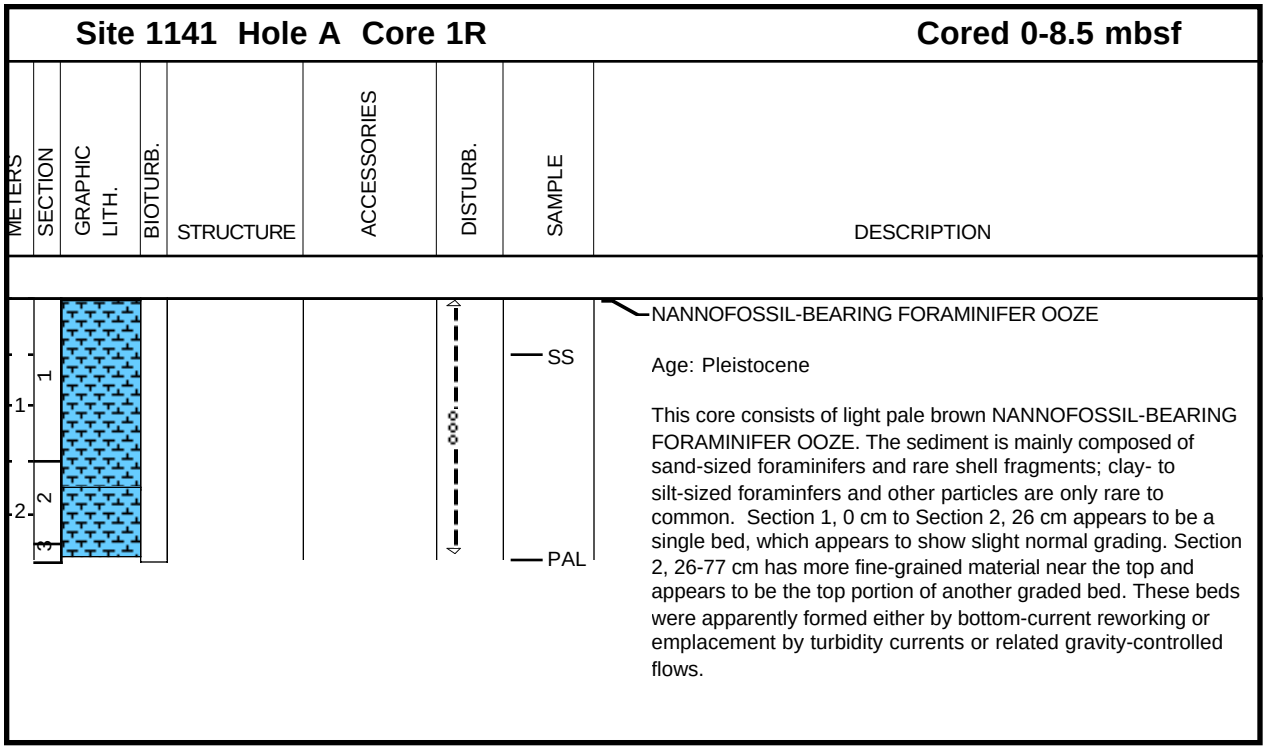
Core Photo


Site 1141 Hole A Core 1R
Cored 0-8.5 mbsf
METERS
SECTION
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
DESCRIPTION
1
2
1
2
3
SS
PAL
NANNOFOSSIL-BEARING FORAMINIFER OOZE
Age: Pleistocene
This core consists of light pale brown NANNOFOSSIL-BEARING FORAMINIFER OOZE. The sediment is mainly composed of sand-sized foraminifers and rare shell fragments; clay- to silt-sized foraminfers and other particles are only rare to common. Section 1, 0 cm to Section 2, 26 cm appears to be a single bed, which appears to show slight normal grading. Section 2, 26-77 cm has more fine-grained material near the top and appears to be the top portion of another graded bed. These beds were apparently formed either by bottom-current reworking or emplacement by turbidity currents or related gravity-controlled flows.

Core Photo

Site 1141 Hole A Core 2R **Cored 8.5-17.8 mbsf**

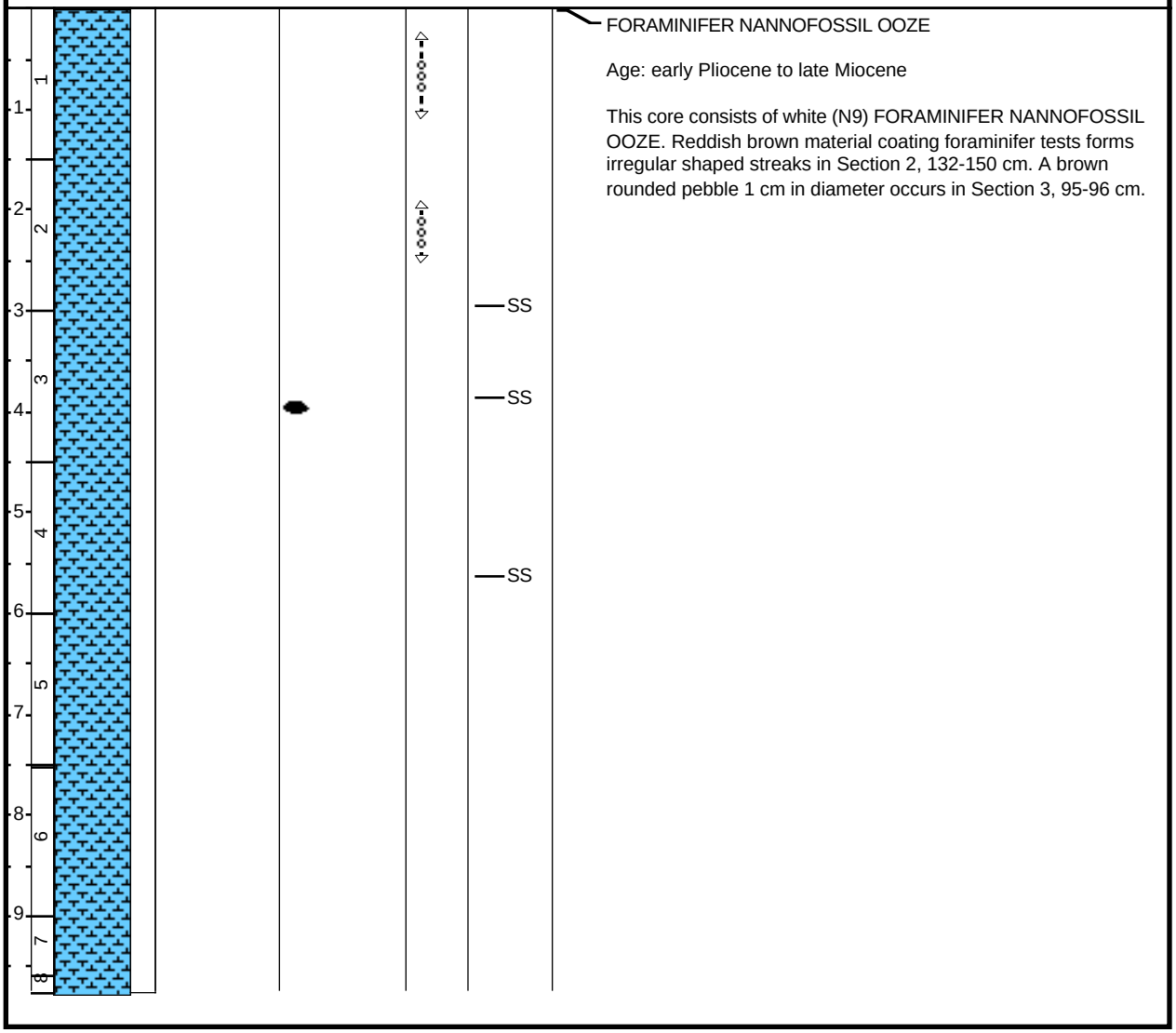
METERS	SECTION	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	DISTURB.	SAMPLE	DESCRIPTION
	1						SS	FORAMINIFER NANNOFOSSIL OOZE

Age: Pliocene

This core consists of white (N9) FORAMINIFER NANNOFOSSIL OOZE. Section CC, 5-12 cm is very pale brown.

Core Photo

Site 1141 Hole A Core 3R **Cored 17.8-27.4 mbsf**



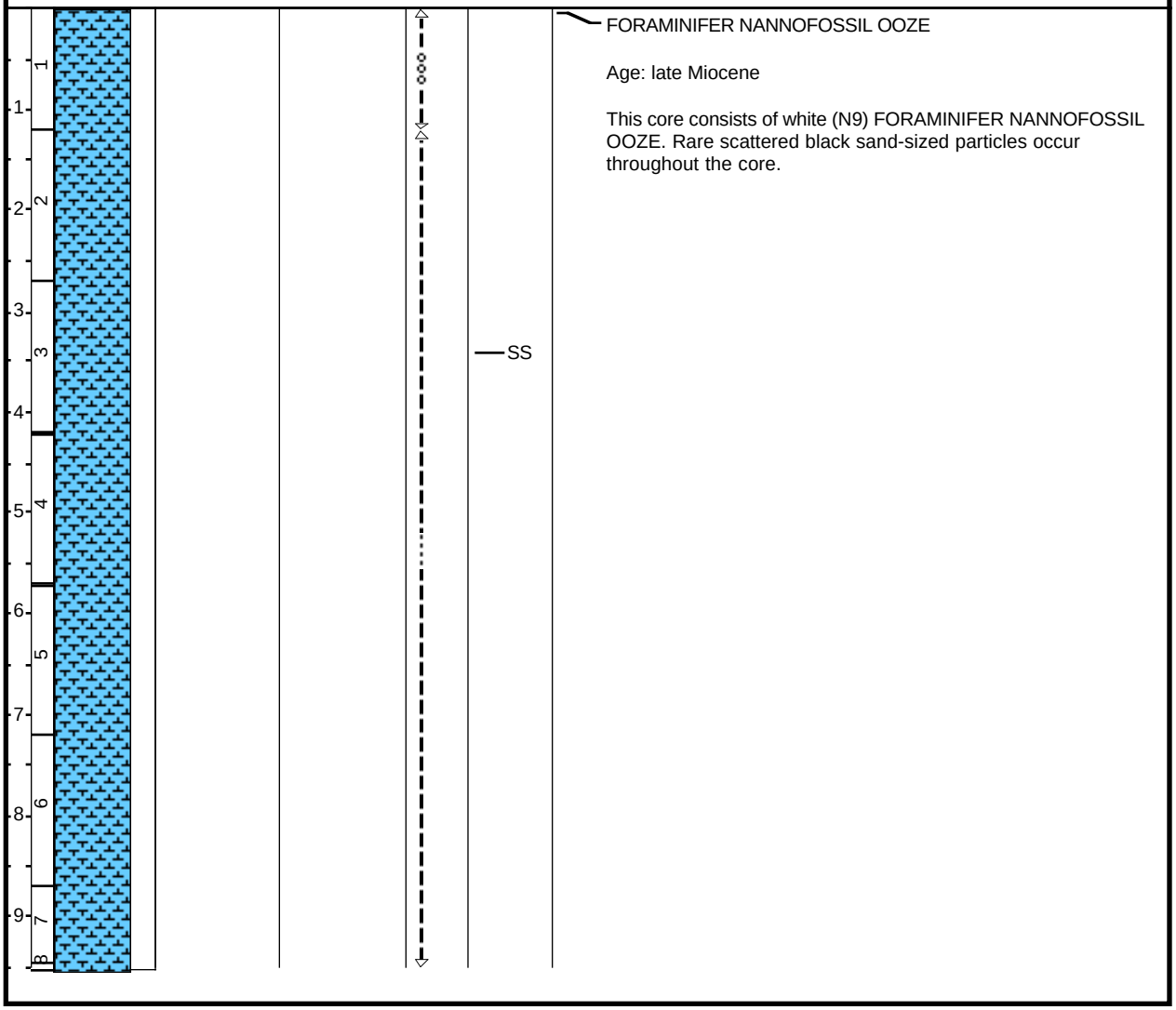
FORAMINIFER NANNOFOSSIL OOZE

Age: early Pliocene to late Miocene

This core consists of white (N9) FORAMINIFER NANNOFOSSIL OOZE. Reddish brown material coating foraminifer tests forms irregular shaped streaks in Section 2, 132-150 cm. A brown rounded pebble 1 cm in diameter occurs in Section 3, 95-96 cm.

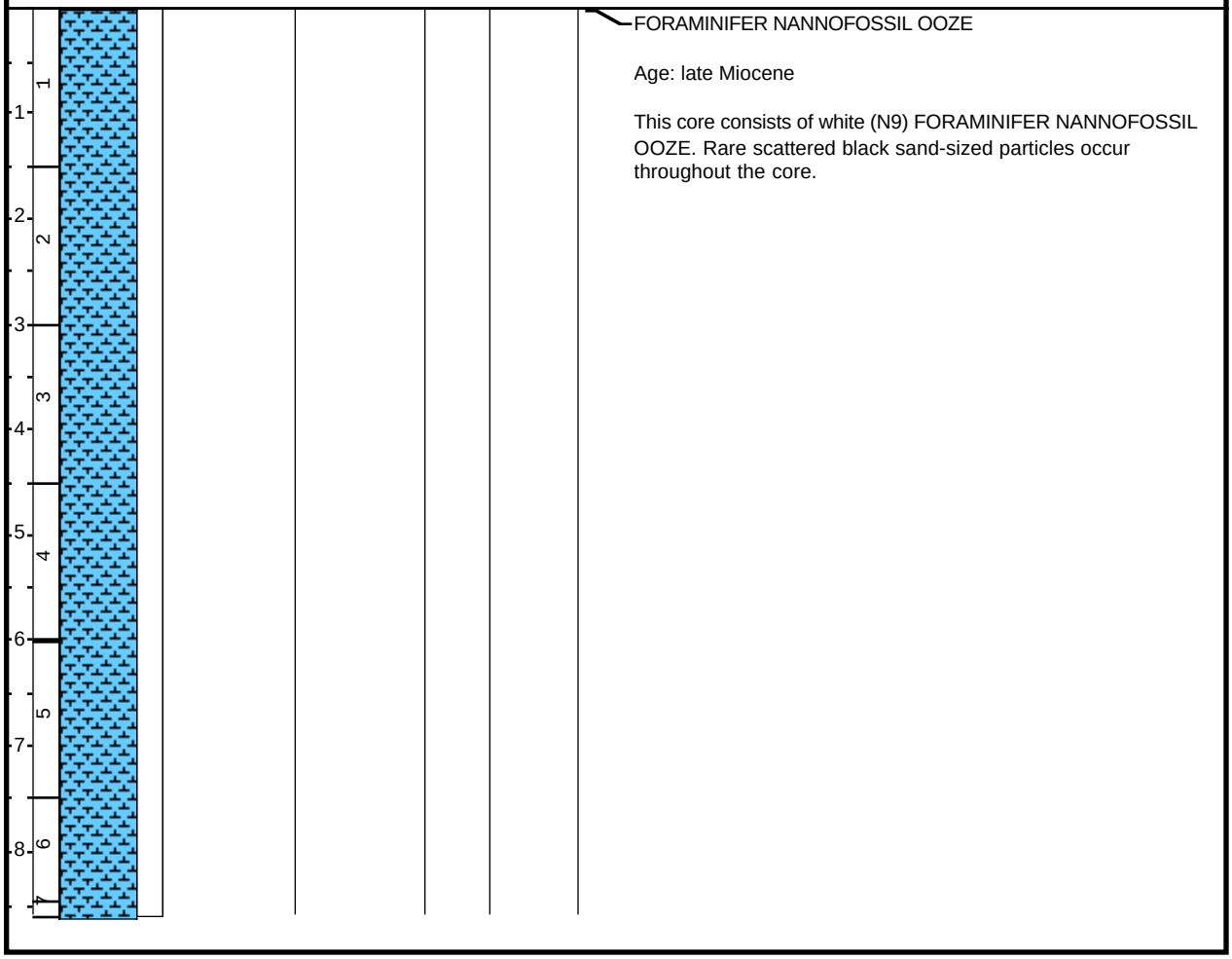
Core Photo

Site 1141 Hole A Core 4R **Cored 27.4-36.8 mbsf**

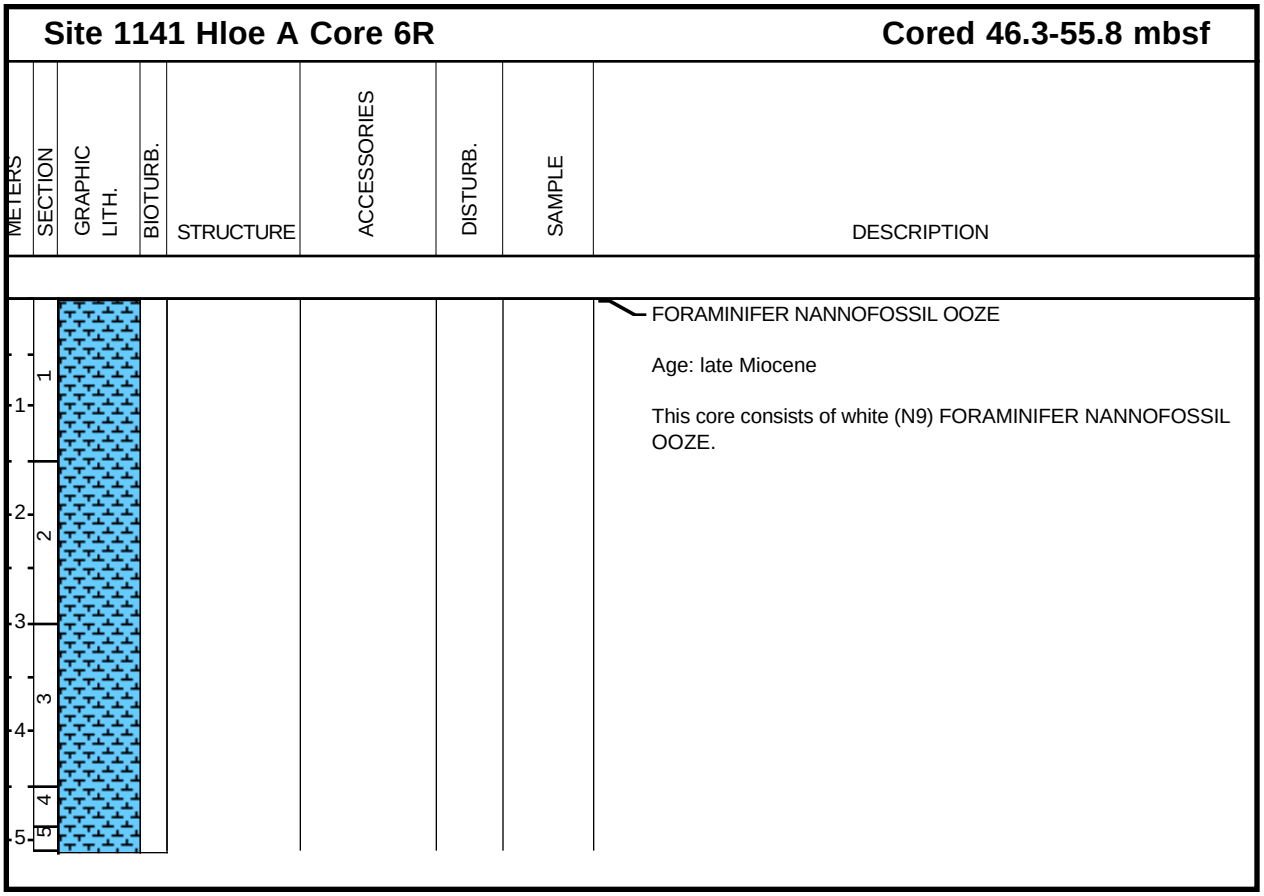


Core Photo

Site 1141 Hole A Core 5R **Cored 36.8-46.3 mbsf**



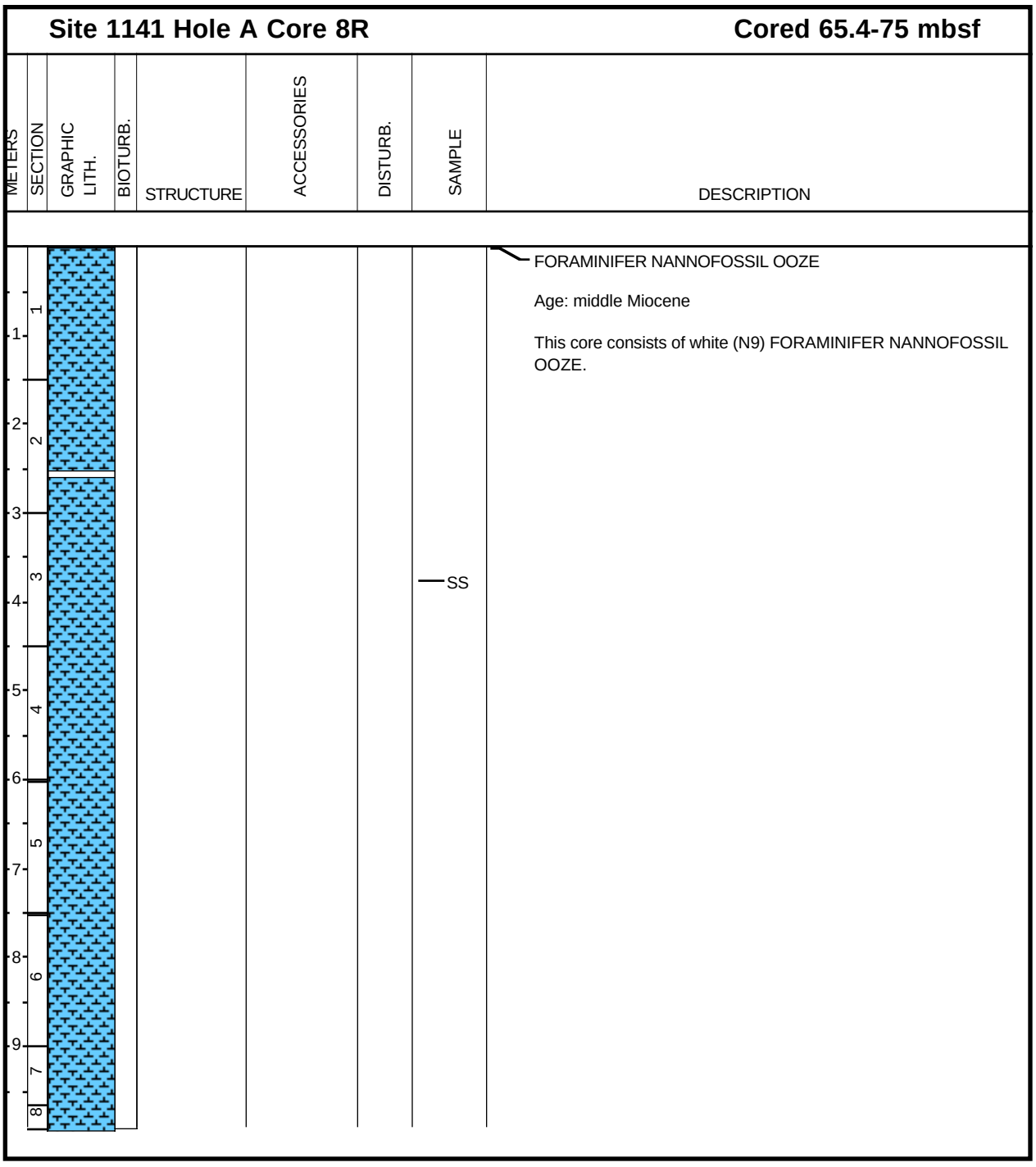
Core Photo



1141A-7R NO RECOVERY

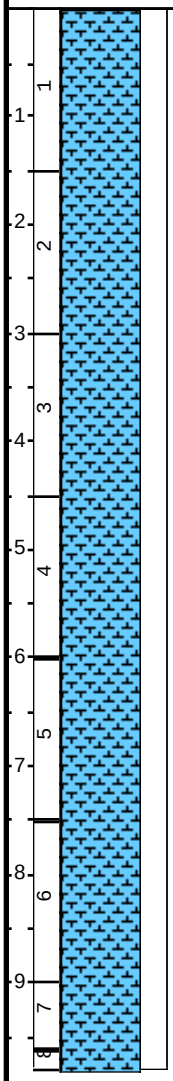
Core Photo

Site 1141 Hole A Core 8R **Cored 65.4-75 mbsf**



Core Photo

Site 1141 Hole A Core 9R **Cored 75-84.6 mbsf**



FORAMINIFER NANNOFOSSIL OOZE

Age: middle to early Miocene

This core consists of white (N9) FORAMINIFER NANNOFOSSIL OOZE.

Core Photo

Site 1141 Hole A Core 10R **Cored 84.6-94.2 mbsf**

METERS	SECTION	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	DISTURB.	SAMPLE	DESCRIPTION
1	1							FORAMINIFER NANNOFOSSIL OOZE Age: middle to early Miocene This core consists of white (N9) FORAMINIFER NANNOFOSSIL OOZE. Rare light tan patches occur in Section 2.
2	2						SS	

Core Photo

Site 1141 Hole A Core 11R **Cored 94.2-103.8 mbsf**

METERS	SECTION	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	DISTURB.	SAMPLE	DESCRIPTION

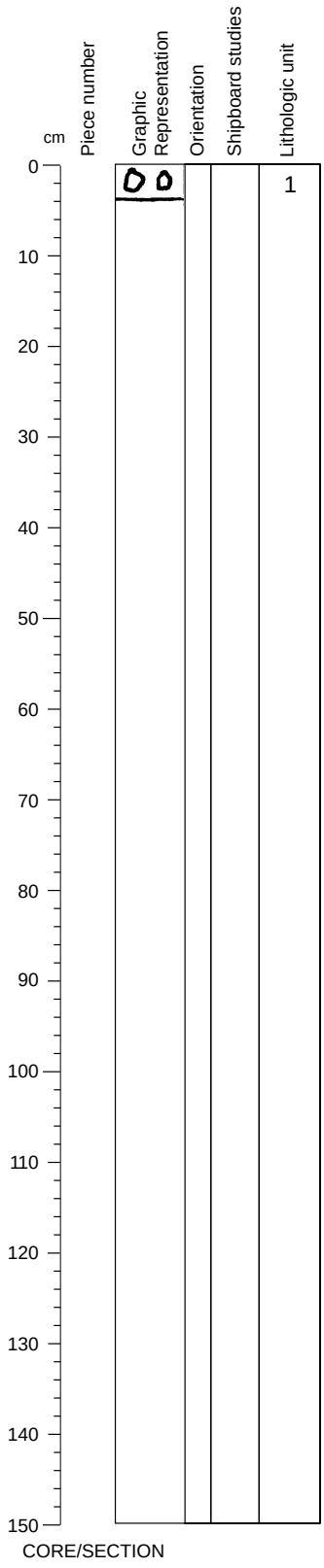
SANDY NANNOFOSSIL-BEARING FORAMINIFER LIMESTONE

Age: middle Eocene to early Miocene

This core consists of two fragments of pale brown SANDY NANNOFOSSIL-BEARING FORAMINIFER LIMESTONE. The sediment has an indurated matrix composed of foraminifer tests and mainly silt- to sand-sized calcareous test fragments and particles. This matrix contains abundant sand- to pebble-sized rock and mineral grains. The pebbles are subrounded, up to 1 cm in diameter, and mainly composed of chert, silicified sedimentary rock, and rare altered basalt. Dendrites occur in some pebbles. The sand particles consist mainly of quartz. Sorting is poor and size-grading is absent. The side of one of the two core fragments is covered by a 1-cm thick ferromanganese crust. Small pockets filled with white NANNOFOSSIL-BEARING FORAMINIFER LIMESTONE occur in the crust. Some pebbles in this fragment are also coated by ferromanganese material. This sediment appears to be part of a reworked bed that was emplaced by a gravity-controlled flow (e.g. debris flow).

1141A-12R NO RECOVERY

Core Photo



183-1141A-13R-1 **Section top: 113.50 (mbsf)**

UNIT 1: GABBRO

Pieces: NA

CONTACTS: Not recovered. The contact between Lithostratigraphic Unit I and Basement Unit 1 is inferred to be between Cores 11R and 13R (recovery in Core 12 was 0%). The contact between Basement Units 1 and 2 is inferred to be between Sections 13R-1 and 14R-1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	60	5	1	2	Subhedral to anhedral, equant and laths; slightly to moderately altered
Olivine:	10	3	1	1.5	Subhedral clay pseudomorphs
Clinopyroxene:	30	4	1	2	Subhedral to anhedral, equant; slightly to moderately altered

GROUNDMASS: None.

VESICLES: Nonvesicular.

COLOR: Dark greenish gray.

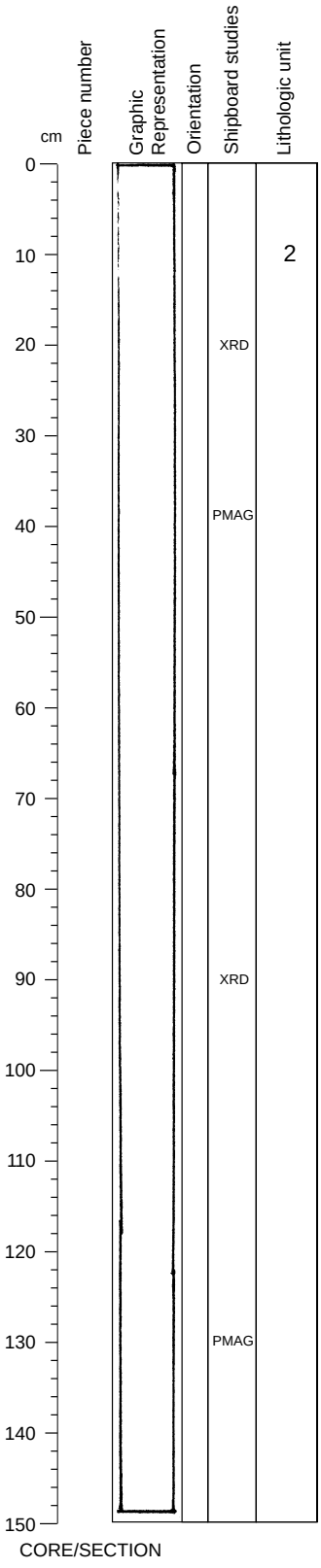
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Two fine (~0.2 m wide) calcite veins are present.

COMMENTS: Unit 1 is represented by three subangular cobbles recovered in the core catcher.

Core Photo



183-1141A-14R-1 **Section top: 114.50 (mbsf)**

UNIT 2: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: Not recovered. The contact between Units 1 and 2 is inferred to be between Sections 13R-1 and 14R-1

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	1	1.5	0.5	0.7	Euhedral

GROUNDMASS: Aphanitic.

VESICLES: Relatively coherent pieces within the upper and lower portions of the section are highly vesicular; those in the middle portion are sparsely vesicular. Vesicles are subround to angular, ≤2 mm, and completely filled with green clay, zeolite, and minor carbonate.

COLOR: From 0-74 cm, color is brownish gray to dark gray; from 74-149 cm, color is dark reddish brown to dusky red.

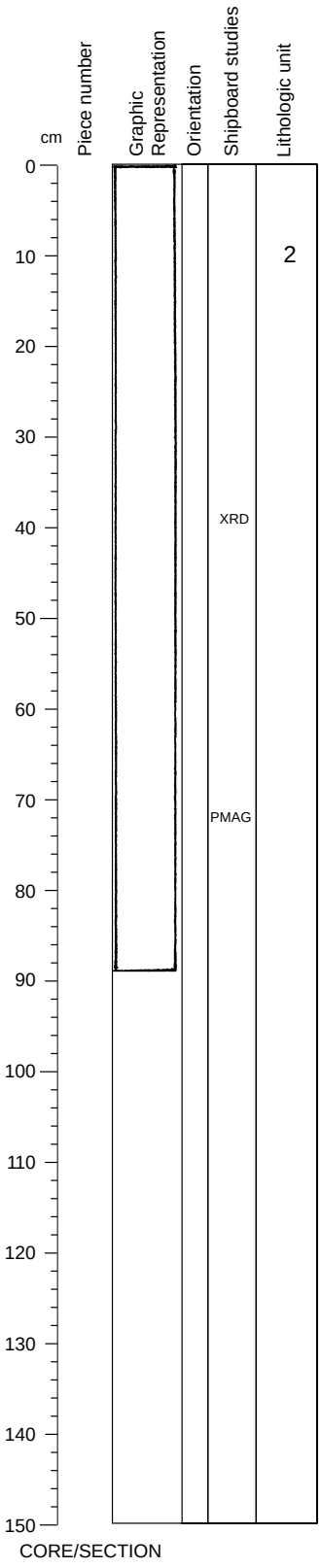
STRUCTURE: Massive (but see comment below).

ALTERATION: Complete, except for a highly altered 3-cm-wide piece at 6-9 cm.

VEINS/FRACTURES: None.

COMMENTS: The material of this core is very soft, although two relatively coherent pieces are present. The color change at 74 cm could mark a boundary between flows (although vesicularity does not change), and the 74-149 cm interval could originally have been a flow breccia (although evidence of clasts is lacking); the top few cm of the section also could have been a breccia, but the alteration makes identification of original structure impossible.

Core Photo



183-1141A-14R-2 **Section top: 116.00 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: Highly vesicular. Vesicles are irregular and angular to subround or flattened, ≤15 mm, and completely filled with green clay, zeolite, and minor carbonate.

COLOR: Upper portion of the section is brownish gray, the middle portion is dark gray, and the lower portion (56-91 cm) is dark reddish brown.

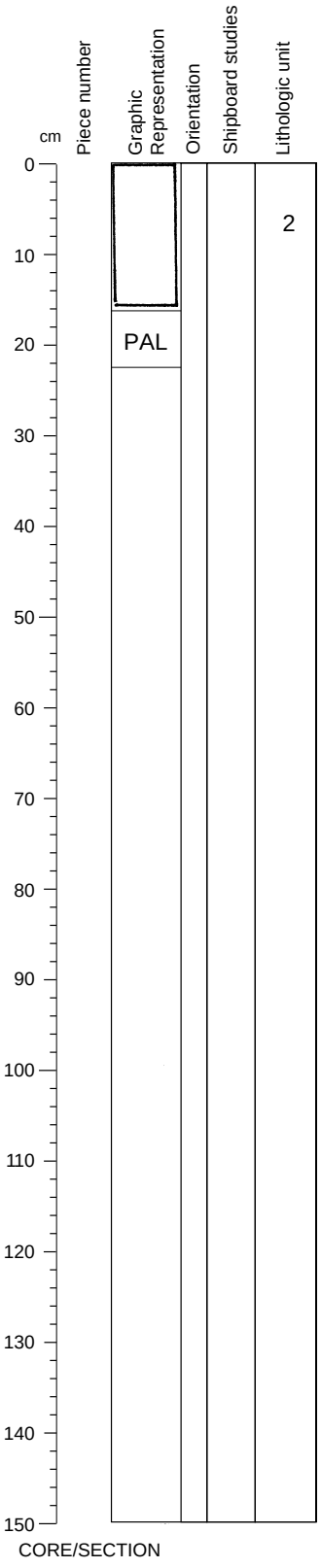
STRUCTURE: See comment below.

ALTERATION: Complete.

VEINS/FRACTURES: Veins are <2 mm wide and filled with zeolites.

COMMENTS: The material of this core is very soft. Vesicle patterns delineate clasts in the 0-60 cm interval, and the entire section originally could have been a basaltic breccia; however, the complete alteration precludes a definite identification of original structure.

Core Photo



183-1141A-14R-CC **Section top: 116.90 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic.

VESICLES: Highly to moderately vesicular. Vesicles are angular to subround, ≤3 mm, and completely filled with green clay and zeolite.

COLOR: Grayish red to very dusky red.

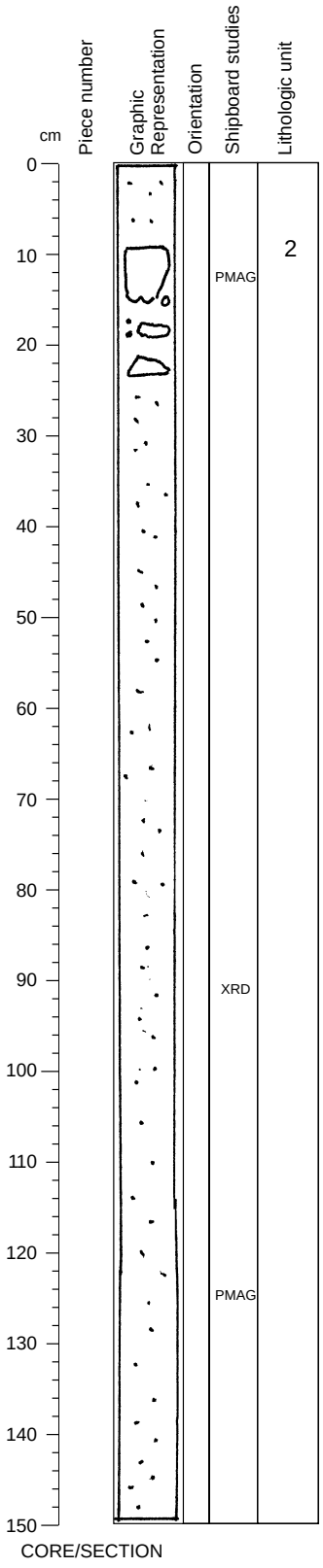
STRUCTURE: Massive.

ALTERATION: Complete.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1141A-15R-1 **Section top: 123.10 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1-2			Euhedral

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular. Vesicles are round, 1-2 mm, and filled with green clay and white zeolite. Rare carbonate-filled vugs are present (e.g., at 60 cm).

COLOR: Upper half of the section is brownish gray to dark gray; lower half is dark reddish brown to dusky red.

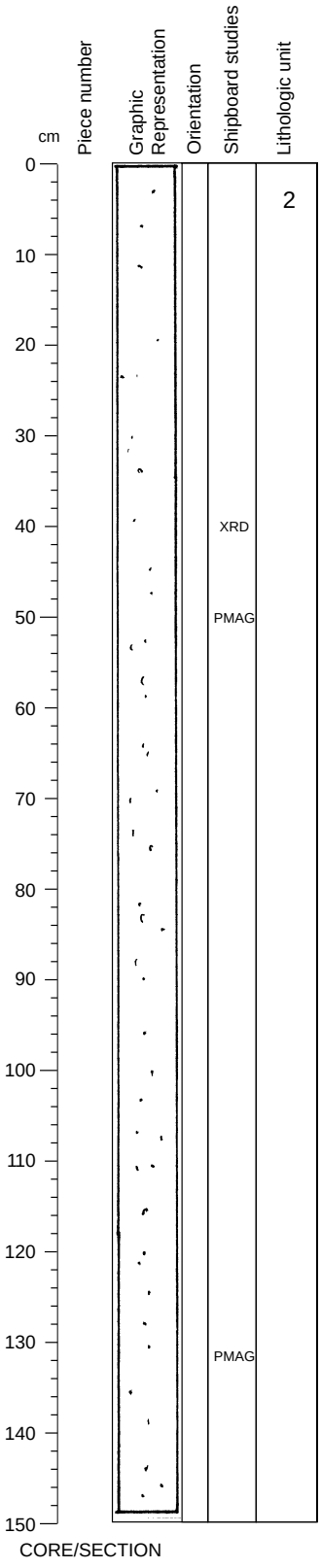
STRUCTURE: Massive.

ALTERATION: Complete. Groundmass is replaced with green and brown clay.

VEINS/FRACTURES: None.

COMMENTS: Relatively coherent, subround, completely altered, 3- to 5-cm domains of the protolith are present in the 10-25 cm interval; the remainder of the section is a mixture of gravel-size domains and clay. Interpreted as a zone of highly weathered basalt.

Core Photo



183-1141A-15R-2 **Section top: 124.60 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular. Vesicles are round, 0.5-1 mm, and filled with green clay and white zeolite.

COLOR: Dusky red or dark reddish brown to dark gray.

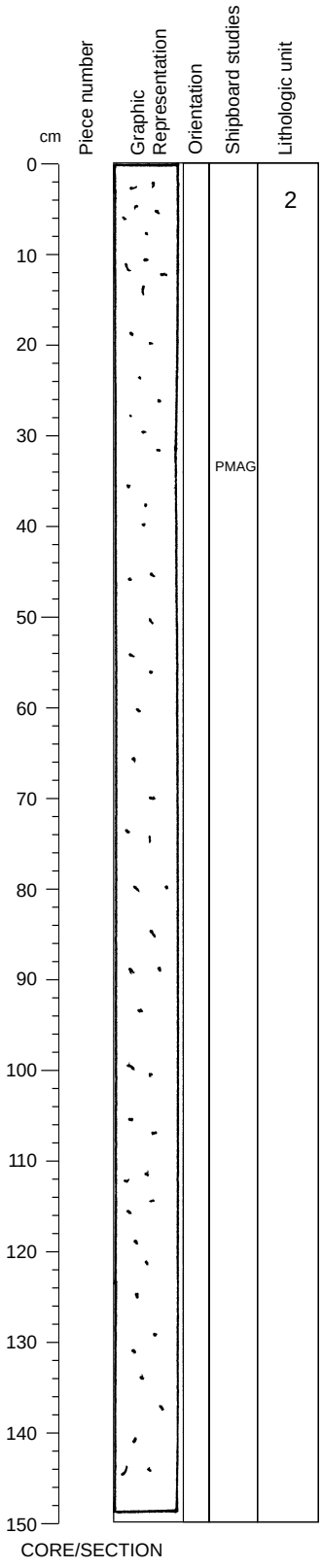
STRUCTURE: Massive.

ALTERATION: Complete. Original basalt is replaced with clay.

VEINS/FRACTURES: None.

COMMENTS: Interval from 137-145 cm contains angular, 2- to 4-cm pieces of basalt; remainder of the section is a mixture of clay and gravel-size altered basalt. Interpreted as a zone of highly weathered basalt.

Core Photo



183-1141A-15R-3 **Section top: 126.10 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Moderately to sparsely vesicular. Vesicles are ≤4 mm, round to irregular and subangular, and filled with green clay, white zeolite, and a trace amount of calcite.

COLOR: Brownish gray to dark gray.

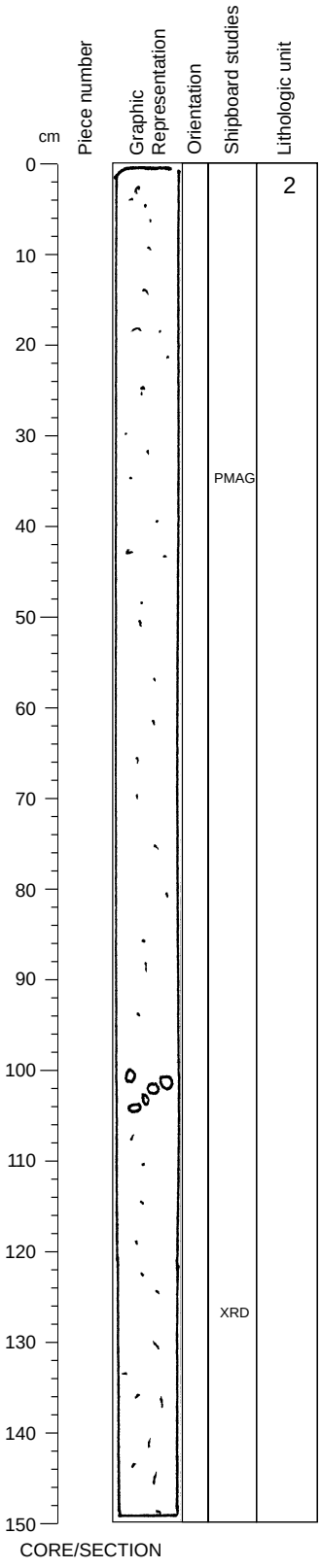
STRUCTURE: Massive.

ALTERATION: Complete.

VEINS/FRACTURES: None.

COMMENTS: The section is relatively homogeneous in color and structure.

Core Photo



183-1141A-15R-4 **Section top: 127.60 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1-2			Euhedral

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular. Vesicles are round, 0.5-1 mm, and filled with green clay, white zeolite, and a trace amount of calcite.

COLOR: Greenish gray to medium gray or brownish gray.

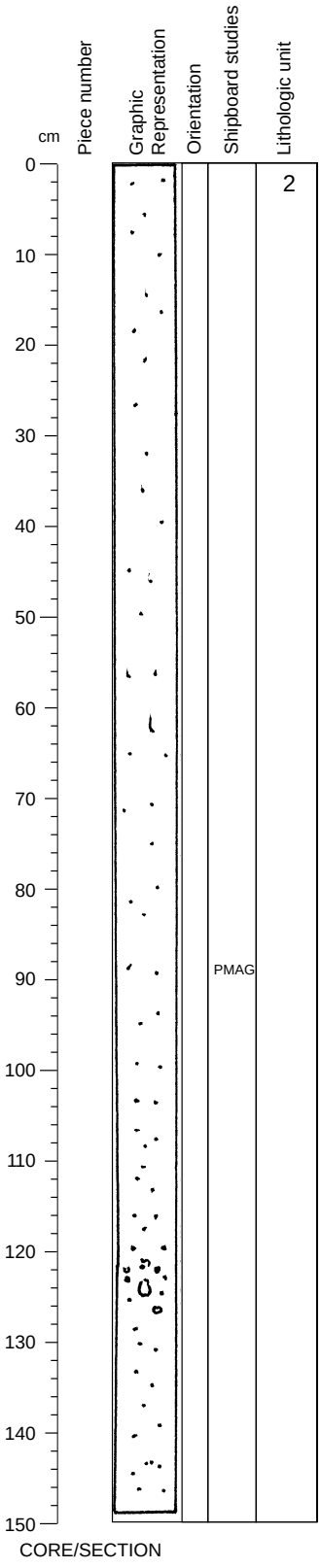
STRUCTURE: Massive.

ALTERATION: Complete.

VEINS/FRACTURES: None.

COMMENTS: Several pieces of highly weathered basalt (1-2 cm) are present from 100-104 and 126-134 cm; the remainder of the section consists of gravel-size basalt fragments in a grayish brown matrix of clay with rare, zeolite-filled vugs (e.g., at 126-127 cm).

Core Photo



183-1141A-15R-5 **Section top: 129.10 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular from 0-50 cm; vesicles are <2 mm and round. Moderately to highly vesicular from 50-112 cm; vesicles are <1 cm and angular (from 50-99 cm) to round (from 99-112 cm). Sparsely vesicular from 112-130 cm, and highly vesicular from 130-150 cm; vesicles are <2 mm and round. Vesicles throughout the section are filled with white zeolite, green clay, and trace amounts of calcite.

COLOR: Brownish gray from 0-29 cm; very dusky red from 29-66 cm; light brownish gray to dark greenish gray from 66-150 cm.

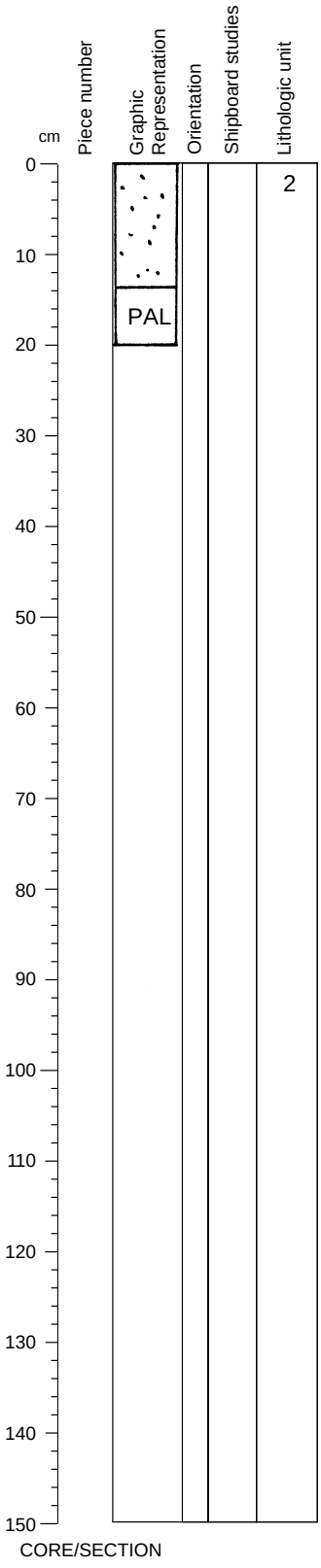
STRUCTURE: Massive, except for the interval from 30-65 cm, which may originally have been a volcanic breccia (a definite identification of original structure is precluded by the advanced alteration).

ALTERATION: Complete. Original basalt is replaced by clay.

VEINS/FRACTURES: None.

COMMENTS: White crystals at 102, 108, and 114 cm may be feldspar glomerocrysts, but are probably zeolite filling vesicles. Rare, altered feldspar (<0.2 mm) and an altered mafic mineral (<0.4 mm; abundance ~2%) are present in a fragment at 124 cm.

Core Photo



183-1141A-15R-CC **Section top: 130.58 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained.

VESICLES: Moderately to highly vesicular; vesicles are subangular to round, <1 mm, and filled with green clay or zeolite.

COLOR: Greenish gray to dark greenish gray.

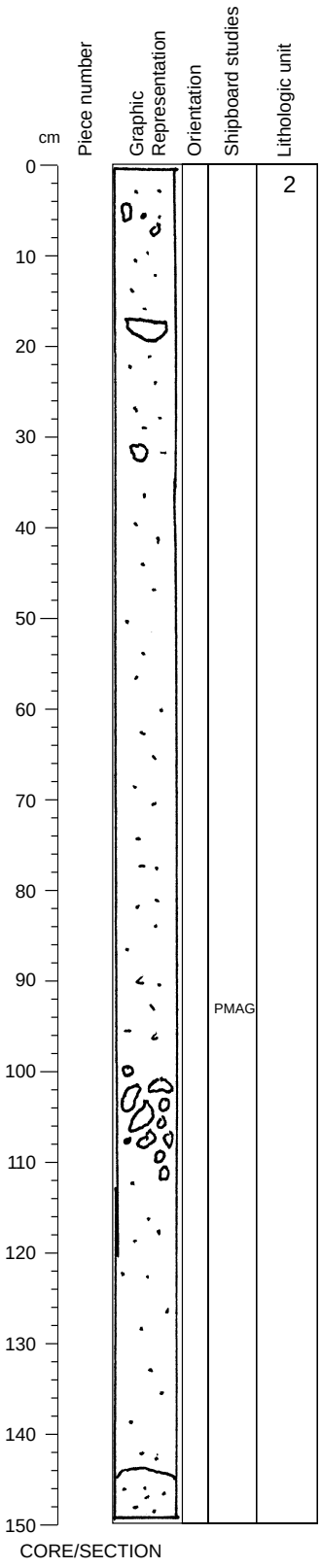
STRUCTURE: Massive.

ALTERATION: Complete.

VEINS/FRACTURES: None.

COMMENTS: The section is a combination of gravel-size rubble and clay.

Core Photo



183-1141A-16R-1 **Section top: 132.80 (mbsf)**

UNIT 2: APHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: None.

PHENOCRYSTS: None.

GROUNDMASS: Aphanitic to fine grained.

VESICLES: Sparsely to moderately vesicular; several more-coherent patches are highly vesicular. Vesicles are ≤5 mm, subround to subangular, and filled with green clay and subordinate zeolite.

COLOR: Most of section varies from medium dark gray to greenish gray. The middle portion of the section contains patches of very dusky red (see comment below). From 144-150 cm, the color is grayish red.

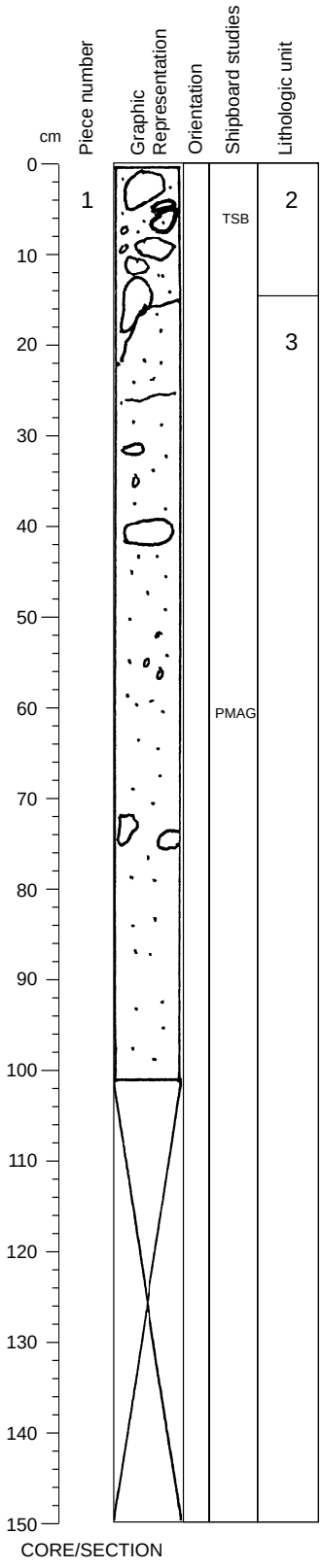
STRUCTURE: Massive.

ALTERATION: Complete, except for rare, highly altered, fine-grained pieces of basalt.

VEINS/FRACTURES: None.

COMMENTS: The material in this section is very soft. Harder areas are present from 14-20 cm and 22-31 cm; a few relatively hard fragments are present between 105 and 113 cm. The very dusky red color in the middle of the section became dark greenish gray after several hours at room temperature in air.

Core Photo



183-1141A-16R-2 **Section top: 134.30 (mbsf)**

UNIT 2: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: NA (too soft)

CONTACTS: The contact between Units 2 and 3 slopes from 17 to 23 cm.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	1	2	0.5	1	Anhedral

GROUNDMASS: Fine grained. Groundmass contains plagioclase, clinopyroxene and oxides.

VESICLES: Sparsely to highly vesicular (but see comment below). Most vesicles are round to subround, 0.5-2 mm, and filled with light green clay, zeolite, and a trace amount of calcite. Rare, partially zeolite-filled ovoid vesicles are ≤5 mm.

COLOR: Light gray to light greenish gray.

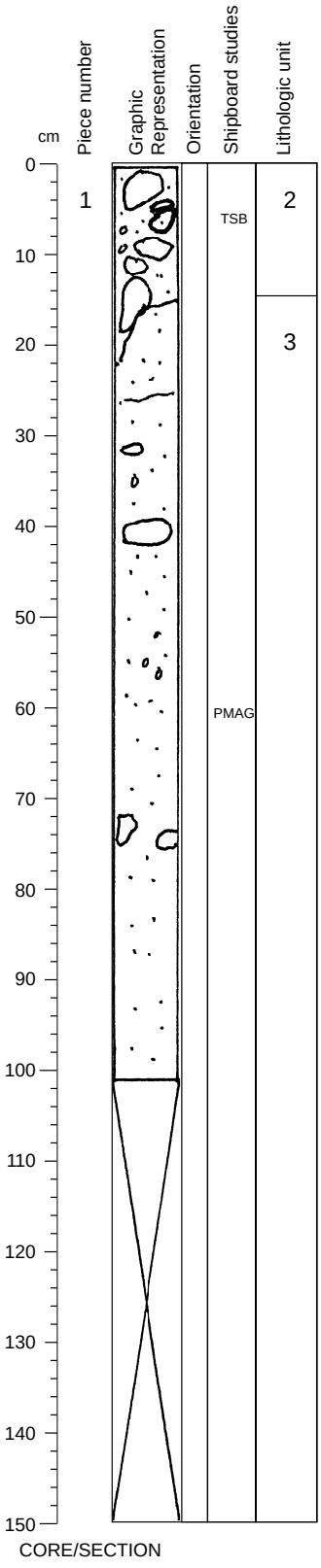
STRUCTURE: Massive.

ALTERATION: Moderate to complete.

VEINS/FRACTURES: None, but see comment below.

COMMENTS: Several relatively hard pieces of basalt reveal a subtrachytic texture under the binocular microscope.

Core Photo



183-1141A-16R-2 **Section top: 134.30 (mbsf)**

UNIT 3: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: NA

CONTACTS: The contact between Units 2 and 3 slopes from 17 to 23 cm.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	2.5	0.8	1.5	Subhedral

GROUNDMASS: Fine grained. Groundmass contains plagioclase, clinopyroxene and oxides.

VESICLES: Relatively hard and coherent pieces are sparsely to moderately veiscular. Vesicles are ≤6 mm, round to subangular and, rarely, flattened; filled with zeolite and green clay.

COLOR: Grayish red; interval from 17-26 cm is dark reddish brown.

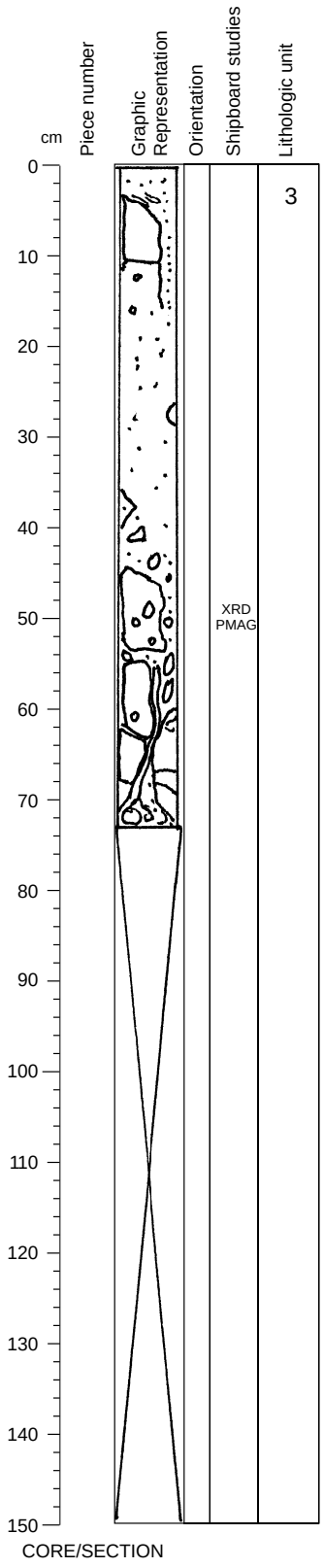
STRUCTURE: Massive. Alteration between more coherent pieces of basalt produces a brecciated appearance.

ALTERATION: High to complete.

VEINS/FRACTURES: None.

COMMENTS: Several of the harder pieces have recognizable groundmasses and igneous texture but most of the section is altered to clay and original features are not recognizable.

Core Photo



183-1141A-16R-3 **Section top: 135.30 (mbsf)**

UNIT 3: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: NA

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	2.5	0.8	1.5	Subhedral

GROUNDMASS: Fine to medium grained. Groundmass contains partially unaltered plagioclase.

VESICLES: Sparsely to moderately vesicular. Vesicles are round, 0.5-2 mm, and filled with green clay, calcite, white zeolite, and silica. Large (~10 mm) vesicles at 47 cm are filled with silica (quartz?).

COLOR: Greenish gray to dark greenish gray.

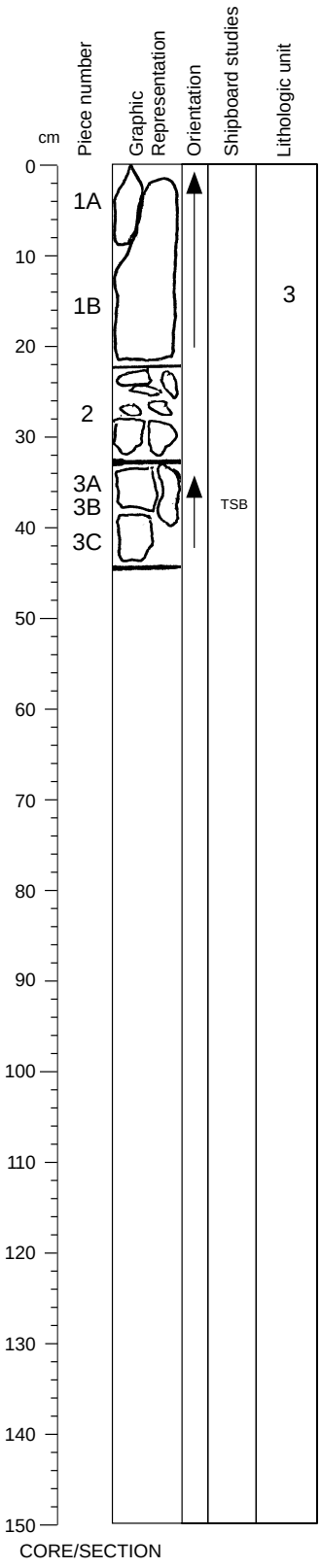
STRUCTURE: Massive.

ALTERATION: Complete from 0 to 47 cm, where rock is replaced with clay. High from 47 to 72 cm, where groundmass clinopyroxene is replaced with green clay, and oxides are replaced with hematite.

VEINS/FRACTURES: Sinuous subvertical veins (5-10 mm wide) in the intervals from 10-18 and 60-72 cm are filled with green clay and calcite.

COMMENTS:

Core Photo



183-1141A-16R-CC **Section top: 136.01 (mbsf)**

UNIT 3: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-3

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	2.5	0.8	1.5	Subhedral

GROUNDMASS: Fine to medium grained. Groundmass contains partially unaltered plagioclase, which produces a spotted appearance.

VESICLES: Sparsely to moderately vesicular; vesicularity decreases from Piece 1 to Piece 3. Vesicles are round to angular (0.5-2 mm) or flattened (≤8 mm), and are filled with green clay, white zeolite and carbonate.

COLOR: Greenish gray to dark greenish gray.

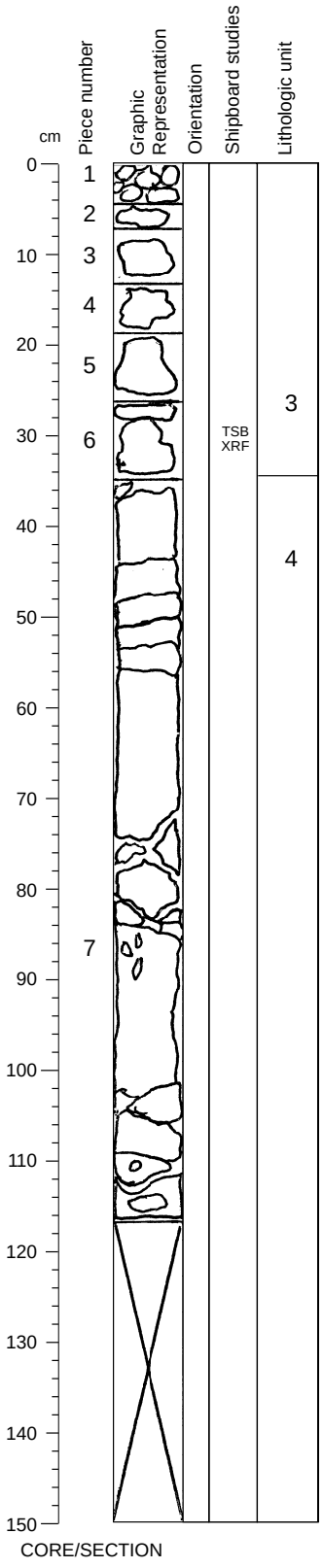
STRUCTURE: Massive.

ALTERATION: Moderate to high. Groundmass clinopyroxene is replaced with green clay and oxides are replaced with hematite.

VEINS/FRACTURES: Sparse veins (≤2 mm wide) are filled with carbonate and zeolite.

COMMENTS:

Core Photo



183-1141A-17R-1 **Section top: 142.40 (mbsf)**

UNIT 3: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-6

CONTACTS: Not recovered. The contact between Units 3 and 4 is inferred to be at ~35 cm, between Pieces 6 and 7 (see comment below).

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	2	2.5	0.8	1.5	Subhedral

GROUNDMASS: Fine to medium grained. Groundmass contains acicular oxides.

VESICLES: Sparsely to moderately vesicular. Vesicles are 0.5-2 mm, round to flattened, and partially filled with clay. Vesicles are aligned subhorizontally in two zones in Piece 5.

COLOR: Medium light gray to medium gray.

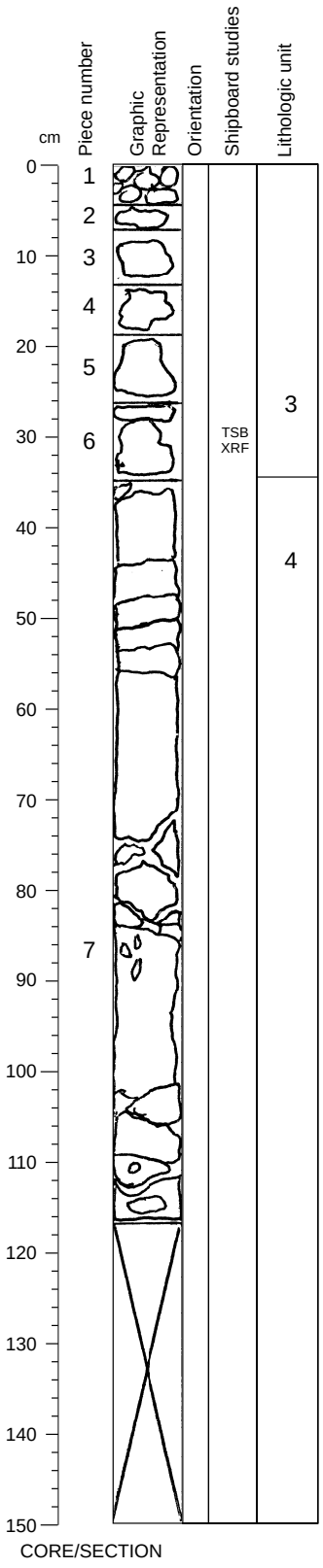
STRUCTURE: Massive.

ALTERATION: Moderate. Groundmass plagioclase laths are partially replaced with clay; clinopyroxene is almost completely replaced with clay and zeolite.

VEINS/FRACTURES: None.

COMMENTS: The contact is inferred on the basis of color and textural changes (see description of Section 17R-1, Piece 7).

Core Photo



183-1141A-17R-1 **Section top: 142.40 (mbsf)**

UNIT 4: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-7

CONTACTS: Not recovered. The contact between Units 3 and 4 is inferred to be at ~35 cm, between Pieces 6 and 7

PHENOCRYSTS:	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	2	3	1	1	Subhedral

GROUNDMASS: Fine grained. Groundmass contains remnant plagioclase, altered clinopyroxene, and oxides replaced by hematite and goethite.

VESICLES: Moderately vesicular. Vesicles are ≤12 mm, subangular and elongate to subround and ovoid, and are filled with green clay, carbonate, and amorphous silica. Large (2 x 3.5 cm) ovoid vesicle at 114 cm is filled with amorphous silica.

COLOR: Brownish black to dark greenish gray.

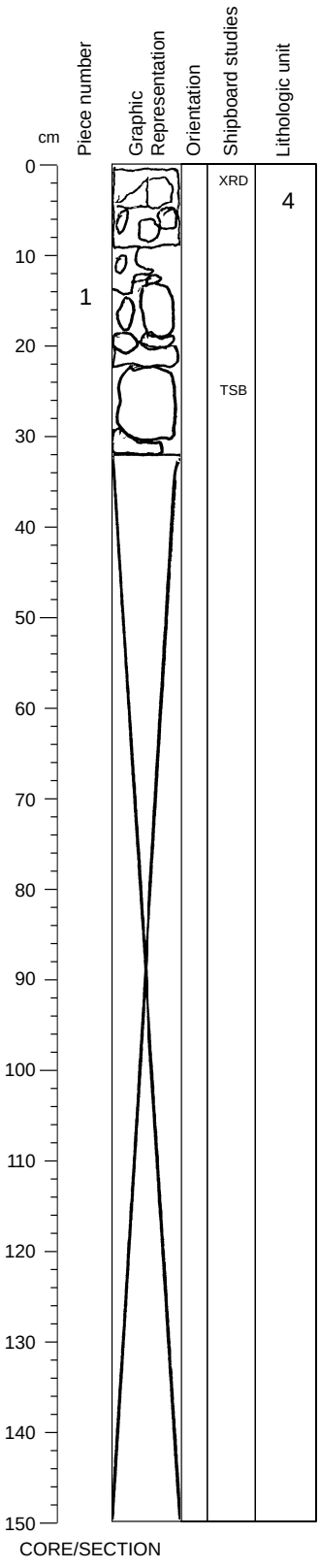
STRUCTURE: Massive, although alteration produces a brecciated appearance.

ALTERATION: Very high to complete.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1141A-17R-CC **Section top: 143.57 (mbsf)**

UNIT 4: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	2	3	1	1	Subhedral

GROUNDMASS: Fine to medium grained. Groundmass contains some unaltered plagioclase.

VESICLES: Nonvesicular to sparsely vesicular. Vesicles are round, ~1 mm, and filled with green clay, calcite, and amorphous silica.

COLOR: Dark gray to light gray.

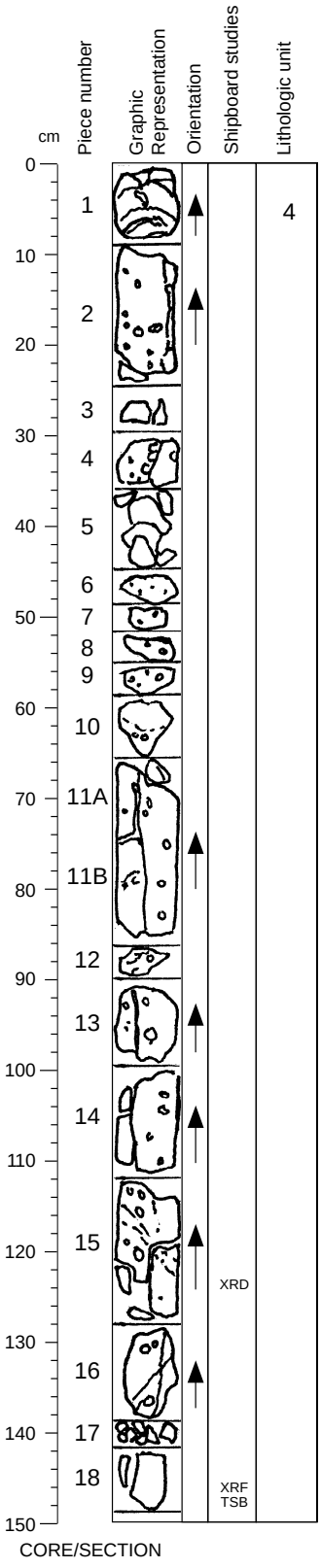
STRUCTURE: Massive pieces are surrounded by loose clay; section is probably disturbed by drilling.

ALTERATION: Moderate to complete. Groundmass clinopyroxene and glass are replaced by green clay.

VEINS/FRACTURES: None.

COMMENTS:

Core Photo



183-1141A-18R-1 **Section top: 152.00 (mbsf)**

UNIT 4: APHYRIC TO MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-18

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	0-5	4	0.5	1	Euhedral laths
Olivine:	trace	0.8	<0.1		Euhedral, equant

GROUNDMASS: Fine grained.

VESICLES: Sparsely to moderately vesicular. Vesicles are round, 1-10 mm, and filled with carbonate, amorphous silica, and clay.

COLOR: Dark greenish gray to dark gray.

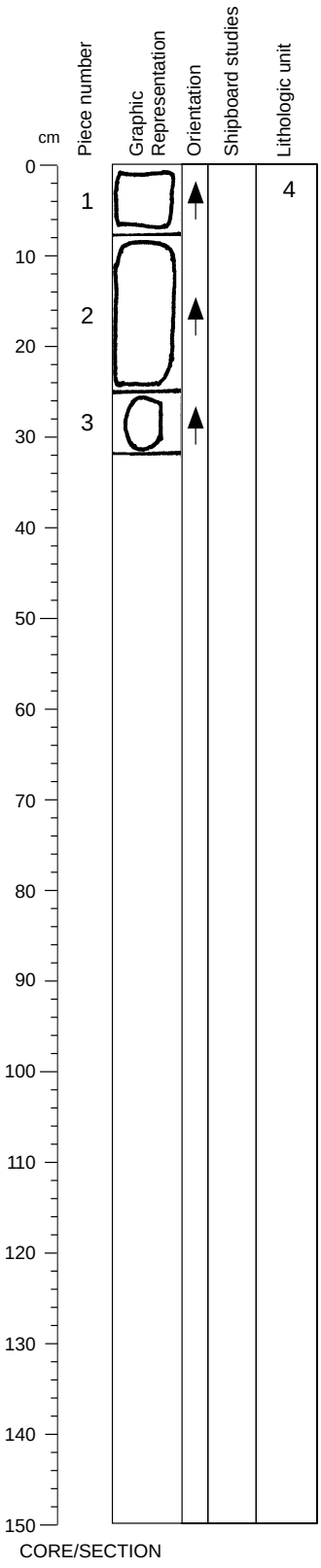
STRUCTURE: Massive, except for Piece 1, which is brecciated.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Moderately abundant, irregular veins, <1 to 3 mm wide, are filled with carbonate and clay.

COMMENTS: Very rare, fine grains of native copper are present in vesicles and disseminated in the groundmass. Note: Piece 1 could be all that was recovered of a flow top. Piece 18 is markedly denser, finer grained, and fresher than the remainder of the section; the same type of rock is present in Section 18R-2 and might be from a dike that intrudes Unit 4; however, no contacts were recovered.

Core Photo



183-1141A-18R-2 **Section top: 153.50 (mbsf)**

UNIT 4: SPARSELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-3

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max	Min	Avg.	Shape/Habit
Plagioclase:	3	2	0.3	0.6	Euhedral, blocky grains

GROUNDMASS: Fine grained.

VESICLES: Nonvesicular, except for the interval from 10-14 cm, which is highly vesicular and contains a subhorizontal vesicle sheet. Vesicles are irregular, <1 to 3 mm, and filled with amorphous silica.

COLOR: Medium gray.

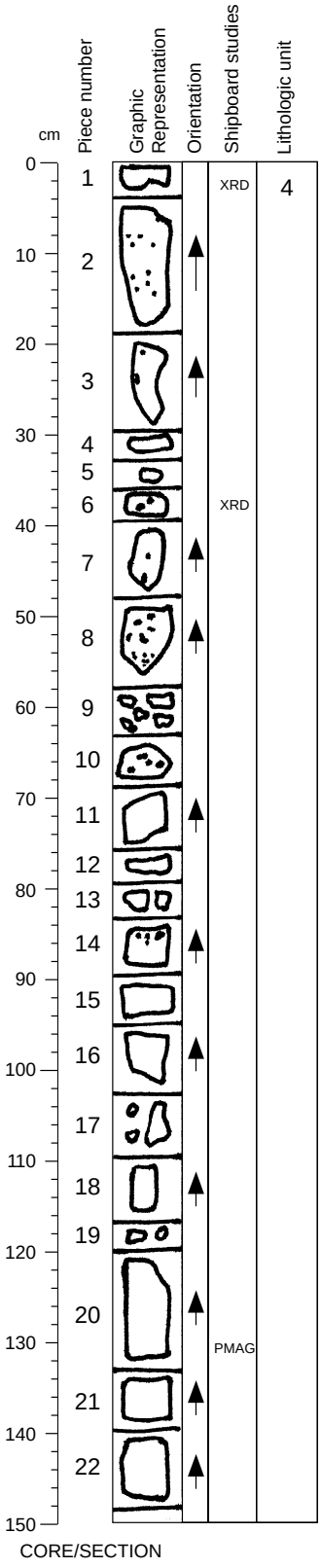
STRUCTURE: Massive.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: None.

COMMENTS: The pieces in this section and Piece 18 in Section 18R-1 are denser, fresher, and finer grained than rock in Section 19R-1 or Pieces 1-17 in Section 18R-1, and might represent a dike within the Unit 4 flow; however, contacts were not recovered.

Core Photo



183-1141A-19R-1 **Section top: 156.80 (mbsf)**

UNIT 4: APHYRIC TO MODERATELY PLAGIOCLASE-OLIVINE-PHYRIC BASALT

Pieces: 1-22

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	0-5	2	0.5	1	Euhedral, blocky
Olivine:	0-2	0.8	0.3	0.5	Euhedral, equant

GROUNDMASS: Fine grained. Groundmass contains abundant spiky grains of iron oxide.

VESICLES: Nonvesicular to moderately vesicular. Vesicles are round to irrregular, <1 to 12 mm, and filled with carbonate and amorphous silica. Vesicles are concentrated in the interval from 48-79 cm.

COLOR: Dark greenish gray to pale greenish gray.

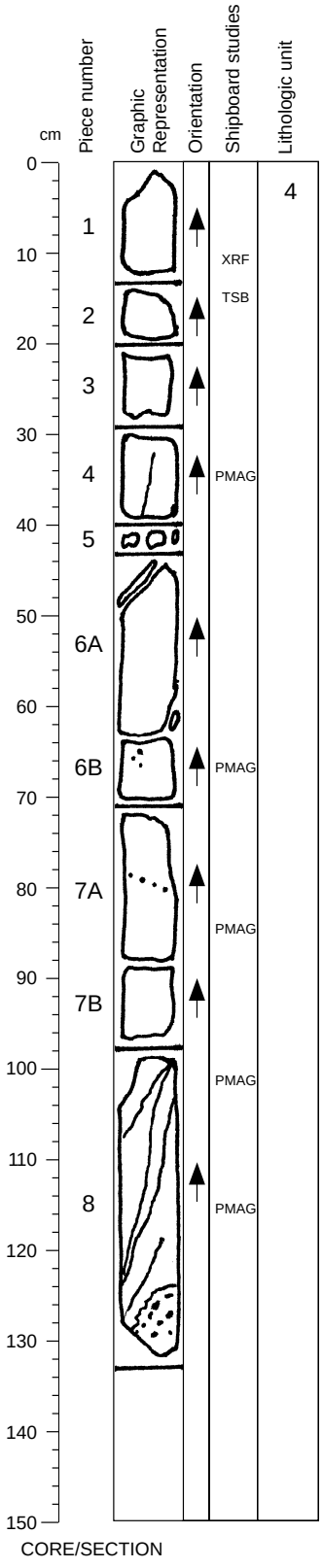
STRUCTURE: Massive.

ALTERATION: Moderate to high. Groundmass of Piece 21 is locally replaced with carbonate.

VEINS/FRACTURES: Very sparse, <1-mm-wide veins are filled with carbonate and zeolite.

COMMENTS: Plagioclase and olivine phenocrysts are irregularly distributed; upper part of section is aphyric, lower part is moderately phyric.

Core Photo



183-1141A-19R-2 **Section top: 158.28 (mbsf)**

UNIT 4: APHYRIC TO MODERATELY PLAGIOCLASE-OLIVINE-PHYRIC BASALT

Pieces: 1-8

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	0-5	2.5	0.5	1	Euhedral, blocky
Olivine:	0-2	0.8	0.3	0.5	Euhedral, equant; altered to green clay

GROUNDMASS: Fine grained.

VESICLES: Sparsely to moderately vesicular. Vesicles are round to irregular, <1 to 6 mm, and filled with carbonate and amorphous silica. Vesicles are concentrated in irregular patches (vertical and inclined cylinders) at 62-66 cm and 122-130 cm.

COLOR: Pale gray.

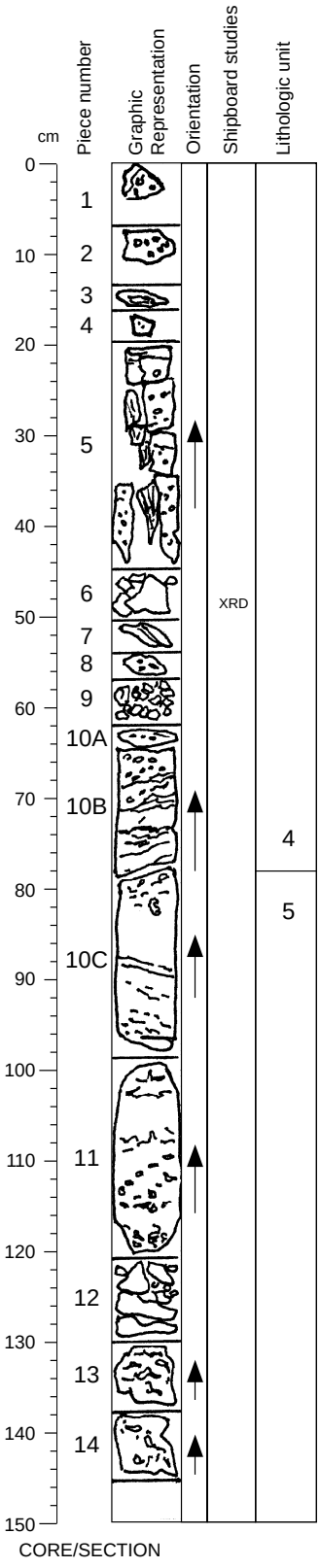
STRUCTURE: Massive.

ALTERATION: Moderate to high. Groundmass is locally replaced with calcite.

VEINS/FRACTURES: Sparse veins (abundant in Piece 8) are <1 mm wide, subvertical, and filled with carbonate and quartz.

COMMENTS: Distribution of phenocrysts is highly variable.

Core Photo



183-1141A-20R-1 **Section top: 161.60 (mbsf)**

UNIT 4: MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-10

CONTACTS: The contact between Units 4 and 5 is at 79 cm, within Piece 10.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	3	1	0.2	0.5	Euhedral, blocky
Olivine:	trace	0.5	0.1	0.2	Euhedral, equant; altered to green clay

GROUNDMASS: Fine grained to aphanitic. Groundmass contains very fine grains of disseminated sulfide.

VESICLES: Sparsely to locally highly vesicular. Vesicles are round, <1 to 8 mm, and filled with carbonate and amorphous silica.

COLOR: Varies down-section from pale gray to dark greenish gray and brownish gray.

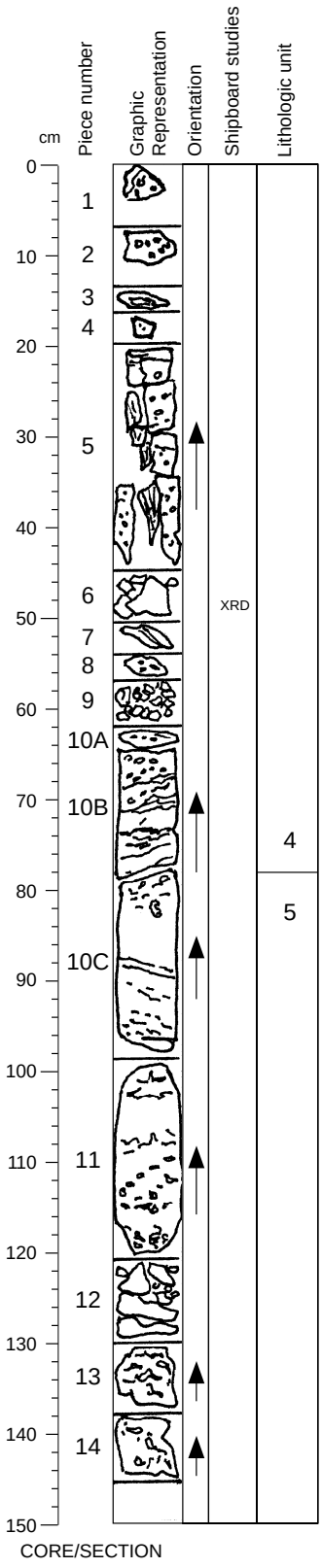
STRUCTURE: Massive from 0-24 cm and 42-66 cm; sheared from 24-42 cm and 66-80 cm.

ALTERATION: Moderate to complete.

VEINS/FRACTURES: Rare veins (<2 mm wide) are filled with carbonate, quartz, and clay.

COMMENTS: Fine grained, dark brown, altered glass forms irregular layers within lower sheared interval.

Core Photo



183-1141A-20R-1 **Section top: 161.60 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 10-14

CONTACTS: The contact between Units 4 and 5 is at 79 cm, within Piece 10.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	2	2	0.5	1	Subhedral; altered to clay

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Moderately to highly vesicular. Vesicles are round to very irregular, <1 to 10 mm. Trains of <1-mm vesicles line the chill zones at 80 and 89 cm. Vesicles are filled with zeolite (?), carbonate, and clay.

COLOR: Dusky red to dark brownish red.

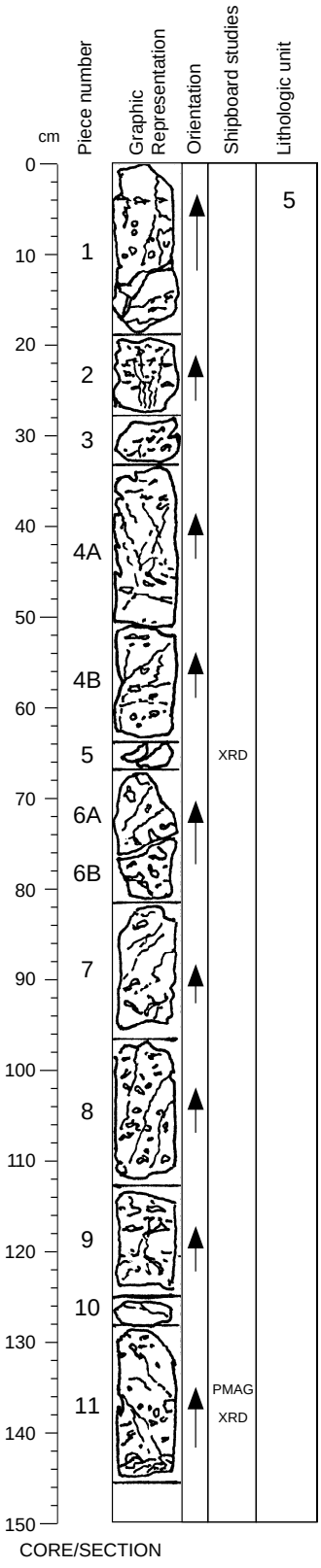
STRUCTURE: Finely brecciated, grading downward to massive.

ALTERATION: High to complete.

VEINS/FRACTURES: Several <2-mm-wide veins are filled with carbonate, clay, and quartz.

COMMENTS: Chill zones are present at 80 and 89 cm, and delineate an upper lobe of the Unit 5 lava flow.

Core Photo



183-1141A-20R-2 **Section top: 163.06 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1-11

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	0-1	1	0.2	0.5	Euhedral, blocky
Olivine:	1-2	0.8	0.1	0.2	Euhedral, equant; altered to green or white clay

GROUNDMASS: Fine grained.

VESICLES: Sparsely to moderately vesicular. Vesicles are <1 to 15 mm, round to irregular, and filled with zeolite (?) and carbonate.

COLOR: Dark reddish brown.

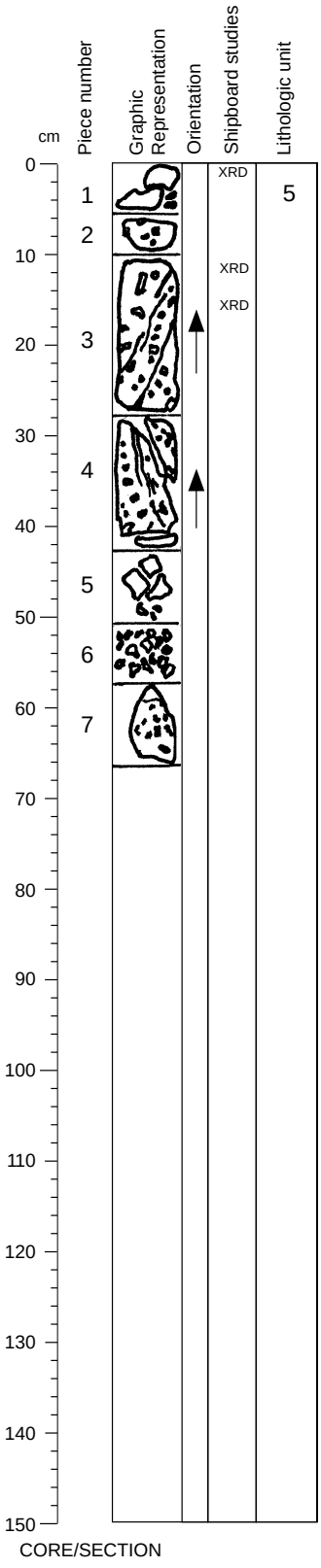
STRUCTURE: Massive.

ALTERATION: Very high.

VEINS/FRACTURES: Sparsely to moderately abundant veins are ≤1 mm wide, have irregular orientations, and are filled with zeolite.

COMMENTS:

Core Photo



183-1141A-20R-3 **Section top: 164.53 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1-7

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	0.8	0.3	0.5	Euhedral, blocky
Olivine:	1	0.6	0.1	0.2	Euhedral, equant to prismatic; altered to green clay

GROUNDMASS: Fine grained.

VESICLES: Moderately vesicular. Vesicles are 1-8 mm, round to irregular, and filled with zeolite or, rarely, green clay and carbonate.

COLOR: Dark reddish brown.

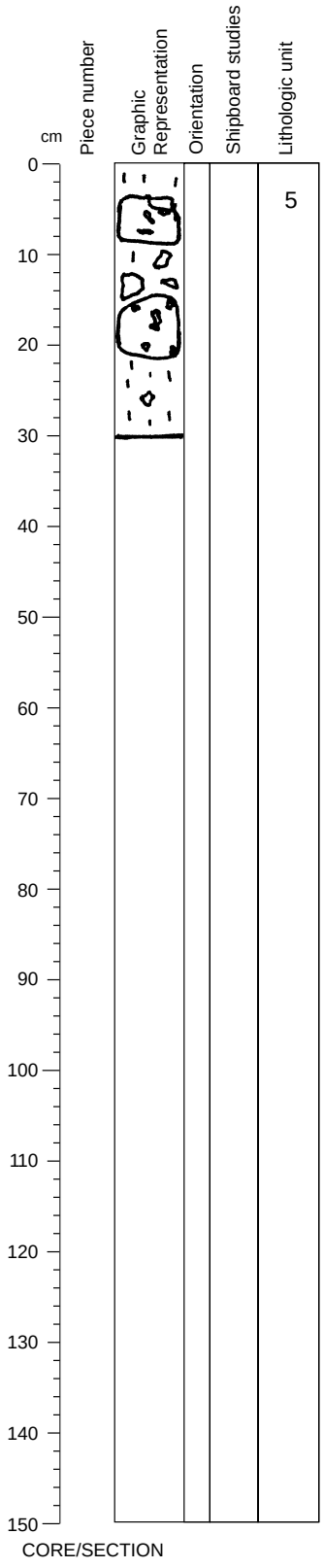
STRUCTURE: Massive.

ALTERATION: Very high.

VEINS/FRACTURES: Abundant veins in Pieces 3 and 4 are 1 to 2 mm wide, have irregular orientations and are filled with zeolite.

COMMENTS:

Core Photo



183-1141A-20R-CC **Section top: 165.20 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	1-2	0.6	0.1	0.2	Euhedral, equant; altered to green clay

GROUNDMASS: Fine grained.

VESICLES: Sparsely vesicular. Vesicles are 1-10 mm, round to irregular, and filled with zeolite (?) and carbonate.

COLOR: Medium greenish gray.

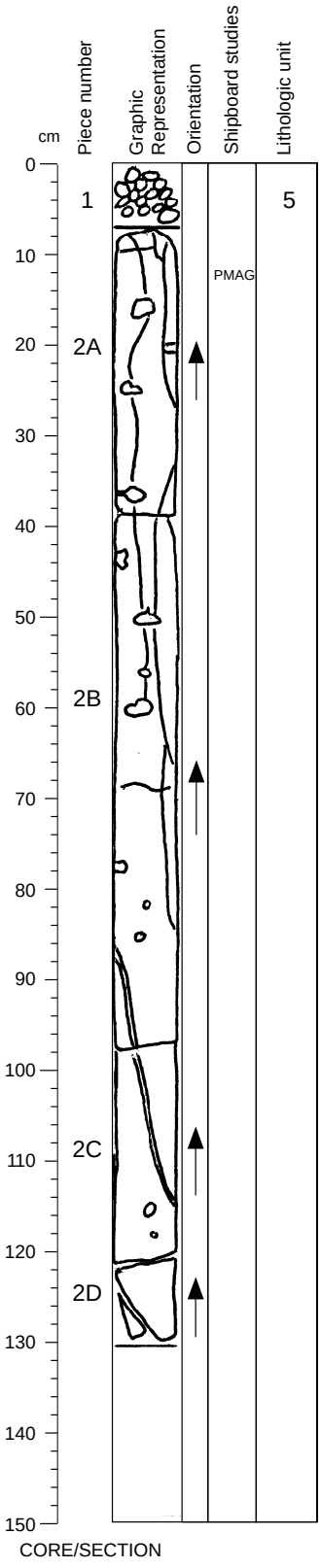
STRUCTURE: Massive fragments in rubble.

ALTERATION: High (in massive fragments) to complete (in rubbly areas).

VEINS/FRACTURES: None.

COMMENTS: Rubbly areas probably were formed during drilling from more highly altered portions of the section. Groundmass of massive fragments contains 5-10% olivine (<0.1 mm).

Core Photo



183-1141A-21R-1 **Section top: 166.40 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1, 2

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<<1	1	0.6	0.7	Euhedral to subhedral
Olivine:	1-2	1	0.5		Subhedral; altered to red clay

GROUNDMASS: Fine to medium grained. Groundmass contains clinopyroxene, plagioclase, and possibly olivine.

VESICLES: Sparsely vesicular; vesicle abundance decreases downward. Vesicles are subround to ovoid, 1 mm to 3 cm, and filled with carbonate and green clay. A 2-cm-wide vesicle sheet is present at 25-27 cm.

COLOR: Light brownish gray to medium light gray at base.

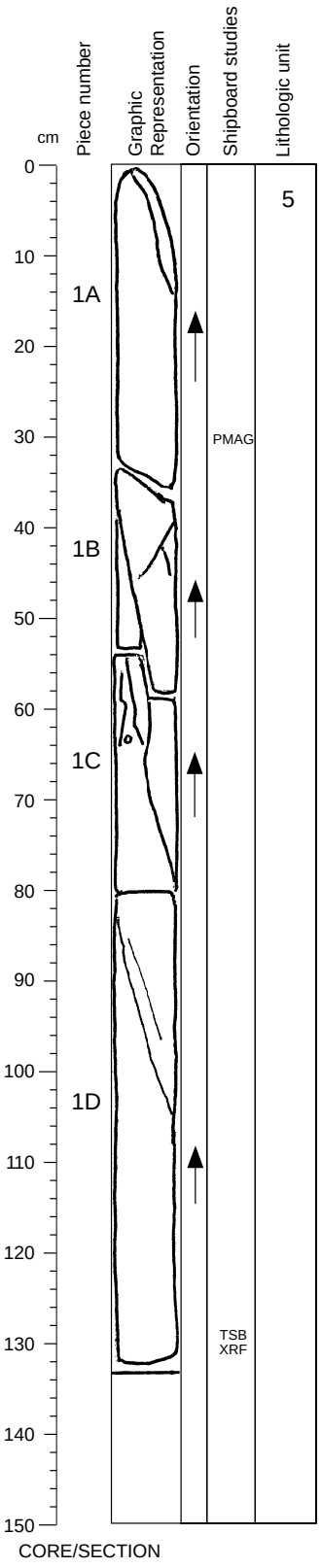
STRUCTURE: Massive.

ALTERATION: Moderate; decreases slightly down section.

VEINS/FRACTURES: Sparse to moderately abundant vertical and subvertical veins are filled with carbonate, and connect large vesicles.

COMMENTS: Light brownish gray color is is probably caused by red alteration associated with clinopyroxene or olivine (iddingsite?). Phenocrysts are mainly in lower portion of section.

Core Photo



183-1141A-21R-2 **Section top: 167.71 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<<1				Euhedral laths
Olivine:	2	2	0.5	1	Euhedral; some grains are relatively unaltered, but most are altered to red clay (iddingsite?)

GROUNDMASS: Fine grained. Groundmass contains plagioclase, clinopyroxene, and olivine.

VESICLES: Nonvesicular. Very rare vesicles are ≤3 mm and filled with carbonate.

COLOR: Medium light gray.

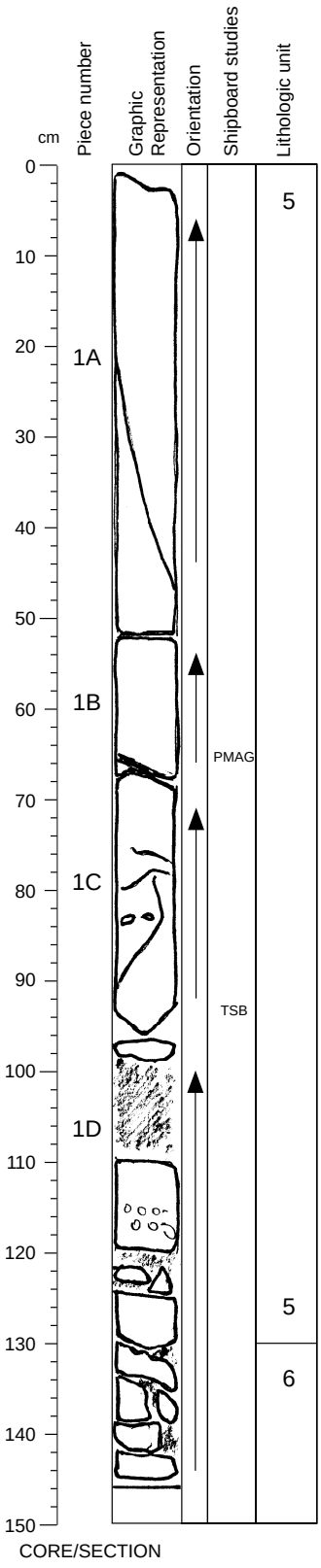
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Vertical to subvertical, carbonate-filled veins are sparse to moderately abundant. A 1- to 1.5-cm-wide vein is at the top of the section; other veins are 1-2 mm wide. Native copper is present in a vein between 40 and 45 cm.

COMMENTS:

Core Photo



183-1141A-21R-3 **Section top: 169.04 (mbsf)**

UNIT 5: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1

CONTACTS: The contact between Units 5 and 6 is at 130 cm, within Piece 1D.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<<1	1	0.8		Euhedral
Olivine:	1-2	1	0.5		Subhedral; altered

GROUNDMASS: Fine to medium grained.

VESICLES: Pieces 1A and 1B are nonvesicular, with very rare, round vesicles (1-2 mm). Piece 1C is sparsely vesicular and Piece 1D is moderately vesicular, with vesicles that are 1-5 mm and round to subround. Carbonate and clay fill vesicles.

COLOR: Pieces 1A and 1B are medium gray; Piece 1C is light brownish gray; Piece 1D is grayish brown to medium brown.

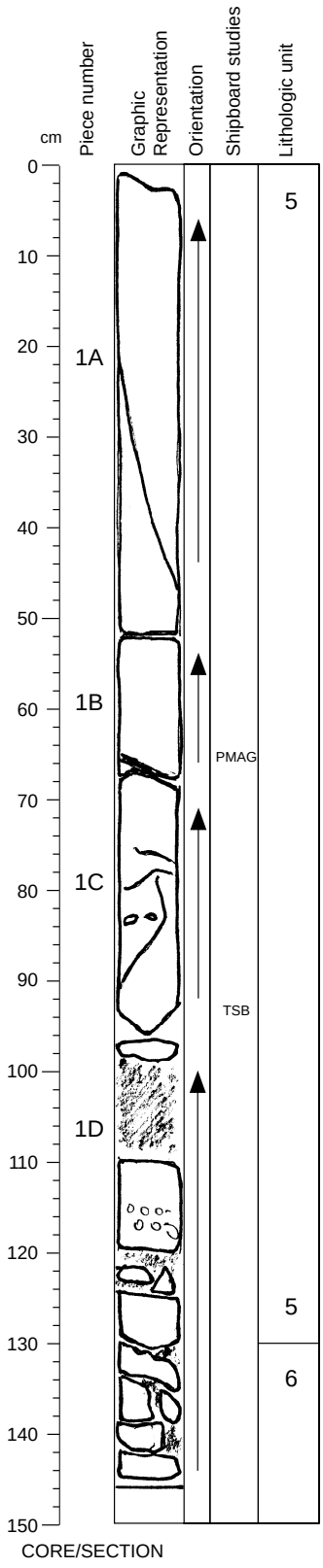
STRUCTURE: Massive.

ALTERATION: Moderate from 0-95 cm; high from 95-130 cm. Groundmass clinopyroxene is almost completely altered to pink clay; olivine is altered to iddingsite.

VEINS/FRACTURES: Sparse, subhorizontal to subvertical veins are 0.2-4 mm wide and filled with carbonate.

COMMENTS: The 95-130 cm interval is interpreted to be the highly altered, vesicular base of the Unit 5 flow.

Core Photo



183-1141A-21R-3 **Section top: 169.04 (mbsf)**

UNIT 6: APHYRIC BASALTIC BRECCIA

Pieces: 1

CONTACTS: The contact between Units 5 and 6 is at 130 cm, within Piece 1D.

PHENOCRYSTS: None.

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Clasts are sparsely to moderately vesicular. Vesicles are angular, 1-2 mm, and filled with carbonate, green clay and, rarely, zeolite.

COLOR: Moderate brown to grayish brown.

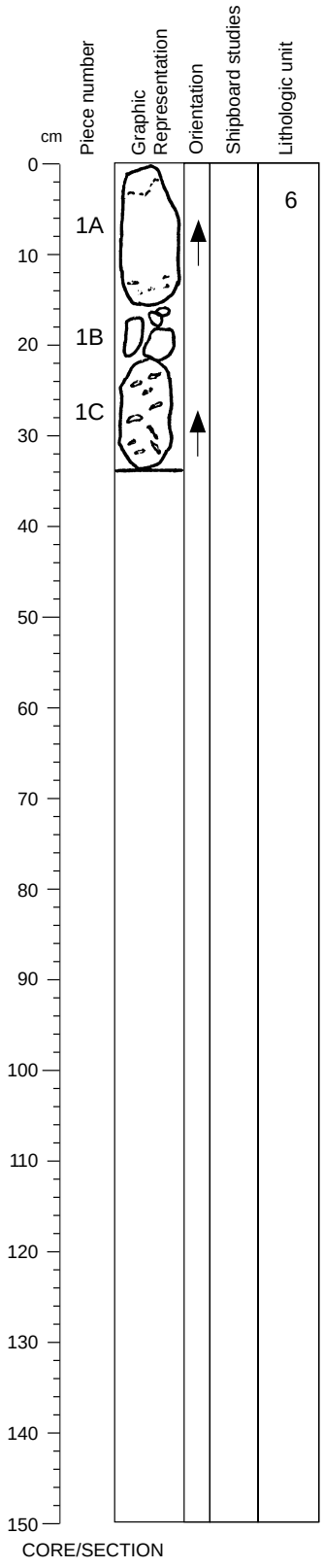
STRUCTURE: Brecciated. Slickensides are present on some fragments.

ALTERATION: Very high to complete.

VEINS/FRACTURES: Rare, <1-mm-wide veins are in matrix between clasts.

COMMENTS: This portion of the section is interpreted as the brecciated top of Unit 6.

Core Photo



183-1141A-21R-4 **Section top: 170.48 (mbsf)**

UNIT 6: MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	5-10	1	0.5		Euhedral to subhedral; altered to black clay

GROUNDMASS: Fine grained.

VESICLES: Moderately to highly vesicular. Vesicles are round to irregular, 0.5-10 mm, and filled with pale green to brown clay and white zeolite.

COLOR: Dusky brown to dusky red.

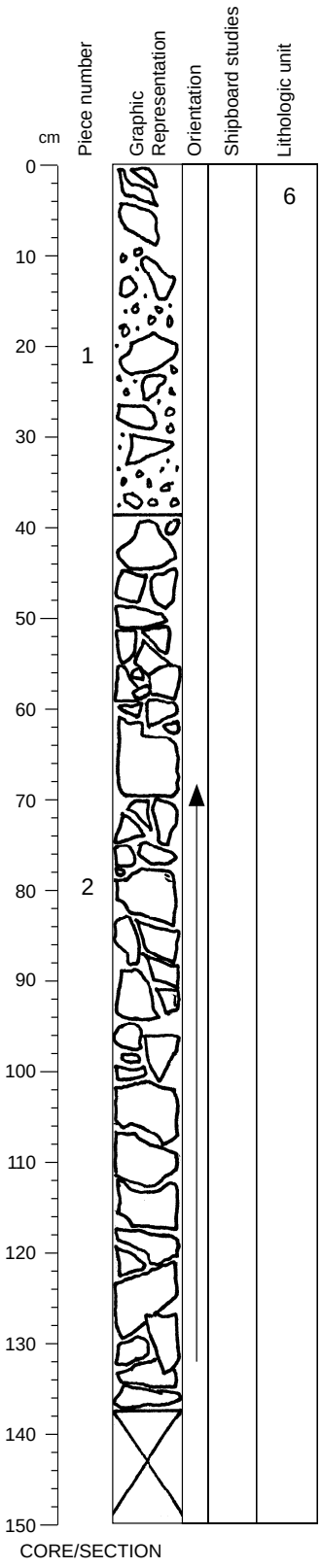
STRUCTURE: Brecciated to massive.

ALTERATION: Very high to complete. Groundmass is completely replaced with clay. Breccia matrix is gray and red clay.

VEINS/FRACTURES: Numerous subvertical, <1-mm-wide veins are filled with white zeolite.

COMMENTS: This section is interpreted as a vesicular lobe in the upper part of the Unit 6 flow.

Core Photo



183-1141A-22R-1 **Section top: 171.20 (mbsf)**

UNIT 6: MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1-2

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	5	1	0.5		Euhedral to subhedral; altered to clay

GROUNDMASS: Fine grained.

VESICLES: Sparsely to moderately vesicular. Vesicles are round to irregular, 0.5-5 mm, and filled with pale green clay, white zeolite, and carbonate.

COLOR: Grayish red to medium reddish brown.

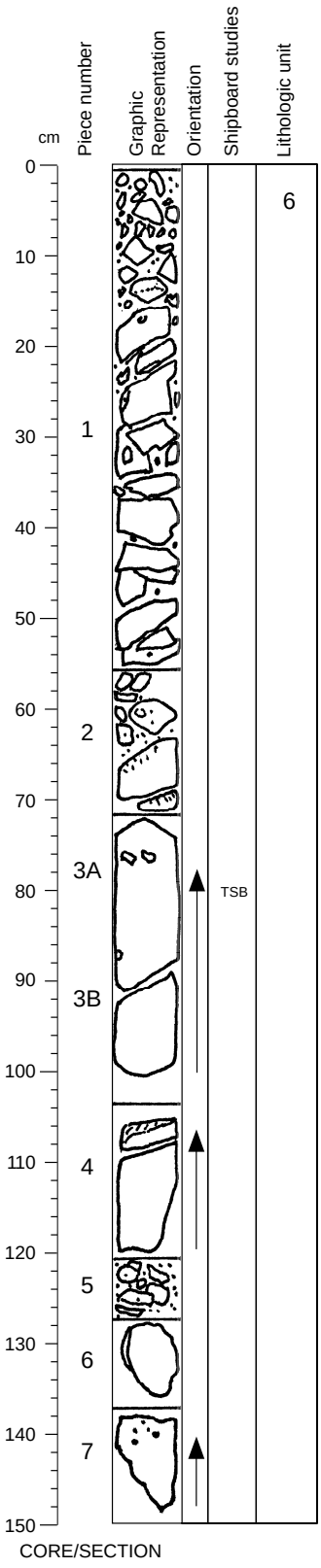
STRUCTURE: Brecciated. Clasts are angular to subround. Matrix is clay, zeolite, and silica.

ALTERATION: Very high to complete. Groundmass is almost completely replaced by brown, red, and black clay.

VEINS/FRACTURES: Piece 2 contains rare, sinuous, <1-mm-wide veins.

COMMENTS: Piece 1 consists of loose, pale green to dusky brown or grayish red pebbles and cobbles, several of which appear unrelated to material in Piece 2 or in Section 22R-1, and may have fallen from a higher stratigraphic level.

Core Photo



183-1141A-22R-2 **Section top: 172.58 (mbsf)**

UNIT 6: MODERATELY OLIVINE-PHYRIC BASALT AND BASALTIC BRECCIA

Pieces: 1-7

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	5	1.5	0.4	0.6	Euhedral; altered

GROUNDMASS: Fine grained.

VESICLES: Breccia clasts and Pieces 3-7 are sparsely to moderately vesicular. Vesicles are round to subround or angular, and filled with zeolite and green or white clay; most vesicles are 0.2-4 mm, although the largest is 11 mm.

COLOR: Pieces 1 and 2 are grayish red to dark reddish brown. Pieces 3-7 are pale brown to light brownish gray.

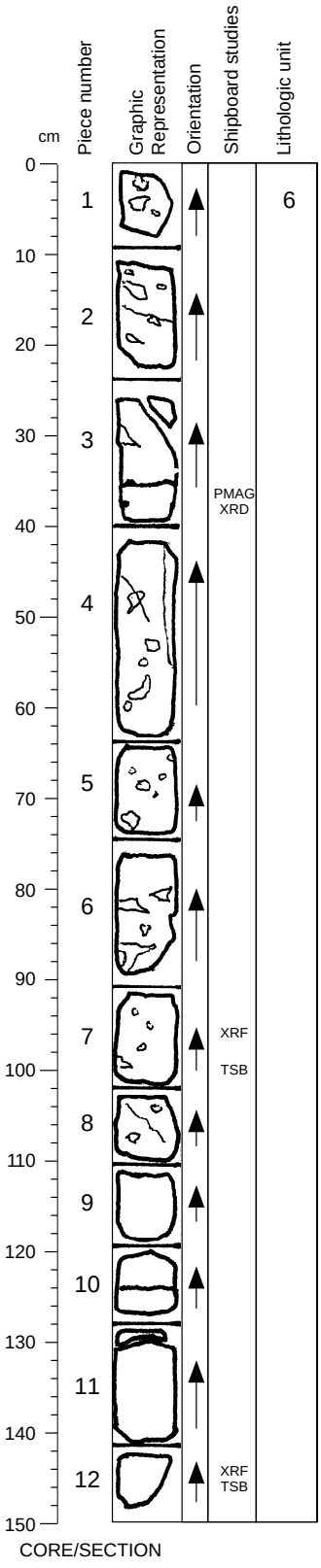
STRUCTURE: Brecciated from 0-72 cm, massive from 72-150 cm.

ALTERATION: HIgh to complete.

VEINS/FRACTURES: Massive portion of the section is sparsely veined, with <1-mm-wide, clay- and zeolite-filled veins. Brecciated zone contains <1-mm-wide, clay- and zeolite-filled veins between clasts.

COMMENTS:

Core Photo



183-1141A-22R-3 **Section top: 174.08 (mbsf)**

UNIT 6: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1-12

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	2	1.5	0.5	1	Euhedral to subhedral; altered to reddish brown clay and white zeolite

GROUNDMASS: Fine grained. Contains subhorizontal mesostasis segregations that are altered to dark green clay.

VESICLES: Sparsely to moderately vesicular. Vesicles are round (0.5-2 mm) and filled with carbonate and silica, or irregular (2-30 mm) and filled with several generations of carbonate. Carbonate forms include radiating blades and concentric layers.

COLOR: Light gray to light greenish gray or light pinkish gray.

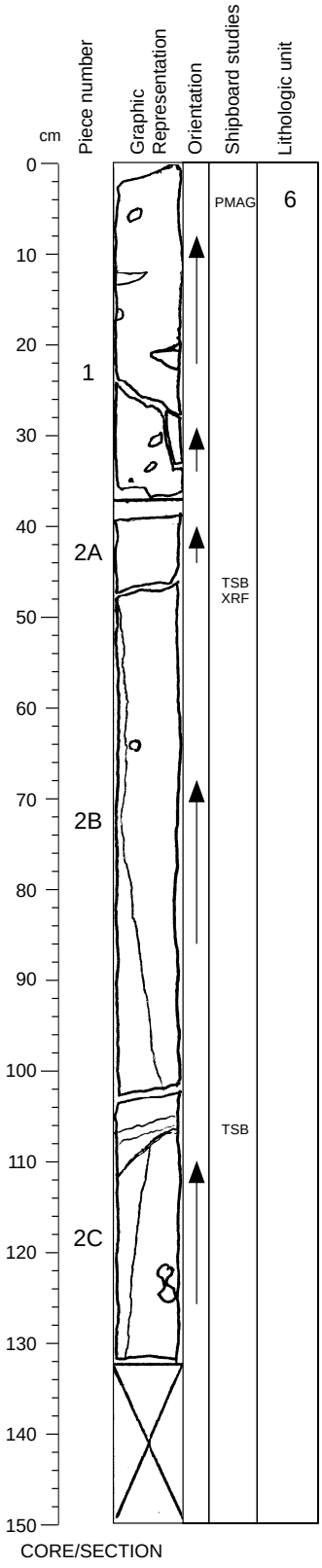
STRUCTURE: Massive.

ALTERATION: Moderate.

VEINS/FRACTURES: Subhorizontal, ~1-mm-wide veins are filled with carbonate and silica.

COMMENTS: Phenocryst abundance decreases downward from Piece 1 (~5%) to Pieces 8-12 (<1%).

Core Photo



183-1141A-23R-1 **Section top: 176.00 (mbsf)**

UNIT 6: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1, 2

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Olivine:	2	0.3	1	0.4	Subhedral; altered

GROUNDMASS: Fine grained. Groundmass contains spherulitic patches of acicular plagioclase and pale green clay (replacing glass) surrounded by an intergranular to intersertal matrix of plagioclase, clinopyroxene and oxides partially altered to reddish brown clay.

VESICLES: Nonvesicular. Rare, 0.5- to 2-cm, irregular vesicles are filled with silica, white zeolite, and carbonate.

COLOR: Light gray to pinkish gray.

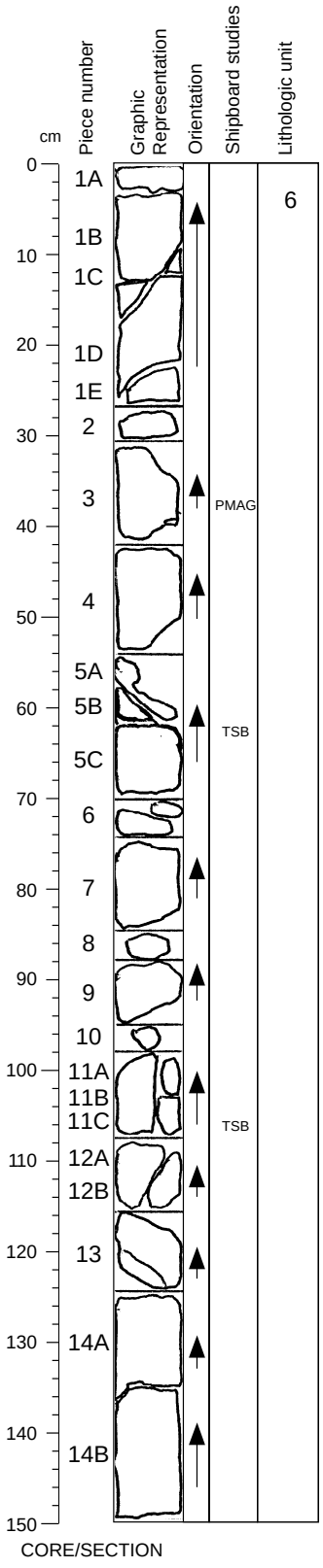
STRUCTURE: Massive.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Sparse. Long subvertical fracture (~1 mm wide) in Piece 2B is filled with green clay, calcite, and quartz. Subhorizontal calcite veins cut across a subvertical vein.

COMMENTS: Spherulitic patches produce a mottled appearance in this dense rock. Piece 2C contains a medium-grained segregation (~1 cm wide) of plagioclase laths, prismatic oxides, intersertal clinopyroxene, and reddish brown clay (replacing glass).

Core Photo



183-1141A-23R-2 **Section top: 177.32 (mbsf)**

UNIT 6: SPARSELY TO MODERATELY OLIVINE-PHYRIC BASALT

Pieces: 1-14

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1	0.5		Euhedral to subhedral; partly replaced with clay
Olivine:	2	1.5	0.5	1	Subhedral to euhedral; altered

GROUNDMASS: Fine grained. A mottled appearance is produced by alteration patches of reddish brown clay.

VESICLES: Nonvesicular. Very rare, round, 1- to 7-mm vesicles are filled with amorphous silica and carbonate.

COLOR: Light gray to pinkish gray.

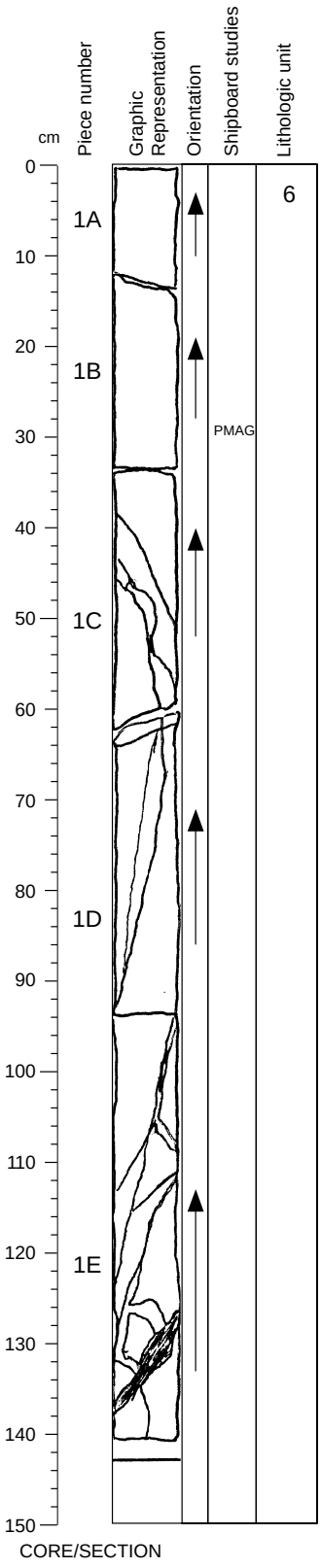
STRUCTURE: Massive.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Subhorizontal to moderately dipping veins (1-3 mm wide) in Pieces 9, 13, and 14A are filled with green clay, carbonate, and amorphous silica.

COMMENTS:

Core Photo



183-1141A-23R-3 **Section top: 178.84 (mbsf)**

UNIT 6: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1	0.7	0.8	Subhedral
Olivine:	2	1.5	0.5	1	Euhedral to subhedral; altered

GROUNDMASS: Fine grained, with spherulitic texture.

VESICLES: Nonvesicular. Rare vesicles are round, ≤10 mm, and filled with amorphous silica and clay.

COLOR: Pale reddish gray to dark reddish gray, with dark green to greenish gray alteration halos near veins.

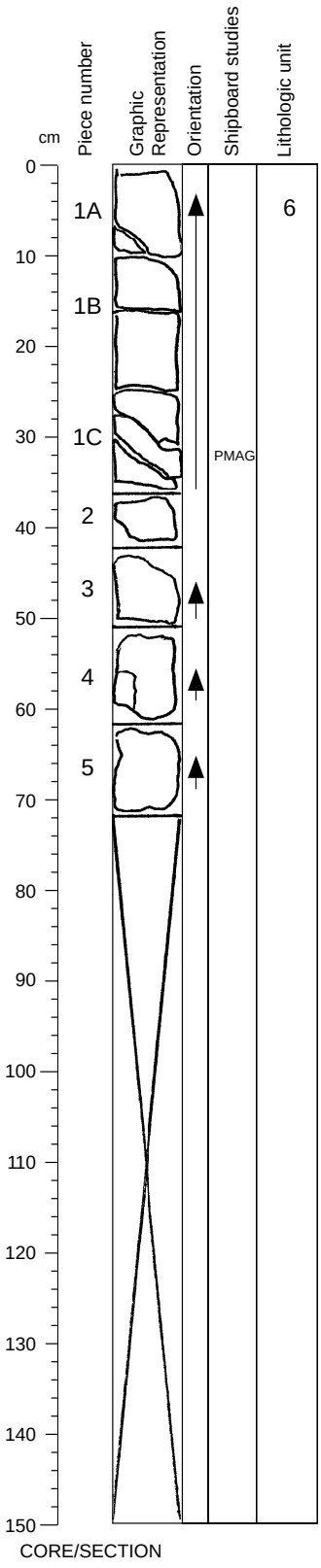
STRUCTURE: Massive.

ALTERATION: High.

VEINS/FRACTURES: Numerous subvertical veins, <1 to 10 mm wide, are filled with quartz and clay, and are surrounded by alteration halos. Rare, subhorizontal fractures are filled with carbonate.

COMMENTS:

Core Photo



183-1141A-23R-4 **Section top: 180.28 (mbsf)**

UNIT 6: MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT

Pieces: 1-5

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	1	2	0.5	1	Euhedral to subhedral; partially altered to pale clay
Olivine:	2	1	0.5	0.8	Subhedral; altered

GROUNDMASS: Fine grained.

VESICLES: Rare.

COLOR: Light gray.

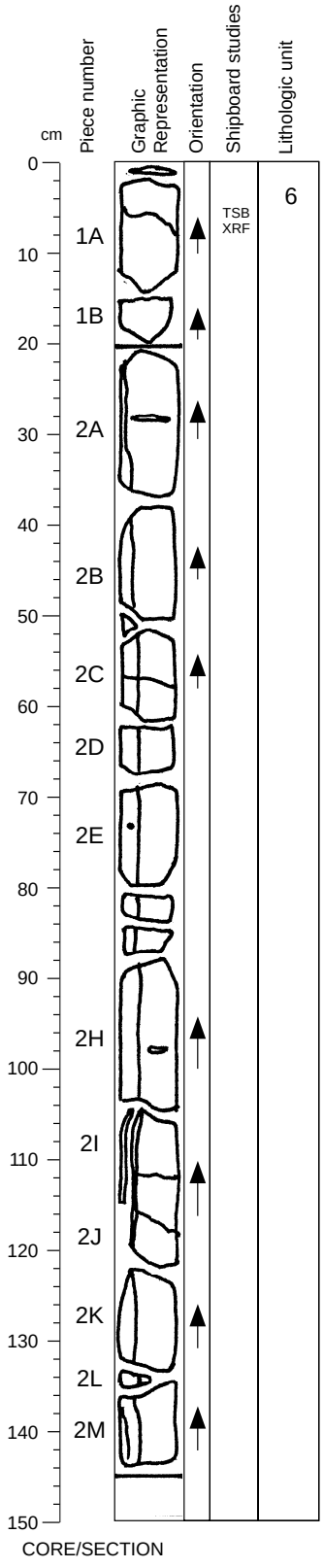
STRUCTURE: Massive.

ALTERATION: Slight to moderate.

VEINS/FRACTURES: Subvertical veins (<1 mm wide) in Pieces 4 and 5 are filled with quartz and clay, and are bordered by ~1-cm-wide, dark greenish gray alteration halos. Calcite-filled veins (<1 mm wide) also are present.

COMMENTS:

Core Photo



183-1141A-24R-1 **Section top: 180.80 (mbsf)**

UNIT 6: SPARSELY TO MODERATELY PLAGIOCLASE-OLIVINE-PHYRIC BASALT

Pieces: 1, 2

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	1-5	0.8	0.2	0.4	Euhedral, blocky
Olivine:	0-2	0.4	0.1	0.2	Euhedral, equant; altered to green clay

GROUNDMASS: Fine grained. Contains minute grains of native copper.

VESICLES: Very sparsely vesicular. Vesicles are irregular, 2-25 mm, and filled with amorphous silica.

COLOR: Pale pinkish gray.

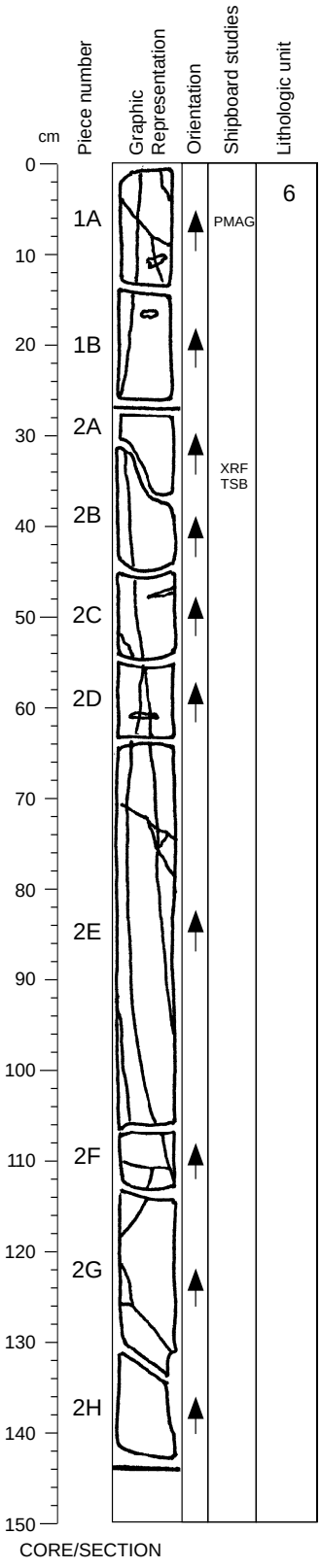
STRUCTURE: Massive.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Vertical, ~2-mm-wide vein from 24-140 cm is filled with quartz and minor carbonate and clay, and is surrounded by an alteration halo.

COMMENTS: Plagioclase in phenocrysts and groundmass is altered to reddish orange clay.

Core Photo



183-1141A-24R-2 **Section top: 182.24 (mbsf)**

UNIT 6: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1, 2

CONTACTS: None.

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	1	0.2	0.4	Euhedral, blocky
Olivine:	2	0.8	0.2	0.3	Subhedral, equant to prismatic; altered

GROUNDMASS: Fine grained.

VESICLES: Very sparse, horizontal sheet-like vesicles are ≤40 mm and filled with amorphous silica.

COLOR: Pale pinkish gray.

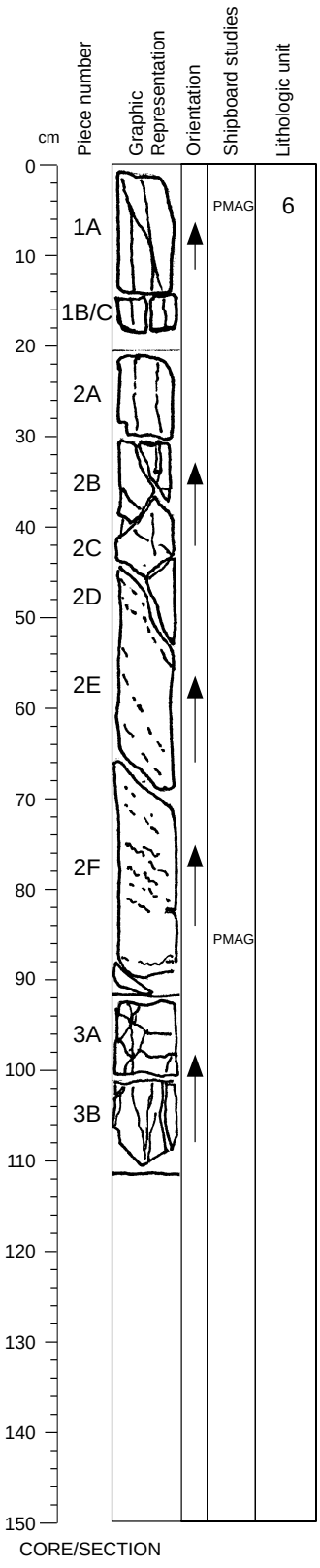
STRUCTURE: Massive.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Subvertical, ~2-mm-wide veins in the 0-112 cm interval are filled with quartz and minor clay and carbonate, and are surrounded by multiple alteration halos.

COMMENTS: Abundance of plagioclase phenocrysts decreases and abundance of mafic microphenocrysts increases downward in the section.

Core Photo



183-1141A-24R-3 **Section top: 183.69 (mbsf)**

UNIT 6: SPARSELY OLIVINE-PHYRIC BASALT

Pieces: 1-3

CONTACTS: None.

PHENOCRYSTS:	**%**	**Grain Size (mm):**			
	Mode	**Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	<1	0.8	0.2	0.4	Euhedral, blocky
Olivine:	2	0.5	0.1	0.3	Euhedral, equant; altered

GROUNDMASS: Fine grained in upper part of section; aphanitic in lower part of section.

VESICLES: Nonvesicular from 0-70 cm; moderately vesicular from 70-112 cm. Vesicles are <1 to 8 mm, round to subhorizontally elongate, and filled with amorphous silica.

COLOR: Upper portion of section is pale pinkish gray; lower portion is medium greenish gray.

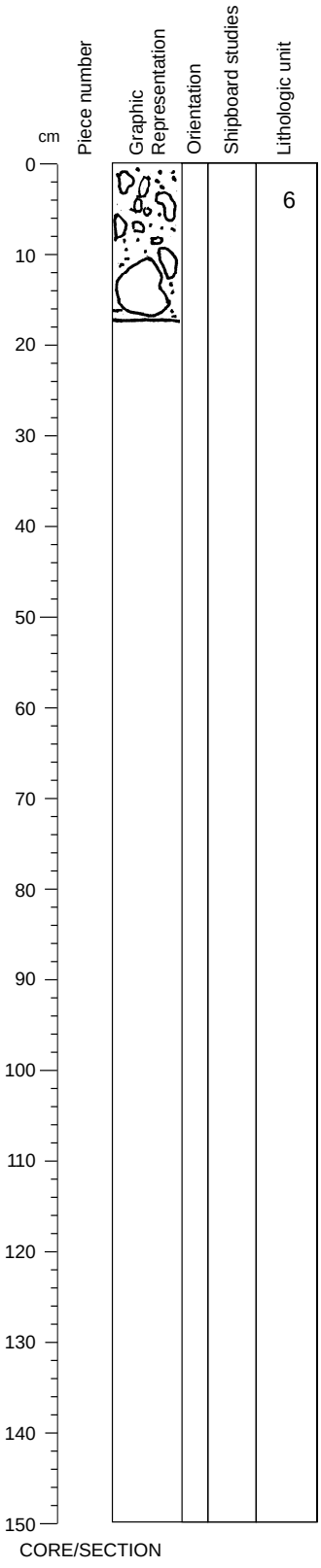
STRUCTURE: Massive.

ALTERATION: Moderate to high.

VEINS/FRACTURES: Steeply dipping vein (7-25 mm wide) from 43-54 cm is filled with angular basalt fragments in a carbonate and quartz matrix.

COMMENTS: Subhorizontal, 25-mm-wide (late stage?) segregation is filled with white to bluish gray clay and zeolite.

Core Photo



183-1141A-24R-CC **Section top: 184.81 (mbsf)**

UNIT 6: APHYRIC TO MODERATELY PLAGIOCLASE-PHYRIC BASALT

Pieces: 1

CONTACTS: None (but see comments below).

PHENOCRYSTS:	**% Mode**	**Grain Size (mm): Max**	**Min**	**Avg.**	**Shape/Habit**
Plagioclase:	0-3	0.8	0.2	0.4	Euhedral, blocky

GROUNDMASS: Fine grained to aphanitic.

VESICLES: Fragments vary considerably. One is sparsely vesicular, with 1- to 10-mm, round to ellipsoidal vesicles filled concentrically with white and brown zeolite. Another fragment is highly vesicular, with <1- to 5-mm, highly irregular vesicles filled with light to dark green clay.

COLOR: Light brownish gray, dark brownish gray, and reddish brown.

STRUCTURE: Brecciated; highly disturbed by drilling.

ALTERATION: Moderate to complete.

VEINS/FRACTURES: None.

COMMENTS: This piece is interpreted as the basal breccia of Unit 6, but could be the flow top of an underlying lava flow.

Sample									Texture			Mineral																				Biogenic														Rock								Other		
Leg	Site	H	Cor	CT	Sct	Top	Depth	Lithology	Sand	Silt	Clay	Amphibole	Chlorite	Clay	Clinopyroxene	Dolomite	Feldspar	Glauconite	Magnetite	Mica	Opaques	Palagonite	Pyrite	Pyroxene	Quartz	Volcanic Glass	Zeolite	Algae	Benthic Forams	Calcispheres	Diatoms	Discoaster	Foraminifers	Nannofossils	Ostracod	Plant Debris	Radiolarians	Silicoflagellates	Skeletal Debris	Sponge Spicules	Basalt Fragments	Calcareous Fragments	Carbonate Particles	Packstone Clast	Rock Fragment	Silt	Volcanic Ash	Volcanic Fragments	Rad/Diatom/Dino Spines	Unknown	Comments
183	1141	A	1	R	1	50	0.5	D			D																						D	A	P																
183	1141	A	2	R	CC	5	8.55	D			D																						A	D	R																
183	1141	A	3	R	2	142	20.72	D			D																						A	D																	
183	1141	A	3	R	3	84	21.64	D			D																					R	C	D																	*	
183	1141	A	3	R	4	110	23.4	D			D																					R	A	D																		
183	1141	A	4	R	3	70	30.8	D			D																					P	C	D																		
183	1141	A	8	R	3	74	69.14	D			D																					R	C	D																		
183	1141	A	10	R	2	20	86.3	D		A	D																					P	A	D																		

THIN SECTION:	**183-1141A-16R-2, 5-8**					**Unit 2**	**OBSERVER:**	**RD**
ROCK NAME:	**Sparsely plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Loose fragment from massive part of flow.**							
GRAIN SIZE:	**Medium grained phenocrysts in a fine grained groundmass.**							
TEXTURE:	**Hypocrystalline, intersertal to intergranular.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	1	1	0.5	2	1	An55	Subhedral to anhedral	Sieved cores and reaction rims; multiple twinning; unzoned.
Alkali feldspar	<1	<1		1.5			Anhedral	Rounded.
GROUNDMASS								
Plagioclase	40	48	0.1	0.2		An60	Euhedral to subhedral	Laths and blocky equant crystals.
Clinopyroxene	15	30	0.05	0.1			Anhedral	Poorly crystallized, replaced by pale green clay and carbonate.
Glass	0	18					Intersertal pools	Totally replaced by pale green clay and carbonate.
Opaques	2	2	0.05	0.1			Acicular blades	

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	20				Glass, clinopyroxene	
Clay	20				Glass, clinopyroxene, feldspar	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	1	Random	0.5	1		Largely round and open; partly filled with carbonate	

COMMENTS : Photomicrograph #:
1141A-1a = Inclusion of apatite(?) in plagioclase phenocryst (x50 objective, ppl);
1141A-1b = Corroded plagioclase phenocryst (x5 objective, ppl).

THIN SECTION:	**183-1141A-16R-CC, 38-40, Piece 3B**					**Unit 3**	**OBSERVER:**	**RD**
ROCK NAME:	**Aphyric basalt.**							
WHERE SAMPLED:	**Flow interior.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.6	1.5			Subhedral to anhedral	Fragments with sieved cores and unaltered overgrowths on rims.
GROUNDMASS								
Plagioclase	50	50	0.2	0.6			Euhedral	
Clinopyroxene	15	30	0.1	0.3			Anhedral	
Titanomagnetite	2	2	0.05	0.1			Acicular and stubby	
Mesostasis	8	18					Intersertal pools	

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	10				Mesostasis, clinopyroxene; fills vesicles	Segregated grains, as well as mixed with clay.
Clay	15				Mesostasis, clinopyroxene; fills vesicles	Pale brown clay mixed with carbonate.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2	Random	0.2	1	0.5	Irregula; filled with clay and carbonate	

COMMENTS :

THIN SECTION:	**183-1141A-17R-1, 26-29**					**Unit 3**	**OBSERVER:**	**CRN**
ROCK NAME:	**Sparsely plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Base of Unit 3.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Porphyritic with a subvariolitic and intergranular groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	1	2	0.8	2.5	1.5	An60	Subhedral	Sieve textured rims are present on most; these have a narrow plagioclase overgrowth (see photomicrograph 1141A-1). Phenocrysts with sieve-textured cores are also present. Compositional zonation is not apparent.
GROUNDMASS								
Plagioclase	50	65	0.2	0.5	0.3		Subhedral laths	Partially altered and replaced by carbonate. Some Carlsbad-only twinned crystals are zoned plagioclases.
Mafics/Mesostasis	0	30			?		?	Completely altered and replaced with carbonate.
Titanomagnetite	0	3	0.05	0.3	0.1		Acicular grains	Completely altered to hematite.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	49				Plagioclase, mafics, mesostasis	
Sulfide	Trace			<0.01	Mesostasis, mafics	Pyrite and chalcopyrite are associated with the alteration.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	1	Random	0.4	0.8	0.5	Either empty or filled with carbonate	
Veins	<1				0.1	Empty	The vein material was probably plucked out during the preparation of this thin section.

COMMENTS : Highly altered with carbonate replacing mafic phases/glass and some plagioclase.
Photomicrograph #:
1141A-1 = Plagioclase phenocryst with sieve textured rim and overgrowth. Carbonate has replaced the mafic/glass inclusions in this crystal. (x10 objective, xpl).

THIN SECTION:	**183-1141A-17R-CC, 24-27, Piece 1**					**Unit 4**	**OBSERVER:**	**RD**
ROCK NAME:	**Sparsely plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Fragment within Unit 4.**							
GRAIN SIZE:	**Medium-grained phenocrysts in a fine-grained groundmass.**							
TEXTURE:	**Intergranular to slightly intersertal, subtrachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	2	3	0.5	2.5	1.5	An60-65	Subhedral to anhedral	Sieved cores, overgrown rims, zoned and unzoned; some in glomerocrystic clots.
GROUNDMASS								
Plagioclase	45	50	0.1	0.5			Euhedral	
Clinopyroxene	5	30	0.05	0.2			Anhedral	
Titanomagnetite	3	3	0.01	0.05			Intersertal, acicular	
Sulfide	<1	<1	<0.01				Rounded blebs	
Mesostasis	5	15					Intersertal pools	

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	15				Mesostasis, clinopyroxene	Patchy distribution; segregated grains as well as cryptocrystalline mix with dark clay.
Clay	25				Mesostasis, clinopyroxene, plagioclase	Pale brown and dark gray.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**

COMMENTS : Photomicrograph #:
1141A-15 = Sieve textured plagioclase (x2.5 objective, xpl).

THIN SECTION:	**183-1141A-18R-1, 146-148 Piece 18**					**Unit 4**	**OBSERVER:**	**MSP**
ROCK NAME:	**Sparsely plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Finer-grained interior section of Unit 4, possibly separate lithology.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal groundmass; perhaps more seriate than sparsely prophyritic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	2-Jan	2		3	1	An70	Euhedral to subhedral laths	Some sieve textures, rare glomerocrysts.
GROUNDMASS								
Plagioclase	40	50	0.1	0.5	0.3	An60-65	Subhedral laths	Relatively unaltered.
Clinopyroxene	20	30	<0.05	0.3	0.1		Anhederal equant	Many are relatively unatlered.
Olivine?	0	10	0.2	0.5	0.4		Subhedral equant	Pseudomorphs completely replaced by clay, carbonate, and possibly serpentine; mode estimate is probably a maximum.
Titanomagnetite	4	5						
Brown glass	1	5					Intersertal	Occasional intersertal patches appear relatively unaltered.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	20-25		1	0.5	Mainly mafic silicates	
Clay	15-Oct				Mainly mafic silicates, glass	
Sulfide	Trace			<0.02	Mesostasis	Pyrite and chalcopyrite associated with the alteration.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	5?	Random			<0.5		At least some carbonate and clay probably filling irregular microvesicles.

COMMENTS : Most of the plagioclase and some of the clinopyroxene is surprisingly unaltered considering the total amount of secondary carbonate and clay
.

THIN SECTION:	**183-1141A-19R-2, 13-14 Piece 2**					**Unit 4**	**OBSERVER:**	**MSP**
ROCK NAME:	**Moderately olivine-plagioclase-phyric basalt.**							
WHERE SAMPLED:	**Typical interior, lower section of Unit 4.**							
GRAIN SIZE:	**Fine-grained to aphanitic.**							
TEXTURE:	**Intergranular to intersertal groundmass; perhaps more seriate than sparsely prophyritic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	~5	0.?	1.5	1		Subhedral equant	Pseudomorphs completely replaced by carbonate, clay, sometimes serpentine, possibly talc; difficult to differentiate phenocrysts from groundmass.
Plagioclase	<1	<1		1			Subhedral laths	Some sieve textures.
GROUNDMASS								
Plagioclase	35	45	0.1	0.4	0.2	An65	Subhedral laths	Relatively unaltered.
Clinopyroxene	15	35	<0.05	0.2	0.08		Anhederal equant	Mode estimate may include some altered olivine.
Titanomagnetite	1-2	3	<0.05	0.4	0.1		Acicular, rarely subhedral to euhedral equant	
Mesostasis	0	10					Intersertal	Occasional intersertal patches appear relatively unaltered.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	30				Mainly mafic silicates	
Clay	20				Mainly mafic silicates, glass	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles					<0.5		Some carbonate patches may be rare microvesicles (<0.5 mm).

COMMENTS :

THIN SECTION:	**183-1141A-21R-2, 126-128, Piece 1D**					**Unit 5**	**OBSERVER:**	**MSP**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Interior of flow.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Ophitic to intersertal (difficult to tell whether intersertal clay replaced original mesostasis or mafic phases).**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	2	0.5	2	1			Totally replaced by carbonate, talc, clay, stilpnomelane, and serpentine(?).
GROUNDMASS								
Plagioclase	20	50	0.1	0.8	0.4			
Clinopyroxene	35	40	0.3	2	1			Exclusively as oikocrysts; almost unaltered.
Olivine	0	3	0.1?	0.5				No real break between phenocryst and groundmass size distribution.
Opaques	0	5						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay						
Stilpnomelane	5	0.05	1.5	0.5	Olivine (± clinopyroxene)	Only weakly pleochroic, relatively well-crystallized in places (nearly primary?), patchy replacement of olivine in others.
Fe-oxy and hydroxides	5					
Carbonate (+ talc) fractures <0.05 mm wide					Olivine, pyroxene; fills	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles							

COMMENTS : Thin section only is about 0.020 mm thick (clinopyroxene exhibits only up to first order yellow-gray interference colors).
Macroscopic: relatively homogeneous, massive, fine-grained rock.
Photomicrograph #:
1141A-6 to 9 = Examples of ophitic texture (x10 objective, xpl);
1141A-10 & 11 = Carbonate after clinopyroxene (x10 objective, xpl);
1141A-12 = Stilpnomelane (?) (x5 objective, xpl).

THIN SECTION:	**183-1141A-21R-3, 93-95, Piece 1C**					**Unit 5**	**OBSERVER:**	**NTA, RD**
ROCK NAME:	**Moderately olivine-phyric basalt.**							
WHERE SAMPLED:	**Vesicular base of Unit 5.**							
GRAIN SIZE:	**Fine-grained.**							
TEXTURE:	**Intergranular to intersertal.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	3	0.3	1	0.5		Euhedral equant	Completely replaced by carbonate, clay and goethite.
Plagioclase	<1	<1		1			Subhedral laths	Rare glomerocrysts.
GROUNDMASS								
Plagioclase	35	40	0.1	0.4	0.2		Subhedral laths	Partially altered to clay.
Clinopyroxene	5	40	<0.05	0.2	0.08		Anhederal equant	
Titanomagnetite	3	5	<0.05	0.4	0.1		Acicular, rarely subhedral to euhedral equant	
Mesostasis	0	10					Intersertal	Occasional intersertal patches appear relatively unaltered.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	35				All silicates and glass	
Clay	22				Plagioclase, clinopyroxene, glass	Black and brown clays present.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	7		0.4	5	1	Carbonate	

COMMENTS : Pervasively altered, vesicular basalt with few redeeming features.

THIN SECTION:	**183-1141A-22R-2, 79-81, Piece 3A**					**Unit 6**	**OBSERVER:**	**NTA, RD**
ROCK NAME:	**Moderately olivine-phyric basalt.**							
WHERE SAMPLED:	**Vesicular top of Unit 6.**							
GRAIN SIZE:	**Fine-grained to aphanitic.**							
TEXTURE:	**Porphyritic with a trachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	3	0.2	1	0.4		Euhedral equant	Completely replaced by carbonate, clay and goethite.
GROUNDMASS								
Plagioclase	10	60	0.1	0.4	0.2		Subhedral laths	Almost entierly altered to clay.
Clinopyroxene	0	10	<0.05	0.2	0.08		Anhederal equant	Completely altered to clay and goethite.
Titanomagnetite	3	5	<0.05	0.4	0.1		Anhedral to subhedral, equant	
Mesostasis	0	20					Intersertal	Completely replaced by carbonate and clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	20				All silicates and glass	
Clay	50				Plagioclase, clinopyroxene, glass	
Goethite	15					

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	3		0.4	3	1	Carbonate and clay	

COMMENTS : Very little primary mineralogy remaining, but well preserved flow texture.

THIN SECTION:	**183-1141A-22R-3, 100-101, Piece 7**					**Unit 6**	**OBSERVER:**	**RD, NTA**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Flow interior, Unit 6.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Intersertal to intergranular.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.5				Anhedral	Rare larger grains with zoned cores.
Olivine	0	2	0.5	1			Euhedral to subhedral	Completely replaced by carbonate and clay.
GROUNDMASS								
Plagioclase	40	40	0.1	0.5			Euhedral to subhedral	
Clinopyroxene	0	35	0.05	0.1			Anhedral	Completely altered to carbonate and clay.
Titanomagnetite	2	2	0.01	0.05			Intersertal	
Mesostasis	0	20					Intersertal pools	

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	30				Mesostasis, clinopyroxene; fills vesicles, vein	Radiating sheaths.
Clay	25				Mesostasis, clinopyroxene; fills vesicles	Pale brown to golden to dark gray.
Zeolite	1					White, bladed, latest stage.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15		0.5	2		Carbonate, clay, zeolite; round to irregular	Calcite and clay alternate in layers; concentric rings of brown clay - maybe siderite?
Veins	1		0.5			Carbonate	

COMMENTS :

THIN SECTION:	**183-1141A-22R-3, 146-148, Piece 12**					**Unit 6**	**OBSERVER:**	**NTA, MSP**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Interior of Unit 6.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Porphyritic with a subophitic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	2	0.3	1	0.4		Euhedral equant	Completely altered to a fine-grained mixture of crystalline clay, talc, carbonate and goethite.
GROUNDMASS								
Plagioclase	35	40	<0.1	0.6	0.2	An45-55	Subhedral laths	
Clinopyroxene	0	30	0.1	1	0.2		Anhedral	Oikocrysts enclosing plagioclase laths; completely altered to clay and/or carbonate.
Olivine	0	10	0.02	0.2	0.1			
Titanomagnetite	3	3	<.01	0.2	0.1		Subhedral to anhedral	Irregular shapes, equant to elongate; embayed.
Mesostatis	0	15						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	20				Clinopyroxene, olivine, mesostasis	
Clay	35				Clinopyroxene, olivine, mesostasis	
Talc	5				Olivine	May just be carbonate in thin portions of slide.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles							

COMMENTS : Miscellaneous unidentified minerals in the groundmass include:
abundant, very fine (<10 microns wide), acicular, colorless, low-birefringence grains - apatite?
translucent, deep yellow-brown, high-birefringence subhedral to prismatic grains - rutile, goethite?
The groundmass olivine and the likely presence of high-P and high-Ti minerals suggest the rock is an alkalic basalt.
Photomicrograph #:
141A-3 = Rutile (?) (x20 objective, ppl);
1141A-4 = Rutile (?) (x20 objective, xpl);
1141A-5 = Carbonate pseudomorph after mafic phenocryst (x10 objective, xpl).

THIN SECTION:	**183-1141A-23R-1, 46-49, Piece 2B**					**Unit 6**	**OBSERVER:**	**NTA, RD**
ROCK NAME:	**Moderately olivine-phyric basalt.**							
WHERE SAMPLED:	**Interior of Unit 6.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Porphyritic with a subophitic to intergranular, subtrachytic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	3	0.3	1.6	0.4		Euhedral equant	Altered to clay, carbonate and goethite.
GROUNDMASS								
Plagioclase	40	45	<0.1	0.5	0.2		Subhedral laths	Slight alteration to pale clay.
Clinopyroxene	0	25	0.1	0.8	0.2		Subhedral to anhedral	Oikocrysts and prismatic grains, completely altered to clay and/or carbonate.
Olivine	0	10	0.02	0.2	0.1		Euhedral, equant	Completely altered to clay, carbonate.
Apatite	1	1		0.2	0.1		Acicular	
Titanomagnetite	3	3	<.01	0.2	0.1		Subhedral to anhedral	Irregular shapes, equant to elongate; embayed.
Mesostatis	0	12						Pools of glass in interstices, now altered to clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	25				Clinopyroxene, olivine, mesostasis	
Clay	30				Clinopyroxene, olivine, mesostasis	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1					Carbonate (probably siderite)	

COMMENTS : Miscellaneous unidentified minerals in the groundmass include:
abundant, very fine (<10 microns wide), acicular, colorless, low-birefringence grains - apatite?
translucent, deep yellow-brown, high-birefringence subhedral to prismatic grains - rutile.
Photomicrograph #:
1141A-16 = Corroded olivine phenocryst (x5 objective, ppl);
1141A-17 = As 1141A-16, but xpl.

THIN SECTION:	**183-1141A-23R-1 106-109, Piece 2C**					**Unit 6**	**OBSERVER:**	**MSP**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Coarse-grained segregation in Unit 6.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Porphyritic with a subophitic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	0	2	0.3	1	0.4		Euhedral equant	Completely altered to a fine-grained mixture of crystalline clay, talc, carbonate and goethite.
GROUNDMASS								
Plagioclase	35	40	<0.1	0.6	0.2	An45-60	Subhedral laths	
Clinopyroxene	0	30	0.1	1	0.2		Anhedral	Oikocrysts enclosing plagioclase laths; completely altered to clay and/or carbonate.
Olivine	0	10	0.02	0.2	0.1			
Titanomagnetite	3	3	<.01	0.2	0.1		Subhedral to anhedral	Irregular shapes, equant to elongate; embayed.
Mesostatis	0	15						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	20				Clinopyroxene, olivine, mesostasis	
Clay	35				Clinopyroxene, olivine, mesostasis	
Talc	5				Olivine	May just be carbonate in thin portions of slide.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles							

COMMENTS : Photomicrograph #:
1141A-2 = Carbonate pseudomorph after mafic phenocryst (x10 objective, xpl);
1141A-13 = Goethite and carbonate (x50 objective, xpl).

THIN SECTION:	**183-1141A-23R-1, 106-109, Piece 2B**					**Unit 6**	**OBSERVER:**	**CRN**
ROCK NAME:	**Coarse segregation in Unit 6.**							
WHERE SAMPLED:	**Middle of flow.**							
GRAIN SIZE:	**Fine- to medium-grained.**							
TEXTURE:	**Intergranular.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
GROUNDMASS								
Plagioclase	55	60	0.3	2	1.5	An45-50	Euhedral laths.	Slightly altered and replaced by carbonate.
Mafics	0	20			?		?	Completely altered and replaced by carbonate, zeolite, and Fe-oxides.
Titanomagnetite	2	4	0.05	0.6	0.2		Subhedral	Acicular and tabular forms present.
Mesostasis	0	16						Completely altered and replaced by zeolites.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Clay	5					Forms rims around calcite masses.
Calcite	20				Mafics	
Siderite	1				Titanomagnetite	Light brown color, rhombhedral cleavage, uniaxial negative. Associated with tianomagnetite.
Goethite	1				Titanomagnetite	Dark brown color, non-pleochroic, 2V close to zero, takes a polish.
Chalcopyrite	Trace					Seen in carbonate.
Zeolite	16				Mesostasis	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**

COMMENTS : Macroscopic observation: section is pink with white areas (plagioclase). Coarser area has light patches (8 mm by 3 mm) that are filled with carbonate and zeolite (observed under the microscope).
No phenocrysts.
Carbonate and zeolite masses along the boundary with the finer grained material.

THIN SECTION:	**183-1141A-23R-2, 61-63, Piece 5C**					**Unit 6**	**OBSERVER:**	**CRN**
ROCK NAME:	**Moderately olivine-phyric basalt.**							
WHERE SAMPLED:	**Fine-grained area of Unit 6.**							
GRAIN SIZE:	**Fine- to medium-grained.**							
TEXTURE:	**Microporphyritic with a sub-ophitic to locally ophitic groundmass.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	2	4	0.3	0.6	0.5		Euhedral?	Microphenocrysts. Alteration makes morphology difficult to identify. Fresh cores present with euhedral chromite inclusions (<0.01 mm). Partially replaced by carbonate.
GROUNDMASS								
Plagioclase	45	50	0.1	0.3	0.2		Subhedral to euhedral laths	Occasionally exhibits compositional zonation.
Clinopyroxene	30	44	0.8	2	1.2		Anhedral	Poikilitically encloses or partially encloses olivine and plagioclase.
Titanomagnetite	2	2	0.05	0.3	0.2		Subhedral	No maghemite exsolution.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	21				Olivine, clinopyroxene; fills veins	Carbonate usually has an iron-oxide rim to it.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Veins	1	Random	0.1	0.25	0.2	Carbonate	

COMMENTS : Macroscopic observation: veins and individual grains can be seen with naked eye. No fabric. Thin section has a pink-brown hue. No sulfide observed.

THIN SECTION:	**183-1141A-23R-2, 107-108, Piece 11A**					**Unit 6**	**OBSERVER:**	**RD, NTA**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 6.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Ophitic, holocrystalline.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	1.5	2	0.5	1.5			Euhedral to subhedral	Partly replaced by clay and carbonate.
Plagioclase	<1	<1	0.5				Subhedral	Sieved cores, overgrown rims, xenocrysts.
GROUNDMASS								
Plagioclase	40	40					Euhedral	Interlocking laths and clusters; a few larger grains.
Clinopyroxene	35	40					Anhedral	Ophitic (~1 mm) crystals, enclosing olivine, plagioclase; mostly unaltered.
Olivine	3	10	0.02	0.1	0.05		Euhedral	Small grains in the groundmass.
Fe-Ti Oxides	3	3	0.05	0.2	0.1		Subhedral to anhedral	
Apatite	1	1	<.01	0.3			Acicular	Abundant, fine (max diameter 50 microns) needles in groundmass.
Sulfides	<1	<1	<0.01	0.01			Intersertal	
Mesostasis	2	5					Intersertal pools	Partly replaced with clay and carbonate.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	5				Mesostasis; fills vesicles and veins	
Clay	5				Olivine, clinopyroxene, mesostasis; fills vesicles	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1					Roun with brown clay and carbonate fill	
Veins	<1					Sinuous with clay and carbonate fill	One thin (0.1 mm), subhorizontal.

COMMENTS : A well-crystallized (nearly completely holocrystalline) rock with partly unaltered olivine (fresh cores) and rare plagioclase xenocrysts in an ophitic matrix of anhedral clinopyroxene and interlocking plagioclase laths.
Photomicrograph #:
1141A-14 = Olivine (x2.5 objective, ppl);
1141A-18 = Sub-ophitic texture with olivine phenocrysts (x2.5 objective, ppl);
1141A-19 = As 1141A-18, but xpl.

THIN SECTION:	**183-1141A-24R-1, 6-8, Piece 1A**					**Unit 6**	**OBSERVER:**	**RD**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Flow interior, Unit 6**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Intergranular to intersertal, subtrachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Olivine	2	3	0.2	0.5	0.3		Euhedral to subhedral	Often in glomerocrystic clots. Many grains only partially altered to clay.
GROUNDMASS								
Plagioclase	50	50	0.1	0.3	0.2		Euhedral to subhedral, small laths	Flow aligned into a subtrachytic texture.
Clinopyroxene	20	30	0.05	0.2	0.1		Anhedral, equant	Granular, partly replaced by pale brown clay.
Olivine	<1	1	0.05	0.1			Subhedral	Partly replaced by clay and carbonate.
Titanomagnetite	4	4	0.05	0.1			Blocky, intersertal	
Sulfide	<1	<1	<0.01	0.02			Rounded blebs	
Mesostasis	2	10					Intersertal pools	Replaced by clay and carbonate.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	10					
Clay	10					

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	<1		0.5			Round; filled with dark gray clay, then carbonate	

COMMENTS :

THIN SECTION:	**183-1141A-24R-2, 36-37, Piece 2A**					**Unit 6**	**OBSERVER:**	**RD**
ROCK NAME:	**Sparsely olivine-phyric basalt.**							
WHERE SAMPLED:	**Flow interior of Unit 6.**							
GRAIN SIZE:	**Fine grained.**							
TEXTURE:	**Intersertal to intergranular, subtrachytic.**							

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**APPROX. COMP.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS								
Plagioclase	<1	<1	0.5	1			Subhedral	Fragments of larger xenocrysts?
Olivine	1	2	0.5	1			Euhedral to subhedral	Often in glomerocrystic clots; partially altered.
GROUNDMASS								
Plagioclase	50	50	0.1	0.5				
Clinopyroxene	15	30	0.05	0.2				Partially altered to clay.
Titanomagnetite	3	3	<0.01	0.05				
Mesostasis	5	15						

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Carbonate	10				Mesostasis, clinopyroxene, olivine; fills vesicles and veins	
Clay	15				1Mesostasis, clinopyroxene; fills vesicles and veins	Pale to dark brown.

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	1		0.5	1		Round to flattened; clay and carbonate fill	Trace amount of zeolite.
Veins	<1		0.1			Sinuous; carbonate and clay fill	

COMMENTS : Clinopyroxene is more highlly altered than olivine.