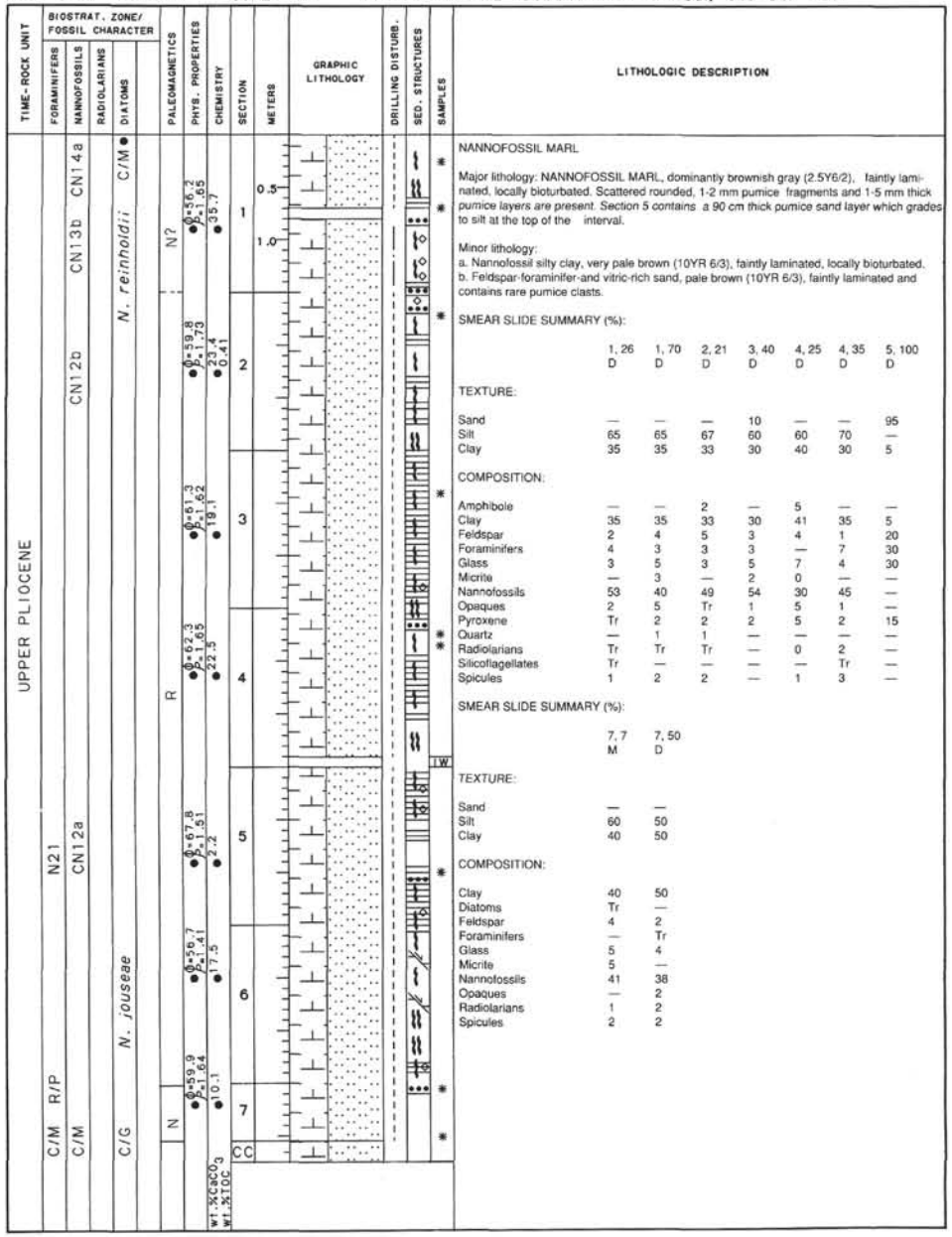
SITE 786 HOLE A CORE 1H CORED INTERVAL 3058.1-3067.8 mbsl; 0.0-9.7 mbsf



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Major lithology: NANNOFOSSIL MARL, dominantly brownish gray (2.5Y6/2), faintly laminated, locally bioturbated. Scattered rounded, 1-2 mm pumice fragments and 1-5 mm thick pumice layers are present. Section 5 contains a 90 cm thick pumice sand layer which grades to silt at the top of the interval.

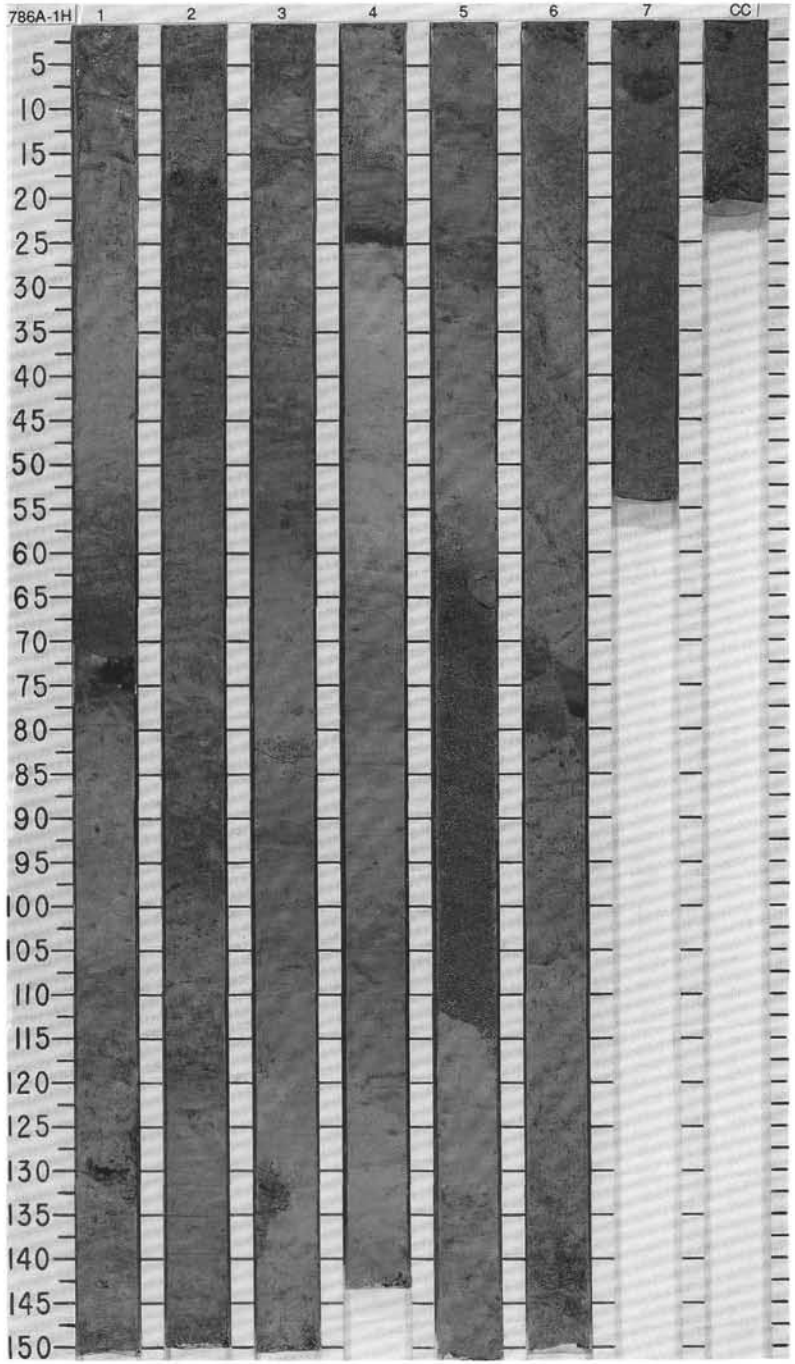
Minor lithology:
a. Nannofossil silty clay, very pale brown (10YR 6/3), faintly laminated, locally bioturbated.
b. Feldspar-foraminifer-and vitric-rich sand, pale brown (10YR 6/3), faintly laminated and contains rare pumice clasts.

SMEAR SLIDE SUMMARY (%):

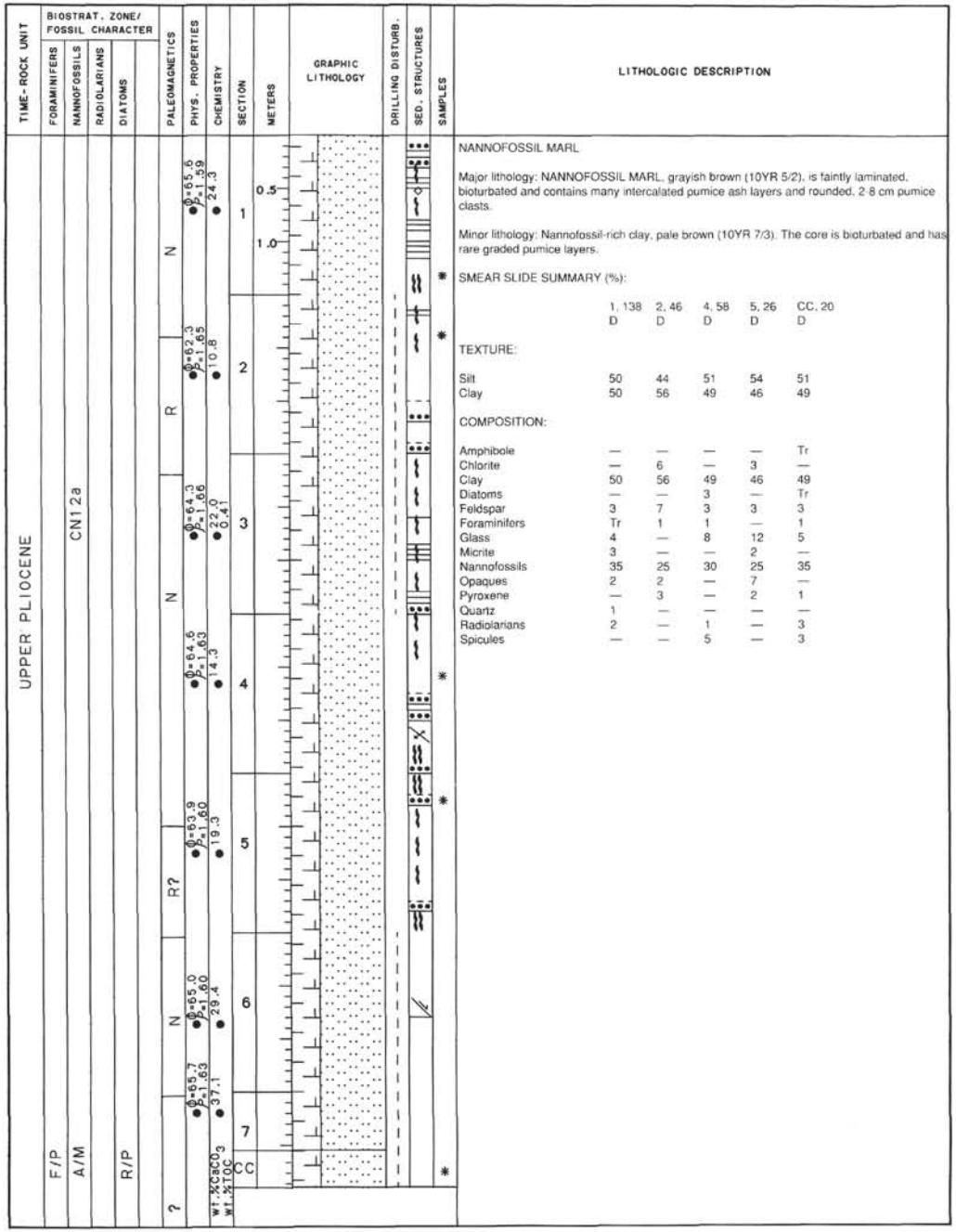
	1, 26 D	1, 70 D	2, 21 D	3, 40 D	4, 25 D	4, 35 D	5, 100 D
TEXTURE:							
Sand	—	—	—	10	—	—	95
Silt	65	65	67	60	60	70	—
Clay	35	35	33	30	40	30	5
COMPOSITION:							
Amphibole	—	—	2	—	5	—	—
Clay	35	35	33	30	41	35	5
Feldspar	2	4	5	3	4	1	20
Foraminifers	4	3	3	3	—	7	30
Glass	3	5	3	5	7	4	30
Micrite	—	3	—	2	0	—	—
Nannofossils	53	40	49	54	30	45	—
Opaques	2	5	Tr	1	5	1	—
Pyroxene	Tr	2	2	2	5	2	15
Quartz	—	1	1	—	—	—	—
Radiolarians	Tr	Tr	Tr	—	0	2	—
Silicoflagellates	Tr	—	—	—	—	Tr	—
Spicules	1	2	2	—	1	3	—

SMEAR SLIDE SUMMARY (%):

	7, 7 M	7, 50 D
TEXTURE:		
Sand	—	—
Silt	60	50
Clay	40	50
COMPOSITION:		
Clay	40	50
Diatoms	Tr	—
Feldspar	4	2
Foraminifers	—	Tr
Glass	5	4
Micrite	5	—
Nannofossils	41	38
Opaques	—	2
Radiolarians	1	2
Spicules	2	2



SITE 786 HOLE A CORE 2H CORED INTERVAL 3067.8-3077.3 mbsl; 9.7-19.2 mbsf



LITHOLOGIC DESCRIPTION

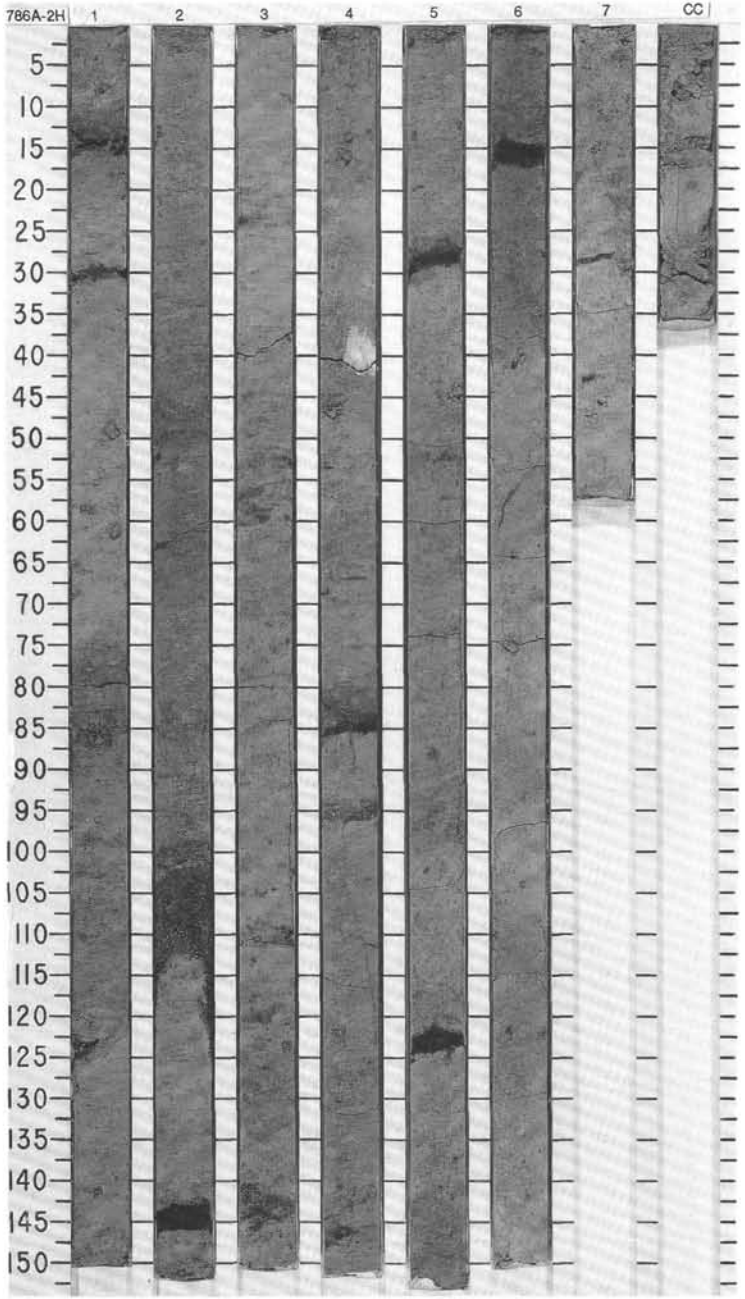
NANNOFOSSIL MARL

Major lithology: NANNOFOSSIL MARL, grayish brown (10YR 5/2), is faintly laminated, bioturbated and contains many intercalated pumice ash layers and rounded, 2-8 cm pumice clasts.

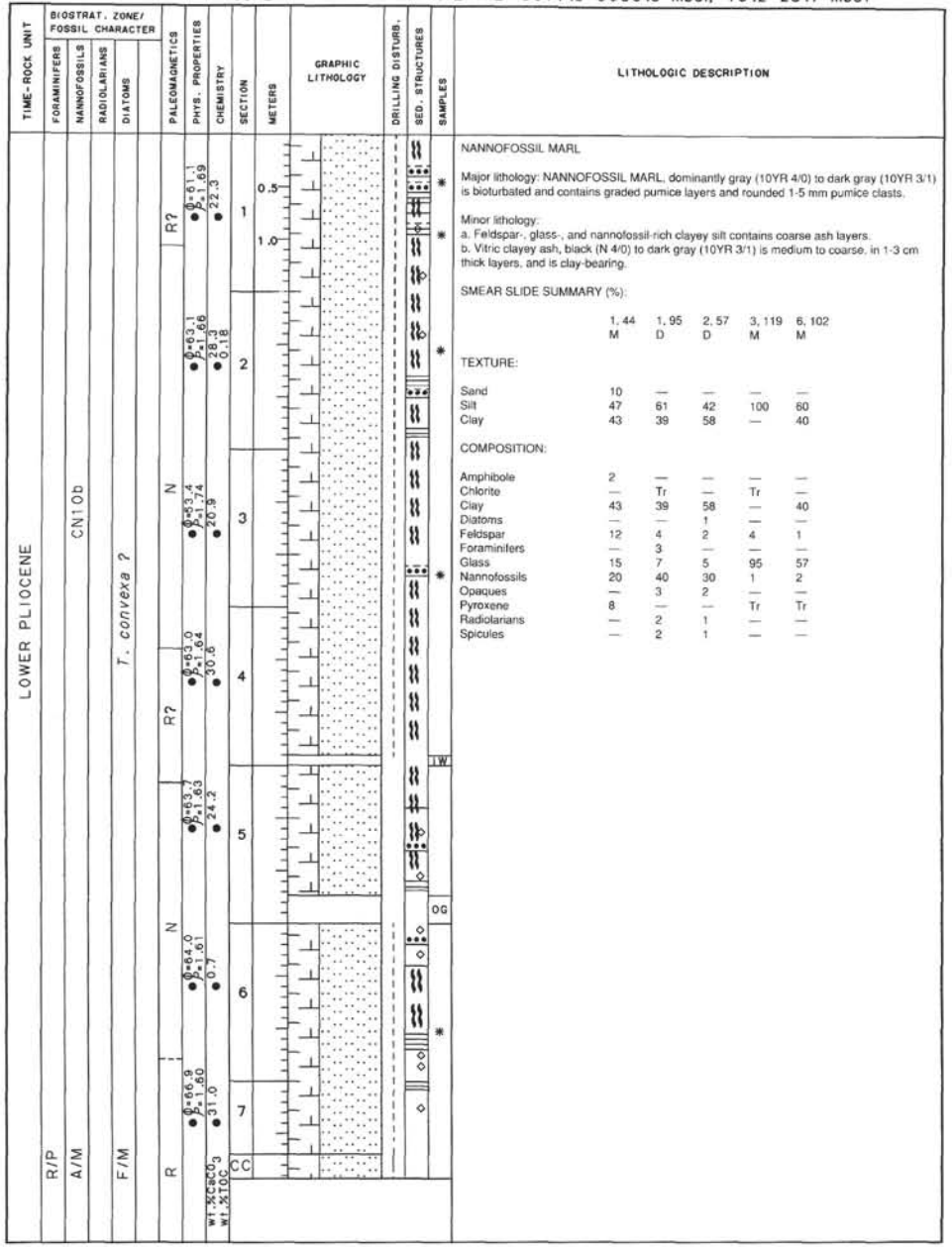
Minor lithology: Nannofossil-rich clay, pale brown (10YR 7/3). The core is bioturbated and has rare graded pumice layers.

SMEAR SLIDE SUMMARY (%):

	1, 138 D	2, 46 D	4, 58 D	5, 26 D	CC, 20 D
TEXTURE:					
Silt	50	44	51	54	51
Clay	50	56	49	46	49
COMPOSITION:					
Amphibole	—	—	—	—	Tr
Chlorite	—	6	—	3	—
Clay	50	56	49	46	49
Diatoms	—	—	3	—	Tr
Feldspar	3	7	3	3	3
Foraminifers	Tr	1	1	—	1
Glass	4	—	8	12	5
Micrite	3	—	—	2	—
Nannofossils	35	25	30	25	35
Opaques	2	2	—	7	—
Pyroxene	—	3	—	2	1
Quartz	1	—	—	—	—
Radiolarians	2	—	1	—	3
Spicules	—	—	5	—	3



SITE 786 HOLE A CORE 3H CORED INTERVAL 3077.3-3086.8 mbsl; 19.2-28.7 mbsf



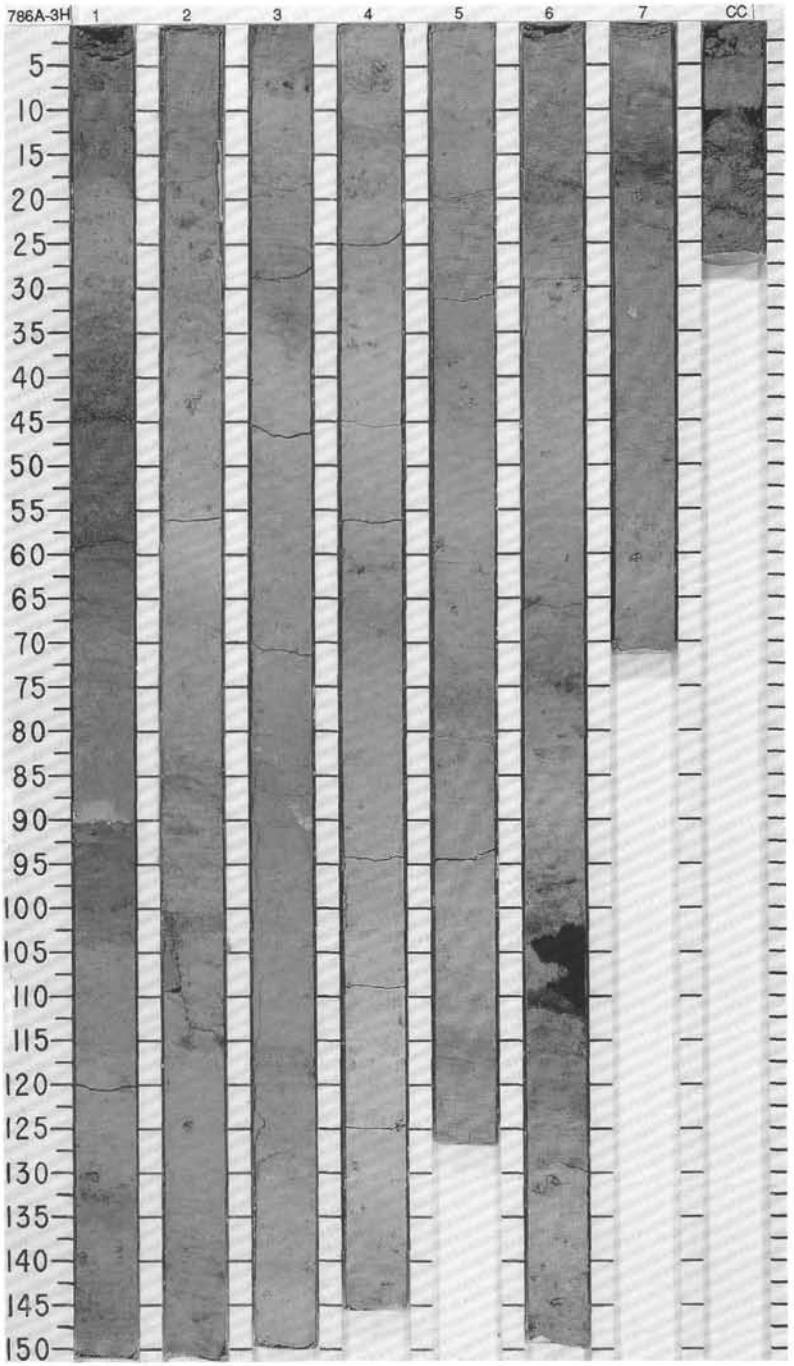
NANNOFOSSIL MARL

Major lithology: NANNOFOSSIL MARL, dominantly gray (10YR 4/0) to dark gray (10YR 3/1) is bioturbated and contains graded pumice layers and rounded 1-5 mm pumice clasts.

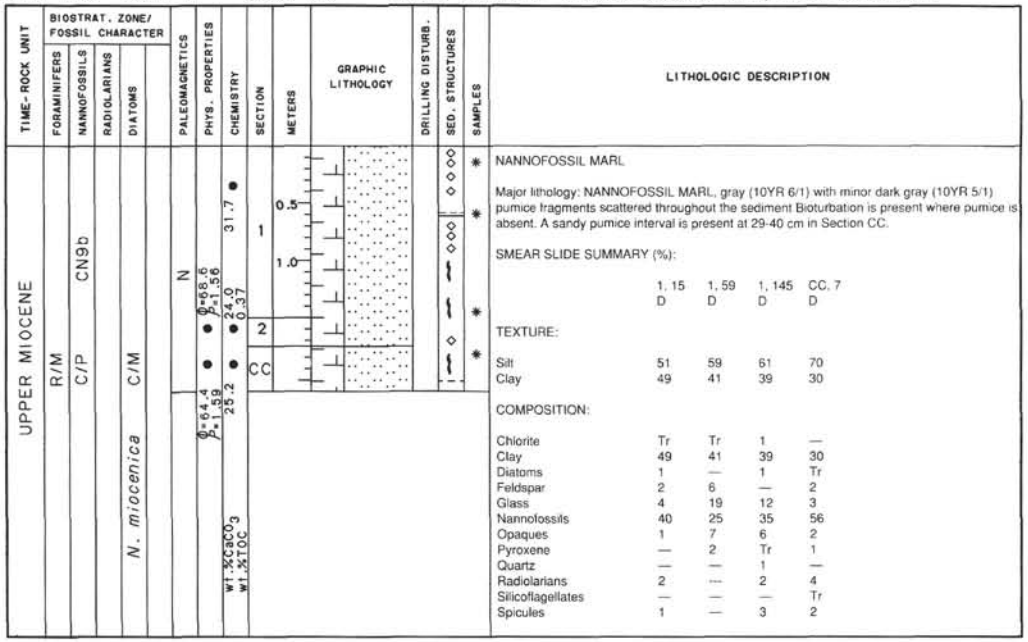
Minor lithology:
a. Feldspar-, glass-, and nannofossil-rich clayey silt contains coarse ash layers.
b. Vitric clayey ash, black (N 4/0) to dark gray (10YR 3/1) is medium to coarse, in 1-3 cm thick layers, and is clay-bearing.

SMEAR SLIDE SUMMARY (%):

	1, 44 M	1, 95 D	2, 57 D	3, 119 M	6, 102 M
TEXTURE:					
Sand	10	—	—	—	—
Silt	47	61	42	100	60
Clay	43	39	58	—	40
COMPOSITION:					
Amphibole	2	—	—	—	—
Chlorite	—	Tr	—	Tr	—
Clay	43	39	58	—	40
Diatoms	—	—	1	—	—
Feldspar	12	4	2	4	1
Foraminifers	—	3	—	—	—
Glass	15	7	5	95	57
Nannofossils	20	40	30	1	2
Opaques	—	3	2	—	—
Pyroxene	8	—	—	Tr	Tr
Radiolarians	—	2	1	—	—
Spicules	—	2	1	—	—



SITE 786 HOLE A CORE 4X CORED INTERVAL 3086.8-3096.3 mbsl; 28.7-38.2 mbsf



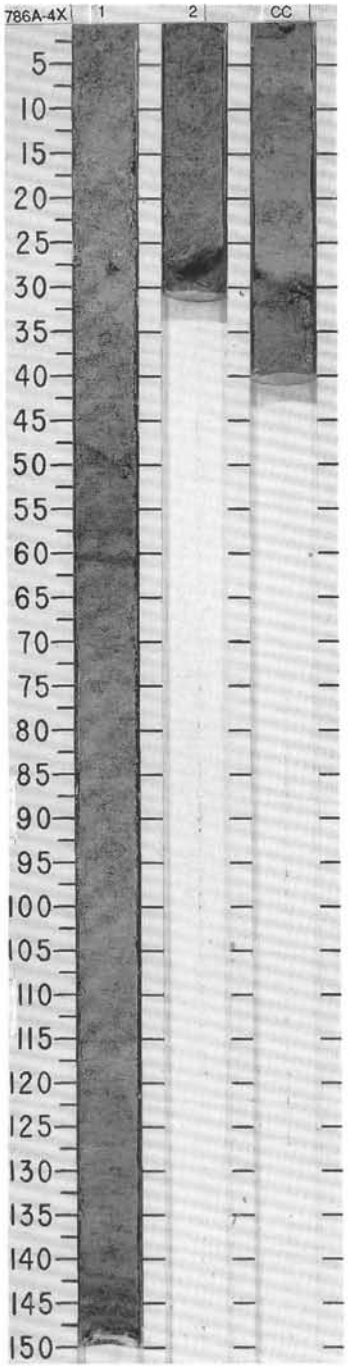
LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

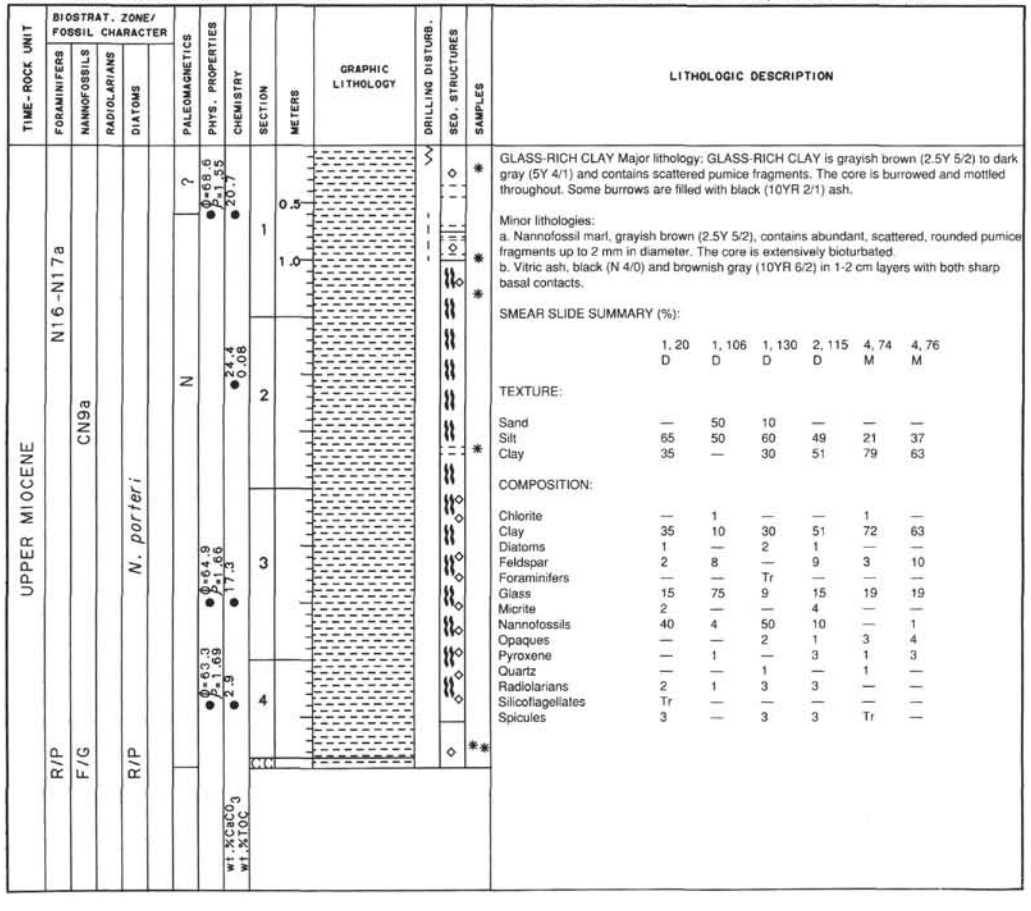
Major lithology: NANNOFOSSIL MARL, gray (10YR 6/1) with minor dark gray (10YR 5/1) pumice fragments scattered throughout the sediment Bioturbation is present where pumice is absent. A sandy pumice interval is present at 29-40 cm in Section CC.

SMEAR SLIDE SUMMARY (%):

	1, 15 D	1, 59 D	1, 145 D	CC, 7 D
TEXTURE:				
Silt	51	59	61	70
Clay	49	41	39	30
COMPOSITION:				
Chlorite	Tr	Tr	1	—
Clay	49	41	39	30
Diatoms	1	—	1	Tr
Feldspar	2	6	—	2
Glass	4	19	12	3
Nannofossils	40	25	35	56
Opaques	1	7	6	2
Pyroxene	—	2	Tr	1
Quartz	—	—	1	—
Radiolarians	2	—	2	4
Silicoflagellates	—	—	—	Tr
Spicules	1	—	3	2



SITE 786 HOLE A CORE 5X CORED INTERVAL 3096.3-3105.7 mbsl; 38.2-47.6 mbsf



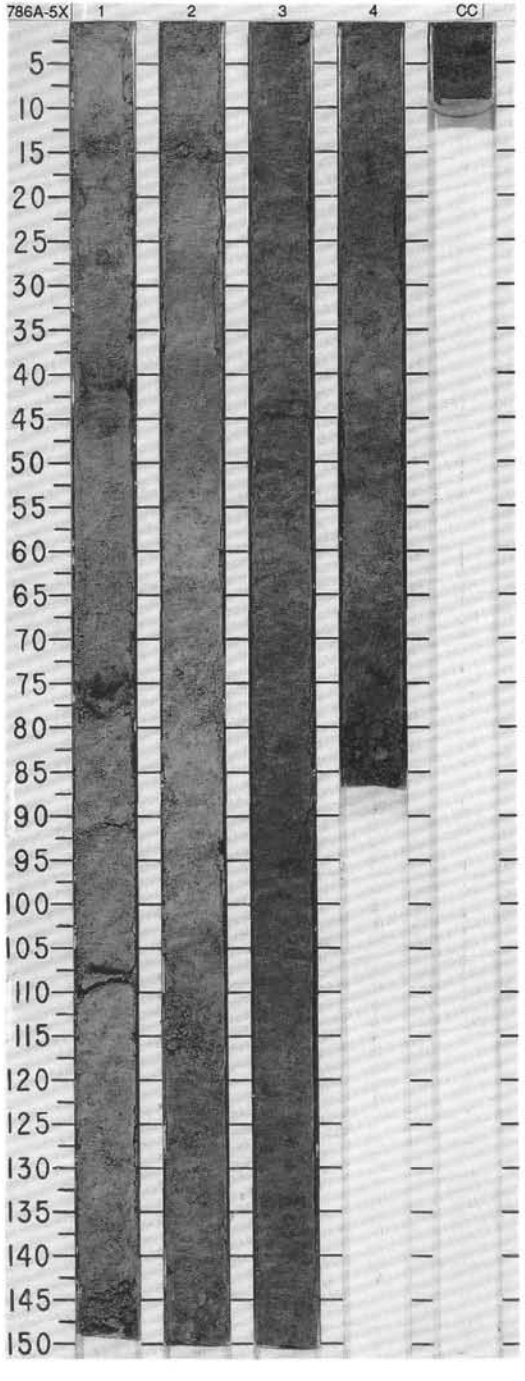
LITHOLOGIC DESCRIPTION

GLASS-RICH CLAY Major lithology: GLASS-RICH CLAY is grayish brown (2.5Y 5/2) to dark gray (5Y 4/1) and contains scattered pumice fragments. The core is burrowed and mottled throughout. Some burrows are filled with black (10YR 2/1) ash.

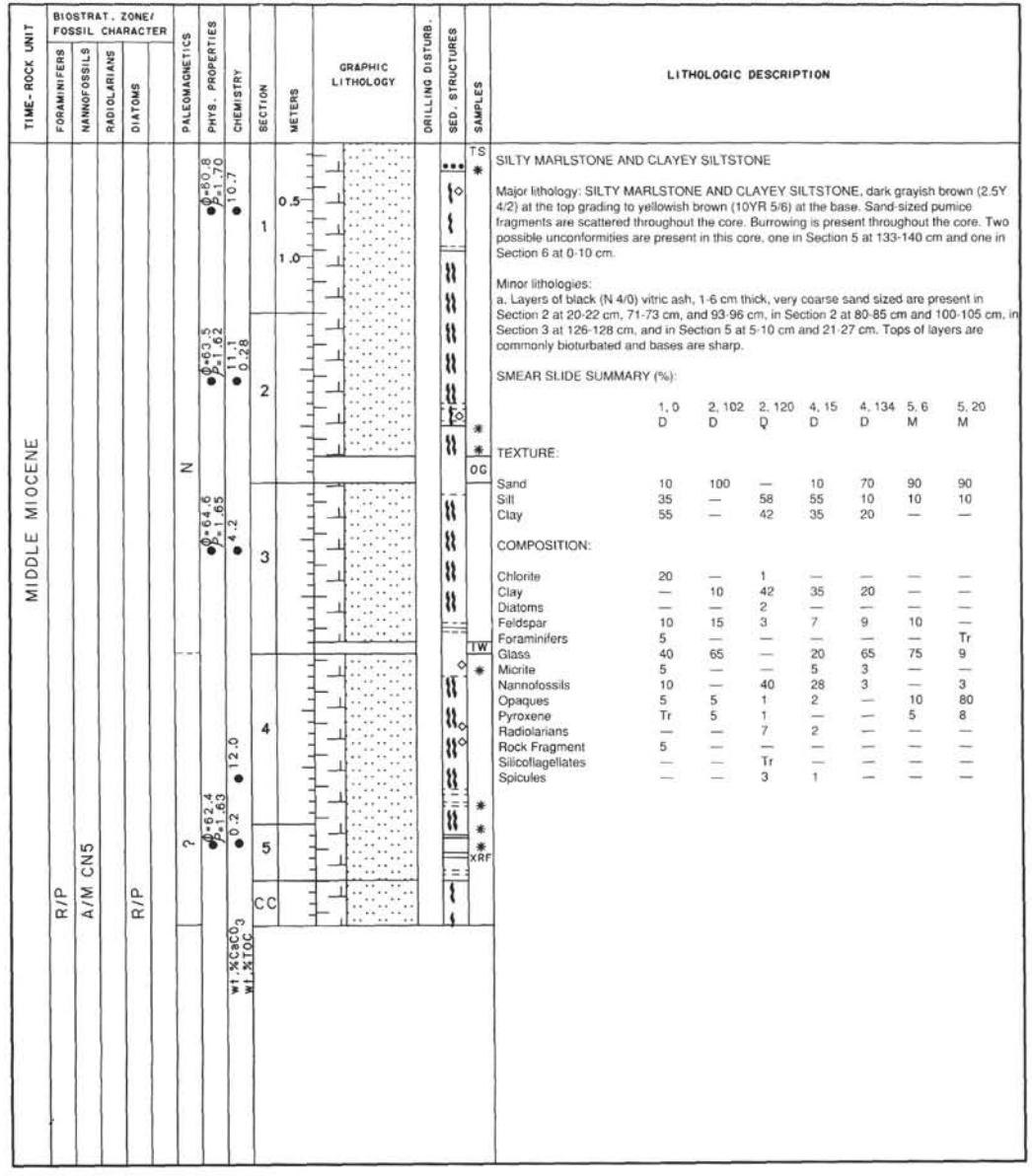
Minor lithologies:
a. Nannofossil marl, grayish brown (2.5Y 5/2), contains abundant, scattered, rounded pumice fragments up to 2 mm in diameter. The core is extensively bioturbated.
b. Vitric ash, black (N 4/0) and brownish gray (10YR 6/2) in 1-2 cm layers with both sharp basal contacts.

SMEAR SLIDE SUMMARY (%):

	1, 20 D	1, 106 D	1, 130 D	2, 115 D	4, 74 M	4, 76 M
TEXTURE:						
Sand	—	50	10	—	—	—
Silt	65	50	60	49	21	37
Clay	35	—	30	51	79	63
COMPOSITION:						
Chlorite	—	1	—	—	1	—
Clay	35	10	30	51	72	63
Diatoms	1	—	2	1	—	—
Feldspar	2	8	—	9	3	10
Foraminifers	—	—	Tr	—	—	—
Glass	15	75	9	15	19	19
Micrite	2	—	—	4	—	—
Nannofossils	40	4	50	10	—	1
Opaques	—	—	2	1	3	4
Pyroxene	—	1	—	3	1	3
Quartz	—	—	1	—	1	—
Radiolarians	2	1	3	3	—	—
Silicoflagellates	Tr	—	—	—	—	—
Spicules	3	—	3	3	Tr	—



SITE 786 HOLE A CORE 6X CORED INTERVAL 3105.7-3115.2 mbsl; 47.6-57.1 mbsf



LITHOLOGIC DESCRIPTION

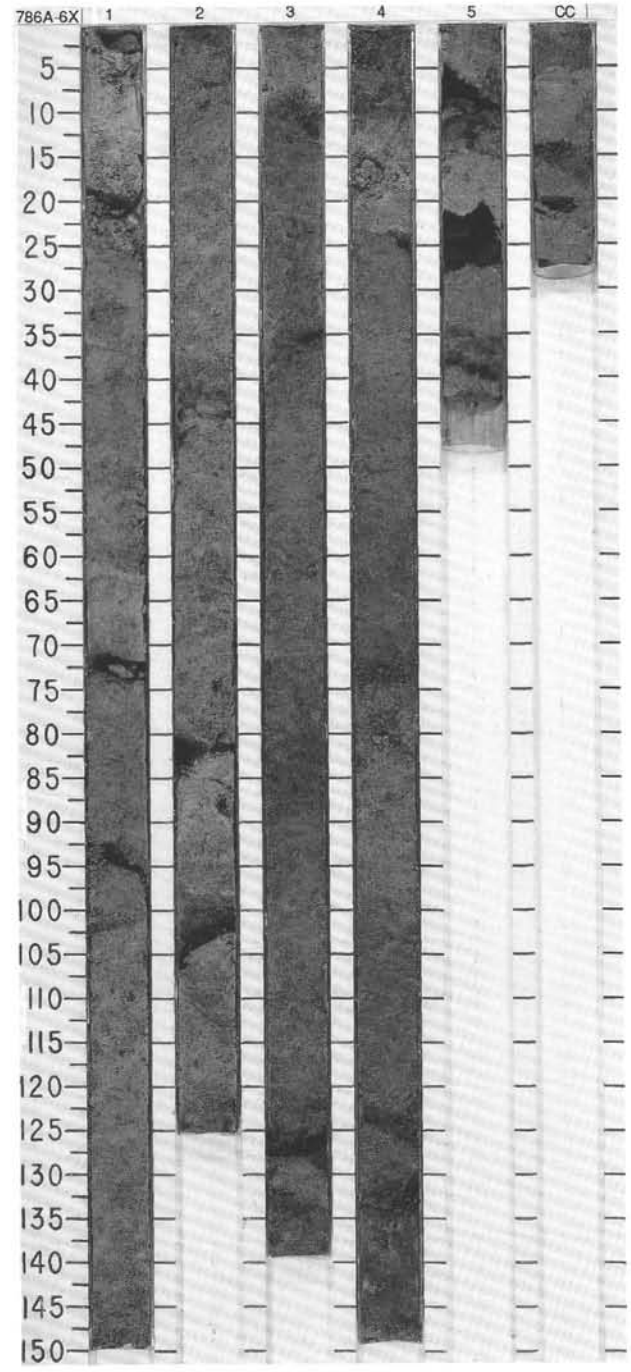
SILTY MARLSTONE AND CLAYEY SILTSTONE

Major lithology: SILTY MARLSTONE AND CLAYEY SILTSTONE, dark grayish brown (2.5Y 4/2) at the top grading to yellowish brown (10YR 5/6) at the base. Sand-sized pumice fragments are scattered throughout the core. Burrowing is present throughout the core. Two possible unconformities are present in this core, one in Section 5 at 133-140 cm and one in Section 6 at 0-10 cm.

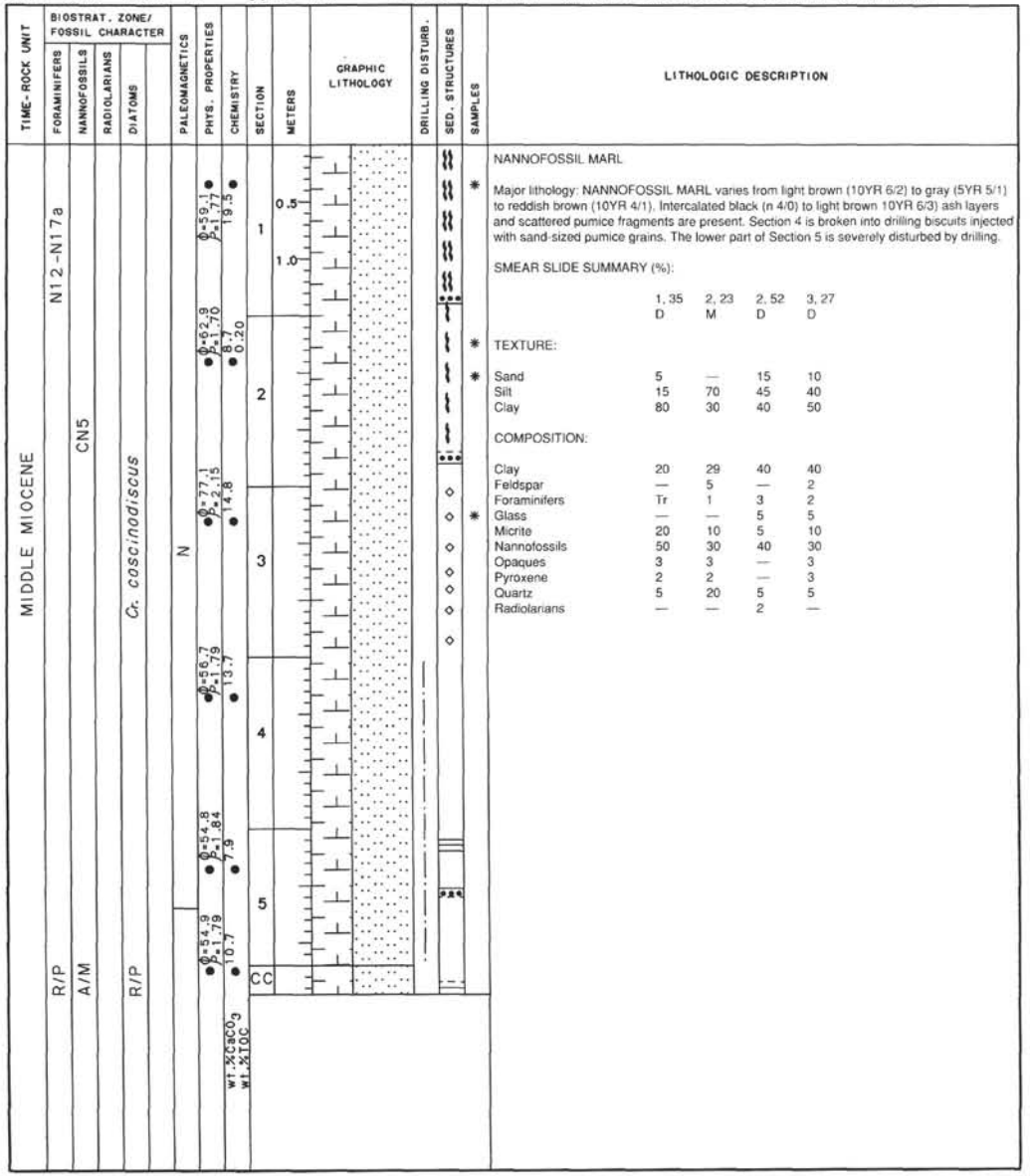
Minor lithologies:
a. Layers of black (N 4/0) vitric ash, 1-6 cm thick, very coarse sand sized are present in Section 2 at 20-22 cm, 71-73 cm, and 93-96 cm, in Section 2 at 80-85 cm and 100-105 cm, in Section 3 at 126-128 cm, and in Section 5 at 5-10 cm and 21-27 cm. Tops of layers are commonly bioturbated and bases are sharp.

SMEAR SLIDE SUMMARY (%):

	1, 0 D	2, 102 D	2, 120 D	4, 15 D	4, 134 D	5, 6 M	5, 20 M
TEXTURE:							
Sand	10	100	—	10	70	90	90
Silt	35	—	58	55	10	10	10
Clay	55	—	42	35	20	—	—
COMPOSITION:							
Chlorite	20	—	1	—	—	—	—
Clay	—	10	42	35	20	—	—
Diatoms	—	—	2	—	—	—	—
Feldspar	10	15	3	7	9	10	—
Foraminifers	5	—	—	—	—	—	Tr
Glass	40	65	—	20	65	75	9
Micrite	5	—	—	5	3	—	—
Nannofossils	10	—	40	28	3	—	3
Opaques	5	5	1	2	—	10	80
Pyroxene	Tr	5	1	—	—	5	8
Radiolarians	—	—	7	2	—	—	—
Rock Fragment	5	—	—	—	—	—	—
Silicoflagellates	—	—	Tr	—	—	—	—
Spicules	—	—	3	1	—	—	—



SITE 786 HOLE A CORE 7X CORED INTERVAL 3115.2-3125.2 mbsl; 57.1-67.1 mbsf



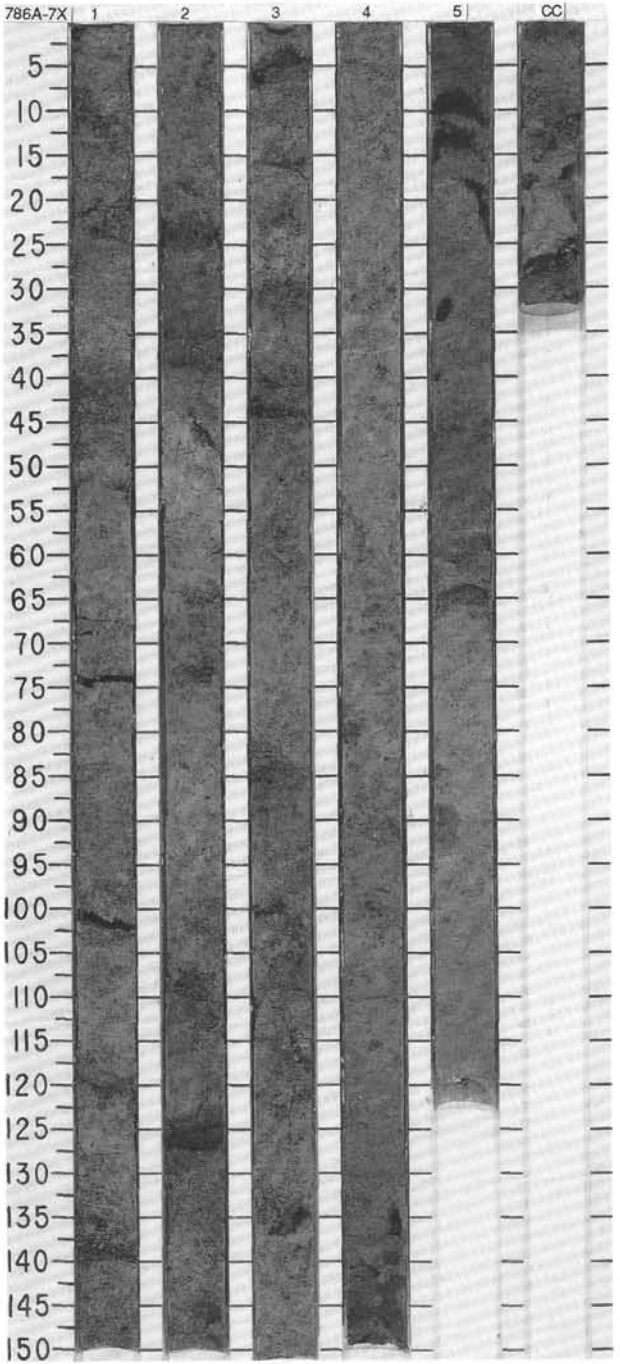
LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Major lithology: NANNOFOSSIL MARL varies from light brown (10YR 6/2) to gray (5YR 5/1) to reddish brown (10YR 4/1). Intercalated black (n 4/0) to light brown 10YR 6/3) ash layers and scattered pumice fragments are present. Section 4 is broken into drilling biscuits injected with sand-sized pumice grains. The lower part of Section 5 is severely disturbed by drilling.

SMEAR SLIDE SUMMARY (%):

	1, 35 D	2, 23 M	2, 52 D	3, 27 D
TEXTURE:				
Sand	5	—	15	10
Silt	15	70	45	40
Clay	80	30	40	50
COMPOSITION:				
Clay	20	29	40	40
Feldspar	—	5	—	2
Foraminifers	Tr	1	3	2
Glass	—	—	5	5
Micrite	20	10	5	10
Nannofossils	50	30	40	30
Opaques	3	3	—	3
Pyroxene	2	2	—	3
Quartz	5	20	5	5
Radiolarians	—	—	2	—



SITE 786 HOLE A CORE 8X CORED INTERVAL 3125.2-3134.9 mbsl; 67.1-76.8 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES
MIDDLE MIOCENE	R/P N12-N17a	A/G CN4		B	N	ρ=58.2 p_n=1.75; ρ=57.6 p_n=1.74	7.2; wt.%$CaCO_3$; wt.%TOC	1; CC	0.5; 1.0				*

LITHOLOGIC DESCRIPTION

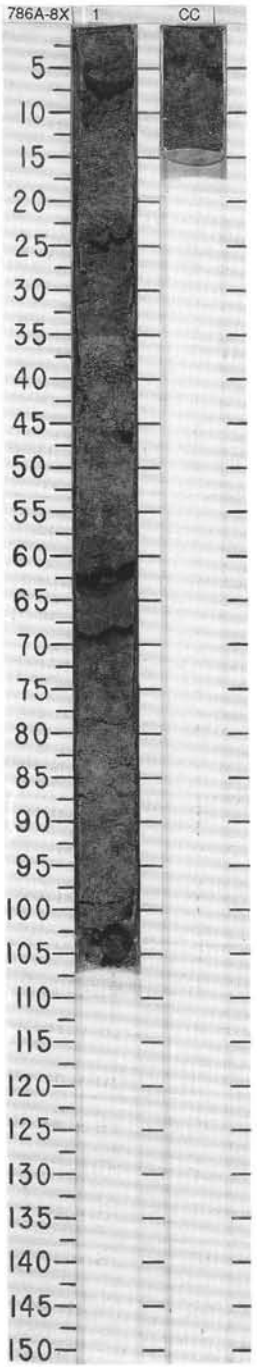
Drilling disturbance is severe in this core.

NANNOFOSSIL MARL

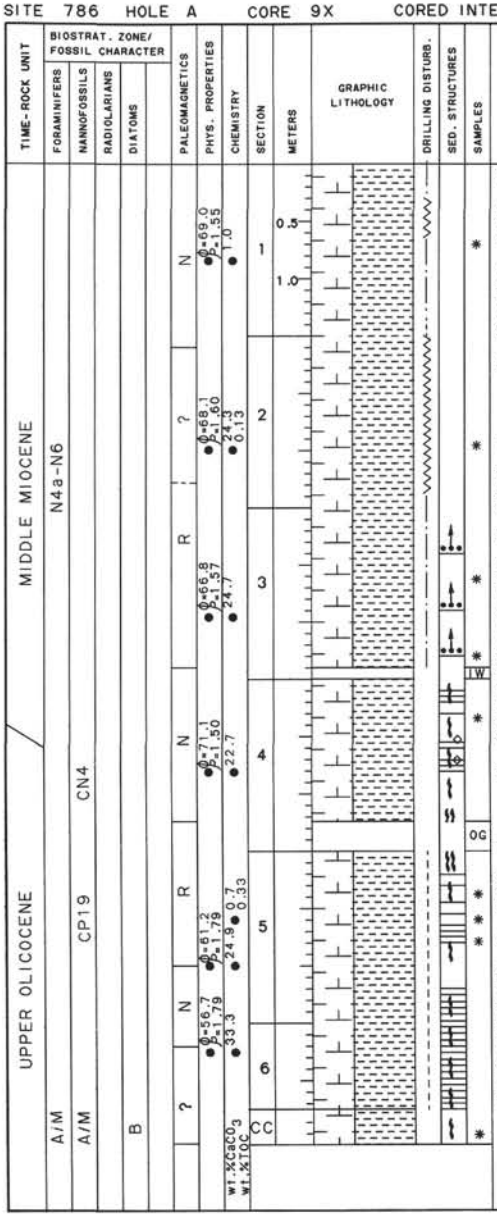
Major lithology: NANNOFOSSIL MARL, grayish brown (10YR 5/2) to gray (10YR 5/1), is structureless.

SMEAR SLIDE SUMMARY (%):

	1, 92
	D
TEXTURE:	
Sand	10
Silt	60
Clay	30
COMPOSITION:	
Clay	25
Feldspar	5
Glass	10
Micrite	30
Nannofossils	25
Pyroxene	Tr
Quartz	5



SITE 786 HOLE A CORE 9X CORED INTERVAL 3134.9-3144.5 mbsl; 76.8-86.4 mbsf



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Major lithology: NANNOFOSSIL MARL, gray (10YR 6/1) to light brownish gray (10YR 6/2). The core is severely disturbed by bioturbation. In Section 3, three 40 cm thick distinct graded intervals of black (10YR 2/1) to pinkish gray (5YR 6/2) sand are present.

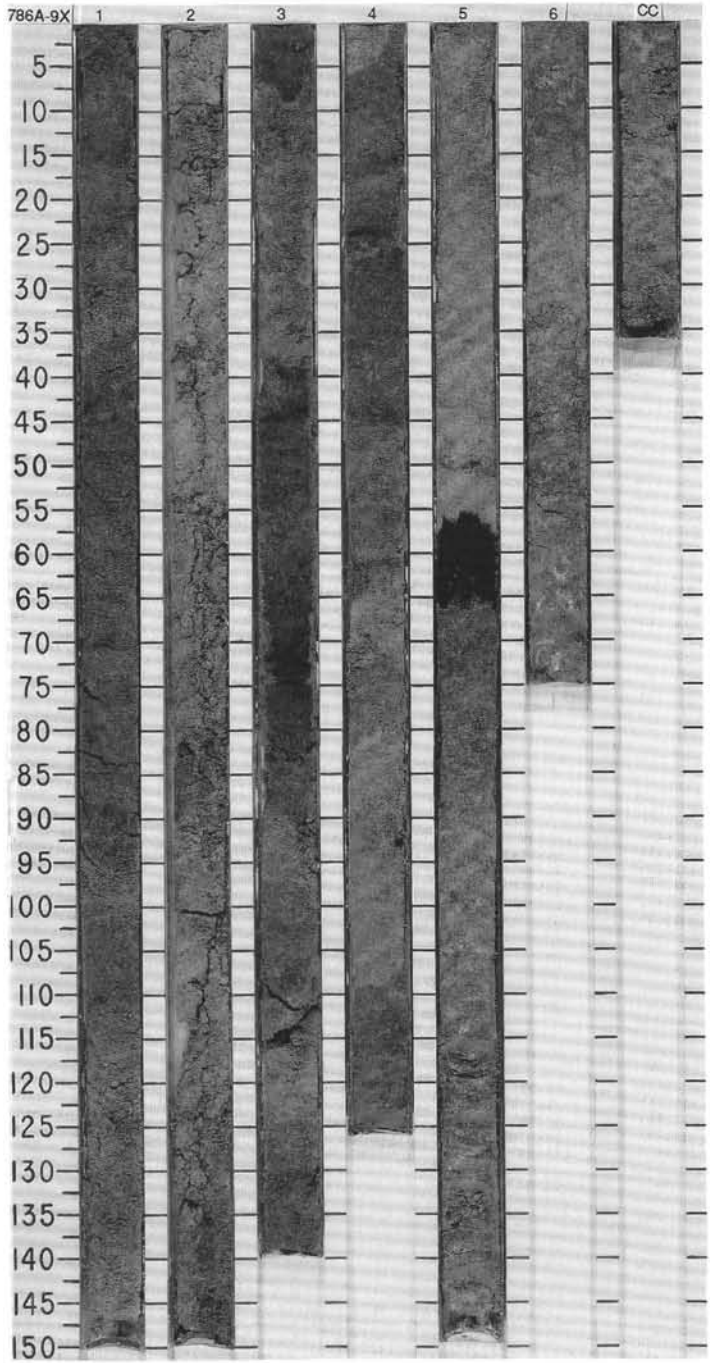
Minor lithology:
a. Black (10YR 2/4), 22 cm thick layer of manganese oxide in Section 5 at 55-67 cm. The interval is weakly indurated and dirty when dry.
b. Volcanic ash, reddish brown (10YR 5/4) is present in Section 5 at 67-150 cm and in Section 6 at 0-75 cm.

SMEAR SLIDE SUMMARY (%):

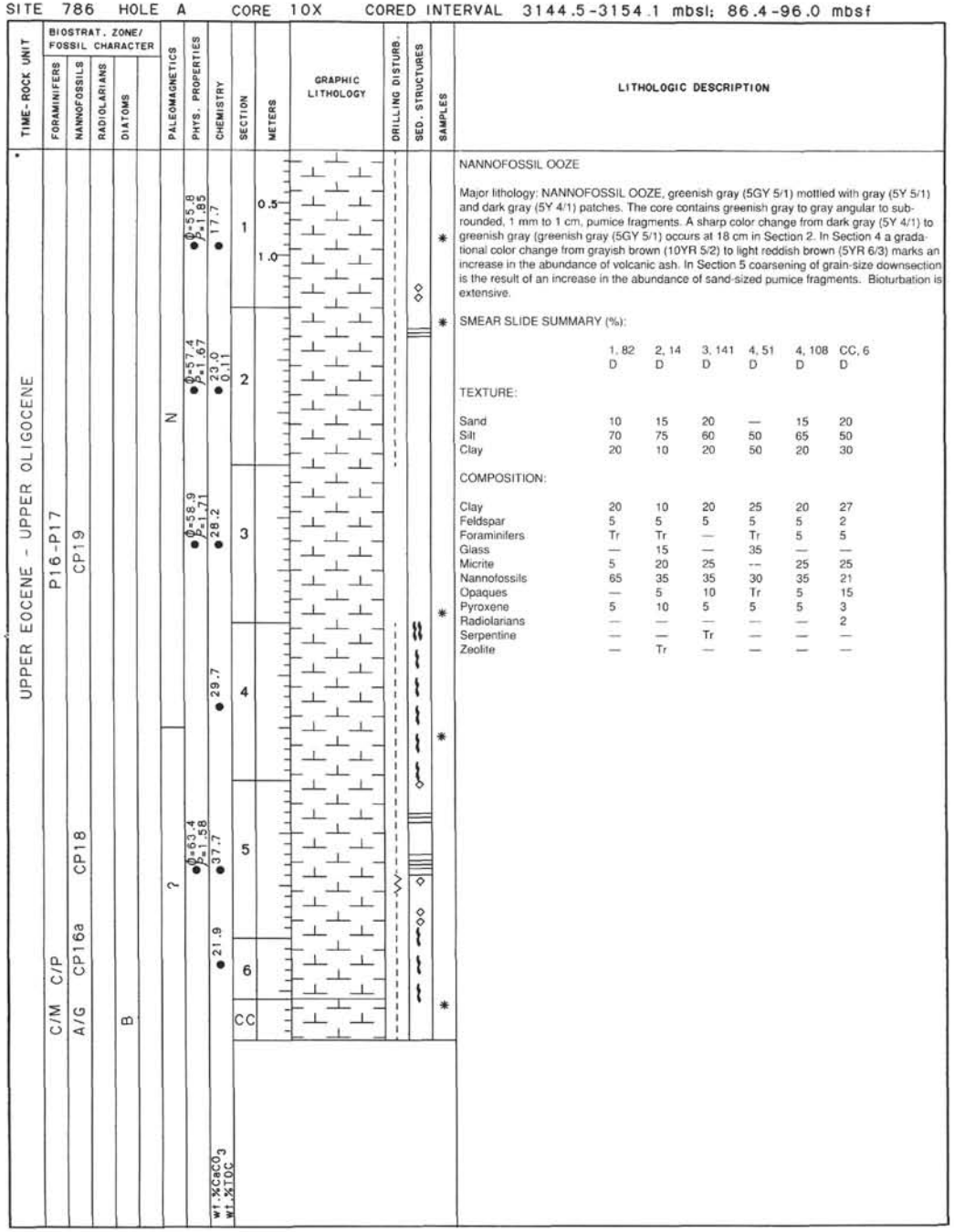
	1, 70 D	2, 95 D	3, 62 D	3, 130 M	4, 34 D	5, 38 D	5, 59 M
TEXTURE:							
Sand	80	20	40	70	80	—	50
Silt	20	70	35	30	20	80	50
Clay	—	10	25	—	—	20	—
COMPOSITION:							
Clay	—	12	30	—	—	20	—
Feldspar	7	3	10	10	5	Tr	3
Foraminifers	—	2	5	—	Tr	Tr	—
Glass	76	—	—	75	80	—	3
Micrite	—	40	15	—	—	10	—
Nannofossils	—	40	10	—	—	70	2
Opaques	5	—	15	5	10	—	50
Pyroxene	10	3	10	5	5	—	2
Quartz	—	—	—	5	—	—	—
Radiolarians	2	—	—	—	—	—	—
Chlorite	—	—	—	—	—	—	40
Spicules	—	—	5	—	—	—	—

SMEAR SLIDE SUMMARY (%):

	5, 79 D	CC, 23 D
TEXTURE:		
Sand	10	5
Silt	70	85
Clay	20	10
COMPOSITION:		
Clay	20	10
Feldspar	2	5
Foraminifers	5	10
Glass	3	—
Micrite	5	10
Nannofossils	60	60
Opaques	2	5
Pyroxene	3	—
Serpentine	Tr	—



SITE 786 HOLE A CORE 10X CORED INTERVAL 3144.5-3154.1 mbsl; 86.4-96.0 mbsf



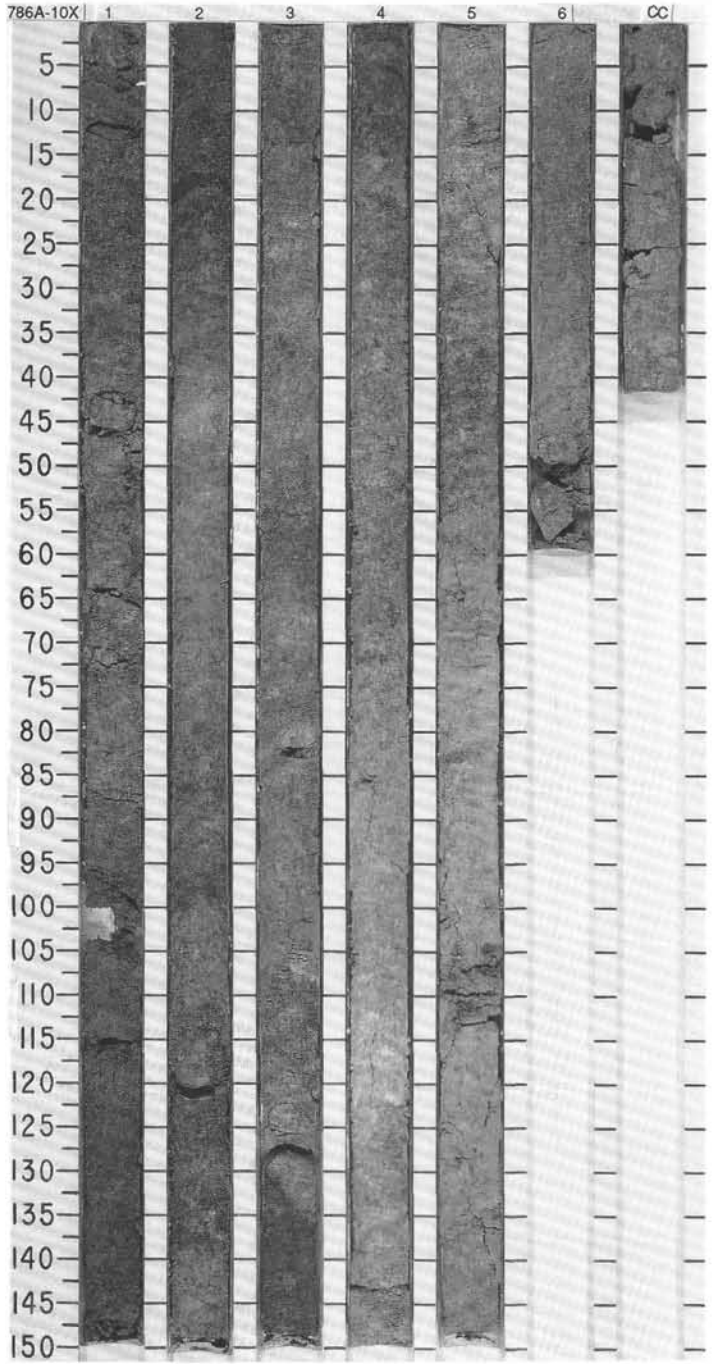
LITHOLOGIC DESCRIPTION

NANNOFOSSIL OOZE

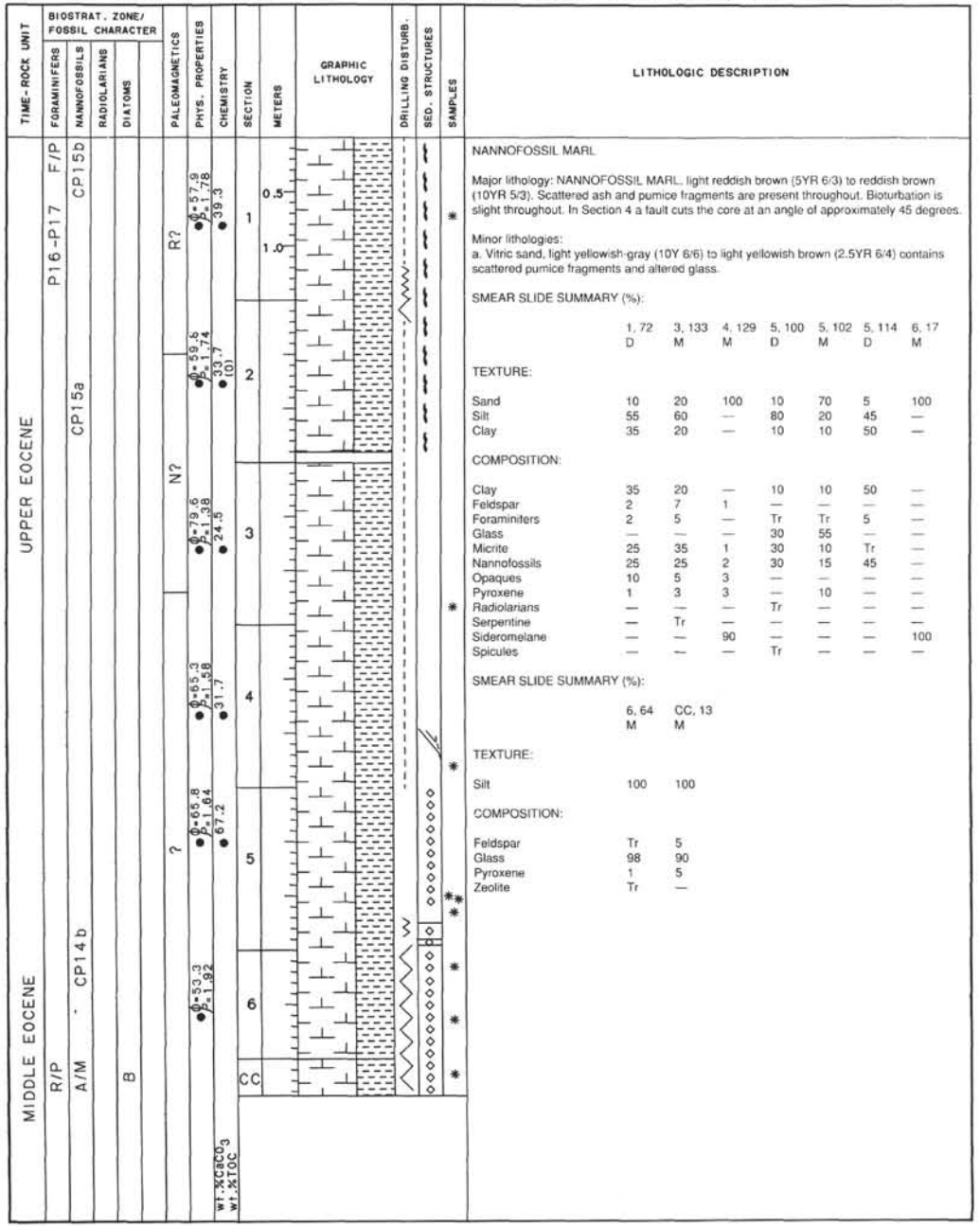
Major lithology: NANNOFOSSIL OOZE, greenish gray (5GY 5/1) mottled with gray (5Y 5/1) and dark gray (5Y 4/1) patches. The core contains greenish gray to gray angular to subrounded, 1 mm to 1 cm, pumice fragments. A sharp color change from dark gray (5Y 4/1) to greenish gray (greenish gray (5GY 5/1) occurs at 18 cm in Section 2. In Section 4 a gradational color change from grayish brown (10YR 5/2) to light reddish brown (5YR 6/3) marks an increase in the abundance of volcanic ash. In Section 5 coarsening of grain-size downsection is the result of an increase in the abundance of sand-sized pumice fragments. Bioturbation is extensive.

SMEAR SLIDE SUMMARY (%):

	1, 82 D	2, 14 D	3, 141 D	4, 51 D	4, 108 D	CC, 6 D
TEXTURE:						
Sand	10	15	20	—	15	20
Silt	70	75	60	50	65	50
Clay	20	10	20	50	20	30
COMPOSITION:						
Clay	20	10	20	25	20	27
Feldspar	5	5	5	5	5	2
Foraminifers	Tr	Tr	—	Tr	5	5
Glass	—	15	—	35	—	—
Micrite	5	20	25	--	25	25
Nannofossils	65	35	35	30	35	21
Opaques	—	5	10	Tr	5	15
Pyroxene	5	10	5	5	5	3
Radiolarians	—	—	—	—	—	2
Serpentine	—	—	Tr	—	—	—
Zeolite	—	Tr	—	—	—	—



SITE 786 HOLE A CORE 11X CORED INTERVAL 3154.1-3163.8 mbsl; 96.0-105.7 mbsf



LITHOLOGIC DESCRIPTION

NANNOFOSSIL MARL

Major lithology: NANNOFOSSIL MARL, light reddish brown (5YR 6/3) to reddish brown (10YR 5/3). Scattered ash and pumice fragments are present throughout. Bioturbation is slight throughout. In Section 4 a fault cuts the core at an angle of approximately 45 degrees.

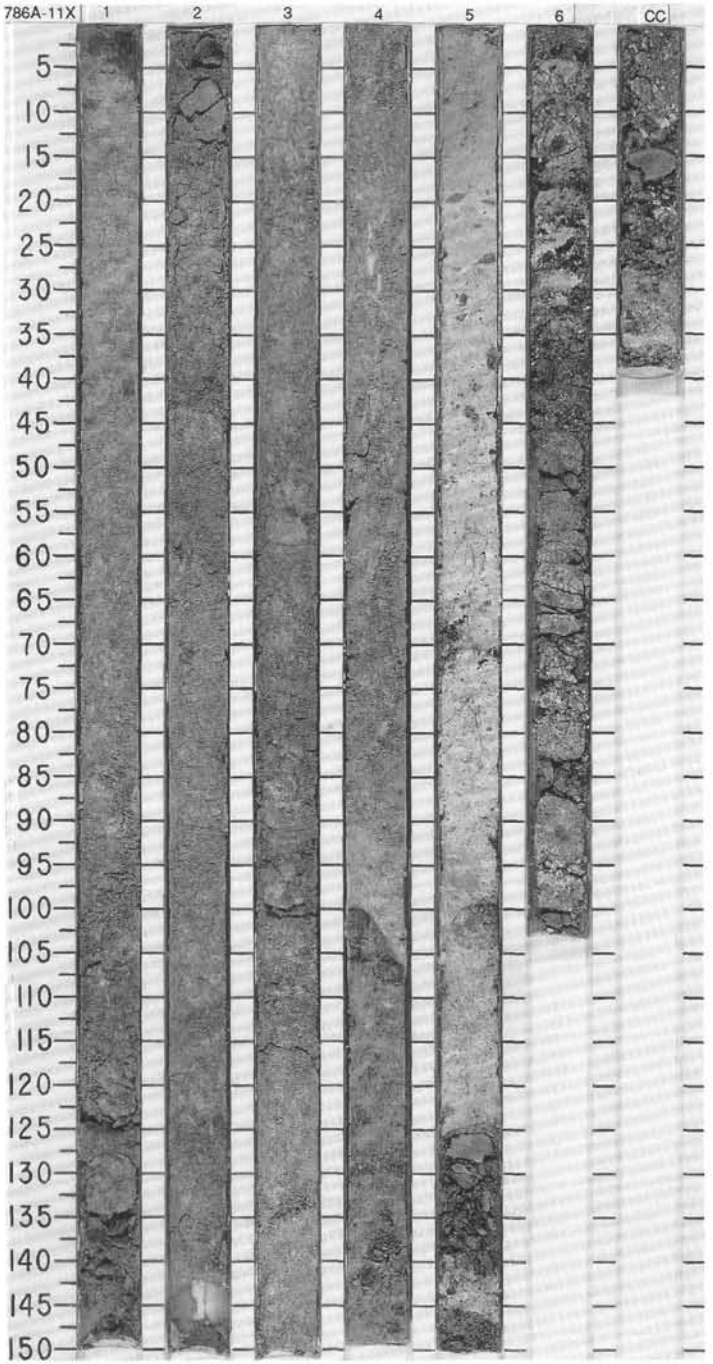
Minor lithologies:
a. Vitric sand, light yellowish-gray (10Y 6/6) to light yellowish brown (2.5YR 6/4) contains scattered pumice fragments and altered glass.

SMEAR SLIDE SUMMARY (%):

	1, 72 D	3, 133 M	4, 129 M	5, 100 D	5, 102 M	5, 114 D	6, 17 M
TEXTURE:							
Sand	10	20	100	10	70	5	100
Silt	55	60	—	80	20	45	—
Clay	35	20	—	10	10	50	—
COMPOSITION:							
Clay	35	20	—	10	10	50	—
Feldspar	2	7	1	—	—	—	—
Foraminiters	2	5	—	Tr	Tr	5	—
Glass	—	—	—	30	55	—	—
Micrite	25	35	1	30	10	Tr	—
Nannofossils	25	25	2	30	15	45	—
Opaques	10	5	3	—	—	—	—
Pyroxene	1	3	3	—	10	—	—
Radiolarians	—	—	—	Tr	—	—	—
Serpentine	—	Tr	—	—	—	—	—
Sideromelane	—	—	90	—	—	—	100
Spicules	—	—	—	Tr	—	—	—

SMEAR SLIDE SUMMARY (%):

	6, 64 M	CC, 13 M
TEXTURE:		
Silt	100	100
COMPOSITION:		
Feldspar	Tr	5
Glass	98	90
Pyroxene	1	5
Zeolite	Tr	—

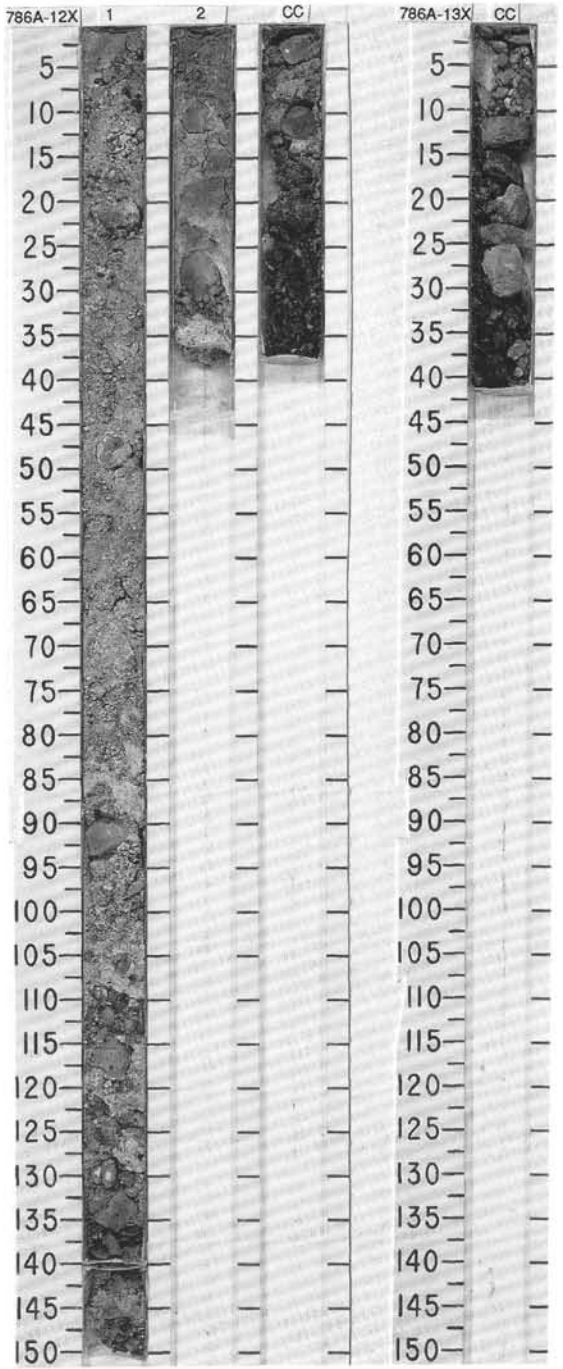


SITE 786 HOLE A CORE 12X CORED INTERVAL 3163.8-3173.4 mbsl; 105.7-115.3 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
MIDDLE EOCENE	R/P	A/M CP14a		B	?	ρ=64.0 ρ=1.62	28.2 (10) wt.%CaCO3 wt.%TOC	1, 2, CC	0.5, 1.0					NANNOFOSSIL MARL Major lithology: NANNOFOSSIL MARL, white (2.5Y 8/2) to light gray (2.5Y 7/2) contains numerous pumice fragments. Pumice fragments are grayish brown (10YR 5/2 to 10YR 6/8), rounded, up to 6 cm in length, vesicular, and float in the nannofossil ooze matrix. The average clast size fines upward. A sharp color and texture change occurs in Section CC at 15 cm. The amount of matrix material decreases and clasts become dark greenish gray (5BG 4/1).

SITE 786 HOLE A CORE 13X CORED INTERVAL 3173.4-3183.0 mbsl; 115.3-124.9 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
					?			CC						NANNOFOSSIL MARL Major lithology: NANNOFOSSIL MARL, greenish gray (5BG 4/1) contains drill cuttings and many vesicular volcanic clasts.



SITE 786 HOLE A CORE 14X CORED INTERVAL 3183.0-3192.7 mbsl; 124.9-134.6 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
					?	● Φ=41.4 ρ=2.05		1 CC		IM IM	× ×		* *	This core consists entirely of drill cuttings of igneous rocks and a few clasts from the overlying nannofossil marls.

SMEAR SLIDE SUMMARY (%):

	1, 10 D	1, 14 M
TEXTURE:		
Silt	41	100
Clay	59	—
COMPOSITION:		
Chlorite	—	90
Clay	59	—
Feldspar	1	—
Foraminifers	1	—
Glass	3	—
Nannofossils	35	—
Pyroxene	1	—
Serpentine	—	10

SITE 786 HOLE A CORE 15X CORED INTERVAL 3192.7-3202.4 mbsl; 134.6-144.3 mbsf

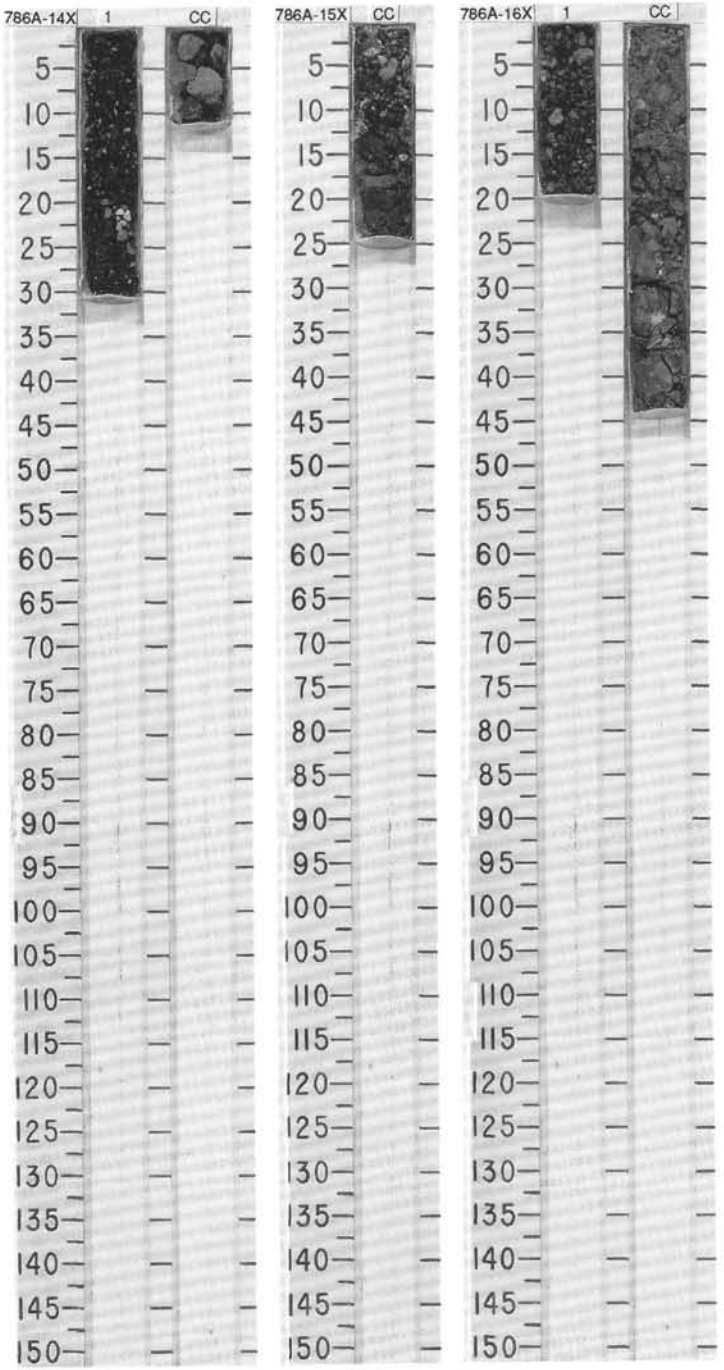
TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
						● Φ=50.2 ρ=1.85		CC		IM	×	◇◇		This core consists of drill cuttings and chips primarily composed of igneous and volcaniclastic rocks.

SITE 786 HOLE A CORE 16X CORED INTERVAL 3202.4-3212.1 mbsl; 144.3-154.0 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
						● Φ=41.7 ρ=2.10	Φ=52.3 ρ=1.94	1 CC		CUTTINGS, IM CUTTINGS, IM	× × ×	⟨v	*	This core consists entirely of drill cuttings and igneous rock fragments.

SMEAR SLIDE SUMMARY (%):

	CC, 10 D
TEXTURE:	
Silt	100
COMPOSITION:	
Serpentine	100

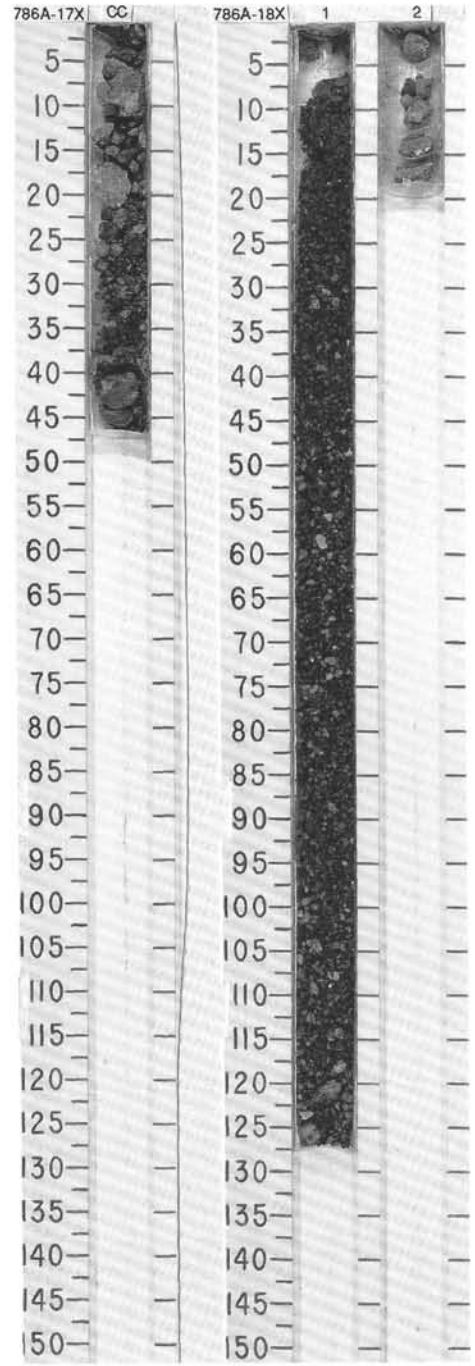


SITE 786 HOLE A CORE 17X CORED INTERVAL 3212.1-3213.1 mbsl; 154.0-155.0 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
						● ϕ=44.9 ρ=1.96	● wt.%$CaCO_3$ 1.1 wt.%TOC 0.21	CC		IM	X X			This core consists entirely of igneous rock clasts.

SITE 786 HOLE A CORE 18X CORED INTERVAL 3213.1-3222.1 mbsl; 155.0-164.0 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
								1	0.5 1.0	CUTTINGS IM				This core consists entirely of drill cuttings and igneous rocks.
								CC		IM				

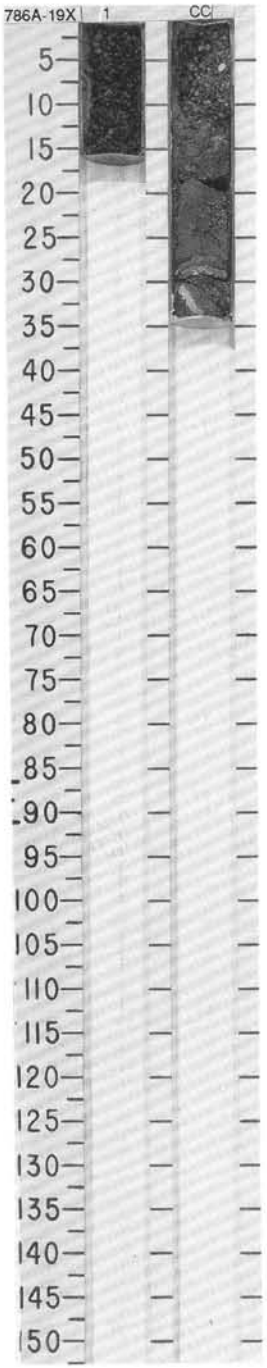


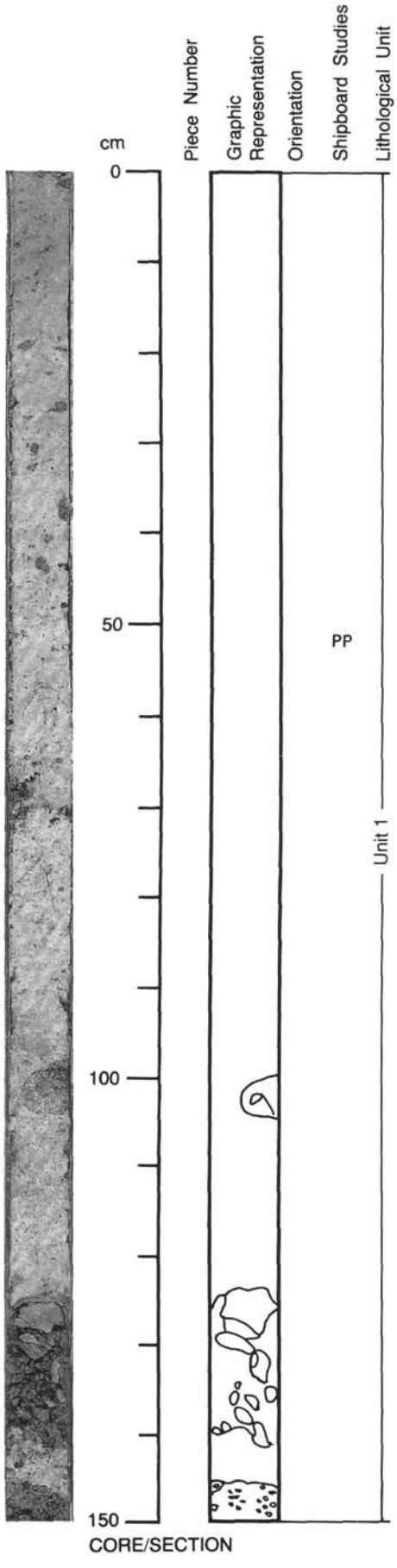
SITE 786 HOLE A CORE 19X CORED INTERVAL 3222.1-3224.6 mbsl: 164.0-166.5 mbsf

TIME-ROCK UNIT	BIOSTRAT. ZONE/ FOSSIL CHARACTER: FORAMINIFERS	NANNOFOSSILS	RADIOLARIANS	DIATOMS	PALEOMAGNETICS	PHYS. PROPERTIES	CHEMISTRY	SECTION	METERS	GRAPHIC LITHOLOGY	DRILLING DISTURB.	SED. STRUCTURES	SAMPLES	LITHOLOGIC DESCRIPTION
								1		CUTTINGS	X			Section 1 and 0-9 cm in Section CC in this core consist entirely of drill cuttings. The remainder of the core (9-34 cm in Section CC) consists of igneous rock capped by a thin (11 cm) veneer of dark greenish gray (5G 4/1) to dark reddish brown (2.5YR 3/4) sheared, coarse sand-sized material.
								CC		IM	X		* *	

SMEAR SLIDE SUMMARY (%):

	CC, 11 D	CC, 17 M
TEXTURE:		
Sand	75	1
Silt	25	91
Clay	—	8
COMPOSITION:		
Clay	—	8
Glass	85	1
Micrite	—	91
Sideromelane	15	—



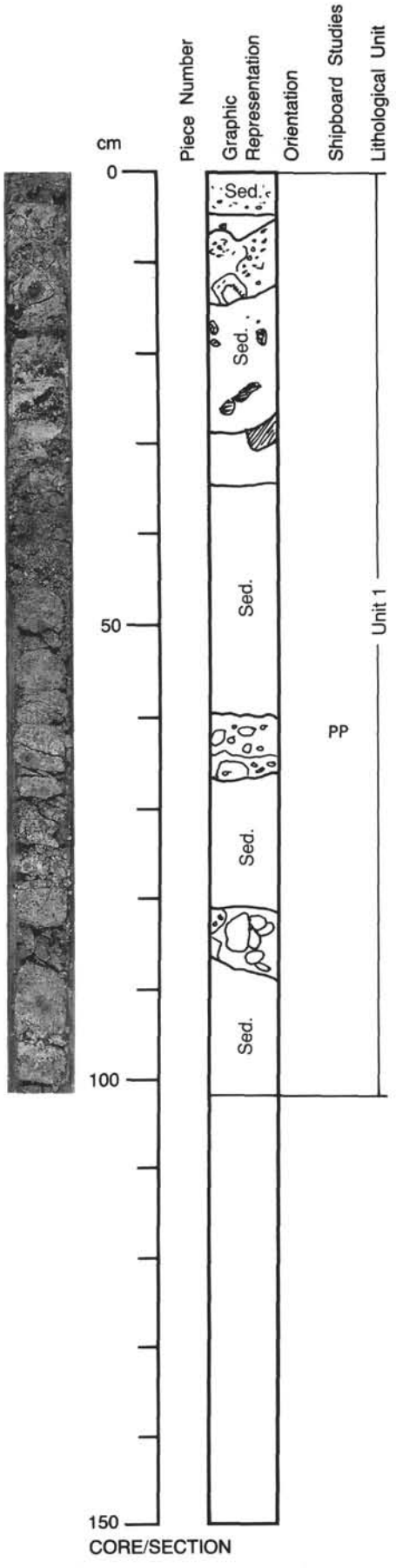


125-786A-11X-5

UNIT 1: VARIABLY ALTERED VOLCANICS

Pieces multiple fragments

CONTACTS: Clasts in marl.
PHENOCRYSTS:
Clinopyroxene - 1%; < 1 mm; euhedral; black.
GROUNDMASS: Glassy when green, maybe very finely crystalline when olive.
VESICLES: 10-30%; < 1 cm; sub-round; distributed throughout rock.
COLOR: Olive, (5Y 4/3) ; tones of green (5GY 7/6 to 5GY 5/8).
STRUCTURE: None.
ALTERATION: Variably altered, locally white silky replacement.
VEINS/FRACTURES: Trace; 1 mm thick; randomly oriented; veins and zones of ochre-colored alteration.
ADDITIONAL COMMENTS: Reworked subrounded breccia clast at 100-105 cm; volcaniclastic horizon at 125-140 cm and at 146-150 cm.

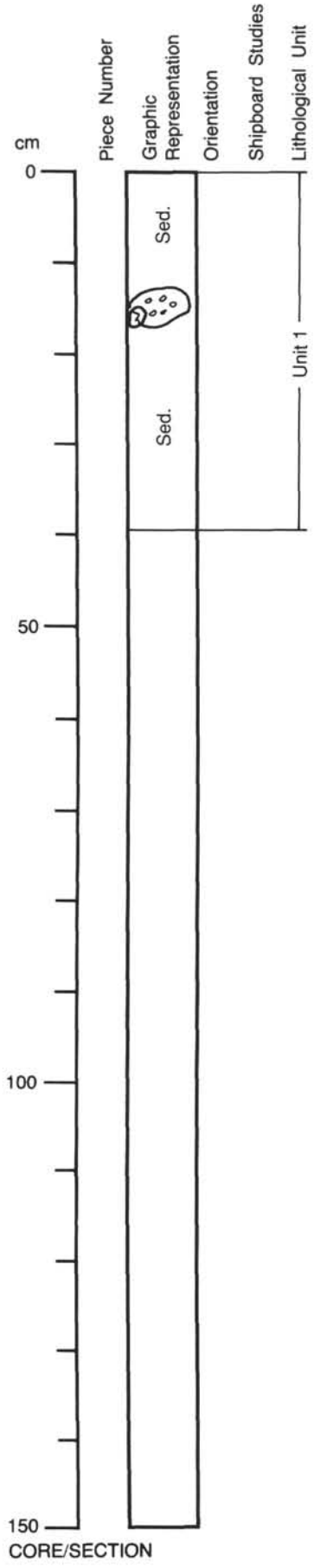


125-786A-11X-6

UNIT 1: ALTERED VOLCANICLASTICS

Pieces multiple fragments

CONTACTS: Fragments in marl.
PHENOCRYSTS:
Clinopyroxene - trace; < 1 mm.
GROUNDMASS: Devitrified glass.
VESICLES: 10-30%; < 5 mm; sub-round; distributed throughout rock.
COLOR: Green (5GY 7/4 to 5 GY 4/8).
STRUCTURE: None.
ALTERATION: Variably altered.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Clasts in distinct beds, well sorted, variable bed thickness (0.25 - 15 cm).

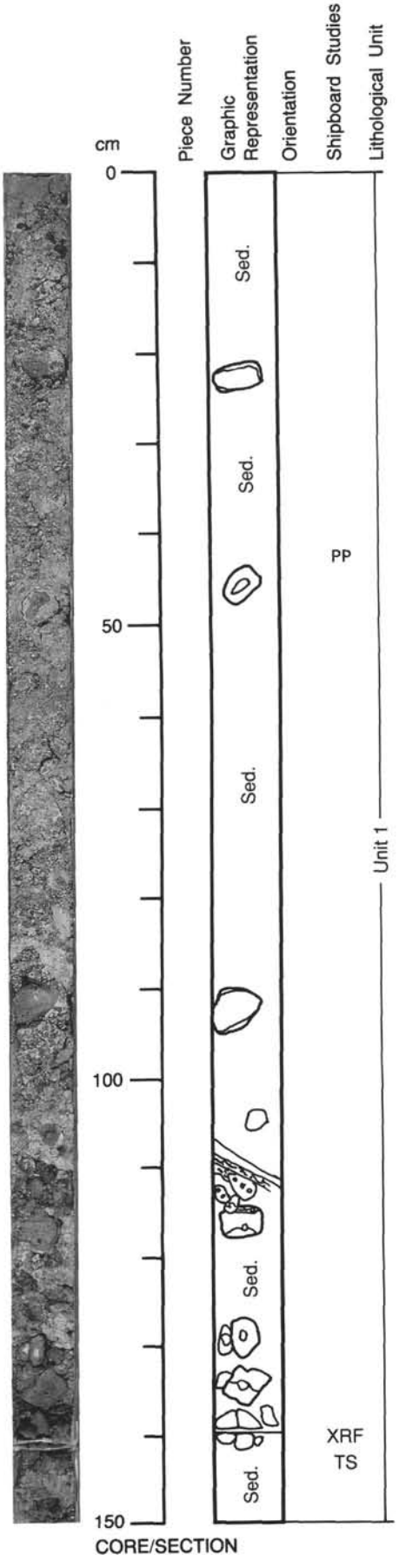


125-786A-11X-CC

UNIT 1: ALTERED VOLCANICLASTICS

Pieces multiple fragments

CONTACTS: Fragments in marl.
PHENOCRYSTS: Euhedral.
Plagioclase - 1%; 1-2 mm; euhedral, altered.
Clinopyroxene - trace; <1 mm; euhedral, black.
Orthopyroxene - 1%; <2 mm; anhedral, light green.
GROUNDMASS: Probably very finely crystalline and altered.
VESICLES: 30%; < 4 mm; round to elongated; distributed throughout rock; some vesicles may be filled with clear glassy material (or rock contains rounded quartz grains).
COLOR: Grayish brown (10YR 5/2 to 10YR 5/6).
STRUCTURE: None.
ALTERATION: Around rim of clast and in core of largest cm-size green clasts.
VEINS/FRACTURES: Trace; < 0.1 mm thickness; randomly distributed; black-appearing veins, probably filled with white milky opal.
ADDITIONAL COMMENTS: Bedding; sorting; description mainly relevant to large clast at 13-16 cm.

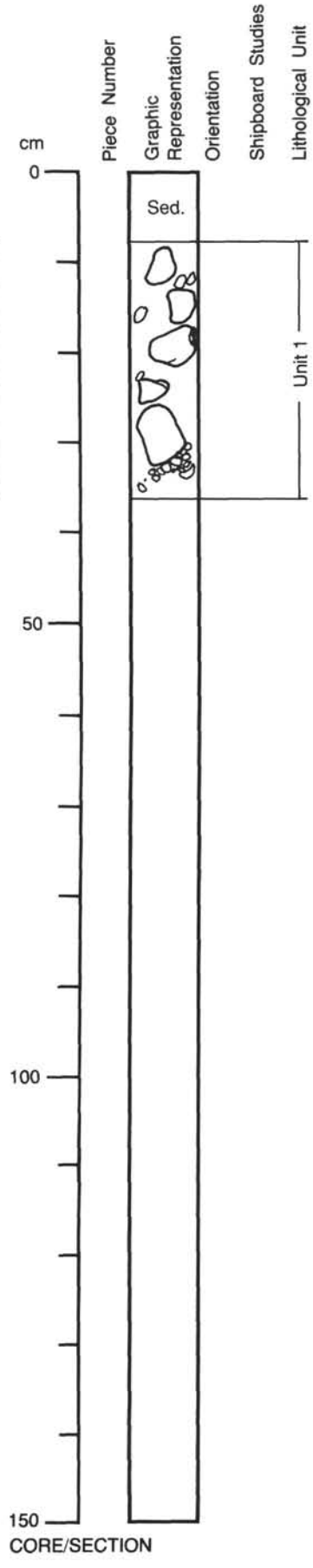


125-786A-12X-1

UNIT 1: ALTERED VOLCANICLASTICS

Pieces multiple clasts

CONTACTS: Clasts in marl.
PHENOCRYSTS: Euhedral crystals, commonly surrounded by dark-green altered orthopyroxene in large grayish-brown clasts; small green fragments are phenocryst-free.
Plagioclase - trace; <1 mm; euhedral, altered.
Clinopyroxene - trace; <1 mm; euhedral, black.
Orthopyroxene - 2%; <2 mm; anhedral, light green.
GROUNDMASS: Altered, very finely crystalline or glassy material in large clasts; small green clasts are altered glass.
VESICLES: 30%; < 4 mm; round to elongated; distributed throughout rock. some vesicle filling.
COLOR: Grayish brown (10YR 6/2 to 10YR 5/2); green (5GY 7/6 to 5GY 5/8).
STRUCTURE: None.
ALTERATION: Alteration at clast rim; green cm-size clasts altered in the center.
VEINS/FRACTURES: Trace; tiny <0.1 mm; randomly oriented; fractures postdating alteration are present, veinlets appear black but contain glassy opal.
ADDITIONAL COMMENTS: Large clasts at 90-95, 110-120, and 130-150 cm; well-sorted beds; green fragments are small (< 2 cm) and common in marl matrix.



125-786A-12X-2

UNIT 1: CONTINUED

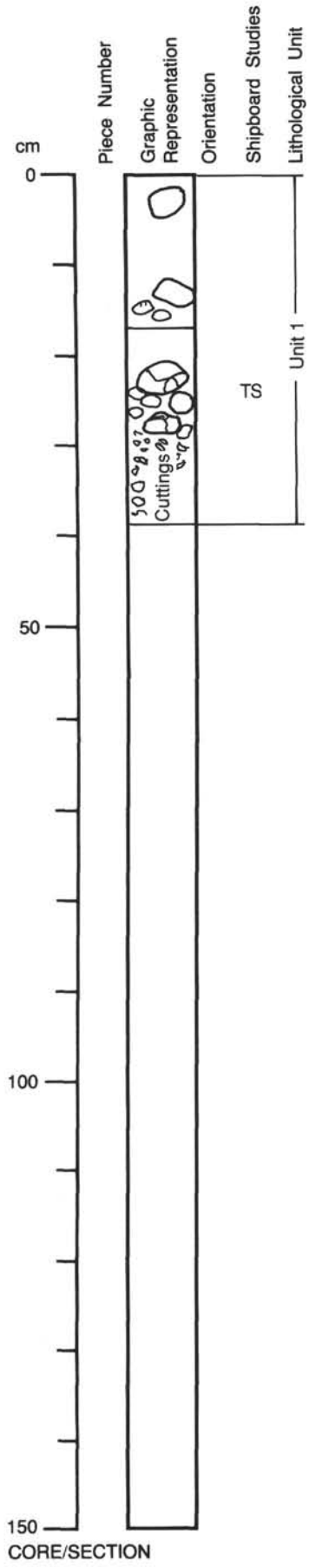
Pieces multiple fragments

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
Miaroles: N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Interval 0-17 cm is continuation of 125-786A-12X-2.

UNIT 1: ALTERED VOLCANICLASTICS

Pieces multiple fragments

CONTACTS: Clasts in marl.
PHENOCRYSTS:
Plagioclase - trace; <2 mm; euhedral, altered.
Orthopyroxene - 1%; 1-3 mm; anhedral to subhedral.
GROUNDMASS: Very finely crystalline, altered.
VESICLES: 30%; < 4 mm; round to elongated; distributed throughout sample; some are filled with milky white opal(?).
COLOR: Grayish brown (7.5YR 6/2).
STRUCTURE: None.
ALTERATION: Clast rims are ochre colored; strongly altered.
VEINS/FRACTURES: Trace; white opal(?) veins; randomly oriented; veins and filled vesicles contain same white material.
ADDITIONAL COMMENTS: Large grayish-brown and green clasts appear consanguineous in this section.

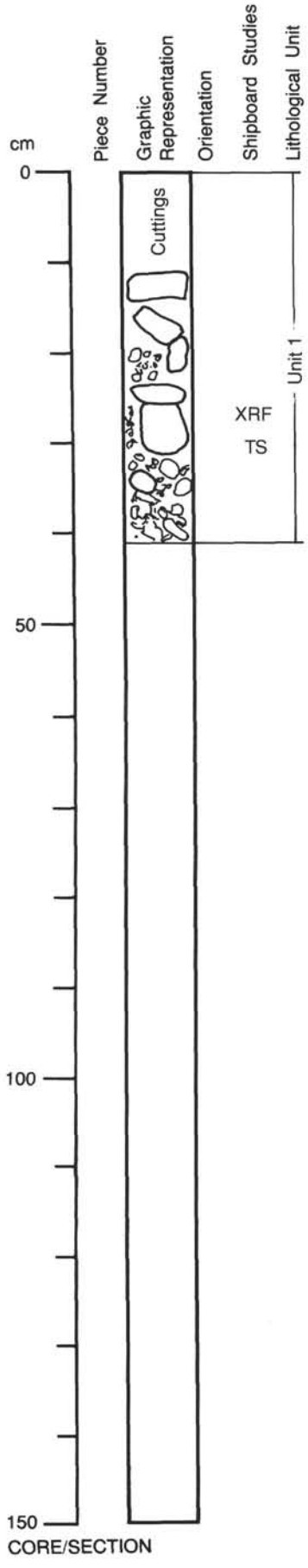


125-786A-12X-CC

UNIT 1: ALTERED BASALTIC ANDESITE

Pieces multiple fragments

CONTACTS: Not visible.
PHENOCRYSTS: Monomineralic glomerocrysts.
Plagioclase - 5%; <1 mm; euhedral, altered.
Orthopyroxene - 10%; <1 mm; anhedral, fresh.
GROUNDMASS: Glassy, commonly altered.
VESICLES: 20%; < 2 mm; sub-round; randomly distributed.
COLOR: Black when fresh and wet; grayish-green (5G 4/2) when altered.
STRUCTURE: None.
ALTERATION: White opal along veins and alteration of glass.
VEINS/FRACTURES: 5%; up to 2 mm-thick veins; random orientation; white veins through black glass.
ADDITIONAL COMMENTS: Brecciated clasts with white vein filling.

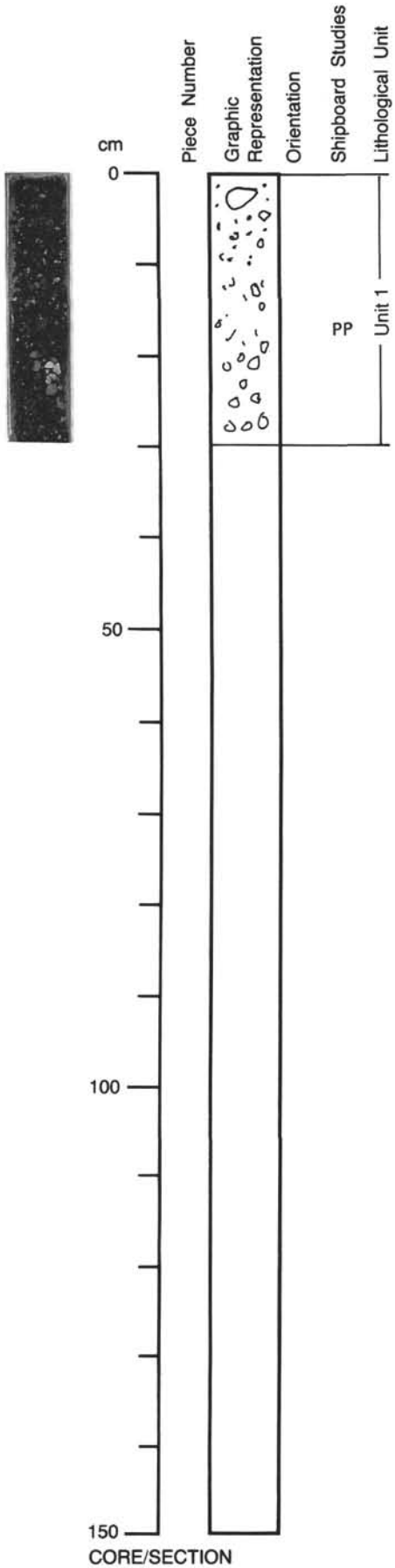


125-786A-13X-CC

UNIT 1: OLIVINE PHYRIC GLASS

Pieces multiple fragments

CONTACTS: Not visible.
PHENOCRYSTS:
Olivine - 20%; <1 mm; euhedral, yellow-colored, not very forsterite-rich.
GROUNDMASS: Glassy, commonly pervasively altered.
VESICLES: 20%; < 3 mm; sub-round; distributed throughout rock.
COLOR: Fresh glass is gray to black (N 7/ to 5B 4/1); altered glass is bluish gray (5BG 5/1).
STRUCTURE: None
ALTERATION: Glass shows alteration.
VEINS/FRACTURES: Not visible.
ADDITIONAL COMMENTS: Probably holohyaline rock.

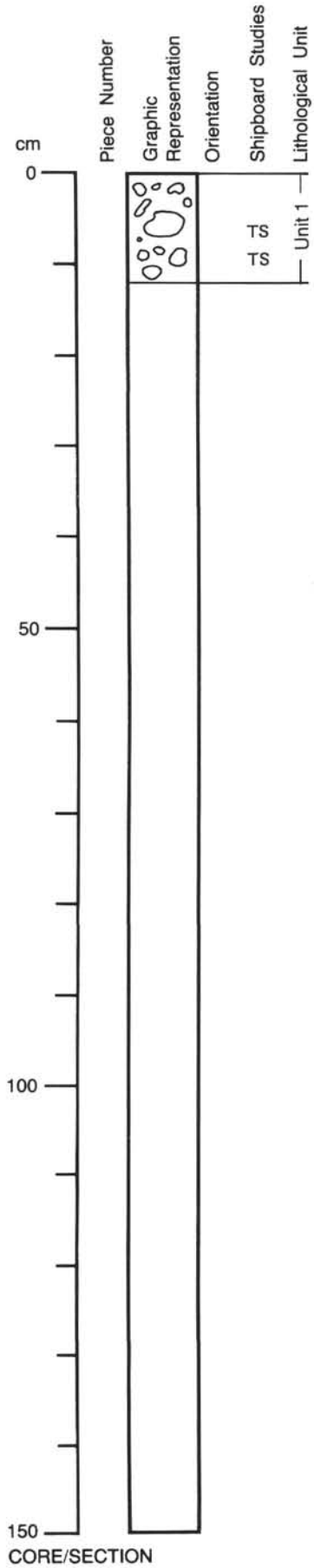


125-786A-14X-1

UNIT 1: OLIVINE- AND BRONZITE-BEARING ANDESITE (BONINITE SERIES?)

Pieces drilling breccia

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - ?; <0.5 mm; elongate, euhedral.
Olivine - ?; <0.3 mm; equant with spinel inclusions.
GROUNDMASS: Approximately 70-85% of rock; glassy with chilled plagioclase. Microcrysts and spinel microcrysts (usually as inclusicns within olivine).
VESICLES: 10-15%; <0.1 - 3 mm; irregular to rounded; n/a; slight clay filling.
COLOR: Dark greenish gray (10Y 4/1), mottled.
STRUCTURE: None visible.
ALTERATION: Chlorite, clays.
VEINS/FRACTURES: <1%; <1.5 mm; no apparent orientation; dark green, amorphous material.
ADDITIONAL COMMENTS: Pieces vary in size from <1 mm to 4 cm; other rock types may be present but this appears to be the dominant lithology.

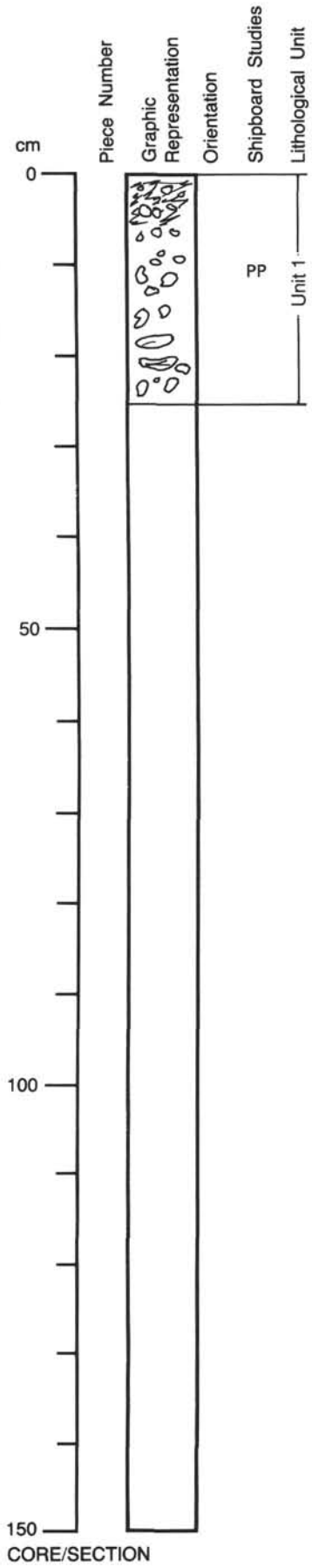


125-786A-14X-CC

UNIT 1: OLIVINE- AND BRONZITE-BEARING ANDESITE

Pieces: Clasts in sediment

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - ?; <0.5 mm; elongate to euhedral.
Olivine - ?; <0.3 mm; equant with spinel inclusions.
GROUNDMASS: Glassy up to 70-80%, quench plagioclase and spinel microcrysts are present.
VESICLES: 10-15%; <0.1-3 mm; irregular to round; random.
COLOR: Dark greenish gray (10Y 4/1), mottled.
STRUCTURE: None visible.
ALTERATION: 30-80% altered to chlorite and clay minerals.
VEINS/FRACTURES: <1%; <1.5 mm; no apparent orientation.

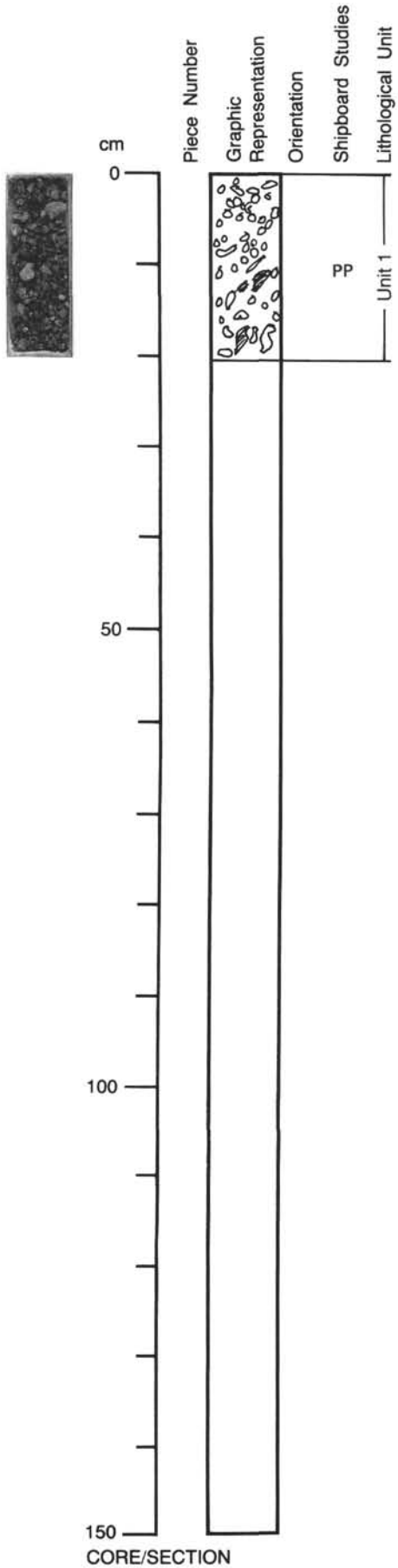


125-786A-15X-CC

UNIT 1: OLIVINE- AND BRONZITE-BEARING ANDESITE (BONINITE SERIES?)

Pieces drilling breccia

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - ?; <0.5 mm; elongate to euhedral.
Olivine - ?; <0.3 mm; equant with spinel inclusions.
GROUNDMASS: Approximately 70-80%; glassy with quench crystals of plagioclase and spinel.
VESICLES: 10-15%; <0.1-3 mm; round to irregular; random.
COLOR: Dark greenish gray (10Y 4-1).
STRUCTURE: None visible.
ALTERATION: Chlorite and clays.
VEINS/FRACTURES: <<1%; <1-2 mm; no visible orientation; dark green amorphous material.
ADDITIONAL COMMENTS: Pieces range from <1 mm to 3-4 mm in diameter. Other rock types may be present, but this appears to be the dominant lithology.

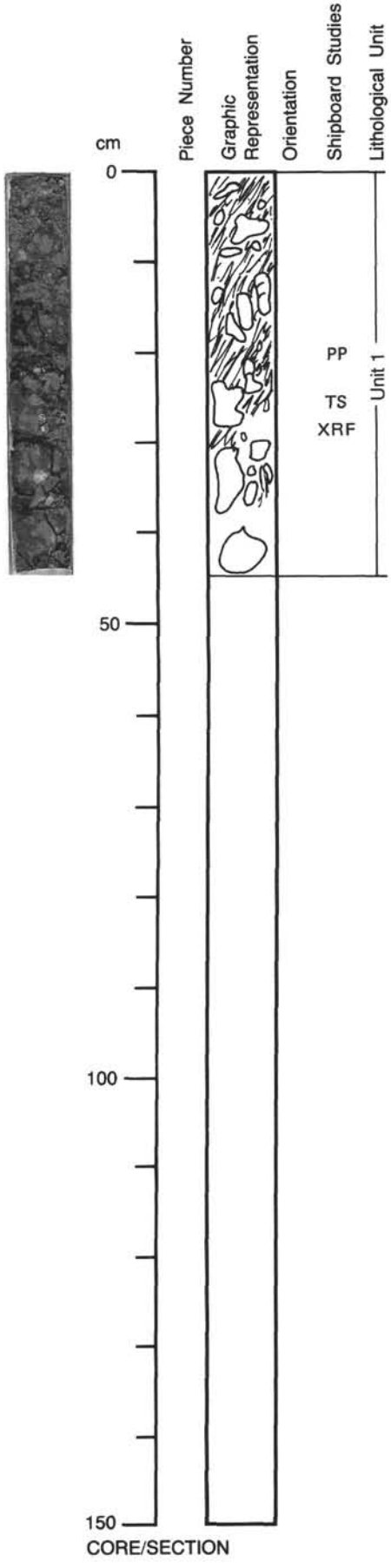


125-786A-16X-1

UNIT 1: OLIVINE- AND BRONZITE-BEARING ANDESITE (BONINITE SERIES)

Pieces drilling breccia

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - ?; <0.5 mm; elongate to euhedral.
Olivine - ?; <0.3 mm; equant with spinel inclusions.
GROUNDMASS: Approximately 80%, glassy with quench crystals of plagioclase and spinel (usually as inclusions within olivine).
VESICLES: 10-15%; <0.1-3 mm; round to irregular; random.
COLOR: Dark greenish gray (10Y 4/1).
STRUCTURE: None visible.
ALTERATION: Chlorite and clays.
VEINS/FRACTURES: <<1%; <1.5 mm; no apparent orientation; filled with dark green amorphous material.
ADDITIONAL COMMENTS: Pieces range from <1 mm to 3-4 cm in diameter; other rock types may be present but this appears to be the dominant lithology.

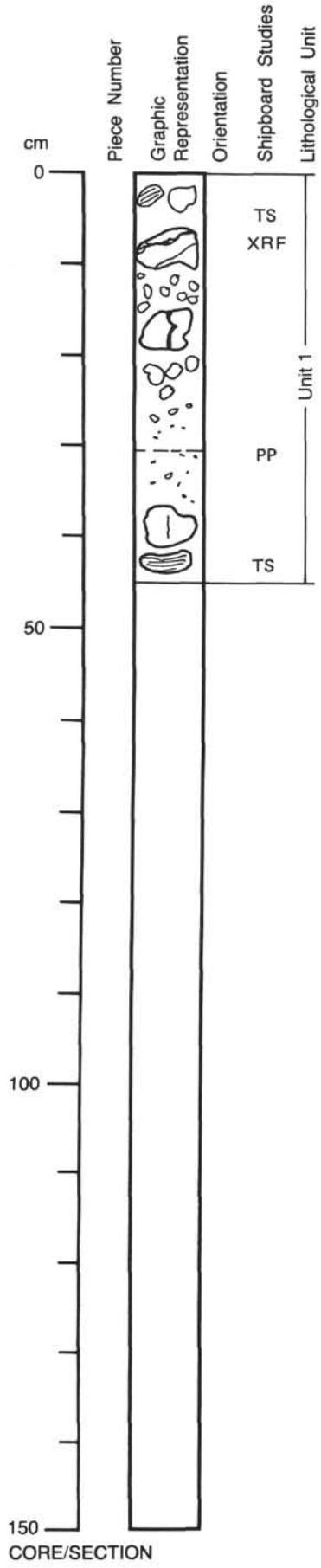


125-786A-16X-CC

UNIT 1: BASALT

Pieces multiple, set in sediment

CONTACTS: None visible.
PHENOCRYSTS:
Olivine - 6-8%; <0.5-1 mm; equant, euhedral, green.
Orthopyroxene - 4-6%; <0.3 mm; euhedral to elongate.
Clinopyroxene - 3-5%; <0.3 mm; euhedral, equant.
Plagioclase - 2%; <0.1 mm; laths.
GROUNDMASS: Approximately 80% of rock is glassy with quench crystals of plagioclase and clinopyroxene.
VESICLES: 7-10%; bimodal <0.5-1; 2-3 mm; round; random.
COLOR: Gray to dark gray (7.5YR 4/0-5/0).
STRUCTURE: None visible.
ALTERATION: Chlorite and celadonite staining on phenocrysts.
VEINS/FRACTURES: None visible.
ADDITIONAL COMMENTS: Rock pieces range from 3-6 cm in diameter.

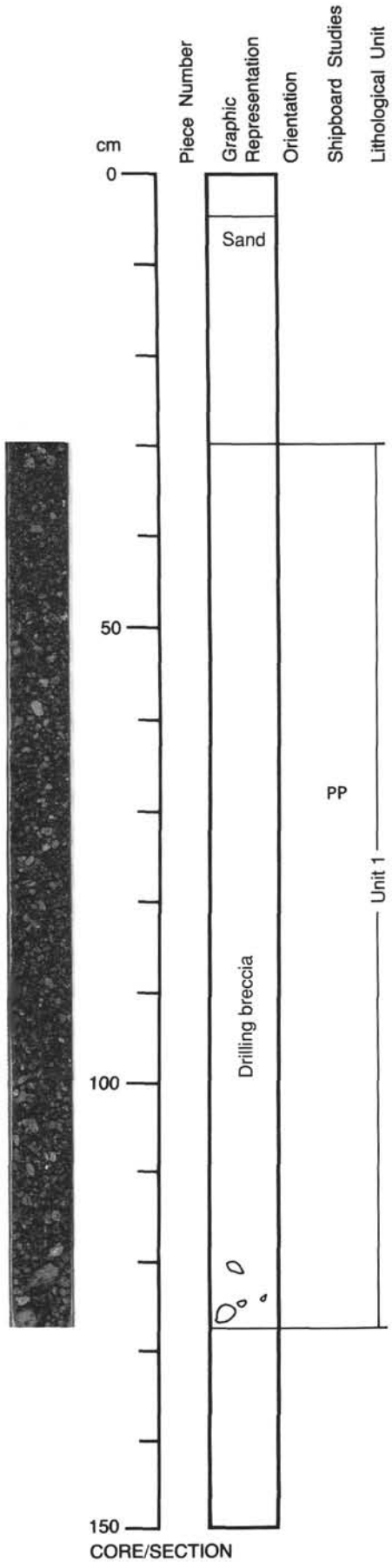


125-786A-17X-CC

UNIT 1: BASALT

Pieces multiple, set in sediment

CONTACTS: None visible.
PHENOCRYSTS:
Olivine - 6-8%; <0.5-1 mm; equant, euhedral, green, contains fluid inclusions.
Orthopyroxene - 4-6%; <0.3 mm; euhedral to elongate with fluid inclusions.
Clinopyroxene - 3-5%; <0.3 mm; euhedral, equant.
Plagioclase - 2%; 0.1 mm; laths.
GROUNDMASS: Approximately 70-80%, glassy with quench crystals of plagioclase and clinopyroxene.
VESICLES: 10-15%; bimodal: <0.5-1, 2-3 mm; usually round, also elongate, irregular; random.
COLOR: Gray to dark gray (7.5YR 4/0-5/0).
STRUCTURE: None visible.
ALTERATION: Chlorite, clays, with celadonite staining.
VEINS/FRACTURES: None present.
ADDITIONAL COMMENTS: Clasts are 2-6 cm in diameter.

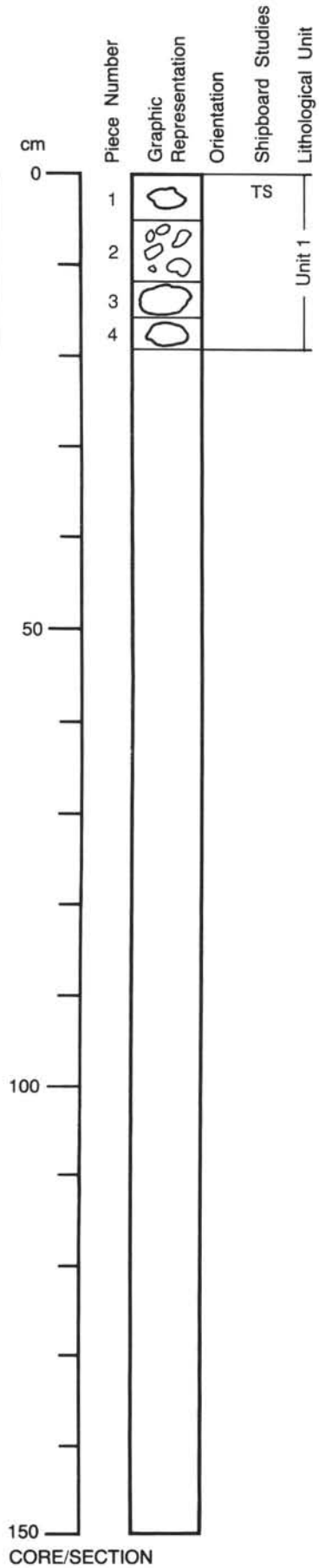


125-786A-18X-1

UNIT 1: OLIVINE- AND BRONZITE-BEARING ANDESITE (BONINITE SERIES)

Pieces drilling breccia

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - ?; <0.5 mm; elongate, euhedral.
Olivine - ?; <0.3 mm; equant with spinel inclusions.
GROUNDMASS: Approximately 70-80% glass, quench crystals of plagioclase and spinel are present.
VESICLES: 10-15%; <0.1-3 mm; irregular to rounded; random.
COLOR: Dark greenish gray (10Y 4/1).
STRUCTURE: None visible.
ALTERATION: Chlorite, clays.
VEINS/FRACTURES: <1%; <1.5 mm; no apparent preferred orientation; dark green, amorphous material.
ADDITIONAL COMMENTS: Pieces range from <1 mm to 2-3 cm in diameter; there may be other rock types present but this is the dominant lithology.

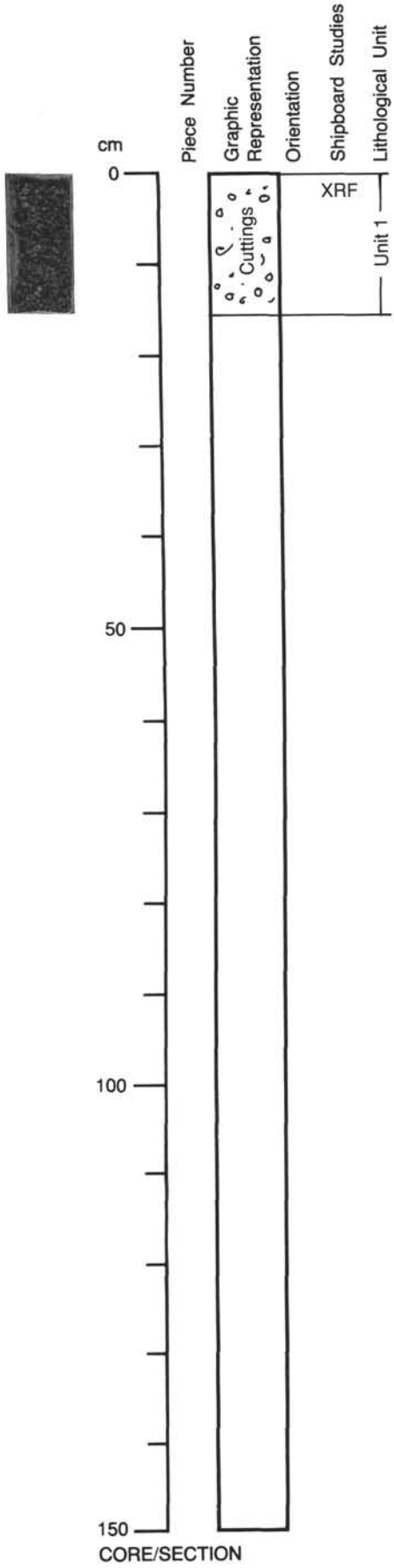


125-786A-18X-2

UNIT 1: OLIVINE AND BRONZITE-BEARING ANDESITE (BONINITE SERIES) (CONTINUATION OF 18-1)

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS: N/A.
GROUNDMASS: Same as 125-786A-18X-1.
VESICLES: None.
COLOR: Dark greenish gray (10Y 4/1).
STRUCTURE: None.
ALTERATION: Chlorite, clays.
VEINS/FRACTURES: Dark green, amorphous material.
ADDITIONAL COMMENTS: Continuation of 125-786A-18X-1; same dominant lithology.

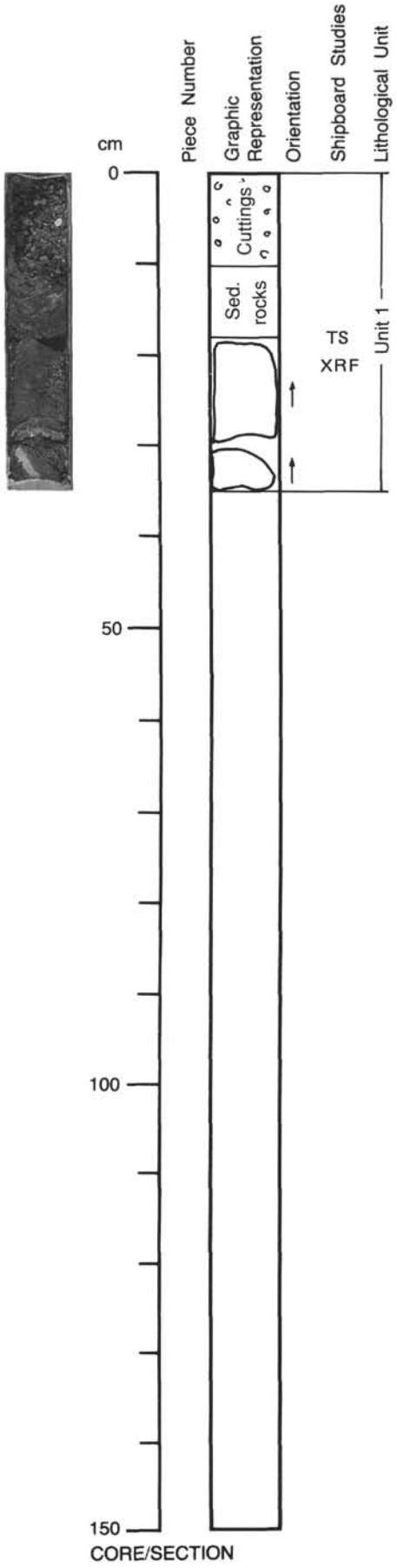


125-786A-19X-1

UNIT 1: OLIVINE PHYRIC GLASS/ROCK

Pieces drill cuttings

CONTACTS: Not visible.
PHENOCRYSTS: Olivine may be glomerocrystic.
Olivine - 10%; < 1 mm; subhedral, yellow-green.
GROUNDMASS: Black when glassy, gray when glass and fine crystals.
VESICLES: 10-25%; 2-3 mm; round; distributed throughout sample; some vesicles are filled with dark blue-green zeolite.
COLOR: Black (10YR 2/1) ; gray (10Y 5/1).
STRUCTURE: None.
ALTERATION: Glass alters to bluish-green material.
VEINS/FRACTURES: Not present.
ADDITIONAL COMMENTS: Glass and partly crystalline material can be observed in gradational contact in some fragments indicating that they are the same composition.



125-786A-19X-CC

UNIT 1: 19X-1 CONTINUED

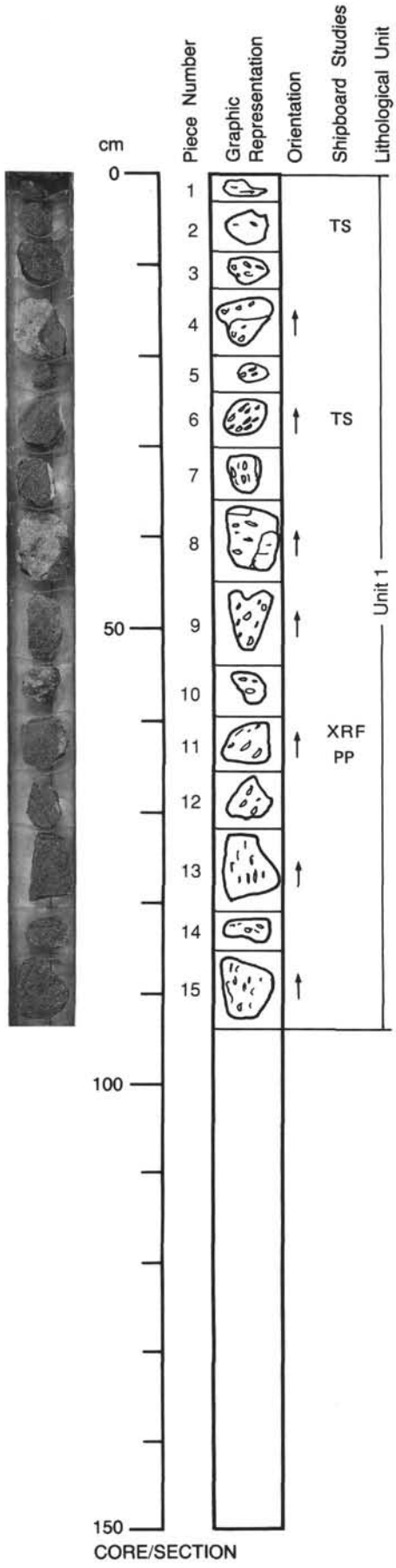
Pieces: drill cuttings

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A
ADDITIONAL COMMENTS: Interval 0-10 cm is continuation of 125-786A-19X-1.

UNIT 1: ALTERED PLAGIOCLASE MICRO-PHENOCRYSTIC BASALT

Piece 1

CONTACTS: Top in contact with chlorite/clay.
PHENOCRYSTS: Plagioclase is completely altered.
Plagioclase - 20%; <0.1 mm; altered, white, lath-shape.
GROUNDMASS: Completely altered.
VESICLES: 0-5%; <1 mm; irregular to round; distributed throughout rock; some are filled with zeolites.
COLOR: Dark gray (N 4/).
STRUCTURE: None.
ALTERATION: Basalt seems to alter to dark green chlorite (serpentine-like) clay.
VEINS/FRACTURES: 10%; 1-2 cm wide; sub-horizontal with 60 degree dip; one vein is light gray with ochre-brown rims; other vein is chlorite-rich zone.

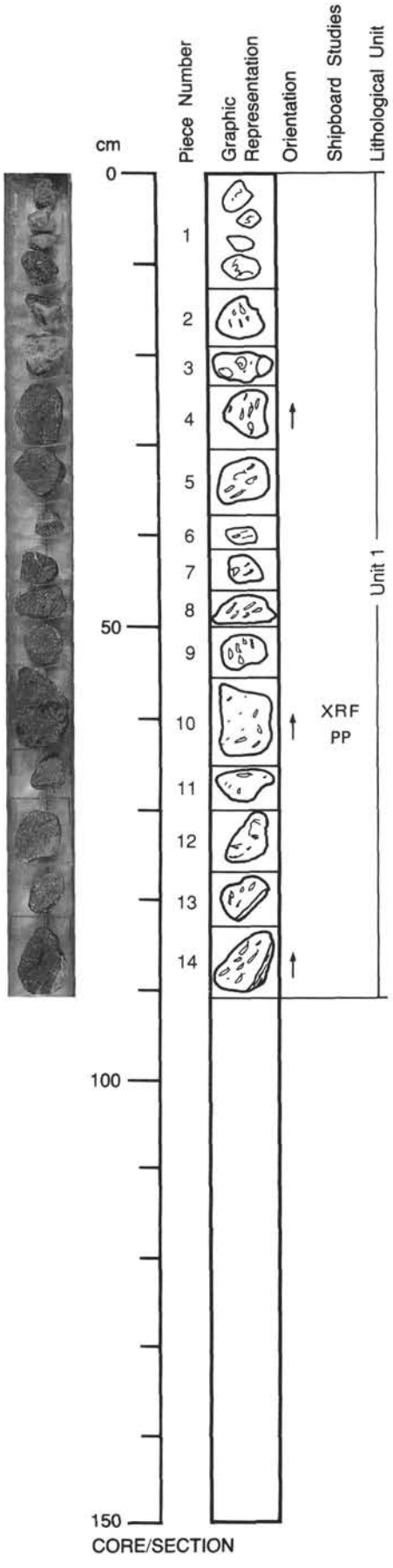


125-786B-1R-1

UNIT 1: BONINITE

Pieces 1-15

CONTACTS: Not visible.
PHENOCRYSTS: Phenocrysts are fresh; glomerocrysts of olivine and of plagioclase are also present.
Plagioclase - 10-15%; <2 mm; euhedral to anhedral, fresh, clear, colorless.
Orthopyroxene - 5%; <3 mm; coke-bottle green, euhedral.
Spinel - trace; <0.5 mm; glassy, black, as inclusions in olivine.
Olivine - 10%; <2 mm; anhedral, yellow to brown.
GROUNDMASS: Glassy to very fine grained.
VESICLES: 15-25%; <1 cm; round to elongated; distributed throughout rock; vesicles are always filled with bluish mineral.
COLOR: Gray (N 5/).
STRUCTURE: Beige-colored streak (2 cm wide); in Piece 6 could be magma-mixing.
ALTERATION: Clay minerals and/or zeolites in vesicles, orthopyroxene coloration might be caused by alteration. Pieces 4, 7, 8 are locally altered to bright green chlorite(?)-rich material. Phenocrysts remain largely unaltered in these areas.
VEINS/FRACTURES: Not present.
ADDITIONAL COMMENTS: Slight variation in phenocryst content and proportion throughout rock.

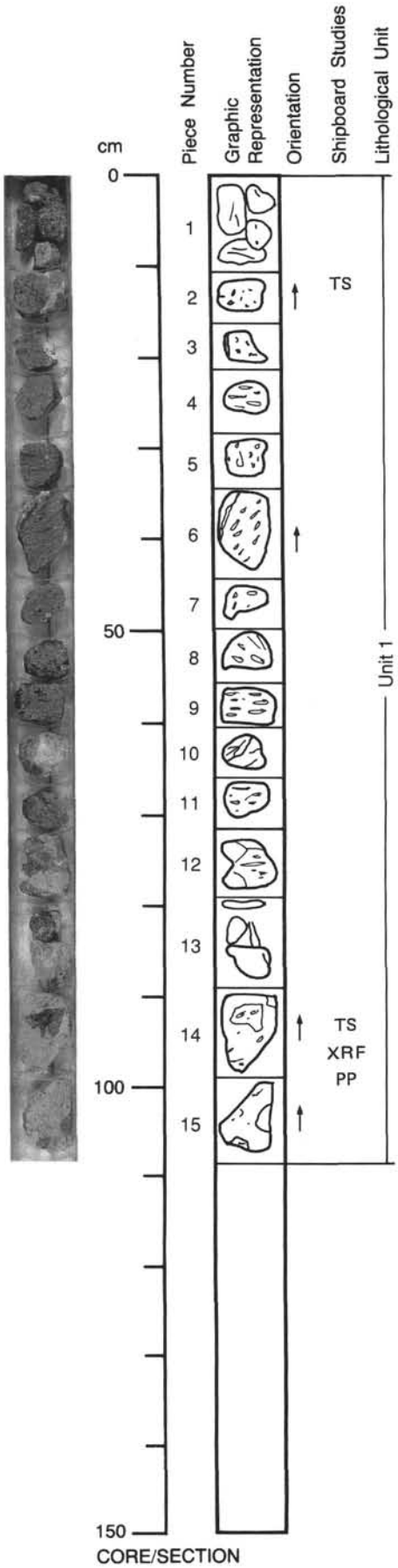


125-786B-2R-1

UNIT 1: BONINITE (786B-1R-1 CONTINUED)

Pieces 1-14

CONTACTS: None visible.
PHENOCRYSTS: Phenocrysts are fresh.
Plagioclase - 10%; <2 mm; euhedral and anhedral, fresh, clear, colorless.
Orthopyroxene - 5%; <1 mm; coke-bottle green, euhedral.
Clinopyroxene - trace; <0.5 mm; anhedral, black glassy.
Olivine - 10%; <2 mm; anhedral, yellow.
GROUNDMASS: Glassy to fine-grained.
VESICLES: 15-25%; <1 cm; round to elongated; distributed throughout rock; vesicles are filled with bluish mineral.
COLOR: Gray (N 5/).
STRUCTURE: Absent.
ALTERATION: Clay minerals and/or zeolites in vesicles; sharp boundaries between green altered rock and gray fresh rock. Rock appears brecciated. Fracture-controlled alteration(?).
VEINS/FRACTURES: 0-90%; cm-wide alteration zones; random orientation; very sharp contact going from altered to fresh rock. Locally highly altered, most pieces do not show green alteration zones.
ADDITIONAL COMMENTS: Section is continuation of 125-786B-1R-1.

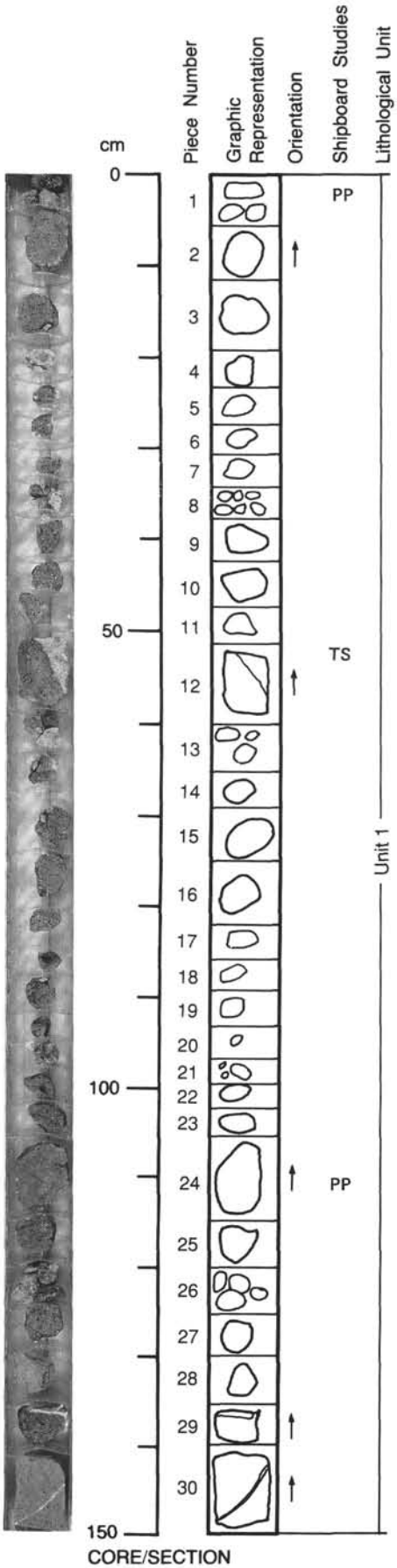


125-786B-3R-1

UNIT 1: BONINITE (786B-2R-1 CONTINUED)

Pieces 1-15

CONTACTS: Not visible.
PHENOCRYSTS: Some variations in phenocryst mode from piece to piece.
Plagioclase - 2-15%; <2 mm; euhedral and anhedral, clear, colorless, fresh.
Orthopyroxene - 5-10%; <2 mm; euhedral, coke-bottle green, fresh.
Olivine - 5-15%; <2 mm; anhedral, yellow, iddingsite.
Clinopyroxene - 1%; <0.5 mm; anhedral, black-glassy, only occurs with olivine in glomerocrysts.
GROUNDMASS: Glassy to finely crystalline.
VESICLES: 15-25%; <1 cm; round to flattened, parallel orientation; distributed throughout; vesicles are filled with bluish zeolite.
COLOR: Gray (N 5/).
STRUCTURE: Absent.
ALTERATION: Alteration zones with sharp transitions to fresh rock (e.g. in Piece 2). Towards bottom (Pieces 12-15) more strongly altered to light gray material.
VEINS/FRACTURES: 0-90%; alteration seems vein controlled; random orientation; alteration is not pervasive but occurs in varying proportions in adjacent pieces.
ADDITIONAL COMMENTS: Section is a continuation of 125-786B-1R-1 and 2R-1.

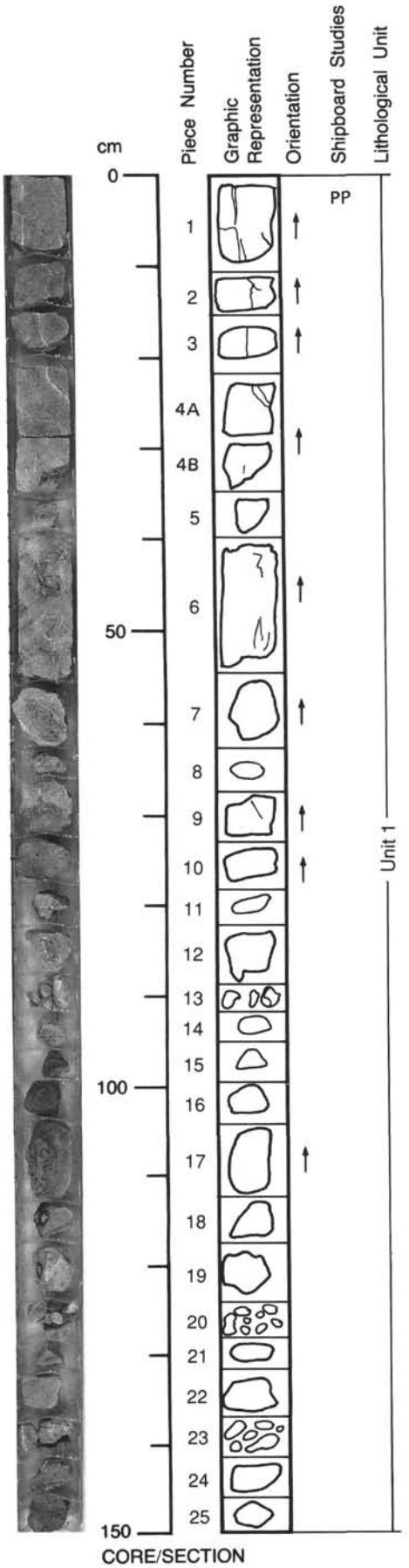


125-786B-4R-1

UNIT 1: BONINITE (3R-1 CONTINUED)

Pieces 1-30

CONTACTS: Not visible.
PHENOCRYSTS: Phenocrysts are fresh.
Plagioclase - 5-15%; <2 mm; euhedral, fresh, colorless.
Orthopyroxene - 5-10%; <2 mm; euhedral, coke-bottle green.
Olivine - 5-15%; <1 mm; anhedral, yellow, in glomerocrysts.
Spinel - 1%; <1 mm; anhedral, included in olivine (glomerocrysts).
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 15-25%; <1 cm; elongated, parallel; distributed throughout; filled with bluish mineral.
COLOR: Gray (N 5/).
STRUCTURE: Absent.
ALTERATION: Locally groundmass is altered and green in color.
VEINS/FRACTURES: Alteration may be fracture-controlled.
ADDITIONAL COMMENTS: Continuation of Core 125-786B-1R-1 to -3R-1.

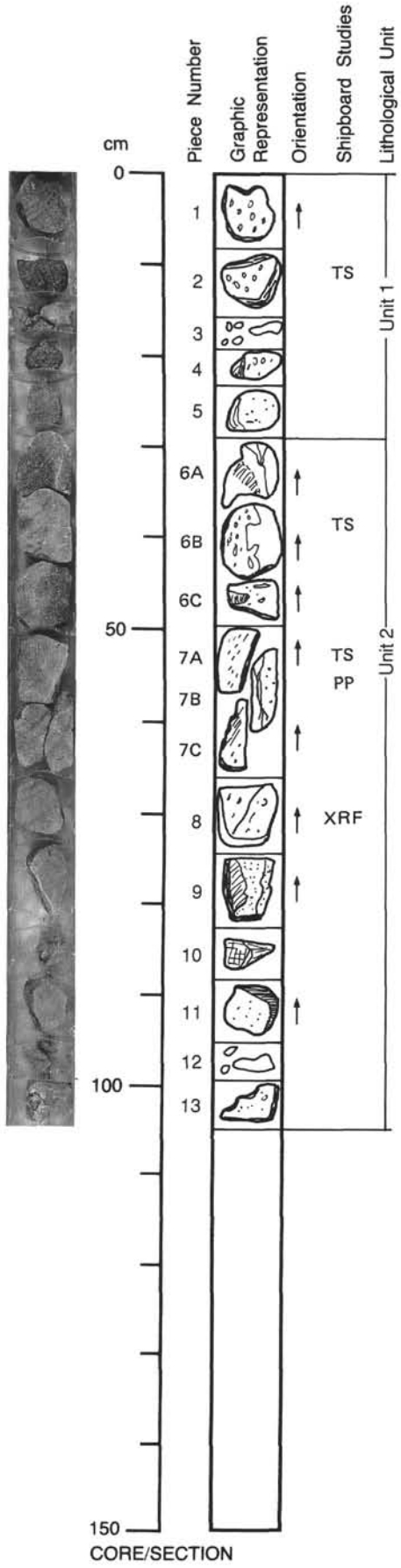


125-786B-5R-1

UNIT 1: TWO-PYROXENE ANDESITE

Pieces 1-25

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of plagioclase and pyroxene are present.
Orthopyroxene - 5-10%; 0.2-1 mm; equant to elongate, bronze to black-brown, euhedral.
Clinopyroxene - 2-5%; 0.2-0.5 mm; equant to elongate, coke-bottle green.
Olivine - trace; 0.8-2 mm; highly altered to orange-brown carbonate/Fe-oxide assemblage.
Plagioclase - 5-10%; 0.3-4 mm; equant, euhedral.
GROUNDMASS: Glassy to fine-grained, variably altered from <10-90%.
VESICLES: 2-7%; <7 mm; elongate; throughout rock; some are filled with light blue amorphous material; often elongated and aligned.
COLOR: Olive-gray to gray (5Y 4/2 - 5Y 5/1).
STRUCTURE: Massive with multiple alteration boundaries.
ALTERATION: Patchy with distinct boundaries between fresh glassy cores and highly altered, coke-bottle green material; cores are 2-5 cm in diameter; alteration minerals give a saussuritized appearance.
VEINS/FRACTURES: <1%; <1-2.5 mm wide; subvertical; calcite and chlorite, most common in Pieces 1-4.
ADDITIONAL COMMENTS: Sharp alteration fronts are unusual, matrix is highly altered and phenocrysts are quite fresh. Rock type is generally a continuation from Cores 1R-1 through 4R-1.



125-786B-5R-2

UNIT 1: TWO-PYROXENE ANDESITE

Pieces 1-5

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of plagioclase and pyroxene are present; most phenocrysts are quite fresh.
Orthopyroxene - 5-10%; 0.2-1 mm; equant to elongate, euhedral, bronze to black-brown.
Clinopyroxene - 2-5%; 0.2-0.5 mm; equant to elongate, coke-bottle green.
Plagioclase - 5-10%; 0.3-4 mm; equant, euhedral.
Olivine - trace; 0.8-2 mm; highly altered to orange-brown carbonate/Fe-oxide assemblage.
GROUNDMASS: 80-85%, glassy to fine-grained, variably altered to a brown (hydrothermal?) appearance.
VESICLES: 10-15%; 1-5 mm; irregular and smooth; throughout; some vesicles are filled with amorphous light-blue material.
COLOR: Light yellowish brown to yellowish brown (10YR 6/4-5/4) for the altered portions; very dark gray to black (2.5Y 4/0-2/0) for the fresh portions.
STRUCTURE: Massive.
ALTERATION: Variable 5->50%; primarily brown clays.
VEINS/FRACTURES: >>1%; 3-4 mm by 7 mm; no orientation; only Piece 1 has an elongate patch of carbonate vein.
ADDITIONAL COMMENTS: Alteration in this part of the core is distinct from Core 5R-1; all alteration here is brown and amorphous; mineralogically this is a continuation from Core 1R-1 through 5R-1.

UNIT 2: TWO-PYROXENE ANDESITE/OLIVINE PHYRIC BASALT

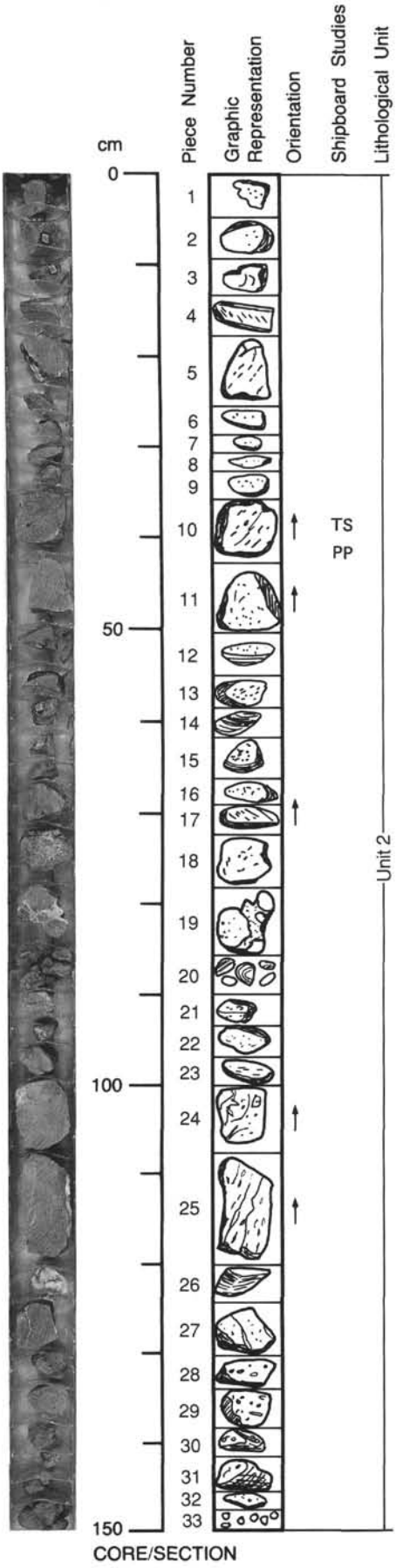
Pieces 6A, B, C; 7A, B, C

CONTACTS: Contorted; appear to result from magma mixing between the two rock types.
PHENOCRYSTS: Assemblage varies between the two rock types.
Orthopyroxene - 5-10%; 0.1-1 mm; equant to elongate, euhedral, bronze to dark brown; similar in both rock types but smaller and less abundant (trace) in basalt segment.
Clinopyroxene - 2-5%; 0.2-0.5 mm; equant to elongate; coke-bottle green; similar but smaller (<0.2 mm) and less abundant (<1%) in basalt segment.
Plagioclase - 5-10%; 0.3-4 mm; equant; euhedral microphenocrysts (<0.1mm; <1%) in basalt segment.
Olivine - 5-7%; 0.5-2 mm; euhedral, altering to carbonate and Fe/oxides; none present in andesite; Cr-spinel inclusions; olivine only present in basalt.
GROUNDMASS: Basalt contains light brown glass with quench crystals of feldspar and pyroxene.
VESICLES: 5-10%; <0.5 - 4 mm; irregular; throughout; some are filled with a pale blue amorphous material.
COLOR: Alteration/compositional boundary is light yellow brown (2.5Y 5/4); bulk of rock is light yellowish-brown to grayish brown (2.5Y 6/4 - 5/2).
STRUCTURE: Massive with the exception of the compositional/alteration boundary.
ALTERATION: Variable <10-65%; two patches (2-4 cm in diameter) of the andesite are fresh and black the remainder is brown and altered to clays.
VEINS/FRACTURES: <1%; <1-2.5 mm; random to sub-parallel to core axis; mostly carbonate but some proportion of other white material.
ADDITIONAL COMMENTS: This is a boundary between Cores 1R-1 through 5R-1, Pieces 1-5, and below.

UNIT 2: OLIVINE PHYRIC BASALT

Pieces 8-13

CONTACTS: None visible.
PHENOCRYSTS:
Olivine - 5-7%; 0.2-2.5 mm; euhedral, slightly elongate, altering to carbonate/Fe-oxide assemblage; inclusions of Cr-spinel.
Clinopyroxene - 2-3%; 0.1-1 mm; equant, euhedral.
Orthopyroxene - trace; <1 mm; euhedral.
Plagioclase - 1%; <1 mm; euhedral laths.
GROUNDMASS: Glassy, light brown with quench crystals of feldspar and pyroxene.
VESICLES: 4-7%; 1-4 mm; irregular, elongate; throughout but locally concentrated; locally they trend in parallel strings.
COLOR: Light yellowish brown to grayish brown (2.5Y 6/4 - 5/2).
STRUCTURE: Massive.
ALTERATION: Alteration is relatively consistent throughout at 40-60%, altering to brown amorphous clays.
VEINS/FRACTURES: <1%; 0.5 - 4 mm; sub-parallel to core axis, random; vein-filling is white carbonate material probably mixed with another white phase (zeolite?).
ADDITIONAL COMMENTS: This rock type is a continuation of the basaltic portion of 5R-2 Pieces 6 and 7.



125-786B-6R-1

UNIT 2: OLIVINE PHYRIC BASALT (CONTINUATION OF 5R-2, PIECES 8-13)

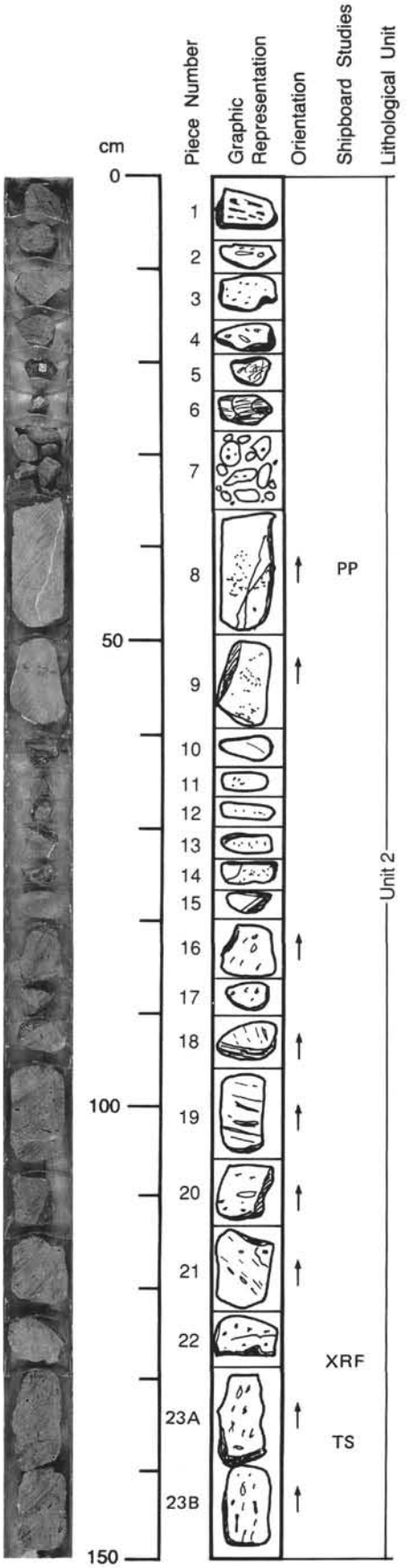
Pieces 1-25, 27-33

CONTACTS: None visible.
PHENOCRYSTS:
Olivine - 5-7%; 0.2-2.5 mm; euhedral, slightly elongate, altering to carbonate/Fe-oxide assemblage, inclusions of Cr-spinel.
Clinopyroxene - 2-3%; 0.1-1 mm; equant, euhedral.
Orthopyroxene - trace; <1 mm; euhedral.
Plagioclase - 1%; <1 mm; laths, euhedral.
GROUNDMASS: Glassy, light brown with quench crystals of feldspar and pyroxene.
VESICLES: 4-7%; 1-4 mm; irregular, elongate; throughout but locally concentrated; some alignment of elongate vesicles.
COLOR: Light yellowish brown to grayish brown (2.5Y 6/4 - 5/2).
STRUCTURE: Massive.
ALTERATION: Consistent throughout at 40-60%, consisting of brown amorphous clays; Piece 19 has red-orange (hematite?) alteration.
VEINS/FRACTURES: <1-1%; 0.5-3.5 mm; random, some preference for sub-parallel; white, amorphous predominantly carbonate with a second phase of an unknown white mineral (zeolite?).
ADDITIONAL COMMENTS: This rock type is continuous with Core 5R-2, Pieces 8-12.

UNIT 2: ZEOLITE (?)

Piece 26

CONTACTS: None.
PHENOCRYSTS: Not a volcanic sample.
GROUNDMASS: Not applicable.
VESICLES: None.
COLOR: White with streaks of olive green (5Y 5/3) along the edge.
STRUCTURE: Massive.
ALTERATION: Probably a piece of nearly pure (95%) zeolite.
VEINS/FRACTURES: May be a fragment of a large vein.
ADDITIONAL COMMENTS: Probably a zeolite, appears to be similar to the white vein filling phase in the surrounding volcanics, this piece is approximately 1x3x3 cm.

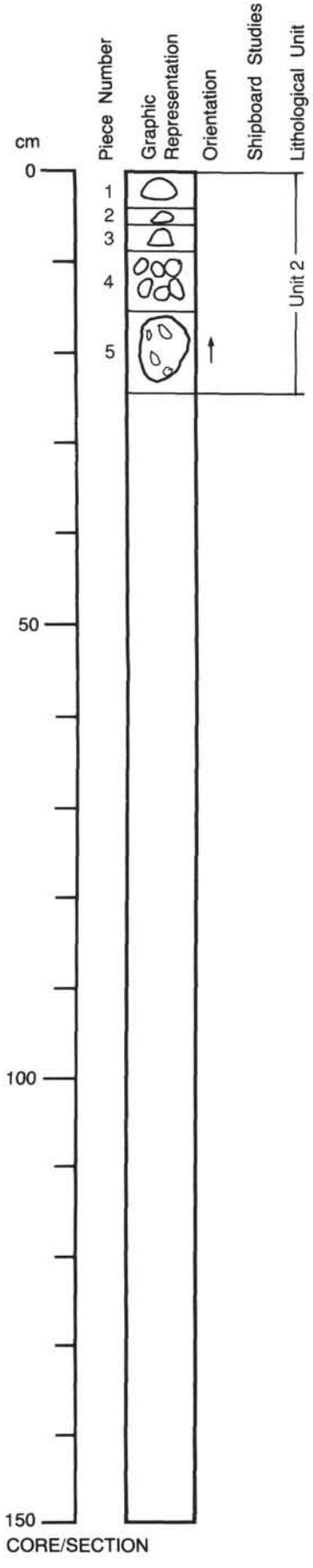


125-786B-6R-2

UNIT 2: OLIVINE PHYRIC BASALT (CONTINUATION OF CORE 6R-1)

Pieces 1-23

CONTACTS: None.
PHENOCRYSTS:
Olivine - 5-7%; 0.2-2.5 mm; euhedral, slightly elongate altering to carbonate/Fe-oxide/zeolite assemblage; inclusions of Cr-spinel.
Clinopyroxene - 2-3%; 0.1-1 mm; euhedral.
Orthopyroxene - trace; <1 mm; equant, euhedral.
Plagioclase - 1%; <1 mm; euhedral laths.
GROUNDMASS: Glassy, light yellow-brown, with quench crystals of feldspar and pyroxene.
VESICLES: <2-12%; 0.5 - 8 mm; irregular to elongate and oval; throughout but locally concentrated; Pieces 1-4, 20-23 have 10-15% vesicles of 2-8 mm diameters, some pieces have aligned vesicles; Pieces 19-20 and 23 have vesicles aligned perpendicular to core axis.
COLOR: Fresh portions are gray to dark gray (2.5Y 5/0 - 4/0); altered portions are yellowish brown to grayish brown (2.5Y 6/4 - 5.2).
STRUCTURE: Massive.
ALTERATION: Variable, Pieces 1-17 have 20-50% alteration to brown amorphous clays, Pieces 18-23 are much fresher with <10% alteration.
VEINS/FRACTURES: <1%; 1-3 mm; sub-parallel to core axis; filled with white amorphous carbonate and zeolite(?).
ADDITIONAL COMMENTS: This rock is a continuation of Cores 5R-2, Pieces 8-12 and 5R-1.

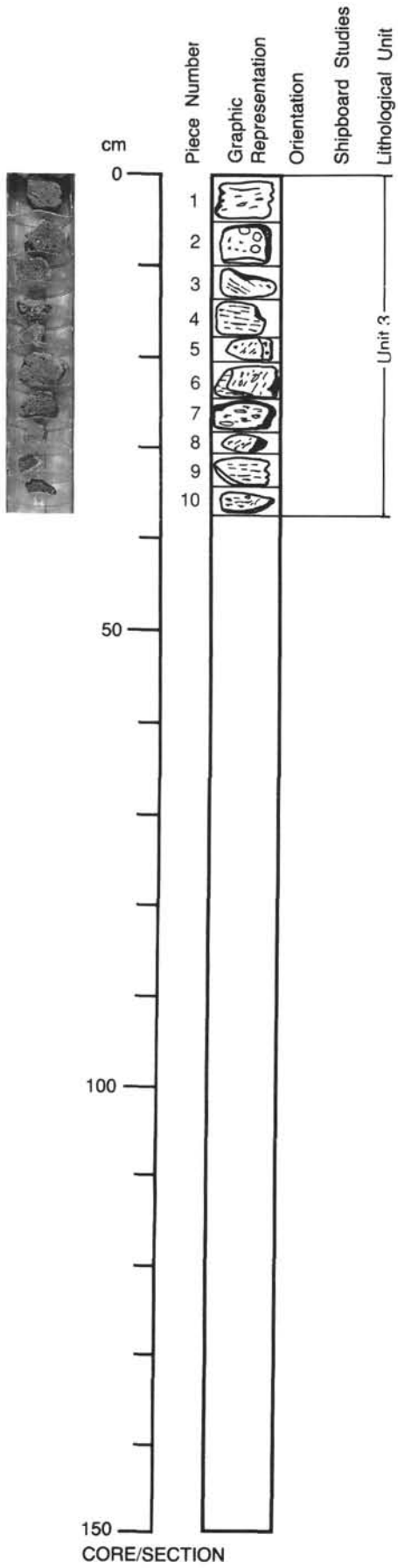


125-786B-6R-3

UNIT 2: OLIVINE PHRYIC BASALT (CONTINUATION OF CORE 6R-2)

Pieces 1-5

CONTACTS: None visible.
PHENOCRYSTS:
Olivine - 5-7%; 0.2-2.5 mm; euhedral, slightly elongate, altering to carbonate/Fe-oxide/zeolite assemblage; inclusions of Cr-spinel.
Clinopyroxene - 2-3%; 0.1-1 mm; equant, euhedral.
Orthopyroxene - trace; <1 mm; euhedral.
Plagioclase - 1%; <1 mm; euhedral.
GROUNDMASS: Glassy, light yellow-brown, with quench crystals of feldspar and pyroxene.
VESICLES: 2-10%; 1-8 mm; irregular to elongate and oval; throughout, locally concentrated; alignment of large vesicles in Piece 5 at a 40 degree angle to core axis.
COLOR: Light yellowish brown to grayish brown (2.5Y 6/4 - 5/2).
STRUCTURE: Massive.
ALTERATION: Variable, but usually less than 20%, to brown amorphous clays.
VEINS/FRACTURES: None in these pieces.
ADDITIONAL COMMENTS: This rock type is continuous with Core 5R-2, Pieces 8-12, through 6R-2.

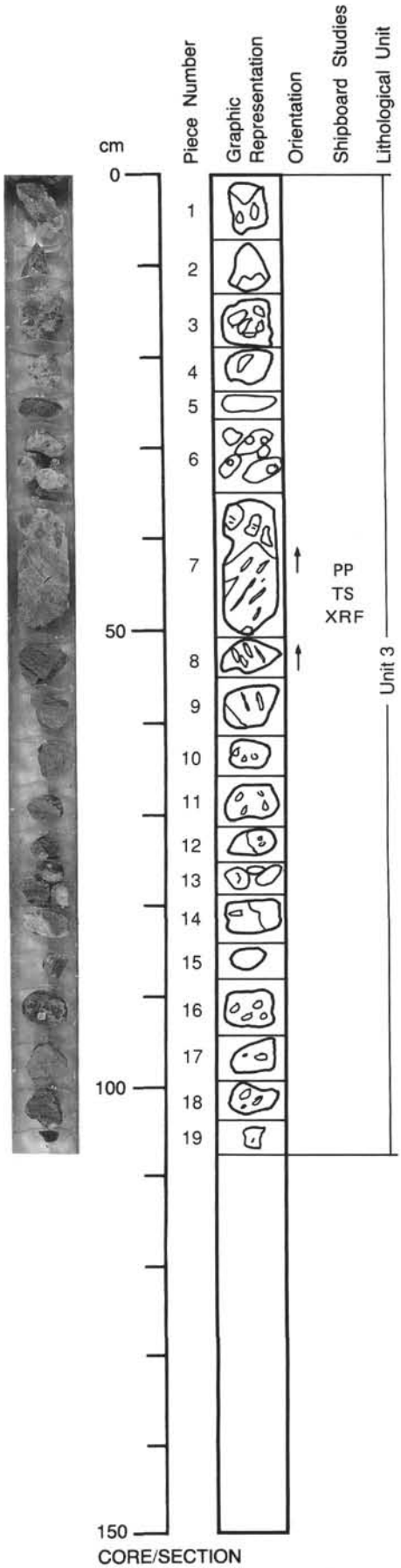


125-786B-7R-1

UNIT 3: PYROXENE PHYRIC ANDESITE

Pieces 1-10

CONTACTS: None visible.
PHENOCRYSTS:
Clinopyroxene - 1-3%; 0.2-0.8 mm; euhedral, elongate to equant.
Orthopyroxene - 1-2%; 0.2-0.6 mm; euhedral to subhedral, elongate to equant.
Plagioclase - 1%; <0.1-0.4 mm; subhedral laths.
GROUNDMASS: Fine-grained with quench crystals of plagioclase.
VESICLES: 5-15%; 1-8 mm; round to irregular; throughout but locally concentrated; elongate vesicles are aligned especially in Piece 1.
COLOR: Fresh portions are gray (2.5Y 6/0-5/0), altered portions are dark grayish brown (2.5Y 5/2).
STRUCTURE: Massive.
ALTERATION: Variable <10-40% to brown amorphous clays; also rinds of green, coarse-grained sand(?) with small clasts (1-2 mm) of rock.
VEINS/FRACTURES: None present.
ADDITIONAL COMMENTS: Rock is relatively fresh.

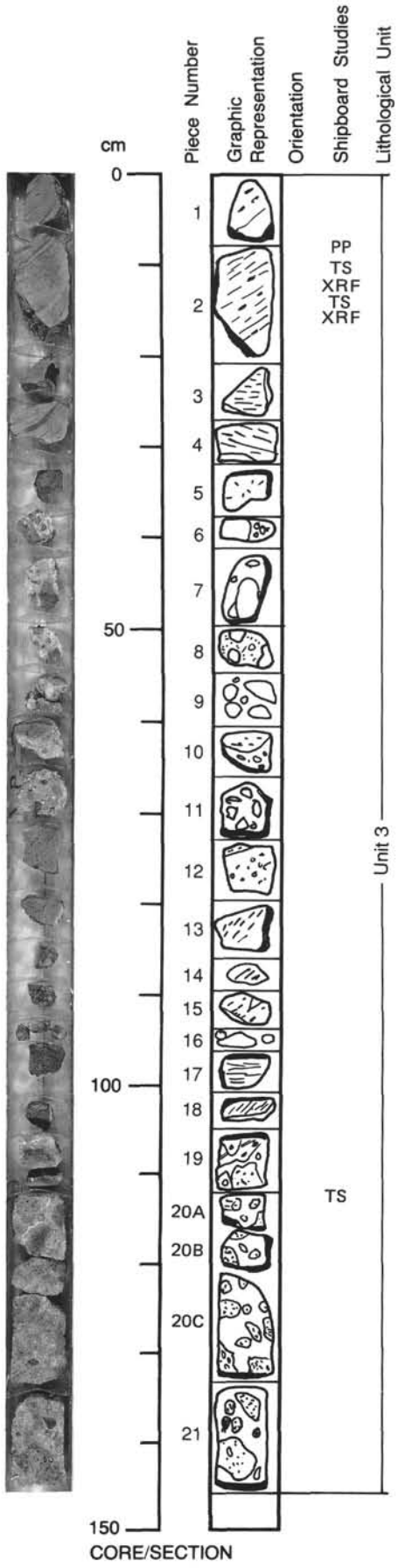


125-786B-8R-1

UNIT 3: PYROXENE PHYRIC ANDESITE (CONTINUATION OF CORE 7R-1) BRECCIA

Pieces 1-19

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of clinopyroxene and orthopyroxene.
Clinopyroxene - 3-5%; 0.1-0.5 mm; equant, euhderal.
Orthopyroxene - 1-2%; 0.1-0.3 mm; equant, subhedral plagioclase - 4-5%; <0.2 mm; laths, euhedral.
GROUNDMASS: Very fine-grained to glassy with quench crystals of plagioclase and pyroxene.
VESICLES: 2-15%; 1-22 mm; elongate, stretched; throughout, locally concentrated; most are aligned and stretched approximately sub-parallel to the core axis.
Miaroles: Green crystalline (sand, alteration?).
COLOR: Dark gray to light gray (2.5Y N7/0 - N4/0) in fresh rock to grayish green (5G 4/2) in breccia rinds.
STRUCTURE: "Brecciated" texture between black fresh rock and green alteration/sand rinds and breccia matrix, brecciation in some pieces appears to be in situ.
ALTERATION: Green rinds containing pyroxene, olivine, and plagioclase fragments, 1-3 mm thick probably locally derived.
VEINS/FRACTURES: <<1%; <1 mm; 45 degrees to core axis; fracture in Piece 7 perpendicular to elongate vesicles.
ADDITIONAL COMMENTS: This rock appears to be a continuation of Core 7R-1 but the brecciated texture was not preserved in 7R-1.

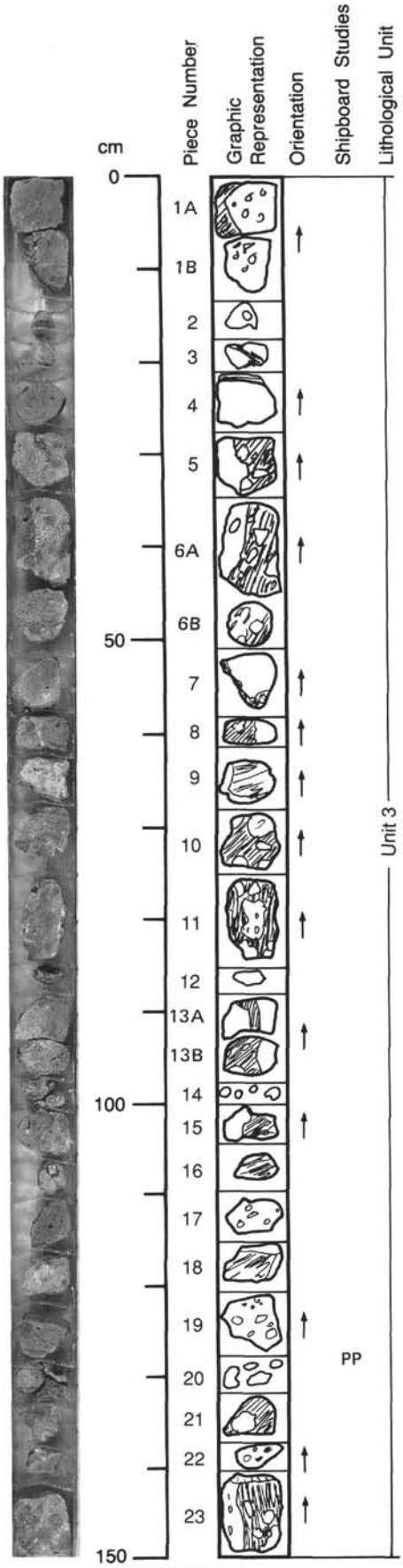


125-786B-9R-1

UNIT 3: PYROXENE PHYRIC ANDESITE BRECCIA (CONTINUATION OF 8R-1)

Pieces 1-21

CONTACTS: None visible.
PHENOCRYSTS:
Clinopyroxene - 3-5%; 0.1-0.5 mm; equant, euhedral.
Orthopyroxene - 1-2%; 0.1-0.3 mm; equant, subhedral.
Plagioclase - 4-5%; <0.2 mm; laths, euhedral.
GROUNDMASS: Very fine-grained to glassy with quench crystals of plagioclase and pyroxene, green matrix material is coarse-grained (1-3 mm) and appears to comprise pyroxene, olivine and plagioclase grains.
VESICLES: 1-8%; <1-3; round to elongate; throughout, locally dense; pieces 1-5 are nearly vesicle free (<1-1%, <1-1 mm); pieces lower in the section are rounder, larger and have a higher proportion of vesicles.
COLOR: From dark gray to light gray (2.5Y N7/0 - N4/0) in basalt to grayish green (5G 4/2) in breccia matrix.
STRUCTURE: "Brecciated" texture between black fresh rock and green sandy alteration matrix material, brecciation in some pieces appears to be in situ.
ALTERATION: Green rinds and matrix are composed of pyroxene, olivine, and plagioclase fragments, (1-3 mm across) probably locally derived.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: This rock appears to be a continuation of Cores 7R-1- 8R-1.



125-786B-9R-2

UNIT 3: PYROXENE PHYRIC ANDESITE BRECCIA (CONTINUATION OF 9R-1)

Pieces 1-23

CONTACTS: None visible.

PHENOCRYSTS: Glomerocrystic patches with plagioclase, ortho-, and clinopyroxene.
Clinopyroxene - 3-6%; 0.1-0.5 mm; equant, dark-green, euhedral.
Orthopyroxene - 2-4%; 0.1-0.3 mm; equant yellow-brown, euhedral.
Plagioclase - 3-5%; <0.2 mm; euhedral laths.

GROUNDMASS: Very fine-grained to glassy with quench feldspar and pyroxene; green matrix material is coarse-grained and appears to comprise pyroxene and feldspar grains cemented by green and white zeolites.

VESICLES: 1-10%; <0.2 - 3 mm; spherical - elongate; variable from clast to clast.

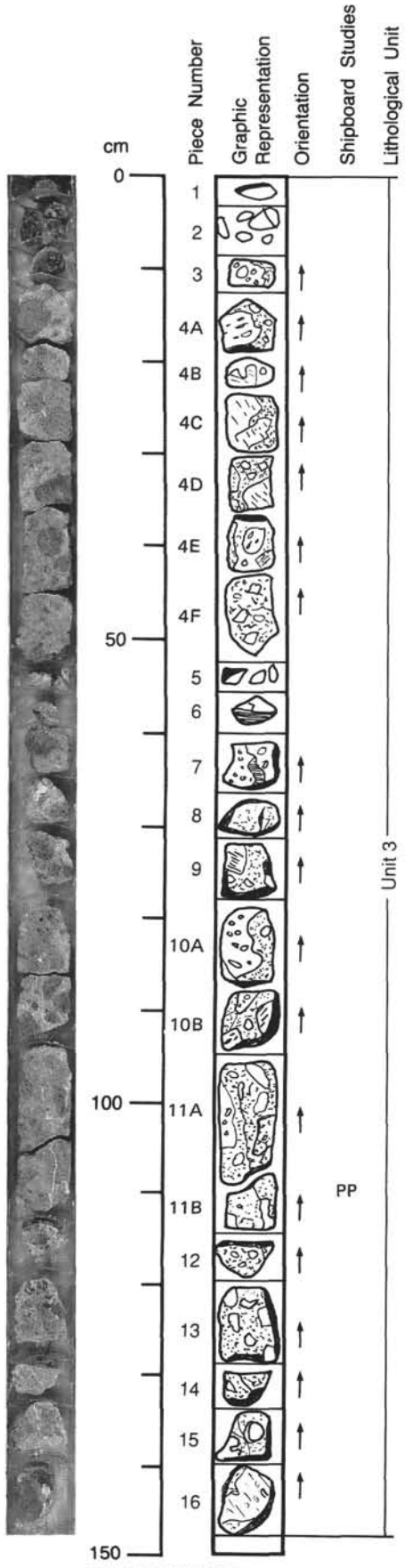
COLOR: Basalt is dark to light gray (2.5Y N7/0 - N4/0); breccia matrix is grayish green (5G 4/2).

STRUCTURE: Brecciated texture.

ALTERATION: Clasts have alteration rinds 0-1.5 mm thick. The matrix is composed of orthopyroxene, clinopyroxene, plagioclase and glass; these phases are angular, 1-3 mm in size. The glass is altered and the matrix as a whole is cemented by a green and white zeolite clay phase.

VEINS/FRACTURES: <1%; <0.5 - 1 mm wide; random; vein-filling is white zeolite cutting both matrix and clasts.

ADDITIONAL COMMENTS: This lithology has different types of clasts ranging from pale gray pumice to dark basalt. The degree of pervasive alteration of the clasts is highly variable.



125-786B-10R-1

UNIT 3: ANDESITE BRECCIA

Pieces 1-16

CONTACTS: Not visible.

PHENOCRYSTS: Phenocrysts also occur in breccia matrix.
Orthopyroxene - 5-10%; <2 mm; glass-green (euhedral) and yellow, altering to orange brown (anhedral). Probably two orthopyroxene varieties present.
Clinopyroxene - 2-5%; <2 mm; dark-green to black, glassy. Often associated with yellow orthopyroxene in glomerocrysts.
Plagioclase - 0-5%; <1 mm; euhedral, clear, colorless; also in glomerocrysts with orthopyroxene.
Olivine - 0-1%; <2 mm; euhedral, but altered to red and white, also occurs in xenolith and then contains nearly opaque Cr-spinel.

GROUNDMASS: In breccia clasts; glassy to finely crystalline.

VESICLES: 10-20%; < 1 cm; round to parallel or elongated; randomly distributed throughout; breccia matrix does not contain vesicles; some have bluish coating.

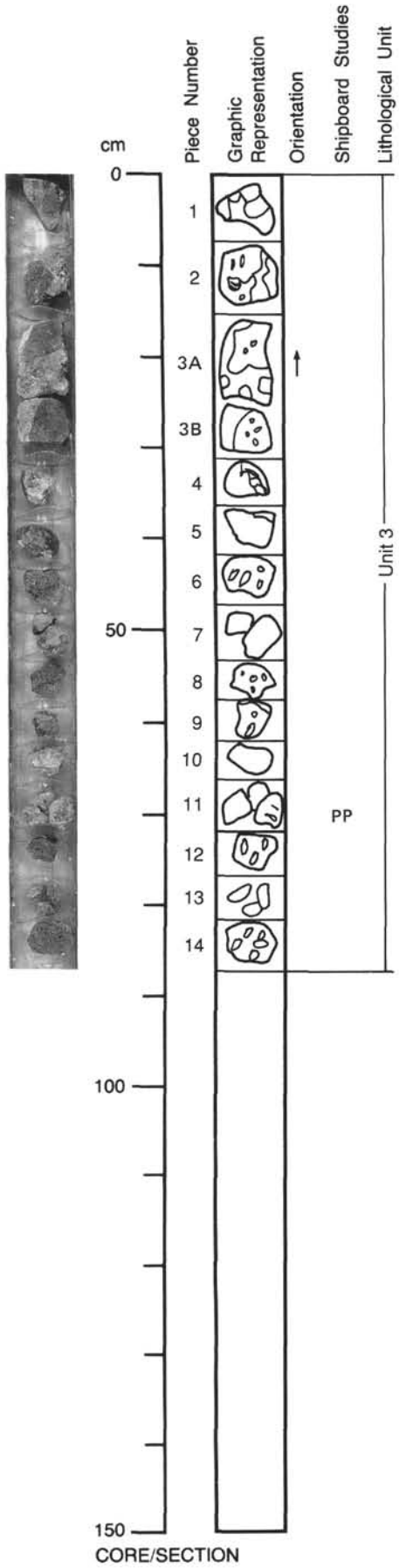
COLOR: Beige to gray (10YR 6/2 to 7.5YR 5/0) for andesite; green for breccia matrix.

STRUCTURE: Matrix-supported breccia.

ALTERATION: Andesite clasts alter to greenish matrix-like product but clast-matrix boundaries are distinct (e.g. in Piece 4C).

VEINS/FRACTURES: Trace; 1-5 mm; fractures in clasts only; random orientation; alteration of clasts seems to occur along fractures and clast surfaces.

ADDITIONAL COMMENTS: Evidence for brecciation: 1) clasts have different phenocryst modes than matrix; 2) vesicles in different clasts have different orientations but are parallel within a single clast; 3) sharp clast-matrix boundaries sometimes show reaction rim in clasts; 4) vesicles at clast rims are filled with matrix; 5) matrix is not vesicular.
ADDITIONAL SPARSE CLASTS: Microlith of 1) olivine (with almost opaque Cr-spinel inclusions + orthopyroxene + clinopyroxene); 2) Orthopyroxene + clinopyroxene (Piece 3); 3) Olivine (with spinel incl.) + orthopyroxene (Piece 3); and 4) others, including pumice. Some large clasts are almost to completely plagioclase free and olivine is rare in all clasts and often absent.

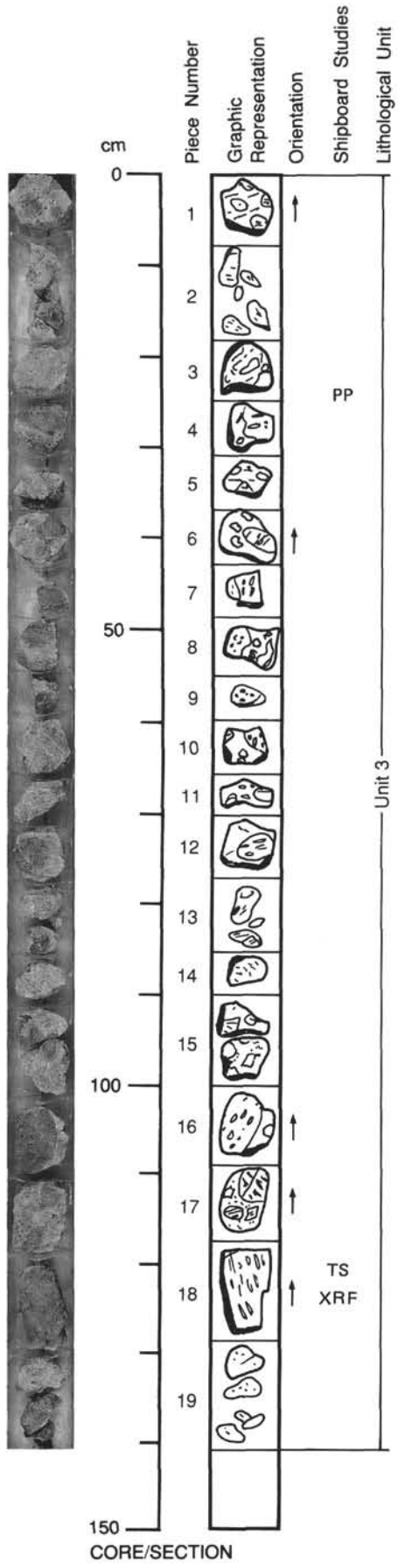


125-786B-10R-2

UNIT 3: ANDESITE BRECCIA (10R-1 CONTINUED)

Pieces 1-14

CONTACTS: Not visible.
PHENOCRYSTS: Microlith of orthopyroxene + clinopyroxene of 1 cm size in Piece 3B; phenocrysts also occur in breccia matrix where orthopyroxene is dominant.
Orthopyroxene - 8-15%; <2 mm; glass-green (euhedral), yellow to brown (anhedral).
Clinopyroxene - 2-4%; <1 mm; black, glassy, with yellow.
Orthopyroxene; Anhedral.
Plagioclase - 0-5%; <2 mm; euhedral to anhedral.
Olivine - trace; <1 mm; reddish alteration (olivine occurs in very few pieces only).
GROUNDMASS: Fine-grained to glassy in clasts, less glass than in 10R-1.
VESICLES: 5-15%; <1 cm; sub-round to parallel or elongated; randomly distributed.
COLOR: Gray (7.5 YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
1%; 1-5 mm; along clast rim; white, soft, not carbonate (zeolite?).
ADDITIONAL COMMENTS: Altered olivine only in matrix; matrix is poorly packed; matrix grain-size is larger (0-2 cm) than in 10R-1; voids along clast boundaries filled with sugary greenish colloform substance; light-blue and gray material (zeolite?) in clasts.



125-786B-11R-1

UNIT 3: ANDESITE BRECCIA (10R-2 CONTINUED)

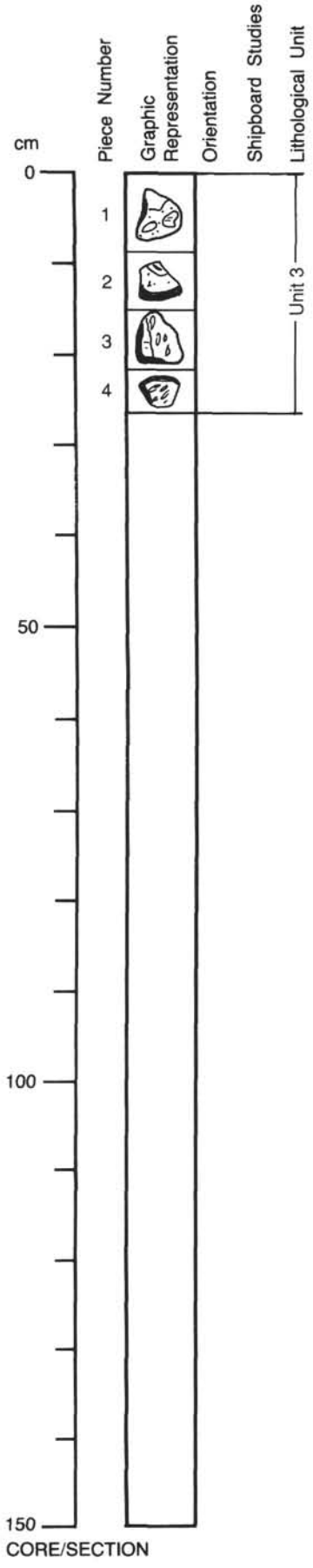
Pieces 1-14

CONTACTS: Not visible.
PHENOCRYSTS: Plagioclase and orthopyroxene microlith in Piece 7; orthopyroxene, clinopyroxene and plagioclase microlith in Piece 12.
Orthopyroxene - 8-15%; <2 mm; glass-green (euhedral), yellow to brown (anhedral).
Clinopyroxene - 2-4%; <1 mm; black, glassy, with yellow.
Orthopyroxene; anhedral.
Plagioclase - 0-5%; <2 mm; euhedral and anhedral.
Olivine - trace; <1 mm; reddish alteration (olivine occurs in vary few pieces only).
GROUNDMASS: In clasts: fine-grained to glassy; less glass than in 10R-1.
VESICLES: 5-15%; <1 mm; sub-round to parallel, elongated; randomly distributed.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; along clast rim; vein filling is white, soft, not carbonate (zeolite?).
ADDITIONAL COMMENTS: Matrix grain size is 0-2 cm; section is a continuation of 125-786B-8R-1.

UNIT 3: BASALT BRECCIA

Pieces 15-19

CONTACTS: Not visible.
PHENOCRYSTS:
Orthopyroxene - 2%; <2 mm; euhedral and anhedral, glass-green.
Clinopyroxene - 3%; <1 mm; black as individual phenocryst and with orthopyroxene in glomerocrysts.
Plagioclase - 5%; <2 mm; anhedral.
Olivine - 1%; <1 mm; reddish, altered.
GROUNDMASS: In clast: fine-grained to glassy, less glass than in 10R-1
VESICLES: 5-15%; <1 cm; subround to parallel elongated; randomly distributed.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2).
STRUCTURE: Breccia.
ALTERATION: Clasts alter to matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; along clast; vein filling is white, soft, not carbonate (zeolite?.)
ADDITIONAL COMMENTS: Altered olivine only in matrix; matrix is poorly packed; matrix grain-size is 0-2 cm; voids along clast boundaries; voids filled with sugary greenish colliform substance; light-blue and gray zeolites/clay in clasts.

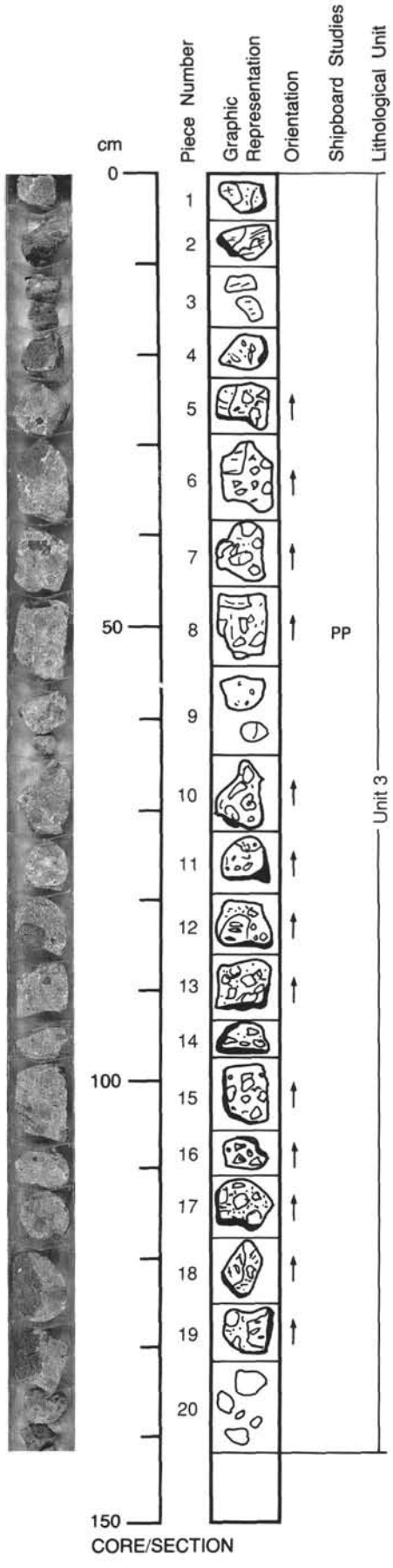


125-786B-11R-2

UNIT 3: BASALT BRECCIA (11R-1, PIECES 15-19 CONTINUED)

Pieces 1-4

CONTACTS: Not visible.
PHENOCRYSTS:
Orthopyroxene - 2%; <2 mm; euhedral and anhedral, glass-green.
Clinopyroxene - 3%; <1 mm; euhedral, black, as individual phenocrysts; with orthopyroxene in glomerocrysts.
Plagioclase - 5%; <2 mm; anhedral.
Olivine - 1%; <1 mm; reddish, altered.
GROUNDMASS: In clasts, fine-grained to glassy.
VESICLES: 5-15%; <1 cm; subrounded to parallel elongated; randomly distributed.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; along clast rim; vein filling is white, soft, not carbonate (zeolite?).
ADDITIONAL COMMENTS: Groundmass of breccia matrix locally cellular structure within clasts; walls are green, filling is white; green tubules also present; amount of green material varies from 10-95%; at high % it looks like phenocrysts in green groundmass; coarse-grained breccia groundmass with voids caused by poor packing.

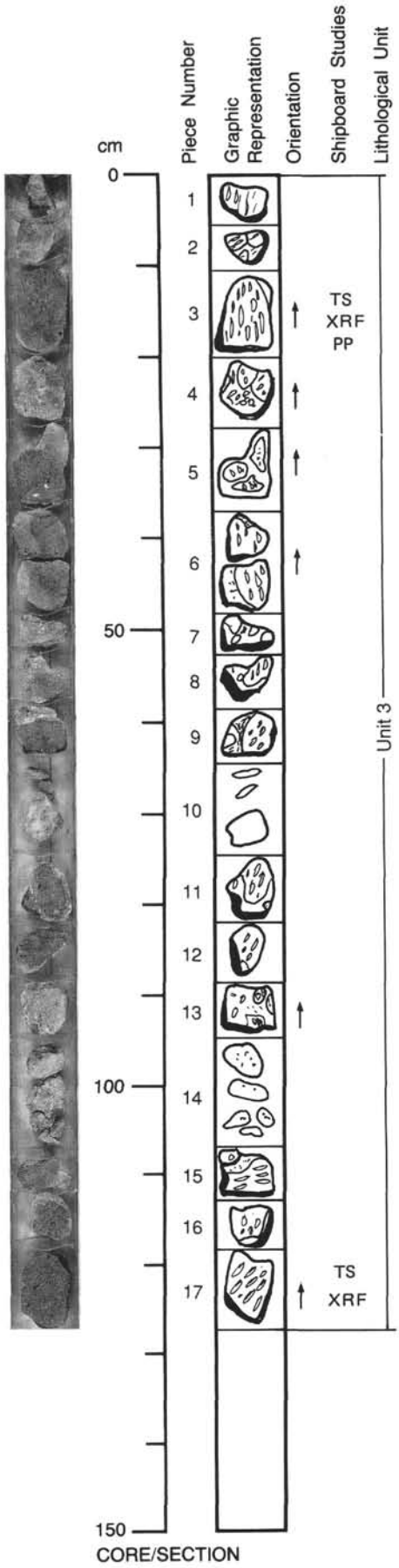


125-786B-12R-1

UNIT 3: BASALT BRECCIA (11R-2 CONTINUED)

Pieces 1-20

CONTACTS: Not visible.
PHENOCRYSTS:
Orthopyroxene - 2%; <2 mm; euhedral and anhedral; glass-green.
Clinopyroxene - 3%; <1 mm; euhedral; black; as individual phenocrysts and with orthopyroxene in glomerocrysts.
Plagioclase - 5%; <2 mm; anhedral.
Olivine - 1%; <1 mm; reddish, altered.
GROUNDMASS: In clasts: fine-grained to glassy.
VESICLES: 5-15%; <1 cm; subrounded to parallel elongated; randomly distributed.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; along clast rim; vein filling is white, soft, not carbonate (zeolite?).
ADDITIONAL COMMENTS: Groundmass of breccia matrix has locally cellular structure within clasts; walls are green, filling is white; also green tubules present; amount of green material varies from 10-95%; at high % maybe phenocrysts in green groundmass; coarse-grained breccia groundmass with voids caused by poor packing; Pieces 18 and 19 contain very glassy clasts, consisting of plagioclase 5%, orthopyroxene 5%, and clinopyroxene trace; different clasts (very dark grayish-brown, 2.5Y 3/2) also occur in Pieces 6-17 and consist of plagioclase 10%, clinopyroxene 5%, and orthopyroxene trace %.

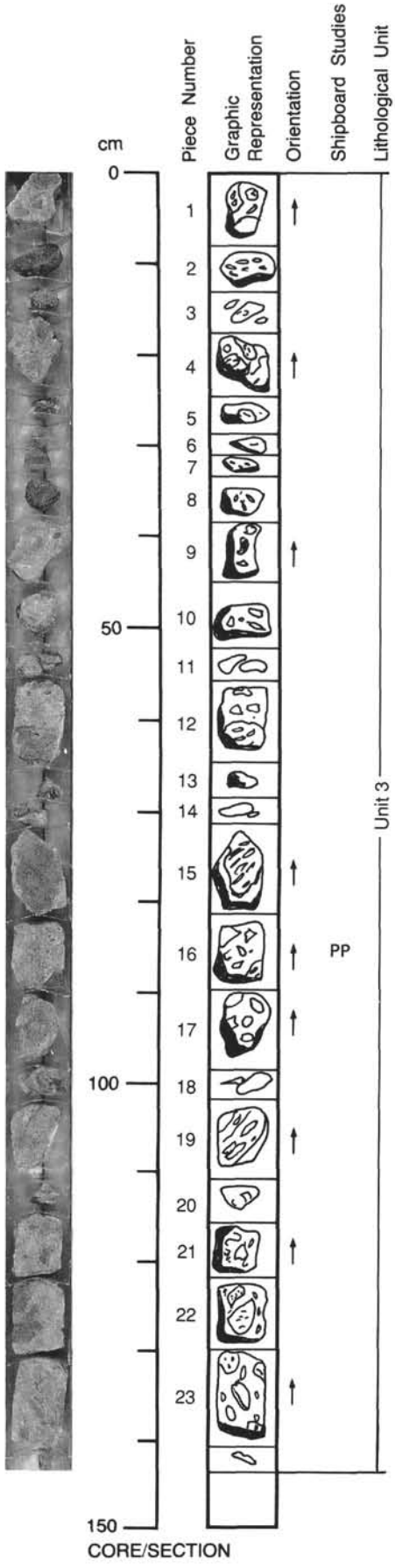


125-786B-12R-2

UNIT 3: BASALT BRECCIA

Pieces 1-17

CONTACTS: Not visible.
PHENOCRYSTS: Contains glomerocrysts of clinopyroxene + plagioclase, clinopyroxene + orthopyroxene, olivine + clinopyroxene.
Plagioclase - 5-8%; 1-4 mm; rounded, anhedral and euhedral; shows poikilitic texture with clinopyroxene.
Clinopyroxene - 2-8%; <2 mm; euhedral in individual crystals.
Orthopyroxene - tr-2%; <1 mm; yellow, anhedral, glomerocrystic.
GROUNDMASS: Glassy to finely crystalline in clasts; coarse-grained cellular altered clasts and fines with few voids in breccia.
VESICLES: 5-15%; <1 cm; subrounded to parallel elongated; randomly distributed.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; random; vein filling is white, soft, not carbonate, zeolite (?).
ADDITIONAL COMMENTS: Pieces 8-17 have more phenocrysts (up to 30% with plagioclase 15%) and plagioclase microphenocrysts; some pieces (9, 12, 15, 16) consist almost entirely of greenish matrix.

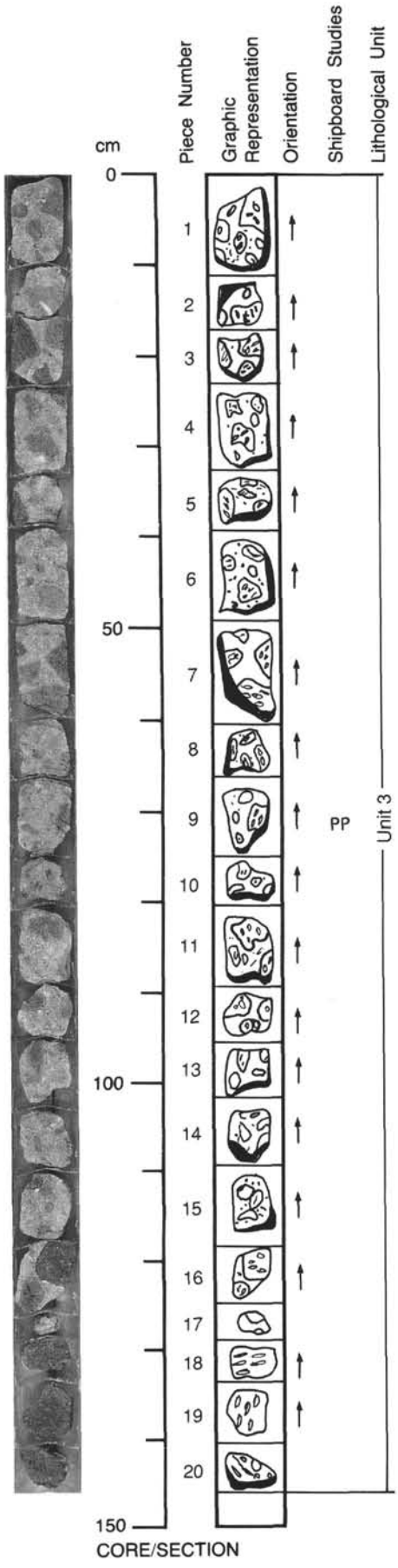


125-786B-13R-1

UNIT 3: BONINITE BRECCIA

Pieces 1-23

CONTACTS: Not visible.
PHENOCRYSTS:
Plagioclase - 10-15%; 1-4 mm; rounded, euhedral.
Orthopyroxene - 0-10%; <1 mm; yellow, anhedral.
Clinopyroxene - trace; <2 mm; euhedral, individual crystal; shows poikilitic texture with plagioclase.
GROUNDMASS: Glassy in clasts; coarse-grained in breccia; cellular altered clasts and fines; few voids.
VESICLES: 5-15%; <1 cm; subrounded to parallel elongated; randomly distributed; filled with bluish minerals.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; random; vein-filling is white, soft, not carbonate, zeolite(?).
ADDITIONAL COMMENTS: In addition to common clasts, Pieces 12, 15, 22 and 23 contain plagioclase microphenocrysts in groundmass; Piece 21 (black clast) is glassy, and contains phenocrysts of clinopyroxene 2%, plagioclase trace % and orthopyroxene trace %; some clasts have alteration rims with matrix occupying 70% of total rock.

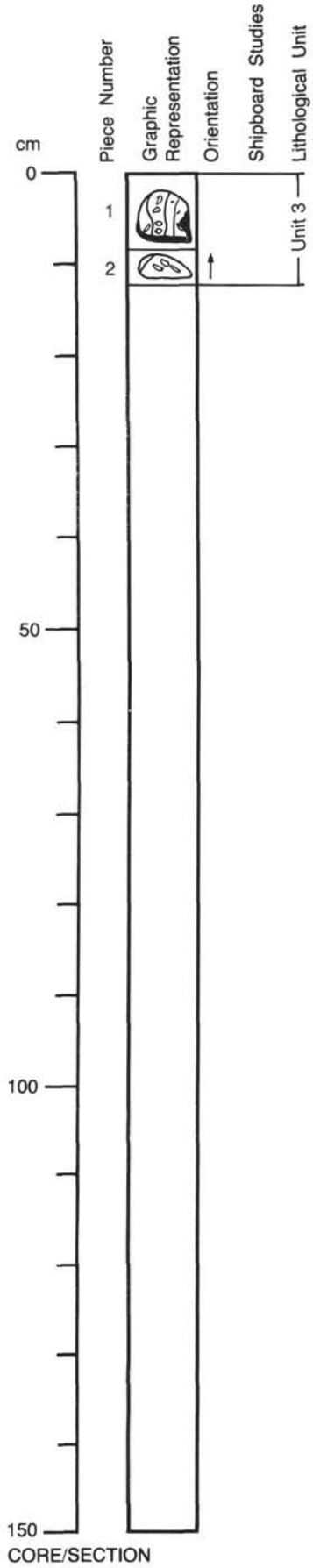


125-786B-13R-2

UNIT 3: BONINITE BRECCIA

Pieces 1-20

CONTACTS: Not visible.
PHENOCRYSTS:
Plagioclase - 5-10%; <4 mm; anhedral to euhedral.
Orthopyroxene - 5-10%; <1 mm; yellow, anhedral.
Clinopyroxene - trace; <2 mm; euhedral, usually associated with orthopyroxene.
GROUNDMASS: Glassy to fine-grained matrix with plagioclase microphenocrysts.
VESICLES: 5-15%; <1 mm; subrounded to parallel elongated; randomly distributed.
COLOR: Gray (7.5YR 5/0) for clasts; pale green (5G 6/2) for matrix.
STRUCTURE: Breccia.
ALTERATION: Clasts alter to green matrix-like product.
VEINS/FRACTURES: 1%; 1-5 mm; random; vein filling is white, soft, not carbonate, zeolite(?).

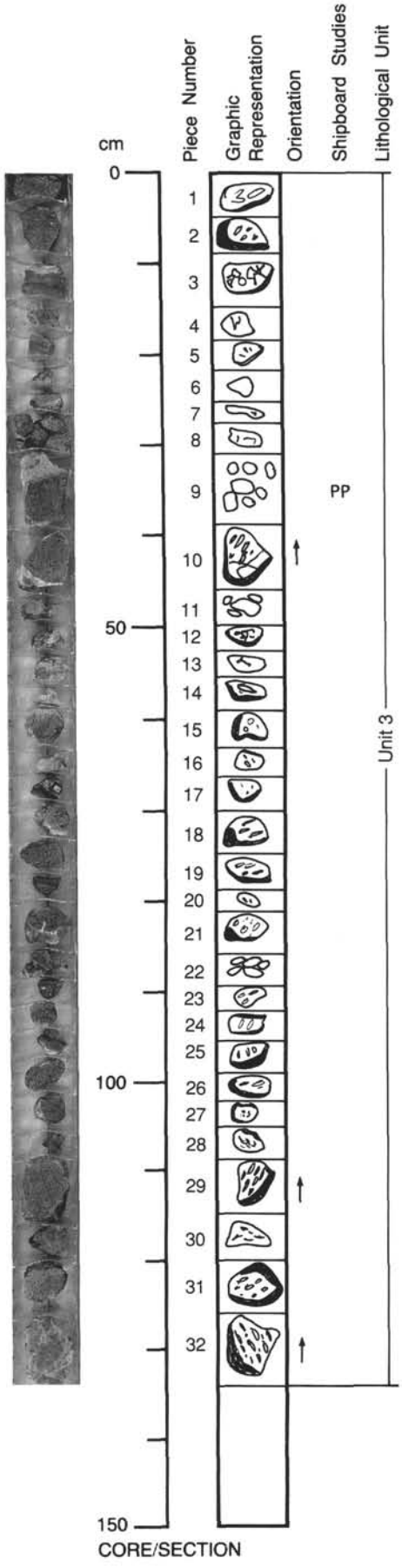


125-786B-13R-3

UNIT 3: BONINITE BRECCIA (13R-2 CONTINUED)

Pieces 1-2

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A
VESICLES: N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Section is continuation of 125-786B-13R-2.

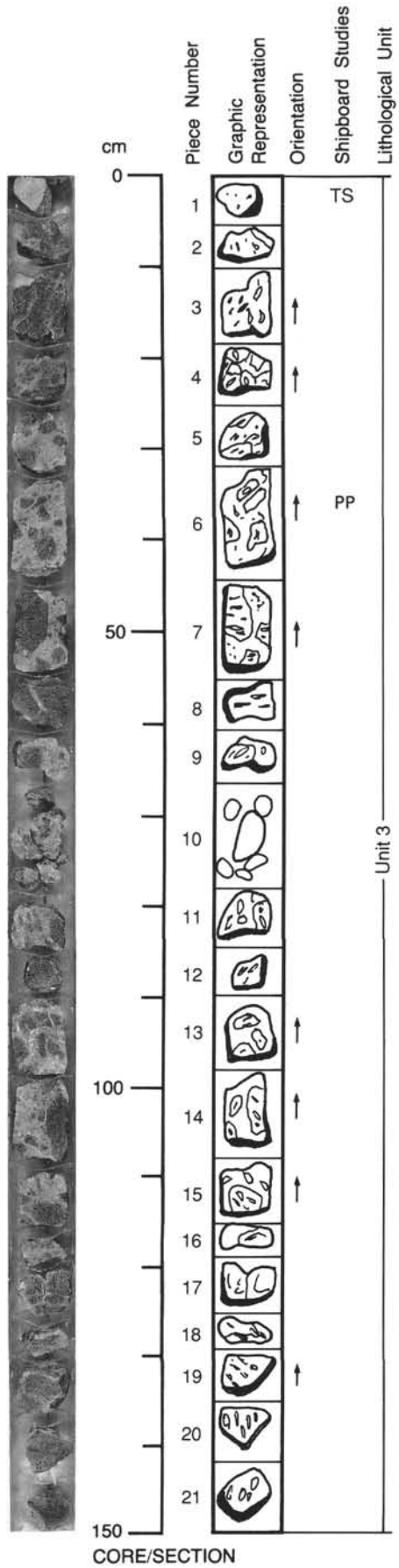


125-786B-14R-1

UNIT 3: ANDESITE BRECCIA

Pieces 1-32

CONTACTS: Not visible.
PHENOCRYSTS: Occur as glomerocrystic and poikilitic assemblages as well as isolated phases.
Plagioclase - 5-8%; 0.5 - 1.5 mm; euhedral elongate.
Orthopyroxene - 1-3%; <1 mm; euhedral equant - elongate.
Clinopyroxene - 2-5%; <1.5 mm; equant euhedral.
GROUNDMASS: Glassy to very fine-grained with quench feldspar.
VESICLES: 1-15%; <10 mm long; elongate; locally aligned; blue coating to vesicle wall in Pieces 1 and 2.
COLOR: Gray (7.5YR 5/0) clasts; pale green (5G 6/2) matrix.
STRUCTURE: Breccia.
ALTERATION: Variable alteration of clasts with reaction boundaries 2 -10 mm in width; Pieces 3-8 are pervasively stained with possible manganiferous alteration having a brown color (10YR 5/3).
VEINS/FRACTURES: Trace; 1-5 mm wide; random; white non-carbonate filling.



125-786B-15R-1

UNIT 3: MICRODIORITE

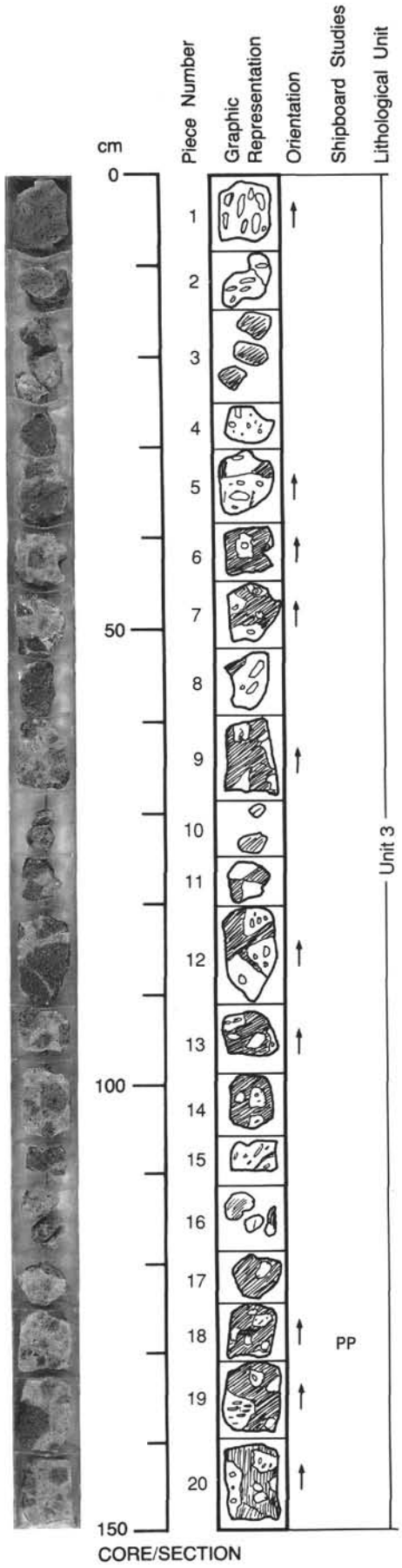
Piece 1

CONTACTS: Not visible.
PHENOCRYSTS: Amphibole-pyroxene glomerocrysts as well as isolated phases.
Amphibole - 5-8%; 0.2-0.6 mm; equant, euhedral, elongate.
Orthopyroxene - 8-12%; 0.5-2 mm; elongate, subhedral.
Plagioclase - <80%; 0.1-1 mm; elongate, euhedral-subhedral.
Magnetite - <2%; <0.1 mm; euhedral, equant.
GROUNDMASS: Composed of same phases as phenocrysts: rock has hypabyssal texture.
VESICLES: None.
COLOR: Light gray (5Y 7/1).
STRUCTURE: Rock has isotropic fabric.
ALTERATION: Minor chlorotic alteration.
VEINS/FRACTURES: None visible.
ADDITIONAL COMMENTS: Texture of this piece is very different from under-and overlying core although phase assemblage is the same.

UNIT 3: ANDESITE BRECCIA

Pieces 2-21

CONTACTS: Not visible.
PHENOCRYSTS: Occur as glomerocrystic and poikilitic assemblages as well as isolated phases.
Plagioclase - 5-8%; 0.5-1.5 mm; euhedral, elongate.
Orthopyroxene - 1-3%; <1 mm; euhedral, equant, elongate.
Clinopyroxene - 2-5%; <1.5 mm; equant, euhedral.
GROUNDMASS: Glassy to very fine-grained with quench feldspar.
VESICLES: 3-5%; 0.2-0.5 mm in diameter, <22 mm long; pipe-shape; aligned; pale white(?) zeolites on walls of vesicles in Pieces 19-21.
COLOR: Gray (7.5YR 5/0) clasts; pale green (5G 6/2) breccia matrix.
STRUCTURE: Breccia.
ALTERATION: Variable alteration of clasts with reaction boundaries 2-10 mm in width.
VEINS/FRACTURES: Trace; 0.5 mm wide; subvertical; filled with white zeolite.
ADDITIONAL COMMENTS: Some of the clasts have a macroscopic orthorhombic fracture pattern; in-situ brecciation of clasts; appears to be abundant altered glassy pillow rinds in Piece 15.

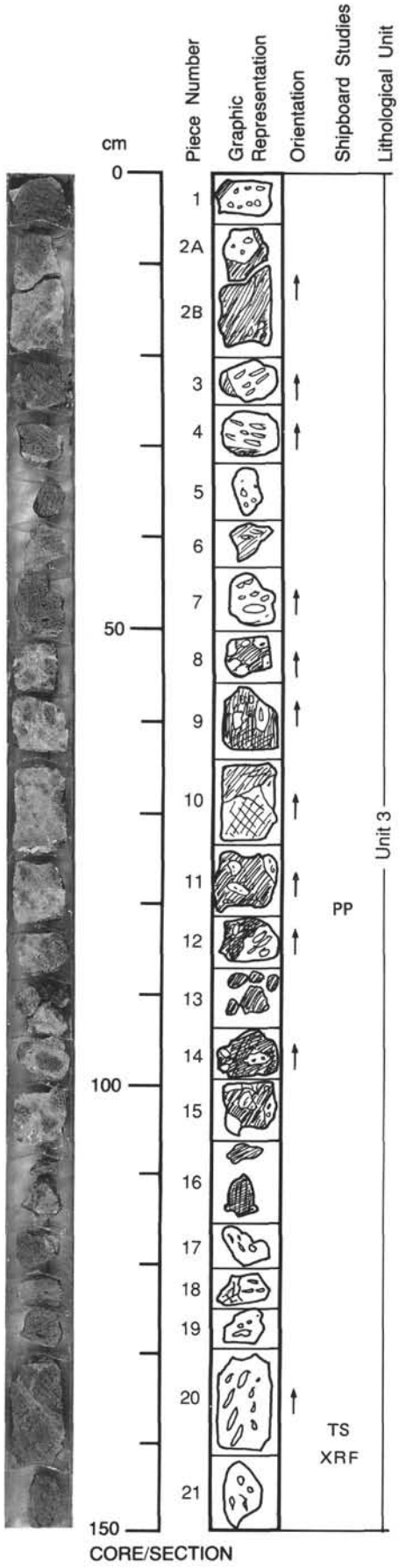


125-786B-15R-2

UNIT 3: ANDESITE BRECCIA

Pieces 1-20

CONTACTS: Not visible.
PHENOCRYSTS: Occur as glomerocrystic and poikilitic assemblages as well as isolated phases.
Plagioclase - 3-5%; 0.5-1 mm; euhedral, lath.
Orthopyroxene - 1-3%; <1 mm; euhedral, equant.
Clinopyroxene - 2-5%; <1.5 mm; equant, euhedral, elongate.
GROUNDMASS: Glassy to very fine-grained with quench feldspar.
VESICLES: 1-15%; 0.2-3 mm; pipe-shaped; aligned; mostly subvertical; pale white to transparent zeolites(?) on walls of vesicles.
COLOR: Gray (7.5YR 5/0) clasts; pale green (5G 6/2) matrix.
STRUCTURE: Breccia.
ALTERATION: Variable alteration of clasts with reaction boundaries 2-10 mm in width.
VEINS/FRACTURES: Trace; <0.3 mm wide; random; filled with white zeolite(?).
ADDITIONAL COMMENTS: Proportion of clasts to matrix is variable from piece to piece.

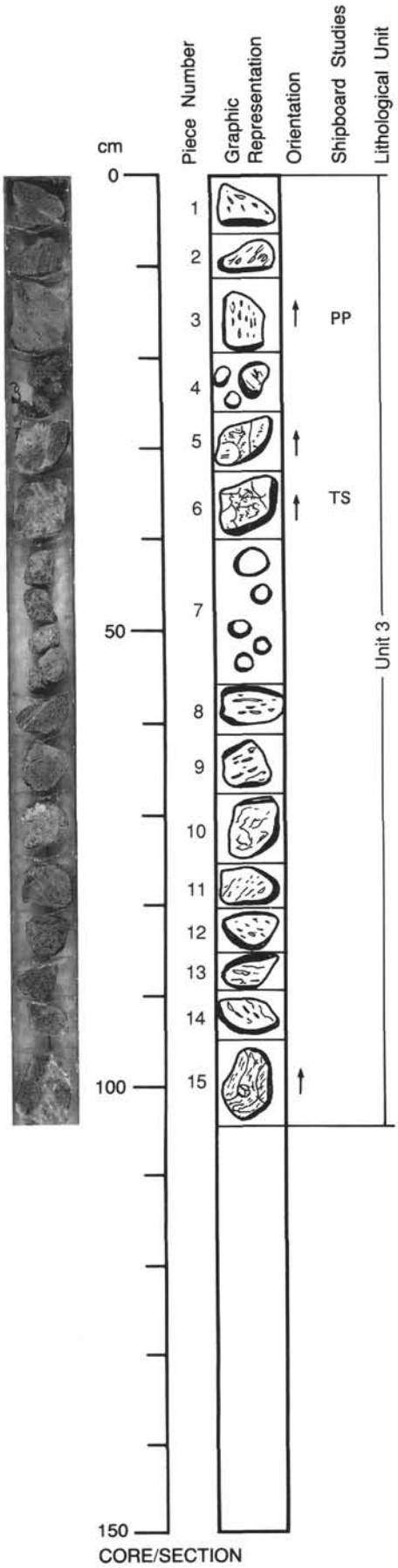


125-786B-16R-1

UNIT 3: ANDESITE BRECCIA

Pieces 1-21

CONTACTS: Not visible.
PHENOCRYSTS: Occur as glomerocrystic and poikilitic assemblages as well as isolated phases.
Plagioclase - 3-6%; 0.5-1 mm; euhedral laths.
Orthopyroxene - 1-3%; <1.5 mm; euhedral, equant.
Clinopyroxene - 2-5%; <1.5 mm; equant, euhedral to elongate.
GROUNDMASS: Glassy to very fine-grained with quench feldspar.
VESICLES: 1-15%; 0.2-3 mm in diameter; pipe-shaped; oriented pieces: horizontal-subvertical; pale white, transparent to pale blue zeolites(?) on walls of some vesicles.
COLOR: Gray (7.5YR 5/0) clasts; pale green (5G 6/2) matrix.
STRUCTURE: Breccia.
ALTERATION: Variable alteration of clasts with reaction boundaries 2 - 20 mm in width; some clasts totally altered.
VEINS/FRACTURES: Trace; <2 mm in width; random; filled with white zeolite.
ADDITIONAL COMMENTS: Matrix is cellular structured with green cell walls and white zeolites(?), feldspar, orthopyroxene and clinopyroxene filling the cells.

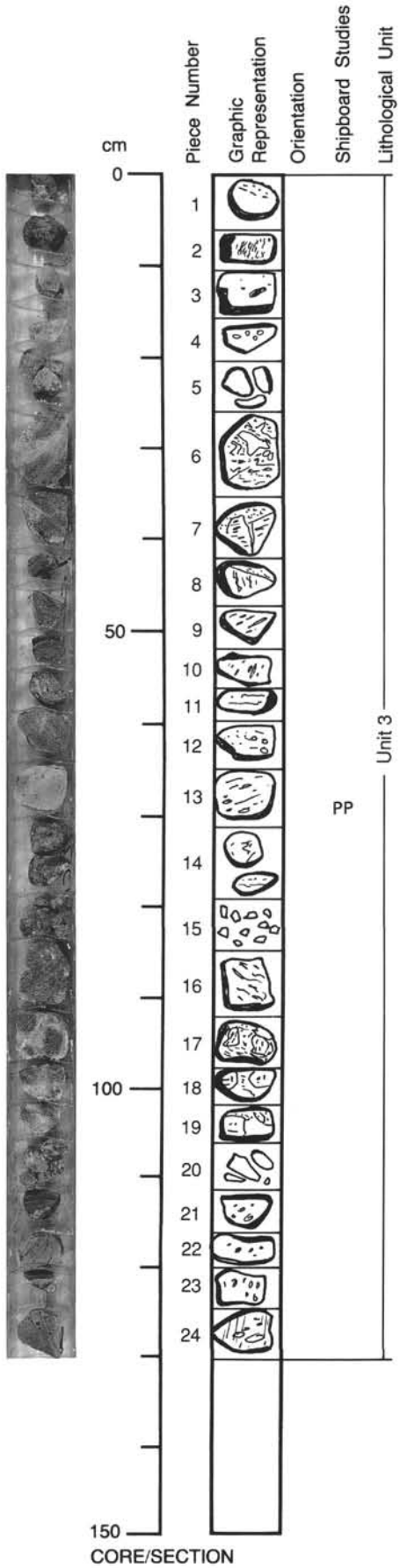


125-786B-16R-2

UNIT 3: ANDESITE BRECCIA

Pieces 1-15

CONTACTS: None visible.
PHENOCRYSTS: Occur as glomerocrystic and poikilitic assemblages as well as isolated phases.
Plagioclase - 3-6%; 0.5-1 mm; euhedral laths.
Orthopyroxene - 1-3%; <1.5 mm; euhedral, equant.
Clinopyroxene - 2-5%; <1.5 mm; equant, euhedral.
GROUNDMASS: Glassy to very fine-grained with quench feldspar.
VESICLES: 1-15%; 0.2-8 mm; irregular, elongate; throughout; some pieces have vertical orientation.
COLOR: Gray (7.5YR 5/0) clasts; pale green (5G 6/2) matrix.
STRUCTURE: Brecciated.
ALTERATION: Variable alteration of clasts with reaction boundaries 2-20 mm in width; some clasts are completely altered.
VEINS/FRACTURES: Trace; <1 mm wide; random orientation; white, zeolite(?)-filled.
ADDITIONAL COMMENTS: Matrix is cellular structured with green cell walls and white zeolites(?), feldspar, orthopyroxene and clinopyroxene filling the cells.



125-786B-17R-1

UNIT 3: ANDESITE BRECCIA

Pieces 1-2, 5-12, 14-24

CONTACTS: Not visible.
PHENOCRYSTS: Occur as glomerocrystic and poikilitic assemblages as well as isolated phases.
Plagioclase - 3-6%; 0.5-1 mm; euhedral laths.
Orthopyroxene - 1-3%; <1.5 mm; euhedral, equant.
Clinopyroxene - 2-5%; <1.5 mm; euhedral-elongate.
GROUNDMASS: Glassy to very fine-grained with quench feldspar.
VESICLES: 1-15%; 0.2-3 mm in diameter; pipe; random; white to pale blue zeolites on the walls of some vesicles.
COLOR: Gray (7.5YR 5/) clasts; pale green (5G 6/2) matrix.
STRUCTURE: Breccia.
ALTERATION: Variable alteration of clasts with reaction boundaries 2-10 mm in width.
VEINS/FRACTURES: Trace; <1 mm in width; random; white zeolite(?)-filled.
ADDITIONAL COMMENTS: Proportion of apparently relict hyaloclastic. matrix is higher in Pieces 3-7 and 17 than in previous cores; Piece 7 has minor Fe-oxide staining in matrix.

UNIT 3: MICRODIORITE

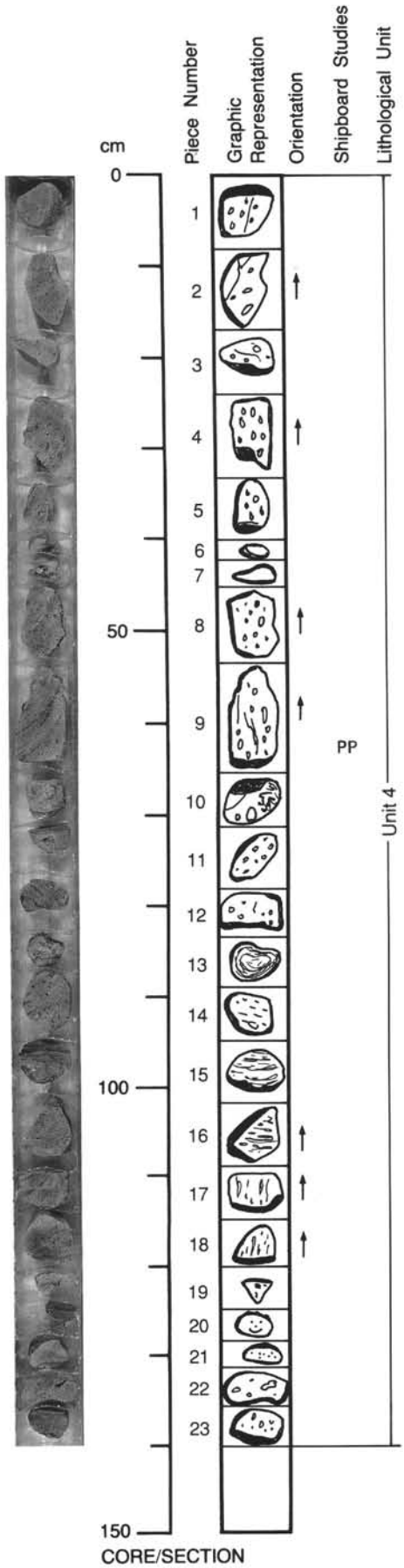
Pieces 3, 4

CONTACTS: None visible.
PHENOCRYSTS: Amphibole-pyroxene-olivine glomerocrysts.
Amphibole - 5-8%; 0.2-0.6 mm; equant, euhedral, elongate.
Orthopyroxene - 8-12%; 0.5-2 mm; elongate, subhedral.
Plagioclase - <80%; 0.1-1 mm; elongate, euhedral-subhedral.
Magnetite - <2%; <0.1 mm; euhedral, equant.
Olivine - <1%; 0.5-1.5 mm; equant, altered with Fe-oxide staining.
GROUNDMASS: Composed of same phases that occur as phenocrysts; rock has hypabyssal textures.
VESICLES: None.
COLOR: Light gray (5Y 7/1).
STRUCTURE: Massive.
ALTERATION: Minor chlorite alteration.
VEINS/FRACTURES: None visible.
ADDITIONAL COMMENTS: Texture of this piece is very different from surrounding core, it is the same as 15R-1 Piece 1.

UNIT 3: SPARSELY PHYRIC ANDESITE

Piece 13

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of pyroxene, plagioclase and magnetite.
Clinopyroxene - <1-1%; <0.5 mm; equant, euhedral.
Orthopyroxene - <<1%; <0.25 mm; equant to elongate, euhedral.
Plagioclase - <2%; <0.5 mm; tabular laths, euhedral.
Magnetite - <<1%; <0.2-0.5 mm; equant, euhedral.
GROUNDMASS: Fine-grained and glassy with quench feldspar.
VESICLES: 2-5%; 1-3 mm; round to elongate, pipe-shaped; throughout; filled with white zeolites(?).
COLOR: Gray to light gray (5Y 5/1 - 7/1).
STRUCTURE: Massive.
ALTERATION: None visible.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: This sample is paler, less phyric and has less orthopyroxene than the other samples in this section.

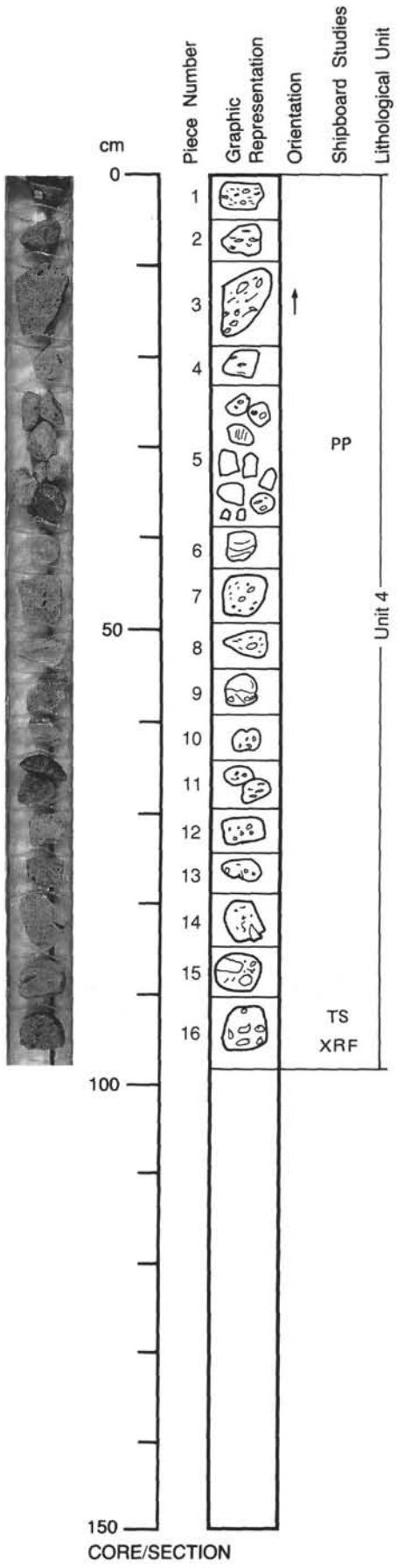


125-786B-18R-1

UNIT 4: ANDESITE

Pieces 1-23

CONTACTS: None visible.
PHENOCRYSTS: Olivine phenocrysts occur sporadically throughout this section.
Clinopyroxene - 5-7%; 0.4-1 mm; equant to elongate, euhedral.
Orthopyroxene - 1-2%; 0.7-1.5 mm; elongate, subhedral.
Plagioclase - 1-2%; 0.1-0.5 mm; elongate, euhedral-subhedral.
Olivine - trace; 1-2 mm; elongate, euhedral, poikilitically enclosed in pyroxene glomerocrysts.
GROUNDMASS: Fine-grained plagioclase and pyroxene crystals and a small amount of brown glass; amount of glass is variable throughout.
VESICLES: 3-12%; 2-6 mm; oval to round; throughout; pipe morphology.
COLOR: Gray to light gray (5Y 6/1).
STRUCTURE: Massive.
ALTERATION: 10-40% chlorite and clays.
VEINS/FRACTURES: None.



125-786B-19R-1

UNIT 4: ANDESITE

Pieces 1-16

CONTACTS: None visible.
PHENOCRYSTS: Pyroxene glomerocrysts enclose highly altered olivine crystals.
Clinopyroxene - 5-7%; 0.4-1 mm; equant to elongate, euhedral.
Orthopyroxene - 1-2%; 0.7-1.5 mm; elongate, subhedral.
Plagioclase - 1-2%; 0.1-0.5 mm; elongate, euhedral-subhedral.
Olivine - trace; 1-2 mm; elongate, euhedral, poikiliticlly enclosed in pyroxene glomerocrysts.
GROUNDMASS: Brown glass and quench crystals of plagioclase and pyroxene.
VESICLES: 3-10%; 2-6 mm; oval to round; pipe vesicles; throughout.
COLOR: Gray to light gray (5Y 6/1).
STRUCTURE: Massive.
ALTERATION: Chlorite and clays 10-25%.
VEINS/FRACTURES: None visible.

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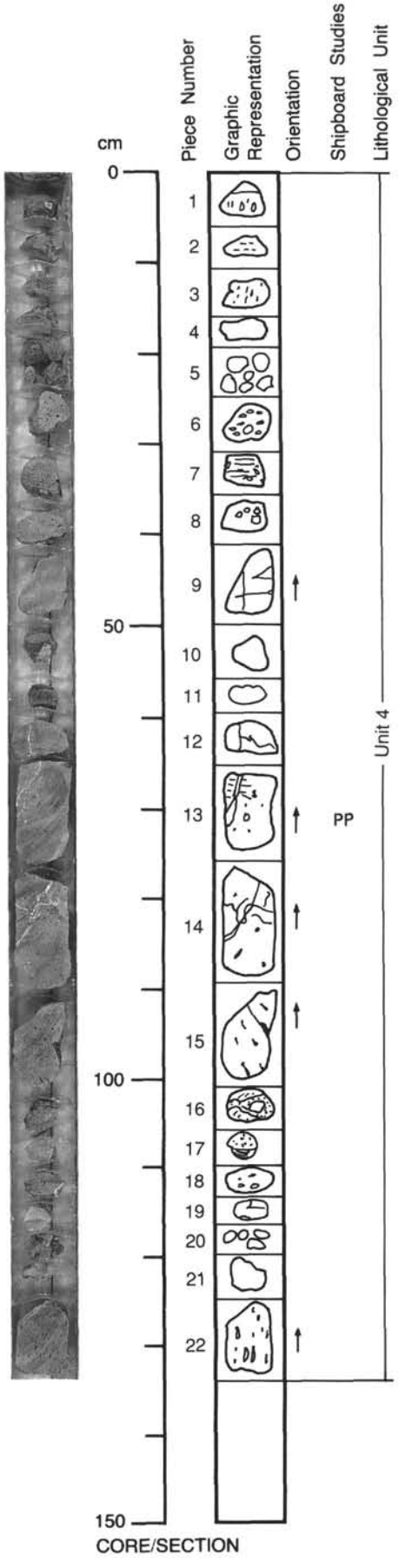
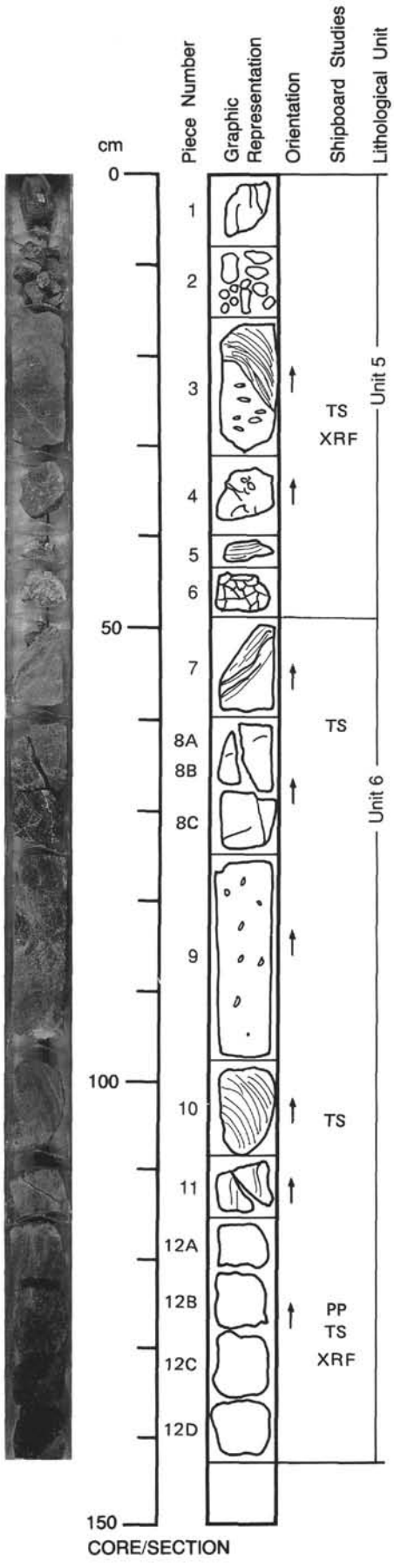


125-786B-20R-1

UNIT 4: TWO-PYROXENE ANDESITE

Pieces 1-22

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 2-3%; 0.5-2 mm; equant, euhedral.
Clinopyroxene - 1-2%; 0.2-0.4 mm; anhedral to subhedral.
Plagioclase - 2%; 0.2-0.8 mm; equant, euhedral.
Olivine - trace; <3 mm; equant, anhedral to subhedral; altered and appear to have orthopyroxene reaction rims.
GROUNDMASS: Fine- to medium-grained; plagioclase laths.
VESICLES: 1-12%; 2-4 mm; elongate; smooth outlines; throughout; alignment parallel to core axis in Piece 22; lined with pale blue to gray zeolite or clay.
COLOR: Greenish gray (5GB 5/1 to 4/1).
STRUCTURE: Massive.
ALTERATION: Pervasive and patchy; chlorites and clays 10-30%.
VEINS/FRACTURES: 1-5%; <8 mm wide; steeply inclined; anastomosing; filled with white materials including carbonate, zeolite, and chlorite.
ADDITIONAL COMMENTS: Piece 4 has Fe-oxide staining as a pervasive alteration.



125-786B-21R-1

UNIT 5: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS: *Glomerocrysts of clinopyroxene and orthopyroxene.*
Orthopyroxene - <1%; <0.5 mm; euhedral, equant.
Clinopyroxene - <2%; <0.75 mm; euhedral, elongate.
Plagioclase - 1-2%; <1 mm; euhedral, tabular laths.
Olivine - trace; 0.5-1.5 mm; euhedral, elongate.
GROUNDMASS: Glassy to fine-grained with quench crystals of plagioclase.
VESICLES: 2-7%; <4 mm; elongate; random, locally concentrated; filled with transparent, white zeolite(?).
COLOR: Greenish gray (5BG 5/1 to 4/1).
STRUCTURE: Massive with alteration and possible shear boundaries.
ALTERATION: 10-40%, minor chlorite, zeolites and clays.
VEINS/FRACTURES: <1%; 1-3 mm wide; random, anastomosing; filled with white zeolite(?).
ADDITIONAL COMMENTS: Piece 3A is brecciated along a plane parallel to a vein that appears to be fault gouge. This rock is similar to the overlying Section 20R-1.

UNIT 5: HIGHLY BRECCIATED META-ANDESITE

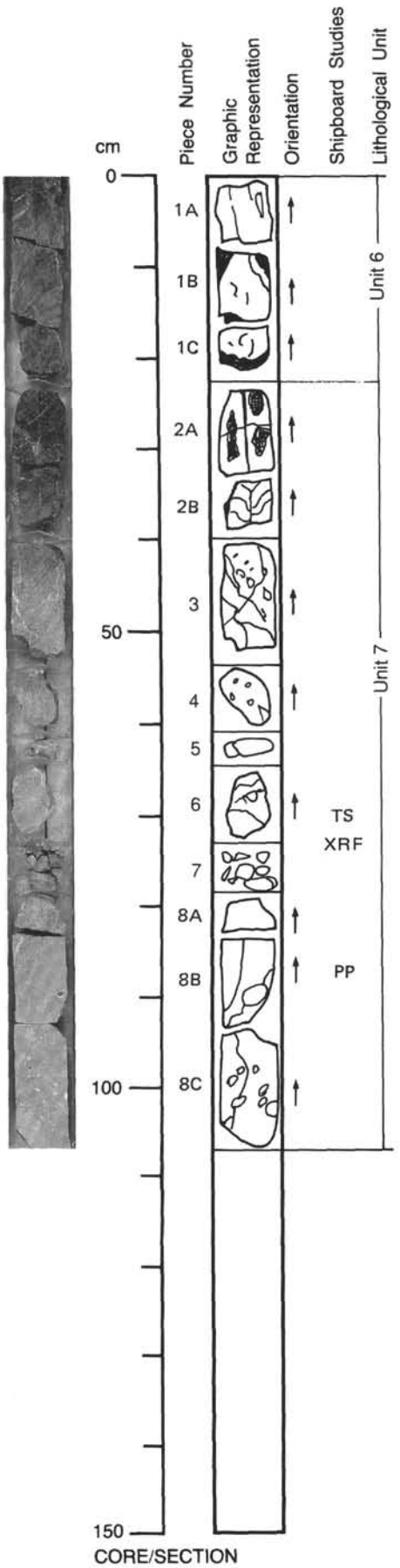
Pieces 5-6

CONTACTS: None visible.
PHENOCRYSTS: None visible.
GROUNDMASS: Zeolite, clays and chlorite.
VESICLES: None present.
COLOR: Dark greenish gray to very light greenish gray (10Y 5/2 to 8/1).
STRUCTURE: Breccia.
ALTERATION: Pieces are altered andesitic breccia; minor iron oxide staining is present.
VEINS/FRACTURES: None present.
ADDITIONAL COMMENTS: Crystals of orthopyroxene, clinopyroxene, plagioclase and magnetite <0.2 mm in size are present in the matrix.

UNIT 6: FLOW-BANDED GLASSY DACITE

Pieces 7-12

CONTACTS: Piece 7: contact with overlying sediment (fine-grained sand and silt with fragments of underlying rock).
PHENOCRYSTS:
Orthopyroxene - <2%; <0.5 mm; equant to elongate, euhedral.
Clinopyroxene - <1%; <0.5 mm; elongate, euhedral.
Plagioclase - <3%; <1.5 mm; equant to tabular, euhedral.
Magnetite - trace; <0.2 mm; equant, euhedral.
GROUNDMASS: Brown glass and minor quench crystals of plagioclase.
VESICLES: None.
COLOR: Black to dusky yellow to olive gray (5Y 6/4).
STRUCTURE: Flow banding at a high angle to the core axis.
ALTERATION: Pervasive Fe-oxide staining; Pieces 7 and 8 may contain palagonite.
VEINS/FRACTURES: <1%; <1 mm wide; subvertical; irregular; filled with white zeolite(?).
ADDITIONAL COMMENTS: *These pieces appear to represent the top portion of a flow unit.*



125-786B-21R-2

UNIT 6: GLASSY DACITE (CONTINUATION OF 21R-1, PIECES 7-12)

Piece 1

CONTACTS: None obvious.
PHENOCRYSTS:
Plagioclase - 7%; <1.5; equant to tabular, euhedral.
Olivine - 1%; 0.5; equant, subhedral.
Clinopyroxene - 1%; 0.5; equant, subhedral.
GROUNDMASS: Fine-grained to glassy with plagioclase microliths.
VESICLES: 10%; up to 1 cm; irregular to subrounded; none; mostly filled, but largest have vugs; possibly including zeolite.
COLOR: Pale gray to whitish brown (2.5Y 8/0 to 8/2) infilling.
STRUCTURE: N/A.
ALTERATION: Pervasive brownish alteration (2.5Y 6/2) and olivine of groundmass; variable alteration of other phenocrysts.
VEINS/FRACTURES: <1%; <1mm; irregular; white infilling (carbonate(?) and zeolite).

UNIT 7: GLASSY BASALT

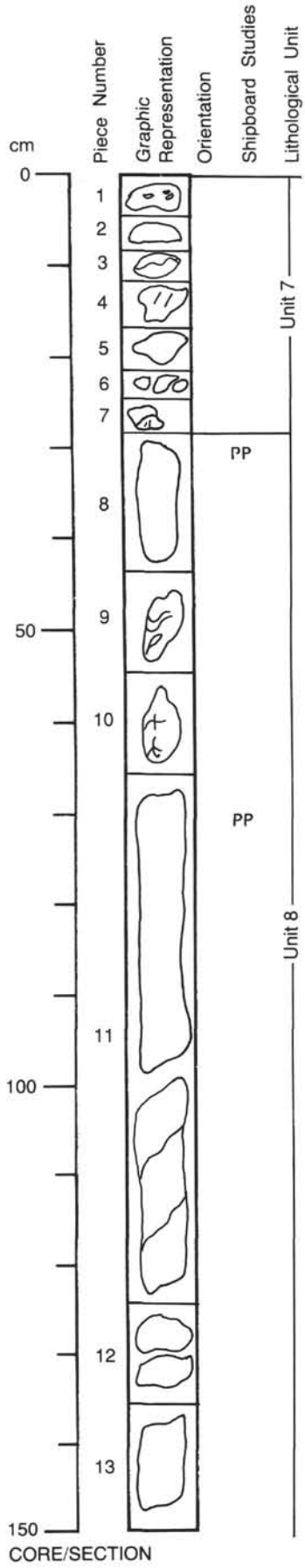
Pieces 2-6

CONTACTS: Between Pieces 1 and 2: two units (intrusion?).
PHENOCRYSTS:
Clinopyroxene - <1%; 0.5 mm; elongate, euhedral
Orthopyroxene - 1-2%; <0.5 mm; equant to elongate, euhedral.
Plagioclase - <3%; <1.5 mm; equant to tabular, euhedral.
Olivine - trace; <0.2 mm; equant, subhedral.
Magnetite - trace; <0.2 mm; equant, euhedral.
GROUNDMASS: Clear, brown glass with quench crystals of plagioclase.
VESICLES: 0-12%; 0.2-2 mm; round; only in Pieces 3-7; in Piece 3 they are concentrated at the top (below the glassy margin) and in Piece 7 they are filled with a pale yellow clay.
COLOR: Black to dusky yellow to olive gray (5Y 6/4).
STRUCTURE: Pieces 2-7 appear to be the top of a cooling unit and Piece 1 the bottom of the overlying cooling unit. Piece 1 is mostly glass, Piece 1C is a glassy extrusion.
ALTERATION: Variable, Piece 1 has Fe-oxide staining, Piece 7 has clay filled vesicles.
VEINS/FRACTURES: <1%; 1-4 mm; subvertical; filled with carbonate and zeolite.
ADDITIONAL COMMENTS: Pieces 1 and 2 have a large amount of fresh glass and represent a contact between two volcanic units.

UNIT 7: BASALT

Pieces 7-8

CONTACTS: None obvious.
PHENOCRYSTS:
Plagioclase - 7%; <1.5 mm; equant to tabular, euhedral.
Clinopyroxene - 1%; 0.5 mm; equant, subhedral.
Olivine - 1%; 0.5 mm; equant, subhedral.
GROUNDMASS: Fine-grained to glassy with plagioclase microliths.
VESICLES: 10%; 1 cm; irregular to subrounded; n/a; mostly filled but largest have vugs, pale gray to whitish brown (2.5Y 8/0 to 8/2) infilling possibly including zeolite.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: Pervasive brownish alteration (2.5Y 6/2) of groundmass and olivine; variable alteration of other phenocrysts.
VEINS/FRACTURES: < 1%; <1 mm wide; irregular; with white infilling (carbonate and zeolite).
ADDITIONAL COMMENTS: Pieces 7 and 8 appear distinct from 1-6, possibly suggesting a contact between 6 and 7.



125-786B-22R-1

UNIT 7: BASALT PEBBLES

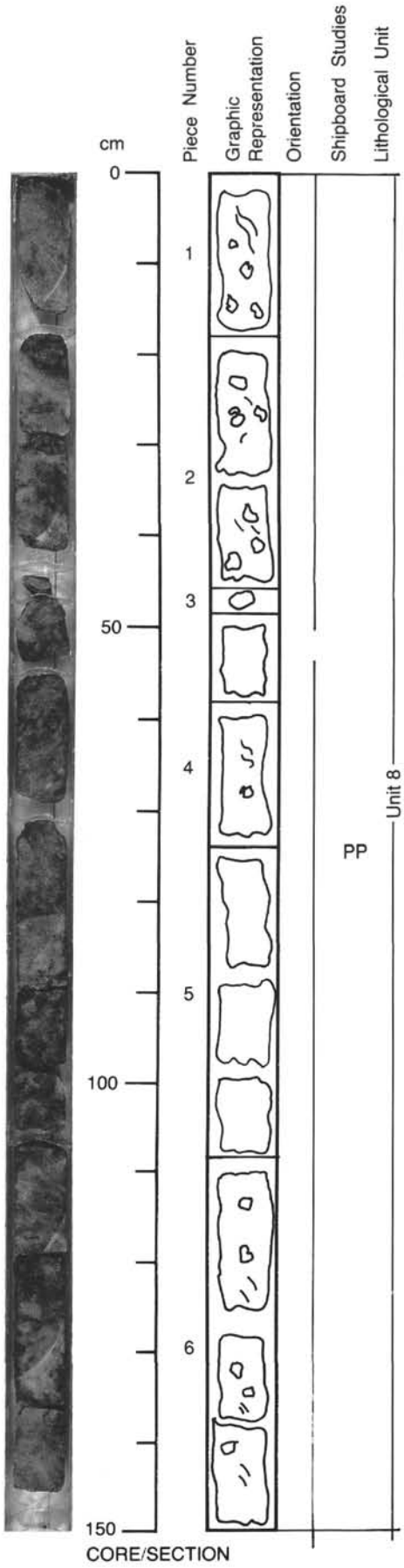
Pieces 1-7

CONTACTS: Piece 7 has sepiolite from underlying rock on lower surface.
PHENOCRYSTS: Clinopyroxene appears fresh; other phases are variably altered.
Clinopyroxene - <1%; 0.4-0.4 mm; equant, euhedral.
Orthopyroxene - trace; <0.5 mm; subhedral-elongate.
Plagioclase - <0.5%; <0.5 mm; euhedral laths.
GROUNDMASS: Glassy to fine-grained; variably altered.
VESICLES: 0-4%; 1-3 mm; round; Pieces 1, 2, and 7 only.
COLOR: Dark greenish gray (10Y 5/2).
STRUCTURE: Massive.
ALTERATION: To clays.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Pieces show a wide range of alteration: Piece 2 is freshest. Sepiolite appears on one side of Piece 5 and as a tiny vein (<0.5 mm) in working half, Piece 5.

UNIT 8: VITRIC SILTSTONE

Pieces 8-13

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A
ADDITIONAL COMMENTS: 28.5-41 cm: sepiolite-foliated, massive and pink-red (5R 5/4-5R 7/4). 45-53 cm: vitric siltstone-breccia with angular clasts in a silty matrix; gray (10YR 4/1). 55-65 cm: vitric clayey siltstone - breccia cut by a fault; gray (10YR 4/1-5/1). 66-99 cm: vitric clayey siltstone - slight brecciation with vertical streaks, small faults, slump feature; dark gray (2.5YR 5/10). 99-124 cm: vitric clayey siltstone - similar to above, but slumped and faulted; dip-50 degree; dark gray (2.5YR 3/0 to 10YR 5/1). 125-134 cm: breccia with one 2 cm basalt clast in a vitric siltstone matrix; dark gray (2.5YR 5/10). 135-148 cm: volcanic breccia; sheared and rounded basalt and pumice clasts in fine-grained matrix. Dark grayish brown (10YR 4/2).

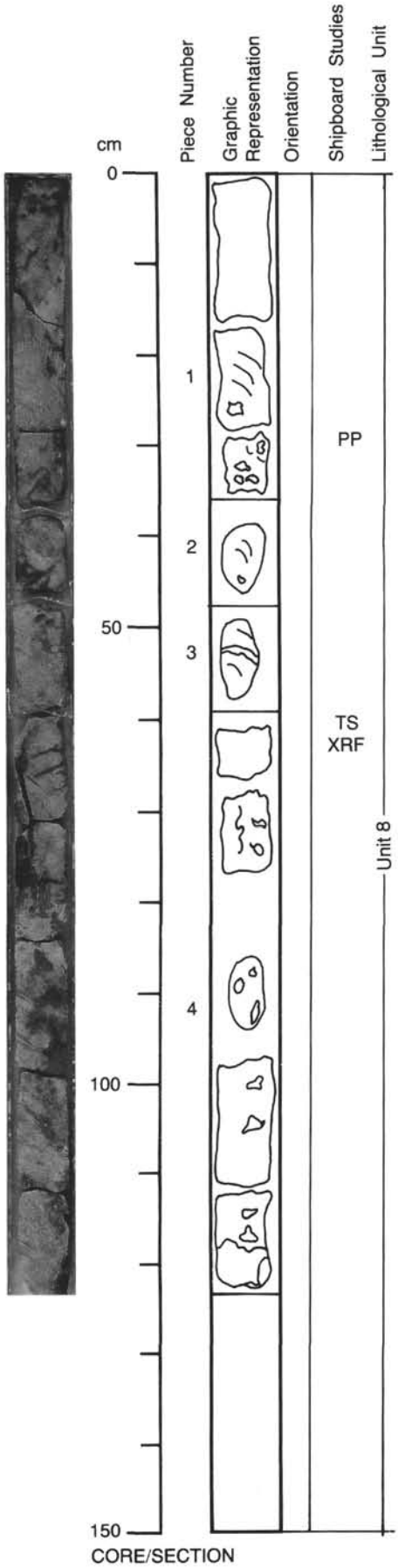


125-786B-22R-2

UNIT 8: VOLCANIC BRECCIA

Pieces 1-7

CONTACTS: None.
PHENOCRYSTS: Clinopyroxene appears fresh; other phases are variably altered.
Clinopyroxene - <1%; 0.4 mm; equant, euhedral.
Orthopyroxene - trace; <0.5 mm; subhedral-elongate.
Plagioclase - <0.5%; <0.5 mm; euhedral laths.
GROUNDMASS: Glassy to fine-grained; variably altered.
VESICLES: 0-4%; 1-3 mm; round; Pieces 1,2 and 7 only.
COLOR: Dark greenish gray (10Y 5/2).
STRUCTURE: Massive.
ALTERATION: To clays.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Clasts (0.5-3 cm in size) mainly of basalt (described above) but also pumice and vesicular basalt; matrix is sheared, palagonitic, with good stratification in upper portion; numerous small faults.



125-786B-22R-3

UNIT 8: VOLCANIC BRECCIA

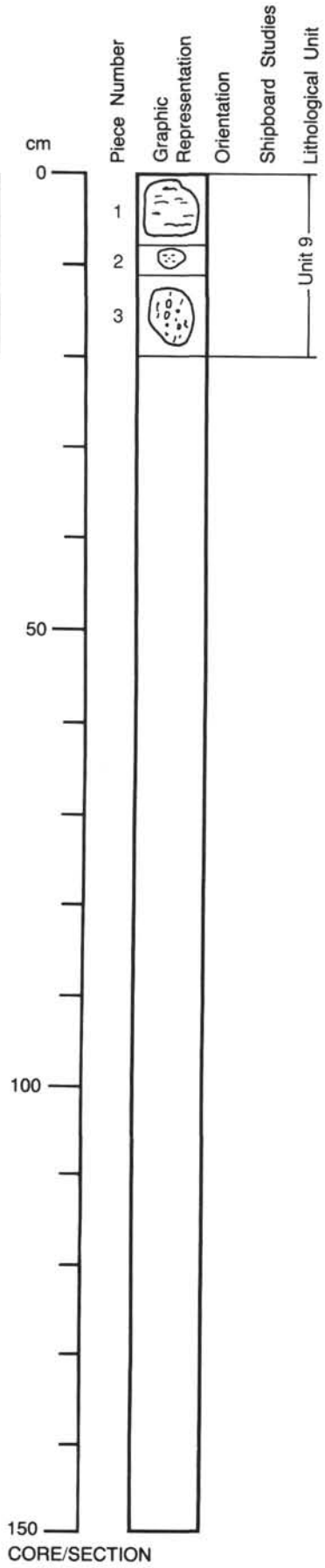
Pieces 1-3

CONTACTS: None obvious.
PHENOCRYSTS: Clinopyroxene appears fresh; other phases are variably altered.
Clinopyroxene - <1%; 0.4 mm; equant, euhedral.
Orthopyroxene - trace; <0.5 mm; subhedral-elongate.
Plagioclase - <0.5%; <0.5 mm; euhedral laths.
GROUNDMASS: Glassy to fine-grained; variably altered.
VESICLES: 0-4%; 1-3 mm; round; Pieces 1, 2, and 7 only.
COLOR: Brown (10YR 4/3).
STRUCTURE: Massive.
ALTERATION: To clays.
VEINS/FRACTURES: None.

UNIT 8: VITRIC SILT-SANDSTONE

Piece 4

CONTACTS: None.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: Dark grayish brown (10YR 4/2).
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: 80-80.5 cm: Silty layer with deformational structures, perhaps the result of loading. 80.5-124 cm: graded breccia from 80.5 to 117 cm, lower portion finer-grained but includes 5 cm basalt clast.

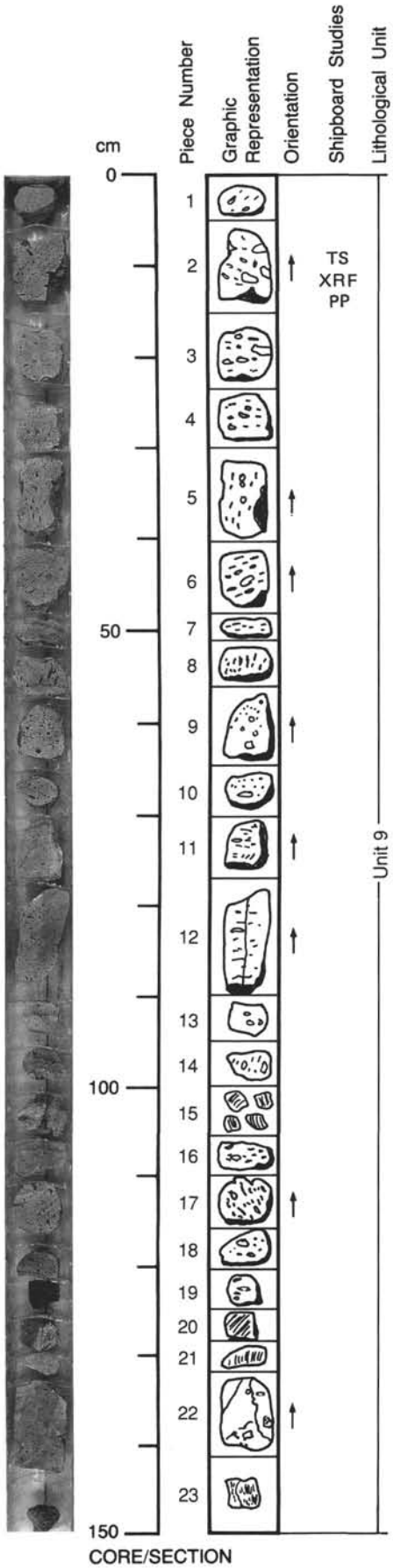


125-786B-23R-1

UNIT 9: TWO-PYROXENE DACITE

Pieces 1-3

CONTACTS: None visible.
PHENOCRYSTS: Sparse glomerocrysts of ortho- and clinopyroxene.
Orthopyroxene - <1%; 0.5-2 mm; elongate, subhedral.
Clinopyroxene - <1%; 0.2-0.5 mm; equant, euhedral.
Plagioclase - <1%; 0.5-1.0 mm; tabular laths, euhedral-subhedral.
Magnetite - trace; 0.2 mm; euhedral.
GROUNDMASS: Glassy to very fine-grained.
VESICLES: 7-15%; 0.5-6 mm; irregular-elongate; throughout; aligned; some lined with light blue mineral; also some translucent prisms with opalescent spherical cores.
COLOR: Dark greenish gray (10Y 5/1).
STRUCTURE: Massive.
ALTERATION: Plagioclase may be variably altered.
VEINS/FRACTURES: None.

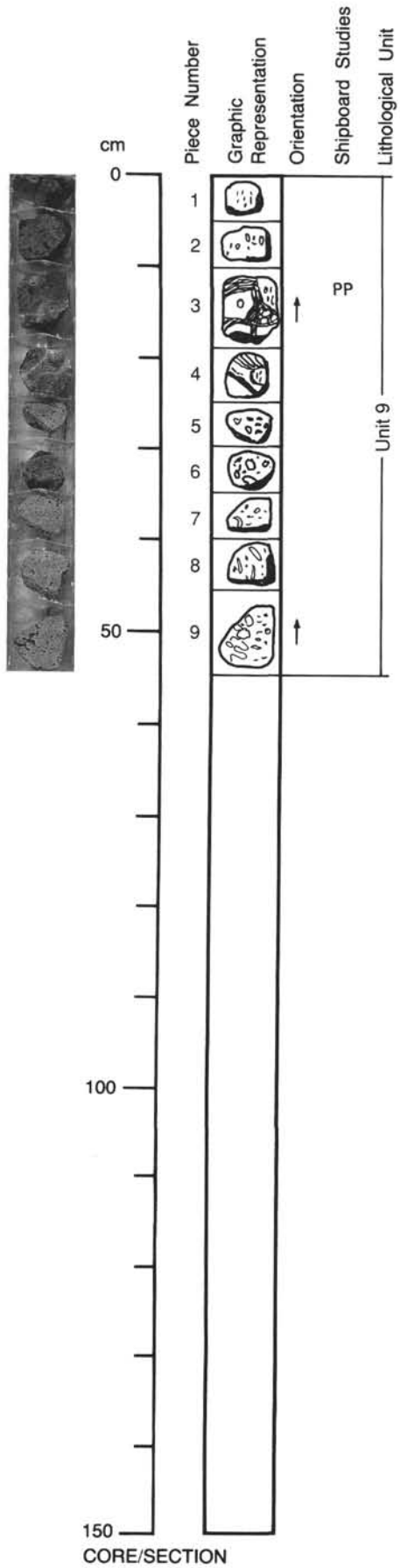


125-786B-24R-1

UNIT 9: TWO-PYROXENE DACITE

Pieces 1-23

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts containing all phenocryst phases (clinopyroxene + orthopyroxene + plagioclase + magnetite).
Orthopyroxene - <1%; 0.5-1 mm; equant, euhedral.
Clinopyroxene - 1-2%; 0.2-2 mm; euhedral, tabular to lath-like.
Plagioclase - <1%; 0.5-0.8 mm; tabular, laths, euhedral-subhedral.
Magnetite - Trace; 0.2 mm; euhedral.
GROUNDMASS: Glassy to very fine-grained.
VESICLES: 7-15%; 0.5-6 mm; irregular, elongate; throughout and aligned; some lined with light blue and translucent prisms with opalescent spherical cores of zeolite.
Miaroles: None.
COLOR: Dark greenish gray (10Y 5/1).
ALTERATION: Patches of variable alteration (5-35%) predominantly to clays.
VEINS/FRACTURES: Trace; <1 mm; random; filled with white zeolite(?).
ADDITIONAL COMMENTS: This unit is a continuation of the overlying core (23R-1).

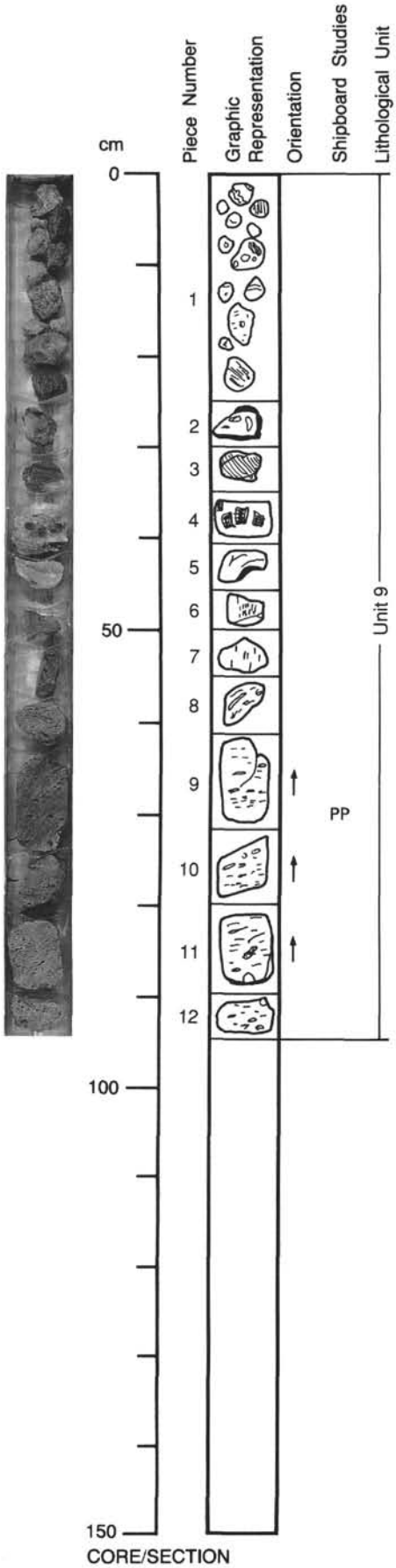


125-786B-24R-2

UNIT 9: TWO-PYROXENE DACITE

Pieces 1-9

CONTACTS: None visible.
PHENOCRYSTS: Sparse glomerocrysts of ortho- and clinopyroxene, plagioclase and magnetite.
Clinopyroxene - <1%; 0.5-1 mm; equant-elongate.
Orthopyroxene - <1%; 0.5-1 mm; equant-euhedral.
Plagioclase - <1%; 0.5-1.5 mm; tabular laths.
Magnetite - trace; <0.2 mm; euhedral.
GROUNDMASS: Glassy to very fine-grained.
VESICLES: 5-20%; <15 mm; elongate; throughout; some empty, others are lined with light blue and prismatic pale green minerals.
COLOR: Dark greenish gray (10Y 5/1) to altered zones dark yellowish brown (10YR 4/4).
STRUCTURE: Massive.
ALTERATION: Variable: Pieces 5 to 9 are pervasively altered whereas Pieces 2 and 3 have alteration locally, concentrated in the vicinity of fractures and veins.
VEINS/FRACTURES: 2-5%; in Pieces 2 and 3, veins <3 mm wide.; conjugate, steeply inclined; veins are filled with white, amorphous, zeolite with a subsequent fill of pale green microprismatic zeolite.

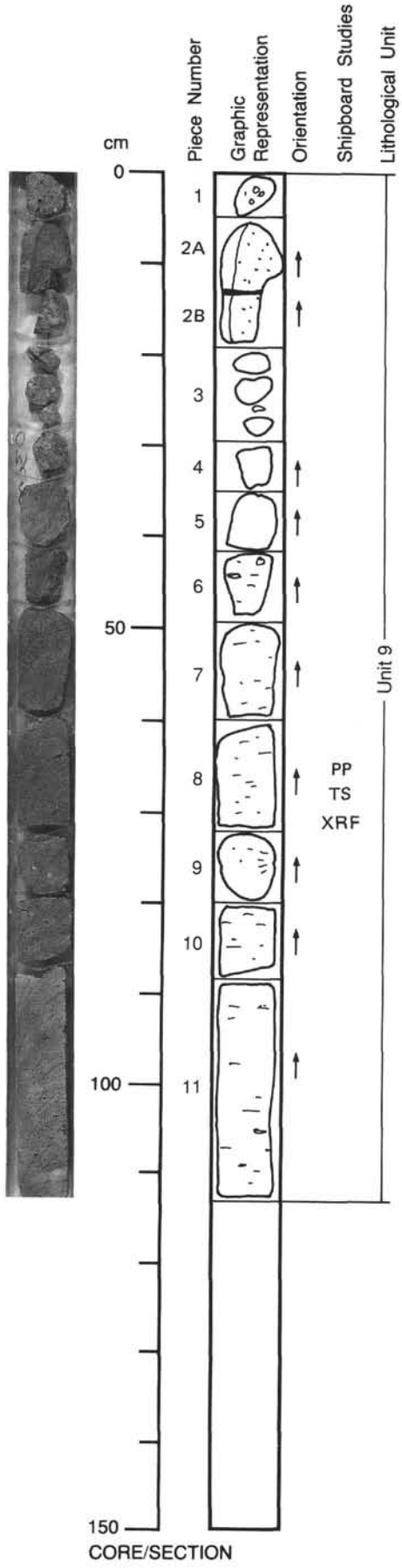


125-786B-25R-1

UNIT 9: SPARSELY PHYRIC DACITE

Pieces 1-12

CONTACTS: None visible.
PHENOCRYSTS:
Clinopyroxene - 0-1%; <1 mm; euhedral, equant, black to dark green.
Plagioclase - 0-1%; <1 mm; euhedral, columnar.
Orthopyroxene - trace; <1 mm.
Magnetite - trace; <0.1 mm; euhedral, octahedral.
GROUNDMASS: Glassy to very fine-grained.
VESICLES: 15%; <2 cm; parallel elongated; randomly distributed; partially filled with hexagonal clear white flakes.
COLOR: Gray to grayish brown (10YR 5/1 - 5/2).
STRUCTURE: None.
ALTERATION: Pieces 1-5 are altered, some appear brecciated.
VEINS/FRACTURES: Not present.

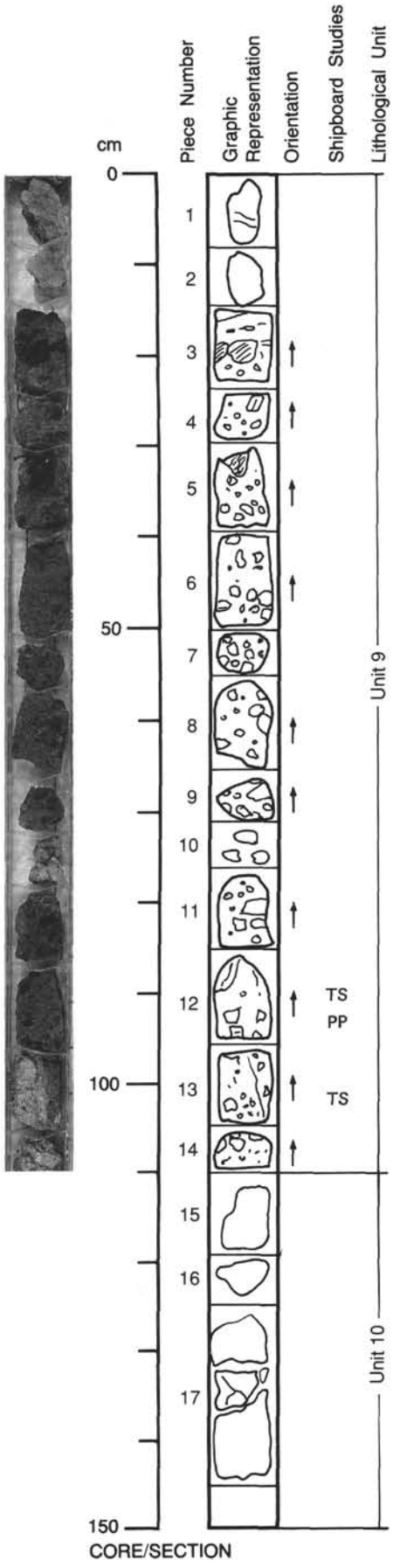


125-786B-26R-1

UNIT 9: SPARSELY PHYRIC DACITE

Pieces 1-11

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - trace; < 1mm; euhedral; also in glomerocrysts with clinopyroxene.
Clinopyroxene - trace; <1 mm; euhedral; commonly with plagioclase in glomerocrysts.
GROUNDMASS: Glassy to finely crystalline.
VESICLES: 10%; <1 cm; sub-round to elongate; random throughout; vesicles elongated in horizontal direction; hexagonal greenish flakes in vesicles.
COLOR: Dark greenish gray (10Y 4/1).
STRUCTURE: None.
ALTERATION: Piece 1 is altered to beige color; rim of Piece 2 is altered.
VEINS/FRACTURES: Not present.
ADDITIONAL COMMENTS: Piece 1 is continuation of 25R-1.



125-786B-27R-1

UNIT 9: DACITE BRECCIA

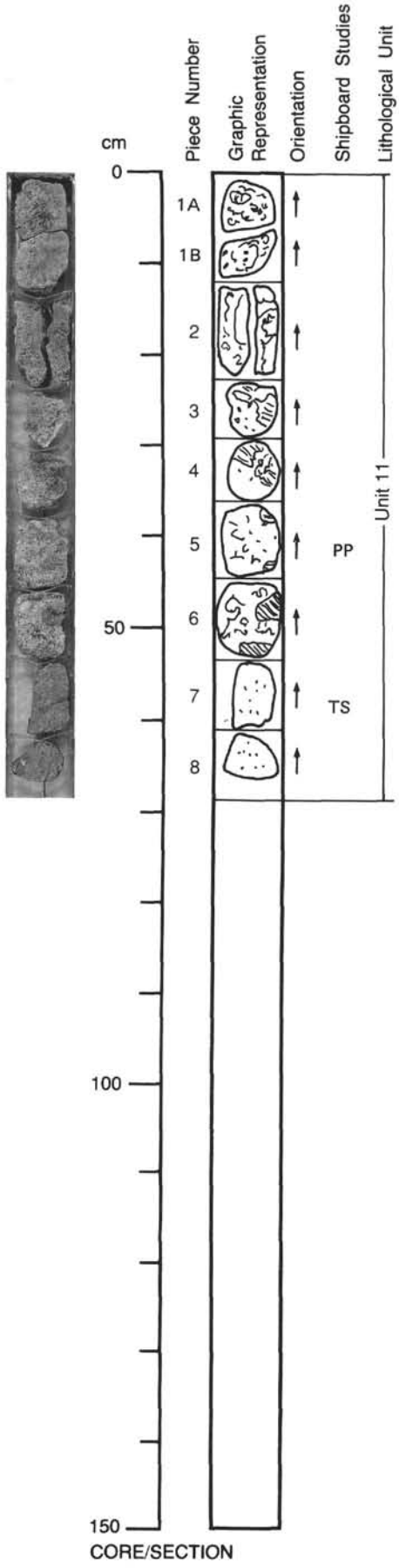
Pieces 1-14

CONTACTS: A sedimentary contact is present at 106 cm where coarse sand and breccia are in contact; at 96-103 cm, a steeply dipping contact between unaltered volcaniclastic breccia and sedimentary breccia occurs. Sediment to altered clinopyroxene-plagioclase -phyric andesite contact at 142 cm.
PHENOCRYSTS:
Plagioclase - 0-2%; <1 cm; euhedral.
Magnetite - trace; <0.1 mm; black specks in groundmass.
GROUNDMASS: Glassy; breccia matrix is also glassy.
VESICLES: 0-50%; 0-1 cm; round to elongated; some fragments are pumiceous; vesicles are differently oriented from clast to clast in breccia.
COLOR: Black to dark greenish-gray (10Y 3/1 - 4/2).
STRUCTURE: Breccia.
ALTERATION: In Piece 11 (98-103 cm), there is a sedimentary(?) or alteration boundary(?).
VEINS/FRACTURES: None present.
ADDITIONAL COMMENTS: Breccia is composed of a single kind of rhyolite clast. Beige-black color variation occurs also in single clasts (Piece 12).

UNIT 10: VITRIC SAND

Pieces 14-17

CONTACTS: Between volcanic breccia and sediment in Piece 14.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: Grayish green (5G 4/2) to pale green (5G 7/2) to light greenish gray (10Y 8/1) to white (N8/).
STRUCTURE: N/A.
ALTERATION: Ubiquitous clay-chlorite alteration.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Piece 15 is a sand that contains angular to subrounded mm to 0.25 cm-size clasts at top to 1 cm-size clasts at base; generally mottled with no primary sedimentary structures. Piece 17 ranges from very coarse sand to silt, is cross-bedded, and contains at least three depositional (flow or slump?) units defined by crossbed dips and erosive set bases. The basal unit is horizontal, the steepest unit is about 38 degrees.

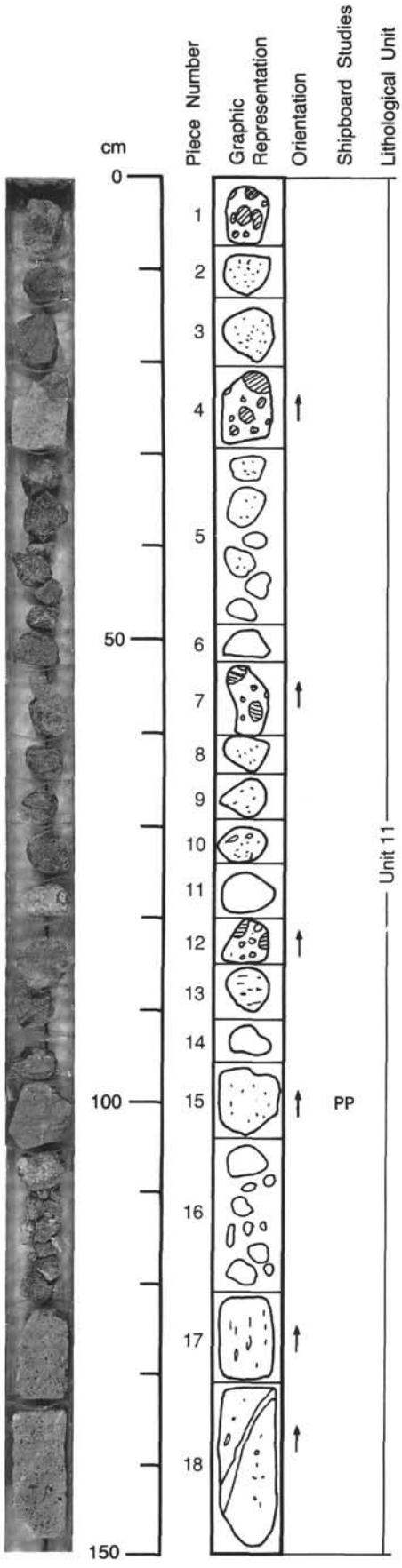


125-786B-27R-2

UNIT 11: TWO-PYROXENE, PLAGIOCLASE PHYRIC BONINITE

Pieces 1-8

CONTACTS: Not visible.
PHENOCRYSTS: Plagioclase is absent in weathered portions.
Orthopyroxene - 15%; 2-8 mm; euhedral, equant, black when unfractured, yellow-brown when fractured.
Plagioclase - 15-20%; 2-10 mm; euhedral, columnar.
Clinopyroxene - 1-2%; <1 mm; dark green when unfractured, pale green when fractured.
GROUNDMASS: Glassy to finely crystalline.
VESICLES: 10%; <3 mm; rounded to irregular shape; randomly distributed; no preferred orientation.
COLOR: Gray (2.5YR 4/0) to grayish yellow-green (5GY 7/4) in altered parts.
STRUCTURE: None.
ALTERATION: Progressively more altered up-section; Pieces 7-8 are fresh.
VEINS/FRACTURES: Not present.
ADDITIONAL COMMENTS: This is not a breccia. In 27R-1 at 142-144 cm contact is exposed of this rock and overlying sediment.

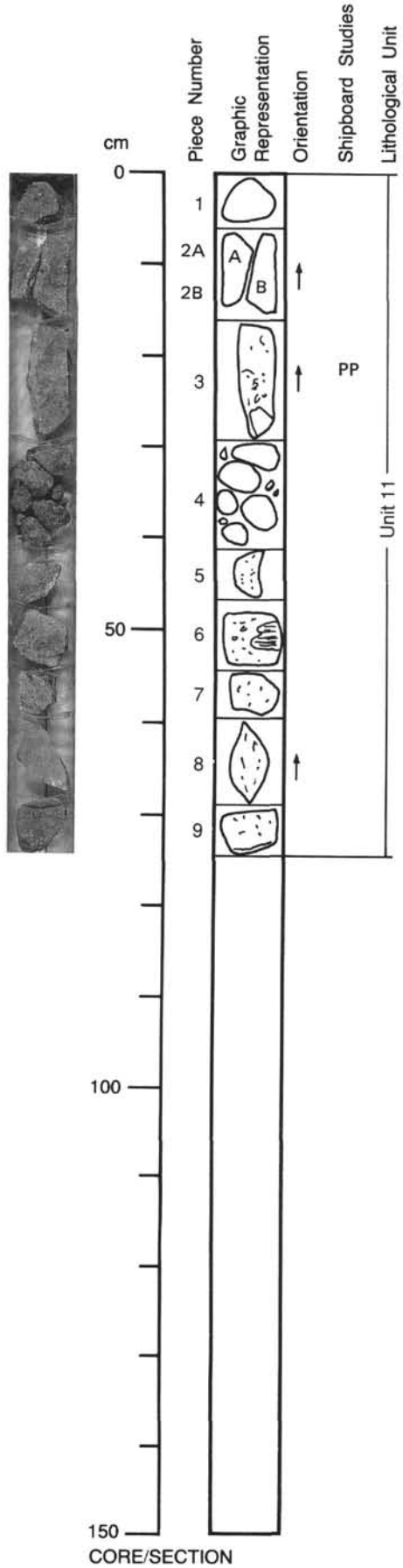


125-786B-28R-1

UNIT 11: TWO-PYROXENE, PLAGIOCLASE PHYRIC BONINITE (27-2 CONTINUED)

Pieces 1-18

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 10-15%; 1-4 mm; euhedral, black when unfractured, pale yellow when fractured.
Plagioclase - 10-15%; 1-5 mm; euhedral and round.
Clinopyroxene - 5%; not visible; dark green when unfractured, pale green when fractured.
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 5-10%; <4 mm; irregular; randomly distributed; some have gray-blue filling.
COLOR: Gray (5BG 5/1) when fresh to greenish-gray (5G 6/1) when altered
STRUCTURE: None.
ALTERATION: Pieces 1,4,7,12 and 16 are altered.
VEINS/FRACTURES: Trace; 1 mm; steeply dipping; in Piece 17 multiple calcite veins; Piece 15 crack with brown alteration zone.
ADDITIONAL COMMENTS: Continuation of Section 125-786B-27R-2.

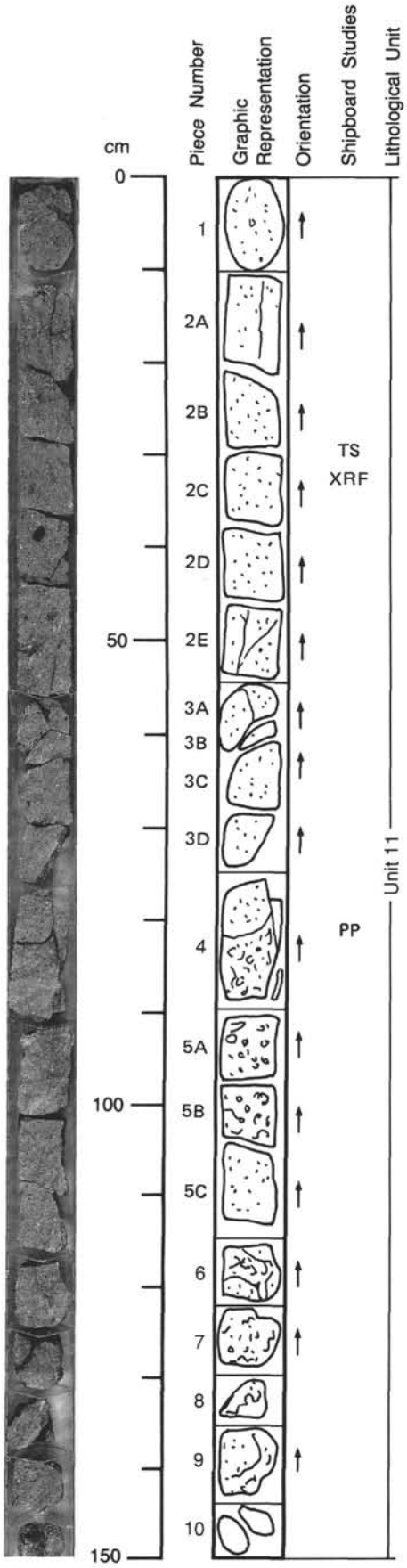


125-786B-29R-1

UNIT 11: TWO-PYROXENE, PLAGIOCLASE PHYRIC BONINITE (28-1 CONTINUED)

Pieces 1-9

CONTACTS: Not visible.
PHENOCRYSTS:
Orthopyroxene - 8%; <4 mm; subhedral to euhedral; black when unfractured, yellow-brown when fractured.
Clinopyroxene - 6%; <2 mm; dark green when unfractured, pale greenish yellow when fractured, euhedral.
Plagioclase - 10%; <5 mm; euhedral and round.
GROUNDMASS: Partly glassy, partly finely crystalline.
VESICLES: 10%; <3 mm; irregular; randomly distributed; filled with pale gray-blue mineral.
COLOR: Gray (10YR 4/1) to pale yellow-brown (10YR 7/4) when altered.
STRUCTURE: None.
ALTERATION: Pieces 2, 3, 4, and 6 show brownish alteration.
VEINS/FRACTURES: Trace; <1 mm; sub-vertical; fractures are filled with white talc-like material and have alteration zones.
ADDITIONAL COMMENTS: Continuation of 125-786B-27R-2. Piece 8 is aphyric, sparsely vesicular and vesicles are filled with calcite.

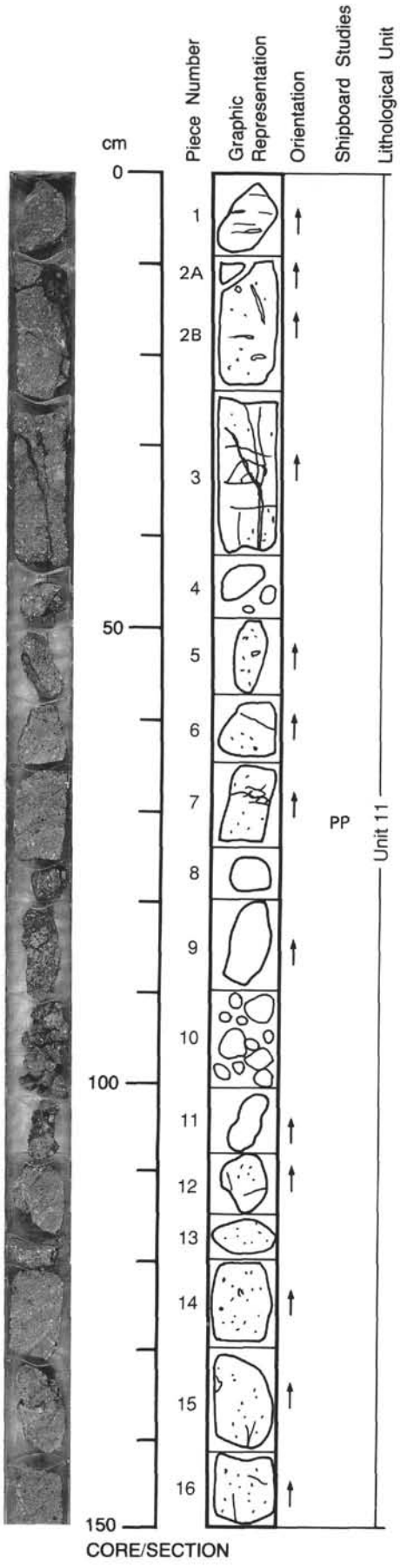


125-786B-30R-1

UNIT 11: TWO-PYROXENE, PLAGIOCLASE PHYRIC BONINITE (29-1 CONTINUED)

Pieces 1-10

CONTACTS: *None visible.*
PHENOCRYSTS:
Orthopyroxene - 10-15%; 1-10 mm; yellow to brown, altering to serpentine.
Plagioclase - 8-10%; <3 mm; euhedral and rounded.
Clinopyroxene - 2-5%; <2 mm; dark green, pale green when fractured; euhedral.
GROUNDMASS: Glassy with plagioclase microphenocrysts.
VESICLES: 5-10%; <4 mm; irregular shape; randomly distributed; filled with calcite or with greenish coating.
COLOR: Bluish gray (5B 5/1) where fresh, greenish gray (5G 5/1) and weak red (10R 4/3) where altered.
STRUCTURE: None.
ALTERATION: Along veins and cracks to reddish and greenish colors.
VEINS/FRACTURES: Trace; <0.2 mm; sub-vertical; veins filled with calcite; some fractures appear may be dark green serpentine(?).
ADDITIONAL COMMENTS: Section is a continuation of 125-786B-27R-2.

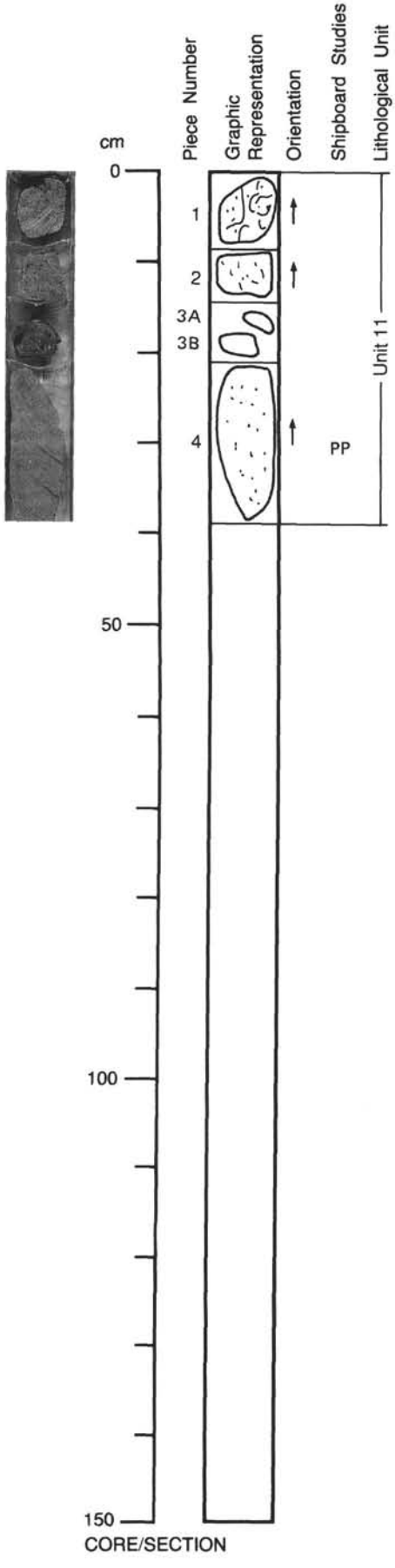


125-786B-30R-2

UNIT 11: TWO-PYROXENE, PLAGIOCLASE PHYRIC BONINITE (30R-1 CONTINUED)

Pieces 1-16

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 15-20%; 2-10 mm; yellow to brown, altering to serpentine.
Plagioclase - 8-10%; <3 mm; euhedral and rounded.
Clinopyroxene - 3-5%; <2 mm; dark green, pale green when fractured.
GROUNDMASS: Glassy with plagioclase microphenocrysts.
VESICLES: 5-10%; <4 mm; irregular shape; randomly distributed; filled with calcite or dark-green coating.
COLOR: Bluish gray (5B 5/1) where fresh, greenish gray (5G 5/1) and weak red (10R 4/3) when altered.
STRUCTURE: None.
ALTERATION: Along veins and cracks to reddish and greenish colors.
VEINS/FRACTURES: Trace; <0.2 mm; sub-vertical; some filled with calcite, some appear dark green: serpentine(?).
ADDITIONAL COMMENTS: Section is a continuation of 125-786B-27R-2.

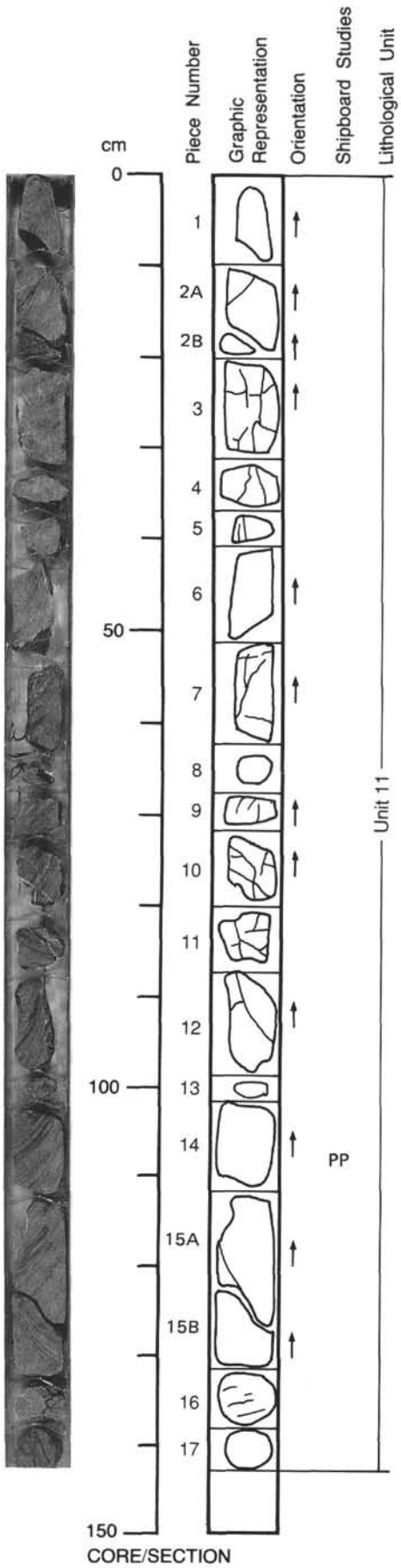


125-786B-30R-3

UNIT 11: TWO-PYROXENE, PLAGIOCLASE PHYRIC BONINITE (30R-2 CONTINUED)

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 15-20%; 1-10 mm; yellow-brown, altering to serpentine, euhedral and anhedral.
Plagioclase - 8-10%; <3 mm; euhedral and rounded.
Clinopyroxene - 5-8%; <3 mm; dark green, euhedral.
GROUNDMASS: Glassy with plagioclase crystals.
VESICLES: 5-10%; <4 mm; irregular; n/a
COLOR: Bluish gray (5B 5/1) where fresh, dark green (5G 4/2) when altered
STRUCTURE: None.
ALTERATION: Dark green alteration veins and patches.
VEINS/FRACTURES: Trace; <0.2 mm; random orientation; dark-green veins (serpentine?).
ADDITIONAL COMMENTS: Section is a continuation of 125-786B-27R-2. N.B. Piece 4 is like Section 31R-1.

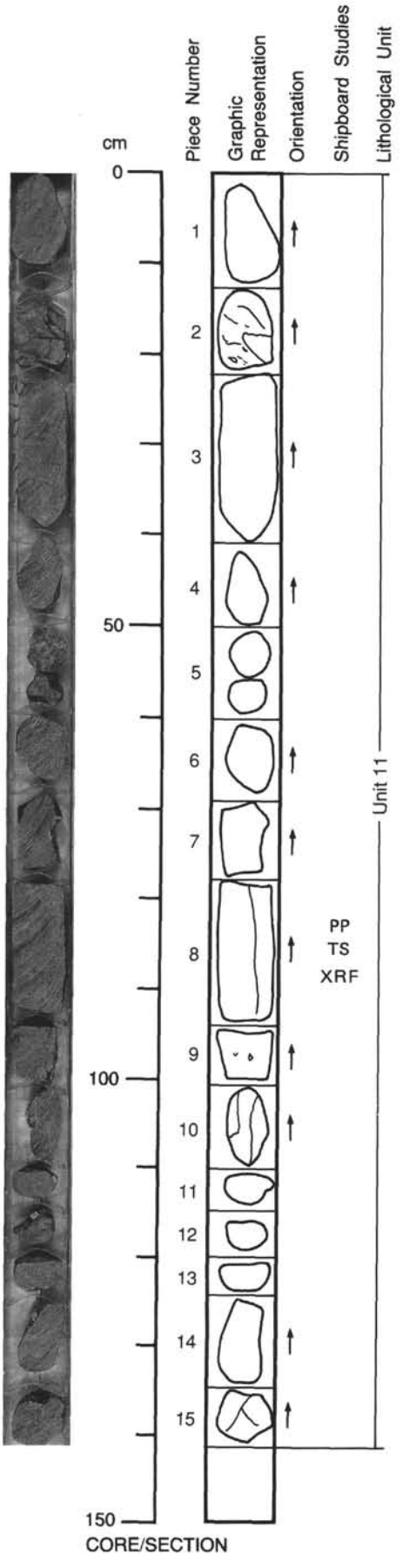


125-786B-31R-1

UNIT 11: OLIVINE, PLAGIOCLASE, TWO-PYROXENE PHYRIC BONINITE

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of orthopyroxene.
Orthopyroxene - 10-15%; < 5 mm; yellow, euhedral.
Plagioclase - 10-15%; <2 mm; subhedral to euhedral.
Clinopyroxene - 2-5%; <1 mm; dark green, euhedral.
Olivine? - 5%; <1 mm; alteration products are hematite and carbonate
GROUNDMASS: Finely crystalline.
VESICLES: 0-1%; <2 mm; round; randomly distributed; filled with calcite and a green mineral.
COLOR: Gray (7.5RYR 5/0) to reddish gray (5R 5/1).
STRUCTURE: None.
ALTERATION: Olivine altered to hematite and carbonate.
VEINS/FRACTURES: 1%; <2 mm; random orientations; filled with calcite.

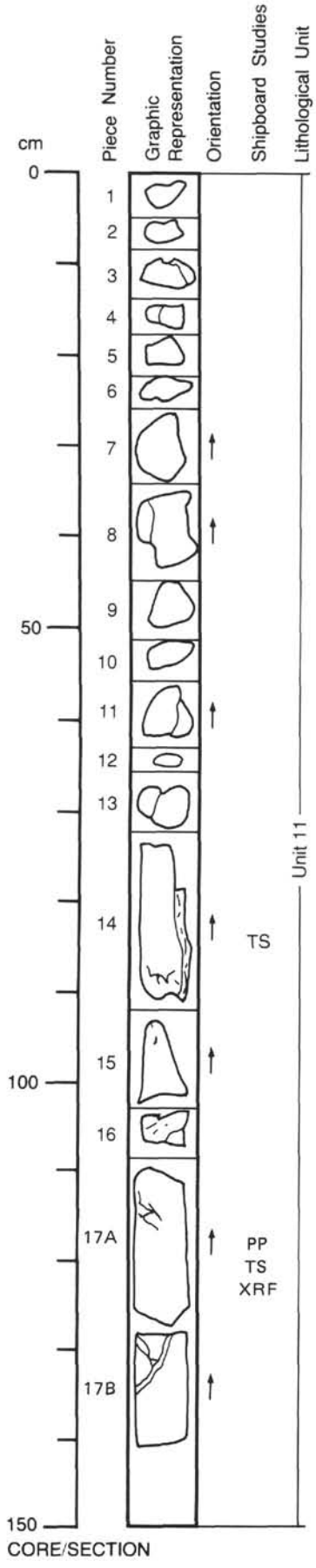


125-786B-31R-2

UNIT 11: OLIVINE, PLAGIOCLASE, TWO-PYROXENE BONINITE (31R-1 CONTINUED)

Pieces 1-15

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene glomerocrysts.
Plagioclase - 10-15%; <2 mm; subhedral to euhedral.
Orthopyroxene - 10-15%; <5 mm; yellow, euhedral.
Clinopyroxene - 2-5%; <1 mm; dark green, euhedral.
Olivine - 5%; <1 mm; alteration products include hematite and carbonate.
GROUNDMASS: Finely crystalline.
VESICLES: 0-1%; <2 mm; round; randomly distributed; filled with calcite and green unidentified material (zeolite?, clay?).
COLOR: Reddish gray (5R 5/1).
STRUCTURE: None.
ALTERATION: Olivine alters to hematite and carbonate.
VEINS/FRACTURES: 1%; 2 mm wide; randomly oriented; filled with calcite.
ADDITIONAL COMMENTS: Continuation of Section 125-786B-30R-1.

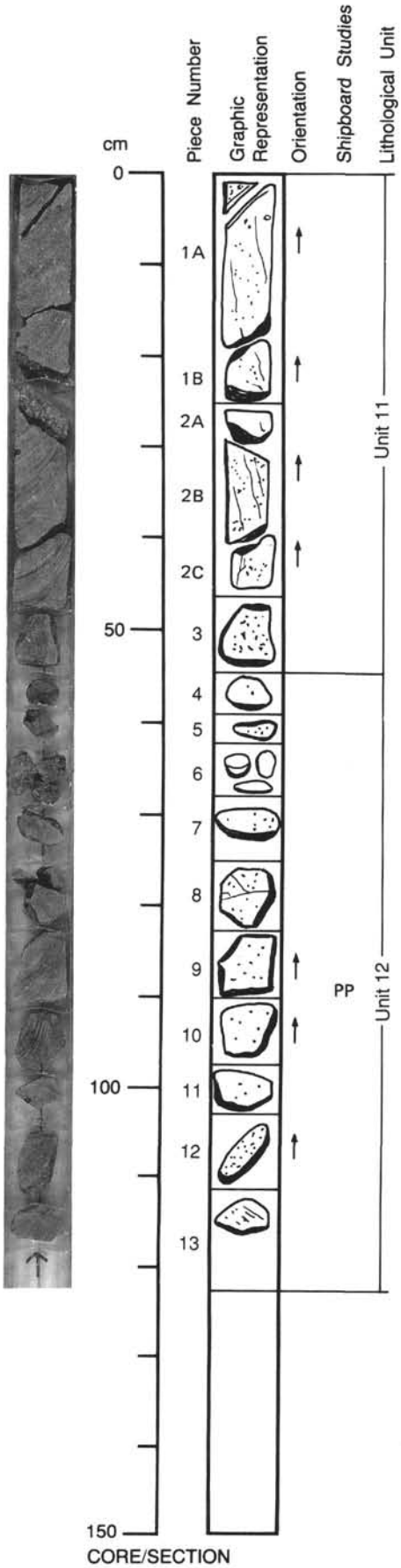


125-786B-32R-1

UNIT 11: OLIVINE-BEARING BONINITE

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Two-pyroxene glomerocrysts, some with plagioclase, are common.
Orthopyroxene - 7-10%; 0.7-2.5 mm; elongate, subhedral.
Clinopyroxene - 5-8%; 0.2-2 mm; elongate, euhedral to subhedral.
Plagioclase - 5-7%; <0.5 mm; euhedral, lath-like.
Olivine - 3-5%; <2.5 mm; euhedral, elongate.
Magnetite - <1%; 0.25 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy.
VESICLES: 1-3%; 0.5-1.5 mm; irregular, jagged; throughout; appear concentrated near glomerocrysts.
COLOR: Dark reddish gray (10R 4/1 to 3/1).
STRUCTURE: Massive.
ALTERATION: Hematitic staining along fractures; overall color of rock appears to result from minor alteration; chlorite is present in the matrix after glass. Olivine phenocrysts are pervasively altered to an Fe-oxide carbonate assemblage.
VEINS/FRACTURES: <1%; 1-2 mm; subparallel; filled with carbonate and a pale green material (chlorite or zeolite?).
ADDITIONAL COMMENTS: Continuation of Section 125-786B-31R-02.



125-786B-32R-2

UNIT 11: OLIVINE-BEARING BONINITE (32R-1 CONTINUED)

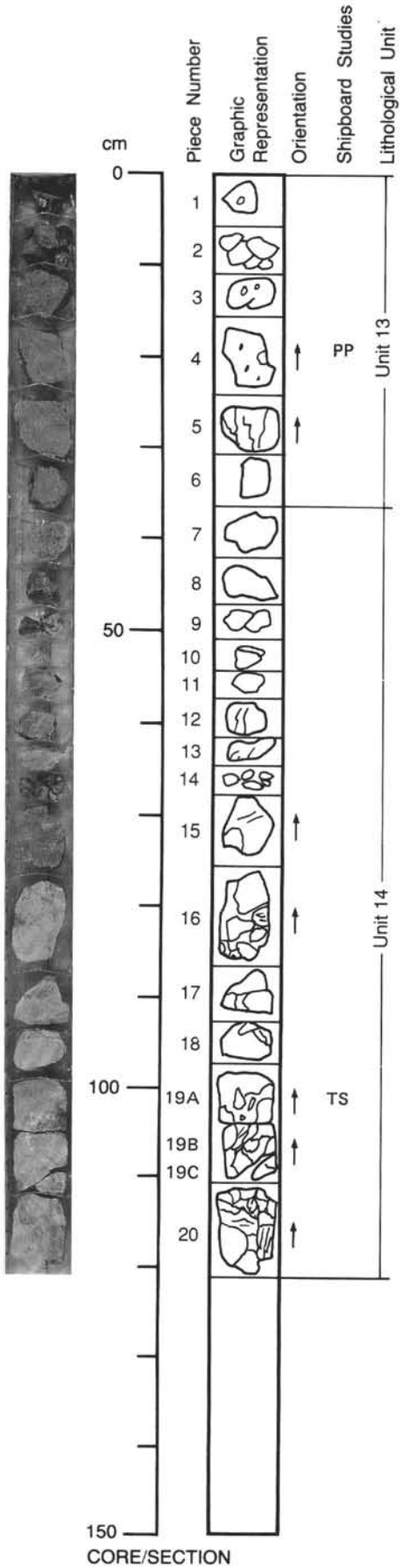
Pieces 1-3, 12

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of two pyroxenes with or without plagioclase.
Orthopyroxene - 7-10%; 0.7-2.5 mm; elongate, subhedral.
Clinopyroxene - 5-8%; 0.2-2 mm; elongate, euhedral to subhedral.
Plagioclase - 5-7%; <0.5 mm; tabular laths, elongate.
Olivine - 3-5%; <2.5 mm; equant, euhedral.
Magnetite - <1%; 0.25 mm; equant, euhedral.
GROUNDMASS: Fine-grained to glassy with tiny magnetite crystals.
VESICLES: 1-3%; 0.5-1.5 mm; irregular, jagged; throughout but random concentrations; tend to cluster near the glomerocrysts.
COLOR: Dark reddish gray (10R 4/1 to 3/1).
STRUCTURE: Massive.
ALTERATION: Hematitic staining along fractures, overall color of rock appears to result from minor alteration; glass is altered to chlorite; olivine phenocrysts are pervasively altered to an Fe-oxide/carbonate assemblage.
VEINS/FRACTURES: <1%; 1-2 mm; subparallel; filled with carbonate and a pale green material (chlorite or zeolite?).
ADDITIONAL COMMENTS: Continuation of Section 32R-1

UNIT 12: RHYOLITE

Pieces 4-11, 13

CONTACTS: None.
PHENOCRYSTS: Glomerocrysts of two pyroxenes with or without plagioclase.
Orthopyroxene - <2%; <0.5 mm; equant, euhedral.
Clinopyroxene - 1-2%; <0.5 mm; equant, euhedral.
Plagioclase - 4-5%; <2 mm; tabular laths, euhedral to subhedral.
Magnetite - trace; <0.25; equant, euhedral.
GROUNDMASS: Fine-grained to glassy, altered.
VESICLES: 1-2%; 0.5-1.5 mm; irregular, ragged; throughout, locally oriented.
COLOR: Gray (5Y 5/1).
STRUCTURE: Massive.
ALTERATION: Variably altered (5-35%) to clays and chlorite.
VEINS/FRACTURES: None.



125-786B-33R-1

UNIT 13: OLIVINE-BEARING BASALTIC ANDESITE

Pieces 1-6

CONTACTS: None visible.
PHENOCRYSTS: Ortho- and clinopyroxene, plagioclase and magnetite occur as glomerocrysts as well as isolated phases.
Orthopyroxene - 7-10%; 0.1-4 mm: euhedral-subhedral; jacketed by clinopyroxene on some crystals.
Clinopyroxene - 3-6%; 0.2-2 mm; equant-elongate.
Plagioclase - 3-5%; 0.5-1.5 mm; equant, euhedral.
Olivine - 3-5%; 0.2-1.5 mm; euhedral-subhedral magnetite - trace; <0.2 mm; euhedral.
GROUNDMASS: Fine-grained, glassy and stained red.
VESICLES: None.
COLOR: Dark reddish gray (10R 4/1 to 3/1).
STRUCTURE: Massive.
ALTERATION: Redness appears to result from pervasive hematitic alteration, localized around olivine and disseminated in the matrix.
VEINS/FRACTURES: Trace; <0.1 mm; sub-vertical; carbonate-filled.

UNIT 14: MINERALIZED TWO-PYROXENE ANDESITE

Pieces 7-13

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene, clinopyroxene and plagioclase form both glomerocrystic clusters and individual crystals.
Plagioclase - 3-5%; 0.5-2.5 mm; euhedral, equant.
Orthopyroxene - 1-2%; <0.5 mm; euhedral, tabular.
Clinopyroxene - <2%; <0.5 mm; euhedral, equant.
Magnetite - trace; <0.2 mm; equant, euhedral.
GROUNDMASS: Fine-grained, glassy, with chlorotic alteration. Carbonate, zeolite and silica in vugs in the groundmass.
VESICLES: None visible.
COLOR: Gray (7.5YR 5/0).
STRUCTURE: Massive.
ALTERATION: Pervasive chloritization.
VEINS/FRACTURES: <1%; <1 mm wide; random; pyrite, silica and zeolite fill veins.
ADDITIONAL COMMENTS: The rock has a greenschist metamorphic alteration assemblage; disseminated pyrite (up to 1 mm in size) grains have euhedral habits when in open vugs, otherwise they form aggregates of ragged anhedral grains.

UNIT 14: ANDESITIC-GLASSY BRECCIA

Pieces 14-15

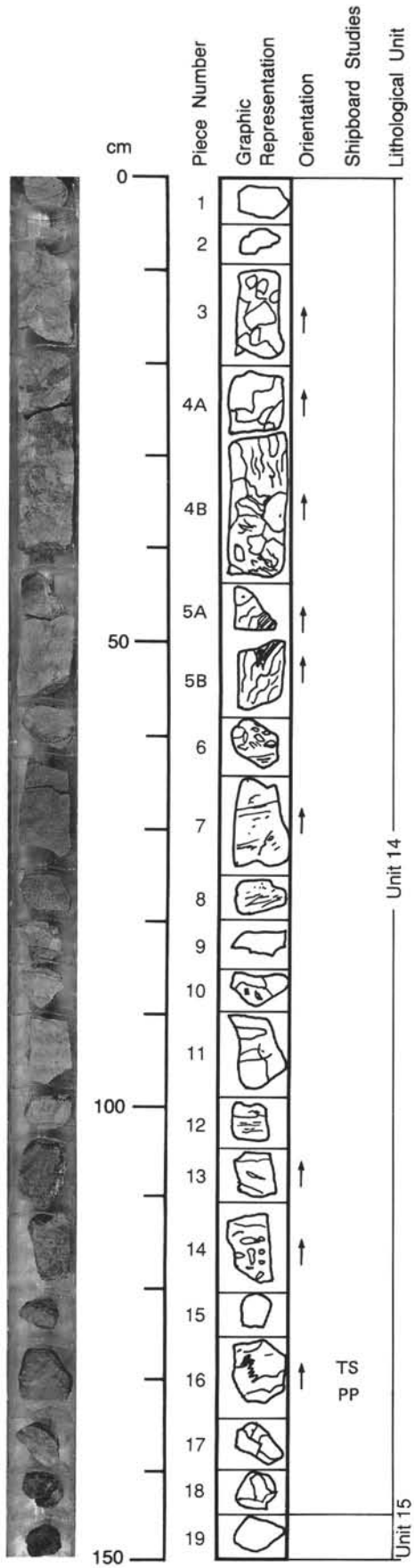
CONTACTS: None visible.
PHENOCRYSTS: Both pyroxenes are variably altered to chlorite.
Plagioclase - 5%; <1.5 mm; euhedral laths.
Orthopyroxene - 5-8%; <0.1 mm; euhedral, equant.
Clinopyroxene - 5%; <1.5 mm; equant, elongate.
Magnetite - trace; <0.5 mm; euhedral.
GROUNDMASS: Flow-banded glass comprises 70%-85%, now altered with trace amounts of pyrite (<0.2 mm grains).
VESICLES: 0-10%; <0.5 mm; elongate; variable; present in some clasts but not in others.
COLOR: Dark yellowish brown (10YR 4/6).
STRUCTURE: Breccia.
ALTERATION: Pervasive, Fe-oxide stained chloritization of pyroxenes.
VEINS/FRACTURES: <0.5%; <1 mm wide; sub-vertical; vein fill is predominately carbonate.

125-786B-33R-1 (continued)

UNIT 14: META-BRECCIATED ANDESITE

Pieces 16-20

CONTACTS: None visible.
PHENOCRYSTS: Two-pyroxene and plagioclase glomerocrysts.
Plagioclase - <1%; 0.5-1 mm; subhedral laths.
Clinopyroxene - 1-2%; 0.5-2 mm; elongate, equant.
Orthopyroxene - 1-2%; 0.5-2 mm; elongate, equant and subhedral.
Magnetite - trace; <0.2 mm; equant, euhedral.
GROUNDMASS: Fine-grained, chlorite and clay alteration products.
VESICLES: None.
COLOR: Light gray (10YR 7/2) to dark yellow-brown (10YR 3/6).
STRUCTURE: Breccia; includes in situ brecciation of individual clasts.
ALTERATION: Pervasive chloritization affecting both clasts and matrix; clasts have alteration rim 3-5 mm wide.
VEINS/FRACTURES: <1%; <3 mm wide; subvertical; filled with carbonate, chlorite and white zeolite. One vug in Piece 19A, is filled with 5-mm dog-tooth calcite crystals.
ADDITIONAL COMMENTS: Pyrite forms disseminated crystals, subhedral to euhedral, especially abundant in chloritized zones and veins (<0.1% of rock).



CORE/SECTION

125-786B-34R-1

UNIT 14: TWO-PYROXENE ANDESITE

Pieces 1-2

CONTACTS: None visible.
PHENOCRYSTS: Clino- and orthopyroxene and plagioclase form glomerocrysts as well as isolated phases.
Plagioclase - <2%; <0.5 mm; euhedral laths.
Orthopyroxene - <1%; <0.2 mm; equant, euhedral.
Clinopyroxene - <1%; <0.2 mm; equant,elongate.
GROUNDMASS: Fine-grained, felted, feldspar-rich.
VESICLES: None.
COLOR: Gray (7.5YR 6/0).
STRUCTURE: Massive.
ALTERATION: Minor chlorotic alteration.
VEINS/FRACTURES: Trace; <0.2 mm; conjugate; appear to be filled with hematite and chlorite.

UNIT 14: BRECCIATED FLOW-BANDED ANDESITE

Pieces 3-6

CONTACTS: Bottom of Piece 6 with underlying sediment.
PHENOCRYSTS: Pyroxene and feldspar form as glomerocrysts and as individual crystals.
Plagioclase - 10-20%; 0.2-2.5 mm; equant, subhedral.
Clinopyroxene - 5-8%; 0.2-0.5 mm; equant, subhedral.
Orthopyroxene - 1%; <0.3 mm; equant, tabular.
Magnetite - trace; <0.2 mm; equant, euhedral.
GROUNDMASS: Very fine-grained to glassy; pervasively altered.
VESICLES: 2%; <0.2 mm; elongate; variable; partially filled with translucent zeolite.
COLOR: Gray (10YR 6/1) to yellowish brown (10YR 5/4).
STRUCTURE: Indurated; breccia; flow-banded at the base.
ALTERATION: Chlorite, minor epidote; some individual clasts show oxidation, others are greenschist facies.
VEINS/FRACTURES: <1%; <0.9 mm wide; sub-vertical, anastomosing; veins are filled with chlorite, epidote and some translucent zeolite.
ADDITIONAL COMMENTS: Disseminated pyrite, as aggregates of anhedral grains and individual cubes, is disseminated throughout. Contact with red sandstone below is glassy, flow banded and has rip-up clasts of the sediment. Contact with glassy chilled margin is 0.5 to 1 cm wide.

UNIT 14: VITRIC SILTY SANDSTONE

Pieces 7-9

CONTACTS: None.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: Dark reddish brown (2.5 YR 3/4).
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Piece 7 is a redbed, homogeneous with suggestion of size-grading (normal), perhaps some burrowing (?) and vague laminae; upper edge of piece has slickensides. Piece 8 is lower portion of redbed, normal size-grading, may have slickensides. Piece 9 is a small piece of redbed attached to an andesite clast.

125-786B-34R-1 (continued)

UNIT 14: BRECCIATED FLOW-BANDED TWO-PYROXENE ANDESITE

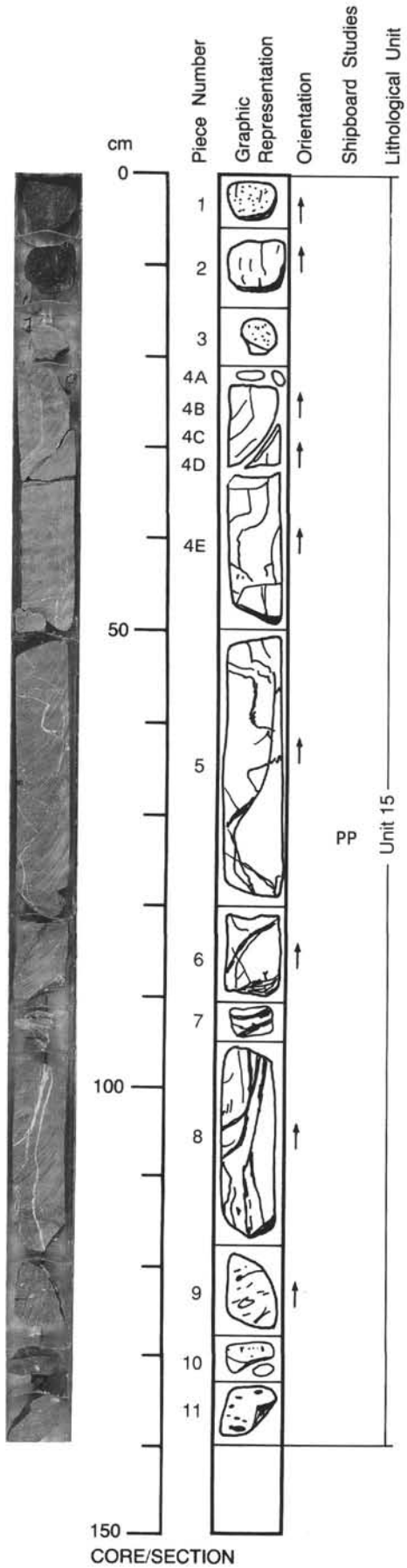
Pieces 10-18

CONTACTS: Top contact (with red sediment) forms a 1 to 5 mm-wide glassy chill; relationship with sediment is ambiguous: bottom contact defined by Pieces 18 & 19, forming a glassy chill at least 3 cm wide.
PHENOCRYSTS: Both pyroxenes and plagioclase form as glomerocrysts and as individual crystals.
Plagioclase - 10-20%; 0.2-2.5 mm; equant, subhedral.
Clinopyroxene - 5-8%; 0.2-0.6 mm; equant, subhedral.
Orthopyroxene - <1%; <0.3 mm; equant, euhedral.
Magnetite - <0.1%; <0.2 mm; equant, euhedral-subhedral.
GROUNDMASS: Very fine-grained to glassy, especially Pieces 18 & 19 which are >75% glass.
VESICLES: 1-2%; <0.2 mm; elongate; variable distribution; partially filled with translucent to pale green material.
COLOR: Gray (10YR 6/1) to olive (10YR 5/3).
STRUCTURE: Indurated breccia with flow-banded clasts and a matrix that is altered flow-banded glass.
ALTERATION: Patchy, chlorotic and Fe-oxidation, variable between clasts. Matrix is pale red (10R 6/2) in places.
VEINS/FRACTURES: <1%; vugs 0.2 to 2 mm wide; sub-vertical; veins are filled with a white stubby prismatic zeolite and green chlorite.
ADDITIONAL COMMENTS: Pyrite mineralization is disseminated throughout the rock especially concentrated in the chlorite-rich altered areas.
Sulfide forms <1% of the rock.

UNIT 15: BASALT

Piece 19

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of pyroxene and plagioclase are present.
Plagioclase - 3%; <1.5 mm; euhedral laths.
Clinopyroxene - 3%; <2 mm; equant to elongate.
Magnetite - trace; <0.2 mm; euhedral.
GROUNDMASS: Fine-grained to glassy; microlites of plagioclase.
VESICLES: 2-5%; <0.5 mm; spherical; localized in patches, some contain zeolite and carbonate.
COLOR: Black (7.5YR 7/0).
STRUCTURE: Massive.
ALTERATION: Minor chlorite alteration around vesicle patches.
VEINS/FRACTURES: 0%; none visible; none visible.
ADDITIONAL COMMENTS: The rock has disseminated sulfide (pyrite) as cubes and aggregates of anhedral blebs (<0.5 mm in size).



125-786B-34R-2

UNIT 15: BASALT

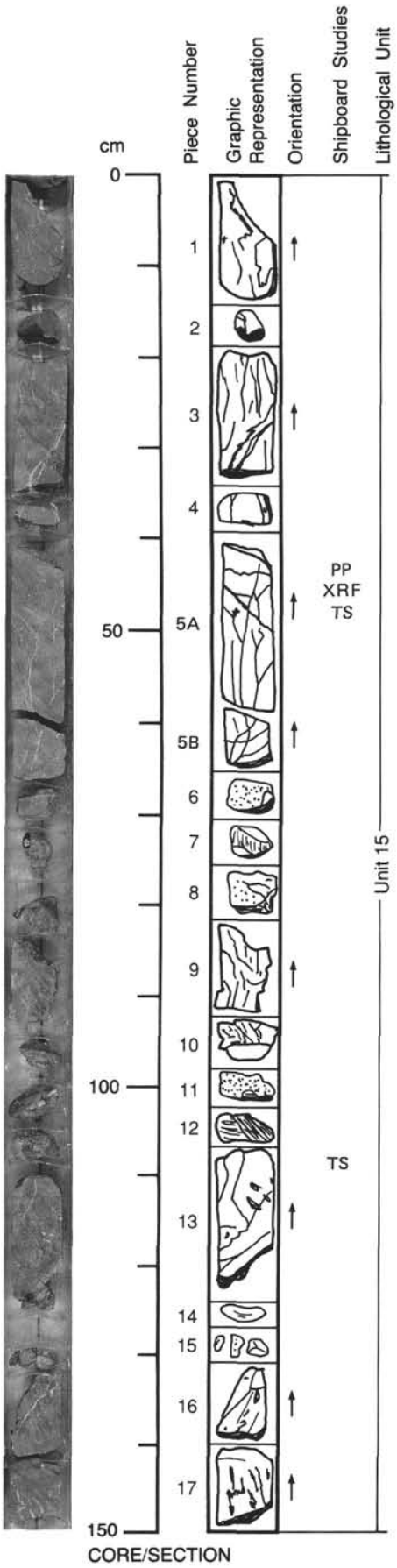
Pieces 1-2

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 3-4%; <1.5 mm; euhedral laths.
Clinopyroxene - 3%; <2 mm; equant to elongate.
Magnetite - trace; <0.2 mm; euhedral.
GROUNDMASS: Glassy to very fine-grained; micro-laths of plagioclase are set in a matrix of glass.
VESICLES: 2-5%; <1 mm; spherical; in patches; some contain pale green to white zeolites(?) and minor carbonate linings.
COLOR: Black (7.5YR 7/0).
STRUCTURE: Massive.
ALTERATION: Minor chloritization about vesicles.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Disseminated sulfide (pyrite) is present as both cubes and patches of anhedral grains, <0.5 mm in size.

UNIT 15: META-OLIVINE BEARING TWO-PYROXENE BASALTIC ANDESITE

Pieces 3-11

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 1-2%; <0.4 mm; elongate euhedral.
Orthopyroxene - <1%; <0.8 mm; equant subhedral to elongate and altered.
Clinopyroxene - 0.5-1%; 0.5-1 mm; equant euhedral to subhedral and fresh.
Magnetite - <1%; <0.1 mm; equant to subhedral.
Olivine - trace; <1 mm; elongate to equant, altered.
GROUNDMASS: Pervasively altered with quench crystals of plagioclase.
VESICLES: 5-10%; 1-2 mm; round; throughout; filled with pale green clay and carbonate.
COLOR: Greenish gray (5G 6/1).
STRUCTURE: Massive.
ALTERATION: Chlorite, clay and carbonate.
VEINS/FRACTURES: 1-2%; <3 mm; subvertical; filled with carbonate and hematite.
ADDITIONAL COMMENTS: Traces of pyrite disseminated throughout.



125-786B-34R-3

UNIT 15: META-OLIVINE-BEARING TWO-PYROXENE BASALT

Pieces 1-17

CONTACTS: *Vesicular meta-two-pyroxene andesite with glassy margin is in contact with* host in pieces 11, 12 and 13, apparently as xenoliths.

PHENOCRYSTS:

Plagioclase - 1-2%; <0.4 mm; elongate euhedral.
Orthopyroxene - <1%; <0.8 mm; equant subhedral to elongate and altered.
Clinopyroxene - 0.5-1%; 0.5-1 mm; equant euhedral/subhedral, fresh.
Magnetite - <1%; <0.1 mm; equant to subhedral.
Olivine - trace; <1 mm; elongate to equant.

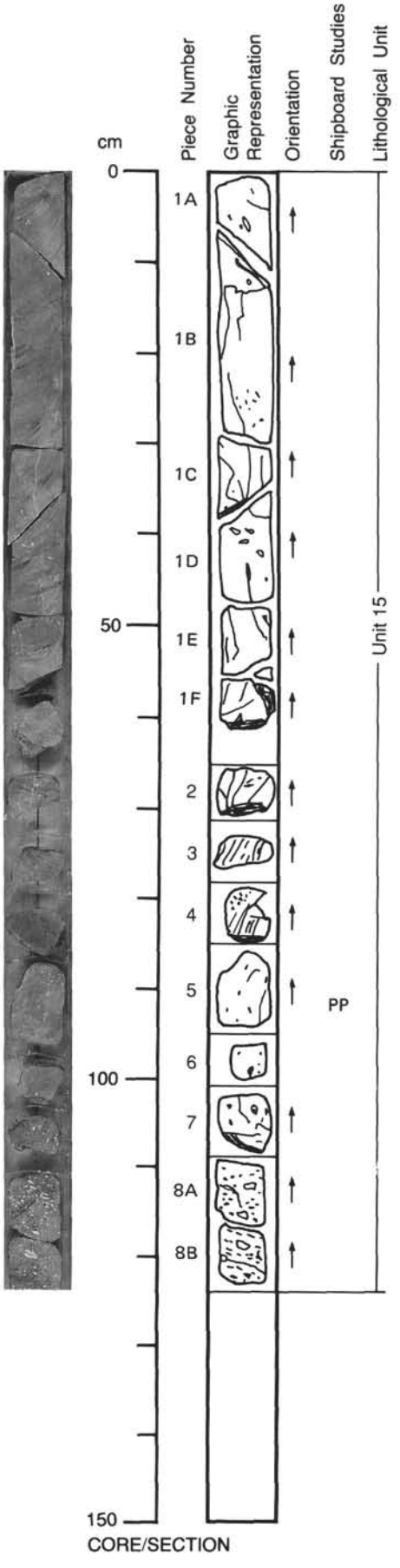
GROUNDMASS: Pervasively altered with chlorite and clay minerals; originally glassy with feldspar quench crystals.

STRUCTURE: Massive.

ALTERATION: Chlorite, clay and carbonate.

VEINS/FRACTURES: 1-2%; <3 mm; subvertical; filled with carbonate and hematite.

ADDITIONAL COMMENTS: Traces of pyrite disseminated throughout; continuation of Section 125-786B-34R-02.



125-786B-34R-4

UNIT 15: META-BASALT

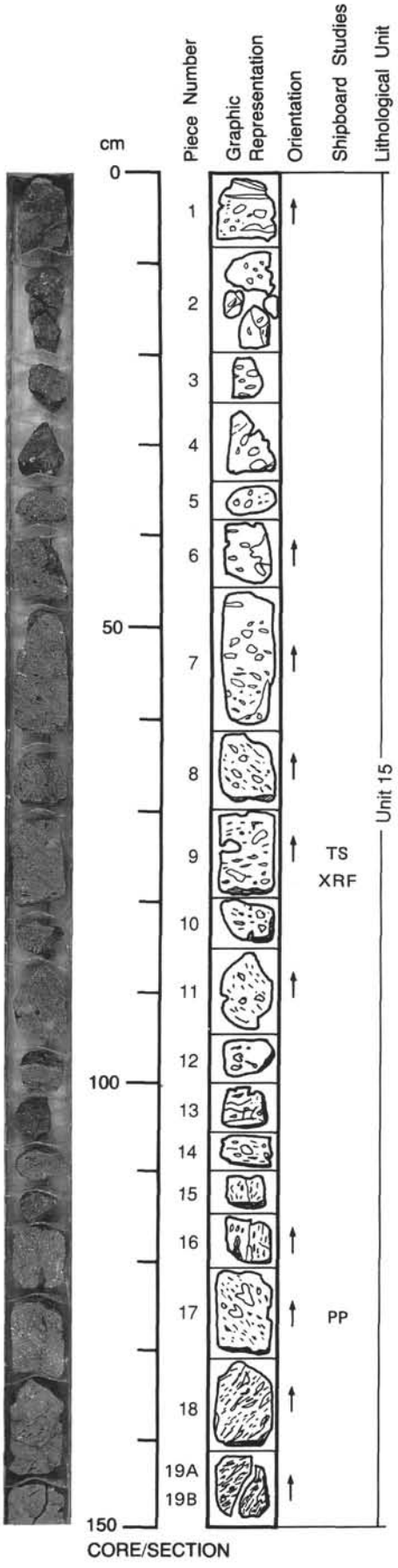
Pieces 1-6

CONTACTS: Chilled margin in Piece 4.
PHENOCRYSTS: Pervasively altered except for in Piece 4.
Orthopyroxene - <10%; <2 mm; euhedral, altered to serpentine.
Clinopyroxene - <5%; <1 mm; black to yellow, unaltered, lath-shape, euhedral.
Plagioclase - <2%; <2 mm; only visible in Piece 4; altered?
GROUNDMASS: Fine-grained greenschist facies minerals (chlorite is visible).
VESICLES: Trace; <1 mm; round to elongate; in zones; filled with calcite.
COLOR: greenish gray (5G 5/1).
STRUCTURE: None.
ALTERATION: Groundmass and phenocrysts are altered to greenschist facies minerals.
VEINS/FRACTURES: Trace; <2 mm wide; dominantly steep dipping; filled with calcite; coarsely crystalline chlorite in veins.

UNIT 15: ORTHOPYROXENE, PLAGIOCLASE VESICULAR DACITE

Pieces 7-8B

CONTACTS: Not visible.
PHENOCRYSTS: Phenocrysts are fresh.
Plagioclase - 5%; <2 mm; rounded and as euhedral laths.
Orthopyroxene - 2%; <3 mm; euhedral, yellow.
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 20%; <2 cm; round to elongated; parallel orientation; random distribution; filled with calcite and with dark green coating.
COLOR: Bluish gray (between 5B 5/1 and 6/1).
STRUCTURE: None.
ALTERATION: Little alteration.
VEINS/FRACTURES: Not present. Pyrite+chlorite zone at rim of stratigraphically highest clast. Related to contact with overlying flow?
ADDITIONAL COMMENTS: Lithology continues in 35R-1. Note contrast in degree of alteration with overlying lithology.



125-786B-35R-1

UNIT 15: ORTHOPYROXENE, PLAGIOCLASE VESICULAR DACITE (34R-4 CONTINUED)

Pieces 1-19B

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 2-5%; <2 mm; euhedral-lath and rounded zoned crystals.
Orthopyroxene - 2-5%; <2 mm, some of 1 cm size; yellow to brown; euhedral.
Clinopyroxene - <2%; <1 mm; dark green; euhedral.
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 20-30%; < 2 cm; elongated; randomly distributed; locally filled with calcite in addition to green or gray coating.
COLOR: Gray 2.5Y 4/0 to 5/0.
STRUCTURE: None.
ALTERATION: Very minor.
VEINS/FRACTURES: Trace; 4 mm; 20 degree dip; vein in Piece 1 of light-green to white coarse crystalline material containing pyrite and with margins and veins of silky dark-green material.
ADDITIONAL COMMENTS: Continuation of Section 125-786B-34R-4; finely vesicular clasts entrained.

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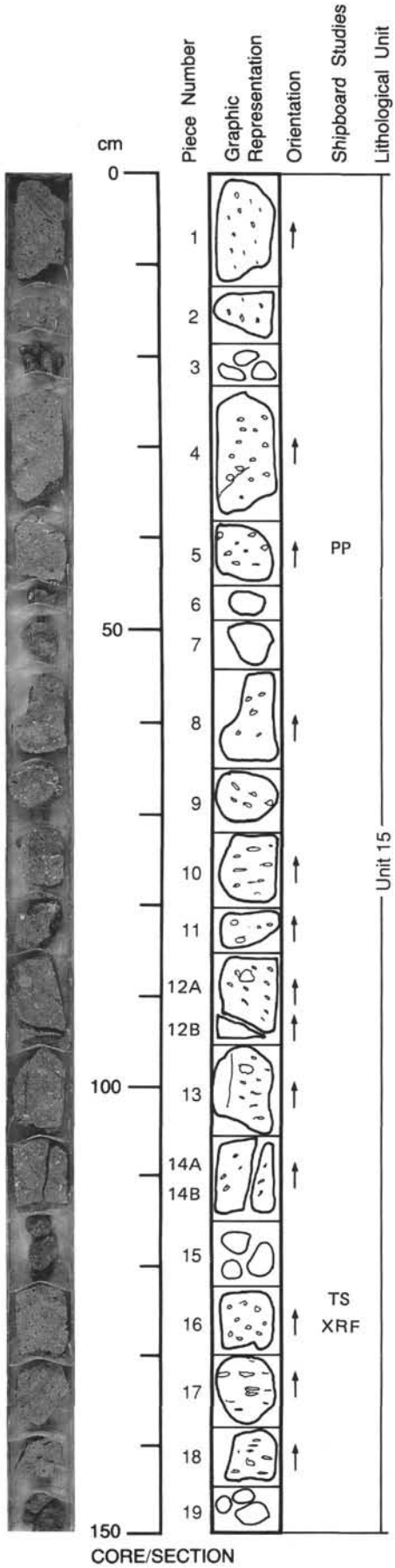
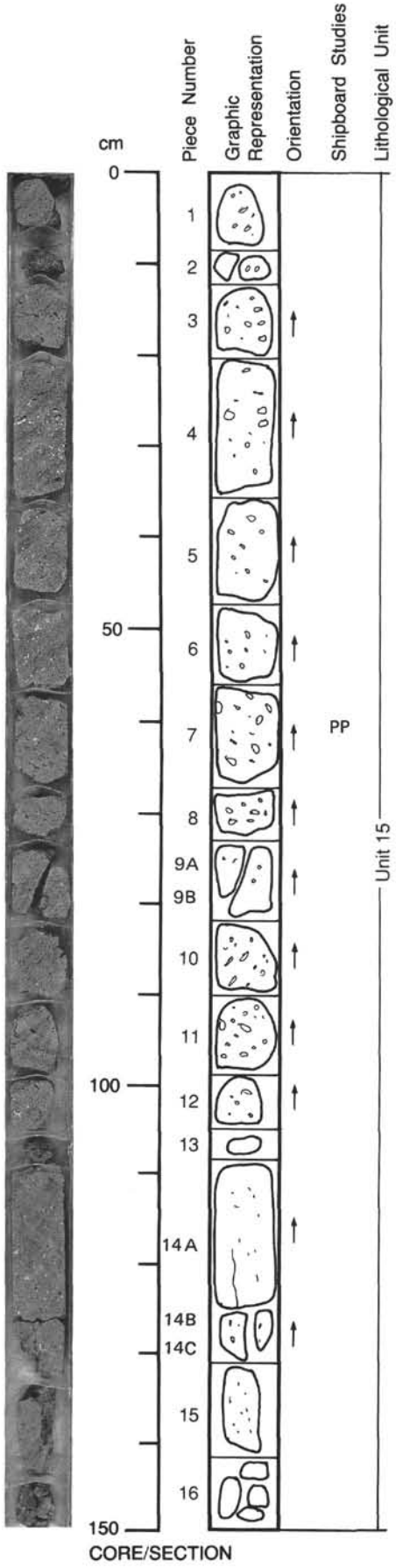


125-786B-35R-2

UNIT 15: ORTHOPYROXENE, PLAGIOCLASE VESICULAR DACITE (35R-1 CONTINUED)

Pieces 1-19

CONTACTS: None visible.
PHENOCRYSTS: Phenocrysts are fresh.
Plagioclase - 2-5%; <2 mm; euhedral laths and rounded; zoned crystals.
Orthopyroxene - 2-5%; < 2 mm, but some are 1 cm in size; euhedral, yellow.
Clinopyroxene - 0-2%; < 1 mm; euhedral, dark green.
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 20-30%; < 1 cm; round to elongate; random distribution; rare pyrite and gray or green coating.
COLOR: Gray (2.55Y 4/0 - 5/0).
STRUCTURE: None.
ALTERATION: Very minor.
VEINS/FRACTURES: Trace; < 1 mm; mostly vertical; fractures are filled with gray (vesicle-coating) material; some have shiny fracture surfaces.
ADDITIONAL COMMENTS: Locally fine-grained, vesicular clasts entrained. Section is a continuation of 125-786B-34R-4.

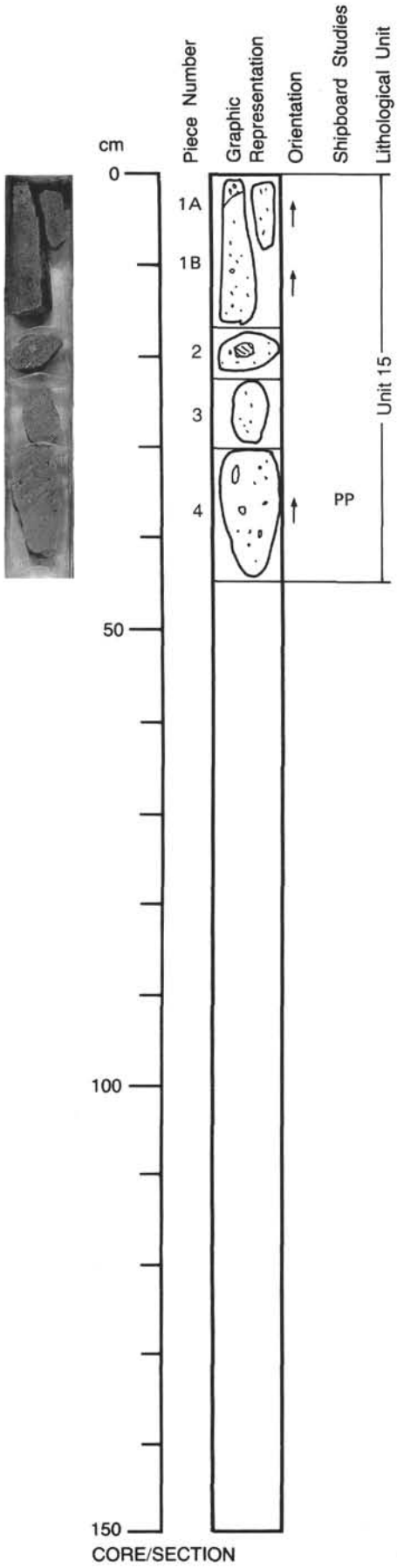


125-786B-35R-3

UNIT 15: PLAGIOCLASE, ORTHOPYROXENE VESICULAR DACITE (35R-2 CONTINUED)

Pieces 1-16

CONTACTS: None visible.
PHENOCRYSTS: Fresh.
Plagioclase - 2-5%; <2 mm; euhedral laths and rounded; zoned.
Orthopyroxene - 2-5%; <2 mm, some 1 cm in size; yellow; euhedral.
Clinopyroxene - 2%; <1 mm; dark green, euhedral.
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 20-30%; < 1 cm; round to elongate; randomly distributed; filled with gray or green coating; zones with calcite filled vesicles occur locally.
COLOR: Gray (2.5Y 4/0 - 5/0).
STRUCTURE: None.
ALTERATION: Very minor.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-34R-4.

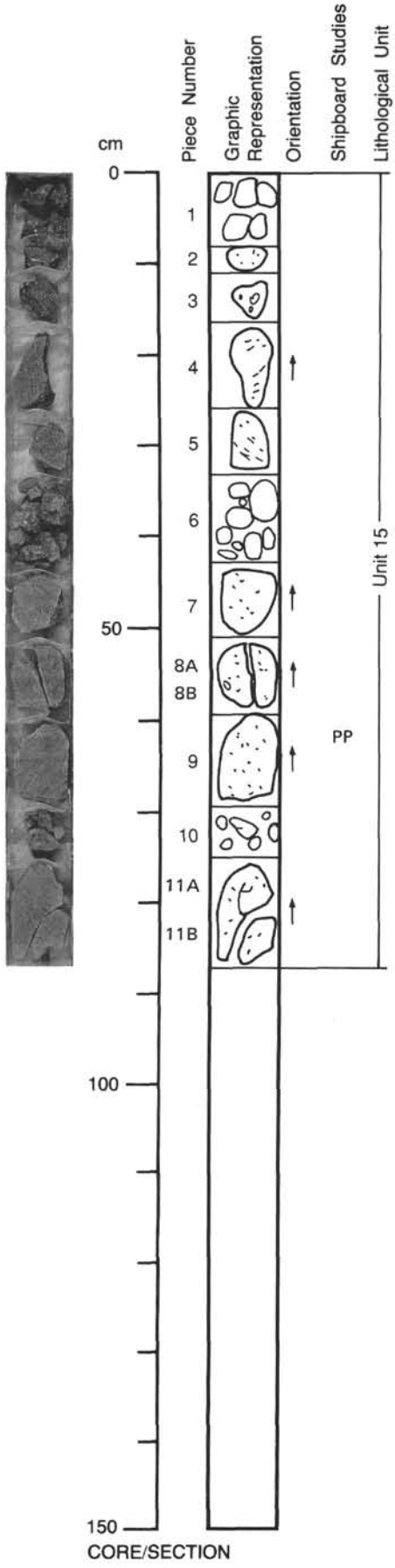


125-786B-35R-4

UNIT 15: PLAGIOCLASE, ORTHOPYROXENE VESICULAR DACITE (35R-3 CONTINUED)

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS: Fresh.
Plagioclase - 5-8%; < 3 mm; euhedral laths and rounded; zoned crystals.
Orthopyroxene - 2-5%; < 2mm; subhedral; yellow.
Clinopyroxene - 2%; < 1 mm; dark green.
GROUNDMASS: Glassy to partly crystalline.
VESICLES: 20%; < 5 mm; round to elongate; randomly distributed; gray coating.
COLOR: Gray (2.5Y 4/0 - 5/0).
STRUCTURE: None.
ALTERATION: Very minor.
VEINS/FRACTURES: Trace; < 1 mm; sub-vertical; shiny fracture surface, possibly chlorite?
ADDITIONAL COMMENTS: Smaller vesicles towards bottom of section. Continuation of 125-786B-34R-4.

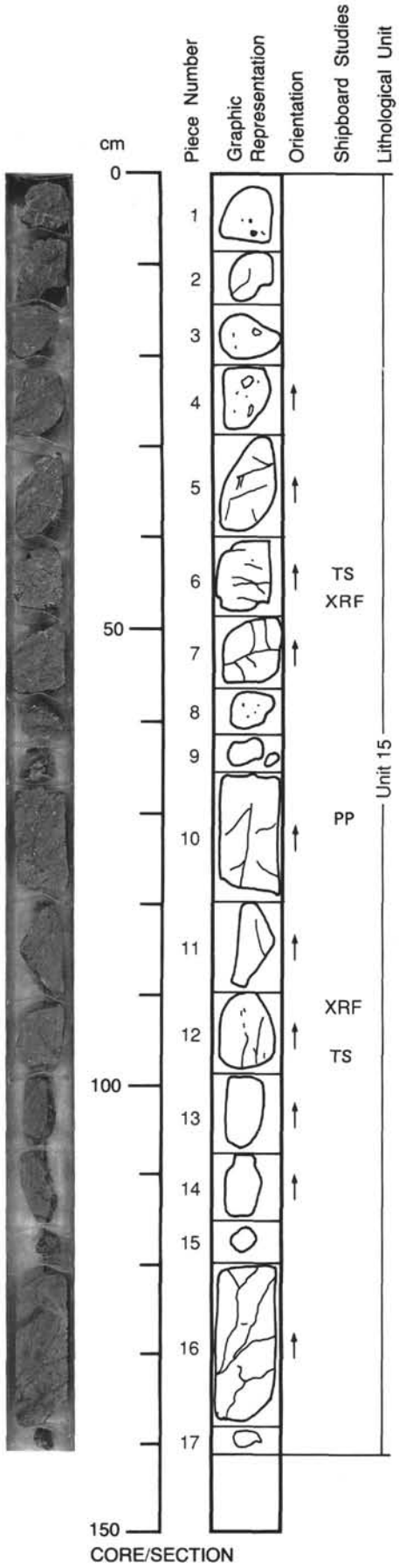


125-786B-36R-1

UNIT 15: PLAGIOCLASE-ORTHOPYROXENE DACITE (35R-4 CONTINUED)

Pieces 1-11B

CONTACTS: None visible.
PHENOCRYSTS: Plagioclase and clinopyroxene are fresh.
Plagioclase - 5%; <2 mm; euhedral laths and rounded crystals.
Orthopyroxene - 2%; <3 mm; euhedral; yellow; prismatic; altering to serpentine.
Clinopyroxene - trace; <1 mm; dark green; equant.
GROUNDMASS: Fine crystalline, contains plagioclase.
VESICLES: 10%; < 3 mm; round to parallel, elongate; random distribution; light gray coating; some elongation directions dip at a shallow angle, possibly caused by flow.
COLOR: Greenish gray (5G 6/1).
STRUCTURE: None.
ALTERATION: Very little.
VEINS/FRACTURES: Trace; < 0.1 mm; vertical; chlorite on fracture surface.
ADDITIONAL COMMENTS: Continuation of 125-786B-34R-4.

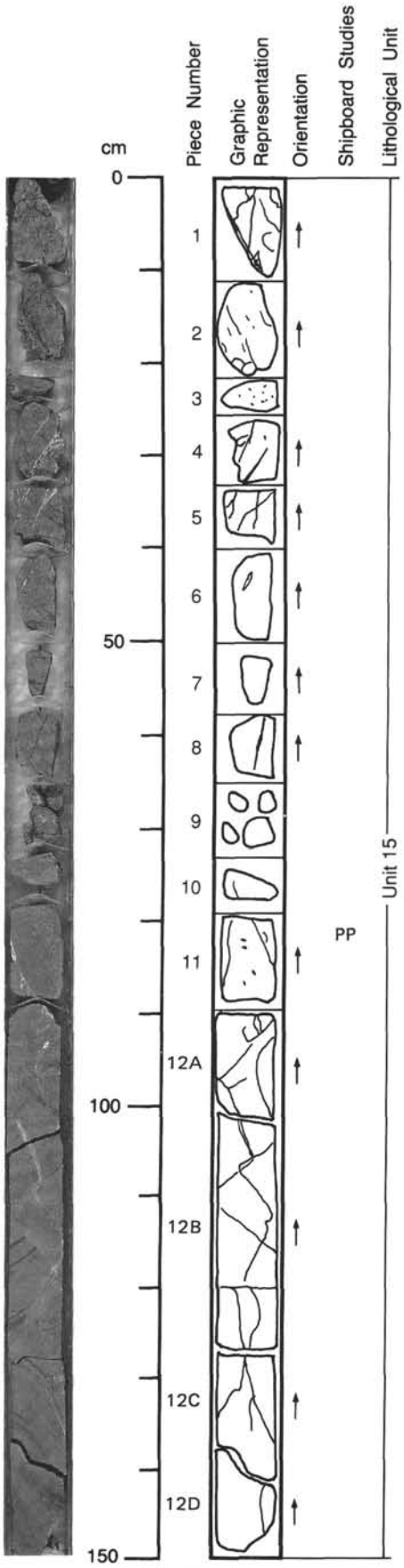


125-786B-37R-1

UNIT 15: ORTHOPYROXENE, PLAGIOCLASE BONINITE (36R-1 CONTINUED)

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene and olivine are altered; olivine is absent at top but becomes more abundant at below 80-cm level.
Plagioclase - 5-10%; < 3 mm; euhedral laths and prisms.
Orthopyroxene - 10-15%; <1 cm; yellow; prismatic; altering to serpentine.
Olivine - 0-3%; <1 mm; completely altered to red specks with white cellular structure.
GROUNDMASS: Glassy with abundant plagioclase; more crystalline below 80-cm level.
VESICLES: 10-15%; < 1 cm; round; large ones concentrated in zones; light-green or gray coating, some filled with calcite.
COLOR: Greenish to bluish gray (5G 5/1 TO 5BG 4/1).
STRUCTURE: Fractured.
ALTERATION: Olivine and orthopyroxene are altered to serpentine and oxides.
VEINS/FRACTURES: 0-5%; up to 5 mm; random orientation; locally strongly fractured; fractures are filled with chlorite, some calcite and another white mineral, and contain pyrite cubes.
ADDITIONAL COMMENTS: The top of this section (1-80 cm) is a continuation of 786B-34R-4.

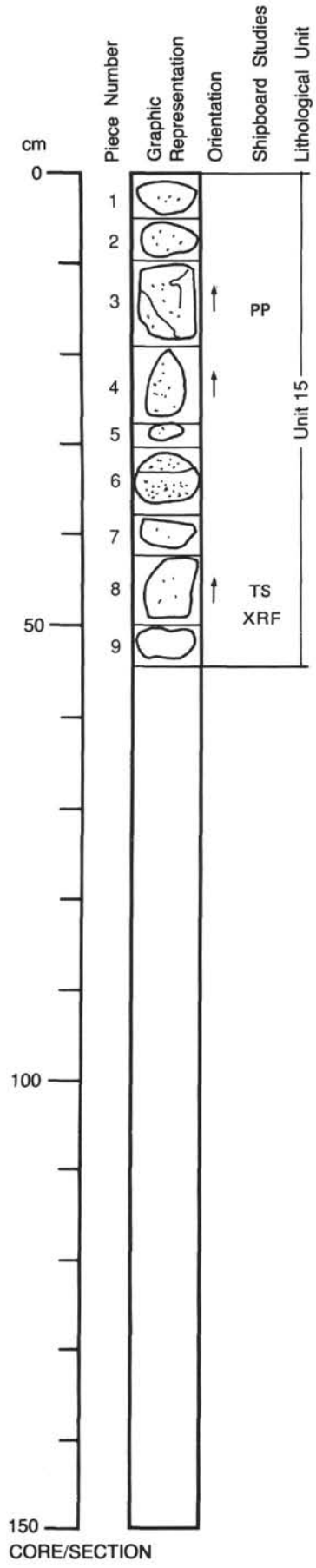


125-786B-37R-2

UNIT 15: PLAGIOCLASE, ORTHOPYROXENE, OLIVINE BONINITE (37R-1 CONTINUED)

Pieces 1-12D

CONTACTS: Differential alteration contact in Piece 2.
PHENOCRYSTS: Orthopyroxene and olivine are altered.
Plagioclase - 5-8%; <2 mm; euhedral laths and rounded crystals.
Orthopyroxene - 10-15%; <1 cm; yellow prisms; inclusions of equant, altered olivine.
Olivine - 3%; <1 mm; altered to red and white material.
Clinopyroxene - trace; <1 mm; dark green; euhedral.
GROUNDMASS: Fine crystalline, plagioclase-rich.
VESICLES: 3-5%; < 3mm; round to elongate; in zones; coated with greenish gray material, some filled with calcite.
COLOR: Dark greenish gray (5G 4/1) in Pieces 1 and 2, changing to dark reddish-gray (5R 4/1 - 4/2) in Piece 2 and continuing through Piece 12D.
STRUCTURE: Fractures.
ALTERATION: Orthopyroxene and olivine are altered to serpentine and calcite.
VEINS/FRACTURES: 2%; < 5 mm; randomly oriented; filled with chlorite and/or white minerals, including calcite.
ADDITIONAL COMMENTS: Continuation from 125-786B-34R-4.



125-786B-37R-3

UNIT 15: PLAGIOCLASE, ORTHOPYROXENE, OLIVINE BONINITE (37R-2 CONTINUED)

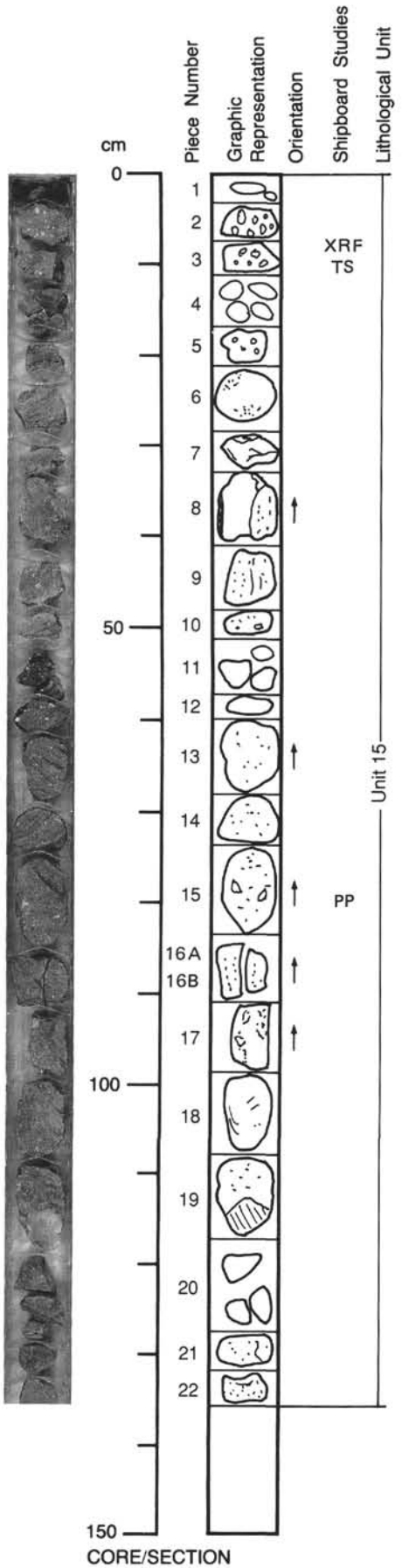
Pieces 1-6

CONTACTS: Horizontally oriented contact with chilled margin in Piece 6.
PHENOCRYSTS:
Plagioclase - 5-8%; <2 mm; euhedral laths and rounded crystals.
Orthopyroxene - 10-15%; <1 cm; yellow prisms; inclusions of equant altered olivine.
Olivine - 3%; <1 mm; altered to red and white material.
Clinopyroxene - trace; <1 mm; dark green; euhedral.
GROUNDMASS: Fine-grained; plagioclase-rich.
VESICLES: 3-5%; <3 mm; rounded to elongate; in zones; coated with greenish gray material; some filled with calcite.
COLOR: Dark greenish gray (5G 4/1) to dark reddish gray (5R 4/1 - 4/2).
STRUCTURE: Fractures.
ALTERATION: Orthopyroxene and olivine are altered to serpentine and calcite.
VEINS/FRACTURES: 2%; <5 mm; randomly oriented; filled with chlorite and/or white minerals, including calcite.
ADDITIONAL COMMENTS: Continuation from 125-786B-34R-4.

UNIT 15: PLAGIOCLASE ANDESITE

Pieces 6-9

CONTACTS: Chilled margin in Piece 6.
PHENOCRYSTS:
Plagioclase - 5-10%; <1 mm; euhedral.
GROUNDMASS: Glassy.
VESICLES: Trace; < 1mm; collapsed; randomly distributed.
COLOR: Gray green (5G 4/1).
STRUCTURE: None.
ALTERATION: Glass is altered along fractures.
VEINS/FRACTURES: Microfractures in glass, probably from quench.

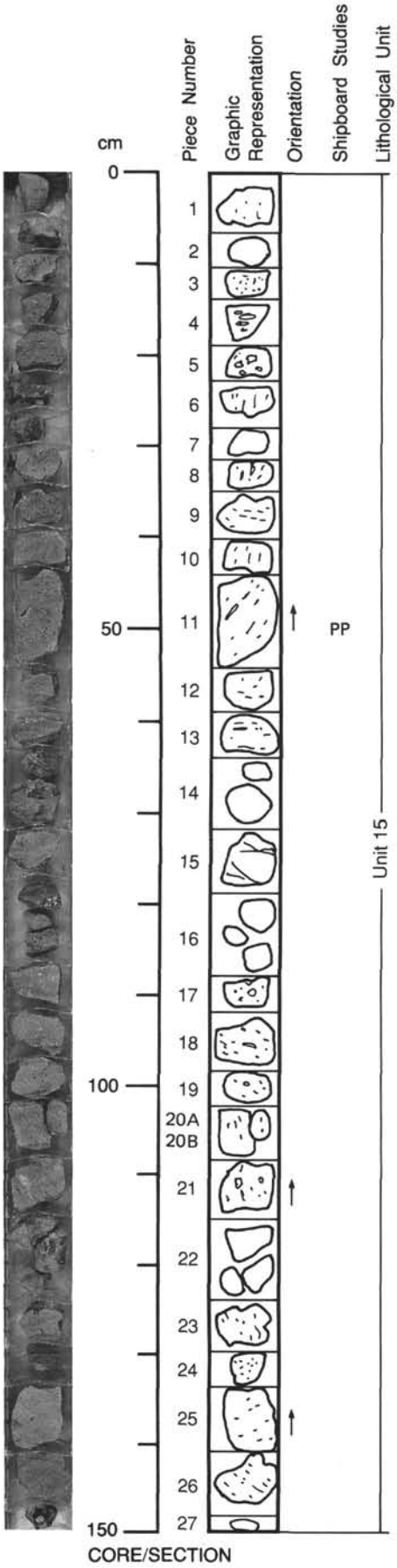


125-786B-38R-1

UNIT 15: PLAGIOCLASE, ORTHOPYROXENE ANDESITE

Pieces 1-22

CONTACTS: Glass fragment of chilled margin in Piece 1.
PHENOCRYSTS:
Plagioclase - 5-10%; <1 mm; euhedral laths.
Orthopyroxene - 2%; <1 mm; euhedral; yellow to brown; prismatic.
GROUNDMASS: Glassy.
VESICLES: 15%; < 1 cm; round in Pieces 2-5, elongate otherwise; randomly distributed; with bluish gray coating.
COLOR: Dark green (5G 4/1) in altered areas, blue gray (5B 6/1 to 5/1) when fresh.
STRUCTURE: Brecciation in Piece 6-22 with the exception of Piece 10.
ALTERATION: Altered in brecciated areas to chlorite-bearing mineralogy.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Clasts in breccia are very glassy; probably fragmented during flow; glass-rich portions are orthopyroxene free; breccia contains pyrite.

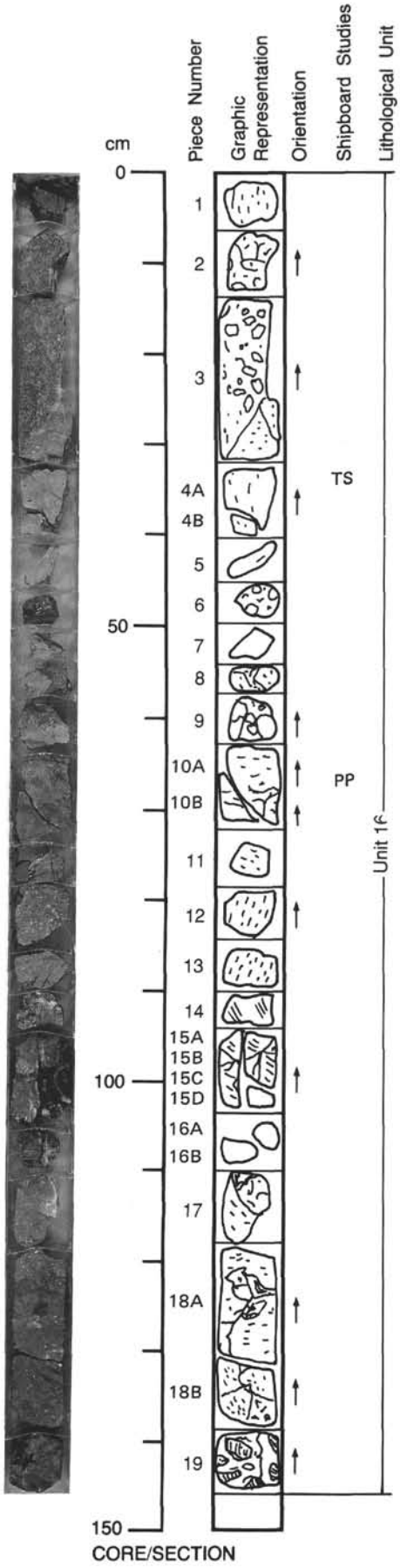


125-786B-39R-1

UNIT 15: PLAGIOCLASE, ORTHOPYROXENE ANDESITE

Pieces 1-27

CONTACTS: None.
PHENOCRYSTS:
Plagioclase - 5%; <1 mm; euhedral laths.
Orthopyroxene - 2%; <1 mm; euhedral; yellow.
GROUNDMASS: Glassy, locally plagioclase-rich.
VESICLES: 5-15%; < 1 cm; round to elongate; grouped by size and shape in zones; local bluish-gray coating.
COLOR: Blue gray (5B 6/1 to 5/1).
STRUCTURE: None.
ALTERATION: Minor.
VEINS/FRACTURES: n/a; < 0.2 mm; n/a; white material in fractures.
ADDITIONAL COMMENTS: Pyrite in vugs.



125-786B-39R-2

UNIT 16: BRECCIATED TWO-PYROXENE ANDESITE

Pieces 1-19

CONTACTS: Piece 3 has a boundary between glassy material and crystalline rock; several pieces have contacts between rock of differing vesicularity and grain size; Pieces 14-19 have an oxidized matrix of mafic rock.

PHENOCRYSTS: Glomerocrysts of orthopyroxene, clinopyroxene and plagioclase occur throughout.
Clinopyroxene - 3%; <0.5 mm; euhedral, elongate.
Orthopyroxene - 2%; <0.5 mm; euhedral, equant.
Plagioclase - 3-5%; <0.5 mm; euhedral, tabular.
Magnetite - trace; <0.2 mm; euhedral.

GROUNDMASS: Altered glass and fine-grained crystalline matrix, predominantly plagioclase.

VESICLES: 1-5%; <1 mm to 4 mm; oval to round, jagged; locally concentrated; some local alignment is present especially in Pieces 4,17, 18.

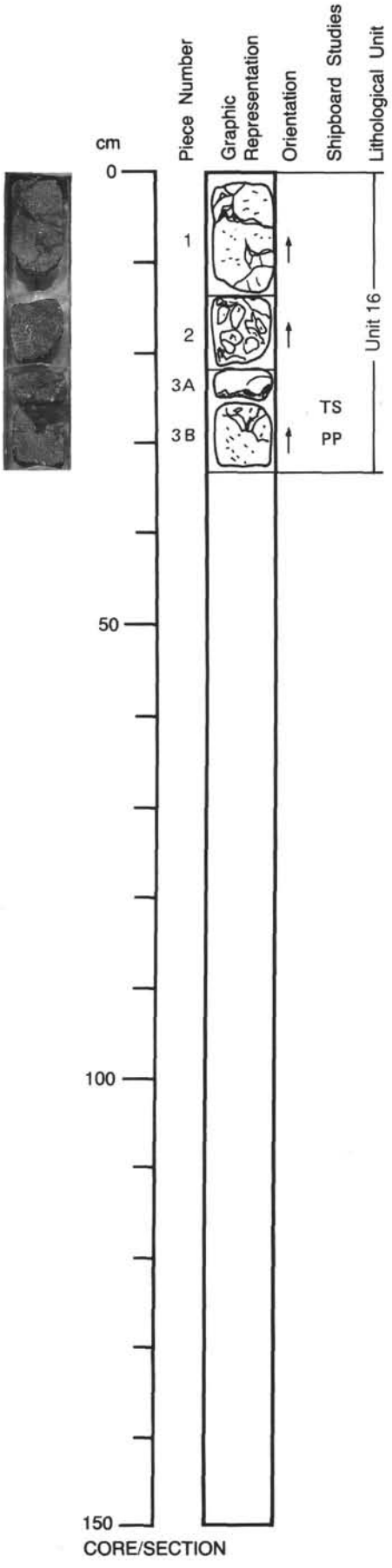
COLOR: Very dark gray to olive-gray (5Y 3/1 to 5/2); oxidized matrix is dusky red (2.5YR 3/2).

STRUCTURE: Autobrecciated; clasts and matrix are of similar composition.

ALTERATION: Pyrite is present throughout this section as both disseminated and crystalline phases and occurs along veins associated with zeolites; glass and matrix is moderately to strongly chloritized.

VEINS/FRACTURES: <1%; <1 mm wide; random; filled with white zeolite and/or quartz and, occasionally, sulfide.

ADDITIONAL COMMENTS: This rock type continues in 39R-3.

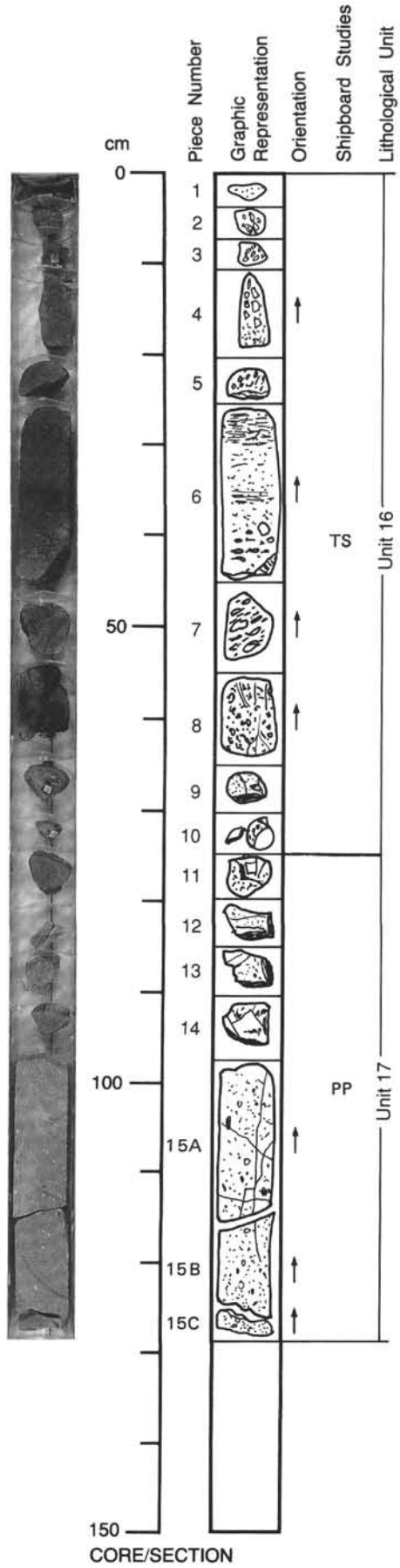


125-786B-39R-3

UNIT 16: BRECCIATED TWO-PYROXENE ANDESITE (39R-2 CONTINUED)

Pieces 1-3

CONTACTS: Sharp between matrix and clasts.
PHENOCRYSTS: Glomerocrysts of orthopyroxene, clinopyroxene and plagioclase in the clasts.
Clinopyroxene - 3%; <0.5 mm; euhedral, elongate.
Orthopyroxene - 2%; <0.5 mm; euhedral, equant.
Plagioclase - 3-5%; <0.5 mm; euhedral, tabular.
Magnetite - trace; <0.2 mm; euhedral.
GROUNDMASS: Clast matrix contains altered glass and fine-grained crystals predominantly of plagioclase.
VESICLES: 1-3%; <1 mm to 4 mm; oval-round, jagged; locally concentrated; some local alignment is present.
COLOR: Very dark gray to olive gray (5Y 3/1 to 5/2); oxidized breccia matrix is dusky red (2.5YR 3/2).
STRUCTURE: Autobrecciated; clasts and matrix are of similar composition.
ALTERATION: Pyrite is present throughout this section as both disseminated and crystalline phases and along veins assosiated with zeolites; glass and matrix are moderately to strongly chloritized.
VEINS/FRACTURES: <1%; <1 mm; random orientation; filled with white zeolite and/or quartz and some sulfide.
ADDITIONAL COMMENTS: This rock type is a continuation of the overlying Section 39R-2.



125-786B-40R-1

UNIT 16: BRECCIATED TWO-PYROXENE ANDESITE

Pieces 1-10

CONTACTS: Sharp between matrix and clasts.
PHENOCRYSTS: Glomerocrysts of orthopyroxene, clinopyroxene and plagioclase in the clasts.
Plagioclase - 3-5%; <0.5; euhedral, tabular.
Clinopyroxene - 3%; <0.5; euhedral, elongate.
Orthopyroxene - 2%; <0.5; euhedral, equant.
Magnetite - trace; <0.2; euhedral.
GROUNDMASS: Clast matrix contains altered glass and fine-grained crystals predominantly of plagioclase.
VESICLES: 1-3%; <1 mm; oval-round, jagged; locally concentrated; some local alignment is present.
COLOR: Very dark gray to olive gray (5Y 3/1 to 5/2); oxidized breccia matrix is dusky red (2.5YR 3/2).
STRUCTURE: Autobrecciated; clasts and matrix are of similar composition.
ALTERATION: Pyrite is present throughout this section as both disseminated and crystalline phases and along veins associated with zeolites; glass and matrix are moderately to strongly chloritized.
VEINS/FRACTURES: <1%; <1 mm; random; filled with white zeolite and/or quartz and some sulfide.
ADDITIONAL COMMENTS: This rock type is a continuation of the overlying Section 39R-3; flow indicated by 1) shard orientation parallel to clast boundaries, 2) preferred shear orientation to clasts and 3) trails of smaller fragments behind clasts.

UNIT 17: GLASSY TWO-PYROXENE BASALT

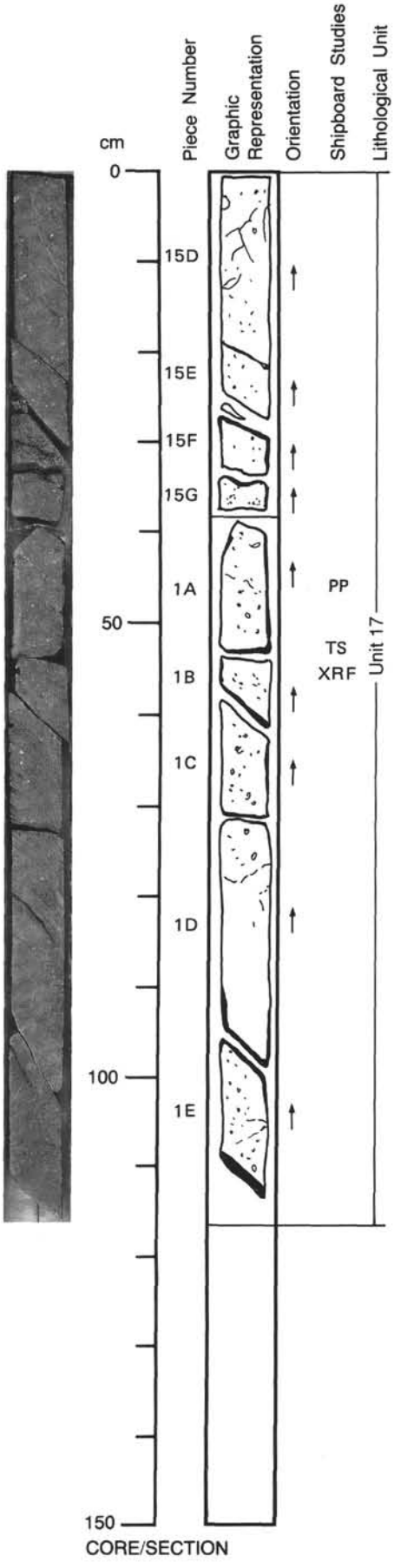
Pieces 11 and 14

CONTACTS: Pieces are chilled margins.
PHENOCRYSTS:
Plagioclase - <1%; <0.9mm; laths.
Clinopyroxene - <1%; <0.5mm; euhedral, tabular.
Orthopyroxene - trace; <0.5 mm; euhedral, tabular.
GROUNDMASS: Predominately glassy with quenched plagioclase laths.
VESICLES: None visible.
COLOR: Dark gray (N 4/).
STRUCTURE: Massive.
ALTERATION: Minor chlorite; pyroxenes appear to be partially altered.
VEINS/FRACTURES: None visible.

UNIT 17: OLIVINE PHYRIC BASALT

Pieces 11-15

CONTACTS: None visible.
PHENOCRYSTS:
Olivine - 7-10%; <4 mm; euhedral tabular; altered to iron oxides and carbonate; contain spinel inclusions.
Clinopyroxene - 3-5%; <0.5 mm; euhedral tabular.
Plagioclase - 10%; <0.5 mm; euhedral tabular.
GROUNDMASS: Very fine-grained with plagioclase laths in glass; variably altered to chlorite, clay, zeolite and carbonate.
VESICLES: 1-2%; 2-8 mm; elongate; dip at 30 degrees; in Pieces 15D - 15G, vesicles are elongate <12 mm long; in Pieces 15A and 15B, the vesicles are <4 mm in length, decreasing in size upwards.
COLOR: Bluish gray (5B 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive alteration to chlorite, carbonate.
VEINS/FRACTURES: <1%; <5 mm width; steeply to gently dipping; carbonate-, chlorite- and iron oxide-filled.
ADDITIONAL COMMENTS: These pieces are continuous with 125-786B-40R-02 Pieces 15D to 15G, 0-40 cm.

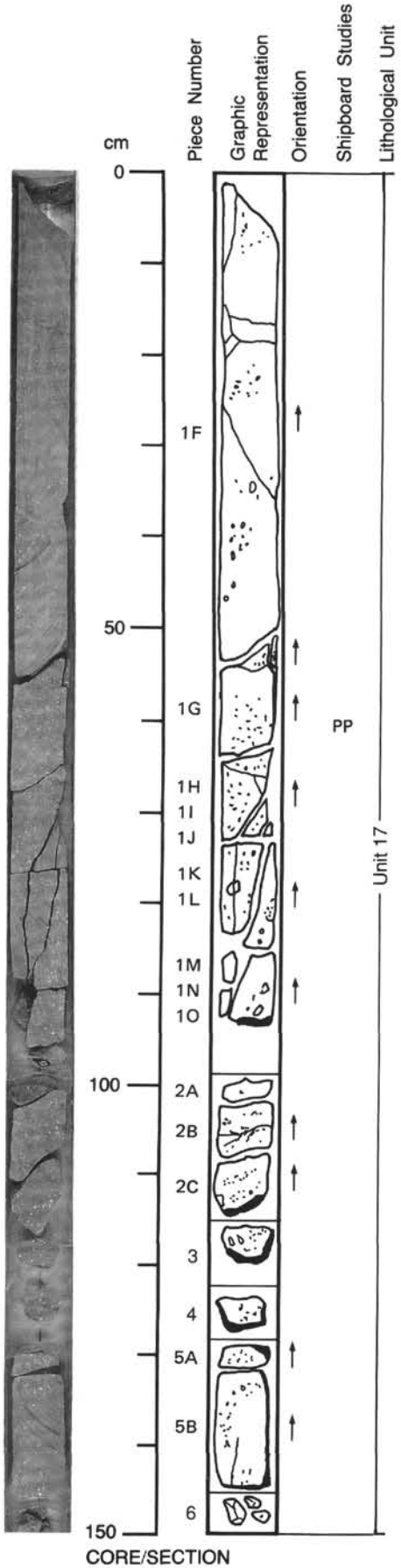


125-786B-40R-2

UNIT 17: OLIVINE PHYRIC BASALT (CONTINUATION OF 40R-1)

Pieces 1A-1E

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <0.5 mm; euhedral, tabular.
Olinopyroxene - 3-5%; <0.5 mm; euhedral, tabular.
Olivine - 7-10%; <4 mm; euhedral, tabular; altered to carbonate/Fe-oxide assemblage.
GROUNDMASS: Very fine-grained with plagioclase laths in glass; variably altered to chlorite, clay, zeolite and carbonate.
VESICLES: 1%; 2-3 mm; elongate; throughout; less common than in 40R-1.
COLOR: Bluish gray (5B 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive alteration to chlorite and carbonate.
VEINS/FRACTURES: <1%; <5 mm wide; steeply dipping; filled with carbonate, chlorite and Fe-oxide. Pieces 1F to 1O; same rock type as all of 40R-3 and 40R-4.

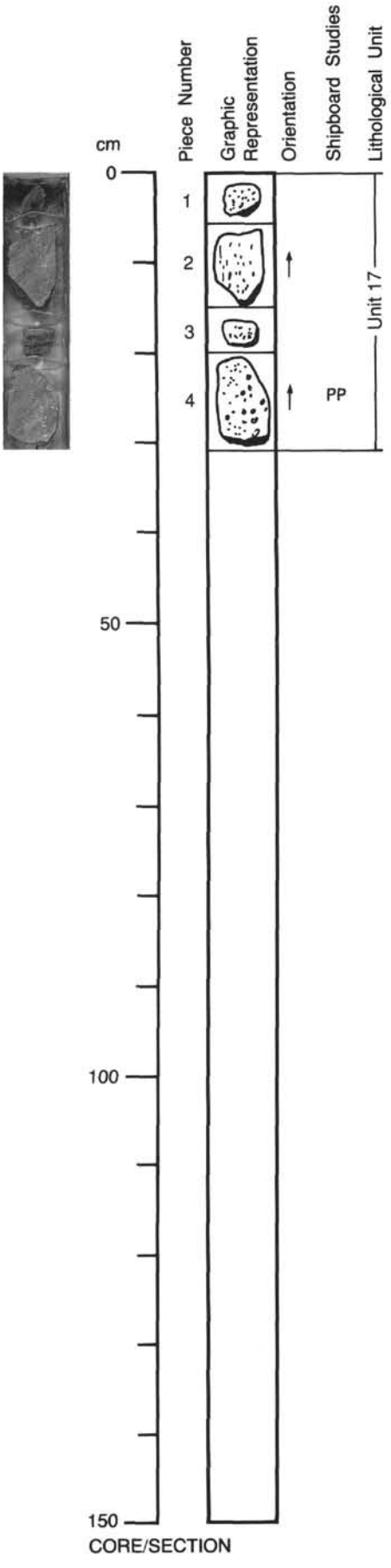


125-786B-40R-3

UNIT 17: OLIVINE PHYRIC BASALT (CONTINUATION OF 40R-2)

Pieces 1F-10, 2-6

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <0.5 mm; euhedral, tabular.
Clinopyroxene - 3-5%; <0.5 mm; euhedral, tabular.
Olivine - 7-10%; <4 mm; euhedral, tabular, altered to Fe-oxide, carbonate assemblage; contains spinel inclusions.
GROUNDMASS: Very fine-grained with plagioclase laths in glass; variably altered to chlorite, clay, zeolite and carbonate.
VESICLES: 1%; 2 mm; elongate to round; throughout, locally concentrated.
COLOR: Bluish gray (5B 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive chlorite and carbonate.
VEINS/FRACTURES: <1%; <5 mm wide; steeply dipping; filled with chlorite and Fe-oxide.
ADDITIONAL COMMENTS: These pieces are continuous with those above (40R-2) and below (40R-4).

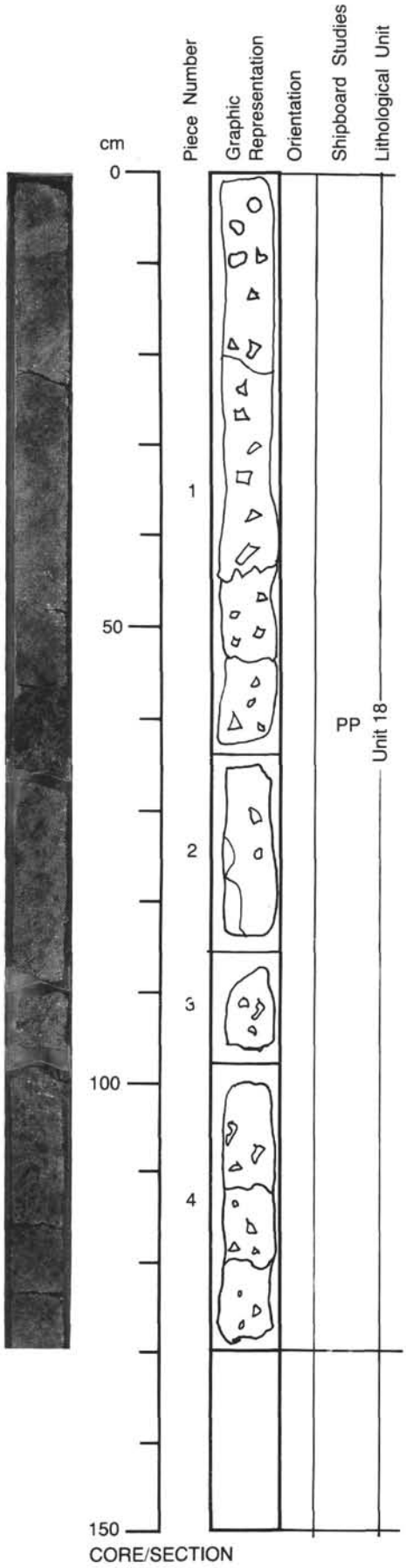


125-786B-40R-4

UNIT 17: OLIVINE PHYRIC BASALT (40R-3 CONTINUED)

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <0.5 mm; euhedral, tabular.
Clinopyroxene - 3-5%; <0.5 mm; euhedral, tabular.
Olivine - 7-10%; <4 mm; euhedral, tabular.
GROUNDMASS: Very fine-grained with plagioclase laths in glass, variably altered to chlorite, clay, zeolite, and carbonate.
VESICLES: 1-2%; <1-3; elongate to round; throughout; filled with carbonate.
COLOR: Bluish gray (5B 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive alteration by chlorite and carbonate; olivine phenocrysts altered to Fe-oxide/carbonate assemblage.
VEINS/FRACTURES: <1%; <5 mm; steeply dipping; filled with chlorite and Fe-oxide assemblage.
ADDITIONAL COMMENTS: These pieces are a continuation of 40R-3.

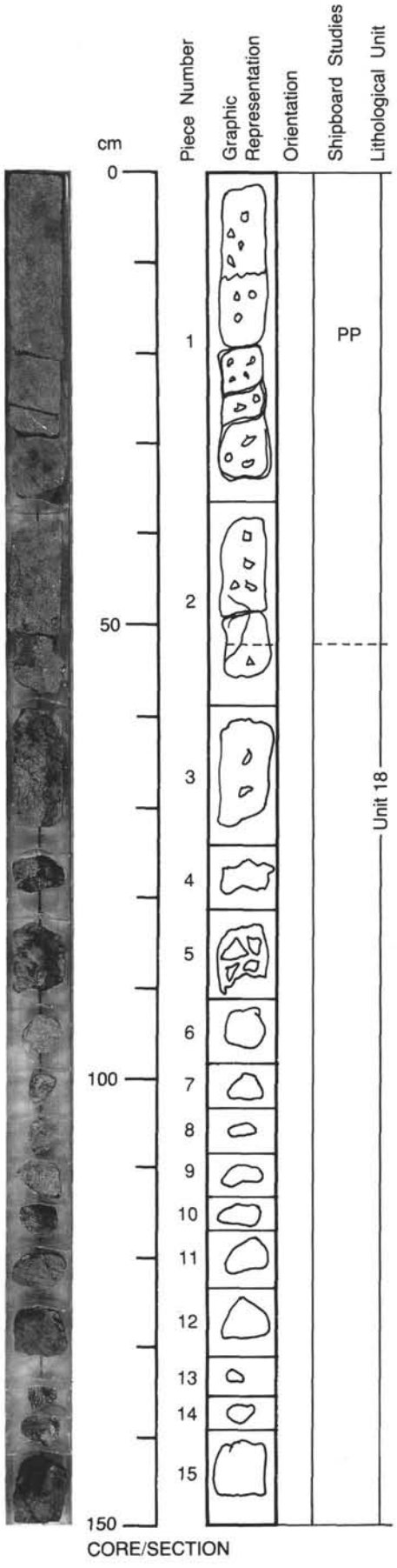


125-786B-41R-1

UNIT 18: ANDESITE BRECCIA

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <2 mm; euhedral, tabular.
Clinopyroxene - 7%; <4 mm; euhedral, elongate.
Orthopyroxene - 5%; <1 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with pyroxene and feldspar laths.
VESICLES: 3-7%; 1-4 mm; elongate, ragged; throughout, locally concentrated.
Miaroles: Coalesce locally into pipe-like structures.
COLOR: Dusky green matrix (10G 3/2) and dark gray clasts (2.5Y 4/0).
STRUCTURE: Brecciated.
ALTERATION: Matrix is pervasively altered to chlorite.
VEINS/FRACTURES: <1-2%; 1-3 mm; random, often sub-parallel to the core; filled with white, zeolitic material.
ADDITIONAL COMMENTS: Clasts are 1 mm to 6 cm (average 1 cm) maximum dimension and poorly-sorted; matrix contains scattered vugs with a partial fill of fine-grained, white, non-carbonate mineral (zeolite?)and silt-sized vitrics rich in microlites.

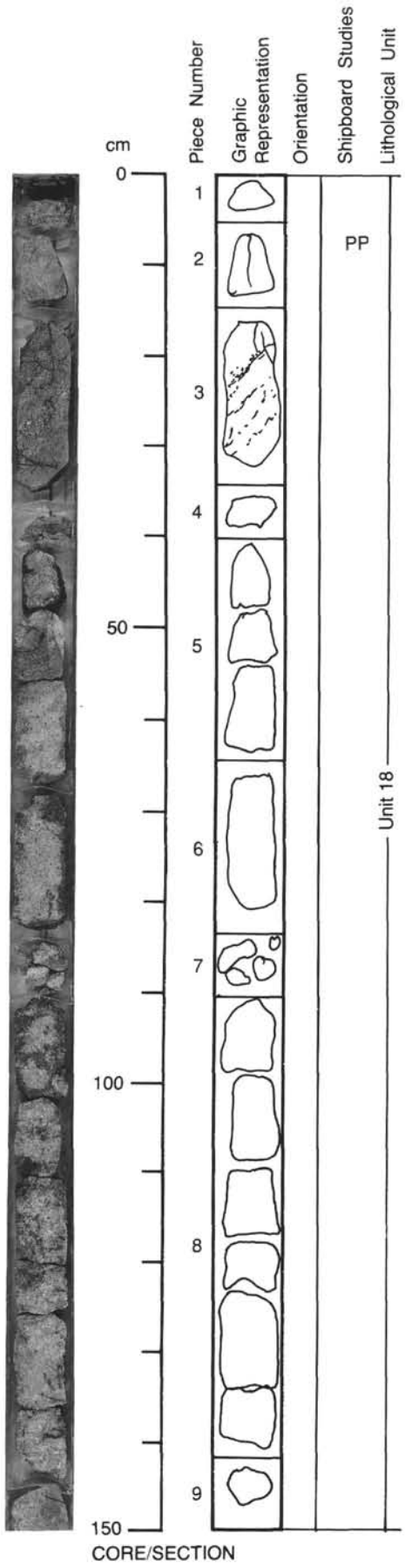


125-786B-41R-2

UNIT 18: ANDESITE BRECCIA

Pieces 1-15

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <2 mm; euhedral, tabular.
Clinopyroxene - 7%; <4 mm; euhedral, elongate.
Orthopyroxene - 5%; <1 mm; euhedral, equant.
GRUNDMASS: Fine-grained to glassy with pyroxene and feldspar laths.
VESICLES: 3-7%; 1-4 mm; elongate, ragged; throughout, locally concentrated; coalesce locally into pipe-like structures.
COLOR: Dusky green (10G 3/2) matrix and dark gray (2.5Y 4/0) clasts.
STRUCTURE: Brecciated.
ALTERATION: Matrix is pervasively altered to chlorite.
VEINS/FRACTURES: <1-2%; 1-3 mm wide; random, often sub-parallel to the core; filled with white, zeolitic material.
ADDITIONAL COMMENTS: Clasts are 1 mm to 6 mm in maximum dimension; a continuation of Section 41R-1.



125-786B-41R-3

UNIT 18: ANDESITE BRECCIA

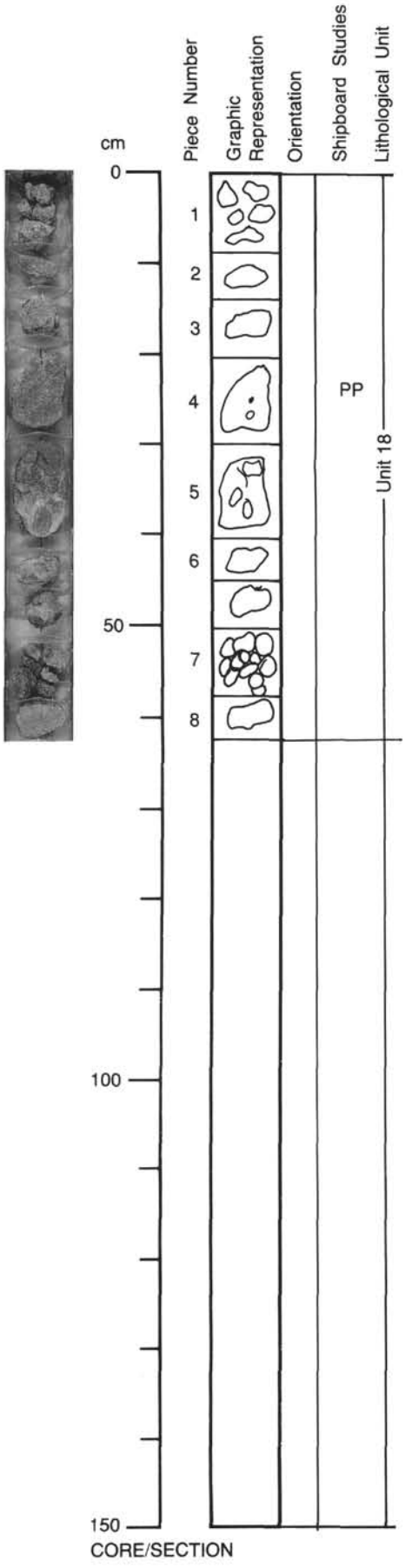
Pieces 1 and 5-9

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <2 mm; euhedral, tabular.
Clinopyroxene - 7%; <4 mm; euhedral, elongate.
Orthopyroxene - 5%; <1 mm; euhedral,equant
GROUNDMASS: Fine-grained to glassy with pyroxene and feldspar laths.
VESICLES: 3-7%; 1-4 mm; elongate, ragged; throughout, locally concentrated; coalesce locally into pipe-like structures.
COLOR: Dusky green (10G 3/2) matrix and dark gray (2.5Y 4/0) clasts.
STRUCTURE: Brecciated at top; massive after Piece 6.
ALTERATION: Matrix is pervasively altered to chlorite.
VEINS/FRACTURES: <1-2%; 1-3 mm; random, often sub-parallel to the core; filled with white, zeolitic material.
ADDITIONAL COMMENTS: The clasts sizes 1 mm - 6 cm (average 0.5 cm); a continuation of Section 41R-2.

UNIT 18: VITRIC SAND

Pieces 2-4

CONTACTS: Between Pieces 1 and 2 and 4 and 5; nature not obvious.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Piece 2 is a well-sorted vitric sand with water-escape pipes. Piece 3 is made up of an upper sand (4 cm thick, fine-grained with water-escape pipe along a micro-fault), an upper-middle sand (2.5 cm thick, coarser-grained, also with water-escape pipes); a lower-middle sand (3 cm thick, medium-grained, massive with faint laminae) and a lower sand (3 cm thick, fine- to medium-grained, structureless). Piece 4 is a silty sand with a white pumice clast.

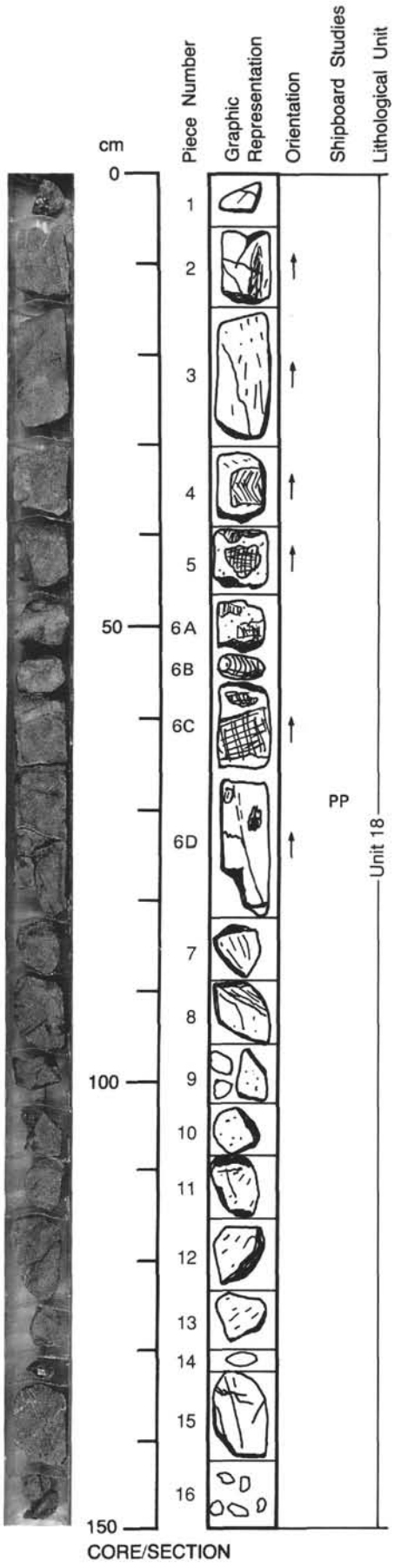


125-786B-41R-4

UNIT 18: TWO-PYROXENE ANDESITE

Pieces 1-9

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <2 mm; euhedral, tabular.
Clinopyroxene - 7%; <4 mm; euhedral, elongate.
Orthopyroxene - 5%; <1 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with pyroxene and feldspar laths.
VESICLES: 3-7%; 1-4 mm; elongate, ragged; throughout, locally concentrated; coalesce locally into pipe-like structures.
COLOR: Dusky green (10G 3/2) matrix and dark gray (2.5Y 4/0) clasts.
STRUCTURE: Brecciated at top.
ALTERATION: Matrix is pervasively altered to chlorite.
VEINS/FRACTURES: <1-2%; 1-3 mm; random, often sub-parallel to the core; filled with white, zeolitic material.
ADDITIONAL COMMENTS: Continuation of Section 41R-3.

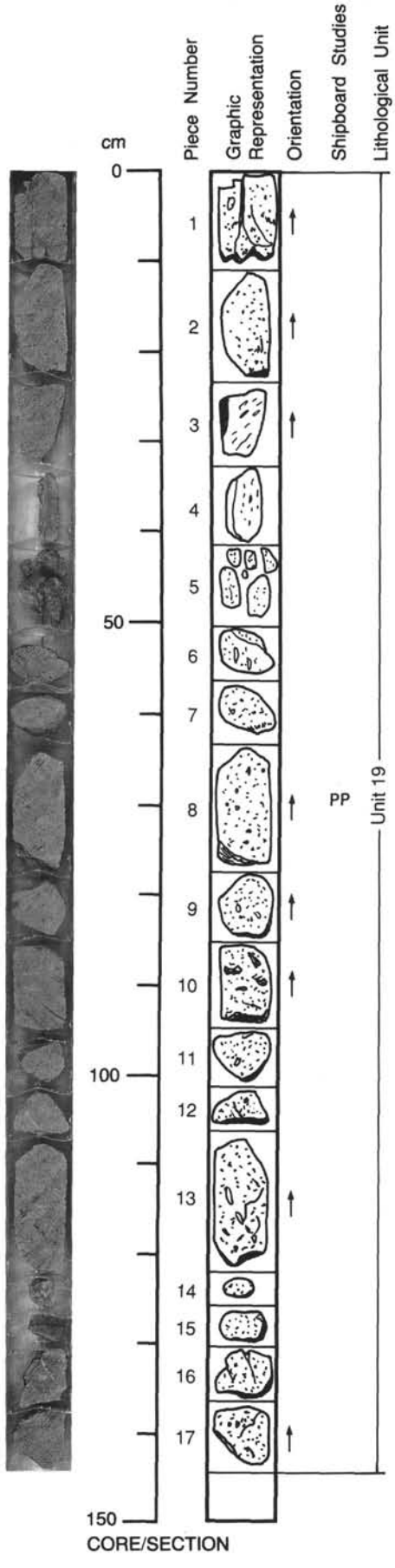


125-786B-42R-1

UNIT 18: TWO-PYROXENE ANDESITE

Pieces 1-16

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10%; <2 mm; euhedral, tabular.
Clinopyroxene - 7%; <4 mm; euhedral, elongate.
Orthopyroxene - 5%; <1 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy, with pyroxene and feldspar laths.
VESICLES: 3-7%; 1-4 mm; elongate, ragged; throughout, locally concentrated; coalesce locally into pipe-like structures.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Brecciated at top; massive after Piece 6.
ALTERATION: Matrix is pervasively altered to chlorite.
VEINS/FRACTURES: <1-2%; 1-3 mm wide; random, often sub-parallel to the core; filled with white, zeolitic material.
ADDITIONAL COMMENTS: Pieces 1-6 are brecciated with clasts of the mafic rock described above and are a continuation of Section 41R-4.

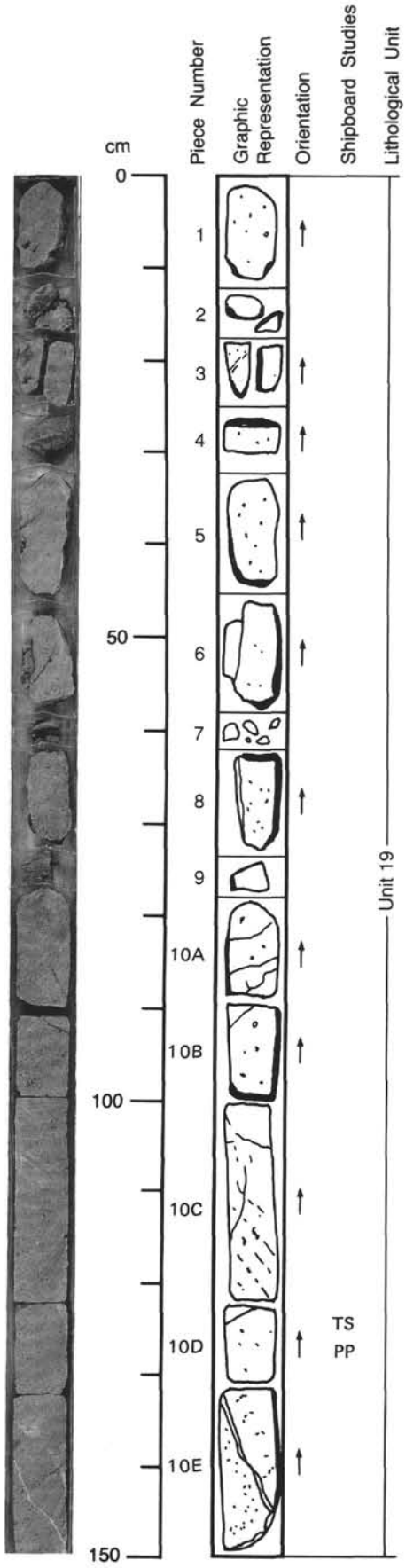


125-786B-42R-2

UNIT 19: TWO-PYROXENE, OLIVINE, BEARING ANDESITE

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of pyroxene and plagioclase.
Plagioclase - 5%; <1.5 mm; equant laths.
Clinopyroxene - 4%; 1 mm; euhedral, tabular.
Orthopyroxene - 6%; 0.7 mm; euhedral, equant.
Olivine - trace; <1.5 mm; euhedral, elongate.
GROUNDMASS: Fine-grained to glassy with feldspar laths.
VESICLES: 2-5%; <1 -3 mm; elongate, irregular; throughout
COLOR: Greenish gray (5B 6/1).
STRUCTURE: Massive.
ALTERATION: Minor, pervasive chlorite and hematite alteration; hematite alteration of olivine and some orthopyroxene phenocrysts.
VEINS/FRACTURES: <1%; 1-2 mm wide; sub-parallel to core axis; only present in Piece 1; filled with green, amorphous material (chlorite?).

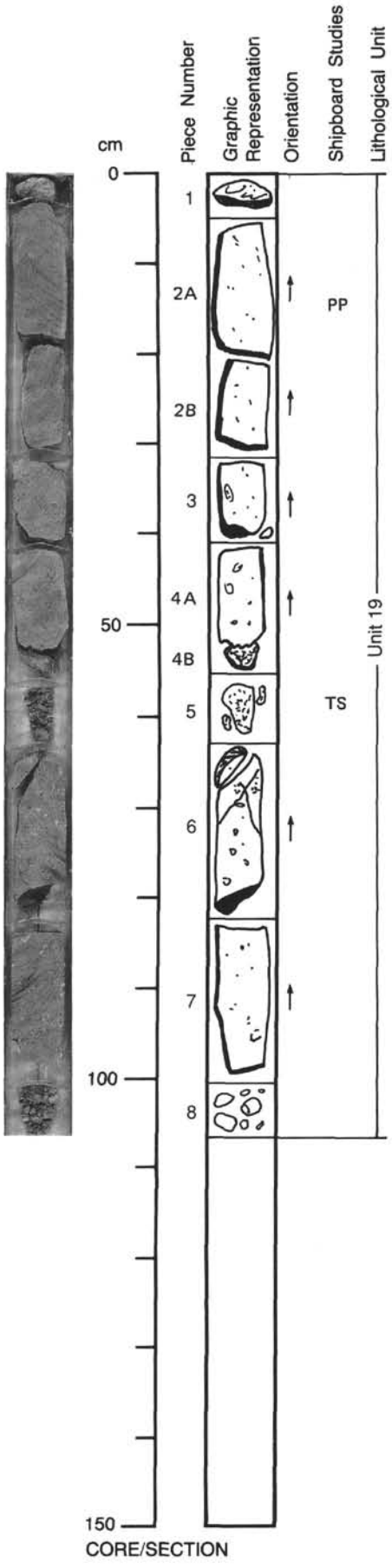


125-786B-42R-3

UNIT 19: TWO-PYROXENE, OLIVINE-BEARING ANDESITE (CONTINUATION OF 42R-2)

Pieces 1-10

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of pyroxene and plagioclase.
Plagioclase - 5%; <1.5 mm; equant laths.
Clinopyroxene - 4%; 1 mm; euhedral, tabular.
Orthopyroxene - 6%; 0.7 mm; euhedral, equant, minor alteration to hematite.
Olivine - trace; <1.5 mm; euhedral, elongate.
GROUNDMASS: Fine-grained to glassy with feldspar laths
VESICLES: 1-5%; 1-3 mm; elongate, ragged; throughout; locally aligned similar to pipe vesicles and locally concentrated.
COLOR: Greenish gray (5BG 6/1).
STRUCTURE: Massive.
ALTERATION: Minor, pervasive chlorite and hematite alteration; hematite alteration of olivine phenocrysts.
VEINS/FRACTURES: <1%; 1-3 mm; sub-parallel to core axis; only in Piece 10, especially Piece 10F.
ADDITIONAL COMMENTS: This section is a continuation of 42R-1 through 42R-2.



125-786B-42R-4

UNIT 19: TWO-PYROXENE, OLIVINE BEARING ANDESITE (CONTINUATION OF 42R-3)

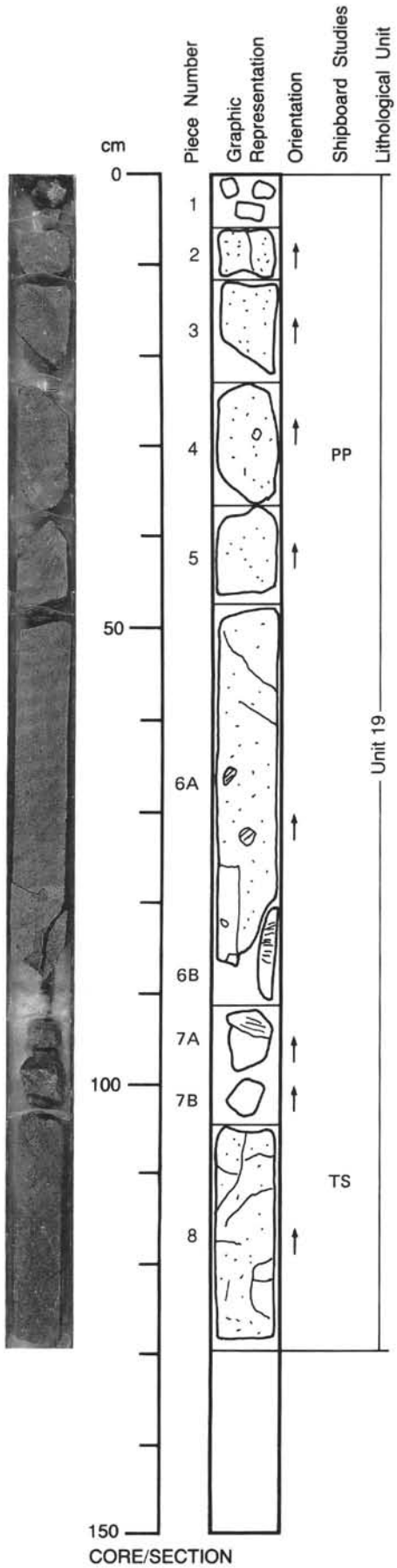
Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of pyroxene and plagioclase.
Plagioclase - 5%; <1.5 mm; equant laths.
Clinopyroxene - 4%; 1 mm; euhedral, equant.
Orthopyroxene - 6%; 0.7 mm; euhedral, equant.
Olivine - trace; <1.5 mm; euhedral, elongate.
GROUNDMASS: Fine-grained to glassy with feldspar laths.
VESICLES: 2-4%; 1-5 mm; elongate, ragged; throughout, locally concentrated; some are filled with Fe-oxide and some with carbonate.
COLOR: Greenish gray (5BG 6/1).
STRUCTURE: Massive.
ALTERATION: Minor pervasive chlorite and hematite alteration; hematite alteration of olivine and some orthopyroxene phenocrysts.
VEINS/FRACTURES: Small, carbonate-filled vein on the edge of Piece 1.
ADDITIONAL COMMENTS: This section is a continuation of Section 42R-3.

UNIT 19: TWO-PYROXENE, OLIVINE BEARING ANDESITE

Pieces 5-8

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of pyroxene and plagioclase.
Plagioclase - 5%; <1.5 mm; euhedral to lath-shaped.
Orthopyroxene - 10%; <1.5 mm; euhedral, equant.
Clinopyroxene - 3-5%; <2.5 mm; euhedral, tabular
Olivine - 1-2%; <3 mm; euhedral.
GROUNDMASS: Fine-grained to glassy with microliths of feldspar.
VESICLES: 3-5%; 1-5 mm; elongate, ragged; throughout; filled with carbonate.
COLOR: Weak red (2.5YR 5/2).
STRUCTURE: Massive.
ALTERATION: Pervasive chlorite and hematite alteration; olivine phenocrysts altering to hematite/carbonate assemblage.
VEINS/FRACTURES: <1%; <1 mm wide; subvertical; filled with carbonate.
ADDITIONAL COMMENTS: These pieces are more oxidized (redder) than overlying unit.

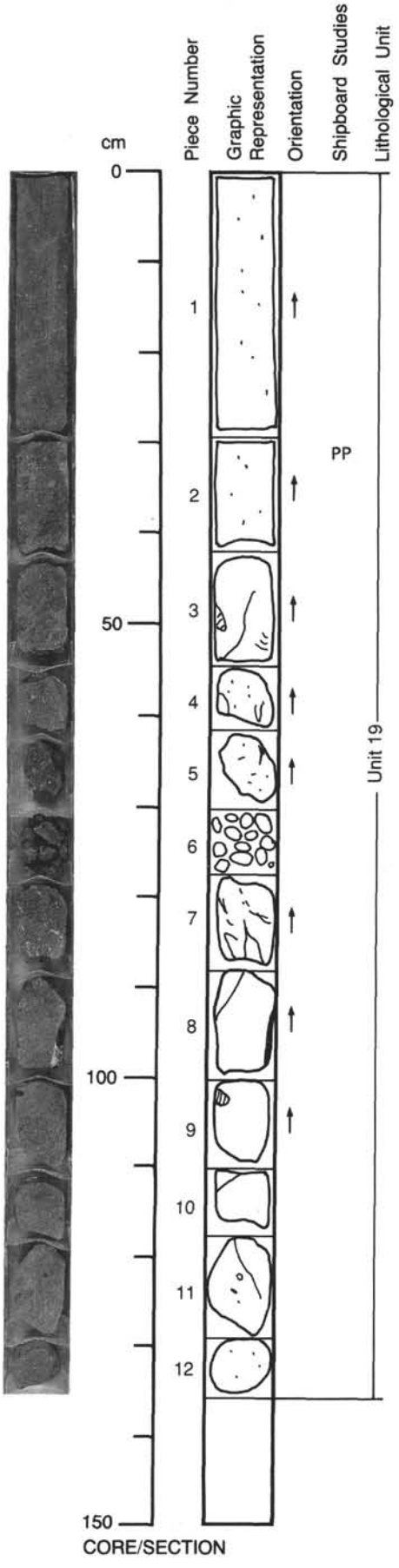


125-786B-43R-1

UNIT 19: TWO-PYROXENE, OLIVINE, PLAGIOCLASE ANDESITE (42R-4 CONTINUED)

Pieces 1-8

CONTACTS: None visible.
PHENOCRYSTS: Plagioclase with opaque inclusions.
Plagioclase - 5-10%; <3 mm; euhedral prisms.
Orthopyroxene - 5-8%; <3 mm; yellow; subhedral.
Clinopyroxene - 5-8%; <3 mm; dark-green; subhedral.
Olivine - 3%; <2 mm; altered to hematite and carbonate.
GROUNDMASS: Glassy with abundant microcrystalline magnetite.
VESICLES: 2-5%; <2 mm; round; random distribution.
COLOR: Gray to weak red (N 5/0 - 2.5YR 5/2).
STRUCTURE: Massive.
ALTERATION: Magnetite from groundmass gives red hematite stains; olivine is completely altered.
VEINS/FRACTURES: Trace; <0.5 mm; random orientation; fractures have chlorite on surface; some calcite present.
ADDITIONAL COMMENTS: Strike-slip slickensides in chlorite on fracture surface in Pieces 6 and 7.

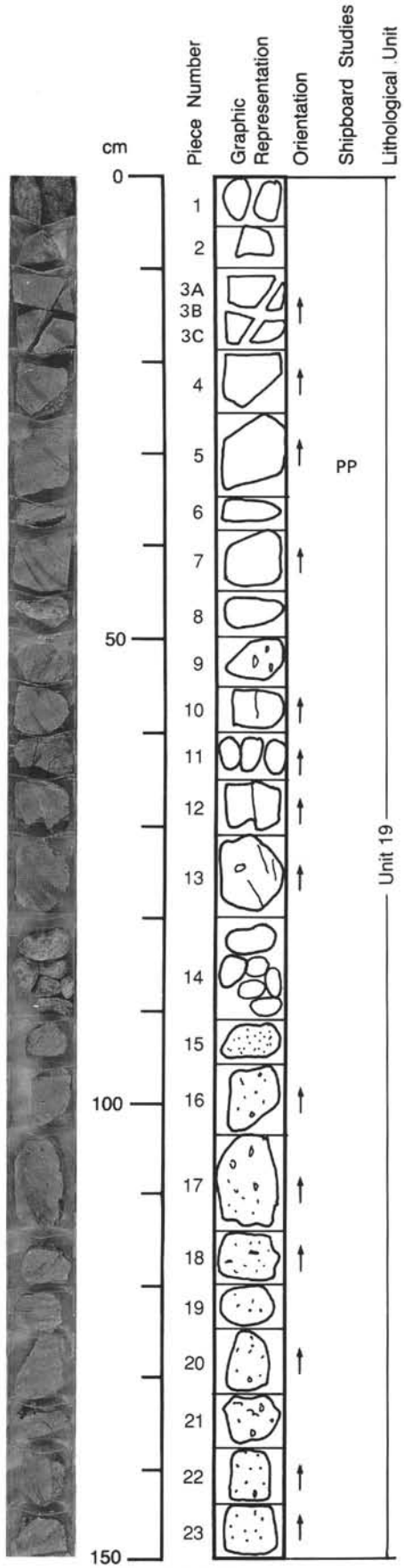


125-786B-43R-2

UNIT 19: TWO-PYROXENE, PLAGIOCLASE ANDESITE

Pieces 1-12

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 10-15%; <3 mm; euhedral.
Orthopyroxene - 10-15%; <3 mm; yellow; subhedral.
Clinopyroxene - 5-10%; <3 mm; dark-green; subhedral.
Olivine - trace; <1 mm.
GROUNDMASS: Glassy with less magnetite than in 43R-1.
VESICLES: 5%; <2 mm; round to irregular; random distribution.
COLOR: Dark greenish gray (5GY 4/1 - 5G 4/1) locally reddish.
STRUCTURE: Massive.
ALTERATION: Orthopyroxene is altered to serpentine; olivine is altered to hematite and carbonate.
VEINS/FRACTURES: Trace; < 2 mm; random orientation; filled with calcite.
ADDITIONAL COMMENTS: Piece 1 is similar rock type to 43R-1.

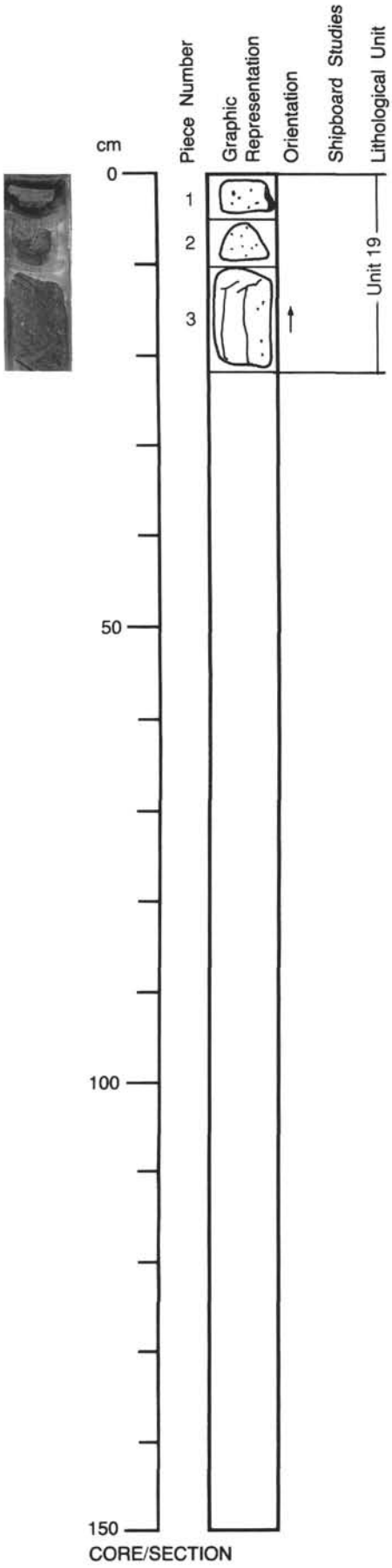


125-786B-44R-1

UNIT 19: META-ANDESITE

Pieces 1-23

CONTACTS: None visible.
PHENOCRYSTS:
Clinopyroxene - 5%; <2 mm; subhedral.
GROUNDMASS: Altered glass and plagioclase.
VESICLES: 0-1%; <4 mm; round; locally present.
COLOR: Greenish gray (5GY 5/1).
STRUCTURE: Massive.
ALTERATION: Rock is pervasively altered to very low grade mineralogy.
VEINS/FRACTURES: Trace; < 0.3 mm; sub-vertical; filled with calcite.
ADDITIONAL COMMENTS: Probably sparsely phyric, clinopyroxene andesite; more clinopyroxene below 90 cm (Pieces 15-23).



125-786B-44R-2

UNIT 19: META-ANDESITE

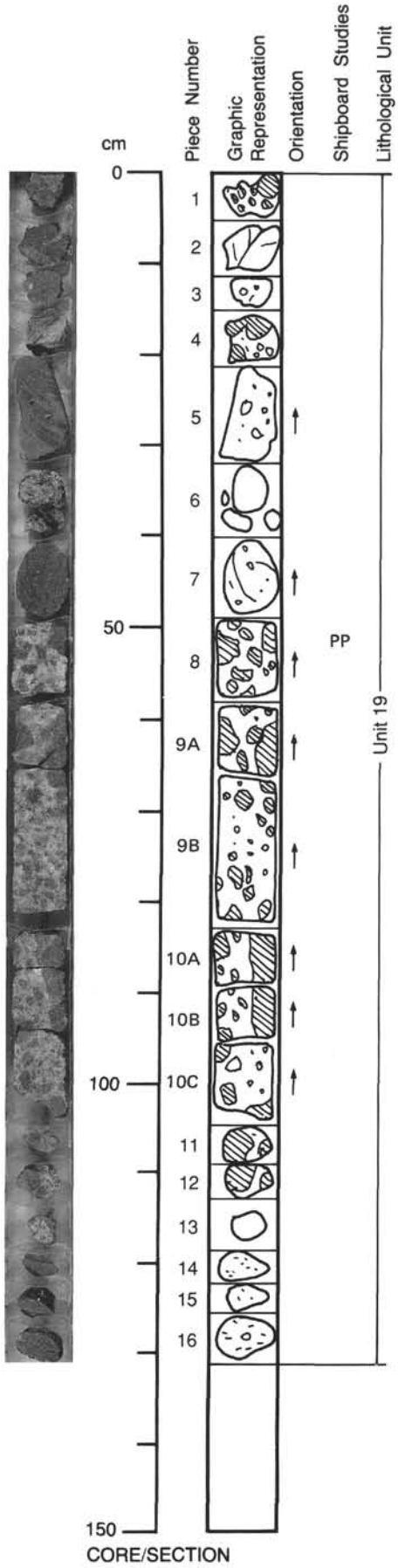
Pieces 1-2

CONTACTS: None visible.
PHENOCRYSTS:
Clinopyroxene - 10-15%; <3 mm; euhedral; light green.
GROUNDMASS: Altered glass and plagioclase.
VESICLES: Trace; 1-2 mm; round; locally present.
COLOR: Greenish gray (10Y 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasively altered to very low grade mineral assemblage.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-44R-1, 90-140 cm.

UNIT 1: TWO-PYROXENE, PLAGIOCLASE, OLIVINE BRECCIATED ANDESITE

Piece 3

CONTACTS: Not visible.
PHENOCRYSTS:
Plagioclase - 10-15%; < 3 mm; euhedral.
Orthopyroxene - 3-5%; <3 mm; euhedral; yellow.
Clinopyroxene - 5-10%; <3 mm; euhedral; dark-green.
Olivine - trace; <1 mm; altered to red spots.
GROUNDMASS: Glassy with plagioclase crystals.
VESICLES: 2%; <2 mm; flattened; randomly distributed.
COLOR: Dark green (5BG 4/1) with light green (10Y 6/6) and red streaks from alteration.
STRUCTURE: Massive.
ALTERATION: Glass alters to green-colored product.
VEINS/FRACTURES: Trace; < 0.2 mm; sub-vertical; probably filled with chlorite and zeolite.

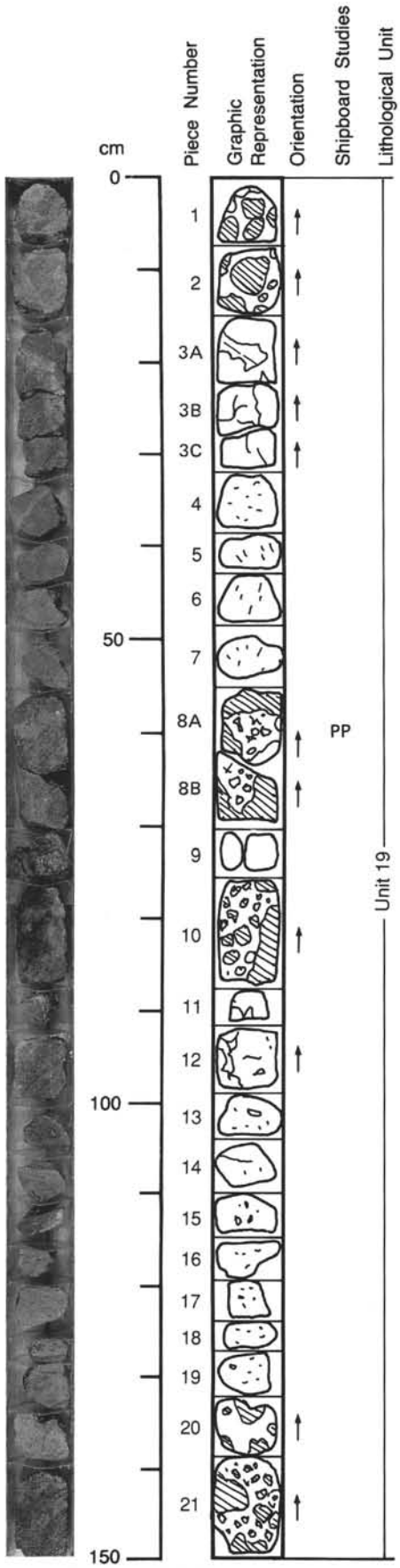


125-786B-45R-1

UNIT 19: TWO-PYROXENE, PLAGIOCLASE, OLIVINE ANDESITE-BRECCIA (44R-2 CONTINUED)

Pieces 1-16

CONTACTS: One visible.
PHENOCRYSTS: Fresh.
Plagioclase - 10-15%; <2 mm; euhedral.
Orthopyroxene - 10%; <3 mm; yellow; euhedral, equant.
Clinopyroxene - 5%; <2 mm; dark-green; columnar.
Olivine - trace; <2 mm; altered to red product.
GROUNDMASS: Glassy with some plagioclase crystals.
VESICLES: 5-8%; <4 mm, some 1 cm in size; round to elongate; randomly distributed; blue coating.
COLOR: Dark bluish gray (5B 4/1) to greenish yellow (5Y 7/4) in brecciated zones.
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered to yellow-green product.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Oligomictic breccia; continuation of 125-786B-44R-2 10cm; Pieces 5, 7 are single fragments without breccia matrix; matrix-dominated from Piece 8-12.

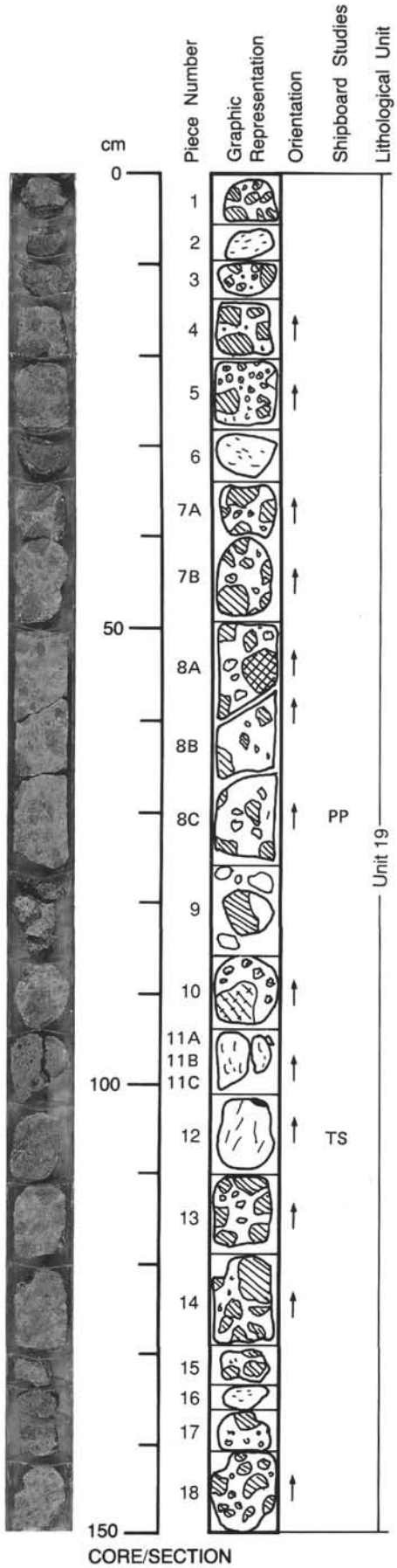


125-786B-46R-1

UNIT 19: TWO-PYROXENE, PLAGIOCLASE, OLIVINE ANDESITE BRECCIA

Pieces 1-21

CONTACTS: None visible.
PHENOCRYSTS: Fresh.
Plagioclase - 10%; <2 mm; euhedral.
Orthopyroxene - 5%; <3 mm; yellow; equant, euhedral.
Clinopyroxene - 10%; <2 mm; dark green; columnar.
Olivine - trace; <2 mm; altered to red product.
GROUNDMASS: Glassy with some plagioclase crystals.
VESICLES: 5-8%; <4 mm, some 1 cm in size; round to elongate; randomly distributed; blue coating.
COLOR: Dark bluish gray (5B 4/1) to greenish yellow (5Y 7/4) in brecciated zones.
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered yellow green product.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Oligomictic breccia; continuation of 125-786B-44-2,10 cm; Piece 4-7 and 14-19 are single fragments without breccia matrix; Pieces 20 and 21 are vuggy.

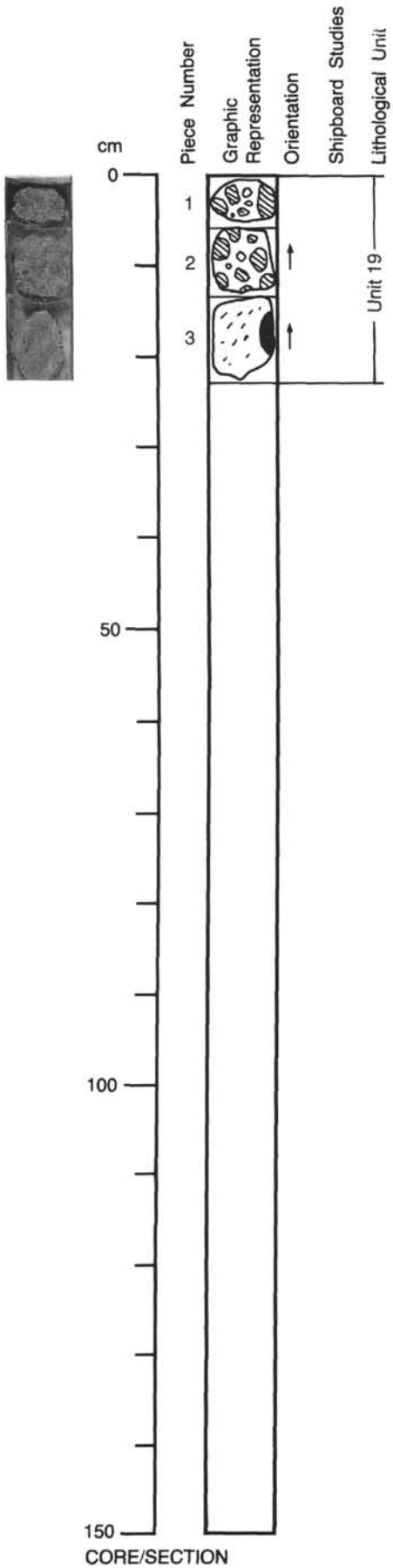


125-786B-46R-2

UNIT 19: TWO-PYROXENE, PLAGIOCLASE, OLIVINE ANDESITE BRECCIA

Pieces 1-18

CONTACTS: None visible.
PHENOCRYSTS: Fresh.
Plagioclase - 10%; <2 mm; euhedral.
Orthopyroxene - 5%; <3 mm; yellow; equant.
Clinopyroxene - 10%; <2 mm; dark green; columnar.
Olivine - trace; <2 mm.
GROUNDMASS: Glassy with some plagioclase crystals.
VESICLES: 5-8%; <4 mm, some 1 cm in size; round and elongate; randomly distributed; blue coating.
COLOR: Dark bluish gray (5B 4/1) to greenish yellow (5Y 7/4) in brecciated zones.
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered yellow-green product; olivine phenocryst is altered to red product.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Oligomictic breccia; continuation of 125-786B-44-2 10cm; Piece 6 a single fragment without breccia matrix.

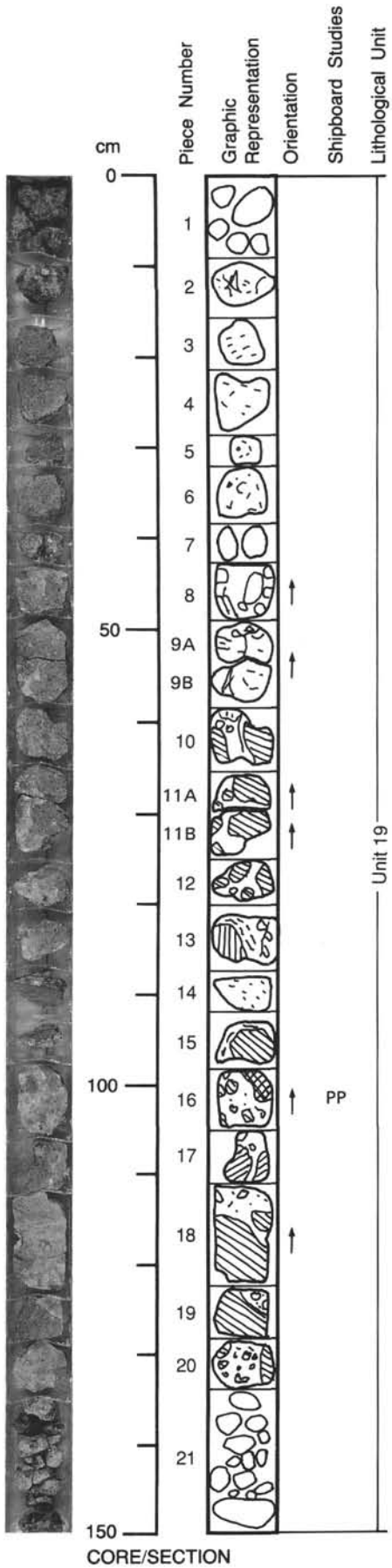


125-786B-46R-3

UNIT 19: TWO-PYROXENE, PLAGIOCLASE, OLIVINE ANDESITE BRECCIA

Pieces 1-3

CONTACTS: None visible.
PHENOCRYSTS: Fresh.
Plagioclase - 10%; <2 mm; euhedral.
Orthopyroxene - 5%; <3 mm; yellow; equant.
Clinopyroxene - 10%; <2 mm; dark green; columnar.
Olivine - trace; < 2 mm ; altered to red product.
GROUNDMASS: Glassy with some plagioclase crystals.
VESICLES: 5-8%; <4 mm, some 1 cm in size; round and elongate; randomly distributed; blue coating.
COLOR: Dark bluish gray (5B 4/1) to greenish yellow (5Y 7/4) in brecciated zones.
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered yellow-green product.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Oligomictic breccia; continuation of 125-786B-44-2, 10cm; Piece 3 contains an orthopyroxene-rich pyroxenite xenolith.

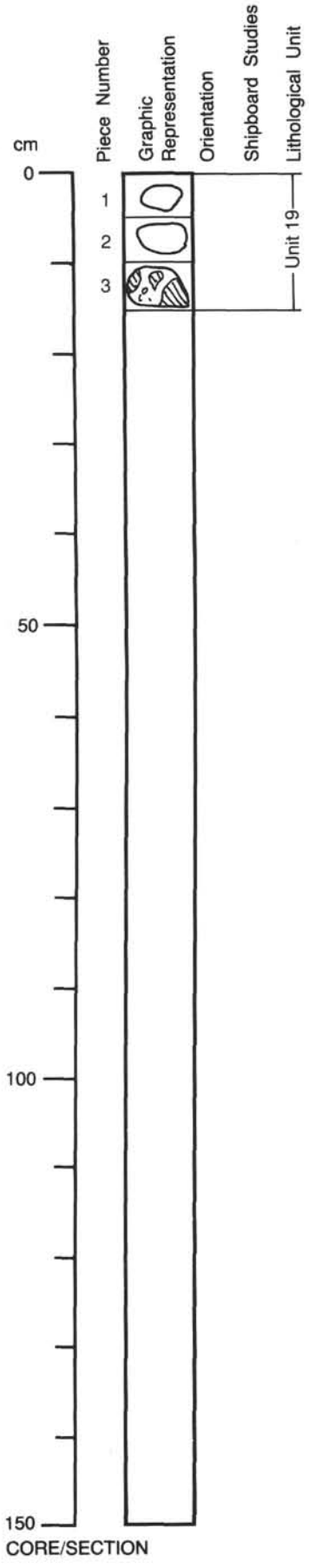


125-786B-47R-1

UNIT 19: TWO-PYROXENE, PLAGIOCLASE, OLIVINE ANDESITE BRECCIA (46R-3 CONTINUED).

Pieces 1-21

CONTACTS: None visible.
PHENOCRYSTS: Fresh in unaltered glassy rock portions.
Plagioclase - 10%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 5-10%; <2 mm; subhedral.
Olivine - trace; <1 mm.
GROUNDMASS: Glassy with plagioclase crystals; green, chlcrite-rich in breccia matrix.
VESICLES: 5-20%; variable (1-10 mm); round to elongate; random within each fragment; bluish coating.
COLOR: Dark bluish gray (5B 4/1) to greenish yellow (5Y 7/4).
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered to chlorite-bearing product, clasts are fresh with locally altered rims; olivine phenocrysts altered to reddish product.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-45R-1; oligomictic breccia.

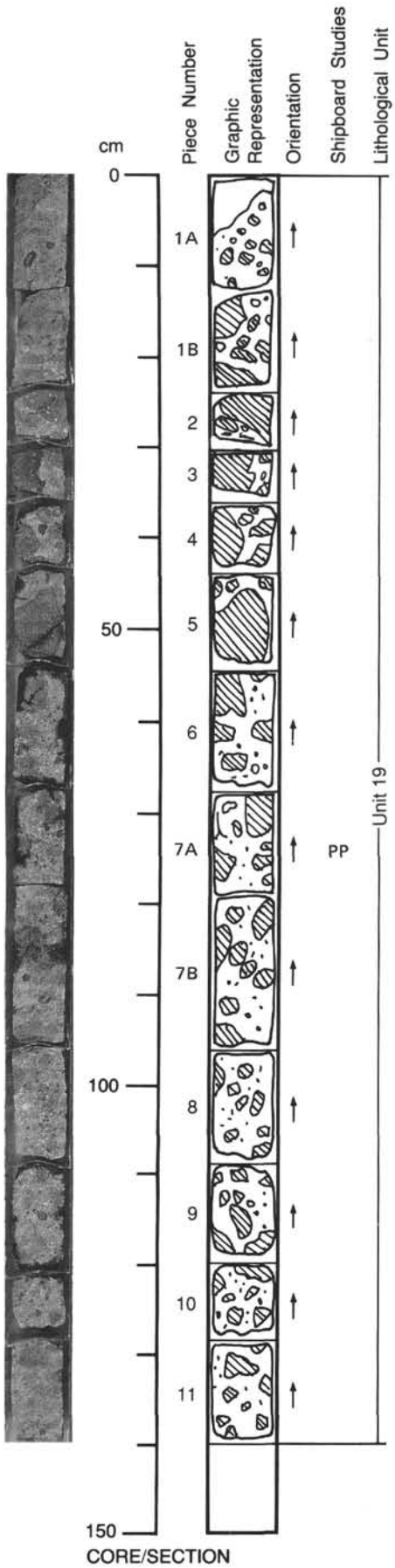


125-786B-47R-2

UNIT 19: TWO-PYROXENE, PLAGIOCLASE ANDESITE BRECCIA (47R-1 CONTINUED)

Pieces 1-3

CONTACTS: None visible.
PHENOCRYSTS: Fresh in unaltered glassy rock portions.
Plagioclase - 10%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 5-10%; <2 mm; subhedral.
Olivine - trace; <1 mm.
GROUNDMASS: Glassy with plagioclase crystals; green, chlorite-rich in breccia matrix.
VESICLES: 5-20%; variable (1-10 mm); round to elongate; random within each fragment; bluish coating.
COLOR: Dark bluish gray (5B 4/1) to greenish yellow (5Y 7/4).
STRUCTURE: Breccia matrix is altered to chlorite-bearing product, clasts are fresh with locally altered rims; olivine phenocrysts altered to reddish product.
ALTERATION: Brecciated.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-45R-1; oligomictic breccia.

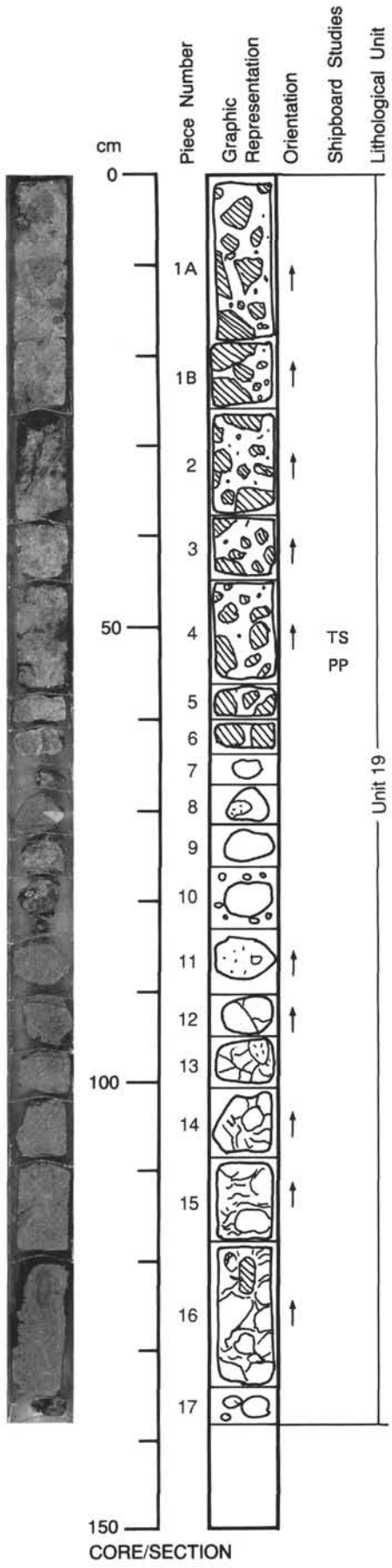


125-786B-48R-1

UNIT 19: TWO-PYROXENE, PLAGIOCLASE ANDESITE BRECCIA

Pieces 1-11

CONTACTS: None visible.
PHENOCRYSTS: Fresh in unaltered glassy rock portions.
Plagioclase - 10%; <2 mm; subhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 5-10%; <2 mm; subhedral.
Olivine - trace; <1 mm; altered to reddish product.
GROUNDMASS: Glassy with plagioclase crystals; green, chlorite-rich in breccia matrix.
VESICLES: 5-20%; variable (1-10 mm); round to elongate; randomly distributed; blue coating.
COLOR: Matrix is pale green (5G 6/2); clasts are gray (N 6/) to dark gray (N4/ to 5Y 4/1).
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered to chlorite-bearing product; clasts are fresh with locally-altered rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-45R-1. The amount of matrix increases toward the bottom of the section and rare, different clast lithologies are present (probably welded tuffs).

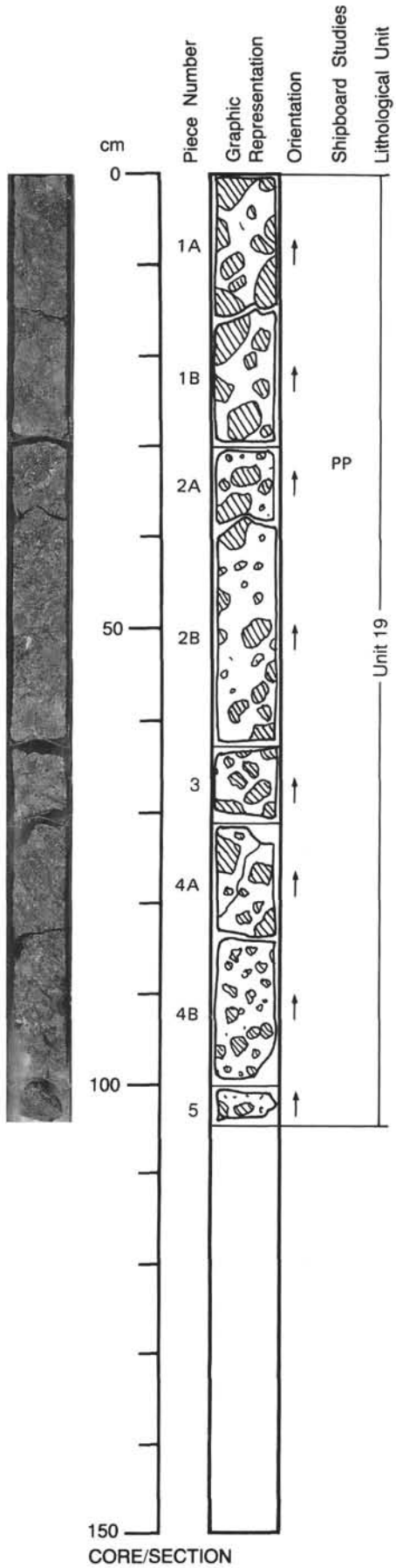


125-786B-48R-2

UNIT 19: TWO-PYROXENE, PLAGIOCLASE ANDESITE BRECCIA (47R-1 CONTINUED)

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Fresh in glassy unaltered rock portions.
Plagioclase - 10%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 5-10%; <2 mm; subhedral.
Olivine - trace; <1 mm.
GROUNDMASS: Glassy with plagioclase crystals; green, chlorite-rich in breccia matrix.
VESICLES: 5-20%; variable (1-10 mm); round to elongate; randomly distributed; bluish coating.
COLOR: Pale green (5G 6/2) matrix, clasts are gray (N 4/) to dark gray (5Y 4/1).
STRUCTURE: Brecciated.
ALTERATION: Breccia matrix is altered to chlorite-bearing product, clasts are fresh with locally altered rims; olivine phenocrysts altered to reddish product.
VEINS/FRACTURES: 0%; 0; 0.
ADDITIONAL COMMENTS: Continuation of 125-786B-45R-1. Below 83 cm (Piece 11) the section is pervasively fractured and oxidized along the fractures; identical mineralogy.

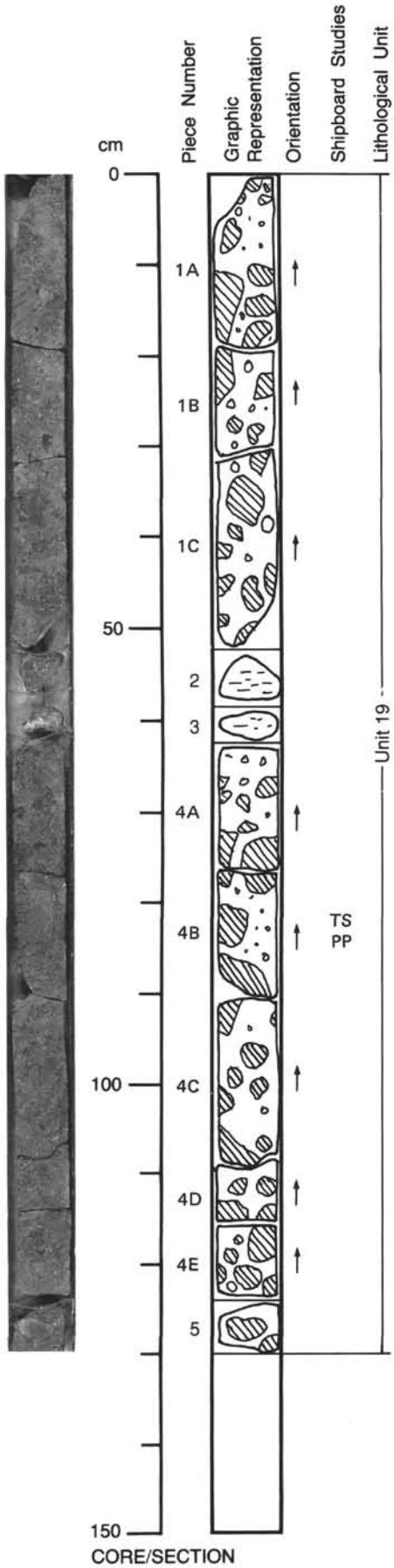


125-786B-49R-1

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-5

CONTACTS: None visible.
PHENOCRYSTS: For most clasts:
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have glassy to very fine-grained groundmass with plagioclase microliths and are pervasively altered; greenish alteration in matrix.
VESICLES: 1-15%; 0.1-10 mm; some flattened and aligned; variable distribution.; bluish white coating to vesicles.
COLOR: Pale green (5G 6/2) matrix; clasts are mainly gray, 10YR 2/1 in freshest and 10YR 4/1 in most altered examples; a few clasts are reddish brown (5YR 6/4).
STRUCTURE: .
ALTERATION: Breccia matrix is altered to green and white minerals; glass in clasts altered to clay minerals, and some, but not all, have alteration rims at their margins.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in longest dimension; larger clasts are subangular-rounded, and smaller clasts are rounded; vitric matrix.

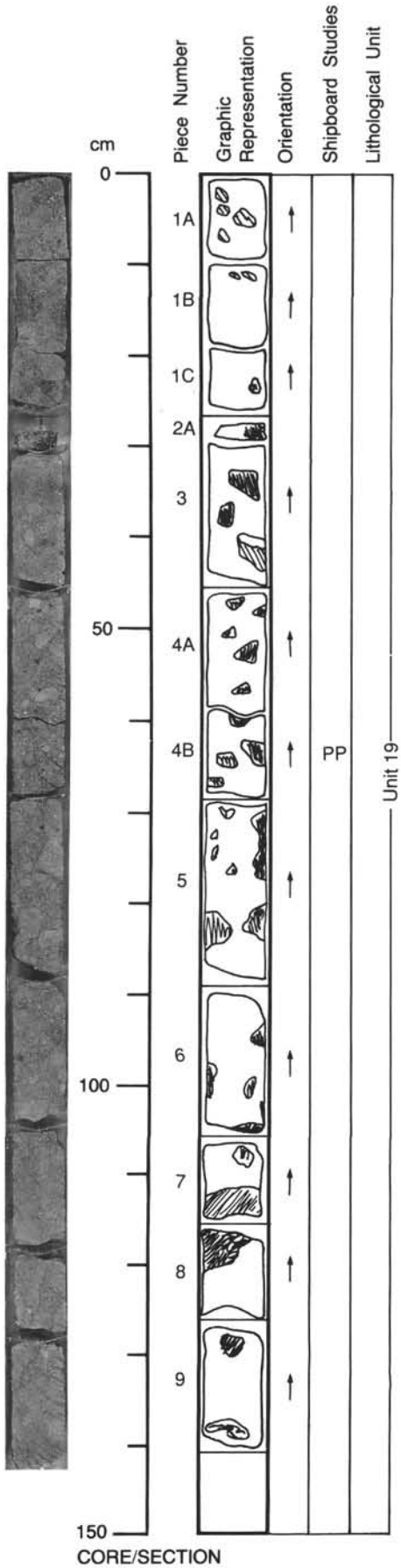


125-786B-49R-2

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-5

CONTACTS: None visible.
PHENOCRYSTS: For most clasts:
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 3-5%; <2 mm; subhedral.
Clinopyroxene - 2-3%; <2 mm; subhedral.
GROUNDMASS: Clasts have glassy to very fine-grained groundmass with plagioclase microliths and are pervasively altered.
VESICLES: 1-15%; variable distribution.; within and between clasts 1-10 mm; some flattened and aligned; bluish-white coating to vesicles.
COLOR: Pale green (5G 6/2) matrix; clasts are mainly gray, 10YR 2/1 in freshest and 10YR 4/1 in most altered; a few clasts are reddish brown (10R 4/8).
STRUCTURE: N/A.
ALTERATION: Breccia matrix is altered to green and white minerals; glass in clasts altered to clay minerals, and some, but not all, have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in longest dimension; larger clasts are subangular-rounded, and smaller clasts are rounded; more red clasts towards the base of the section; vitric matrix.

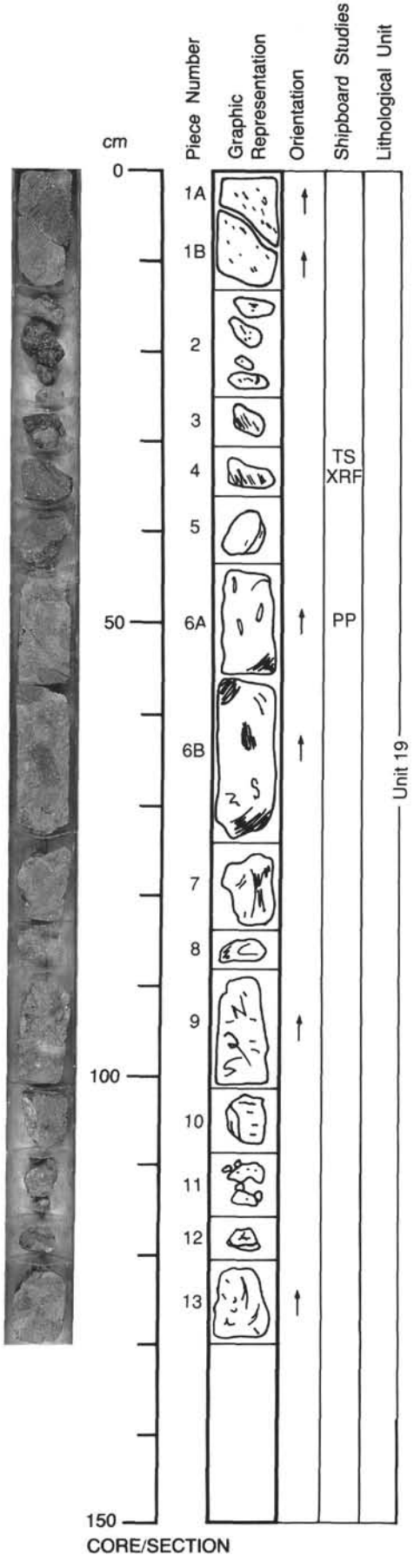


125-786B-49R-3

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-9

CONTACTS: None visible.
PHENOCRYSTS: For most clasts:
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have glassy to very fine-grained groundmass with plagioclase microliths and are pervasively altered.
VESICLES: 1-15%; 0.1-10 mm; flattened and aligned; variable distribution within clasts; bluish white coating to vesicles.
Miaroles: some
COLOR: Red brown (10R 4/4) in matrix; clasts vary enormously in color to give most shades of gray to green; a few clasts are red brown.
STRUCTURE: N/A.
ALTERATION: Clasts are red brown, breccia matrix is altered to red brown oxides and clays; clasts show pervasively low-grade alteration.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in longest dimension; larger clasts are subangular-rounded, and smaller clasts are rounded; vitric matrix.

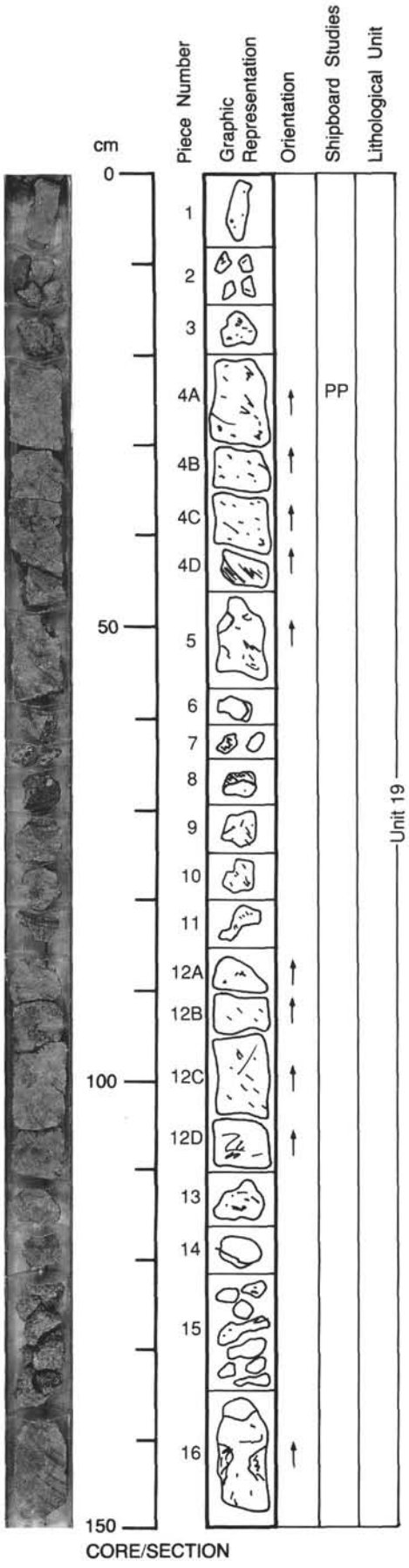


125-786B-49R-4

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-13

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Glassy clasts have very fine-grained groundmass and are variably but pervasively altered.
VESICLES: 1-15%; 0.1-10 mm; flattened and aligned; variable distribution within clasts; bluish white coating to vesicles.
Miaroles: Some.
COLOR: Grayish green (10G 4/2) to dusky yellowish-green (10G 3/2) matrix; clasts are mainly gray, (10YR 2/1) in freshest and (10YR 4/1) in most altered examples; a few clasts are reddish-brown (10R 4/8).
STRUCTURE: N/A.
ALTERATION: Breccia matrix is altered to green and white minerals; clasts exhibit low-grade alteration and some have altered margins.
VEINS/FRACTURES: One irregular fracture with white mineral on fracture walls.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm upwards; vitric matrix.

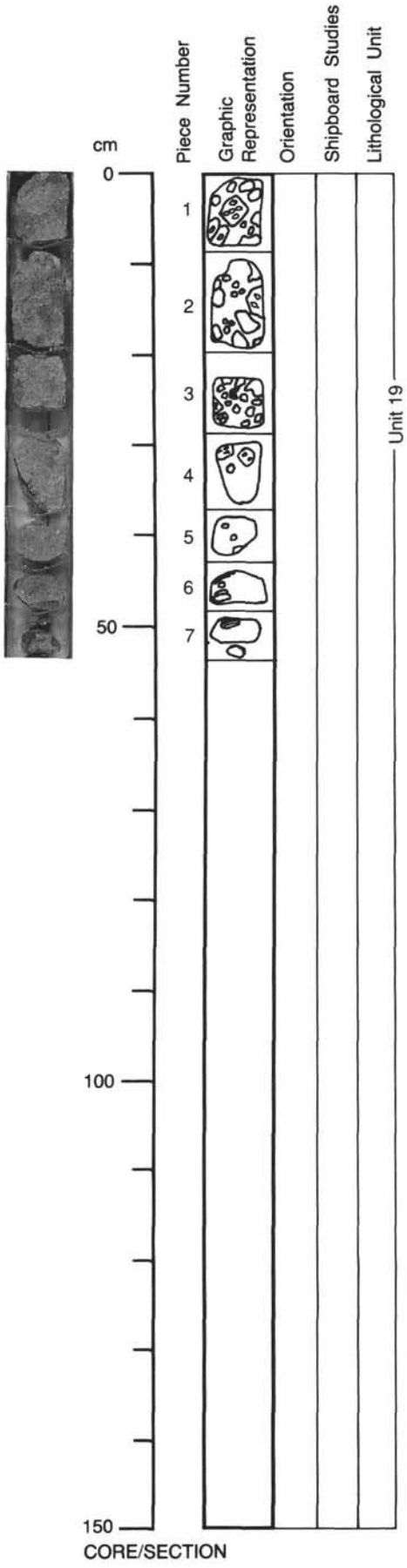


125-786B-50R-1

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-16

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Clasts are pervasively altered, and have a very fine-grained to glassy groundmass with plagioclase microliths.
VESICLES: 1-15%; 0.1-10 mm; flattened and aligned; variable distribution within clasts; bluish white coating to vesicles.
Miaroles: Some.
COLOR: Grayish green (10G 4/2) to dusky yellowish-green matrix; clasts are mainly gray, (10YR 2/1) in freshest and (10YR 4/1) in most altered examples; a few clasts are reddish (10R 4/8).
STRUCTURE: N/A.
ALTERATION: Breccia matrix is altered to green and white minerals which show a pervasive low-grade alteration; clasts have moderately fresh interiors, and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in longest dimension; vitric matrix (no detrital component).

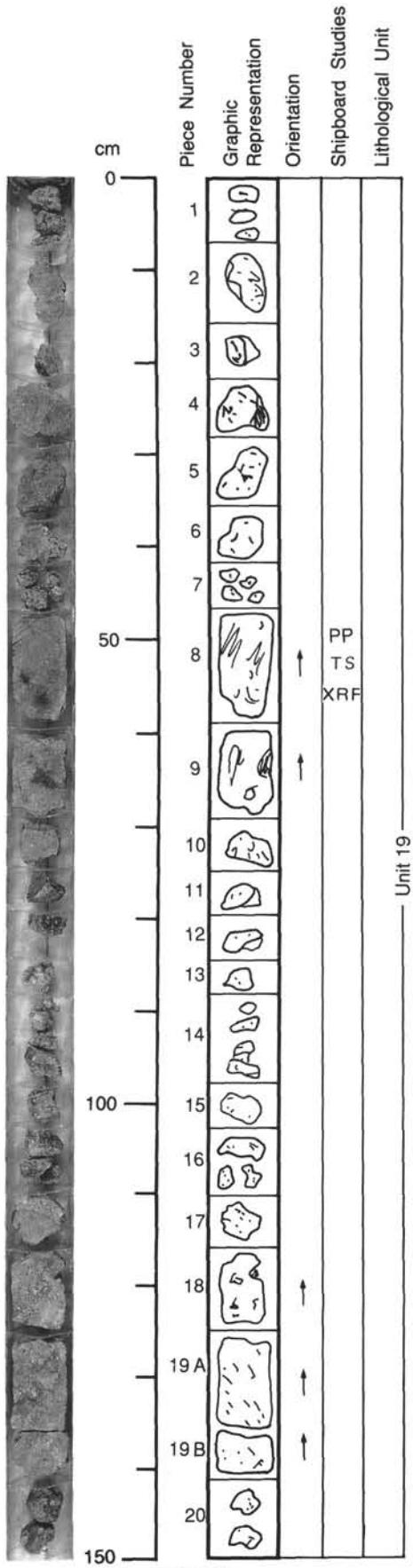


125-786B-50R-2

UNIT 19: TWO-PYROXENE ANDESITE

Pieces 1-7

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; bluish white lining.
COLOR: Grayish green (10G 4/2) to dusky yellowish green (10GY 3/2) matrix; clasts are mainly gray (10YR 4/1 to 6/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration, some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 4 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component).

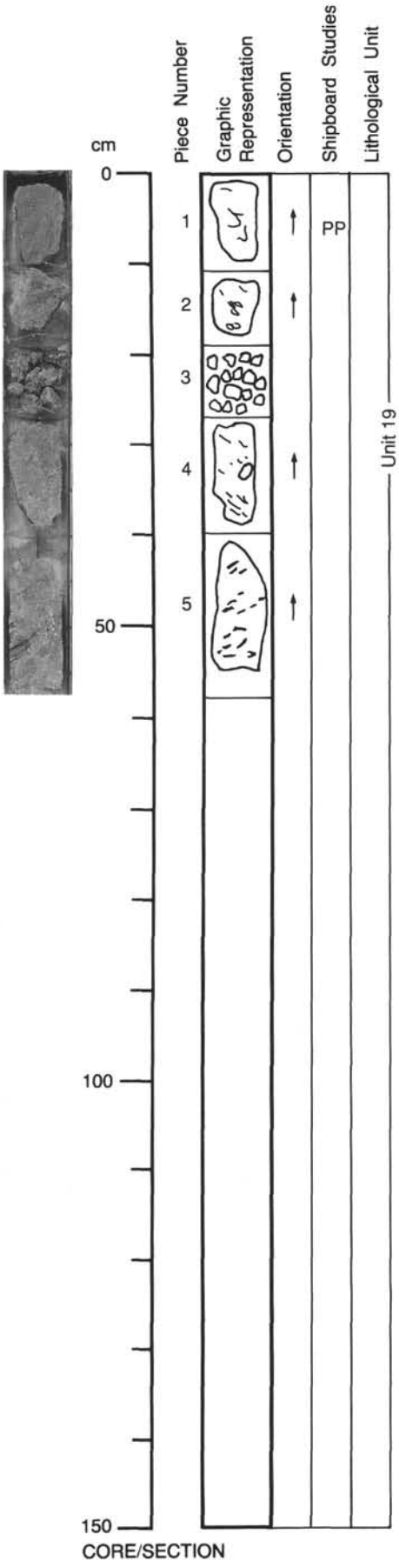


125-786B-51R-1

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-20

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - <10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have glassy to very fine-grained groundmass with plagioclase microliths and are pervasively altered.
VESICLES: 1-15%; 0.1-10 mm; some flattened and aligned; variable distribution within clasts; bluish white coating to vesicles.
COLOR: Grayish green (10G 4/2) to dusky yellowish green (10GY 3/2) matrix; clasts are mainly gray, (10YR 2/1), in freshest and (10YR 4/1) in most altered examples.
STRUCTURE: N/A.
ALTERATION: Breccia matrix is altered to green and white minerals; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 11 cm in longest dimension; larger clasts are subangular-rounded, and smaller clasts are rounded; vitric matrix (no detrital component).

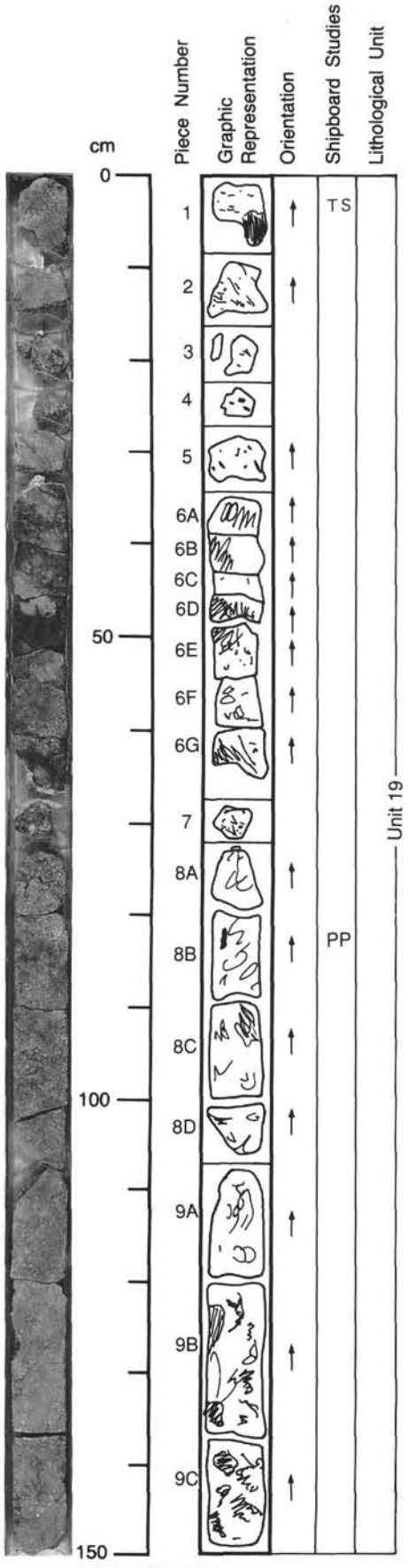


125-786B-51R-2

UNIT 19: TWO-PYROXENE ANDESITE BRECCIA

Pieces 1-5

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 5-10%; <2 mm; euhedral.
Orthopyroxene - 2-5%; <2 mm; subhedral.
Clinopyroxene - 2-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have very fine-grained to glassy groundmass and are pervasively altered.
VESICLES: 1-15%; 0.1-10 mm; some flattened and aligned; variable within clasts; bluish white lining.
COLOR: Grayish green (10G 4/2) to dusky yellowish green (10GY 3/2) matrix; clasts are mainly gray, (10YR 2/1), in least altered to (10YR 4/1) in most altered examples.
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white minerals; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly-altered; clasts range in size from 2 mm to 6 cm in longest dimension; largest clasts are subangular-rounded; vitric matrix (no detrital component).

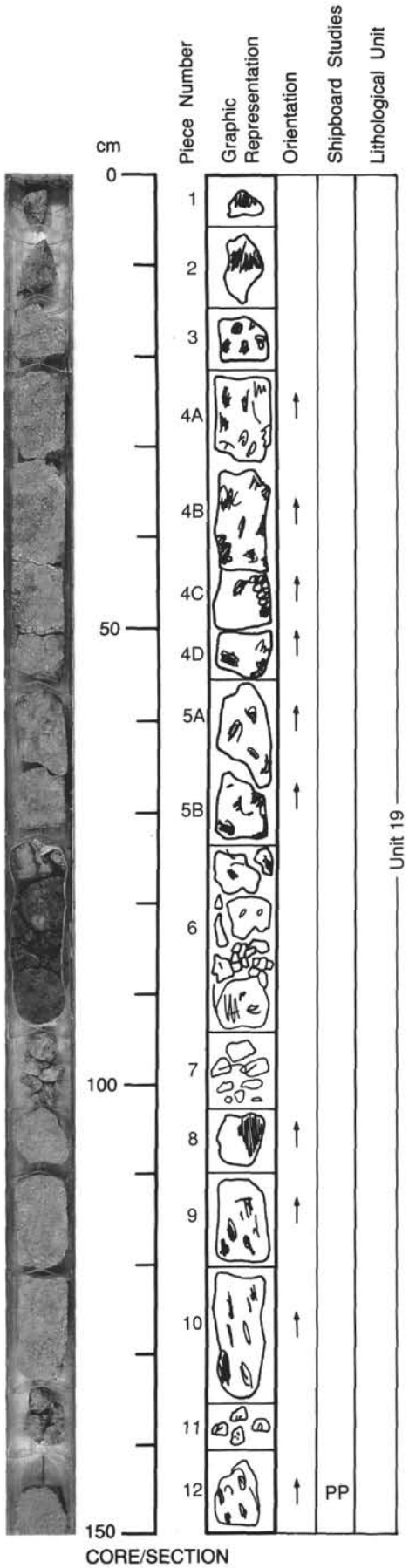


125-786B-52R-1

UNIT 19: BONINITE BRECCIA

Pieces 1-9

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; euhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; bluish white lining.
COLOR: Grayish green (10G 4/2) to dusky yellowish green (10GY 3/2) matrix; clasts are mainly gray (10YR 4/1 to 6/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component).

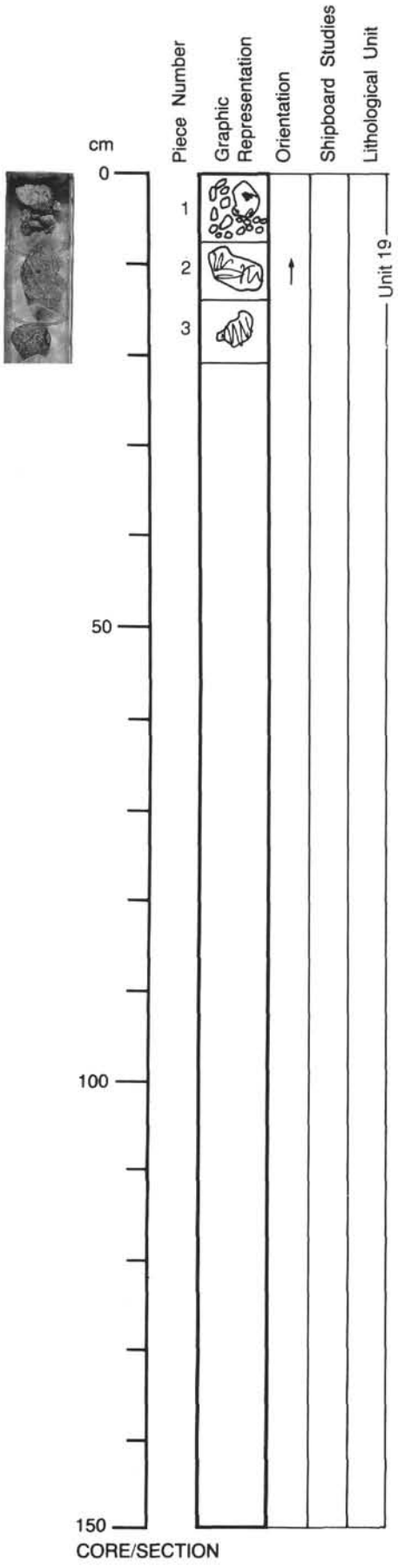


125-786B-52R-2

UNIT 19: BONINITE BRECCIA

Pieces 1-12

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; some have bluish white lining, others are filled with greenish matrix material.
COLOR: Grayish green (10G 4/2) to dusky yellowish green (10GY 3/2) matrix; clasts are mainly gray (10YR 4/1 to 6/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 5 mm to 6 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component).

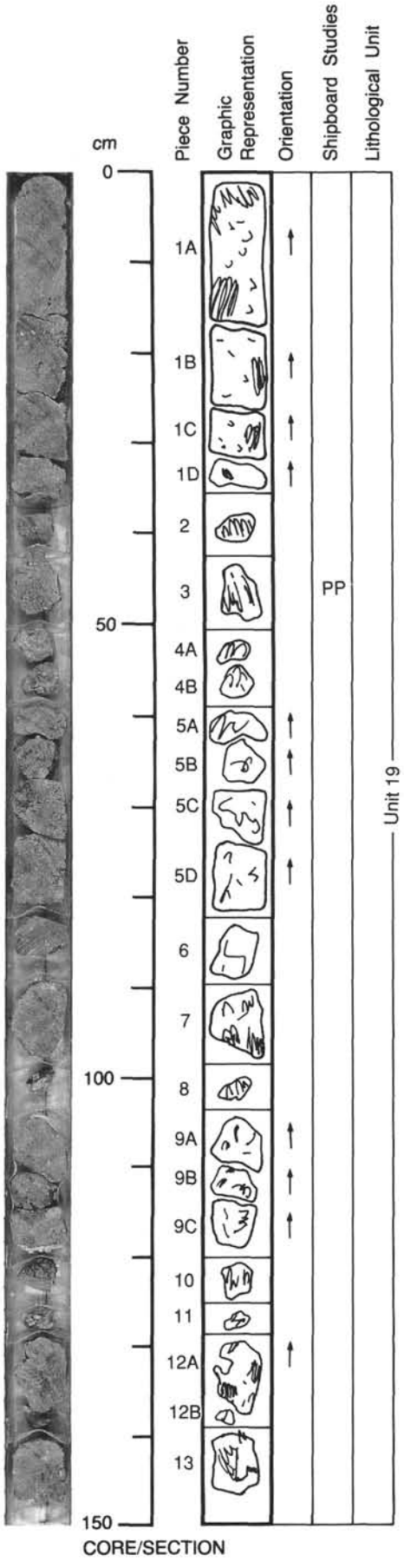


125-786B-52R-3

UNIT 19: BONINITE BRECCIA

Pieces 1-3

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; some have bluish white lining, others are filled with greenish matrix material.
COLOR: Grayish green (10G 4/2) to dusky yellowish green (10GY 3/2) matrix; clasts are mainly gray (10YR 4/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component).

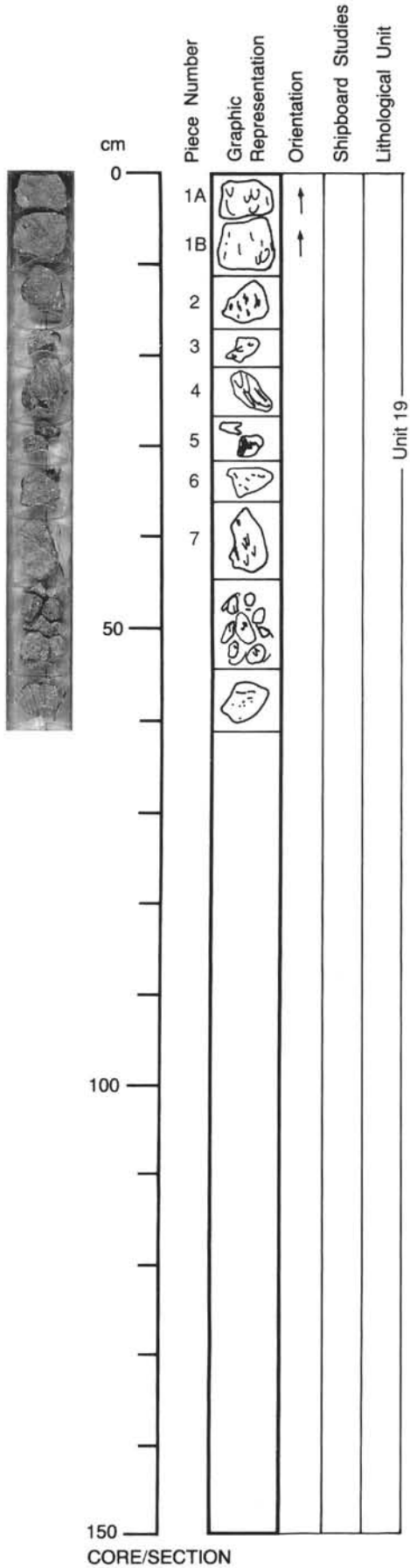


125-786B-53R-1

UNIT 19: BONINITE BRECCIA

Pieces 1-13

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; carbonate and white zeolite filling.
COLOR: Dark gray green (5G 3/4 - 5G 4/4) matrix; clasts are mainly dark gray to dark bluish gray (N 4/ to 5B 4/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Clasts range in size from 2 mm to 6 cm in largest dimension; matrix is vitric and porous with 1-2% grain-interstitial pores from 0.5 mm to 5 mm; pores have a lining of pale-green and creamy-white zeolite.

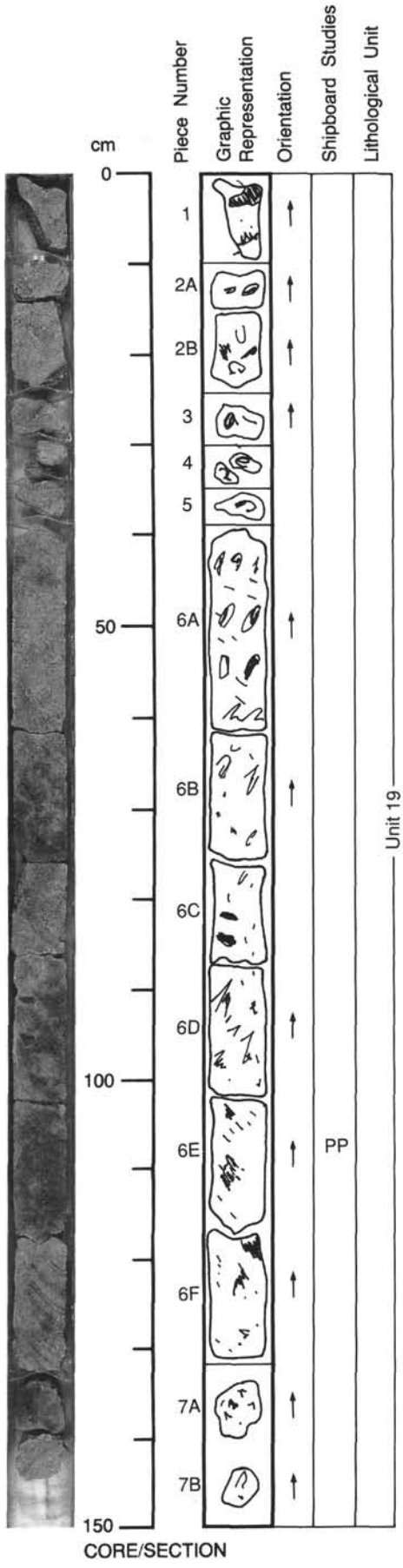


125-786B-53R-2

UNIT 19: BONINITE BRECCIA

Pieces 1-9

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable. distribution among clasts; filled with carbonate and white zeolite; parallel or concentric layers of zeolite (translucent-white-eggshell blue) fill some vesicles.
COLOR: Dark gray green (5G 3/4 - 5G 4/4) matrix; clasts are mainly dark gray to dark bluish gray (N 4/ to 5B 4/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 6 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component).

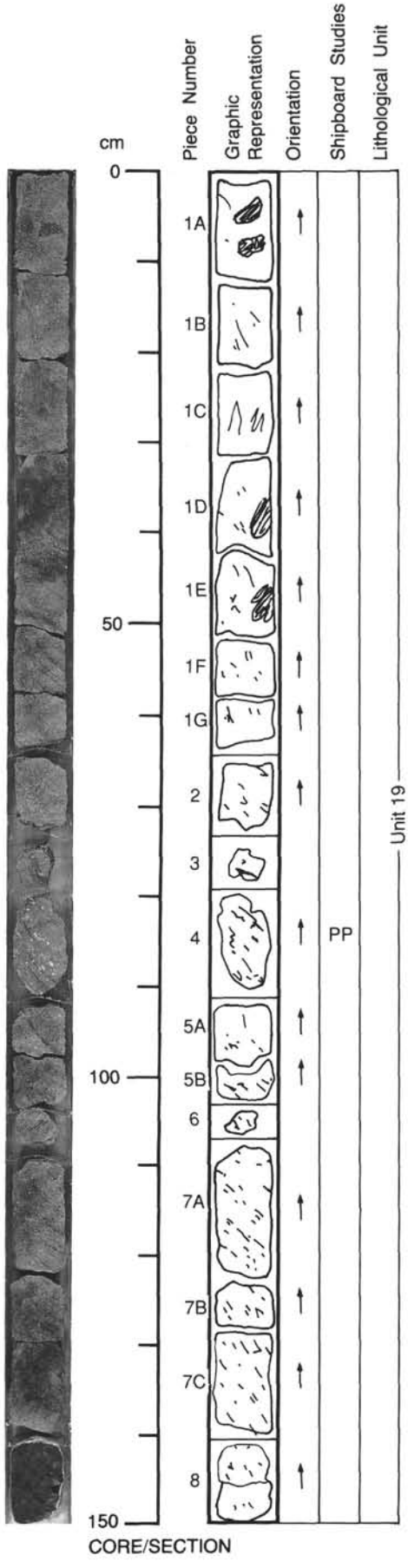


125-786B-54R-1

UNIT 19: BONINITE BRECCIA

Pieces 1-7

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution among clasts; bluish white lining.
COLOR: Dark gray green (5G 3/4) matrix; clasts are dark bluish gray to black (10YR 5/1 to 10YR 2/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration. products; clasts are pervasively altered and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Clasts range in size from 1 mm to 5 cm in largest dimension; matrix is vitric (no detrital component); the relative proportion of matrix to clasts is less than in previous cores and the distance between clasts is 1-3 mm; long axes of the clasts may be aligned with an apparent dip of 35 degrees; some clasts break up parallel to possible foliation.

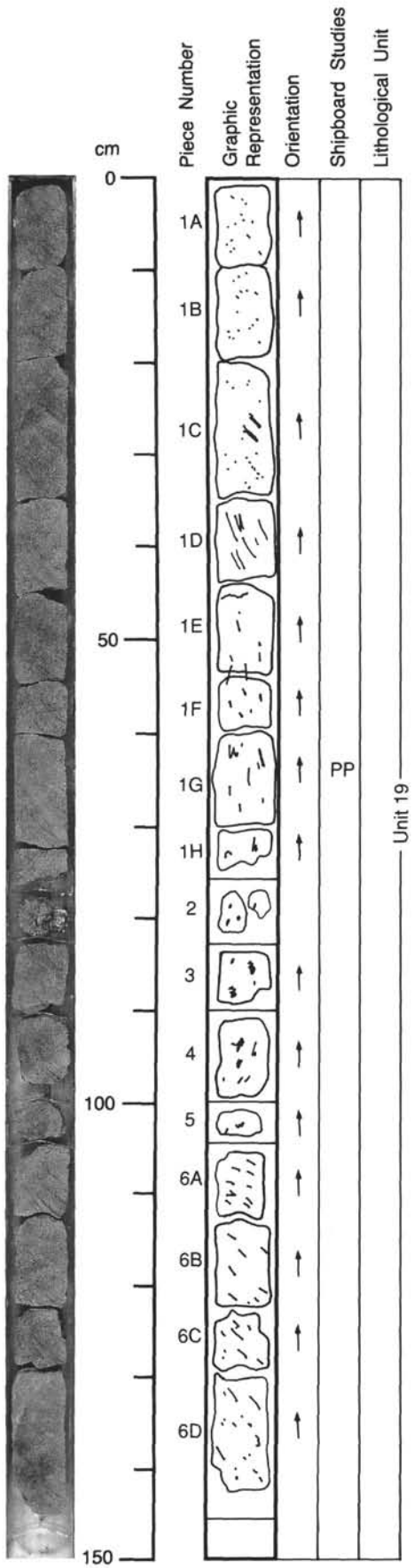


125-786B-54R-2

UNIT 19: BONINITE BRECCIA

Pieces 1-8

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution among clasts; whitish carbonate and zeolite lining or filling.
COLOR: Dark gray green (5G 3/4) matrix; clasts are dark bluish gray to black (10YR 5/11 - 10YR 2/1).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; some have clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 1 mm to 11 cm in largest dimension; larger clasts are subangular - rounded; matrix is vitric (no detrital component).

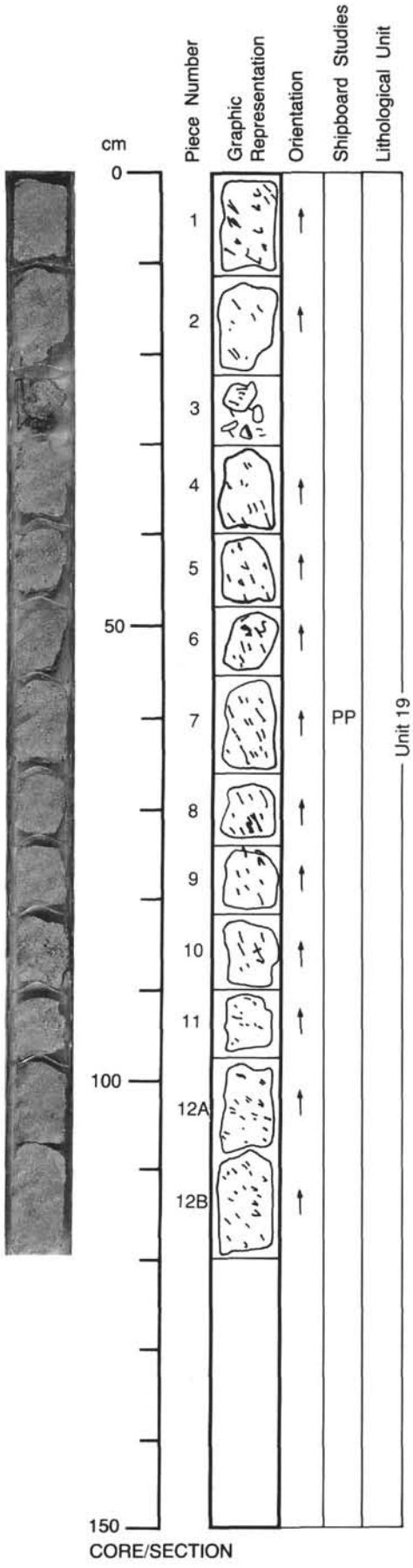


125-786B-54R-3

UNIT 19: BONINITE BRECCIA

Pieces 1-6

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Linopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; whitish lining and filling.
COLOR: Dark gray green (5G 3/4) matrix; clasts are dark gray to black (10YR 4/1 to 7.5YR 2/0).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 4.5 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component), but contains sand-sized fragments; the relative proportion of matrix to clasts decreases down section.

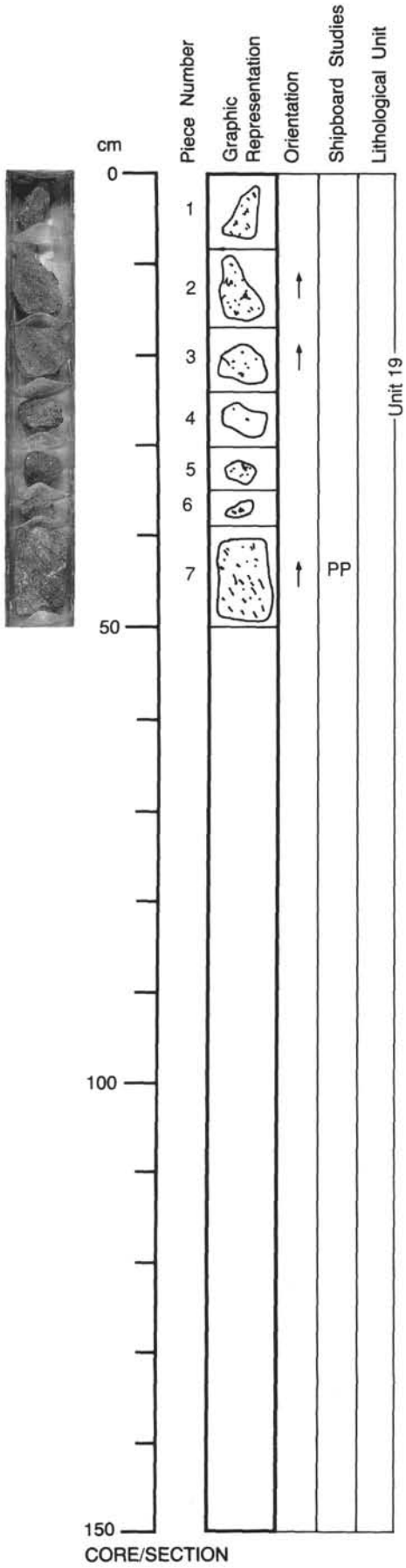


125-786B-54R-4

UNIT 19: BONINITE BRECCIA

Pieces 1-12

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; ,2 mm; subhedral.
Clinopyroxene - 3-5%; ,2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that show pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; whitish lining and filling.
COLOR: Dark gray green (5G 3/4) matrix; clasts are mainly dark gray to black 10YR 4/1 to 7.5YR 2/0.
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 4.5 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrial component) , but contains sand-sized fragments.

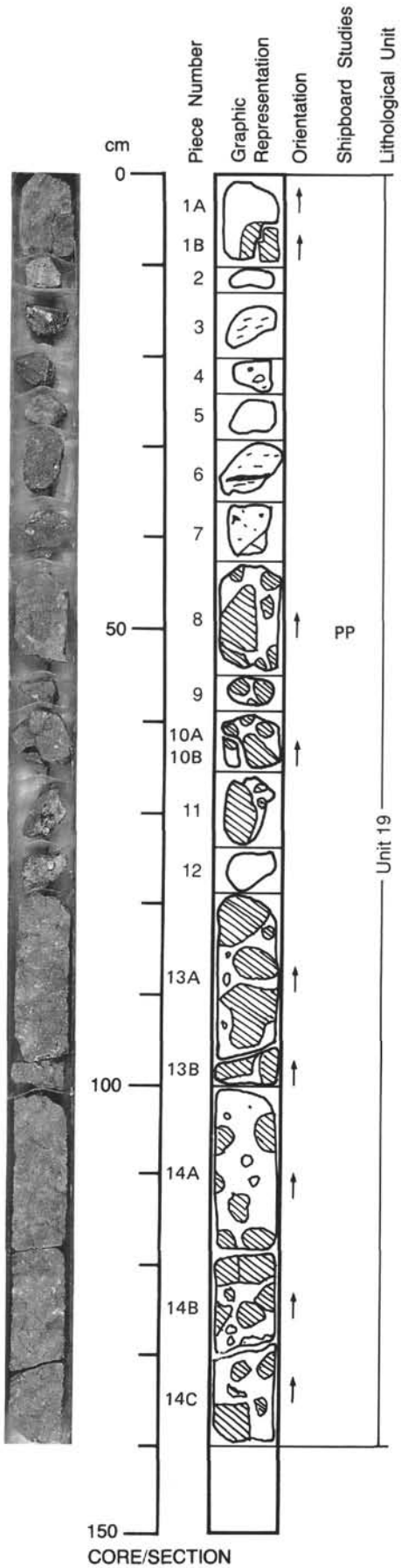


125-786B-54R-5

UNIT 19: BONINITE BRECCIA

Pieces 1-7

CONTACTS: None visible.
PHENOCRYSTS: For clasts.
Plagioclase - 3-5%; <2 mm; euhedral.
Orthopyroxene - 5-10%; <2 mm; subhedral.
Clinopyroxene - 3-5%; <2 mm; subhedral.
GROUNDMASS: Clasts have a very fine-grained to glassy groundmass that shows pervasive alteration.
VESICLES: 1-15%; 1-10 mm; some flattened and aligned; variable distribution within clasts; bluish white lining and filling.
COLOR: Dark gray green (10G 4/2) matrix; clasts are mainly dark gray to black (10YR 4/1 to 7.5YR 2/0).
STRUCTURE: N/A.
ALTERATION: Breccia matrix altered to green and white alteration products; clasts show pervasive low-grade alteration and some have alteration rims.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Smaller clasts are less vesicular, finer-grained and more highly altered; clasts range in size from 2 mm to 4.5 cm in largest dimension; larger clasts are subangular-rounded; matrix is vitric (no detrital component) and contains sand-sized fragments.

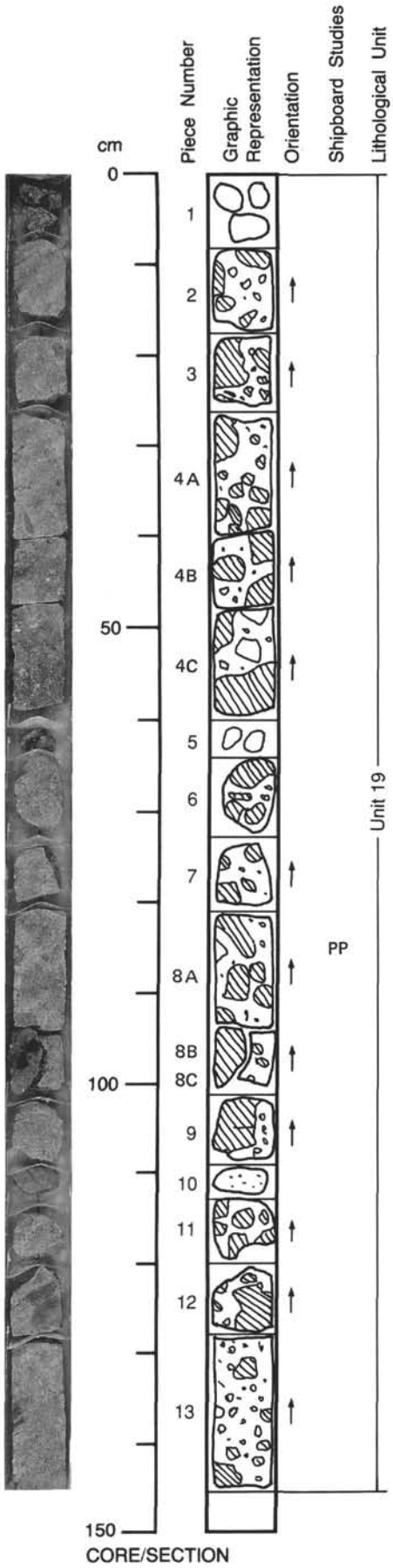


125-786B-55R-1

UNIT 19: TWO-PYROXENE, PLAGIOCLASE BONINITE BRECCIA

Pieces 1A-14C

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 2-5%; <2 mm; euhedral.
Orthopyroxene - 10%; <3 mm; yellow; subhedral.
Clinopyroxene - 5%; <2 mm; dark-green; subhedral.
GROUNDMASS: Glassy to partly altered in clasts; chlorite-rich along cracks.
VESICLES: 5-20%; <3 mm, locally 1 cm diameter; round to elongate; sorted by size; blue coating.
COLOR: Gray (N 5/) where fresh; greenish gray (5G 5/2 - 6/2) and white where altered.
STRUCTURE: Brecciated to intensely fractured.
ALTERATION: Along fractures to green and creamy-white products.
VEINS/FRACTURES: Strongly fractured.
ADDITIONAL COMMENTS: Oligomictic breccia.

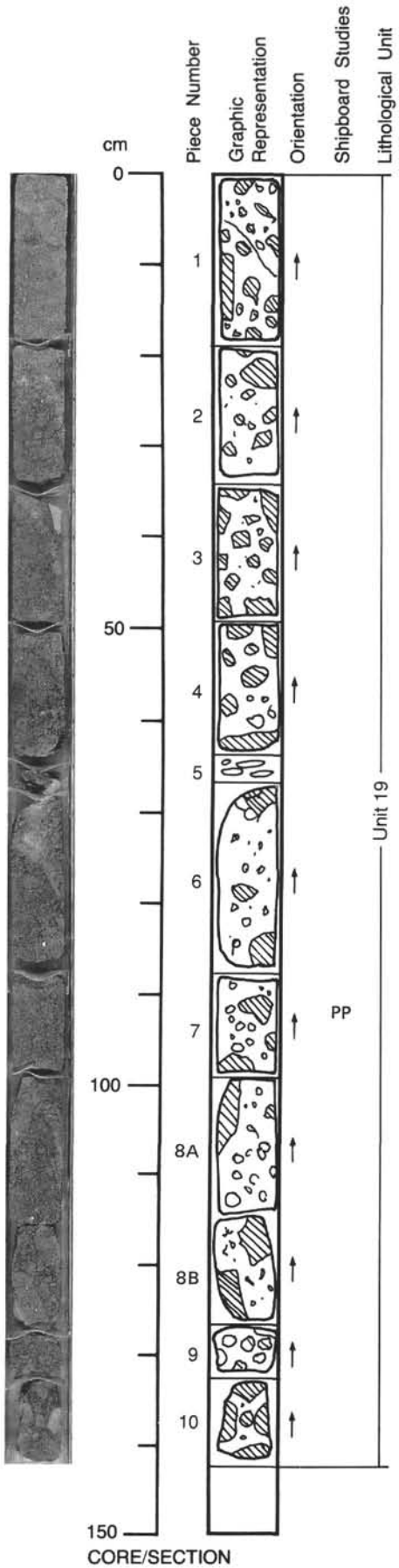


125-786B-55R-2

UNIT 19: TWO-PYROXENE, PLAGIOCLASE BONINITE BRECCIA

Pieces 1-13

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 2-5%; <2 mm; euhedral.
Orthopyroxene - 10%; <3 mm; yellow; subhedral.
Clinopyroxene - 5%; <2 mm; dark green, subhedral.
GROUNDMASS: Glassy to party altered in clasts; chlorite-rich along cracks.
VESICLES: 5-20%; <3 mm, locally 1 cm; round to elongate; sorted by size; blue coating.
COLOR: Gray (N 5/) where fresh, greenish gray (5G 5/2 -6/2) and white where altered.
STRUCTURE: Brecciated to intensely fractured.
ALTERATION: Along fractures to green and creamy-white products.
VEINS/FRACTURES: Strongly fractured.
ADDITIONAL COMMENTS: Oligomictic breccia; the amount of altered matrix is increasing from Section 1; Pieces 8C and 10 are fresh clasts.

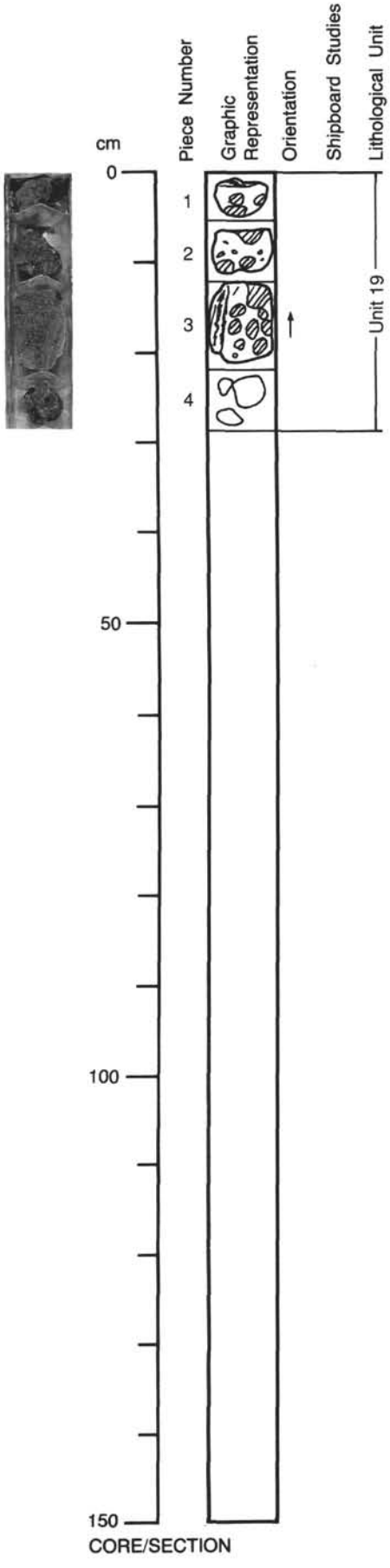


125-786B-55R-3

UNIT 19: TWO-PYROXENE, PLAGIOCLASE BONINITE BRECCIA

Pieces 1-10

CONTACTS: None.
PHENOCRYSTS: Glomerocyrsts of plagioclase and orthopyroxene.
Plagioclase - trace; <2 mm; euhedral.
Orthopyroxene - 15-20%; <3 mm; yellow; subhedral.
Clinopyroxene - 5%; <2 mm; dark green; subhedral.
GROUNDMASS: Glassy to partly altered in clasts; chlorite-rich along cracks.
VESICLES: 5-20%; <3 mm, locally 1 cm; rounded to elongate; sorted by size; blue coating.
COLOR: Gray (N 5/) where fresh; greenish gray (5G 5/2 - 6/2) and white where altered.
STRUCTURE: Brecciated to intensely fractured.
ALTERATION: Along fractures to green and creamy-white product.
VEINS/FRACTURES: Strongly fractured.
ADDITIONAL COMMENTS: Oligomictic breccia; native copper is present in the fresh glass in Piece 4 and Piece 8B; glassy groundmass contains some plagioclase.

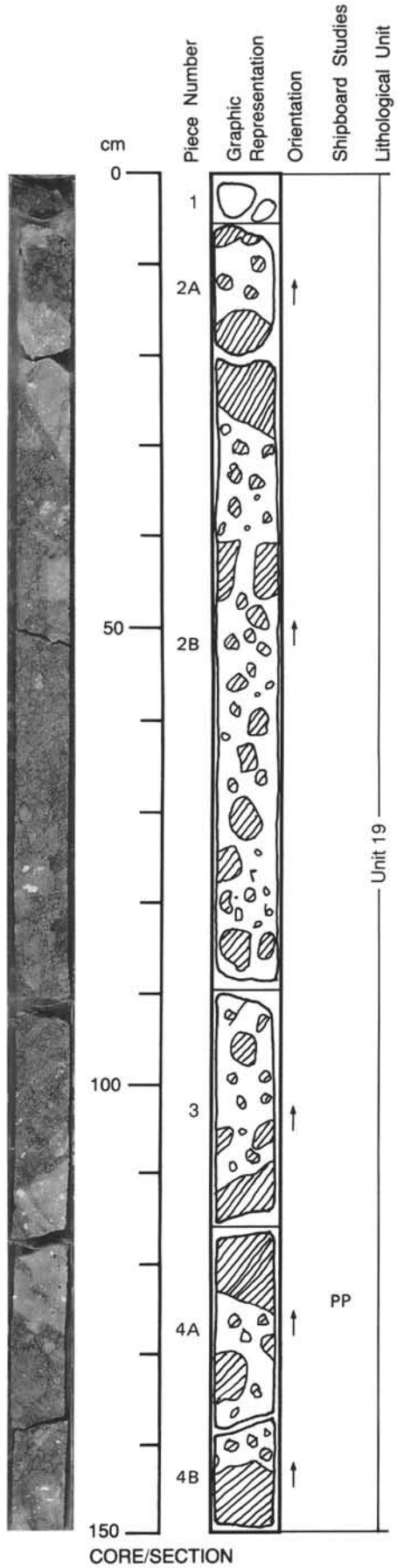


125-786B-55R-4

UNIT 19: TWO-PYROXENE, PLAGIOCLASE BONINITE BRECCIA

Pieces 1-4

CONTACTS: None.
PHENOCRYSTS: Glomerocyrsts of plagioclase and orthopyroxene.
Plagioclase - trace; <2; euhedral.
Orthopyroxene - 15-20%; <3; yellow; subhedral.
Clinopyroxene - 5%; <2; dark green; subhedral.
GROUNDMASS: Glassy to partly altered in clasts; chlorite-rich along cracks.
VESICLES: 5-20%; < 3mm, locally 1 cm; rounded to elongate; sorted by size; blue coating.
COLOR: Gray (N 5/) where fresh; greenish gray (5G 5/2 - 6/2) and white where altered.
STRUCTURE: Brecciated to intensely fractured.
ALTERATION: Along fractures to green and creamy-white product.
VEINS/FRACTURES: Strongly fractured.
ADDITIONAL COMMENTS: Continued from 125-786B-55R-3.

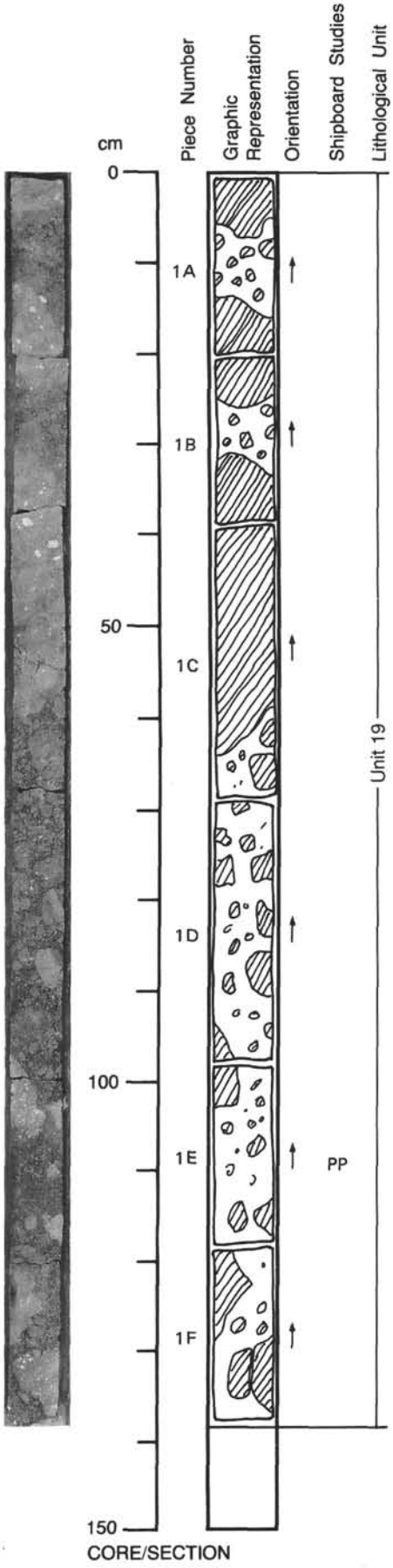


125-786B-56R-1

UNIT 19: BONINITE BRECCIA

Pieces 1-4

CONTACTS: None.
PHENOCRYSTS:
Orthopyroxene - 10-15%; <3 mm; yellow; euhedral.
Cr-spinel - trace; <0.1 mm; black; euhedral.
GROUNDMASS: Devitrified glass; contains plagioclase.
VESICLES: 0-5%; <2 mm, locally 1 cm; round; sorted by size; filled with clay.
COLOR: Dark gray (N 4/) to light greenish gray (5GY 7/1) and grayish green (5G 4/2); the fresh material is dark gray.
STRUCTURE: Breccia, probably pillow fragments, some showing in situ fractures infilled with finer-grained debris.
ALTERATION: Differentially altered.
VEINS/FRACTURES: Trace; <1 mm wide; random; filled with zeolitic material.
ADDITIONAL COMMENTS: A trace of copper is present.

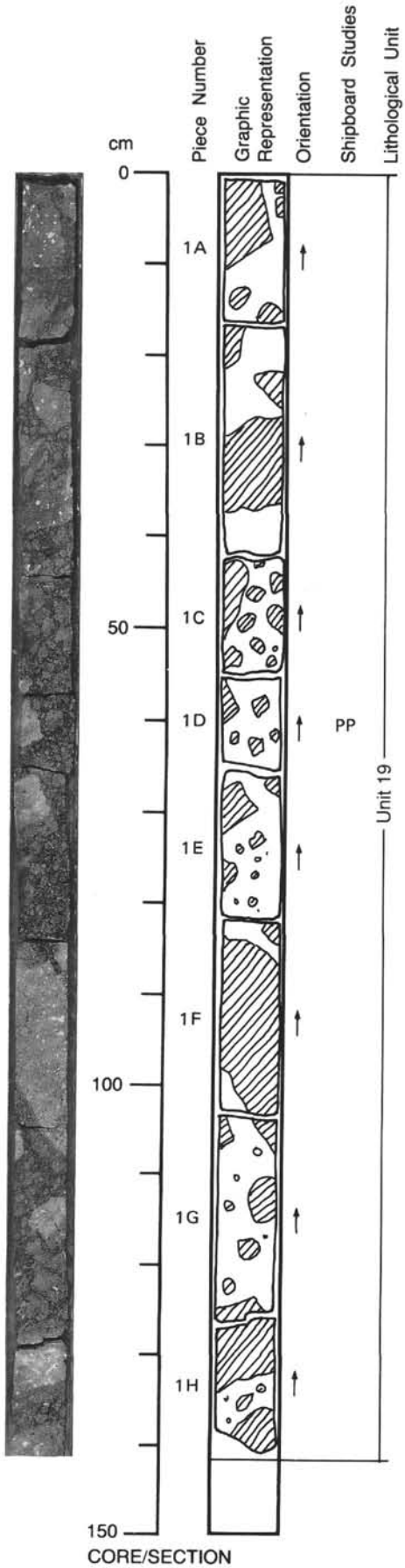


125-786B-56R-2

UNIT 19: BONINITE BRECCIA

Pieces 1A-1F

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 10-15%; < 3 mm; yellow; euhedral.
Cr-spinel - trace; <0.1 mm; black; euhedral.
GROUNDMASS: Devitrified glass, contains plagioclase.
VESICLES: 0-5%; < 2mm, locally 1 cm; round; sorted by size; filled with clay.
COLOR: Dark gray (n 4/) when fresh; light greenish gray (5GY 7/1) and grayish green (5G 4/2) where altered.
STRUCTURE: Breccia; individual fragments up to 30 cm in diameter.
ALTERATION: Differentially altered.
VEINS/FRACTURES: Trace; <1 mm; random; filled with zeolite and chlorite.
ADDITIONAL COMMENTS: Continuation of 125-786B-56R-1.

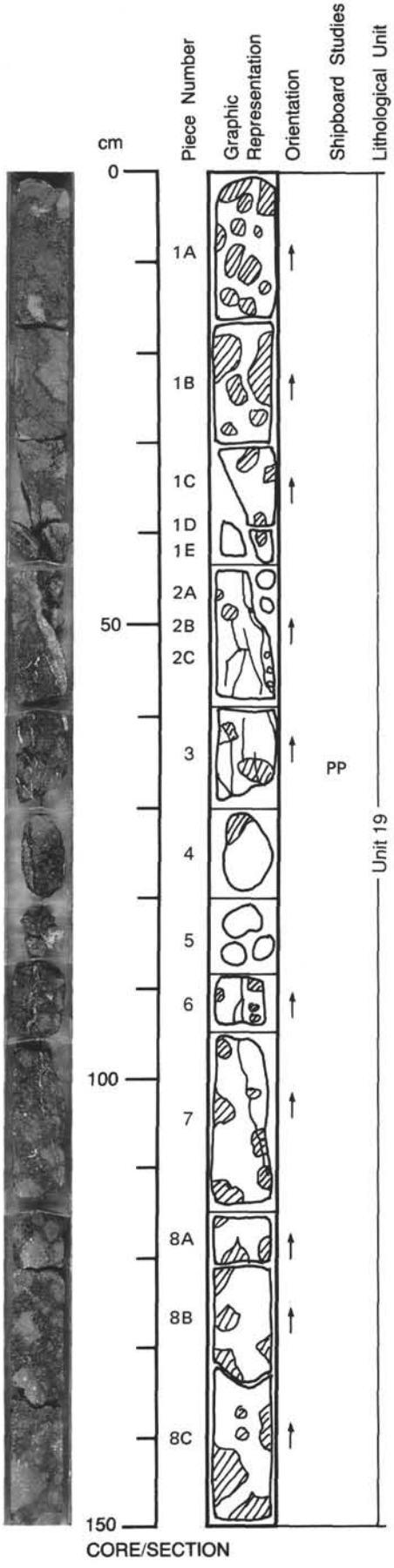


125-786B-56R-3

UNIT 19: BONINITE BRECCIA

Pieces 1A-1H

CONTACTS: None.
PHENOCRYSTS:
Orthopyroxene - 10-15%; <3 mm; yellow; euhedral.
Cr-spinel - trace; <0.1 mm; black; euhedral.
GROUNDMASS: Devitrified glass, contains plagioclase.
VESICLES: 0-5%; <2 mm, locally 1 cm; round; sorted by size; filled with clay.
COLOR: Dark gray (N 4/) when fresh; light greenish gray (5GY 7/1) and grayish green (5G 4/2) where altered.
STRUCTURE: Breccia; individual fragments up to 15 cm in size.
ALTERATION: Differentially altered.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Continuation of 125-786B-56R-1.

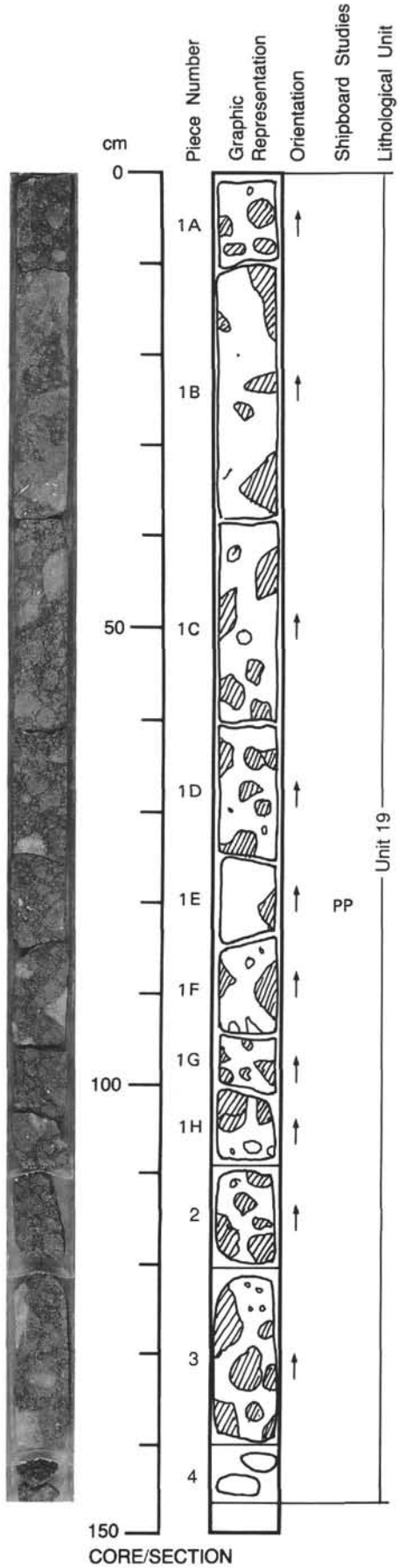


125-786B-56R-4

UNIT 19: BONINITE BRECCIA

Pieces 1-8

CONTACTS: None.
PHENOCRYSTS:
Orthopyroxene - 10-15%; <3 mm; yellow; euhedral.
Cr-spinel - trace; <0.1 mm; black; euhedral.
GROUNDMASS: Devitrified glass, contains plagioclase.
VESICLES: 0-5%; <2 mm, locally 1 cm; rounded; sorted by size; filled with clay.
COLOR: Dark gray (N 4/) where fresh; light greenish gray (5GY 7/1) and grayish green (5G 4/2).
STRUCTURE: Breccia; probably pillow fragments with individual fragments up to 20 cm in size.
ALTERATION: Glass altered to clays.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-56R-1; slickensides indicating horizontal and vertical motion in fracture zone from Piece 2 to Piece 7.

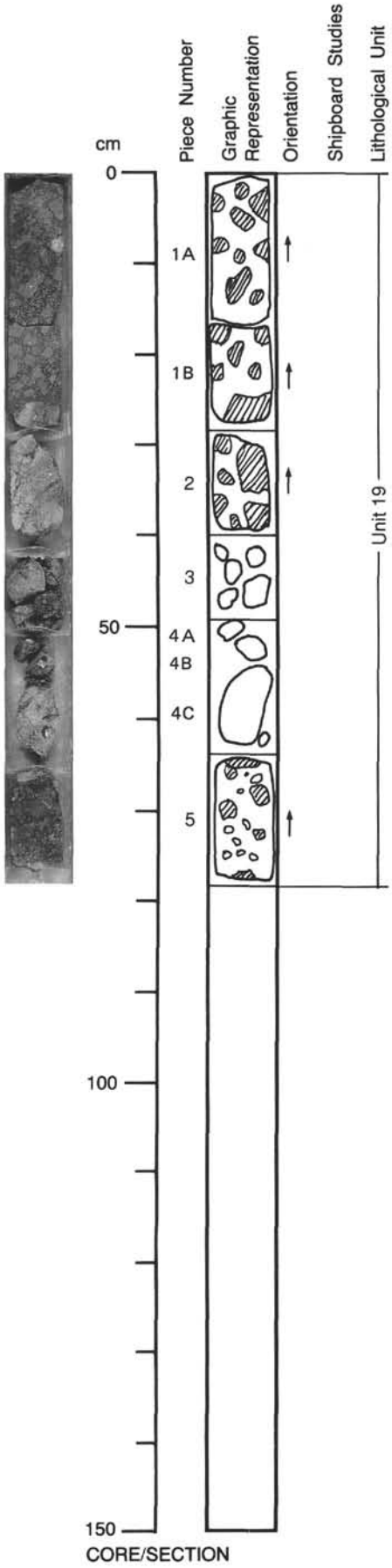


125-786B-56R-5

UNIT 19: BONINITE BRECCIA

Pieces 1-4

CONTACTS: None.
PHENOCRYSTS:
Orthopyroxene - 10-15%; <3 mm; yellow; euhedral.
Cr-spinel - trace; <0.1 mm; black; euhedral.
GROUNDMASS: Devitrified glass, contains plagioclase.
VESICLES: 0-5%; <2 mm, locally 1 cm; rounded; sorted by size; filled with clay.
COLOR: Same as previous section.
STRUCTURE: Breccia; individual fragments up to 15 cm in size.
ALTERATION: Glass altered to clay.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-56R-1.

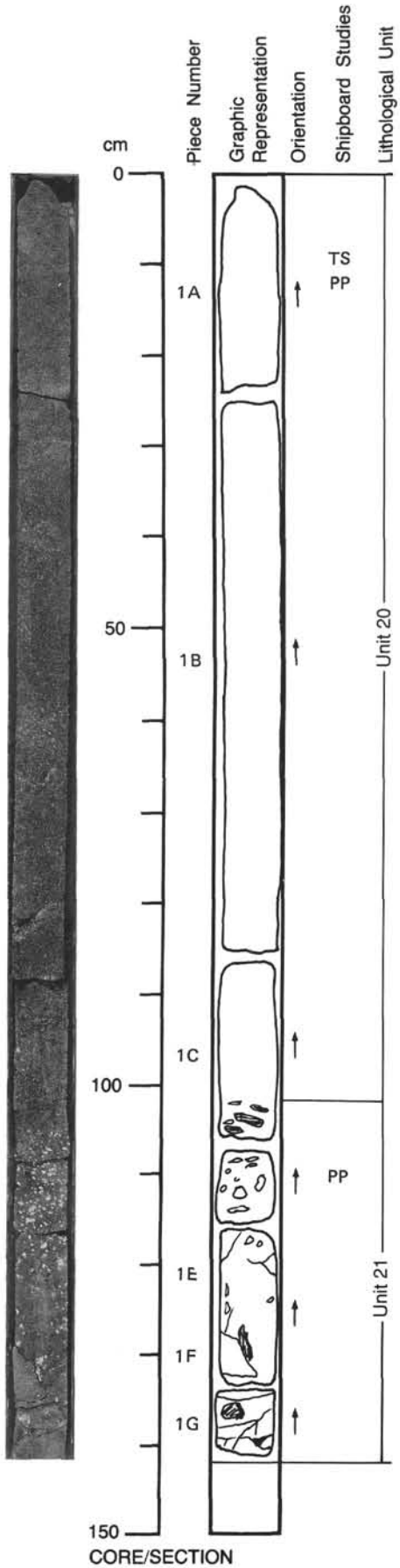


125-786B-56R-6

UNIT 19: BONINITE BRECCIA

Pieces 1-5

COMMENTS: Continuation of 125-786B-56R-1.



125-786B-57R-1

UNIT 20: BONINITIC HYALOCLASTITE SAND

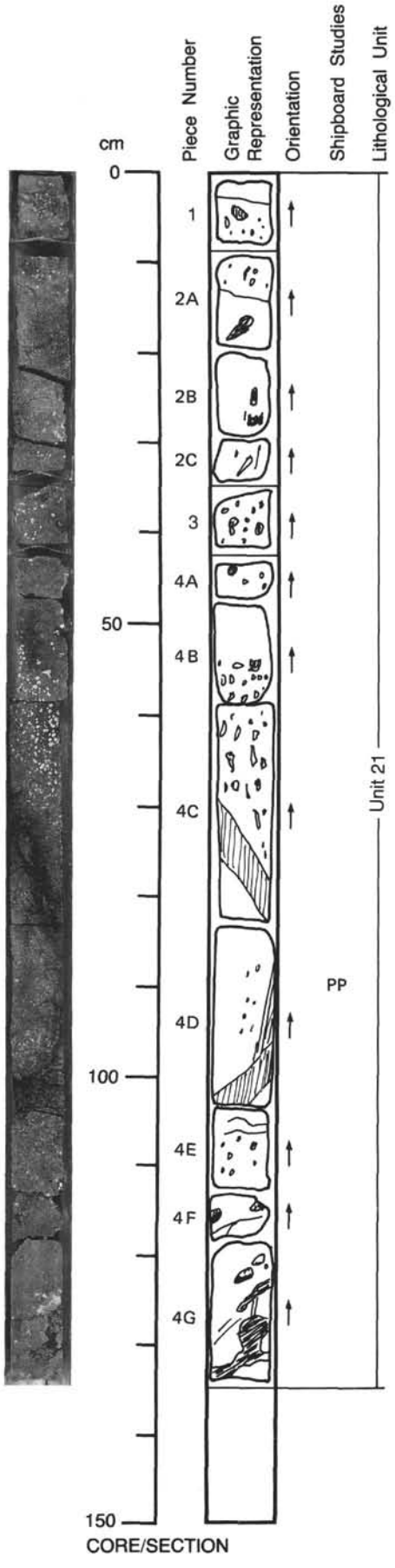
Pieces 1A-1C

CONTACTS: None.
ADDITIONAL COMMENTS: The unit is a fining-upward sandstone containing mm-to cm-sized lithic and vitric fragments of glassy margins of boninite as well as single crystals of orthopyroxene. The unit exhibits basal graded bedding.

UNIT 21: BONINITE

Pieces 1C - 1G

CONTACTS: Between overlying boninite hyaloclastite sand and this flow.
PHENOCRYSTS: Orthopyroxene occurs as isolated crystals and glomerocrystic patches, rarely with clinopyroxene.
Orthopyroxene - 3-10%; <1.5 mm; euhedral, tabular, with spinel inclusions.
Clinopyroxene - trace; <0.3 mm; deep green; euhedral equant.
GROUNDMASS: Fine-grained to glassy with microlites of feldspar.
VESICLES: 0-15%; <8 mm long; elongate-ovoid to irregular; concentrated towards fragment boundaries; filled with fibrous white zeolites.
COLOR: Dark greenish gray (5BG 4/1) to dark brown (7.5YR 3/4).
STRUCTURE: Partially fragmented pillow rims; interiors mostly massive.
ALTERATION: Variable; oxidized towards margins of fragments; possible chlorite and Fe-oxide.
VEINS/FRACTURES: 2%; <4 mm wide; random; filled with zeolite and amorphous green phase (zeolite?, altered glass?); also patches or cavities filled in the same manner.
ADDITIONAL COMMENTS: Appears to be pillow fragment at base of hyaloclastitic, boninitic sand.

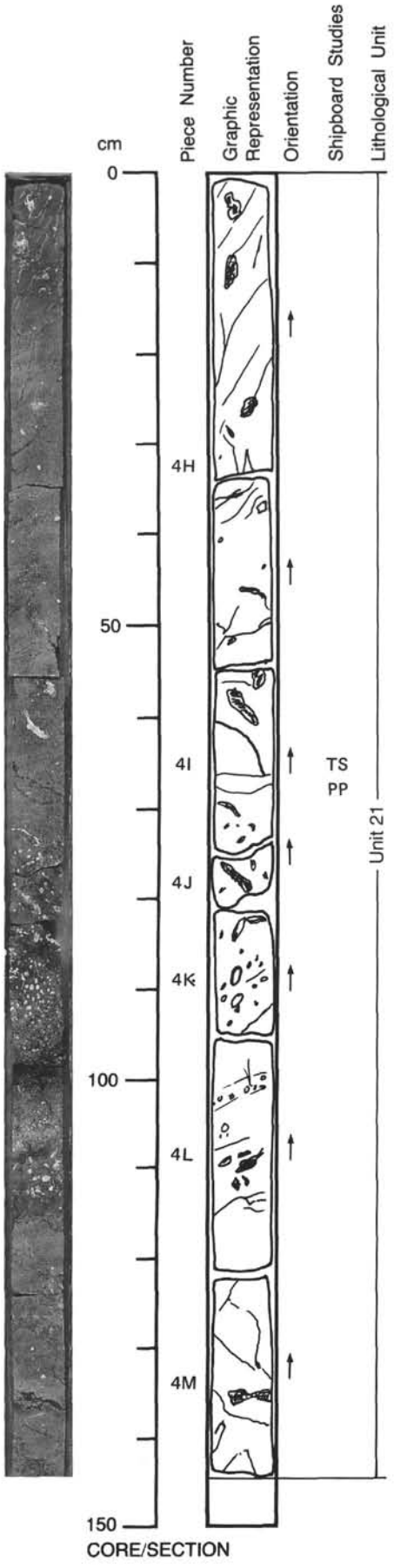


125-786B-57R-2

UNIT 21: BONINITE PILLOWS AND BONINITIC HYALOCLASTITIC SAND (CONTINUED FROM 57R-1)

Pieces 1-4G

CONTACTS: Between hyaloclastite sand and pillows in Pieces 2 and 4.
PHENOCRYSTS: Glomerocrysts of orthopyroxene and sparse clinopyroxene, and isolated orthopyroxene.
Orthopyroxene - 3-10%; <1.5 mm; euhedral, with spinel inclusions.
Clinopyroxene - trace; <0.3 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with microlites of feldspar; variably altered.
VESICLES: 0-15%; <8 mm long; elongate-ovoid to irregular; concentrated at fragment boundaries; often filled with white zeolite and green amorphous altered glass (or zeolite?).
COLOR: Dark greenish gray (5BG 4/1) to dark brown (7.5YR 3/4).
STRUCTURE: Pillow lavas and brecciated hyaloclastite overlying pillow lavas.
ALTERATION: Zeolites and Fe-oxide filled (altered clays) veins and cavities.
VEINS/FRACTURES: 1-2%; 1-4 mm; random; some large (1 cm) diameter elongate cavities are present filled with Fe-oxide and zeolite.
ADDITIONAL COMMENTS: Continuation of 125-786B-57R-1.

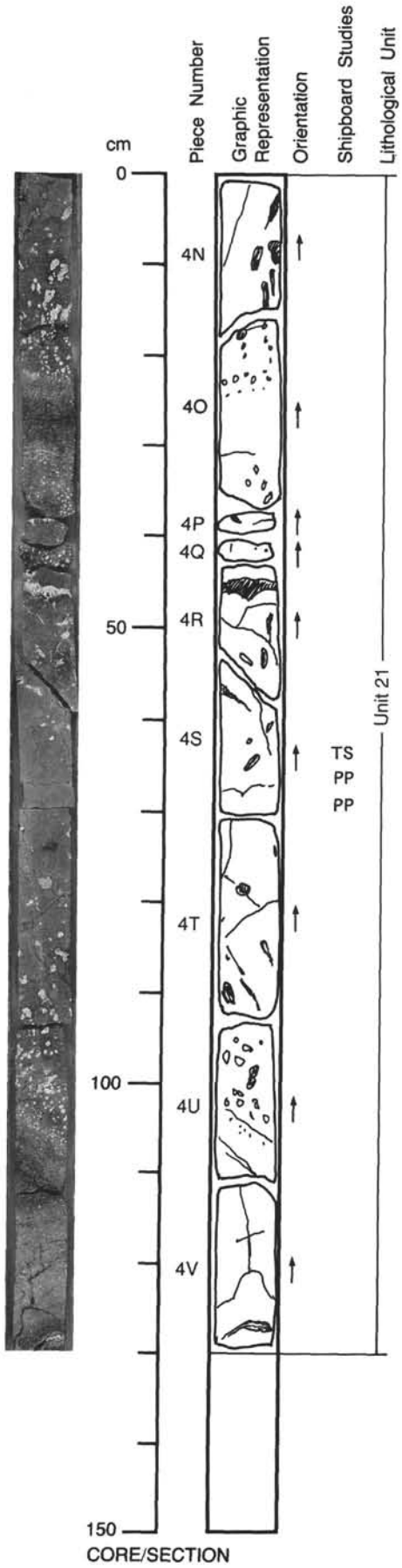


125-786B-57R-3

UNIT 21: BONINITE PILLOWS AND HYALOCLASTITE (CONTINUED FROM 57R-2)

Pieces 4H-4M

CONTACTS: Between hyaloclastite sand and pillows in Pieces 4K and 4J.
PHENOCRYSTS: Orthopyroxene occurs as isolated crystals and glomerocrysts with sparse clinopyroxene.
Orthopyroxene - 3-10%; <1.5 mm; euhedral tabular; with spinel inclusions.
Clinopyroxene - trace; <0.3 mm; euhedral, equant; deep green.
GROUNDMASS: Fine-grained to glassy with microliths of feldspar; variably altered.
VESICLES: 0-15%; 1-6 mm; round to elongate, irregular; concentrated in fracture boundary 4I-4L; filled with white and green zeolite, appear concentrated at pillow boundaries.
COLOR: Dark greenish gray (5BG 4/1) to dark brown (7.5YR 3/4).
STRUCTURE: Massive to pillow-brecciated.
ALTERATION: Zeolite, Fe-oxide alteration of vein filling; chlorite in the groundmass.
VEINS/FRACTURES: 1-2%; 1-3 mm wide; random orientation; veins filled with zeolite and larger fractures (up to 1 cm) also zeolite-filled.
ADDITIONAL COMMENTS: Continuation of 125-786B-57R-2.

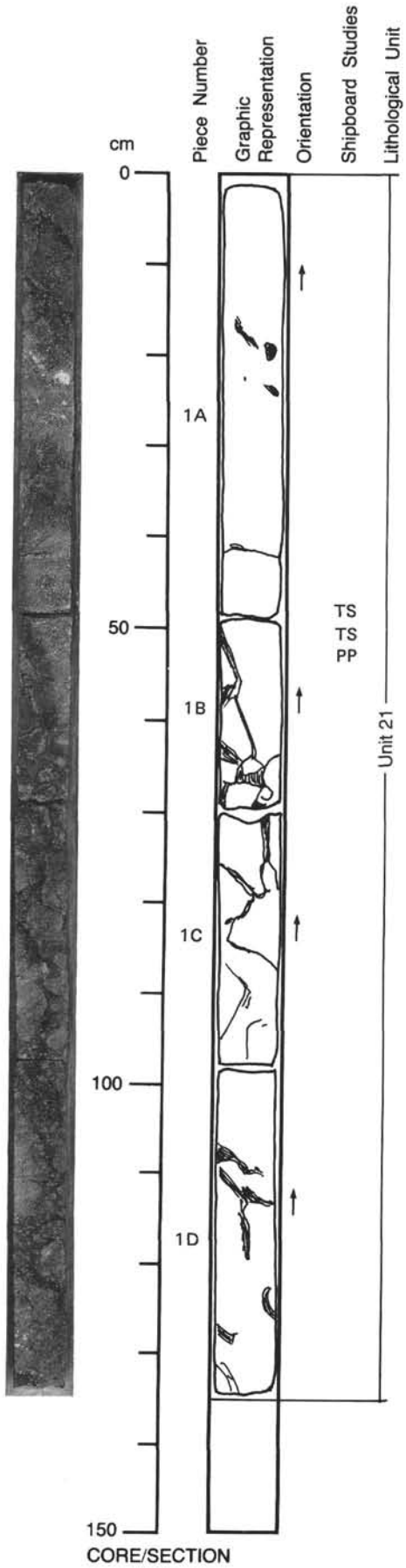


125-786B-57R-4

UNIT 21: BONINITE PILLOWS AND HYALOCLASTITE (CONTINUED FROM 57R-3)

Pieces 4N-4V

CONTACTS: Between boninite pillows and hyaloclastite in Pieces 4O, 4U.
PHENOCRYSTS: Orthopyroxenes occur as glomerocrysts with and without clinopyroxenes, and as isolated crystals.
Orthopyroxene - 6-10%; <1.5 mm; euhedral, tabular, with occasional spinel inclusions.
Clinopyroxene - trace; <0.3 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with microlites of feldspar; variably altered.
VESICLES: 0-20%; 0-7 mm long; elongate to round; concentrated at fragment boundaries; filled with white and light-green zeolite.
COLOR: Dark greenish gray (5BG 4/1) to dark brown (7.5YR 3/4).
STRUCTURE: Massive to pillow lava and brecciated pillows.
ALTERATION: Zeolites alteration as vesicle and fracture filling.
VEINS/FRACTURES: 1-2%; 1-3 mm wide; random; filled with white and green zeolite.
ADDITIONAL COMMENTS: Continuation of 125-786B-57R-1.

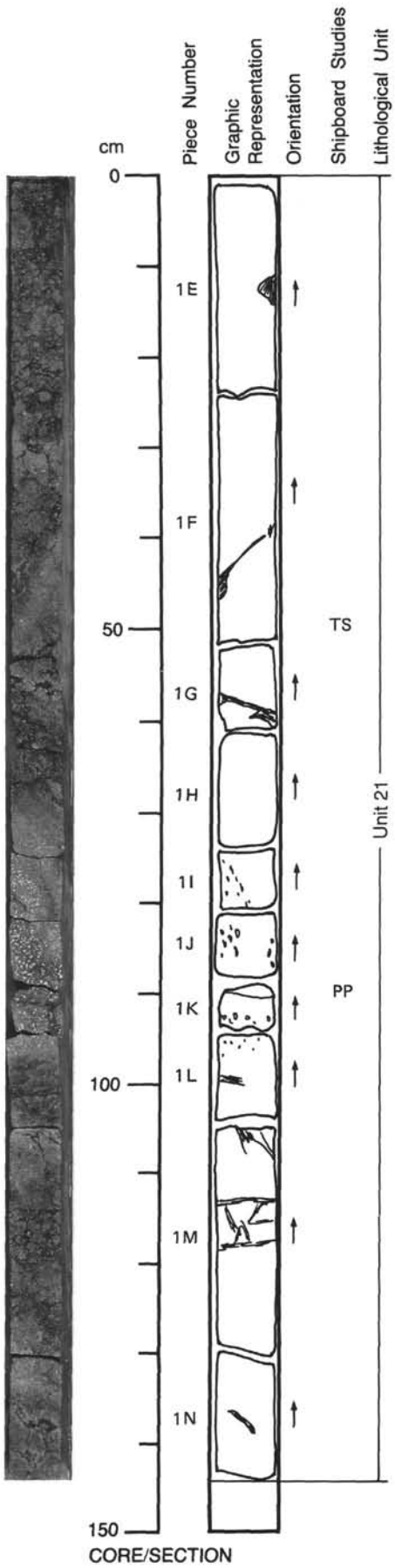


125-786B-57R-5

UNIT 21: BONINITIC PILLOWS AND HYALOCLASTITE (57R-4 CONTINUED)

Pieces 1A-1D

CONTACTS: No distinct contacts visible.
PHENOCRYSTS: Glomerocrysts of orthopyroxene with and without clinopyroxene. Orthpyroxene - 5-10%; <1.5 mm; euhedral, tabular, some with spinel inclusions. Clinopyroxene - trace; <0.3 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with microlites of feldspar; variably altered.
VESICLES: 0-7%; 1-3 mm; round to elongate; concentrated at pillow rims; filled with white zeolite; vesicles concentrated just below glassy pillow rims.
COLOR: Dark greenish gray (5BG 4/1) to dark brown (7.5YR 3/4).
STRUCTURE: Pillow structure with minor brecciation.
ALTERATION: Zeolites and Fe-oxide alteration fill vesicles, veins, fractures; minor chlorite in groundmass.
VEINS/FRACTURES: 1-4%; 1-4 mm wide; random, irregular; locally concentrated at fragment boundaries.
ADDITIONAL COMMENTS: Continuation of 125-786B-57R-4.

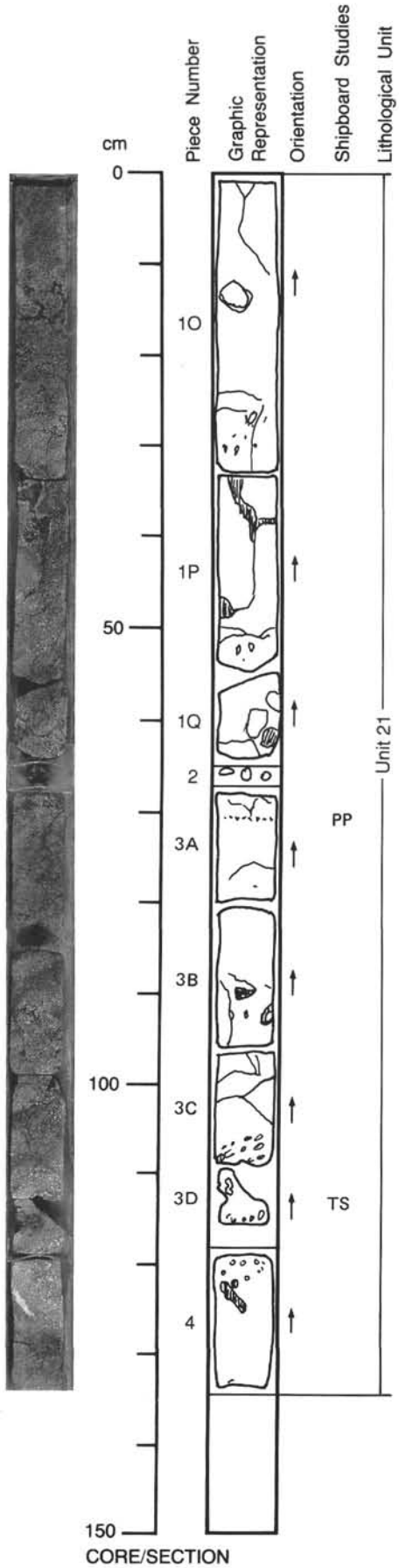


125-786B-57R-6

UNIT 21: BONINITIC PILLOWS AND HYALOCLASTITE (CONTINUED FROM 57R-5)

Pieces 1E-1N

CONTACTS: Between hyaloclastite and pillow in Pieces 1H to 1I.
PHENOCRYSTS: Glomerocrysts of orthopyroxene with and without clinopyroxene.
Orthopyroxene - 5-10%; <1.5 mm; euhedral, tabular.
Clinopyroxene - trace; <0.5 mm; euhedral.
GROUNDMASS: Very fine-grained to glassy with microlites of feldspar; variably altered.
VESICLES: 0-25%; <6 mm; ovoid-irregular; concentrated in pillow fragment; filled with fibrous white zeolite.
COLOR: Matrix hyaloclastite is dark gray green (5G 3/2); clasts are dark bluish gray (5B 4/1); interior of pillow fragment is reddish brown (5YR 4/4).
STRUCTURE: Hyaloclastite breccia.
ALTERATION: Extensive green alteration, possibly zeolitic and smectitic.
VEINS/FRACTURES: 2-3%; <8 mm; random; filled with altered glass; some filling by ferromanganese red fine-grained porcellanous sediment (yellowish red 5YR 4/6).
ADDITIONAL COMMENTS: Continuation of 125-786B-57R-5.

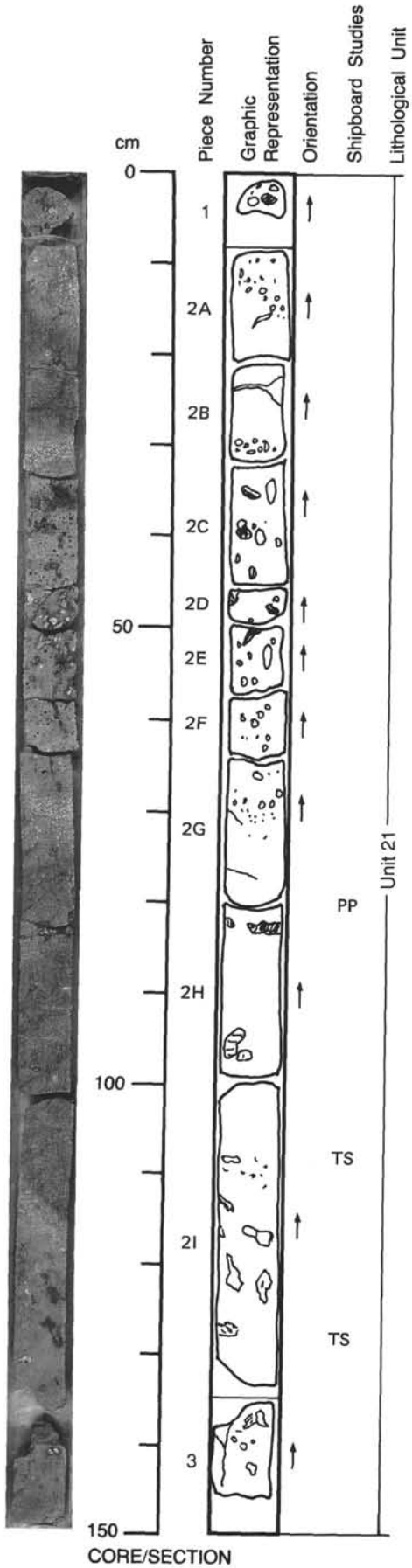


125-786B-57R-7

UNIT 21: BONINITIC PILLOWS AND HYALOCLASTITE (CONTINUED FROM 57R-6)

Pieces 10-4

CONTACTS: Between hyaloclastite and pillow in Pieces 3 and 4.
PHENOCRYSTS: Glomerocrysts of orthopyroxene with and without clinopyroxene.
Orthopyroxene - 5-10%; <1.5 mm; euhedral, tabular.
Clinopyroxene - trace; <0.5 mm; euhedral.
GROUNDMASS: Very fine-grained to glassy with microlites of feldspar; variably altered.
VESICLES: 0-15%; <7 mm; avoid-irregular; concentrated at pillow rims; filled with fibrous white zeolite.
COLOR: Matrix: dark gray green (5G 3/2); clasts: dark bluish gray (5B 4/1); pillow interior: greenish gray (5G 5/1).
STRUCTURE: Hyaloclastite breccia.
ALTERATION: Extensive green alteration, possibly zeolitic and smectitic.
VEINS/FRACTURES: 2%; <2-4 mm; random; filled with altered glass and microfragments.
ADDITIONAL COMMENTS: Interstices between some clasts filled with ferromanganese red fine-grained porcellanous sediment (yellowish red 5YR 4/6); continuation of 125-786B-57R-6.

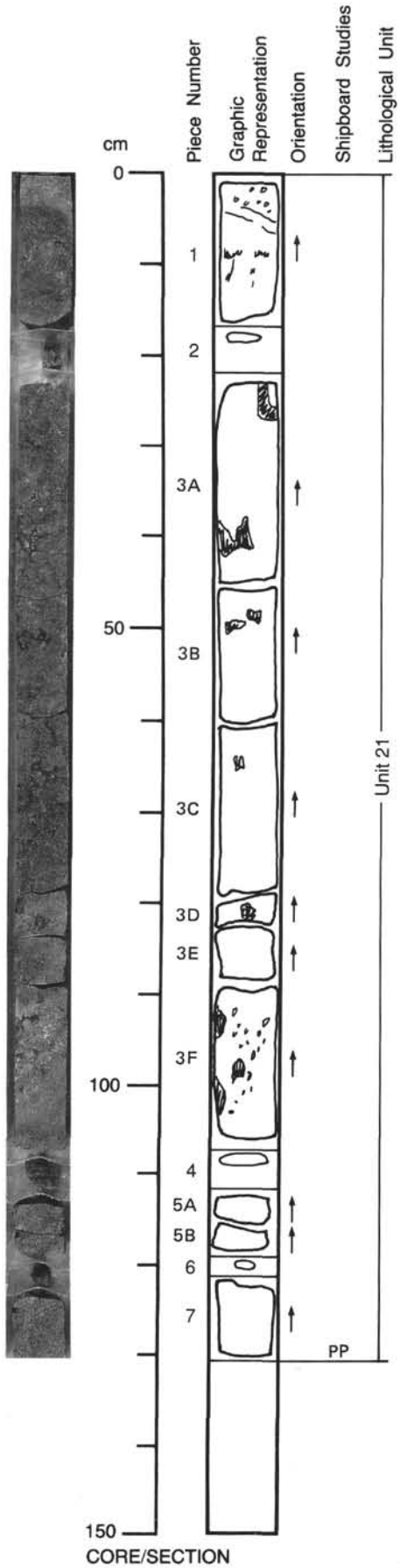


125-786B-58R-1

UNIT 21: BONINITIC PILLOW AND HYALOCLASTITE (CONTINUATION OF 57R-7)

Pieces 1-3

CONTACTS: Between pillows and hyaloclastite in Pieces 2A, B, G, I.
PHENOCRYSTS: Glomerocrysts of orthopyroxene and clinopyroxene.
Orthopyroxene - 3-7%; <1.5 mm; elongate, euhedral; inclusions of spinel.
Clinopyroxene - trace; <0.3 mm; equant to elongate.
GROUNDMASS: Fine-grained to glassy with microlites of feldspar; variably altered.
VESICLES: 0-25%; 1-7 mm; round to elongate, ragged; locally concentrated; some are filled with white fibrous to fine-grained zeolite; some are unfilled; Piece 1 and 2C-F are very vesicular, up to 25%, 6-7 mm wide.
COLOR: Light gray (5Y 7/1) to dark greenish gray (5G 4/1).
STRUCTURE: Massive to hyaloclastite.
ALTERATION: Zeolites, chlorite in the groundmass; minor hematite staining and veining especially in Piece 2I.
VEINS/FRACTURES: 0-2%; 0.5-3 mm wide; random orientation; filled with dark green amorphous and white crystalline zeolite.
ADDITIONAL COMMENTS: Continuation of 125-786B-57R-1.

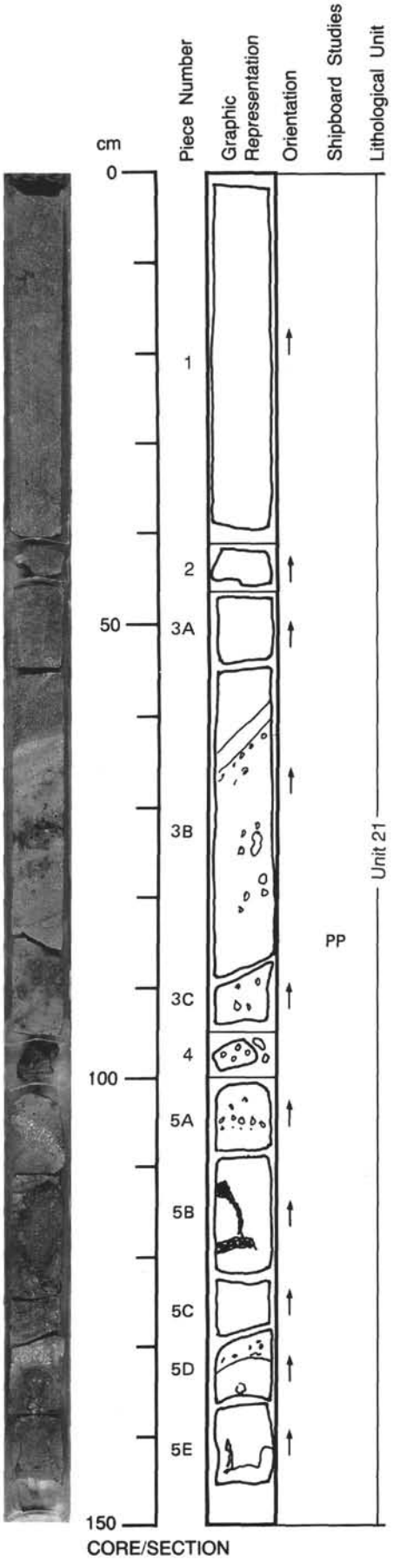


125-786B-58R-2

UNIT 21: BONINITIC HYALOCLASTITE, MINOR PILLOW LAVAS (CONTINUATION OF 58R-1)

Pieces 1-7

CONTACTS: Piece 1 only contact between pillow rind and hyaloclastite.
PHENOCRYSTS: Glomerocrysts of orthopyroxene with and without clinopyroxene.
Orthopyroxene - 3-5%; 0.5-1.5 mm; elongate, euhedral to subhedral.
Clinopyroxene - 1%; 0.5 mm; equant, euhedral.
GROUNDMASS: Hyaloclastite; fine- to medium-grained; variably altered.
VESICLES: 0-3%; 1-2 mm; round; Pieces 1 and 3F only; filled with white, fine-grained to fibrous zeolites; vesicles occur only at pillow-hyaloclastite interface.
COLOR: Grayish green (5G 6/2).
STRUCTURE: Hylaoclastite.
ALTERATION: Zeolites in vesicles and fractures, minor chlorite in groundmass.
VEINS/FRACTURES: 1-2%; fractures 2-15 mm; random; filled with amorphous green material and, rarely, white zeolite.
ADDITIONAL COMMENTS: Continuation of 125-786B-58R-1.

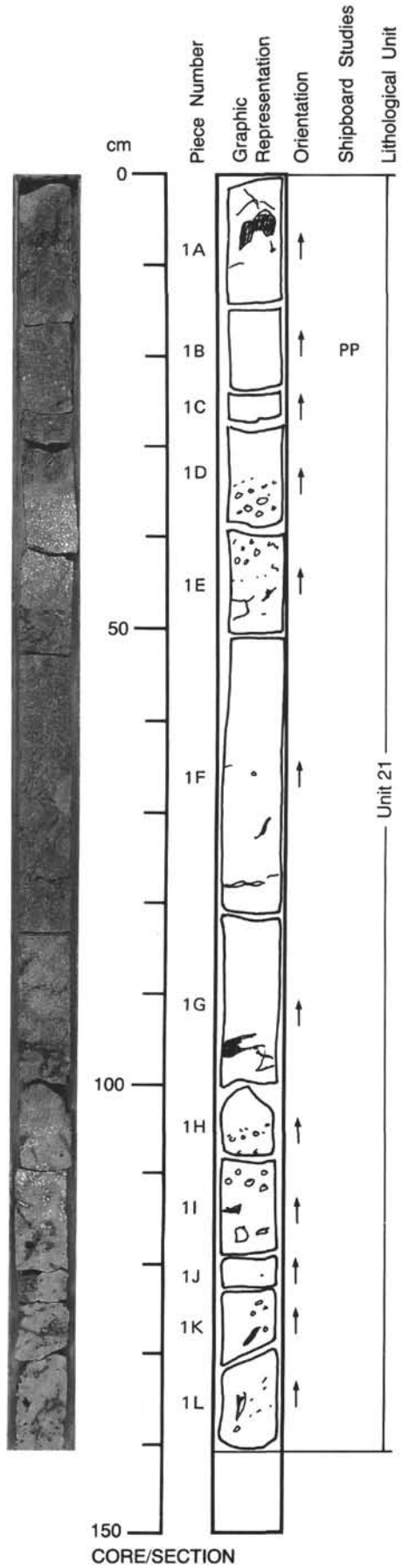


125-786B-58R-3

UNIT 21: BONINITIC PILLOW AND HYALOCLASTITE

Pieces 1-5E

CONTACTS: In Pieces 3 - 5 between pillow and hyaloclastite.
PHENOCRYSTS: Glomerocrysts of orthopyroxene with and without clinopyroxene.
Orthopyroxene - 3-5%; 0.5-1.5 mm; elongate, euhedral.
Clinopyroxene - <1%; <0.5 mm; equant, euhedral.
GROUNDMASS: Fine-grained to glassy with feldspar microlites; variably altered.
VESICLES: 0-15%; <4 mm; ovoid; concentrated at pillow rims; filled with fibrous white zeolite.
COLOR: Matrix: Dark gray green (5BG 4/1); pillow core dark gray (5Y 4/1) to dusky red (10R 3/4).
STRUCTURE: Fragmented pillow and hyaloclastite.
ALTERATION: Pervasive green alteration in matrix, possibly zeolitic and smectitic.
VEINS/FRACTURES: <2%; <3 mm; random; filled with altered glass, zeolite and ferromanganoan, extremely fine-grained sediment (yellowish red 5YR 4/6).
ADDITIONAL COMMENTS: Continuation of 125-786B-58R-2.

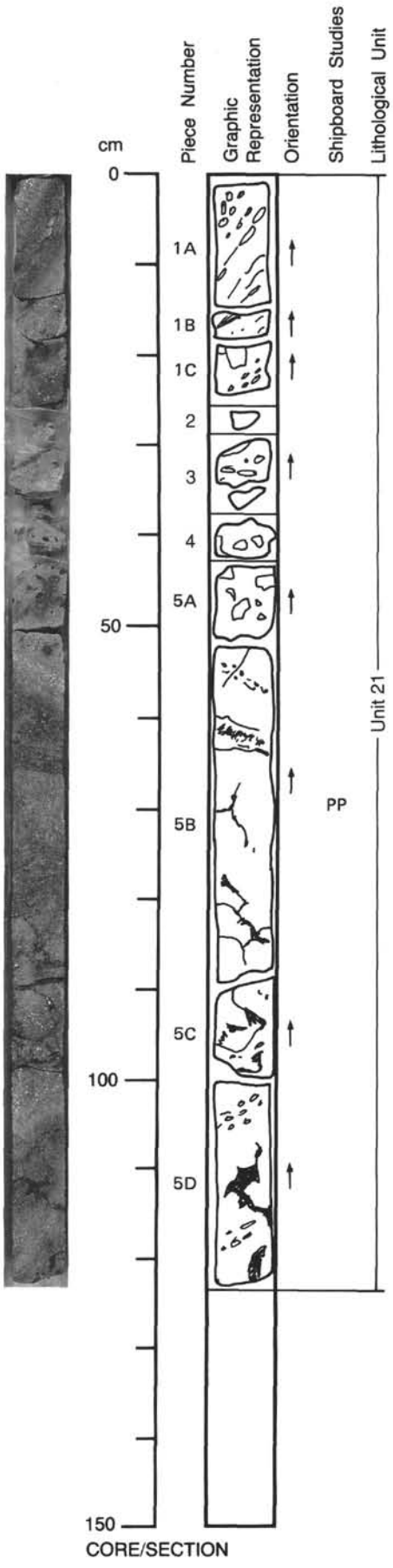


125-786B-58R-4

UNIT 21: BONINITIC PILLOWS AND HYALOCLASTITE

Pieces 1A-1L

CONTACTS: In Pieces 1D-E and 1H between pillows and hyaloclastite.
PHENOCRYSTS: Glomerocrysts of orthopyroxene with and without clinopyroxene.
Orthopyroxene - 3-5%; 0.5-1.5 mm; elongate, euhedral.
Clinopyroxene - trace; <0.5 mm; equant, euhedral.
GROUNDMASS: Fine-grained to glassy with feldspar microlites in pillow; variably altered.
VESICLES: 0-15%; <15 mm; ovoid-very irregular; concentrated near pillow rims; some filled with fibrous white zeolite.
COLOR: Matrix: Dark gray green (5BG 4/1); pillow interior: greenish gray (5GY 6/1).
STRUCTURE: Massive to fragmented pillow in hyaloclastite.
ALTERATION: Pervasive green alteration in matrix, possibly zeolitic and smectitic.
VEINS/FRACTURES: <3%; <10 mm; random; filled with altered glass, zeolite and some with very fine-grained ferromanganoan sediment (yellowish red 5YR 4/6).
ADDITIONAL COMMENTS: Continuation of 125-786B-58R-3.

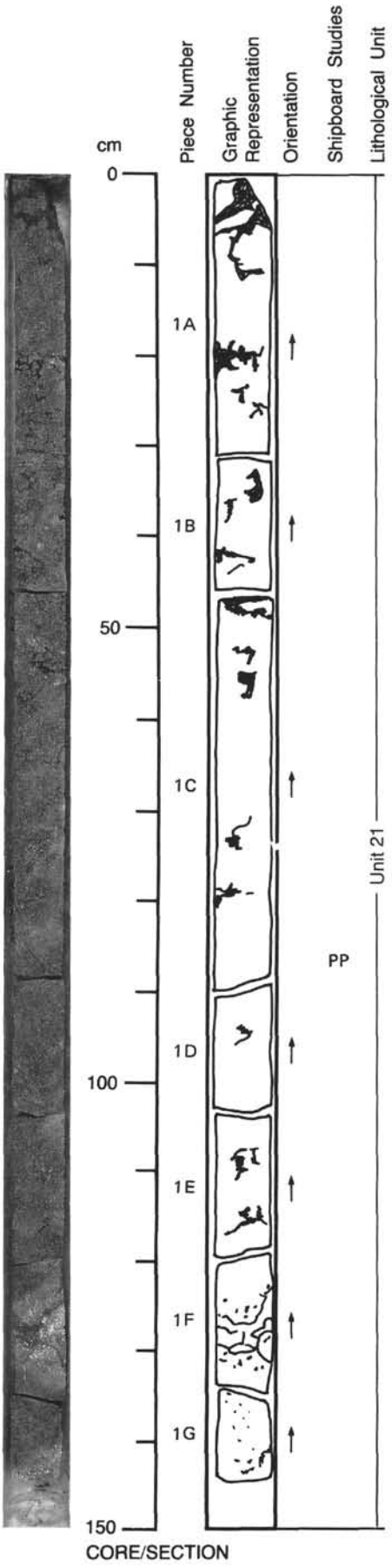


125-786B-59R-1

UNIT 21: BONINITIC PILLOW AND HYALOCLASTITE BRECCIA

Pieces 1-5D

CONTACTS: In 1B and 5B between pillows and hyaloclastite.
PHENOCRYSTS: Glomerocrysts of orthopyroxene as well as isolated phases
Orthopyroxene - 3-7%; 0.3-1.5 mm; elongate, euhedral.
Clinopyroxene - trace; <0.3 mm; equant, euhedral.
GROUNDMASS: Fine-grained to glassy with feldspar microlites in the pillows; variably altered.
VESICLES: 0-25%; <4 mm; ovoid; concentrated near pillow rims; filled with fibrous white zeolite.
COLOR: Matrix is dark gray (5GY 4/1) to dark greenish gray (5BG 4/1); pillow interior is greenish gray(5Y 6/1).
STRUCTURE: Massive to fragmented pillow in hyaloclastite.
ALTERATION: Pervasive green alteration in matrix; zeolitic and trace carbonate in pillow interiors.
VEINS/FRACTURES: Trace; <2 mm; random; filled with altered glass and possibly zeolite; <10 mm irregular pockets with angular boundaries filled with ferromanganoan, very fine-grained sediment (dark reddish brown 2.5YR 3/4).
ADDITIONAL COMMENTS: Continuation of 125-786B-58R-4.

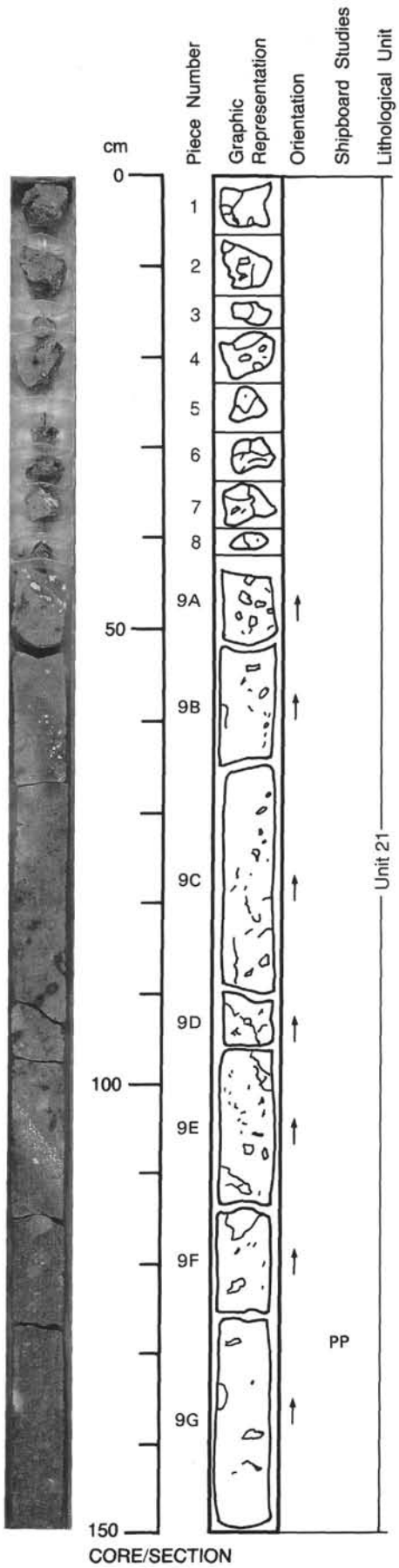


125-786B-59R-2

UNIT 21: BONINITIC HYALOCLASTITE AND PILLOW FRAGMENTS

Pieces 1A-1G

CONTACTS: In Pieces 1F and 1G between exterior of pillow fragment and hyaloclastite.
PHENOCRYSTS: Glomerocrystic orthopyroxene occurs with and without clinopyroxene.
Orthopyroxene - 3-8%; <3 mm; euhedral, elongate.
Clinopyroxene - trace; <0.3 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with feldspar microlites in pillow fragments; variably altered.
VESICLES: 0-20%; <6 mm; ovoid; concentrated near pillow fragment rims; filled with white fibrous zeolite.
COLOR: Matrix is dark gray (5BG 4/1) to dark greenish gray (5G 4/1); pillow fragment interiors are dark grayish brown (10YR 4/2).
STRUCTURE: Hyaloclastite and fragmental.
ALTERATION: Pervasive green alteration in matrix; zeolitic and trace carbonate in pillow fragments.
VEINS/FRACTURES: <1%; <2 mm; random; filled with altered glass and white zeolite; large irregular fractures/pockets filled with ferromanganoan, very fine-grained sediment (dark reddish brown 10YR 4/2).
ADDITIONAL COMMENTS: Continuation of 125-786B-59R-01.

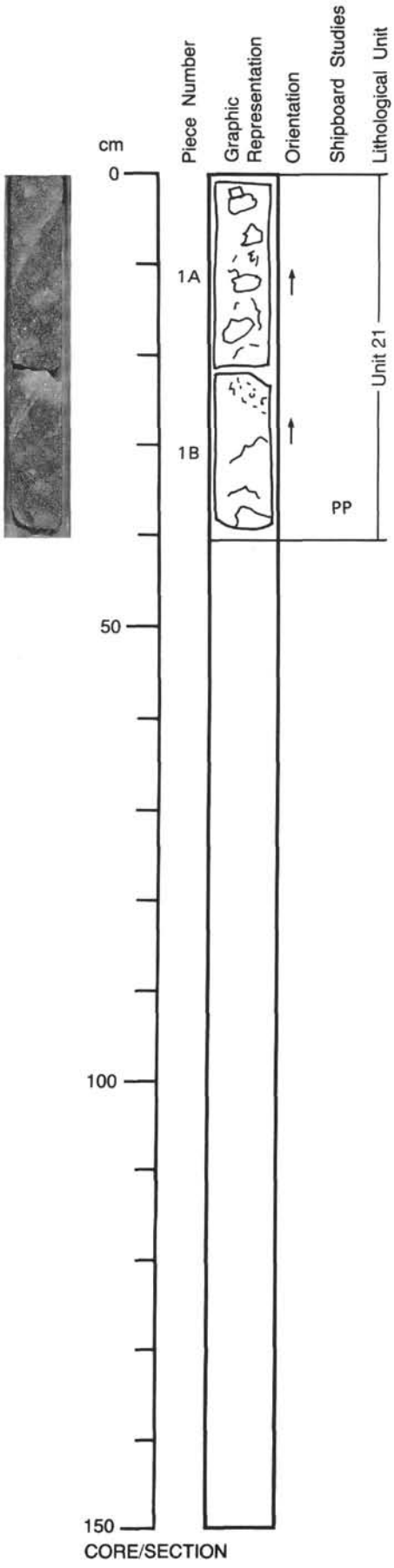


125-786B-59R-3

UNIT 21: BONINITIC PILLOW AND HYALOCLASTITE

Pieces 1-9G

CONTACTS: In Pieces 9A and 9E between pillow and hyaloclastite.
PHENOCRYSTS: Glomerocrystic orthopyroxene occurs with and without clinopyroxene.
Orthopyroxene - 3-10%; <3 mm; euhedral, elongate.
Clinopyroxene - trace; <0.2 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with feldspar microlites in pillow; variably altered.
VESICLES: 0-15%; <15 mm; ovoid; concentrated near pillow rims; filled with white fibrous zeolite.
COLOR: Matrix is dark gray (5B 4/1) to dark greenish gray (5G 4/1); pillow interior and fragments are greenish gray (5GY 6/1).
STRUCTURE: Hyaloclastite and massive pillow.
ALTERATION: Pervasive green alteration of matrix possibly zeolitic and smectitic.
VEINS/FRACTURES: Trace; <1 mm; random; filled with altered glass and zeolite.
ADDITIONAL COMMENTS: Pieces 1 - 8 are isolated pillow fragments; continuation of 125-786B-59R-02.

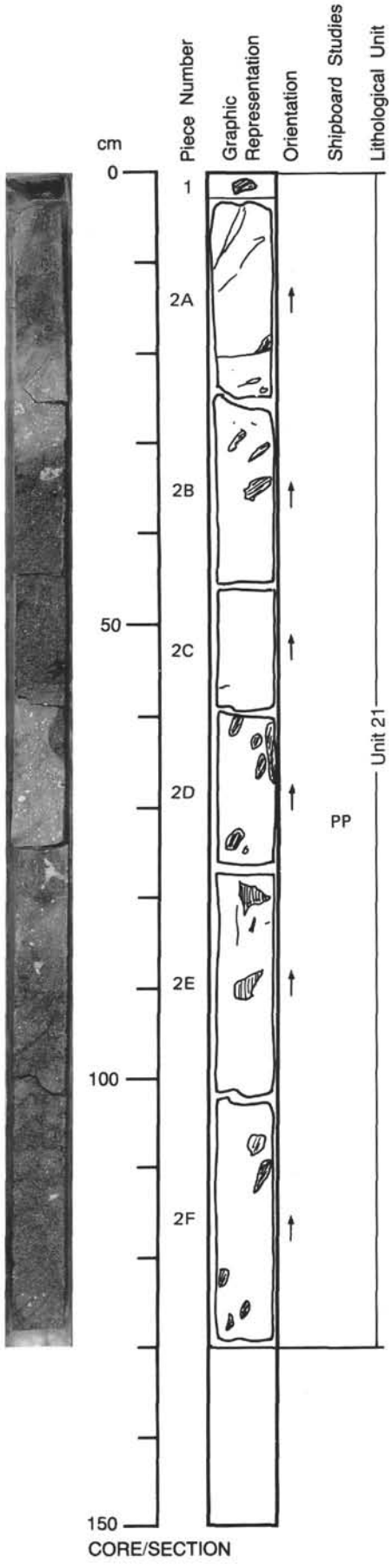


125-786B-59R-4

UNIT 21: BONINITIC HYALOCLASTITE

Pieces 1A-1B

CONTACTS: None visible.
PHENOCRYSTS: None.
GROUNDMASS: Altered glass with orthopyroxene (<3 mm in size) and zeolite.
VESICLES: 0-10%; <2 mm; ovoid; concentrated in pillow fragment; filled with fibrous white zeolite.
COLOR: Dark greenish gray (5G 4/1).
STRUCTURE: Hyaloclastite breccia.
ALTERATION: Pervasive green alteration by zeolite and smectite.
VEINS/FRACTURES: Trace; <1 mm; irregular; filled with altered green glass.
ADDITIONAL COMMENTS: Continuation of 125-786B-59R-3 hyaloclastite matrix.



125-786B-60R-1

UNIT 21: TWO-PYROXENE BASALTIC ANDESITE

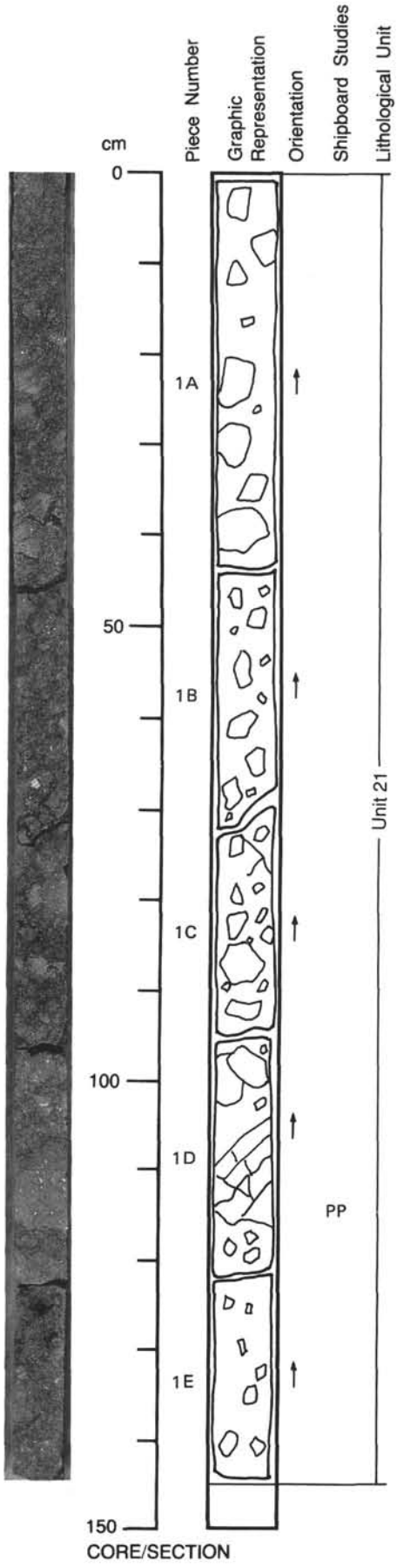
Piece 1

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - <8%; <0.5 mm; euhedral, tabular.
Orthopyroxene - <5%; <0.4 mm; euhedral, equant.
Clinopyroxene - <2%; <0.4 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with plagioclase microlites.
VESICLES: 2%; 0.3-1.5 mm; pipe-shaped; toward edge of piece; empty.
COLOR: Gray (5Y 6/1).
STRUCTURE: Massive.
ALTERATION: Pervasive slight chloritization.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: First appearance of phenocryst plagioclase down-hole since 125-786B-55R-3; may be dike or sill.

UNIT 21: HYALOCLASTITE AND BONINITIC PILLOW AND HYALOCLASTITE

Pieces 2A-2F

CONTACTS: In Pieces 2A, 2B and 2E between pillow and hyaloclastite.
PHENOCRYSTS: Glomerocrystic orthopyroxene occurs with and without clinopyroxene.
Orthopyroxene - 4-8%; <2 mm; euhedral to subhedral, equant.
Clinopyroxene - <1%; <1 mm; euhedral, equant.
GROUNDMASS: Fine-grained to glassy with feldspar microlites in pillow; variably altered.
VESICLES: 5-15%; <1 cm; ovoid; random; filled with white fibrous zeolite and calcite.
COLOR: Matrix is dark gray (5B 4/1) to dark greenish gray (5G 4/1); pillow interior and fragments are greenish gray (5GY 6/1).
STRUCTURE: Hyaloclastite and massive pillow.
ALTERATION: Pervasive green alteration of matrix.
VEINS/FRACTURES: Trace; <1 mm; random; filled with calcite and zeolite.
ADDITIONAL COMMENTS: Continuation of 125-786B-59R-4.

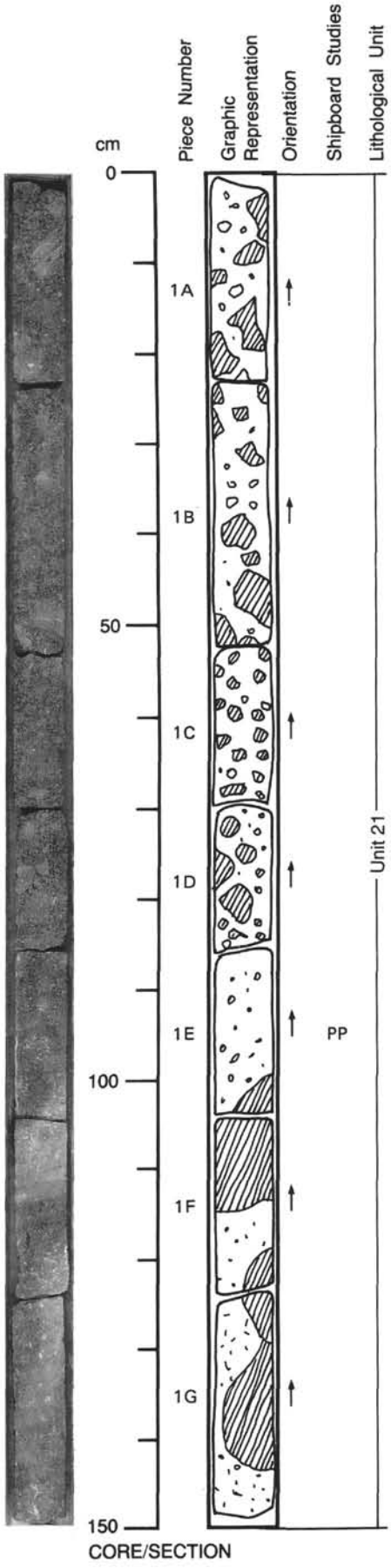


125-786B-60R-2

UNIT 21: ORTHOPYROXENE ANDESITE BRECCIA

Pieces 1A-1E

CONTACTS: None visible.
PHENOCRYSTS: Pyroxenes are fresh in breccia matrix.
Orthopyroxene - 10%; <3 mm; pale-yellow; euhedral; glomerocrystic.
Spinel - trace; <0.05 mm; included in orthopyroxene, black.
GROUNDMASS: Breccia matrix contains chlorite and clays, clasts contain devitrified and altered glass.
VESICLES: 0-5%; < 8 mm; elongate to round; in clasts only; filled with white material, which differs from the swelling clay.
COLOR: Matrix is dark grayish green (5G 4/1); clasts are bluish green-gray (5B 4/1 - 5/1).
STRUCTURE: Hyaloclastite.
ALTERATION: Glass is pervasively altered; phenocrysts are often partially altered to serpentine in clasts.
VEINS/FRACTURES: Trace; <.1 mm; random orientation; clasts are fractured.
ADDITIONAL COMMENTS: Hyaloclastitic pillow breccia of andesitic lava.

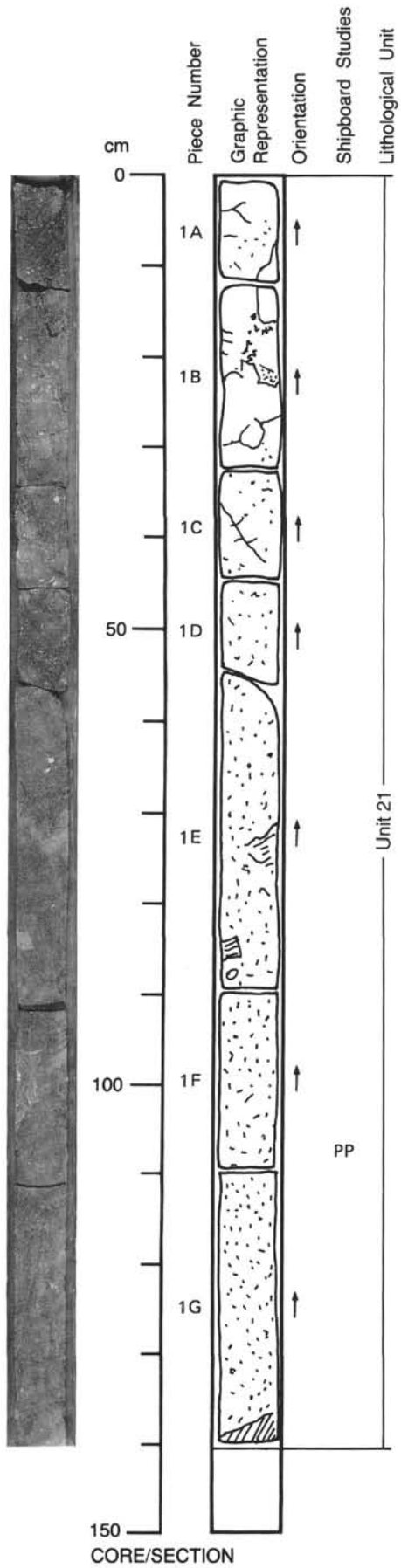


125-786B-60R-3

UNIT 21: ORTHOPYROXENE ANDESITE BRECCIA

Pieces 1A-1G

CONTACTS: None visible.
PHENOCRYSTS: Pyroxenes are fresh in breccia matrix, often altered to serpentine in clasts.
Orthopyroxene - 10%; <3 mm; pale yellow; euhedral; glomerocrystic.
Spinel - trace; <0.05 mm; included in orthopyroxene; black (not Cr- rich).
GROUNDMASS: Breccia matrix contains chlorite and clays; clasts contain devitrified and altered glass.
VESICLES: 0-5%; <8 mm; elongate to rounded; in clasts only; are filled with white material that differs from the swelling clay.
COLOR: Matrix is dark grayish green (5G 4/1); clasts are bluish green-gray (5B 4/1 -5/1).
STRUCTURE: Hyaloclastite.
ALTERATION: Glass is pervasively altered.
VEINS/FRACTURES: Trace; <0.1 mm; randomly oriented; clasts are fractured.
ADDITIONAL COMMENTS: Hyaloclastitic pillow breccia of andesitic lava.

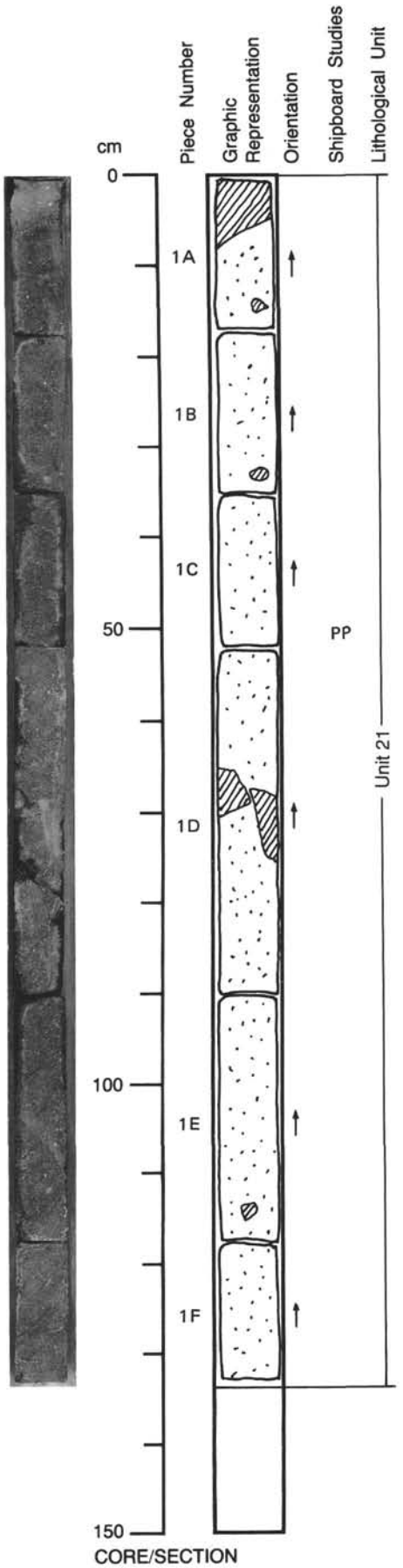


125-786B-60R-4

UNIT 21: ORTHOPYROXENE ANDESITE BRECCIA

Pieces 1A-1G

CONTACTS: None visible.
PHENOCRYSTS: Pyroxenes are fresh in breccia matrix, often partially altered to serpentine in clasts.
Orthopyroxene - 10%; <3 mm; pale yellow; euhedral; glomerocrystic.
Spinel - trace; <0.05 mm; included in orthopyroxene; black (not Cr-rich).
GROUNDMASS: Breccia matrix contains chlorite and clays; clasts contain divitrified and altered glass.
VESICLES: 0-5%; <8 mm; elongate to round; in clasts only; filled with white material that differs from the swelling clay.
COLOR: Matrix is dark grayish green (5G 4/1); clasts are bluish green-gray (5B 4/1 - 5/1).
STRUCTURE: Hyaloclastite.
ALTERATION: Glass is pervasively altered.
VEINS/FRACTURES: Trace; <0.1 mm; randomly oriented; clasts are fractured.
ADDITIONAL COMMENTS: Hyaloclastitic pillow breccia of andesitic lava.

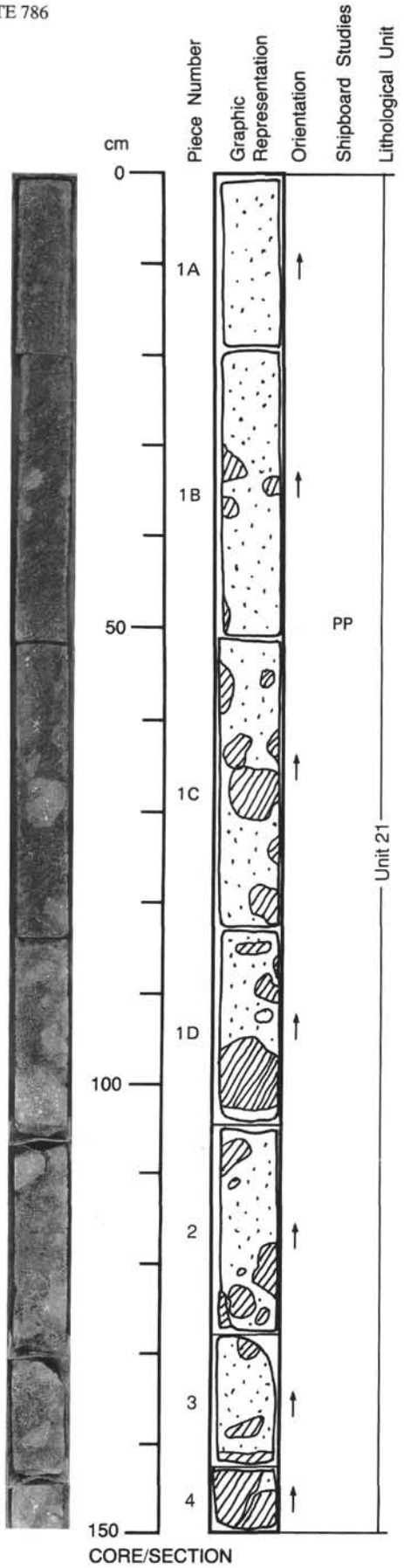


125-786B-60R-5

UNIT 21: ORTHOPYROXENE ANDESITE BRECCIA

Pieces 1A-1F

CONTACTS: None visible.
PHENOCRYSTS: Pyroxenes are fresh in breccia matrix, often partially altered to serpentine in clasts.
Orthopyroxene - 10%; <3 mm; pale yellow; euhedral; glomerocrystic.
Spinel - trace; <0.05 mm; included in orthopyroxene, black (not Cr-rich).
GROUNDMASS: Breccia matrix contains chlorite and clays; clasts contain divitrified and altered glass.
VESICLES: 0-5%; <8 mm; elongate to rounded; in clasts only are filled with white material that is different from the swelling clay.
COLOR: Matrix is dark grayish green (5G 4/1), clasts are bluish green-gray (5B 4/1 -5/1).
STRUCTURE: Hyaloclastite.
ALTERATION: Glass is pervasively altered.
VEINS/FRACTURES: Trace; <0.1 mm; randomly oriented; clasts are fractured.
ADDITIONAL COMMENTS: Hyaloclastitic pillow of andesitic lava; this section is more matrix-rich than previous sections.

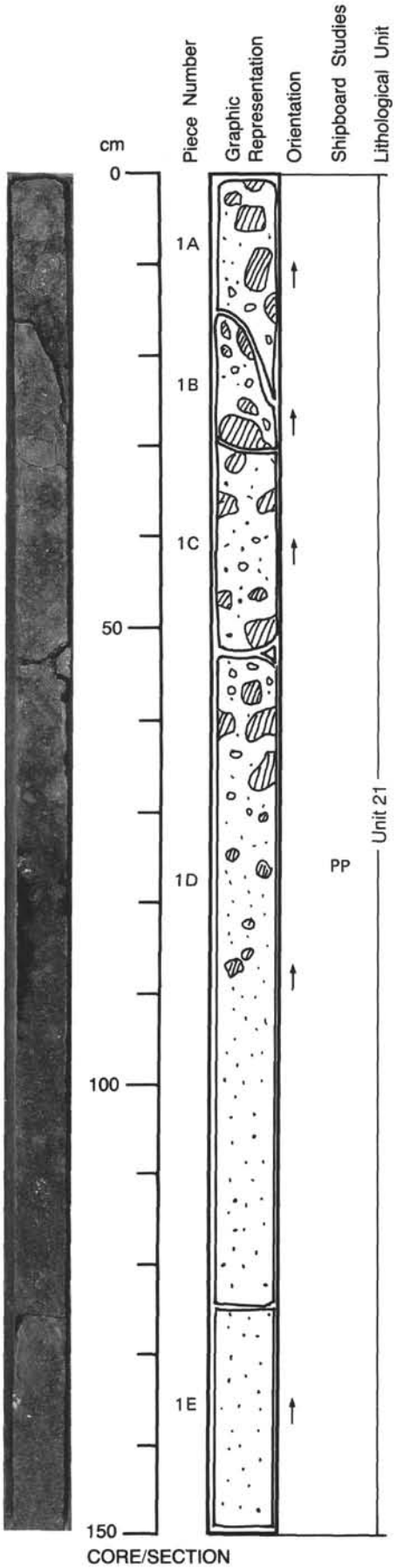


125-786B-60R-6

UNIT 21: ORTHOPYROXENE ANDESITE BRECCIA

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS: Pyroxenes are fresh in breccia matrix, often partially altered to serpentine clasts.
Orthopyroxene - 10%; <3 mm; pale yellow; euhedral; glomerocrystic.
Spinel - trace; <0.05 mm; included in orthopyroxene, black (not Cr rich).
GROUNDMASS: Breccia matrix contains chlorite and clays; clasts contain divitrified and altered glass.
VESICLES: 0-5%; <8 mm; elongate to rounded; in clasts only; filled with white material that is different from the swelling clay.
COLOR: Matrix is dark grayish green (5G 4/1); clasts are bluish green-gray (5B 4/1 - 5/1) and, rarely, red (2.5 YR 5/8).
STRUCTURE: Hyaloclastite.
ALTERATION: Glass is pervasively altered.
VEINS/FRACTURES: Trace; <0.1 mm; randomly oriented; clasts are fractured.
ADDITIONAL COMMENTS: Hyaloclastitic pillow breccia; of andesitic lava; continuation of 125-786B-60R-05.

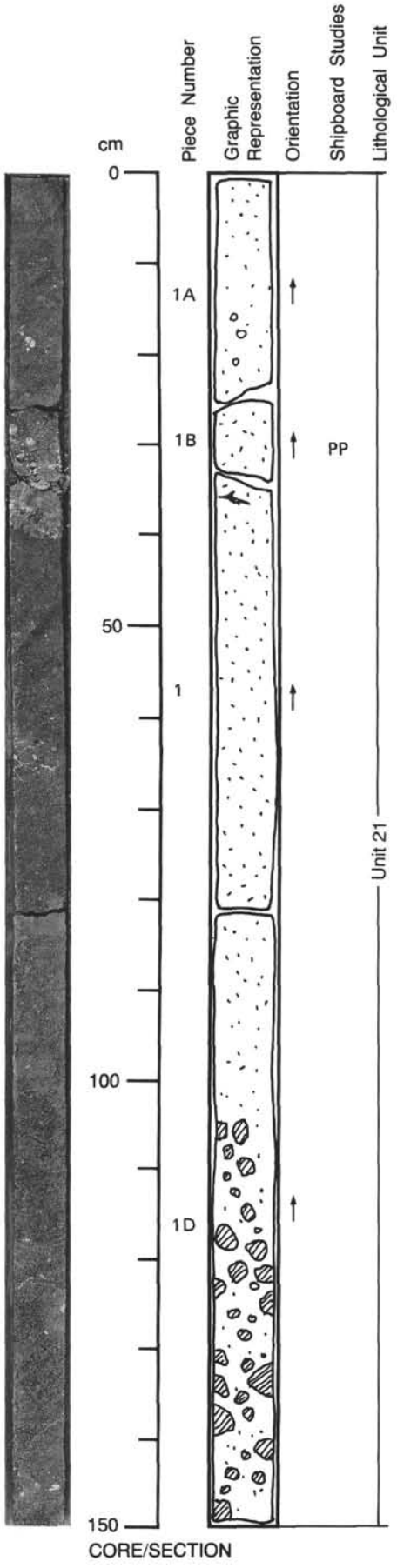


125-786B-61R-1

UNIT 21: ORTHOPYROXENE ANDESITE BRECCIA (60R-6 CONTINUED)

Pieces 1A-1E

CONTACTS: None visible.
PHENOCRYSTS: Pyroxenes are fresh in breccia matrix, often partially altered in serpentine clasts.
Orthopyroxene - 5%; <3 mm; pale yellow; euhedral.
Spinel - trace; <0.05 mm; included in orthopyroxene; black (not Cr-rich).
GROUNDMASS: Breccia matrix contains strongly altered glass with orthopyroxene crystals; clasts contain altered glass.
VESICLES: 0-10%; < 4 mm; round to elongate; uniform size within clasts; filled with white material.
COLOR: Matrix is dark greenish gray (5G 4/1); clasts are gray (N 5/) and weak red to red (10R 5/3 - 5/6).
STRUCTURE: Brecciated.
ALTERATION: Pervasive alteration of glasses to chlorite.
VEINS/FRACTURES: Trace; <0.1 mm; random orientation; fracturing along clast rims.
ADDITIONAL COMMENTS: Continuation of 125-786B-60R-1; more reddish material, clasts are absent below 90 cm.

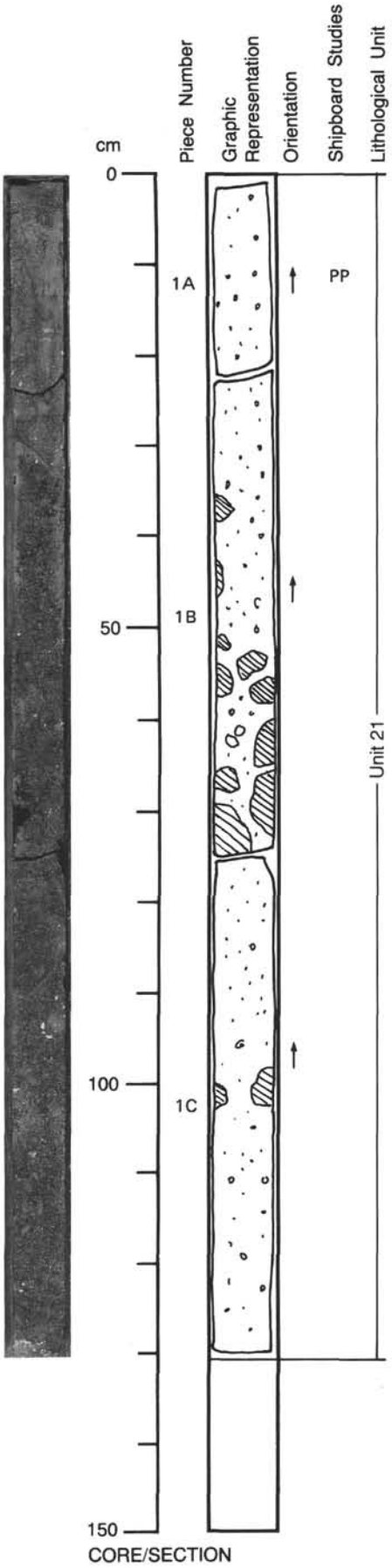


125-786B-61R-2

UNIT 21: ORTHOPYROXENE ANDESITE SAND

Pieces 1A-1D

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 3-5%; <2 mm; euhedral.
GROUNDMASS: N/A.
VESICLES: N/A
COLOR: Dark greenish-gray (5GY 4/1).
STRUCTURE: N/A.
ALTERATION: Local oxidation to dark red material.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Continuation of 61R-1.

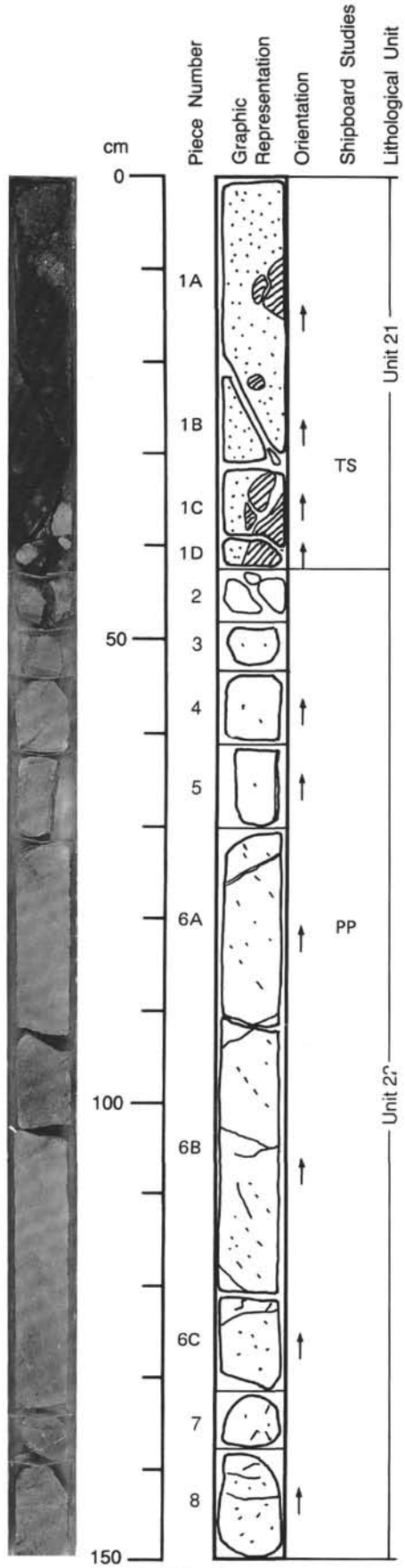


125-786B-61R-3

UNIT 21: ORTHOPYROXENE ANDESITE SANDSTONE

Pieces 1A-1C

CONTACTS: None visible.
PHENOCRYSTS:
Orthopyroxene - 3-5%; <2 mm; euhedral.
GROUNDMASS: N/A.
VESICLES: Trace; <1 mm; round to elongate; in clasts.
COLOR: Dark greenish gray (5GY 4/1)
STRUCTURE: N/A.
ALTERATION: Local oxidation to dark red material; alteration of glass to chlorite.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Continuation of 61R-1.



125-786B-61R-4

UNIT 21: ORTHOPYROXENE ANDESITE SANDSTONE (61R-3 CONTINUED)

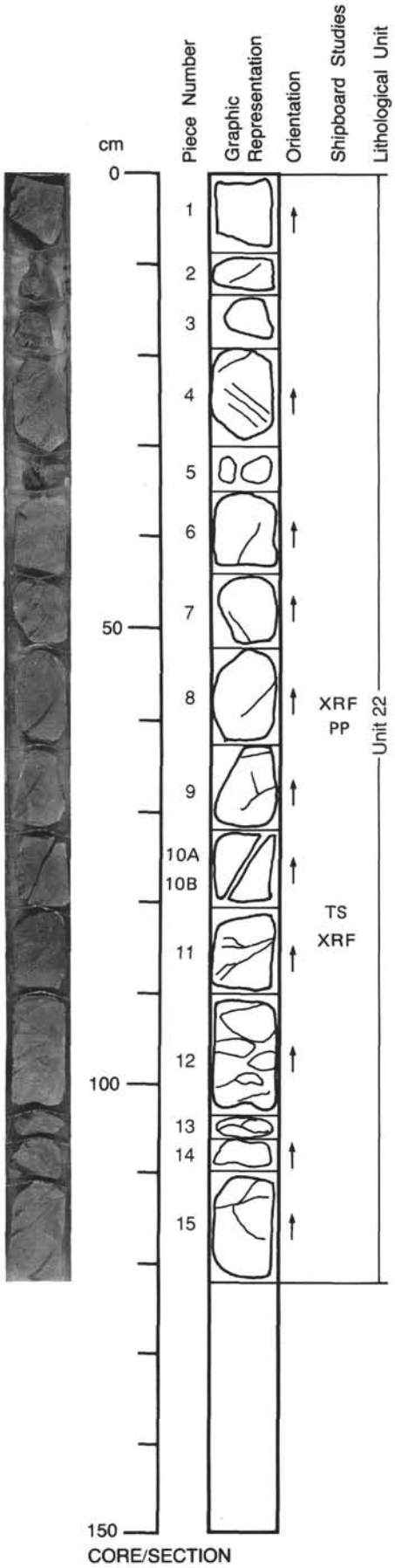
Piece 1

CONTACTS: None present.
PHENOCRYSTS:
Orthopyroxene - 3-5%; <2 mm; euhedral.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: Dark greenish gray (5GY 4/1).
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: Slickensides in bottom of Piece 1 have reddish coloration at the surface.

UNIT 22: RHYOLITE

Pieces 2-8

CONTACTS: None visible.
PHENOCRYSTS: Plagioclase is altered.
Plagioclase - 5%; <3 mm; euhedral laths.
Magnetite - trace; <0.1 mm; euhedral.
GROUNDMASS: Altered to serpentine and clay.
VESICLES: 5%; <2 mm; elongate; randomly distributed.
COLOR: Gray (2.5Y 5/0).
STRUCTURE: N/A.
ALTERATION: Along fractures; ground mass is pervasively altered.
VEINS/FRACTURES: 1%; <2 mm; shallow dipping, but variable orientation; calcite in fractures; reddish oxide rims present.

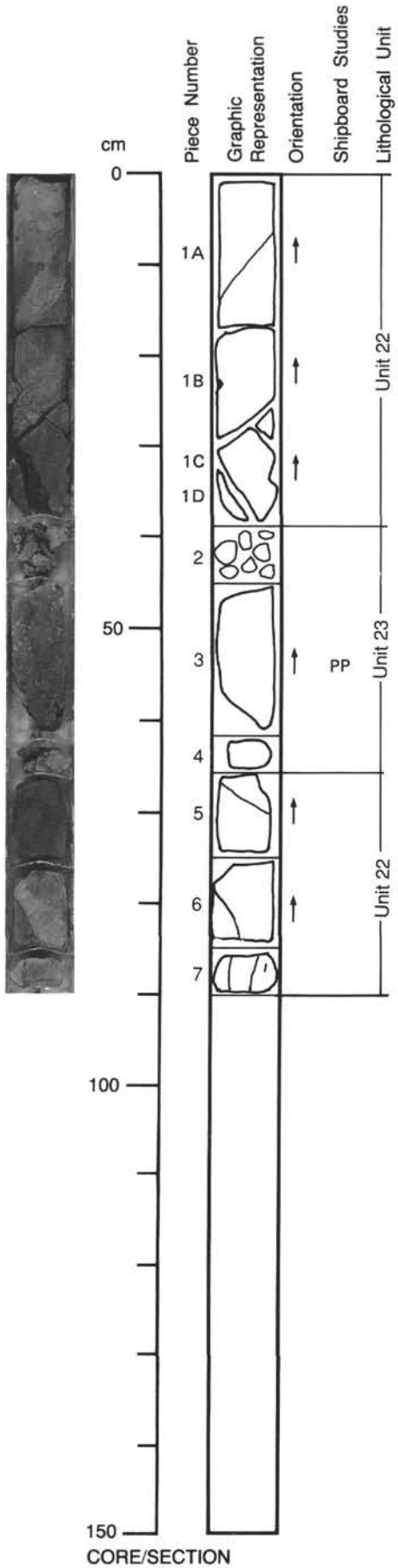


125-786B-61R-5

UNIT 22: RHYOLITE (CONTINUATION OF 61R-4)

Pieces 1-15

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 5%; <3 mm; euhedral laths.
Magnetite - trace; <0.1 mm; euhedral.
GROUNDMASS: Altered to serpentine and clay.
VESICLES: 1%; <2 mm; strongly elongate; randomly distributed; some filled with greenish serpentine.
COLOR: Gray (2.5Y 5/0).
STRUCTURE: N/A.
ALTERATION: Pervasive alteration.
VEINS/FRACTURES: 1%; <2 mm; generally between 20-60 degree dips; calcite and some red staining along fractures.
ADDITIONAL COMMENTS: Continuation of 125-786B-61R-04.



125-786B-61R-6

UNIT 22: RHYOLITE (61R-5 CONTINUED)

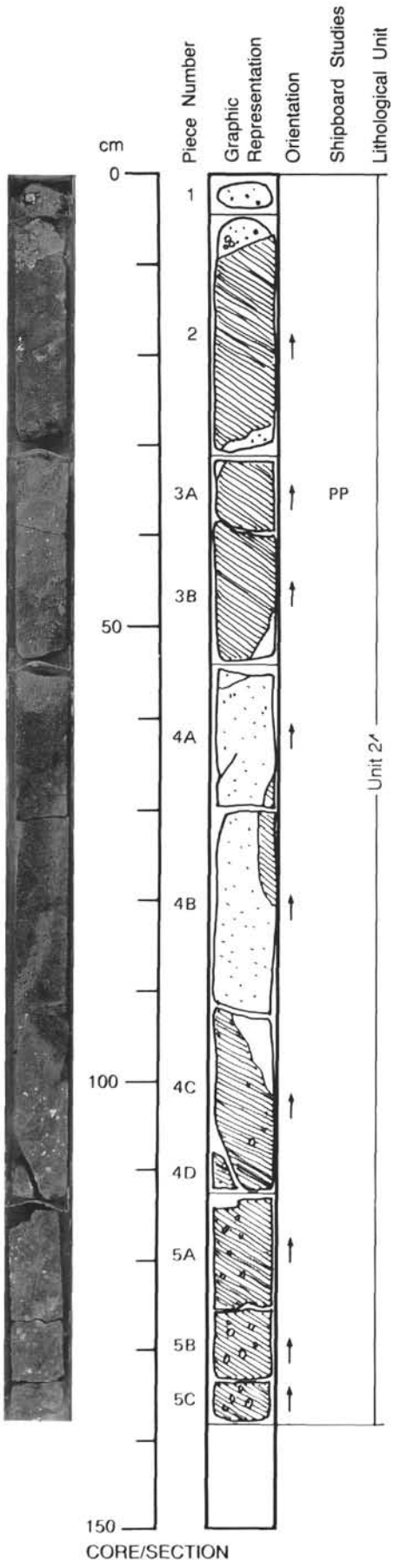
Pieces 1A-1D, 5-7

CONTACTS: Gradational contact from rhyolite to sediment at 10-30 cm; the rhyolite becomes fractured near the contact (brecciation); fracture surfaces are slickensided at 25-35 cm; Pieces 5, 6, and 7 are rhyolite again.
PHENOCRYSTS:
Plagioclase - 5%; <3 mm; euhedral laths.
Magnetite - trace; <0.1 mm; euhedral.
GROUNDMASS: Altered to serpentine and clay.
VESICLES: 1%; <2 mm; strongly elongate; randomly distributed; some filled with greenish serpentine.
COLOR: Gray (2.5Y 5/0).
STRUCTURE: N/A.
ALTERATION: Pervasively altered.
VEINS/FRACTURES: 1%; <2 mm; randomly oriented.

UNIT 23: SHEAR-ZONE BRECCIA AND SANDSTONE

Pieces 2-4

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: N/A.
STRUCTURE: N/A.
ALTERATION: N/A.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Fractured bluish-gray clay that contains brecciated rhyolite clasts. The clay overlies a clay-rich vitric silt containing predominantly quartz and feldspar along with pyroxene.

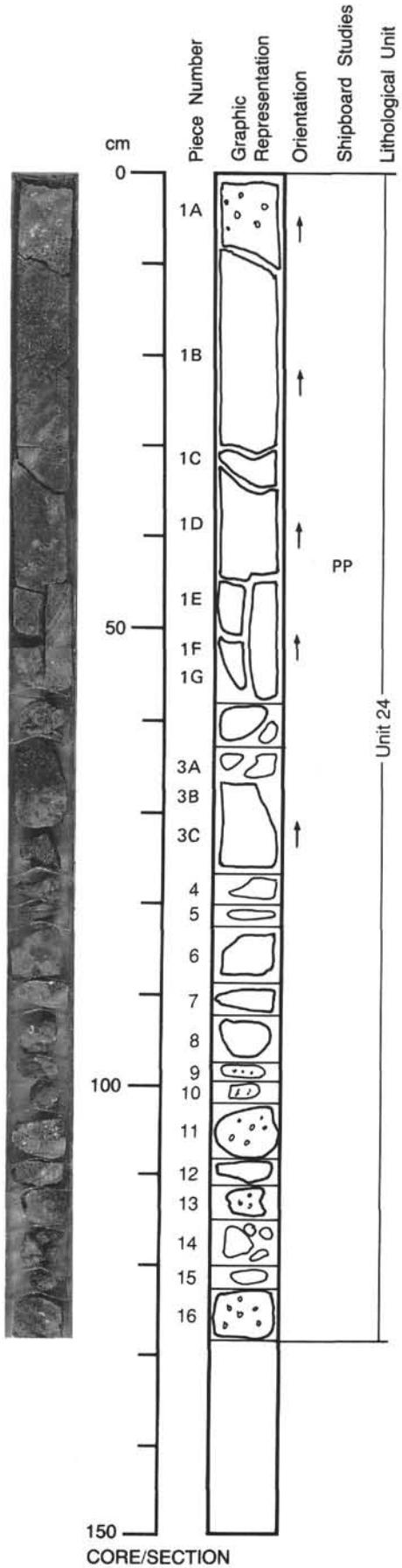


125-786B-62R-1

UNIT 24: BONINITE/TWO-PYROXENE ANDESITE

Pieces 1-5C

CONTACTS: Piece 2 contains contact between brecciated hyaloclastite and fine-grained boninite; Piece 4B contains contact between fine-grained, altered boninite pillow and very fine-grained intrusive andesite vein 2-3 cm wide, which continues below Piece 4B.
PHENOCRYSTS: Two-pyroxene glomerocrysts, up to 5 mm long, are common
Orthopyroxene - 4-10%; 0.75-2 mm; euhedral, elongate; inclusions of spinel.
Clinopyroxene - 2-4%; <0.75 mm; euhedral, equant; black.
GROUNDMASS: Fine-grained, altered.
VESICLES: 0-5%; 2-6 mm; round to irregular; concentrated at Pieces 3B, 4C and 5A; filled with white, fibrous to fine-grained zeolite.
COLOR: Bluish gray to greenish gray (5B 5/1 to 5G 5/1).
STRUCTURE: Brecciated in Pieces 1 and 2A; massive but cut by veins and containing chilled margin.
ALTERATION: Zeolite-filled vesicles and veins; groundmass is moderately chloritized and altered to amorphous clays.
VEINS/FRACTURES: <1%; 1-3 mm wide; random; filled with white zeolites, red oxidized sediments and, rarely, carbonate.
ADDITIONAL COMMENTS: Contact between boninite pillows and andesite intrusion. Andesitic dike in Piece 4B is sulfide-bearing.

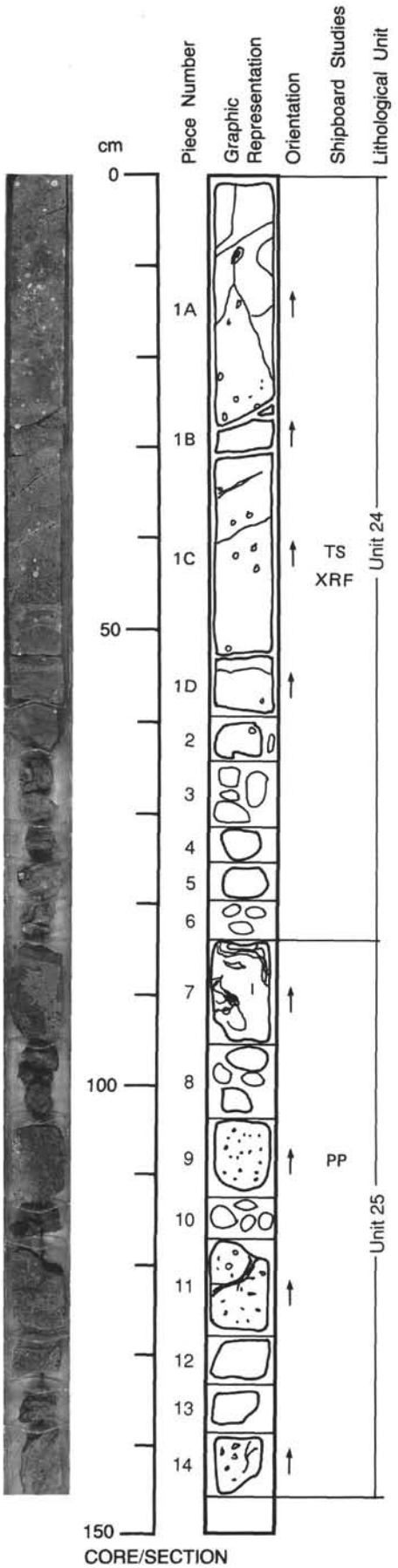


125-786B-62R-2

UNIT 24: BONINITE/TWO-PYROXENE ANDESITE PILLOWS AND HYALOCLASTITE

Pieces 1 - 16

CONTACTS: In Piece 1B, between pillow rim and hyaloclastite breccia.
PHENOCRYSTS: Glomerocrysts of orthopyroxene and clinopyroxene with rare spinel inclusions.
Orthopyroxene - 5-9%; 0.8-1.5 mm; elongate, euhedral to subhedral.
Clinopyroxene - 4-7%; <0.8 mm; euhedral, equant.
Plagioclase - 2-5%; 0.3-0.5 mm; euhedral tabular.
GROUNDMASS: Fine-grained to glassy with sparse microliths of plagioclase; variably altered.
VESICLES: 0-17%; 2-6 mm; elongate to irregular; not present in Pieces 1B-3A; filled with white fibrous-amorphous zeolite and, rarely, carbonate.
COLOR: Bluish gray to greenish gray (5B 5/1 to 5G 5/1).
STRUCTURE: Brecciated in Pieces 1-3C; massive but highly vesicular in remainder of core.
ALTERATION: Pervasive clay and chlorite alteration of glass and fine-grained matrix.
VEINS/FRACTURES: <<1%; 1-2 mm wide; random; filled with carbonate and zeolite and, rarely, hematite-altered sediment.
ADDITIONAL COMMENTS: Fine filaments of red ferromanganoan sediment, particularly in hyaloclastite breccia.



125-786B-62R-3

UNIT 24: BONINITE/TWO-PYROXENE ANDESITE PILLOWS AND HYALOCLASTITE

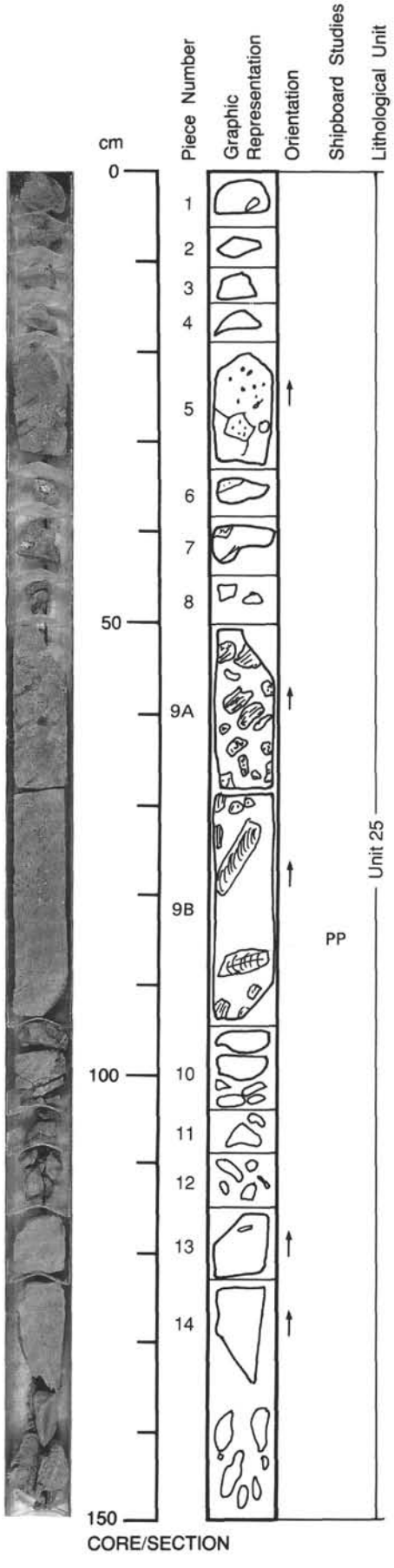
Pieces 1-6

CONTACTS: Normal to brecciated contact with sediment in Piece 7 (86 cm).
PHENOCRYSTS: Sparse glomerocrysts of orthopyroxene and clinopyroxene; Orthopyroxene to clinopyroxene ratio decreases down-section.
Orthopyroxene - 8-12%; 0.8-2.5 mm; elongate, euhedral to subhedral; some with spinel inclusions.
Clinopyroxene - 3-12%; <1 mm; equant to elongate, euhedral; mode increases down section.
GROUNDMASS: Fine- to medium-grained, with microliths of plagioclase and, possibly, orthopyoxene quench crystals.
VESICLES: 0-5%; 2-7 mm; round to elongate; concentrated in Piece 1; filled with white fibrous to finely crystalline zeolite and rare carbonate.
COLOR: Bluish gray to greenish gray (5B 5/1 to 5G 5/1).
STRUCTURE: Massive, sparsely to moderately phyric.
ALTERATION: Pervasive in groundmass to chlorite and some clay.
VEINS/FRACTURES: <1-2%; veins: 1-3 mm; fractures up to 2 cm; random; filling is primarily hematite-altered sediment for the fractures and zeolite with sparse carbonate in the veins.
ADDITIONAL COMMENTS: This is a continuation of 125-786B-62-2.

UNIT 25: VITRIC SILT AND HYALOCLASTITE BRECCIA

Pieces 7-14

CONTACTS: N/A.
PHENOCRYSTS: N/A.
GROUNDMASS: N/A.
VESICLES: N/A.
COLOR: Red jasper and greenish gray (5G 5/1).
STRUCTURE: Breccia; cauliflower-texture in jasper vitric sediment.
ALTERATION: Pervasive to chlorite/clay minerals.
VEINS/FRACTURES: N/A.
ADDITIONAL COMMENTS: Piece 7 shows jasper with fine laminae in swirling and anastomosing pattern with irregular clasts of hyaloclastite breccia. Not certain whether Pieces 7-14 should have been assigned to Unit 24 or to Unit 25.



125-786B-63R-1

UNIT 25: META-TWO-PYROXENE ANDESITE

Piece 1

CONTACTS: None visible.
PHENOCRYSTS: Glomerocrysts of clinopyroxene and orthopyroxene.
Orthopyroxene - 2-4%; 0.5-1.5 mm; equant-elongate.
Clinopyroxene - 4-7%; 0.5-2.0 mm; equant euhedral.
Plagioclase - 2-4%; 0.3-0.5 mm; tabular; euhedral.
GROUNDMASS: Fine-grained; composed of 60% feldspar, 40% pyroxene.
VESICLES: None.
COLOR: Greenish gray (5G 5/2).
STRUCTURE: Massive.
ALTERATION: Pervasive chloritization; some fresh cores of pyroxenes remain.
VEINS/FRACTURES: 1%; 3-4 mm wide vugs; random; vugs filled with pale green and white stubby prismatic zeolite and chlorite.

UNIT 25: CATACLASTIC ANDESITE

Pieces 2-4

CONTACTS: None visible.
PHENOCRYSTS: Strings of ortho- and clinopyroxene together with plagioclase as fragmented crystals; proportions difficult to estimate.
GROUNDMASS: Very fine-grained.
VESICLES: None.
COLOR: Gray (5Y 6/1).
STRUCTURE: Strongly sheared.
ALTERATION: Chloritic.
VEINS/FRACTURES: Trace; <0.2 mm; indeterminable; filled with chlorite.
ADDITIONAL COMMENTS: These pieces are strongly sheared and brecciated forming an indurated cataclasite.

UNIT 25: META-TWO-PYROXENE XENOLITH-BEARING ANDESITE

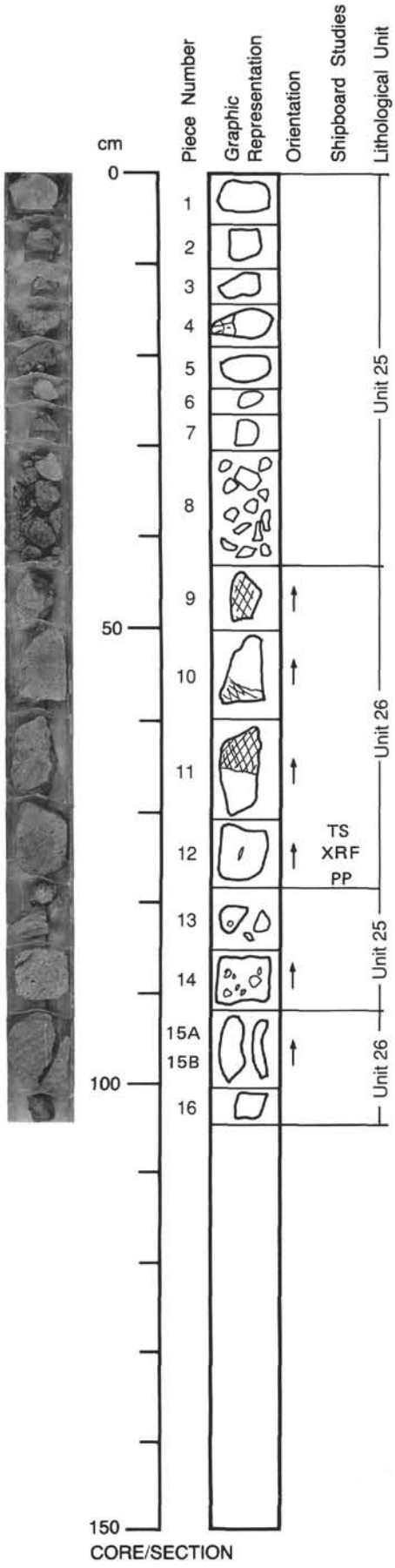
Pieces 5-9

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene is pervasively chloritized; clinopyroxene is varaibly altered. Pyroxenes occur in glomerocrystic patches.
Orthopyroxene - 5-8%; <1.5 mm; euhedral; equant.
Clinopyroxene - <3%; 1.5-0.5 mm; subhedral.
GROUNDMASS: Fine-grained, consisting of about 35% plagioclase and 65% pyroxene.
VESICLES: 15-20%; <5 mm; round-ovoid; throughout; filled with zeolite and chlorite.
COLOR: Dark gray (N 4/) to light greenish gray (5G 7/1).
STRUCTURE: Shearing prominent in Pieces 8 and 9A, dipping at 70 degrees and showing normal faulting.
ALTERATION: Pervasive chloritic alteration.
VEINS/FRACTURES: Trace; <1 mm; random; filled with clay and zeolite.
ADDITIONAL COMMENTS: angular-subrounded xenoliths (1-10 cm long) of vesicular, two-pyroxene andesite (pervasively chloritized; color is greenish gray, 5G 5/2); the xenoliths are of similar appearance to those in 125-786B-62R-3.

UNIT 25: CATACLASTIC ANDESITE

Pieces 10-14

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene and clinopyroxene are present but proportions are difficult to determine.
GROUNDMASS: Very fine-grained.
VESICLES: None.
COLOR: Light greenish gray (10Y 6/1).
STRUCTURE: Tectonic lenses from fault gouge; pervasive shearing dips at 65 degrees and indicates normal brittle faulting.
ALTERATION: Chloritic.
VEINS/FRACTURES: None.



125-786B-63R-2

UNIT 25: CATACLASTIC ANDESITE

Pieces 1-8

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene and clinopyroxene are present but proportions are difficult to determine.
GROUNDMASS: Very fine-grained.
VESICLES: None.
COLOR: Greenish gray (10Y 6/1).
STRUCTURE: Strongly sheared fabric; subvertical.
ALTERATION: Chloritic.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Continuation of Section 125-786B-063R-01.

UNIT 26: META-TWO-PYROXENE ANDESITE

Pieces 9-11

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene is pervasively chloritized, clinopyroxene variably altered. Pyroxenes occur in glomerocystic patches and as isolated crystals.
Orthopyroxene - 8-10%; 3-1.5 mm; equant-euhedral.
Clinopyroxene - 2-4%; 2.5-0.5 mm; subhedral.
GROUNDMASS: Fine-grained, consisting of about 35% plagioclase and 65% pyroxene.
VESICLES: 5-10%; <2 mm; round ovoid; throughout; filled with zeolite, carbonate and chlorite.
COLOR: Dark gray (N 4/) to light greenish gray (5G 7/1).
STRUCTURE: Massive.
ALTERATION: Variable chloritic alteration.
VEINS/FRACTURES: Trace; <1 mm; random; filled with clay and zeolite.
ADDITIONAL COMMENTS: Possible xenoliths of vesicular two-pyroxene andesite or variable alteration defining color changes in pieces.

UNIT 26: META-RHYOLITE

Piece 12

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene completely chloritized.
Plagioclase - trace; <0.5 mm; euhedral lath.
Clinopyroxene - 8 -10%; <0.5 mm; euhedral.
Orthopyroxene - <2%; <0.3 mm; equant-elongate.
GROUNDMASS: Very fine-grained; altered.
VESICLES: 2%; <3 mm; elongate; aligned; filled with zeolite
COLOR: Black (7.5YR 2/0).
STRUCTURE: Flow-banded, dipping at 55 degrees.
ALTERATION: Chloritic.
VEINS/FRACTURES: None.

UNIT 25: META-DACITE

Pieces 13 and 14

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene is completely replaced leaving a carbonate-chlorite-filled vug.
Plagioclase - 5%; <1.5 mm; euhedral, tabular.
Orthopyroxene - 1-2%; 1-2 mm; euhedral.
GROUNDMASS: Fine-grained; variably altered; disseminated pyrite.
VESICLES: 5%; <5 mm; elongate-irregular; throughout; quartz and sulfide coating on some vesicle walls.
COLOR: Gray (2.5YR 8/0).
STRUCTURE: Massive.
ALTERATION: Chloritic.
VEINS/FRACTURES: Trace; <0.1 mm; random; filled with zeolite.

125-786B-63R-2 (continued)

UNIT 26: META-TWO-PYROXENE ANDESITE

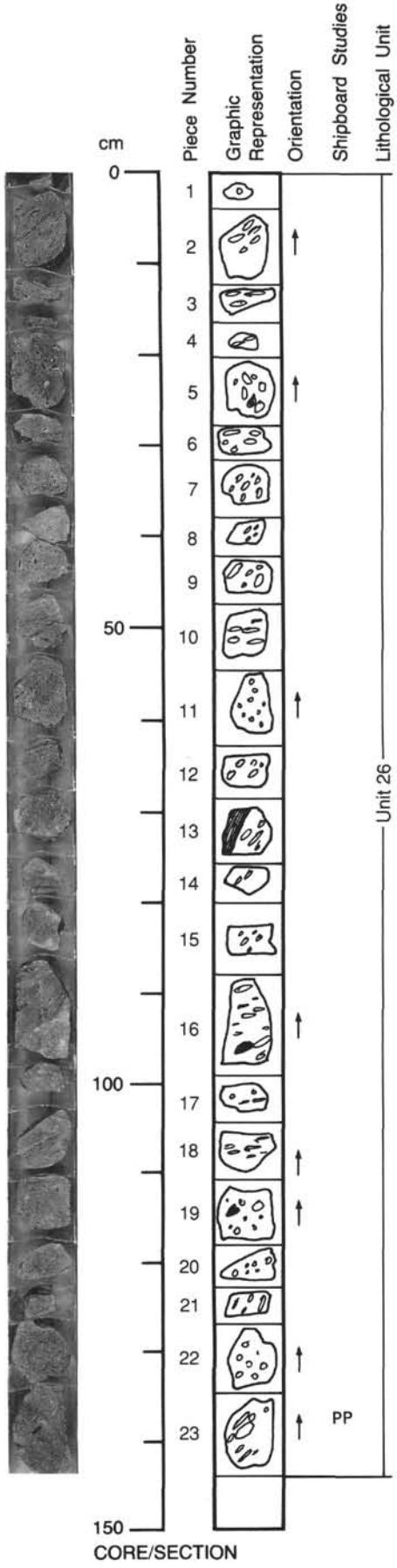
Piece 15

CONTACTS: None visible.
PHENOCRYSTS: Mostly occur as isolated phases; pervasively altered.
Plagioclase - 2-3%; 0.5-1.5 mm; equant laths.
Orthopyroxene - 10-12%; 1.5-2.5 mm; euhedral, equant.
Clinopyroxene - 2-5%; 0.5-1.5 mm; euhedral, equant.
Magnetite - 0.5-1%; 0.1-0.3 mm; equant, cubic.
GROUNDMASS: Fine-grained; 40-50% feldspar, 40-50% pyroxene.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive lower greenschist facies assemblage of albite after plagioclase, chlorite after orthopyroxene; includes disseminated pyrite and mesh-texture of hematite veining.
VEINS/FRACTURES: Trace; <1 mm; sub-vertical; filled with carbonate.

UNIT 26: META-TWO-PYROXENE ANDESITE

Piece 16

CONTACTS: None visible.
PHENOCRYSTS: Orthopyroxene is pervasively chloritized, clinopyroxene variably altered; pyroxenes occur in glomerocrystic patches.
Orthopyroxene - 8-10%; 1.5-3 mm; equant, euhedral.
Clinopyroxene - 2-4%; 2.5-0.5 mm; subhedral.
GROUNDMASS: Fine-grained to very fine-grained, consisting of about 35% plagioclase and 65% pyroxene.
VESICLES: 2%; <1 mm; round to ovoid; throughout; filled with zeolite, carbonate and chlorite.
COLOR: Dark gray (N 4/).
STRUCTURE: Massive.
ALTERATION: Pervasive chloritic.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Looks like host from Pieces 5 - 9 from 125-786B-63R-1.

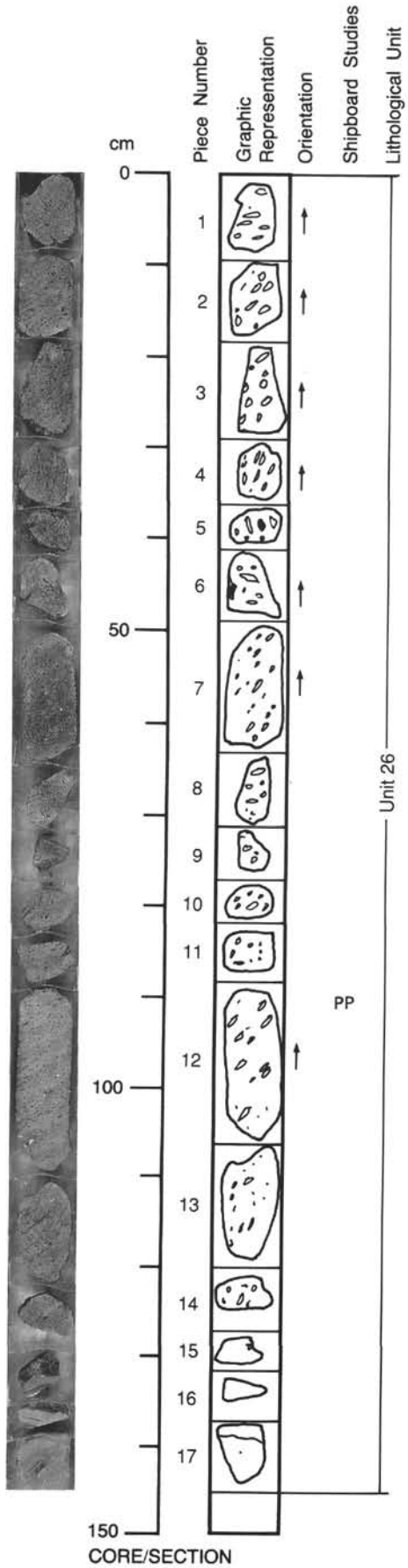


125-786B-64R-1

UNIT 26: META-ORTHOPYROXENE ANDESITE

Pieces 1-23

CONTACTS: None visible.
PHENOCRYSTS: Primary mineralogy altered to lower greenschist facies assemblage (albite-chlorite).
Plagioclase - 3-5%; 0.2-0.8 mm; subhedral-euhedral.
Orthopyroxene - 1-2%; <3 mm; euhedral, elongate.
GROUNDMASS: Fine-grained; <2% dusty euhedral magnetite disseminated throughout.
VESICLES: 10%; <15 mm; pipe-shaped; evenly distributed; some filled with carbonate, chlorite and white zeolite; strongly aligned, dipping at 60 degrees.
COLOR: Dark gray (2.5Y 4/0).
STRUCTURE: Massive.
ALTERATION: Variable chloritization of orthopyroxene and albitization of plagioclase.
VEINS/FRACTURES: None.

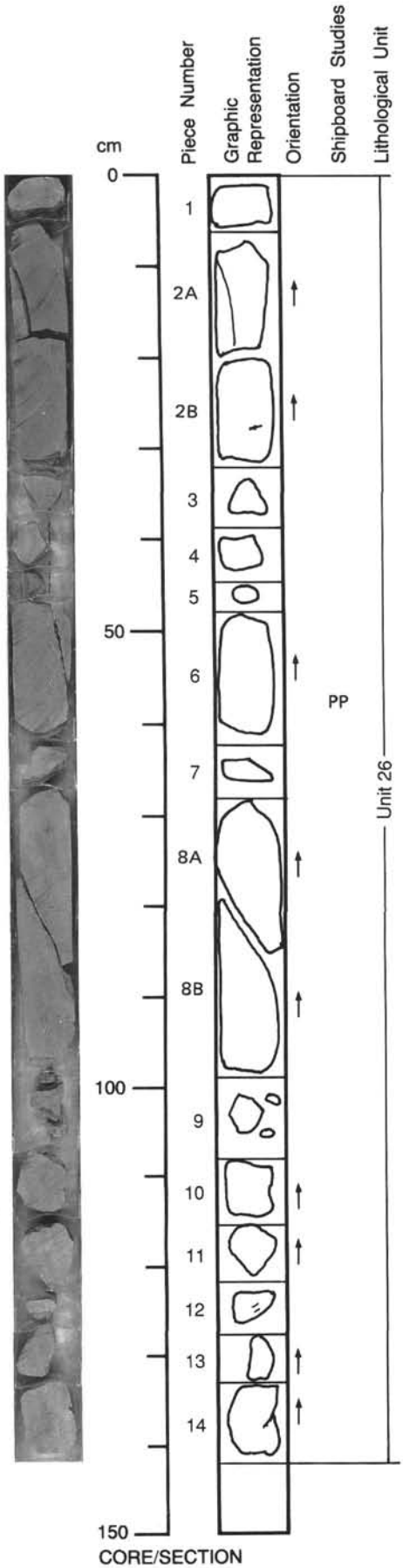


125-786B-64R-2

UNIT 26: META-ORTHOPYROXENE ANDESITE

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Primary mineralogy altered to lower greenschist facies assemblage.
Plagioclase - 3-5%; 0.2-0.8 mm; subhedral-euhedral.
Orthopyroxene - 1-2%; <3 mm; euhedral, elongate.
GROUNDMASS: Fine-grained; <2% dusty euhedral magnetite disseminated throughout.
VESICLES: 0-15%; <20 mm; pipe-shaped; concentrated in Pieces 1-14; dipping at 30 - 60 degrees.
COLOR: Dark gray (2.5Y 4/0).
STRUCTURE: Massive.
ALTERATION: Variable chloritization of orthopyroxene and albitization of plagioclase.
VEINS/FRACTURES: Trace; <0.5 mm; subhorizontal; filled with carbonate.
ADDITIONAL COMMENTS: Continuation of 125-786B-64R-1.

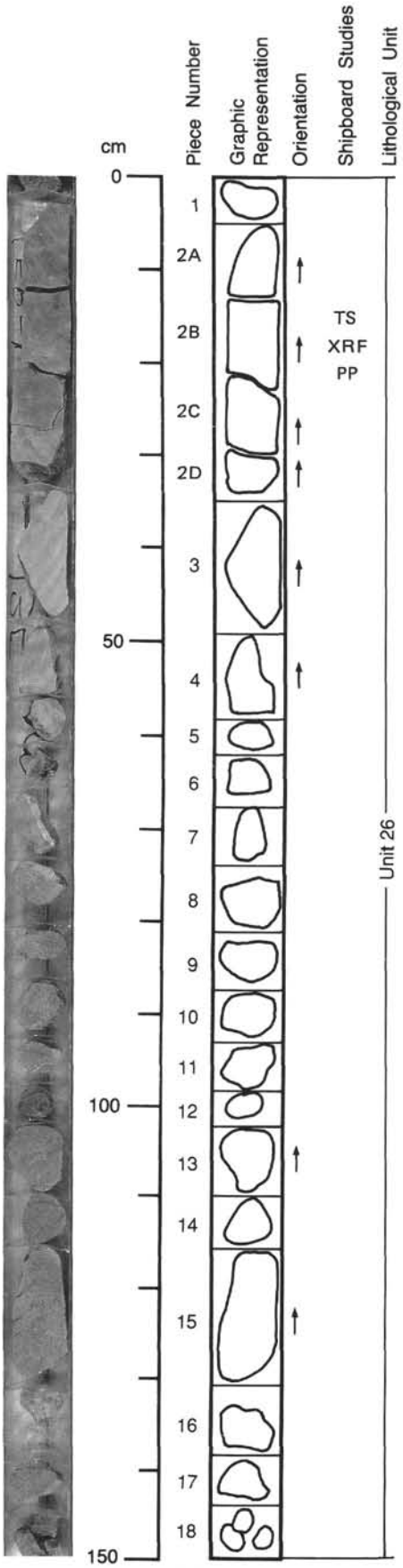


125-786B-64R-3

UNIT 26: META-ORTHOPYROXENE ANDESITE

Pieces 1-14

CONTACTS: None visible.
PHENOCRYSTS: Primary mineralogy altered to lower greenschist facies assemblage.
Plagioclase - 3-5%; 0.2-0.5 mm; subhedral-euhedral.
Orthopyroxene - 1-2%; <2 mm; euhedral, elongate.
GROUNDMASS: Very fine-grained; <2% dusty euhedral magnetite disseminated throughout.
VESICLES: Trace; <2 mm; elongate; concentrated in Pieces 8B-14; filled with carbonate.
COLOR: Greenish gray (5G 6/1 to 5BG 5/1).
STRUCTURE: Massive.
ALTERATION: Variable chloritization of orthopyroxene and albitization of plagioclase.
VEINS/FRACTURES: Trace; <0.3 mm wide; subvertical; filled with carbonate.
ADDITIONAL COMMENTS: Continuation of 125-786B-64R-2; on the basis of the absence of vesicles, this is probably a dike.



125-786B-65R-1

UNIT 26: CHLORITE-ALBITE ROCK

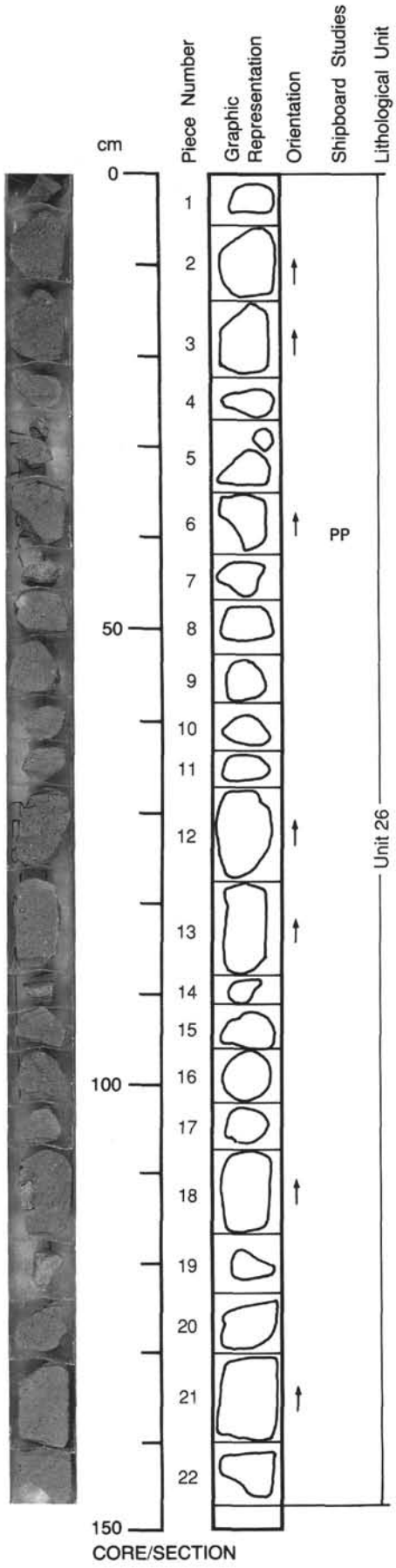
Pieces 1-7

CONTACTS: Contact with lower, metadacite dike is exposed in Piece 8; some black-colored dacite seems to have intruded into overlying rock; no chilled margin or vesicle-free rock at contact.
PHENOCRYSTS: Absent.
GROUNDMASS: Fine-grained; albite-chlorite.
VESICLES: Absent.
COLOR: Greenish gray (5G 6/1).
STRUCTURE: Massive.
ALTERATION: Probably meta-andesite.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-64R-3.

UNIT 26: META-DACITE

Pieces 8-18

CONTACTS: Chlorite albite rock inclusion in Piece 18.
PHENOCRYSTS:
Plagioclase - 2%; <2 mm; euhedral.
Clinopyroxene - trace; <3 mm; euhedral; black; altering to chlorite.
Magnetite - trace; <0.1 mm; euhedral.
GROUNDMASS: Very fine-grained, albitic, chlorite.
VESICLES: 10%; <2 mm; irregular; randomly distributed; filled with hexagonal, colorless, transparent flakes and dark red flakes or pyrite.
COLOR: Gray (N 5/).
STRUCTURE: Absent.
ALTERATION: Meta-dacite.
VEINS/FRACTURES: Absent.

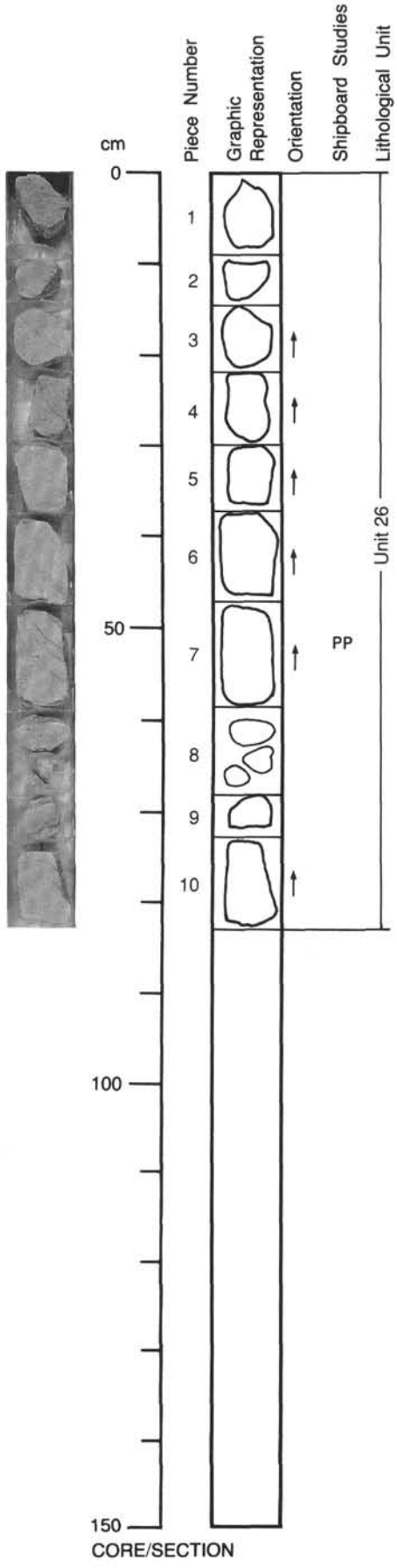


125-786B-65R-2

UNIT 26: META-DACITE

Pieces 1-22

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 2%; <2 mm; euhedral.
Clinopyroxene - trace; <3 mm; euhedral, black, altering to chlorite.
Magnetite - trace; <0.1 mm; euhedral.
GROUNDMASS: Very fine-grained, albite and chlorite.
VESICLES: 10%; <2 mm; irregular; randomly distributed; filled with hexagonal, colorless, transparent flakes and dark red flakes or pyrite.
COLOR: Gray (N 5/).
STRUCTURE: Absent.
ALTERATION: Meta-dacite.
VEINS/FRACTURES: Absent.

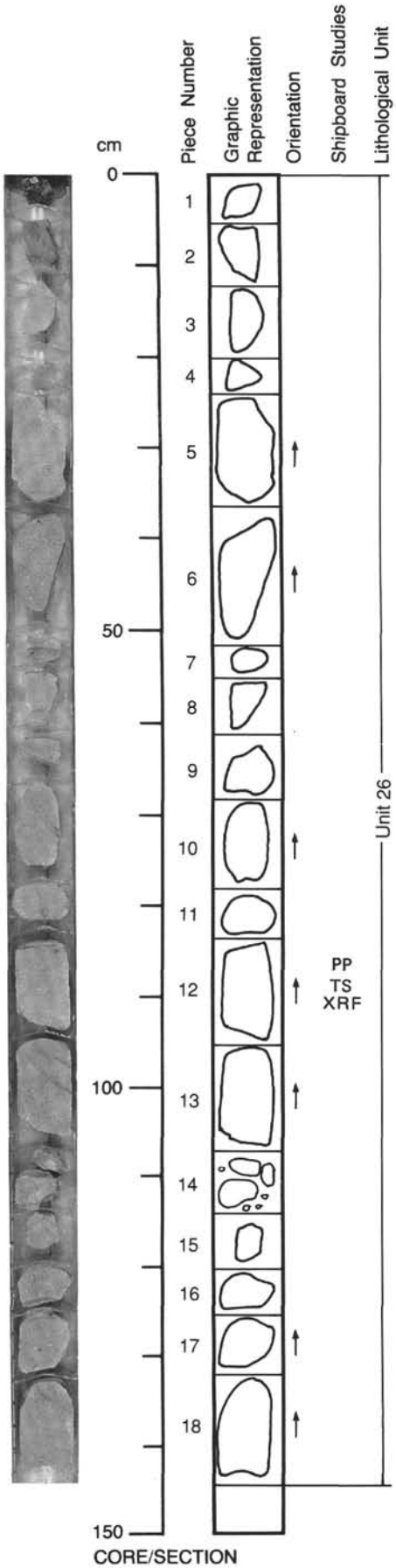


125-786B-65R-3

UNIT 26: META-DACITE

Pieces 1-10

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 2%; <2 mm; euhedral.
Clinopyroxene - trace; <3 mm; euhedral, black, altering to chlorite.
Magnetite - trace; <0.1 mm; euhedral.
GROUNDMASS: Very fine-grained, albite and chlorite.
VESICLES: 10%; <2 mm; irregular; randomly distributed; filled with hexagonal, transparent, colorless flakes and dark red flakes or pyrite.
COLOR: Gray (N 5/).
STRUCTURE: Absent.
ALTERATION: Meta-dacite.
VEINS/FRACTURES: Absent.

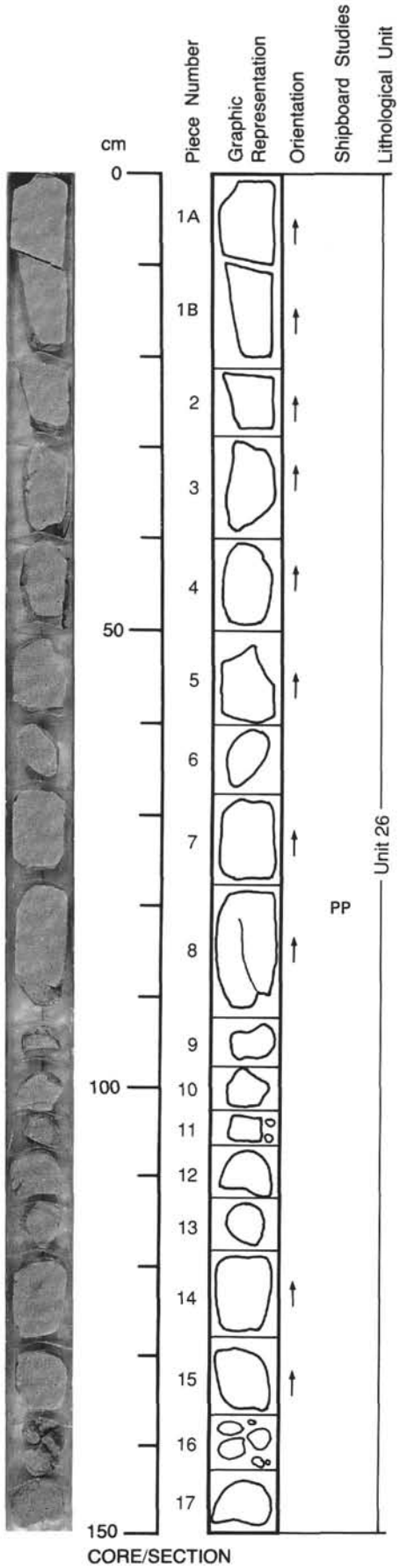


125-786B-66R-1

UNIT 26: META-ANDESITE TO DACITE

Pieces 1-18

CONTACTS: None.
PHENOCRYSTS:
Plagioclase - 5%; <2 mm; euhedral laths.
GROUNDMASS: Fine-grained, altered to chlorite.
VESICLES: 0-5%; <2 mm; elongate; appear locally in some pieces.
COLOR: Light gray (N 7/).
STRUCTURE: Massive.
ALTERATION: Altering to chlorite and albite.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Continuation of 125-786B-65R-3. Local round chlorite inclusions with complex white and green rims.

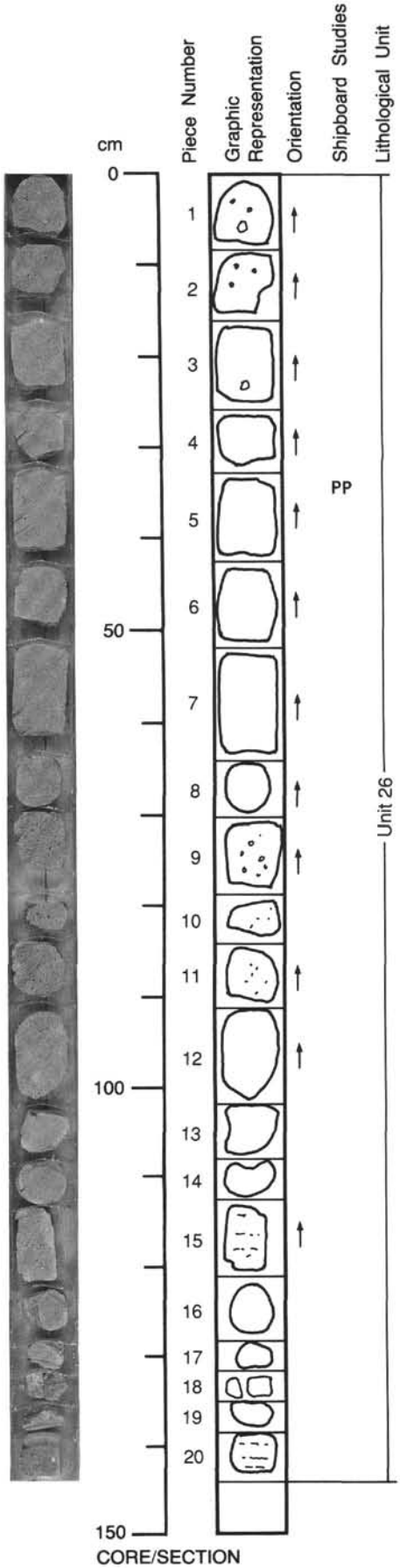


125-786B-66R-2

UNIT 26: META-ANDESITE TO DACITE

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 5%; <2 mm; euhedral laths.
GROUNDMASS: Fine-grained, altering to chlorite and albite.
VESICLES: 0-5%; <2 mm; elongate; in some pieces; rare.
COLOR: Light gray (N 7/).
STRUCTURE: Massive.
ALTERATION: Altering to chlorite and albite.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Continuation of 125-786B-65R-3.

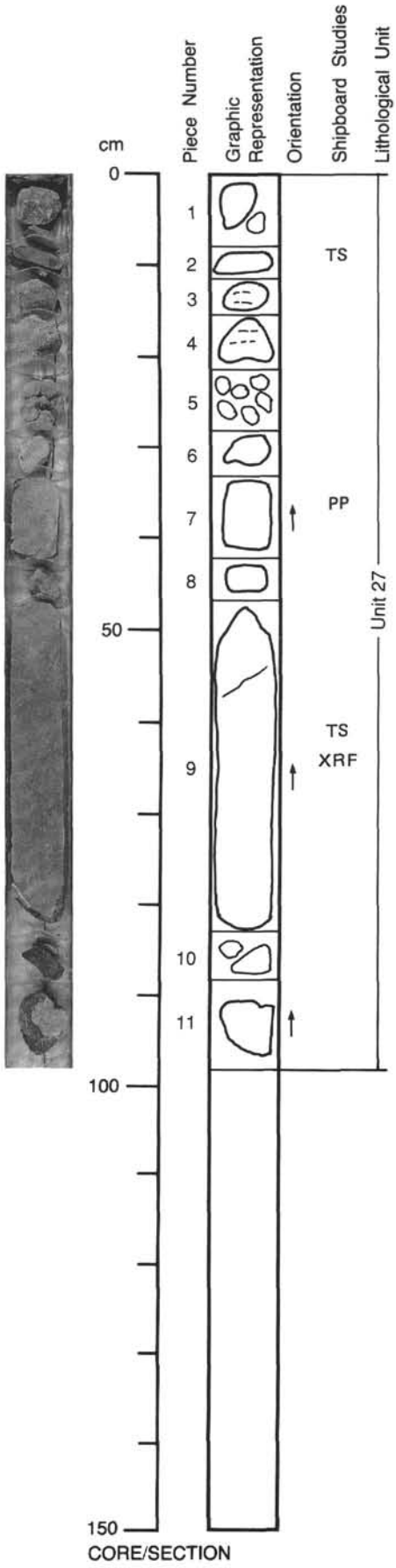


125-786B-66R-3

UNIT 26: META-DACITE TO ANDESITE

Pieces 1-20

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 5%; <2 mm; euhedral laths.
GROUNDMASS: Fine-grained, altering to chlorite and albite.
VESICLES: 0-5%; <2 mm; elongate; in some pieces; rare.
COLOR: Light gray (N/7)
STRUCTURE: Massive.
ALTERATION: Altering to chlorite and albite.
VEINS/FRACTURES: Absent.
ADDITIONAL COMMENTS: Continuation of 125-786B-66R-2.



125-786B-67R-1

UNIT 27: META-PYROXENE ANDESITE

Pieces 1, 3 - 8

CONTACTS: None visible.
PHENOCRYSTS: Pyroxene and feldspar occur as glomerocrysts and as isolated phases; orthopyroxene is pervasively chloritized.
Plagioclase - 5%; <1 mm; euhedral, tabular.
Orthopyroxene - 3%; <3 mm; euhedral, equant.
Clinopyroxene - trace; <0.5 mm; euhedral, tabular.
Magnetite - trace; <0.2 mm; euhedral.
GROUNDMASS: Fine-grained; feldspathic.
VESICLES: 1-10%; n/a; elongate; variable; vesicle walls are coated with quartz.
COLOR: Greenish gray (5BG 6/1).
STRUCTURE: Massive.
ALTERATION: Chloritization of pyroxene and some albitization of feldspar.
VEINS/FRACTURES: None.

UNIT 27: OLIVINE-BEARING BONINITE

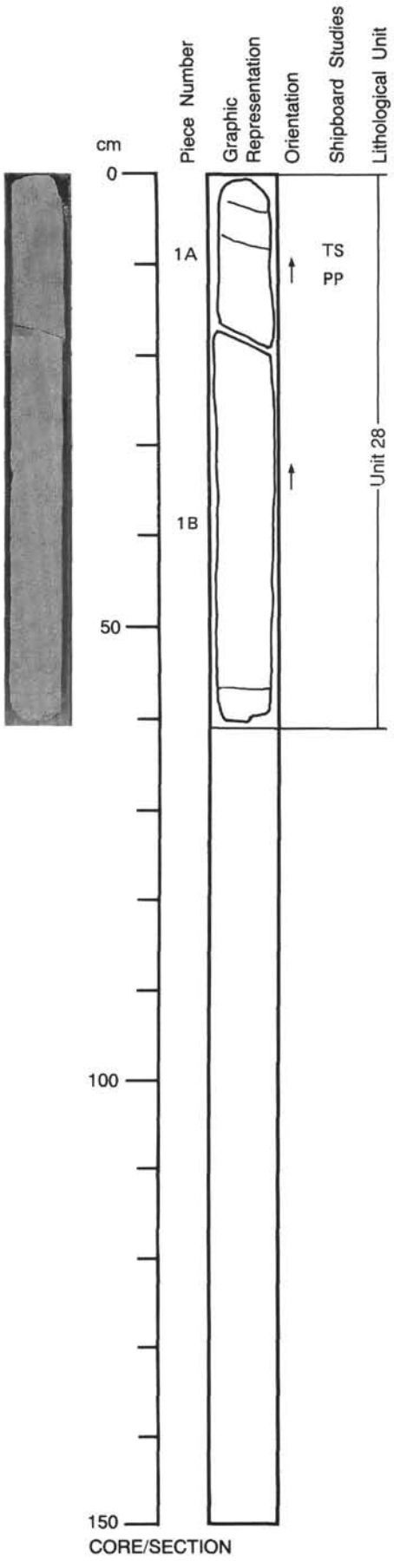
Piece 2

CONTACTS: None visible.
PHENOCRYSTS: Pyroxene and plagioclase occur as isolated phases and as glomerocrystic patches; olivine is completely altered to a carbonate and Fe-oxide assemblage.
Orthopyroxene - 8-15%; <2 mm; euhedral, equant.
Clinopyroxene - 5-10%; <1.5 mm; equant, tabular.
Olivine - 3%; <2 mm; euhedral.
Plagioclase - 5%; <1.5 mm; euhedral, tabular.
GROUNDMASS: Fine-grained to glassy with variable alteration.
VESICLES: None.
COLOR: Weak red (5R 4/2).
STRUCTURE: Massive.
ALTERATION: Some Fe-staining.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: First reappearance of olivine downhole.

UNIT 27: BONINITE

Pieces 9-11

CONTACTS: None visible.
PHENOCRYSTS: Clinopyroxene is variably chloritized; olivine completely replaced by a chlorite-carbonate assemblage.
Orthopyroxene - 8-12%; <3 mm; euhedral, elongate.
Clinopyroxene - trace; <0.5 mm; euhedral, equant.
Olivine - 1%; <2 mm; euhedral, with spinel inclusions.
GROUNDMASS: Fine-grained, rich in pyroxene and feldspar.
VESICLES: None.
COLOR: Dark greenish gray (5G 4/1).
STRUCTURE: Massive.
ALTERATION: Some chloritic alteration of olivine, clinopyroxene and groundmass.
VEINS/FRACTURES: Trace; <3 mm wide; dipping at 45 degrees; filled with carbonate.
ADDITIONAL COMMENTS: Some slickensides on base of Piece 11, partly coated with carbonate.

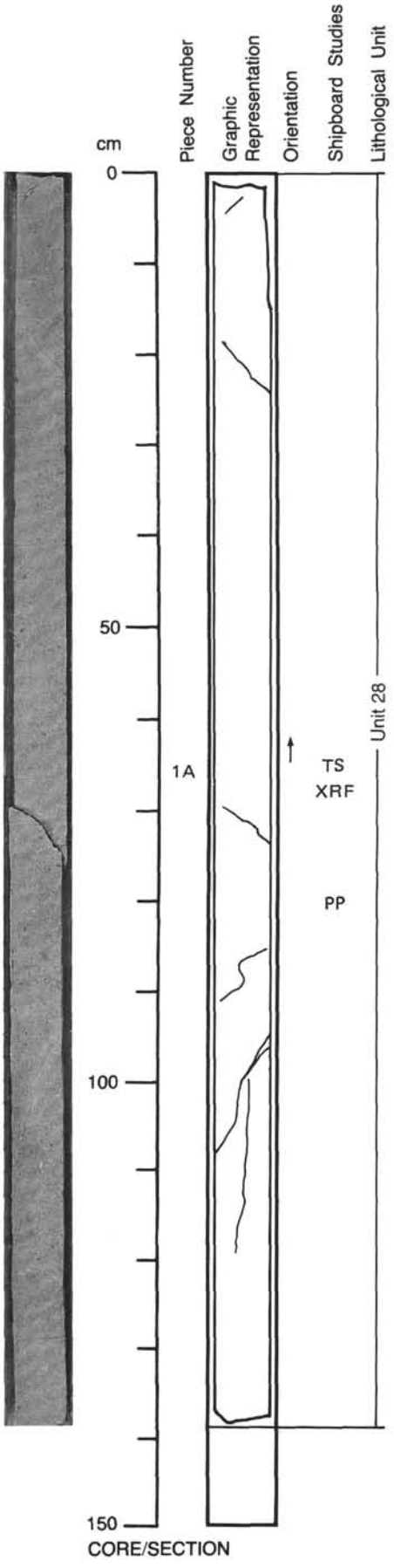


125-786B-68R-1

UNIT 28: META-TWO-PYROXENE ANDESITE

Pieces 1A-1B

CONTACTS: None visible.
PHENOCRYSTS: Highly altered to chlorite, carbonate and albite.
Clinopyroxene - 3-6%; <2 mm; equant, euhedral; altered to chlorite.
Orthopyroxene - 5-10%; <1.5 mm; equant to elongation, euhedral; altered to chlorite.
Feldspar - trace; <0.5 mm; euhedral tabular, altered to chlorite.
GROUNDMASS: Fine-grained; altered to chlorite and carbonate.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Highly altered to chlorite with subordinate amounts of carbonate and albite.
VEINS/FRACTURES: <1%; 1-2 mm; dip at 30 to 60 degrees to core axis; filled with carbonate and sulfide (pyrite, possibly chalcopyrite).

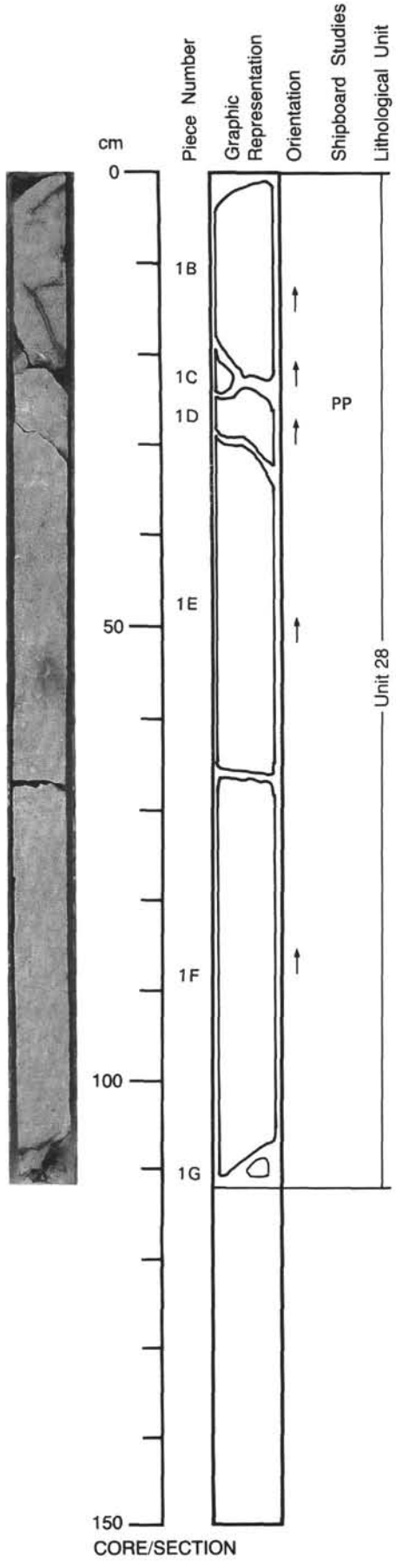


125-786B-69R-1

UNIT 28: META-TWO-PYROXENE ANDESITE (68R-1 CONTINUED)

Piece 1A

CONTACTS: None visible.
PHENOCRYSTS: Highly altered to chlorite, carbonate and albite.
Clinopyroxene - 3-6%; <2 mm; equant to elongate, altered to chlorite.
Orthopyroxene - 5-10%; <1.5 mm; equant to elongate, euhedral; altered to chlorite.
Feldspar - trace; <0.5 mm; euhedral, tabular; altered to chlorite.
GROUNDMASS: Fine-grained; holocrystalline; variably altered to chlorite and carbonate.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Highly altered to chlorite with subordinate amounts of carbonate and albite.
VEINS/FRACTURES: <1%; <1-2 mm wide; 30-60 degrees to core axis; filled with carbonate and sulfide.
ADDITIONAL COMMENTS: Continuation of 125-786B-68R-1

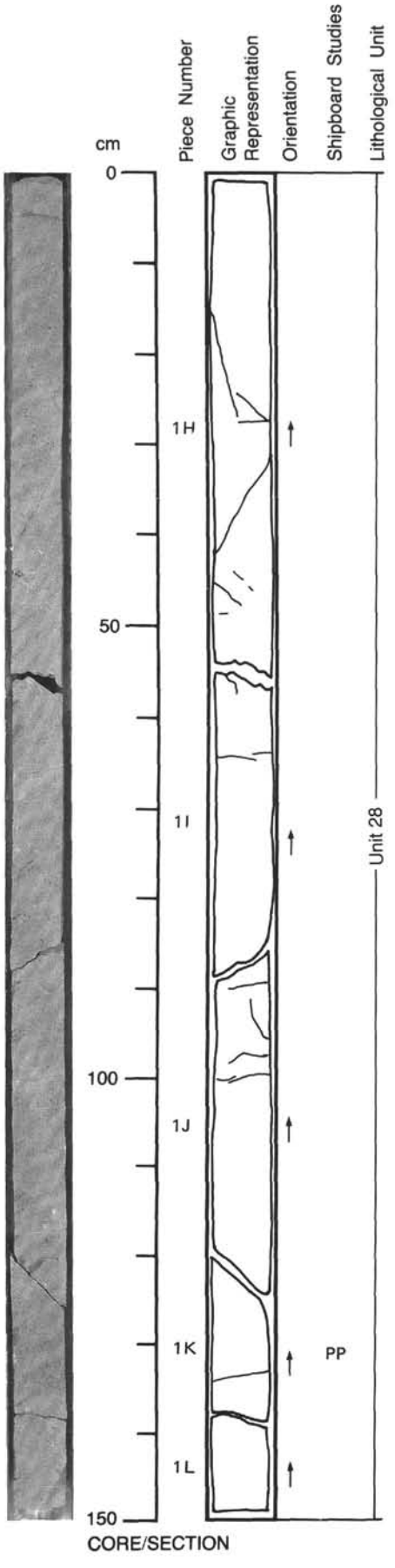


125-786B-69R-2

UNIT 28: META-TWO-PYROXENE ANDESITE (69R-1 CONTINUED)

Pieces 1B-1G

CONTACTS: None visible.
PHENOCRYSTS: Highly altered to chlorite, carbonate and albite.
Clinopyroxene - 3-6%; <2 mm; equant, euhedral; altered to chlorite.
Orthopyroxene - 5-10%; <1.5 mm; equant to elongate, euhedral; altered to chlorite.
Feldspar - trace; <0.5 mm; euhedral, tabular; altered to chlorite/albite.
GROUNDMASS: Fine-grained; holocrystalline; altered to chlorite and carbonate.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Extensive-pervasive, to chlorite, carbonate and albite.
VEINS/FRACTURES: <1%; 1-2 mm; 30-60 degrees to core axis.
ADDITIONAL COMMENTS: Rock is a continuation of the Interval 125-786B-68R-1 to 125-786B-69R-1.

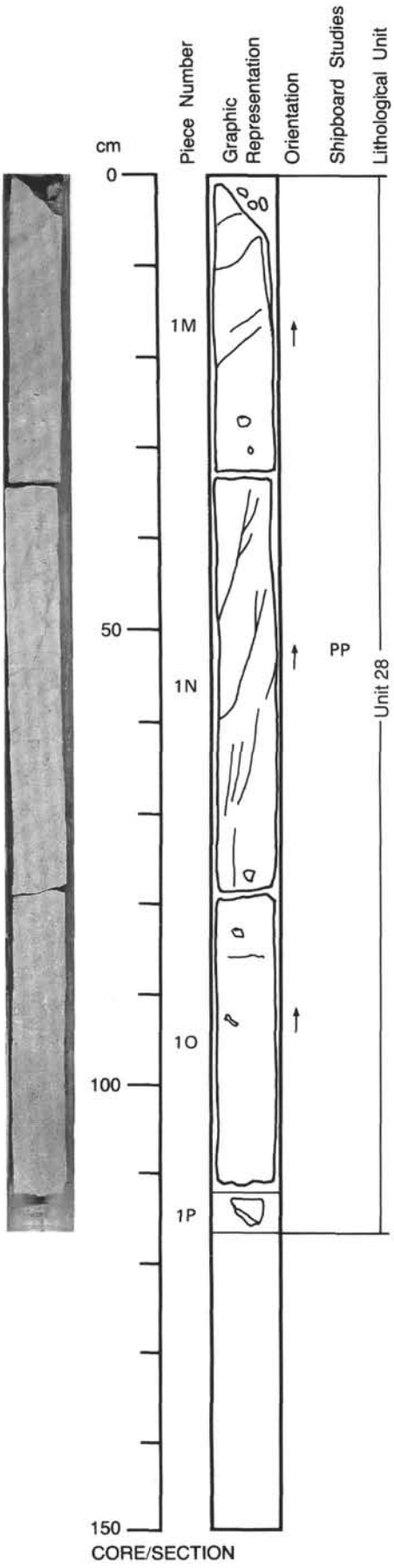


125-786B-69R-3

UNIT 28: META-TWO-PYROXENE ANDESITE (69R-2 CONTINUED)

Pieces 1H-1L

CONTACTS: None.
PHENOCRYSTS: Highly altered to chlorite with subordinate amounts of carbonate and albite.
Clinopyroxene - 3-6%; <2 mm; equant, euhedral; altered.
Orthopyroxene - 5-10%; <1.5 mm; equant to elongate, euhedral; altered.
Feldspar - trace; <0.5 mm; euhedral, tabular; altered.
GROUNDMASS: Fine-grained, holocrystalline; altered to chlorite and carbonate.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive, extensive, to chlorite with subordinate amounts of carbonate and albite.
VEINS/FRACTURES: <1%; 1-2 mm wide; 30-60 degrees to core axis; filled with carbonate and sulfides.
ADDITIONAL COMMENTS: Rock is a continuation of 125-786B-68R-1 to 69R-2.

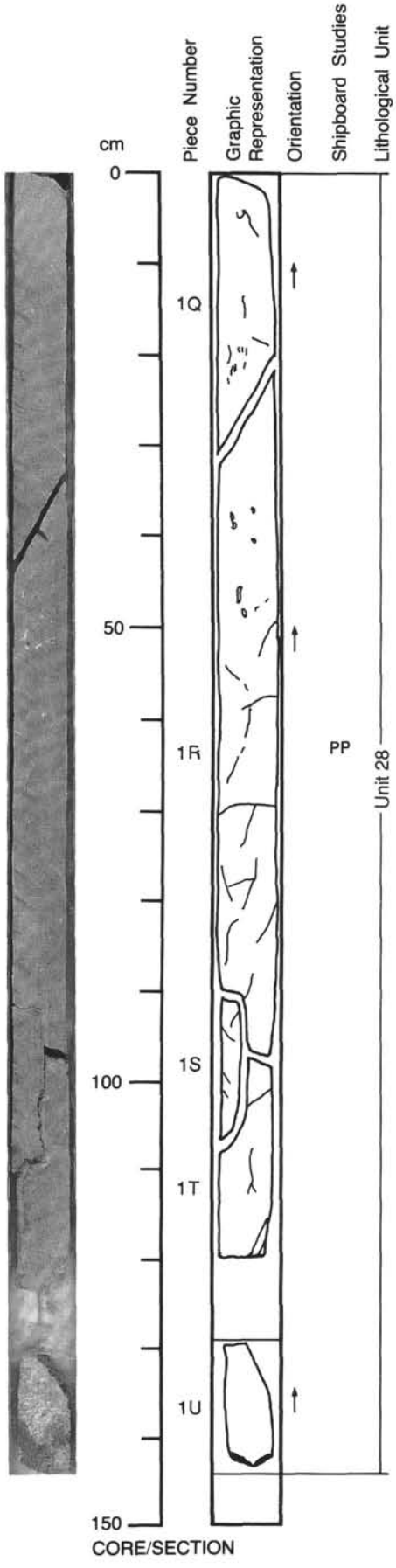


125-786B-69R-4

UNIT 28: META-TWO PYROXENE ANDESITE (69R-3 CONTINUED)

Pieces 1M-1P

CONTACTS: None visible.
PHENOCRYSTS: Highly altered to chlorite with carbonate and albite.
Orthopyroxene - 3-6%; <2 mm; equant, euhedral; altered.
Clinopyroxene - 5-10%; <1.5 mm; equant to elongate, euhedral; altered.
Feldspar - trace; <0.5 mm; euhedral, tabular; altered.
GROUNDMASS: Fine-grained, holocrystalline.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Extensive, pervasive, to an assemblage of chlorite with subordinate amounts of carbonate and albite.
VEINS/FRACTURES: 1<; <1-2 mm wide; 30-60 degrees to core axis; filled with carbonate and sulfide.
ADDITIONAL COMMENTS: Rock is a continuation of 125-786B-68R-1.

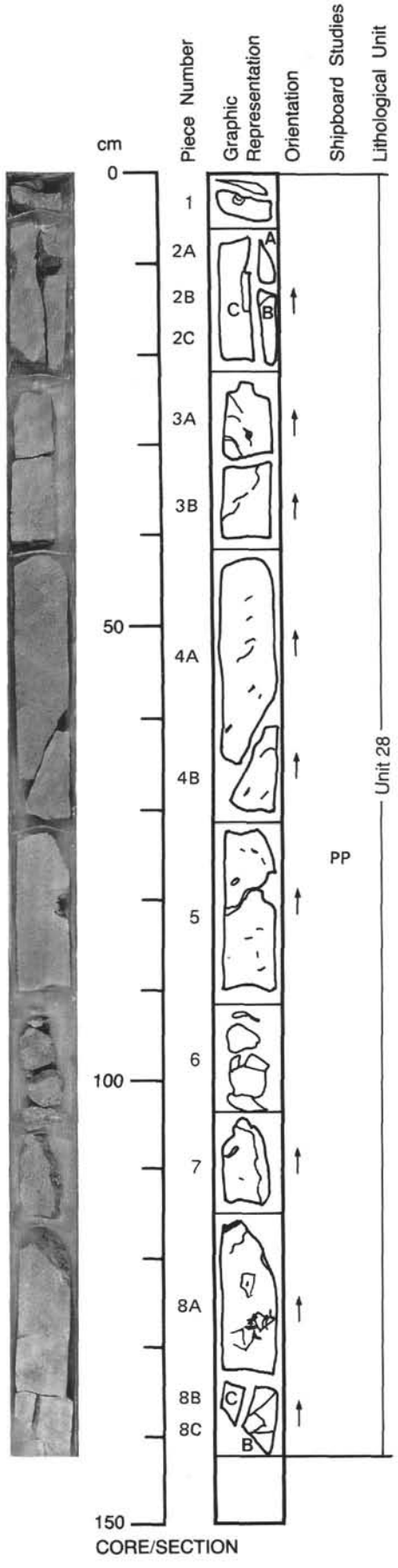


125-786B-69R-5

UNIT 28: META-TWO-PYROXENE ANDESITE (69R-4 CONTINUED)

Pieces 1Q-1U

CONTACTS: None.
PHENOCRYSTS: Variably altered; less altered; more plagioclase-phyric zone at 12 cm.
Clinopyroxene - 3-6%; <1.5 mm; equant, euhedral.
Orthopyroxene - 5-7%; <1.8 mm; equant to elongate, euhedral.
Feldspar - 1-2%; <0.5 mm, 1-2 mm; elongate, equant.
Spinel - <1%; <0.1 mm; equant, usually as inclusions in pyroxene, also in groundmass.
GROUNDMASS: Fine-grained, holocrystalline; altered to chlorite.
VESICLES: None.
COLOR: Greenish gray (5G 5/1) to grayish green (5G 6/2).
STRUCTURE: Massive; finer-grained midway through section; less veining.
ALTERATION: Chlorite and minor carbonate; pervasive, variable.
VEINS/FRACTURES: <1%; 1-3 mm; random; filled with carbonate and minor sulfide; some fractures 1-2 cm long and 5-6 mm wide filled with carbonate.
ADDITIONAL COMMENTS: Rock is a continuation of 125-786B-68R-1 to 69R-4.

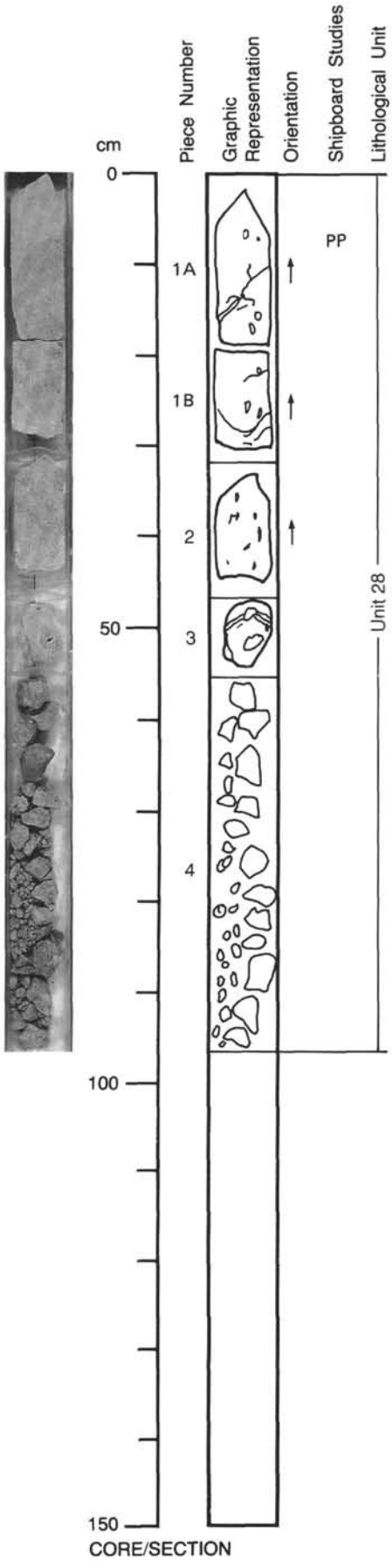


125-786B-69R-6

UNIT 28: META-TWO-PYROXENE ANDESITE

Pieces 1-8C

CONTACTS: None visible.
PHENOCRYSTS: Variably altered to chlorite and carbonate.
Clinopyroxene - 3-6%; <2 mm; euhedral; altered.
Orthopyroxene - 5-10%; <1.5 mm; equant to elongate; altered.
Plagioclase - 1%; <1 mm; tabular, elongate.
Magnetite - trace; <0.25 mm; equant.
GROUNDMASS: Fine-grained, holocrystalline; microcrysts of plagioclase and pyroxene.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive; Piece 6 broken into multiple fragments, possibly caused by faulting.
ALTERATION: Pervasive, to chlorite and carbonate.
VEINS/FRACTURES: 1%; 1-2 mm wide in zone 1.5 cm wide; sub-perpendicular; filled with carbonate and sulfide; the wide zone contains anastomosing sulfide with subordinate amounts of carbonate; large vug 2 cm long in Piece 5, lined with euhedral quartz crystals and sulfide.
ADDITIONAL COMMENTS: This is a continuation of 125-786B-68R-1 to 69R-5.

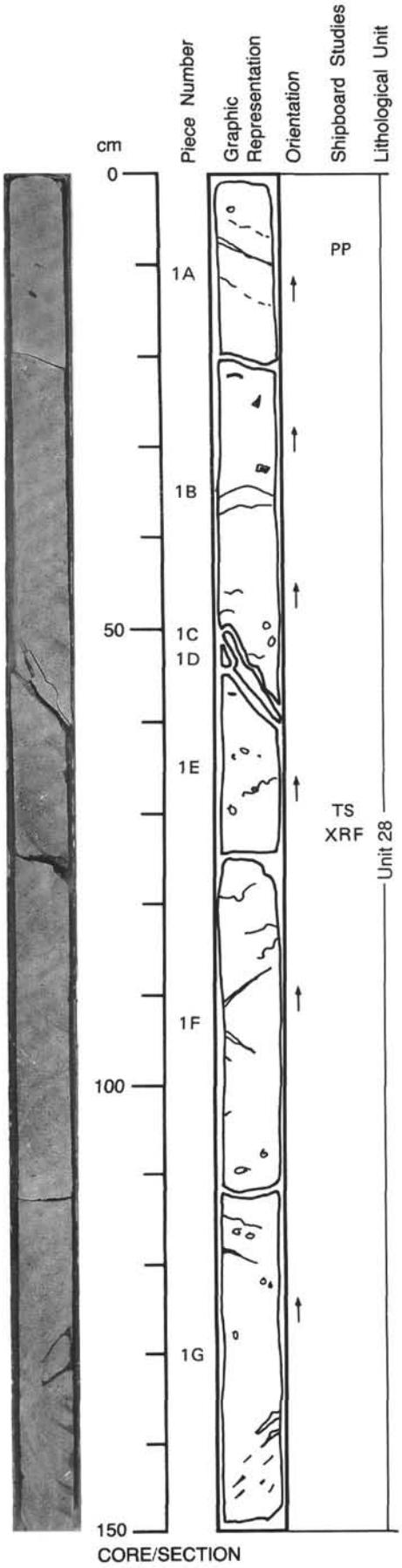


125-786B-69R-7

UNIT 28: META-TWO-PYROXENE ANDESITE (69R-6 CONTINUED)

Pieces 1-4

CONTACTS: None visible.
PHENOCRYSTS: Variably altered to chlorite and carbonate.
Clinopyroxene - 3-6%; <2 mm; euhedral, equant; altered.
Orthopyroxene - 5-10%; <1.5 mm; equant to elongate; altered.
Feldspar - 1%; <1 mm; tabular, elongate; altered.
Magnetite - trace; <0.25 mm; equant.
GROUNDMASS: Fine-grained, holocrystalline; plagioclase and pyroxene microcrysts.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive; Piece 4 multiple fragments, may be due to faulting; slickensides and pyrite veining are present.
ALTERATION: Chlorite and carbonate; pervasive.
VEINS/FRACTURES: <1%; 1-4 mm; 30-45 degrees to core axis; filled with carbonate and sulfide and a later episode of carbonate; Piece 4 has a vug 1 cm wide, filled with quartz and sulfide crystals with later-stage carbonate.
ADDITIONAL COMMENTS: This rock is a continuation of 125-786B-68R-1 to 69R-6.

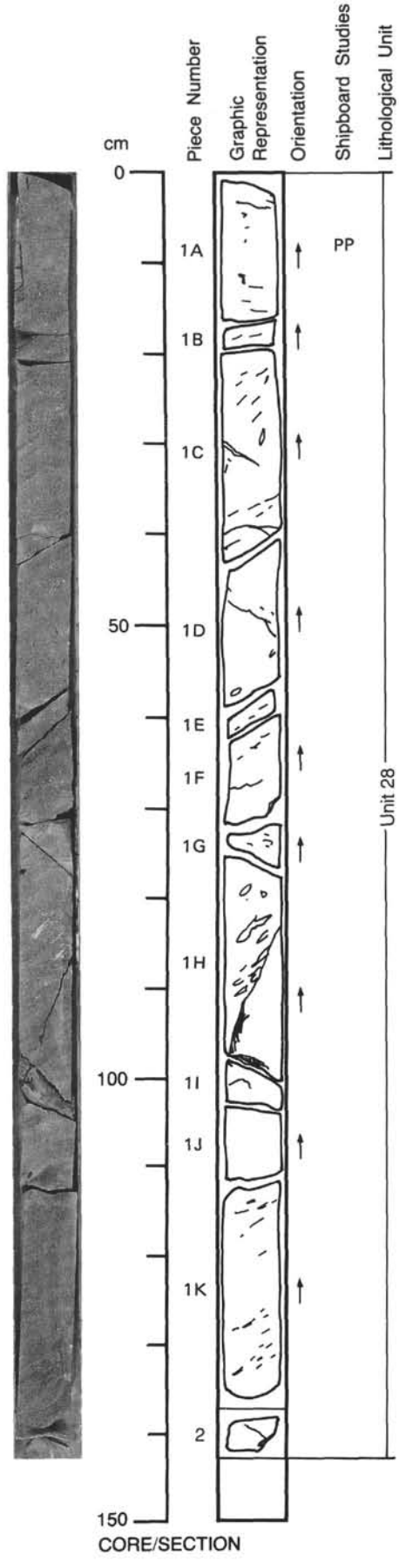


125-786B-70R-1

UNIT 28: META-TWO-PYROXENE ANDESITE (69R-7 CONTINUED)

Pieces 1A-1G

CONTACTS: None visible.
PHENOCRYSTS: Variably altered to carbonate and chlorite, glomerocrysts of pyroxene.
Clinopyroxene - 5-7%; <2 mm; equant, euhedral.
Orthopyroxene - 7-10%; <1,5 mm; equant to elongate, euhedral; variably altered.
Feldspar - 1-2%; <1-2 mm; elongate, tabular; euhedral.
GROUNDMASS: Fine-grained, holocrystalline; altered to chlorite and carbonate.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Variable intensity; pervasive; chlorite and carbonate.
VEINS/FRACTURES: <1%; 1-2 mm wide; random; filled with sulfide and carbonate.
ADDITIONAL COMMENTS: The rock type is a continuation or the 125-786B-67R-1 to 69-7.

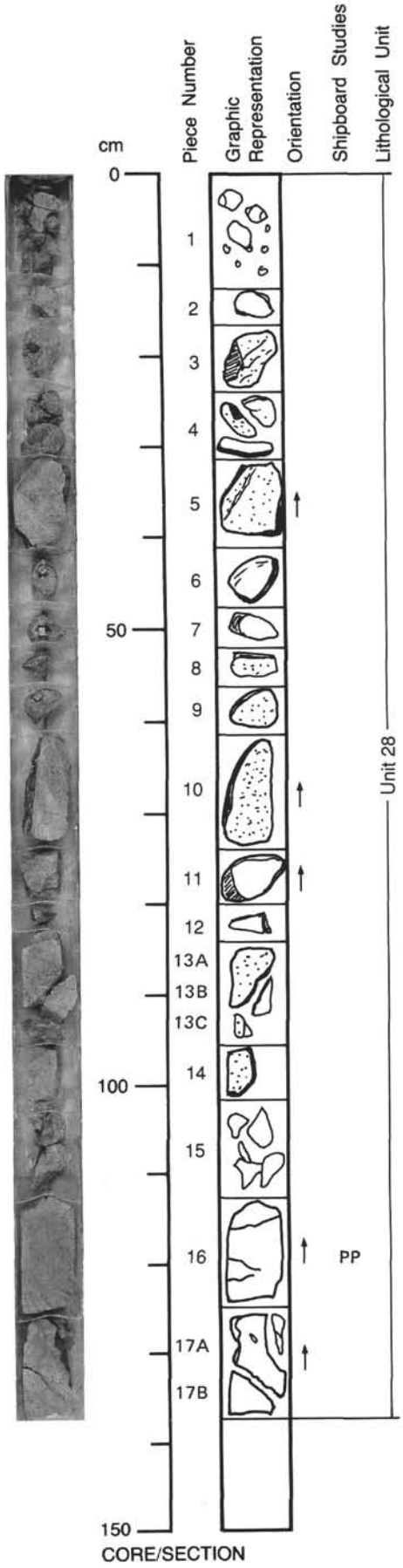


125-786B-70R-2

UNIT 28: META-TWO-PYROXENE ANDESITE (70R-1 CONTINUED)

Pieces 1A-1K, 2

CONTACTS: None visible.
PHENOCRYSTS: Variably altered to chlorite and carbonate, glomerocrysts of pyroxene.
Clinopyoxene - 5-8%; 1-2 mm; equant, euhedral, altered.
Orthopyroxene - 3-5%; <1.5 mm; elongate, euhedral.
Feldspar - 1%; <2 mm; tabular, euhedral.
Magnetite - trace; <0.25 mm; equant.
GROUNDMASS: Fine-grained, holocrystalline; microcrysts of plagioclase and pyroxene.
VESICLES: None.
COLOR: Greenish gray (95G 5/1).
STRUCTURE: Massive.
ALTERATION: Pervasive, variable, chlorite and carbonate.
VEINS/FRACTURES: 1-2%; 2 mm by 8-12 mm fractures; at 45 degrees to core axis; filled with chlorite, appear to be tension gashes.
ADDITIONAL COMMENTS: Rock is a continuation of 25-786B-67R-1 to 70R-1

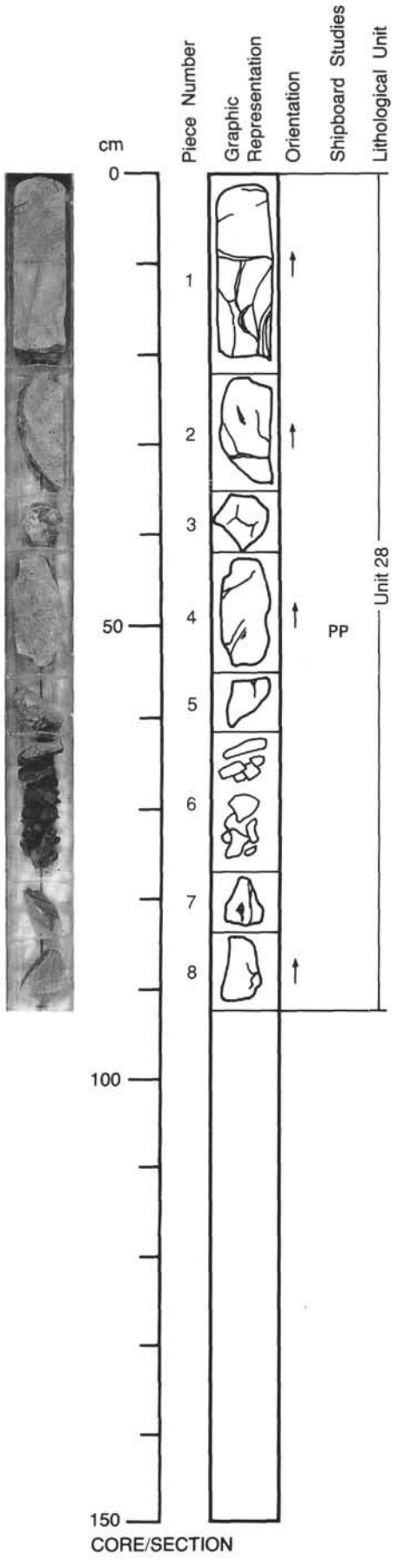


125-786B-70R-3

UNIT 28: META-TWO-PYROXENE ANDESITE (70R-2 CONTINUED)

Pieces 1-17

CONTACTS: None visible.
PHENOCRYSTS: Variably altered with carbonate, glomerocrysts and intersertal texture.
Clinopyroxene - 7-10%; <2 mm; equant to elongate, euhedral; altered.
Orthopyroxene - 3-5%; <1.5 mm; elongate, euhedral; altered.
Feldspar - <1%; 1 mm; elongate, tabular; altered.
Magnetite - trace; <0.25 mm; equant.
GROUNDMASS: Fine-grained, holocrystalline, microcrysts of feldspar and pyroxene.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive; Pieces 1 and 4 are composed of many fragments; Piece 3 is very altered and appears brecciated.
ALTERATION: Pervasive; chlorite and carbonate.
VEINS/FRACTURES: 1%; 1-2 mm wide; random; filled with carbonate and sulfide; also unfilled fractures.
ADDITIONAL COMMENTS: Rock is a continuation of 125-786B-67R-1 to 70R-2.

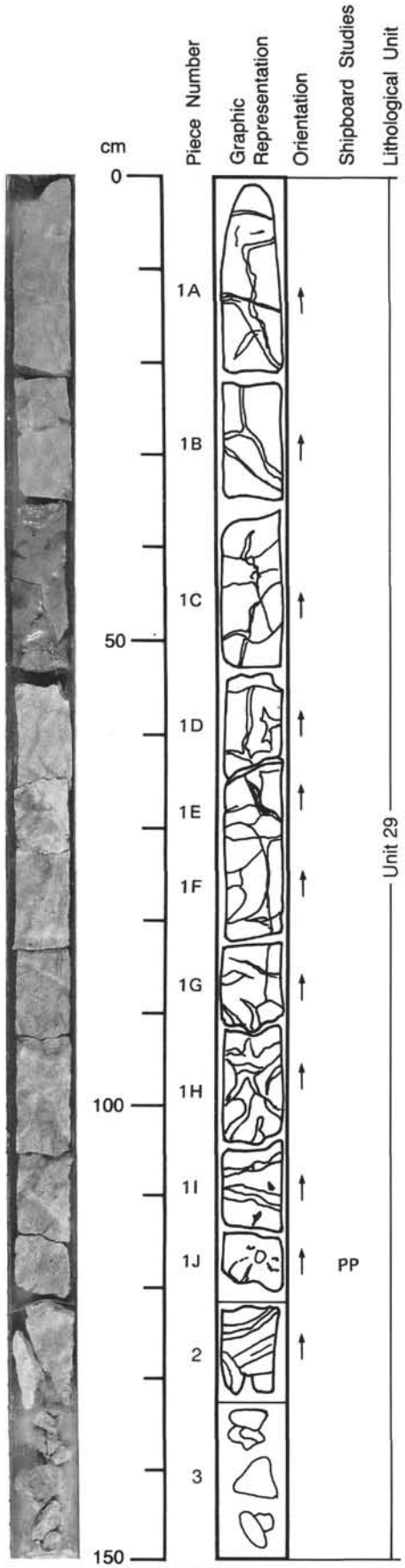


125-786B-70R-4

UNIT 28: META-TWO-PYROXENE ANDESITE (70R-3 CONTINUED)

Pieces 1-8

CONTACTS: None visible.
PHENOCRYSTS: Altered to chlorite and carbonate; glomerocrysts of pyroxene.
Clinopyroxene: 7-10%; 1-2 mm; equant to elongate, euhedral; altered; magnetite inclusions.
Orthopyroxene - 4-7%; <1.5 mm; elongate, euhedral; altered; magnetite inclusions.
Feldspar - <1%; <1-2 mm; tabular, altered.
Magnetite - <1%; 0.25 mm; equant.
GROUNDMASS: Fine-grained, holocrystalline; altered to chlorite and carbonate.
VESICLES: None.
COLOR: Greenish gray (5G 5/1).
STRUCTURE: Massive.
ALTERATION: Chlorite and carbonate; pervasive.
VEINS/FRACTURES: <1%; 1-2 mm; random; filled with carbonate and sulfide.
ADDITIONAL COMMENTS: Rock is a continuation of 125-786B-67R-1 to 70R-4.



125-786B-71R-1

UNIT 29: ANDESITE STOCK WORK ZONE

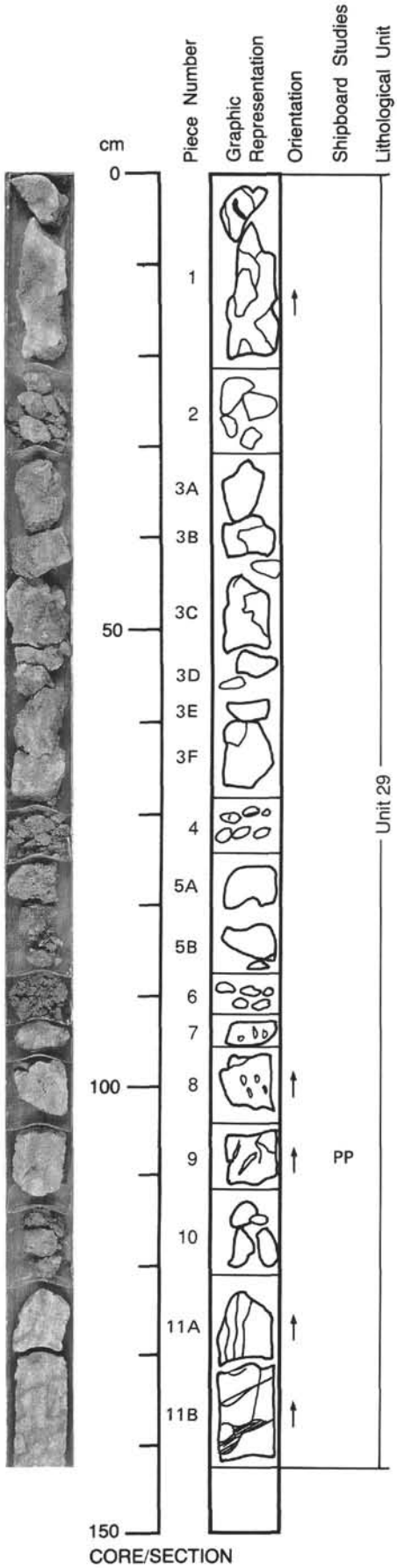
Pieces 1-2

CONTACTS: None visible.
PHENOCRYSTS: Pyroxene and plagioclase are extensively altered.
Plagioclase - 2-3%; <2 mm; euhedral laths.
Pyroxene - 8-10%; <2 mm; subhedral.
GROUNDMASS: Fine-grained, holocrystalline; granular; totally altered.
VESICLES: None.
COLOR: Host andesite: greenish gray (5BG 6/1) to dark greenish gray (10Y 5/2); more altered stock work is light gray (10YR 7/1).
STRUCTURE: Stockwork breccia with clasts <10 cm in size (autobrecciation).
ALTERATION: Pervasive chloritization, sulfidation, argillic alteration.
VEINS/FRACTURES: 10-20%; <30 mm; predominantly sub-vertical & horizontal; multiple generations of fill; wall-rock reaction increases from 5 to 25 mm downhole; veins filled with sulfides, clays and epidote.
ADDITIONAL COMMENTS: This section represents an argillaceous zone in a mineralized stockwork.

UNIT 29: ALTERED-MINERALIZED CATACLASTITE

Piece 3

CONTACTS: None visible.
PHENOCRYSTS: Rock is completely altered: no primary minerals remain.
GROUNDMASS: Clay, epidote, sulfide.
VESICLES: None.
COLOR: Light greenish gray (5B 7/1).
STRUCTURE: Cataclasite.
ALTERATION: Argillic.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Disseminated sulfides, <1.5%, in cubic morphology.



125-786B-71R-2

UNIT 29: ANDESITE STOCKWORK

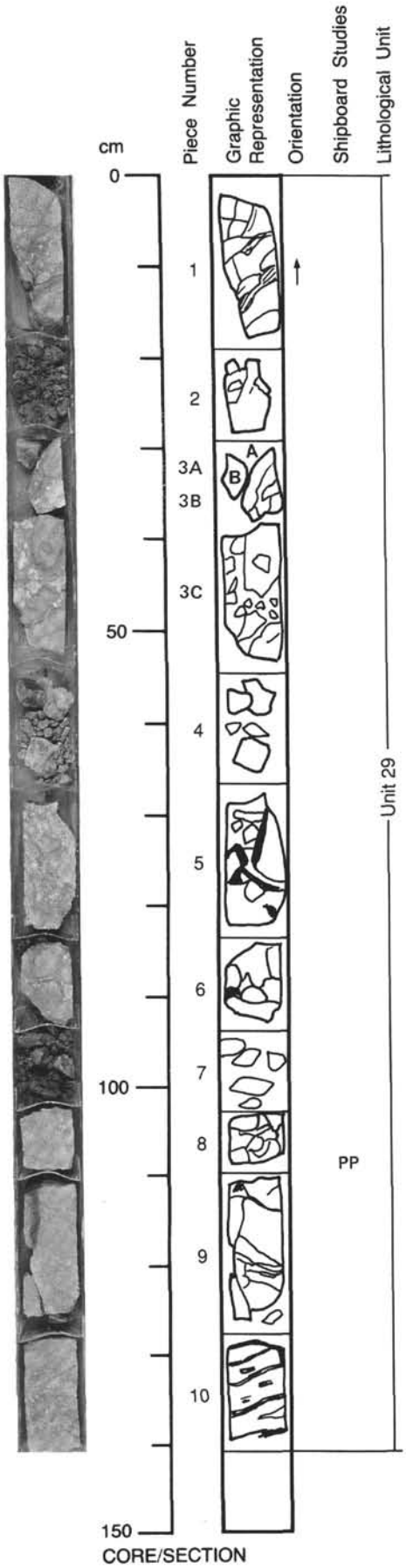
Pieces 1, 5, 7-11

CONTACTS: None visible.
PHENOCRYSTS: Pyroxene and plagioclase extensively altered.
Plagioclase - 2-4%; <1.5 mm; euhedral laths.
Pyroxene - 5-10%; <2 mm; euhedral, tabular.
GROUNDMASS: Fine-grained, holocrystalline; granular; totally altered.
VESICLES: 0-5%; <<5 mm; elongate; irregular; coating of pyramidal quartz and sulfide in some vesicles.
COLOR: Host andesite is greenish gray (5BG 6/1) to dark greenish gray (10Y 5/2); more altered stockwork is light gray (10YR 7/1).
STRUCTURE: Stockwork breccia with clasts <7 cm in size (autobrecciation).
ALTERATION: Pervasive argilllic, chloritic, silicic and sulfidation (disseminated 0.5% pyrite cubes).
VEINS/FRACTURES: 10-40%; <20 mm; stockwork; in Pieces 7 - 11, wall-rock alteration decreases downhole; from 1 - 5 mm width.
ADDITIONAL COMMENTS: Continuation of stockwork in 125-786B-71R-1.

UNIT 29: ARGILLITIZED-MINERALIZED STOCKWORK

Pieces 2-4, 6

CONTACTS: None visible.
PHENOCRYSTS: Pieces are completely altered; no primary minerals remain.
GROUNDMASS: Clay, epidote, quartz and sulfide.
VESICLES: None.
COLOR: Greenish gray (5B 7/1).
STRUCTURE: Cataclasite.
ALTERATION: Argillic.
VEINS/FRACTURES: None.
ADDITIONAL COMMENTS: Disseminated sulfides <1%; 0.1 mm; throughout.

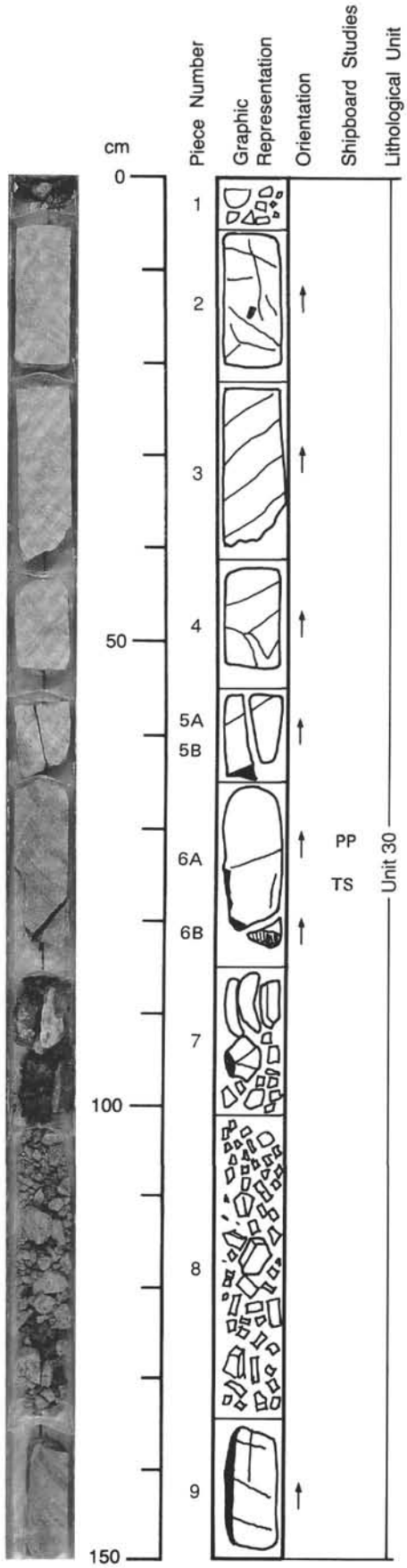


125-786B-71R-3

UNIT 29: CLINOPYROXENE PLAGIOCLASE BASALT CATACLASTITE (CONTINUATION OF 71R-2)

Pieces 1-10

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 4%; <2 mm; completely altered to clays.
Clinopyroxene - 8%; <1.5 mm; completely altered to chlorite.
GROUNDMASS: Fine-grained; completely altered to albite/chlorite; contains disseminated pyrite.
VESICLES: Absent.
COLOR: Light gray to gray (7.5YR 7/0 - 6/0).
STRUCTURE: Cataclastic.
ALTERATION: Ground to clay in fracture zones; pyroxene and plagioclase phenocrysts and groundmass are extensively altered to clay and chlorite.
VEINS/FRACTURES: 15%; locally fractured; randomly oriented; some zones are entirely pulverized; interval from 0-110 cm is intensely fractured.
ADDITIONAL COMMENTS: Continuation of 125-786B-71R-1; clasts range from 0.5 to 8 cm.

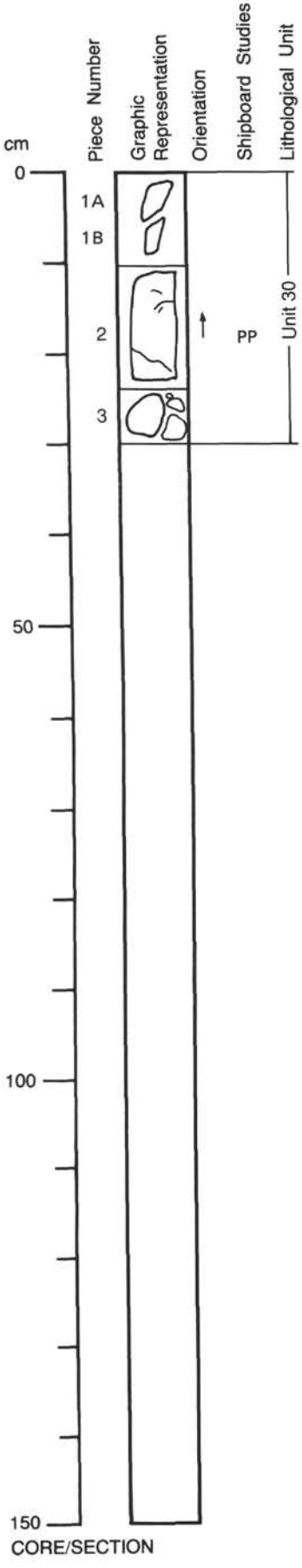


125-786B-71R-4

UNIT 30: CLINOPYROXENE PLAGIOCLASE BASALT CATACLASTITE (CONTINUATION OF 71R-2)

Pieces 1-9

CONTACTS: None visible.
PHENOCRYSTS:
Plagioclase - 3-5%; <1.5 mm; completely altered to clays except in Pieces 6, 7 and 9.
Clinopyroxene - 8%; <1.5 mm; completely altered to chlorite except in Pieces 6, 7 and 9.
GROUNDMASS: Fine-grained; completely altered to albite/chlorite, contains disseminated pyrite.
VESICLES: Absent.
COLOR: Light gray to gray (7.5YR 7/0 -6/0) and very dark gray (2.5YR 3/0) when fresh.
STRUCTURE: Cataclastic.
ALTERATION: Extensively altered to clay, albite, and chlorite except for Pieces 6, 7, and 9.
VEINS/FRACTURES: n/a; <0.1 mm; randomly oriented; fractured in Pieces 2-5 and in Piece 8.
ADDITIONAL COMMENTS: Continuation of 125-786B-71R-3.

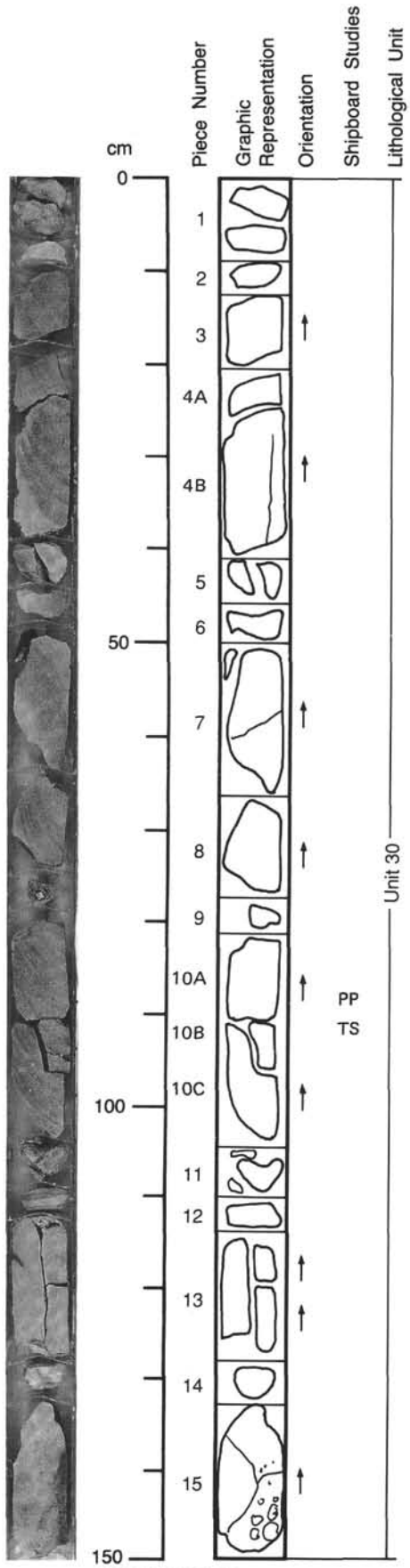


125-786B-71R-5

UNIT 30: CLINOPYROXENE-OLIVINE BASALT (CONTINUATION OF 71R-4) CLINOPYROXENE-PLAGIOCLASE BASALT

Pieces 1-3

CONTACTS: None visible.
PHENOCRYSTS: Extensively altered to albite/chlorite.
Plagioclase - 2-3%; <1.5 mm; altered to clay.
Clinopyroxene - 5-8%; <2 mm; altered to chlorite, some fresh.
Olivine - 2%; <3 mm; altered to white calcite with a green chlorite/serpentine rim.
GROUNDMASS: Fine-grained, completely altered to chlorite.
VESICLES: Absent.
COLOR: Gray to dark greenish gray.
STRUCTURE: Massive.
ALTERATION: Extensively altered.
VEINS/FRACTURES: Some pyrite and calcite in veins and fractures.
ADDITIONAL COMMENTS: Continuation of 125-786B-71R-4.

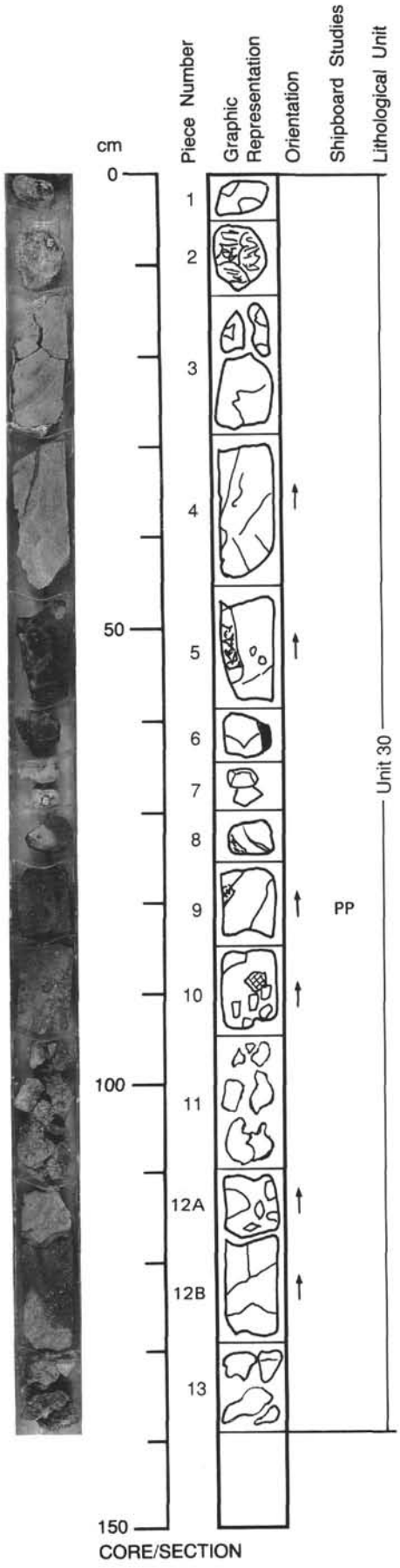


125-786B-72R-1

UNIT 30: CLINOPYROXENE-OLIVINE BASALT

Pieces 1-15

CONTACTS: None visible.
PHENOCRYSTS: Extensively altered.
Plagioclase - 1-2%; <1.5 mm; altered to clay.
Clinopyroxene - 5-8%; <2 mm; altered to chlorite, locally fresh.
Olivine - 2%; <2 mm; altered to white calcite with a green chlorite/serpentine rim.
GROUNDMASS: Fine-grained, completely altered to chlorite and albite.
VESICLES: Absent.
COLOR: Gray to dark greenish gray (5BG 4/1).
STRUCTURE: Massive.
ALTERATION: Extensively altered.
VEINS/FRACTURES: Pieces 1, 2, and 15 are fractured and altered; chlorite and calcite in fracture surfaces.
ADDITIONAL COMMENTS: Continuation of 125-786B-71R-5.



125-786B-72R-2

UNIT 30: CLINOPYROXENE-PLAGIOCLASE BASALT (CONTINUATION OF 72R-1)

Pieces 1-13

CONTACTS: None visible.
PHENOCRYSTS: Extensively altered.
Plagioclase - 5%; <1.5 mm; altered to clay.
Clinopyroxene - 5%; <2 mm; altered to chlorite, some fresh.
Olivine - 2%; <2 mm; altered to calcite and chlorite/serpentine.
GROUNDMASS: Fine-grained, completely altered to chlorite/calcite.
VESICLES: Absent.
COLOR: Gray to dark greenish gray.
STRUCTURE: Massive.
ALTERATION: Extensively altered to chlorite/albite.
VEINS/FRACTURES: Strongly brecciated areas contain abundant disseminated pyrite, locally pulverized to clays.
ADDITIONAL COMMENTS: Continuation of 125-786B-72R-1

125-786A-12X-01 (140-142 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Basalt

GRAIN SIZE:

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	<1	1-1.4		Equant	98% altered to clays.
Plagioclase	2-3	5-10	0.2-1.5		Subhedral-anhedral	Laths, 50-100% altered.
Clinopyroxene	3-5	7-12	0.2-1.2		Euhedral-subhedral	Twinned.
Spinel	<1	<1	0.05-0.1		Subhedral	Rounded to equant and euhedral.
GROUNDMASS						
Glass	0	75-85	N/A		N/A	100% altered.
Plagioclase	<1	4-6	0.01-0.05		Lath, quench	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	80-90	Glass and quench plagioclase	Brown, amorphous, pervasive.
Hematite	<1-1	Glass, veins	Red-brown, opaque, amorphous.
Zeolite	2-3	Vesicles	Isotropic to very low birefringence, fine-grained.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-10	Throughout	0.1-13	Some zeolite	Oval-ragged

COMMENTS: Glomerocrysts up to 3 mm of clinopyroxene and clinopyroxene plus plagioclase. No piece # given.

125-786A-12X-CC (24-26 cm) OBSERVER: TER WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Monogenetic pyroclastic rock

GRAIN SIZE: 0.01-4 mm

TEXTURE: Hyalo-ophitic texture, glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	2	4	0.1-4		Euhedral-subhedral	Olivine partly replaced by carbonate.
Clinopyroxene	<2	2	0.05-1		Euhedral-subhedral	2V=+60 degrees.
Spinel	<1	<1	0.01-0.1		Euhedral-subhedral	Spinel is included in olivine.
Orthopyroxene	10	10	0.05-1.5	Bronzite	N/A	2V=-80 degrees, compositional zoning in some crystals, glomerophyric texture.
GROUNDMASS						
Glass	35-40	80-85	N/A		N/A	Partly fresh.
Clinopyroxene	Trace	Trace	0.01-0.05		Euhedral	Augite, showing prismatic shape (see comments).
Orthopyroxene	Trace	Trace	0.01-0.05		Euhedral	Showing prismatic shape.
Opaque	Trace	Trace	0.01-0.03		Euhedral	Existing in the glass.
Plagioclase	1	1	0.01-0.05		Euhedral	Showing prismatic shape under crossed polars. Clinoestatite with lamellar twins.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	40-45	Olivine, glass	Dark brown clays are replacing olivine and glass.
Carbonate	5	Olivine, glass	In vesicles; carbonates are replacing olivine and glass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	30-40	Random	0.02-1	Clay	Round	Vesicles are partly filled by clay and carbonate.

COMMENTS: Olivine crystals contain euhedral Cr-spinel and are surrounded by reaction rim of orthopyroxene. Clinopyroxene-olivine-orthopyroxene basaltic andesite magma was quenched and fragmented, then lithic fragments and matrix are made from the same rock. Matrix is more altered than lithic part, the glass of which is very fresh. Clinopyroxenes in groundmass are both Ca-rich and Ca-poor, or augite and "clinoenstatite", respectively. No piece # given. GROUNDMASS: Low-Ca-clinopyroxene; 1-2%; 0.01-0.05 mm; euhedral; equals clinoenstatite, showing lamellae twin.

125-786A-13X-CC (27-29 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-phyric high-magnesian basalt

GRAIN SIZE:

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	<1	<1	0.1-0.5		Subhedral	In glomerocryst with orthopyroxene.
Spinel	Trace	Trace	0.01		Euhedral-subhedral	
Orthopyroxene	12-17	15-20	0.1-1.5		Euhedral-subhedral	Frequently as glomerocrysts; spinel inclusions in rounded crystals.
GROUNDMASS						
Glass	35-40	40-45	N/A		N/A	Colorless, high relief.
Plagioclase	10-12	12-15	0.02-0.15		Quenched, needles	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	35-45	Glass matrix	Brown amorphous clay, pervasively replacing the matrix between fresh clasts of andesite.
Carbonate	7-10	Vesicles, veins	Lines vesicles (0.02 mm thick) and forms veins (0.01-0.1 mm thick).
Chlorite	2-5	Glass, pyroxene	Light green-yellow, pleochroic, amorphous to fibrous.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	>10	Throughout	0.1-0.5	Carbonate	Oval

COMMENTS: Rock is a breccia of moderately phyric, orthopyroxene-rich glassy andesite fragments in a chloritized clay matrix. No piece # given.

125-786A-14X-CC (7-8 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-phyric boninite

GRAIN SIZE: 0.1-2 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Spinel	<1	<1	0.05-0.1		Subhedral	Mostly low birefringence.
Orthopyroxene	5-7	7-10	0.1-2		Euhedral-subhedral	Random distribution, except for concentration in glomerocrysts.
GROUNDMASS						
Glass	0	70-85	N/A		N/A	No quench phases visible.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass	Brown-gray, amorphous, pervasive throughout matrix and many phenocrysts.
Carbonate	10-12	Vesicles	White, radiating crystals.
Chlorite	15-20	Glass, pyroxenes	Light green, fine-grained, replacing matrix and especially trapped glass associated with glomerocrysts.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-15	Throughout	0.5-3	60%	Round to irregular

COMMENTS: Glomerocrysts of orthopyroxene 1-4 mm in diameter. Pervasive clay and minor chlorite and zeolite(?) alteration obscure original textural and mineralogical features. Similar to 786A-18X-2, 0-2 cm, Piece 1. No piece # given.

125-786A-14X-CC (9-10 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Brecciated two-pyroxene boninite

GRAIN SIZE: Glassy, 0.2-1.5 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	<1	<1	0.5-1.5		Euhedral(relict)	90% altered; outline and small relict fragments (0.1 mm) remain.
Clinopyroxene	1-2	1-2	0.3-1		Euhedral-subhedral	Usually in glomerocrysts with orthopyroxene.
Orthopyroxene	7-10	8-12	0.2-1.5		Euhedral-subhedral	Glass inclusions, spinel inclusions, glomerocrysts.
GROUNDMASS						
Glass	40-60	70-80	N/A		N/A	
Plagioclase	5-7	7-10	0.02- 0.12		Needles, quench texture	Locally aligned.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10-15	Glass	Light brown-yellow, amorphous, occurs with chlorite.
Carbonate	15-20	Vesicles, veins	Light yellow, white; lines vein walls.
Chlorite	20-30	Glass	Light brown-green, pleochroic, fine-grained or amorphous.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	12-17	Throughout	0.1-0.5	Carbonate	Round-elon gate

COMMENTS: Rock may be autobrecciated-matrix material is chlorite and/or smectite-rich and appears to be crushed or altered glass such as that found in the clasts. Clasts of glassy andesite set in green, altered matrix. No piece number given.

125-786A-16X-CC (25-28 cm) OBSERVER: TER WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Olivine-plagioclase-clinopyroxene basalt

GRAIN SIZE: 0.1-3 mm

TEXTURE: Hyalo-ophitic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1	0.5-3		Euhedral-subhedral	One olivine pseudomorph in section.
Plagioclase	3	3	0.1-2		Euhedral	Partly resorbed.
Clinopyroxene	5	5	0.1-0.5		Euhedral-subhedral	2V=+60 degrees.
Spinel	Trace	Trace	0.001-0.005		Euhedral	Inclusion in olivine pseudomorph.
Orthopyroxene	3	3	0.1-2		Euhedral-subhedral	Making glomerophyric aggregate with augite.
GROUNDMASS						
Glass	20-30	75-80	N/A		N/A	Partly devitrified to clays.
Plagioclase	10	15	0.01-0.02		Euhedral, laths	
Augite	2	2	0.01-0.02		Euhedral, prismatic	
Orthopyroxene	1	1	0.02-0.03		Euhedral, prismatic	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-55	Glass and olivine	Replacing olivine and glass. Pale brown in color.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Random	0.1-4	None	Round

COMMENTS: Glass-rich volcanic rocks. Glass is partly fresh, partly altered to clays. Olivine pseudomorph and orthopyroxene and augite make glomerophyric texture. Groundmass minerals are very fine grained, indicating quench texture. No piece # given.

125-786A-17X-CC (44-46 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Glassy basalt margin

GRAIN SIZE: Glassy; phenocrysts (0.2-1 mm)

TEXTURE: Glassy margin, sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	<1	1-2	0.1-0.4		Euhedral-subhedral	
Clinopyroxene	1-2	3-7	0.2-1		Euhedral-subhedral	With magnetite/spinel inclusion.
Spinel	Trace	Trace	<0.02		Euhedral	Fresh, often as inclusions.
Orthopyroxene	<1	1-3	0.2-0.4		Subhedral	75% altered to chlorite + clays.
GROUNDMASS						
Glass	10-15	85	N/A		N/A	Clear with quench plagioclase.
Plagioclase	2-5	3-7	0.01-0.1		Laths, quench	Tiny needles within glass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass	Brown amorphous.
Chlorite	5-7	Glass	As veins. Slight yellow-green pleochroism.
Prehnite?	5?-7	Veins	Abnormal birefringence for clays and some development of bow-tie structure.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: May be flow-banding or glassy layers interbedded in sediments. No piece # given.

125-786A-18X-02 (Piece 1,0-2 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-phyric boninite

GRAIN SIZE: 0.1-1.5 mm

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Orthopyroxene	<1-1	1-3	0.1-1.3		Equant-subhedral	90% altered to clays and chlorite.
Spinel	N/A	N/A	0.01-0.1	Cr-rich	Euhedral	Blood red-black, disseminated.
GROUNDMASS						
Clinopyroxene	5-7	15-20	0.1-0.2		Euhedral-laths	Quench texture "tails", altered to chlorite.
Glass	0	70-80	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	30-40	Glass, pyroxene	Brown, amorphous, occur as globular patches up to 0.2 mm in diameter and intimately mixed with chlorite.
Zeolite	Trace	Vesicle filling	Parallel extinction.
Chlorite	50-60	Glass, pyroxene	Yellow-green, birefringent, radiating habit, pleochroic.
Hematite	3-5	Matrix	Intimately mixed with chlorite and clays present throughout.
Carbonate	10-15	Vesicles	Lines vesicles, high birefringence, parallel extinction.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	10-15	Throughout	0.1-1.5	Carbonate	Irregular	Filled with white, radiating mineral with parallel extinction; carbonate?

COMMENTS: Clay patches appear in glass-rich (relict) areas while chlorite-rich alteration is concentrated in the microphyric matrix portions. Much of the texture and primary mineralogy is obscured by alteration. Similar to 786A-14X-CC (7-8 cm).

125-786A-19X-CC (17-20 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Basalt

GRAIN SIZE: Fine-grained

TEXTURE: Glassy

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	<1	<1	<0.8		Euhedral	>90% altered to clay and chlorite.
Orthopyroxene	<1	<1	<0.5		Subhedral	>95% altered to clay and chlorite.
GROUNDMASS						
Clinopyroxene	10-15	15-20	<0.2		Subhedral	Equant and tabular; some have quench texture.
Orthopyroxene	<5	5-10	<0.2		Subhedral	Tabular; some have quench textures.
Spinel	1-2	1-2	<0.02		Subhedral	Equant.
Glass	<10	75-80	N/A		N/A	Pale yellow, devitrified.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	20-30	Glass	Brown, clustered around vesicles.
Carbonate	1-2	Pyroxene, vesicles	
Zeolites	3-7	Vesicles	Radiating, pale yellow, mixed with chlorite.
Chlorite	55-65	Glass	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-10		<0.8	Chlorite, clay, zeolites	Round

COMMENTS: No piece # given.

125-786B-1R-01 (Piece 2,3-6 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase phyric boninite

GRAIN SIZE: 0.3-2 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	7-10	8-10	0.3-2		Euhedral-rounded	Glass inclusions, complex twinning, normal, reverse, and oscillatory zoning.
Clinopyroxene	5-7	6-7	0.3-1.5		Euhedral-anhedral	Complex twinning, glass inclusions.
Spinel	Trace	Trace	<0.1		Subhedral	Appear randomly distributed, may be alteration.
Orthopyroxene	2-3	2-4	0.5-1.5		Euhedral	Glass inclusions.
GROUNDMASS						
Glass	5-65	75-85	N/A		N/A	Minor pervasive chlorite alteration.
Plagioclase	6-10	12-15	<0.1		Quench laths	Locally aligned and deflected around phenocrysts.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3-5	Glass	Brown amorphous clay pervasively altering glass.
Chlorite	20-25	Glass	Fine-grained and pervasive lending a slight green pleochroism to the glassy matrix.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-7	Throughout	0.5-3	No	Elongate

COMMENTS: Glomerocrysts of pyroxene and plagioclase up to 4 mm in diameter; also of plagioclase only.

125-786B-1R-01 (Piece 6,26-28 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase phyric boninite

GRAIN SIZE: 0.3-1.2 mm, medium

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	6-8	7-9	0.15-1.2		Euhedral-subhedral	Spinel inclusions, Carlsbad twinning.
Clinopyroxene	9-11	10-12	0.7-1		Euhedral-subhedral	Frequently twinned, spinel inclusions, glass inclusions.
Spinel	Trace	Trace	0.01		Euhedral	
Orthopyroxene	2-4	3-5	0.3		Euhedral-subhedral	Spinel and glass inclusions.
GROUNDMASS						
Glass	<5	65-75	N/A		N/A	Devitrified.
Plagioclase	6-8	7-10	0.02-0.1		Laths	Usually twinned.
Clinopyroxene	3-5	4-5	0.02-0.08		Equant, euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	60-70	Glass	Dark brown, amorphous, pervasive.
Hematite	Trace	Clinopyroxene	In fine-grained glomerocrysts.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-12	Throughout	0.1-2	No	Oval

COMMENTS: Glomerocrysts of orthopyroxene, clinopyroxene and plagioclase are abundant.

125-786B-3R-01 (Piece 2,12-15 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase boninite

GRAIN SIZE: 0.2-1.5 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-5	5-7	0.2-1.2		N/A	Abundant twins, glass and spinel inclusions.
Clinopyroxene	2-5	3-5	0.5-1		Euhedral-subhedral	Zoned with relict subrounded cores, glass and spinel inclusions.
Spinel	Trace	Trace	0.01-0.05		Euhedral	
Orthopyroxene	7-10	8-10	0.4-1.5		Euhedral-subhedral	Deep brown, fresh glass inclusions.
GROUNDMASS						
Glass	<5	75-80	N/A		N/A	
Plagioclase	4-5	5-7	0.2-0.3		Laths	Quench crystals and needles.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass	Brown, amorphous, pervasive.
Chlorite	1-3	Veins	Green-light yellow-brown, <0.1 mm wide.
Hematite	<1	Orthopyroxene	Rust orange, irregular shaped patches associated with fine-grained glomerocrysts.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-10	Throughout	0.1-3	No	Oval-round

COMMENTS: Glomerocrysts of orthopyroxene + or - clinopyroxene + or - plagioclase are frequent and have a bimodal grain size distribution (0.1-0.3; 0.7-1.0 mm). Clinopyroxenes are pale green in plane-polarized light (PPL) and slightly pleochroic.

125-786B-3R-01 (Piece 14,94-97 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase boninite breccia

GRAIN SIZE:

TEXTURE:

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1-2	2-3	0.5-1.5		Euhedral, laths	
Clinopyroxene	6-8	7-9	0.4-1.5		Euhedral-subhedral	Glass inclusions.
Spinel	Trace	Trace	<0.1		Equant-subhedral	Mainly present in groundmass.
Orthopyroxene	4-6	5-7	0.2-1		Subhedral	
GROUNDMASS						
Glass	10-15	15-20	N/A		N/A	Light brown to light yellow, ~1/3 devitrified.
Plagioclase	4-6	5-7	<0.1		Laths-needles-quench crystals.	
Matrix crystals	10-12	12-15	0.01-0.03		Subhedral	Crystals of pyroxene set in clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	60-70	Glass matrix	Brown, amorphous, pervasive and as matrix for breccia.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Finely brecciated, glassy, rounded boninite clasts 0.5-6 mm in diameter set in a clay-rich matrix.

125-786B-4R-01 (Piece 12,52-54 cm) OBSERVER: TER WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase boninite

GRAIN SIZE: 0.05-4 mm

TEXTURE: Hyalopilitic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2	1-4		Subhedral	Pseudomorphs.
Plagioclase	4	4	0.05-4		Anhedral-euhedral	Two generations.
Clinopyroxene	8	8	0.05-3	Augite	Euhedral-subhedral	Has compositional zoning. 2V=+60 degrees.
Spinel	Trace	Trace	0.02-0.1	Cr-spinel	Euhedral	Included in olivine pseudomorph.
Orthopyroxene	15	15	0.05-4	Bronzite	Euhedral-subhedral	2V=-80-85, Bushveld-type exsolution lamellae (=augite (100) lamellae) in some crystals.
GROUNDMASS						
Glass	0	67	N/A		N/A	Devitrified to clays.
Plagioclase	2	2	0.005-0.01		Euhedral, laths	
Augite	1	1	0.05-0.01		Euhedral, prismatic	
Orthopyroxene	1	1	0.01-0.05		Euhedral, prismatic	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-70	Glass, olivine	Replacing olivine and glass, brown in color.
Carbonate	1	Plagioclase(?)	
Opaque	1	Glass	Glass was replaced partly by opaque minerals.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20	Random	0.1-4	None	Round

COMMENTS: Some orthopyroxene grains have fine (100) augite lamellae (which are common in basic plutonic rocks) and are surrounded by reaction rim of clinopyroxene (augite 2V=+60 degrees). Olivine pseudomorph (now clays) contains euhedral Cr-spinel, and is surrounded by reaction rim of orthopyroxene (2V=80(-) degrees).

125-786B-5R-02 (Piece 2,12-14 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene phyric andesite

GRAIN SIZE: 0.2-4 mm

TEXTURE: Moderately phyric, glomerocrystic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	6-12	7-13	0.5-4		Euhedral	Some with spinel inclusions. Complex zoning: normal, reverse, oscillatory.
Clinopyroxene	10-20	11-20	0.2-2		Euhedral-anhedral	Has glass inclusions; twinning and zoning.
Spinel	<1	<1	0.01-0.1		Subhedral-anhedral	Randomly distributed.
Orthopyroxene	1-3	2-4	0.5-1.5		Anhedral-subhedral	Has glass inclusions.
GROUNDMASS						
Glass	30-40	45-65	N/A		N/A	Altered to clay + chlorite.
Plagioclase	5-10	10-15	<0.1		Quench laths	Locally aligned and deflected around phenocrysts.
Clinopyroxene	1-3	3-5	0.05		Subhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	25	Glass	Brown amorphous clays pervasively altering the glass and matrix material.
Chlorite	10	Glass	Fine-grained; slight green pleochroism.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-4	Throughout	0.3-2	No	Mostly elongate

COMMENTS: There are glomerocrysts of plagioclase + pyroxenes up to 3 mm in diameter. There are also glomerocrysts consisting entirely of plagioclase phenocrysts. Glomerocrysts occur with and without spinels.

125-786B-5R-02 (Piece 6C,38-41 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene andesite

GRAIN SIZE: 0.5-4 mm

TEXTURE: Moderately to sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	7-12	8-13	0.8-3.7		Euhedral	Some with spinel inclusions. Complex zoning, normal and reverse and oscillatory.
Clinopyroxene	15-20	17-20	0.3-2		Euhedral-anhedral	Spinel and glass inclusions, also relict rounded cores and complex zoning.
Spinel	<1	<1	0.01-0.2		Subhedral	Often as inclusions in plagioclase and clinopyroxene.
Orthopyroxene	1-3	2-4	0.8-1.7		Anhedral-subhedral	Crystals appear to have been broken from longer tabular crystals.
GROUNDMASS						
Glass	7-10	50-60	N/A		N/A	Patches of slightly fresh glass present in a brecciated texture.
Plagioclase	5-10	10-15	<0.1		Laths	Small tabular microphenocrysts and quench crystals.
Clinopyroxene	2-3	3-6	<0.05		Subhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	30-40	Glass	Brown amorphous clays, chlorite and hematite intermix and pervasively alter the glass and matrix material. There is a second-order patchy fabric.
Chlorite	12-15	Glass	
Hematite	15-20	Glass	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	1-3	Throughout	0.2-1.5	Not usually	Random, ragged	More concentrated and smoother in glassy portion.

COMMENTS: Sharp boundary between fine-grained, glassy-textured rock and phyric coarser-grained rock. May be mixing boundary. Plagioclase and clinopyroxene in glassy rock are small (<0.8 mm), less abundant and more altered than in coarse part. Glass is altered to hematite, chlorite and clays in both sections but more clay is present in the finer-grained portion. Glomerocrysts of two pyroxenes and plagioclase with and without spinel are present.

125-786B-5R-02 (Piece 7A,53-55 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Pyroxene-plagioclase basalt

GRAIN SIZE: 0.2-2 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	8-13	10-15	0.2-3		Euhedral	Glass inclusions, twinned, complex zoning.
Clinopyroxene	8-10	10-12	0.5-2		Euhedral-anhedral	Glass + spinel inclusions; complex twinning.
Spinel	<1	<1	<0.2		Subhedral-euhedral	Randomly distributed.
Orthopyroxene	2-6	3-7	0.5-2		Subhedral-euhedral	Has glass + spinel inclusions.
GROUNDMASS						
Glass	<2	65-70	N/A		Devitrified	Altered to clays.
Plagioclase	3-5	5-7	0.02-0.15		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	35-45	Glass	Brown, finely disseminated, amorphous, pervasive (and yellow).
Chlorite	3-5	Glass, plagioclase	Light yellow to brownish green, slightly pleochroic.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	3-5	Throughout	0.5-4	None	Random, irregular	Some may be voids caused during thin-section making.

COMMENTS: Glomerocrysts of pyroxene and plagioclase, of orthopyroxene and clinopyroxene, and of only plagioclase, from 1-3 mm in diameter. At least one example of clinopyroxene jacketing orthopyroxene.

125-786B-6R-01 (Piece 10,38-40 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Clinopyroxene-plagioclase-phyric andesite

GRAIN SIZE: Fine-grained

TEXTURE: Intersertal, moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	15-20	20-25	0.2-0.4		Euhedral-subhedral	Tabular, sparse spinel inclusions, some radiating clusters.
Clinopyroxene	8-12	20-15	0.1-0.8		Subhedral-anhedral	Dusty pink to gray, spinel inclusions, twinning.
Spinel	1-2	1-2	<0.02		Subhedral	Dispersed black, equant to irregular.
GROUNDMASS						
Glass	10-20	50-60	N/A		N/A	Brown to light green, altered to clays and chlorite.
Plagioclase	8-10	10-15	<0.02		Laths	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10-15	Glass, plagioclase	Brown to dark yellow, amorphous, pervasive in glassy areas and dispersed throughout.
Chlorite	45-50	Glass, plagioclase, pyroxene	Pale green to yellow-brown, slightly pleochroic.
Hematite	<5	Pyroxene	Completely alters and pseudomorphs pyroxene so that only outline and interior fractures are still present. This type of alteration is present in other thin sections associated with carbonate which may have been lost due to plucking in this section.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-12		0.15-3	No	Round-irregular

COMMENTS: There appear to be two generations of clinopyroxene - those still present and those now altered by hematite.

125-786B-6R-02 (Piece 23A,137-138 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Olivine-orthopyroxene-clinopyroxene basalt

GRAIN SIZE: 0.5-1.5 mm

TEXTURE: Glomerophyric and hyalo-ophitic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	4-5	1-1.5		Euhedral	Fully altered to brownish clay.
Plagioclase	<1	<1	0.2-0.5		Euhedral-subhedral	Twinning is common.
Clinopyroxene	5	5	0.5-1		Subhedral	Shows glomerophyric texture with orthopyroxene.
Spinel	Trace	Trace	<0.01		Euhedral	Occurs as inclusion in olivine crystal.
Orthopyroxene	3	3	0.5-1		Euhedral-subhedral	Shows pale green to pale red pleochroism.
GROUNDMASS						
Clinopyroxene	5-10	5-10	0.05-0.1		Euhedral-subhedral	Twinned, prismatic shape.
Plagioclase	10-20	10-20	0.1-0.2		Euhedral	Occurs as quenched, elongate crystals.
Glass	0	50-60	N/A		N/A	Fully altered to dusty, brownish clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	60-75	Olivine, glass vesicle	Brownish dusty clay replaces glass and olivine and fills in vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-10	Random	0.5-5	Brownish clay	Round

COMMENTS: This rock is relatively rich in olivine phenocrysts, that were fully altered to brownish clay. Clinopyroxene and orthopyroxene show glomerophyric texture.

125-786B-8R-01 (Piece 7,45-47 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Clinopyroxene-plagioclase phyric andesite

GRAIN SIZE: Fine-grained

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	18-24	20-25	0.2-1		Euhedral-subhedral	Spinel inclusions, lath shaped.
Clinopyroxene	4-6	5-7	0.2-1.2		Subhedral-anhedral	Dusty gray to gray green, spinel inclusions, glass inclusions.
GROUNDMASS						
Glass	8-12	35-40	N/A		N/A	
Plagioclase	10-15	15-20	<0.3		Needles	Preferred alignment throughout thin section.
Microlites	20	20-25	<0.02		Tabular	Higher relief than glass, no discernible optical properties.
Spinel	2-3	2-3	<0.01		Equant	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	25-30	Glass/matrix	Brown, amorphous, pervasive.
Zeolites	<2	Vesicles	Radiating needles.
Chlorite	10-15	Glass/matrix	Slight green-yellow pleochroism.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10-12	Throughout	0.2-4	No	Elongate to equant

COMMENTS: Glomerocrysts of plagioclase and clinopyroxene up to 1 mm across.

125-786B-9R-01 (Piece 2,10-13 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-clinopyroxene andesite

GRAIN SIZE: <2 mm

TEXTURE: Glomerophyric texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	10-15	0.5-2		Euhedral	Compositional zoning and twinning are common.
Clinopyroxene	1-2	1-2	0.5-1		Euhedral-anhedral	Compositional zoning and twinning are common.
Orthopyroxene	1-2	1-2	0.5-1		Euhedral	Occurs as euhedral, elongate crystal, showing relatively low birefringence.
GROUNDMASS						
Plagioclase	5-10	5-10	<0.4		Euhedral	Frequently showing quenched H-shaped crystals.
Clinopyroxene	Trace	Trace	<0.4		Euhedral	Showing quenched acicular crystal.
Orthopyroxene	Trace	Trace	<0.4		Euhedral	Showing quenched acicular crystal.
Glass	0	70-85	N/A		N/A	Fully altered to dusty brown clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	70-85	Glass	Replacing glass, dusty brown in color.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Phenocrysts and microphenocrysts define crude flow lamination and the later fracturing (parallel to the lamination) is developed throughout the rock. Phenocryst plagioclase is rarely fragmented and shows corroded form. Clinopyroxene, orthopyroxene and plagioclase often form glomerophyric texture.

125-786B-9R-01 (Piece 20A,113-118 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Pyroxene-plagioclase phyric andesite breccia

GRAIN SIZE: 0.5-2 mm, brecciated

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1-3	2-4	0.8-2		Subhedral	Moth-eaten texture.
Clinopyroxene	11-14	12-15	0.4-2		Euhedral-subhedral	Complex and frequent twinning, slight yellow-green pleochroism, spinel and glass inclusions.
Spinel	Trace	Trace	0.01-0.03		Euhedral	Black, primarily as inclusions.
Orthopyroxene	7-11	8-12	0.8-1.8		N/A	Spinel and glass inclusions.
GROUNDMASS						
Glass	15-30	55-65	N/A		N/A	Colorless to very faintly green.
Plagioclase	8-10	8-10	0.04-0.15		Equant and lath	Mostly elongate euhedral crystals.
Pyroxene	10-12	10-12	0.01-0.08		Needles and equant, diamonds	High birefringence needles and small equant crystals.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10-15	Glass/matrix	Brown, amorphous, pervasive replacing glass in part of thin section; also intimately mixed with chlorite in breccia matrix.
Chlorite	30-50	Breccia	Matrix, mixed with clays, filling between moderately altered glassy clasts.
Carbonate	3-5	Veins	Lines veins up to 0.02 mm thick.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3-4	Throughout	0.1-1	Some carbonate	Round

COMMENTS: Glomerocrysts of two pyroxenes with and without plagioclase. This brecciated section is difficult to describe using single mode estimates; the modes above assume the chlorite and clay breccia matrix was originally defined primarily from glass.

125-786B-11R-01 (Piece 18,122-126 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase phyric basalt

GRAIN SIZE:

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-12	11-13	0.5-2		Equant, altered	Glass and spinel inclusions, moth-eaten texture, zoning.
Clinopyroxene	9-11	10-12	0.5-1.2		Elongate, euhedral	Glass and spinel inclusions, complex and abundant twinning.
Spinel	Trace	Trace	<0.01		Euhedral	Primarily as inclusions.
Orthopyroxene	9-11	9-11	0.8-1.2		Elongate, euhedral	Glass and sparse spinel inclusions.
GROUNDMASS						
Glass	<3	45-55	N/A		N/A	Devitrified, locally fresh in glomerocrysts.
Plagioclase	2-3	2-3	0.1-0.2		Equant, lath-tabulars	
Pyroxene	3-5	3-5	0.1-0.2		Equant, subhedral	
Microlites	2-3	3-5	<0.01-0.02		Needles	Low birefringence, variable extinction.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-60	Glass-matrix crystals	Brown amorphous clay, pervasively altering the glassy matrix.
Chlorite	<5	Glass in glomerocrysts	Weakly birefringent, locally fibrous; yellow to yellow-green.
Hematite	Trace	Pyroxene	Amorphous, intimately mixed with chlorite, present only in the middle of pyroxene glomerocrysts.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-10	Throughout	0.1-3	No	Irregular

COMMENTS: Glass within glomerocrysts is slightly fresh, altering to minor chlorite but not brown clays. Glomerocrysts of one and two pyroxenes with and without plagioclase. Matrix phases are obscured by the intensive clay alteration of the glassy groundmass making a confident determination difficult.

125-786B-12R-02 (Piece 3,14-16 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Pyroxene-plagioclase phyric basalt

GRAIN SIZE: 0.1-1 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	9-11	10-12	0.1-0.8		Elongate, subhedral	Oscillatory zoning, moth-eaten texture with altered glass inclusions, spinel inclusions.
Clinopyroxene	7-9	8-10	0.15-1		Euhedral-subhedral	Complex twinning, spinel and altered glass inclusions.
Spinel	<1	<1	<0.01		Equant	In glassy matrix and as inclusions.
Orthopyroxene	4-7	5-7	0.1-1		Equant, euhedral	Glass inclusions, two growth phases (relict core).
GROUNDMASS						
Glass	<3	60-65	N/A		N/A	Devitrified in patches. Some have a small amount of fresher glass.
Microlites	1-3	3-5	<0.01		Needles	Probably plagioclase.
Clinopyroxene	3-5	3-5	0.05-0.1		Subhedral-euhedral	Equant microphenocrysts.
Plagioclase	1-2	1-2	<0.01		Equant	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	60-70	Glass/matrix	Brown to light yellow-brown, amorphous, pervasive after glassy matrix.
Chlorite	<1	Clinopyroxene	Chlorite + hematite alteration at the center of a clinopyroxene rich glomerocryst.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10-12	Throughout	0.1-3.5	No	Oval, round

COMMENTS: Glomerocrysts of orthopyroxene + or - clinopyroxene + or - plagioclase are common up to 4 mm in diameter. Individual grains are commonly rounded possibly indicating recrystallization or disequilibrium.

125-786B-12R-02 (Piece 17,120-124 cm) OBSERVER: TER WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene plagioclase boninite

GRAIN SIZE: 0.1-4 mm

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5	5	1-4		Euhedral-subhedral-anhedral	
Clinopyroxene	4	4	0.1-2	Augite	Euhedral-subhedral	2V=+40-60 degrees.
Opaque	Trace	Trace	0.1-0.2	Magnetite?	Euhedral-subhedral-anhedral	Inclusions in pyroxenes.
Orthpyroxene	7	7	0.1-2	Bronzite	Euhedral-subhedral	2V=-80-85 degrees, (100) exsolution lamellae are rare, augite rim is common, compositional zoning is common.
GROUNDMASS						
Plagioclase	5	5	0.02-0.1		Euhedral-subhedral, prismatic	
Augite	1	1	0.02-0.05		Euhedral-subhedral, prismatic	
Orthopyroxene	1	1	0.01-0.05		Euhedral-subhedral, prismatic	
Glass	35-40	70-80	N/A		N/A	Brown glass.
Opaque	Trace	Trace	~0.05		Subhedral	Magnetite(?).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	35-40	Glass	Replacing glass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5	Random	0.2-2	None	Round

COMMENTS: Orthopyroxene has (100) exsolution lamellae (rarely). In the groundmass glass, very fine needle-like crystals are observed. They may be pyroxene, but detail is not clear because the thin section is too thick (clinoenstatite?).

125-786B-15R-01 (Piece 1,0-1 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase micro-diorite

GRAIN SIZE: 0.5-2 mm

TEXTURE: Subhedral equigranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	50-60	55-65	0.3-1.5		Euhedral	Relict cores, oscillatory zoning, glass and spinel inclusions, pyroxene inclusions.
Clinopyroxene	2-5	8-15	0.2-1.2		Subhedral	Uralitized, spinel inclusions.
Spinel	5-7	5-7	0.1-0.4		Subhedral-euhedral	
Orthopyroxene	2-5	5-10	0.2-1.2		Subhedral	Uralitized.
GROUNDMASS						
N/A	N/A	N/A	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15-20	Plagioclase	Brown-gray clay, pervasive, replacing 50-95% of some plagioclase.
Chlorite	3-5	Orthopyroxene	Slight pleochroism, elongate crystals, parallel extinction.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

125-786B-16R-01 (Piece 20,137-144 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-phyric andesite

GRAIN SIZE: 0.2-1 mm

TEXTURE: Glomerophyric, moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-12	10-12	0.2-1		Euhedral-subhedral	Pale brown glass inclusions, spinel inclusions.
Clinopyroxene	8-10	8-10	0.2-0.8		Euhedral-subhedral	Rare spinel and glass inclusions, light green in PPL.
Spinel	Trace	Trace	0.01-0.1		Euhrdral-subhedral	Often associated with glomerocrysts.
Orthopyroxene	1-3	1-3	0.2-0.8		Euhedral	Rare spinel and glass inclusions.
GROUNDMASS						
Glass	35-45	37-47	N/A		N/A	Light brown glass (with microlites).
Microlites	35-45	35-45	<0.01-0.015		Needles/laths	Probably half plagioclase and half pyroxene. Too small to identify accurately.
Spinel	1	1	<0.01		Euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	3-6	Glass	Brown amorphous clays following perlitic pattern.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3-7	Throughout	0.1-2	None	Round-oval

COMMENTS: Glomerocrysts of plagioclase + or - pyroxene up to 3 mm diameter. This rock is very fresh although the matrix is microcrystalline with no patches of crystal-free glass. Same as rock in 786B-16R-02 (32-36 cm).

125-786B-16R-02 (Piece 6,32-36 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Brecciated andesite

GRAIN SIZE: 0.2-1 mm

TEXTURE: Brecciated glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	8-11	10-12	0.2-1		Euhedral-subhedral	Spinel and pale brown glass inclusions.
Clinopyroxene	6-9	8-10	0.2-0.8		Euhedral-subhedral	Glass and rare spinel inclusions, pale green in PPL.
Spinel	Trace	Trace	0.01-0.1		Euhedral-subhedral	Usually associated with glomerocrysts.
Orthopyroxene	1-3	1-3	0.2-0.8		Subhedral	Glass and rare spinel inclusions.
GROUNDMASS						
Glass	25-35	37-47	N/A		N/A	Light brown (interstitial to microlite mesh).
Microlites	25-35	35-45	<0.01-0.015		Needles/laths	Probably plagioclase and pyroxene in equal proportions.
Spinel	1	1	<0.01		Euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	20-35	Glass	Brown-gray, amorphous clay filling perlitic fractures and obscuring patches of glass/matrix.
Zeolites	8-10	Veins, vesicles	Low birefringence, acicular needles.
Chlorite	5-10	Glass, veins	Pale green-yellow, slightly pleochroic, low birefringence, 0.01-0.02 wide as veins.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	2-5	Throughout	0.1-1.5	Zeolite	Round-irre gular

COMMENTS: Same as 786B-16R-01 (137-144 cm), but brecciated and more altered especially along breccia zones. Glomerocrysts of plagioclase + or - pyroxene up to 2 mm in diameter.

125-786B-19R-01 (Piece 14,91-94 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite flow

GRAIN SIZE: Fine-grained

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	12-15	12-15	N/A		Euhedral	Spinel and glass inclusions.
Clinopyroxene	10-12	10-12	0.1-1.4		Euhedral	Spinel and glass inclusions, sparse twinning, pale green and slightly pleochroic.
Spinel	Trace	Trace	<0.1		Euhedral-subhedral	
Orthopyroxene	3-5	3-5	0.1-1.4		Euhedral-subhedral	Glass inclusions.
GROUNDMASS						
Glass	12-17	20-30	N/A		N/A	Pale to medium yellow-brown, 15-30% altered.
Matrix microlites	40-50	45-50	<0.01		Needles	Plagioclase and pyroxene needles (in glassy matrix).
Spinel	1	1	<0.01		Euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	10-25	Glass/matrix	Brown and gray amorphous clay altered in a patchy pattern, some patches 10-20% altered, some 30-40%.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3-7	Throughout	0.2-4	No	Round-oval

COMMENTS: Glomerocrysts of plagioclase + or - pyroxene up to 1.5 mm.

125-786B-21R-01 (Piece 3,26-29 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: 0.2-1.2 mm

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	12-15	14-17	0.2-1.2		Subhedral	Spinel inclusions, altered, moth-eaten, oscillatory zoning.
Clinopyroxene	5-7	6-9	0.2-0.8		Euhedral-subhedral	Pale-yellow-green in plane light, altered, rare twinning.
Orthopyroxene	1-2	2-4	0.2-0.6		Subhedral	Altered.
GROUNDMASS						
Glass	0	55-65	N/A		N/A	
Plagioclase	15-20	20-25	<0.2		Laths	
Magnetite	1	1	<0.02		Euhedral-subhedral	Equant, mostly in matrix, same as inclusions.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-65		Dark brown; patchy; pervasive; variable.
Chlorite	5-15	Pyroxene, glass	Slight pale yellow-green pleochroism.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	3-5	Throughout	0.1-1	No	Irregular	Some may have been plucked during thin-section making.

COMMENTS: Alteration boundary between <60% clay alteration to >75%. Plagioclase is typically moth-eaten and appears to be marking glomerocrysts of radiating plagioclase + or - pyroxene.

125-786B-21R-01 (Piece 7,59-63 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Volcanic breccia

GRAIN SIZE: Glassy

TEXTURE: Brecciated

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	8-10	10-12	<0.2		Anhedral	Fragmented. Do not have quench texture.
Spinel	<1	<1	<0.1		Subhedral	Dark blood-red to black.
GROUNDMASS						
Glass	20-40	80-90	N/A		N/A	Glassy fragments 0.5-2 mm in diameter in a clay matrix; fresh glass is yellow.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-70	Glass	Yellow-brown to dark brown, amorphous, pervasive, 10-20% of glass fragments, 100% of breccia matrix.
Chlorite	1-2	Glass	Along fractures in glassy pieces in breccia.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: One end of thin section is glass broken up in a clay matrix, the other is altered sediment with pyroxene fragments. The connecting portion is missing. The sediment is a hematite-stained clay matrix with 10% pyroxene lithic fragments. Faint layering is apparent.

125-786B-21R-01 (Piece 10,105-107 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesitic tuff

GRAIN SIZE: 0.3-2 mm

TEXTURE: Tuffaceous

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	3-7	4-8	0.4-2		Subhedral-euhedral	Twinning is common.
Clinopyroxene	1-2	1-2	0.3-1		Subhedral-euhedral	Pale green to colorless.
Spinel	1	1	<0.2		Euhedral	Black.
Orthopyroxene	2-3	2-3	0.3-1		Subhedral-euhedral	Pale green to colorless.
GROUNDMASS						
N/A	N/A	N/A	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	82-88	Matrix	Brown, amorphous, pervasive.
Chlorite	5	Matrix	Pale green to colorless and intermixed with clays.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-10	Random	<2 mm	N/A	Round, irregular

COMMENTS: Glomerocrysts of plagioclase + pyroxene up to 2 mm in diameter in a tuff.

125-786B-21R-01 (Piece 120,129-132 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Dacite

GRAIN SIZE: 0.1-1.2

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-7	6-8	0.3-1.2		Euhedral	Fractured, sparse glass inclusions.
Clinopyroxene	1-2	<2	0.15-0.18		Anhedral	
Spinel	<1	<1	0.1-0.2		Euhedral, irregular	
Orthopyroxene	<1	<1	N/A		Anhedral	Pale green to gray, sparse spinel inclusions.
GROUNDMASS						
Glass	65-70	65-75	N/A		N/A	Yellow-gold, locally devitrified, perlitic fracture.
Microlites	18-20	18-20	<0.02		Needles	Locally aligned.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	<10	Glass/veins	Brown to gray, amorphous.
Carbonate?	1-2	Veins	Very low birefringence, extinction perpendicular to vein.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3-6	Throughout	0.2-2	No	Irregular-round

125-786B-21R-02 (Piece 6,72-76 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene basalt

GRAIN SIZE: 0.1-1 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	5-8	20-25	0.1-0.8		Subhedral-anhedral	Some are completely replaced by carbonate +/- hematite, others have spinel inclusions.
Orthopyroxene	2-5	3-5	0.2-0.5		Euhedral-subhedral	Spinel inclusions.
GROUNDMASS						
Glass	0	50-60	N/A		N/A	100% pervasively altered to clays.
Plagioclase	18-25	25-30	<0.15		Laths	Plagioclase needles.
Magnetite	1-2	1-2	<0.05		Irregular	Black individual blebs and equant, euhedral crystals.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	35-45	Glass	Dark brown to gray, amorphous, pervasive.
Carbonate	18-22	Clinopyroxene, vesicles and veins	
Chlorite	10-12	Glass, clinopyroxene	Slightly yellow-green, pleochroic.
Hematite	7-10	Clinopyroxene	Intimately associated with carbonate, together pseudomorph clinopyroxene(?). May have been olivine - but shape and fracture patterns do not support this. These crystals are larger than other, fresher clinopyroxene and may be xenocrysts (0.2-0.8 mm).

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-3	Throughout	0.2-0.4	Carbonate	Round-irregular

COMMENTS: Glomerocrysts of pyroxene are common, (both fresh and altered). Fe/carbonate alteration similar to 786B-32R-01, 121-122 cm, 786B-31R-02, 86-87 cm.

125-786B-22R-03 (Piece 4A, 61-64 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-phyric dacite

GRAIN SIZE: Fine-grained

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	7-8	7-9	0.2-1.2		N/A	Altered glass inclusions.
Clinopyroxene	1-2	1-2	<0.8		Euhedral-anhedral	Spinel inclusions, pale green, glass inclusions.
Spinel	<1	<1	<0.5	Cr?	Euhedral	Deep blood red.
Orthopyroxene	Trace	Trace	0.5		N/A	Pale gray to light brown.
GROUNDMASS						
Glass	<10	65-70	N/A		N/A	Yellow, locally devitrified, largely altered to clays.
Microlites	12-15	15-20	<0.01		Equant, needles	May be pyroxene, locally aligned.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays		Glass, plagioclase, microlites	Dark brown, amorphous, pervasive, especially concentrated along fracture in glass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	<1		0.1-0.8	No	Rounded-ir regular

COMMENTS: Sparse glomerocrysts of plagioclase and pyroxene up to 1 mm diameter. Some appear physically disaggregated. Clay alteration obscures much of the original texture in the groundmass.

125-786B-24R-01 (Piece 2, 9-12 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Sparsely phyric dacite

GRAIN SIZE: 0.2-0.8 mm

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-6	5-7	0.2-0.8		Euhedral-subhedral	Moth-eaten.
Clinopyroxene	<2	1-2	0.1-0.8		Subhedral-euhedral	Pale green, rarely twinned.
Spinel	Trace	Trace	<0.3		Irregular-rounded	
Orthopyroxene	<1	1	0.1-0.6		N/A	Pale-green to yellow pleochroism.
GROUNDMASS						
Glass	<5	55-60	N/A		N/A	Devitrified, altered.
Microlites	32-35	35-38	<0.15		Needles	Probably plagioclase, locally aligned.
Spinel/magnetite	1	1	<0.01		Equant-irregular	Tiny in groundmass, may be secondary.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	48-55	Glass, matrix	Brown to dark gray, amorphous, pervasive, variable.
Hematite	7-10	Glass/matrix	Intimately mixed with clay.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	7-10	Throughout	0.1-2.5	None	Irregular

COMMENTS: Glomerocrysts of plagioclase + or - pyroxene.

125-786B-26R-01 (Piece 8,67-68 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Pumice

GRAIN SIZE: 0.5-2 mm

TEXTURE: Glassy, vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	2	2	0.5-2		Euhedral-subhedral	Twinning is present.
Clinopyroxene	1	1	0.5-1		Subhedral	
GROUNDMASS						
Glass	<5	97	N/A		N/A	Devitrified.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	>93	Glass	Brown, amorphous, pervasive.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	15-20	Random	<12			Stretched.

125-786B-27R-01 (Piece 12,91-93 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Dacite

GRAIN SIZE:

TEXTURE: Sparsely phyric, brecciated

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	2-3	2-3	0.2-1.2		Tabular, Euhedral-subhedral	Altered. Moth-eaten texture.
Clinopyroxene	1-2	1-2	0.2-0.8		Euhedral-subhedral	Pale gray-green.
Spinel	Trace	Trace	<0.2		Equant	
Orthopyroxene	2-3	2-3	N/A		N/A	Very pale green, spinel and fluid inclusions(?).
GROUNDMASS						
Glass	<10	70-77	N/A		N/A	Brown-yellow, mostly altered.
Microcrysts	15-18	18-22	<0.02		Needles	May be plagioclase and/or pyroxene.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	55-65	Glass	Pale-brown to yellow pervasive but doesn't obscure original texture. Degree of alteration varies between individual breccia pieces.
Chlorite	<10	Glass	Yellow-green, weakly pleochroic, pervasive especially along breccia boundaries.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10-12	Throughout	0.1-2	None	Round-oval

COMMENTS: Crystallization sequence is clearly plagioclase-pyroxene. Individual breccia fragments have an alignment of matrix microcrysts, probably indicating flow direction.

125-786B-27R-01 (Piece 13,101-104 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Dacite breccia

GRAIN SIZE: 0.2-1 mm

TEXTURE: Sparsely phyric, brecciated

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	2-3	2-3	0.2-1		Subhedral-euhedral	Twinning and zoning.
Clinopyroxene	1-2	1-2	0.2-0.8		Euhedral-subhedral	Pale green to colorless.
Spinel	1	1	<0.2		Euhedral-anhedral	Black.
Orthopyroxene	2-3	2-3	0.2-0.8		N/A	Pale green to colorless.
GROUNDMASS						
Glass	10	70-77	N/A		N/A	
Microcrysts	15-18	20	<0.02		Laths, needles	Plagioclase and/or pyroxenes(?).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	55-65	Glass	Pale brown-yellow, pervasive, but doesn't obscure original texture in fragments. Degree of alteration varies between individual breccia pieces.
Chlorite	5	Matrix	Pale green; concentrated along grain boundaries of fragments.
Hematite	Trace		Rust orange; distributed between breccia fragments.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-10	Random	<2		Round, oval

125-786B-27R-02 (Piece 7,57-59 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase boninite

GRAIN SIZE: 0.3-2 mm

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	15-20	0.3-3		Subhedral-euhedral	Moth-eaten texture in larger crystals; spinel and fluid inclusions; some are corroded.
Clinopyroxene	7-10	9-12	0.2-2		Subhedral-euhedral	
Spinel	Trace	Trace	<0.2		Equant	Brown-black.
Orthopyroxene	2-5	3-6	0.2-1		Subhedral-euhedral	Pale-green to colorless.
GROUNDMASS						
Glass	10	35-45	N/A		N/A	
Plagioclase	30	30-40	<0.1		Lath-prismatic	Microlites.
Clinopyroxene	10	10-12	<0.2		Lath	Microlites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	25	Glass	Brown-gray, amorphous clay pervasive throughout slide.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	N/A	Throughout	0.4-3	No	Irregular

COMMENTS: Glomerocrysts of plagioclase + pyroxenes. Larger glomerocrysts appear to be more "moth-eaten" than separate crystals.

125-786B-30R-01 (Piece 2C,29-31 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene-plagioclase boninite

GRAIN SIZE: 0.3-3 mm

TEXTURE: Highly phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	8-11	8-12	0.3-3		Euhedral-anhedral	Moth-eaten texture common, normal and reverse zoning, rare spinel inclusions.
Clinopyroxene	20-23	20-25	0.3-1.7		Euhedral-anhedral	Some are pale green, complex twinning, rare spinel inclusions.
Spinel	1	1	<0.2		Subhedral	Deep blood-red to black.
Orthopyroxene	3-5	3-5	0.4-1.4		Subhedral-anhedral	Pale green to colorless.
GROUNDMASS						
Glass	<5	25-35	N/A		N/A	Dark brown, mostly devitrified.
Pyroxene	8-10	10-12	<0.2		Subhedral	Highly altered.
Plagioclase?	18-20	22-25	<0.2		Needles	Microlites of white, low-birefringent mineral with inclined extinction.
Magnetite	1-2	1-2	<0.01		Euhedral	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	20-30	Glass	Brown, amorphous, pervasive.
Clays	7-10	Glass, vesicles	Green clays locally important and mixed with chlorite.
Chlorite	8-10	Glass, veins	Green to green-brown, slightly pleochroic, disseminated in glass/groundmass but locally concentrated. Mixed with green clays.
Magnetite	<1	Glass	Blebs of black opaque material in alteration rind.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	15-20	Throughout	0.5-4	Yes	Irregular	Some filled with carbonate, others lined with chlorite(?).

COMMENTS: Glomerocrysts of plagioclase, clinopyroxene, spinel up to 3 cm diameter. Crystals are smaller and may be tectonized.

125-786B-31R-02 (Piece 8,86-87 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Olivine-clinopyroxene-plagioclase boninite

GRAIN SIZE: 0.2-1.5 mm

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	7-10	0.4-2		Subhedral	Altered completely to carbonate + Fe-oxide.
Clinopyroxene	7-10	9-12	0.3-1		Euhedral-anbhedral	Glass and spinel inclusions, twinned, pale pink to yellow-green.
Spinel	<1	<1	<0.2		Subhedral	
Orthopyroxene	<2	<2	1.4		Subhedral	Chloritized.
Plagioclase	10-15	12-18	0.4-1.5		Euhedral-subhedral	Moth-eaten, some oscillitory-zoned, relict cores.
GROUNDMASS						
Glass	10-15	40-50	N/A		N/A	60% altered to clays.
Plagioclase	5-7	7-9	0.2		Euhedral	
Pyroxene	8-10	15-20	0.2-0.3		Subhedral	Highly altered to chlorite.
Microlites	N/A	N/A	<0.04		Needles	Probably plagioclase.
Magnetite	1-2	1-2	<0.02		Equant	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	32-40	Glass/matrix	Brown amorphous clay, pervasive.
Chlorite	10-12	Orthopyroxene, vesicles, glass	Directly replacing orthopyroxene and forming patches in the glass and matrix. Also see carbonate comments.
Carbonate	8-10	Olivine/clinopyroxene	Intimate mixture of carbonate, chlorite and hematite (brick red to brown). Pseudomorph crystals which are shaped and have fractures like olivine. These may be pyroxene too.
Hematite	3-5		

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Cavities	<2		0.2-0.8	Lined with carbonate	Irregular	Some also filled with chlorite.

COMMENTS: Glomerocrysts of plagioclase, clinopyroxene and orthopyroxene are common. Carbonate/hematite alteration is similar to 786B-21R-01, 72-76 cm and 786B-32R-01, 121-122 cm.

125-786B-32R-01 (Piece 17,121-122 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Olivine-two-pyroxene-plagioclase boninite

GRAIN SIZE: 0.2-1.2 mm

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	7	0.2-1.2		Euhedral	100% altered to carbonate and hematite.
Plagioclase	6-8	7-10	N/A		Anhedral-euhedral	Moth-eaten texture, glass and spinel inclusions.
Clinopyroxene	4-6	5-7	0.2-1.2		Subhedral	Pale green to yellow, slightly pleochroic, spinel inclusions.
Orthopyroxene	2-4	3-5	0.2-1		Subhedral-anhedral	
GROUNDMASS						
Glass	<7	35-45	N/A		N/A	Devitrified.
Microcrysts	25-30	35-40	<0.05		Needles	Probably plagioclase, vague twinning.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	20-30	Glass	Brown-gray, amorphous, pervasive.
Carbonate	7-10	Olivine, vesicles/cavities	High and varied birefringence.
Chlorite	25-30	Orthopyroxene, clinopyroxene, glass	Pale green, pleochroic, pseudomorphing parts of pyroxenes.
Hematite	<3	Olivine	Intimate mixture of carbonate and hematite pseudomorphing euhedral olivine or clinopyroxene crystals. Crystal shape and fracture pattern is more like olivine than clinopyroxene.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicle /	10-15	Throughout	0.2-6	Carbonate	Irregular

COMMENTS: Glomerocrysts of clinopyroxene, orthopyroxene and plagioclase. Some crystals (~5%) plucked during thin-section making. Fe/carbonate alteration similar to 786B-21R-01, 72-76 cm and 786B-31R-02, 86-87 cm.

125-786B-32R-02 (Piece 9,85-86 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-phyric rhyolite

GRAIN SIZE: 0.3-1.3

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-6	5-7	0.3-1.3		Anhedral-euhedral	Rare relict cores, zoning; two generations, one very altered (xenocryst?); rare spinel and glass inclusions.
Clinopyroxene	<1	1-2	<0.08		Anhedral	90% altered to clays; about 50% are fresher (<50% altered); spinel and glass inclusions.
Spinel	<1	<1	<0.2		Irregular, jagged-rounded	Appear late in crystallization.
GROUNDMASS						
Glass	0	65-70	N/A		N/A	
Plagioclase	<10	25-30	<0.04		Tabular, needles	
Magnetite	<1	<1	<0.01		Irregular	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass/matrix	Dark-brown to bright green, pervasive, amorphous, brown and green clays are locally mottled (3:1).
Carbonate	1-2	Pyroxene, cavities, veins	Filling veins, and some cavities, especially those associated with plagioclase.
Fe-oxide	7-10	Glass/matrix	Red-brown stains ~0.1 mm in diameter.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicle	3/5		0.2-2	None	Irregular	Some may have been plucked during thin-section making.

COMMENTS: Clay alteration of groundmass severely obscures the texture and matrix mineral associations.

125-786B-33R-01 (Piece 19A,101-103 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-phyric andesite

GRAIN SIZE: Fine- to medium-grained

TEXTURE: Sparsely-phyric glassy rind

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-7	5-7	0.5-1.2		Euhedral-subhedral	Spinel and glass inclusions, oscillatory zoning.
Clinopyroxene	<1	3-5	N/A		Subhedral	Pale brown-green, altered, rare spinel and glass inclusions.
Spinel	<1	<1	<0.3		Subhedral	Deep red brown.
GROUNDMASS						
Glass	<10	80-85	N/A		N/A	80% fresh in glassy rind, tan to yellow.
Microlites	<5	5-7	<0.05		Needles	20% of glassy inclusions.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass	Pale brown, amorphous, pervasive.
Carbonate	5-7	Veins	Fills large veins and vugs and vesicles.
Chlorite	<5	Veins	Follows carbonate veins.
Sulfide	<1	Veins	Secondary sulfide crystals-probably disseminated pyrite but mostly concentrated in veins with chlorite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-7		0.1-1.5	Carbonate	Irregular

COMMENTS: Rock has glassy pillow rind which is less altered than the rest of the sample. This rock is cut by carbonate veins and has secondary sulfide precipitation.

125-786B-34R-01 (Piece 16,128-130 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-phyric andesite

GRAIN SIZE: 0.2-1.8 mm

TEXTURE: Sparsely phyric, glassy

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	12-15	12-16	0.2-1.8		Subhedral-anhedral	Spinel and glass inclusions, oscillatory zoning, moth-eaten to relatively fresh, rounded.
Clinopyroxene	3-5	4-6	0.2-1.2		Euhedral-subhedral	Pale yellow-green, pleochroic, twinned, fractured.
Spinel	1-2	1-2	0.02-0.3		Irregular	Deep blood-red to black.
Orthopyroxene	1-2	1-2	0.3-0.8		Subhedral-anhedral	Pale yellow-green, pleochroic.
GROUNDMASS						
Glass	30-40	65-75	N/A		N/A	Mustard yellow-brown, devitrified, altered, fractured.
Microlites	1-2	10-12	<0.05		Needles	Probably plagioclase.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	55-65	Glass	Dark brown, amorphous, pervasive after glass, but concentrated along fractures; green clays rimming individual crystals and at boundaries in groundmass.
Prehnite?	2-5	Vesicle lining	Vein filling, high variable birefringence, slightly fibrous, brown-green, only in coarser-grained groundmass associated with larger plagioclase.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	2-3	Throughout	0.2-4	None	Irregular

COMMENTS: Phenocrysts tend to cluster but are not always in contact (glomerocrysts). Evidence of fracturing and dissociation of pieces is common. Sample may be brecciated or have large lithic, plagioclase-bearing xenoliths. Two matrix textures are present. This may also be a flow texture with variable alteration and recrystallization.

125-786B-34R-03 (Piece 5A,47-48 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Altered basalt

GRAIN SIZE: 0.3-4 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	9-10	20-25	0.3-1		Euhedral-anhedral, equant to elongate.	Spinel inclusions.
Spinel	1-2	1-2	<0.01		Euhedral-subhedral	Deep red-black.
Orthopyroxene	0	3-5	1-4		Anhedral, long, tabular crystals.	100% altered to chlorite, carbonate and green clay. May be plagioclase. At least one jacketed by clinopyroxene.
GROUNDMASS						
Glass	<5	45-55	N/A		N/A	Light to deep brown, devitrified.
Plagioclase	15-17	17-22	<0.15		Euhedral, laths to tabular	
Pyroxene	10-15	15-20	<0.15		Anhedral, equant	Highly altered.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15-20	Glass	Brown, amorphous, locally concentrated to pervasive.
Clays	5-7	Glass, vesicles	Green, amorphous.
Carbonate	12-17	Veins, vesicles, pyroxene	See hematite comments.
Chlorite	25-30	Glass, pyroxene	
Hematite	5-7	Pyroxene?	Hematite intergrown with carbonate pseudomorphing what appear to be pyroxene judging from crystal shape and fracture/cleavage pattern.
Hematite	1-2	Veins	Hematite also forms poorly defined veins in the groundmass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	15-20		3-6, 0.3-1	Carbonate, green clay, chlorite	Round, irregular	Irregular distribution of vesicles, bimodal size distribution.

COMMENTS: This rock is highly altered and much of the original textural and modal information is obscured.

125-786B-34R-03 (Piece 12,107-108 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Dacite (inclusions in basalt)

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	2-3	3.5	0.2-0.7		Enhedral to subhedral	Highly altered, sparse spinel inclusions, glomerocrysts.
Clinopyroxene	<1	<1	0.1-0.4		Euhedral to subhedral	Altered to chlorite.
Spinel	1-2	1-2	<0.05		Euhedral	Equant.
GROUNDMASS						
Plagioclase	15-20	17-22	<0.15		Needles	
Glass	15-30	70-80	1-3		N/A	Light yellow to brown, devitrified.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	35-40	Glass	Brown, amorphous, pervasive.
Clays	<2	Glass	Green, amorphous, patchy.
Carbonate	20-25	Veins, olivine, pyroxene	Mostly as veins and patches 0.3-0.5 mm wide.
Chlorite	5-15	Pyroxenes, glass	Less abundant than in basalt matrix.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	2-10		<0.5	Carbonate	Irregular	Mostly vesicles in the andesite.

COMMENTS: Sample is two rock types in contact: a fresher glassy andesite basalt (described on a separate sheet) containing inclusions of dacite (described here).

125-786B-34R-03 (Piece 12,108-109 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Basalt (with dacite inclusions)

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Moderately to sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine?	0	1-2	0.5-1		Subhedral	Completely altered to carbonate and chlorite.
Clinopyroxene	1-3	2-3	0.3-3		Enhedral to subhedral	Usually tabular, rare spinel inclusions.
Spinel	<1	<1	<0.1		Subhedral	
Orthopyroxene	<1	6-7	1-3		Euhedral to subhedral	Jacketed by clinopyroxene, also 5-6% completely chloritized.
GROUNDMASS						
Glass	15-20	75-85	1-3		N/A	Light yellow to brown, devitrified.
Clinopyroxene	8-10	10-12	<0.1		Subhedral	Quench and microphenocrysts.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	35-40	Glass	Brown, amorphous, pervasive.
Clays	<2	Glass	Green, amorphous, patchy.
Carbonate	20-25	Veins, olivine, pyroxene	Mostly as veins and patches, 0.3-0.5 mm wide.
Chlorite	5-15	Pyroxenes, glass	Higher percentage in basalt than in dacite inclusions.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	2-10		<0.5	Carbonate	Irregular

COMMENTS: Sample consists of two rock types in contact: a fresher glassy basalt (described here) containing inclusions of dacite (described on a separate form).

125-786B-35R-01 (Piece 9,73-76 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Clinopyroxene-plagioclase dacite

GRAIN SIZE: 0.3-1.5 mm

TEXTURE: Porphyritic, hyalopilitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-10	5-10	0.5-1.5		Euhedral	Shows compositional zoning and twinning.
Clinopyroxene	2-3	2-3	0.3-1		Euhedral-subhedral	Frequently twinned.
GROUNDMASS						
Plagioclase	10-15	10-15	>0.1		Euhedral	Typically quenched and slender prismatic crystals.
Glass	0	75-85	N/A		N/A	Completely altered to brown clay.
Opaque	Trace	Trace	>0.1		Euhedral-subhedral	Scattered in groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	75-85	Glass, vesicles	Pale green to pale brown in color.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	15	Random	0.1-5	Clay	Round to elongate

COMMENTS: Some plagioclase phenocrysts show corroded form.

125-786B-35R-02 (Piece 16,122-126 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-pyroxene phyric dacite

GRAIN SIZE: 0.2-2 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	12-15	13-17	0.2-2		Subhedral-rounded	Most large crystals are moth-eaten with relict cores.
Clinopyroxene	7-9	8-10	0.2-1.3		Euhedral-subhedral	Pale green-yellow pleochroic, most have low (10-20 degrees) extinction angles, spinel inclusions.
Spinel	<1	<1	0.1-0.3		Rounded	
GROUNDMASS						
Glass	<10	15-20	N/A		N/A	
Plagioclase	25-35	50-60	N/A		Needles, hollow squares	Very low birefringence, may not all be plagioclase.
Magnetite	1-2	1-2	<0.01		Equant, irregular	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	30-40	Glass	Brown amorphous clay, pervasive.
Chlorite	10-15	Glass, clinopyroxene, veins	Green-yellow-brown birefringence pseudomorphing pyroxene and scattered intimately through glass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	20-25		0.1-6	None-green clay	Elongate-oval

COMMENTS: Some plagioclase crystals have large (0.2 mm) pyroxene inclusions. Glomerocrysts of plagioclase + or - clinopyroxene up to 3 mm diameter.

125-786B-37R-01 (Piece 6,44-47 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-clinopyroxene-plagioclase dacite

GRAIN SIZE: 0.5-1 mm

TEXTURE: Hyalo-ophitic, locally glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1	0.2-0.7		Euhedral	Completely altered to clay.
Plagioclase	10-15	10-15	0.5-1		Euhedral-anhedral	Compositional zoning and twinning are common.
Clinopyroxene	2-3	2-3	0.5-0.8		Subhedral-anhedral	Twinning is common.
Orthopyroxene	<1	1-2	0.5-1.5		Euhedral	Partly altered to clay.
GROUNDMASS						
Plagioclase	10-20	10-20	0.1-0.2		Euhedral	Slender quenched crystals are predominant.
Clinopyroxene	1-2	2-3	<0.1		Anhedral	Partly altered to clay, dusty.
Orthopyroxene	Trace	Trace	<0.1		Euhedral-subhedral	Showing relatively low birefringence.
Glass	0	60-75	N/A		N/A	Completely altered to clay.
Opaque	<1	<1	<0.1		Euhedral-anhedral	Scattered throughout groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	60-75	Olivine, orthopyroxene, vein, vesicles	Pale green to pale brown in color, low birefringence.
Carbonate	<2		Having characteristic high birefringence.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-2	Random	<1	Clay	Round

COMMENTS: Calcite and clay veins (0.5-1 mm wide) run throughout the slide. Most of the plagioclase phenocrysts are dusty and show corroded form. Some plagioclase crystals occur as xenocrysts whose primary internal zonal structure was cut by their fragmented outlines.

125-786B-37R-01 (Piece 12,95-98 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-clinopyroxene-plagioclase boninite

GRAIN SIZE: 0.5-1.5 mm

TEXTURE: Hyalo-ophitic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1-2	0.3-0.6		Euhedral	Completely altered to clay.
Plagioclase	5-10	5-10	0.5-1.5		Euhedral-anhedral	Shows twinning and compositional banding.
Clinopyroxene	3-5	3-5	0.5-1		Subhedral-anhedral	Shows twinning, locally forms glomerocrystic texture.
Orthopyroxene	1-2	1-2	0.5-1		Euhedral, sometimes elongated	Partly altered to clay.
GROUNDMASS						
Plagioclase	15-20	15-20	0.1-0.4		Euhedral	Slender prismatic plagioclase is predominant.
Clinopyroxene	1-2	1-2	0.05-0.2		Subhedral-anhedral	Scattered throughout groundmass.
Orthopyroxene	Trace	Trace	0.05-0.2		Euhedral	Relatively low birefringence.
Glass	0	70-80	N/A		N/A	Completely altered to brown clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	70-80	Glass, vesicles	Pale brown to pale green in color.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5	Random	0.1-1	Clay	Round-ragged

COMMENTS: Two types of plagioclase phenocryst are recognized. One is dusty and shows corroded form, and another is clean and euhedral in shape.

125-786B-37R-03 (Piece 8,45-49 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesitic breccia

GRAIN SIZE: 0.1-1.0 mm

TEXTURE: Hyalo-ophitic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	10-15	0.5-1.5		Euhedral	
Clinopyroxene	Trace	Trace	0.5-1.5		Euhedral	
GROUNDMASS						
Plagioclase	5-10	10-15	<0.1		N/A	Partly altered to clay.
Clinopyroxene	1-2	1-2	<0.15		Elongate, prismatic	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	70-80	Glass	Pale green clay is predominant.
Limonite	1-2	Crack	Reddish, limonitic material is scattered throughout the rock.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	Trace	Random	<1	Clay	Variable

COMMENTS: This rock is highly altered andesitic breccia. Pale greenish clay present throughout the rock.

125-786B-38R-01 (Piece 3,9-11 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-phyric andesite

GRAIN SIZE: 0.3-2 mm

TEXTURE: Hyalo-ophitic, locally glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	10-15	0.3-2		Subhedral-euhedral	Twinning is common, zoning is rare.
Clinopyroxene	1-2	2-3	0.2-1		Subhedral	Pale green to colorless in color.
GROUNDMASS						
Glass	<10	15-20	N/A		N/A	
Plagioclase	30-40	50-60	<0.2		Laths	Slender, prismatic crystals are common.
Magnetite	<1	<1	<0.05		Equant	Scattered throughout groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	30-40	Glass	Pale green to pale brown in color, pervasive.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-3	Throughout	0.3-3	None	Round-irregular

COMMENTS: Glomerocrysts up to 2 mm in diameter consisting dominantly of plagioclase.

125-786B-39R-02 (Piece 3,33-34 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesitic breccia

GRAIN SIZE: 0.1-1.5 mm

TEXTURE: Fracturing texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	15-20	15-20	0.5-1.5		Euhedral	Glomerophyric; twinning is common.
Clinopyroxene	Trace	Trace	0.5-1		Euhedral	
Orthopyroxene	Trace	Trace	0.5-1		Euhedral	
GROUNDMASS						
Plagioclase	5-10	15-25	<0.2		Euhedral	Partly altered to clay.
Glass	0	50-60	N/A		N/A	Completely altered to clay.
Opaque	Trace	Trace	<0.5		Euhedral-subhedral	Scattered throughout matrix and groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-60	Glass, vesicles	Pale-green to pale-brown clay replacing glassy material.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-2	Random	<1	Clay	Round to elongate

COMMENTS: This rock is highly fragmented.

125-786B-39R-03 (Piece 43,26-27 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Brecciated andesite

GRAIN SIZE: 0.1-0.5 mm

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	2-5	2-5	0.5-1		Euhedral	Compositional zoning is common.
Clinopyroxene	1-3	1-3	0.3-0.7		Euhedral	
GROUNDMASS						
Plagioclase	7-10	10-15	<0.1		Euhedral, prismatic	
Clinopyroxene	5-10	5-10	<0.1		Euhedral, prismatic	
Glass	0	70-80	N/A		N/A	Completely altered to clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	70-80	Glass, plagioclase	Pale-green to pale-brown clay is predominant.
Limonite	1-2	Crack	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3-5	Random	0.5-1	Clay	Round to elongate

COMMENTS: Limonitic material is locally predominant, especially along the brecciated fragments.

125-786B-40R-01 (Piece 6,40-41 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesitic tuff-breccia

GRAIN SIZE: 0.1-1 mm

TEXTURE: Porphyritic (in andesitic fragments)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1-2	1-2	0.5-1.5		Euhedral	In andesitic fragments.
Clinopyroxene	Trace	Trace	0.5-1		Euhedral	In andesitic fragments.
GROUNDMASS						
Plagioclase	3-5	3-5	<0.1		Euhedral, acicular	
Clinopyroxene	Trace	Trace	<0.1		Euhedral, prismatic	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	90-95	Glass	Pale greenish clay is predominant in andesitic fragments. Dusty brownish clay occupies matrix between fragments.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	30-40	Random	<1	Clay	Round	Occurs in andesitic fragments.

COMMENTS: Phenocrysts of plagioclase and clinopyroxene in andesitic fragments are highly altered to clay.

125-786B-40R-02 (Piece 18,54-56 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-olivine basalt

GRAIN SIZE: 0.1-1.5 mm

TEXTURE: Hyalo-ophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	15-20	0.5-3		Euhedral	Completely altered to clay.
Orthopyroxene	1-2	1-2	0.5-1.5		Euhedral	Partly altered to clay; showing compositional zoning.
GROUNDMASS						
Plagioclase	10-15	10-15	<0.2		Euhedral, acicular	Quench texture.
Orthopyroxene	Trace	Trace	0.1-0.3		Euhedral	Partly altered to clay.
Clinopyroxene	5-10	5-10	<0.2		Subhedral, prismatic	
Glass	0	50-60	N/A		N/A	Altered to clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-60	Glass, olivine	Brown, dusty clay replaces glass.
Carbonate	1-3	Olivine, vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	3-5	Random	<1	Carbonate	Round

COMMENTS: This rock is characterized by the abundance of olivine phenocrysts. Olivine phenocrysts are fully replaced by dusty brownish clay.

125-786B-42R-01 (Piece 5,41-42 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Pyroxene-plagioclase phyric andesite

GRAIN SIZE: 0.3-4 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-5	5-7	0.3-3		Euhedral-subhedral	Commonly twinned; glass and spinel inclusions.
Clinopyroxene	2-5	3-5	0.15-1		Euhedral-subhedral	Glass and spinel inclusions, rarely zoned.
Spinel	Trace	Trace	0.01-0.05		Euhedral-subhedral	Brown-black.
Orthopyroxene	5-10	7-10	0.4-2		Euhedral-subhedral	Pale green-colorless.
GROUNDMASS						
Glass	<5	75-80	N/A		N/A	
Plagioclase	3-5	4-7	<0.3		Laths	Quench crystals.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass	Brown, amorphous, pervasive.
Hematite	<1	Pyroxene	Rust-orange; associated with fine-grained glomerocrysts.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Glomerocrysts of plagioclase and of pyroxenes are present, up to 2 mm in diameter.

125-786B-42R-03 (Piece 10D,126-127 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Olivine-two-pyroxene andesite

GRAIN SIZE: 0.5-2 mm

TEXTURE: Hyalo-ophitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2-3	0.5-1		Euhedral	Altered to clay.
Plagioclase	10-15	10-15	0.5-2		Euhedral-anhedral	Compositional zoning and twinning are common.
Clinopyroxene	5-10	5-10	0.5-2		Euhedral-subhedral	Compositional zoning and twinning are common.
Orthopyroxene	2-4	3-5	0.5-1.5		Euhedral	Partly or fully altered to clay.
GROUNDMASS						
Glass	0	55-70	N/A		N/A	Altered to clay.
Plagioclase	5-10	5-10	<0.1		Euhedral laths	Quench texture.
Clinopyroxene	2-3	2-3	<0.1		Subhedral-anhedral, prismatic	
Opaque	Trace	Trace	<0.1		Euhedral-anhedral	Scattered throughout the groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	55-75	Glass, olivine, orthopyroxene, vesicles	Brown in color.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	Trace	Random	<0.5	Clay	Round

COMMENTS: Some orthopyroxene grains have fine (100) augite lamellae and are surrounded by reaction rim of clinopyroxene (augite). Some plagioclase phenocrysts show corroded form.

125-786B-43R-01 (Piece 8,110-111 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Pyroxene-plagioclase phyric andesite

GRAIN SIZE: 0.5-2 mm

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	15-20	0.5-2		Euhedral-subhedral	Spinel and glass inclusions, commonly twinned, moth-eaten texture.
Clinopyroxene	7-10	8-12	0.3-2		Subhedral-euhedral	Inclusions of fluid, pale green to colorless.
Spinel	Trace	Trace	<0.02		Equant	Dispersed, black.
GROUNDMASS						
Glass	10-15	53-67	N/A		N/A	Altered to clays.
Plagioclase	8-10	10-15	<0.02		Laths	Microlites in groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	47-61	Glass	Red to red- brown clays, pervasive.
Carbonate	<1	Vein	0.5 mm vein.
Zeolites	1	Vesicles	Lines vesicles.
Chlorite	2	Vesicles	Pale green to colorless; lines some vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	N/A	Random	0.2-2	Chlorite, zeolites	Round, irregular

125-786B-46R-02 (Piece 12,106-107 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene andesite

GRAIN SIZE: <2 mm

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	15-20	15-20	0.5-2		Euhedral	Compositional zoning and twinning are common.
Clinopyroxene	10-15	10-15	0.5-1.5		Euhedral	Compositional zoning and twinning are common.
Orthopyroxene	10-15	10-15	0.5-2		Euhedral	Compositional zoning is common.
GROUNDMASS						
Plagioclase	20-30	20-30	<0.2		Euhedral	Quenched H-shaped crystal.
Clinopyroxene	<1	<1	<0.2		Euhedral-subhedral, acicular	Quench texture.
Glass	15-35	20-40	N/A		N/A	
Orthopyroxene	<2	<2	<0.2		Euhedral, acicular	Quench texture.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	5	Glass	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10-15	Random	<2	None	Round

COMMENTS: Clinopyroxene, orthopyroxene and plagioclase sometimes form glomerophyric texture. Groundmass glass is well preserved.

125-786B-48R-02 (Piece 4B,52-53 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite breccia

GRAIN SIZE: 0.2-2 mm

TEXTURE: Brecciated, locally glomerophyric?

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	4-8	5-10	0.2-1.5		Euhedral-subhedral	Spinel and fluid inclusions, twinned, zoned.
Clinopyroxene	1-2	1-2	0.2-2		Euhedral-subhedral	Pale green to colorless.
Spinel	1	1	<0.2		Euhedral-anhedral	Black.
Orthopyroxene	3-5	3-5	0.2-2		Euhedral-subhedral	Spinel and fluid(?) inclusions.
GROUNDMASS						
Glass	<10	60-78	N/A		N/A	
Plagioclase	15-20	18-22	<0.02		Lath	Microlites.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	40-50	Glass	Pale brown to dark brown; pervasive but doesn't obscure original texture.
Chlorite	5-10	Matrix	Pale green; distributed among fragments and along boundaries.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-10	Random	<2		Round-oval

COMMENTS: Glomerocrysts of plagioclase and plagioclase plus pyroxene up to 2 mm in diameter. Rock is composed of breccia fragments of volcanic andesitic rocks. Degree of alteration varies between individual fragments.

125-786B-49R-02 (Piece 4,83-84 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesitic breccia

GRAIN SIZE: 0.1-1 mm

TEXTURE: Clastic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-10	5-10	0.5-1		Euhedral-anhedral	Twinning and compositional zoning are common.
Clinopyroxene	2-3	2-3	0.5-1		Euhedral-anhedral	Twinning is common.
Orthopyroxene	3-5	3-5	0.5-2		Euhedral-anhedral	Clinopyroxene exsolution lamellae.
GROUNDMASS						
Plagioclase	2-3	2-3	<0.1		Euhedral-anhedral, acicular	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	80-85	Glass	Brownish dusty clay is predominant.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	Trace	Random	<0.2	Clay	Round

COMMENTS: This rock contains fragments of andesite and crystals in a fine-grained matrix. Matrix is highly altered to clay.

125-786B-49R-04 (Piece 4,32-37 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-clinopyroxene andesite

GRAIN SIZE: 0.1-2 mm

TEXTURE: Porphyritic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-15	10-15	0.5-2		Euhedral-subhedral	Shows compositional zoning.
Clinopyroxene	5-10	5-10	0.5-2		Euhedral	
Orthopyroxene	3-8	5-10	0.5-2		Euhedral	Partly altered to clay; has clinopyroxene exsolution lamellae.
GROUNDMASS						
Plagioclase	10-15	15-20	0.1-0.2		Euhedral	Slender, quenched crystals.
Clinopyroxene	5-10	5-10	0.1-0.2		Euhedral-subhedral	Slender, quenched crystals.
Orthopyroxene	5-10	5-10	0.1-0.4		Euhedral-subhedral	Slender, quenched crystals.
Glass	15-30	35-60	N/A		N/A	Partly altered to clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	15-30	Glass, vesicles	Pale green to pale brown in color.
Carbonate	Trace	Orthopyroxene	High birefringence.
Zeolites	<1	Vesicles	Radial, wavy extinction.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10-15	Random	0.5-5	Zeolite, clay	Round, deformed

COMMENTS: Clinopyroxene occurs as exsolution lamellae of orthopyroxene and as reaction rim of orthopyroxene.

125-786B-51R-01 (Piece 8,51-55 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene basalt

GRAIN SIZE: 0.1-1.5 mm

TEXTURE: Porphyritic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	15-20	15-20	0.5-1.5		Euhedral-anhedral	Compositional zoning.
Clinopyroxene	5-10	5-10	0.5-1.5		Euhedral-anhedral	
Orthopyroxene	5-10	5-10	0.5-1.5		Euhedral	Partly altered to clay.
GROUNDMASS						
Plagioclase	3-7	5-10	<0.1		Euhedral	Partly altered to clay.
Clinopyroxene	5-10	5-10	<0.2		Euhedral, elongate, prismatic	
Orthopyroxene	5-10	5-10	<0.2		Euhedral, elongate, prismatic	
Glass	5-10	40-50	N/A		N/A	Altered to clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	30-40	Glass	Brown dusty clay replacing glass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	N/A	Random	0.3-1		Round

COMMENTS: Plagioclase phenocrysts show corroded form. Clinopyroxene occurs as euhedral phenocryst, as exsolution lamellae of orthopyroxene, and as reaction rim of orthopyroxene.

125-786B-52R-01 (Piece 1,2-4 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite breccia

GRAIN SIZE: 0.1-1 mm

TEXTURE: Breccia with porphyritic andesite fragments

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	5-10	0.5-1		Euhedral-subhedral	Completely altered to clay.
Plagioclase	3-5	3-5	0.5-1.5		Euhedral	Shows twinning and compositional zoning.
Clinopyroxene	3-5	3-5	0.5-1		Subhedral	
Orthopyroxene	5-10	5-10	0.5-1		Euhedral	
GROUNDMASS						
Orthopyroxene	5-10	5-10	0.05-0.2		Euhedral, elongate, prismatic	
Clinopyroxene	3-5	3-5	0.05-0.2		Euhedral, elongate, prismatic	Occurs as crystal.
Plagioclase	Trace	Trace	<0.1		Euhedral, acicular	
Glass	0	40-60	N/A		N/A	Altered to clay.
Opaque	Trace	Trace	<0.05		Euhedral	Scattered throughout groundmass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	40-60	Glass	Replacing groundmass glass and matrix of hyaloclastite; pale green to pale brown in color.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	2-3	Random	<1	Clay	Round

COMMENTS: Hyaloclastite consists of highly altered glass fragments.

125-786B-57R-01 (Piece 1A,8-11 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Altered andesite

GRAIN SIZE: Fine-grained

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	1-3	10-20	<0.7		Euhedral-anhedral	Some crystals are completely altered to clays making phase determination difficult.
GROUNDMASS						
Glass	0	65-70	N/A		N/A	
Microlites	<5	10-20	<0.02		Needles	No optical properties discernible.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	80-85	Glass/matrix, clinopyroxene	Brown amorphous clays.
Chlorite	<7	Glass, veins	Pale yellow to green brown, slightly pleochroic.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Much of material polished away during thin-section preparation.

125-786B-57R-03 (Piece 1A,65-67 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene andesite

GRAIN SIZE: 0.1-1 mm

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0	10-15	0.5-1		Euhedral	Altered to clay.
Clinopyroxene	1-2	10-15	0.5-1		Euhedral-subhedral	Altered to clay.
Orthopyroxene	<5	15-20	0.5-3		Euhedral	Altered to clay.
GROUNDMASS						
Plagioclase	2-3	10-15	<0.2		Euhedral, elongate, prismatic	Altered to clay.
Orthopyroxene	0	1-10	<0.2		Euhedral-subhedral	Altered to clay.
Clinopyroxene	Trace	1-10	<0.2		Euhedral-subhedral, prismatic	
Glass	0	40-50	N/A		N/A	Altered to clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	40-50	Glass, plagioclase, orthopyroxene	Mainly illite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: This rock is highly altered andesite. Most of phenocrysts are replaced by illite-rich clay.

125-786B-57R-04 (Piece 4B,64-66 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite breccia

GRAIN SIZE:

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Trace	Trace	0.5-1		Euhedral	Highly altered to clay.
Orthopyroxene	Trace	Trace	0.5-1		Euhedral	Mostly torn off by polishing.
GROUNDMASS						
N/A	N/A	N/A	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	>95	Groundmass, glass, vesicles	Groundmass is highly altered to clay.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-10	Random	0.5-1	Clay	Round

COMMENTS: This rock is highly altered andesite and is locally brecciated.

125-786B-57R-05 (Piece 1A,49-50 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene boninite

GRAIN SIZE: 0.2-2 mm

TEXTURE: Vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Orthopyroxene	3-5	3-5	1-2		Euhedral	Partly altered to clay.
GROUNDMASS						
Clinopyroxene	10-15	10-15	0.05-0.2		Anhedral, acicular	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	80-90	Glass	Pale green to pale brown.
Zeolites	1-2	Vesicles	Occurs as radial crystals.
Chlorite	Trace	Vesicles	Pale green.
Prehnite?	Trace		Reflective index is slightly higher than zeolite minerals.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	30-40	Random	1-4	Zeolite, clay, prehnite	Round

COMMENTS: Vesicles are abundant throughout the rock.

125-786B-57R-05 (Piece 1A, 50-51 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Two-pyroxene boninite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Vesicular, sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	<2	2-5	<0.5		Subhedral	Too altered to determine accurate original mode, spinel inclusions.
Orthopyroxene	<2	2-5	<1		Subhedral	Too altered to determine accurate original mode, spinel inclusions.
GROUNDMASS						
Glass	0	85-90	N/A		N/A	
Microlites	<5	10-15	<0.07		Needles	Brown in PPL, probably alteration.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	75-85	Glass, vesicles	Yellow-brown amorphous clay: ~5% pale green, pervasive.
Zeolites	5	Vesicles	3 types, radiating, parallel extinction; small crystals (<0.01 mm) and mixed with chlorite.
Chlorite	<10	Glass, vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	25-35		0.2-1.2	Zeolite, chlorite	Round	Nice examples of zeolite filling.

COMMENTS: This rock is quite altered; primary mineralogy and texture are obscured by alteration.

125-786B-57R-06 (Piece 1, 48-49 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene boninite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Vesicular, porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Orthopyroxene	25-35	25-35	0.5-1.5		Euhedral	Shows clinopyroxene exsolution lamellae.
GROUNDMASS						
Plagioclase	Trace	1-2	<0.1		Acicular	
Orthopyroxene	Trace	1-2	<0.1		Prismatic	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-75	Glass, plagioclase	Pale-green to pale-brown dusty clay replaces groundmass glass and fills in vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	15-20	Random	<0.5	Clay	Round

125-786B-57R-06 (Piece 1E,48-49 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-7	5-8	0.2-0.8		Subhedral-anhedral	Spinel inclusions.
Orthopyroxene	1-2	1-2	0.1-0.5		Subhedral-anhedral	Spinel inclusions.
GROUNDMASS						
Glass	10-15	75-80	N/A		N/A	Brown to green.
Plagioclase	<10	15-20	<0.2		Needles	Chloritized and clay alteration.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	50-55	Glass, matrix	Dark brown to yellow to green, amorphous, pervasive in glassy portions.
Zeolites	1	Vesicles	Radiating, length extinct.
Chlorite	20-25	Glass, matrix	Green to brownish yellow, slightly pleochroic, intimately mixed with clays.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	10-15		0.2-1.5	Chlorite	Elongate

COMMENTS: Slide is very thin and only a small portion (5 mm diameter) remains. This and the degree of alteration make the rock difficult to characterize.

125-786B-57R-07 (Piece 5D,114-115 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Boninite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	<1	<1	0.8-1.5		Subhedral	Very low extinction angle, spinel inclusions.
Spinel	<1	<1	<0.05		Equant	Very dark red.
Orthopyroxene	<1-1	1-2	0.5-0.8		Subhedral	Spinel inclusions. Mostly altered and altered material, plucked out.
GROUNDMASS						
Glass	0	65-70	N/A		N/A	Totally altered to brown clays.
Microlites	<5	30-35	<0.05		Needles, equant	Low birefringence, bimodal size/shape, equant ones may be zeolite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	85-90	Glass, matrix	Brown, amorphous, clay pervasive.
Zeolites	5-10	Vesicle lining	Lining vesicles. May also be the equant crystals above as microlites. They occur as crystals pointing into vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	20-25		0.5-5	Zeolite lining	Irregular	Some may be plucking during thin section preparation.

COMMENTS: Relict glomerocrysts of orthopyroxene up to 2.5 mm. Totally altered rock is so severely altered that most of its original mineralogy is obscured.

125-786B-58R-01 (Piece 21,107-108 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1-2	1-2	0.2-1		Subhedral	Twinning is rarely visible.
Orthopyroxene	2-4	3-5	0.3-2		Subhedral-euhedral	Mostly altered.
GROUNDMASS						
Glass	0	80	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	92	Glass, vesicles	Green-brown, amorphous clay pervasive and in vesicles.
Zeolites	2	Vesicles	Occurs as crystals pointing into vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	15-20	Random	0.5-1	Clays	Round	Some filled with clays + zeolites.

COMMENTS: Very poorly made thin section. It is extremely difficult to tell what type of rock it is. Rock appears almost totally altered so primary mineralogy is obscured.

125-786B-58R-01 (Piece 21,127-128 cm) OBSERVER: TER WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Intersertal texture, sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0	5	1		Euhedral-subhedral	Replaced by clays.
Clinopyroxene	Trace	Trace	0.5		Subhedral	Dusty appearance.
Orthopyroxene	2	4	0.5-1	Bronzite	Subhedral	2V=~85 degrees, replaced by clays.
GROUNDMASS						
Plagioclase	5	10	0.05-0.2		Euhedral-subhedral, prismatic, elongate	Altered to clay.
Clinopyroxene	3	3	0.05-0.1		Euhedral, prismatic	
Orthopyroxene	1	1	0.05-0.1		Euhedral, prismatic	
Glass	0	75-80	N/A		N/A	
Opaque	1	1	0.01-0.05		Subhedral	Magnetite?

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	85-90	Glass, plagioclase	Pale-brown clay replacing minerals and glass.
Opaque	1-2	Glass, vein	Replacing glass, vein.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	30	Random	0.1-5	None	

COMMENTS: Relatively altered andesite.

125-786B-61R-04 (Piece 1E,32-34 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric/glassy margin

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	<5	10-15	0.2-1.2		Subhedral	Sparse spinel inclusions.
Clinopyroxene	<2	<5	<0.5		Euhedral-subhedral	Some are pale green.
Spinel	Trace	Trace	<0.02		Subhedral	
Orthopyroxene	1-3	1-3	<1		Subhedral	80-90% altered.
GROUNDMASS						
Glass	<10	55-60	N/A		N/A	Deep yellow to light brown, highly altered.
Microlites?	<10	25-30	<0.02		Needles	No discernible optical properties.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-70		Brown to yellow-brown clays, pervasive.
Chlorite	5-10	Glass/matrix	Slight yellow-green pleochroism, seems to be chlorite intimately mixed with brown clay.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Most of sample was ground away during thin-section preparation. The remaining portion appears to be the glassy margin attached to a piece of more crystal rock. The more crystalline rock is mostly missing. Therefore the above description is highly biased towards the glassy margins.

125-786B-61R-05 (Piece 10A,81-84 cm) OBSERVER: HIR WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Rhyolite tuff

GRAIN SIZE: Variable

TEXTURE: Clastic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-10	5-10	0.5-1		Euhedral	Mostly torn off by polishing.
GROUNDMASS						
N/A	N/A	N/A	N/A		N/A	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	70-85	Matrix	Dusty clay filling in matrix.
Carbonate	<1	Vesicles	Showing typical twinning and high birefringence.
Chlorite	<1	Matrix, vesicles	Pale, green-colored chlorite is scattered throughout the rock.
Plagioclase	10-20	Matrix	Showing anhedral shape, <0.2 mm.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-2	Random	<1	Calcite, chlorite	Round-elongate

125-786B-62R-03 (Piece 1E,40-42 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Orthopyroxene-phyric boninite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Spinel	<1	<1	<0.02		Euhedral-subhedral	
Orthopyroxene	2	2-10	0.5-2.5		Euhedral-subhedral	Most crystals plucked during preparation; those that remain have spinel inclusions. Some chlorite alteration.
GROUNDMASS						
Glass	<5	55-60	N/A		N/A	Slightly altered to clay.
Plagioclase	<10	30-35	<0.25		Needles	Random orientation.
Pyroxene	<5	10-15	<0.2		Tabular	Chloritic alteration.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-70	Glass/groundmass	Brown to yellow-brown clay, pervasive.
Carbonate	2-4	Veins, vesicles	Patchwork up to 0.8 mm blocks.
Zeolites	<2	Vesicle	Yellow and black in crossed polars with a radiating structure. Low-birefringence crystals mixed with carbonate.
Chlorite	5-10	Groundmass, pyroxene	Green to green-brown, slight pleochroism.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-12	Rock	0.15-0.8	No	Irregular

COMMENTS: Plucking of pyroxene and plagioclase crystals was quite severe during thin-section preparation. This may indicate high alteration.

125-786B-63R-02 (Piece 12,72-74 cm) OBSERVER: SAB WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Rhyolite tuff

GRAIN SIZE: Variable

TEXTURE: Clastic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	5-10	5-10	0.5-1		Euhedral	Mostly plucked out by polishing.
GROUNDMASS						
Glass	0	70-85	N/A		N/A	
Plagioclase	10-20	10-20	<0.2		Anhedral	
Opaque	1-2	1-2	<0.2		Eudedral	Black, euhedral and as dusty grains distributed throughout matrix.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	70-85	Matrix	Dusty brown clay filling in matrix.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	1-2	Random	<2		Round-elongate

125-786B-65R-01 (Piece 2B,16-17 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Aphyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	Trace	Trace	<0.3		Euhedral	
GROUNDMASS						
Glass	<5	35-45	N/A		N/A	Highly altered to brown clays.
Plagioclase	25-30	40-50	<0.2		Needles	Occasional radiating clusters.
Pyroxene	10-15	15-20	<0.1		Anhedral	Equant.
Spinel	2-4	2-4	<0.04		Euhedral-anhedral	Irregular-shaped, black, evenly distributed.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	55-60	Glass matrix	Brown amorphous clay locally pervasive to patchy.
Carbonate	1-2	Vesicles, phenocrysts	May be completely altering phenocrysts, no relict crystal shapes remain.
Chlorite	5-10	Matrix	Slight green, pleochroic tinge to glass and groundmass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	<2		<0.1	Carbonate	Round

125-786B-66R-01 (Piece 12,87-88 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Aphyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	<10	10-20	<0.2		Anhedral	Ragged fragments of low birefringence; mineral may be pyroxene or plagioclase.
GROUNDMASS						
Matrix	0	70-80	N/A		N/A	May have been glassy or holocrystalline; no original texture preserved.
Plagioclase	<10	10-20	<0.3		Laths	
Spinel	1-2	1-2	<0.02		Subhedral, equant	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Carbonate	1-2	Vesicles, cavities	Small patches, equant, irregular shaped up to 0.5 mm across, may be replacing minerals in some cases.
Plagioclase?	10-20	?	Fragments of very low birefringence. Angular material may be primary minerals but no mineral forms or associations preserved.
Clays	70-80	Groundmass	Brown, amorphous clay replacing groundmass/glass.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	5-7	Throughout	0.2-4	Carbonate	Elongate to round

COMMENTS: No igneous textures or mineralogy preserved. May be brecciated, glassy volcanic then altered to clays.

125-786B-67R-01 (Piece 2,8-10 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Clinopyroxene-plagioclase-orthopyroxene andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Moderately glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	<4	8-12	0.5-2.5		Euhedral-subhedral	Spinel inclusions. Moth-eaten, highly altered to clays.
Clinopyroxene	<3	5-7	0.3-0.8		Subhedral	Spinel inclusions, pale green.
Orthpyroxene	0	8-12	N/A		Subhedral, lath-shaped to equant	Crystals altered to Fe-oxide + carbonate + chlorite.
GROUNDMASS						
Glass	<5	50-60	N/A		N/A	Nearly completely altered to clays.
Plagioclase	<8	10-15	<0.15		Needles	
Clinopyroxene	<5	10-15	<0.3		Tabular	Completely altered to clays and chlorite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	45-50	Glass, plagioclase	Brown, amorphous clay.
Carbonate	5-7	Orthopyroxene	Pseudomorphs pyroxene; also in fractures and cleavages.
Chlorite	17-22	Glass, matrix, orthophyroxene	Altering glass and groundmass phases.
Hematite	3-5	Orthopyroxene	Part of the Fe-oxide + carbonate + chlorite alteration assemblage.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	10-15	Rock	0.2-6	No	Irregular	Some may be due to plucking during thin-section preparation.

COMMENTS: Glomerocrysts of plagioclase + clinopyroxene up to 3 mm across.

125-786B-67R-01 (Piece 9,62-63 cm) OBSERVER: TER WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-clinopyroxene-orthopyroxene phyric basalt

GRAIN SIZE: Fine-grained to glassy (0-3 mm)

TEXTURE: Glomerophyric, hyalophitic texture

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Trace	Trace		Subhedral	Olivine replaced by carbonate.
Plagioclase	1	1	0.1-0.5		Subhedral-euhedral	Plagioclase is very sparse in this rock.
Clinopyroxene	3	3	0.1-1		Subhedral-euhedral	
Orthopyroxene	4	5	0.1-3		Subhedral-euhedral	Orthopyroxene has reaction rim.
GROUNDMASS						
Plagioclase	10	30	0.05-0.1		Euhedral	Showing lath shape.
Clinopyroxene	5	10	0.02-0.05		Subhedral-euhedral	Showing short prismatic shape.
Opaque	3	3	0.01-0.02		Subhedral-euhedral	Equant in shape.
Glass	10	40-45	N/A		N/A	Party devitrified to clays.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	60-65	Glass, orthopyroxene, olivine(?)	
Carbonate	3	Orthopyroxene, olivine(?)	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	15				

COMMENTS: Orthopyroxenes are sometimes surrounded by clinopyroxene rim. Plagioclase-poor, two-pyroxene basalt.

125-786B-68R-01 (Piece 1A,7-9 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Meta-andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Moderately to highly phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	<2	2-5	0.8-2		Subhedral	Highly altered, only "shells" remain.
Clinopyroxene	<3	4-6	0.4-1		Euhedral-subhedral	Spinel inclusions.
Spinel	<1	<1	<0.15		Euhedral-subhedral	Black (equant) to red.
Orthopyroxene	0	15-20	0.3-1.2		Euhedral-subhedral	100% altered to clay and chlorite, shape of crystals and direction of chlorite extinction used as mineral identification.
GROUNDMASS						
Groundmass	<10	70-80	N/A		N/A	Glass and possible microphenocrysts of plagioclase. Alteration has obscured the textural distinction.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-70	Glass, phenocrysts	Brown, amorphous pervasive.
Chlorite	10-15	Pyroxene, glass	Appears to have formed pseudomorphing orthopyroxene and later become overprinted by brown clays.
Magnetite	1-3	Veins	Black to deep blood-red, massive, forming veins up to 0.5 mm wide and crossing minerals.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Rock is highly altered to brown clays and minor chlorite which obscure the primary textural and crystallographic characteristics.

125-786B-69R-05 (Piece 18,65-67 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Meta-andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Moderately phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1-2	<3	<0.2		Tabular	Fresh microphenocrysts, twinned.
Pyroxene	<2	10-20	<1.5		Euhedral-subhedral	Highly altered to clays + chlorite, no original mineral fragments or optical character left. Morphologically these appear to be pyroxenes.
GROUNDMASS						
Groundmass	0	65-85	N/A		N/A	May have been glass or microcrystalline completely obscured by alteration.
Plagioclase	<5	5-15	<0.1		Tabular	Low birefringence.
Spinel	1-2	1-2	<0.05		Equant	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays		Glass, matrix	
Carbonate	1-5	Veins	
Chlorite	10-20	Pyroxene, glass	Orange-yellow to yellow-green pleochroism.
Magnetite	1-2	Veins	Intimately associated with albite or a low birefringence zeolite, and chlorite up to 0.15 mm equant euhedral-subhedral pieces.
Unknown?	20-25	Matrix	Low birefringence, colorless, anhedral crystals approximately 0.05 mm across which interlock and may be albite, quartz or a zeolite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Highly altered rock. Nearly all original mineralogy and texture have been obscured by alteration.

125-786B-70R-01 (68-72 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Meta-andesite

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Pyroxene	Trace	20-25	<1		Subhedral	Crystals 100% replaced by clays and some carbonate. Tiny traces of relict mineral suggest orthopyroxene as does general morphology.
Spinel	1-2	1-2	<0.01		Equant	See pyroxene comments.
GROUNDMASS						
Glass	0	55-60	N/A		N/A	
Microlites	<10	20-25	<0.05		Needles	Probably plagioclase; alteration obscures optical character.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	75-80	Glass, matrix	Brown to light brown, amorphous, pervasive locally patchy.
Carbonate	5-10	Glass, vesicles	Locally intimately mixed with clays, fills vesicles and may completely replace minerals.
Chlorite	5-10	Glass, matrix	Slight yellow-green pleochroism.
Hematite?	Trace	Vesicle/glass	Maybe mixed with chlorite, slight radiating fabric.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: This rock is highly altered and the original mineralogy and textural characteristics are obscured. No piece # given.

125-786B-71R-04 (Piece 69,73-74 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Clinopyroxene-phyric basalt

GRAIN SIZE: Fine-grained to glassy

TEXTURE: Sparsely phyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	7-9	10-14	0.3-1.5		Subhedral	Rare spinel inclusions, moth-eaten, oscillatory zoning.
Clinopyroxene	<4	5-7	0.15-0.9		Subhedral-anhedral	Pale green to yellow, slightly pleochroic, spinel inclusions.
Spinel	Trace	Trace	<0.02		Equant	As inclusions.
GROUNDMASS						
Glass	0	65-70	N/A		N/A	
Plagioclase	<10	10-15	<0.15		Laths	
Microlites	<10	10-15	<0.02		Needles	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	55-60	Glass	Brown amorphous clay, locally pervasive and patchy in appearance.
Chlorite	<10	Matrix	Green to yellow coloration in altered patches due to chlorite, small local patches of chloritic birefringence.
Magnetite	1-3	Veins, matrix	Strings and irregular pieces of black opaque material locally concentrated and in veins.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Glomerocrysts of plagioclase and of clinopyroxene, but not both. Some gaps in thin section appear to be caused by plucking during thin-section preparation.

125-786B-72R-01 (Piece 10R, 91-92 cm) OBSERVER: JOH WHERE SAMPLED: Izu-Bonin outer-arc high

ROCK NAME: Plagioclase-pyroxene phyric basalt

GRAIN SIZE: Fine-grained

TEXTURE: Glomerophyric

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	10-12	12-15	0.3-1		Subhedral	Moth-eaten, altered, spinel inclusions oscillatory zoning.
Clinopyroxene	<5	5-10	0.2-2		Euhedral-subhedral	Pale yellow to green, spinel and glass inclusions.
Spinel	1-3	1-3	<0.1		Subhedral	Irregular shape, dark blood red, some may be secondary.
Orthopyroxene	0	2-3	<2		Subhedral	100% altered to clays, mineral identification is based on crystal morphology.
GROUNDMASS						
Groundmass	0	65-70	N/A		N/A	Glass + microlites, distinction obscured by alteration.
Plagioclase	<5	7-10	<0.2		Subhedral, tabular	

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS
Clays	65-70	Glass, plagioclase, orthopyroxene	Brown amorphous, clustering in patches 0.1-0.7 mm long.
Chlorite	<10	Glass	Slight yellow-green pleochroism.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE
Vesicles	0				

COMMENTS: Glomerocrysts of plagioclase + clinopyroxene up to 6 mm across.