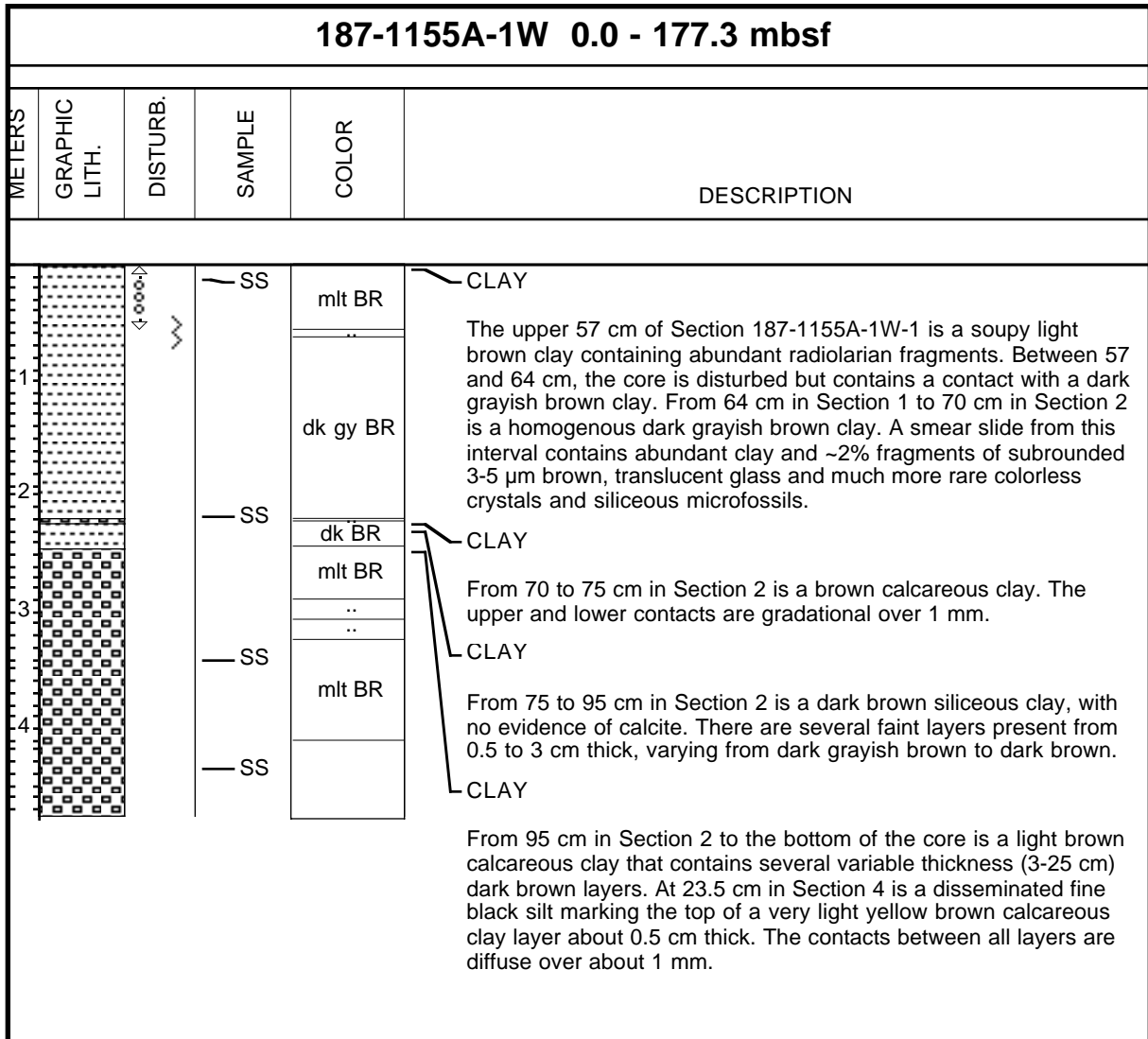
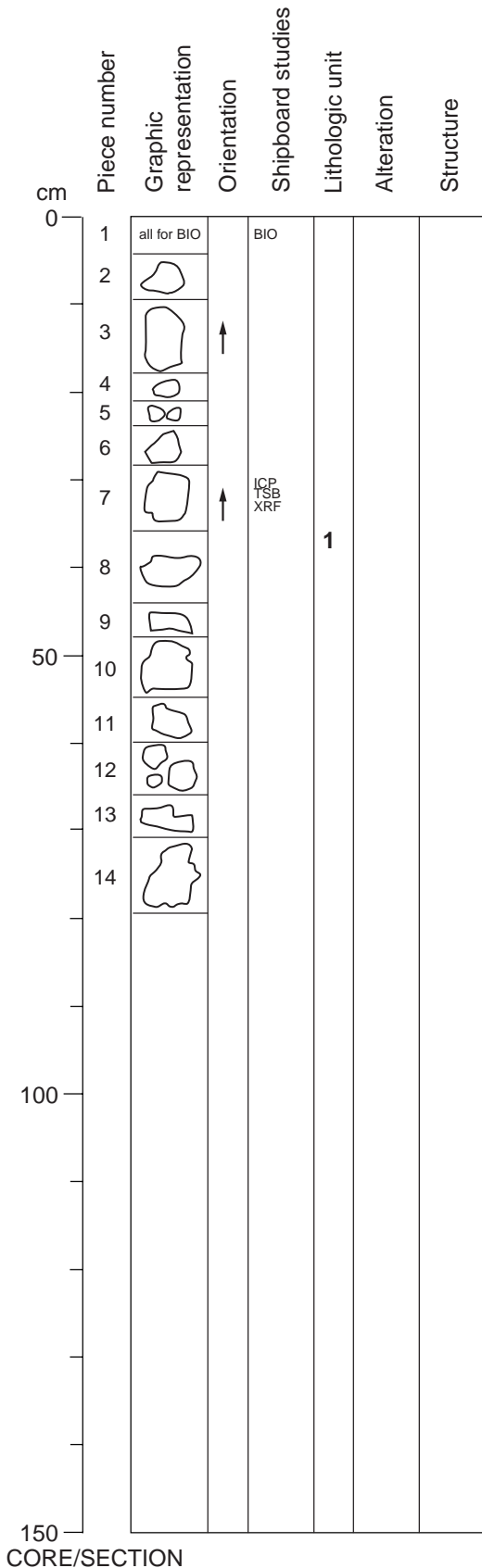


Core Photo



Core Photo



187-1155A-2R-1

UNIT 1: SPARSELY TO MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-14

PHENOCRYSTS:

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
Plagioclase	1.5	1	2 0.5	acicular to tabular
Olivine	1	1	2 0.5	subhedral
Total	2.5			

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Medium gray

VESICLES:

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

Filling: Smectite lined with calcite interiors

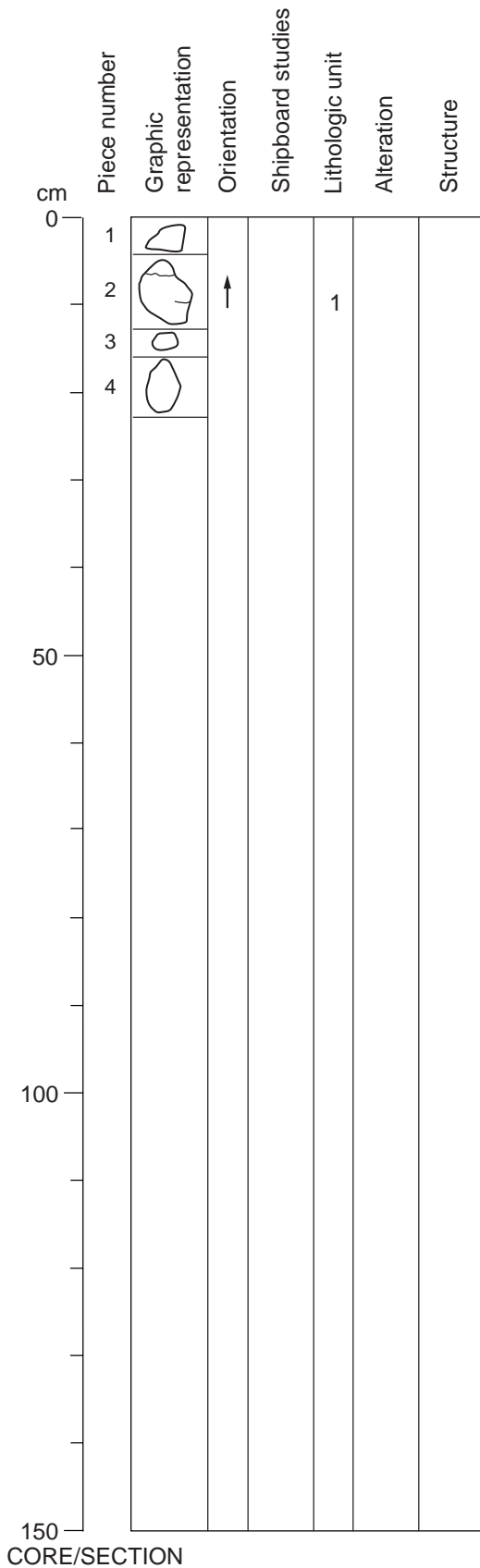
VEINS/FRACTURES: Piece 14 has a small (<0.5 mm) fracture with a <0.5 mm oxidation halo.

ALTERATION: Overall fresh, with the exception of Piece 5 (see comments below). Olivine is up to 40% altered in Piece 2, but variable throughout the section.

STRUCTURE: None

ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and olivine up to 1.3 cm in Piece 14. Plagioclase and olivine tend to be seriate. Palagonite and altered chilled margin in Piece 5 and 12. Piece 5 is a strongly palagonitized glass rind 3 mm thick with an altered chilled margin 8 mm wide. The outside of Piece 5 has a 1 mm thick cryptocrystalline silica remnant vein face. The outside of a majority of pieces are fracture surfaces often coated with cryptocrystalline and crystalline silica and Mn oxide, best represented by Piece 9.

Core Photo



187-1155A-3R-1

UNIT 1: SPARSELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-4

PHENOCRYSTS:

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
Plagioclase	1	1	2 0.5	acicular to tabular
Olivine	<1	1	2 0.5	subhedral
Total	2			

GROUNDMASS: Microcrystalline

COLOR: Medium gray

VESICLES:

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

Filling: Smectite lined with calcite interiors.

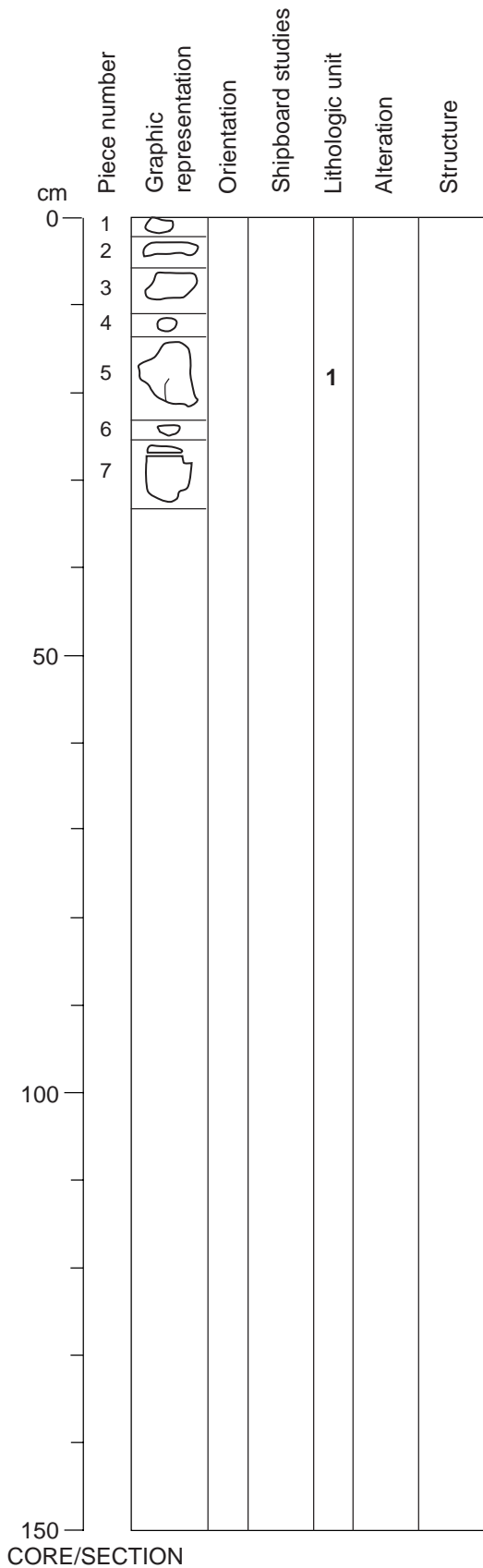
VEINS/FRACTURES: Piece 2 has two <0.5 mm wide fractures, one showing little to no alteration and the other has a 1 mm wide oxidation halo. There is also a 1 mm wide oxidized margin on Piece 2 located below the precipitated calcite (see additional comments below).

ALTERATION: Overall fresh

STRUCTURE: None

ADDITIONAL COMMENTS: Glomerocrysts of Plagioclase and olivine. Piece 1 is coated with pink (Fe-stained?) calcareous material. Piece 2 has calcite on the top (old fracture surface?).

Core Photo



187-1155A-4R-1

UNIT 1: SPARSELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-7

PHENOCRYSTS:

	Abundance %	avg. Size (mm)	max. Size (mm)	min. Size (mm)	Shape
Plagioclase	1	1	2	0.5	acicular to tabular
Olivine	<1	1	2	0.5	subhedral
Total	<2				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Medium gray

VESICLES:

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

Filling: Smectite lined with calcite interiors

VEINS/FRACTURES: Piece 5 has two <0.5 mm wide fractures one of which has a 1mm wide oxidation halo.

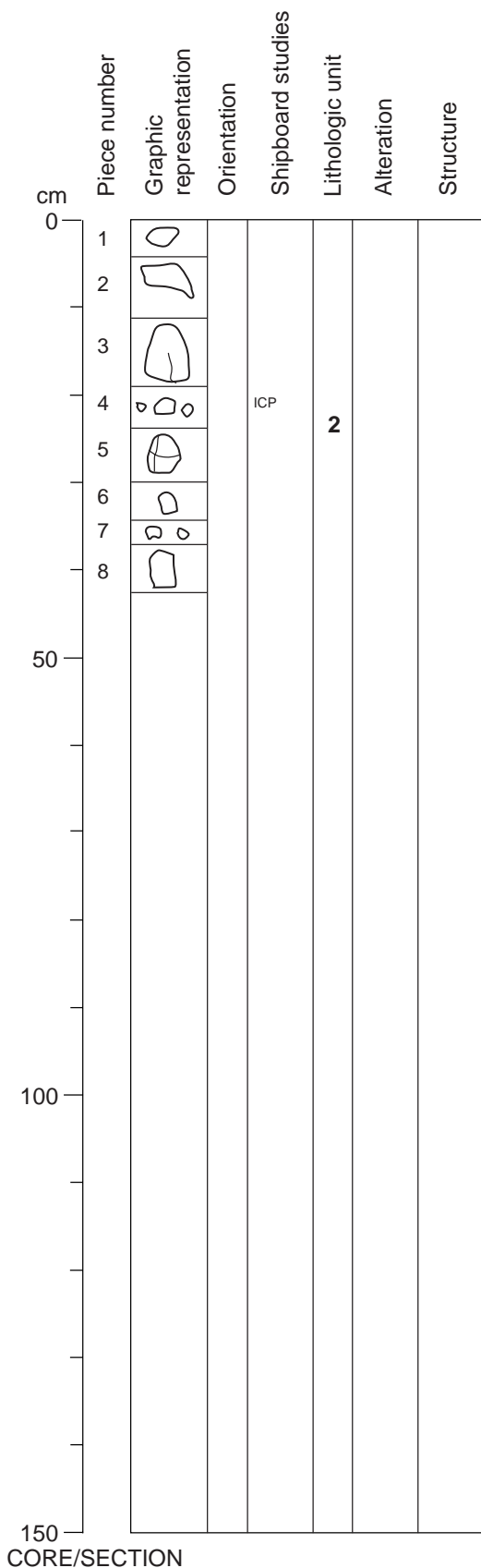
ALTERATION: Overall fresh. Piece 2 has calcareous sediment on its outside.

Piece 3 and 5 have oxidized edges up to 7 mm wide in Piece 5, which also has pink (Fe-stained?) siliceous sediment on its outside.

STRUCTURE: Pillow fragments as indicated by the glass/palagonite rinds <1 mm thick on Pieces 2 and 6. Piece 6 also has a 6 mm wide chilled margin.

ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and olivine, and single phases present in Piece 5. Throughout the section approximately 40% of the olivine is altered to either a yellow-green clay or Fe oxyhydroxide.

Core Photo



187-1155A-5R-1

UNIT 2: APHYRIC TO MODERATELY PLAGIOCLASE OLIVINE PHYRIC BASALT

PIECES 1-8

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	<1 to 3	1	2	0.5	acicular to tabular
Olivine	<1 to 2	1	2	0.5	euhedral
Total	<2				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Medium gray

VESICLES:

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

Filling: Some coated with Fe oxyhydroxides, but mostly unfilled

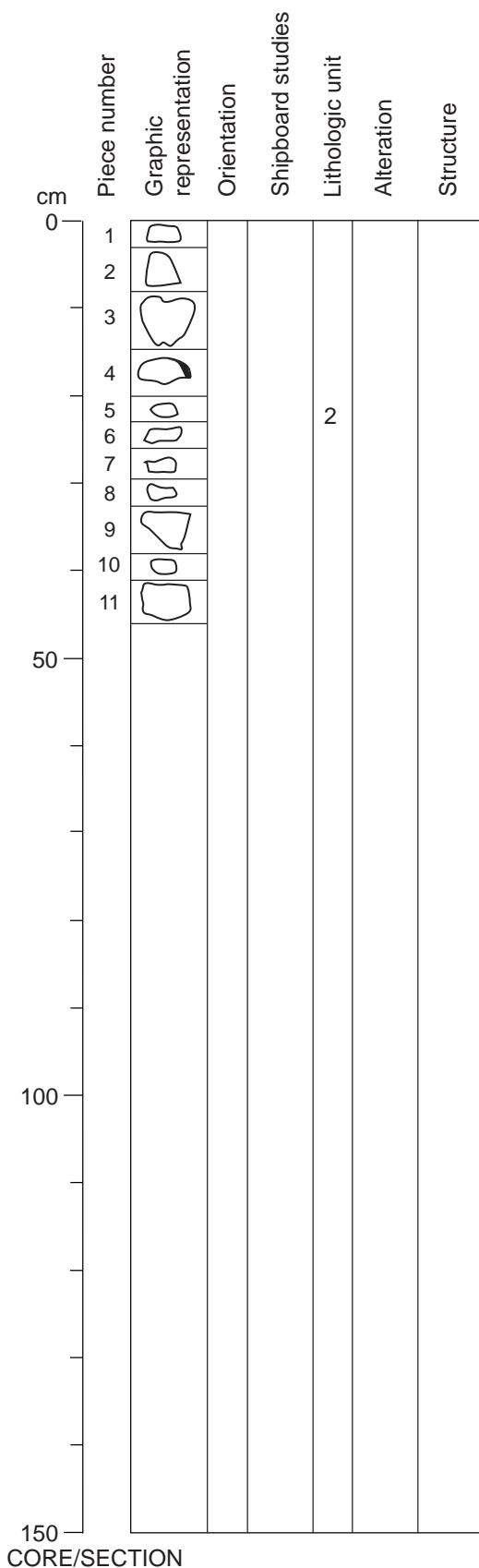
VEINS/FRACTURES: Thin quartz veins in Pieces 2 and 5. Piece 5 also has a fracture with a 2 mm wide bleached alteration margin.

ALTERATION: Slightly to moderately altered. Pieces 2, 3, 5, and 8 are largely weathered to a buff color 25%-75% ; Fe oxyhydroxide replacement of olivine (and groundmass?) abundant here. Spots and patches of Mn oxides and drusy quartz on the weathered surface on Piece 2.

STRUCTURE: Piece 5 (working half only) has a thin (2-3 mm thick) glassy rind, suggesting that the rocks represent pillow lavas.

ADDITIONAL COMMENTS: The section appears to consist of weathered pebble- to cobble-size fragments, probably from a talus pile. Phenocryst size and abundance is variable and the pieces may not be genetically related. Pieces 1, 2, 4, 5, 6, and 8 appear to be largely aphyric basalt. Piece 3 and one pebble of Piece 7 are moderately plagioclase-olivine phyric basalt, similar to the material in Cores 2R through 4R. These pieces may have fallen into the core from above and therefore be part of Unit 1. Glomerocrysts of plagioclase occur in Piece 3. Throughout the section approximately 60% of the olivine is altered to Fe oxyhydroxide.

Core Photo



187-1155A-6R-1

UNIT 2: APHYRIC TO MODERATELY PLAGIOCLASE OLIVINE PHYRIC BASALT

PIECES 1-11

PHENOCRYSTS:

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

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Medium gray

VESICLES:

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

Filling: Vesicles in Pieces 1, 2, 4, and 7 are unfilled or filled with Fe oxyhydroxides in the more weathered areas; in Piece 3 they are lined with a bluish-white material; in Pieces 6 and 11 they are coated or filled with a white material (probably alcite); in Piece 8 the vesicles are lined with a dark gray material (Mn oxide?)

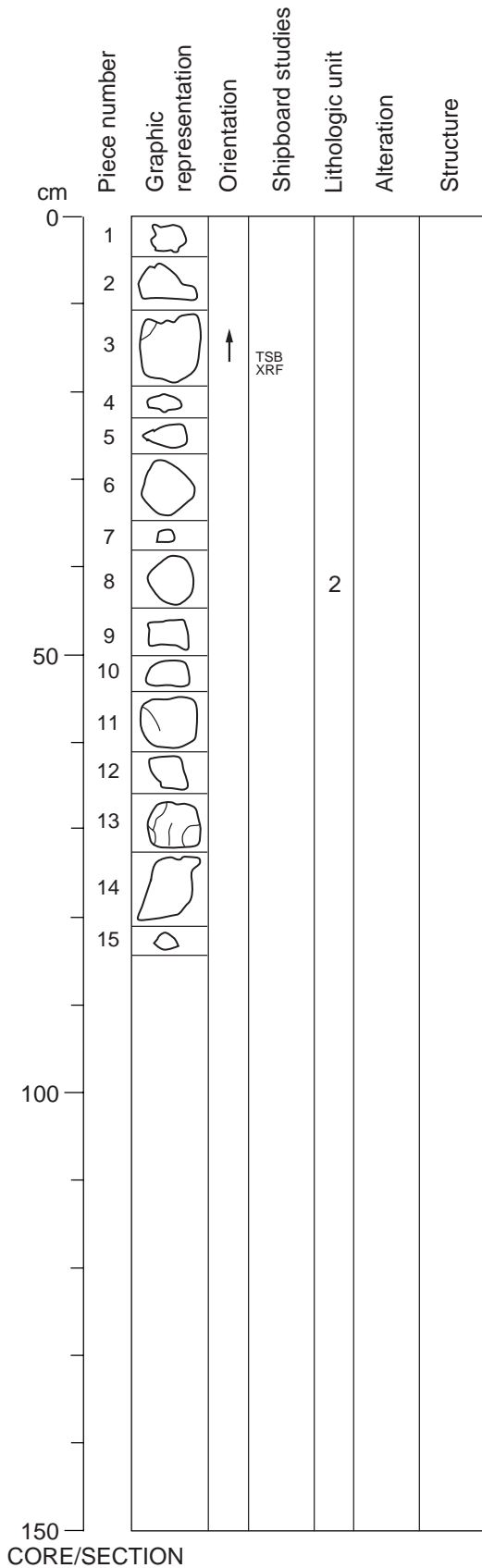
VEINS/FRACTURES: Piece 10 has a thin quartz vein.

ALTERATION: Moderately to highly altered throughout, with Pieces 1, 2, 9, 10, and 11 being the most altered. Pieces are largely weathered to a buff color, with ubiquitous Fe oxyhydroxide replacement of olivine (and groundmass?) in weathered areas. Groundmass and rare olivine phenocrysts in less weathered interiors of pieces are also 50%-80% altered.

STRUCTURE: Chilled margin in Piece 4 suggests that at least some of the material is derived from pillow lavas. Piece 8 (working half only) consists of clear glass plus a few microphenocrysts and spherulites, with a palagonite surface coating.

ADDITIONAL COMMENTS: The section appears to consist of weathered pebble- to cobble-size fragments, probably from a talus pile. Most pieces appear to be aphyric, with only Piece 3 containing significant olivine phenocrysts (~1%). The distinction between aphyric and phyric, however, is complicated by the small size of many pieces and the degree of alteration. The chilled margin of Piece 4 consists of ~8 mm of clear glass plus a few microphenocrysts and spherulites; and an adjacent 5 mm wide zone of coalesced spherulites. The interior of the pillow fragment is 60% oxidized, with replacement of glass and groundmass quench phases by Fe oxyhydroxides.

Core Photo



187-1155A-7R-1

UNIT 2: APHYRIC TO SPARSELY OLIVINE PHYRIC BASALT

PIECES 1-15

PHENOCRYSTS:

	Abundance %	Size (mm) avg.	Size (mm) max.	Size (mm) min.	Shape
Olivine	<1 to 1	<1	2	<1	equant
Total	<1				

GROUNDMASS: Fine-grained

COLOR: Medium gray

VESICLES:

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

Filling: Vesicles in most pieces are filled with olive green smectite. Some vesicles in Piece 8 are filled with calcite.

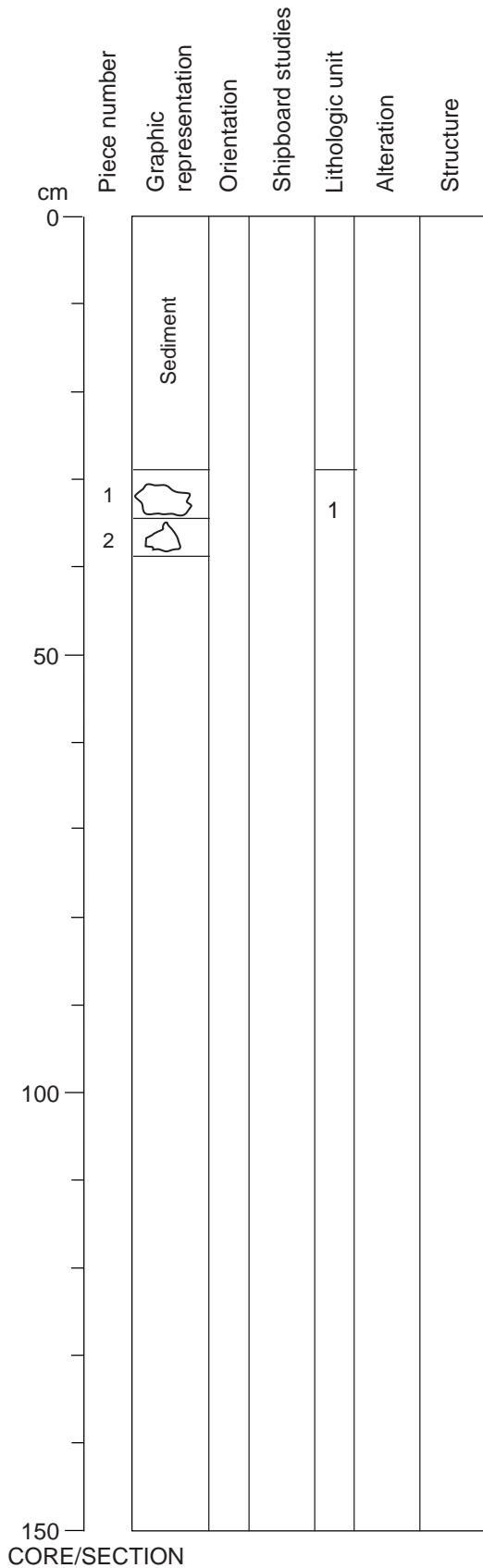
VEINS/FRACTURES: Thin calcite veins occur in Pieces 11 and 13.

ALTERATION: Piece 6 is highly altered (~60%). The remaining pieces are moderately altered, with alteration dominated by replacement of olivine (both phenocrysts and groundmass) by Fe oxyhydroxide. There is also some replacement of groundmass by smectite.

STRUCTURE: None

ADDITIONAL COMMENTS: Phenocryst content is generally low (<1%), but Pieces 2 and 11 have ~1% olivine (now replaced by Fe oxyhydroxides) phenocrysts.

Core Photo



187-1155B-1W-1

UNIT 1 MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-2

INTERNAL CONTACTS: Piece 2 has a mixed glass/palagonite rind 3 mm thick and a 5 mm thick chilled margin.

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
Plagioclase	2	1	2.5 <1	acicular
Olivine	1	1	2 <1	subhedral
Total	3			

GROUNDMASS: Microcrystalline

COLOR: Buff-gray

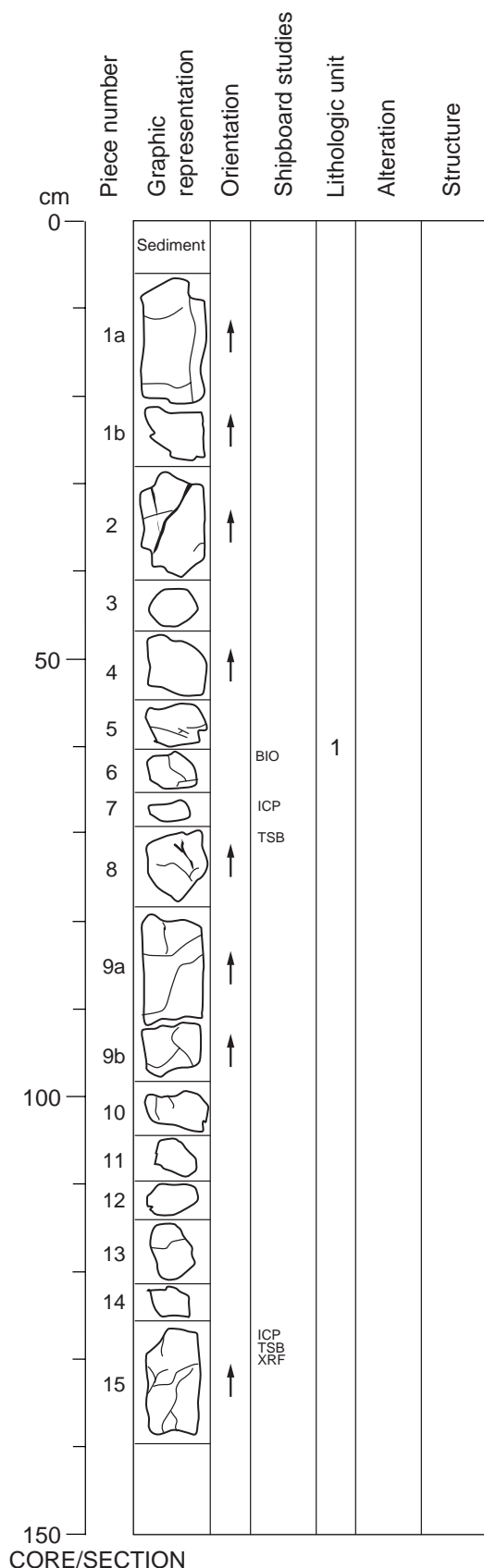
VEINS/FRACTURES: Siliceous material (does not react with diluted. HCl) on top of glass (vein interior?).

ALTERATION: Very high. Olivine ~80% altered to Fe oxyhydroxide, and ~20% plagioclase altered (cloudy to white). Mn oxide in fractures and on edges.

STRUCTURE: Pillow lavas as indicated by glassy rind and chilled margin in Piece 2.

ADDITIONAL COMMENTS: The top 28 cm of this 38 cm core is sediment.

Core Photo



187-1155B-2R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-15

INTERNAL CONTACTS: Glass/Palagonite rinds and chilled margins on Pieces 5, 6, 7, 8, 11, 12, 13 (working), and 14. Maximum thickness is 1 cm, e.g., Pieces 8 and 11, minimum of 3 mm in Piece 14. In oriented Pieces 5 and 8 the glassy rind is at the bottom and top respectively.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3	2	5	1	tabular to subhedral rounded
Olivine	1.5	1.5	3	<1	subhedral
Total	4.5				

GROUNDMASS: Microcrystalline to fine-grained.

COLOR: Tan-brown to light gray (the latter in relatively unaltered areas).

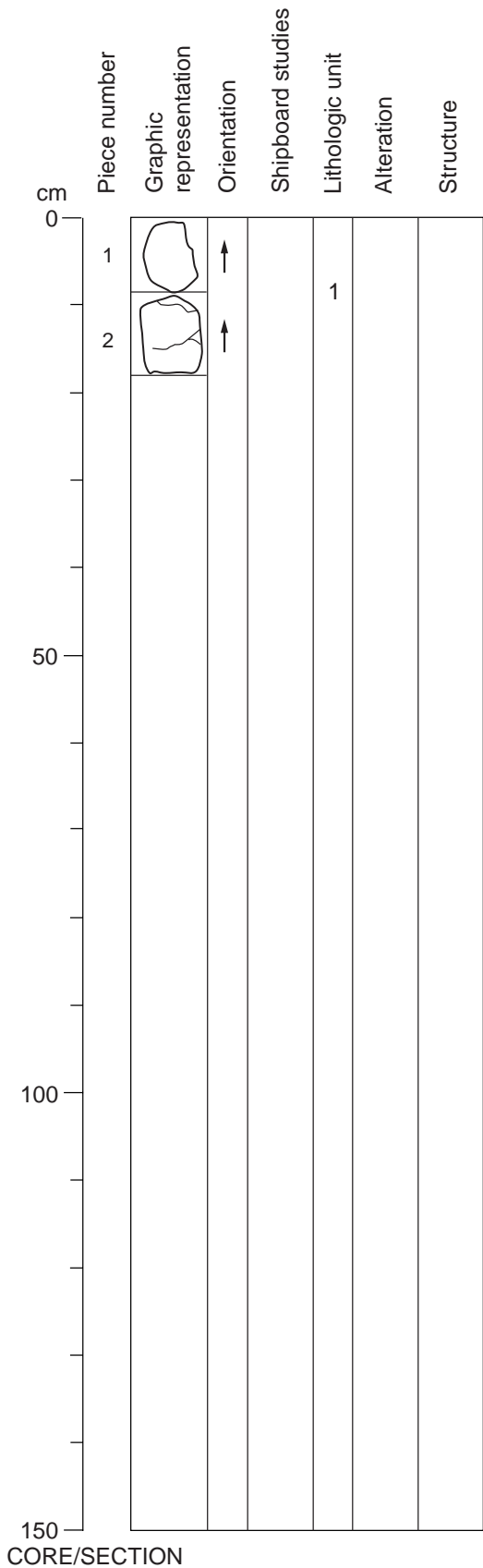
VEINS/FRACTURES: Siliceous sediment on the outside of Pieces 1b, 2, 4, 5, and 6. Calcite on outside of Piece 3. Where glassy rinds are present fractures can be seen to be either sub parallel and/or orthogonal to the rind. Fractures within the glass are filled with quartz and associated with palagonite. Filled fractures through the remainder of the rock contain calcite and Mn oxide (Pieces 1a, 2, 8, 9a, 9b, and 15). Width of filled fractures is >1 mm to 2 mm. Unfilled fractures are generally close to older filled fractures but may not follow the same plane.

ALTERATION: Circa 60% of olivine is altered to Fe oxyhydroxide, and ~20% of plagioclase (cloudy-white). Groundmass shows patchy alteration, mesostasis between microlites in groundmass are altered to yellow-brown clay. Pieces that have fresh interiors show no evidence of groundmass or phenocryst alteration, but in altered groundmass there are both fresh and altered phenocrysts. Piece 9a has discontinuous crack-seal veins. Thinnest (and oldest?) are Mn oxide filled. In places veins have Mn oxide selvages and are filled by calcite. At 85-86 cm is lithified siliceous clay, surrounded by calcite, and the veins have Mn-linings. Thin Mn-lined veins with calcite fill are cut by calcite veins with subrounded Mn oxide grains embedded in, and attached to, the vein walls. Late open fractures cross-cut all veins and even where they penetrate glass (Piece 6), the glass along the open fracture is fresh. In Piece 8 a calcite vein orthogonal to the glassy margin changes to silica once into the glass, this silica vein melds seamlessly with pillow margin-parallel silica veins. The silica veins are mantled by palagonite. On calcite veins where they are translucent enough to see into them (Piece 8), the walls are lined with silica containing Mn-nodules and calcite infills all. Note also that in groundmass even in pieces that have a homogeneous brown color the dense matte of plagioclase microlites is still fresh and only the mesostasis is altered.

STRUCTURE: Pillow Lavas

ADDITIONAL COMMENTS: In Piece 5 there is subtle flow banding of phenocrysts, an area 13 mm above the glassy rind (at the bottom of this oriented Piece) which is less phyric than the remainder of the Piece. There is also some flow alignment of plagioclase in this and other pieces with glassy rinds. In Piece 9a plagioclase occurs as rounded grains up to 5 mm as well as euhedral phenocrysts.

Core Photo



187-1155B-2R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-2

INTERNAL CONTACTS: 1 cm of glass on Piece 1

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3	2	5	1	tabular to sub rounded
Olivine	1.5	1.5	3	<1	euhedral subhedral
Total	4.5				

GROUNDMASS: Microcrystalline to fine-grained

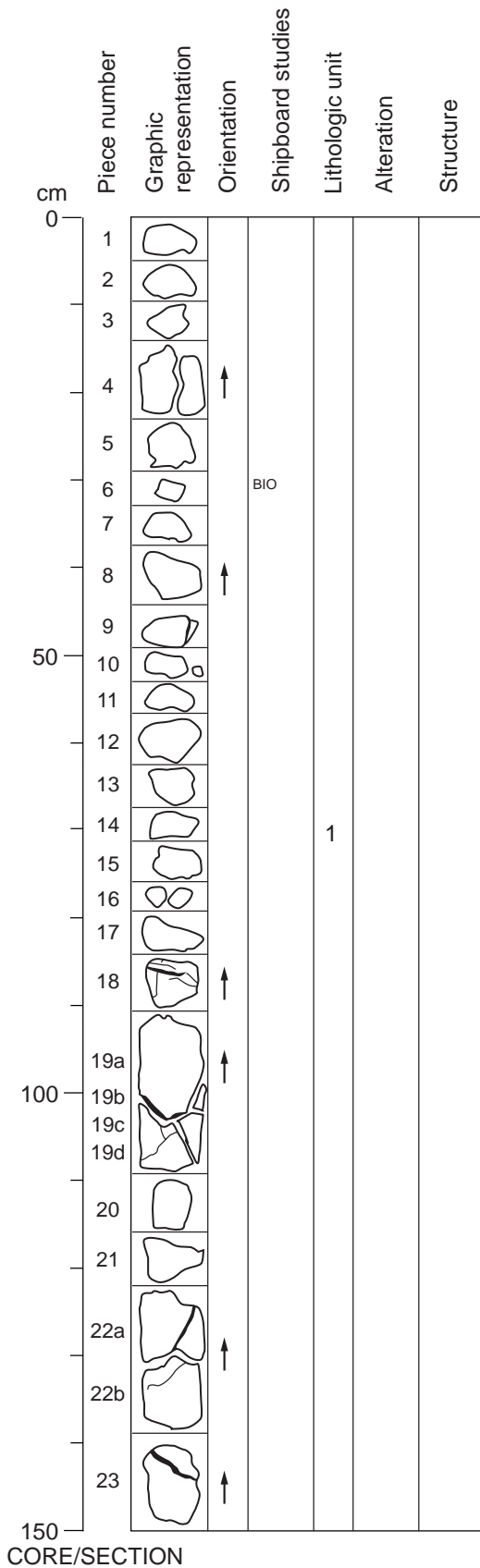
COLOR: Tan-brown

VEINS/FRACTURES: Unfilled fractures in Piece 2 (~1 mm) wide, pinches out.

ALTERATION: Mn oxide on outside of both pieces, siliceous sediment on outside of Piece 1. Groundmass shows patchy alteration, mesostasis between microlites in groundmass are altered to yellow-brown clay.

STRUCTURE: Pillow lavas

Core Photo



187-1155B-3R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-23

INTERNAL CONTACTS: Glassy rinds in Pieces 1, 3, 4, 8, 9, 13, 14, 19, and 20. Thickness ranges from 5 mm in Piece 3 to 8 mm in Piece 8, 13, and 14.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	2	1	5	<1	tabular
Olivine	trace to 1	1.5	3	<1	euhedral subhedral
Total	3				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Buff to gray

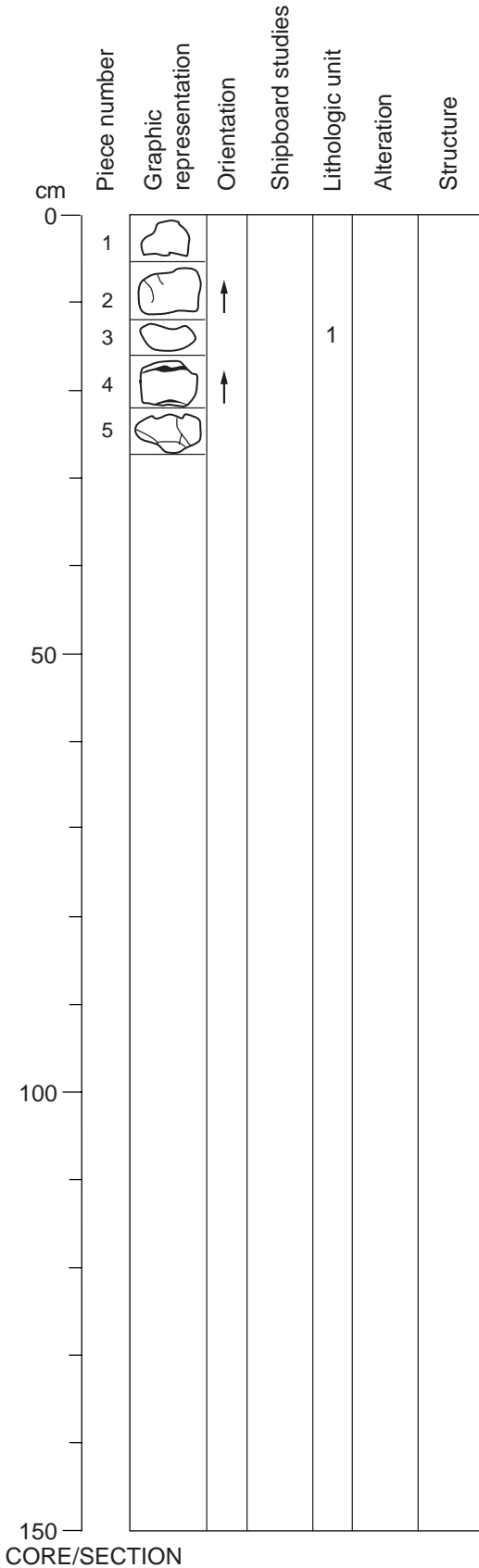
VEINS/FRACTURES: Calcite veins are commonly seen throughout the section, as is calcite coating. Fibrous mineral is aligned orthogonal to vein walls in Piece 19.

ALTERATION: Groundmass shows patchy alteration, mesostasis between microlites in groundmass are altered to yellow-brown clay. Pieces that have fresh interiors show no evidence of groundmass or phenocryst alteration, but in altered groundmass there are both fresh and altered phenocrysts. Mn oxide throughout section as both spots and massive coating, e.g. Piece 23. Piece 4 has a vug infilled with zeolites, silica, calcite and Fe-stained quartz.

STRUCTURE: pillow lava

ADDITIONAL COMMENTS: Subtle flow alignment of plagioclase phenocrysts sub-parallel to glassy rind in Piece 14.

Core Photo



187-1155B-3R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-5

INTERNAL CONTACTS-GLASS: Glassy/Palagonite rind 5 mm thick on Piece 2, also glass and palagonite within the body of the piece.

SEDIMENT: Piece 1 is a lithified (recrystallized?) micritic limestone, with Mn oxide nodules (<1 mm).

PHENOCRYSTS:

	Abundance	Siee (mm)			Shape
	%	avg.	max.	min.	
Plagioclase	1.5	1.5	3	<1	tabular
Olivine	0.5-1	1	2	<1	subhedral
Total	2-2.5				

GROUNDMASS: Microcrystalline to fine-grained

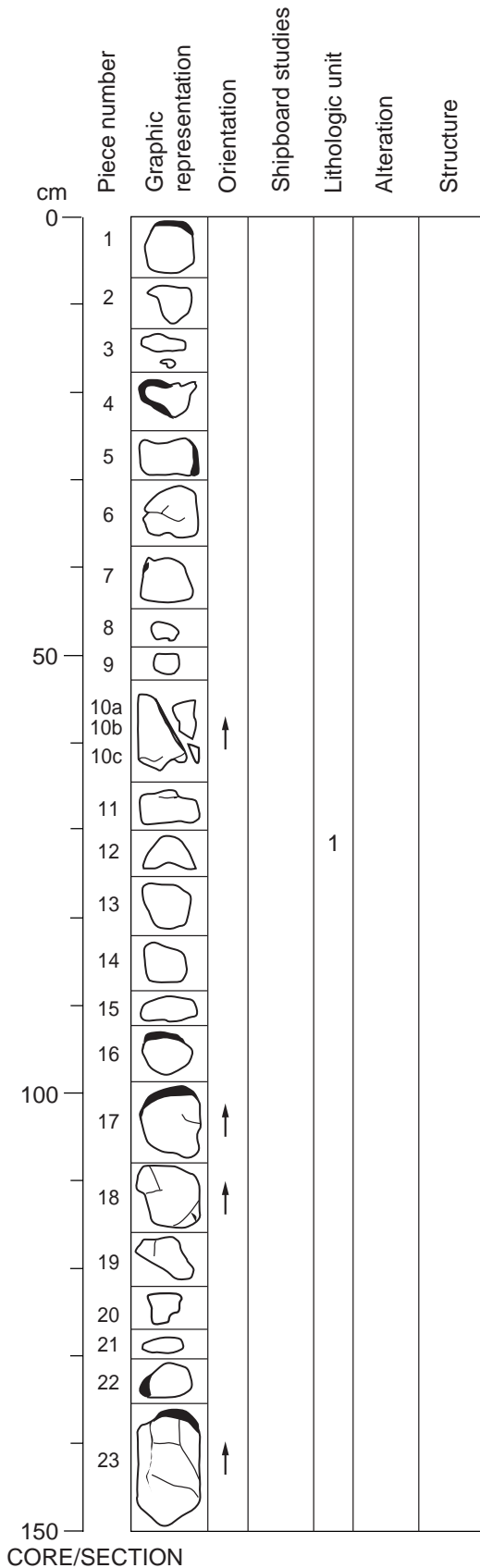
COLOR: Buff to gray

VEINS/FRACTURES: Calcite veins in Pieces 4 and 5, 2 mm and 1 mm wide respectively. Siliceous sediment and calcite vein in Piece 2.

ALTERATION: Groundmass shows patchy alteration, mesostasis between microlites in groundmass are altered to yellow-brown clay. In altered groundmass there are both fresh and altered phenocrysts.

STRUCTURE: Pillow lava

Core Photo



187-1155B-4R-1

UNIT 1: SPARSELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-7

PHENOCRYSTS:

	Abundance %	avg.	Size (mm) max.	min.	Shape
Plagioclase	1	1	2	0.5	acicular to tabular
Olivine	<1	1	2	0.5	subhedral
Total	<2				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Medium gray

VESICLES:

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

Filling: Smectite lined with calcite interiors

VEINS/FRACTURES: Piece 5 has two <0.5 mm wide fractures one of which has a 1 mm wide oxidation halo.

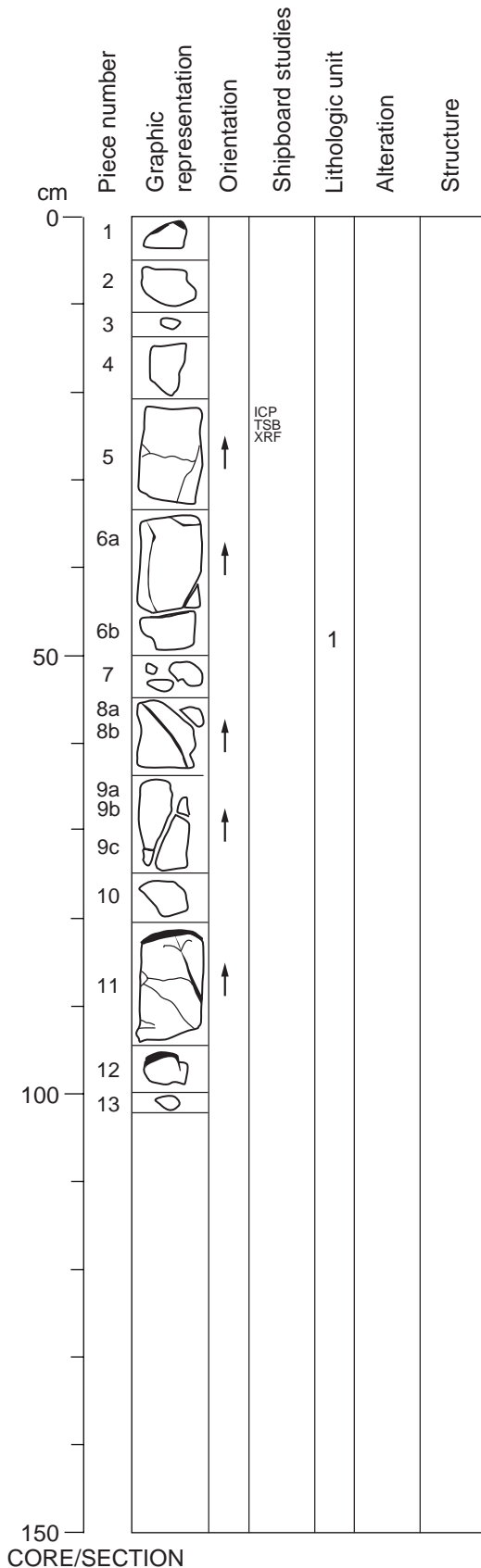
ALTERATION: Overall fresh. Piece 2 has calcareous sediment on its outside.

Piece 3 and 5 have oxidized edges up to 7 mm wide in Piece 5, which also has pink (possibly Fe-stained) siliceous sediment on its outside.

STRUCTURE: Pillow fragments as indicated by the glass/palagonite rinds <1 mm thick on Pieces 2 and 6. Piece 6 also has a 6 mm wide chilled margin.

ADDITIONAL COMMENTS: Glomerocrysts of Plagioclase and olivine, and single phases represented in Piece 5. Throughout the section approximately 40% of the olivine is altered to either a yellow-green clay or Fe oxyhydroxide.

Core Photo



187-1155B-4R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-13

INTERNAL CONTACTS: 0.5-0.8 cm wide glassy pillow rinds on piece 11 and 12. Outer margin (0.5 mm) shows highest degree of palagonitization.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3-4	1.5	5	1	tabular
Olivine	1-2	1	2	1	equant
Total	3-5.5				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Grayish brown to light gray

VESICLESS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
	<0.5	0.3	0.4	0.2	round

Filling: Bluish white cryptocrystalline silica coating some filled with calcite

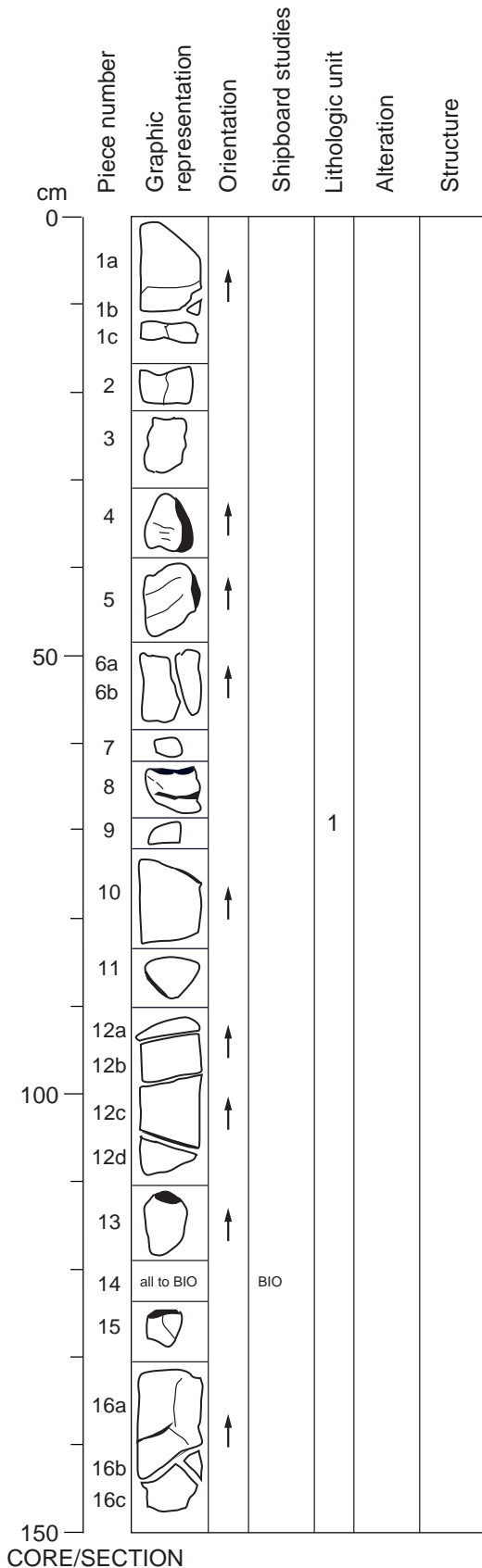
VEINS/FRACTURES: Calcite veins in Pieces 6, 7, 8, 9, 11, and 12. Coarse grained calcite vugs on piece 1 and 2. Calcite vein in Piece 11 stops at glass margin, indicating crack propagation from bottom to top. Mn oxide veins on Pieces 4, 5, 6, 8, 9, and 11. Mn oxide occurs as large patches (2-3 cm) and small pots (<1 mm), coating weathered surfaces throughout the core.

ALTERATION: Pieces 2, 3, 4, 5, 8, and 9 are slightly altered. Pieces 6, 7, 11 and 13 are moderately altered. Pieces 1, 10, and 12 are highly altered. Alteration is manifested by patchy to complete oxidation of the groundmass. It is not clear whether smectite is also present. In moderately to highly altered samples olivine phenocrysts are altered to Fe oxyhydroxide, but sometimes fresh parts are preserved. In slightly altered pieces or parts (e.g., Piece 11) olivine is fresh. Plagioclase is mostly unaltered throughout. Calcite fractures in Piece 11 cut through altered groundmass and are surrounded by 1-2 cm thick alteration halos.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Clusters of olivine and plagioclase are up to 0.4 cm in diameter and make up 5%-10% of the phenocryst assemblage.

Core Photo



187-1155B-5R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-16

INTERNAL CONTACTS-GLASS: Glassy rinds on Pieces 2, 4, 5, 13, and 15. In general, glassy rinds consist of <1 mm of palagonite, 4-5 mm of clear glass plus phenocrysts, and 2-5 mm of coalesced spherulites, which grades into the more crystalline interior. Piece 15 has no clear glass and begins with the coalesced spherulite zone.

SEDIMENT: Piece 3 is a grayish-brown micritic limestone containing spots of Mn oxide and small patches (1-2 mm in diameter) of un lithified (siliceous?) sediment.

PHENOCRYSTS:

	Abundance %	avg. Size (mm)	max. Size (mm)	min. Size (mm)	Shape
Plagioclase	4-5	2	11	1	tabular
Olivine	1-2	1	2	1	equant
Total	5-7				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Grayish brown to light gray

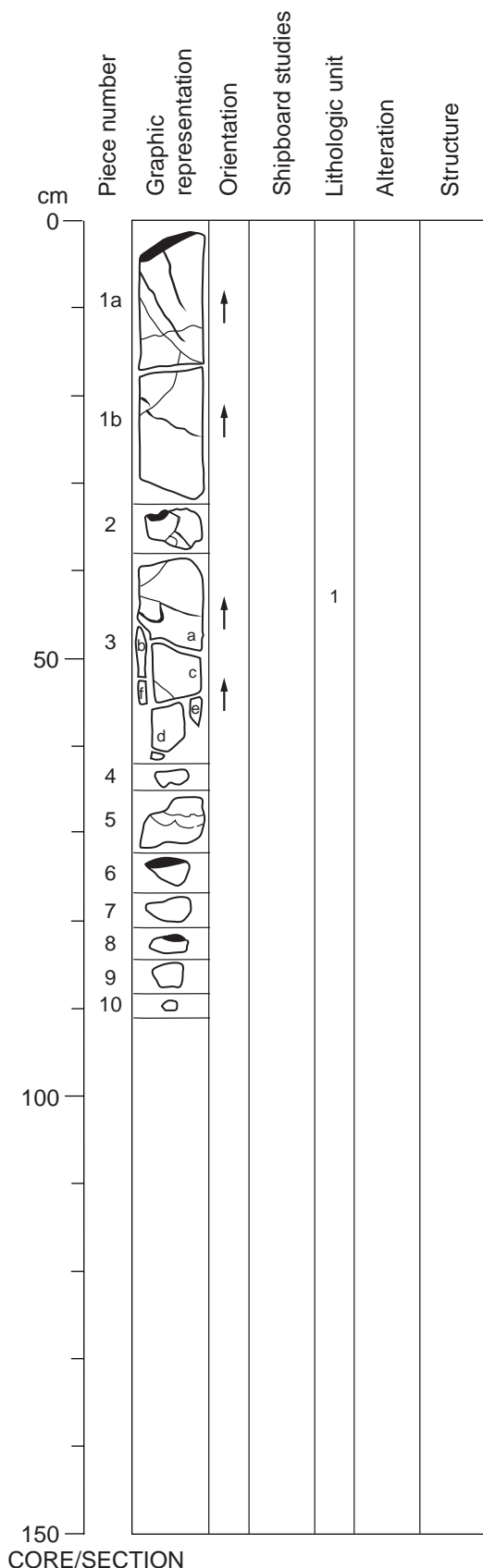
VEINS/FRACTURES: Calcite ± Mn oxide veins are present in Pieces 1, 2, 6, 8, 12, 13, and 16. Fe-stained quartz veins cross cut the glassy margins in Pieces 5, 22, and 23. Unfilled fractures are present in Pieces 5 and 10. Mn commonly coats the surfaces of otherwise unfilled fractures. Radial fractures are observed crosscutting glass in Pieces 2, 4, 5, and 15.

ALTERATION: Most pieces are moderately altered (~25% 35%); Pieces 2, 4, 5, 8, 9, and 11 are highly altered. Alteration is predominantly the result of oxidation of olivine phenocrysts and groundmass phases to Fe oxyhydroxides, although at least 10%-20% of the olivine in most pieces is unaltered or only slightly altered. Plagioclase phenocrysts are largely unaltered throughout. Mn oxide occurs throughout the section as both spots and larger patchy coating on outer weathered surfaces and fractures. Fe-stained silica veins in Pieces 2 and 4 are oriented at a high angle to the cooling surface; the silica veins tend to occur only in the vicinity of glassy margins. Fragment of a calcite vug filling with sparry calcite crystals occurs on one side of Piece 8. This piece also has a 5 mm thick cavity filled with micritic calcite that crosscuts the middle of the piece, plus a 5 mm thick selvage of similar material on the side opposite the vug filling. This latter carbonate selvage has an Fe-stained layer adjacent to the basalt and also includes a small fragment of basalt within the calcite. Piece 9 has a small vug (3 mm diameter) that is lined with a buff colored material, which is in turn coated with a bluish-gray material and topped with a small mound of Mn oxide. One side of Piece 15 has a fragment of Fe-stained siliceous sediment plus Mn oxide adhering to it.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Pieces 1 and 2 were probably originally contiguous. Plagioclase and plagioclase + olivine clusters are common throughout the basalt pieces. There is some preferred orientation of plagioclase laths parallel to the chilled margin in Piece 5, indicative of flow alignment. There may also be more than one generation of plagioclase. Throughout the core, plagioclase ranges from white to dark gray in color. Some of the larger crystals can be observed to have partially resorbed cores, which may be contributing to the dark color in some cases. It is unclear whether any of the dark coloration elsewhere is due to alteration. In Pieces 2 and 16, there are large blocky to rounded plagioclase crystals that are probably xenocrysts.

Core Photo



187-1155B-5R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-10

INTERNAL CONTACTS: Glassy pillow rinds on piece 1, 2, 6, 7, and 8 are 0.5-1 cm thick. Highest degree of palagonitization on the outer part of glass rims.

PHENOCRYSTS:

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
Plagioclase	3-5	1.5	4	tabular
Olivine	1	1	2	equant
Total	4-5			

GROUNDMASS: Microcrystalline to fine grained

COLOR: Light brown when highly altered, grayish brown when moderately altered, light grey when slightly altered

VESICLES:

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
	<0.2	0.2		round

Filling: Bluish white cryptocrystalline silica coating

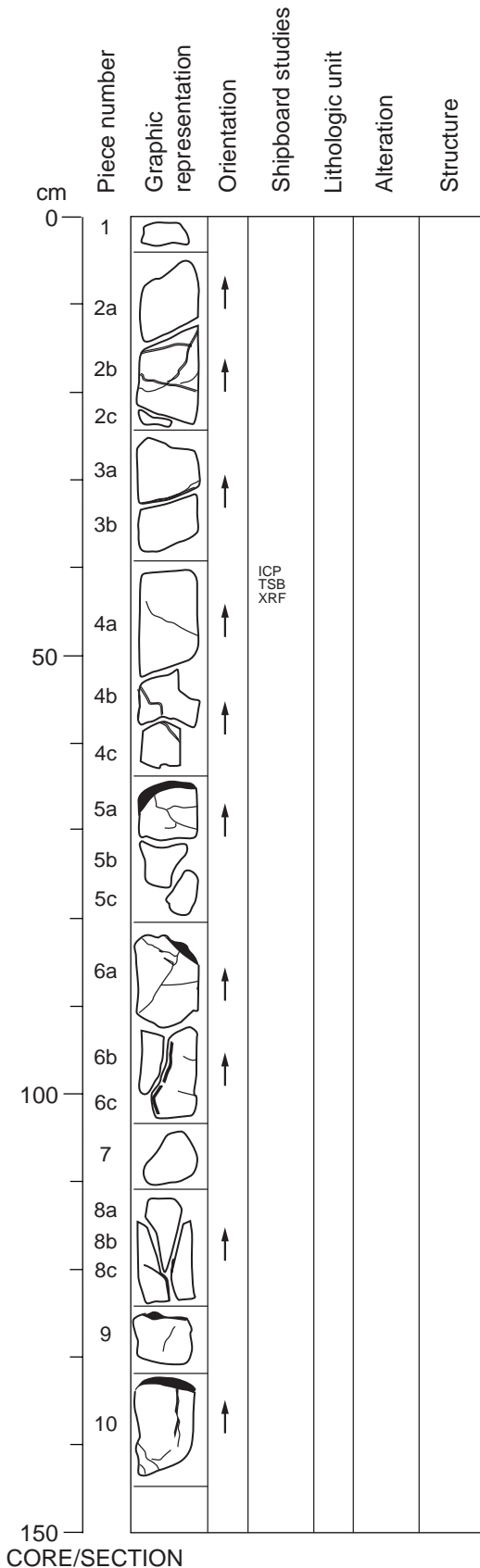
VEINS/FRACTURES: Calcite veins in Pieces 1, 2, 3, and 5. Mn oxide coated fractures in Pieces 1, 2, 3, and 5. Spots of Mn oxide sometimes within calcite veins.

ALTERATION: Alteration is pervasive, occurring in up to 8 cm wide alteration halos around glassy pillow margins, veins and fractures. Slightly altered zones in Piece 1. Pieces 1, 3b, 3c, 3d, 5, and 9 are moderately altered. Pieces 2, 3a, 4, 7, and 10 are highly altered. Alteration is manifested by oxidation of olivine and clinopyroxene in the groundmass. It is not clear whether smectite is also present. Plagioclase is mostly fresh throughout the core, but is sometimes altered along edges. Olivine is completely or partially replaced by Fe oxyhydroxide, but is sometimes still fresh in slightly altered zones, such as in Piece 1.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Clusters of olivine and plagioclase are up to 0.6 cm in diameter and make up 5% of the phenocryst assemblage. Three cm below the glassy pillow margin of Piece 1 occurs a 1 cm oval spot that consists of fresh glass and from which a 1 mm wide silica vein extends towards pillow margin. The vein narrows towards the pillow margin.

Core Photo



187-1155B-6R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-10

INTERNAL CONTACTS: Glassy rinds on Pieces 5a, 6a, and 10 consist of 1-3 mm of palagonite, 4 mm of clear glass plus phenocrysts, and 2-3 mm of coalesced spherulites, which grades into the more crystalline interior. Pieces 5c and 9 have no clear glass and are composed of palagonite and coalesced spherulites.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	5	2	4	1	tabular
Olivine	1	1	2	1	equant
Total	6				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Grayish brown to light gray

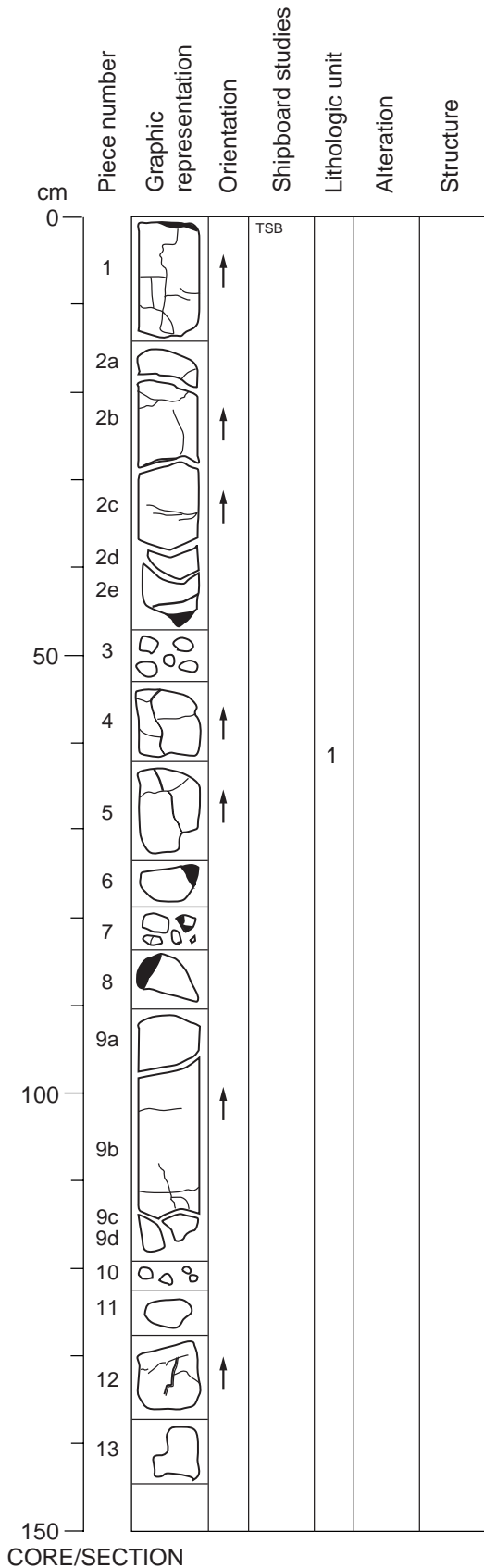
VEINS/FRACTURES: Calcite ± Mn oxide veins are present in Pieces 2-6 and 10. Fe-stained quartz veins cross cut the glassy margins in Pieces 6 and 10. Most fracture surfaces are coated with Mn and tiny fractures are common throughout the core.

ALTERATION: Most pieces are moderately to highly altered (~40%-60%); Pieces 3 and 6a are only slightly to moderately altered (~10%-15%). Alteration is predominantly the result of oxidation of olivine phenocrysts and groundmass phases to Fe oxyhydroxides. At least 10%-20% of the olivine in most pieces is unaltered or only slightly altered. Oxidation of groundmass is greatest adjacent to calcite veins. Pieces 1 to 3 and 7 have patchy replacement of groundmass by calcite. Pieces 2 to 4, 6, 8, and 10 may also have some smectite replacing groundmass. Plagioclase phenocrysts are largely unaltered throughout; however, some may be coated or lined with Mn oxide along fractures, crystal boundaries or cleavage planes (see below). Mn oxide occurs throughout the section as both spots and larger patchy coating on outer weathered surfaces and fractures. Fe-stained silica veins in Pieces 6 and 10 are oriented at a high angle to the cooling surface; the silica veins tend to occur only in the vicinity of glassy margins. Calcite + Mn oxide coats portions of the outer surface of Pieces 4 and 7. In Piece 4, there are several layers of milky white calcite separated by thin dark layers (probably Mn oxide), indicating that the carbonate built up over several episodes of deposition.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Plagioclase and plagioclase + olivine clusters are common throughout the basalt pieces. Plagioclase ranges from clear white to dark gray. Some of this may be due to partial resorption and inclusion of patches of devitrified glass. There also appears to be a correlation between color and the presence of minute fractures lined with Mn oxide, suggesting that Mn oxide may be coating fractures and/or cleavages in some plagioclase crystals.

Core Photo



187-1155B-6R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-13

INTERNAL CONTACTS: 1.3 to 1.8 cm thick glassy pillow-rinds on Pieces 2, 6, and 8. Highest degree of palagonitization on the outer part of glass rims on Piece 2. On Piece 6 palagonitization is strongest in the center, suggesting it may represent the center between two pillows.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3-4	1.5	5	0.5	tabular
Olivine	1	1	1.5	0.5	equant
Total	4-5				

GROUNDMASS: Microcrystalline to fine-grained

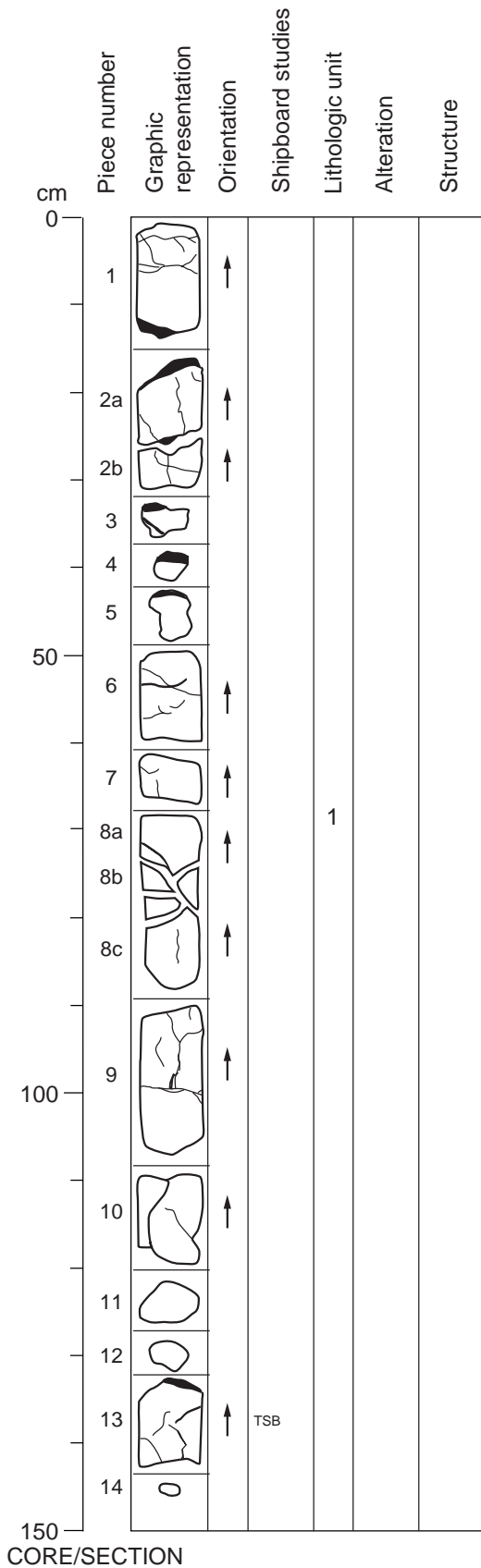
COLOR: Light brown when highly altered, grayish brown when moderately altered, light gray when slightly altered

VEINS/FRACTURES: Calcite veins in Pieces 1, 2, 3, 4, 8, 9, and 12. Two set of fractures are observed (a) perpendicular to pillow rim (cooling fracture ?), (b) ± perpendicular to (a). Mn oxide often coats the inner walls of the calcite veins or occurs as small spots within the calcite. Very small Mn veins transect the groundmass and sometimes phenocrysts. Fracture and vein density increases towards glassy margins.

ALTERATION: The core is moderately to highly altered, except for Piece 10, which is slightly altered. The groundmass is most severely affected by oxidation of olivine and clinopyroxene. This type of alteration ranges from millimeter wide patches to total oxidation. In Piece 1 and 9 groundmass is replaced by calcite along veins. Alteration is strongest around fractures / veins. Plagioclase phenocrysts are mostly fresh. Sometimes small Mn veins are observed at the crystal edges, resulting in dark color (e.g., Piece 5). Olivine phenocrysts are variably altered to Fe oxyhydroxide. The degree of olivine alteration correlates positively with the degree of groundmass alteration.

STRUCTURE: Pillow lava

Core Photo



187-1155B-6R-3

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-14

INTERNAL CONTACTS: Glassy rinds on Pieces 1-6, 8, 9, and 13. Piece 1 has micritic sediment (\pm siliceous sediment) attached to the outer most surface.

Pieces 3 and 5 have a 2-6 mm thick layer of siliceous sediment attached to the outermost surface, separated from the glass underneath by a 2 mm thick layer of palagonite. The glassy (+ phenocrysts) zone is ~4 mm thick and a zone of coalesced spherulites of similar thickness. Pieces 2, 4, 6, 8, and 9 have a thin layer of palagonite (<1 mm), followed by 2-5 mm of clear glass + phenocrysts and about 4 mm wide zone of coalesced spherulites.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	4	2	5	1	tabular
Olivine	2	1	1.5	1	equant
Total	6				

GROUNDMASS: Cryptocrystalline to microcrystalline

COLOR: Grayish brown to light gray

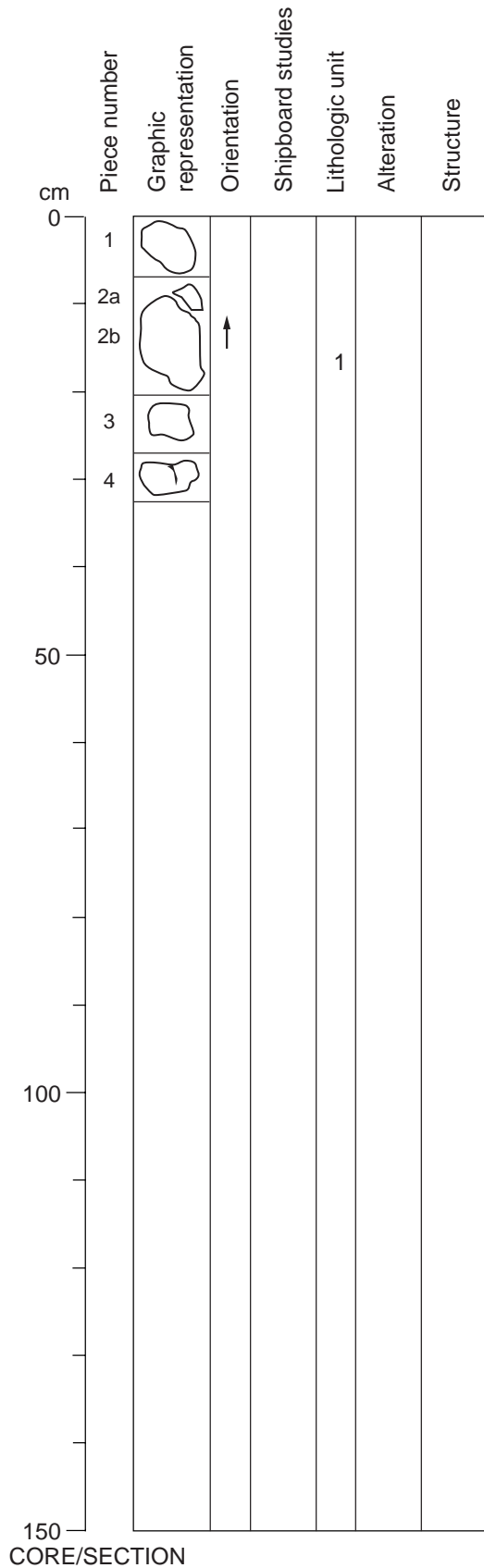
VEINS/FRACTURES: Calcite \pm Mn oxide veins are present in Pieces 2, 3, 6, 8, 9, 10, and 13. Fe-stained quartz veins cross cut the glassy margins in Pieces 3, 6, 7, and 13. Most fracture surfaces are coated with Mn oxide and tiny fractures are common throughout the core.

ALTERATION: Most pieces are moderately altered (~30% 60%); Pieces 4, 8, and 11 are only slightly altered. Alteration is predominantly the result of oxidation of olivine phenocrysts and groundmass phases to Fe oxyhydroxides, although there is at least some fresh olivine in most pieces. Oxidation of groundmass is greatest adjacent to calcite veins; oxidized halos range from a few mm to >1 cm. Elsewhere, alteration of groundmass has a patchy appearance, cause for most of this is uncertain, but Pieces 1 and 9 may have some smectite replacing groundmass. Plagioclase phenocrysts are largely unaltered throughout. Mn oxide occurs throughout the section as both spots and larger patchy coating on outer weathered surfaces and fractures. Fe-stained silica veins in Pieces 3, 6, 7, and 13 are oriented at a high angle to the cooling surface; the silica veins tend to occur only in the vicinity of glassy margins. They usually extend into the sample for 1-3 cm and terminate in a calcite vein.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Plagioclase clusters are common throughout the basalt pieces. Pieces 9 and 10 were probably originally contiguous. The glassy margins of Pieces 1 and 13 are unusual in that they appear to have been folded back into the pillow lava, i.e. fingers of glass + palagonite + siliceous sediment(?) protrude into the more crystallized interior.

Core Photo



187-1155B-6R-4

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-4

INTERNAL CONTACTS: No glass rinds occur in this section

PHENOCRYSTS:

	Abundance	Size (mm)			Shape
	%	avg.	max.	min.	
Plagioclase	3	1.5	3	0.5	tabular
Olivine	<1	1	1.5	0.5	equant
Total	3-4				

GROUNDMASS: Microcrystalline to fine-grained

COLOR: Grayish brown to light gray

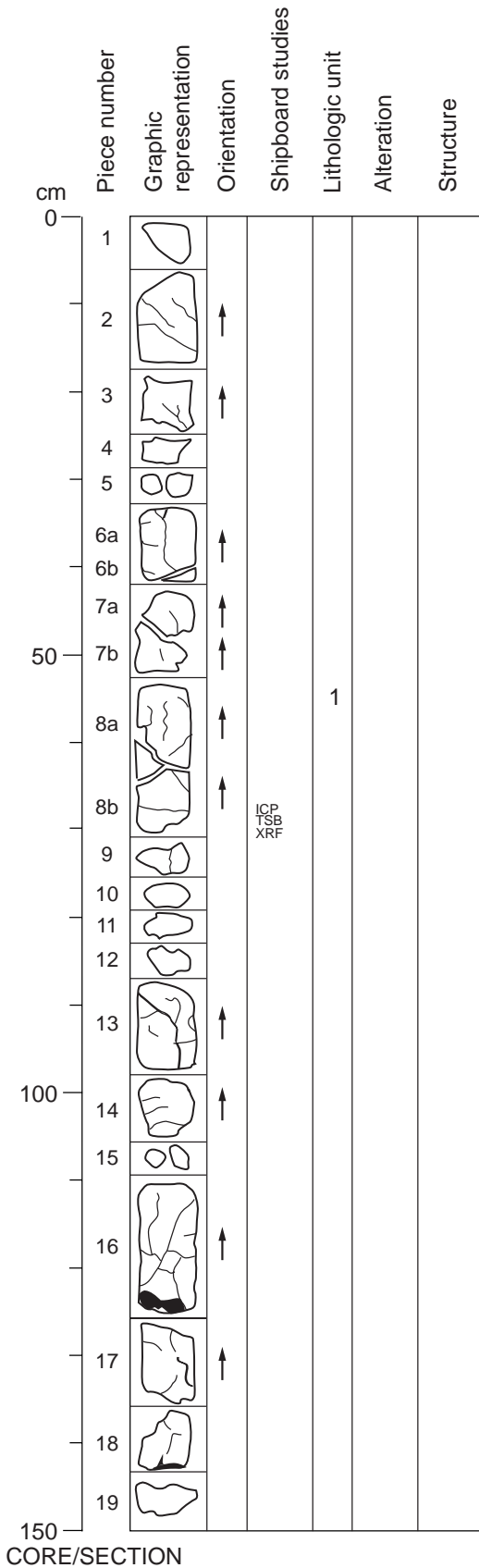
VEINS/FRACTURES: Calcite veins parallel to core at the edge of Piece 2.

Minute Mn oxide covered fractures cut irregularly across most pieces.

ALTERATION: The core is slightly to moderately altered. Groundmass is oxidized and replaced by clay in millimeter-sized patches, which appear to connect in a net like manner. In this section this type of alteration progressed from the outside of pieces towards the interior. Olivine and plagioclase phenocrysts are fresh throughout.

STRUCTURE: Not possible to determine, most likely pillow lava

Core Photo



187-1155B-7R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-19

INTERNAL CONTACTS: Glassy/palagonite rinds on Pieces 1, 2, 5, 6a, 8a, 13, 14, 16, 18, and 19. The rinds are generally 5 mm thick, except in Pieces 1 and 19 which are approximately 1 mm thick. Pieces 2, 8a, 13 and 16 (oriented) have glass on the top of the Pieces. Pieces 7 and 14 (oriented) have glass on the bottom of the piece.

SEDIMENT: The bottom of Piece 16 is dominated by calcareous material. Pink possibly siliceous material (does not react with dilute HCl) is commonly associated with glassy/palagonite rinds.

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3	2	6	<1	tabular subhedral euhedral
Olivine	1	1	2.5	<1	euhedral
Total	4				

GROUNDMASS: Fine-grained

COLOR: buff to medium gray

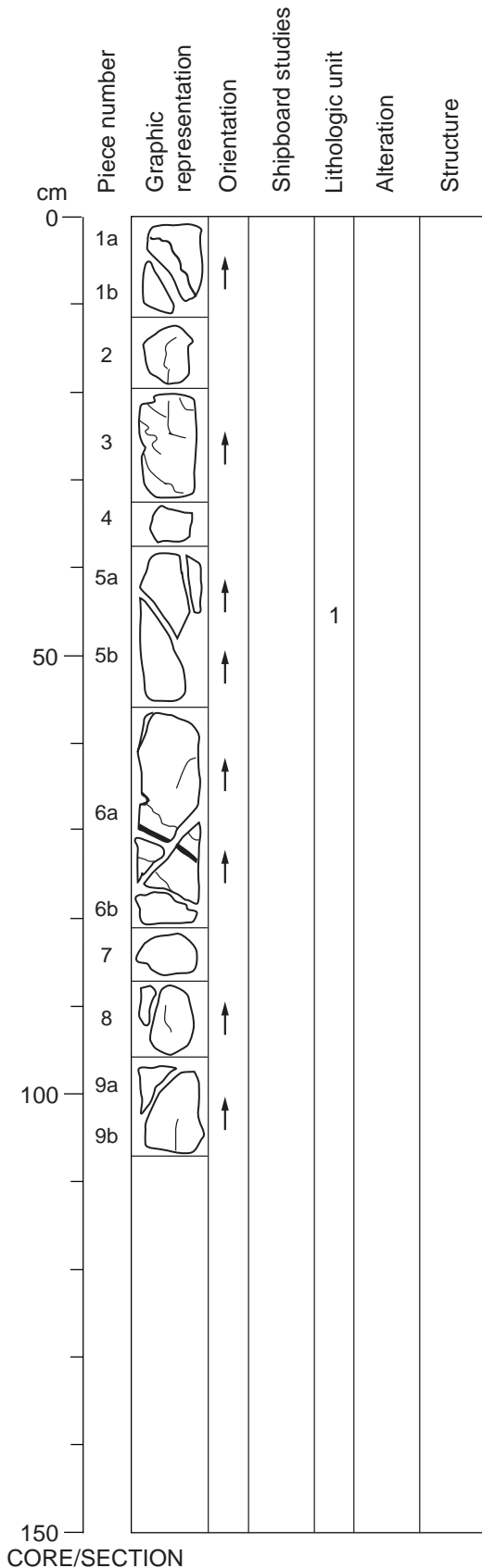
VEINS/FRACTURES: An open fracture is present in Piece 2. Pieces 3, 7, 8, 13, and 18 have open fractures with oxidation halos that average 2 mm in width. Pieces 12, 16, and 17, have calcite veins, with associated oxidation halos in Pieces 16 and 17. Short radial cooling fractures occur in Pieces 2, 8a, 13, and 16. Vertical siliceous(?) veins are present in Pieces 6, 13, and 16.

ALTERATION: Overall the section is slightly altered. Pieces 1, 4 and 14 show patchy groundmass alteration to a tan-yellow clay. Of these, Piece 1 shows the highest percentage of alteration, with approximately 30% of the groundmass altered to clay. Piece 7 has an oxidized margin 5 mm wide that extends around 75% of the piece. Fracture fill may comprise two or more bands of minerals, e.g., calcite and quartz with Mn oxide confined to a specific band.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Glomerocrysts comprise 10% 15% of phenocrysts, and consist of numerous small crystals, e.g., Piece 2 has a 6 mm glomerocryst consisting of > 20% phenocrysts of plagioclase and olivine <1 mm in size.

Core Photo



187-1155B-7R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-9

INTERNAL CONTACTS: Glass/palagonite rinds with chilled margins occur on Pieces 2 and 6a (oriented) ranging from 6 mm wide in Piece 2 to 8 mm wide in Piece 6 where it occurs on the top of the piece.

SEDIMENT: A small fragment of siliceous sediment adheres to the top of the glass on Piece 6a.

PHENOCRYSTS:

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3	2	7	<1	tabular subhedral euhedral
Olivine	1	1	3	<1	euhedral
Total	4				

GROUNDMASS: Fine-grained

COLOR: Medium gray

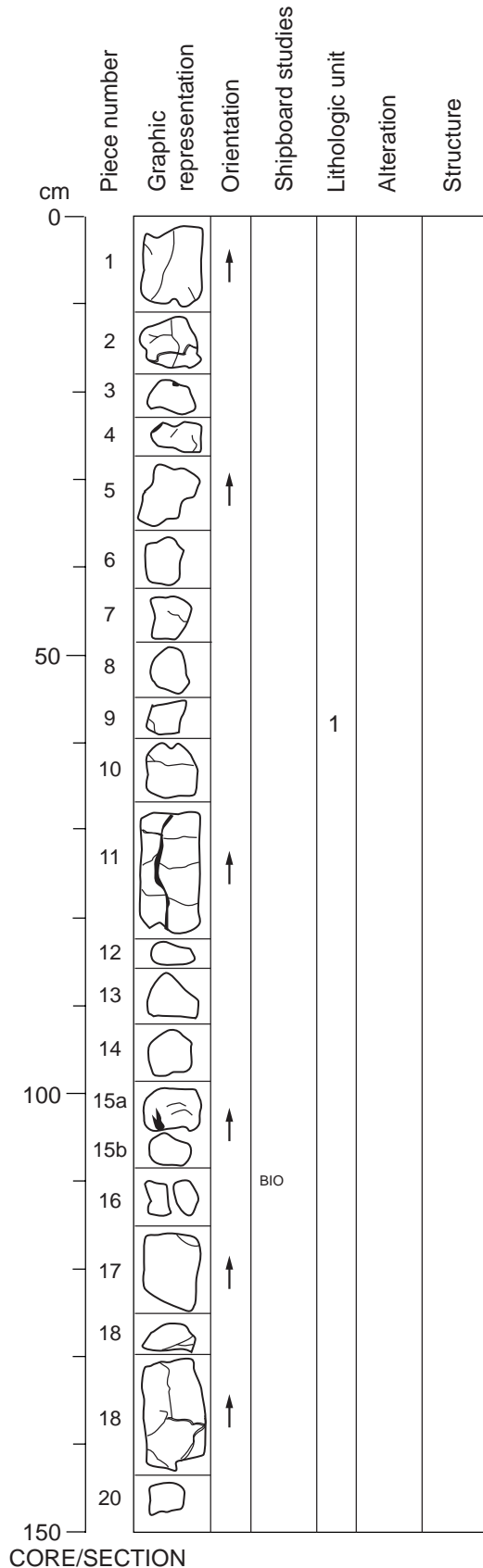
VEINS/FRACTURES: Pieces 1 and 6 have calcite veins 1 mm wide with 1 cm wide oxidation halos. Piece 6 also has an 8 mm wide open vug partially filled with calcite (dog's tooth). A small <1 mm wide open fracture with a 2 mm wide oxidation halo occurs in Piece 9.

ALTERATION: Overall the section is slightly altered. Olivine phenocrysts show some alteration throughout the section to Fe oxyhydroxide, ranging from about 10% in Piece 2 to 70% in Piece 7. This variation is non-systematic and fresh olivine is always present.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Piece 9 contains a 7 mm glomerocryst made up of many small <1 mm plagioclase and olivine phenocrysts. Small (<0.5 mm) vesicles are scarce (< 0.5%) and are lined with blue cryptocrystalline silica.

Core Photo



187-1155B-8R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-20

INTERNAL CONTACTS: Glassy rinds and chilled margins on Pieces 2, 3, 4, 10, 13, 15, and 19. Glass/Palagonite rinds vary from 3 mm thick in Piece 19 to 6 mm thick in Piece 10. Oriented Pieces 15 and 19 have glass on the side and bottom, respectively.

SEDIMENT: Piece 20 is micritic limestone (recrystallized?) consisting of angular fragments of finer grained material in a coarser grained matrix; the piece has a palagonite (2 mm thick) and a glass (2 mm thick) fragment attached to one side. The boundary between the limestone and the palagonite is lined with Mn oxide. Piece 14 is also limestone that contains Mn oxide and unlithified clasts of siliceous(?) sediment.

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

GROUNDMASS: Fine-grained to microcrystalline

COLOR: Buff to medium gray (depending on the degree of alteration).

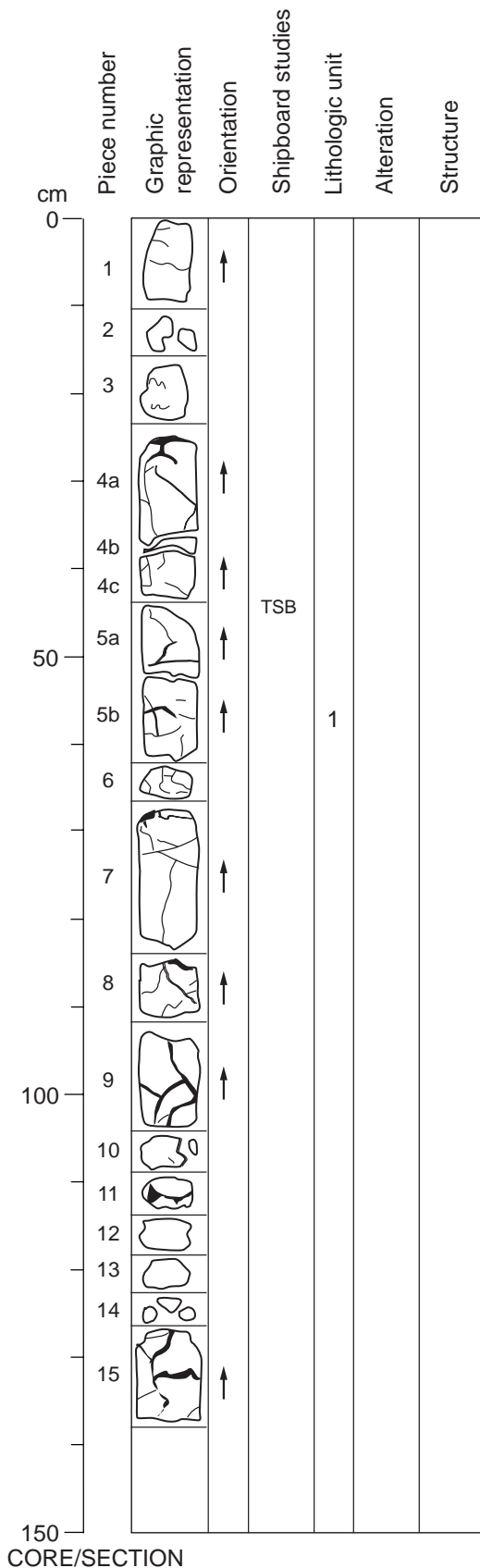
VEINS/FRACTURES: Fractures and veins are present throughout the section. Veins frequently show cross-cutting relationships between younger crystalline colorless calcite and older Fe-stained (pink) siliceous material. Oxidation halos on a mm to cm scale surround open fractures and filled veins, made visible by orange-brown alteration in the groundmass and replacement of olivine by Fe oxyhydroxide.

ALTERATION: Overall slight, but locally up to high. Mn oxide is present as spots or massive coatings in veins or along fracture faces.

STRUCTURE: Pillow lava

ADDITIONAL COMMENTS: Glomerocrysts (up to 7 mm) are formed of numerous small (<1 mm) interlocking plagioclase arranged in an open lattice with olivine occupying some spaces. Rare vesicles (<0.5%) are lined with cryptocrystalline quartz and/or calcite.

Core Photo



187-1155B-8R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-15

INTERNAL CONTACTS: Glassy/palagonite rinds are present on Pieces 1, 2a, 3, 4a, 4b, 4c, 5a, 5b, 6a, 7, 8, 10, 11, and 14. These rinds range in thickness from 1 cm on Piece 5a to <1 mm on Piece 4c. Pieces 4c and 5b (oriented) have glassy bottoms. Pieces 4a, 5a and 7 (oriented) have glassy tops. Pieces 1, 5a and 5b have glassy sides.

SEDIMENT: Piece 12 is a grayish brown micritic limestone containing altered pieces of basaltic glass (<3 mm). Piece 11 is also predominantly limestone, but includes three ellipses of glass/palagonite (3-3.5 cm across) that are attached to the outer surface. This could be interpreted as evidence that the associated pillow lavas erupted into a slurry of calcareous ooze. Mn oxide is present in both pieces as discrete nodules <1 mm across.

PHENOCRYSTS:

	Abundance %	Size (mm) avg.	Size (mm) max.	Size (mm) min.	Shape
Plagioclase	3	2	5	<1	tabular
Olivine	1	1.5	3	<1	euhedral
Total	4				

GROUNDMASS: Fine-grained

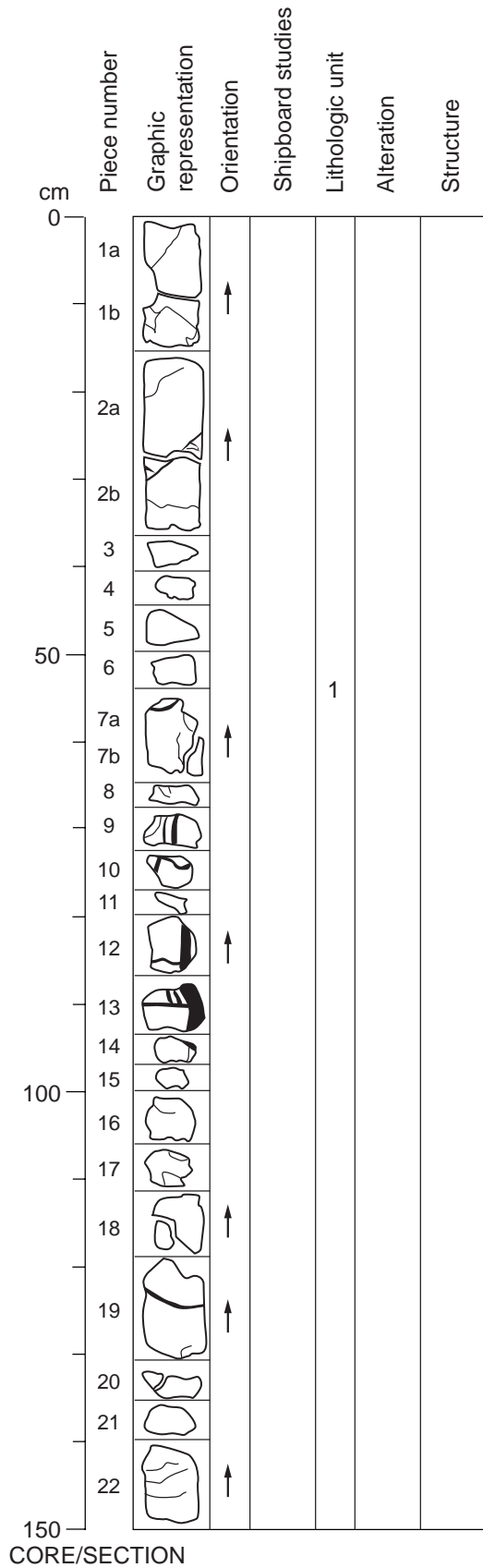
COLOR: Buff to medium gray

VEINS/FRACTURES: Calcite veins are present in Pieces 4, 5a, 5b, 6, 7, 8, 9, and 15. All calcite veins have associated oxidized margins and vary in size from 1-1.5 cm. Piece 1 contains an open fracture 1 mm wide with a 2 mm wide oxidation halo. Piece 4a has developed snuff-box texture where anastomosing fracture controlled alteration halos enclose oval-to-box shaped enclaves of unaltered groundmass. Small radial cooling fractures are present in Pieces 1 and 3. Pieces 4, 5, and 7 contain Fe-stained cryptocrystalline veins, possibly siliceous (does not react with dilute HCl), that are concentrated in areas of palagonite and often link up to calcite veins in the interior.

ALTERATION: Much of the groundmass in Pieces 5, 8, 10, and 15 has weathered to a tan-yellow clay. Mn oxide occurs as nodules (<1 mm across) and massive sheets on the outside of most Pieces and are in most calcite and quartz veins throughout the section. Overall the section is moderately (~15%) altered. Piece 7 has a vug on its outer surface (10 mm by 20 mm) lined with a mixture of botryoidal and dog tooth calcite.

STRUCTURE: Pillow lava

Core Photo



187-1155B-8R-3

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT WITH SEDIMENT

PIECES 1-22

INTERNAL CONTACTS: Glass/palagonite rinds are present on Pieces 1b, 2a, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, and 22 ranging in thickness from 2 mm on Piece 21 to 1 cm on Piece 12.

SEDIMENT: Pieces 9, 10, 12, and 13 have large veins filled with calcareous sediment in their glass margins which range in width from 3 mm in Piece 10 to 2 cm in Piece 9.

The contacts with palagonite are lined with Mn oxide.

PHENOCRYSTS:

	Abundance %	Size (mm) avg.	max.	min.	Shape
Plagioclase	3	1.5	4	<1	tabular
Olivine	1	1	3	<1	subhedral
Total	4				

GROUNDMASS: Fine-grained

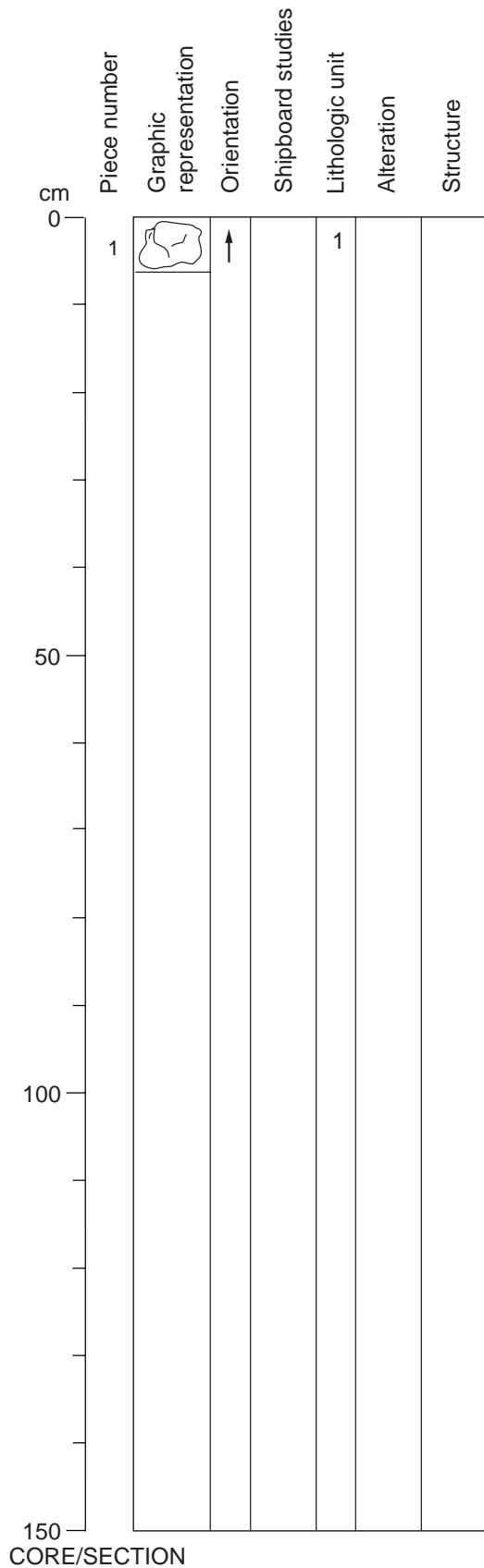
COLOR: Buff to medium gray

VEINS/FRACTURES: Calcite veins are present in Pieces 1a, 2a, 2b, 7a, 9, 10, 12, and 19. The calcite veins in Pieces 1a, 2a, 2b, 7 and 19 have oxidation halos approximately 1 cm wide. Open fractures are present in 1b, 2a, 2b, 7, 8, 16, 17, 21, and 22, all these have oxidation halos that range from 1 mm in Piece 17 to 6 mm in Piece 22. Radial cooling fractures occur in Piece 22. Piece 21 has a silica and calcite vein that contains some Mn oxide and is oriented perpendicular to the glass cooling surface.

ALTERATION: Overall the section is slightly altered. The groundmass in Pieces 2, 3, 10, 13, 14, 16, and 20 is partially (20%-30%) weathered to tan yellow clay.

STRUCTURE: Pillow lava

Core Photo



187-1155B-8R-4

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECE 1

INTERNAL CONTACTS: Glass/palagonite and chilled margin 5 mm thick on the bottom and side of this oriented Piece.

	Abundance %	Size (mm)			Shape
		avg.	max.	min.	
Plagioclase	3	2.5	4	1	tabular
Olivine	<1	1	2	<1	euhedral
Total	~3-4				

GROUNDMASS: Fine-grained

COLOR: Buff to medium gray

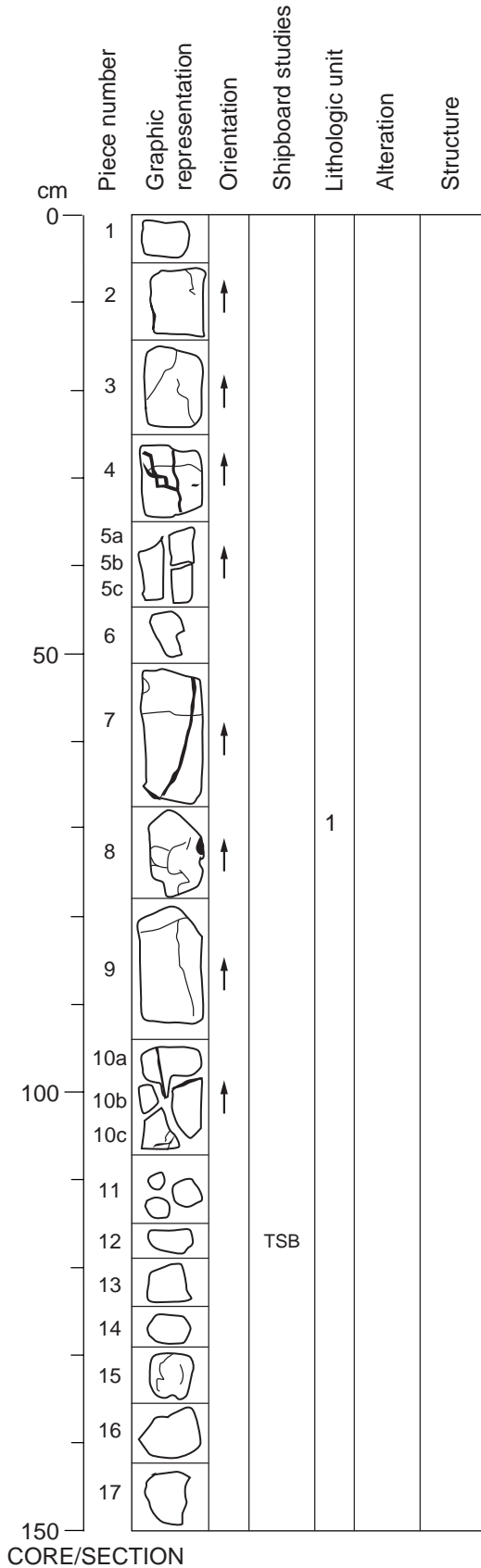
VEINS/FRACTURES: Piece has one vertical fracture intermittently filled with Mn oxide and quartz with an alteration halo 1.6 cm wide.

ALTERATION: Outside surface has Mn oxide nodules (<1 mm across) and quartz associated with Fe oxyhydroxide stained alteration. Overall the piece is slightly altered.

STRUCTURE: pillow lava

ADDITIONAL COMMENTS: Within the alteration halo ~80% of the olivine has been replaced by Fe oxyhydroxide. Glomerocrysts up to 4 mm are composed of plagioclase and olivine.

Core Photo



187-1155B-9R-1

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-17

INTERNAL CONTACTS: Glassy /Palagonite rinds and chilled margins on Pieces 4, 7, 8, 10c, 11,12, 13, 14, and 15. Oriented Pieces 4a, 7a, 8a and 10c have glassy rinds on the top, bottom, shoulder and bottom, respectively. Glass thickness varies from 1 mm in Piece 10 to 10 mm on Piece 4.

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
Plagioclase	3	1.5	4 <1	tabular
Olivine	~1	1	2 <1	subhedral euhedral
Total	4			

GROUNDMASS: Fine-grained

COLOR: Buff in Piece 3, but generally medium gray

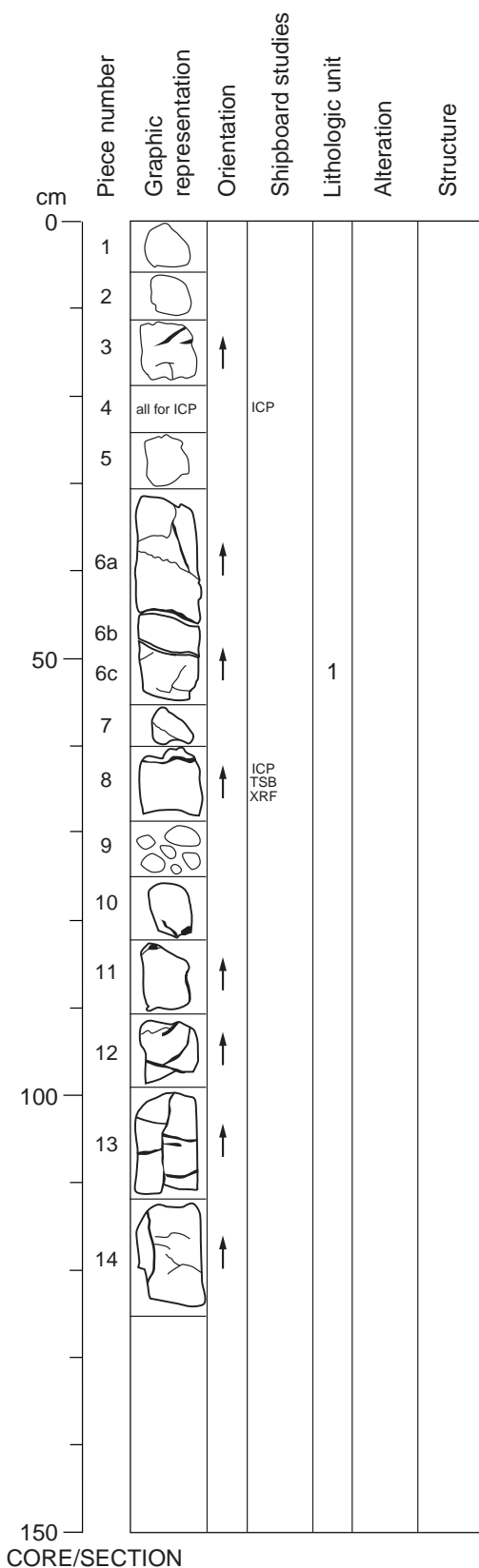
VEINS/FRACTURES: Calcite veins in Pieces 3, 4, 7, 8, and 10. Piece 4 has 2 mm wide veins orthogonal to the glass that are infilled with white calcite and pink (Fe-stained?) siliceous material and lined with Mn oxide. Later colorless calcite veins cross-cut and mingle with the pink siliceous veins. Piece 7 has a large (5 mm wide) brownish gray cryptocrystalline calcite vein lined with Mn oxide that runs the length of the piece. Piece 8 has a network of anastomosing veins/fractures partially filled with calcite and Mn oxide. All fractures/veins have oxidation halos on a mm to cm scale. Piece 4 is cut by a 2 mm wide calcite and siliceous vein with associated Mn oxide. Piece 8 has a fragment of the vein material, described above in Piece 4, attached to the palagonitized chilled margin.

ALTERATION: Slightly altered overall. In Piece 4 groundmass within a cm of the veins is highly altered to tan-yellow clay. Mn oxide occurs as nodules (<1 mm) in Pieces 1, 6, 10, 11, 12, 13, 14, 15, 16, and 17. Olivine is replaced by a yellow waxy hydrated silicate(?) in Piece 2, but is mainly replaced by Fe oxyhydroxide in oxidized halos in the remainder of the section.

STRUCTURE: pillow lava

ADDITIONAL COMMENTS: Pieces 11 to 16 are cobble to pebble sized with weathered edges, interpreted as pillow debris.

Core Photo



187-1155B-9R-2

UNIT 1: MODERATELY PLAGIOCLASE-OLIVINE PHYRIC BASALT

PIECES 1-14

INTERNAL CONTACTS: Glassy rinds on Pieces 2 to 5. Piece 1 has a 0.5 mm thick layer of sparry calcite on the outermost surface with ~1 mm of palagonite underneath; the thickness of glass + phenocrysts is ~4 mm; the coalesced spherulite zone is indistinct. Piece 3 has a thin layer of palagonite followed by a glassy zone ~4 mm thick and a zone of coalesced spherulites of similar thickness. Piece 5 has only a thin layer of clear glass (~1 mm) and a wider zone of coalesced spherulites (2-3 mm wide).

	Abundance %	Size (mm)		Shape
		avg.	max. min.	
Plagioclase	1-4	2	3 1	tabular
Olivine	1-3	1	2 1	equant
Total	2-7			

GROUNDMASS: Cryptocrystalline to microcrystalline

COLOR: Grayish brown to light gray

VEINS/FRACTURES: Calcite ± Mn oxide veins are present in Pieces 3, 6 to 8, and 10 to 14; orientation of these veins ranges from near vertical (relative to the core piece) to horizontal. They are usually <1 mm wide. The carbonate ranges from clear, sparry calcite to a milky white micritic calcite. In Piece 6b there is a composite vein made up predominantly of sparry calcite, but which also includes a milky white portion; the micritic portion forms the middle of the vein over part of its length, but then crosses over to one side of the vein wall and then terminates. Mn oxide appears to be more abundant in the micritic portion than in the sparry portion of the vein. Pieces 10 and 11 have diffuse calcite veins, where a principal vein (~1 mm wide) is associated with several smaller and parallel calcite veinlets. An Fe-stained silica (?) + calcite vein (~1 mm wide) cross cuts the glassy margins in Pieces 3; this vein extends for ~4 mm into the pillow interior. Most of the vein is silica (?), but sparry calcite occurs along one side of the vein and there are fragments of basalt trapped between the two. The vein dies out at ~4 mm length and intersects a fracture coated with Mn oxide whose orientation is at right angles to the silica (?) vein. Most fracture surfaces are coated with Mn oxide.

ALTERATION: Most pieces are slightly altered (<10%), although for 1 to 5 mm away from calcite veins the rocks are highly altered in intense alteration halos. Piece 6 is moderately altered throughout (~15%). Alteration is predominantly the result of oxidation of olivine phenocrysts and groundmass phases to Fe oxyhydroxides, although there may be some replacement of groundmass by smectite away from veins, giving the groundmass in these areas a patchy appearance. Plagioclase phenocrysts are unaltered throughout. Mn oxide occurs throughout the section as both spots and larger patchy coating on outer weathered surfaces and fractures. Fe-stained silica(?) veins in Piece 3 are oriented at a high angle to the cooling surface; the silica(?) veins tend to occur only in the vicinity of glassy margins. They usually extend into the sample for 1-3 cm.

STRUCTURE: Pillow lavas

ADDITIONAL COMMENTS: Plagioclase and plagioclase + olivine clusters are common throughout the basalt pieces. Phenocryst abundance varies slightly; Piece 1 has ~1% plagioclase and 1% olivine, whereas Piece 12 has ~3% plagioclase and 3% olivine. Elsewhere plagioclase (2-3%) usually exceeds olivine (~1%). There may be more than one generation of plagioclase phenocrysts. Some larger crystals have clearly resorbed cores (dark inclusions of glass). Olivine ranges from euhedral to subhedral in habit; plagioclase is subhedral throughout.

187-1155A-2R-1, 29-31 cm (TS #14)			Unit: 1			OBSERVER:	Kempton	
ROCK NAME:	Moderately plagioclase-olivine phyric basalt							
WHERE SAMPLED:	near top of section							
GRAIN SIZE:	microcrystalline							
TEXTURE:	intersertal w/ plumose quench clinopyroxene							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	2	2	1	2.5			tabular, subhedral	Twinned. Some crystals are partially resorbed; in some cases this appears as rounded, unresorbed cores, surrounded by rims that are partially resorbed, but otherwise subhedral.
Olivine Clinopyroxene	1	1	0.5	1			equant, anhedral to subhedral	
GROUNDMASS								
Olivine	1	1		0.2			equant	
Plagioclase	40	40		1			tabular	With some acicular quench overgrowths.
Clinopyroxene	42	42		0.1			mostly plumose quench textures, some anhedral granular crystals	
Opaque Minerals	2	2		2-5 microns			equant to acicular	<1% of opaque minerals are sulfide globules.
Glass								
Mesostasis	10	11						
SECONDARY MINERALOGY	PERCENT		SIZE (mm)				REPLACING / FILLING	COMMENTS
			min.	max.	av.			
Clays	1						replacing groundmass, filling vesicles	Smectite is concentrated at one side of the thin section.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)				FILLING / MORPHOLOGY	COMMENTS
			min.	max.	av.			
Vesicles	1	1	0.1	0.4	0.3		filled with smectite, smectite + calcite and calcite/ round	Vesicles in the side of the slide where groundmass is replaced by smectite are filled by smectite; in some cases these have calcite cores. Away from the areas of smectite, vesicles are filled only with calcite.
COMMENTS : Most phenocrysts occur in glomerocrysts or clusters of plagioclase and plagioclase + olivine. Plagioclase is seriate; distinction between largest groundmass crystal and smallest phenocryst is arbitrary.								

187-1155A-7R-1, 16-19 cm (TS #15)			Unit: 2			OBSERVER:	Kempton	
ROCK NAME:	Aphyric basalt							
WHERE SAMPLED:	piece 3							
GRAIN SIZE:	fine grained							
TEXTURE:	intersertal to intergranular							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	<1	<1		2			anhedral to subhedral	Twinned, some partially resorbed, zoned.
Olivine	<1	<1		0.6			anhedral	
Clinopyroxene								
GROUNDMASS								
Olivine	2	3		0.2			equant	Partially to totally replaced by Fe oxyhydroxides.
Plagioclase	41	42		1			tabular	
Clinopyroxene	40	42					anhedral	
Opaque Minerals	2	2		15-100 microns			acicular to equant	Commonly occurring as bundles of elongate crystals, aspect ratio ~ 7:1, sometimes with the individual crystals in near optical continuity.
Glass								
Mesostasis	3	10						
SECONDARY MINERALOGY	PERCENT		SIZE (mm)				REPLACING / FILLING	COMMENTS
			min.	max.	av.			
Clays	10						replacing groundmass glass and filling vesicles	
Fe oxyhydroxides	1						replacing groundmass olivine	
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)				FILLING / MORPHOLOGY	COMMENTS
			min.	max.	av.			
Vesicles	1	distributed	0.1	0.4	0.3		filled with smectite/ round	
COMMENTS : Clusters of plagioclase and plagioclase + olivine present. Plagioclase seriate; distinction between largest groundmass crystal and smallest phenocryst arbitrary.								

187-1155B-2R-1, 68-71 cm (TS #16)			Unit: 1	OBSERVER:	Kempton and Gee
ROCK NAME:	Moderately plagioclase-olivine phyric basalt				
WHERE SAMPLED:	chilled pillow margin with vein				
GRAIN SIZE:	cryptocrystalline to microcrystalline				
TEXTURE:	various quench textures				

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	6	6	0.5	6	2		tabular to blocky, subhedral	Many phenocrysts with quench overgrowth extensions. Partial resorption along cleavage/twin planes common. Some staining by Fe oxyhydroxides along fractures. Discontinuous zoning present, but not abundant.
Olivine	<<1	1						
Clinopyroxene								
GROUNDMASS								
Olivine								
Plagioclase	20	20		0.5			acicular to skeletal	Plagioclase is seriate and boundary between max. groundmass and min phenocryst size is arbitrary. There is some preferred orientation of plagioclase microlites indicating flow alignment.
Clinopyroxene								
Opaque Minerals								
Glass	20	26						In the outermost 5 mm, the glass includes only plagioclase phenocrysts and/or microlites with no quench overgrowths. Quench crystallization begins beyond that with plagioclase spherulite overgrowths on microlites for the next 2-3 mm. Beyond that into the interior, groundmass is dominated by quench crystallization.
Mesostasis	20	47						modal estimate includes plagioclase and clinopyroxene quench crystals + devitrified glass away from glassy margin; note that the amount of glass here however is small and most of this material consists of quench crystals of plagioclase and clinopyroxene.

SECONDARY MINERALOGY	PERCENT	SIZE (mm)			REPLACING / FILLING	COMMENTS
		min.	max.	av.		
Clays						Two cracks (~0.3 mm wide) in the palagonite (probably connected, but can't be sure because the slide is plucked) are filled with colorless cryptocrystalline clay, bordered by a thin layer of silica (?) (10-15 microns wide). The palagonite on each side of these veins is typically about 0.2 mm wide. Dendritic traces of microbial activity can be seen at the interface between the glass and the palagonite.
Calcite	5				filling vein	
Palagonite	5				replacing glass	The glass is crosscut by numerous cracks that are roughly parallel to the cooling surface and altered to palagonite.
Fe oxyhydroxides	23				replacing mesostasis	
Mn oxide	1				filling veins, replacing groundmass	occurs in association with calcite in main vein, but also lining small fractures and as patchy replacement of groundmass

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)			FILLING / MORPHOLOGY	COMMENTS
			min.	max.	av.		
Vesicles	<<1%?			0.1			presence of vesicles and their size is uncertain due to some plucking of the slide

COMMENTS : The chilled margin is crosscut by a calcite vein that ranges from sparry calcite near the chilled margin to micritic calcite that has a 'dusty' appearance further away. Mixed in with the micritic calcite are small patches (<0.5 mm) of sparry calcite and small spherical patches of Mn oxide. This part of the vein also includes small clusters of acicular, radiating crystals (unidentified but may be aragonite); individual crystals in the clusters are less than 25 microns long. The vein is 0.5 to 2 mm wide and irregular in shape (i.e. boundaries with basalt are neither straight nor sharp). Phenocrysts occur predominantly in clusters of plagioclase or plagioclase + olivine. Proportions of groundmass phases cannot be accurately assessed due to the predominance of quench crystal morphologies

187-1155B-2R-1, 125-129 cm (TS #17)						Unit: 1	OBSERVER:	Russo
ROCK NAME:	Moderately plagioclase phyric basalt							
WHERE SAMPLED:	pillow Interior							
GRAIN SIZE:	microcrystalline							
TEXTURE:	intersertal							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	5		0.5	3.5	1.5		tabular, subhedral	Plagioclase is commonly twinned and occasionally displays oscillatory zoning. Some phenocryst cores are resorbed. Cr-spinel ~140 microns across was observed in one phenocryst. Overall plagioclase is seriate.
Olivine								
Clinopyroxene								
GROUNDMASS								
Olivine							acicular	
Plagioclase	35							
Clinopyroxene								
Opaque Minerals								
Mesostasis	65							
SECONDARY MINERALOGY	PERCENT		SIZE (mm)				REPLACING / FILLING	COMMENTS
			min.	max.	av.			
Clays								
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)				FILLING / MORPHOLOGY	COMMENTS
			min.	max.	av.			
COMMENTS :	Approximately 70% of the groundmass glass has altered to palagonite.							

187-1155B-4R-2, 22-28 cm (TS #18)			Unit: 1			OBSERVER:		Gee and Kempton	
ROCK NAME:			Moderately plagioclase-olivine phyric basalt						
WHERE SAMPLED:			relatively fresh basalt						
GRAIN SIZE:			microcrystalline to fine grained						
TEXTURE:			intersertal						
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS	
			min.	max.	av.				
PHENOCRYSTS									
Plagioclase	8	8	0.5	5	2		tabular, subhedral	Many crystals show evidence for partial resorption, particularly those in glomerocrysts. Zoning ranges from normal to discontinuous;	
Olivine	1	2	0.5	3	2		equant, euhedral	Partially replaced by iddingsite (<10%); some crystals in glomerocrysts entirely replaced by pale brown smectite.	
Clinopyroxene									
GROUNDMASS									
Olivine	1	2		0.2			equant	Partially replaced by iddingsite.	
Plagioclase	42	42		0.5			acicular to skeletal (swallowtail)		
Clinopyroxene	25	28					quench morphologies		
Opaque Minerals	2	2		2-5 microns			equant		
Glass									
Mesostasis	10	16						Includes anything that can't be positively identified as quench groundmass clinopyroxene or oxides.	
SECONDARY MINERALOGY	PERCENT		SIZE (mm)				REPLACING / FILLING	COMMENTS	
			min.	max.	av.				
Clays + Fe oxyhydroxides	10						replacing groundmass and filling vesicles	Golden yellow-brown in color replacing groundmass, pale brown replacing olivine and filling some vesicles.	
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)				FILLING / MORPHOLOGY	COMMENTS	
			min.	max.	av.				
Vesicles	<1	distributed	0.1	0.2			filled with smectite / round		
COMMENTS : Modal estimates of groundmass phases are only very approximate due to predominance of quench groundmass morphologies that are overprinted by alteration. Most phenocrysts occur as glomerocrysts.									

187-1155B-6R-1, 40-44 cm (TS #19)			Unit: 1			OBSERVER:	Russo	
ROCK NAME:	Moderately plagioclase-olivine phyric basalt							
WHERE SAMPLED:	pillow Interior							
GRAIN SIZE:	microcrystalline							
TEXTURE:	intersertal							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	5		0.5	3.5	1.5		tabular, subhedral	Plagioclase phenocrysts are often twinned and exhibit oscillatory zoning. Some phenocrysts have resorbed rims, but resorbed cores are more common. Plagioclase is seriate. Olivine phenocrysts are commonly altered to iddingsite along fractures and rims.
Olivine	1		0.5	2.5	1		subhedral	
Clinopyroxene								
GROUNDMASS								
Olivine	2							Presence determined by plumose quench textures.
Plagioclase	42						acicular	
Clinopyroxene	17							
Opaque Minerals								
Mesostasis	23							
SECONDARY MINERALOGY	PERCENT		SIZE (mm)				REPLACING / FILLING	COMMENTS
			min.	max.	av.			
Clays	10							Smectite present as an alteration product.
VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)				FILLING / MORPHOLOGY	COMMENTS
			min.	max.	av.			
COMMENTS : Glomerocrysts of plagioclase and olivine up to 4 mm across are present. Smectite is present as an alteration product along fractures and in the groundmass adjacent to these fractures.								

187-1155B-6R-2, 0-1 cm (TS #20)			Unit: 1			OBSERVER: Kempton		
ROCK NAME:		Moderately plagioclase-olivine phyric basalt						
WHERE SAMPLED:		top of core piece, adjacent to calcite fracture filling						
GRAIN SIZE:		microcrystalline						
TEXTURE:		Intersertal						
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	5	5	0.5	3	2		tabular, subhedral	Many crystals show evidence for partial resorption, numerous pockets of devitrified glass occur parallel to twin/cleavage planes. Discontinuous zoning common. Twinned. Cr-spinel included in one phenocryst.
Olivine Clinopyroxene	1	1	0.5	2	1		equant, subhedral	Most crystals ~20% replaced by iddingsite.
GROUNDMASS								
Olivine	1?	2		0.1			equant	
Plagioclase	45	45		0.3			tabular	
Clinopyroxene	see comment						quench morphologies	Because of small size of quench morphologies and large amount of alteration, clinopyroxene abundance has been included with the mesostasis estimate.
Opaque Minerals	1	1					equant	
Glass								
Mesostasis	23	46						Includes quench clinopyroxene.
SECONDARY MINERALOGY	PERCENT	LOCATION	SIZE (mm)			REPLACING / FILLING	COMMENTS	
			min.	max.	av.			
Clays	5					replacing mesostasis; filling vesicles	Clay is a pale buff color, in contrast to the olive green smectite seen in the alteration of other holes. The clay completely fills some vesicles, whereas other vesicles are unfilled; replacement of groundmass is also distributed in a patchy manner. Distribution doesn't obviously correlate with presence of veins, but this may not be possible to determine over small size of thin section.	
Calcite	3					replacing groundmass, filling veins	Forms a patchy replacement of groundmass adjacent to veins (see comment below on veins).	
Fe oxyhydroxides	15					replacing mesostasis and groundmass olivine	Mesostasis and groundmass mafic minerals are uniformly altered to Fe oxyhydroxide.	
VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)			FILLING / MORPHOLOGY	COMMENTS	
			min.	max.	av.			
Vesicles	1		0.1	0.2	0.15	Some filled with clay		
COMMENTS : Predominant feature of this slide is the calcite veining. The veins are 0.5 to 1 mm wide, crosscut groundmass and phenocryst phases, and are irregular in shape (i.e. boundaries with basalt are neither straight nor sharp). The fracture filling along one edge of the slide consists of a 1.5 mm wide 'dusty' zone where sparry calcite includes small clusters of acicular, radiating crystals (unidentified); individual crystals in the clusters are less than 25 microns long. The 'dusty' calcite is topped by sparry calcite that are elongate perpendicular to the basalt surface, indicating that they grew into a void. Phenocrysts occur predominantly in clusters of plagioclase or plagioclase + olivine. Proportions of groundmass phases are only approximate due to large proportion of quench morphologies and significant degree of alteration.								

187-1155B-6R-3, 135-138 cm (TS #21)			Unit:1			OBSERVER:		Hauff	
ROCK NAME:		Moderately plagioclase-olivine phyric basalt							
WHERE SAMPLED:		pillow margin							
GRAIN SIZE:		cryptocrystalline to microcrystalline							
TEXTURE:		quench textures							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS	
			min.	max.	av.				
PHENOCRYSTS									
Plagioclase	5	5	0.5	4	1.5		blocky to tabular, euhedral to subhedral	Partially resorbed along cleavage planes. Staining by Fe oxyhydroxides along fractures.	
Olivine	2	2	0.3	2	0.8		equant, subhedral	16um melt inclusion in olivine at the edge of TS opposite to labeling	
Clinopyroxene									
GROUNDMASS									
Olivine	<1				0.01		equant		
Plagioclase	30	30	0.01	0.06	0.02		acicular to skeletal	Alignment of crystals parallel to glass margin and around phenocrysts.	
Clinopyroxene									
Opaque Minerals									
Glass	8	10						Outer margin consists of fresh glass including plagioclase phenocrysts and microlites. This zone grades into a spherulitic quench zone, followed by coalesced spherulites. Towards the interior, groundmass is dominated by quench crystallization. A second zone of fresh glass in the center of the thin section reflects the outer glass margin folded back into the pillow, as observed in hand specimen.	
Mesostasis	35	53						Consists of plagioclase, clinopyroxene and devitrified glass.	
SECONDARY MINERALOGY	PERCENT	LOCATION	SIZE (mm)			REPLACING / FILLING	COMMENTS		
			min.	max.	av.				
Clays									
Palagonite	2					glass	Palagonitization appears to propagate along cracks, aligned roughly parallel and perpendicular to the pillow margin.		
Cryptocrystalline silica	1					vein	Marks the center of plagonite veins and extends towards the interior of pillow		
Fe oxyhydroxide	18					replacing groundmass	Also occurs as small spots within cryptocrystalline silica vein.		
Calcite	<0.5					vein filling			
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)			FILLING / MORPHOLOGY	COMMENTS		
			min.	max.	av.				
Vesicles	<<0.5			0.1			partial plugging of thin section makes estimates on abundance and filling difficult		
COMMENTS :									

187-1155B-7R-1, 62-65 cm (TS #22)			Unit: 1			OBSERVER:	Kempton	
ROCK NAME:	Moderately plagioclase-olivine phyric basalt							
WHERE SAMPLED:	from relatively fresh piece							
GRAIN SIZE:	microcrystalline							
TEXTURE:	intersertal							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	4	4	0.5	4			tabular to blocky, subhedral to anhedral	Most plagioclase phenocrysts show evidence for partial resorption; in some cases these occurs in the cores of crystals, along cleavage or twin planes, in other cases it is concentrated in subhedral overgrowth rims on rounded cores. There is some staining of crystals with Fe oxyhydroxides along fractures. Discontinuous zoning and twinning are present. Anhedral Cr spinel inclusions (<0.1 mm) in some crystals. Partially replaced (10-20%) by iddingsite.
Olivine Clinopyroxene	2	2	0.5	2.5			equant, anhedral	Partially replaced (10-20%) by iddingsite.
GROUNDMASS								
Olivine	2	2		0.2			equant	Largely unaltered; only very slight replacement by iddingsite.
Plagioclase	40	40		0.5	0.2		acicular to tabular	Quench morphologies common.
Clinopyroxene	see comment						anhedral (granular) to quench morphologies	
Opaque Minerals	2	2		<1 micron				
Glass								
Mesostasis	46	49						Includes clinopyroxene quench crystals and devitrified glass since these are difficult to distinguish in this slide.
SECONDARY MINERALOGY	PERCENT	LOCATION	SIZE (mm)			REPLACING / FILLING	COMMENTS	
			min.	max.	av.			
Clay + Fe oxyhydroxides	2					replacing groundmass/ filling vesicles	Replacement of groundmass has a patchy distribution.	
Calcite	1					replacing groundmass/ filling a few vesicles	Replacement of groundmass has a patchy distribution; only fills vesicles in areas where groundmass is partially replaced by calcite.	
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)			FILLING / MORPHOLOGY	COMMENTS	
			min.	max.	av.			
Vesicles	1		0.1	0.2		smectite, calcite/round	Most vesicles are filled by smectite. In areas where calcite has replaced groundmass, some vesicles are filled with calcite.	
COMMENTS :	Most phenocrysts occur in clusters of plagioclase or plagioclase + olivine.							

187-1155B-8R-2, 44-48 cm (TS #23) Unit: 1 OBSERVER: Hauff
ROCK NAME: Moderately plagioclase-olivine phyric basalt
WHERE SAMPLED: Pillow margin
GRAIN SIZE: cryptocrystalline to microcrystalline
TEXTURE: quench textures

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS
			min.	max.	av.			
PHENOCRYSTS								
Plagioclase	3	3	0.5	2.4	1		blocky to tabular, euhedral to subhedral	Fe oxyhydroxide along small cracks.
Olivine	<1	<1	0.3	1	0.5		equant, subhedral	Partially replaced by smectite.
Clinopyroxene								
GROUNDMASS								
Olivine	<1						equant, anhedral	
Plagioclase	10	10					tabular, euhedral to subhedral	
Clinopyroxene								
Opaque Minerals								
Glass	30	40						Perpendicular network of cracks dissects fresh glass. Palagonitization appears to initiate along these cracks. Quench textures grade from glass (including plagioclase & olivine phenocrysts), to glass with plagioclase microphenocrysts, followed by 1.5 mm wide zone of spherulites. A 5 mm zone of coalesced spherulites follow before the groundmass is dominated by sheaf textured plagioclase.
Spherulites	35							Consisting of acicular plagioclase and plumose clinopyroxene. Relative abundance difficult to determine.

SECONDARY MINERALOGY	PERCENT	SIZE (mm)			REPLACING / FILLING	COMMENTS
		min.	max.	av.		
Clays					replacing glass	Part of the palagonite.
Fe oxyhydroxide					replacing groundmass	Abundance difficult to estimate because it predominantly stains spherulites.
Palagonite	10				replacing glass	
Calcite	15				vein filling	Micritic for the most part. Sparry calcite along vein margins.
Mn oxide	<1					Along margins of calcite veins and around Mn oxide spots within the calcite.

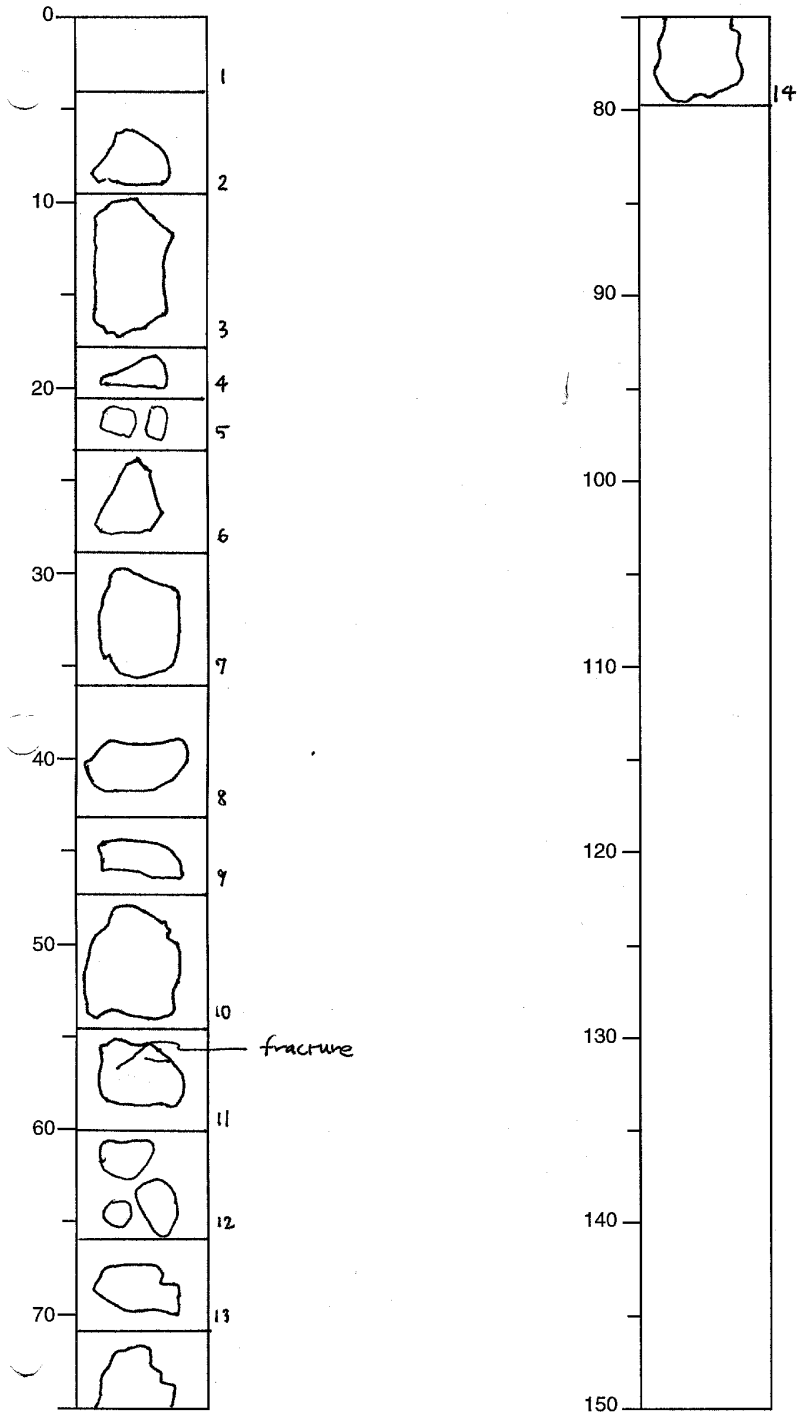
VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)			FILLING / MORPHOLOGY	COMMENTS
			min.	max.	av.		
COMMENTS :							

187-1155B-9R-1, 119-122 cm (TS#26)			Unit:1			OBSERVER:		Russo	
ROCK NAME:		Moderately plagioclase-olivine phyric basalt							
WHERE SAMPLED:		Sample margin							
GRAIN SIZE:		microcrystalline							
TEXTURE:		intersertal							
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS	
			min.	max.	av.				
PHENOCRYSTS									
Plagioclase	5		0.5	3.2	2		prismatic to blocky subhedral	Sieve textured, oscillatory zoned, twinned.	
Olivine	2		0.5	1.6	0.7				
Clinopyroxene									
GROUNDMASS									
Olivine							acicular	Some swallowtail.	
Plagioclase	25								
Clinopyroxene									
Opaque Minerals									
Glass									
Mesostasis	70							Sheaf and plumose quench textures present.	
SECONDARY MINERALOGY	PERCENT		SIZE (mm)				REPLACING / FILLING	COMMENTS	
			min.	max.	av.				
Clays									
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)				FILLING / MORPHOLOGY	COMMENTS	
			min.	max.	av.				
COMMENTS : Groundmass is approximately 70% altered to a light brown color, possible a mixture of palagonite and clay. One side of the thin section is 90-95% altered. Image 57 is a sieve textured plagioclase from this thin section.									

187-1155B-9R-2, 63-67 cm (TS #24)			Unit: 1			OBSERVER:		Kempton	
ROCK NAME: Moderately plagioclase-olivine phyric basalt									
WHERE SAMPLED: from relatively fresh part of core near bottom of hole									
GRAIN SIZE: microcrystalline									
TEXTURE: intersertal									
PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)			APPROX. COMP.	MORPHOLOGY	COMMENTS	
			min.	max.	av.				
PHENOCRYSTS									
Plagioclase	4	4	0.5	3			tabular to equant, subhedral to anhedral	Most plagioclase phenocrysts show evidence for partial resorption; in some cases this occurs in the cores of crystals, along cleavage or twin planes, in other cases it is concentrated in subhedral overgrowth rims on rounded cores. There is some staining of crystals with Fe oxyhydroxides along fractures. Discontinuous zoning and twinning are present.	
Olivine Clinopyroxene	2	2	0.5	2.5			equant, subhedral to skeletal	Partially replaced (10-20%) by iddingsite.	
GROUNDMASS									
Olivine	2	2		0.2			equant	Partially replaced by iddingsite.	
Plagioclase	40	40		0.5	0.2		acicular to tabular	Quench morphologies common.	
Clinopyroxene	see comment								
Opaque Minerals	2	2		<1 micron			equant		
Glass									
Mesostasis	41	49						Includes clinopyroxene quench crystals and devitrified glass.	
SECONDARY MINERALOGY	PERCENT	LOCATION	SIZE (mm)			REPLACING / FILLING	COMMENTS		
			min.	max.	av.				
Clay + Fe oxyhydroxides	5					replacing groundmass/ filling vesicles	Replacement of groundmass has a patchy distribution.		
Calcite	3					replacing groundmass/ filling a few vesicles	Replacement of groundmass has a patchy distribution.		
VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)			FILLING / MORPHOLOGY	COMMENTS		
			min.	max.	av.				
Vesicles	1		0.1	0.2		smectite, calcite/round	Most vesicles are filled by smectite. In areas where calcite has replaced groundmass, some vesicles are filled with calcite.		
COMMENTS : Most phenocrysts occur in clusters of plagioclase or plagioclase + olivine. There is some local preferred orientation of groundmass plagioclase crystals suggesting flow alignment. An incomplete fragment of a calcite vein occurs on one side of the thin section.									

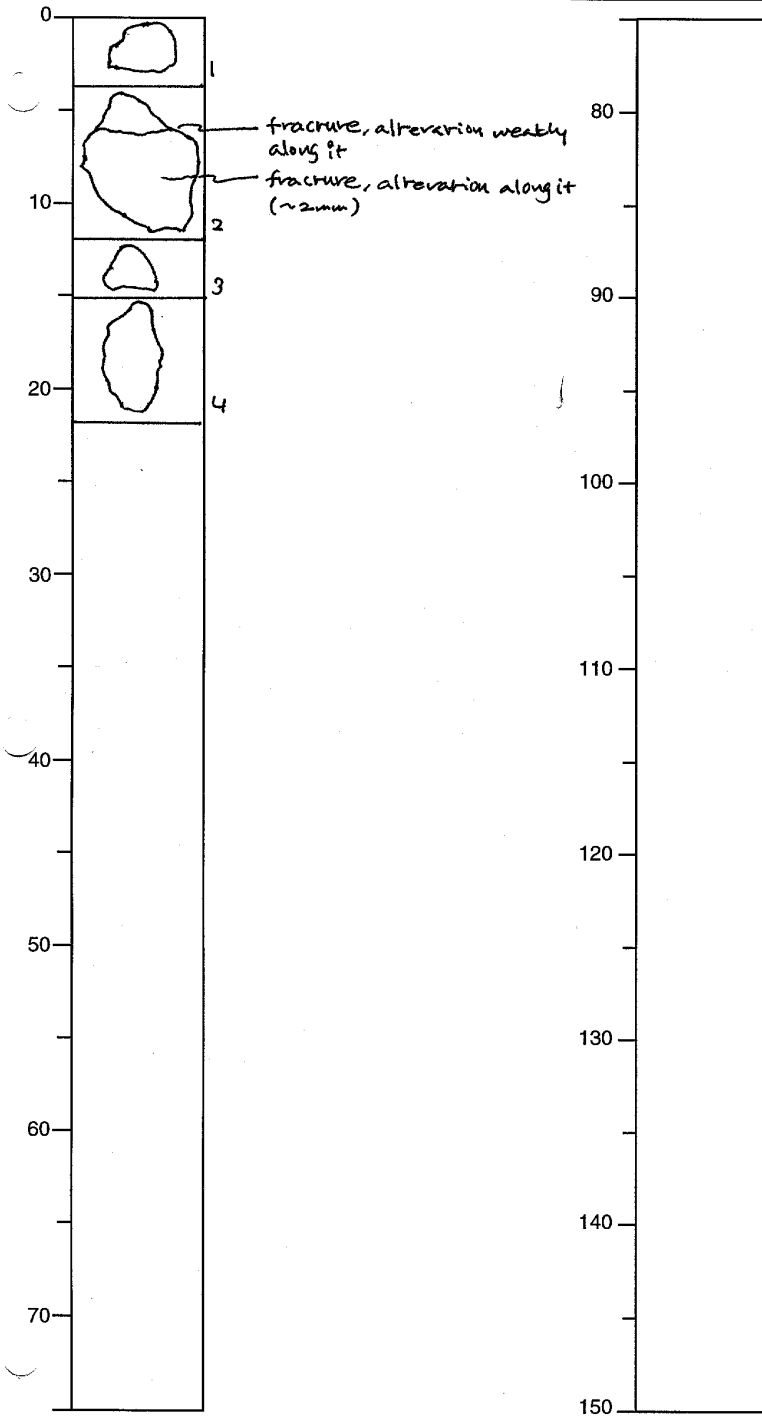
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Secl
187	1155A	2R	1



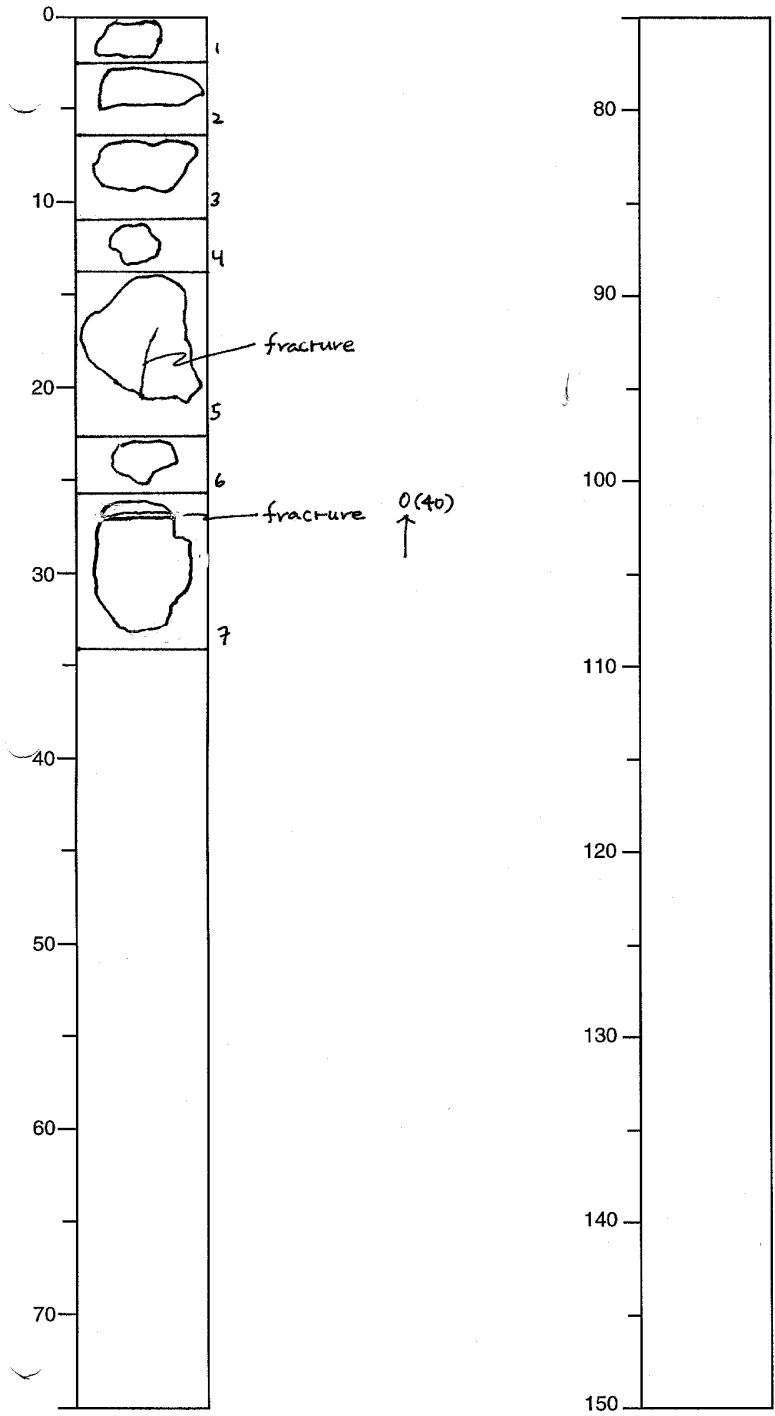
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155A	3R	1



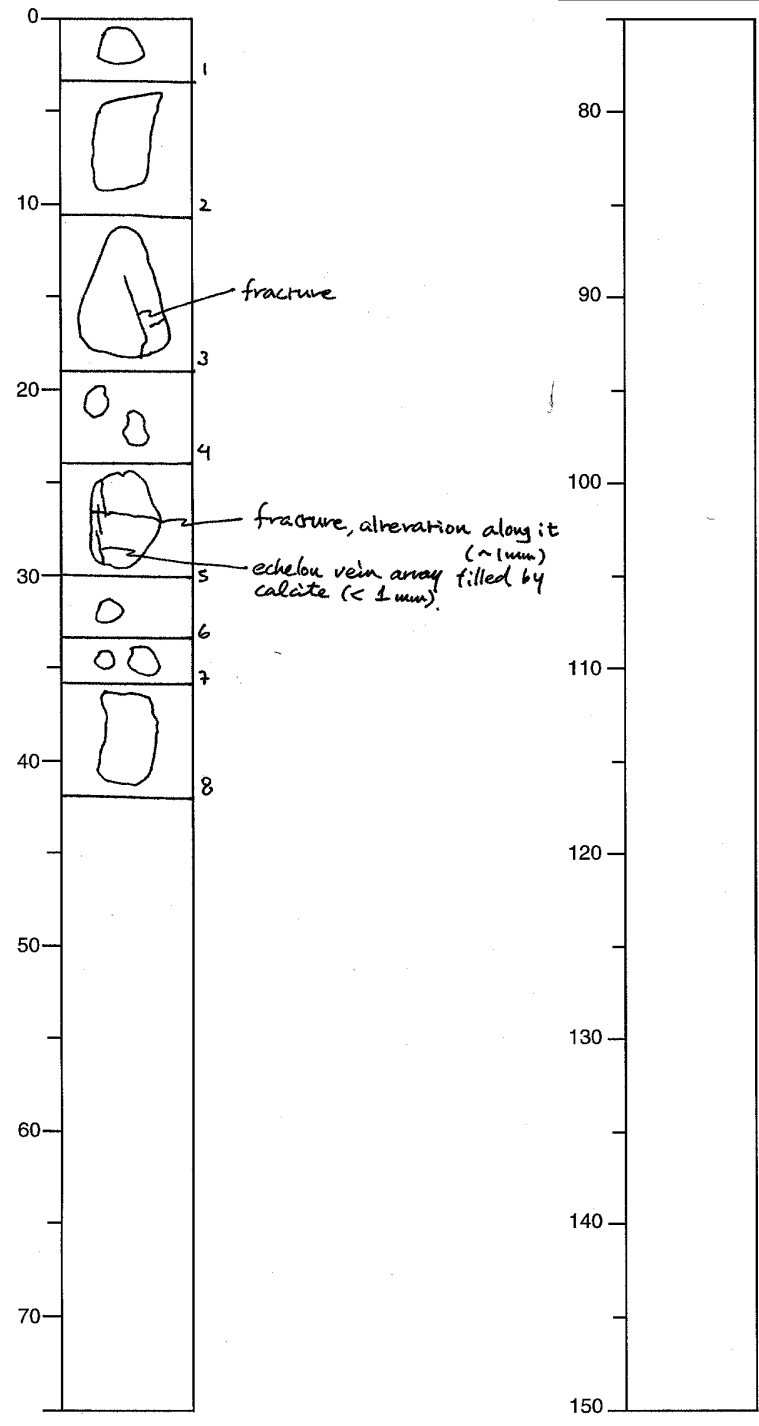
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Sec
107	1155A	4A	



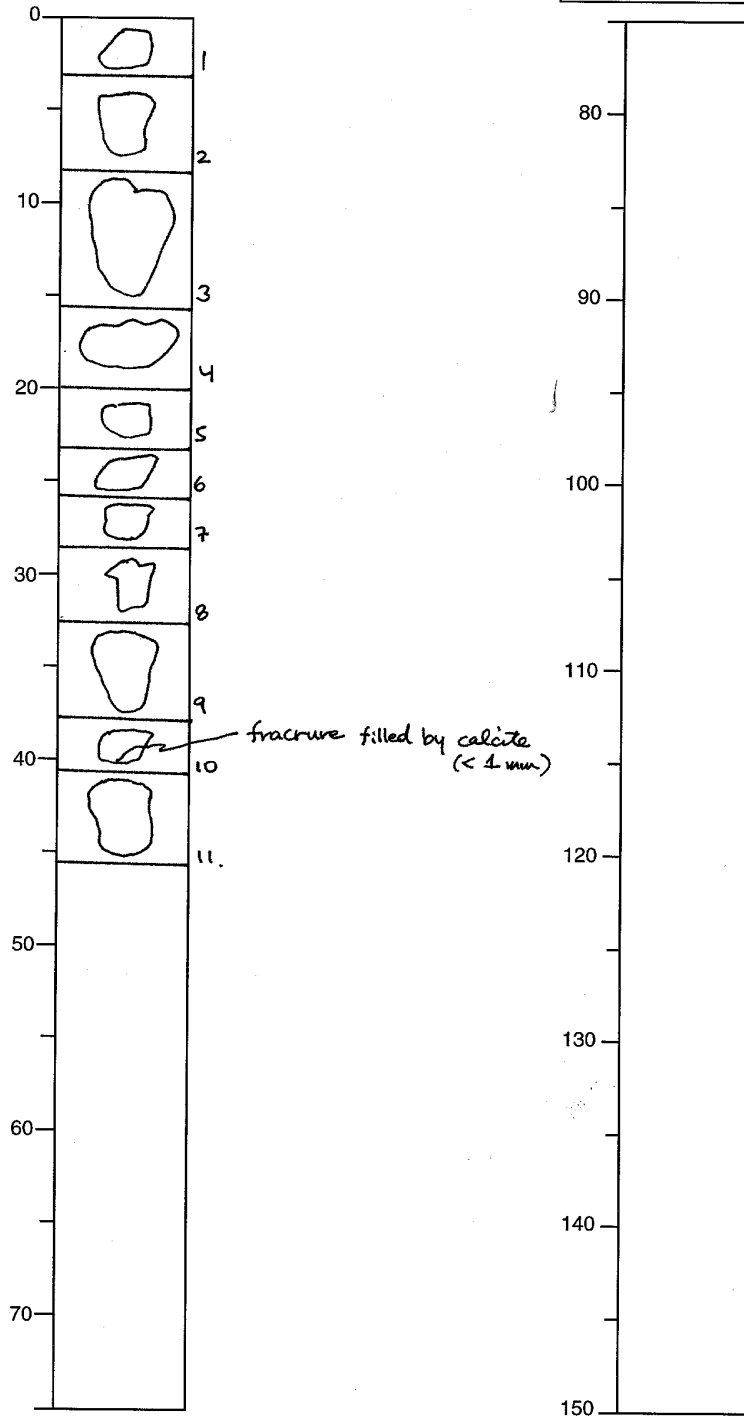
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155A	5R	1.



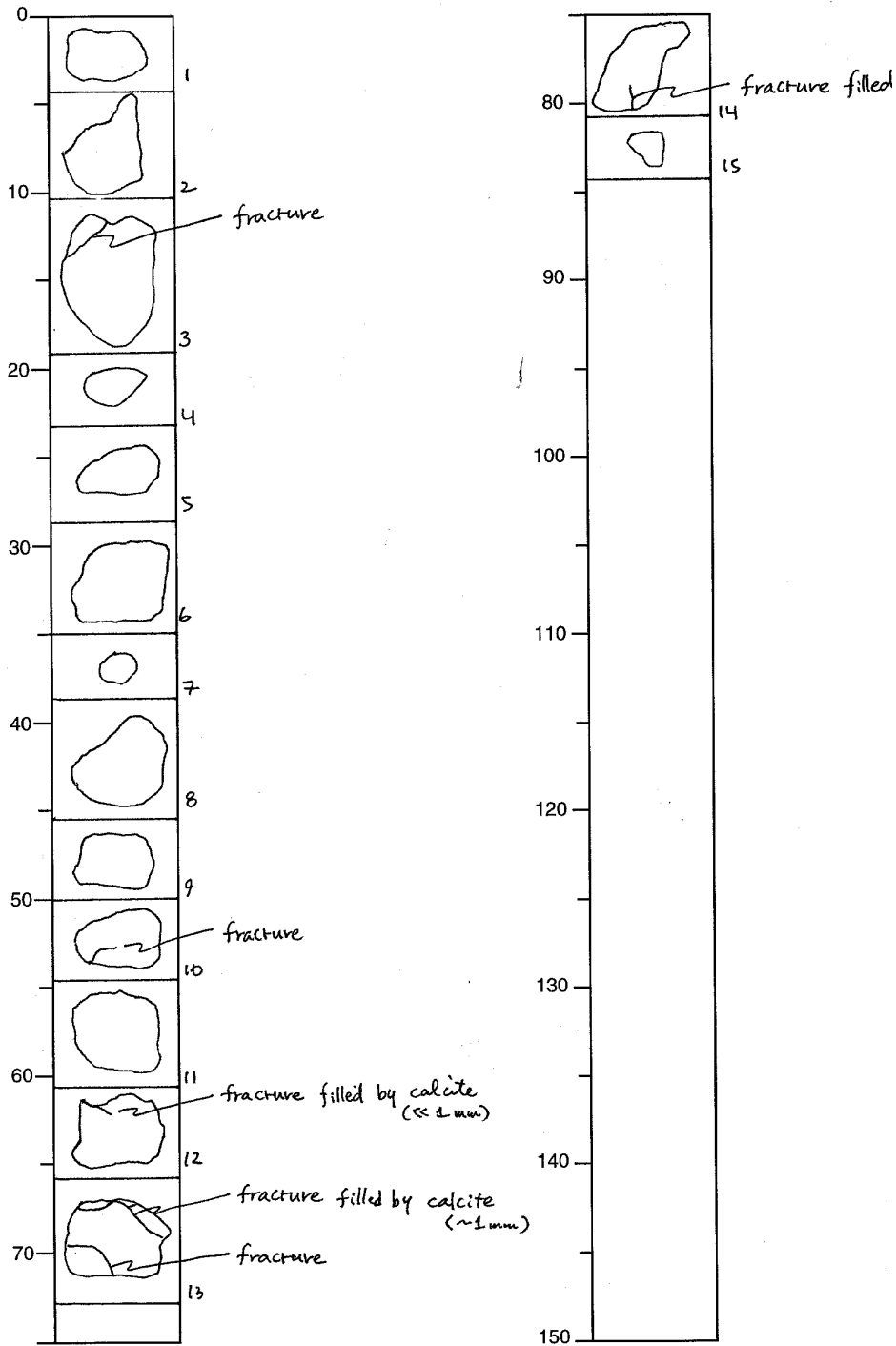
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Sect
107	1155A	6R	1.



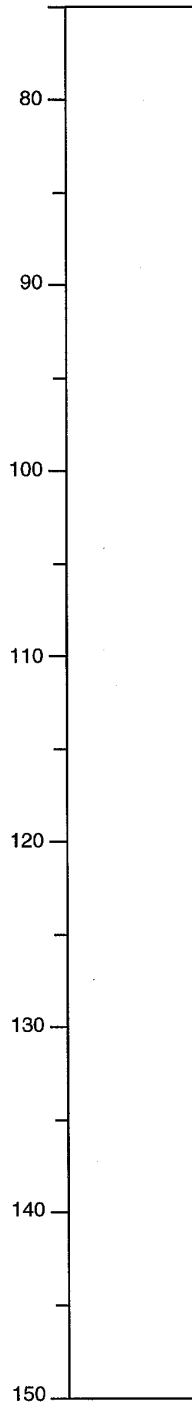
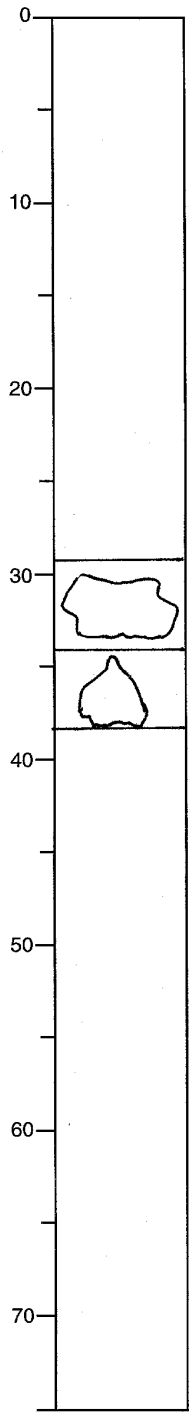
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155A	7R	1.



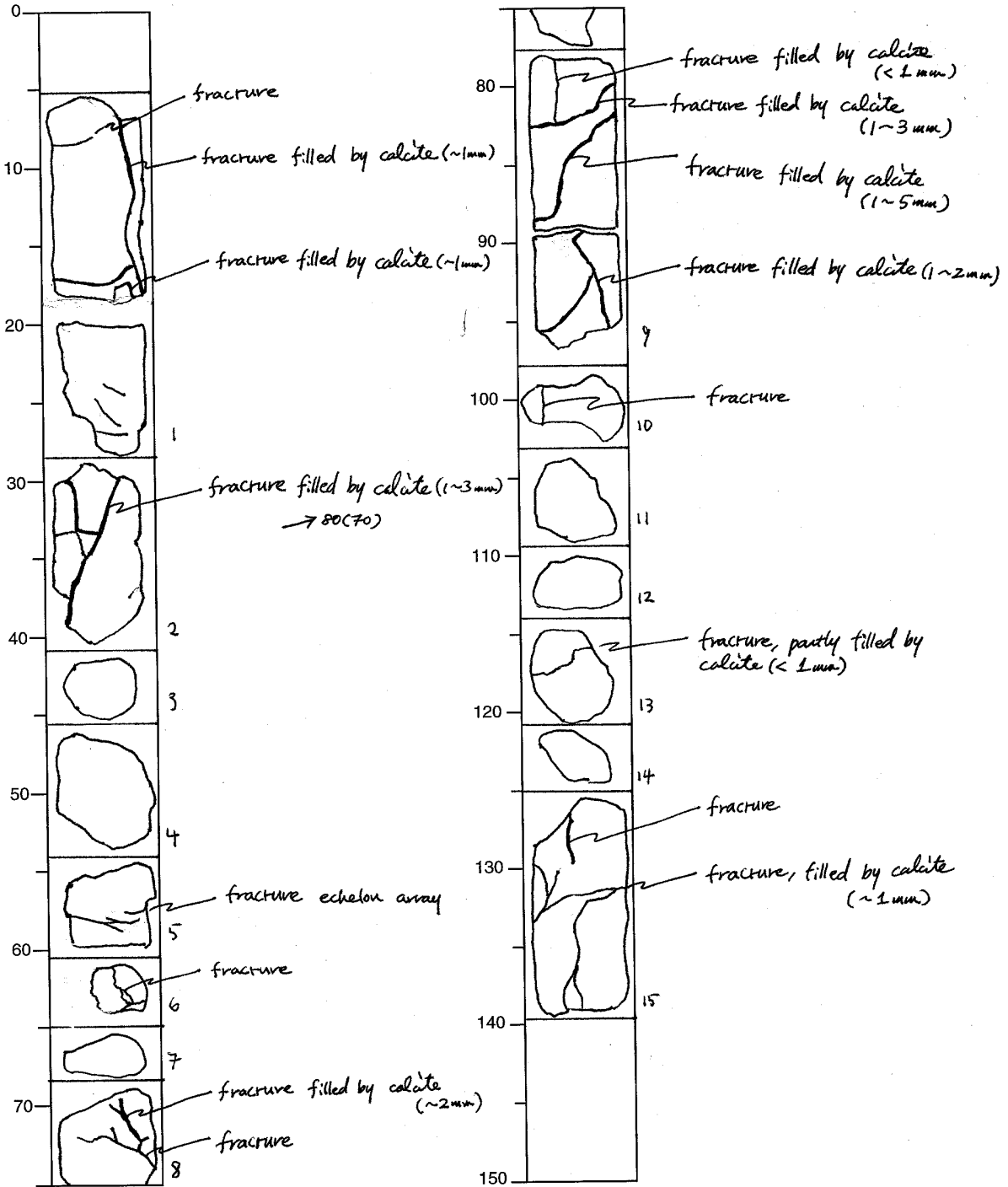
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155B	1W	1



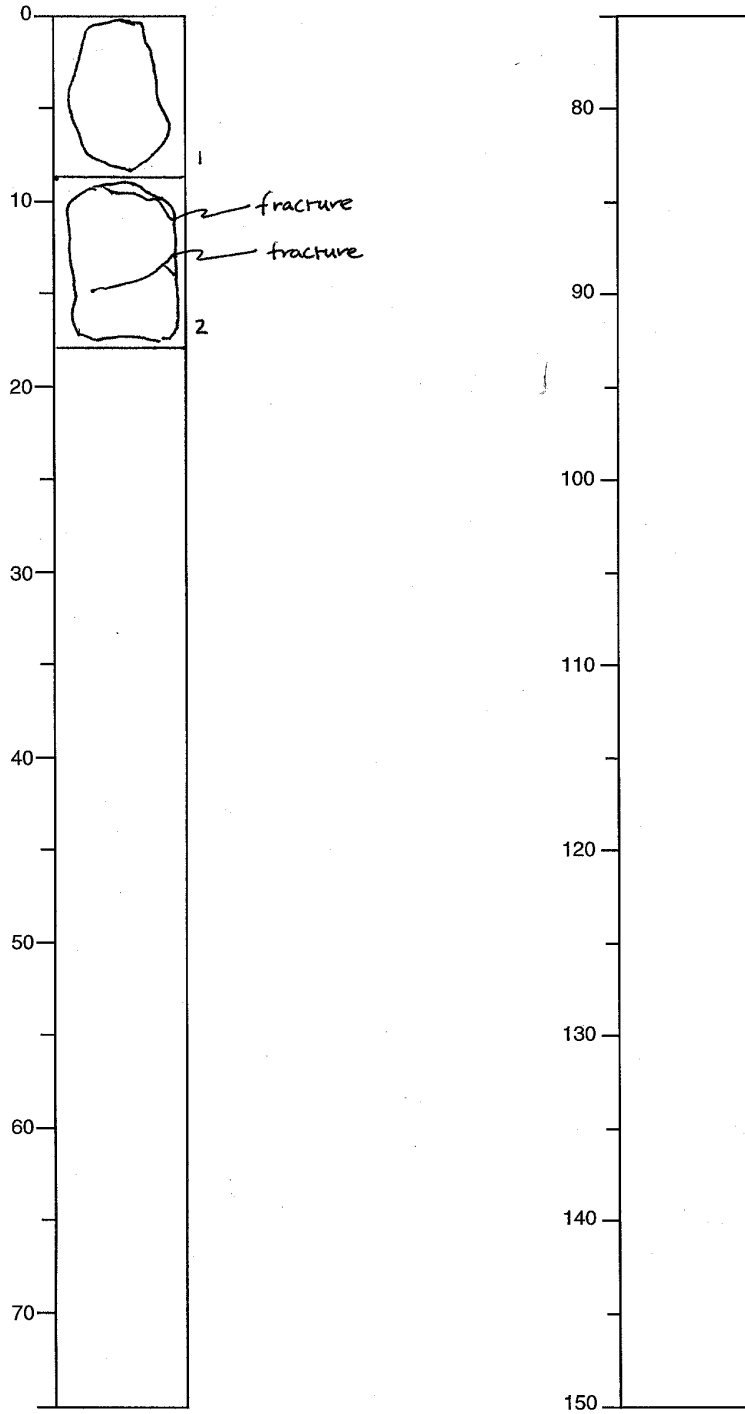
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	2R	1	



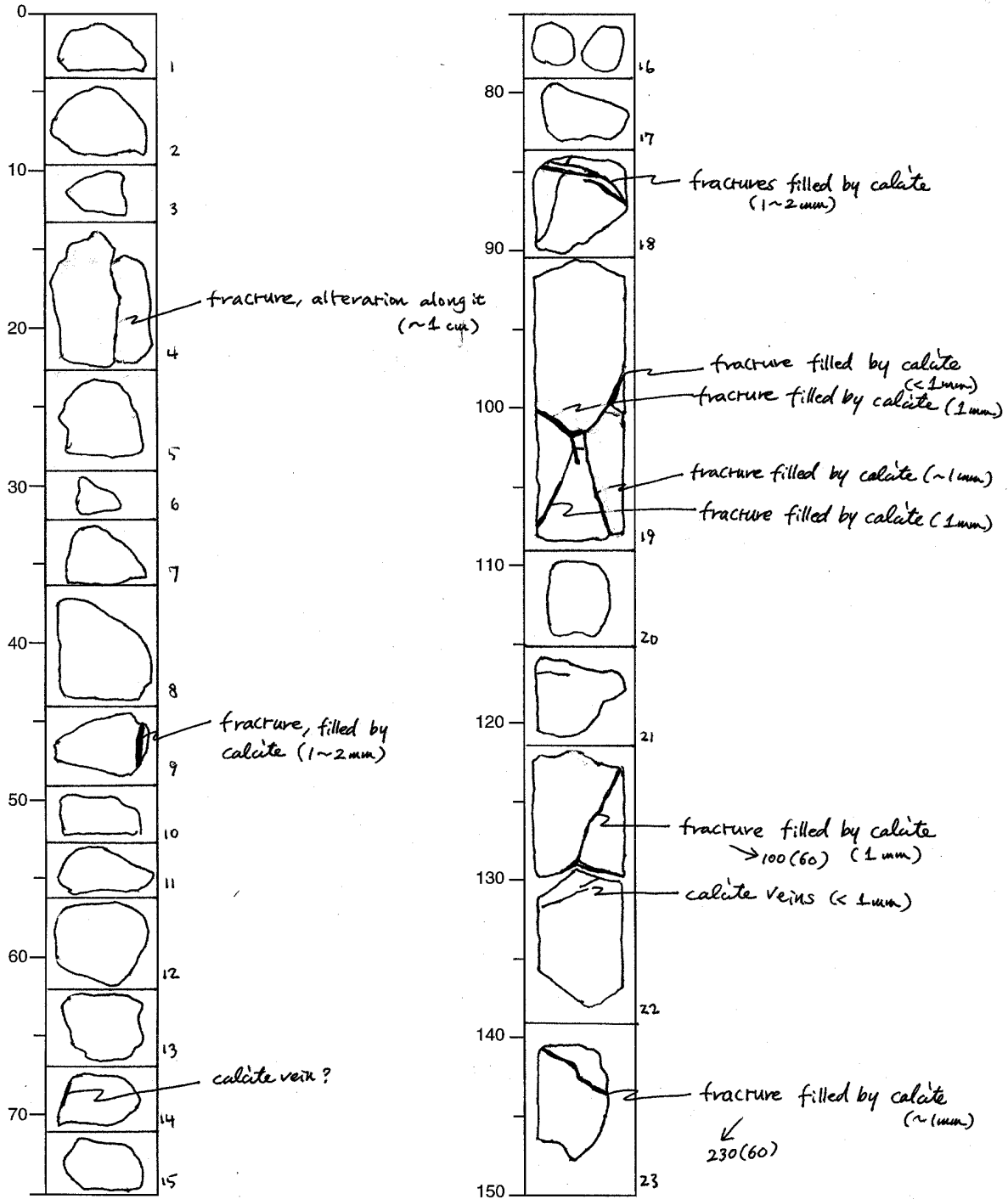
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155B	2R	2



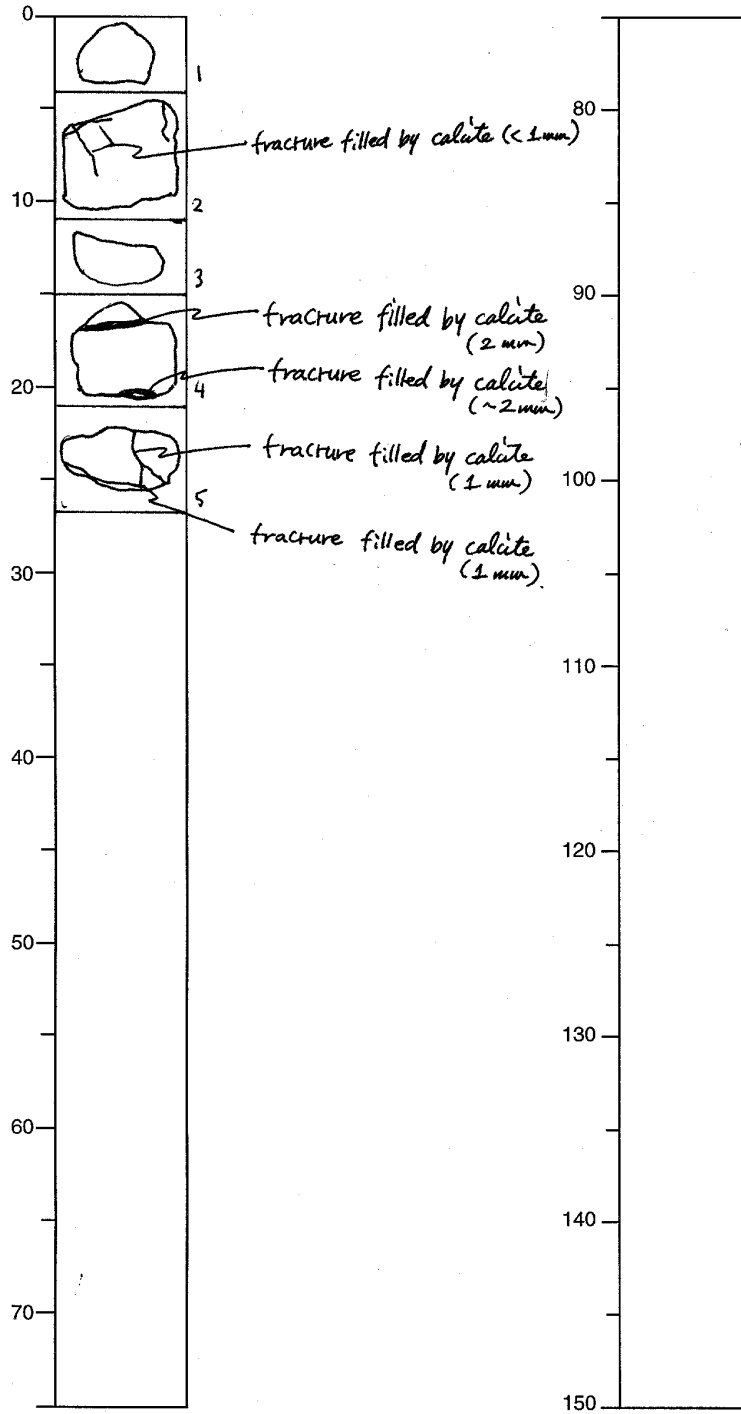
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	3R	1	



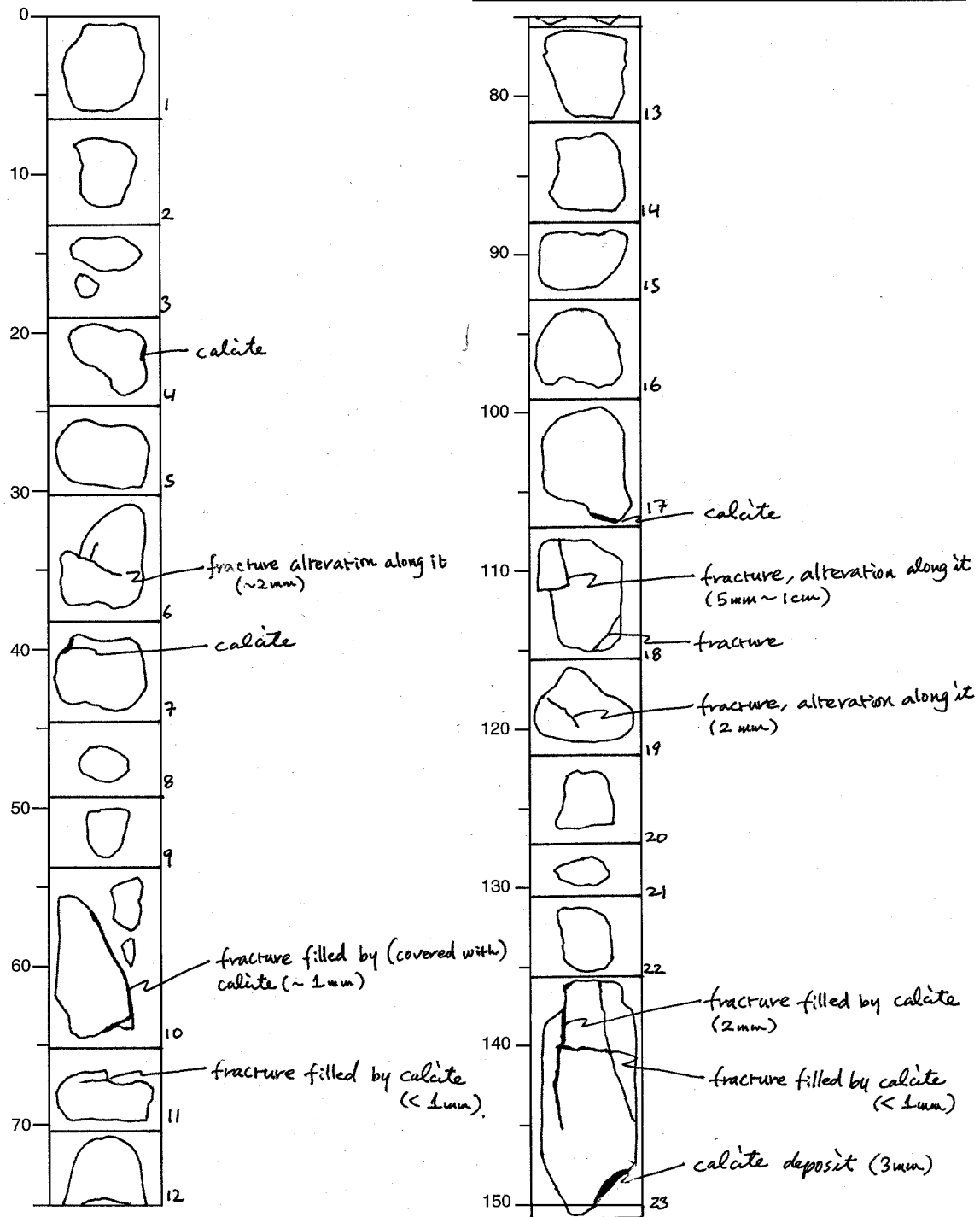
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155B	3R	2



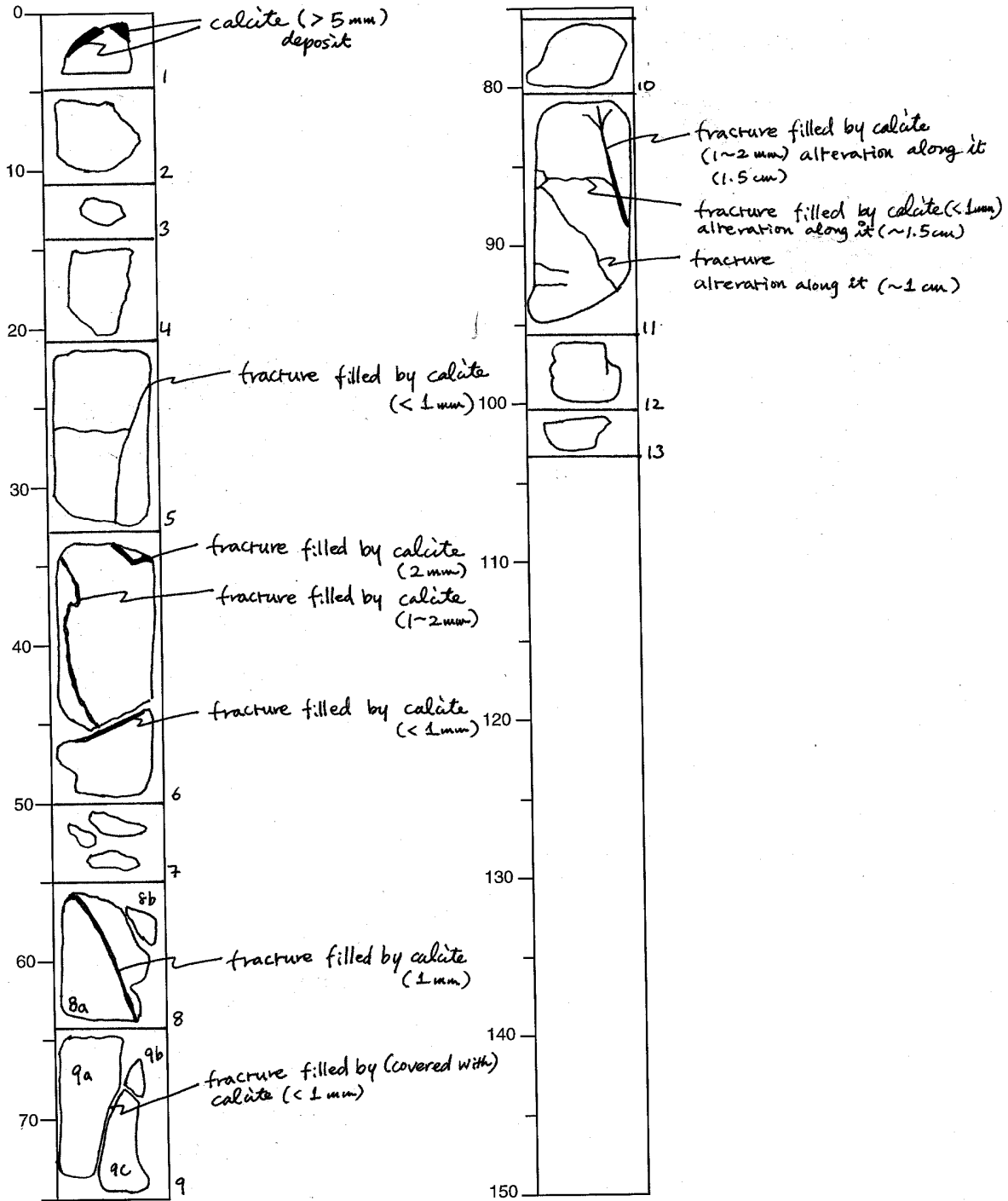
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	4R	1	



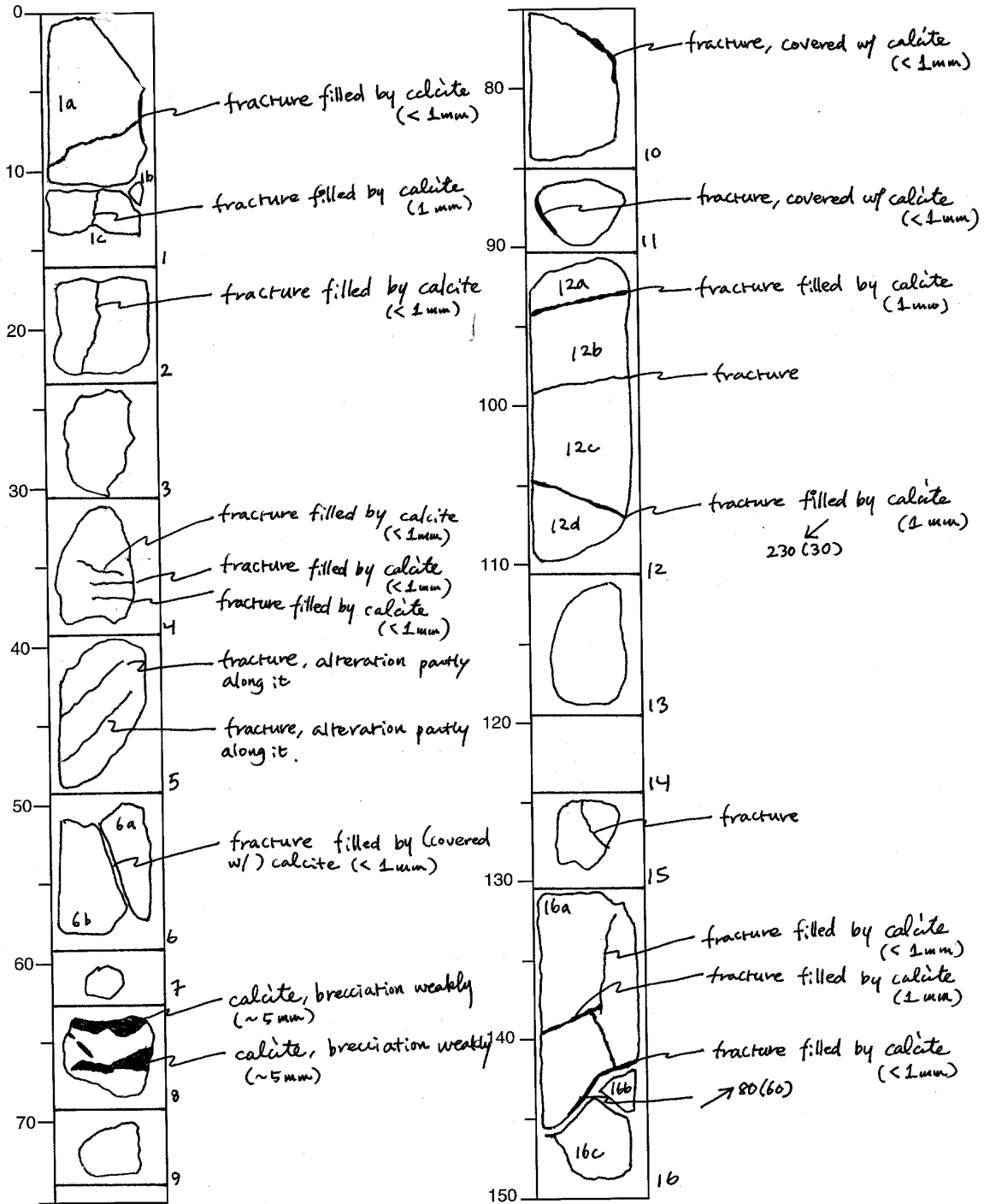
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	4R	2.	



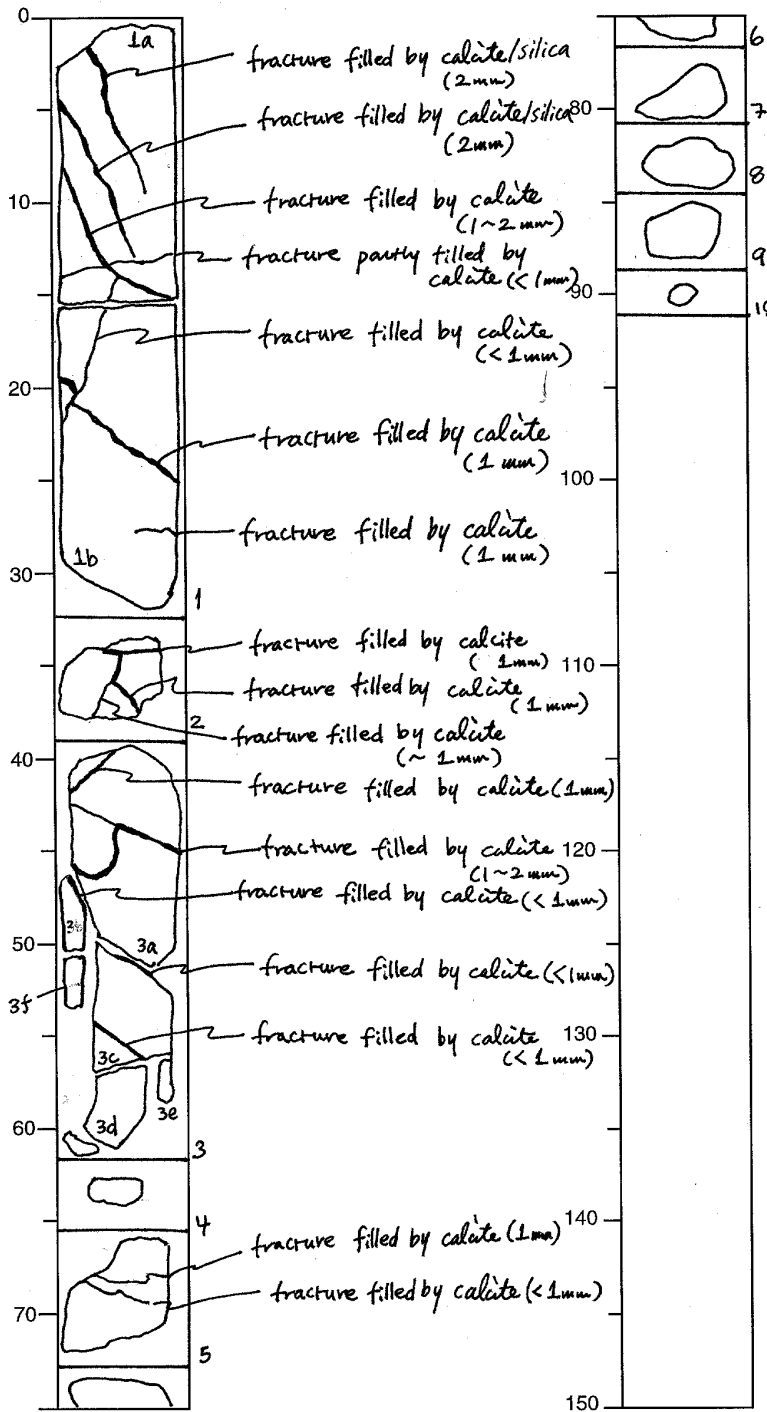
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	5R	1.	



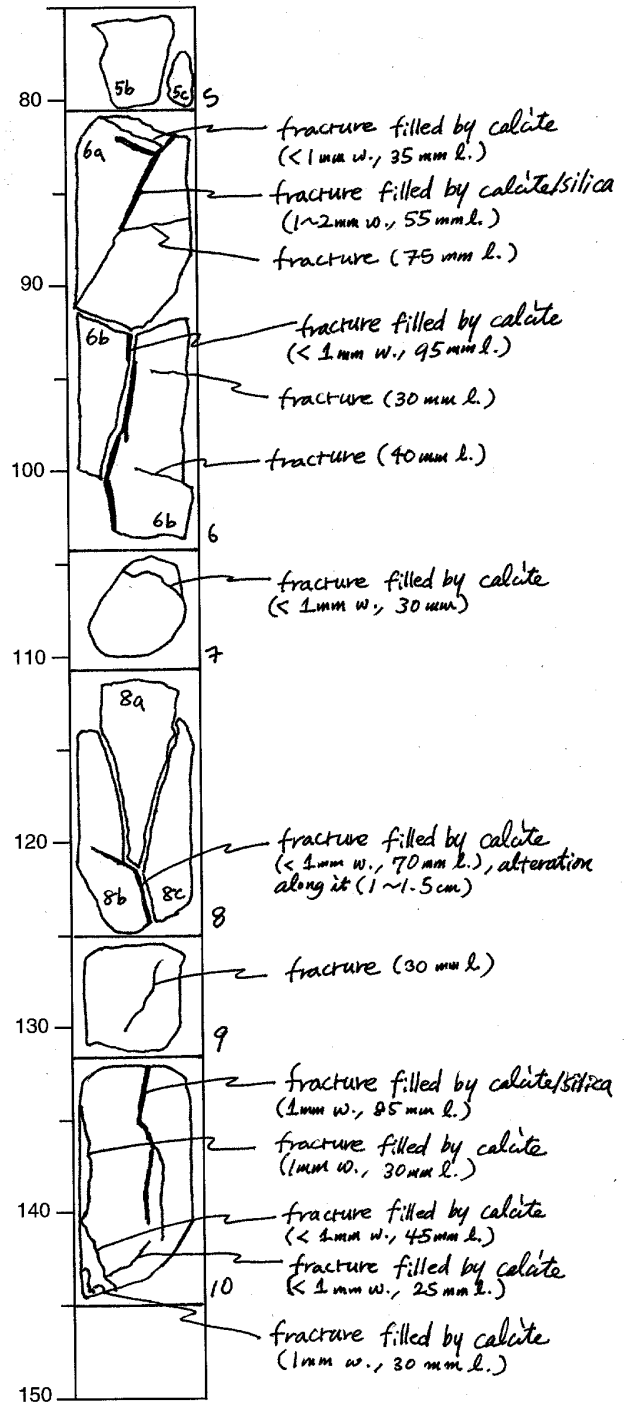
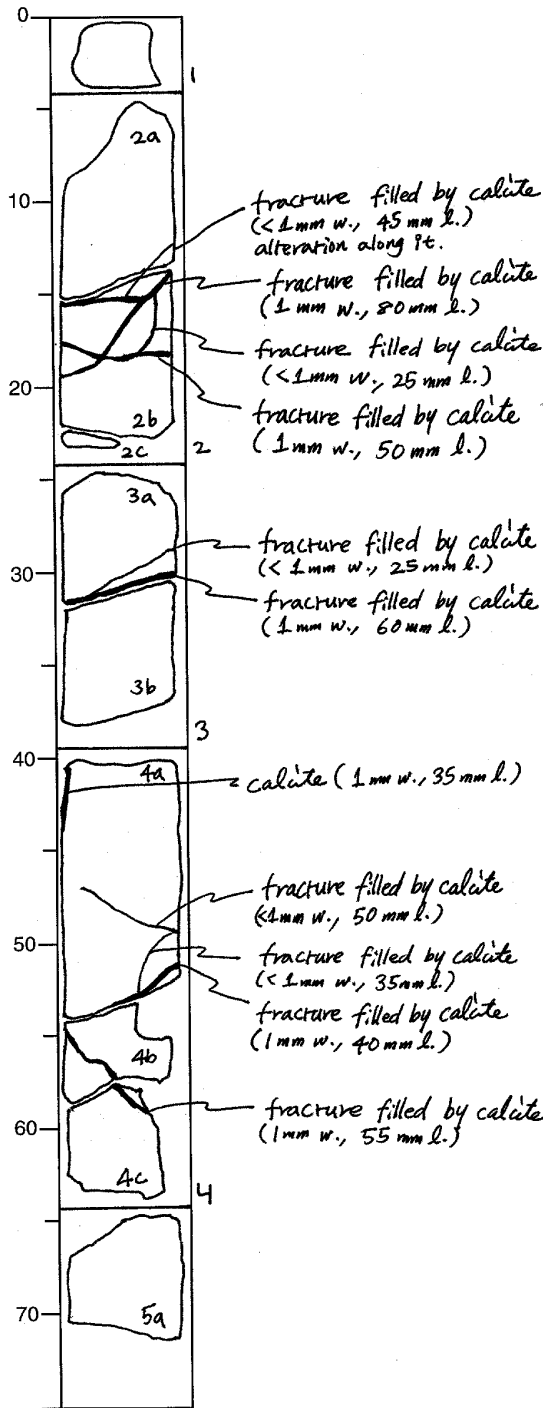
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
107	1155B	5R	2.



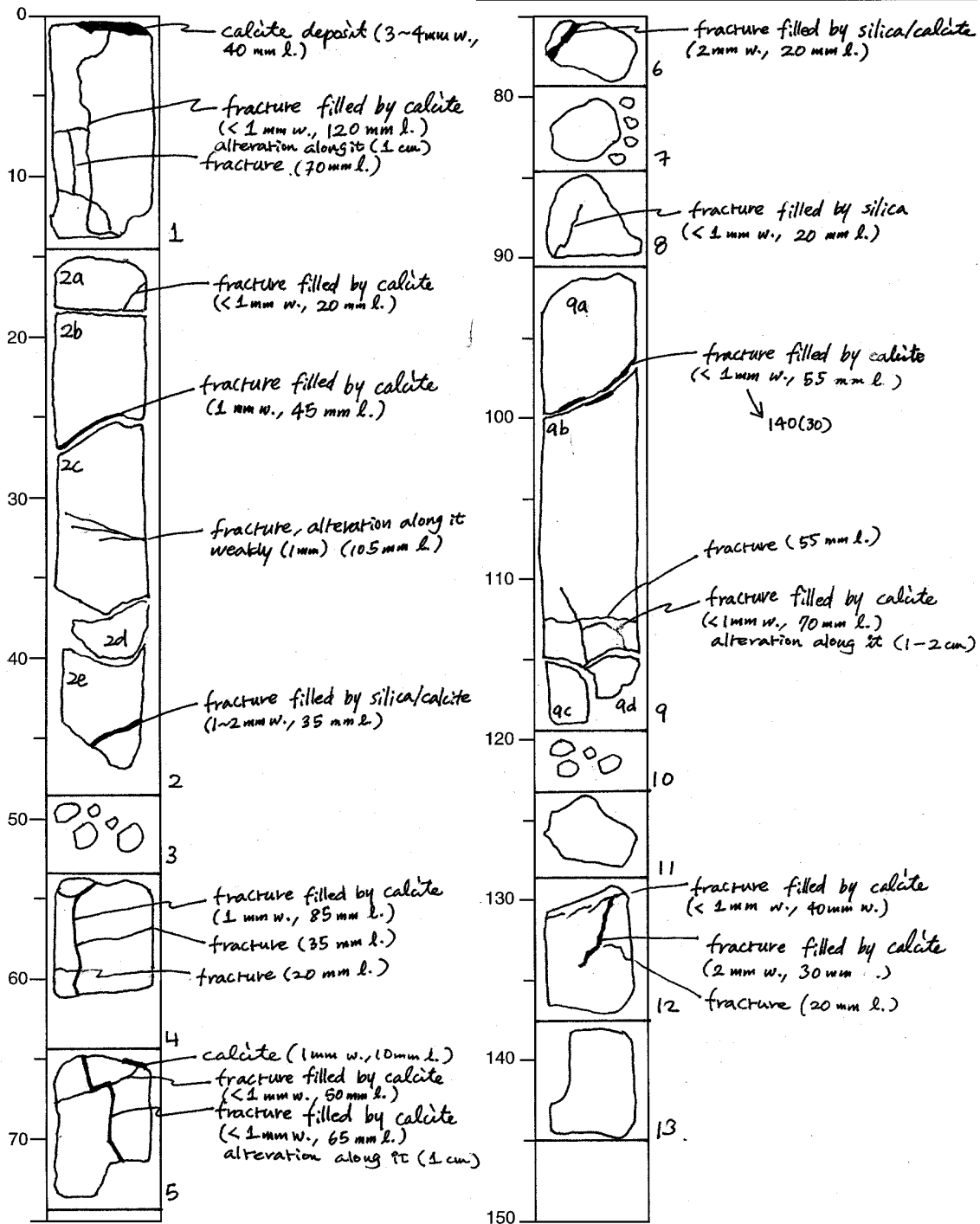
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
107	1155B	6R	1.	H.S.



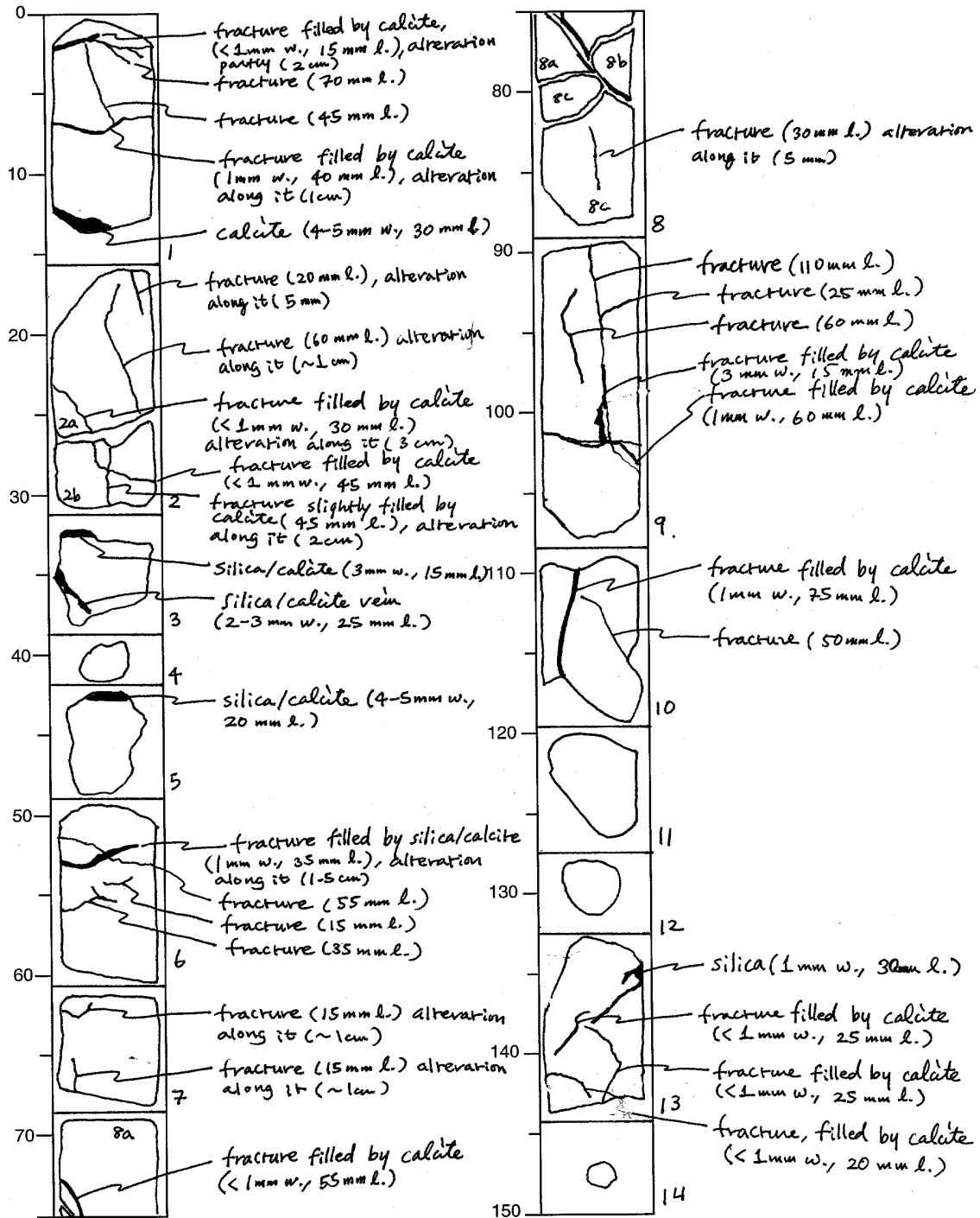
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	6R	2.	H.S.



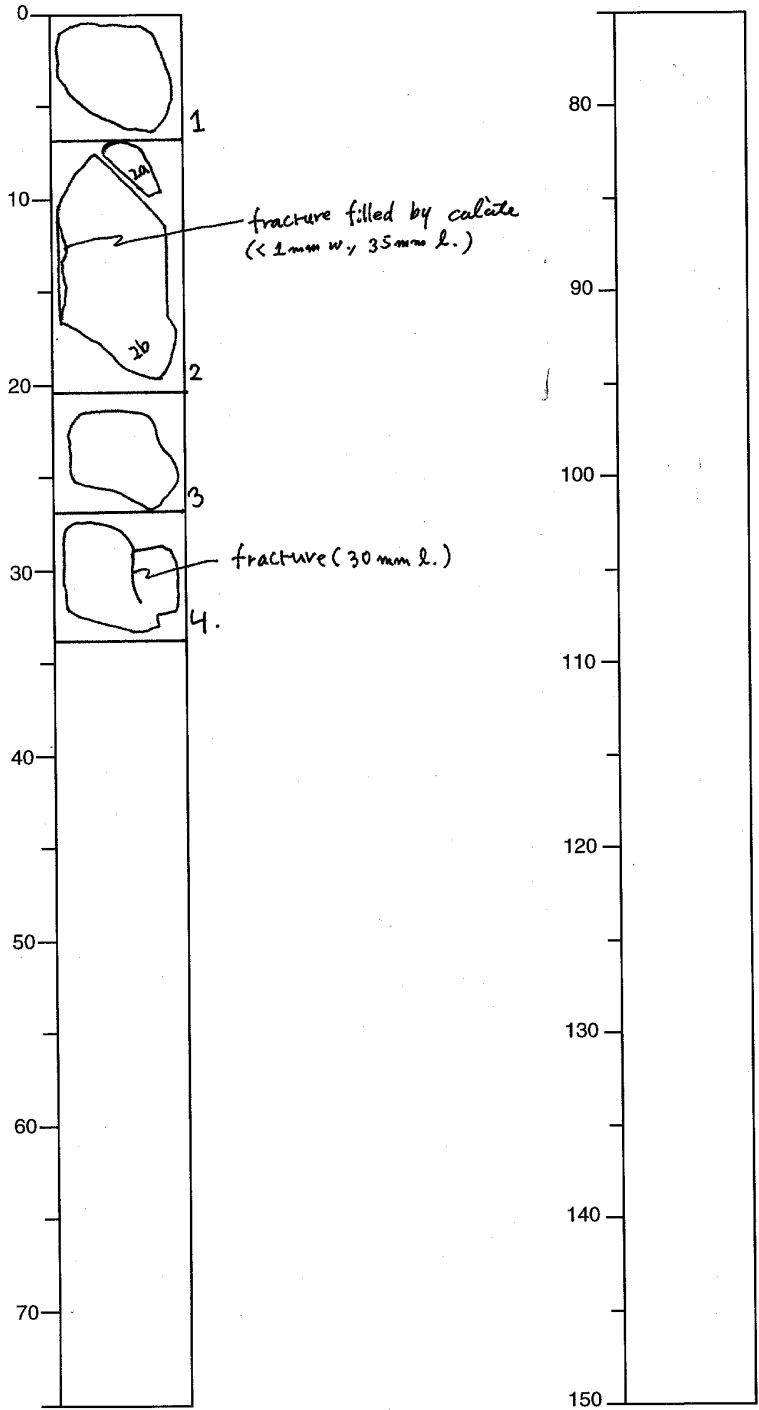
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	185B	6R	3	H.S.



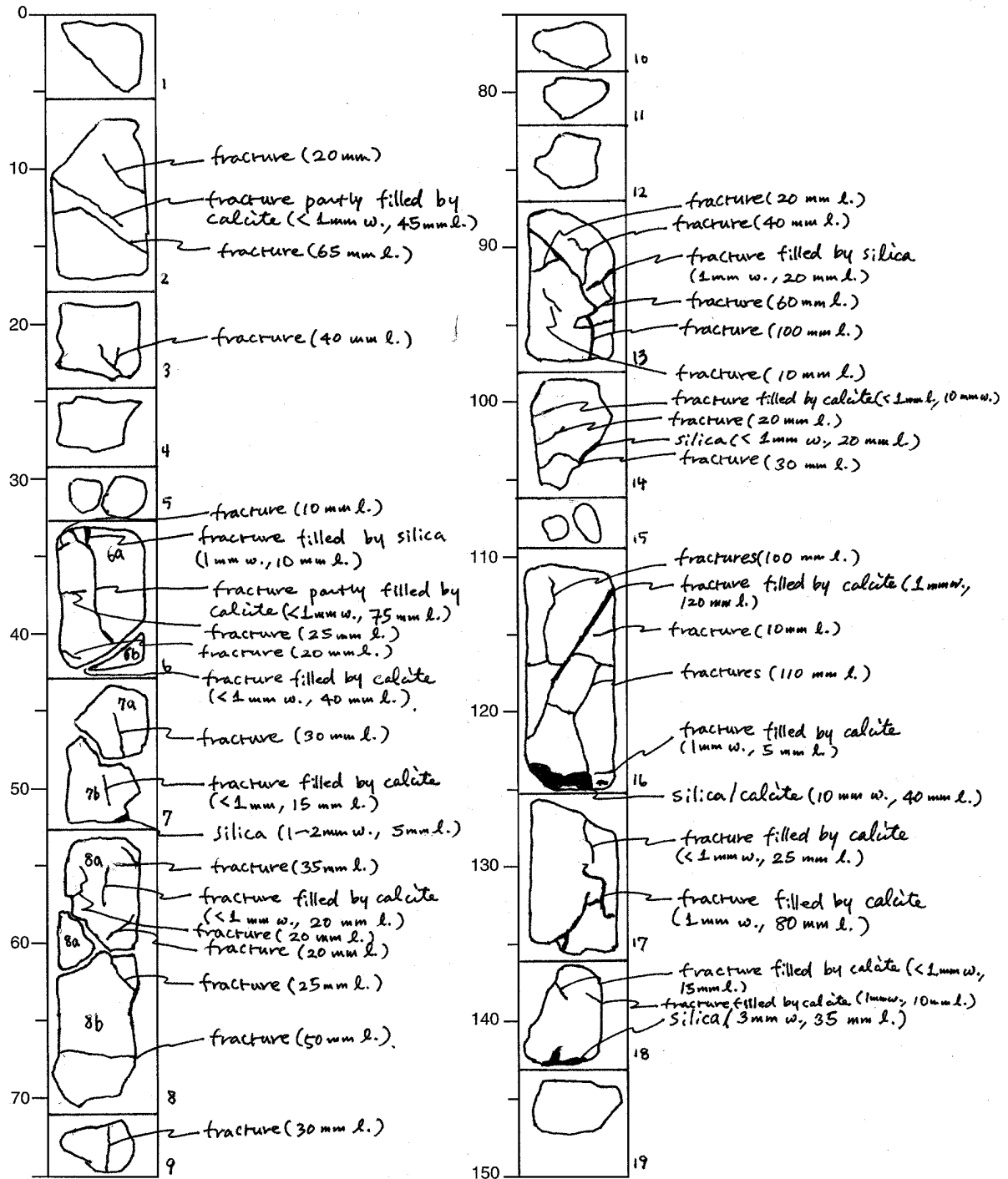
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155B	6R	4



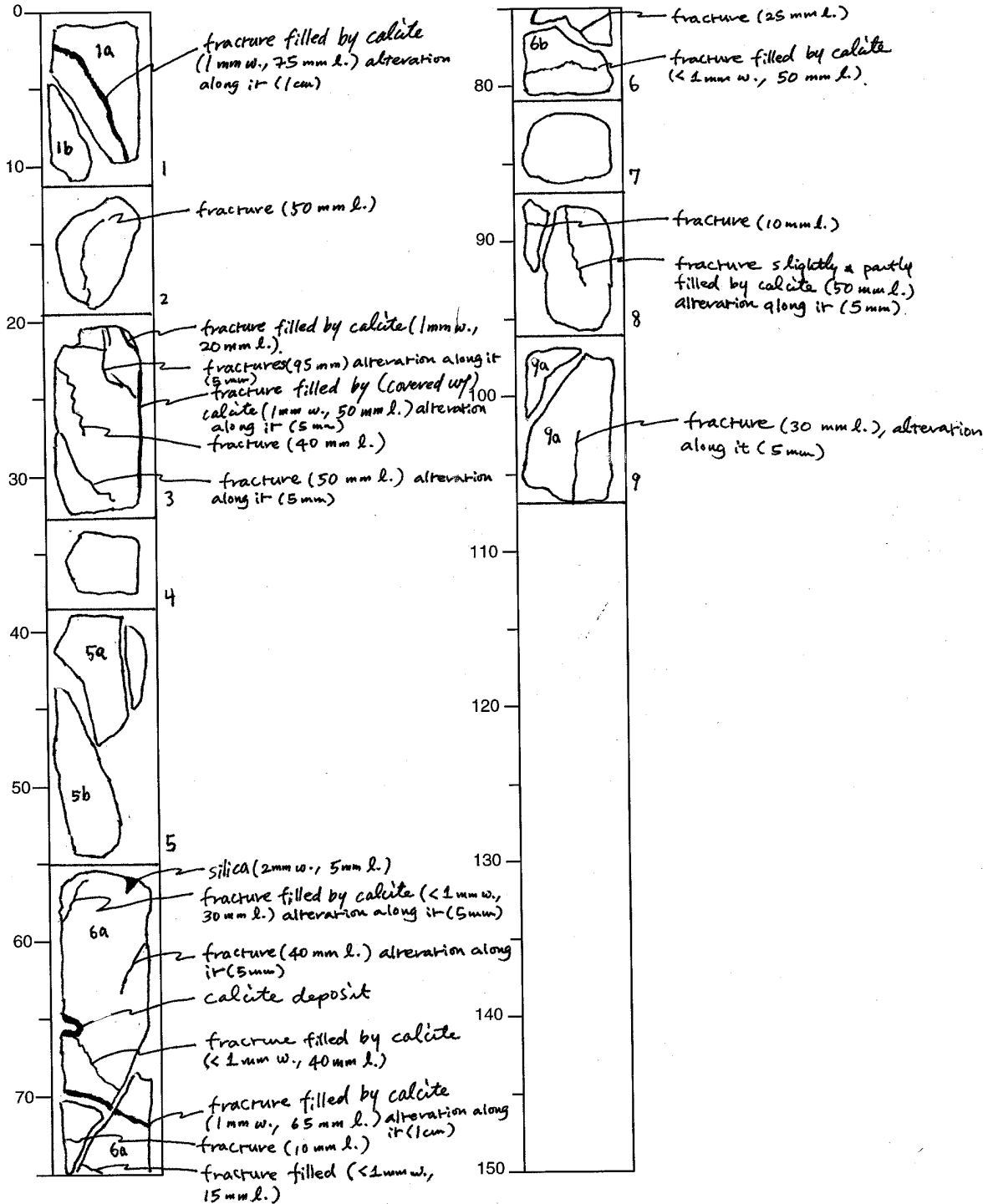
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	7	1	H.S.



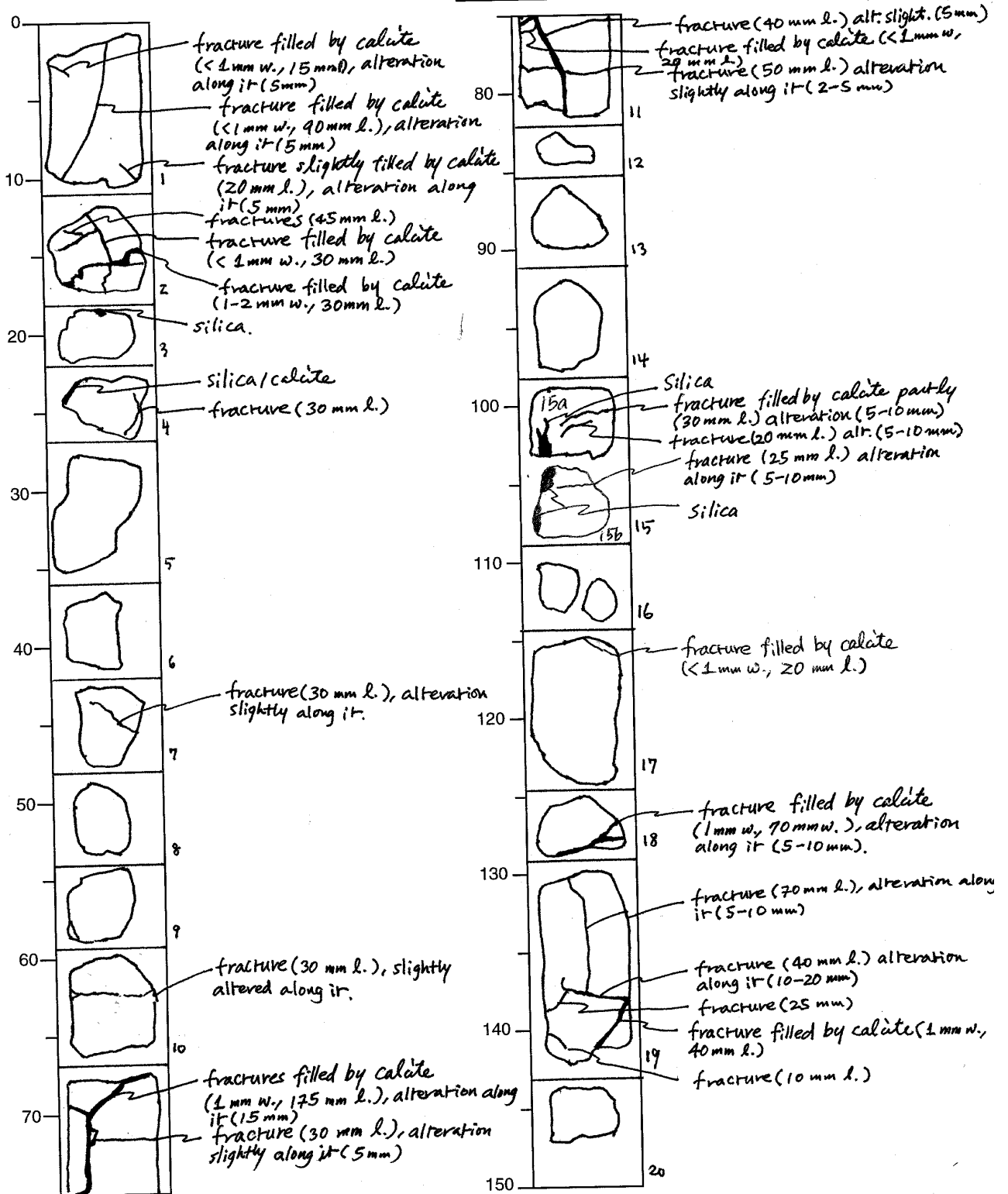
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	7	2	H.S.



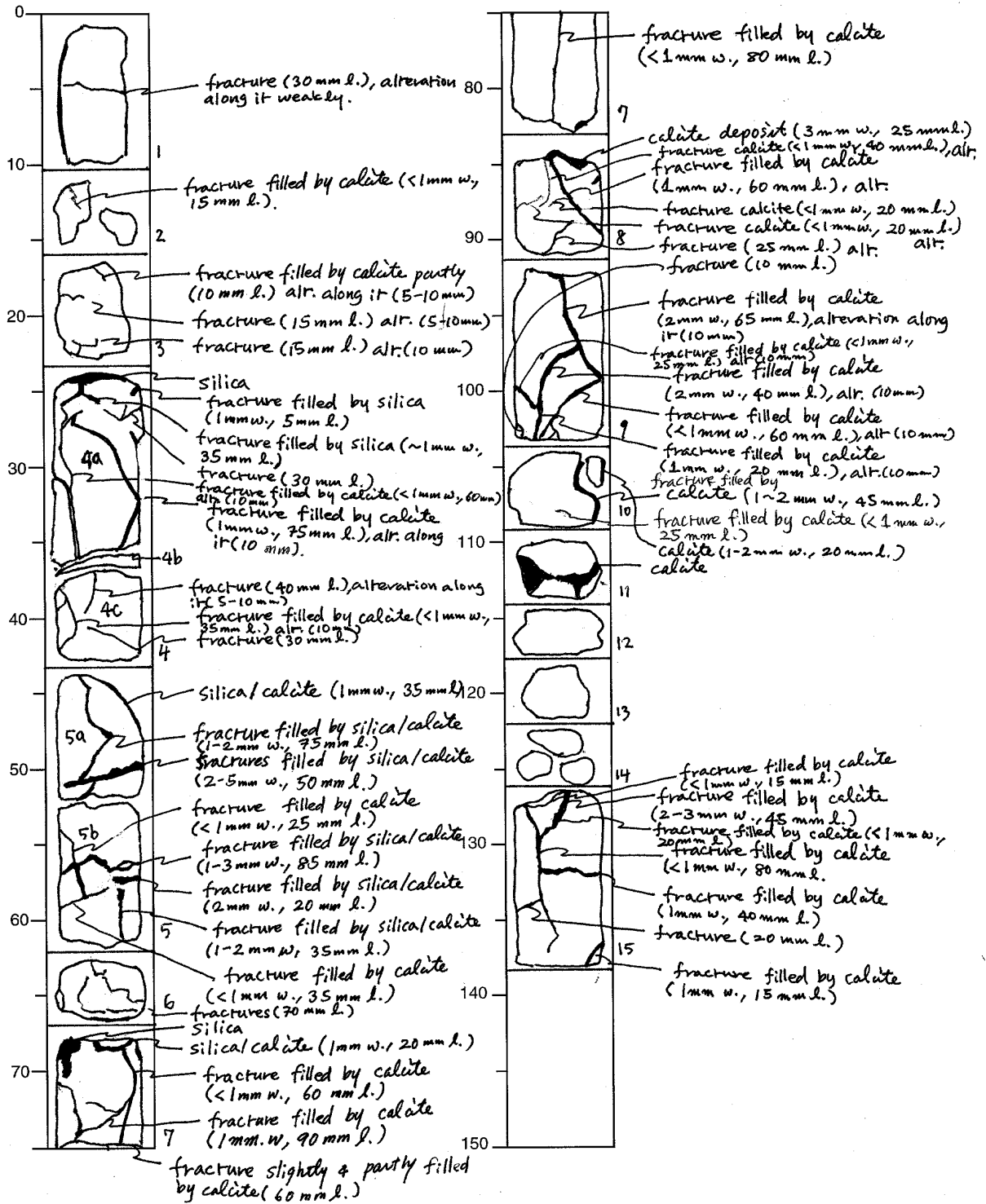
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	8	1	H.S.



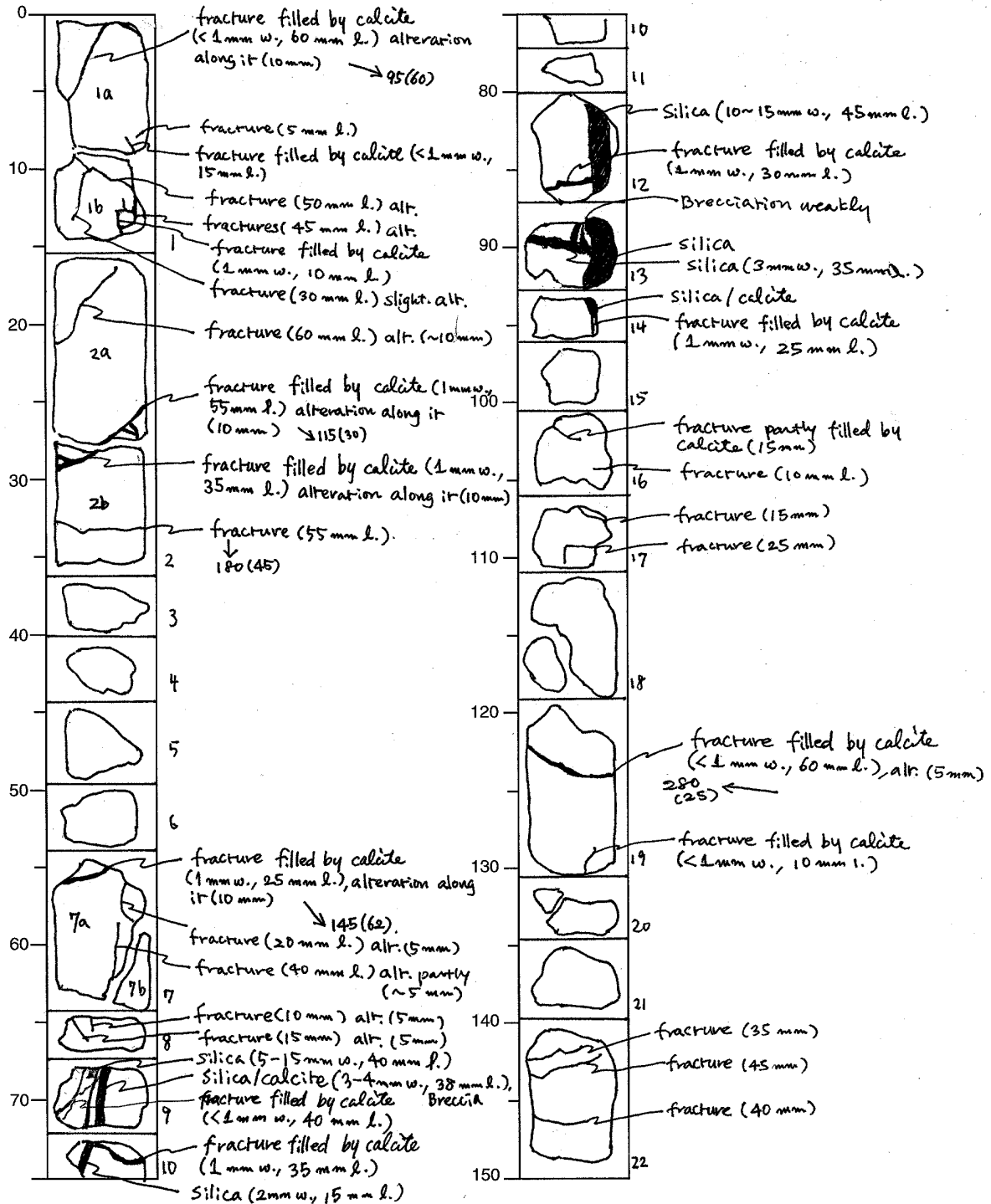
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	8R	2	H.S.



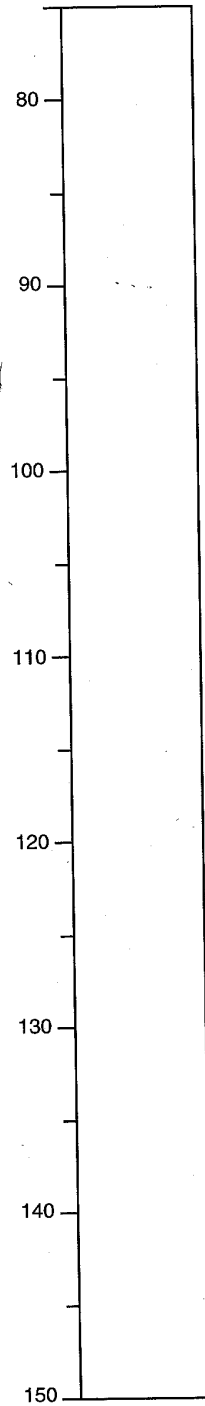
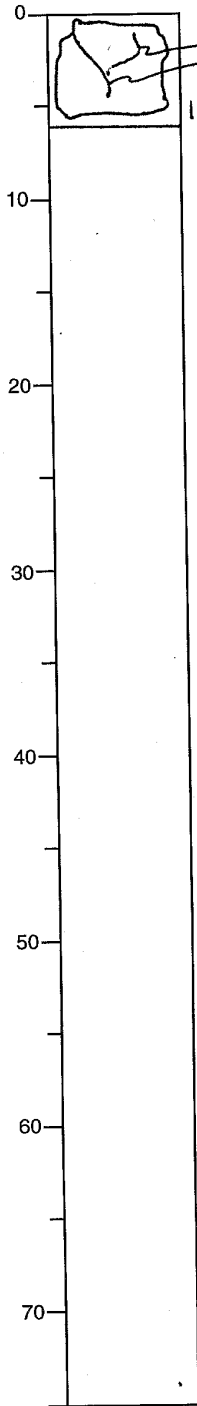
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	8R	3	H.S.



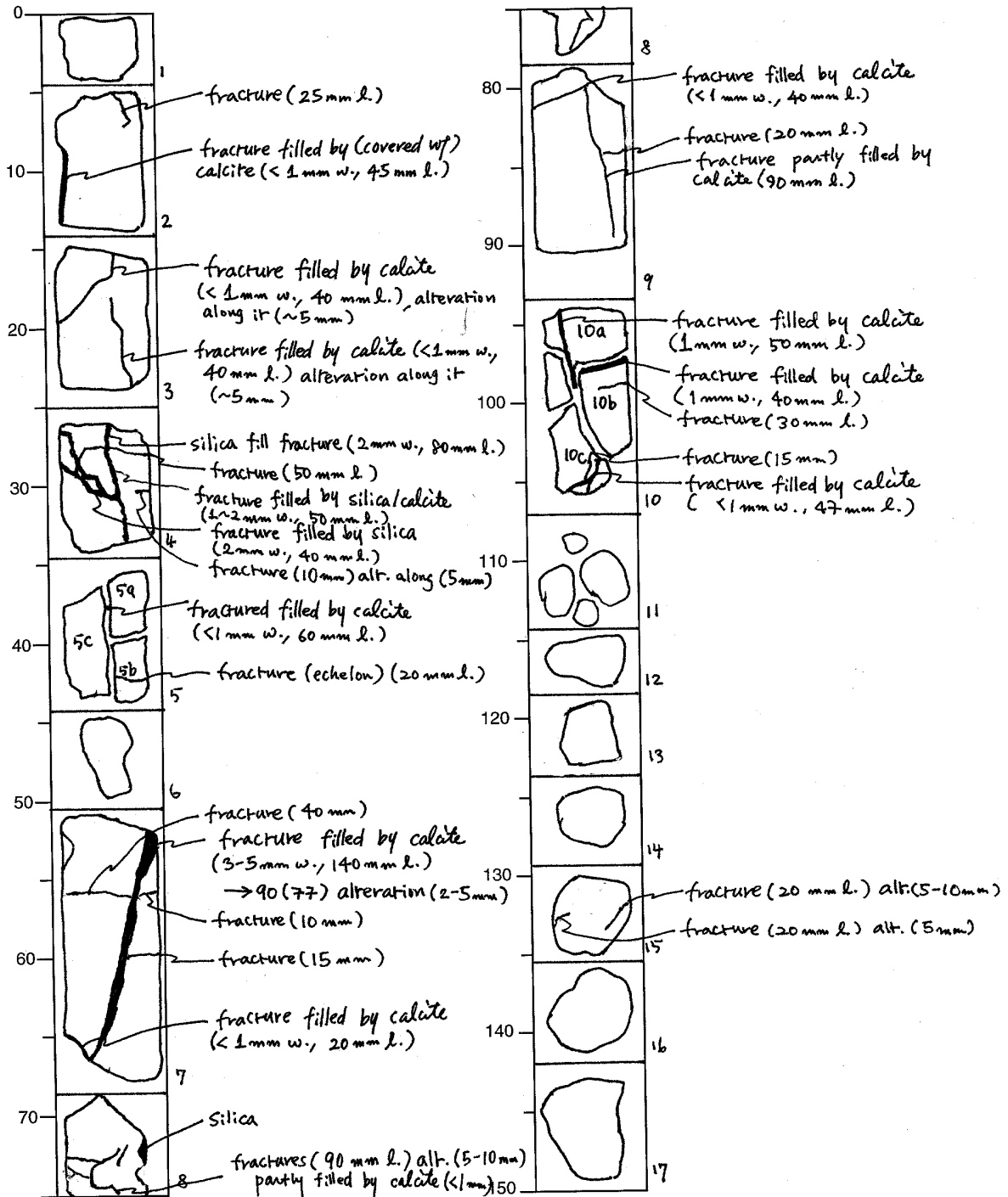
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1155B	8R	4



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	9R	1	H.S.



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1155B	9R	2	H.S.

