace	
4	28.5-38.0	30.90	58.7	35.5		33.8	34.2	16.2	11.4			4.5	Present	
5	38.0-47.5	41.40	67.3	48.9		30.5	33.0	16.5	7.8			12.1	Present	
		41.60	66.7	48.0		31.6	37.4	11.6	7.5			11.8	–	Present
8	66.5-76.0	68.80	62.6	41.5		37.2	30.3	20.0	9.2			3.3	Present	–
12	147.5-157.0	150.20	60.5	38.3		30.7	38.6	11.9	8.1			10.8	Present	–
15	242.5-252.0	244.80	63.8	43.4		32.1	37.0	12.4	7.8			10.7	Trace	–
17	261.5-271.0	263.90	63.6	43.2		35.2	32.8	10.2	8.7			13.1	Trace	–
		164.60	63.8	43.5		32.7	37.1	13.2	6.3			10.8	Trace	–
18	271.0-280.5	274.80	64.7	44.9		29.6	34.9	15.6	6.6			13.3	Trace	Present
20	413.5-423.0	415.40	62.6	41.5		35.5	33.7	17.4	8.1			5.2	Trace	–
		417.30	60.5	38.3		33.1	32.1	19.1	10.7			5.0	Present	–
		418.30	61.8	40.3		30.4	32.1	16.6	11.1			9.8	Trace	–
		418.90	65.1	45.4		32.7	36.7	12.3	7.0			11.4	Trace	Trace
23	442.0-451.5	445.80	62.1	40.8		30.7	33.2	13.2	7.1			15.9	Trace	Trace
24	451.5-461.0	453.50	61.1	39.2		32.4	33.5	15.8	9.3			9.0	Trace	–

[a]Peak at 12.1A.

[b]Peak at 22.2A and 11.25A.

TABLE 10
Results of X-Ray Diffraction Analyses from Site 181

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Quar.	Plag.	Mica	Chlo.	Mont.	Gyps.	Amph.	U-1[c]	U-4[d]	U-6[e]
Bulk Samples														
2	9.0-18.5	10.90	71.3	55.2	22.6	20.3	39.0	15.0	–	–	3.1			
		13.90	67.5	49.2	25.5	25.9	34.0	10.3	–	–	4.2			
4	28.0-37.5	30.00	76.4	63.1	18.6	18.2	40.8	16.9	1.5	1.1	3.0			
6	47.0-56.5	48.80	75.3	61.3	23.3	20.5	37.5	13.6	2.4	–	2.7			
7	56.5-66.0	58.80	69.1	51.7	39.6	38.7	12.3	6.1	–	–	3.3			
8	66.6-75.5	68.50	71.7	55.8	21.4	20.5	37.8	16.0	1.5	–	2.7			
12	104.0-133.5	105.90	72.7	57.3	23.4	25.5	33.5	13.7	–	–	4.0			
13	113.5-123.0	115.30	67.6	49.4	22.6	24.3	34.7	14.8	–	–	3.6			
		118.40	75.4	61.6	22.4	22.5	36.0	13.2	1.7	–	4.2			
17	151.5-161.0	153.40	67.0	48.5	22.3	21.3	36.0	15.5	–	–	4.9			
		159.30	67.7	49.5	20.2	20.5	35.4	17.6	1.1	–	5.2			
22	196.0-205.5	197.30	68.5	50.8	25.5	23.6	33.1	15.2	2.6	–	–			
27	275.0-281.0	277.40	72.3	56.7	28.0	14.7	35.1	21.1	–	1.1	–			
28	319.5-322.5	320.70[a]	74.9	60.8	21.7	24.0	31.9	14.4	2.9	–	5.1			
		320.70[b]	65.3	45.8	30.9	25.0	28.7	13.7	–	–	1.7			
29	337.5-340.5	339.60	73.7	58.9	23.0	19.3	35.2	16.3	6.2	–	–			
2-20μ Fraction														
2	9.0-18.5	10.90	58.5	35.1	35.8	31.3	17.8	10.5			4.6	Trace	Trace	–
		13.90	62.3	41.0	30.8	30.7	22.8	9.7			6.0	Trace	–	–
4	28.0-37.5	30.00	63.9	43.6	32.1	31.4	21.4	8.6			6.6	Trace	–	–
6	47.0-56.5	48.80	62.7	41.7	41.8	33.9	13.1	7.1			4.0	–	Trace	Present
7	56.5-66.0	58.80	65.1	45.4	43.2	37.6	9.8	4.3			5.1	–	Trace	–
8	66.6-75.5	68.50	60.7	38.7	32.6	28.8	21.4	12.1			5.1	Trace	–	–
12	104.0-133.5	105.90	61.9	40.5	35.6	33.0	15.0	10.4			6.0	Trace	–	–
13	113.5-123.0	115.30	60.7	38.6	34.0	31.0	18.1	10.4			6.5	Present	–	–
		118.40	62.3	41.1	34.6	32.5	16.9	9.7			6.3	Trace	–	–
17	151.5-161.0	153.40	62.0	40.7	31.6	30.1	20.6	11.1			6.5	Present	–	–
		159.30	62.9	42.1	36.7	34.8	13.9	7.0			7.7	Trace	–	–
22	196.0-205.5	197.30	57.7	33.9	38.0	31.5	18.1	9.7			2.6	Trace	–	–
25	224.5-234.0	226.30	56.5	32.0	37.7	34.6	14.1	10.1			3.5	Trace	–	–
27	275.0-281.0	277.40	55.5	30.4	44.1	30.8	14.7	8.8			1.6	Trace	–	–
28	319.5-322.5	320.70[a]	58.8	35.7	25.6	30.0	22.1	11.8			10.5	Present	–	–
		320.70[b]	57.6	33.7	41.0	34.8	13.1	9.3			1.8	Trace	–	–
29	337.5-340.5	339.60	60.7	38.6	33.2	35.0	14.4	9.1			8.4	Trace	–	–
<2μ Fraction														
2	9.0-18.5	10.90	74.9	60.8	14.1	13.8	44.1	24.2	3.7	–	–	–	–	
		13.90	75.2	61.2	15.4	18.2	37.4	24.1	1.9	–	3.0	Tr	–	
4	28.0-37.5	30.00	76.5	63.3	14.2	13.8	42.4	22.9	4.8	–	1.9	–	–	
6	47.0-56.5	48.80	77.2	64.3	14.3	13.1	38.8	18.6	13.9	1.1	–	–	–	
7	56.5-66.0	58.80	79.3	67.7	16.5	13.7	37.7	19.7	9.9	2.5	–	–	Abund.	
8	66.6-75.5	68.50	79.8	68.4	17.3	18.6	36.4	17.2	8.3	–	2.2	–	–	
12	104.0-133.5	105.90	76.1	62.6	15.5	15.3	38.0	20.4	8.1	–	2.7	–	Trace	
13	113.5-123.0	115.30	77.5	64.8	17.0	19.5	35.5	21.3	3.5	–	3.3	–	Present	
		118.40	78.7	66.8	17.2	19.9	35.4	16.8	7.3	–	3.5	–	Trace	
17	151.5-161.0	153.40	75.9	62.4	17.5	18.4	36.8	23.9	–	–	3.3	–	–	
		159.30	78.2	66.0	15.6	16.7	36.8	19.7	6.8	1.2	3.2	–	Present	

TABLE 10 – *Continued*

Core	Cored Interval Below Sea Floor (m)	Sample Depth Below Sea Floor (m)	Diff.	Amor.	Quar.	Plag.	Mica	Chlo.	Mont.	Gyps.	Amph.	U-1[c]	U-4[d]	U-6[e]
<2μ Fraction														
22	196.0-205.5	197.30	72.5	57.1	16.2	14.0	40.6	22.4	6.8	–	–	–	Present	
25	224.5-234.0	226.30	74.1	59.5	19.3	19.3	37.5	23.9	–	–	–	–	–	
27	275.0-281.0	277.40	75.8	62.1	20.8	15.0	41.6	17.4	5.2	–	–	–	–	
28	319.5-322.5	320.70	74.9	60.7	17.5	19.1	30.5	22.9	6.3	–	3.8	–	–	
		320.70	99.6	99.4	19.3	16.3	39.9	22.8	1.8	–	–	–	–	
29	337.5-340.5	339.60	74.8	60.7	15.4	17.5	30.7	18.8	13.7	–	3.9	–	–	

[a]"Dirty" mud.

[b]Laminated mud.

[c]Peak at 12.1A.

[d]Peaks at 22.2A and 11.25A.

[e]Peak at 4.21A.

TABLE 11
Sediment Samples Submitted for X-Ray Diffraction Analysis from Leg 18

Hole	Core	Section	Depth in Section (cm)	Depth Below Sea Floor (m)
172	1	3	109-111	4.1
	2	6	109-111	16.6
	3	4	100-102	18.1
173	1	4	110-112	5.6
	2	4	110-112	11.1
	3	6	104-106	23.5
	4	1	110-112	25.6
	5	1	110-112	35.1
	7	3	110-112	57.1
	8	2	110-112	65.1
	8	5	110-112	69.6
	9	3	110-112	76.1
	11	2	110-112	93.6
	12	3	109-111	104.6
	13	2	110-112	112.6
	13	4	110-112	115.6
	14	2	110-112	122.1
	15	3	110-112	133.1
	16	2	110-112	141.1
	16	3	110-112	142.6
	18	4	110-112	163.1
	19	3	110-112	171.1
	20	3	110-112	180.6
	21	2	110-112	188.6
	22	2	110-112	198.1
	22	3	110-112	199.6
	25	2	110-112	226.6
	26	3	110-112	237.6
	30	1	20-22	271.7
	35	2	110-112	313.1
174A	4	6	87-89	64.9
	6	2	132-134	78.3
	8	5	35-37	100.8
	11	6	132-134	131.8
	13	4	21-23	146.7
	16	5	46-48	177.0

TABLE 11 – *Continued*

Hole	Core	Section	Depth in Section (cm)	Depth Below Sea Floor (m)
	17	3	134-141	184.4
	21	2	116-118	220.7
	23	4	55-57	242.1
	27	2	132-134	277.8
	29	2	80-82	296.3
	34	2	20-22	371.7
	34	4	47-49	375.0
	37	1	57-59	503.6
	37	2	100-102	505.5
	39	2	28-29	751.8
	40	5	44-46	775.4
175	2	3	110-112	9.1
	3	3	110-112	18.6
	3	4	107-109	20.1
	4	2	110-112	26.6
	4	4	110-112	29.6
	5	5	110-112	40.6
	6	3	119-112	47.1
	7	2	110-112	55.1
	8	2	70-72	64.2
	9	4	110-112	77.1
	10	3	110-112	85.1
	13	3	110-112	113.6
	16	2	110-112	140.6
	17	2	111-113	150.1
	17	5	111-113	154.6
	18	3	110-112	161.1
	19	1	110-112	167.6
	20	2	110-112	178.6
	20	3	110-112	180.0
176	1	3	110-112	4.1
	2	2	110-112	8.6
	2	4	110-112	11.6
	3	5	110-112	22.1
	4	3	110-112	28.1
	4	5	110-112	31.1
177A	2	6	110-112	26.6
	3	3	110-112	31.1

TABLE 11 – *Continued*

Hole	Core	Section	Depth in Section (cm)	Depth Below Sea Floor (m)
	5	4	110-112	50.6
	7	2	118-120	63.7
	8	2	118-120	82.2
	8	5	110-112	86.6
	9	5	109-111	96.1
	10	3	96-98	102.5
	11	3	110-112	121.6
	14	2	100-102	205.5
	15	4	16-18	217.2
	16	2	55-63	224.1
	17	3	34-44	234.8
	18	2	10-15	242.6
	20	2	44-48	261.9
	21	3	65-71	273.1
	22	3	116-122	283.2
	23	5	25-31	351.8
	25	3	69-73	385.2
	26	1	80-84	450.8
178	2	2	79-81	8.3
	3	3	75-77	18.1
	11	2	75-77	89.3
	12	2	75-77	98.3
	15	2	75-77	125.3
	17	3	67-69	144.7
	20	4	67-69	173.18
	20	4	140-142	173.91
	25	2	75-77	213.3
	28	2	120-123	241.71
	30	2	121-123	289.71
	30	3	55-57	309.55
	30	3	145-147	310.45
	33	5	71-73	322.22
	44	3	20-22	459.23
	44	3	134-136	460.35
	44	4	52-54	461.0
	46	2	74-75	498.2
	50	1	40-42	629.41
	51	2	129-130	549.8
	51	2	141-143	659.92
	53	1	63-65	716.60
	54	1	88.90	742.9
	54	2	110-112	744.6
	54	4	140-142	747.9

TABLE 11 – *Continued*

Hole	Core	Section	Depth in Section (cm)	Depth Below Sea Floor (m)
	54	5	85-87	748.8
	57	1	125-127	769.26
	57	1	145-147	769.46
179	2	2	32-34	5.3
	4	3	20-22	25.7
	8	4	61-63	65.6
	10	3	93-95	83.4
	11	3	52-54	92.5
180	2	2	75-77	11.8
	4	2	86-88	30.9
	5	3	44-46	41.4
	5	3	63-65	41.6
	8	2	75-77	68.8
	12	2	100-118	150.2
	15	2	75-77	244.8
	17	2	92-94	263.9
	17	3	60-62	264.6
	18	3	75-77	274.8
	20	2	42-44	415.4
	20	3	75-77	417.3
	20	4	26-28	418.3
	20	4	94-96	418.9
	23	3	75-77	445.8
	24	2	50-52	453.5
181	2	2	44-46	10.9
	2	4	42-44	13.9
	4	2	53-55	30.0
	6	2	35-37	48.8
	7	2	80-82	58.8
	8	2	40-42	68.5
	12	2	37-39	105.9
	13	2	35-37	115.3
	13	4	36-38	118.4
	17	2	40-42	153.4
	17	6	30-32	159.3
	22	1	125-132	197.3
	25	2	30-37	226.3
	27	2	87-92	277.4
	28	1	120-123	320.7
	28	1	120-123	320.7
	29	2	57-60	339.6

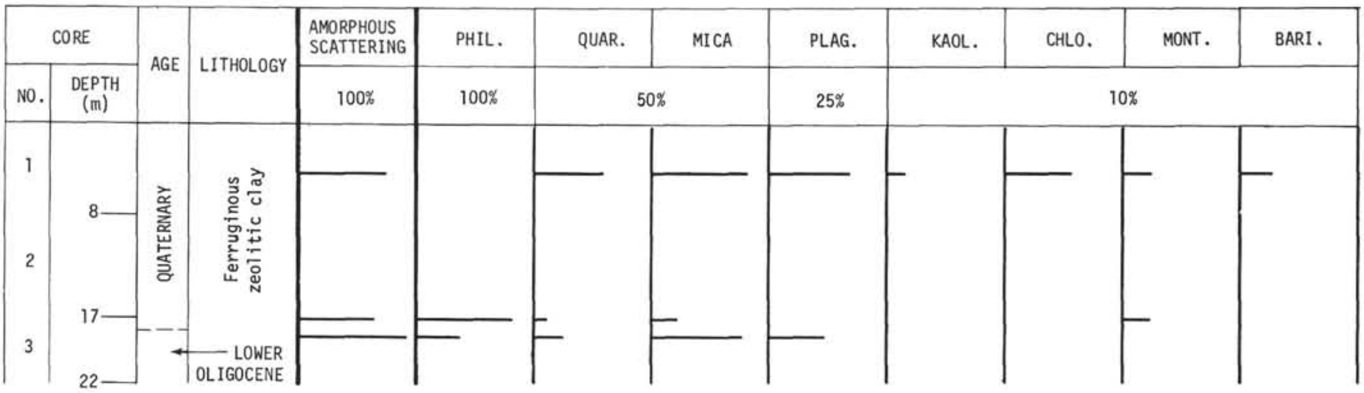

Figure 1. *Site 172. Bulk samples.*

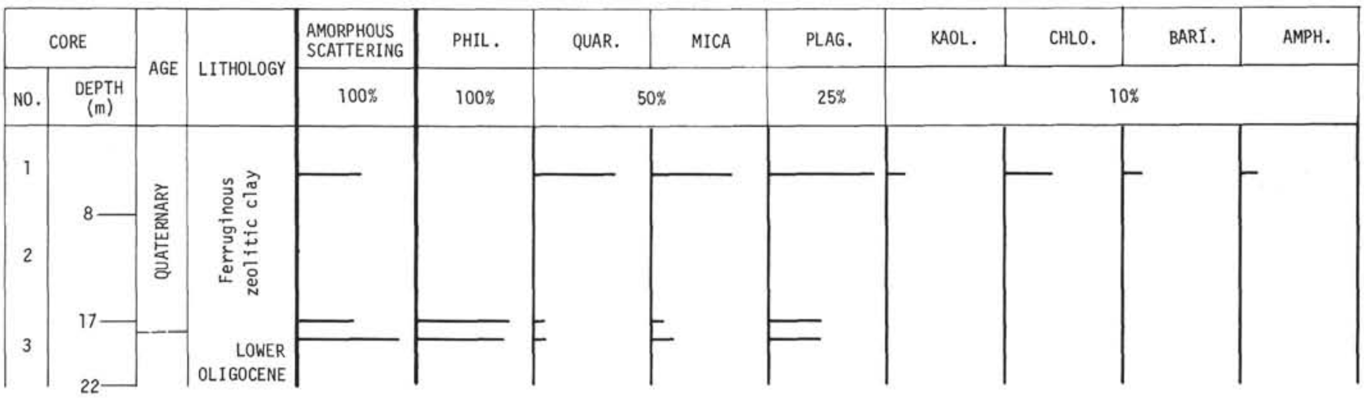

Figure 2. *Site 172. 2-20μ fractions.*

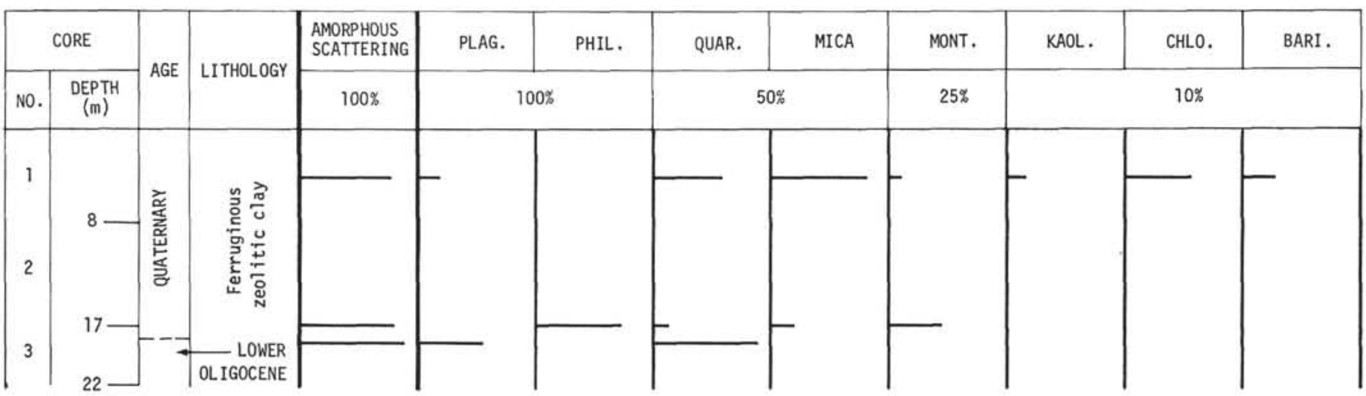

Figure 3. *Site 172. <2μ fractions.*

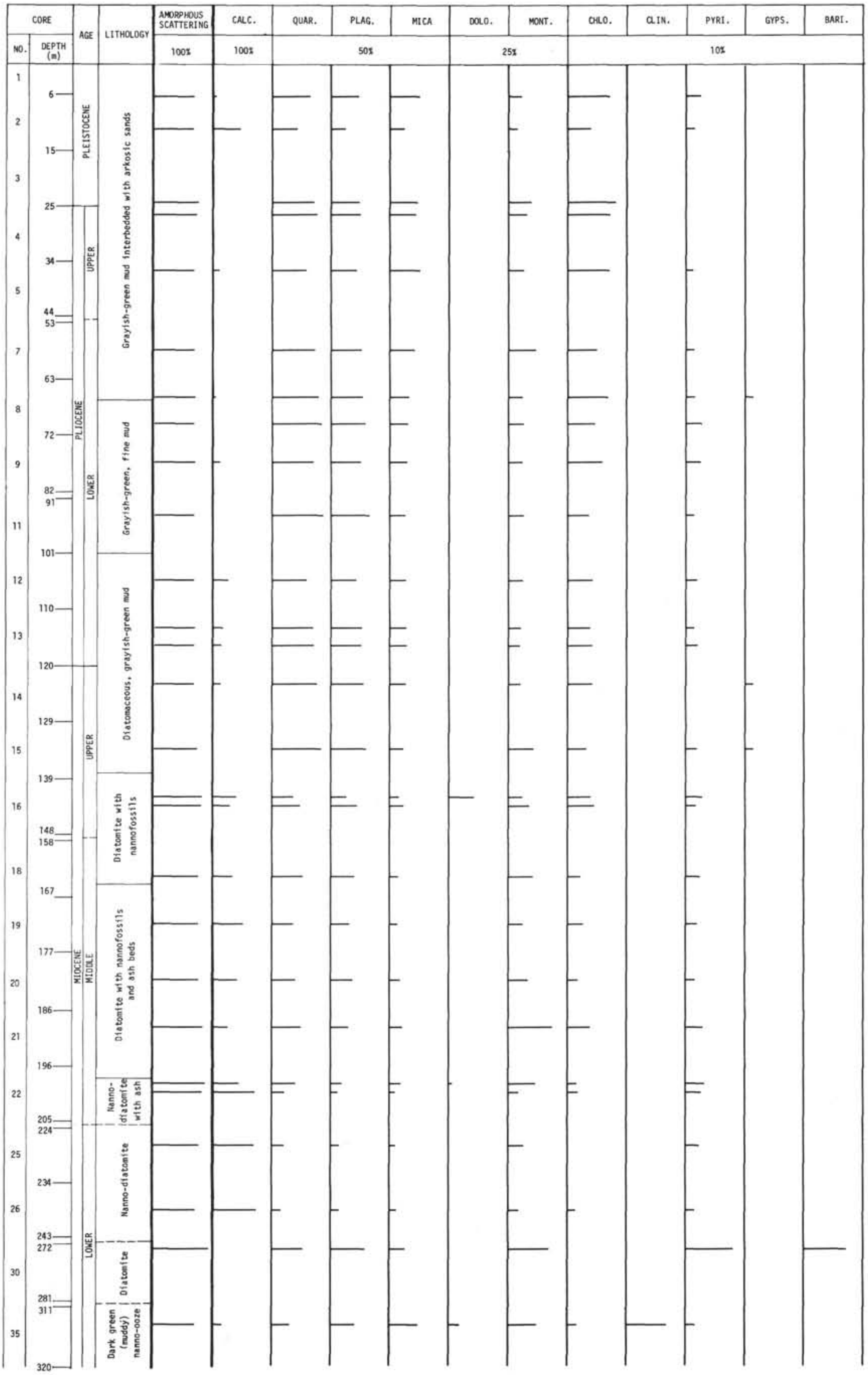

Figure 4. *Site 173. Bulk samples.*

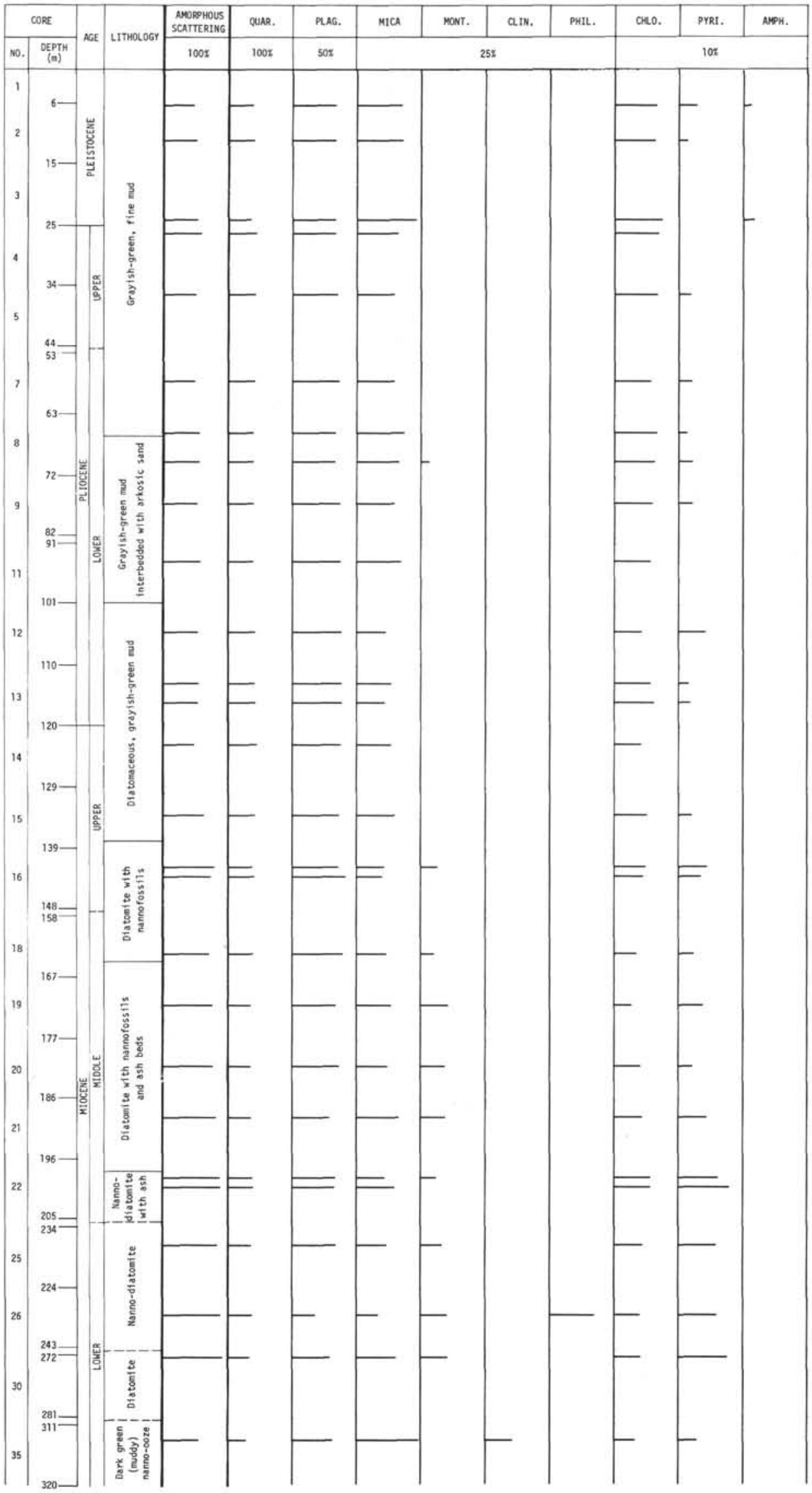

Figure 5. *Site 173. 2-20μ fractions.*

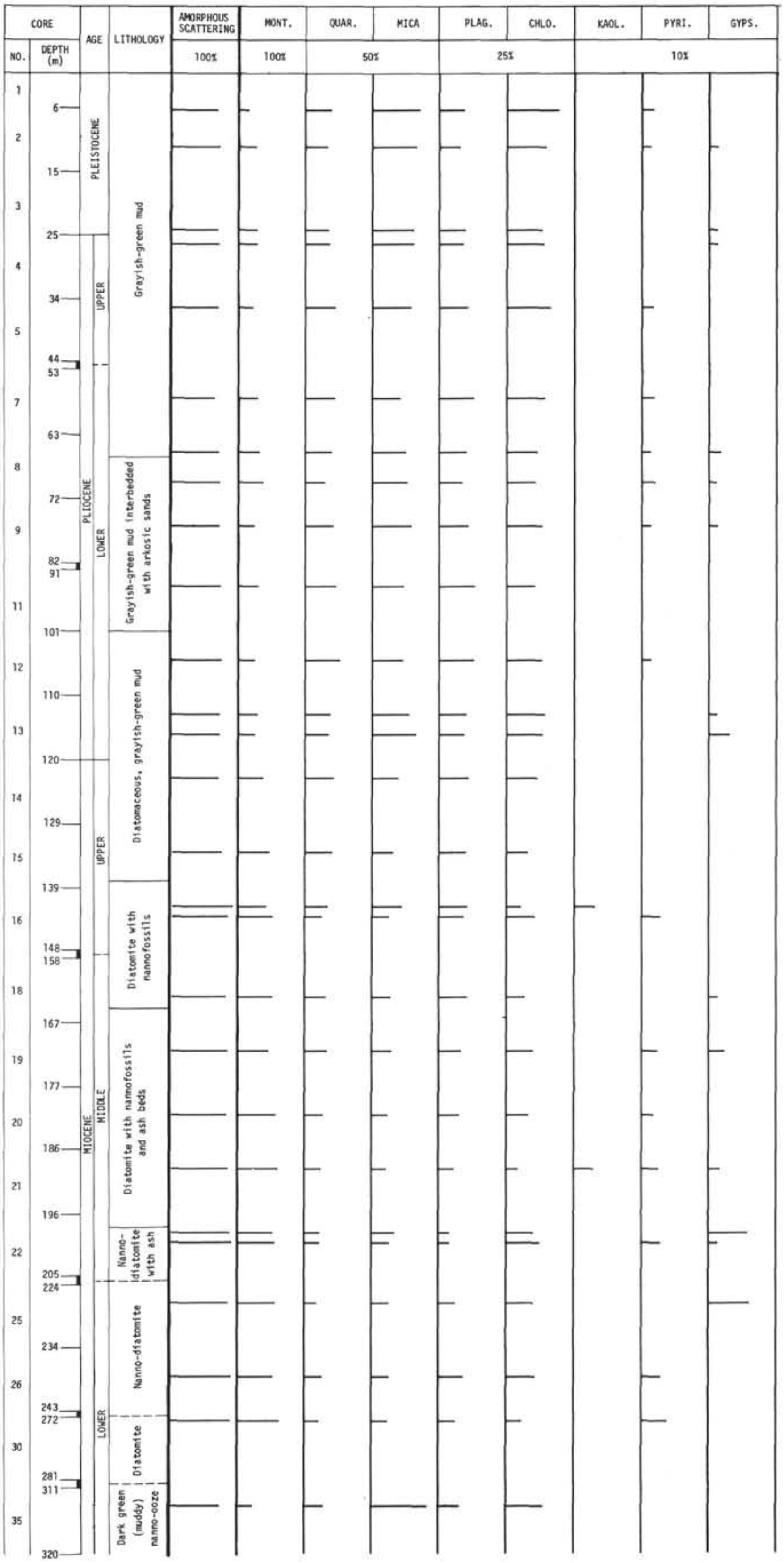

Figure 6. *Site 173. <2μ fractions.*

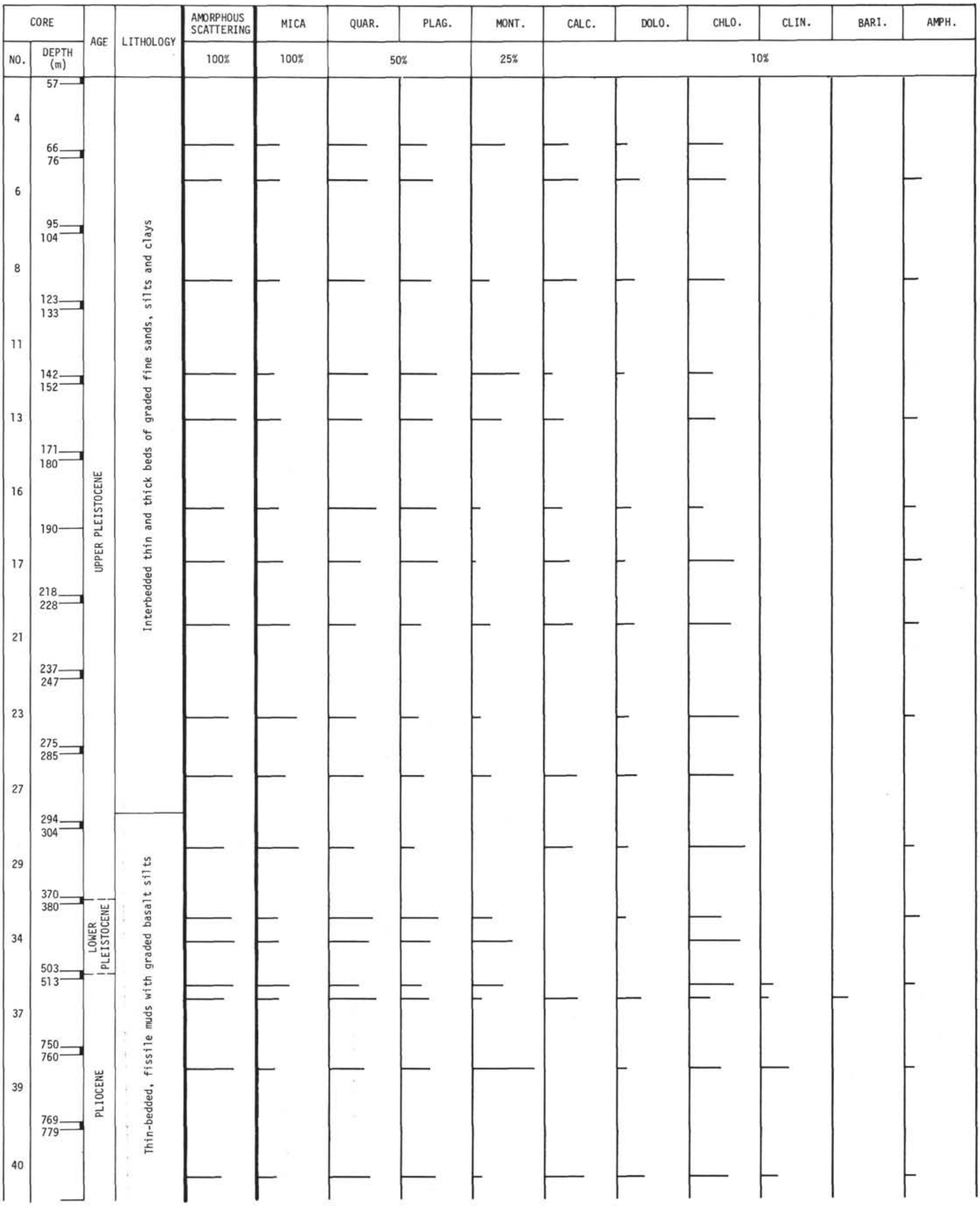

Figure 7. *Site 174. Bulk samples.*

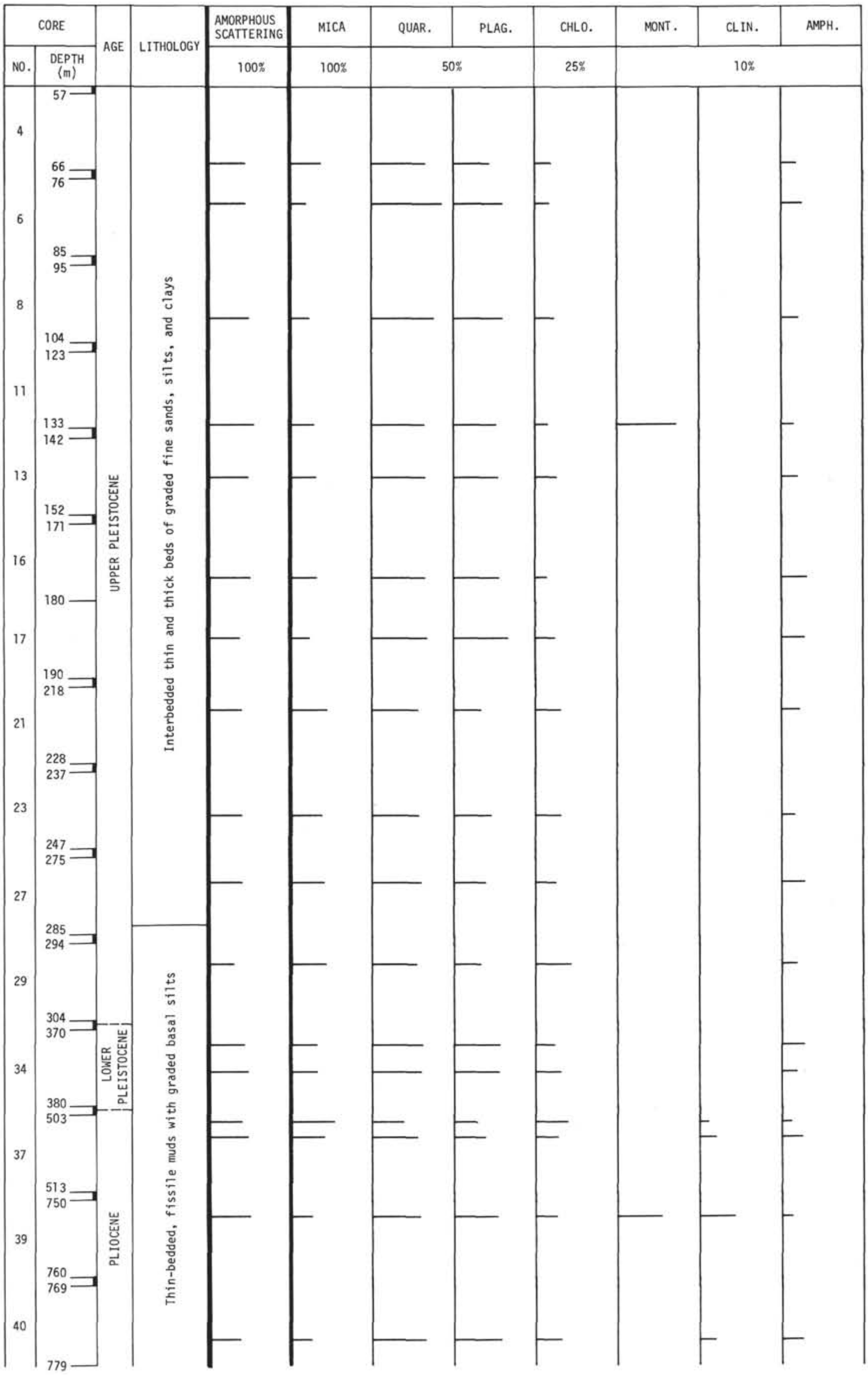

Figure 8. *Site 174. 2-20μ fractions.*

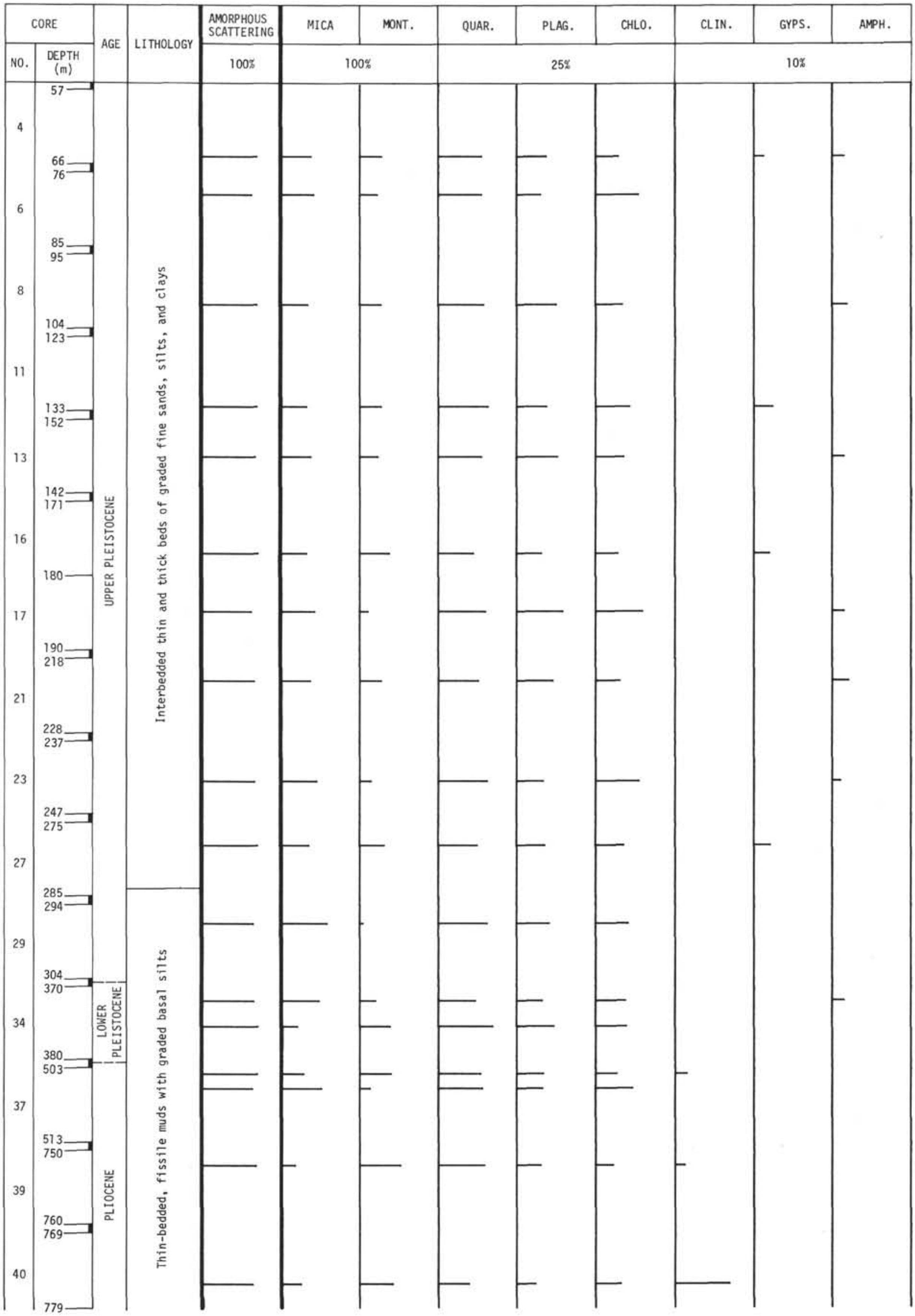

Figure 9. *Site 174. <2μ fractions.*

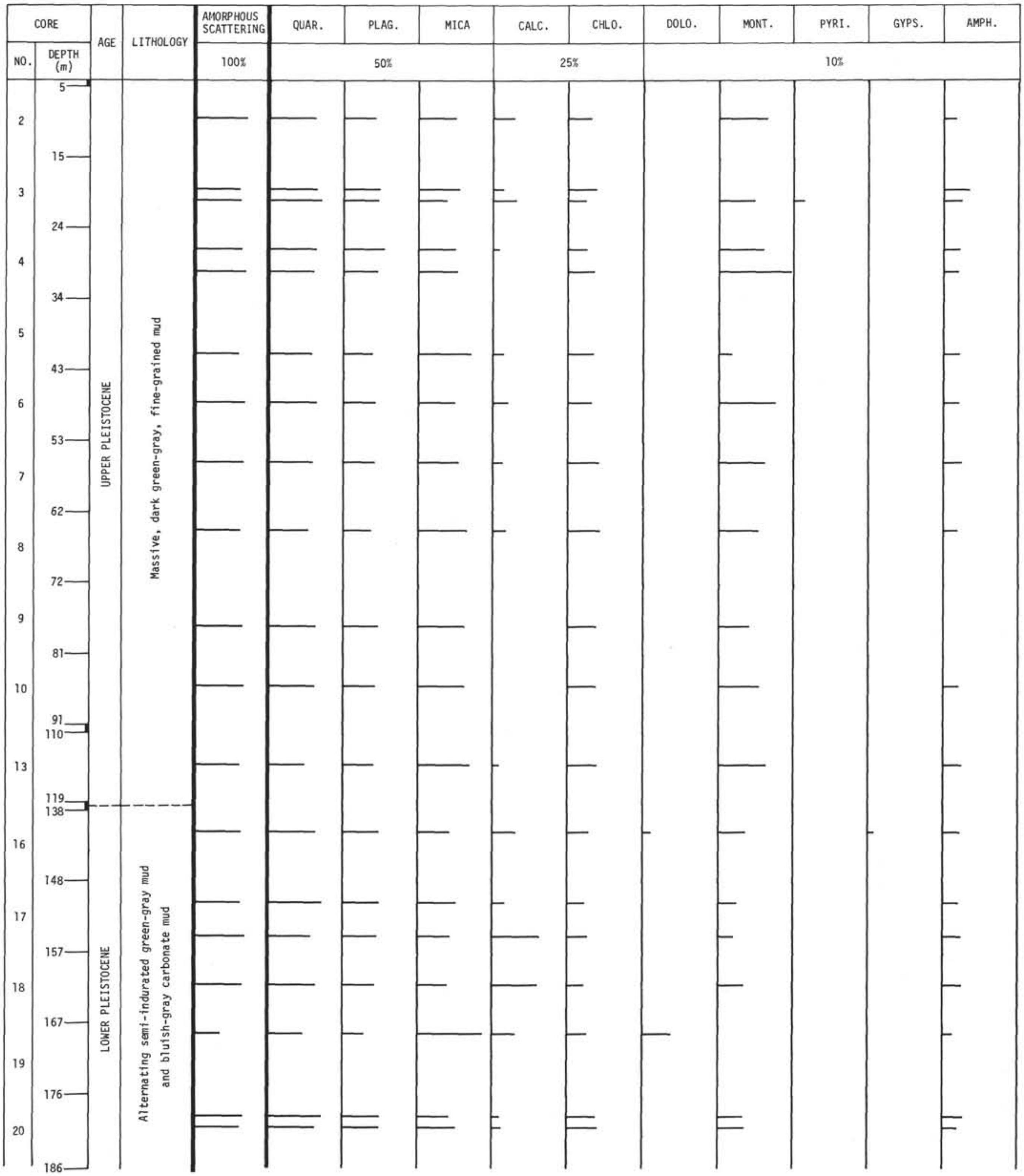

Figure 10. *Site 175. Bulk samples.*

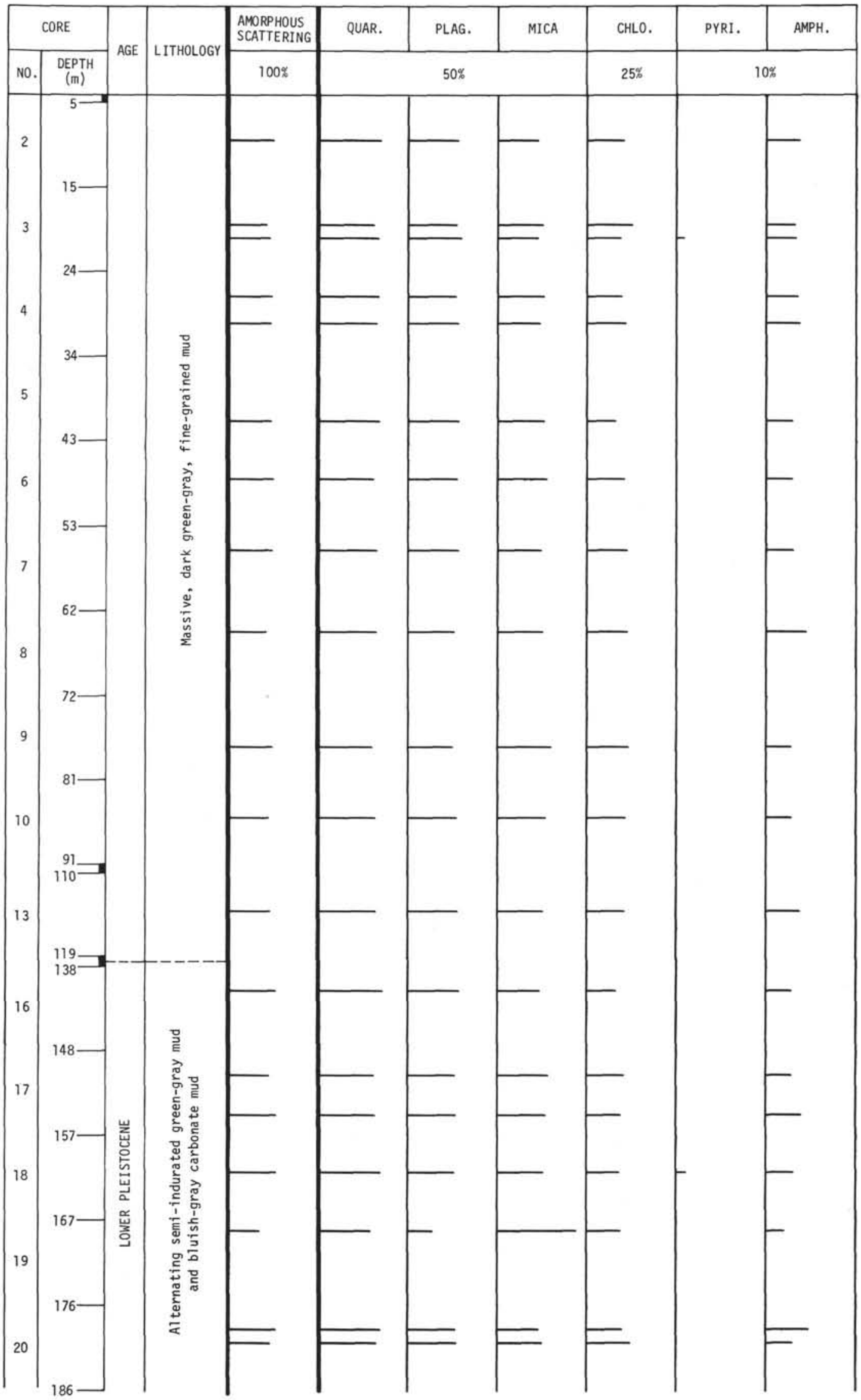

Figure 11. *Site 175. 2-20μ fractions.*

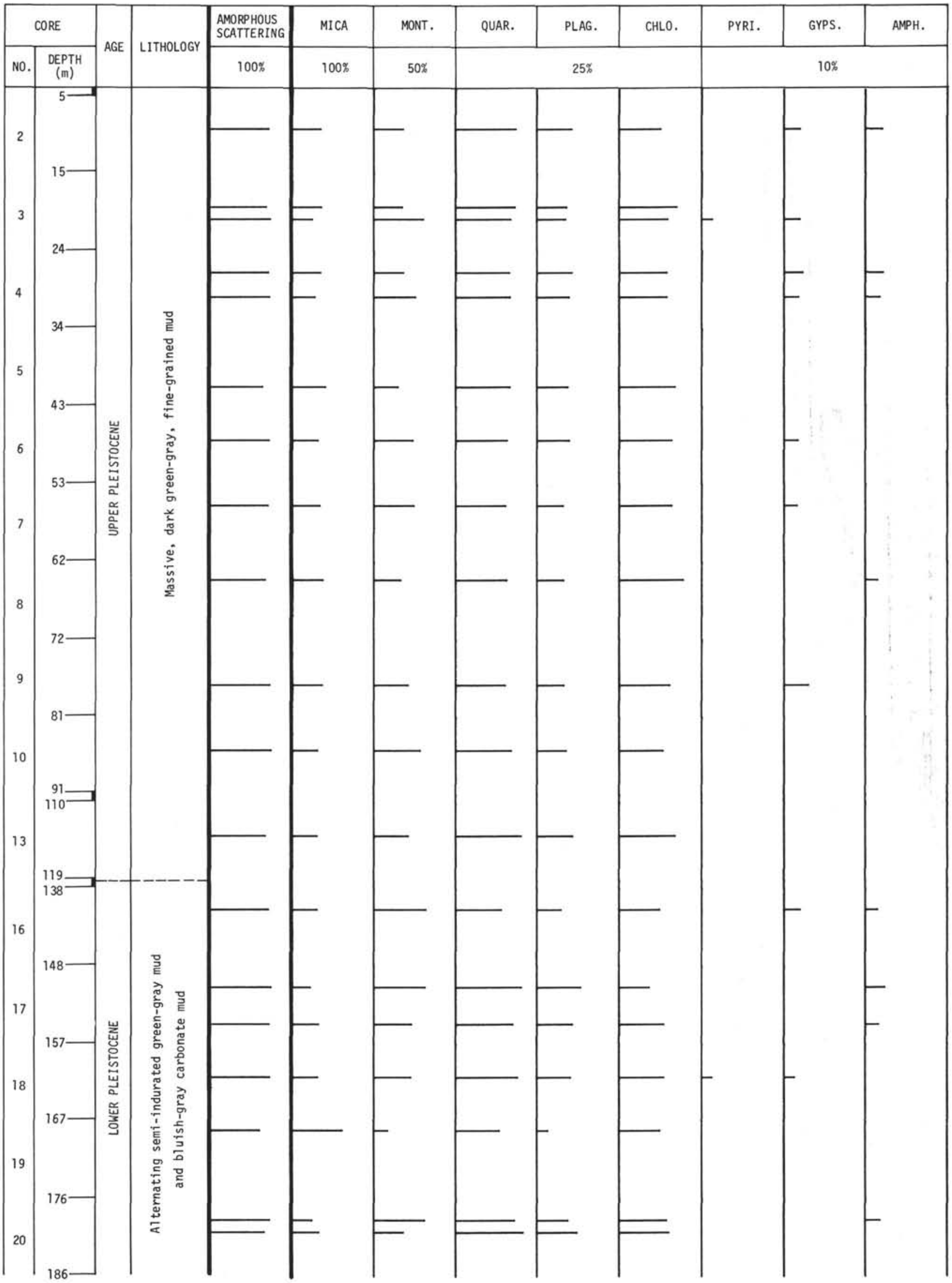

Figure 12. *Site 175. <2μ fractions.*

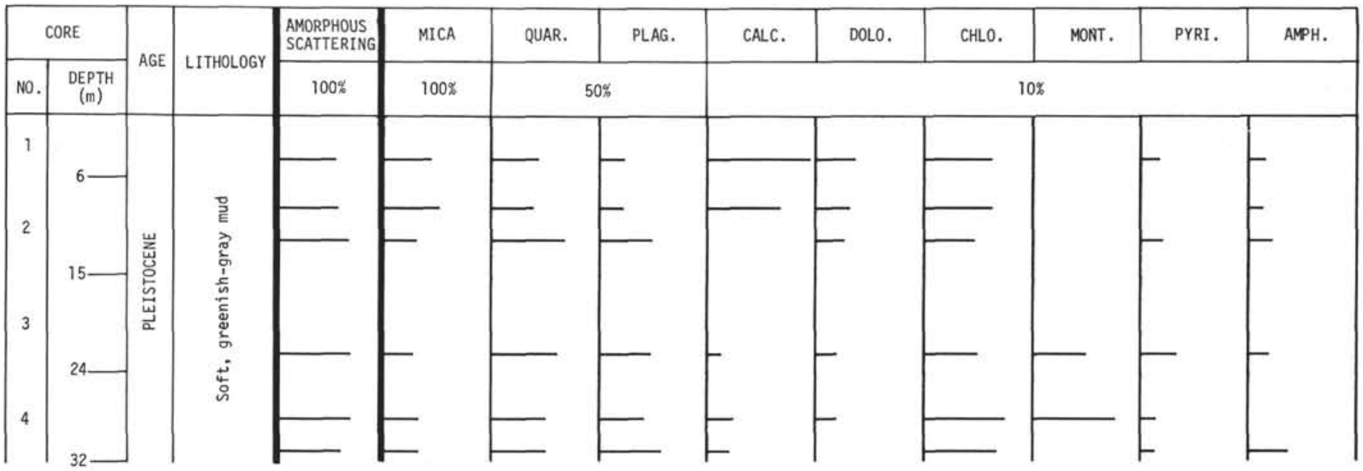

Figure 13. *Site 176. Bulk samples.*

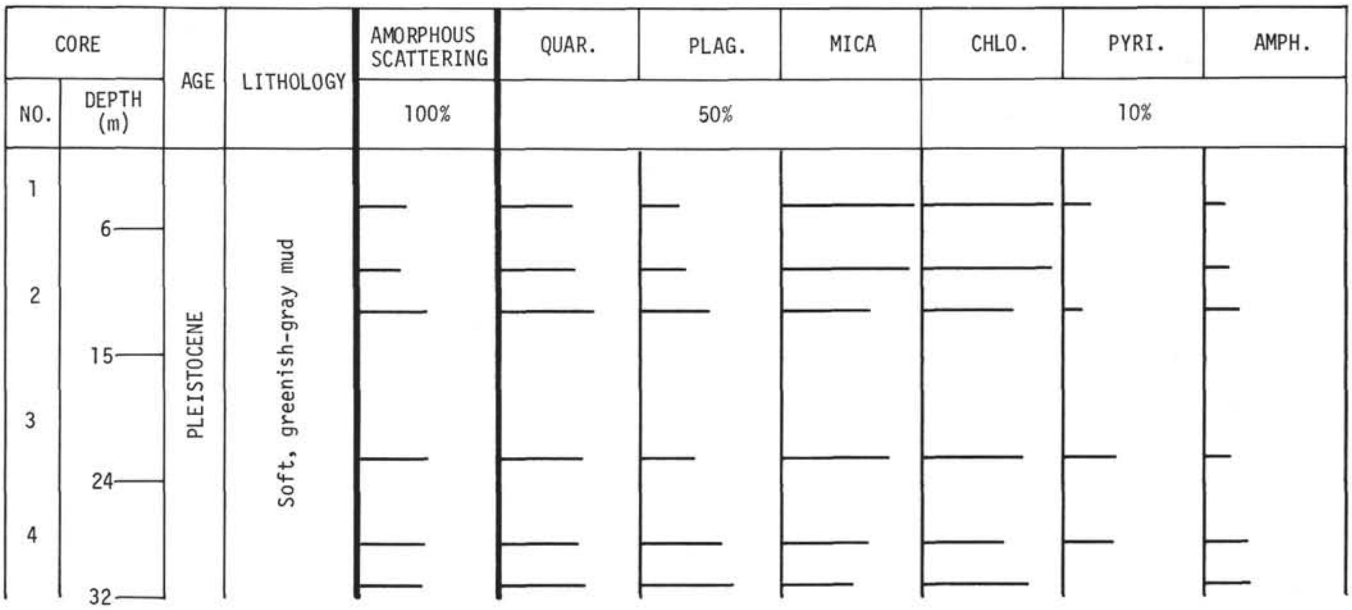

Figure 14. *Site 176. 2-20μ fractions.*

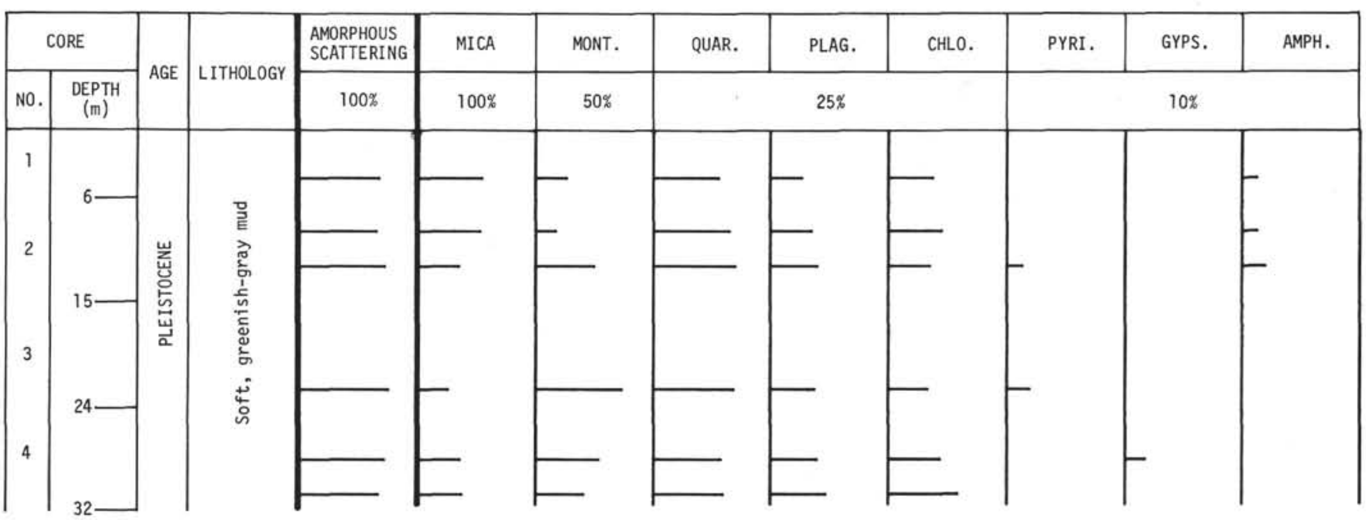

Figure 15. *Site 176. <2μ fractions.*

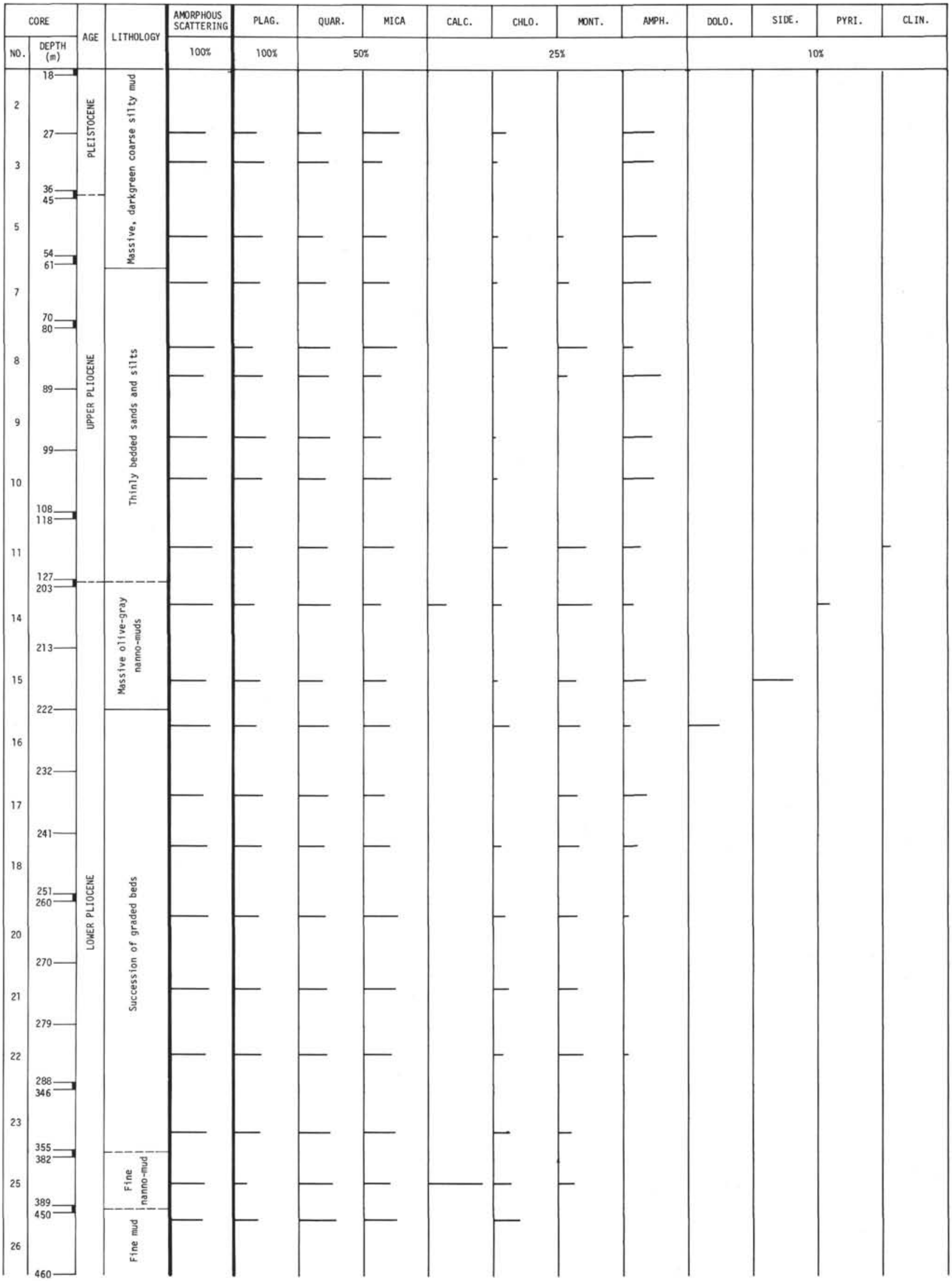

Figure 16. *Site 177. Bulk samples.*

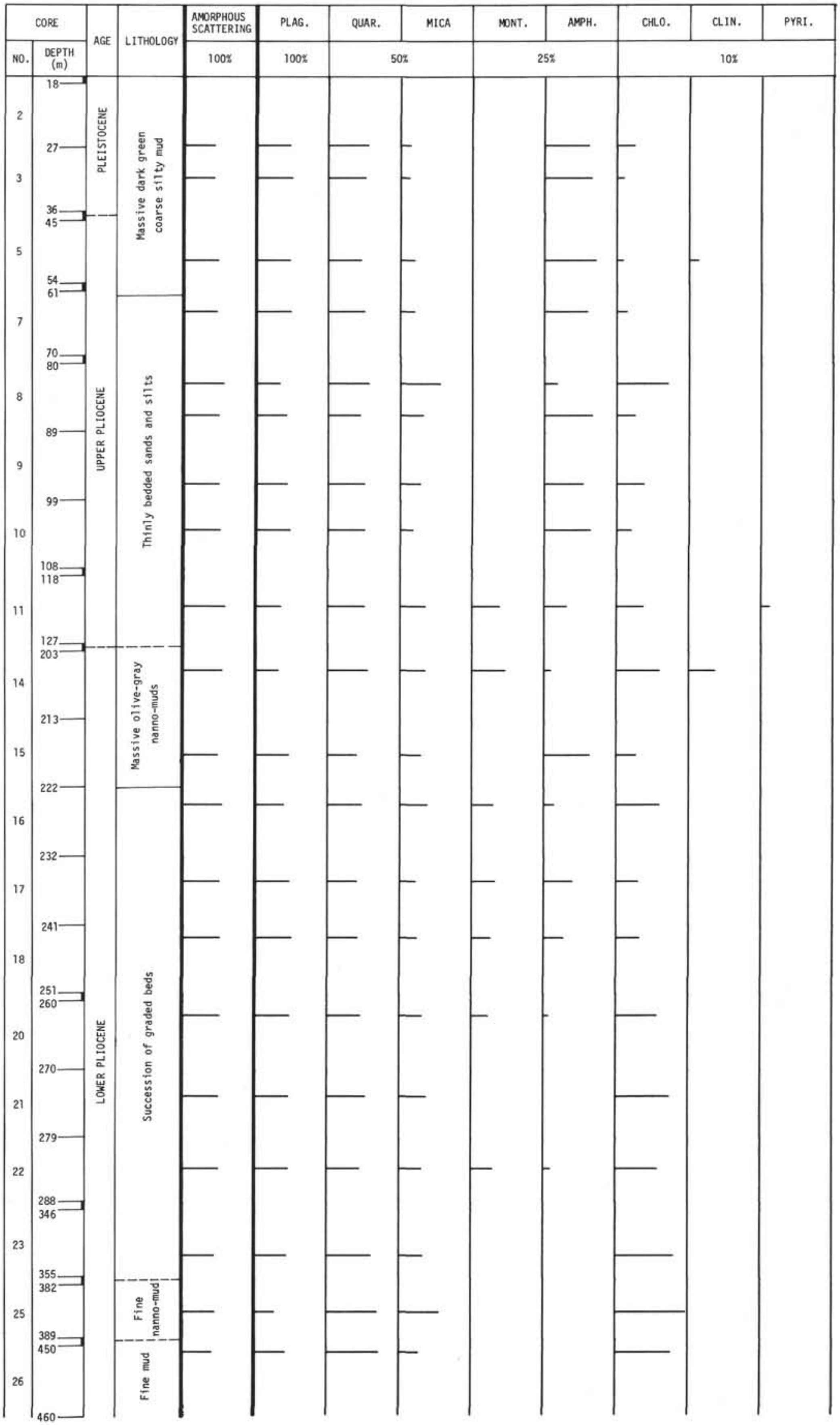

Figure 17. *Site 177. 2-20μ fractions.*

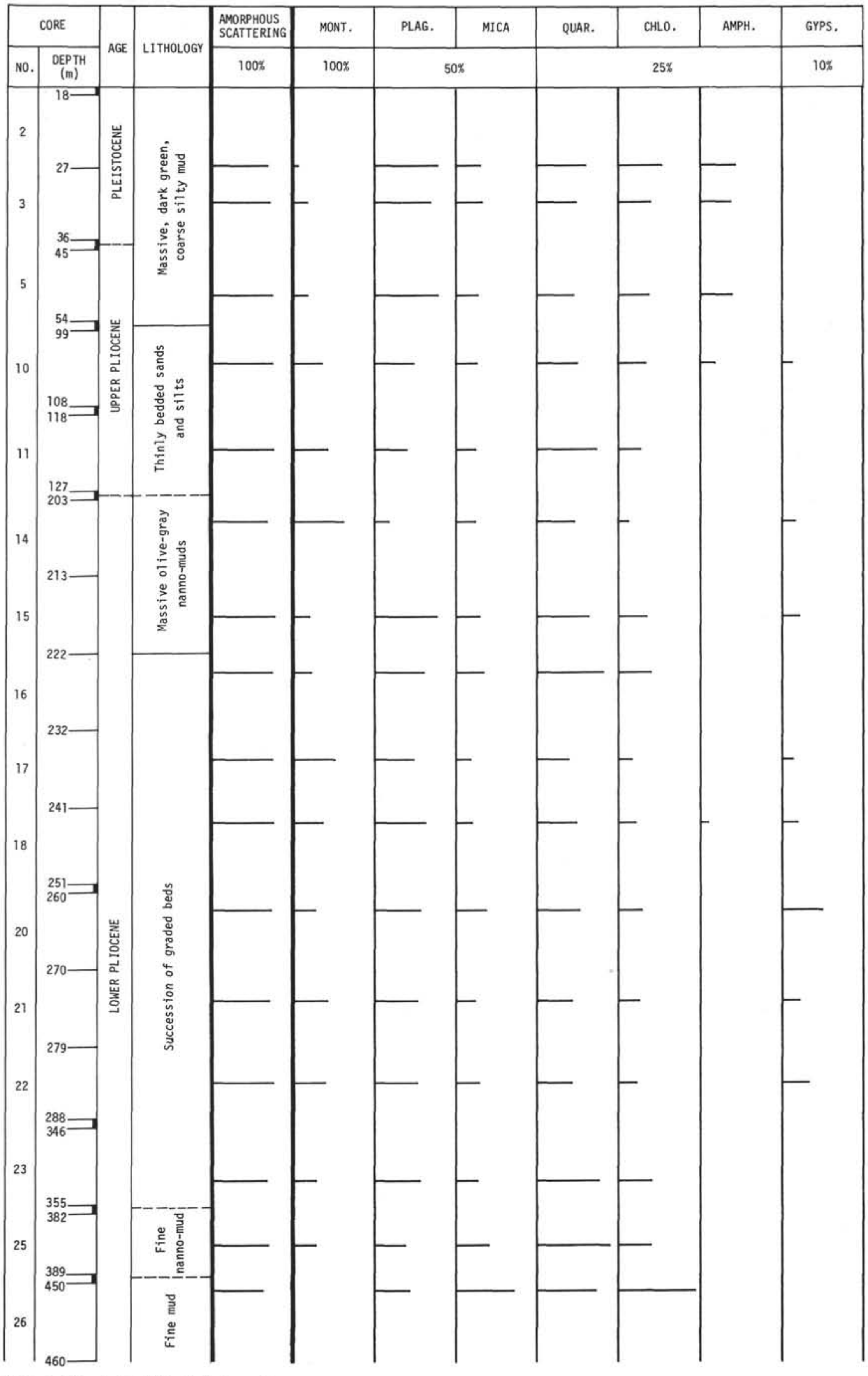

Figure 18. *Site 177. <2μ fractions.*

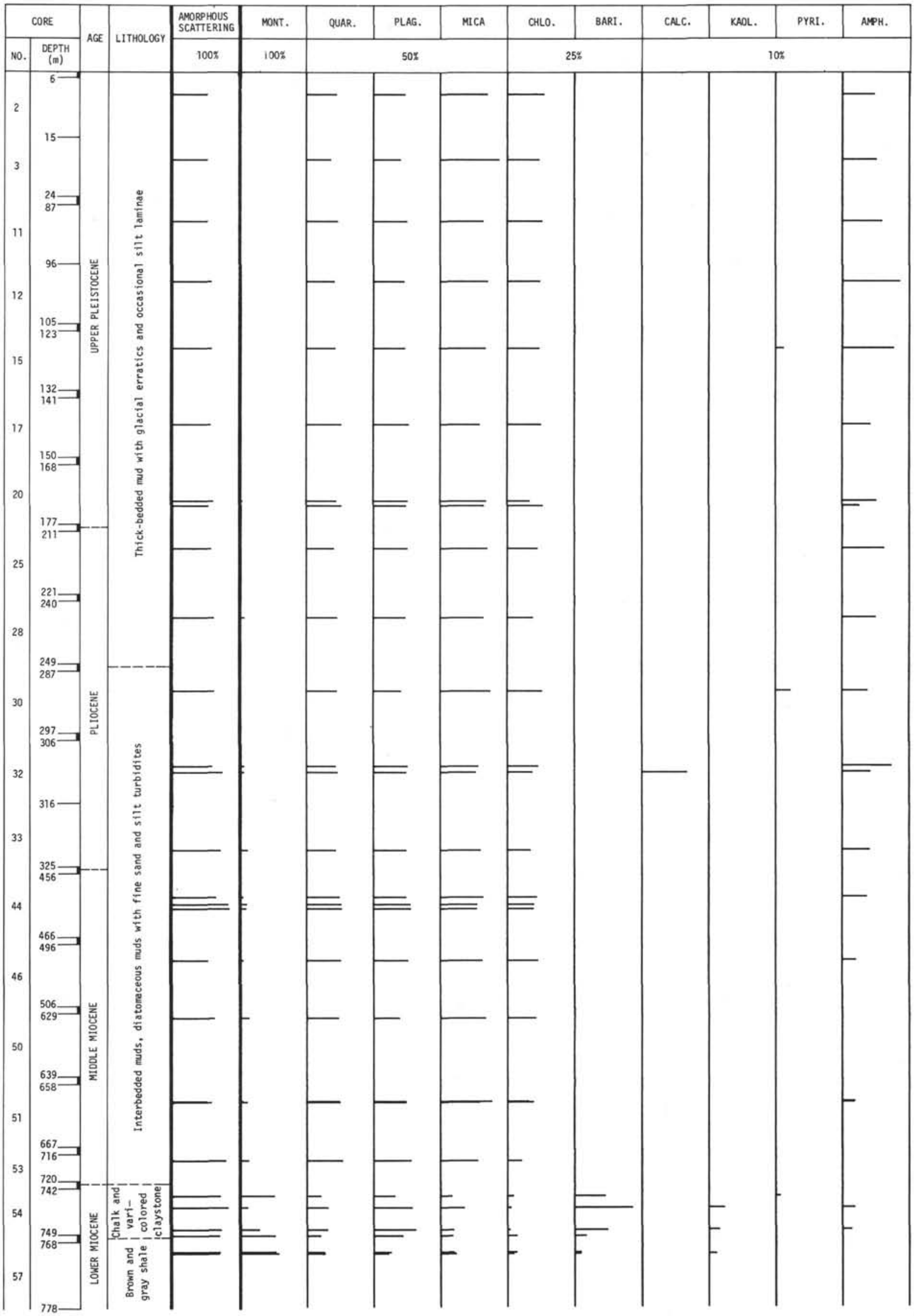

Figure 19. *Site 178. Bulk samples.*

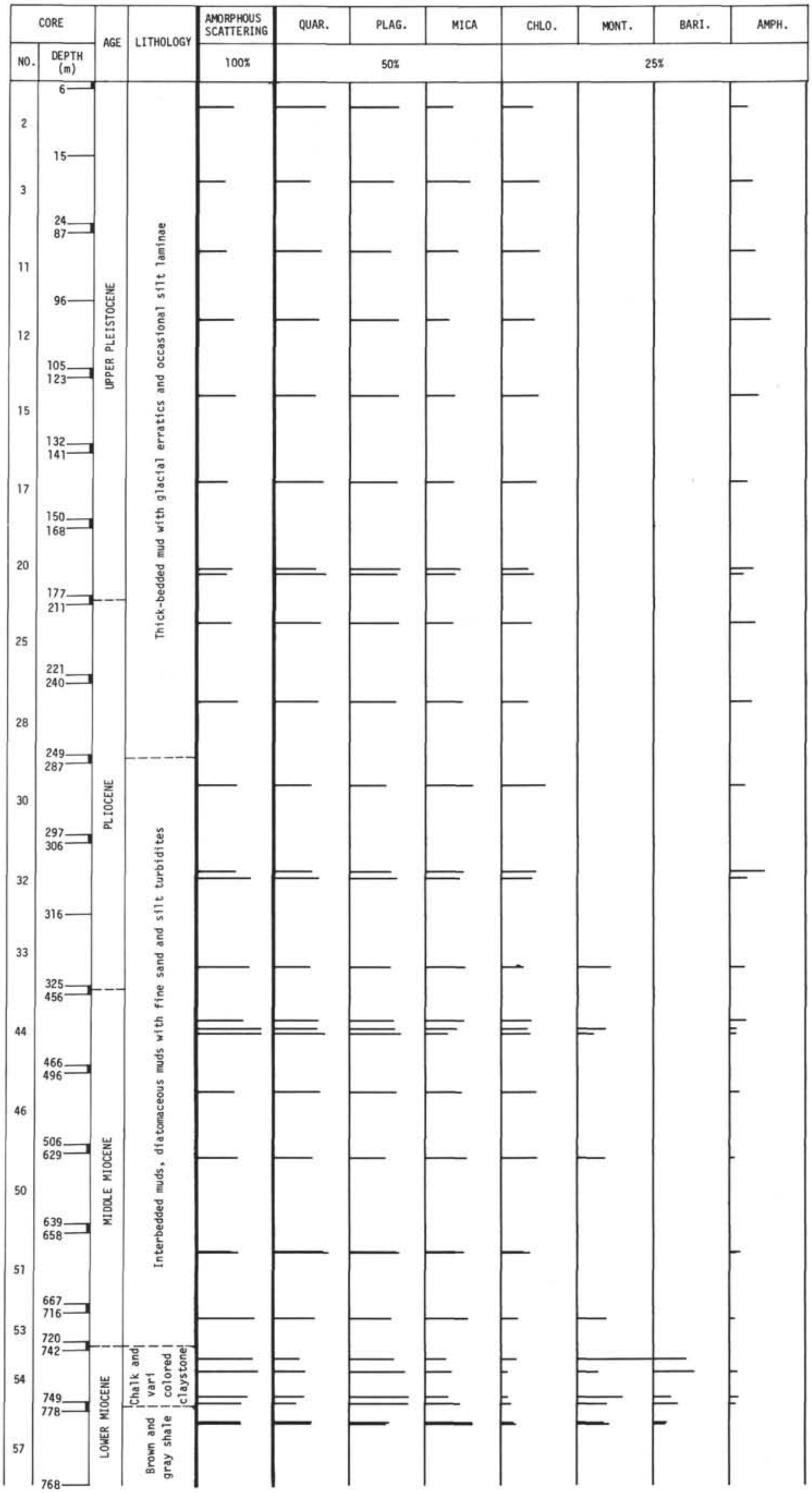

Figure 20. *Site 178. 2-20μ fractions.*

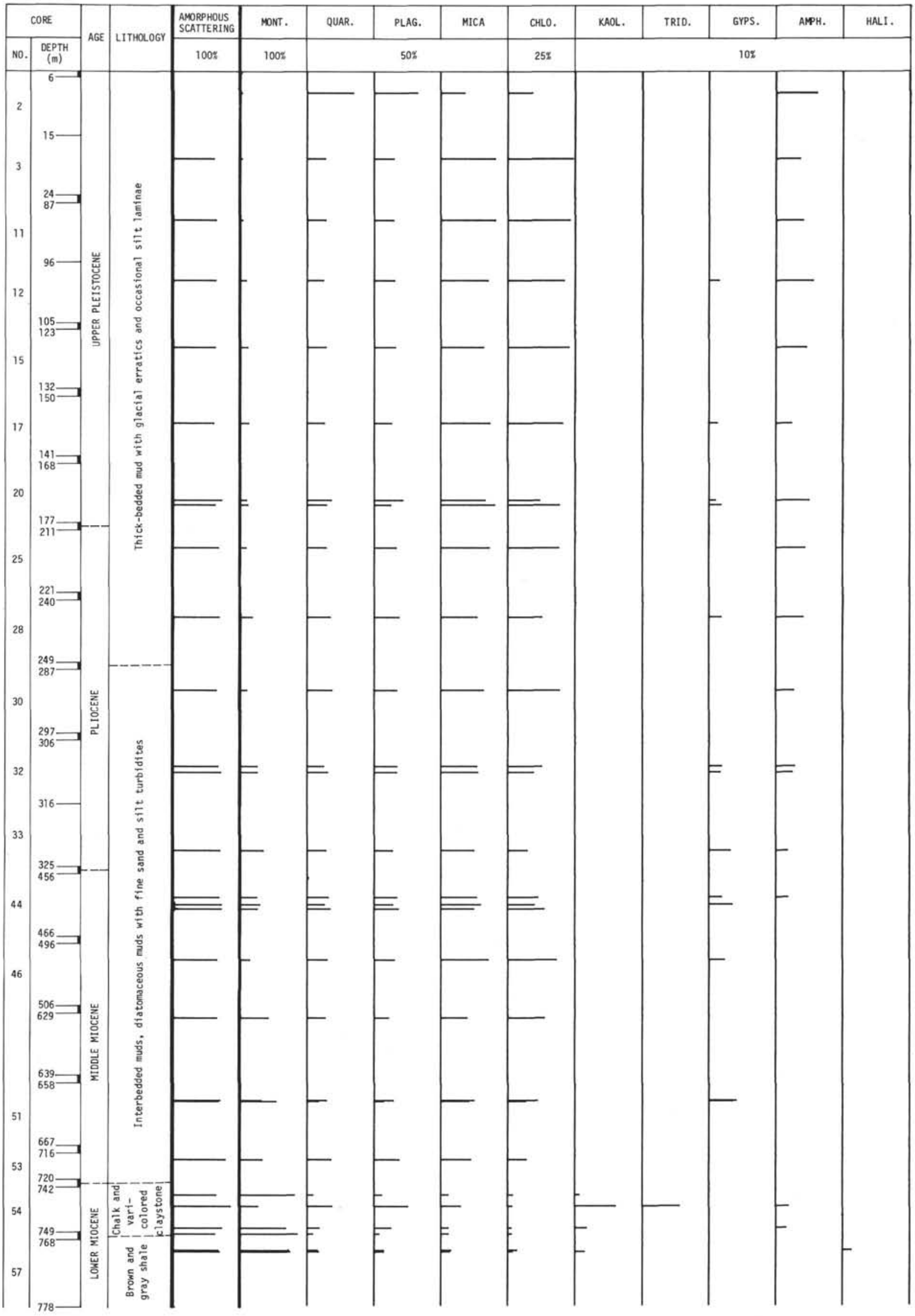

Figure 21. *Site 178.* <2μ *fractions.*

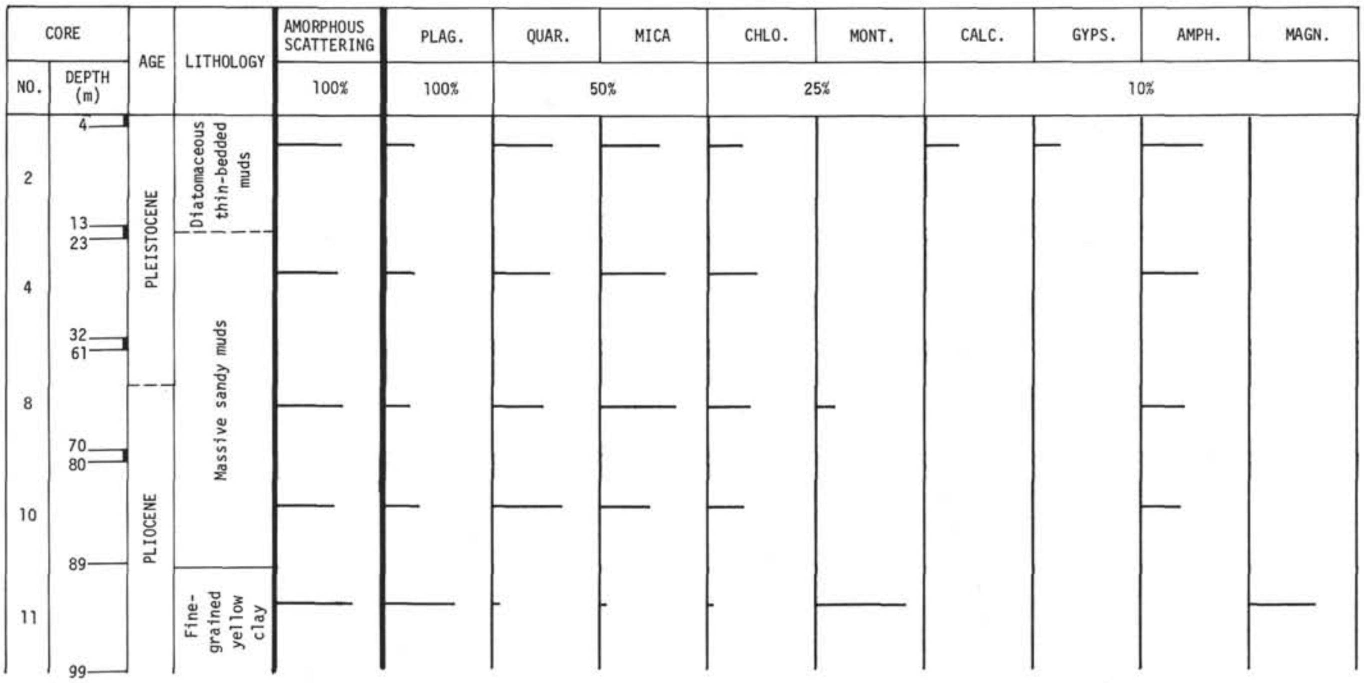

Figure 22. *Site 179. Bulk samples.*

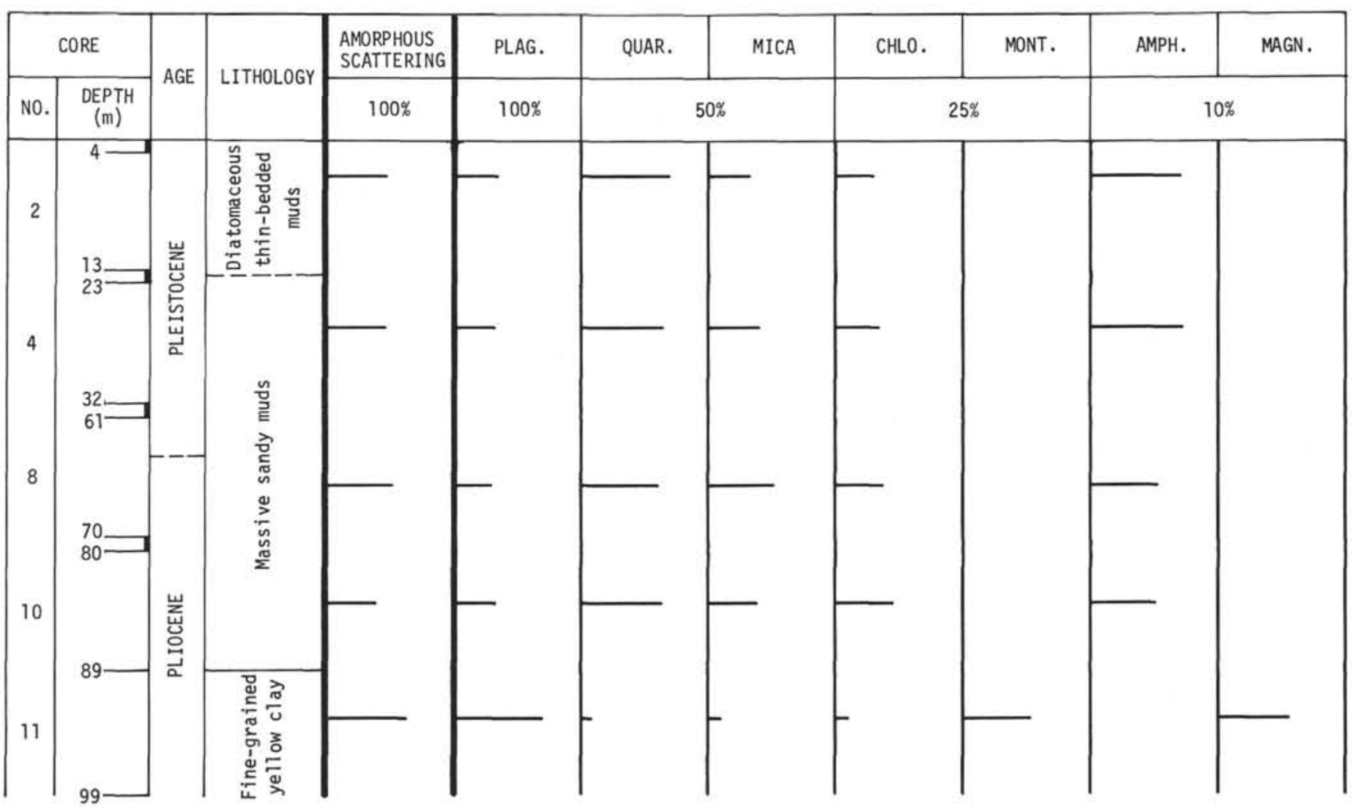

Figure 23. *Site 179. 2-20μ fractions.*

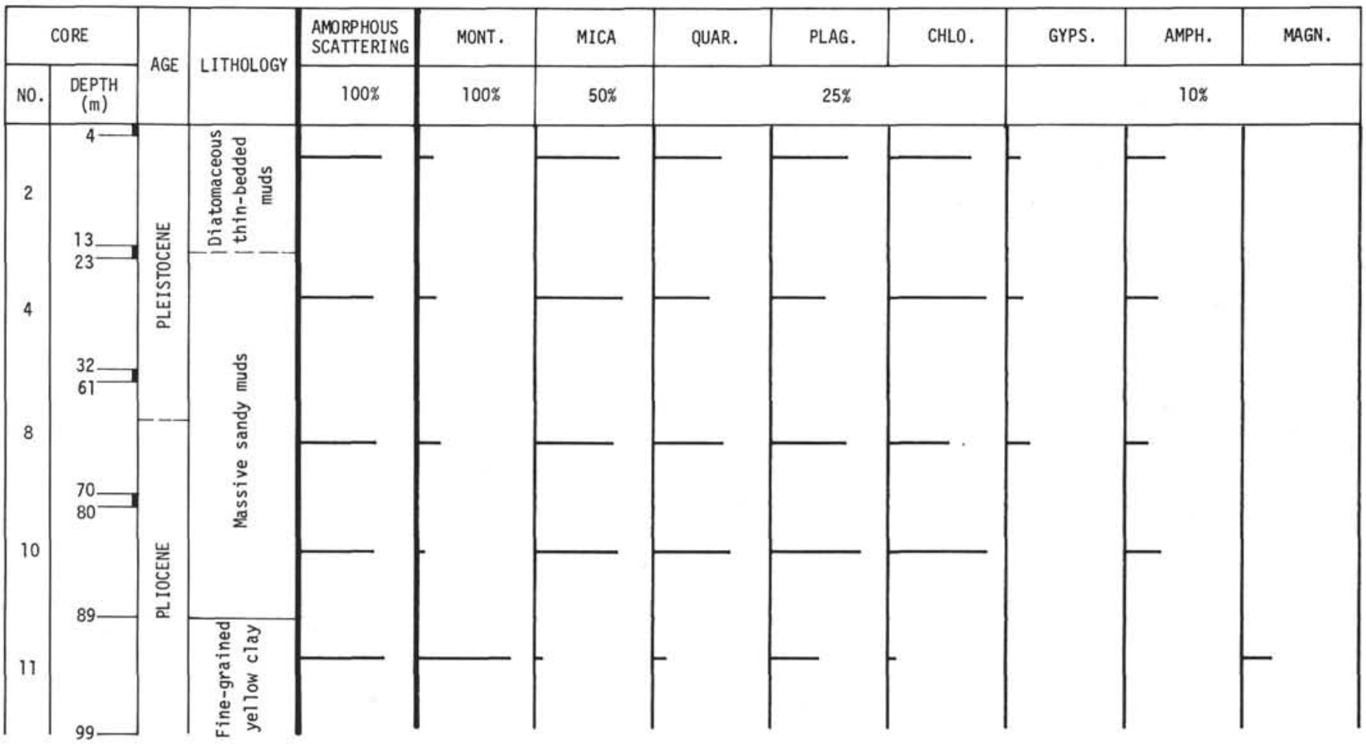

Figure 24. *Site 179. <2μ fractions.*

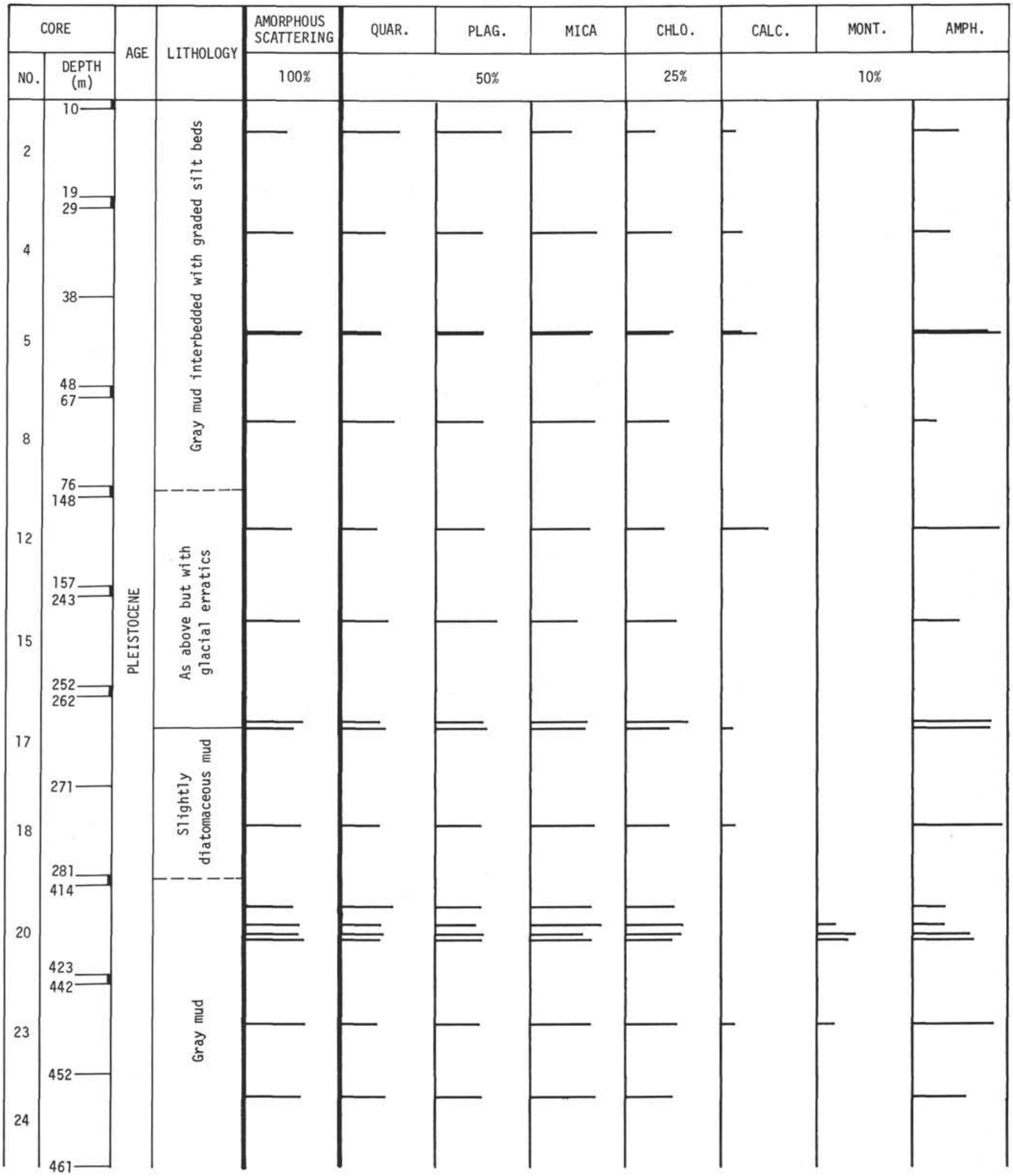

Figure 25. *Site 180. Bulk samples.*

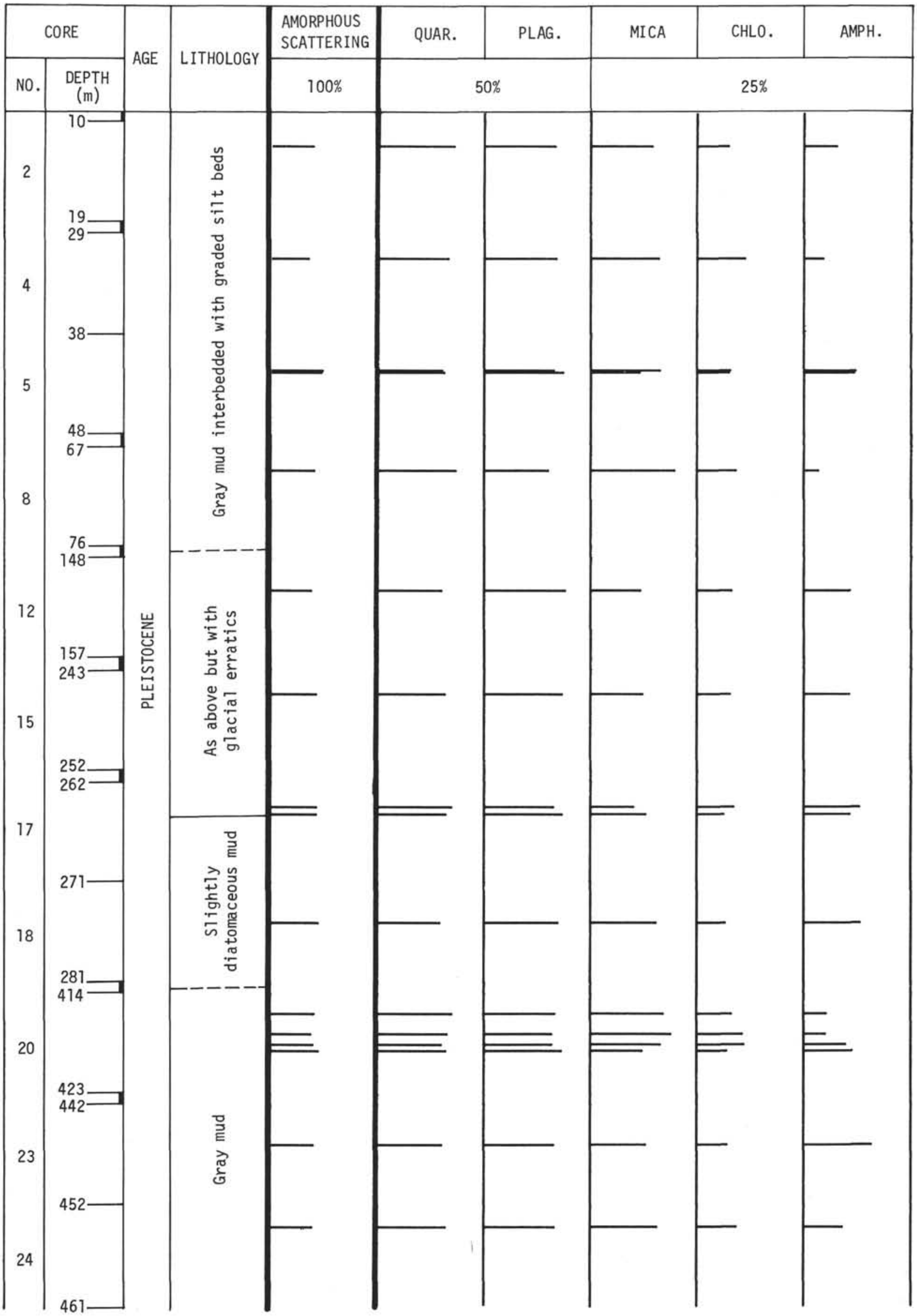

Figure 26. *Site 180. 2-20μ fractions.*

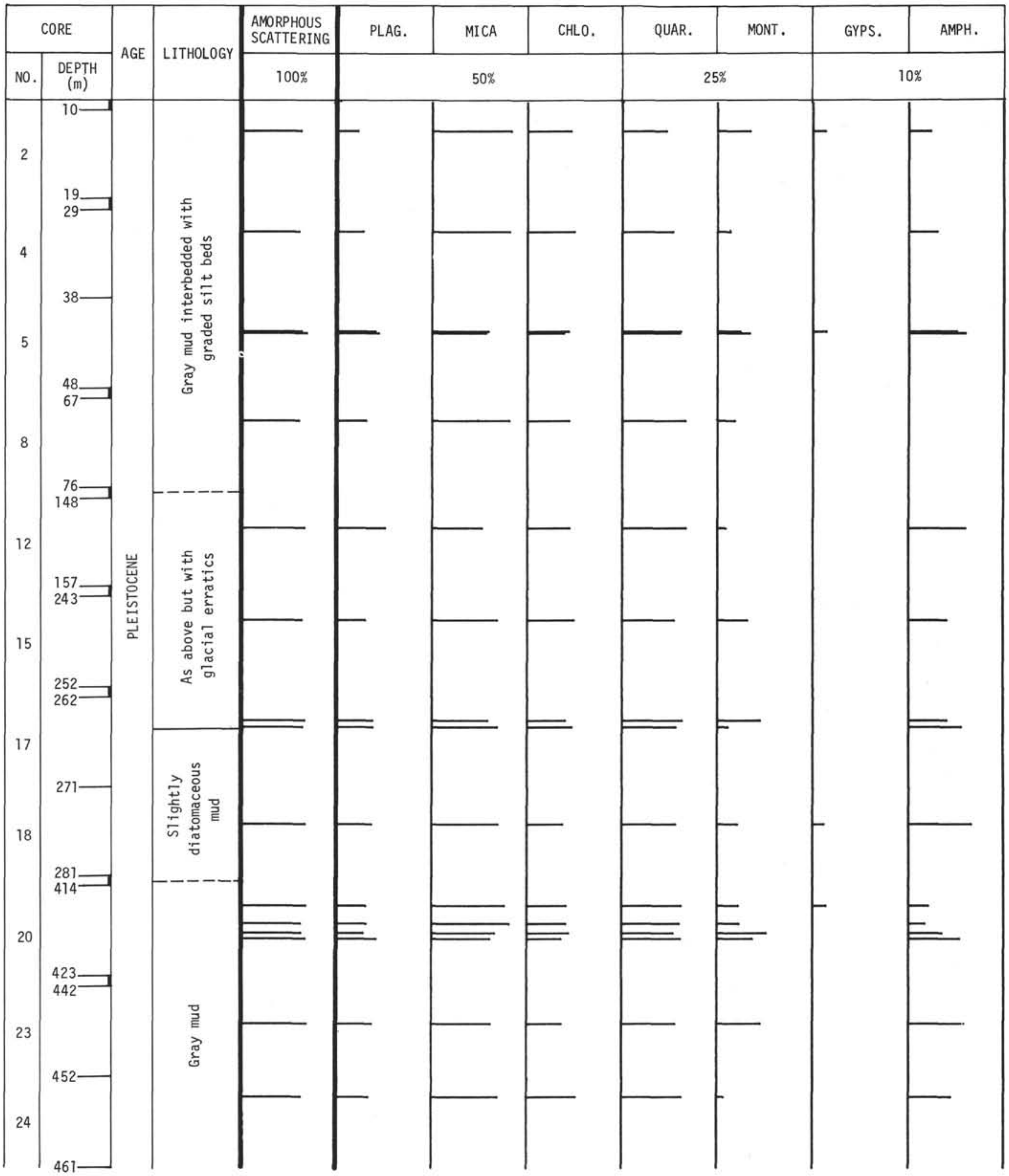

Figure 27. *Site 180. <2μ fractions.*

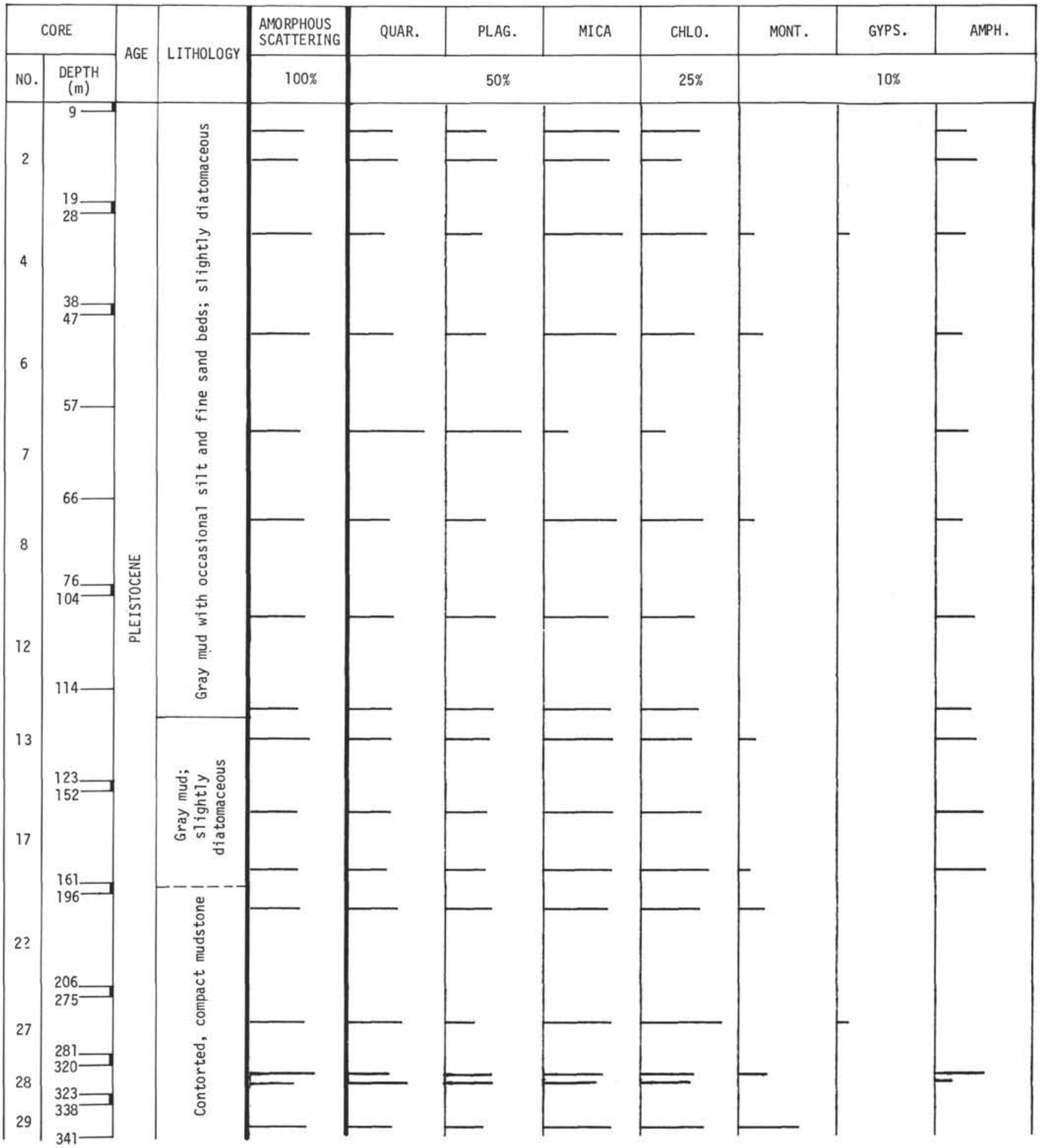

Figure 28. *Site 181. Bulk samples.*

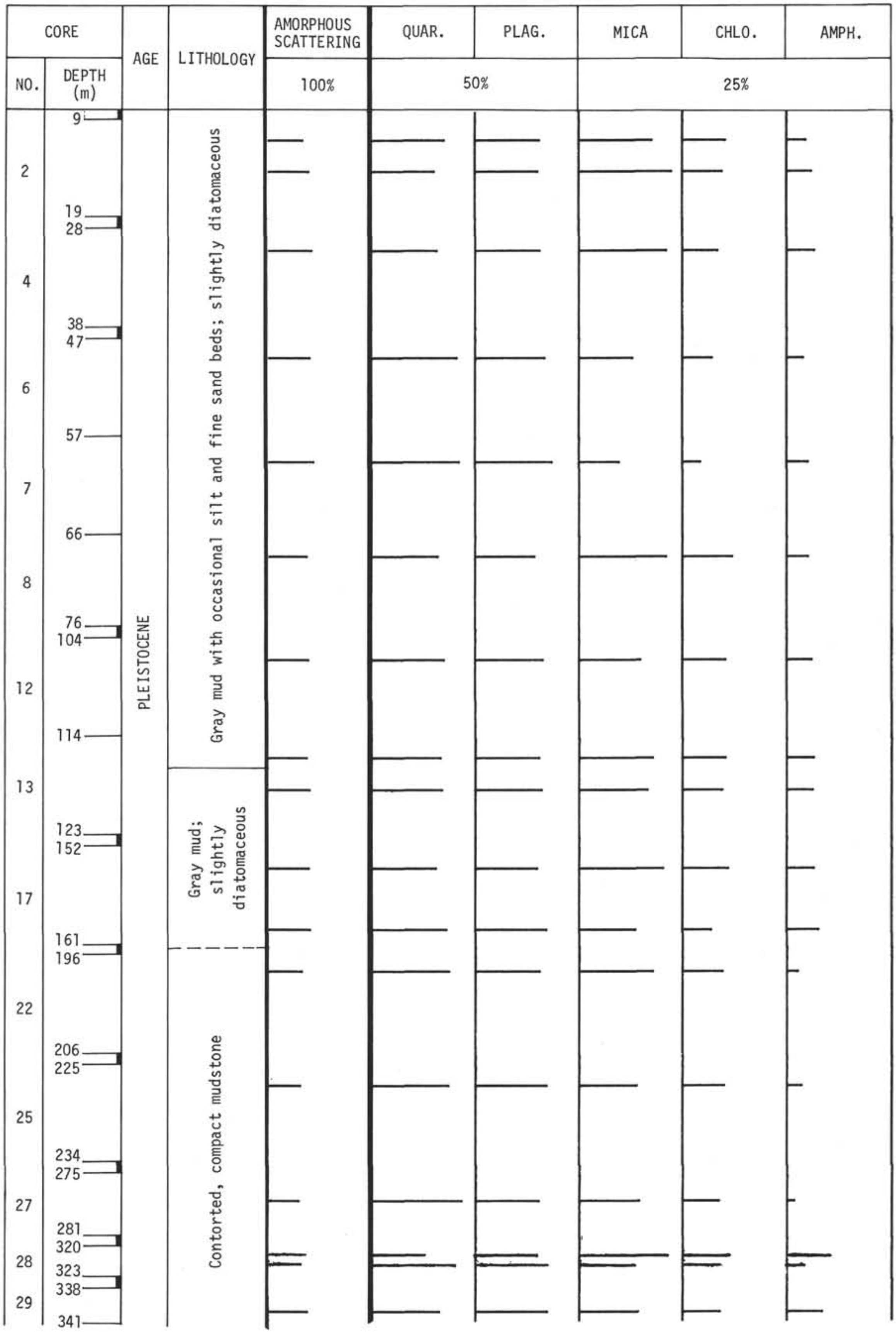

Figure 29. *Site 181. 2-20μ fractions.*

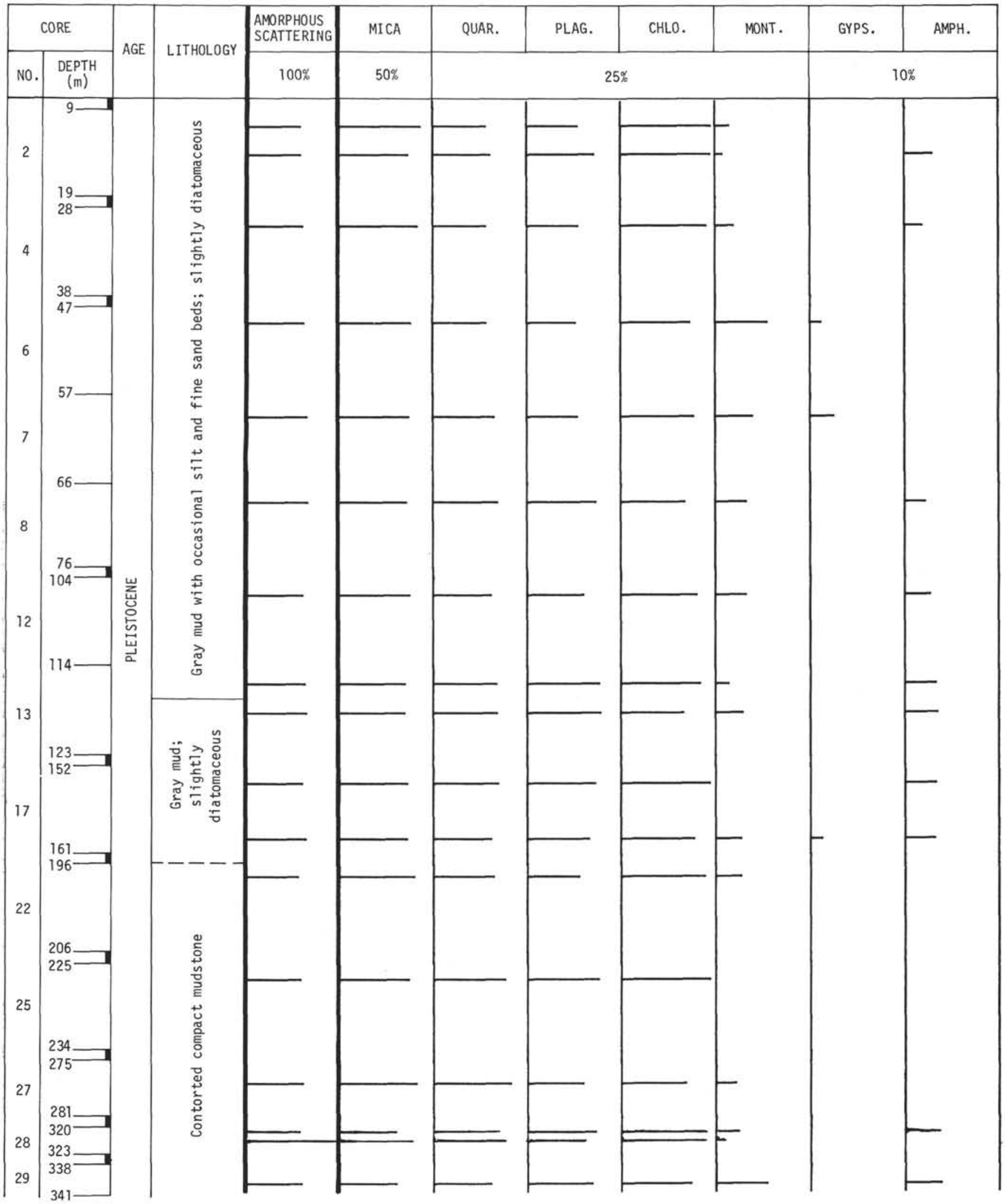

Figure 30. *Site 181.* <2μ *fractions.*