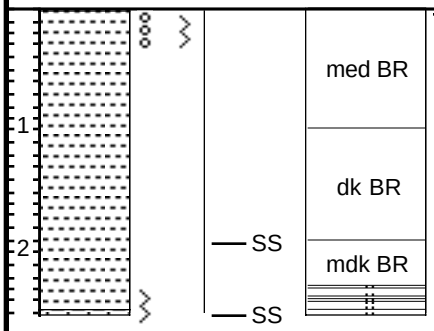
Core Photo

187-1154A-1W 0.0-233.2 mbsf

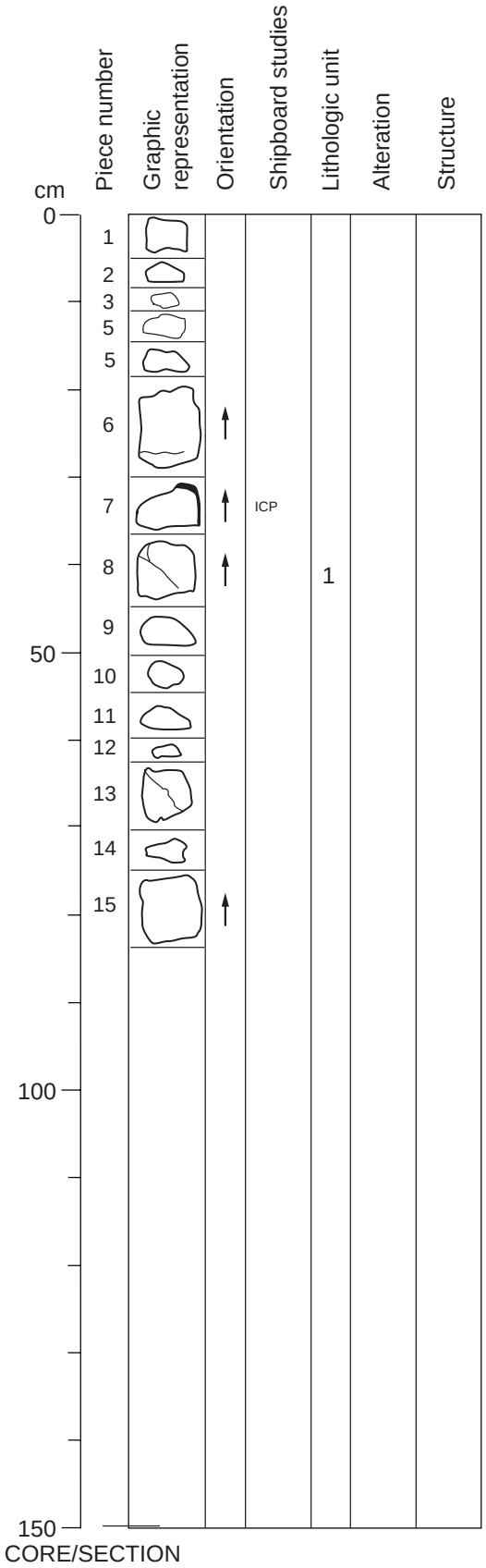


DESCRIPTION

CLAY

Very dark brown to dark grayish brown clay. The upper part of Section 1 is soupy and contains 2-4 mm sized clasts of indurated medium gray clay which is similar in appearance to a 1 cm thick layer at 26 cm in Section 1. Below 34 cm in Section 1, obvious core disturbance substantially decreases, although the edges of the core show minor drilling induced deformation. While the color of the sediment is generally dark brown, there is considerable variablity in color on scales of 1 to 5 cm thick intervals from very dark grayish brown to light brown. Between 76 and 79 cm in Section 2 is a distinct olive brown clay that has a sharp lower contact with very dark brown clay. Section 3 appears deformed and varies from very dark grayish brown clay to light brown silty clay at the base of the section. A smear slide from Section 2 contains almost exclusively clay with very rare (<1%) 2-4 µm subrounded, brown, translucent glass fragments and colorless quartz crystals. The 2 cm thick light brown interval at the bottom of Section 3 is a calcareous ooze.

Core Photo



187-1154A-2R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-15

INTERNAL CONTACTS: Glassy pillow margin on Piece 7 (31- 32 cm).

PHENOCRYSTS:

	Abundance	Size (mm)		Shape
	%	avg.	max.	min.	
Plagioclase	2	1	5	1	tabular
Olivine	1	1	3	0.5	equant
Total	3				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:

Abundance	Size (mm)		Shape
%	avg.	max.	min.	
1-2	0.5	2	<0.5	round

Filling: Fe oxyhydroxides, white clay and/or cryptocrystalline silica, mostly toward rims of pieces

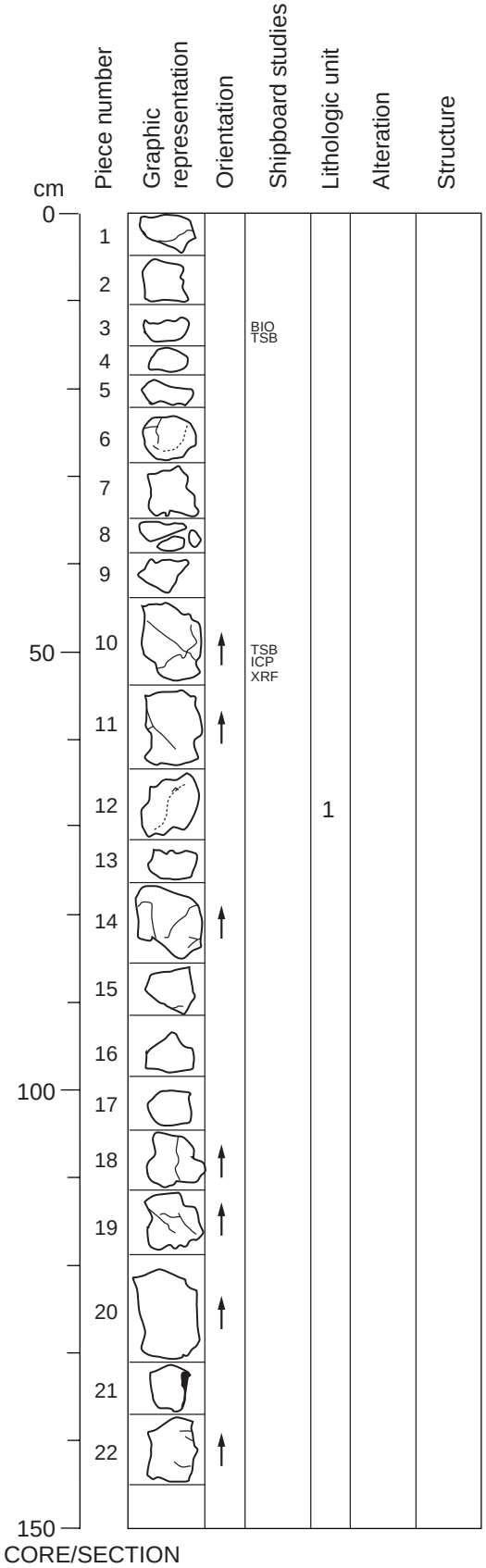
VEINS/FRACTURES: Vein 0.5 mm wide parallel to layers of palagonite and fresh glass in Piece 7; filled with silica and Fe oxyhydroxides

ALTERATION: Slightly altered, alteration concentrated in 1 cm wide halos on the margins of some pieces and in thin (<1 cm) halos around open fractures. In these alteration halos, olivine is 100% altered to Fe oxyhydroxides. Plagioclase in the halos is altered and iron stained but commonly retains fresh cores. Spots of Mn oxide (<1 mm in diameter) on the outside of some pieces. Open fractures contain clay and/or cryptocrystalline silica and Fe oxyhydroxide coatings.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Phenocryst abundance appears to be variable from virtually aphyric to sparsely phyric. This may be an alteration effect, or possibly due to flow driven crystal sorting. A large anhedral plagioclase crystal in Piece 13 contains a euhedral spinel inclusion; suggests the plagioclase may be a xenocryst. Olivine phenocrysts range from euhedral to skeletal; plagioclase is predominantly subhedral.

Core Photo



187-1154A-3R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-22

INTERNAL CONTACTS: Glassy rinds and/or chilled margins, interpreted as pillow margins, on Pieces 1, 4, 6, 9 (working half only), 10 and 16. Piece 16 has an 8 mm thick glassy rind partially altered to palagonite with quartz and a 5 mm wide chilled margin. On all other pieces the glassy rinds are <2 mm thick and are variably altered to palagonite, the chilled margins are typically less than 8 mm. Piece 10 (working half) is oriented, and the glassy rind is on the top.

PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
Plagioclase	3	2	4	<1 acicular to tabular
Olivine	1	1.5	3	<1 euhedral
Total 4				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
	1	<1	1	<0.5 round

Filling: Interiors coated with cryptocrystalline silica

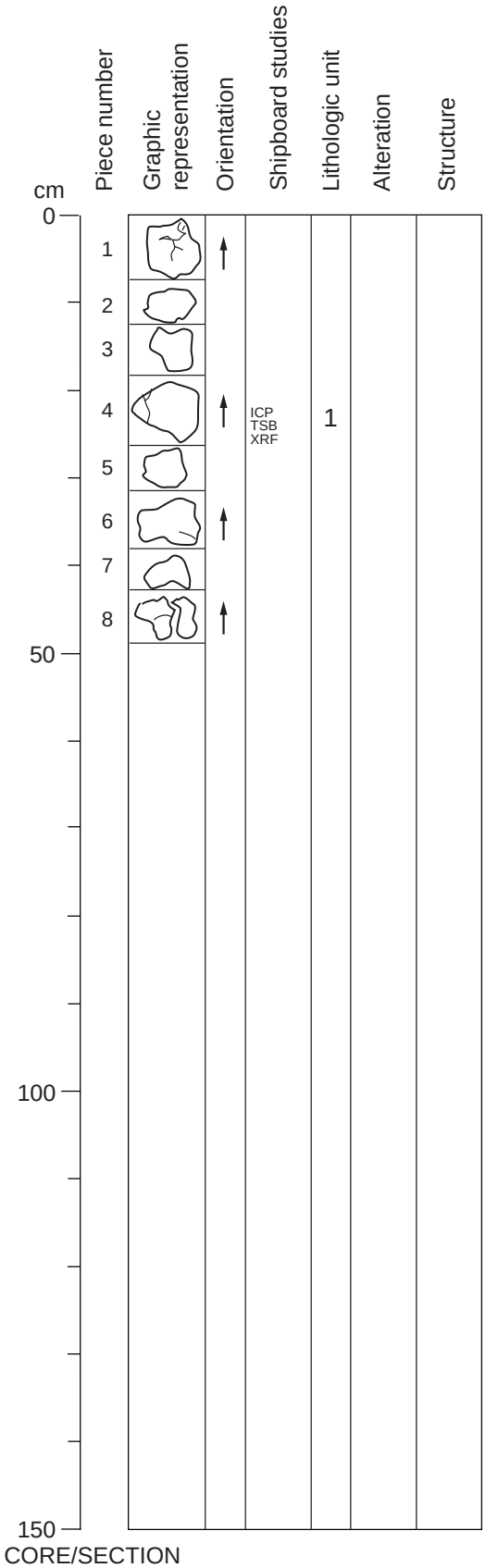
VEINS/FRACTURES: Small fractures <1 mm wide occur in Pieces 1, 6,10, 11, 14, 18, and 19. Only the fractures in Pieces 18 and 19 were associated with <1 mm wide oxidation halos.

ALTERATION: Overall the rock is fresh, however 15% of all olivine is altered to Fe oxyhydroxide. Small <1 mm spot Mn oxide associated with cryptocrystalline silica and Fe oxyhydroxide are present on edges of Pieces 2, 5, 6, 7, 8, 11,12, 14, 15, 17, 21, and 22.

STRUCTURE: Pillow lava as indicated by the glassy rinds and V-shape morphology, (as a result of radial cooling fractures), best represented by Piece 16.

ADDITIONAL COMMENTS: In this section approximately 20% of phenocrysts are glomerocrysts of either exclusively plagioclase or plagioclase and olivine. Piece 10 (oriented) has subtle flow alignment of plagioclase in the top 30 mm sub-parallel to the chilled margin at the top of the Piece. Phenocryst abundance throughout this section varies from 6% in Piece 18 to 3% in Piece 2, but there is no systematic variation.

Core Photo



187-1154A-3R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-8

INTERNAL CONTACTS: Glassy rinds on Pieces 1 (working half) and 8 indicate pillow lavas. Piece 8 has a 3 mm thick glassy rind on its exterior with a 1.2 cm wide chilled margin below which occurs an interior band of glass 3 mm thick. Although both glasses are a mixture of glass and palagonite, the internal band is more altered.

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2	1.5	3	<1	tabular to acicular
Olivine	1	1	2	<1	euhedral
Total	3				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
	1	<1	1	<0.5	round

Filling: Interiors coated with cryptocrystalline silica

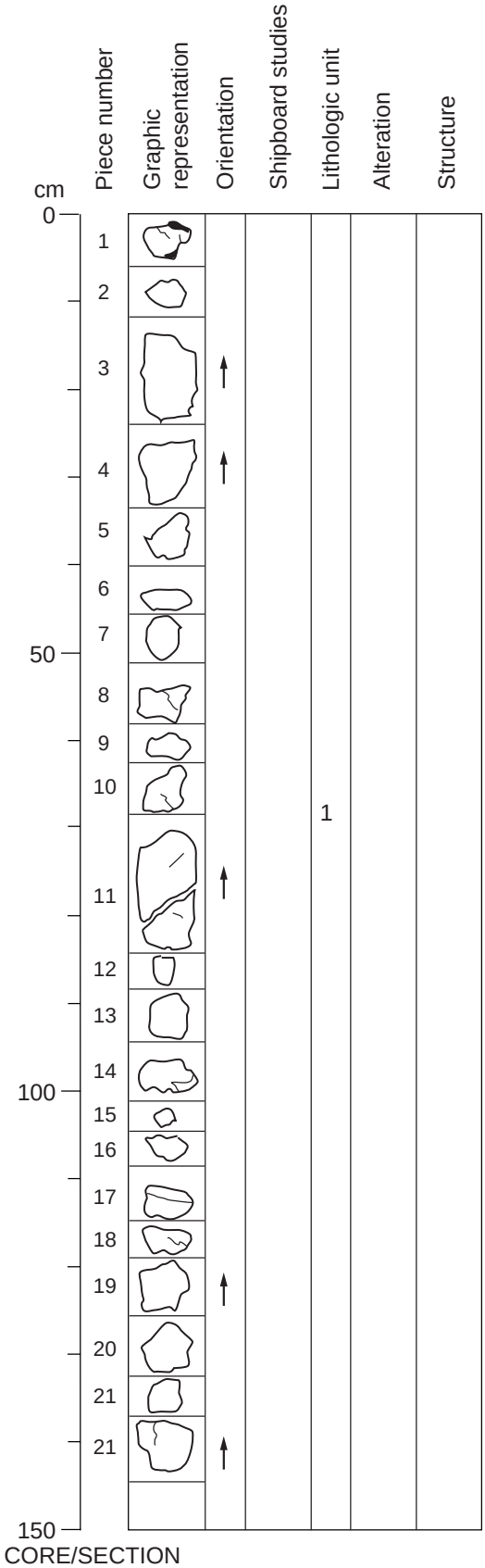
VEINS/FRACTURES: Pieces 1, 4, and 8 have small 1 mm wide fractures. The fracture in Piece 1 is filled by a tanish yellow clay. The fracture in Piece 8 runs parallel to its glassy rind and is filled with a pink (possibly Fe-stained) clay.

ALTERATION: Overall rock is fresh, however individual olivine phenocrysts show up to 80% alteration close to fractures and weathered margins, best represented by Piece 1. In total approximately 20% of all olivines are altered to Fe oxyhydroxide. Small <1 mm Mn oxide spots associated with cryptocrystalline silica and Fe oxyhydroxide are present on edges of Pieces 1, 3, 6, 7, and 8.

STRUCTURE: Pillow lavas as indicated by the glassy margins on Pieces 1 and 8 and the radial fracture that result in the V shaped morphology of Piece 8.

ADDITIONAL COMMENTS: In this section approximately 15% of phenocrysts are glomerocrysts of either exclusively plagioclase or plagioclase and olivine.

Core Photo



187-1154A-4R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-23

INTERNAL CONTACTS: Glassy rinds on Pieces 1, 7 and 11a indicate pillow lavas. Piece 1 has a 3 mm thick glassy rind on its exterior with a 5 mm wide chilled margin. Piece 7 has a 2 mm thick glassy rind with a 5 mm wide chilled margin. Piece 11 is oriented and has a 2 mm thick glassy rind on its exterior with a 8 mm wide chilled margin at the top. On all pieces glass appears as a mixture of glass and palagonite.

PHENOCRYSTS:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2	2	6	<1	tabular to acicular
Olivine	1	1	2	<1	euhedral
Total	3				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
	1	<1	1	<0.5	round

Filling: Interiors coated with cryptocrystalline silica, or possibly a white clay.

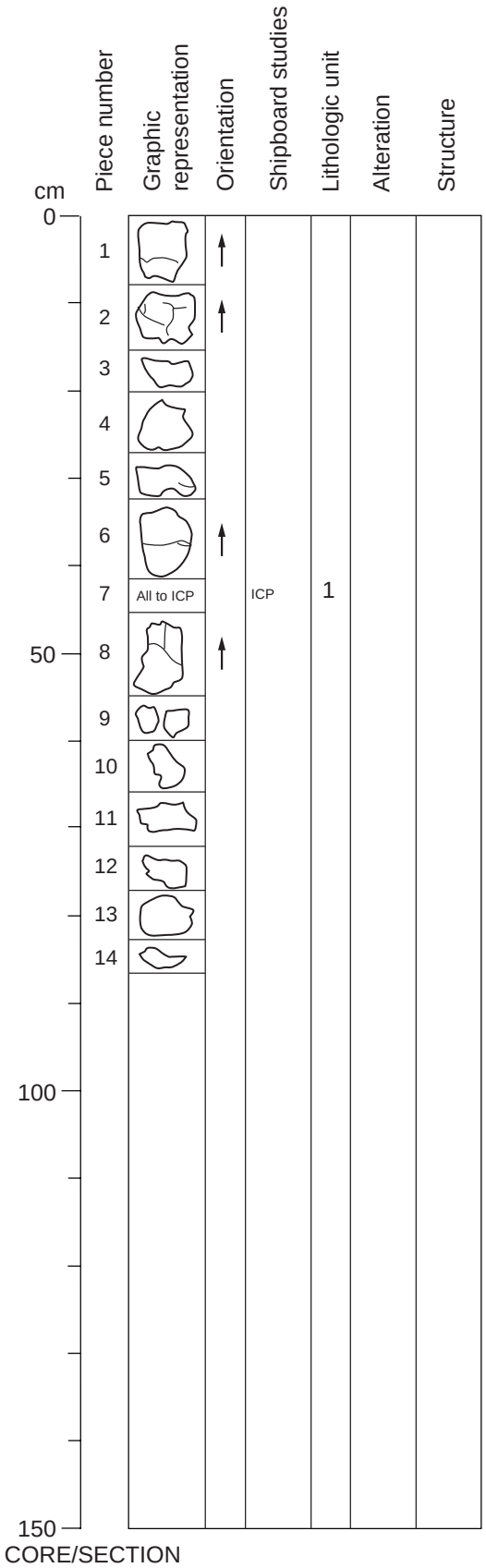
VEINS/FRACTURES: Pieces 1, 11, and 17 have small 1 mm wide fractures. The fracture in Piece 17 is associated with a 1 mm wide oxidation halo.

ALTERATION: Overall rock is slightly altered. Individual olivine phenocrysts show up to 80% alteration close to fractures and weathered margins. In total approximately 50% of all olivines are altered to Fe oxyhydroxide. Small <1 mm spot Mn oxide associated with cryptocrystalline silica and Fe oxyhydroxide are present on edges of Pieces 3, 4, 5, 9, 17, and 18.

STRUCTURE: Pillow lavas as indicated by the glassy margins on Pieces 1, 11, and 17 and the radial fractures that result in the V-shaped morphology of Pieces 8 and 16.

ADDITIONAL COMMENTS: In this section approximately 15% of phenocrysts are glomerocrysts of either exclusively plagioclase or plagioclase and olivine, one clinopyroxene(?) and plagioclase glomerocryst in Piece 19. Olivine is locally greater than 1% of phenocrysts, but is unequally distributed throughout individual Pieces. However, there is no systematic variation in phenocryst abundance.

Core Photo



187-1154A-4R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-14

INTERNAL CONTACTS: Glassy rinds and/or chilled margins on Pieces 2, 3, 4, 6, and 11 indicate pillow lavas. Piece 2 (oriented) has a 3 mm thick glassy rind and a chilled margin 1.2 cm wide on the side of the piece. Piece 3 has a 1 mm thick glassy rind and a 1.1 cm wide chilled margin. Piece 4 has a 2 mm thick glassy rind and a 5 mm wide chilled margin. Piece 6 (working and oriented) has a glassy rind 2 mm thick and a 6 mm wide chilled margin on its side. Piece 11 has a glassy rind <1 mm thick.

PHENOCRYSTS:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2	2	5	<1	tabular to acicular
Olivine	1	1	2	<1	euhedral
Total	3				

GROUNDMASS: microcrystalline

COLOR: light gray

VESICLES:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
	1	<1	1	<0.5	round

Filling: interiors coated with cryptocrystalline silica, or possibly a white clay.

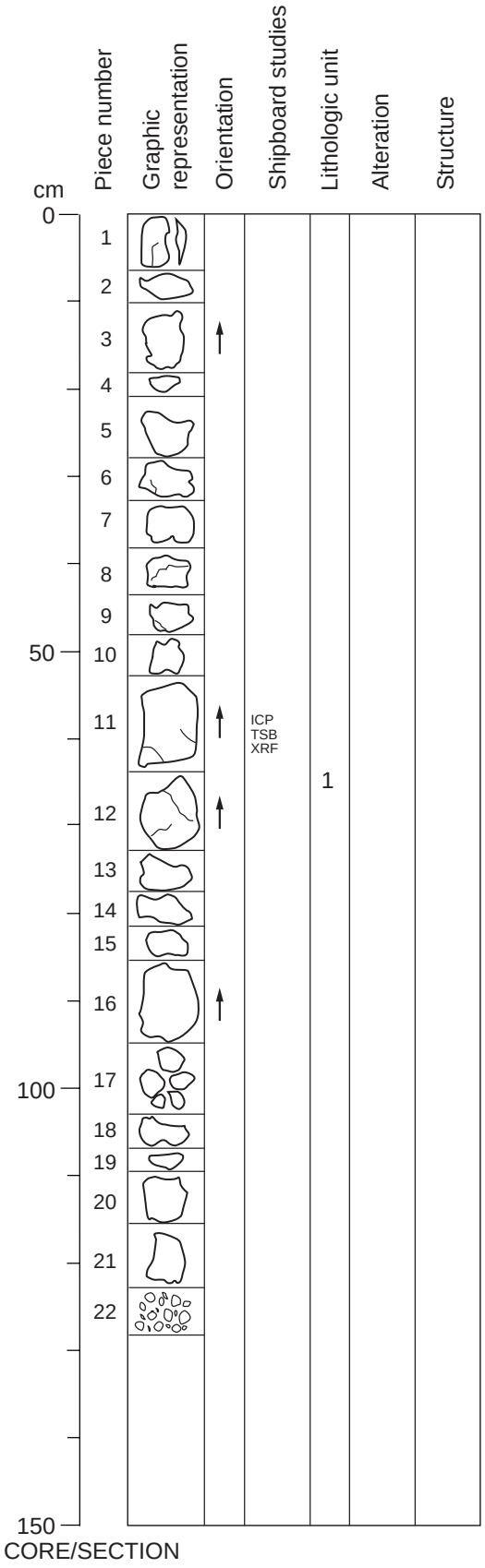
VEIN/FRACTURES: Pieces 2 and 8 have small 1 mm wide fractures associated with 1mm wide oxidation halo.

ALTERATION: Overall rock is fresh to slightly altered. Pieces 12-14 have less altered olivine than the remaining pieces. Individual olivine phenocrysts show up to 80% alteration close to fractures and weathered margins. In total, approximately 40% of all olivines are altered to Fe oxyhydroxide. Small <1 mm spots of Mn oxide associated with cryptocrystalline silica and Fe oxyhydroxide are present on edges of Pieces 6 and 8.

STRUCTURE: Pillow lavas as indicated by the glassy margins on Pieces 2, 3, 4, 6, and 11 and the radial fractures that result in the V-shaped morphology of Piece 4.

ADDITIONAL COMMENTS: In this section approximately 10% of phenocrysts are glomerocrysts of either exclusively plagioclase or plagioclase and olivine. Olivine is locally greater than 1% of phenocrysts, but is unequally distributed throughout individual pieces. However, there is no systematic relationship. It is noticeable that glassy rinds/chilled margins on oriented pieces in this section are on the side of the piece.

Core Photo



187-1154A-5R-1A

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-22

INTERNAL CONTACTS: Glassy rinds and/or chilled margins on Pieces 1 and 12. Piece 1 has a 2 mm thick glassy rind that includes olivine and plagioclase phenocrysts, followed by a 4 mm wide zone of coalesced spherulites. The chilled margin is interrupted by a layer of palagonite and a thin (<1 mm) vein of silica. There may be some replacement of glass and/or spherulites by a white clay(?) or cryptocrystalline silica(?) in the adjacent quenched margin. Piece 12 has a <1 mm thin rind of mixed glass + palagonite, followed by a 5 mm wide zone of coalesced spherulites. Part of the quenched margin is altered to a buff color. Quench spherulites tend to be <0.5 mm in diameter.

PHENOCRYSTS:

	Abundance	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2	1	5	0.5	tabular
Olivine	1	1	2	<0.5	equant
Total	3				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:

Abundance	**Size** (mm)			**Shape**
%	**avg.**	**max.**	**min.**	
1	0.5	2	<0.5	round

Filling: Interiors coated with Fe oxyhydroxides and a white clay (or possibly cryptocrystalline silica) in most pieces. Some filled with smectite.

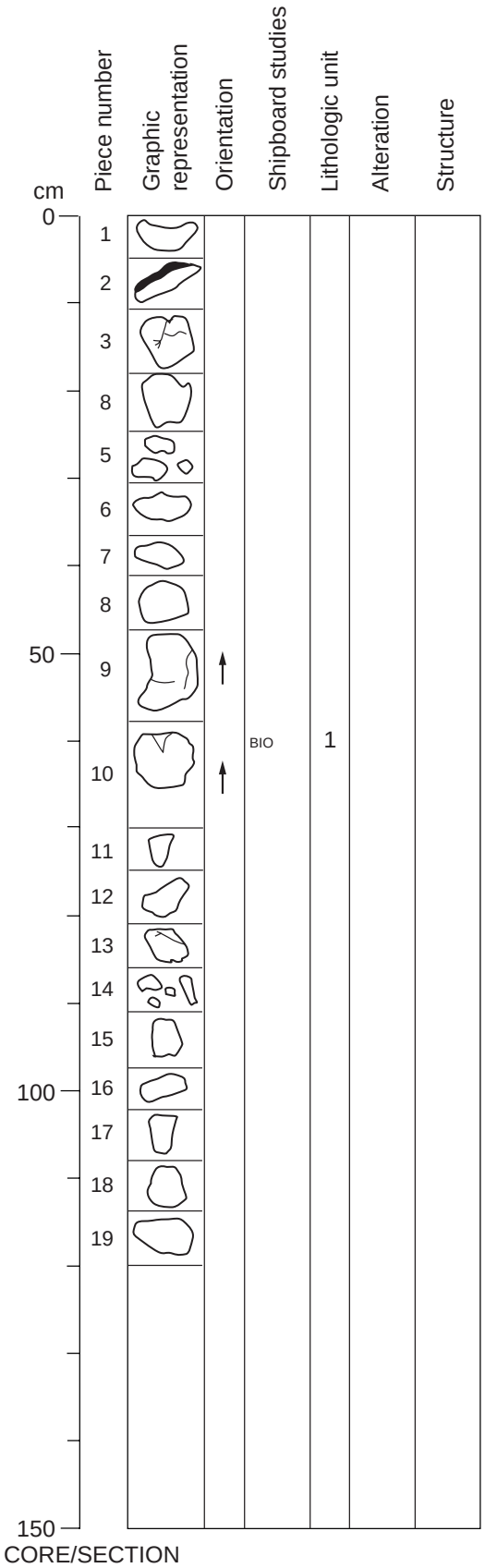
VEIN/FRACTURES: Pieces 3 and 12 have small <0.5 mm wide fractures. These fractures are oriented radially and may represent cooling cracks. There is a small vein fragment of Fe-stained silica attached to the glassy margin of Piece 12

ALTERATION: Basalt of this section is slightly altered. The outside surfaces of Pieces 2, 4-6, 11-14, 17, 18 and 20 are partly covered with a light brown coating (smectite?). Spots of Mn oxide are associated with these coatings and up to 2 mm in diameter. The largest patches of Mn oxide occur on Pieces 6 and 12. Alteration halos in which olivine is 90-100 % altered to Fe oxyhydroxides and a white clay extend for about 0.5 to 2 cm inward from the margins of the pieces. In Pieces 6, 11, 14, 15, and 21, the alteration halos include groundmass replacement and vesicle filling by olive green smectite. The boundary between the altered halos and unaltered interiors tends to be more convoluted than those seen in Hole 1152B.

STRUCTURE: Pillow lavas as indicated by the glassy margins on Pieces 1 and 12 and radial fractures in Piece 12.

ADDITIONAL COMMENTS: Plagioclase is seriate, ranging from acicular microphenocrysts to blocky or tabular phenocrysts. Phenocryst abundance varies significantly throughout the core, and in most pieces the plagioclase is borderline microphenocryst in size (<1 mm). Pieces 1-6, and 10-13 have dominant plagioclase phenocrysts or microphenocrysts with subordinant olivine phenocrysts, Pieces 7 to 9, 14 to 17, and 19 to 21 appear to be virtually aphyric or only sparsely plagioclase-olivine phyric, but this is probably due to alteration affects noted in previous cores. Piece 5 has a higher abundances of olivine phenocrysts (5 %) than other pieces. A blocky, anhedral plagioclase crystal (2 mm wide) in Piece 1 contains an opaque inclusion that may be spinel. Olivine is subhedral to euhedral throughout and plagioclase is subhedral. The pocked appearance of the cut surface of most core pieces may be due to removal of altered groundmass and/or olivine during cutting.

Core Photo



187-1154A-6R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-19

INTERNAL CONTACTS: Glassy rinds and/or chilled margins on Pieces 1, 2, and 9. Piece 1 has a chilled margin with no glass or spherulitic zone. Piece 2 is a glassy rind fragment 8 mm wide containing olivine and plagioclase phenocrysts. A thin vein of Fe oxyhydroxides + silica parallels the boundary between the glass and the zone of coalesced spherulites. There is also a 5 mm wide zone of quench variolitic texture, brown in color. Piece 9 has recovered only a thin fragment of the coalesced spherulite zone (1 mm wide).

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	1-3	1	4	0.5	tabular
Olivine	1-2	1	3	<0.5	equant
Total	2-5				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
	1	0.5	1	<0.5	round

Filling: Interiors coated with Fe oxyhydroxides and/or cryptocrystalline silica in most pieces. Some filled with smectite in the alteration halos.

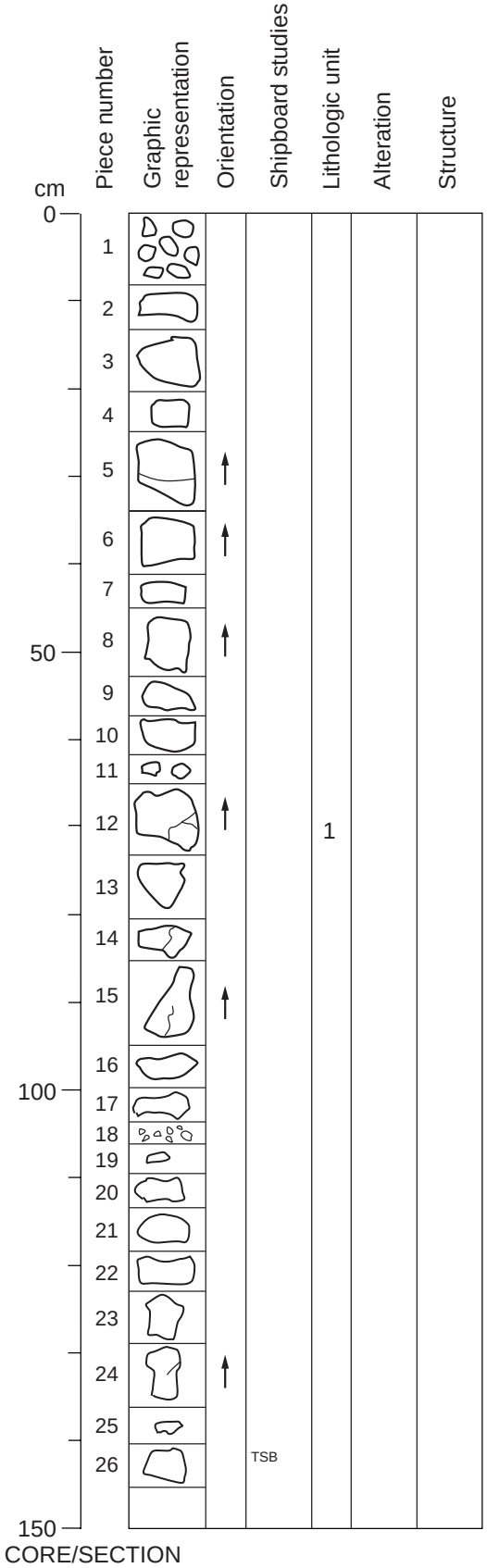
VEIN/FRACTURES: Piece 2 has a thin vein of Fe oxyhydroxides and silica parallel to the quench margin. Pieces 4 and 12 have small fractures with bleached alteration margins (up to 4 mm wide).

ALTERATION: Basalt of this section is slightly altered. Portions of the uncut surfaces of Pieces 1, 4, 5, 8, 10 to 13, 15, 17, and 18 are weathered to a light brown color. Spots of manganese are associated with these coatings and up to 1 mm in diameter. Alteration halos up to 2 cm wide are found on most pieces. Olivine is 90-100 % altered to Fe oxyhydroxides in these halos and there is some replacement of olivines and groundmass by smectite. A white clay is found pervasively surrounding and replacing olivines, in both the alteration halos and the otherwise unaltered interiors of pieces. Piece 2 is a glassy rind fragment consisting of a mixture of glass and palagonite. The surface of the piece has a vermiform structure visible under the microscope and this surface has a coating of drusy quartz.

STRUCTURE: Pillow lavas as indicated by the glassy margins on Pieces 1, 2, and 9.

ADDITIONAL COMMENTS: Plagioclase is seriate, ranging from acicular microphenocrysts to blocky or tabular phenocrysts. Phenocryst abundance varies significantly throughout the core, and in most pieces the plagioclase is borderline microphenocryst in size (<1 mm). Pieces 1 to 3 and 8 to 10 are the most phenocryst rich and have the largest plagioclase crystals. Olivine is subhedral to euhedral throughout and plagioclase is subhedral.

Core Photo



187-1154A-7R-1

UNIT 1: SPARSELY TO MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-19

INTERNAL CONTACTS: There are glassy rinds on four of the pebbles making up Piece 1. These consist of varying proportions of clear glass + spherulitic glass + palagonite + a drusy quartz coating on top of the palagonite similar to that described in the previous core.

PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
Plagioclase	1-3	1	2	0.5	tabular
Olivine	1-2	1	2	<0.5	equant
Total	2-5				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
	1	0.5	1	<0.5	round

Filling: Interiors coated or filled with Fe oxyhydroxides and/or cryptocrystalline silica in most pieces. Pieces 17, 19, and 21 have a blue-gray material lining the vesicles. Some vesicles in the alteration halos are filled with smectite.

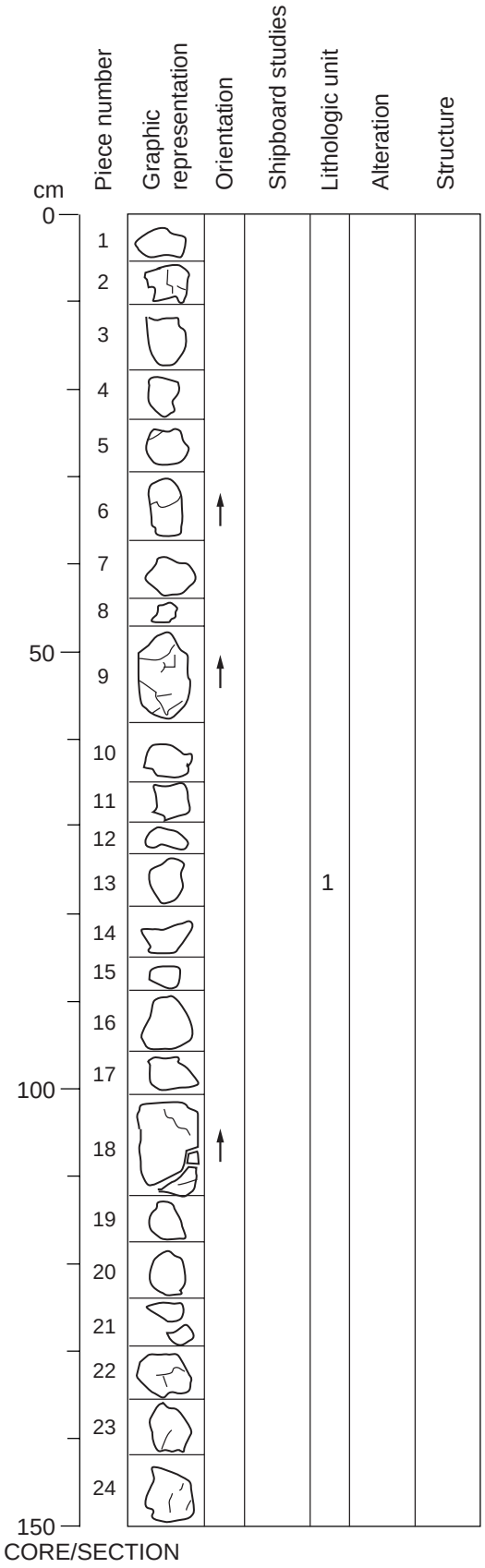
VEIN/FRACTURES: Fracture in Piece 12 has a coating of Fe oxyhydroxide. Fractures in Pieces 5 and 14 have no obvious fillings or coatings.

ALTERATION: Basalt of this section is slightly altered throughout. There is much less fresh olivine than seen in previous cores; most crystals are 100% replaced by Fe oxyhydroxides or smectite. Portions of the uncut surfaces of Pieces 3, 4, 6, 8, 13, and 26 are weathered to a light brown color. Spots of Mn oxide occur on Pieces 15, 16, and 19. Alteration halos up to 2 cm wide are found on most pieces. A white clay is found pervasively surrounding olivines, in both the alteration halos and the otherwise unaltered interiors of pieces. Several pebbles of Piece 1 have a vermiform surface textures with a drusy quartz coating overlying the palagonite.

STRUCTURE: Pillow lavas as indicated by the glassy margins on several pebbles in Piece 1.

ADDITIONAL COMMENTS: Phenocryst abundance varies from piece to piece, and in most pieces the plagioclase is relatively small in size (borderline microphenocryst rather than phenocryst). Plagioclase phenocrysts usually exceed olivine in abundance, but in Pieces 12 and 13 olivine is equal to plagioclase. Olivine is subhedral to euhedral throughout and plagioclase is subhedral.

Core Photo



187-1154A-8R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-24

INTERNAL CONTACTS: Pieces 6, 10, 17, and 21 have glassy rinds and/or chilled margins. Piece 6 (oriented) has a 6 mm thick chilled margin on the top of the Piece. Piece 10 has a thin <1 mm rind of palagonite with a 3 mm wide chilled margin. Piece 17 had a 8 mm thick rind of mixed glass and palagonite with a 6 mm wide chilled margin and 1.4 cm wide oxidized band. Piece 21 has a <1 mm wide glassy rind on one of its edges.

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	1-2	1.5	6	<1	acicular to tabular
Olivine	0.5-1	1	3	<1	euhedral
Clinopyroxene	trace				
Total	1.5-3				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
	<1	<1	1	<0.5	round

Filling: Commonly lined with cryptocrystalline silica or Fe oxyhydroxide. More rarely filled with olive green smectite or containing microcrystalline euhedral quartz crystals.

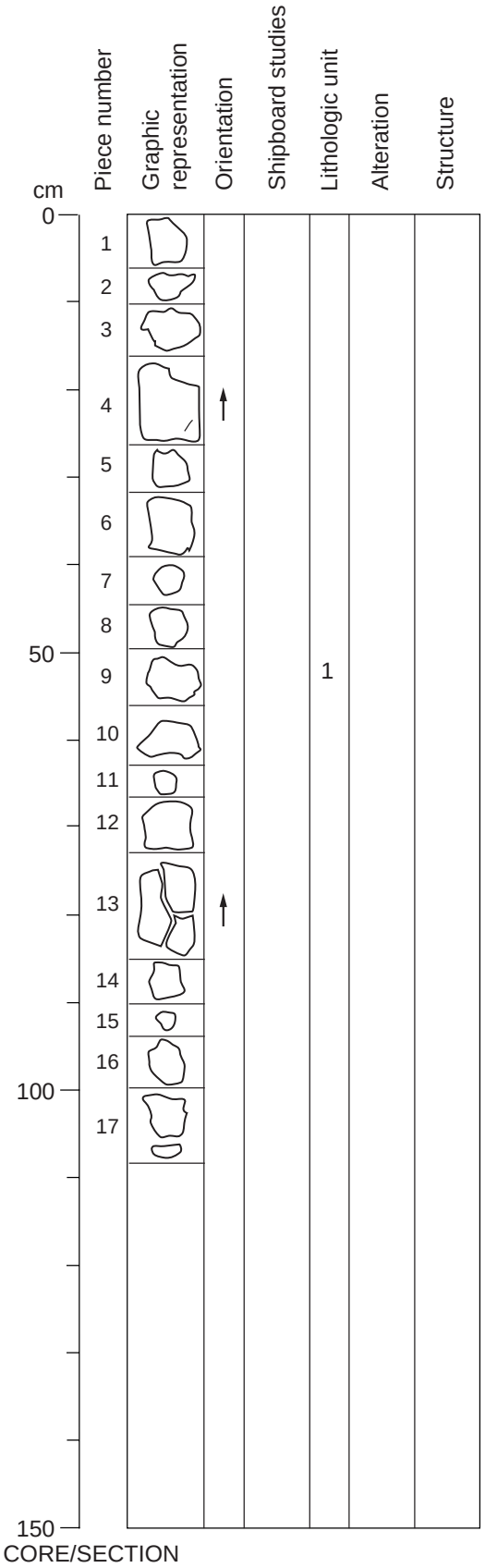
VEINS/FRACTURES: Discontinuous Fe oxyhydroxide and cryptocrystalline silica coating on open fractures.

ALTERATION: Slightly altered. In some pieces plagioclase is pervasively replaced by clay and Fe oxyhydroxide, but fresh phenocryst cores are also abundant. Weathered surfaces are gray-green and rare glassy selvages are palagonitized.

STRUCTURE: Pillow lavas as indicated by glassy rinds.

ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and olivine comprise about 10% of the phenocrysts. Clinopyroxene(?) was found in Piece 9,18, and 23, only as phenocrysts >1.5 mm or associated with glomerocrysts. Mn oxide spots and weathered edges on Pieces 2, 3, 14, 17, 18, and 23. Approximately 70% of all olivine shows alteration which varies from 10%-100% in individual crystals.

Core Photo



187-1154A-8R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-17

INTERNAL CONTACTS: Pieces 5 and 9 have glassy rinds and/or chilled margins. Piece 5 has a 2 mm wide glassy rind with a 6 mm wide chilled margin. Piece 9 has a strongly altered 1 mm thick glassy rind with a 7 mm wide chilled margin followed by a 1.7 cm thick oxidized band.

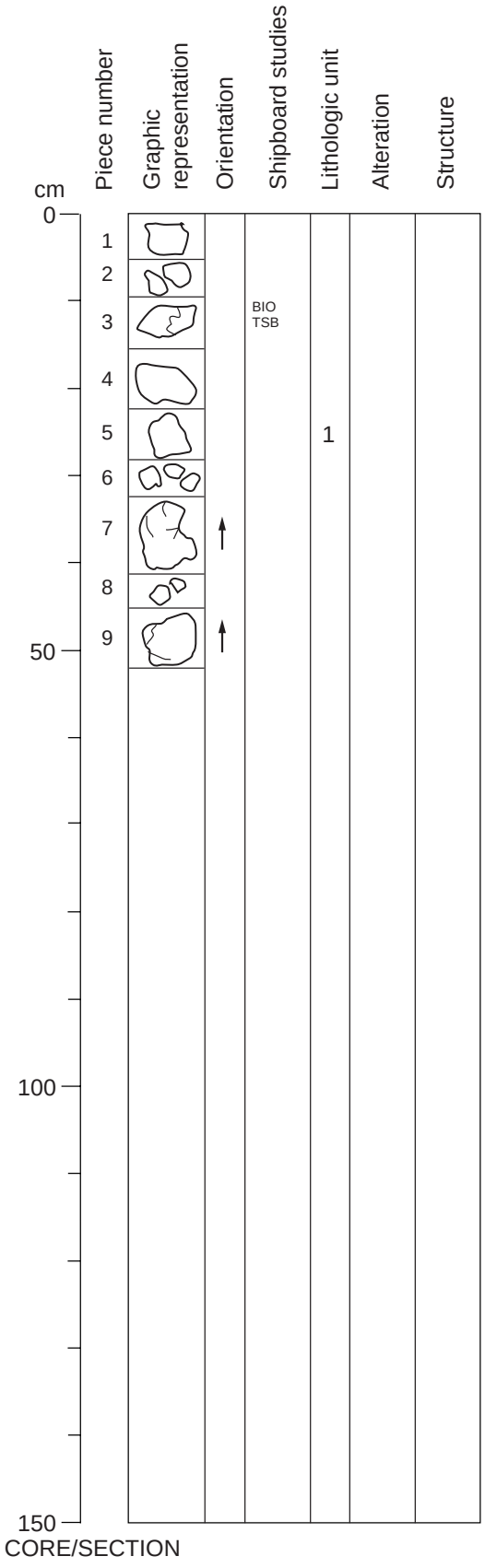
PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
Olivine	0.5-1	1	2.5	<1 euhedral
Total	2.5-3			

GROUNDMASS: microcrystalline to fine-grained
COLOR: light gray

VESICLES:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
	<1	<1	1	<0.5 round

Filling: commonly lined with cryptocrystalline silica or Fe oxyhydroxide. More rarely filled with clay.
VEINS/FRACTURES: Discontinuous Fe oxyhydroxide and silica coating on open fractures.
ALTERATION: Slightly altered. Pieces 1, 3, 8, 9, and 16 have gray-green weathered surfaces. Open fracture on Piece 13 coated with Fe-stained cryptocrystalline silica.
STRUCTURE: Pillow lavas as indicated by glassy rinds.
ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and olivine comprise about 10% of the phenocrysts. Mn oxide spots and weathered edges on Pieces 2 and 10. Approximately 70% of all olivine shows alteration which varies from 10%-100% in individual crystals.

Core Photo



187-1154A-9R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-9

INTERNAL CONTACTS: Pieces 5 has a <1 mm thick glassy rind and a chilled margin 5 mm wide.

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2	1.5	4	<1	acicular to tabular
Olivine	0.5-1	1	2.5	<1	euhedral
Total	2.5-3				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
	<1	<1	1	<0.5	round

Filling: Commonly lined with cryptocrystalline silica or Fe oxyhydroxide. More rarely filled with clay.

VEINS/FRACTURES: Discontinuous Fe oxyhydroxide and silica coating on open fractures.

ALTERATION: Slightly altered. Piece 7 has a 2 cm wide light brown alteration halo on one side of the cut face. Plagioclase and olivine are partially altered to clay and Fe oxyhydroxide.

STRUCTURE: Pillow lavas as indicated by the glassy rind.

ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and olivine comprise about 10% of the phenocrysts. Mn oxide spots and weathered edges on Pieces 3, 4, and 7. Approximately 70% of all olivine shows alteration, which varies from 10%-100% in individual crystals. Clinopyroxene(?) was observed in Piece 3.

187-1154A-3R-1, 10-14 cm (TS #8) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Moderately plagioclase - olivine phyric basalt**
WHERE SAMPLED: **near top of unit from sample with macroscopically visible alteration halo**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **plumose quench textures**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	4	4	1	2	1		tabular, subhedral	Partially resorbed cores and zoning in some crystals; twinned; some crystals have quench crystallization extensions on the edges.
Olivine	1	0.5	0.5	1	0.5		equant, subhedral to euhedral	Skeletal shapes to some crystals, but obscured by alteration
Clinopyroxene								
GROUNDMASS								
Olivine				<0.1			equant to skeletal	
Plagioclase	see comments below			0.3			acicular + quench crystallization	
Clinopyroxene	see comments below						plumose quench	
Opaque Minerals				<.01			equant	
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	3				replacing olivine, glass (?), filling vesicles	The color of the clay varies throughout the slide. Near edges and areas with more Fe oxyhydroxide, the clay has a stronger yellow-brown color (and green in crossed polars); in the otherwise less altered areas, the clay is a paler yellow to buff color.
Fe oxyhydroxides	1				replacing olivine, glass/groundmass	The Fe oxyhydroxide is concentrated toward one side of the slide.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	1	distributed	0.1	0.3	0.2	smectite; round	Vesicles are filled in alteration halo, but unfilled elsewhere

COMMENTS : Proportions of groundmass phases cannot be accurately assessed due to predominance of plumose quench textures. Crystal clots/glomerocrysts are common, consisting of plagioclase and plagioclase + olivine.

187-1154A-3R-1, 50-53 cm (TS #10) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Moderately plagioclase - olivine phryic basalt**
WHERE SAMPLED: **near top of unit**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **intersertal to plumose quench textures**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	2	2	1	2	1		tabular, subhedral	Partially resorbed cores and zoning in some crystals; twinned;
Olivine	1	0.5	0.5	1	1		equant, subhedral to euhedral	Skeletal shapes to some crystals, but obscured by alteration which replaces 30 to 100% of crystals.
Clinopyroxene								
GROUNDMASS								
Olivine				0.1			equant to skeletal	
Plagioclase	see comments below			0.3			acicular + quench crystallization	
Clinopyroxene	see comments below						plumose quench	
Opaque Minerals				<.01			equant	
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	3				replacing olivine, glass(?)/groundmass, filling vesicles	The color of the clay varies throughout the slide. Vesicles and most groundmass olivine are replaced by a yellow-brown smectite. Some olivines show an earlier(?) replacement by a pale buff-yellow clay along edges and cracks.
Fe oxyhydroxides	trace				replacing some olivine; filling some vesicles	Occurs in association with darker yellow-brown smectite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles		distributed				smectite; round	

COMMENTS : Polish on this slide not very good. Proportions of groundmass phases cannot be accurately assessed due to predominance of plumose quench textures. Crystal clots/glomerocrysts are common, consisting of plagioclase and plagioclase + olivine. Plagioclase in glomerocrysts tends to show partial resorption. This sample is very similar to Sample 187-1154A-3R-1, 10-14, but slightly more coarsely crystalline

187-1154A-3R-2, 23-26 cm (TS #9) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Moderately plagioclase - olvine phyric basalt**
WHERE SAMPLED: **sample with macroscopically visible alteration halo**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **intersertal to plumose quench textures**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	2	2	1	2	1		tabular, subhedral	Partially resorbed cores and zoning in some crystals; twinned; some crystals have quench crystallization extensions on the edges.
Olivine	2	1	0.5	1.6	1		equant, subhedral to euhedral	Skeletal shapes to some crystals, but obscured by alteration which replaces 30 to 100% of crystals.
Clinopyroxene								
GROUNDMASS								
Olivine				0.1			equant to skeletal	
Plagioclase	see comments below			0.3			acicular + quench crystallization	
Clinopyroxene	see comments below						plumose quench	
Opaque Minerals				<.01			equant	
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	4				replacing olivine, glass(?)/groundmass, filling vesicles	The color of the clay varies throughout the slide. Near edges and areas with more Fe oxyhydroxide, the clay has a stronger yellow-brown color (and green in crossed polars); in the otherwise less altered areas, the clay is a paler yellow to buff color.
Fe oxyhydroxides	1				replacing olivine, glass/groundmass	The Fe oxyhydroxide is concentrated toward one side of the slide.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles		distributed				smectite; round	Vesicles are filled in alteration halo, but unfilled elsewhere

COMMENTS : Proportions of groundmass phases cannot be accurately assessed due to predominance of plumose quench textures. Crystal clots/glomerocrysts are common, consisting of plagioclase and plagioclase + olivine. This sample is very similar to Sample 187-1154A-3R-1, 10-14, but just slightly more coarse grained in groundmass.

187-1154A-5R-1, 58-61 cm (TS #11) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Moderately plagioclase-olvine phyric basalt**
WHERE SAMPLED: **typical piece**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **intergranular to plumose quench textures**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	3	3	0.5	3	1		most lath shaped; some blocky	Some larger crystals are partially resorbed; some crystals are zoned (some discontinuously); twinned.
Olivine	1	1	0.3	1	0.5		equant, subhedral	~10% replaced by smectite.
Clinopyroxene								
GROUNDMASS								
Olivine	0	3		0.1			equant to skeletal	Totally replaced by smectite.
Plagioclase	35	35		0.3			acicular to lath shaped	
Clinopyroxene	38	38		0.1			granular to plumose quench	
Opaque Minerals	2	2		2-5 microns			equant to acicular	
Glass								
Mesostasis	15	17						

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	5				replacing olivine and groundmass; filling vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	1	distributed	<0.1	0.2	0.2	smectite filling; round shape	

COMMENTS : Glomerocrysts of plagioclase + olivine present. Proportions of groundmass phases difficult to assess due to presence of quench textures and replacement of groundmass + olivine by smectite. Plagioclase seriate; groundmass crystals increase in size into microphenocrysts and phenocrysts.

187-1154A-6R-1, 23-25 cm (TS#25) **Unit:** **OBSERVER:** **Miller**

ROCK NAME: **Moderately plagioclase-olvine phryic basalt**
WHERE SAMPLED:
GRAIN SIZE: **microcrystalline to fine grained**
TEXTURE: **Intersertal**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	1.5	2	1	3	1.5		Subhedral, prismatic	Feathery edge quench textures, twinning and concentric zoning common
Olivine	0.5	1	0.5	1	1		Euhedral	Minor fractures, but distinct strained extinction common
Clinopyroxene								
GROUNDMASS								
Olivine	2	5			0.1			
Plagioclase	35	35			0.2			Acicular needles, box and hopper textures common
Clinopyroxene	40	45						Plumose quench texture
Opaque Minerals	1	1			2-15 microns			Irregular shaped, quench textured magnetite common, rare 2 micron sulfide globules
Glass								
Mesostasis	15							

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	REPLACING / FILLING	COMMENTS
Clays	5-7			In vesicles, replacing crystals and groudmass	Most alteration is concentrated near the edges of this section, the center is fresh. Alteration is manifested in groundmass clinopyroxene and mesostasis, as well as pervasive relacement of both olivine and plagioclase. Iron staining is also common in alteration patches.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
VESICLES/	<1				0.25	Clay	Most filling are incomplete

COMMENTS : This section has two prominent fractures each now open 15-20 microns. One has a discontinuous clay lining, in turn disconinuously lined with silica, but it is open. The groundamss and crystals around this vein show relatively intense alteration. A second open fracture that cuts through groundmass and crystals has no alteration halo at all.

187-1154A-7R-1, 140-145 cm (TS #12) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Moderately plagioclase-olivine phryic basalt**
WHERE SAMPLED: **typical piece**
GRAIN SIZE: **microcrystalline to fine grained**
TEXTURE: **intersertal**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	3	3	0.5	3	1		most lath shaped; some blocky	Some larger crystals are partially resorbed; some crystals are zoned (some discontinuously); twinned.
Olivine	1	1	0.5	2	1		equant, subhedral	~10% replaced by smectite.
Clinopyroxene								
GROUNDMASS								
Olivine	0	3		0.1			equant	Totally replaced by smectite.
Plagioclase	35	35		0.3			acicular to lath shaped	
Clinopyroxene	35	38		0.1			granular, anhedral	
Opaque Minerals	2	2	<5 microns	0.3			equant to acicular	
Glass								
Mesostasis	15	17						

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	8				replacing olivine and groundmass; filling vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	<1	distributed	<0.1	0.3	0.2	smectite filling; round shape	

COMMENTS : Glomerocrysts of plagioclase + olivine present. Slide plucked during preparation; makes estimates of modes difficult.

187-1154A-9R-1, 11-14 cm (TS #13) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Moderately plagioclase - olivine phyric basalt**
WHERE SAMPLED: **quenched pillow margin**
GRAIN SIZE: **cryptocrystalline to microcrystalline**
TEXTURE: **glassy to spherulitic to immature plumose quench textures**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	3	3	0.5	3			tabular to blocky	Discontinuous zoning in many crystals; twinned.
Olivine	1	1	0.5	1.5			equant to skeletal	Iddingsite replaces ~20% of olivine.
Clinopyroxene								
GROUNDMASS								
Olivine				0.1			equant	Partially to totally replaced by iddingsite and/or smectite.
Plagioclase	see comments below			0.5			acicular, w/ quench extensions	
Clinopyroxene	see comments below			0.5			plumose	
Opaque Minerals	2							
Glass	15	17						Glass away from outermost margin is devitrified, mixed with quench crystals. The amount of clear glass is <2%.

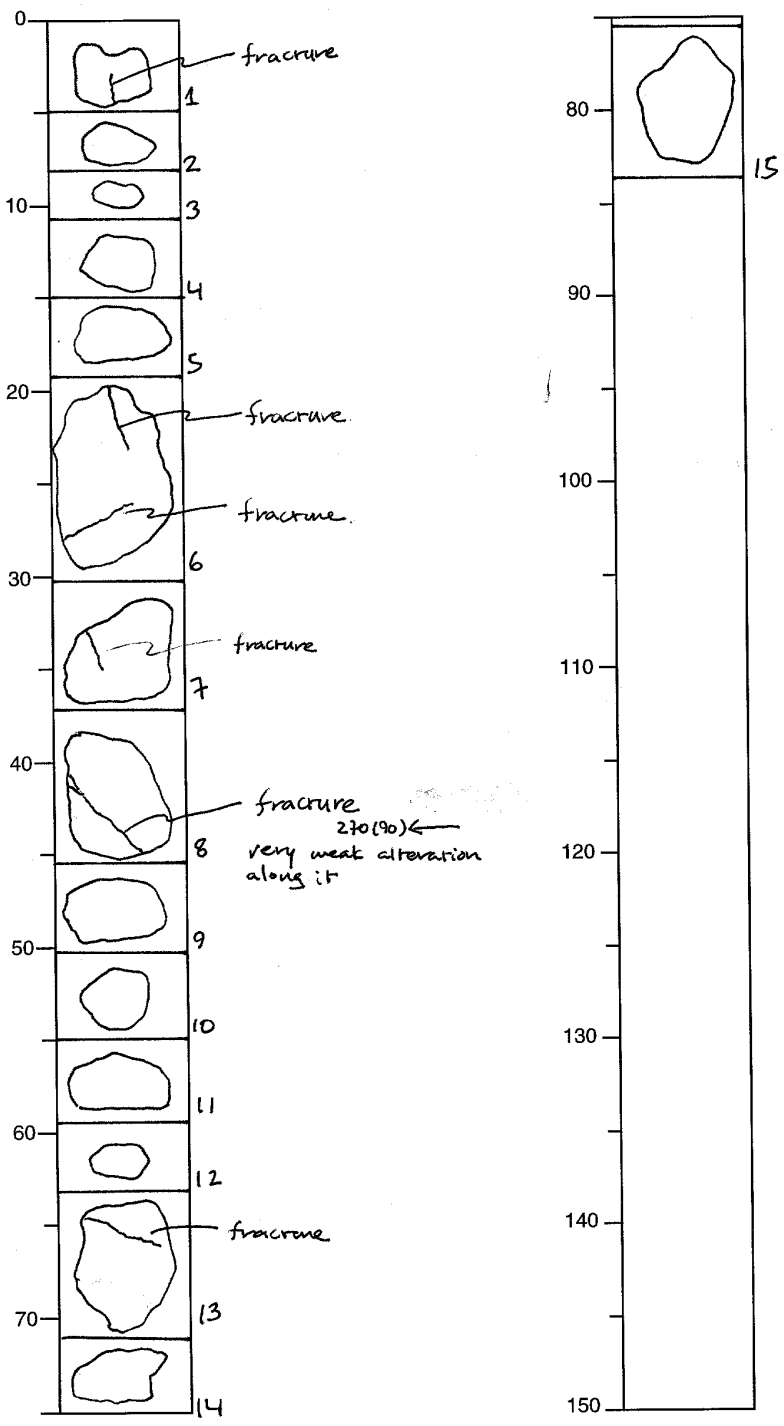
SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	2				replacing glass and olivine	
Fe oxyhydroxides	1				replacing olivine, some groundmass	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
	<<1%	distributed		0.1		none?	

COMMENTS : Slide shows traverse across a quenched pillow margin. A thin rim of glass + spherulites occurs on one side of the slide. Most of slide consists of coalesced spherulites and plumose quench textures. Individual spherulites are ~0.1 to 0.2 mm in diameter. There is some local preferred alignment of plagioclase microlites parallel to chilled margin. Plagioclase (and to a less extent olivine) is seriate, so the cut off between maximum groundmass crystal size and minimum phenocryst (microphenocryst) size is arbitrary. Glomerocrysts of plagioclase and plagioclase + olivine are present.

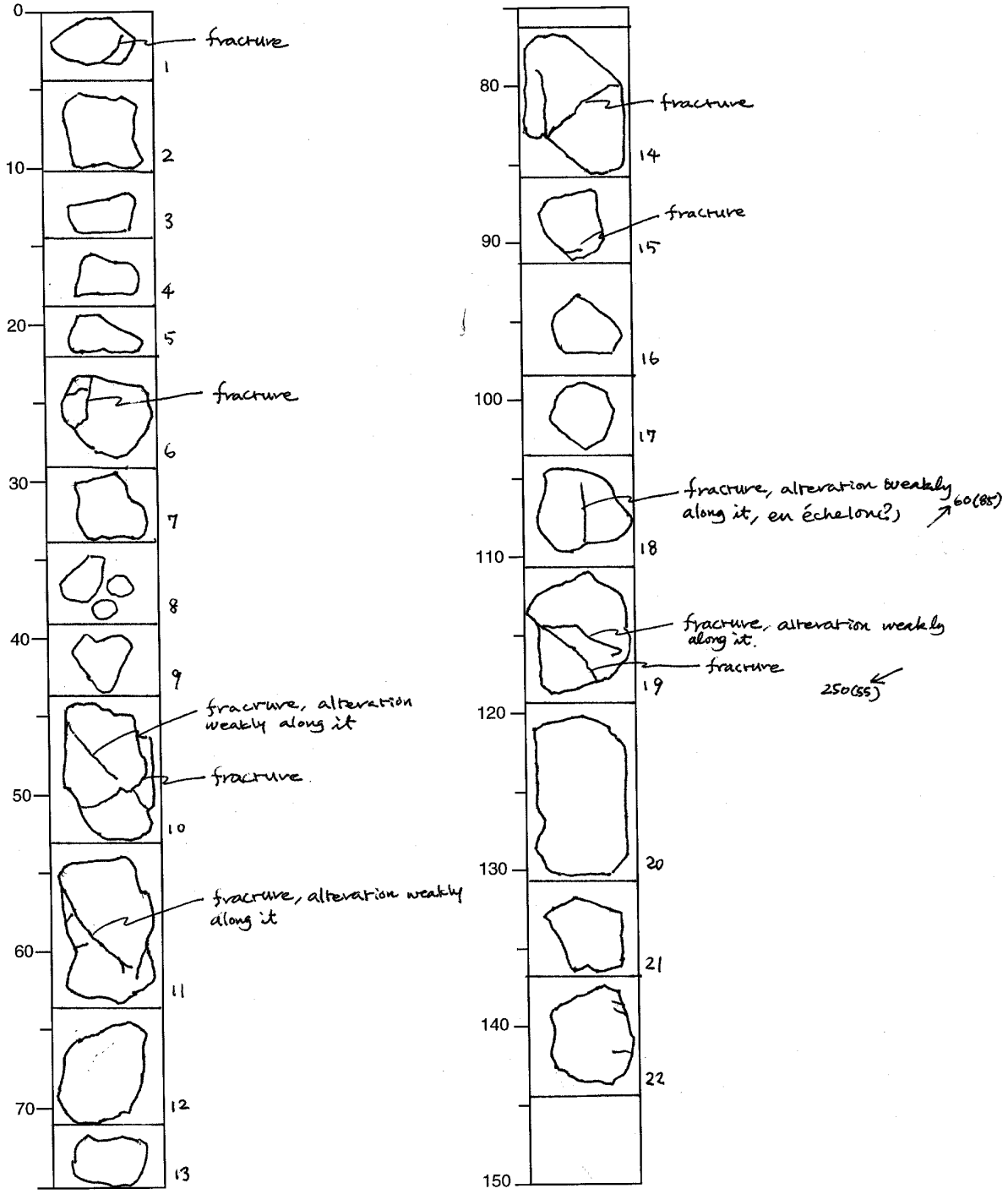
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core
187	1154A	2R



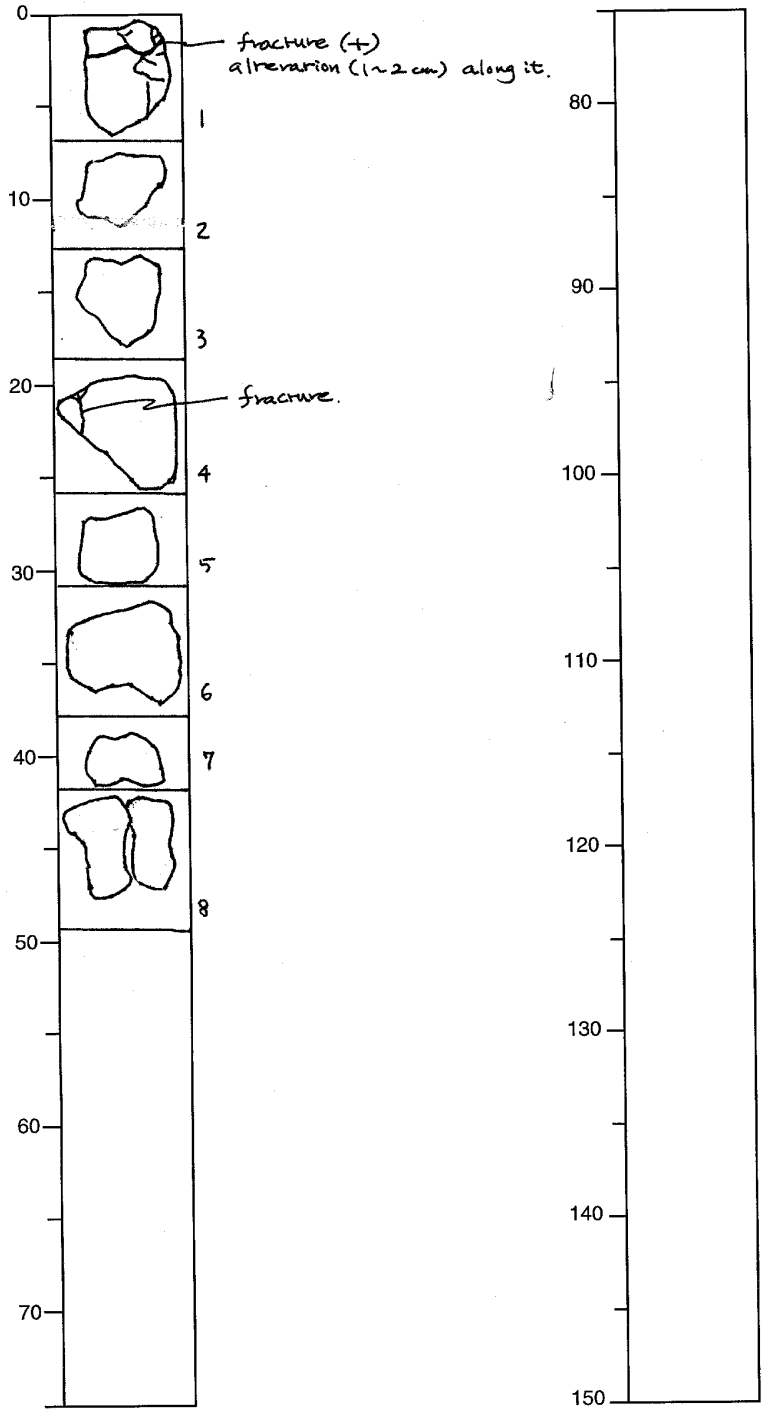
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1154A	3 R	1	



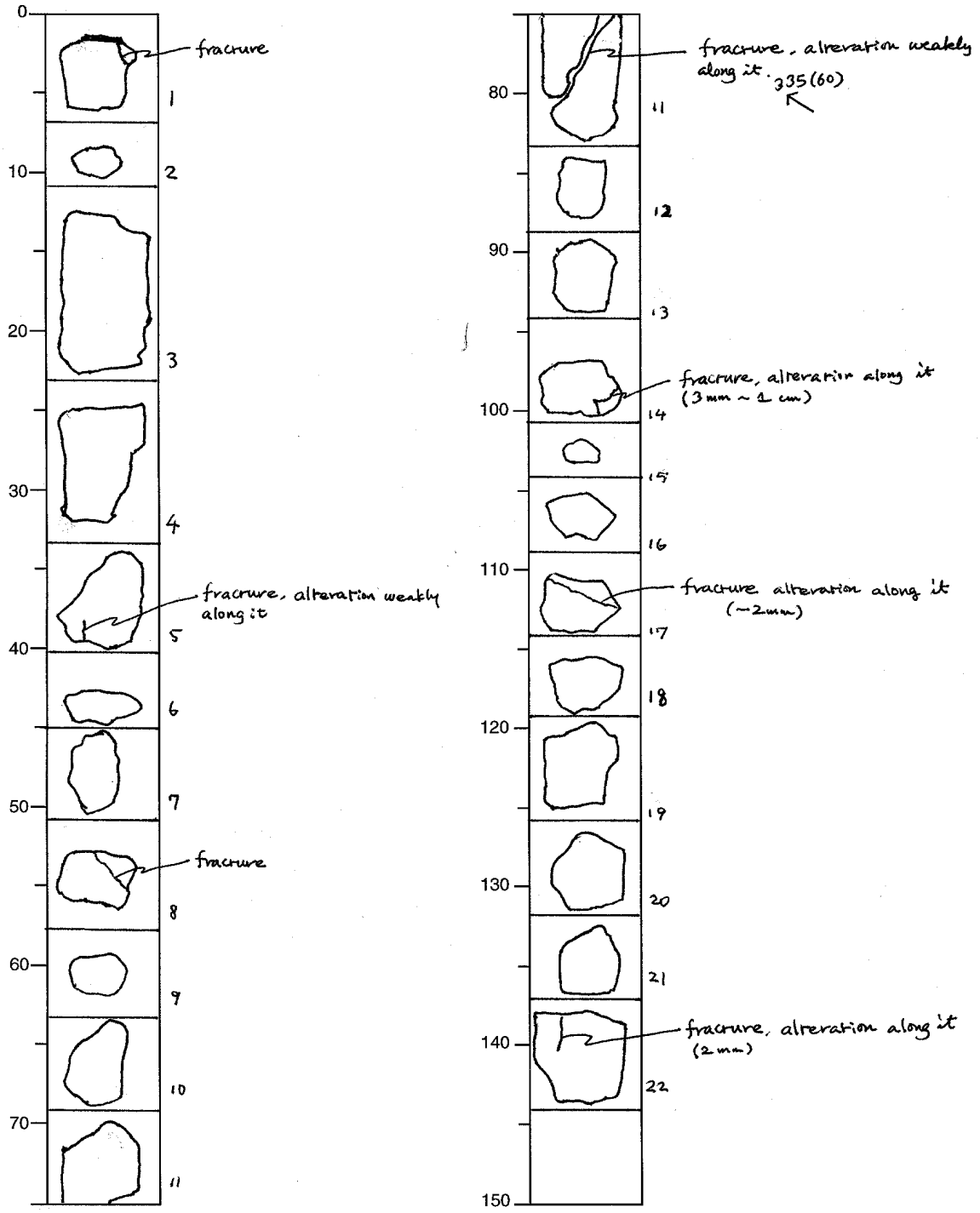
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1154A	3R	2



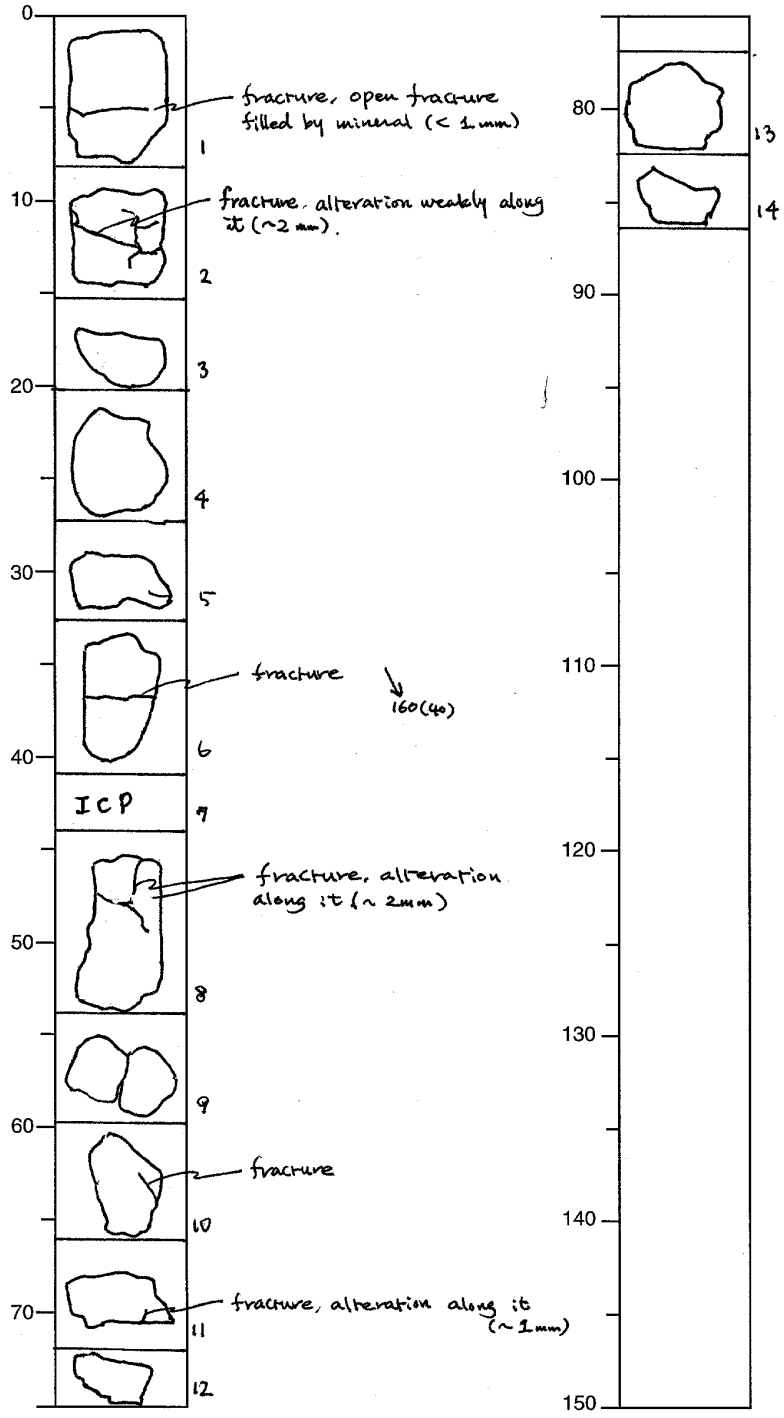
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1154	4R	1	



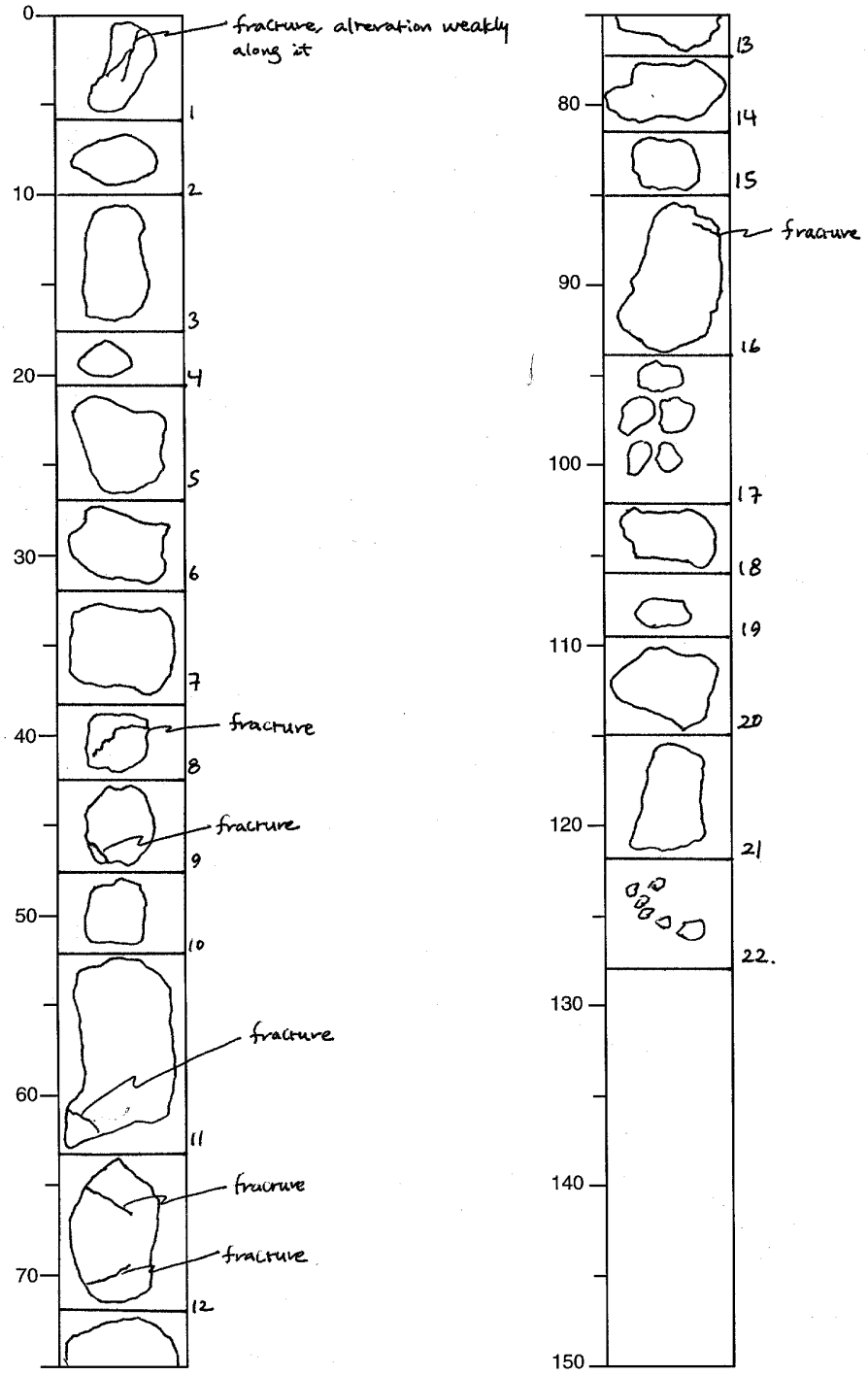
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Sectic
187	1154	4R	2



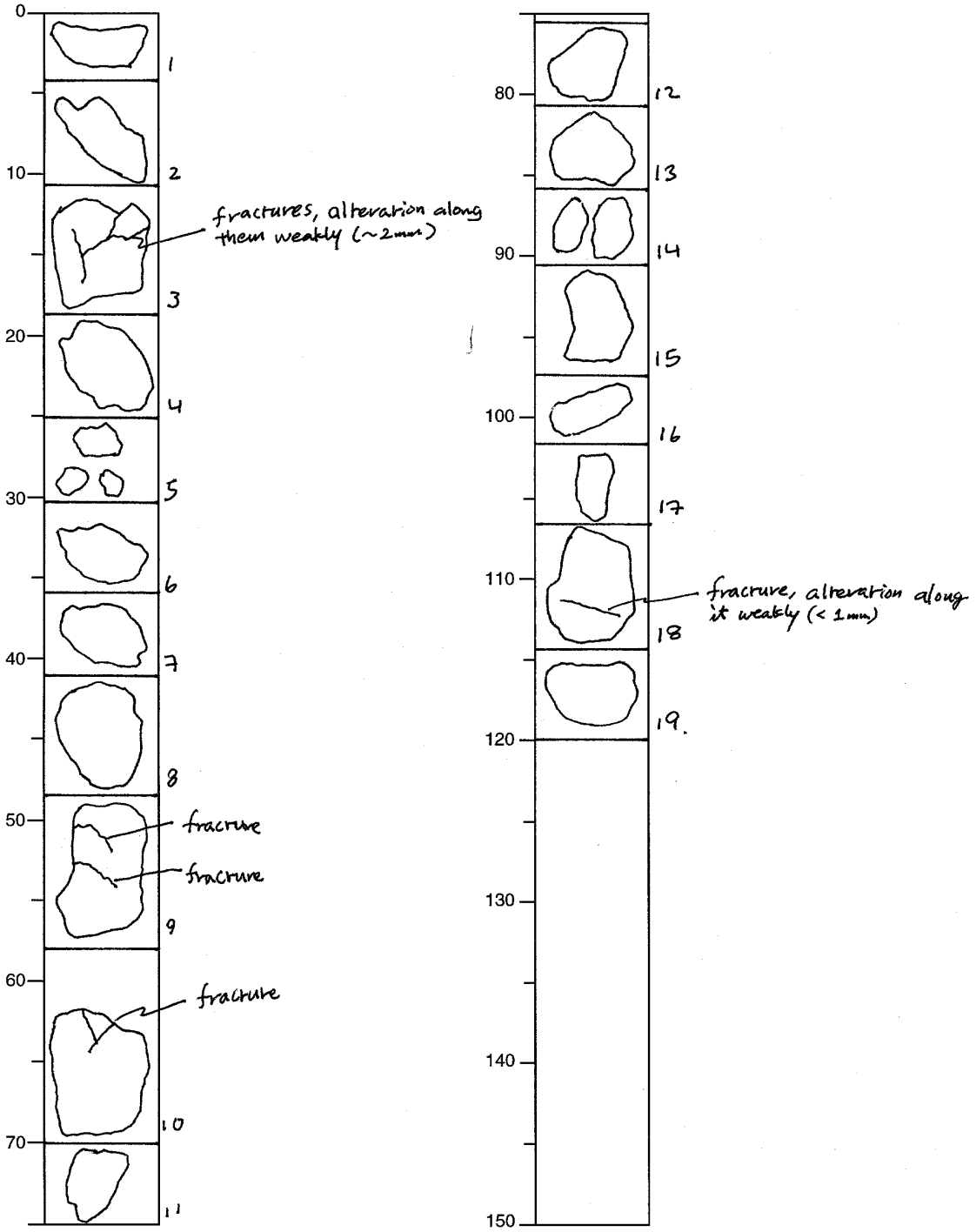
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Sectio
187	1154A	5R	1.



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1154A	6R	1.	



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
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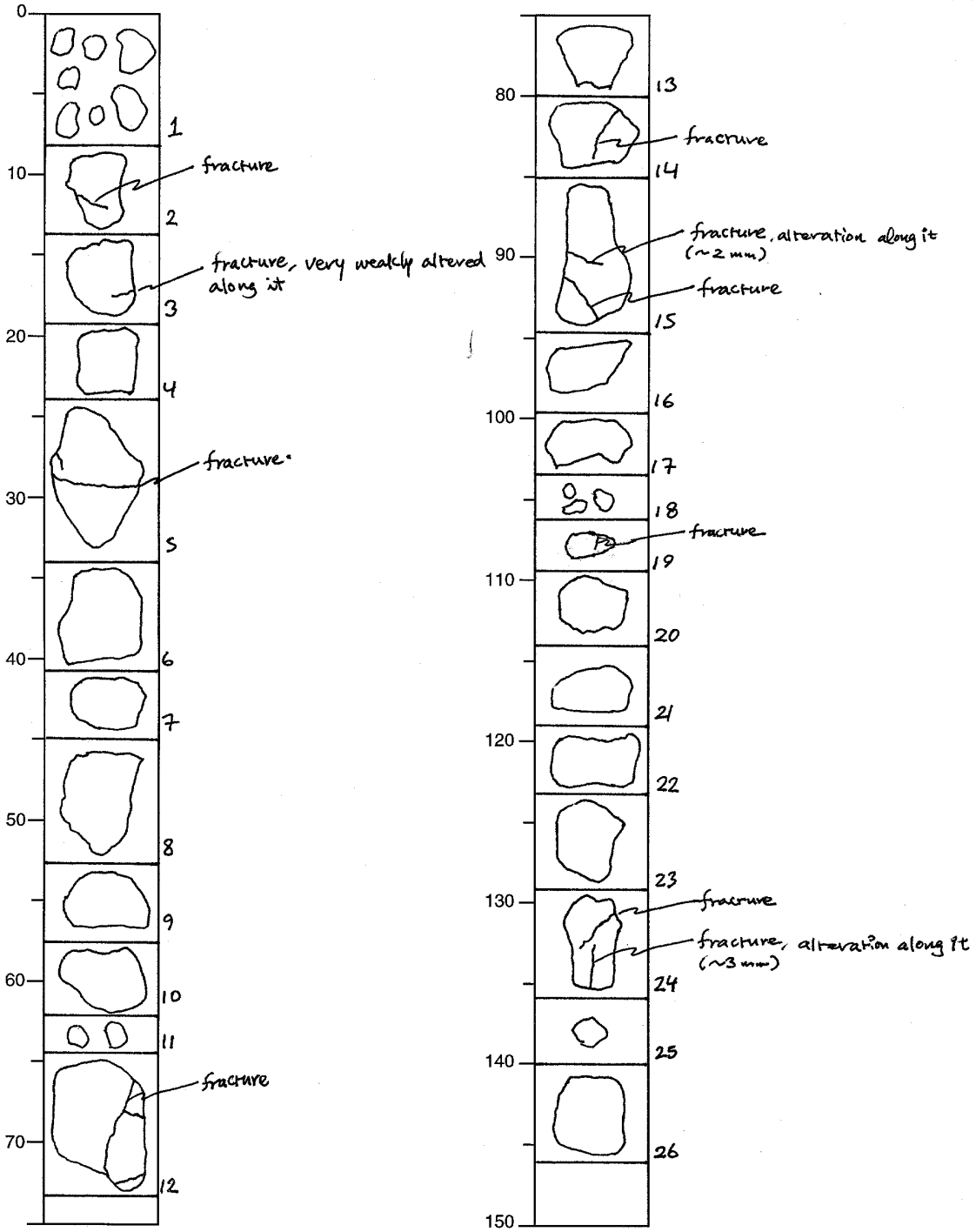

STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
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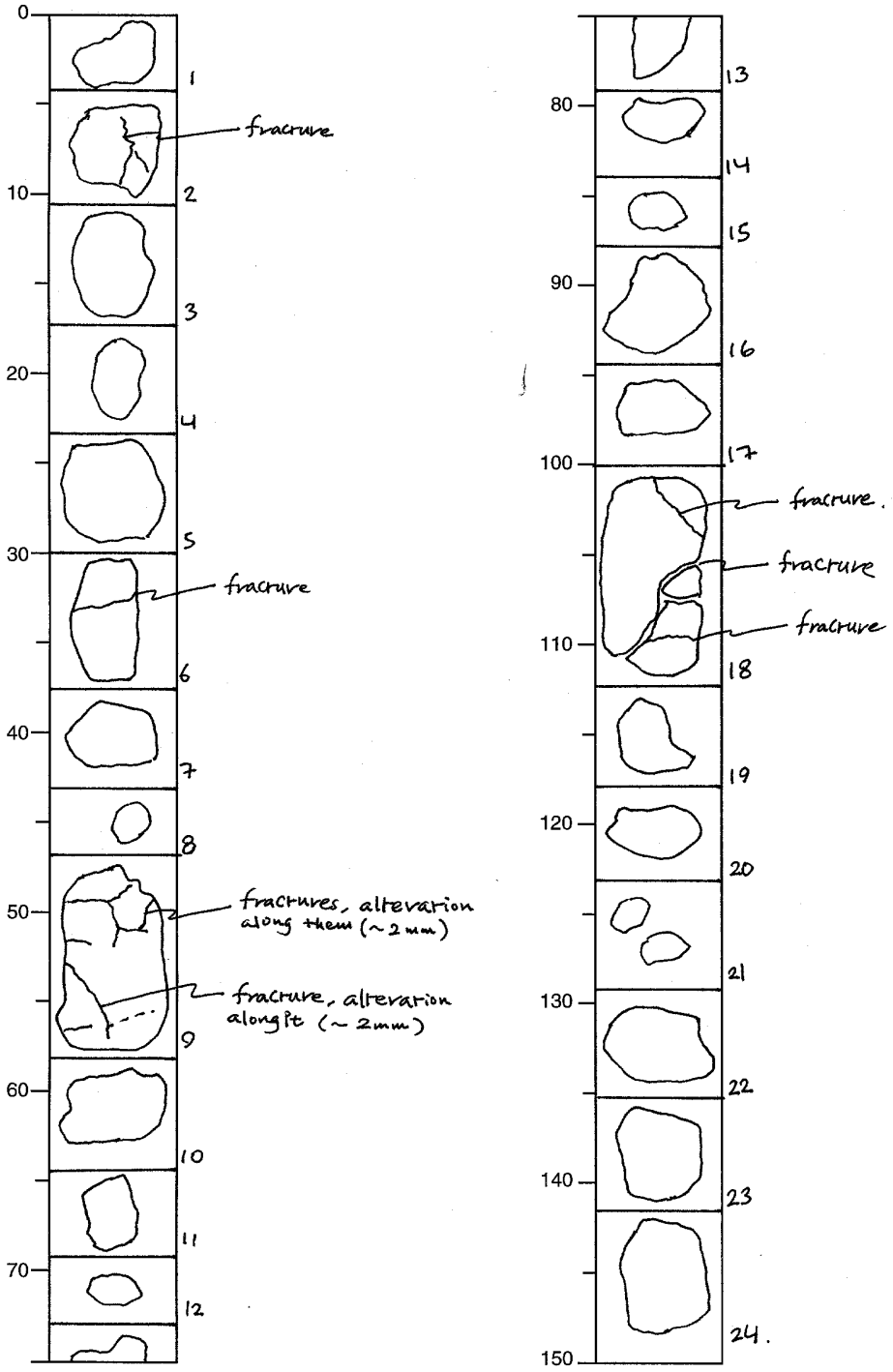
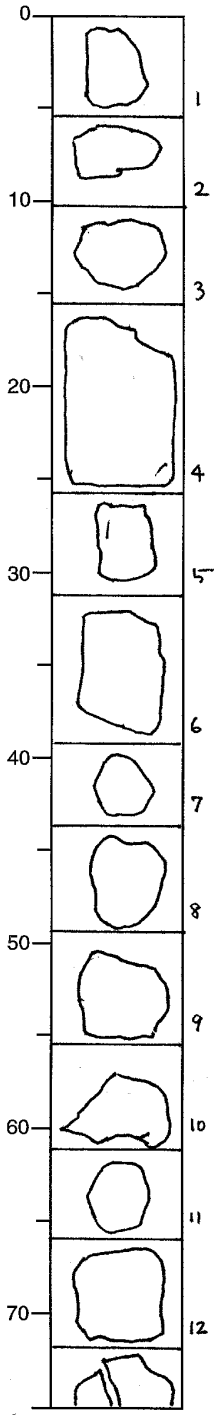
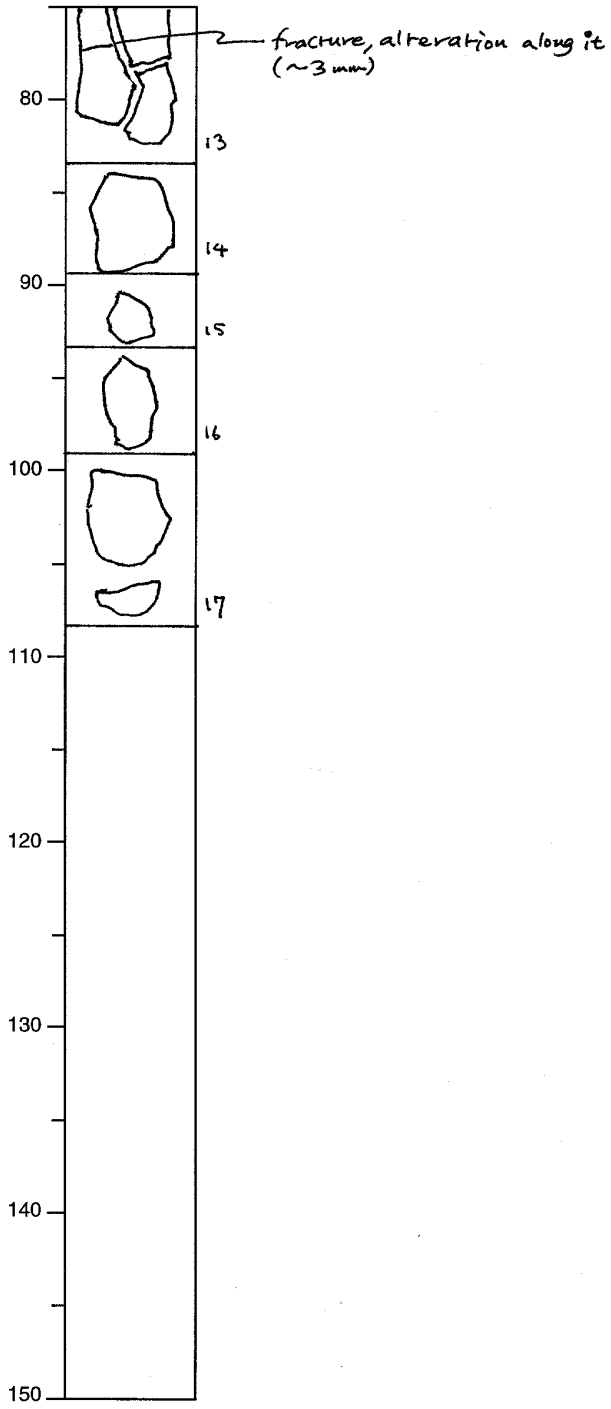


STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1154	8R	2	





STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1154	9R	1