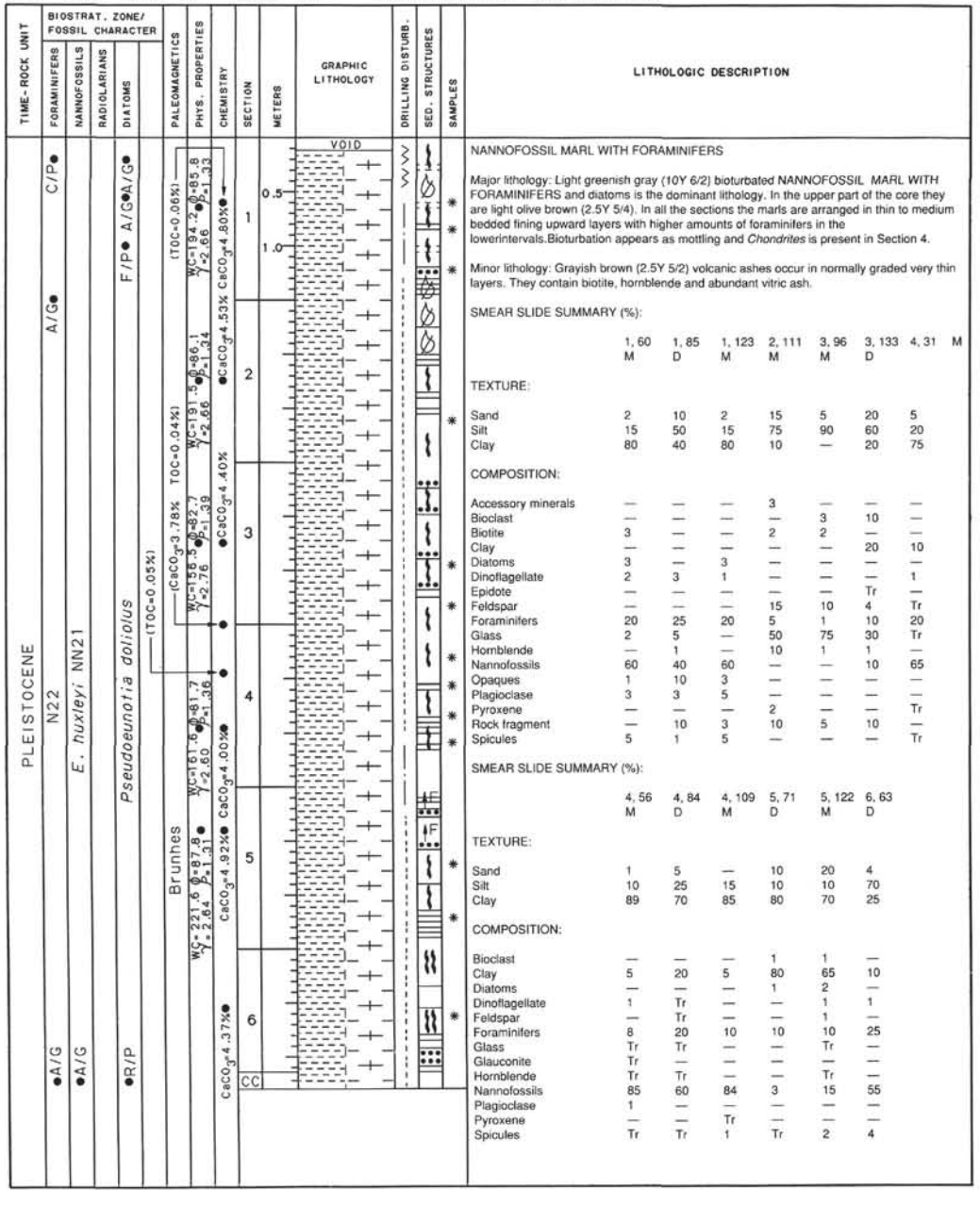
SITE 768 HOLE A CORE 1H CORED INTERVAL 0.0-9.5 mbsf



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH FORAMINIFERS

Major lithology: Light greenish gray (10Y 6/2) bioturbated NANNOFOSSIL MARL WITH FORAMINIFERS and diatoms is the dominant lithology. In the upper part of the core they are light olive brown (2.5Y 5/4). In all the sections the marls are arranged in thin to medium bedded fining upward layers with higher amounts of foraminifers in the lowerintervals.Bioturbation appears as mottling and *Chondrites* is present in Section 4.

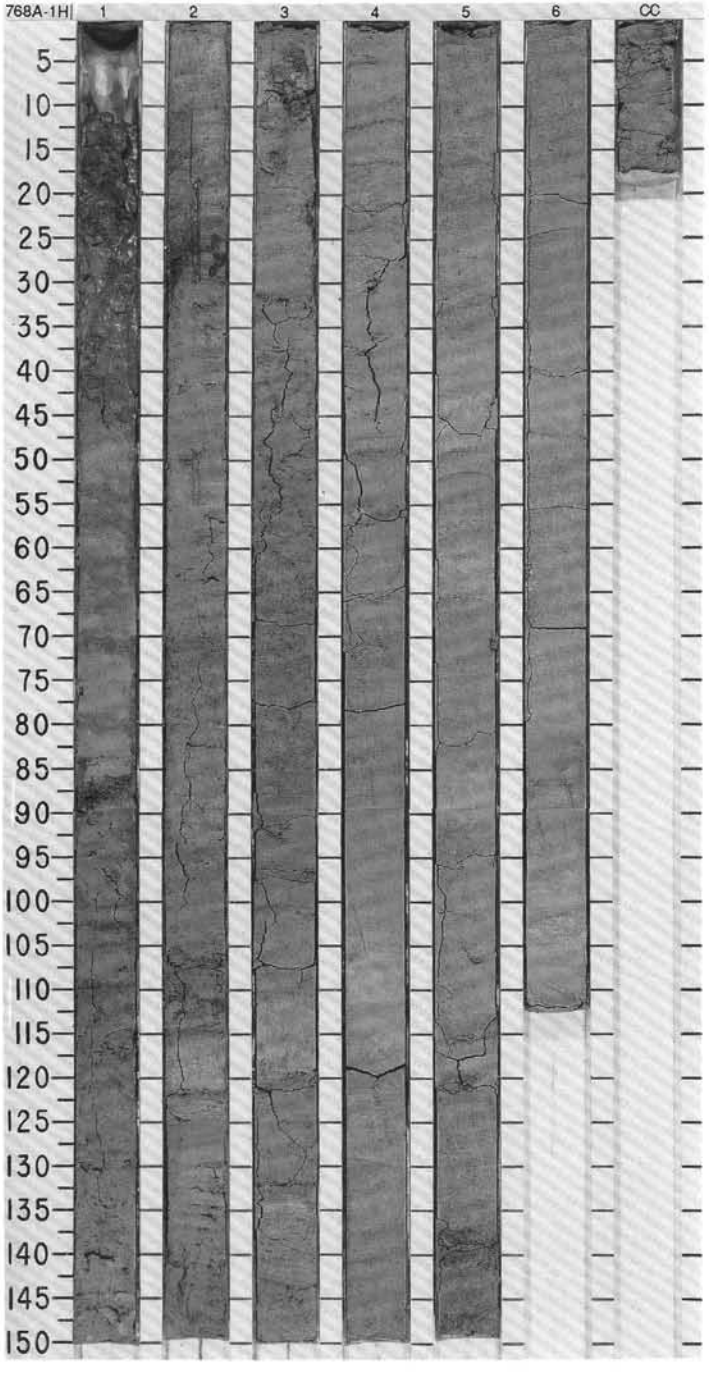
Minor lithology: Grayish brown (2.5Y 5/2) volcanic ashes occur in normally graded very thin layers. They contain biotite, hornblende and abundant vitric ash.

SMEAR SLIDE SUMMARY (%):

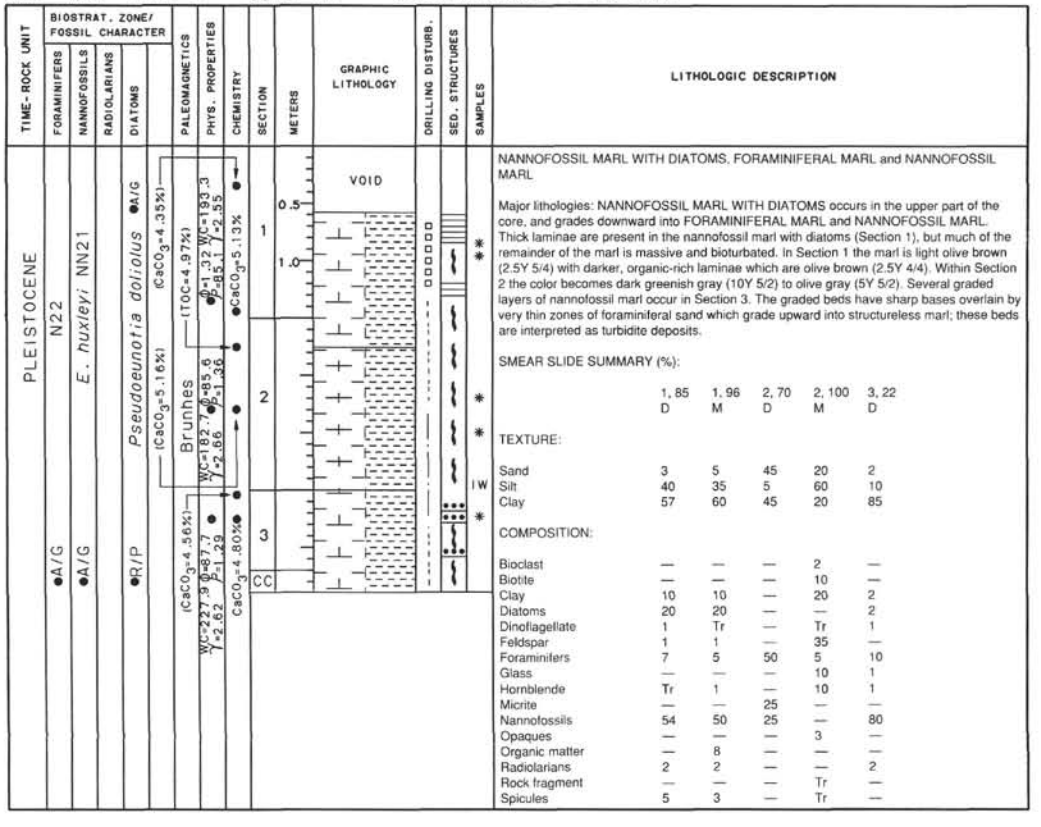
	1, 60 M	1, 85 D	1, 123 M	2, 111 M	3, 96 M	3, 133 D	4, 31 M
TEXTURE:							
Sand	2	10	2	15	5	20	5
Silt	15	50	15	75	90	60	20
Clay	80	40	80	10	—	20	75
COMPOSITION:							
Accessory minerals	—	—	—	3	—	—	—
Bioclast	—	—	—	—	3	10	—
Biotite	3	—	—	2	2	—	—
Clay	—	—	—	—	—	20	10
Diatoms	3	—	3	—	—	—	—
Dinoflagellate	2	3	1	—	—	—	1
Epidote	—	—	—	—	—	Tr	—
Feldspar	—	—	—	15	10	4	Tr
Foraminifers	20	25	20	5	1	10	20
Glass	2	5	—	50	75	30	Tr
Hornblende	—	1	—	10	1	1	—
Nannofossils	60	40	60	—	—	10	65
Opaques	1	10	3	—	—	—	—
Plagioclase	3	3	5	—	—	—	—
Pyroxene	—	—	—	2	—	—	Tr
Rock fragment	—	10	3	10	5	10	—
Spicules	5	1	5	—	—	—	Tr

SMEAR SLIDE SUMMARY (%):

	4, 56 M	4, 84 D	4, 109 M	5, 71 D	5, 122 M	6, 63 D
TEXTURE:						
Sand	1	5	—	10	20	4
Silt	10	25	15	10	10	70
Clay	89	70	85	80	70	25
COMPOSITION:						
Bioclast	—	—	—	1	1	—
Clay	5	20	5	80	65	10
Diatoms	—	—	—	1	2	—
Dinoflagellate	1	Tr	—	—	1	1
Feldspar	—	Tr	—	—	1	—
Foraminifers	8	20	10	10	10	25
Glass	Tr	Tr	—	—	Tr	—
Glauconite	Tr	—	—	—	—	—
Hornblende	Tr	Tr	—	—	Tr	—
Nannofossils	85	60	84	3	15	55
Plagioclase	1	—	—	—	—	—
Pyroxene	—	—	Tr	—	—	—
Spicules	Tr	Tr	1	Tr	2	4



SITE 768 HOLE B CORE 1H CORED INTERVAL 0-4.0 mbsf



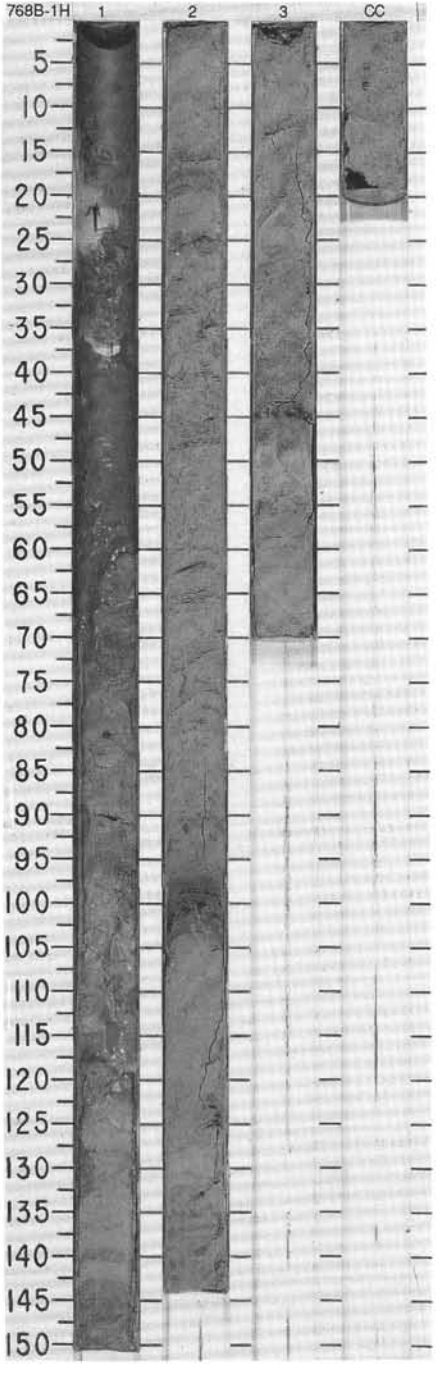
LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH DIATOMS, FORAMINIFERAL MARL and NANNOFOSSIL MARL

Major lithologies: NANNOFOSSIL MARL WITH DIATOMS occurs in the upper part of the core, and grades downward into FORAMINIFERAL MARL and NANNOFOSSIL MARL. Thick laminae are present in the nannofossil marl with diatoms (Section 1), but much of the remainder of the marl is massive and bioturbated. In Section 1 the marl is light olive brown (2.5Y 5/4) with darker, organic-rich laminae which are olive brown (2.5Y 4/4). Within Section 2 the color becomes dark greenish gray (10Y 5/2) to olive gray (5Y 5/2). Several graded layers of nannofossil marl occur in Section 3. The graded beds have sharp bases overlain by very thin zones of foraminiferal sand which grade upward into structureless marl; these beds are interpreted as turbidite deposits.

SMEAR SLIDE SUMMARY (%):

	1, 85 D	1, 96 M	2, 70 D	2, 100 M	3, 22 D
TEXTURE:					
Sand	3	5	45	20	2
Silt	40	35	5	60	10
Clay	57	60	45	20	85
COMPOSITION:					
Bioclast	—	—	—	2	—
Biotite	—	—	—	10	—
Clay	10	10	—	20	2
Diatoms	20	20	—	—	2
Dinoflagellate	1	Tr	—	Tr	1
Feldspar	1	1	—	35	—
Foraminifers	7	5	50	5	10
Glass	—	—	—	10	1
Hornblende	Tr	1	—	10	1
Micrite	—	—	25	—	—
Nannofossils	54	50	25	—	80
Opaques	—	—	—	3	—
Organic matter	—	8	—	—	—
Radiolarians	2	2	—	—	2
Rock fragment	—	—	—	Tr	—
Spicules	5	3	—	Tr	—



SITE 768 HOLE B CORE 2H CORED INTERVAL 4.0-13.5 mbsf

TIME-ROCK UNIT: PLEISTOCENE

BIOSTRAT. ZONE/ FOSSIL CHARACTER:
- FORAMINIFERS: N22 (●A/G)
- NANNOFOSSILS: *E. huxleyi* NN21 (●A/G)
- RADIOLARIANS (●R/P)
- DIATOMS

PALEOMAGNETICS: Brunhes

PHYS. PROPERTIES:
- ●84.6 WC=171.6 P=1.37 Y=2.64
- ●87.15 WC=216.5 P=1.31 Y=2.44

CHEMISTRY:
- ●$CaCO_3$=4.51%●
- ●$CaCO_3$=4.91%
- ●$CaCO_3$=3.92%
- TOC=0.03%
- ●$CaCO_3$=3.74%

SECTION: 1, 2, 3, 4, 5, 6, 7, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES: OG, IW

LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL and FORAMINIFERAL NANNOFOSSIL MARL and ash

Major lithologies: NANNOFOSSIL MARL and FORAMINIFERAL NANNOFOSSIL MARL *occur as clayey oozes in this core. They are greenish gray* (10Y 5/2, 6/2). *Beds with sharp* bases and occasional lamination are common and bioturbation is more intense towards the top of these beds; the lower parts of the beds contain more foraminifers. These beds are interpreted as pelagic clay and carbonate turbidities. Other beds are massive and bioturbated.

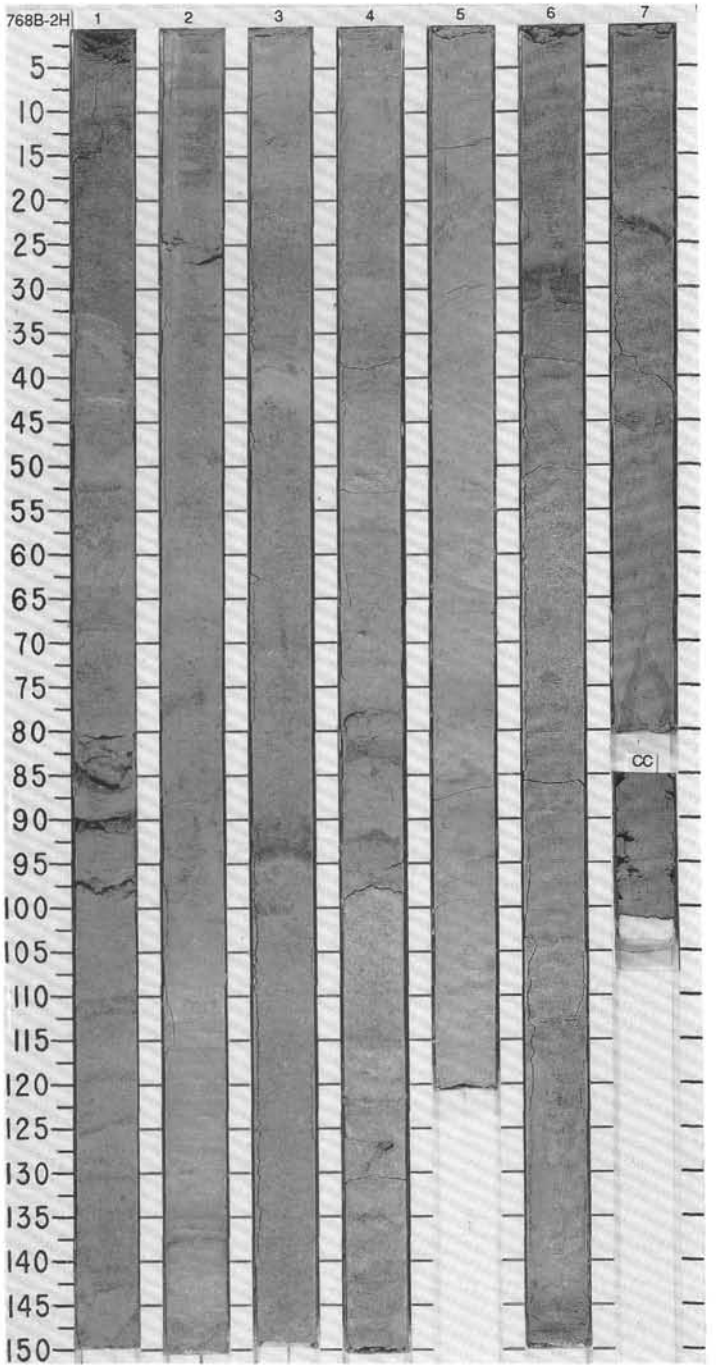
Minor lithologies: Vitric and crystal ash occurs in very thin beds in Section 1, 39-41 cm and Section 6, 28-32 cm which are considered to be redeposited. They are grayish brown (2.5Y 5/2, 10YR 5/2). They have sharp bases and gradational upper contacts. They are composed of glass, plagioclase and hornblende with small amounts of biotite, opaques and rock fragments.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 30 D	1, 40 M	1, 40 D	3, 40 D	3, 60 D	3, 103 M	4, 110 D
TEXTURE:							
Sand	20	40	10	10	10	70	8
Silt	10	20	30	30	30	30	30
Clay	70	40	60	60	60	—	62
COMPOSITION:							
Accessory minerals	—	4	—	—	—	—	—
Bioclast	1	—	—	—	5	—	—
Biotite	—	—	—	—	—	—	Tr
Clay	15	—	5	5	15	—	10
Clinopyroxene	—	—	—	—	—	2	
Dinoflagellate	—	—	—	—	—	—	Tr
Feldspar	—	10	—	—	1	—	—
Foraminifers	20	Tr	50	50	20	—	20
Glass	—	70	—	—	—	—	3
Hematite	—	—	—	—	—	Tr	—
Hornblende	—	—	—	—	—	12	Tr
Magnetite	—	—	—	—	—	5	—
Micrite	—	—	15	15	15	—	—
Nannofossils	60	10	25	25	40	—	65
Opaques	—	—	—	—	Tr	—	—
Plagioclase	—	—	—	—	—	20	—
Rock fragment	—	1	—	—	—	60	—
Spicules	—	—	1	1	—	—	Tr

SMEAR SLIDE SUMMARY (%):

	5, 66 D	6, 31 M	6, 90 D	7, 14 D
TEXTURE:				
Sand	30	20	1	10
Silt	30	75	5	50
Clay	40	5	94	40
COMPOSITION:				
Accessory minerals	—	2	—	—
Biotite	—	3	—	—
Clay	10	—	1	5
Diatoms	—	—	2	—
Dinoflagellate	Tr	—	1	5
Feldspar	1	—	—	—
Foraminifers	30	—	10	10
Glass	5	40	—	—
Hornblende	Tr	10	—	5
Nannofossils	45	—	80	55
Opaques	—	5	—	—
Plagioclase	—	30	2	Tr
Pteropod	5	—	—	—
Quartz	—	—	—	5
Radiolarians	1	—	1	5
Rock fragment	—	5	—	—
Silicoflagellates	Tr	—	—	—
Spicules	1	—	3	10



SITE 768 HOLE B CORE 3H CORED INTERVAL 13.5-23.0 mbsf

TIME-ROCK UNIT: PLEISTOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: N22 (*E. huxleyi* NN21)

FORAMINIFERS: ●A/G ●C/G

NANNOFOSSILS: ●R/P

RADIOLARIANS:

DIATOMS:

PALEOMAGNETICS: Brunhes

PHYS. PROPERTIES: ●ϕ=74.5 WC=135.3 ρ=1.40 ϒ=2.46; ●ϕ=81.6 WC=156.2 ρ=1.37 ϒ=2.51; ●ϕ=85.2 WC=198.0 ρ=1.31 ϒ=2.54

CHEMISTRY: ●$CaCO_3$=7.79% ●$CaCO_3$=1.33% TOC=0.0% ●$CaCO_3$=5.97% ●$CaCO_3$=4.97% ●$CaCO_3$=5.29% TOC=0.07%

SECTION: 1, 2, 3, 4, 5, 6, 7, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES: F, F, F, IW

SAMPLES

LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH FORAMINIFERS and FORAMINIFERAL MARL WITH NANNOFOSSILS and ash

Major lithologies: The marls in this core vary from NANNOFOSSIL MARL WITH FORAMINIFERS to FORAMINIFERAL MARL WITH NANNOFOSSILS and ash. They occur in massive light greenish gray (10Y 5/1, 6/1, 5Y 6/2) thick beds which are mottled due to bioturbation or medium beds which have sharp bases and are normally graded. Bioturbation has disturbed original bedding contacts in many places. The marls are composed of clay, nannofossils and foraminifers, but also include pteropods and volcanogenic grains (glass, feldspar and amphibole).

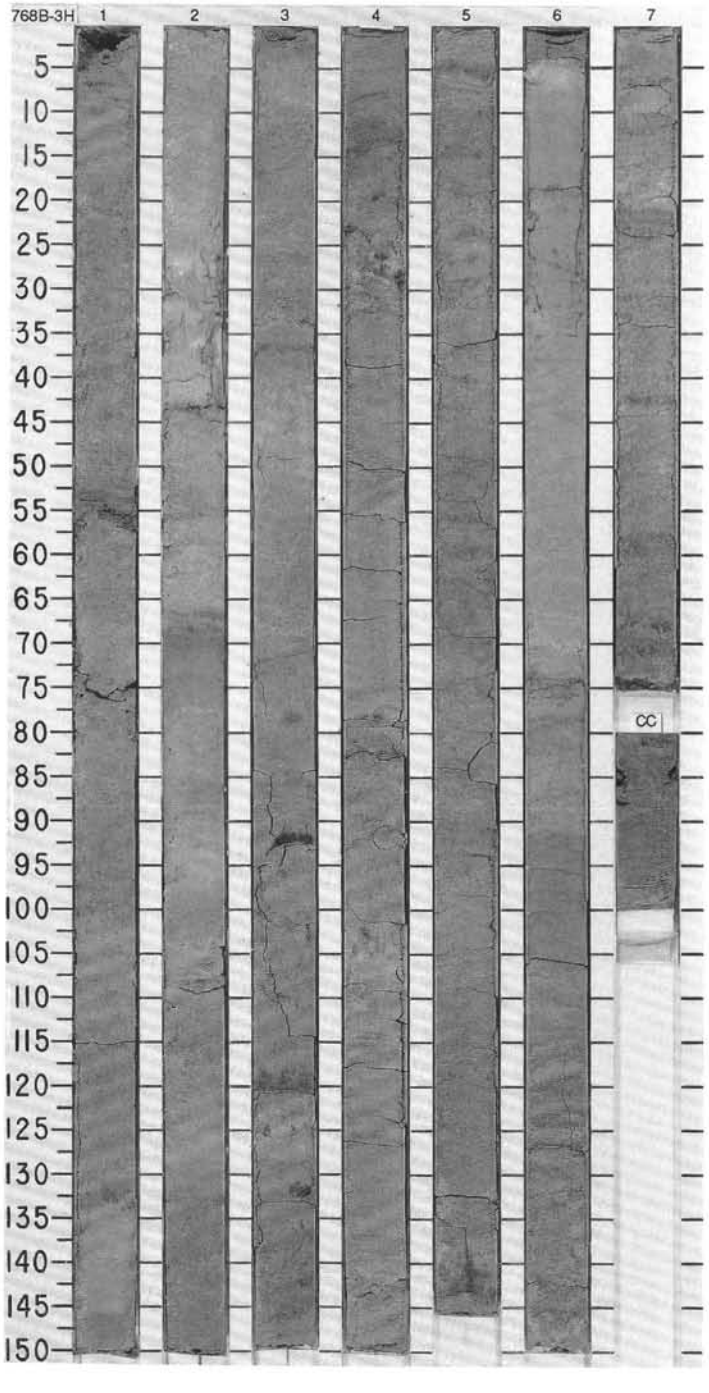
Minor lithology: Very thin ash beds occur in Sections 1 and 3. They are dark gray (10Y 3/1, 4/1) and have sharp basal contacts. They are composed mainly of glass, plagioclase, amphiboles and biotite, but also include some calcareous material (foraminifers and nannofossils).

SMEAR SLIDE SUMMARY (%):

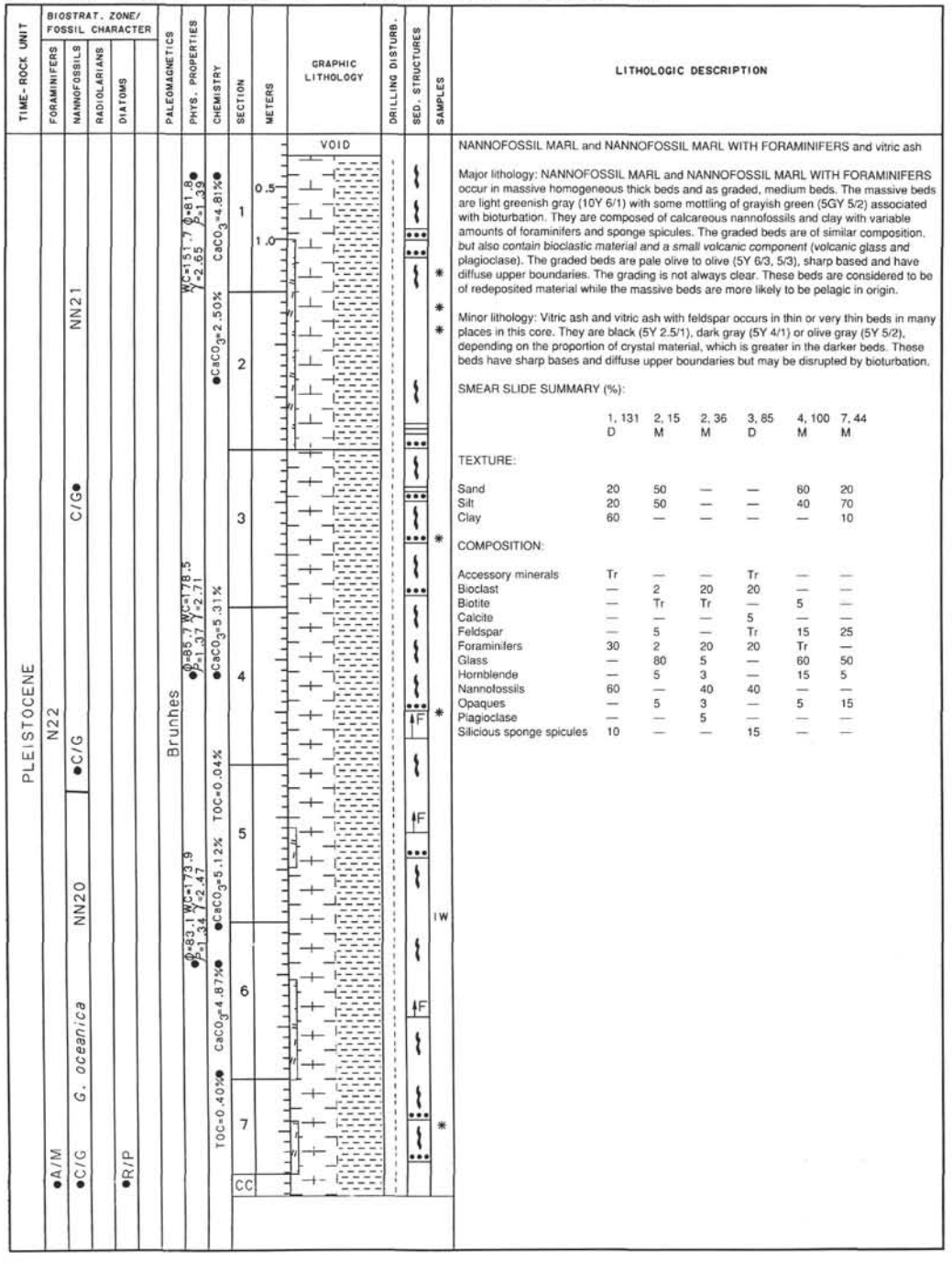
	1, 36 M	1, 55 M	1, 121 D	2, 85 D	3, 68 D	4, 82 M	5, 92 M
TEXTURE:							
Sand	20	10	2	10	30	60	2
Silt	70	80	20	40	10	20	20
Clay	10	10	78	50	60	20	78
COMPOSITION:							
Accessory minerals	—	—	—	1	—	—	—
Amphibole	Tr	Tr	Tr	—	—	2	—
Bioclast	—	—	—	—	10	—	—
Biotite	—	2	—	—	—	—	—
Clay	—	—	10	4	20	15	10
Dinoflagellate	—	—	—	5	1	Tr	1
Feldspar	—	—	—	—	—	5	—
Foraminifers	—	1	15	25	30	70	10
Glass	65	70	Tr	—	2	Tr	—
Hornblende	5	5	Tr	—	—	—	—
Nannofossils	—	—	70	50	20	2	78
Opaques	Tr	Tr	—	—	—	—	—
Plagioclase	25	20	—	—	2	—	1
Pteropod	—	—	1	—	10	5	—
Pyroxene	Tr	Tr	—	—	—	—	—
Radiolarians	—	—	—	5	—	—	—
Spicules	—	Tr	Tr	10	2	Tr	Tr

SMEAR SLIDE SUMMARY (%):

	6, 2 M	CC, 19 M
TEXTURE:		
Sand	5	2
Silt	70	40
Clay	25	55
COMPOSITION:		
Accessory minerals	—	5
Amphibole	8	—
Biotite	5	—
Clay	10	10
Dinoflagellate	—	1
Feldspar	15	—
Foraminifers	5	5
Glass	40	65
Nannofossils	15	5
Plagioclase	—	5
Spicules	Tr	2



SITE 768 HOLE B CORE 4H CORED INTERVAL 23.0-32.5 mbsf



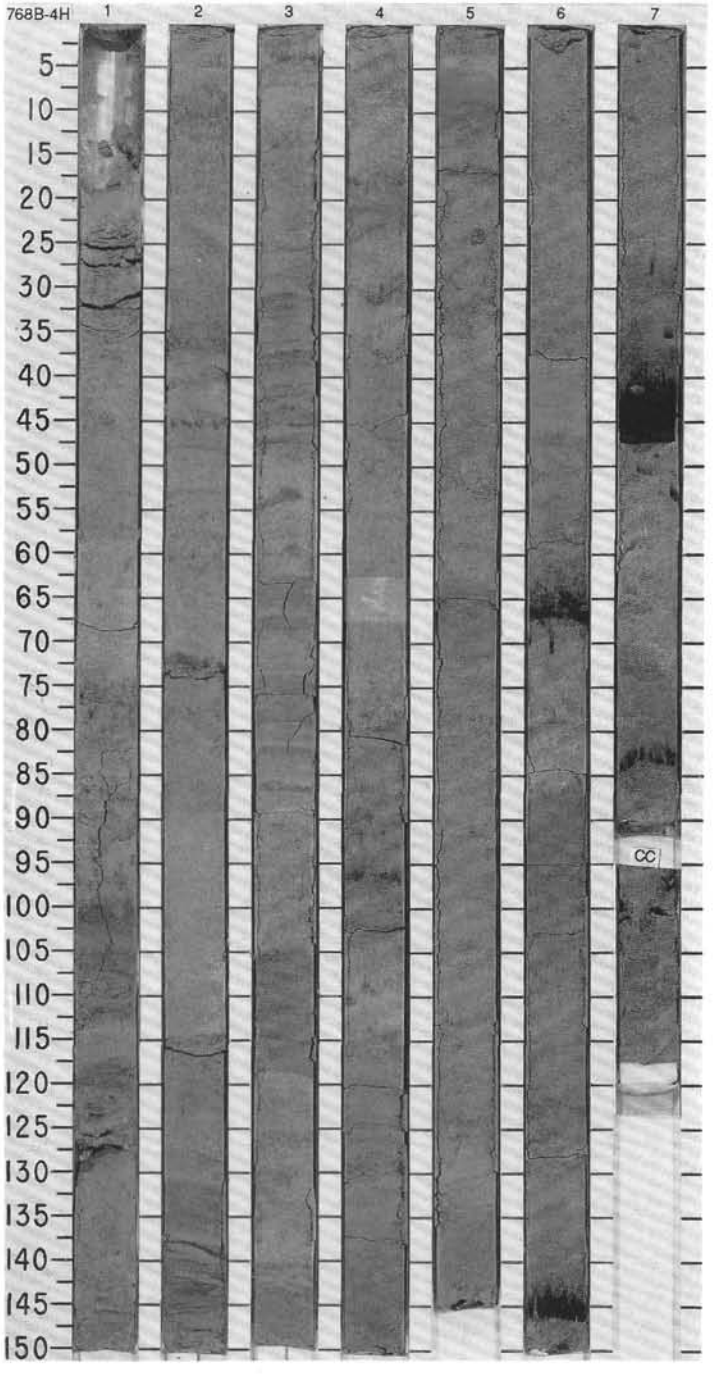
NANNOFOSSIL MARL and NANNOFOSSIL MARL WITH FORAMINIFERS and vitric ash

Major lithology: NANNOFOSSIL MARL and NANNOFOSSIL MARL WITH FORAMINIFERS occur in massive homogeneous thick beds and as graded, medium beds. The massive beds are light greenish gray (10Y 6/1) with some mottling of grayish green (5GY 5/2) associated with bioturbation. They are composed of calcareous nannofossils and clay with variable amounts of foraminifers and sponge spicules. The graded beds are of similar composition, but also contain bioclastic material and a small volcanic component (volcanic glass and plagioclase). The graded beds are pale olive to olive (5Y 6/3, 5/3), sharp based and have diffuse upper boundaries. The grading is not always clear. These beds are considered to be of redeposited material while the massive beds are more likely to be pelagic in origin.

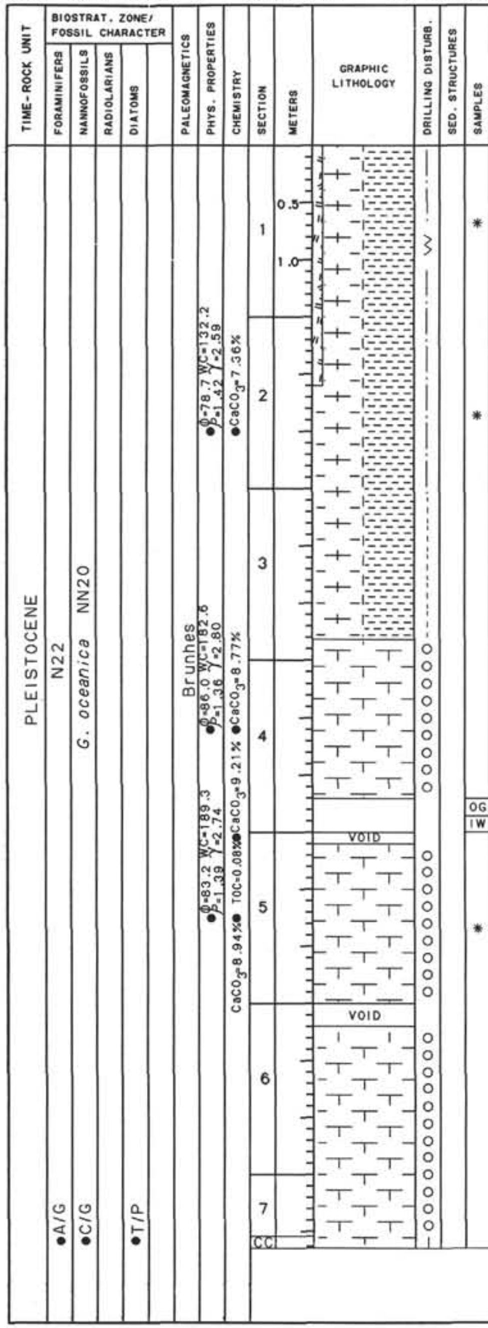
Minor lithology: Vitric ash and vitric ash with feldspar occurs in thin or very thin beds in many places in this core. They are black (5Y 2.5/1), dark gray (5Y 4/1) or olive gray (5Y 5/2), depending on the proportion of crystal material, which is greater in the darker beds. These beds have sharp bases and diffuse upper boundaries but may be disrupted by bioturbation.

SMEAR SLIDE SUMMARY (%):

	1, 131 D	2, 15 M	2, 36 M	3, 85 D	4, 100 M	7, 44 M
TEXTURE:						
Sand	20	50	—	—	60	20
Silt	20	50	—	—	40	70
Clay	60	—	—	—	—	10
COMPOSITION:						
Accessory minerals	Tr	—	—	Tr	—	—
Bioclast	—	2	20	20	—	—
Biotite	—	Tr	Tr	—	5	—
Calcite	—	—	—	5	—	—
Feldspar	—	5	—	Tr	15	25
Foraminifers	30	2	20	20	Tr	—
Glass	—	80	5	—	60	50
Hornblende	—	5	3	—	15	5
Nannofossils	60	—	40	40	—	—
Opaques	—	5	3	—	5	15
Plagioclase	—	—	5	—	—	—
Siliccious sponge spicules	10	—	—	15	—	—



SITE 768 HOLE B CORE 5H CORED INTERVAL 32.5-42.0 mbsf



LITHOLOGIC DESCRIPTION

FORAMINIFERAL OOZE WITH NANNOFOSSILS and NANNOFOSSIL MARL WITH FORAMINIFERS with vitric ash

Major lithologies:

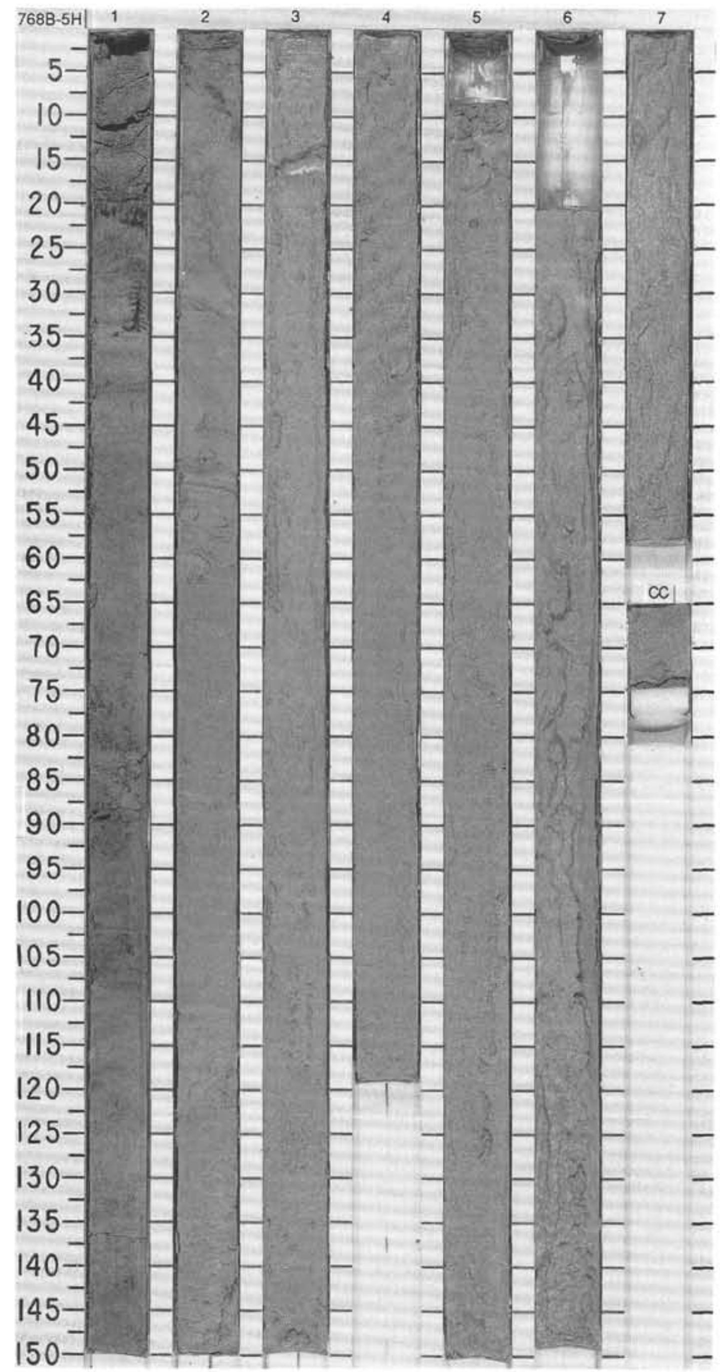
a. The NANNOFOSSIL MARL WITH FORAMINIFERS is dark greenish gray (10Y 5/1) with thin green laminae. It is composed of clay, nannofossils, foraminifers, bioclasts and sponge spicules. Bioturbation appears as grayish mottling.

b. The FORAMINIFERAL OOZE WITH NANNOFOSSILS is light greenish gray (10Y 6/1). It is composed of foraminifers, nannofossils and a small amount of sponge spicules. In Sections 4, 5 and 6 the deposits are soupy and any original structure in the sequence has been lost.

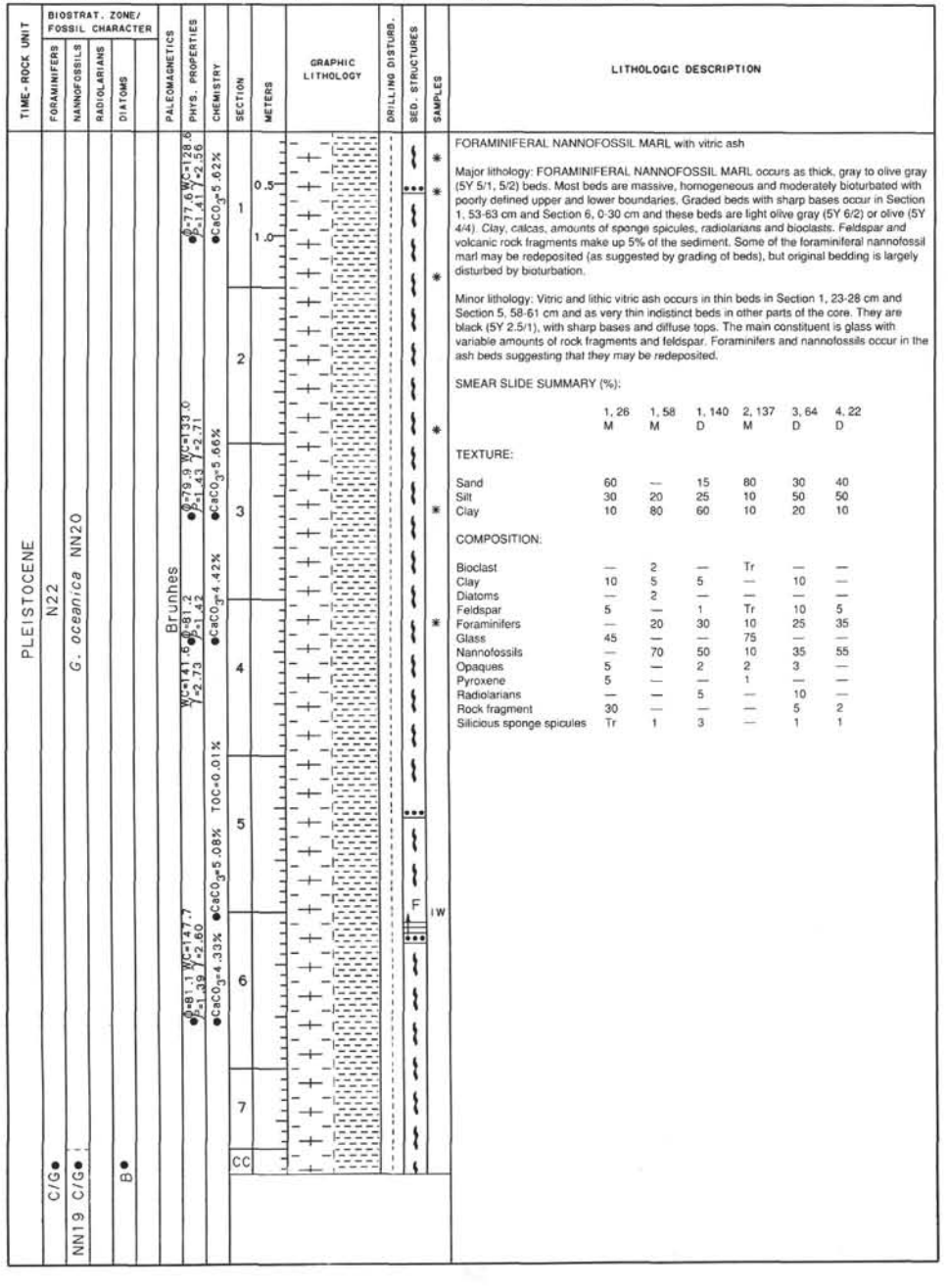
Minor lithology: In the upper part of the core thin laminated black (5Y 2.5/1) volcanic ash layers occur. At places the lamination is disturbed by bioturbation. In Section 1 a thin, graded olive gray (5Y 5/2) nannofossil ooze with major bioclasts (shell debris) is intercalated. The coarser foraminiferal ooze in the lower part of this core may have been turbidite deposits but original structure has been lost in this part of the core.

SMEAR SLIDE SUMMARY (%):

	1, 68 D	2, 86 D	5, 84 D
TEXTURE:			
Sand	30	40	70
Silt	60	60	20
Clay	10	—	10
COMPOSITION:			
Bioclast	—	10	—
Diatoms	1	—	—
Feldspar	5	5	—
Foraminifers	15	20	70
Glass	5	—	—
Hornblende	—	Tr	—
Nannofossils	65	60	20
Radiolarians	1	—	—
Silicious sponge spicules	5	5	5



SITE 768 HOLE B CORE 6H CORED INTERVAL 42.0-51.5 mbsf



LITHOLOGIC DESCRIPTION

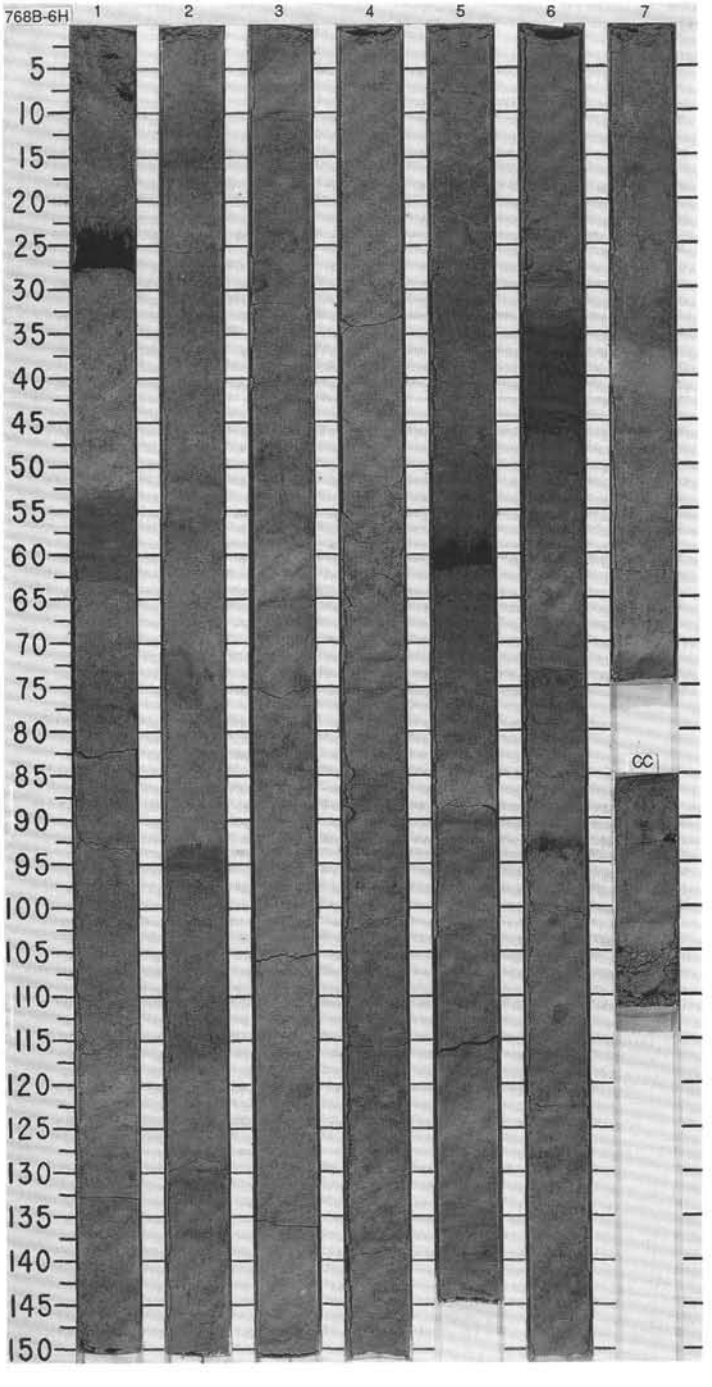
FORAMINIFERAL NANNOFOSSIL MARL with vitric ash

Major lithology: FORAMINIFERAL NANNOFOSSIL MARL occurs as thick, gray to olive gray (5Y 5/1, 5/2) beds. Most beds are massive, homogeneous and moderately bioturbated with poorly defined upper and lower boundaries. Graded beds with sharp bases occur in Section 1, 53-63 cm and Section 6, 0-30 cm and these beds are light olive gray (5Y 6/2) or olive (5Y 4/4). *Clay, calcas, amounts of sponge spicules, radiolarians and bioclasts. Feldspar and* volcanic rock fragments make up 5% of the sediment. Some of the foraminiferal nannofossil marl may be redeposited (as suggested by grading of beds), but original bedding is largely disturbed by bioturbation.

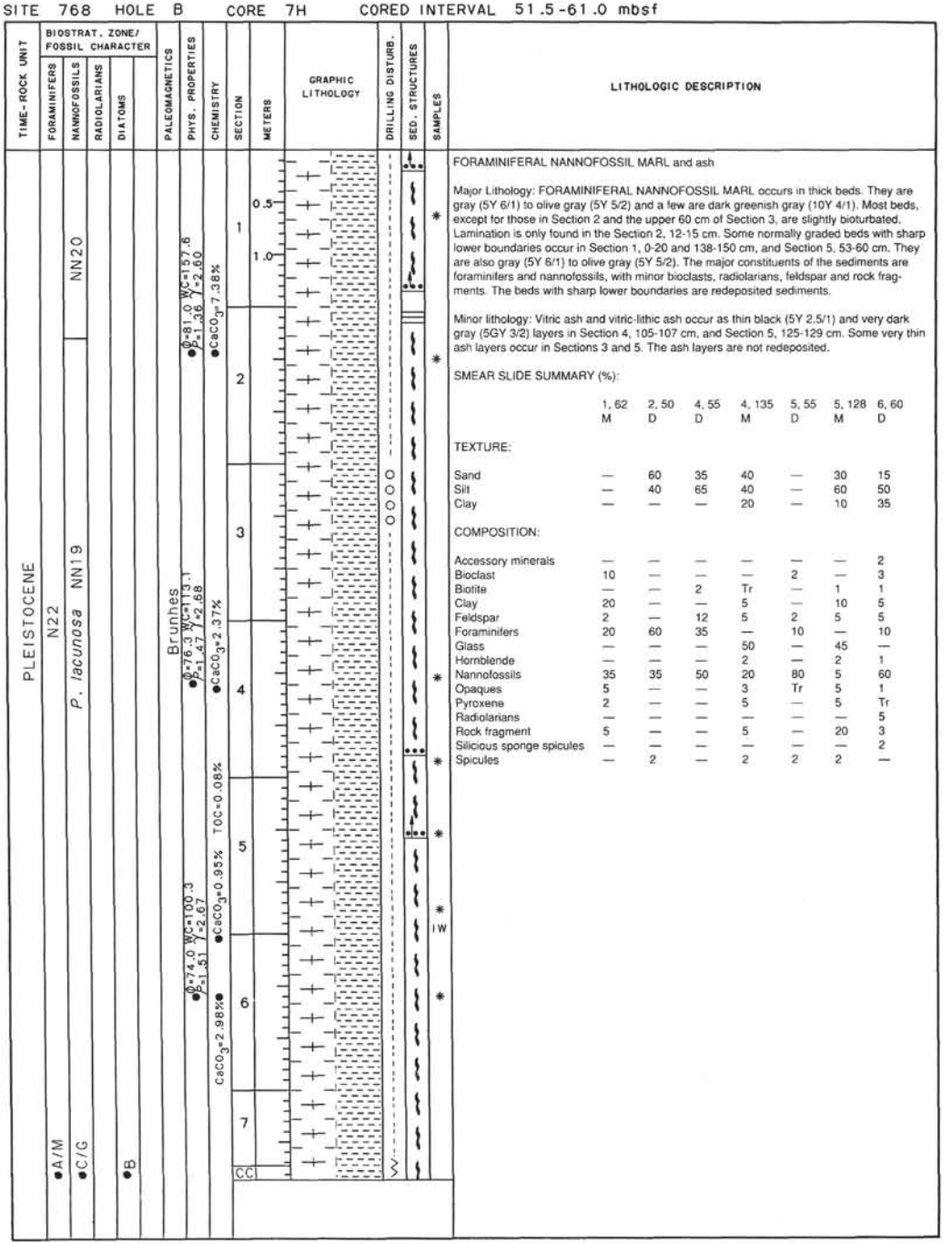
Minor lithology: Vitric and lithic vitric ash occurs in thin beds in Section 1, 23-28 cm and Section 5, 58-61 cm and as very thin indistinct beds in other parts of the core. They are black (5Y 2.5/1), with sharp bases and diffuse tops. The main constituent is glass with variable amounts of rock fragments and feldspar. Foraminifers and nannofossils occur in the *ash beds suggesting that they may be redeposited.*

SMEAR SLIDE SUMMARY (%):

	1, 26 M	1, 58 M	1, 140 D	2, 137 M	3, 64 D	4, 22 D
TEXTURE:						
Sand	60	—	15	80	30	40
Silt	30	20	25	10	50	50
Clay	10	80	60	10	20	10
COMPOSITION:						
Bioclast	—	2	—	Tr	—	—
Clay	10	5	5	—	10	—
Diatoms	—	2	—	—	—	—
Feldspar	5	—	1	Tr	10	5
Foraminifers	—	20	30	10	25	35
Glass	45	—	—	75	—	—
Nannofossils	—	70	50	10	35	55
Opaques	5	—	2	2	3	—
Pyroxene	5	—	—	1	—	—
Radiolarians	—	—	5	—	10	—
Rock fragment	30	—	—	—	5	2
Silicious sponge spicules	Tr	1	3	—	1	1



SITE 768 HOLE B CORE 7H CORED INTERVAL 51.5-61.0 mbsf



LITHOLOGIC DESCRIPTION

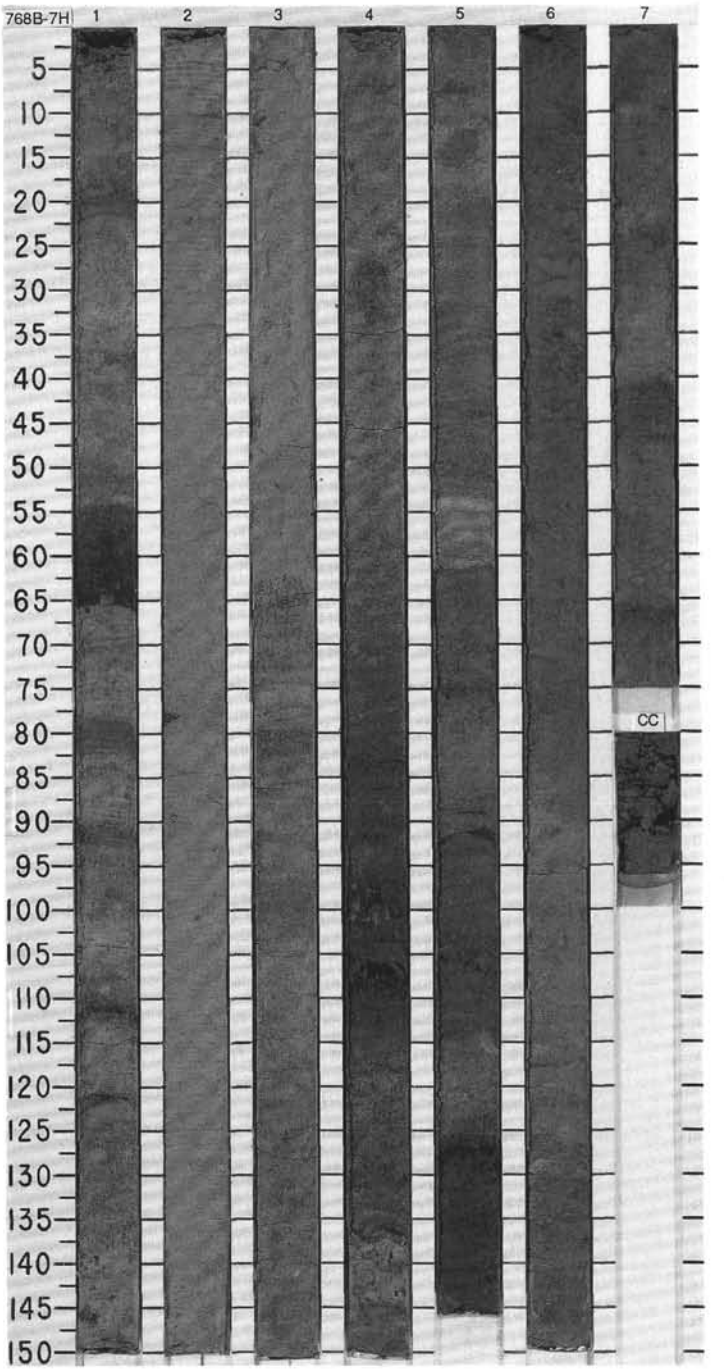
FORAMINIFERAL NANNOFOSSIL MARL and ash

Major Lithology: FORAMINIFERAL NANNOFOSSIL MARL occurs in thick beds. They are gray (5Y 6/1) to olive gray (5Y 5/2) and a few are dark greenish gray (10Y 4/1). Most beds, except for those in Section 2 and the upper 60 cm of Section 3, are slightly bioturbated. Lamination is only found in the Section 2, 12-15 cm. Some normally graded beds with sharp lower boundaries occur in Section 1, 0-20 and 138-150 cm, and Section 5, 53-60 cm. They are also gray (5Y 6/1) to olive gray (5Y 5/2). The major constituents of the sediments are foraminifers and nannofossils, with minor bioclasts, radiolarians, feldspar and rock fragments. The beds with sharp lower boundaries are redeposited sediments.

Minor lithology: Vitric ash and vitric-lithic ash occur as thin black (5Y 2.5/1) and very dark gray (5GY 3/2) layers in Section 4, 105-107 cm, and Section 5, 125-129 cm. Some very thin ash layers occur in Sections 3 and 5. The ash layers are not redeposited.

SMEAR SLIDE SUMMARY (%):

	1, 62 M	2, 50 D	4, 55 D	4, 135 M	5, 55 D	5, 128 M	6, 60 D
TEXTURE:							
Sand	—	60	35	40	—	30	15
Silt	—	40	65	40	—	60	50
Clay	—	—	—	20	—	10	35
COMPOSITION:							
Accessory minerals	—	—	—	—	—	—	2
Bioclast	10	—	—	—	2	—	3
Biotite	—	—	2	Tr	—	1	1
Clay	20	—	—	5	—	10	5
Feldspar	2	—	12	5	2	5	5
Foraminifers	20	60	35	—	10	—	10
Glass	—	—	—	50	—	45	—
Hornblende	—	—	—	2	—	2	1
Nannofossils	35	35	50	20	80	5	60
Opaques	5	—	—	3	Tr	5	1
Pyroxene	2	—	—	5	—	5	Tr
Radiolarians	—	—	—	—	—	—	5
Rock fragment	5	—	—	5	—	20	3
Silicious sponge spicules	—	—	—	—	—	—	2
Spicules	—	2	—	2	2	2	—



SITE 768 HOLE B CORE 8H CORED INTERVAL 61.0-70.5 mbsf

TIME-ROCK UNIT: PLEISTOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER:
- FORAMINIFERS: ●A/M N22 ●C/G
- NANNOFOSSILS: *P. lacunosa* NN19
- RADIOLARIANS
- DIATOMS: ●B

PALEOMAGNETICS: Brunhes

PHYS. PROPERTIES: ●ρ=75.7 WC=107.8 ρ=1.49 ϕ=2.69; ●ρ=127.4 WC=78.4 ρ=2.60 ϕ=1.43; ●ρ=79.5 WC=135.2 ρ=1.42 ϕ=2.63; WC=66.3 ϕ=69.7 ρ=2.59 ρ=1.54

CHEMISTRY: $CaCO_3$=3.60%●; ●$CaCO_3$=6.09% TOC=0.02%; $CaCO_3$=4.44%●; ●$CaCO_3$=3.59%; $CaCO_3$=2.77%●

SECTION: 1 2 3 4 5 6 7 CC

METERS: 0.5 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES: OG IW

LITHOLOGIC DESCRIPTION

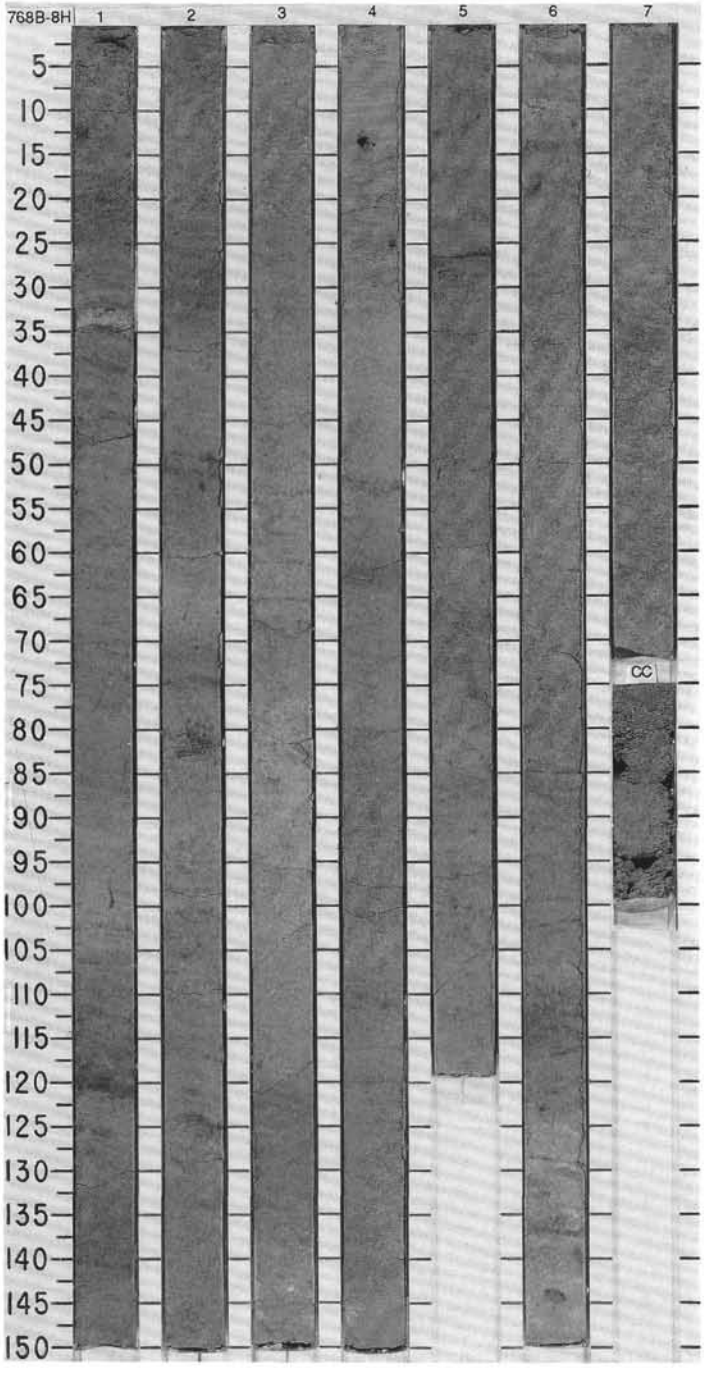
NANNOFOSSIL MARL and NANNOFOSSIL-FORAMINIFERAL MARL with foraminiferal marl and vitric ash

Major lithology: NANNOFOSSIL MARL and NANNOFOSSIL-FORAMINIFERAL MARL. The nannofossil marl is gray (5Y 5/1) and is composed of clay, nannofossils, foraminifers, bioclasts and minor amounts of hornblende, pyroxene, rock fragments, glass, feldspar and biotite. It is bioturbated (greenish to grayish mottling) throughout the whole core. The nannofossil-foraminifer marl is g (5Y 6/1), bioturbation appears as grayish and greenish The marl is composed of clay, nannofossils, foraminifers, and bioclasts.

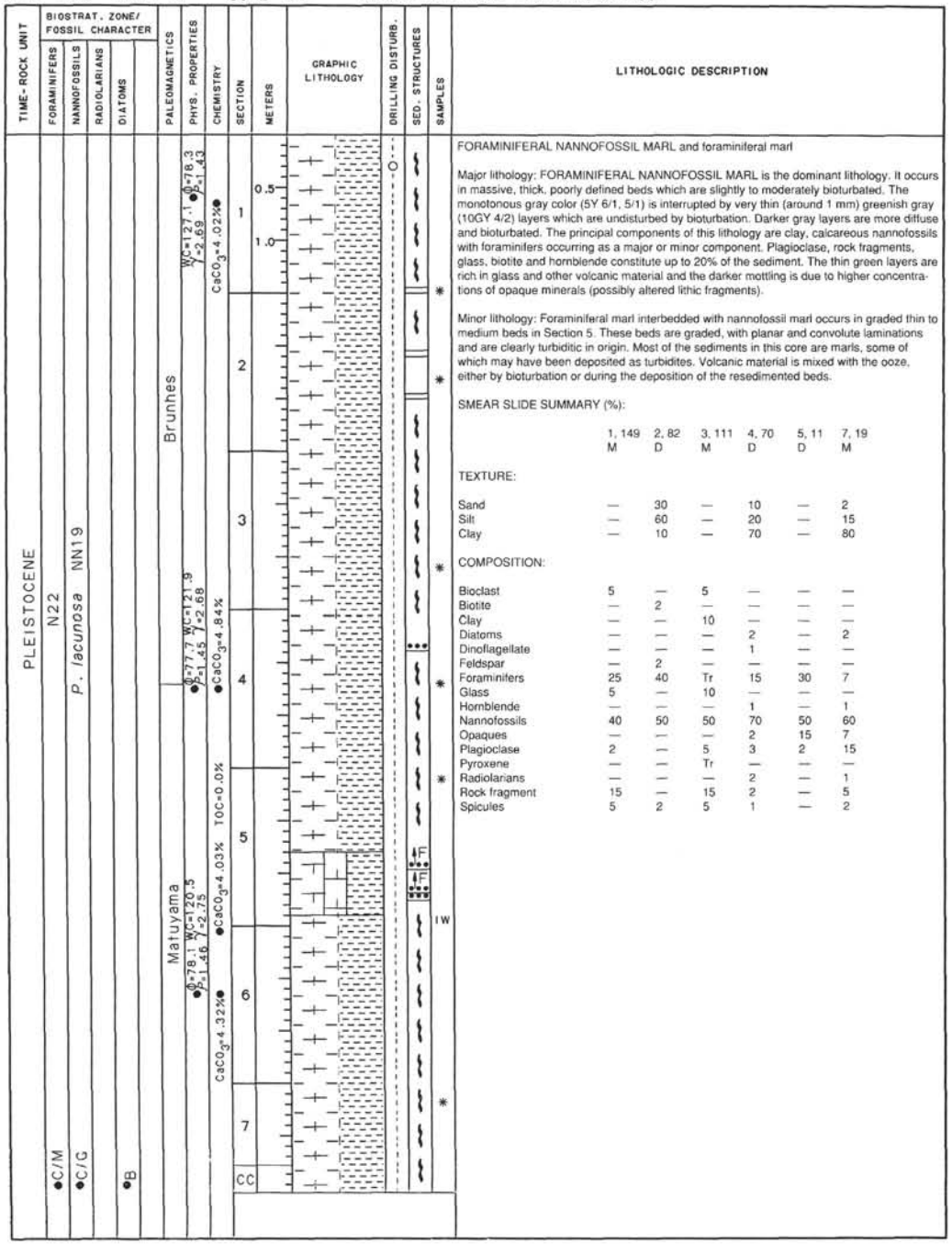
Minor lithology: In Section 1 there is a very thin bed of a light gray (5Y 7/1) vitric ash composed of glass, feldspar, rock fragments, hornblende, pyroxene and opaques. Disrupted and strongly bioturbated very thin ash layers also appear in the throughout the core. In Section 2 there is a medium bedded layer of normally graded, laminated foraminiferal marl, gray (5Y 6/2) in color with plant debris. The marl is composed of clay, foraminifers, nannofossils, feldspar, hornblende and biotite.

SMEAR SLIDE SUMMARY (%):

	1, 34 M	2, 124 M	4, 13 M	4, 29 M	6, 77 D	6, 85 M
TEXTURE:						
Sand	30	—	—	80	20	10
Silt	70	—	—	20	60	70
Clay	—	—	—	—	20	20
COMPOSITION:						
Accessory minerals	—	—	—	—	5	10
Bioclast	3	10	—	—	10	20
Biotite	2	—	—	2	Tr	—
Clay	—	—	—	—	—	20
Feldspar	10	5	—	3	Tr	—
Fish	—	—	—	—	Tr	5
Foraminifers	2	15	—	80	20	10
Glass	70	5	—	—	5	Tr
Hornblende	3	3	—	2	Tr	—
Nannofossils	—	50	—	10	55	20
Opaques	3	3	—	—	—	—
Plant	—	—	100	2	—	—
Pyroxene	2	2	—	—	Tr	—
Rock fragment	5	5	—	—	—	10
Spicules	—	2	—	—	5	5



SITE 768 HOLE B CORE 9H CORED INTERVAL 70.5-80.0 mbsf



LITHOLOGIC DESCRIPTION

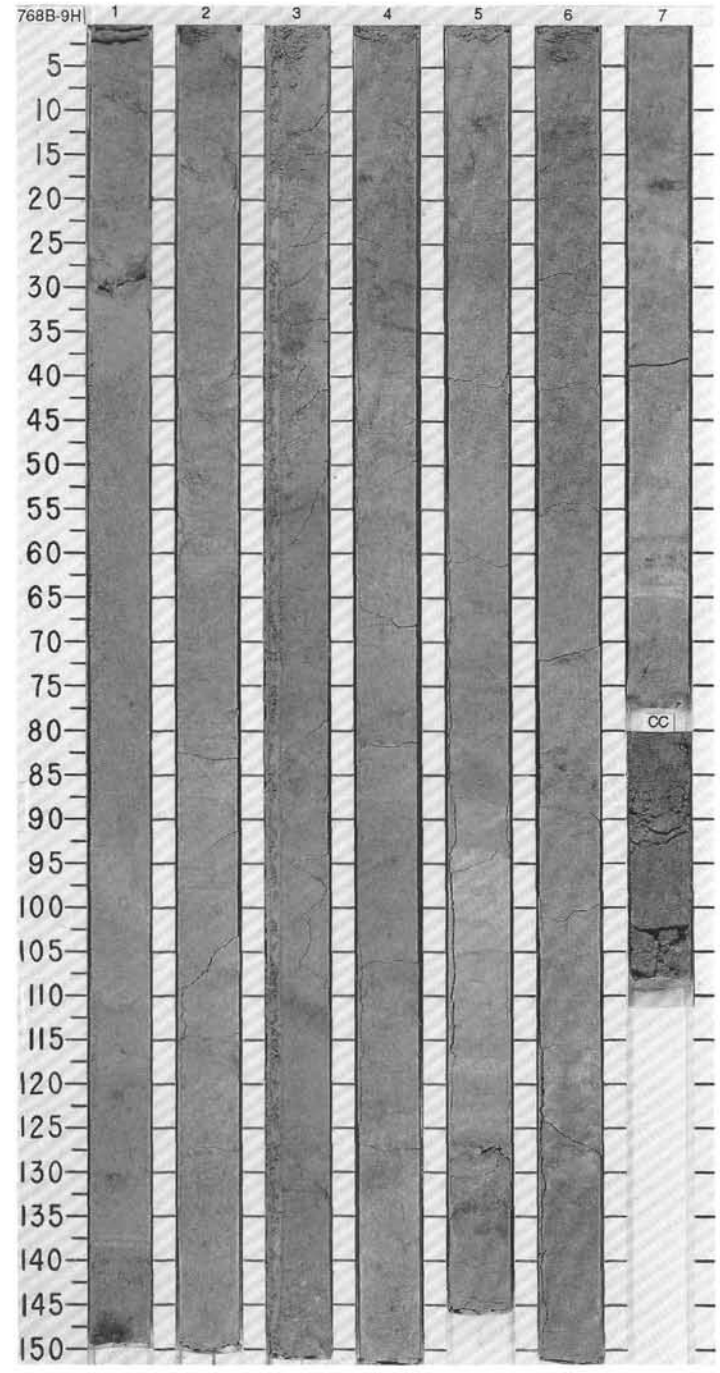
FORAMINIFERAL NANNOFOSSIL MARL and foraminiferal marl

Major lithology: FORAMINIFERAL NANNOFOSSIL MARL is the dominant lithology. It occurs in massive, thick, poorly defined beds which are slightly to moderately bioturbated. The monotonous gray color (5Y 6/1, 5/1) is interrupted by very thin (around 1 mm) greenish gray (10GY 4/2) layers which are undisturbed by bioturbation. Darker gray layers are more diffuse and bioturbated. The principal components of this lithology are clay, calcareous nannofossils with foraminifers occurring as a major or minor component. Plagioclase, rock fragments, glass, biotite and hornblende constitute up to 20% of the sediment. The thin green layers are rich in glass and other volcanic material and the darker mottling is due to higher concentrations of opaque minerals (possibly altered lithic fragments).

Minor lithology: Foraminiferal marl interbedded with nannofossil marl occurs in graded thin to medium beds in Section 5. These beds are graded, with planar and convolute laminations and are clearly turbiditic in origin. Most of the sediments in this core are marls, some of which may have been deposited as turbidites. Volcanic material is mixed with the ooze, either by bioturbation or during the deposition of the resedimented beds.

SMEAR SLIDE SUMMARY (%):

	1, 149 M	2, 82 D	3, 111 M	4, 70 D	5, 11 D	7, 19 M
TEXTURE:						
Sand	—	30	—	10	—	2
Silt	—	60	—	20	—	15
Clay	—	10	—	70	—	80
COMPOSITION:						
Bioclast	5	—	5	—	—	—
Biotite	—	2	—	—	—	—
Clay	—	—	10	—	—	—
Diatoms	—	—	—	2	—	2
Dinoflagellate	—	—	—	1	—	—
Feldspar	—	2	—	—	—	—
Foraminifers	25	40	Tr	15	30	7
Glass	5	—	10	—	—	—
Hornblende	—	—	—	1	—	1
Nannofossils	40	50	50	70	50	60
Opaques	—	—	—	2	15	7
Plagioclase	2	—	5	3	2	15
Pyroxene	—	—	Tr	—	—	—
Radiolarians	—	—	—	2	—	1
Rock fragment	15	—	15	2	—	5
Spicules	5	2	5	1	—	2



SITE 768 HOLE B CORE 10H CORED INTERVAL 80.0-89.5 mbsf

TIME-ROCK UNIT: PLEISTOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS ●C/G; N22 / ●F/G; NANNOFOSSILS *P. lacunosa*; RADIOLARIANS NN19; DIATOMS ●B

PALEOMAGNETICS: Matuyama / Jaramillo

PHYS. PROPERTIES: Matuyama: ρ=70.9 WC=87.8 ρ=1.56 γ=2.65; ρ=76.8 WC=115.4 ρ=1.47 γ=2.71

CHEMISTRY: $CaCO_3$=3.93%● ●$CaCO_3$=3.01% TOC=0.02% ●$CaCO_3$=3.81% ●TOC=0.05% $CaCO_3$=4.24%●

SECTION: 1 2 3 4 5 6 7 CC

METERS: 0.5 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES: IW

SAMPLES: WC=104.1 ρ=73.4 γ=2.57 ρ=1.46

LITHOLOGIC DESCRIPTION

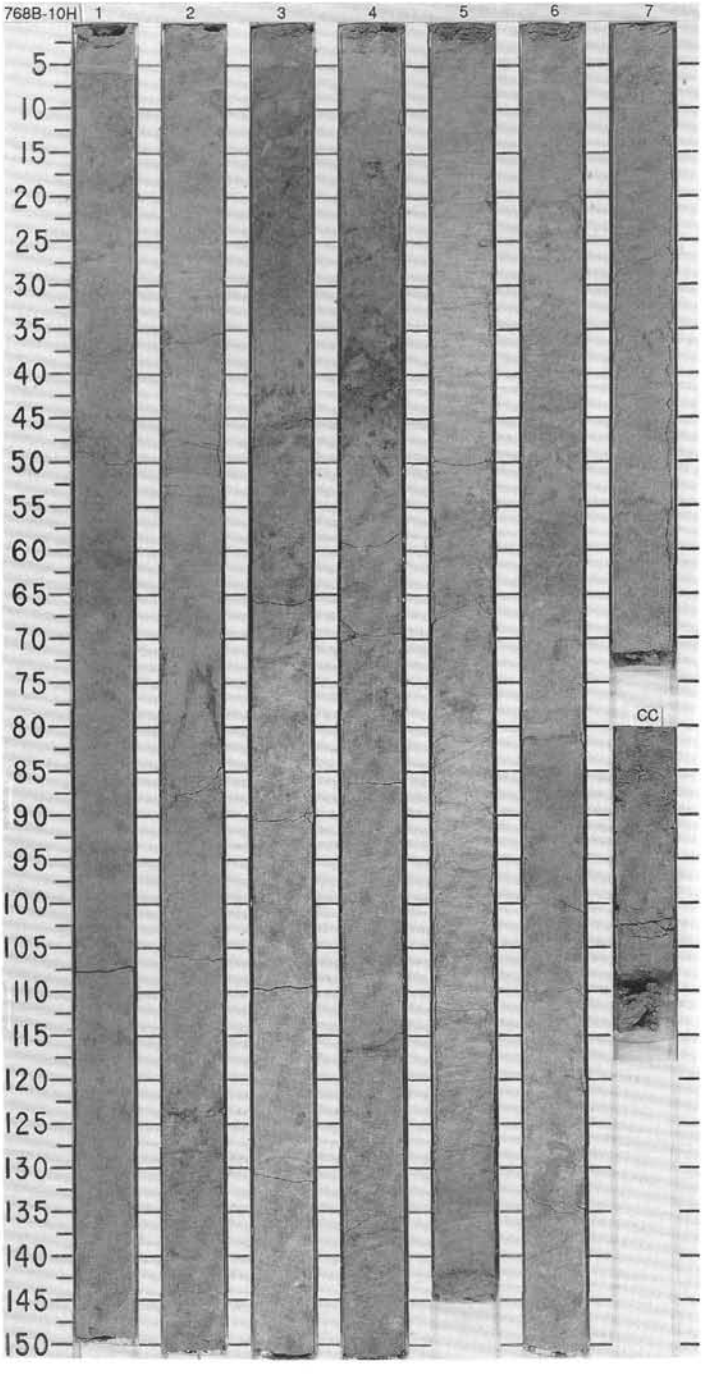
FORAMINIFERAL NANNOFOSSIL MARL and ash

Major lithology: FORAMINIFERAL NANNOFOSSIL MARL occurs throughout this principal components and the proportion of foraminifers is around 25% in most places. Higher concentrations of foraminifers occur at the bottoms of sharp-based, normally graded units of foraminiferal nannofossil marl. These graded beds are turbiditic in origin. The bulk of the sequence may be either pelagic or turbiditic. Bioturbation is common. Generally the marl is light greenish gray (10Y 6/1, 6/2) but it is mottled gray (5Y 5/1) in Section 4, 9-46 cm where there is a mixture with volcanic material. Volcanic material (feldspar, rock fragments and glass) occurs in all the marl samples examined.

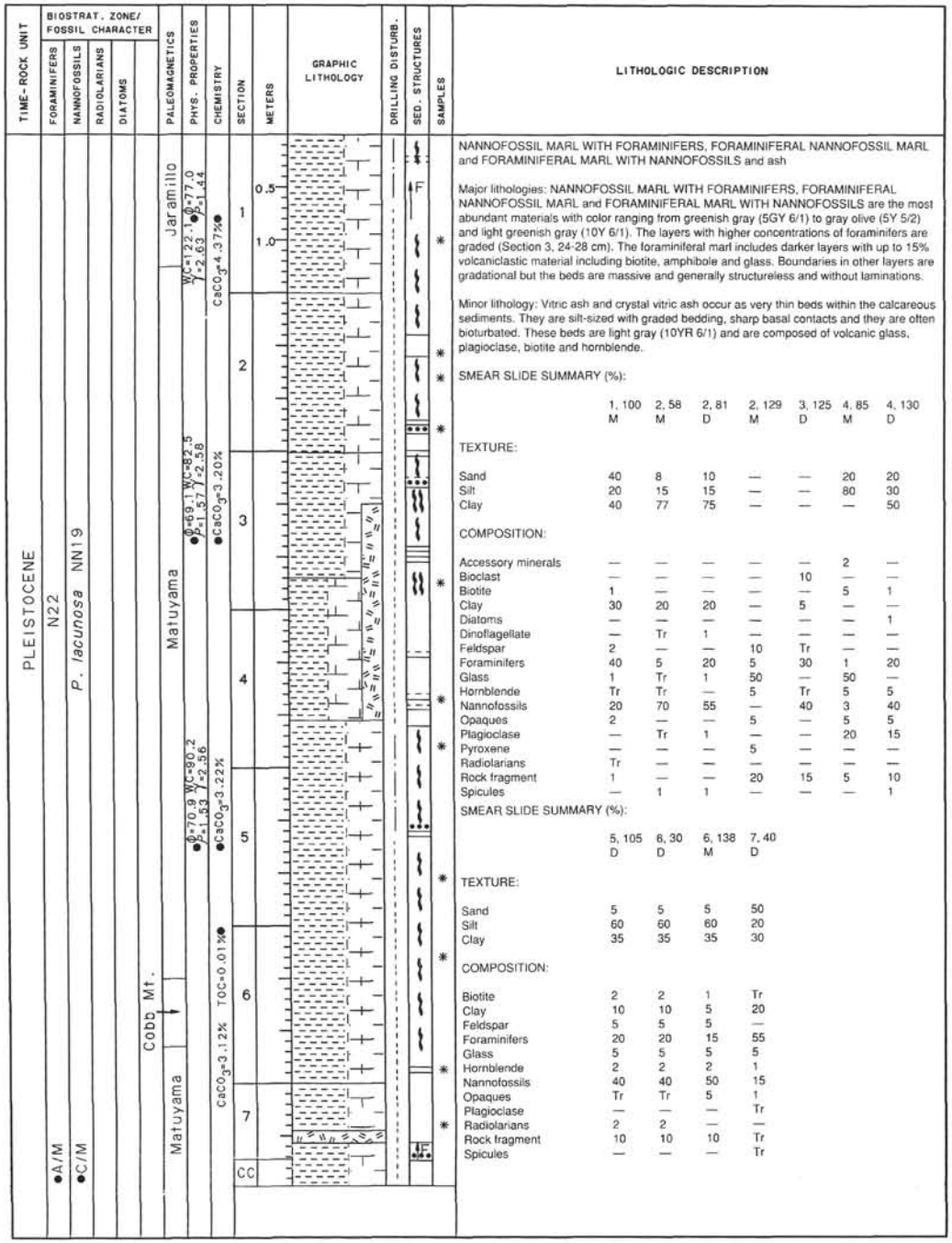
Minor lithology: Vitric ash and lithic vitric ash occurs as discrete very 4, 103 and 109 cm, as very thin darker laminae in other parts of the core. It also occurs mixed, probably by bioturbations with the ooze in Section 4. It is mainly composed of glass, lithic fragments, feldspar, and hornblende.

SMEAR SLIDE SUMMARY (%):

	1, 100 D	2, 52 M	3, 46 M	4, 42 M	4, 105 M	4, 108 M	7, 50 D
TEXTURE:							
Sand	15	80	—	—	—	—	50
Silt	45	20	—	—	—	—	50
Clay	40	—	—	—	—	—	—
COMPOSITION:							
Accessory minerals	2	Tr	—	—	—	—	—
Bioclast	4	5	Tr	—	—	—	—
Biotite	—	—	—	Tr	Tr	—	5
Clay	5	—	—	5	5	5	—
Feldspar	3	Tr	—	—	10	10	—
Foraminifers	25	60	—	5	—	5	15
Glass	—	—	90	5	50	50	25
Hornblende	—	2	—	5	5	5	2
Nannofossils	50	30	—	30	—	10	40
Opaques	2	Tr	Tr	5	2	3	—
Plagioclase	—	—	5	10	—	—	10
Pyroxene	—	3	5	3	5	Tr	—
Quartz	2	—	—	—	—	—	—
Radiolarians	2	—	—	—	—	—	—
Rock fragment	2	—	—	30	20	10	—
Spicules	1	Tr	—	Tr	—	—	2



SITE 768 HOLE B CORE 11H CORED INTERVAL 84.5-99.0 mbsf



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL WITH FORAMINIFERS, FORAMINIFERAL NANNOFOSSIL MARL and FORAMINIFERAL MARL WITH NANNOFOSSILS and ash

Major lithologies: NANNOFOSSIL MARL WITH FORAMINIFERS, FORAMINIFERAL NANNOFOSSIL MARL and FORAMINIFERAL MARL WITH NANNOFOSSILS are the most abundant materials with color ranging from greenish gray (5GY 6/1) to gray olive (5Y 5/2) and light greenish gray (10Y 6/1). The layers with higher concentrations of foraminifers are graded (Section 3, 24-28 cm). The foraminiferal marl includes darker layers with up to 15% volcaniclastic material including biotite, amphibole and glass. Boundaries in other layers are gradational but the beds are massive and generally structureless and without laminations.

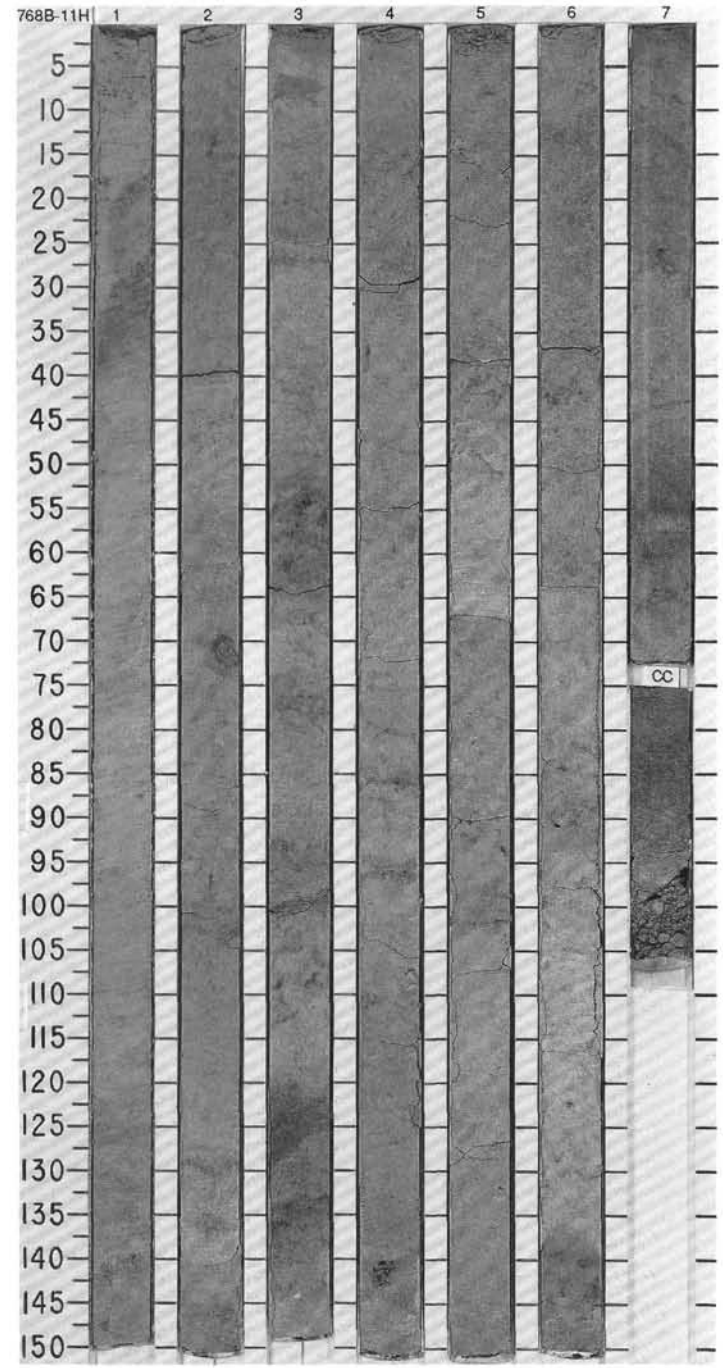
Minor lithology: Vitric ash and crystal vitric ash occur as very thin beds within the calcareous sediments. They are silt-sized with graded bedding, sharp basal contacts and they are often bioturbated. These beds are light gray (10YR 6/1) and are composed of volcanic glass, plagioclase, biotite and hornblende.

SMEAR SLIDE SUMMARY (%):

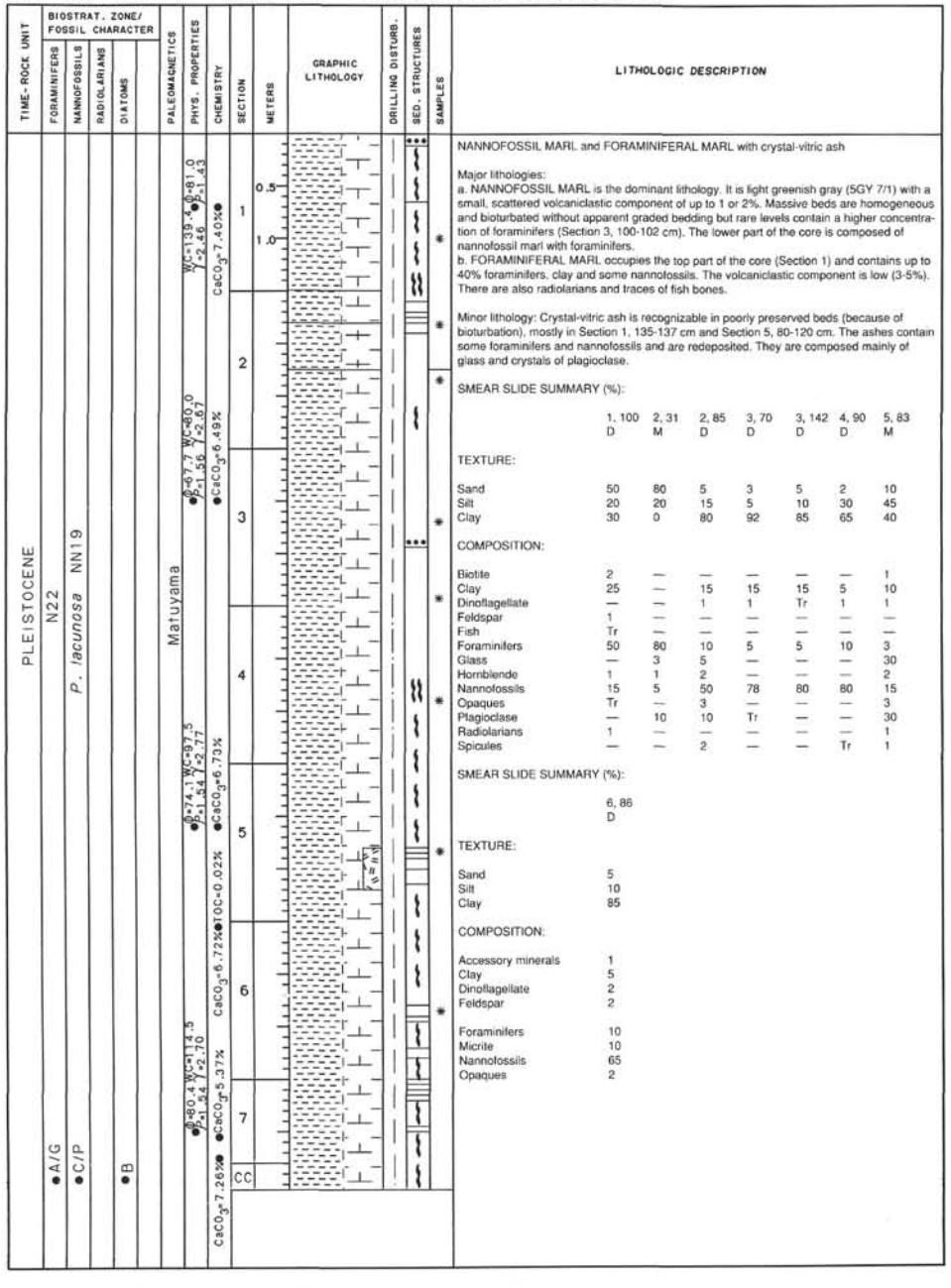
	1, 100 M	2, 58 M	2, 81 D	2, 129 M	3, 125 D	4, 85 M	4, 130 D
TEXTURE:							
Sand	40	8	10	—	—	20	20
Silt	20	15	15	—	—	80	30
Clay	40	77	75	—	—	—	50
COMPOSITION:							
Accessory minerals	—	—	—	—	—	2	—
Bioclast	—	—	—	—	10	—	—
Biotite	1	—	—	—	—	5	1
Clay	30	20	20	—	5	—	—
Diatoms	—	—	—	—	—	—	1
Dinoflagellate	—	Tr	1	—	—	—	—
Feldspar	2	—	—	10	Tr	—	—
Foraminifers	40	5	20	5	30	1	20
Glass	1	Tr	1	50	—	50	—
Hornblende	Tr	Tr	—	5	Tr	5	5
Nannofossils	20	70	55	—	40	3	40
Opaques	2	—	—	5	—	5	5
Plagioclase	—	Tr	1	—	—	20	15
Pyroxene	—	—	—	5	—	—	—
Radiolarians	Tr	—	—	—	—	—	—
Rock fragment	1	—	—	20	15	5	10
Spicules	—	1	1	—	—	—	1

SMEAR SLIDE SUMMARY (%):

	5, 105 D	6, 30 D	6, 138 M	7, 40 D
TEXTURE:				
Sand	5	5	5	50
Silt	60	60	60	20
Clay	35	35	35	30
COMPOSITION:				
Biotite	2	2	1	Tr
Clay	10	10	5	20
Feldspar	5	5	5	—
Foraminifers	20	20	15	55
Glass	5	5	5	5
Hornblende	2	2	2	1
Nannofossils	40	40	50	15
Opaques	Tr	Tr	5	1
Plagioclase	—	—	—	Tr
Radiolarians	2	2	—	—
Rock fragment	10	10	10	Tr
Spicules	—	—	—	Tr



SITE 768 HOLE B CORE 12H CORED INTERVAL 99.0-108.5 mbsf



NANNOFOSSIL MARL and FORAMINIFERAL MARL with crystal-vitric ash

Major lithologies:
a. NANNOFOSSIL MARL is the dominant lithology. It is light greenish gray (5GY 7/1) with a small, scattered volcaniclastic component of up to 1 or 2%. Massive beds are homogeneous and bioturbated without apparent graded bedding but rare levels contain a higher concentration of foraminifers (Section 3, 100-102 cm). The lower part of the core is composed of nannofossil marl with foraminifers.
b. FORAMINIFERAL MARL occupies the top part of the core (Section 1) and contains up to 40% foraminifers, clay and some nannofossils. The volcaniclastic component is low (3-5%). There are also radiolarians and traces of fish bones.

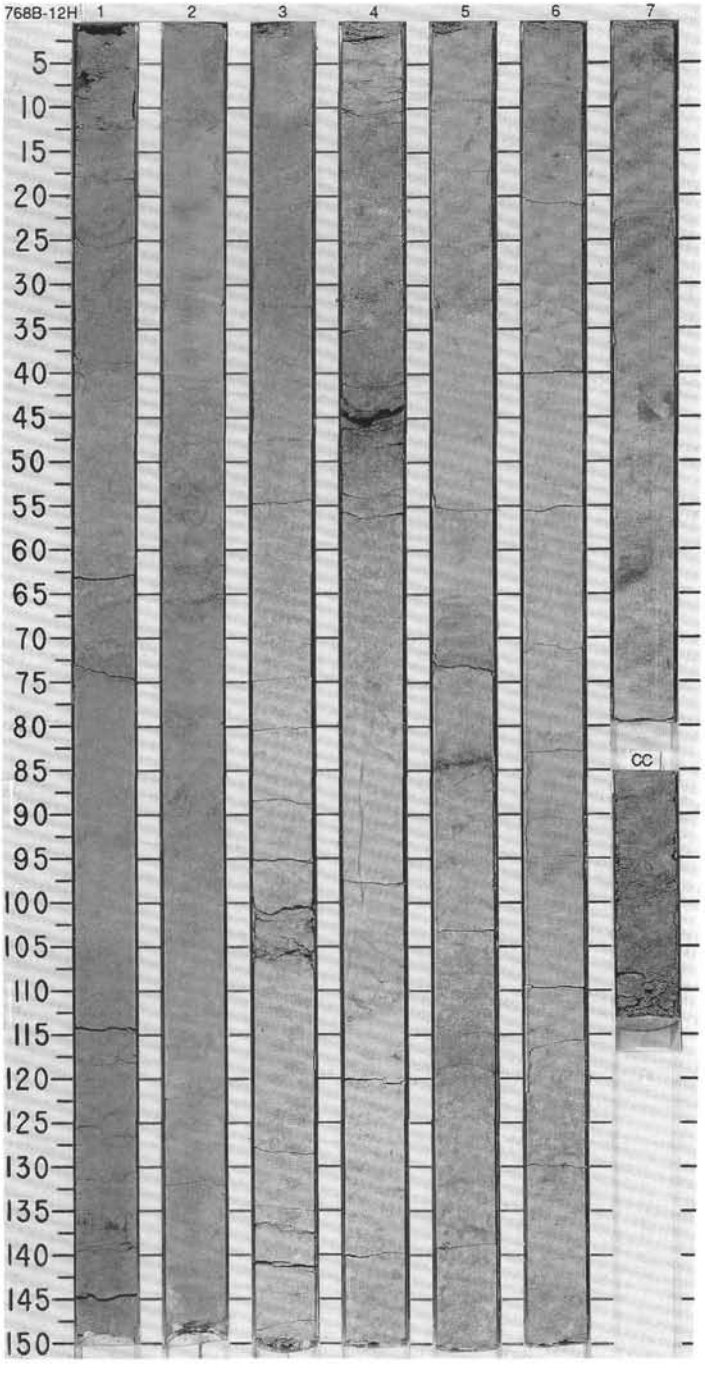
Minor lithology: Crystal-vitric ash is recognizable in poorly preserved beds (because of bioturbation), mostly in Section 1, 135-137 cm and Section 5, 80-120 cm. The ashes contain some foraminifers and nannofossils and are redeposited. They are composed mainly of glass and crystals of plagioclase.

SMEAR SLIDE SUMMARY (%):

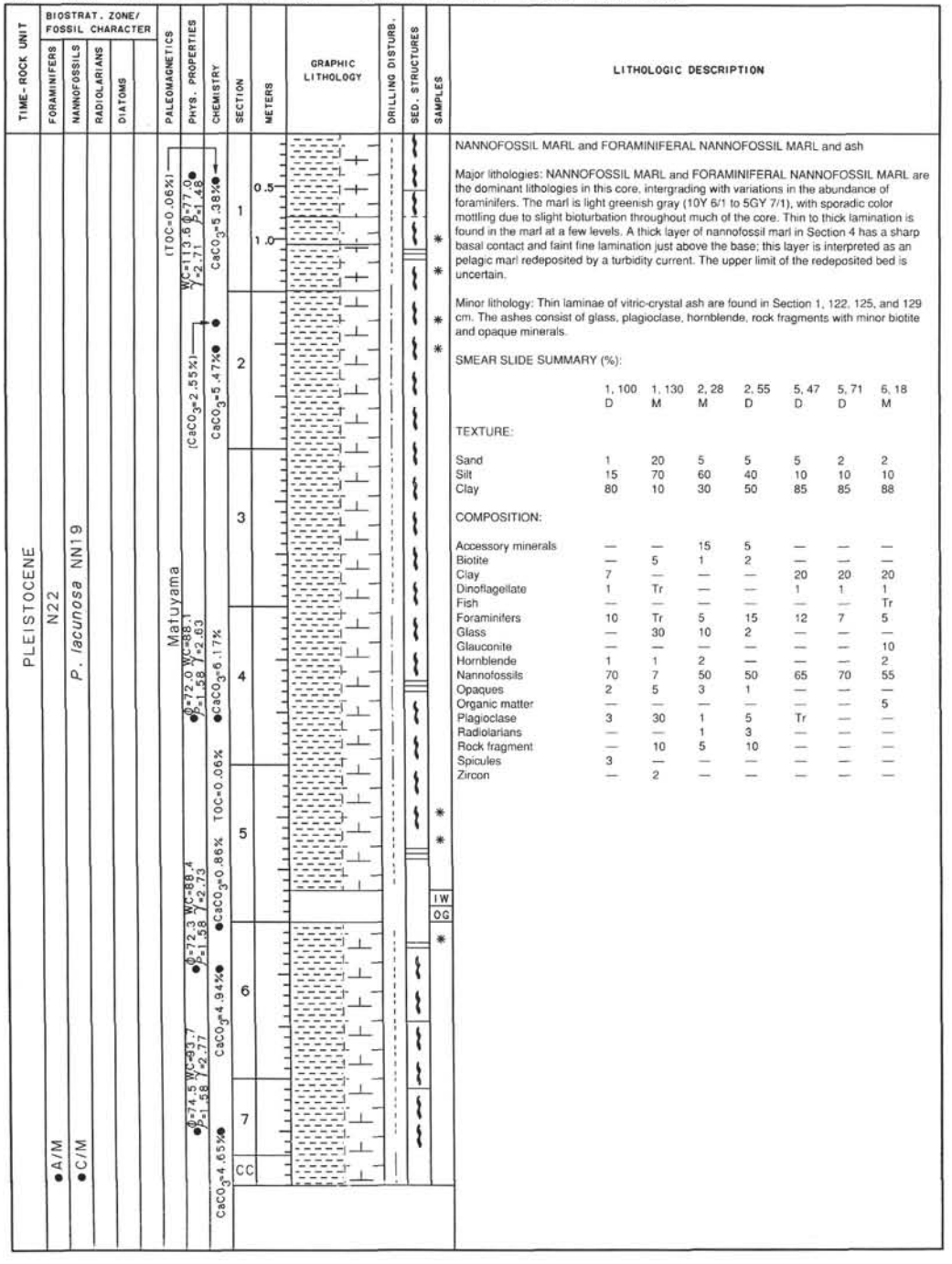
	1, 100 D	2, 31 M	2, 85 D	3, 70 D	3, 142 D	4, 90 D	5, 83 M
TEXTURE:							
Sand	50	80	5	3	5	2	10
Silt	20	20	15	5	10	30	45
Clay	30	0	80	92	85	65	40
COMPOSITION:							
Biotite	2	—	—	—	—	—	1
Clay	25	—	15	15	15	5	10
Dinoflagellate	—	—	1	1	Tr	1	1
Feldspar	1	—	—	—	—	—	—
Fish	Tr	—	—	—	—	—	—
Foraminifers	50	80	10	5	5	10	3
Glass	—	3	5	—	—	—	30
Hornblende	1	1	2	—	—	—	2
Nannofossils	15	5	50	78	80	80	15
Opaques	Tr	—	3	—	—	—	3
Plagioclase	—	10	10	Tr	—	—	30
Radiolarians	1	—	—	—	—	—	1
Spicules	—	—	2	—	—	Tr	1

SMEAR SLIDE SUMMARY (%):

	6, 86 D
TEXTURE:	
Sand	5
Silt	10
Clay	85
COMPOSITION:	
Accessory minerals	1
Clay	5
Dinoflagellate	2
Feldspar	2
Foraminifers	10
Micrite	10
Nannofossils	65
Opaques	2



SITE 768 HOLE B CORE 13H CORED INTERVAL 108.0-118.5 mbsf



LITHOLOGIC DESCRIPTION

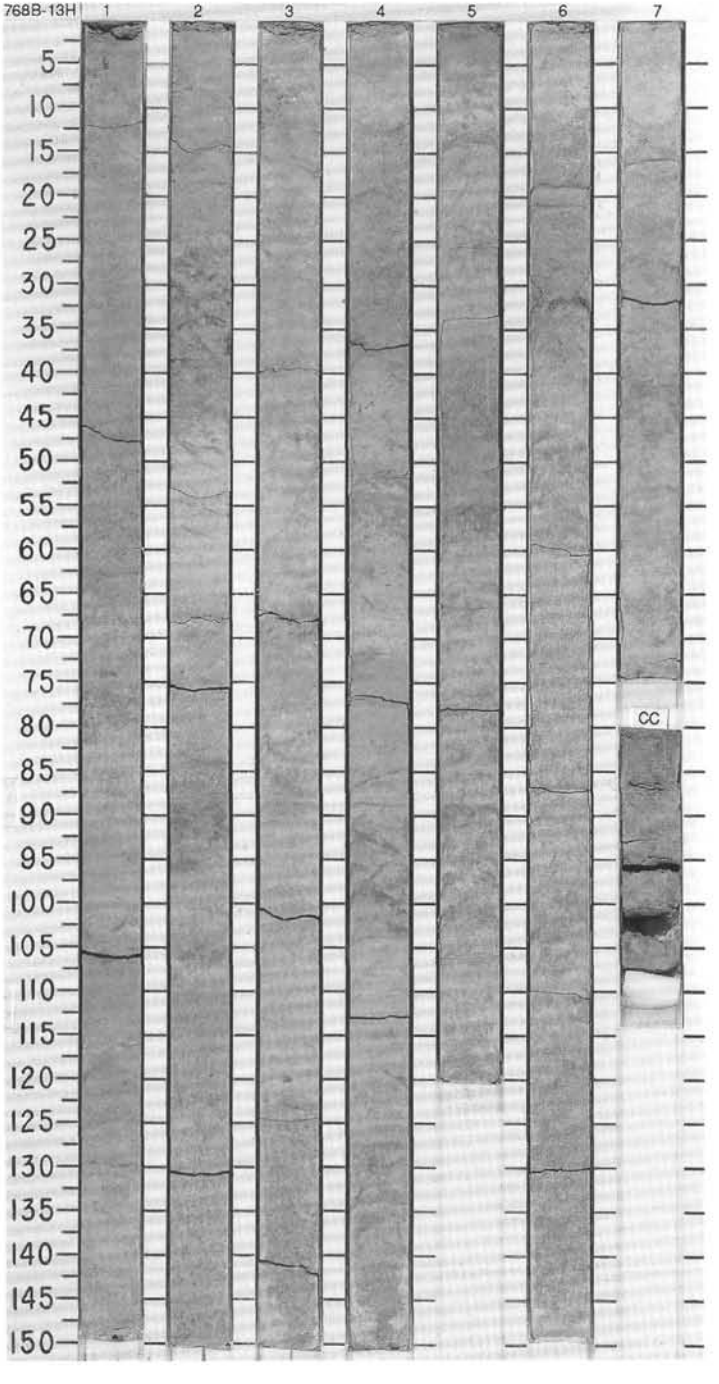
NANNOFOSSIL MARL and FORAMINIFERAL NANNOFOSSIL MARL and ash

Major lithologies: NANNOFOSSIL MARL and FORAMINIFERAL NANNOFOSSIL MARL are the dominant lithologies in this core, intergrading with variations in the abundance of foraminifers. The marl is light greenish gray (10Y 6/1 to 5GY 7/1), with sporadic color mottling due to slight bioturbation throughout much of the core. Thin to thick lamination is found in the marl at a few levels. A thick layer of nannofossil marl in Section 4 has a sharp basal contact and faint fine lamination just above the base; this layer is interpreted as an pelagic marl redeposited by a turbidity current. The upper limit of the redeposited bed is uncertain.

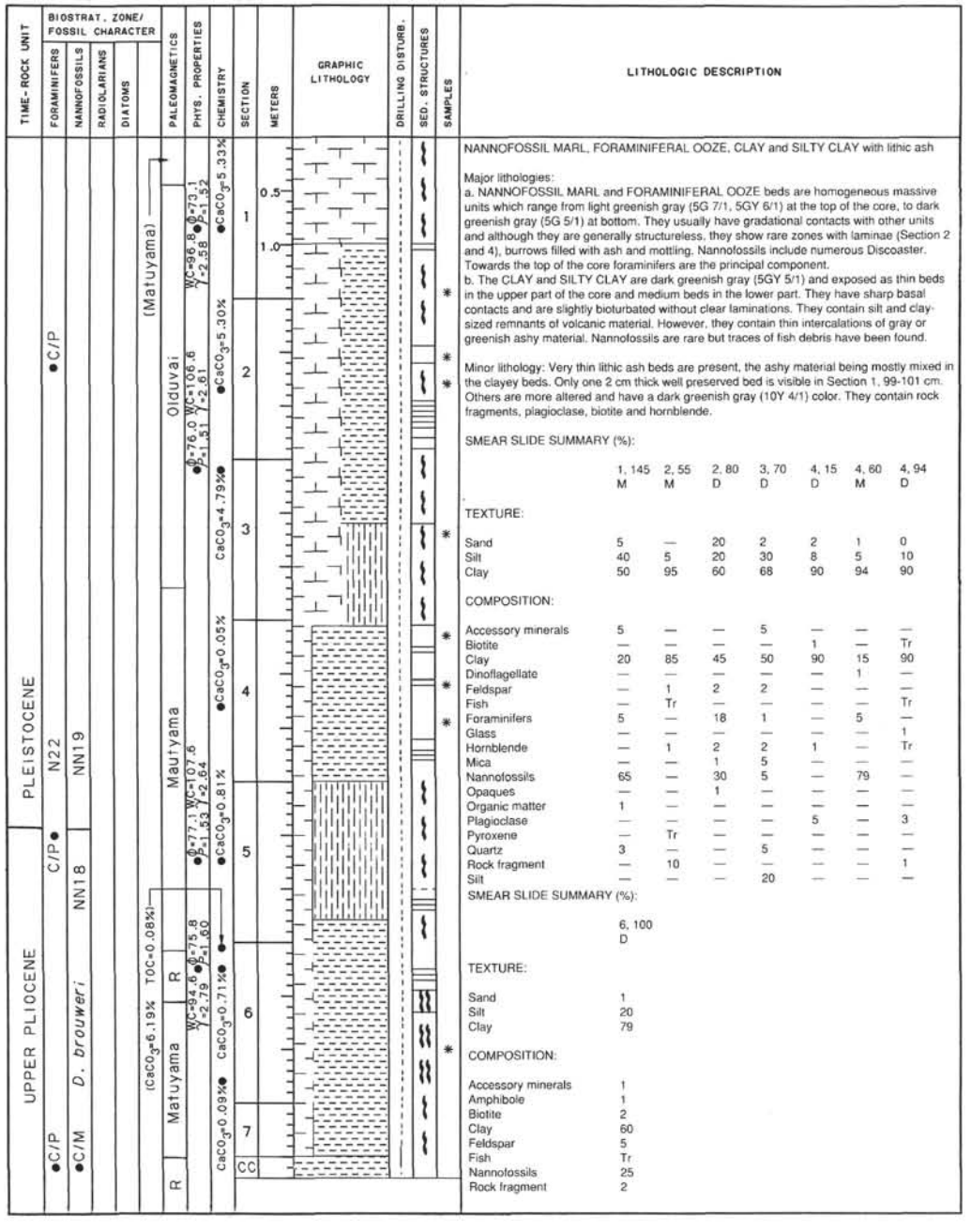
Minor lithology: Thin laminae of vitric-crystal ash are found in Section 1, 122, 125, and 129 cm. The ashes consist of glass, plagioclase, hornblende, rock fragments with minor biotite and opaque minerals.

SMEAR SLIDE SUMMARY (%):

	1, 100 D	1, 130 M	2, 28 M	2, 55 D	5, 47 D	5, 71 D	6, 18 M
TEXTURE:							
Sand	1	20	5	5	5	2	2
Silt	15	70	60	40	10	10	10
Clay	80	10	30	50	85	85	88
COMPOSITION:							
Accessory minerals	—	—	15	5	—	—	—
Biotite	—	5	1	2	—	—	—
Clay	7	—	—	—	20	20	20
Dinoflagellate	1	Tr	—	—	1	1	1
Fish	—	—	—	—	—	—	Tr
Foraminifers	10	Tr	5	15	12	7	5
Glass	—	30	10	2	—	—	—
Glauconite	—	—	—	—	—	—	10
Hornblende	1	1	2	—	—	—	2
Nannofossils	70	7	50	50	65	70	55
Opaques	2	5	3	1	—	—	—
Organic matter	—	—	—	—	—	—	5
Plagioclase	3	30	1	5	Tr	—	—
Radiolarians	—	—	1	3	—	—	—
Rock fragment	—	10	5	10	—	—	—
Spicules	3	—	—	—	—	—	—
Zircon	—	2	—	—	—	—	—



SITE 768 HOLE B CORE 14H CORED INTERVAL 118.0-127.5 mbsf



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL, FORAMINIFERAL OOZE, CLAY and SILTY CLAY with lithic ash

Major lithologies:
a. NANNOFOSSIL MARL and FORAMINIFERAL OOZE beds are homogeneous massive units which range from light greenish gray (5G 7/1, 5GY 6/1) at the top of the core, to dark greenish gray (5G 5/1) at bottom. They usually have gradational contacts with other units and although they are generally structureless, they show rare zones with laminae (Section 2 and 4), burrows filled with ash and mottling. Nannofossils include numerous Discoaster. Towards the top of the core foraminifers are the principal component.
b. The CLAY and SILTY CLAY are dark greenish gray (5GY 5/1) and exposed as thin beds in the upper part of the core and medium beds in the lower part. They have sharp basal contacts and are slightly bioturbated without clear laminations. They contain silt and clay-sized remnants of volcanic material. However, they contain thin intercalations of gray or greenish ashy material. Nannofossils are rare but traces of fish debris have been found.

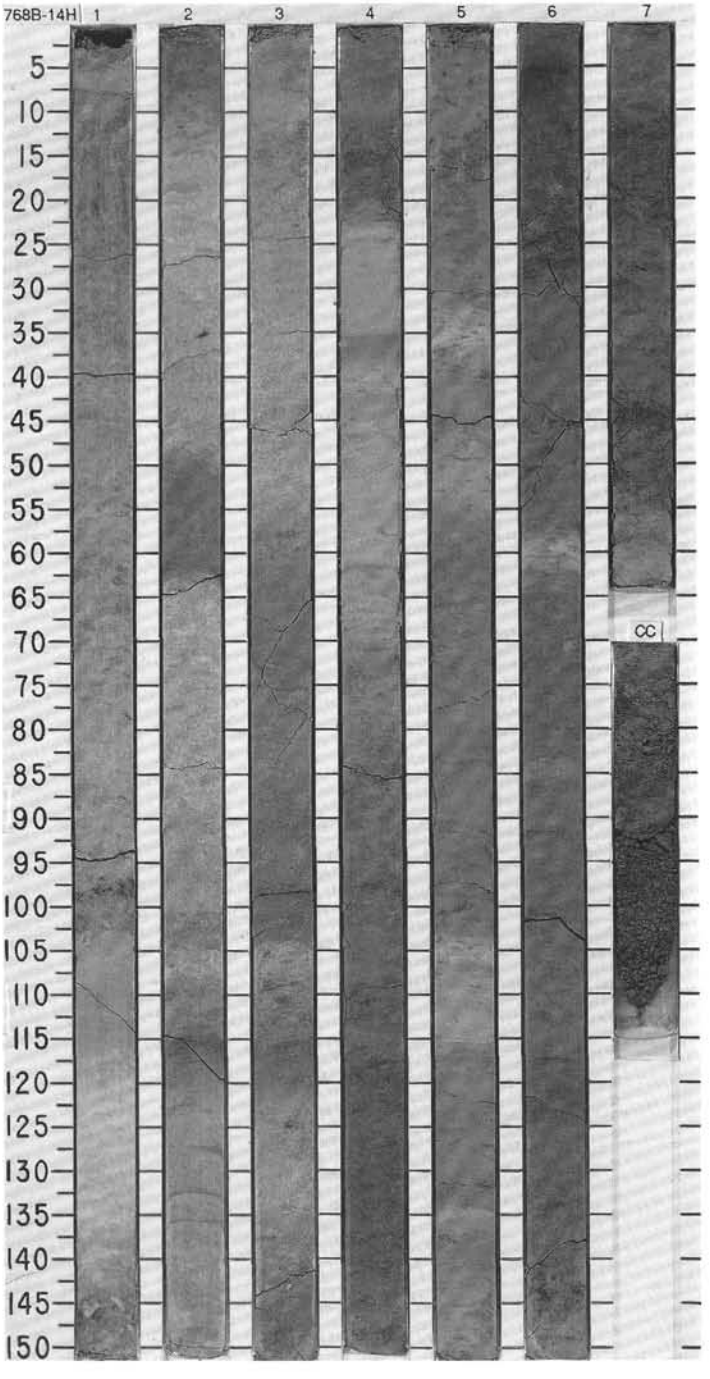
Minor lithology: Very thin lithic ash beds are present, the ashy material being mostly mixed in the clayey beds. Only one 2 cm thick well preserved bed is visible in Section 1, 99-101 cm. Others are more altered and have a dark greenish gray (10Y 4/1) color. They contain rock fragments, plagioclase, biotite and hornblende.

SMEAR SLIDE SUMMARY (%):

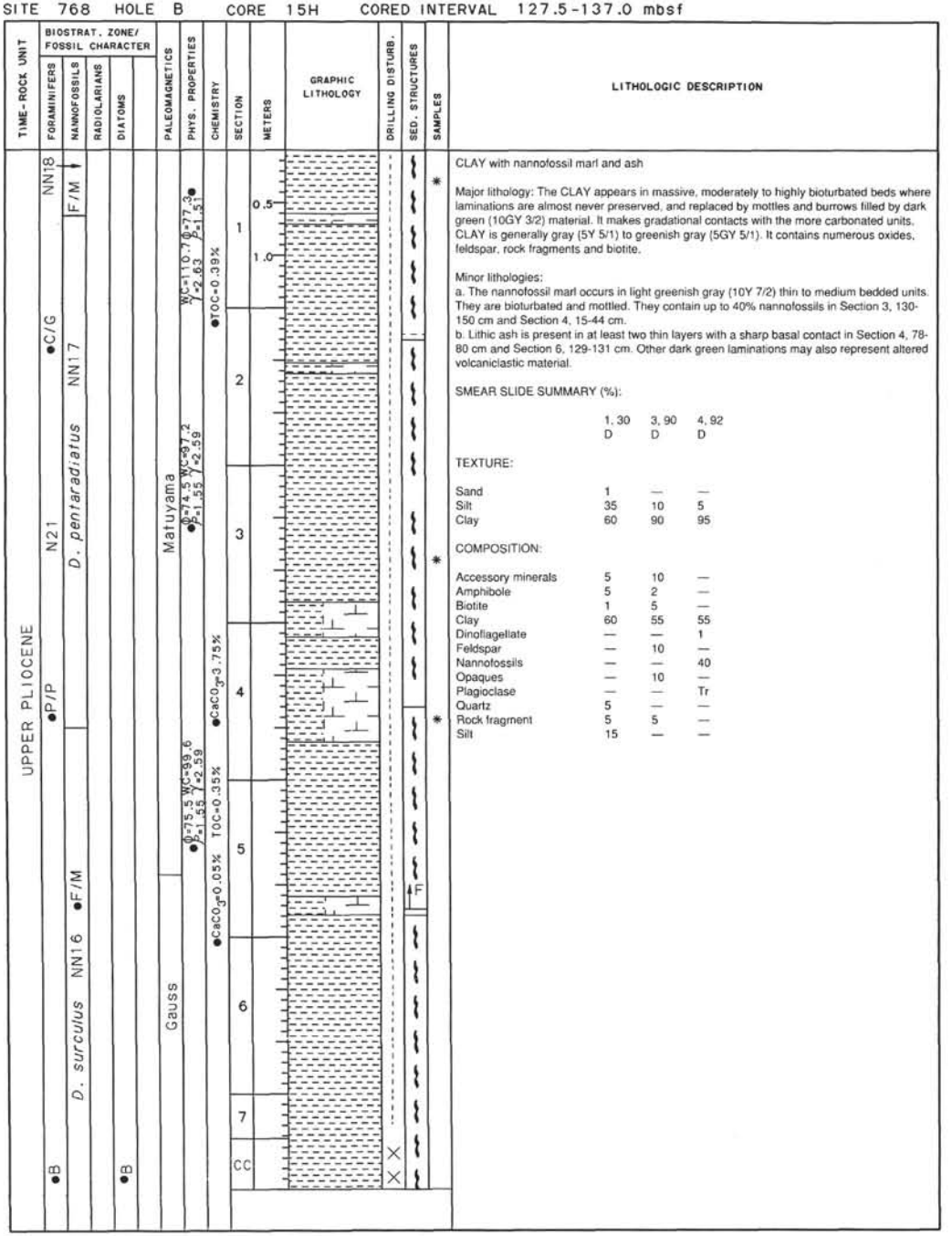
	1, 145 M	2, 55 M	2, 80 D	3, 70 D	4, 15 D	4, 60 M	4, 94 D
TEXTURE:							
Sand	5	—	20	2	2	1	0
Silt	40	5	20	30	8	5	10
Clay	50	95	60	68	90	94	90
COMPOSITION:							
Accessory minerals	5	—	—	5	—	—	—
Biotite	—	—	—	—	1	—	Tr
Clay	20	85	45	50	90	15	90
Dinoflagellate	—	—	—	—	—	1	—
Feldspar	—	1	2	2	—	—	—
Fish	—	Tr	—	—	—	—	Tr
Foraminifers	5	—	18	1	—	5	—
Glass	—	—	—	—	—	—	1
Hornblende	—	1	2	2	1	—	Tr
Mica	—	—	1	5	—	—	—
Nannofossils	65	—	30	5	—	79	—
Opaques	—	—	1	—	—	—	—
Organic matter	1	—	—	—	—	—	—
Plagioclase	—	—	—	—	5	—	3
Pyroxene	—	Tr	—	—	—	—	—
Quartz	3	—	—	5	—	—	—
Rock fragment	—	10	—	—	—	—	1
Silt	—	—	—	20	—	—	—

SMEAR SLIDE SUMMARY (%):

	6, 100 D
TEXTURE:	
Sand	1
Silt	20
Clay	79
COMPOSITION:	
Accessory minerals	1
Amphibole	1
Biotite	2
Clay	60
Feldspar	5
Fish	Tr
Nannofossils	25
Rock fragment	2



SITE 768 HOLE B CORE 15H CORED INTERVAL 127.5-137.0 mbsf



LITHOLOGIC DESCRIPTION

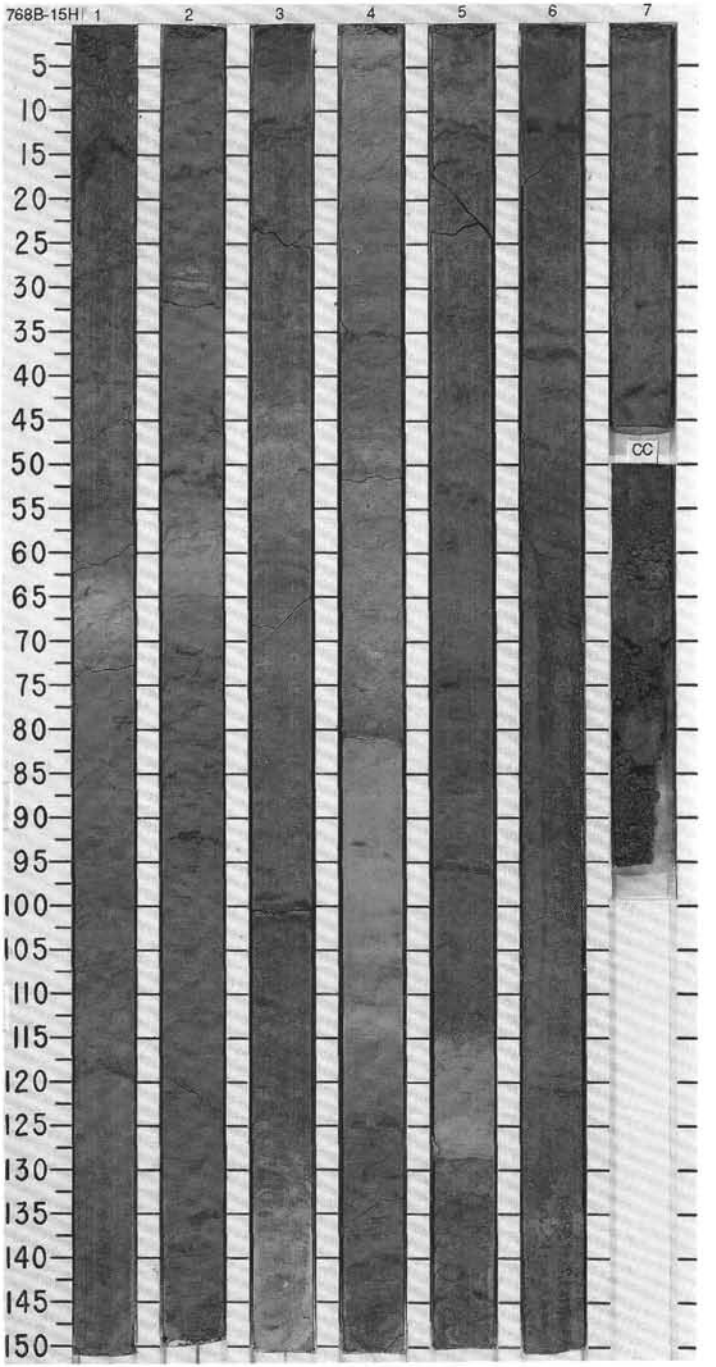
CLAY with nannofossil marl and ash

Major lithology: The CLAY appears in massive, moderately to highly bioturbated beds where laminations are almost never preserved, and replaced by mottles and burrows filled by dark green (10GY 3/2) material. It makes gradational contacts with the more carbonated units. CLAY is generally gray (5Y 5/1) to greenish gray (5GY 5/1). It contains numerous oxides, feldspar, rock fragments and biotite.

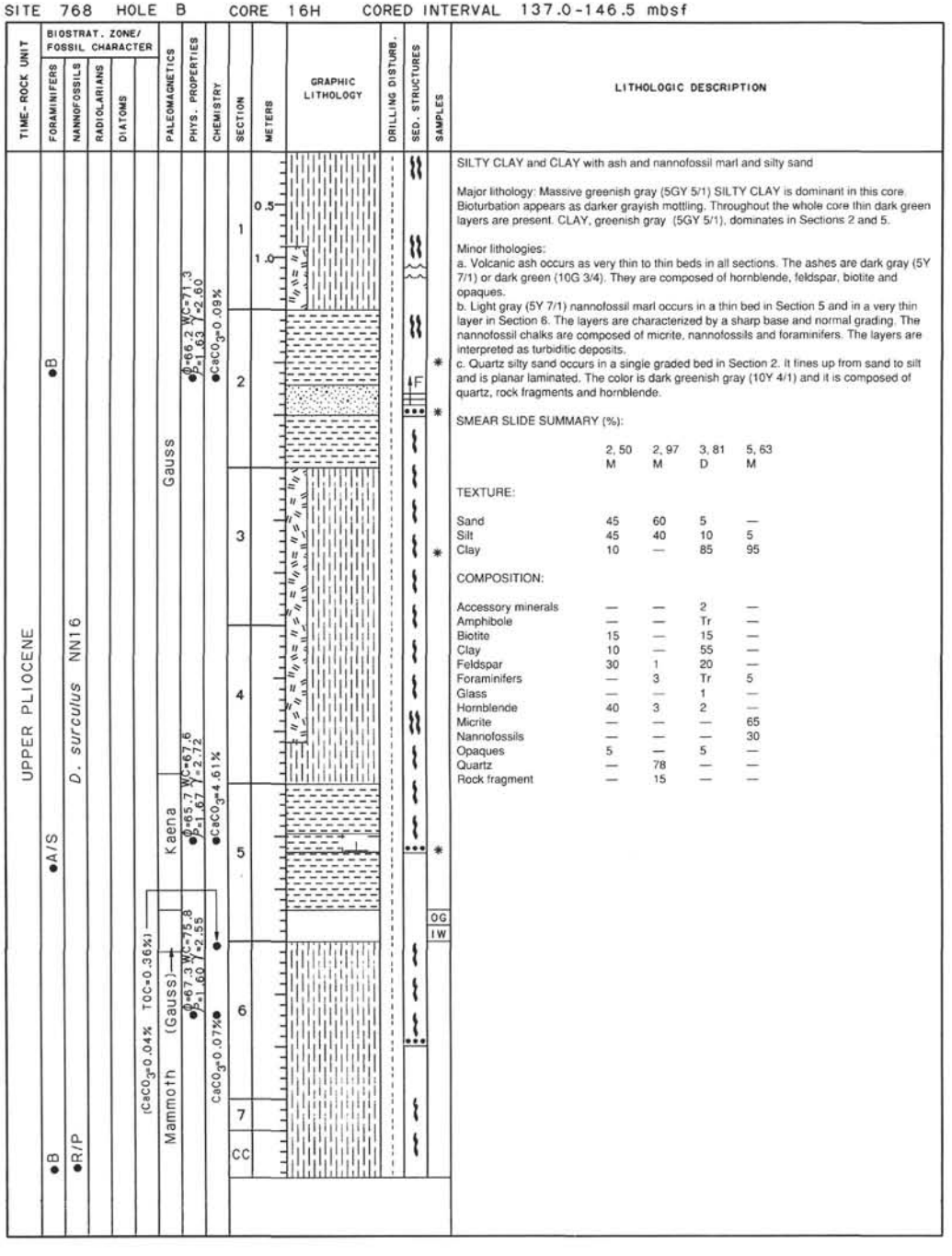
Minor lithologies:
a. The nannofossil marl occurs in light greenish gray (10Y 7/2) thin to medium bedded units. They are bioturbated and mottled. They contain up to 40% nannofossils in Section 3, 130-150 cm and Section 4, 15-44 cm.
b. Lithic ash is present in at least two thin layers with a sharp basal contact in Section 4, 78-80 cm and Section 6, 129-131 cm. Other dark green laminations may also represent altered volcaniclastic material.

SMEAR SLIDE SUMMARY (%):

	1, 30 D	3, 90 D	4, 92 D
TEXTURE:			
Sand	1	—	—
Silt	35	10	5
Clay	60	90	95
COMPOSITION:			
Accessory minerals	5	10	—
Amphibole	5	2	—
Biotite	1	5	—
Clay	60	55	55
Dinoflagellate	—	—	1
Feldspar	—	10	—
Nannofossils	—	—	40
Opaques	—	10	—
Plagioclase	—	—	Tr
Quartz	5	—	—
Rock fragment	5	5	—
Silt	15	—	—



SITE 768 HOLE B CORE 16H CORED INTERVAL 137.0-146.5 mbsf



SILTY CLAY and CLAY with ash and nannofossil marl and silty sand

Major lithology: Massive greenish gray (5GY 5/1) SILTY CLAY is dominant in this core. Bioturbation appears as darker grayish mottling. Throughout the whole core thin dark green layers are present. CLAY, greenish gray (5GY 5/1), dominates in Sections 2 and 5.

Minor lithologies:

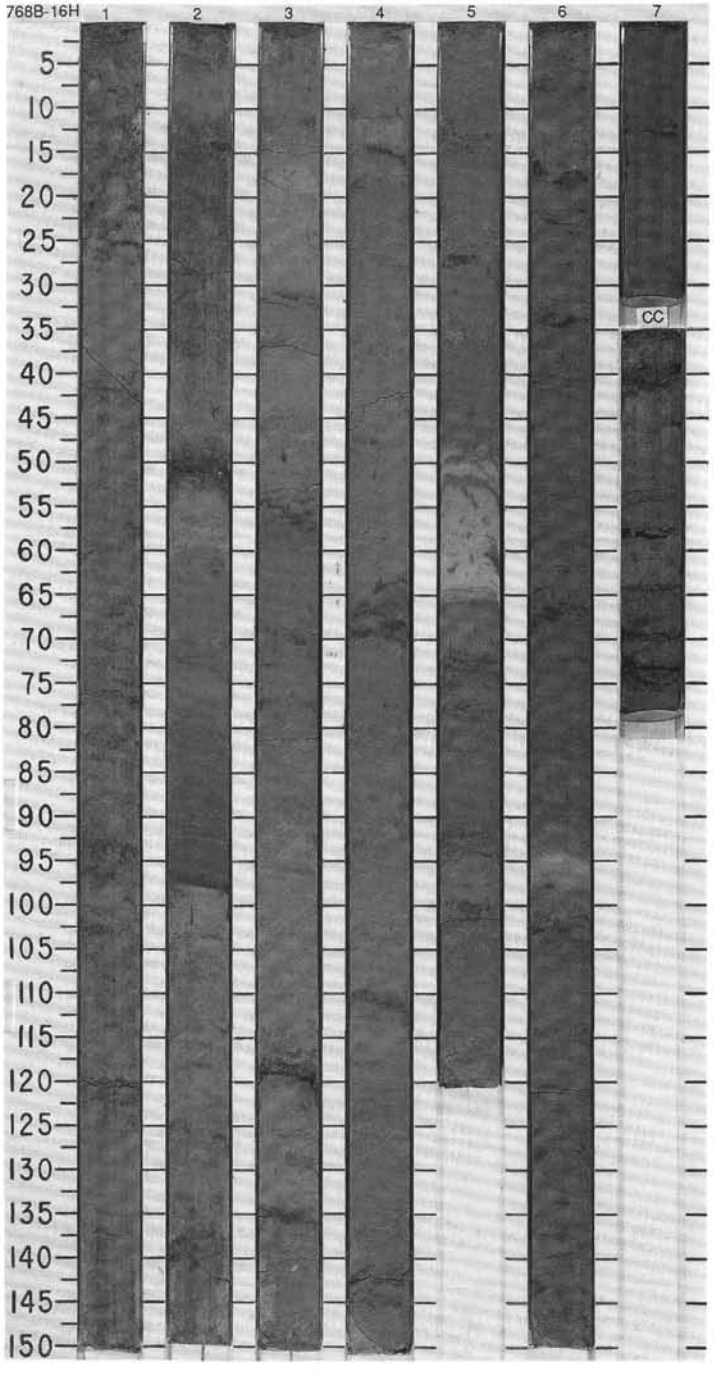
a. Volcanic ash occurs as very thin to thin beds in all sections. The ashes are dark gray (5Y 7/1) or dark green (10G 3/4). They are composed of hornblende, feldspar, biotite and opaques.

b. Light gray (5Y 7/1) nannofossil marl occurs in a thin bed in Section 5 and in a very thin layer in Section 6. The layers are characterized by a sharp base and normal grading. The nannofossil chalks are composed of micrite, nannofossils and foraminifers. The layers are interpreted as turbiditic deposits.

c. Quartz silty sand occurs in a single graded bed in Section 2. It fines up from sand to silt and is planar laminated. The color is dark greenish gray (10Y 4/1) and it is composed of quartz, rock fragments and hornblende.

SMEAR SLIDE SUMMARY (%):

	2, 50 M	2, 97 M	3, 81 D	5, 63 M
TEXTURE:				
Sand	45	60	5	—
Silt	45	40	10	5
Clay	10	—	85	95
COMPOSITION:				
Accessory minerals	—	—	2	—
Amphibole	—	—	Tr	—
Biotite	15	—	15	—
Clay	10	—	55	—
Feldspar	30	1	20	—
Foraminifers	—	3	Tr	5
Glass	—	—	1	—
Hornblende	40	3	2	—
Micrite	—	—	—	65
Nannofossils	—	—	—	30
Opaques	5	—	5	—
Quartz	—	78	—	—
Rock fragment	—	15	—	—



SITE 768 HOLE B CORE 17H CORED INTERVAL 146.5-156.0 mbsf

TIME-ROCK UNIT: UPPER PLIOCENE; LOWER PLIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS: ●A/G; N19/20; ●R/M; ●R/P NN15; NANNOFOSSILS: NN16; RADIOLARIANS: *R. pseudoumbilicus*; DIATOMS

PALEOMAGNETICS: Gauss; Gilbert

PHYS. PROPERTIES: ϕ=68.8 WC=76.8 ρ=1.62 ?=2.74; ϕ=68.4 WC=75.7 ρ=1.63 ?=2.66; ϕ=70.8 WC=81.0 ρ=1.62 ?=2.77

CHEMISTRY: ●$CaCO_3$=0.15%; ●$CaCO_3$=0.09%; TOC=0.36%●; $CaCO_3$=0.02%; ●$CaCO_3$=0.05%

SECTION: 1, 2, 3, 4, 5, 6, 7, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES

LITHOLOGIC DESCRIPTION

CLAY with calcareous marl

Major lithology: Massive CLAY, is dominant in all sections of this core. It is dark greenish gray (10Y 4/1) and bioturbated (including Zoophycos). It is structureless except for thin grayish green (5G 4/2) laminae which are silty. This coarser material contains amphiboles and other volcanogenic material, otherwise clay minerals constitute at least 90% of the sediment.

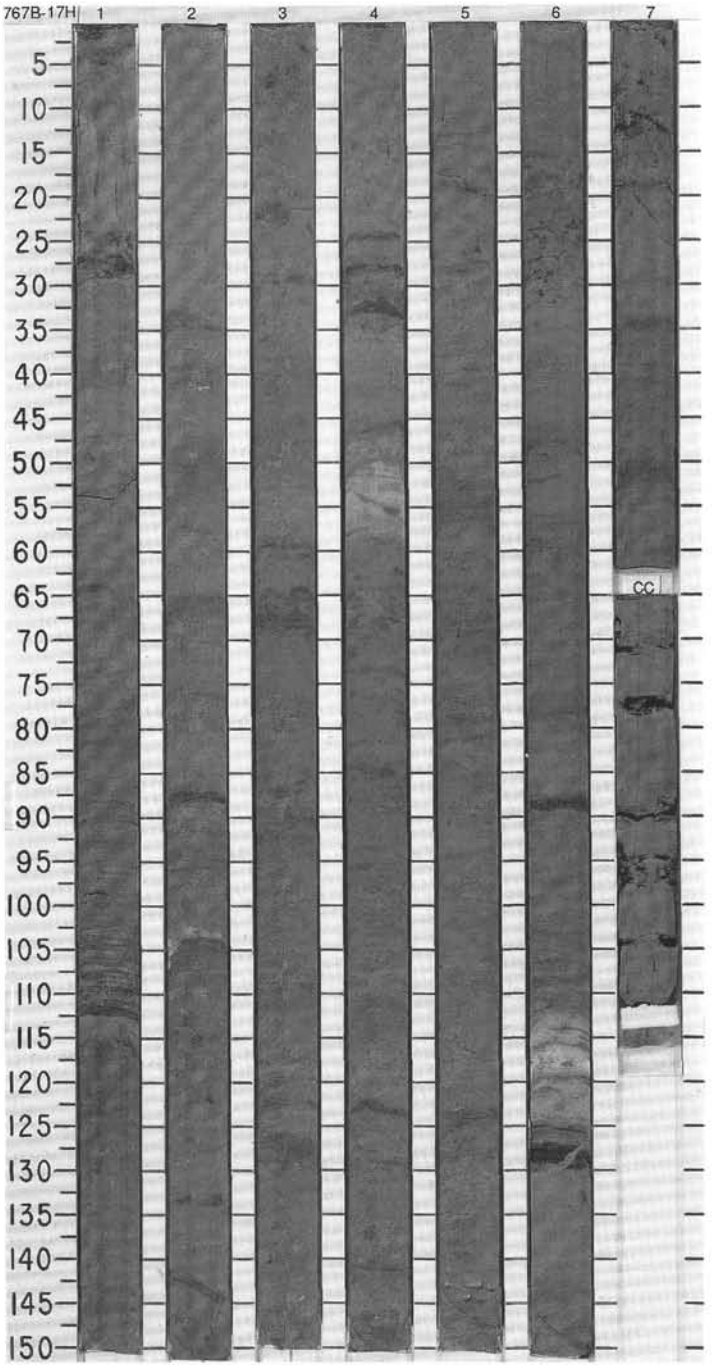
Minor lithologies:

a. A sand/silt/clay bed occurs in Section 1, 86-113 cm. It is made up of interlaminated dark gray (5Y 3/1) and light greenish gray (10Y 6/2) clay, silt and sand composed of quartz, feldspar and rock fragments plus nannofossils and foraminifers. The bed is graded and thinly laminated, including cross lamination. This polygenetic sediment is considered to have a turbiditic origin.

b. Calcareous marl of clay, micrite and some nannofossils occurs in two thin graded beds in Sections 4 and 6. These are redeposited clayey oozes. Bioturbation has caused a mixing of the upper boundaries of these beds but the bases are sharp.

SMEAR SLIDE SUMMARY (%):

	1, 110 M	2, 52 D	4, 125 M	6, 112 M
TEXTURE:				
Sand	70	—	5	—
Silt	20	10	30	10
Clay	10	90	65	90
COMPOSITION:				
Amphibole	—	—	35	—
Clay	10	90	50	—
Feldspar	10	4	—	—
Foraminifers	5	—	—	—
Glauconite	2	—	—	—
Hornblende	—	—	1	—
Mica	—	2	—	—
Micrite	—	—	—	90
Nannofossils	5	—	—	5
Opaques	10	1	10	1
Plant	—	—	—	1
Quartz	40	—	—	—
Rock fragment	15	—	—	—



SITE 768 HOLE B CORE 18H CORED INTERVAL 156.0-165.5 mbsf

LITHOLOGIC DESCRIPTION

CLAY with nannofossil marl

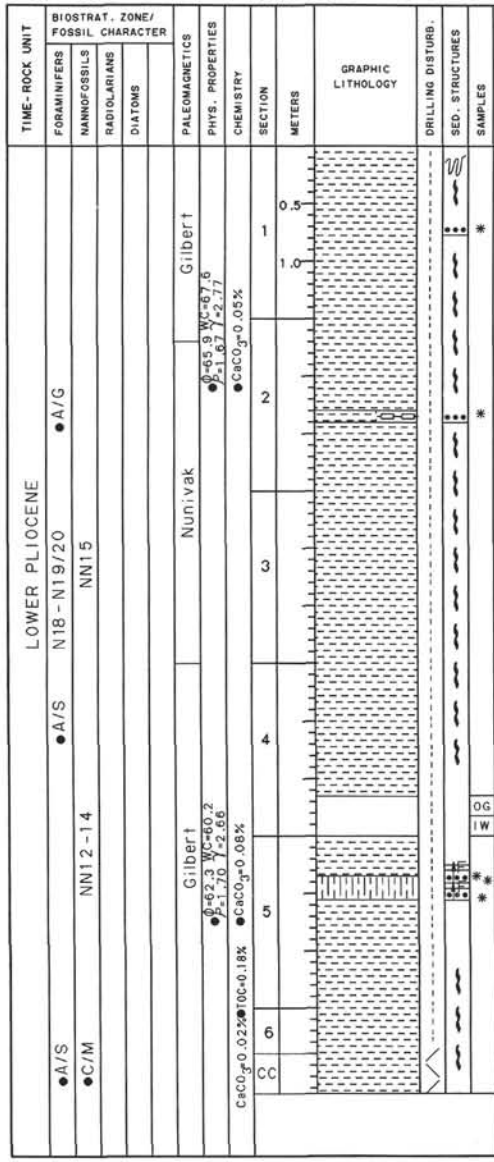
Major lithology: Massive CLAY, is dominant in all sections of this core. It is dark greenish gray (10Y 4/1) and bioturbated. It is structureless except for thin grayish green (5G 4/1) silty laminae and some more distinct very thin silty beds up to 7 cm thick. These layers are vitric ashes containing glass and feldspar and are dark gray (10YR 4/1, 5Y 3/1). Ash layers occur *at 20-50 cm intervals throughout this core.*

Minor lithology: Nannofossil marl occurs in very thin beds in Sections 2 and 7. These beds are gray (2.5Y 6/2), bioturbated (including Zoophycos) and are composed of calcareous nannofossils and clay minerals. Small amounts of feldspar in these beds suggest that they *may be redeposited.*

SMEAR SLIDE SUMMARY (%):

	1, 47 D	2, 132 M	4, 108 M
TEXTURE:			
Sand	5	—	10
Silt	25	20	75
Clay	70	80	15
COMPOSITION:			
Accessory minerals	—	—	2
Bioclast	—	—	5
Clay	80	20	15
Feldspar	3	2	25
Glass	—	—	50
Nannofossils	—	78	—
Opaques	1	—	2
Pellets	15	—	—
Quartz	1	—	1

SITE 768 HOLE B CORE 19H CORED INTERVAL 165.5-173.8 mbsf



LITHOLOGIC DESCRIPTION

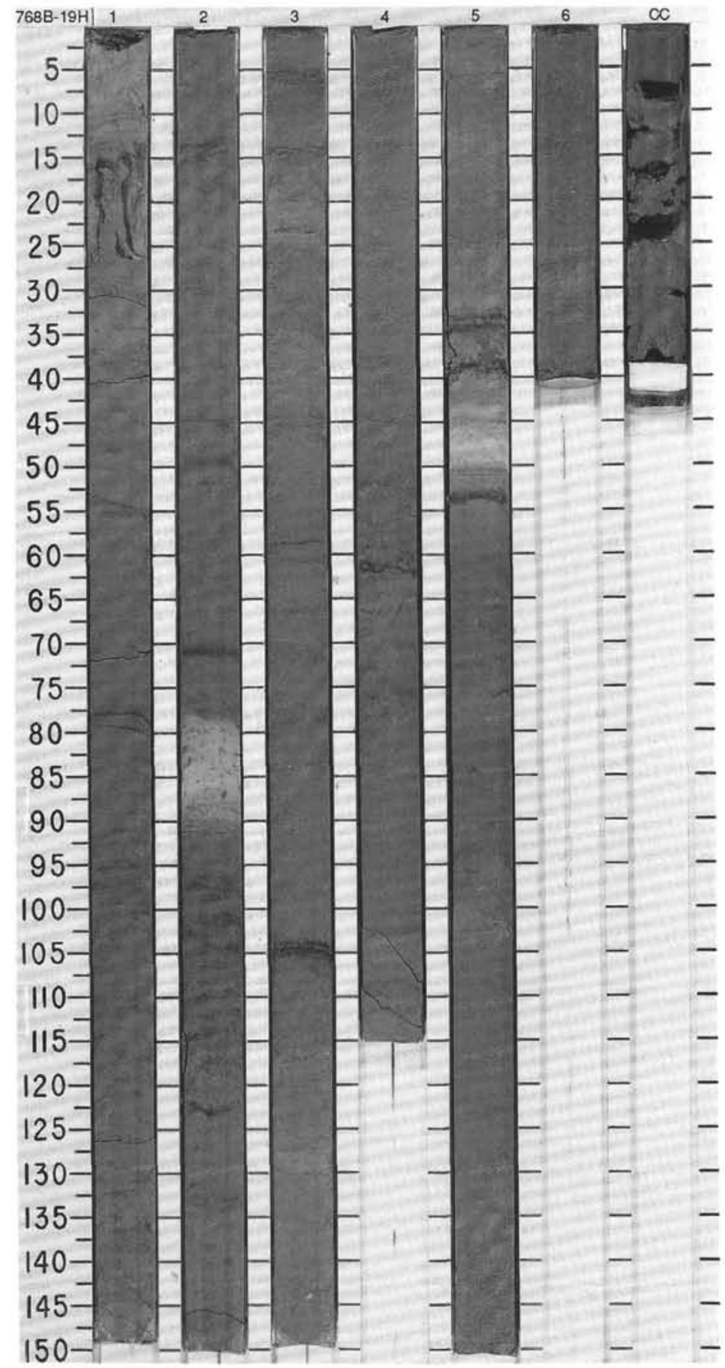
CLAYSTONE with calcareous marl and clayey siltstone

Major lithology: Massive CLAY is dominant in all sections of this core. It is dark greenish gray (10Y 4/1) and is structureless except for thin grayish green (5G 4/1) silty laminae and layers which are normally graded. Bioturbation occurs as dark gray mottling.

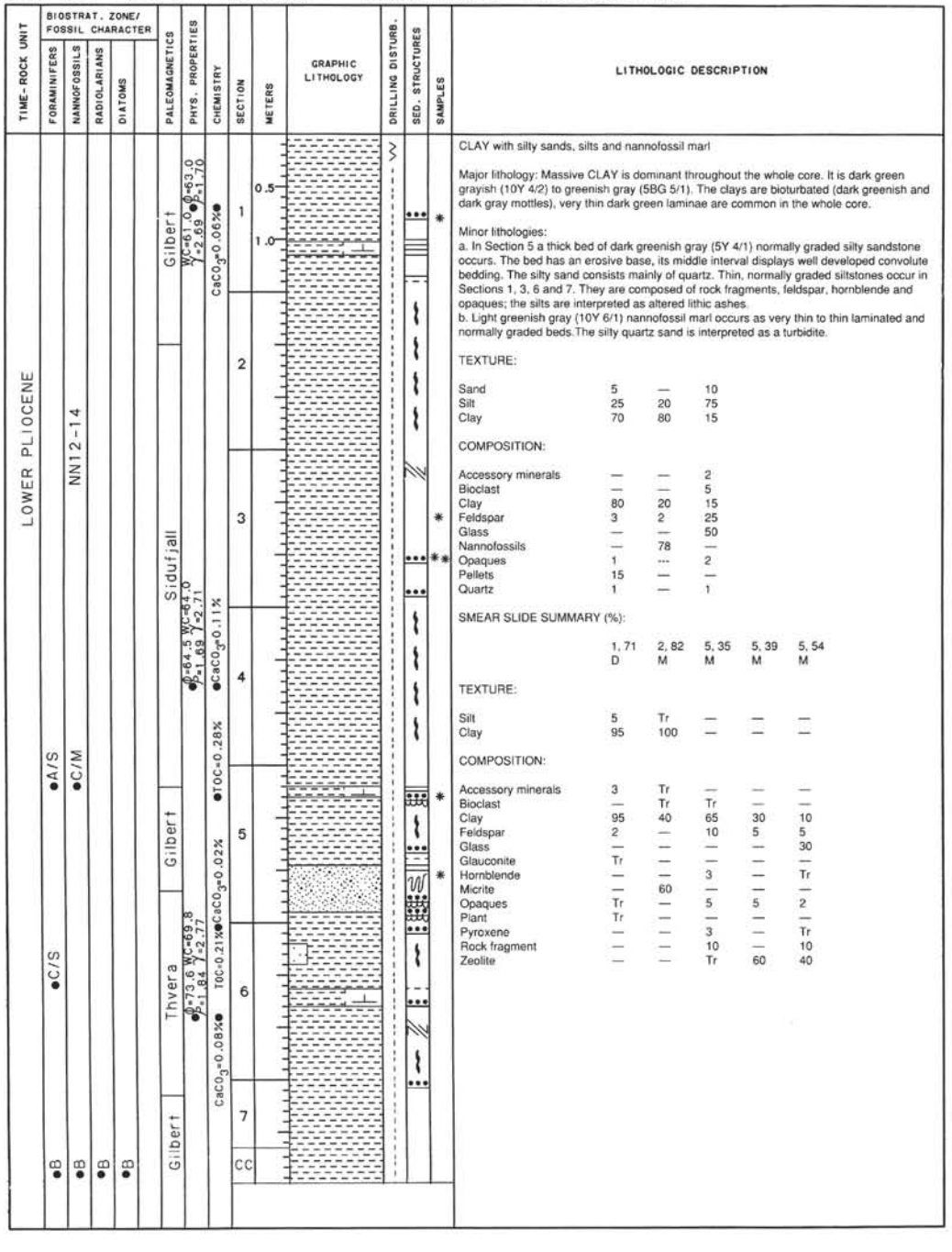
Minor lithologies:
a. Calcareous marl occurs in a very thin bed in Section 2. This bed is gray (2.5Y 6/2) and bioturbated. Small amounts of accessory minerals suggest that it may be redeposited.
b. Dark greenish gray (10Y 4/1 to 10Y 4/2) thin to medium bedded clayey siltstones occur in Section 5. They are composed of glass, rock fragments, opaques, feldspar, pyroxene, hornblende and zeolites. The silts are interpreted as redeposited altered lithic ashes.

SMEAR SLIDE SUMMARY (%):

	1, 71 D	2, 82 M	5, 35 M	5, 39 M	5, 54 M
TEXTURE:					
Silt	5	Tr	—	—	—
Clay	95	100	—	—	—
COMPOSITION:					
Accessory minerals	3	Tr	—	—	—
Bioclast	—	Tr	Tr	—	—
Clay	95	40	65	30	10
Feldspar	2	—	10	5	5
Glass	—	—	—	—	30
Glauconite	Tr	—	—	—	—
Hornblende	—	—	3	—	Tr
Micrite	—	60	—	—	—
Opaques	Tr	—	5	5	2
Plant	Tr	—	—	—	—
Pyroxene	—	—	3	—	Tr
Rock fragments	—	—	10	—	10
Zeolite	—	—	Tr	60	40



SITE 768 HOLE B CORE 20H CORED INTERVAL 173.8-183.3 mbsf



LITHOLOGIC DESCRIPTION

CLAY with silty sands, silts and nannofossil marl

Major lithology: Massive CLAY is dominant throughout the whole core. It is dark green grayish (10Y 4/2) to greenish gray (5BG 5/1). The clays are bioturbated (dark greenish and dark gray mottles), very thin dark green laminae are common in the whole core.

Minor lithologies:
a. In Section 5 a thick bed of dark greenish gray (5Y 4/1) normally graded silty sandstone occurs. The bed has an erosive base, its middle interval displays well developed convolute bedding. The silty sand consists mainly of quartz. Thin, normally graded siltstones occur in Sections 1, 3, 6 and 7. They are composed of rock fragments, feldspar, hornblende and opaques; the silts are interpreted as altered lithic ashes.
b. Light greenish gray (10Y 6/1) nannofossil marl occurs as very thin to thin laminated and normally graded beds.The silty quartz sand is interpreted as a turbidite.

TEXTURE:

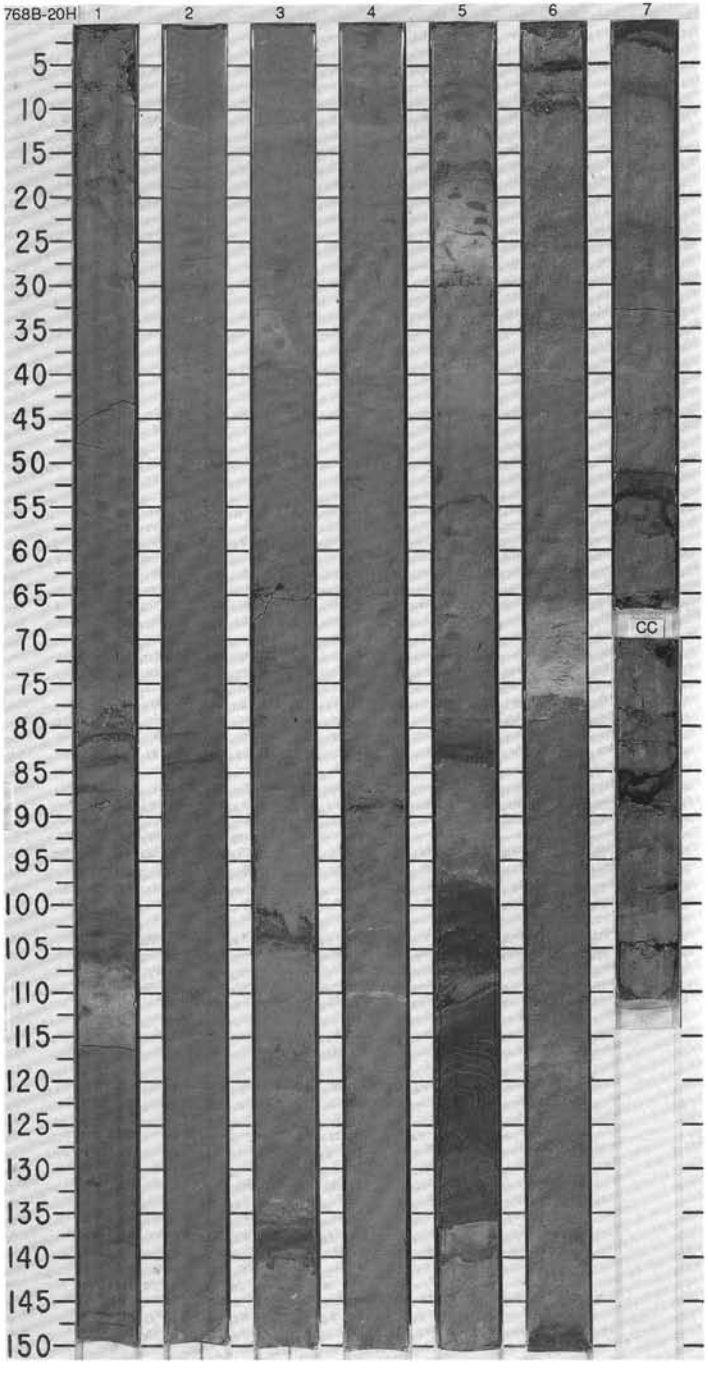
Sand	5	—	10
Silt	25	20	75
Clay	70	80	15

COMPOSITION:

Accessory minerals	—	—	2
Bioclast	—	—	5
Clay	80	20	15
Feldspar	3	2	25
Glass	—	—	50
Nannofossils	—	78	—
Opaques	1	—	2
Pellets	15	—	—
Quartz	1	—	1

SMEAR SLIDE SUMMARY (%):

	1, 71 D	2, 82 M	5, 35 M	5, 39 M	5, 54 M
TEXTURE:					
Silt	5	Tr	—	—	—
Clay	95	100	—	—	—
COMPOSITION:					
Accessory minerals	3	Tr	—	—	—
Bioclast	—	Tr	Tr	—	—
Clay	95	40	65	30	10
Feldspar	2	—	10	5	5
Glass	—	—	—	—	30
Glauconite	Tr	—	—	—	—
Hornblende	—	—	3	—	Tr
Micrite	—	60	—	—	—
Opaques	Tr	—	5	5	2
Plant	Tr	—	—	—	—
Pyroxene	—	—	3	—	Tr
Rock fragment	—	—	10	—	10
Zeolite	—	—	Tr	60	40



SITE 768 HOLE B CORE 21H CORED INTERVAL 183.3-192.8 mbsf

TIME-ROCK UNIT: LOWER PLIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER
- FORAMINIFERS: ●B ●B ●R/P
- NANNOFOSSILS: ●R/S; NN12-14
- RADIOLARIANS
- DIATOMS

PALEOMAGNETICS: Gilbert

PHYS. PROPERTIES: ϕ=61.2 WC=54.5 ρ=1.78 γ=2.77; ϕ=64.5 WC=64.9 ρ=1.64 γ=2.70; ϕ=64.6 ϕ=64.2 WC=64.6 WC=64.2 ρ=1.67 ρ=1.68 γ=2.67

CHEMISTRY: ●CaCO3=0.06%; ●CaCO3=0.02% TOC=0.15%; ●%CaCO3=0.07; ●CaCO3=0.07%

SECTION: 1 2 3 4 5 6 7 CC

METERS: 0.5 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES

LITHOLOGIC DESCRIPTION

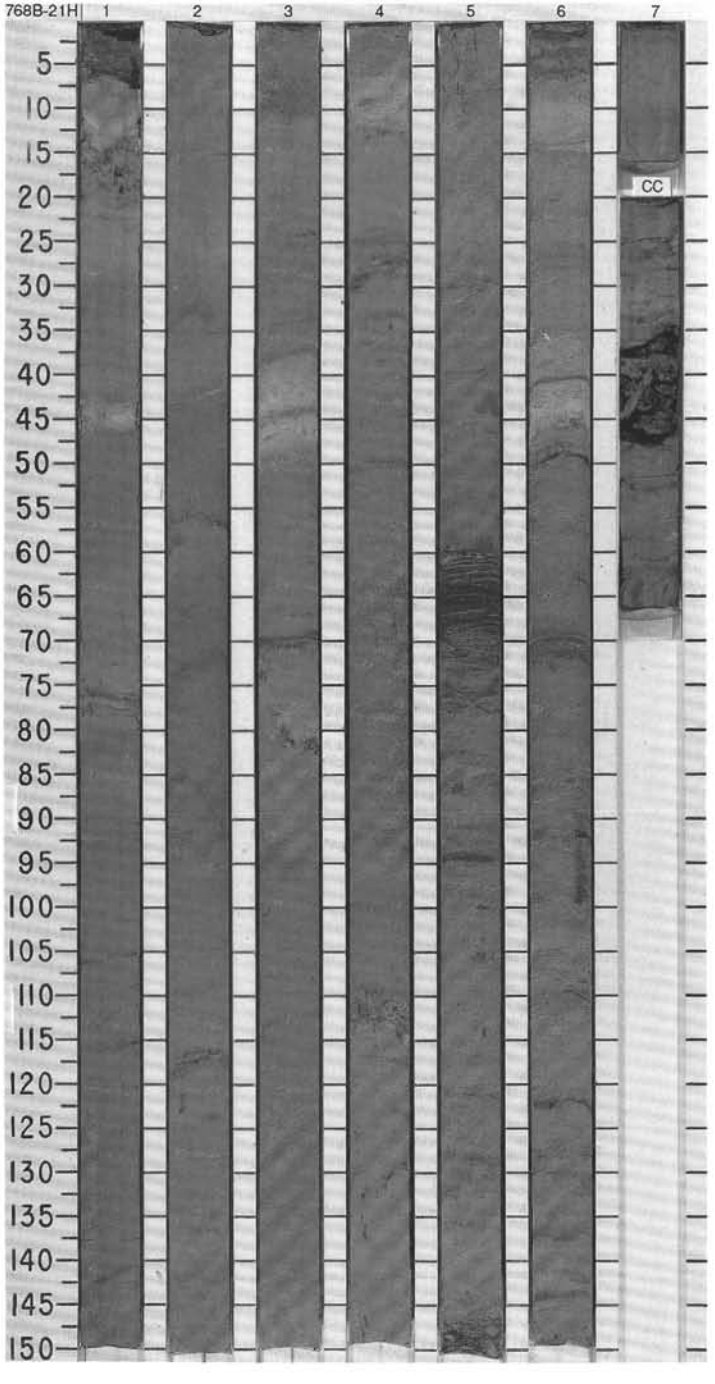
CLAY with nannofossil marl and ash

Major lithology: greenish gray (5BG 5/1) to dark greenish gray (10Y 4/1) CLAY occurs throughout this core. It is bioturbated and in places displays a faint lamination. Pyrite occurs in discrete nodules associated with burrows and disseminated in the clay. The clay contains some plant material and silt-sized feldspar.

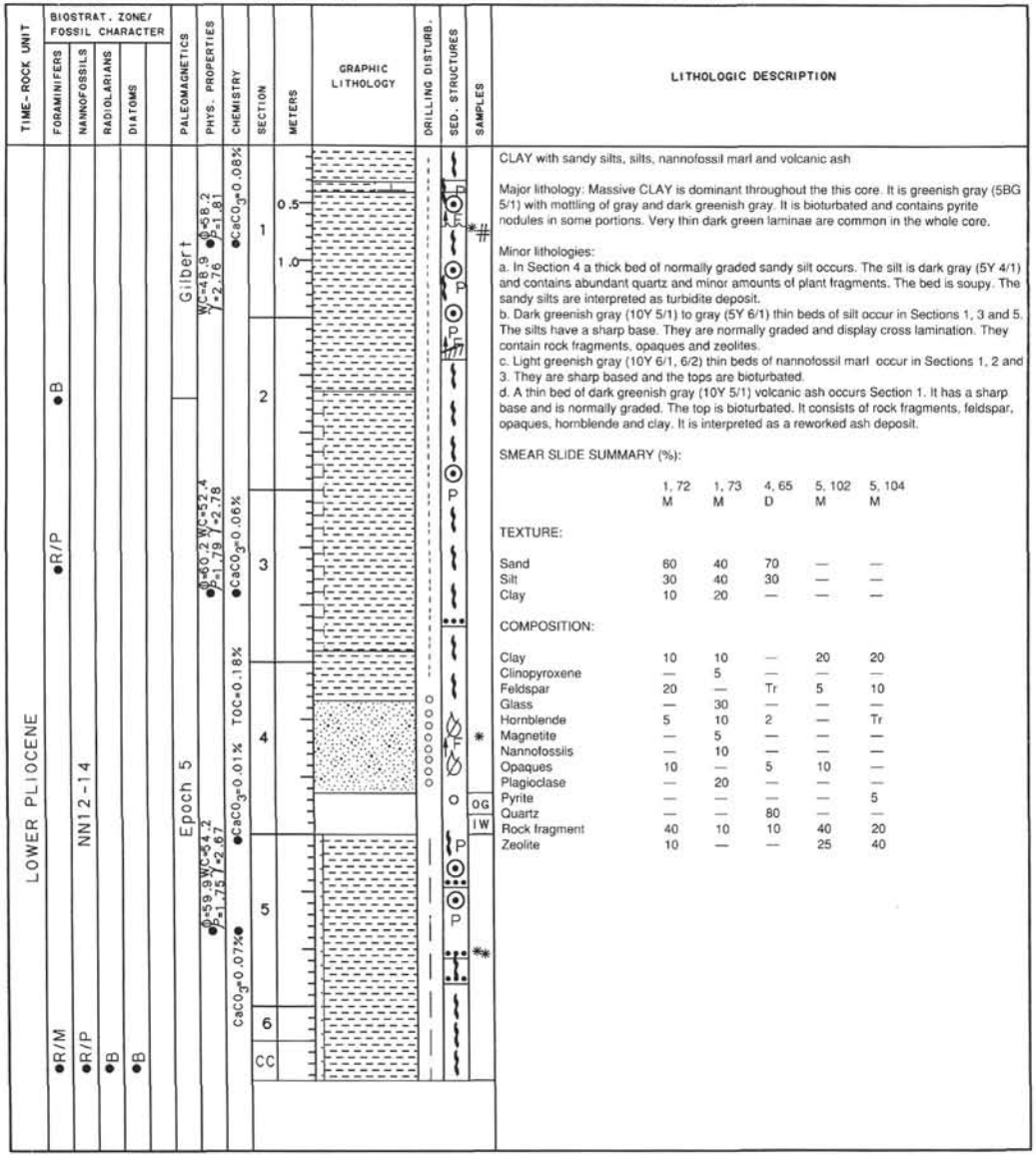
Minor lithologies:
a. Nannofossil marl occurs in four thin beds in this core. The beds are light gray (5Y 7/1) to light olive gray (5Y 6/2) with sharp bases and composed of nannofossils and clay. These are considered to be beds of pelagic material reworked by turbidites.
b. *Lithic ash occurs as very thin beds in Section 1, 77 cm and Section 5, 6 and 7 cm.* These ash layers are composed mainly of altered rock fragments, feldspar, hornblende and zeolite.
Structure: Microfaults occur in Section 2 of this core.

SMEAR SLIDE SUMMARY (%):

	1, 77 M	3, 45 M	3, 112 D	4, 75 D	6, 5 M	6, 6 M
TEXTURE:						
Silt	95	5	5	—	80	80
Clay	5	95	95	100	20	20
COMPOSITION:						
Accessory minerals	—	—	5	2	—	—
Biotite	2	—	—	—	—	—
Clay	5	10	95	95	20	10
Feldspar	25	—	Tr	Tr	8	15
Hornblende	15	—	—	—	2	2
Nannofossils	—	90	—	—	—	—
Opaques	5	—	—	—	3	5
Plant	—	—	Tr	—	—	—
Pyrite	—	—	—	3	—	—
Rock fragment	35	—	—	—	60	55
Zeolite	10	—	—	—	5	10



SITE 768 HOLE B CORE 22H CORED INTERVAL 192.8-201.0 mbsf



LITHOLOGIC DESCRIPTION

CLAY with sandy silts, silts, nannofossil marl and volcanic ash

Major lithology: Massive CLAY is dominant throughout the this core. It is greenish gray (5BG 5/1) with mottling of gray and dark greenish gray. It is bioturbated and contains pyrite nodules in some portions. Very thin dark green laminae are common in the whole core.

Minor lithologies:

a. In Section 4 a thick bed of normally graded sandy silt occurs. The silt is dark gray (5Y 4/1) and contains abundant quartz and minor amounts of plant fragments. The bed is soupy. The sandy silts are interpreted as turbidite deposit.

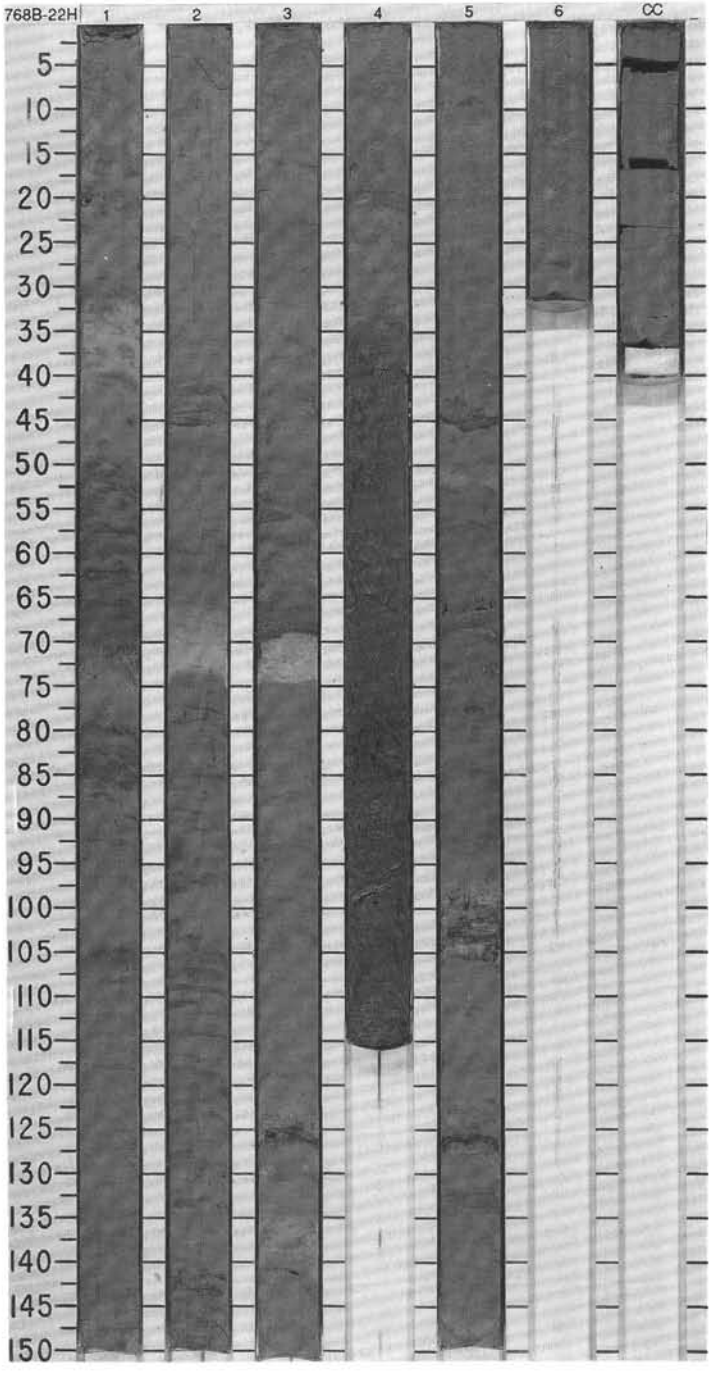
b. Dark greenish gray (10Y 5/1) to gray (5Y 6/1) thin beds of silt occur in Sections 1, 3 and 5. The silts have a sharp base. They are normally graded and display cross lamination. They contain rock fragments, opaques and zeolites.

c. Light greenish gray (10Y 6/1, 6/2) thin beds of nannofossil marl occur in Sections 1, 2 and 3. They are sharp based and the tops are bioturbated.

d. A thin bed of dark greenish gray (10Y 5/1) volcanic ash occurs Section 1. It has a sharp base and is normally graded. The top is bioturbated. It consists of rock fragments, feldspar, opaques, hornblende and clay. It is interpreted as a reworked ash deposit.

SMEAR SLIDE SUMMARY (%):

	1, 72 M	1, 73 M	4, 65 D	5, 102 M	5, 104 M
TEXTURE:					
Sand	60	40	70	—	—
Silt	30	40	30	—	—
Clay	10	20	—	—	—
COMPOSITION:					
Clay	10	10	—	20	20
Clinopyroxene	—	5	—	—	—
Feldspar	20	—	Tr	5	10
Glass	—	30	—	—	—
Hornblende	5	10	2	—	Tr
Magnetite	—	5	—	—	—
Nannofossils	—	10	—	—	—
Opaques	10	—	5	10	—
Plagioclase	—	20	—	—	—
Pyrite	—	—	—	—	5
Quartz	—	—	80	—	—
Rock fragment	40	10	10	40	20
Zeolite	10	—	—	25	40



SITE 768 HOLE B CORE 23H CORED INTERVAL 201-209.20 mbsf

TIME-ROCK UNIT: UPPER MIOCENE / LOWER PLIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS ●B ●B ●R/P; NANNOFOSSILS *D. quinqueramus* NN11 / NN12-14; RADIOLARIANS; DIATOMS; PALEOMAGNETICS Epoch 5 ●A/S

PHYS. PROPERTIES: ●53.8 WC=41.4 γ=2.75 φ=1.88; ●71.2 WC=60.8 γ=2.76 φ=1.83; ●57.3 WC=61.8 γ=2.74 φ=1.74

CHEMISTRY: $CaCO_3$=0.02% ●$CaCO_3$=0.01% TOC=0.33% ●$CaCO_3$=0.02% ●$CaCO_3$=0.02%

SECTION: 1 2 3 4 5 6 CC

METERS: 0.5 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES

LITHOLOGIC DESCRIPTION

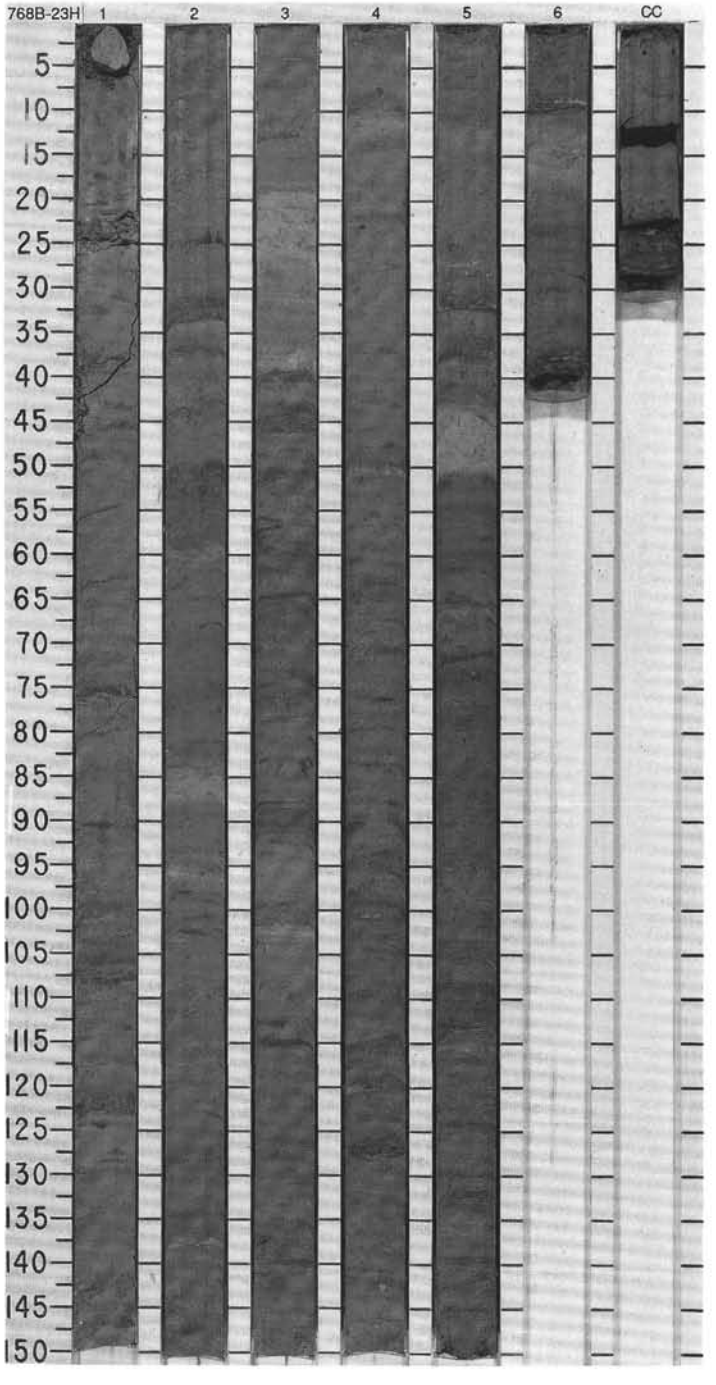
CLAY with silt, marl, and ash

Major lithology: CLAY occurs as thin to thick beds throughout the core. It is greenish gray (5BG 5/1).It is bioturbated and has abundant burrows with rare faint lamination, flaser bedding. The clay contains rare silt-sized feldspar and rock fragments.

Minor lithologies:
a. Silt occurs as very thin to thin beds throughout the core in the bottom of the clay beds. It is dark greenish gray (10Y 5/1). The lower boundaries are sharp or scoured and the upper boundaries with the clay are diffuse. Graded bedding, wavy laminae and flaser bedding are the main structures in the silt. The silt is mainly rock fragments, quartz and feldspar with a few grains of pyrite.
b. Calcareous marl occurs in Section 1, 0-4 cm, Section 2, 84-87 cm, Section 3, 18-31 cm, Section 4, 10-13 cm and Section 6, 10-18 cm as light greenish gray (10Y 6/1, 6/2), very thin to thin beds. Some b have sharp lower boundaries and diffuse upper boundaries. Lamination occurs near the bottom and bioturbation is common near the top of the beds.
c. Lithic ash occurs in Section 1, 73-74 cm. It is dark gray (5Y 5/1) and the bed has a sharp base and bioturbated top.
d. Calcareous silt occurs in very thin beds in Section 4, 51-52 cm and in Section 5, 31-32, 116-117 cm. The beds are light greenish gray (10Y 6/1, 6/2) and have sharp bases and bioturbated tops with parallel laminae.

SMEAR SLIDE SUMMARY (%):

	1, 121 M	2, 76 D	3, 37 M	3, 103 M	5, 47 M
TEXTURE:					
Sand	30	—	—	—	—
Silt	60	5	—	—	—
Clay	10	95	—	—	—
COMPOSITION:					
Accessory minerals	2	—	—	—	—
Clay	—	80	20	30	—
Feldspar	10	2	10	15	—
Hornblende	—	—	—	2	—
Micrite	—	—	—	—	90
Nannofossils	—	—	—	—	10
Opaques	10	10	5	—	—
Plant	1	—	—	—	—
Pyrite	—	—	—	5	—
Quartz	40	—	—	—	—
Rock fragment	35	5	60	35	—
Zeolite	—	—	Tr	10	—



SITE 768 HOLE B CORE 24H CORED INTERVAL 209.2-209.6 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	B●	R/P●	B●	B●				CC				p	*	CLAY

Major lithology: CLAY, with small amounts of silty clay, are the only lithologies found disturbed in the core catcher. They are greenish gray (5G 5/1), mottled and bioturbated. The silty material is largely altered rock fragments and pyrite, which occurs both as disseminated grains and in nodules.

SMEAR SLIDE SUMMARY (%):

	CC, 20 M
TEXTURE:	
Silt	60
Clay	40
COMPOSITION:	
Biotite	1
Clay	40
Feldspar	5
Pyrite	10
Rock fragment	40

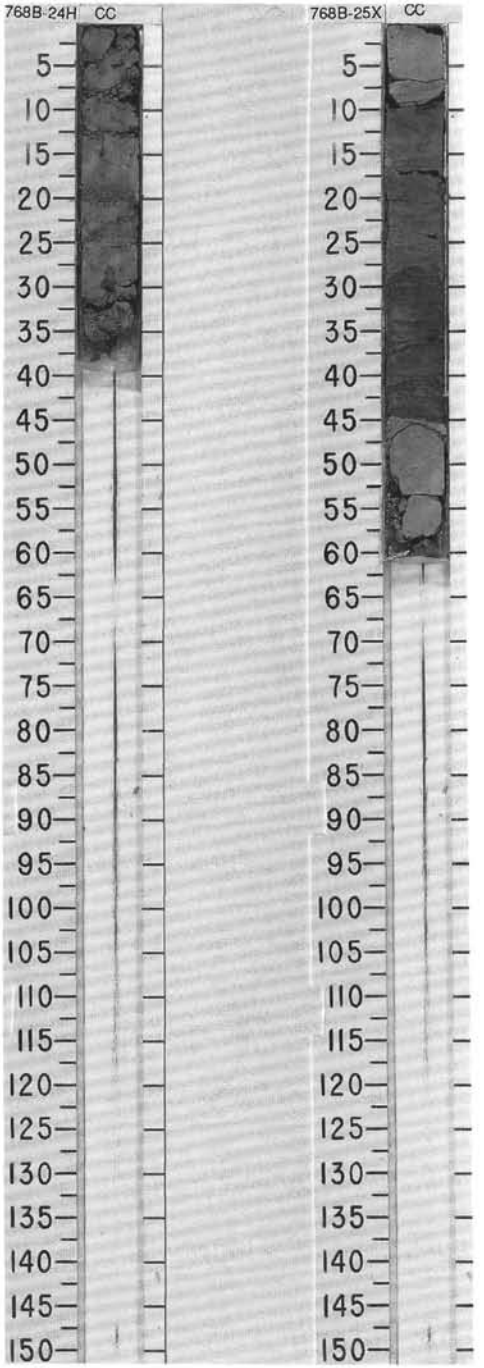
SITE 768 HOLE B CORE 25X CORED INTERVAL 209.6-219.3 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
UPPER MIOCENE	B●	R/P●						CC				p	* * *	SILTY CLAY, SILTY QUARTZ SAND and DOLOMITIC LIMESTONE

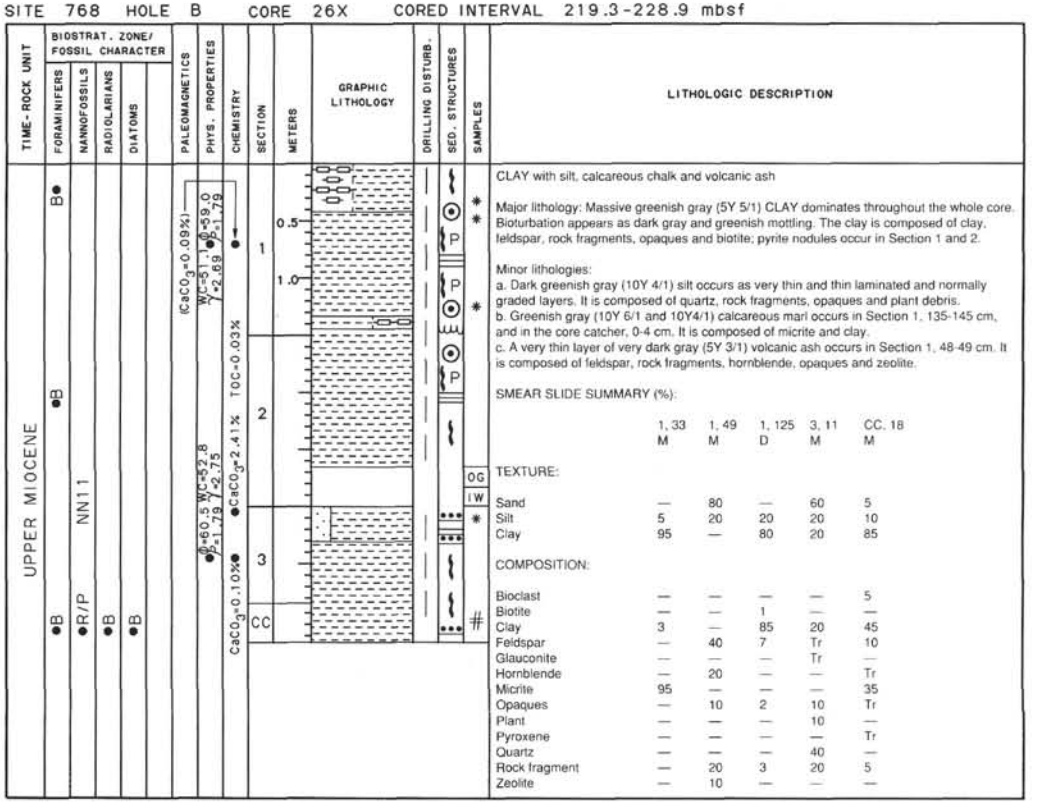
Major lithologies:
a. The SILTY CLAY is greenish gray (5G 5/1) and is composed mainly of clay minerals with some feldspar, quartz and pyrite crystals. It is bioturbated, but otherwise homogeneous.
b. A bed of SILTY QUARTZ SAND in core catcher, 25-45 cm is planar and cross laminated. It is dark gray (5Y 4/1) and is composed of quartz, rock fragments, plant debris and pyritized plant material. The thick laminae are picked out by variations in grain size and composition.
c. DOLOMITIC LIMESTONE occurs both at the top and the bottom of the core catcher. These beds are massive and bioturbated, fine grained carbonate material which can be seen to be made up of discrete rhombs under high magnification.

SMEAR SLIDE SUMMARY (%):

	CC, 21 D	CC, 36 D	CC, 49 D
TEXTURE:			
Sand	—	50	—
Silt	25	30	—
Clay	75	20	—
COMPOSITION:			
Clay	80	20	—
Feldspar	5	5	—
Micrite	—	—	100
Opaques	10	—	—
Plant	—	10	—
Pyrite	—	10	—
Quartz	5	45	—
Rock fragment	—	10	—



SITE 768 HOLE B CORE 26X CORED INTERVAL 219.3-228.9 mbsf



LITHOLOGIC DESCRIPTION

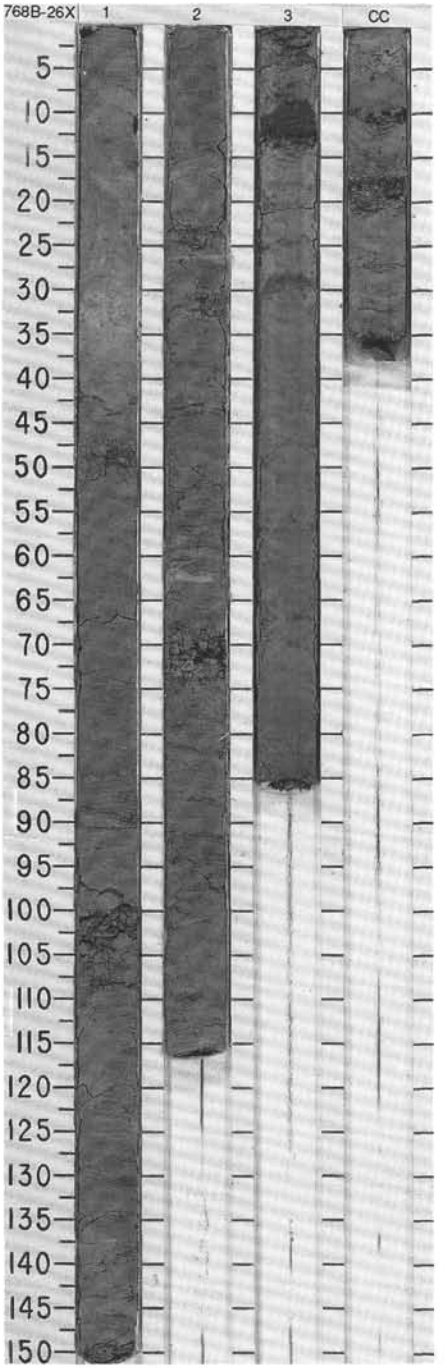
CLAY with silt, calcareous chalk and volcanic ash

Major lithology: Massive greenish gray (5Y 5/1) CLAY dominates throughout the whole core. Bioturbation appears as dark gray and greenish mottling. The clay is composed of clay, feldspar, rock fragments, opaques and biotite; pyrite nodules occur in Section 1 and 2.

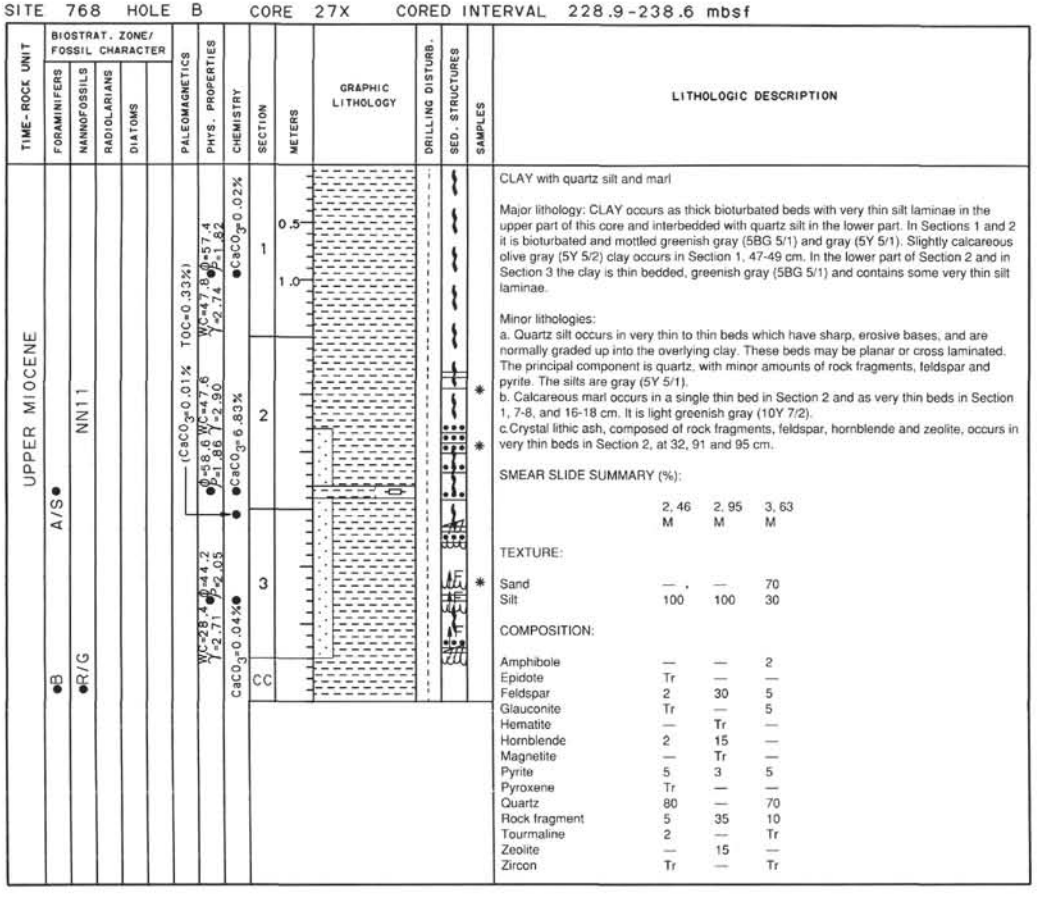
Minor lithologies:
a. Dark greenish gray (10Y 4/1) silt occurs as very thin and thin laminated and normally graded layers. It is composed of quartz, rock fragments, opaques and plant debris.
b. Greenish gray (10Y 6/1 and 10Y4/1) calcareous marl occurs in Section 1, 135-145 cm, and in the core catcher, 0-4 cm. It is composed of micrite and clay.
c. A very thin layer of very dark gray (5Y 3/1) volcanic ash occurs in Section 1, 48-49 cm. It is composed of feldspar, rock fragments, hornblende, opaques and zeolite.

SMEAR SLIDE SUMMARY (%):

	1, 33 M	1, 49 M	1, 125 D	3, 11 M	CC, 18 M
TEXTURE:					
Sand	—	80	—	60	5
Silt	5	20	20	20	10
Clay	95	—	80	20	85
COMPOSITION:					
Bioclast	—	—	—	—	5
Biotite	—	—	1	—	—
Clay	3	—	85	20	45
Feldspar	—	40	7	Tr	10
Glauconite	—	—	—	Tr	—
Hornblende	—	20	—	—	Tr
Micrite	95	—	—	—	35
Opaques	—	10	2	10	Tr
Plant	—	—	—	10	—
Pyroxene	—	—	—	—	Tr
Quartz	—	—	—	40	—
Rock fragment	—	20	3	20	5
Zeolite	—	10	—	—	—



SITE 768 HOLE B CORE 27X CORED INTERVAL 228.9-238.6 mbsf



CLAY with quartz silt and marl

Major lithology: CLAY occurs as thick bioturbated beds with very thin silt laminae in the upper part of this core and interbedded with quartz silt in the lower part. In Sections 1 and 2 it is bioturbated and mottled greenish gray (5BG 5/1) and gray (5Y 5/1). Slightly calcareous olive gray (5Y 5/2) clay occurs in Section 1, 47-49 cm. In the lower part of Section 2 and in Section 3 the clay is thin bedded, greenish gray (5BG 5/1) and contains some very thin silt laminae.

Minor lithologies:

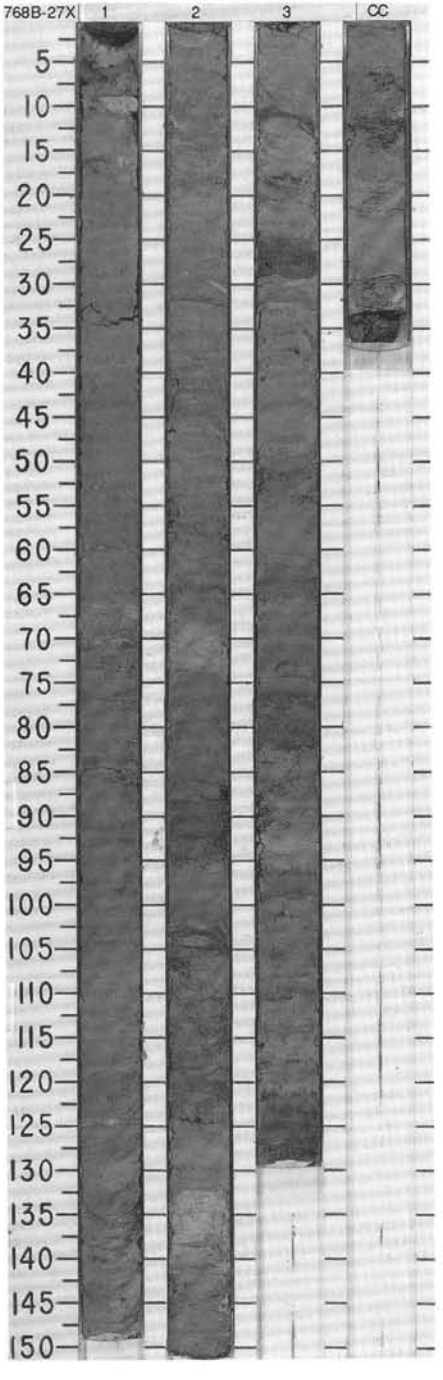
a. Quartz silt occurs in very thin to thin beds which have sharp, erosive bases, and are normally graded up into the overlying clay. These beds may be planar or cross laminated. The principal component is quartz, with minor amounts of rock fragments, feldspar and pyrite. The silts are gray (5Y 5/1).

b. Calcareous marl occurs in a single thin bed in Section 2 and as very thin beds in Section 1, 7-8, and 16-18 cm. It is light greenish gray (10Y 7/2).

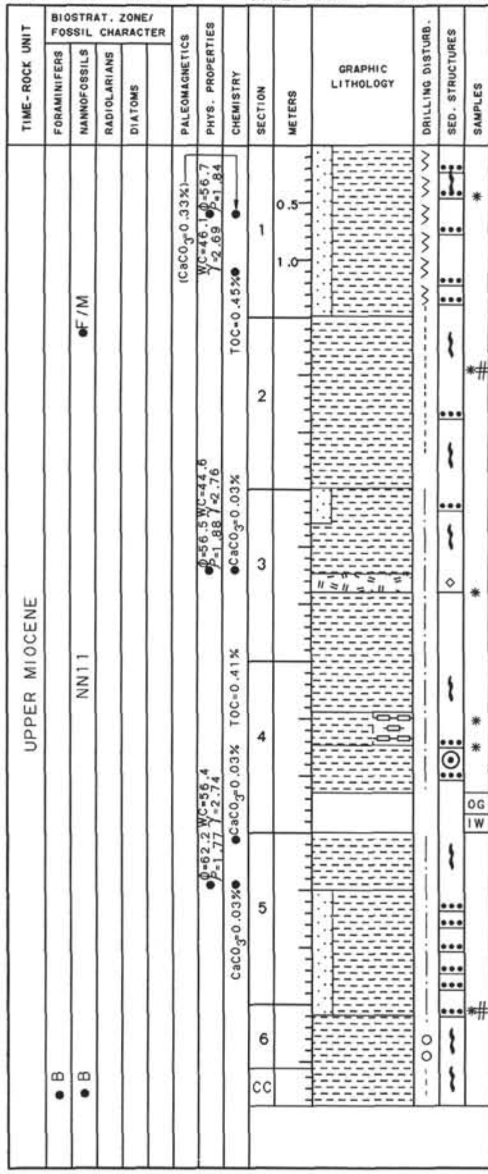
c. Crystal lithic ash, composed of rock fragments, feldspar, hornblende and zeolite, occurs in very thin beds in Section 2, at 32, 91 and 95 cm.

SMEAR SLIDE SUMMARY (%):

	2, 46 M	2, 95 M	3, 63 M
TEXTURE:			
Sand	—	—	70
Silt	100	100	30
COMPOSITION:			
Amphibole	—	—	2
Epidote	Tr	—	—
Feldspar	2	30	5
Glauconite	Tr	—	5
Hematite	—	Tr	—
Hornblende	2	15	—
Magnetite	—	Tr	—
Pyrite	5	3	5
Pyroxene	Tr	—	—
Quartz	80	—	70
Rock fragment	5	35	10
Tourmaline	2	—	Tr
Zeolite	—	15	—
Zircon	Tr	—	Tr



SITE 768 HOLE B CORE 28X CORED INTERVAL 238.6-248.2 mbsf



LITHOLOGIC DESCRIPTION

CLAY with silt and sand, nannofossil marl and volcanic ash

Major lithology: Greenish gray (5BG 5/1) CLAY. Throughout the whole core the clay displays darker gray and greenish mottling due to bioturbation. In Section 4 a calcareous nodule occurs.

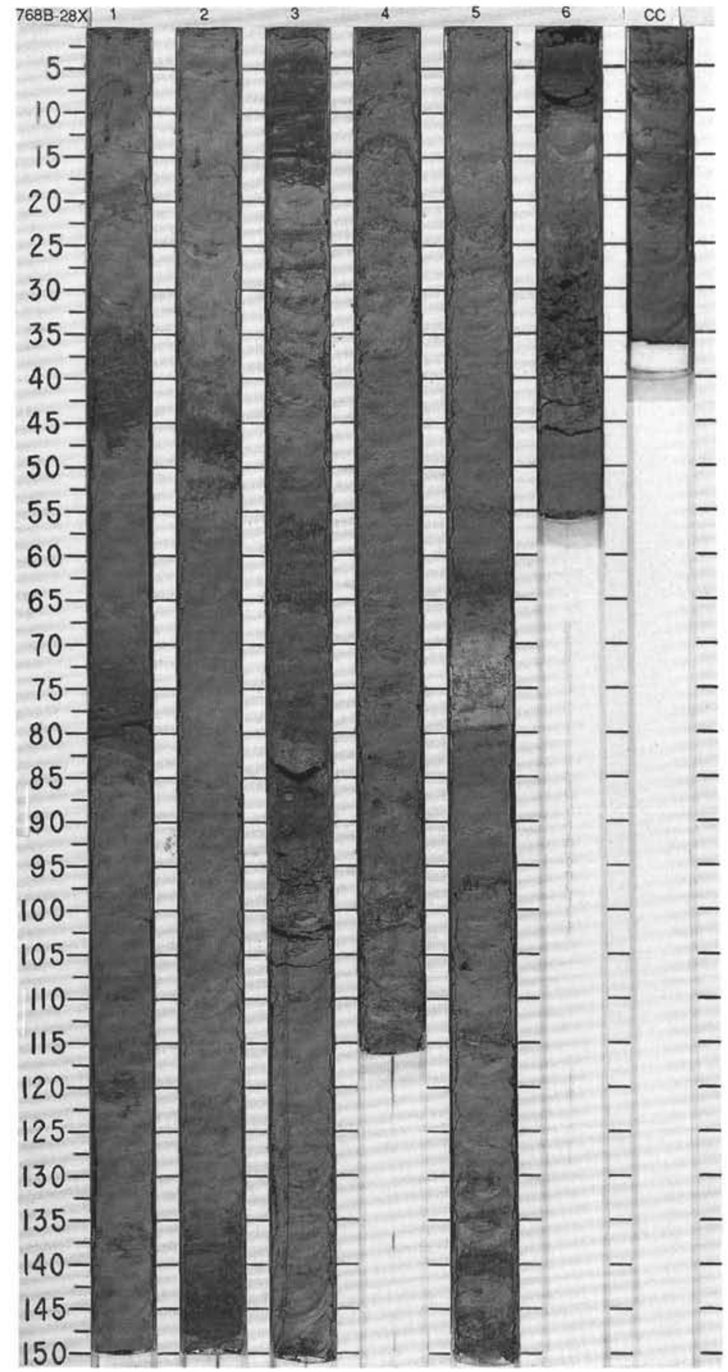
Minor lithologies:
a. Dark gray (5Y 4/1), sharp based, very thin to medium bedded, normally graded and laminated silts and sands occur throughout the whole core. The contact with the clays is transitional. They contain quartz, rock fragments, pyrite, plant debris and minor amounts of clay. In Section 5 the basal interval of a silt layer contains low amounts of carbonate.
b. Gray (5Y 5/1) nannofossil marl occurs in the Sections 2, 4 and 5. The beds are sharp based, thin to medium bedded and normally graded. They contain nannofossils, micrite, clay and quartz.
c. Very thin layers of dark gray (5Y 4/1) volcanic ashes occur in Sections 1, 2, 3 and 6. They are composed of rock fragments, feldspar, hornblende and zeolite.

SMEAR SLIDE SUMMARY (%):

	1, 44 M	2, 47 M	2, 47 D	3, 90 M	4, 52 M	4, 75 M	6, 5 M
TEXTURE:							
Sand	20	70	—	80	—	—	30
Silt	60	30	20	20	—	30	30
Clay	20	—	80	—	—	70	40
COMPOSITION:							
Accessory minerals	—	2	Tr	2	—	—	—
Bioclast	—	—	—	—	—	15	—
Biotite	—	—	—	—	—	—	1
Clay	15	—	70	—	15	20	40
Feldspar	—	25	15	25	—	—	15
Foraminifers	—	—	—	—	—	Tr	—
Glauconite	2	—	—	—	—	Tr	—
Hornblende	—	10	2	15	—	—	10
Micrite	—	—	5	—	15	—	—
Nannofossils	—	—	Tr	—	65	40	—
Opaques	—	—	1	—	Tr	—	1
Plant	10	—	—	—	—	—	—
Pyrite	10	10	—	5	—	—	—
Pyroxene	—	—	1	—	—	—	1
Quartz	40	—	—	—	5	15	15
Rock fragment	20	50	5	40	—	10	15
Zeolite	—	Tr	—	10	—	—	—

SMEAR SLIDE SUMMARY (%):

	6, 6 M
TEXTURE:	
Sand	40
Silt	60
COMPOSITION:	
Accessory minerals	2
Feldspar	25
Hornblende	10
Pyrite	3
Rock fragment	50
Zeolite	10



SITE 768 HOLE B CORE 29X CORED INTERVAL 248.2-257.8 mbsf

TIME-ROCK UNIT: UPPER MIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS ●B ●A/S; NANNOFOSSILS NN11; RADIOLARIANS ●R/G; DIATOMS

PALEOMAGNETICS

PHYS. PROPERTIES: WC=41.3 WC=26.2 ρ=2.04 γ=2.62; WC=42.3 WC=29.7 ρ=1.89 γ=2.94; WC=49.2 WC=58.3 ρ=1.76 γ=2.81

CHEMISTRY: $CaCO_3$=0.06%● $CaCO_3$=0.08%● $CaCO_3$=0.11% TOC=0.32% ●$CaCO_3$=0.02%

SECTION: 1, 2, 3, 4, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES

LITHOLOGIC DESCRIPTION

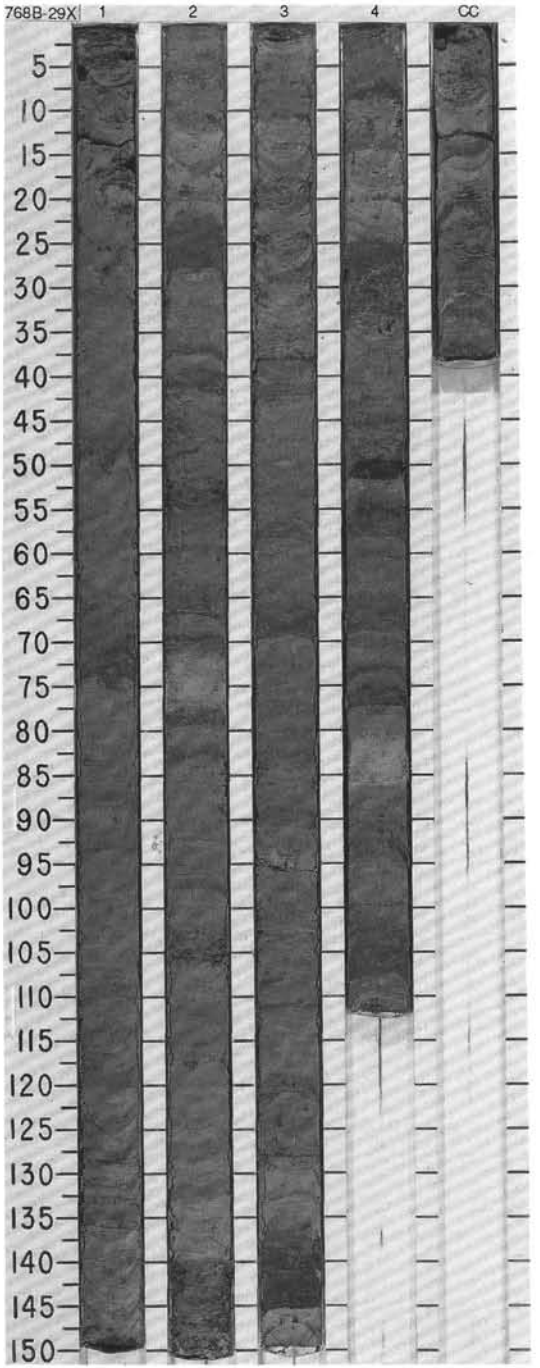
CLAY with quartz silt, marl and ash

Major lithology: Greenish gray (5BG 5/1) CLAY is the dominant lithology. It is composed mainly of clay minerals with some silt grade quartz and feldspar. The beds are homogeneous and may be bioturbated.

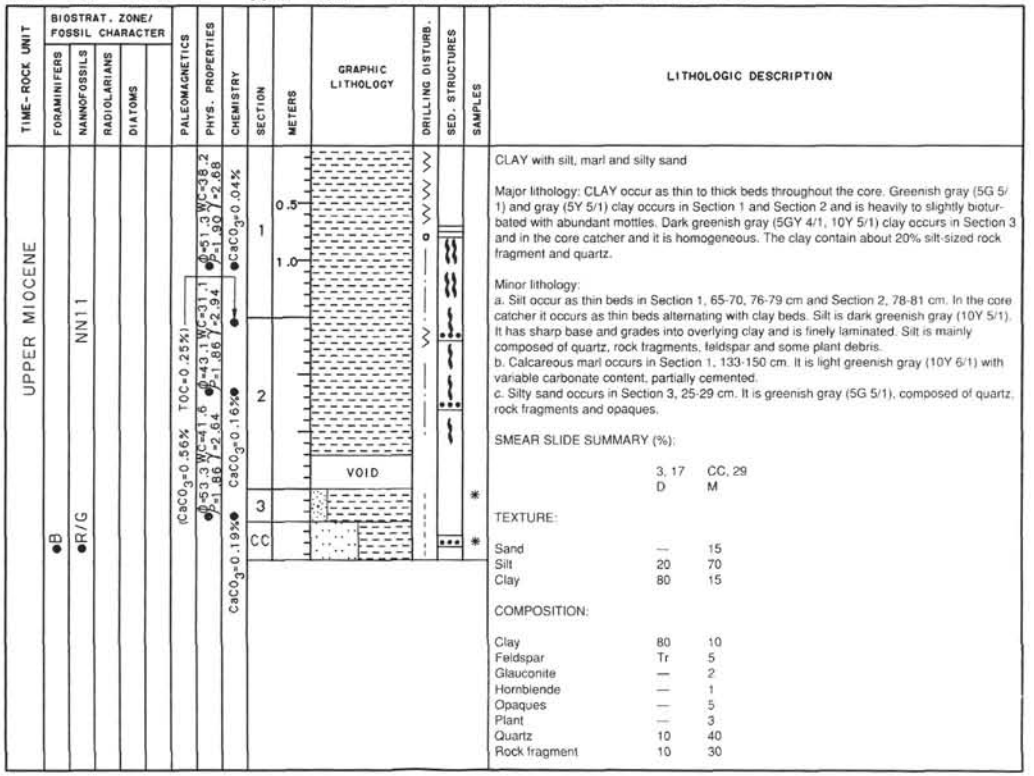
Minor lithologies:
a. Quartz silt occurs in very thin beds in this core. The beds have sharp bases, they are laminated and normally graded and the upper boundary with overlying clay is diffuse. They are dark gray (5Y 4/1). Silt grade rounded quartz grains are the main constituent with variable amounts of feldspar, lithic fragments and calcareous material. These beds are considered to be thin turbidites.
b. Calcareous marl occurs as very thin beds in Section 2, 5-6 and 71-77 cm, Section 3, 93-95 cm, and Section 4, 51-53 and 81-86 cm. These beds are well defined and are light greenish gray (10Y 6/2). They are mainly micrite with a few nannofossils.
c. Ash beds occur in Section 2, 105 cm and in Section 4, 49-51 cm. They consist of altered lithic fragments, zeolite and feldspar. Clasts of andesite up to 4 mm across occur in these beds.

SMEAR SLIDE SUMMARY (%):

	1, 96 D	2, 29 M	2, 105 M	3, 143 M	4, 5 M	4, 50 M
TEXTURE:						
Sand	—	—	—	—	10	—
Silt	5	—	—	90	60	—
Clay	95	—	—	5	30	—
COMPOSITION:						
Accessory minerals	—	—	—	2	—	—
Calcite	—	—	—	—	—	5
Clay	90	10	—	—	10	—
Feldspar	5	2	10	20	5	5
Foraminifers	—	—	—	—	5	—
Glauconite	Tr	—	—	Tr	—	—
Hornblende	—	—	5	3	1	3
Micrite	—	80	—	—	10	—
Nannofossils	—	5	—	—	5	Tr
Opaques	3	—	3	—	—	—
Pellets	—	—	—	—	35	—
Plant	Tr	—	—	—	—	—
Pyrite	—	—	—	—	—	15
Quartz	2	1	—	50	25	—
Rock fragment	—	—	60	20	—	50
Zeolite	—	—	20	—	—	20



SITE 768 HOLE B CORE 30X CORED INTERVAL 257.8-267.50 mbsf



LITHOLOGIC DESCRIPTION

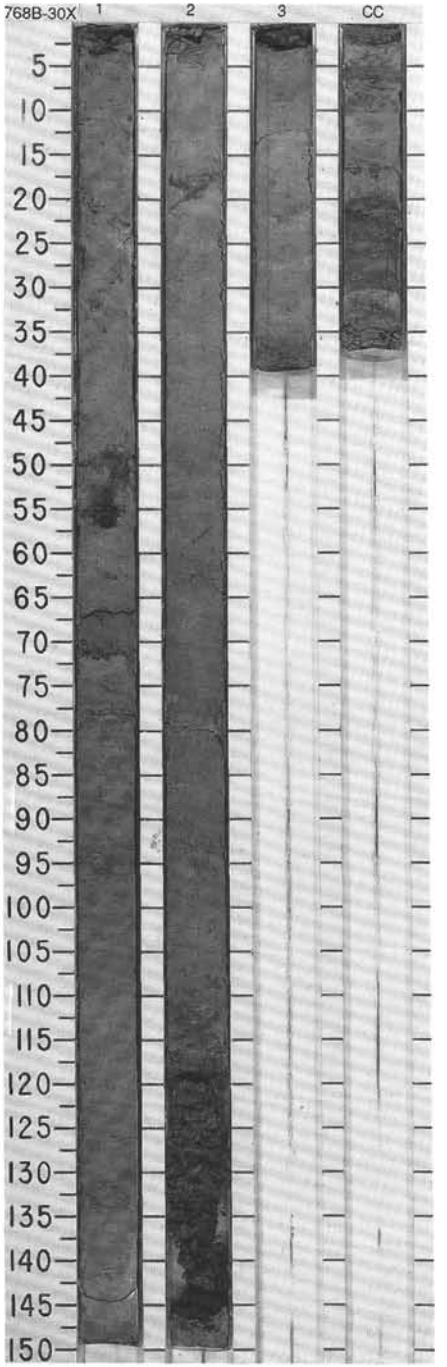
CLAY with silt, marl and silty sand

Major lithology: CLAY occur as thin to thick beds throughout the core. Greenish gray (5G 5/1) and gray (5Y 5/1) clay occurs in Section 1 and Section 2 and is heavily to slightly bioturbated with abundant mottles. Dark greenish gray (5GY 4/1, 10Y 5/1) clay occurs in Section 3 and in the core catcher and it is homogeneous. The clay contain about 20% silt-sized rock fragment and quartz.

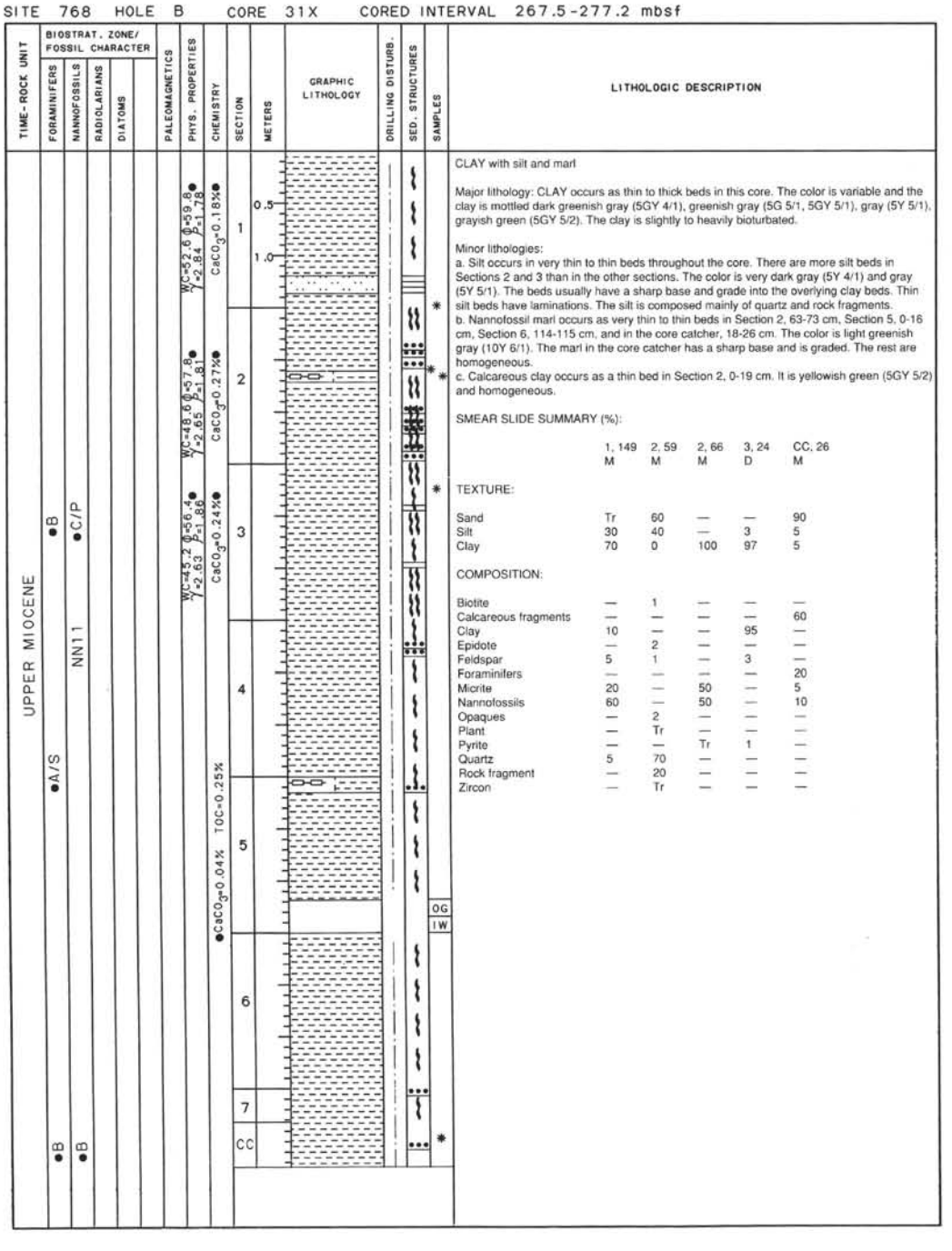
Minor lithology:
a. Silt occur as thin beds in Section 1, 65-70, 76-79 cm and Section 2, 78-81 cm. In the core catcher it occurs as thin beds alternating with clay beds. Silt is dark greenish gray (10Y 5/1). It has sharp base and grades into overlying clay and is finely laminated. Silt is mainly composed of quartz, rock fragments, feldspar and some plant debris.
b. Calcareous marl occurs in Section 1, 133-150 cm. It is light greenish gray (10Y 6/1) with variable carbonate content, partially cemented.
c. Silty sand occurs in Section 3, 25-29 cm. It is greenish gray (5G 5/1), composed of quartz, rock fragments and opaques.

SMEAR SLIDE SUMMARY (%):

	3, 17 D	CC, 29 M
TEXTURE:		
Sand	—	15
Silt	20	70
Clay	80	15
COMPOSITION:		
Clay	80	10
Feldspar	Tr	5
Glauconite	—	2
Hornbiende	—	1
Opaques	—	5
Plant	—	3
Quartz	10	40
Rock fragment	10	30



SITE 768 HOLE B CORE 31X CORED INTERVAL 267.5-277.2 mbsf



LITHOLOGIC DESCRIPTION

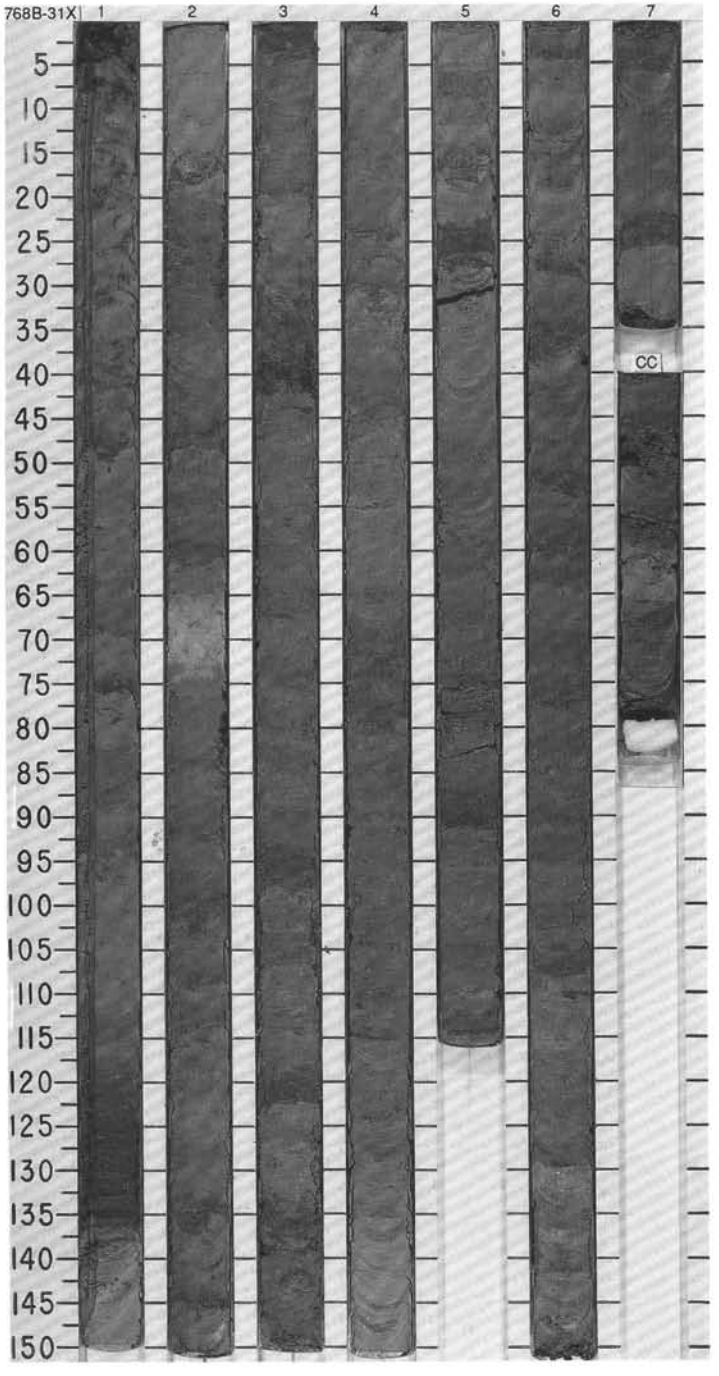
CLAY with silt and marl

Major lithology: CLAY occurs as thin to thick beds in this core. The color is variable and the clay is mottled dark greenish gray (5GY 4/1), greenish gray (5G 5/1, 5GY 5/1), gray (5Y 5/1), grayish green (5GY 5/2). The clay is slightly to heavily bioturbated.

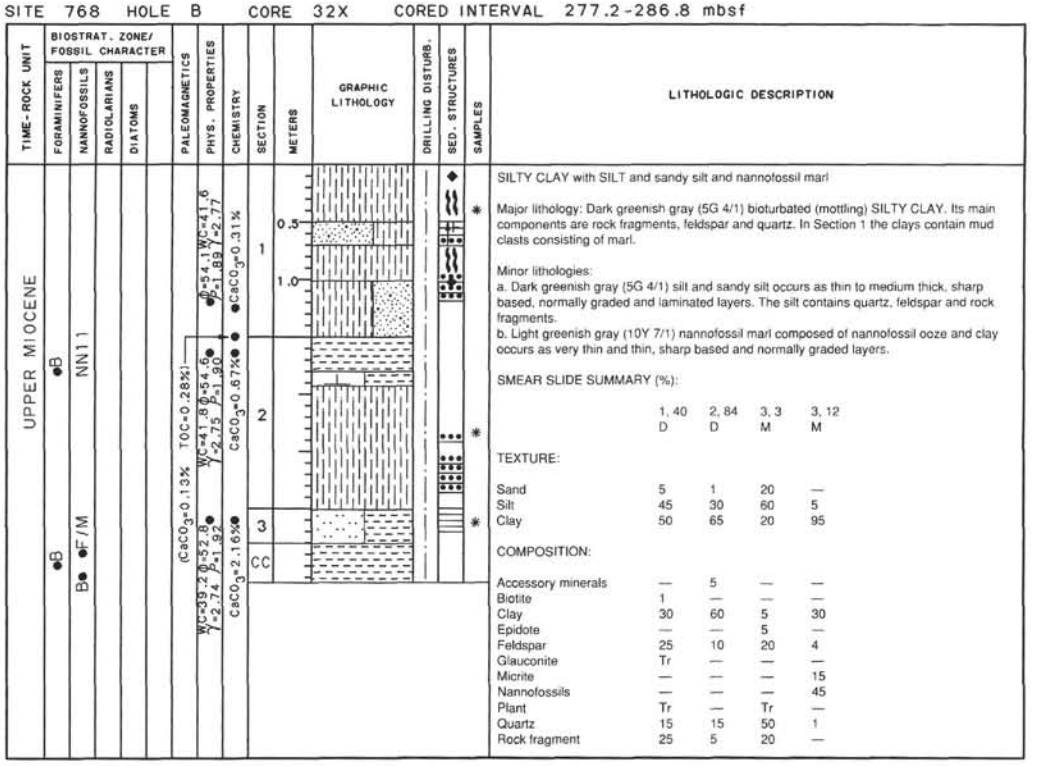
Minor lithologies:
a. Silt occurs in very thin to thin beds throughout the core. There are more silt beds in Sections 2 and 3 than in the other sections. The color is very dark gray (5Y 4/1) and gray (5Y 5/1). The beds usually have a sharp base and grade into the overlying clay beds. Thin silt beds have laminations. The silt is composed mainly of quartz and rock fragments.
b. Nannofossil marl occurs as very thin to thin beds in Section 2, 63-73 cm, Section 5, 0-16 cm, Section 6, 114-115 cm, and in the core catcher, 18-26 cm. The color is light greenish gray (10Y 6/1). The marl in the core catcher has a sharp base and is graded. The rest are homogeneous.
c. Calcareous clay occurs as a thin bed in Section 2, 0-19 cm. It is yellowish green (5GY 5/2) and homogeneous.

SMEAR SLIDE SUMMARY (%):

	1, 149 M	2, 59 M	2, 66 M	3, 24 D	CC, 26 M
TEXTURE:					
Sand	Tr	60	—	—	90
Silt	30	40	—	3	5
Clay	70	0	100	97	5
COMPOSITION:					
Biotite	—	1	—	—	—
Calcareous fragments	—	—	—	—	60
Clay	10	—	—	95	—
Epidote	—	2	—	—	—
Feldspar	5	1	—	3	—
Foraminifers	—	—	—	—	20
Micrite	20	—	50	—	5
Nannofossils	60	—	50	—	10
Opaques	—	2	—	—	—
Plant	—	Tr	—	—	—
Pyrite	—	—	Tr	1	—
Quartz	5	70	—	—	—
Rock fragment	—	20	—	—	—
Zircon	—	Tr	—	—	—



SITE 768 HOLE B CORE 32X CORED INTERVAL 277.2-286.8 mbsf



LITHOLOGIC DESCRIPTION

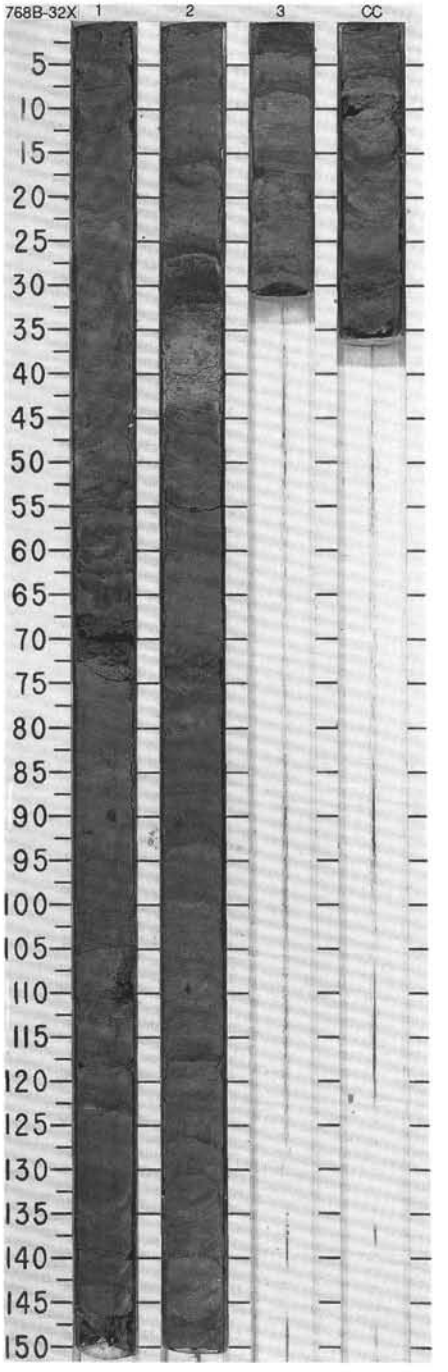
SILTY CLAY with SILT and sandy silt and nannofossil marl

Major lithology: Dark greenish gray (5G 4/1) bioturbated (mottling) SILTY CLAY. Its main components are rock fragments, feldspar and quartz. In Section 1 the clays contain mud clasts consisting of marl.

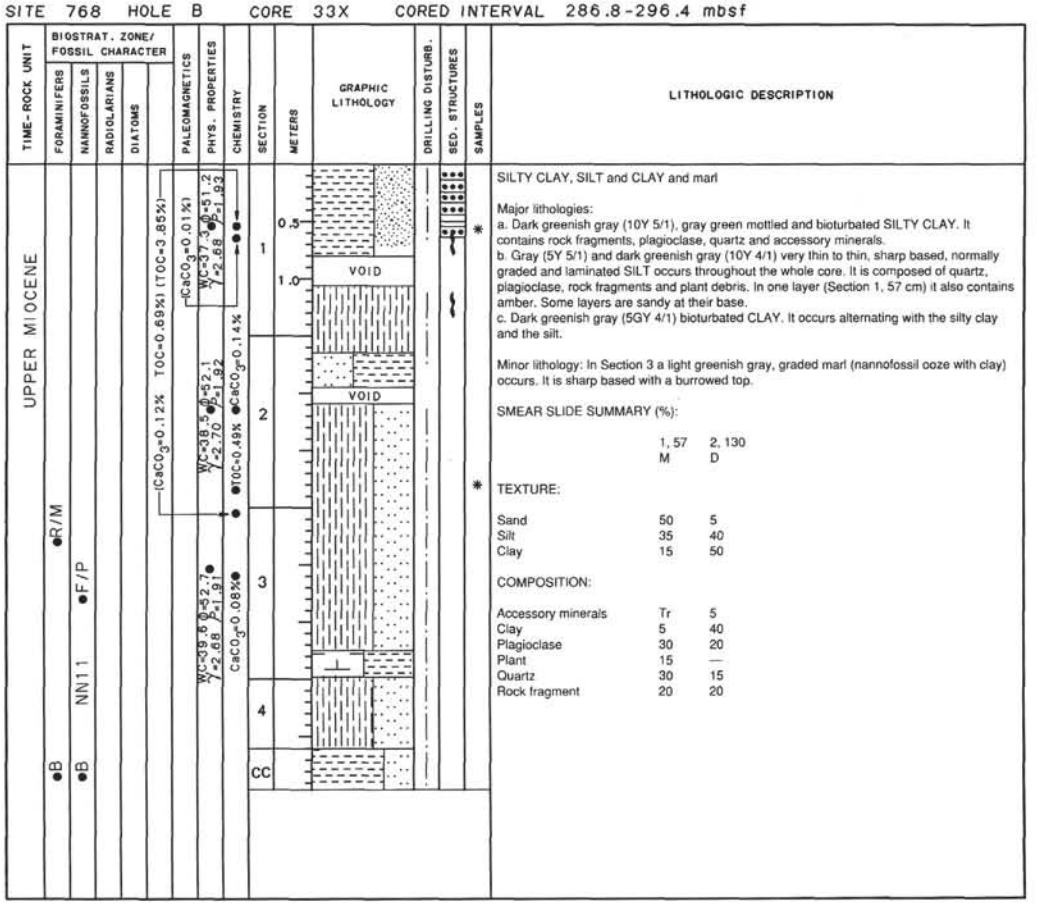
Minor lithologies:
a. Dark greenish gray (5G 4/1) silt and sandy silt occurs as thin to medium thick, sharp based, normally graded and laminated layers. The silt contains quartz, feldspar and rock fragments.
b. Light greenish gray (10Y 7/1) nannofossil marl composed of nannofossil ooze and clay occurs as very thin and thin, sharp based and normally graded layers.

SMEAR SLIDE SUMMARY (%):

	1, 40 D	2, 84 D	3, 3 M	3, 12 M
TEXTURE:				
Sand	5	1	20	—
Silt	45	30	60	5
Clay	50	65	20	95
COMPOSITION:				
Accessory minerals	—	5	—	—
Biotite	1	—	—	—
Clay	30	60	5	30
Epidote	—	—	5	—
Feldspar	25	10	20	4
Glauconite	Tr	—	—	—
Micrite	—	—	—	15
Nannofossils	—	—	—	45
Plant	Tr	—	Tr	—
Quartz	15	15	50	1
Rock fragment	25	5	20	—



SITE 768 HOLE B CORE 33X CORED INTERVAL 286.8-296.4 mbsf



LITHOLOGIC DESCRIPTION

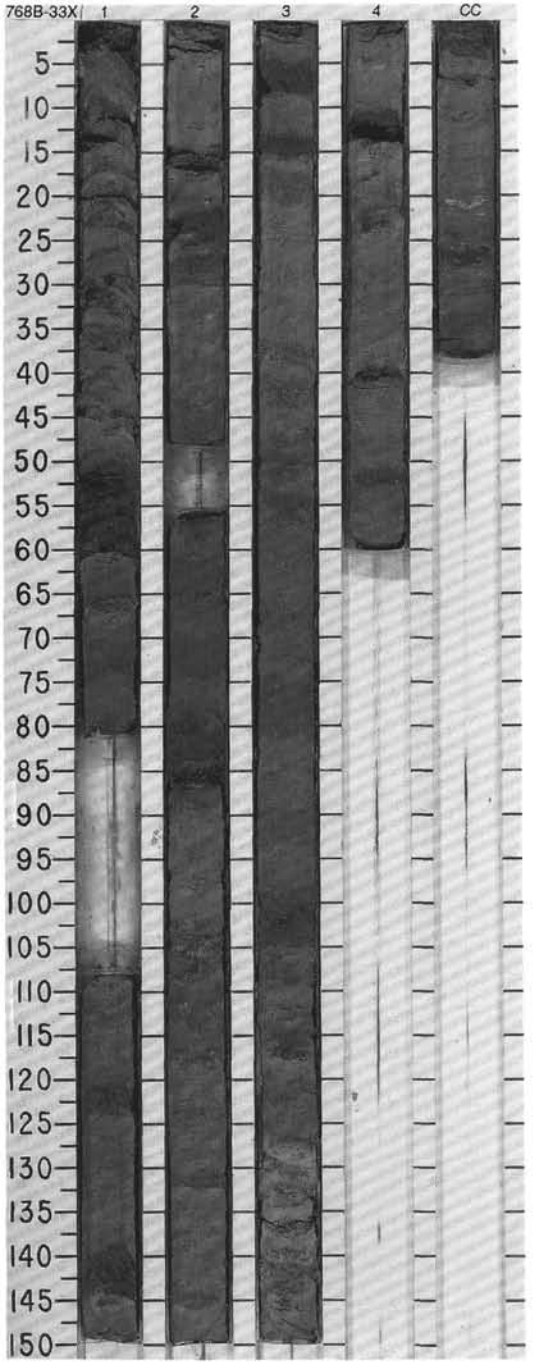
SILTY CLAY, SILT and CLAY and marl

Major lithologies:
a. Dark greenish gray (10Y 5/1), gray green mottled and bioturbated SILTY CLAY. It contains rock fragments, plagioclase, quartz and accessory minerals.
b. Gray (5Y 5/1) and dark greenish gray (10Y 4/1) very thin to thin, sharp based, normally graded and laminated SILT occurs throughout the whole core. It is composed of quartz, plagioclase, rock fragments and plant debris. In one layer (Section 1, 57 cm) it also contains amber. Some layers are sandy at their base.
c. Dark greenish gray (5GY 4/1) bioturbated CLAY. It occurs alternating with the silty clay and the silt.

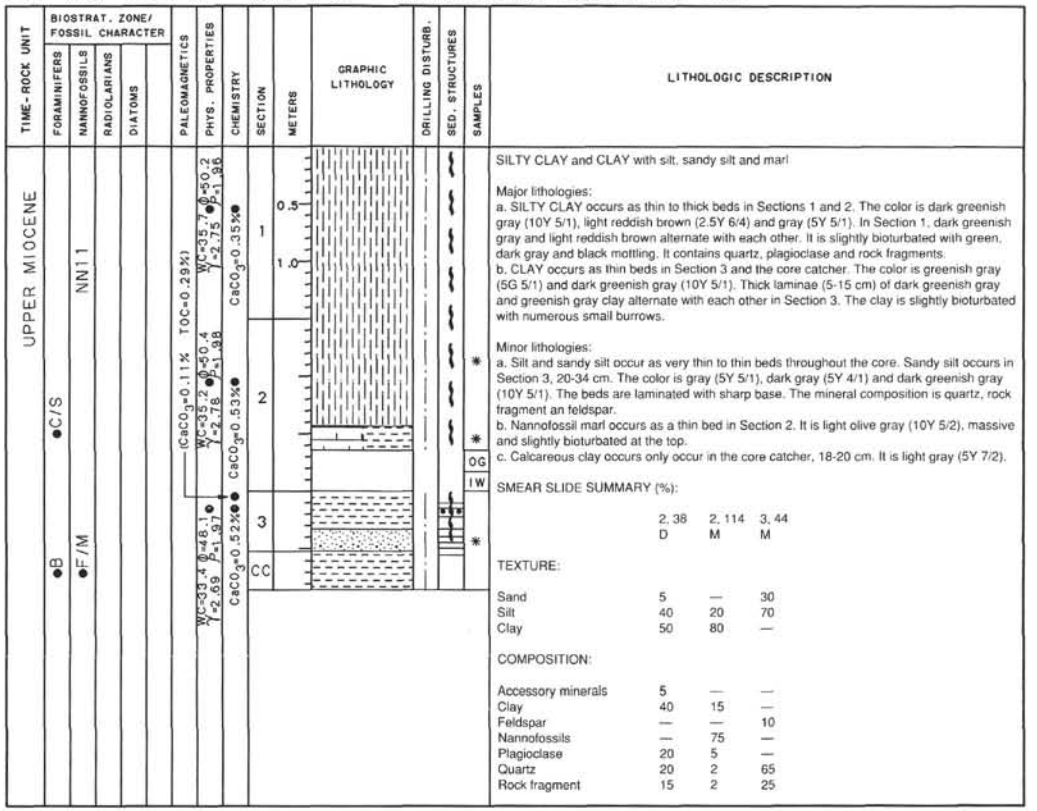
Minor lithology: In Section 3 a light greenish gray, graded marl (nannofossil ooze with clay) occurs. It is sharp based with a burrowed top.

SMEAR SLIDE SUMMARY (%):

	1, 57 M	2, 130 D
TEXTURE:		
Sand	50	5
Silt	35	40
Clay	15	50
COMPOSITION:		
Accessory minerals	Tr	5
Clay	5	40
Plagioclase	30	20
Plant	15	—
Quartz	30	15
Rock fragment	20	20



SITE 768 HOLE B CORE 34X CORED INTERVAL 296.4-306.1 mbsf



SILTY CLAY and CLAY with silt, sandy silt and marl

Major lithologies:

a. SILTY CLAY occurs as thin to thick beds in Sections 1 and 2. The color is dark greenish gray (10Y 5/1), light reddish brown (2.5Y 6/4) and gray (5Y 5/1). In Section 1, dark greenish gray and light reddish brown alternate with each other. It is slightly bioturbated with green, dark gray and black mottling. It contains quartz, plagioclase and rock fragments.

b. CLAY occurs as thin beds in Section 3 and the core catcher. The color is greenish gray (5G 5/1) and dark greenish gray (10Y 5/1). Thick laminae (5-15 cm) of dark greenish gray and greenish gray clay alternate with each other in Section 3. The clay is slightly bioturbated with numerous small burrows.

Minor lithologies:

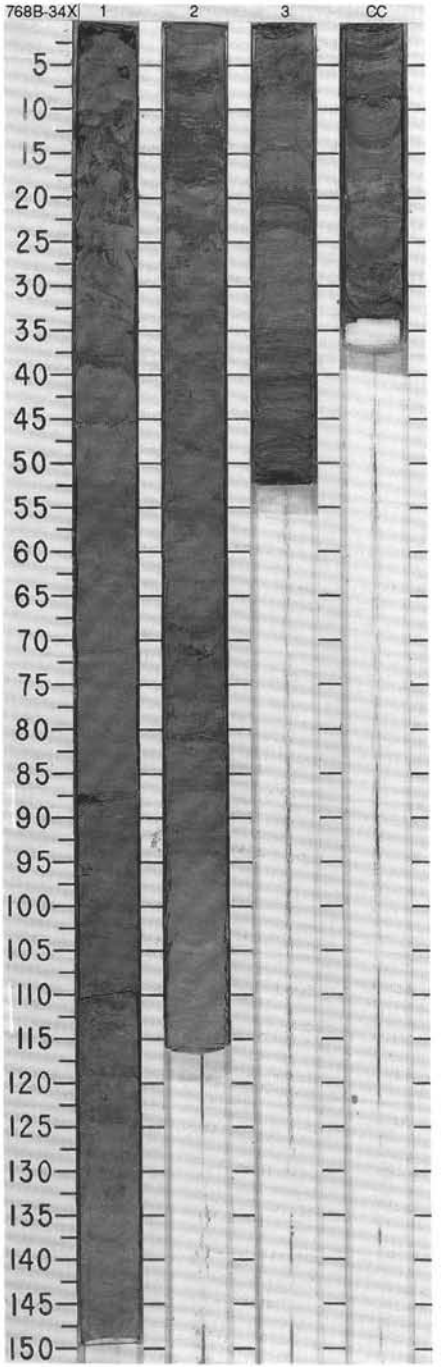
a. Silt and sandy silt occur as very thin to thin beds throughout the core. Sandy silt occurs in Section 3, 20-34 cm. The color is gray (5Y 5/1), dark gray (5Y 4/1) and dark greenish gray (10Y 5/1). The beds are laminated with sharp base. The mineral composition is quartz, rock fragment an feldspar.

b. Nannofossil marl occurs as a thin bed in Section 2. It is light olive gray (10Y 5/2), massive and slightly bioturbated at the top.

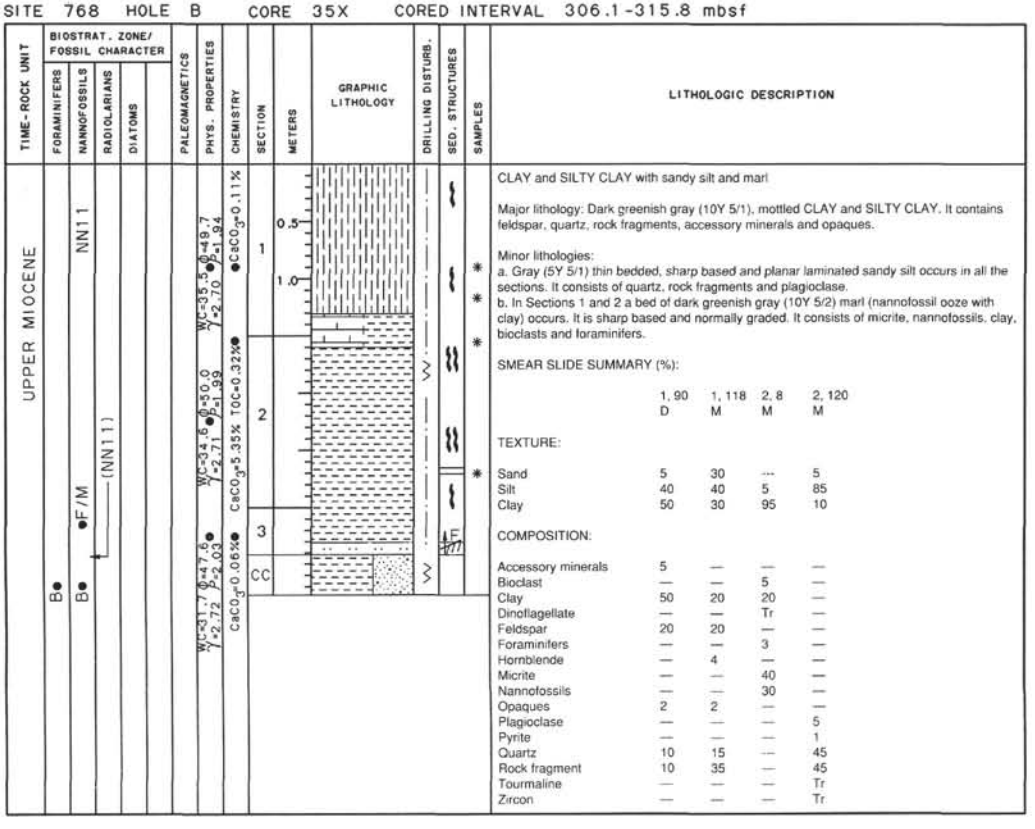
c. Calcareous clay occurs only occur in the core catcher, 18-20 cm. It is light gray (5Y 7/2).

SMEAR SLIDE SUMMARY (%):

	2, 38 D	2, 114 M	3, 44 M
TEXTURE:			
Sand	5	—	30
Silt	40	20	70
Clay	50	80	—
COMPOSITION:			
Accessory minerals	5	—	—
Clay	40	15	—
Feldspar	—	—	10
Nannofossils	—	75	—
Plagioclase	20	5	—
Quartz	20	2	65
Rock fragment	15	2	25



SITE 768 HOLE B CORE 35X CORED INTERVAL 306.1-315.8 mbsf



LITHOLOGIC DESCRIPTION

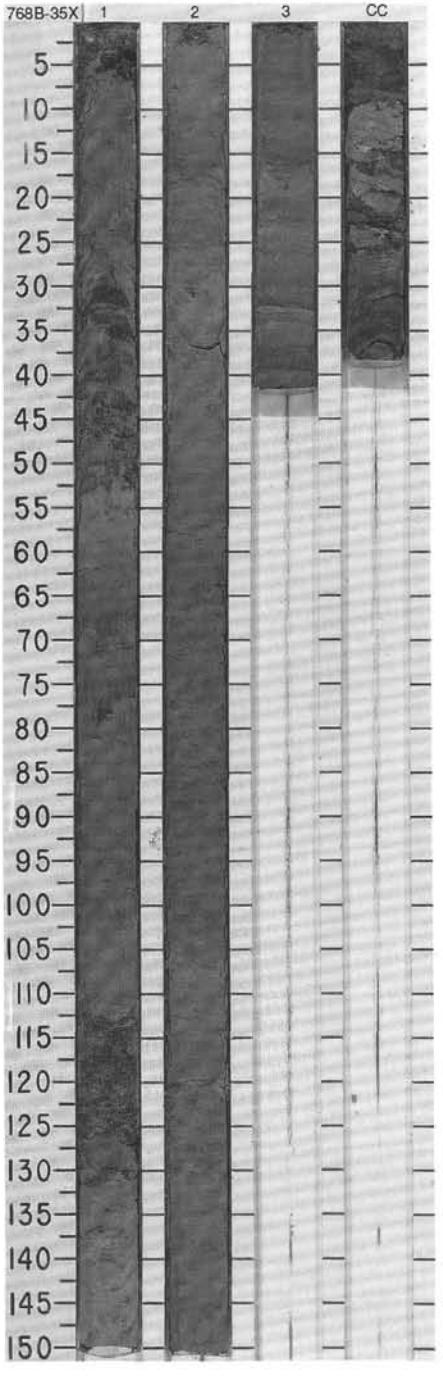
CLAY and SILTY CLAY with sandy silt and marl

Major lithology: Dark greenish gray (10Y 5/1), mottled CLAY and SILTY CLAY. It contains feldspar, quartz, rock fragments, accessory minerals and opaques.

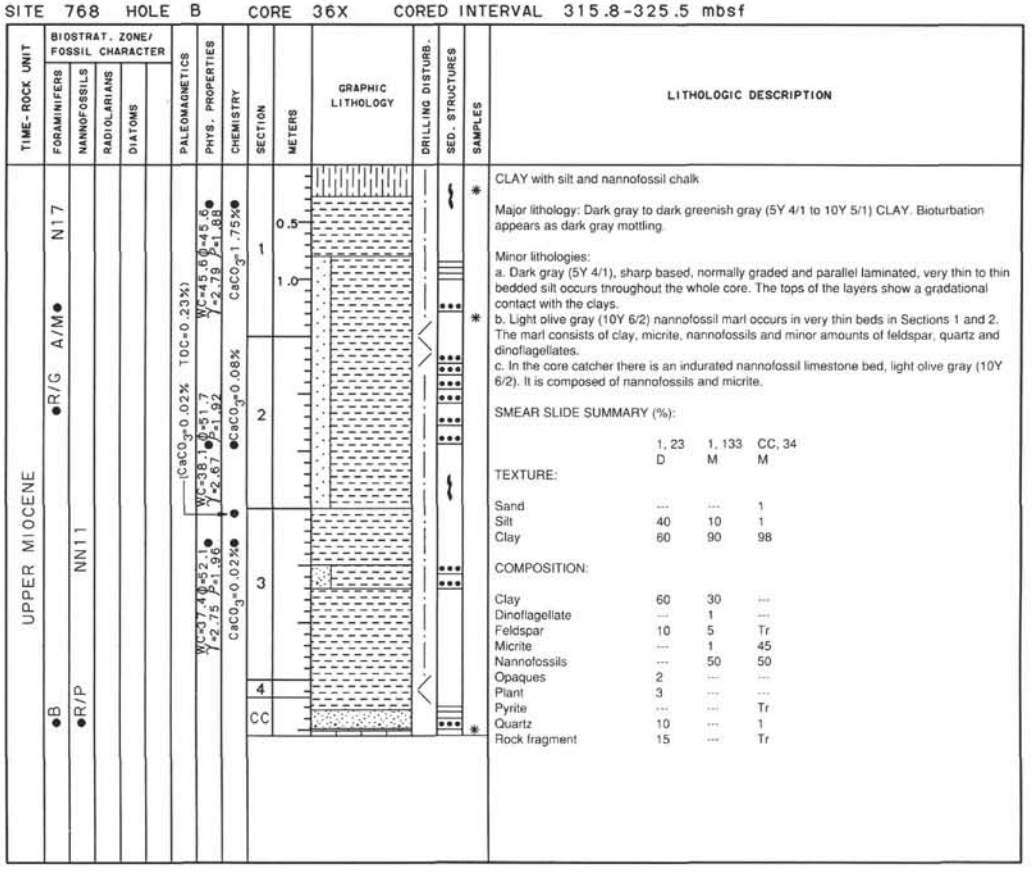
Minor lithologies:
a. Gray (5Y 5/1) thin bedded, sharp based and planar laminated sandy silt occurs in all the sections. It consists of quartz, rock fragments and plagioclase.
b. In Sections 1 and 2 a bed of dark greenish gray (10Y 5/2) marl (nannofossil ooze with clay) occurs. It is sharp based and normally graded. It consists of micrite, nannofossils, clay, bioclasts and foraminifers.

SMEAR SLIDE SUMMARY (%):

	1, 90 D	1, 118 M	2, 8 M	2, 120 M
TEXTURE:				
Sand	5	30	---	5
Silt	40	40	5	85
Clay	50	30	95	10
COMPOSITION:				
Accessory minerals	5	—	—	—
Bioclast	—	—	5	—
Clay	50	20	20	—
Dinoflagellate	—	—	Tr	—
Feldspar	20	20	—	—
Foraminifers	—	—	3	—
Hornblende	—	4	—	—
Micrite	—	—	40	—
Nannofossils	—	—	30	—
Opaques	2	2	—	—
Plagioclase	—	—	—	5
Pyrite	—	—	—	1
Quartz	10	15	—	45
Rock fragment	10	35	—	45
Tourmaline	—	—	—	Tr
Zircon	—	—	—	Tr



SITE 768 HOLE B CORE 36X CORED INTERVAL 315.8-325.5 mbsf



LITHOLOGIC DESCRIPTION

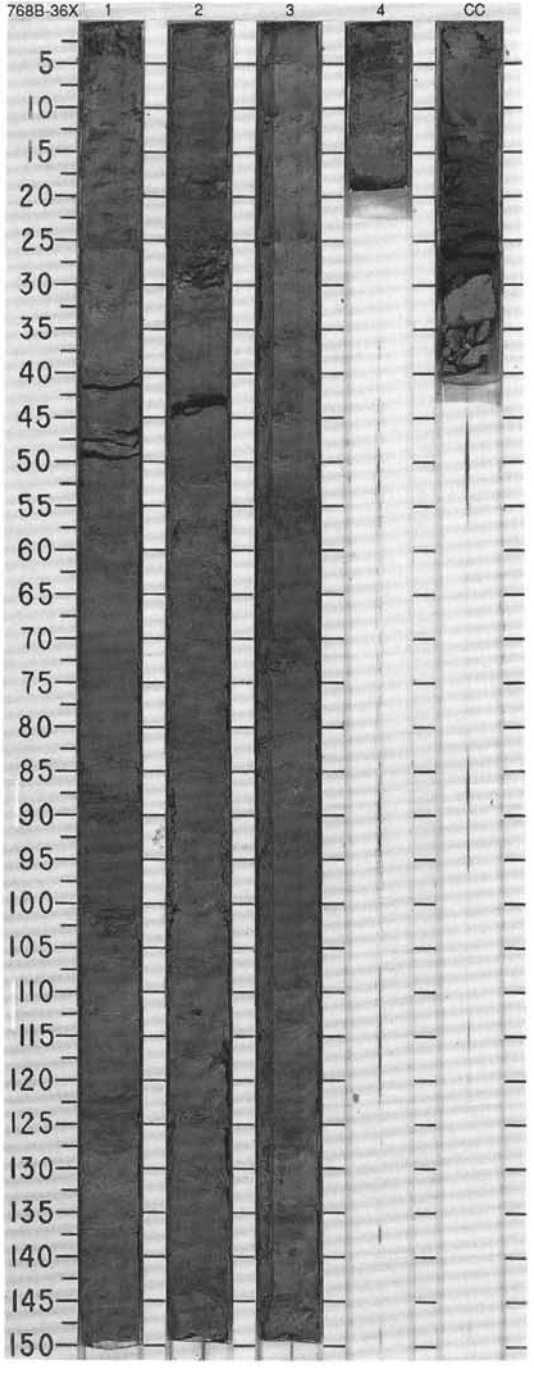
CLAY with silt and nannofossil chalk

Major lithology: Dark gray to dark greenish gray (5Y 4/1 to 10Y 5/1) CLAY. Bioturbation appears as dark gray mottling.

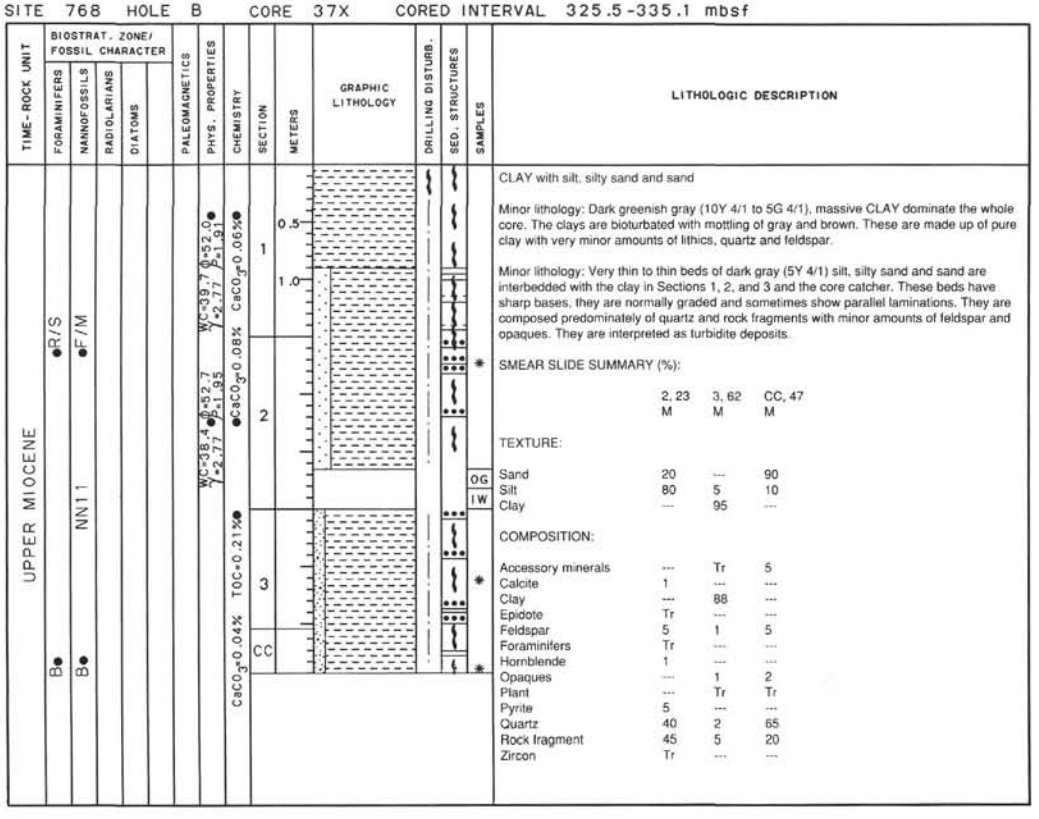
Minor lithologies:
a. Dark gray (5Y 4/1), sharp based, normally graded and parallel laminated, very thin to thin bedded silt occurs throughout the whole core. The tops of the layers show a gradational contact with the clays.
b. Light olive gray (10Y 6/2) nannofossil marl occurs in very thin beds in Sections 1 and 2. The marl consists of clay, micrite, nannofossils and minor amounts of feldspar, quartz and dinoflagellates.
c. In the core catcher there is an indurated nannofossil limestone bed, light olive gray (10Y 6/2). It is composed of nannofossils and micrite.

SMEAR SLIDE SUMMARY (%):

	1, 23 D	1, 133 M	CC, 34 M
TEXTURE:			
Sand	---	---	1
Silt	40	10	1
Clay	60	90	98
COMPOSITION:			
Clay	60	30	---
Dinoflagellate	---	1	---
Feldspar	10	5	Tr
Micrite	---	1	45
Nannofossils	---	50	50
Opaques	2	---	---
Plant	3	---	---
Pyrite	---	---	Tr
Quartz	10	---	1
Rock fragment	15	---	Tr



SITE 768 HOLE B CORE 37X CORED INTERVAL 325.5-335.1 mbsf



LITHOLOGIC DESCRIPTION

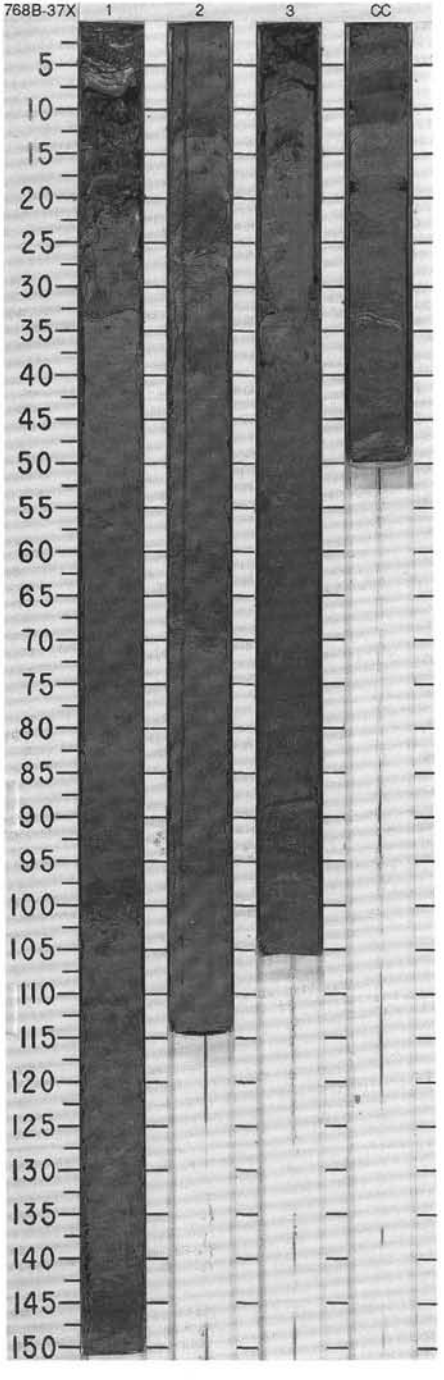
CLAY with silt, silty sand and sand

Minor lithology: Dark greenish gray (10Y 4/1 to 5G 4/1), massive CLAY dominate the whole core. The clays are bioturbated with mottling of gray and brown. These are made up of pure clay with very minor amounts of lithics, quartz and feldspar.

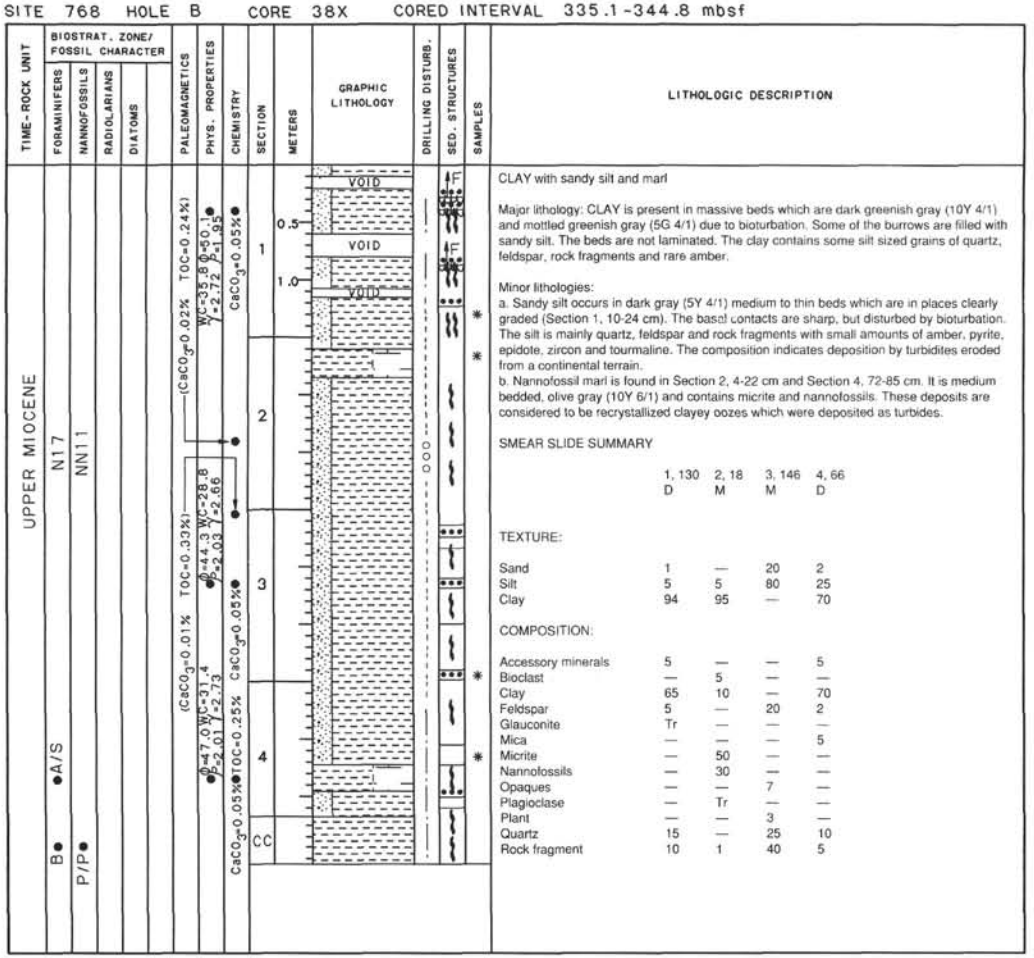
Minor lithology: Very thin to thin beds of dark gray (5Y 4/1) silt, silty sand and sand are interbedded with the clay in Sections 1, 2, and 3 and the core catcher. These beds have sharp bases, they are normally graded and sometimes show parallel laminations. They are composed predominately of quartz and rock fragments with minor amounts of feldspar and opaques. They are interpreted as turbidite deposits.

SMEAR SLIDE SUMMARY (%):

	2, 23 M	3, 62 M	CC, 47 M
TEXTURE:			
Sand	20	---	90
Silt	80	5	10
Clay	---	95	---
COMPOSITION:			
Accessory minerals	---	Tr	5
Calcite	1	---	---
Clay	---	88	---
Epidote	Tr	---	---
Feldspar	5	1	5
Foraminifers	Tr	---	---
Hornblende	1	---	---
Opaques	---	1	2
Plant	---	Tr	Tr
Pyrite	5	---	---
Quartz	40	2	65
Rock fragment	45	5	20
Zircon	Tr	---	---



SITE 768 HOLE B CORE 38X CORED INTERVAL 335.1-344.8 mbsf



LITHOLOGIC DESCRIPTION

CLAY with sandy silt and marl

Major lithology: CLAY is present in massive beds which are dark greenish gray (10Y 4/1) and mottled greenish gray (5G 4/1) due to bioturbation. Some of the burrows are filled with sandy silt. The beds are not laminated. The clay contains some silt sized grains of quartz, feldspar, rock fragments and rare amber.

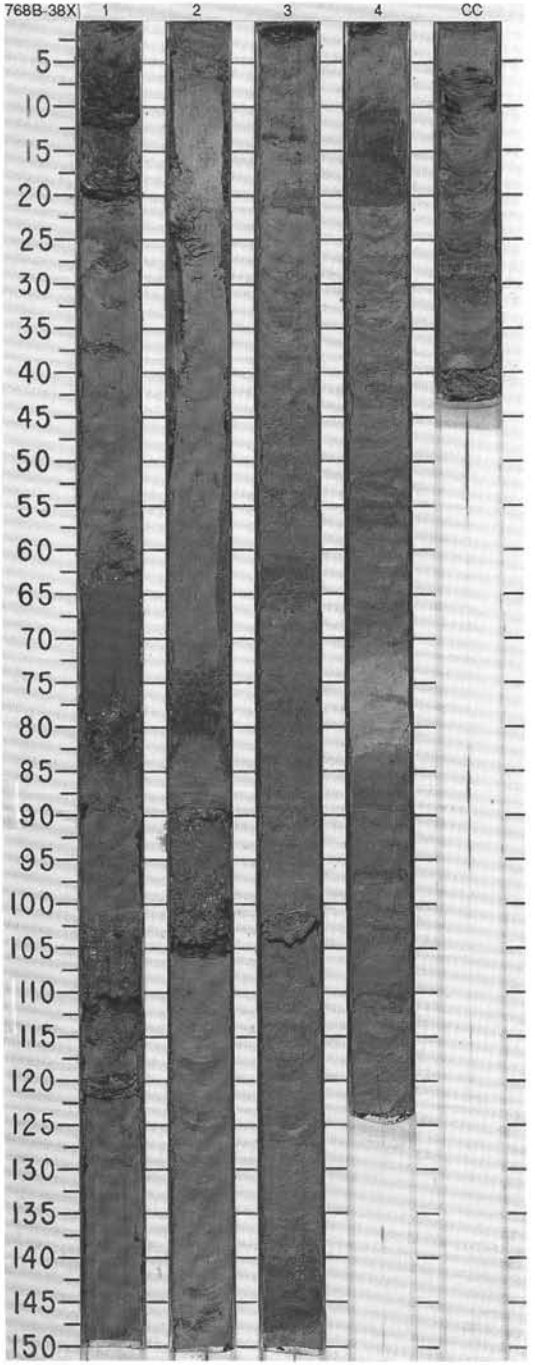
Minor lithologies:

a. Sandy silt occurs in dark gray (5Y 4/1) medium to thin beds which are in places clearly graded (Section 1, 10-24 cm). The basal contacts are sharp, but disturbed by bioturbation. The silt is mainly quartz, feldspar and rock fragments with small amounts of amber, pyrite, epidote, zircon and tourmaline. The composition indicates deposition by turbidites eroded from a continental terrain.

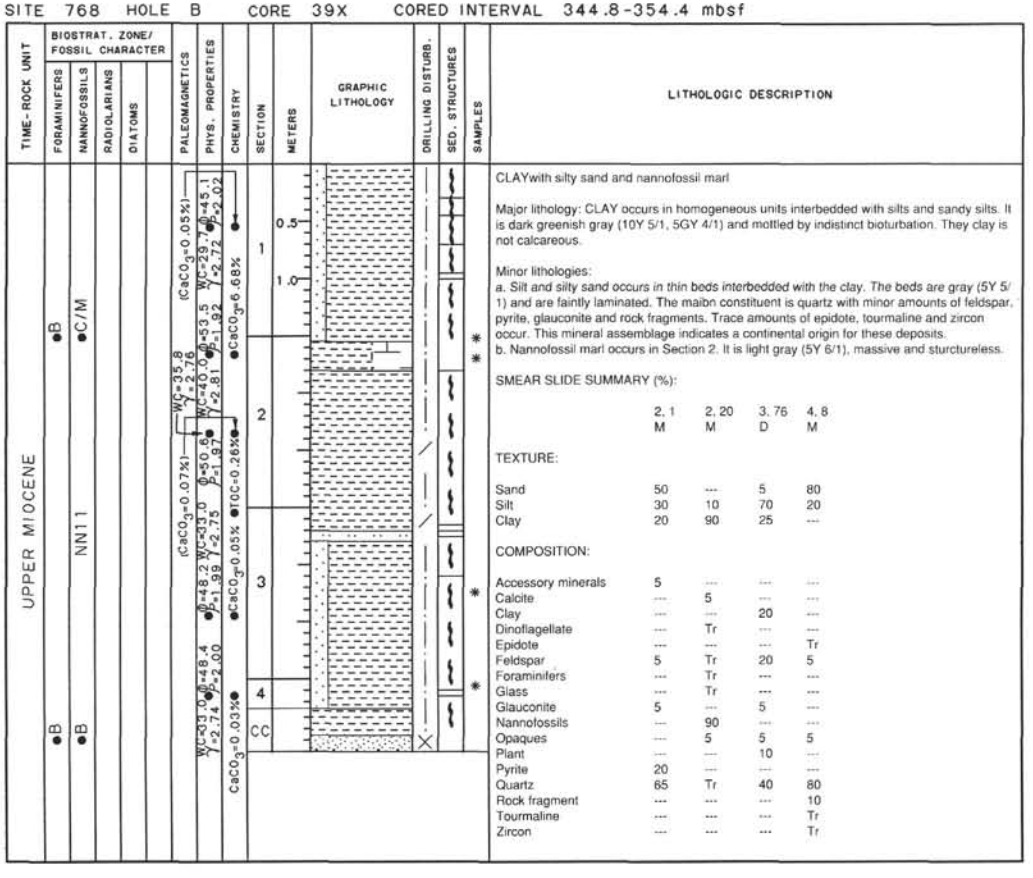
b. Nannofossil marl is found in Section 2, 4-22 cm and Section 4, 72-85 cm. It is medium bedded, olive gray (10Y 6/1) and contains micrite and nannofossils. These deposits are considered to be recrystallized clayey oozes which were deposited as turbides.

SMEAR SLIDE SUMMARY

	1, 130 D	2, 18 M	3, 146 M	4, 66 D
TEXTURE:				
Sand	1	—	20	2
Silt	5	5	80	25
Clay	94	95	—	70
COMPOSITION:				
Accessory minerals	5	—	—	5
Bioclast	—	5	—	—
Clay	65	10	—	70
Feldspar	5	—	20	2
Glauconite	Tr	—	—	—
Mica	—	—	—	5
Micrite	—	50	—	—
Nannofossils	—	30	—	—
Opaques	—	—	7	—
Plagioclase	—	Tr	—	—
Plant	—	—	3	—
Quartz	15	—	25	10
Rock fragment	10	1	40	5



SITE 768 HOLE B CORE 39X CORED INTERVAL 344.8-354.4 mbsf



LITHOLOGIC DESCRIPTION

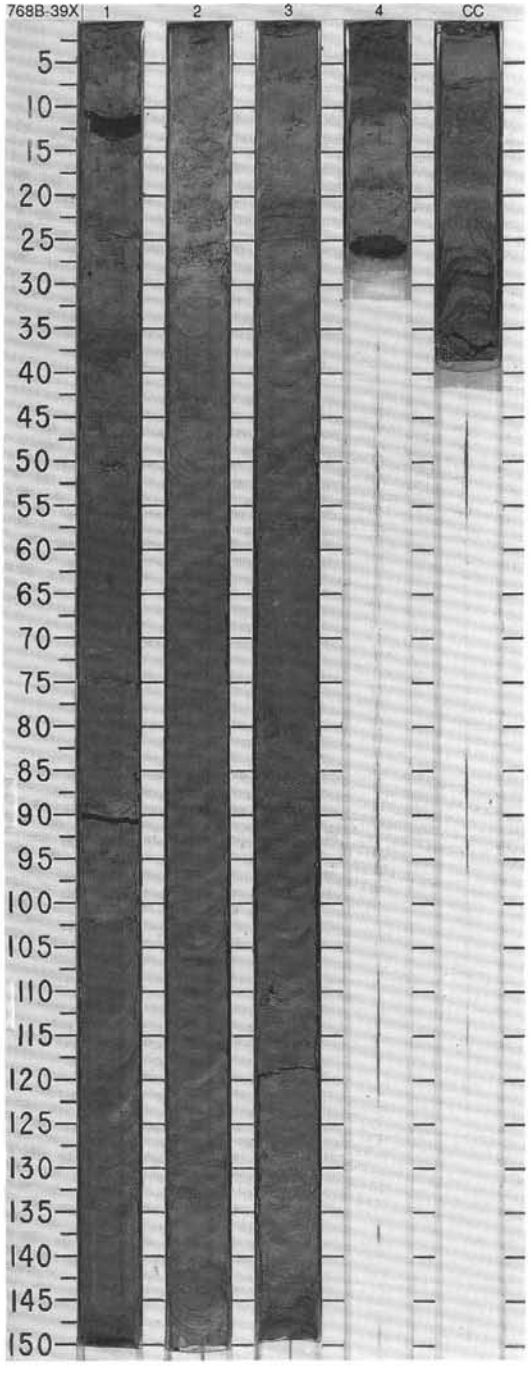
CLAYwith silty sand and nannofossil marl

Major lithology: CLAY occurs in homogeneous units interbedded with silts and sandy silts. It is dark greenish gray (10Y 5/1, 5GY 4/1) and mottled by indistinct bioturbation. They clay is not calcareous.

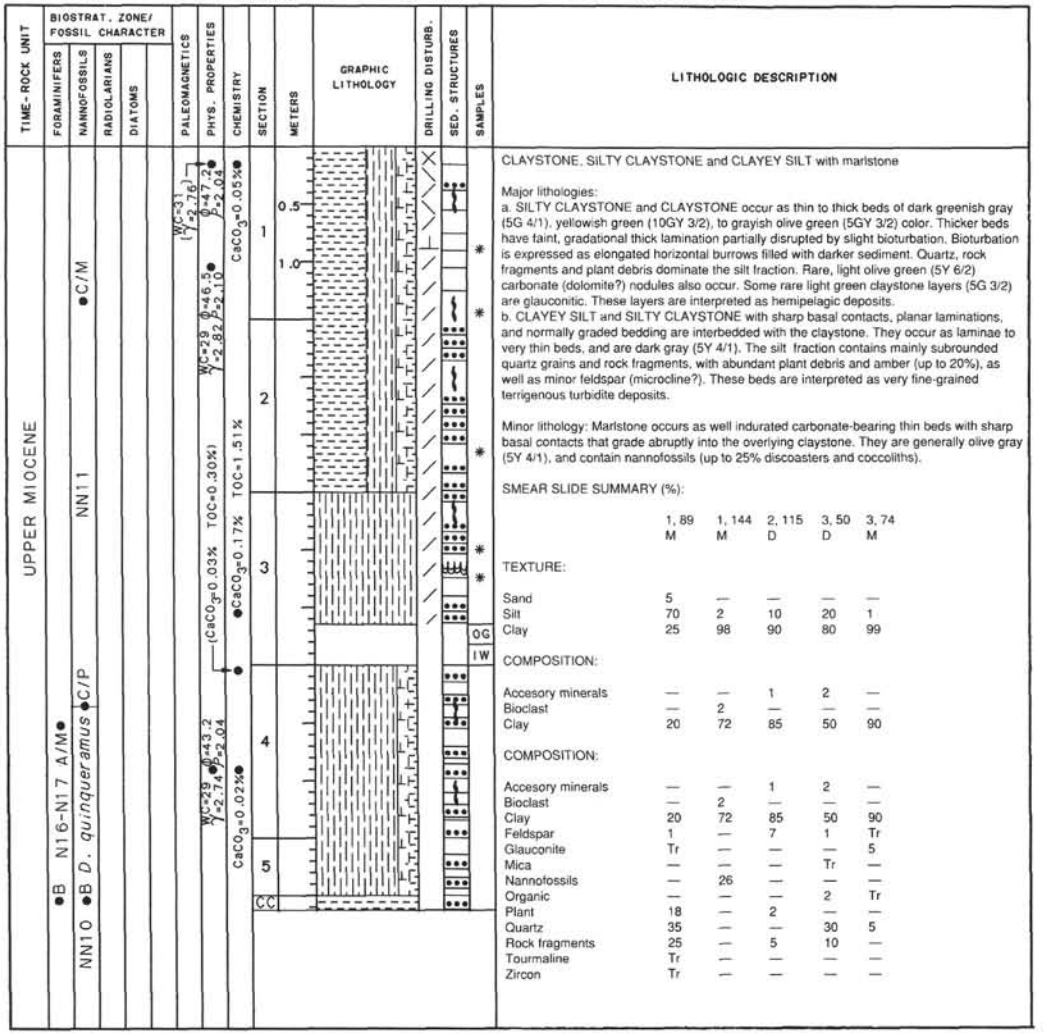
Minor lithologies:
a. Silt and silty sand occurs in thin beds interbedded with the clay. The beds are gray (5Y 5/1) and are faintly laminated. The maibn constituent is quartz with minor amounts of feldspar, pyrite, glauconite and rock fragments. Trace amounts of epidote, tourmaline and zircon occur. This mineral assemblage indicates a continental origin for these deposits.
b. Nannofossil marl occurs in Section 2. It is light gray (5Y 6/1), massive and sturctureless.

SMEAR SLIDE SUMMARY (%):

	2, 1 M	2, 20 M	3, 76 D	4, 8 M
TEXTURE:				
Sand	50	---	5	80
Silt	30	10	70	20
Clay	20	90	25	---
COMPOSITION:				
Accessory minerals	5	---	---	---
Calcite	---	5	---	---
Clay	---	---	20	---
Dinoflagellate	---	Tr	---	---
Epidote	---	---	---	Tr
Feldspar	5	Tr	20	5
Foraminifers	---	Tr	---	---
Glass	---	Tr	---	---
Glauconite	5	---	5	---
Nannofossils	---	90	---	---
Opaques	---	5	5	5
Plant	---	---	10	---
Pyrite	20	---	---	---
Quartz	65	Tr	40	80
Rock fragment	---	---	---	10
Tourmaline	---	---	---	Tr
Zircon	---	---	---	Tr



SITE 768 HOLE C CORE 1R CORED INTERVAL 353.2-362.9 mbsf



LITHOLOGIC DESCRIPTION

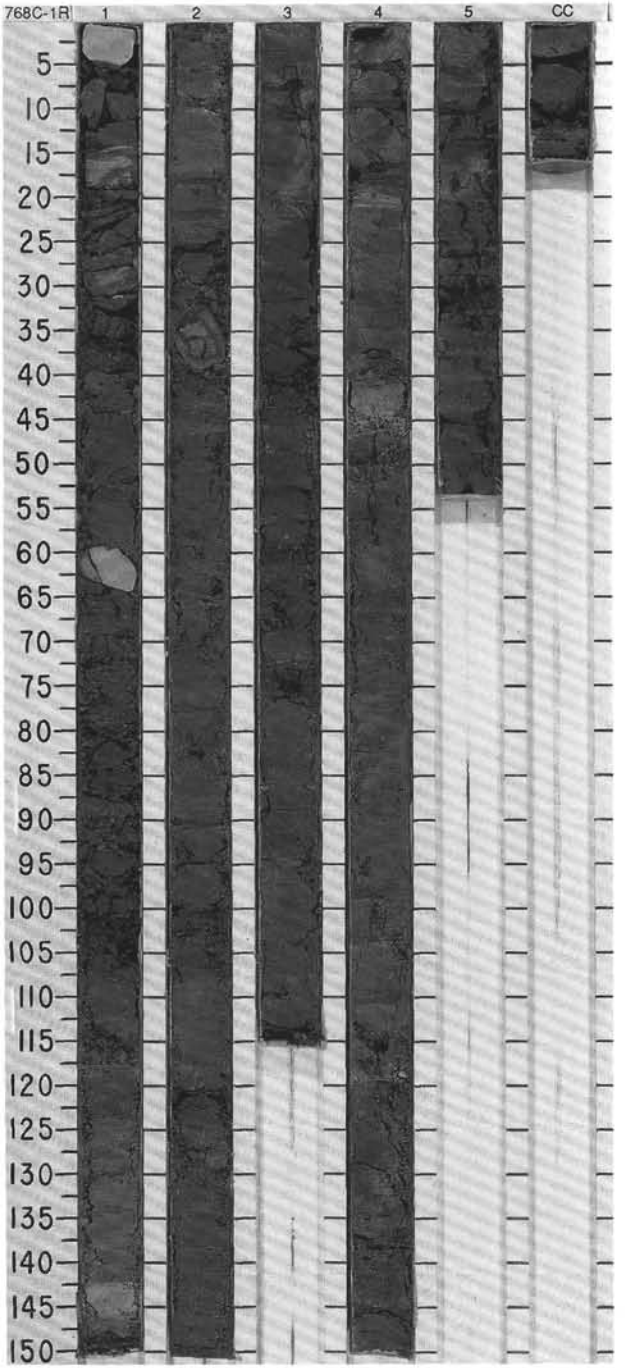
CLAYSTONE, SILTY CLAYSTONE and CLAYEY SILT with marlstone

Major lithologies:
a. SILTY CLAYSTONE and CLAYSTONE occur as thin to thick beds of dark greenish gray (5G 4/1), yellowish green (10GY 3/2), to grayish olive green (5GY 3/2) color. Thicker beds have faint, gradational thick lamination partially disrupted by slight bioturbation. Bioturbation is expressed as elongated horizontal burrows filled with darker sediment. Quartz, rock fragments and plant debris dominate the silt fraction. Rare, light olive green (5Y 6/2) carbonate (dolomite?) nodules also occur. Some rare light green claystone layers (5G 3/2) are glauconitic. These layers are interpreted as hemipelagic deposits.
b. CLAYEY SILT and SILTY CLAYSTONE with sharp basal contacts, planar laminations, and normally graded bedding are interbedded with the claystone. They occur as laminae to very thin beds, and are dark gray (5Y 4/1). The silt fraction contains mainly subrounded quartz grains and rock fragments, with abundant plant debris and amber (up to 20%), as well as minor feldspar (microcline?). These beds are interpreted as very fine-grained terrigenous turbidite deposits.

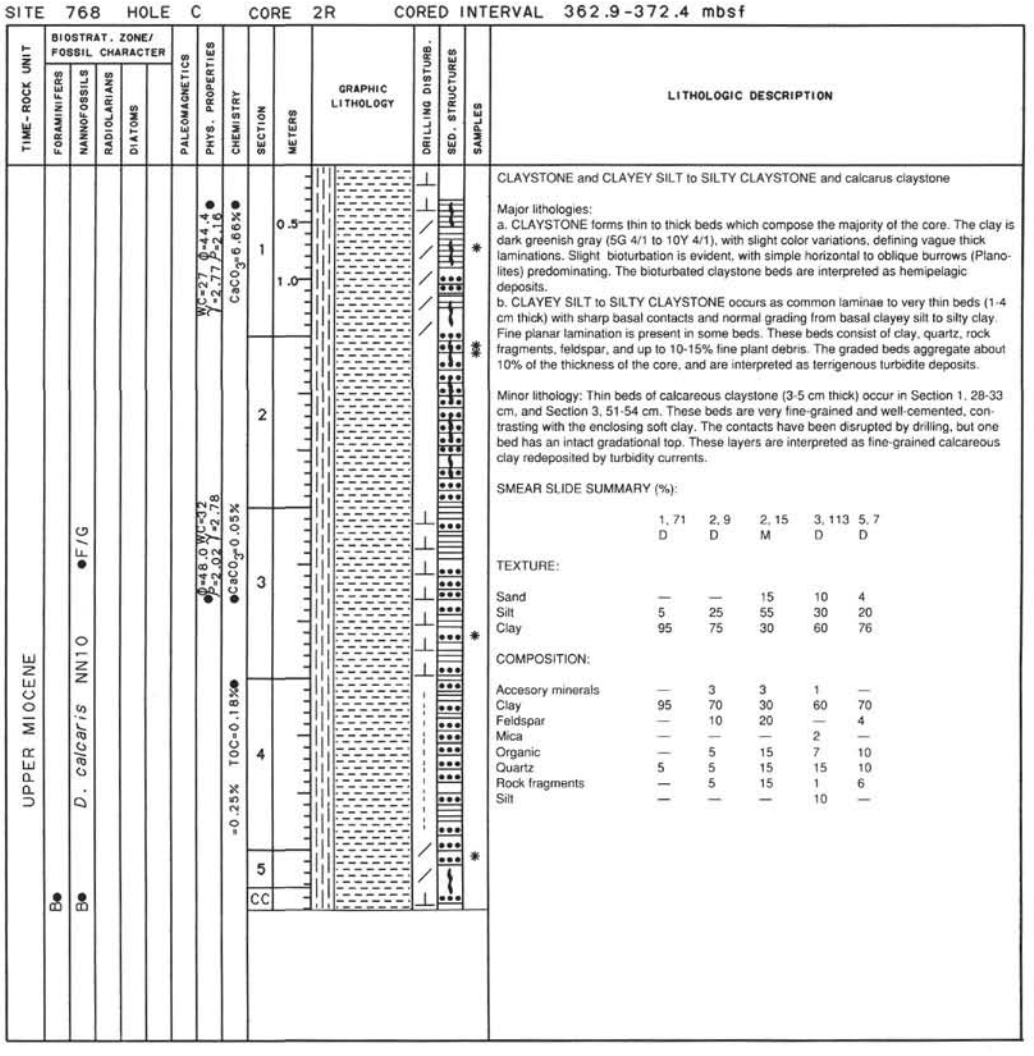
Minor lithology: Marlstone occurs as well indurated carbonate-bearing thin beds with sharp basal contacts that grade abruptly into the overlying claystone. They are generally olive gray (5Y 4/1), and contain nannofossils (up to 25% discoasters and coccoliths).

SMEAR SLIDE SUMMARY (%):

	1, 89 M	1, 144 M	2, 115 D	3, 50 D	3, 74 M
TEXTURE:					
Sand	5	—	—	—	—
Silt	70	2	10	20	1
Clay	25	98	90	80	99
COMPOSITION:					
Accesory minerals	—	—	1	2	—
Bioclast	—	2	—	—	—
Clay	20	72	85	50	90
COMPOSITION:					
Accesory minerals	—	—	1	2	—
Bioclast	—	2	—	—	—
Clay	20	72	85	50	90
Feldspar	1	—	7	1	Tr
Glauconite	Tr	—	—	—	5
Mica	—	—	—	Tr	—
Nannofossils	—	26	—	—	—
Organic	—	—	—	2	Tr
Plant	18	—	2	—	—
Quartz	35	—	—	30	5
Rock fragments	25	—	5	10	—
Tourmaline	Tr	—	—	—	—
Zircon	Tr	—	—	—	—



SITE 768 HOLE C CORE 2R CORED INTERVAL 362.9-372.4 mbsf



CLAYSTONE and CLAYEY SILT to SILTY CLAYSTONE and calcarus claystone

Major lithologies:

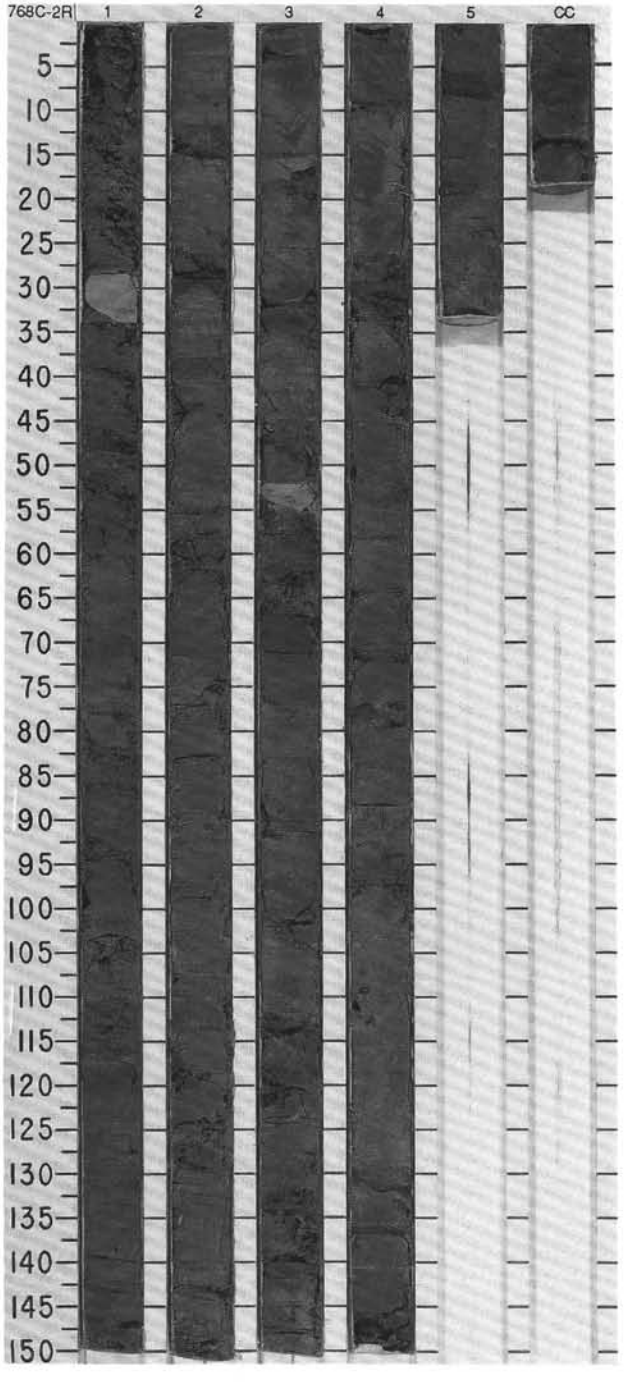
a. CLAYSTONE forms thin to thick beds which compose the majority of the core. The clay is dark greenish gray (5G 4/1 to 10Y 4/1), with slight color variations, defining vague thick laminations. Slight bioturbation is evident, with simple horizontal to oblique burrows (Planolites) predominating. The bioturbated claystone beds are interpreted as hemipelagic deposits.

b. CLAYEY SILT to SILTY CLAYSTONE occurs as common laminae to very thin beds (1-4 cm thick) with sharp basal contacts and normal grading from basal clayey silt to silty clay. Fine planar lamination is present in some beds. These beds consist of clay, quartz, rock fragments, feldspar, and up to 10-15% fine plant debris. The graded beds aggregate about 10% of the thickness of the core, and are interpreted as terrigenous turbidite deposits.

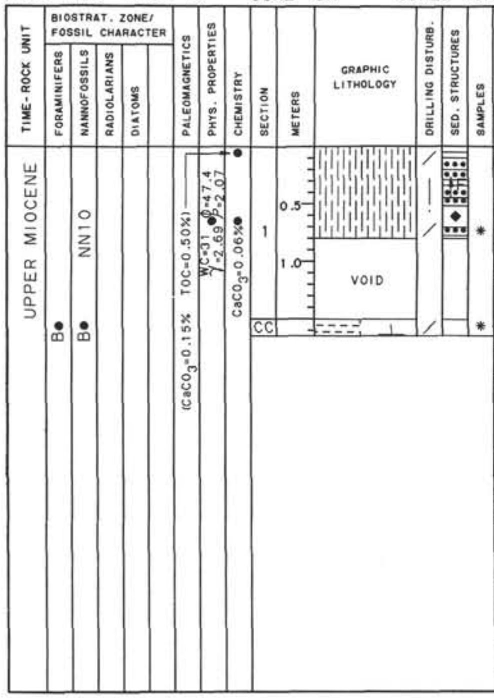
Minor lithology: Thin beds of calcareous claystone (3-5 cm thick) occur in Section 1, 28-33 cm, and Section 3, 51-54 cm. These beds are very fine-grained and well-cemented, contrasting with the enclosing soft clay. The contacts have been disrupted by drilling, but one bed has an intact gradational top. These layers are interpreted as fine-grained calcareous clay redeposited by turbidity currents.

SMEAR SLIDE SUMMARY (%):

	1, 71 D	2, 9 D	2, 15 M	3, 113 D	5, 7 D
TEXTURE:					
Sand	—	—	15	10	4
Silt	5	25	55	30	20
Clay	95	75	30	60	76
COMPOSITION:					
Accesory minerals	—	3	3	1	—
Clay	95	70	30	60	70
Feldspar	—	10	20	—	4
Mica	—	—	—	2	—
Organic	—	5	15	7	10
Quartz	5	5	15	15	10
Rock fragments	—	5	15	1	6
Silt	—	—	—	10	—



SITE 768 HOLE C CORE 3R CORED INTERVAL 372.4-382.1 mbsf



LITHOLOGIC DESCRIPTION

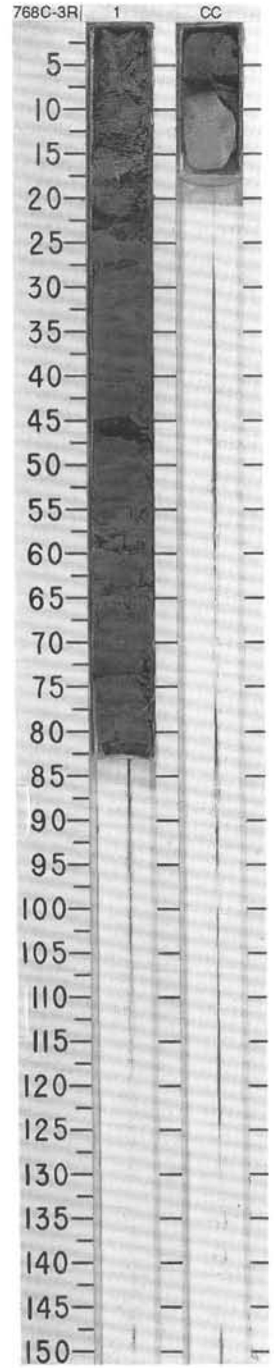
CLAYEY SILT and SILTY CLAYSTONE with recrystallized marl

Major lithologies: Dominantly CLAYEY SILT and SILTY CLAYSTONE in thin to very thin beds of dark greenish gray color (10Y 4/1) containing thin laminae of more light green material. Clayey silt beds have a sharp base of coarser sediment that grades upwards into finer clays. Both lithologies contain abundant quartz and rock fragments with plant debris (reaching 0.5 mm) occurring in the coarser material. There is one thick sandy silt lamina in Section 1, 72-73 cm. Small carbonate (dolomite?) nodules are present, as well as very small pyrite nodules.

Minor lithology: A single bed of recrystallized marl containing 50% clay and 45% microsparite occurs in the core catcher. It is light greenish gray (10Y 6/1). Drilling disturbance precludes any interpretation of the basal contact.

SMEAR SLIDE SUMMARY (%):

	1, 72 M	CC, 6 M
TEXTURE:		
Sand	40	5
Silt	45	20
Clay	15	70
COMPOSITION:		
Clay	10	50
Feldspar	10	—
Glauconite	Tr	—
Micsparite	—	45
Organic	10	1
Quartz	40	—
Rock fragments	30	—



SITE 768 HOLE C CORE 4R CORED INTERVAL 382.1-391.8 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
UPPER MIOCENE	B●	B●				●=44.3 WC=28 ●=2.07 ϒ=2.75	$CaCO_3$=0.06% TOC=0.28% ●$CaCO_3$=0.04%	1, 2, CC	0.5, 1.0				IW

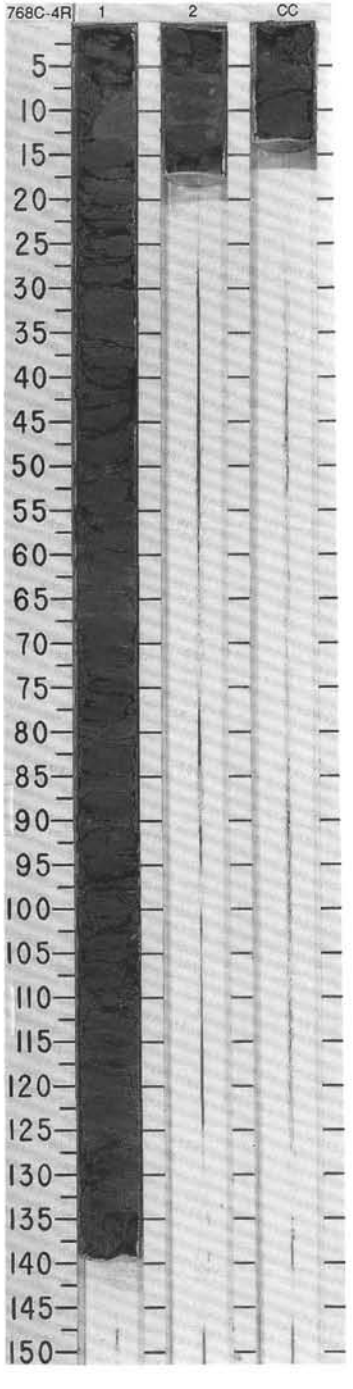
LITHOLOGIC DESCRIPTION

CLAYSTONE and CLAYEY SILT to SILTY CLAYSTONE

Major lithologies:
a. CLAYSTONE occurs in thin to medium beds with faint color laminations and common small horizontal burrows (Planolites). The color is primarily dark greenish gray (5G 4/1).
b. CLAYEY SILT and SILTY CLAY contain very abundant quartz of silt size. It is present in interbeds 1-3 cm thick with sharp basal contact and graded bedding. Thicker beds show planar laminations accentuated by concentration of plant fragments (Section 1) or rare cross bedding (Core catcher).

SMEAR SLIDE SUMMARY (%):

	1, 58 M
TEXTURE:	
Sand	10
Silt	50
Clay	40
COMPOSITION:	
Clay	40
Epidote	Tr
Feldspar	2
Glauconite	2
Plant	10
Quartz	40
Rock fragment	5
Zircon	Tr



SITE 768 HOLE C CORE 5R CORED INTERVAL 391.8-401.4 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
MIDDLE MIOCENE	●R/S	*D. hamatus* NN9 F/G●			($CaCO_3$=0.04% TOC=0.54%)	●Φ=45.6 WC=29 ρ=2.06 γ=2.73	●$CaCO_3$=0.04%	3					
						●Φ=45.9 WC=29.7 ρ=2.05 γ=2.78	●$CaCO_3$=0.08%	2					
						●Φ=48.1 WC=33 ρ=1.99 γ=2.76	●$CaCO_3$=0.08%	1	0.5 / 1.0			OG	
								4					
								CC					

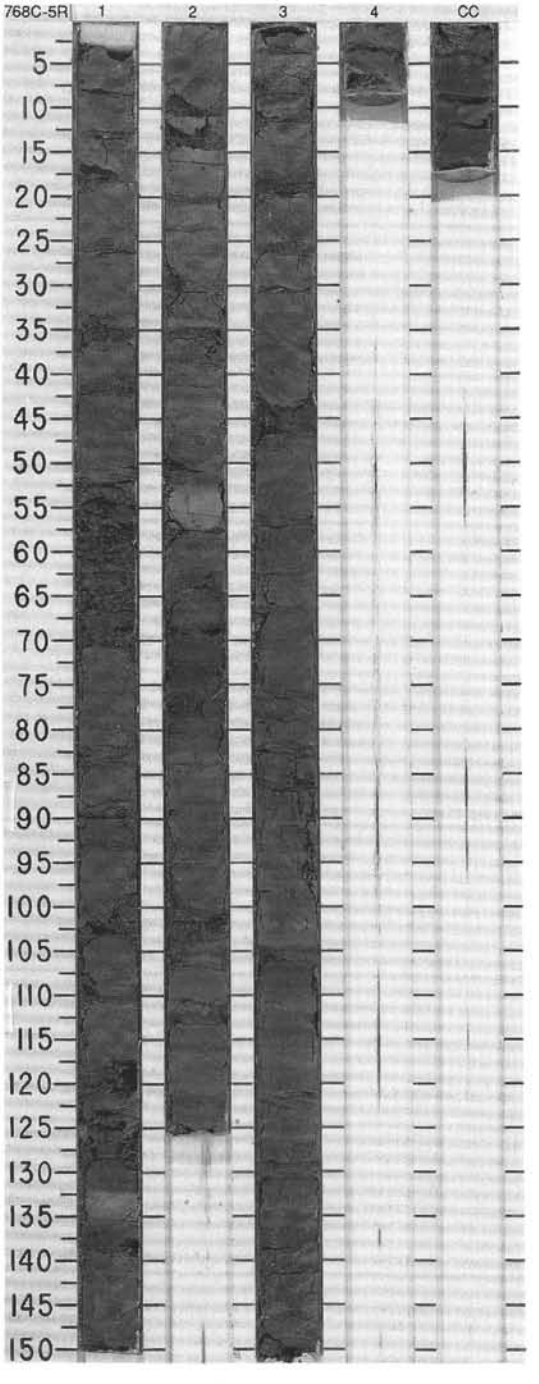
LITHOLOGIC DESCRIPTION

CLAYSTONE and SILTY CLAYSTONE to CLAYEY SILT

Major lithologies:
a. CLAYSTONE occurs in thin to thick, dark greenish gray (10Y 4/1) beds with thick color laminations and common horizontal simple burrows. It commonly contains micronodules of pyrite or chalcopyrite. These deposits are interpreted as hemipelagic in origin.
b. SILTY CLAYSTONE to CLAYEY SILT appears in beds 1-4 cm thick with sharp bases, common planar lamination, and abundant black plant debris. These beds are interpreted as fine-grained turbidite deposits. They are less cohesive than the claystone and probably tend to wash out; the original beds could be thicker than the recovery would suggest.

SMEAR SLIDE SUMMARY (%):

	3, 57 D
TEXTURE:	
Sand	1
Silt	20
Clay	75
COMPOSITION:	
Accesory minerals	2
Clay	75
Glauconite	2
Organic matter	1
Quartz	5
Silt	10



SITE 768 HOLE C CORE 6R CORED INTERVAL 401.4-411.1 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
MIDDLE MIOCENE	B	NN9	B		($CaCO_3$=0.04% TOC=0.41%)	WC=33 Φ=49.3 γ=2.70 P=2.05	$CaCO_3$=0.06%	1	0.5 1.0				*
						(TOC=0.61%)	$CaCO_3$=0.04%	2					
						WC=37 Φ=52.7 γ=2.80 P=2.00	$CaCO_3$=0.03%	3					*
								CC					

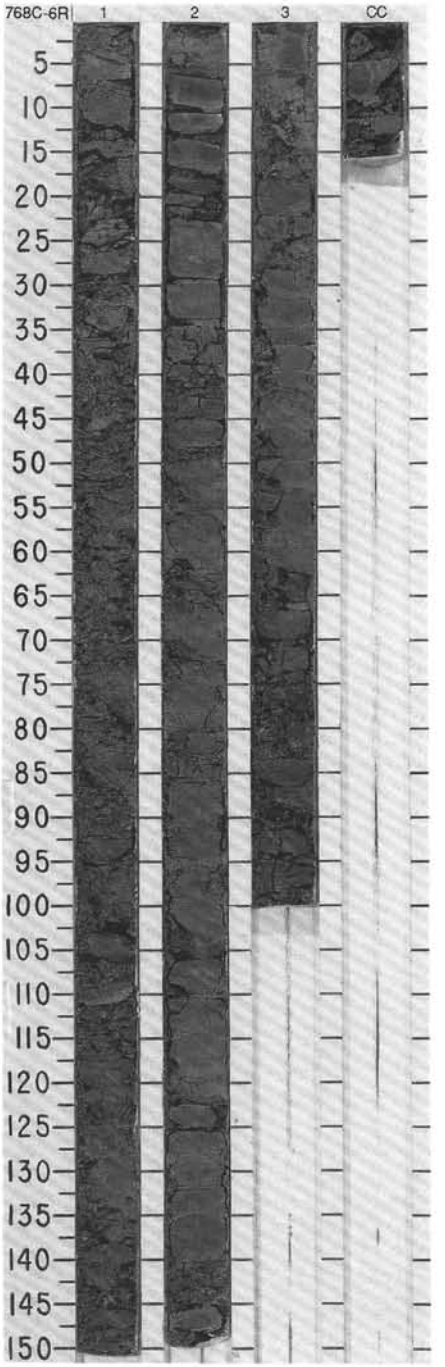
LITHOLOGIC DESCRIPTION

CLAYSTONE and CLAYEY SILT to SILTY CLAYSTONE

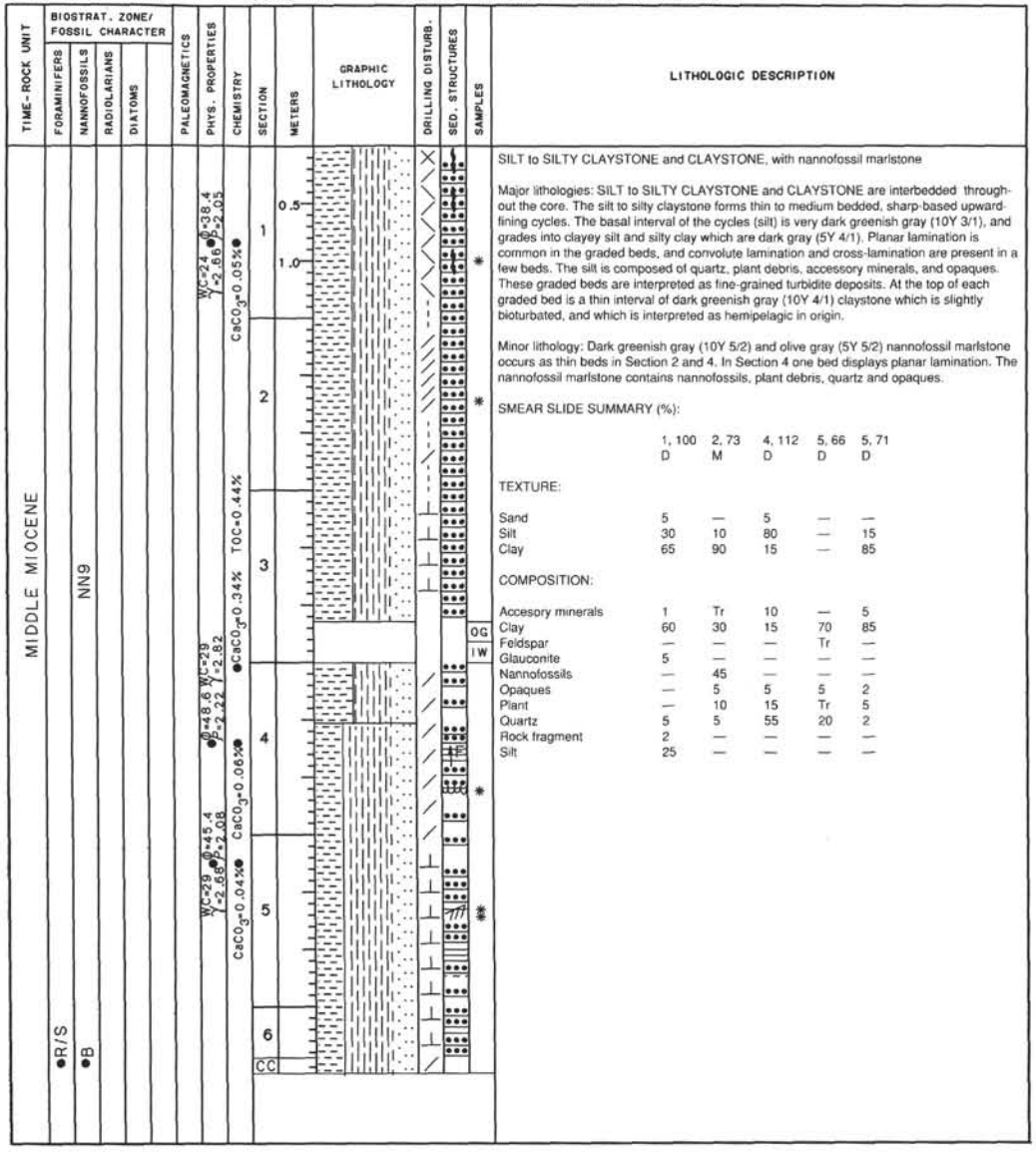
Major lithologies:
a. CLAYSTONE occurs in thin to medium beds with poorly defined thick laminae and simple flattened horizontal burrows. The claystone is dark greenish gray (10Y 4/1) to dark grayish green (10GY 4/1), and is interpreted as hemipelagic in origin.
b. CLAYEY SILT to SILTY CLAYSTONE beds are very thin with sharp basal contacts and gradational tops, grading from clayey silt at the base upward to silty claystone. The silt component of these beds is primarily quartz, rock fragments, and plant debris. The graded beds are dark greenish gray (10Y 4/1), and are interpreted as turbidite deposits.

SMEAR SLIDE SUMMARY (%):

	1, 76 M	3, 46 D
TEXTURE:		
Sand	10	—
Silt	50	20
Clay	40	80
COMPOSITION:		
Accesory minerals	—	Tr
Clay	40	80
Epidote	Tr	—
Glauconite	3	Tr
Opaques	—	2
Organic matter	—	3
Plant	15	—
Quartz	20	15
Rock fragment	20	—



SITE 768 HOLE C CORE 7R CORED INTERVAL 411.1-420.7 mbsf



LITHOLOGIC DESCRIPTION

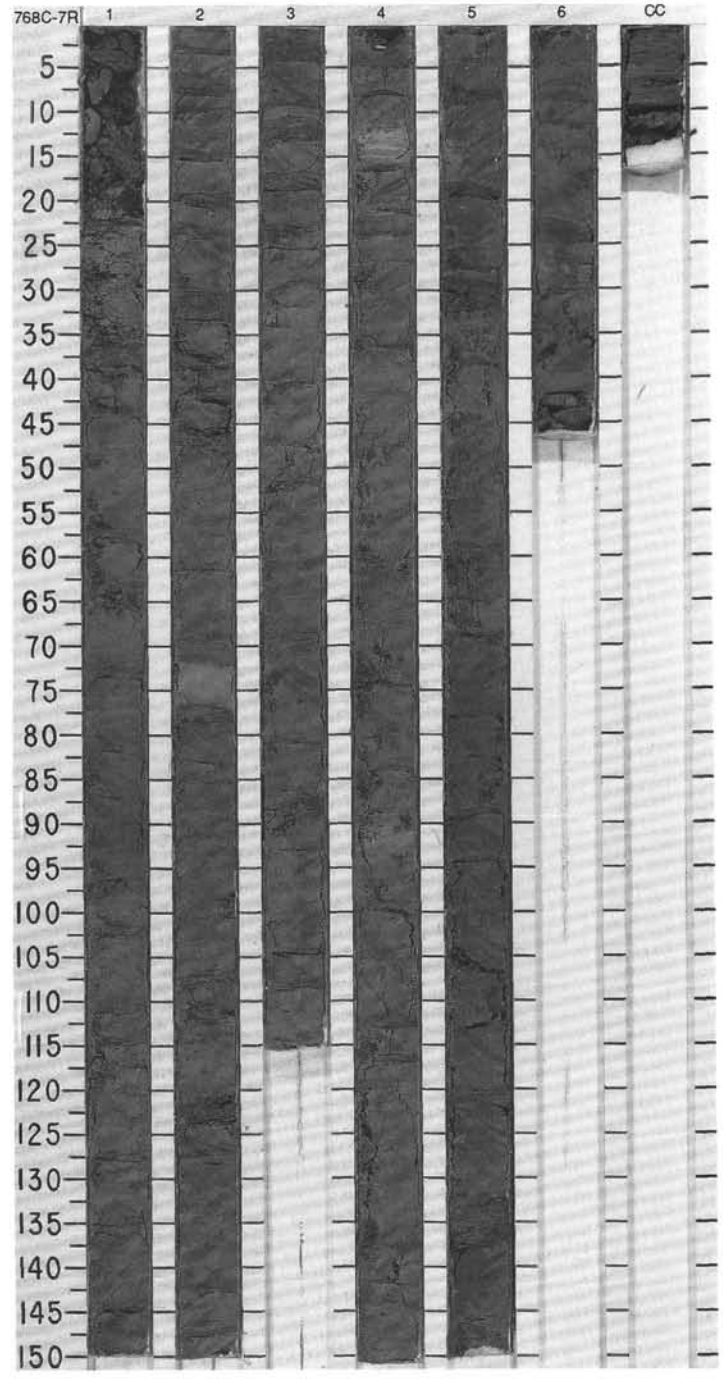
SILT to SILTY CLAYSTONE and CLAYSTONE, with nannofossil marlstone

Major lithologies: SILT to SILTY CLAYSTONE and CLAYSTONE are interbedded throughout the core. The silt to silty claystone forms thin to medium bedded, sharp-based upward-fining cycles. The basal interval of the cycles (silt) is very dark greenish gray (10Y 3/1), and grades into clayey silt and silty clay which are dark gray (5Y 4/1). Planar lamination is common in the graded beds, and convolute lamination and cross-lamination are present in a few beds. The silt is composed of quartz, plant debris, accessory minerals, and opaques. These graded beds are interpreted as fine-grained turbidite deposits. At the top of each graded bed is a thin interval of dark greenish gray (10Y 4/1) claystone which is slightly bioturbated, and which is interpreted as hemipelagic in origin.

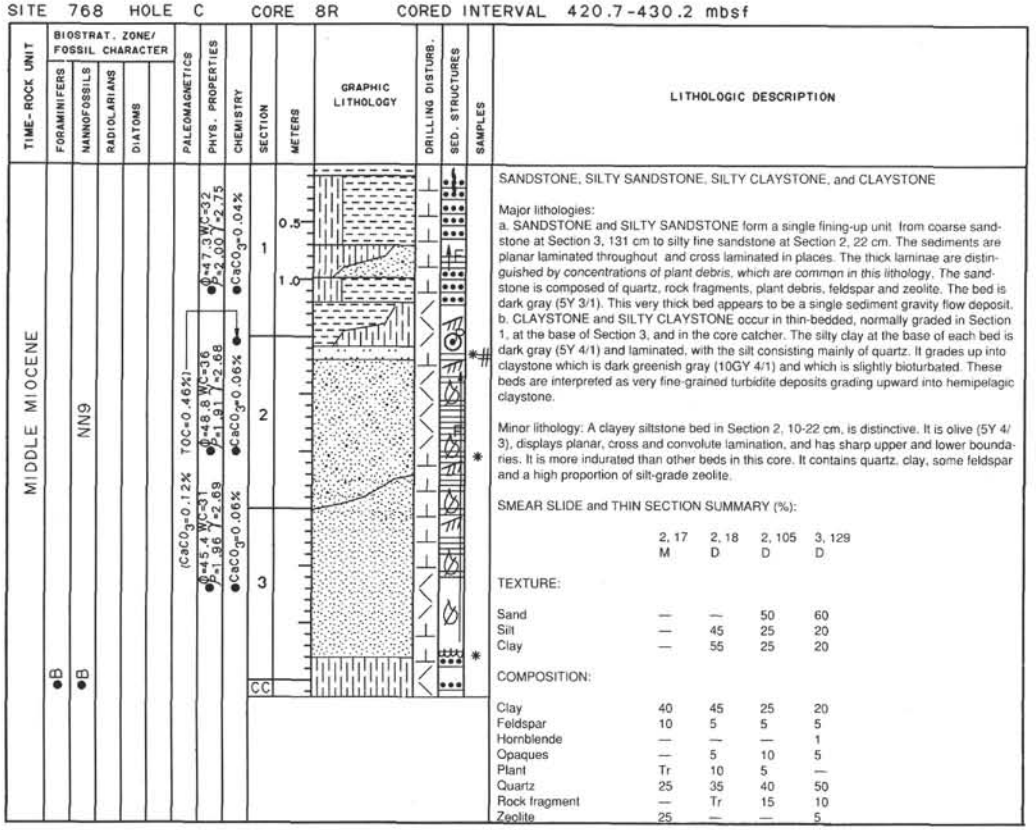
Minor lithology: Dark greenish gray (10Y 5/2) and olive gray (5Y 5/2) nannofossil marlstone occurs as thin beds in Section 2 and 4. In Section 4 one bed displays planar lamination. The nannofossil marlstone contains nannofossils, plant debris, quartz and opaques.

SMEAR SLIDE SUMMARY (%):

	1, 100 D	2, 73 M	4, 112 D	5, 66 D	5, 71 D
TEXTURE:					
Sand	5	—	5	—	—
Silt	30	10	80	—	15
Clay	65	90	15	—	85
COMPOSITION:					
Accesory minerals	1	Tr	10	—	5
Clay	60	30	15	70	85
Feldspar	—	—	—	Tr	—
Glauconite	5	—	—	—	—
Nannofossils	—	45	—	—	—
Opaques	—	5	5	5	2
Plant	—	10	15	Tr	5
Quartz	5	5	55	20	2
Rock fragment	2	—	—	—	—
Silt	25	—	—	—	—



SITE 768 HOLE C CORE 8R CORED INTERVAL 420.7-430.2 mbsf



LITHOLOGIC DESCRIPTION

SANDSTONE, SILTY SANDSTONE, SILTY CLAYSTONE, and CLAYSTONE

Major lithologies:

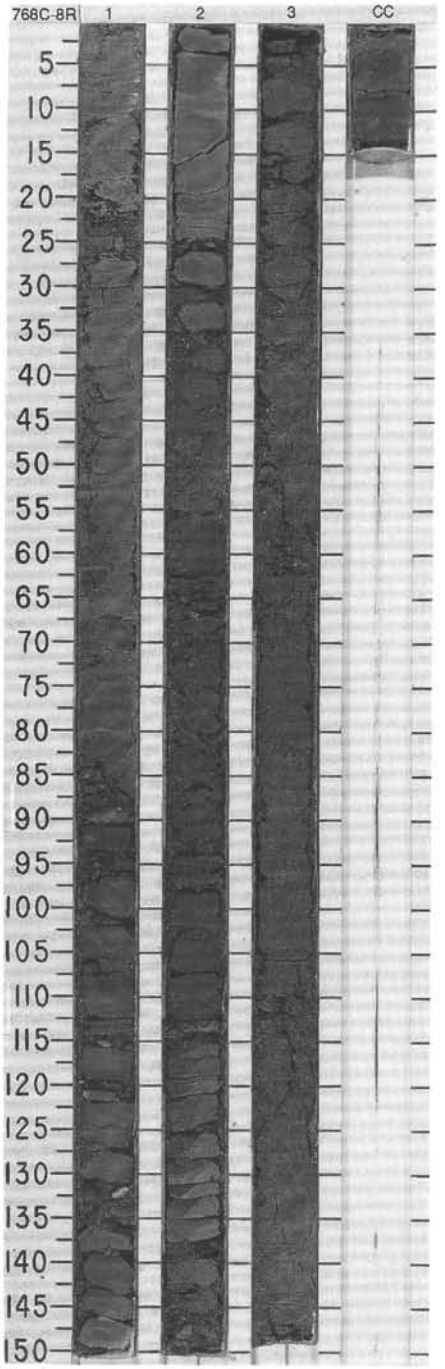
a. SANDSTONE and SILTY SANDSTONE form a single fining-up unit from coarse sandstone at Section 3, 131 cm to silty fine sandstone at Section 2, 22 cm. The sediments are planar laminated throughout and cross laminated in places. The thick laminae are distinguished by concentrations of plant debris, which are common in this lithology. The sandstone is composed of quartz, rock fragments, plant debris, feldspar and zeolite. The bed is dark gray (5Y 3/1). This very thick bed appears to be a single sediment gravity flow deposit.

b. CLAYSTONE and SILTY CLAYSTONE occur in thin-bedded, normally graded in Section 1, at the base of Section 3, and in the core catcher. The silty clay at the base of each bed is dark gray (5Y 4/1) and laminated, with the silt consisting mainly of quartz. It grades up into claystone which is dark greenish gray (10GY 4/1) and which is slightly bioturbated. These beds are interpreted as very fine-grained turbidite deposits grading upward into hemipelagic claystone.

Minor lithology: A clayey siltstone bed in Section 2, 10-22 cm, is distinctive. It is olive (5Y 4/3), displays planar, cross and convolute lamination, and has sharp upper and lower boundaries. It is more indurated than other beds in this core. It contains quartz, clay, some feldspar and a high proportion of silt-grade zeolite.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	2, 17 M	2, 18 D	2, 105 D	3, 129 D
TEXTURE:				
Sand	—	—	50	60
Silt	—	45	25	20
Clay	—	55	25	20
COMPOSITION:				
Clay	40	45	25	20
Feldspar	10	5	5	5
Hornblende	—	—	—	1
Opaques	—	5	10	5
Plant	Tr	10	5	—
Quartz	25	35	40	50
Rock fragment	—	Tr	15	10
Zeolite	25	—	—	5



SITE 768 HOLE C CORE 9R CORED INTERVAL 430.20-439.90 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
MIDDLE MIOCENE	B	NN9 B			($CaCO_3$=0.03%)	WC=27 Φ=42.7 ρ=2.70 Φ=2.07		1	0.5			P	*
						WC=27 Φ=43.4 ρ=2.68 Φ=2.08		1	1.0				
					($CaCO_3$=0.04% TOC=0.47%)		$CaCO_3$=0.03%	2					*
								3					
								CC					

LITHOLOGIC DESCRIPTION

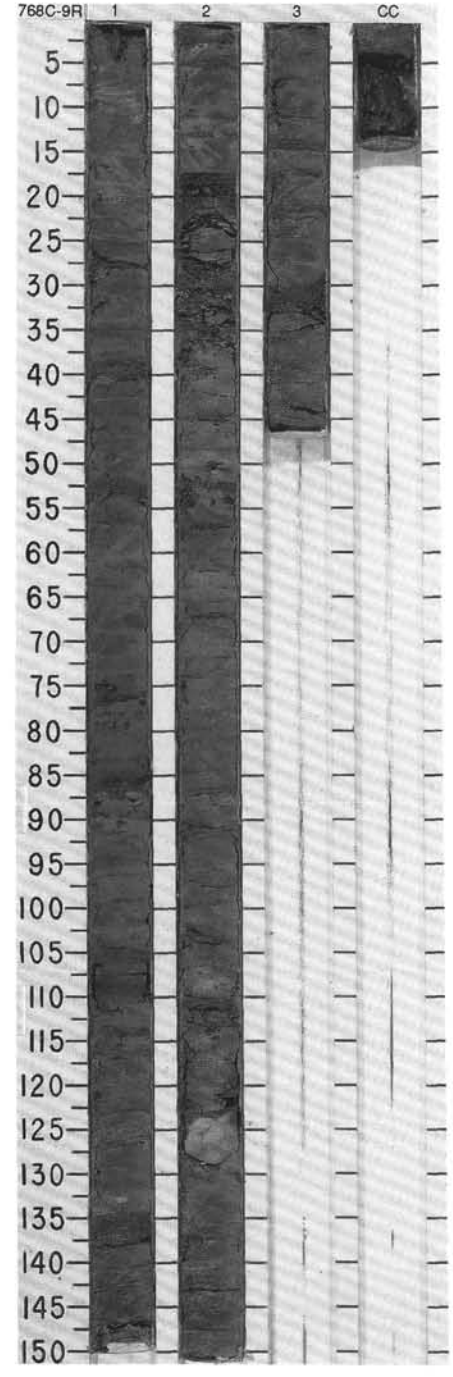
CLAYSTONE and SILTY CLAYSTONE with marlstone

Major lithologies:
CLAYSTONE and SILTY CLAYSTONE are interbedded throughout this core. Very thin to thin graded beds of silty claystone to claystone are homogeneous or faintly laminated, with sharp bases. They are gray (5Y 5/1) to dark gray (5Y 4/1), and are composed of clay, quartz, and plant fragments. In Section 1, 10-15 cm, mudclasts are present. These graded beds are interpreted as turbidite deposits. Claystone also occurs as very thin to medium beds gradationally overlying the graded beds. The color is greenish gray (5GY 5/1) and dark greenish gray (5G 4/1). It is slightly bioturbated with some mottling, and contains pyrite nodules in Section 1, 20-25 cm. The tops of the claystone beds are usually truncated. These beds are interpreted as hemipelagic in origin.

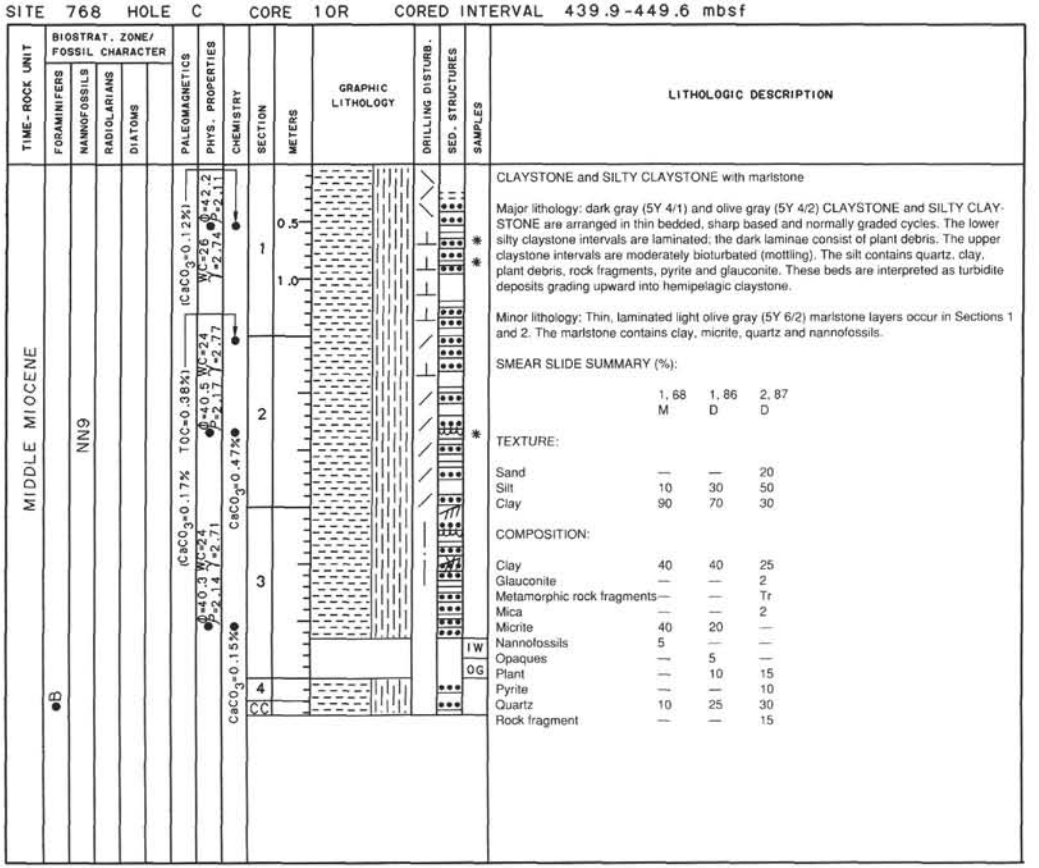
Minor lithology: Nannofossil marlstone occurs in Section 2, 105-108, 123-130 cm,as thin beds. The color is light olive gray (5Y 6/2). It is massive and slightly bioturbated.

SMEAR SLIDE SUMMARY (%):

	1, 83 D	2, 107 M
TEXTURE:		
Sand	10	5
Silt	75	15
Clay	15	80
COMPOSITION:		
Accesory minerals	5	—
Calcite	—	20
Clay	10	55
Nannofossils	—	15
Plant	15	5
Quartz	70	5



SITE 768 HOLE C CORE 10R CORED INTERVAL 439.9-449.6 mbsf



LITHOLOGIC DESCRIPTION

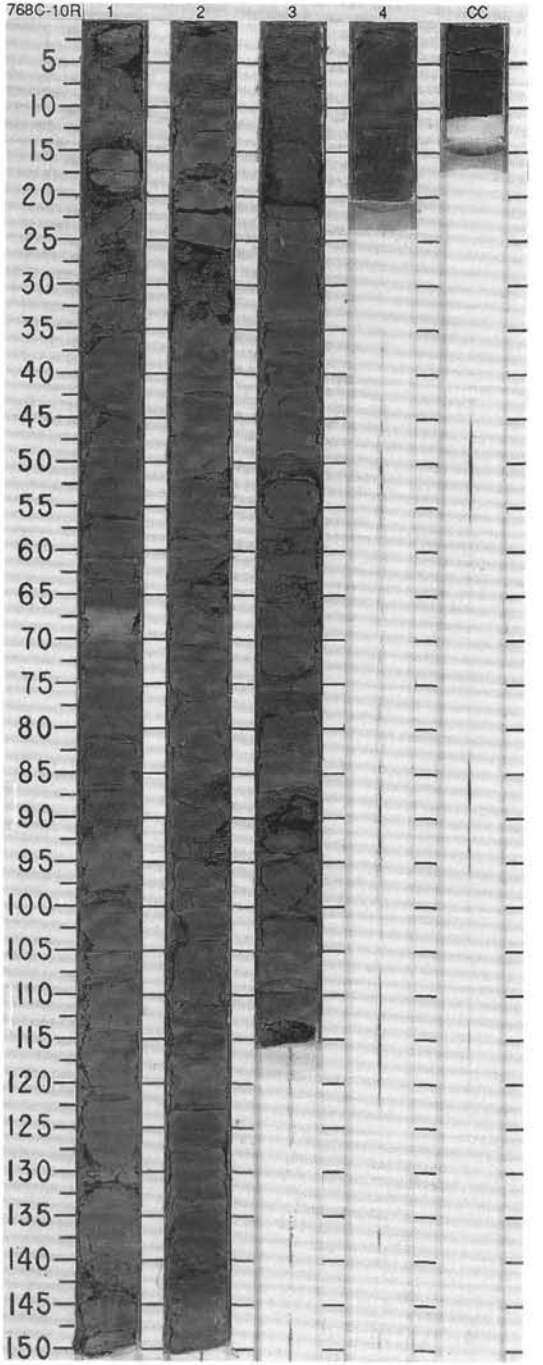
CLAYSTONE and SILTY CLAYSTONE with marlstone

Major lithology: dark gray (5Y 4/1) and olive gray (5Y 4/2) CLAYSTONE and SILTY CLAYSTONE are arranged in thin bedded, sharp based and normally graded cycles. The lower silty claystone intervals are laminated; the dark laminae consist of plant debris. The upper claystone intervals are moderately bioturbated (mottling). The silt contains quartz, clay, plant debris, rock fragments, pyrite and glauconite. These beds are interpreted as turbidite deposits grading upward into hemipelagic claystone.

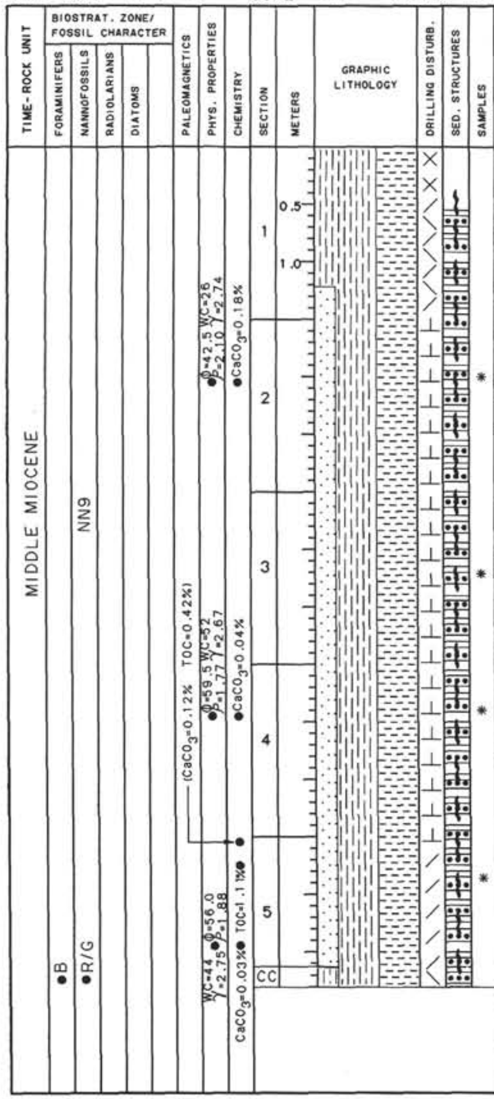
Minor lithology: Thin, laminated light olive gray (5Y 6/2) marlstone layers occur in Sections 1 and 2. The marlstone contains clay, micrite, quartz and nannofossils.

SMEAR SLIDE SUMMARY (%):

	1, 68 M	1, 86 D	2, 87 D
TEXTURE:			
Sand	—	—	20
Silt	10	30	50
Clay	90	70	30
COMPOSITION:			
Clay	40	40	25
Glauconite	—	—	2
Metamorphic rock fragments	—	—	Tr
Mica	—	—	2
Micrite	40	20	—
Nannofossils	5	—	—
Opaques	—	5	—
Plant	—	10	15
Pyrite	—	—	10
Quartz	10	25	30
Rock fragment	—	—	15



SITE 768 HOLE C CORE 11R CORED INTERVAL 449.6-459.2 mbsf



LITHOLOGIC DESCRIPTION

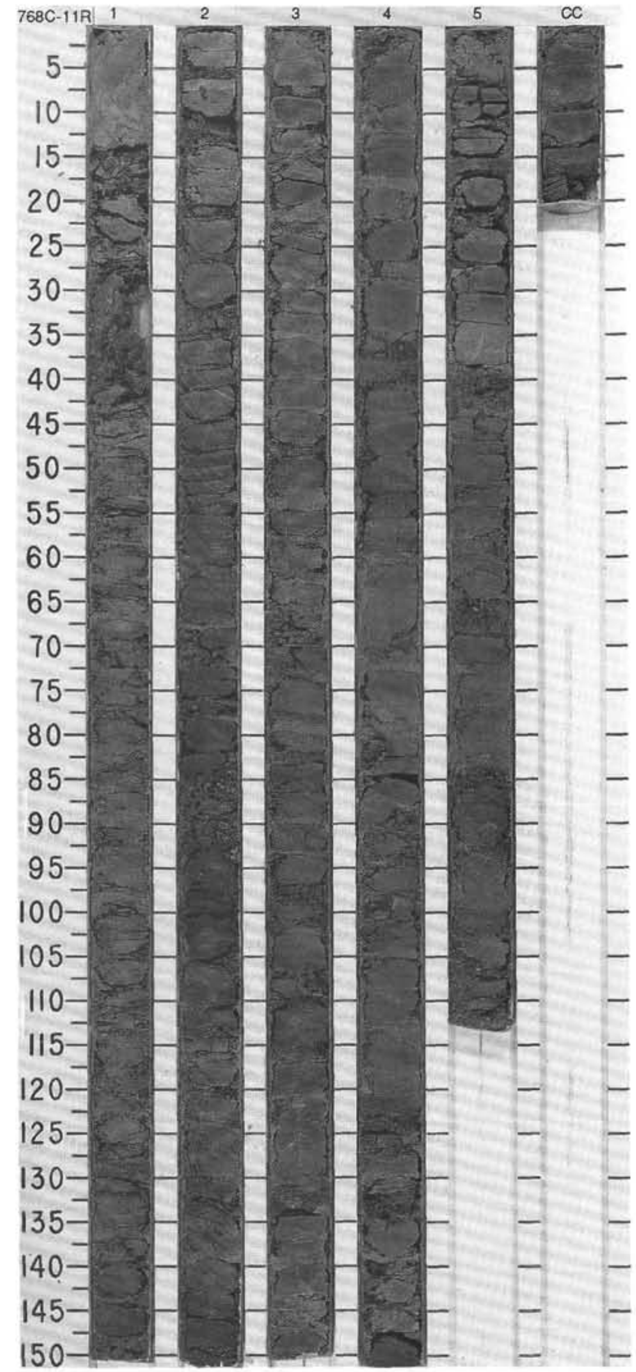
CLAYSTONE, SILTY CLAYSTONE and SILTSTONE with marlstone

Major lithologies: CLAYSTONE, SILTY CLAYSTONE and CLAYSTONE. This core is rhythmically bedded throughout in thin to medium beds (5-20 cm). The base of each rhythm is sharp and there is a gradual transition upwards through finer grain sizes to clay. The medium beds have siltstone (which may be sandy) at the base, grading up to more clay-rich material; the majority of the beds are normally graded from silty claystone to claystone. The silty beds are planar laminated, dark gray or very dark gray (5Y 4/1, 3/1). Quartz is the principal component of the silt grade material and the lithology also contains rock fragments, mica, glauconite, plant fragments and pyrite. These graded beds are interpreted as turbidite deposits.Gradationally overlying each turbidite are generally thinner, greenish gray (5G 4/1) clay stone intervals which are slightly to moderately bioturbated. They are interpreted as hemipelagic deposits.

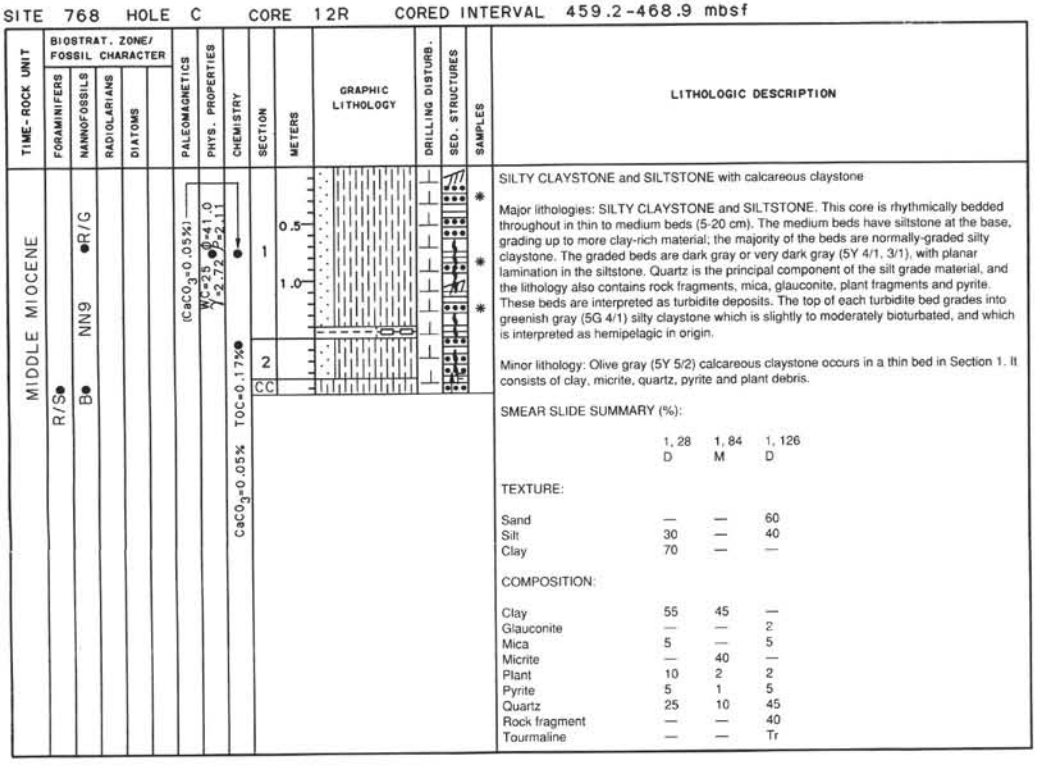
Minor lithology: Olive gray (5Y 5/2) marlstone occurs in two very thin beds in Section 5, 33-39, 43-46 cm.

SMEAR SLIDE SUMMARY (%):

	2, 50 D	3, 71 M	4, 40 D	5, 36 M
TEXTURE:				
Sand	—	60	—	—
Silt	30	40	5	5
Clay	70	—	95	95
COMPOSITION:				
Clay	70	—	90	45
Feldspar	—	2	—	—
Foraminifers	—	Tr	—	—
Glauconite	—	Tr	—	—
Mica	—	5	—	—
Micrite	—	—	—	50
Plant	3	10	—	—
Pyrite	2	10	Tr	2
Quartz	20	55	5	3
Rock fragment	5	15	Tr	—



SITE 768 HOLE C CORE 12R CORED INTERVAL 459.2-468.9 mbsf



LITHOLOGIC DESCRIPTION

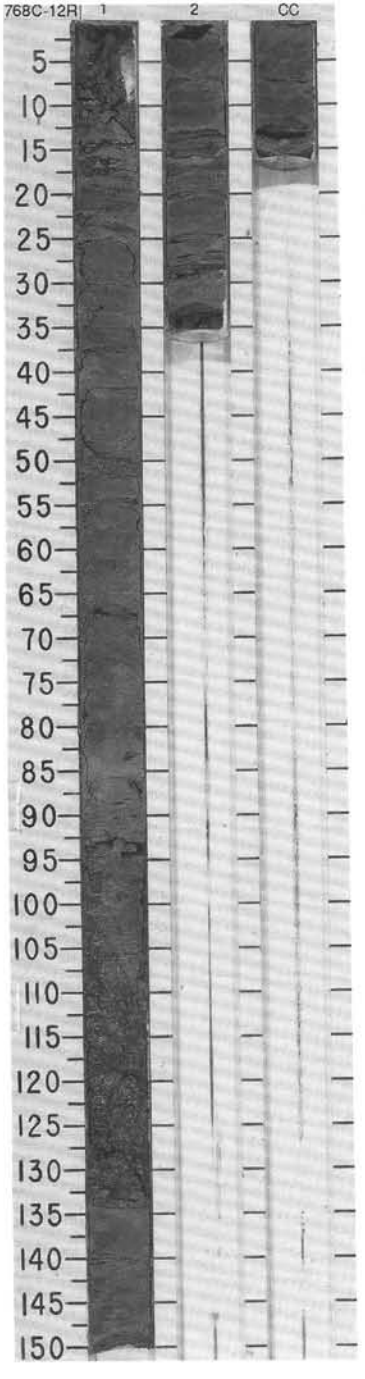
SILTY CLAYSTONE and SILTSTONE with calcareous claystone

Major lithologies: SILTY CLAYSTONE and SILTSTONE. This core is rhythmically bedded throughout in thin to medium beds (5-20 cm). The medium beds have siltstone at the base, grading up to more clay-rich material; the majority of the beds are normally-graded silty claystone. The graded beds are dark gray or very dark gray (5Y 4/1, 3/1), with planar lamination in the siltstone. Quartz is the principal component of the silt grade material, and the lithology also contains rock fragments, mica, glauconite, plant fragments and pyrite. These beds are interpreted as turbidite deposits. The top of each turbidite bed grades into greenish gray (5G 4/1) silty claystone which is slightly to moderately bioturbated, and which is interpreted as hemipelagic in origin.

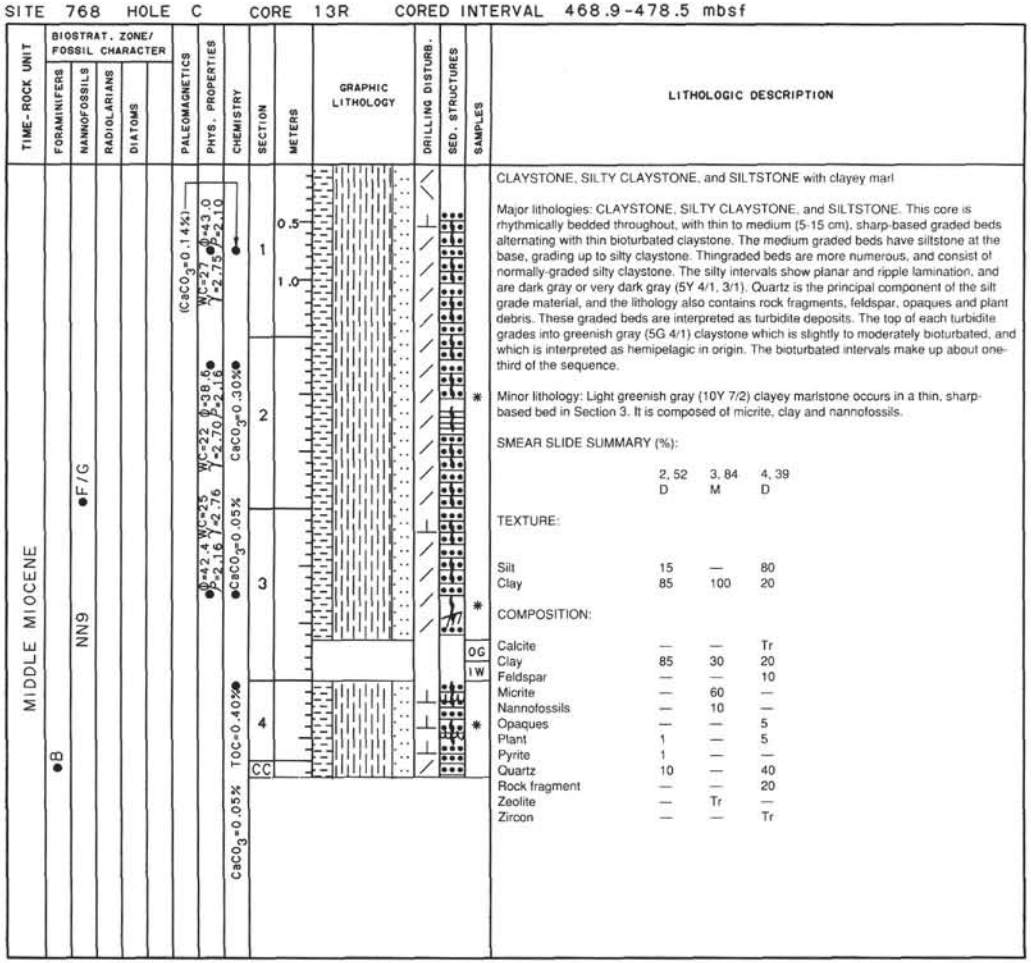
Minor lithology: Olive gray (5Y 5/2) calcareous claystone occurs in a thin bed in Section 1. It consists of clay, micrite, quartz, pyrite and plant debris.

SMEAR SLIDE SUMMARY (%):

	1, 28 D	1, 84 M	1, 126 D
TEXTURE:			
Sand	—	—	60
Silt	30	—	40
Clay	70	—	—
COMPOSITION:			
Clay	55	45	—
Glauconite	—	—	2
Mica	5	—	5
Micrite	—	40	—
Plant	10	2	2
Pyrite	5	1	5
Quartz	25	10	45
Rock fragment	—	—	40
Tourmaline	—	—	Tr



SITE 768 HOLE C CORE 13R CORED INTERVAL 468.9-478.5 mbsf



LITHOLOGIC DESCRIPTION

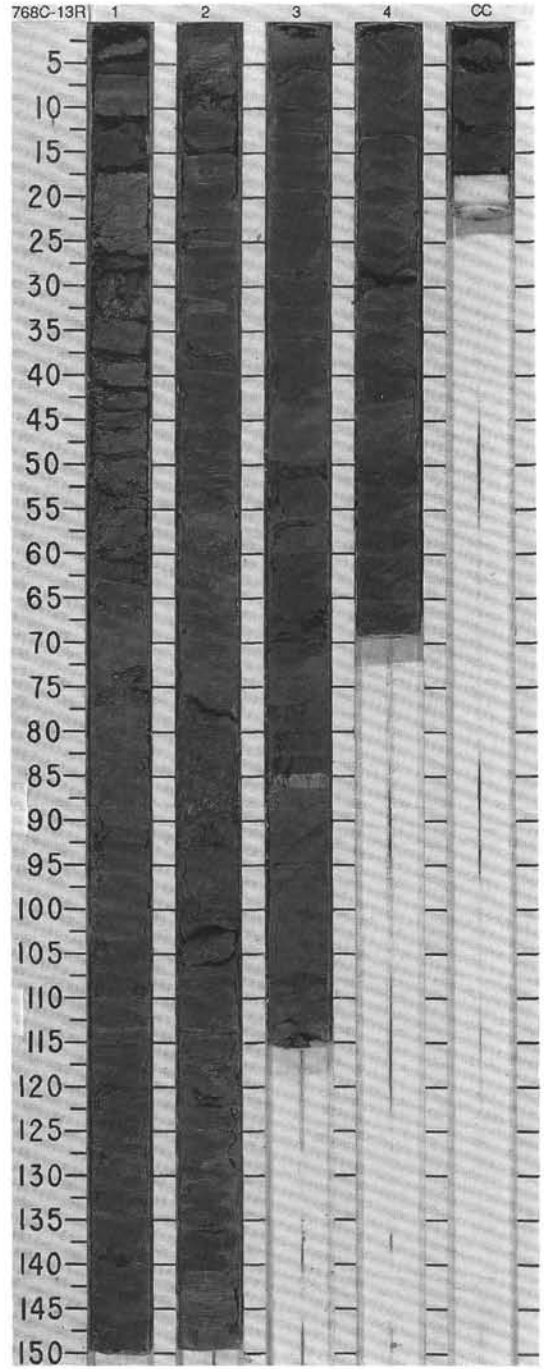
CLAYSTONE, SILTY CLAYSTONE, and SILTSTONE with clayey marl

Major lithologies: CLAYSTONE, SILTY CLAYSTONE, and SILTSTONE. This core is rhythmically bedded throughout, with thin to medium (5-15 cm), sharp-based graded beds alternating with thin bioturbated claystone. The medium graded beds have siltstone at the base, grading up to silty claystone. Thingraded beds are more numerous, and consist of normally-graded silty claystone. The silty intervals show planar and ripple lamination, and are dark gray or very dark gray (5Y 4/1, 3/1). Quartz is the principal component of the silt grade material, and the lithology also contains rock fragments, feldspar, opaques and plant debris. These graded beds are interpreted as turbidite deposits. The top of each turbidite grades into greenish gray (5G 4/1) claystone which is slightly to moderately bioturbated, and which is interpreted as hemipelagic in origin. The bioturbated intervals make up about one-third of the sequence.

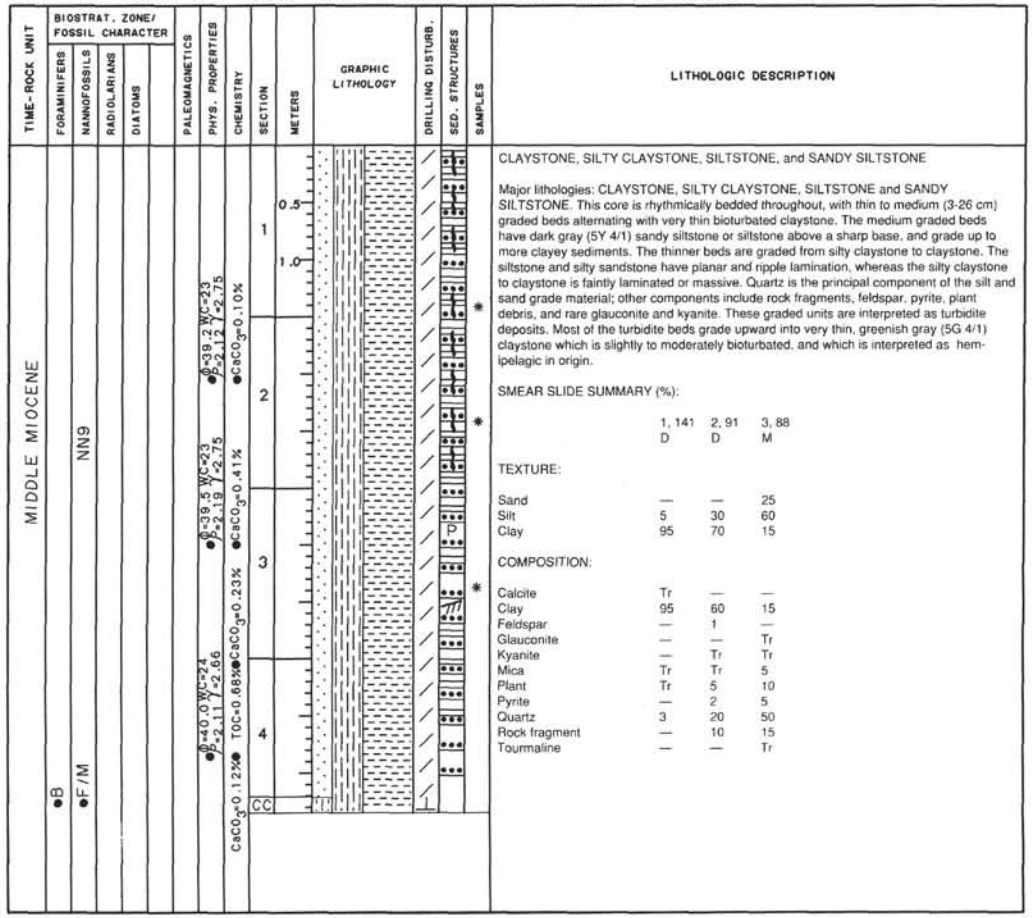
Minor lithology: Light greenish gray (10Y 7/2) clayey marlstone occurs in a thin, sharp-based bed in Section 3. It is composed of micrite, clay and nannofossils.

SMEAR SLIDE SUMMARY (%):

	2, 52 D	3, 84 M	4, 39 D
TEXTURE:			
Silt	15	—	80
Clay	85	100	20
COMPOSITION:			
Calcite	—	—	Tr
Clay	85	30	20
Feldspar	—	—	10
Micrite	—	60	—
Nannofossils	—	10	—
Opaques	—	—	5
Plant	1	—	5
Pyrite	1	—	—
Quartz	10	—	40
Rock fragment	—	—	20
Zeolite	—	Tr	—
Zircon	—	—	Tr



SITE 768 HOLE C CORE 14R CORED INTERVAL 478.5-488.2 mbsf



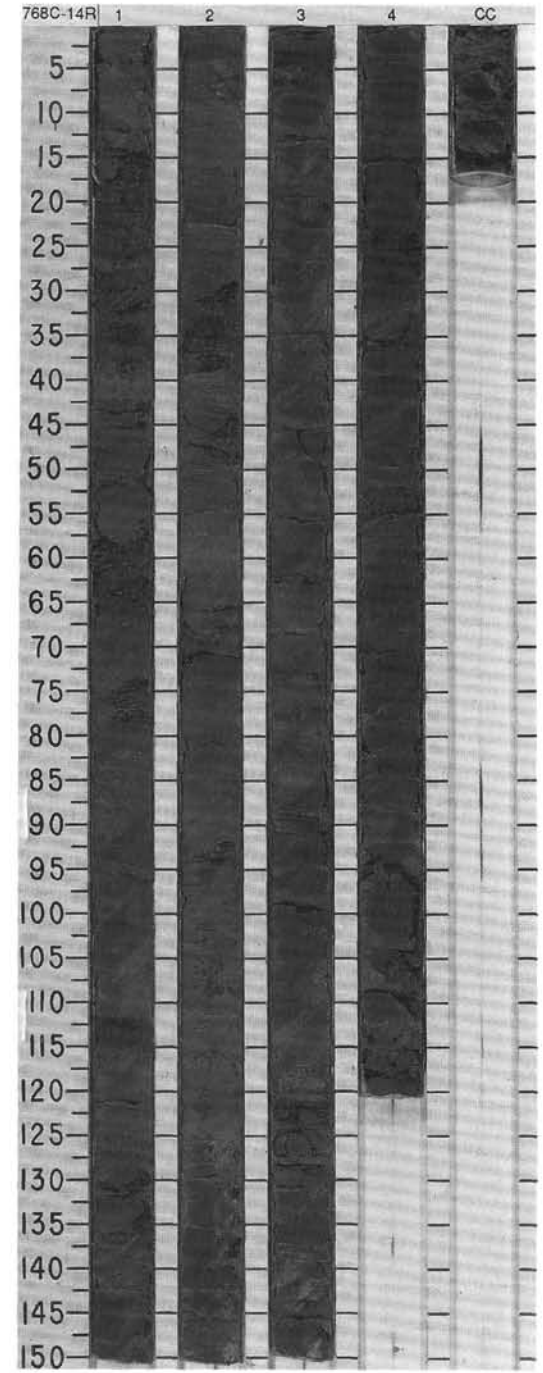
LITHOLOGIC DESCRIPTION

CLAYSTONE, SILTY CLAYSTONE, SILTSTONE, and SANDY SILTSTONE

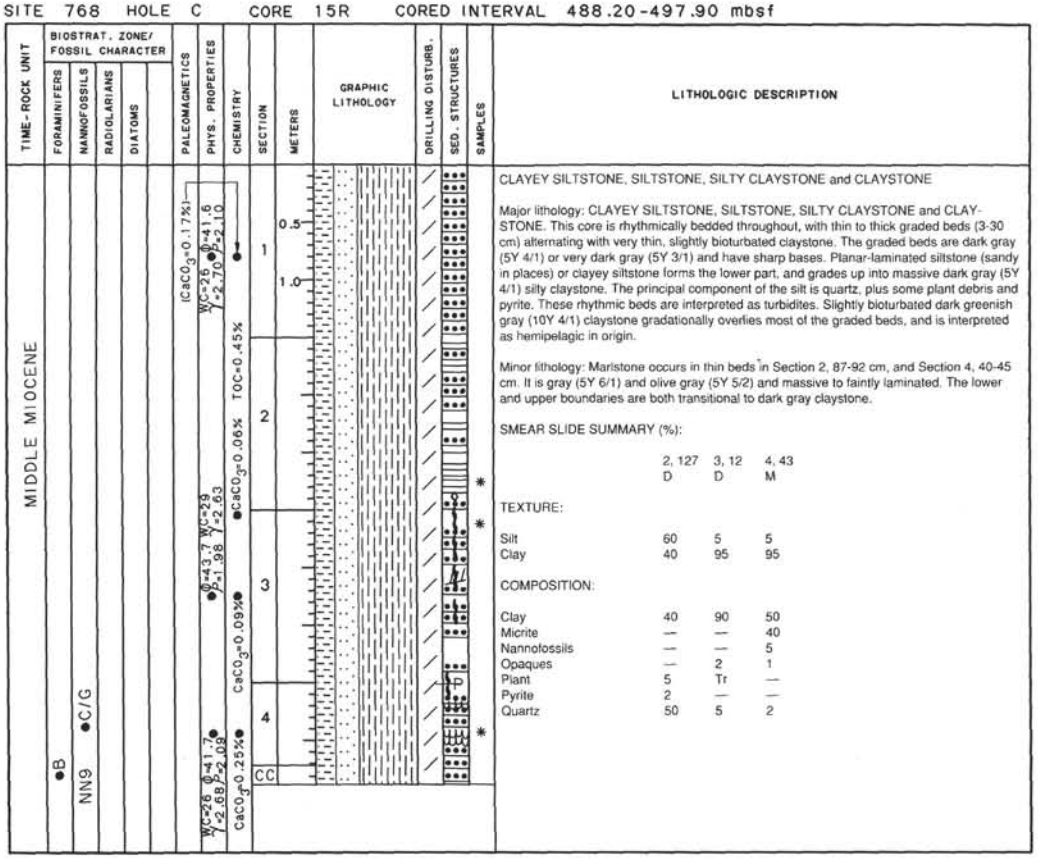
Major lithologies: CLAYSTONE, SILTY CLAYSTONE, SILTSTONE and SANDY SILTSTONE. This core is rhythmically bedded throughout, with thin to medium (3-26 cm) graded beds alternating with very thin bioturbated claystone. The medium graded beds have dark gray (5Y 4/1) sandy siltstone or siltstone above a sharp base, and grade up to more clayey sediments. The thinner beds are graded from silty claystone to claystone. The siltstone and silty sandstone have planar and ripple lamination, whereas the silty claystone to claystone is faintly laminated or massive. Quartz is the principal component of the silt and sand grade material; other components include rock fragments, feldspar, pyrite, plant debris, and rare glauconite and kyanite. These graded units are interpreted as turbidite deposits. Most of the turbidite beds grade upward into very thin, greenish gray (5G 4/1) claystone which is slightly to moderately bioturbated, and which is interpreted as hemipelagic in origin.

SMEAR SLIDE SUMMARY (%):

	1, 141 D	2, 91 D	3, 88 M
TEXTURE:			
Sand	—	—	25
Silt	5	30	60
Clay	95	70	15
COMPOSITION:			
Calcite	Tr	—	—
Clay	95	60	15
Feldspar	—	1	—
Glauconite	—	—	Tr
Kyanite	—	Tr	Tr
Mica	Tr	Tr	5
Plant	Tr	5	10
Pyrite	—	2	5
Quartz	3	20	50
Rock fragment	—	10	15
Tourmaline	—	—	Tr



SITE 768 HOLE C CORE 15R CORED INTERVAL 488.20-497.90 mbsf



LITHOLOGIC DESCRIPTION

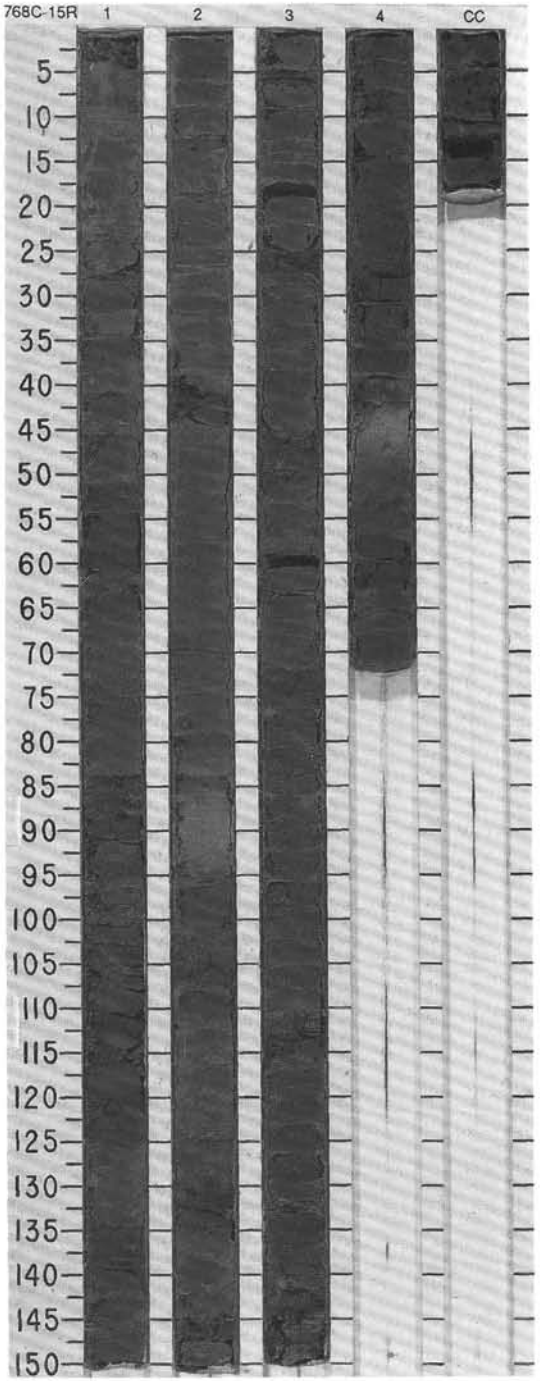
CLAYEY SILTSTONE, SILTSTONE, SILTY CLAYSTONE and CLAYSTONE

Major lithology: CLAYEY SILTSTONE, SILTSTONE, SILTY CLAYSTONE and CLAYSTONE. This core is rhythmically bedded throughout, with thin to thick graded beds (3-30 cm) alternating with very thin, slightly bioturbated claystone. The graded beds are dark gray (5Y 4/1) or very dark gray (5Y 3/1) and have sharp bases. Planar-laminated siltstone (sandy in places) or clayey siltstone forms the lower part, and grades up into massive dark gray (5Y 4/1) silty claystone. The principal component of the silt is quartz, plus some plant debris and pyrite. These rhythmic beds are interpreted as turbidites. Slightly bioturbated dark greenish gray (10Y 4/1) claystone gradationally overlies most of the graded beds, and is interpreted as hemipelagic in origin.

Minor lithology: Marlstone occurs in thin beds in Section 2, 87-92 cm, and Section 4, 40-45 cm. It is gray (5Y 6/1) and olive gray (5Y 5/2) and massive to faintly laminated. The lower and upper boundaries are both transitional to dark gray claystone.

SMEAR SLIDE SUMMARY (%):

	2, 127 D	3, 12 D	4, 43 M
TEXTURE:			
Silt	60	5	5
Clay	40	95	95
COMPOSITION:			
Clay	40	90	50
Micrite	—	—	40
Nannofossils	—	—	5
Opaques	—	2	1
Plant	5	Tr	—
Pyrite	2	—	—
Quartz	50	5	2



SITE 768 HOLE C CORE 16R CORED INTERVAL 497.9-507.5 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
MIDDLE MIOCENE	●B	●R/P NN9					$CaCO_3$=0.24%● $CaCO_3$=0.06% TOC=0.10%●	1 CC	0.5 1.0		○○○○○	* TW	

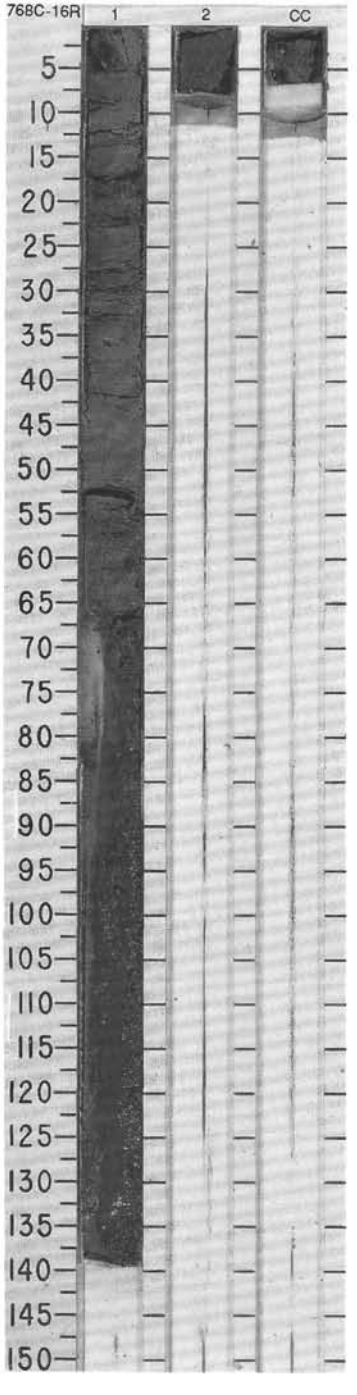
LITHOLOGIC DESCRIPTION

SILTY CLAYSTONE to CLAYEY SILTSTONE, CLAYSTONE, and SAND

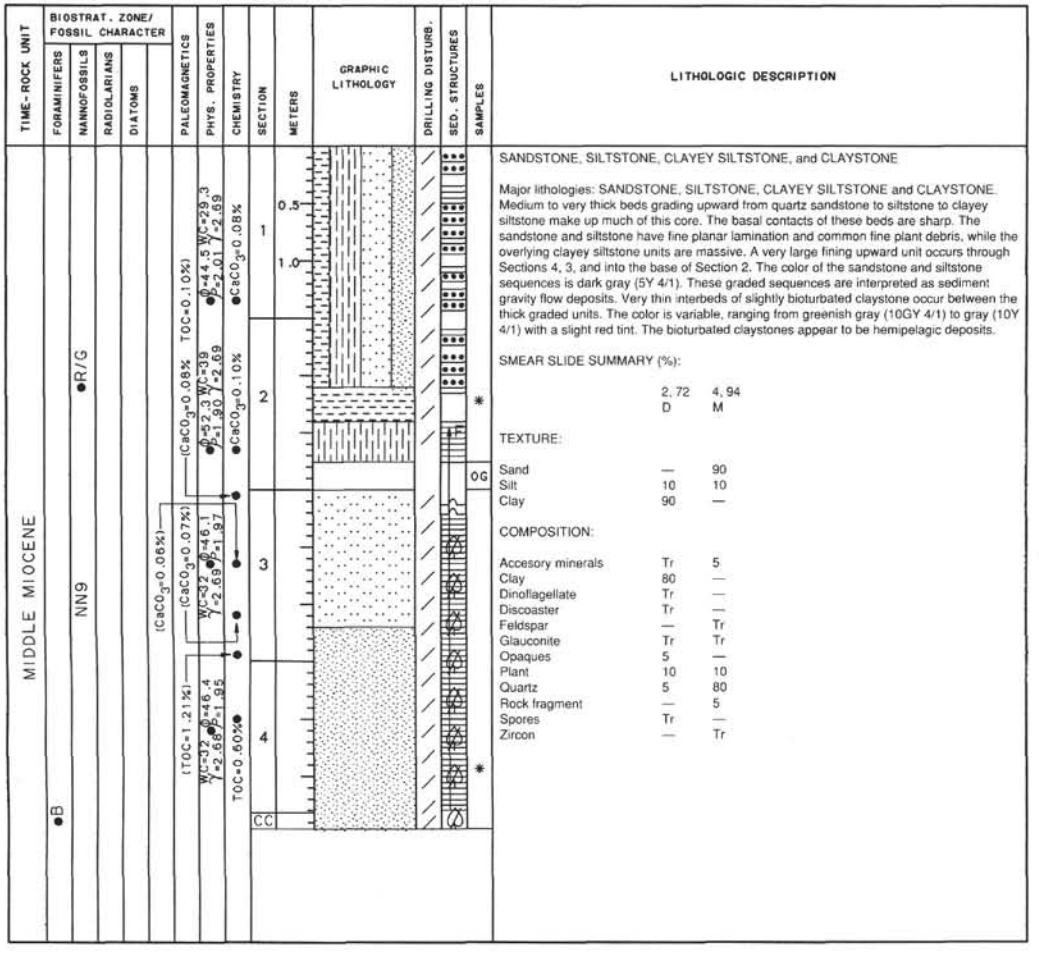
Major lithologies:
SILTY CLAYSTONE to CLAYEY SILTSTONE, CLAYSTONE, and SAND, all of which are dark gray (5Y 4/1). The upper part of Section 1 consists of interbedded silty claystone to clayey siltstone and claystone. The silty claystone to clayey siltstone occurs in thin graded beds with sharp bases and planar lamination. The silt component consists of quartz, lithic fragments, and plant debris. The interbedded claystone is massive. The remainder of the core consist of fine-grained, unconsolidated sand which is soupy an structureless (probably homogenized by drilling disturbance). Because of the soft nature of the sand, an unknown but perhaps considerable additional thickness of sand may have escaped recovery due to washout during drilling.

SMEAR SLIDE SUMMARY (%):

	1, 60 D
TEXTURE:	
Sand	90
Silt	10
COMPOSITION:	
Glauconite	Tr
Opaques	Tr
Plant	10
Quartz	90



SITE 768 HOLE C CORE 17R CORED INTERVAL 507.5-517.2 mbsf



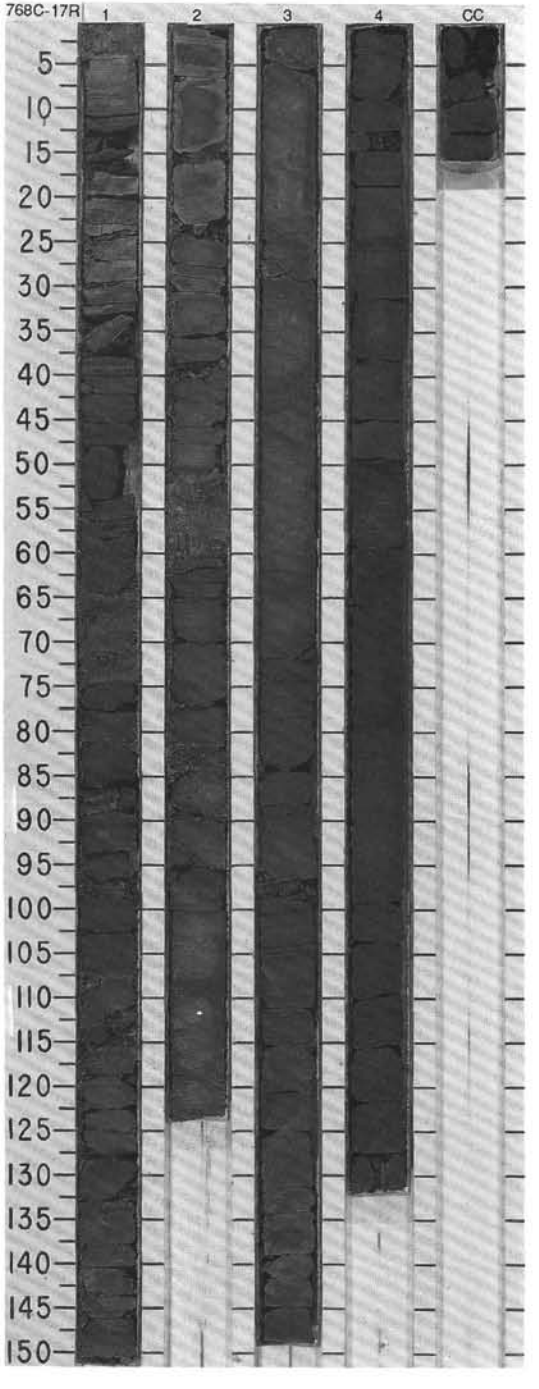
LITHOLOGIC DESCRIPTION

SANDSTONE, SILTSTONE, CLAYEY SILTSTONE, and CLAYSTONE

Major lithologies: SANDSTONE, SILTSTONE, CLAYEY SILTSTONE and CLAYSTONE. Medium to very thick beds grading upward from quartz sandstone to siltstone to clayey siltstone make up much of this core. The basal contacts of these beds are sharp. The sandstone and siltstone have fine planar lamination and common fine plant debris, while the overlying clayey siltstone units are massive. A very large fining upward unit occurs through Sections 4, 3, and into the base of Section 2. The color of the sandstone and siltstone sequences is dark gray (5Y 4/1). These graded sequences are interpreted as sediment gravity flow deposits. Very thin interbeds of slightly bioturbated claystone occur between the thick graded units. The color is variable, ranging from greenish gray (10GY 4/1) to gray (10Y 4/1) with a slight red tint. The bioturbated claystones appear to be hemipelagic deposits.

SMEAR SLIDE SUMMARY (%):

	2, 72 D	4, 94 M
TEXTURE:		
Sand	—	90
Silt	10	10
Clay	90	—
COMPOSITION:		
Accesory minerals	Tr	5
Clay	80	—
Dinoflagellate	Tr	—
Discoaster	Tr	—
Feldspar	—	Tr
Glauconite	Tr	Tr
Opaques	5	—
Plant	10	10
Quartz	5	80
Rock fragment	—	5
Spores	Tr	—
Zircon	—	Tr



SITE 768 HOLE C CORE 18R CORED INTERVAL 517.2-526.9 mbsf

TIME-ROCK UNIT: MIDDLE MIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS ●R/S; NANNOFOSSILS NN9 ●R/P; RADIOLARIANS; DIATOMS

PALEOMAGNETICS: (TOC=0.46%) (CaCO3=0.06%)

PHYS. PROPERTIES: ●ρ=42.9 WC=26 P=2.13 Y=2.72; ●ρ=48.4 WC=32 P=2.03 Y=2.71

CHEMISTRY: TOC=0.19%● ●CaCO3=0.44% TOC=0.49% ●CaCO3=0.24% ●CaCO3=4.28%

SECTION: 1, 2, 3, 4, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES: *

LITHOLOGIC DESCRIPTION

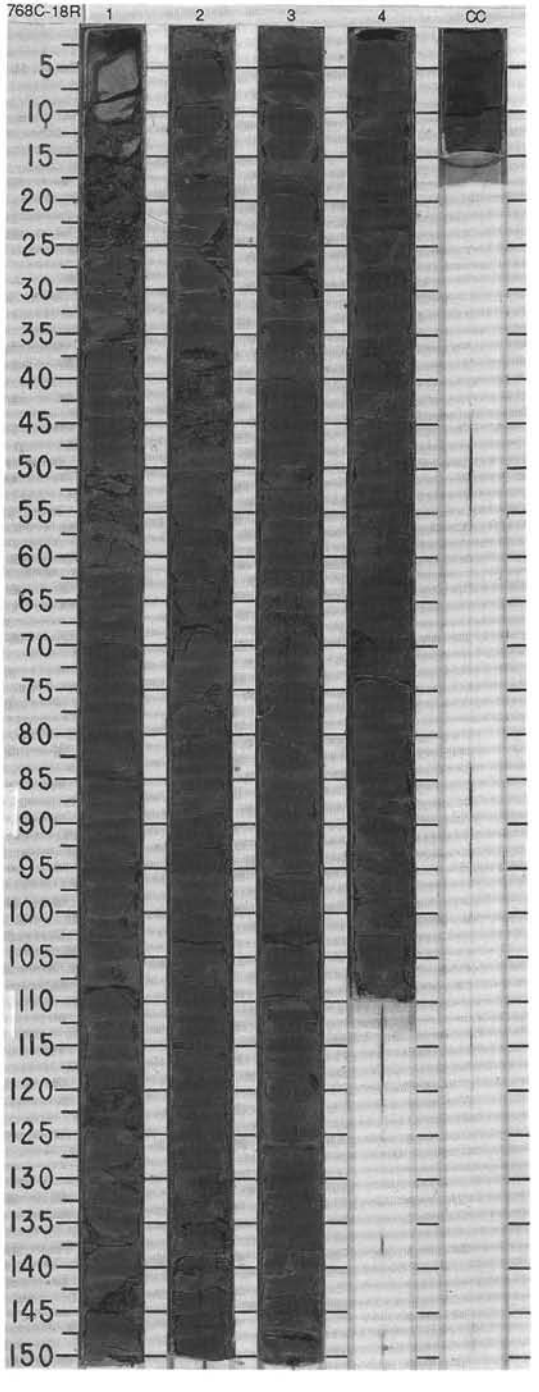
CLAYSTONE, CLAYEY SILTSTONE, and SILTY CLAYSTONE, with sandstone

Major lithologies: CLAYEY SILTSTONE, SILTY CLAYSTONE, and CLAYSTONE. This core consists of very thin to medium graded beds of clayey siltstone to claystone alternating with very thin to thin beds of claystone. The graded beds have sharp bases and planar laminations in their lower part, with the upper portion usually structureless. The silt fraction is dominantly quartz with minor rock fragments, feldspar, and plant debris. These dark gray (5Y 4/1) beds grade upward into claystone which is slightly bioturbated and dark greenish gray (10Y 4/1 to 5Y 4/1). The graded beds are interpreted as turbidites, and the claystone as hemipelagic deposits.

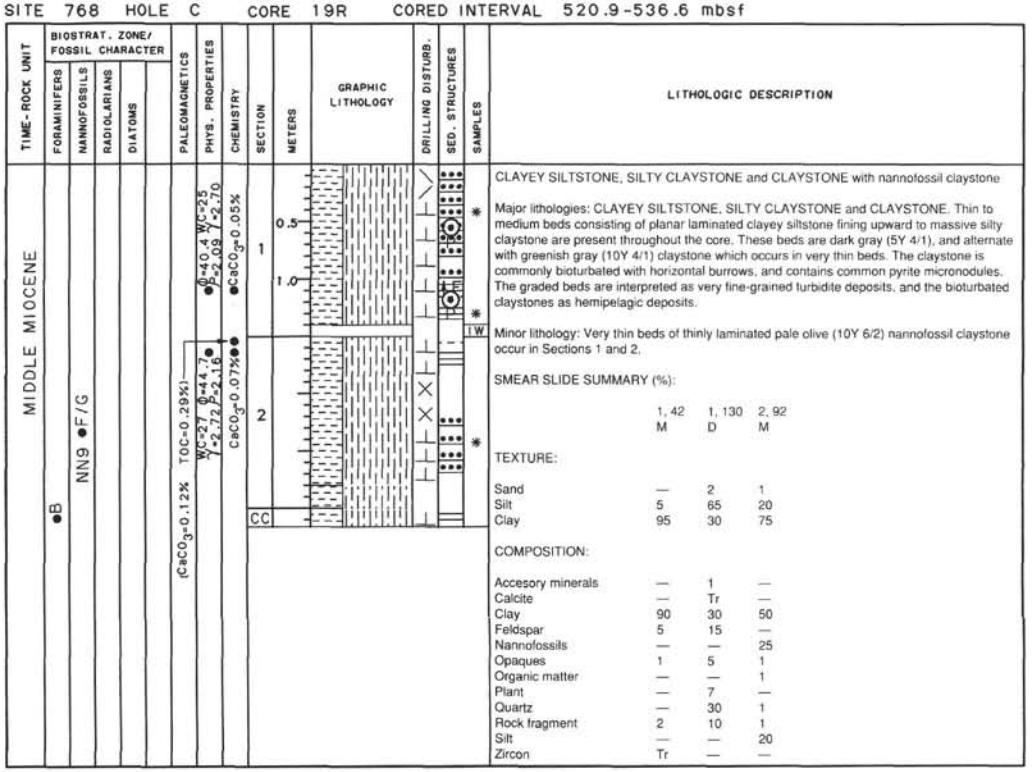
Minor lithology: Fine sandstone occurs at the top of Section 1 above a sharp basal contact. It is interpreted as the base of the very thick graded sequence of sandstone/siltstone/clayey siltstone which makes up the lower part of Core 124-768C-17R.

SMEAR SLIDE SUMMARY (%):

	1, 83 D	1, 124 M	2, 68 M	4, 46 D
TEXTURE:				
Sand	10	—	10	1
Silt	50	10	70	20
Clay	40	90	20	75
COMPOSITION:				
Accesory minerals	2	—	—	2
Calcite	Tr	—	—	—
Clay	40	90	10	75
Feldspar	10	3	—	—
Glauconite	—	—	—	1
Opaques	—	—	1	—
Organic matter	10	—	—	1
Plant	—	—	13	—
Quartz	20	—	50	1
Rock fragment	15	5	25	—
Silt	—	—	—	15
Zircon	—	—	1	—



SITE 768 HOLE C CORE 19R CORED INTERVAL 520.9-536.6 mbsf



LITHOLOGIC DESCRIPTION

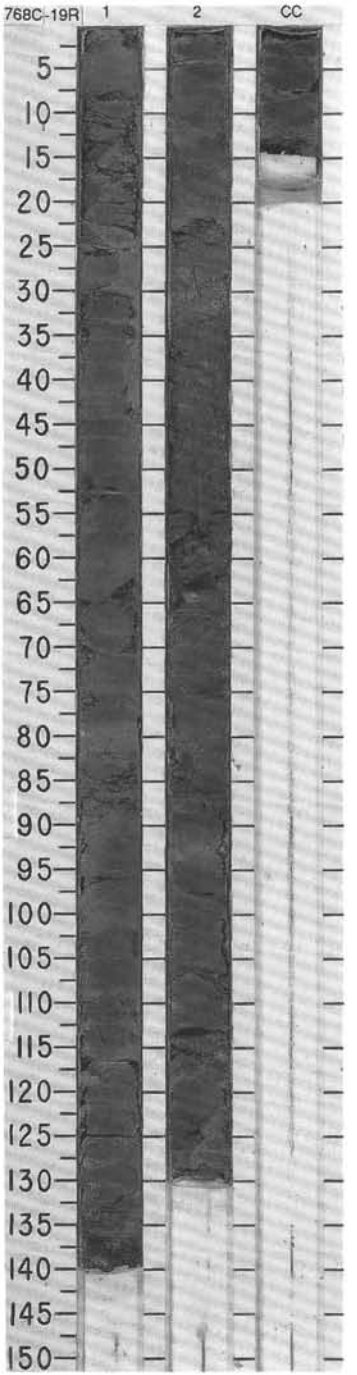
CLAYEY SILTSTONE, SILTY CLAYSTONE and CLAYSTONE with nannofossil claystone

Major lithologies: CLAYEY SILTSTONE, SILTY CLAYSTONE and CLAYSTONE. Thin to medium beds consisting of planar laminated clayey siltstone fining upward to massive silty claystone are present throughout the core. These beds are dark gray (5Y 4/1), and alternate with greenish gray (10Y 4/1) claystone which occurs in very thin beds. The claystone is commonly bioturbated with horizontal burrows, and contains common pyrite micronodules. The graded beds are interpreted as very fine-grained turbidite deposits, and the bioturbated claystones as hemipelagic deposits.

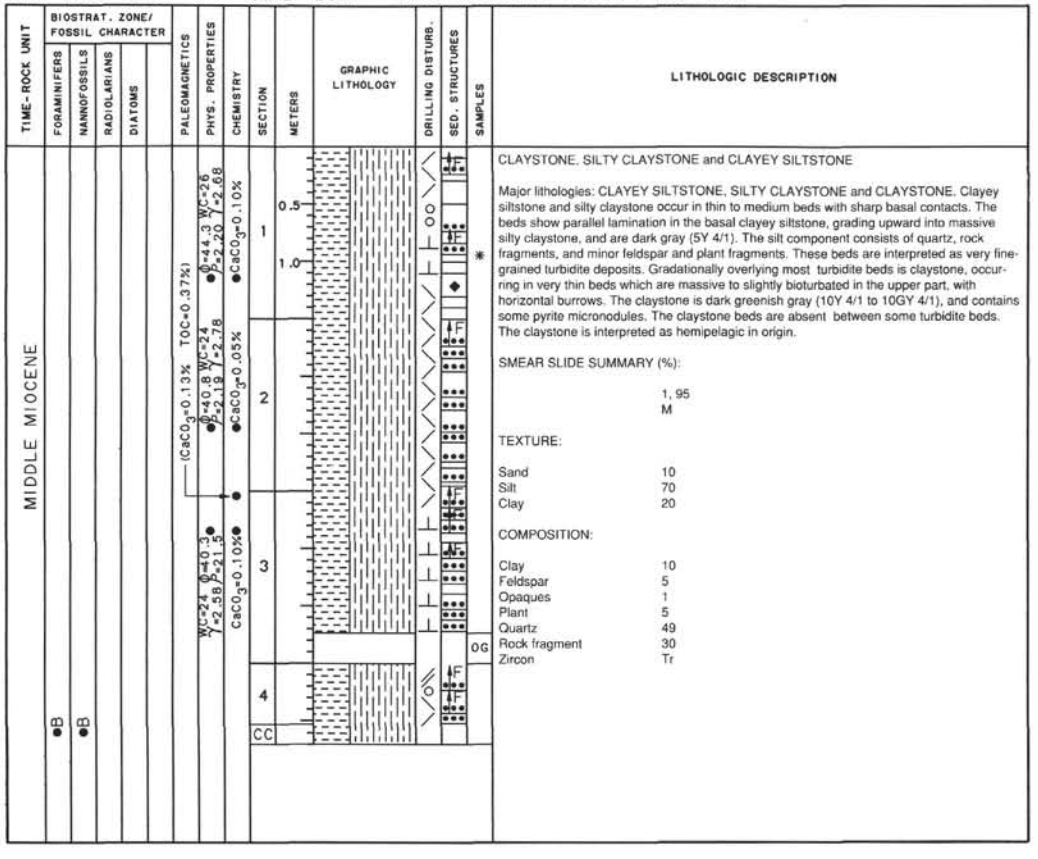
Minor lithology: Very thin beds of thinly laminated pale olive (10Y 6/2) nannofossil claystone occur in Sections 1 and 2.

SMEAR SLIDE SUMMARY (%):

	1, 42 M	1, 130 D	2, 92 M
TEXTURE:			
Sand	—	2	1
Silt	5	65	20
Clay	95	30	75
COMPOSITION:			
Accesory minerals	—	1	—
Calcite	—	Tr	—
Clay	90	30	50
Feldspar	5	15	—
Nannofossils	—	—	25
Opaques	1	5	1
Organic matter	—	—	1
Plant	—	7	—
Quartz	—	30	1
Rock fragment	2	10	1
Silt	—	—	20
Zircon	Tr	—	—



SITE 768 HOLE C CORE 20R CORED INTERVAL 536.6-546.3 mbsf



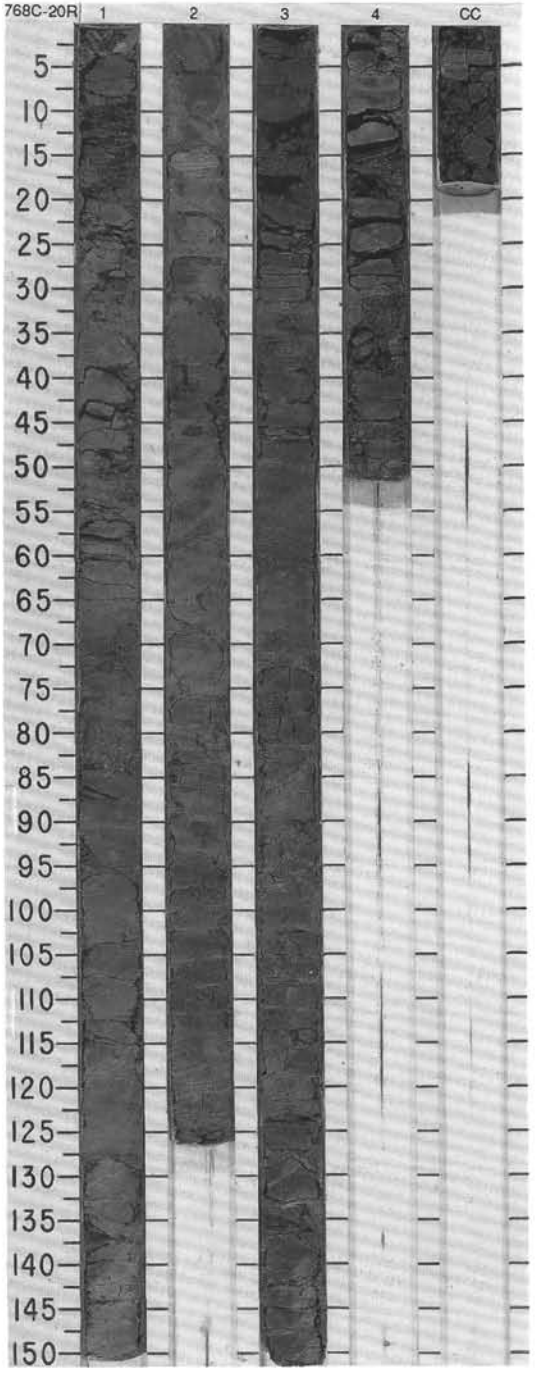
LITHOLOGIC DESCRIPTION

CLAYSTONE, SILTY CLAYSTONE and CLAYEY SILTSTONE

Major lithologies: CLAYEY SILTSTONE, SILTY CLAYSTONE and CLAYSTONE. Clayey siltstone and silty claystone occur in thin to medium beds with sharp basal contacts. The beds show parallel lamination in the basal clayey siltstone, grading upward into massive silty claystone, and are dark gray (5Y 4/1). The silt component consists of quartz, rock fragments, and minor feldspar and plant fragments. These beds are interpreted as very fine-grained turbidite deposits. Gradationally overlying most turbidite beds is claystone, occurring in very thin beds which are massive to slightly bioturbated in the upper part, with horizontal burrows. The claystone is dark greenish gray (10Y 4/1 to 10GY 4/1), and contains some pyrite micronodules. The claystone beds are absent between some turbidite beds. The claystone is interpreted as hemipelagic in origin.

SMEAR SLIDE SUMMARY (%):

	1, 95 M
TEXTURE:	
Sand	10
Silt	70
Clay	20
COMPOSITION:	
Clay	10
Feldspar	5
Opaques	1
Plant	5
Quartz	49
Rock fragment	30
Zircon	Tr



SITE 768 HOLE C CORE 21R CORED INTERVAL 546.3-555.8 mbsf

TIME-ROCK UNIT: MIDDLE MIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER — FORAMINIFERS: B; NANNOFOSSILS: NN9, R/P

CHEMISTRY: TOC=0.57% (CaCO$_3$=0.14%); (CaCO$_3$=0.05%); CaCO$_3$=4.12%

PHYS. PROPERTIES: WC=31 ϕ=49.0 γ=2.73 ρ=2.15; WC=2.6 ϕ=6.8 γ=2.71 ρ=2.80

SECTION: 1, CC — METERS: 0.5, 1.0

GRAPHIC LITHOLOGY — DRILLING DISTURB. — SED. STRUCTURES — SAMPLES

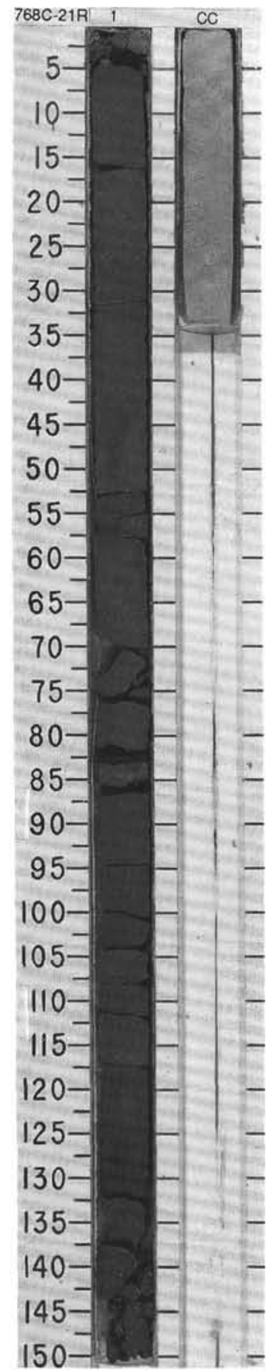
LITHOLOGIC DESCRIPTION

QUARTZ SANDSTONE

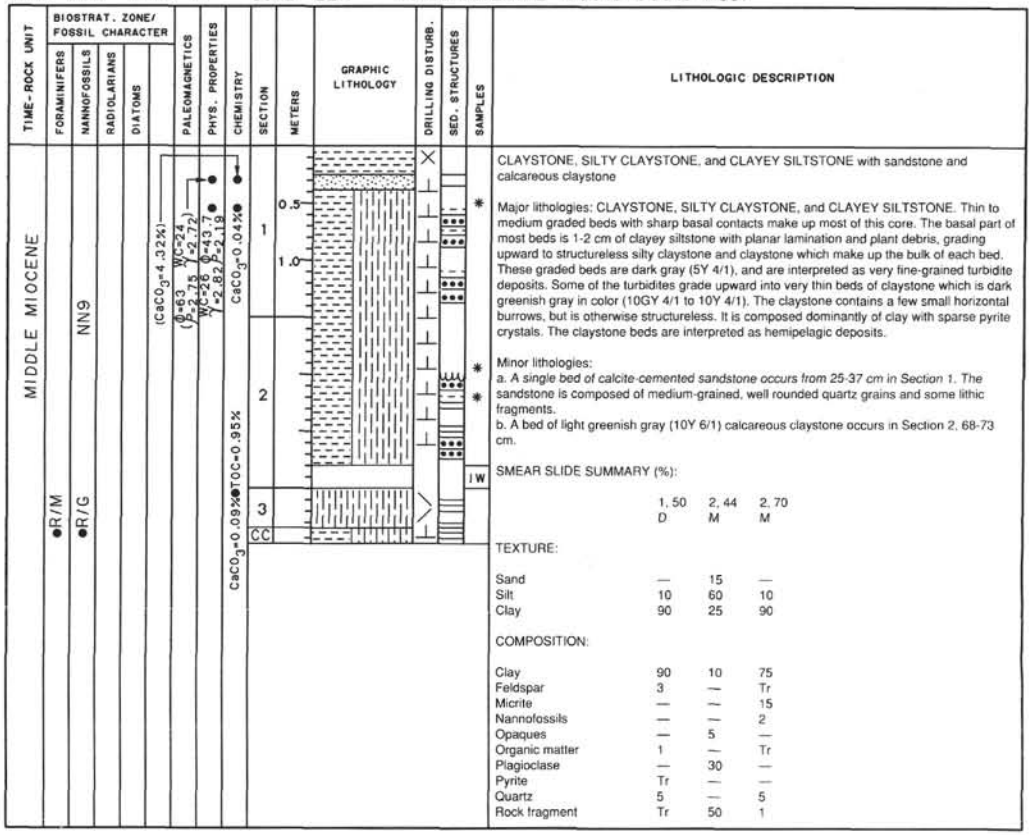
Major lithology: QUARTZ SANDSTONE is the only lithology recovered in this core. It is gray (5Y 5/1) to dark greenish gray (5GY 4/1) and medium-grained. Subrounded quartz grains, rock fragments, and minor feldspar and opaque minerals make up the sandstone. Several large (up to 1 cm long) wood fragments occur in the lower part of the bed (Section 1, 131-135 cm). The sandstone is graded, with some diffuse planar laminae in the middle part which are accentuated by concentrations of black plant debris. In the core catcher there is a massive sandstone bed which is very indurated and cemented by calcium carbonate. It is composed of quartz grains and angular lithic grains.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 71 D	1, 140 D	T CC, 30 D
TEXTURE:			
Sand	85	75	70
Silt	10	5	—
Clay	5	20	30
COMPOSITION:			
Clay	3	20	30
Feldspar	5	5	5
Glauconite	—	Tr	—
Opaques	2	5	—
Plant	5	—	—
Quartz	65	40	40
Rock fragment	20	25	20
Serpentine	—	—	5
Zircon	Tr	—	—



SITE 768 HOLE C CORE 22R CORED INTERVAL 555.8-565.5 mbsf



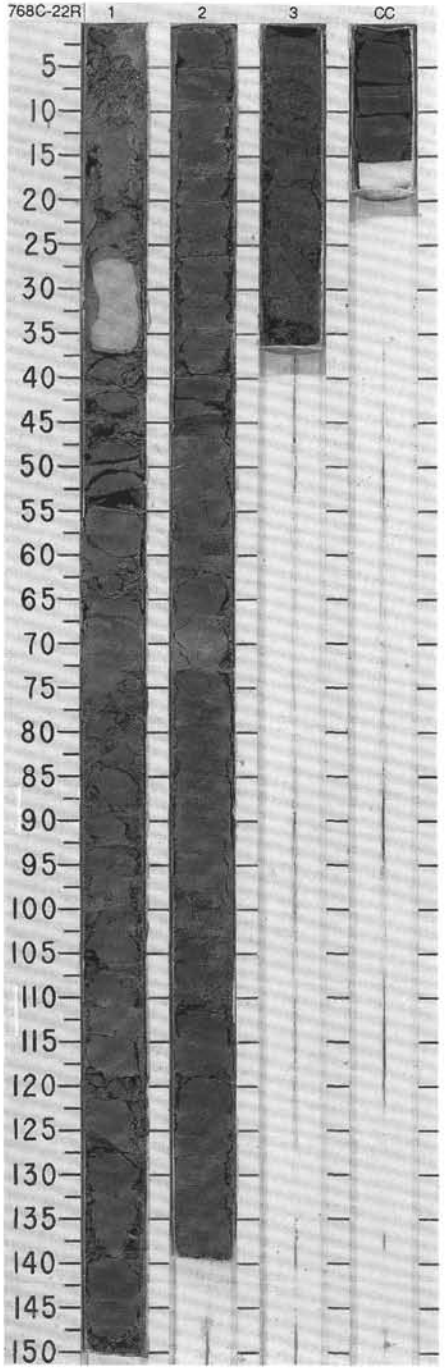
CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE with sandstone and calcareous claystone

Major lithologies: CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE. Thin to medium graded beds with sharp basal contacts make up most of this core. The basal part of most beds is 1-2 cm of clayey siltstone with planar lamination and plant debris, grading upward to structureless silty claystone and claystone which make up the bulk of each bed. These graded beds are dark gray (5Y 4/1), and are interpreted as very fine-grained turbidite deposits. Some of the turbidites grade upward into very thin beds of claystone which is dark greenish gray in color (10GY 4/1 to 10Y 4/1). The claystone contains a few small horizontal burrows, but is otherwise structureless. It is composed dominantly of clay with sparse pyrite crystals. The claystone beds are interpreted as hemipelagic deposits.

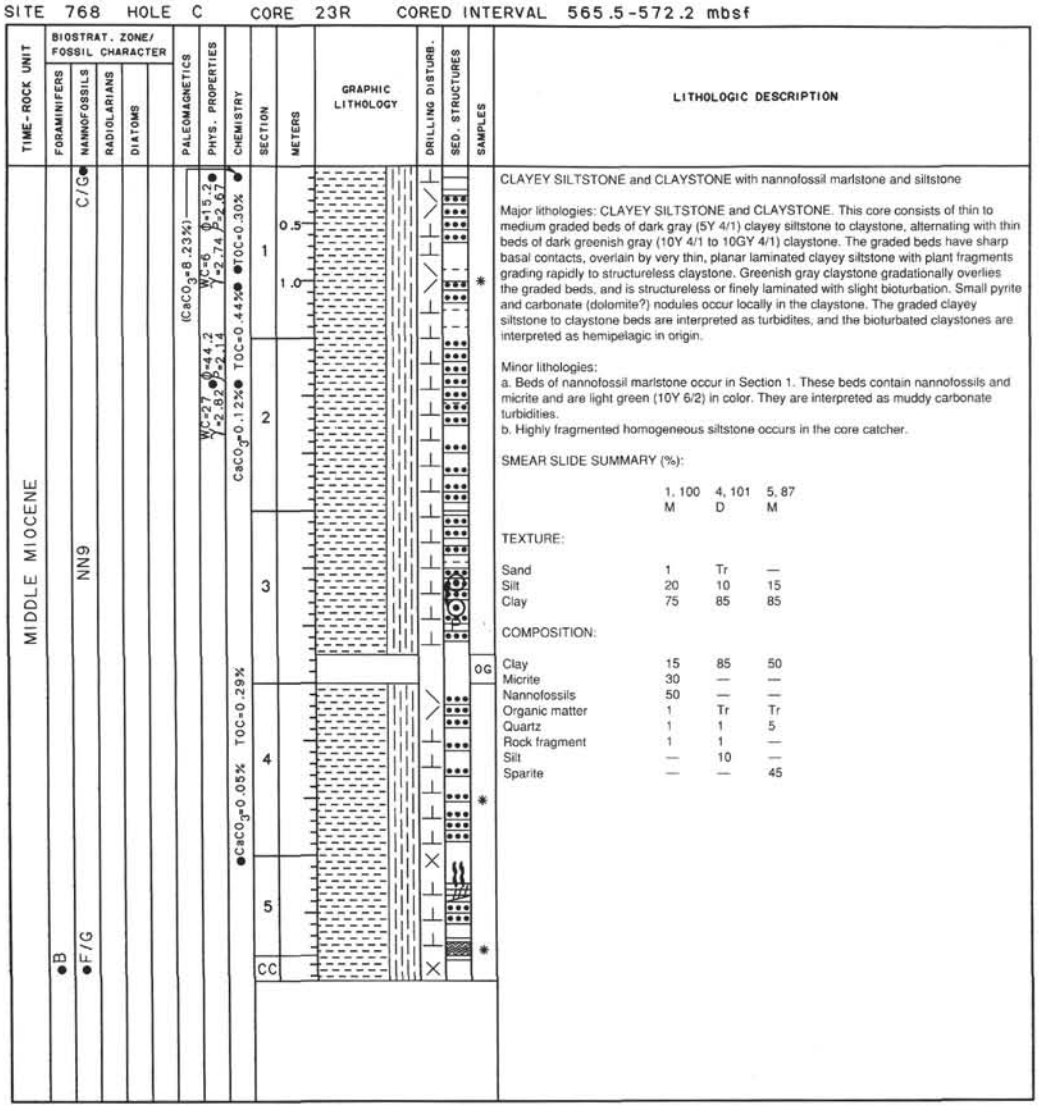
Minor lithologies:
a. A single bed of calcite-cemented sandstone occurs from 25-37 cm in Section 1. The sandstone is composed of medium-grained, well rounded quartz grains and some lithic fragments.
b. A bed of light greenish gray (10Y 6/1) calcareous claystone occurs in Section 2, 68-73 cm.

SMEAR SLIDE SUMMARY (%):

	1, 50 D	2, 44 M	2, 70 M
TEXTURE:			
Sand	—	15	—
Silt	10	60	10
Clay	90	25	90
COMPOSITION:			
Clay	90	10	75
Feldspar	3	—	Tr
Micrite	—	—	15
Nannofossils	—	—	2
Opaques	—	5	—
Organic matter	1	—	Tr
Plagioclase	—	30	—
Pyrite	Tr	—	—
Quartz	5	—	5
Rock fragment	Tr	50	1



SITE 768 HOLE C CORE 23R CORED INTERVAL 565.5-572.2 mbsf



LITHOLOGIC DESCRIPTION

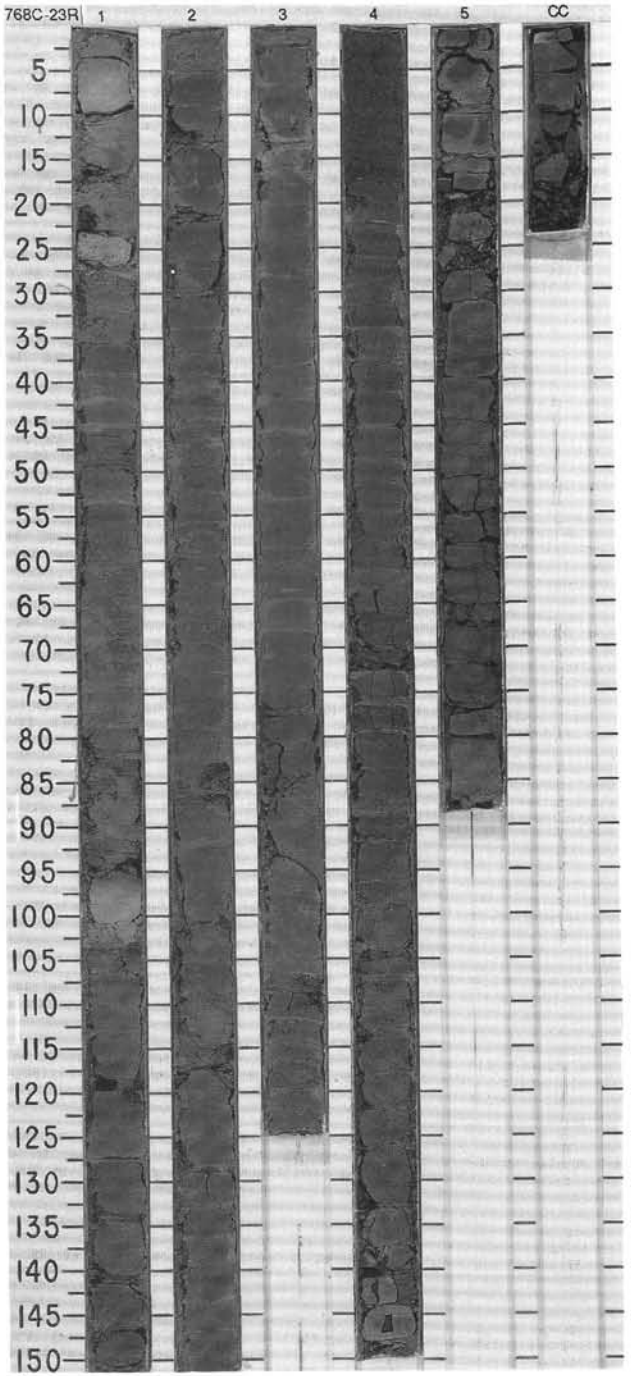
CLAYEY SILTSTONE and CLAYSTONE with nannofossil marlstone and siltstone

Major lithologies: CLAYEY SILTSTONE and CLAYSTONE. This core consists of thin to medium graded beds of dark gray (5Y 4/1) clayey siltstone to claystone, alternating with thin beds of dark greenish gray (10Y 4/1 to 10GY 4/1) claystone. The graded beds have sharp basal contacts, overlain by very thin, planar laminated clayey siltstone with plant fragments grading rapidly to structureless claystone. Greenish gray claystone gradationally overlies the graded beds, and is structureless or finely laminated with slight bioturbation. Small pyrite and carbonate (dolomite?) nodules occur locally in the claystone. The graded clayey siltstone to claystone beds are interpreted as turbidites, and the bioturbated claystones are interpreted as hemipelagic in origin.

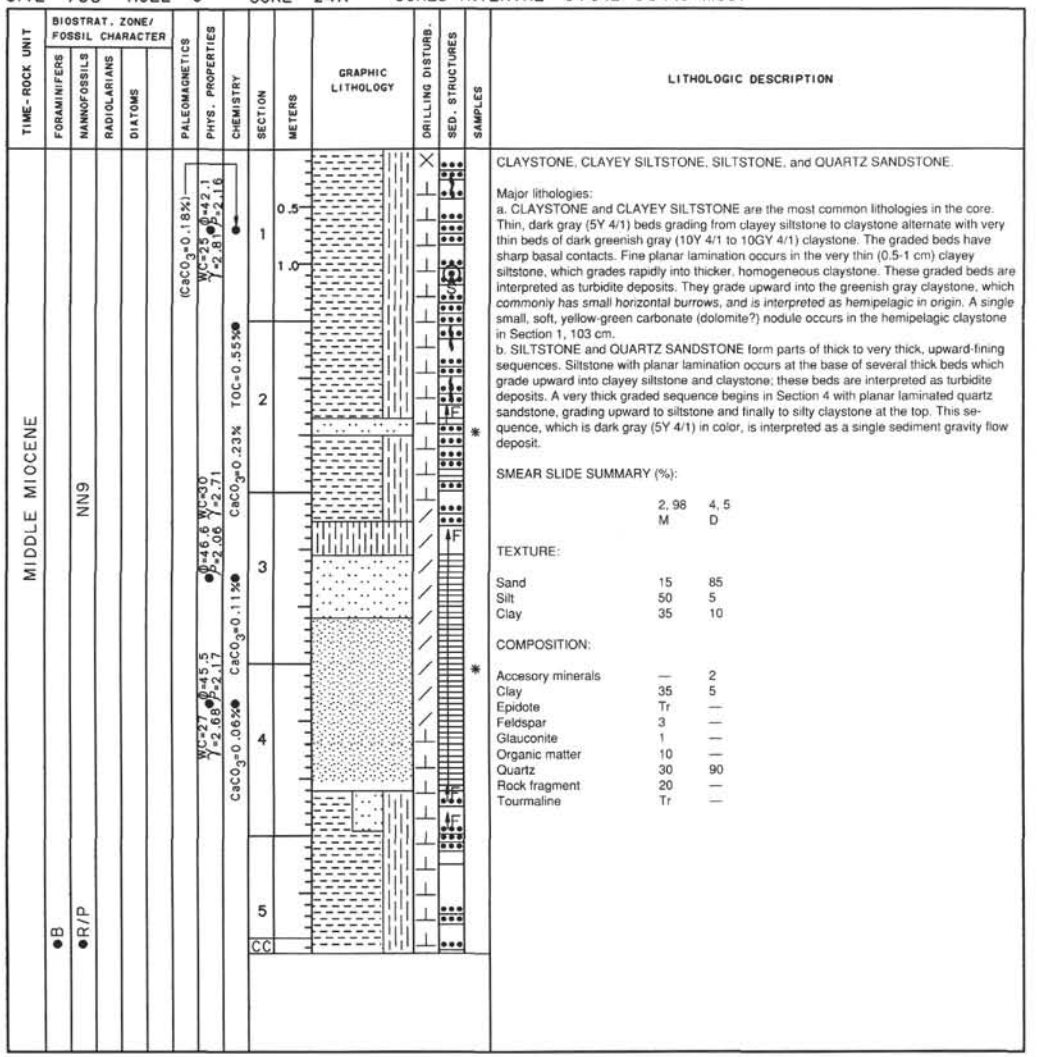
Minor lithologies:
a. Beds of nannofossil marlstone occur in Section 1. These beds contain nannofossils and micrite and are light green (10Y 6/2) in color. They are interpreted as muddy carbonate turbidites.
b. Highly fragmented homogeneous siltstone occurs in the core catcher.

SMEAR SLIDE SUMMARY (%):

	1, 100 M	4, 101 D	5, 87 M
TEXTURE:			
Sand	1	Tr	—
Silt	20	10	15
Clay	75	85	85
COMPOSITION:			
Clay	15	85	50
Micrite	30	—	—
Nannofossils	50	—	—
Organic matter	1	Tr	Tr
Quartz	1	1	5
Rock fragment	1	1	—
Silt	—	10	—
Sparite	—	—	45



SITE 768 HOLE C CORE 24R CORED INTERVAL 575.2-584.9 mbsf



LITHOLOGIC DESCRIPTION

CLAYSTONE, CLAYEY SILTSTONE, SILTSTONE, and QUARTZ SANDSTONE.

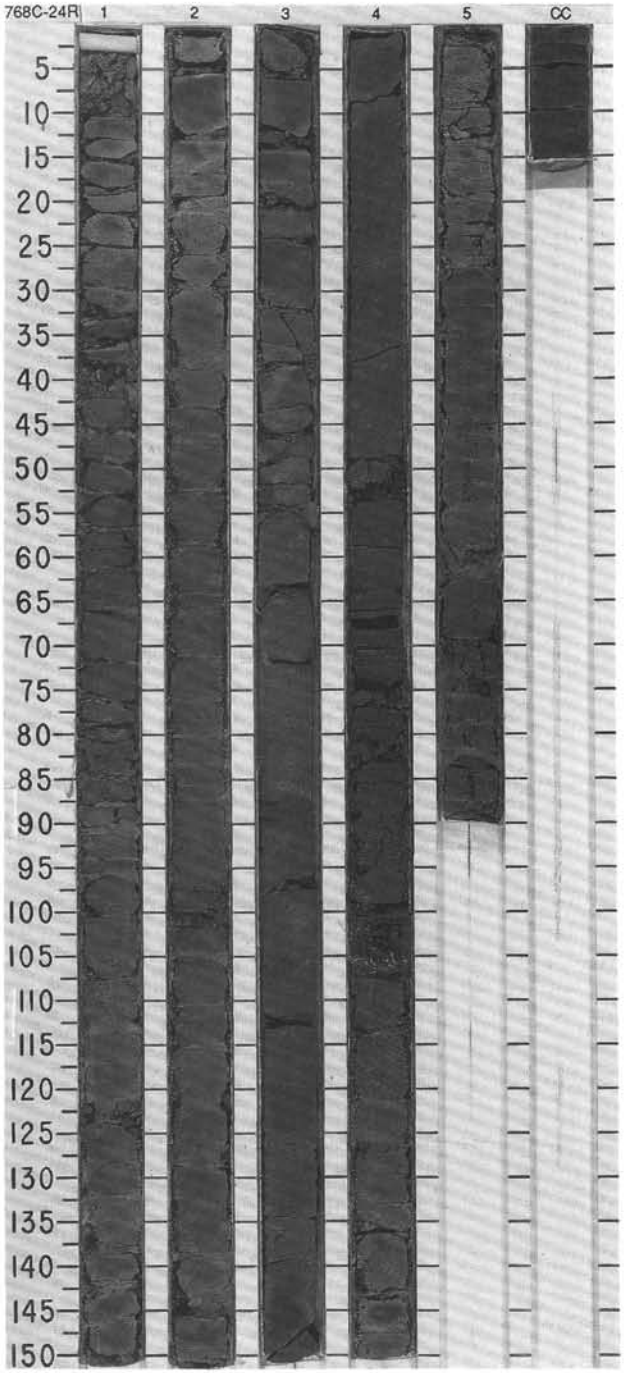
Major lithologies:

a. CLAYSTONE and CLAYEY SILTSTONE are the most common lithologies in the core. Thin, dark gray (5Y 4/1) beds grading from clayey siltstone to claystone alternate with very thin beds of dark greenish gray (10Y 4/1 to 10GY 4/1) claystone. The graded beds have sharp basal contacts. Fine planar lamination occurs in the very thin (0.5-1 cm) clayey siltstone, which grades rapidly into thicker, homogeneous claystone. These graded beds are interpreted as turbidite deposits. They grade upward into the greenish gray claystone, which commonly has small horizontal burrows, and is interpreted as hemipelagic in origin. A single small, soft, yellow-green carbonate (dolomite?) nodule occurs in the hemipelagic claystone in Section 1, 103 cm.

b. SILTSTONE and QUARTZ SANDSTONE form parts of thick to very thick, upward-fining sequences. Siltstone with planar lamination occurs at the base of several thick beds which grade upward into clayey siltstone and claystone; these beds are interpreted as turbidite deposits. A very thick graded sequence begins in Section 4 with planar laminated quartz sandstone, grading upward to siltstone and finally to silty claystone at the top. This sequence, which is dark gray (5Y 4/1) in color, is interpreted as a single sediment gravity flow deposit.

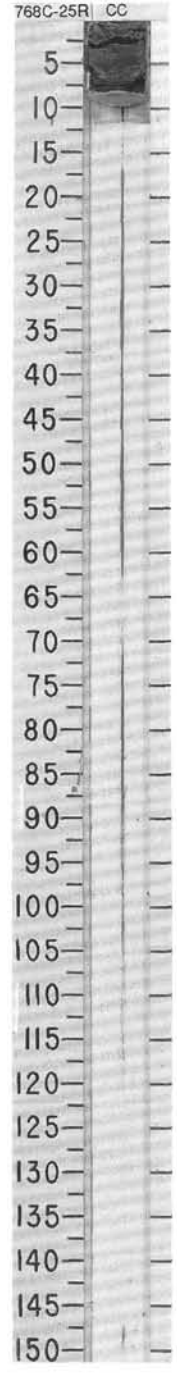
SMEAR SLIDE SUMMARY (%):

	2, 98 M	4, 5 D
TEXTURE:		
Sand	15	85
Silt	50	5
Clay	35	10
COMPOSITION:		
Accesory minerals	—	2
Clay	35	5
Epidote	Tr	—
Feldspar	3	—
Glauconite	1	—
Organic matter	10	—
Quartz	30	90
Rock fragment	20	—
Tourmaline	Tr	—

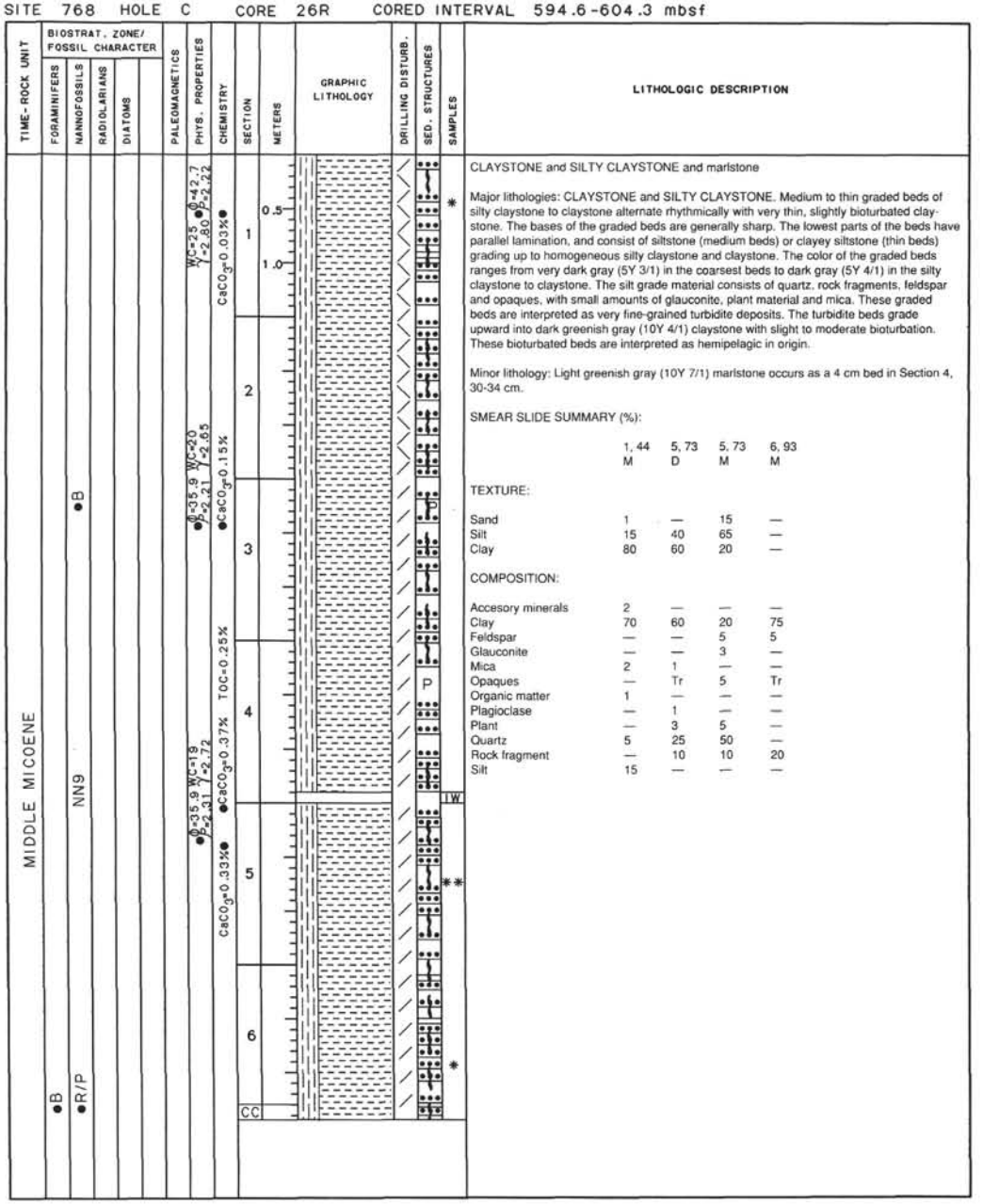


SITE 768 HOLE C CORE 25R CORED INTERVAL 584.9-594.6 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
MIDDLE MIOCENE	B●	R/P● NN9						CC			X			CLAYEY SILTSTONE and CLAYSTONE Major lithology: CLAYEY SILTSTONE and CLAYSTONE occur in a single graded bed in the core catcher. The color ranges from very dark to dark gray (5Y 3/1 to 5Y 4/1). Several wavy laminations are also preserved, although the section is disturbed by drilling.



SITE 768 HOLE C CORE 26R CORED INTERVAL 594.6-604.3 mbsf



LITHOLOGIC DESCRIPTION

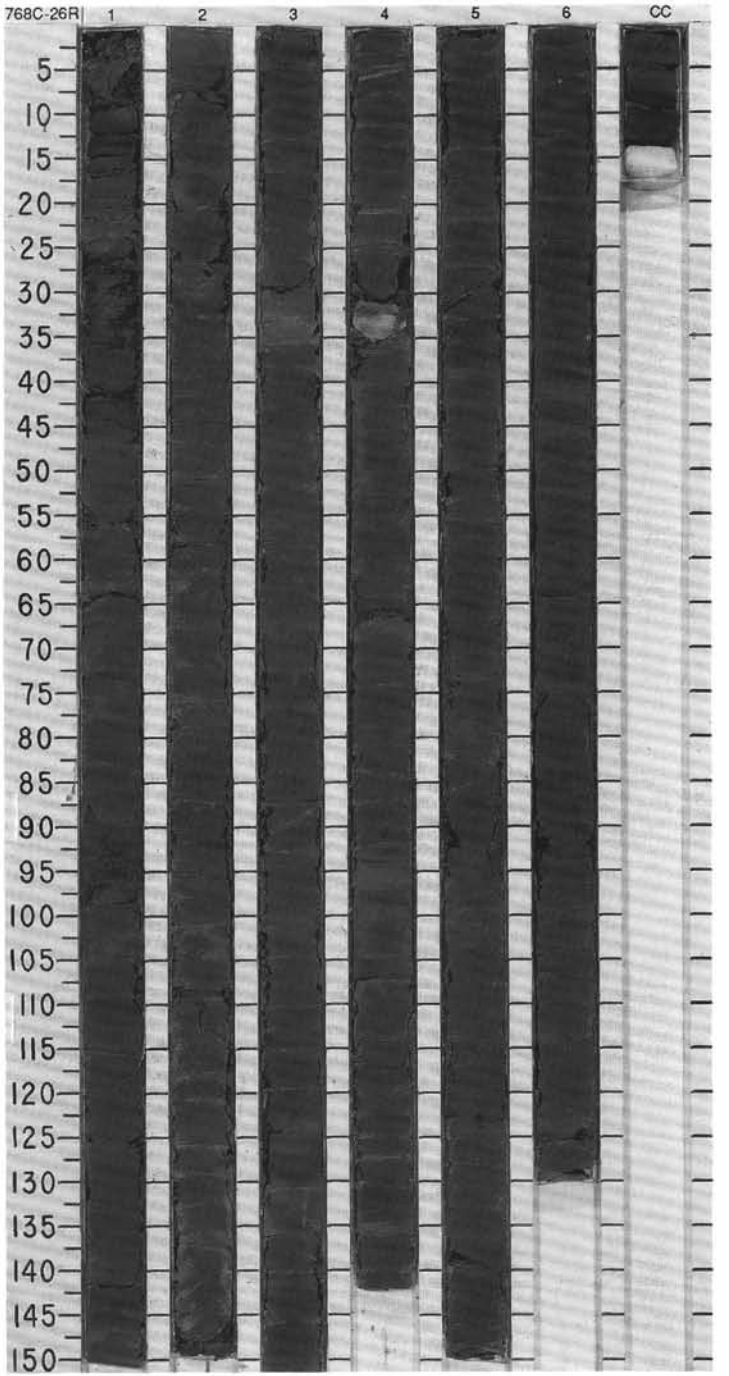
CLAYSTONE and SILTY CLAYSTONE and marlstone

Major lithologies: CLAYSTONE and SILTY CLAYSTONE. Medium to thin graded beds of silty claystone to claystone alternate rhythmically with very thin, slightly bioturbated claystone. The bases of the graded beds are generally sharp. The lowest parts of the beds have parallel lamination, and consist of siltstone (medium beds) or clayey siltstone (thin beds) grading up to homogeneous silty claystone and claystone. The color of the graded beds ranges from very dark gray (5Y 3/1) in the coarsest beds to dark gray (5Y 4/1) in the silty claystone to claystone. The silt grade material consists of quartz, rock fragments, feldspar and opaques, with small amounts of glauconite, plant material and mica. These graded beds are interpreted as very fine-grained turbidite deposits. The turbidite beds grade upward into dark greenish gray (10Y 4/1) claystone with slight to moderate bioturbation. These bioturbated beds are interpreted as hemipelagic in origin.

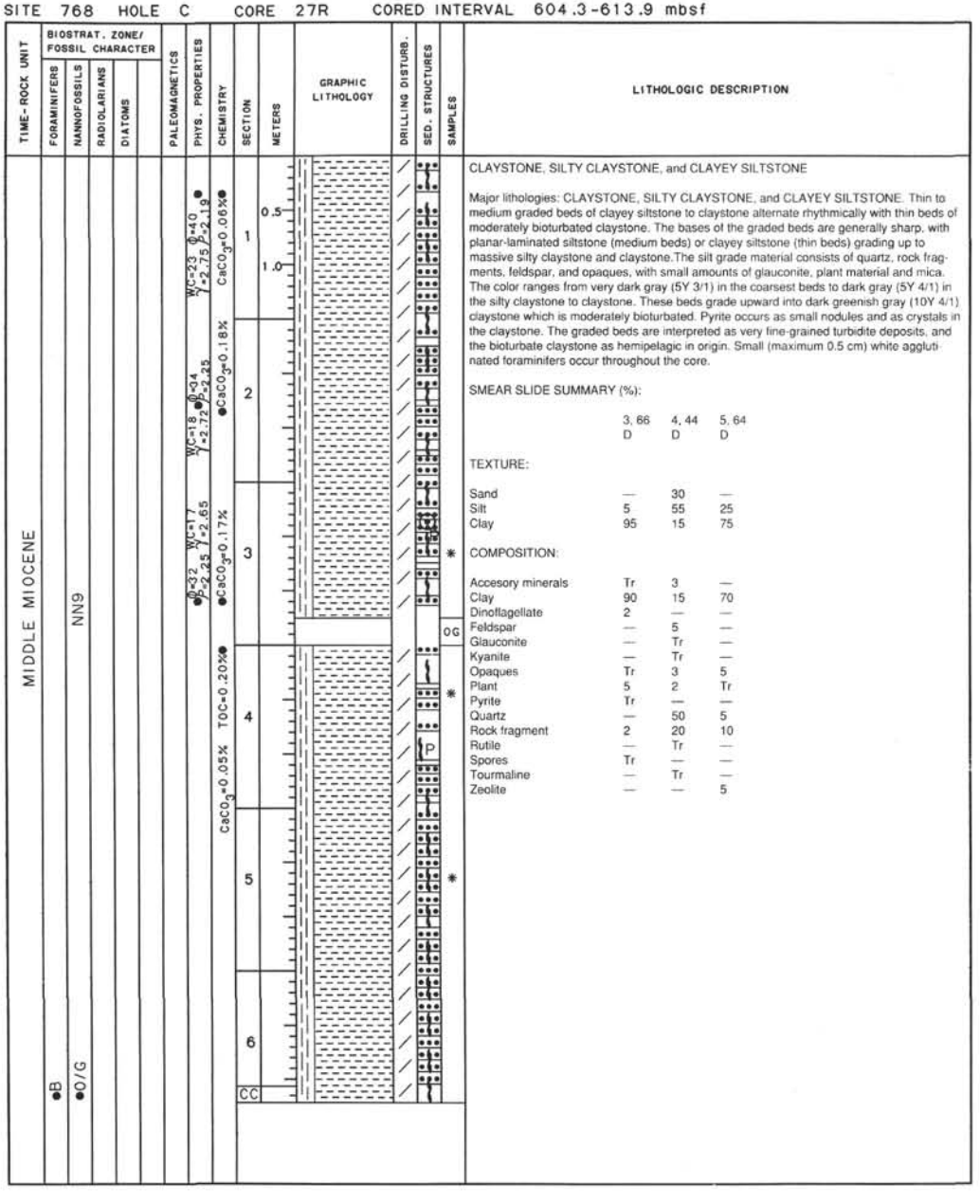
Minor lithology: Light greenish gray (10Y 7/1) marlstone occurs as a 4 cm bed in Section 4, 30-34 cm.

SMEAR SLIDE SUMMARY (%):

	1, 44 M	5, 73 D	5, 73 M	6, 93 M
TEXTURE:				
Sand	1	—	15	—
Silt	15	40	65	—
Clay	80	60	20	—
COMPOSITION:				
Accesory minerals	2	—	—	—
Clay	70	60	20	75
Feldspar	—	—	5	5
Glauconite	—	—	3	—
Mica	2	1	—	—
Opaques	—	Tr	5	Tr
Organic matter	1	—	—	—
Plagioclase	—	1	—	—
Plant	—	3	5	—
Quartz	5	25	50	—
Rock fragment	—	10	10	20
Silt	15	—	—	—



SITE 768 HOLE C CORE 27R CORED INTERVAL 604.3-613.9 mbsf

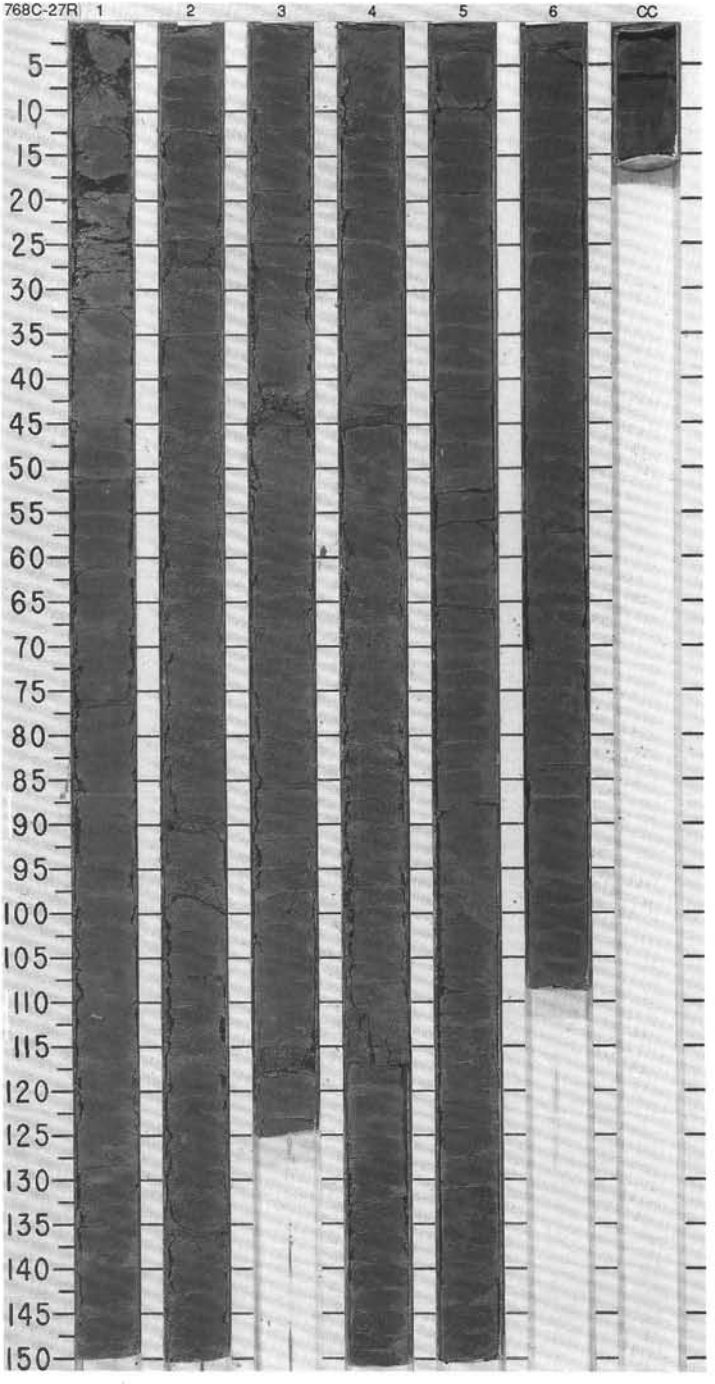


CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE

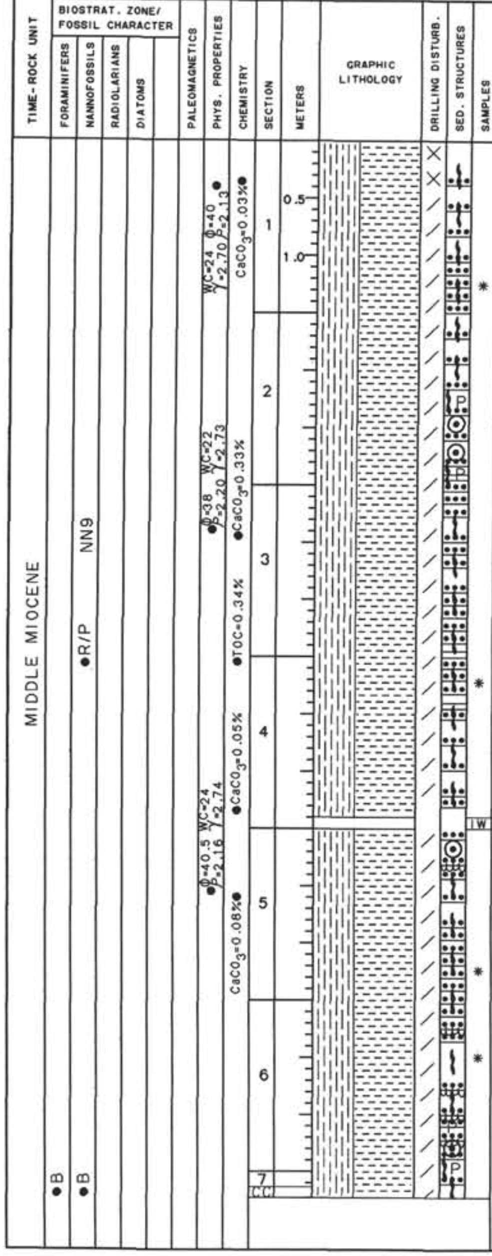
Major lithologies: CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE. Thin to medium graded beds of clayey siltstone to claystone alternate rhythmically with thin beds of moderately bioturbated claystone. The bases of the graded beds are generally sharp, with planar-laminated siltstone (medium beds) or clayey siltstone (thin beds) grading up to massive silty claystone and claystone. The silt grade material consists of quartz, rock fragments, feldspar, and opaques, with small amounts of glauconite, plant material and mica. The color ranges from very dark gray (5Y 3/1) in the coarsest beds to dark gray (5Y 4/1) in the silty claystone to claystone. These beds grade upward into dark greenish gray (10Y 4/1) claystone which is moderately bioturbated. Pyrite occurs as small nodules and as crystals in the claystone. The graded beds are interpreted as very fine-grained turbidite deposits, and the bioturbate claystone as hemipelagic in origin. Small (maximum 0.5 cm) white agglutinated foraminifers occur throughout the core.

SMEAR SLIDE SUMMARY (%):

	3, 66 D	4, 44 D	5, 64 D
TEXTURE:			
Sand	—	30	—
Silt	5	55	25
Clay	95	15	75
COMPOSITION:			
Accesory minerals	Tr	3	—
Clay	90	15	70
Dinoflagellate	2	—	—
Feldspar	—	5	—
Glauconite	—	Tr	—
Kyanite	—	Tr	—
Opaques	Tr	3	5
Plant	5	2	Tr
Pyrite	Tr	—	—
Quartz	—	50	5
Rock fragment	2	20	10
Rutile	—	Tr	—
Spores	Tr	—	—
Tourmaline	—	Tr	—
Zeolite	—	—	5



SITE 768 HOLE C CORE 28R CORED INTERVAL 613.9-623.5 mbsf



LITHOLOGIC DESCRIPTION

CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE

Major lithologies: CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE. This core consists of a rhythmic alternation of graded beds of clayey siltstone to claystone, and moderately bioturbated claystone. The bases of the graded beds are generally sharp. Some beds have a planar-laminated siltstone at the base, but most beds grade from clayey siltstone (with planar lamination in some beds) to massive or slightly bioturbated claystone. The silt grade material consists of quartz, rock fragments, feldspar, plant material and opaques. These beds are dark gray (5Y 4/1), and are interpreted as turbidite deposit. Gradationally overlying each turbidite is a thin to very thin bed of dark greenish gray (10Y 4/1), moderately bioturbated claystone which is interpreted as hemipelagic in origin. Small pyrite nodules are moderately common in the claystone.

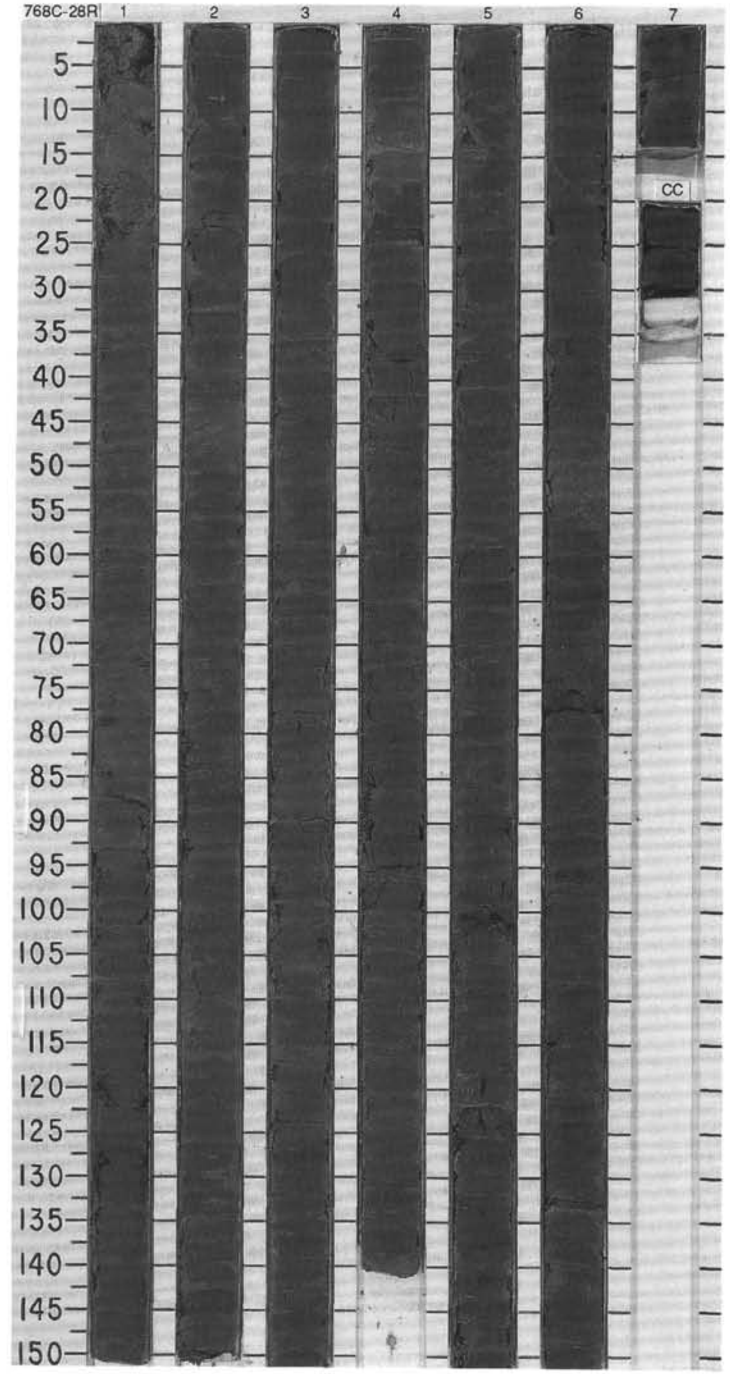
Minor lithologies:

a. Calcareous claystones occur in diffuse thin beds in Section 4, 11-16 cm and Section 6, 46-64 cm. They are olive gray (5Y 4/2) and contain micrite

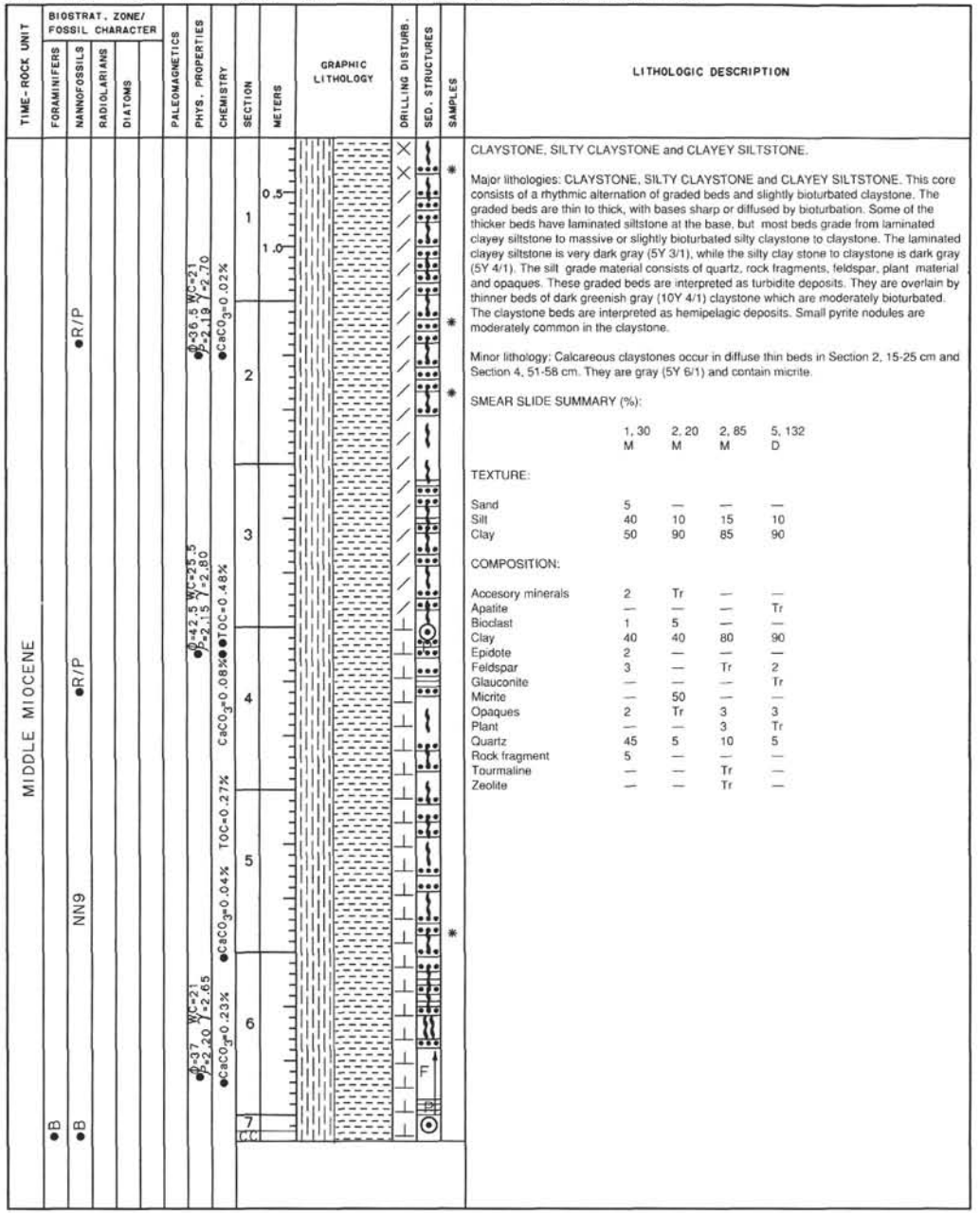
b. Claystones containing volcaniclastic material occur in Section 1, 124 cm and Section 5, 123-124 cm. These very thin beds are dark olive gray (5Y 3/2 and contain plagioclase, apatite and hornblende.

SMEAR SLIDE SUMMARY (%):

	1, 126 M	4, 23 D	5, 124 M	6, 50 M
TEXTURE:				
Sand	—	15	—	—
Silt	—	60	10	—
Clay	—	25	90	100
COMPOSITION:				
Apatite	Tr	—	Tr	—
Clay	80	20	90	80
Epidote	—	—	2	—
Feldspar	5	—	5	—
Glauconite	—	Tr	—	—
Hornblende	Tr	—	—	—
Micrite	—	—	—	20
Opaques	5	5	3	—
Plant	—	15	—	—
Quartz	—	50	—	—
Rock fragment	5	10	Tr	—
Zircon	—	Tr	—	—



SITE 768 HOLE C CORE 29R CORED INTERVAL 623.5-633.1 mbsf



LITHOLOGIC DESCRIPTION

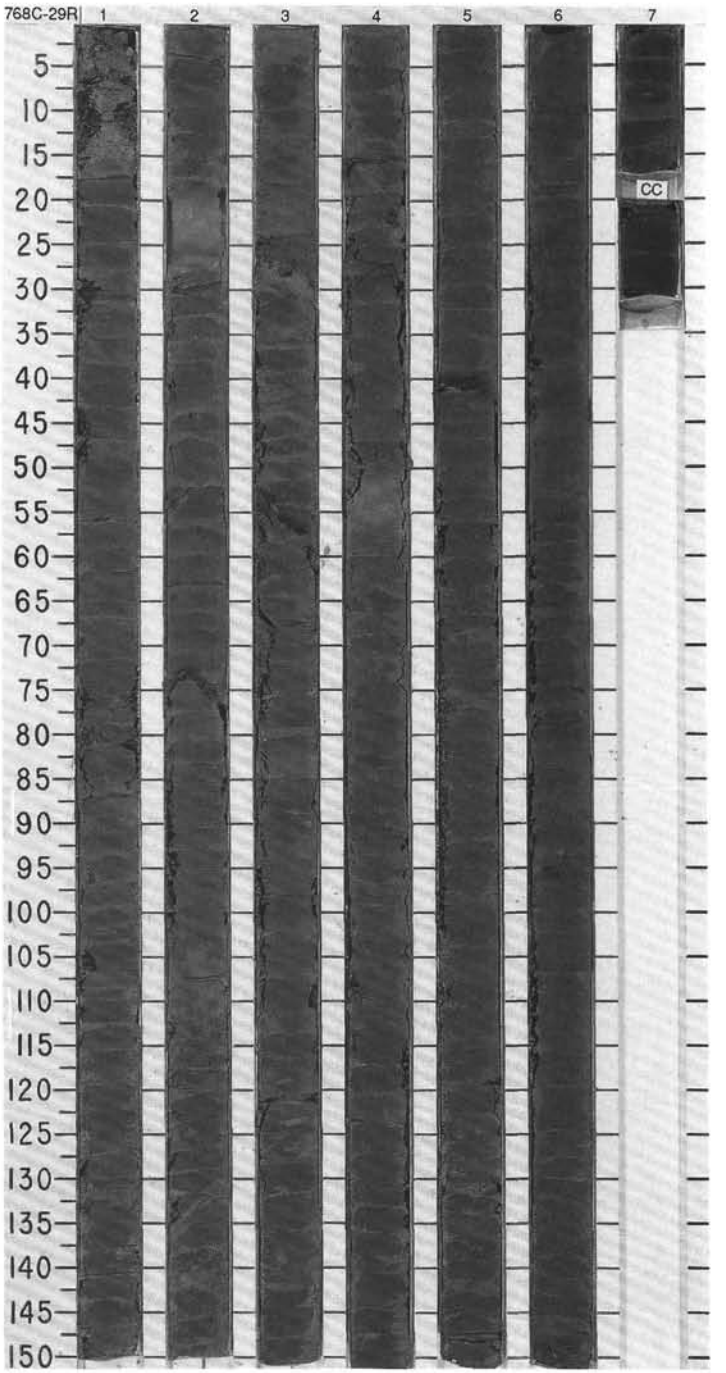
CLAYSTONE, SILTY CLAYSTONE and CLAYEY SILTSTONE.

Major lithologies: CLAYSTONE, SILTY CLAYSTONE and CLAYEY SILTSTONE. This core consists of a rhythmic alternation of graded beds and slightly bioturbated claystone. The graded beds are thin to thick, with bases sharp or diffused by bioturbation. Some of the thicker beds have laminated siltstone at the base, but most beds grade from laminated clayey siltstone to massive or slightly bioturbated silty claystone to claystone. The laminated clayey siltstone is very dark gray (5Y 3/1), while the silty clay stone to claystone is dark gray (5Y 4/1). The silt grade material consists of quartz, rock fragments, feldspar, plant material and opaques. These graded beds are interpreted as turbidite deposits. They are overlain by thinner beds of dark greenish gray (10Y 4/1) claystone which are moderately bioturbated. The claystone beds are interpreted as hemipelagic deposits. Small pyrite nodules are moderately common in the claystone.

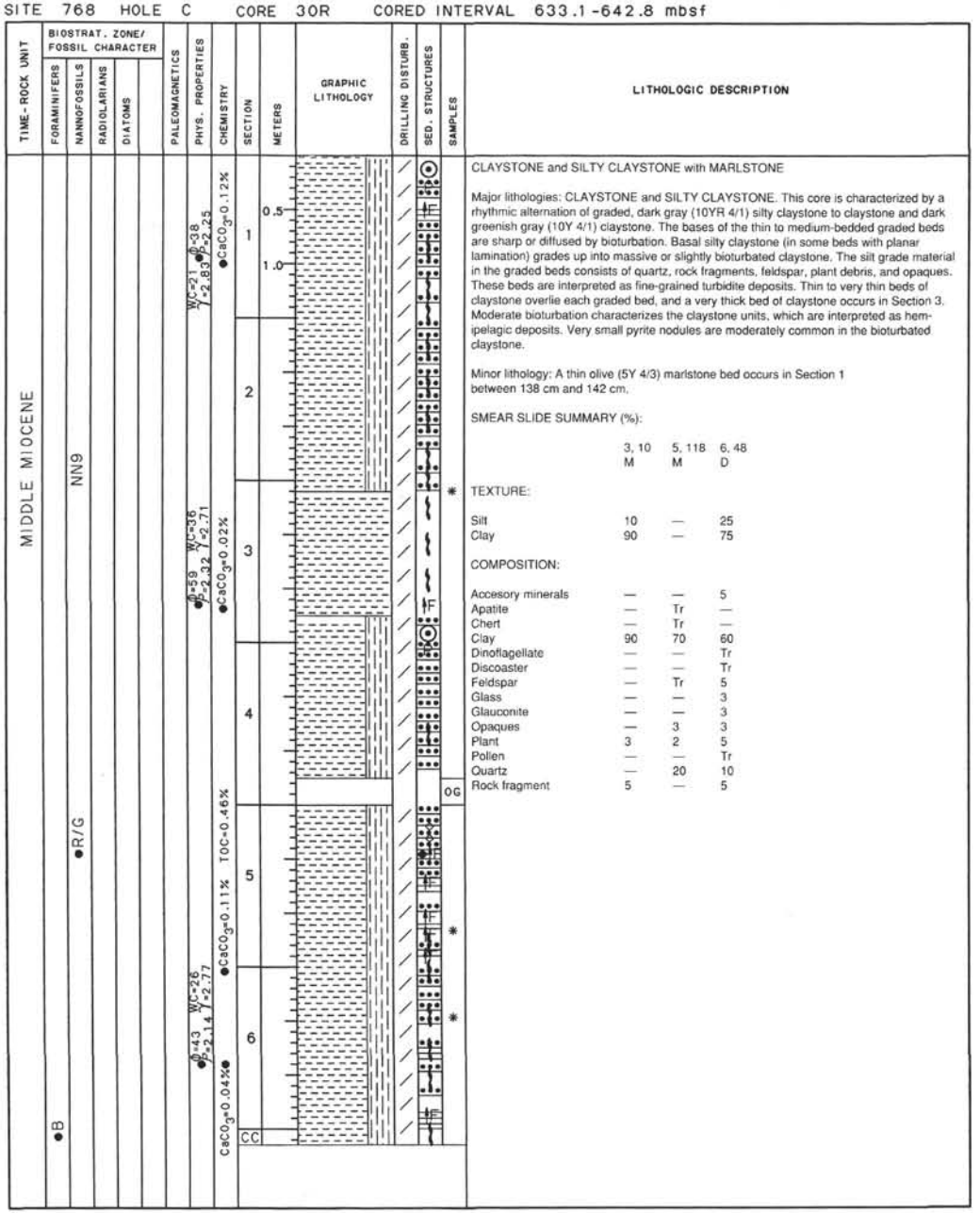
Minor lithology: Calcareous claystones occur in diffuse thin beds in Section 2, 15-25 cm and Section 4, 51-58 cm. They are gray (5Y 6/1) and contain micrite.

SMEAR SLIDE SUMMARY (%):

	1, 30 M	2, 20 M	2, 85 M	5, 132 D
TEXTURE:				
Sand	5	—	—	—
Silt	40	10	15	10
Clay	50	90	85	90
COMPOSITION:				
Accesory minerals	2	Tr	—	—
Apatite	—	—	—	Tr
Bioclast	1	5	—	—
Clay	40	40	80	90
Epidote	2	—	—	—
Feldspar	3	—	Tr	2
Glauconite	—	—	—	Tr
Micrite	—	50	—	—
Opaques	2	Tr	3	3
Plant	—	—	3	Tr
Quartz	45	5	10	5
Rock fragment	5	—	—	—
Tourmaline	—	—	Tr	—
Zeolite	—	—	Tr	—



SITE 768 HOLE C CORE 30R CORED INTERVAL 633.1-642.8 mbsf



LITHOLOGIC DESCRIPTION

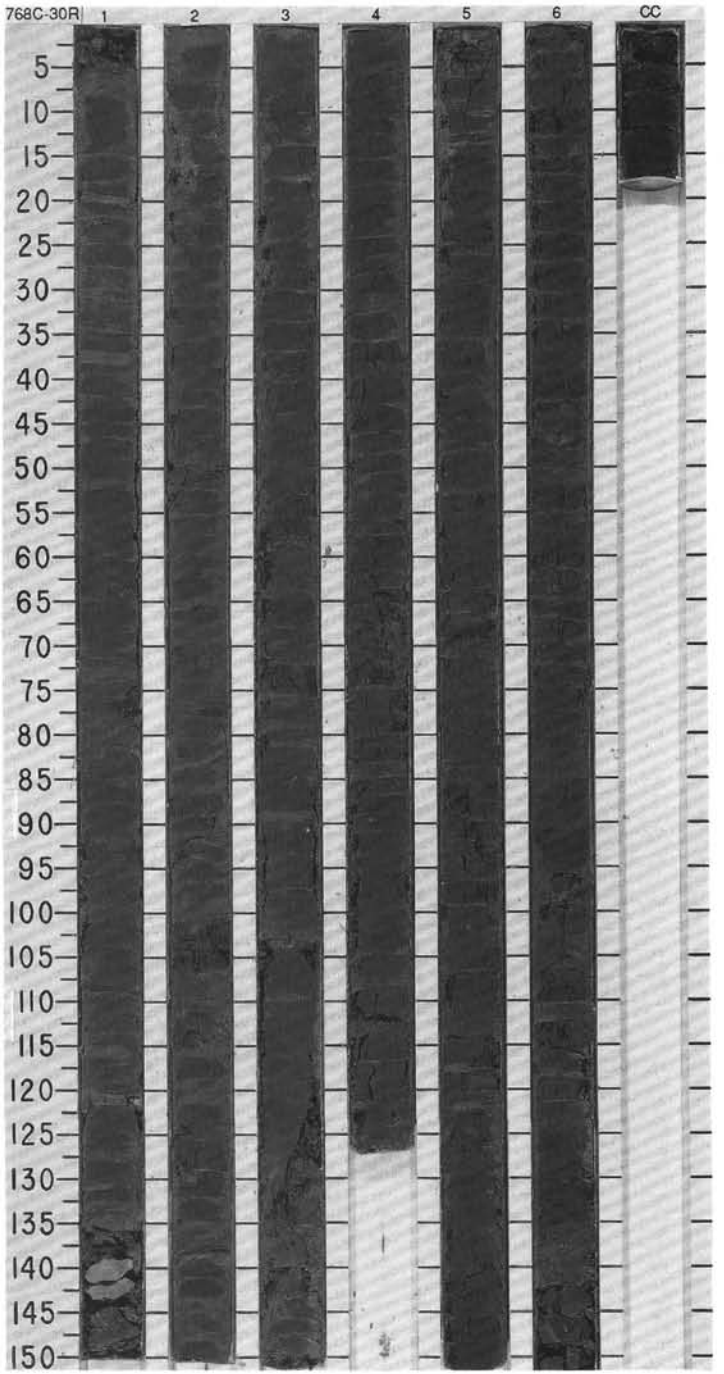
CLAYSTONE and SILTY CLAYSTONE with MARLSTONE

Major lithologies: CLAYSTONE and SILTY CLAYSTONE. This core is characterized by a rhythmic alternation of graded, dark gray (10YR 4/1) silty claystone to claystone and dark greenish gray (10Y 4/1) claystone. The bases of the thin to medium-bedded graded beds are sharp or diffused by bioturbation. Basal silty claystone (in some beds with planar lamination) grades up into massive or slightly bioturbated claystone. The silt grade material in the graded beds consists of quartz, rock fragments, feldspar, plant debris, and opaques. These beds are interpreted as fine-grained turbidite deposits. Thin to very thin beds of claystone overlie each graded bed, and a very thick bed of claystone occurs in Section 3. Moderate bioturbation characterizes the claystone units, which are interpreted as hemipelagic deposits. Very small pyrite nodules are moderately common in the bioturbated claystone.

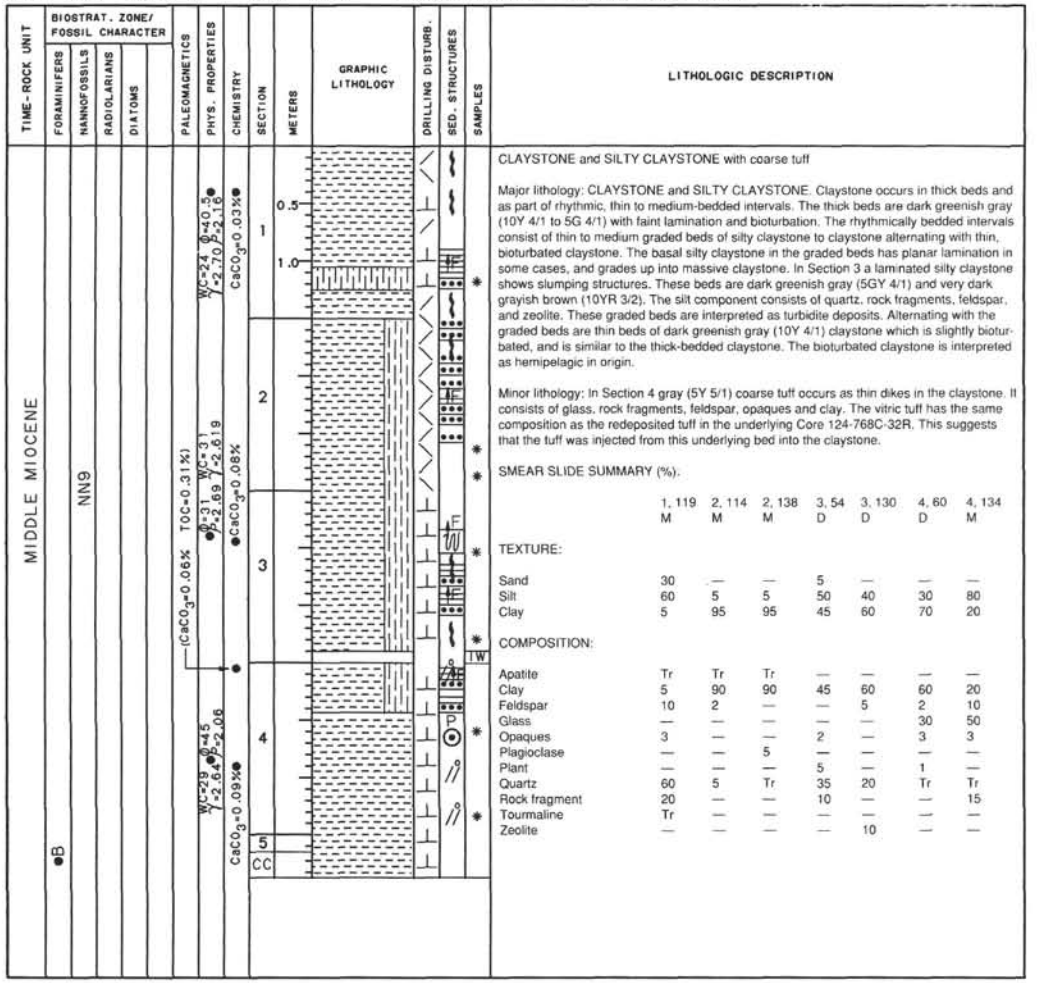
Minor lithology: A thin olive (5Y 4/3) marlstone bed occurs in Section 1 between 138 cm and 142 cm.

SMEAR SLIDE SUMMARY (%):

	3, 10 M	5, 118 M	6, 48 D
TEXTURE:			
Silt	10	—	25
Clay	90	—	75
COMPOSITION:			
Accesory minerals	—	—	5
Apatite	—	Tr	—
Chert	—	Tr	—
Clay	90	70	60
Dinoflagellate	—	—	Tr
Discoaster	—	—	Tr
Feldspar	—	Tr	5
Glass	—	—	3
Glauconite	—	—	3
Opaques	—	3	3
Plant	3	2	5
Pollen	—	—	Tr
Quartz	—	20	10
Rock fragment	5	—	5



SITE 768 HOLE C CORE 31R CORED INTERVAL 642.8-652.4 mbsf



LITHOLOGIC DESCRIPTION

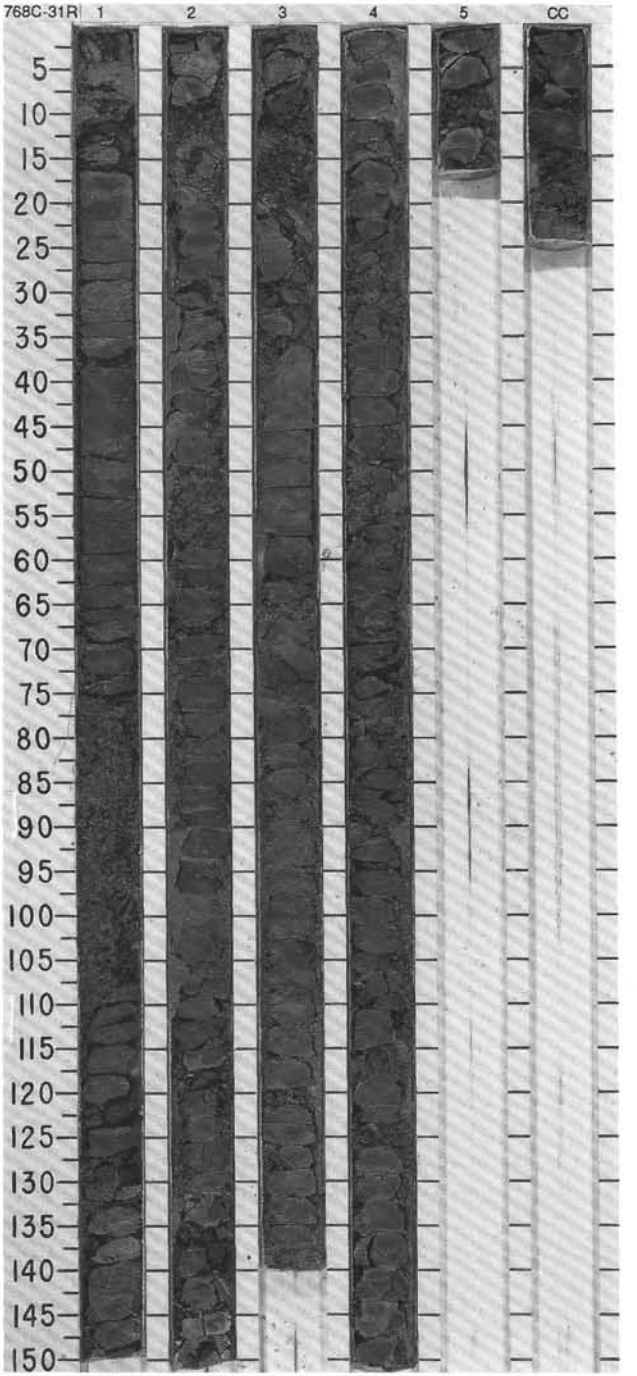
CLAYSTONE and SILTY CLAYSTONE with coarse tuff

Major lithology: CLAYSTONE and SILTY CLAYSTONE. Claystone occurs in thick beds and as part of rhythmic, thin to medium-bedded intervals. The thick beds are dark greenish gray (10Y 4/1 to 5G 4/1) with faint lamination and bioturbation. The rhythmically bedded intervals consist of thin to medium graded beds of silty claystone to claystone alternating with thin, bioturbated claystone. The basal silty claystone in the graded beds has planar lamination in some cases, and grades up into massive claystone. In Section 3 a laminated silty claystone shows slumping structures. These beds are dark greenish gray (5GY 4/1) and very dark grayish brown (10YR 3/2). The silt component consists of quartz, rock fragments, feldspar, and zeolite. These graded beds are interpreted as turbidite deposits. Alternating with the graded beds are thin beds of dark greenish gray (10Y 4/1) claystone which is slightly bioturbated, and is similar to the thick-bedded claystone. The bioturbated claystone is interpreted as hemipelagic in origin.

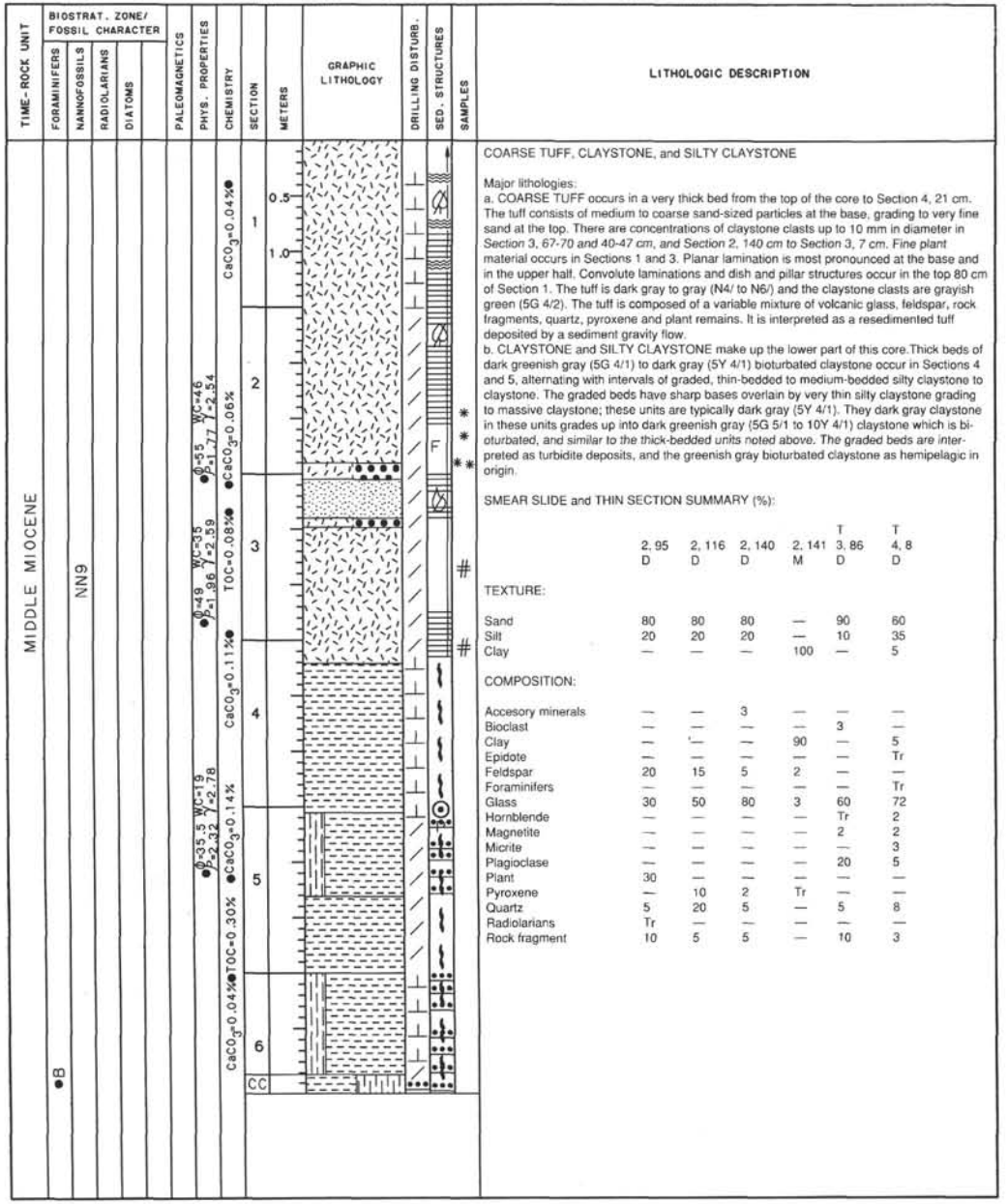
Minor lithology: In Section 4 gray (5Y 5/1) coarse tuff occurs as thin dikes in the claystone. It consists of glass, rock fragments, feldspar, opaques and clay. The vitric tuff has the same composition as the redeposited tuff in the underlying Core 124-768C-32R. This suggests that the tuff was injected from this underlying bed into the claystone.

SMEAR SLIDE SUMMARY (%):

	1, 119 M	2, 114 M	2, 138 M	3, 54 D	3, 130 D	4, 60 D	4, 134 M
TEXTURE:							
Sand	30	—	—	5	—	—	—
Silt	60	5	5	50	40	30	80
Clay	5	95	95	45	60	70	20
COMPOSITION:							
Apatite	Tr	Tr	Tr	—	—	—	—
Clay	5	90	90	45	60	60	20
Feldspar	10	2	—	—	5	2	10
Glass	—	—	—	—	—	30	50
Opaques	3	—	—	2	—	3	3
Plagioclase	—	—	5	—	—	—	—
Plant	—	—	—	5	—	1	—
Quartz	60	5	Tr	35	20	Tr	Tr
Rock fragment	20	—	—	10	—	—	15
Tourmaline	Tr	—	—	—	—	—	—
Zeolite	—	—	—	—	10	—	—



SITE 768 HOLE C CORE 32R CORED INTERVAL 652.4-662.1 mbsf



LITHOLOGIC DESCRIPTION

COARSE TUFF, CLAYSTONE, and SILTY CLAYSTONE

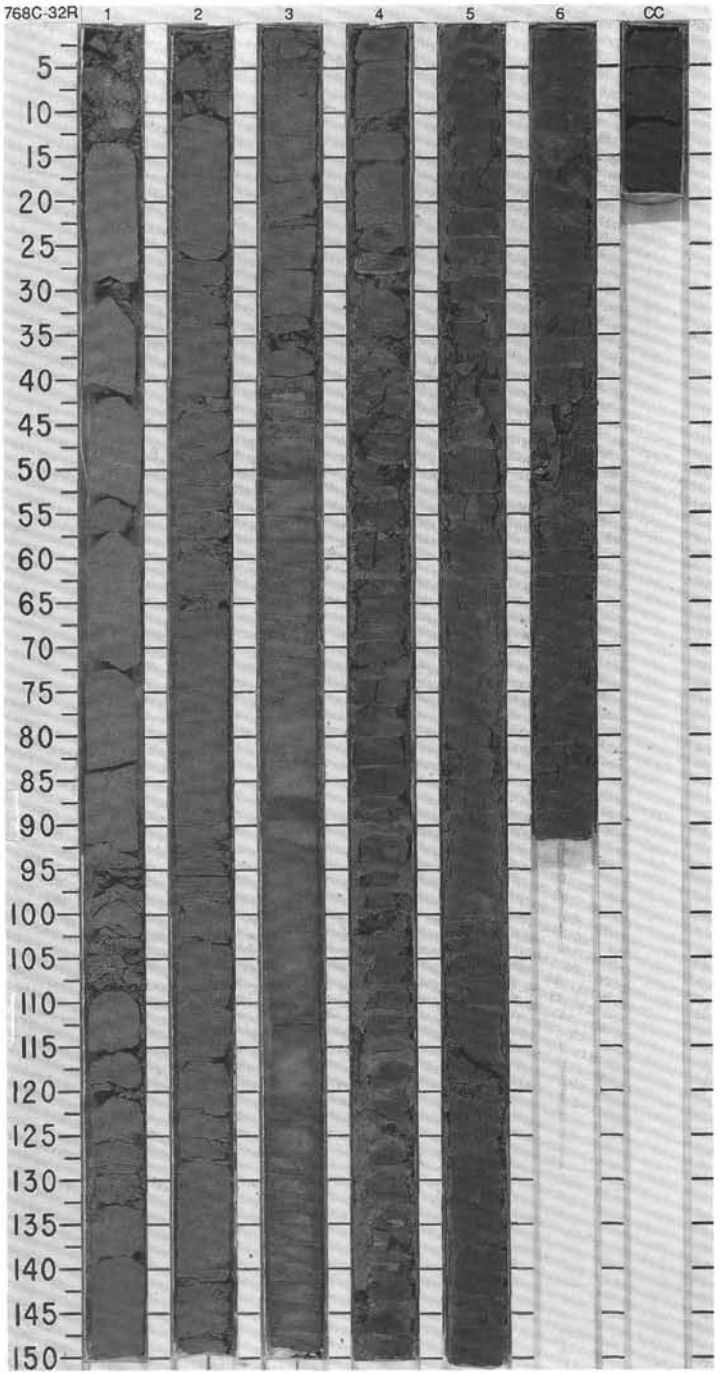
Major lithologies:

a. COARSE TUFF occurs in a very thick bed from the top of the core to Section 4, 21 cm. The tuff consists of medium to coarse sand-sized particles at the base, grading to very fine sand at the top. There are concentrations of claystone clasts up to 10 mm in diameter in *Section 3, 67-70 and 40-47 cm, and Section 2, 140 cm to Section 3, 7 cm. Fine plant* material occurs in Sections 1 and 3. Planar lamination is most pronounced at the base and in the upper half. Convolute laminations and dish and pillar structures occur in the top 80 cm of Section 1. The tuff is dark gray to gray (N4/ to N6/) and the claystone clasts are grayish green (5G 4/2). The tuff is composed of a variable mixture of volcanic glass, feldspar, rock fragments, quartz, pyroxene and plant remains. It is interpreted as a resedimented tuff deposited by a sediment gravity flow.

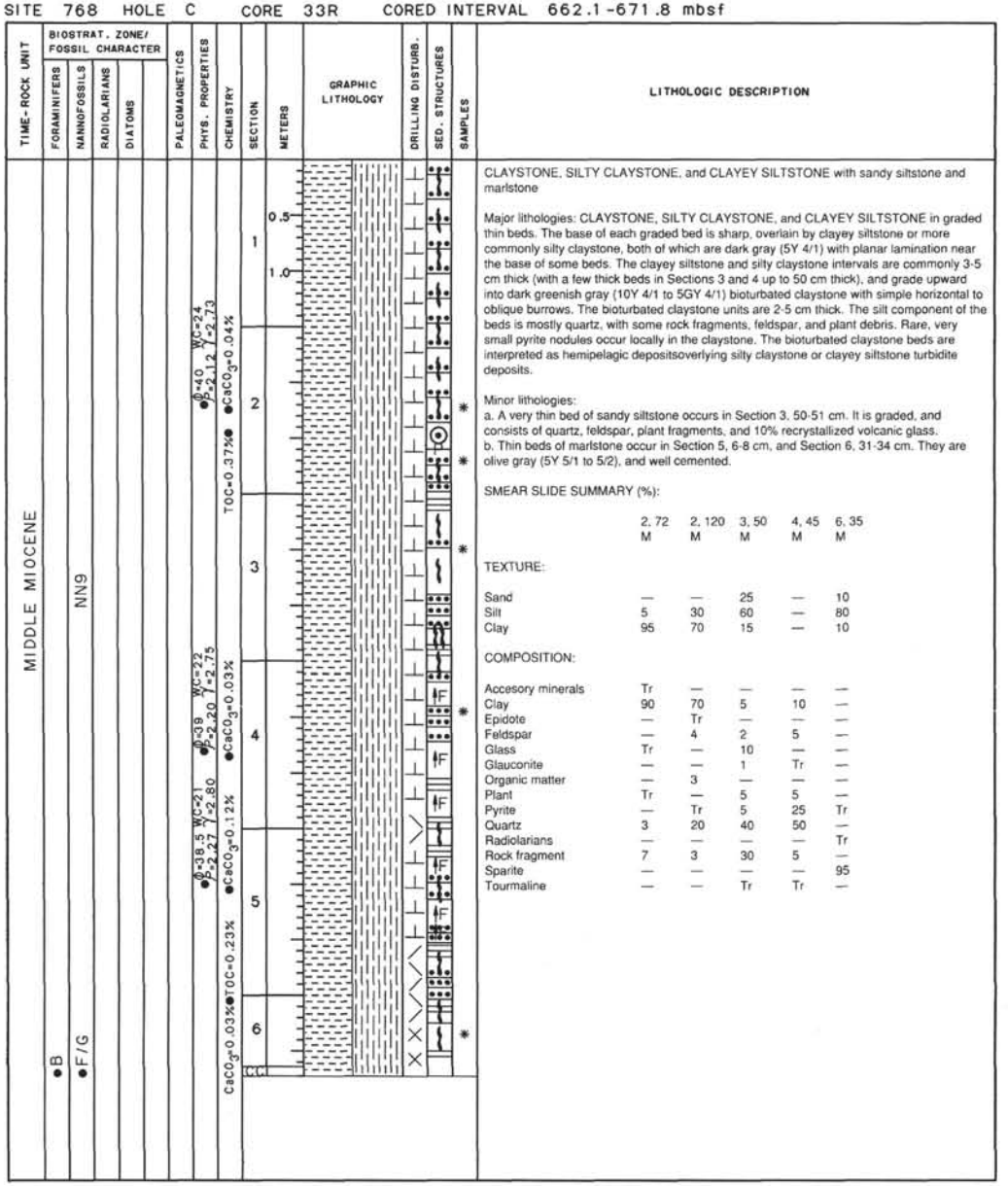
b. CLAYSTONE and SILTY CLAYSTONE make up the lower part of this core. Thick beds of dark greenish gray (5G 4/1) to dark gray (5Y 4/1) bioturbated claystone occur in Sections 4 and 5, alternating with intervals of graded, thin-bedded to medium-bedded silty claystone to claystone. The graded beds have sharp bases overlain by very thin silty claystone grading to massive claystone; these units are typically dark gray (5Y 4/1). They dark gray claystone in these units grades up into dark greenish gray (5G 5/1 to 10Y 4/1) claystone which is bioturbated, and similar to the thick-bedded units noted above. The graded beds are interpreted as turbidite deposits, and the greenish gray bioturbated claystone as hemipelagic in origin.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	2, 95 D	2, 116 D	2, 140 D	2, 141 M	T 3, 86 D	T 4, 8 D
TEXTURE:						
Sand	80	80	80	—	90	60
Silt	20	20	20	—	10	35
Clay	—	—	—	100	—	5
COMPOSITION:						
Accesory minerals	—	—	3	—	—	—
Bioclast	—	—	—	—	3	—
Clay	—	—	—	90	—	5
Epidote	—	—	—	—	—	Tr
Feldspar	20	15	5	2	—	—
Foraminifers	—	—	—	—	—	Tr
Glass	30	50	80	3	60	72
Hornblende	—	—	—	—	Tr	2
Magnetite	—	—	—	—	2	2
Micrite	—	—	—	—	—	3
Plagioclase	—	—	—	—	20	5
Plant	30	—	—	—	—	—
Pyroxene	—	10	2	Tr	—	—
Quartz	5	20	5	—	5	8
Radiolarians	Tr	—	—	—	—	—
Rock fragment	10	5	5	—	10	3



SITE 768 HOLE C CORE 33R CORED INTERVAL 662.1-671.8 mbsf



LITHOLOGIC DESCRIPTION

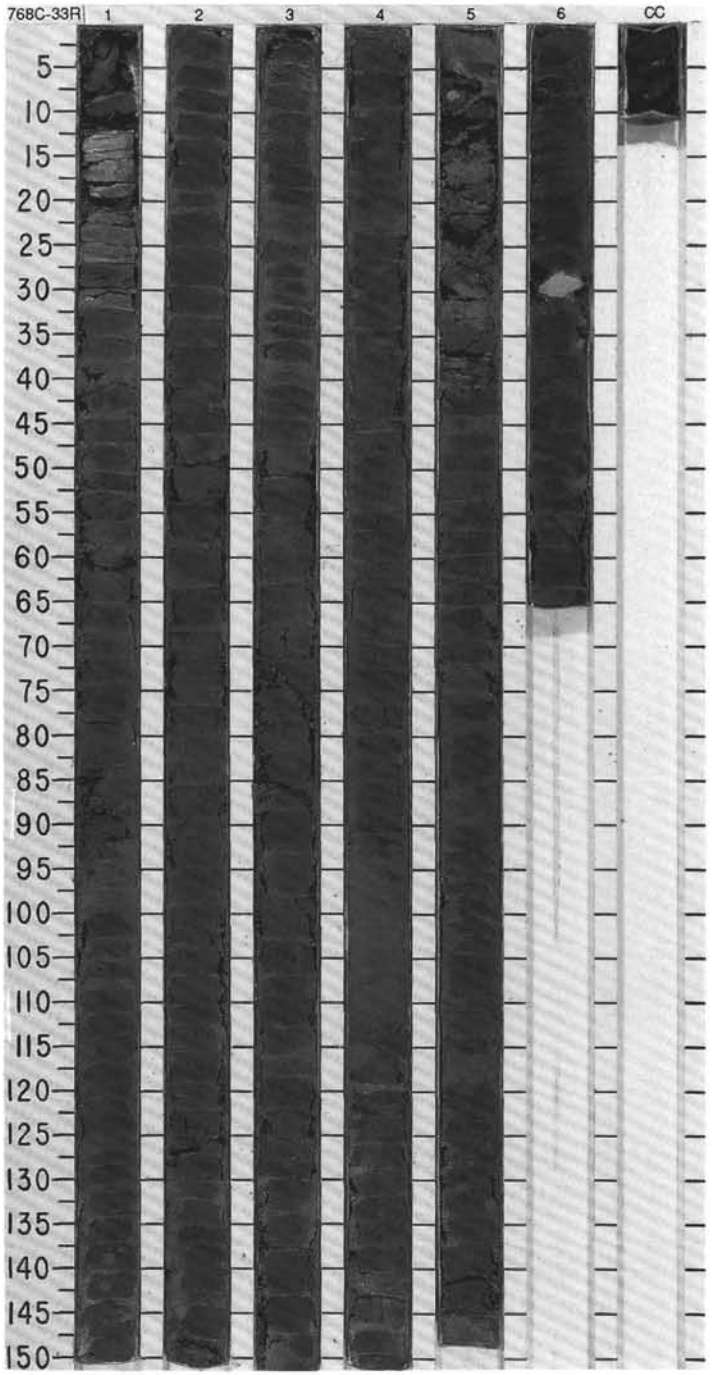
CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE with sandy siltstone and marlstone

Major lithologies: CLAYSTONE, SILTY CLAYSTONE, and CLAYEY SILTSTONE in graded thin beds. The base of each graded bed is sharp, overlain by clayey siltstone or more commonly silty claystone, both of which are dark gray (5Y 4/1) with planar lamination near the base of some beds. The clayey siltstone and silty claystone intervals are commonly 3-5 cm thick (with a few thick beds in Sections 3 and 4 up to 50 cm thick), and grade upward into dark greenish gray (10Y 4/1 to 5GY 4/1) bioturbated claystone with simple horizontal to oblique burrows. The bioturbated claystone units are 2-5 cm thick. The silt component of the beds is mostly quartz, with some rock fragments, feldspar, and plant debris. Rare, very small pyrite nodules occur locally in the claystone. The bioturbated claystone beds are interpreted as hemipelagic depositsoverlying silty claystone or clayey siltstone turbidite deposits.

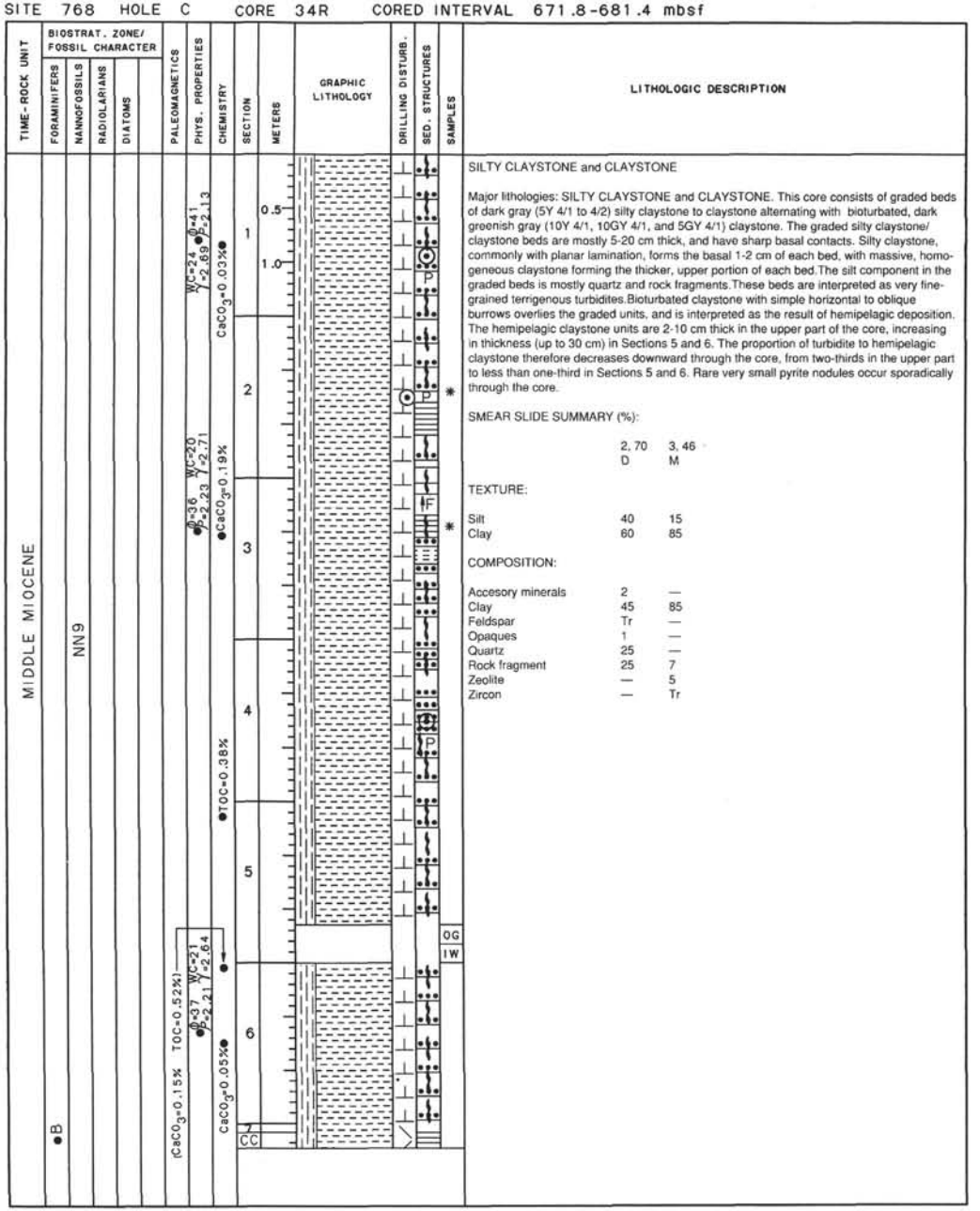
Minor lithologies:
a. A very thin bed of sandy siltstone occurs in Section 3, 50-51 cm. It is graded, and consists of quartz, feldspar, plant fragments, and 10% recrystallized volcanic glass.
b. Thin beds of marlstone occur in Section 5, 6-8 cm, and Section 6, 31-34 cm. They are olive gray (5Y 5/1 to 5/2), and well cemented.

SMEAR SLIDE SUMMARY (%):

	2, 72 M	2, 120 M	3, 50 M	4, 45 M	6, 35 M
TEXTURE:					
Sand	—	—	25	—	10
Silt	5	30	60	—	80
Clay	95	70	15	—	10
COMPOSITION:					
Accesory minerals	Tr	—	—	—	—
Clay	90	70	5	10	—
Epidote	—	Tr	—	—	—
Feldspar	—	4	2	5	—
Glass	Tr	—	10	—	—
Glauconite	—	—	1	Tr	—
Organic matter	—	3	—	—	—
Plant	Tr	—	5	5	—
Pyrite	—	Tr	5	25	Tr
Quartz	3	20	40	50	—
Radiolarians	—	—	—	—	Tr
Rock fragment	7	3	30	5	—
Sparite	—	—	—	—	95
Tourmaline	—	—	Tr	Tr	—



SITE 768 HOLE C CORE 34R CORED INTERVAL 671.8-681.4 mbsf

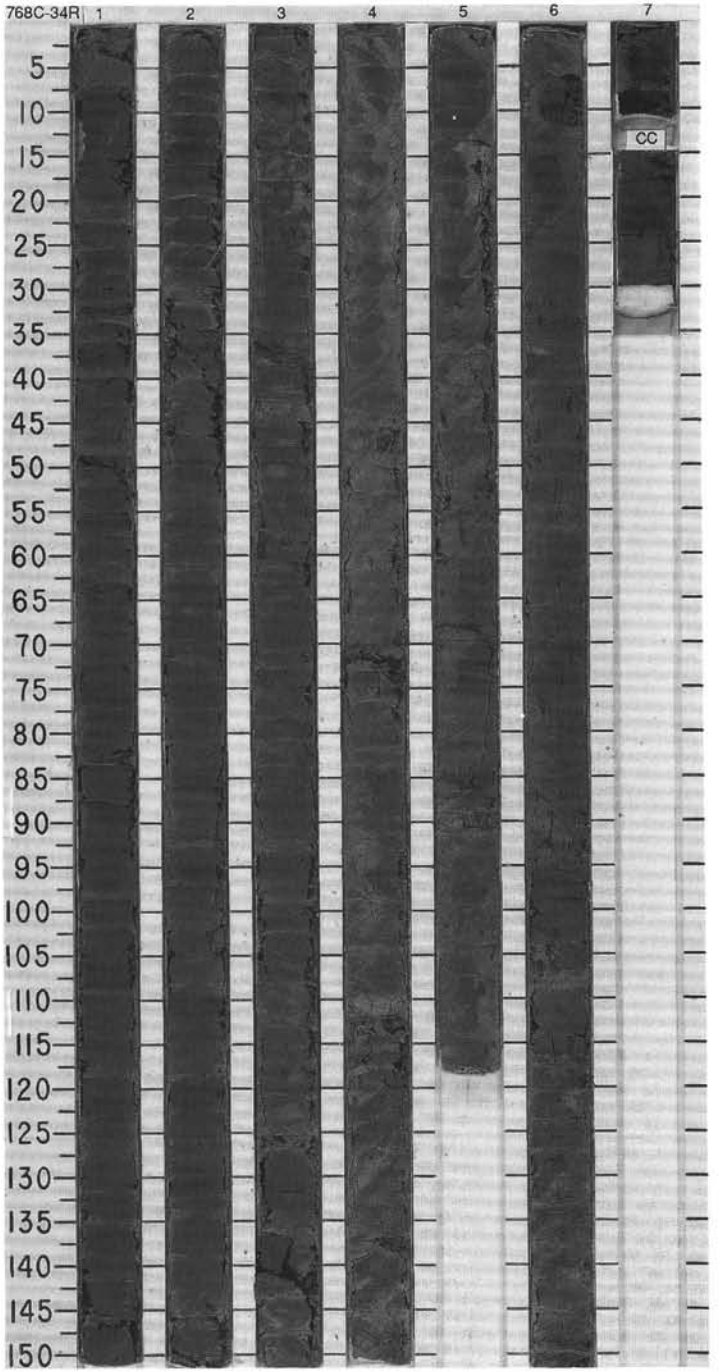


SILTY CLAYSTONE and CLAYSTONE

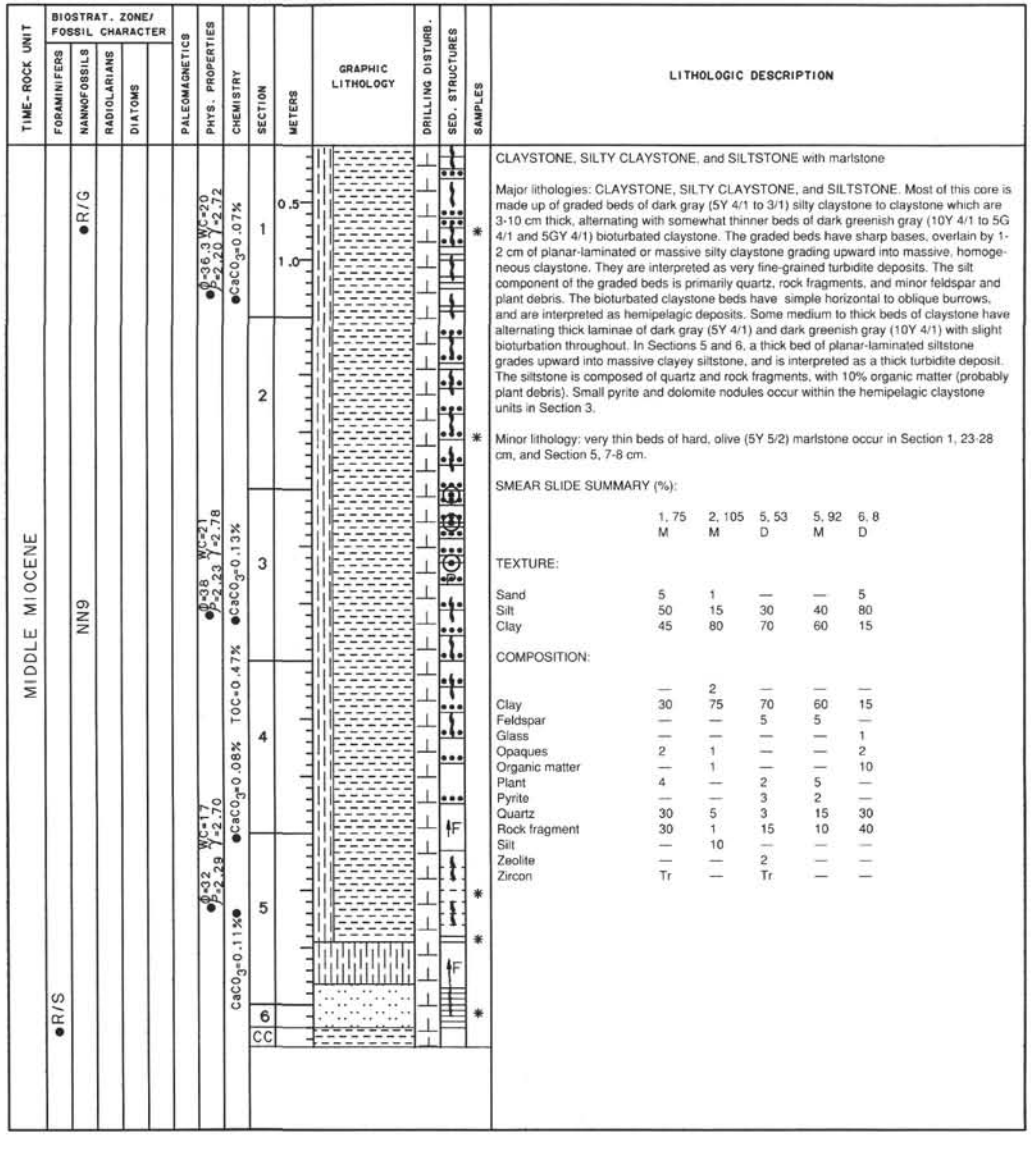
Major lithologies: SILTY CLAYSTONE and CLAYSTONE. This core consists of graded beds of dark gray (5Y 4/1 to 4/2) silty claystone to claystone alternating with bioturbated, dark greenish gray (10Y 4/1, 10GY 4/1, and 5GY 4/1) claystone. The graded silty claystone/ claystone beds are mostly 5-20 cm thick, and have sharp basal contacts. Silty claystone, commonly with planar lamination, forms the basal 1-2 cm of each bed, with massive, homogeneous claystone forming the thicker, upper portion of each bed. The silt component in the graded beds is mostly quartz and rock fragments. These beds are interpreted as very fine-grained terrigenous turbidites. Bioturbated claystone with simple horizontal to oblique burrows overlies the graded units, and is interpreted as the result of hemipelagic deposition. The hemipelagic claystone units are 2-10 cm thick in the upper part of the core, increasing in thickness (up to 30 cm) in Sections 5 and 6. The proportion of turbidite to hemipelagic claystone therefore decreases downward through the core, from two-thirds in the upper part to less than one-third in Sections 5 and 6. Rare very small pyrite nodules occur sporadically through the core.

SMEAR SLIDE SUMMARY (%):

	2, 70 D	3, 46 M
TEXTURE:		
Silt	40	15
Clay	60	85
COMPOSITION:		
Accesory minerals	2	—
Clay	45	85
Feldspar	Tr	—
Opaques	1	—
Quartz	25	—
Rock fragment	25	7
Zeolite	—	5
Zircon	—	Tr



SITE 768 HOLE C CORE 35R CORED INTERVAL 681.4-691.1 mbsf



LITHOLOGIC DESCRIPTION

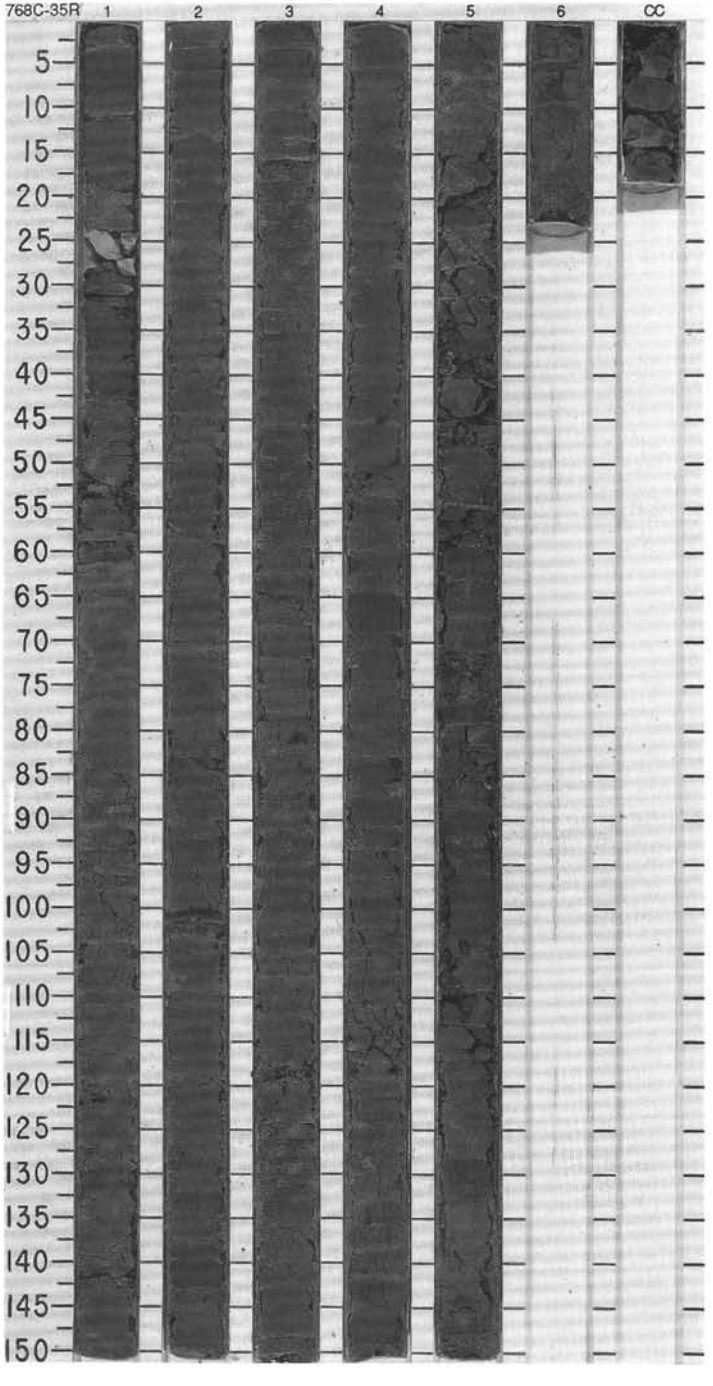
CLAYSTONE, SILTY CLAYSTONE, and SILTSTONE with marlstone

Major lithologies: CLAYSTONE, SILTY CLAYSTONE, and SILTSTONE. Most of this core is made up of graded beds of dark gray (5Y 4/1 to 3/1) silty claystone to claystone which are 3-10 cm thick, alternating with somewhat thinner beds of dark greenish gray (10Y 4/1 to 5G 4/1 and 5GY 4/1) bioturbated claystone. The graded beds have sharp bases, overlain by 1-2 cm of planar-laminated or massive silty claystone grading upward into massive, homogeneous claystone. They are interpreted as very fine-grained turbidite deposits. The silt component of the graded beds is primarily quartz, rock fragments, and minor feldspar and plant debris. The bioturbated claystone beds have simple horizontal to oblique burrows, and are interpreted as hemipelagic deposits. Some medium to thick beds of claystone have alternating thick laminae of dark gray (5Y 4/1) and dark greenish gray (10Y 4/1) with slight bioturbation throughout. In Sections 5 and 6, a thick bed of planar-laminated siltstone grades upward into massive clayey siltstone, and is interpreted as a thick turbidite deposit. The siltstone is composed of quartz and rock fragments, with 10% organic matter (probably plant debris). Small pyrite and dolomite nodules occur within the hemipelagic claystone units in Section 3.

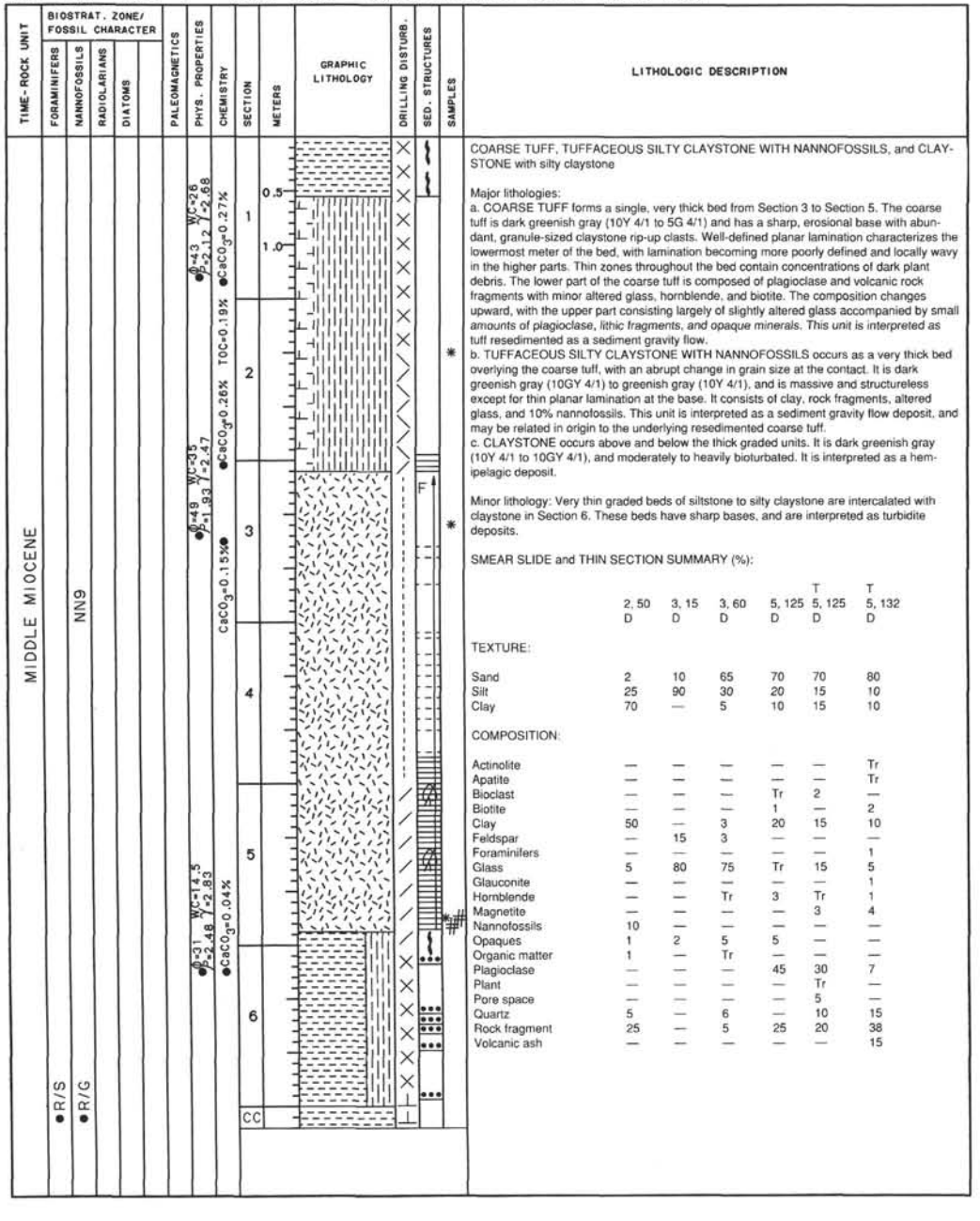
Minor lithology: very thin beds of hard, olive (5Y 5/2) marlstone occur in Section 1, 23-28 cm, and Section 5, 7-8 cm.

SMEAR SLIDE SUMMARY (%):

	1, 75 M	2, 105 M	5, 53 D	5, 92 M	6, 8 D
TEXTURE:					
Sand	5	1	—	—	5
Silt	50	15	30	40	80
Clay	45	80	70	60	15
COMPOSITION:					
	—	2	—	—	—
Clay	30	75	70	60	15
Feldspar	—	—	5	5	—
Glass	—	—	—	—	1
Opaques	2	1	—	—	2
Organic matter	—	1	—	—	10
Plant	4	—	2	5	—
Pyrite	—	—	3	2	—
Quartz	30	5	3	15	30
Rock fragment	30	1	15	10	40
Silt	—	10	—	—	—
Zeolite	—	—	2	—	—
Zircon	Tr	—	Tr	—	—



SITE 768 HOLE C CORE 36R CORED INTERVAL 691.1-700.8 mbsf



LITHOLOGIC DESCRIPTION

COARSE TUFF, TUFFACEOUS SILTY CLAYSTONE WITH NANNOFOSSILS, and CLAYSTONE with silty claystone

Major lithologies:

a. COARSE TUFF forms a single, very thick bed from Section 3 to Section 5. The coarse tuff is dark greenish gray (10Y 4/1 to 5G 4/1) and has a sharp, erosional base with abundant, granule-sized claystone rip-up clasts. Well-defined planar lamination characterizes the lowermost meter of the bed, with lamination becoming more poorly defined and locally wavy in the higher parts. Thin zones throughout the bed contain concentrations of dark plant debris. The lower part of the coarse tuff is composed of plagioclase and volcanic rock fragments with minor altered glass, hornblende, and biotite. The composition changes upward, with the upper part consisting largely of slightly altered glass accompanied by small amounts of plagioclase, lithic fragments, and opaque minerals. This unit is interpreted as tuff resedimented as a sediment gravity flow.

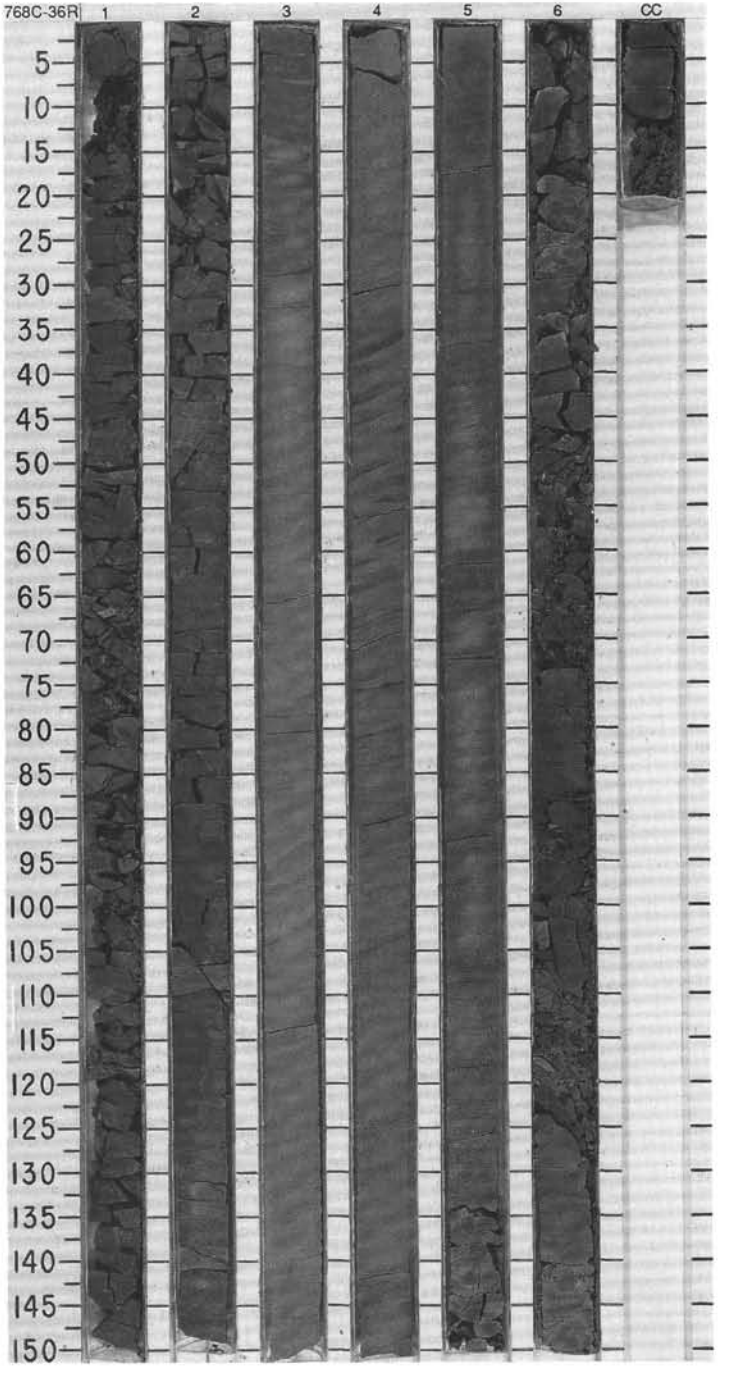
b. TUFFACEOUS SILTY CLAYSTONE WITH NANNOFOSSILS occurs as a very thick bed overlying the coarse tuff, with an abrupt change in grain size at the contact. It is dark greenish gray (10GY 4/1) to greenish gray (10Y 4/1), and is massive and structureless except for thin planar lamination at the base. It consists of clay, rock fragments, altered glass, and 10% nannofossils. This unit is interpreted as a sediment gravity flow deposit, and may be related in origin to the underlying resedimented coarse tuff.

c. CLAYSTONE occurs above and below the thick graded units. It is dark greenish gray (10Y 4/1 to 10GY 4/1), and moderately to heavily bioturbated. It is interpreted as a hemipelagic deposit.

Minor lithology: Very thin graded beds of siltstone to silty claystone are intercalated with claystone in Section 6. These beds have sharp bases, and are interpreted as turbidite deposits.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	2, 50 D	3, 15 D	3, 60 D	5, 125 D	T 5, 125 D	T 5, 132 D
TEXTURE:						
Sand	2	10	65	70	70	80
Silt	25	90	30	20	15	10
Clay	70	—	5	10	15	10
COMPOSITION:						
Actinolite	—	—	—	—	—	Tr
Apatite	—	—	—	—	—	Tr
Bioclast	—	—	—	Tr	2	—
Biotite	—	—	—	1	—	2
Clay	50	—	3	20	15	10
Feldspar	—	15	3	—	—	—
Foraminifers	—	—	—	—	—	1
Glass	5	80	75	Tr	15	5
Glauconite	—	—	—	—	—	1
Hornblende	—	—	Tr	3	Tr	1
Magnetite	—	—	—	—	3	4
Nannofossils	10	—	—	—	—	—
Opaques	1	2	5	5	—	—
Organic matter	1	—	Tr	—	—	—
Plagioclase	—	—	—	45	30	7
Plant	—	—	—	—	Tr	—
Pore space	—	—	—	—	5	—
Quartz	5	—	6	—	10	15
Rock fragment	25	—	5	25	20	38
Volcanic ash	—	—	—	—	—	15



SITE 768 HOLE C CORE 37R CORED INTERVAL 700.8-710.5 mbsf

TIME-ROCK UNIT: MIDDLE MIOCENE

BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS ●B ●R/G; NANNOFOSSILS ●F/G NN9; RADIOLARIANS; DIATOMS

PALEOMAGNETICS

PHYS. PROPERTIES: ϕ=33 WC=17 ρ=2.28 ?=2.71; ϕ=46 WC=30 ρ=2.06 ?=2.78; ϕ=36 WC=20 ρ=2.19 ?=2.71

CHEMISTRY: $CaCO_3$=0.13%; $CaCO_3$=0.10% TOC=0.54%; $CaCO_3$=0.08%; $CaCO_3$=0.07%

SECTION; METERS

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES: OG, IW

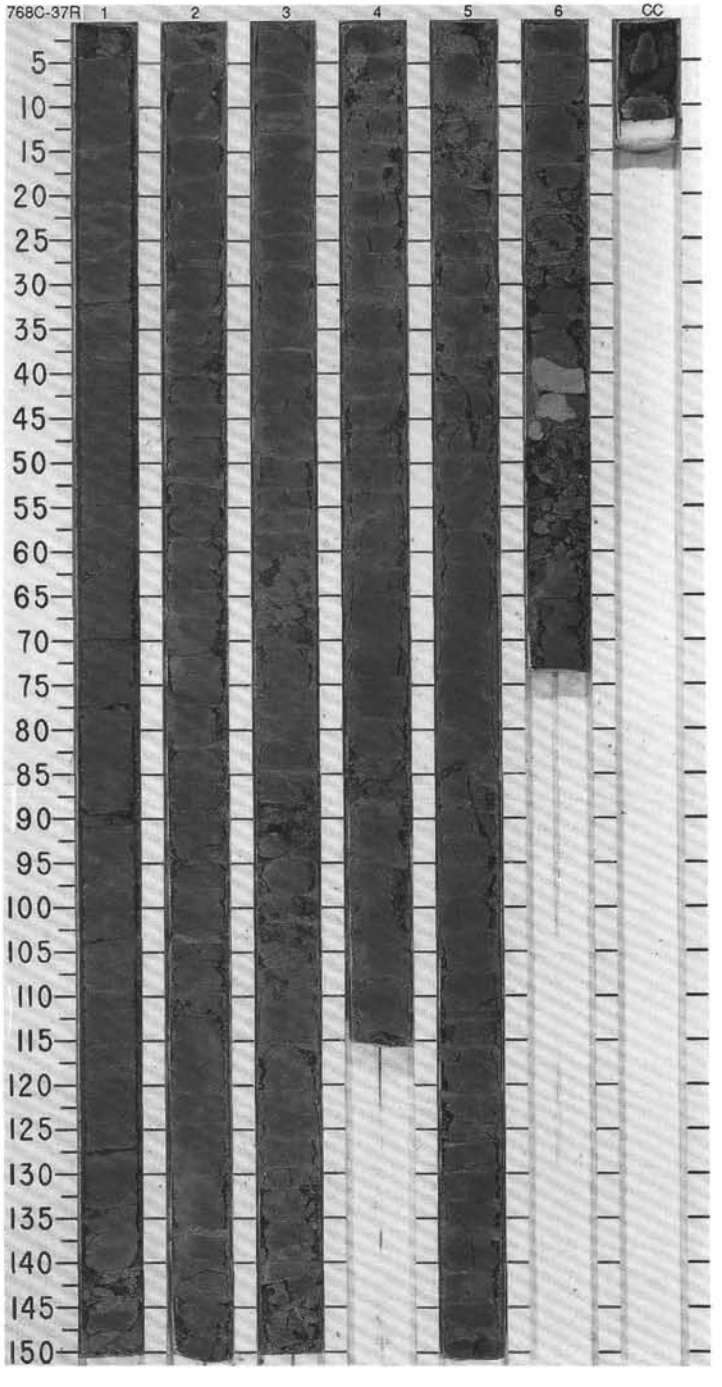
LITHOLOGIC DESCRIPTION

CLAYSTONE and SILTY CLAYSTONE

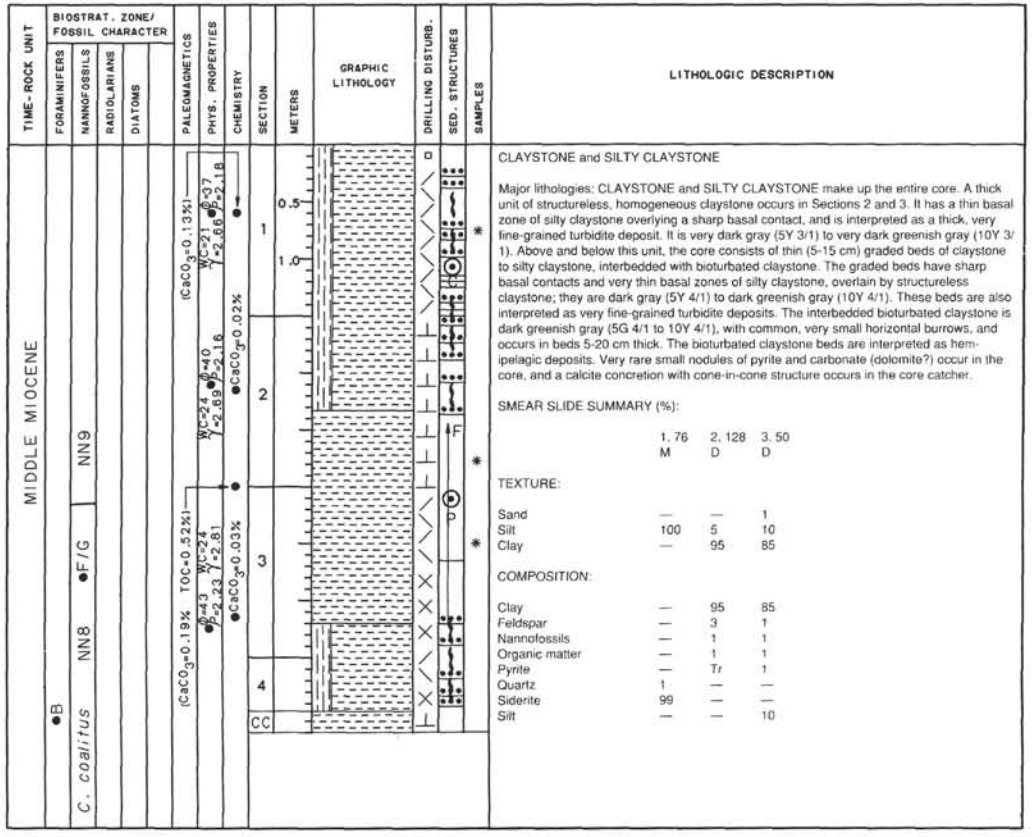
Major lithologies:
CLAYSTONE and SILTY CLAYSTONE form repeated graded units throughout this core. Individual cycles are commonly 5-20 cm thick, with some thicker cycles (25-30 cm) in Sections 5 and 6. The base of each graded unit is sharp, and is overlain by silty claystone grading within 1-2 cm into massive, homogeneous claystone, which in turn grades upward into bioturbated claystone with common horizontal burrows. The bioturbated claystone is dark greenish gray (10Y 4/1, 10GY 4/1, and 5GY 4/1), whereas the underlying graded silty claystone/claystone is dark gray (5Y 4/1 to 4/2). The upper bioturbated claystone intervals are typically much thinner than the underlying graded portions of the cycles. The graded beds are interpreted as turbidite deposits, and the bioturbate claystone as hemipelagic in origin. Very small carbonate (dolomite?) nodules occur sporadically in the bioturbated claystone.

SMEAR SLIDE SUMMARY (%):

	1, 60 D	3, 147 D
TEXTURE:		
Sand	—	1
Silt	30	20
Clay	70	75
COMPOSITION:		
Accesory minerals	2	1
Chlorite	—	2
Clay	50	75
Feldspar	5	—
Glass	25	—
Micrite	5	—
Opaques	1	1
Organic matter	—	1
Quartz	5	5
Rock fragment	5	1
Silt	—	10



SITE 768 HOLE C CORE 38R CORED INTERVAL 710.5-720.2 mbsf



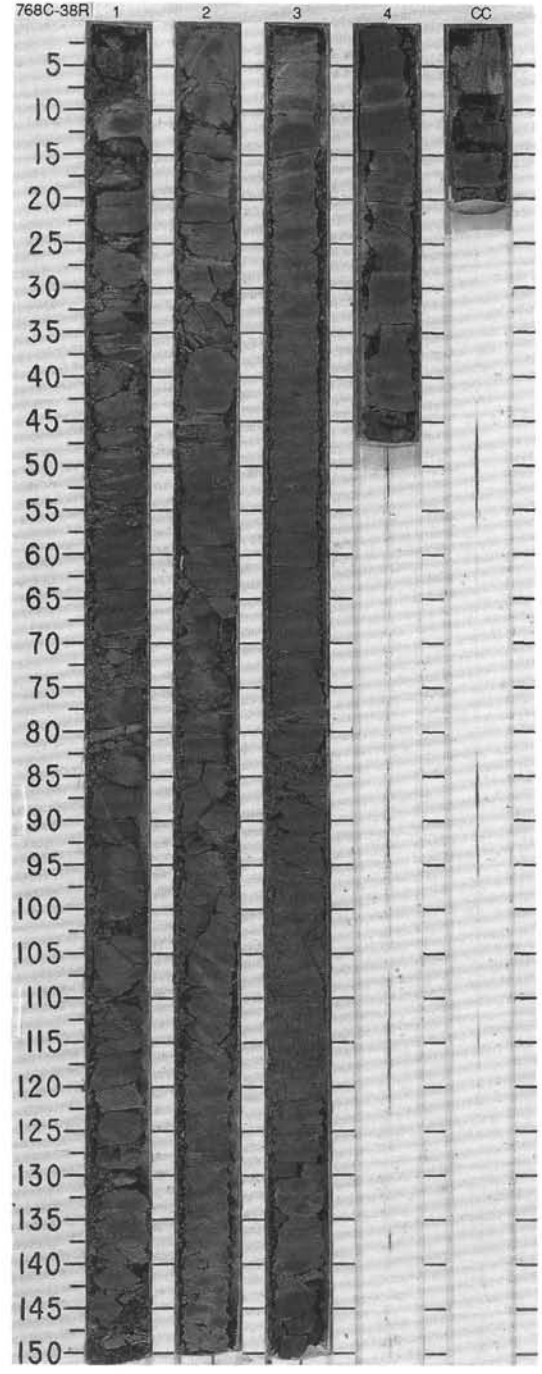
LITHOLOGIC DESCRIPTION

CLAYSTONE and SILTY CLAYSTONE

Major lithologies: CLAYSTONE and SILTY CLAYSTONE make up the entire core. A thick unit of structureless, homogeneous claystone occurs in Sections 2 and 3. It has a thin basal zone of silty claystone overlying a sharp basal contact, and is interpreted as a thick, very fine-grained turbidite deposit. It is very dark gray (5Y 3/1) to very dark greenish gray (10Y 3/1). Above and below this unit, the core consists of thin (5-15 cm) graded beds of claystone to silty claystone, interbedded with bioturbated claystone. The graded beds have sharp basal contacts and very thin basal zones of silty claystone, overlain by structureless claystone; they are dark gray (5Y 4/1) to dark greenish gray (10Y 4/1). These beds are also interpreted as very fine-grained turbidite deposits. The interbedded bioturbated claystone is dark greenish gray (5G 4/1 to 10Y 4/1), with common, very small horizontal burrows, and occurs in beds 5-20 cm thick. The bioturbated claystone beds are interpreted as hemipelagic deposits. Very rare small nodules of pyrite and carbonate (dolomite?) occur in the core, and a calcite concretion with cone-in-cone structure occurs in the core catcher.

SMEAR SLIDE SUMMARY (%):

	1, 76 M	2, 128 D	3, 50 D
TEXTURE:			
Sand	—	—	1
Silt	100	5	10
Clay	—	95	85
COMPOSITION:			
Clay	—	95	85
Feldspar	—	3	1
Nannofossils	—	1	1
Organic matter	—	1	1
Pyrite	—	Tr	1
Quartz	1	—	—
Siderite	99	—	—
Silt	—	—	10



SITE 768 HOLE C CORE 39R CORED INTERVAL 720.2-729.9 mbsf

TIME-ROCK UNIT: MIDDLE MIOCENE

BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS: B; F/G; NANNOFOSSILS: NN8; RADIOLARIANS; DIATOMS

PALEOMAGNETICS

PHYS. PROPERTIES

CHEMISTRY: $CaCO_3$=0.13% TOC=0.08%; WC=39 ρ=2.18 ρ=2.68; WC=23; $CaCO_3$=0.03%; WC=36 ρ=2.58 ρ=1.86; WC=35 ρ=2.62 ρ=1.89; $CaCO_3$=0.09%; TOC=0.04%; $CaCO_3$=0.08%

SECTION: 1, 2, 3, 4, 5, CC

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY

DRILLING DISTURB.

SED. STRUCTURES

SAMPLES

LITHOLOGIC DESCRIPTION

COARSE TUFF to FINE TUFF, CLAYSTONE, and SILTY CLAYSTONE

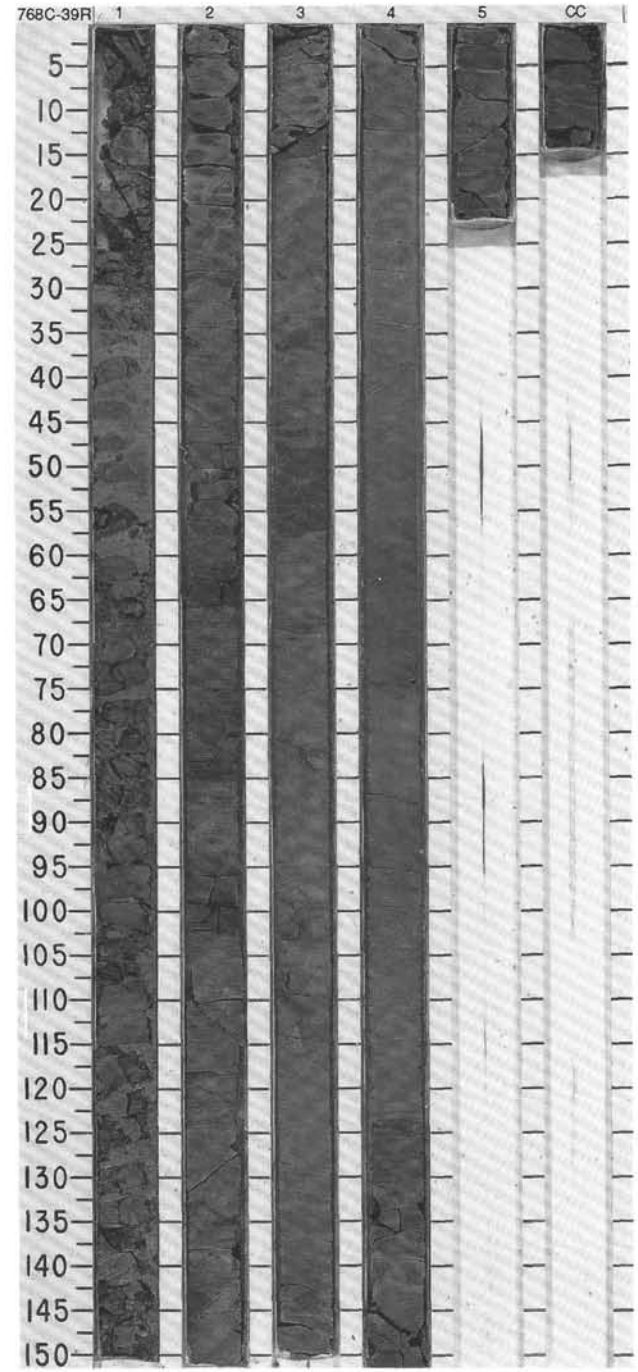
Major lithologies:

a. COARSE TUFF to FINE TUFF form a single very thick depositional unit in Sections 3 and 4. They are dark greenish gray (10Y 5/1 to 5GY 4/1). The coarse tuff is finely laminated just above the sharp base, but is otherwise structureless. It grades up into fine tuff with gently inclined planar to convolute lamination; horizontal planar lamination occurs at some levels in the upper part. The structures in the fine tuff are indicative of syndepositional soft-sediment deformation affecting the middle part of this very thick, graded unit. The unit is interpreted as tuff redeposited as a sediment gravity flow deposit. It consists of volcanic glass, volcanic rock fragments, and minor plagioclase and clay

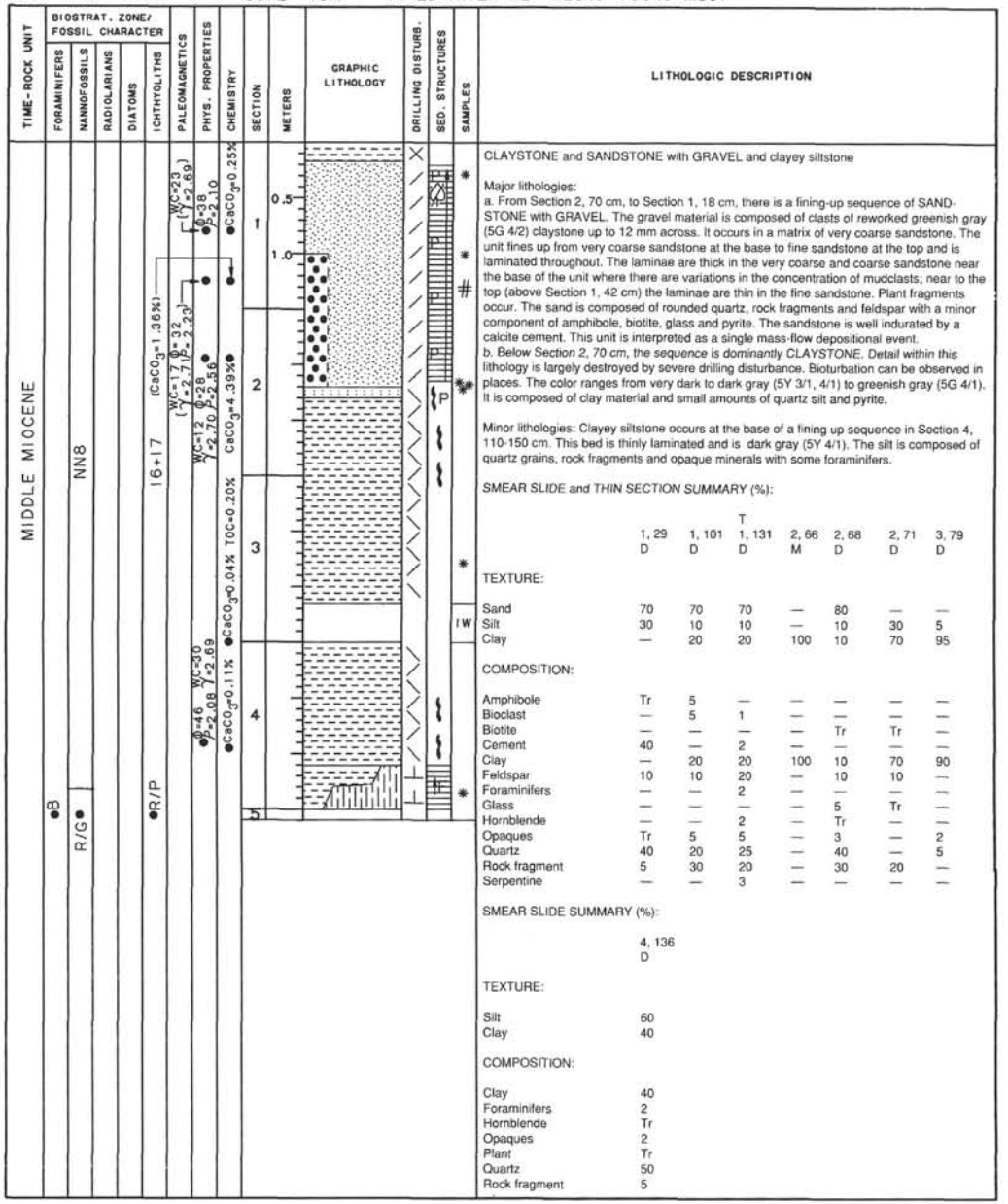
b. CLAYSTONE and SILTY CLAYSTONE make up the remainder of the core. Claystone occurs primarily in thick to very thick bioturbated beds which are mottled greenish gray (5GY 5/1 to 10GY 4/1), with dark horizontal burrows. The bioturbated claystone is interpreted as hemipelagic in origin.In Section 1, graded units of claystone to silty claystone are interbedded with thinner beds of faintly laminated and bioturbated hemipelagic claystone. The graded units are 30-40 cm thick, with sharp bases overlain by laminated silty claystone a few centimeters thick, grading into structureless claystone which makes up the remainder of the bed. The graded beds are dark greenish gray (10Y 4/1), and are interpreted as turbidite deposits.

SMEAR SLIDE SUMMARY (%):

	2, 90 D	3, 8 D	3, 87 D
TEXTURE:			
Sand	2	—	20
Silt	10	2	70
Clay	85	98	10
COMPOSITION:			
Accesory minerals	1	—	—
Clay	85	98	10
Glass	—	—	45
Hornblende	—	—	Tr
Opaques	1	—	—
Plagioclase	—	2	5
Quartz	5	—	—
Rock fragment	5	—	40



SITE 768 HOLE C CORE 40R CORED INTERVAL 729.9-739.6 mbsf



CLAYSTONE and SANDSTONE with GRAVEL and clayey siltstone

Major lithologies:

a. From Section 2, 70 cm, to Section 1, 18 cm, there is a fining-up sequence of SANDSTONE with GRAVEL. The gravel material is composed of clasts of reworked greenish gray (5G 4/2) claystone up to 12 mm across. It occurs in a matrix of very coarse sandstone. The unit fines up from very coarse sandstone at the base to fine sandstone at the top and is laminated throughout. The laminae are thick in the very coarse and coarse sandstone near the base of the unit where there are variations in the concentration of mudclasts; near to the top (above Section 1, 42 cm) the laminae are thin in the fine sandstone. Plant fragments occur. The sand is composed of rounded quartz, rock fragments and feldspar with a minor component of amphibole, biotite, glass and pyrite. The sandstone is well indurated by a calcite cement. This unit is interpreted as a single mass-flow depositional event.

b. Below Section 2, 70 cm, the sequence is dominantly CLAYSTONE. Detail within this lithology is largely destroyed by severe drilling disturbance. Bioturbation can be observed in places. The color ranges from very dark to dark gray (5Y 3/1, 4/1) to greenish gray (5G 4/1). It is composed of clay material and small amounts of quartz silt and pyrite.

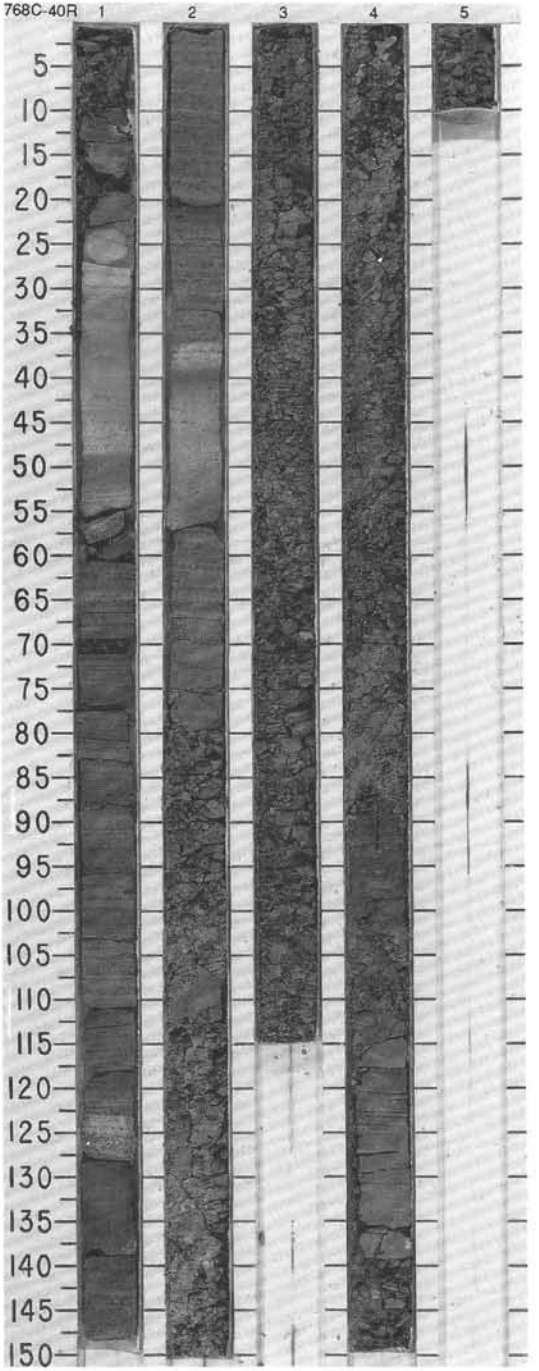
Minor lithologies: Clayey siltstone occurs at the base of a fining up sequence in Section 4, 110-150 cm. This bed is thinly laminated and is dark gray (5Y 4/1). The silt is composed of quartz grains, rock fragments and opaque minerals with some foraminifers.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

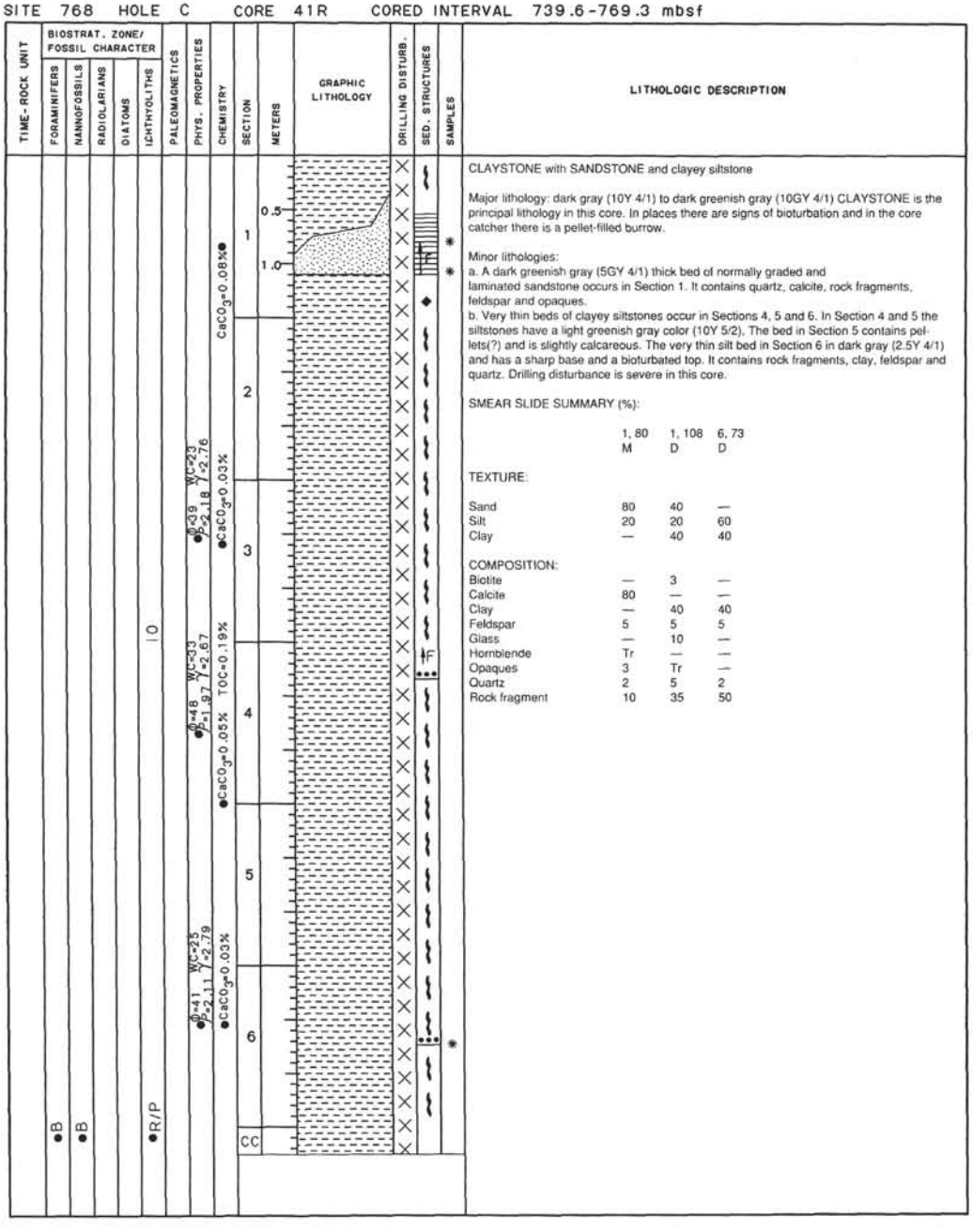
	1, 29 D	1, 101 D	T 1, 131 D	2, 66 M	2, 68 D	2, 71 D	3, 79 D
TEXTURE:							
Sand	70	70	70	—	80	—	—
Silt	30	10	10	—	10	30	5
Clay	—	20	20	100	10	70	95
COMPOSITION:							
Amphibole	Tr	5	—	—	—	—	—
Bioclast	—	5	1	—	—	—	—
Biotite	—	—	—	—	Tr	Tr	—
Cement	40	—	2	—	—	—	—
Clay	—	20	20	100	10	70	90
Feldspar	10	10	20	—	10	10	—
Foraminifers	—	—	2	—	—	—	—
Glass	—	—	—	—	5	Tr	—
Hornblende	—	—	2	—	Tr	—	—
Opaques	Tr	5	5	—	3	—	2
Quartz	40	20	25	—	40	—	5
Rock fragment	5	30	20	—	30	20	—
Serpentine	—	—	3	—	—	—	—

SMEAR SLIDE SUMMARY (%):

	4, 136 D
TEXTURE:	
Silt	60
Clay	40
COMPOSITION:	
Clay	40
Foraminifers	2
Hornblende	Tr
Opaques	2
Plant	Tr
Quartz	50
Rock fragment	5



SITE 768 HOLE C CORE 41R CORED INTERVAL 739.6-769.3 mbsf



LITHOLOGIC DESCRIPTION

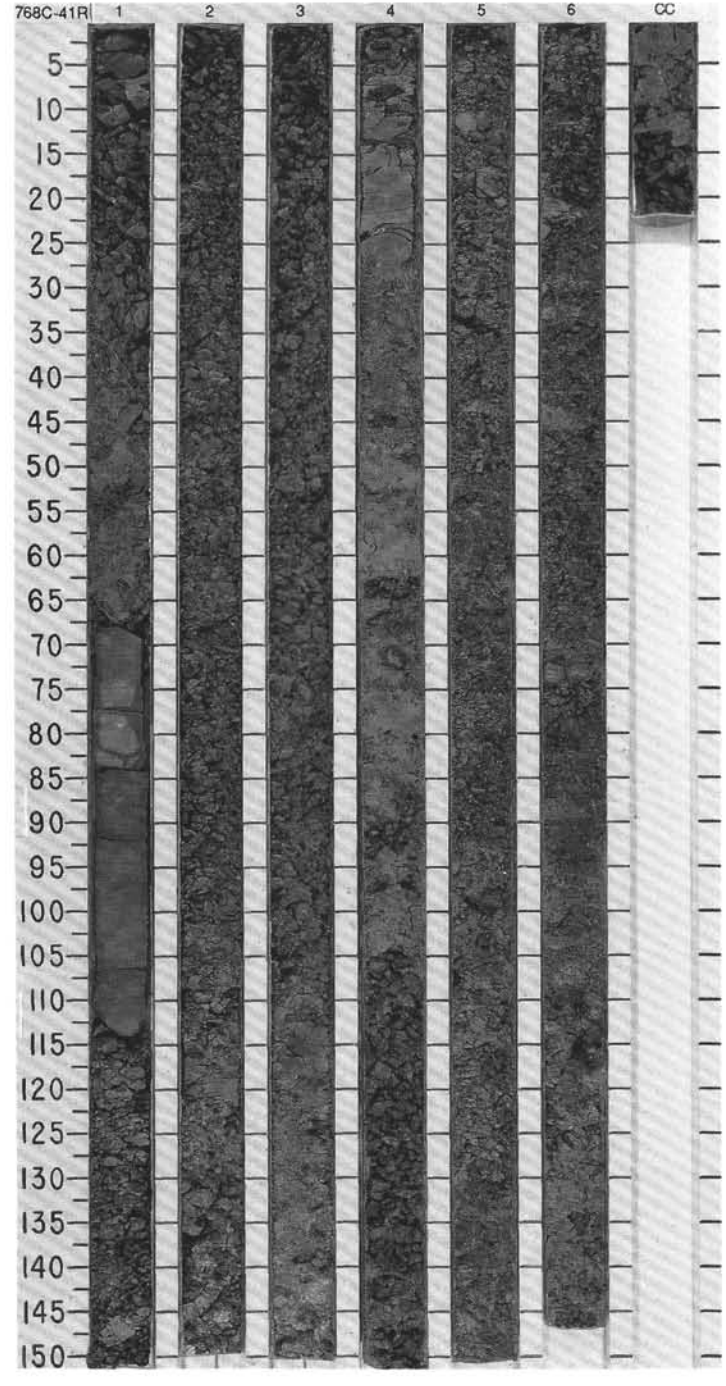
CLAYSTONE with SANDSTONE and clayey siltstone

Major lithology: dark gray (10Y 4/1) to dark greenish gray (10GY 4/1) CLAYSTONE is the principal lithology in this core. In places there are signs of bioturbation and in the core catcher there is a pellet-filled burrow.

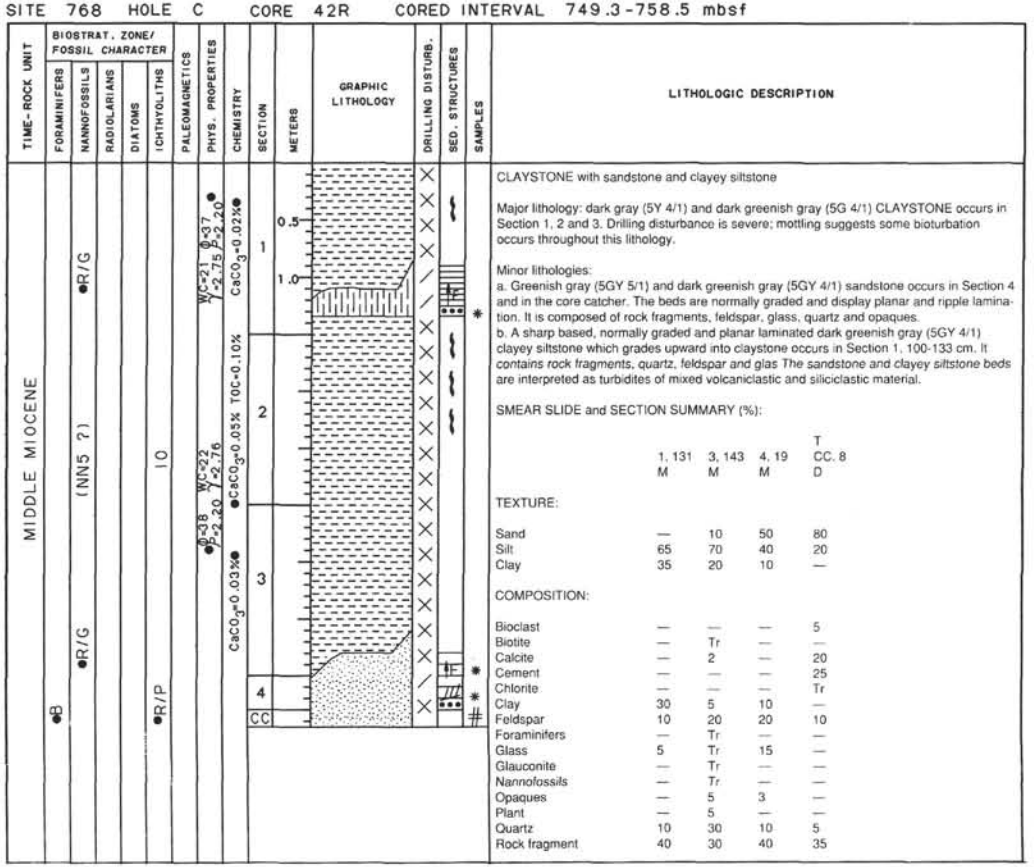
Minor lithologies:
a. A dark greenish gray (5GY 4/1) thick bed of normally graded and laminated sandstone occurs in Section 1. It contains quartz, calcite, rock fragments, feldspar and opaques.
b. Very thin beds of clayey siltstones occur in Sections 4, 5 and 6. In Section 4 and 5 the siltstones have a light greenish gray color (10Y 5/2). The bed in Section 5 contains pellets(?) and is slightly calcareous. The very thin silt bed in Section 6 in dark gray (2.5Y 4/1) and has a sharp base and a bioturbated top. It contains rock fragments, clay, feldspar and quartz. Drilling disturbance is severe in this core.

SMEAR SLIDE SUMMARY (%):

	1, 80 M	1, 108 D	6, 73 D
TEXTURE:			
Sand	80	40	—
Silt	20	20	60
Clay	—	40	40
COMPOSITION:			
Biotite	—	3	—
Calcite	80	—	—
Clay	—	40	40
Feldspar	5	5	5
Glass	—	10	—
Hornblende	Tr	—	—
Opaques	3	Tr	—
Quartz	2	5	2
Rock fragment	10	35	50



SITE 768 HOLE C CORE 42R CORED INTERVAL 749.3-758.5 mbsf



LITHOLOGIC DESCRIPTION

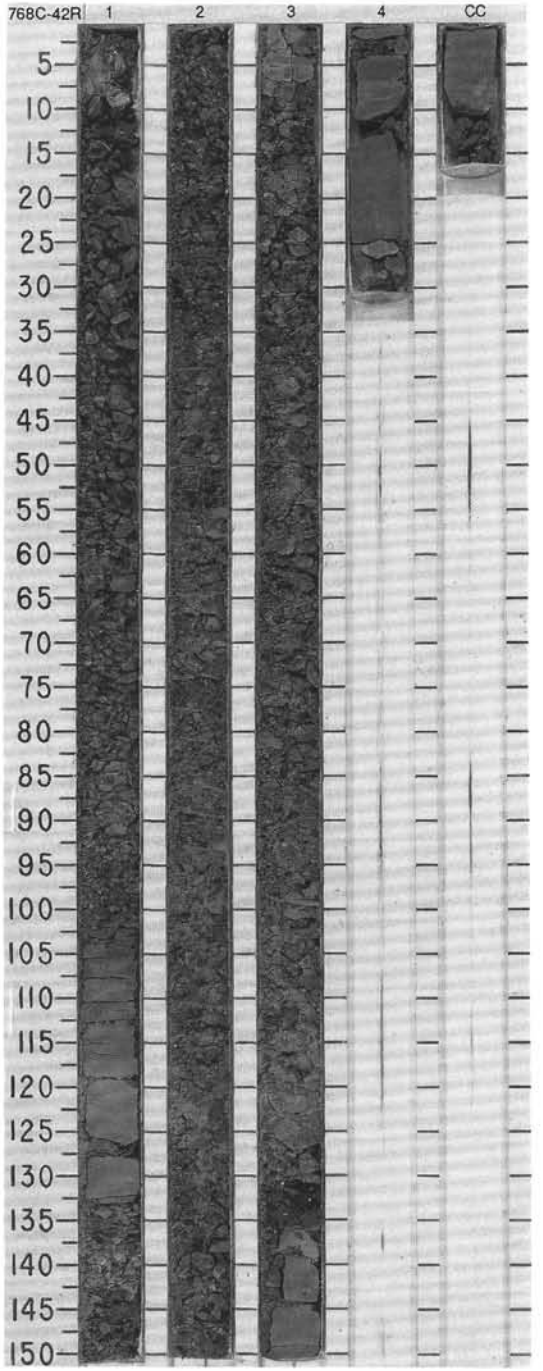
CLAYSTONE with sandstone and clayey siltstone

Major lithology: dark gray (5Y 4/1) and dark greenish gray (5G 4/1) CLAYSTONE occurs in Section 1, 2 and 3. Drilling disturbance is severe; mottling suggests some bioturbation occurs throughout this lithology.

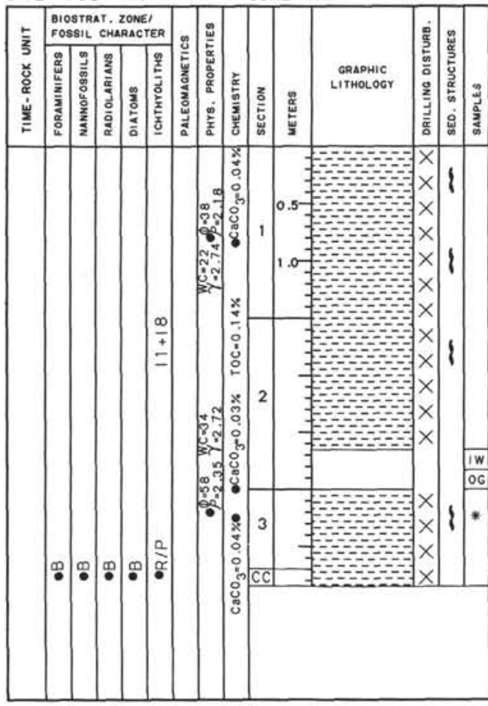
Minor lithologies:
a. Greenish gray (5GY 5/1) and dark greenish gray (5GY 4/1) sandstone occurs in Section 4 and in the core catcher. The beds are normally graded and display planar and ripple lamination. It is composed of rock fragments, feldspar, glass, quartz and opaques.
b. A sharp based, normally graded and planar laminated dark greenish gray (5GY 4/1) clayey siltstone which grades upward into claystone occurs in Section 1, 100-133 cm. It contains rock fragments, quartz, feldspar and glas The sandstone and clayey siltstone beds are interpreted as turbidites of mixed volcaniclastic and siliciclastic material.

SMEAR SLIDE and SECTION SUMMARY (%):

	1, 131 M	3, 143 M	4, 19 M	T CC, 8 D
TEXTURE:				
Sand	—	10	50	80
Silt	65	70	40	20
Clay	35	20	10	—
COMPOSITION:				
Bioclast	—	—	—	5
Biotite	—	Tr	—	—
Calcite	—	2	—	20
Cement	—	—	—	25
Chlorite	—	—	—	Tr
Clay	30	5	10	—
Feldspar	10	20	20	10
Foraminifers	—	Tr	—	—
Glass	5	Tr	15	—
Glauconite	—	Tr	—	—
Nannofossils	—	*Tr*	—	—
Opaques	—	5	3	—
Plant	—	5	—	—
Quartz	10	30	10	5
Rock fragment	40	30	40	35



SITE 768 HOLE C CORE 43R CORED INTERVAL 758.5-768.1 mbsf



LITHOLOGIC DESCRIPTION

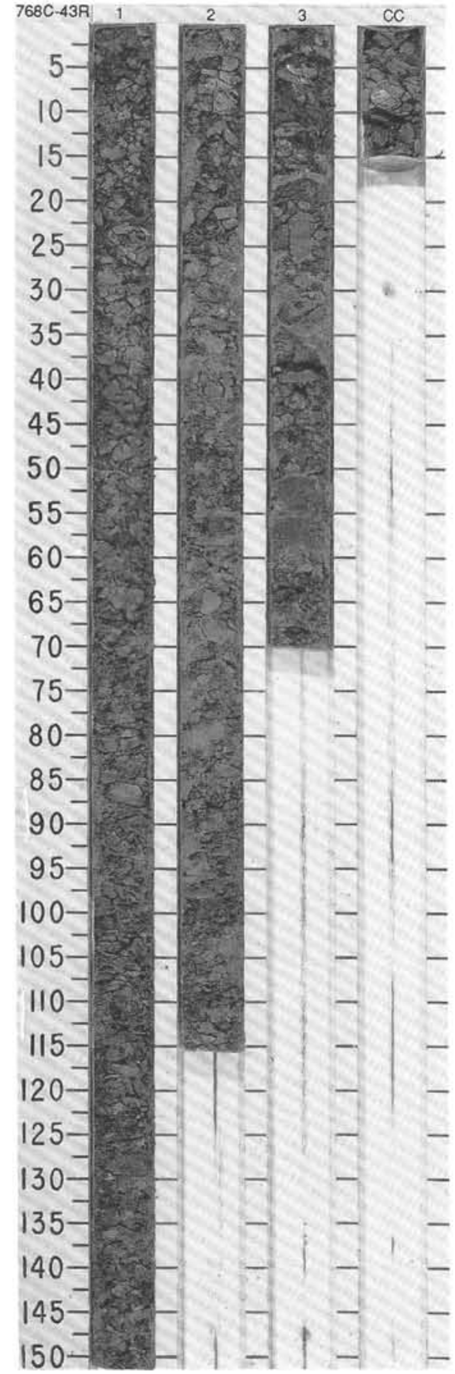
CLAYSTONE

Major lithology: the only lithology in this core is CLAYSTONE. It is dark gray (5Y 4/1) to dark greenish gray (10Y 4/1) or olive gray (5Y 4/2). There is no evidence of lamination, but there is some mottling indicating bioturbation in places.

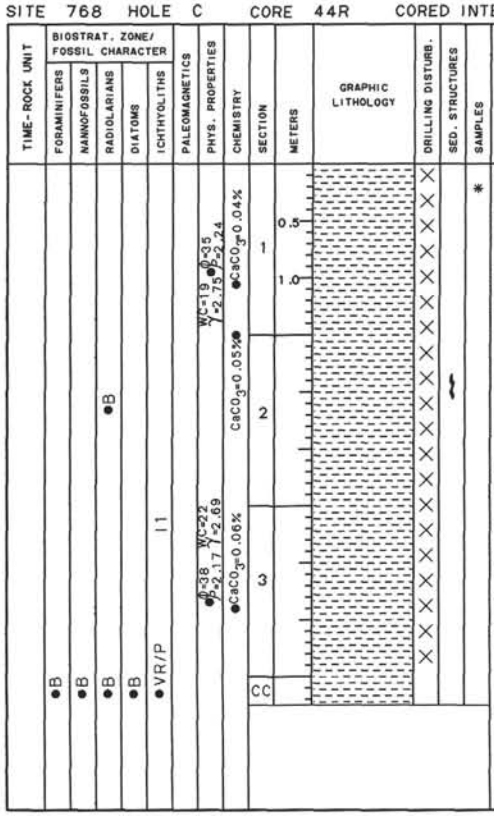
Drilling disturbance in this core is severe.

SMEAR SLIDE SUMMARY (%):

	3, 22
	D
TEXTURE:	
Silt	5
Clay	95
COMPOSITION:	
Clay	90
Quartz	2
Rock fragment	5



SITE 768 HOLE C CORE 44R CORED INTERVAL 768.1-777.7 mbsf



LITHOLOGIC DESCRIPTION

CLAYSTONE

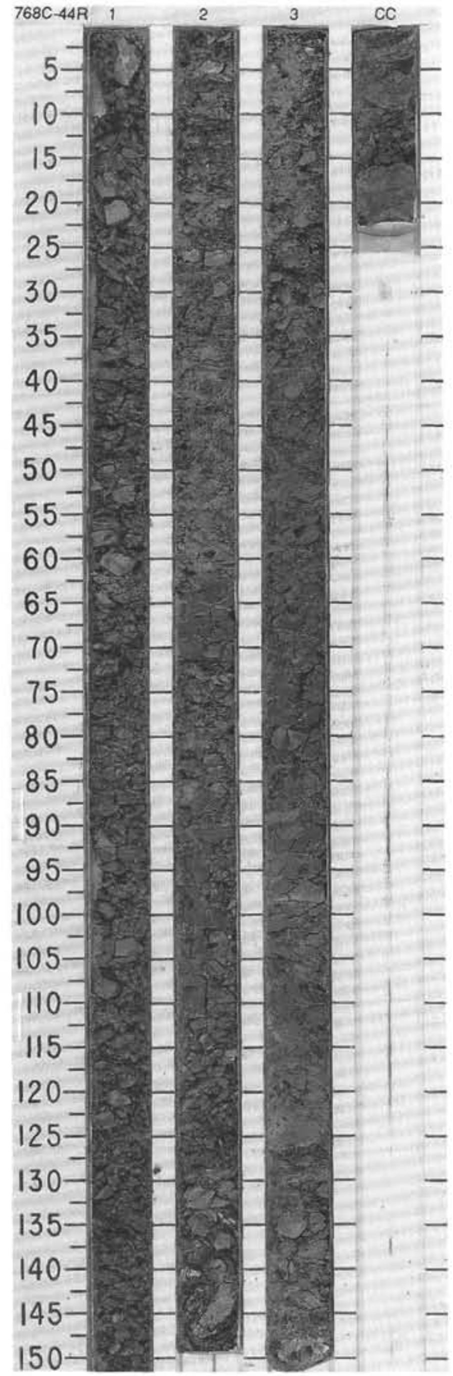
Major lithology: The principal lithology in this core is CLAYSTONE which is silty in places. It is very dark to dark gray (5Y 3/1, 4/1) or dark greenish gray (10Y 4/1). There is no evidence of lamination, but there is some mottling due to bioturbation in places.

Minor lithology: Silty claystone occurs as very thin beds in Section 1, 20-22 cm and Section 3, 98-99 cm. This material is light gray (5Y 7/1) and contains volcanic material (plagioclase, glass and biotite) in addition to quartz.

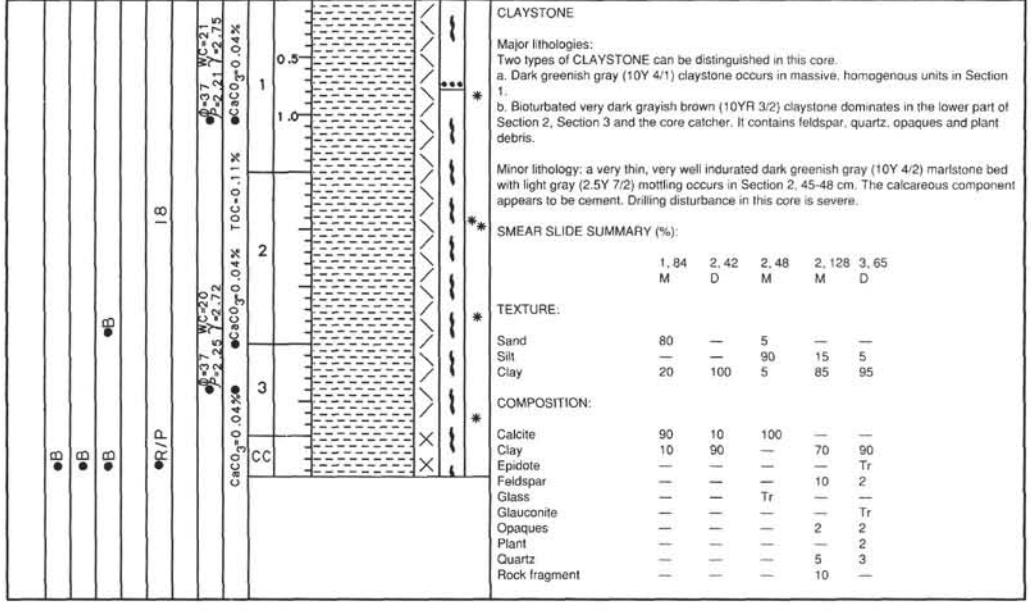
Drilling disturbance in this core is severe.

SMEAR SLIDE SUMMARY (%):

	1, 21
	D
TEXTURE:	
Silt	40
Clay	60
COMPOSITION:	
Biotite	Tr
Clay	60
Feldspar	5
Glass	5
Opaques	Tr
Quartz	20
Rock fragment	10



SITE 768 HOLE C CORE 45R CORED INTERVAL 777.7-787.4 mbsf



LITHOLOGIC DESCRIPTION

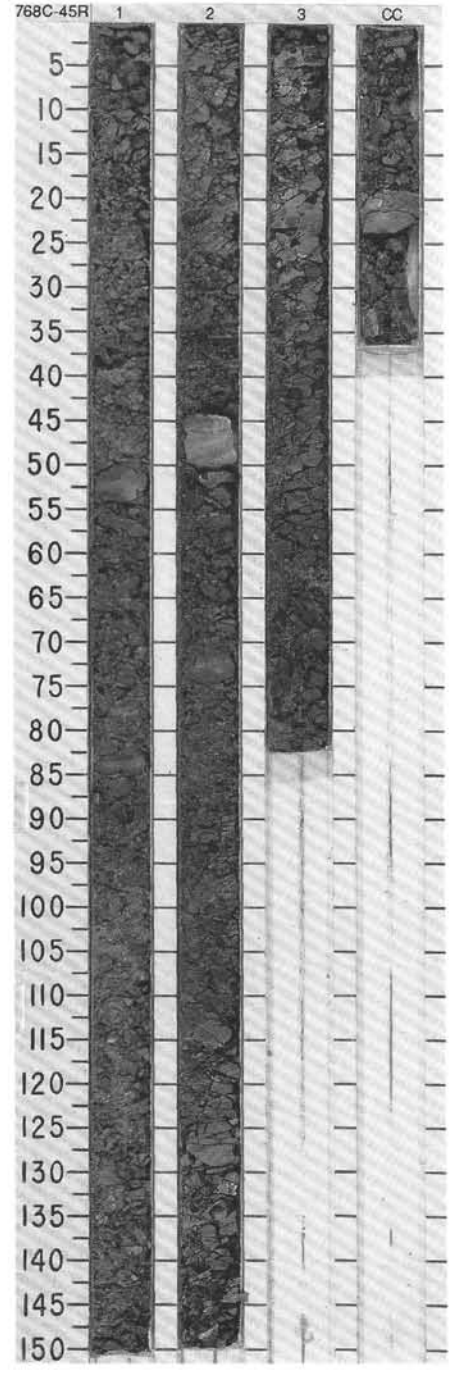
CLAYSTONE

Major lithologies:
Two types of CLAYSTONE can be distinguished in this core.
a. Dark greenish gray (10Y 4/1) claystone occurs in massive, homogenous units in Section 1.
b. Bioturbated very dark grayish brown (10YR 3/2) claystone dominates in the lower part of Section 2, Section 3 and the core catcher. It contains feldspar, quartz, opaques and plant debris.

Minor lithology: a very thin, very well indurated dark greenish gray (10Y 4/2) marlstone bed with light gray (2.5Y 7/2) mottling occurs in Section 2, 45-48 cm. The calcareous component appears to be cement. Drilling disturbance in this core is severe.

SMEAR SLIDE SUMMARY (%):

	1, 84 M	2, 42 D	2, 48 M	2, 128 M	3, 65 D
TEXTURE:					
Sand	80	—	5	—	—
Silt	—	—	90	15	5
Clay	20	100	5	85	95
COMPOSITION:					
Calcite	90	10	100	—	—
Clay	10	90	—	70	90
Epidote	—	—	—	—	Tr
Feldspar	—	—	—	10	2
Glass	—	—	Tr	—	—
Glauconite	—	—	—	—	Tr
Opaques	—	—	—	2	2
Plant	—	—	—	—	2
Quartz	—	—	—	5	3
Rock fragment	—	—	—	10	—



SITE 768 HOLE C CORE 46R CORED INTERVAL 787.4-796.9 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	ICHTHYOLITHS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
	●B	●B	●B	●B	●VR/M 11+18 ●R/M	(CaCO$_3$=0.04% TOC=0.01%)	WC=17 ϕ=32 ρ=2.59 ρ=2.23 ● WC=19 ϕ=35 ρ=2.25 ρ=2.75 ●	CaCO$_3$=0.03% ● CaCO$_3$=0.04% ●	1 2 CC	0.5 1.0				* * *

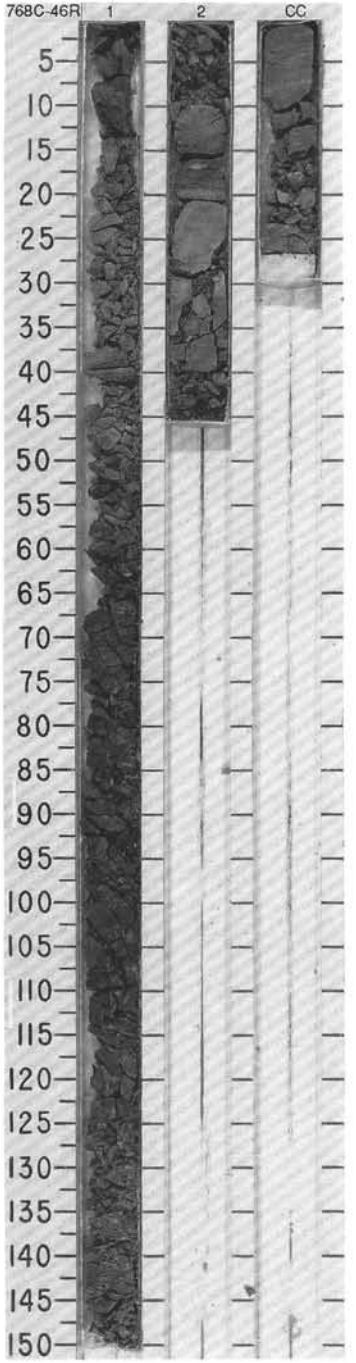
CLAYSTONE and SILTY CLAYSTONE

Major lithologies: graded greenish gray (5G 5/1) laminated SILTY CLAYSTONE occurs, fining upward into greenish gray (5G 5/1) CLAYSTONE. In Section 1 the boundary between the silty claystone and the claystone is diffuse. In Section 1, 0-13 and 49-115 cm, the claystone is massive and very dark grayish brown (10YR 3/2). It is composed mainly of clay, but also contains rock fragments, quartz, feldspar and opaques. In Sections 2 and 3 the silty claystone is laminated. It contains rock fragments, feldspar, glass and biotite.

Drilling disturbance in this core is severe.

SMEAR SLIDE SUMMARY (%):

	1, 30 D	1, 100 D	2, 17 M	CC, 7 M
TEXTURE:				
Sand	—	—	20	—
Silt	10	5	50	100
Clay	90	95	30	—
COMPOSITION:				
Biotite	Tr	Tr	10	—
Calcite	—	—	Tr	5
Clay	90	90	35	10
Epidote	—	—	—	Tr
Feldspar	2	2	20	10
Glass	3	—	—	30
Opaques	—	1	—	Tr
Quartz	4	3	5	Tr
Rock fragment	—	3	30	45
Zircon	—	—	Tr	—



SITE 768 HOLE C CORE 47R CORED INTERVAL 796.9-806.6 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	ICHTHYOLITHS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
	B●	B● (*C. costata*)	C/M● C/M●		C/M● 11 C/M●	($CaCO_3$=0.05% TOC=0.03%)	MAD=20 0-35 2.63 2.19	$CaCO_3$=0.02%	1 CC	0.5 1.0				**

LITHOLOGIC DESCRIPTION

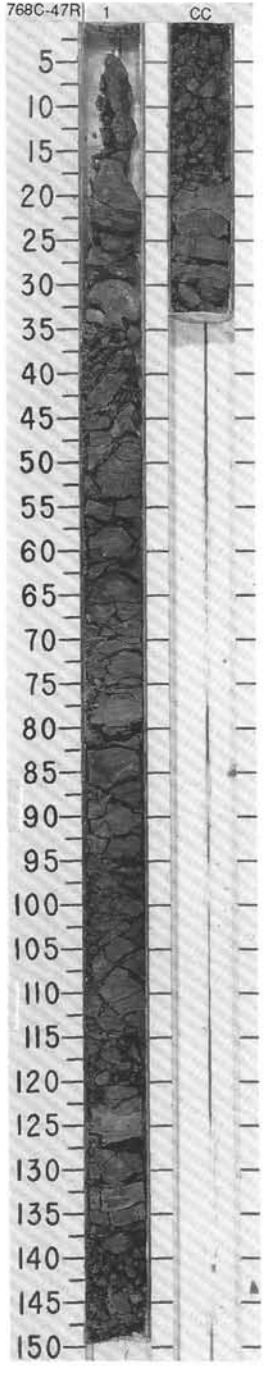
CLAYSTONE and silty claystone

Major lithologies:
Two types of CLAYSTONE are recognized in this core.
a. Olive gray (5Y 4/2) claystone occurs only in Section 1, 0-45 cm. It is structureless and very disturbed by drilling.
b. Very dark grayish brown (10Y 3/2) claystone occurs interbedded with silty claystone below Section 1, 45 cm. It is bioturbated or homogeneous.

Minor lithology: silty claystone occurs as thin and very thin normally graded beds with sharp bases which are interbedded with the brown claystone. The color is very dark gray (10YR 4/1) and light olive gray (5Y 6/2). It contains some feldspar, rock fragments and glass and is likely to be reworked tuff deposits.

SMEAR SLIDE SUMMARY (%):

	1, 78 M
TEXTURE:	
Silt	25
Clay	75
COMPOSITION:	
Clay	75
Feldspar	5
Glass	5
Opaques	Tr
Pyroxene	Tr
Rock fragment	15



SITE 768 HOLE C CORE 48R CORED INTERVAL 806.6-815.5 mbsf

TIME-ROCK UNIT
BIOSTRAT. ZONE/ FOSSIL CHARACTER
FORAMINIFERS: ●B ●B ●F/M ●B
NANNOFOSSILS
RADIOLARIANS: S. wolffii
DIATOMS: ●C/M F/M● C. costata ●F/M
ICHTHYOLITHS
PALEOMAGNETICS
PHYS. PROPERTIES: ●Φ=33 WC=19 ρ=2.11 γ=2.52; WC=18 Φ=32 ρ=2.51 ρ=2.11 ●; ●Φ=34 WC=20 ρ=2.09 γ=2.52
CHEMISTRY: CaCO3=0.05% TOC=0.03%●; ●CaCO3=0.05%; CaCO3=0.04%●; ●CaCO3=0.05%
SECTION: 1 2 3 4 5 CC
METERS: 0.5 1.0
GRAPHIC LITHOLOGY
DRILLING DISTURB.
SED. STRUCTURES
SAMPLES: OG IW

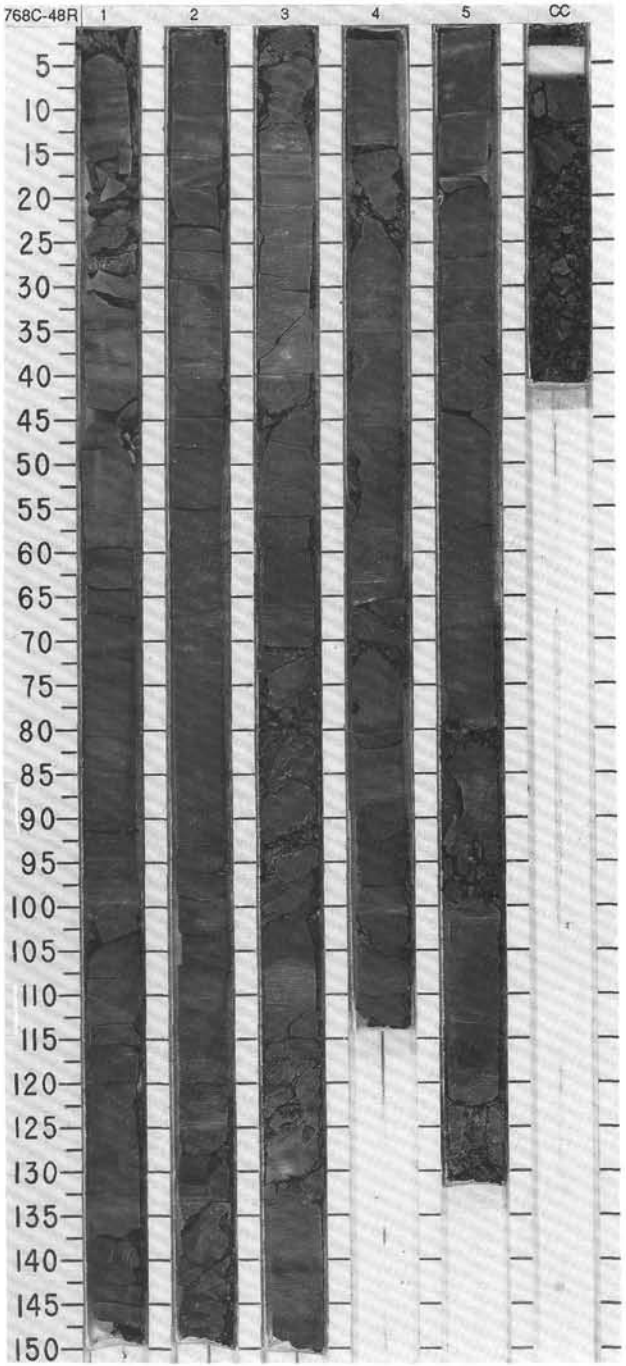
LITHOLOGIC DESCRIPTION

COARSE TUFF, FINE TUFF and CLAYSTONE

Major lithologies: COARSE TUFF, FINE TUFF and CLAYSTONE occur in fining-up medium to thin beds throughout this core. The base of each rhythm is sharp and starts with coarse or fine tuff, fining-up to claystone, which truncated at the top. The thinner beds are generally finer. These sedimentary structures present are graded bedding, planar, convolute and cross lamination in the lower and middle part of the beds. In the upper parts of the beds there are thin planar laminations, compaction cracks and some very slight bioturbation. The color of the coarse and fine tuff is dark green (10GY 3/1, 4/1) and the claystone is dark green and greenish gray (10GY 3/1, 7.5G 3/2, 10Y 3/1). The tuffs are composed of feldspar, glass, rock fragments, hornblende and pyroxene. All of the normally graded beds are considered to be turbidites of pyroclastic material.

SMEAR SLIDE and SECTION SUMMARY (%):

	1, 59 D	1, 100 D	2, 13 D	2, 94 D	T 5, 118 D
TEXTURE:					
Sand	20	70	—	—	50
Silt	60	20	70	30	10
Clay	20	10	30	70	40
COMPOSITION:					
Biotite	—	—	Tr	Tr	Tr
Calcite	—	5	—	Tr	—
Clay	20	10	20	70	20
Feldspar	10	20	5	2	—
Glass	40	—	50	5	20
Glauconite	—	—	—	—	Tr
Hornblende	2	5	—	Tr	2
Opaques	5	3	5	—	10
Plagioclase	—	—	—	—	15
Plant	—	—	—	—	3
Pore space	—	—	—	—	8
Pumice	—	—	—	—	10
Pyroxene	Tr	5	—	Tr	—
Quartz	—	—	—	—	1
Rock fragment	20	50	20	20	—
Volcanic ash	—	—	—	—	10



SITE 768 HOLE C CORE 49R CORED INTERVAL 815.5-825.2 mbsf

TIME-ROCK UNIT | BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS | PALEOMAGNETICS | PHYS. PROPERTIES | CHEMISTRY | SECTION | METERS | GRAPHIC LITHOLOGY | DRILLING DISTURB. | SED. STRUCTURES | SAMPLES

PHYS. PROPERTIES: ●0.39 WC-27 P=1.84 T=2.30

CHEMISTRY: ●CaCO3=0.03% TOC=0.5%

CHEMISTRY: ●CaCO3=0.03% TOC=0%

PHYS. PROPERTIES: ●0.40 WC-24 P=2.14 T=2.52

CHEMISTRY: ●CaCO3=0.05%

SECTION: 1 2 3 4 5 6 7 CC

METERS: 0.5 1.0

LITHOLOGIC DESCRIPTION

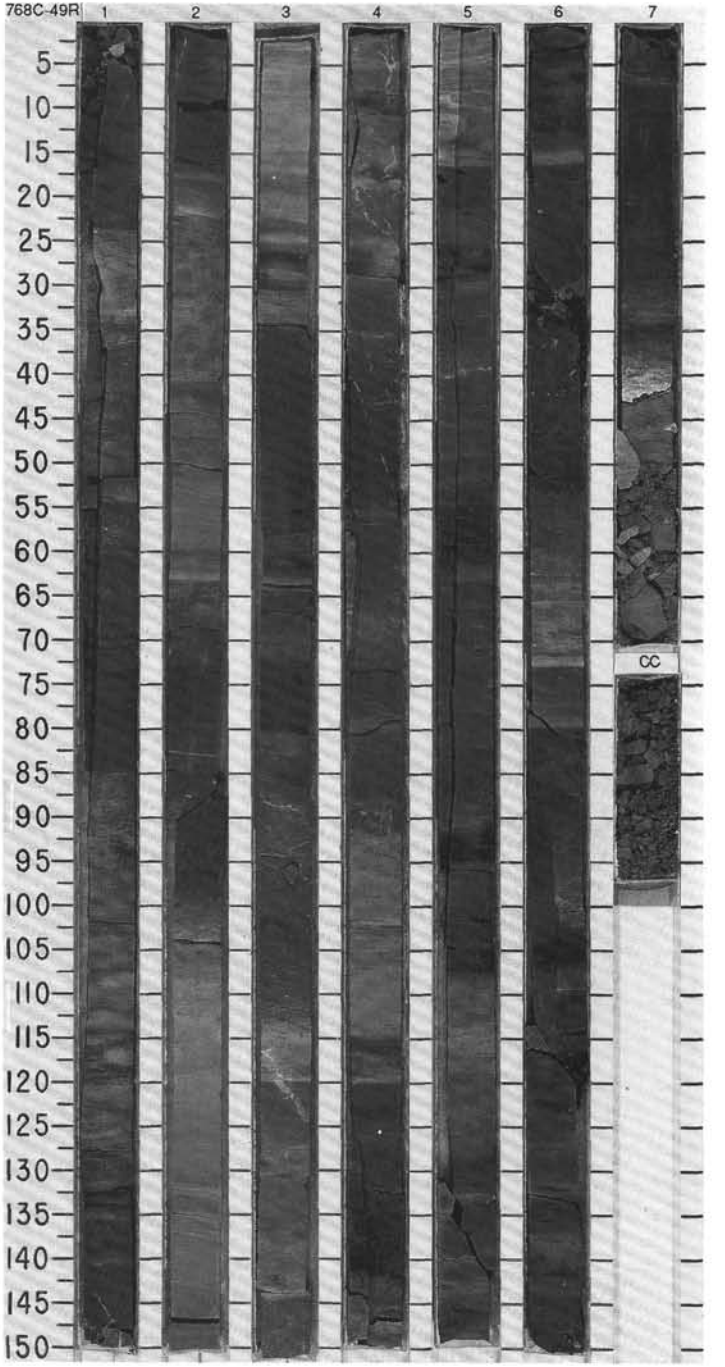
FINE TUFF and coarse tuff

Major lithology: successive medium to thick graded beds of FINE TUFF. The beds show normal graded bedding, have sharp basal contacts, and show thin planar, convolute and cross lamination. The fine tuff in the upper parts of the beds is not well laminated and is more bioturbated (including *Chondrites*). Some of the fine tuff is clay grade material and shows compaction cracks at the top of the sequence where it is overlain by the next graded bed. The tuff is composed of rock fragments, feldspar (plagioclase), and glass.

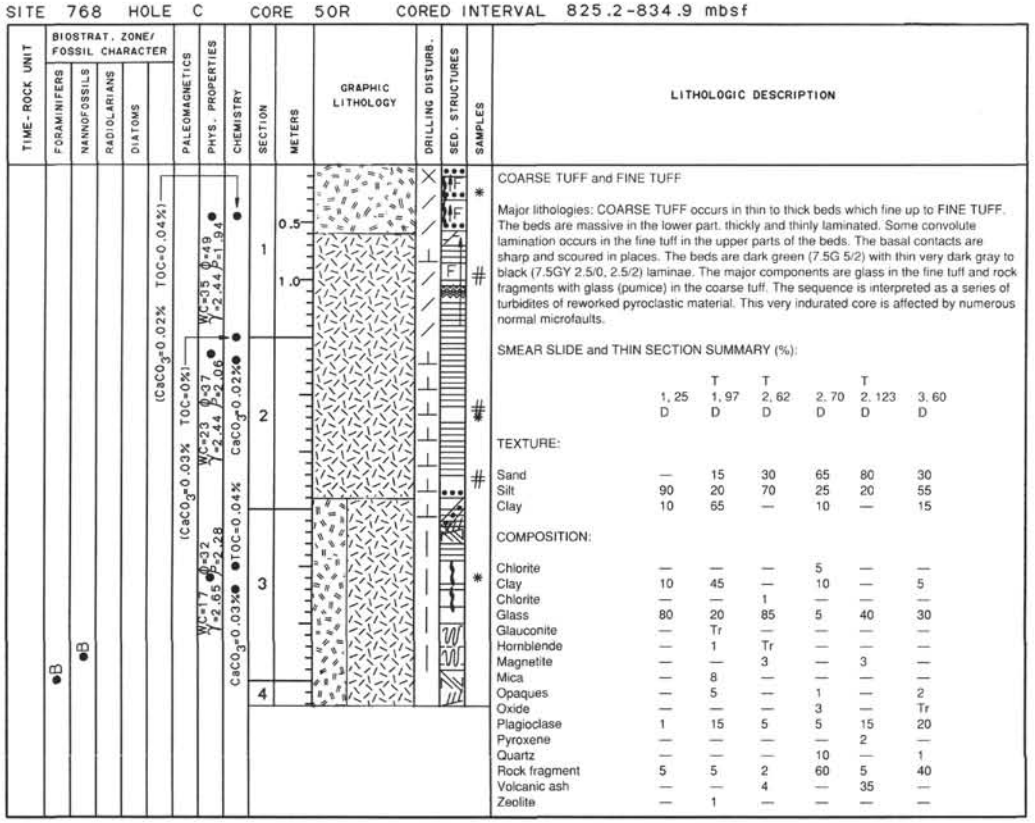
Minor lithology: coarse tuff occurs at the base of medium graded beds in Sections 3 and 6. It is thickly laminated and grades up into fine tuff. The beds are dark grayish green (10GY 3/1) to grayish green (7.5G 5/2) and are interpreted as a sequence of turbidites of reworked pyroclastic material. There are some sedimentary dikes of siltstone material cutting the claystone.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 1, 135 D	2, 100 D	3, 27 D	4, 110 D	5, 112 D
TEXTURE:					
Sand	30	70	70	—	—
Silt	5	20	30	—	—
Clay	65	10	—	—	—
COMPOSITION:					
Biotite	—	—	—	Tr	—
Clay	15	10	—	—	—
Feldspar	—	5	20	5	5
Glass	15	10	20	10	90
Hornblende	Tr	—	5	1	—
Opaques	3	3	2	Tr	2
Plagioclase	30	—	—	—	—
Pumice	15	—	—	—	—
Pyroxene	—	2	3	2	—
Quartz	Tr	—	—	—	—
Rock fragment	2	70	50	80	—
Smectite	20	—	—	—	—



SITE 768 HOLE C CORE 50R CORED INTERVAL 825.2-834.9 mbsf



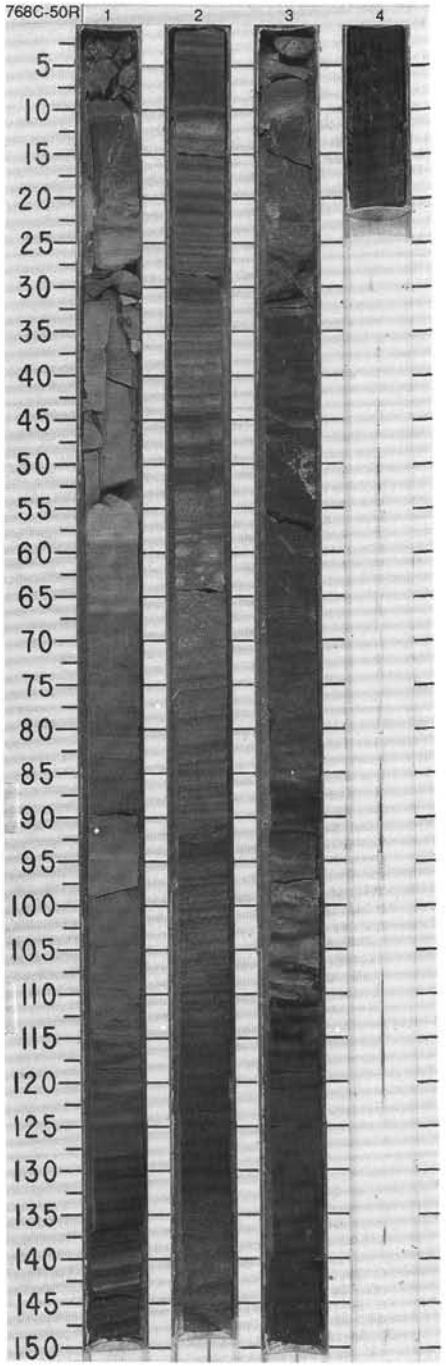
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

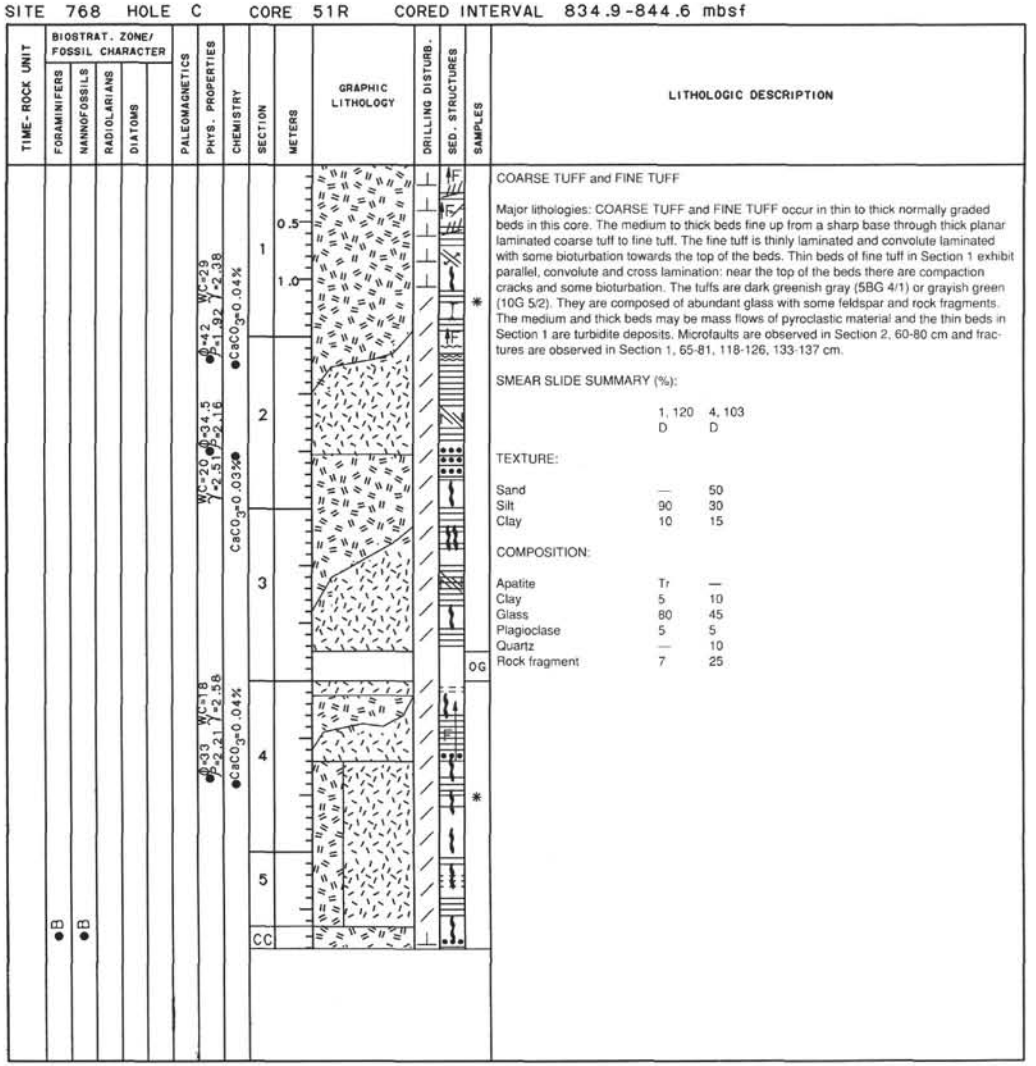
Major lithologies: COARSE TUFF occurs in thin to thick beds which fine up to FINE TUFF. The beds are massive in the lower part, thickly and thinly laminated. Some convolute lamination occurs in the fine tuff in the upper parts of the beds. The basal contacts are sharp and scoured in places. The beds are dark green (7.5G 5/2) with thin very dark gray to black (7.5GY 2.5/0, 2.5/2) laminae. The major components are glass in the fine tuff and rock fragments with glass (pumice) in the coarse tuff. The sequence is interpreted as a series of turbidites of reworked pyroclastic material. This very indurated core is affected by numerous normal microfaults.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 25 D	T 1, 97 D	T 2, 62 D	2, 70 D	T 2, 123 D	3, 60 D
TEXTURE:						
Sand	—	15	30	65	80	30
Silt	90	20	70	25	20	55
Clay	10	65	—	10	—	15
COMPOSITION:						
Chlorite	—	—	—	5	—	—
Clay	10	45	—	10	—	5
Chlorite	—	—	1	—	—	—
Glass	80	20	85	5	40	30
Glauconite	—	Tr	—	—	—	—
Hornblende	—	1	Tr	—	—	—
Magnetite	—	—	3	—	3	—
Mica	—	8	—	—	—	—
Opaques	—	5	—	1	—	2
Oxide	—	—	—	3	—	Tr
Plagioclase	1	15	5	5	15	20
Pyroxene	—	—	—	—	2	—
Quartz	—	—	—	10	—	1
Rock fragment	5	5	2	60	5	40
Volcanic ash	—	—	4	—	35	—
Zeolite	—	1	—	—	—	—



SITE 768 HOLE C CORE 51R CORED INTERVAL 834.9-844.6 mbsf



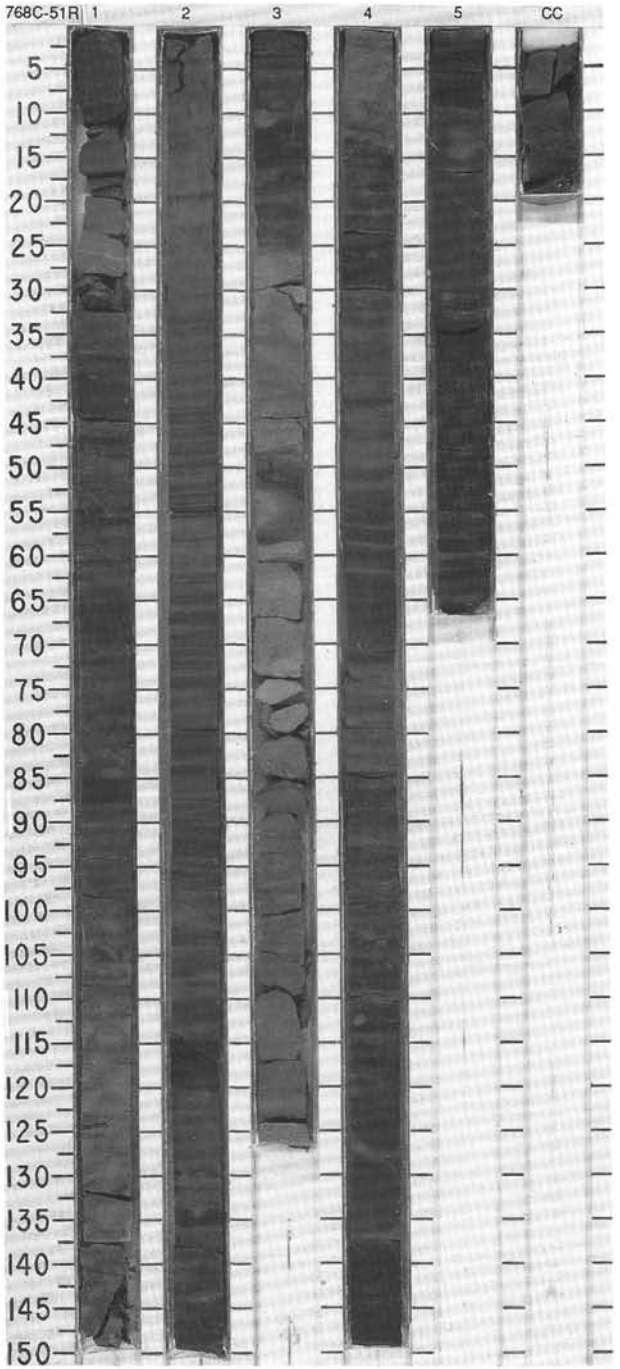
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

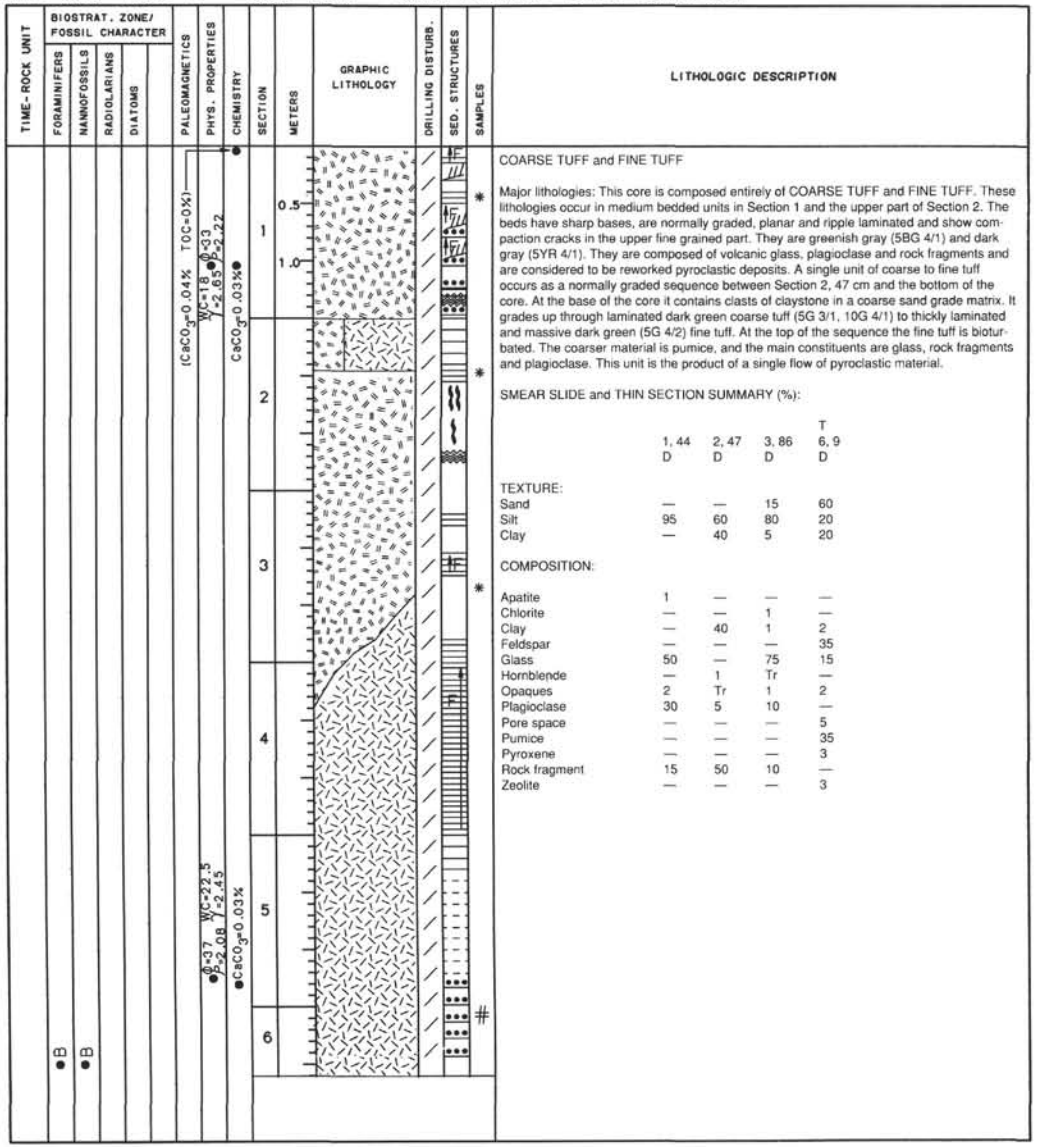
Major lithologies: COARSE TUFF and FINE TUFF occur in thin to thick normally graded beds in this core. The medium to thick beds fine up from a sharp base through thick planar laminated coarse tuff to fine tuff. The fine tuff is thinly laminated and convolute laminated with some bioturbation towards the top of the beds. Thin beds of fine tuff in Section 1 exhibit parallel, convolute and cross lamination: near the top of the beds there are compaction cracks and some bioturbation. The tuffs are dark greenish gray (5BG 4/1) or grayish green (10G 5/2). They are composed of abundant glass with some feldspar and rock fragments. The medium and thick beds may be mass flows of pyroclastic material and the thin beds in Section 1 are turbidite deposits. Microfaults are observed in Section 2, 60-80 cm and fractures are observed in Section 1, 65-81, 118-126, 133-137 cm.

SMEAR SLIDE SUMMARY (%):

	1, 120 D	4, 103 D
TEXTURE:		
Sand	—	50
Silt	90	30
Clay	10	15
COMPOSITION:		
Apatite	Tr	—
Clay	5	10
Glass	80	45
Plagioclase	5	5
Quartz	—	10
Rock fragment	7	25



SITE 768 HOLE C CORE 52R CORED INTERVAL 844.6-854.3 mbsf



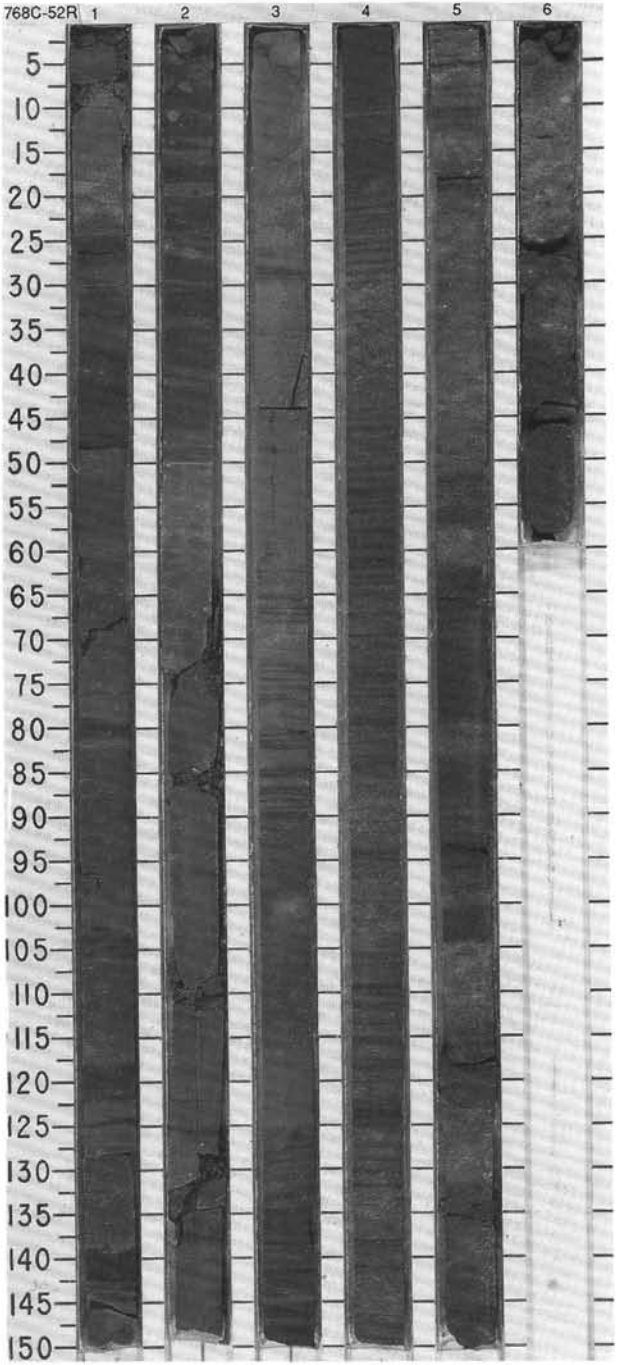
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

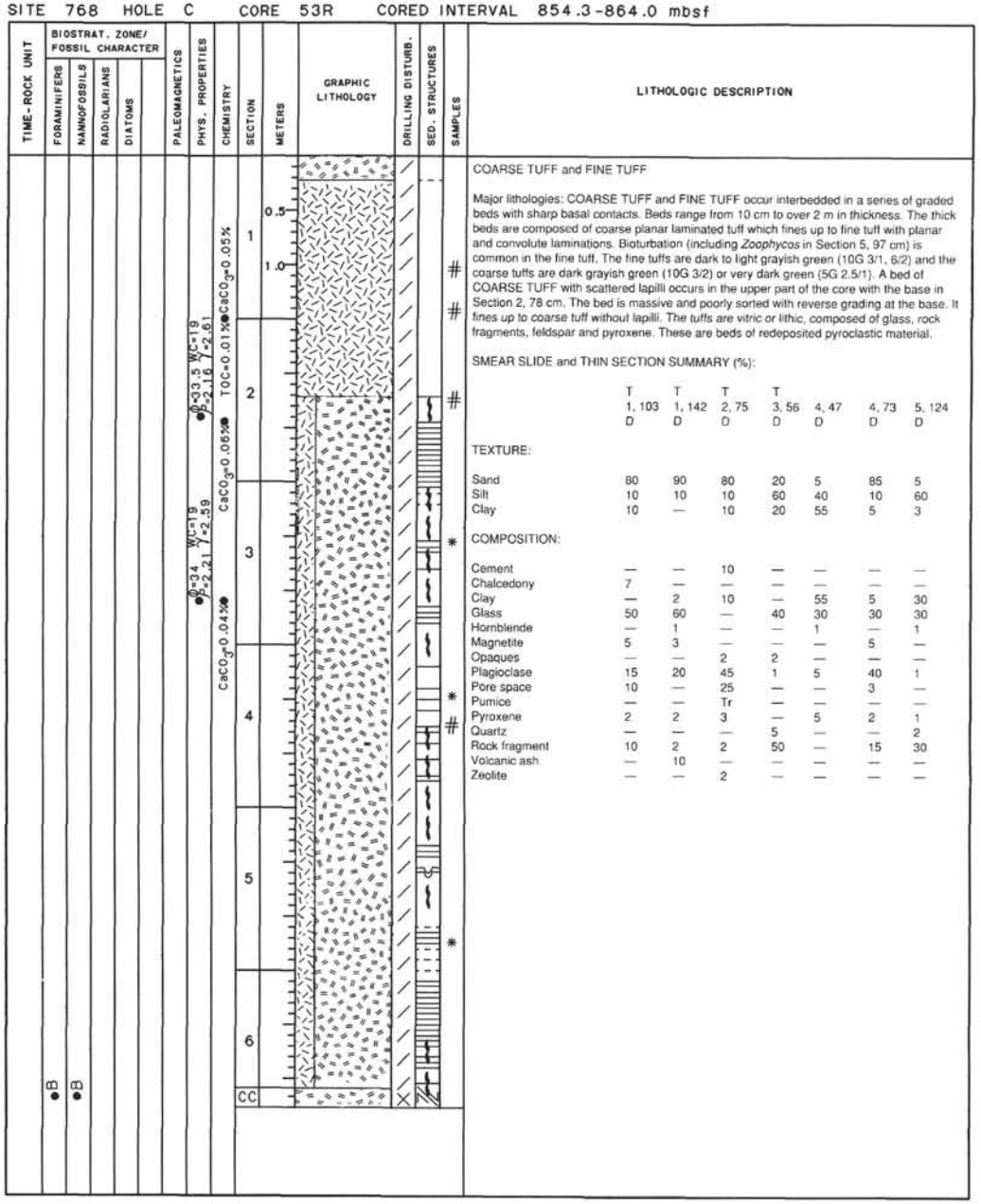
Major lithologies: This core is composed entirely of COARSE TUFF and FINE TUFF. These lithologies occur in medium bedded units in Section 1 and the upper part of Section 2. The beds have sharp bases, are normally graded, planar and ripple laminated and show compaction cracks in the upper fine grained part. They are greenish gray (5BG 4/1) and dark gray (5YR 4/1). They are composed of volcanic glass, plagioclase and rock fragments and are considered to be reworked pyroclastic deposits. A single unit of coarse to fine tuff occurs as a normally graded sequence between Section 2, 47 cm and the bottom of the core. At the base of the core it contains clasts of claystone in a coarse sand grade matrix. It grades up through laminated dark green coarse tuff (5G 3/1, 10G 4/1) to thickly laminated and massive dark green (5G 4/2) fine tuff. At the top of the sequence the fine tuff is bioturbated. The coarser material is pumice, and the main constituents are glass, rock fragments and plagioclase. This unit is the product of a single flow of pyroclastic material.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 44 D	2, 47 D	3, 86 D	T 6, 9 D
TEXTURE:				
Sand	—	—	15	60
Silt	95	60	80	20
Clay	—	40	5	20
COMPOSITION:				
Apatite	1	—	—	—
Chlorite	—	—	1	—
Clay	—	40	1	2
Feldspar	—	—	—	35
Glass	50	—	75	15
Hornblende	—	1	Tr	—
Opaques	2	Tr	1	2
Plagioclase	30	5	10	—
Pore space	—	—	—	5
Pumice	—	—	—	35
Pyroxene	—	—	—	3
Rock fragment	15	50	10	—
Zeolite	—	—	—	3



SITE 768 HOLE C CORE 53R CORED INTERVAL 854.3-864.0 mbsf



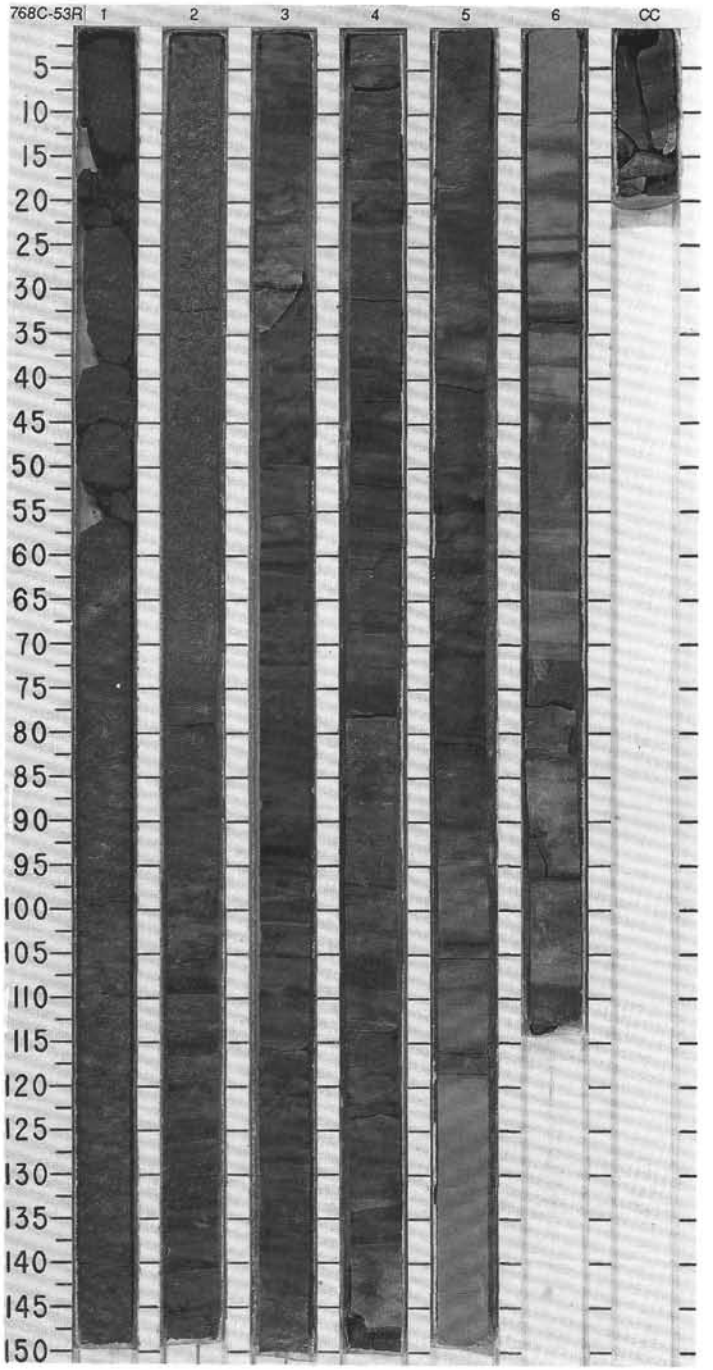
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

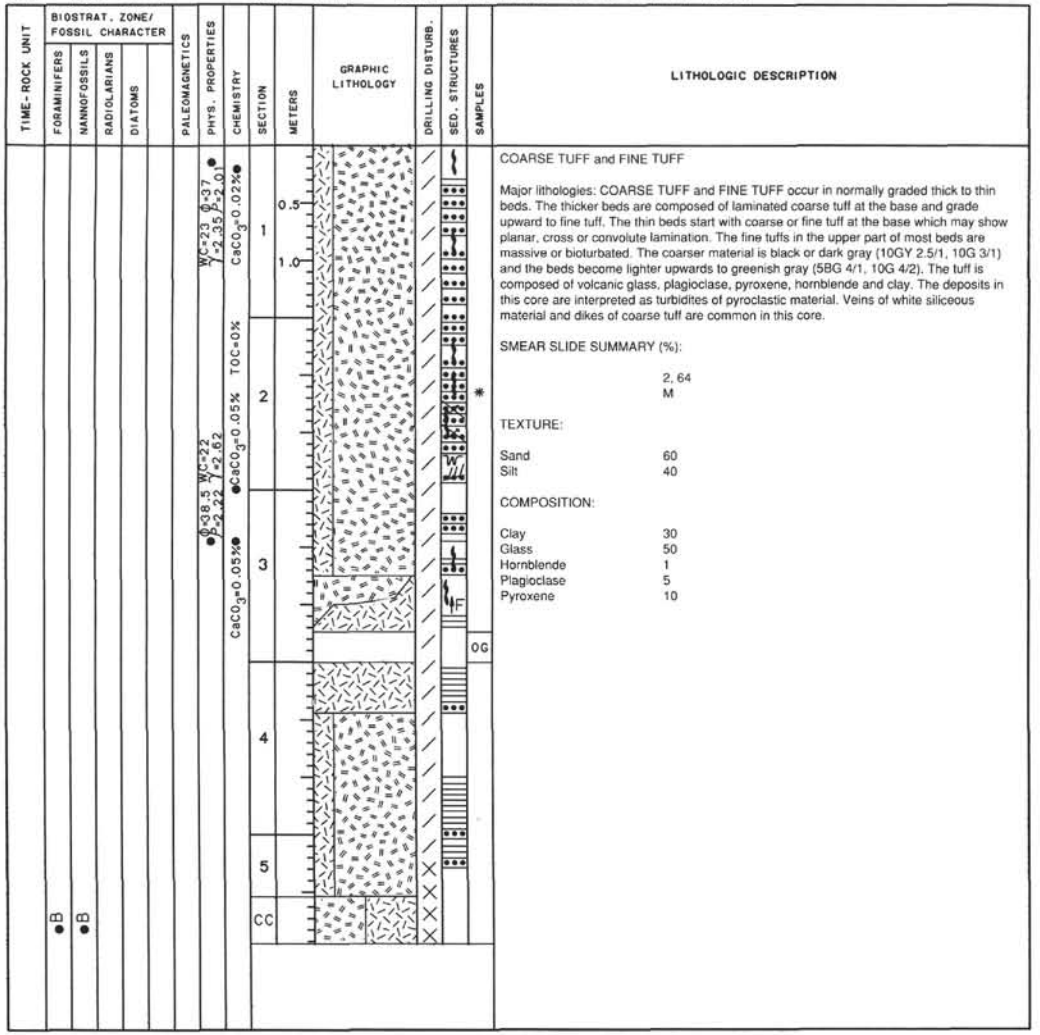
Major lithologies: COARSE TUFF and FINE TUFF occur interbedded in a series of graded beds with sharp basal contacts. Beds range from 10 cm to over 2 m in thickness. The thick beds are composed of coarse planar laminated tuff which fines up to fine tuff with planar and convolute laminations. Bioturbation (including *Zoophycos* in Section 5, 97 cm) is common in the fine tuff. The fine tuffs are dark to light grayish green (10G 3/1, 6/2) and the coarse tuffs are dark grayish green (10G 3/2) or very dark green (5G 2.5/1). A bed of COARSE TUFF with scattered lapilli occurs in the upper part of the core with the base in Section 2, 78 cm. The bed is massive and poorly sorted with reverse grading at the base. It fines up to coarse tuff without lapilli. The tuffs are vitric or lithic, composed of glass, rock fragments, feldspar and pyroxene. These are beds of redeposited pyroclastic material.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 1, 103 D	T 1, 142 D	T 2, 75 D	T 3, 56 D	4, 47 D	4, 73 D	5, 124 D
TEXTURE:							
Sand	80	90	80	20	5	85	5
Silt	10	10	10	60	40	10	60
Clay	10	—	10	20	55	5	3
COMPOSITION:							
Cement	—	—	10	—	—	—	—
Chalcedony	7	—	—	—	—	—	—
Clay	—	2	10	—	55	5	30
Glass	50	60	—	40	30	30	30
Hornblende	—	1	—	—	1	—	1
Magnetite	5	3	—	—	—	5	—
Opaques	—	—	2	2	—	—	—
Plagioclase	15	20	45	1	5	40	1
Pore space	10	—	25	—	—	3	—
Pumice	—	—	Tr	—	—	—	—
Pyroxene	2	2	3	—	5	2	1
Quartz	—	—	—	5	—	—	2
Rock fragment	10	2	2	50	—	15	30
Volcanic ash	—	10	—	—	—	—	—
Zeolite	—	—	2	—	—	—	—



SITE 768 HOLE C CORE 54R CORED INTERVAL 864.0-873.7 mbsf



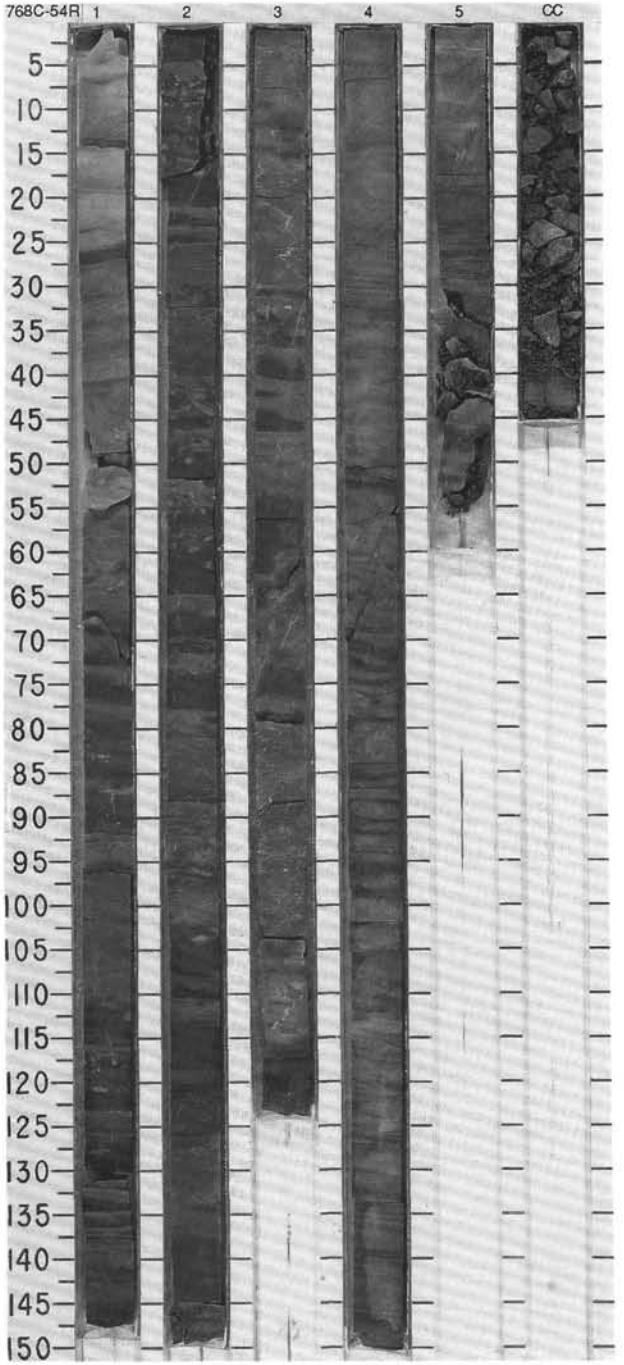
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

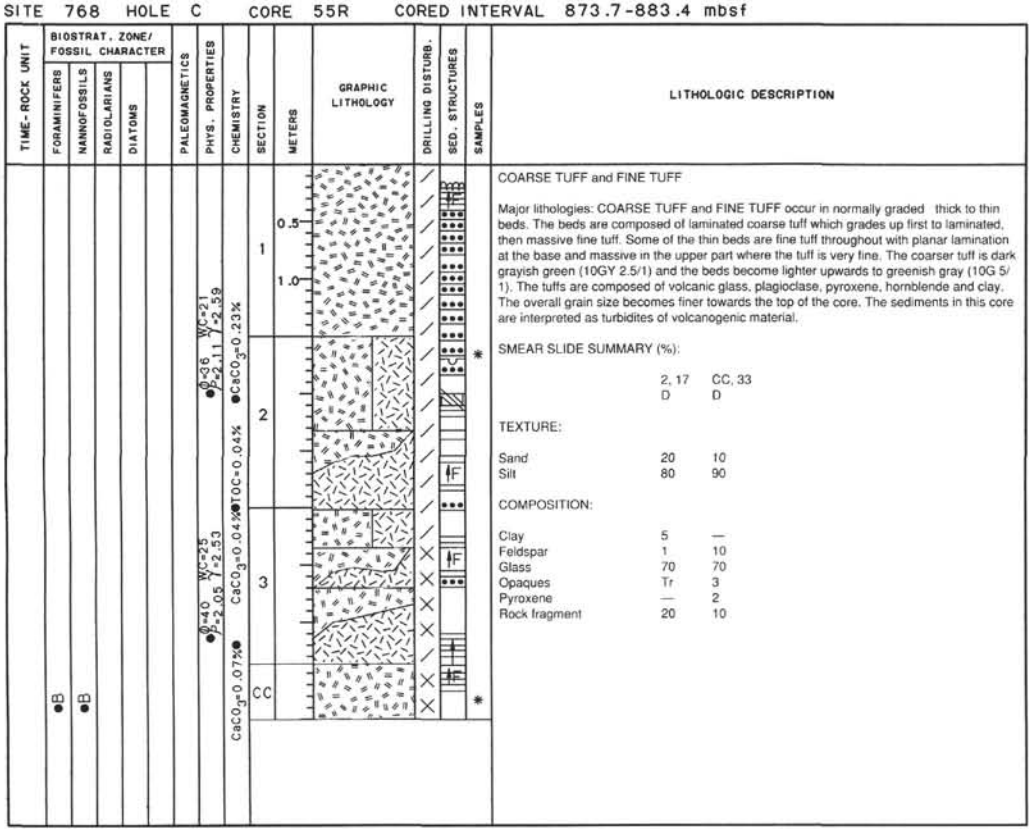
Major lithologies: COARSE TUFF and FINE TUFF occur in normally graded thick to thin beds. The thicker beds are composed of laminated coarse tuff at the base and grade upward to fine tuff. The thin beds start with coarse or fine tuff at the base which may show planar, cross or convolute lamination. The fine tuffs in the upper part of most beds are massive or bioturbated. The coarser material is black or dark gray (10GY 2.5/1, 10G 3/1) and the beds become lighter upwards to greenish gray (5BG 4/1, 10G 4/2). The tuff is composed of volcanic glass, plagioclase, pyroxene, hornblende and clay. The deposits in this core are interpreted as turbidites of pyroclastic material. Veins of white siliceous material and dikes of coarse tuff are common in this core.

SMEAR SLIDE SUMMARY (%):

	2, 64 M
TEXTURE:	
Sand	60
Silt	40
COMPOSITION:	
Clay	30
Glass	50
Hornblende	1
Plagioclase	5
Pyroxene	10



SITE 768 HOLE C CORE 55R CORED INTERVAL 873.7-883.4 mbsf



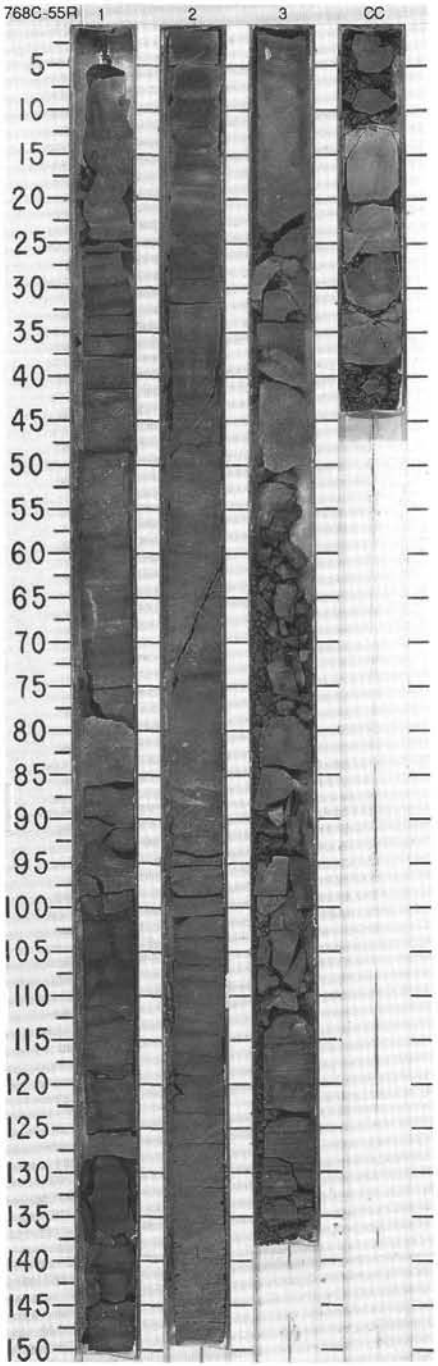
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

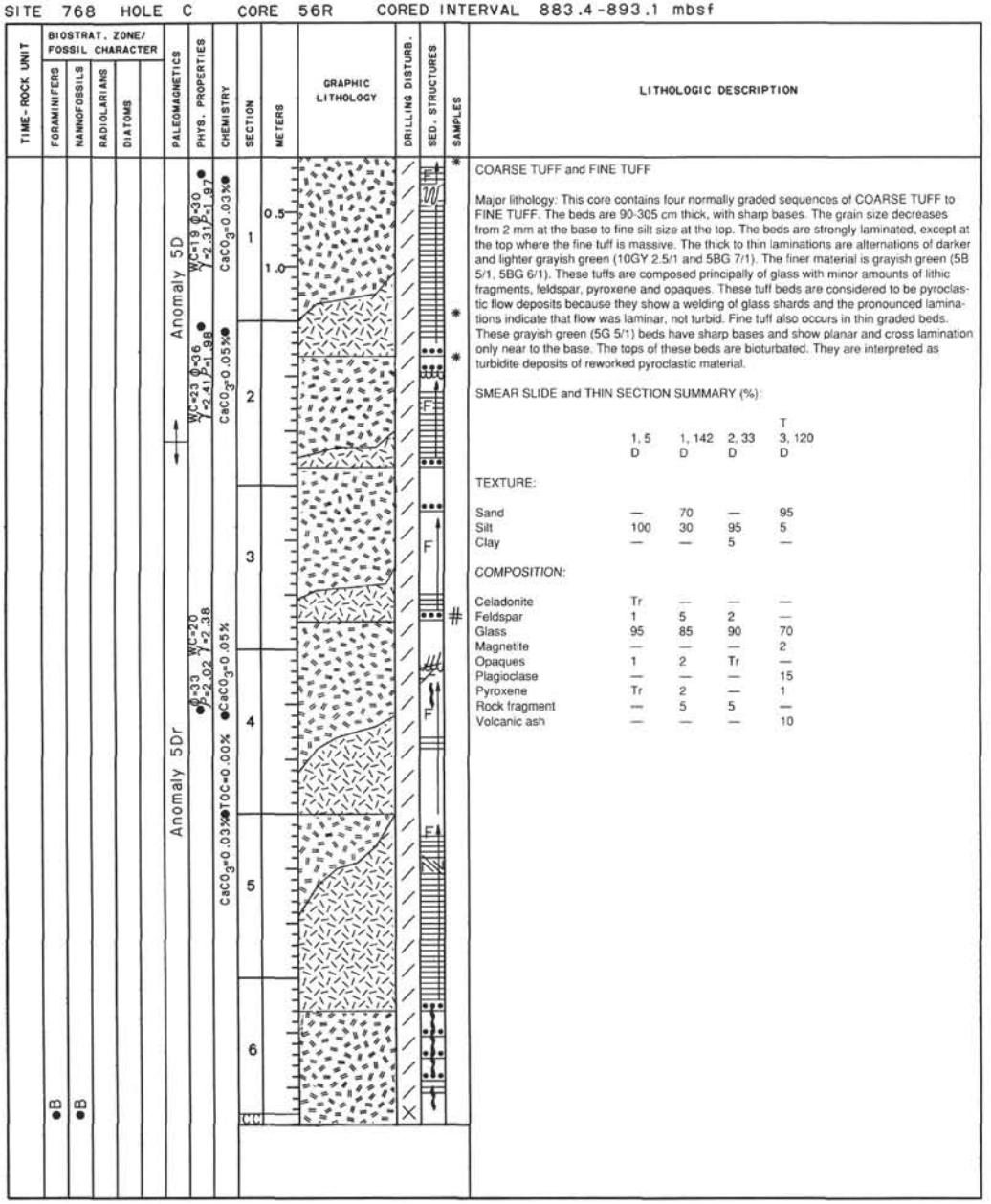
Major lithologies: COARSE TUFF and FINE TUFF occur in normally graded thick to thin beds. The beds are composed of laminated coarse tuff which grades up first to laminated, then massive fine tuff. Some of the thin beds are fine tuff throughout with planar lamination at the base and massive in the upper part where the tuff is very fine. The coarser tuff is dark grayish green (10GY 2.5/1) and the beds become lighter upwards to greenish gray (10G 5/1). The tuffs are composed of volcanic glass, plagioclase, pyroxene, hornblende and clay. The overall grain size becomes finer towards the top of the core. The sediments in this core are interpreted as turbidites of volcanogenic material.

SMEAR SLIDE SUMMARY (%):

	2, 17 D	CC, 33 D
TEXTURE:		
Sand	20	10
Silt	80	90
COMPOSITION:		
Clay	5	—
Feldspar	1	10
Glass	70	70
Opaques	Tr	3
Pyroxene	—	2
Rock fragment	20	10



SITE 768 HOLE C CORE 56R CORED INTERVAL 883.4-893.1 mbsf



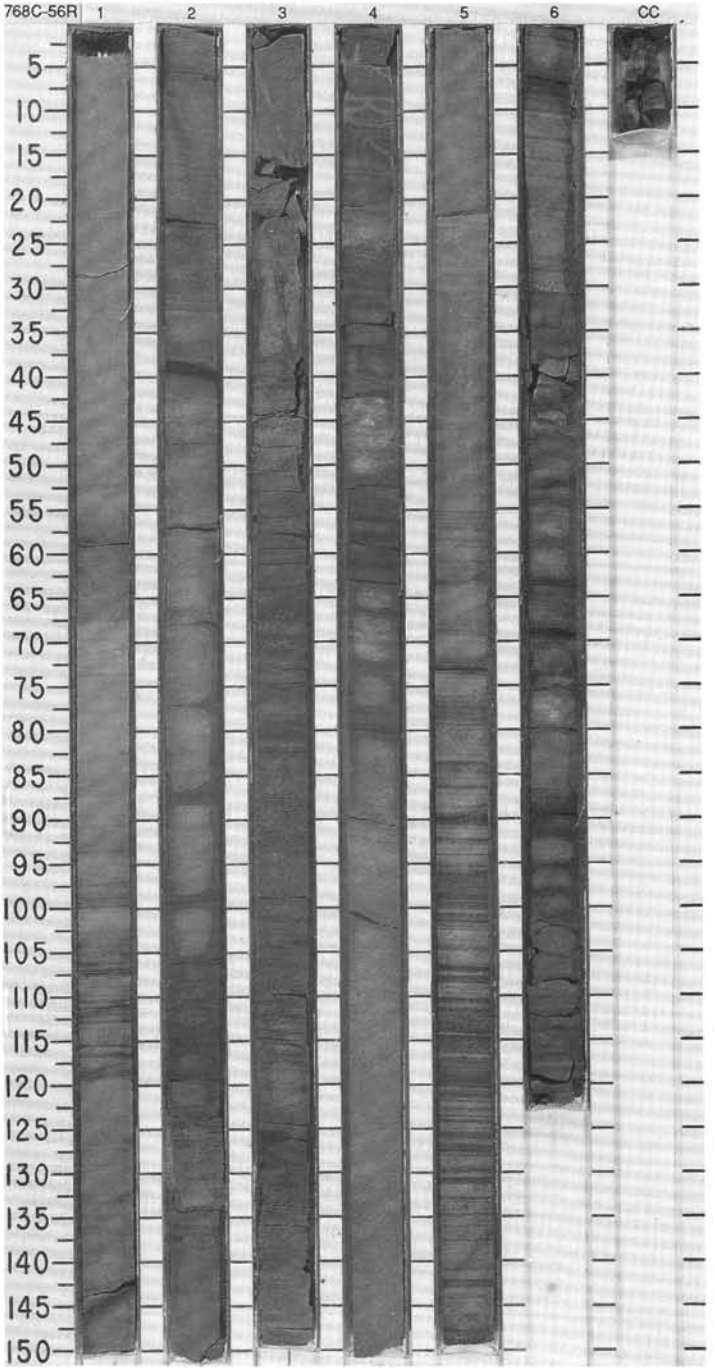
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

Major lithology: This core contains four normally graded sequences of COARSE TUFF to FINE TUFF. The beds are 90-305 cm thick, with sharp bases. The grain size decreases from 2 mm at the base to fine silt size at the top. The beds are strongly laminated, except at the top where the fine tuff is massive. The thick to thin laminations are alternations of darker and lighter grayish green (10GY 2.5/1 and 5BG 7/1). The finer material is grayish green (5B 5/1, 5BG 6/1). These tuffs are composed principally of glass with minor amounts of lithic fragments, feldspar, pyroxene and opaques. These tuff beds are considered to be pyroclastic flow deposits because they show a welding of glass shards and the pronounced laminations indicate that flow was laminar, not turbid. Fine tuff also occurs in thin graded beds. These grayish green (5G 5/1) beds have sharp bases and show planar and cross lamination only near to the base. The tops of these beds are bioturbated. They are interpreted as turbidite deposits of reworked pyroclastic material.

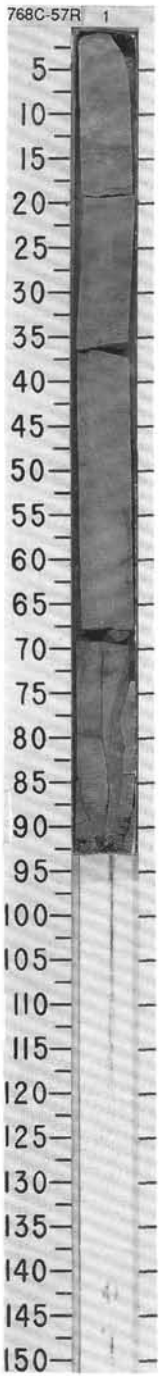
SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 5 D	1, 142 D	2, 33 D	T 3, 120 D
TEXTURE:				
Sand	—	70	—	95
Silt	100	30	95	5
Clay	—	—	5	—
COMPOSITION:				
Celadonite	Tr	—	—	—
Feldspar	1	5	2	—
Glass	95	85	90	70
Magnetite	—	—	—	2
Opaques	1	2	Tr	—
Plagioclase	—	—	—	15
Pyroxene	Tr	2	—	1
Rock fragment	—	5	5	—
Volcanic ash	—	—	—	10

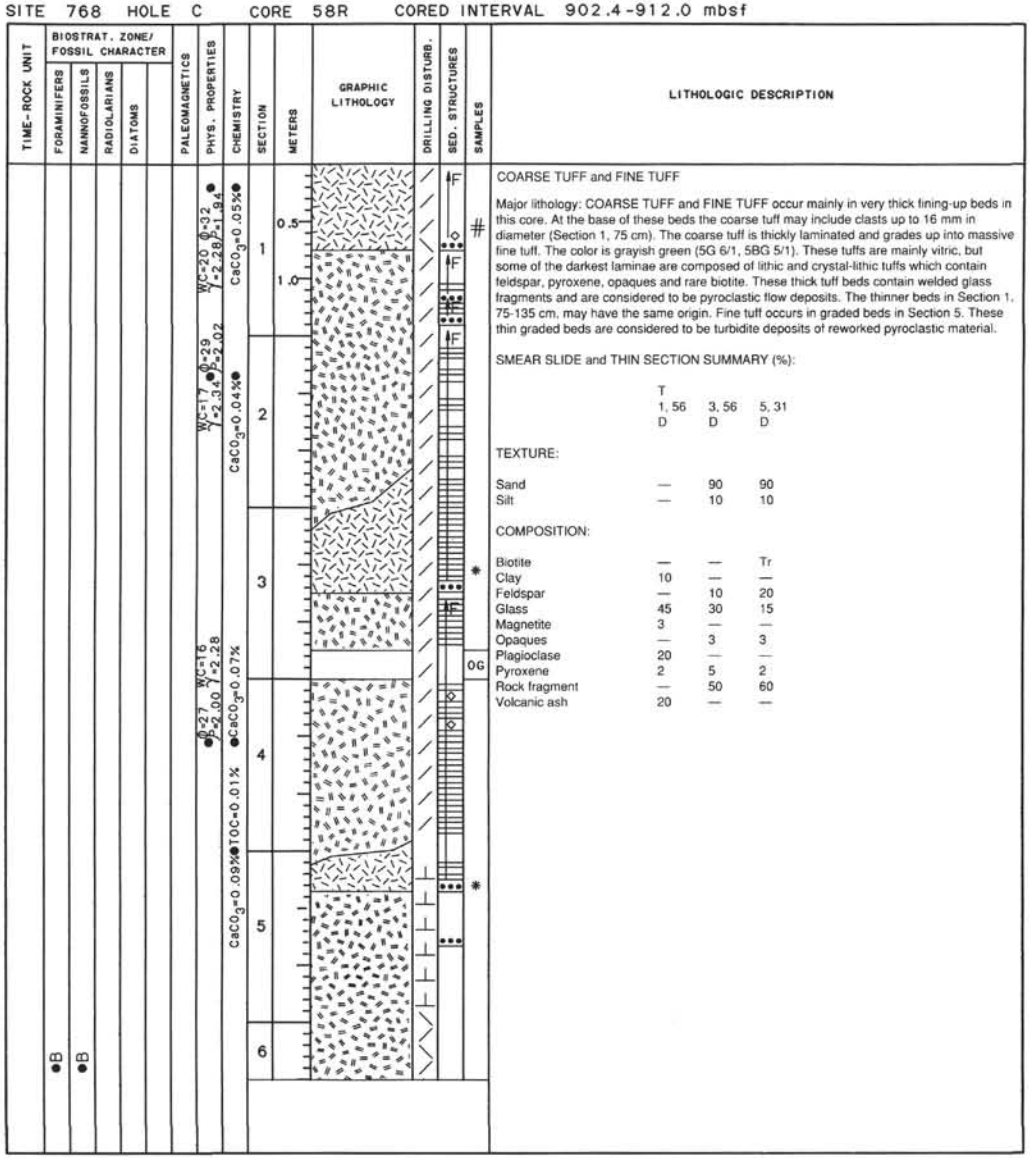


SITE 768 HOLE C CORE 57R CORED INTERVAL 893.1-902.4 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
							$CaCO_3$=0.03% TOC=05%	1						FINE TUFF Major lithology: Light green (5G 6/2) FINE TUFF is the only lithology. It shows planar and convoluted lamination.



SITE 768 HOLE C CORE 58R CORED INTERVAL 902.4-912.0 mbsf

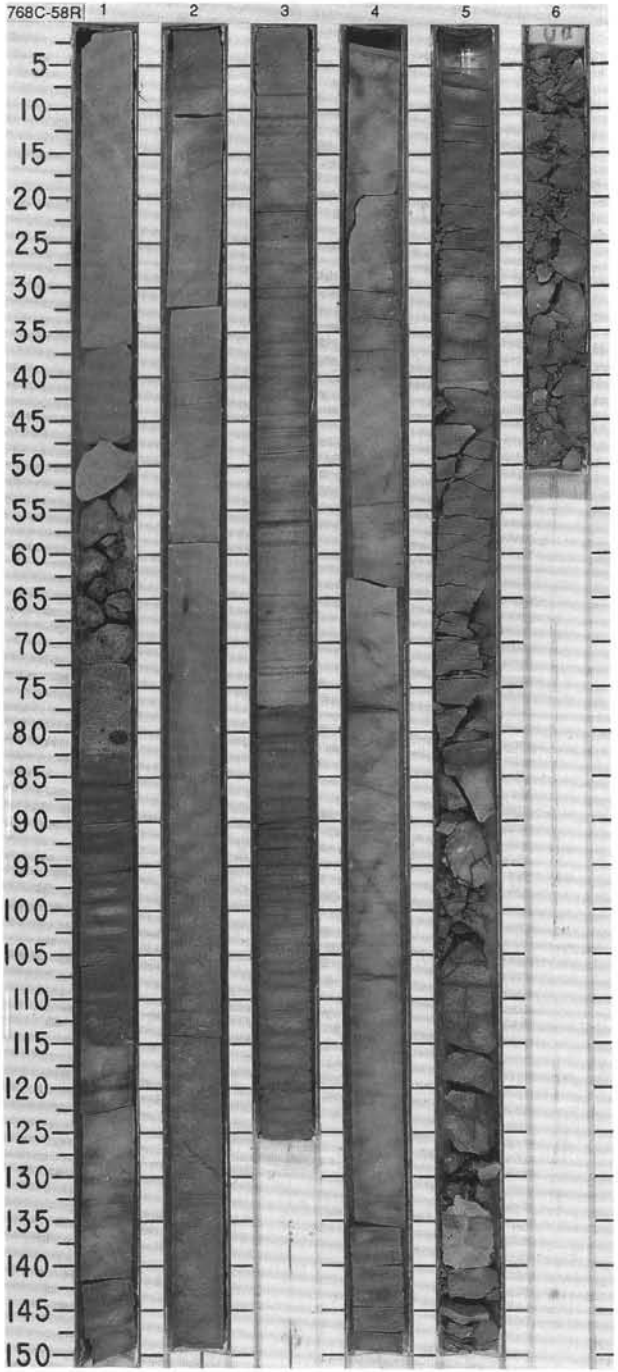


COARSE TUFF and FINE TUFF

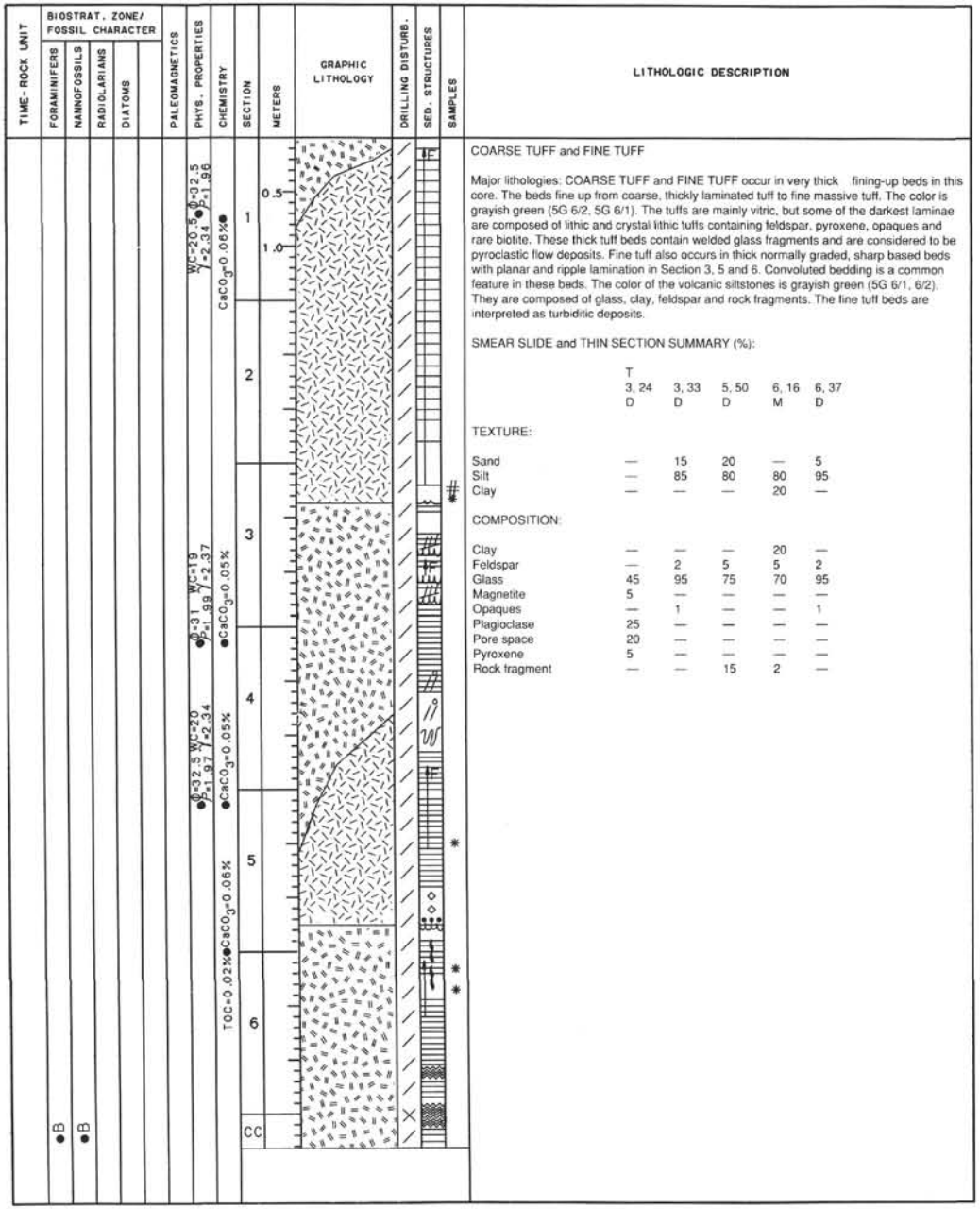
Major lithology: COARSE TUFF and FINE TUFF occur mainly in very thick fining-up beds in this core. At the base of these beds the coarse tuff may include clasts up to 16 mm in diameter (Section 1, 75 cm). The coarse tuff is thickly laminated and grades up into massive fine tuff. The color is grayish green (5G 6/1, 5BG 5/1). These tuffs are mainly vitric, but some of the darkest laminae are composed of lithic and crystal-lithic tuffs which contain feldspar, pyroxene, opaques and rare biotite. These thick tuff beds contain welded glass fragments and are considered to be pyroclastic flow deposits. The thinner beds in Section 1, 75-135 cm, may have the same origin. Fine tuff occurs in graded beds in Section 5. These thin graded beds are considered to be turbidite deposits of reworked pyroclastic material.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 1, 56 D	3, 56 D	5, 31 D
TEXTURE:			
Sand	—	90	90
Silt	—	10	10
COMPOSITION:			
Biotite	—	—	Tr
Clay	10	—	—
Feldspar	—	10	20
Glass	45	30	15
Magnetite	3	—	—
Opaques	—	3	3
Plagioclase	20	—	—
Pyroxene	2	5	2
Rock fragment	—	50	60
Volcanic ash	20	—	—



SITE 768 HOLE C CORE 59R CORED INTERVAL 912.0-921.7 mbsf



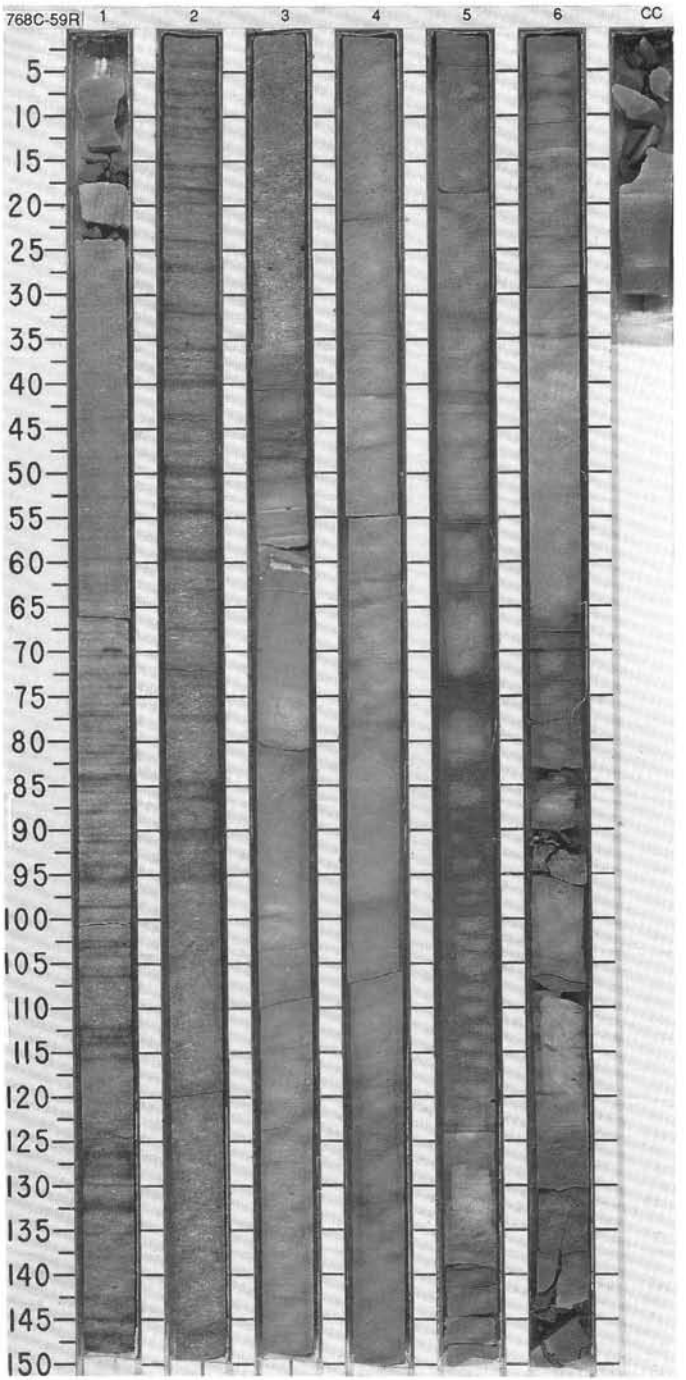
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

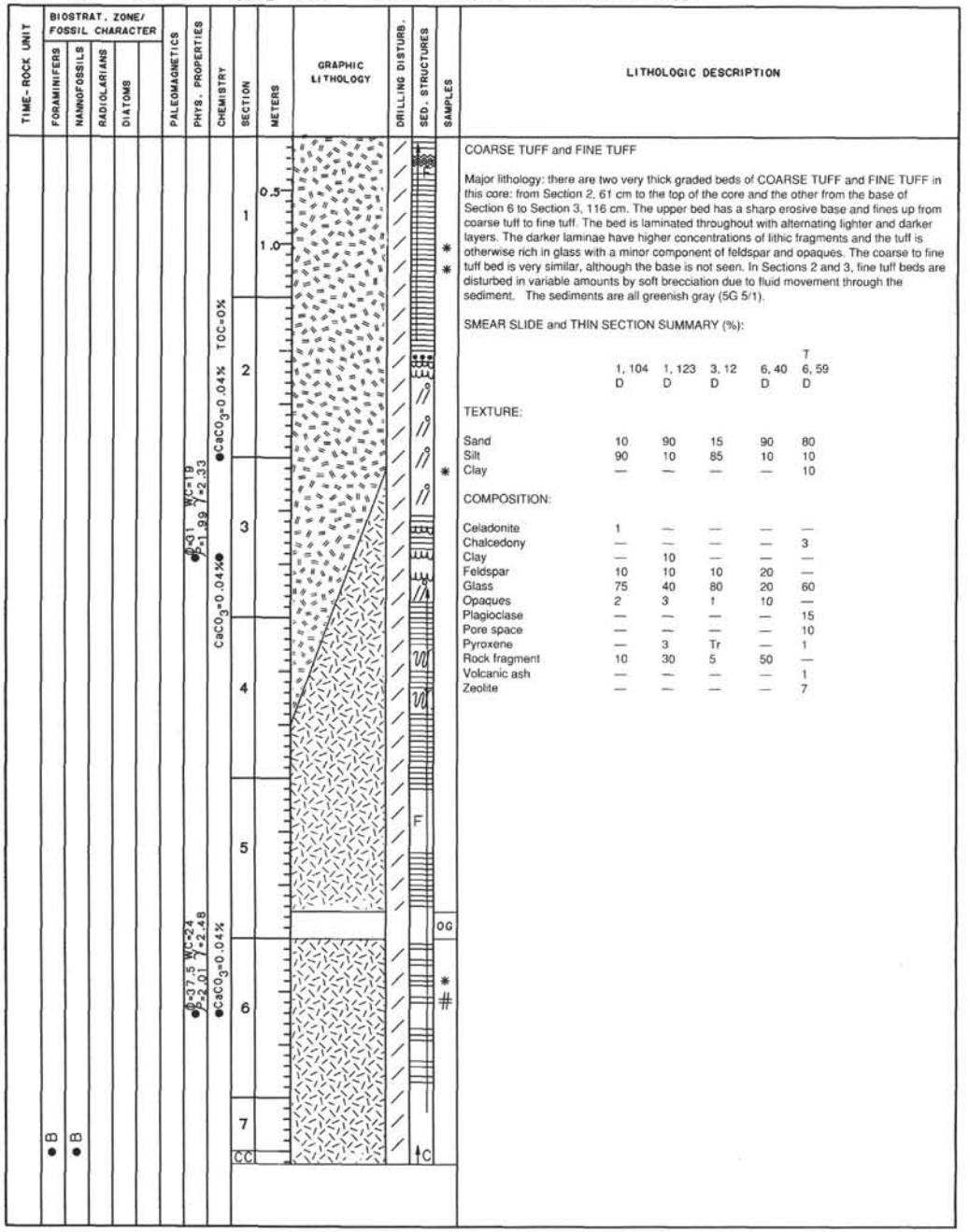
Major lithologies: COARSE TUFF and FINE TUFF occur in very thick fining-up beds in this core. The beds fine up from coarse, thickly laminated tuff to fine massive tuff. The color is grayish green (5G 6/2, 5G 6/1). The tuffs are mainly vitric, but some of the darkest laminae are composed of lithic and crystal lithic tuffs containing feldspar, pyroxene, opaques and rare biotite. These thick tuff beds contain welded glass fragments and are considered to be pyroclastic flow deposits. Fine tuff also occurs in thick normally graded, sharp based beds with planar and ripple lamination in Section 3, 5 and 6. Convoluted bedding is a common feature in these beds. The color of the volcanic siltstones is grayish green (5G 6/1, 6/2). They are composed of glass, clay, feldspar and rock fragments. The fine tuff beds are interpreted as turbiditic deposits.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 3, 24 D	3, 33 D	5, 50 D	6, 16 M	6, 37 D
TEXTURE:					
Sand	—	15	20	—	5
Silt	—	85	80	80	95
Clay	—	—	—	20	—
COMPOSITION:					
Clay	—	—	—	20	—
Feldspar	—	2	5	5	2
Glass	45	95	75	70	95
Magnetite	5	—	—	—	—
Opaques	—	1	—	—	1
Plagioclase	25	—	—	—	—
Pore space	20	—	—	—	—
Pyroxene	5	—	—	—	—
Rock fragment	—	—	15	2	—



SITE 768 HOLE C CORE 60R CORED INTERVAL 921.7-931.4 mbsf



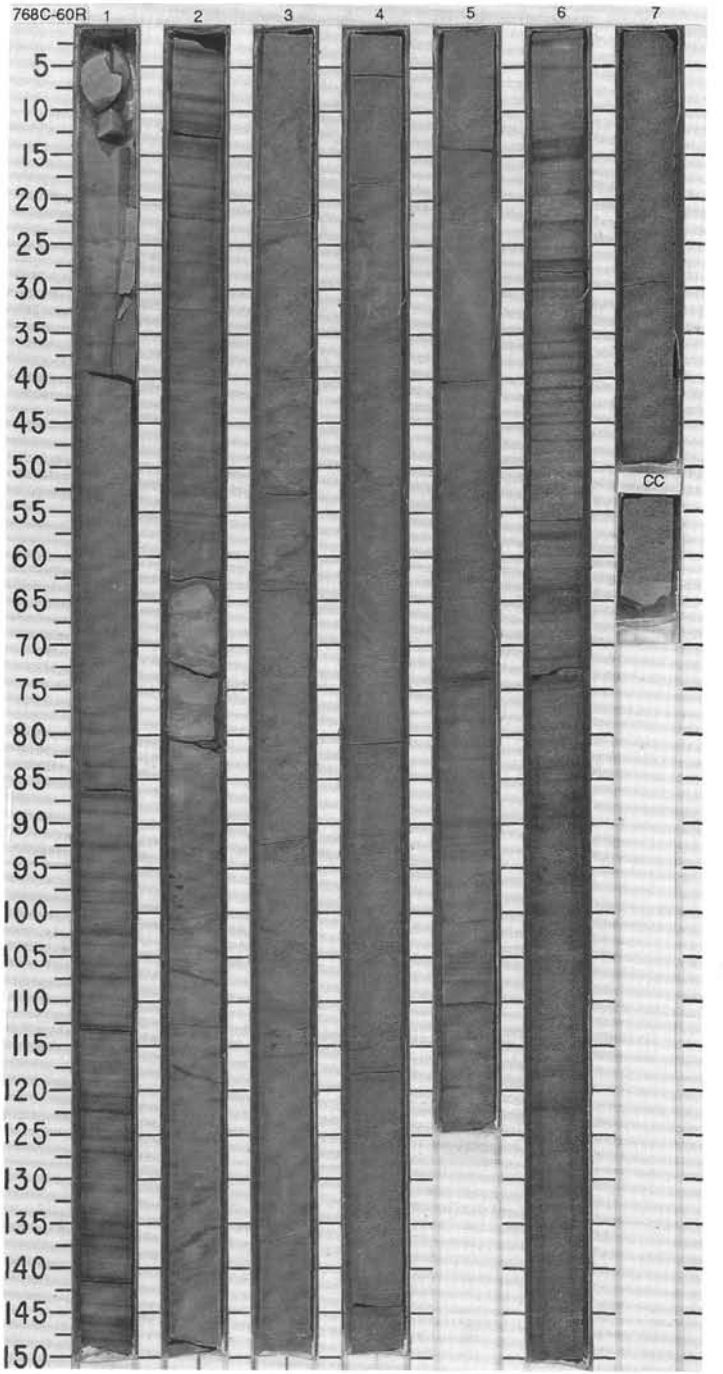
LITHOLOGIC DESCRIPTION

COARSE TUFF and FINE TUFF

Major lithology: there are two very thick graded beds of COARSE TUFF and FINE TUFF in this core: from Section 2, 61 cm to the top of the core and the other from the base of Section 6 to Section 3, 116 cm. The upper bed has a sharp erosive base and fines up from coarse tuff to fine tuff. The bed is laminated throughout with alternating lighter and darker layers. The darker laminae have higher concentrations of lithic fragments and the tuff is otherwise rich in glass with a minor component of feldspar and opaques. The coarse to fine tuff bed is very similar, although the base is not seen. In Sections 2 and 3, fine tuff beds are disturbed in variable amounts by soft brecciation due to fluid movement through the sediment. The sediments are all greenish gray (5G 5/1).

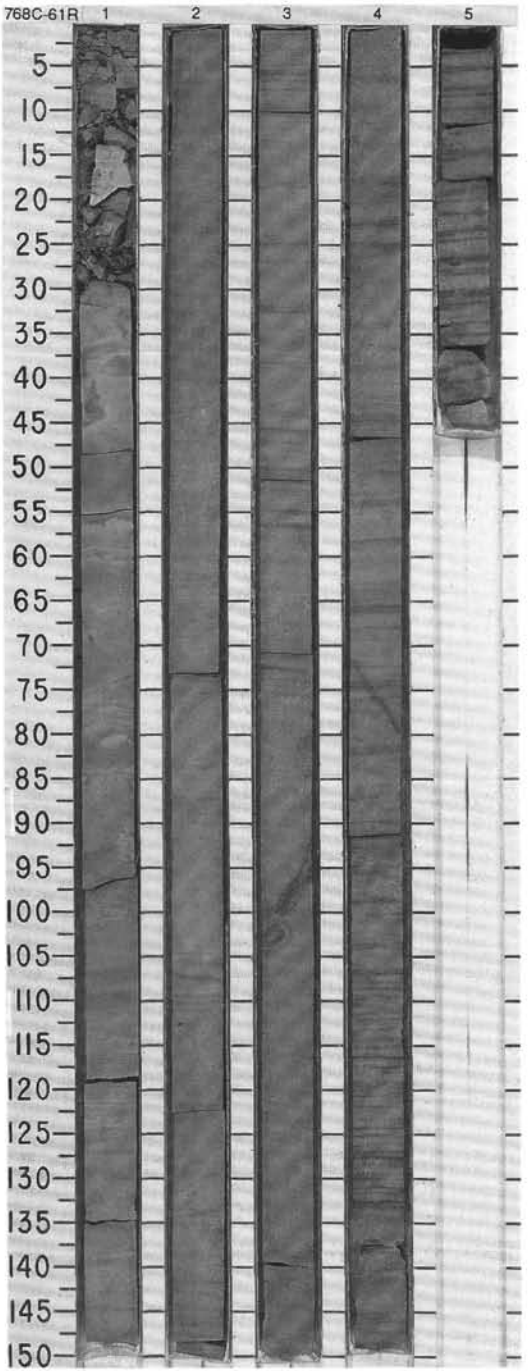
SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 104 D	1, 123 D	3, 12 D	6, 40 D	T 6, 59 D
TEXTURE:					
Sand	10	90	15	90	80
Silt	90	10	85	10	10
Clay	—	—	—	—	10
COMPOSITION:					
Celadonite	1	—	—	—	—
Chalcedony	—	—	—	—	3
Clay	—	10	—	—	—
Feldspar	10	10	10	20	—
Glass	75	40	80	20	60
Opaques	2	3	1	10	—
Plagioclase	—	—	—	—	15
Pore space	—	—	—	—	10
Pyroxene	—	3	Tr	—	1
Rock fragment	10	30	5	50	—
Volcanic ash	—	—	—	—	1
Zeolite	—	—	—	—	7

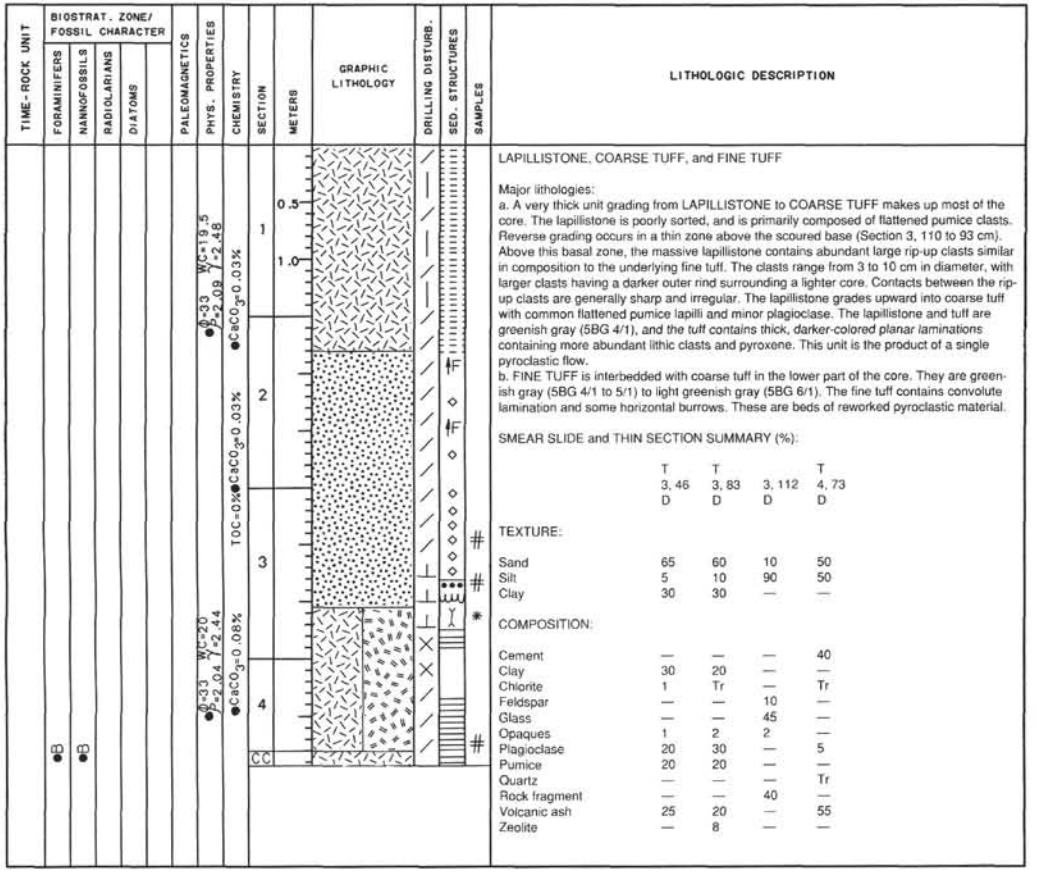


SITE 768 HOLE C CORE 61R CORED INTERVAL 931.4-941.0 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
	B	B				0-30 W.C.=18 ρ=2.01 Y=2.37 0-32 W.C.=19 ρ=2.04 Y=2.41	$CaCO_3$=0.02% $CaCO_3$=0.04% TOC=0.0% $CaCO_3$=0.07%	1 2 3 4 5	0.5 1.0				* *	COARSE TUFF and FINE TUFF Major lithologies: a. In Section 1, 0-135 cm, FINE TUFF occurs in thick to thin beds. The beds are normally graded, and convolute lamination is common. The sedimentis entirely silt-sized vitric ash which has been redeposited and severely disturbed by fluid movement through it. b. There is one very thick graded bed of COARSE TUFF in this core. It extends from the base of the core catcher, 44 cm, to base of Section 1, 135. It has a sharp erosive base and fines up from lapillistone in the bottom 3 cm to very coarse sand size material to silt-sized tuff at the top. The bed is laminated throughout with alternating lighter and darker layers. The darker laminae have higher concentrations of lithic fragments and the ash is otherwise rich in glass with a minor component of feldspar and opaques. There are also water escape structures. A fracture filled with minerals (silica) is found in Section 3, 94-97 cm. A thin bed of coarse tuff occurs in top of Section 1, 0-17 cm. The sediments are all greenish gray (5BG 5/1). SMEAR SLIDE SUMMARY (%): 1, 135 D — 2, 42 D TEXTURE: Silt 95 — COMPOSITION: Feldspar 1 10 Glass 95 70 Opaques Tr 1 Pyroxene — 3 Rock fragment 3 15



SITE 768 HOLE C CORE 62R CORED INTERVAL 941.0-950.3 mbsf



LAPILLISTONE, COARSE TUFF, and FINE TUFF

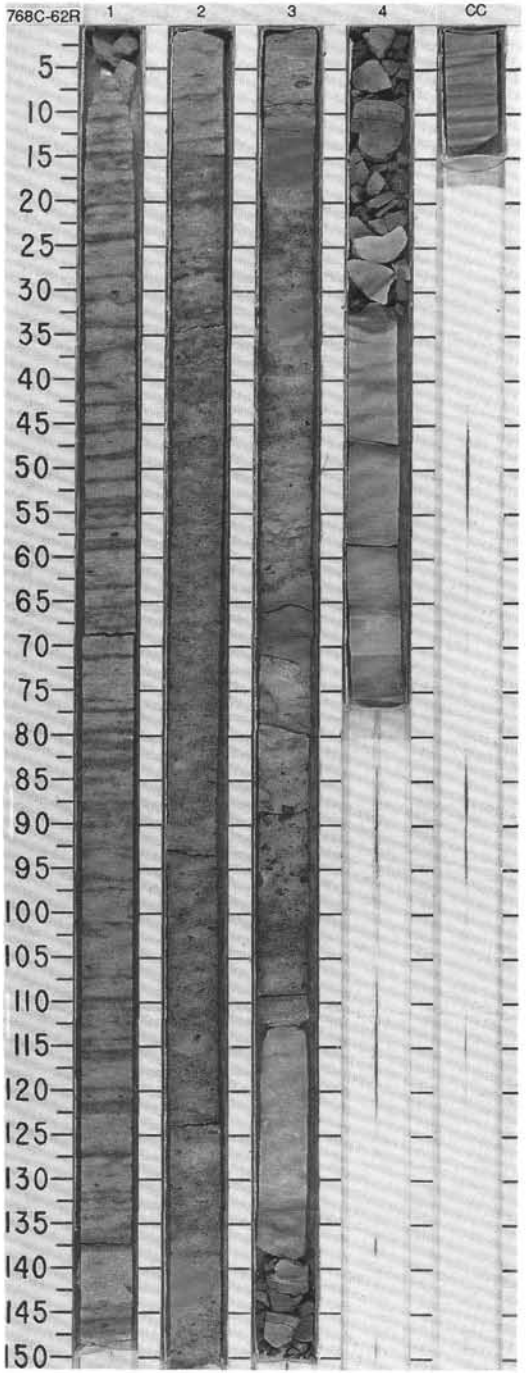
Major lithologies:

a. A very thick unit grading from LAPILLISTONE to COARSE TUFF makes up most of the core. The lapillistone is poorly sorted, and is primarily composed of flattened pumice clasts. Reverse grading occurs in a thin zone above the scoured base (Section 3, 110 to 93 cm). Above this basal zone, the massive lapillistone contains abundant large rip-up clasts similar in composition to the underlying fine tuff. The clasts range from 3 to 10 cm in diameter, with larger clasts having a darker outer rind surrounding a lighter core. Contacts between the rip-up clasts are generally sharp and irregular. The lapillistone grades upward into coarse tuff with common flattened pumice lapilli and minor plagioclase. The lapillistone and tuff are greenish gray (5BG 4/1), and the tuff contains thick, darker-colored planar laminations containing more abundant lithic clasts and pyroxene. This unit is the product of a single pyroclastic flow.

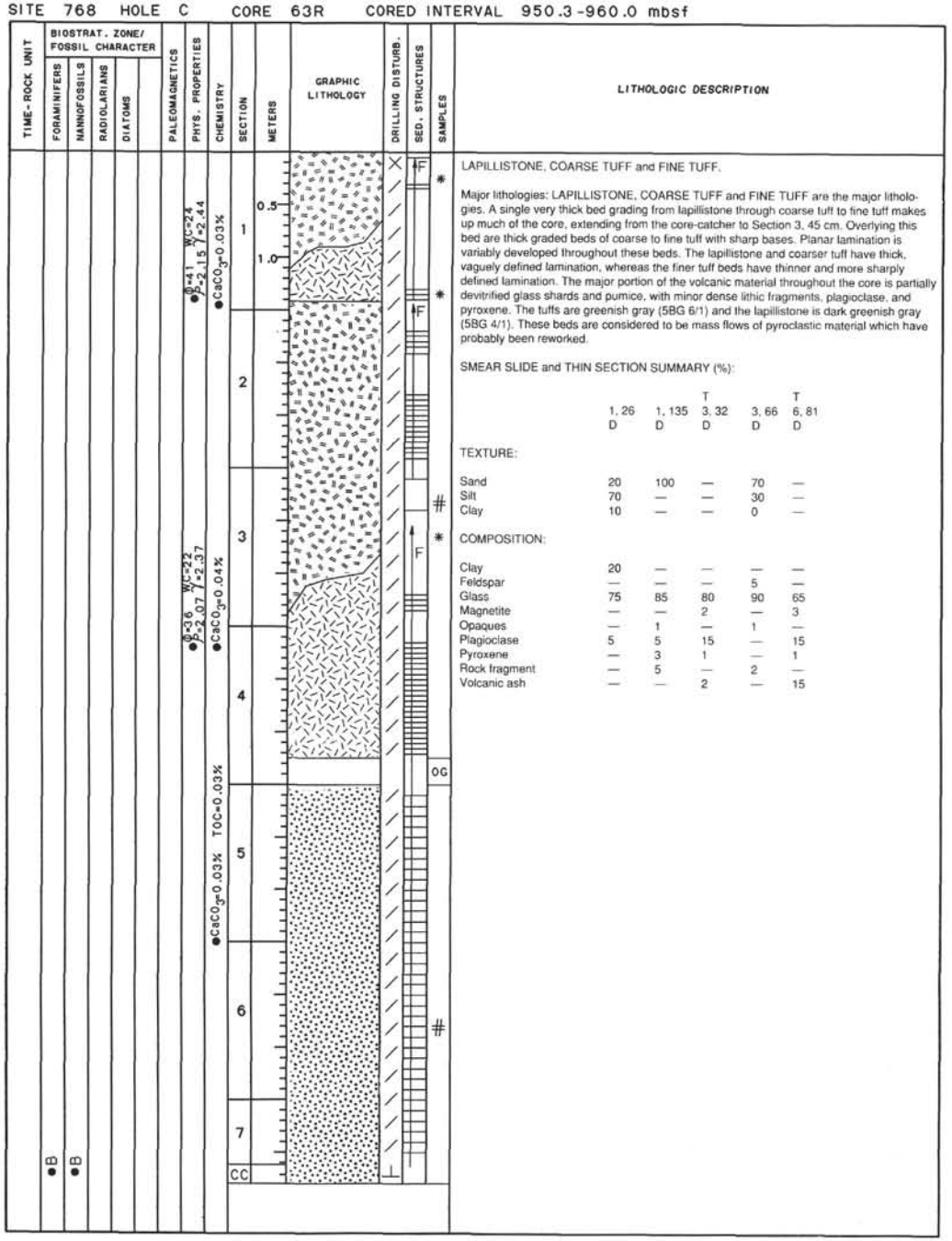
b. FINE TUFF is interbedded with coarse tuff in the lower part of the core. They are greenish gray (5BG 4/1 to 5/1) to light greenish gray (5BG 6/1). The fine tuff contains convolute lamination and some horizontal burrows. These are beds of reworked pyroclastic material.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 3, 46 D	T 3, 83 D	3, 112 D	T 4, 73 D
TEXTURE:				
Sand	65	60	10	50
Silt	5	10	90	50
Clay	30	30	—	—
COMPOSITION:				
Cement	—	—	—	40
Clay	30	20	—	—
Chlorite	1	Tr	—	Tr
Feldspar	—	—	10	—
Glass	—	—	45	—
Opaques	1	2	2	—
Plagioclase	20	30	—	5
Pumice	20	20	—	—
Quartz	—	—	—	Tr
Rock fragment	—	—	40	—
Volcanic ash	25	20	—	55
Zeolite	—	8	—	—



SITE 768 HOLE C CORE 63R CORED INTERVAL 950.3-960.0 mbsf



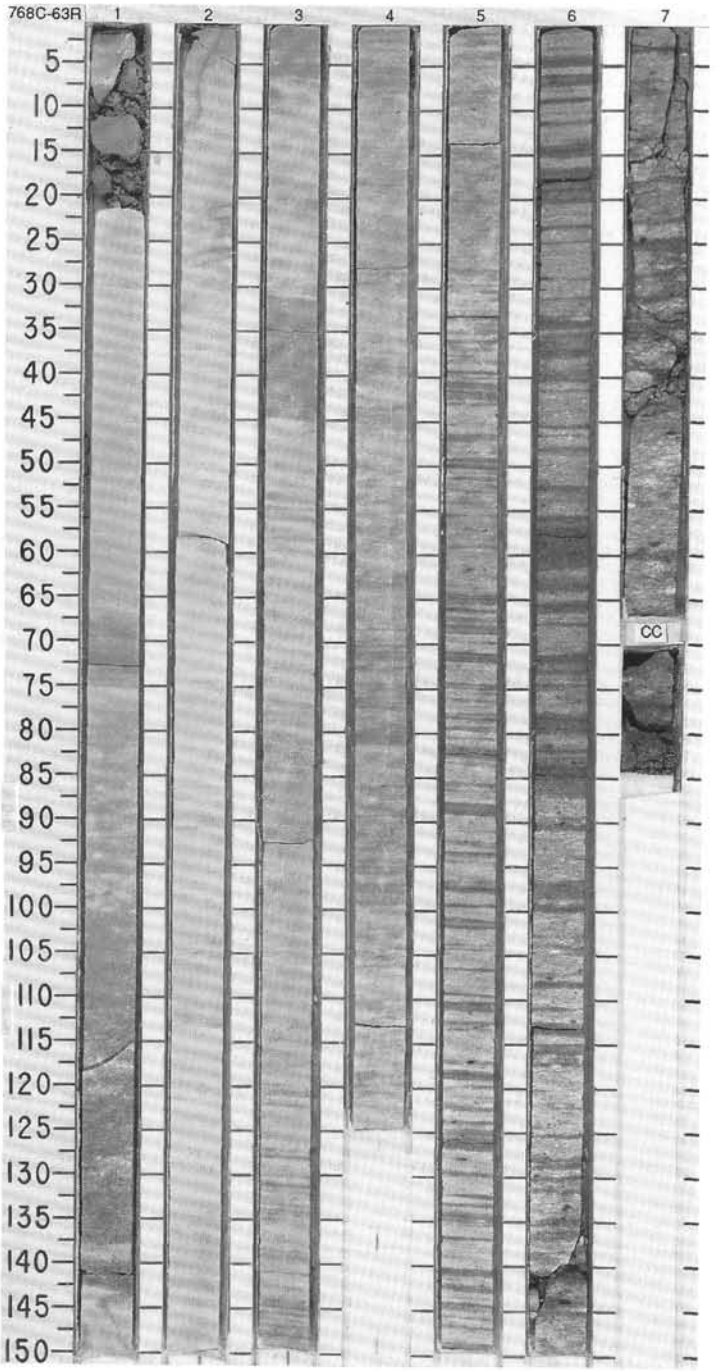
LITHOLOGIC DESCRIPTION

LAPILLISTONE, COARSE TUFF and FINE TUFF.

Major lithologies: LAPILLISTONE, COARSE TUFF and FINE TUFF are the major lithologies. A single very thick bed grading from lapillistone through coarse tuff to fine tuff makes up much of the core, extending from the core-catcher to Section 3, 45 cm. Overlying this bed are thick graded beds of coarse to fine tuff with sharp bases. Planar lamination is variably developed throughout these beds. The lapillistone and coarser tuff have thick, vaguely defined lamination, whereas the finer tuff beds have thinner and more sharply defined lamination. The major portion of the volcanic material throughout the core is partially devitrified glass shards and pumice, with minor dense lithic fragments, plagioclase, and pyroxene. The tuffs are greenish gray (5BG 6/1) and the lapillistone is dark greenish gray (5BG 4/1). These beds are considered to be mass flows of pyroclastic material which have probably been reworked.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	1, 26 D	1, 135 D	T 3, 32 D	3, 66 D	T 6, 81 D
TEXTURE:					
Sand	20	100	—	70	—
Silt	70	—	—	30	—
Clay	10	—	—	0	—
COMPOSITION:					
Clay	20	—	—	—	—
Feldspar	—	—	—	5	—
Glass	75	85	80	90	65
Magnetite	—	—	2	—	3
Opaques	—	1	—	1	—
Plagioclase	5	5	15	—	15
Pyroxene	—	3	1	—	1
Rock fragment	—	5	—	2	—
Volcanic ash	—	—	2	—	15

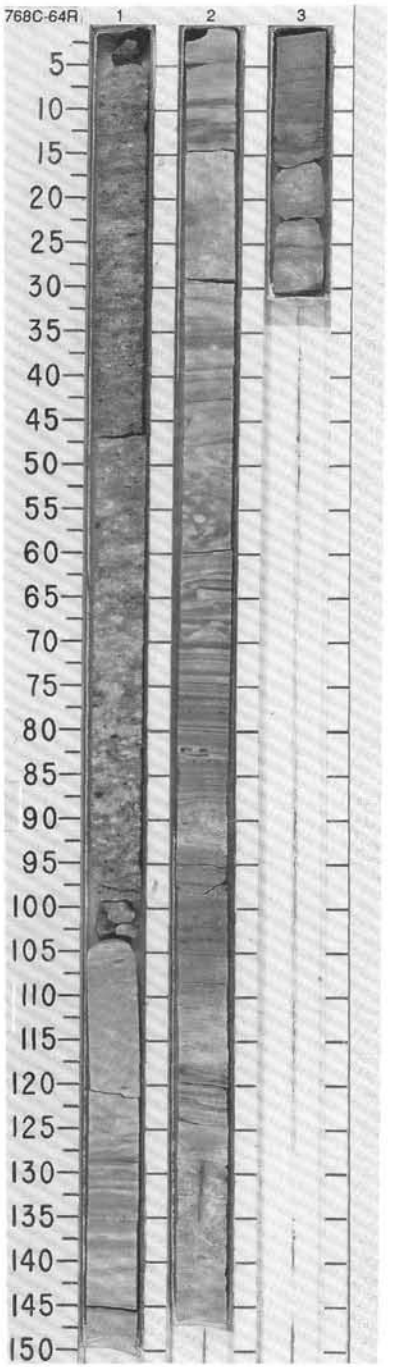


SITE 768 HOLE C CORE 64R CORED INTERVAL 960.0-969.7 mbsf

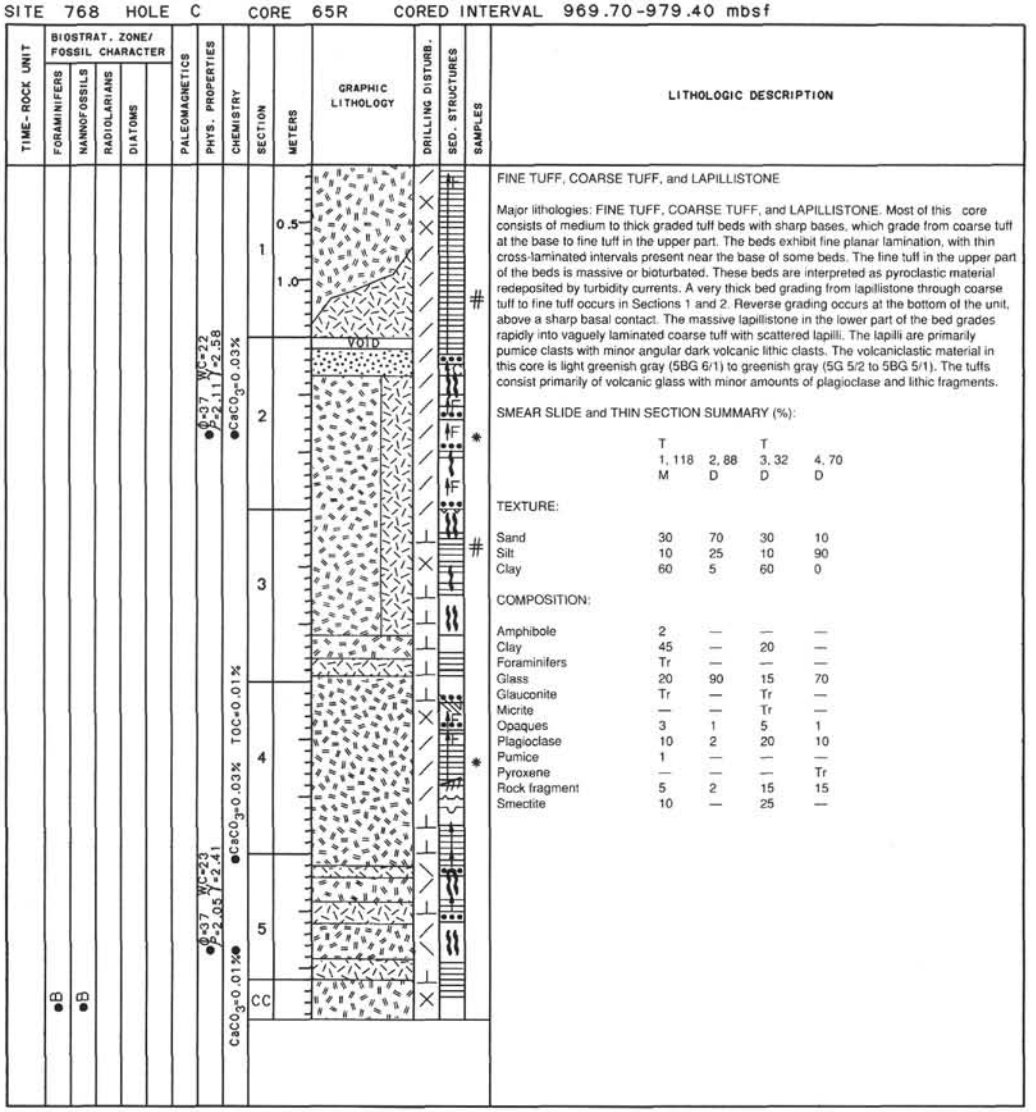
TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
	B	B			($CaCO_3$=0.07%)	Φ=34 WC=20 ρ=2.14 γ=2.44	$CaCO_3$=0.03%	1	0.5					LAPILLISTONE, COARSE TUFF, and FINE TUFF
						Φ=20 WC=20 ρ=2.50 γ=2.16	TOC=0%		1.0					Major lithologies:
							$CaCO_3$=0.03%	2					*	*a.* VITRIC LAPILLISTONE *occurs at the top of the core as a very thick, massive bed with a* base at Section 1, 100 cm. It is poorly sorted, with abundant flattened pumice lapilli and minor lithic fragments. The color is greenish gray (5G 6/1). This is the basal part of a very thick graded lapillistone-tuff unit which continues upward into Core 124-768C-63R.
								3						b. COARSE TUFF and FINE TUFF are interbedded in medium to thick graded beds below the lapillistone. The thick coarse tuff beds have planar lamination, sharp bases, and grade upward into medium beds of fine tuff. The fine tuff beds are planar laminated in part, with intervening portions highly bioturbated; Zoophycos, Planolites, and Chondrites are common in the fine tuff. The tuffs are made up primarily of volcanic glass, plagioclase, and volcanic *lithic fragments, and may be reworked fine pyroclastic material.*

SMEAR SLIDE SUMMARY (%):

	1, 145 M
TEXTURE:	
Sand	10
Silt	90
COMPOSITION:	
Glass	50
Opaques	Tr
Plagioclase	20
Rock fragment	30



SITE 768 HOLE C CORE 65R CORED INTERVAL 969.70-979.40 mbsf



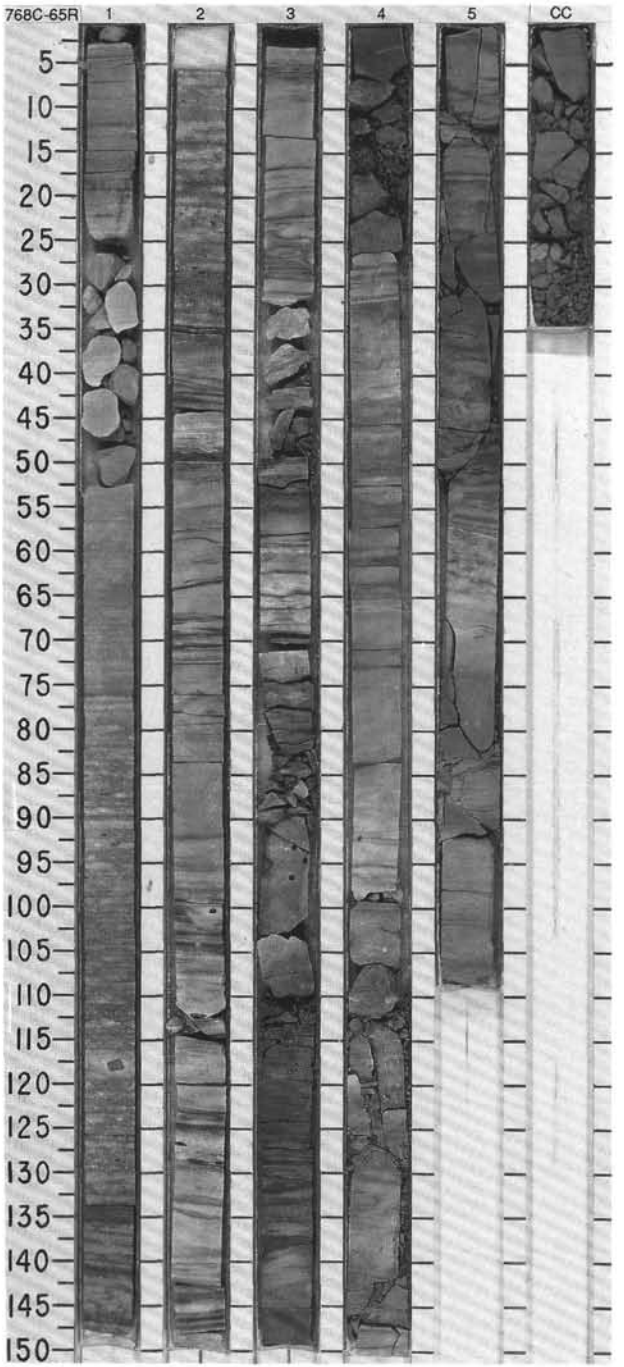
LITHOLOGIC DESCRIPTION

FINE TUFF, COARSE TUFF, and LAPILLISTONE

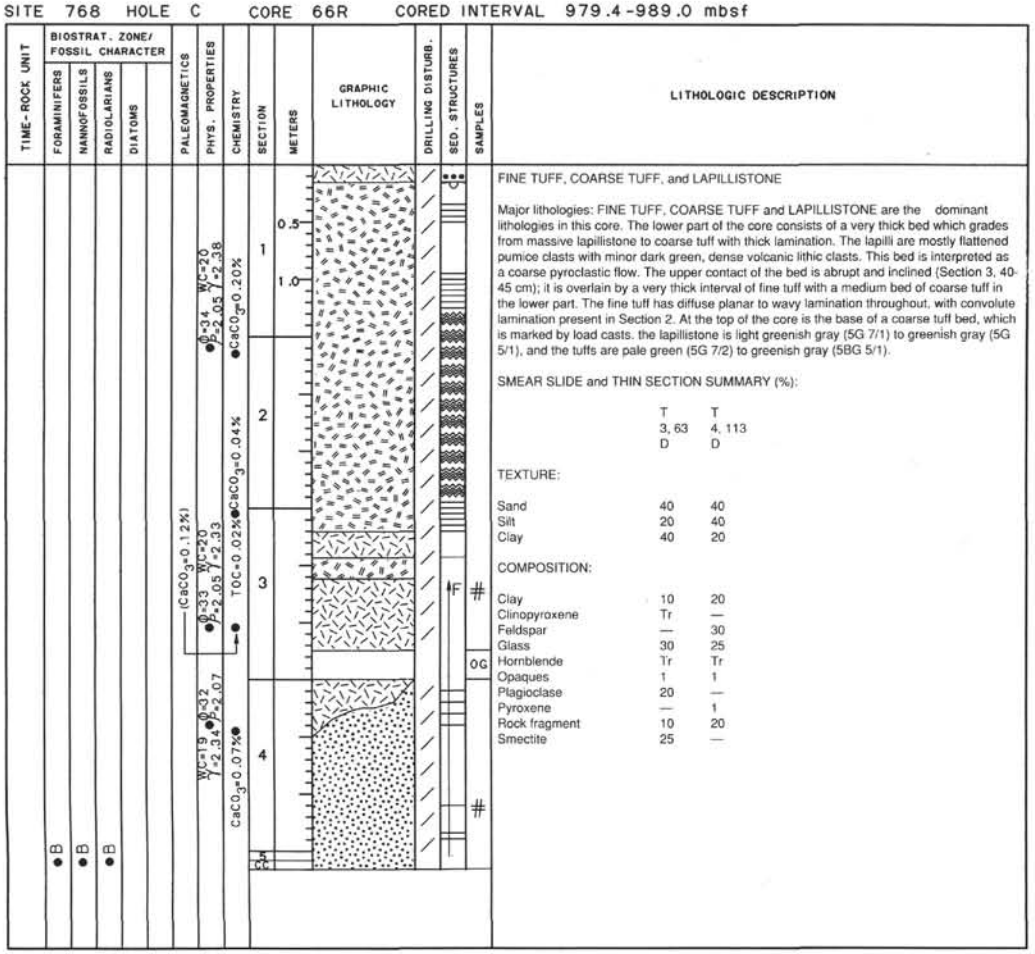
Major lithologies: FINE TUFF, COARSE TUFF, and LAPILLISTONE. Most of this core consists of medium to thick graded tuff beds with sharp bases, which grade from coarse tuff at the base to fine tuff in the upper part. The beds exhibit fine planar lamination, with thin cross-laminated intervals present near the base of some beds. The fine tuff in the upper part of the beds is massive or bioturbated. These beds are interpreted as pyroclastic material redeposited by turbidity currents. A very thick bed grading from lapillistone through coarse tuff to fine tuff occurs in Sections 1 and 2. Reverse grading occurs at the bottom of the unit, above a sharp basal contact. The massive lapillistone in the lower part of the bed grades rapidly into vaguely laminated coarse tuff with scattered lapilli. The lapilli are primarily pumice clasts with minor angular dark volcanic lithic clasts. The volcaniclastic material in this core is light greenish gray (5BG 6/1) to greenish gray (5G 5/2 to 5BG 5/1). The tuffs consist primarily of volcanic glass with minor amounts of plagioclase and lithic fragments.

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 1, 118 M	2, 88 D	T 3, 32 D	4, 70 D
TEXTURE:				
Sand	30	70	30	10
Silt	10	25	10	90
Clay	60	5	60	0
COMPOSITION:				
Amphibole	2	—	—	—
Clay	45	—	20	—
Foraminifers	Tr	—	—	—
Glass	20	90	15	70
Glauconite	Tr	—	Tr	—
Micrite	—	—	Tr	—
Opaques	3	1	5	1
Plagioclase	10	2	20	10
Pumice	1	—	—	—
Pyroxene	—	—	—	Tr
Rock fragment	5	2	15	15
Smectite	10	—	25	—



SITE 768 HOLE C CORE 66R CORED INTERVAL 979.4-989.0 mbsf



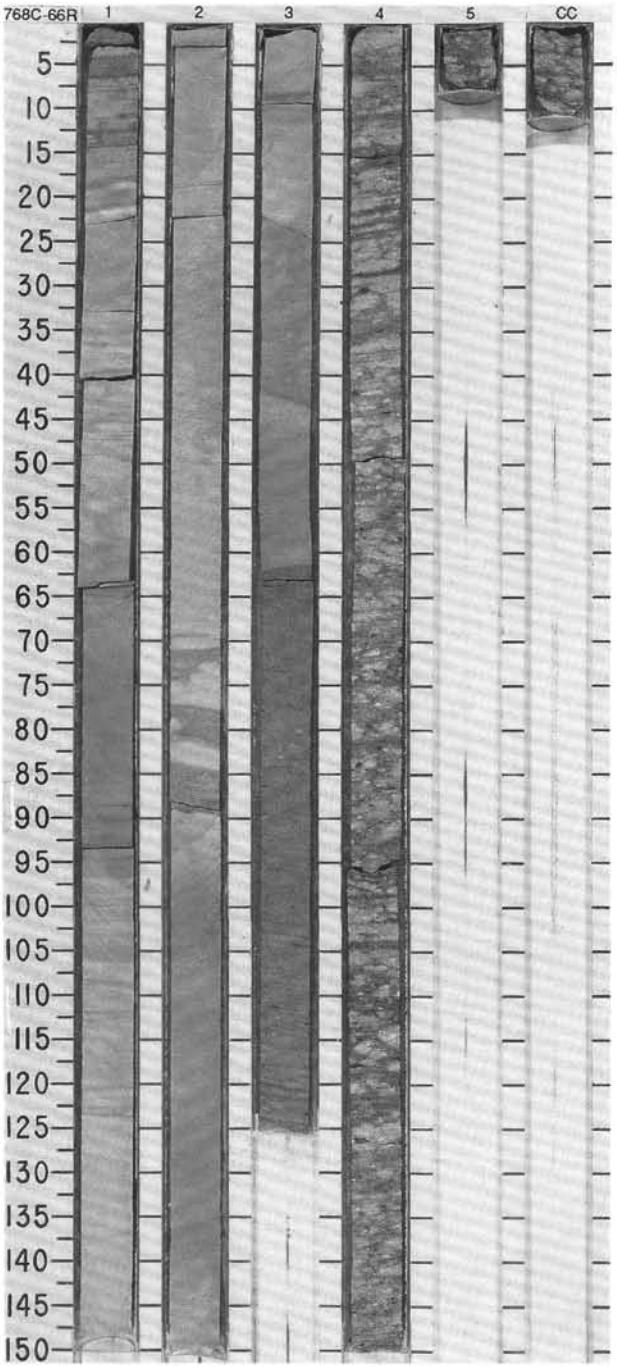
LITHOLOGIC DESCRIPTION

FINE TUFF, COARSE TUFF, and LAPILLISTONE

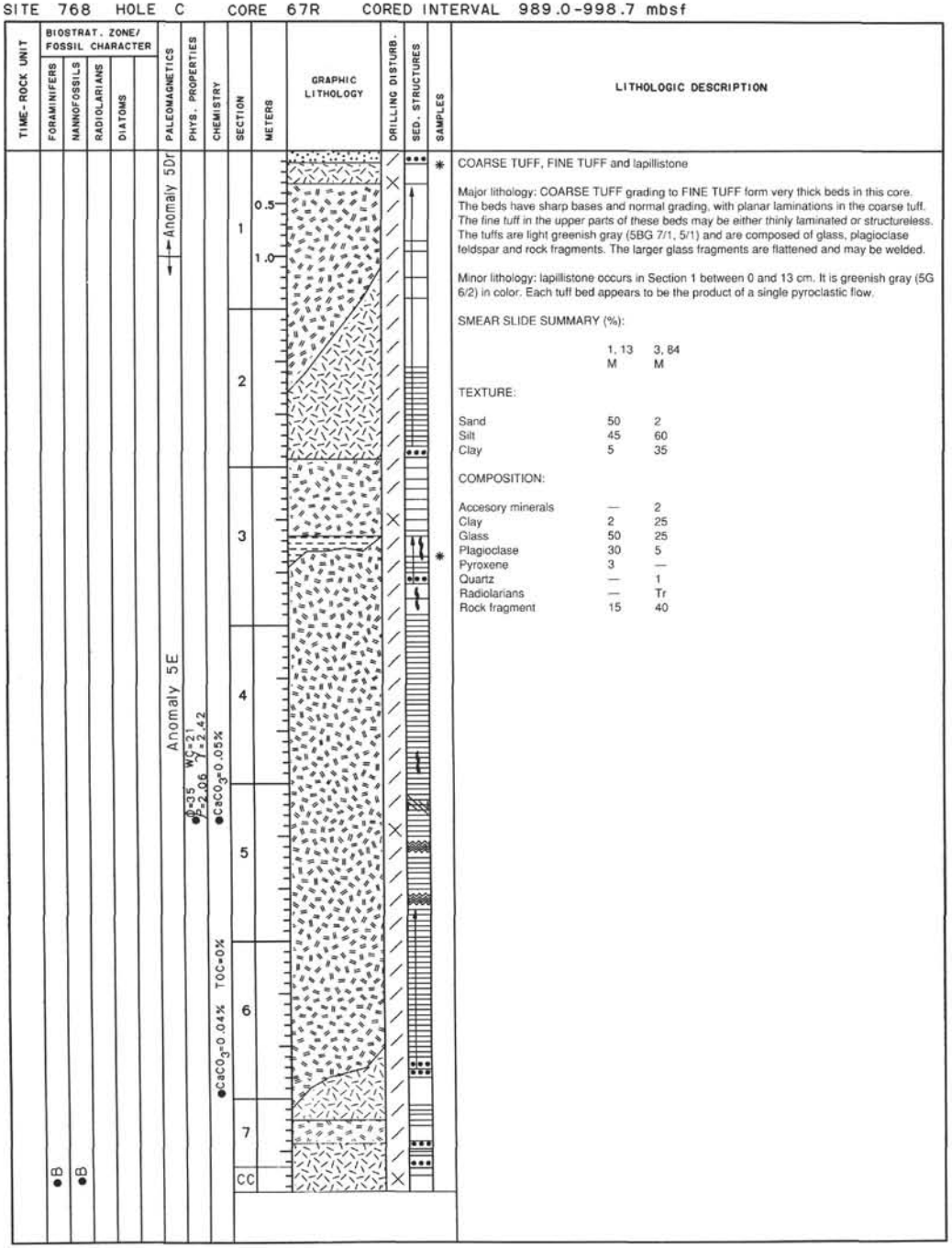
Major lithologies: FINE TUFF, COARSE TUFF and LAPILLISTONE are the dominant lithologies in this core. The lower part of the core consists of a very thick bed which grades from massive lapillistone to coarse tuff with thick lamination. The lapilli are mostly flattened pumice clasts with minor dark green, dense volcanic lithic clasts. This bed is interpreted as a coarse pyroclastic flow. The upper contact of the bed is abrupt and inclined (Section 3, 40-45 cm); it is overlain by a very thick interval of fine tuff with a medium bed of coarse tuff in the lower part. The fine tuff has diffuse planar to wavy lamination throughout, with convolute lamination present in Section 2. At the top of the core is the base of a coarse tuff bed, which is marked by load casts. the lapillistone is light greenish gray (5G 7/1) to greenish gray (5G 5/1), and the tuffs are pale green (5G 7/2) to greenish gray (5BG 5/1).

SMEAR SLIDE and THIN SECTION SUMMARY (%):

	T 3, 63 D	T 4, 113 D
TEXTURE:		
Sand	40	40
Silt	20	40
Clay	40	20
COMPOSITION:		
Clay	10	20
Clinopyroxene	Tr	—
Feldspar	—	30
Glass	30	25
Hornblende	Tr	Tr
Opaques	1	1
Plagioclase	20	—
Pyroxene	—	1
Rock fragment	10	20
Smectite	25	—



SITE 768 HOLE C CORE 67R CORED INTERVAL 989.0-998.7 mbsf



LITHOLOGIC DESCRIPTION

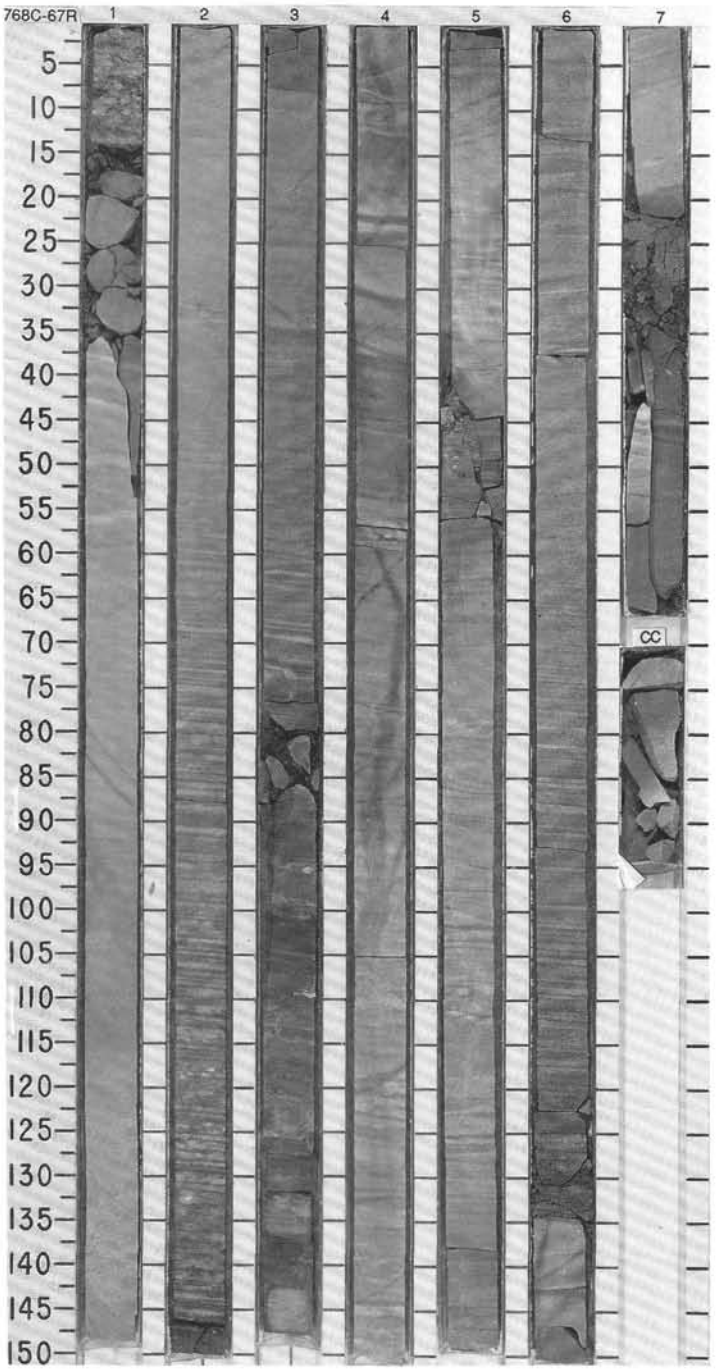
COARSE TUFF, FINE TUFF and lapillistone

Major lithology: COARSE TUFF grading to FINE TUFF form very thick beds in this core. The beds have sharp bases and normal grading, with planar laminations in the coarse tuff. The fine tuff in the upper parts of these beds may be either thinly laminated or structureless. The tuffs are light greenish gray (5BG 7/1, 5/1) and are composed of glass, plagioclase feldspar and rock fragments. The larger glass fragments are flattened and may be welded.

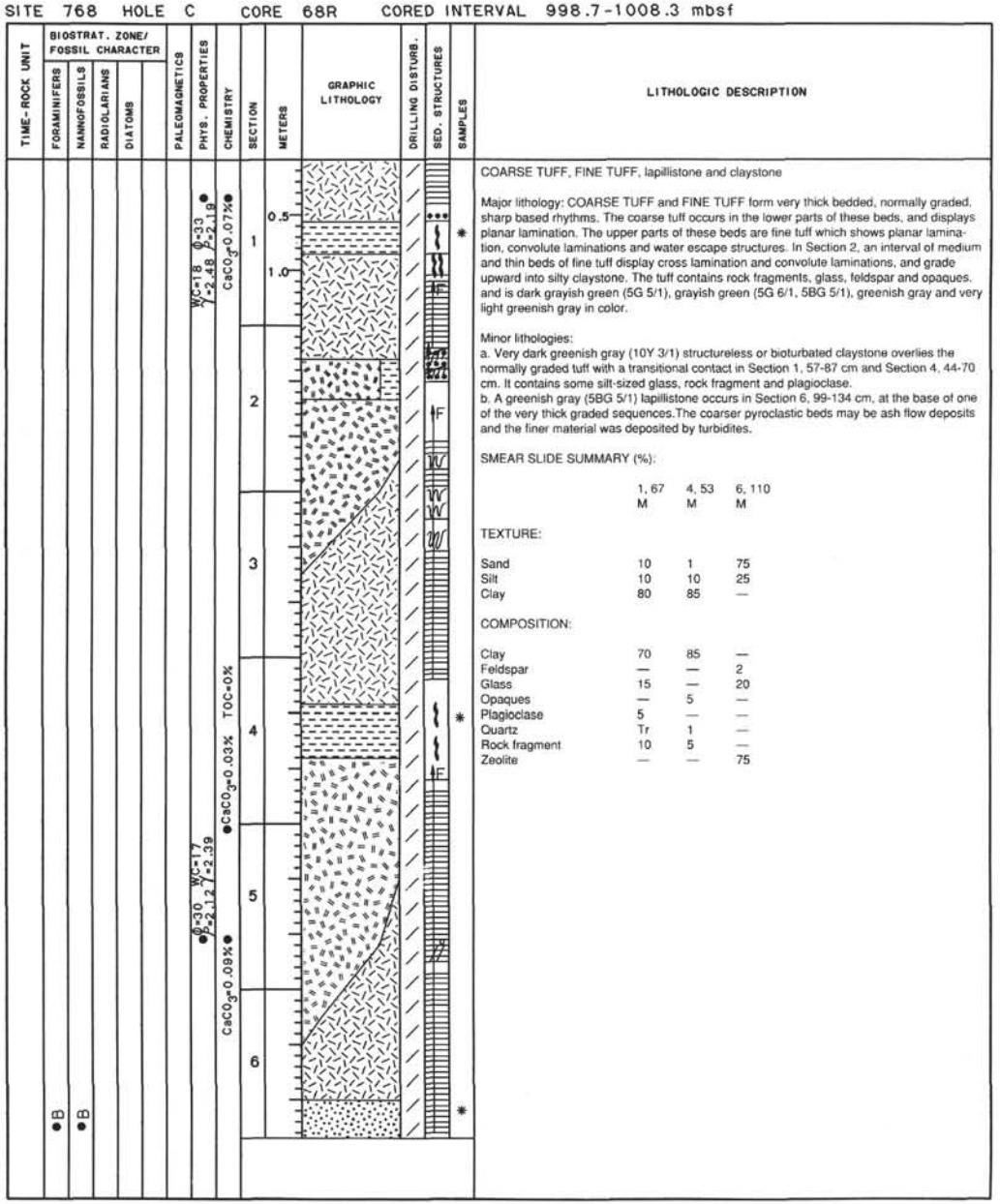
Minor lithology: lapillistone occurs in Section 1 between 0 and 13 cm. It is greenish gray (5G 6/2) in color. Each tuff bed appears to be the product of a single pyroclastic flow.

SMEAR SLIDE SUMMARY (%):

	1, 13 M	3, 84 M
TEXTURE:		
Sand	50	2
Silt	45	60
Clay	5	35
COMPOSITION:		
Accesory minerals	—	2
Clay	2	25
Glass	50	25
Plagioclase	30	5
Pyroxene	3	—
Quartz	—	1
Radiolarians	—	Tr
Rock fragment	15	40



SITE 768 HOLE C CORE 68R CORED INTERVAL 998.7-1008.3 mbsf



LITHOLOGIC DESCRIPTION

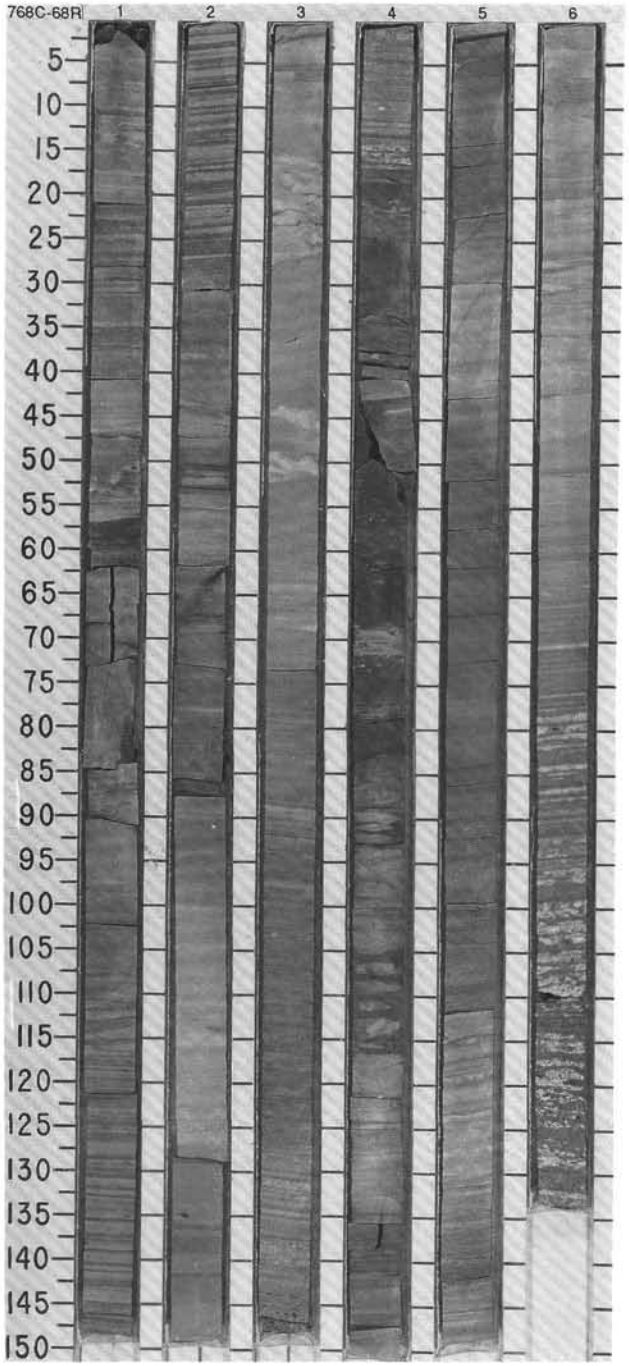
COARSE TUFF, FINE TUFF, lapillistone and claystone

Major lithology: COARSE TUFF and FINE TUFF form very thick bedded, normally graded, sharp based rhythms. The coarse tuff occurs in the lower parts of these beds, and displays planar lamination. The upper parts of these beds are fine tuff which shows planar lamination, convolute laminations and water escape structures. In Section 2, an interval of medium and thin beds of fine tuff display cross lamination and convolute laminations, and grade upward into silty claystone. The tuff contains rock fragments, glass, feldspar and opaques, and is dark grayish green (5G 5/1), grayish green (5G 6/1, 5BG 5/1), greenish gray and very light greenish gray in color.

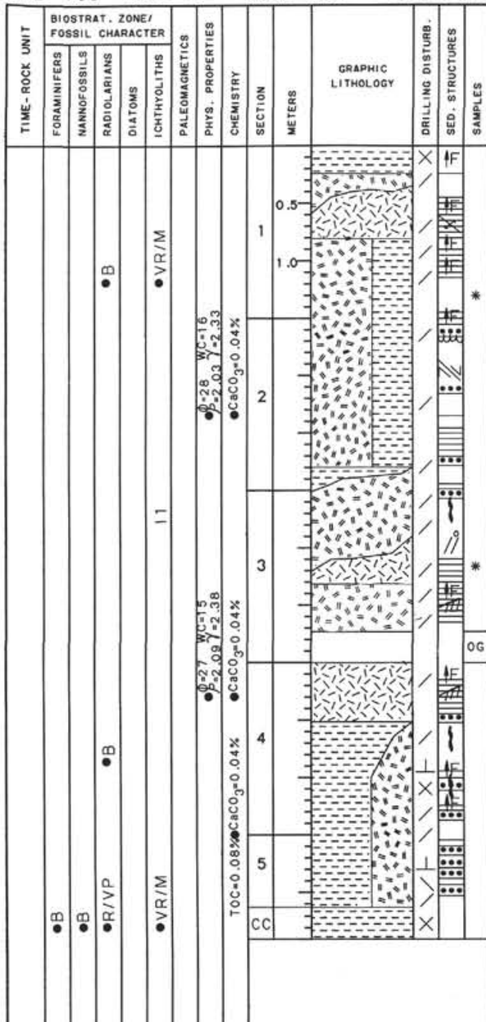
Minor lithologies:
a. Very dark greenish gray (10Y 3/1) structureless or bioturbated claystone overlies the normally graded tuff with a transitional contact in Section 1, 57-87 cm and Section 4, 44-70 cm. It contains some silt-sized glass, rock fragment and plagioclase.
b. A greenish gray (5BG 5/1) lapillistone occurs in Section 6, 99-134 cm, at the base of one of the very thick graded sequences.The coarser pyroclastic beds may be ash flow deposits and the finer material was deposited by turbidites.

SMEAR SLIDE SUMMARY (%):

	1, 67 M	4, 53 M	6, 110 M
TEXTURE:			
Sand	10	1	75
Silt	10	10	25
Clay	80	85	—
COMPOSITION:			
Clay	70	85	—
Feldspar	—	—	2
Glass	15	—	20
Opaques	—	5	—
Plagioclase	5	—	—
Quartz	Tr	1	—
Rock fragment	10	5	—
Zeolite	—	—	75



SITE 768 HOLE C CORE 69R CORED INTERVAL 1008.3-1017.6 mbsf



LITHOLOGIC DESCRIPTION

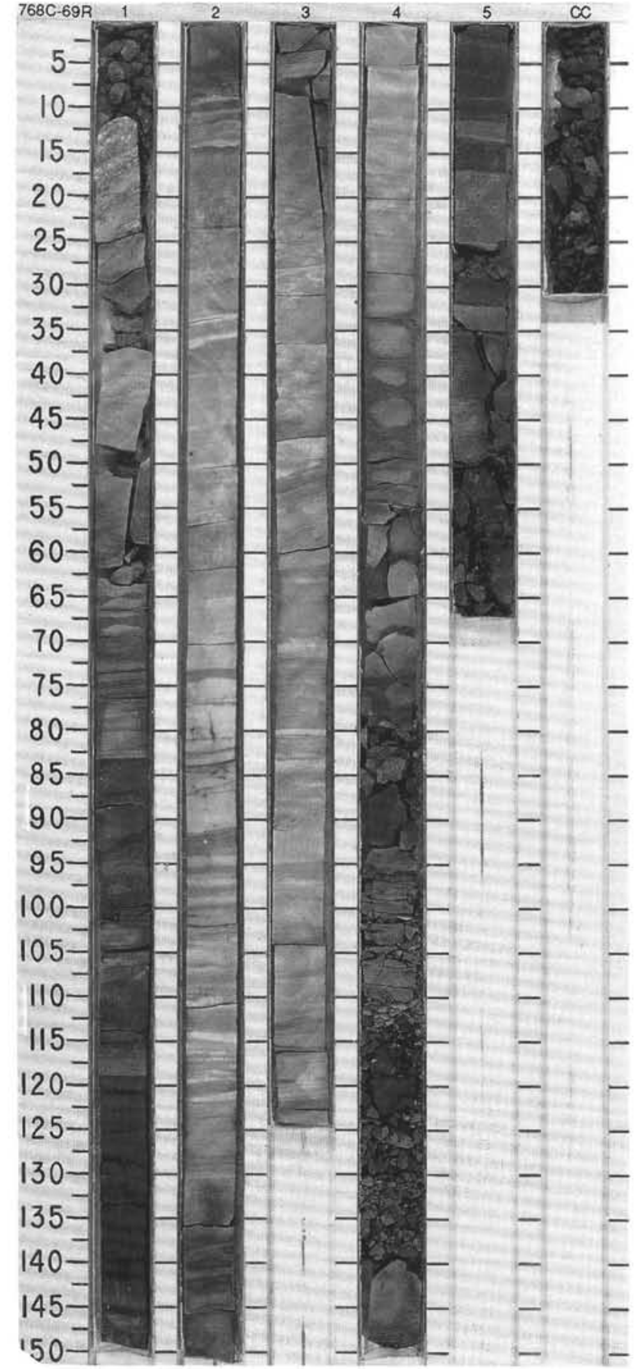
COARSE TUFF, FINE TUFF and CLAYSTONE with lapillistone

Major lithologies:
a. COARSE TUFF and FINE TUFF form medium to thick-bedded, normally graded and sharp-based rhyhms. The coarse tuff beds display planar lamination and the fine tuff beds show ripple lamination, convolute lamination, and water escape structures. The tuffs are composed of rock fragments, glass, feldspar and opaques. They are dark grayish green (5G 5/1) and grayish green (5G 6/1).
b. Dark brown (5YR 3/1) bioturbated CLAYSTONE overlies the normally graded coarse and fine tuff beds. The contacts are transitional.

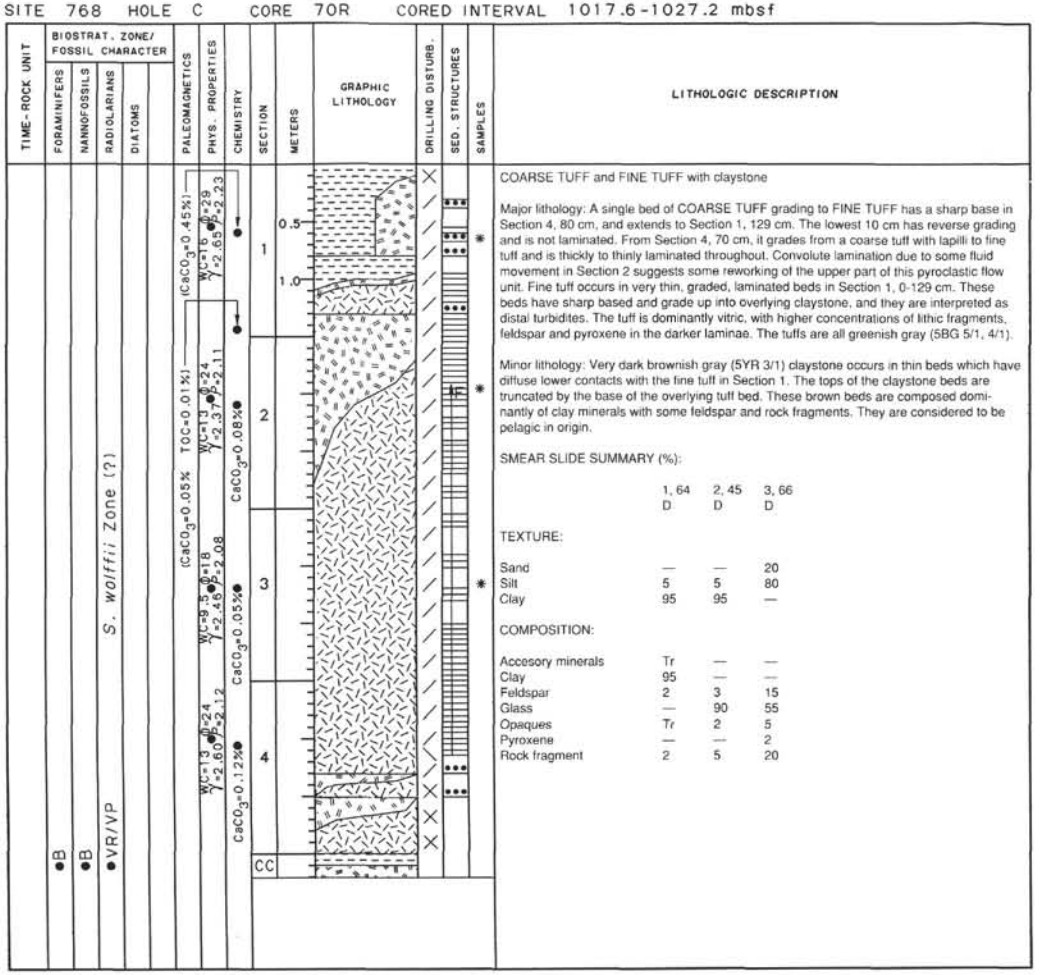
Minor lithology: A dark greenish gray (5BG 4/1) normally graded lapillistone occurs at top of Section 1. The tuff are considered to be reworked material deposited by turbiditym currents, and the dark brown clays represent the hemipelagic background sedimentation.

SMEAR SLIDE SUMMARY (%):

	1, 130	3, 68
	M	D
TEXTURE:		
Sand	—	90
Silt	10	10
Clay	90	—
COMPOSITION:		
Clay	80	—
Feldspar	10	10
Fish	3	—
Glass	—	40
Opaques	Tr	5
Quartz	5	—
Rock fragment	2	45



SITE 768 HOLE C CORE 70R CORED INTERVAL 1017.6-1027.2 mbsf



LITHOLOGIC DESCRIPTION

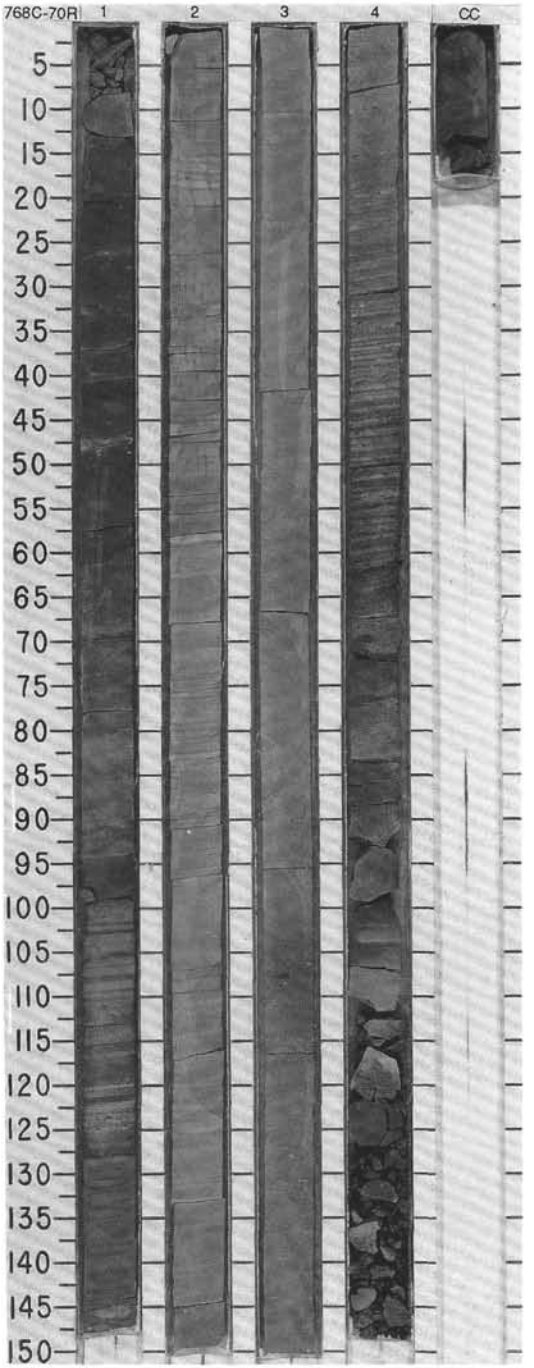
COARSE TUFF and FINE TUFF with claystone

Major lithology: A single bed of COARSE TUFF grading to FINE TUFF has a sharp base in Section 4, 80 cm, and extends to Section 1, 129 cm. The lowest 10 cm has reverse grading and is not laminated. From Section 4, 70 cm, it grades from a coarse tuff with lapilli to fine tuff and is thickly to thinly laminated throughout. Convolute lamination due to some fluid movement in Section 2 suggests some reworking of the upper part of this pyroclastic flow unit. Fine tuff occurs in very thin, graded, laminated beds in Section 1, 0-129 cm. These beds have sharp based and grade up into overlying claystone, and they are interpreted as distal turbidites. The tuff is dominantly vitric, with higher concentrations of lithic fragments, feldspar and pyroxene in the darker laminae. The tuffs are all greenish gray (5BG 5/1, 4/1).

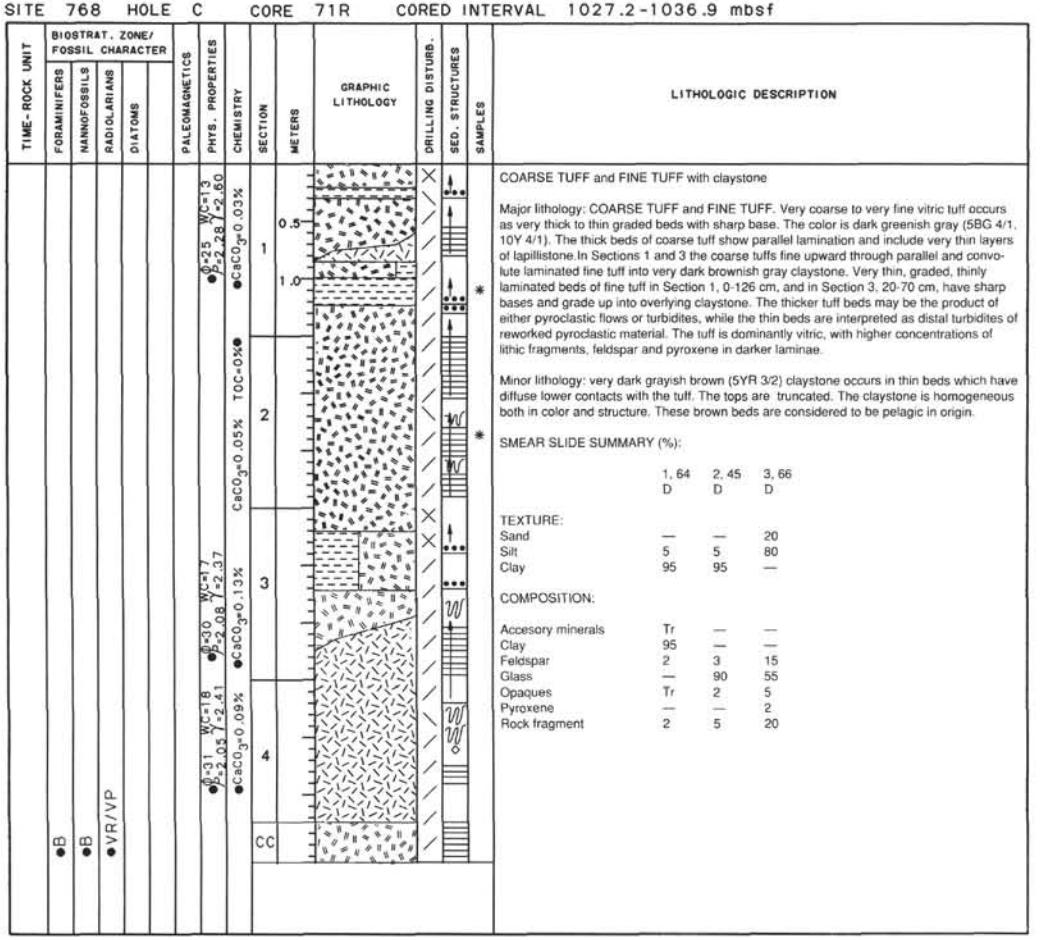
Minor lithology: Very dark brownish gray (5YR 3/1) claystone occurs in thin beds which have diffuse lower contacts with the fine tuff in Section 1. The tops of the claystone beds are truncated by the base of the overlying tuff bed. These brown beds are composed dominantly of clay minerals with some feldspar and rock fragments. They are considered to be pelagic in origin.

SMEAR SLIDE SUMMARY (%):

	1, 64 D	2, 45 D	3, 66 D
TEXTURE:			
Sand	—	—	20
Silt	5	5	80
Clay	95	95	—
COMPOSITION:			
Accesory minerals	Tr	—	—
Clay	95	—	—
Feldspar	2	3	15
Glass	—	90	55
Opaques	Tr	2	5
Pyroxene	—	—	2
Rock fragment	2	5	20



SITE 768 HOLE C CORE 71R CORED INTERVAL 1027.2-1036.9 mbsf



LITHOLOGIC DESCRIPTION

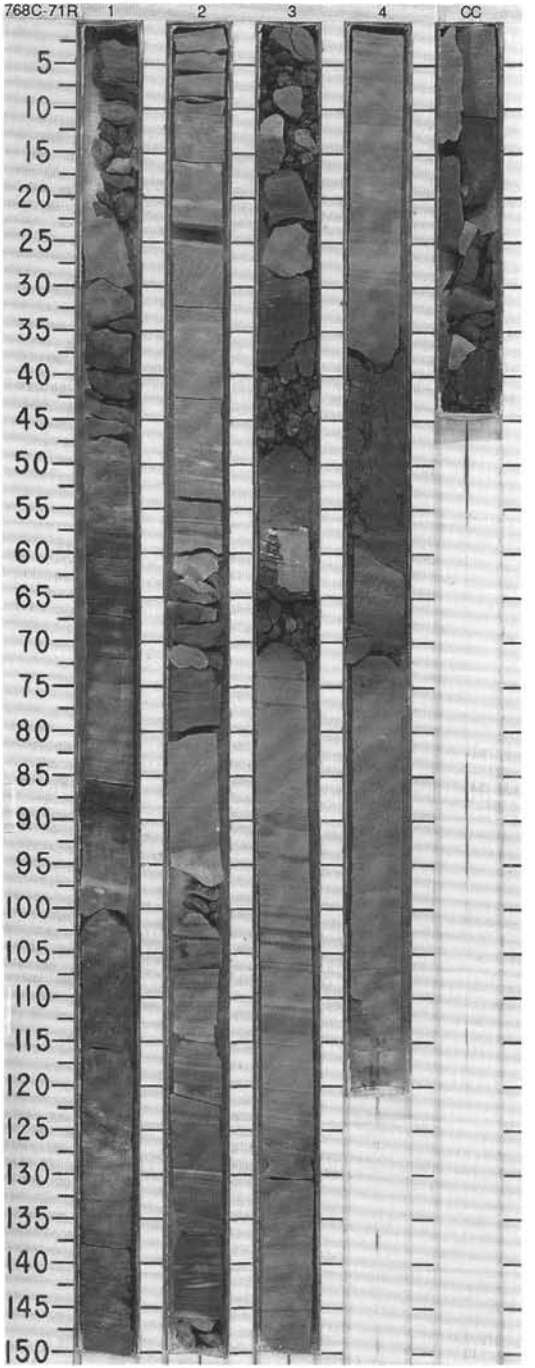
COARSE TUFF and FINE TUFF with claystone

Major lithology: COARSE TUFF and FINE TUFF. Very coarse to very fine vitric tuff occurs as very thick to thin graded beds with sharp base. The color is dark greenish gray (5BG 4/1, 10Y 4/1). The thick beds of coarse tuff show parallel lamination and include very thin layers of lapillistone.In Sections 1 and 3 the coarse tuffs fine upward through parallel and convolute laminated fine tuff into very dark brownish gray claystone. Very thin, graded, thinly laminated beds of fine tuff in Section 1, 0-126 cm, and in Section 3, 20-70 cm, have sharp bases and grade up into overlying claystone. The thicker tuff beds may be the product of either pyroclastic flows or turbidites, while the thin beds are interpreted as distal turbidites of reworked pyroclastic material. The tuff is dominantly vitric, with higher concentrations of lithic fragments, feldspar and pyroxene in darker laminae.

Minor lithology: very dark grayish brown (5YR 3/2) claystone occurs in thin beds which have diffuse lower contacts with the tuff. The tops are truncated. The claystone is homogeneous both in color and structure. These brown beds are considered to be pelagic in origin.

SMEAR SLIDE SUMMARY (%):

	1, 64 D	2, 45 D	3, 66 D
TEXTURE:			
Sand	—	—	20
Silt	5	5	80
Clay	95	95	—
COMPOSITION:			
Accesory minerals	Tr	—	—
Clay	95	—	—
Feldspar	2	3	15
Glass	—	90	55
Opaques	Tr	2	5
Pyroxene	—	—	2
Rock fragment	2	5	20



SITE 768 HOLE C CORE 72R CORED INTERVAL 1036.9-1046.6 mbsf

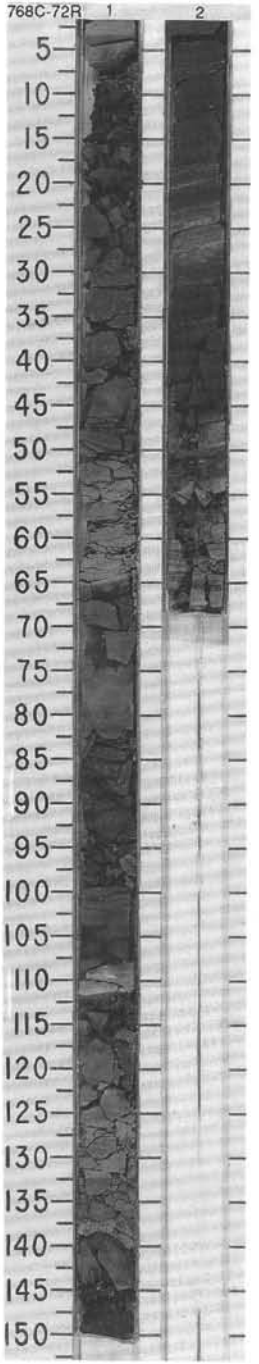
TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
	B●		● VR/VP	($CaCO_3$=0.04% TOC=0.02%)	R/M● ●CM Anomaly 5E I1	●Φ=32.5 WC=16.5 ρ=2.35 γ=2.80	$CaCO_3$=0.07%	1	0.5 1.0				* * *	CLAYSTONE and fine tuff
								2						

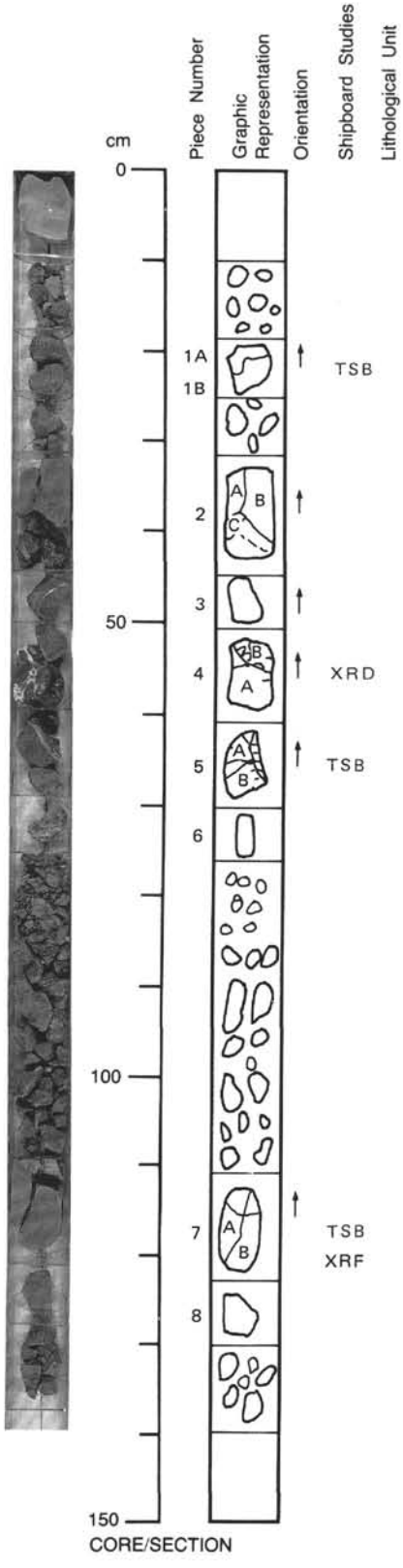
Major lithology: Dark reddish brown (5YR 3/2) and dark brown (7.5YR 3/2) CLAYSTONE occurs in medium and thick beds. It is homogeneous both in color and structure. It contains 90% clay and about 10% glass. It is considered to be pelagic in origin.

Minor lithology: Greenish gray (5G 5/1, 6/1) fine tuff occurs in very thin to thin, faintly graded and laminated beds. Only the bed in Section 1, 49-66 cm, has a sharp base and grades up into the overlying claystone. It contains glass, rock fragments and feldspar. These beds are interpreted as distal pyroclastic turbidites.

SMEAR SLIDE SUMMARY (%):

	1, 3 M	1, 30 D	1, 60 M
TEXTURE:			
Silt	100	5	40
Clay	—	95	60
COMPOSITION:			
Clay	—	90	55
Feldspar	10	Tr	—
Glass	30	10	30
Opaques	Tr	Tr	1
Rock fragment	60	—	10





124-768C-73R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1A-1B

CONTACTS: None.
PHENOCRYSTS: Olivine - 12%; 0.3-0.8 mm; Euhedral, pseudomorphed by alteration minerals.
GROUNDMASS: Intersertal texture composed of 10% plagioclase, 20% pyroxene (fresh), Fe-Ti oxide, 40% altered glassy mesostasis.
VESICLES: ~25%; <0.7 mm; N/A; Partly filled with calcite and/or smectite.
COLOR: Dark gray.
STRUCTURE: Massive.
ALTERATION: Moderate, mixture of carbonate and fibrous clays.
VEINS/FRACTURES: Thin, filled with calcite.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 2A-2B

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: Plagioclase, pyroxene, Fe-Ti oxide, altered mesostasis.
VESICLES: ~10%; <0.5 mm; N/A; N/A; Partly filled with calcite and/or smectite.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: 1-8 mm long elongated cavities filled with smectite or chlorite.
ADDITIONAL COMMENTS: TEXTURE: Intersertal divergent texture with sparse microphenocrysts of altered olivine.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 3

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 10%; 1 mm; Altered olivine.
GROUNDMASS: Intersertal divergent texture.
VESICLES: N/A.
COLOR: N/A.
STRUCTURE: Massive.
ALTERATION: N/A.
VEINS/FRACTURES: 1-2 mm thick fractures, filled with calcite.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 4A

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 5%; N/A.
GROUNDMASS: Texture grading from intersertal to variolitic (toward the hyaloclastite border) with micro varioles (~0.1 mm).
VESICLES: Elongated, up to 3 cm long, perpendicular to the basalt/hyaloclastite border; spherical vesicles <1 mm, filled with smectite.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 4B

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 5%; 0.5-1 mm; Altered olivine.
GROUNDMASS: Intersertal texture grading to microvariolitic, consisting of plagioclase, pyroxene and Fe-Ti oxide.
VESICLES: Few, irregularly distributed flattened vesicles filled with smectite, ~1 mm thick, a few centimeters long.
COLOR: None.
STRUCTURE: None.
ALTERATION: None.
VEINS/FRACTURES: None.

124-768C-73R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 5A-5B

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 10%; 0.1-1.0 mm; Euhedral, prismatic, pseudomorphed by secondary minerals.
GROUNDMASS: Texture grading from intersertal (inner part) to microvariolitic to glassy with sparse 0.15 mm microvarioles (outer green border).
VESICLES: Flattened, filled with smectite a few mm long, perpendicular to the basal hyaloclastite boundary.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: Glass and olivine alter to a mixture of fibrous highly birefringent clays and smectite, with minor carbonate.
VEINS/FRACTURES: N/A.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 6

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Altered ash with angular claystone clasts. Bedded structures (bed 1-3 cm thick), silty texture. Two sides of the piece are coated with veins of calcite and smectite.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

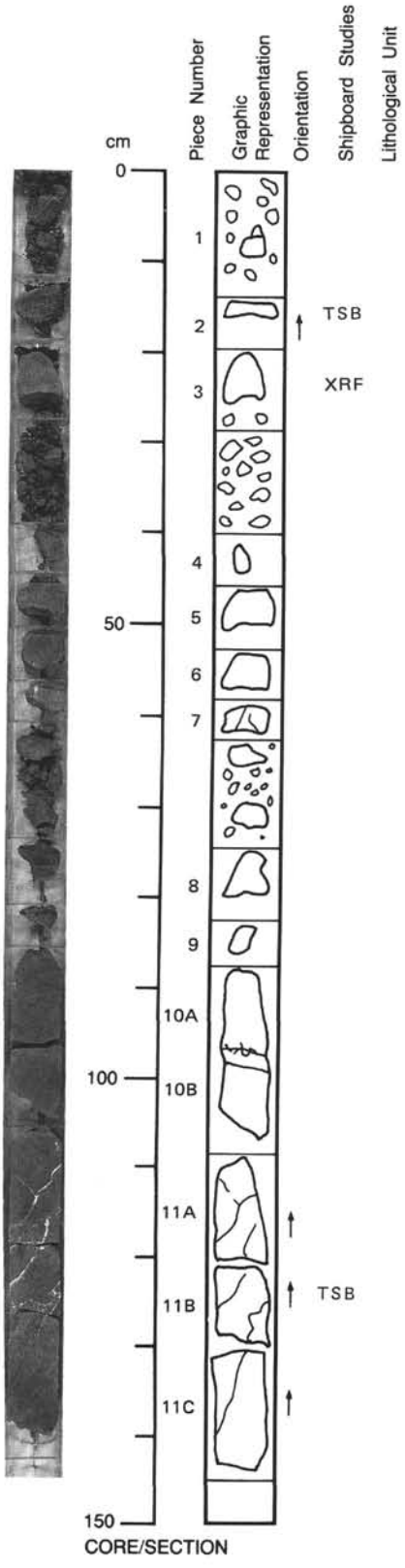
Pieces 7A-7B

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 12%; 0.04-0.7 mm; euhedral, altered to secondary minerals.
GROUNDMASS: Intersertal divergent to variolitic texture consisting of 20% plagioclase, 8% pyroxene, Fe-Ti oxide and 20% glassy mesostasis.
VESICLES: 40%; mostly very fine; spherical (0.07 - <1 mm); N/A; Filled with fibrous clay, allophane, and iron oxide.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: Highly altered, olivine and mesostasis alter to a mixture of fibrous clay, allophane and iron oxide.
VEINS/FRACTURES: One fracture filled with mixed basaltic and sedimentary (claystone) fragments, 1-10 mm in size, cemented with calcite, 1-1.5 cm thick.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 8

CONTACTS: N/A.
PHENOCRYSTS: *Olivine - 3-5%; N/A; Subhedral to euhedral, sporadically distributed* throughout, some glomerocrysts. Some are sites of vesiculation, rimmed by Fe-oxide in altered portion of the piece.
GROUNDMASS: Fine grained, relatively fresh plagioclase, pyroxene and glass.
VESICLES: Moderate, mostly filled by calcite and green mineral (chlorite/smectite?).
COLOR: N/A.
STRUCTURE: Vesicular.
ALTERATION: Slight to moderate; Fe-oxide, chlorite/smectite.
VEINS/FRACTURES: None.



124-768C-74R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE BASALT

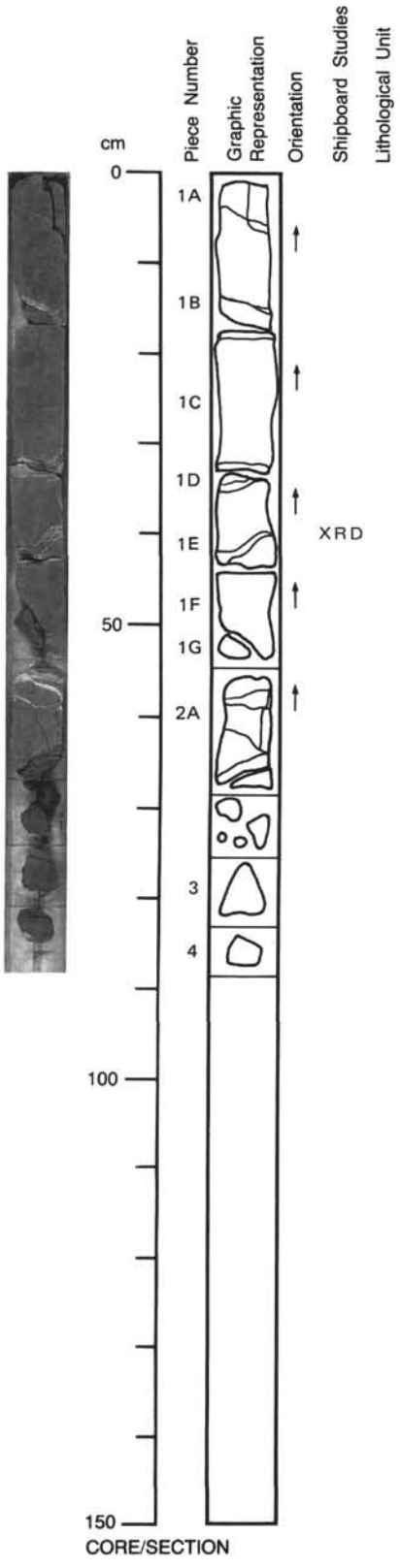
Pieces 1-2

CONTACTS: None.
PHENOCRYSTS: Olivine - 12%; 0.1-1 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Hypocrystalline mixture of plagioclase 20%, clinopyroxene 15% and devitrified glass 23%.
VESICLES: 30%, 0.015-0.15 mm, spherical to lobate, evenly distributed, filled with clay.
COLOR: Light gray.
STRUCTURE: Glassy margin of pillow. Upper margin very fine grained, light colored, glassy with varioles and olivine phenocrysts; zone of small lobate vesicles filled with green mineral just below varioles.
ALTERATION: Highly altered.
VEINS/FRACTURES: None.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 3-11

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 15%; 0.1-1 mm; Euhedral, prismatic, altered to iddingsite and carbonate.
GROUNDMASS: Glassy to microcrystalline, sometimes variolitic to intersertal texture, with radiating fresh plagioclase 0.3-1.0 mm, 25%, and interstitial glass 13%, and pyroxene 0.01-0.02 mm, 10%.
VESICLES: Numerous small (0.03-0.7 mm diameter) vesicles uniformly distributed throughout, generally lobate, filled with calcite and green clay.
COLOR: Light gray green in Piece 2, rest dark gray.
STRUCTURE: Chilled upper margin indicates lava, no evidence of pillows.
ALTERATION: Moderate; phenocrysts replaced by iddingsite and carbonate.
VEINS/FRACTURES: Few very thin carbonate veins in upper part, become numerous in Piece 6. They are irregular ~5 mm wide filled with white and buff colored calcite. Vein in Piece 6C filled with brown clay.

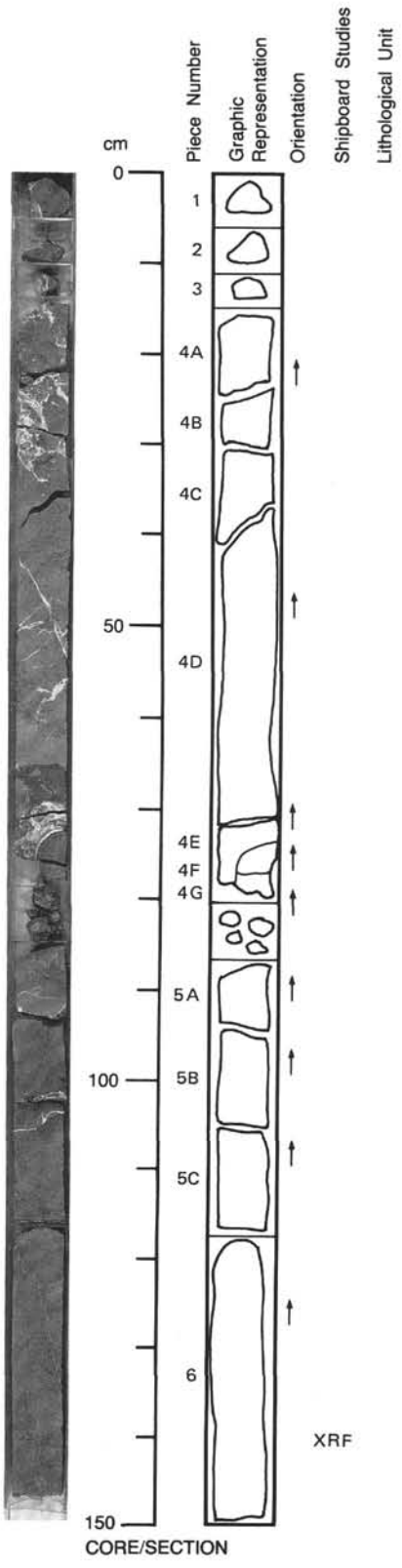


124-768C-74R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-4

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Veins in Pieces 1B, 1D, 1E, 1F, and 2A are mainly red clay with some carbonate. Mineralogy and textures are similar to Section 124-768C-74R-1, but vesicles become larger in Pieces 1B and 1C. The vein in the bottom of 1E contains a green banded mineral which may represent the vesicle filling.



124-768C-75R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 1

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Chilled margin with varioles in glass and olivine phenocrysts in microcrystalline to intersertal matrix. No contact. 15% filled vesicles.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

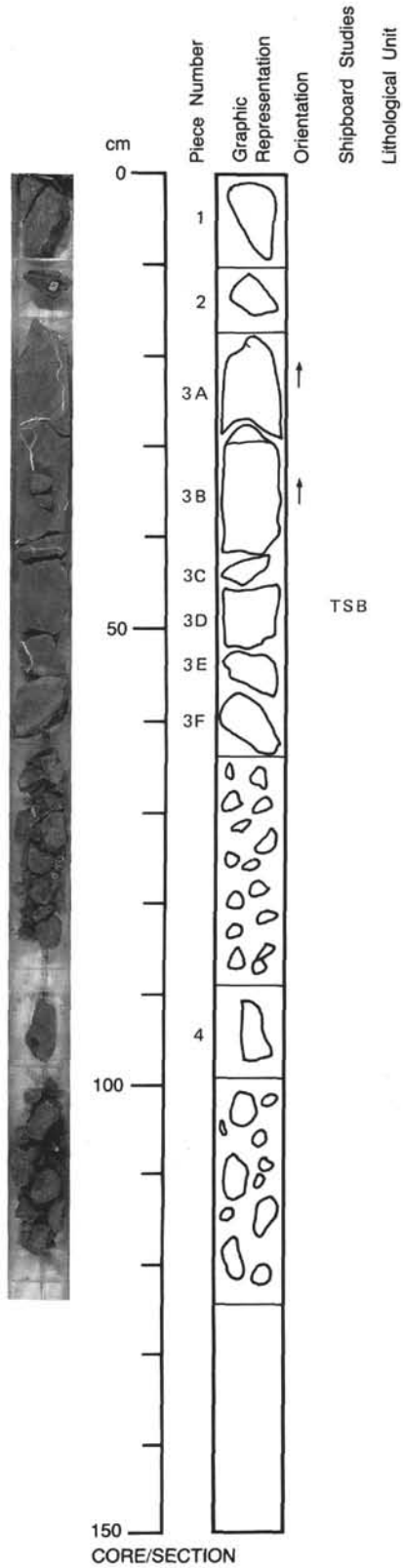
Piece 2

CONTACTS: N/A
PHENOCRYSTS: Olivine altering to dark green mineral.
GROUNDMASS: Variolitic to intersertal and microcrystalline. Intergrown plagioclase laths, pyroxene, and mesostasis.
VESICLES: 15-20% filled or partially filled mainly with green clay or calcite.
COLOR: Gray with pale green chilled margin.
STRUCTURE: N/A.
ALTERATION: Slight to moderate.
VEINS/FRACTURES: 1-2 mm irregular veins filled with calcite.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 3-6

CONTACTS: Fragmental chilled margin.
PHENOCRYSTS: Olivine - <10%; N/A.
GROUNDMASS: Pillow margins are glassy with varioles; texture of main parts varies from intersertal to equigranular microcrystalline consisting of plagioclase, pyroxene and glassy mesostasis.
VESICLES: Up to 15% lobate vesicles, mostly filled with green material, some with calcite.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: Top half--vein networks. Fe-oxidation along some veins and adjacent rock. Red clay parting and veining near the bottom of 4D and in 4E where it is associated with pillow margin.

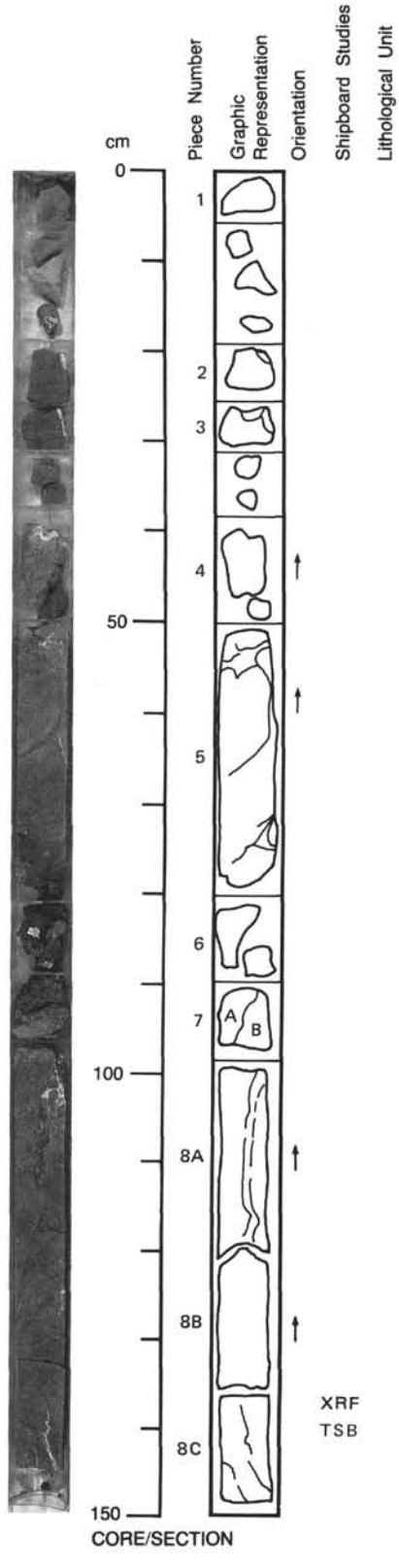


124-768C-75R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-3

CONTACTS: Chilled margins of pillows in Piece 1, 3E and 3F.
PHENOCRYSTS: Olivine - 10%; 0.2-1.0 mm; Euhedral prisms, pseudomorphed by secondary minerals.
GROUNDMASS: Microcrystalline to hypocrystalline, intersertal divergent aggregates of plagioclase 24%, and clinopyroxene 7%, and mesostasis 24%.
VESICLES: 35%; 0.03-0.6 mm; spherical to lobate; filled with clays and carbonate.
COLOR: Brownish gray.
STRUCTURE: Chilled margins of pillows in Pieces 1, 3E, and 3F.
ALTERATION: Highly altered, mesostasis and olivine altered to allophane and iron oxide.
VEINS/FRACTURES: None.



124-768C-76R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

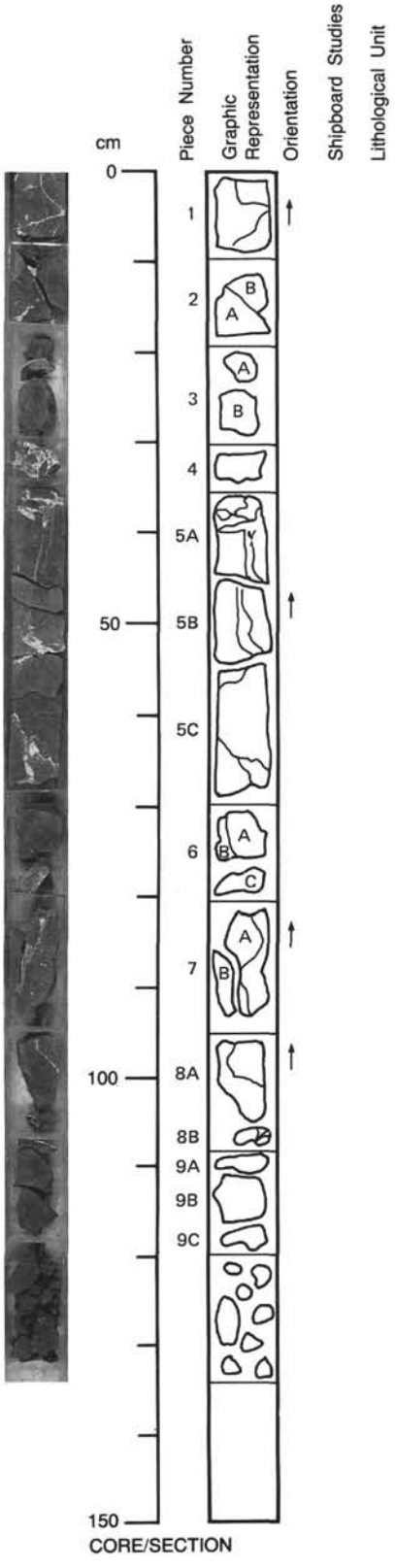
Piece 1

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Variolitic chilled margin continues from bottom of Section 124-768C-75R-2.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 2-8

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 10%; N/A; Including Cr-spinel, replaced by secondary minerals.
GROUNDMASS: Hypocrystalline to fine grained, sporadic intersertal texture consisting of plagioclase 15%, pyroxene 10% and mesostasis 32%. Grain size increases from Piece 2 to Piece 6.
VESICLES: 15%; 0.05-0.5 mm; spherical to lobate; N/A; Filled with green clay, occasionally lined with limonite.
COLOR: Brownish gray except for green chilled margin.
STRUCTURE: Broken pillow lava, Pieces 7 and 8 are pillow margin hyaloclastite.
ALTERATION: High. Mafic minerals are commonly coated with Fe-oxide; pyroxene is altered to a green mineral.
VEINS/FRACTURES: Discontinuous and irregular. Occur throughout. Carbonate fills the thinner veins and carbonate, mud and hyaloclastic fragments fill the wider veins and interpillow spaces.

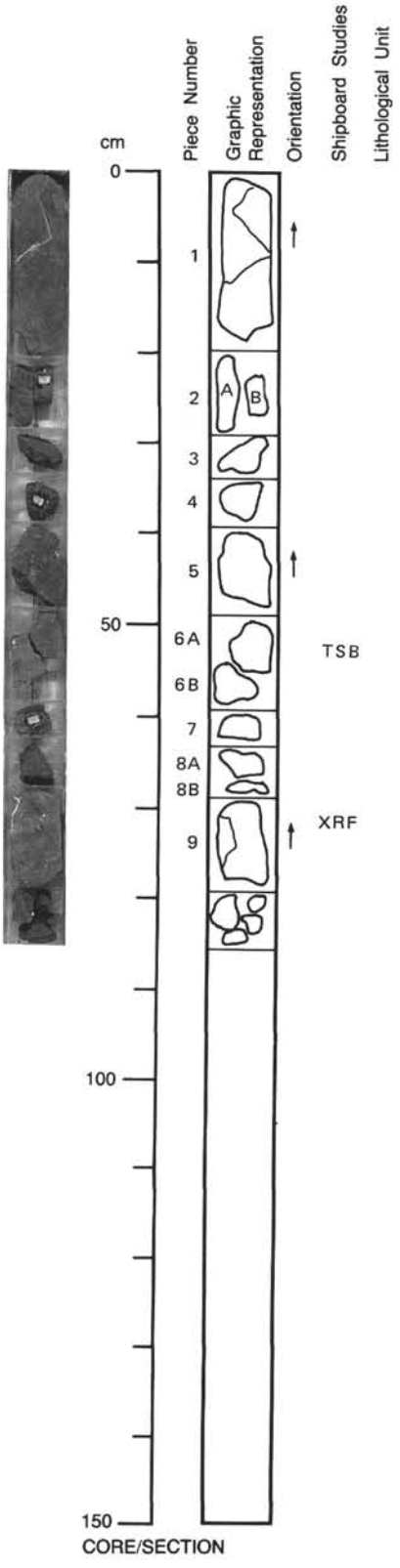


124-768C-76R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-9

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: This section shows similar features to the rocks in Section 124-768C-76R-1 including oxidized glomeroporphyritic aggregates of olivine. Chilled pillow margins grain size coarsening inward, generally similar vein systems and brown-gray color.

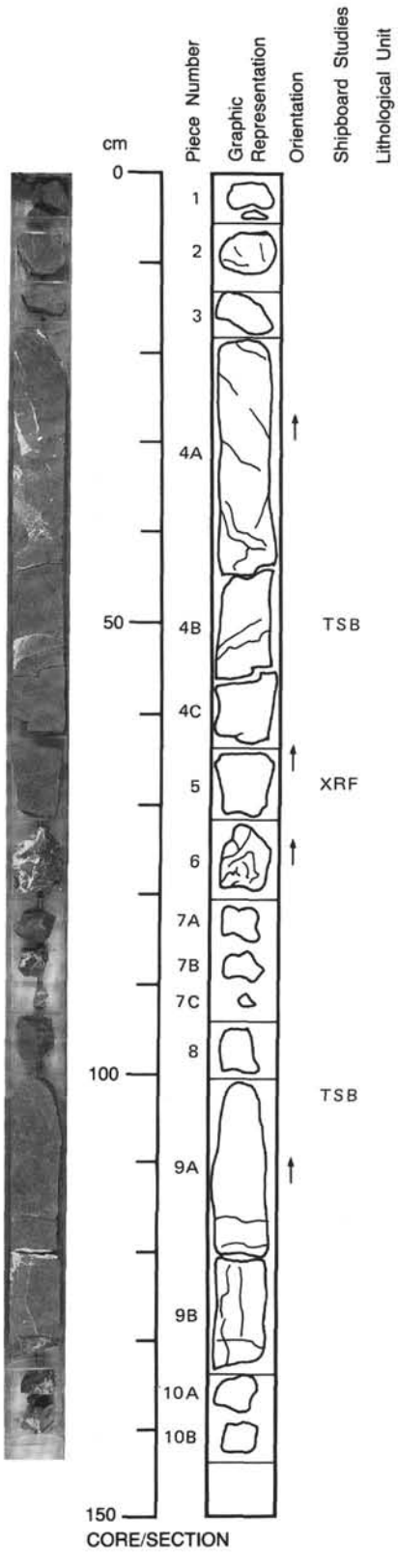


124-768C-76R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-9

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 7%; N/A; Euhedral prisms pseudomorphed by secondary minerals.
GROUNDMASS: Microcrystalline to fine grained, patchy intersertal texture made up of radiating 35% plagioclase laths 0.01-1.0 mm, and 3% pyroxene 0.01-0.2 mm and 23% glassy mesostasis.
VESICLES: 30%; generally 0.1-1 mm; lobate to spherical; N/A; Most filled or partly filled with green clay.
COLOR: Brownish gray.
STRUCTURE: Massive.
ALTERATION: Moderate, plagioclase laths in upper part of section are iron stained; iron stained zones around fractures.
VEINS/FRACTURES: 1-2% white and buff colored calcite ~5 mm wide.



124-768C-77R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

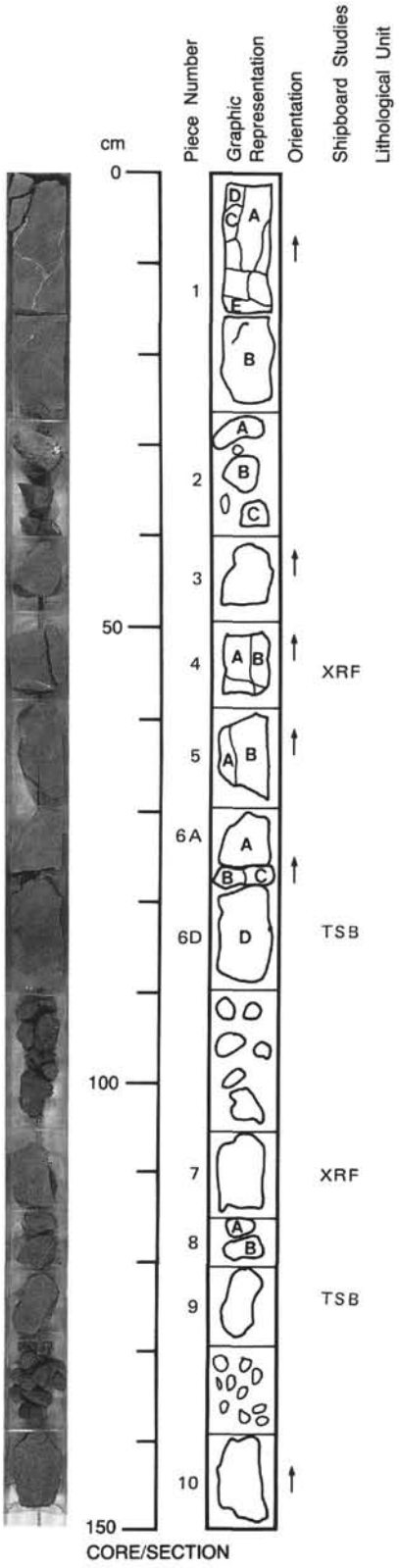
Pieces 1-4

CONTACTS: No contacts. Chilled margins of fractured pillows.
PHENOCRYSTS: Olivine - 10%; 0.2-1.5 mm; Euhedral prisms. Commonly altered to fibrous clay, and Fe-oxide.
GROUNDMASS: Fine-grained intersertal texture with aggregates of 24% plagioclase laths 0.02-1.0 mm, 2% olivine, 2% pyroxene 0.002-0.2 mm, and 20% glassy mesostasis. There are several examples of fine-grained margins and glassy margins grading inward to coarser grained rock from Pieces 1 through 3, 2 to 5, 6 to 10.
VESICLES: 30%; 0.1-1.0 mm; spherical to lobate; N/A; Filled with clay.
COLOR: Brownish gray to gray.
STRUCTURE: Pillowed.
ALTERATION: Moderate, olivine and mesostasis alters to clays.
VEINS/FRACTURES: Veins and interpillow filling of red clay up to 3 cm thick. Clay is amygdaloidal in some veins and may be cut by later veins of white calcite (<1 cm) or produce a breccia of hyaloclastite fragments, clay and calcite veins.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 5-9

CONTACTS: None.
PHENOCRYSTS: Olivine - 5%; 0.15-0.5 mm; Euhedral prisms, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained, intersertal and divergent aggregates of 28% plagioclase, 1% olivine, 2% clinopyroxene, and 20% mesostasis.
VESICLES: 45%; 0.1-1.0 mm; spherical to lobate vesicles; N/A; Filled with clay.
COLOR: Brownish-gray.
STRUCTURE: Pillowed.
ALTERATION: Moderate, olivine and mesostasis alter to clay and fibrious minerals.
VEINS/FRACTURES: As in Pieces 1 to 4.



124-768C-77R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

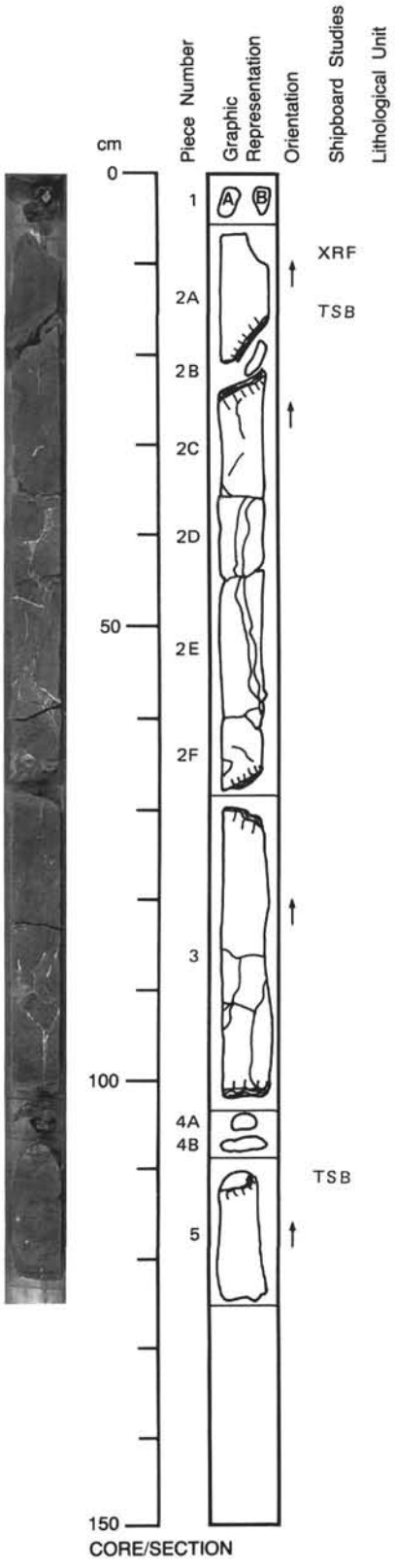
Pieces 1-5

CONTACTS: None
PHENOCRYSTS: Olivine - 12%; 0.1-0.6 mm; Euhedral prisms, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained intersertal aggregates of 22% plagioclase 0.01-0.5 (An50-70), 1% clinopyroxene 0,01-0.2, and 24% mesostasis.
VESICLES: 25%; 0.03-2.0 mm; spherical; N/A; Filled with clay.
COLOR: Brownish-gray.
STRUCTURE: Massive.
ALTERATION: *Moderate, olivine and mesostasis replaced by green to yellow fibrous clays.*
VEINS/FRACTURES: Few.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 6-9

CONTACTS: None.
PHENOCRYSTS: Olivine - 8%; 0.07-1.3 mm; Euhedral, pseudomorph ed by secondary minerals.
GROUNDMASS: Fine-grained aggregate of 35% plagioclase, 1% olivine, 1% clinopyroxene 0.17 mm, and 25% mesostasis.
VESICLES: 30%; 0.03-2.0 mm; irregular; N/A; Filled with clay, two size groups.
COLOR: Brownish-gray.
STRUCTURE: Large pillows >50 cm.
ALTERATION: Moderate, pale greenish and yellowish fibrous clays replace olivine and mesostasis.
VEINS/FRACTURES: Few.

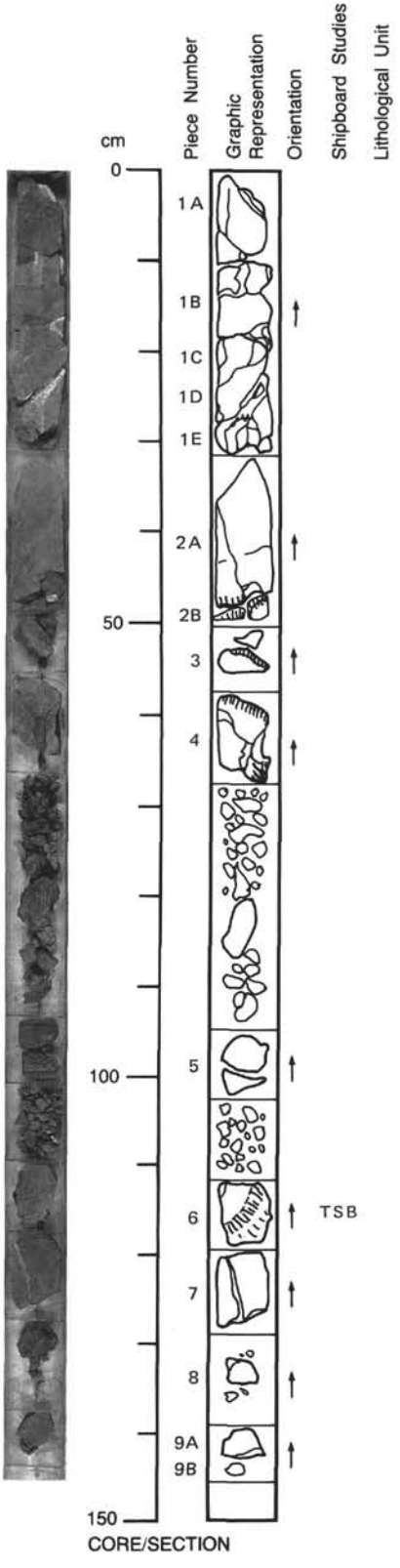


124-768C-78R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-5

CONTACTS: N/A.
PHENOCRYSTS: Altered olivine - 8-10%; 0.5-1 mm; Euhedral, pseudomorphosed by smectite and calcite.
GROUNDMASS: Varying from intersertal to intersertal divergent to variolitic to glassy. Mineral assemblage is 10 % plagioclase, 12% clinopyroxene (microlithic to skeletal), Fe-Ti oxide, and mesostasis 30%.
VESICLES: 40%; 0.01-0.3 mm; N/A; N/A; Filled with smectite and/or calcite. Larger vesicles (1-2 mm) are lined or filled with smectite.
COLOR: Brownish gray.
STRUCTURE: Pillowed, moderately brecciated.
ALTERATION: Highly altered.
VEINS/FRACTURES: Few fractures. Veins 2-10 mm thick, irregular, filled with brown clay and lesser amount of calcite. Smaller veins (0.5-3 mm) filled with calcite cut the former ones.
ADDITIONAL COMMENTS: Piece 2A: Moderately phyric olivine basalt with texture grading from intersertal divergent to variolitic. Chilled border (pillow rim) inclines 45 degrees. Pieces 2B-2F: Pieces 2C, 2D, and 2F show a thick (up to 2 cm) vein filled with brown clay specked and cemented by calcite. Thin calcite veins occur through all unit. Upper and lower boundaries are chilled margins of one pillow (estimated minimum diameter approximately 50 cm). Piece 3A: Upper part inclines 20 degrees and lower part approximately 0 degree. Boundaries are chilled margin of a pillow. Pieces 4-5: Interpillow glassy basalt and chilled margin of a pillow are shown by Pieces 4A and 4B, and by the upper border (0 degree inclination) of Piece 5.



124-768C-78R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

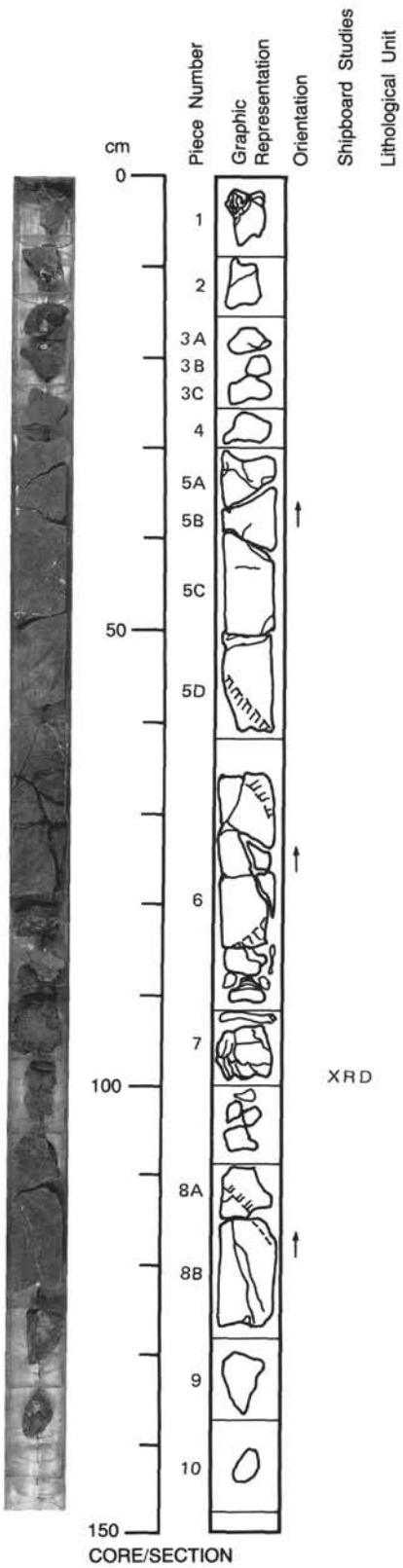
Pieces 1-3

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately phyric olivine basalt with intersertal divergent texture, rarely variolitic. Color varies from brownish gray to dark brownish gray in the most altered portions (Piece 1A). Pieces 1B, 1C and 1D show thick (maximum 3 cm) breccia red veins filled with brown clays and cemented with calcite and a geode (extending through Pieces 1C-1D) lined with calcite crystals. Pieces 2A-2B show an intersertal divergent to variolitic texture(lower part of Piece 2A) suggesting a chilled pillow margin (20 degrees inclination).

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 4-9

CONTACTS: None.
PHENOCRYSTS: Olivine - 10%; 0.06-0.6 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained aggregates comprising 5% plagioclase < 0.2 mm (An50-70), 3% olivine, 22% quenched and plumose clinopyroxene < 0.3 mm and 30% mesostasis.
VESICLES: 30%; 0.08-1.0 mm; N/A; N/A; Filled with green clays and carbonate.
COLOR: Brown gray to greenish gray.
STRUCTURE: Pillowed to massive (center of pillow?).
ALTERATION: Highly altered, olivines and mesostasis replaced by fibrous clays.
VEINS/FRACTURES: Mostly irregular veins, 1-5 mm thick, filled with brown clays and rare calcite.
ADDITIONAL COMMENTS: Piece 4: Texture grading from subvariolitic (center) to microvariolitic (upper and lower border) indicating chilled rims of a small (cm-sized) pillow. Unnumbered pieces in interval at 68-95 cm: Microlitic to glassy (altered) basalt, representing interpillow material. Piece 5: Moderately olivine phyric basalt with intersertal texture. Piece 6: Moderately phyric olivine basalt with intersertal to variolitic texture (varioles 1-2 mm), representing a chilled margin of a pillow. Pieces 7-9: Moderately phyric olivine basalt with uniform intersertal divergent texture, veined by brown clays and scarce calcite.



124-768C-79R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-5

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately phyric olivine basalt with intersertal divergent to microvariolitic to glassy texture. Pillowed structure. Pieces 1 to 3 show variolitic and glassy texture. Pieces 4 to 5 show intersertal divergent to variolitic (lower part of Piece 5C) texture. These pieces could represent one pillow with thick (4-5 cm) variolitic borders, lower one inclines 70 degrees.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

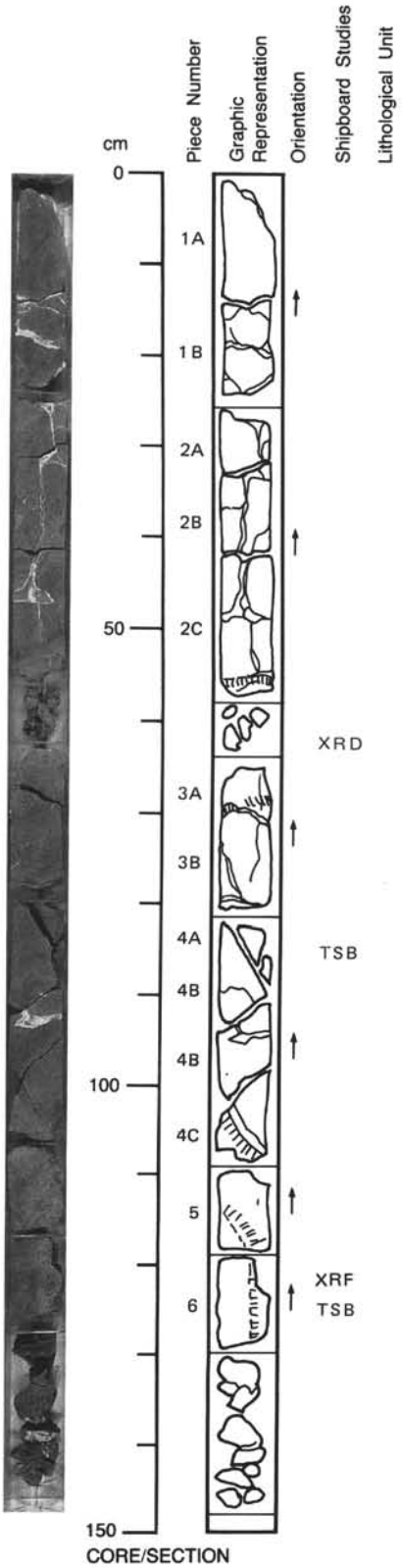
Pieces 6-7

CONTACTS: N/A.
PHENOCRYSTS: Altered (to smectite) olivine, variable in frequency from 5% to 10%.
GROUNDMASS: Textures varying from intersertal divergent to subvariolitic to microvariolitic, or variolitic to glassy.
VESICLES: None.
COLOR: Greenish gray to brownish gray to dark green (altered glass).
STRUCTURE: Pillowed (pillow rim on the lower part of Piece 6) and brecciated (lowermost part of Piece 6 and Piece 7), representing a part of a pillow and interpillow material consisting of rock fragment and glassy matrix.
ALTERATION: N/A.
VEINS/FRACTURES: Some fractures in Piece 6. Brown clay veins 2-10 mm thick and calcite veinlets occur in Piece 6. Piece 7 shows frequent calcite veinlet.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 8-10

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Similar in petrographical features to Pieces 1-5. Pieces 8A and 8B show a chilled pillow margin, inclined about 80 degrees, in the upper portions.



124-768C-79R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Pieces 1, 2A and 2B show uniformly subvariolitic textures. Lower part of Piece 2C shows a variolitic border (lower chilled margin of a pillow) a few cm thick with 220 degrees azimuth.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

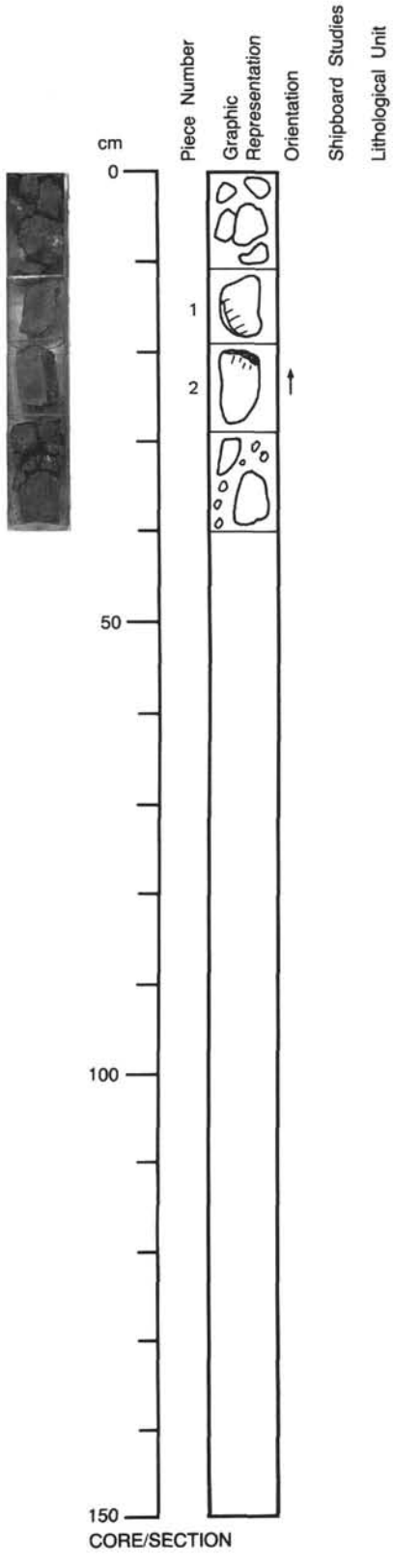
Pieces 3-4

CONTACTS: None.
PHENOCRYSTS: Olivine - 12%; 0.07-0.8 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained, subvariolitic, divergent to intersertal aggregates of 32% plagioclase 0.01-0.4, >1% clinopyroxene, 20% mesostasis.
VESICLES: 35%; 0.03-1.5 mm; N/A; N/A; Filled with clay.
COLOR: N/A.
STRUCTURE: Pieces 3B, 3D and 4C show the upper (azimuth 220 degrees) and lower (azimuth 130 degrees) chilled margins, with variolitic texture, 3-5 cm thick, of a pillow.
ALTERATION: Highly altered, 40% yellowish and colorless fibrous clay replacing mesostasis and olivine.
VEINS/FRACTURES: None.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 5-6

CONTACTS: None.
PHENOCRYSTS: Olivine - 12%; 0.07-0.6 mm; Euhedral olivine, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained variolitic, comprising 8% plagioclase 0.006-0.02 (An50-70), 2% olivine, 18% clinopyroxene < 0.1 quenched and plumose, and 2518% mesostasis.
VESICLES: 3%; 0.08-0.7; Round to irregular; N/A; Filled with clay.
COLOR: N/A.
STRUCTURE: Show well developed variolitic margins (up to 7 cm in Piece 5) of possibly the same pillow.
ALTERATION: Highly altered, 56% Mesostasis oxidized and olivine replaced by yellow green clay.
VEINS/FRACTURES: N/A.

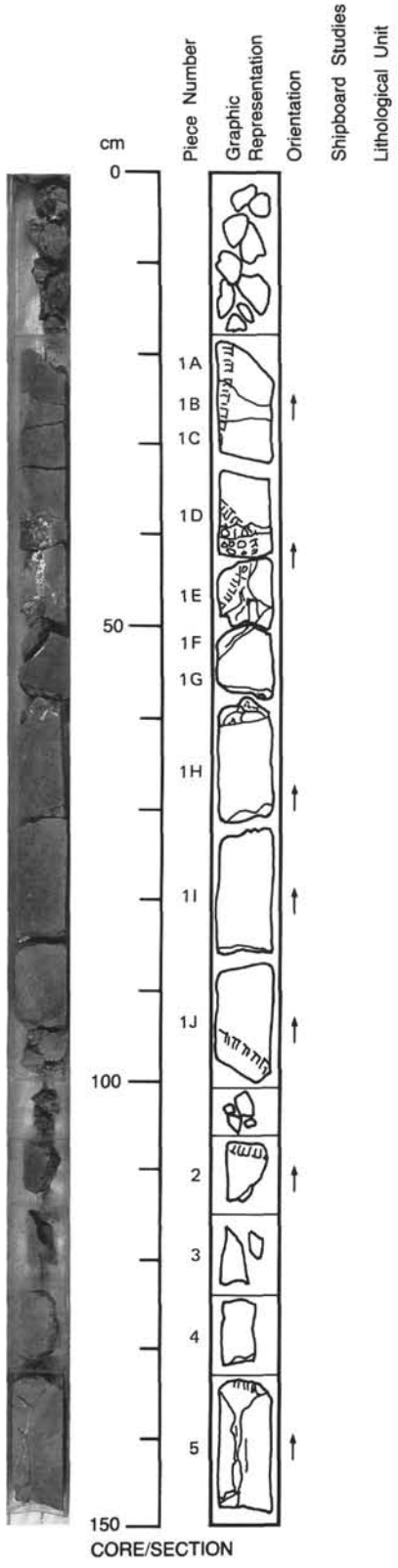


124-768C-79R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Pieces 1 and 2 are lithologically similar to Section 124-768C-79R-2, Pieces 5-6 and show subvariolitic texture in inner part, and chilled variolitic borders of a pillow.

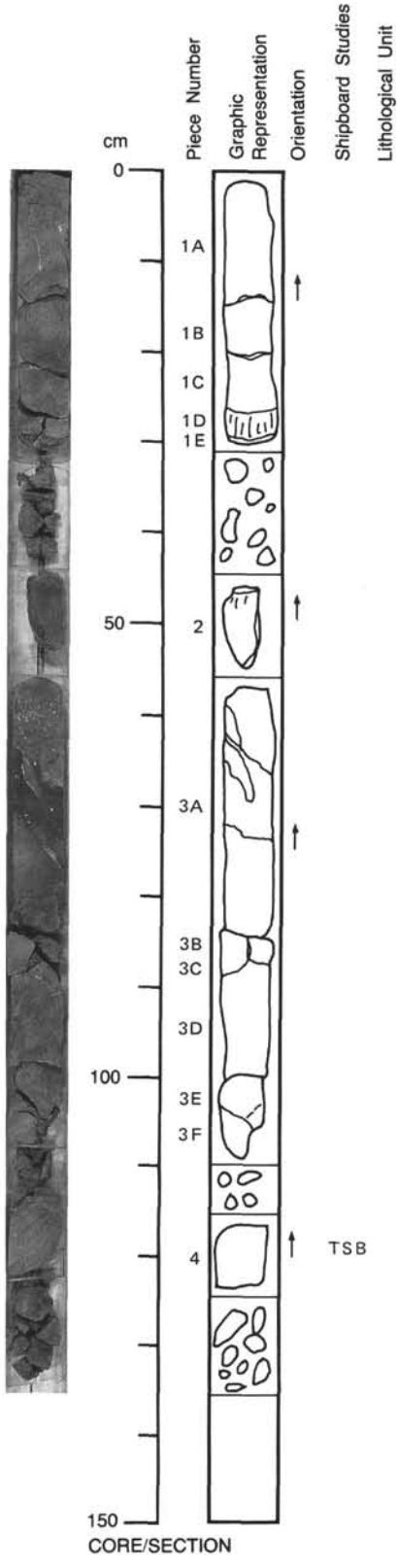


124-768C-80R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-5

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 5-10%; N/A; Pseudomorphosed by green or orange-yellow smectite and scarce calcite.
GROUNDMASS: Consisting of plagioclase, pyroxene, Fe-Ti oxide and altered glassy mesostasis. Varies in texture from intersertal to subvariolitic.
VESICLES: Very small (<0.1 mm) vesicles uniformly distributed, lined with smectite, and sparse, coarser (0.5-1 mm) filled with smectite and less frequently with calcite.
COLOR: Brown gray to green gray.
STRUCTURE: Pillowed, brecciated.
ALTERATION: N/A.
VEINS/FRACTURES: Fractures are widely spaced. Irregular veins filled with brown clays, up to 4 cm in thickness, and filled with a fine breccia composed of altered glass cemented by brown clay or calcite.
ADDITIONAL COMMENTS:
Piece 1: Consisting of moderately phyric basalt with intersertal to subvariolitic texture. Fractured and cemented by brown clays or by fine-grained breccia of glass clasts cemented with calcite or brown clays. Subvariolitic margins occur in Pieces 1A-1D (azimuth 90 degrees) and at bottom of Piece 1J (azimuth 120 degrees).
Piece 2: Moderately phyric olivine basalt with subvariolitic to glassy texture. Representing chilled margin of pillow. Pieces 3-5: Moderately phyric olivine basalt with intersertal divergent groundmass, with veins filled with brown clays and calcite.



124-768C-80R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1A-1E

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately phyric olivine basalt with intersertal to subvariolitic texture, showing thin fractures filled with green smectite and/or calcite. Pieces 1D and 1E show the lower chilled margin of a pillow (azimuth 180 degrees).

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT
Piece 2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately phyric olivine basalt with intersertal divergent to subvariolitic texture, showing a chilled margin on top (azimuth 180 degrees).

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

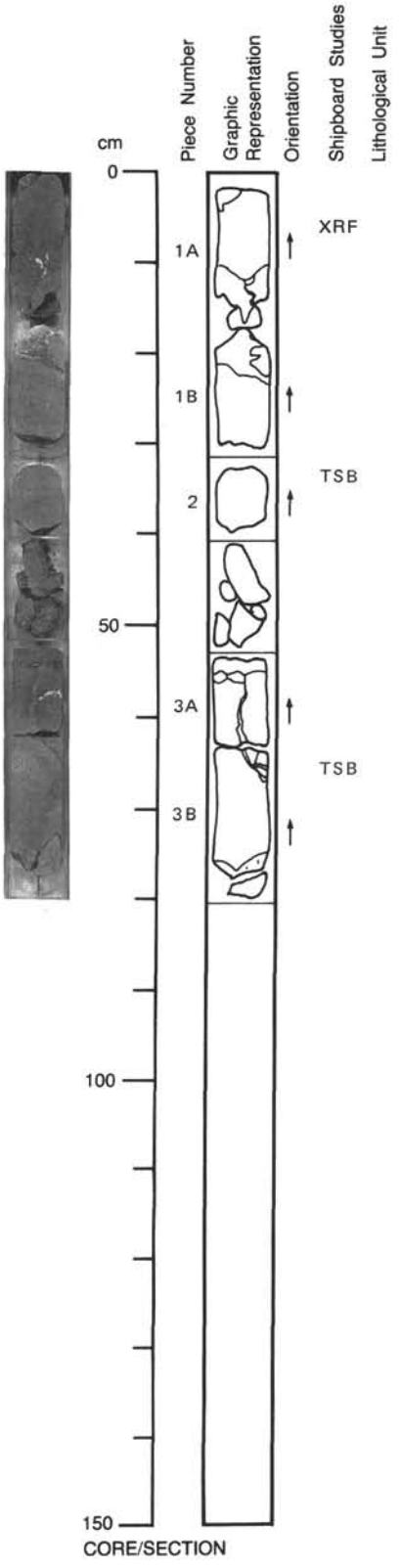
Piece 3

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Lithologically similar to Section 124-768C-80R-1, Pieces 3-5. Shows coarser veins of brown clays (up to 5 cm, Piece 3A) and calcite amygdules (upper part of Piece 3A).

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 4

CONTACTS: None
PHENOCRYSTS: Olivine - 10%; 0.1-0.7 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained, divergent to subvariolitic made up of 32% plagioclase <0.1 mm (An50-70), 3% clinopyroxene and 35% mesostasis and glass.
VESICLES: 2%; 0.02-0.7 mm; Round to irregular; N/A; Filled with clays.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: Moderate.
VEINS/FRACTURES: N/A.



124-768C-80R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1A-1B

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately phyric olivine basalt with intersertal divergent texture. Piece 1A shows a poorly vesicular massive texture. Piece 1B is finely vesicular and contains veins filled with brown clays and/or calcite.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

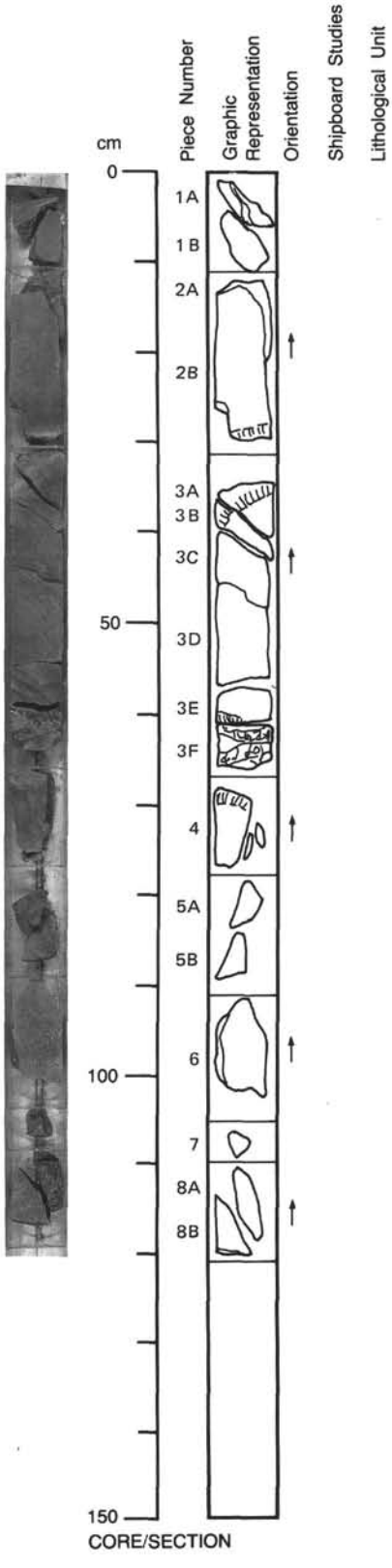
Piece 2

CONTACTS: None
PHENOCRYSTS: Olivine - ~5%; 0.02-0.4 mm; Pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained, divergent and intersertal, made up of 34% plagioclase, >1% olivine, >1% clinopyroxene, 30% mesostasis.
VESICLES: 30%; 0.03-1.3 mm; irregular and rounded; N/A; Filled with clays.
COLOR: Gray to dark gray.
STRUCTURE: None.
ALTERATION: Highly altered, mesostasis and olivine altered to pale green to colorless fibrous clay and allophane.
VEINS/FRACTURES: N/A.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 3

CONTACTS: None.
PHENOCRYSTS: Olivine - 5%; 0.07-0.6 mm; Euhedral completely pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained, intersertal divergent aggregates of 20% subhedral plagioclase 0.02-1.7 mm, 4% olivine 0.2-0.6 mm, >1% subhedral clinopyroxene 0.05 mm.
VESICLES: 35%; N/A; Irregular and rounded; Even.
COLOR: Dark gray.
STRUCTURE: None.
ALTERATION: Highly altered, olivine altered to greenish fibrous material and smectite, and mesostasis altered to clays.
VEINS/FRACTURES: Thin veins filled with brown clay and calcite.

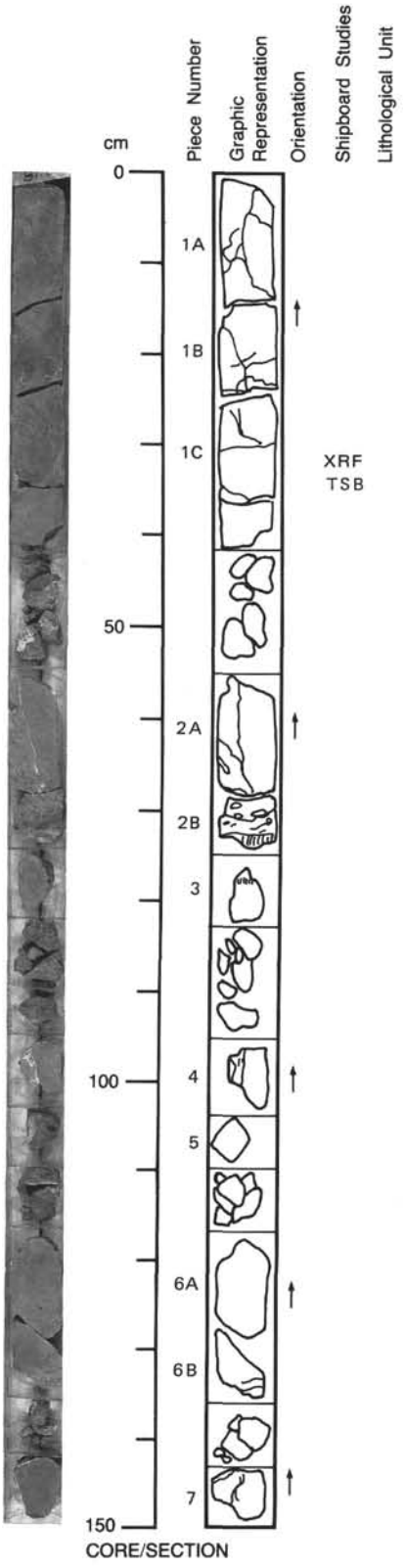


124-768C-81R-1

UNIT X: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-8

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 1-10%; N/A; Replaced by green or orange yellow smectite.
GROUNDMASS: Consisting of plagioclase, pyroxene, iron ore and intersertal glass showing intersertal to subvariolitic texture. Locally (adjacent to subvariolitic rims and in intersertal breccia) glassy texture.
VESICLES: Very fine, uniformly distributed, lined with smectite, and sparse coarser (0.5-2 mm) spherical or flattened, filled partly with smectite or calcite.
COLOR: Brownish gray to greenish gray.
STRUCTURE: Pillowed to brecciated, locally massive.
ALTERATION: N/A.
VEINS/FRACTURES: Moderately frequent, filled with brown clays and calcite.
ADDITIONAL COMMENTS: Pieces 1-2: Moderately olivine phyric basalt with finely vesicular intersertal to variolitic to glassy texture. Some calcite veinlets. Piece 2A shows a chilled margin at bottom (azimuth 185 degrees), corresponding to a border of a pillow. Pieces 3A-3F: Similar in lithology to Pieces 1-2. A chilled margin (upper border of pillow, with azimuth 45 degrees) is shown by Pieces 3A-3B. Piece 3F shows brecciated green glass, altered to smectite, cemented by calcite veinlets. Piece 4: Lithologically similar to Pieces 3A-3F. Shows in the upper part of Piece 4A a chilled margin of pillow (azimuth 350 degrees). Pieces 5-8: Sparsely phyric olivine basalt with uniform intersertal groundmass. Very fine and fine vesicles filled with smectite and (Piece 6) calcite. Veins filled with brown clays occur in Pieces 6 and 8B.



124-768C-81R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

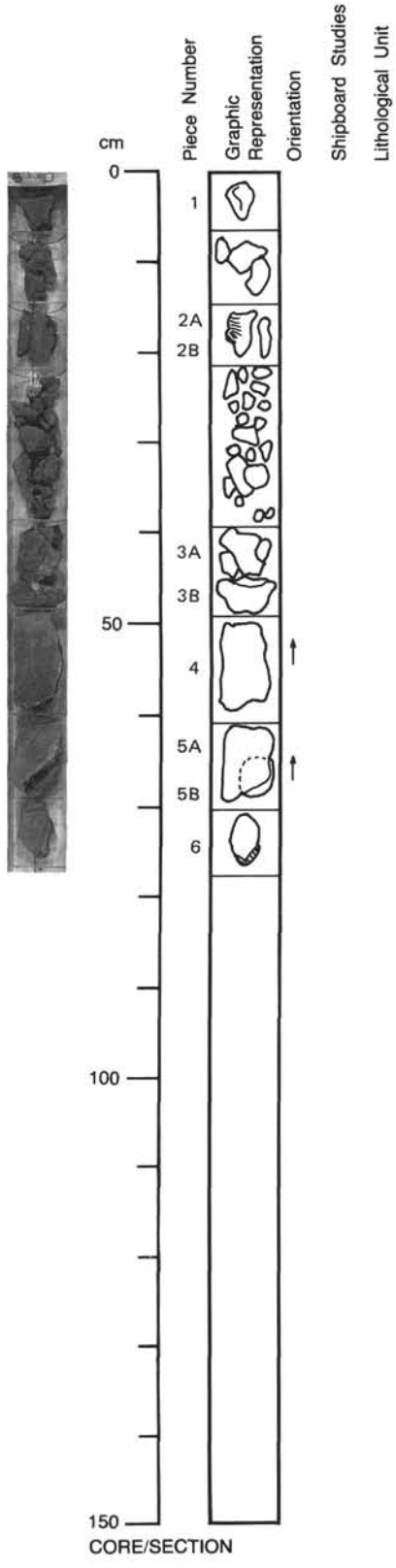
Pieces 1A-1D

CONTACTS: None.
PHENOCRYSTS: Olivine - 15%; 0.03-1.0; Subhedral to euhedral crystals, wholly pseudomorphed.
GROUNDMASS: Fine-grained, intersertal divergent aggregates of 28% subhedral to euhedral plagioclase < 2.0 mm (An50-70), > 1% of subhedral clinopyroxene 0.04-0.2 mm, and 20% mesostasis.
VESICLES: 40%; 0.04-0.4 mm; Rounded and irregular.; N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: Highly altered, mesostasis and olivine altered to clay.
VEINS/FRACTURES: Sparse veinlets of brown clays and calcite.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 2-7

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately to sparsely olivine phyric basalt with intersertal divergent to intersertal groundmass. Locally glassy texture (glass altered to green smectite) with slightly brecciated structure and cementation by calcite (Piece 2B). A chilled margin, suggesting a pillow border, is in Piece 3. Veins filled with brown clays and/or calcite occur in Pieces 2A, 3-5, 6B and 7. Sparse vesicles 1-3 mm in size occur in Pieces 4-6A. Very fine vesicles are thoroughly distributing.



124-768C-81R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Lithologically similar to Section 124-768C-81R-1, but showing textural grading to variolitic in Piece 2A, probably indicating the chilled margin of a pillow.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

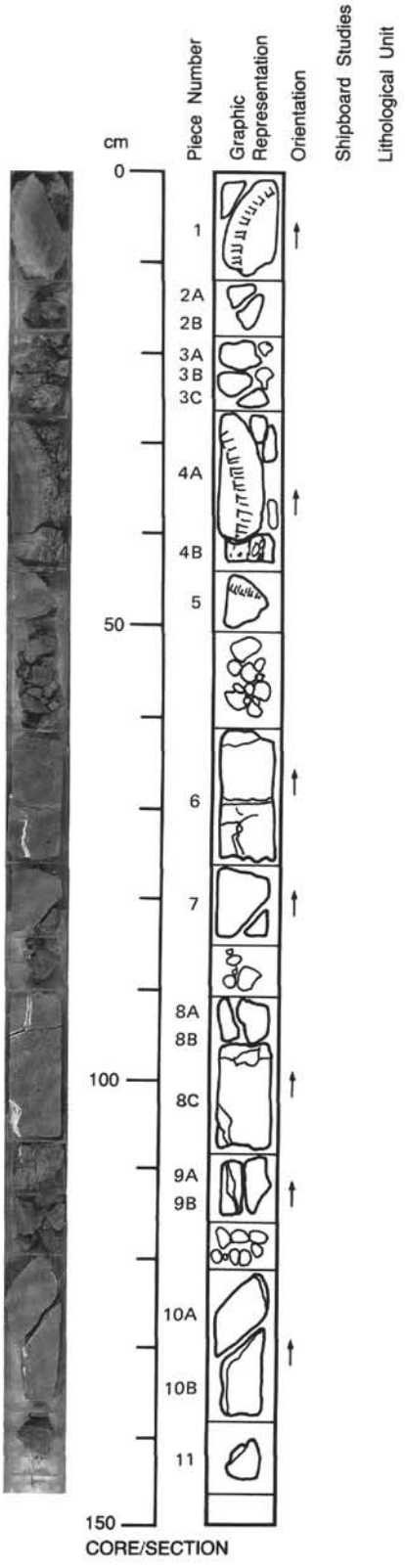
Pieces 3-5

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Lithologically similar to Section 124-768C-81R-2, uniform in texture. It shows a moderately finely vesicular texture.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Piece 6

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Lithologically similar to Pieces 3-5. Also probably representing the chilled margin of a pillow.



124-768C-82R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

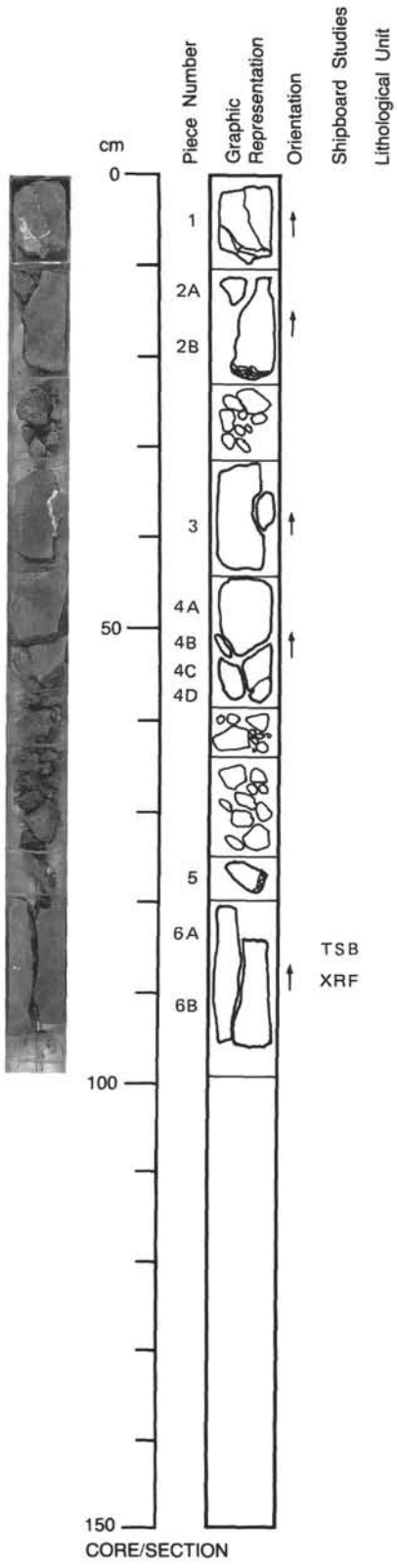
Pieces 1-9

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 5-8%; N/A; Altered, pseudomorphosed by green or orange yellow smectite.
GROUNDMASS: Consists of plagioclase, pyroxene, iron ore and glass showing various textures grading from intersertal to subvariolitic to variolitic to glassy.
VESICLES: Moderately frequent fine-grained and few sparse 1-3 mm vesicles, filled or lined with green smectite and very rarely with calcite.
COLOR: Brownish gray to light gray.
STRUCTURE: Pillowed, brecciated.
ALTERATION: None.
VEINS/FRACTURES: Sparse veins filled with brown clay or calcite.
ADDITIONAL COMMENTS: Piece1: Moderately olivine phyric basalt with intersertal divergent to variolitic groundmass bordered by altered glass representative of the outer zone and chilled margin of a pillow (azimuth 90 degrees). Pieces 2-3: Basalt and glass (dark green, altered to smectite) fragments cemented by ?silica. Possibly representing intrapillow material. Pieces 4A-4B: Lithologically similar to Pieces 2-3, representative of the outer zone and chilled margin of a pillow (azimuth 179 degrees). Piece 5: Lithologically similar to Pieces 2-3, but showing a small portion with subvariolitic texture, representing part of the chilled margin of a pillow. Pieces 6-9: Moderately olivine phyric basalt with uniform intersertal divergent groundmass. Piece 6: veins filled with brown clays. Pieces 8A-9B veins partially filled with calcite.

UNIT 1: CONTINUED

Pieces 10-11

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 2-3%; N/A; Pseudomorphosed by smectite.
GROUNDMASS: Consisting of plagioclase, pyroxene, iron ore and altered glassy mesostasis, intersertal in texture.
VESICLES: Very fine grained evenly distributed, and sparse coarser (0.5-1 mm), lined or filled with smectite and rarely with calcite.
COLOR: Gray.
STRUCTURE: Massive.
ALTERATION: N/A.
VEINS/FRACTURES: Veinlets (1-3 mm thick) filled with calcite and/or brown clay.



124-768C-82R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-2

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 5-8%; N/A; Altered.
GROUNDMASS: With texture grading from intersertal to subvariolitic to variolitic, consisting of plagioclase, pyroxene, iron ore and altered glass.
VESICLES: Mostly very fine, evenly distributed and lined or filled with smectite.
COLOR: Brownish gray to greenish gray.
STRUCTURE: Pillowed, brecciated.
ALTERATION: N/A.
VEINS/FRACTURES: Coarse (3 cm thick) vein filled with brown clay and calcite, veinlets mostly filled with calcite.
ADDITIONAL COMMENTS: Piece 1: Moderately olivine phyric basalt, finely vesicular, with intersertal divergent groundmass, with veins filled with brown clay and/or calcite. Pieces 1A-1B: Moderately olivine phyric basalt with texture grading from intersertal to variolitic. At the lower edge of Piece 1B bordered with altered green glass, representative of the outer zone and chilled margin of a pillow.

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

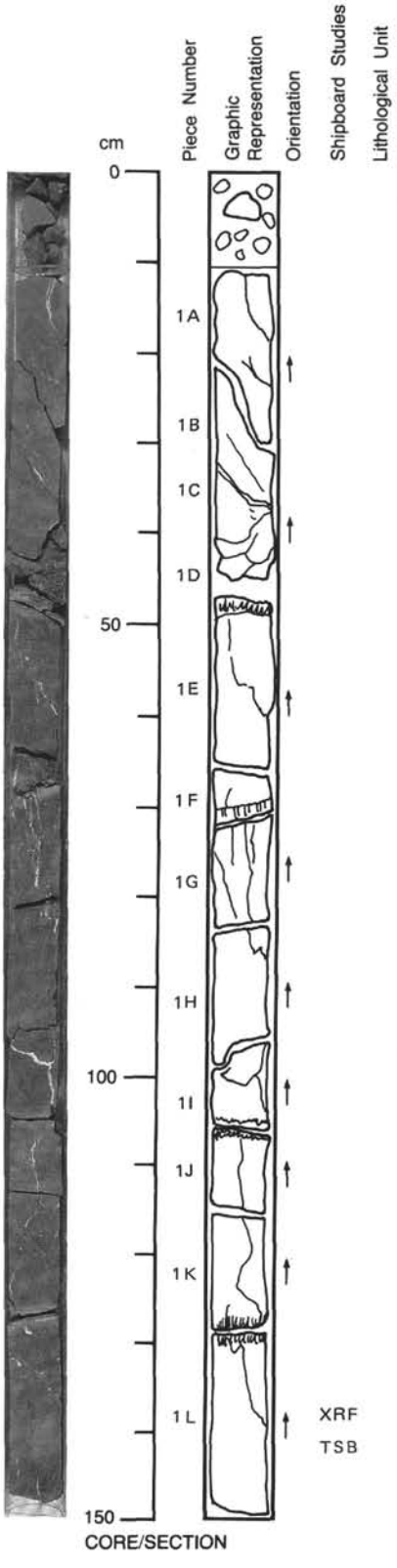
Pieces 3-4

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 2-3%; N/A; Altered.
GROUNDMASS: Consisting of plagioclase, pyroxene, iron ore and altered glass, with uniform intersertal divergent texture.
VESICLES: N/A; Sparse vesicles 0.5-1 mm in diameter.; N/A; Finely distributed.; Very fine grained, filled or lined by smectite.
COLOR: Gray to brownish gray.
STRUCTURE: Massive.
ALTERATION: N/A.
VEINS/FRACTURES: Thin veins filled with calcite and brown clay.

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 5-6

CONTACTS: N/A.
PHENOCRYSTS: Olivine - 8%; 0.2-1.0 mm; Euhedral prismatic, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained, hypocrystalline, intersertal and divergent texture, consisting of 40% plagioclase laths 0.01-0.8 mm (labradorite), 2% clinopyroxene, iron ore and 20% mesostasis.
VESICLES: 20%; 0.05-2.0 mm; Spherical to lobate; N/A; Filled with clay and calcite.
COLOR: N/A.
STRUCTURE: Massive.
ALTERATION: Moderately altered, olivine and mesostasis replaced by fibrous clays.
VEINS/FRACTURES: None.

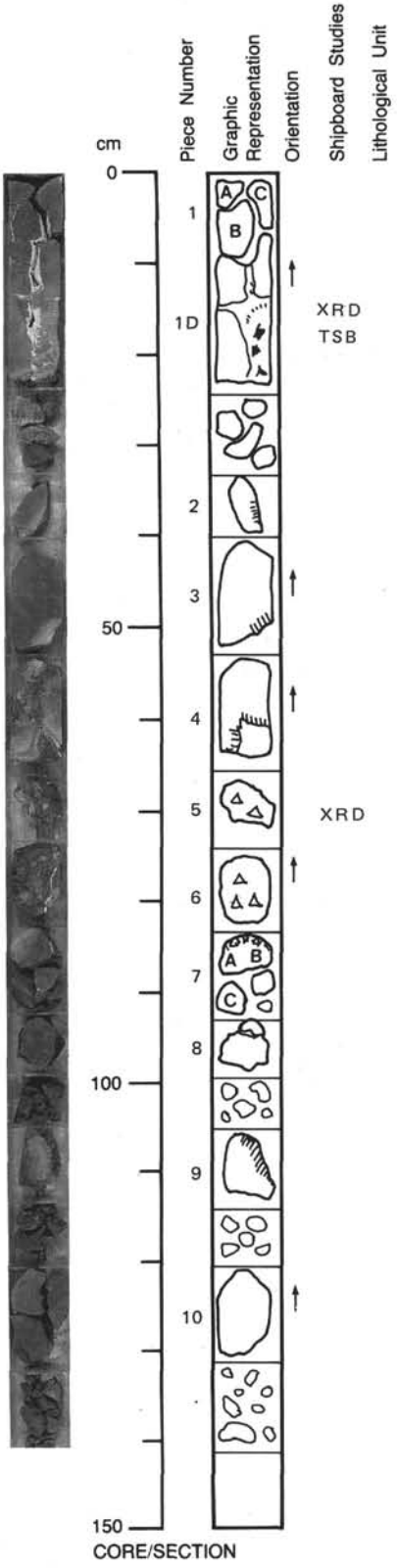


124-768C-83R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1A-1D

CONTACTS: No contact, but pillow rinds preserved at intervals as shown.
PHENOCRYSTS: Olivine - ~3%; 0.14-0.8 mm; Heterogeneously distributed, euhedral. Altered almost totally to green clay and Fe-oxide.
GROUNDMASS: Fine-grained intersertal divergent texture. Mainly aggregates of 23% plagioclase <1.1 mm and 3% clinopyroxene 0.04-0.2 and 33% mesostasis.
VESICLES: 38%, 0.01-0.9 mm vesicles throughout rock filled or partly filled with green clay and carbonate. Larger vesicles (~1 mm) partly filled with green clay and carbonate occur in patches.
COLOR: Brownish gray.
STRUCTURE: Pillowed.
ALTERATION: Highly altered olivine and mesostasis, to clays and Fe-oxide.
VEINS/FRACTURES: Brown clay with white areas fills irregular fractures through the length of the section, thickness 1-5 mm. These are cut by irregular white calcite veins.

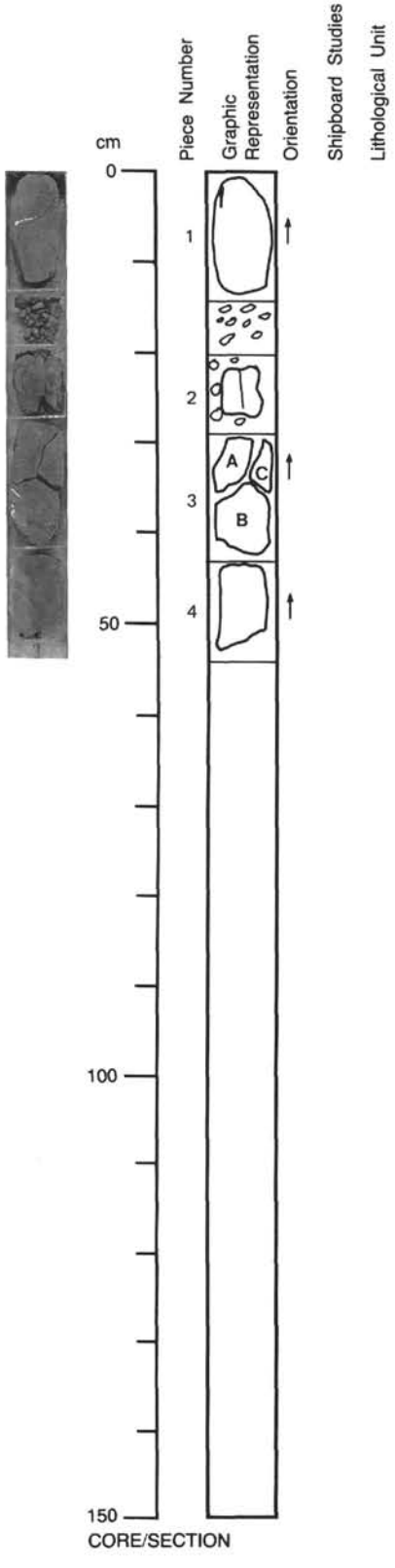


124-768C-83R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-9

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Cryptocrystalline, made up of 15% glass, 30% crypto-crystallites, and 45% varioles.
VESICLES: <1%; N/A; N/A; N/A; ?
COLOR: Brownish-gray.
STRUCTURE: Pillow breccia.
ALTERATION: Highly altered, carbonate replacing varioles.
VEINS/FRACTURES: Structure is broken by large fractures filled with brown clay which contain angular fragments of green altered glass from pillow margins and in places white mineral aggregates are developing. Frequent examples of small pieces of pillow margin indicate that this is a breccia.

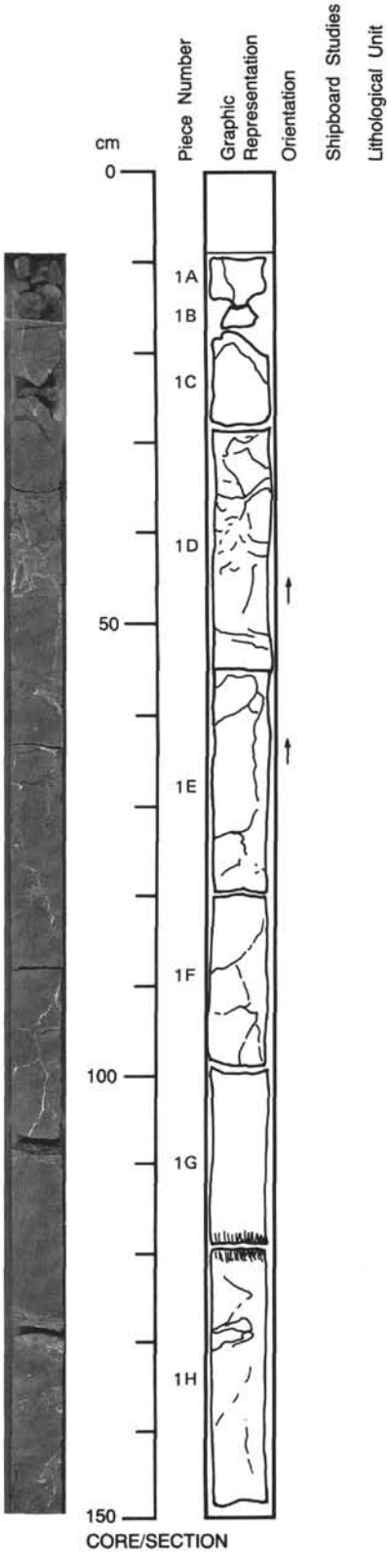


124-768C-83R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-4

CONTACTS: None.
PHENOCRYSTS: Olivine - 2%; < 1 mm; Heterogeneously distributed euhedral and resorbed olivine altered to green clay.
GROUNDMASS: Varies from cryptocrystalline in pillow margin to variolitic and intersertal texture. Made up of plagioclase, pyroxene, and glass.
VESICLES: N/A; Mainly <0.5 mm, some about 1 mm; Lobate and circular; Heterogeneously distributed; Partly or completely filled almost entirely with green clay, few with calcite.
COLOR: Brownish gray.
STRUCTURE: Massive, with remnant of pillow margin in Piece 4.
ALTERATION: Slightly altered, olivine to clay and matrix to Fe-oxide.
VEINS/FRACTURES: Few thin irregular calcite veins about 2 mm. One irregular brown clay vein in Piece 3B.



124-768C-84R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

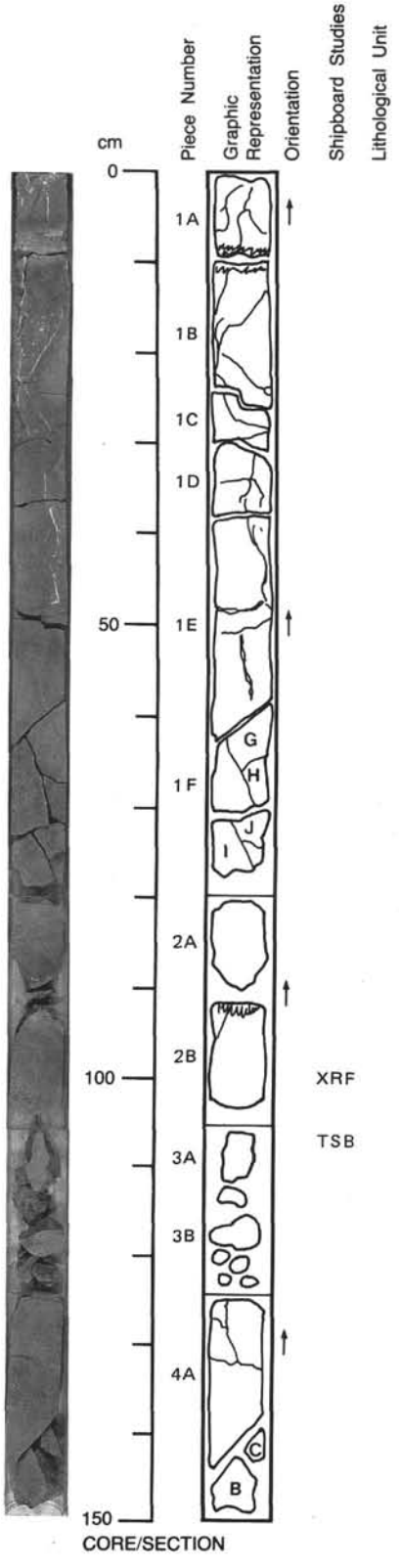
Pieces 1A-1G

CONTACTS: Flat chilled margin at the bottom of piece 1G.
PHENOCRYSTS: Olivine - <20%; <1 mm; heterogeneously distributed, altered to green clay and Fe-oxide. Euhedral and corroded.
GROUNDMASS: Intersertal aggregates of plagioclase, pyroxene, and glass. *Cryptocrystalline chilled margin.*
VESICLES: 20%+; <0.5 mm, some large vesicles about 1 mm.; N/A; N/A; Filled or partially filled dominantly with green clay and some calcite.
COLOR: Reddish brown.
STRUCTURE: Possible sheet flow approximately 1 m.
ALTERATION: Slightly to moderately altered, olivine phenocrysts altered to clay and Fe-oxide and mesostasis altered to Fe-oxide.
VEINS/FRACTURES: Flow penetrated throughout by irregular brown clay (with zeolites) and calcite veins <1 cm thick.

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Piece 1H

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Chilled top and bottom 40 cm. Sheet flow?



124-768C-84R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

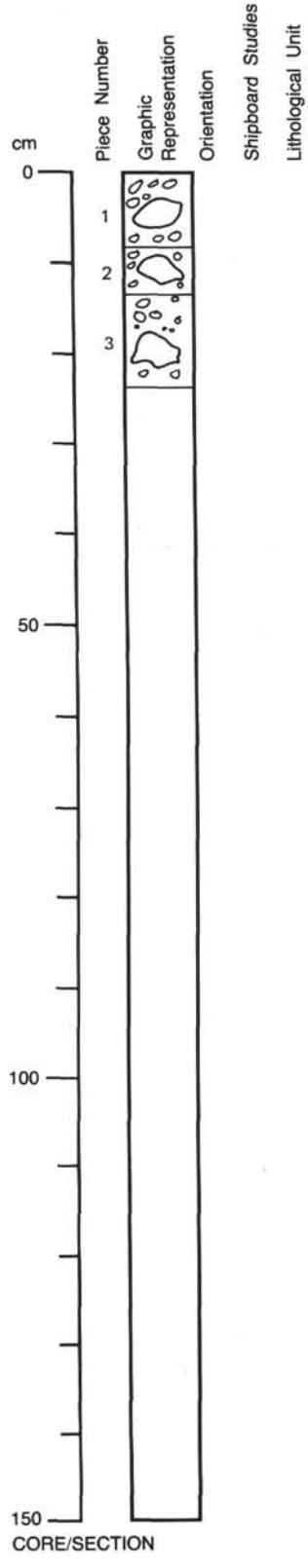
Pieces 1-2A

CONTACTS: Planar chilled contacts above and below about 80 cm.
PHENOCRYSTS: Olivine - ~1%; < 1mm; Scattered as individual crystals and glomeroporphyries.
GROUNDMASS: Variable to intersertal texture consisting of plagioclase, pyroxene and glass.
VESICLES: <0.5 mm throughout the rock. Filled with green clay and some calcite.
COLOR: Brownish gray to gray.
STRUCTURE: Sheet flow, grains fine inward from margins.
ALTERATION: Moderate.
VEINS/FRACTURES: N/A.

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 2B-4C

CONTACTS: Chilled top, 25 cm total thickness, sheet flow?
PHENOCRYSTS: Olivine - 12%; 0.07-0.7 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained intersertal divergent texture, made up of 18% subhedral to euhedral plagioclase 0.02-1.7 mm, 7% subhedral clinopyroxene 0.01-0.2 mm, and 20% mesostasis.
VESICLES: 40%; 0.04-2.6 mm; Irregular; N/A; Filled with clay.
COLOR: Brownish-gray.
STRUCTURE: Pillow margins indicate pillows are up to 1 m in diameter.
ALTERATION: Highly altered, olivine and mesostasis altered to colorless to pale yellowish green clay.
VEINS/FRACTURES: N/A.

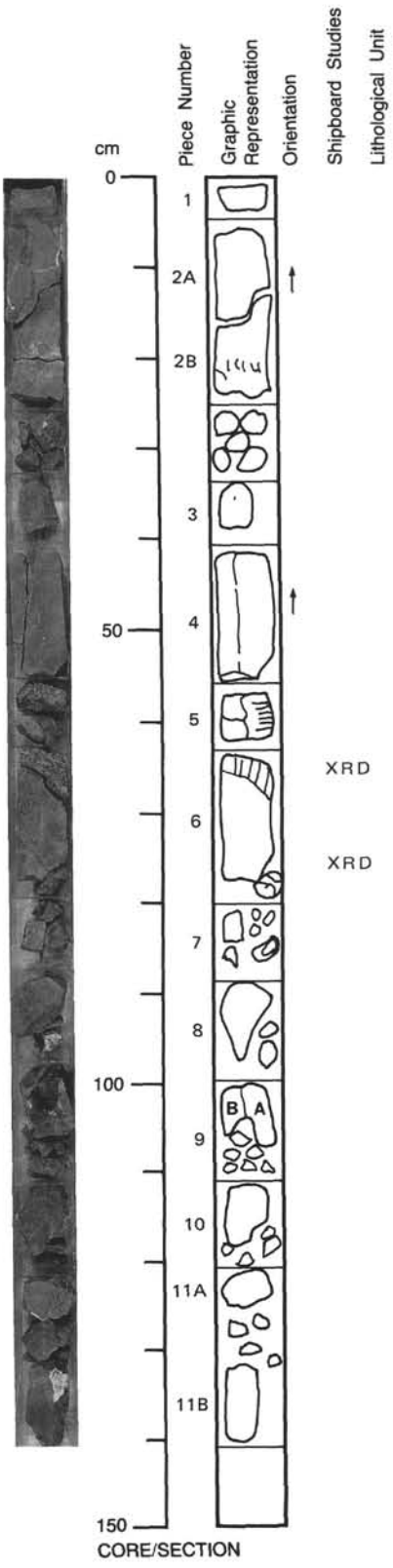


124-768C-84R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-3

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continues from Section 124-768C-84R-2.

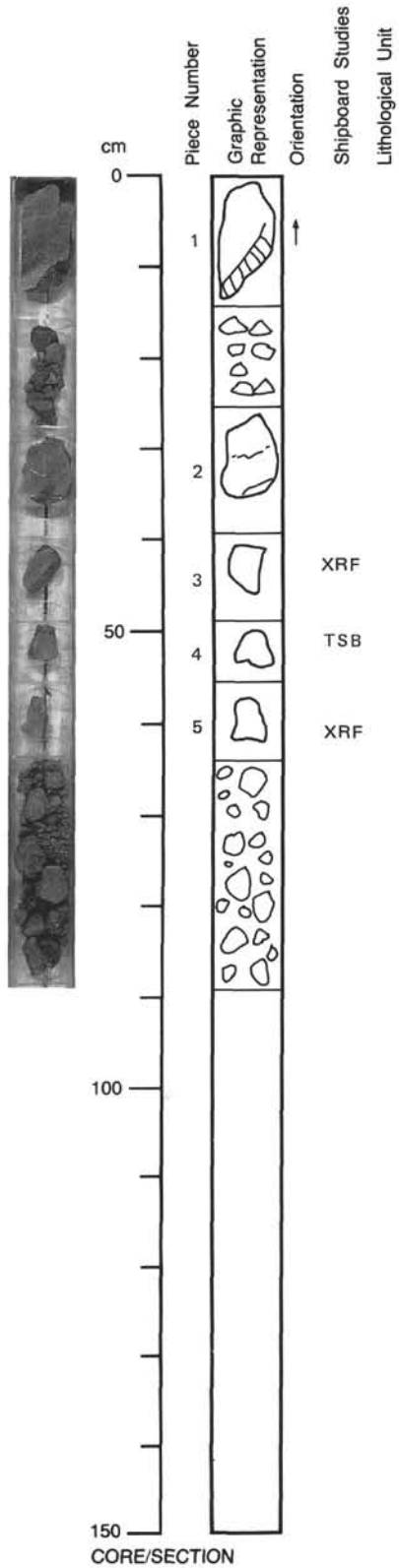


124-768C-85R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continues from Section 124-768C-84R-3. Flow is about 1 m thick.



124-768C-85R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-5

CONTACTS: None.
PHENOCRYSTS: Olivine - 12%; 0.07-1.6 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained subvariolitic to intersertal made of 20% euhedral plagioclase < 0.8 mm, 7% olivine, 4% subhedral clinopyroxene 0.02-0.45 and 15% mesostasis.
VESICLES: 40%; N/A; N/A; N/A.
COLOR: Brownish gray.
STRUCTURE: It may be a pillow basalt. It may be a pillow breccia, evidence not entirely clear.
ALTERATION: Highly altered, olivine and mesostasis to pale green to colorless fibrous clays.
VEINS/FRACTURES: None

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

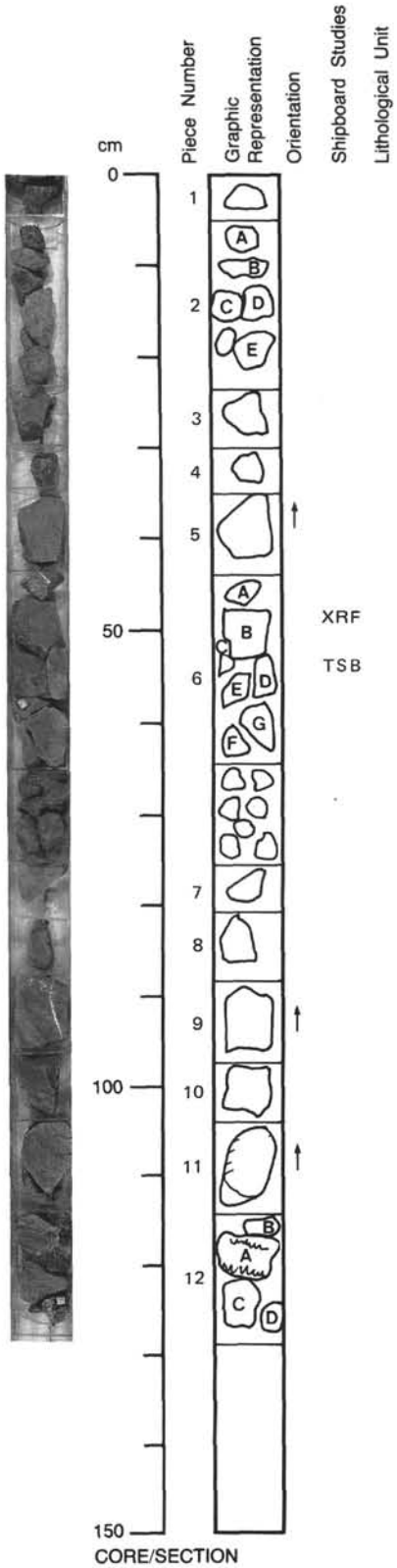
Pieces 5-11

CONTACTS: N/A.
PHENOCRYSTS: Olivine - <2%; <1 mm; Altered to green clay and Fe-oxide, euhedral to corroded.
GROUNDMASS: Microcrystalline variolitic to intersertal aggregates of plagioclase with minor pyroxene and glass (i.e., more leucocratic?).
VESICLES: Fewer and smaller than average, filled mainly with green clay and calcite.
COLOR: Brownish gray, pillow rind fragments are much darker green than previous core.
STRUCTURE: Core very broken with some curved pillow margins evident.
ALTERATION: Moderate; olivine to green clay and Fe-oxide; groundmass contains no Fe-oxide.
VEINS/FRACTURES: Mainly calcite and red clay filled some green clay in Piece 6.

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 3-4

CONTACTS: N/A.
PHENOCRYSTS: Olivine - ~1%; < 1.0 mm.
GROUNDMASS: Intersertal texture consisting of plagioclase, clinopyroxene and mesostasis.
VESICLES: <20%; <0.5 mm or smaller than 0.5 mm; N/A; N/A; Filled with green clay and some calcite.
COLOR: Gray to brownish-gray.
STRUCTURE: Massive.
ALTERATION: Slightly to moderately altered, olivine and mesostasis altered to clay and iron oxide.
VEINS/FRACTURES: Mainly calcite and red clay filled with some green clay in Piece 6.

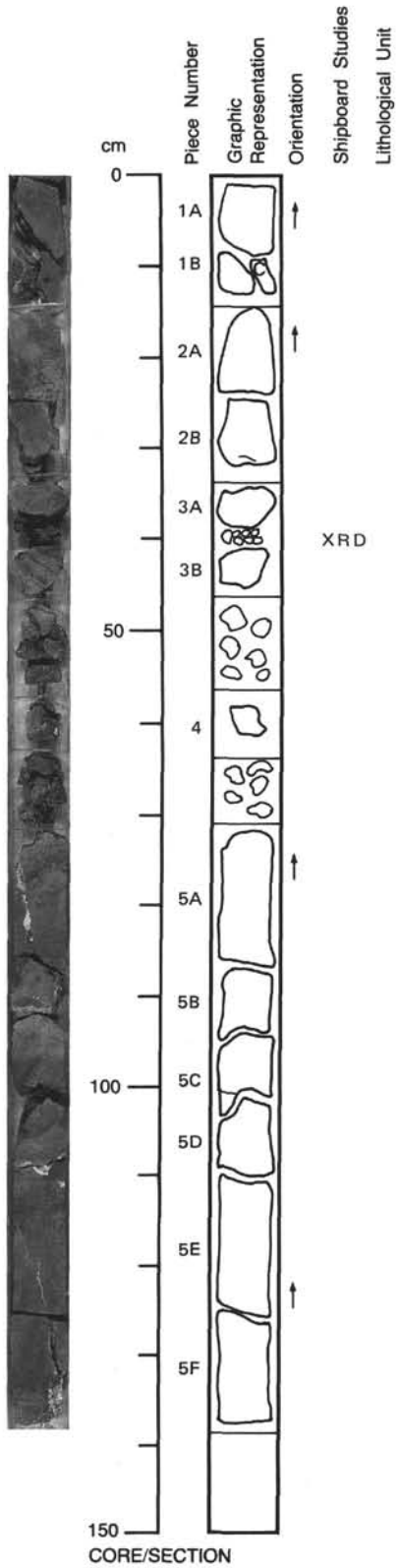


124-768C-86R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-12

CONTACTS: None.
PHENOCRYSTS: Olivine - 10%; 0.04-0.6; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained intersertal divergent texture made up of 17% euhedral plagioclase <1.4 mm (An50-70), 10% subhedral clinopyroxene 0.1 mm and 21% mesostasis.
VESICLES: 35%; 0.02-1.0 mm; Irregular to round; N/A.
COLOR: Brownish gray.
STRUCTURE: Brecciated pillow lava.
ALTERATION: Highly altered, olivine and mesostasis replaced by pale green high relief fibrous clays.
VEINS/FRACTURES: Few.

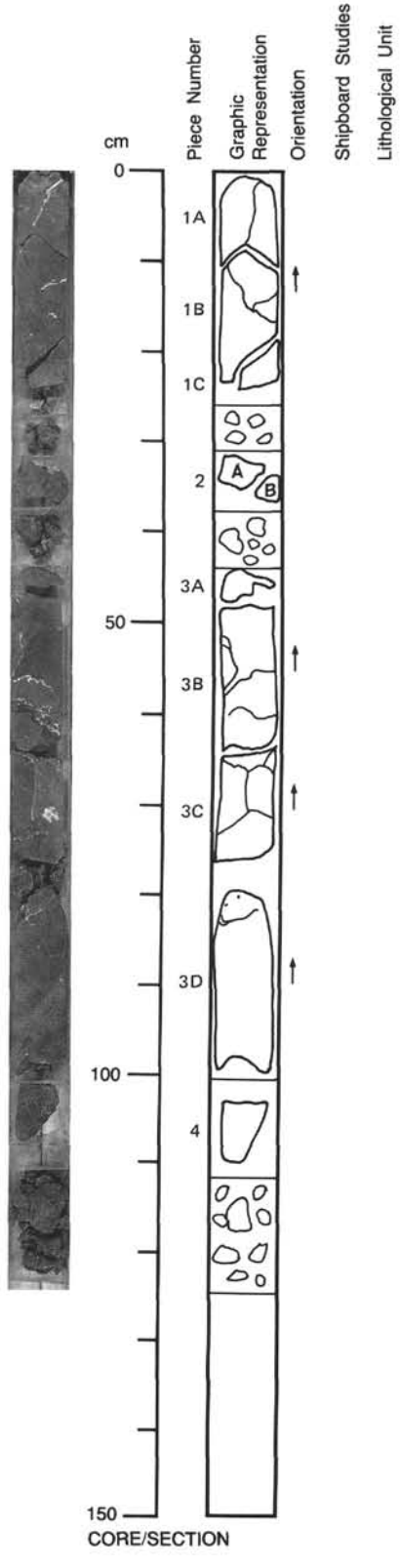


124-768C-86R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-4F

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Shows dark green hyaloclastite pillow margins, varioles and leucocratic groundmass; perhaps slightly coarser grained than in the previous sections but still clearly belonging to this unit petrographically. Varioles and apparent chill zones develop at intervals but cannot generally be identified as associated with pillow margins. However, there is at least one rounded hyaloclastite coated margin in Piece 3.

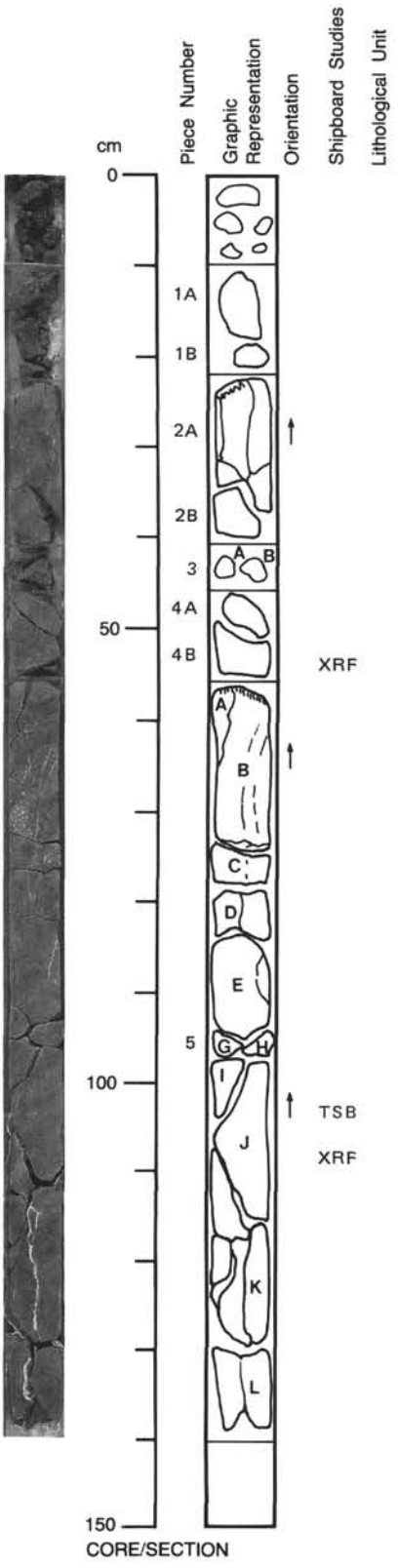


124-768C-86R-3

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-4?

CONTACTS: N/A.
PHENOCRYSTS: Not determined - ~2%; < 1 mm; heterogeneously distributed, euhedral and corroded.
GROUNDMASS: Variolitic to intersertal with abundant plagioclase laths and minor pyroxene and glass.
VESICLES: Sparse, partly and completely filled with green clay or carbonate, spherical to lobate.
COLOR: Brownish gray.
STRUCTURE: Massive.
ALTERATION: Moderate; olivine to clay and Fe-oxide, groundmass to Fe-oxide.
VEINS/FRACTURES: Veins of red clays.



124-768C-87R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

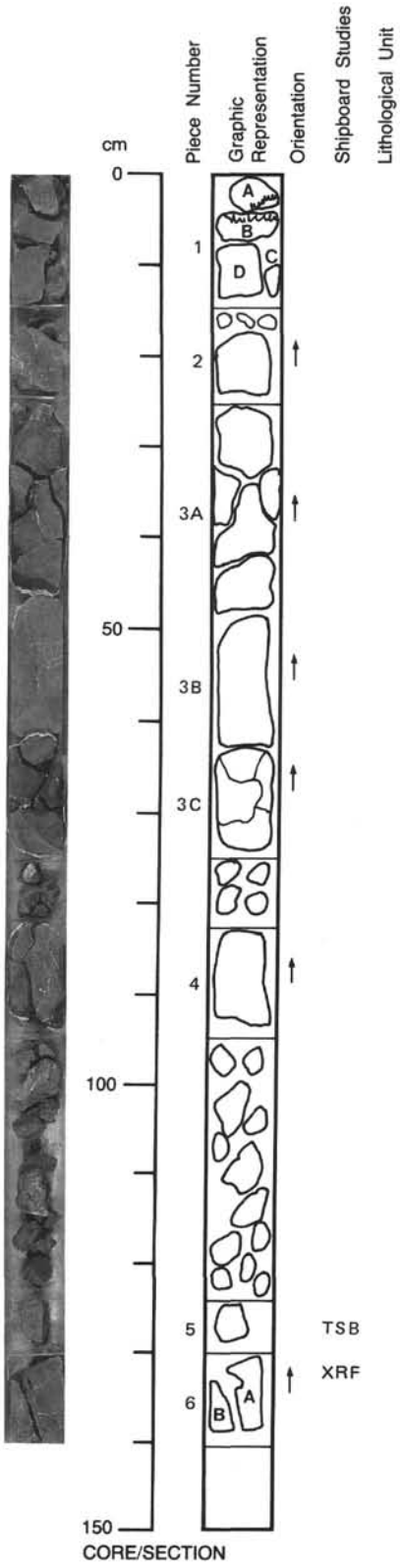
Pieces 1-4

CONTACTS: Planar.
PHENOCRYSTS: Olivine - ~2%; N/A; Euhdral.
GROUNDMASS: Variolitic to intersertal with abundant plagioclase laths, minor pyroxene and glass.
VESICLES: Sparse filled with green clay and carbonate.
COLOR: Brownish gray.
STRUCTURE: Massive.
ALTERATION: Moderately altered, olivive and groundmass to clay, iron oxide.
VEINS/FRACTURES: N/A.

UNIT 1: MODERATELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 4-5

CONTACTS: Planar
PHENOCRYSTS: Olivine - < 8%; 0.12-1.1 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained even textured intergrowth of 28% plagioclase 0.04-0.2 mm (An50-70), 8% anhedral clinopyroxene and 15% mesostasis.
VESICLES: 20%; 0.06-1.2 mm; Round to lobate; N/A; Filled with green clay.
COLOR: Gray.
STRUCTURE: Large pillow (30 cm) lava.
ALTERATION: Moderately altered, olivine and groundmass and mesostasis to clays.
VEINS/FRACTURES: Irregular veins of red clay and white calcite.
ADDITIONAL COMMENTS: Similar to Pieces 1-4 thicker (approximately 95 cm). Continues to the upper part of Section 124-768C-87R-2.



124-768C-87R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

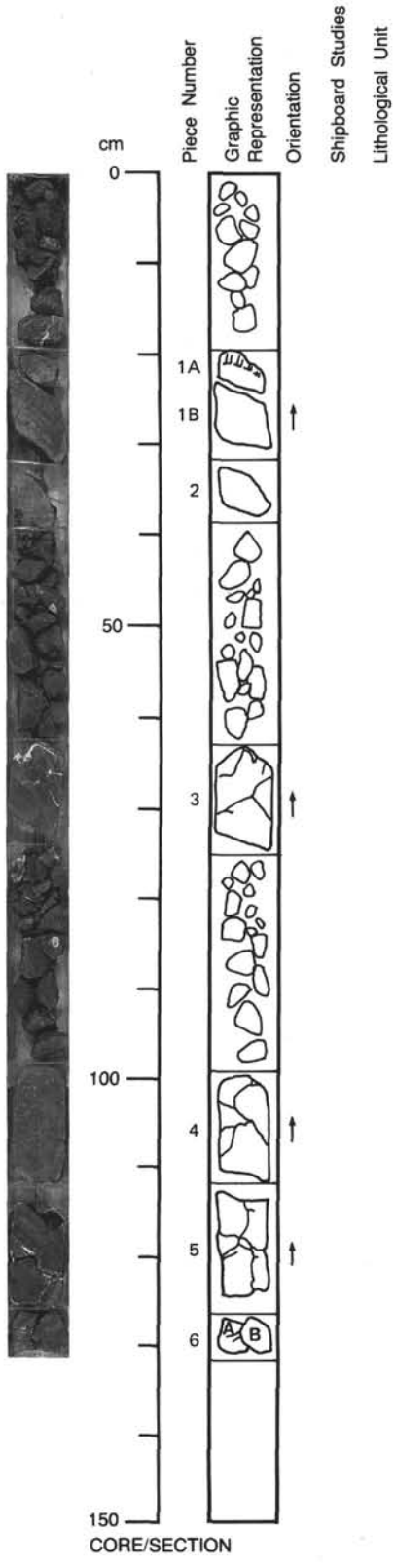
Piece 1A

CONTACTS: Planar contact at top.
PHENOCRYSTS: Olivine - <2%; 0.5 mm; Heterogeneously distributed, altered to green clay.
GROUNDMASS: Fine grained, even intergrowth of plagioclase, pyroxene and glass.
VESICLES: Small and scattered in matrix and large (2 mm) concentrated in a zone 10 cm from the top, filled with green clay and carbonate.
COLOR: Gray with minor oxidation in parts.
STRUCTURE: Sheet lava > 135 cm thick, although there are large vesicles in the granules between Piece 4 and 5.
ALTERATION: Slight, olivine altered to clay and some oxidation in the groundmass.
VEINS/FRACTURES: Filled with red clay and carbonate.

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1B-6

CONTACTS: None
PHENOCRYSTS: Olivine - 8%; 0.02-0.09 mm; Euhedral, pseudomorphed by secondary minerals.
GROUNDMASS: Fine-grained intersertal intergrowth of 26% plagioclase, 10% clinopyroxene, and 20% mesostasis.
VESICLES: 35%; 0.03-2.3 mm; Round to lobate; N/A; Filled with clay. Two size classes.
COLOR: Gray.
STRUCTURE: Large pillow, 135 cm in thickness.
ALTERATION: Highly altered, olivine and mesostasis replaced by pale greenish to colorless fibrous clay.
VEINS/FRACTURES: Filled with red clay and carbonate.

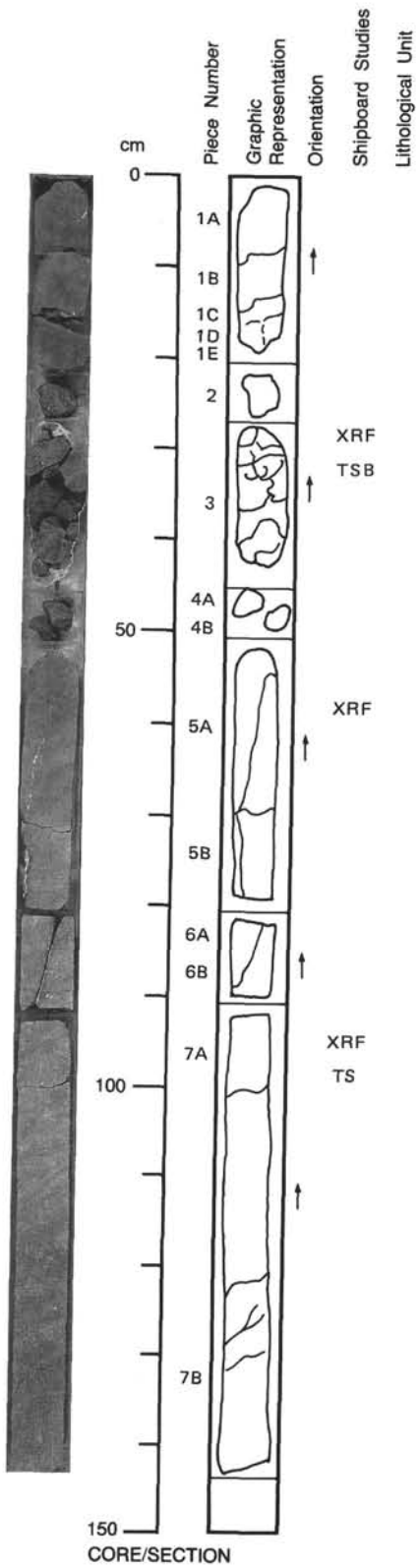


124-768C-88R-1

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

Pieces 1-6

CONTACTS: N/A.
PHENOCRYSTS: Olivine - ~10%; N/A; Altered, replaced by green and yellow smectite.
GROUNDMASS: Consisting of plagioclase, clinopyroxene, Fe ore and altered glassy mesostasis; varies in texture from intersertal to variolitic. Varioles may be 5 mm in diameter.
VESICLES: Sparse, < 1 mm, filled with green smectite.
COLOR: Brownish gray.
STRUCTURE: Massive.
ALTERATION: N/A.
VEINS/FRACTURES: Sparse veins filled with green smectite and finely granular opaque minerals, and/or calcite.
ADDITIONAL COMMENTS: Textural variations along the section indicate a lava with one recognizable chilled margin (Piece 1A-2), with undetermined structure.



124-768C-88R-2

UNIT 1: MODERATELY TO HIGHLY OLIVINE, PHYRIC BASALT

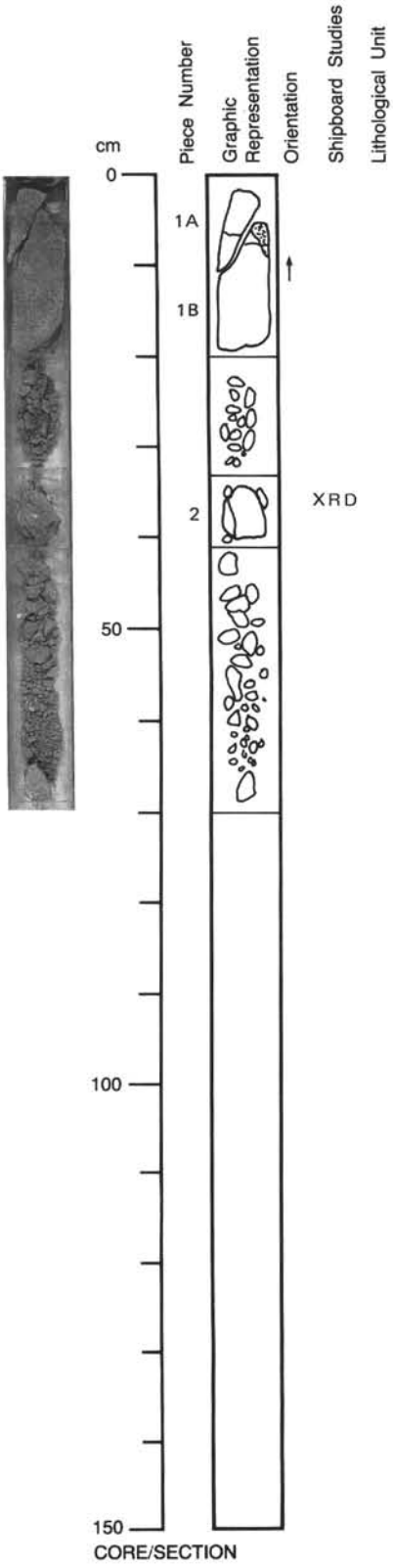
Pieces 1-4

CONTACTS: N/A.
PHENOCRYSTS: Olivine - ~10%; 0.15-0.7 mm; Altered, euhedral.
GROUNDMASS: Fine-grained intersertal intergrowth of 18 plagioclase laths<0.57 (An50-70), 2% subhedral clinopyroxene 0.05 mm, and 40% mesostasis.
VESICLES: 30%; 0.007-0.9 mm; Round to lobate; N/A; Filled with clay.
COLOR: Brownish gray.
STRUCTURE: Massive.
ALTERATION: Highly altered, olivine, plagioclase and mesostasis replaced by pale green and colorless clays.
VEINS/FRACTURES: N/A

UNIT 2: OLIVINE DOLERITE

Pieces 5-7

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: Phaneritic, fine-grained rock consisting of 50% plagioclase, 2% olivine, 25% pyroxene, Fe ore and 18% mesostasis. Texture is mostly intersertal. Piece 5A shows the gradual downward passage from a microporphyritic (olivine) texture of intersertal type to an intersertal texture increasing in grain size downward. The transition has a vertical trend, indicating an horizontal upper surface of chilling of a lava flow or of a sill.
VESICLES: 3%; N/A; N/A; N/A; Filled with green smectite.
COLOR: Gray to greenish gray.
STRUCTURE: N/A.
ALTERATION: Highly altered.
VEINS/FRACTURES: Almost vertical veins, 0.5-2 mm thick, filled with calcite. These veins mark surfaces of alteration advancing toward the interior of the rock, marked by diffusion of opaque minerals. Veinlets filled with opaque minerals (Fe oxide or manganese ore), with horizontal trend also occur.

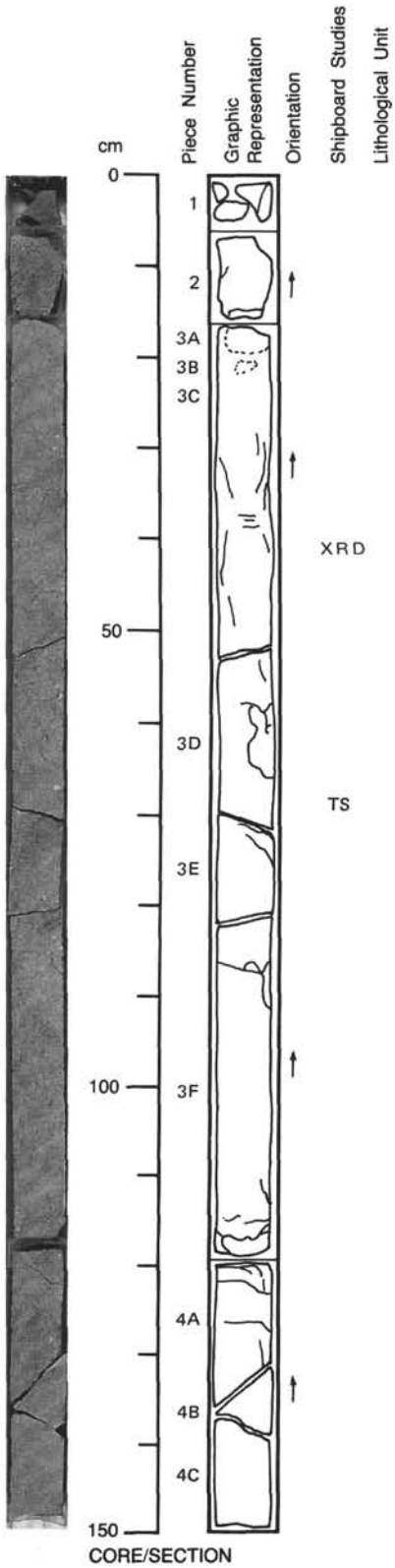


124-768C-88R-3

UNIT 2: CONTINUED

Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: The olivine dolerite shows a slightly coarser grain size than in Section 124-768C-88R-2 and is more altered.

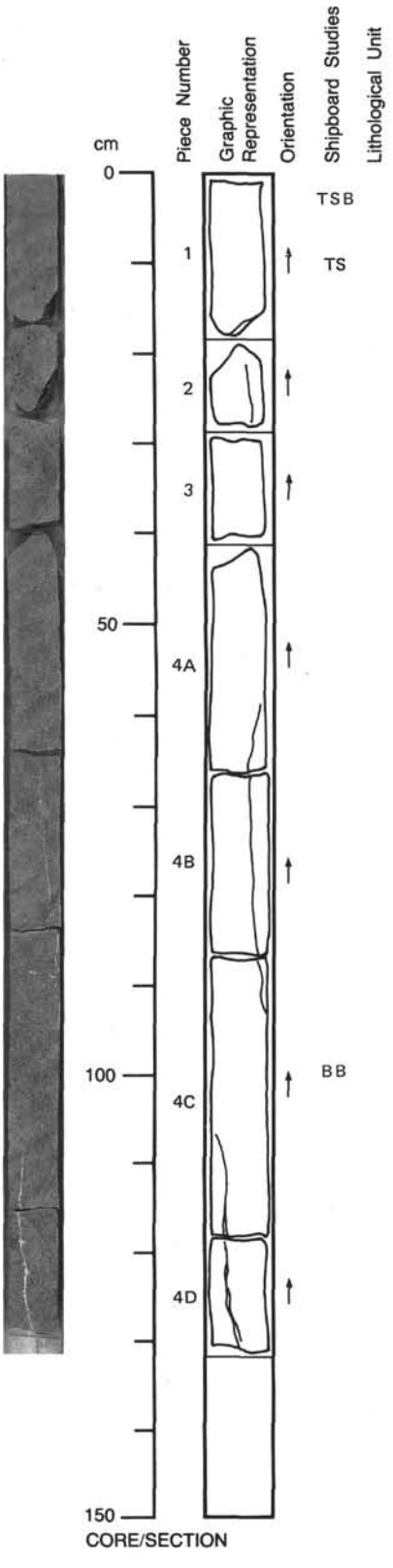


124-768C-89R-1

UNIT 2: CONTINUED

Pieces 1-4

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Medium to fine grained, phaneritic aphyric rock with an intergranular to subophitic and intersertal texture. It consists of 50% plagioclase laths 0.3-2.0 mm, 27% subhedral clinopyroxene 0.2-1.0 mm, 3% magnetite, and 18% mesostasis. The rock becomes progressively finer grained at the bottom of the section (Piece 4C).
VESICLES: 2%; N/A; Spherical and ovoid amygdules; N/A; Filled with clay and zeolites are unevenly distributed. In the interval 5-87 cm, amygdules with ovoidal forms (elongated mostly in horizontal directions) 1-5 mm in size filled with zeolites occur. In the lower part of the section (interval 112-140 cm) there are spherical amygdules 1-2 mm in size filled with smectite.
COLOR: Gray.
STRUCTURE: Massive with lower zone of rapid chilling.
ALTERATION: Moderately altered, clays and carbonate replace mesostasis.
VEINS/FRACTURES: Veinlets filled with opaque minerals occur.



124-768C-89R-2

UNIT 2: CONTINUED

Pieces 1 (Interval 3-4 cm)

CONTACTS: N/A
PHENOCRYSTS: Olivine - 15%; 0.5 mm; Euhedral, entirely altered to clays.
GROUNDMASS: Phaneritic, fine-grained, consisting of 52% subhedral plagioclase laths 0.05-0.75 mm (An50-70), >1% clinopyroxene 0.01- 0.25, 2% magnetite 0.04 mm, cryptocrystallites and mesostasis. Texture is fining upward through Pieces 2 to 1.
VESICLES: 1%; Amygdules 2.4 mm; N/A; Unevenly distributed; Partially filled with clay, Fe-oxide and actinolite. In the lower part of the section 1-3 mm sized amygdules filled with green smectite occur.
COLOR: Greenish gray.
STRUCTURE: Massive, with ill-defined upper zone of rapid chilling.
ALTERATION: Highly altered, clays replace plagioclase and mesostasis.
VEINS/FRACTURES: Almost vertical, filled with calcite.

UNIT 2: CONTINUED

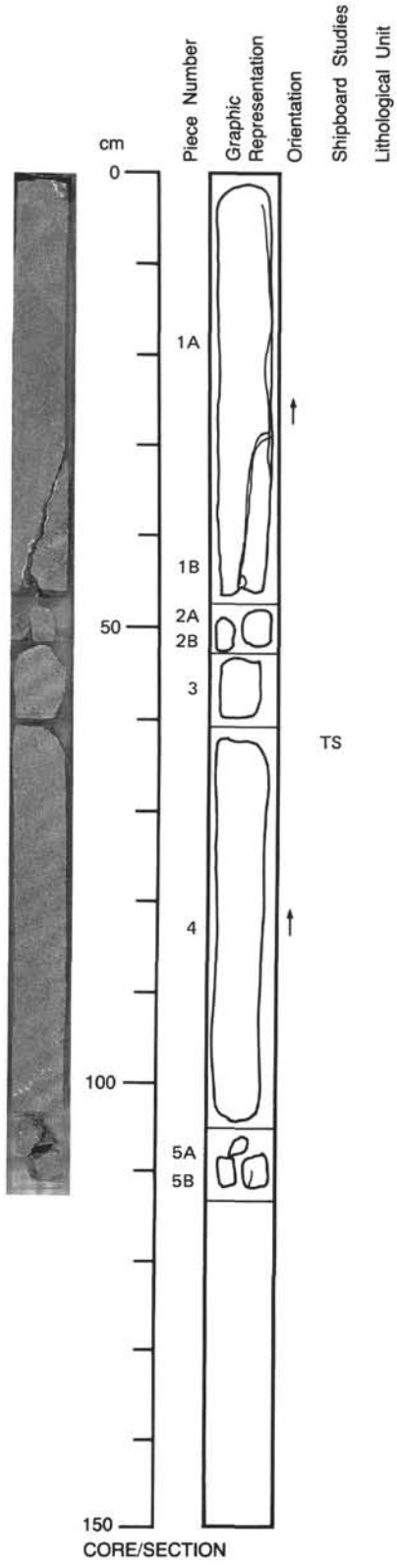
Pieces 1-4

CONTACTS: None.
PHENOCRYSTS: Olivine - 10%; 0.26-1.1 mm; Euhedral completely altered to actinolit and clay.
GROUNDMASS: Fine-grained intersertal, made up of 54% plagioclase laths 0.04-1.85 mm, >1% subhedral clinopyroxene 0.3-1.6 mm, 2% euhedral magnetite 0.008-0.06 mm, and 30 crystallites.
VESICLES: 4%; 0.18-2.6 mm; Round to lobate; Evenly distributed; Filled with amphibole and zeolites.
COLOR: Greenish gray.
STRUCTURE: Massive.
ALTERATION: Highly altered, clays replace plagioclase and crystallites, actinolite replaces olivine and crystallites, allophane abundant.
VEINS/FRACTURES: None.

UNIT 2: CONTINUED

Piece 4

CONTACTS: N/A
PHENOCRYSTS: Olivine - 10%; N/A; Completely replaced.
GROUNDMASS: Fine-grained phaneritic, made up of 52% euhedral, tabular, plagioclase 0.04 mm (An50-70), 12% subhedral clinopyroxene, 0.04-2.6 mm, 2% magnetite, and 15% mesostasis.
VESICLES: 6%; Amygdales 2.4 mm; Round to ovate; Unevenly distributed; Filled with clay.
COLOR: Greenish-gray.
STRUCTURE: Massive.
ALTERATION: Moderate, clay replacing plagioclase and mesostasis principally.
VEINS/FRACTURES: Almost vertical, filled with calcite.

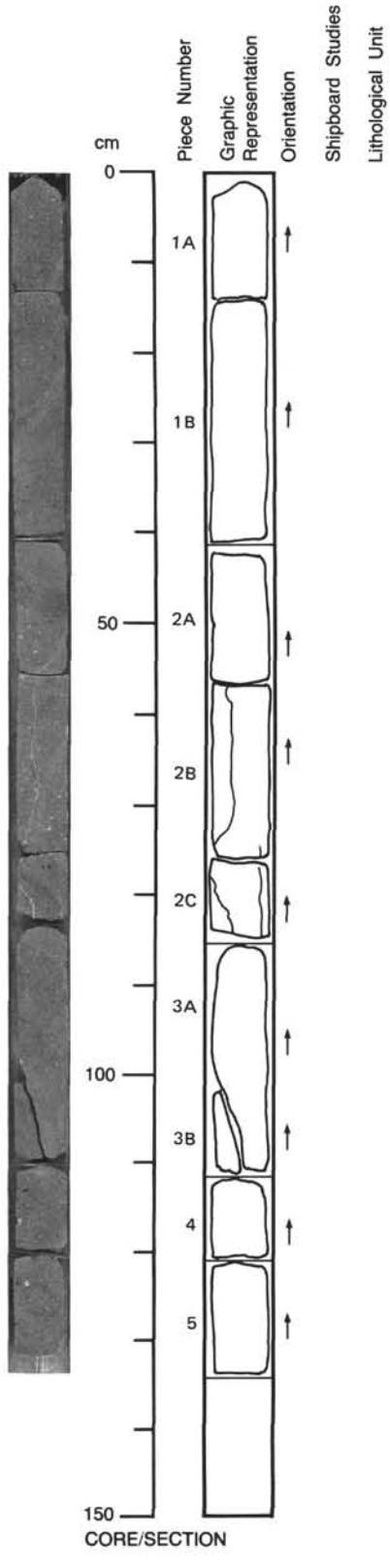


124-768C-89R-3

UNIT 2: CONTINUED

Pieces 1-5

CONTACTS: N/A
PHENOCRYSTS: Olivine - 10%; N/A; Subhedral, replaced by secondary minerals.
GROUNDMASS: Medium to fine-grained, intergranular to subophitic, comprising, 52% subhedral to euhedral plagioclase 0.2-2.0 mm (An50-70), 12% subhedral clinopyroxene 0.1-1.0 mm, 5% euhedral to skeletal magnetite 0.1 mm, 15% mesostasis, trace of acicular apatite.
VESICLES: 6%; 2-5 mm; Spherical to ovoid.; N/A.
COLOR: Gray.
STRUCTURE: Massive.
ALTERATION: Moderate, olivine is replaced by hematite and clay, actinolite, clay and zeolites replace the mesostasis and clinopyroxene.
VEINS/FRACTURES: Few filled with calcite.



124-768C-89R-4

UNIT 2: CONTINUED

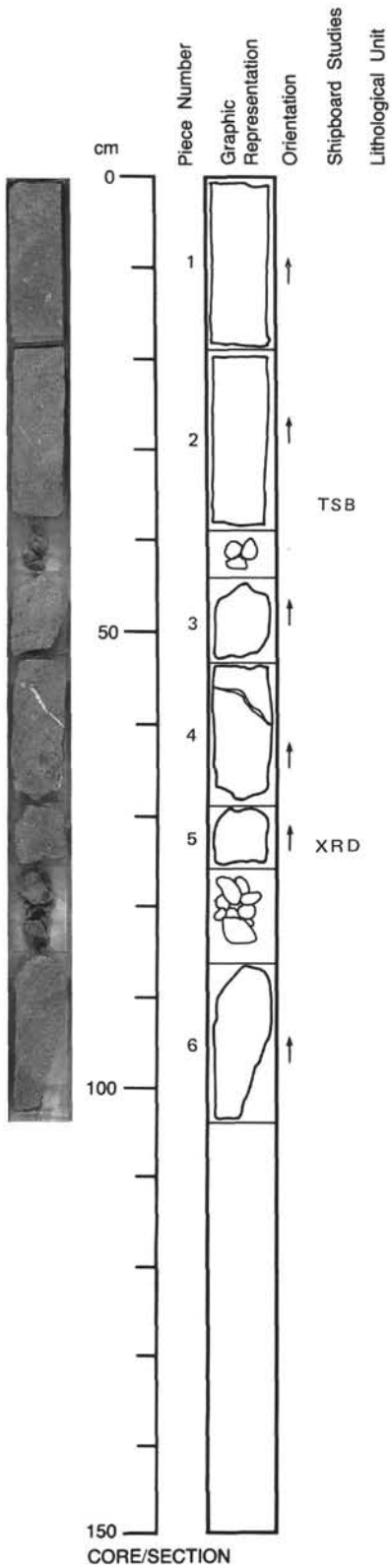
Pieces 1-3

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: N/A
VESICLES: N/A
COLOR: N/A
STRUCTURE: N/A
ALTERATION: N/A
VEINS/FRACTURES: N/A
ADDITIONAL COMMENTS: *This section shows the coarse grained zone of Unit 2,* downward fining through Piece 3A and in Piece 3B. The dolerite is relatively less altered in the interval between 0-64 cm. Vertical veinlets filled with calcite cross Pieces 1B and 2.

UNIT 2: CONTINUED

Pieces 4-5

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Consists of plagioclase, pyroxene, olivine, Fe ore, composing holocrystalline intergrowths with texture intermediate between intergranular and ophitic.
VESICLES: Amygdules unevenly distributed, spherical and ovoidal, 1-3 mm in size, filled with white or yellowish green phyllosilicate.
COLOR: Gray to greenish gray.
STRUCTURE: Massive.
ALTERATION: N/A
VEINS/FRACTURES: Veins rare, filled with calcite.

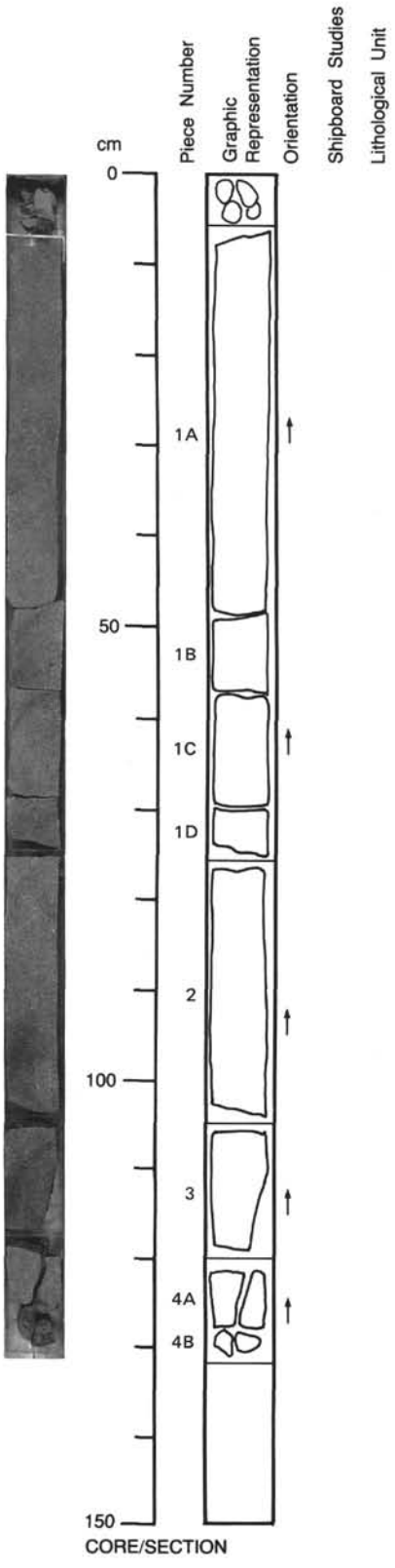


124-768C-89R-5

UNIT 2: CONTINUED

Pieces 1-6

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Medium to fine-grained, hypidiomorphic granular to sub-ophitic and ophitic. 55% euhedral, tabular plagioclase 0.07-2.22 mm (An50-70), 30% subhedral to anhedral clinopyroxene 0.52-1.85 mm, 3% euhedral to skeletal magnetite 0.007-0.15 mm, 12% altered mesostasis.
VESICLES: None
COLOR: Gray to greenish-gray.
STRUCTURE: Massive.
ALTERATION: Moderate, plagioclase, clinopyroxene and the mesostasis are altered to clays.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: This section shows the even grained olivine dolerite described in Section 124-768-89R-4. The rock is moderately amygdaloidal and locally contains abundant amygdules 1-5 mm in size (Pieces 4-5), filled with greenish yellow fibrous crystals.

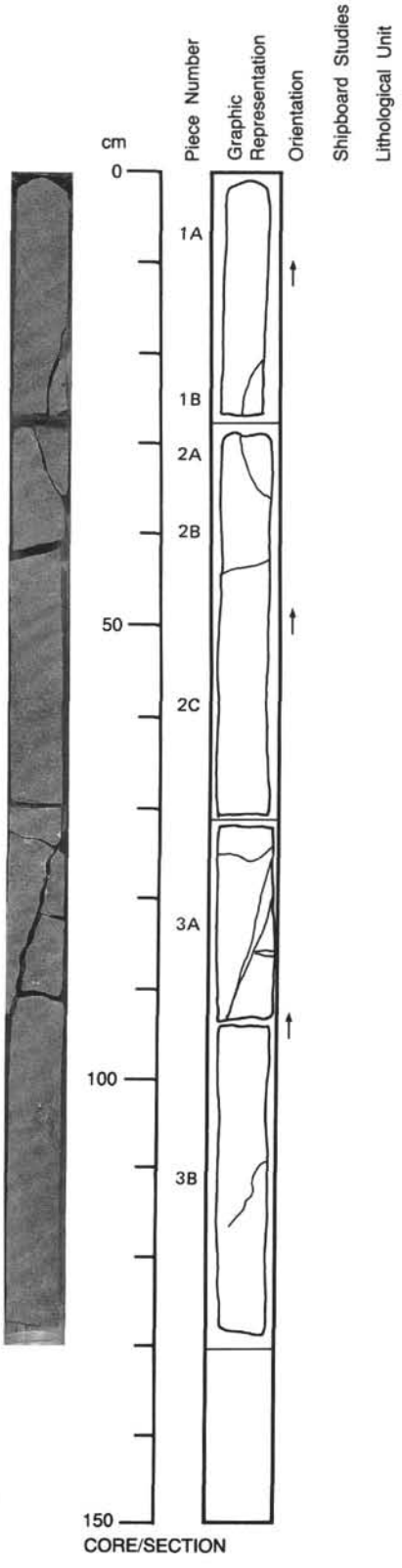


124-768C-90R-1

UNIT 2: CONTINUED

Pieces 1-4

CONTACTS: No contact or major discontinuities are present through the unit.
PHENOCRYSTS: N/A
GROUNDMASS: Phaneritic fine-grained rock, consisting of plagioclase, pyroxene, olivine and Fe-Ti oxide. Olivine and glassy mesostasis occur in variable amounts. Texture shows significant variations along this unit. Intersertal to ophitic texture is predominant. Intersertal divergent to subvariolitic textures occur, showing gradual passages to each other and to the dominant texture.
VESICLES: Amygdules moderately frequent, 1-3 mm in size, unevenly distributed with various fillings; zeolites, fibrous? phyllosilicates and rare calcite.
COLOR: Greenish gray to brownish gray.
STRUCTURE: Massive.
ALTERATION: Low to moderate, affecting olivine and glass, and incipiently at places plagioclase and Fe-Ti oxide.
VEINS/FRACTURES: Very rare, filled with calcite and Fe-oxide.
ADDITIONAL COMMENTS: Pieces 1-2: This unit consists of relatively olivine-poor dolerite, greenish gray in color, with frequent amygdules, characterized by intersertal to ophitic texture. Pieces 3-4: Consists of olivine dolerite, richer in olivine with texture grading from subvariolitic to intersertal (from the upper part to the lower edge of Piece 3).

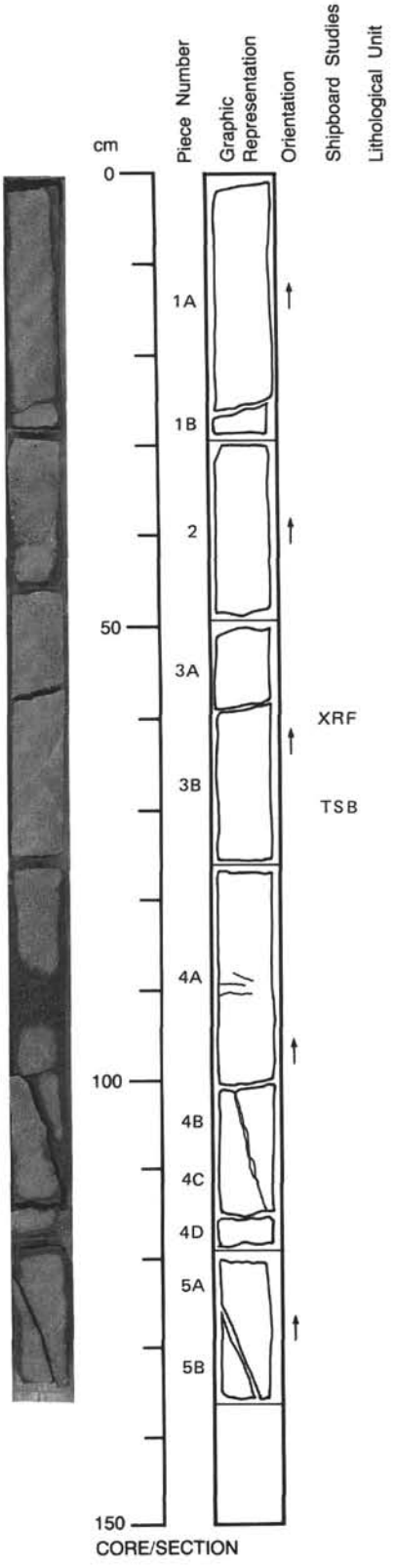


124-768C-90R-2

UNIT 2: CONTINUED

Pieces 1-3

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: *see comments*
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: This section shows an even textured and coarser grain than in Section 124-768C-90R-1. Olivine dolerite, slightly fresher than in Section 124-768C-90R-1. Piece 3 is cut by calcite-Fe oxide veins, nearly vertical or steeply inclined.

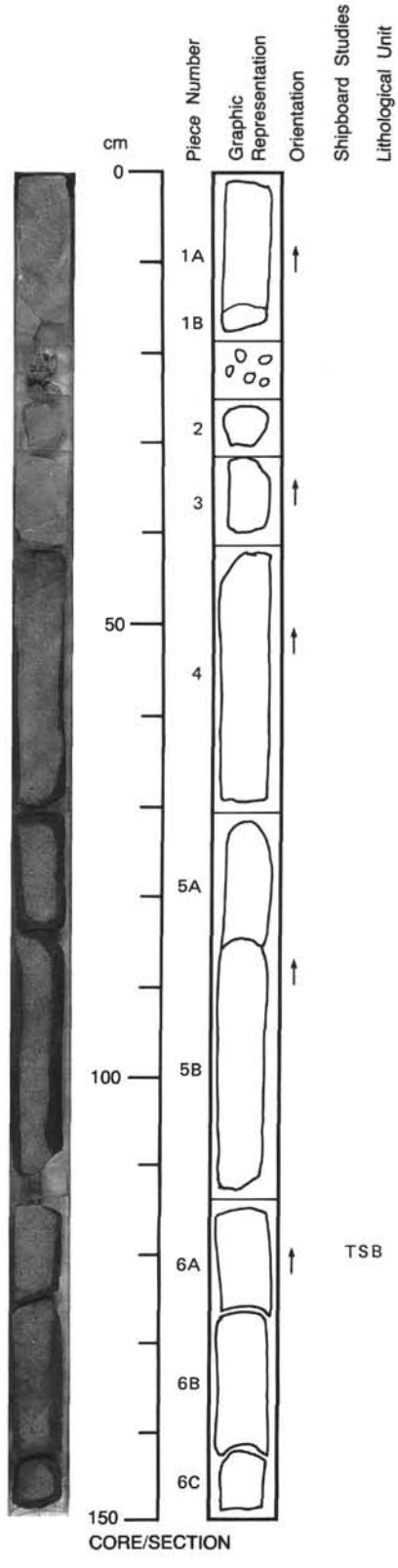


124-768C-90R-3

UNIT 2: CONTINUED

Pieces 1-5

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Phaneritic, intergranular to subophitic texture. 8% totally altered olivine, with 55% euhedral to subhedral plagioclase 0.2-2.0 mm (An50-70), 8% subhedral clinopyroxene 0.1-1.0 mm, 4% euhedral and skeletal magnetite, 5% mesostasis, and trace of acicular apatite.
VESICLES: 10%; 1.0-1.5 mm; N/A; N/A.
COLOR: Greenish-gray.
STRUCTURE: Massive.
ALTERATION: Moderate, olivine and mesostasis alter to clays, clinopyroxene alters to actinolite.
VEINS/FRACTURES: Few steep dipping filled with calcite.

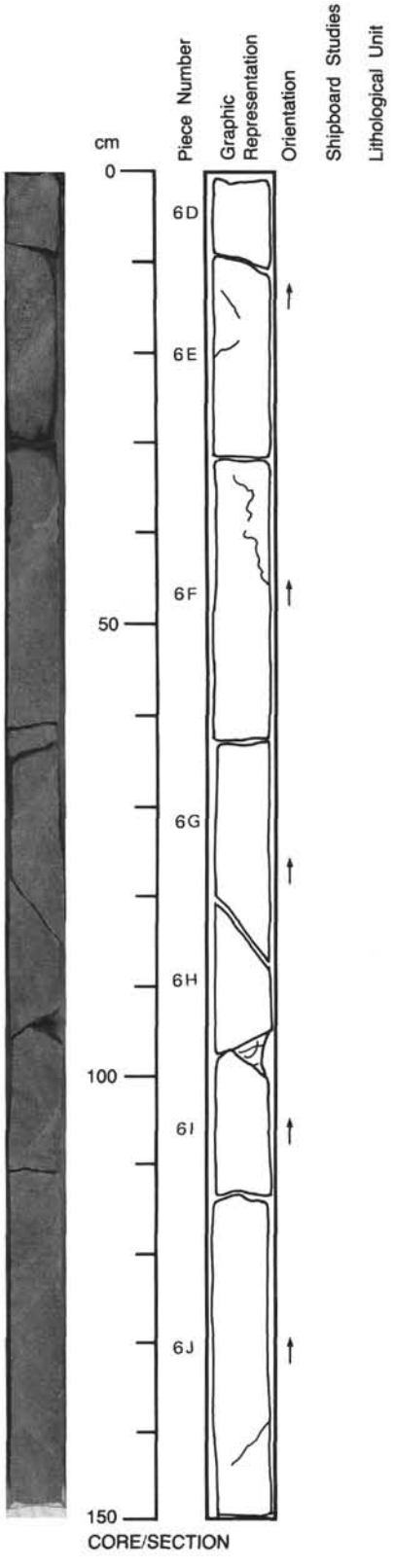


124-768C-90R-4

UNIT 2: CONTINUED

Pieces 1-6C

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Fine to medium-grained intersertal to intergranular texture. 3% completely replaced euhedral to subhedral olivine, 54% euhedral to subhedral plagioclase 0.1-2.0 mm (An45-80), 8% subhedral clinopyroxene 0.05-2.0 mm, 6% euhedral and skeletal magnetite, 10% mesostasis, and trace of apatite.
VESICLES: 5%; N/A; N/A; N/A; Filled with clay.
COLOR: Greenish gray.
STRUCTURE: Massive.
ALTERATION: Moderate, chlorite and actinolite after clinopyroxene, clay after olivine.
VEINS/FRACTURES: None.

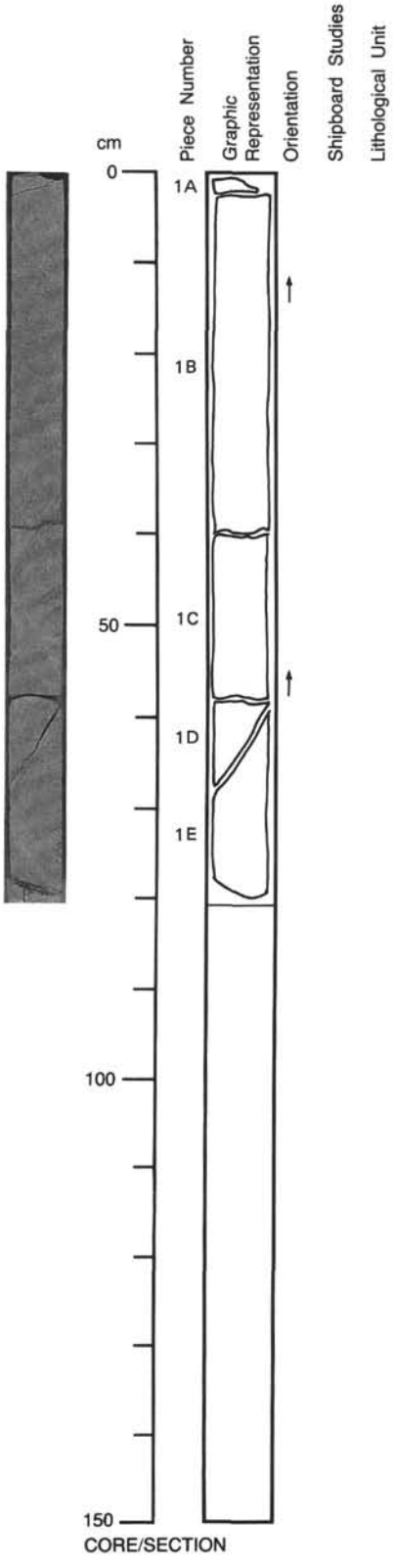


124-768C-90R-5

UNIT 2: CONTINUED

Pieces 6D-6J

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Dolerite is evenly textured, with intersertal features and slightly richer in olivine. Locally more altered zones (Piece 6E) and zones with diffuse brownish standing are present (Pieces 6G-6J).

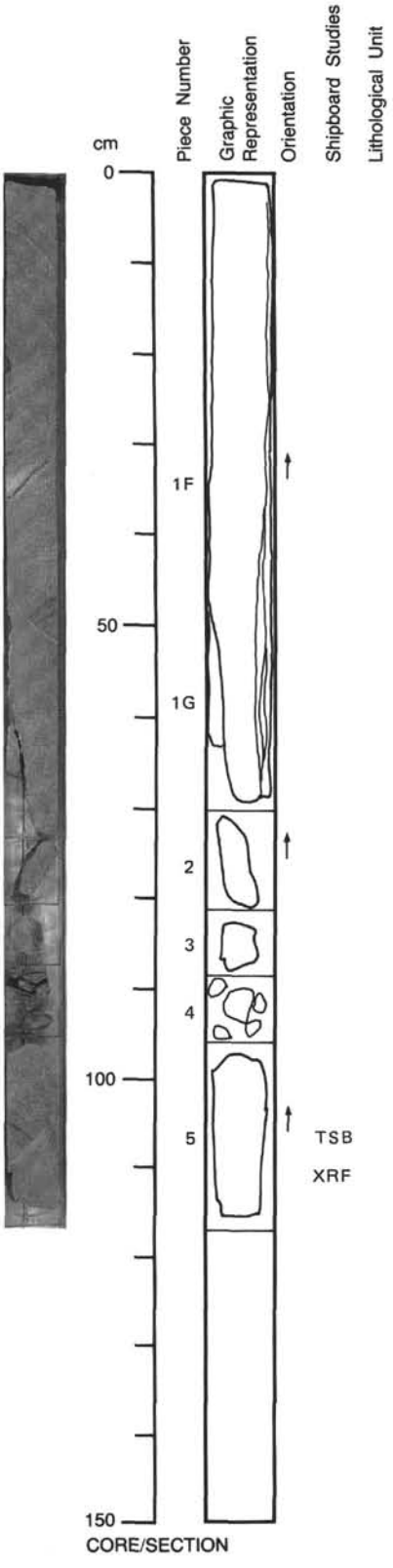


124-768C-90R-6

UNIT 2: CONTINUED

Pieces 1A-1E

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: *Consists of olivine dolerite, poor in olivine than in Section* 124-768C-90R-5, with even finer grained intersertal, relatively glass-rich texture. Alteration is low.

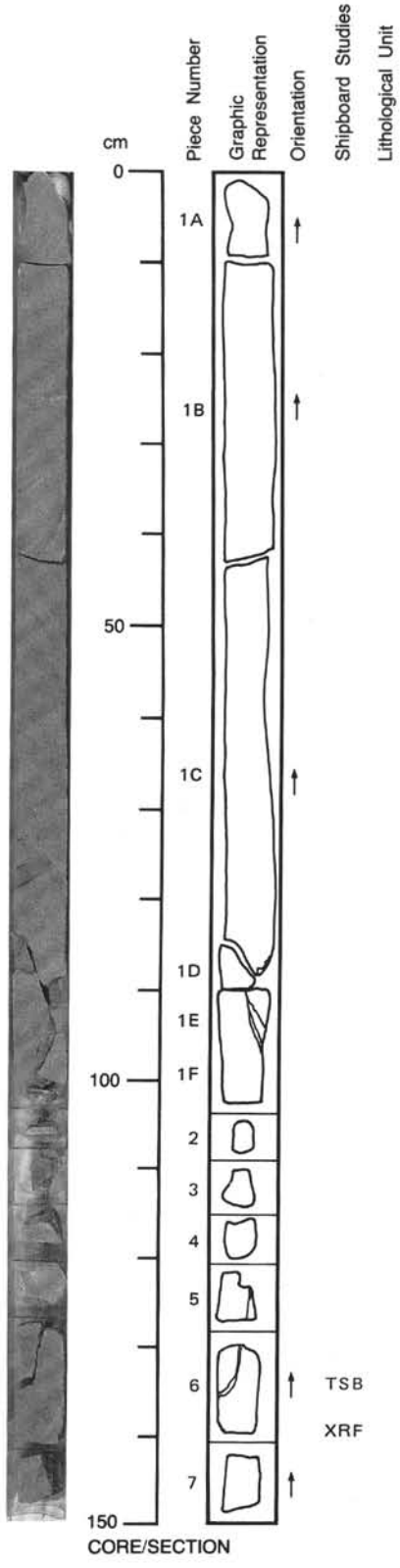


124-768C-90R-7

UNIT 2: CONTINUED

Pieces 1F-5

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Fine to medium-grained, phaneritic subophitic rock. 10%, 0.3-1.0 mm, euhedral to subhedral olivine, totally altered to clay, 42% euhedral plagioclase laths 0.1-2.0 (An30-75), 25% anhedral prisms of clinopyroxene 0.1-1.0 mm, 3% subhedral magnetite 0.03-0.3 mm, 20% mesostasis including altered crystallites.
VESICLES: None.
COLOR: Greenish gray.
STRUCTURE: N/A.
ALTERATION: Slightly altered, 5% of the mesostasis, and all of the olivine, altered to clays.
VEINS/FRACTURES: None.

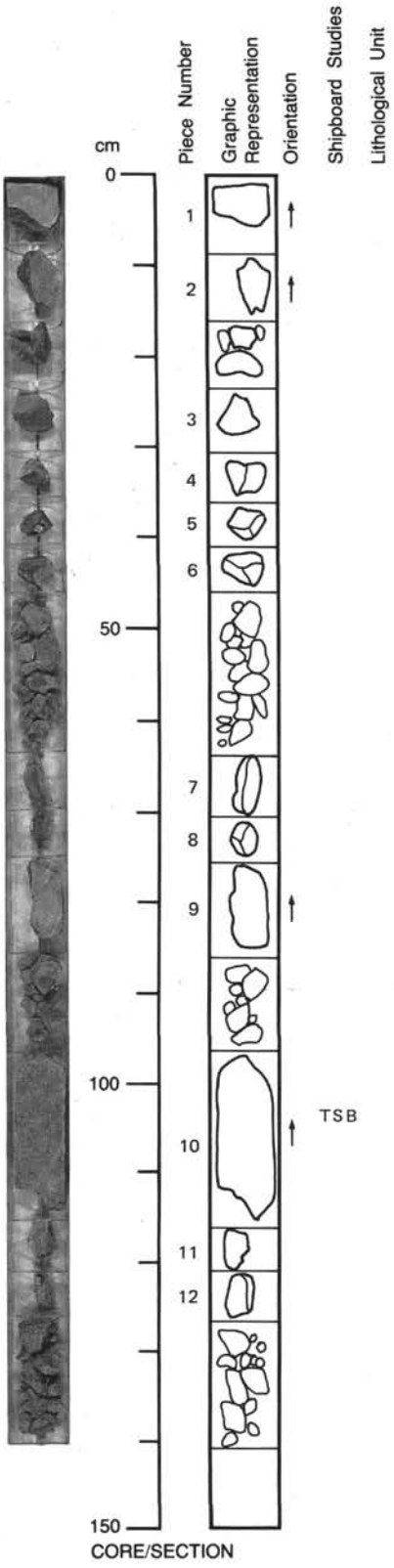


124-768C-91R-1

UNIT 2: CONTINUED

Pieces 1-7

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Medium-grained, phaneritic, hypidiomorphic granular rock consisting of 37% skeletal and lath plagioclase 0.07-1.5 mm (An50-70, An70-90), 30% subhedral clinopyroxene 0.04-1.2 mm, 2% olivine, 3% euhedral Fe-Ti oxide 0.008-0.3 mm, and 8% mesostasis.
VESICLES: 20%; 0.4-9.0 mm; Round; Evenly distributed; Filled with clay.
COLOR: Greenish-gray.
STRUCTURE: Massive.
ALTERATION: Moderately altered, clays, allophane, and actinolite replace mesostasis, Fe oxide after olivine and magnetite.
VEINS/FRACTURES: Few.



124-768C-91R-2

UNIT 2: CONTINUED

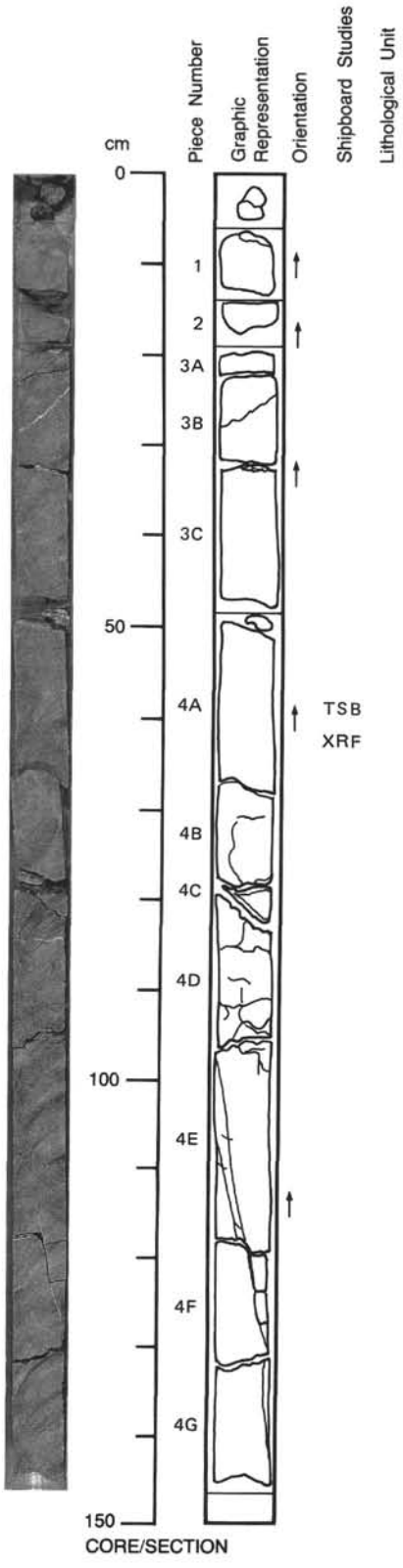
Pieces 1-9

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continuation of Section 124-768C-91R-1.

UNIT 2: CONTINUED

Pieces 10-12

CONTACTS: None
PHENOCRYSTS: Olivine - 15%; N/A; totally replaced.
GROUNDMASS: Fine to medium-grained, phaneritic rock with hypidiomorphic granular texture, consisting of 25% euhedral tabular plagioclase 0.05-2.22 mm (An50-70), 30% subhedral pyroxene 0.1-1.6 mm, > 1% magnetite and 28% mesostasis.
VESICLES: 2%; 2.7-3.4 mm; Lobate; Irregularly distributed; Filled with clays and crystallites.
COLOR: Brownish gray.
STRUCTURE: Massive.
ALTERATION: Moderate, mainly clays replacing plagioclase, mesostasis and olivine.
VEINS/FRACTURES: N/A
ADDITIONAL COMMENTS: Pieces 10 to 12 differ from the previous section in having larger grain size and high contents of coarse amygdules.

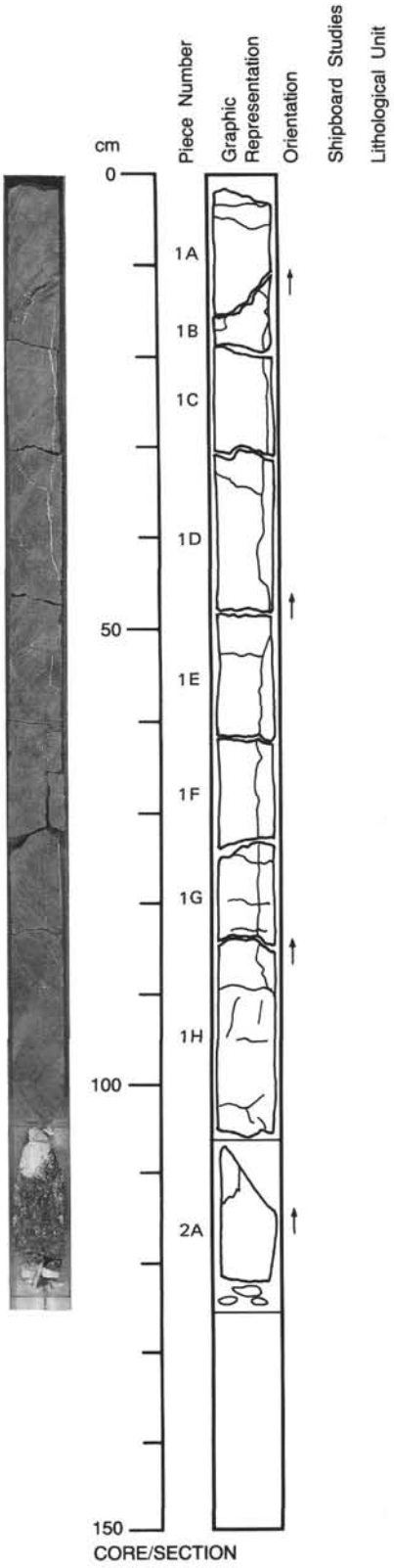


124-768C-92R-1

UNIT 3: OLIVINE MICROGABBRO

PIECES 1-4G

CONTACTS: None
PHENOCRYSTS: None
GROUNDMASS: Fine to medium-grained hypidiomorphic granular to ophitic and intergranular. Consists of 20% olivine 0.45-1.11 mm, 40% plagioclase 0.04-1.85 mm, 24% clinopyroxene 0.08-0.22 mm, 1% magnetite 0.04-0.5 mm, 10% mesostasis, and a trace of biotite.
VESICLES: 5%; 0.7-2.5 mm; Lobate; Irregularly distributed; Filled with clay.
COLOR: Dark gray to brownish gray.
STRUCTURE: Massive to moderately brecciated.
ALTERATION: Highly altered, along major veins, plagioclase, mesostasis and olivine replaced by clays, chlorite, and actinolite.
VEINS/FRACTURES: Thin, mostly vertical veins filled with calcite and Fe-oxide. Thicker veins (up to 3 cm) are filled with pale green fibrous ?serpentine, calcite, gypsum and hematite. Fibrous ?serpentine also occur in veinlets.

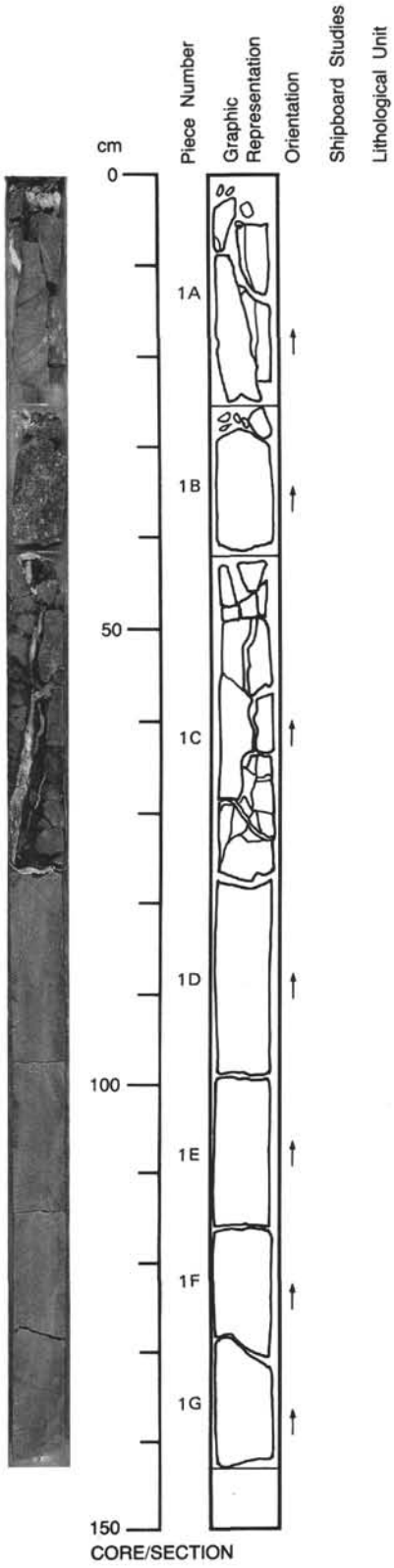


124-768C-92R-2

UNIT 3: CONTINUED

Pieces 1-2A

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Same lithology as Section 124-768C-92R-1. Alteration uniformly moderate. A long vertical vein filled with calcite and Fe-oxide extends through Piece 1. Piece 2 shows one wall of a major vein. It is filled with hematite, calcite, fibrous? serpentine and gypsum.

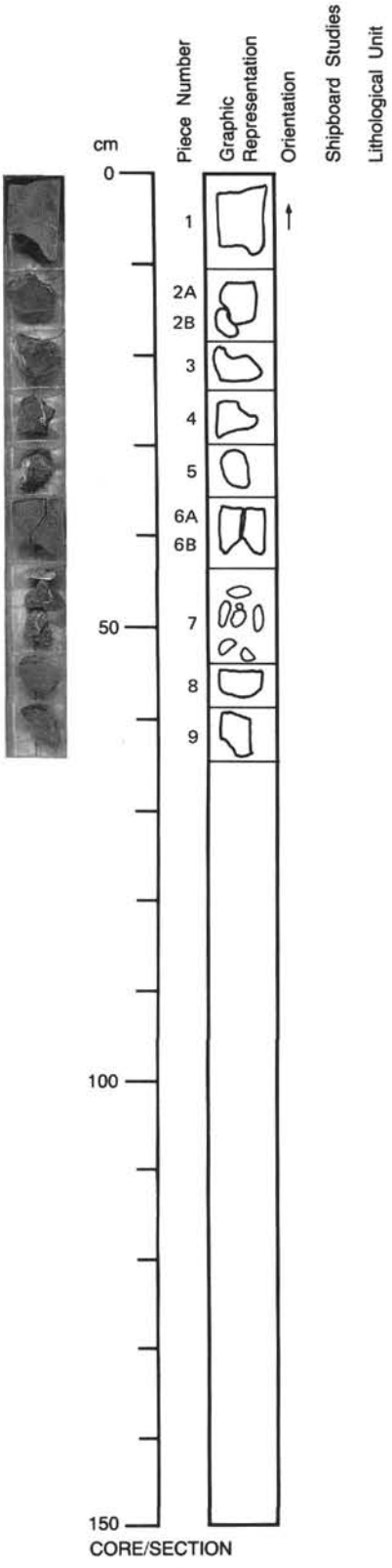


124-768C-92R-3

UNIT 3: CONTINUED

Pieces 1A-1G

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Same lithology as Section 124-768C-92R-1 and -92R-2 except degree of alteration related to veining. Pieces 1D and 1G are moderately altered with brownish staining which is diffused and perpendicular to a vertical surface. Pieces 1A, 1B, and 1C are cut by a vertical vein pinching and thickening lengthwise, with maximum thickness of approximately 2 cm. The vein is filled with hematite, ? serpentine, calcite and gypsum.

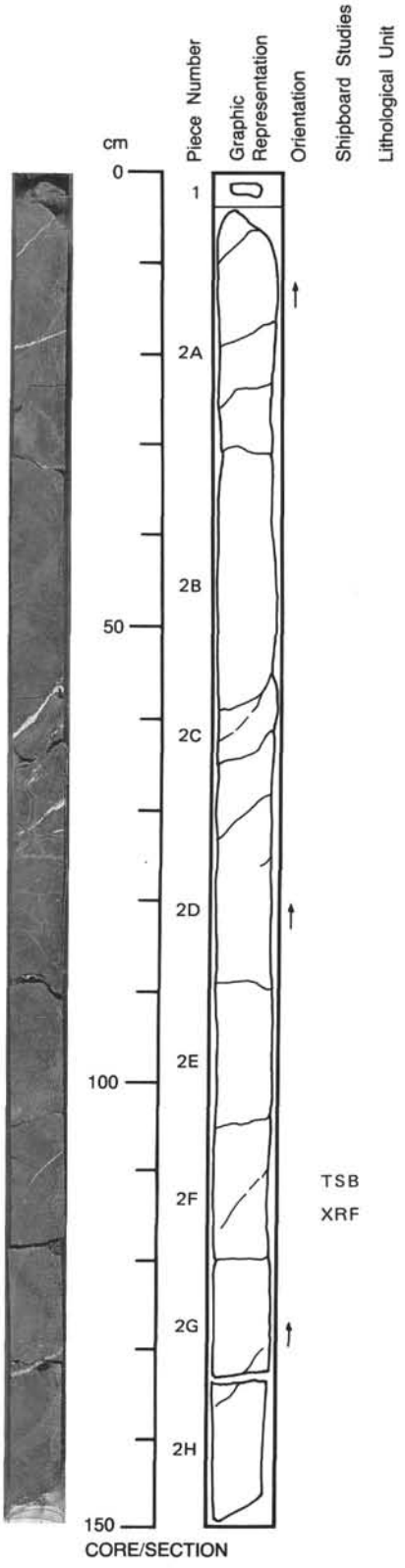


124-768C-92R-4

UNIT 3: CONTINUED

Pieces 1-9

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Moderately altered olivine microgabbro is in this section. Veins are present and thin filling is mostly of calcite, hematite and ?serpentine.

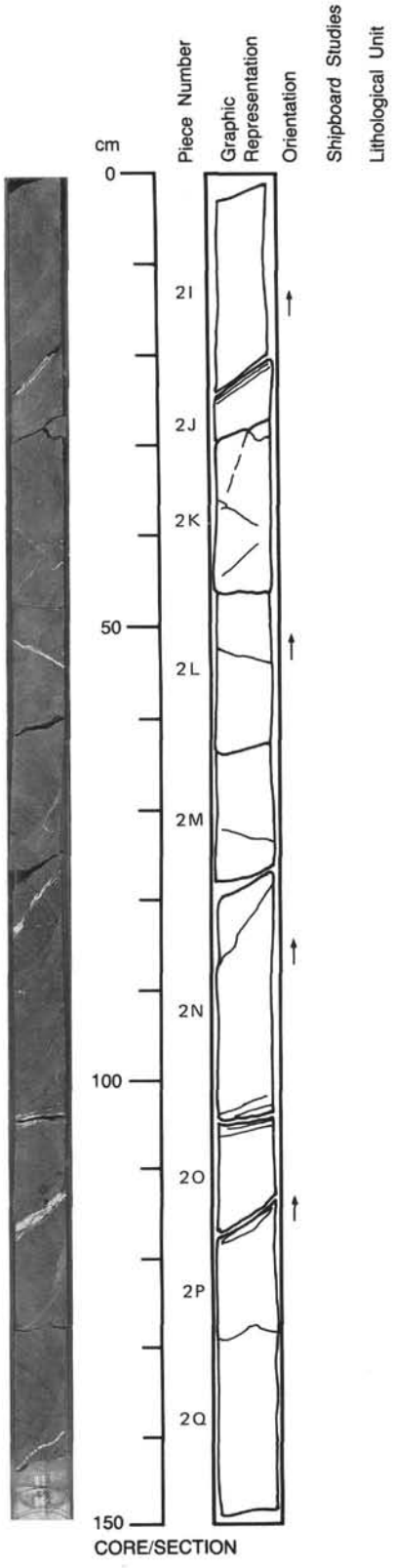


124-768C-93R-1

UNIT 3: CONTINUED

Pieces 1A-2H

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Fine to medium-grained, phaneritic hypidiomorphic texture. 15% euhedral olivine 0.1-0.9 mm totally altered and included in orthopyroxene and clinopyroxene, 15% subhedral clinopyroxene 0.04-1.2 mm, 8% euhedral to subhedral orthopyroxene 0.3-0.6 mm, 45% subhedral plagioclase 0.2-1.2 mm (An75-85), 1% brown, subhedral hornblende 0.1-0.3 mm, 0.5% biotite 0.2-0.3 mm.
VESICLES: None.
COLOR: Dark gray.
STRUCTURE: Massive.
ALTERATION: Moderate, clays replace olivine, orthopyroxene, clinopyroxene, and plagioclase, 10% chlorite replacing hornblende, clinopyroxene and orthopyroxene.
VEINS/FRACTURES: Numerous vertical to steeply dipping fractures filled with hematite, gypsum, carbonate, and clay.

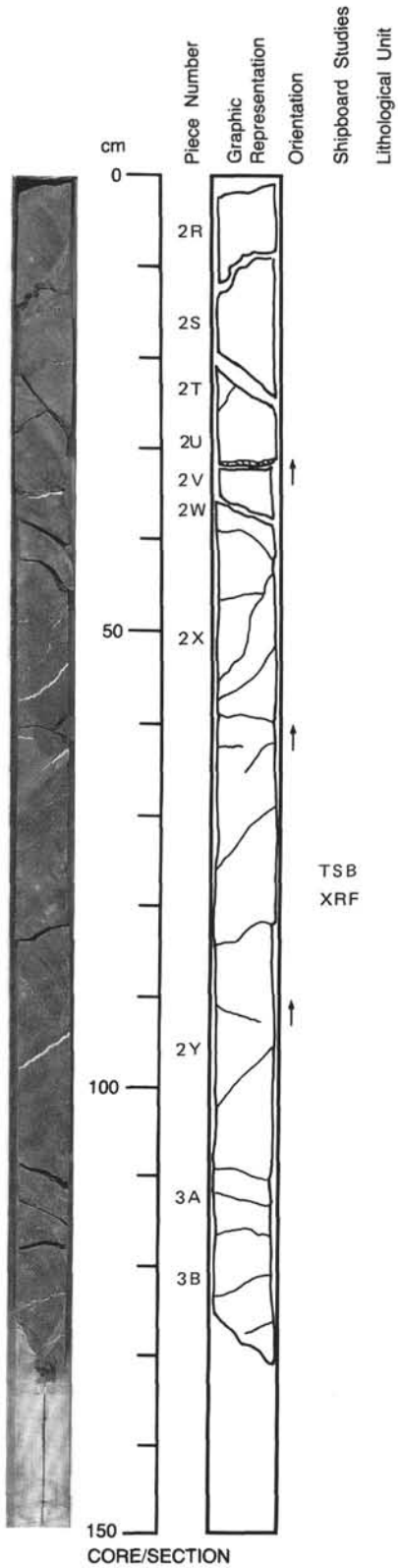


124-768C-93R-2

UNIT 3: CONTINUED

Pieces 2I-2Q

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: The rock shows the same mineralogy, texture, alteration and vein systems as described in Core 124-768C-92R.

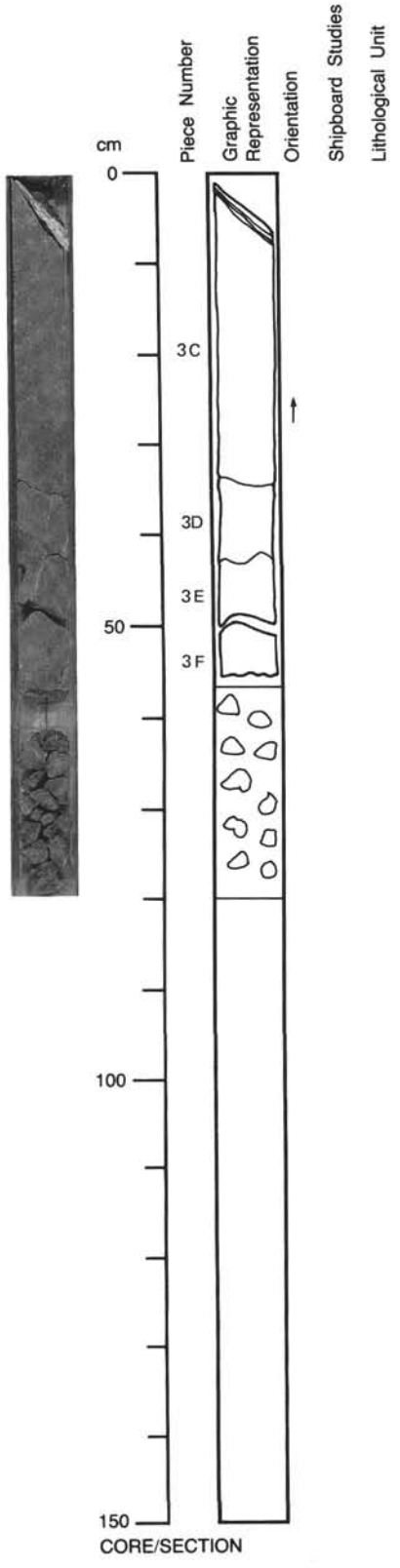


124-768C-93R-3

UNIT 3: CONTINUED

Pieces 2R-3B

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Fine to medium-grained, hypidiomorphic granular texture, comprising 20% totally replaced euhedral prismatic olivine 0.2-0.7 mm, 30% euhedral to subhedral plagioclase laths 0.2-1.5 mm (An75-85), 20% subhedral prisms of clinopyroxene 0.2-1.5 mm, 2% euhedral to subhedral prisms of orthopyroxene 0.2-0.7 mm, 2% subhedral prisms of hornblende 0.05-0.6 mm, 3% biotite 0.1-0.6 mm, 4% magnetite and limonite, trace of apatite.
VESICLES: None.
COLOR: Dark gray.
STRUCTURE: Massive.
ALTERATION: Moderately altered, olivine alters to turbid aggregates, plagioclase is replaced by clays, hornblende and olivine by chlorite, orthopyroxene, clinopyroxene, and hornblende by actinolite, and celadonite replaces all of the mafic minerals.
VEINS/FRACTURES: Abundant steeply dipping to horizontal fractures filled with hematite, gypsum, and carbonate.

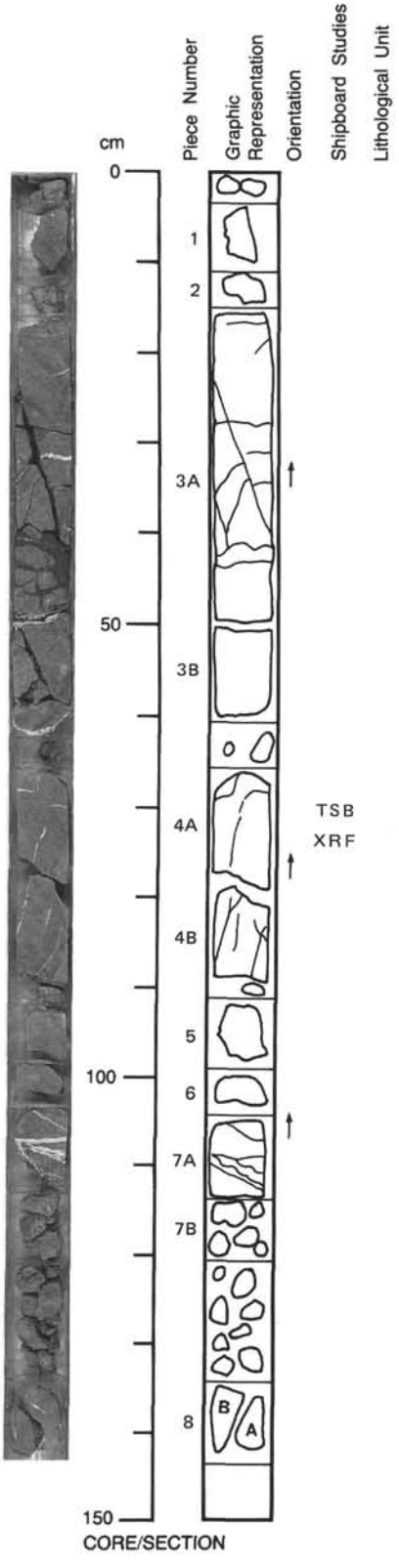


124-768C-93R-4

UNIT 3: CONTINUED

Pieces 3C -3F

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: The rock shows the same mineralogy, texture, alteration and vein systems as described in core 124-768C-92R.

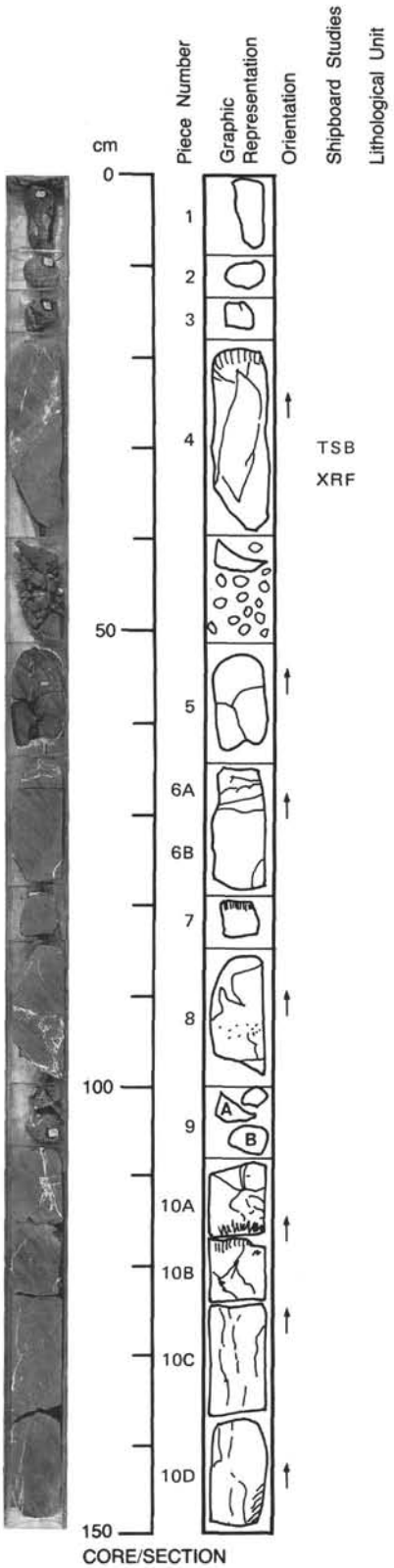


124-768C-94R-1

UNIT 3: CONTINUED

Pieces 1-8

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Fine to medium-grained, phaneritic hypidiomorphic texture, 13% totally replaced euhedral olivine 0.2-1.0 mm, 45% plagioclase, 20% clinopyroxene, 2% magnetite, 3% mesostasis, traces of hornblende and apatite.
VESICLES: None.
COLOR: Dark gray.
STRUCTURE: Massive.
ALTERATION: Moderate, olivine is replaced by clasts, hematite, and carbonate, plagioclase by clays and carbonate, and clinopyroxene by actinolite and celadonite.
VEINS/FRACTURES: Abundant steep and horizontally dipping veins filled with hematite, gypsum, carbonate.

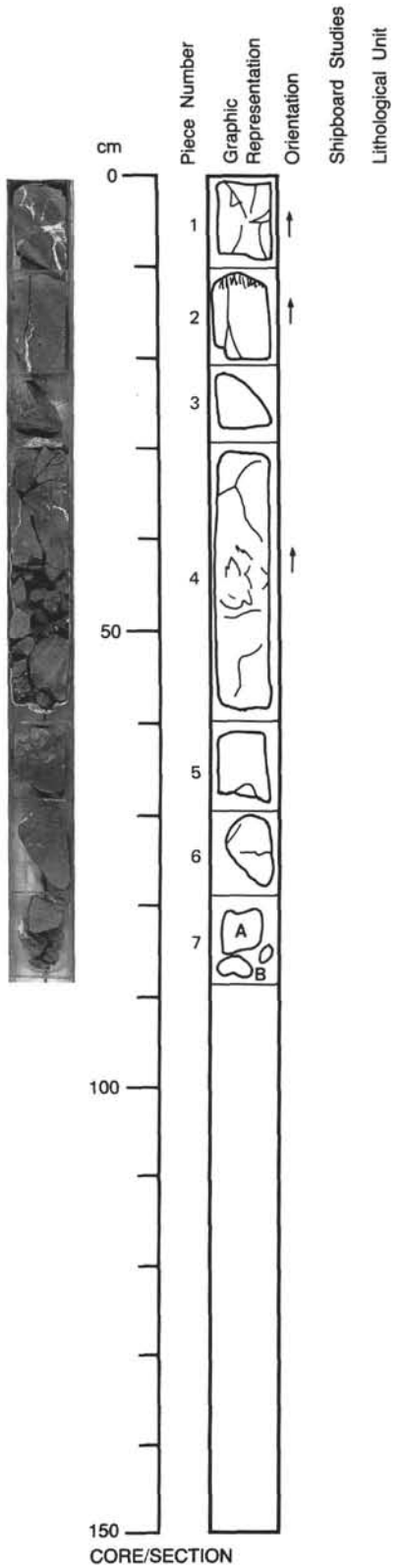


124-768C-95R-1

UNIT 4: SPARSELY OLIVINE PHYRIC TO APHYRIC OLIVINE BASALT

Pieces 1-10D

CONTACTS: No contact. Minor portions of chilled margins preserved.
PHENOCRYSTS: Olivine - 10%; ~ 1 mm; Heterogeneously distributed and altered to green clay.
GROUNDMASS: Fine-grained to microcrystalline and glassy variolitic to intersertal (poorly developed), made up of 15% skeletal and lath plagioclase 0.02-0.6 mm (An50-70), 5% subhedral to microcrystalline clinopyroxene < 0.2 mm, > 1% magnetite, 7% mesostasis, and 8% crystallites.
VESICLES: ~50%; 0.04 mm in groundmass, 3.7 mm scattered; Mainly spherical, some lobate, irregular; N/A; Filled or partially filled with green gray clay and calcite.
COLOR: Gray to brownish gray.
STRUCTURE: Pillowed.
ALTERATION: Highly altered, clay, allophane after olivine and mesostasis, some oxidation around veins.
VEINS/FRACTURES: Irregular veins throughout section, filled with white calcite and some silicate, green clay and minor red clay.

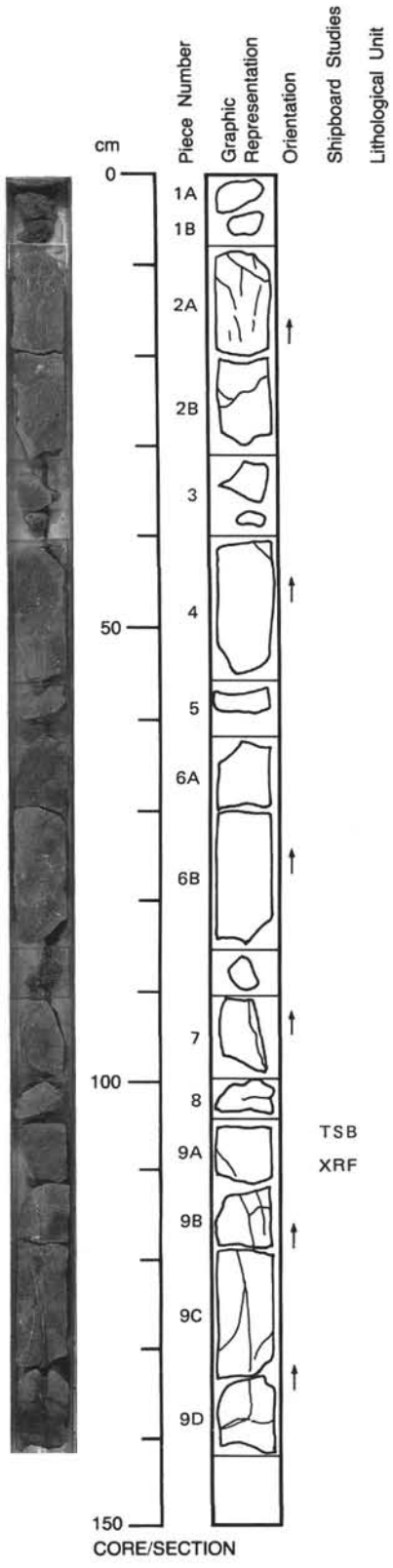


124-768C-95R-2

UNIT 4: CONTINUED

Pieces 1-7

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continues from Section 124-768C-95R-1.

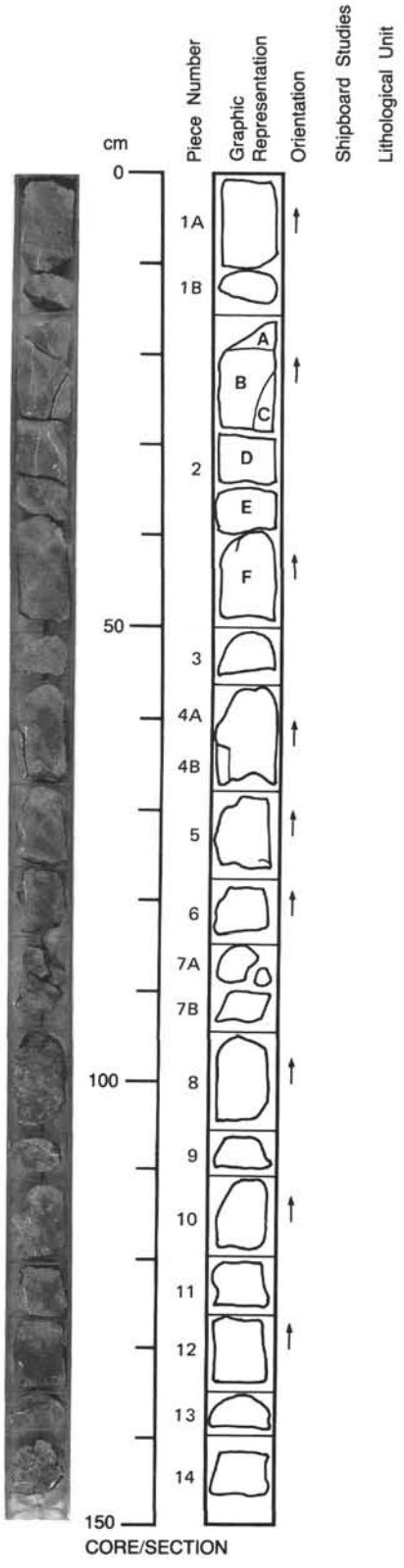


124-768C-96R-1

UNIT 4: CONTINUED

Pieces 1-8D

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Fine-grained, hypocrystalline intersertal texture, 35% altered plagioclase plates 0.1-2.0 mm, 15% microcrystalline and skeletal clinopyroxene < 0.3 mm, 3% magnetite, 20% mesostasis which is cryptocrystalline and glassy.
VESICLES: ~25%; 0.05-1.0 mm; Small spherical and lobate; N/A; Partly filled with zeolites, carbonate, and chlorite.
COLOR: Brownish gray.
STRUCTURE: N/A
ALTERATION: Highly altered.
VEINS/FRACTURES: Irregular veins filled with red clay and calcite (possibly with some silica and clay).

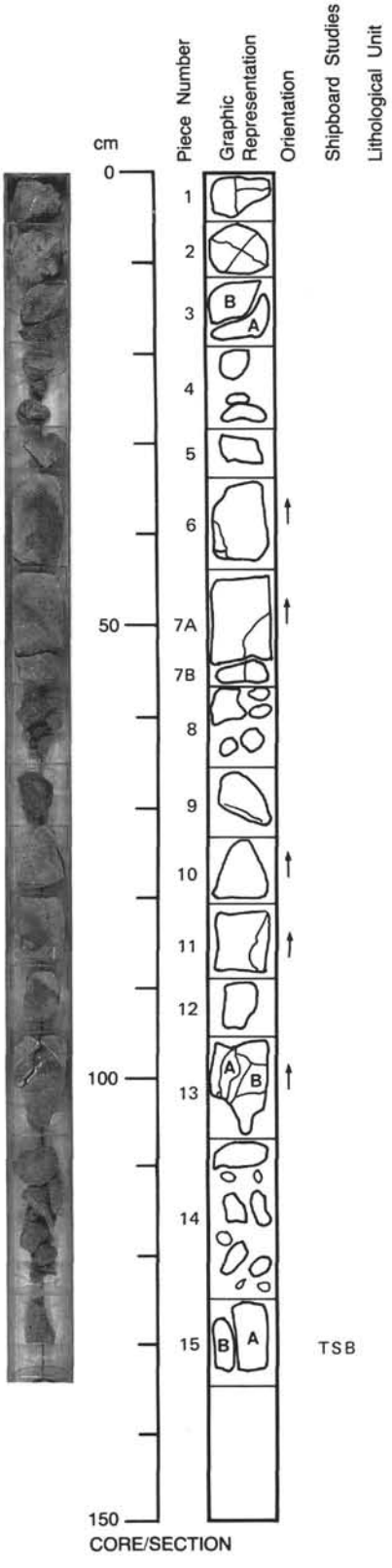


124-768C-96R-2

UNIT 4: CONTINUED

Pieces 1-14

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: N/A
VESICLES: N/A
COLOR: N/A
STRUCTURE: N/A
ALTERATION: N/A
VEINS/FRACTURES: N/A
ADDITIONAL COMMENTS: Very similar to 124-768C-96R-1 in texture and,mineralogy. There are some variolitic areas which may indicate a margin nearby but no contacts are found.



124-768C-96R-3

UNIT 4: CONTINUED

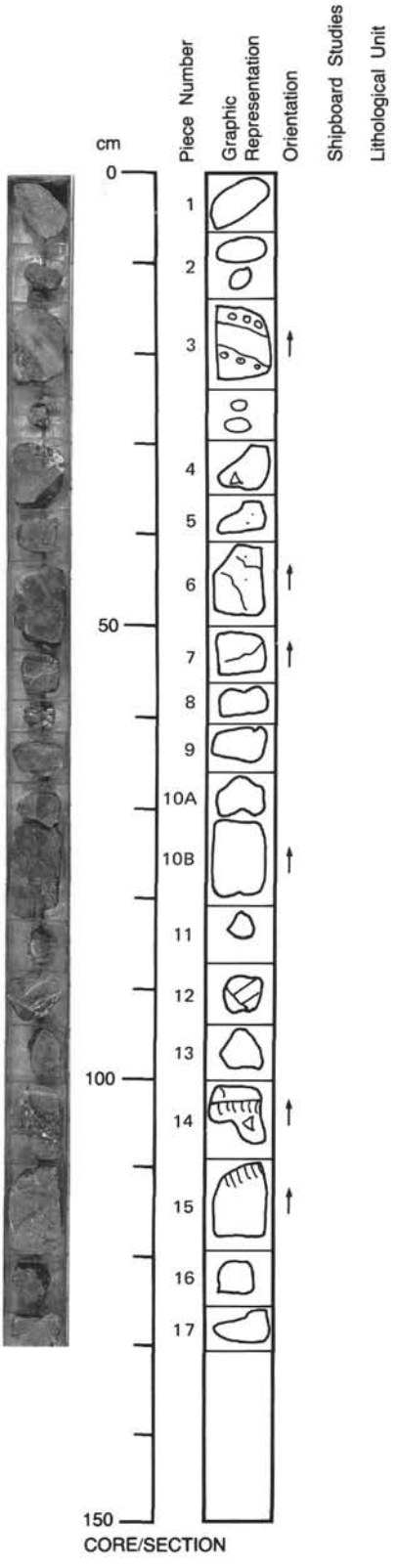
Pieces 1-13

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continuation of 124-768C-96R-2

UNIT 4: CONTINUED

Pieces 14-15

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Fine to medium-grained intersertal texture. 10% euhedral prisms of olivine replaced by clays, 20% subhedral clinopyroxene 0.05-2.5 mm, 40% plagioclase laths 0.05-2.5 (An70-80). 4% euhedral to skeletal Fe-Ti oxides, 15% mesostasis, and traces of spinel and apatite.
VESICLES: 10%; 0.1-1.5 mm; Spherical to lobate; N/A; Filled with clays and carbonate.
COLOR: Brownish gray.
STRUCTURE: None evident.
ALTERATION: Highly altered, olivine replaced by celadonite and carbonate, plagioclase by zeolites and k-feldspar, mesostasis partially replaced by clays, and iron-oxides by hematite.
VEINS/FRACTURES: Few



124-768C-97R-1

UNIT 4: CONTINUED

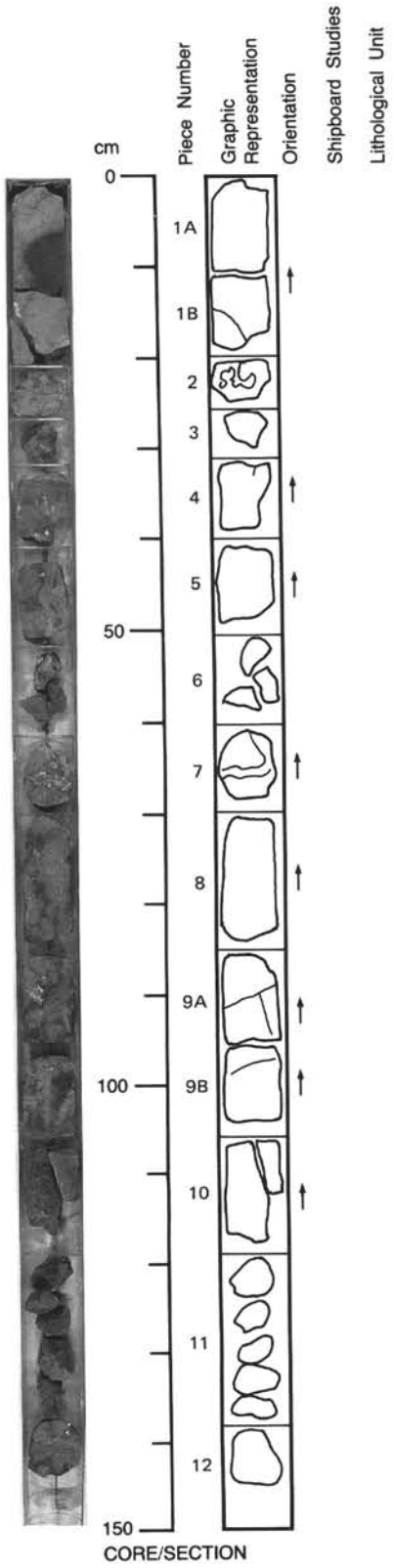
Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continuation of 124-768C-96R-3.

UNIT 4: CONTINUED

Pieces 3-17

CONTACTS: N/A
PHENOCRYSTS: N/A
GROUNDMASS: Variolitic to intersertal aggregates of plagioclase and glass, ?pyroxene, dark blade mineral present.
VESICLES: Abundant small vesicles filled with green clay. Larger vesicles filled with white ?chalcedony.
COLOR: Red, red-brown, and brownish gray.
STRUCTURE: Brecciated.
ALTERATION: Moderately altered to clay and Fe-oxide.
VEINS/FRACTURES: Irregular veins filled with red clay or calcite, maximum thickness 3-4 mm.
ADDITIONAL COMMENTS: Much of the rock is fragmental pillow rinds, varioles and basalt. No order can be made out.

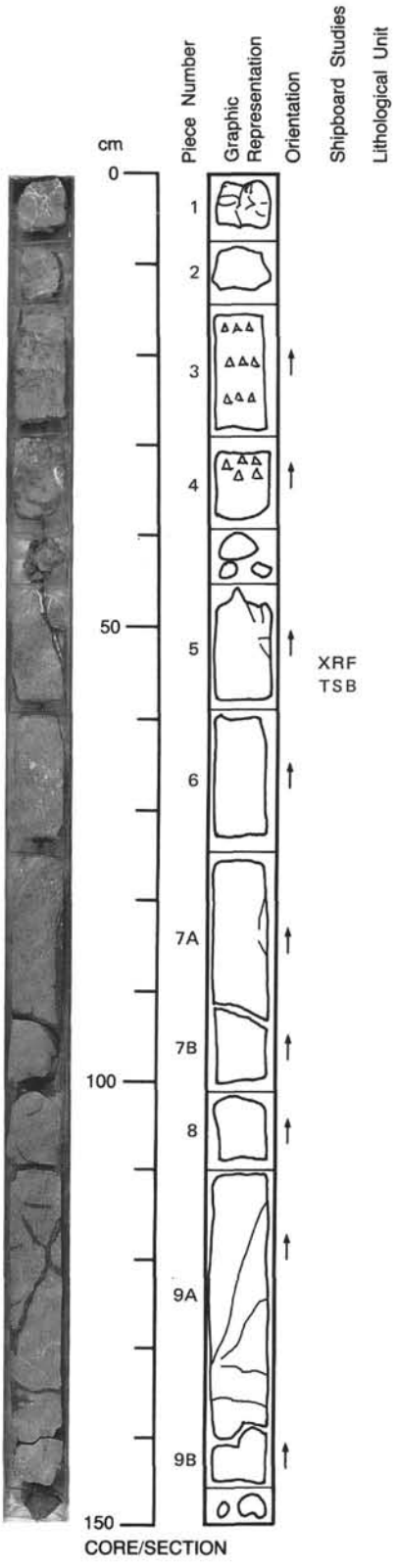


124-768C-97R-2

UNIT 4: CONTINUED

Pieces 1-?

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: The dark acicular mineral may be pyroxene. Still brecciated, one individual pillow or sheet may be present at top of section between Pieces 1 and 2, it contains olivine.



124-768C-97R-3

UNIT 4: CONTINUED

Piece 1

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Continuation of 124-768C-97R-2.

UNIT 4: CONTINUED

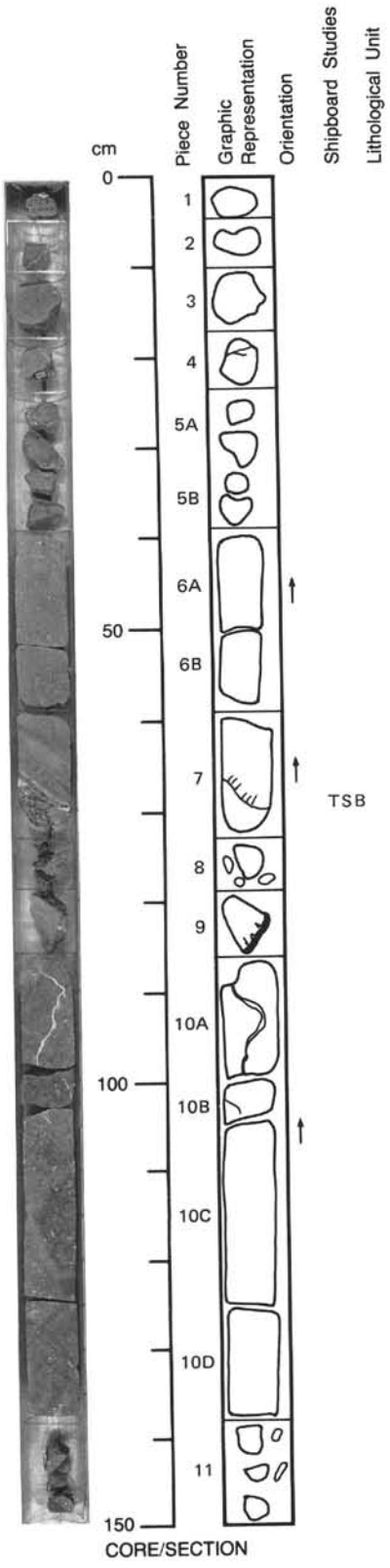
Pieces 2-4

CONTACTS: Chilled at top and bottom margins. Maybe planar making this a sheet flow (Pieces 2-4, 9B).
PHENOCRYSTS: Olivine - N/A; 1.0 mm; Most abundant between interval 100-110 cm, possible accumulation.
GROUNDMASS: Microcrystalline, variolites near chilled margin, plagioclase, glass and acicular or platey pyroxene.
VESICLES: Abundant small vesicles; the matrix filled with green clay. Larger vesicles near center of unit filled with chalcedony.
COLOR: Brownish-red.
STRUCTURE: Sheet flow? - 140 cm thick.
ALTERATION: Olivine altered to smectite and Fe-oxide, matrix stained with Fe-oxide.
VEINS/FRACTURES: There are a few thin (1-3 mm) irregular veins filled with calcite and ?chalcedony.

UNIT 4: CONTINUED

Pieces 5-9

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Fine to medium-grained, intersertal to intergranular comprising 25% skeletal and lath plagioclase 0.09-2.0 mm (An50-70), 33% subhedral clinopyroxene 0.05-3.1 mm, 20% mesostasis and glass, 2% euhedral olivine, > 1% euhedral magnetite.
VESICLES: 20%; 0.14-1.7 mm; Irregular and round; Evenly distributed; Filled with clay and zeolites.
COLOR: Brownish-gray.
STRUCTURE: N/A
ALTERATION: Highly altered, clays after plagioclase, mesostasis, and olivine, iron oxide after olivine and magnetite.
VEINS/FRACTURES: Few, filled with calcite and chalcedony.

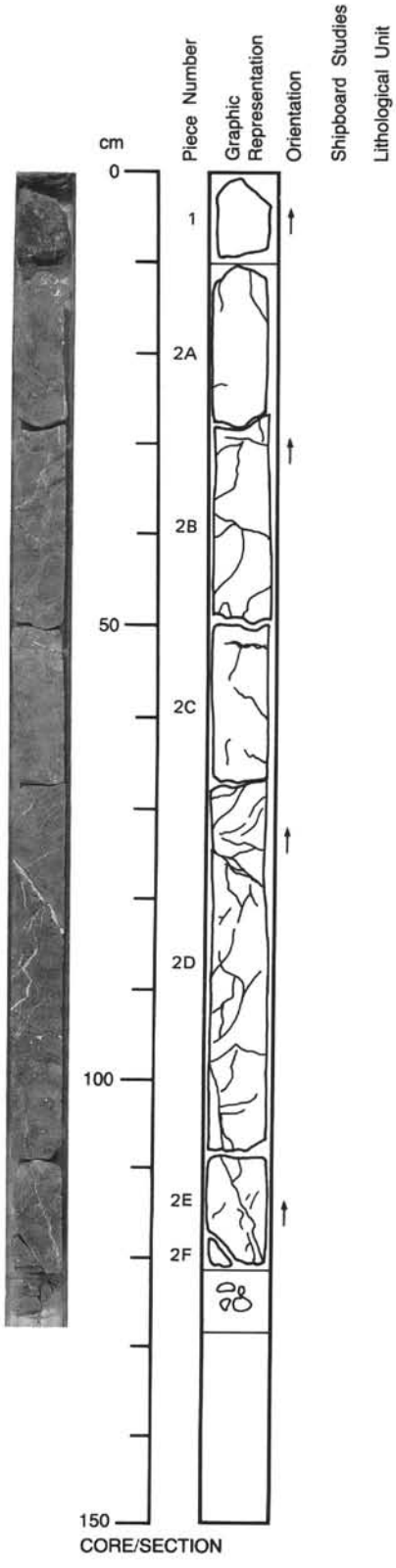


124-768C-98R-1

UNIT 4: CONTINUED

Pieces 1-11

CONTACTS: Chilled pillow margins in section.
PHENOCRYSTS: Olivine - 2%; 0.2-2.0 mm; Euhedral, altered to smectite and Fe-oxide.
GROUNDMASS: Fine-grained intersertal to variolitic, consisting of 5% microcrystalline plagioclase, 1% microcrystalline clinopyroxene, 20% crystallines and 27% glass. Texture markedly variable from intersertal to subvariolitic in section. Glassy texture with or without crystallite clusters developed at chilled margins.
VESICLES: 45% very fine irregular and lobate vesicles 0.008-0.5 mm, filled or lined with smectite and chalcedony; coarser larger vesicles (1-2 mm) irregularly distributed, filled mostly with chalcedony or empty.
COLOR: Gray, brownish gray, reddish gray, dark green (chilled margins).
STRUCTURE: Pillowed, moderately brecciated, locally finely brecciated (interpillow material).
ALTERATION: Moderate, clays zeolites, allophane and iron oxide are secondary minerals.
VEINS/FRACTURES: Sinuous with calcite filling, < 1 mm to 3 mm.
ADDITIONAL COMMENTS: Pieces 1-8: Sparsely to moderately phyric basalt with intersertal texture (Pieces 1-6), grading to intersertal divergent to variolitic to glass (Pieces 7-8). This subunit represents the inner part, and the chilled margin of a pillow, and the interpillow glass-rich breccia. Pieces 9-11: A chilled margin with thin microvariolitic rim in Piece 9. Pieces 10-11 consist of variably textured sparsely phyric basalt. They probably represent an inner zone of a metric sized pillow.

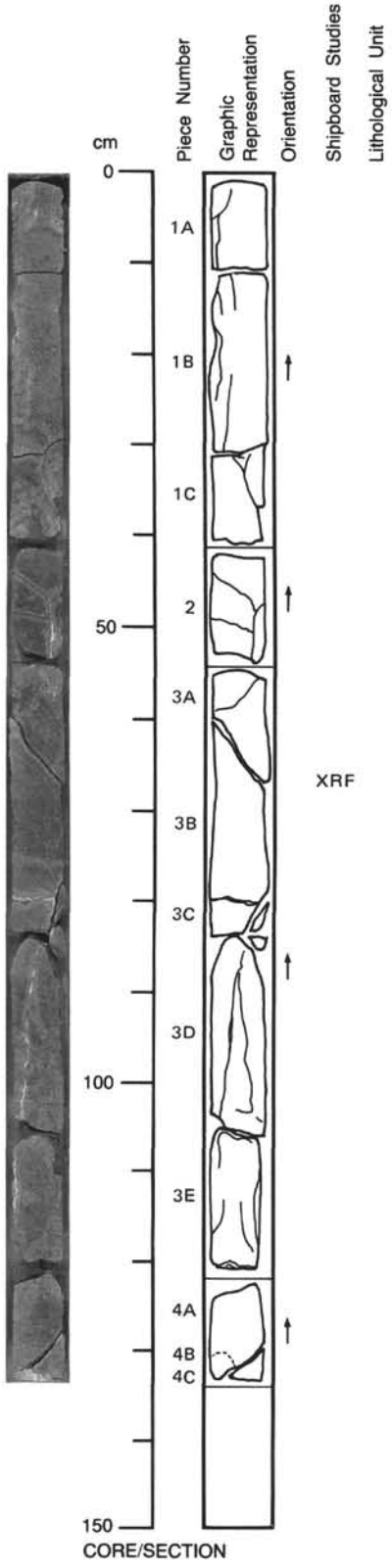


124-768C-98R-2

UNIT 5: SPARSELY OLIVINE PHYRIC BASALT

Pieces 1-2

CONTACTS: N/A
PHENOCRYSTS: Olivine - 1-2%; N/A; Altered to smectite, Fe-oxide and ? chalcedony. In places olivine is more abundant (up to about 8%) (e.g., Piece 1D).
GROUNDMASS: Consisting of plagioclase, pyroxene, Fe-oxide and glass (altered to smectite plus ? chalcedony); has a uniform intersertal texture.
VESICLES: Abundant very fine vesicles diffused evenly in the groundmass, partly filled with smectite. Scattered larger vesicles, irregular in form and distribution, 1-4 mm in size, are filled with chalcedony and often lined with calcite.
COLOR: Gray, reddish gray.
STRUCTURE: Massive, slightly brecciated. Could indicate a massive lava, 3-4 m minimum thickness.
ALTERATION: Moderate.
VEINS/FRACTURES: N/A; 0.5-10 mm; N/A; Irregular veins filled with calcite (the thinnest vein), chalcedony and scarce calcite, brown and green smectite (thicker veins).

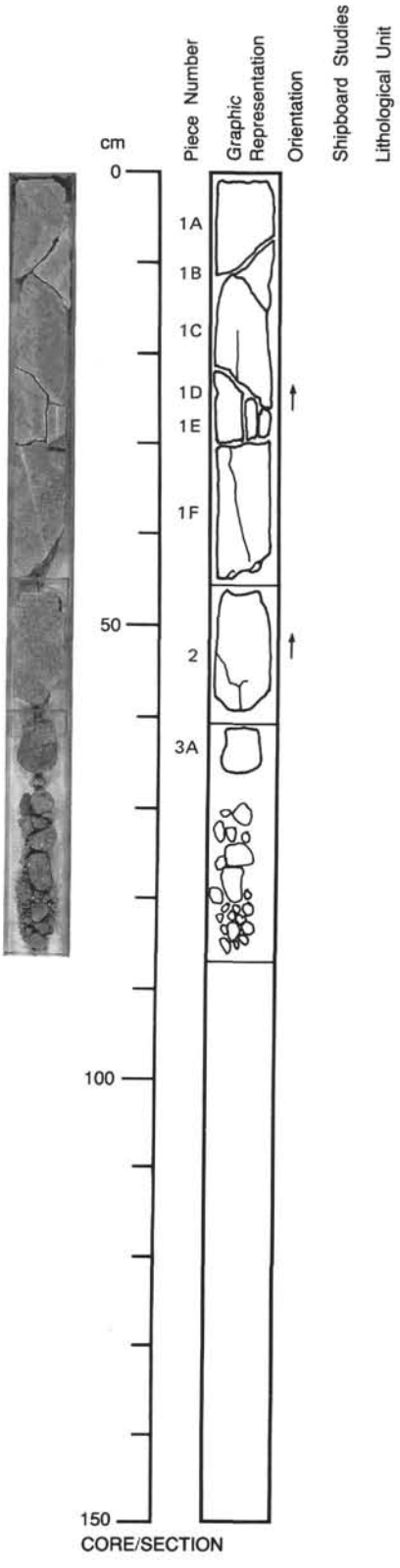


124-768C-98R-3

UNIT 5: CONTINUED

Pieces 1A-4C

CONTACTS: None.
PHENOCRYSTS: *Olivine* - >1%; ~2.2 *mm*; Euhedral, completely altered.
GROUNDMASS: Fine-grained intersertal texture made up of 25% skeletal and lath plagioclase (An50-70), 15% subhedral clinopyroxene, 12% olivine, 2% euhedral and acicular magnetite and opaques, and 26% mesostasis.
VESICLES: 20%; N/A; Round to lobate; evenly distributed; Filled with clay and zeolites.
COLOR: Gray.
STRUCTURE: Massive.
ALTERATION: Highly altered; clays replace olivine and plagioclase, actinolite and iddingsite after olivine and allophane.
VEINS/FRACTURES: Veins mostly vertical, filled with chalcedony and scarce calcite, fractures frequent.
ADDITIONAL COMMENTS: Lithologic features are same as Section 124-768C-98R-2. More diffused, slightly olivine-rich zones (Pieces 2 and 4) and zones with abundant chalcedony filled vesicles, 0.3-0.5 mm in size.

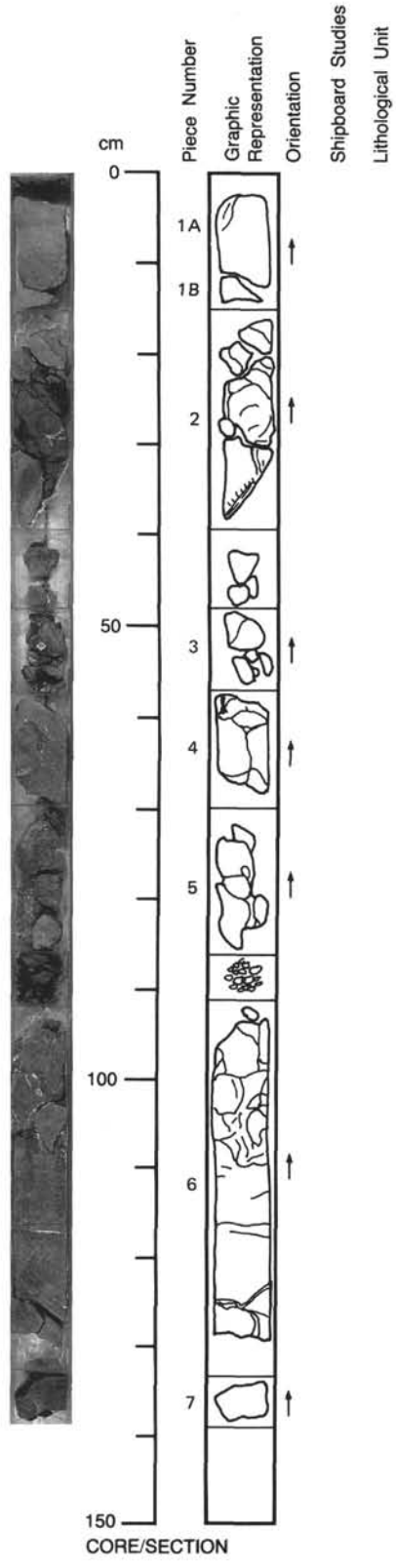


124-768C-98R-4

UNIT 5: CONTINUED

Pieces 1-3

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Lithological features are same as Section 124-768C-98R-3. Olivine content slightly higher than average in this section, locally abundant chalcedony filled vesicles 0.1-1.0 mm in size. Vertical veinlets filled with chalcedony and scarce calcite.



124-768C-99R-1

UNIT 5: CONTINUED

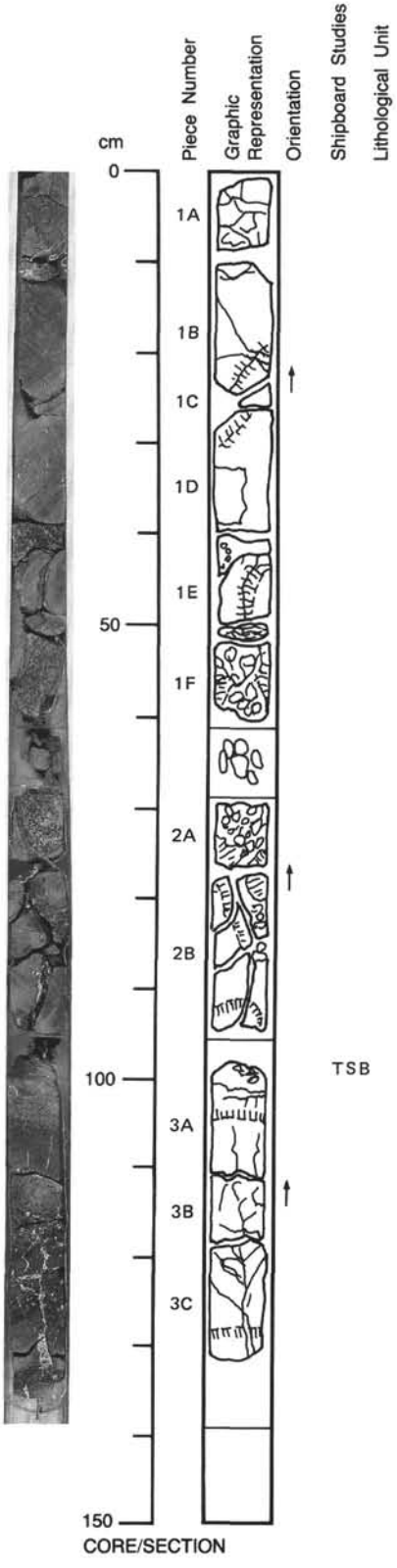
Piece 1

CONTACTS: N/A
PHENOCRYSTS: Olivine - ~1%; N/A; Altered.
GROUNDMASS: Consisting of plagioclase, pyroxene, Fe-Ti oxide and abundant altered (to green smectite) glass, intersertal in texture.
VESICLES: Very fine vesicles are scattered, partly filled with smectite and chalcedony or calcite.
COLOR: Brownish gray to gray.
STRUCTURE: Massive.
ALTERATION: Moderate.
VEINS/FRACTURES: Veinlets filled with calcite and Fe-oxide.

UNIT 6: SPARSELY OLIVINE PHYRIC BASALT

Pieces 2-7

CONTACTS: N/A
PHENOCRYSTS: Olivine - < 1-3%; N/A; Altered.
GROUNDMASS: Consisting of plagioclase and pyroxene (mostly skeletal) and Fe-Ti oxide, contains altered glass in highly variable amounts (up to 100% in chilled margins). Groundmass texture variable, grading from intersertal divergent to arborescent, subvariolitic to microvariolitic (varioles 1 mm or less) or variolitic (varioles up to 5 mm) toward the glassy margin. Microvariolitic borders are 2-10 mm thick.
REST SEE COMMENTS
VESICLES: Sparse to moderate, spherical and elongated, perpendicular to chilled margins, filled with green smectite.
COLOR: Brown, brownish gray, reddish gray, greenish gray, dark green(glassy portions).
STRUCTURE: Brecciated, pillowed.
ALTERATION: Moderate to high.
VEINS/FRACTURES: *Irregular <1-5mm thick, filled with aragonite and chalcedony or with* reddish brown Fe-oxide.
ADDITIONAL COMMENTS: GROUNDMASS CONTINUED: Variolitic borders develop in inner and the farthest from the glassy rims, and are up to 3 cm thick, followed toward the glassy rim by subvariolitic to microvariolitic zones. Pieces 2-5: Pillow breccia with cm-sized fragments embedded in scarce hyaloclastite matrix (altered to smectite), irregular veins filled with iron oxide. Pieces 6-7: Moderately brecciated pillow. More than 60 cm in size (lower part in Section 124-768C-99R-2). Upper chilled margin represented probably by disaggregated glass in the interval 87-93 cm.

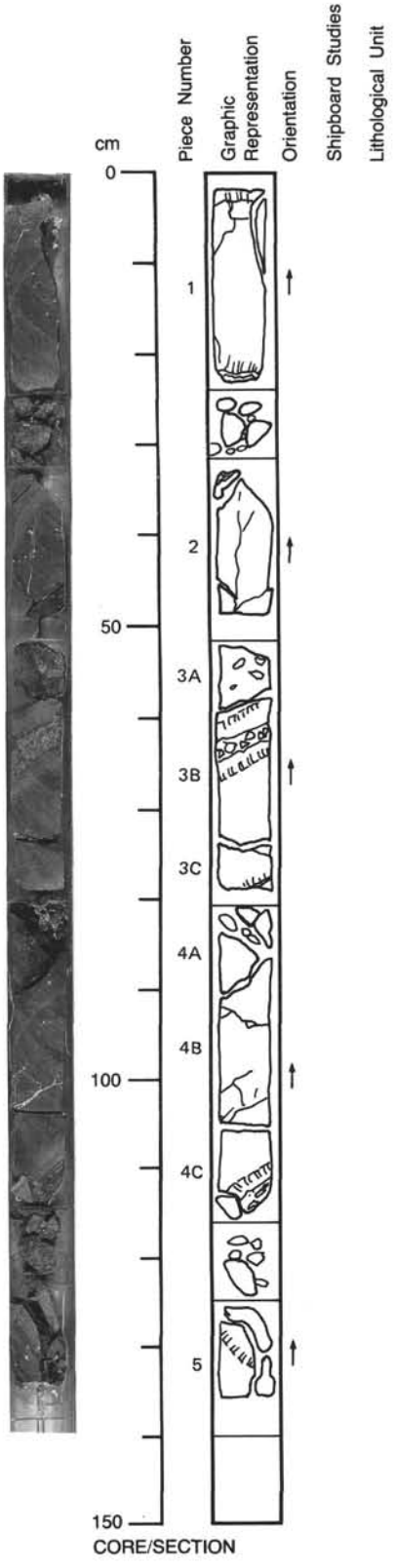


124-768C-99R-2

UNIT 6: CONTINUED

Pieces 1-3

CONTACTS: Pillow margin.
PHENOCRYSTS: Trace of euhedral olivine, completely altered.
GROUNDMASS: Fine-grained to microcrystalline comprising plumose aggregates, variolites, of 45% crystallites, 20% glass and a trace of clinopyroxene 0.2 mm.
VESICLES: 35%; N/A; Round to lobate; Evenly distributed; Filled with clay and calcite.
COLOR: Light gray.
STRUCTURE: Pillow margin.
ALTERATION: Highly altered to clays, carbonate, zeolites, allophane, and iron oxide.
VEINS/FRACTURES: Few.
ADDITIONAL COMMENTS: Pieces 1A-1B: Lower portion of pillow showing a 3-4 mm thick microvariolitic rim (azimuth 50 degrees). Pieces 1C-1D: Small pillow (about 20 cm in size) with microvariolitic and glassy margins. Pieces 1E-2A p.p.-2B p.p.: Interpillow breccia with micropillows and fragments of pillow and abundant hyaloclastite matrix. Pieces 2A p.p-2B p.p: Pillow of decimetric size showing a curved vertical chilled margin. Piece 3: Pillow about 35 cm in size, with a well developed upper chill margin that include (from the inner to the outer part) a variolitic zone (2.5 cm), a subvariolitic zone (1.5 cm) and a microvariolitic zone. Glass margin preserved. Lower thin chilled margin in the bottom portion of Piece 3C. Piece 3C p.p: Pillow (~20 cm). The upper chilled margin is present in the lower part of Piece 3C.



124-768C-99R-3

UNIT 6: CONTINUED

Piece 1

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Interior zone and lower chilled margin of pillow. Sparse vesicles 1-3 mm in size.

UNIT 6: CONTINUED

Pieces 2-3A-3B p.p.

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Pillow about 30 cm in size with traces of the upper chilled margin, separated by the overlying pillow by glass-rich breccia (fragments in the interval 24-32 cm of this section), with preserved lower chill margin. Coarse amygdules filled with smectites and aragonite occur in an inner, brecciated portion.

UNIT 6: CONTINUED

Pieces 3B p.p.-3C

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Decimeter-sized pillow separated by the overlying pillow by 3 cm of intrapillow glassy breccia.

UNIT 6: CONTINUED

Piece 4

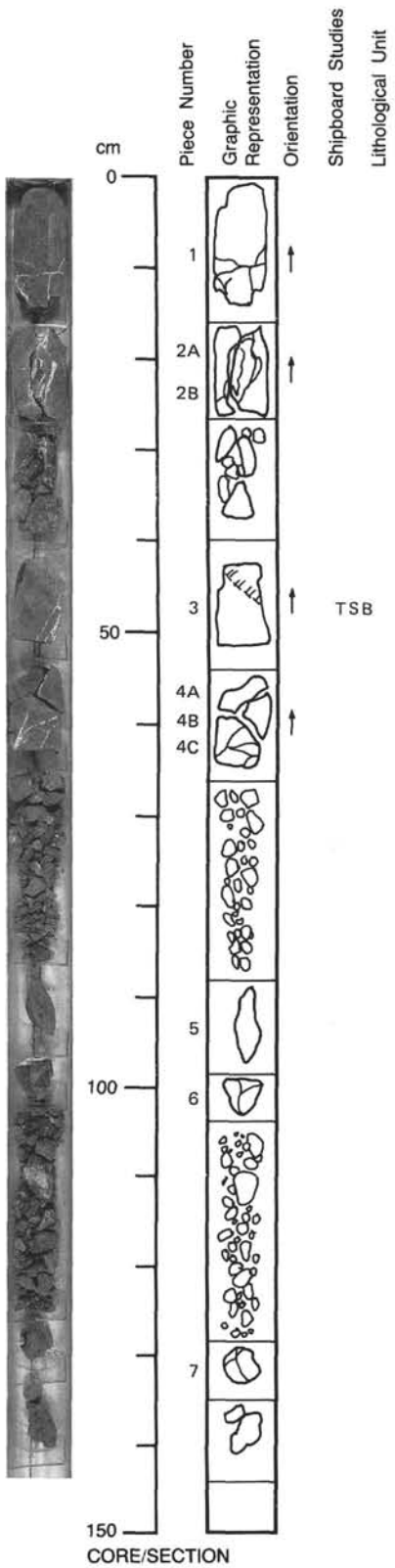
CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Decimeter-sized (>30 cm) pillow with well preserved lower chilled margin (azimuth 60 degrees).

124-768C-99R-3

UNIT 6: CONTINUED

Piece 5

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Portion of pillow with inclined (azimuth 80 degrees) chilled margin.



124-768C-99R-4

UNIT 6: CONTINUED

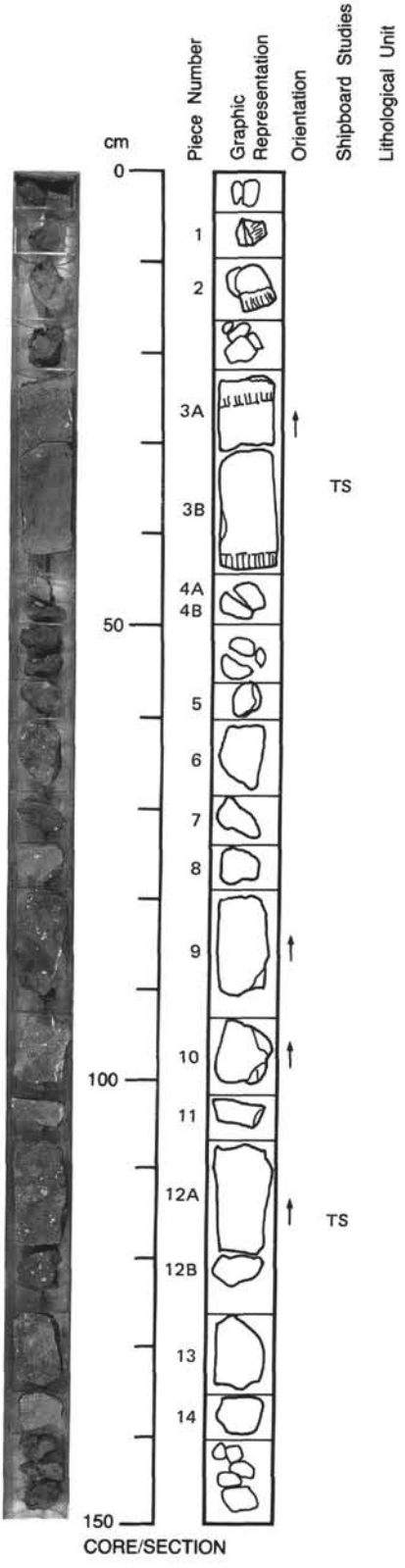
Pieces 1-2

CONTACTS: see comments
PHENOCRYSTS: see comments
GROUNDMASS: see comments
VESICLES: see comments
COLOR: see comments
STRUCTURE: see comments
ALTERATION: see comments
VEINS/FRACTURES: see comments
ADDITIONAL COMMENTS: Inner part of pillow. Lower chilled margin not shown. Aragonite veins.

UNIT 6: CONTINUED

Pieces 3-4

CONTACTS: None.
PHENOCRYSTS: Olivine - 1%; 0.17-0.57 mm; Euhedral, completely altered.
GROUNDMASS: Fine-grained, intersertal divergent texture, comprising, 10% microcrystalline plagioclase 0.15 mm (An50-70), 7% skeletal olivine, 0.3 mm, >1% clinopyroxene 0.02-0.13 mm, and 62% mesostasis.
VESICLES: 20%; 0.06-0.9 mm; Round to lobate; Evenly distributed; Filled with clay.
COLOR: Brownish gray.
STRUCTURE: Pillowed.
ALTERATION: Highly altered, mesostasis and olivine alter to allophane and iron oxide.
VEINS/FRACTURES: Few.
ADDITIONAL COMMENTS: Fragment of pillow with upward concave upper chilled margin. Aragonite veins.



124-768C-100R-1

UNIT 7: SPARSELY TO HIGHLY OLIVINE PHYRIC BASALT

Pieces 1-3

CONTACTS: None.
PHENOCRYSTS: Olivine - 3%; 0.03-0.7; Euhedral, completely altered.
GROUNDMASS: Fine-grained with intersertal divergent texture, comprising 22% plagioclase 1.0 mm (An50-70), 12% olivine skeletal olivine 0.28 mm, >1% clinopyroxene 0.008-0.11 mm, and 38% mesostasis.
VESICLES: 25%; 0.02-1.7 mm; Irregular and round; Evenly distributed; Filled with clay.
COLOR: Brownish gray.
STRUCTURE: Pillowed.
ALTERATION: Highly altered olivine and plagioclase alter to clay and olivine and mesostasis are altered to iron oxide.
VEINS/FRACTURES: Carbonate veinlets.

UNIT 7: CONTINUED

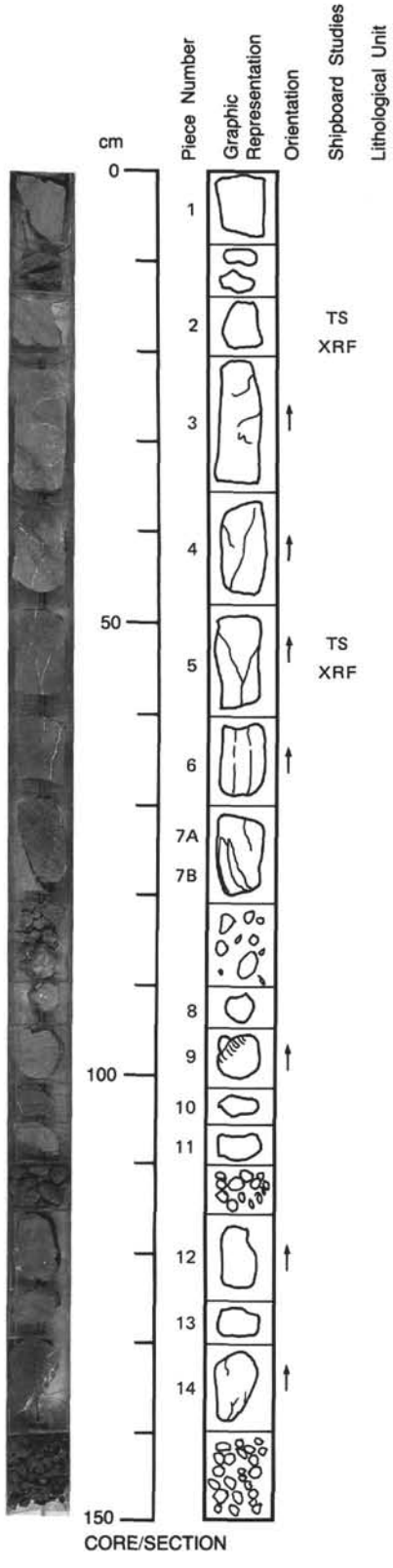
Piece 4

CONTACTS: N/A
PHENOCRYSTS: Olivine - ~3%; N/A; Altered.
GROUNDMASS: Consisting of 25% plagioclase, 10% pyroxene, Fe-Ti oxide and 43% mesostasis. Intersertal divergent (glass-poor) to subvariolitic to variolitic.
VESICLES: 15%; 0.5-2 mm; N/A; N/A; Very fine grained vesicles. Scattered through the groundmass. Irregularly distributed (inner part of pillow).
COLOR: Brownish gray, dark green (altered glass).
STRUCTURE: Pillowed, brecciated. One pillow 20 cm in size present. This unit closely resembles Section 124-768C-99R-1 to -4 in lithology and structure.
ALTERATION: Very highly altered.
VEINS/FRACTURES: Carbonate veinlets.

UNIT 7: CONTINUED

Pieces 5-14

CONTACTS: N/A
PHENOCRYSTS: Olivine - 3%; N/A; Altered euhedral prismatic. Variable in amount. (5% in the finer grained basalt and up to 15% in the coarser grained).
GROUNDMASS: Fine-grained intersertal divergent texture made up of 25% altered skeletal and lath plagioclase 0.1-1.2 mm, 7% microcrystalline and skeletal clinopyroxene < 0.03 mm, 2% spinel, 25% mesostasis.
VESICLES: 15%; 1-8 mm; N/A; N/A; Filled with aragonite and chalcedony in basalt.
COLOR: Reddish brown to gray and greenish-gray.
STRUCTURE: Massive. No chilled margin shown. Structure and variations in texture, frequency of vesicles and oxidation indicate a lava flow, 160 cm as minimum thickness, with a thick rapidly chilled upper zone (basalt, about 25 cm) and a lower zone that cooled more slowly where accumulation of olivine occurred.
ALTERATION: Moderate, olivine alters to clay, hematite and carbonate, plagioclase to clay and zeolites, magnetite to hematite, and mesostasis to clay and hematite.
VEINS/FRACTURES: Few filled with carbonate and chalcedony.



124-768C-100R-2

UNIT 7: CONTINUED

Pieces 1-2

CONTACTS: N/A
PHENOCRYSTS: None.
GROUNDMASS: Fine-grained, phaneritic intergranular to subophitic. Comprising, 50% plagioclase laths 0.3-1.0 mm (labradorite), 20% subhedral clinopyroxene 0.5-1.0 mm, 2% euhedral magnetite 0.3-0.5 mm, 15% mesostasis.
VESICLES: 10%; 0.2-0.5 mm; N/A; N/A; Filled with clays.
COLOR: Gray.
STRUCTURE: Massive, uniform flow 1.85 m thick.
ALTERATION: Moderately altered.
VEINS/FRACTURES: Rare filled with carbonate.

UNIT 7: CONTINUED

Pieces 3-7

CONTACTS: N/A
PHENOCRYSTS: Olivine - 15%; N/A; Euhedral, replaced by secondary minerals.
GROUNDMASS: Fine-grained, phaneritic intergranular to subophitic, made up of 30% plagioclase (labradorite), 2% olivine, 18% clinopyroxene, 18% mesostasis.
VESICLES: 13%; N/A; N/A; N/A; Filled with carbonate.
COLOR: Gray.
STRUCTURE: Massive with planar contacts, lava flow.
ALTERATION: Highly altered.
VEINS/FRACTURES: Rare, filled with carbonate.
ADDITIONAL COMMENTS: This is the coarser grained (doleritic) portion than Pieces 1 and 2. The sequence an increase of the content of olivine downward, from Piece 1 to Piece 7, and concurrently a coarsening of the grain size, and decrease of glass content.

UNIT 8: MODERATELY OLIVINE PHYRIC BASALT

Pieces 8-14

CONTACTS: N/A
PHENOCRYSTS: Olivine - 8-10%; N/A; Altered.
GROUNDMASS: Consisting of plagioclase, pyroxene, Fe-Ti oxide and glass. Texture is intersertal divergent.
VESICLES: Few.
COLOR: Brownish gray.
STRUCTURE: Possibly pillowed, inferred by the occurrence of a chilled margin in Piece 9 (subvariolitic basalt).
ALTERATION: Moderate.
VEINS/FRACTURES: Veins rare, filled with carbonate.

124–768C–73R–01 (Piece 1, 19–22 cm) OBSERVER: SPA WHERE SAMPLED: Pillow interior

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal divergent

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	0.3–0.8		Euhedral	Pseudomorphed by alteration minerals.
Spinel	trace	trace	~0.05	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	35	37	~0.3	An70	Euhedral	Slight alteration to fresh; acicular.
Clinopyroxene	10	10	0.03–0.8	Diop.	Subhedral euhedral	Mostly intersertal to pl; colorless.
Mesostasis	15	15	N/A		Angular patches	Mostly with brown muck and magnetite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	11	Olivine	Carbonate and fibrous clays.
Clays	20	Vesicles	Red smectite and fibrous clays.
Carbonate	1	Olivine and vesicles	Calcite replacing olivine, occasionally in vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	25	Even	0.04–0.7	Clays	Round or circular(irregular).	20% full, 5% empty.

COMMENTS: Calcite could have been more abundant in vesicles, but was removed by slide preparation.

124–768C–73R–01 (Piece 5B, 67–69 cm) OBSERVER: SPA WHERE SAMPLED: Border of pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric subvariolitic/variolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	1–0.1		Euhedral–prism	Pseudomorphed by secondary minerals.
Spinel	trace	trace	0.02	Chromite	Euhedral	Cr–Sp included in Olivine.
GROUNDMASS						
Plagioclase	10	10	0.5–0.1	An50–70	Lath, skeletal	Incipiently altered.
Clinopyroxene	20	20	0.3–.001	Diop.?	Subhedral, skeletal microliths	Colorless (endiopside?).
Glass	40	40	N/A		N/A	Devitrified.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Fibrous, highly
Clays	20	Vesicles	Smectite and fibrous clay mineral with high birefringence.
Carbonate	>1	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	20	Even	2–0.2	Clay	Spherical, elongated	Rare medium-sized, mostly 0.03–0.02 mm.

COMMENTS: Marked textural zoning. A 1 mm thick variolitic zone includes varioles 0.15 mm in size.

124-768C-73R-01 (Piece 5B, 67-69 cm) OBSERVER: SPA WHERE SAMPLED: Pillow rim

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, hypocrystalline subvariolitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	15	1-0.2		Euhedral, prisms	Replaced by phyllosilicates.
Spinel	trace	trace	N/A		Euhedral	Circular Cr-Sp included in olivine.
GROUNDMASS						
Plagioclase	3	5	N/A		Microliths	
Clinopyroxene	7	7	0.2-0.01		Microliths, skeletal	Colorless (endiopside?).
Devitrified glass	40	53	N/A		N/A	Partly altered, glass with crystallites in origin.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15	Olivine, plagioclase	
Clays	30	Vesicles, Groundmass	
Fe-hydrox.	5	Olivine, Groundmass	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	20		0.1-.003	Clay	Spherical, pipe	Zonally distributed, missing in outer variolitic rims.

COMMENTS: Porphyritic (olivine) texture, with quenched groundmass high vesicularity (NO UNIT NUMBER GIVEN).

124-768C-73R-01 (Piece 7A, 113-114 cm) OBSERVER: SAJ WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, divergent intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	.04-.7		Euhedral	Pseudomorphosed by secondary mineral.
Spinel	>1	>1	0.01	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	15	22	N/A		N/A	
Clinopyroxene	10	10	N/A		N/A	
Mesostasis	26	26	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Fibrous mineral (colorless to yellow) and Fe oxide.
Clays	32	Fracture, vesicles, plagioclase	Smectite and allophane.
Fe-oxide	7	Fracts, plag, ol, vesicles, mesostasis	2% vacant fracture.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles,	30	Even	0.040.8	Clay, Fe-oxide	Round, irregular	Filled with fibrous clay, and Fe-oxide.

COMMENTS: The colorless clay(?) mineral in the vesicles has high relief and very high strong birefringence.

124–768C–74R–01 (Piece 2, 14–16 cm) OBSERVER: SAP WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, hypocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	1–0.1		Euhedral, prism	Pseudomorphosed by secondary mineral.
Spinel	trace	trace	.002	Chromite	Euhedral	Cr-Sp included in olivine.
GROUNDMASS						
Plagioclase	20	20	.15–.03		Laths, microliths parallel and radiate aggregates	
Clinopyroxene	15	15	0.2–<0.001		Subhedral, prismatic, microliths, skeletal	Colorless (endiopside?)
Devitrified glass	23	23	N/A		N/A	With crystallites, dusted with magnetite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	12	Olivine	With calcite; fibrous, high relief (colorless).
Clays	30	Vesicles	Fibrous, colorless to greenish.
Carbonate	<1	Olivine	Usually in olivine cores.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	30	Even	.15–.015	Clay	Spherical, lobate

124–768C–74R–01 (Piece 11B, 127–129 cm) OBSERVER: SAP WHERE SAMPLED:

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	15	1–0.1		Euhedral, Prismatic	
Spinel	trace	trace	0.002		Euhedral	Cr-Sp and magnetite, included in olivine.
GROUNDMASS						
Plagioclase	24	25	1–0.03	Labradorite	Lath, skeletal	
Clinopyroxene	10	10	.2–.01		Microlith	Colorless (endiopside?).
Magnetite	2	2	N/A	Iron oxide	Euhedral	
Mesostasis	23	23	N/A		Anhedral	Devitrified plus crystallites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Olivine	Associated with iddingsite and calcite.
Clays	20	Plag., vesicles	
Carbonate	6	Olivine, fractures	Mostly in veins, also replacing olivine and in vesicles.
Iddingsite	10	Olivine	Associated with calcite and clays.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
V/fracts.	25	Even	0.03–0.7	Calcite, clay	Irregular to round

COMMENTS: Wall lining of vesicles are usually pale green smectite, the core is a fibrous colorless mineral (also clay) with high relief and birefringence. Allophane is usually associated and obscures the vesicle fillings.

124-768C-75R-02 (Piece 3C, 48-50 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	0.2-1.0		Euhedral, prismatic	Pseudomorphored by secondary mineral
Spinel	<1	<1	0.001	Chromite	Euhedral	Included in olivine and groundmass.
GROUNDMASS						
Plagioclase	23	29	.002-0.6	An50-70	Lath, microliths, skeletal	
Clinopyroxene	7	7	0.02-0.3	Diopside?	Anhedral, subhedral	
Mesosatsis	24	29	N/A		Subhedral, anhedral, euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Olivine	Associated with carbonate and iron oxide.
Clays	25	Vesicles	Smectite. Pale greenish, fibrous, highly birefringent.
Carbonate	4	Olivine	
Clays	11	Plagioclase, mesostasis	
Fe-oxide	1	Olivine	Associated with calcite and clay.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	25	Even	0.03-0.6	Clays, calcite	Spherical, lobate	Filled with smectite, filled with fibrous mineral.

124-768C-76R-01 (Piece 8C, 137-139 cm) OBSERVER: SPA WHERE SAMPLED: Pillow interior

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, hypocrystalline, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	1-0.2		Euhedral, prismmatic	Including Cr-Sp.
Spinel	Trace	Trace	N/A		Granules	
GROUNDMASS						
Plagioclase	15	25	1-.01	Labradorite	Lath, microliths	Cores replaced by zeolites.
Clinopyroxene	10	10	0.5-0.01		Subhedral, microlith	Colorless (endiopside?).
Magnetite	2	3	<.01		Euhedral	
Mesostasis	32	37	N/A		N/A	Cryptocrystalline, slightly altered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Olivine	Pale green fibrous and orange-yellow lath.
Clays	20	Vesicles, mestasis	
Carbonate	5	Olivine	
Zeolites	10	Plagioclase	
Hematite	1	Magnetite	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	15	Even	.5-.05	Clay	Spherical, lobate.

124–768C–76R–03 (Piece 6A, 53–55 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal–divergent

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	7	0.1–1.0		Euhedral, prismatic	Pseudomorphosed by secondary mineral.
Spinel	<1	<1	.001	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	30	37	.01–1.0	An50–70	Lath, skeletal	Microliths are masked by allophane.
Clinopyroxene	3	3	.01–.2	Endiopside?	Microlith, skeletal	Colorless.
Mesostasis	33	33	N/A		N/A	Devitrified

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine	
Clays	20	Vesicles	Smectite lining walls of vesicles filled with fibrous clay and smudged by allophane.
Carbonate	5	Olivine	
Allophane	7	Vesicles, plagioclase	Masking the obscuring inclusions.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Even	0.1–1.0	Clay	Spherical, Iobate

124–768C–77R–01 (Piece 9A, 106–108 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivive basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal–divergent

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	5	0.15–0.5		Euhedral, prismatic	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.001		Granules	Included in olivine.
GROUNDMASS						
Plagioclase	30	40	.02–1.0	An50–70	Lath, skeletal	
Clinopyroxene	2	2	.002–.2	Endiopside?	Microliths, skeletal	
Mesostasis	19	20	N/A		N/A	
Olivine	0	1	0.05		Skeletal	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3	Olivine	Yellowish, including smectite and fibrous clay mineral.
Clays	30	Vesicles, plagioclase	Pale yellowish to colorless fibrous minerals.
Carbonate	3	Olivine	Usually in olivine cores.
Fe oxide	3	Olivine, mt., plagioclase	As stains and cryptocrystallites.
Allophane	10	Plagioclase, vesicles, mesostasis	Cryptocrystallite clay obscuring rock.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
V/C	32	Even	0.1–1.0	Clay	Spherical, Iobate

COMMENTS: 13% of rock is empty vesicles. (NO UNIT NUMBER GIVEN).

124-768C-77R-01 (Piece 43, 49-51 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Phyric intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	0.2-1.5		Euhedral, prismatic	Pseudomorphosed by secondary mineral.
Spinel	<1	<1	.001	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	24	30	.02-1.0	An50-70	Lath, skeletal	
Clinopyroxene	2	2	.002-.2	Endiopside?	Microlith, skeletal	
Olivine	0	2	N/A		N/A	
Mesostasis	24	24	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine	Fibrous high birefringent mineral, including smectite globules.
Clays	24	Vesicles	Colorless, fibrous, and pale green.
Carbonate	7	Olivine	Usually in olivine cores.
Allophane	14	Plagioclase, vesicles	Masking plag. and vesicular minerals.
Fe-oxide	2	Mesostasis olivine	Replacing skeletal olivine and magnetite in mesostasis.
Iddingsite	1	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	26	Even	0.1-1.0	Clay	Spherical, lobate

124-768C-77R-02 (Piece 6B, 81-83 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	0.6-0.1		Euhedral, prismatic	Pseudemorphosed by secondary mineral.
Spinel	<1	<1	.001	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	18	22	0.01-0.5	An50-70	Lath, skeletal	
Clinopyroxene	1	1	0.01-0.2	Endiopside?	Microliths, skeletal	
Mesostasis	24	40	N/A		N/A	Abundant allophane obscuring.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	12	Olivine	Pale greenish to yellowish, fibrous, high relief and birefringence.
Clays	25	Vesicles	Similar to clay alteration of olivine.
Allophane	20	Mesostasis, plagioclase	Obscurring mesostasis and plagioclase.
Fe oxide	<1	Groundmass	
Carbonate	<1	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	25	Even	0.03-2.0	Clay	Spherical, elongate	Two size groups.

COMMENTS: (NO UNIT NUMBER GIVEN).

124-768C-77R-02 (Piece 9, 122-125 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	8	0.07-1.3		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.02-.04	Chromite	Euhedral	Included in olivine and groundmass.
GROUNDMASS						
Plagioclase	34	35	N/A		N/A	
Clinopyroxene	1	1	Max. 0.17mm		Subhedral, skeletal, microliths.	
Mesostasis	30	30	N/A		N/A	Including cryptocrystallites, devitrified.
Olivine	0	1	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine	Pale greenish to colorless clay minerals; walls of vesicles lined with smectite.
Clays	26	Vesicles	
Carbonate	6	Olivine	
Fe oxide	<1	Olivine	
Iddingsite	<1	Olivine	
Clays	1	Plagioclase	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	25	Even	0.04 -1.4	Clay	Round, irregular

COMMENTS: Olivine are either skeletal or lath shaped. Some have glassy core. Others have cores transformed into k-spar or less calcic variety (low relief). (NO UNIT NUMBER GIVEN).

124-768C-78R-01 (Piece 2A, 15-18 cm) OBSERVER: SPA WHERE SAMPLED: Pillow border

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal/sub-variolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	8	0.5-1.0		Euhedral, prismatic	Irregularly distributed. Maximum frequency in non-glassy portion.
Spinel	<1	<1	.002	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	18	18	N/A		N/A	
Clinopyroxene	10	12	N/A		N/A	Plumose texture.
Glass	15	30	N/A		N/A	Including plumose anhedral unresolvable crystals with feathery, fibrous radiate texture.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	8	Olivine	Very slight greenish, fibrous, high relief.
Clays	32	Vesicles	Similar material to that replacing olivine.
Carbonate	<1	Olivine	
Fe oxide	10	Glass	
Allophane	1	Rock	Obscuring whole section.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	32	Even	0.01-0.3	Clay	Spherical, lobate

COMMENTS: Marked textural variations related to chilling. Vesicles very abundant in phyric portions, absent in glass. (NO UNIT NUMBER GIVEN).

124-768C-78R-01 (Piece 6, 114-116 cm) OBSERVER: SPA WHERE SAMPLED: Near pillow border

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Variolitic to sub-variolitic, phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	0.06-0.6		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	.001-.04	Chromite	Euhedral	Included in olivine and gm
GROUNDMASS						
Plagioclase	5	5	Max. 0.2	An50-70	Microliths, skeletal	
Clinopyroxene	22	22	Max. 0.3	Diopside?	Microliths, skeletal	Plumose, quenched.
Mesostasis	36	36	~0.014		?	With cryptocrystallites.
Olivine	0	3	0.09		Subhedral, skeletal	Quenched.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	9	Olivine	Colorless to very pale greenish fibrous clay mineral.
Clays	23	Vesicles, fracture	Similar to those in olivine, includes smectite.
Carbonate	2	Olivine, fracture, vesicles	
Fe oxide	3	Olivine, mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
V/fracts.	24	Even	0.08-1.0	Clays, cc	Spherical, irregular

COMMENTS: Abundant quenched pyroxene define and enclose varioles with much vesicles, glass, px, and plagioclase microliths. Interstitial to the cpx are cryptocrystallites of mesostasized glass. (NO UNIT NUMBER GIVEN).

124-768C-79R-02 (Piece 4B, 86-87 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Subvariolitic/intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	0.03-0.8		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.04	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	28	32	0.01-0.4	~An70	Euhedral	Occasionally obscurred by allophane.
Mesostasis	31	31	~0.3		Anhedral, subhedral	Devitrified.
Clinopyroxene	<1	<1	N/A		Subhedral	Microliths.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	9	Olivine	Yellowish to colorless fibrous high biref, high relief clay.
Clays	25	Vesicles	Similar to alteration of olivine
Carbonate	3	Olivine	
Fe oxide	3	Olivine, plagioclase	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	25	Even	0.03 -1.5	Clay		3% vesicles empty.

COMMENTS: (NU UNIT NUMBER GIVEN).

124-768C-79R-02 (Piece 6, 124-125 cm) OBSERVER: SPA WHERE SAMPLED: Near pillow border

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Variolitic, phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	0.07-0.6		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.04	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	8	8	.006-.02	An50-70	Microliths	Bow tie.
Clinopyroxene	18	18	~0.1	Diopside?	Microliths, skeletal	Quenched, plumose
Mesostasis	31	38	~0.02		Anhedral	Oxidized in portions, includes allophane.
Olivine	0	2	~0.02		Subhedral, skeletal	Totally altered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Colorless to very pale yellow greenish clay.
Clays	20	Vesicles	Similar to that in olivine.
Chlorite	4	Olivine, vesicles	Lining vesicles.
Fe oxide	9	Olivine, mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	22	Even	0.08-0.7	Clay	round, irregular

COMMENTS: Texture gives evidence of quenching.

124-768C-80R-02 (Piece 4, 120-121 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal/subvariolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	0.1-0.7		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.04	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	32	32	Max. 0.1	An50-70	Subhedral, euhedral, skeletal	
Clinopyroxene	3	3	0.02-0.4	Diopside?	Subhedral	Colorless, occasionally skeletal.
Mesostasis	35	35	N/A		N/A	Altered glass with crystallites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	9	Olivine	Very pale greenish high relief clay (fibrous).
Clays	20	Vesicles	Same material as in olivine.
Carbonate	1	Olivine	
Fe oxide	<1	Magnetite	Within mesostasis.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Even	0.02-0.2	Clays	Round, irregular

COMMENTS: (NO UNIT NUMBER GIVEN).

124-768C-80R-03 (Piece 2, 35-36 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Divergent intersertal, phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	5	0.02-0.4		N/A	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.002	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	30	34	N/A		N/A	
Mesostasis	35	37	N/A		N/A	Altered glass with crystallites.
Clinopyroxene	<1	<1	N/A		N/A	
Olivine	0	<1	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	~5	Clay	Very pale greenish to colorless fibrous clay.
Clays	23	Vesicles	Similar to that in olivine, associated with allophane.
Carbonate	<1	Olivine	
Allophane	6	Mesostasis, vesicles, plagioclase	Obscuring certain portions of the section.
Fe oxide	<1	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	23	Even	0.03-1.3	Clays	Irregular, round	Two size classes.

COMMENTS: The plagioclase cores can be glassy (skeletal plag.)or replaced by probable K-feldspar. (NO UNIT NUMBER GIVEN).

124-768C-80R-03 (Piece 3C, 65-66 cm) OBSERVER: SPA WHERE SAMPLED: Pillow

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	5	.07-.60		Euhedral	Completely pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.02-.04	Cr	Euhedral	In olivine and gm.
GROUNDMASS						
Plagioclase	32	30	0.02-1.7	An50-70	Subhedral-euhedral	Occasionally skeletal.
Clinopyroxene	<1	<1	0.05	Diopside?	Subhedral	Skeletal, plumose.
Olivine	0	4	0.07-0.20		Subhedral	Skeletal.
Mesostasis	35	35	?		Anhedral	Magnetite on glass mesostasis and along grain boundaries.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	7	Olivine	Slightly greenish fibrous mineral.
Clays	2	Vesicles	Similar to that in olivine associated with allophane.
Carbonate	<1	Olivine	
Fe oxide	2	Olivine	Along olivine rims and wholly in skeletal, olivine.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	25	Even	N/A		Irregular, round

COMMENTS: Fracture filling may have been removed during preparation. Plagioclase can be skeletal with glassy cores, or altered to clay. (NO UNIT NUMBER GIVEN).

124–768C–81R–02 (Piece 1C, 33–34 cm) OBSERVER: SAP WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine–grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	15	0.03–1.0		Subhedral–euhedral	Wholly pseudomorphosed phenocrysts and skeletal grains.
Spinel	<1	<1	0.02	Chromite	Euhedral	Inclusion in olivine.
GROUNDMASS						
Plagioclase	25	30	Max. 2.0	An50–70	Subhedral–euhedral	Microliths to lath.
Mesostasis	25	31	N/A		Anhedral, irregular	
Clinopyroxene	<1	<1	.04–0.2	Diopside	Subhedral	Skeletal, plumose, microliths.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	30	Olivine, vesicles	
Clays	9	Plagioclase	
Fe oxide	~10	Mesostasis, olivine, plagioclase	Secondary mixed with primary, hard to estimate.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	23	Even	0.04–0.4		Round, irregular	0.4 size = 5.7%, 0.04 size = 33–35% of rock.

COMMENTS: (NO UNIT NUMBER GIVEN).

124–768C–82R–02 (Piece 6B, 85–87 cm) OBSERVER: SAP WHERE SAMPLED:

ROCK NAME: Olivine basalt, phyric

GRAIN SIZE: Fine–grained

TEXTURE: Phyric, divergent–intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	8	1–0.2		Euhedral, prismatic	Including Cr–Sp.
Spinel	Trace	Trace	N/A		N/A	Cr–Spinel.
GROUNDMASS						
Plagioclase	32	37	0.8–.01		Lath, skeletal	Cores replaced by clay and zeolites.
Clinopyroxene	2	2	<0.01		Microliths, skeletal	Colorless (endiopside).
Mesostasis	20	30	N/A		N/A	Cryptocrystalline, altered p.p.
Magnetite	2	3	N/A		Euhedral	Dusty, partly hematitized.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Olivine	Fibrous, pale green, relatively high birefringent.
Clays	23	Plagioclase, mesostasis	Fine–grained smectites.
Zeolites	1		
Clays	12	Vesicles	Fibrous, similar to olivine pseudomorphs.
Carbonate	3	Vesicles, olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Even	2.0–.05	Clay, carbonate	Spherical, lobate

COMMENTS: (NU UNIT NUMBER GIVEN).

124-768C-83R-01 (Piece 1P, 139-140 cm) OBSERVER: SAP WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Divergent-intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3	0.14-0.80		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	0.01-0.04	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	25	28	Max. 1.1	An50-70	Subhedral, euhedral, skeletal	
Clinopyroxene	3	3	0.04-0.20	Diop?	Subhedral	Microliths.
Mesostasis	34	38	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	32	Olivine, plagioclas , vesicles	Very pale yellow, fibrous.
Carbonate	2	Olivine	
Chlorite	4	Mesostasis	As lining on walls of vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	28	Even	0.01-0.90		Round, irregular	Two sets: big, 2%; small, 31%.

COMMENTS: Plagioclase has either glassy or replaced core by K-feldspar. (NO UNIT NUMBER GIVEN)

124-768C-83R-02 (Piece 1C, 16-20 cm) OBSERVER: SAP WHERE SAMPLED: Pillow border

ROCK NAME: Aphyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Hypohyaline, variolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Groundmass	99	N/A	N/A		N/A	Hypohyaline, devitrified.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	1	Vesicles	
Carbonate	45	Varioles	
Fe-oxide	9		Including Fe-rich clay, masking the rock.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1	Ocassional	0.14	Clay	Oval

COMMENTS: The rock is a chilled basalt pillow border with abundant pseude-varioles completely replaced by calcite. Cryptocrystalline mineral probably plagioclase is intermicrogranular with glass.

124-768C-84R-02 (Piece 3A, 109-111 cm) OBSERVER: SAP WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Divergent-intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	0.07-0.70		Euhedral	Pseudomorphosed by calcite and other secondary minerals.
Spinel	<1	<1	0.01-0.03	Chromite	Euhedral	Included in olivine and dispersed in groundmass.
GROUNDMASS						
Plagioclase	14	18	0.02-1.70	An50-70	Subhedral euhedral	Microliths to fine grained, with replaced cores.
Clinopyroxene	7	7	0.01-0.20	Diopside?	Subhedral	
Mesostasis	17	23	N/A		Anhedral	
Crystallites	15	15	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Colorless to very pale yellow greenish, with high birefringence and relief.
Clays	24	Vesicles	Colorless to pale yellow greenish clay with high birefringence and relief.
Carbonate	2	Olivine, vesicles	
Chlorite	<1	Olivine	
Fe oxide	3	Mesostasis	
Cryptocrystallites	7	?	Included allophanous clay.
Clays	1	Plagiocalse	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	25	Even	0.04-2.60	Clay	Round, irregular

COMMENTS: ?????????CANNOT READ COPY?????? (NO UNIT NUMBER GIVEN).

124-768C-85R-02 (Piece 4, 52-54 cm) OBSERVER: SAP WHERE SAMPLED: Chilled margin of pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Sub-variolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	12	0.07-1.60		Euhedral	Pseudomorphosed by secondary mineral.
Spinel	<1	<1	0.02	Chromic oxide	Euhedral	Included in olivine and in gm.
GROUNDMASS						
Plagioclase	17	20	Max. 0.8	An50-70	Euhedral	Microliths near chilled, to fine grained.
Olivine	0	7	~0.5		Subhedral	Skeletal
Clinopyroxene	4	4	0.02-0.45	Diopside?	Subhedral	Skeletal near chilled margin.
Mesostasis	25	30	?		Anhedral	Including cryptocrystallites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Very pale green to colorless fibrous high relief clay.
Clays	30	Vesicles, plagioclase	Very pale green to colorless fibrous high relief clay.
Carbonate	<1	Olivine	
Allophane	6	gm	
Fe oxide	7	Olivine, mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	27	Even	0.04-0.70		

COMMENTS: Rock shows abrupt chilling and a relatively more crystalline portion.(NO UNIT NUMBER GIVEN).

124–768C–86R–01 (Piece 6, 51–53 cm) OBSERVER: SAP WHERE SAMPLED: Near chilled pillow border

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Divergent–intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	0.04–0.60		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	Trace	Trace	0.02	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	17	20	Max. 1.40	An50–70	Euhedral	Microliths in chilled portion.
Clinopyroxene	10	10	~0.1	Diopside?	Subhedral	
Mesostasis	21	27	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine, plagioclase, mesostasis	Pale green, fibrous high relief and birefringent mineral, including chlorite/smectite.
Clays	40	Vesicles	Pale green fibrous high relief and biref mineral, including chlorite/smectite.
Fe oxide	10	Olivine, Mt.	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicise	33	Even	0.02–1.00		Irregular, round

COMMENTS: Chilled portion ends abruptly to more crystalline portion. Plagioclase may be skeletal, whose cores are glassy, or are transformed to either K-feldspar or a less calcic plagioclase. (NO UNIT NUMBER GIVEN).

124–768C–87R–01 (Piece 2D, 107–109 cm) OBSERVER: SAP WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Intesertal, phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	8	0.12–1.10		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	Trace	Trace	0.02		Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	28	35	0.04–0.20	An50–70	Euhedral	
Mesostasis	15	25	N/A		Anhedral	Magnetite and glass.
Clinopyroxene	8	12	0.07	Diopside?	Subhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Plagioclase	With kaolinite(?)/illite
Clays	24	Vesicles, olivine	With smectite lining walls of vesicles, pale greenish fibrous clay.
Carbonate	4	Olivine	
Iddingsite	<1	Olivine	
Serpertine	<1	Olivine	
Allophane	8	Plagioclase, mesostasis, pyroxene	Obscurring crystal faces.
Fe oxide	7	Mesostasis, olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Even	0.06–1.20	Clay	Round, lobate

COMMENTS: Kaolinite usually occurs along twinning plane of plagioclase and encroaching into adjacent crystals. (NO UNIT NUMBER GIVEN).

124-768C-87R-02 (Piece 5, 125-126 cm) OBSERVER: SAJ WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal, phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	8	0.09-.002		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	Trace	Trace	0.014	Chromite	Euhedral	Inclusions in olivine.
GROUNDMASS						
Plagioclase	28	31	N/A		N/A	
Clinopyroxene	10	10	N/A		N/A	
Mesostasis	20	25	N/A		N/A	
Magnetite	1	1	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	32	Olivine, vesicles	Pale greenish to colorless fibrous mineral.
Clays	3	Plag, mesostasis	Kaolinite/illite.
Carbonate	<1	Olivine	
Fe oxide	4	Mesostasis	Altering mt. in mesostasis.
Iddingsite	<1	Olivine	
Allophane	2	Plag, mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	25	Even	0.03-2.3	Clay	Round, lobate	2 size classes.

124-768C-88R-02 (Piece 3, 30-31 cm) OBSERVER: SAJ WHERE SAMPLED: Pillow

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	0.15-0.70		Euhedral	Pseudomorphosed by secondary minerals.
Spinel	<1	<1	.015	Chromite	Euhedral	Included in olivine.
GROUNDMASS						
Plagioclase	9	18	Max.0 .57	An50-70	Microliths, lath, skeletal	
Clinopyroxene	2	2	0.05		Subhedral, microlith	
Mesostasis	40	40	N/A		N/A	Including crystallites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	8	Plagioclase, mesostasis	Kaolinite/illite
Clays	40	Olivine, vesicles	Pale green and colorless clay mineral.
Carbonate	<1	Olivine, vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	30	Even	0.007-0.900	Crystallites, clay	Round, lobate	Includes fractures.

COMMENTS: Chilled portion are characterized by glass and quenched pyroxene and plagioclase. One fracture (?) filled with glassy material. (NO UNIT NUMBER GIVEN).

124-768C-88R-02 (Piece 7A, 100-101 cm) OBSERVER: SAP WHERE SAMPLED:

ROCK NAME: Olivine bearing dolerite

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal, aphyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	30	50	0.04	An50-70	Euhedral, tabular, skeletal, subhedral	
Clinopyroxene	25	25	0.04-2.60	Diopside?	Subhedral	Colorless to very faint brown.
Glass	16	18	?		Anhedral	Plus magnetite.
Magnetite	2	2	0.03	Fe oxide	Euhedral	Disseminated in groundmass.
Olivine	0	2	~0.30		Euhedral to skeletal	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	11	Plagioclase, mesostasis, vesicles,	Kaolinite/illite
Clays	8	Vesicles, olivine, mesostasis	Colorless to green, high relief.
Chlorite	<1	Plagioclase	
Fe oxide	4	Olivine, mesostasis	Includes secondary magnetite.
Iddingsite	<1	Olivine	
Uralite	1	Pyroxene	
Carbonate	3	Plag, mesostasis, pyroxene.	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3	Uneven	0.4	Clay	Round, lobate

COMMENTS: Clinopyroxene and plagioclase can be intergrown forming radiate crystals. Illite/kaolinite alters plagioclase along cracks and masks the interstices of the crystals including glass mesostasis. (NO UNIT NUMBER GIVEN).

124-768C-89R-01 (Piece 3B, 69-70 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Dolerite

GRAIN SIZE: Medium-to fine-grained

TEXTURE: Intersertal to subophitic, aphyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	50	50	2.0-0.3	An65-70	Lath	Finer grained in scattered domains with intersertal texture.
Clinopyroxene	27	27	1.0-0.2	Augite	Subhedral-prismatic	Finer grained in scattered domains with intersertal texture.
Mt	3	3	0.15-0.05		N/A	
Mesostasis	0	18	N/A		N/A	Including microliths and skeletal crystals, altered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	11	Mesostasis	
Clays	1	Vesicles	
Carbonate	3	Mesostasis	
Celadonite	2	Mesostasis	
Zeolites	1	Vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	2		2.0-0.5	Clay, zeolite	Spherical, ovoidal	Zeolite is mostly scolecite.

COMMENTS: Marked variations in texture: phaneritic medium to fine-grained dolerite with sparse mesostasis (of original glass) includes domains mm-sized lenticular or vein-like with fine-grained largely glassy intersertal texture often developed around vesicles. (NO UNIT NUMBER GIVEN).

124–768C–89R–02 (Piece 1, 3–4 cm) OBSERVER: SPA WHERE SAMPLED: Sill

ROCK NAME: Olivine dolerite

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	15	~0.5		Euhedral	Entirely altered.
GROUNDMASS						
Plagioclase	40	52	0.05–0.75	An50–70	Lath, skeletal	
Clinopyroxene	>1	>1	0.01–0.25	Diopside?	Subhedral	Incipiently altered to actinolite.
Mesostasis	30	30	N/A		N/A	Glass with pyroxene crystallites.
Magnetite	2	2	~0.04		Euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3	Plagioclase, mesostasis	Including kaolinite/illite.
Clays	9	Olivine, mesostasis	
Carbonate	Trace	Vesicles	
Actinolite	15	Olivine, pyroxene, mesostasis	
Fe oxide	1	Mt, olivine, vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1	Uneven	2.4	Clay, Fe oxide, actinolite	

COMMENTS: (NO UNIT NUMBER GIVEN).

124–768C–89R–02 (Piece 1, 7–10 cm) OBSERVER: SPA WHERE SAMPLED: Sill

ROCK NAME: Olivine dolerite

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	45	54	0.04–1.85	Lab50–70	Lath, skeletal	
Clinopyroxene	<1	<1	0.3–1.6	Diopside?	Subhedral	
Mesostasis	26	30	N/A		N/A	
Magnetite	2	2	N/A		Euhedral	
Olivine	0	10	0.26–1.10		Euhedral	Completely altered to actinolite and clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	7	Vesicles, plagioclase, crystallites	
Zeolites	<1	Vesicles	
Allophane	8		
Actinolite	10	Olivine, crystallites	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	4	Even	0.18–2.60	Empty, zeolites	Round, lobate

COMMENTS: (NO UNIT NUMBER GIVEN).

124–768C–89R–03 (Piece 4, 62–63 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine dolerite

GRAIN SIZE: Medium–to fine–grained

TEXTURE: Aphyric, intersertal/subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	10	0.6–0.3		Sub, prismatic	
Plagioclase	52	52	2.0–0.2	An70–50	Subhedral–euhedral	
Clinopyroxene	12	12	1.0–0.1[1]	Augite	Subhedral	In places ophitic intergranular with plag.
Magnetite	5	5	0.1		Euhedral, skeletal	
Mesostasis	15	25	N/A		N/A	Devitrified, partly altered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Mesostasis	
Chlorite	1	Mesostasis	Strong pleochroism, blue–green
Zeolites	Trace	Cavities	
Actinolite	4	Cavities	Partly formed after clinopyroxene
Hematite	6	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Cavity	6		2–5		Ovoidal, spherical	Largest probably originated by degassing.

COMMENTS: GROUNDMASS CONT: Apatite, trace, trace, euhedral needles. (NO UNIT NUMBER GIVEN).

124–768C–89R–05 (Piece 2, 36–37 cm) OBSERVER: SPA WHERE SAMPLED: Sill

ROCK NAME: Microgabbro

GRAIN SIZE: Fine to medium–grained

TEXTURE: Hyphyiomorphic granular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	48	55	0.07–2.22	An50–70	Euhedral, tabular	
Clinopyroxene	29	30	0.52–1.85	Diopside?	Subhedral, anhedral	
Mesostasis	0	12	N/A		N/A	Altered to chl. activelite and clay.
Magnetite	3	3	.007–0.15	Fe oxide	Euhedral, skeletal	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	4	Plagioclase, mesostasis	Including kaolinite/illite.
Carbonate	<1	Mesostasis	
Chlorite	<1	Mesostasis	
Actinolite	6	Mesostasis, plagioclase, px	
Allophane	10	Mesostasis, plagioclase	Amorphous, isotropic clays.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Dark intergranular interstices are interpreted as mesostasis. (NO UNIT NUMBER GIVEN).

124-768C-92R-01 (Piece 4A, 60-61 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine microgabbro

GRAIN SIZE: Medium to fine-grained

TEXTURE: Subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	15	1.2-0.5		Subhedral, prismatic	
Plagioclase	50	50	2.0-0.2	An85-30	Laths	
Clinopyroxene	22	22	3.0-0.2	Augite	Subhedral, prismatic	
Orthopyroxene	2	2	0.6-0.4	Bronzite	Subhedral, prismatic	Incipiently altered to clays.
Accessories	4	5	0.4-0.1		N/A	Inclusions: Ti-magnetite, apatite, hornblende and phlogopite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15	Olivine	Plae yellow - green.
Clays	9	Mesostasis	
Actinolite	1		Replacing/overgrown on cpx, opx and hornblende.
Clays	2	Phlogopite, mesostasis	Blue green celadonite replacing phlogopite and mesostasis.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Groundmass continued: Mesostasis, present percent=5, original percent=15, comments= microliths of plag, pyroxene, apatite, opaques and altered glass. Comments: Mostly plutonic texture - Late magmatic hydrous phases include green hornblende and phlogopite replaced in post-magmatic stages by actinolite and clays.

124-768C-93R-01 (Piece 2F, 110-116 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine microgabbro

GRAIN SIZE: Medium to fine-grained

TEXTURE: Gabbroic to subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	20	1.2-0.5		Subhedral, prismatic	Small crystals included within cpx.
Plagioclase	37	40	2.0-0.2	An85-60	Laths	Altered to clays along cracks.
Clinopyroxene	22	24	2.0-0.2	Augite	Subhedral, prismatic	Incipiently altered to clays.
Orthopyroxene	3	6	1.5-2.0	Bronzite	Subhedral, prismatic	Columnar, incipiently altered.
Hornblende	2	2	0.5-0.2		Subhedral, prismatic	Reddish brown to pale green color.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	20	Olivine	Yellow-green smectites.
Clays	8	Plag, cpx, opx	
Hydromica	3	Phlogopite	Blue green pseudomorphing phlogopite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Groundmass continued: Phlogopite, present percent=2, original percent=5, size=0.6-0.2 mm, morphology=plates, comments=orange color, isolated crystals replacing cpx. Accessories, present percent=3, original percent=3, size=0.15-0.05 mm, comments=Fe-Ti oxides and apatite.

124-768C-93R-03 (Piece 2X, 77-78 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine microgabbro

GRAIN SIZE: Medium to fine-grained

TEXTURE: Gabbroic - subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	25	1.3-.15		Subhedral, prismatic	Small crystals included in cpx.
Plagioclase	33	35	2.0-0.3	An85-60	Laths	Invaded by clays along cracks.
Clinopyroxene	19	20	1.5-0.2	Augite	Subhedral, prismatic	Incipiently replaced by hornblende and mica.
Orthopyroxene	2	4	0.5-0.2	Bronzite	Subhedral, prismatic	Mostly columnar.
Phlogopite	2	8	0.6-0.2		N/A	Largely altered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	25	Olivine	Yellow smectite and irresolvable turbid clays.
Clays	6	Plag, pyroxene, hornblende	Also filling intergranular spaces.
Actinolite	4	Pyroxene, hornblende	
Hydromica	6	Mica	Green and blue - green.
Fe-oxides	trace	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Hornblende: present percent=1, original percent=4, size=0.4 mm, morphology=subhedral, prismatic. Accessories, present percent=2, original percent=2, size=0.15-0.05 mm, comments=granular Fe-Ti oxides and columnar apatite.

124-768C-94R-01 (Piece 4A, 74-77 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine microgabbro

GRAIN SIZE: Medium to fine-grained

TEXTURE: Subophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	13	1.0-0.5		Subhedral, prismatic	
Plagioclase	42	47	2.5-0.8	An85-55	Plates	
Clinopyroxene	24	25	1.5-0.3	Augite	Subhedral, prismatic	Pale brown color.
Mesostasis	5	7	N/A		N/A	Microfelsite with microliths.
Mica	trace	5	0.3	Mg	Plates	Relics of orange colored phlogopite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	7	Plag, cpx, mesostasis	
Clays	8	Olivine	Yellow and green smectite.
Carbonate	4	Olivine	At cores of altered crystals.
Actinolite	1		Mostly fringing augite.
Fe oxide/hydroxide	trace	Olivine, mesostasis	Staining altered olivine and mesostasis.
Hematite	1	Olivine, mesostasis	Disseminated granules.
Hydromica	5	Mica	Blue - green.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: The rock is crossed by a vein 0.4 to 0.15 mm thick, filled with carbonate and clays which is in turn cut by a veinlet (0.04 mm in width) of albite. Groundmass continued: Accessories, present percent=3, original percent=3, comments=Fe-Ti oxides and apatite.

124-768C-95R-01 (Piece 4, 30-33 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, hypocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	10	1.0-0.3		Euhedral, prismatic	
GROUNDMASS						
Plagioclase	5	15	7.0-0.05	Labradorite	Laths	Largely altered to clays.
Clinopyroxene	5	5	0.3-0.05	Augite	Subhedral, prismatic	
Mesostasis	40	50	N/A		N/A	Poorly resoviable intergrowth of plag, cpx and Fe-Ti oxides within altered glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Green smectite.
Clays	50	Mesostasis, vesicles, plag	Pale green and colorless.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	30	Even	2.5-.05	Clays	Spherical, lobate	Two size groups: >1 mm and 0.1 .o5 mm.

124-768C-96R-01 (Piece 8A, 106-108 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Aphyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	trace	35	2.5-0.15		Laths	Crystals with length/width ratio ~20:1.
Clinopyroxene	15	15	0.2-0.1	Augite	Microliths, skeletal crystals	
Mesostasis	30	40	N/A		N/A	Poorly resolvable intergrowth of plag, cpx and Fe-Ti oxides within altered glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15	Plag, mesostasis	Pale yellow green and green smectites.
Clays	10	Vesicles	Pale yellow green, lining vesicles.
Plagioclase	25	Plag	Albite/oligoclase pseudomorphing plagioclase.
K-feldspar	5	Plag	Replacing at crystal cores.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	25	Even	2.5-0.05	Clays	Spherical, lobate

124-768C-96R-03 (Piece 15A, 126-128 cm) OBSERVER: SPA WHERE SAMPLED: Pillow core

ROCK NAME: Olivine dolerite

GRAIN SIZE: Medium to fine-grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1	1.5		Euhedral, prismatic	
GROUNDMASS						
Olivine	0	4	1.2		Euhedral, prismatic	Altered to clays and carbonate.
Plagioclase	30	40	3.0-0.2	An50-70	Laths	
Clinopyroxene	20	20	2.0-.05	Augite	Subhedral, prismatic	Pale brown core to purple brown rim.
Fe-Ti oxides	5	5	0.1-.05		Skeletal, granular	
Mesostasis	10	15	N/A		N/A	Poorly resolvable aggregate of plag, cpx and Fe-Ti oxides within altered glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	9	Olivine, mesostasis	Mostly reddish brown, colorless and green smectites.
Clays	14	Vesicles	
Carbonate	2	Olivine, vesicles	Replacing olivine at crystal cores, also in amygdules.
K-feldspar	10	Plag	Replacing plag at crystal cores.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	15	Even	1.0-.05	Clays, carbonate	Spherical, ovoid	Clay filling in concentric layers of colorless and brown smectite (outer part) and celadonite (inner part).

124-768C-97R-03 (Piece 5, 55-59 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine dolerite

GRAIN SIZE: Medium to fine-grained

TEXTURE: Aphyric, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Olivine	0	2	0.5		Euhedral, prismatic	
Plagioclase	15	30	3.0-.05	Labradorite	Laths	Replaced by K-feldspar and zeolites at cores.
Clinopyroxene	30	30	1.5-.05	Augite	Prism, skeletal	
Fe-Ti oxides	5	5	0.1-.05		Grains	Ti-magnetite
Mesostasis	5	13	N/A		N/A	Poorly resolvable microliths of plag, cpx and Fe-Ti oxides and altered glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine	Reddish brown iddingsite.
Clays	13	Vesicles, mesostasis	Green and colorless smectite, pale green celadonite.
Carbonate	6	Vesicles	Fibrous radiate aggregates and patchy crystals.
Zeolites	12	Plag, vesicles	Mostly fibrous.
K-feldspar	12	Plag	
Fe hydroxide	trace	Mesostasis	Staining altered mesostasis.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Even	2.0-0.2	Zeolite, clay, carbonate	Spherical, lobate

124-768C-98R-01 (Piece 7, 67-69 cm) OBSERVER: SPA WHERE SAMPLED: Pillow rim

ROCK NAME: Olivine basalt

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Phyric, hypocrystalline, subvariolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2	1.0-0.4		Euhedral, prismatic	Irregularly distributed.
GROUNDMASS						
Plagioclase	0	7	0.05		Laths	
Clinopyroxene	3	3	0.05		Skeletal	
Mesostasis	45	65	N/A		N/A	Intergrown skeletal plag and cpx in bundles and radiate aggregates with interposed altered glass, or altered glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine	Colorless smectite.
Clays	50	Plag, mesostasis, vesicles	
Zeolites	trace	Olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	25	Even	1.0-.03	Clays	Spherical, ovoidal

124-768C-98R-03 (Piece 3B, 68-69 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivien basalt

GRAIN SIZE: Fine to medium-grained

TEXTURE: Aphyric, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	trace	1		Euhedral, prismatic	
GROUNDMASS						
Olivine	0	12	0.5-.15		Subhedral, prismatic	
Plagioclase	5	25	1.2-0.2	Labradorite	Laths	
Clinopyroxene	25	25	2.0-.05	Augite	Euhedral - subhedral	Columnar habit.
Fe-Ti oxides	2	2	0.2-.05		Grains, skeletal crystals	
Mesostasis	10	21	N/A		N/A	Irresolvable intergrowth of plag, cpx with interstitial glass dusted with opaques.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	12	Olivine	Mostly reddish brown iddingsite.
Clays	26	Mesostasis, plag, vesicles	Colorless, green and orange.
Zeolites	20	Plag, vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	15	Even	2.0-.15	Zeolite, clays	Spherical, ovoidal, angular

124–768C–99R–02 (Piece 3A, 100–104 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine basalt

GRAIN SIZE: Fine–grained

TEXTURE: Hypocrystalline, subvariolitic, phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2	0.5–0.3		Euhedral, prismatic	
Spinel	trace	trace	0.01	Chromite	Grains	Dark brown Cr–spinel.
GROUNDMASS						
Olivine	0	trace	0.2		Grains	
Plagioclase	0	2	0.2		Laths	
Clinopyroxene	trace	trace	0.4		Acicular crystals	
Crystallites & glass	48	81	N/A		N/A	Glass devitrified and altered P.P. crystallites of plag and clinopyroxene.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	2	Olivine	
Clays	50	Vesicles, glass and crystallites	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	15	Irregular	0.5–.03	Clays	Ovoidal, spherical

COMMENTS: The rock is fractured into cm–sized fragments cemented by veins 1 to 6 mm thick with composite fillings of clays and carbonate.

124–768C–99R–04 (Piece 3, 49–50 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine–grained

TEXTURE: Phyric, intersertal–radiate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3	1.0–0.3		Euhedral, prismatic	Isolated and glomerophyric, sometimes hollowed crystals.
Spinel	trace	trace	.02	Chromite	Grains	Dark brown Cr–spinel.
GROUNDMASS						
Olivine	0	7	1.0–0.3		Plates	Typical habit of quenched olivine.
Plagioclase	20	20	0.3–.03	Labradorite	Laths	
Clinopyroxene	trace	trace	.03		Skeletal	
Mesostasis	20	50	N/A		N/A	Crystallites within altered and devitrified glass dusted with opaques.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Olivine	Reddish brown iddingsite.
Clays	50	Vesicles, mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Even	1.0–.03	Clays	Lobate, spherical, ovoidal

124–768C–100R–01 (Piece 3B, 34–35 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal–radiate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	5	1.0–0.3		Euhedral grains	Isolated and glomerophyric.
Spinel	trace	trace	.01	Chromite	Grains	Included mostly in olivine.
GROUNDMASS						
Olivine	0	10	1.0–0.5		Plates	Quenched crystals.
Plagioclase	15	25	1.0–0.1	Labradorite	Laths, skeletal crystals	
Clinopyroxene	trace	trace	~.15	Augite	Microliths	Acicular habit.
Mesostasis	10	25	N/A		N/A	Crystallites within altered and devitrified glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15	Olivine	Mostly pale yellow green smectite.
Clays	55	Plag, vesicles, mesostasis	
K-feldspar	5	Plag	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	25	Even	1.5–.05	Clays	Spherical, ovoidal, and lobate

124–768C–100R–01 (Piece 12A, 115–119 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine basalt

GRAIN SIZE: Fine-grained

TEXTURE: Phyric, intersertal–radiate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3	0.5–0.2		Euhedral, prismatic	
Spinel	trace	trace	0.02	Chromite	Grains	Dark brown, black.
GROUNDMASS						
Plagioclase	0	25	1.5–0.1		Laths	
Clinopyroxene	2	2	0.3–.05		Subhedral, prismatic, skeletal	
Mesostasis	10	55	N/A		N/A	Devitrified, altered glass with crystallites.
Olivine	0	trace	0.3		Plates	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3	Olivine	Reddish brown iddingsite.
Clays	55	Plag, vesicles, mesostasis	
Carbonate	5	Vesicles	
Zeolites	25	Plag, vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	15	Even	10–.05	Clays, zeolites, carbonate	Spherical, ovoidal, lobate	Two size classes.

124–768C–100R–02 (Piece 2, 17–19 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Aphyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	40	50	2.0–0.1	Labradorite	Laths	
Clinopyroxene	25	25	1.2–.03	Augite	Subhedral, prismatic	
Fe–Ti oxides	3	3	.03–.01		Grains, skeletal crystals	
Mesostasis	5	12	N/A		N/A	Devitrified, altered glass with crystallites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10	Plag, mesostasis	
Clays	9	Vesicles	
Carbonate	1	Vesicles	
Hematite	trace	Mesostasis	
K-feldspar	7		

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10	Even	2.0–.15	Clays	Spherical, lobate

124–768C–100R–02 (Piece 5, 53–55 cm) OBSERVER: SPA WHERE SAMPLED:

ROCK NAME: Olivine phyric basalt

GRAIN SIZE:

TEXTURE: Phyric, intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	15	1.2–0.2		Euhedral, prismatic	
GROUNDMASS						
Plagioclase	20	35	1.0–.05	Labradorite	Laths	
Clinopyroxene	20	20	1.0–.05	Augite	Subhedral, prismatic	
Fe–Ti oxides	3	3	.05		Grains, skeletal crystals	
Mesostasis	5	12	N/A		N/A	
Olivine	0	2	0.2–0.1		Subhedral grains	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	17	Olivine	Reddish brown iddingsite.
Clays	24	Plag, mesostasis, vesicles	
Carbonate	1	Vesicles	
K-feldspar	10	Plagioclase	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	13	Even	2.0–.15	Clays, carbonate	Spherical, lobate