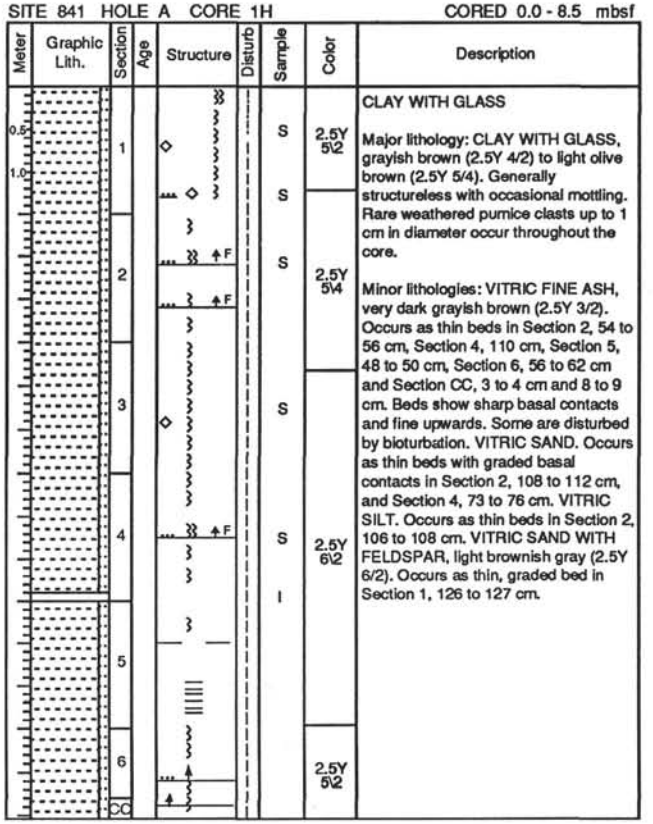
135-841A-1H
SMEAR SLIDE SUMMARY (%):

	1, 50 D	1, 127 M	2, 56 M	3, 75 D	4, 75 M
TEXTURE:					
Sand	10	50	20	---	70
Silt	10	45	70	5	30
Clay	80	5	10	95	—
COMPOSITION:					
Accessory minerals	---	Tr	5	Tr	Tr
Clay	75	5	5	80	—
Foraminifers	Tr	---	---	---	—
Glass	20	85	80	15	95
Nannofossils	5	---	---	5	—
Plagioclase	---	10	10	---	5

SITE 841 HOLE A CORE 1H CORED 0.0 - 8.5 mbsf

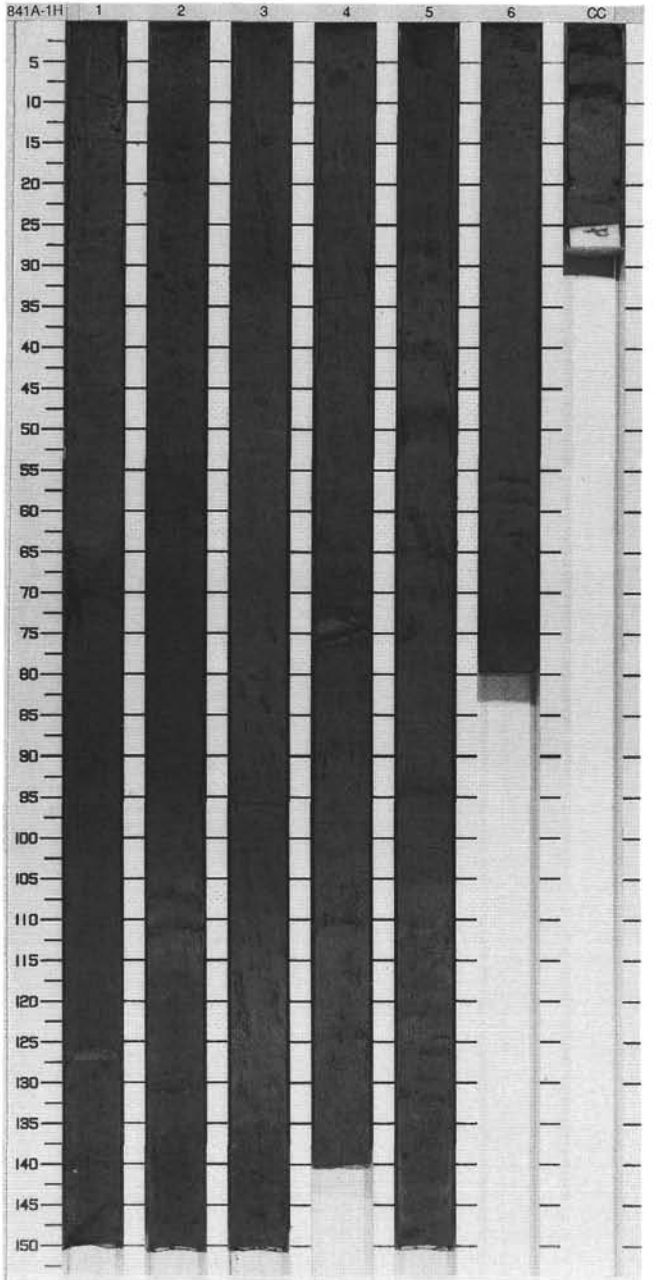


Description

CLAY WITH GLASS

Major lithology: CLAY WITH GLASS, grayish brown (2.5Y 4/2) to light olive brown (2.5Y 5/4). Generally structureless with occasional mottling. Rare weathered pumice clasts up to 1 cm in diameter occur throughout the core.

Minor lithologies: VITRIC FINE ASH, very dark grayish brown (2.5Y 3/2). Occurs as thin beds in Section 2, 54 to 56 cm, Section 4, 110 cm, Section 5, 48 to 50 cm, Section 6, 56 to 62 cm and Section CC, 3 to 4 cm and 8 to 9 cm. Beds show sharp basal contacts and fine upwards. Some are disturbed by bioturbation. VITRIC SAND. Occurs as thin beds with graded basal contacts in Section 2, 108 to 112 cm, and Section 4, 73 to 76 cm. VITRIC SILT. Occurs as thin beds in Section 2, 106 to 108 cm. VITRIC SAND WITH FELDSPAR, light brownish gray (2.5Y 6/2). Occurs as thin, graded bed in Section 1, 126 to 127 cm.

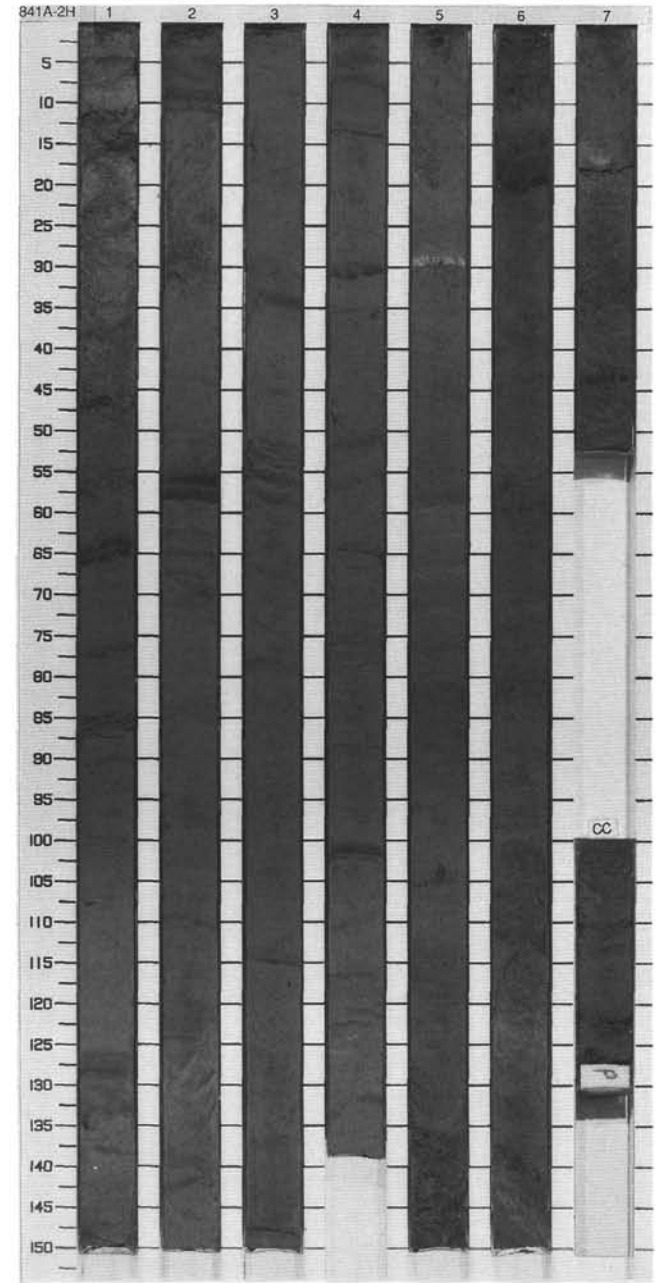


135-841A-2H
SMEAR SLIDE SUMMARY (%):

	2, 57 M	2, 80 D	5, 19 D	5, 29 M	6, 19 M
TEXTURE:					
Sand	85	5	0	60	75
Silt	10	10	25	35	15
Clay	5	85	75	5	10
COMPOSITION:					
Accessory minerals	---	---	Tr	---	---
Clay	5	85	---	5	5
Glass	95	15	100	90	90
Nannofossils	---	Tr	---	---	---
Plagioclase	Tr	Tr	---	5	5

SITE 841 HOLE A CORE 2H — CORED 8.5 - 18.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 / 1.0		1, 2, 3, 4, 5, 6, 7, CC				S, S, I, S, S	5G 5/1; 5GY 5/1; 5Y 5/3; 10YR 6/4	CLAY WITH GLASS and VITRIC SAND. Major lithologies: CLAY WITH GLASS, pale olive (5Y 6/3) to greenish gray (5G 5/1), generally structureless but with localized mottling. Occasional clasts of weathered pumice occur throughout the core. VITRIC SILT, dark gray (5Y 4/1). Occurs as graded beds, 1 to 6 cm thick, throughout the core. The beds usually show sharp basal contacts with the underlying lithology. Minor lithologies: VITRIC SAND, dark gray (N4). Occurs as graded intervals, 2–4 cm thick, interbedded within clay with glass, in Section 1, 65 cm, Section 5, 30 cm, and Section 6, 144 cm. VITRIC FINE ASH, very dark grayish brown (2.5Y 3/2), occurs as thin beds (1 to 2 cm thick) in Section 4 at 31, 65, 102, 117, and 122 cm and Section 6 at 111 cm. In Section 4, at 65 and 122 cm, the ash layers are disrupted due to microfaulting. In Section 6, 15 to 19 cm and Section 7, 44 cm, graded, very dark gray (2.5Y 3/0) COARSE VITRIC ASH occurs.

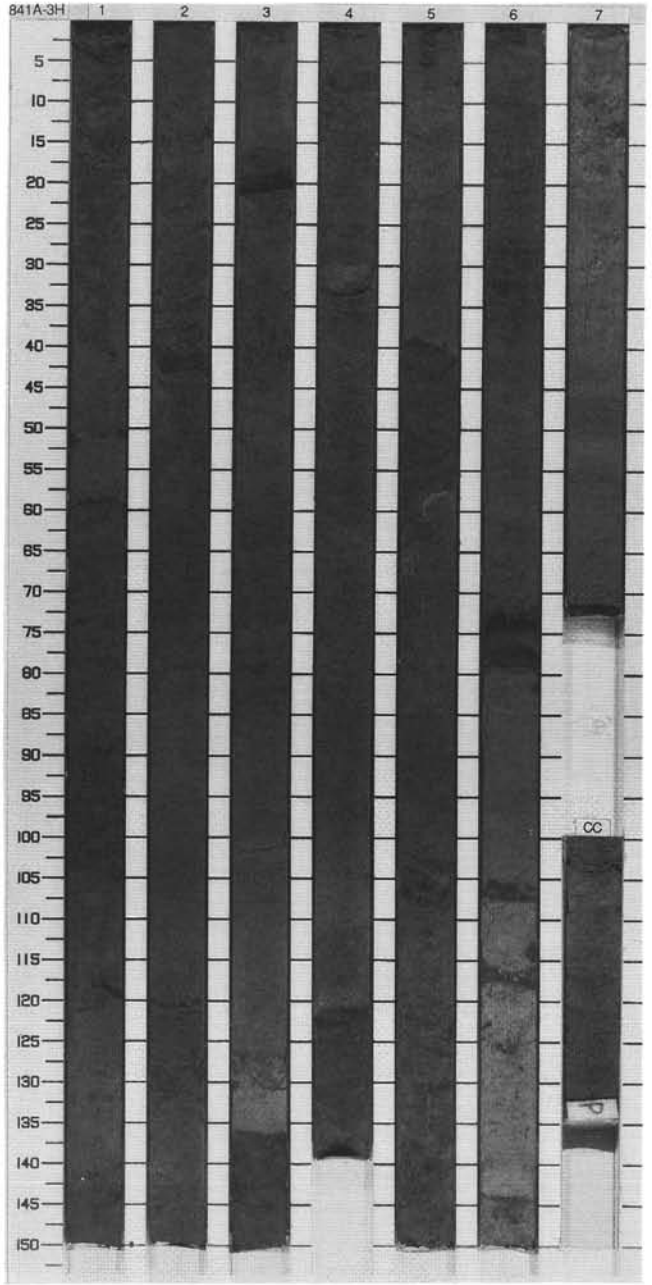


135-841A-3H
SMEAR SLIDE SUMMARY (%):

	2, 64 D	3, 18 D	4, 64 M	6, 143 M
TEXTURE:				
Sand	---	85	20	5
Silt	4	6	56	95
Clay	96	9	24	--
COMPOSITION:				
Accessory minerals	Tr	2	1	Tr
Clay	96	9	24	--
Feldspar	2	4	5	1
Glass	2	---	70	99
Opaques	---	---	Tr	--
Rock fragment	---	85	---	--
Spicules	Tr	---	--	--

SITE 841 HOLE A CORE 3H CORED 18.0 - 27.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1						CLAY Major lithology: CLAY, light yellowish brown (10YR 6/4) to yellowish brown (10YR 5/4), generally homogeneous except for slight mottling and occasional pumice clasts scattered throughout the core. Minor lithologies: VITRIC COARSE ASH, occurs as 0.5 to 1 cm thick graded beds in Section 1, 51 and 59 cm, Section 3, 20 cm, and Section 6, 75 and 106 cm. VITRIC FINE ASH, occurs as 1 cm thick bed in Section 6, 79 cm. VITRIC SILT WITH CLAY, occurs as thin graded beds in Section 4, 30–33 and 64–66 cm. VITRIC SAND, occurs as 0.5 to 2 cm thick graded beds in Section 2, 23 cm, 26 cm, and 40 cm and Section 6, 116 cm.
		2				S	10YR 6/4	
		3				S		
		4				S	10YR 5/4 To 10YR 6/4	
		5				I	10YR 6/4	
		6				S	10YR 7/3	
		7					10YR 6/4	
		CC						

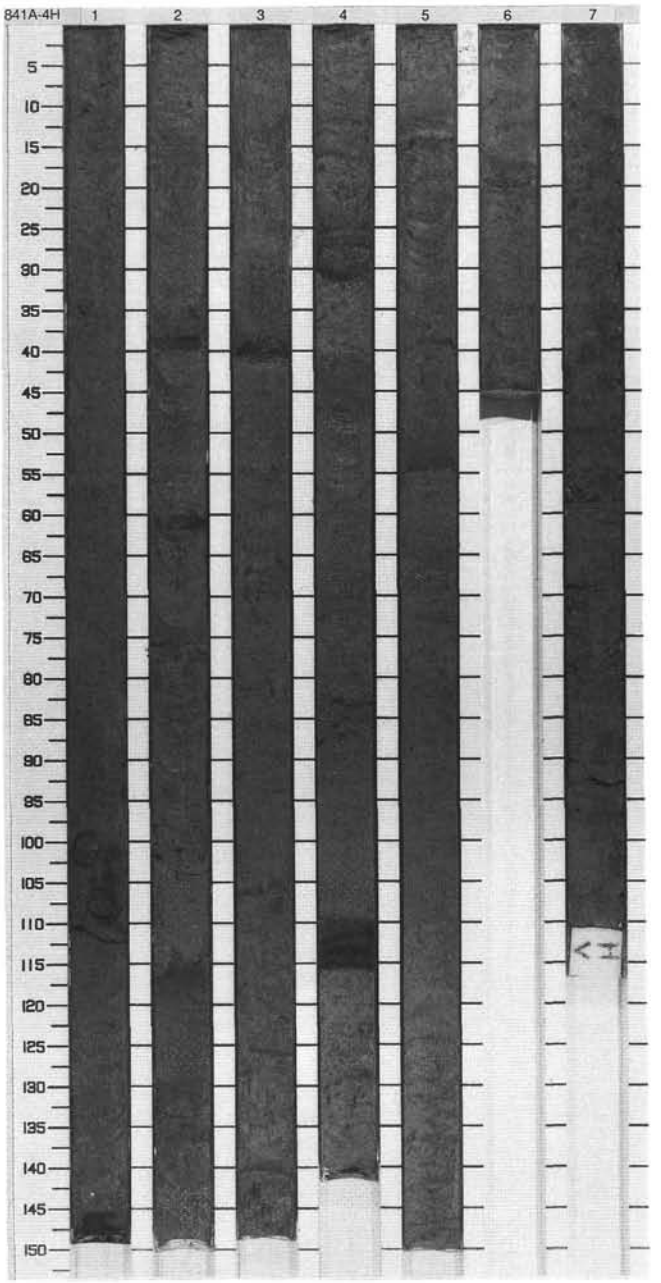


135-841A-4H
SMEAR SLIDE SUMMARY (%):

	4, 44 M	4, 124 M
TEXTURE:		
Sand	10	---
Silt	85	1
Clay	5	99
COMPOSITION:		
Accessory minerals	Tr	Tr
Clay	3	9
Feldspar	2	1
Glass	95	90
Opaques	---	Tr

SITE 841 HOLE A CORE 4H CORED 27.5 - 37.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0	Void	1 2 3 4 5 6 7		F F		S S	10YR 6/4	CLAY Major lithology: CLAY, light yellowish brown (10YR 6/4), generally homogeneous, although minor mottling and manganese staining occurs throughout. A sub-vertical clay injection structure occurs in Section 3 from 5 to 28 cm. Minor lithologies: COARSE ASH, dark brown (7.5YR 3/4), very thin graded beds occur in Section 1, 146–150 cm, and Section 2, 37–38 and 60 to 61 cm. FINE ASH, gray (5Y 5/1) to very dark gray (5Y 3/1). Very thin graded beds occur in Section 3, 39–41, 124–127 and 137–141 cm, Section 5, 10–14, 38–40, 49–55, and 63–68 cm, and Section 6, 13–20 cm. VITRIC SILT, very dark grayish brown (2.5Y 3/1) to reddish brown (5YR 5/3). Occurs as thin graded beds, with occasional planar laminae, in Section 4, 25–26, 30–31, 42–46 and 109–116 cm. VOLCANIC BRECCIA occurs in Section 1, 100–110 cm, with clasts up to 4 cm in diameter, comprising fine grained sedimentary breccia. Black coatings, possibly manganese oxide, occur on grains within breccia.

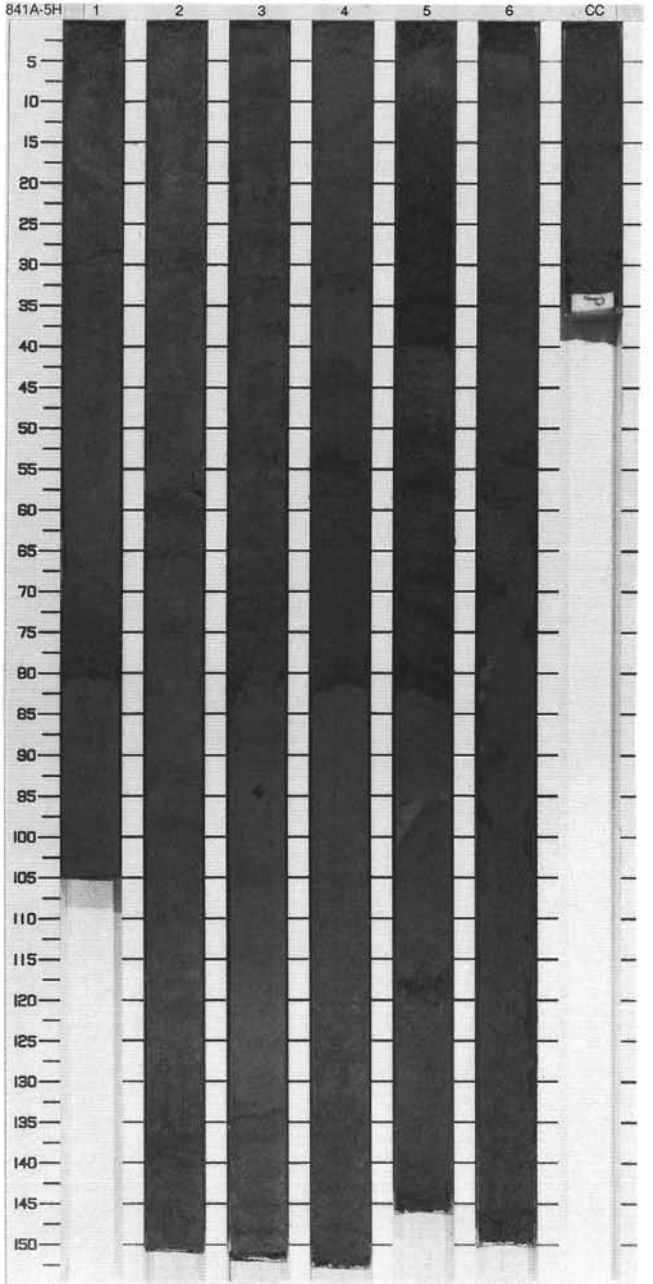


135-841A-5H
SMEAR SLIDE SUMMARY (%):

	2, 59 M	3, 40 D	3, 132 D	4, 80 M	5, 39 M	CC, 6 D
TEXTURE:						
Sand	20	---	---	5	10	–
Silt	77	3	3	95	80	6
Clay	3	97	97	---	10	94
COMPOSITION:						
Accessory minerals	1	Tr	Tr	1	5	Tr
Clay	3	97	97	22	10	94
Feldspar	6	Tr	1	2	10	6
Glass	90	3	2	75	75	–

SITE 841 HOLE A CORE 5H CORED 37.0-46.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 / 1.0	Void	1		F			10YR 6/4 To 5Y 4/2	CLAY Major lithology: CLAY, light yellowish brown (10YR 6/4) in Section 1 through Section 3, 80 cm, and greenish gray (5G 5/1) to dark greenish gray (5GY 4/1) below Section 3, 80 cm. Generally homogeneous, although slight mottling occurs throughout and isolated, faint planar laminations occur in Section 3, 3–80 cm. Minor lithologies: VITRIC SILT, greenish gray (5G 5/1) to gray (5Y 4/1), grading up into clay. Occurs as thick beds in Section 4, 20–30 cm and 55–82 cm, and as thin beds in Section 5, 55–57 cm, and Section 6, 0–3 cm and 55–56 cm. Very thin graded beds, 1–2 cm thick of VITRIC SILT WITH FELDSPAR, black (2.5Y 7/0) occur in Section 5, between 36 and 40 cm. VITRIC FINE ASH, very dark grayish brown (2.5Y 3/2) to olive gray (5Y 4/2) occur in Section 1, 73–81 cm, Section 2, 57–66 and 98–99 cm. VITRIC COARSE ASH, black (2.5Y 7/0) occurs as thin graded intervals, 1 to 2 cm thick, in Section 5, 22–23 cm, 54–55 cm, 68–70 cm, and 79–81 cm.
		2				S	10YR 6/4	
		3				S	5GY 5/1 To 5Y 4/1	
		4		F F F		S	5GY 5/1 To 2.5Y 7/0	
		5				S	5GY 5/1	
		6		F			5GY 4/1	
		CC				S	5GY 5/1	

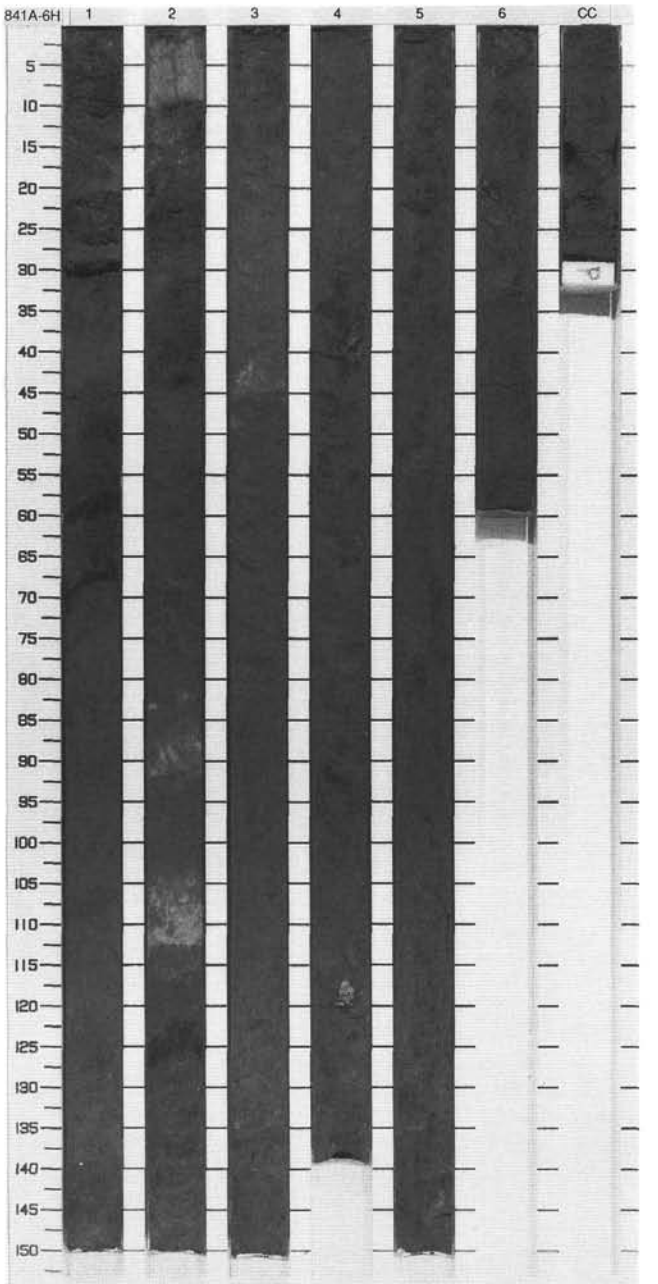


135-841A-6H
SMEAR SLIDE SUMMARY (%):

	2, 5 M	2, 111 D	2, 116 M	2, 126 M
TEXTURE:				
Sand	---	22	5	10
Silt	92	70	90	88
Clay	8	8	5	2
COMPOSITION:				
Accessory minerals	---	Tr	Tr	1
Clay	8	8	4	2
Feldspar	6	4	1	2
Glass	86	88	95	95
Opaques	---	Tr	---	---

SITE 841 HOLE A CORE 6H CORED 46.5 - 56.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1			WWWWWWW		5GY 4/1	CLAY Major lithology: CLAY, dark greenish gray (5GY 3/1 to 5GY 4/1), homogeneous with slight mottling and scattered pumice clasts, up to 3 cm in diameter. Minor lithologies: VITRIC SILT, light gray (5GY 6/1), gray (5Y 6/2) and grayish black (5Y 2.5/1) occurs in Section 2, 0–9 cm, 104–113 cm, 113–116 cm, and 123–127 cm, and in Section 3, 43–45 cm. VITRIC COARSE ASH, black (2.5Y 2/0), up to 2 cm thick layers occur in Section 1, 49–50 cm, 58–60 cm, and 66–67 cm.
		2				S	5GY 3/1	
		3				S S		
		4						
		5				I	5GY 4/1	
		6						
		CC						

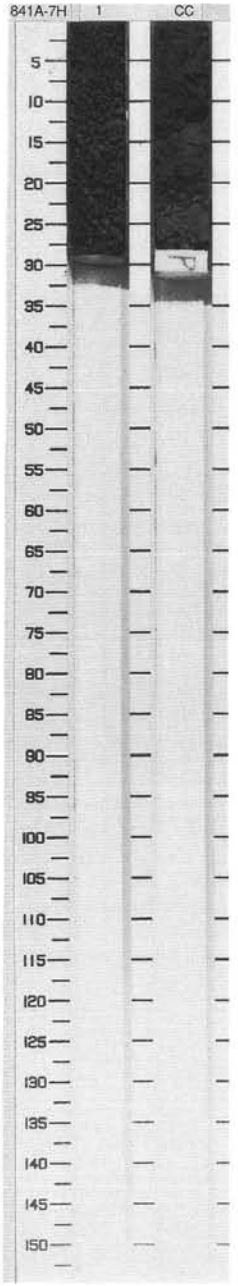


135-841A-7H
SMEAR SLIDE SUMMARY (%):

	1, 6 D
TEXTURE:	
Sand	30
Silt	70
Clay	—
COMPOSITION:	
Accessory minerals	2
Feldspar	10
Glass	88

SITE 841 HOLE A CORE 7H CORED 56.0 - 65.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5		1 CC	Pli		WWW	S	5G 4/1	SILTY GRAVEL and VITRIC SILT WITH FELDSPAR. Major lithologies: SILTY GRAVEL, dark greenish gray (5G 4/1), granule-sized, poorly sorted oligomict gravel. Maximum clast size up to 1 cm. VITRIC SILT WITH FELDSPAR, dark greenish gray (10Y 4/1), structureless. Minor lithology: None.



135-841A-8H
SMEAR SLIDE SUMMARY (%):

	1, 65 M	3, 53 M	3,70 D
TEXTURE:			
Sand	60	40	20
Silt	30	50	5
Clay	10	10	75
COMPOSITION:			
Clay	10	Tr	35
Feldspar	10	5	—
Glass	80	95	65

135-841A-9X
SMEAR SLIDE SUMMARY (%):

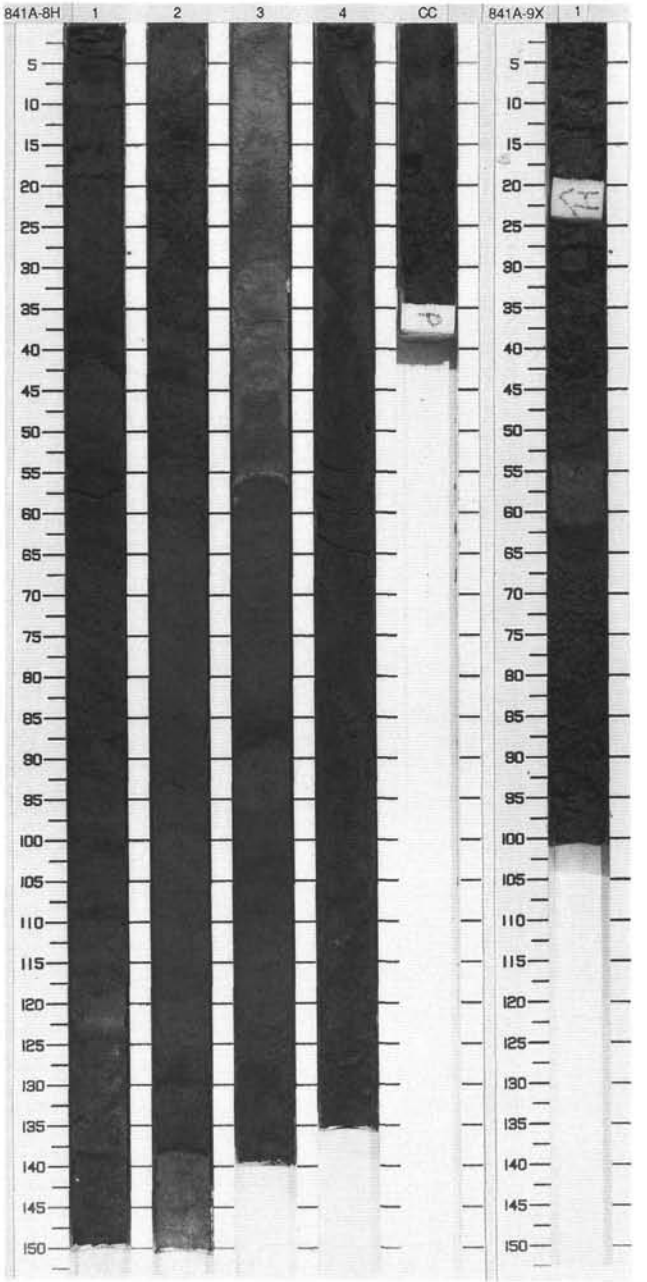
	1, 58 M	1, 64 M
TEXTURE:		
Sand	0	60
Silt	75	35
Clay	25	5
COMPOSITION:		
Accessory minerals	---	Tr
Clay	Tr	Tr
Feldspar	5	15
Glass	95	85

SITE 841 HOLE A CORE 8H — CORED 65.5 - 71.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 CC	Upper Miocene	F		S S S I	5BG 4/1 To 2.5Y 2/0 5Y 4/1 To N4 5Y 6/1 N4 2.5Y 2/0 To 5GY 4/1 2.5Y 2/0	CLAY WITH GLASS, VITRIC CLAY, VITRIC SAND and VITRIC SANDY SILT. Major lithologies: CLAY WITH GLASS and VITRIC CLAY, dark greenish gray to dark gray (5BG 4/1 to 5Y 4/1). Generally structureless and poorly sorted. Occurs between graded volcaniclastic layers and interbedded with vitric fine ash and vitric silt. Locally mottled. VITRIC SAND and VITRIC SANDY SILT, gray to black (5Y 5/1 to 2.5Y 2/0), occurs as graded, sharp based intervals, grading up into clay with glass. Few sedimentary structures are present, although faint planar laminae occur in Section 3. In Sections 4 and CC the lithology is found intermixed with discrete vitric clay intervals due to strong drilling disturbance. Minor lithologies: VITRIC FINE ASH, dark greenish gray to dark gray (5BG 4/1 to 5Y 4/1). Occurs as graded, thin bedded intervals with sharp bases and gradational tops. VITRIC SILT, dark greenish gray to dark gray, (5BG 4/1 to 5Y 4/1). Occurs as thin graded intervals with sharp basal contacts but are otherwise structureless. Both vitric fine ash and vitric silt occur interbedded with vitric clay and clay with glass.

SITE 841 HOLE A CORE 9X — CORED 71.7 - 81.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5		1	uMio	F		S S	2.5Y 3/2	VITRIC CLAY and VITRIC CLAYSTONE. Major lithologies: VITRIC CLAY and VITRIC CLAYSTONE, very dark grayish brown (2.5Y 3/2), structureless. Highly fractured during drilling. Minor lithologies: VITRIC SILT, gray (5Y 5/1), structureless. Occurs as a discrete interval in Section 1, 54 to 61 cm, with sharp upper and basal contacts. VITRIC SAND WITH FELDSPAR, black (2.5Y 2/0). Occurs as a thin graded bed in Section 1, 61 to 65 cm with a sharp basal contact. VITRIC FINE ASH, very dark grayish brown (2.5Y 3/2). Occurs as a thin graded bed in Section 1, 53–54 cm.



135-841A-11X
SMEAR SLIDE SUMMARY (%):

	1, 15 D
TEXTURE:	
Sand	30
Silt	50
Clay	20
COMPOSITION:	
Accessory minerals	Tr
Clay	20
Feldspar	5
Glass	75

SITE 841 HOLE A CORE 10X — CORED 81.4 - 91.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		CC			X			VITRIC SILT and VITRIC SAND WITH FORAMINIFERS. Major lithologies: VITRIC SILT , dark gray (5Y 4/1), structureless. VITRIC SAND WITH FORAMINIFERS, black (2.5Y 2/0), structureless. Both lithologies are present as pebbles in drilling breccia. Minor lithologies: None.

SITE 841 HOLE A CORE 11X — CORED 91.0 - 100.7 mbsf

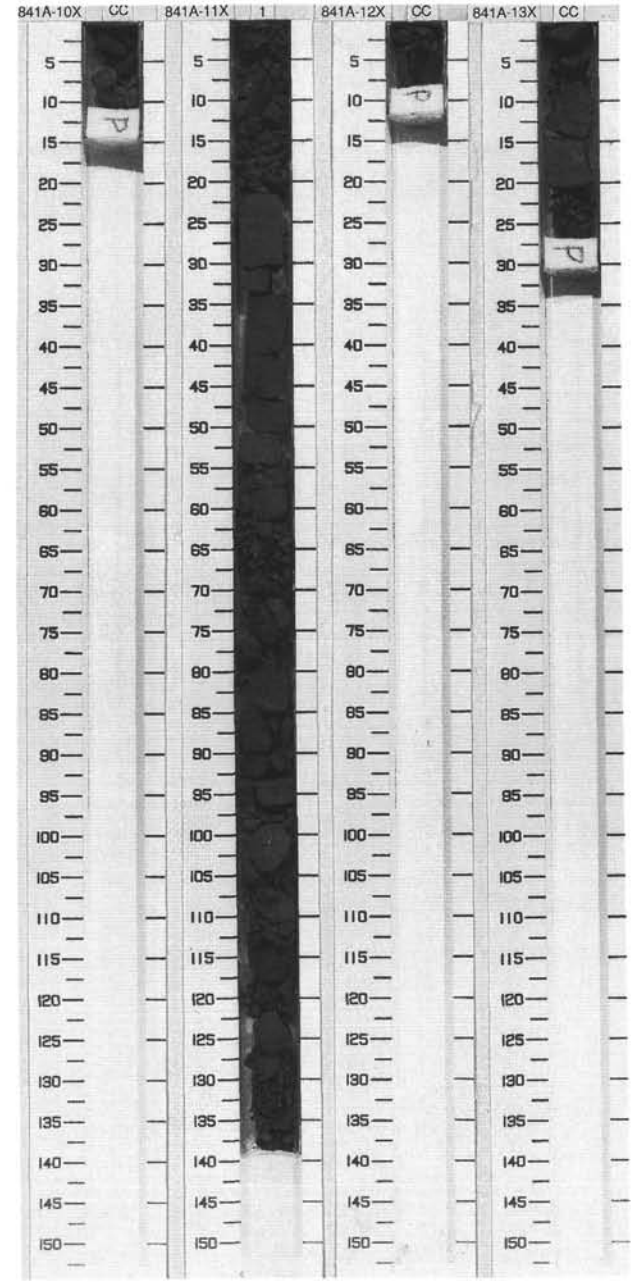
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1	Upper Miocene	F F	X	S	5GY 4/1 To 2.5Y 2/0	VITRIC SILTSTONE. Major lithology: VITRIC SILTSTONE, dark greenish gray (5GY 4/1). Generally structureless with some mottling. Minor lithology: VITRIC SANDSTONE, black (2.5Y 2/0). Occurs at the base of fining upward sequences at 60 cm and 125 cm and grades upwards into volcanic siltstone.

SITE 841 HOLE A CORE 12X — CORED 100.7 - 110.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		CC			X			VITRIC SANDSTONE. Major lithology: VITRIC SANDSTONE, dark gray (5Y 4/1). Structureless. Minor lithology: None.

SITE 841 HOLE A CORE 13X — CORED 110.3 - 120.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		CC			X		10Y 3/1	VITRIC SILTSTONE. Major lithology: VITRIC SILTSTONE, very dark greenish gray (10Y 3/1). Generally structureless but with some mottling. Minor lithology: VITRIC SANDSTONE, black (2.5Y 2/0). Occurs intermixed with siltstone, particularly where burrows occur.



135-841A-15X
SMEAR SLIDE SUMMARY (%):

	1, 46 D	1, 51 M
TEXTURE:		
Sand	---	55
Silt	65	45
Clay	35	---
COMPOSITION:		
Accessory minerals	1	20
Clay	30	---
Feldspar	4	20
Glass	65	60

135-841A-16X
SMEAR SLIDE SUMMARY (%):

	1, 11 D
TEXTURE:	
Sand	5
Silt	95
Clay	---
COMPOSITION:	
Accessory minerals	1
Feldspar	4
Glass	95

SITE 841 HOLE A CORE 14X — CORED 120.0 - 129.6 mbsf

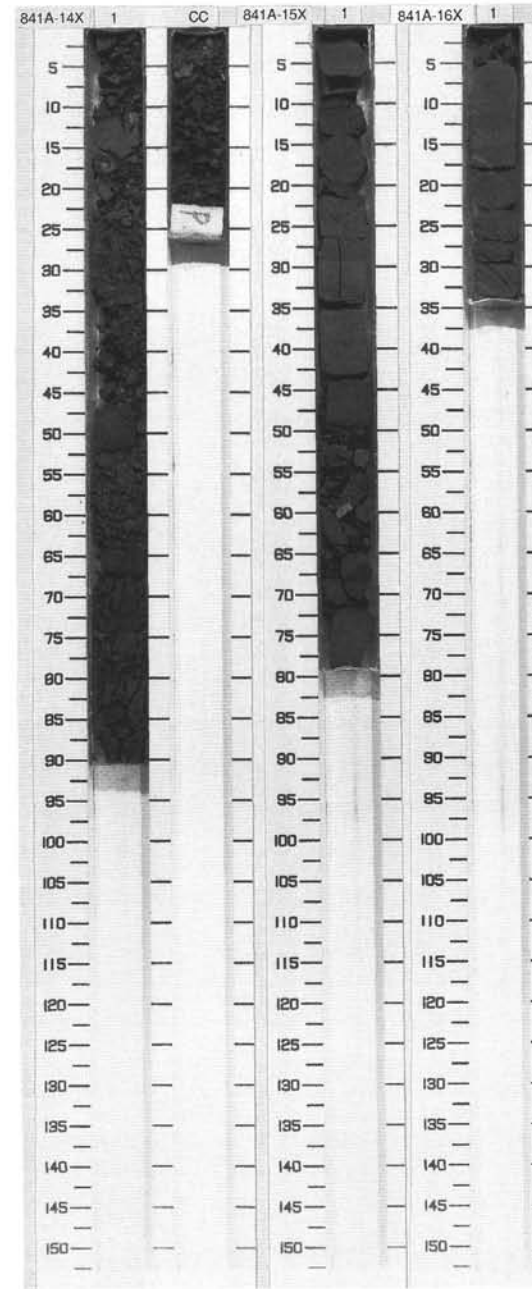
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 CC	UMio	F F	XXXXX		5GY 4/1 To 2.5Y 2/0 5GY 4/1	VITRIC SILTSTONE Major lithology: VITRIC SILTSTONE, dark greenish gray (5GY 4/1). Generally structureless with occasional mottling. Minor lithology: VITRIC SANDSTONE, black (2.5Y 2/0). Occurs over small intervals at the base of fining upwards sequences which grade into vitric siltstone. Vitric sandstone is frequently burrowed.

SITE 841 HOLE A CORE 15X — CORED 129.6 - 139.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5		1				S S	5Y 4/1	CLAYEY SILTSTONE Major Lithology: CLAYEY SILTSTONE, dark gray (5Y 4/1), fining-upward bioturbated beds, 1 to10 cm thick. Minor lithology: VITRIC SANDSTONE WITH FELDSPAR AND ACCESSORY MINERALS,very dark gray (5Y 3/1), thin, normally graded beds with sharp bases occur at 2, 11, 20, 34, 35, 41, 47, 67 and 71 cm, and with a scoured base at 31 cm.

SITE 841 HOLE A CORE 16X — CORED 139.3 - 148.9 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		1				S	5Y 3/1	CLAYEY SILTSTONE Major lithology: CLAYEY SILTSTONE, dark gray (5Y 4/1), generally structureless, but locally faintly bioturbated, occuring as fining-upward cycles, 1 to 3 cm thick. Closely spaced microfaults affect the entire sequence. Minor lithologies: VITRIC SANDSTONE, very dark gray (5Y 3/1), occurs at 23, 24, 33, and 34 cm and VITRIC SILTSTONE , white (10YR 8/2) at 10 cm. These are thin, normally graded beds (up to 1 cm thick), fining upwards into clayey vitric silt.



135-841A-17X
SMEAR SLIDE SUMMARY (%):

	1, 65 M	1, 66 M
TEXTURE:		
Sand	60	---
Silt	37	70
Clay	3	30
COMPOSITION:		
Accessory minerals	2	2
Clay	3	29
Feldspar	10	4
Foraminifers	Tr	---
Glass	85	65
Nannofossils	---	Tr
Spicules	Tr	Tr

135-841A-19X
SMEAR SLIDE SUMMARY (%):

	CC, 4 D
TEXTURE:	
Sand	5
Silt	60
Clay	35
COMPOSITION:	
Accessory minerals	2
Clay	35
Feldspar	3
Glass	60

SITE 841 HOLE A CORE 17X — CORED 148.9 - 153.9 mbsf

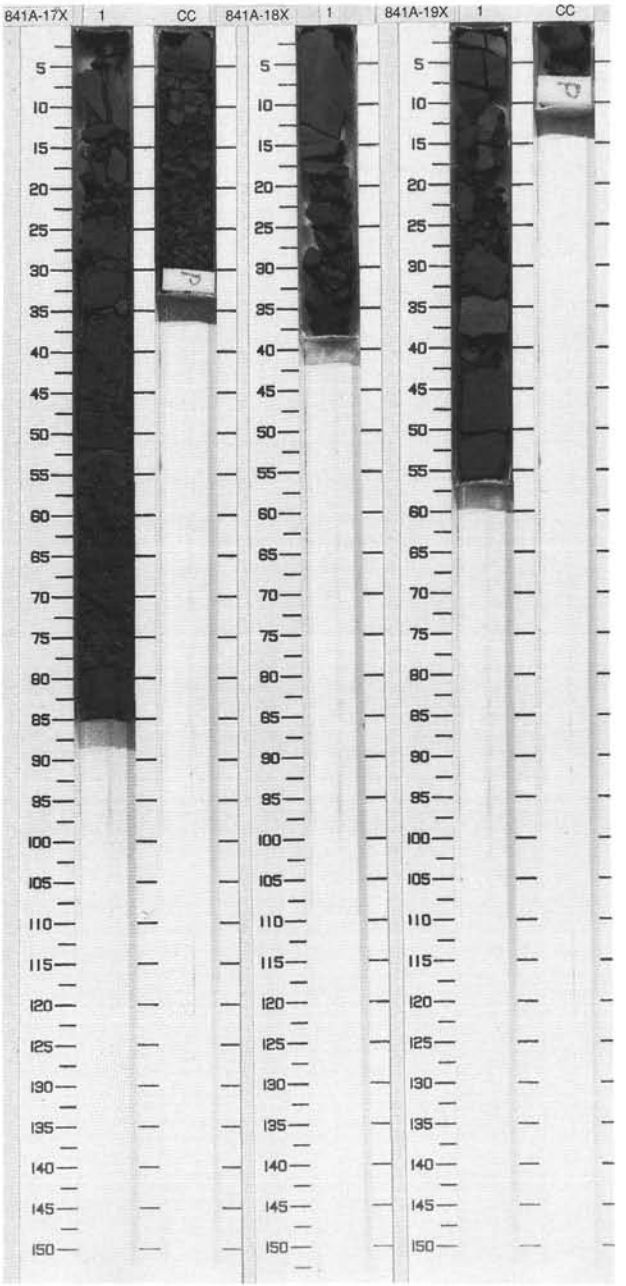
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 / 1.0		1 / CC	uMio	F F F F	WWWWW	S S	10Y 3/1	CLAYEY SILTSTONE Major lithology: CLAYEY SILTSTONE, dark greenish gray (10Y 3/1), very thin to thin (2–10 cm) fining-upward beds. Minor lithology: VITRIC SANDSTONE WITH FELDSPAR, black (2.5Y 2/0), very thin intervals which grade into clayey siltstone, occur in Section 1 at 5, 8, 17, 31 38, 50 and 78 cm and in the corecatcher CC at 7 cm. Laminated, fining-upward intervals occur in Section 1at 63 and 67 cm.

SITE 841 HOLE A CORE 18X — CORED 153.9 - 159.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		1			X		10Y 4/1	CLAYEY SILTSTONE Major lithology: CLAYEY SILTSTONE, dark greenish gray (10Y 4/1), normally graded beds with planar laminated bases. From 0–3 cm a band of short, almost vertical microfaults occur. Minor lithology: COARSE VITRIC SANDSTONE, white (10YR 8/2), thin, graded bed, offset by a continuous oblique microfault, occurs at 5 cm and 12 cm.

SITE 841 HOLE A CORE 19X — CORED 159.1 - 168.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		1 / CC	uMio	F	XVV	S	10Y 4/1	CLAYEY SILTSTONE Major lithology: CLAYEY SILTSTONE, dark greenish gray (10YR 4/1), normally graded, fining-upward beds occur at 15, 30, 31, 36 and 50 cm with faint localized bioturbation between 37–48 cm, and planar lamination between 0–1 cm and 10–11 cm. Minor lithology: VITRIC SILTSTONE, black (2.5Y 2/0), very thin beds grading up into clayey siltstone. Several microfaults cause visible displacement of sedimentary structures between 10 and 14 cm and 32 and 35 cm.



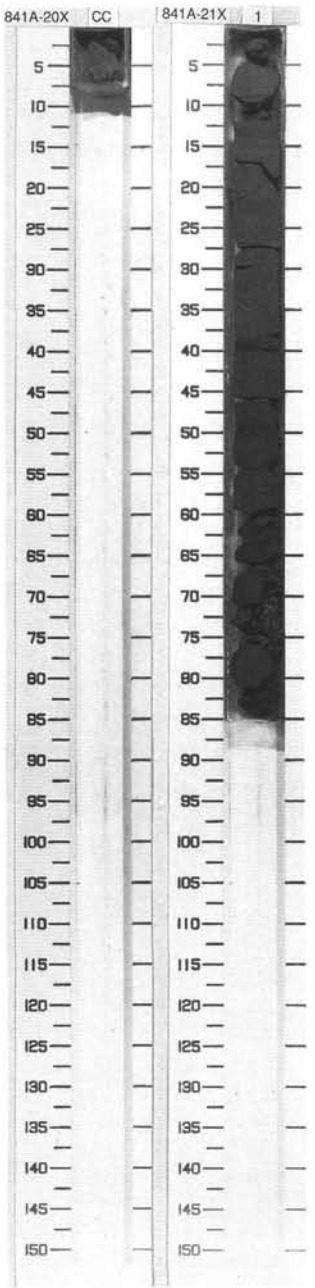
SITE 841 HOLE A CORE 20X — CORED 168.7 - 176.9 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		CC			X		10Y3/1	CLAYEY SILTSTONE Major lithology: CLAYEY SILTSTONE, dark green gray (10YR 3/1). Minor lithology: None.

SITE 841 HOLE A CORE 21X — CORED 176.9 - 186.6 mbsf

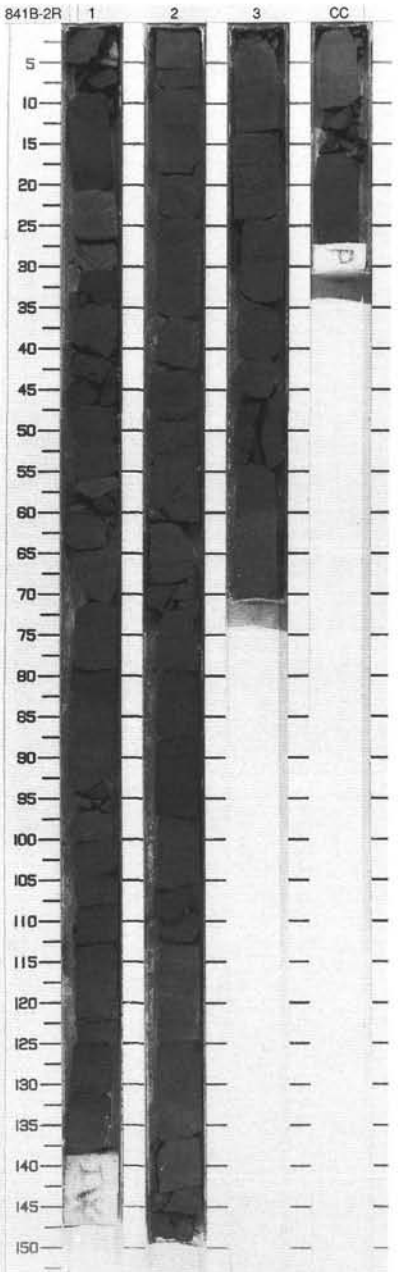
Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5		1			XXX		10Y 3/1	CLAYEY SILTSTONE Major lithology: CLAYEY SILTSTONE, very dark greenish gray (10YR 3/1) showing localized heavy bioturbation. Minor lithology: COARSE VITRIC SANDSTONE, black (2.5Y 2/0), very thin, planar and cross-laminated beds, fining upwards into clayey siltstone. A very thin graded interval occurs at 55 cm. Minor lithology: None.

841B 1W WASH CORE



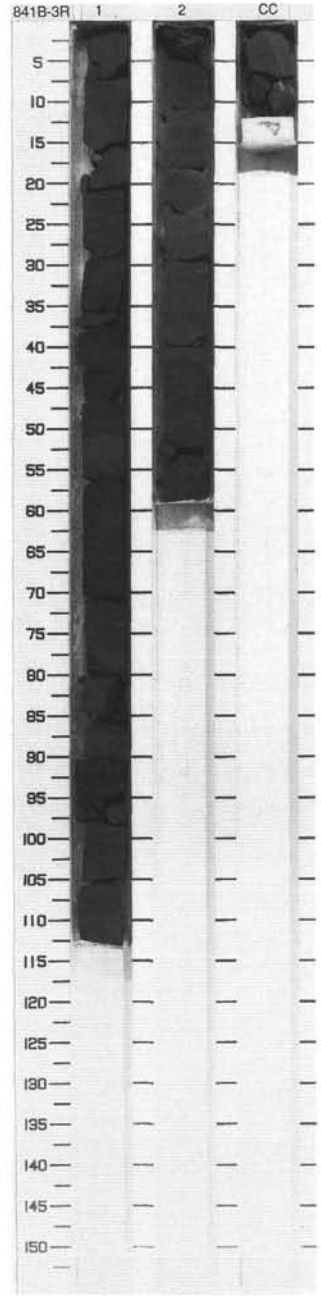
SITE 841 HOLE B CORE 2R CORED 169.8 - 179.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC	Upper Miocene	F F F		1	10Y 3/1 5Y 3/1	VITRIC SILTSTONE and VITRIC SANDSTONE Major lithologies: VITRIC SILTSTONE and VITRIC SANDSTONE, dark greenish gray (10Y 3/1) to very dark gray (5Y 3/1). Occur as alternating medium-bedded and thick-bedded intervals. Interbedded intervals occur in Section 1, 71–140 cm and Section 2, 0–53 cm, with beds varying from 2 to 15 cm in thickness. Planar lamination, burrowed intervals and fining upward intervals are present throughout . Micro-reverse faults occur within vitric sandstone in Section 1, 70 cm. Minor lithology: NONE.



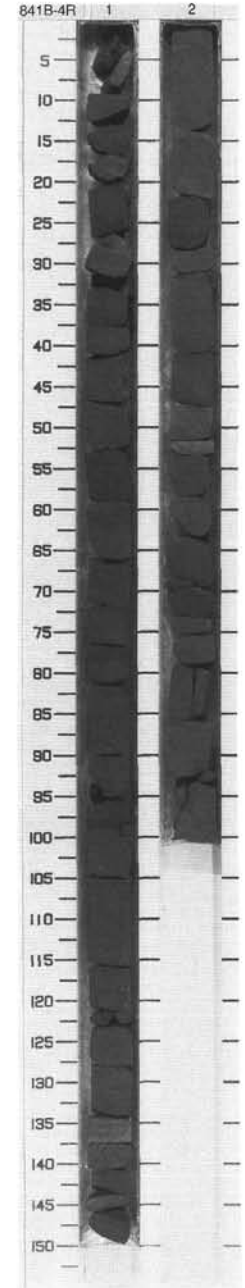
SITE 841 HOLE B CORE 3R CORED 179.4 - 189.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1	Upper Miocene	F F			5Y 3/1	VITRIC SILTSTONE and VITRIC SANDSTONE Major lithologies: VITRIC SILTSTONE and VITRIC SANDSTONE, very dark gray (5Y 3/1) to gray (5Y 4/1). Occur as alternating medium-bedded and thick-bedded intervals. Interbedded intervals occur in Section 1, 98–113 cm and Section 2, 0 to 29 cm. Planar parallel laminae and burrows occur throughout. Cross laminae occur in Section 1, 25–30 cm. Microfaulting occurs in Section 1, 15 cm. Minor lithology: NONE.
	Void							
		2		F			5Y 4/1	
		CC						



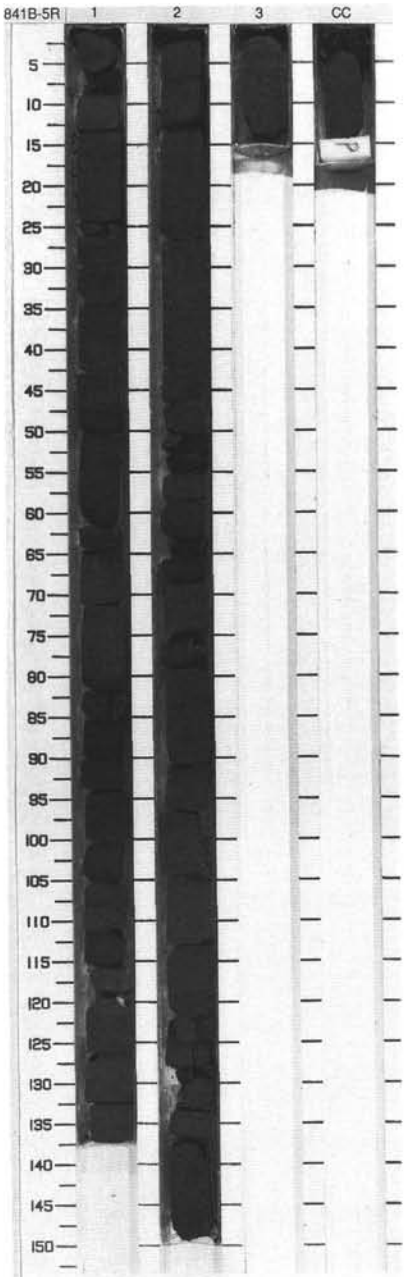
SITE 841 HOLE B CORE 4R CORED 189.1 - 198.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2	Upper Miocene	F F F F			10Y 4/1	VITRIC SILTSTONE and VITRIC SANDSTONE Major lithologies: VITRIC SILTSTONE and VITRIC SANDSTONE, greenish gray (10Y 4/1). Very thin and thin interbeds occur in Section 1, 0–60 cm and 122–150 cm respectively. Vitric siltstones form very thick-bedded and thick-bedded intervals. In Section 2, thin beds of vitric sandstone occur within the siltstone at 21-28 cm and 70-79 cm. Planar lamination and fining upward sequences are common. Cross lamination, contorted bedding, burrows and microfaulting also occur. Minor lithology: NONE.



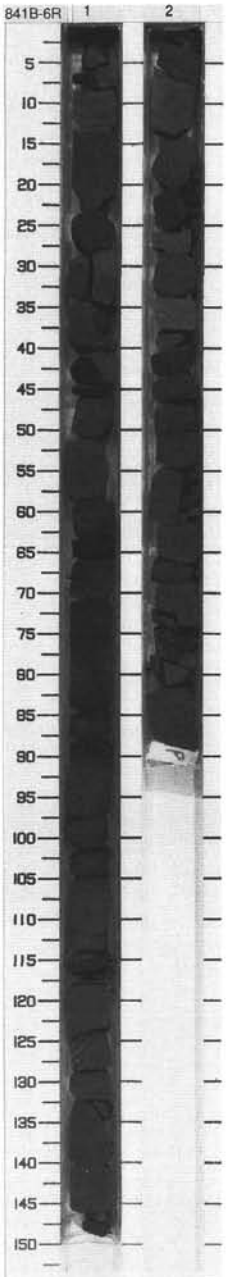
SITE 841 HOLE B CORE 5R CORED 198.7 - 208.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2	Upper Miocene	F F F C		1	10Y 3/1	VITRIC SILTSTONE and VITRIC SANDSTONE Major lithologies: VITRIC SILTSTONE and VITRIC SANDSTONE, dark greenish gray (10Y 3/1), occur as alternating thick-bedded and medium-bedded intervals. Very thin and thick interbeds occur in Section 1, 43–65 cm, 122–138 cm and Section 2, 68–114 cm. Planar laminae, fining upward sequences and burrows are common throughout the core. Contorted bedding, graded intervals and cross-lamination occur rarely. In Section 2, 104–114 cm, a vitric sandstone bed shows reverse grading. Minor lithology: NONE.



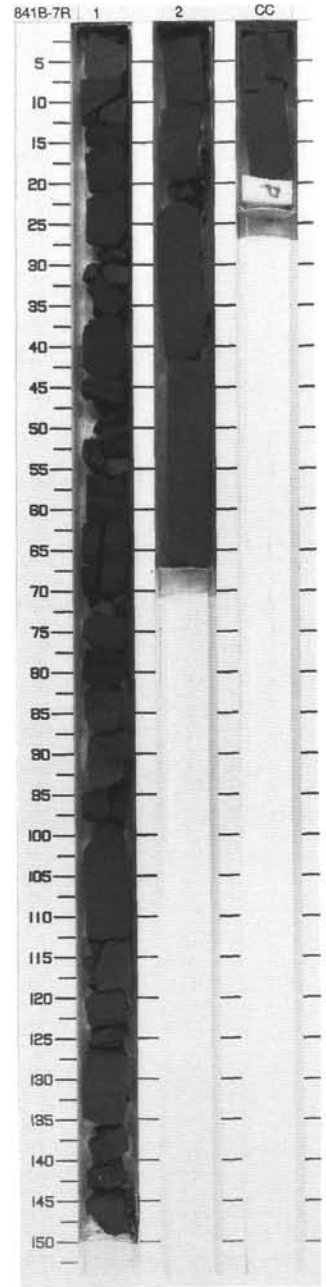
SITE 841 HOLE B CORE 6R CORED 208.4 - 218.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2	Upper Miocene	F C F			10Y 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major lithologies: VITRIC SANDSTONE, dark greenish gray (10Y 3/1). Planar lamination, fining upward sequences and burrows are common. In Section 1, 25-65 cm, convoluted bedding is present. Occasional cross-lamination occurs. VITRIC SILTSTONE, dark grayish green (10Y 3/1), occurs at the base of the core and as thin beds in Section 1, 8–23 cm, 92–98 cm and 103–111 cm, and in Section 2, 0–13 cm and 29–33 cm. In Section 1, 92–98 cm, the vitric siltstone coarsens upward into vitric sandstone. A microfault occurs in Section 2, at 31 cm. Faint planar laminae occur within the vitric siltstone. Minor lithology: NONE.



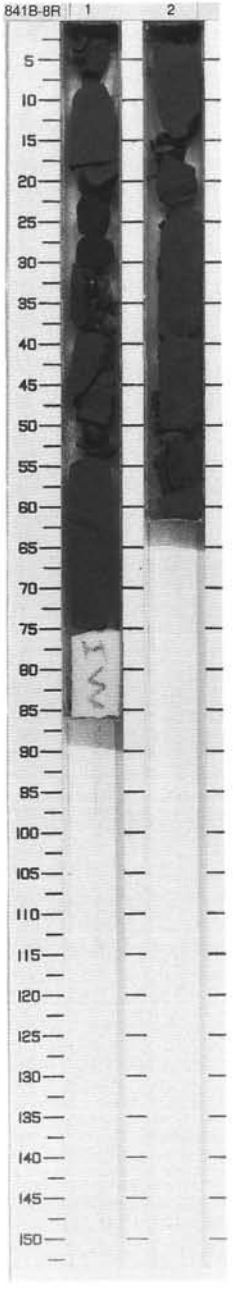
SITE 841 HOLE B CORE 7R CORED 218.1 - 227.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC	Upper Miocene	F F F F			5Y 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major lithologies: VITRIC SANDSTONE and VITRIC SILTSTONE, very dark gray (5Y 3/1). Planar laminae, cross laminae, convoluted beds, fining upward intervals and burrows are common. Occurs as thin interbeds in Section 1, 127 cm through Section 2, 19 cm. Minor lithology: NONE.



SITE 841 HOLE B CORE 8R CORED 227.7 - 237.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 / 1.0	Void	1 / 2	Upper Miocene	F		1	5Y 3/1	VITRIC SILTSTONE and VITRIC SANDSTONE. Major lithologies: VITRIC SILTSTONE and VITRIC SANDSTONE, dark gray (5Y 3/1). Show planar laminae, cross laminae, convoluted beds and burrows. Occur as medium thickness interbeds in Section 1, 0–29 cm. Minor lithology: NONE.

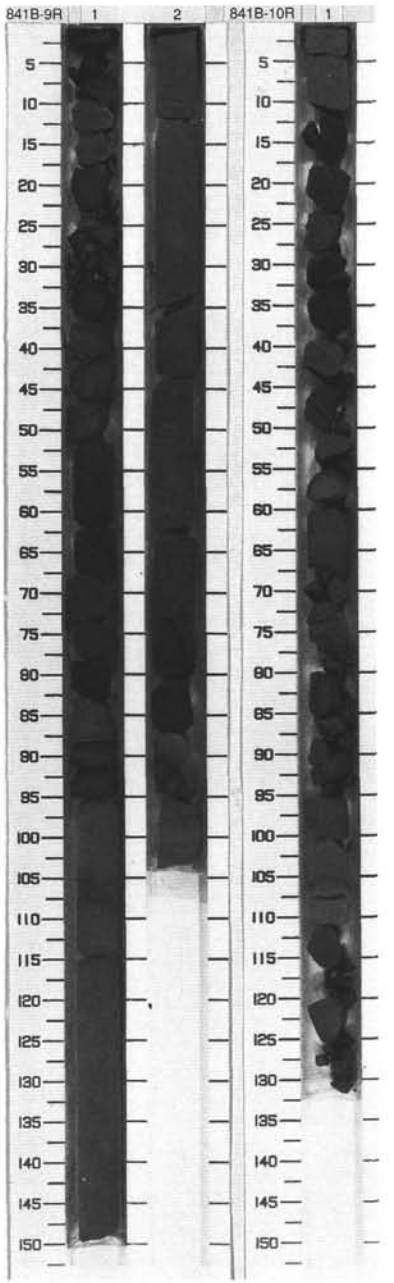


SITE 841 HOLE B CORE 9R CORED 237.4 - 247.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1 1.5		1 2	Upper Miocene	F F			5Y 3/1	VITRIC SILTSTONE and VITRIC SANDSTONE. Major lithologies: VITRIC SILTSTONE and VITRIC SANDSTONE, dark gray (5Y 3/1). Vitric sandstones are usually planar laminated, normally graded and have sharp lower contacts. In Section 1, 83–150 cm, microfaults are common within vitric siltstone. In Section 1, 0–51 cm, the vitric sandstone and vitric siltstone occur as thin to medium thickness interbeds. Minor Lithology: NONE.

SITE 841 HOLE B CORE 10R CORED 247.0 - 256.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1 1.5		1	uMio				5Y 3/1 5GY 4/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major Lithologies: VITRIC SANDSTONE, very dark gray (5Y 3/1), generally homogeneous with no apparent bedding or grain size changes. VITRIC SILTSTONE, gray (5Y 5/1) to dark greenish gray (5GY 4/1), showing faint planar lamination between 66–79 cm and convoluted bedding between 107–112 cm. Minor Lithologies: NONE.

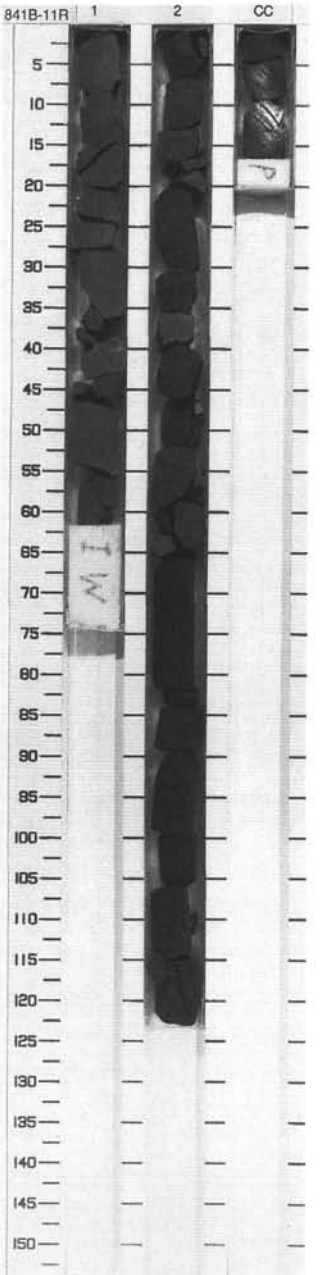


135 841B-11R
SMEAR SLIDE SUMMARY (%):

	1, 35 D
TEXTURE:	
Sand	---
Silt	80
Clay	20
COMPOSITION:	
Clay	20
Foraminifers	Tr
Glass	77
Plagioclase	3
Spicules	Tr

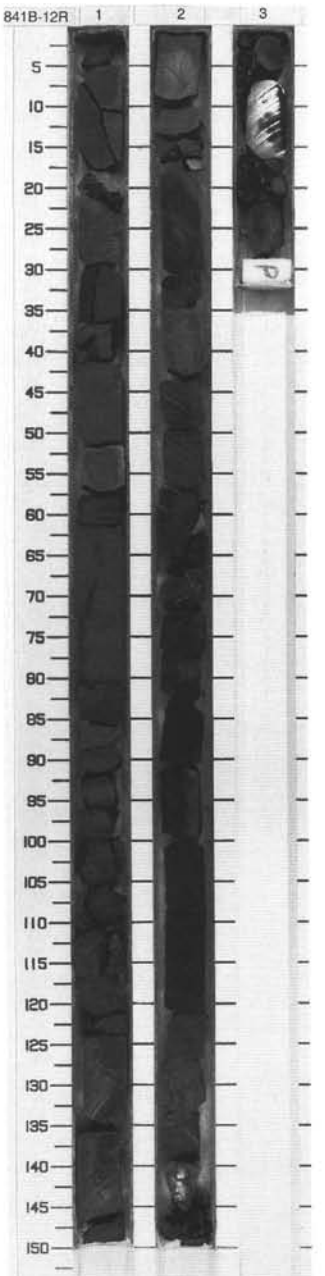
SITE 841 HOLE B CORE 11R CORED 256.7 - 266.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0	Void	1 2 CC	Upper Miocene	F F F		S I	5Y 4/1 5Y 3/1	VITRIC SILTSTONE WITH CLAY and VITRIC SANDSTONE. Major Lithologies: VITRIC SILTSTONE WITH CLAY, dark gray (5Y 4/1), very fine grained and homogeneous. A microfault occurs at 2 cm and two oval reduction spots at Section 1, 31 cm and 42.5 cm. VITRIC SANDSTONE, very dark gray (5Y 3/1), mottled, upward fining sequences of medium to fine-grained sand with wavy, cross- and planar lamination. Minor Lithology: NONE.



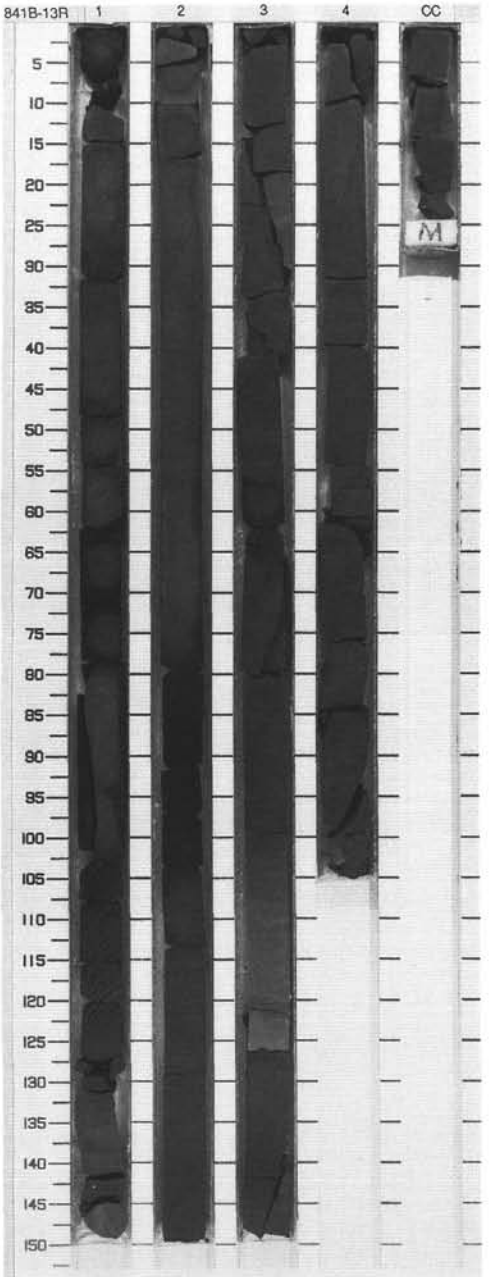
SITE 841 HOLE B CORE 12R CORED 266.3 - 275.6 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC	Upper Miocene	F F F F F F			5Y 2.5/1 2.5YR 2/0 5Y 2/0	CLAYEY SILTSTONE and VITRIC SANDSTONE. Major Lithology: CLAYEY SILTSTONE, black (5Y 2.5/1), thin to medium-bedded (8-30 cm), fining upward beds showing planar-, wavy -, wedge-planar and trough cross-laminae with thin intervals in Section 1 between 105-110 and 118-121 cm showing convoluted laminae. VITRIC SANDSTONE, black (5Y 2.5/1). Very thin to thin-bedded fine-grained sandstone beds grading into coarse vitric siltstones in Section 1 at 41, 58, 62, 92, 125, 140, and 150 cm, in Section 2 at 51, 70, and 136 cm, and in Section CC at 27 cm. Minor Lithology: NONE.



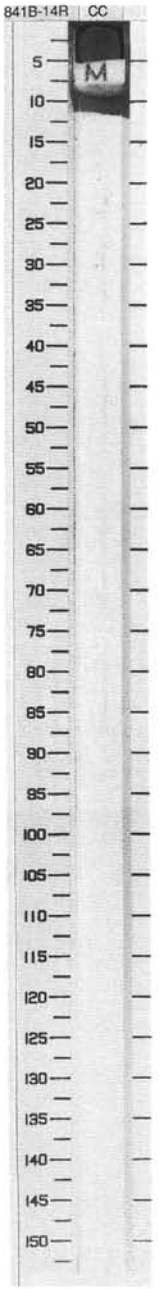
SITE 841 HOLE B CORE 13R CORED 275.6 - 285.2 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 CC	Upper Miocene	F			10G 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major Lithology: VITRIC SANDSTONE, very dark greenish gray (10G 3/1), massive beds, grading upward into vitric siltstone. Vitric sandstone intervals frequently show scoured bases and show planar-, lenticular-, wedge-planar and wavy laminae and cross-bedding. VITRIC SILTSTONE, very dark greenish gray (10G 3/1), typically structureless intervals occurring above the graded sandstone beds. In Sections 3 and CC sedimentary structures include wavy, planar-, lenticular and wedge-planar laminae. Faint burrow structures occur locally. Reverse microfaults occur within massive and wavy laminated siltstones. Minor Lithology: NONE.



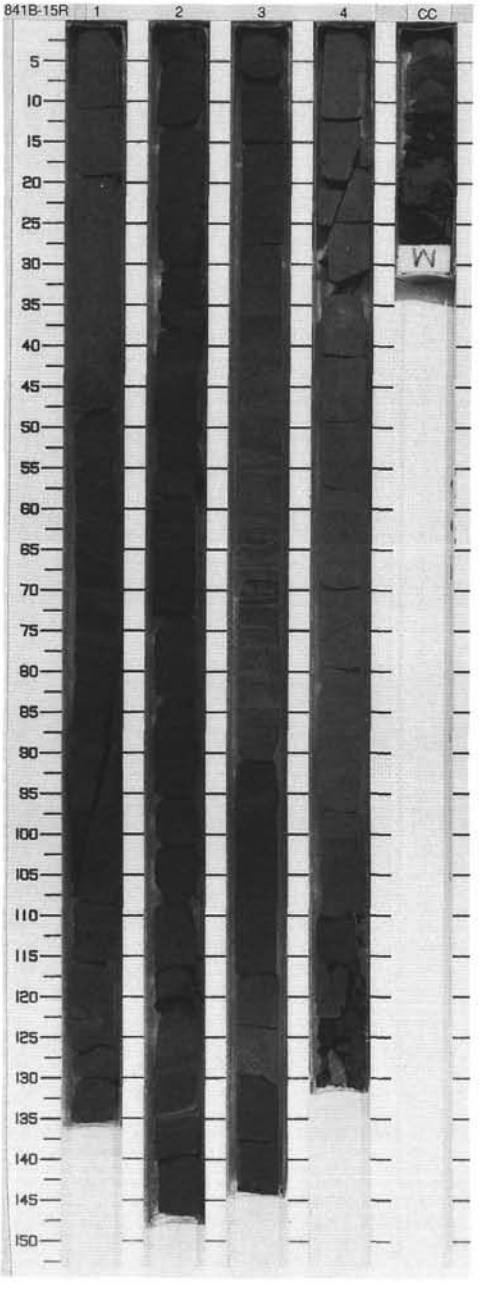
SITE 841 HOLE B CORE 14R CORED 285.2 - 294.9 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
CC					X		10G 3/1	VITRIC SILTSTONE. Major Lithology: VITRIC SILTSTONE, very dark grayish green (10G 3/1), structureless. Minor Lithology: NONE.



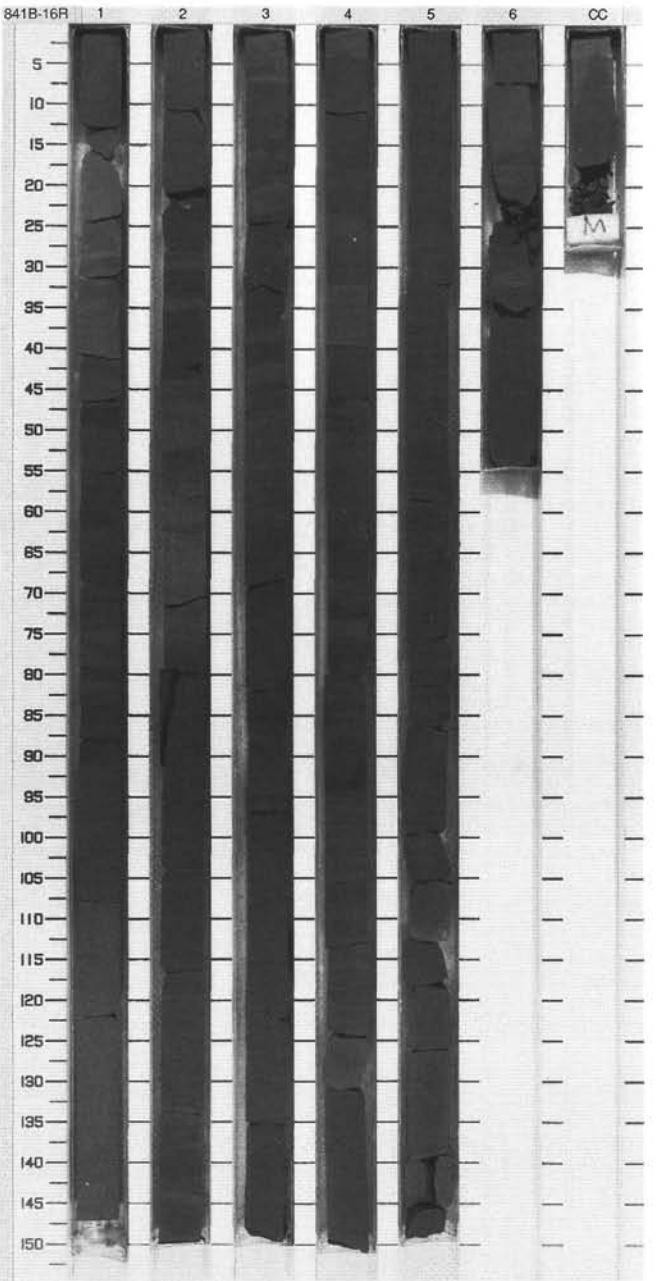
SITE 841 HOLE B CORE 15R CORED 294.9 - 304.6 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 CC	Upper Miocene	F F F F F		1	10G 2.5/1 10G 3/1	VITRIC SILTSTONE and VITRIC SANDSTONE. Major lithologies: VITRIC SANDSTONE, very dark grayish green (10G 2.5/1) to dark grayish green (10G 3/1). Shows frequent planar- and cross laminae and fines upwards into vitric silt. Occurs as thin to medium sized interbeds with vitric silt in Sections 2, 4 and CC. VITRIC SILTSTONE, dark grayish green (10G 3/1). Shows fewer sedimentary structures than vitric sandstone, although some planar and cross lamination occurs. Microfaults are present in Section 2, 40 cm, Section 4, 75 and 53 cm, and Section CC, 4 cm. Localised bioturbation occurs. Minor lithology: NONE.



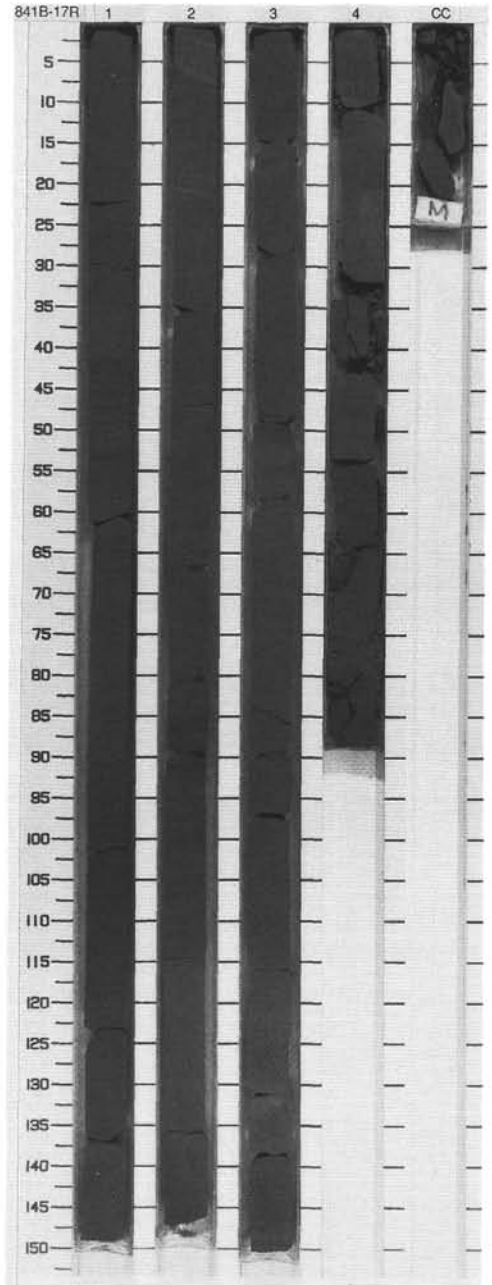
SITE 841 HOLE B CORE 16R CORED 304.6 - 313.8 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 5 6 CC	Upper Miocene	F nop			10G 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major lithologies: VITRIC SANDSTONE and VITRIC SILTSTONE, very dark grayish green (10G 3/1). Planar laminae, cross laminae, wedge-planar laminae, convoluted bedding, normally graded bedding are common. Some localised bioturbation. Microfaults occur within both the vitric sandstone and vitric siltstone in Section 2, 125 cm, in Section 3, 3 cm, in Section 4, 78 cm, and in Section 5, 27 cm, 36 cm, 52 cm and 88 cm. Both lithologies occur as medium and thin interbeds within Section 1, 50–70 cm, Section 2, 30–52 cm, Section 2, 102 cm through Section 3, 23 cm, and the Section CC. Minor lithology: VOLCANICLASTIC CONGLOMERATE, occurs as a 12 cm-thick interval interbedded with vitric sandstone and vitric siltstone in Section 5, 79 –125 cm.



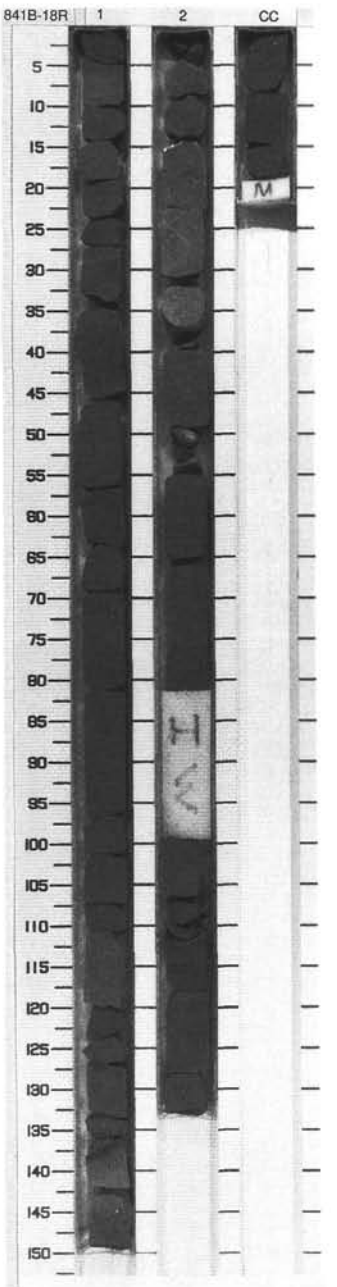
SITE 841 HOLE B CORE 17R CORED 313.8 - 323.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 CC	Middle Miocene -Upper Miocene	F F F F F	XXX		10G 4/1 10G 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major lithologies: VITRIC SANDSTONE and VITRIC SILTSTONE, dark grayish green (10G 4/1) to very dark grayish green (10G 3/1). Common planar laminae, cross laminae, convoluted bedding, fining upward sequences occur throughout. Microfaults occur in Section 1, 18 cm, Section 2, 15 cm, Section 3, 135 cm and Section 4, 28 cm. In Section 1, 55–110 cm, the vitric sandstone is structureless. Both lithologies occur as very thin interbeds in Section 1, and as *medium* thickness beds in Section 4. Minor lithology: NONE.



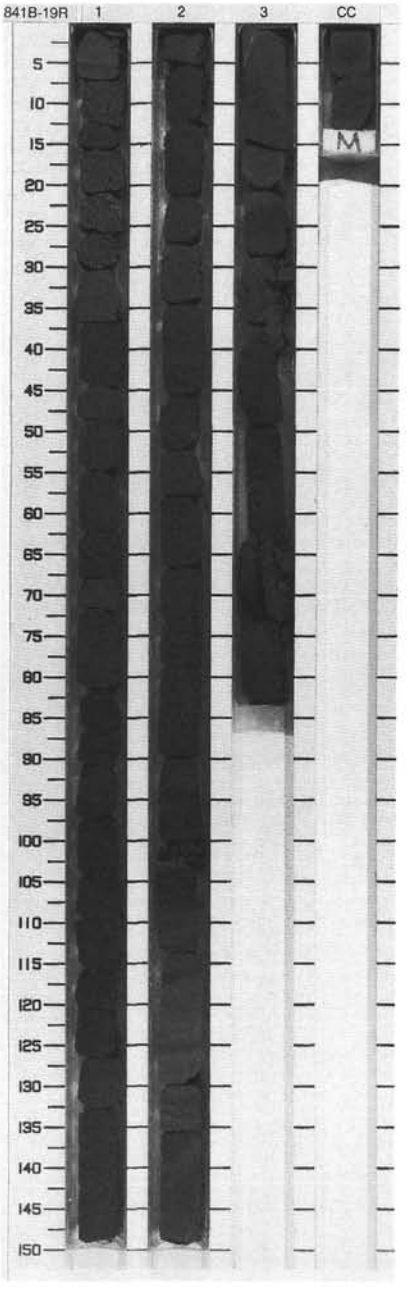
SITE 841 HOLE B CORE 18R CORED 323.5 - 333.2 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC		F F F		1	10G 5/1 N5/0 10G 4/1 10G 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major Lithologies: VITRIC SANDSTONE and VITRIC SILTSTONE, grayish green (10G 5/1) to very dark grayish green (10G 3/1). Show common planar laminae and fining upward sequences. Clasts of vitric siltstone occur within vitric sandstone in Section 1, 28 cm and Section 2, 113 cm. In Section 1, 0–14 cm, vitric siltstone occurs with very thin beds of volcanic sandstone. In Section 1, 138 cm through to Section 2, 37 cm. PLAGIOCLASE PHYRIC BASALT occurs which shows a chilled upper contact with the overlying vitric sandstone. Minor lithology: NONE.



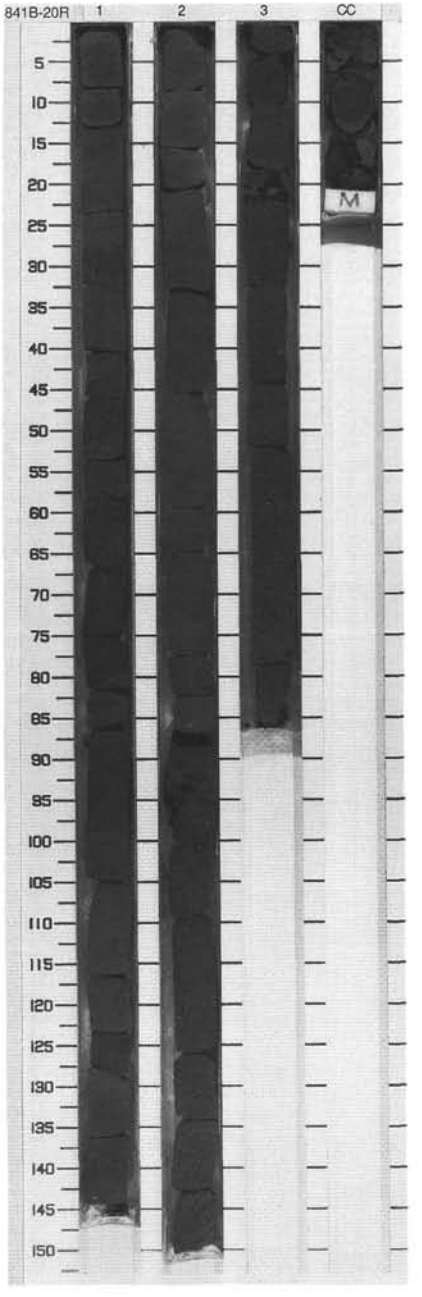
SITE 841 HOLE B CORE 19R CORED 333.2 - 342.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC	Middle Miocene -Upper Miocene	F F F F F			10G 5/1 To 10G 4/1 10G 5/1 To 10G 3/1	VITRIC SANDSTONE and VITRIC SILTSTONE. Major lithologies: VITRIC SANDSTONE, grayish green (10G 5/1) to dark grayish green (10G 3/1), coarse to medium-grained. In Section 1, 30 cm through to Section 2, 90 cm the sandstone is generally structureless, with rare planar laminae and fining upward intervals. In Section 2, 104 cm through to Section 3, 14 cm, microfaulting, fractures and mineral filled fractures (probably zeolite), planar laminae and small scale graded intervals occur within the volcanic sandstone. VITRIC SILTSTONE occurs interbedded with volcanic sandstone in Section 2, 90–104 cm and Section 3, 14–83 cm. Planar laminae are common, with occasional microfaults and burrows. In Section 3, 72 cm a reverse fault occurs. Minor lithology: VOLCANIC CONGLOMERATE, dark grayish brown (10G 4/1), occurs in Section 1, 6–30 cm, and as thin beds in Section 2, 47–52 cm and 62–66 cm. Individual clasts range up to 1 cm across.



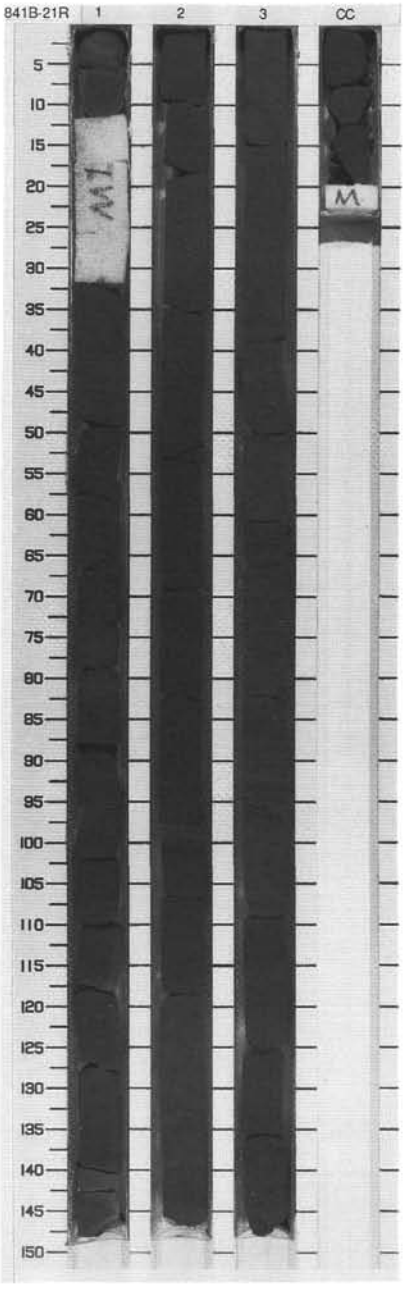
SITE 841 HOLE B CORE 20R CORED 342.5 - 352.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC		C F C			10G 4/1 10G 3/1	COARSE VITRIC SANDSTONE and VOLCANIC CONGLOMERATE. Major lithologies: COARSE VITRIC SANDSTONE and VOLCANIC CONGLOMERATE, dark grayish green (10G 3/1 to 10G 4/1), occur in alternating thin to medium-bedded sequences. The conglomerate is generally polymict, with abundant pumice and glass fragments, altered mafic clasts and red, intraformational clay fragments. The conglomerate is poorly sorted, with a maximum clast-size of 18 mm and a mean clast size of about 3 mm. Some conglomerate beds have scoured lower contacts. Planar and trough cross-stratification is common. Minor lithology: VITRIC SILTSTONE, dark grayish green (10G 4/1) occurs in vitric sandstone at Section 2, 75-76 cm.



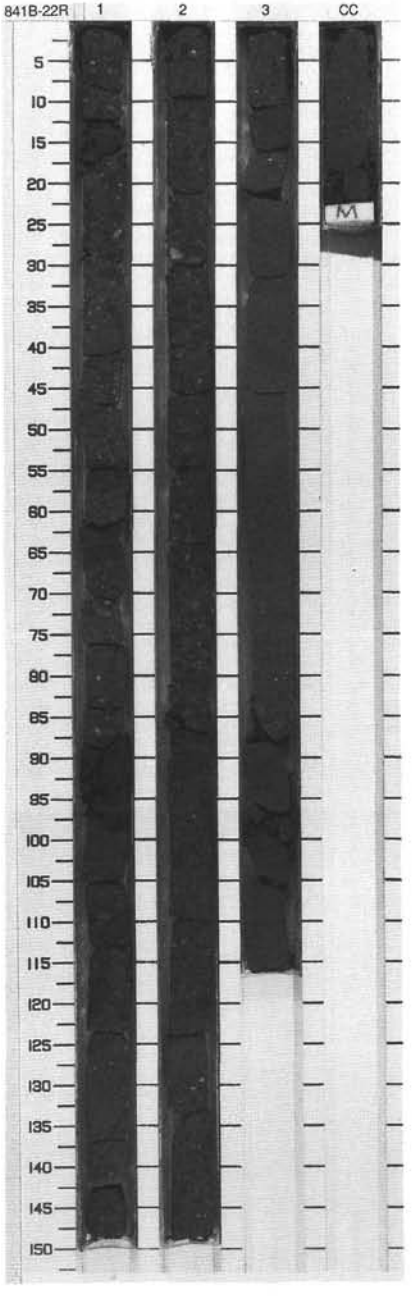
SITE 841 HOLE B CORE 21R CORED 352.1 - 361.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC		F		1	10G3/1 To 10G4/1 10G 3/1 To 10G 4/1 5G 4/1	COARSE VITRIC SANDSTONE. Major Lithology: Dark greenish gray (5G 4/1), polymict, very coarse to medium-grained, normally graded beds of COARSE VITRIC SANDSTONE. Individual beds show cross-bedding and planar lamination. Basal parts of beds often contain granule-sized grains of feldspar, mudclasts, altered basalt and other mafic material. Some beds have poorly defined basal contacts. Minor Lithology: VOLCANIC CONGLOMERATE occuring as a 24 cm-thick bed from 50 to 74 cm in Section 1, of subangular to rounded mudclasts up to 15 cm across in a sandy matrix. Clast supported. Dark reddish gray (10R 4/1, 10R 3/1), CLAYSTONE occurs as thin, faintly laminated beds in Sections 1 and 2 at 74 - 81 cm and 106 - 107 cm, respectively.



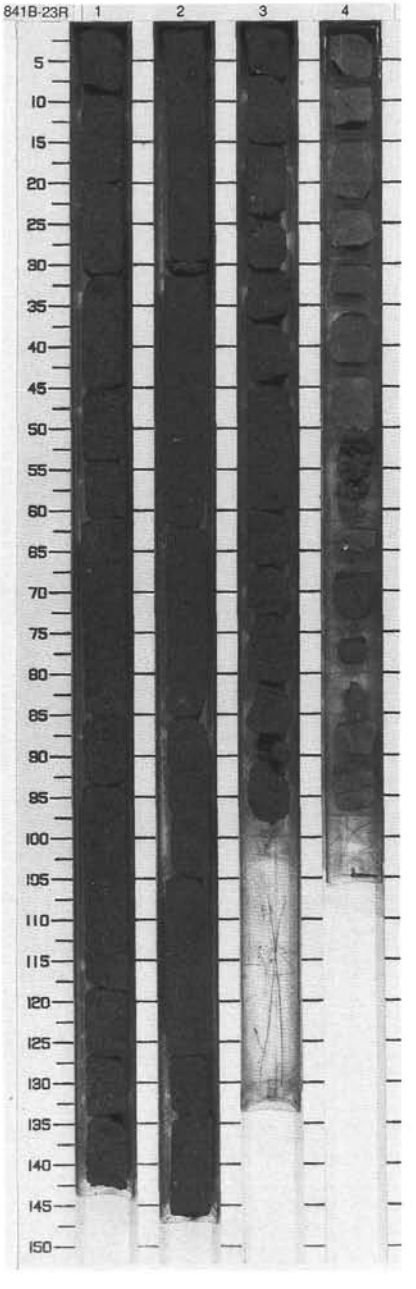
SITE 841 HOLE B CORE 22R CORED 361.4 - 371.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC		C			10YR 4/1 To 10G 4/1 10YR 4/1 To 5G 3/1	VOLCANIC CONGLOMERATE and COARSE VITRIC SANDSTONE. Major lithologies: VOLCANIC CONGLOMERATE, dark greenish gray (10G 3/1 to 10G 4/1) with up to 40 volume percent clasts of dark reddish gray (10YR 4/1) heavily altered lava. *Other clasts include heavily altered* green glass, black mafic fragments, gray pumice, vein quartz and foraminifers up to 4 mm across. The conglomerate is poorly sorted and clast-supported, with angular to rounded fragments up to 12 cm in diameter embedded within a matrix of coarse- to very coarse-grained sandstone. The conglomerate is occasionally imbricated and thin to medium-bedded. Normally and reversely graded intervals occur. COARSE VITRIC SANDSTONE, dark *greenish gray* (10G 3/1 to 10G 4/1), usually cross-stratified with conglomeratic lenses. Minor lithology: Layers of CLAYSTONE, dark reddish gray (10YR 4/1), up to 6 cm thick, are interbedded with vitric sandstone in Section 3, 19-45 cm.



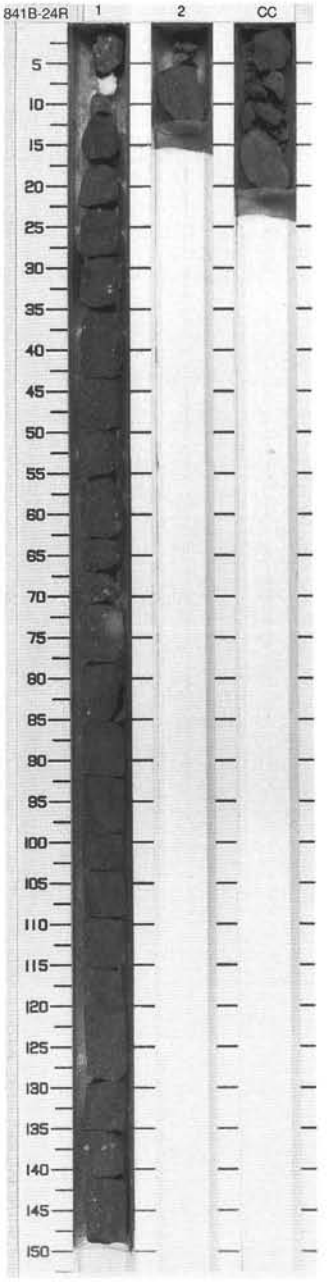
SITE 841 HOLE B CORE 23R CORED 371.1 - 380.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 Void 4		C F			7.5YR 3/2 and 5BG 4/1	VOLCANIC CONGLOMERATE. Major Lithology: Dark reddish gray (7.5YR 3/2) and greenish gray (5BG 4/1), poorly sorted, polymict VOLCANIC CONGLOMERATE. Clasts include abundant dark reddish gray altered lava, and range from 1 to 45 mm across. Greenish gray, subangular to subrounded clasts of altered pumice, mudstone and bioclastic debris also occur. A reversely graded interval occurs in Section 1, 118 cm through Section 2, 32 cm and a normally graded interval occurs in Section 2, 50–62 cm. Minor Lithology: VOLCANIC SANDSTONE, dark greenish gray (5BG 4/1 to 5B 4/1) occurs in Section 4, 50-62 cm and 68-85 cm. BASALT clasts occur in Section 4, 0-50 cm, 62-68 cm and 85-98 cm.



SITE 841 HOLE B CORE 24R CORED 380.7 - 390.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 CC					7.5YR 3/2 and 5BG 4/1	VOLCANIC CONGLOMERATE and VOLCANIC BRECCIA. Major Lithologies: VOLCANIC CONGLOMERATE, dark reddish brown (7.5YR 3/2) and greenish-gray (5BG 4/1). Polymict clast assemblage is matrix supported. Clasts are subrounded to angular in form and include altered lava and greenish gray mudstone. This lithology occurs in Section 1 from 0 - 73 cm. VOLCANIC BRECCIA, composed of predominantly angular clasts of similar composition to the overlying volcanic conglomerate. In Section 1, from 98 - 110 cm, a prominent fault showing evidence of fluid movement occurs. A band of disseminated sulphides containing sulphides and zeolites occurring within small cavities and vugs in the matrix occurs in Section 1, 137 cm through Section 2, 12 cm. Minor Lithology: NONE.

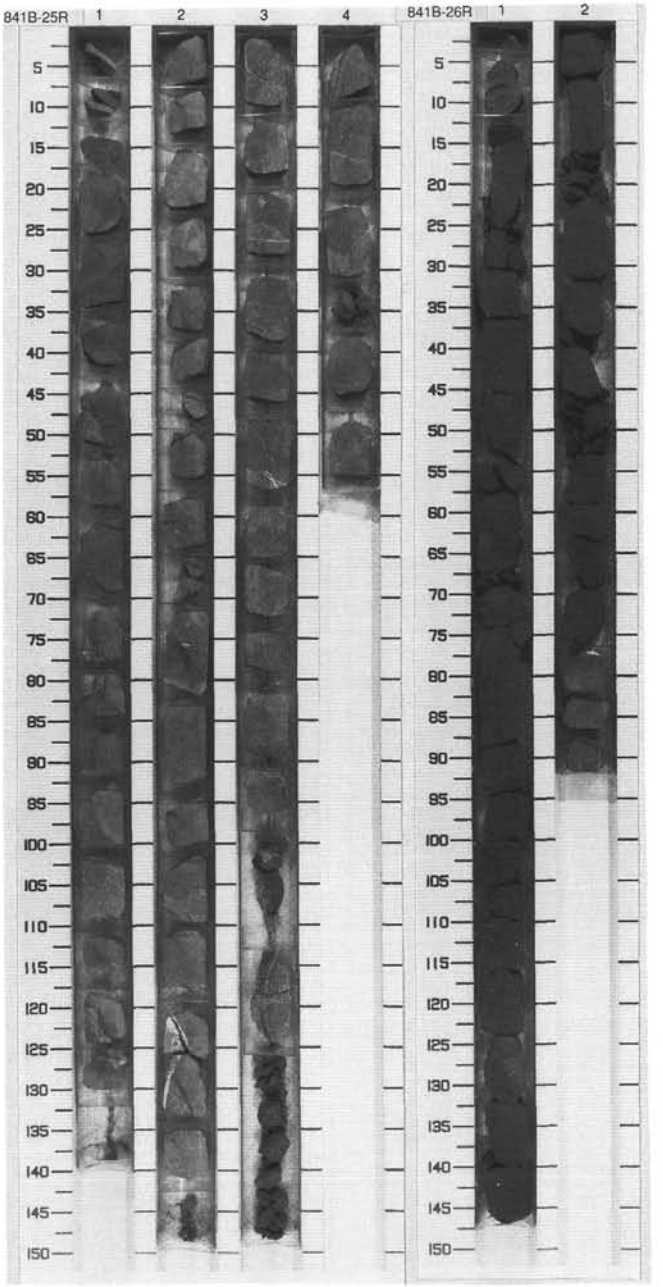


SITE 841 HOLE B CORE 25R CORED 390.4 - 400.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1					2.5Y 5\0 To 2.5Y 4\0	BASALTIC ANDESITE AND VOLCANIC CONGLOMERATE Major lithologies: BASALTIC ANDESITE, gray to dark gray (2.5Y 5/0 to 2.5 Y 4/0). Sparsely to moderately phyric with pyroxene and plagioclase. VOLCANIC CONGLOMERATE, dark gray (N4), structureless. Occurs in Section 3, 99 to 113 cm and 125 to 150 cm, as pebbles. Clasts are subangular to subrounded, up to 1 cm across, and comprise altered volcanic fragments. Overlying basalt in Section 3, 113 to 125 cm shows a chilled contact with the conglomerate. Minor lithology: NONE
	Void							
		2						
		3					N7	
		4					2.5Y 5\0	

SITE 841 HOLE B CORE 26R CORED 400.1 - 409.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1		F			10G 4/1	COARSE VITRIC SANDSTONE and VOLCANIC CONGLOMERATE. Major lithologies: COARSE VITRIC SANDSTONE, dark grayish green (10G 4/1) to dark gray (N6). Generally structureless, but showing a fining upwards trend in Section 1. A thin bed of coarse vitric sandstone occurs in Section 1, 117–127 cm, and shows planar lamination and microfaulting. Three rounded clasts of red, altered basalt, up to 12 mm in diameter, occur in Section 2 between 21 and 32 cm. VOLCANIC CONGLOMERATE, dark grayish green (10G 4/1), structureless and poorly sorted. In Section 2, 73–76 cm, a thin bed of volcanic conglomerate, contains poorly sorted, rounded clasts, up to 7 mm in diameter. This fines upward into the overlying vitric sandstone. Basalt occurs in Section 1, 0–11 cm and Section 2, 76–92 cm. Minor lithology : NONE
							10G 3/1	
							N4	
		2		F			10G 3/1	

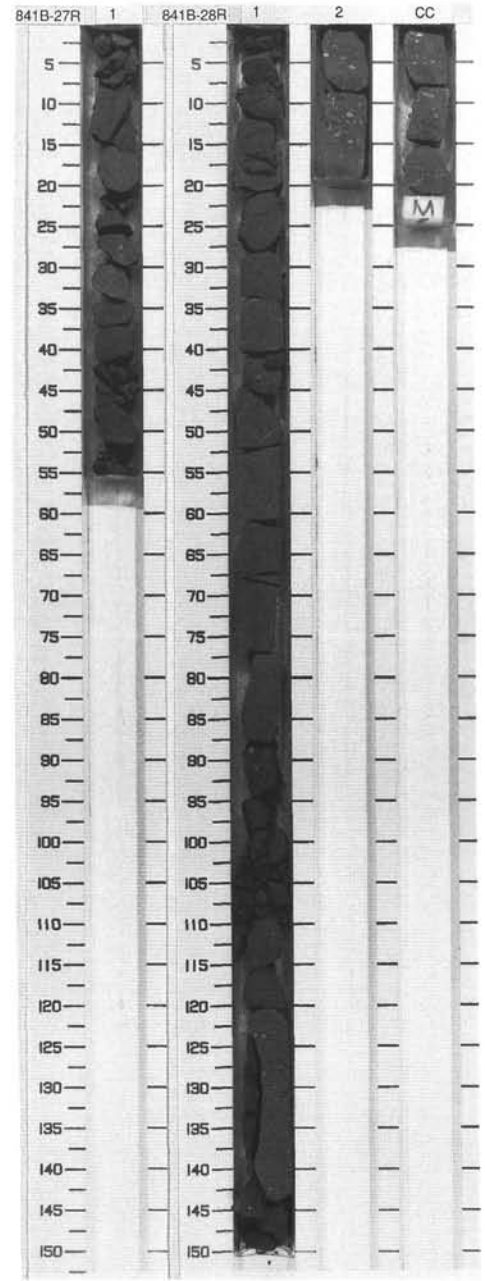


SITE 841 HOLE B CORE 27R CORED 409.7 - 419.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0		1			XXX		2.5Y 3/0	VOLCANIC CONGLOMERATE. Major lithology: VOLCANIC CONGLOMERATE, very dark gray (2.5Y 3/0). Generally poorly sorted and structureless with a clast supported fabric. Clasts are subrounded to rounded and are predominantly altered lavas with occasional white clasts (probably zeolite). Minor Lithology: NONE.

SITE 841 HOLE B CORE 28R CORED 419.4 - 429.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC		F C			10G 3/1 To 10G 2.5/1 10G 3/1	COARSE VITRIC SANDSTONE and VOLCANIC CONGLOMERATE. Major lithologies: COARSE VITRIC SANDSTONE, dark grayish green (10G 3/1). Generally structureless but fines upwards in Section 1. Also occurs as a thin planar laminated, microfaulted bed in Section CC, 14–21 cm, . In Section 1, 115–141 cm, the coarse vitric sandstone occurs as thin interbeds with volcanic conglomerate with frequent gradational contacts between these two lithologies. Section 1, 0–7 cm, contains a basalt clast. VOLCANIC CONGLOMERATE, very dark grayish green (10G 2.5/1) to dark grayish green (10G 3/1). In Section 1, 68–115 cm, clasts predominantly comprise subrounded basalt/lava and claystone with minor quartz and calcite clasts. The conglomerate shows a coarsening upward sequence. In Sections 2, 0–19 cm, and in Section CC, 0–14 cm, clasts are subangular to subrounded and poorly sorted. In Section 2, the basal 4 cm of the conglomerate shows diffuse bands of coarser and finer material, with the coarsest material occuring from Section 2, 3 to 6 cm and 8 to 14 cm. Minor lithology: NONE

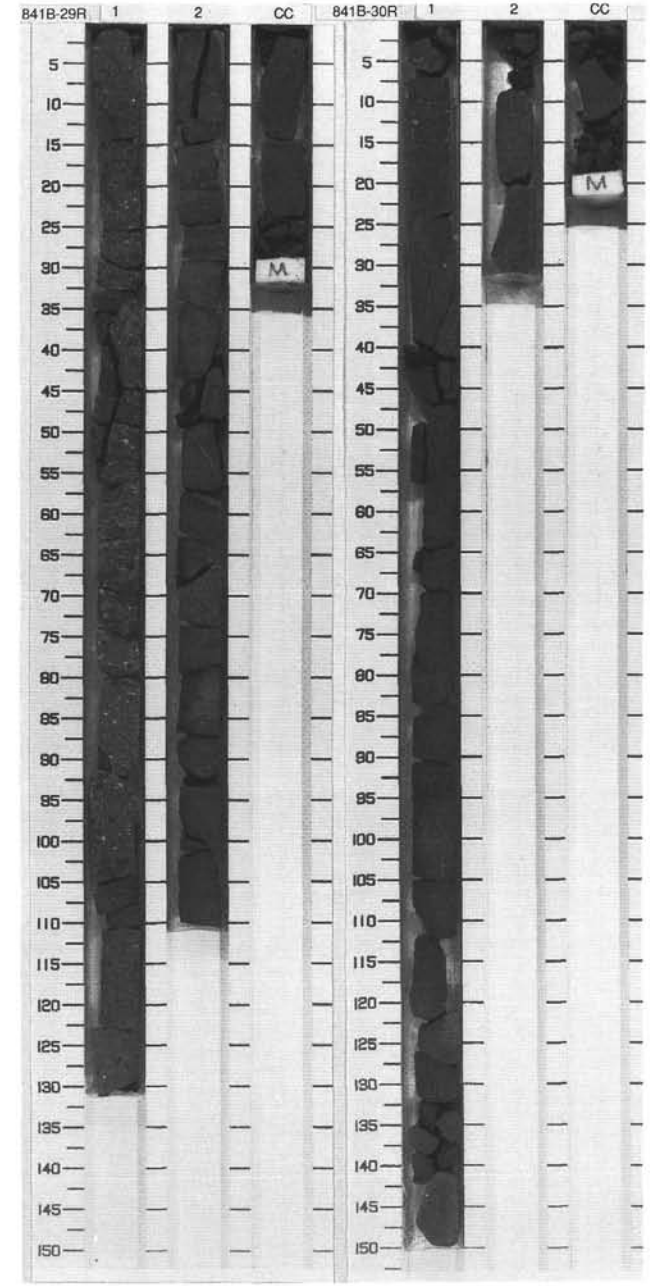


SITE 841 HOLE B CORE 29R CORED 429.1 - 438.8 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5, 1.0		1, 2, CC		F, C, F		1	10G 3/1	VOLCANIC CONGLOMERATE and VITRIC SANDSTONE. Major Lithologies: VOLCANIC CONGLOMERATE, dark grayish green (10G 3/1). Poorly sorted texture, with a coarse vitric sandstone matrix. Clasts are up to 3.8 cm across and include basalt and mudstone, as well as minor silica, calcite and jasper. Clasts are rounded to subrounded in shape. VITRIC SANDSTONE, dark grayish green (10G 3/1). Generally structureless, but contains rare, faint planar laminae. Fractures occur throughout Sections 1 and 2 and are infilled by white quartz. Minor Lithology: VITRIC SILTSTONE, dark grayish green (10G 3/1) occurs as a discrete, generally structureless beds within vitric sandstone in Section 2, 15-29 cm and as thin disrupted layers between 58-83 cm.

SITE 841 HOLE B CORE 30R CORED 438.8 - 448.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5, 1.0		1, 2, CC		C, F			10G 3/1	VITRIC SANDSTONE and VOLCANIC CONGLOMERATE. Major Lithologies: VITRIC SANDSTONE, dark grayish green (10G 3/1) and generally structureless. Grain sorting is moderate with individual grains ranging up to 9 mm across. In Section 2, 18-31 cm it forms the upper part of a fining upward sequence and is underlain by VOLCANIC CONGLOMERATE. This lithology shows gradational contacts with vitric sandstone and has a moderately to poorly sorted clast supported fabric. Clasts are subrounded to rounded, are up to 17 mm across and include fresh and altered basalt, mudstone and quartz. Thin, white, quartz-filled fractures occur throughout Sections 1 and 2. Minor Lithology: NONE.

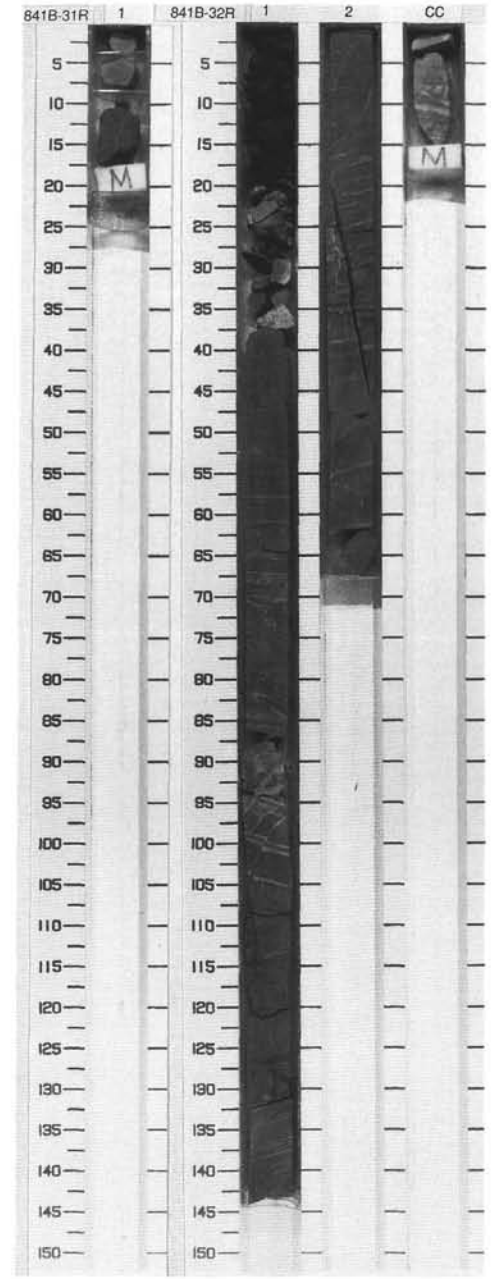


SITE 841 HOLE B CORE 31R — CORED 448.5 - 458.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
		1					N4	VOLCANIC BRECCIA. Major Lithology: VOLCANIC BRECCIA, dark gray (N4) with altered volcanic clasts, up to 2 cm across in a coarse sand-sized matrix. Minor Lithology: BASALT occurs from 0 to 8 cm.

SITE 841 HOLE B CORE 32R — CORED 458.1 - 467.8 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2	Middle Miocene				2.5Y 2/0 2.5Y 3/0 2.5Y 4/0	VOLCANIC SILTSTONE. Major Lithology: VOLCANIC SILTSTONE, very dark gray (2.5Y 3/0 to 2.5Y 4/0), shows trough cross-, wedge- and planar laminae and microfaulting throughout. In Section 1 , at 64 cm, trough cross lamination appears to be bidirectional. Rubble consisting of fragments of altered siltstone and vein minerals occur in Section 1 from 0 to 36 cm. VOLCANIC BRECCIA, black (2.5Y 2/0), consisting of fragments of siltstone, quartz and altered volcanics. Minor Lithology: NONE

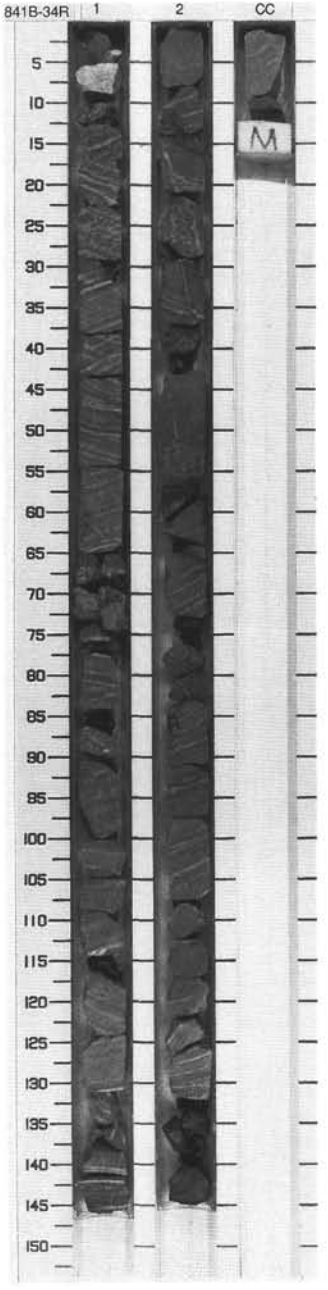


SITE 841 HOLE B CORE 33R CORED 467.8 - 477.5 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3	Middle Miocene				2.5Y 4\0 To 2.5Y 2\0 2.5Y 4\0	VOLCANIC SILTSTONE. Major Lithology: Dark gray to black (2.5Y 4/0 to 2.5Y 2/0) VOLCANIC SILTSTONE occurs as a sequence as thin to very thick, normally graded beds (5 cm to >1 m). Bed boundaries are often obscure due to alteration. Beds show closely to medium-spaced planar lamination over long intervals. Convolute, wavy, lenticular and wedge-planar laminae also occur. Numerous oblique and vertical mineral-filled fractures (up to 4mm thick) occur throughout. Minor Lithology: NONE.

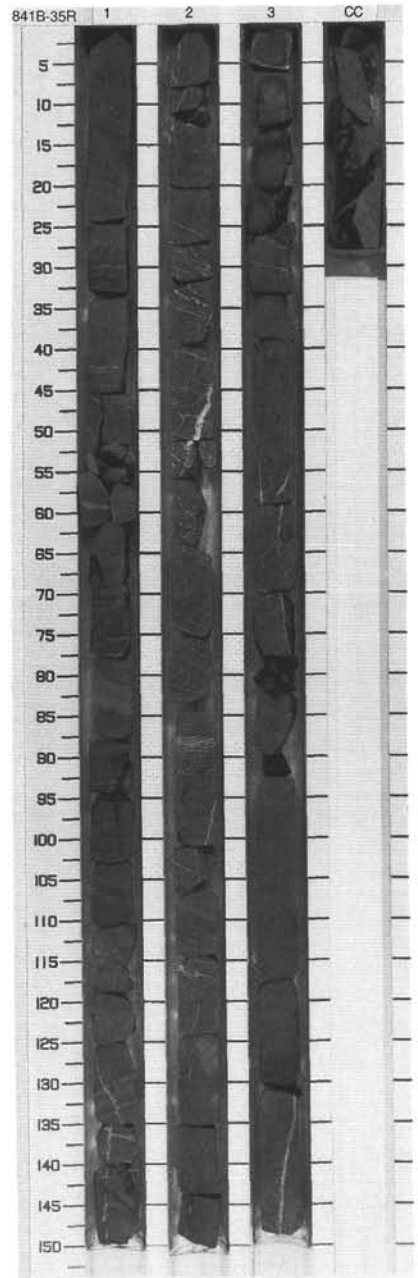
SITE 841 HOLE B CORE 34R CORED 477.5 - 487.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC	Middle Miocene	F F F F			10Y 3/1	VOLCANIC SILTSTONE. Major lithology: Dark greenish gray (10Y 3/1) VOLCANIC SILTSTONE occurs as a sequence of very thin to medium-bedded, normally-graded beds (2-26 cm thick). Closely to moderately spaced planar lamination occurs over long intervals. Lenticular, wedge-planar and cross-lamination are also present. Individual beds have coarse silt/fine sand laminated or normally-graded bases, and occasionally have scoured basal contacts. Beds are often crossed by oblique (often closely-spaced) microfaults and oblique or near-vertical mineral-filled fractures, up to 2 mm in diameter. Minor lithology: NONE.



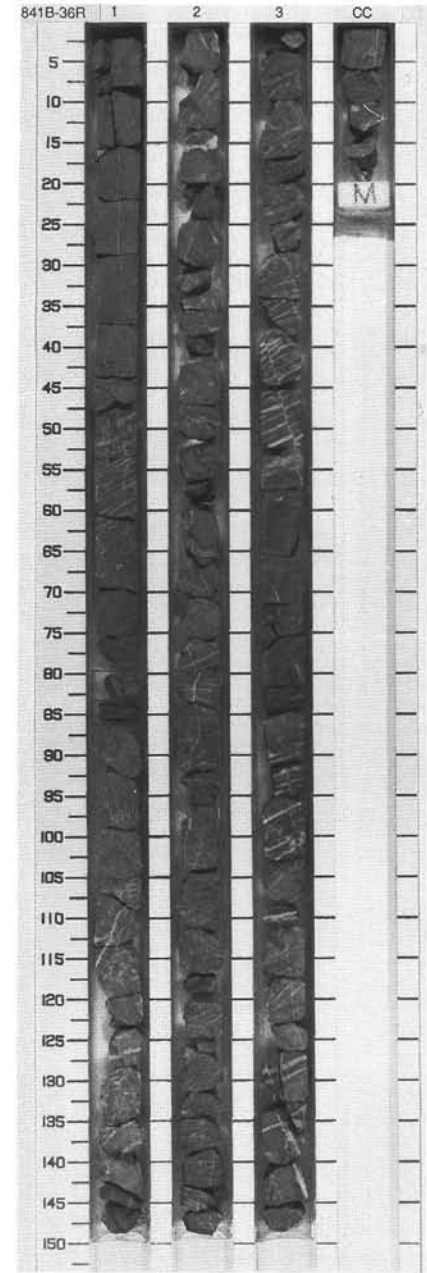
SITE 841 HOLE B CORE 35R CORED 487.1 - 496.8 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC	Middle Miocene				2.5Y 3\0 To 10R 4/1 2.5Y 3\0 To 2.5Y 2\0 2.5Y 3\0	VOLCANIC SILTSTONE Major lithology: VOLCANIC SILTSTONE, very dark gray (2.5Y 3/0) to black (2.5Y 2/0), common planar and wavy lamination, cross and convoluted bedding and soft sediment deformation structures. Scoured basal contacts with overlying thin to thick-bedded (5 to 60 cm), normally graded silt beds are common, particularly in Section 3. In Section 1, 36–42 cm, a thin structureless interval of massive siltstone occurs. Throughout the core, microfaults, intersecting microfractures and fractures, sometimes mineral-filled, (containing zeolite or gypsum) and up to 5 mm wide are common. Minor lithology: NONE.



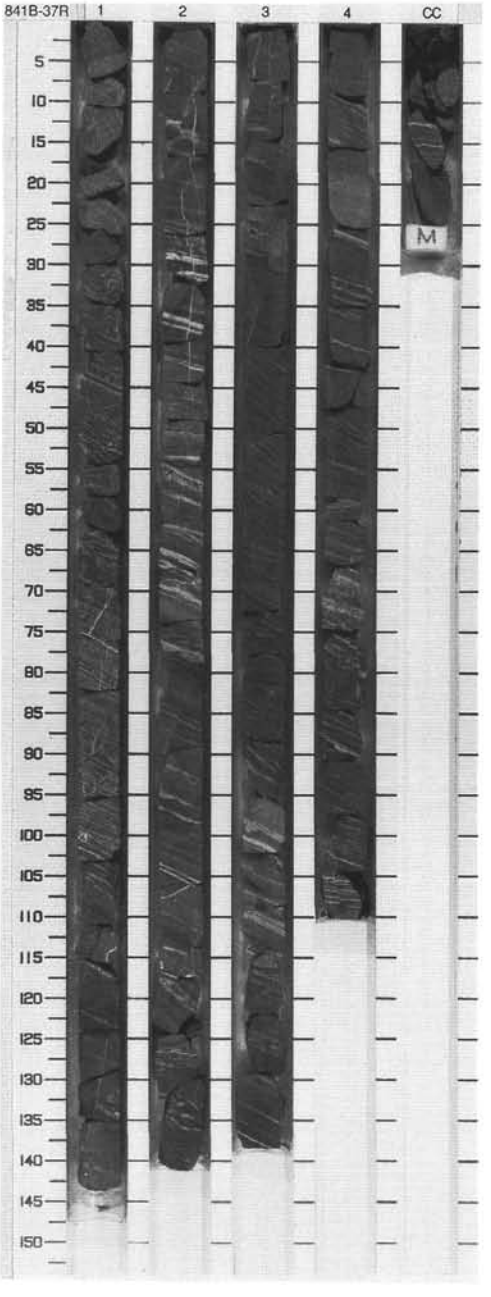
SITE 841 HOLE B CORE 36R CORED 496.8 - 506.4 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC	Lower Miocene -Middle Miocene				10G 2.5/1	VOLCANIC SILTSTONE and VOLCANIC SANDSTONE. Major lithologies: VOLCANIC SILTSTONE and VOLCANIC SANDSTONE, very dark grayish green (10G 2.5/1). Alternating thin to medium thick beds of volcanic siltstone and volcanic sandstone occur. Both lithologies show frequent microfaults and the occurence of white, mineral-filled veins throughout. Planar- and contorted laminae and convoluted bedding occur throughout the core, while cross lamination occurs locally. Basalt occurs in Section 1, 79 to 86 cm. Minor lithology: NONE.



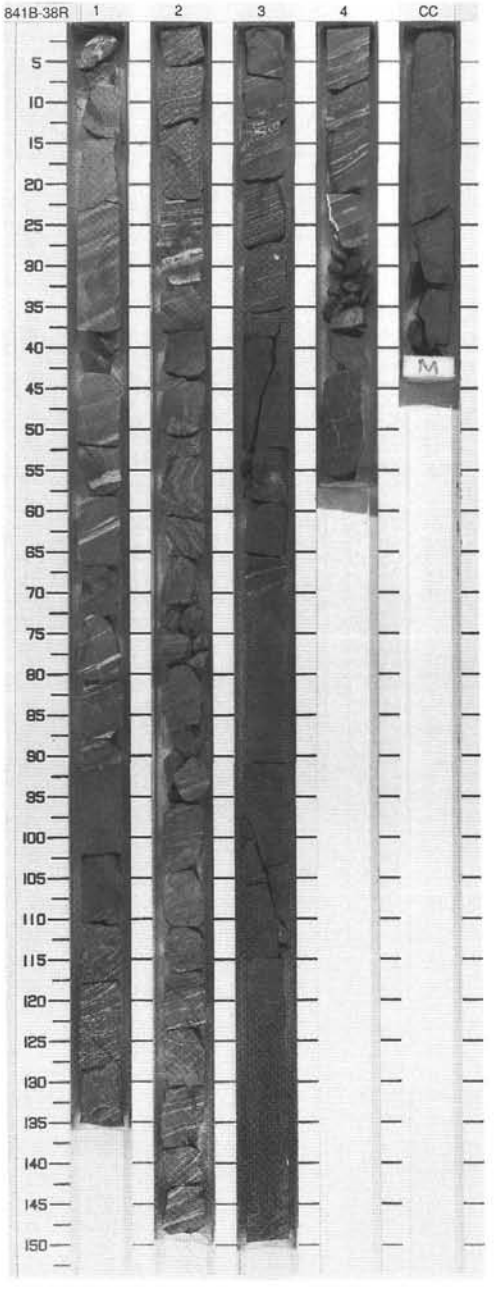
SITE 841 HOLE B CORE 37R CORED 506.4 - 516.1 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1	Lower Miocene - Middle Miocene			1	10G 2.5/1 To 5GY 5/1	VOLCANIC SILTSTONE and VOLCANIC SANDSTONE. Major lithologies: VOLCANIC SILTSTONE, commonly showing strong planar lamination with very dark grayish green (10G 2.5/1) thicker laminae and greenish gray (5GY 5/1) thinner laminae. Sedimentary structures include cross-and wedge-planar laminae, convoluted bedding and flame structures. VOLCANIC SANDSTONE, very dark grayish green (10G 2.5/1) and greenish gray (5GY 5/1). Sedimentary structures include convoluted bedding, planar laminae and cross bedding. In Section 1, 0–30 cm, the sandstone appears heavily disturbed and is brecciated. Thin to medium thickness beds of volcanic sandstone occur interbedded with volcanic siltstone in Section 2, 12–16 cm, 55–56 cm and 118–120 cm, in Section 3, 31–38 cm, 92–106 cm and 123–125 cm and in Section 4, 32–34 cm. Microfaulting and mineral filled fractures are common throughout. Minor lithology: NONE.
		2					10G 2.5/1 and 5GY 5/1	
		3						
		4					10G 3/1 To 5Y 5/1	
		CC					10G 3/1	



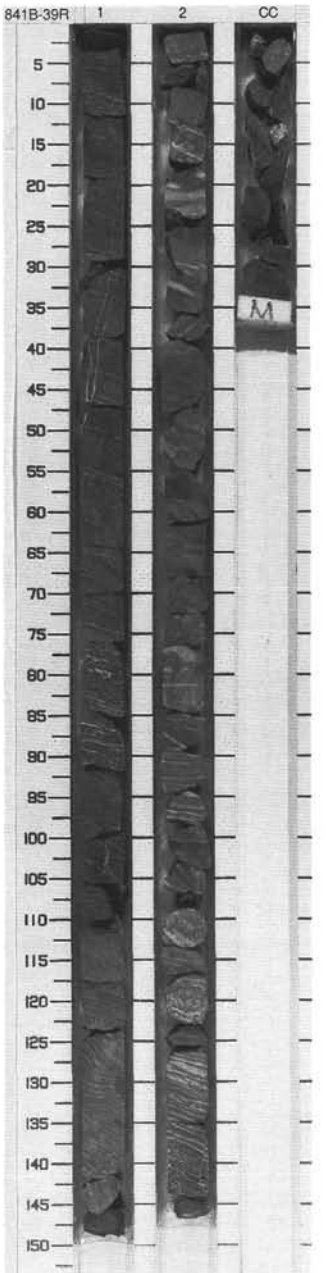
SITE 841 HOLE B CORE 38R CORED 516.1 - 525.7 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 / 1.0		1					10Y 4/1	VOLCANIC SANDSTONE and VOLCANIC SILTSTONE. *Major lithologies:* VOLCANIC SILTSTONE, commonly shows strong planar lamination with very dark grayish green (10G 2.5/1) thick laminae and greenish gray (5GY 5/1) thin laminae. In section 1, 5–67 cm laminae are less pronounced and dark olive gray in color (10Y 4/1). Sedimentary structures in the siltstone include planar laminae, cross- and wedge-planar laminae and convoluted bedding. Microfaults and mineral filled fractures also occur within siltstones. Thin beds of volcanic siltstone also occur within volcanic sandstone in Section 3, 71–78 cm and in Section 4, 5–12 cm. VOLCANIC SANDSTONE, dark grayish green (10G 3/1) shows convoluted bedding, fining upward intervals, planar- and wedge-shaped laminae, microfaulting and mineral-filled fractures. Massive volcanic sandstone also occurs in Section 3, 80–115 cm. Thin to medium thickness beds of volcanic sandstone occur interbedded with volcanic siltstone in Section 1, 67–71 cm and 110–112 cm, in Section 2, 32–43 cm and 76–85 cm, in Section 3, 13–17 cm and in Section 4, 12–13 cm. Minor lithology: VOLCANIC CONGLOMERATE, dark olive gray (10Y 4/1) occurs in Section 1, 0 to 5 cm and contains rounded clasts of volcanic siltstone up to 18 mm in diameter.
	Void	2					10G 2.5/1 To 5Y 5/1	
		3					10G 3/1	
		4					10G 2.5/1 to 5Y 6/1	
		CC					10G 3/1	



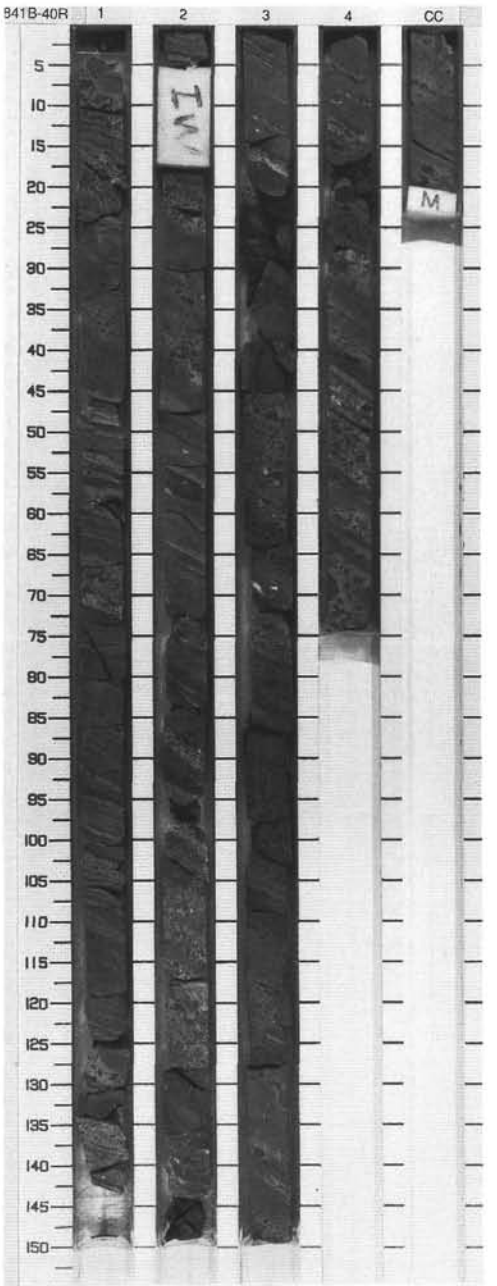
SITE 841 HOLE B CORE 39R CORED 525.7 - 535.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC	Middle Miocene	F F F F			2.5Y 3\0 To 5Y 6/1 10G 3/1 To 10G 5/1 10G 2.5/1	VOLCANIC SILTSTONE and VOLCANIC SANDSTONE Major lithologies: VOLCANIC SILTSTONE. Very dark gray (2.5Y 3/0) with thin laminae of gray (5Y 6/1) volcanic siltstone. Shows fining upward intervals, cross-, planar-, wedge-planar laminae and convoluted bedding. Microfaults and subvertical calcareous veins are common. In Section 1 minor interbeds of volcanic sandstone, 2 to 5 mm thick, occur. VOLCANIC SANDSTONE, dark grayish green (10G 3/1) to very dark grayish green (10G 2.5/1). Thin planar laminae, burrows and microfaulting occur within the sandstone in Section 2, 22–101 cm. In Section CC, convoluted bedding, planar laminae and a graded interval occur. Minor lithology: NONE.



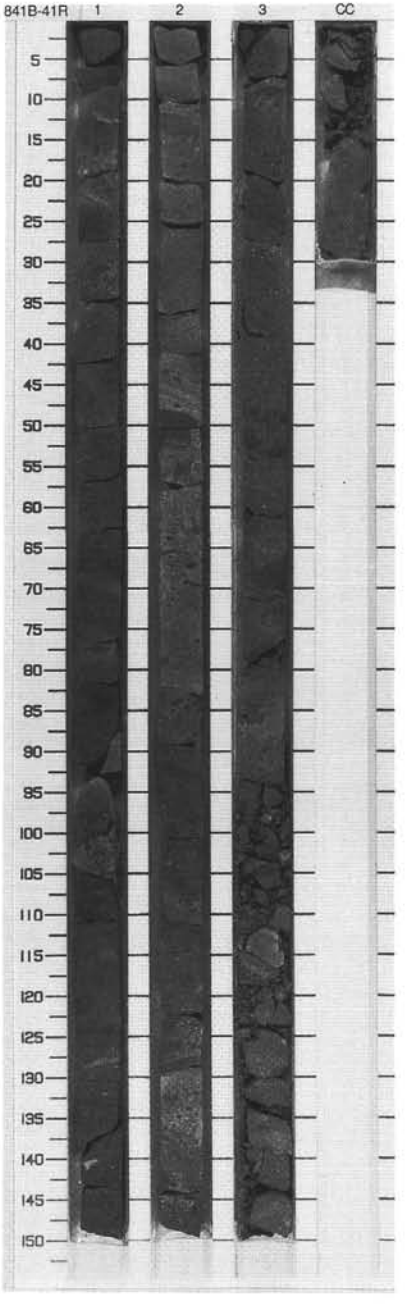
SITE 841 HOLE B CORE 40R CORED 535.3 - 545.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 CC	Middle Miocene	F F		I	2.5Y 3/0 2.5Y 6/0 To 2.5YR 2.5/0 5Y 7/1 To 5Y 2.5/1 2.5YR 3/0	VOLCANIC CONGLOMERATE, VOLCANIC SANDSTONE and VOLCANIC SILTSTONE Major lithologies: VOLCANIC CONGLOMERATE, VOLCANIC SANDSTONE and VOLCANIC SILTSTONE, light gray (5Y 7/1) to gray (2.5YR 6/0 to 5Y 5/1) to black (2.5YR 2.5/0 to 5Y 2.5/1). The different lithologies occur in very thin to medium-bedded layers. Planar-, wedge-planar, lenticular- and cross-lamination is common in the sandstones and the siltstones. The volcanic conglomerates are either planar stratified or structureless and commonly have scoured bases. Clasts of black and altered, green, mafic rocks and grayish red, altered mafic rocks are common. Maximum clast size is generally around 3 cm, the mean clast size is 1-2 cm. Micro-faults and mineral-filled fractures are common. Minor lithology: NONE.



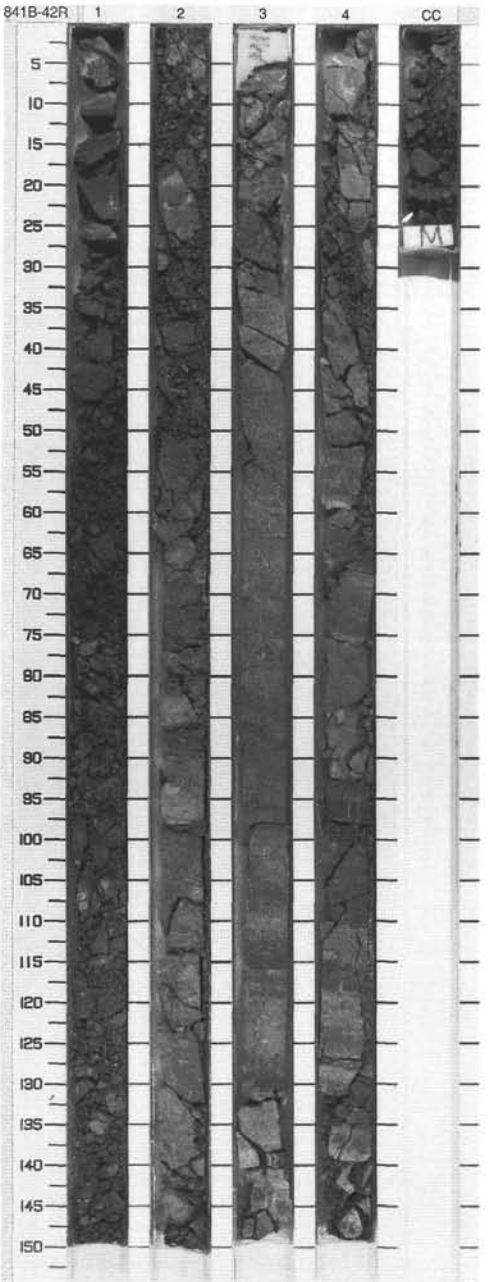
SITE 841 HOLE B CORE 41R CORED 545.0 - 554.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC	Lower Oligocene				10G 2.5/1 To 5Y 5/1; 5GY 4/1 To 5Y 6/1; 7.5YR 4/2	VOLCANIC SANDSTONE and VOLCANIC CONGLOMERATE. Major Lithologies: VOLCANIC SANDSTONE, gray (10G 2.5/1). This lithology occurs as thin to medium thick-bedded, coarse-grained, planar and wedge-planar laminated beds. It is typically interbedded with gray (10G 2.5/1) to greenish black (5Y 5/1), matrix supported VOLCANIC CONGLOMERATE. In Section 2 the conglomerate matrix consists of coarse to very coarse-grained sand, while in Section 3 it is granule-sized to very coarse grained sand. The conglomerate is poorly sorted. Angular to rounded clasts up to 3 cm across occur in Section 1, increasing to 7 cm in Section 2. The mean clast size also increases from 1-2 cm in Section 1 to 2-3 cm in Sections 2 and 3. Planar lamination and planar stratification is common. In Section 3, at 103 cm, a marked color change within the volcanic conglomerate occurs. Below this, the conglomerate is a dark brown (7.5YR 4/2) to pinkish gray (7.5YR 7/2), polymict assemblage of poorly sorted, rounded to very angular fragments up to 2.5 cm across. Very thin sandstone, clayey siltstone layers occur within the conglomerate. Minor lithology: NONE.



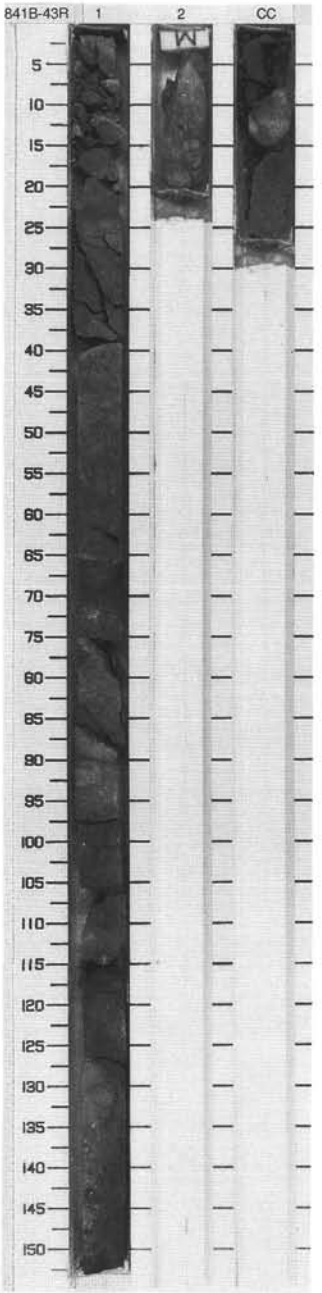
SITE 841 HOLE B CORE 42R CORED 554.3 - 564.0 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 4 CC	Lower Oligocene	F		1	7.5YR 4/4 7.5YR 3/4 7.5YR 7/2 To 7.5YR 4/4 7.5YR 7/4 To 7.5YR 4/2 5BG 4/1	CLAYEY CALCAREOUS SANDSTONE WITH FORAMINIFERS, SANDY CLAYSTONE, CLAYEY SANDSTONE and CLAYSTONE Major lithology: CLAYEY CALCAREOUS SANDSTONE WITH FORAMINIFERS, pink (7.5YR 7/4) to pinkish gray (7.5YR 7/2) to brown (7.5YR 5/4). Bioturbation is common and primary lamination is partially destroyed. Interbedded with the clayey calcareous sandstone with foraminifers are 1-10 cm thick beds of massive CLAYSTONE, SANDY CLAYSTONE and normally graded CLAYEY SANDSTONE, dark brown (7.5YR 4/4) to greenish gray (5Y 6/2). The sequence is strongly microfaulted and shows some diagenetic alteration. Minor lithology: VOLCANIC CONGLOMERATE, reddish brown (5YR 5/3) to dark brown (7.5YR 3/4), occurs in Section 1, 0-11 cm and 27-42 cm. Matrix-supported, with subangular to rounded clasts.



SITE 841 HOLE B CORE 43R CORED 564.0 - 573.6 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 CC	Lower Oligocene	F F F F			5BG 6/1 To 5BG 4/1 5BG 6/1	CALCAREOUS VOLCANIC SANDSTONE WITH FORAMINIFERS Major Lithology: CALCAREOUS VOLCANIC SANDSTONE WITH FORAMINIFERS, greenish gray (5BG 6/1) to dark greenish gray (5BG 4/1), brecciated due to faulting and fracturing. Contains abundant scattered granule to small pebble-sized clasts of volcanic rocks and mudstone. Minor Lithology: Coarse-grained VOLCANIC SANDSTONE, very dark grayish green (10G 2.5/1) to black (5Y 2.5/1), thin-bedded, normally graded, mafic sandstone beds containing abundant fresh pyroxenes. Occurs in Section 1, 65-71 cm, 114-118 cm, 143-150 cm and in Section 2, 0-11 cm. CLAYSTONE, dark greenish gray (5BG 4/1), homogeneous, occurs in Section 1, 0-9 cm and in Section 2, 20-27 cm.

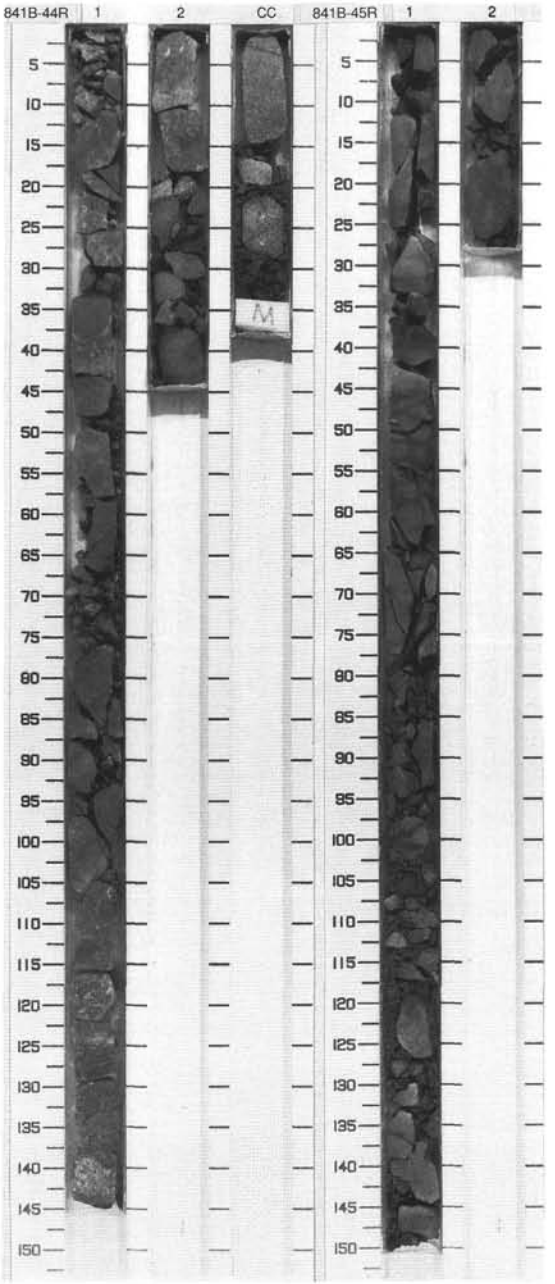


SITE 841 HOLE B CORE 44R CORED 573.6 - 583.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 CC	Upper Eocene				5Y 3/1	CALCAREOUS VOLCANIC SANDSTONE Major lithology: CALCAREOUS VOLCANIC SANDSTONE, very dark gray (5Y 3/1). Normally-graded layers with eroded and occasionally loaded lower contacts occur throughout. The sandstone varies from very coarse-grained to fine-grained, but in Section 1, 117-150 cm, conglomeratic intervals occur. Soft sediment deformation structures are common. Minor lithology: NONE.

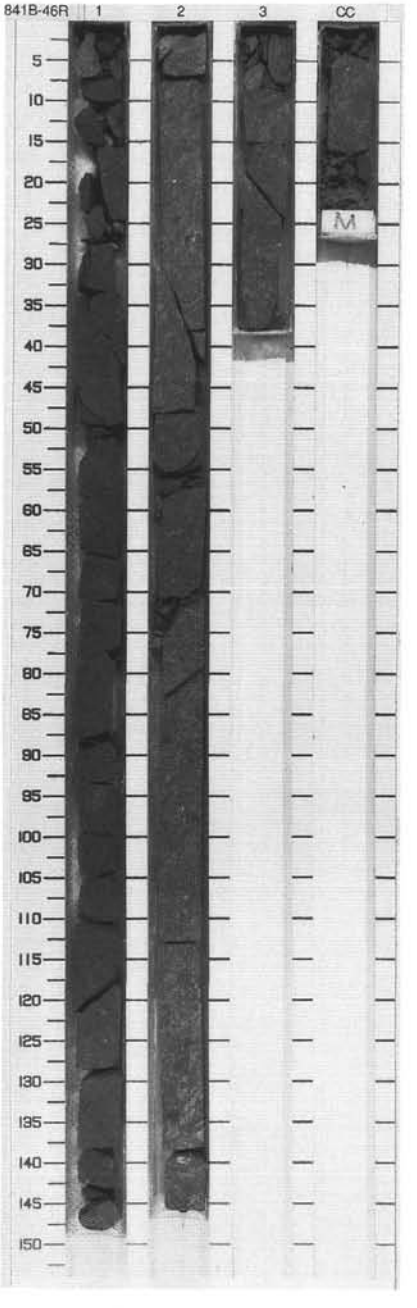
SITE 841 HOLE B CORE 45R CORED 583.3 - 592.9 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2	Upper Eocene	F			5GY 5/1 to 5G 5/1	CALCAREOUS VOLCANIC SANDSTONE. Major lithology: CALCAREOUS VOLCANIC SANDSTONE, greenish gray (5GY 5/1) to dark greenish gray (5G 5/1), moderate bioturbation. Zoophycos burrows common. Minor Lithology : Coarse-grained, normally graded mafic VOLCANIC SANDSTONE occurs as thin band in Section 1, 42-44 cm and as an oblique dispersed band in Section 2, 18–26 cm.



SITE 841 HOLE B CORE 46R CORED 592.9 - 602.6 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0.5 1.0		1 2 3 CC					5Y 4/1 to 5Y 3/1	CALCAREOUS VOLCANIC SANDSTONE WITH LARGE FORAMINIFERS and LARGE FORAMINIFER BIOCLAST VOLCANIC SANDSTONE Major Lithology : CALCAREOUS VOLCANIC SANDSTONE WITH LARGE FORAMINIFERS and LARGE FORAMINIFER BIOCLAST VOLCANIC SANDSTONE, dark gray (5Y 4/1) to very dark gray (5Y 3/1). Fine-grained sandstone with mafic granules (up to 3mm across) and calcareous cement. Foraminifers, Discocyclina sp., and molluscan shells are common throughout. Minor Lithology : None.

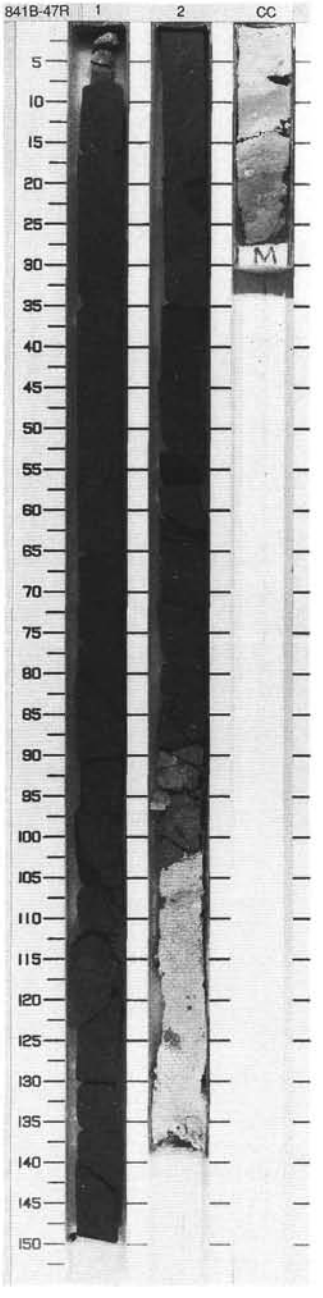


135-841B-47R
SMEAR SLIDE SUMMARY (%):

	2, 50 M
TEXTURE:	
Sand	80
Silt	20
Clay	—
COMPOSITION:	
Glass	25
Magnetite	Tr
Plagioclase	20
Pyroxene	15
Quartz	30
Rock fragment	10

SITE 841 HOLE B CORE 47R CORED 602.6 - 612.3 mbsf

Meter	Graphic Lith.	Section	Age	Structure	Disturb	Sample	Color	Description
0 1 2		1 2 CC				S	10G 3/1 10G 8/1	VOLCANIC SANDSTONE WITH LARGE FORAMINIFERS and RHYOLITIC FAULT GOUGE AND BRECCIA. Major lithologies: VOLCANIC SANDSTONE WITH LARGE FORAMINIFERS, dark grayish green (10G 3/1). Generally structureless, with occasional faint planar laminae and burrows. A microfault showing slickensides occurs in Section 1, 110 cm. RHYOLITIC FAULT GOUGE AND BRECCIA, light grayish green (10G 8/1), generally structureless and intensely altered. Contains unsorted and ungraded bipyramidal quartz grains, 1 to 3 mm in diameter in a clay matrix. Chlorite is present. A large quartz clast 5 cm across occurs in Section 2, 138 cm. Small pyrite crystals up to 1 mm across occur throughout. Chalcopyrite may also be present. In Section 2, 90–104 cm, a light greenish gray (10Y 7/1), intensely sheared zone occurs containing chlorite. Minor lithologies: CALCAREOUS SANDSTONE, very pale brown (10YR 7/3), occurs in Section 1, 0–3 cm. CLAYSTONE BRECCIA, bluish gray (5B 6/1) occurs in Section CC, 21–27 cm, and contains angular clasts up to 24 mm across.

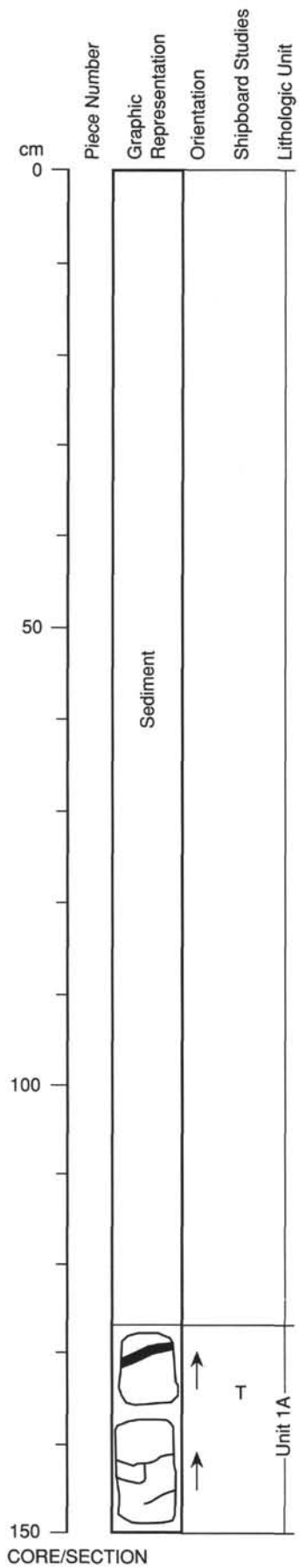


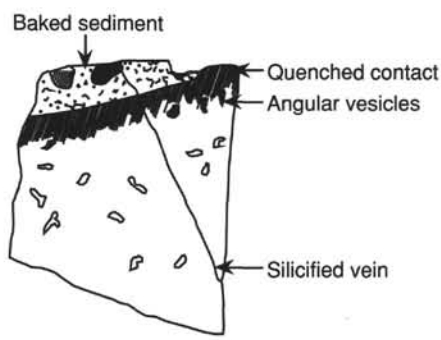
135-841B-18R-1

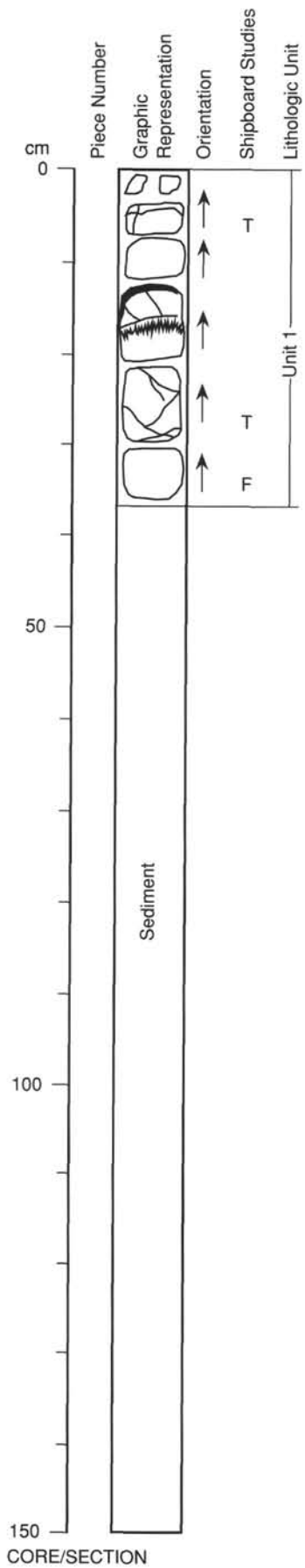
UNIT 1A: MODERATELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 128–150 cm

CONTACTS: The upper contact is preserved between vitric sandstone and the basalt.
PHENOCRYSTS: Glomerocrysts tend to become larger away from the contact.
Plagioclase: 5%–7%; 0.5–4 mm; as glomerocrysts.
Clinopyroxene: Trace; 0.5 mm; as rare subhedral to euhedral crystals.
GROUNDMASS: Very fine-grained microcrystalline network of interlocking plagioclase and clinopyroxene.
VESICLES: Trace vesicles are restricted to a zone 1 cm from the contact. They are irregularly shaped, and are partially filled with frothy quenched magma and/or colorless zeolites.
COLOR: Gley N5/0, gray.
STRUCTURE: Massive; possibly a thin sill/dike, or flow.
ALTERATION: Highly altered with a greenish coloration throughout.
VEINS/FRACTURES: 5%; 1 mm wide; steeply dipping; some of the small white veins are carbonate. Others are silicic, and are associated with sulfides. Dark veins also appear to be silicic.
ADDITIONAL COMMENTS: The association of sulfides with the silicic veins may indicate somewhat elevated temperatures of the solutions, suggesting that the veining occurred close to the time of magma emplacement.







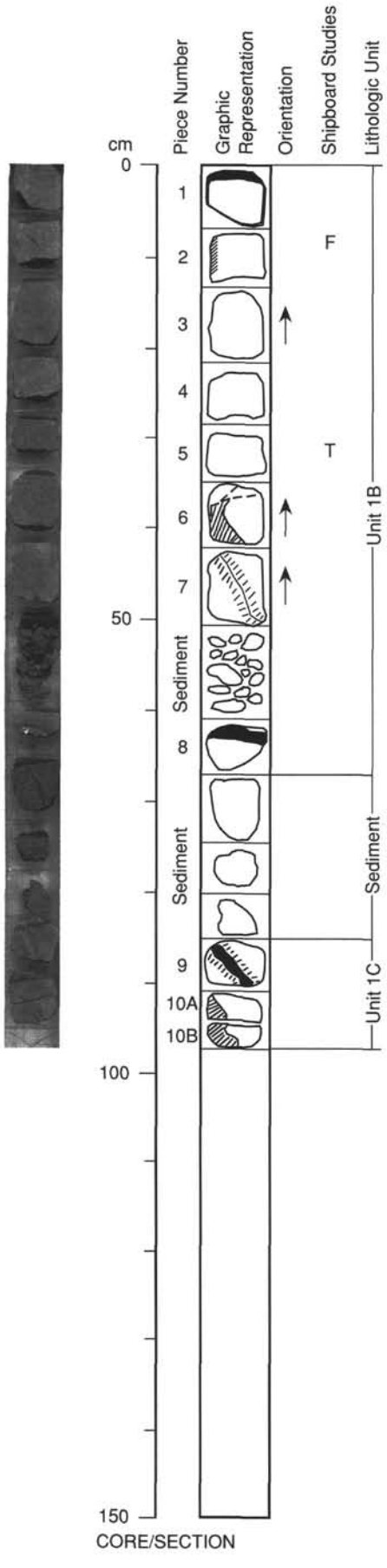
135-841B-18R-2

UNIT 1A: MODERATELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 0–37 cm

CONTACTS: *None.*
PHENOCRYSTS:
Plagioclase: 5%–7%; 0.5–4 mm; as glomerocrysts.
Clinopyroxene: Trace; 0.5 mm; as rare subhedral to euhedral crystals.
GROUNDMASS: Fine-grained, microcrystalline intergrowth of clinopyroxene and plagioclase.
VESICLES: Rare vesicles up to 1 mm long.
COLOR: Gley N 5/0, gray.
STRUCTURE: Massive; possibly a thin sill/dike or flow.
ALTERATION: Moderately to highly altered; greenish hue throughout.
VEINS/FRACTURES: 2%–10%; 0.5–5 mm wide; randomly oriented; at 13–14 cm there is a 5 mm wide carbonate vein. Dark veins appear to comprise a very thin quartz vein (0.3 mm wide) surrounded by a silicification halo 1 mm across. Sulfides associated with the quartz veins are concentrated at vein intersections.
ADDITIONAL COMMENTS: The basalt terminates at 39 cm, but without preservation of a basalt-sediment contact.

135-841B-23R-4



Contact with sediment, chilled

Alteration halo

UNIT 1B: MODERATELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–8

CONTACTS: Pieces 1 and 8 show chilled contacts with sediment.

PHENOCRYSTS: Glomerocrysts increase in size towards the interiors of pieces (ie. away from the chilled margins).
Plagioclase: 5%–7%; up to 3 mm; euhedral tabular isolated crystals and glomerocrysts.
Clinopyroxene: Trace; 0.5 mm; subhedral crystals intergrown with some plagioclase glomerocrysts.

GROUNDMASS: Very fine-grained microcrystalline network of interlocking plagioclase and clinopyroxene. Microlitic towards the chilled contacts.

VESICLES: Trace vesicles towards chilled zones. Vesicularity is difficult to estimate in interior pieces owing to the possible dissolution of mineral phases, but it is probably in the order of 1%–3%. Some of these have colorless zeolites lining the cavity walls.

COLOR: 2.5Y 4/0, dark gray.

STRUCTURE: Could represent thin flows, dikes, sills, or pillows.

ALTERATION: Moderately altered. In Piece 8A clinopyroxene(?) is surrounded by a brick red alteration halo, possibly consisting of oxidized sulfides(?).

VEINS/FRACTURES: 5%; up to 1 mm wide; randomly oriented; veining appears to be dominated by quartz with disseminated pyrite and possibly albite(?). A small amount of fizzing on contact with dilute acid of white vein material in Piece 8 indicates some associated carbonate. This piece also shows some fine-scale veining parallel to the contact, and a single vein perpendicular to these. The contact in Piece 8 shows a 2.7 mm offset.

ADDITIONAL COMMENTS: Although the general appearance of Unit 1B is similar to that of Unit 1A, Unit 1B does not have the same greenish hue, and therefore appears to be less altered.

UNIT 1C: MODERATELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 9–10B

CONTACTS: Both pieces show chilled zones, Piece 9 may represent fusion between two pillows, or an example of an internal quenched rind within a single pillow or thin sill or dike.

PHENOCRYSTS: Generally occurring as quenched microphenocrysts towards chilled margins, grading to coarser glomerocrystic intergrowths towards the interior.
Plagioclase: 3%–5%; 0.3–2.8 mm; as single quenched crystals and glomerocrysts.
Clinopyroxene: Trace; up to 0.5 mm; intergrown with plagioclase in some glomerocrysts.

GROUNDMASS: Very fine-grained to microlitic.

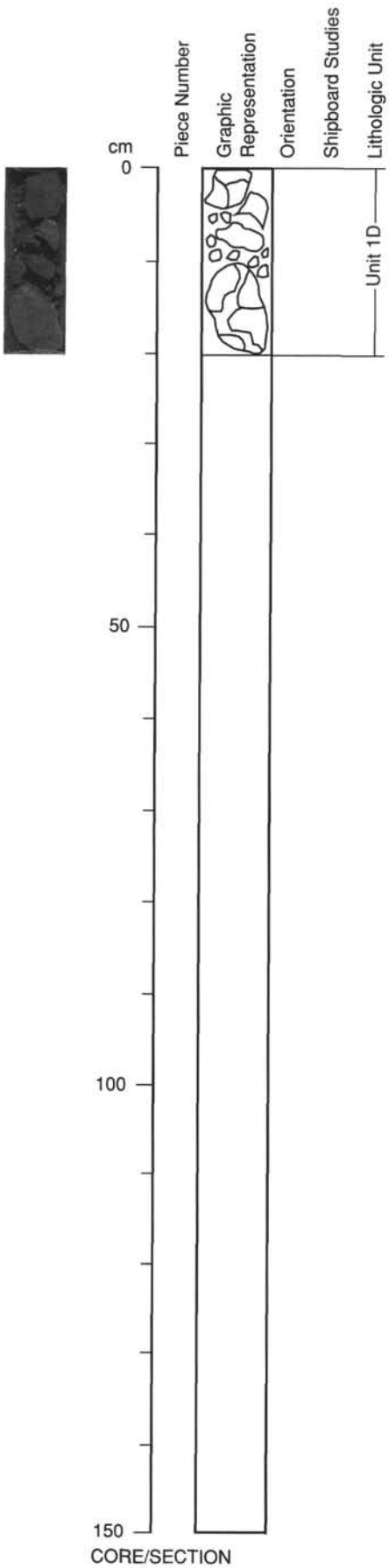
VESICLES: 2%–3%; up to 1.3 mm; irregularly shaped; randomly distributed; apart from the zeolites, the vesicles are generally clear from infillings.
Miaroles: Some cavities contain multifaceted, colorless zeolites.

COLOR: 2.5Y 4/0, dark gray.

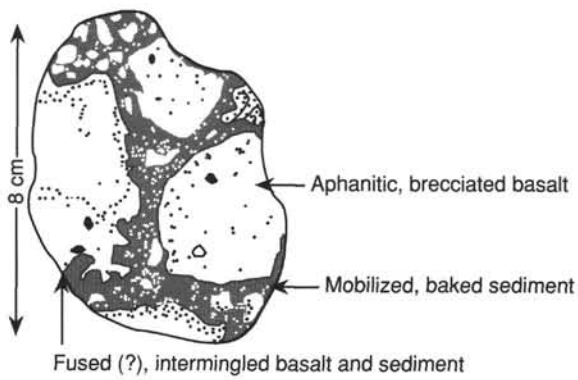
STRUCTURE: Small pillows or thin sills or dikes.

ALTERATION: Moderately altered.

VEINS/FRACTURES: 5%; up to 2 mm; randomly oriented; dark veins appear to be silicic and some are associated with sulfide development. Fine, white veining appears to be a combination of silicic, feldspathic(?) and lesser carbonate material.



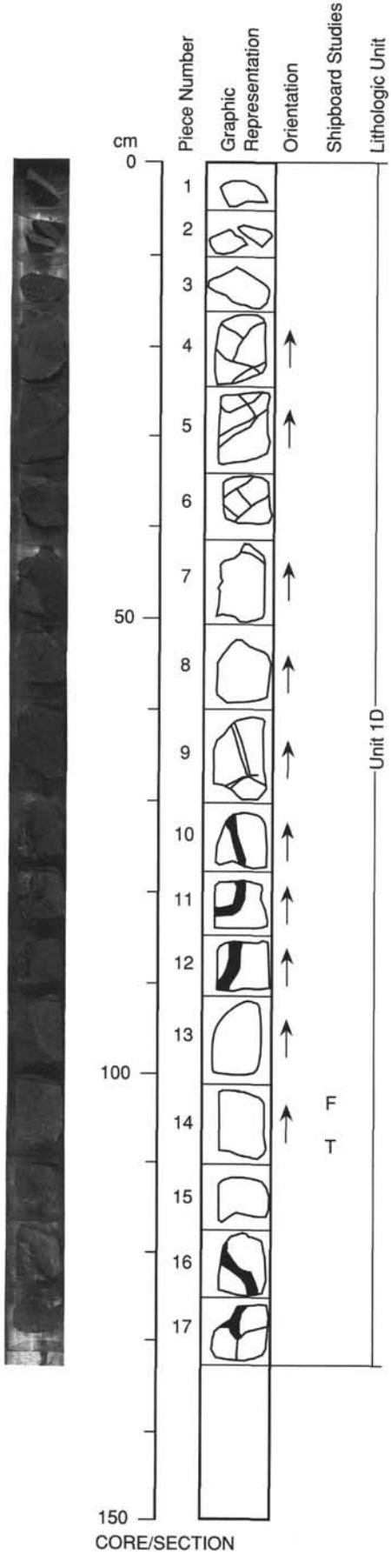
135-841B-24R-CC



UNIT 1D: SPARSELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 0–20 cm

CONTACTS: Brecciated basalt mingled with fused sediment.
PHENOCRYSTS: Phenocrysts become absent towards the basalt-sediment contact.
Plagioclase: 0–2%; 0.2–0.8 mm; small laths and larger glomerocrysts.
Clinopyroxene: Trace; 0.1 mm; associated with plagioclase glomerocrysts.
GROUNDMASS: Aphanitic; scattered dark granules are conspicuous, possibly Fe-Ti oxides.
VESICLES: 0%–5%; 0.1–0.2 mm; angularly shaped; irregularly distributed; Angular cavities enclose tabular plagioclase crystals, which tend to appear transitional to miarolitic cavities.
Miaroles: See vesicle comments.
COLOR: 7.5YR 4/0, gray.
STRUCTURE: Brecciated on margins.
ALTERATION: Slight, may be a pervasive oxidation.
VEINS/FRACTURES: Not applicable.
ADDITIONAL COMMENTS: This appears to be the upper contact of an igneous unit that continues into the next core.



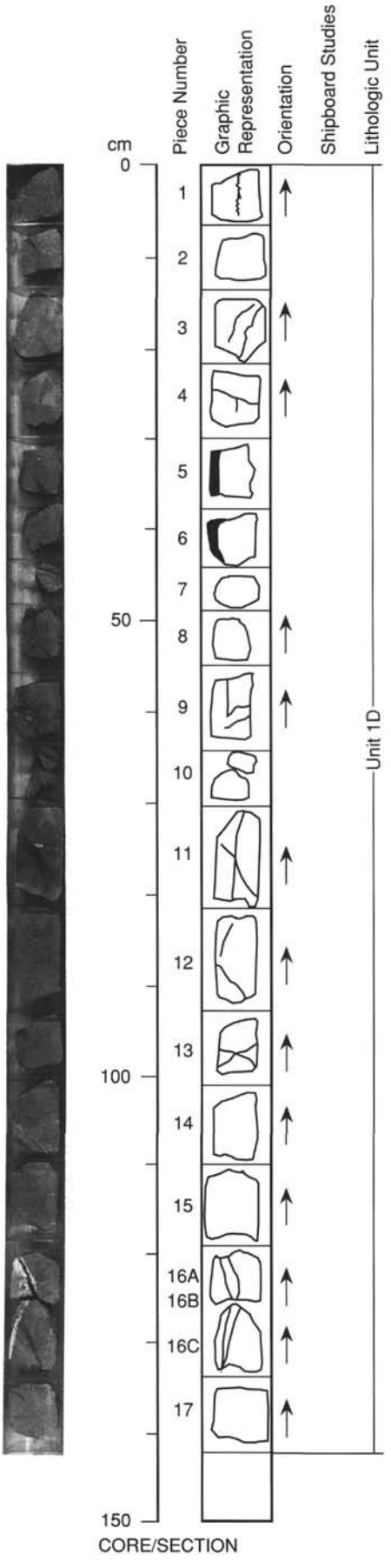
135-841B-25R-1

UNIT 1D: SPARSELY TO MODERATELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–17

CONTACTS: Pieces 10, 11, 12, 16, and 17 have chilled contacts with coarse sand.
PHENOCRYSTS: Single quenched plagioclase microphenocrysts occur close to the chilled margins, becoming larger and glomerocrystic towards the interior of pieces.
Plagioclase: 2%–7%; 0.4–4 mm; as single crystals and glomerocrysts
Clinopyroxene: Trace; 0.4 mm; rarely present, associated with plagioclase glomerocrysts.
GROUNDMASS: Microlitic close to chilled contacts, grading to fine-grained and microcrystalline away from these margins.
VESICLES: Trace vesicles are generally concentrated towards the chilled contacts, some have glassy, frothy quenched magma partially infilling or lining the cavity walls.
Miaroles: Colorless zeolites line the walls of some vesicles.
COLOR: 2.5Y 5/0, gray to 2.5Y 4/0, dark gray towards the contacts.
STRUCTURE: The contacts are all steeply dipping suggesting either pillows or thin dikes.
ALTERATION: Slightly to moderately altered.
VEINS/FRACTURES: 2%–5%; typically up to 3 mm wide; randomly oriented; in Piece 9, a 1 cm wide fracture is filled with brecciated, altered basalt and silicic vein material.

J Chilled margin



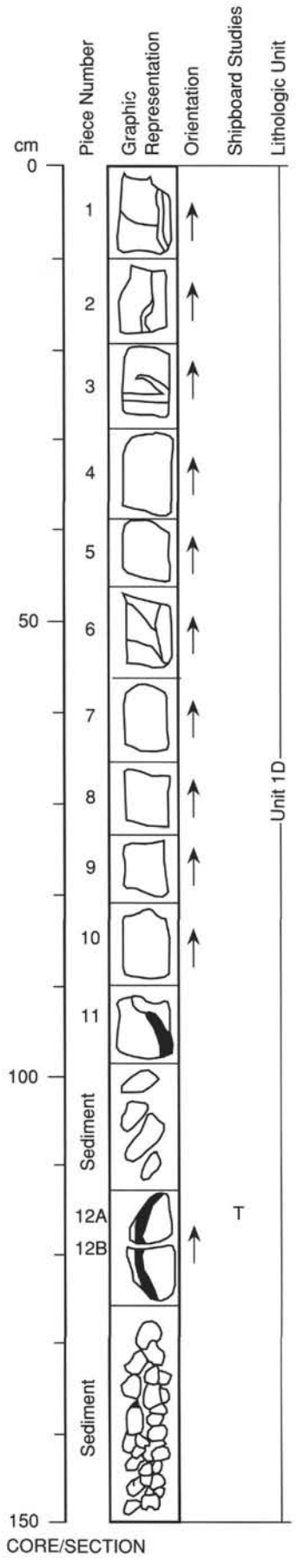
135-841B-25R-2

UNIT 1D: SPARSELY TO MODERATELY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–17

CONTACTS: There is a subvertical chilled edge to Piece 5.
PHENOCRYSTS:
Plagioclase: 2%–7%; 0.3–2.4 mm; as single quenched crystals and glomerocrysts.
Clinopyroxene: Trace; 0.3 mm; rare subhedral grains associated with some plagioclase glomerocrysts.
GROUNDMASS: Microlitic to microcrystalline intergrowth of clinopyroxene and plagioclase.
VESICLES: 0%–2%; up to 2 mm; irregularly shaped; randomly distributed; the rare vesicles are generally free from alteration. Some are lined or partially filled with bladed, colorless zeolites.
COLOR: 2.5Y 5/0, gray.
STRUCTURE: Pillows or thin dikes (or possibly steeply dipping flows/sills?).
ALTERATION: Moderately altered.
VEINS/FRACTURES: 5%; up to 3 mm; randomly oriented; fractures are infilled with silicic material, sometimes associated with pyrite and rare carbonate.

Chilled margin



135-841B-25R-3

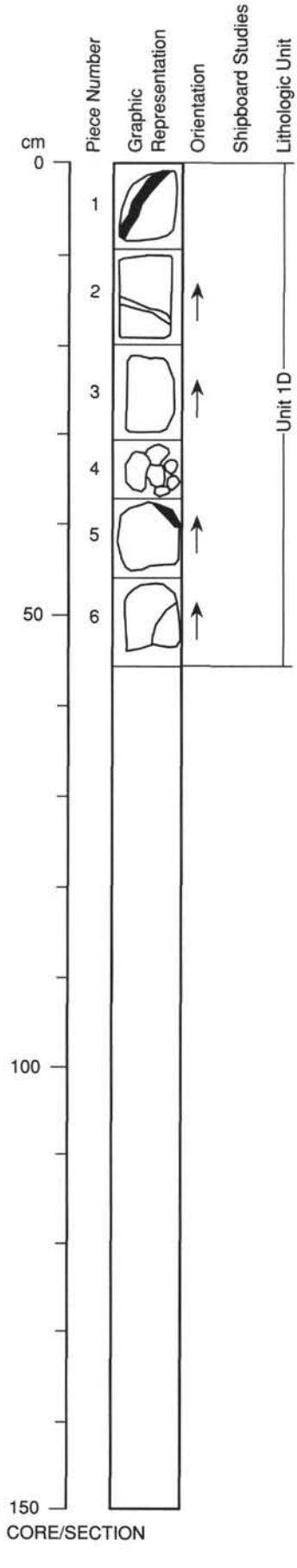
UNIT 1D: MODERATELY TO HIGHLY PHYRIC PYROXENE, PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–12B

CONTACTS: Pieces 11 and 12 contain subvertical chilled contacts.
PHENOCRYSTS:
Plagioclase: 5%–10%; 0.2–3.9 mm; as single quenched crystals and glomerocrysts.
Clinopyroxene: Trace; 0.3 mm; associated with some plagioclase glomerocrysts.
GROUNDMASS: Microlitic to microcrystalline groundmass of interlocking clinopyroxene and plagioclase.
VESICLES: Trace vesicles are randomly oriented. Those closest to chilled contacts are partially filled with frothy, glassy magmas. Some cavities contain colorless zeolites.
COLOR: 2.5Y 5/0, gray.
STRUCTURE: Thin dipping sills, dikes, or pillows(?).
ALTERATION: Slightly to moderately altered.
VEINS/FRACTURES: 5%; up to 2.3 mm wide; randomly oriented; white veins contain significant carbonate and silicic material. Some darker silicic veins have white carbonate selvages.

Carbonate/silica vein

Chilled contact



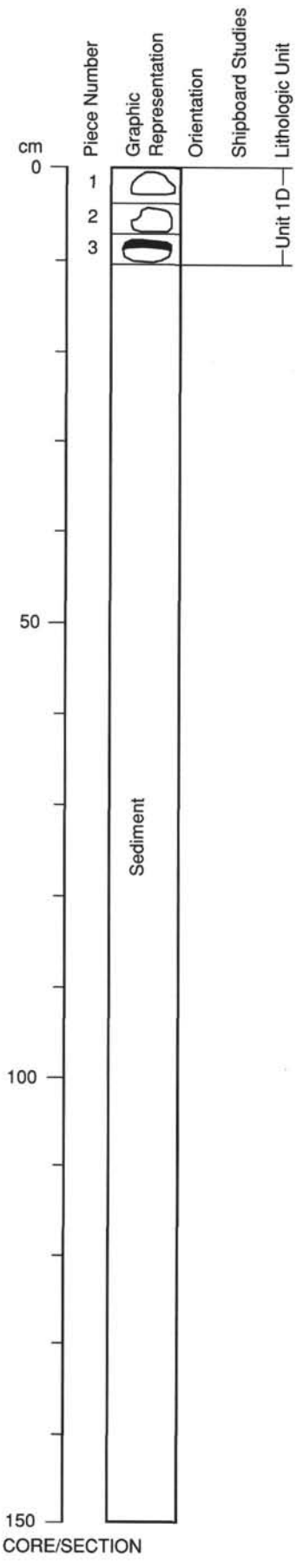
135-841B-25R-4

UNIT 1D: MODERATELY TO HIGHLY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–6

CONTACTS: Pieces 1 and 5 contain chilled contacts with baked sediment.
PHENOCRYSTS: Glomerocrysts of plagioclase increase in size away from the chilled margins.
Plagioclase: 7%–10%; 0.2–3.9 mm; as single quenched crystals and glomerocrysts.
Clinopyroxene: Trace; 0.2 mm; rare, associated with plagioclase glomerocrysts.
GROUNDMASS: Microlitic to microcrystalline intergrowth of pyroxene and plagioclase.
VESICLES: Trace vesicles are more concentrated adjacent to the quenched margin. Irregular in shape, some cavities are partially filled or lined with colorless zeolites, others contain frothy quenched magma.
COLOR: 2.5Y 5/0, gray.
STRUCTURE: Thin flows, dikes or pillows.
ALTERATION: Slightly to moderately altered.
VEINS/FRACTURES: 2%; up to 2.3 mm wide; randomly oriented; filled with silicic material(?).


Chilled contact

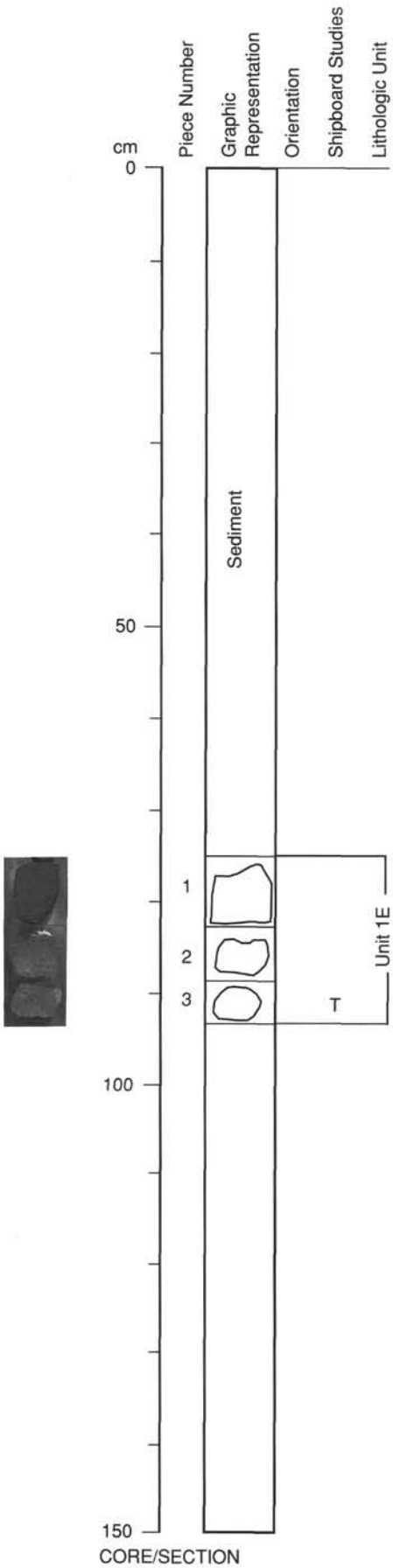


135-841B-26R-1

UNIT 1D: MODERATELY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–3

CONTACTS: Piece 3 has a devitrified glassy chilled margin.
PHENOCRYSTS: Size and abundance of glomerocrysts increase with distance from the chilled margin.
Plagioclase: 5%–7%; 0.3–2.8 mm; as single quenched crystals and glomerocrysts.
Clinopyroxene: Trace; 0.3 mm; rare; associated with plagioclase glomerocrysts.
GROUNDMASS: Microlitic to microcrystalline interlocking intergrowth of plagioclase and clinopyroxene.
VESICLES: Trace vesicles only; up to 0.9 mm across close to the chilled margin.
COLOR: 2.5Y 5/0, gray.
STRUCTURE: Pillows, thin sills, or dikes.
ALTERATION: Slightly to moderately altered.
VEINS/FRACTURES: Rare white silicic and carbonate veining in Piece 3.



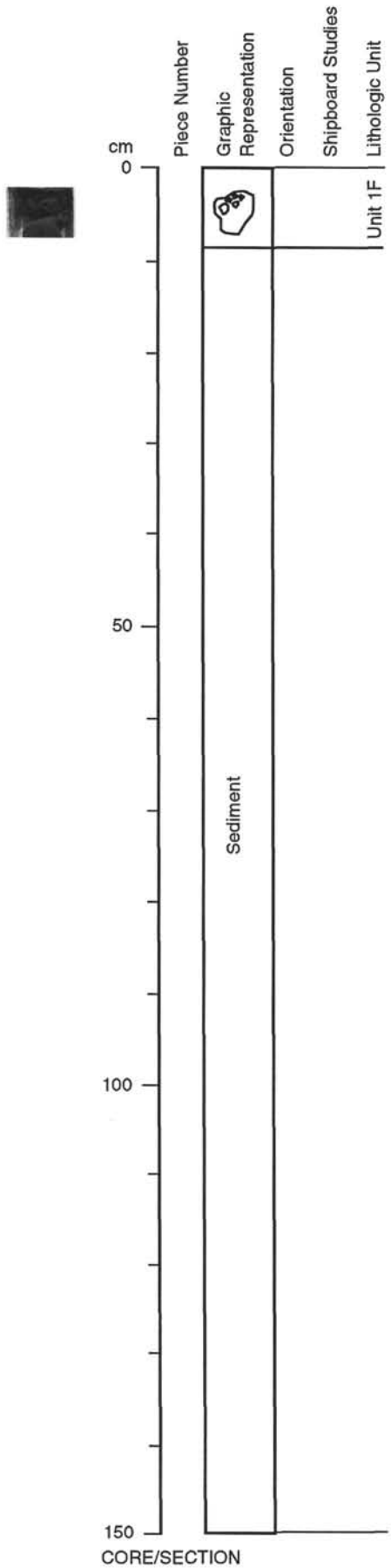
135-841B-26R-2

UNIT 1E: SPARSELY TO MODERATELY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–3

CONTACTS: None.
PHENOCRYSTS:
Plagioclase: 1%–3%; 0.2–2.6 mm; as single crystals and glomerocrysts.
Clinopyroxene: Trace; 0.3 mm; rare subhedral crystals associated with plagioclase glomerocrysts.
GROUNDMASS: Microlitic to microcrystalline intergrowth of plagioclase and clinopyroxene.
VESICLES: Trace irregular vesicles; some contain colorless zeolites.
COLOR: 2.5Y 5/0, gray.
STRUCTURE: Massive.
ALTERATION: Slightly to moderately altered.
VEINS/FRACTURES: 3%; up to 0.6 mm wide; randomly oriented; most are dark silicic veins, but occasional white veins contain significant carbonate.

135-841B-28R-1

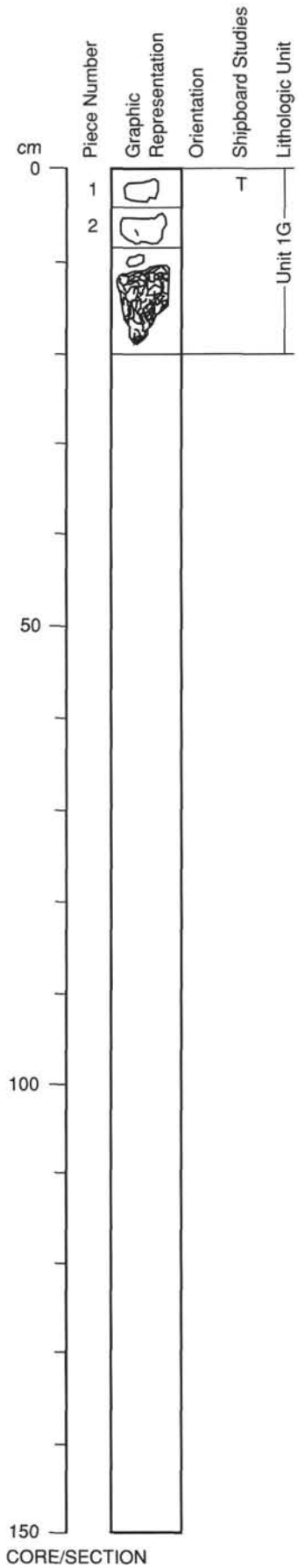


Hyaloclastite-like coating

UNIT 1F: MODERATELY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 0–7 cm

CONTACTS: None.
PHENOCRYSTS:
Plagioclase: 3%–5%; 0.5–2 mm; as single crystals and in glomerocrysts
Clinopyroxene: Trace; <0.5 mm; small microphenocrysts; often in clusters with plagioclase.
GROUNDMASS: Microcrystalline intergrowth of plagioclase and pyroxene.
VESICLES: None.
COLOR: 7.5YR 5/0, gray.
STRUCTURE: Massive.
ALTERATION: Slightly altered.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: 1 cm hyaloclastite rim; glassy fragments and basalt fragments welded to the basaltic piece.



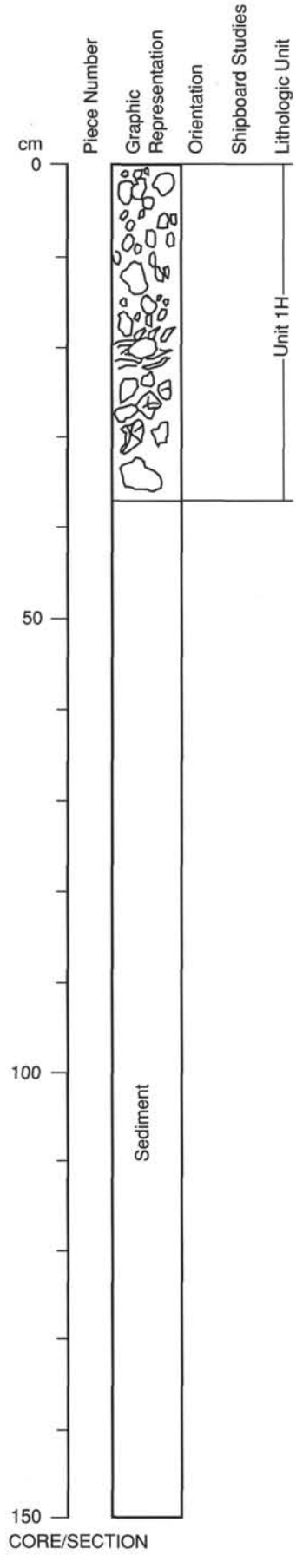
135-841B-31R-1

UNIT 1G: MODERATELY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–2

CONTACTS: Altered volcanic breccia below Piece 2.
PHENOCRYSTS: Dominantly plagioclase.
Plagioclase: 3%–7%; 0.6–2.2 mm; euhedral to subhedral, commonly in glomerocrysts.
Clinopyroxene: Trace; <0.4 mm; small microphenocrysts grading into groundmass.
GROUNDMASS: Microcrystalline, equigranular.
VESICLES: 1%; <0.5 mm; irregular; one side of Piece 2; irregularly distributed in groundmass; may be accentuated by alteration.
Miaroles: None.
COLOR: 2.5YR 6/0 gray.
STRUCTURE: Massive, though only pebbles.
ALTERATION: Moderately altered.
VEINS/FRACTURES: Trace; <0.3x7 mm; unknown orientation; distinct, short whitish vein in Piece 2.
ADDITIONAL COMMENTS: Gray, soft breccia below Piece 2 may be the same material as occurs in the top of Core 135-841B-32R as a rubbly zone.

Piece at 8–20 cm is soft, gray volcanic breccia, (drilling disturbed? or fault gouge)



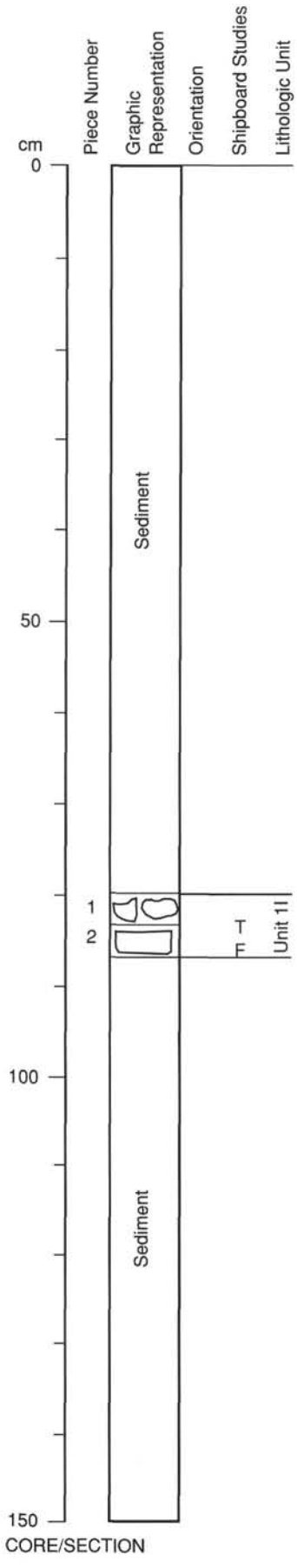
135-841B-32R-1

UNIT 1H: SPARSELY TO MODERATELY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 0–37 cm

CONTACTS: None.
PHENOCRYSTS:
Plagioclase: 1%–5%; 0.7–1.2 mm; now partially replaced by epidote.
Clinopyroxene: Trace; <0.5 mm; grading into groundmass; some with browner hues may be orthopyroxene.
GROUNDMASS: Microcrystalline, equigranular.
VESICLES: None.
Miaroles: None.
COLOR: 2.5Y 6/0 gray to 2.5Y 5/2 green gray.
STRUCTURE: None, pebbles.
ALTERATION: Highly altered; epidote, white (siliceous, prehnite?) veins, some K-feldspar (on one piece) variously developed; most of the white veining is in associated fine sandstone/siltstone pieces.
VEINS/FRACTURES: 2%–3%; <0.2 mm wide; various; some epidote veining in one fragment; abundant white veins throughout; little or no carbonate in them; a number of angular pebbles of veined fine sandstone in same interval; like finer grained sequences in lower parts of core.
ADDITIONAL COMMENTS: Eight to nine volcanic fragments; all angular, not rounded clasts from the breccia above; looks like they represent pieces of another sill or flow. A coarse grained quartzo-feldspathic(?) pebble occurs below the volcanic fragments and before the laminated sediments. This may represent a pebble of vein fill.

Basalt fragments 26–33 cm occur between whitish silica/prehnite? piece at 35 cm and greenish clayey fault gouge? at 20–26 cm



135-841B-36R-1

UNIT 1I: MODERATELY PHYRIC PYROXENE PLAGIOCLASE BASALTIC ANDESITE

Pieces 1–2

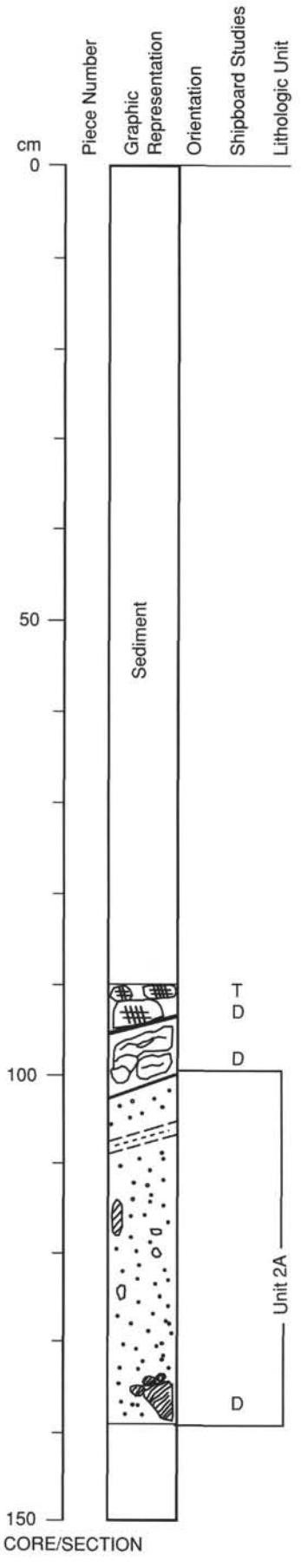
CONTACTS: None.
PHENOCRYSTS:
Plagioclase: 5%–7%; 0.3–4 mm; as single crystals and glomerocrysts.
Clinopyroxene: Trace; 0.3–1.6 mm; brownish single euhedral crystals and glomerocrysts.
GROUNDMASS: Microcrystalline. intergrowth of clinopyroxene and plagioclase.
VESICLES: None.
COLOR: 2.5Y 4/0, dark gray.
STRUCTURE: Massive.
ALTERATION: Fresh to slightly altered.
VEINS/FRACTURES: None.

135-841B-47R-2

UNIT 2A: RHYOLITIC FAULT GOUGE AND BRECCIA

Pieces 100–139 cm

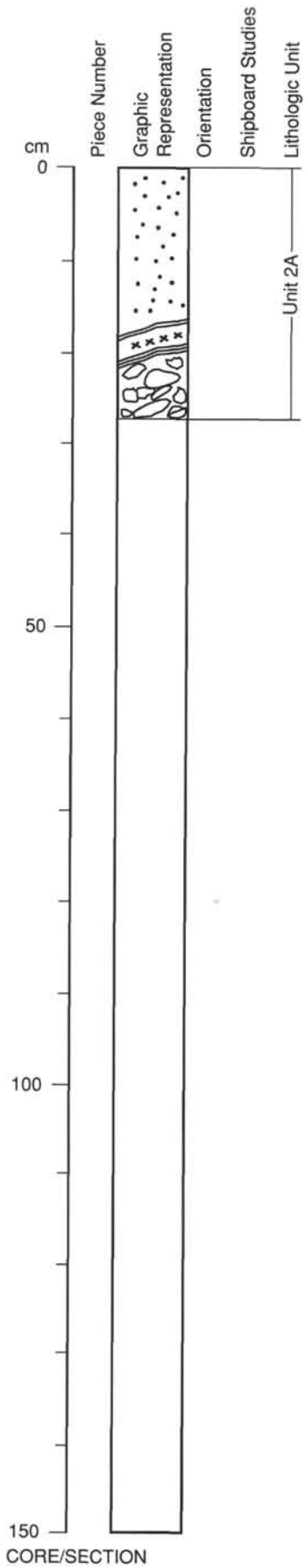
CONTACTS: Contact between overlying limestone at 100 cm.
PHENOCRYSTS: Original phenocrysts of rhyolite, some broken, in soft clay gouge matrix.
Quartz: 10%; up to 3 mm; euhedral bipyramidal.
Plagioclase: 5%; up to 2 mm; euhedral-subhedral tabular crystals.
GROUNDMASS: Soft fault gouge.
VESICLES: None.
COLOR: 5BG 7/1, light greenish gray.
STRUCTURE: Massive.
ALTERATION: Intensely altered; pyrite, clay, and chlorite are present throughout.
VEINS/FRACTURES: No clear veins; one distinct shear zone approximately 1.5 cm wide.
ADDITIONAL COMMENTS: Hard silicified lithic fragments (up to 5 cm) through unit; all are pyritized. Material interpreted as sheared rhyolite fault gouge from underlying rhyolitic units (2B and 2C). Highly fossiliferous limestone ends at 90 cm; from there downwards there is a 5 cm interval of a brown calcareous sandstone (with green clays and chlorite on shear surfaces cutting it), then about 7 cm of grayish, possibly sheared, silicic tuff, and then the highly altered white, pyrite rich material.



Limestone
Shear zone
Lithic fragments
Crystal fragments (schematic)

Zone of soft fault gouge. Fine pyrite present throughout

135-841B-47R-CC



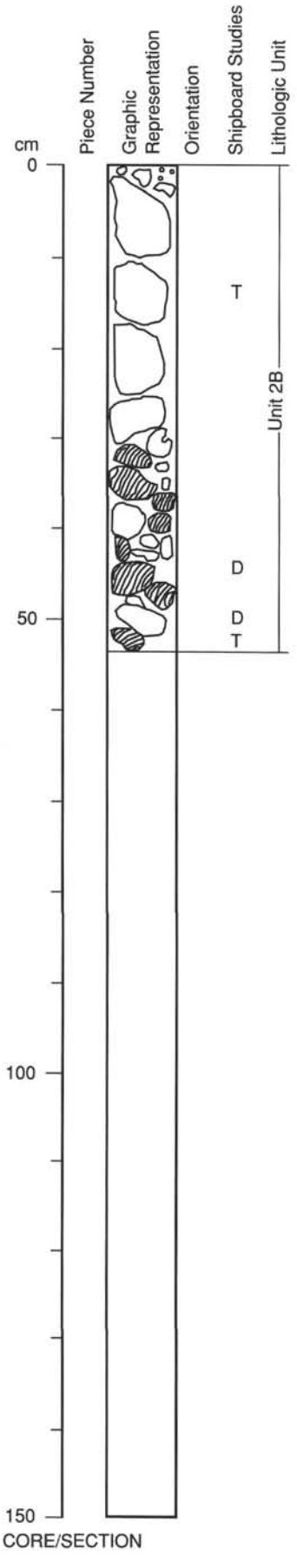
Fault gouge zone

Shear zones
Fault breccia
Crystal fragments with occasional small lithic fragments
Mixed pyrite and crystal fragments in fault

UNIT 2A: RHYOLITIC FAULT GOUGE AND SHEAR BRECCIA

Pieces 0–27 cm

CONTACTS: None.
PHENOCRYSTS: Occur in top 20 cm of section; below this are extremely fine-grained, non porphyritic, pyritized breccia fragments.
Quartz: 10%; up to 3 mm; euhedral bipyramids.
Plagioclase: 5%; up to 2 mm; euhedral to subhedral tabular crystals.
GROUNDMASS: Soft fault gouge in top 20 cm.
VESICLES: None.
COLOR: 5BG 7/1, light greenish gray to 5B 6/1, bluish gray.
STRUCTURE: Massive to breccia.
ALTERATION: Intensely altered; clay, pyrite, chlorite present.
VEINS/FRACTURES: No clear veins; intense shearing and brecciation at base of section.
ADDITIONAL COMMENTS: Sparse silicified lithic fragments (<1 cm) present in gouge. Interpreted as lower part of shear zone, composed mainly of rhyolitic material from underlying units 2B and 2C.



135-841B-48R-1

UNIT 2B: HIGHLY PHYRIC PLAGIOCLASE QUARTZ RHYOLITE AND RHYOLITIC PUMICE BRECCIA

Pieces 0–53 cm

CONTACTS: None.

PHENOCRYSTS: The phenocryst description is for black pitchstone.
Quartz: 10%; up to 2 mm; euhedral, equant, some bipyramids.
Plagioclase: 10%; up to 2 mm; euhedral, tabular.
Pyroxene: <1%; up to 1 mm; euhedral prismatic crystals.

GROUNDMASS: Black volcanic glass in black pitchstone fragments; grayish green pumiceous glassy matrix in pumiceous breccia fragments.

VESICLES: 10%; up to 3 mm; irregular; disseminated throughout; applies to black pitchstone.

COLOR: NØ black in pitchstone; 10GY 5/2, grayish green in pumiceous brecciated fragments.

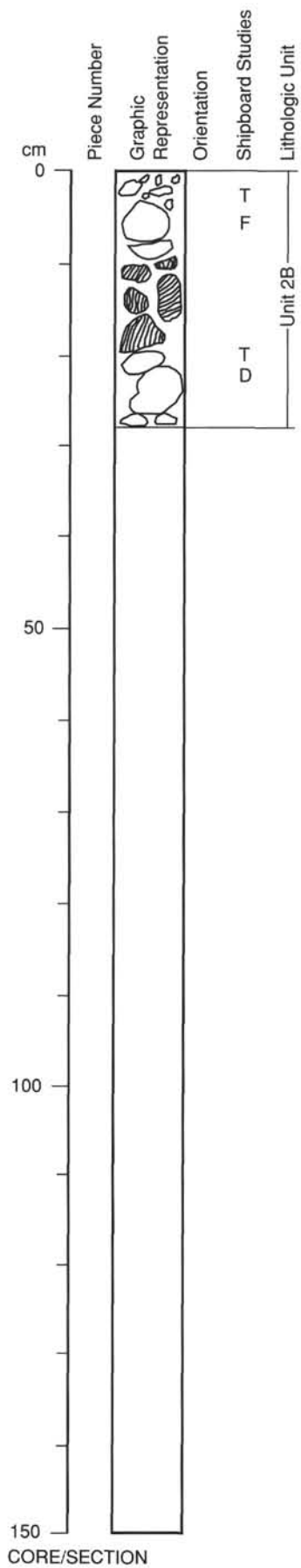
STRUCTURE: Porphyritic, massive.

ALTERATION: None to slight.

VEINS/FRACTURES: <1%; up to 3 mm wide; random orientations; green sheared veins associated with local brecciation of black pitchstone clasts; green color may be due to development of chlorite and from hydration of the glass.

ADDITIONAL COMMENTS: Mixed pitchstone and brecciated pumice fragments look to be derived from margin of rhyolite flow (or dome) where spalling and brecciation of more pumiceous margin has occurred.

Black crystal-rich pitchstone fragments
Greenish pumice breccia fragments containing black pitchstone clasts



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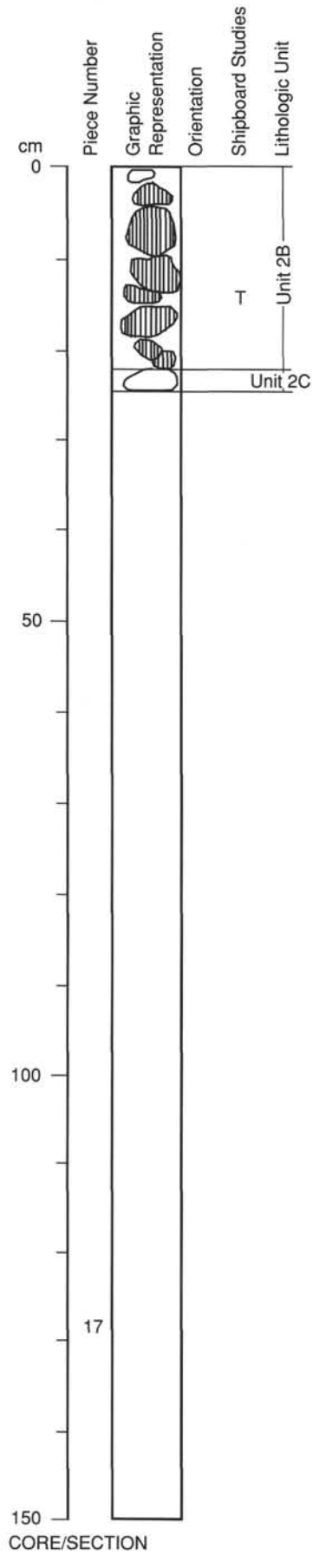
Black crystal-rich pitchstone fragments
Greenish pumice breccia fragments containing some black pitchstone clasts

UNIT 2B: HIGHLY PHYRIC PLAGIOCLASE QUARTZ RHYOLITE AND RHYOLITIC PUMICE BRECCIA

Pieces 0–28 cm

CONTACTS: None.
PHENOCRYSTS: The phenocryst descriptions refer to black pitchstone fragments. The greenish to yellow-green pumiceous fragments have similar mineralogy, but less phenocrysts.
Quartz: 10%; up to 2 mm; euhedral, equant, some bipyramidal.
Plagioclase: 10%; up to 2 mm; euhedral tabular.
Pyroxene: 1%; up to 1 mm; euhedral prismatic.
GROUNDMASS: Black glass in pitchstones. Greenish to yellow-green pumiceous glass in pumiceous fragments.
VESICLES: 5%; up to 2.5; subrounded to irregular; disseminated; vesicles only present in pitchstone.
COLOR: N0, black in pitchstone; 10Y 6/6, yellow-green to SG 4/2, grayish green for pumice.
STRUCTURE: Massive porphyritic to pumiceous.
ALTERATION: None to slight.
VEINS/FRACTURES: <1%; 1 2 mm wide; random orientation; occasional green veins cutting pitchstone fragments; green may be due to hydration of volcanic glass.
ADDITIONAL COMMENTS: Mixed pitchstone-pumice breccia; fragments look to be derived from margin of rhyolite flow (or dome) where spalling and brecciation of a more pmiceous margin has occurred.

135-841B-50R-1



Black crystal-rich pitchstone fragments
Greenish pumice breccia fragments containing black pitchstone clasts

UNIT 2B: HIGHLY PHYRIC PLAGIOCLASE QUARTZ RHYOLITE AND RHYOLITIC PUMICE BRECCIA

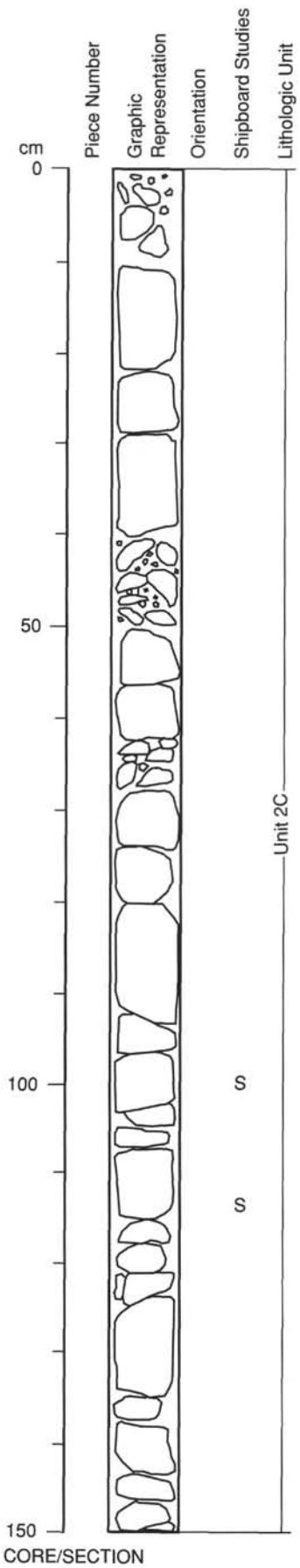
Pieces 0–22 cm

CONTACTS: None.
PHENOCRYSTS: Phenocryst descriptions apply to pitchstone fragments; pumiceous fragments have similar mineralogy but are less crystal rich.
Quartz: 10%; up to 2 mm; euhedral equant, some bipyramidal.
Plagioclase: 10%; up to 2 mm; euhedral, tabular.
Pyroxene: 1%; up to 1 mm; euhedral prismatic.
GROUNDMASS: Black glassy in pitchstone; glassy pumiceous in pumice.
VESICLES: 1%–10%; up to 5 mm; subrounded to elongated; disseminated; applies to black pitchstone fragments.
Miaroles: local green linings of mixed clay and chlorite.
COLOR: N0, black in pitchstone; 5G 6/2, grayish green in pumiceous fragments.
STRUCTURE: Massive to pumiceous
ALTERATION: None to slight in pitchstone; intense clay-chlorite replacement in pumice breccia fragments.
VEINS/FRACTURES: Some zones of green hydration and or incipient alteration in pitchstone.
ADDITIONAL COMMENTS: Some lithic devitrified rhyolite fragments (1 cm) in pitchstone. Core section consists of a mixture of pitchstone and altered pumice breccia fragments which seem to have been derived from marginal zone of rhyolite lava (or dome) where spalling and brecciation of pumiceous margins has occurred. The more highly pumiceous lithologies have subsequently been highly altered by fluid flow due to their permeable nature.

UNIT 2C: PUMICE BRECCIA (1 CLAST)

Pieces 23–25 cm

CONTACTS: None.
PHENOCRYSTS: The grains described as phenocrysts occur in clasts and as disaggregated crystals; some brownish altered pyroxene (<1%) may be visible.
Quartz: 5%–10%; up to 3 mm; equant, some bipyramidal.
Plagioclase: 5%; up to 2 mm; euhedral to subhedral; some altered.
Magnetite: <1%; up to 0.2 mm; small equant crystals.
GROUNDMASS: Altered pumiceous glass.
VESICLES: Original material highly vesicular, but due to alteration, vesicular structure destroyed and infilled.
COLOR: N7, light gray to 5G 6/2, pale green.
STRUCTURE: No prominent flattening or distortion of clasts.
ALTERATION: High to extreme; soft and soapy; mixed clay, chlorite, and pyrite.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Some gray less pumiceous fragments (8 mm) present; interpreted as primary volcanic pumice breccia.



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UNIT 2C: PUMICE BRECCIA (RHYOLITIC)

Pieces 0–150 cm

CONTACTS: None.

PHENOCRYSTS: Grains described as phenocrysts occur in clasts and as disaggregated crystals some brownish altered pyroxene (<1%) may be visible.
Quartz: 5%–10%; up to 3 mm; equant, some bipyramidal.
Plagioclase: 5%; up to 2 mm; euhedral to subhedral, some altered.
Magnetite: <1%; up to 0.2 mm; small equant crystals.

GROUNDMASS: Altered pumiceous glass.

VESICLES: Original material highly vesicular but due to alteration, vesicular structure destroyed and infilled; some less altered highly vesicular clasts also present.

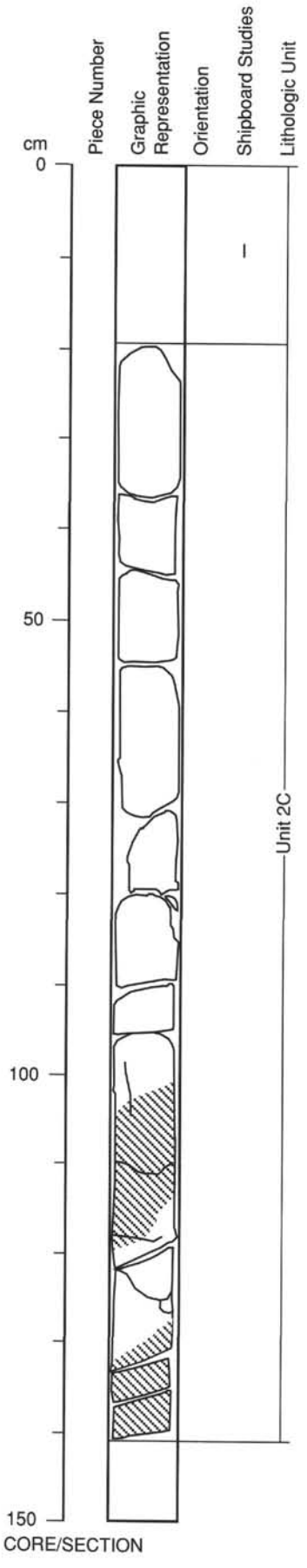
COLOR: N7, light gray to 5G 6/2, pale green.

STRUCTURE: No prominent flattening or distortion of clasts.

ALTERATION: High to extreme; soft and soapy; mixed clay-chlorite and pyrite.

VEINS/FRACTURES: <1%; <1 mm wide; 45° dips; slickensided and coated with soft greenish mixed clay-chlorite material.

ADDITIONAL COMMENTS: Some gray less pumiceous fragments (8 mm) present. Interpreted as primary volcanic pumice breccia. Smear slide shows >65% glass in the fine-grained fraction.



135-841B-51R-2

UNIT 2C: RHYOLITIC PUMICE BRECCIA

Pieces 20–140 cm

CONTACTS: None.

PHENOCRYSTS: In clasts or disaggregated; rare euhedral pyroxene or amphibole in more massive pieces.
Quartz: 3%–7%; to 2 mm; euhedral to subhedral.
Plagioclase: 1%– 2%; to 1 mm; euhedral to subhedral, may be albitized.

GROUNDMASS: Pumice and altered pumice or rhyolitic clasts 1 cm to over 25 cm in maximum dimension; less common dark gray fine-grained material or siliceous clasts.

VESICLES: Highly vesicular pumice clasts; alteration and collapse(?) makes clasts more massive; hard to discern original shapes and percents.

COLOR: 10/g 6/2, gray and 5Y 6/1, greenish gray.

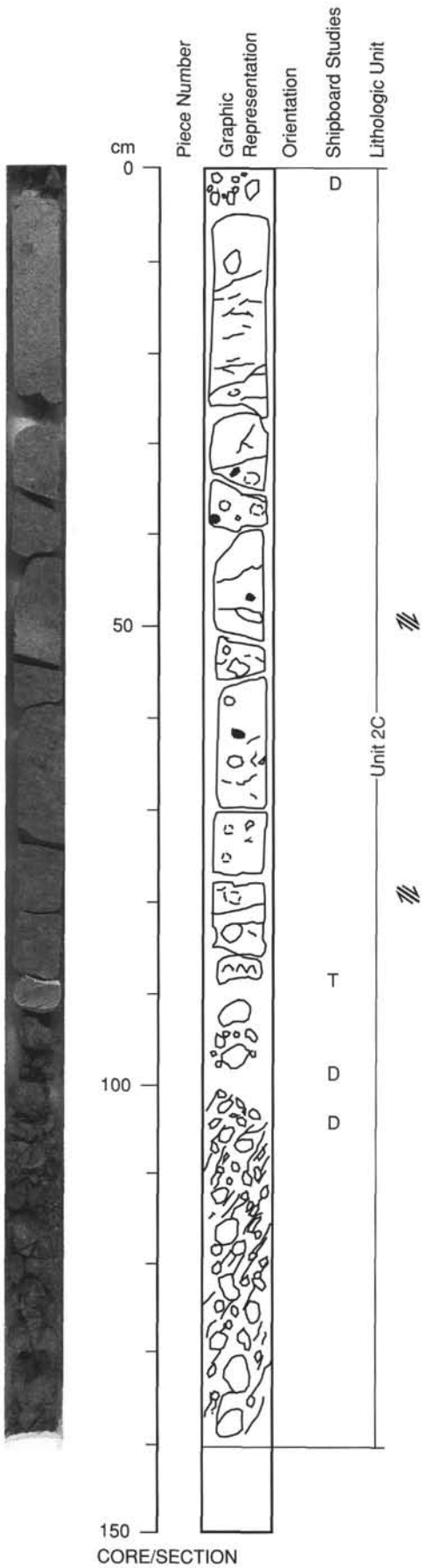
STRUCTURE: None; no prominent flattening or distortion of fragments.

ALTERATION: High to extreme; clays/chlorite give a greenish cast to rock and a soft, soapy feel to the clasts.

VEINS/FRACTURES: 1%–2%; <2 mm wide; 45° to 15°; bound ends of many pieces; coated with green, soft, soapy feeling aggregates, commonly with slickensides (good examples at 87 and 42 cm).

Pumice Breccia Unit

Pieces of single pumiceous clasts
Veins (dark to medium green, chlorite-rich)



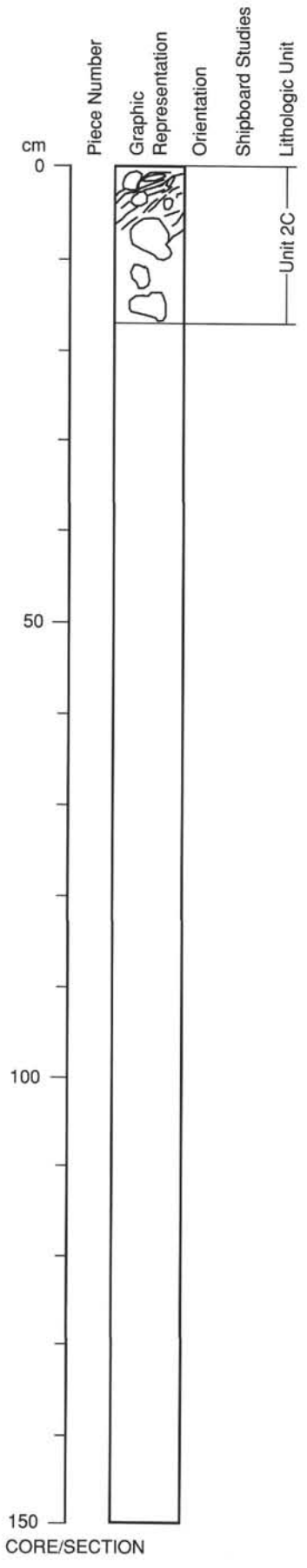
135-841B-51R-3

UNIT 2C: PUMICE BRECCIA

Pieces 0–140 cm

CONTACTS: None; rhyolite clast at 88 cm; sheared zone from 90 to 140 cm.
PHENOCRYSTS: Disaggregated and in clasts.
Quartz: 2%–4%; to 2 mm; euhedral to subhedral.
Plagioclase: 1%– 2%; to 2 mm; euhedral to subhedral, may be albitized.
GROUNDMASS: Pumice and altered pumice clasts 0.5 to 8 mm in matrix of altered pumice and disaggregated crystals.
VESICLES: Highly vesicular pumice fragments; many now altered and collapsed with original structure obscured.
COLOR: Top: 10G 6/2 and 5Y 6/1, grayish green to light gray; bottom: 5G 5/2 to 10GY 4/4, grayish green to dark yellowish green.
STRUCTURE: None; no prominent flattening or deformation of clasts.
ALTERATION: High to extreme; clays, chlorite, talc in lower portion; possible prehnite.
VEINS/FRACTURES: 2%; 1–2 mm wide; subhorizontal to gently dipping; light green filled veins crosscutting sample; generally flat to 10.
ADDITIONAL COMMENTS: Hard, fresh quartz-plagioclase phyric rhyolite cobble at 86–89 cm; 90–140 cm is totally altered and intensely fractured, sheared, and green with a very soft greasy feel (mixed clays, chlorite?)

- Dark clasts
- Larger clasts
- Chlorite? veins
- Rhyolite clast
- Soft, clayey matrix

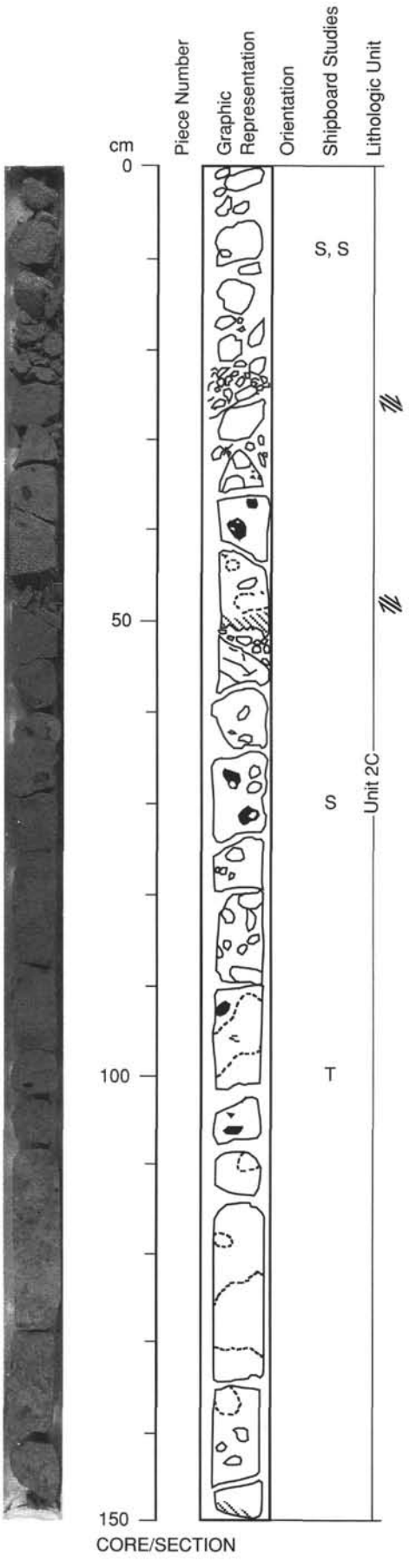


135-841B-51R-CC

UNIT 2C: RHYOLITIC PUMICE BRECCIA

Pieces 0–20 cm

CONTACTS: None.
PHENOCRYSTS: In highly altered rhyolitic clasts and disaggregated fragments.
Quartz: 2%–5%; up to 1 mm; euhedral to subhedral.
Plagioclase: 1%– 2%; up to 1.5 mm; euhedral to subhedral, partially albitized.
GROUNDMASS: Soapy, highly altered pumice breccia with one large clast (10 cm) of whitish, extremely altered quartz-plagioclase rhyolite.
VESICLES: Altered clast is vesicular; alteration is too extreme in the rest.
COLOR: 5G 5/2, grayish green to 10G 8/1, very light grayish green.
STRUCTURE: Large pieces of highly altered material are somewhat scaly and sheared.
ALTERATION: Extreme; mixed clays, chlorite gouge; green pieces have a soapy feel; whitish alteration of rhyolite clast (clays?).
VEINS/FRACTURES: Too broken and ground up to find discrete fractures.
ADDITIONAL COMMENTS: Continuation of shear zone at base of section 135-841B-51R-3.



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UNIT 2C: PUMICE BRECCIA

Pieces 0–150 cm

CONTACTS: None.

PHENOCRYSTS: In clasts and disaggregated; rare pyroxene or amphibole phenocyrsts in larger clasts.
Quartz: 3%–5%; to 1.5 mm; euhedral to subhedral; single crystals.
Plagioclase: 1%–2%; to 1 mm; euhedral to subhedral; may be albitized in more altered clasts.

GROUNDMASS: Pumice, altered pumice clasts (to 15 cm); minor, irregular mafic clasts to 4 mm; in matrix of altered and disaggregated pumice and crystal fragments.

VESICLES: Originally very highly vesicular; alteration and collapse has obscured percent and size in most.

COLOR: 10G 6/1, pale green (top) to 10G 5/2, grayish green.

STRUCTURE: Generally structureless; some shards show slight subhorizontal flattening or alignment, but there is no pervasive, prominent flattening throughout, though.

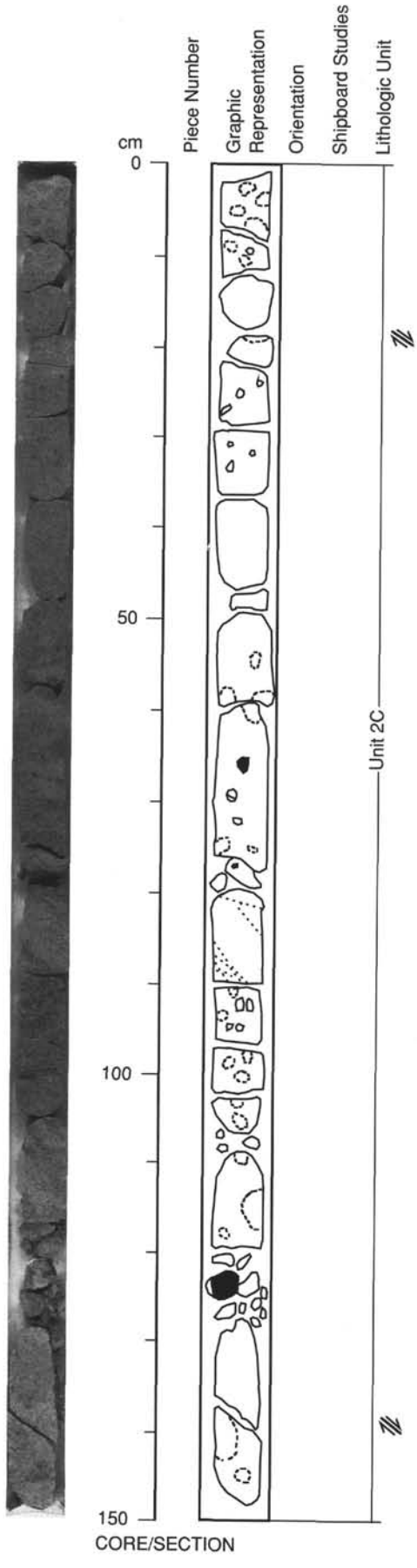
ALTERATION: High to extreme; clays and chlorite throughout giving soft, soapy texture; the top 30 cm is light green extremely altered to soapy slick material with some shearing; same soft green aggregates developed on faults at 35 and 50 cm.

VEINS/FRACTURES: Trace–1%; 1–2 mm wide; 45° dip; two prominent faults dipping about 45° with 2– 4 mm soapy green coatings; both polished and slickensided.

ADDITIONAL COMMENTS: Smear slides show 30%–75% glass in matrix, >70% clay-sized particles in matrix.

● Dark, aphyric clasts
○ Larger clasts

135-841B-52R-2



UNIT 2C: PUMICEOUS BRECCIA

Pieces 0–150 cm

CONTACTS: None.

PHENOCRYSTS: In clasts or disaggregated from clasts.
Quartz: 3%– 4%; to 1 mm; euhedral to subhedral.
Plagioclase: 1%–2%; to 1 mm; euhedral to subhedral; some look quite fresh while others are partly albitized.

GROUNDMASS: Pumiceous and rhyolitic clasts 1–16 cm in matrix of altered pumice, rhyolite with disaggregated quartz and plagioclase phenocrysts up to 2 mm.

VESICLES: Very high percent originally in pumices but due to alteration and collapse they are greatly obscured.

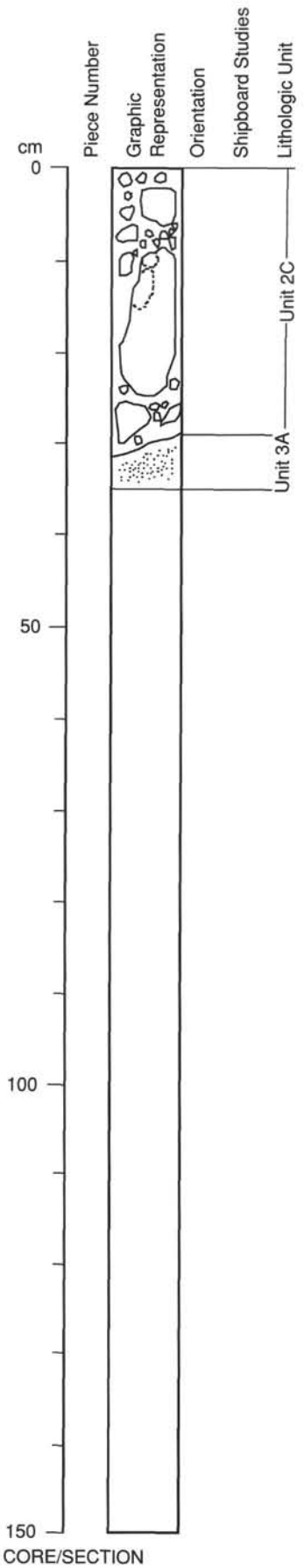
COLOR: 10G 5/2, greenish gray.

STRUCTURE: None; some very faint subhorizontal to gently dipping banding; no prominent flattening though.

ALTERATION: High to extreme; very soft green matrix includes clays, chlorite, pyrite; denser pumice clasts may be partially collapsed and infilled from alteration dip; Some pieces break on fractures coated with soft soapy chlorite.

ADDITIONAL COMMENTS: Intensely altered pumice breccia; large dark aphyric volcanic inclusion (5 cm) with microcrystalline groundmass at 125 cm; several small darker inclusions throughout; some of these small inclusions look like microcrystalline siliceous material (could be recrystallized rhyolitic fragments or siliceous vein fill pieces).

● Black, aphyric inclusions
○ Large pumice clasts



135-841B-52R-CC

UNIT 2C: PUMICEOUS BRECCIA

Pieces 0–30 cm

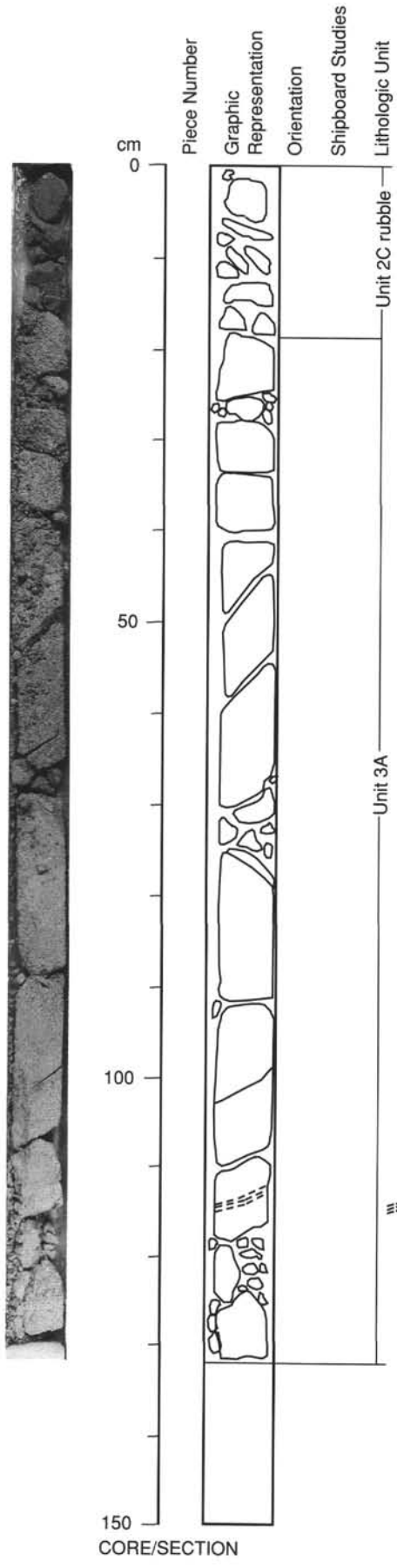
CONTACTS: Bottom of 2C at 30 cm.
PHENOCRYSTS: In clasts and disaggregated.
Quartz: 3%–5%; to 1.5 mm; euhedral to subhedral.
Plagioclase: 1%– 2%; to 1 mm; euhedral to subhedral.
GROUNDMASS: Variously altered pumice clasts from 1 to >15 cm in size with smaller lithic and pumice fragments and disaggregated phenocrysts in matrix.
VESICLES: Very high vesicularity in pumices, but alteration and collapse obscure percent and structure.
COLOR: 10G 5/2, grayish green.
STRUCTURE: None; no prominent flattening or deformation of clasts.
ALTERATION: High to extreme; extensive development of chlorite(?), clays(?); very soft to soapy texture.
VEINS/FRACTURES: Trace–1%; <1 mm wide; orientation indeterminate; polished, slickensided surfaces on outsides of some pieces.
ADDITIONAL COMMENTS: Same breccia as in Section 135-841B-52R-2; contact with whitish rhyolitic sands of underlying Unit 3 dips to left (about 30°) and could represent primary deposition but could also be due to mixing by drilling.

UNIT 3A: RHYOLITIC TUFF AND LAPILLI TUFF

Pieces 30–35 cm

CONTACTS: Top of Unit 3 at 30 cm.
PHENOCRYSTS: None.
GROUNDMASS: Fine to very coarse sands of weathered and disaggregated quartz and plagioclase phenocrysts, rhyolite, and altered pumice(?) lithic fragments; grains up to 2.2 mm.
VESICLES: None.
COLOR: 5B 6/1, bluish gray.
STRUCTURE: Structureless.
ALTERATION: Lithic grains moderately altered, probably to clay; pyrite abundant.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Sand derived from rhyolite pumices; mode of origin or emplacement unknown.

Large pumice clasts



135-841B-53R-1

UNIT 3A: RHYOLITIC TUFFS AND LAPILLI TUFFS

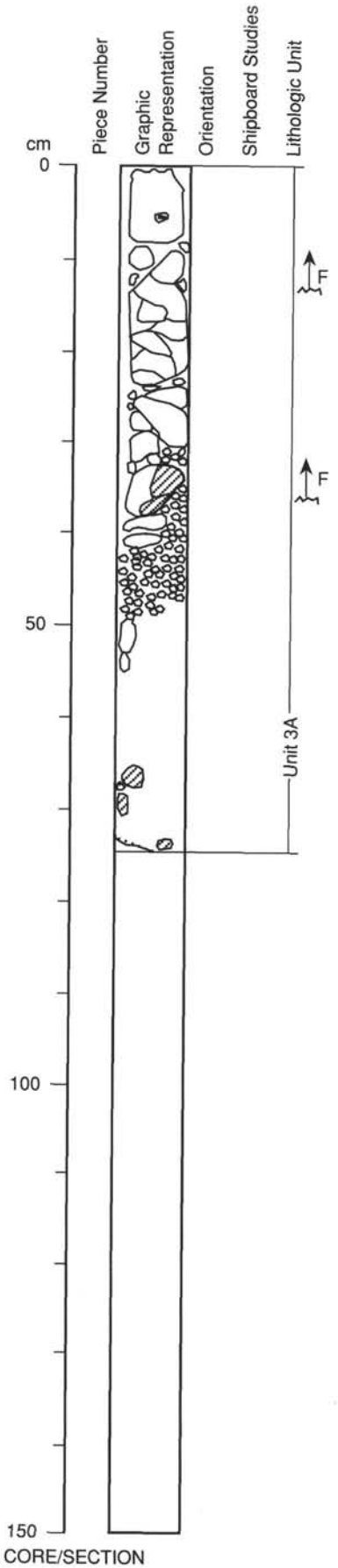
Pieces 20–132 cm

CONTACTS: Irregular erosive contact between lapilli and ash sized tuffs.
PHENOCRYSTS: None.
GROUNDMASS: Abundant porphyritic plagioclase quartz rhyolite fragments; most between 1 and 6 mm diameter (above 72 cm) set in a fine altered matrix with scattered quartz and pyrite crystals. Between 72 and 116 cm, fragments of the same type < 2mm diameter occur.
VESICLES: None.
COLOR: Dominantly 5BG 7/1, light greenish gray.
STRUCTURE: Massive; no clear lamination or bedding visible.
ALTERATION: Intensely altered; matrix altered to clay chlorite pyrite assemblage.
VEINS/FRACTURES: <1%; to 1 cm; approximately 10° dip; the shear zone occurs at 116 cm and is filled by soft gouge. Below this shear is lapilli sized tuff.
ADDITIONAL COMMENTS: Fragments in the top 18 cm of section are rhyolitic pumice breccias identical to Unit 2C and are considered to have fallen into the top of this core section.

Top 20 cm are rubble from Unit 2C

Internal contact between lapilli sized tuff (above) and underlying dominantly ash-sized tuff

≡≡≡ Narrow (≤ 1 cm). Shear zone with soft gouge - courser lapilli sized tuff beneath shear zone



135-841B-53R-2

UNIT 3A: RHYOLITIC TUFFS AND LAPILLI TUFFS

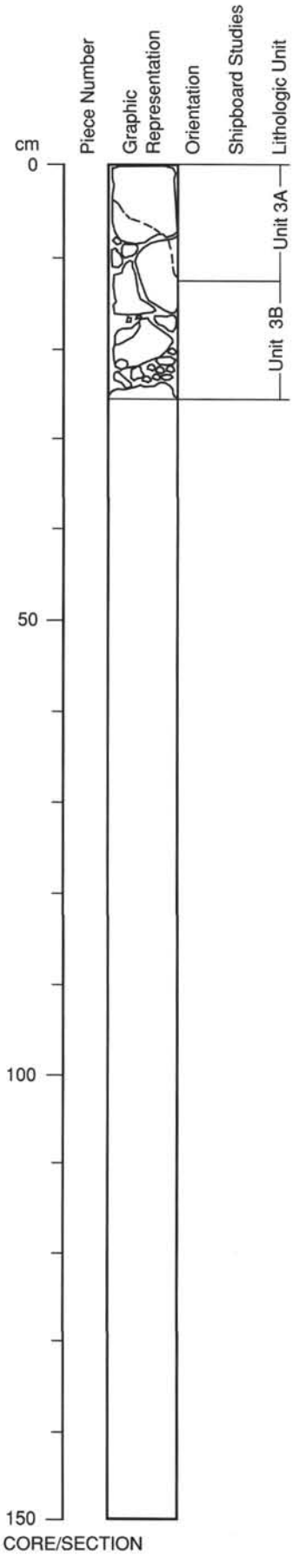
Pieces 0–75 cm

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Abundant quartz plagioclase phyric rhyolitic fragments; mostly 1– 6 mm (rare clasts 18–25 mm) set in a fine altered matrix with scattered quartz and pyrite crystals.
VESICLES: None.
COLOR: Dominantly 5BG 7/1, light greenish gray.
STRUCTURE: Massive; no clear lamination or bedding.
ALTERATION: Intensely altered; matrix altered to clay-chlorite-pyrite assemblage.
VEINS/FRACTURES: Some fracturing of semi-indurated portions at 30–50 cm, but it may be drilling induced.
ADDITIONAL COMMENTS: Fine-grained greenish silty ash at 39–50 cm; badly fractured.

Clearly defined lithic fragments

F Indicates a fining upward sequence

Finely broken fragments resulting from drilling



135-841B-53R-CC

UNIT 3A: RHYOLITIC TUFFS AND LAPILLI TUFFS

Pieces 0–13 cm

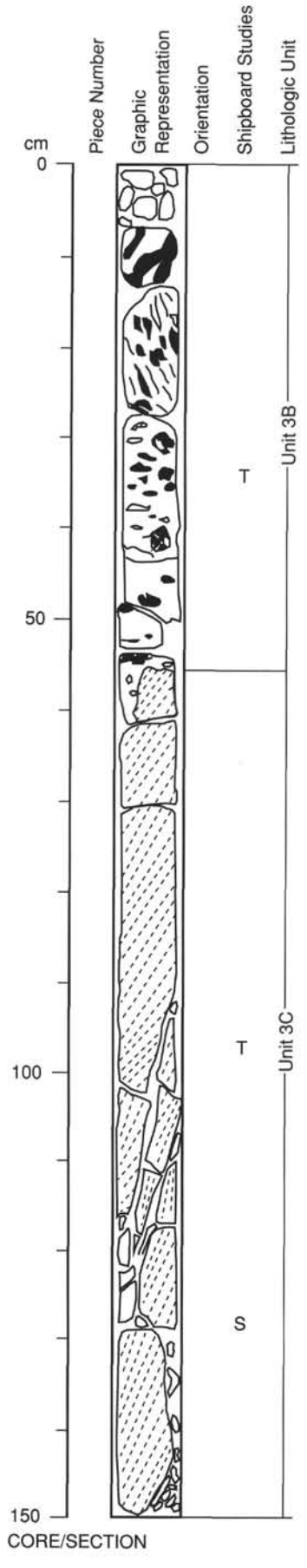
CONTACTS: Steeply dipping contact. between bottom of Unit 3A and top of Unit 3B.
PHENOCRYSTS: None.
GROUNDMASS: Abundant. Quartz-plagioclase phyric rhyolite fragments; most are 1–6 mm in size; these are set in a fine-grained altered matrix with scattered quartz, feldspar,and pyrite crystals.
VESICLES: None.
Miaroles: None.
COLOR: Dominantly 5BG 7/1 light greenish gray.
STRUCTURE: Massive, no clear lamination or bedding.
ALTERATION: Intense; matrix is altered to clay-chlorite-pyrite assemblage.
VEINS/FRACTURES: None distinct.

UNIT 3B: WELDED TUFF

Pieces 13–27 cm

CONTACTS: Steeply dipping contact between top of Unit 3B and bottom of Unit 3A; contact is sharp, irregular, and likely erosive.
PHENOCRYSTS: None.
GROUNDMASS: Rhyolitic lithic fragments (< 2 mm) set in a finer grained matrix. Scattered quartz phenocrysts, partly rounded and fractured, up to 2 mm.
VESICLES: None.
Miaroles: None.
COLOR: 5GY 6/1, greenish gray.
STRUCTURE: None distinct.
ALTERATION: Rock is strongly altered to clays-chlorite-pyrite.
VEINS/FRACTURES: Pieces are highly fracture, but may be a result of drilling.
ADDITIONAL COMMENTS: The section is a coarse sand with the same greenish color as the welded tuff in Section 135-841B-54R-1; this sandy layer appears to be an extremely altered portion of that tuff.

Steeply diping contact between IIIA and IIIB
Contact zone



135-841B-54R-1

UNIT 3B: ALTERED RHYOLITIC WELDED TUFF

Pieces 0–55 cm

CONTACTS: Erosive contact between subunits 3B and 3C at 55 cm.
PHENOCRYSTS: Phenocrysts visible in pumice clasts, and loose crystals in matrix.
Quartz: 5%–7%; up to 2 mm; euhedral, equant.
Plagioclase: 3%–5%; up to 1.5 mm; euhedral to subhedral, tabular, altered.
GROUNDMASS: Highly deformed, dark green-gray, altered pumice and highly altered fine-grained matrix.
VESICLES: Original highly vesicular pumice has been deformed, flattened, and extensively altered, thus destroying all vesicularity.
COLOR: 5G 5/A, greenish gray for pumice clasts to 5BG 7/1, light greenish gray for matrix.
STRUCTURE: Pumiceous, with intensely deformed lenticular pumice clasts.
ALTERATION: Intensely altered to clay, chlorite, and pyrite.
VEINS/FRACTURES: None visible.
ADDITIONAL COMMENTS: The orientation of the deformed pumice clasts is highly variable, even within single core pieces; this may suggest an original depositional feature, such as deposition on steep or irregular surfaces.

3B Flattened chloritized pumice fragments showing schematically their general orientation
3C Generalized dip of wavy lamination

Piece from 53 to 60 cm

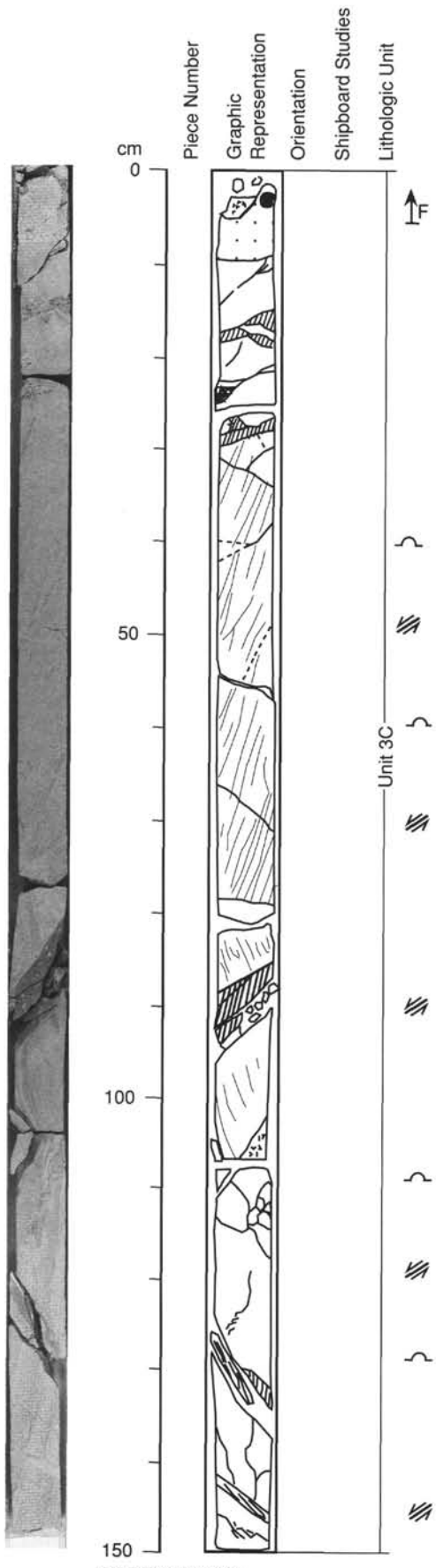
Dark gray-green flattened and deformed pumice fragments in Unit 3C
Very fine, near vertical wavy lamination in Unit 3C

F

UNIT 3C: LAMINATED CRYSTAL TUFFS

Pieces 55–150 cm

CONTACTS: Erosive contact between subunits 3B and 3C at 55 cm.
PHENOCRYSTS: None.
GROUNDMASS: Fine-grained; apparently well sorted mixture of ash (glass and microcrystalline quartz and feldspar) and crystals (feldspar and quartz) fragments, with rarer irregular coarser layers containing deformed and altered pumice fragments. Rare larger quartz grains (1–2 mm) visible.
VESICLES: None.
COLOR: 5B 7/1, light bluish gray.
STRUCTURE: A fine wavy lamination present, steeply dipping.
ALTERATION: Highly altered; clays and pyrite present.
VEINS/FRACTURES: <1%; <1 mm; subhorizontal to 45°; small pyrite-calcite veins sporadically distributed.
ADDITIONAL COMMENTS: At 125 to 150 cm, a steeply dipping, slightly coarser (up to 1 mm) crystal rich lithology, also containing small deformed pumice lenticules (2–3 cms long) is intersected. The fine grain size, well sorted nature, and irregular wavy laminations are interpreted to indicate that this unit may represent a surge deposit. A smear slide shows size fractions of 25% sand, 47% silt, 28% clay, with 70% feldspar and 28% clay in the clay-sized fraction.



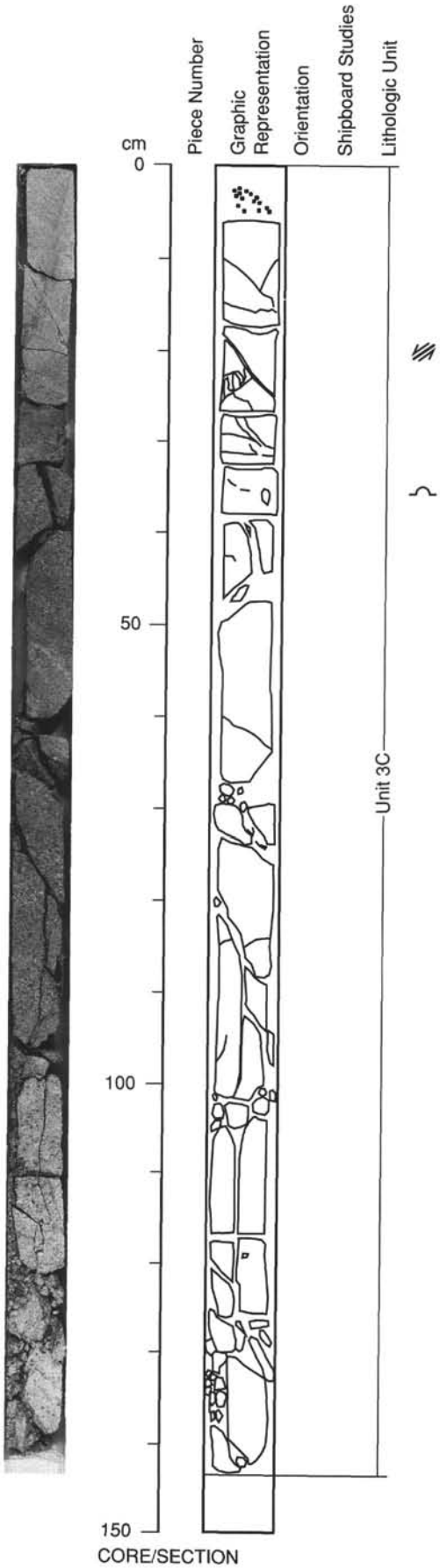
135-841B-54R-2

UNIT 3C: LAMINATED CRYSTAL TUFFS

Pieces 0–150 cm

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: <0.3 mm indurated, altered pumice and rhyolitic fragments, feldspar, quartz; angular but well sorted fragments.
VESICLES: None.
COLOR: 10YR 8/1, very light gray.
STRUCTURE: Massive with steeply dipping (<0°–80°) lamination defined by subtle light and dark banding with convoluted layering and slight grain size variations; this lamination is truncated by coarser grained bed at 11 cm of same material (contact is irregular) and by gently to steeply dipping fractures and dikes.
ALTERATION: Moderately to highly altered; light green chlorite material in groundmass; altered feldspar and pumice fragments are a very bright white (clay?); abundant fine-grained pyrite throughout.
VEINS/FRACTURES: 3%; 0.4–4.3 mm; 20°–60°; the widest fractures dip about 60° and are filled with flow-aligned clastic dike material; also thin veins with irregular branches coming off them and 1–3 mm alteration halos around the branches (a good example at 142 cm); thin veins cutting laminations and offsets of lamination occur throughout.

Clastic dikes along faults or fractures
Medium to coarse sand
Large clast
Fine lamination in fine-grained sandstone
F Indicates a fining upward



135-841B-54R-3

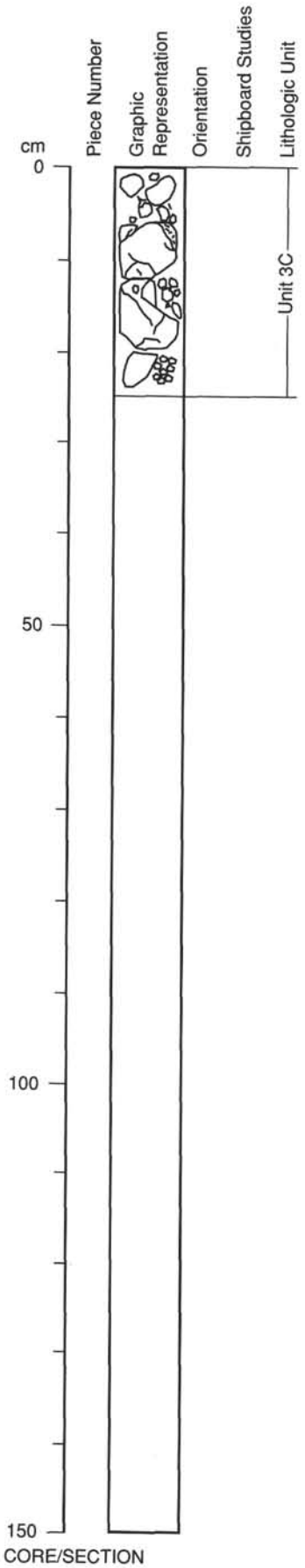
UNIT 3C: LAPILLI TUFFS TO LAMINATED CRYSTAL TUFFS

Pieces 5–143 cm

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Lapilli (up to 5 mm at base) sized pumice, with scattered plagioclase, quartz, altered pumice, and rhyolitic fragments; grading upwards to fine lapilli (< 3 mm) to ash sized indurated tuff with steeply dipping laminae (60°–70°).
VESICLES: None.
COLOR: 10YR 7/1 to 10YR 8/1, very light gray.
STRUCTURE: Grades upwards with rapid transition from coarse to fine grain size at 20–30 cm.
ALTERATION: Moderately to highly altered; coarser fragments break apart easily soft clays replacing pumice/rhyolite matrix; abundant pyrite in coarse and fine sections.
VEINS/FRACTURES: 5%; 0.2 to 10 mm wide; subhorizontal to steep; abundant subvertical and horizontal fractures in coarser sections; upper finer section is veined (with 1–2 mm alteration halos around veins) and fractured; larger fractures are filled by clastic dike material.

Top 5 cm empty

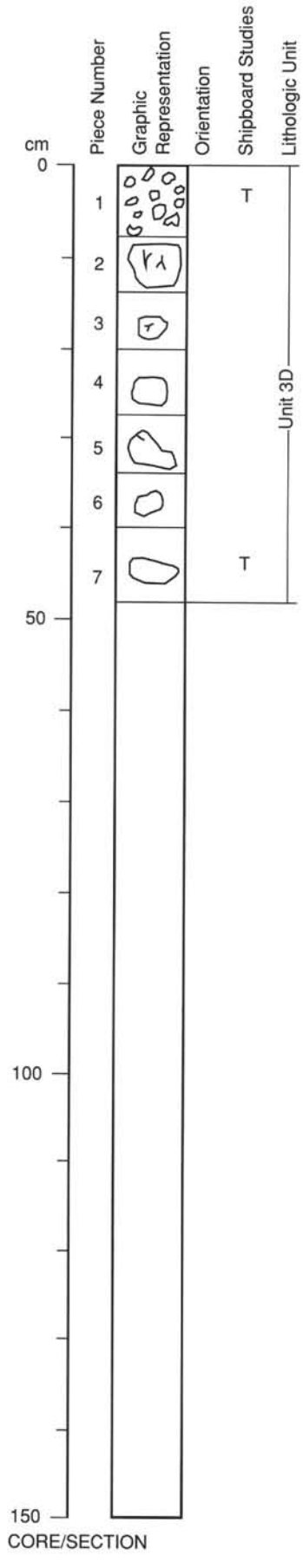
135-841B-54R-CC



UNIT 3C: LAPILLI TUFFS

Pieces 0–25 cm

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: Top 20 cm composed largely of ash to lapilli sized (0.5 to 3 mm) fragments; fragments include pumice, plagioclase, quartz, and altered pumice and rhyolitic clasts. Bottom 5 cm is richer in lithic fragments (to 2.5 cm) and has a more greenish color.
VESICLES: None.
COLOR: 10YR 8/1, very light gray.
STRUCTURE: Structureless.
ALTERATION: Very highly altered.
VEINS/FRACTURES: Pieces are highly fractured, but this may be due to drilling disturbance, as the material is very soft.
ADDITIONAL COMMENTS: Like base of Section 135-841B-54R-3.



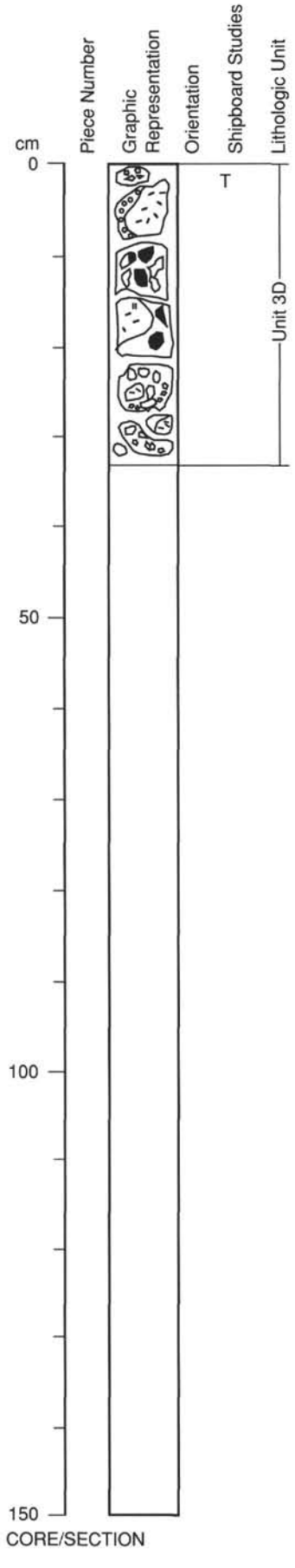
135-841B-55R-1

UNIT 3D: MODERATELY PHYRIC QUARTZ-PLAGIOCLASE RHYOLITE BRECCIAS

Pieces 1–7

CONTACTS: None.
PHENOCRYSTS: Occur in rhyolite clasts; plagioclase may be partly albitized.
Plagioclase: 2%–3%; to 2.5 mm; euhedral to subhedral.
Quartz: 1%–2%; < 0.7 mm; euhedral to subhedral.
GROUNDMASS: Cryptocrystalline.
VESICLES: None.
Miaroles: None.
COLOR: 7.5YR 7/0 whitish gray to 7.5YR 6/0 gray.
STRUCTURE: None.
ALTERATION: Moderate to total; Pieces 2 and 3 are the least altered; Piece 4 is completely replaced by secondary minerals.
VEINS/FRACTURES: Trace–1%; <0.2 mm wide; branching; most prominent in Piece 2 and some of Piece 1; filled with sulfides.
ADDITIONAL COMMENTS: Variously altered rhyolitic debris; Pieces 1, 2, and 3 are whitish, fairly fresh, with abundant pyrite on surfaces and in veins; Piece 4 is grayish, soft, and totally replaced by clays (it may be, a fault gouge derived from rhyolitic parent). Subrounded lithic fragments up to 3.5 mm in size occur in some of the rhyolite clast. From 0 to 8 cm these inclusions include some dark, siliceous (almost quartzitic) pieces. Piece 7 shows a light dark banding suggesting incipient welding. The breccias from this core through Core 135-841B-61R may be a basal lag within Unit 3.

Sulfides disseminated on surface of pieces 2 and 3, also filling cracks



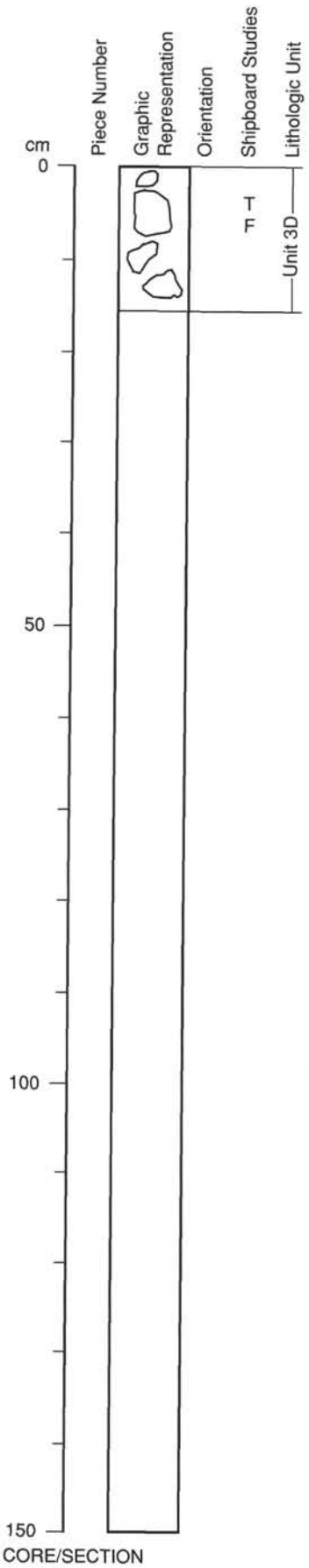
135-841B-56R-1

UNIT 3D: RHYOLITIC BRECCIA

Pieces 0–33 cm

CONTACTS: None.
PHENOCRYSTS: Occur within rhyolite clasts.
Plagioclase: 3%–5%; up to 2.5 mm; subhedral to anhedral alteration patches.
Quartz: 5%; up to 2.4 mm; some euhedral crystals, but generally as rounded or blocky glassy patches.
GROUNDMASS: Microcrystalline to cryptocrystalline.
VESICLES: None; cavities formed by alteration(?).
COLOR: 7.5YR 6/0, gray to 5G 7/1, light greenish gray.
STRUCTURE: Breccia consisting of rounded and angular fragments.
ALTERATION: Highly altered; sulfides up to 0.5 mm in size (disseminated throughout, green) chlorite development pervasive. Sulfides (up to 0.5 mm in size) make up trace to 2% of the rocks; the larger grains are associated with quartz, but the pyrite is disseminated throughout the samples.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Large rhyolitic clasts up to 5 cm across, partially broken out of matrix by drilling. Other clasts include round, brownish siltstones and light gray pumiceous fragments.

Large rhyolitic clasts



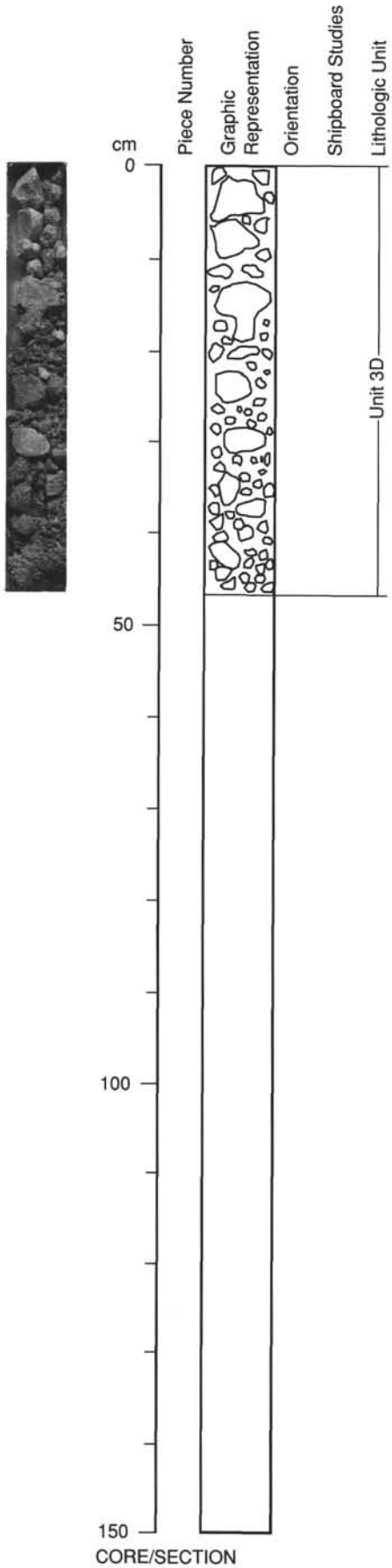
135-841B-56R-CC

UNIT 3D: RHYOLITIC BRECCIA

Pieces 0–15 cm

CONTACTS: None.
PHENOCRYSTS: Occur in rhyolite clasts.
Plagioclase: 1%–2%; 0.5–1.5 mm; subhedral to angular.
Quartz: 1%–2%; 0.5–1.5 mm; angular to euhedral grains.
GROUNDMASS: Cryptocrystalline.
VESICLES: None; cavities that are present appear to result from alteration around phenocrysts.
COLOR: 7.5YR 7/0, light gray to 10Y 7/0, light greenish gray.
STRUCTURE: Clasts in breccia; top and bottom pieces are fine-grained tuff fragments, heterolithic, <3 mm; second and third pieces are massive to 6 cm; bottom piece shows a coarse sand rim on a large 5 cm clast.
ALTERATION: Highly altered; extensive secondary pyrite, greenish chloritic hue.
VEINS/FRACTURES: Trace; <0.3 mm wide; randomly oriented; filled with pyrite.
ADDITIONAL COMMENTS: Large clasts from breccia (probably disaggregated by drilling); some matrix pieces occur loose in core or still adhering to clasts. The rhyolite clasts have lithic inclusions (up to 5.5 mm) making up 1% of the rock. These inclusions are subrounded and are largely recrystallized siliceous fragments (almost like dark quartzites in appearance).

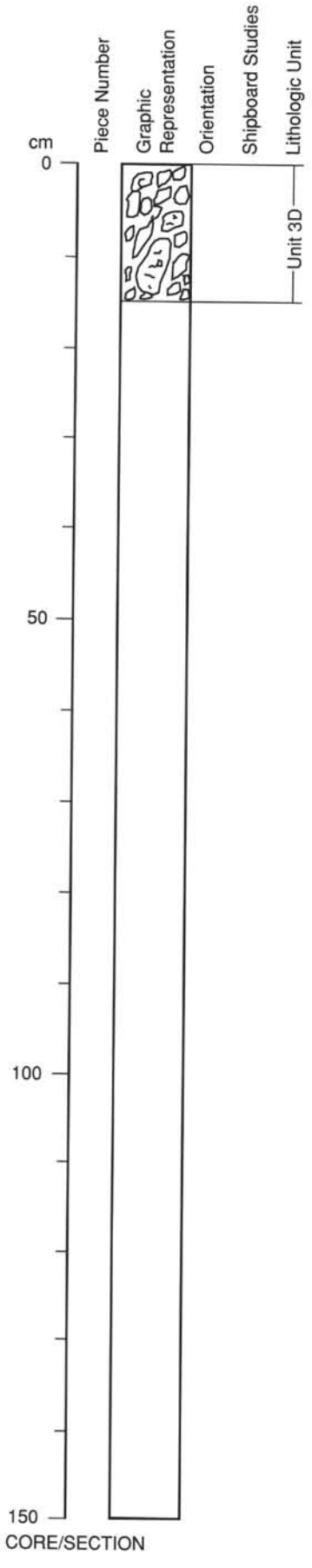
135-841B-57R-1



UNIT 3D: RHYOLITE AND RHYOLITIC BRECCIA PIECES AS DRILLING RUBBLE

Pieces 0–48 cm

CONTACTS: None.
PHENOCRYSTS: In rhyolite clasts.
Quartz: 5%; up to 3 mm; euhedral, bipyramidal crystals.
Feldspar: 3%–5%; up to 2 mm; tabular crystals, completely altered.
GROUNDMASS: Microcrystalline.
VESICLES: Some of the fragments are composed of vesicular pumiceous rhyolite; vesicles are infilled.
COLOR: 7.5YR 7/0, pale gray.
STRUCTURE: Massive, brecciated.
ALTERATION: Highly altered.
VEINS/FRACTURES: <1%; <0.2 mm wide; randomly oriented; small mineral infilled fractures sporadically distributed through fragments.
ADDITIONAL COMMENTS: Drilling rubble. Larger fragments are shown. Main body of section consists of small fragments and soft whitish clays. Extensive alteration with development of secondary quartz, clays, chlorite, pyrite. Fragments entirely rhyolitic, although often varying in their detailed lithology. Range from near rounded to more commonly irregular and angular. Largest fragments are approximately 5 cm in diameter. Matrix consists of smaller, unsorted fragments extending to clay-like, soft matrix. Fragments may have been broken up by drilling. The clay-like matrix probably represents drilling produced gouge.



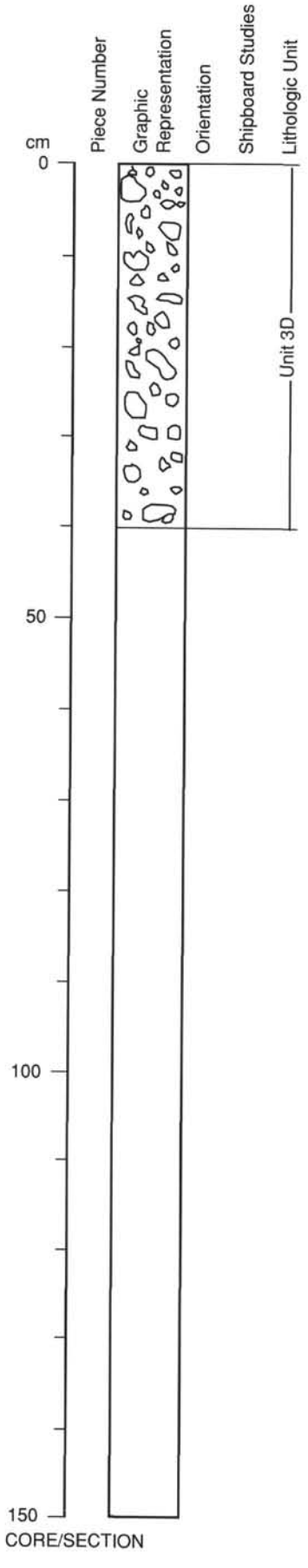
135-841B-57R-CC

UNIT 3D: RHYOLITE AND RHYOLITE BRECCIA PIECES IN DRILLING RUBBLE

Pieces 0–15 cm

CONTACTS: None.
PHENOCRYSTS: Feldspar not easily identified as plagioclase because of alteration.
Plagioclase(?): 1%–2%; 0.5–1 mm; small laths, albite twins rarely visible.
Quartz: 2%–5%; 0.5–1 mm; rounded, glassy, conchoidal fracture.
GROUNDMASS: Aphanitic.
VESICLES: 1%–2%; <0.5 mm; irregular shape; random distribution; irregular pits, filled with white clay(?).
COLOR: 7YR 7/0, gray to 7YR 4/0, dark gray.
STRUCTURE: Massive.
ALTERATION: Moderate to highly altered; dark pyrite grains apparent on outer surface of fragments.
VEINS/FRACTURES: Trace; very thin; lengthwise and perpendicular to piece; very thin, dark trace visible on cut surface; filled by sulfides.
ADDITIONAL COMMENTS: Pebble to cobble sized pieces in clayey matrix (probably of drilling origin). Some pieces may have pervasive, disseminated sulfides. Rhyolites includes lithic fragments (up to 2–3 mm) making up <1% of rock. Some of these lithics appear to be rhyolite or dacite. Pieces probably broken up by drilling.

Large rhyolite clasts



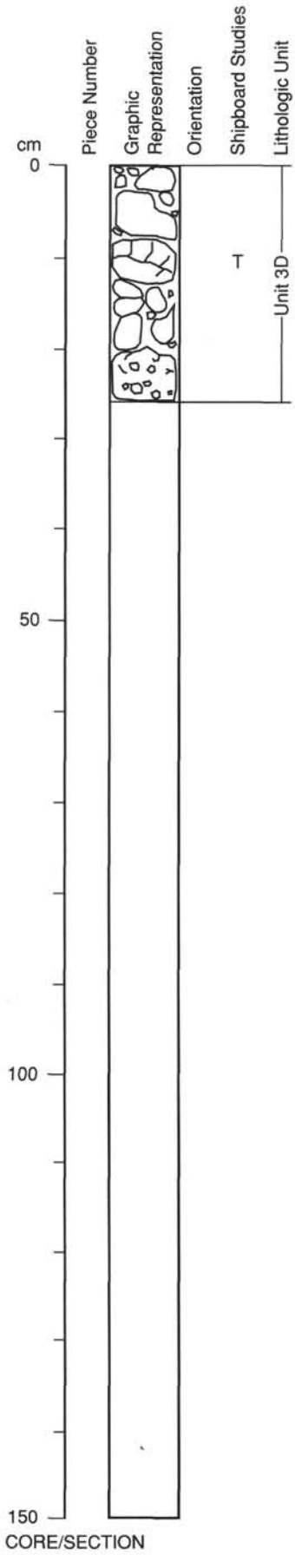
135-841B-58R-1

UNIT 3D: RHYOLITE AND RHYOLITIC BRECCIA IN DRILLING RUBBLE

Pieces 0–40 cm

CONTACTS: None.
PHENOCRYSTS: Sulfide granules also sometimes in clusters up to 1 mm in diameter.
Plagioclase: 1%–2%; <0.8 mm; tabular, subhedral.
Quartz: 3%–5%; 0.8–1 mm; rounded, anhedral.
Orthopyroxene(?): Trace; <0.5 mm; tiny pink prism.
GROUNDMASS: Aphanitic; sulfide granules (pyrite?) widely distributed (1%–2%?).
VESICLES: None.
COLOR: 7.5YR 7/0 to 7.5YR 4/0, light to dark gray.
STRUCTURE: Massive.
ALTERATION: Slightly to highly altered; greenish patches with oxidized sulfides and white clay.
VEINS/FRACTURES: Trace; <0.2 mm wide; randomly oriented; filled with sulfides (pyrite?).
ADDITIONAL COMMENTS: Pebble to cobble sized pieces in pale gray clay matrix (*probably of drilling origin*). *Rhyolites have likely been broken up by drilling.*

Drilling rubble.



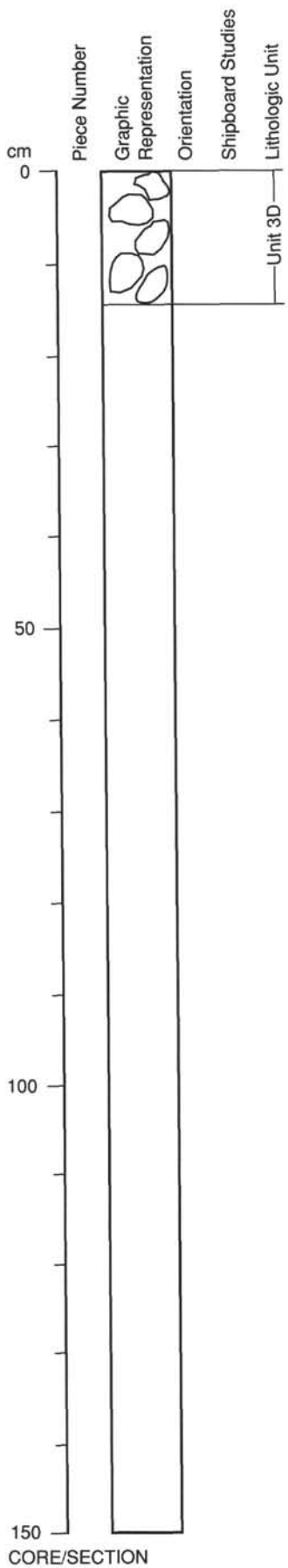
135-841B-59R-1

UNIT 3D: RHYOLITE AND RHYOLITIC BRECCIA IN DRILLING RUBBLE

Pieces 0–27 cm

CONTACTS: None.
PHENOCRYSTS: Sulfide may border phenocrysts, or partly replace plagioclase(?).
Quartz: 3%–5%; 0.8–1.2 mm; rounded, subhedral, glassy
Plagioclase(?): 1%–2%; 0.5–1.0 mm; tabular, subhedral, turbid.
GROUNDMASS: Aphanitic, cryptocrystalline.
VESICLES: None, but there are some cavities; probably from crystals plucked during drilling or sawing.
COLOR: 7.5YR 7/0 to 7.5YR 4/0, light to dark gray.
STRUCTURE: Massive.
ALTERATION: Moderately to highly altered; greenish alteration in plagioclase and groundmass represents replacement by clays.
VEINS/FRACTURES: Trace; <0.2 mm wide; randomly oriented; filled with sulfides
ADDITIONAL COMMENTS: Pieces broken up by drilling.

Rhyolitic drilling rubble.
The bottom "piece" is a breccia-conglomerate.



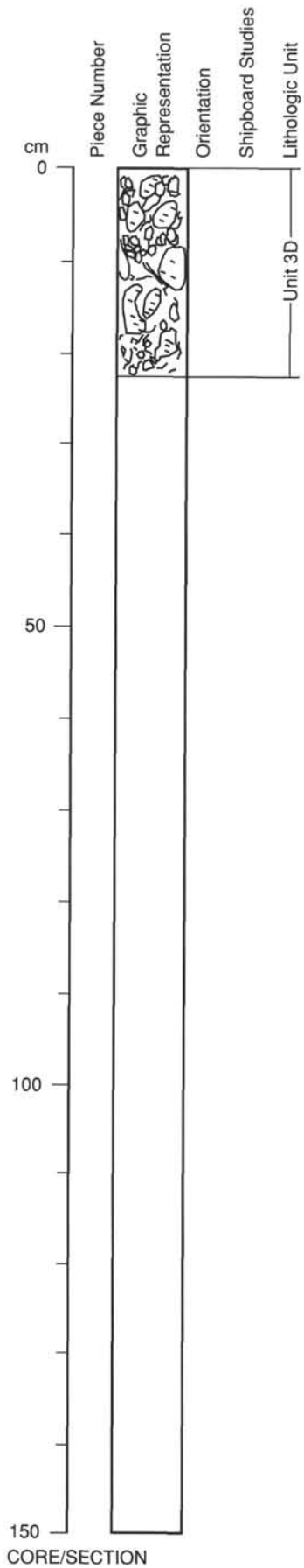
135-841B-60R-1

UNIT 3D: RHYOLITE AND RHYOLITE BRECCIA IN DRILLING RUBBLE

Pieces 0 –14 cm

CONTACTS: None.
PHENOCRYSTS: Plagioclase difficult to confirm; partially altered to clay.
Quartz: 2%–5%; 1.0 mm; rounded, some bipyramidal.
Plagioclase(?): 2%–3%; <0.8 mm; turbid, tabular crystals.
GROUNDMASS: Sulfide widely disseminated in one piece, almost absent in another.
Silicates are cryptocrystalline.
VESICLES: Tiny cavities probably result from plucking during sawing.
COLOR: 7.5YR 5/0, gray.
STRUCTURE: Massive.
ALTERATION: Moderately altered.
VEINS/FRACTURES: Present in one fragment; filled with sulfides.
ADDITIONAL COMMENTS: Fragments broken up by drilling.

Drilling rubble.



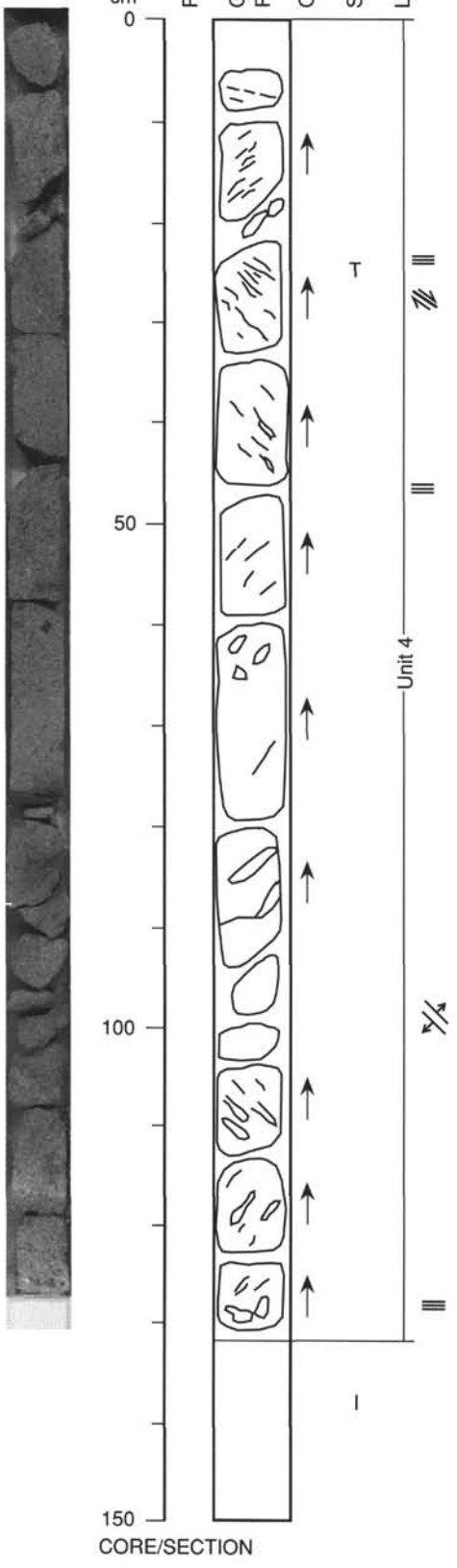
135-841B-61R-1

UNIT 3D: RHYOLITE AND RHYOLITIC BRECCIA IN DRILLING RUBBLE

Pieces 0–22 cm

CONTACTS: None.
PHENOCRYSTS:
Quartz: 1%–2%; up to 1.3 mm; anhedral, glassy looking grains.
Feldspar: 3%–5%; up to 2.3 mm; euhedral blocky crystals (replaced in part by clays).
GROUNDMASS: Cryptocrystalline.
VESICLES: None.
COLOR: N7/0 (gley chart), light gray to 7.5YR 3/0, very dark gray.
STRUCTURE: None.
ALTERATION: Highly altered; pervasive chlorite development. Trace pyrite grains (up to 0.4 mm) occur disseminated throughout.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Fragments broken up by drilling.

Drilling rubble with pumiceous clasts



135-841B-62R-1

UNIT 4: WELDED LAPILLI TUFF

Pieces 0–142 cm

CONTACTS: None.

PHENOCRYSTS: Occur in lithic pieces and disaggregated in matrix.

Quartz: 2%; up to 1.0 mm; euhedral to subhedral, rare pyramidal terminations, rare inclusions.

Feldspar: Trace–1%; up to 3.5 mm; subhedral to tabular crystals, largely replaced with clays.

Magnetite(?): Trace; <0.5 mm; euhedral.

GROUNDMASS: Groundmass of larger lithic clasts is aphanitic to microcrystalline with visible quartz and feldspar. Pumice clasts (up to 3 cm) make up 30% of the rock. These pumices are elongate and compacted, and are heavily altered to clays and chlorite.

VESICLES: None.

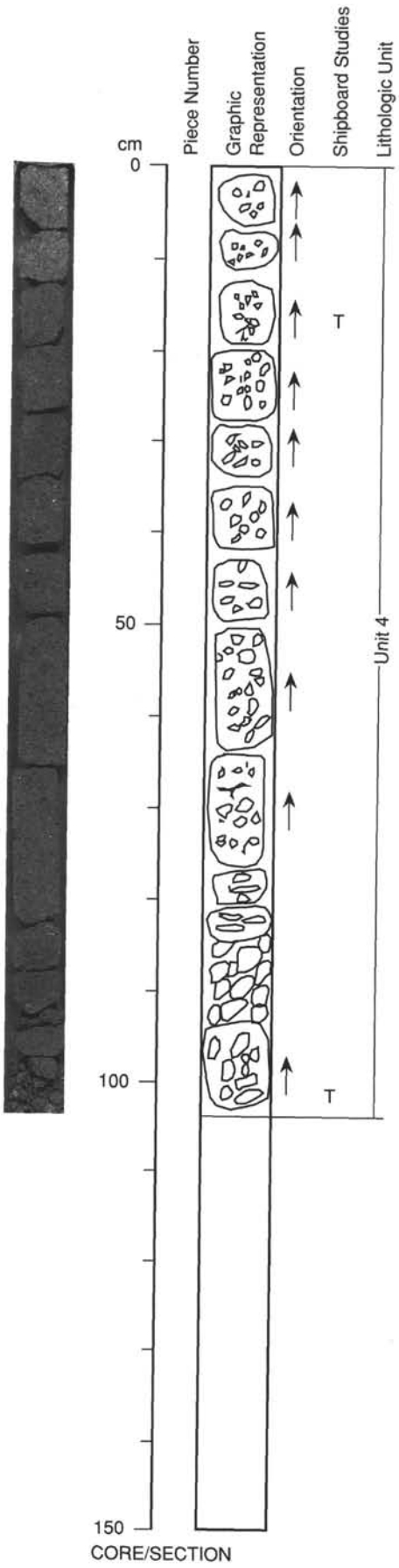
COLOR: 5G 6/1, greenish gray.

STRUCTURE: Lenticular structure.

ALTERATION: Lithic fragments highly altered to clays and chlorite; matrix is less altered but the rock overall is highly altered. Trace pyrite in grains <0.5 mm occurs disseminated throughout.

VEINS/FRACTURES: Irregular fracture network between 82 and 93 cm is filled with clays and chlorite.

ADDITIONAL COMMENTS: Elongate, compacted pumice fragments impart a planarfabric, which is steeply dipping. Well developed lenticular collapsed pumice fragments, typical of welded ignimbrite. Section shows a coarsening towards the base.



135-841B-62R-2

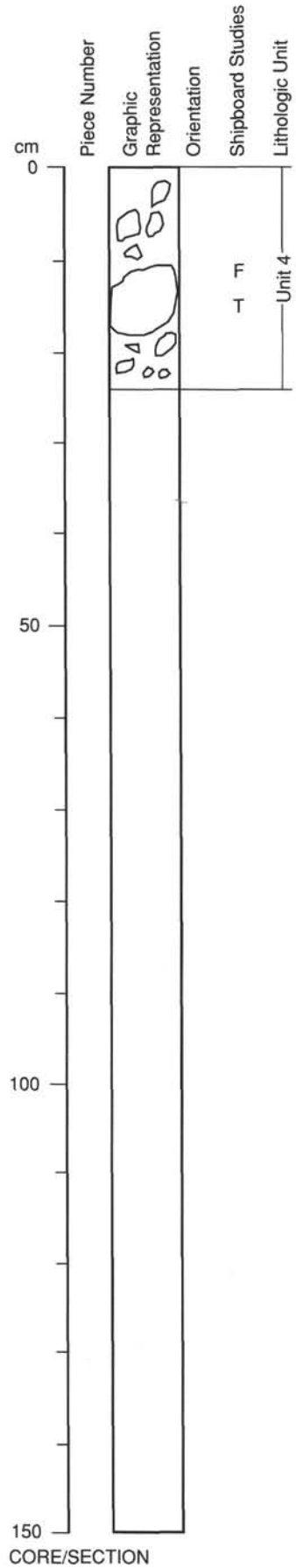
UNIT 4: WELDED LITHIC TUFF

Pieces 0–103 cm

CONTACTS: None.
PHENOCRYSTS: Occur in clasts and as grains disseminated in matrix.
Quartz: 1%–2%; up to 2.1 mm; rounded glassy fragments.
Feldspar: 2%–3%; up to 4 mm; subhedral, largely replaced with clays.
GROUNDMASS: Groundmass of clasts is microcrystalline, quartz, feldspar and pyrite and silvery sulfides are disseminated throughout, but all are rare. Pumice fragments (up to 2 cm across) compose 25%–30% of tuff. Pumice pieces are flattened and lenticular.
VESICLES: None.
COLOR: 5G 6/1, greenish gray.
STRUCTURE: Massive.
ALTERATION: Highly altered; pumiceous fragments are heavily altered to clays and chlorite(?).
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Lithic concentration increases towards the base of the section (one fragment is 2 cm across). The upper part of the section shows collapsed pumiceous fragments with clearly defined lenticular structure. The concentration of pumice fragments is higher in the upper parts of the unit, compared to the concentration of lithics.

Chloritized rhyolitic tuff with abundant lithic fragments.

135-841B-62R-CC

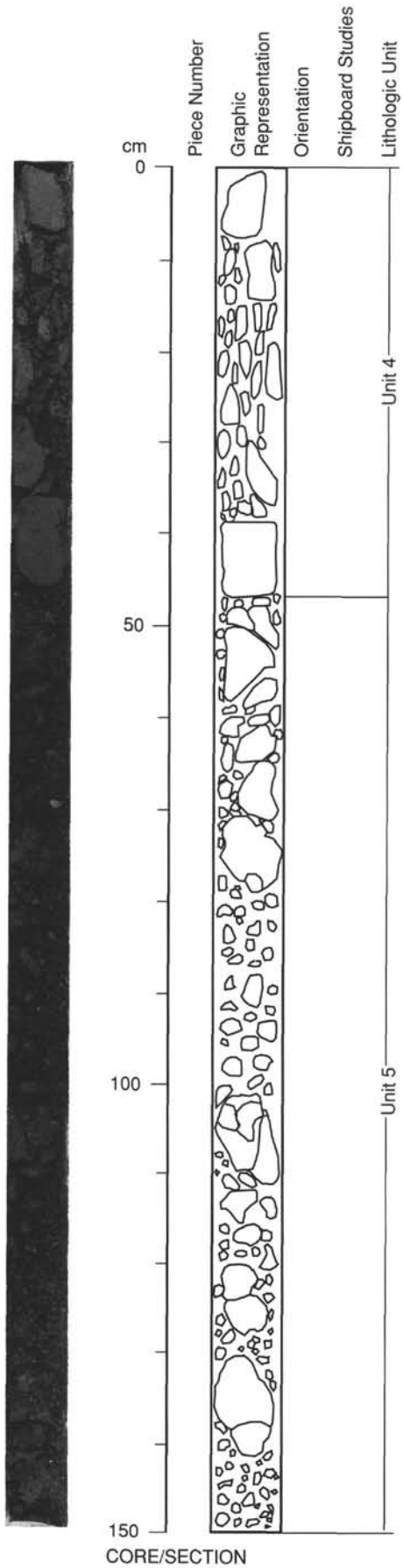


UNIT 4: WELDED TUFF AND RHYOLITE IN DRILLING RUBBLE

Pieces 0–25 cm

CONTACTS: None.
PHENOCRYSTS: The phenocryst descriptions apply to the largest fragment only.
Quartz: 3%–5%; up to 2.5 mm; euhedral, equant crystals.
Plagioclase: 2%–3%; up to 2.5 mm; euhedral, tabular crystals.
Magnetite: Trace; up to 0.3 mm; euhedral microphenocrysts associated with quartz phenocrysts.
GROUNDMASS: The large fragment has a microcrystalline and spherulitic groundmass.
VESICLES: None.
COLOR: 10R 5/1, reddish gray.
STRUCTURE: None.
ALTERATION: Highly altered in general, but the large fragment is only slightly altered.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: This unit is a mixture of altered fragments of welded tuff (like that in Section 135-841B-62R-1) and rhyolite cobbles. A large (7 cm long) clast differs from others in its reddish brown coloration (10R 5/1, reddish gray). One end is a grayish green similar to the rhyolites in Cores 135-841B-57R to 60R. These fragments may represent a lithic concentration zone near the base of Unit 4. The large fragment is a spherulitic rhyolite lava.

Rhyolitic tuff conglomerate drilling rubble



135-841B-63R-1

UNIT 4: WELDED LAPILLI TUFF

Pieces 0–48 cm

CONTACTS: None.
PHENOCRYSTS: Visible only in the larger clasts.
Quartz: 1%–3%; up to 1.5 mm; euhedral, bipyramidal.
Feldspar: 1%; up to 1 mm; tabular crystals, altered.
GROUNDMASS: Microcrystalline, altered.
VESICLES: Many fragments originally vesicular, but due to infilling, these are no longer clearly defined.
COLOR: 5G 5/1, greenish gray.
STRUCTURE: Breccia.
ALTERATION: Very highly altered; green color due to secondary chlorite and/or clays(?).
VEINS/FRACTURES: No clearly defined veins; but smaller fragments show shearing.
ADDITIONAL COMMENTS: The section is highly sheared, but fragments of welded tuff are still identifiable down to 47 cm so this portion of the core has been assigned to Unit 4. Fragments up to 1.5 mm; subrounded to subangular, dominantly rhyolitic. Finer interstitial fragments show flattening and compaction.

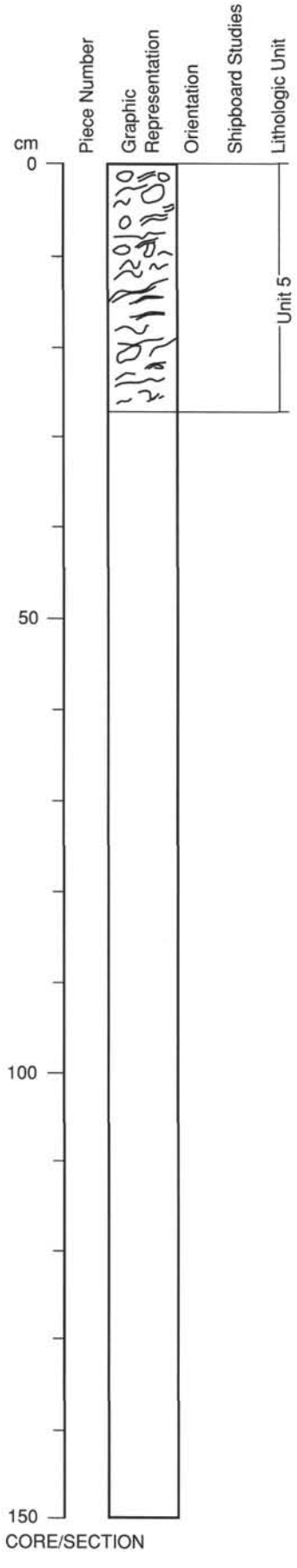
←Marked abrupt increase in dark colored, very fine grained sheared fragments, included in breccia, identified as sediment. Taken to demarcate Unit 12.

* Most of section consists of broken fragments of varying sizes to near clay size. Larger fragments shown; smaller fragments schematic.

UNIT 5: SHEARED VOLCANICLASTIC BRECCIA

Pieces 48–150 cm

CONTACTS: No clear contacts visible.
PHENOCRYSTS: Occur only in rhyolitic fragments and disseminated in matrix.
Quartz: 1%–2%; up to 1 mm; euhedral bipyramidal crystals.
GROUNDMASS: Microcrystalline.
VESICLES: 30%; up to 1 mm; irregular; restricted to some clasts; vesicle present in some rhyolite clasts; vesicles dominantly infilled by secondary minerals (quartz, chlorite, and others).
COLOR: 5G 5/2, grayish green to 5R 4/1, dark bluish gray.
STRUCTURE: Breccia.
ALTERATION: Very highly altered; green coloration due to chlorite/clay(?) development.
VEINS/FRACTURES: No clearly defined veins. However, many of fine-grained, dark colored fragments are strongly sheared.
ADDITIONAL COMMENTS: Unit consists of angular, dark-colored fragments up to 3 cm in size (siltstone/shale?) which become abundant abruptly at 47 cm in core section. Their appearance is taken to define the top of Unit 5. These fragments mixed with various lithological types of altered rhyolite, and are set in a fine friable rhyolitic dominated matrix.

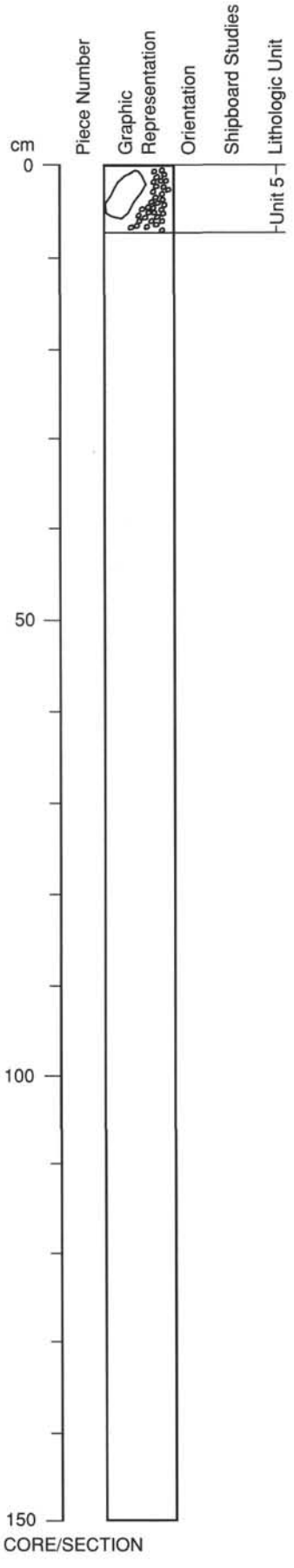


135-841B-63R-CC

UNIT 5: SHEARED VOLCANICLASTIC BRECCIA

Pieces 0–28 cm

CONTACTS: None.
PHENOCRYSTS: Occur only in rhyolitic fragments and disseminated in matrix. Quartz: 1%–2%; up to 1 mm; euhedral, bipyramidal crystals.
GROUNDMASS: Microcrystalline.
VESICLES: 30%; up to 1 mm; irregular; random distribution; vesicles are present in some rhyolite clasts; they are dominantly infilled by secondary minerals (quartz, chlorite, and others).
COLOR: 5G 5/2, grayish green to 5 R 4/1, dark bluish gray.
STRUCTURE: Breccia.
ALTERATION: Very highly altered; green coloration due to chlorite development.
VEINS/FRACTURES: No clearly defined veins. However, many of the fine grained dark colored fragments (siltstone/shale?) are strongly sheared.
ADDITIONAL COMMENTS: Dark colored fragments are mixed with various lithologic types of altered rhyolite and are set in a fine, friable rhyolitic dominated matrix.

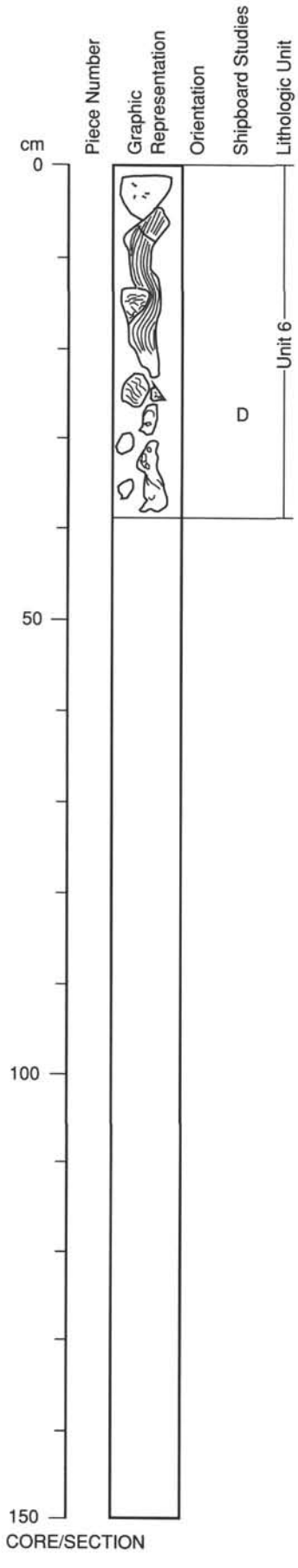


135-841B-64R-CC

UNIT 5: SHEARED VOLCANICLASTIC BRECCIA

Pieces 0–8 cm

CONTACTS: None.
PHENOCRYSTS: The described grains occur in the single large fragment recovered.
Quartz: 5%; up to 3.5 mm; euhedral, equant crystals; often glomerocrystic.
Plagioclase: 2%–3%; up to 1.5 mm; euhedral tabular crystals.
GROUNDMASS: Microcrystalline.
VESICLES: None.
COLOR: 5Y 6/1, gray to 5GY 6/1, greenish gray.
STRUCTURE: Massive.
ALTERATION: Slightly to moderately altered.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Description refers to single coherent fragment (rhyolite lava) in section. Remaining material is clay-mud (possibly in part drilling mud residue or drilling gouge). The material is arbitrarily assigned to Unit 5, but it could be entirely composed of debris from higher in the hole.



135-841B-65R-CC

UNIT 6: RHYOLITIC LITHIC LAPILLI TUFFS IN DRILLING RUBBLE

Pieces 0–40 cm

CONTACTS: None.

PHENOCRYSTS:

Quartz: 1%–2%; up to 0.9 mm; rounded clear grains.

Plagioclase: 3%–5%; up to 3.9 mm; subhedral, irregular patches.

GROUNDMASS: Cryptocrystalline; quartz and feldspar with rare pyrite disseminated throughout.

VESICLES: Trace–1%; 0.4 to 4; rounded to elongate; randomly distributed; vesicles only occur in topmost massive rhyolitic piece.

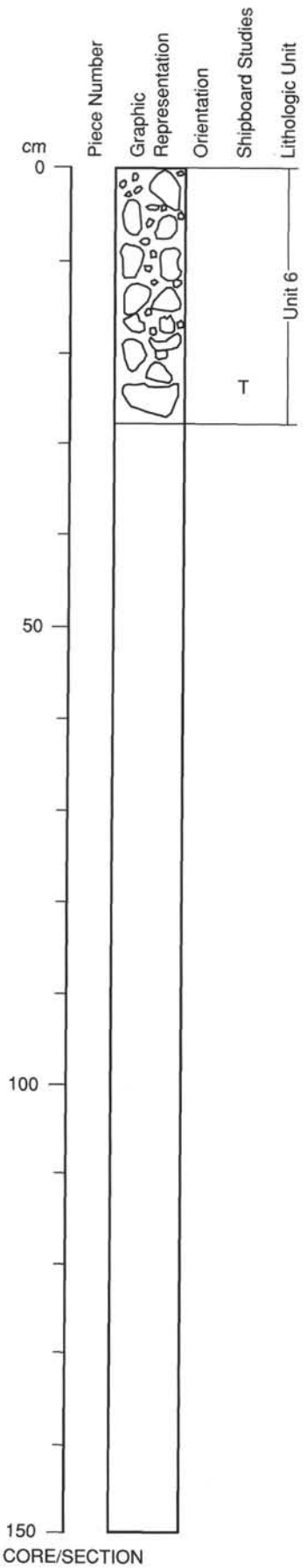
COLOR: 5B 6/1, bluish gray to 5B 7/1, light bluish gray.

STRUCTURE: Irregular welded banding in one clast.

ALTERATION: Moderately to highly altered; rinds on two clasts; albitized plagioclase; some development of mixed clays/chlorite(?) in thin matrix rinds.

VEINS/FRACTURES: None.

ADDITIONAL COMMENTS: Several large clasts in blue-green-gray matrix which may be drilling induced gouge from altered matrix or veins in tuff; two clasts of welded tuff like those in Core 135-841B-66R; three tan to gray rhyolitic cobbles (one with microcrystalline groundmass). The three smallest pieces have 2–3 mm alteration or brecciated rinds(?) on them. These rinds look like chlorite-rich breccia matrix with sandy sized fragments of lithics and crystals or chlorite-rich veins along which the clasts have broken.



135-841B-66R-CC

UNIT 6: WELDED RHYOLITIC LITHIC LAPILLI TUFF IN DRILLING RUBBLE

Pieces 0–28 cm

CONTACTS: None.

PHENOCRYSTS:

Quartz: 2%–3%; up to 2 mm; euhedral equant crystals.
Feldspar: 2%–3%; up to 2 mm; tabular euhedral to subhedral crystals, altered.
Magnetite: Trace; up to 0.6 mm; euhedral equant microphenocyrsts.

GROUNDMASS: Microcrystalline, with prominent lenticular texture due to compacted and deformed pumice clasts.

VESICLES: Original vesicular structures destroyed by compaction and infillings.

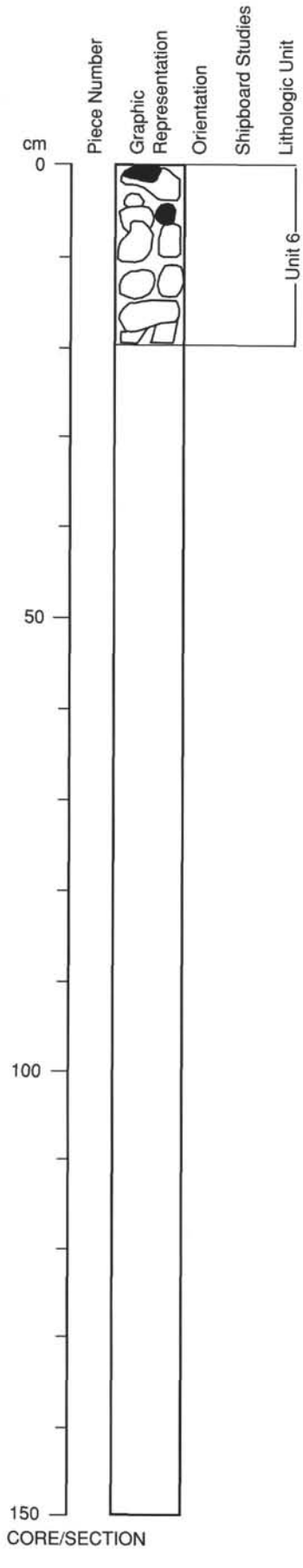
COLOR: N 6/1, gray to light gray to 5G 5/2, grayish green.

STRUCTURE: Lenticular, massive.

ALTERATION: Very highly altered; chlorite, albite, trace of pyrite.

VEINS/FRACTURES: None.

ADDITIONAL COMMENTS: In many fragments pumice lenticules strongly deformed and irregular. Lenticules altered to chlorite bearing intense green material. Original feldspars and matrix have been replaced in intense secondary alteration. Lithic volcanic fragments are up to 1.2 cm, subrounded to subangular; these could be rhyolitic to dacitic.



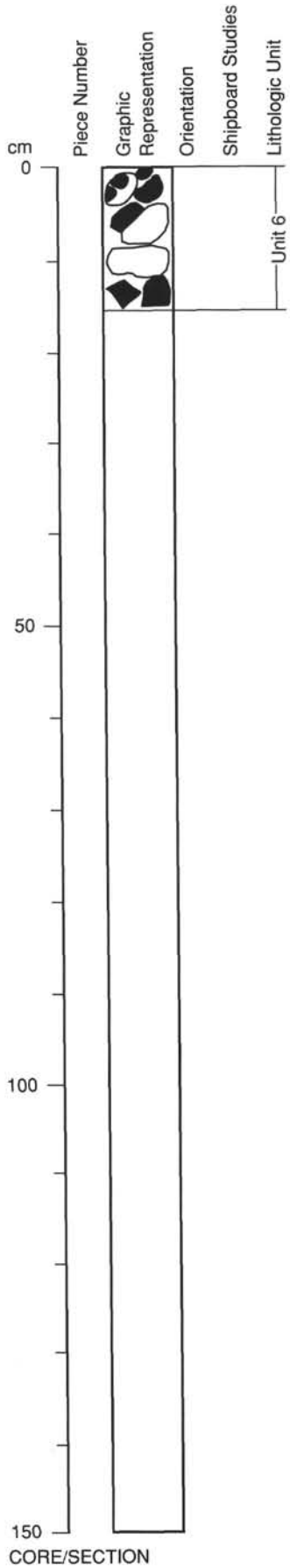
135-841B-67R-CC

UNIT 6: WELDED RHYOLITIC LITHIC LAPILLI TUFFS IN DRILLING BRECCIA

Pieces 0–20 cm

CONTACTS: None.
PHENOCRYSTS: Occur in clasts and disseminated in matrix.
Feldspar: 3%–5%; up to 4.9 mm; replaced crystals.
Quartz: 1%–2%; up to 0.9 mm; as glassy rounded pools.
GROUNDMASS: Cryptocrystalline to microcrystalline, trace sulfides disseminated throughout.
VESICLES: None.
COLOR: 5G 6/1 to 5G 5/1, greenish gray.
STRUCTURE: Prominent flattened welding in some pieces.
ALTERATION: Very highly altered. The pumiceous fragments are extensively replaced by mixed clays/chlorite(?) and feldspars are replaced by white clays.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Drilling rubble. Lithic fragments (up to 3 cm across) make up 30%–40% of the tuff. These lithic clasts are angular and include pumices, rhyolites and altered basalts. Section contains 11 pebbles of tuff and some drilling gouge; one cobble (> 4 cm) has an angular 4 cm, dark gray, lithic inclusion (siliceous or recrystallized mafic material).

●Basalt clast



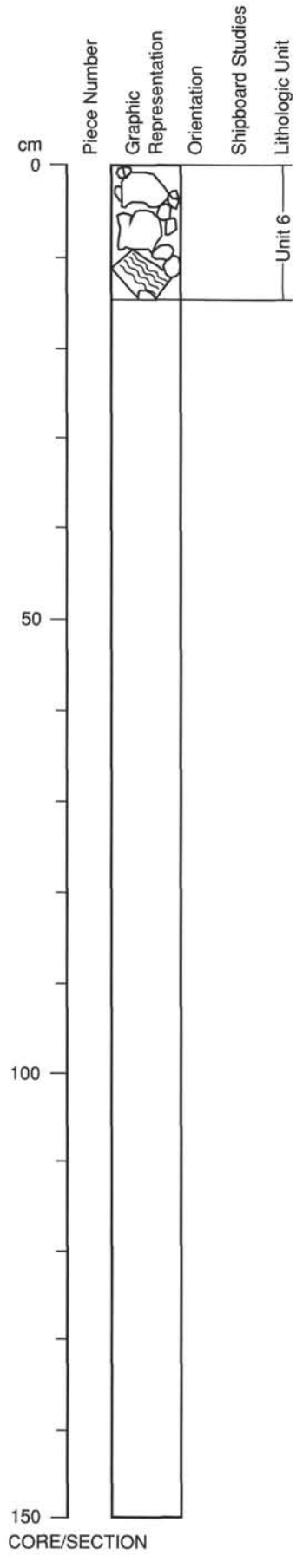
135-841B-68R-CC

UNIT 6: WELDED LITHIC LAPILLI TUFFS AND LITHIC FRAGMENTS IN DRILLING RUBBLE

Pieces 0–16 cm

CONTACTS: None.
PHENOCRYSTS: None.
GROUNDMASS: See comments.
VESICLES: None.
COLOR: 5B 7/1, light bluish gray through 5G 6/1, greenish gray to N 5/0, gray.
STRUCTURE: None.
ALTERATION: Highly altered (basaltic cobbles) to very highly altered.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: This Core Catcher contains a combination of welded tuffaceous fragments, basaltic clasts (greenstones(?), sub-rounded possibly through the process of drilling), one clast with gray lithic fragments, and a large mudball which probably represents tuff ground up during drilling. Some of the lithics are clearly included in tuffs; those lithics which are not may have been broken out of the tuff during drilling.

Greenstone clasts and fragments



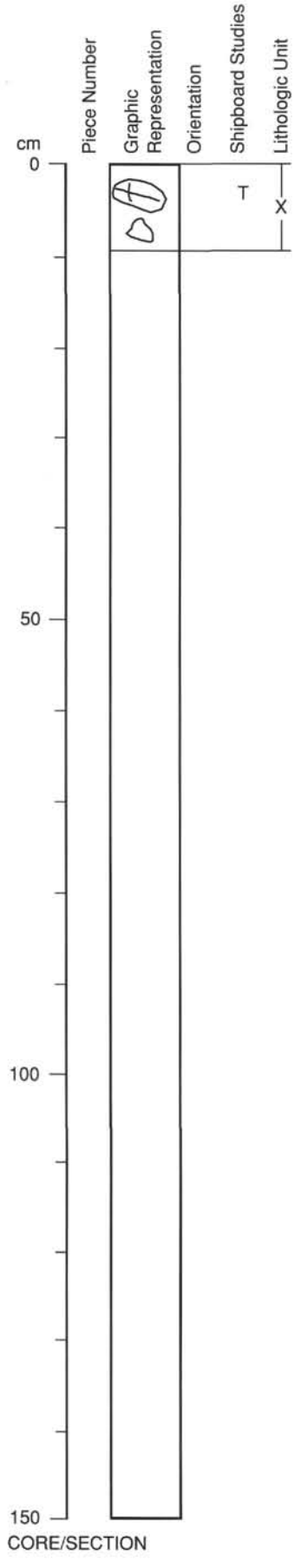
135-841B-69R-CC

UNIT 6: LITHIC FRAGMENTS AND WELDED LITHIC LAPILLI TUFF

Pieces 0–15 cm

CONTACTS: Contact between rhyolitic clast and tuff in one piece.
PHENOCRYSTS: None.
GROUNDMASS: See comments.
VESICLES: None.
COLOR: 5R 5/0, pinkish gray (rhyolite clast) to 5G 6/1, grayish green (sediment).
STRUCTURE: None.
ALTERATION: Very highly altered, pervasive oxidation in rhyolite, tuff is extensively altered to mixed clays/chlorite(?).
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Drilling rubble. Gray-green volcanic sandstone is the principle component of the rubble. This sand, and the associated greenish clay, may be drilling gouge from chlorite-rich veins in tuffs or from chlorite-rich matrix material. There is a clast of rhyolite included in the tuff, and a second fragment of tuff which resembles other lithologies of Unit 6. The fragment of welded tuff is highly fractured and disturbed. These fragments and cobbles have probably been broken up by drilling.

Rhyolite clast



135-841B-70R-CC

UNIT X: DRILLING RUBBLE

Pieces 0–10 cm

CONTACTS: None.
PHENOCRYSTS: See comments.
GROUNDMASS: See comments.
VESICLES: None.
COLOR: 5B 5/1, bluish gray (greenstone) to 5G 4/2, grayish green.
STRUCTURE: None.
ALTERATION: Very highly altered; probably greenschist facies metamorphism.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Rubble consists of one rounded clast of greenstone, and one fragment of a quartz epidote(?) vein. The fragments may be debris from another part of the hole and cannot be assigned to a unit.

135-841B-18R-01 (137-140 cm) OBSERVER: JAN WHERE SAMPLED: Unit 1A

ROCK NAME: Moderately phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Very fine grained; grading into devitrified glass at the contact

TEXTURE: Glomeroporophyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-6	5-7	0.05-0.8		subhedral to euhedral	skeletal elongate crystals and glomerocrysts; many contain melt inclusions and show zoning
Clinopyroxene	1-2	1-2	0.05-0.4		anhedral to subhedral	as single crystals and associated with glomerocrysts of plagioclase; prominently zoned and twinned
Orthopyroxene	<tr	tr	<0.2		euhedral	remnant cores of low birefringent material surrounded by brown clays
GROUNDMASS						
Plagioclase	25-30	25-30	0.02-0.05		euhedral	elongate laths
Clinopyroxene	10-15	<0.03	up to 0.03		anhedral	fibrous fine crystals
Opaques	3-5	3-5	0.01		anhedral	rods and dusty grains in mesostasis
Mesostasis	5-10	50-60	n/a		interstitial	largely replaced by Fine-grained clays

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Quartz?	5	vein fill	
?clays	40-50	replacement	replacing mesostasis with cryptocrystalline green-brown clays

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	5	throughout	0.05	quartz	parallel to contact	see comments

COMMENTS: This sample is a contact of basaltic andesite with volcanic siltstone. Numerous tiny (0.05 mm wide) veins are aligned parallel to the glassy contact. The distance between these veinlets increase with distance away from the margin; from 0.4 mm apart close to the contact, to 3 mm apart at 2 cm into the interior of the sample. Volcanic siltstone has bundles (0.1-0.3 mm across) of a birefringent, radiating mineral near the contact (prehnite?) possibly from contact metamorphism. Rock is highly altered.

135-841B-18R-02 (7-10 cm) OBSERVER: JAN WHERE SAMPLED: Unit 1A

ROCK NAME: Moderately phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine grained

TEXTURE: Glomeroporphyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1-2	2-4	0.5-1.5		euhedral to subhedral	generally as glomerocrysts; osccillatory zoning and melt inclusions are common
Clinopyroxene	tr	tr	<0.6		euhedral	single rare crystals
GROUNDMASS						
Plagioclase	35-40	40-45	<0.4		subhedral to euhedral	as quenched, skeletal crystals towards the contact
Clinopyroxene	10-15	10-15	<0.3		anhedral to subhedral	as elongate crystals and rounded grains
Mesostasis	5-10	30-35	n/a		interstitial	cryptocrystalline brownish clays with a fine dusting of opaque minerals
Opaques	3-5	3-5	0.1-0.2		euhedral to anhedral	as irregular grains and dust in the mesostasis

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
K- feldspar	3-5	both	replaces plagioclase and fills veins; biaxial, negative, very low 2V, very low birefringence
Clays	25-30	replacement	breakdown of mesostasis
Pyrite?	tr	vein fill and disseminated in rock	associated with the silicic veins, accounts for 20-30% of the vein fill

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Veins	3-5	various	1 mm wide	pyrite?	irregular

COMMENTS: The grain size variation is large in this slide owing to the presence of a chilled margin at one end of the section. This rock is highly altered.

135-841B-18R-02 (29-30 cm) OBSERVER: WIL WHERE SAMPLED: Unit 1A

ROCK NAME: Moderately to highly phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine grained

TEXTURE: Seriate, local aphanitic patches, glomeroporphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	10-15	0.2-1.0	An 70-75	subhedral to euhedral	many in glomerocrysts
Clinopyroxene	<1	<1	0.2-0.3	augite	anhedral to subhedral	intergrown with plagioclase in glomerocrysts
GROUNDMASS						
Plagioclase	25-30	25-30	0.05-.1	An 30-40	euhedral	tabular; irregular overgrowths on many; occur in radiating bundles
Clinopyroxene	10-15	10-15	<0.1	augite	euhedral to subhedral	tends toward acicular crystals
Magnetite	1-2	1-2	<<0.1		tiny granules	
Mesostasis	0	25-30	0.1-0.2		interstitial	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
?clays	25-30	replacement	cryptocrystalline green brown clays replace mesostasis

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: One vein of quenched, silica rich material, bordered by dark, dusty mesostasis; patches of aphanitic matrix with plagioclase and augite phenocrysts zeolite forms a low birefringence fracture filling. Rock is moderately altered.

135-841B-23R-04 (Piece 5,30-33 cm) OBSERVER: JAN WHERE SAMPLED: Unit 1B

ROCK NAME: Moderately phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine to medium grained

TEXTURE: Glomeroporphyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-6	5-7	0.4-1.5		euhedral to subhedral	as single crystals and glomerocrysts; some with oscillatory zoning; replacement in the crystals closest to the veins; cores corroded
Clinopyroxene	1-2	1-2	0.1-0.5		subhedral to anhedral	commonly intergrown with plagioclase; seriate into groundmass
GROUNDMASS						
Plagioclase	20-25	20-25	0.05-0.3		anhedral to subhedral	elongate laths
Clinopyroxene	10-15	10-15	0.03-0.25		anhedral to subhedral	
Opaques	1-3	1-3	up to 0.1		irregular	
Mesostasis	25-30	45-50	n/a		interstitial	greenish-brown cryptocrystalline material with opaques dusted throughout

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Feldspar	2	filling vein	shows weak tartan twinning
Clays	20-25	replacement	from breakdown of mesostasis

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	2	cuts slide	1 mm wide	feldspar and host rock fragments	irregular	the vein fill includes crystalline material and a micro breccia of broken host rock minerals; appears to be potassic feldspar

COMMENTS: Rock is moderately altered.

135-841B-25R-01 (Piece 14,104-105 cm) OBSERVER: KRI WHERE SAMPLED: Unit 1D

ROCK NAME: Moderately phyric orthopyroxene clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine grained

TEXTURE: Glomeroporphyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-7	5-7	0.5-2		euhedral to subhedral	generally in glomeroporphyritic clusters to 4 mm; melt inclusions in many, most are strongly zoned with sodic rims; seriate to groundmass
Orthopyroxene	1	1-2	0.3-1		euhedral to subhedral	tabular crystals with clinopyroxene cores in some
Clinopyroxene	2-3	2-3	0.3-1		subhedral to anhedral	isolated in groundmass and in clusters with plagioclase
GROUNDMASS						
Plagioclase	20-25	22-28	<1		euhedral	randomly oriented skeletal crystals
Clinopyroxene	15-20	15-20	<0.5		euhedral to subhedral	elongate and equant; some plumose aggregates and intergrowths with plagioclase
Orthopyroxene	3-4	3-4	<0.3		euhedral	randomly distributed throughout groundmass
Magnetite	3-4	3-4	<0.1		skeletal	cruciform morphologies common
Mesostasis	15-20	30-35	n/a		interstitial	green-brown cryptocrystalline clays replace much of the mesostasis

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
mixed clays	10	replacement	green-brown clays replace mesostasis; orthopyroxene and plagioclase phenocrysts show minor breakdown to Fine-grained clays

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
None	n/a					Several large (2-3 mm) cavities are present, but these may be plucked glomerocrysts as they are all rimmed by large plagioclase crystals

COMMENTS: Trace amounts of sulfide globules to 0.1 mm associated with plagioclase phenocrysts and disseminated throughout the groundmass. Seriate texture makes the distinction between phenocrysts and groundmass somewhat arbitrary. Rock is moderately altered.

135-841B-25R-03 (Piece 12A,117-118 cm) OBSERVER: JAN WHERE SAMPLED: Unit 1D

ROCK NAME: Moderately to highly phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Glassy to fine grained

TEXTURE: Glomeroporphyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	7-10	7-10	0.07-1.5		euhedral to subhedral	as single quenched laths and glomerocrysts; larger crystals show oscillatory zoning and narrow sodic rims; melt inclusions are common
Clinopyroxene	3-5	3-5	o.o5-0.6		subhedral to euhedral	elongate and equant corroded crystals
Orthopyroxene	tr	tr	<0.75		euhedral to subhedral	tabular crystals with brownish clay alteration; edges intergrown with groundmass
GROUNDMASS						
Mesostasis	75-80	80-85	<0.04		microcrystalline to cryptocrystalline	felty needles of plagioclase, clinopyroxene, and opaques are discernible

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Palagonite	tr	replacement	alteration of the glass
? clays	5-10	replacement	cryptocrystalline green-brown clays replace the mesostasis

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	tr	cuts slide	0.5 mm wide	quartz, feldspar, brown clays	irregular	additional fine veins (<0.04 mm wide) are discontinuous and wispy and occur parallel to the chilled contact. These do not appear to be the same as the larger vein described here

COMMENTS: This section includes a devitrified glass contact and grades into a fine-grained porphyritic basalt. The rock appears to be fresh except for alteration along variolitic glassy margin. Rock is slightly altered.

135-841B-26R-02 (Piece 3,88-91 cm) OBSERVER: JAN WHERE SAMPLED: Unit 1E

ROCK NAME: Moderately phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine grained

TEXTURE: Glomeroporphyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	3-5	5-7	0.3-1.2		euhedral to subhedral	as single crystals and glomerocrysts; many of the larger plagioclase crystals show oscillatory zoning and narrow sodic rims; melt inclusions are common, and many large plagioclases show corroded edges
Clinopyroxene	1-2	2-3	0.3-0.7		subhedral to anhedral	commonly intergrown with plagioclase in glomerocrysts, but the crystals always show signs of alteration mostly in irregular edges
Orthopyroxene	tr	tr	0.25		euhedral to subhedral	single crystals and in glomerocrysts with plagioclase; sometimes with brownish clayey alteration haloes; faint pink-green pleochroism.
GROUNDMASS						
Plagioclase	20-25	20-25	0.01-1.0		subhedral	as laths and skeletal crystals
Pyroxene	5-10	5-10	.01-0.6		anhedral to subhedral	rounded to elongate grains
Opaques	3-5	3-5	<0.8		anhedral	as small equant grains and elongate rods
Mesostasis	5-10	40-50	n/a		interstitial	brownish cryptocrystalline mesostasis with significant clay development

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Green and brown clay	20-30	replacement	mesostasis replacement
Quartz	2-3	replacement and vein fill	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	tr	randomly oriented	0.1-0.3 mm	quartz	irregularly shaped	chlorite associated with the smaller of the veins

COMMENTS: This rock is moderately altered

135-841B-31R-01 (Piece 1,0-2 cm) OBSERVER: JAN WHERE SAMPLED: Unit 1G

ROCK NAME: Moderately phyric clinopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine grained

TEXTURE: Glomeroporphyritic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	3-5	3-5	0.5-1.5		subhedral to euhedral	as single tabular crystals and as glomerocrysts; larger crystals show oscillatory zoning and narrow sodic rims; melt inclusions are common; the edges of some plagioclase phenocrysts are scalloped and corroded.
Clinopyroxene	tr	tr	0.3-1.0		anhedral to subhedral	elongate crystals; corroded edges
Orthopyroxene	tr	tr	up to 0.25		subhedral	as rare single crystals, with faint pink-green pleochroism
GROUNDMASS						
Plagioclase	25-30	25-30	0.05-0.4		subhedral to anhedral	elongate laths and tabular (sometimes skeletal) crystals
Clinopyroxene	5-10	5-10	0.05-0.2		anhedral to subhedral	rounded grains and elongate crystals; abundant quench crystallites
Opaques	3-5	3-5	0.05-0.5		anhedral to euhedral	as irregular elongate grains and square blocky crystals
Mesostasis	5-10	35-45	n/a		interstitial	cryptocrystalline

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Carbonate	1-2	replacement	
Brown clays	20-30	replacement	some may be chlorite
Zeolites	tr	fill	radiating low birefringence mineral

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: This rock is moderately to highly altered

135-841B-34R-01 (2-4 cm) OBSERVER: EWE WHERE SAMPLED: clast in sedimentary unit IV

ROCK NAME: Granodiorite

GRAIN SIZE: Coarse grained

TEXTURE: Holocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Quartz	30-35	35-40	0.03-3 mm		subhedral to anhedral	vary from well-developed crystals to interstitial grains; some in graphic intergrowths with alkali feldspar
Plagioclase	5	20-25	0.03-1 mm	An10	euhedral to subhedral	alteration in most grains
Alkali feldspar	0	10-15	0.03-2 mm		subhedral to anhedral	altered to albite

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Chlorite	5-10	replacement	aggregates after original Fe-Mg silicates
Epidote	10-15	replacement	granular aggregates after original Fe-Mg silicates
Clinozoisite	5	replacement	local aggregates replacing feldspars
Fe-hydroxides?	<1	infillings?	local small (<0.1 mm) brown near-isotropic grain boundaries and cleavage planes
Albite	10-20	replacement	recrystallization of alkali feldspars and plagioclases
Quartz	5?	replacement	recrystallization of primary quartz

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	0				

COMMENTS: Difficult to positively identify proportion of alkali feldspar, particularly proportion of original K-feldspar. Needs to be stained. General texture suggests clast was derived from a high level granodioritic pluton.

135-841B-36R-01 (Piece 1,84-86 cm) OBSERVER: EWE WHERE SAMPLED: Unit 1I

ROCK NAME: Moderately phyric clinopyroxene orthopyroxene plagioclase basaltic andesite

GRAIN SIZE: Fine grained

TEXTURE: Glomeroporphyitic, seriate

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10	10	0.5-2	An60-70	euhedral to subhedral	glomerocrysts; oscillatory zoning prominent with sodic rims
Orthopyroxene	1	1	0.5-0.8		euhedral to subhedral	elongated prismatic crystals; intergrown clinopyroxene and partial clinopyroxene rims; extends to microphenocrysts size
Clinopyroxene	<1	1	0.4-0.5		subhedral	lamellar twinning in some grains; most grains with ragged outline
GROUNDMASS						
Plagioclase	25-30	25-30	<0.5		euhedral to subhedral	elongated tabular crystals to microlites; smallest crystals skeletal with swallowtail terminations
Orthopyroxene	1	1	<0.5		subhedral	prismatic crystals, some intergrown with plagioclase
Clinopyroxene	15	15	<0.4		subhedral to anhedral	interstital grains intergrown with plagioclase and orthopyroxene, some fine radiating prismatic growths
Magnetite	2-3	2-3	0.002-0.05		anhedral	skeletal laths to equant aggregates
Mesostasis	40-50	40-50	n/a		interstitial	very fine bladed plagioclase-pyroxene intergrowths and dust-like magnetite; shows quench texture.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	2-3	disseminated	0.05-0.2	none	subrounded to irregular

COMMENTS: A remarkably fresh rock with one segregation veinlet present

135-841B-40R-01 (0-3 cm) OBSERVER: EWE WHERE SAMPLED: Sedimentary Unit IV

ROCK NAME: Basalt (altered)

GRAIN SIZE: Fine grained, recrystallized

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0	2-3	0.3-2		euhedral	completely replaced by albite-actinolite-magnetite intergrowths
Augite	0	1	0.6		euhedral to subhedral	completely replaced b actinolite
GROUNDMASS						
Matrix	0	90	up to 0.15		interstitial	consists of Fine-grained intergrowth of acicular actinolite, albite, magnetite with minor chlorite. Actinolite often occurs as radiating growths, apparently replacing original quenched pyroxene grains. Some possible small olivine pseudomorphs.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Actinolite	70	replacement	see previous comments
Albite	15-20	replacement	
Magnetite	5-10	replacement	
Chlorite	2	replacement	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: This represents a clast of an original quenched submarine basalt or basaltic andesite which has quench and variolitic texture. The form of some albite-actinolite growths suggest infilling and replacement of original amygdules. The rock is in the low greenschist facies of metamorphism.

135-841B-48R-01 (14-15 cm) OBSERVER: JAN WHERE SAMPLED: Unit 2B

ROCK NAME: *Highly phyric plagioclase quartz rhyolite to rhyolitic pumice breccia*

GRAIN SIZE: Glassy to fine grained

TEXTURE: Porphyritic, sheared, partially pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	8-10	8-10	to 1.7 mm		subhedral to euhedral	as single crystals and glomerocrysts. Rare crystals show oscillatory zoning.
Quartz	10-12	10-12	to 2.5 mm		subhedral	large equant embayed crystals, some with melt inclusions
Magnetite	1-2	1-2	to 0.4 mm		anhedral to subhedral	often as clusters of small irregular, isolated grains and also included in plagioclase
Clinopyroxene	tr	tr	to 0.6 mm		subhedral	as rare ragged single crystals
Orthopyroxene	tr	tr	to 0.6 mm		subhedral	prismatic crystals with clinopyroxene phenocrysts
GROUNDMASS						
Glass	70-75	80	n/a		interstitial	highly fractured; perlitic cracks sometimes encircle phenocrysts, due to hydration of glass

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	tr	infilling along fractures	the amount of infilling and replacement is hard to tell but seems to be restricted to fractures in the glass and voids in pumice; only minor alteration of the pumiceous material, if any

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	5-10	throughoutto	5 mm	clear from infilling	elongate and irregular	the pumiceous part of the slide contains vesicles. These impart a wavey fabric to the rock and vesicles sometimes wrap around to parallel phenocryst edges.
Fractures	2-3	see comments	3 mm wide	locally sheared glass	irregular	there appears to be a brecciated zone between the massive rholite and the rhyolitic pumice breccia. It is not clear if the fragmentation resulted from flow as there is no preferred orientation of elongated fragments Locally fragmented phenocrysts

COMMENTS: The section includes the transition from a massive rhyolite to a rhyolitic pumice breccia. There is a brecciated zone across the contact. The pumice breccia lithology consists of interlocking fresh glass pumice clasts (>= 10 mm) with some interstitial finer fragmented glass, randomly oriented. The clasts commonly exhibit tubular vesicualr forms and have a phenocryst mineralogy closely similar to that described in the rhyolite. It is not clear if this transition is original in the margins of a flow or is a post-eruption brecciation.

135-841B-48R-01 (53-56 cm) OBSERVER: JAN WHERE SAMPLED: Unit 2B

ROCK NAME: Highly phyric quartz plagioclase rhyolite (pitchstone)

GRAIN SIZE: Glassy

TEXTURE: Porphyritic, welded bands of flow(?) sheared matrix and phenocrysts.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-12	10-12	to 2.5 mm		euhedral to subhedral	equant and tabular crystals, many with normal oscillatory zoning, rarely as glomerocrysts.
Quartz	7-10	7-10	to 2.0 mm		euhedral to subhedral	typically as equant, embayed single crystals
Orthopyroxene	tr	tr	to 0.6 mm		euhedral to subhedral	as small fractured and altered single crystals
Clinopyroxene	tr-1	tr-1	to 1.5 mm		anhedral to subhedral	as single fractured crystals
Magnetite	1	1	to 0.2 mm		euhedral to anhedral	small isolated grains, sometimes in clusters of 3 or 4 crystals.
GROUNDMASS						
Glass	65-75	70-80	n/a		interstitial	circular and curved perlitic cracking is common throughout the glass (due to hydration), sometimes surrounding phenocrysts. Occasional opaque and plagioclase(?) microlites are barely discernable.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	tr	replacement	some pyroxenes show replacement by brownish clays.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Fractures	5	in subparallel bands	4-5 mm wide	sheared glass and phenocrysts	in wavey bands	these features are not true fractures, but appear to be subparallel shear zones related to flow(?) within the lava which has broken up phenocrysts. Fragments within these zones however, are only partially aligned parallel to the zone of shear.
Vesicles	10	throughout	up to 4 mm	thin linings	irregular	thin linings of mixed ?clay-chlorite

COMMENTS: This rock is only slightly altered. It was originally from a lava or dome. The shearing indicated by the fractures is interpreted as occuring during cooling, before the lava was completely solid. Note that phenocrysts in these shears are not usually broken or disaggregated.

135-841B-49R-01 (4-7 cm) OBSERVER: WIL WHERE SAMPLED: Unit 2B

ROCK NAME: Highly phyric plagioclase quartz rhyolite and rhyolitic pumice breccia

GRAIN SIZE: Glassy

TEXTURE: Porphyritic, pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	5-7	5-7	0.1-1.3		euhedral to subhedral	equant crystal; some slightly embayed; some fractured
Plagioclase	5-7	5-7	0.3-1.2	An25	euhedral to subhedral	some marginal rounding and corrosion; strongly developed oscillatrory zoning, often with marked internal compositional discontinuities
Clinopyroxene	<1	<1	0.08-0.12		subhedral	prismatic crystals
Magnetite	1	1	0.04-0.15		equant	isolated crystals and as inclusions in plagioclase phenocrysts
GROUNDMASS						
Pumice fragments	85-90	85-90	n/a		n/a	pumice and pumiceous glass fragments; consists of an interlocking aggregate of pumice fragments, randomly oriented. Vesicles tend to be strongly elongated; glass still unaltered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Fe oxyhydroxide	tr	staining	marginal staining of clast margins and in fine linings to larger vesicles
Clays	tr	in cores, fractures in plagioclase	as local fine linings to larger vesicles

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	30-50	disseminated	0.004-0.1	local lining	elongate to tubular	percent in pumice difficult to discern

COMMENTS: This sample is a pumice breccia, possibly a poorly welded local ash-flow tuff. It contains a fragment of rhyolite lava containing phenocrysts of quartz (8%), plagioclase (10%) clinopyroxene (2%), orthopyroxene (<1%), and magnetite (1%) in a microcrystalline groundmass. The properties of the phenocrysts are similar to those in the pitchstone fragments of Section 135-841B-49R-1. This rock is fresh.

135-841B-49R-01 (20-21 cm) OBSERVER: JAN WHERE SAMPLED: Unit 2B

ROCK NAME: Highly phyric quartz plagioclase rhyolitic pumice breccia

GRAIN SIZE: Glassy to fine grained

TEXTURE: Porphyritic, pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-12	10-12	to 2 mm		euhedral to subhedral	as single crystals and glomerocrysts, some showing oscillatory zoning
Quartz	3-5	3-5	to 1.2 mm		subhedral	as equant, embayed crystals; some showing fracturing and disaggregation
Magnetite	1-2	1-2	to 0.3 mm		euhedral to subhedral	As equant separate crystals and included in plagioclase
Orthopyroxene	tr	tr	to 0.3		subhedral	as rare prismatic single crystals
Clinopyroxene	tr	tr	to 0.5 mm		subhedral	as rare prismatic single crystals
GROUNDMASS						
Pumice	40	40	n/a		frothy	fragments show wavy flow and elongate vesicles. Fragments erratically oriented; the pumice glass seems unaltered

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Greenish brown clays	tr	replacement	alteration of glassy groundmass

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	45	patchy distribution	to 1 mm	clear from infilling	elongate to irregular	some of the larger vesicles are wrapped around to be parallel to the edges of phenocrysts. Both the percentage and size estimates of vesicles is difficult owing to the small size of the vesicles.

COMMENTS: This sample may represent an unwelded to poorly welded ash flow tuff. The rock is only slightly altered.

135-841B-50R-01 (14-17 cm) OBSERVER: EWE WHERE SAMPLED: Unit 2B

ROCK NAME: Highly phyric quartz plagioclase rhyolite (pitchstone)

GRAIN SIZE: Fine grained to vitreous

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	10	10	0.4-2 mm		euhedral	equant, mostly isolated. Glass inclusions and some resorption common.
Plagioclase	10-12	10-12	0.2-2.5 mm		euhedral	tabular to equant, oscillatory normal zoning, mostly as isolated crystals.
Orthopyroxene	1	1	0.2-1.5 mm		euhedral	short prismatic crystals. Most contain magnetite. Rarely in glomerocrysts with plagioclase
Clinopyroxene	tr	tr	0.2-0.5 mm		euhedral to subhedral	prismatic crystals, some with magnetite inclusions. Rarely in glomerocrysts with plagioclase.
Magnetite	tr	tr	to 0.3 mm		euhedral to subhedral	mostly included in, or associated with, plagioclase and pyroxenes. Also rarely as isolated crystals.
GROUNDMASS						
Glass	75-80	75-80	n/a		interstitial	extensive cracking, including perlitic cracking often concentrated around phenocrysts. No crystallites visible.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Mixed clay/chlorite?	tr	linings to vesicles	a mixture of clays-chlorite +/- secondary chalcedony(?). Very thin linings to vesicles, or less commonly, filling small vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5	disseminated	0.4-4 mm	thin linings and rare infillings	elongated

COMMENTS: The rock is fresh to slightly altered.

135-841B-51R-03 (89-91 cm) OBSERVER: EWE WHERE SAMPLED:

ROCK NAME: Highly phyric quartz plagioclase rhyolite

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	3-5	3-5	0.5-2		subhedral to anhedral	equant, often in glomerocrysts; margins granuloblastic suggesting recrystalliztion interaction with matrix minerals; some grains show minor resorption textures.
Plagioclase	5-7	5-7	0.6-2.6	An45-55	euhedral	single and in glomerocryst; oscillatory zoning and sporadic melt inclusions
Hornblende	<1	2-3	0.5-1.5		euhedral	elongated prismatic crystals mostly replaced by actinolite; some possible relict unaltered patches left
Magnetite	1	1	0.2-0.5		subhedral	equant crystals with exsolution
Clinopyroxene	tr	tr	0.5		anhedral	relict core in actinolite
GROUNDMASS						
Plagioclase	45	45	up to 0.4		subhedral	normal zoning well defined
Quartz	35	35	up to 0.25		subhedral to anhedral	interlocking grains with feldspars
K-feldspar	5-10	5-10	up to 0.2		ahnedral	mostly interstitial and in graphic intergrowths with quartz surrounding some of the quartz phenocrysts
Hornblende	tr	3	up to 0.5		subhedral	mostly replaced by actinolite
Magnetite	1-2	1-2	up to 0.2		subhedral to anhedral	equants; show exsolution

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Actinolite	5-7	replacement	acicular actinolite pseudomorphs after hornblende and augite; occasional relicts of these primary minerals occur

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	0				

COMMENTS: Relatively coarse groundmass averaging approximately 0.2-0.3 mm size. Seems to represent a clast of an original minor intrusive plug or dike based on texture. Groundmass shows evidence of recrystallization; minor apatite and traces of zircon. The rock is slightly to moderately altered.

135-841B-52R-01 (100-103 cm) OBSERVER: EWE WHERE SAMPLED: Unit 2C

ROCK NAME: Rhyolitic pumice breccia

GRAIN SIZE: Glassy

TEXTURE: Porphyritic, pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	8-10	8-10	.1-1.0	An 40-45	subhedral	large grains are subhedral, whereas smaller ones are angular
Quartz	10-12	10-12	0.1-1.5		euhedral to subhedral	rounded bipyramids, small fragments are angular; where fractured some grains show slight resorption
Clinopyroxene	<1	<1	<1=0.15		subhedral	prismatic crystals
Orthopyroxene ?	tr	tr	0.9		subhedral	one crystal observed
Magnetite	<1	<1	<0.1		euhedral to subhedral	isolated crystals and included in plagioclase phenocrysts
GROUNDMASS						
Glassy pumice clasts	40	40	<1->4		rounded	rounded to elongated elliptical clasts; glass still fresh

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
chlorite	tr		
brown clay, Fe oxide	<1	replacement	local replacement of ?pyroxene and pumice glass, and fine linings along margins of some fragments

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
vesicle	40	disseminated	0.004-0.4	none to trace	tubular	elongated, subparallel tubes in stretched pumice; difficult to estimate due to very small sizes

COMMENTS: Contains a dark clast 4 by 6 mm of highly altered vesicular moderately phyric clinopyroxene plagioclase basalt or basaltic andesite

135-841B-54R-01 (35-37 cm) OBSERVER: SHE WHERE SAMPLED: Unit 3B

ROCK NAME: Welded lithic tuff

GRAIN SIZE: Ash to lapilli

TEXTURE: Pumiceous, welded

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	2-5	2-5	0.3-1.5		anhedral to euhedral	as phenocrysts in microlitic clasts and disaggregated grains
Plagioclase	<3	<3	0.3-0.8		anhedral to subhedral	commonly broken; in clasts and as disaggregated grains, complex oscillatory zoning; in tuff; broken with secondary overgrowths
GROUNDMASS						
Pumice clasts	10	95	0.5-4.0		irregular	clasts of rhyolite and pumice, disaggregates all highly altered

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clay	20-35	volcanic clasts, feldspar	nearly total replacement of many clasts and grains
Carbonate	35-40	volcanic clasts, feldspar	
Quartz/Albite	15-20	recrystallization	Fine-grained granular mosaics
Pyrite	3-5	groundmass	patchy irregular crystal aggregates throughout slide

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	varie				irregular	pumice shards originally highly vesicular; collapse and alteration has obscured the original relationships

COMMENTS: Alteration has obscured a lot of structure, flattening and bending of fragments is locally pronounced, as is folding of layers around crystals; flattening has different directions in different parts of slide, as does the unit in hand sample, could reflect flowage or collapse of various pumice fragments. Rock is very highly altered.

135-841B-54R-01 (97-99 cm) OBSERVER: EWE WHERE SAMPLED: Unit 3C

ROCK NAME: Laminated ash-sized crystal tuff

GRAIN SIZE: Fine grained

TEXTURE: Fine, equigranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Matrix	70	100	n/a		n/a	see below

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
?clay and ?chlorite	30	replacement	occur as near opaque irregular patches throughout the rocks; apparently replacing matrix

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: Consists of scattered subhedral to angular fragments of quartz (0.05 to 0.2 mm) and less common plagioclase fragments (0.05 to 0.15) in a finer matrix of devitrified and recrystallized volcanic shards (0.01 to 0.25 mm), now consisting mainly of interlocking quartz, feldspar, Fe oxides, and ?clay. This rock is equigranular and is interpreted as an altered basal surge deposit. Rock is moderately to highly altered

135-841B-55R-01 (Piece 1,1-3 cm) OBSERVER: EWE WHERE SAMPLED: Unit 3D

ROCK NAME: Moderately phyric plagioclase quartz rhyolite

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	5	5	0.2-1.5		euhedral to anhedral	equant crystals, a few fractured and corroded; some enclosed by zones of graphic intergrowths
Plagioclase	2-3	2-3	0.25-1.0	An45	euhderal to subhedral	oscillatory zoning prominent; some with matrix inclusions
GROUNDMASS						
Matrix	90	90	0.01-0.02		interstitial	microcrystalline granular intergrowth of quartz, interstitial alkali feldspar and plagioclase

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Pyrite	2	replacement	disseminated throughout; sieve textured with rare pyrrhotite inclusions in large grains. Occurs as discrete crystals and in veins.
Chlorite	tr	replacement	occurs as haloes around pyrite grains; possibly in part replacing original pyroxene? phenocrysts

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	0				

COMMENTS: Inclusions (1.5 mm) of strongly pyritized and chloritized rhyolitic tuff. In spite of pyritization, original plagioclase phenocrysts seem remarkably fresh. The rock is slightly altered.

135-841B-55R-01 (Piece 7,42-46 cm) OBSERVER: EWE WHERE SAMPLED: Unit 3D

ROCK NAME: Moderately to highly phyric quartz plagioclase rhyolite

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	3-5	3-5	0.3-1.0		euhedral to subhedral	range from equant euhedra some showing slight marginal resorption. Some enclosed by quartz plagioclase graphic like intergrowths; some fractured
Plagioclase	3-5	3-5	0.4-2 .5		euhedral to subhedral	tabular crystals, occur singly and as glomerocrysts; some crystals surrounded by quartz plagoclase graphic-like intergrowths; some fractured; rarely as glomeroporphyritic intergrowth aggregates with quartz; oscillatory zoning visible
Magnetite	<1	<1	up to 0.15		euhedral to subhedral	isolated equant crystals and enclosed in plagioclase phenocyrsts
GROUNDMASS						
Matrix	90	90	n/a		microcrystalline	microcrystalline quartz feldspar intergrowths, with additional scattered plagioclase microlites (up to 0.15 mm)

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Pyrite	1-2		skeletal pyrite widely scattered through groundmass; some pyrite-chlorite -?albite pseudomorphs after original ?pyroxenes
Mixed	1-2	replacement	mix of clay, chlorite, albite and quartz

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: Sample originally from a rhyolitic lava or dome. The quartz plagioclase graphic like overgrowths on the quartz and plagioclase phenocrysts is inferred to be a post eruptive feature developed during the early stages of lava cooling

135-841B-56R-01 (0-3 cm) OBSERVER: EWE WHERE SAMPLED: Unit 3D

ROCK NAME: Moderately to highly phyric plagioclase quartz rhyolitic pumice breccia

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	5	5	0.2-2.0		euhedral to subhedral	range from equant euhedra to broken crystals; some with glass inclusions; some have fine graphic intergrowths developed in groundmass adjacent to crystal rim
Plagioclase	0	2-3	0.2-2.5		euhedral to subhedral	tabular crystals; partially to completely replaced by calcite and albite
GROUNDMASS						
matrix	0	92	n/a		n/a	recrystallized and altered fragmental volcanic glass and original pumice fragments

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
mixed	92-93	replacement	replacement of original matrix with calcite, albite, pyrite, chlorite, and quartz.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: Looks to have been originally a primary pumice breccia (unwelded ash-flow tufff). Rock is very highly altered. Extensive recrystallization has destroyed most of fine-grained shard texture. Outlines of original pumice fragments still preserved, but shards replaced.

135-841B-56R-CC (0-2 cm) OBSERVER: SHE WHERE SAMPLED: Unit 3D

ROCK NAME: Moderately phyric plagioclase quartz rhyolite

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	3-5	3-5	0.4-1.5		euhedral to subhedral	single crystals to 6 crystal aggregates; some with quartz feldspar graphic like overgrowths; rarely resorbed
Plagioclase	1-2	1-2	0.3-0.5		euhedral to subhedral	tabular; sometimes intergrown with quartz, extensively replaced and recrystallized
GROUNDMASS						
Mesostasis	40-50?	90	n/a		equigranular	microcrystalline quartz-feldspar aggregates; quartz and plagioclase grains up to 0.1 mm, most <0.02 mm; quartz and plagioclase intergrowths as radial growths 0.2-0.5 mm and as rims on quartz and plagioclase grains

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Pyrite	2-3		subhedral to anhedral skeletal grains
Clays	20-40?	replaces plagioclase	in groundmass after plagioclase; sometimes clots in stringers or lines, possibly following original perlitic cracks
Albite	2-3	replaces plagiolase	recrystallized phenocrysts and groundmass
Carbonate	3-5	cores of plagioclase	disseminated in groundmass

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: Extensive development of clays in groundmass after plagioclase; rock is highly altered.

135-841B-59R-01 (8-12 cm) OBSERVER: SHE WHERE SAMPLED: Unit 3D

ROCK NAME: Moderately phyric plagioclase quartz rhyolite

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	3-5	3-5	0.2-1.5		euhedral to anhedral	subrounded, rarely resorbed; rarely intergrown with plagioclase
Plagioclase	tr-1	2-3	0.4-1		euhedral to subhedral	rims to 0.2 mm of graphic quartz and feldspar intergrowths are common; plagioclase shows oscillatory zoning; is partially to completely replaced by carbonate and graphic intergrowths
GROUNDMASS						
Matrix	60?	90	n/a		equigranular	quartz and plagioclase mosaic; some clays or smectite after plagioclase; aggregates (0.1 to 0.5 mm) of graphic like intergrowths; radial aggregates as rim on plagioclase and quartz; some may be replacements of smaller plagioclase grains

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Pyrite	3-4	both	irregular aggregates of small grains in clasts, filling veins and as a replacement of plagioclase
Carbonate	1-2	after plagioclase	
Clays	15-20	replacement	dark brownish patches and stringers concentrated in patches and stringers

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: Probably a lot of recrystallized albite and quartz; rock is moderately to highly altered.

135-841B-62R-01 (23-27 cm) OBSERVER: EWE WHERE SAMPLED: Unit 4

ROCK NAME: Rhyolitic welded tuff

GRAIN SIZE: Fine grained, originally vitreous

TEXTURE: Porphyritic, originally vitroclastic and pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	3-5	3-5	0.2-1.0		euhedral to subhedral	vary from perfectly euhedral equant crystal to crystals with partial resorption and glass inclusions, to broken crystal fragments
Plagioclase	0	1-2	0.3-0.5		euhedral to subhedral	tabular crystals mostly completely replaced by calcite
GROUNDMASS						
Matrix	0	94-96	n/a		n/a	devitrified and recrystallized fragmental glass; extensively recrystallized and replaced by albite-chlorite-clay +?zeolites + pyrite assemblage

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Mixed	94-96	replacement and infilling	mixture of calcite, albite, clay, chlorite, pyrite, ?zeolite, quartx, and K-feldspar; includes both replacement and recrystallization of original matrix

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
NONE	n/a				

COMMENTS: Outlines of original pumice clasts are discernable, strongly deformed and flattened, but now completely recrystallized and replaced. Original groundmass shard structures destroyed by recrystallization. This rock is very highly altered.

135-841B-62R-02 (16-20 cm) OBSERVER: EWE WHERE SAMPLED: Unit 4

ROCK NAME: Rhyolitic welded tuff

GRAIN SIZE: Fine grained, originally pumiceous and glassy

TEXTURE: Porphyritic, vitroclastic, pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	5	5	0.1-1.0		euhedral to subhedral,	range from equant, euhedral to broken crystals; some showing partial resorption
Plagioclase	2-3	3-5	0.2-1.3		euhedral	tabular crystals; occur singly and in glomerocrysts; rarely with skeletal quartz intergrowths
GROUNDMASS						
Matrix	0	90	n/a		n/a	devitrified and recrystallized original fragmental volcanic glass and pumice

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Fine-grained mix	90-95	replacement	mix of calcite, pyrite, chlorite, albite, and quartz. Pseudomorphs after original plagioclase and ?pyroxene phenocrysts. Also replacement of groundmass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
None	n/a				

COMMENTS: Groundmass shows original shard texture still visible, and pumice outlines, although the original glass has altered and recrystallized to quartz-feldspar-chlorite +/- clay and calcite assemblages. Form of original remnant shard texture suggests that rock not strongly compacted. This rock is very highly altered.

135-841B-62R-02 (113-116 cm) OBSERVER: EWE WHERE SAMPLED: Unit 4

ROCK NAME: Rhyolitic lithic welded tuff

GRAIN SIZE: Fine grained, originally vitreous

TEXTURE: Porphyritic, vitroclastic, pumiceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	5-7	5-7	0.2-1.6		euhedral to subhedral	range from equant euhedra to crystals with scattered large glass inclusions with local resorption to broken fragments; spherulitic devitrified rims around some crystals
Plagioclase	1-2	1-2	0.2-0.6		euhedral to subhedral	single crystals and glomerocrysts; prominent oscillatory zoning; glass inclusions present in some crystals
GROUNDMASS						
Matrix	0	90-94	n/a		n/a	devitrified and recrystallized fragmental glass; despite extensive recrystalization, local patches occur in which original vitroclastic texturs are still visible; local isolated spherulites occur; original welding not intense

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Mixed	90-94	replacement	mix of pyrite, albite, quartz, chlorite, calcite, K-feldspar; includes both replacement and recrystallization

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	n/a				

COMMENTS: Outlines of original pumice clasts are visible, but have undergone intense recrystallization and replacement. Lithic clasts include rhyolites and dark clasts of what seems to have been highly altered, aphyric, vesicular basalt or basaltic andesite. Rock is very highly altered.

135-841B-62R-CC (29-31 cm) OBSERVER: EWE WHERE SAMPLED: Unit 4

ROCK NAME: Moderately to highly phyric quartz plagioclase rhyolite

GRAIN SIZE: Fine grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	3	3	0.2-2.0		euhedral to subhedral	Mostly equant, euhedral isolated crystals, with occassional large originally glass inclusions and partial resorption in some crystals
Plagioclase	5-7	5-7	0.2-2.0		euhedral	tabular cyrstals, occur singly or as glomerocrysts; oscillatory normal zoning.
Magnetite	<1	<1	0.1-0.2		euhedral	euhedral equant grains; usually attached to plagioclase or included in original pyroxene; less common as isolated crystals
GROUNDMASS						
Matrix	80	85	0.03-0.08		n/a	devitrified, microcrystalline and microspherulitic; relatively even grain size

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Calcite	3-5	replacement	replacing original ?pyroxene phenocrysts, and also groundmass minerals

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
none	n/a				

COMMENTS: Sample represents clast of an original rhyolite lava or dome, completely devitrified and showing some calcite replacement. Highly altered pumice (chlorite-albite-?zeolite) attached to margin of fragment. Fragment itself is only slightly to moderately altered.

135-841B-66R-CC (24-27 cm) OBSERVER: SHE WHERE SAMPLED: Unit 6

ROCK NAME: Rhyolitic welded lithic tuff

GRAIN SIZE: Fine to coarse

TEXTURE: Welded

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Quartz	5	5	0.2-0.4		subhedral to anhedral	slightly rounded to broken; one grain highly resorbed; rarely in aggregates with some breakage and recrystallization
GROUNDMASS						
Lithic fragments	5	5	0.5-4		subrounded	aphyric volcanic clasts highly altered to clays; also densely plagioclase-pyroxene pyric volcanics also completely replaced
Vitric shards	0	70-85	<0.1 to 1		flattened, welded	largely recrystallized to quartz mosaic, also clays and alteration products throughout
Mafics	0	5-10	?		long stringers	replaced by clays and chlorite in greenish aggregates

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Chlorite	5-10	mafic aggregates	very fine grained aggregates
Clay	5-10	both	fills old porosity and replacing mafics; Fine-grained dark aggregates, identification is difficult
Quartz	60	shards	<0.4 mm anhedral mosaics to very fine aggregates
Carbonates	1-3	irregular patches	
Zeolites	5-10	aggregates	clear radial aggregates in groundmass

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0	throughout	n/a			some shards may have been pumiceous; but recrystallization has obscured original vesicle content

COMMENTS: Clear flattening of shards and fragments; planar fabric wrapped around margins and xenocrysts with mafic 'lenses' of chlorite and clay which could be highly altered mafic clast?; largest clast is densely plagioclase-pyroxene phryic and definitely a more mafic composition. This rock is highly altered.

135-841B-70R-CC (2-4 cm) OBSERVER: SHE WHERE SAMPLED: Single clast in last core; unit unknown

ROCK NAME: Aphyric basalt

GRAIN SIZE: Fine grained

TEXTURE: Microcrystalline, intergranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	tr	tr	0.7	An30 at most	euhedral	recrystallized to albite and clays; altered glass inclusions common
GROUNDMASS						
Plagioclase	10-15	30-35	0.03-0.4		subhedral to euhedral	radiating laths; largely recrystallized and replaced
Pyroxene?	0	10	up to 0.2		intergranular aggregates	completely replaced by chlorite and clays
Mesostasis	0	50-55	to 0.2		interstitial	
Magnetite	3-5	3-5	0.01-0.1		euhedral to subhedral	raggedy edges

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Carbonate	5-10	groundmass	irregular patches
Clays	15-20	groundmass	may be retrograde
Chlorite	5-10	replacing pyroxene and mesostasis	probably some actinolite as well
Albite	30	replacing plagioclase	
Pyrite	1	groundmass, veins	filling veins and in patches
Zeolite	5	filling vesicles and cavities	
Epidote	5	replacing mesostasis and plagioclase	
Quartz	5	mesostasis	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	n/a				

COMMENTS: Almost looks like a lot of retrograde clay development after an original greenschist facies assemblage;the slide has not taken a good polish, and it is difficult to pick out fine-grained material. This rock is highly altered.