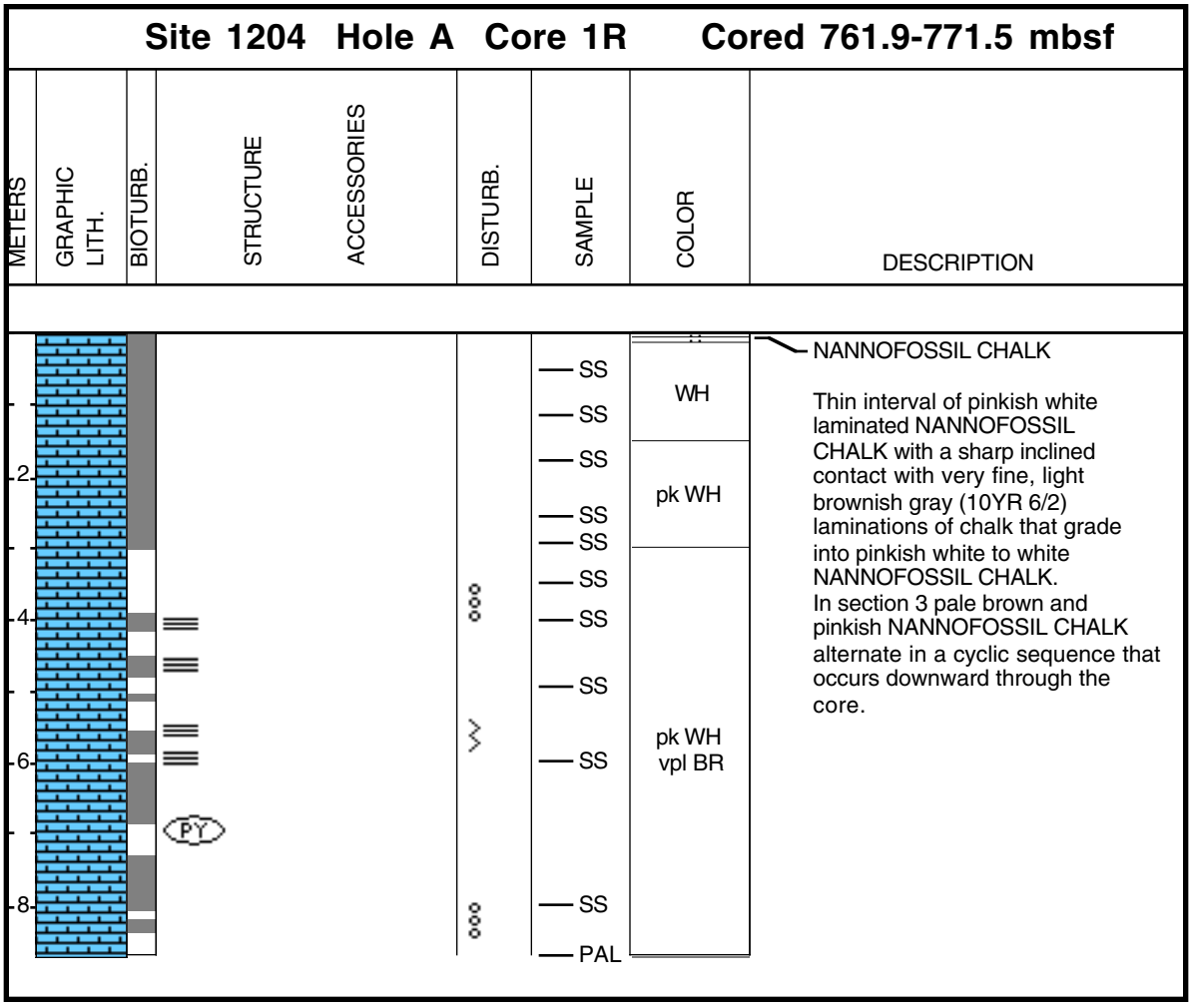
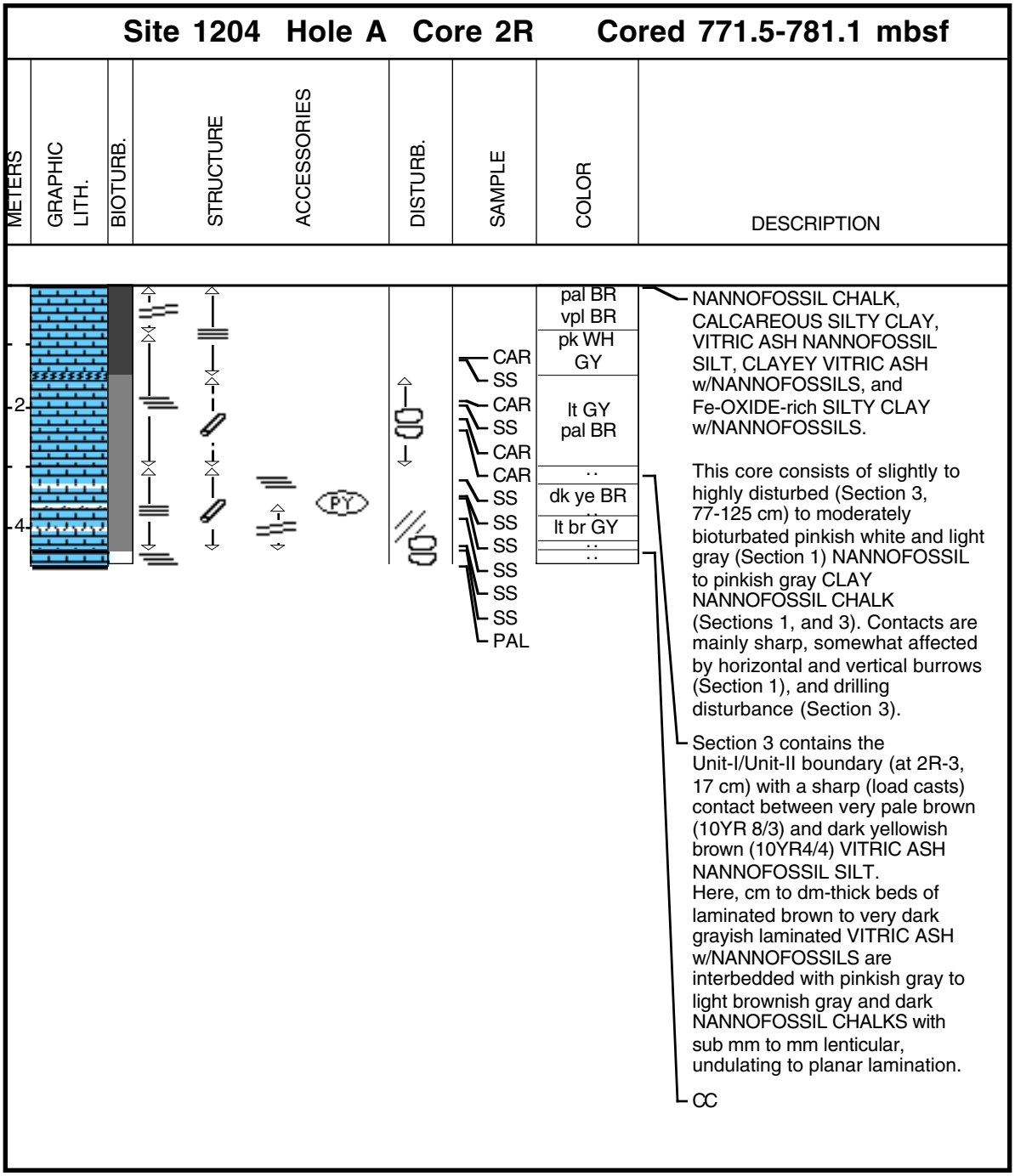
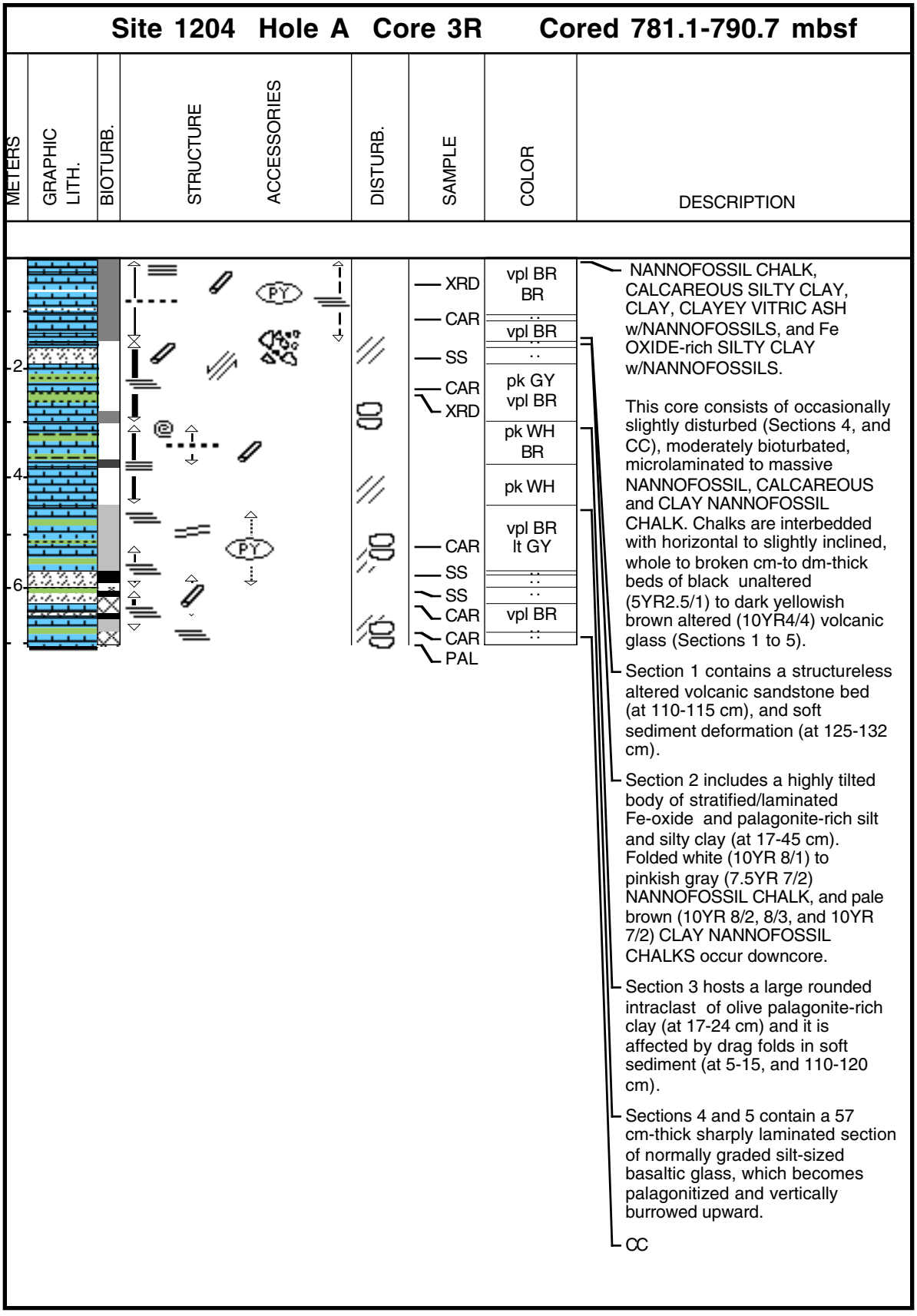
Core Photo


Site 1204 Hole A Core 1R Cored 761.9-771.5 mbsf
METERS
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
COLOR
DESCRIPTION
2
4
6
8
PY
SS
SS
SS
SS
SS
SS
SS
SS
SS
PAL
WH
pk WH
pk WH
vpl BR
NANNOFOSSIL CHALK
Thin interval of pinkish white laminated NANNOFOSSIL CHALK with a sharp inclined contact with very fine, light brownish gray (10YR 6/2) laminations of chalk that grade into pinkish white to white NANNOFOSSIL CHALK.
In section 3 pale brown and pinkish NANNOFOSSIL CHALK alternate in a cyclic sequence that occurs downward through the core.

Core Photo


Site 1204 Hole A Core 2R Cored 771.5-781.1 mbsf
METERS
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
COLOR
DESCRIPTION
2
4
PY
CAR
SS
CAR
SS
CAR
CAR
SS
SS
SS
SS
SS
SS
PAL
pal BR
vpl BR
pk WH
GY
lt GY
pal BR
dk ye BR
lt br GY
NANNOFOSSIL CHALK, CALCAREOUS SILTY CLAY, VITRIC ASH NANNOFOSSIL SILT, CLAYEY VITRIC ASH w/NANNOFOSSILS, and Fe-OXIDE-rich SILTY CLAY w/NANNOFOSSILS.
This core consists of slightly to highly disturbed (Section 3, 77-125 cm) to moderately bioturbated pinkish white and light gray (Section 1) NANNOFOSSIL to pinkish gray CLAY NANNOFOSSIL CHALK (Sections 1, and 3). Contacts are mainly sharp, somewhat affected by horizontal and vertical burrows (Section 1), and drilling disturbance (Section 3).
Section 3 contains the Unit-I/Unit-II boundary (at 2R-3, 17 cm) with a sharp (load casts) contact between very pale brown (10YR 8/3) and dark yellowish brown (10YR4/4) VITRIC ASH NANNOFOSSIL SILT.
Here, cm to dm-thick beds of laminated brown to very dark grayish laminated VITRIC ASH w/NANNOFOSSILS are interbedded with pinkish gray to light brownish gray and dark NANNOFOSSIL CHALKS with sub mm to mm lenticular, undulating to planar lamination.
CC

Core Photo

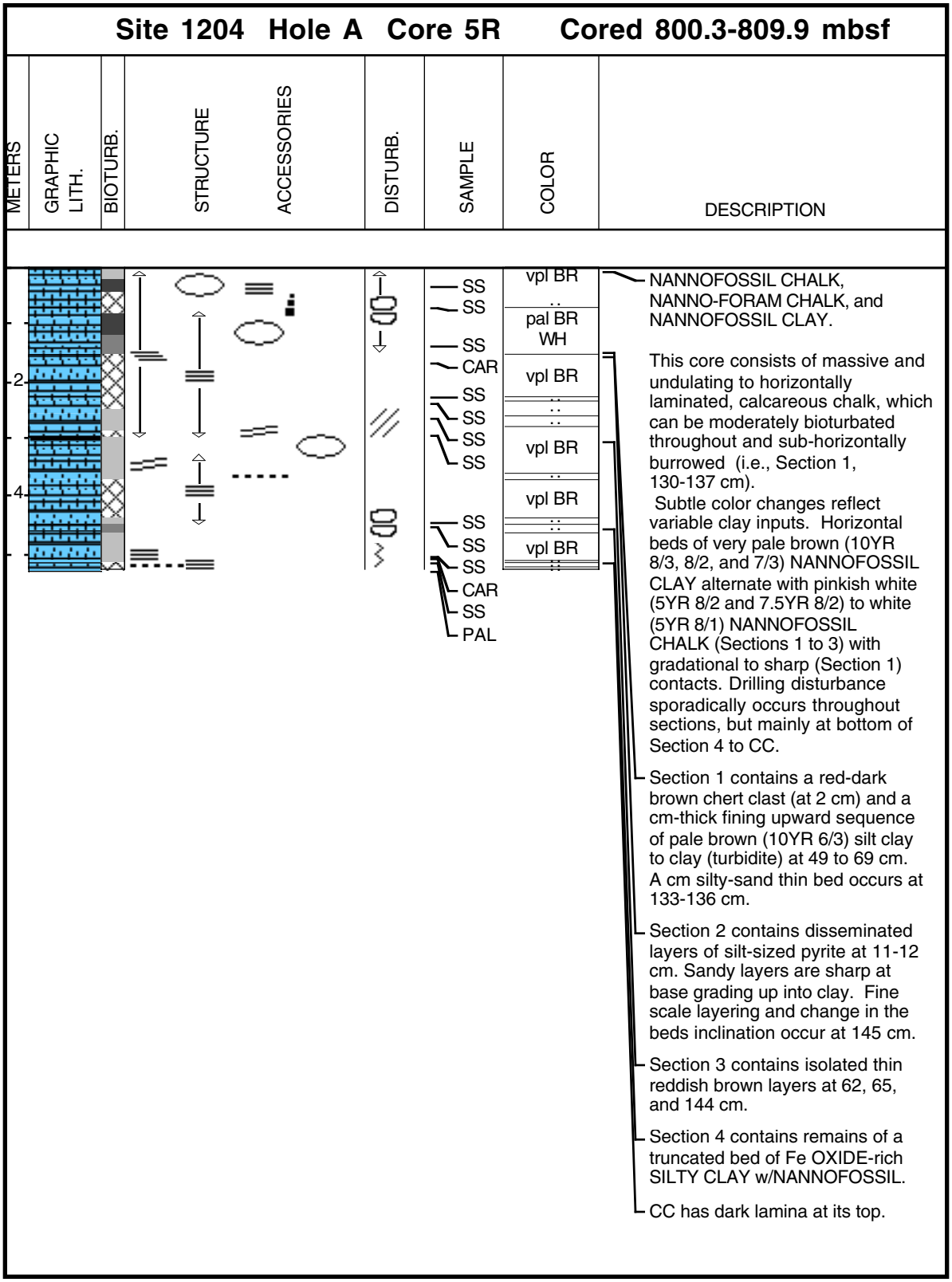

Site 1204 Hole A Core 3R Cored 781.1-790.7 mbsf
METERS
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
COLOR
DESCRIPTION
2
4
6
PY
PY
XRD
CAR
SS
CAR
XRD
CAR
SS
SS
CAR
CAR
PAL
vpl BR
BR
vpl BR
pk GY
vpl BR
pk WH
BR
pk WH
vpl BR
lt GY
vpl BR
NANNOFOSSIL CHALK, CALCAREOUS SILTY CLAY, CLAY, CLAYEY VITRIC ASH w/NANNOFOSSILS, and Fe OXIDE-rich SILTY CLAY w/NANNOFOSSILS.
This core consists of occasionally slightly disturbed (Sections 4, and CC), moderately bioturbated, microlaminated to massive NANNOFOSSIL, CALCAREOUS and CLAY NANNOFOSSIL CHALK. Chalks are interbedded with horizontal to slightly inclined, whole to broken cm-to dm-thick beds of black unaltered (5YR2.5/1) to dark yellowish brown altered (10YR4/4) volcanic glass (Sections 1 to 5).
Section 1 contains a structureless altered volcanic sandstone bed (at 110-115 cm), and soft sediment deformation (at 125-132 cm).
Section 2 includes a highly tilted body of stratified/laminated Fe-oxide and palagonite-rich silt and silty clay (at 17-45 cm). Folded white (10YR 8/1) to pinkish gray (7.5YR 7/2) NANNOFOSSIL CHALK, and pale brown (10YR 8/2, 8/3, and 10YR 7/2) CLAY NANNOFOSSIL CHALKS occur downcore.
Section 3 hosts a large rounded intraclast of olive palagonite-rich clay (at 17-24 cm) and it is affected by drag folds in soft sediment (at 5-15, and 110-120 cm).
Sections 4 and 5 contain a 57 cm-thick sharply laminated section of normally graded silt-sized basaltic glass, which becomes palagonitized and vertically burrowed upward.
CC

Core Photo

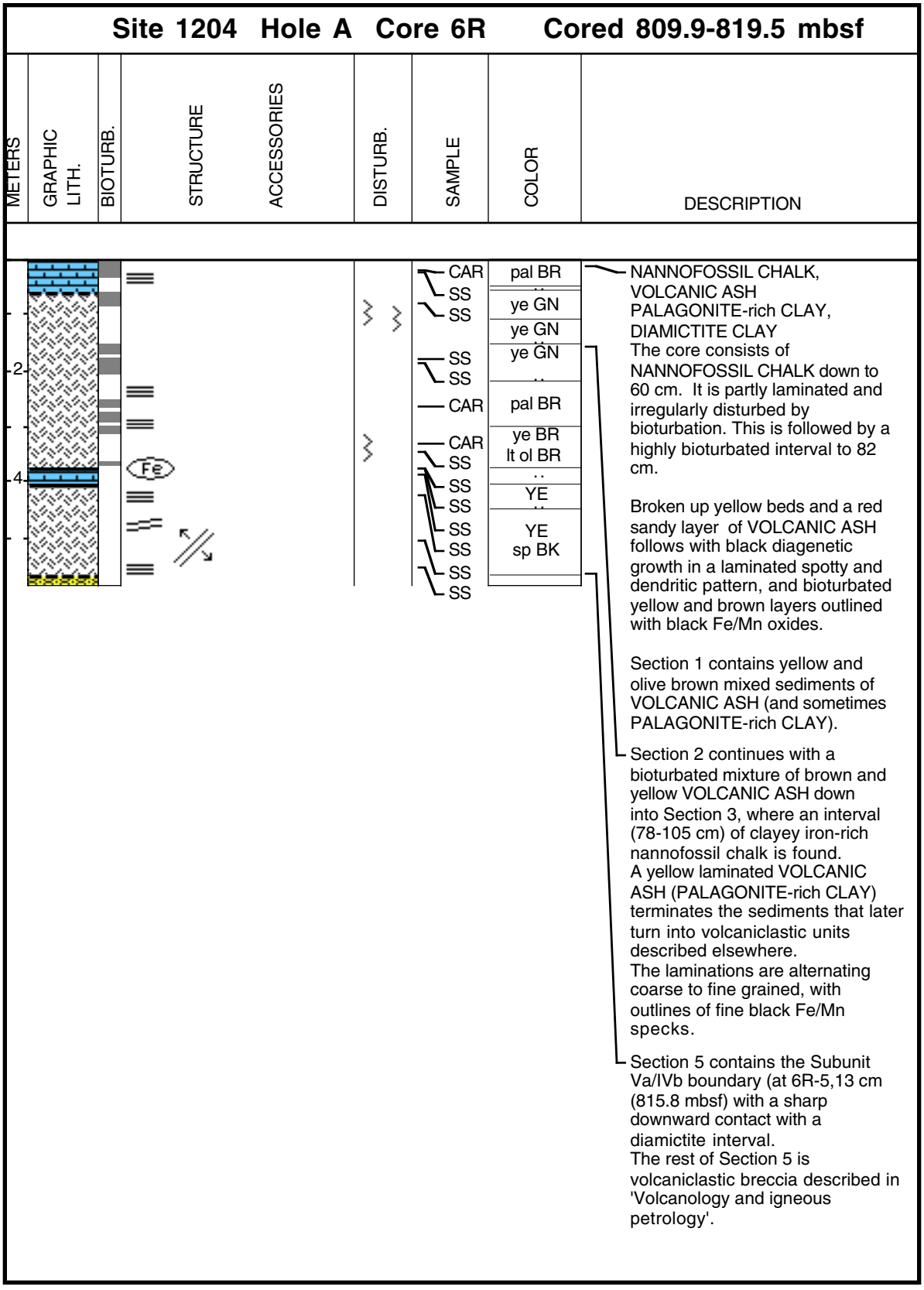
Site 1204 Hole A Core 4R Cored 790.7-800.3 mbsf

METERS	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	DISTURB.	SAMPLE	COLOR	DESCRIPTION
2						SS CAR SS CAR SS CAR	vpl BR pk GY dk ye BR vpl BR vpl BR	NANNOFOSSIL CHALK w/CLAY and NANNOFOSSIL CHALK, VITRIC ASH-rich SILT w/NANNOFOSSILS, and Fe OXIDE-rich SILTY CLAY w/NANNOFOSSILS. This core consists of massive to very finely laminated very pale brown NANNOFOSSIL CHALK w/CLAY (10YR 8/3, 8/2, 7/3, and 7/4), and pinkish white (7.5YR 8/2) to pinkish gray nodules of NANNOFOSSIL CHALK. They are interbedded with a) very dark gray (5YR3/1) VITRIC ASH-rich SILT w/NANNOFOSSIL (Section 1); and b) horizontal, sharply stratified to structureless cm-to dm-thick beds of light to dark yellowish brown (10YR 6/4 and 4/4) (Sections 2 and 3). Beds are slightly to rarely disturbed (Sections 3 and 4) and moderately to commonly bioturbated in cm to dm intervals throughout the core. Cm-thick inclined beds, consisting of finely layered mm-sized clasts of brown clay and white chalk, occur in Section 1. Angular brown clay pebbles are chaotically clustered and embedded in deformed chalks within beds in Section 2 (at 82-87 cm) and Section 3 (at 45 cm).
4						CAR	BR pk WH	
						SS	vpl BR	Section 1 contains silty-clay layers (130-136 cm). Bedding change inclination at 76-97 cm and a dark brown clast of silty clay occurs at 120 cm.
6						SS PAL		Section 3 contains the Unit-II/Unit-III boundary (at 4R-3, 105 cm). This has a sharp, but bioturbated contact between very pale brown (10YR 8/3) chalk and the first occurring brown (10YR5/3) bed of horizontal sharply laminated and altered VITRIC ASH-rich SILTY CLAY. CC

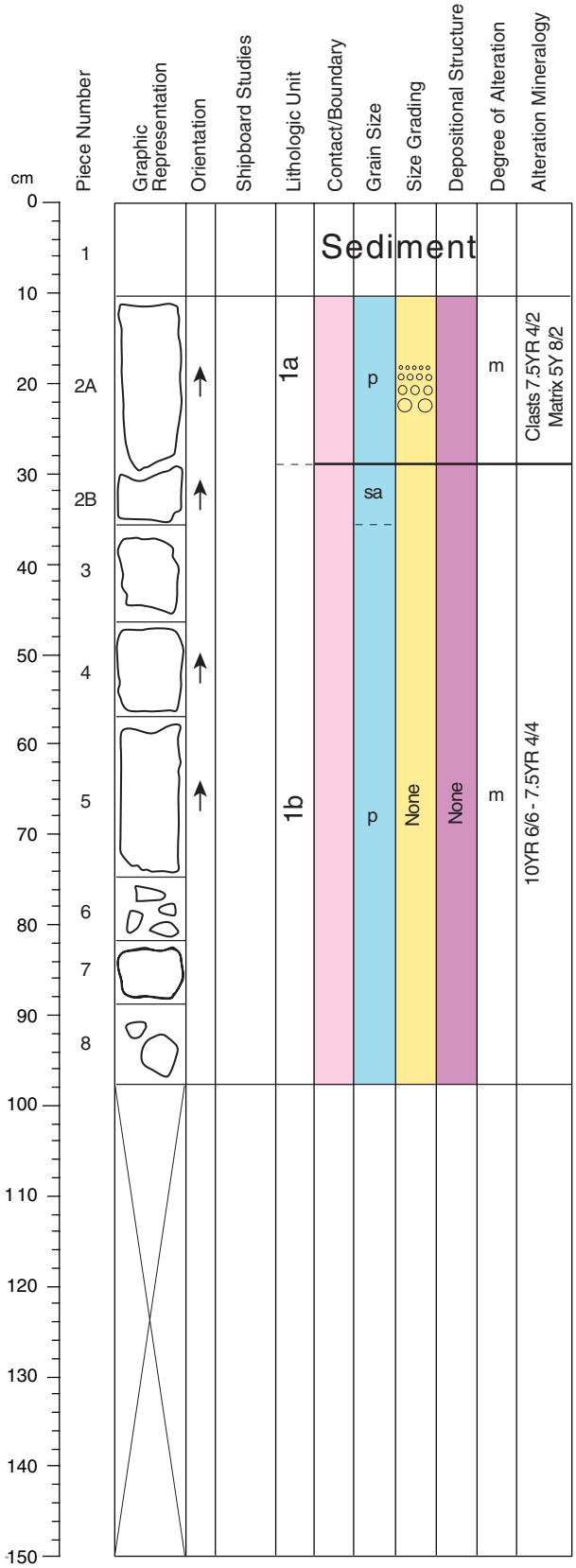
Core Photo


Site 1204 Hole A Core 5R Cored 800.3-809.9 mbsf
METERS
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
COLOR
DESCRIPTION
2
4
SS
SS
SS
CAR
SS
SS
SS
SS
SS
SS
SS
CAR
SS
PAL
vpl BR
pal BR
WH
vpl BR
vpl BR
vpl BR
vpl BR
NANNOFOSSIL CHALK, NANNO-FORAM CHALK, and NANNOFOSSIL CLAY.
This core consists of massive and undulating to horizontally laminated, calcareous chalk, which can be moderately bioturbated throughout and sub-horizontally burrowed (i.e., Section 1, 130-137 cm).
Subtle color changes reflect variable clay inputs. Horizontal beds of very pale brown (10YR 8/3, 8/2, and 7/3) NANNOFOSSIL CLAY alternate with pinkish white (5YR 8/2 and 7.5YR 8/2) to white (5YR 8/1) NANNOFOSSIL CHALK (Sections 1 to 3) with gradational to sharp (Section 1) contacts. Drilling disturbance sporadically occurs throughout sections, but mainly at bottom of Section 4 to CC.
Section 1 contains a red-dark brown chert clast (at 2 cm) and a cm-thick fining upward sequence of pale brown (10YR 6/3) silt clay to clay (turbidite) at 49 to 69 cm. A cm silty-sand thin bed occurs at 133-136 cm.
Section 2 contains disseminated layers of silt-sized pyrite at 11-12 cm. Sandy layers are sharp at base grading up into clay. Fine scale layering and change in the beds inclination occur at 145 cm.
Section 3 contains isolated thin reddish brown layers at 62, 65, and 144 cm.
Section 4 contains remains of a truncated bed of Fe OXIDE-rich SILTY CLAY w/NANNOFOSSIL.
CC has dark lamina at its top.

Core Photo


Site 1204 Hole A Core 6R Cored 809.9-819.5 mbsf
METERS
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
COLOR
DESCRIPTION
2
4
Fe
CAR
SS
SS
SS
SS
CAR
CAR
SS
SS
SS
SS
SS
SS
pal BR
ye GN
ye GN
ye GN
pal BR
ye BR
lt ol BR
YE
YE
sp BK
NANNOFOSSIL CHALK, VOLCANIC ASH
PALAGONITE-rich CLAY, DIAMICTITE CLAY
The core consists of NANNOFOSSIL CHALK down to 60 cm. It is partly laminated and irregularly disturbed by bioturbation. This is followed by a highly bioturbated interval to 82 cm.
Broken up yellow beds and a red sandy layer of VOLCANIC ASH follows with black diagenetic growth in a laminated spotty and dendritic pattern, and bioturbated yellow and brown layers outlined with black Fe/Mn oxides.
Section 1 contains yellow and olive brown mixed sediments of VOLCANIC ASH (and sometimes PALAGONITE-rich CLAY).
Section 2 continues with a bioturbated mixture of brown and yellow VOLCANIC ASH down into Section 3, where an interval (78-105 cm) of clayey iron-rich nannofossil chalk is found.
A yellow laminated VOLCANIC ASH (PALAGONITE-rich CLAY) terminates the sediments that later turn into volcaniclastic units described elsewhere.
The laminations are alternating coarse to fine grained, with outlines of fine black Fe/Mn specks.
Section 5 contains the Subunit Va/IVb boundary (at 6R-5,13 cm (815.8 mbsf) with a sharp downward contact with a diamictite interval.
The rest of Section 5 is volcaniclastic breccia described in 'Volcanology and igneous petrology'.

Core Photo



VOLCANICLASTIC VISUAL CORE DESCRIPTION

197-1204A-6R-5 (Section top: 815.48 mbsf)

UNIT 1a: DIAMICTITE.

Pieces: 2 (13–29 cm)

CONTACTS: Upper subplanar contact with overlying fine-grained calcareous mud at 12 cm. Contact with Unit 1b is gradational over a scale of 3-4 mm.

GENERAL DESCRIPTION: Fine grained, moderately to poorly sorted diamicton with subangular basalt fragments (2-20 mm), in a pale carbonate matrix.

COLOR: Matrix is pale yellow (5Y 8/2) to light brown (7.5 YR 5/3). Clasts are mid to dark brown (7.5YR 4/2 to 4/3).

COMPONENTS:
25%: Basaltic clasts, some highly vesicular and rimmed with fine-grained black material. Clasts are subangular and 2-20 mm.
5%: Sandstone clasts.
70%: Fine grained sandstone matrix consisting of 0.5-1 mm subrounded orange and brown grains.
Cement: White carbonate.

SEDIMENTARY TEXTURES: Matrix displays normal grading, whereas clasts are moderately well sorted and display no grading.

SEDIMENTARY STRUCTURES: No sedimentary structures are present.

COMMENTS: Faint 2-3 mm wide carbonate-filled veins are present throughout, but are concentrated in a horizontal band at 19-21 cm. Clasts and matrix are similar to Unit 1b but Unit 1a contains a substantially higher proportion of white carbonate cement.

UNIT 1b: VOLCANICLASTIC BRECCIA.

Pieces: 2–8.

CONTACTS: Contact with overlying volcaniclastic breccia is gradational over a scale of 3–4 mm.

GENERAL DESCRIPTION: Poorly sorted volcaniclastic breccia consisting of angular to subrounded basaltic clasts (1-40 mm) in a sandstone matrix. Uppermost 10 cm (interval 30-40 cm) contains no clasts.

COLOR: Varies from orange (10YR 6/6) to mid brown (7.5YR 4/4).

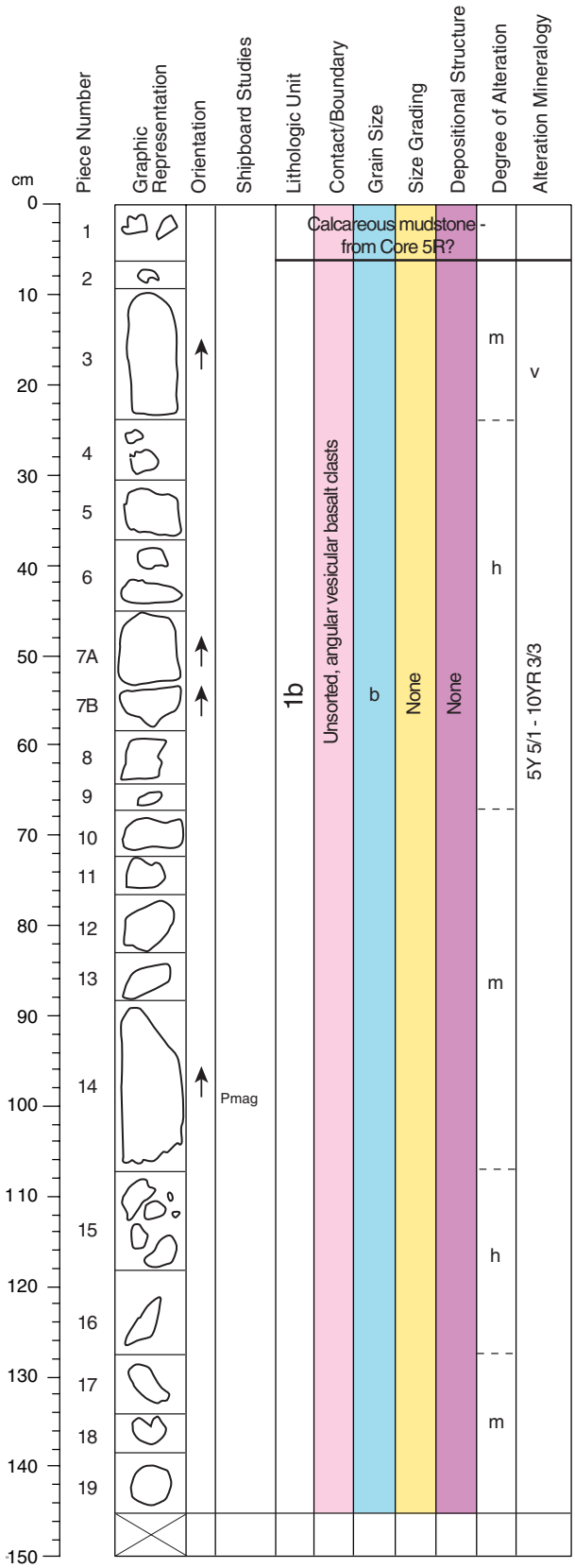
COMPONENTS:
75%: Basaltic angular to subrounded clasts, 1-40 mm in size. Basaltic clasts are moderately to highly vesicular and are dark red and are rimmed with fine grained material.
25%: Sandstone matrix, consisting of subangular to subrounded orange and brown grains 0.5-1 mm.
Cement: Carbonate.

SEDIMENTARY TEXTURES: Poorly sorted massive deposit.

SEDIMENTARY STRUCTURES: None.

COMMENTS: Vesicular basalt clasts in Piece 8 resemble basalt lava in Unit 2 below.

Core Photo



VOLCANICLASTIC VISUAL CORE DESCRIPTION

197-1204A-7R-1 (Section top: 819.5 mbsf)

UNIT 1b: VOLCANICLASTIC BRECCIA.

Pieces: 1-19

CONTACTS: Contact with underlying basalt is inferred to be at the base of Section 7R-1.

GENERAL DESCRIPTION: Poorly sorted volcaniclastic, clast-supported breccia consisting of angular to subrounded vesicular basaltic clasts (≤1-15 cm) with a vesicular basalt pebble and calcareous sandstone matrix. Piece 1 consists only of sand to silt sized sediment with dark (Mn?) laminae, (possibly out of place and from Core 5R).

COLOR: Gray (5Y 5/1) with altered areas dark brown (10YR 3/3).

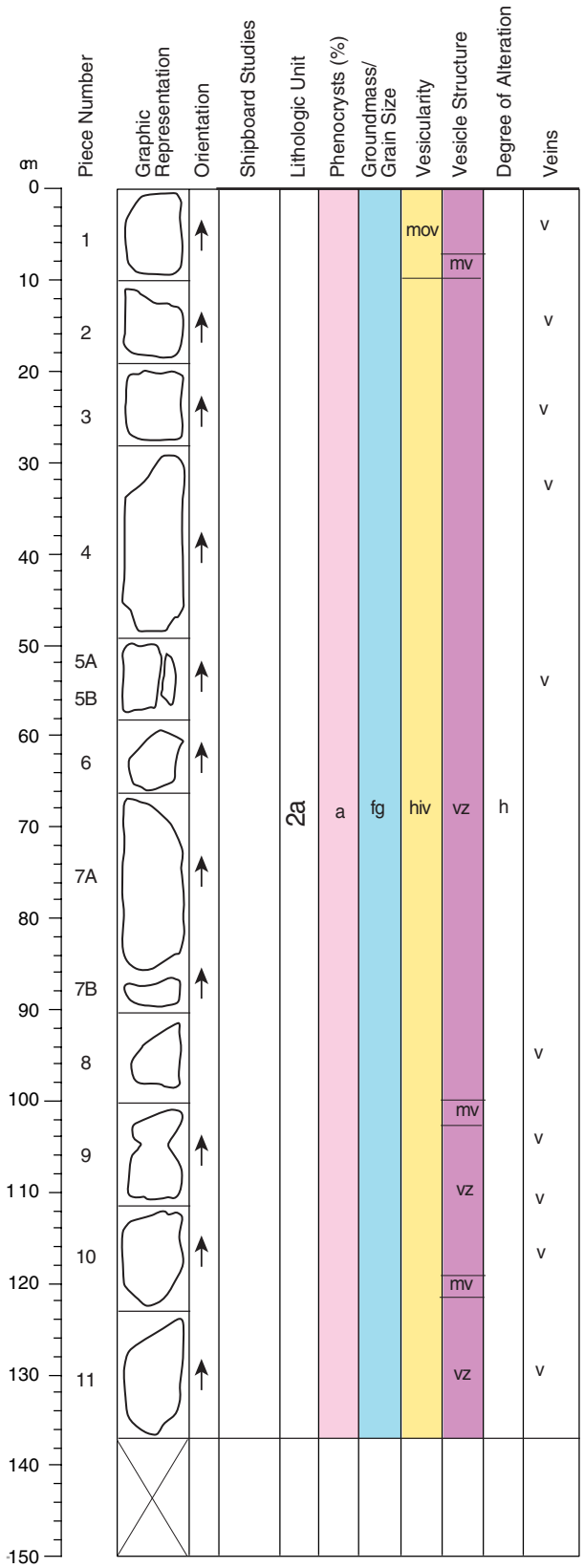
COMPONENTS:
Basaltic angular to subrounded clasts (85%), 3-15 cm in size. Basaltic clasts are moderately to highly vesicular, and are moderately to highly altered. Intervals 20-65 cm and 106-126 cm consist mainly of matrix and contain the highest amount of Fe oxyhydroxide alteration. The groundmass of the basalt clasts consists of fine grained plagioclase, clinopyroxene and olivine, with olivine altered completely to Fe oxyhydroxide. Clasts and occasionally matrix are often rimmed with fine grained white carbonate cement.
Matrix (15%) consists of calcareous mud and vesicular basalt pebbles. Carbonate cement.

SEDIMENTARY TEXTURES: Poorly sorted lapillus-size (2-20 mm) basalt fragments in sand-size matrix.

SEDIMENTARY STRUCTURES: Structureless (massive).

COMMENTS: The proportion of minerals in the groundmass as well as the vesicularity of the basalt varies from clast to clast.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-7R-2 (Section top: 820.95 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-11

CONTACTS: None observed. Unit boundary is inferred to be at the base of Section 7R-1.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Olivine[1]:	15	0.5	0.2	0.3	Euhedral

GROUNDMASS: Fine grained and intergranular. Consists of plagioclase and clinopyroxene(?).

VESICLES[2]:	% Mode	Size (mm): Average	Shape
Highly vesicular	25	3	Irregular

COLOR: Gray (5Y 5/1).

STRUCTURE: Massive.

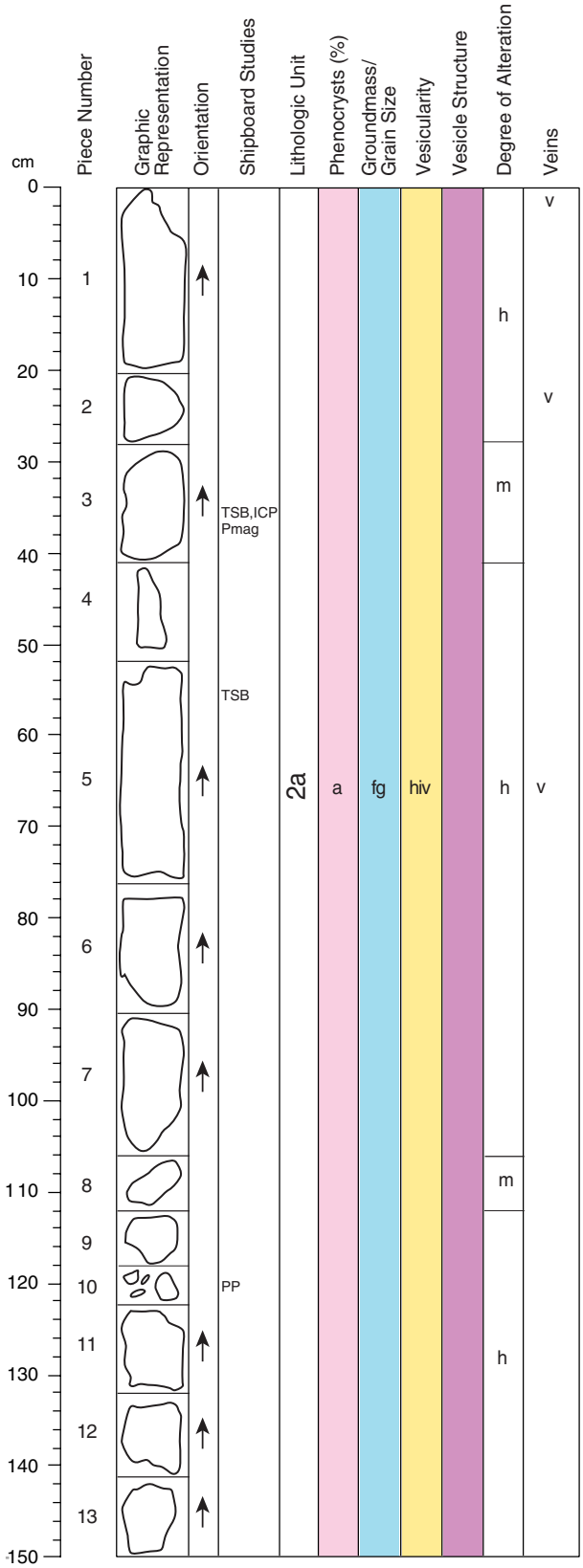
ALTERATION: High. Olivine is altered to a yellowish brown (10YR 5/6) clay.

VEINS/FRACTURES: Vertical veins are observed in Pieces 1 and 2. Veins are present in Pieces 1-5 and 10-11, and range from 1-5 mm in width. Veins in Piece 1 are filled with both calcite and brownish yellow (10YR 6/6) clay. Veins in the other pieces are filled with carbonate. 60% of the vesicles are filled with carbonate.

COMMENTS:
[1] Olivine is present as a microphenocryst phase. It is variable in abundance throughout, and is replaced by Fe oxyhydroxide but is still recognizable by its euhedral shape and distinctive fracture.

[2]One megavesicle is 15 mm in size (Interval 6-8 cm) and is filled with carbonate and brownish yellow (10YR 6/6) clay.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-7R-3 (Section top: 822.32 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-13

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Olivine[1]:	5	1	0.2	0.3	Euhedral

GROUNDMASS: Fine grained and intergranular. Consists of plagioclase and clinopyroxene(?).

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	25	3	Irregular

COLOR: Gray (2.5YR 6/0).

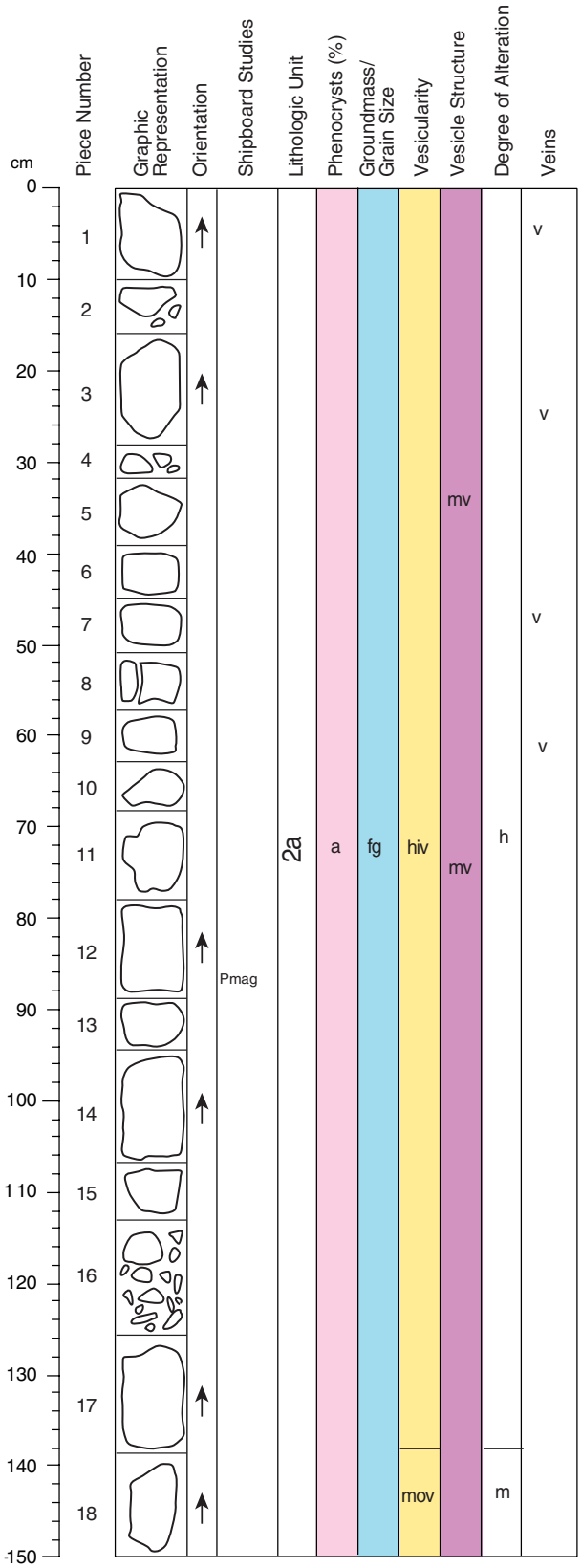
STRUCTURE: Massive.

ALTERATION: Medium to high. Olivine is altered to a yellowish brown (10YR 5/6) clay. 60% of the vesicles are filled with carbonate, the remainder are unfilled.

VEINS/FRACTURES: Sparsely veined. Veins are present throughout and are up to 2 mm in width and filled with carbonate (~60%) and mid brown (5YR 4/4) material (probably Fe oxyhydroxide; 40%).

COMMENTS:
[1]Olivine is present as a microphenocryst phase. It is variable in abundance throughout, and is replaced by Fe oxyhydroxide but is still recognizable by its euhedral to subhedral equant shape and distinctive fracture.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-7R-4 (Section top: 823.82 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-18

CONTACTS: None.

PHENOCRYSTS:	%	Grain Size (mm):			
	Mode	Max.	Min.	Avg.	Shape/Habit
Olivine[1]:	5	1	0.2	0.3	Euhedral

GROUNDMASS: Fine grained and intergranular. Consists of plagioclase and clinopyroxene(?).

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
Highly vesicular	25	3	Irregular

COLOR: Gray (2.5YR 6/0).

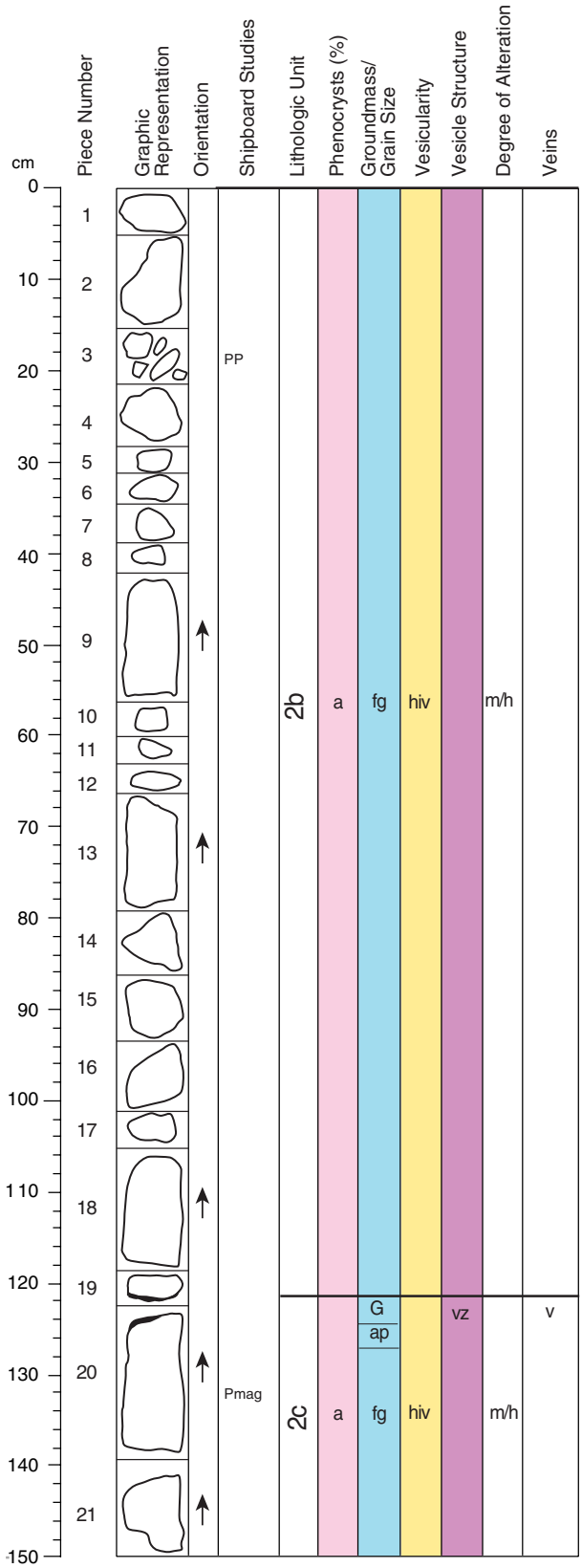
STRUCTURE: Massive.

ALTERATION: Medium to high. Olivine is altered to a yellowish brown (10YR 5/6) clay. Veins are filled with a mixture of carbonate and Feoxyhydroxide. 50% of the vesicles are carbonate filled; the remainder are unfilled.

VEINS/FRACTURES: Sparsely veined. Veins are present in Pieces 1, 3, 7 and 9 and are typically up to 2 mm in width. A wide (1.5 cm) vein is present in Piece 1 and consists of basaltic breccia clasts in white carbonate and red brown clay matrix.

COMMENTS: [1]Olivine is present as a microphenocryst phase. It is variable in abundance throughout, and is replaced by Fe oxyhydroxide but is still recognizable by its euhedral to subhedral equant shape and distinctive fracture.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-8R-1 (Section top: 829.0 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-21

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, clinopyroxene and black oxide minerals.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	20-25	2.5	Irregular

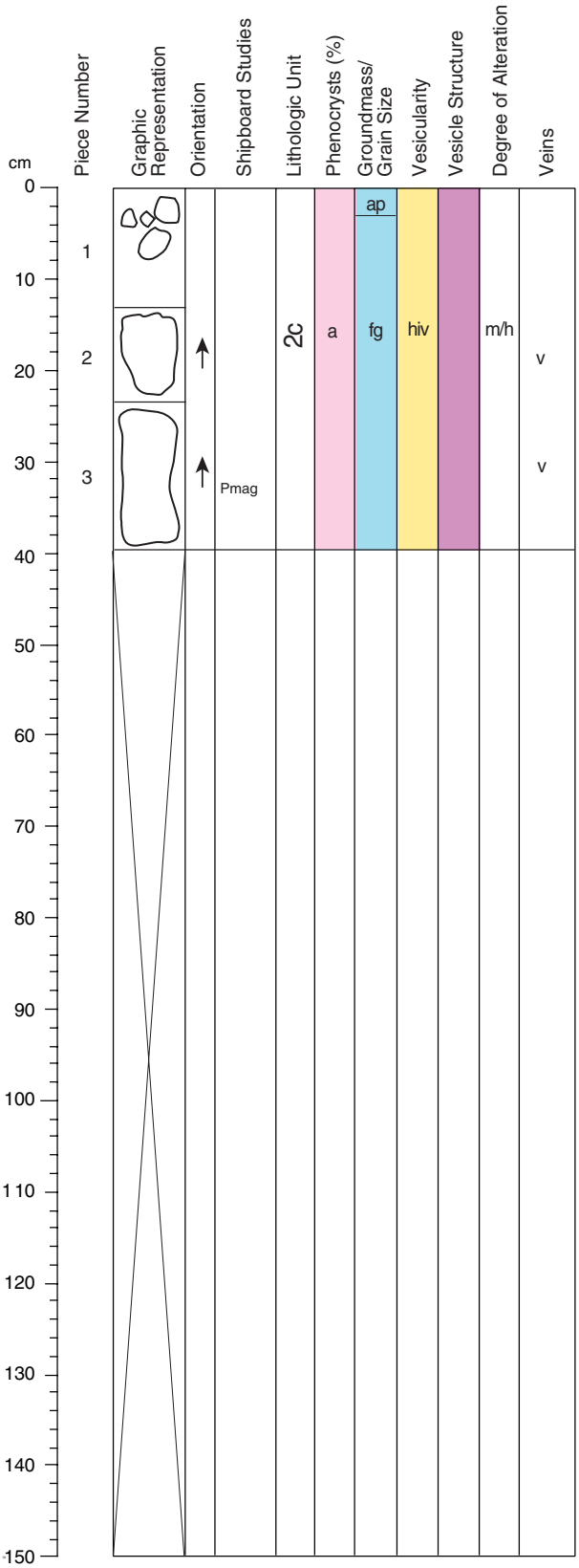
COLOR: Grayish brown (10YR 5/2).

STRUCTURE: Lobed. Lobe boundary inferred to lie at 122 cm between Pieces 19 and 20, based on presence of partially altered glass in Piece 19, and cryptocrystalline layer at the top of Piece 20.

ALTERATION: High. Most vesicles are filled with carbonate, green clay and Fe oxyhydroxide. The clinopyroxene crystals in the groundmass are partly replaced by Fe oxyhydroxide.

VEINS/FRACTURES: One carbonate-filled vein, 4.5 mm wide, occurs in Piece 19.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-8R-2 (Section top: 830.5 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-3

CONTACTS: None.

GROUNDMASS: Fine grained. Consists of plagioclase and clinopyroxene(?) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	10-20	3	Irregular

COLOR: Gray (10YR 6/1) to light brownish gray (10YR 6/2).

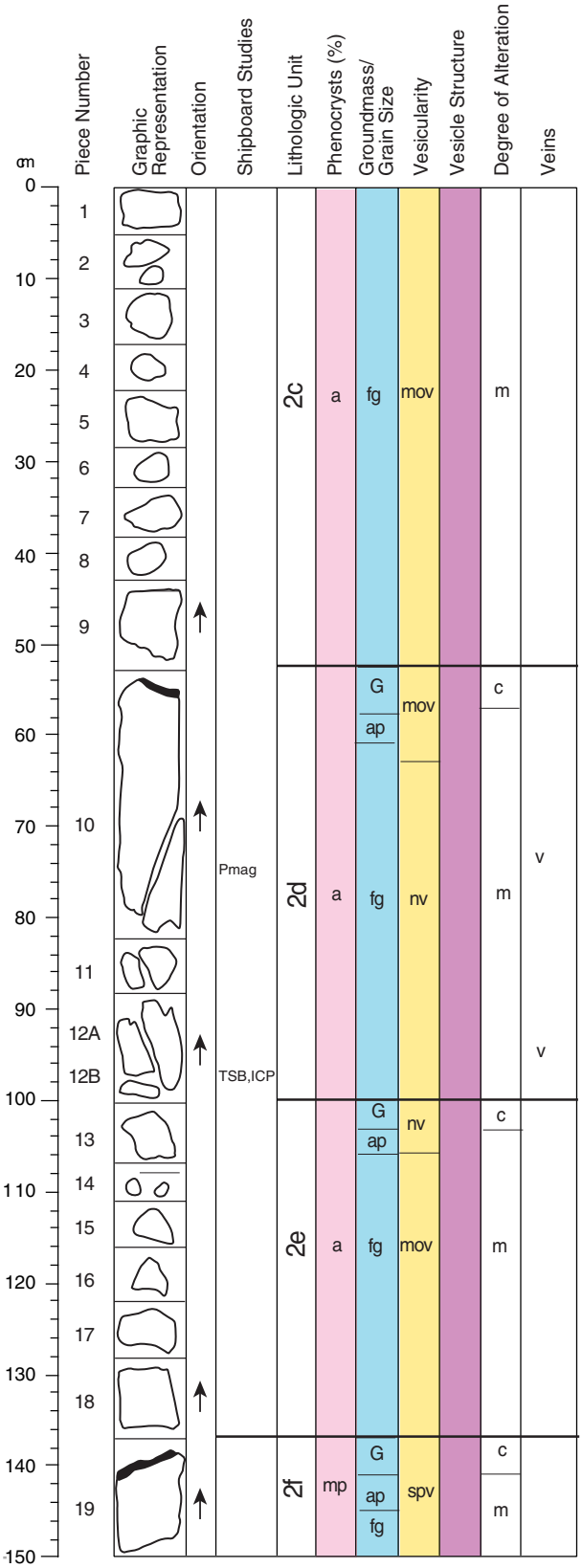
STRUCTURE: Massive. No indicators of lobe boundaries are present in this short core section.

ALTERATION: Moderate to high. Clinopyroxene in the groundmass is replaced by Fe oxyhydroxide. Vesicles are mostly filled with white carbonate and Fe oxyhydroxide. Where unfilled, they are lined with Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Veins are <1 mm wide and filled with white carbonate and Fe oxyhydroxide.

COMMENTS: One piece in Piece 1 is aphanitic. All other pieces are fine grained.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-9R-1 (Section top: 838.6 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-19

CONTACTS: None.

PHENOCRYSTS:	%	Grain Size (mm):			
	Mode	Max.	Min.	Avg.	Shape/Habit
Olivine:	0-10	1.5	0.5	0.8	Euhedral to subhedral; equant

GROUNDMASS: Fine grained to aphanitic (cryptocrystalline) adjacent to the lobe margin. Consists of plagioclase, (altered) clinopyroxene, and black oxides in an intergranular texture.

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	0-30	2	Round to irregular

COLOR: Gray (10YR 6/1) to brownish yellow (10YR 6/8) to grayish brown (10YR 5/2).

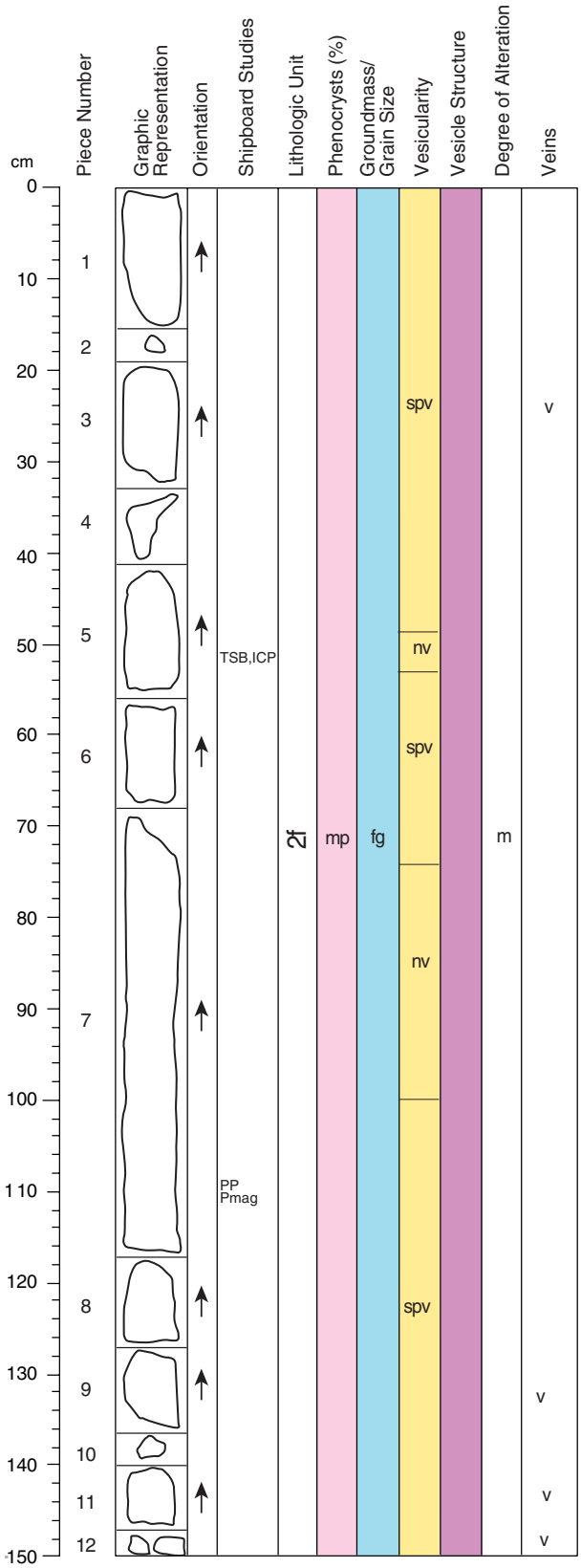
STRUCTURE: Lobed. Glassy lobe margins are present in Pieces 10 and 13 and 19.

ALTERATION: Moderate to complete. Glassy lobe margins are completely altered to clay minerals. Fe oxyhydroxide is pervasive throughout the core section. Clinopyroxene is completely replaced by Fe oxyhydroxide. Vesicles are filled with Fe oxyhydroxide and white carbonate or are unfilled but lined with Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Veins are <1 mm wide and filled with white carbonate (in Piece 10) and Fe oxyhydroxide (in Piece 12B).

COMMENTS: Vesicles are present in distinct zones in Pieces 10 and 18. Olivine microphenocrysts are most distinct in the aphanitic region adjacent to the glassy lobe margin (Piece 19). Quenched plagioclase laths of the groundmass are approximately the same size as the olivine phenocrysts.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-9R-2 (Section top: 840.1 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-12

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	3	1.5	0.5	1	Subhedral
Olivine:	5	2	0.5	1	Subhedral

GROUNDMASS: Fine grained.

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	1-5	1	Irregular

COLOR: Yellowish brown (2.5YR 5/4).

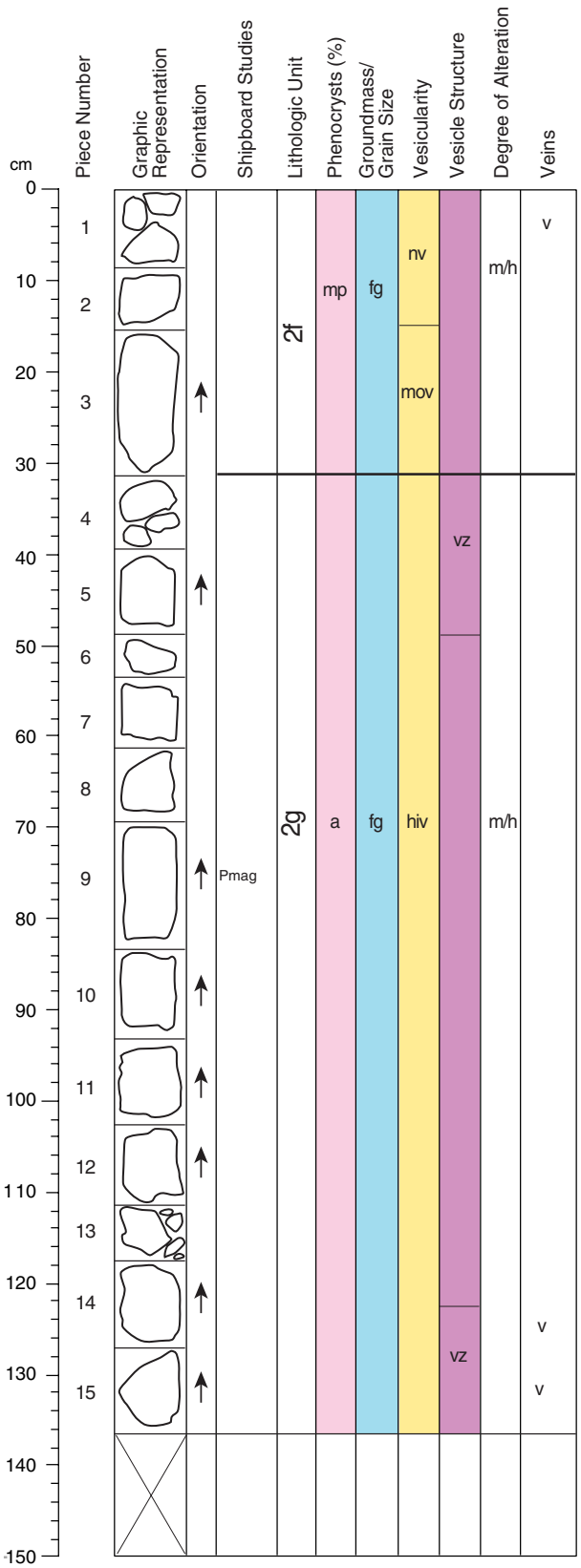
STRUCTURE: Massive. May be part of a massive lobe interior.

ALTERATION: Moderate. Olivine is completely altered to iddingsite(?)/Fe oxyhydroxide . Approximately half of the vesicles are filled or partially filled with carbonate and Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Veins are present in Pieces 3, 9, 11, and 12 only, and are randomly oriented, 1-2 mm wide, and filled with white carbonate and Fe oxyhydroxide.

COMMENTS: Pieces 1-4 have vesicles ≤4 mm in diameter.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-9R-3 (Section top: 841.6 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-15

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Olivine:	0-5	0.5	0.2	0.4	Euhedral to subhedral; equant

GROUNDMASS: Fine grained. Consists of plagioclase, clinopyroxene and black oxides.

VESICLES:

% Mode	Size (mm): Average	Shape
3–20	3	Irregular.

COLOR: Grayish brown (10YR 5/3).

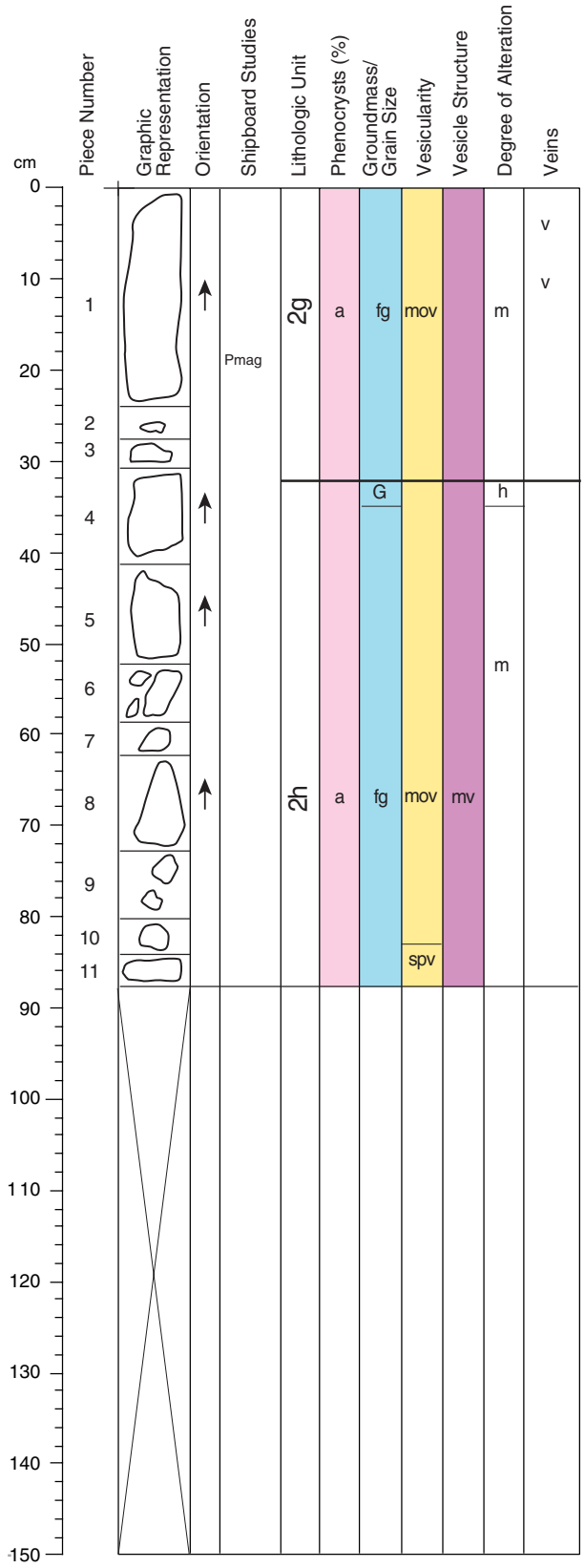
STRUCTURE: Lobed. Possible lobe margin is present in Piece 5.

ALTERATION: Moderate to high. Most vesicles are filled with carbonate and Fe oxyhydroxide, some of which are present as small nodules. Olivine microphenocrysts are completely altered to Fe oxyhydroxide. The clinopyroxene crystals in the groundmass are partly altered to Fe oxyhydroxide.

VEINS/FRACTURES: 0.5 mm to 6 mm wide veins, filled with carbonate, are present in Pieces1 and 11 to 15.

COMMENTS: Olivine microphenocrysts appear to be more abundant in Pieces 4-15. This may be an artefact of variable alteration making recognition of olivine difficult.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-9R-4 (Section top: 842.97 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-11

CONTACTS: None.

GROUNDMASS: Fine grained. Plagioclase and highly to moderately altered mesostasis. Grain size increases to 1.5 mm below 59 cm (Piece 7).

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	2-15	2	Irregular

COLOR: Yellowish brown (2.5YR 5/3).

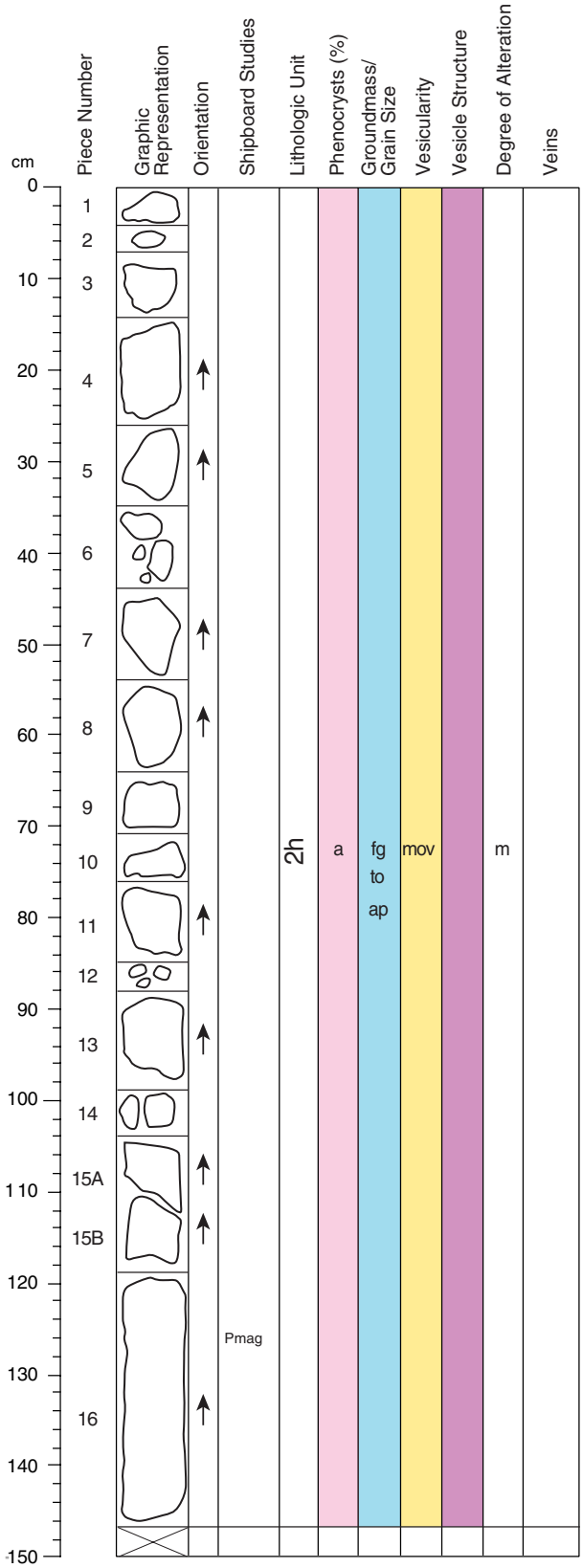
STRUCTURE: Lobed. A trace of a glassy margin is present on the top of Piece 4.

ALTERATION: Moderate to complete. Highest near the glassy margin. Most of the vesicles are filled or partially filled with gray carbonate. Glass remnants in the top of Piece 4 look devitrified and palagonitized.

VEINS/FRACTURES: None to sparsely veined. Two <1 mm wide veins are present in the top half of Piece 1, are randomly oriented, and are filled with carbonate.

COMMENTS: Larger vesicles (≤10 mm) are randomly dispersed throughout.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-10R-1 (Section top: 848.3 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-16

CONTACTS: None.

GROUNDMASS: Fine grained. Grain size decreases down section, and abundance of completely altered microphenocrysts of what may have been olivine also decreases to zero at the bottom. Plagioclase and clinopyroxene are also present.

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	7-10	1.5	Irregular

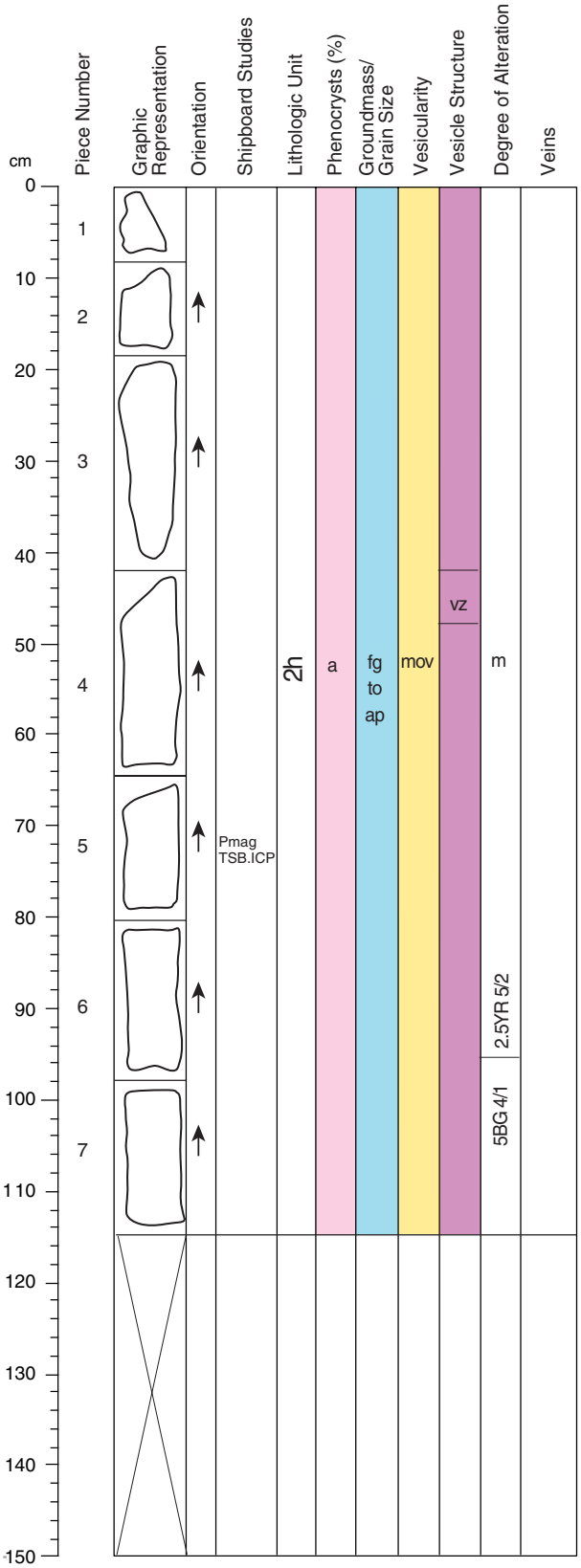
COLOR: Yellowish brown (2.5YR 5/2).

STRUCTURE: Massive.

ALTERATION: Moderate. Olivine(?) microphenocysts are completely replaced by Fe oxyhydroxide. Variably 20%-80% of the vesicles are filled with carbonate or lined with Fe oxyhydroxide.

VEINS/FRACTURES: None.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-10R-2 (Section top: 849.77 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-7

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Plagioclase is ~1 mm in length, which is at the boundary between fine grained and aphanitic. Clinopyroxene is also present.

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	10	1.5	Irregular

COLOR: Yellowish brown (2.5YR 5/2) from 0-95 cm, and blue gray (5BG 9/1) with a slight bluish green tint below 95 cm.

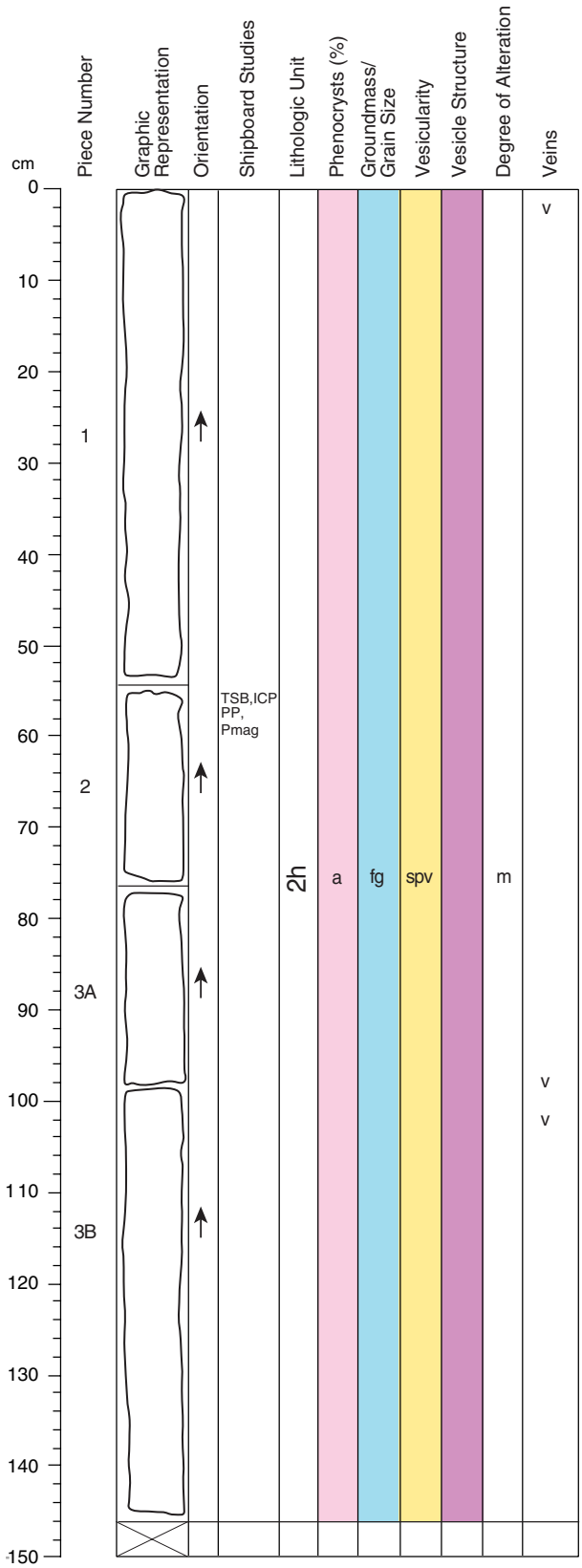
STRUCTURE: Massive.

ALTERATION: Moderate. From 0-95 cm the groundmass is partially altered to Fe oxyhydroxide, most of the vesicles are filled with carbonate or lined with Fe oxyhydroxide, and some vesicles are lined with a bluish black metallic mineral (hematite?). Below 95 cm the groundmass is partly altered to bluish gray clay and 100% of the vesicles are filled with the same bluish-gray clay.

VEINS/FRACTURES: None.

COMMENTS: There is a sharp horizontal boundary at 95 cm between two different styles of alteration. Below 95 cm the vesicles are not obvious because they are filled with the same clay that replaces the groundmass mesostasis.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-10R-3 (Section top: 850.91 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-3B

CONTACTS: None.

GROUNDMASS: Fine grained, holocrystalline. Consists of partially altered plagioclase, clinopyroxene and black oxides.

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	10-15	2	Irregular

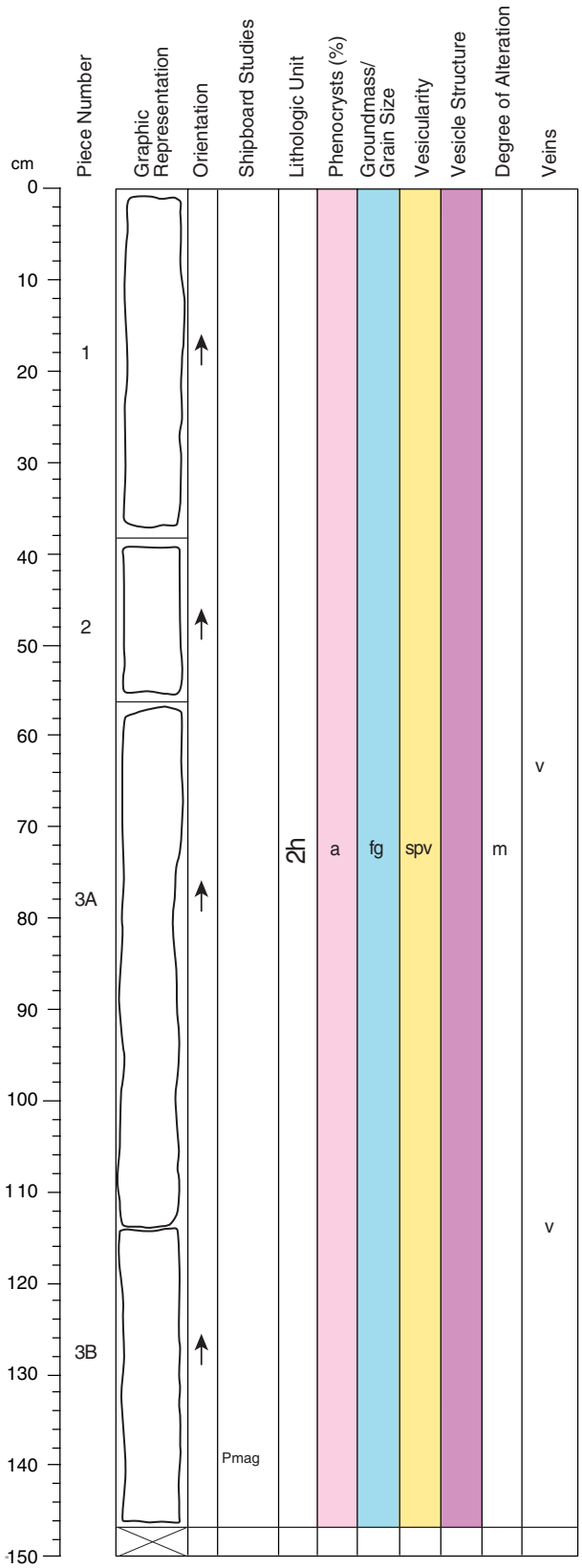
COLOR: Gray green (5BG 4/1).

STRUCTURE: Massive.

ALTERATION: Moderate. Groundmass plagioclase is partially sericitized. Sulfide occurs throughout the groundmass. Vesicles are filled with green-gray clay and sulfide, and rarely with carbonate.

VEINS/FRACTURES: Sparsely veined. Veins are 1-2 mm wide, filled with carbonate, and occur in Pieces 1, 3A, and 3B.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-10R-4 (Section top: 852.36 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-3B

CONTACTS: None.

GROUNDMASS: Fine grained, holocrystalline. Consists of partially altered plagioclase, clinopyroxene and black oxides.

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	5-10	2	Irregular

COLOR: Gray green (5BG 4/1).

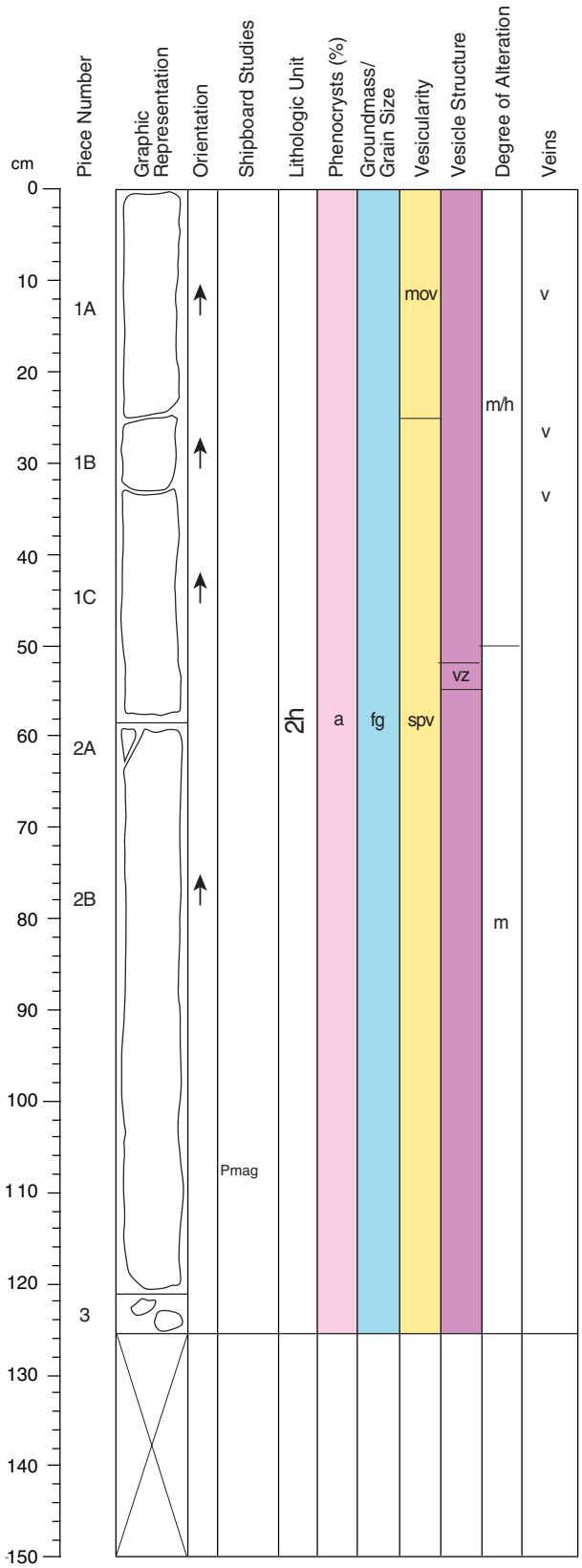
STRUCTURE: Massive.

ALTERATION: Moderate. Most intense close to veins. Groundmass plagioclase is partially sericitized. Sulfide occurs throughout the groundmass. Vesicles are filled with green-gray clay, sulfide and carbonate (carbonate filled vesicles occur mostly close to veins).

VEINS/FRACTURES: Sparsely veined. Veins are 1-4 mm wide, filled with carbonate and brown clay.

COMMENTS: Piece 2 contains one 8 mm plagioclase phenocryst.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-10R-5 (Section top: 853.82 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-3

CONTACTS: None.

GROUNDMASS: Fine grained, holocrystalline. Consists of partially altered plagioclase, clinopyroxene and black oxides.

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	5-10	3	Irregular

COLOR: Gray green (5BG 4/1), between 26 cm and 48 cm is brown (2.5Y 5/3).

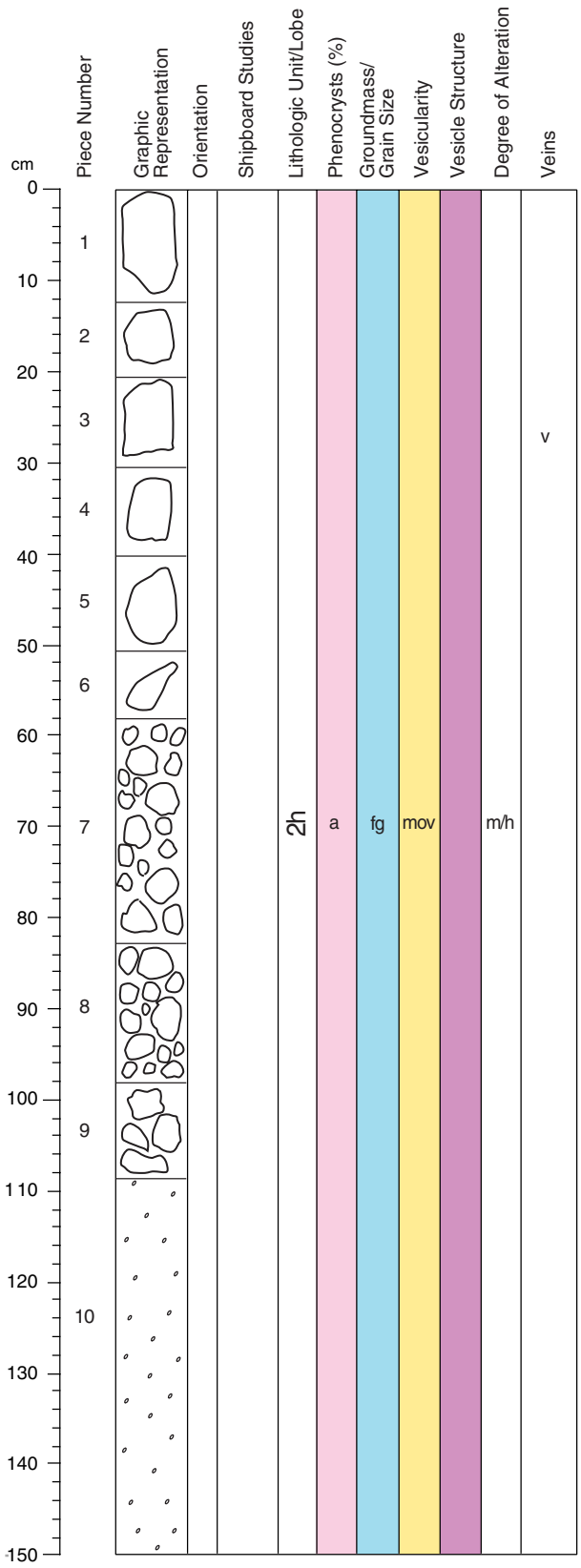
STRUCTURE: Massive.

ALTERATION: Moderate. Groundmass plagioclase is partially sericitized. Secondary sulfide occurs throughout the groundmass. Vesicles are filled with green-gray (5G 4/2) clay and sulfide, or carbonate.

VEINS/FRACTURES: Sparsely veined. Veins are 0.5-4 mm wide, filled with carbonate, Fe oxyhydroxide and green clays.

COMMENTS: In Piece 1, a 22 cm wide zone (between 26 cm and 48 cm) has a brown color (2.5Y 5/3), which contrasts with the green-gray color of the rest of this section. Sulfide is present only in the green-gray (reduced) portion of the section.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204A-10R-6 (Section top: 855.06 mbsf)

UNIT 2: APHYRIC TO MODERATELY OLIVINE-PLAGIOCLASE-PHYRIC BASALT.

Pieces: 1-10

CONTACTS: None.

GROUNDMASS: Fine grained, holocrystalline. Contains plagioclase, clinopyroxene and black oxides

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	5-10	3	Irregular

COLOR: Pieces 1 and 2 are gray green (5BG 4/1), Pieces 3 to 6 are brown (2.5Y 5/3).

STRUCTURE: Massive.

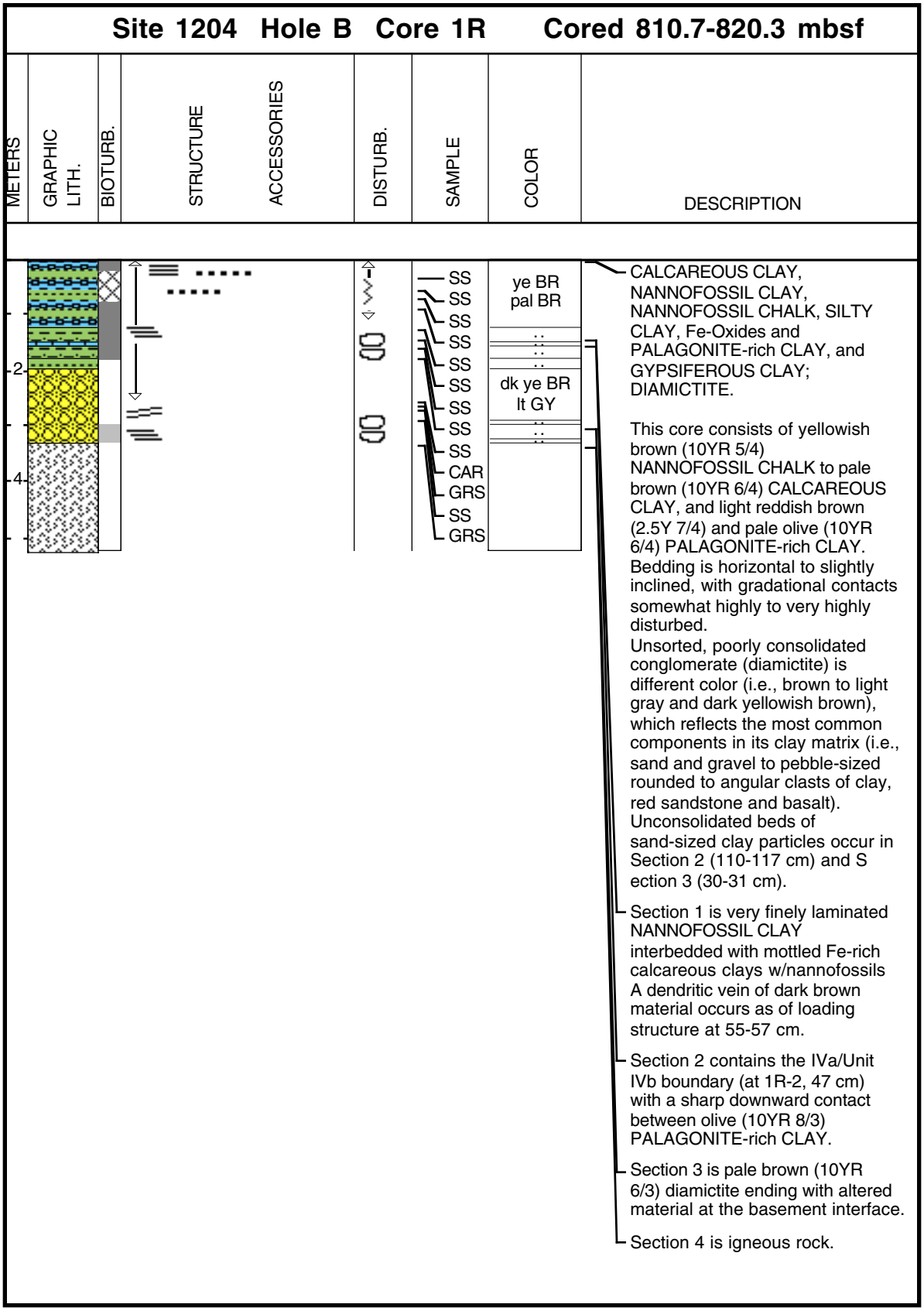
ALTERATION: High. Groundmass plagioclase is partially sericitized. Secondary sulfide occurs in the groundmass in Pieces 1 and 2. Vesicles are filled with green-gray (5G 4/2) clay and sulfide, or carbonate and Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Piece 3 contains a 2 mm wide vein of carbonate and Fe oxyhydroxide.

COMMENTS: This is the last section recovered before Hole 1204A was abandoned, and the lower part of the section is much disturbed by drilling. Pieces 7 to 9 consist of rounded 1-5 cm sized fragments of aphyric basalt similar to that in Pieces 1 to 6, and Piece 10 consists of mud to 0.5 cm sized fragments of the same material.

1204A-11R NO RECOVERY
1204A-12R NO RECOVERY
1204A-13R NO RECOVERY
1204A-14R NO RECOVERY

Core Photo


Site 1204 Hole B Core 1R Cored 810.7-820.3 mbsf
METERS
GRAPHIC LITH.
BIOTURB.
STRUCTURE
ACCESSORIES
DISTURB.
SAMPLE
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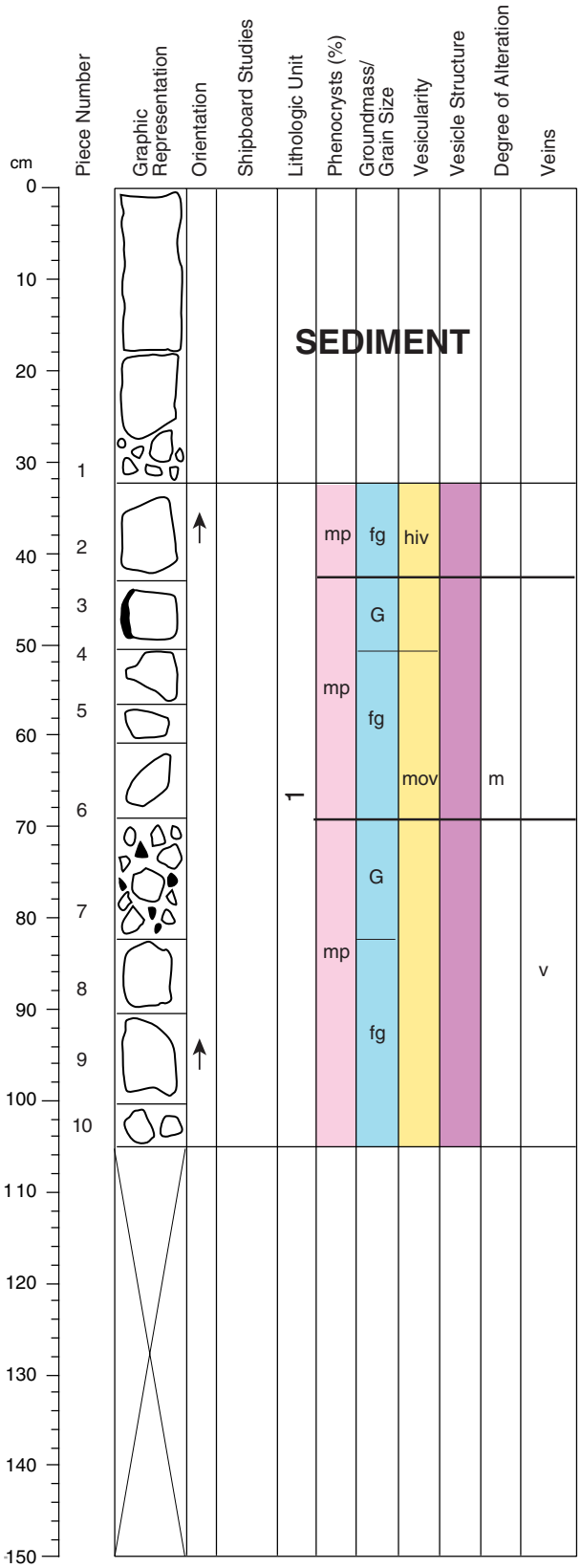
CALCAREOUS CLAY, NANNOFOSSIL CLAY, NANNOFOSSIL CHALK, SILTY CLAY, Fe-Oxides and PALAGONITE-rich CLAY, and GYPSIFEROUS CLAY; DIAMICTITE.
This core consists of yellowish brown (10YR 5/4) NANNOFOSSIL CHALK to pale brown (10YR 6/4) CALCAREOUS CLAY, and light reddish brown (2.5Y 7/4) and pale olive (10YR 6/4) PALAGONITE-rich CLAY. Bedding is horizontal to slightly inclined, with gradational contacts somewhat highly to very highly disturbed.
Unsorted, poorly consolidated conglomerate (diamictite) is different color (i.e., brown to light gray and dark yellowish brown), which reflects the most common components in its clay matrix (i.e., sand and gravel to pebble-sized rounded to angular clasts of clay, red sandstone and basalt). Unconsolidated beds of sand-sized clay particles occur in Section 2 (110-117 cm) and S ection 3 (30-31 cm).
Section 1 is very finely laminated NANNOFOSSIL CLAY interbedded with mottled Fe-rich calcareous clays w/nannofossils A dendritic vein of dark brown material occurs as of loading structure at 55-57 cm.
Section 2 contains the IVa/Unit IVb boundary (at 1R-2, 47 cm) with a sharp downward contact between olive (10YR 8/3) PALAGONITE-rich CLAY.
Section 3 is pale brown (10YR 6/3) diamictite ending with altered material at the basement interface.
Section 4 is igneous rock.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-1R-3 (Section top: 813.7 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 2-10

CONTACTS: None observed. The contact between Unit 1 and the overlying sediment is inferred to be at 33 cm, between Pieces 1 and 2.

PHENOCRYSTS:	%	Grain Size (mm):			
	Mode	Max.	Min.	Avg.	Shape/Habit
Olivine:	5-8	1	0.2	0.5	Euhedral; equant

GROUNDMASS: Fine grained. Glassy to aphanitic in Pieces 3 and 7. The groundmass contains plagioclase, clinopyroxene and black oxides.

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	6-21	2	Irregular

COLOR: Gray brown (2.5Y 6/1 to 10YR 5/2).

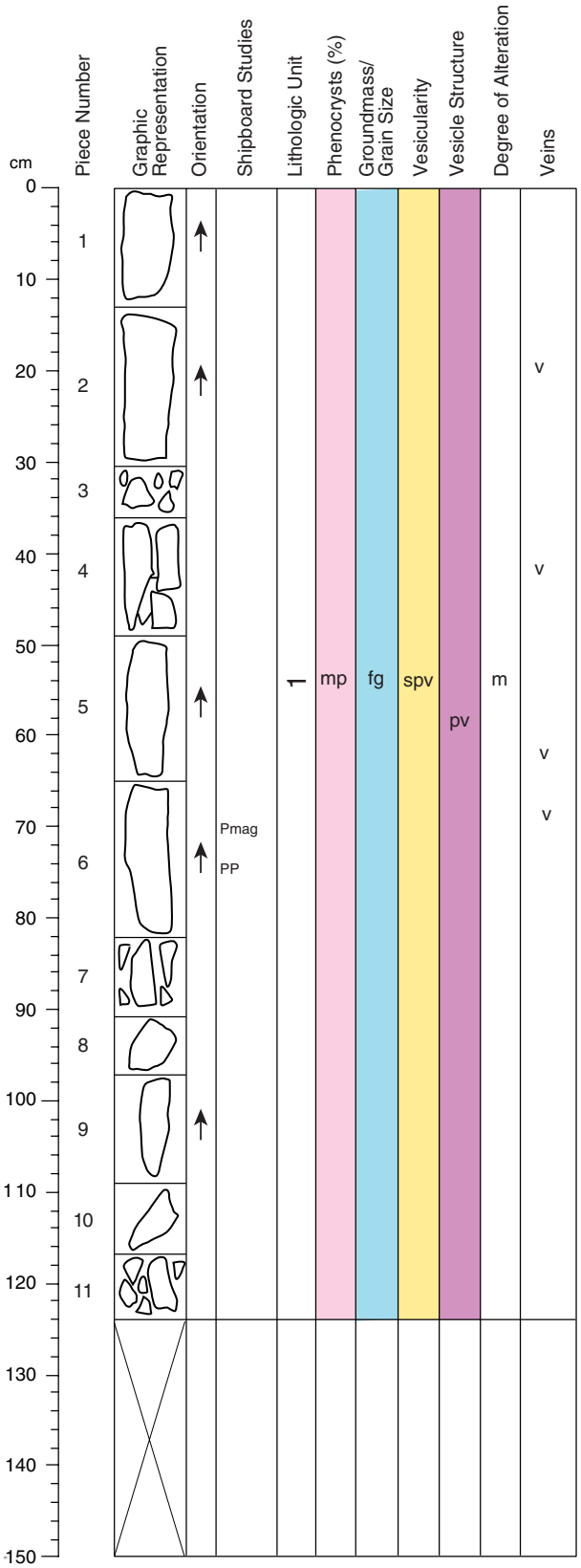
STRUCTURE: Lobed. Glassy lobe margins are present in Pieces 3 and 7.

ALTERATION: Moderate. Olivine microphenocrysts are completely replaced by Fe oxyhydroxide and carbonate. Vesicles are filled with carbonate and Fe oxyhydroxide. Glass in Pieces 3 and 7 is partly to completely devitrified.

VEINS/FRACTURES: Sparsely veined. A 1-2 cm vein in Piece 8 is filled with carbonate and angular fragments of altered basalt.

COMMENTS: Olivine crystals are similar in size to those of the groundmass, but are described as microphenocrysts on the basis of their euhedral shape, which indicates that they were an early formed phase.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-1R-4 (Section top: 814.75 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-11

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	5	2	0.5	1.5	Euhedral
Olivine:	5	1.5	0.5	1	Subhedral to euhedral

GROUNDMASS: Fine grained. The groundmass contains plagioclase, clinopyroxene, and black oxides.

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	3	0.5	Subround

COLOR: Yellowish brown (10YR 4/1).

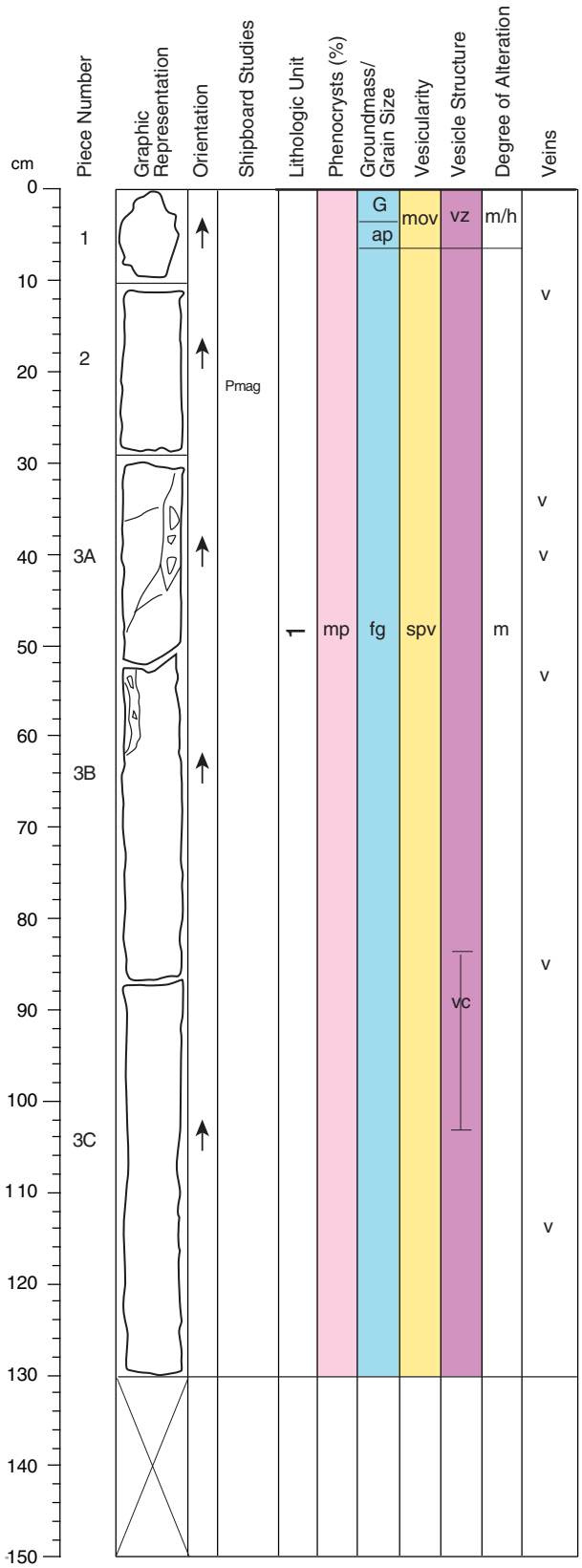
STRUCTURE: Lobed. A glassy lobe margin is present in Piece 2.

ALTERATION: Moderate. Olivine microphenocysts are completely replaced by Fe oxyhydroxides and carbonate. Some vesicles are filled with carbonate and lesser amounts of Fe oxyhydroxides. Glass in Piece 2 is devitrified.

VEINS/FRACTURES: Sparsely veined. Veins are mostly subhorizontal, (except for a vertical one in Piece 2), are 0.5-8 mm wide, and are filled with gray carbonate and scattered Fe oxyhydroxides that in some cases may be replacing glass fragments.

COMMENTS: Olivine and plagioclase microphenocrysts are only slightly larger than those of the groundmass, but are described as microphenocrysts on the basis of their euhedral shape, which indicates that they formed early. Microphenocryst size and groundmass crystallinity decrease down section. Vesicles appear to have a bimodal size distribution. Many are <0.5 mm, but some scattered vesicles are 1-2 mm wide.
A pipe vesicle is present in Piece 5 at 58-60 cm.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-2R-1 (Section top: 820.3 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-3C

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	3	2	0.5	1	Euhedral
Olivine:	3	1.5	0.5	1	Subhedral to euhedral

GROUNDMASS: Fine grained. The groundmass contains plagioclase and olivine microphenocrysts, clinopyroxene, and black oxides.

VESICLES:	% Mode	Size (mm): Average	Shape
	2-10	1	Subround

COLOR: Yellowish brown (10YR 4/1), except slightly browner (10R 4/3) next to wider veins. Wider veins are off-white (2.5Y 7/0).

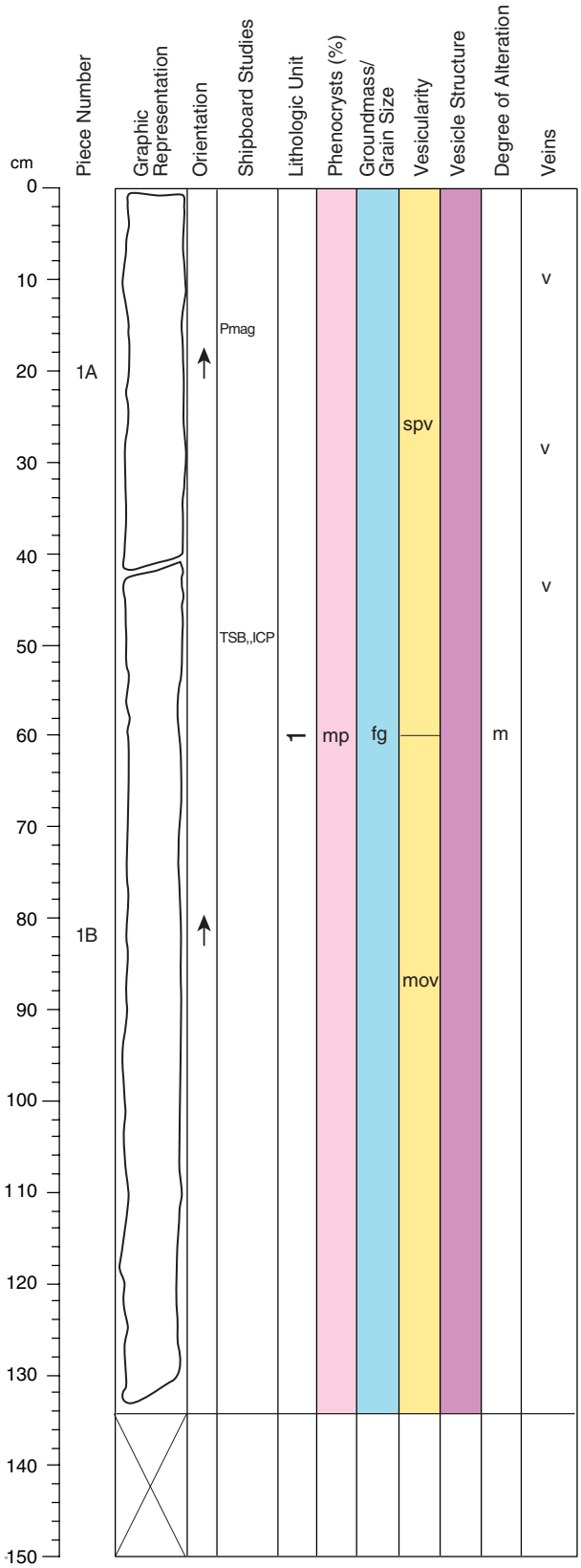
STRUCTURE: Lobed. A possible lobe margin (glass present in the working half) is present on the top part of Piece 1.

ALTERATION: Moderate. Olivine microphenocrysts are completely replaced by Fe oxyhydroxides and carbonate. Some vesicles are filled with carbonate and lesser amounts of Fe oxyhydroxides.

VEINS/FRACTURES: Moderately veined. Veins are randomly oriented, 0.5-2 mm wide, and filled with gray carbonate and Fe oxyhydroxides. Veins contain angular clasts of basalt at 30-60 cm and 85-102 cm.

COMMENTS: Olivine microphenocrysts are only slightly larger than those of the groundmass, but are described as microphenocrysts on the basis of their euhedral shape, which indicates that they formed early. One plagioclase phenocryst, 4 mm in length, is present in Piece 1.
Vesicle abundance is patchy. Segregated material is present at 86-103 cm.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-2R-2 (Section top: 821.6 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1A-1B

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	3	2	0.5	1	Euhedral
Olivine:	3	1.5	0.5	1	Subhedral to euhedral

GROUNDMASS: Fine grained. The groundmass contains plagioclase and olivine microphenocrysts, clinopyroxene, and black oxides.

VESICLES:

% Mode	Size (mm): Average	Shape
2-10	1	Subround

COLOR: Yellowish brown (10YR 4/1), except slightly browner (10R 4/3) next to wider veins. Wider veins are off-white (2.5Y 7/0).

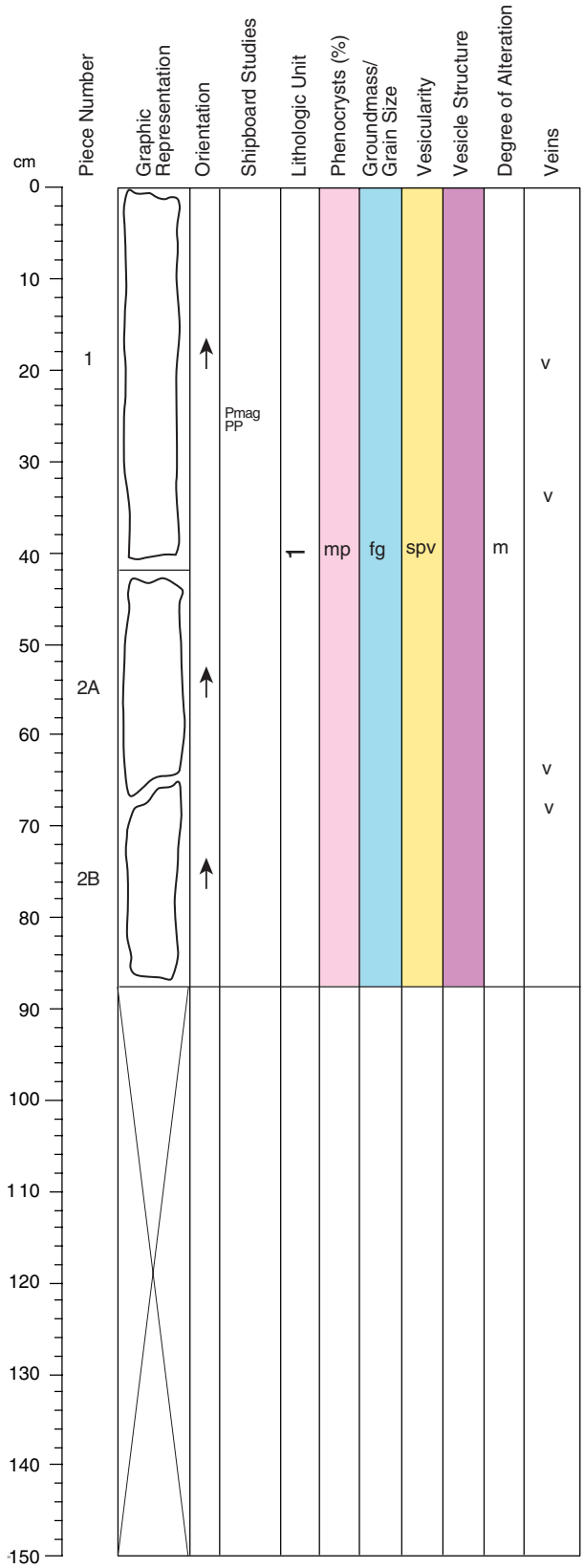
STRUCTURE: Massive.

ALTERATION: Moderate. Olivine microphenocrysts are completely replaced by Fe oxyhydroxides and carbonate. Some vesicles are filled with carbonate and lesser amounts of Fe oxyhydroxides. The vein at 44 cm has an ~2 mm thick layer of Fe oxyhydroxides.

VEINS/FRACTURES: Moderately veined. Veins are randomly oriented, 0.5-2 mm wide, and filled with gray carbonate and Fe oxyhydroxides. Veins are slightly narrower and fewer below 60 cm.

COMMENTS: Olivine microphenocrysts are only slightly larger than those of the groundmass, but are described as microphenocrysts on the basis of their euhedral shape, which indicates that they formed early.
Vesicle abundance is patchy.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-2R-3 (Section top: 822.93 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-2B

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	~1	3	1	1.5	Euhedral; blocky
Olivine:	3-5	0.8	0.2	0.5	Euhedral to subhedral; equant

GROUNDMASS: Fine grained. Plagioclase and clinopyroxene in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	0-3	2	Round to irregular

COLOR: Gray (10YR 5/1) to very pale brown (10YR 7/4).

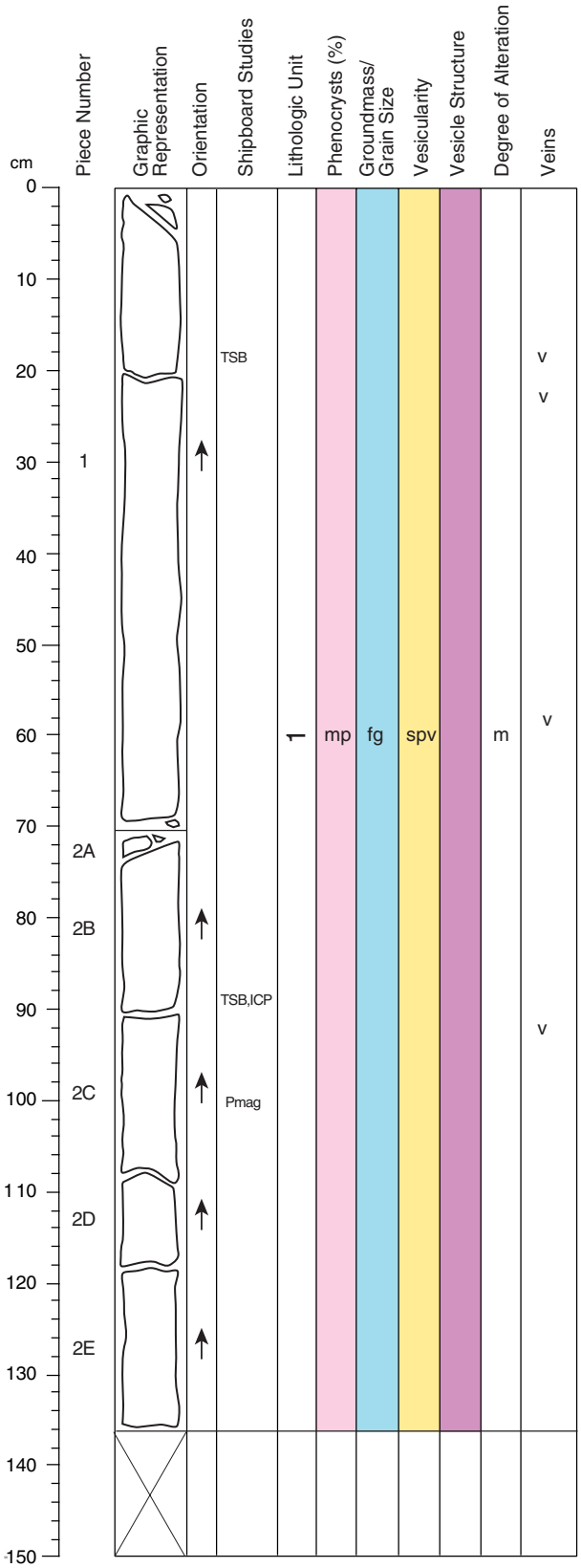
STRUCTURE: Massive.

ALTERATION: Moderate. Fe oxyhydroxide alteration halos, up to 12 mm wide, are present adjacent to veins. Olivine microphenocrysts are altered to Fe oxyhydroxide and replaced by white carbonate. Glass and some clinopyroxene are altered to Fe oxyhydroxide. Where present, vesicles are filled with white carbonate and lined with Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely to moderately veined. Randomly oriented veins, 0.1-6 mm wide, are filled with white carbonate and Fe oxyhydroxide.

COMMENTS: Olivine is a microphenocryst phase that is approximately the same size as the fine-grained groundmass. It is distinct where it has been replaced by white carbonate as Fe oxyhydroxide highlights the characteristic fracture pattern. Plagioclase phenocryst abundance has decreased from Section 2R-2.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-2R-4 (Section top: 823.8 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-2E

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	~1	3	1	2	Euhedral; blocky
Olivine:	5-15	0.8	0.2	0.4	Euhedral to subhedral; equant

GROUNDMASS: Fine grained. Plagioclase and clinopyroxene in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	0-3	1	Round to irregular

COLOR: Gray (10YR 5/1) to very pale brown (10YR 7/4).

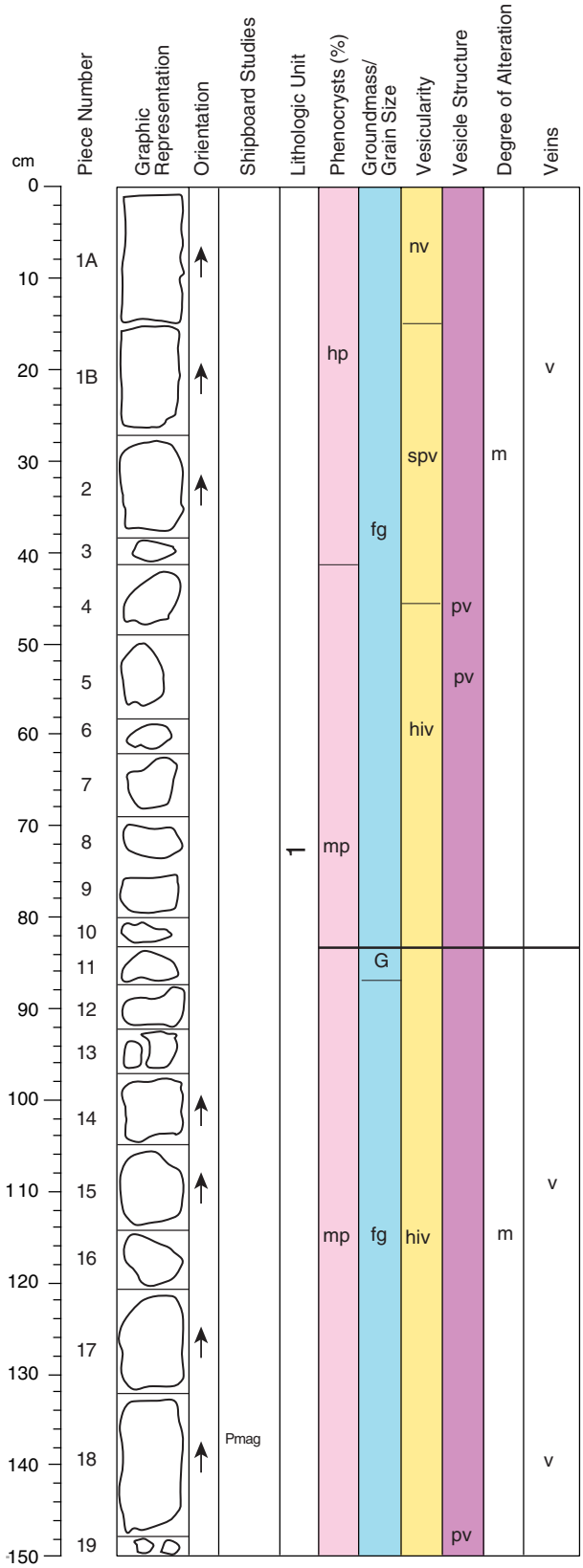
STRUCTURE: Lobed.

ALTERATION: Moderate. Fe oxyhydroxide alteration halos, up to 2 cm wide, are present adjacent to veins. Olivine microphenocrysts are altered to Fe oxyhydroxide and replaced by white carbonate. Glass and some clinopyroxene are altered to Fe oxyhydroxide. Where present, vesicles are filled with white carbonate and lined with Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely to moderately veined. Predominantly horizontal veins, 0.1-5 mm wide, are filled with white carbonate and Fe oxyhydroxide. Veins have brecciated the basalt at 90-92 cm.

COMMENTS: Olivine is a microphenocryst phase that is approximately the same size as the fine-grained groundmass. It is distinct where it has been replaced by white carbonate as Fe oxyhydroxide highlights the characteristic fracture pattern. Olivine abundance has increased from Section 2R-3 and increases down the core section to 15% in Piece 2E.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-2R-5 (Section top: 825.15 mbsf)

UNIT 1: APHYRIC BASALT[1].

Pieces: 1A-19

CONTACTS: None.

PHENOCRYSTS:	%	Grain Size (mm)			
	Mode	Max.	Min.	Avg.	Shape/Habit
Plagioclase	<1		1		Euhedral
Olivine:	2-20	1	0.3	0.5	Euhedral to subhedral; equant

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, black oxides, and clinopyroxene (+olivine?) in an intergranular texture. Plagioclase laths are occasionally coated with Fe oxyhydroxide.

VESICLES:	%	Size (mm)	
	Mode	Average	Shape
	0-25	3	Subround to irregular

COLOR: Dark yellowish brown (10YR 4/2), moderate brown (5YR 4/4), and light brownish gray (5YR 6/1).

STRUCTURE: Lobed. Completely altered glassy lobe margins are present on Pieces 10-12.

ALTERATION: Moderate to complete. Fe oxyhydroxide is pervasive. Olivine microphenocrysts are completely altered to Fe oxyhydroxide and white carbonate. Vesicles are variably filled with carbonate (white calcite and cream colored dolomite), Fe oxyhydroxide, and green-brown clay. Clinopyroxene is partially altered and glass is completely altered to Fe oxyhydroxide and white carbonate.

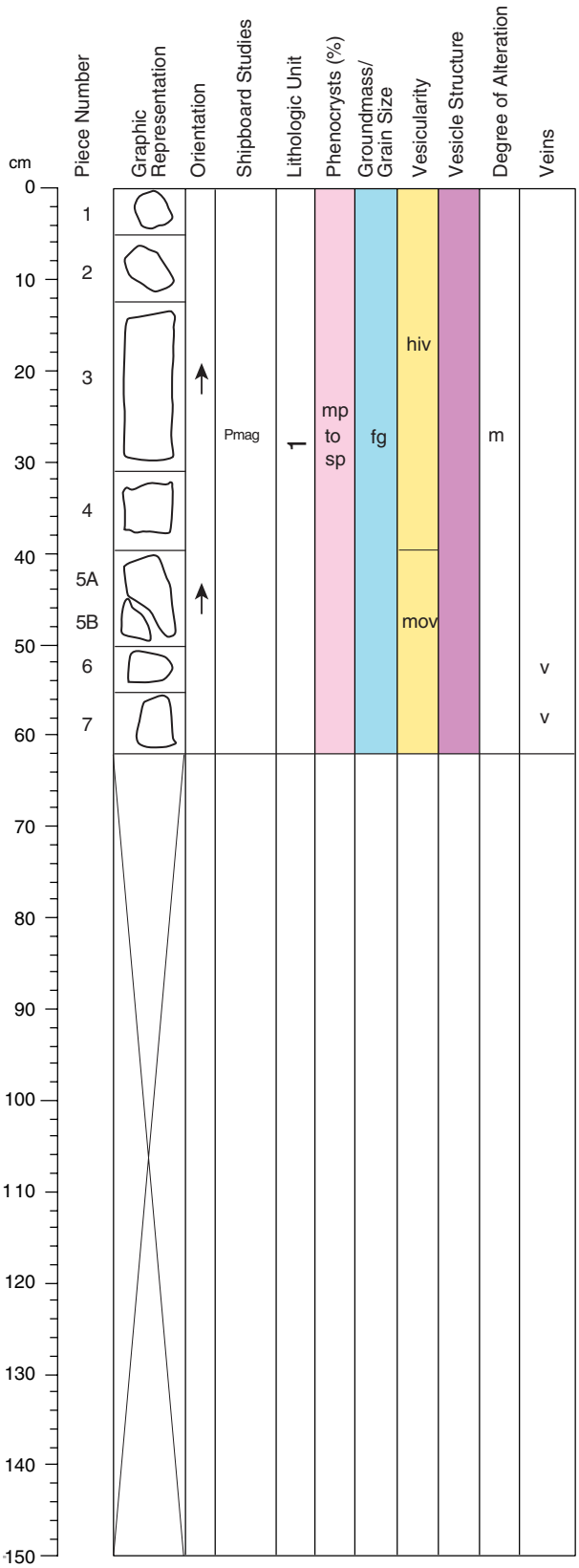
VEINS/FRACTURES: Sparsely veined. Veins are <0.1-1 mm wide (Pieces 1B, 15, and 18) and are present on the outer surface of Pieces 4-8, 10-12, 15, and 17. They are filled with white carbonate (calcite) and cream colored carbonate (dolomite), and Fe oxyhydroxide.

COMMENTS: [1]This section is a continuation of a massive flow interior of Unit 1 from Section 2R-4. The massive interior is represented by Pieces 1A-3 where olivine is most abundant (10% 20%). Pieces 4-19 represent the vesicular base of this unit, which is moderately olivine phyric. There are only rare plagioclase phenocrysts present.
Olivine is present as a microphenocryst phase that is similar in size to the fine-grained groundmass.

Vesicularity is variable. The basalt is essentially nonvesicular in Pieces 1A-3 to highly vesicular in Pieces 4-19.

Pipe vesicles are present in Pieces 4, 5, and 19. They are approximately 2 cm long, 3-5 mm wide, and filled with predominantly white carbonate (calcite) and cream colored carbonate (dolomite) and minor segregated material.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-2R-6 (Section top: 826.67 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-7

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Olivine:	2	1	0.5	0.7	Subhedral; equant

GROUNDMASS: Fine grained. Consists of plagioclase, black oxides and clinopyroxene in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	4-15	2	Irregular

COLOR: Dark brown (5YR 3/1).

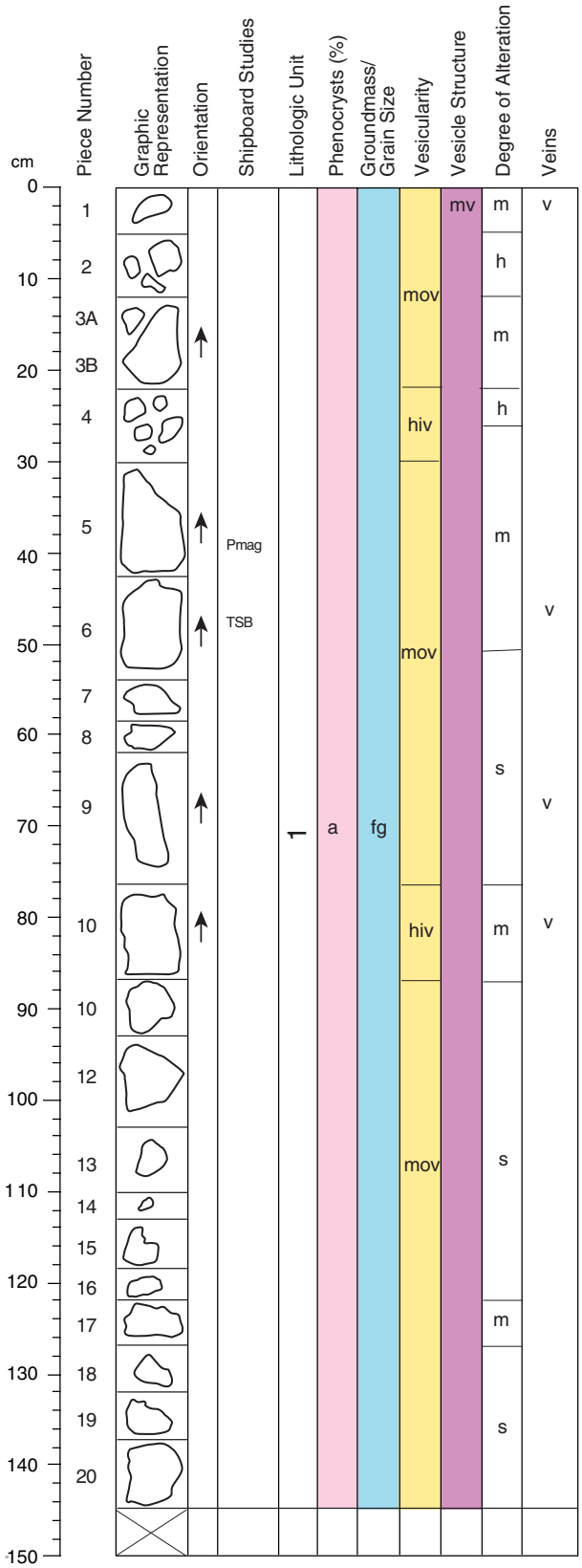
STRUCTURE: Lobed.

ALTERATION: Moderate. Olivine microphenocrysts are completely altered to Fe oxyhydroxide and carbonate. Vesicles are variably filled with carbonate (calcite and dolomite), Fe oxyhydroxide and green-brown clay.

VEINS/FRACTURES: Sparsely veined. Fragments of carbonate filled veins are present on the sides of Pieces 6 and 7.

COMMENTS: Olivine is present as a microphenocryst phase.
Vesicles in Pieces 1 and 2 are largely empty, and lined with green-brown clay, whereas those in Pieces 3-7 are filled with carbonate.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-3R-1 (Section top: 829.9 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-20

CONTACTS: None.

GROUNDMASS: Fine grained. Consists of plagioclase, black oxides, clinopyroxene and orange red patches (olivine??) in an intergranular texture.

VESICLES:

	% Mode	Size (mm): Average	Shape
	15-35	2	Round to irregular

COLOR: Medium dark brown (5YR 4/2).

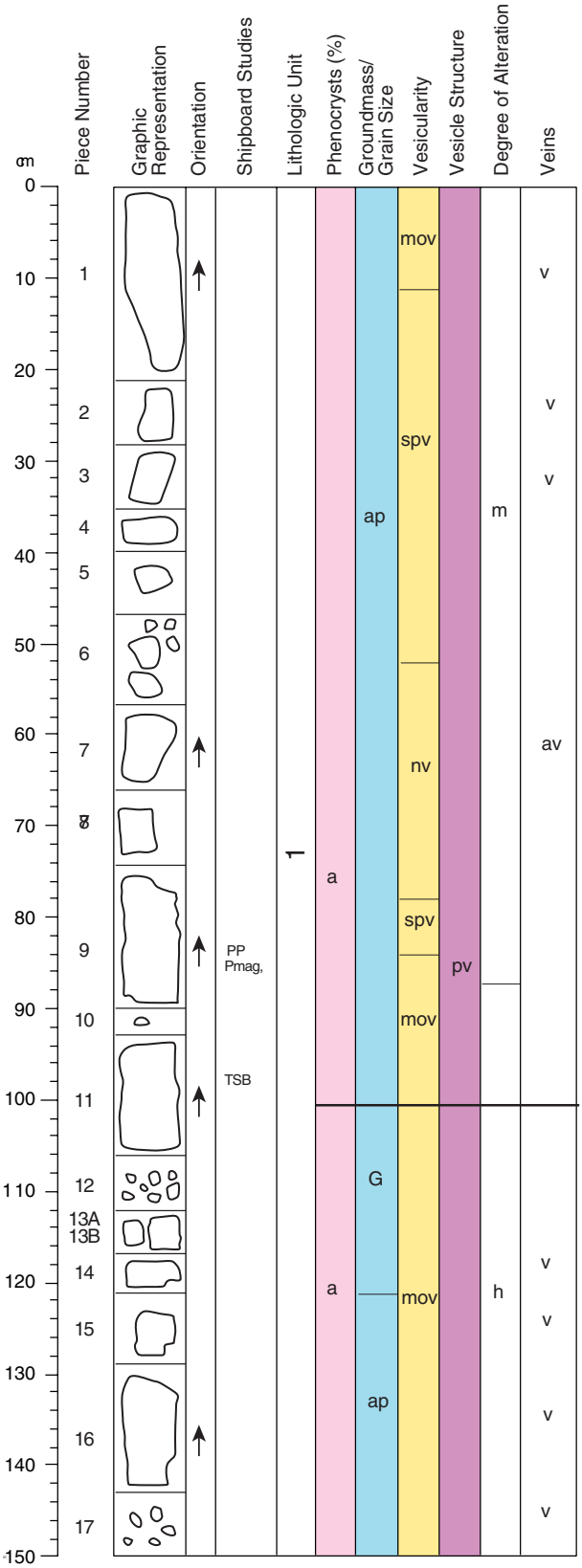
STRUCTURE: There is no convincing evidence for the presence of lobe margins in this section.

ALTERATION: Moderate to high. Olivine is completely altered to Fe oxyhydroxide and carbonate. 30% of the vesicles are filled with carbonate and Fe oxyhydroxide. The remainder are lined with greenish brown clay.

VEINS/FRACTURES: Sparsely veined. Veins are 1-5 mm wide, filled with white carbonate, and are found in Pieces 1, 6, 9 and the upper part of Piece 10. One large vein is present along the edge of Piece 6, is 12 mm wide and contains angular vesicular altered basalt fragments 3-20 mm in size.

COMMENTS: Olivine may be a microphenocryst phase rather than a groundmass phase.
Several more vesicular areas (30%-35%) are found in intervals 22-30 cm and 76-86 cm (Piece 10). In Piece 1 vesicles are up to 12 mm.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-3R-2 (Section top: 831.35 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-17

CONTACTS: None.

GROUNDMASS: Aphanitic. Consists of plagioclase, black oxides, clinopyroxene and orange red patches of Fe oxyhydroxide (replacing olivine??) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-20	1.5	Round to irregular

COLOR: Brownish gray (5YR 4/1). More altered areas are moderate brown (5YR 4/4).

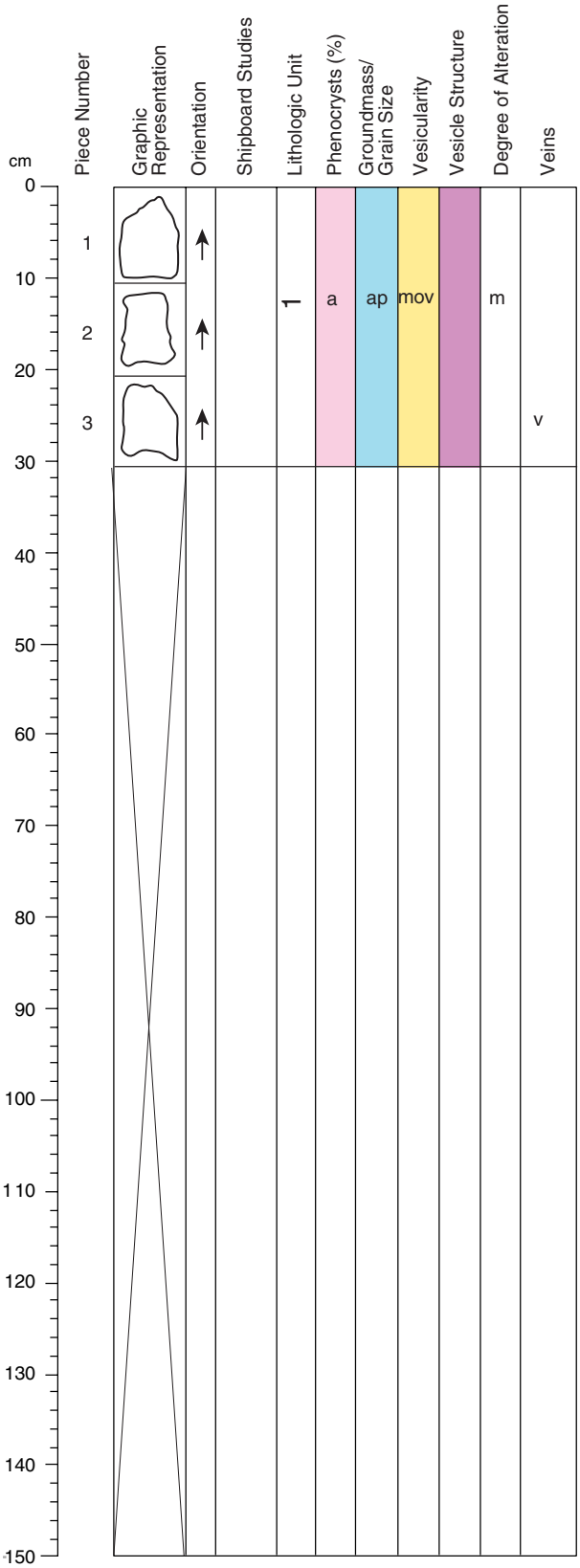
STRUCTURE: Lobed. A lobe margin is present in Piece 11, indicated by unaltered glass and brecciation caused by quenching. Evidence for a lobe margin is also found in Piece 12 which contains an unaltered glassy margin.

ALTERATION: Moderate to high. Olivine is completely altered to Fe oxyhydroxide. 40% of the vesicles are filled with carbonate, Fe oxyhydroxide, or lined with green-brown clay. Alteration appears to be most prevalent around veins.

VEINS/FRACTURES: Sparsely veined. White carbonate filled 1mm veins are present in Piece 7, and Pieces 14-17. White carbonate lined fractures are present on the edges of Pieces 1-3.

COMMENTS: Olivine may be a microphenocryst phase rather than a groundmass phase. Two small (1 cm long) pipe vesicles, coated with Fe oxyhydroxide and brown clays, are present in Piece 9.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-3R-3 (Section top: 832.85 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-3

CONTACTS: None.

GROUNDMASS: Aphanitic. Consists of plagioclase, black oxides, clinopyroxene and orange red patches of Fe oxyhydroxide (replacing olivine??) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	20	3	Round to irregular

COLOR: Brownish gray (5YR 4/1). More altered areas are moderate brown (5YR 4/4).

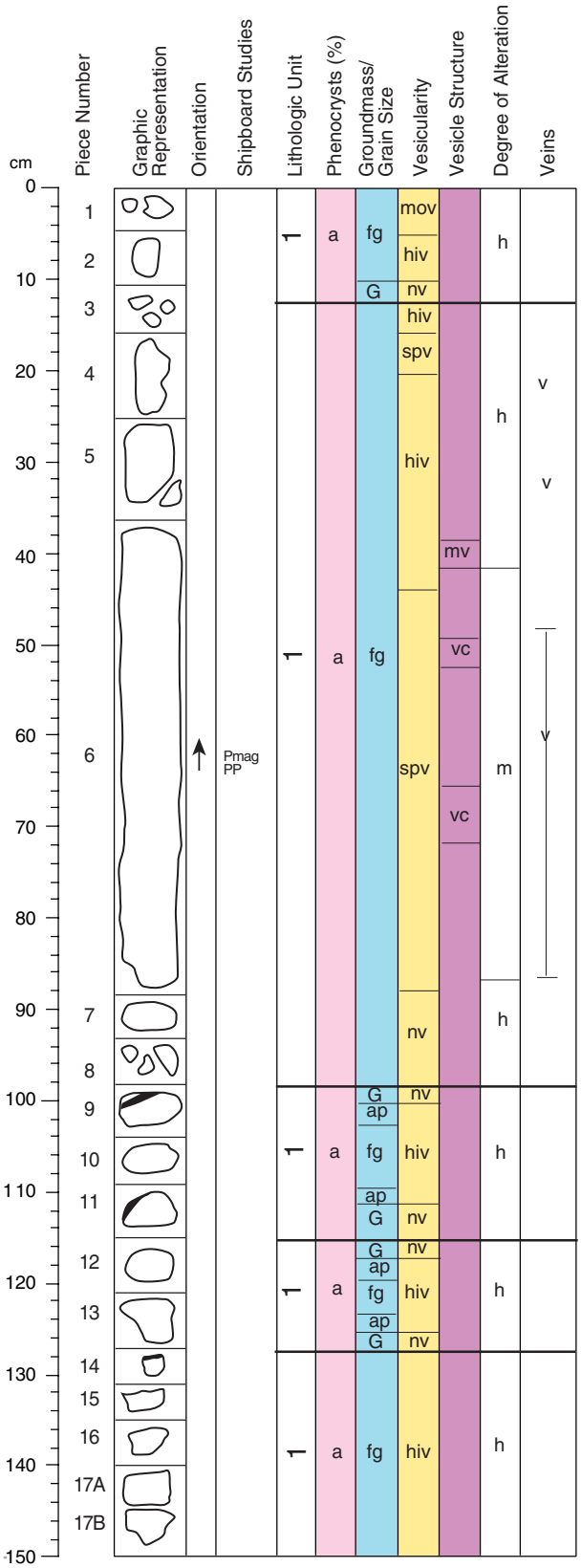
STRUCTURE: There is no convincing evidence for the presence of lobe margins in this section.

ALTERATION: Moderate to high. Olivine is completely altered to Fe oxyhydroxide. 85% of the vesicles are filled with carbonate, Fe oxyhydroxide, and a white mineral with a globular texture (zeolite?). The remainder are lined with green-brown clay. Alteration appears to be most prevelant around veins.

VEINS/FRACTURES: Sparsely veined. A vein, 1.5 mm wide, is found in Piece 3 filled with white carbonate.

COMMENTS: Olivine may be a microphenocryst phase rather than a groundmass phase.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-4R-1 (Section top: 839.6 mbsf)

UNIT 1: APHYRIC BASALT.

Pieces: 1-17

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, black oxides, clinopyroxene and orange red patches (olivine?) in an intergranular texture. Glassy and/or aphanitic near lobe margins.

VESICLES:	% Mode	Size (mm): Average	Shape
	2-30	3	Round to irregular

COLOR: Medium dark brown (5YR 4/2) in highly altered regions, and medium gray (N5) in moderately altered regions.

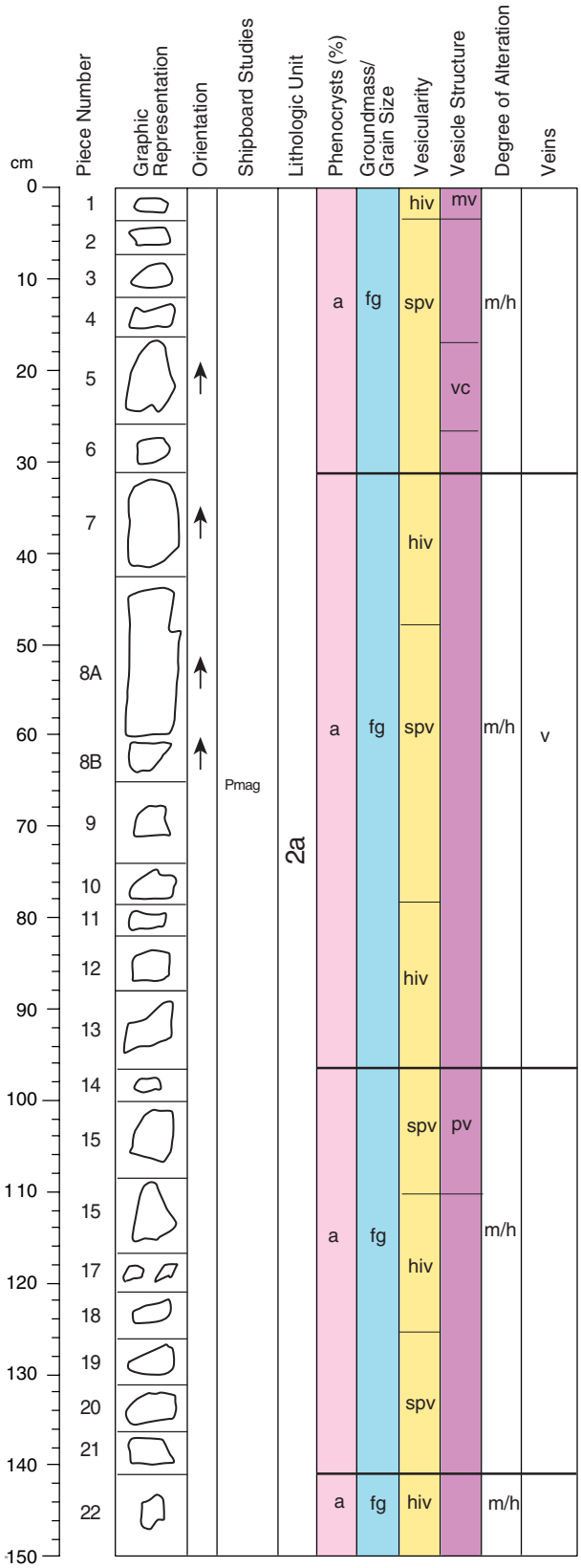
STRUCTURE: Lobed. Lobe margins are observed in Piece 3, Piece 9, between Piece 11 and 12, and Piece 14, and are defined by the presence of glassy margins.

ALTERATION: Moderate to high. Olivine is completely altered to Fe oxyhydroxide and carbonate. 40% of the vesicles are filled with carbonate and Fe oxyhydroxide. The remainder are lined with greenish brown clay. Two vesicle cylinders are observed in Piece 6 at 46-51 cm and 65-71 cm, and are filled with white calcite.

VEINS/FRACTURES: Sparsely veined. Veins are 1-5 mm wide, are found in Pieces 4, 5 and 6, and are filled with white carbonate.

COMMENTS: Highly vesicular zones are present in Pieces 2, 5, upper part of 6, and Pieces 10-17.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-4R-2 (Section top: 841.1 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-22

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, black oxides, and altered orange red clinopyroxene and olivine in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-35	2	Round to irregular

COLOR: Light brownish gray (5YR 6/1) to light brown (5YR 5/6).

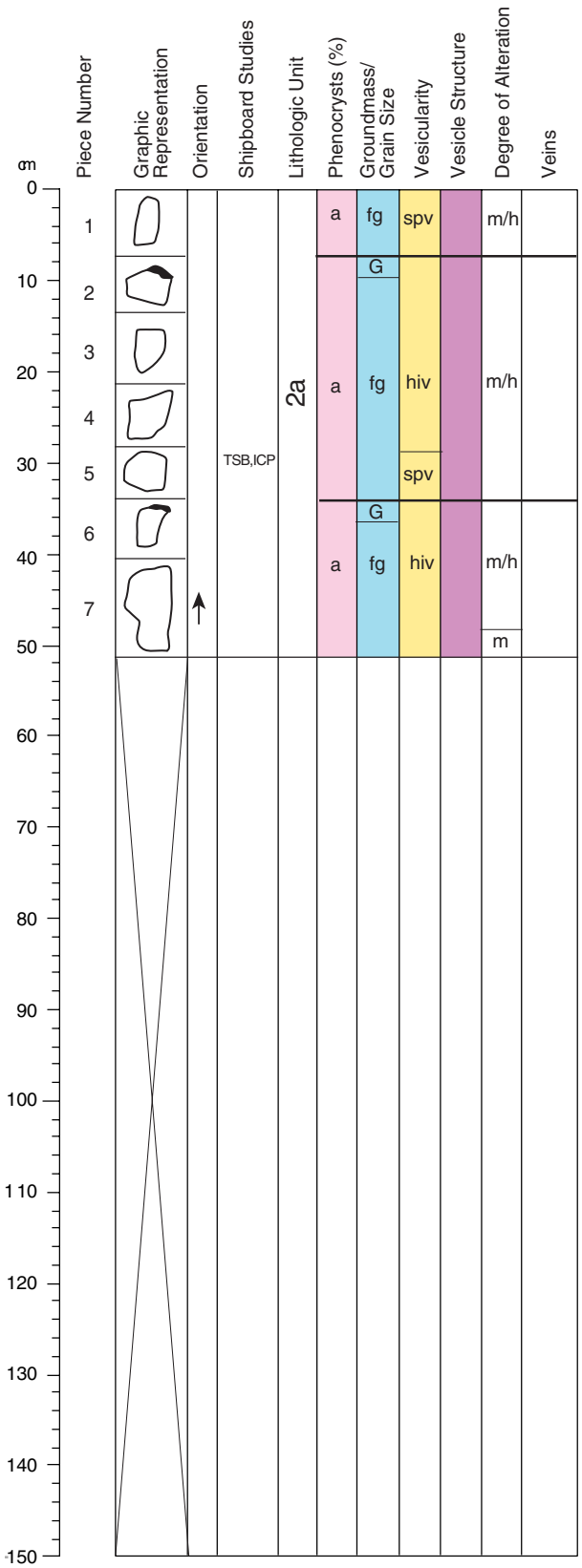
STRUCTURE: Lobed. Based on significant changes in vesicularity and presence of glass in Piece 22.

ALTERATION: Moderate to high. Olivine and clinopyroxene are completely altered to Fe oxyhydroxide. 75% of the vesicles are filled with white carbonate and 25% are unfilled.

VEINS/FRACTURES: Sparsely veined. Veins 0.5 to 2 mm wide are found in Piece 8 and are filled with carbonate.

COMMENTS: Olivine may be a microphenocryst phase rather than a groundmass phase.
Highly vesicular zones are in Pieces 1, 7, 12, 13, 16, and 22. Pipe vesicles present in Piece 15 are filled with white carbonate. A prominent vesicle cylinder in Piece 5 is partially filled with segregated material.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-4R-3 (Section top: 842.6 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-7

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, black oxides, altered orange red clinopyroxene and olivine in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-35	2	Round to irregular

COLOR: Light brownish gray (5YR 6/1) to light brown (5YR 5/6).

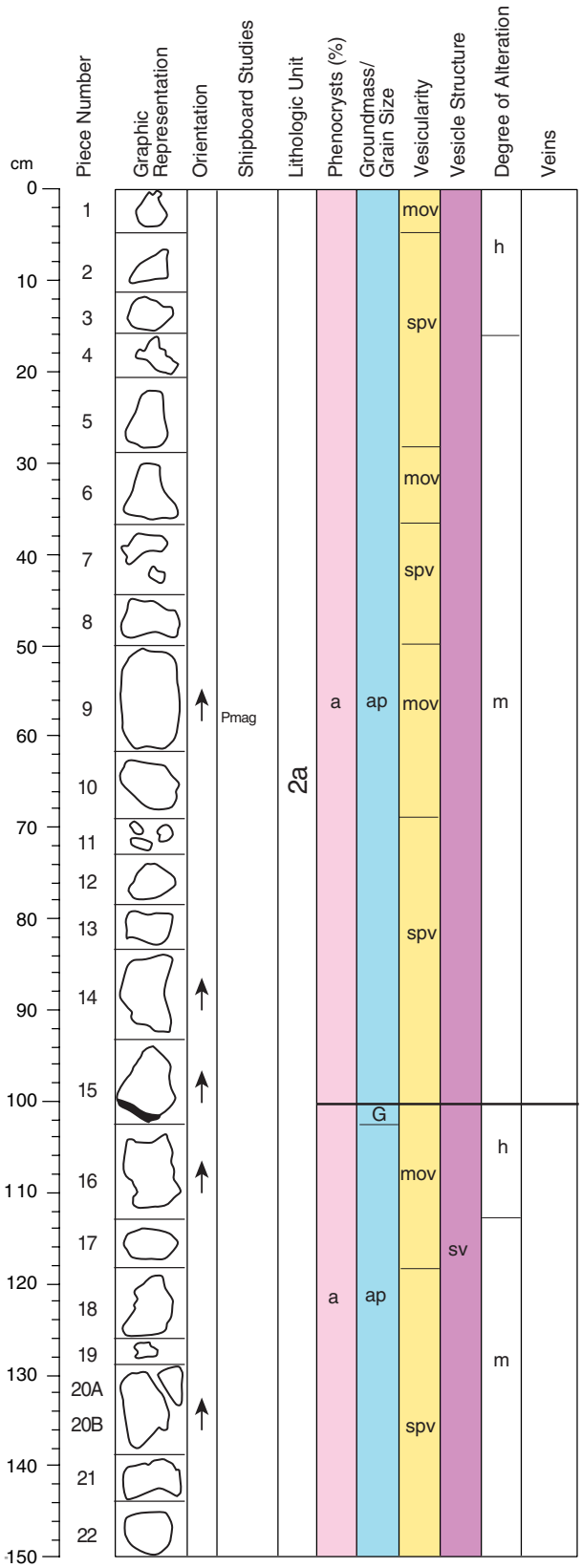
STRUCTURE: Lobed. Based on significant changes in vesicularity and presence of glass in Pieces 2 and 6.

ALTERATION: Moderate to high. Olivine and clinopyroxene are completely altered to Fe oxyhydroxide. 75% of the vesicles are filled with white carbonate and 25% are unfilled.

VEINS/FRACTURES: None.

COMMENTS: Olivine may be a microphenocryst phase rather than a groundmass phase.
Highly vesicular zones are present in Pieces 2, 3, 4, 6, and 7.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-5R-1 (Section top: 849.3 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-21

CONTACTS: None.

GROUNDMASS: Aphanitic. Consists of plagioclase, black oxides and euhedral equant orange red patches (olivine and clinopyroxene?) in an intergranular texture. Glassy near lobe margins.

VESICLES:	% Mode	Size (mm): Average	Shape
	2-30	3	Round to irregular

COLOR: Medium brown (10YR 5/2) in highly altered regions, and medium brown (2.5Y 5/3) in moderately altered regions.

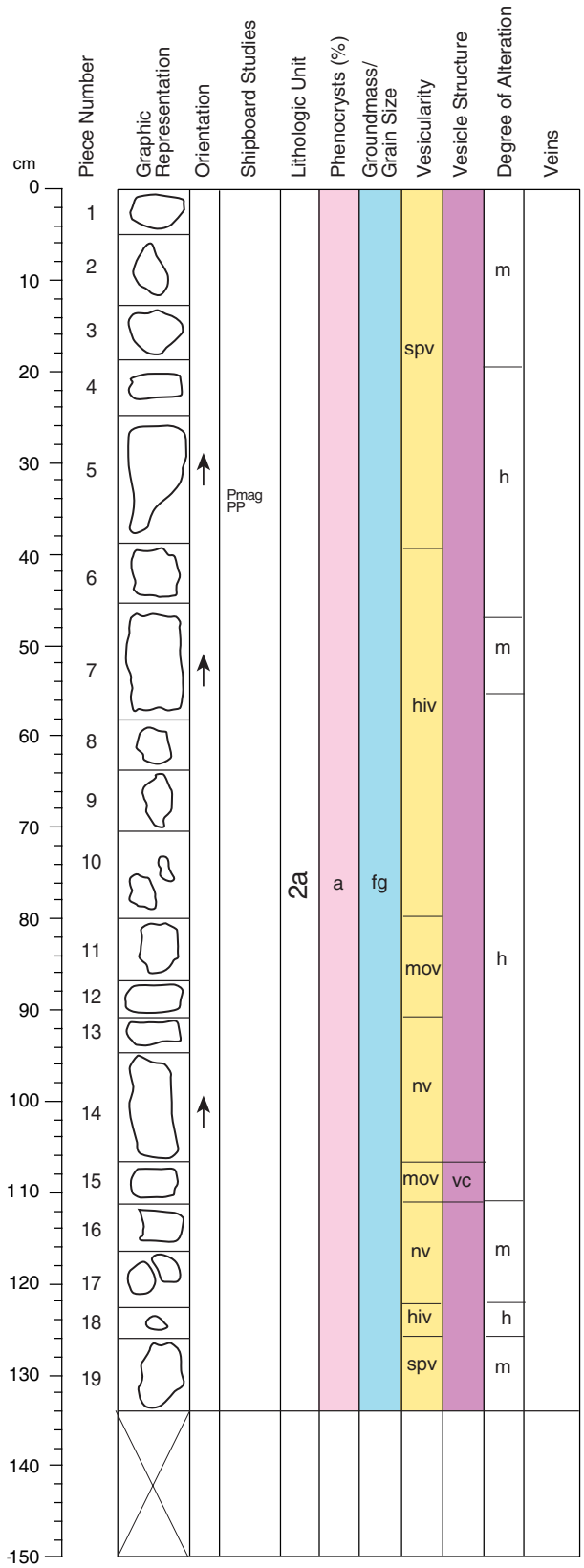
STRUCTURE: Lobed. A lobe margin is observed in Piece 15, and is defined by the presence of glass and a variolitic texture in aphanitic areas.

ALTERATION: Moderate to high. Olivine is completely altered to Fe oxyhydroxide and carbonate. 50% of the vesicles are filled with carbonate and Fe oxyhydroxide. The remainder are lined with greenish brown clay.

VEINS/FRACTURES: None.

COMMENTS: Highly (30%-40%) vesicular zones are present in Pieces 5, 6, 10, 16, and 17. Within 1.5 cm of a glassy lobe margin (Piece 15), occasional microphenocrysts of plagioclase are present up, to 1 mm in size.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-5R-2 (Section top: 850.8 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-19

CONTACTS: None.

GROUNDMASS: Fine grained. Consists of plagioclase, black oxides and euhedral equant orange red patches (olivine and clinopyroxene?) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	2-30	3	Round to irregular

COLOR: Medium brown (10YR 5/2) in highly altered regions, and medium brown (2.5Y 5/3) in moderately altered regions.

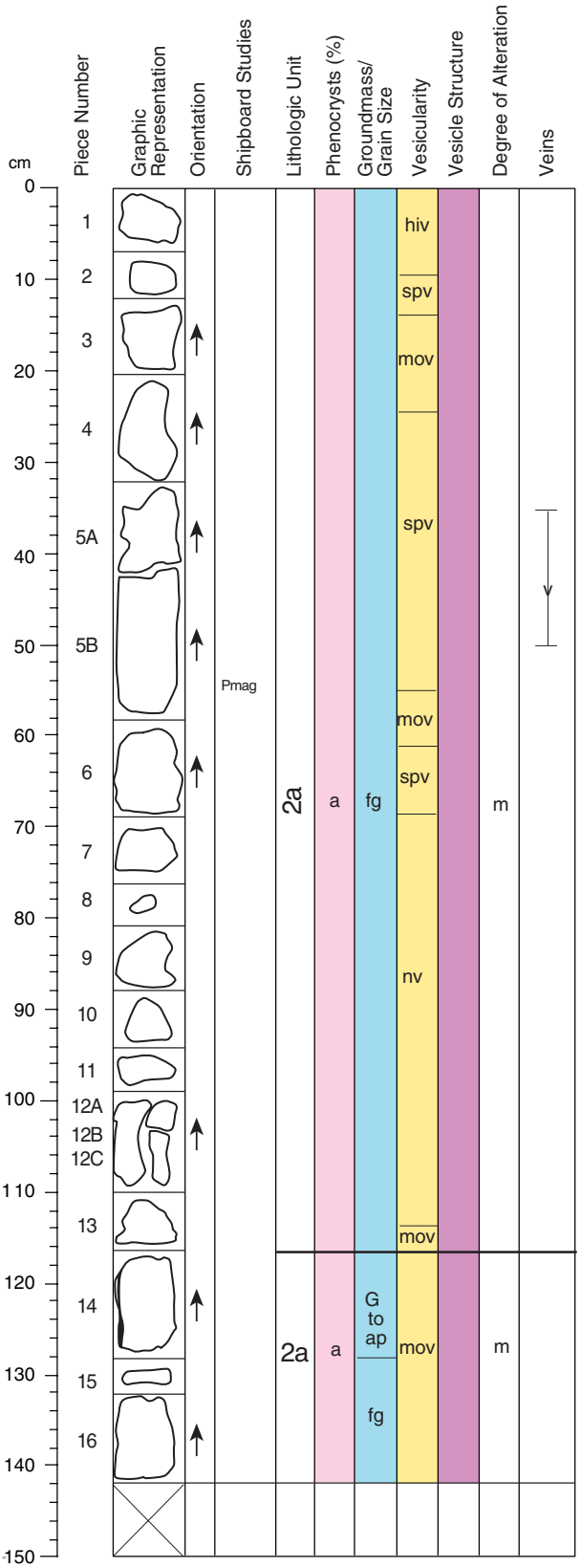
STRUCTURE: Lobed. There is no convincing evidence for the presence of lobe margins in this section.

ALTERATION: Moderate to high. Olivine is completely altered to Fe oxyhydroxide and carbonate. 50% of the vesicles are filled with carbonate and Fe oxyhydroxide. The remainder are lined with greenish brown clay.

VEINS/FRACTURES: None.

COMMENTS: Highly vesicular zones are present in Pieces 6-10. A vesicle cylinder is observed in Piece 15 at 107-113 cm, and is filled with black oxide enriched segregated material. A rectangular feldspar(?) crystal, 3 mm in size, is present in Piece 19 at 132 cm.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-6R-1 (Section top: 858.6 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-16

CONTACTS: None.

GROUNDMASS: Fine grained. Consists of plagioclase, clinopyroxene, and orange red patches (olivine or altered clinopyroxene?) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	0-25	2.5	Round to irregular

COLOR: Medium brown (10YR 5/2) in highly altered regions, and medium brown (2.5Y 5/3) in moderately altered regions.

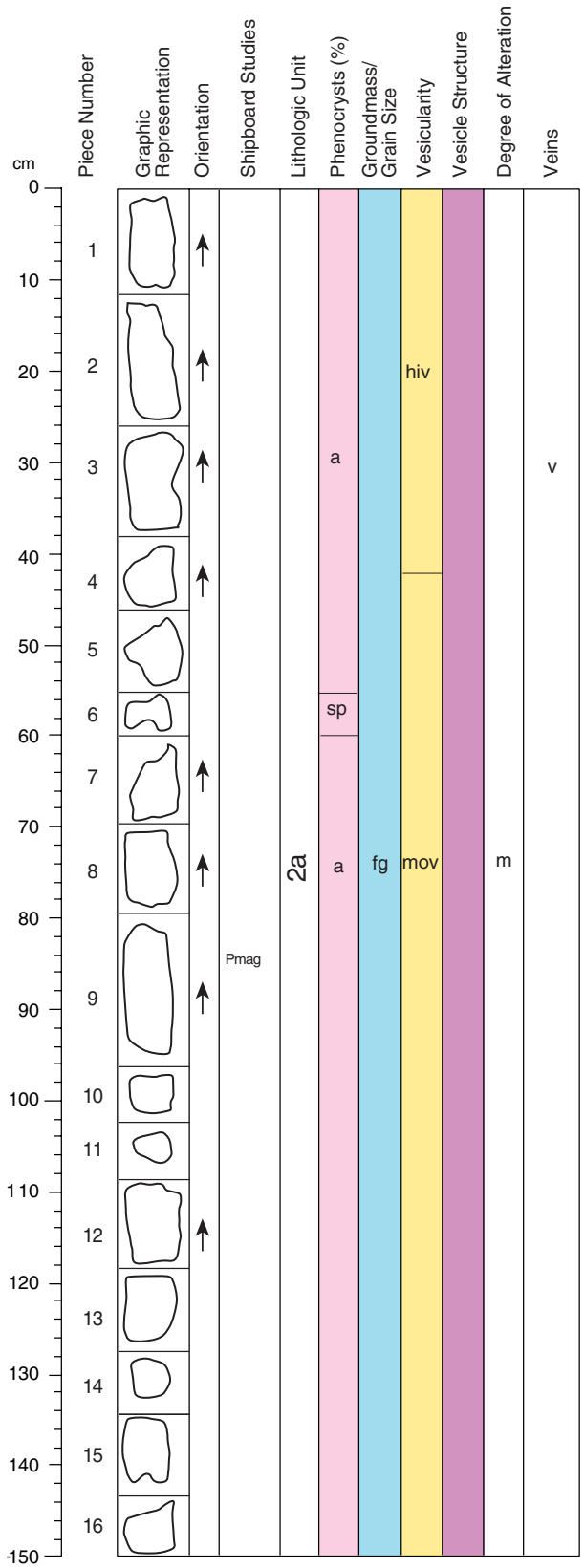
STRUCTURE: Lobed. A lobe margin is observed along the length of Piece 14, and is defined by the presence of unaltered glass and a concentration of vesicles.

ALTERATION: Moderate. The groundmass is dominated by orange red patches which may represent olivine or clinopyroxene. Olivine is completely altered to Fe oxyhydroxide and carbonate. 85% of the vesicles are filled with carbonate. The remainder are lined with greenish brown clay.

VEINS/FRACTURES: Sparsely veined. A 2-3 mm wide white carbonate and Fe oxyhydroxide filled vein is present in Piece 5 (35-50 cm).

COMMENTS: Pieces 1, 3, 6, 14, 15, and 16 are highly vesicular.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-6R-2 (Section top: 860.03 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-16

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic near lobe margins. Consists of plagioclase, clinopyroxene, and orange red patches (olivine or altered clinopyroxene?) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	0-25	2.5	Round to irregular

COLOR: Medium brown (10YR 5/2) in highly altered regions, and medium brown (2.5Y 5/3) in moderately altered regions.

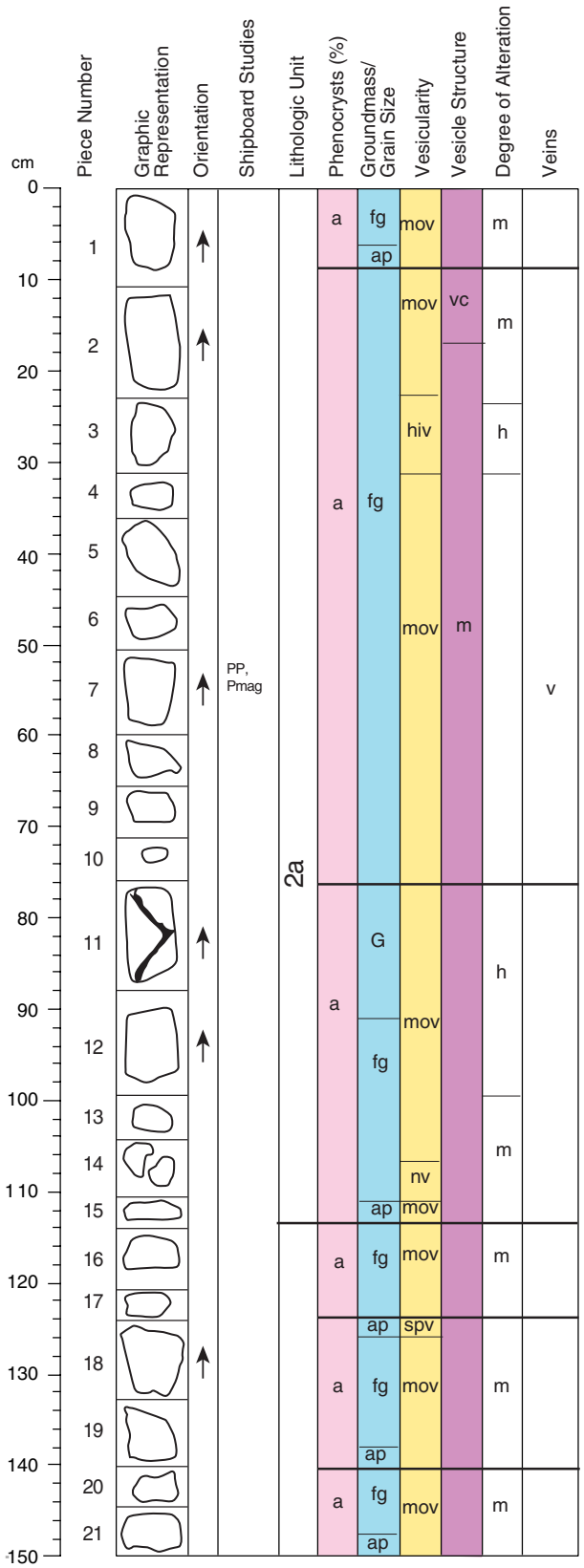
STRUCTURE: No convincing evidence for the presence of lobes in this section.

ALTERATION: Moderate. The groundmass is dominated by orange red patches which may replace olivine or clinopyroxene.

VEINS/FRACTURES: Very sparsely veined. A 1 mm vein is present in Piece 3, and contains Fe oxyhydroxide.

COMMENTS: Small lath-like to skeletal (0.5-2.5 mm) plagioclase phenocrysts are present only in Piece 6.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-6R-3 (Section top: 861.53 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-21

CONTACTS: None.

GROUNDMASS: Fine grained. Consists of plagioclase, clinopyroxene, and orange red patches (olivine or altered clinopyroxene?) in an intergranular texture. Glassy and/or aphanitic near lobe margins.

VESICLES:	% Mode	Size (mm): Average	Shape
	0-15	3	Round to irregular

COLOR: Medium brown (10YR 5/2) in highly altered regions, and medium brown (2.5Y 5/3) in moderately altered regions.

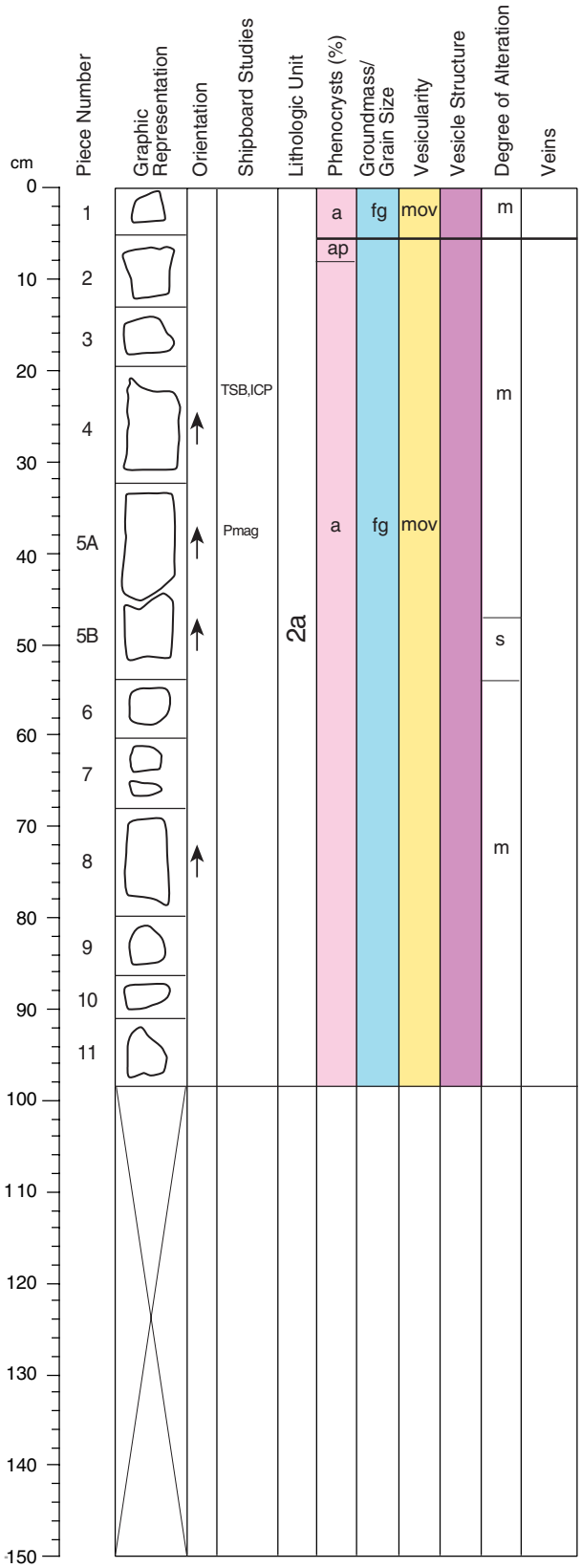
STRUCTURE: Lobed. Lobe margins are observed in Piece 1, between Piece 11 and 12, Pieces 15, 17, 19 and 21, and are defined by the presence of glass and/or variolitic texture in aphanitic areas.

ALTERATION: Moderate to high. The groundmass is dominated by orange red patches which may represent olivine or clinopyroxene. Olivine is completely altered to Fe oxyhydroxide and carbonate. 85% of the vesicles are filled with carbonate. The remainder are lined with greenish brown clay.

VEINS/FRACTURES: Sparsely veined. A <1 mm wide vein filled with Fe oxyhydroxide and carbonate is present in Piece 7 (50-57 cm).

COMMENTS: Highly vesicular zones are present in Pieces 3 and 4. A 12 mm wide vesicle cylinder is present in Piece 2 at 11-15 cm, filled with segregated material and Fe oxyhydroxide. In Piece 11, we recovered a small pahoehoe lobe blanketing an ~10 cm long cognate lava lithic. The glassy lobe margins follow exactly the outline of the clast.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-6R-4 (Section top: 863.03 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-11

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, clinopyroxene, and olivine which ranges from unaltered to completely altered (replaced by Fe oxyhydroxide) in an intergranular texture.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	~20	1	Round to irregular

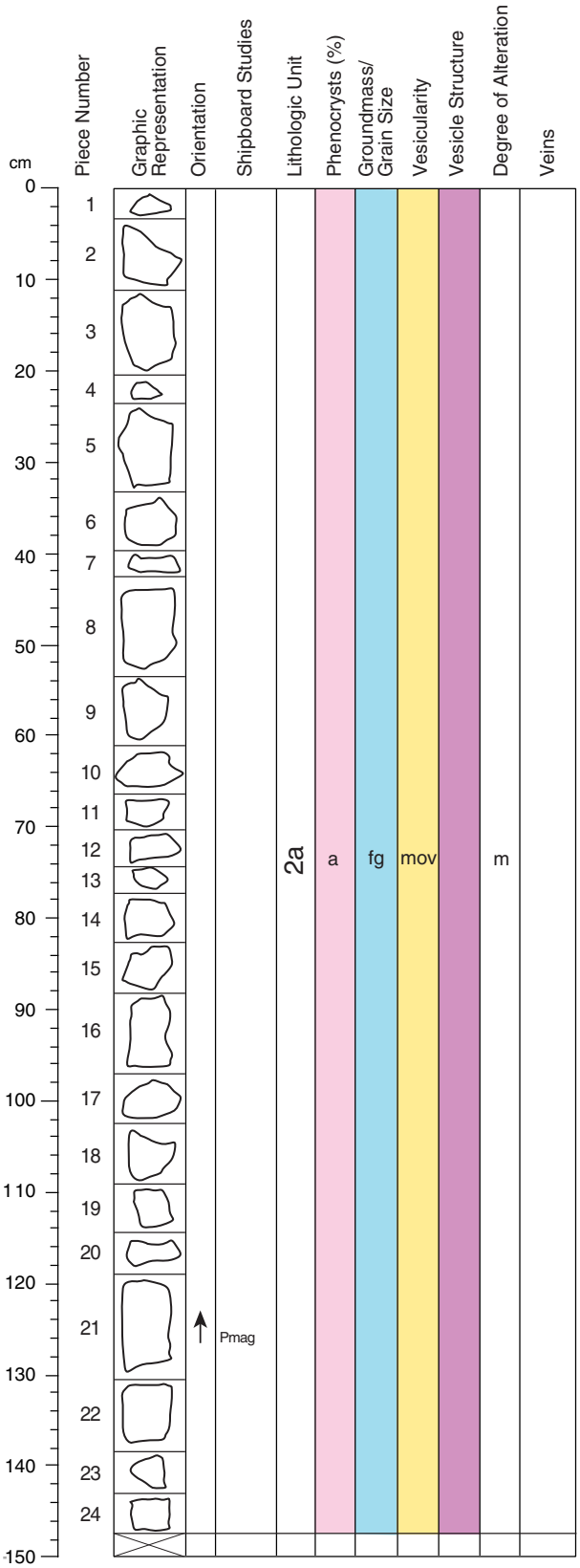
COLOR: Light olive gray (5Y6/1) in slightly altered regions to dark yellowish orange (10YR 6/6) in moderately altered regions.

STRUCTURE: Lobed. A lobe margin is marked by a 5 mm wide aphanitic zone.

ALTERATION: Moderate to slight. Some regions are dominated by orange red alteration that may represent olivine or clinopyroxene. Olivine is unaltered in gray regions of Piece 5B. 75% of the vesicles are filled with carbonate and 25% are lined with red orange to black minerals.

VEINS/FRACTURES: None.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-7R-1 (Section top: 868.2 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-24

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, clinopyroxene, and olivine.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-15	1.5	Irregular

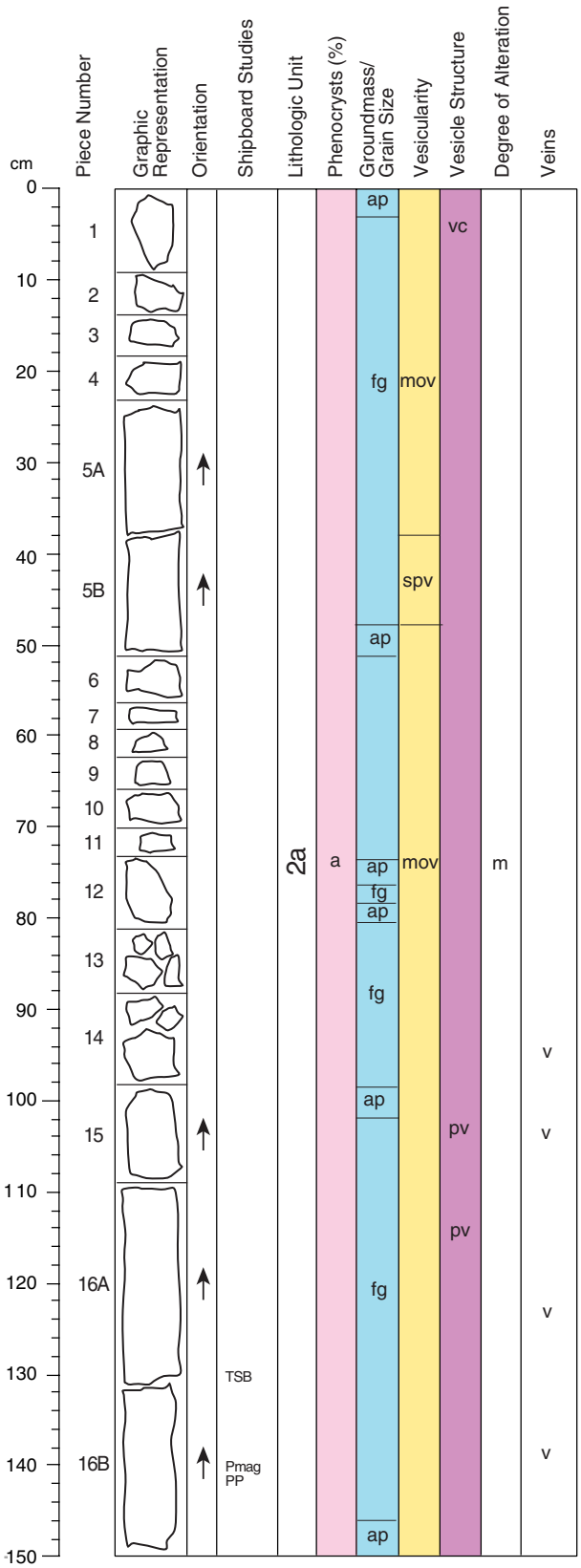
COLOR: Pale yellowish brown (10YR 6/2), except moderate yellowish brown (10YR 5/4) along edges of many pieces that probably adjoined veins.

STRUCTURE: Lobed. No convincing evidence for the presence of lobe margins in this section.

ALTERATION: Moderate. Some groundmass is replaced by clay and Fe oxyhydroxide. Olivine is completely replaced by Fe oxyhydroxide. 30%-100% of vesicles are filled with light gray carbonate, and the other 0%-70% are lined with Fe oxyhydroxide, except for Piece 15, in which all of the vesicles are lined with Fe oxyhydroxide.

VEINS/FRACTURES: None. However, many of the pieces have angular edges with additional Fe oxyhydroxide staining and traces of carbonate that suggest those edges adjoined veins.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-7R-2 (Section top: 869.67 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1-16B

CONTACTS: None.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Olivine:	<2	1	0.2	0.5	Subhedral; equant

GROUNDMASS: Fine grained to aphanitic. Consists of plagioclase, clinopyroxene, and black oxides.

VESICLES:	% Mode	Size (mm): Average	Shape
Moderately vesicular	7-8	2	Irregular

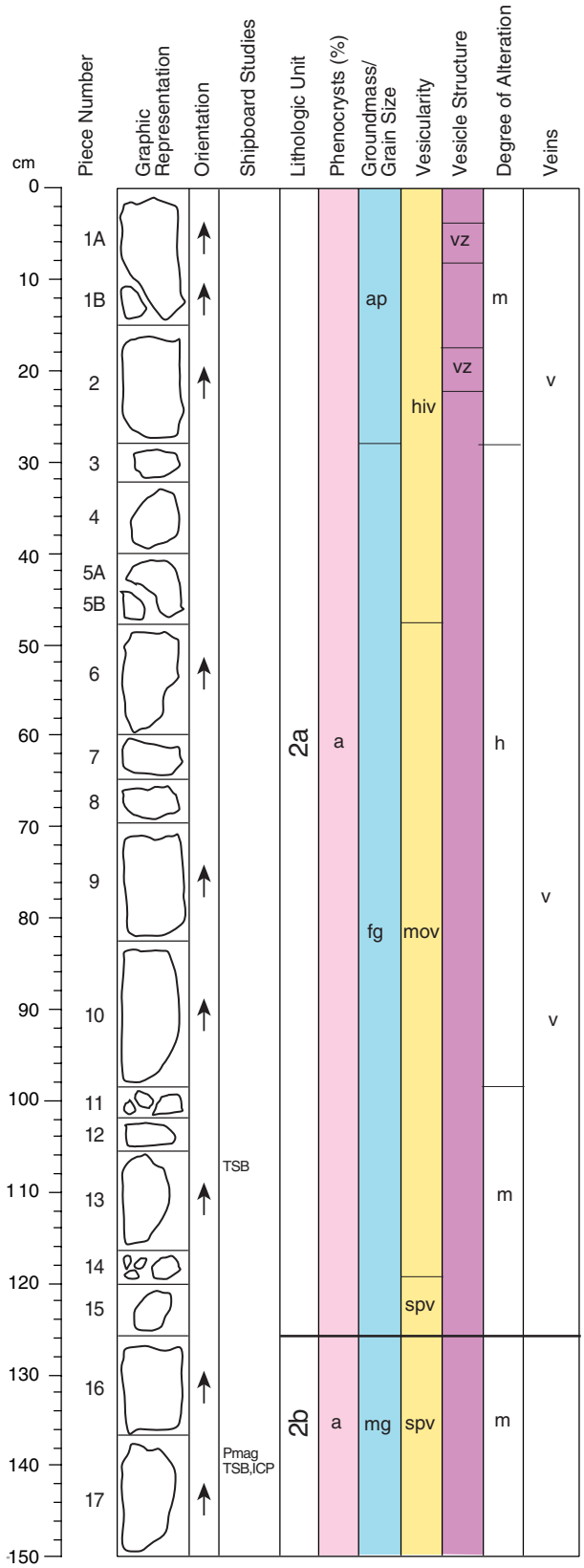
COLOR: Pale yellowish brown (10YR 6/2).

STRUCTURE: Lobed. No convincing evidence for the presence of lobe margins in this section.

ALTERATION: Moderate. Most intensely altered close to veins. Olivine microphenocrysts are completely replaced by Fe oxyhydroxide and carbonate. Vesicles are filled with carbonate, Fe oxyhydroxide and green-brown clay. Plagioclase crystals of the groundmass are partially sericitized close to veins.

VEINS/FRACTURES: Sparsely veined. Subhorizontal and subvertical veins, 1-3 mm in width, occur in Pieces 15 and 16. Veins are filled with carbonate and Fe oxyhydroxide.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-7R-3 (Section top: 871.17 mbsf)

UNIT 2a: APHYRIC BASALT.

Pieces: 1A-15

CONTACTS: Contact with underlying diabase (Unit 2b) was not retrieved, but is inferred to be at 125 cm.

GROUNDMASS: Medium grained to aphanitic. In the aphanitic regions (e.g., Piece 2) the texture is subvariolitic to intersertal, and is occasionally subtrachytic. Olivine is distinctive in the aphanitic regions.

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	3-25	3	Subround to irregular

COLOR: Moderate yellowish brown (10YR 5/4) to light gray (N7).

STRUCTURE: Lobed (based on vesicle patterns).

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive. Some groundmass is replaced by clay and Fe oxyhydroxide. Approximately 60% of the vesicles are filled with white carbonate; 40% are unfilled but lined with Fe oxyhydroxide. Olivine is completely replaced by Fe oxyhydroxide and white carbonate.

VEINS/FRACTURES: Sparsely veined. Veins up to 0.2 mm wide are present in Pieces 2, 9, and 10, and are filled with white carbonate and Fe oxyhydroxide.

COMMENTS: Olivine may be a microphenocryst phase that is the same size as the groundmass. Rare euhedral and blocky plagioclase crystals up to 4 mm long are present.

UNIT 2b: DIABASE.

Pieces: 16-17

CONTACTS: Contact with overlying aphyric basalt was not retrieved, but is inferred to be at 125 cm.

GROUNDMASS: Medium grained. Consists of plagioclase, clinopyroxene, olivine, and black oxides in an intergranular texture.

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	3-25	3	Subround to irregular

COLOR: Moderate yellowish brown (10YR 5/4) to pale yellowish brown (10YR 6/2).

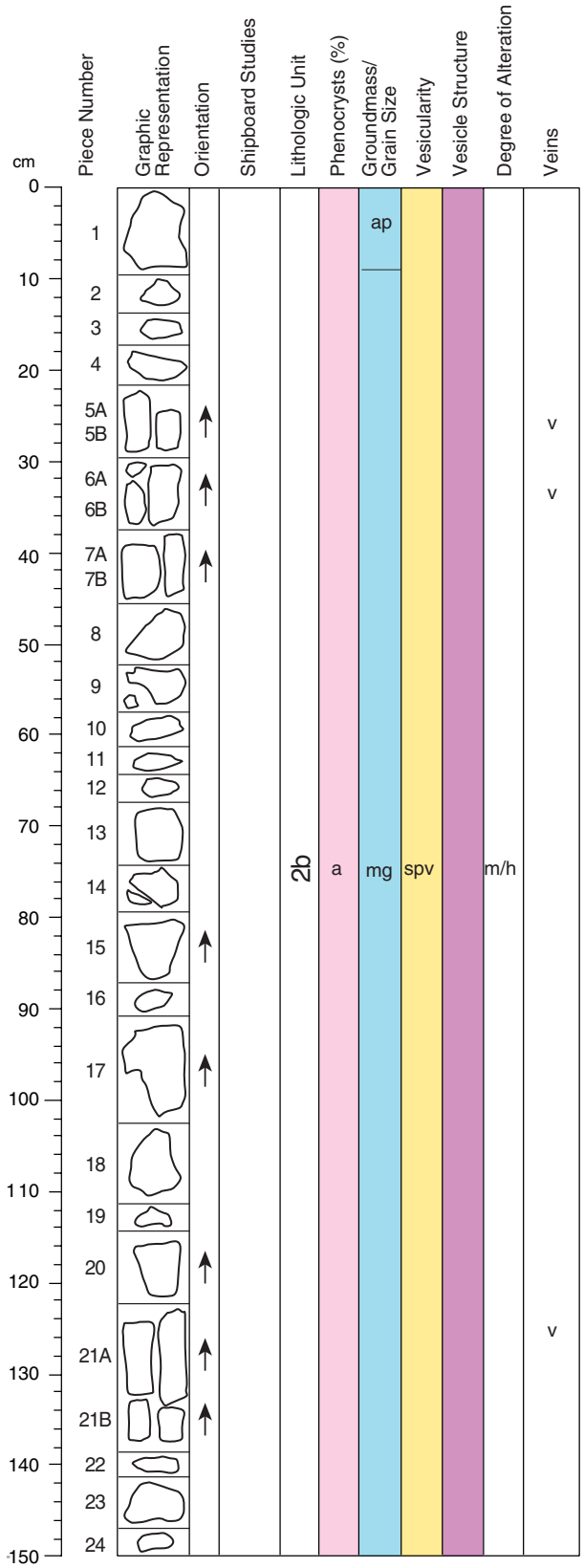
STRUCTURE: Massive.

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive. Some groundmass is replaced by clay and Fe oxyhydroxide. Approximately 60% of the vesicles are filled with white carbonate; 40% are unfilled but lined with Fe oxyhydroxide. Olivine is completely replaced by Fe oxyhydroxide and white carbonate.

VEINS/FRACTURES: None.

COMMENTS: Olivine may be a microphenocryst phase that is the same size as the groundmass. Rare euhedral and blocky plagioclase crystals up to 4 mm long are present (e.g., Piece 16).

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-8R-1 (Section top: 877.8 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-24

CONTACTS: None.

GROUNDMASS: Piece 1 is aphanitic with euhedral to subhedral olivine (2%-4%) made conspicuous by alteration to Fe oxyhydroxide. Pieces 2-24 are medium grained and consist of clinopyroxene and plagioclase intergrown in subophitic texture, with black oxides and olivine (10%-15%).

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	1-5	2	Irregular

COLOR: Moderate yellowish brown (10YR 5/4) to pale yellowish brown (10YR 6/2).

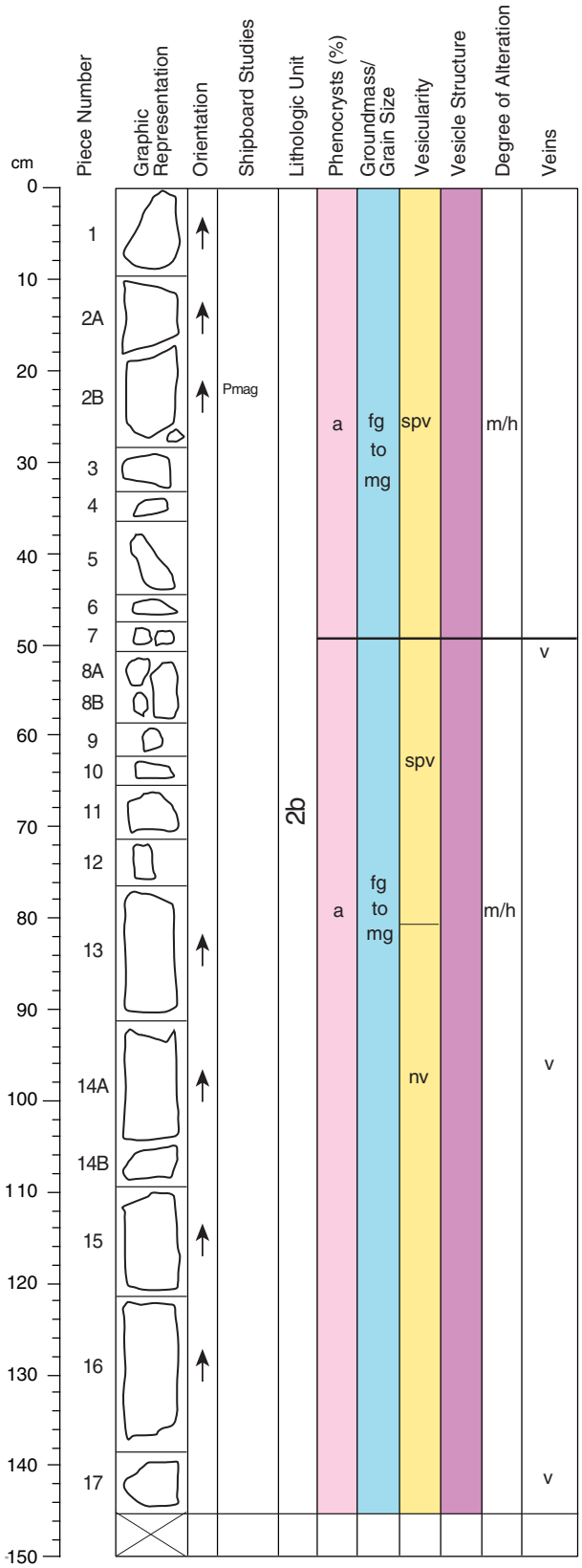
STRUCTURE: Massive.

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive. Olivine is completely replaced by Fe oxyhydroxide and white carbonate. Plagioclase crystals of the groundmass are stained with Fe oxyhydroxide. 50% of vesicles are filled with white carbonate, Fe oxyhydroxide and gray-green clay, and 50% are unfilled but lined with Fe oxyhydroxide. Some clinopyroxene and glass in the groundmass are altered to clay.

VEINS/FRACTURES: Sparsely veined. Veins up to 0.5 mm wide are present in Pieces 5, 6, and 21, and are filled with Fe oxyhydroxide and white carbonate.

COMMENTS: Euhedral to subhedral olivine is the same size as or smaller than the groundmass in the medium-grained regions.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-8R-2 (Section top: 879.3 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-17

CONTACTS: None.

GROUNDMASS: Medium grained. Consists of clinopyroxene and plagioclase intergrown in an ophitic texture, black oxides and some olivine.

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	1-4	2	Irregular

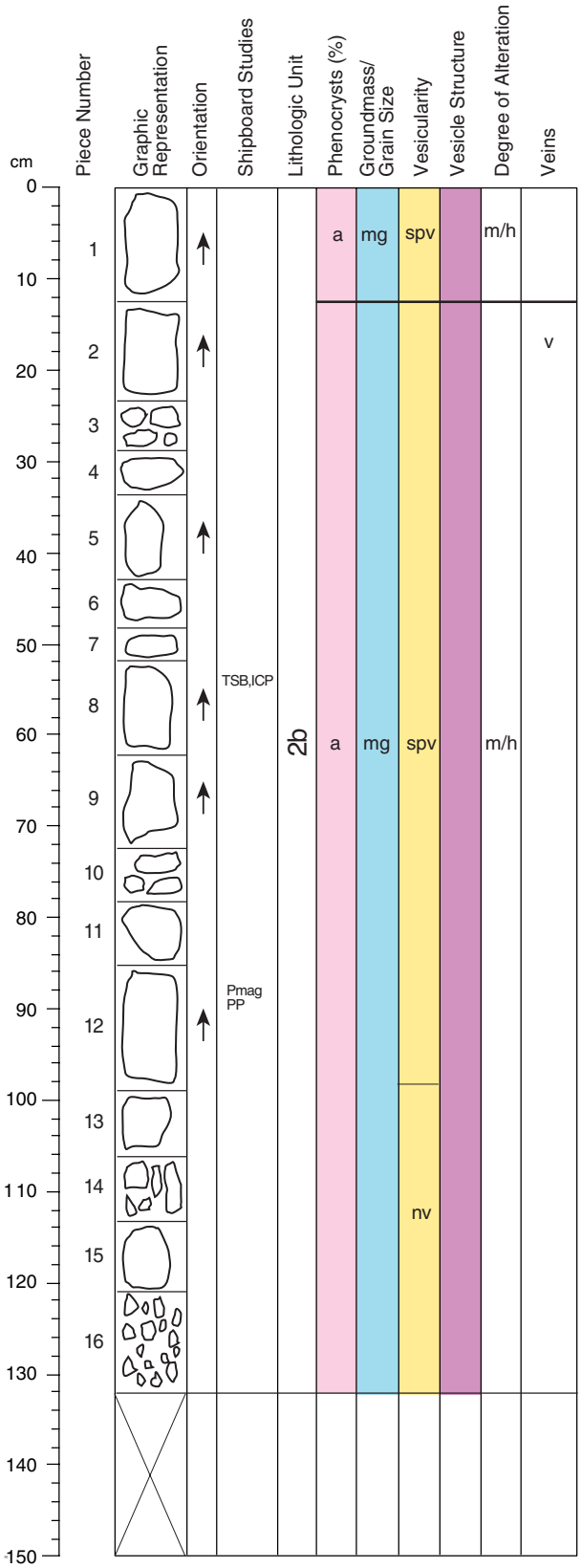
COLOR: Dark brown (10YR 4/2).

STRUCTURE: Massive.

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive. Olivine is completely replaced by Fe oxyhydroxide and white carbonate. Plagioclase crystals of the groundmass are partially sericitized. Vesicles are filled with carbonate, Fe oxyhydroxide and gray green clay. Glass in Piece 7 is partially devitrified.

VEINS/FRACTURES: Sparsely veined. Veins up to 2 mm wide are present in Pieces 14 and 17, and are filled with white carbonate and Fe oxyhydroxide. In Piece 7, a 0.5 mm wide vein is filled with partially altered glass.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-8R-3 (Section top: 880.76 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-16

CONTACTS: None.

GROUNDMASS: Medium grained. Clinopyroxene, plagioclase, and possibly some completely altered olivine. Large (≤6 mm) clinopyroxene is grown around plagioclase laths (ophitic texture).

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	3-8	1.5	Irregular

COLOR: Pale yellowish brown (10YR 6/2).

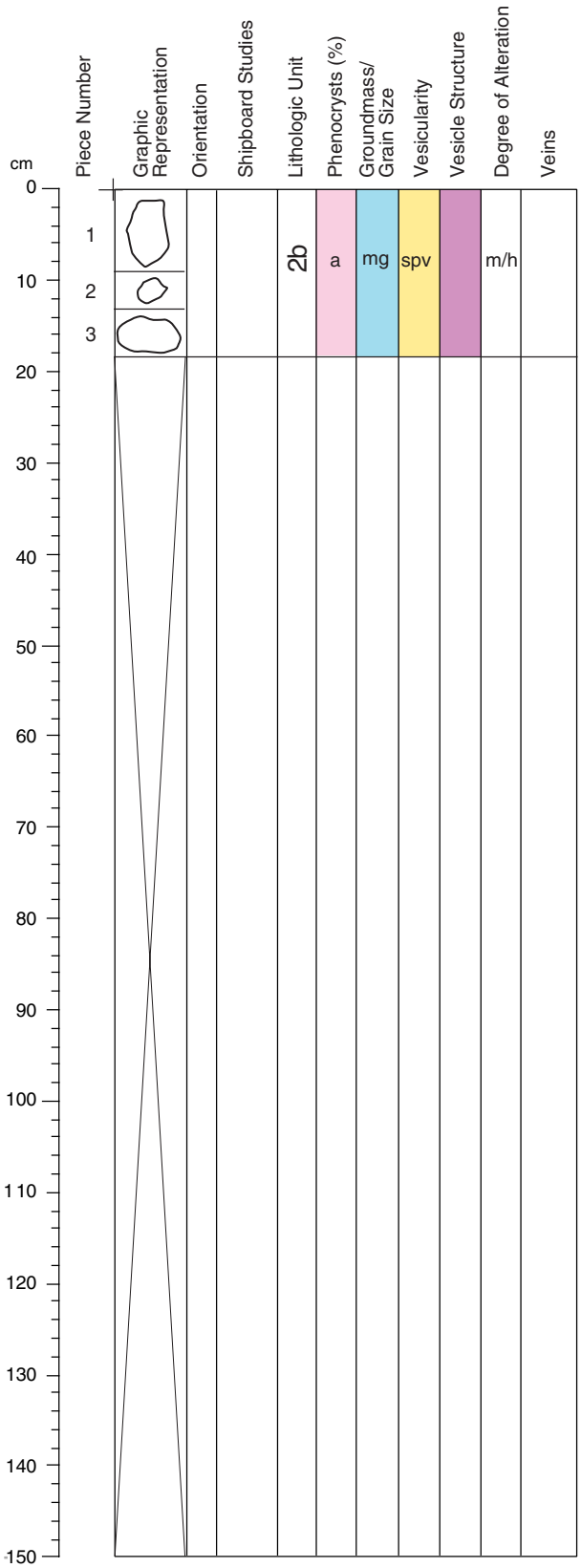
STRUCTURE: Massive.

ALTERATION: Moderate. Some groundmass (possibly including olivine) is replaced by clay and Fe oxyhydroxide. Some vesicles are filled with white carbonate, and others are lined with Fe oxyhydroxide.

VEINS/FRACTURES: None, except for one 1.5 mm wide vein filled with gray carbonate in Piece 2.

COMMENTS: Traces of glass are present on the bottom at the back of Piece 1.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-9R-1 (Section top: 887.1 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-3

CONTACTS: None.

GROUNDMASS: Medium grained. Consists of clinopyroxene and plagioclase intergrown in a subophitic to ophitic texture, with black oxides and olivine (10%-15%).

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	1-5	1.5	Round to subround

COLOR: Moderate yellowish brown (10YR 5/4) to dark yellowish orange (10YR 6/6).

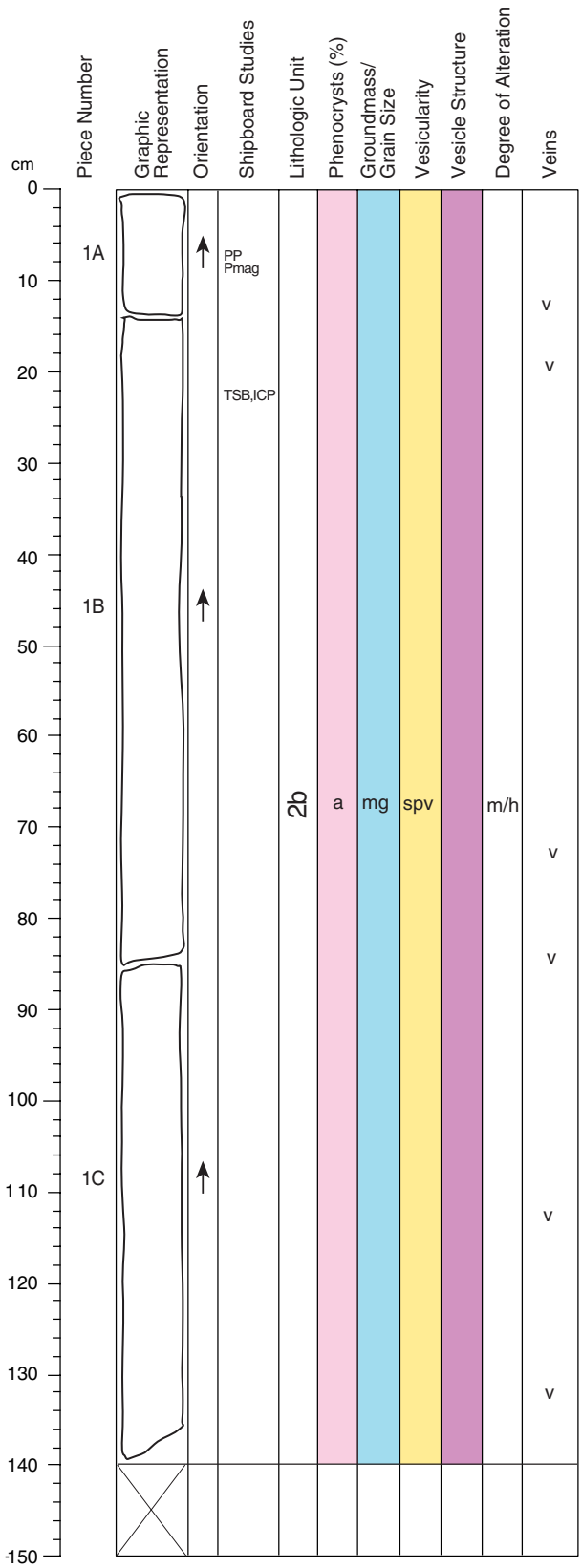
STRUCTURE: Massive.

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive. Olivine is completely replaced by Fe oxyhydroxide and white carbonate. 40% of vesicles are filled with white carbonate, Fe oxyhydroxide and gray-green clay, and 60% are unfilled but lined with Fe oxyhydroxide.

VEINS/FRACTURES: None.

COMMENTS: Same unit as in the base of 8R-3. Olivine abundance is 10%-12%.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-9R-2 (Section top: 887.29 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-1C

CONTACTS: None.

GROUNDMASS: Medium grained. Consists of clinopyroxene and plagioclase intergrown in a subophitic to ophitic texture. Other components are difficult to observe due to the nature of the alteration.

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	1-5	1.5	Round to subround

COLOR: Moderate yellowish brown (10YR 5/4) to dark yellowish orange (10YR 6/6).

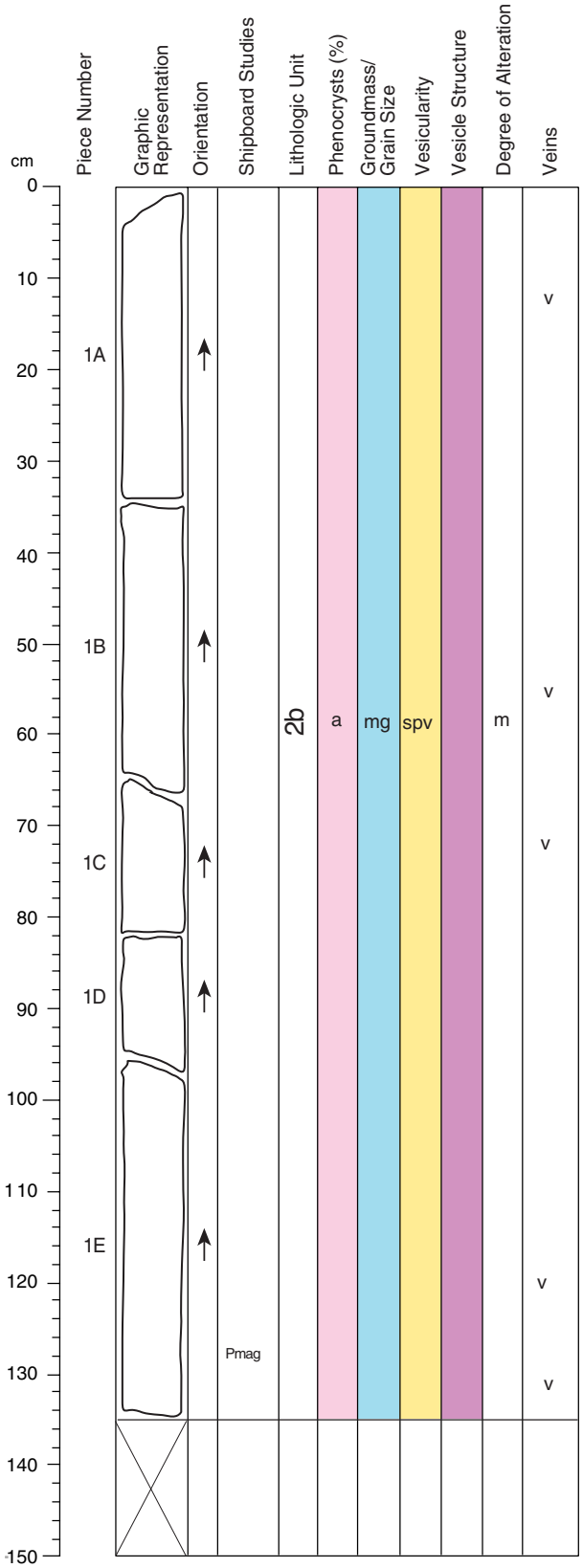
STRUCTURE: Massive.

ALTERATION: Moderate to high. The nature of the alteration has changed from Section 9R-1 from oxidizing to reducing. Fe oxyhydroxide is rare and present only around one vein. Pyrite is present in veins and the groundmass and blue-green clay is pervasive in the groundmass. Olivine is defined only where it is replaced by white carbonate, which accentuates the crystal shape. Vesicles are filled with white carbonate and blue-green clay.

VEINS/FRACTURES: Sparsely veined. Veins are 0.1-4 mm wide, randomly oriented, and filled with white carbonate, blue-green clay, and pyrite. There is an Fe oxyhydroxide halo (~1 cm wide) around the vein at 111-115 cm in Piece 1C.

COMMENTS: There is a large (1.5 cm) plagioclase crystal at 61 cm.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-9R-3 (Section top: 888.69 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-1E

CONTACTS: None.

GROUNDMASS: Medium grained. Clinopyroxene, plagioclase, and possibly some completely altered olivine. Large (≤5 mm) clinopyroxene is grown around plagioclase laths (ophitic texture). Grain size is slightly smaller than Core 8R.

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	2-5	1	Irregular

COLOR: Grayish blue green (5BG 5/2).

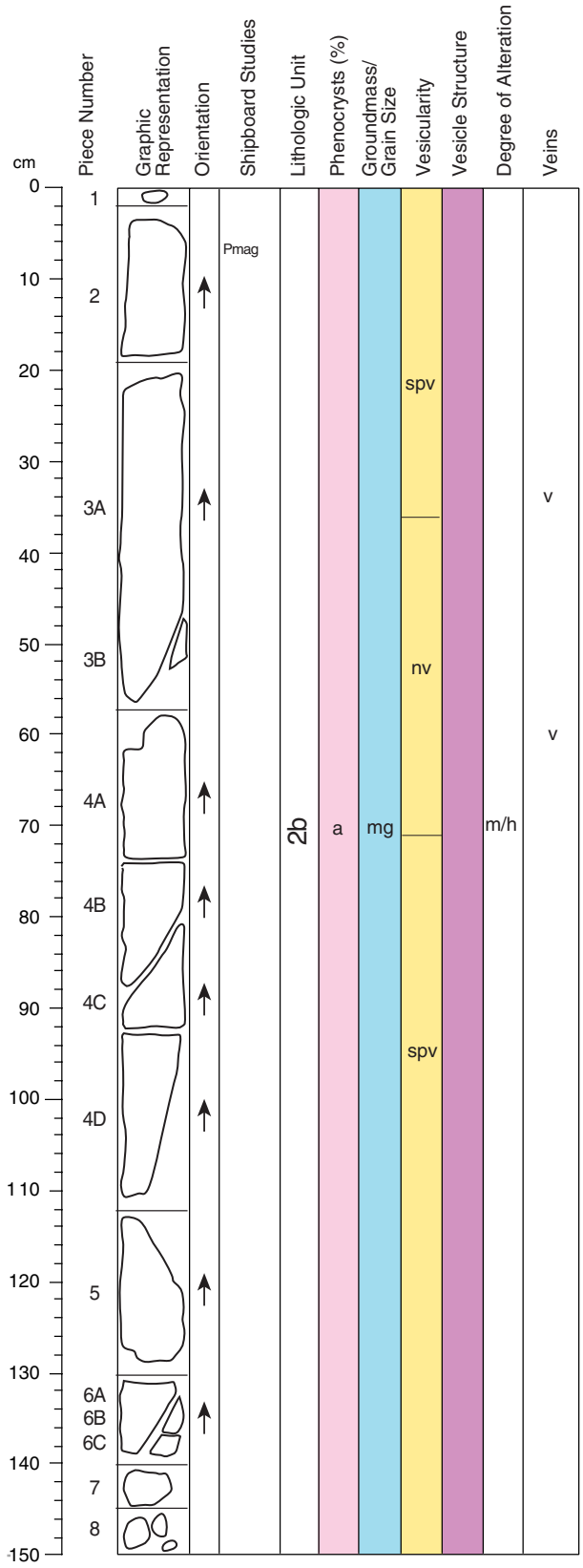
STRUCTURE: Massive.

ALTERATION: Moderate. Some groundmass (possibly including olivine) is replaced by grayish blue-green clay. All vesicles are filled with slightly lighter grayish blue-green clay. Veins have Fe oxyhydroxide alteration halos up to 30 mm wide in Pieces 1B, 1C, and 1E.

VEINS/FRACTURES: Sparsely veined. Veins are randomly oriented, 0.5-4 mm wide, and filled with gray carbonate and Fe oxyhydroxide. No veins are present in Piece 1D.

COMMENTS: This diabase is very similar to that in Core 8R except for the different style of alteration.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-10R-1 (Section top: 888.8 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-8

CONTACTS: None.

GROUNDMASS: Medium grained. Clinopyroxene and plagioclase form a subophitic to ophitic texture. Olivine (8%-12%) is present as euhedral to subhedral, equant crystals that are the same size or smaller than the groundmass.

VESICLES:	% Mode	Size (mm): Average	Shape
	1-8	2	Round to irregular

COLOR: There is a color change between 30-35 cm. Between 2-30 cm the color is pale blue (5B 6/2 to 5PB 6/2). From 0-2 cm and 35-150 cm it is pale yellowish brown (10YR 6/2).

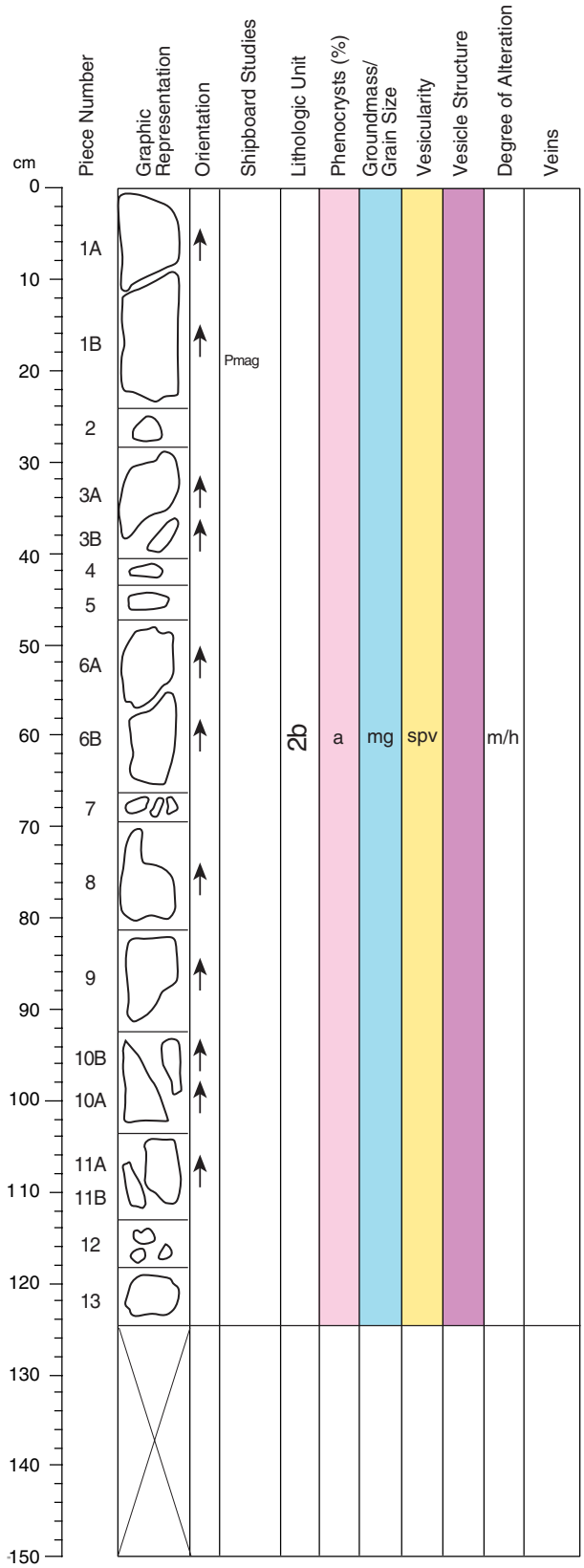
STRUCTURE: Massive.

ALTERATION: Moderate to high. The style of alteration changes although this is the same Unit. In the interval 2-30 cm, blue-green clay is pervasive. It replaces some of the groundmass and olivine, although olivine is difficult to identify. Vesicles are filled with white carbonate and blue-green clay. Sulfide is present in the groundmass.
In the intervals 0-2 cm and 35-150 cm, Fe oxyhydroxide is pervasive. It completely replaces olivine and some of the groundmass. Vesicles are filled with white carbonate and Fe oxyhydroxide. The interval 30-35 cm marks the transition between the two styles of alteration.

VEINS/FRACTURES: Sparsely veined. Veins are <0.1-2 mm wide and are filled with white carbonate, blue-green clay, and Fe oxyhydroxide.

COMMENTS: In places grain size is on the borderline between fine and medium grained.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-10R-2 (Section top: 890.3 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-13

CONTACTS: None.

GROUNDMASS: Medium grained. Clinopyroxene, plagioclase, and possibly some completely altered olivine. Large (≤5 mm) clinopyroxene is grown around plagioclase laths (ophitic texture).

VESICLES:	% Mode	Size (mm): Average	Shape
Sparsely vesicular	5	1	Irregular

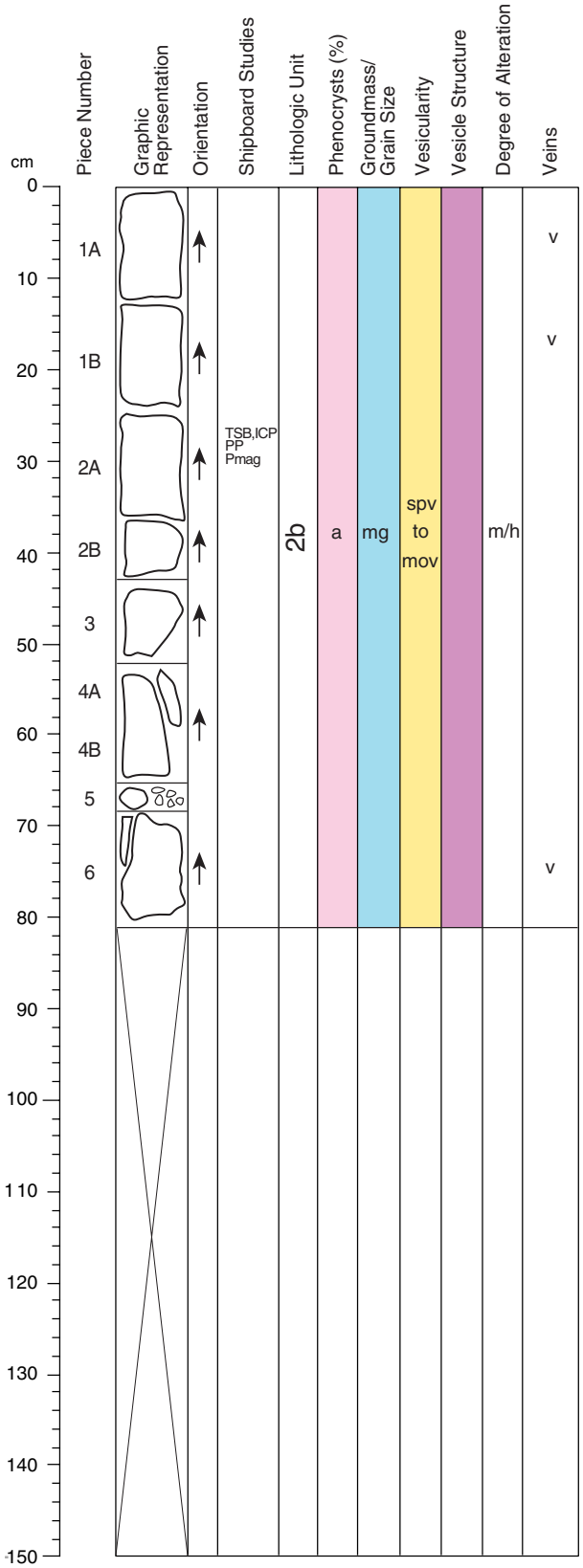
COLOR: Pale yellowish brown (10YR 6/2).

STRUCTURE: Massive.

ALTERATION: Moderate. Some groundmass is replaced by clay and Fe oxyhydroxide. Olivine(?) is completely replaced by Fe oxyhydroxide. Some of the larger vesicles are filled with light gray carbonate, and the rest are lined with Fe oxyhydroxide.

VEINS/FRACTURES: None. However, many of the pieces have angular edges with additional Fe oxyhydroxide staining and traces of carbonate that suggest those edges adjoined veins.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-10R-3 (Section top: 891.55 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-6

CONTACTS: None.

GROUNDMASS: Medium grained. Groundmass consists of clinopyroxene, plagioclase, olivine and black oxides. Plagioclase and clinopyroxene are intergrown in an ophitic texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	2-7	1	Irregular and round

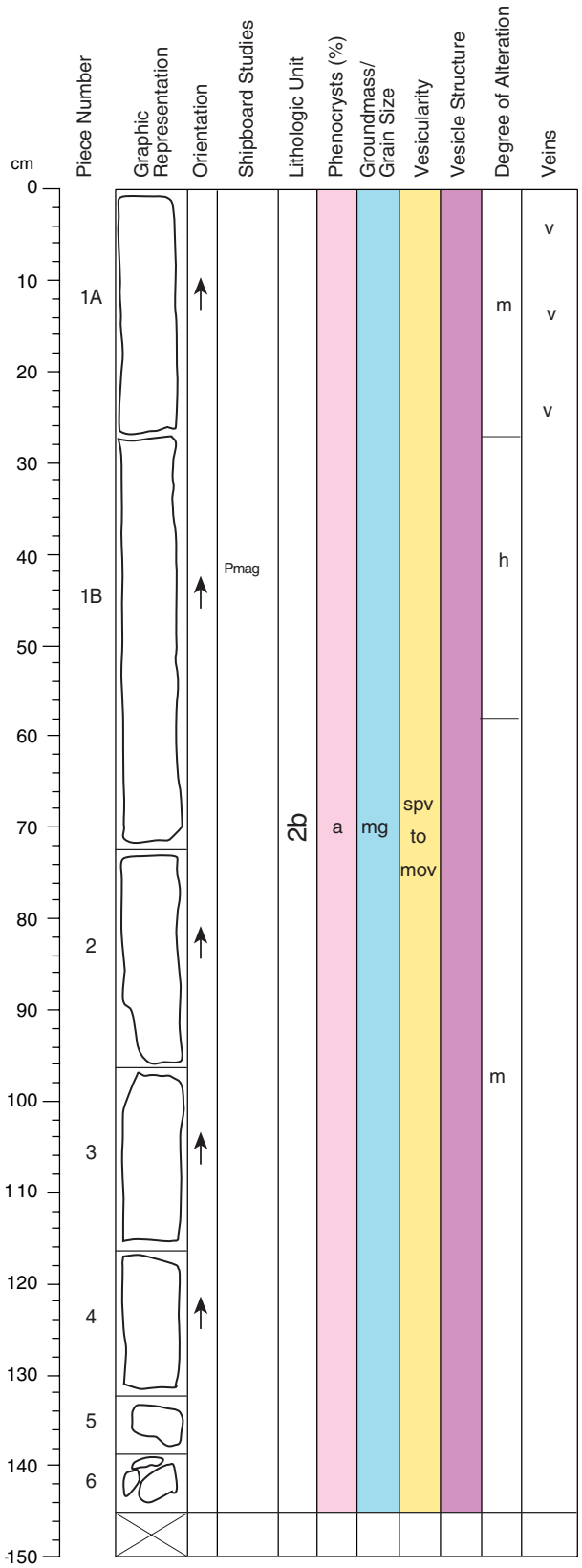
COLOR: Grayish orange (10YR 7/4).

STRUCTURE: Massive.

ALTERATION: Moderate to high. Olivine and some plagioclase are completely replaced by carbonate and Fe oxyhydroxide. Vesicles are filled with carbonate and Fe oxyhydroxide. Some vesicles are lined with Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Two thin (0.1-0.3 mm) veins occur in Pieces 1A, 1B and 3, and are filled with carbonate and minor amounts of Fe oxyhydroxide. A thicker vein (2 mm) is present in Piece 6 and is filled by carbonate and Fe oxyhydroxide in similar amounts.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-10R-4 (Section top: 892.36 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-6

CONTACTS: None.

GROUNDMASS: Medium grained. Groundmass consists of clinopyroxene, plagioclase, olivine, and black oxides. Plagioclase and clinopyroxene are intergrown in an ophitic texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	3-7	2	Irregular

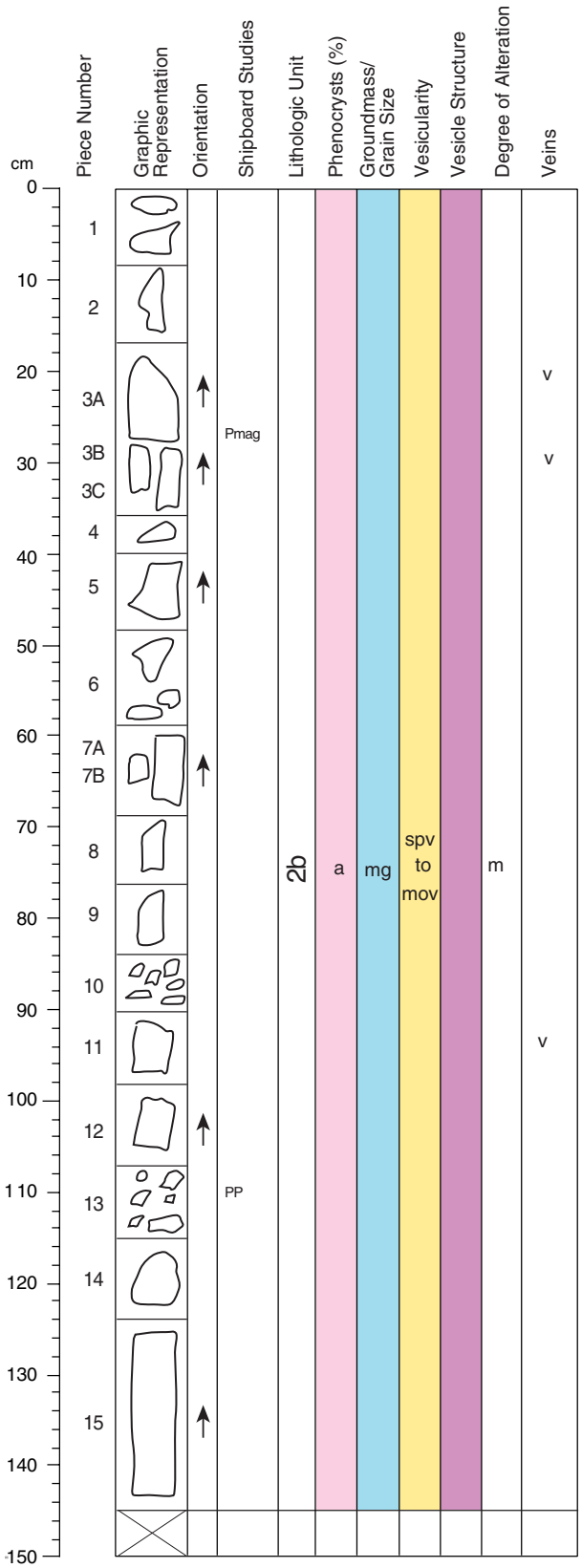
COLOR: Grayish blue green (5BG 5/2) between 25 cm and 60 cm. The rest of the section is brown (10YR 5/2).

STRUCTURE: Massive.

ALTERATION: Moderate to high. Olivine is completely replaced by carbonate and Fe oxyhydroxide. Plagioclase is partially sericitized. Secondary sulfide occurs between 27 cm and 60 cm in Piece 1B. Vesicles are filled with carbonate, Fe oxyhydroxide, and green-blue clay.

VEINS/FRACTURES: Sparsely veined. Veins occur in Pieces 1 and 2 between 0 and 30 cm. They are randomly oriented, 0.5-9 mm wide, and filled with carbonate and Fe oxyhydroxide.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-11R-1 (Section top: 896.6 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-15

CONTACTS: None.

GROUNDMASS: Medium grained. Clinopyroxene, plagioclase, and possibly some completely altered olivine. Clinopyroxene is grown around plagioclase laths in an ophitic to subophitic texture.

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	5-7	1	Irregular

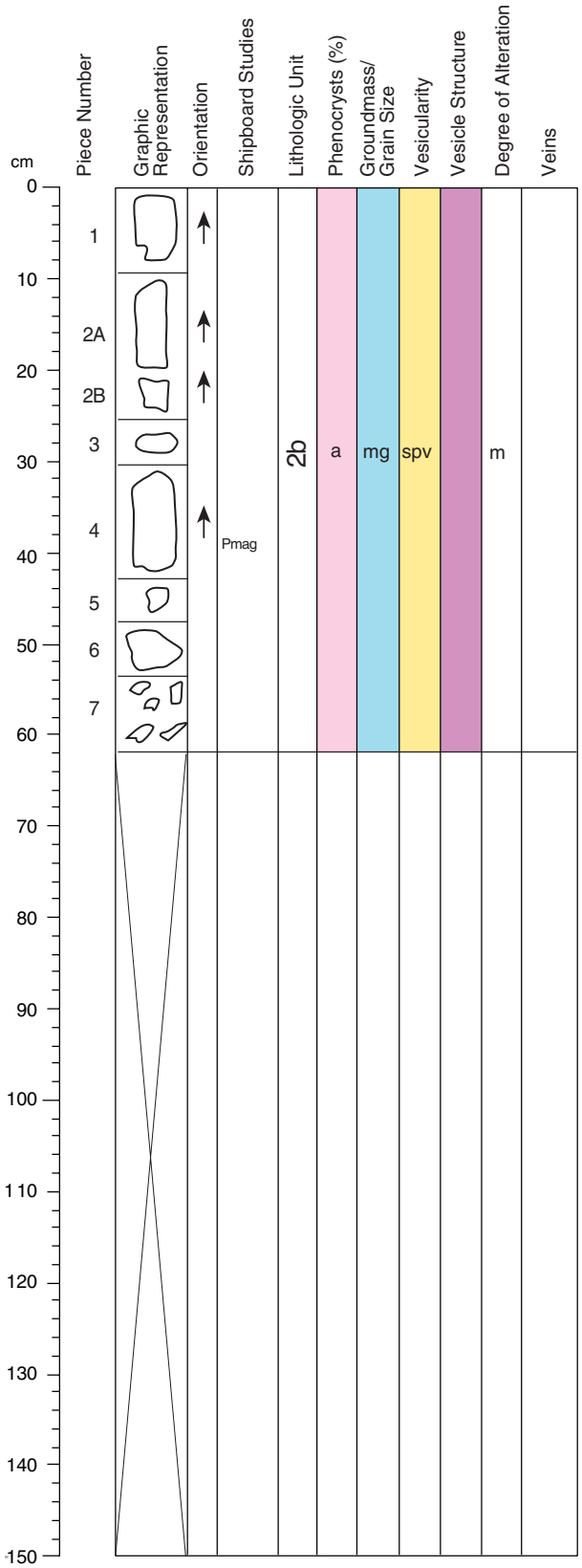
COLOR: Brownish yellow (10YR 6/8).

STRUCTURE: Massive.

ALTERATION: Moderate. In some regions a significant amount of groundmass is replaced or stained by Fe oxyhydroxide. Olivine (if present) is completely replaced by Fe oxyhydroxide. Most of the larger vesicles are filled with carbonate stained with yellow (10YR 8/6) Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Veins are <1 mm wide and are filled with white carbonate.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-11R-2 (Section top: 898.05 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-7

CONTACTS: None.

GROUNDMASS: Medium grained (average: 2 mm). Groundmass consists of clinopyroxene, plagioclase, black oxides and orange anhedral patches that may be olivine (altered to Fe oxyhydroxide). Plagioclase and clinopyroxene are intergrown in an ophitic texture.

VESICLES:	% Mode	Size (mm): Average	Shape
	3-6	1.5	Irregular to round

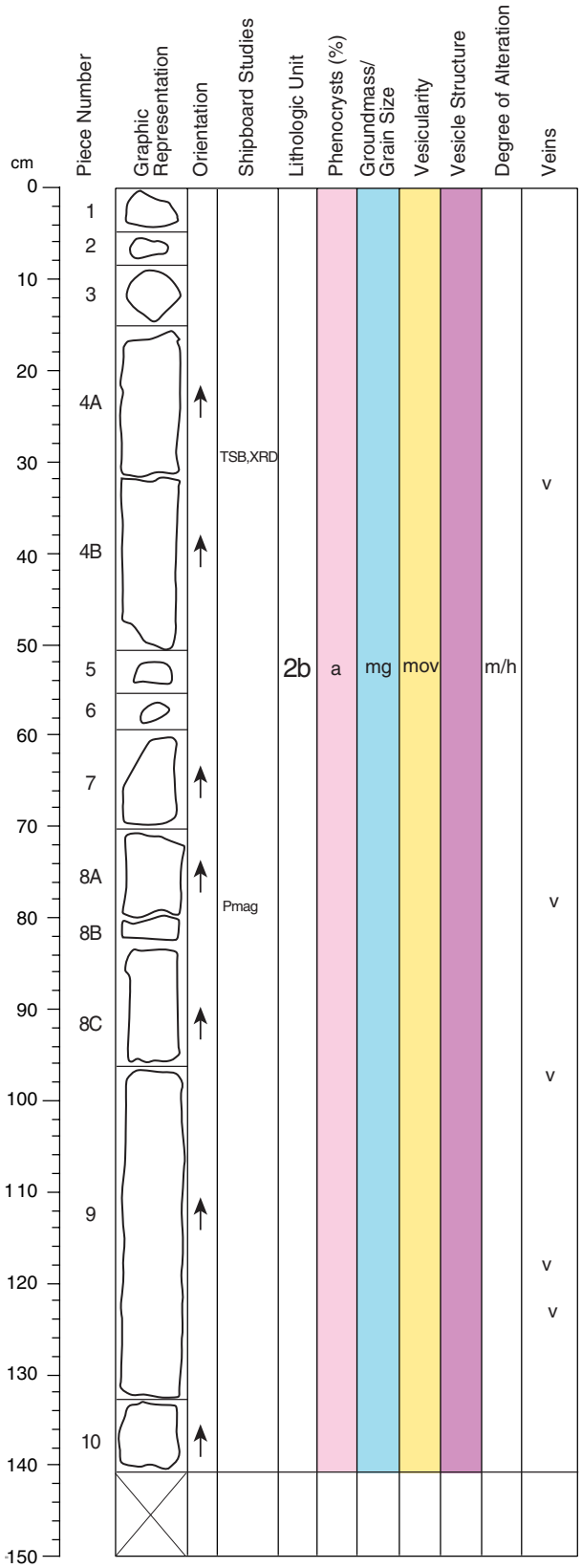
COLOR: Brown (10YR 5/3).

STRUCTURE: Massive.

ALTERATION: Moderate to high. Olivine (if present) is completely replaced by carbonate and Fe oxyhydroxide. Plagioclase is partially sericitized. Vesicles are filled with carbonate and Fe oxyhydroxide.

VEINS/FRACTURES: None present.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-12R-1 (Section top: 906.3 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-10

CONTACTS: None.

GROUNDMASS: Medium grained (average: 2 mm). Groundmass consists of clinopyroxene, plagioclase, abundant black oxides (5%) and orange anhedral patches that may be olivine (altered to Fe oxyhydroxide).

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	4-7	2	Round

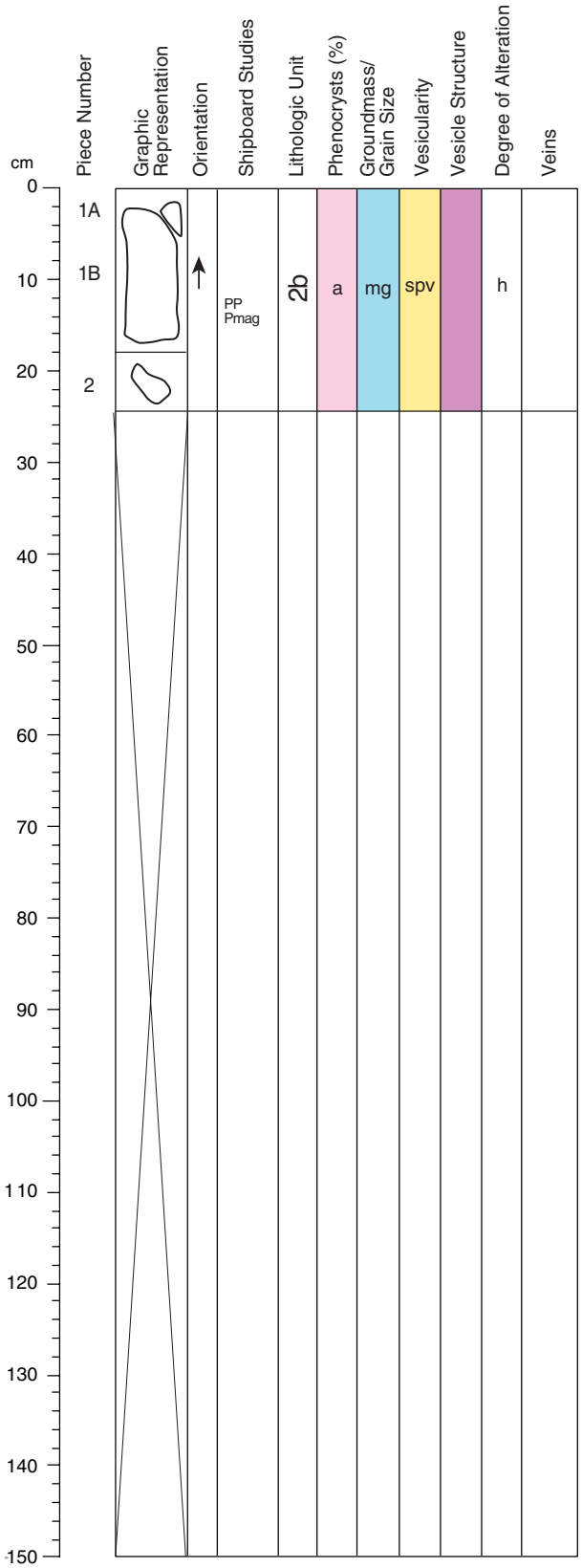
COLOR: Brown (10YR 5/2).

STRUCTURE: Massive.

ALTERATION: Moderate. Olivine (if present) is completely replaced by carbonate and Fe oxyhydroxide. Plagioclase is partially sericitized. Vesicles are filled with carbonate and Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. 1-5 mm wide veins are present in Pieces 4, 8 and 9 and are filled with Fe oxyhydroxide and carbonate.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-12R-2 (Section top: 907.71 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-2

CONTACTS: None.

GROUNDMASS: Medium grained (average: 2 mm). Groundmass consists of clinopyroxene, plagioclase, abundant black oxides (5%) and orange anhedral patches that may be olivine (altered to Fe oxyhydroxide).

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	1	1	Round

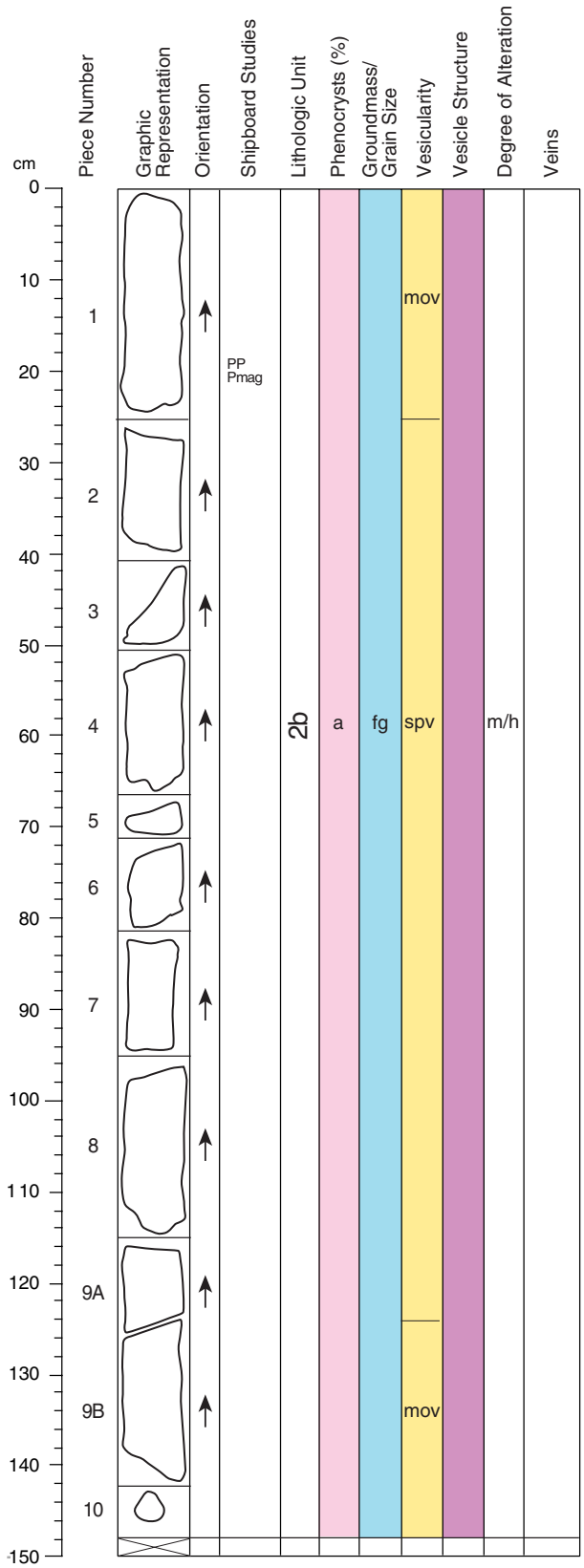
COLOR: Brown (10YR 5/2).

STRUCTURE: Massive.

ALTERATION: Moderate. Olivine (if present) is completely replaced by carbonate and Fe oxyhydroxide. Plagioclase is partially sericitized. Vesicles are filled with carbonate and Fe oxyhydroxide.

VEINS/FRACTURES: None.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-13R-1 (Section top: 908.3 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-10

CONTACTS: None.

GROUNDMASS: Fine grained. Contains plagioclase and clinopyroxene intergrown in a subophitic to intergranular texture. Olivine is present as euhedral to subhedral crystals of similar size to the groundmass.

VESICLES:	% Mode	Size (mm): Average	Shape
	3-10	1	Round to irregular

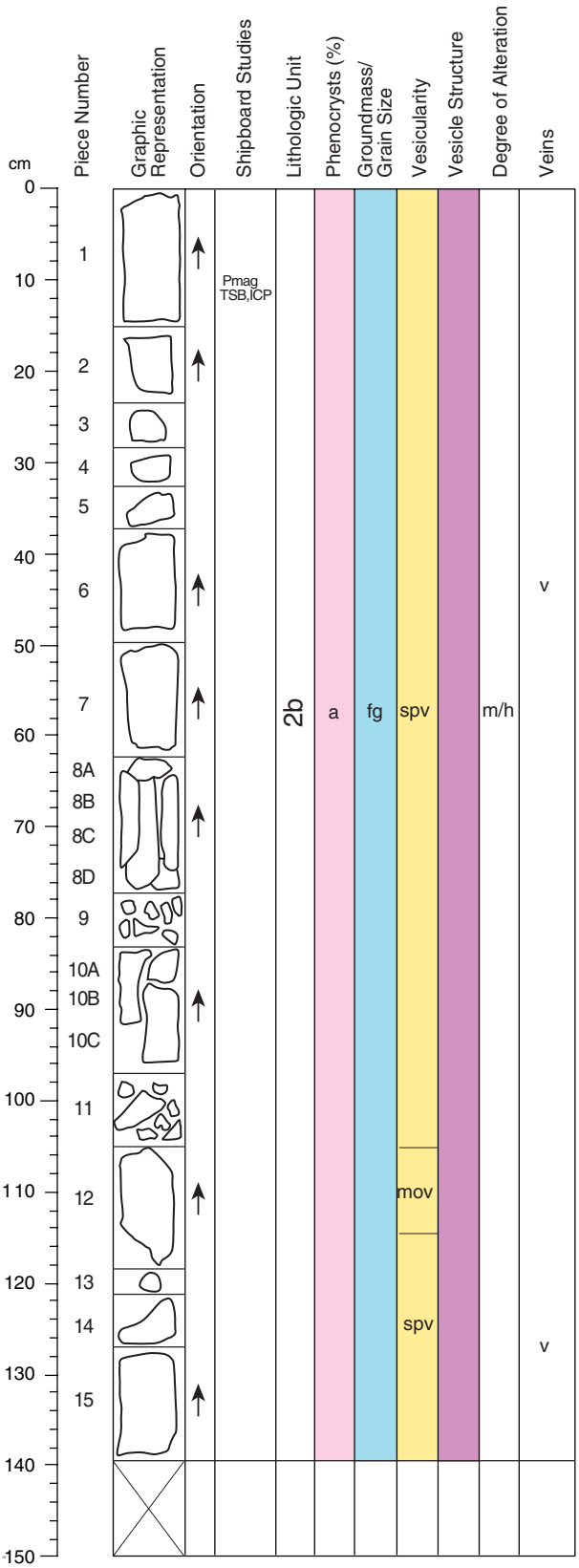
COLOR: Moderate yellowish brown (10YR 5/4) to pale yellowish brown (10YR 6/2).

STRUCTURE: Massive.

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive. Vesicles are filled with white carbonate and Fe oxyhydroxide. Olivine and some clinopyroxene are replaced by Fe oxyhydroxide, which also stains plagioclase laths.

VEINS/FRACTURES: None.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-13R-2 (Section top: 909.77 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-15

CONTACTS: None.

GROUNDMASS: Fine grained. Contains plagioclase and clinopyroxene intergrown in a subophitic to intergranular texture. Olivine is present as euhedral to subhedral crystals of similar size to the groundmass.

VESICLES:	% Mode	Size (mm): Average	Shape
	1-10	0.5	Round to irregular

COLOR: Moderate yellowish brown (10YR 5/4) to pale yellowish brown (10YR 6/2). The base of Piece 15 is medium light gray (N6) and marks a change in the style of alteration.

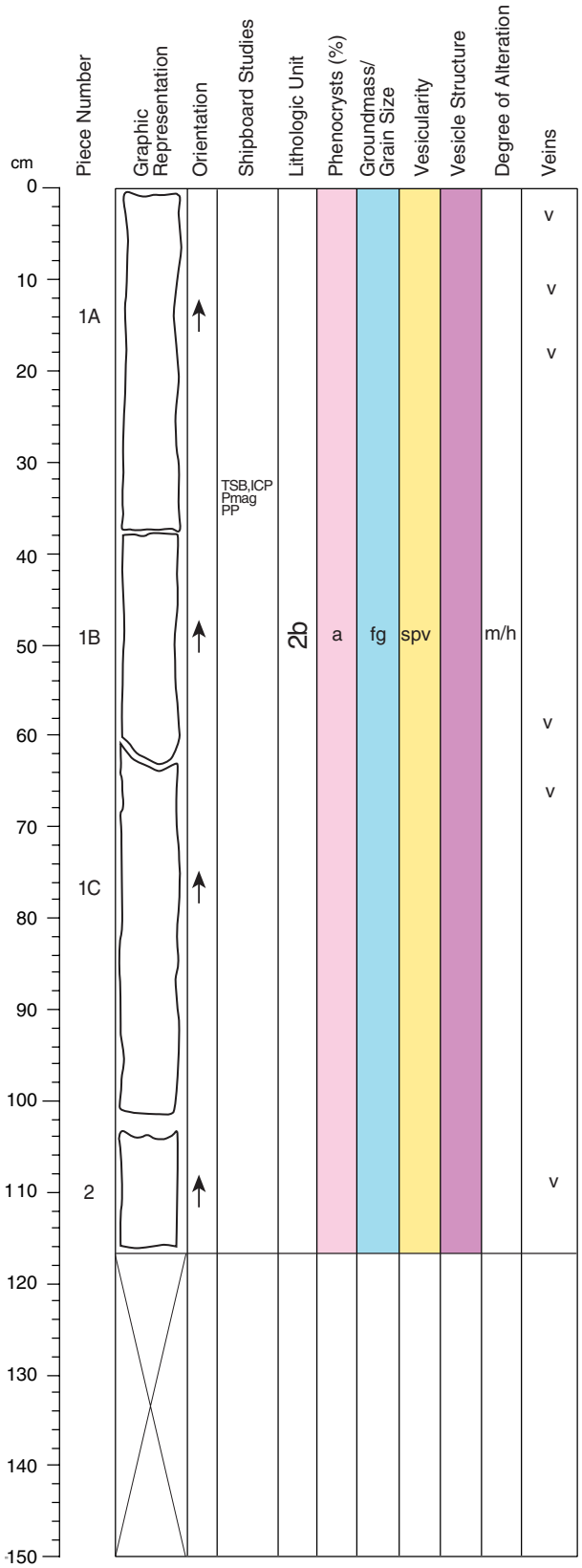
STRUCTURE: Massive.

ALTERATION: Moderate to high. Fe oxyhydroxide is pervasive from Piece 1 to all but the lower part of Piece 15. Vesicles are filled with white carbonate and Fe oxyhydroxide. Olivine and some clinopyroxene are replaced by and the plagioclase laths are stained by Fe oxyhydroxide. At the base of Piece 15, a change in the style of alteration is present. Fe oxyhydroxide is no longer present; blue-green clay is the pervasive alteration mineral. This style of alteration highlights the clinopyroxene, as the plagioclase laths are stained by the clay.

VEINS/FRACTURES: None.

COMMENTS: An increase in vesicle size and abundance occurs in Piece 12.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-13R-3 (Section top: 911.16 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-2

CONTACTS: None.

GROUNDMASS: Fine grained. Contains plagioclase and clinopyroxene intergrown in a subophitic texture, together with black oxide.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-8	2	Irregular

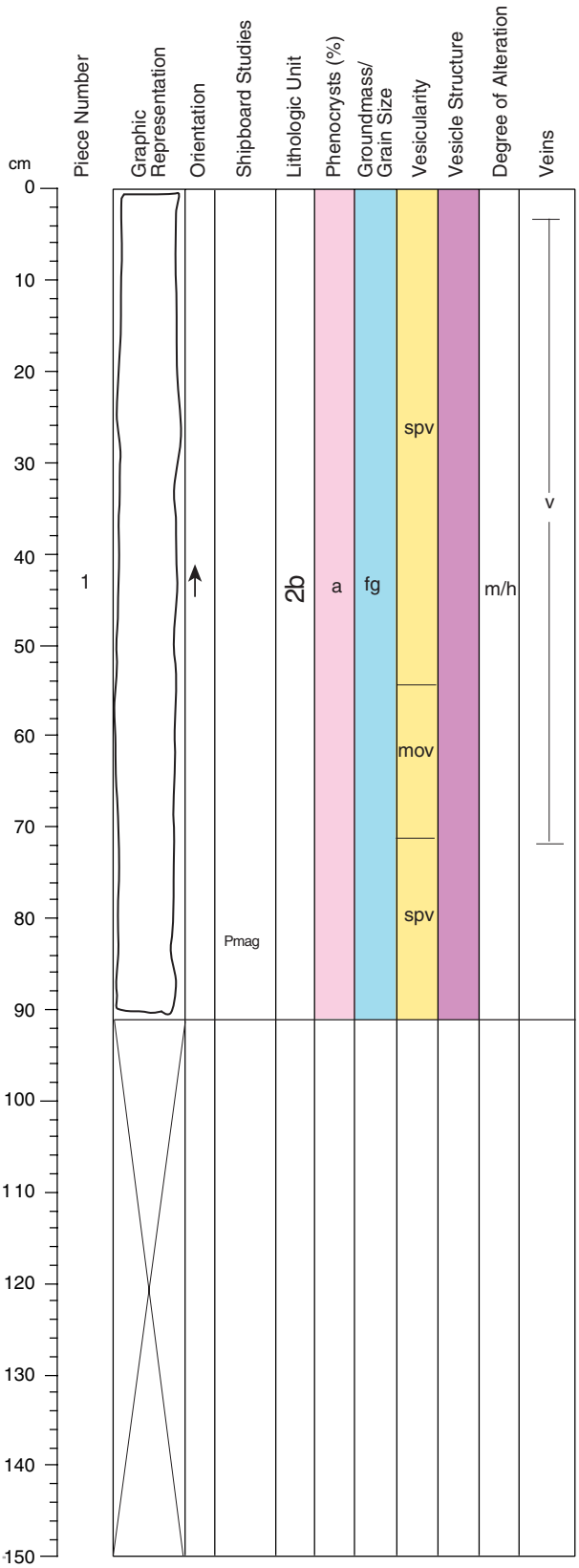
COLOR: Medium gray (N5).

STRUCTURE: Massive.

ALTERATION: High. Plagioclase is partially sericitized, and clinopyroxene is slightly altered to white clay. Vesicles are filled with carbonate and gray-green clay. Secondary sulfide occurs throughout the groundmass.

VEINS/FRACTURES: Sparsely veined. Veins are 0.5-2 mm wide, randomly oriented, and filled with carbonate and gray-green clay, often with an outer layer of sulfide.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-13R-4 (Section top: 912.33 mbsf)

UNIT 2b: DIABASE.

Pieces: 1

CONTACTS: None.

GROUNDMASS: Fine to medium grained. Only some of the clinopyroxene and a little of the plagioclase remains unaltered. The rest is bluish greenish gray clay.

VESICLES:	% Mode	Size (mm): Average	Shape
	5	0.5	Subround

COLOR: Medium gray (N5) with a slight bluish tint when wet.

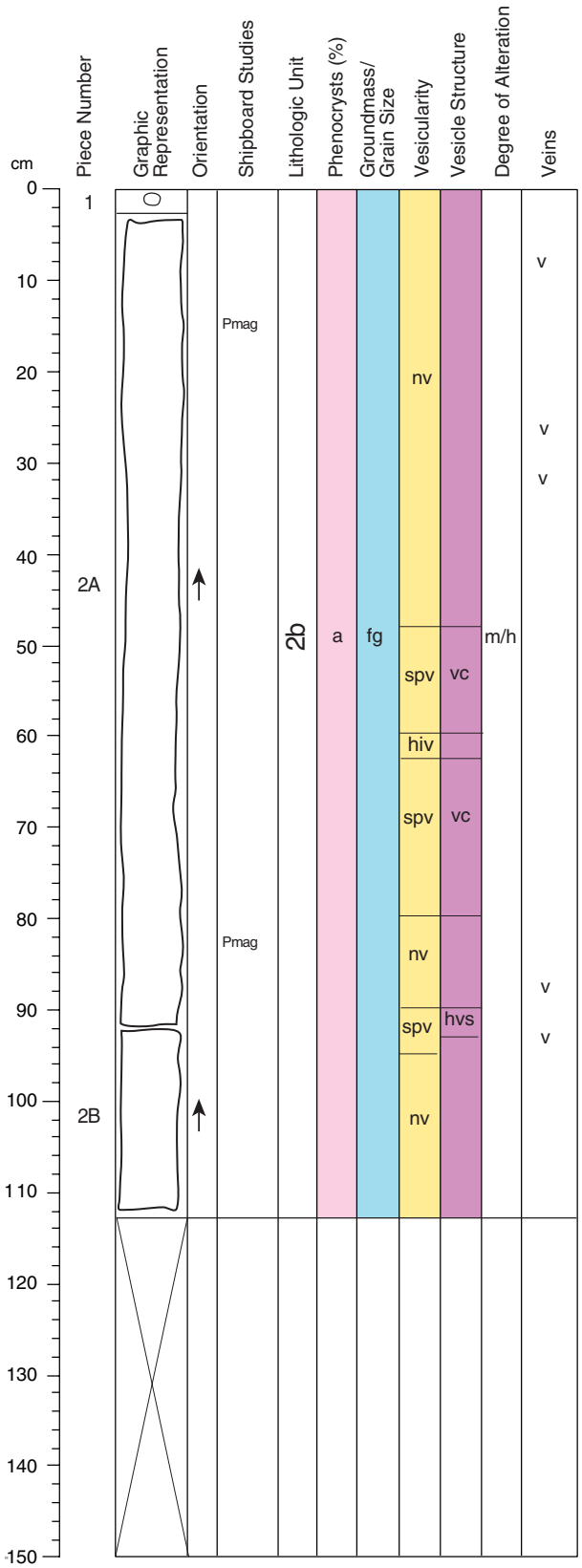
STRUCTURE: Massive.

ALTERATION: High. Most of the groundmass is altered to bluish greenish gray clay. Only some of the clinopyroxene and a little of the plagioclase remains unaltered. Carbonate and Fe oxyhydroxide and sulfide are present in and near veins.

VEINS/FRACTURES: Sparsely veined. Two carbonate filled 1-2 mm wide veins are present, one at 37-40 cm and one at 55-72 cm. A vertical vein <0.5 mm wide and filled with sulfide runs down the middle of the section from 3-55 cm.

COMMENTS: It is difficult to estimate vesicle abundance because they are filled with the same greenish bluish gray clay that replaces most of the groundmass.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-14R-1 (Section top: 915.9 mbsf)

UNIT 2b: DIABASE.

Pieces: 1-2B

CONTACTS: None.

GROUNDMASS: Fine grained. Plagioclase and clinopyroxene form an intersertal texture. Euhedral to subhedral olivine is present and is the same size or smaller than the groundmass.

VESICLES:	% Mode	Size (mm): Average	Shape
	0-5	0.5	Subround to irregular

COLOR: Medium gray (N5) 0-43 cm. Moderate yellowish brown (10YR 5/4) 43-112 cm.

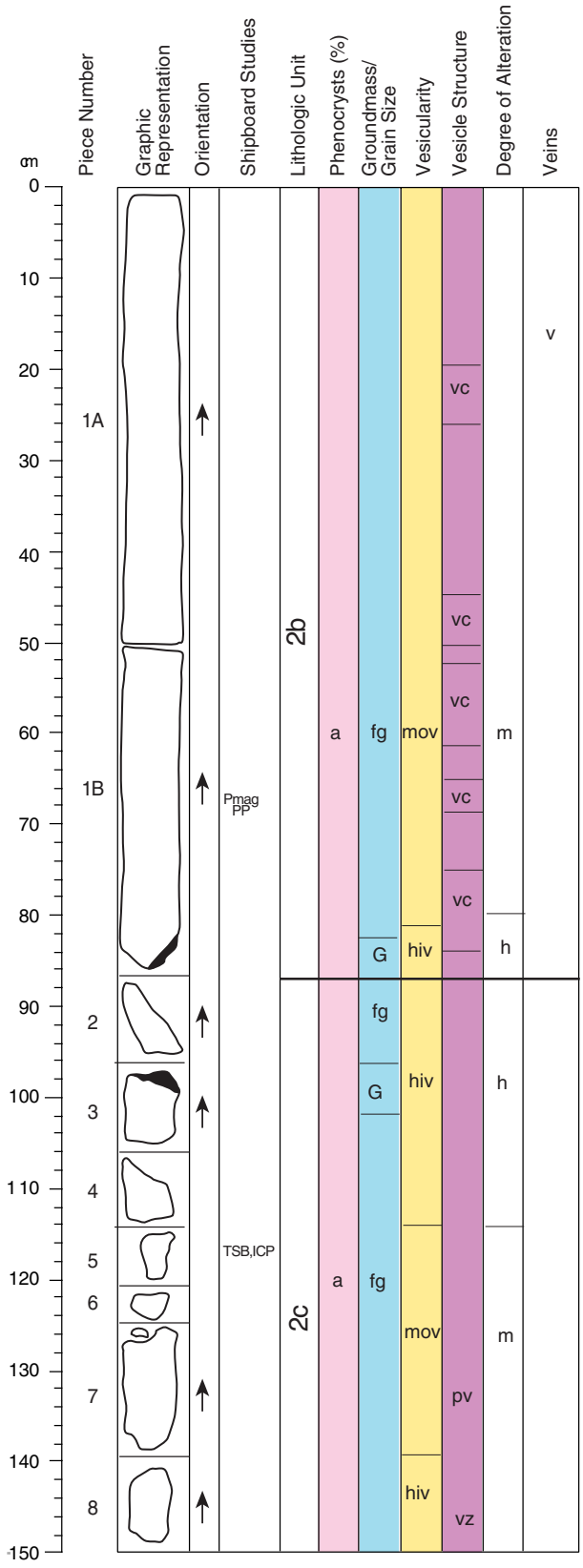
STRUCTURE: Massive.

ALTERATION: Moderate to high. Blue-green clay is pervasive from 0 to 43 cm replacing glass and some clinopyroxene. Sulfide is present in the groundmass throughout this interval. Fe oxyhydroxide is pervasive in the interval 43-112 cm. Olivine is replaced by white carbonate (0-43 cm) and white carbonate and Fe oxyhydroxide (43-112 cm). Vesicles are filled with white carbonate and lined with blue-green clay (0-43 cm) and Fe oxyhydroxide (43-112 cm).

VEINS/FRACTURES: Sparsely veined. Veins are <0.1-2 mm wide, randomly oriented, and filled with white carbonate and either blue-green clay and pyrite (0-43 cm) or Fe oxyhydroxide (43-112 cm).

COMMENTS: A 5-7 mm vesicle cylinder is present in the interval 66-75 cm, Piece 2A. It is filled with white carbonate and segregated material. A 1.5 cm long horizontal vesicle is present at 91 cm in Piece 2A and is filled with white carbonate.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-14R-2 (Section top: 917.02 mbsf)

UNIT 2b: DIABASE.

Pieces: 1A-1B

CONTACTS: None observed. Boundary between Units 2b and 2c is inferred to lie at 85 cm between Pieces 1 and 2.

GROUNDMASS: Fine grained to aphanitic. Only some of the clinopyroxene and a little of the plagioclase remains unaltered in Piece 1A and 51-72 cm in Piece 1B, but below 72 cm the groundmass is aphanitic and consists of variolitic plagioclase microlites in altered mesostasis. Obvious outlines of olivine microphenocrysts that were replaced by Fe oxyhydroxide are present below 72 cm in Piece 1B. Above 72 cm there are smaller and less distinct areas of Fe oxyhydroxide which may have been olivines.

VESICLES:	%	Size (mm):	
	Mode	Average	Shape
	1-10	2	Irregular

COLOR: Dark yellow brown (10YR 4/2) except medium gray (N5) from 12-26 cm.

STRUCTURE: Massive.

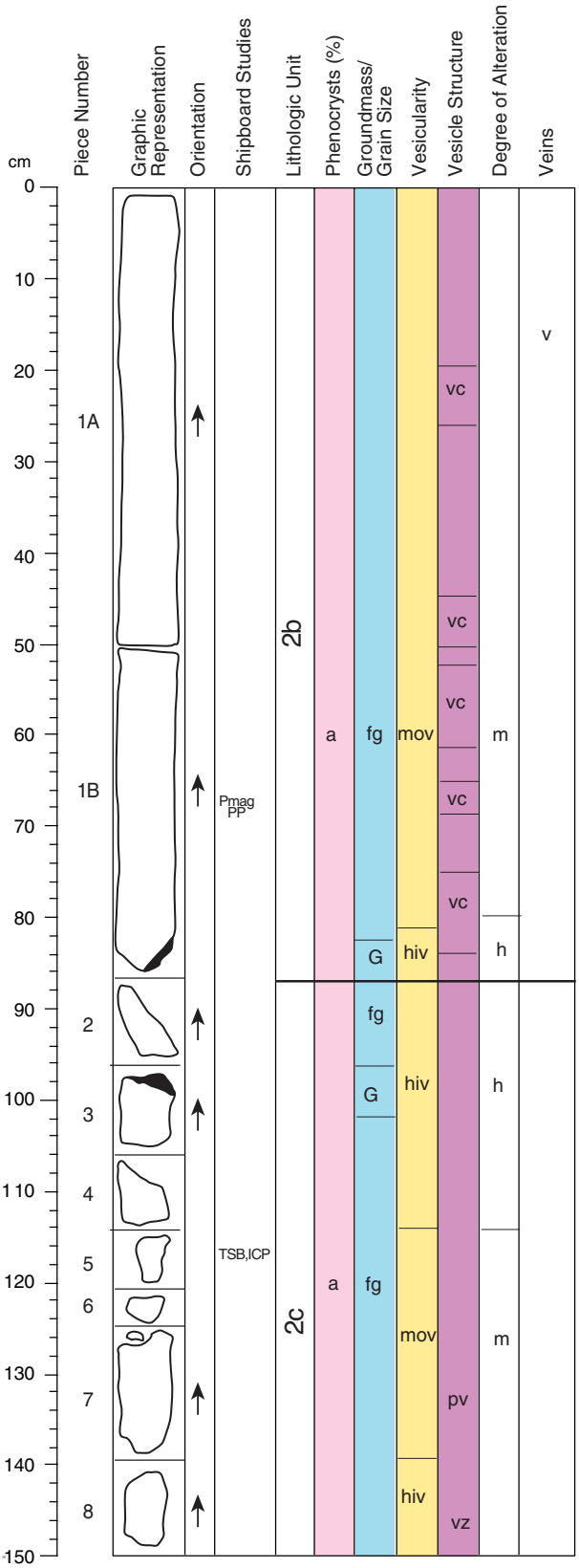
ALTERATION: High (12-26 cm) to moderate. From 12-26 cm most of the groundmass is altered to bluish greenish gray clay, and only some of the clinopyroxene and a little of the plagioclase remains unaltered. Elsewhere some of the groundmass is altered to clay, and Fe oxyhydroxide replaces what appear to have been olivine microphenocrysts. Vesicles are filled with carbonate and Fe oxyhydroxide. Carbonate and Fe oxyhydroxide are present in and near veins. From 10-26 cm sulfide is also present in the vein and in the groundmass.

VEINS/FRACTURES: Sparsely veined. One 1-2 mm wide vein filled with carbonate and sulfide is present at 16-23 cm.

COMMENTS: Vesicles segregation cylinders are present from 75-85 cm, plus three others are scattered from 45-68 cm. Thus, the bottom of Piece 1B appears to be the bottom of the flow. Glass in the bottom of Piece 1B appears altered but may contain some unaltered regions.

(Continued on next page)

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-14R-2 (Continued)

UUNIT 2c: APHYRIC BASALT.

Pieces: 2-8

CONTACTS: None observed. The boundary between Units 2b and 2c is inferred to lie at 85 cm, between Pieces 1 and 2.

PHENOCRYSTS:	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	<1	5	1	1	Subhedral

GROUNDMASS: Aphanitic. Consists of variolitic plagioclase microlites in altered mesostasis. Olivine microphenocrysts have been replaced by Fe oxyhydroxide.

VESICLES:	% Mode	Size (mm): Average	Shape
	1-20	1.5	Subround

COLOR: Dark yellowish brown (10YR 4/2).

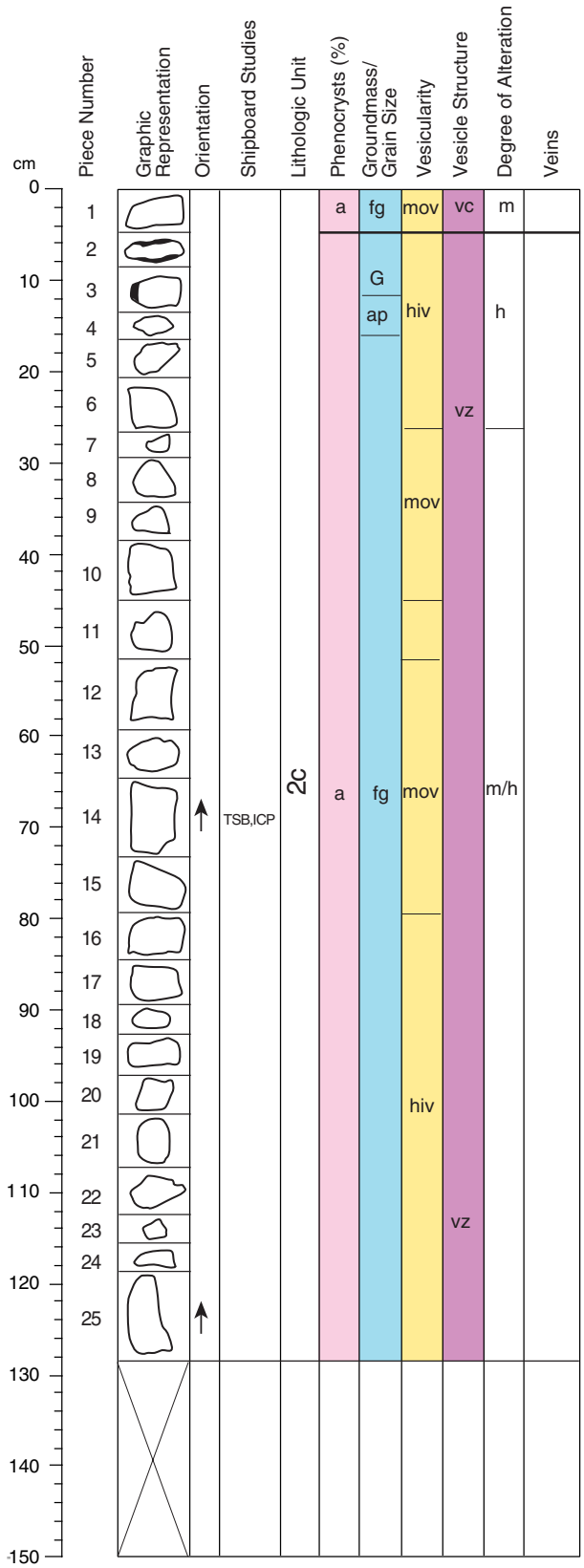
STRUCTURE: Lobed.

ALTERATION: Moderate. Some of the groundmass is altered to clay and Fe oxyhydroxide replace what appear to have been olivine microphenocrysts. Some vesicles are filled with Fe oxyhydroxide and lesser amounts of carbonate. Others are lined with Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. One <1 mm wide vein filled with carbonate and Fe oxyhydroxide is present in Piece 7.

COMMENTS: Vertical vesicle segregation cylinders are present in Piece 7. Glass in the top of Piece 3 appears altered but may contain some unaltered material.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-14R-3 (Section top: 918.52 mbsf)

UNIT 2c: APHYRIC BASALT.

Pieces: 1-25

CONTACTS: None.

PHENOCRYSTS:

	% Mode	Grain Size (mm): Max.	Min.	Avg.	Shape/Habit
Plagioclase:	<3	3	0.5	1.5	Subhedral, prismatic
Olivine:	<1			0.5	Subhedral

GROUNDMASS: Fine grained to aphanitic. The groundmass contains plagioclase, clinopyroxene, and black oxides.

VESICLES:

% Mode	Size (mm): Average	Shape
2-25	2	Irregular

COLOR: Brownish gray (5YR 4/1).

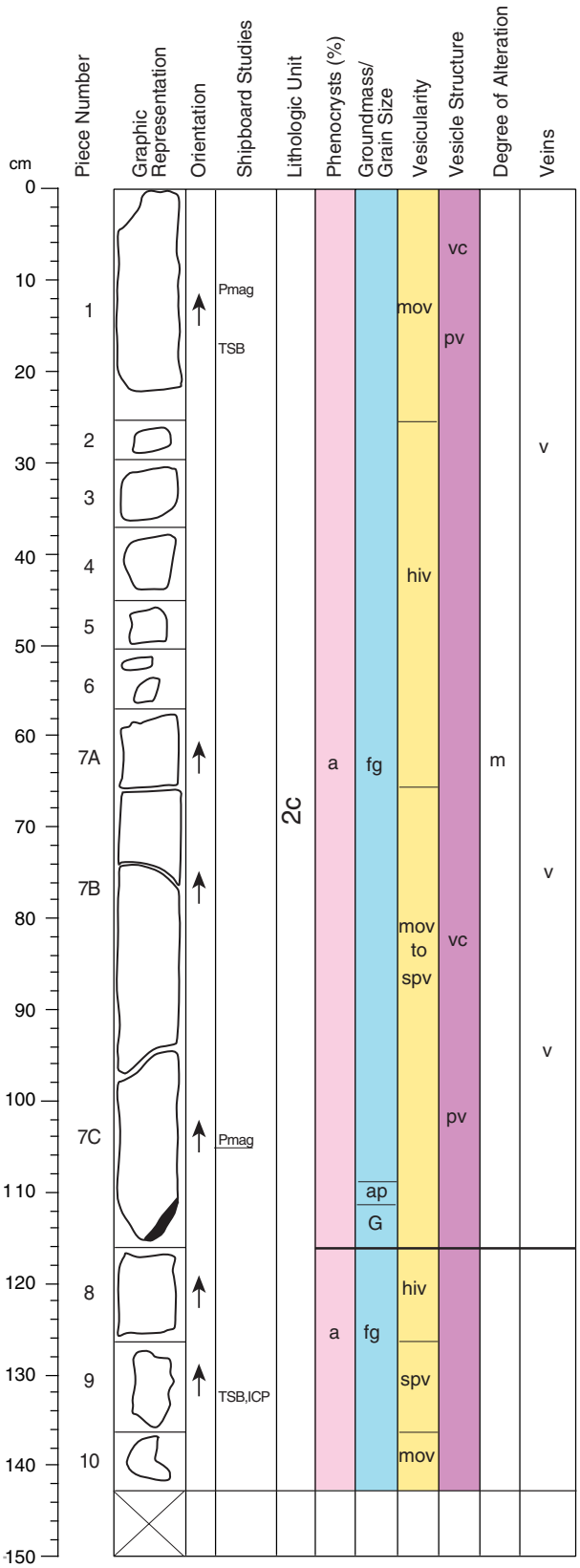
STRUCTURE: Lobed. Glassy lobe margins are present in Pieces 2 and 3.

ALTERATION: Moderate to high. Glass in Pieces 2 and 3 is completely devitrified. Olivine is completely replaced by Fe oxyhydroxide and carbonate. Vesicles are filled with carbonate and lesser amounts of Fe oxyhydroxide. Some sulfur coating on Piece 4.

VEINS/FRACTURES: None.

COMMENTS: A vesicle cylinder (25 mm long, 3 mm wide), composed of carbonate-filled vesicles, and surrounded by quench plagioclase and feathery clinopyroxene crystals, is present in Piece 1.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-15R-1 (Section top: 925.6 mbsf)

UNIT 2c: APHYRIC BASALT.

Pieces: 1-10

CONTACTS: None.

GROUNDMASS: Fine grained to aphanitic in more vesicular regions. The groundmass contains plagioclase, clinopyroxene, black oxides, and olivines that have been completely altered to Fe oxyhydroxide. Variolitic texture is present near the lobe margin in Piece 7C.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-30	2-3	Round to irregular

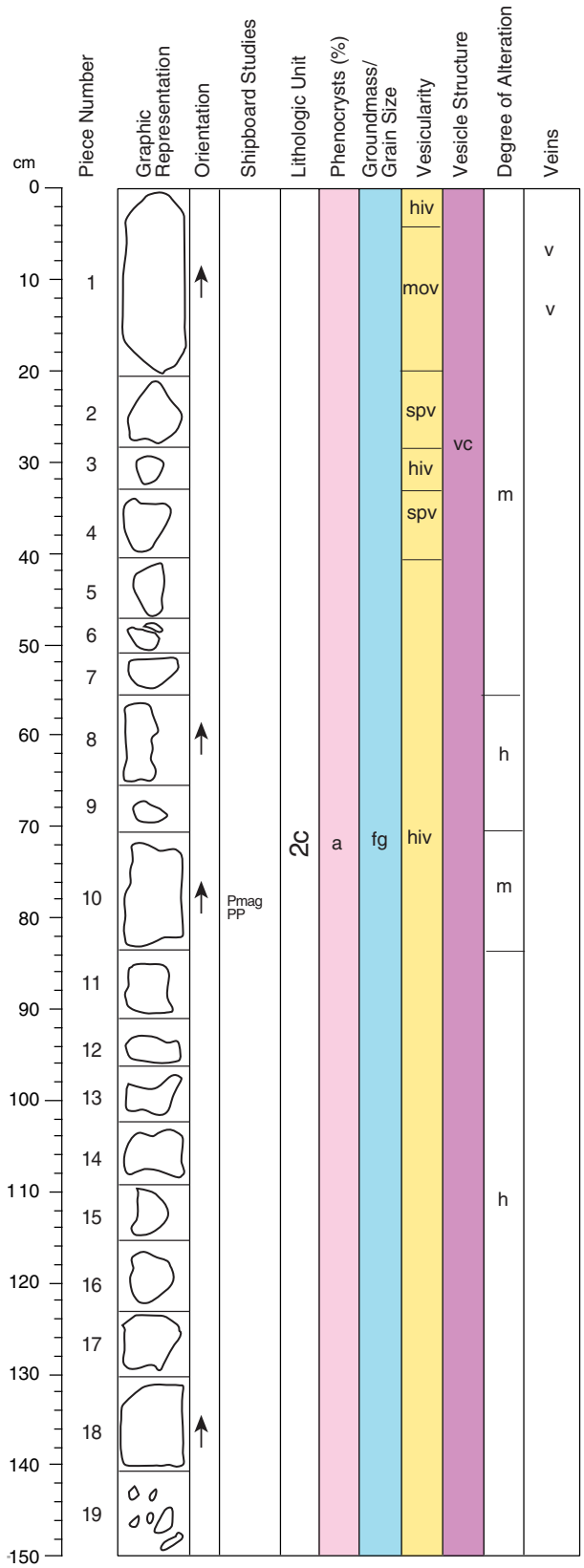
COLOR: Dark brownish gray (10YR 4/2) in moderately altered areas, and dark brown in highly altered areas (10YR 3/3).

STRUCTURE: Lobed. A glassy lobe margin is found in Piece 7C at 116 cm. Lobe structure is also supported by changes in vesicularity, including pipe vesicles and vesicle cylinders in Pieces 1 and 7.

ALTERATION: Moderate to high. Highly altered in the more vesicular areas, near lobe margins, and near veins.

VEINS/FRACTURES: Sparsely veined. Thin (<1 mm wide) veins are present in Pieces 2 and 7, and are filled with white carbonate and Fe oxyhydroxide.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-15R-2 (Section top: 927.04 mbsf)

UNIT 2c: APHYRIC BASALT.

Pieces: 1-19

CONTACTS: None.

GROUNDMASS: Fine grained to glassy and aphanitic near lobe margins. The groundmass contains plagioclase, clinopyroxene, and black oxides with an intersertal texture. A subvariolitic texture is visible in the aphanitic region in Piece 16A.

VESICLES:	% Mode	Size (mm): Average	Shape
	1-30	2	Round to irregular

COLOR: Brownish gray (5YR 4/1) in moderately altered areas, and moderate brown in highly altered areas (10YR 4/6).

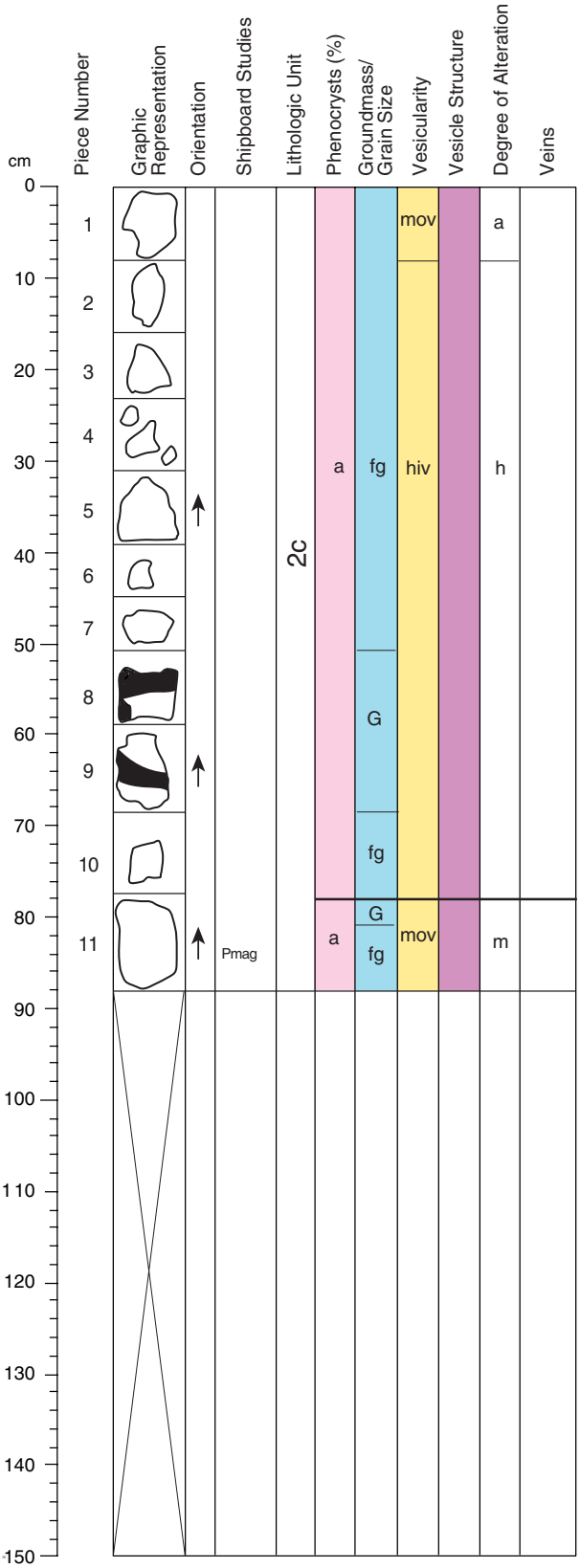
STRUCTURE: Lobed. A thin glassy lobe margin is found in Piece 18. Two margins surrounded by a hyaloclastite lapilli tuff are found in Pieces 16 and 18.

ALTERATION: Moderate to high. Highly altered in the more vesicular areas near the hyaloclastite lapilli tuff. Vesicles are filled with carbonate and Fe oxyhydroxide in Pieces 1, 2, 3, 5, 6, 7, and 10, and remain unfilled in the remainder of the pieces.

VEINS/FRACTURES: Sparsely veined. Thin (<1 mm) wide veins are present in Piece 1 and are filled with carbonate and Fe oxyhydroxide.

COMMENTS: A small vesicle cylinder (20 mm long, 3 mm wide), composed of carbonate-filled vesicles, and surrounded by quenched plumose clinopyroxene crystals, is present at 27-29 cm.
Slivers of hyaloclastite lapilli tuff found in Pieces 16 and 18 consist of irregular and angular basalt clasts 1-5 mm in size, in a fine-grained carbonate matrix.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-15R-3 (Section top: 928.54 mbsf)

UNIT 2c: APHYRIC BASALT.

Pieces: 1-11

CONTACTS: None.

GROUNDMASS: Fine grained. The groundmass contains plagioclase, clinopyroxene, and black oxides. Glassy and aphanitic near lobe margin.

VESICLES:	% Mode	Size (mm): Average	Shape
	5-30	3	Round to irregular

COLOR: Brownish gray (5YR 4/1) in moderately altered areas, and moderate brown in highly altered areas (10YR 4/6).

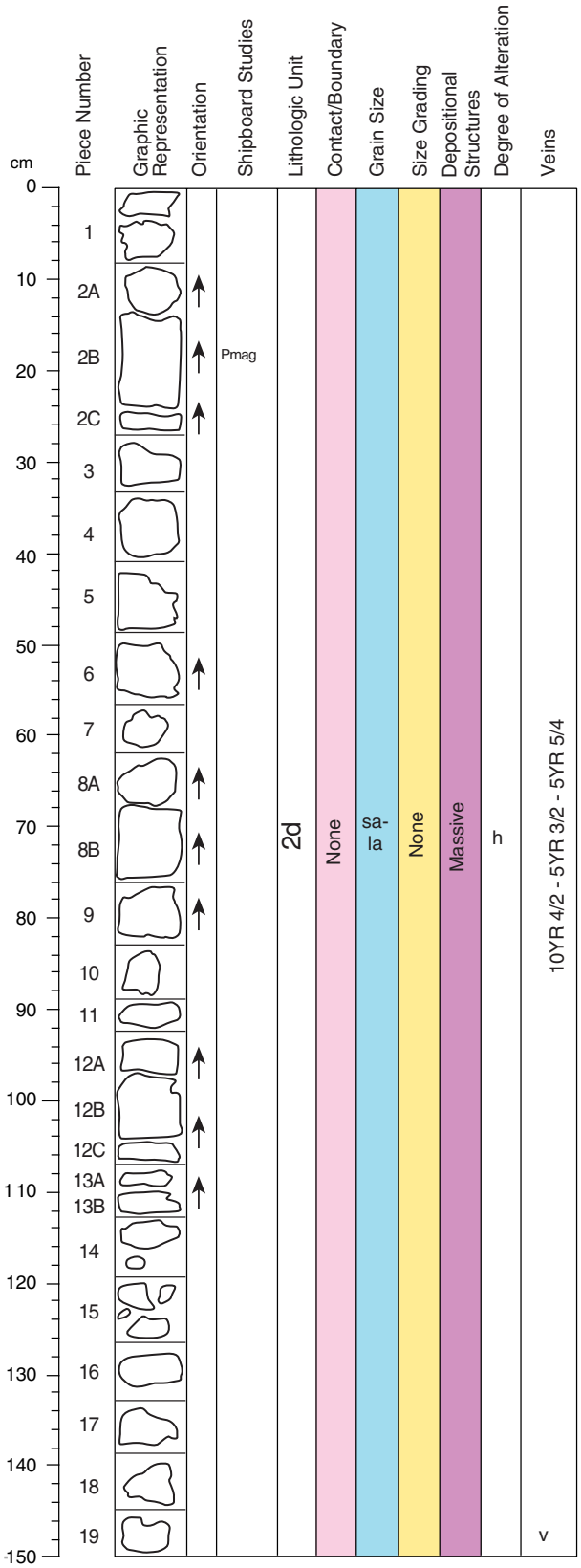
STRUCTURE: Lobed. A sub-mm glassy lobe margin is found in Piece 11 at 79 cm.

ALTERATION: Moderate to high. Highly altered in the more vesicular areas in Pieces 2-10. Vesicles are filled with Fe oxyhydroxide in Piece 1, carbonate in Piece 11, and remain unfilled in the remainder of the pieces.

VEINS/FRACTURES: None.

COMMENTS: In Pieces 8 and 9 a yellow hyaloclastic lapilli tuff is present on the basalt margins.

Core Photo



VOLCANICLASTIC VISUAL CORE DESCRIPTION

197-1204B-16R-1 (Section top: 935.2 mbsf)

UNIT 2d: HYALOCLASTITE LAPILLI BRECCIA.

Pieces: 1-19

CONTACTS: None.

GENERAL DESCRIPTION: Matrix supported, very poorly sorted lapilli breccia consisting of a coarse fraction comprised of angular medium lapilli to breccia (10-120 mm) fragments and a matrix of fine lapilli (1-5 mm).

COLOR: Varies from yellow brown (5YR 5/4) to brown (5YR 3/2). The lava clasts are typically gray brown (10YR 4/2), whereas basalt glass fragments vary from dark brown (5YR 3/2) through light brown (5YR 5/6) to yellow brown (5YR 5/4). The matrix color is typically yellow brown (10YR 6/6).

COMPONENTS:
The clast (coarse fraction) to matrix ratio is typically between 30/70 and 40/60.

10%-15%: Sparsely to moderately vesicular, angular aphanitic lava fragments (20-120 mm) that typically have variolitic texture. Fragments often have remnants of glassy lobe margins along their edges. A few are completely surrounded by glass (i.e., Pieces 2 and 12B) and may represent small lava toes intercalated with the lapilli breccia.

15%-30%: Highly altered, moderately to highly vesicular basalt glass fragments (10-80 mm) that exhibit blocky-equant (broken) shapes. Rare clasts are elongated to spherical, with convoluted lobate outlines and contain long (<15 mm) oval vesicles[1].

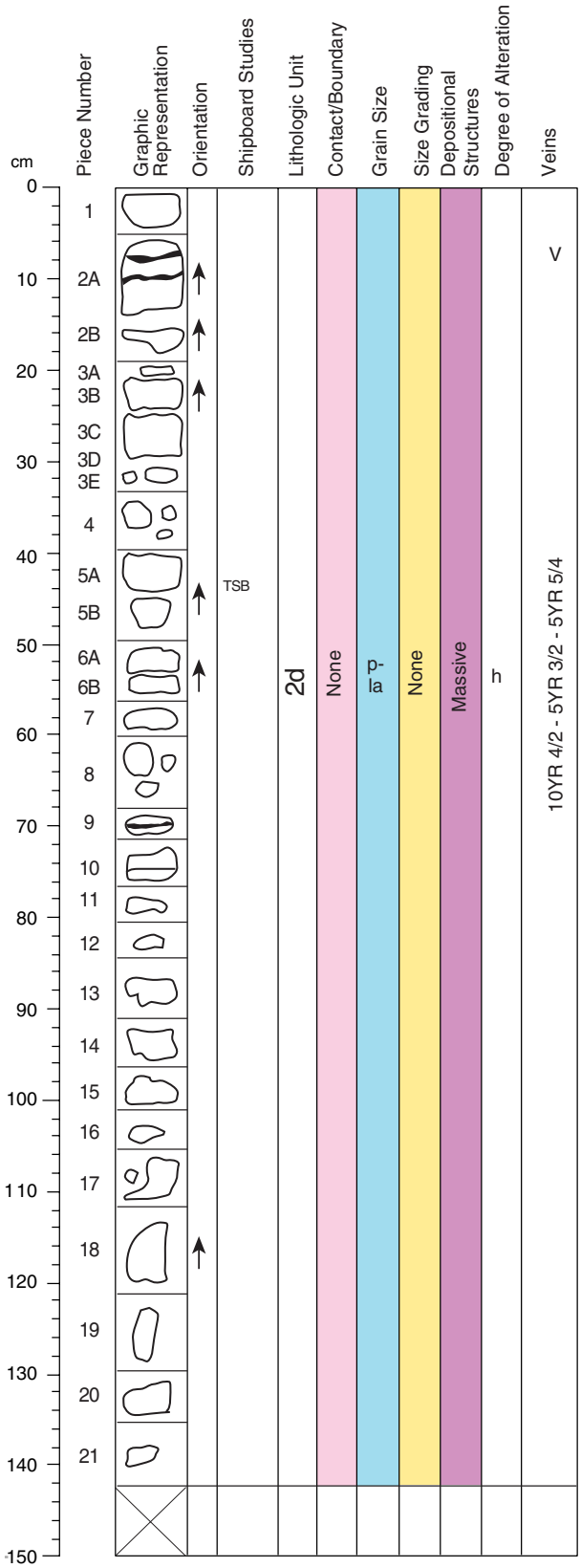
60%-70%: Angular basaltic glass (<1-10 mm), typically altered to palagonite and clay.
All clast types contain scattered (<1%) euhedral olivine.

SEDIMENTARY TEXTURES: Sorting is extremely poor and in terms of grain size there is a continuous range from the matrix to the coarse fraction. No discernable size grading.

SEDIMENTARY STRUCTURES: Massive, matrix supported breccia, with a matrix supported interval at 40-49 cm (Piece 5).

COMMENTS: [1]The dominance of blocky clasts is consistent with origin by quenched fragmentation of lava entering water, thus the convoluted shapes may be formed by disintegration of molten lava in littoral explosions.

Core Photo



VOLCANICLASTIC VISUAL CORE DESCRIPTION

197-1204B-16R-2 (Section top: 936.7 mbsf)

UNIT 2d: HYALOCLASTITE LAPILLI BRECCIA.

Pieces: 1-21

CONTACTS: None.

GENERAL DESCRIPTION: Matrix supported, very poorly sorted lapilli breccia consisting of a coarse fraction comprised of angular medium lapilli to breccia (10-100 mm) fragments and a matrix of fine lapilli (1-5 mm).

COLOR: Varies from yellow brown (5YR 5/4) to brown (5YR 3/2). The lava clasts are typically medium gray (10YR 4/2), whereas basalt glass fragments vary from dark brown (5YR 3/2) through light brown (5YR 5/6) to yellow brown (5YR 5/4). The matrix color is typically yellow brown (10YR 6/6).

COMPONENTS:
The clast (coarse fraction) to matrix ratio is typically between 30/70 and 40/60.

10%-15%: Sparsely to moderately vesicular, angular aphanitic lava fragments (10-100 mm) that typically have variolitic texture. Fragments often have remnants of glassy lobe margins along their edges. A few are completely surrounded by glass (i.e., Pieces 2A and 5A) and may represent small lava toes intercalated with the lapilli breccia.

15%-30%: Highly altered, moderately to highly vesicular basalt glass fragments (10-40 mm) that exhibit blocky-equant (broken) shapes. Rare clasts are elongated to spherical, with convoluted lobate outlines[1].

60%-70%: Angular basaltic glass (<1-10 mm), typically altered to palagonite and clay.

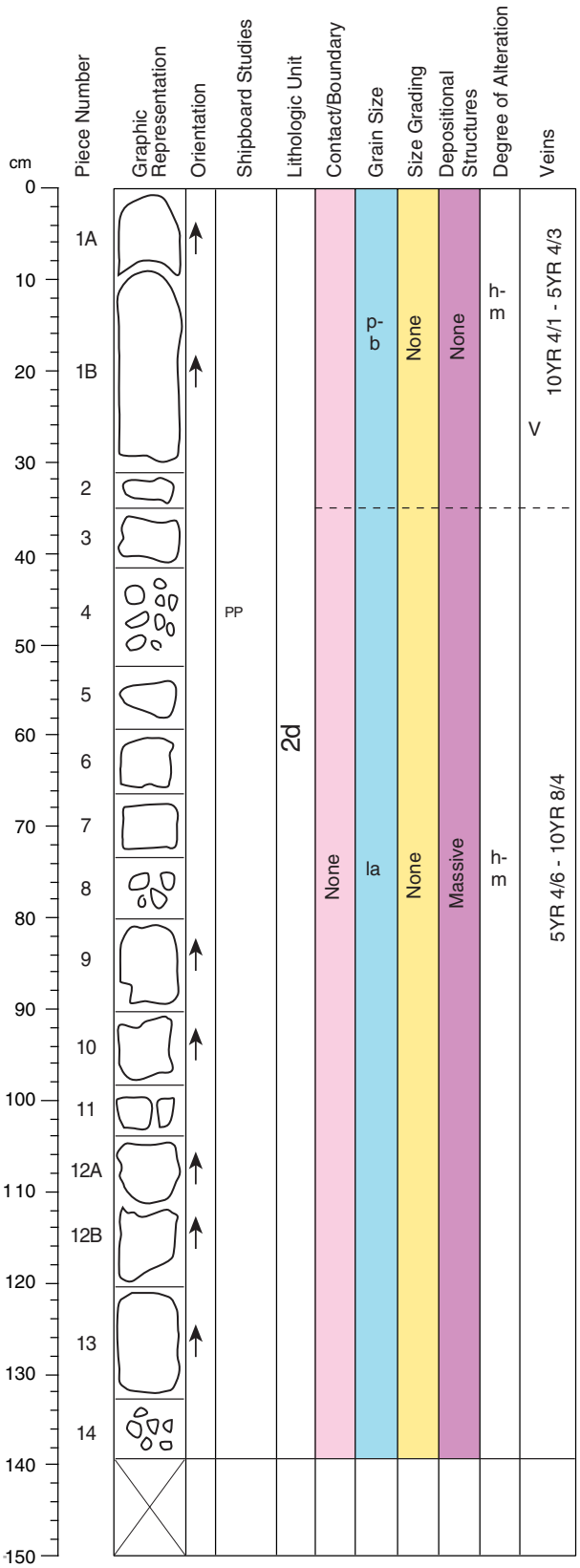
All clast types contain scattered (<1%) euhedral olivine.

SEDIMENTARY TEXTURES: Sorting is extremely poor and in terms of grain size there is a continuous range from the matrix to the coarse fraction. No discernable size grading.

SEDIMENTARY STRUCTURES: Massive, matrix supported breccia, with a matrix supported interval at 0-5 cm (Piece 1).

COMMENTS: [1]The dominance of blocky clasts is consistent with origin by quenched fragmentation of lava entering water, thus the convoluted shapes may be formed by disintegration of molten lava in littoral explosions. Pieces 17-21 are aphyric basalt, and are identical to the other basalt in this unit. There is a glassy lobe margin on Piece 17 at 107 cm. The observed aphyric basalt continues to Section 16R-3, Piece 2. They are described as basalt clast here, but it could also represent a subunit.

Core Photo



VOLCANICLASTIC VISUAL CORE DESCRIPTION

197-1204B-16R-3 (Section top: 938.12 mbsf)

UNIT 2d: HYALOCLASTITE LAPILLI BRECCIA.

Pieces: 1-14

CONTACTS: None.

GENERAL DESCRIPTION: Matrix supported, very poorly sorted lapilli breccia consisting of a coarse fraction comprised of angular medium lapilli to breccia (10-120 mm) fragments and a matrix of fine lapilli (1-5 mm). Large basalt clasts (90-180 mm) without matrix are also present.

COLOR: Varies from yellow brown (5YR 5/4) to brown (5YR 3/2). The lava clasts are typically gray brown (10YR 4/2), whereas basalt glass fragments vary from dark brown (5YR 3/2) through light brown (5YR 5/6) to yellow brown (5YR 5/4). The matrix color is typically yellow brown (10YR 8/4).

COMPONENTS:
50%: Angular basaltic clasts, 10 to 190 cm in size. Clasts are moderately to highly vesicular aphanitic lava fragments with a variolitic texture. A few are completely surrounded by glass selvages and may represent small lava toes intercalated with the lapilli breccia.

30%: Moderately to highly vesicular, angular basaltic glass fragments, <1-10 mm in size. Most clasts are altered to yellowish orange palagonite and clay.

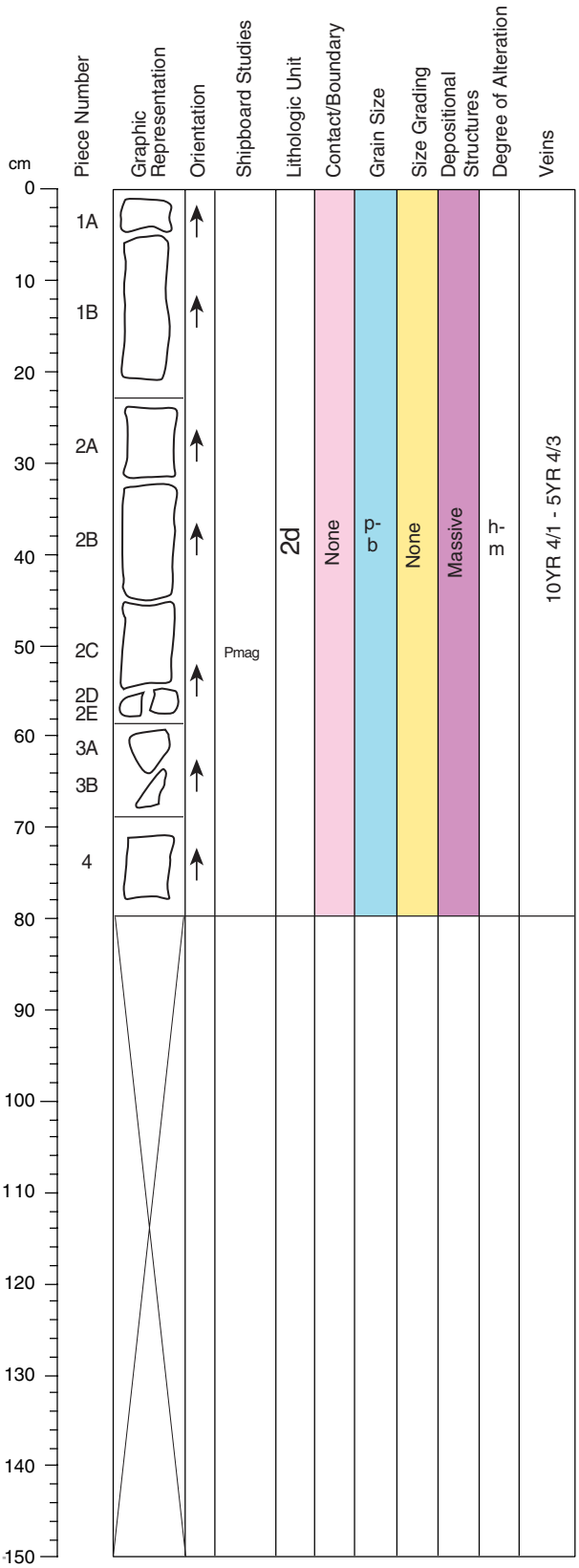
20%: White zeolite(?) cement.

SEDIMENTARY TEXTURES: Sorting is extremely poor and in terms of grain size there is a continuous range from the matrix to the coarse fraction. No discernable size grading.

SEDIMENTARY STRUCTURES: Massive, mainly matrix supported breccia. Piece 13, contains multiple clasts (~2 mm) and is clast supported.

COMMENTS: Pieces 1-2 are large (80-190 mm) clasts of vesicular basalt. They appear to be a continuation from the bottom of Section 16R-2. They may represent large clasts incorporated into the breccia, or alternatively may represent part of a lobe (i.e., a new subunit).

Core Photo



VOLCANICLASTIC VISUAL CORE DESCRIPTION

197-1204B-16R-4 (Section top: 939.51 mbsf)

UNIT 2d: HYALOCLASTITE LAPILLI BRECCIA.

Pieces: 1-4

CONTACTS: None.

GENERAL DESCRIPTION: Matrix supported very poorly sorted lapilli breccia comprised of angular basaltic glass clasts <1-80 mm in size in a white cement. Clasts are broadly bimodal in size, ranging from <1-10 mm and >10-80 mm. Some of the larger clasts (e.g., 1-10 cm) may represent small in situ lobes or parts of lobes that have brecciated in contact with water and produced hyaloclastite.

COLOR: Clasts are reddish brown (2.5YR 3/3) and matrix is yellowish orange (10YR 6/6).

COMPONENTS:
40%: Angular basaltic clasts, 10 to 80 cm in size. Clasts are moderately to highly vesicular aphanitic lava fragments with a variolitic texture. A few are completely surrounded by glass and may represent small lava toes intercalated with the lapilli breccia.

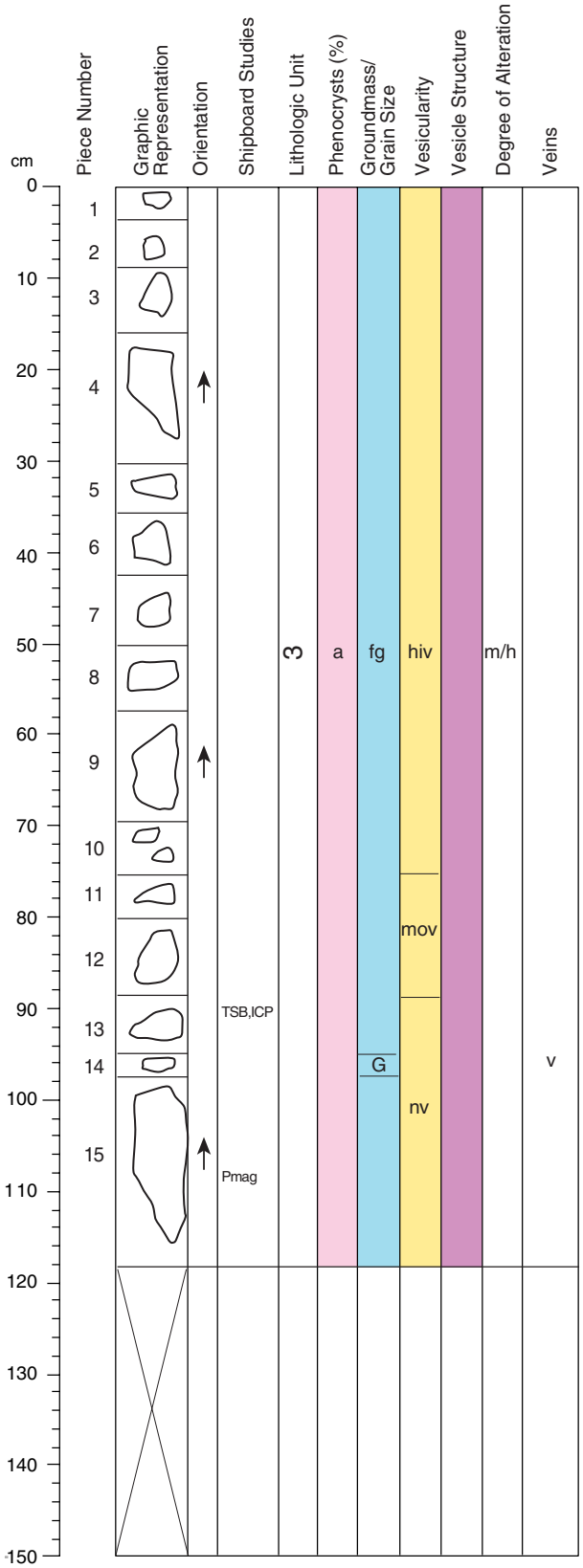
40%: Moderately to highly vesicular, angular basaltic glass fragments, <1-10 mm in size. Most clasts are altered to yellowish orange palagonite and clay.

20%: White zeolite(?) cement.

SEDIMENTARY TEXTURES: Extremely poorly sorted. No discernable grading. Deposit is matrix supported overall, but appears clast supported in interval 32-44 cm, where we see an abundance of larger basalt fragments.

SEDIMENTARY STRUCTURES: None.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-17R-1 (Section top: 944.9 mbsf)

UNIT 3: APHYRIC BASALT.

Pieces: 1-15

CONTACTS: None.

GROUNDMASS: Fine grained. The intersertal groundmass contains plagioclase, clinopyroxene, black oxides, and altered olivine.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	20-25	1-2	Irregular

COLOR: Gray (10YR 5/1) in moderately altered areas and weak red (2.5YR 5/2) in more altered areas.

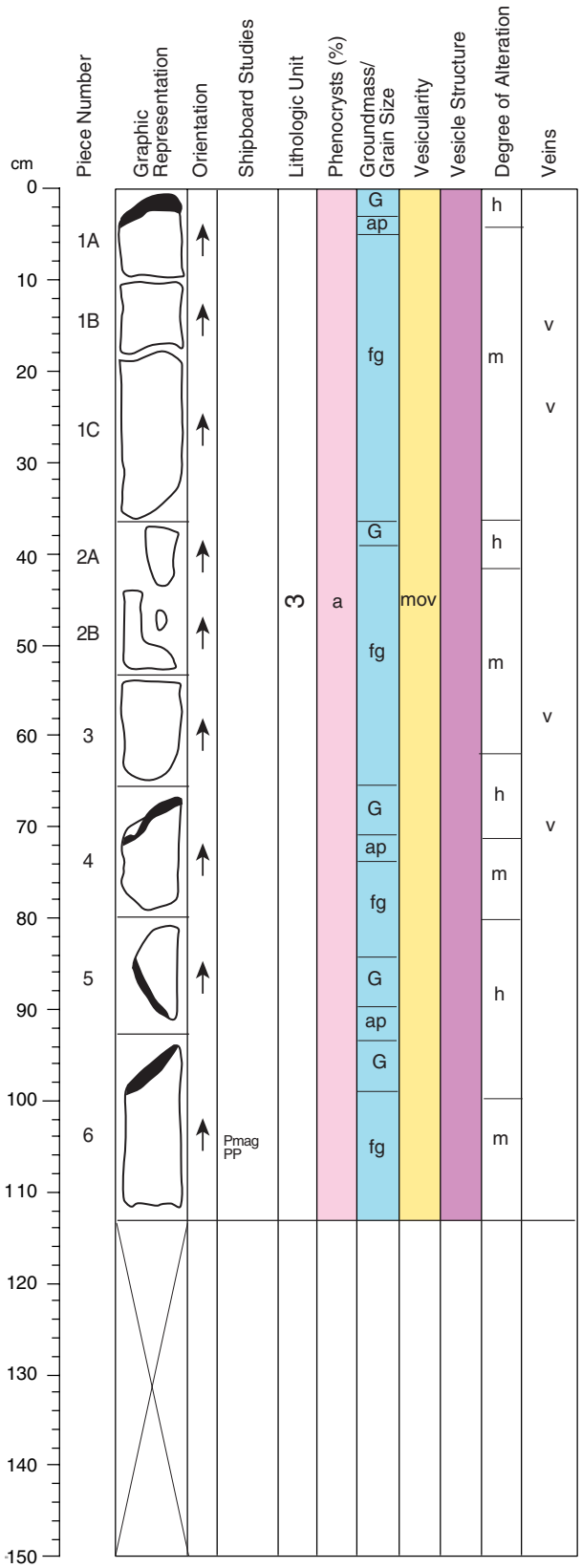
STRUCTURE: Possibly lobed. Piece 14 is glass, but it is not obviously related to Pieces 13 and 15.

ALTERATION: Moderate to high. Patchy distribution of vesicles filled with white carbonate (50%) and unfilled (50%). Sulfides occur in groundmass. Olivine has been completely altered to Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. A white carbonate, 1-3 mm wide vein is present in Piece 15.

COMMENTS: Piece 6 consists of a 5 cm, highly vesicular, ovoid basalt clast (lobe toe?) with glassy margins in a hyaloclastite lapilli breccia similar to that described in Core 16R4.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-17R-2 (Section top: 946.08 mbsf)

UNIT 3: APHYRIC BASALT.

Pieces: 1-6

CONTACTS: None.

GROUNDMASS: Fine grained. The intergranular groundmass contains plagioclase, clinopyroxene, black oxides, and altered olivine.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	20-25	2	Irregular

COLOR: Grayish brown (10YR 5/2) in moderately altered areas, reddish brown (5YR 5/4) in more altered areas and yellow (2.5Y 8/8) adjacent to glassy lobe margins.

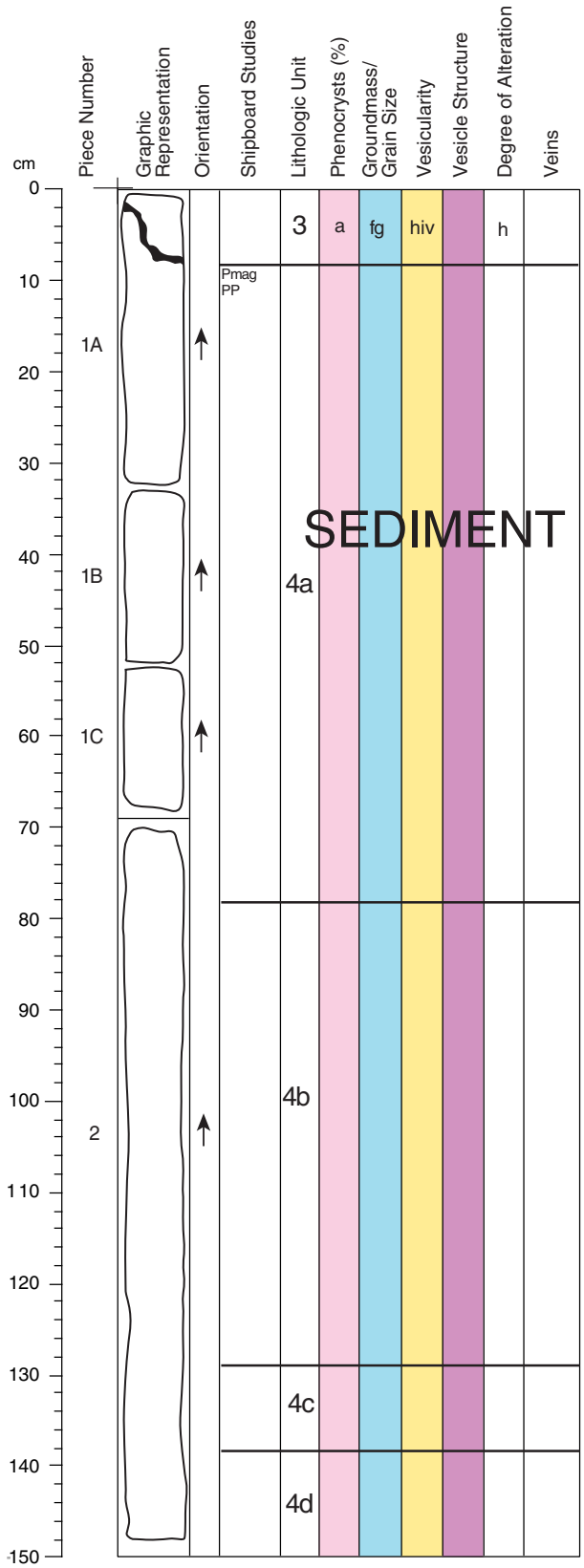
STRUCTURE: Lobed. Pieces 1A, 2, 4, 5, and 6 have aphanitic groundmass bordered by a 1-5 mm glass rim and a 1-5 mm thick layer of yellow sediment.

ALTERATION: Moderate to high. Patchy distribution of vesicles filled with white carbonate. Olivine has been completely altered to Fe oxyhydroxide.

VEINS/FRACTURES: Sparsely veined. Thin <1 mm white carbonate veins are present in Piece 1B, 1C, 3, and 4.

COMMENTS: Presence of numerous glassy margins indicates 20-40 cm thick lobes.

Core Photo



IGNEOUS ROCK VISUAL CORE DESCRIPTION

197-1204B-17R-3 (Section top: 947.21 mbsf)

UNIT 3: APHYRIC BASALT.

Pieces: 1A

CONTACTS: Contact between Units 3 and 4a is represented by an irregular sub-planar glassy margin from 2-7 cm.

GROUNDMASS: Fine grained. The intergranular groundmass contains plagioclase, clinopyroxene, black oxides, and olivine that has been completely altered to Fe-oxyhydroxide.

VESICLES:	% Mode	Size (mm): Average	Shape
Highly vesicular	20-25	1	Irregular

COLOR: Grayish brown (2.5YR 5/2).

STRUCTURE: Lobed. The basalt has a red (5YR 5/8), 5 mm glassy margin bordered by an aphanitic groundmass.

ALTERATION: High. Vesicles filled with white carbonate.

VEINS/FRACTURES: None.

Hole 1204A Smear Slides

Sample						Texture			Mineral												Biogenic					
Core	Core Type	Section	Top (cm)	Depth (mbsf)	Lithology	Sand	Silt	Clay	Accessory Minerals	Dolomite	Calcite	Gypsum	Fe Oxide	Pyrite	Opaques	Quartz	Feldspar	Volcanic Glass	Palagonite	Clays	Nannofossils	Foraminifers (whole)	Foraminifers Tests	Sponge Spicules	Organic Debris	Comments
1	R	1	2	761.92	D	-	-	-	0	0	0	0	0	0	0	0	0	3	3	0	87	0	7	0	0	Nannofossil chalk
1	R	1	7	761.97	D	-	-	-	0	0	0	0	0	0	0	0	0	3	3	0	88	0	6	0	0	Nannofossil chalk
1	R	1	45	762.35	M	-	-	-	0	0	0	0	0	0	0	0	0	10	8	19	59	0	0	0	4	Nannofossil clay with vitric ash
1	R	1	69	762.59	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	98	0	0	1	1	Nannofossil chalk
1	R	1	110	763.00	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	Nannofossil chalk
1	R	2	29	763.69	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	Nannofossil chalk
1	R	2	99	764.39	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	Nannofossil chalk
1	R	2	140	764.80	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	Nannofossil chalk
1	R	3	40	765.30	D	-	-	-	0	0	0	0	0	0	3	0	0	0	0	0	94	0	0	0	3	Nannofossil chalk
1	R	3	93	765.83	D	-	-	-	0	0	4	0	2	2	0	0	0	2	0	0	90	0	0	0	0	Nannofossil chalk
1	R	4	40	766.80	D	-	-	-	0	0	0	0	2	0	2	0	0	0	0	0	96	0	0	0	0	Nannofossil chalk
1	R	4	142	767.82	D	-	-	-	0	0	0	0	3	0	0	0	0	3	0	0	91	0	3	0	0	Nannofossil chalk
1	R	5	101	768.91	D	-	-	-	0	0	2	0	0	0	0	0	0	0	0	0	98	0	0	0	0	Nannofossil chalk
1	R	5	146	769.36	D	-	-	-	0	0	3	0	2	0	3	0	0	5	0	0	87	0	0	0	0	Nannofossil chalk
1	R	6	44	769.84	D	-	-	-	0	0	0	0	2	0	0	0	0	4	0	0	94	0	0	0	0	Nannofossil chalk
2	R	1	120	772.70	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	Nannofossil chalk
2	R	2	45	773.45	D	-	-	-	0	0	0	0	0	0	0	0	2	0	0	0	98	0	0	0	0	Nannofossil chalk
2	R	3	19	774.69	M	0	40	60	0	0	0	0	15	0	5	0	14	7	25	8	26	0	0	0	0	Palagonite-rich nannofossil silt clay with feldspar and Fe-oxide
2	R	3	41	774.91	M	0	85	15	0	0	0	0	8	0	10	0	11	40	0	0	31	0	0	0	0	Vitric ash-rich nannofossil silt with opaques
2	R	3	42	774.92	M	0	60	40	0	0	0	0	0	0	0	0	0	50	0	33	17	0	0	0	0	Vitric ash-rich clays with nannofossils
2	R	3	124	775.74	M	0	35	65	0	0	0	0	35	0	0	0	9	12	11	23	10	0	0	0	0	Fe-oxide-rich silty clay with nannofossil, palagonite and vitric ash
2	R	3	130	775.80	M	0	30	70	0	0	0	0	29	0	4	0	22	3	7	22	13	0	0	0	0	Fe-oxide-rich silty clay with nannofossils and feldspar
3	R	1	112	782.22	M	0	30	70	0	0	0	0	6	0	3	0	25	0	16	47	3	0	0	0	0	Feldspar-rich silty clay with palagonite
3	R	2	31	782.91	M	0	30	70	0	0	0	0	35	0	0	0	15	15	25	0	10	0	0	0	0	Palagonite-rich Fe-oxide silty clay with nannofossils, feldspar and vitric ash
3	R	4	120	786.80	M	30	60	10	0	0	0	0	31	0	0	0	15	28	0	11	15	0	0	0	0	Vitric-ash-rich Fe-oxide sandy silt with nannofossils and feldspar
3	R	5	2	787.12	D	-	-	-	0	0	0	0	0	0	2	0	4	4	0	60	30	0	0	0	0	Clays-rich nannofossil chalk
4	R	1	27	790.97	D	-	-	-	0	0	0	0	0	0	3	0	1	0	0	0	96	0	0	0	0	Nannofossil chalk
4	R	1	134	792.04	M	0	90	10	0	0	0	0	13	0	4	0	6	64	0	0	13	0	0	0	0	Vitric ash-rich silt with nannofossils and Fe-oxide
4	R	2	2	792.22	D	0	30	70	0	0	0	0	19	9	0	0	13	0	28	2	29	0	0	0	0	Palagonite-rich nannofossil silty clay with feldspar and Fe-oxide
4	R	2	41	792.61	M	0	95	5	0	0	0	0	10	0	1	0	7	67	0	0	15	0	0	0	0	Vitric ash-rich silt with Fe-oxide and nannofossils
4	R	4	67	795.87	D	-	-	-	0	0	0	0	0	0	0	0	0	0	0	10	90	0	0	0	0	Nannofossil chalk with clay
4	R	CC	2	796.62	D	-	-	-	0	0	0	0	2	0	0	0	1	0	0	0	97	0	0	0	0	Nannofossil chalk
5	R	1	31	800.61	M	-	-	-	0	0	2	0	0	0	0	0	0	0	0	11	87	0	0	0	0	Nannofossil chalk
5	R	1	135	801.65	D	-	-	-	0	0	1	0	0	0	0	0	0	0	0	0	85	14	0	0	0	Foraminifer-nannofossil chalk
5	R	2	74	802.54	D	-	-	-	0	0	0	0	0	0	0	0	2	0	0	5	93	0	0	0	0	Nannofossil chalk
5	R	2	85	802.65	M	0	10	90	0	2	36	0	0	0	4	0	4	4	0	2	24	24	0	0	0	Calcareous nannofossil-foraminifer clay
5	R	2	112	802.92	M	0	15	85	0	0	7	0	5	0	0	0	16	0	0	0	60	12	0	0	0	Foraminifer-nannofossil chalk with feldspar
5	R	2	140	803.20	D	-	-	-	0	10	0	0	0	3	0	0	3	0	0	16	68	0	0	0	0	Nannofossil chalk with dolomite and clays
5	R	3	144	804.74	D	-	-	-	0	0	0	0	2	0	2	0	0	0	0	16	80	0	0	0	0	Nannofossil chalk with clays
5	R	3	149	804.79	M	0	35	65	0	0	0	0	0	0	10	0	25	0	0	26	39	0	0	0	0	Feldspar-rich nannofossil silty clay with opaques
5	R	4	51	805.32	M	0	35	65	0	0	0	0	31	0	15	0	2	0	0	31	21	0	0	0	0	Clays and Fe oxide-rich silty clay with opaques and nannofossils
5	R	4	55	805.36	D	-	-	-	0	7	0	0	1	0	1	0	0	0	0	10	81	0	0	0	0	Nannofossil chalk with clays
5	R	4	63	805.44	M	-	-	-	0	2	0	0	1	0	0	0	0	5	0	0	92	0	0	0	0	Nannofossil chalk
6	R	1	23	810.13	D	-	-	-	0	1	0	0	0	0	0	0	0	0	0	2	97	0	0	0	0	Nannofossil chalk
6	R	1	75	810.65	D	-	-	-	0	1	1	0	1	0	1	0	0	0	0	2	94	0	0	0	0	Nannofossil chalk
6	R	2	26	811.66	M	0	70	30	0	0	0	0	7	0	0	0	1	7	30	48	0	0	0	0	7	Palagonite-rich clay
6	R	2	34	811.74	D	10	60	30	0	0	0	0	14	6	0	0	3	0	57	14	0	0	0	0	6	Palagonite-rich clayey silt with Fe-oxides
6	R	3	42	813.32	M	0	80	20	6	0	0	0	10	5	2	0	6	6	28	28	9	0	0	0	0	Palagonite-rich silt with Fe-oxides, nannofossils and clays

Hole 1204A Smear Slides

Sample						Texture			Mineral												Biogenic					
Core	Core Type	Section	Top (cm)	Depth (mbsf)	Lithology	Sand	Silt	Clay	Accessory Minerals	Dolomite	Calcite	Gypsum	Fe Oxide	Pyrite	Opaques	Quartz	Feldspar	Volcanic Glass	Palagonite	Clays	Nannofossils	Foraminifers (whole)	Foraminifers Tests	Sponge Spicules	Organic Debris	Comments
6	R	3	75	813.65	M	0	75	25	11	0	0	0	10	0	0	0	0	4	56	19	0	0	0	0	0	Palagonite-rich clayey silt with Fe-oxides
6	R	3	75	813.65	M	-	-	-	0	0	0	0	98	0	0	0	0	0	2	0	0	0	0	0	0	Fe-oxides black nodule
6	R	3	83	813.73	D	-	-	-	3	0	0	0	18	0	0	0	3	3	3	13	54	0	0	0	3	Nannofossil chalk with Fe-oxides and clays
6	R	3	120	814.10	M	57	29	14	0	0	0	0	11	0	0	0	4	20	65	0	0	0	0	0	0	Palagonite-rich silty sand with Fe-oxides and vitric ash
6	R	4	51	814.91	M	0	67	33	0	0	0	0	11	0	0	0	0	6	55	28	0	0	0	0	0	Palagonite-rich clayey silt with Fe-oxides
6	R	4	102	815.42	M	63	25	12	0	0	3	0	17	0	0	0	10	3	32	32	0	0	3	0	0	Palagonite-rich silty sand with feldspar and Fe-oxides

Hole 1204B Smear Slides

Sample						Texture			Mineral															Biogenic			
Core	Core Type	Section	Top (cm)	Depth (mbsf)	Lithology	Sand	Silt	Clay	Accessory Minerals	Dolomite	Calcite	Gypsum	Fe Oxide	Pyrite	Opaques	Quartz	Feldspar	Volcanic Glass	Palagonite	Clay Minerals	Clay	Nannofossils	Foraminifers (whole)	Foraminifers Tests	Organic Debris	Comments
1	R	1	33	811.03	D	0	15	85	0	0	4	0	2	0	0	0	0	0	0	3	38	53	0	0	0	Nannofossil clay
1	R	1	52	811.22	M	0	30	70	0	0	0	0	39	0	0	0	0	0	5	6	0	45	0	5	0	Fe-oxide-rich nannofossil silty clay
1	R	1	55	811.25	D	0	20	80	0	0	0	0	16	0	5	0	0	0	37	10	31	1	0	0	0	Palagonite-rich clay with clay minerals and Fe-oxide
1	R	1	57	811.27	M	0	40	60	0	0	0	0	24	0	10	0	4	0	29	1	30	2	0	0	0	Fe-oxide-rich palagonite silt clay with opaques
1	R	1	67	811.37	M	0	60	40	0	1	0	0	0	0	7	0	6	0	34	0	28	13	0	0	11	Palagonite-rich silt clay with organic debris and nannofossils
1	R	1	90	811.60	D	0	20	80	0	0	32	0	6	0	5	0	0	0	8	7	16	23	0	0	3	Calcareous nannofossil clay
1	R	1	103	811.73	D	0	15	85	0	*	25	0	10	0	13	0	1	1	13	*	23	10	0	0	4	Calcareous clay with nannofossils, opaques and palagonite
1	R	1	121	811.91	D	0	10	90	0	0	3	0	27	2	2	0	11	8	2	8	29	0	0	0	8	Fe-oxide-rich clay with feldspar
1	R	1	125	811.95	D	0	5	95	0	0	0	0	3	2	3	0	12	1	0	28	37	6	0	0	8	Clay mineral-rich clay with feldspar
1	R	1	143	812.13	D	0	30	70	0	0	0	0	5	0	14	0	5	0	0	14	27	21	0	0	14	Silty clay nannofossil with clay minerals, opaques and organic debris
1	R	2	9	812.29	M	0	20	80	0	0	42	15	15	0	0	0	0	0	0	25	0	3	0	0	0	Clay minerals-rich calcareous clay with Fe-oxide and gypsum
1	R	2	27	812.47	D	0	35	65	0	0	0	0	15	0	11	0	1	20	31	0	20	2	0	0	0	Palagonite-rich silty clay with opaques, Fe-oxide and vitric ash
1	R	2	39	812.59	D	0	30	70	0	0	2	0	7	0	13	0	10	9	0	30	28	1	0	0	0	Clay mineral-rich silty clay with feldspar and opaques
1	R	2	105	813.25	D	0	10	90	0	0	28	0	12	0	0	*	3	0	0	25	0	16	0	0	16	Clay mineral-rich calcareous clay with Fe-oxide, nannofossils and organic debris
1	R	2	111	813.31	M	40	40	20	0	0	5	34	5	0	27	0	8	0	0	0	18	0	0	0	3	Opaques-rich gypsiferous sand silt with clay
1	R	2	137	813.57	M	0	40	60	0	0	5	19	10	0	17	0	7	0	0	26	16	0	0	0	0	Clay minerals-rich silt clay with Fe-oxide, opaques and gypsum
1	R	3	7	813.77	D	0	15	85	0	0	11	0	16	0	8	0	16	0	8	16	11	14	0	0	0	Clay with nannofossils, feldspar and Fe-oxides
1	R	3	27	813.97	D	0	20	80	0	0	25	27	22	0	10	0	4	0	0	0	0	12	0	0	0	Gypsiferous calcareous clay with nannofossils, Fe-oxides and opaques
1	R	3	31	814.01	D	15	50	35	0	0	3	26	3	0	11	0	15	8	0	0	31	3	0	0	0	Gypsiferous clayey silt with opaques and feldspar

Thin Section Log

Leg	Site	Hole	Core	Type	Section	Top (cm)	Bot (cm)	Depth (mbsf)	Piece	Comments	ICP?	UNIT	Ship Code	TS Number
Hole A														
197	1204	A	7	R	3	36	37	822.68	3	Next to ICP, base of PMAG sample	YES	2	1432300	78
197	1204	A	7	R	3	54	55	822.86	5	Vein - alteration		2	1432302	79
197	1204	A	9	R	1	96	97	839.56	12B	Next to ICP, aphyric basalt	YES	2	1432303	80
197	1204	A	9	R	2	50	51	840.60	5	Next to ICP, olivine microphenocrysts	YES	2	1432305	81
197	1204	A	10	R	2	77	79	850.54	5	Next to ICP and PMAG	YES	2	1432322	82
197	1204	A	10	R	3	54	56	851.45	2	Next to ICP and PMAG	YES	2	1432325	83
Hole B														
197	1204	B	2	R	2	48	50	822.08	1B	Moderately ol-plg-phric basalt: Ol-poor region	YES	1	1432358	84
197	1204	B	2	R	4	16	19	823.96	1	Mod. to highly ol-plg-phyric basalt: less apparent ol-rich region		1	1432360	85
197	1204	B	2	R	4	87	89	824.67	2B	Mod. to highly ol-plg-phyric basalt: ol-rich region	YES	1	1432361	86
197	1204	B	3	R	1	47	50	830.37	6	Alteration - Veins		1	1432365	87
197	1204	B	3	R	2	97	100	832.32	11	Alteration: Brecciation - glass. FRESH OLIVINE!		1	1432367	88
197	1204	B	4	R	3	29	31	842.89	5	Aphyric basalt	YES	2a	1432363	89
197	1204	B	6	R	4	21	24	863.24	4	Aphyric basalt	YES	2a	1432377	90
197	1204	B	7	R	2	66	69	870.33	10	Aphyric basalt	YES	2a	1432533	107
197	1204	B	7	R	2	129	131	870.96	16A	Alteration - Vein		2a	1432382	93
197	1204	B	7	R	3	42	44	871.59	5A	Aphyric basalt	YES	2a	1432535	108
197	1204	B	7	R	3	106	108	872.23	13	Medium grained part of Unit 2a		2a	1432383	91
197	1204	B	7	R	3	140	142	872.57	17	Next to ICP medium-grained part of Unit 2b	YES	2b	1432385	92
197	1204	B	8	R	3	53	55	881.29	8	Aphyric diabase next to ICP	YES	2b	1432397	94
197	1204	B	9	R	2	22	24	887.51	1B	TSB contains vein and next to ICP, which does not	YES	2b	1432399	95
197	1204	B	10	R	3	25	27	891.80	2A	Diabase (brown) next to ICP	YES	2b	1432415	96
197	1204	B	12	R	1	28	30	906.58	4A	Alteration - Veins		2b	1432423	97
197	1204	B	13	R	2	10	12	909.87	1	Next to PMAG and ICP	YES	2b	1432429	98
197	1204	B	13	R	3	32	34	911.48	1A	Next to PMAG and ICP	YES	2b	1432431	99
197	1204	B	14	R	2	115	117	918.17	5	Next to ICP, Unit 2c	YES	2c	1432446	100
197	1204	B	14	R	3	68	70	919.20	14	Next to ICP, Unit 2c	YES	2c	1432448	101
197	1204	B	15	R	1	15	18	925.75	1	Vesicle cylinder		2c	1432459	102
197	1204	B	15	R	1	131	133	926.91	9	Next to ICP	YES	2c	1432460	103
197	1204	B	16	R	2	42	44	937.12	5A	Hyaloclastite lapilli breccia		2d	1432458	104
197	1204	B	17	R	1	89	90	945.79	13	Last basalt core - next to ICP	YES	3	1432467	105

THIN SECTION:	**197-1204A-7R-3, 36-37**	**Piece No.: 3**	**Unit: 2**	**ODP TS#: 78**
ROCK NAME:	Aphyric to Olivine-Plagioclase-Phyric Basalt.			
WHERE SAMPLED:				
GRAIN SIZE:	Fine grained.			
TEXTURE:	Intergranular, subophitic.			

OBSERVER: PT, CRN, SR.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS							
Plagioclase	7	8	1	2	1.5	Euhedral to subhedral; elongate	Crystals show zoning and fractures. Glomerocrystic- forms elongate aggregates of <5 crystals.
GROUNDMASS							
Plagioclase	36	36	0.2	1	0.7	Euhedral; subhedral	
Clinopyroxene	36	36	0.2	1	0.7	Anhedral	
Olivine	0	8	0.2	0.6	0.3	Subhedral, equant; some elongate	Replaced by calcite and Fe oxyhydroxide.
Titanomagnetite	3	6	0.1	0.2	0.15	Octahedral; occasionally skeletal	
Glass	0	6					Replaced by green-brown clay and Fe oxyhydroxide

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	REPLACING / FILLING	COMMENTS
Fe-oxyhydroxide	4				Glass and olivine	
Green-brown clay	3				Glass	
Maghemite	3				Titanomagnetite	Unaltered titanomagnetite centers are present.
Calcite	5				Olivine	
Zeolite	2				Vesicles	
Goethite	<1				Vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	max.	av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	10		0.5	3	1	Occasionally lined with Fe oxyhydroxide and filled with calcite and zeolite.	Rimmed with segregated material.

COMMENTS: Segregated material is concentrated around vesicle rims and is rich in dendritic black oxides. Olivine may be an early formed phase but is a similar size to the groundmass around it (Photomicrographs 1204-106, 107, 108 and 110). of alteration textures.

Photomicrograph 1204-106. Field of view 0.25 mm, RL.
Photomicrograph 1204-107. Field of view 1.25 mm, PPL.
Photomicrograph 1204-108. Field of view 0.625 mm, PPL.
Photomicrograph 1204-110. Field of view 1.25 mm, PPL.
Photomicrograph 1204-163. Field of view 5 mm, XPL.
Photomicrograph 1204-164. Field of view 5 mm, XPL.

THIN SECTION:	**197-1204A-7R-3, 54-55**	**Piece No.: 5**	**Unit: 2**	**ODP TS#: 79**	**OBSERVER: CRN, SR.**
ROCK NAME:	Altered basalt.				
WHERE SAMPLED:	Next to vein for alteration.				
GRAIN SIZE:	Fine grained.				
TEXTURE:	Subophitic to intersertal.				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Olivine	0	0.5	0.8	0.2	0.4	Subhedral; equant	Completely altered and difficult to distinguish.
GROUNDMASS							
Plagioclase	40	40				Subhedral laths	
Clinopyroxene	25	35				Subhedral to anhedral	Partially altered to green clay.
Titanomagnetite	2	4				Subhedral to anhedral	Skeletal octhedra; partially replaced by maghemite.
Glass	0	20.5					

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Green clay (saponite)	5				Vesicles, vein, glass, cpx?	
Fe oxyhydroxide	11				Vesicles, vein, glass, olivine?	
Maghemite	2				Titanomagnetite	
Goethite	5				Vein, lines vesicles, glass, olivine?	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vein	10	Vertical down RHS of section	2	4	3	Calcite, saponite, goethite, Fe oxyhydroxide	Fe oxyhydroxide and goethite. Goethite looks like it is replacing calcite as it has the characteristic rhombohedral cleavage of calcite in reflected light.
Vesicles	2	Random	3	0.5	0.8	Saponite, Fe oxyhydroxide, goethite	

COMMENTS: Section is a little thin. Calcite birefringence is lower than normal.

THIN SECTION:	**197-1204A-9R-1, 96-97**	**Piece No.: 12B**	**Unit: 2**	**ODP TS#: 80**
ROCK NAME:	Aphyric to Olivine-Plagioclase-Phyric Basalt.			
WHERE SAMPLED:				
GRAIN SIZE:	Fine grained.			
TEXTURE:	Intersertial.			

OBSERVER: PT, CRN, SR.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS							
Plagioclase	15	15	0.5	2	1	Subhedral; elongate	Often forms small glomerocrysts consisting of 3-4 crystals. Shows strong zoning and is often fractured. Indistinct from groundmass plagioclase.
Olivine	0	3	0.2	0.6	0.4	Subhedral, equant; some elongate	Totally replaced by Fe oxhydroxide and calcite. Photomicrograph 1204A-109. This may be groundmass, not phenocryst - cannot tell due to alteration.
GROUNDMASS							
Clinopyroxene	26	26	0.05	0.2	0.1	Equant, some elongate; euhedral to subhedral	
Plagioclase	30	30					
Apatite	1	1	0.01	0.3	0.1	Elongate, acicular; hexagonal basal sections	Primary or secondary? Photos 1204-120 and 121.
Glass	0	22					
Titanomagnetite	0.5	3	0.02	0.1	0.05	Cubic	Relict centers are occasionally present.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	REPLACING / FILLING	COMMENTS
Fe oxyhydroxide	12				Glass and olivine	
Green clay (saponite?)	12				Glass	
Zeolite					Lines vesicles and replaces groundmass	Photomicrograph 1204-165.
Maghemite	2.5				Titanomagnetite	
Sulfide	Trace		0.002		Titanomagnetite	Pyrite?

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	max.	av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	1	Throughout	0.5	1	0.75	Lined with black clay and infilled with brown clay.	
Vein	1	Top of slide	0.5		1	Filled with red isotropic material.	Goethite.

COMMENTS: Note: olivine is present as a microphenocryst or possibly groundmass phase but is difficult to recognize as has been altered to calcite and Fe oxhydroxide. Difficult to distinguish from calcite-filled vesicles (Photomicrographs 109, 111, 112, and 113).

Photomicrograph 1204A-109. Field of view 1.25 mm, XPL.
Photomicrograph 1204A-111. Field of view 0.625 mm, RL.
Photomicrograph 1204A-112.
Photomicrograph 1204A-113. Field of view 0.25 mm, RL.
Photomicrograph 1204A-120. Field of view 1.25 mm, PPL.
Photomicrograph 1204A-121. Field of view 1.25 mm, XPL.
Photomicrograph 1204A-165. Field of view 0.625 mm, XPL.

THIN SECTION:	**197-1204A-9R-2, 50-51**	**Piece No.: 5**	**Unit: 2**	**ODP TS#: 81**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric to Olivine-Plagioclase-Phyric Basalt.				
WHERE SAMPLED:					
GRAIN SIZE:	Fine grained.				
TEXTURE:	Intergranular, subophitic.				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS							
Olivine	0	1			0.4		Replaced by calcite (Photomicrographs 1204A-122 and 123).
GROUNDMASS							
Plagioclase	41	41	0.2	1	0.7	Euhedral, subhedral	
Clinopyroxene	34	45	0.2	1	0.7	Anhedral	
Titanomagnetite	0.5	4	0.1	0.2	0.15	Dendritic, octahedral, skeletal	Altered to maghemite.
Glass	0	9					Replaced by green-brown clay and Fe oxyhydroxide.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Fe oxyhydroxide	12				Glass, occasionally pyroxene	In RL looks like goethite and takes a polish.
Maghemite	3.5				Titanomagnetite	
Green-brown clay	2				Glass	Nontronite-saponite?
Calcite	7				Clinopyroxene, olivine and filling vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	2		0.5	1	0.75	Lined with Fe oxyhydroxide	Rimmed with segregated material.

COMMENTS: Segregated material is concentrated around vesicle rims and is rich in dendritic black oxides.Photomicrographs 1204-114, 115, 116, and 117. Titanomagnetite is seen to mantle maghemite (Photomicrograph 1204A-125).

Chapter 4, Figure F20A. Field of view 0.625 mm, RL.
Photomicrograph 1204A-115. Field of view 0.625 mm, XPL.
Chapter 4, Figure F20B.
Photomicrograph 1204A-117. Field of view 0.625 mm, XPL.
Photomicrograph 1204A-122. Field of view 2.5 mm, PPL.
Photomicrograph 1204A-123. Field of view 2.5 mm XPL.
Chapter 4, Figure 20C. Field of view 0.25 mm, RL.

THIN SECTION:	**197-1204A-10R-2, 77-79**		**Piece No.: 5**		**Unit: 2**	**ODP TS#: 82**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric to Olivine-Plagioclase-Phyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular, subophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	42	42	0.2	1	0.7	Euhedral, subhedral	
Clinopyroxene	22	30	0.8	4	2	Anhedral, some elongate	Basal sections have less of a pink color and are more fractured- look like olivine. Some partially replaced by green clay. Clear subophitic texture visible.
Titanomagnetite	5	5	0.1	0.2	0.15	Octahedral	Replaced by maghemite.
Sulfide	Trace	Trace			<0.01	Blobs	Inclusions in primary minerals.
Glass	0	22					Replaced by green-brown clay and Fe oxyhydroxide.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	7				Glass and vesicles	
Green-brown clay	5				Glass	
Zeolite	16				Glass	Phillipsite?
Calcite	3				Vesicles	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	8	Throughout	0.5	1.5	1	Rimmed with green brown clay or zeolite and filled with calcite and Fe oxyhydroxide.	

COMMENTS:	Altered groundmass-ICP analysis may reflect this. Olivine microphenocrysts (now pseudomorphed by Fe oxyhydroxide and goethite) may be present, although state of alteration means this is just speculation (Photomicrograph 1204A-126).	**Chapter 4, Figure F10.** Field of view 1.25 mm, PPL.

THIN SECTION:	**197-1204A-10R-3, 54-56**		**Piece No.: 2**		**Unit: 2**	**ODP TS#: 83**	**OBSERVER: PT**
ROCK NAME:	Aphyric to Olivine-Plagioclase-Phyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular, subophitic.						

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	15	45	0.2	1	0.7	Euhedral, subhedral	Partially altered to sericite and other clay. Highly zoned.
Clinopyroxene	15	30	0.8	4	2	Anhedral; some elongate	Partially altered to clay.
Titanomagnetite	5	5	0.1	0.2	0.15	Cubic	
Glass	0	20					Replaced by green-brown clay and Fe oxyhydroxide.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Green-brown clay	15				Glass and clinopyroxene	
Other clay (sericite/ illite)	28				Plagioclase along fractures and cracks	
Calcite	2				Filling rare small vesicles	
Pyrite	10					
Zeolite	10				Glass	Phillipsite?

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

COMMENTS: Highly altered groundmass - ICP analysis may reflect this. Section contains areas of interstitial clay - may be infilled vesicles but state of alteration means could be highly altered glass. Small olivines (groundmass-size) may be present, making the rock an alkali basalt, although unclear due to degree of alteration.

THIN SECTION:	**197-1204B-2R-2, 48-50**		**Piece No.: 1B**		**Unit: 1**	**ODP TS#: 84**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained (towards medium grained).						
TEXTURE:	Subophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	60	60	0.2	1	0.5	Both elongate and skeletal, and subhedral.	Larger subhedral crystals may represent an earlier crystallization phase? Smaller ones are clearly skeletal.
Clinopyroxene	10	10	0.5	1.4	0.8	Some elongate; subhedral	Subophitic, pleochroic.
Olivine	0	5	0.1	0.3	0.2	Euhedral; equant	Shows characteristic fracture patterns and high relief. Photomicrograph 1204-129. Highlighted by Fe oxyhydroxide.
Titanomagnetite	1	5	0.01	0.02	0.02	Some skeletal and dendritic	
Glass	0	20					

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	2				Olivine	
Brown/yellow/ green clay	19				Glass	Saponite?
Goethite	1				Glass	
Calcite	3				Olivine, filling vesicles	
Maghemite	4					Smaller crystals are altered to maghemite. Larger crystals have a remnant titanomagnetite cores.

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15	Throughout	0.1	0.3	0.15	Some unfilled; some filled with calcite.	

COMMENTS:	Interstitial patches of glass (some adjacent to vesicles) display a quenched texture - segregated material?	**Photomicrograph 1204B-129.** Field of view 1.25 mm, PPL.

THIN SECTION:	**197-1204B-2R-4, 16-19**	**Piece No.: 1**	**Unit: 1**	**ODP TS#: 85**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric basalt.				
WHERE SAMPLED:					
GRAIN SIZE:	Fine grained (towards medium grained).				
TEXTURE:	Subophitic.				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS							
Plagioclase	<1	<1	0.25	1	0.6	Subhedral to anhedral	
GROUNDMASS							
Plagioclase	55	55	0.2	1	0.5	Lath-like	
Clinopyroxene	12	14	0.5	1.7	1	Some elongate; subhedral	Subophitic, pleochroic.
Olivine	0	5	0.2	0.5	0.4	Equant	Replaced by goethite and calcite.
Titanomagnetite	1	5	0.03	0.07	0.05	Octahedral	
Glass	0	20					Altered to green-yellow clay and fibrous zeolites(?)

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Green clay	16				Replacing glass and clinopyroxene	
Maghemite	4				Replacing titanomanetite	Exsolving ulvospinel. Photomicrograph 1204B-134.
Goethite	4				Replacing olivine, filling vesicles	
Calcite	4				Replacing olivine, filling vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	5	Thoughout	0.1	0.3	0.2	Calcite and goethite. Lined with green clay.	

COMMENTS: Groundmass is more altered than Section 2R-2, 48-50 cm. Identification of olivine is difficult due to the altered nature of the rock. Olivine may equally be a microphenocryst phase rather than a groundmass phase. **Photomicrograph 1204B-134.** Field of view 0.25 mm, RL.

THIN SECTION:	**197-1204B-2R-4, 87-89**		**Piece No.: 2B**		**Unit: 1**	**ODP TS#: 86**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained (towards medium grained).						
TEXTURE:	Subophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	50	50	0.2	1	0.5	Elongate	
Olivine	0	8	0.1	0.4	0.2	Euhedral	Replaced by Fe oxyhydroxide and clay.
Clinopyroxene	15	15	0.5	1.7	1	Some elongate; subhedral	Subophitic.
Titanomagnetite	2	5	0.03	0.07	0.05	Octahedral	
Glass	0	22					Altered to green-yellow clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Green-yellow clay	24				Glass	Nontronite/saponite?
Fe oxyhydroxide	6				Olivine	Goethite
Sericite/Illite	<1				Replacing plagioclase along fractures	
Maghemite	3				Titanomagnetite	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15	Throughout	0.1	0.3	0.15	Unfilled	Could be plucked out altered olivine.

COMMENTS: Many holes are present in the section and may represent altered olivine that has been plucked out. Remnant titanomagnetite centers are common throughout.

THIN SECTION:	**197-1204B-3R-1, 47-50**		**Piece No.: 6**		**Unit: 1**	**ODP TS#: 87**	**OBSERVER: CRN, PT, SR.**
ROCK NAME:	Aphyric Basalt.						
WHERE SAMPLED:	Next to vein.						
GRAIN SIZE:	Fine grained, altered.						
TEXTURE:	Intersertal.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	35	40	0.2	1	0.6	Skeletal subhedral laths	Partially altered to zeolite?
Olivine	0	6	0.1	0.2	0.15	Subhedral, equant	Pseudomorphed by Fe oxyhydroxide.
Clinopyroxene	2	15	0.1	0.2	0.15		Partially replaced by Fe oxyhydroxide.
Titanomagnetite	0	4			0.01	Often skeletal	Completely altered to maghemite.
Glass	0	35					Completely altered to yellow-green clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	12				Olivine, clinopyroxene, glass	
Goethite	5				Clinopyroxene, olivine	
Calcite	15				Vein, vesicles, glass	
Yellow-green clay	20				Glass, clinopyroxene	Saponite?
Zeolite - analcite?	5				Plagioclase, vein, vesicles	This could be a clay mineral - same morphology as the yellow-green clay.
Zeolite - phillipsite?	2				Margins of vesicles	Isotropic, medium relief, colorless, prismatic. Square basal section.
Maghemite	4				Titanomagnetite	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	5					Calcite, some phillipsite?	
Vein	30					Calcite, some phillipsite?	

COMMENTS:	Segregated material around vesicles comprised of altered clinopyroxene and titanomagnetite. The vein contains glass altered to yellow-green clay and contains plagioclase and altered olivine crystals.	**Photomicrograph 1204B-135.** Field of view 5 mm, PPL.

THIN SECTION:	**197-1204B-3R-2, 97-100**		**Piece No.: 11**		**Unit: 1**	**ODP TS#: 88**	**OBSERVER: CRN, PT, SR.**
ROCK NAME:	Quenched basaltic glass.						
WHERE SAMPLED:	Glassy lobe margin.						
GRAIN SIZE:	Glassy.						
TEXTURE:	Glassy, porphyritic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Olivine	1	2	0.1	0.8	0.6	Euhedral, equant	Unaltered olivine is present in the glass. Some contain melt inclusions. Photomicrograph 1204B-140.
Plagioclase	1	1	0.2	0.8	0.4	Lathlike, elongate, skeletal	
GROUNDMASS							
Glass	15	97					

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Yellow-brown clay	37				Glass	
Calcite	35				Glass, vein	
Analcite	10				Lining vesicles and veins	
Fe oxyhydroxide	1				Olivine	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vein	20					Lined with analcite, filled with calcite	

COMMENTS:	**Chapter 4, Figure 11.** Field of view 1.25 mm, PPL. **Photomicrograph 1204B-139.** Field of view 1.25 mm, XPL. **Chapter 4, Figure 13.** Field of view 1.25 mm, PPL. **Chapter 4, Figure 12.** Field of view 1.25 mm, XPL.

THIN SECTION:	**197-1204B-4R-3, 29-31**		**Piece No.: 5**		**Unit: 2a**	**ODP TS#: 89**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	50	55	0.2	1	0.5	Elongate	Rare zonation in larger crystals.
Olivine	0	3	0.1	0.4	0.2	Euhedral	Replaced by Fe oxyhydroxide.
Clinopyroxene	1	15	0.5	1.7	1	Some elongate; subhedral	Subophitic.
Titanomagnetite	1	2	0.03	0.07	0.05	Octahedral	Partially altered to maghemite.
Glass	0	25					Altered to green-yellow clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	8					Partially crystallized as goethite.
Brown clay	30				Glass and clinopyroxene	
Maghemite	1				Titanomagnetite	
Calcite	3				Infilling vesicles	
Zeolite	6				Lining vesicles and replacing glass	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	5	Throughout	0.1	0.3	0.15	Some filled with calcite. Others are unfilled and lined with clay or zeolite.	

COMMENTS: Vesicles are rimmed with round areas of segregated material. The titanomagnetite is small, but only partially maghemitized. It contains ilmenite oxidation lamellae.

THIN SECTION:	**197-1204B-6R-4, 21-24**		**Piece No.: 4**		**Unit: 2a**	**ODP TS#: 90**	**OBSERVER: PT, CRN.**
ROCK NAME:	Aphyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular to subtrachytic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Plagioclase	1	1	0.5	1	0.7	Subhedral	
GROUNDMASS							
Plagioclase	51	51	0.2	1	0.5	Elongate and skeletal	
Olivine	0	3	0.1	0.4	0.2	Euhedral	Replaced by Fe oxyhydroxide and calcite. Photomicrograph 1204B-136.
Clinopyroxene	12	15	0.5	1.7	1	Some elongate; subhedral	Subophitic.
Titanomagnetite	4	8	0.03	0.07	0.05	Octahedral; often skeletal	
Glass	0	22					Altered to green-yellow clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	11				Olivine, clinopyroxene and glass	Partially crystallized as goethite.
Brown/yellow clay	14				Glass	Nontronite?
Calcite	3				Fills vesicles and replaces olivine	
Maghemite	4				Titanomagnetite	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15	Throughout	0.25	1.5	0.8	Lined with brown clay or Fe oxyhydroxide (goethite) and filled with calcite.	

COMMENTS: **Photomicrograph 1204B-136.** Field of view 1.25 mm, PPL.

THIN SECTION:	**197-1204B-7R-2, 66-69**		**Piece No.: 10**		**Unit: 2a**	**ODP TS#: 107**	**OBSERVER: PT**
ROCK NAME:	Aphyric basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Subtrachytic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Plagioclase	8	8	0.6	1.5	0.9	Elongate; euhedral to subhedral	Difficult to distinguish from groundmass plagioclase due to similar size and shape.
Olivine	0	3	0.4	1	0.6	Equant	Replaced by Fe oxyhydroxide and calcite (e.g., Photomicrographs 1204B-177 and 178).
GROUNDMASS							
Plagioclase	44	44	0.1	0.6	0.4	Elongate and euhedral	Displays a subtrachytic texture.
Clinopyroxene	35	35	0.05	0.1	0.08	Subhedral	
Titanomagnetite	2	5	0.05	0.2	0.1	Octahedral. Often skeletal.	Alters to maghemite along rims. Often has fresh core of titanomagnetite.
Glass	0	5					Altered to green-yellow clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	3				Replacing olivine and glass, especially in segregated areas.	
Brown clay	1				Glass	
Maghemite	3				Titanomagnetite	
Calcite	4				Infilling vesicles, replacing olivine.	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	10	Throughout	0.1	2	1	Lined with Fe oxyhydroxide and filled with calcite.	Surrounded by segregated material (7% of rock).

COMMENTS: Olivine is difficult to distinguish due to its size (similar to groundmass) and alteration. There may be more present than stated above. Photomicrograph 1204B-176 of subtrachytic domains.

Photomicrograph 1204B-176.
Photomicrograph 1204B-177. Field of view 1.25 mm, XPL.
Photomicrograph 1204B-178. Field of view 1.25 mm, PPL.

THIN SECTION:	**197-1204B-7R-2, 129-131**		**Piece No.: 16A**		**Unit: 2a**	**ODP TS#: 93**	**OBSERVER: SR, PT.**
ROCK NAME:	Aphyric Basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Medium grained.						
TEXTURE:	Intergranular.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	40	0.4	1.4	1	Elongate and euhedral	Displays a subtrachytic texture.
Olivine	0	5	0.1	0.5	0.3	Euhedral and equant	Replaced by calcite and Fe oxyhydroxide.
Clinopyroxene	35	35	0.1	0.5	0.35	Subhedral	
Titanomagnetite	4	4	0.05	0.2	0.1	Octahedral; often skeletal	Alters to maghemite along rims. Often has fresh core of titanomagnetite.
Glass	0	16					Altered to brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown clay	4					
Fe oxyhydroxide	7				Glass, olivine, vein	
Calcite	10				Vein, olivine	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vein	10		2	4	3	Lined with brown clay and Fe oxyhydroxide, filled with calcite	
Vesicles	3	Throughout	0.25	1	0.5	Lined with goethite and filled with calcite	Some filled with zeolite and lined with incipient zeolite or clay.

COMMENTS:

THIN SECTION:	**197-1204B-7R-3, 42-44**		**Piece No.: 5A**		**Unit: 2a**	**ODP TS#: 108**	**OBSERVER: PT**
ROCK NAME:	Aphyric basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Plagioclase	3	3	0.5	1.2	0.8	Subhedral	Typically displays zoning.
Olivine	0	3	0.1	0.5	0.2	Equant and euhedral	Replaced by calcite and rimmed with Fe oxyhydroxide. Difficult to distinguish.
GROUNDMASS							
Plagioclase	46	46	0.2	1	0.6	Elongate and euhedral.	
Clinopyroxene	30	33	0.1	0.5	0.3	Subhedral	
Titanomagnetite	3	5	0.02	0.07	0.05	Octahedral. Often skeletal.	Alters to maghemite along rims. Often has fresh core of titanomagnetite.
Glass	0	10					Altered to Fe oxyhydroxide and clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	10				Olivine and glass	
Green clay	2				Glass	
Maghemite	2				Titanomagnetite	
Calcite	4				Replacing olivine; occasionally filling vesicles	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15	Throughout	0.25	2.5	1	Occasionally partially filled with calcite	Surrounded by segregated material.

COMMENTS:

THIN SECTION: 197-1204B-7R-3, 106-108 **Piece No.:** 13 **Unit:** 2a **ODP TS#:** 91 **OBSERVER:** PT, CRN.
ROCK NAME: Aphyric basalt.
WHERE SAMPLED:
GRAIN SIZE: Fine grained to medium grained.
TEXTURE: Intergranular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	46	46	0.2	1.5	1	Elongate and euhedral	
Olivine	0	3	0.1	0.4	0.2	Elongate and subhedral	Replaced by calcite and rimmed with Fe oxyhydroxide. Recognized by their euhedral shape and characteristic fracture.
Clinopyroxene	30	30	0.5	1.7	1	Some elongate; subhedral	Subophitic. Some show slight pleochroism.
Titanomagnetite	3	6	0.03	0.07	0.05	Octahedral; often skeletal	Alters to maghemite along rims. Often has fresh core of titanomagnetite.
Glass	0	10					Altered to green-yellow clay.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Fe oxyhydroxide	6				Olivine and glass	
Brown clay	4				Glass	
Maghemite	3				Titanomagnetite	
Calcite	8				Infilling vesicles, replacing olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	15	Throughout	0.25	1.5	0.8	Lined with Fe oxyhydroxide and 50% are filled with calcite. The remainder are unfilled.	

COMMENTS:

THIN SECTION:	**197-1204B-7R-3, 140-142**		**Piece No.: 17**		**Unit: 2b**	**ODP TS#: 92**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Aphyric diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Medium grained.						
TEXTURE:	Intergranular, subophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	45	1	2.5	2	Elongate and subhedral	Zonation present in larger crystals.
Olivine	0	9	0.3	0.7	0.5	Elongate and subhedral to anhedral	Replaced by calcite and rimmed with Fe oxyhydroxide. Recognized by their euhedral shape and characteristic fracture.
Clinopyroxene	30	30	0.5	2.5	2	Some elongate; subhedral	Subophitic and pleochroic. Photomicrographs 1204B-130 and 131.
Titanomagnetite	2	6	0.03	0.07	0.05	Octahedral; occasionally skeletal	Alters to maghemite along rims. Often has relict center of titanomagnetite.
Glass	0	10					Altered to Fe oxyhydroxide and brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	8				Olivine and glass	
Brown clay	6				Glass	
Maghemite	4				Magnetite	
Calcite	4				Olivine	
Illite	5				Replacing plagioclase along fractures	
Goethite	1					

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

COMMENTS:	Only rare titanomagnetite relicts are present - almost completely altered to maghemite.	**Chapter 4, Figure 14.** Field of view 5 mm, XPL. **Chapter 4, Figure 15.** Field of view 5 mm, PPL.

THIN SECTION:	**197-1204B-8R-3, 53-55**		**Piece No.: 8**		**Unit: 2b**	**ODP TS#: 94**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Medium grained.						
TEXTURE:	Intergranular, subophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	40	0.2	2	1	Elongate and subhedral	
Olivine	0	9	0.4	1	0.8	Elongate and subhedral to anhedral	Replaced by Fe oxyhydroxide and calcite. Recognized by their euhedral shape and characteristic fracture.
Clinopyroxene	30	30	0.5	4	2.5	Some elongate; subhedral	Subophitic.
Titanomagnetite	1	6	0.05	0.2	0.1	Octahedral; occasionally skeletal	Alters to maghemite along rims. Often has relict center of titanomagnetite.
Glass	0	15					Altered to Fe oxyhydroxide and brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	12				Olivine and glass	Partially crystallized as goethite.
Brown clay	5				Glass	
Zeolite	5				Glass	
Maghemite	5				Magnetite	
Calcite	2				Olivine	

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

COMMENTS:	See Photomicrographs 1204B-137 and 141 for titanomagnetite to maghemite alteration.	**Chapter 4, Figure F20D.** Field of view 2.5 mm, RL. **Photomicrograph 1204B-138.** Field of view 2.5 mm, RL. **Chapter 4, Figure F20E.**

THIN SECTION:	**197-1204B-9R-2, 22-24**		**Piece No.: 1B**		**Unit: 2b**	**ODP TS#: 95**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Medium grained.						
TEXTURE:	Intergranular, subophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	40	0.2	1.5	1	Elongate and subhedral	
Olivine	0	9	0.4	1	0.8	Elongate and subhedral to anhedral	Replaced by Fe oxyhydroxide and calcite. Recognized by their euhedral shape and characteristic fracture. Photo 1204B-133.
Clinopyroxene	30	30	0.5	4.5	2	Some elongate; subhedral	
Titanomagnetite	5	6	0.05	0.2	0.1	Octahedral; occasionally skeletal	Alters to maghemite along rims. Often has relict center of titanomagnetite.
Glass	0	15					Altered to Fe oxyhydroxide and brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Green clay	6				Olivine and glass	Saponite
Brown clay	7				Glass	
Maghemite	1				Magnetite	
Sulfide	1				Glass	Pyrite
Calcite	10				Olivine, vesicles and vein	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vein	3	Middle of slide	3	4	3	Lined with green clay and filled with calcite.	
Vesicles	3					Clay and calcite	

COMMENTS:	Maghemitization of titanomagnetite not as pervasive as in oxidized zones.	**Photomicrograph 1204B-133.** Field of view 5 mm, PPL.

THIN SECTION:	**197-1204B-10R-3, 25-27**		**Piece No.: 2A**		**Unit: 2b**	**ODP TS#: 96**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Medium grained.						
TEXTURE:	Intergranular, ophitic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	40	0.5	3	1.5	Elongate and subhedral	
Olivine	0	10	0.4	0.7	0.5	Elongate and subhedral to anhedral	Replaced by Fe oxyhydroxide and clay.
Clinopyroxene	30	35	1	3	5	Some elongate; subhedral	Ophitic, pleochroic.
Titanomagnetite	6	6	0.05	0.3	0.1	Octahedral	Appears to be unaltered titanomagnetite?
Glass	0	9					Altered to Fe oxyhydroxide and brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	8				Clinopyroxene, olivine and glass	
Brown clay	12				Olivine and glass	
Goethite	1				Filling vesicles and replacing glass	
Calcite	3				Filling vesicles	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	3		0.5	5	1	Clay, goethite and calcite	

COMMENTS: Maghemitization of titanomagnetite not as pervasive as in oxidized zones.

THIN SECTION:	**197-1204B-12R-1, 28-30**		**Piece No.: 4A**		**Unit: 2b**	**ODP TS#: 97**	**OBSERVER: CRN, SR, PT.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:	Vein.						
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular to intersertal.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	45				Laths	
Clinopyroxene	20	20				Subhedral to anhedral	
Olivine	0	5				Subhedral, equant	Completely replaced by Fe oxyhydroxide and calcite.
Titanomagnetite	0	7	0.02	0.3	0.2	Skeletal octahedra	Very rare titanomagnetite remnants are present.
Glass	0	23					

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Goethite	9				Glass, vesicles, vein	
Fe oxyhydroxide	2				Olivine, glass	
Clay	7				Plagioclase, glass	
Zeolite	3				Lines vesicles	
Calcite	12				Glass, olivine, vein, vesicles	
Maghemite	7				Titanomagnetite	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vein	5		3	5	4	Calcite, goethite	
Vesicles	2		0.2	1	0.4	Calcite, goethite. Lined by zeolite.	

COMMENTS: Goethite is surrounded by calcite.

THIN SECTION:	**197-1204B-13R-2, 10-12**		**Piece No.: 1**		**Unit: 2b**	**ODP TS#: 98**	**OBSERVER: PT, CRN, JG, SR.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained (bordering on medium grained).						
TEXTURE:	Intergranular, subophitic.						

			SIZE (mm)				
PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	40	40	0.5	3	2	Elongate	
Olivine	0	5	0.4	0.7	0.5	Elongate and subhedral to anhedral	Replaced by Fe oxyhydroxide, clay, and calcite.
Clinopyroxene	30	35	0.5	0.5	2	Some elongate; subhedral	
Titanomagnetite	<1	6	0.05	0.3	0.1	Octahedral	Several grains have unaltered titanomagnetite cores. Remainder altered to maghemite?
Glass	0	14					Altered to Fe oxyhydroxide and brown clay.

		SIZE (mm)				
SECONDARY MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Fe oxyhydroxide	5				Clinopyroxene, olivine and glass	
Brown clay	12				Olivine and glass	
Calcite	2				Olivine	
Goethite	5				Glass	
Maghemite	>5				Titanomagnetite	

			SIZE (mm)				
VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	1	Throughout	1	4	2	Empty; occasionally filled with Fe oxyhydroxide.	Filling probably lost in thin section preparation process.

COMMENTS: Some well-crystallized clay and/or incipient zeolite surround goethite and Fe oxyhydroxide.

THIN SECTION:	**197-1204B-13R-3, 32-34**		**Piece No. :1**		**Unit: 2b**	**ODP TS#: 99**	**OBSERVER: PT, CRN, SR.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained (bordering on medium grained).						
TEXTURE:	Intergranular.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	30	40	0.5	3	2	Elongate	
Clinopyroxene	2	?	0.5	2	0.7	Some elongate; subhedral	
Titanomagnetite	0?	5	0.05	0.3	0.1	Octahedral	All altered to maghemite??
Glass	0	?					Altered to Fe oxyhydroxide and brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Green clay	35				Glass, plagioclase, pyroxene and possibly olivine?	Occurs as radiating masses. Saponite?
Zeolite- phillipsite	20				Glass, pyroxene and possibly olivine?	Occurs as radiating masses.
Calcite	3				Vesicles	
Sulfide	5					Pyrite and chalcopyrite.
Maghemite	5?				Titanomagnetite	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles		Throughout	0.4	0.8	0.5	Calcite; irregular	

COMMENTS: Groundmass altered. ICP analysis may reflect this. Olivine may have been present, but sample is too altered to tell. Primary texture is difficult to ascertain due to alteration.

THIN SECTION:	**197-1204B-14R-2, 115-117**		**Piece No.: 5**		**Unit: 2c**	**ODP TS#: 100**	**OBSERVER: CRN, SR, PT.**
ROCK NAME:	Diabase.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intersertal to subtrachytic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Plagioclase	1	1	1	7	3	Subhedral, blocky	Optically zoned with resorption features.
GROUNDMASS							
Plagioclase	40	40	0.1	1	0.6	Subhedral laths	Some are skeletal.
Olivine	0	5	0.1	0.6	0.4	Euhedral to subhedral	Completely altered and replaced by calcite.
Clinopyroxene	10	25	0.05	0.3	0.1	Anhedral masses	Mostly altered to Fe oxyhydroxide.
Titanomagnetite	0	4	<0.01	0.06	0.01	Skeletal octahedra, dendritic	Most abundant in the vesicle cylinder. Altered to maghemite.
Glass	0	25					

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brownish green clay	19				Glass, clinopyroxene, lines vesicles	Could be incipient zeolite?
Calcite	6				Olivine, glass	
Fe oxyhydroxide	20				Clinopyroxene, glass	
Maghemite	4				Titanomagnetite	

VESICLES/			**SIZE (mm)**				
CAVITIES	**PERCENT**	**LOCATION**	**min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	5	Random	0.2	1	0.4	Unfilled	Lined with green clay.

COMMENTS:	Vesicle cylinder filled with segregated material (moderately pleochroic clinopyroxene, skeletal plagioclase, titanomagnetite) and vesicles is present midway down section on the right side. Titanomagnetite is almost completely altered to maghemite. Rare relict centers in larger crystals. Most of the titanomagnetite is <0.01 microns.	**Chapter 4, Figure 9.** Field of view 1.25 mm, XPL.

THIN SECTION:	**197-1204B-14R-3, 68-70**	**Piece No.: 14**	**Unit: 2c**	**ODP TS#: 101**	**OBSERVER: PT**
ROCK NAME:	Diabase.				
WHERE SAMPLED:					
GRAIN SIZE:	Fine grained.				
TEXTURE:	Intergranular.				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Plagioclase	2	2	1	2.5	1.75	Subhedral	Show rounded edges and some resorption.
GROUNDMASS							
Plagioclase	30	40	0.25	0.9	0.6	Elongate	Smaller grains are frequently skeletal.
Olivine	0	5	0.1	0.2	0.15	Equant	May be more abundant - difficult to tell due to alteration. Replaced by calcite and Fe oxyhydroxide.
Clinopyroxene	1	?	0.2	0.8	0.4	Subhedral	Replaced by clay.
Titanomagnetite	1	2	0.02	0.1	0.03	Dendritic, skeletal	Partially altered to maghemite along rims.
Glass	0	?					Altered to Fe oxyhydroxide and brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown clay	22				Replacing glass, plagioclase, pyroxene and possibly olivine?	
Fe oxyhydroxide	40				Replacing glass, pyroxene and possibly olivine?	
Calcite	3				Olivine	
Maghemite	1				Titanomagnetite	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	2	Throughout	0.3	1.5	1	Calcite, round	Surrounded with abundant segregation material Photomicrograph 1204B-159.

COMMENTS:	Groundmass altered. ICP analysis may reflect this.	**Photomicrograph 1204B-159.** Field of view 1.25 mm, XPL.

THIN SECTION:	**197-1204B-15R-1, 15-18**	**Piece No.: 1**	**Unit: 2c**	**ODP TS#: 102**	**OBSERVER: PT**
ROCK NAME:	Diabase.				
WHERE SAMPLED:	Segregation vesicle within unit.				
GRAIN SIZE:	Fine grained.				
TEXTURE:	Intergranular.				

PRIMARY MINERALOGY	**PERCENT PRESENT**	**PERCENT ORIGINAL**	**SIZE (mm) min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Plagioclase	2	4	0.5	0.8	0.6	Subhedral	Frequently forms glomerocrysts.
Olivine	0	2	0.3	0.8	0.6	Equant; euhedral	Frequently forms glomerocrysts.
GROUNDMASS							
Plagioclase	30	30	0.25	1	0.5	Elongate	Occasional larger, more anhedral and zoned grains could be phenocrysts. Smaller grains are frequently skeletal.
Clinopyroxene	1	?	0.2	0.8	0.4	Subhedral	Replaced by clay.
Titanomagnetite	3	3	0.02	0.05	0.03		
Glass	0	?					Altered to Fe oxyhydroxide and brown clay.

SECONDARY MINERALOGY	**PERCENT**	**SIZE (mm) min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown clay	33				Replacing glass, pyroxene and possibly olivine in groundmass?	
Calcite	10				Infilling vesicles and olivine	
Fe oxyhydroxide	21				Replacing glass, pyroxene and possibly olivine in groundmass?	

VESICLES/ CAVITIES	**PERCENT**	**LOCATION**	**SIZE (mm) min.**	**max.**	**av.**	**FILLING / MORPHOLOGY**	**COMMENTS**
Vesicles	15	Segregation vesicle in center	0.5	3.5	1.5	Calcite	Surrounded by segregated material.
Vein	2		0.5	2	1	Brown clay	

COMMENTS: Groundmass altered. ICP analysis may reflect this. Olivine may originally have been present in the groundmass, but sample is too altered to tell. Photomicrograph 1204B-172 of segregated material and 1204B-173 of plagioclase and olivine glomerocryst.

Photomicrograph 1204B-172. Field of view 5 mm, PPL.
Photomicrograph 1204B-173. Field of view 5 mm, PPL.

THIN SECTION: 197-1204B-15R-1, 131-133 **Piece No.:** 9 **Unit:** 2c **ODP TS#:** 103 **OBSERVER:** PT
ROCK NAME: Diabase.
WHERE SAMPLED:
GRAIN SIZE: Fine grained.
TEXTURE: Intergranular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS							
Plagioclase	2	2	0.5	0.8	0.65	Subhedral	Appear to have had a more complex history than skeletal plagioclase in groundmass
GROUNDMASS							
Plagioclase	30	40	0.25	1	0.5	Elongate	Occasional larger, more anhedral and zoned grains could be phenocrysts. Smaller grains are frequently skeletal.
Olivine	0	3	0.1	0.2	0.15	Equant	May be more abundant - difficult to tell due to alteration.
Clinopyroxene	1	?	0.2	0.8	0.4	Subhedral	Replaced by clay.
Titanomagnetite	1.5	3	0.02	0.1	0.03	Dendritic, skeletal	Partially altered to maghemite along rims.
Glass	0	?					Altered to Fe oxyhydroxide and brown clay.

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Brown clay	40				Replacing glass, plagioclase, pyroxene and possibly olivine?	
Fe oxyhydroxide	24				Replacing glass, pyroxene and possibly olivine?	
Maghemite	1.5				Titanomagnetite	

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

COMMENTS: Groundmass altered. ICP analysis may reflect this. Olivine may have been more abundant, but sample is too altered to tell.

THIN SECTION:	**197-1204B-16R-2, 42-44**		**Piece No.: 5A**		**Unit: 2d**	**ODP TS#: 104**	**OBSERVER: CRN, PT.**
ROCK NAME:	Quenched basaltic glass.						
WHERE SAMPLED:	Glassy lobe margin.						
GRAIN SIZE:	Glassy.						
TEXTURE:	Glassy, porphyritic.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
Olivine	0	1	0.1	0.8	0.6	Euhedral, equant	Entirely altered to iddingsite.
Plagioclase	3	3	0.14	1	0.4	Lath-like and skeletal	
GROUNDMASS							
Glass	10	96					

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Iddingsite	1				Olivine	
Palagonite	20				Glass	
Yellow-brown clay	40				Glass	
Fe oxyhydroxide	26				Glass	

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

COMMENTS:	Photomicrograph 1204B-174 of plagioclase microlites in glass.	**Photomicrograph 1204B-174.** Field of view 1.25 mm, PPL. **Photomicrograph 1204B-175.** Field of view 1.25 mm, XPL.

THIN SECTION:	**197-1204B-17R-1, 89-90**		**Piece No.: 13**		**Unit: 3**	**ODP TS#: 105**	**OBSERVER: PT**
ROCK NAME:	Aphyric basalt.						
WHERE SAMPLED:							
GRAIN SIZE:	Fine grained.						
TEXTURE:	Intergranular.						

PRIMARY	**PERCENT**	**PERCENT**	**SIZE (mm)**				
MINERALOGY	**PRESENT**	**ORIGINAL**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS							
GROUNDMASS							
Plagioclase	30	40	0.25	1	0.5	Elongate	Occasional larger, more anhedral and zoned grains could be phenocrysts. Smaller grains are frequently skeletal.
Olivine	0	1?	0.1	0.4	0.2	Equant	May be more abundant - difficult to tell due to alteration.
Clinopyroxene	1	?	0.2	0.8	0.4	Subhedral	Replaced by clay.
Titanomagnetite	0?	2	0.02	0.1	0.03	Dendritic; skeletal	All altered to maghemite??
Glass	0	?					Altered to Fe oxyhydroxide and brown clay.

SECONDARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**REPLACING / FILLING**	**COMMENTS**
Brown clay	56				Replacing glass, plagioclase, pyroxene and possibly olivine?	
Fe oxyhydroxide	11				Replacing glass, pyroxene and possibly olivine?	
Maghemite	2?				Replacing titanomagnetite.	

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

COMMENTS: Groundmass altered. ICP analysis may reflect this. Olivine may have been more abundant, but sample is too altered to tell.

Hole 1204A Alteration Log

Unit	Core	Section	Section Top (mbsf)	Alteration Degree	FeOx	CaCO3	Brn C	Sap	Py	Cel	Zeol	Vesicularity	CaCO3	Brn C	GC	Pyr	DKGC	Zeol	FeOx
2	7R	2	820.95	3			x					3	x						
2	7R	3	822.32	2.5	x	x	x	x			x	3	x		x				x
2	7R	4	823.82	2.5			x					3	x						
2	8R	1	829.00	3	x		x					3	x		x				x
2	8R	2	830.50	2.5	x		x					3	x						x
2	9R	1	838.60	3	x	x	x	x			x	2	x					x	x
2	9R	2	840.10	2	x		x					1	x						x
2	9R	3	841.60	2.5	x		x					2	x						x
2	9R	4	842.97	3	x		x					1.5	x						x
2	10R	1	848.30	2	x		x					2	x						x
2	10R	2	849.77	2	x		x	x			x	2	x	x	x			x	x
2	10R	3	850.91	2			x	x	x		x	2	x		x	x		x	
2	10R	4	858.36	2				x	x			2	x		x	x			
2	10R	5	853.82	2			x	x	x			2	x		x	x			
2	10R	6	855.06	3	x		x	x	x			2	x		x	x			x

Hole 1204B Alteration Log

Unit	Core	Section	Section Top (mbsf)	Alteration Degree	FeOx	CaCO3	Brn C	Sap	Py	Zeol	Vesicularity	CaCO3	Brn C	GC	Py	Zeol	FeOx
1	1R	3	813.70	2	x	x					2	x					x
1	1R	4	814.75	2	x	x					1	x					x
1	2R	1	820.30	2	x	x					1.5	x					x
1	2R	2	821.60	2	x	x		x			1.5	x					x
1	2R	3	822.93	2	x	x					0.5	x					x
1	2R	4	823.80	2	x	x		x		x	0.5	x		x		x	x
1	2R	5	825.15	3	x	x					2	x	x	x			x
1	2R	6	826.67	2	x	x					2	x	x	x			x
1	3R	1	829.90	2.5	x	x		x		x	2.5	x	x	x		x	x
1	3R	2	831.35	2.5	x	x		x		x	2.5	x	x	x		x	x
1	3R	3	832.85	2.5	x	x					3	x	x	x		x	x
1	4R	1	839.60	2.5	x	x					3	x	x	x			x
2A	4R	2	841.10	2.5	x						3	x					
2A	4R	3	842.60	2.5	x	x	x			x	3	x	x			x	x
2A	5R	1	849.30	2	x	x					2.5	x	x	x			x
2A	5R	2	850.80	2.5	x	x					2.5	x	x	x			x
2A	6R	1	858.60	2	x	x					2	x	x	x			
2A	6R	2	860.03	2	x						2	x	x	x			x
2A	6R	3	861.53	2.5	x	x					1.5	x	x	x			
2A	6R	4	863.03	1.5	x	x	x	x		x	3	x		x		x	x
2A	7R	1	868.20	2	x	x					2	x					x
2A	7R	2	869.69	2	x	x	x			x	2	x	x	x			x
2B	7R	3	871.17	2.5	x	x	x	x			2.5	x					x
2B	8R	1	877.80	2.5	x	x					1	x		x			x
2B	8R	2	877.80	2.5	x	x					1	x		x			x
2B	8R	3	879.30	2.5	x	x					1	x		x			x
2B	8R	4	880.76	2	x		x	x			1.5	x					x
2B	9R	1	887.10	2.5	x	x					1	x		x			x
2B	9R	2	887.29	2.5		x		x	x		1	x		x	x		
2B	9R	3	888.69	2	x	x		x	x	x	1	x		x	x	x	
2B	10R	1	888.80	2.5	x	x		x	x		1.5	x		x	x		x
2B	10R	2	890.30	2	x	x					1	x					x
2B	10R	3	891.55	2.5	x	x					1.5	x					x
2B	10R	4	892.36	2.5	x	x		x	x		1.5	x		x	x		x
2B	11R	1	896.60	2	x	x					2	x					x
2B	11R	2	898.05	2.5	x	x					1.5	x					x
2B	12R	1	906.30	2	x	x	x	x			1.5	x				x	x
2B	12R	2	907.70	2	x	x					0.5	x					x
2B	13R	1	908.30	2.5	x	x					2	x					x
2B	13R	2	909.77	2.5	x	x		x	x	x	2	x		x	x	x	x
2B	13R	3	911.16	3		x		x	x	x	1.5	x		x	x	x	
2B	13R	4	912.33	3		x		x	x		1	x		x	x		
2B	14R	1	915.90	2.5		x		x	x		1	x		x	x		x
2C	14R	2	917.02	3	x	x		x	x	x	1.5	x		x	x	x	x
2C	14R	3	918.32	2.5	x	x	x				2.5	x					x
2C	15R	1	925.60	2.5	x	x	x				3	x					x
2C	15R	2	927.04	2.5	x						3	x					x
2C	15R	3	928.54	2.5	x						3	x					x
3	17R	1	944.90	2.5	x	x	x		x		3	x			x		
3	17R	2	946.08	2.5	x	x					3	x					x
3	17R	3	947.21	3	x	x					3	x					x

Hole 1204A Vein Log

Identifiers				Position		Vein						Halo				
Unit	Core	Sec	Piece	Section	Section	Top	Bot	Width	App.	Mineralogy	Proportions	Color	Width	Mineralogy	Proportions	
			#	Top	Bottom	(cm)	(cm)	(mm)	Orient.		(%)		(mm)		(%)	
				(mbsf)	(mbsf)											Comments
2	7R	2	2	820.95	821.15	20	27	1	sv	CaCO3	100	LBrn	1	FeOx	100	Border of piece/CaCO3 well shaped crystals
2	7R	2	3	820.95	821.25	30	34	2	i	CaCO3	100	LBrn	1	FeOx	100	Border of piece/CaCO3 well shaped crystals
2	7R	2	8	820.95	821.88	93	97	5	sv	CaCO3	100					Border of piece/CaCO3 well shaped crystals
2	7R	2	9	820.95	821.96	101	103	3	i	CaCO3	100					Border of piece/CaCO3 well shaped crystals
2	7R	2	11	820.95	822.20	125	128	2	i	CaCO3	100					Border of piece/CaCO3 well shaped crystals
2	7R	3	1	822.32	822.33	1	7	3	i	CaCO3	100	LBrn	1	FeOx	100	Border of piece/CaCO3 well shaped crystals
2	7R	3	2	822.32	822.53	21	24	2	i	CaCO3	100					Border of piece/CaCO3 well shaped crystals
2	7R	3	5	822.32	822.85	53	69	2-3	sv	CaCO3-FeOx	60-40					
2	7R	4	1	823.82	823.83	1	9	3 cm	sv	CaCO3-FeOx	70-30					Brecciated material
2	8R	2	3	830.50	830.74	-	-	5	sv	CaCO3-FeOx	50-50					Border of piece/CaCO3 well shaped crystals/ Goethite/pervasive FeOx alteration
2	8R	1	19	829.00	830.19	119	121	2		CaCO3-FeOx	50-50					
2	9R	2	11	840.1	841.51	141	142	5	sh	CaCO3	100					
2	9R	3	15	841.6	842.90	130	131	1		CaCO3-FeOx	50-50					Border of piece, Lbrn color in the vein
2	10R	3	1	850.91	851.32	41	47	2	i	CaCO3-Py	95-5					Vesicles filled with GC-Py
2	10R	3	2	850.91	851.81	90	106	1	i	CaCO3-Py	80-20					
2	10R	4	1	852.36	852.61	25	30	2	i	CaCO3-GC	80-20					
2	10R	4	3a	852.36	853.02	66	78	5	i	CaCO3-FeOx-GC	50-30-20					
2	10R	4	3b	852.36	853.48	112	114	2-5	sh	CaCO3-FeOx-GC	50-30-20					
2	10R	5	1abc	853.82	853.93	11	40		sv	CaCO3-GC	60-40	LBrn	5	FeOx		Close up photo

Hole 1204B Vein Log

Identifiers				Position		Vein						Halo				
Unit	Core	Sec	Piece	Section Top (mbsf)	Section Bottom (mbsf)	Top (cm)	Bot (cm)	Width (mm)	App. Orient.	Mineralogy	Proportions (%)	Color	Width (mm)	Mineralogy	Proportions (%)	Comments
1	1R	1	2	810.7	810.85	15	27	20	sv	Brecciated material						
1	2R	1	3b	820.3	820.90	60	90	30	sv	Brecciated material						
1	2R	2	1	821.6	821.82	22	37	10	sv--i	CaCO3-BrnC/FeOx	80-20	LBrn	3	FeOx		
1	2R	2	1	821.6	822.68	108	122	5	sv	CaCO3-Black oxide	80-20					
1	2R	3	1	822.93	823.03	10	16	1-3	i	CaCO3-BrnC/FeOx	60-40	LBrn	3	FeOx		
1	2R	3	1	822.93	823.23	30	32	2-5	sh	CaCO3-BrnC/FeOx	60-40	LBrn	3	FeOx		
1	2R	3	1	822.93	823.56	63	65	3	sh	CaCO3-BrnC/FeOx	60-40	LBrn	3	FeOx		
1	2R	4	1	823.8	823.91	11	12	3	sh	CaCO3-BrnC/FeOx	60-40					
1	2R	4	1	823.8	824.05	25	27	2	i	CaCO3-BrnC/FeOx	60-40	LBrn	50	FeOx		Pervasive
1	2R	4	1	823.8	824.18	38	39	2	i	CaCO3-BrnC/FeOx	10-90					
1	2R	4	1	823.8	824.31	51	53	2	i	CaCO3-BrnC/FeOx	10-90					
1	2R	4	1	823.8	824.69	89	92	2	i	CaCO3	100					
1	3R	1	9	829.90	830.55	65	77	5	sv	CaCO3	100					Border of piece
1	3R	2	7	831.35	831.98	63	70	1	sv	CaCO3	100					Border of piece
1	3R	2	7	831.35	832.04	69	70	1	sh	CaCO3	100					
1	3R	2	16	831.35	832.72	137	145	3	i	CaCO3-black oxide	60-40					With dispersed brown clay or FeOx ?
1	4R	1	6	839.60	840.10	50	91	0.5	i	CaCO3-FeOx-black oxide	40-30-30					
2A	4R	2	7a	841.10	841.60	50	63	0.5	i	CaCO3-FeOx	70-30					
2A	4R	2	7b	841.10	841.74	64	72	0.5	i	CaCO3-FeOx	70-30					
2A	6R	1	5a	858.60	858.97	37	42	2	i	CaCO3-FeOx	70-30					
2A	7R	2	14b	869.67	870.61	94	97	2	i	CaCO3-FeOx	80-20					FeOx lining vein
2A	7R	2	15	869.67	870.72	105	107	1-2	sh	CaCO3-FeOx	80-20	LBrn	5	FeOx		Photo
2A	7R	2	16a	869.67	870.76	109	130	2	sv	CaCO3-FeOx	80-20	LBrn	5	FeOx		
2A	7R	2	16a	869.67	870.94	127	129	3	sh	CaCO3-FeOx-GC	50-40-10	LBrn	5	FeOx		Disseminated black oxides, TSB
2A	7R	2	16b	869.67	870.99	132	134	3	i	CaCO3-FeOx-GC	50-40-10	LBrn	5	FeOx		FeOx lining vein
2B	8R	2	14a	879.30	880.25	95	104	2	sv	CaCO3-FeOx	70-30					
2B	9R	2	1	887.29	887.42	13	13	1	sh	CaCO3-GC-Py	95-5					
2B	9R	2	1b	887.29	887.47	18	27	3	i	CaCO3-GC-Py	80-20					
2B	9R	2	1b	887.29	888.04	75	76	0.5	sh	CaCO3-GC-Py	90-10					
2B	9R	2	1c	887.29	888.40	111	116	5	i	CaCO3-FeOx-Py	40-60	LBrn	10	FeOx		In reducing zone
2B	9R	2	1c	887.29	888.44	115	123	2	i	CaCO3-FeOx-GC	70-20-10	LBrn	5-15	FeOx		Pervasive halo, difficult to see
2B	9R	2	1c	887.29	888.52	123	128	0.5	i	CaCO3	100					
2B	9R	3	2	888.69	889.19	50	57	2	i	CaCO3-GC	95-5					
2B	9R	3	1b	888.69	889.29	60	76	5	i	CaCO3-FeOx	70-30	LBrn	20	FeOx		Pervasive halo, difficult to see, in reducing zone
2B	9R	3	1e	888.69	889.86	117	123	5	i	CaCO3-FeOx-GC	60-30-10	LBrn	20	FeOx		Pervasive halo, difficult to see, in reducing zone
2B	9R	3	1e	888.69	889.83	114	120	1-2	i	FeOx or BrnC	100					
2B	9R	3	1e	888.69	889.92	123	133	1-5	i	CaCO3-FeOx-GC	60-30-10					
2B	10R	1	2	888.80	889.06	26	27	1-2	sh	CaCO3-FeOx-GC	70-20-10					In reducing zone
2B	10R	3	1a	891.55	891.63	8	16	0.2	i	CaCO3	100					Oxidizing zone
2B	10R	3	6	891.55	892.26	71	76	1-2	i	CaCO3-FeOx	40-60					Oxidizing zone
2B	10R	4	1a	892.36	892.37	1	14	1-5	i	CaCO3-FeOx	70-30					Pervasive FeOx alteration
2B	10R	4	1b	892.36	892.63	27	30	2	sh	CaCO3-FeOx-GC-Py?	80-5-10-5					
2B	10R	4	2	892.36	893.15	79	86	0.5	i	CaCO3-FeOx	80-20					
2B	11R	1	2	896.60	896.77	17	36	0.2	sv	CaCO3-FeOx	98-2					
2B	12R	1	4ab	906.30	906.46	16	36	6	sv	CaCO3-FeOx	50-50	LBrn	15	FeOx		
2B	12R	1	9	906.30	907.26	96	124	2-3	sv	CaCO3-FeOx	50-50	LBrn	1-3	FeOx		Oxidizing zone
2B	13R	2	5	909.77	910.15	38	45	1-3	i	CaCO3-FeOx	50-50					
2B	13R	2	6	909.77	910.28	51	60	1-5	sv	CaCO3-FeOx	50-50					Border of piece
2B	13R	2	14	909.77	911.00	123	126	5	shh	CaCO3-FeOx	70-30	LBrn	1-3	FeOx		FeOx lining vein, oxidizing zone
2B	13R	4	1	912.33	912.69	36	38	1-3	sh	CaCO3-GC-Py	70-25-5					Reducing zone
2B	13R	4	1	912.33	912.86	53	70	1-5	i	CaCO3-GC-Py	70-25-5					Surrounded by vesicles filled with calcite
2B	13R	4	1	912.33	913.15	82	87	0.2-0.5	i	CaCO3-GC-Py	70-20-10					
2B	13R	3	1a	911.16	911.17	1	6	2	i	CaCO3-GC-FeOx	80-10-10	LBrn	3-5	FeOx		FeOx altough in reducing zone
2B	13R	3	1a	911.16	911.27	11	31	1	i	CaCO3-GC-Py	80-15-5					Reducing zone

Hole 1204B Vein Log

Identifiers				Position		Vein						Halo				
				Section	Section	Top	Bot	Width	App.	Mineralogy	Propor-tions	Color	Width	Mineralogy	Proportions	
Unit	Core	Sec	Piece	Top	Bottom	(cm)	(cm)	(mm)	Orient.		(%)		(mm)		(%)	
			#	(mbsf)	(mbsf)											Comments
2B	13R	3	1bc	911.16	911.73	57	72	1-2	i	CaCO3-GC-Py	80-15-5					Reducing zone
2B	13R	3	2	911.16	912.20	104	117	3	i	CaCO3-GC-Py	80-10-10					Reducing zone
2B	14R	1	2a	915.90	915.93	3	8	1	i	CaCO3-GC-Py	80-10-10					Reducing zone
2B	14R	1	2b	915.90	916.77	87	103	1-2	i	CaCO3-FeOx	50-50					Oxidizing zone
2B	14R	2	1	917.02	917.18	16	23	1-2	i	CaCO3-GC-Py	80-10-10					Small reducing zone
2C	15R	1	7b	925.60	926.34	74	90	1	i	CaCO3-FeOx	50-50					