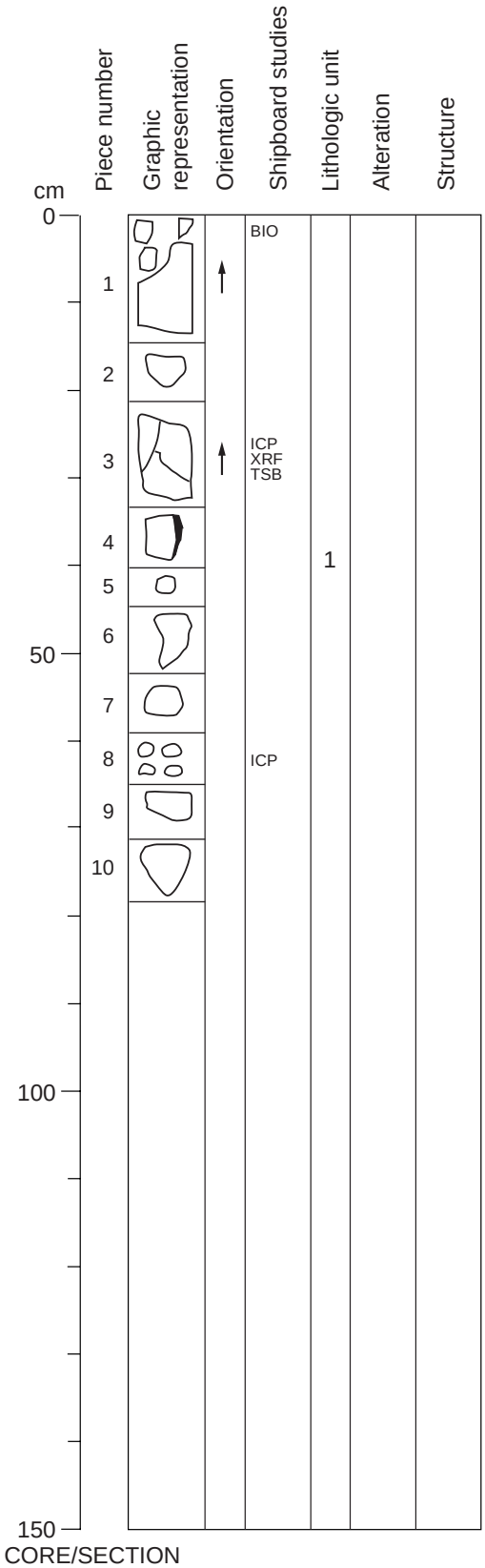
Core Photo



CORE/SECTION

1152B-1W-1 NO RECOVERY

187-1152A-1R-1

UNIT 1: APHYRIC BASALT

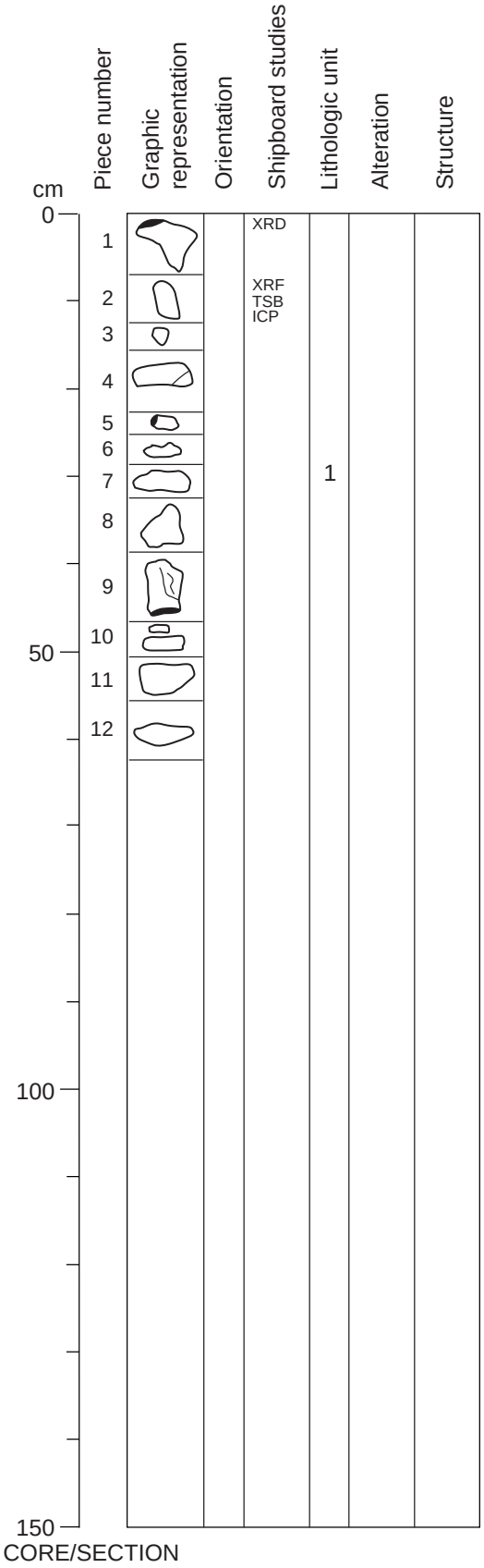
PIECES 1-10

GROUNDMASS: Microcrystalline (rare plagioclase microphenocrysts, <1 mm)
COLOR: Light gray

VESICLES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
	3	<1	1	<0.5	round

Filling: Inner surface of vesicles lined with cryptocrystalline silica occasional zeolite overgrowths.
VEINS/FRACTURES: Pieces 1, 3, 4, and 6 contain small (<1mm wide) fractures with 1mm thick oxidation halos.
ALTERATION: Most pieces have a 1-1.5 cm thick orange brown oxidation rind. Overall the unit is slightly altered.
STRUCTURE: Pillow fragments.
ADDITIONAL COMMENTS: Glassy rinds are present on Pieces 4, 6, 8, and 10 varying in thickness from 1-5 mm. Pieces 6 and 8 contain the freshest glass. Palagonite is observed on all glass rinds.

Core Photo



187-1152B-2R-1

UNIT 1: APHYRIC BASALT

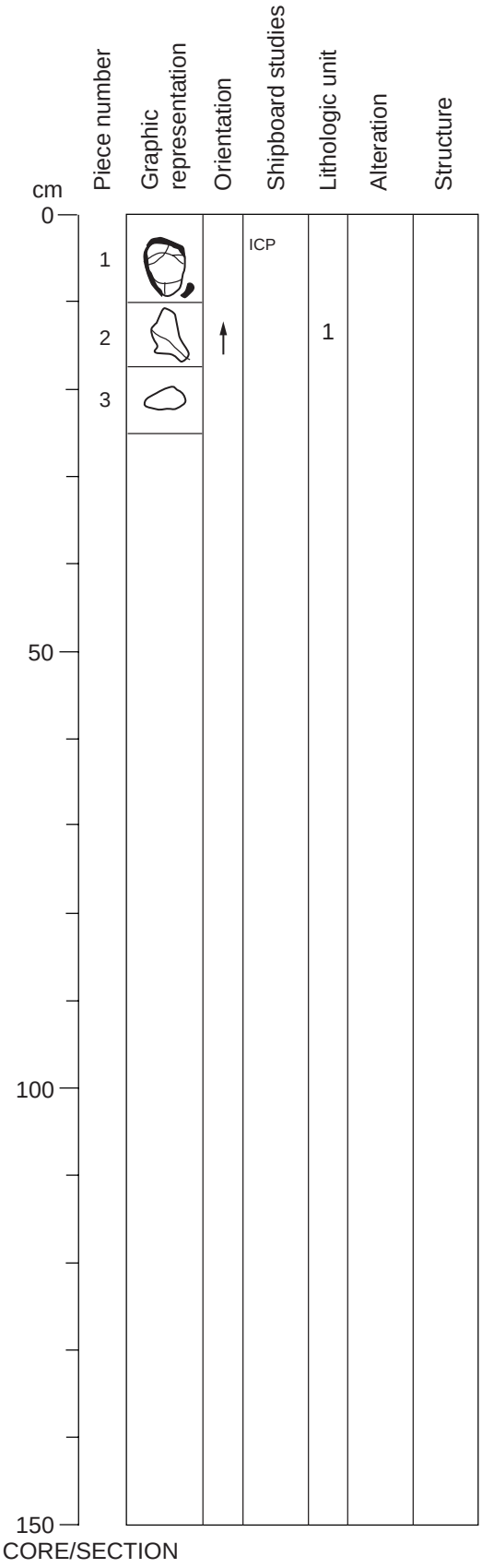
PIECES 1-12

INTERNAL CONTACTS: Pillow rims. (<1 mm) glassy rind on Piece 12; (2-3 mm) glass rind on Pieces 1, 5, 9, and 10. In Piece 4 glass rind fragments (3-4 mm) are associated with a Mn crust.
PHENOCRYSTS: None
GROUNDMASS: Microcrystalline (rare plagioclase microphenocrysts, <1 mm)
COLOR: Light gray to dark gray when fresh
VESICLES:

Abundance	**Size** (mm)			**Shape**
%	**avg.**	**max.**	**min.**	
5	0.7	1	0.5	round

Filling: Most vesicles lined with Fe oxyhydroxides, except in Piece 11 where vesicles are unfilled.
VEINS/FRACTURES: Pieces 1 and 4 contain 2 mm wide vein of pinkish-white material.
ALTERATION: Slightly altered, i.e., bleached halos, mostly on outer surfaces, fractures and around vesicles. In Piece 9 fracture halos are 3-5 mm wide around fractures. Glass is <30% altered in most occurrences.
STRUCTURE: Pillow sequence
ADDITIONAL COMMENTS: Piece 1 has three concentric zones, differing in degree of alteration. The interior zone is darker gray, contains vesicles (~5%) free of filling and unaltered groundmass. This zone is surrounded by a 5-6 mm wide zone that is lighter gray, in which vesicles are filled with smectite and groundmass olivine and/or glass is altered to Fe oxyhydroxides. The outer zone (up to 2 cm wide) is lighter gray to buff in color, vesicles are filled with cryptocrystalline material ranging from red to yellow-brown. This zone contains spherulites, which decrease in abundance outward toward a 1-2 mm wide glass rind. Attached to the glass rind is a vein fragment of similar material to vein filling in Piece 4. Pieces 1, 4, and 6 may have originally fit together as the outer part of a pillow. Piece 4 consists of ~80% Mn crust (dendritic Mn + pelagic sediment). Piece 6 is 100% Mn crust.

Core Photo



187-1152B-3R-1

UNIT 1: APHYRIC BASALT

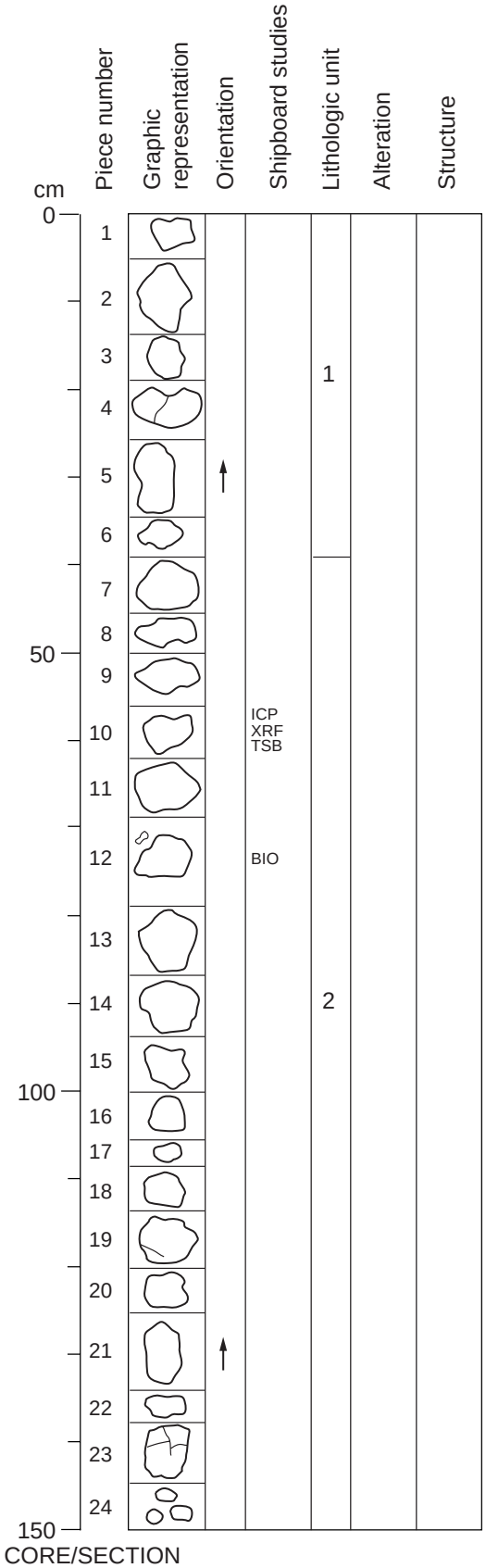
PIECES 1-3

INTERNAL CONTACTS: Pillow rims
PHENOCRYSTS: None
GROUNDMASS: Microcrystalline (rare plagioclase microphenocrysts)
COLOR: Light gray
VESICLES:

Abundance	**Size** (mm)			**Shape**
%	**avg.**	**max.**	**min.**	
2	0.25	0.5	<0.5	round

Filling: Vesicles lined with silica and Fe oxyhydroxides
VEINS/FRACTURES: Piece 1 has a 0.5-mm-wide vein filled with pinkish-white material.
ALTERATION: Slightly altered. Outer surfaces and fractures have bleached halos. Spotty Mn coating on piece 2. Vesicles in half of Piece 3 are filled with silica and Fe oxyhydroxides; vesicles in the other half have only a thin coating of silica. Glass in Piece 1 is ~10% altered.
STRUCTURE: Pillow sequence
ADDITIONAL COMMENTS: Piece 1 has a 1-cm-wide glass rim containing ~3% plagioclase microphenocrysts; approximately 2 cc of spalled glass fragments from this sample are stored in a sample vial along with the whole rock.

Core Photo



187-1152B-4R-1

UNIT 1: APHYRIC BASALT

PIECES 1-5

PHENOCRYSTS: None
GROUNDMASS: Microcrystalline
COLOR: Light gray
VESICLES:

Abundance	**Size** (mm)			**Shape**
%	**avg.**	**max.**	**min.**	
4	0.5	1	<0.5	round

Filling: Mainly Fe oxyhydroxide, zeolites are also present but less abundant.
VEINS/FRACTURES: A small fracture is present in Piece 4 that is less than 1 mm wide and has no alteration halo.
ALTERATION: Samples are fresh overall with an oxidized outer surface present on some areas of all the pieces.
STRUCTURE: none
ADDITIONAL COMMENTS: Vesicles are variable throughout the unit.

UNIT 2: MODERATELY PLAGIOCLASE CLINOPYROXENE PHYRIC BASALT

PIECES 6-24

INTERNAL CONTACTS: Pillow rims. Glass rinds (1-3mm thick) occur on Pieces 17, 20, 22, and 24. Glass is present, usually as a mixture of fresh glass and palagonite.
PHENOCRYSTS:

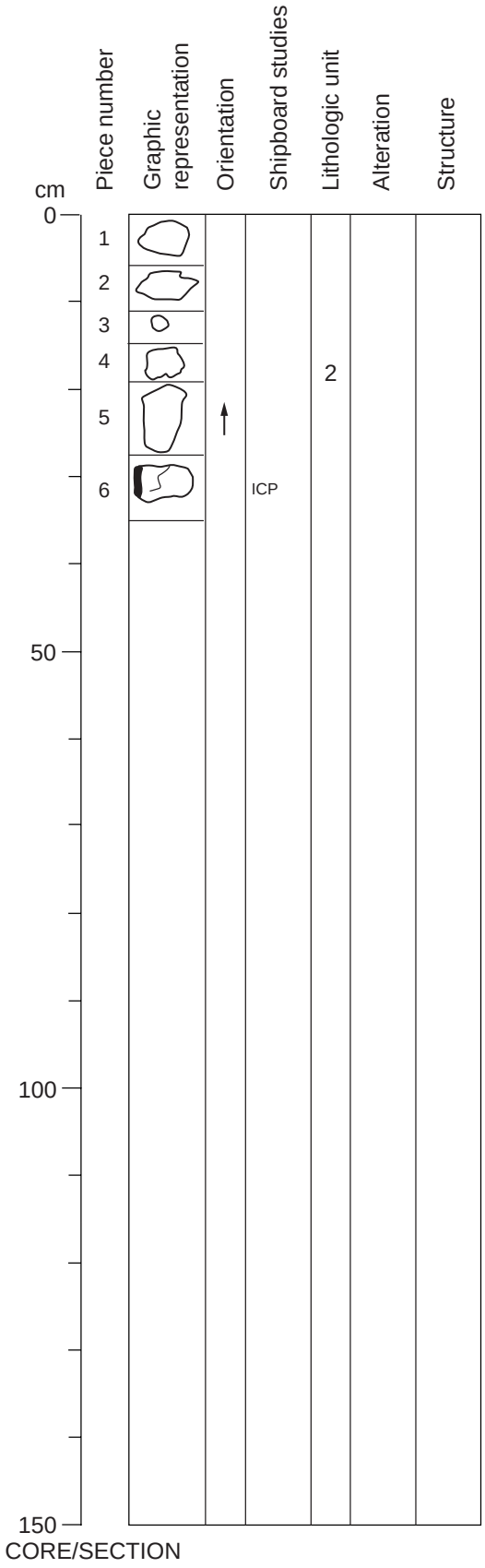
	Abundance	**Size** (mm			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	5	2	3	1	tabular
Olivine	1	1	2	<1	subhedral
Clinopyroxene	2	1.5	4	1.5	subhedral
Total	8				

GROUNDMASS: Microcrystalline
COLOR: Light gray. Altered zones are lighter gray on most pieces.
VESICLES:

Abundance	**Size** (mm			**Shape**
%	**avg.**	**max.**	**min.**	
3	0.7	3	<1	round to elongate

Filling: Mainly Fe oxyhydroxide, some vesicles are lined with silica and zeolite.
VEINS/FRACTURES: Small fractures can be found in Pieces 7, 8, 18, 19, 20, 22, and 23. Alteration associated with fracture only occurs in Piece 19 and expressed an 1 mm thick oxidized halo.
ALTERATION: Slight alteration can be seen on the outer surfaces of most Pieces. This alteration is characterized by an orange-brown color and rarely extends more than 0.5 mm from the edge.
STRUCTURE: Pillow sequence.
ADDITIONAL COMMENTS: Overall, the crystallinity increases in this unit from the top down, with plagioclase and olivine being more abundant at the top of the section and plagioclase and clinopyroxene at the bottom. Phenocryst size also increases slightly down section. Glomerocrysts of clinopyroxene and plagioclase and olivine and plagioclase are present in Piece 6. Plagioclase exhibits a seriate texture throughout the section. The glass rind on Piece 17 is 3 mm thick and is a mixture of fresh glass with spherulites and palagonite. The majority of Pieces have an outer margin which is lighter in color, has fewer vesicles and lower phenocryst abundances. These probably represent incomplete chilled margins.

Core Photo



187-1152B-4R-2

UNIT 2: MODERATELY PLAGIOCLASE CLINOPYROXENE PHYRIC BASALT

PIECES: 1-6

INTERNAL CONTACTS: Pillow rims. Glassy rind (2 mm thick) occurs on Piece 6. Glass is present as a mix of fresh glass with palagonite.

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	5	2	3	1	tabular
Olivine	1	1	2	<1	subhedral
Clinopyroxene	2	1.5	4	1.5	subhedral
Oxides					
Sulfides					
Total	8				

GROUNDMASS: Microcrystalline

COLOR: Light gray. Chilled margins on some pieces are lighter gray)

VESICLES:	**Abundance**	**Size** (mm		**Shape**
	%	**avg.**	**max.**	**min.**	
	3	0.7	3	<1	round to elongate

Filling: Mainly Fe oxyhydroxide some vesicles are lined with silica and zeolite.

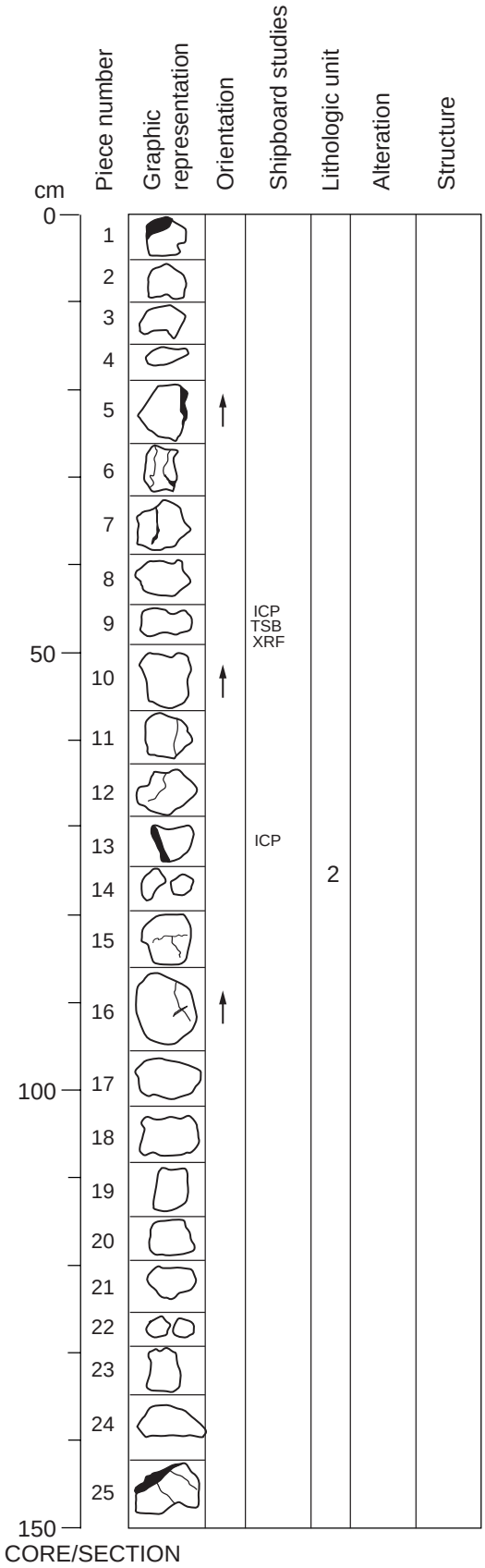
VEINS/FRACTURES: Small fracture can be found in Piece 6.

ALTERATION: Slight alteration can be seen on the outer surfaces of most pieces. This alteration is characterized by an orange-brown color and rarely extends more than 0.5 mm into the rocks interior.

STRUCTURE: Pillow sequence.

ADDITIONAL COMMENTS: Alteration extends 2 cm into Piece 6 and zones of alteration correspond to changes in crystallinity. Interior of the glassy rind (3 mm wide) is a brownish zone 5 mm wide consisting of glass + spherulites + acicular plagioclase microphenocrysts. Inward of that is a light gray, fine grained zone with altered groundmass olivine and/or glass. The innermost zone has the largest grain size, most vesicles and is least altered.

Core Photo



187-1152B-5R-1

UNIT 2: MODERATELY PLAGIOCLASE CLINOPYROXENE PHYRIC BASALT

PIECES 1-25

INTERNAL CONTACTS: Pillow rims. Glassy rinds are present on Pieces 1,13 and 25 (3-4 mm thick).

PHENOCRYSTS:

	Abundance	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	5	2	4	<1	tabular
Olivine	1	1.5	2	0.5	subhedral
Clinopyroxene	3	2	5	1.5	euhedral to subhedral
Total	9				

GROUNDMASS: Microcrystalline

COLOR: Light gray

VESICLES:

Abundance		**Size** (mm)		**Shape**
%	**avg.**	**max.**	**min.**	
2	1	1.5	0.5	round to elongate

Filling: Mainly amorphous silica, Fe oxyhydroxide and zeolites are also present

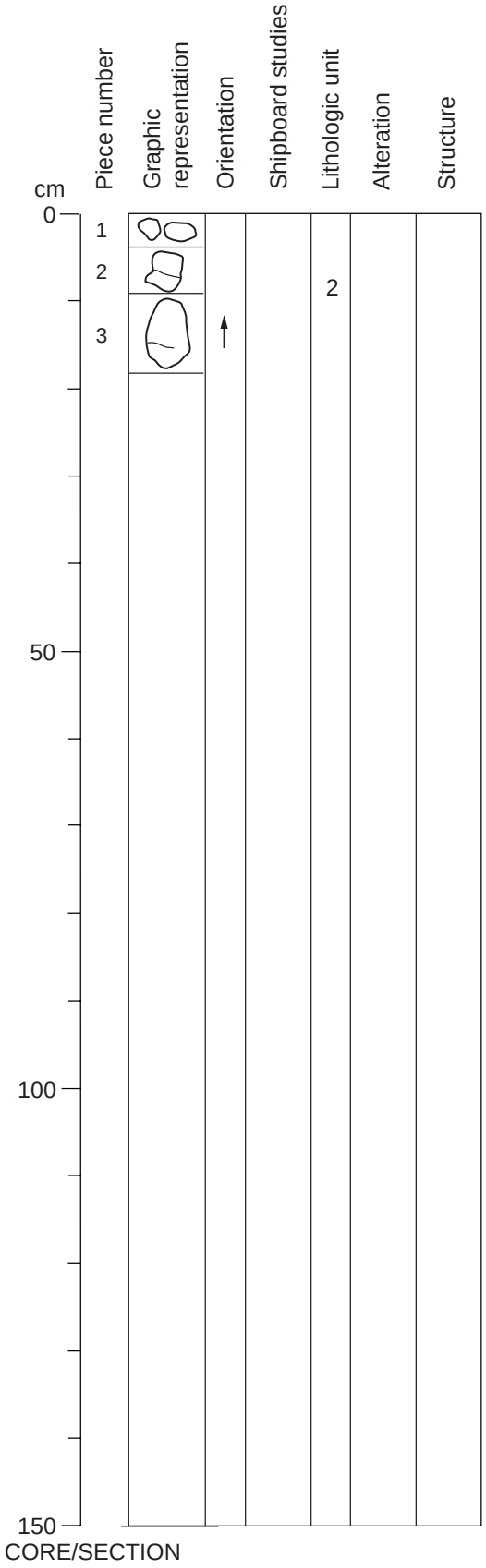
VEINS/FRACTURES: Pieces 1, 3 ,and 25 have fractures parallel to their glassy rinds with <0.5 mm oxidation halos. Piece 25 also has a radial fracture set that runs normal to the glassy rind, these fractures do not have oxidation halos.

ALTERATION: Slight, overall the section is about 6% altered with thin oxidation rims covering the outer surface of most samples. Pieces 7 and 8 are the most altered with margins that extend 0.5-1 cm into the piece.

STRUCTURE: Pillow sequence.

ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and plagioclase + clinopyroxene are occur commonly throughout the section. Piece 25 recovered a fairly complete section through a chilled pillow rind. The outer 5 mm is glassy with small, acicular plagioclase phenocrysts, followed by a zone of glass + grey spherulites (5 mm), followed by a zone of glass + brown spherulites (5 mm). Crystallinity increases toward the interior and degree of alteration decreases, i.e., in the outer zones olivine is totally replaced by Fe oxyhydroxides. Vesicularity is greatest in the unaltered interior.

Core Photo



187-1152B-5R-2

UNIT 2: MODERATELY PLAGIOCLASE CLINOPYROXENE PHYRIC BASALT

PIECES 1-3

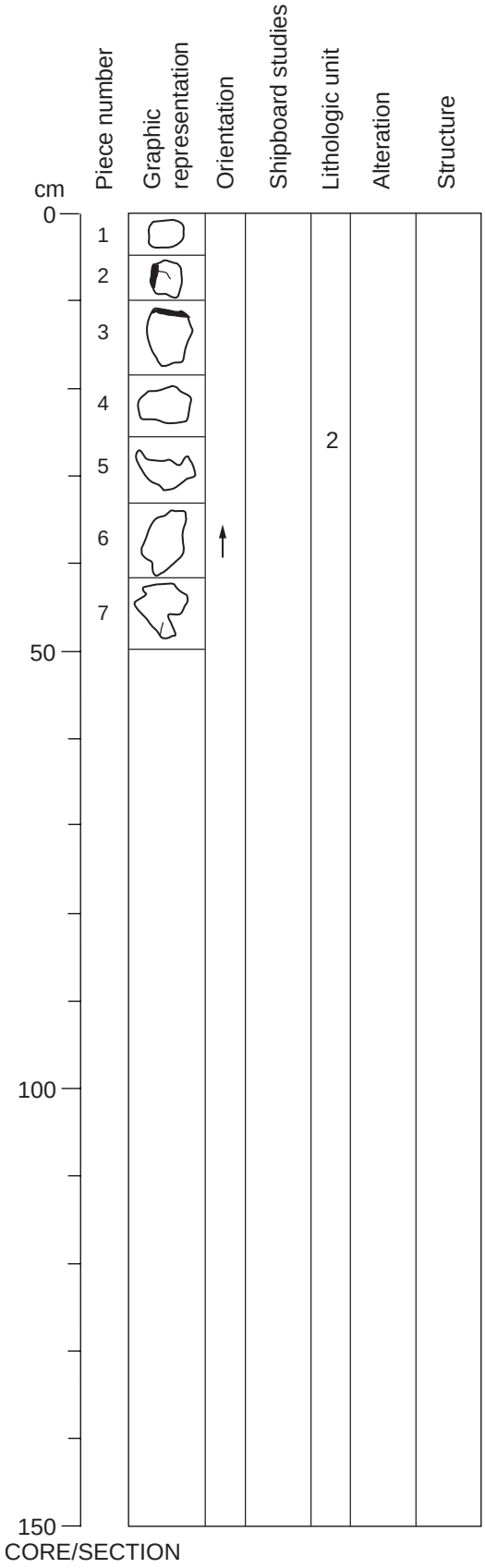
PHENOCRYSTS:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	5	2	4	<1	tabular
Olivine	1	1.5	2	0.5	subhedral
Clinopyroxene	3	2	5	1.5	euhedral to subhedral
Total	9				

GROUNDMASS: Microcrystalline
COLOR: Light gray

VESICLES:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
	2	1	1.5	0.5	round to elongate

Filling: Mainly amorphous silica, Fe oxyhydroxide and zeolites are also present
VEINS/FRACTURES:
ALTERATION: Slight, overall the section is about 6% altered with thin oxidation rims covering the outer surface of most samples.
ADDITIONAL COMMENTS: Glomerocrysts of plagioclase and clinopyroxene are commonly observed throughout the section.

Core Photo



187-1152B-6R-1

UNIT 2: SPARSELY PLAGIOCLASE CLINOPYROXENE PHYRIC BASALT

PIECES 1-7

INTERNAL CONTACTS: Pillow rims. Glassy rinds (1-2 mm) on Pieces 2 and 6.

PHENOCRYSTS:

	Abundance %	Size (mm) avg.	max.	min.	Shape
Plagioclase	2	1	3	1	tabular
Olivine	<1	1	4	<1	equant
Clinopyroxene	1	2	6	1	elongate
Total	4				

GROUNDMASS: Microcrystalline

COLOR: Light to medium gray

VESICLES:

Abundance %	Size (mm) avg.	max.	min.	Shape
3	0.3	1	<0.3	round

Filling: Unaltered interiors of pieces are unfilled. In altered rims, some vesicles lined with cryptocrystalline silica; most lined with Fe oxyhydroxides.

ALTERATION: Slightly altered overall. Alteration is restricted to exterior zones that may be up to 1 cm wide. Boundary between altered and unaltered zones is irregular. Altered zones are lighter gray in color than the unaltered interiors. Olivine in the altered zones is usually 100% altered, but may be totally fresh in piece interiors. Alteration zones appear to correlate with degree of crystallinity of the groundmass. Zones with intersertal texture have Fe oxyhydroxides replacing glass matrix, whereas more intergranular textures are largely restricted to filling of minute vesicles with Fe oxyhydroxides. Piece 5 has spotty Mn alteration on outer surface

STRUCTURE: Core pieces are probably pebbles and cobbles of pillow basalt from a talus deposit, as suggested by their subangular shapes and and the fact that the light brown (up to 1 mm thick) weathered surfaces extend all the way around each piece.

ADDITIONAL COMMENTS: Phenocryst abundance is not uniformly distributed throughout, even within individual pieces. Piece 2 has a 1cm wide glassy rim consisting of ~2mm of glass largely free of crystals, followed by a wider zone of glass containing spherulites. This grades into the microcrystalline interior which contains phenocrysts of olivine, plagioclase and clinopyroxene. Glomerocrysts of plagioclase and plagioclase + clinopyroxene are observed sporadically throughout.

187-1152A-1R-1, 30-34 cm (TS #1) **Unit: 1** **OBSERVER:** **Hauff**

ROCK NAME: **Aphyric basalt w/ plagioclase and clinopyroxene microphenocrysts**
WHERE SAMPLED:
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **sheaf quench texture**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	<1		0.6	2.5			subhedral	Twinned, zoned.
Olivine	<1		0.1	0.8			skeletal to subhedral	
GROUNDMASS								
Olivine	1			0.2			skeletal	
Plagioclase	see comments below			0.5			sheaf quench texture to skeletal	
Clinopyroxene	see comments below			0.4		augite	plumose quench texture to anhedral	
Opaque Minerals	<1						equant to acicular	1% of opaques are 2 -3 micron size pyrite globules.
Glass	10							

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	15-Oct				replacing clinopyroxene, olivine and filling vesicles	
Fe oxyhydroxides	<1				replacing clinopyroxene and olivine	

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

COMMENTS : Proportions of groundmass minerals difficult to estimate because of predominance of quench textures, but plagioclase probably exceeds clinopyroxene based on predominance of sheaf textures.

187-1152B-2R-1, 8-10 cm (TS#2) **Unit: 1** **OBSERVER:** **Kempton**

ROCK NAME: **Aphyric basalt**
WHERE SAMPLED: **near top of unit 1**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **variable--ranging from plumose quench to intersertal**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase								
Olivine								
Clinopyroxene								
GROUNDMASS								
Olivine								
Plagioclase	see comments below			1			acicular to tabular; subhedral	Displays a range of grain sizes (seriate)
Clinopyroxene	see comments below			0.2		augite	plumose quench to anhedral	
Opaque Minerals	3			0.025			equant to acicular	<<1% of the opaques are 2 micron size pyrite globules
Glass								
Mesostasis	15							

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays (smectite)	10				replacing olivine?, filling vesicles	A 'diamond' shape of some clay patches may indicate pseudomorphing of olivine.
Fe oxyhydroxides	<1				replacing mesostasis, filling vesicles	Occurs in the centers of some vesicle fillings along with smectite and replacing some mesostasis.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
	<1			0.2		round, filled with smectite	

COMMENTS : Slide badly plucked during preparation, making assessment of vesicle size and abundance difficult. Proportions of groundmass minerals difficult to estimate because of predominance of quench textures, but clinopyroxene probably exceeds plagioclase based on predominance of plumose textures. Grain size varies randomly throughout the thin section from cryptocrystalline quench textures to areas that are sufficiently well crystallized to show subophitic relationships between clinopyroxene and plagioclase.

187-1152B-4R-1, 57-61 cm (TS #3) **Unit: 2** **OBSERVER:** **Kempton**

ROCK NAME: **Sparsely plagioclase (+olivine) phyric basalt**
WHERE SAMPLED: **middle of unit 2**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **immature plumose quench texture w. plagioclase ± olivine glomerocrysts**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	3	3	0.4	2	1		subhedral	Lath shaped in glomerocrysts, acicular where smaller; zoned; seriate.
Olivine	<1	<1	0.2	1.6	1		subhedral	Partially replaced along edges and fractures w/ Fe oxyhydroxides; partially encloses some plagioclase laths.
Clinopyroxene								
GROUNDMASS								
Olivine	1?			0.2			euhedral to subhedral	Presence of olivine assumed from the presence of euhedral smectite pseudomorphs.
Plagioclase	see comments below			0.4			acicular to skeletal	
Clinopyroxene	see comments below			0.4			plumose	
Opaque Minerals	2			0.01			equant	<1% of opaque minerals are 2 micron size pyrite globules.
Glass								
Mesostasis	2							

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	1				replacing olivine; filling vesicles	Alteration concentrated at one end of the slide.
Fe oxyhydroxides	1				replacing clinopyroxene and olivine	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	1	distributed	0.1	0.4	0.3	round, filled with smectite	Vesicles are filled only in altered area at one end of slide; remaining vesicles free of filling.

COMMENTS : Slide partially plucked during preparation. Proportions of groundmass minerals difficult to estimate because of predominance of quench textures, but clinopyroxene probably exceeds plagioclase based on predominance of plumose textures. Alteration is concentrated at one end of the thin section where groundmass is strongly altered to orange-brown Fe oxyhydroxides (width of zone ~2mm). Alteration to Fe oxyhydroxides + replacement of groundmass and filling of vesicles with smectite continues into the rock over a distance of ~ 1cm. Degree of alteration ends abruptly after that.

187-1152B-5R-1, 44-47 cm (TS #4) **Unit: 2** **OBSERVER:** **Kempton**

ROCK NAME: **Sparsely plagioclase + clinopyroxene phyric basalt**
WHERE SAMPLED: **middle of unit 2**
GRAIN SIZE: **microcrystalline to cryptocrystalline**
TEXTURE: **immature plumose quench texture w/ plagioclase ± clinopyroxene glomerocrysts**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	2	2	0.2	2	1		subhedral	Zoned. Seriate. One crystal encloses small melt inclusions (~20 micrometers across).
Olivine	<1?	<1					euhedral	Olivine may have been present, but a euhedral hole was plucked of its contents.
Clinopyroxene	<1	<1	0.5	2	1	augite	anhedral to subhedral	Quench overgrowths on some crystals.
GROUNDMASS								
Olivine	?							
Plagioclase	see comments below			0.1			acicular to skeletal	
Clinopyroxene	see comments below			0.1		augite	plumose	
Opaque Minerals	2			0.01			equant	~1% of opaque minerals are 2 micron size pyrite globules.
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays - smectite	1				replacing glass and olivine; filling vesicles	
Fe oxyhydroxides	<<1				groundmass	Occurs only on outermost rim of sample.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
	2	distributed	0.1	?		smectite	

COMMENTS : Alteration restricted to one side of thin section. Smectite forms up to 3% of rock where altered, but <1% overall. Transition to unaltered basalt abrupt. Slide badly plucked during polishing; maximum size of vesicles can't be determined. Proportions of groundmass minerals difficult to estimate because of predominance of quench textures, but clinopyroxene probably exceeds plagioclase based on predominance of plumose textures.

STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
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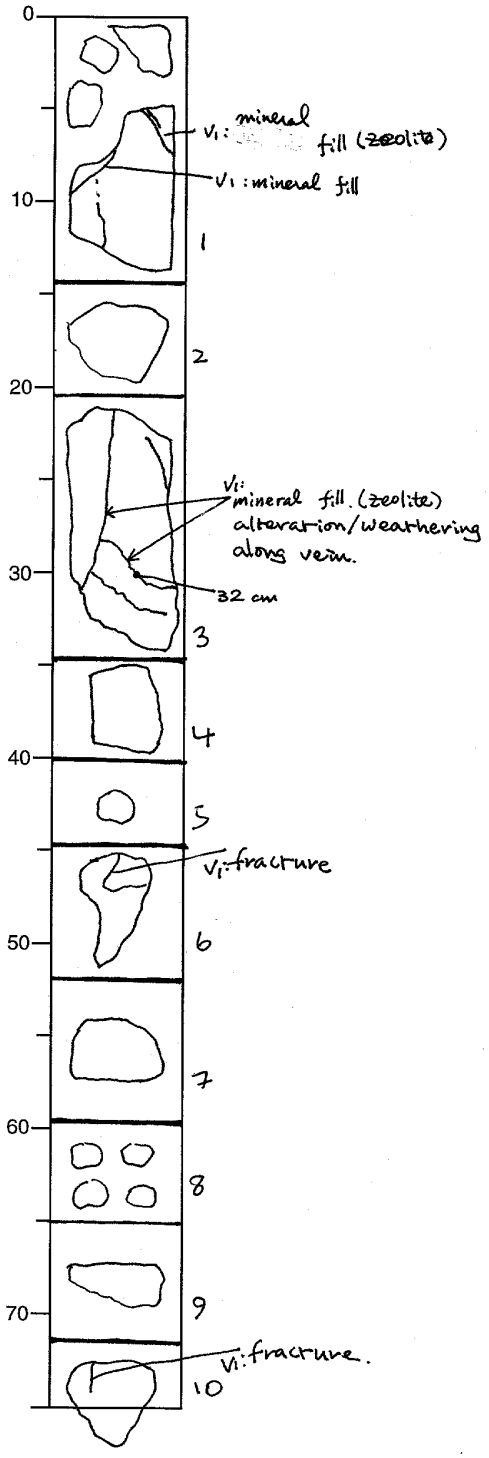

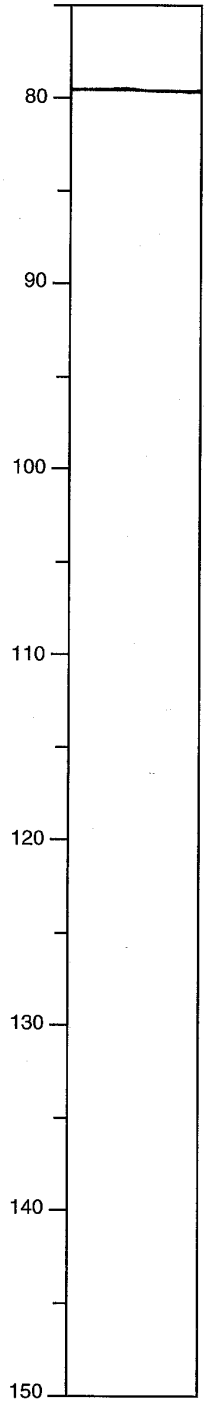

STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Se
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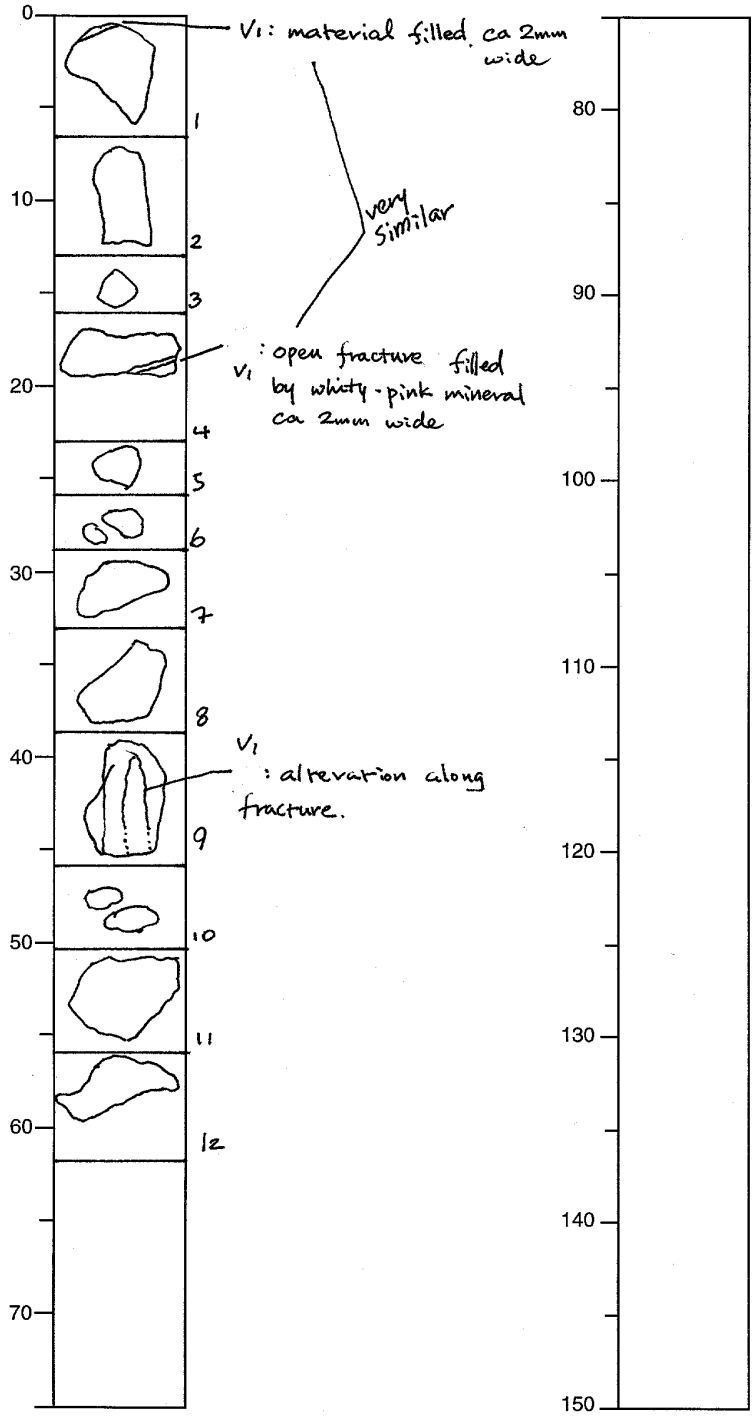
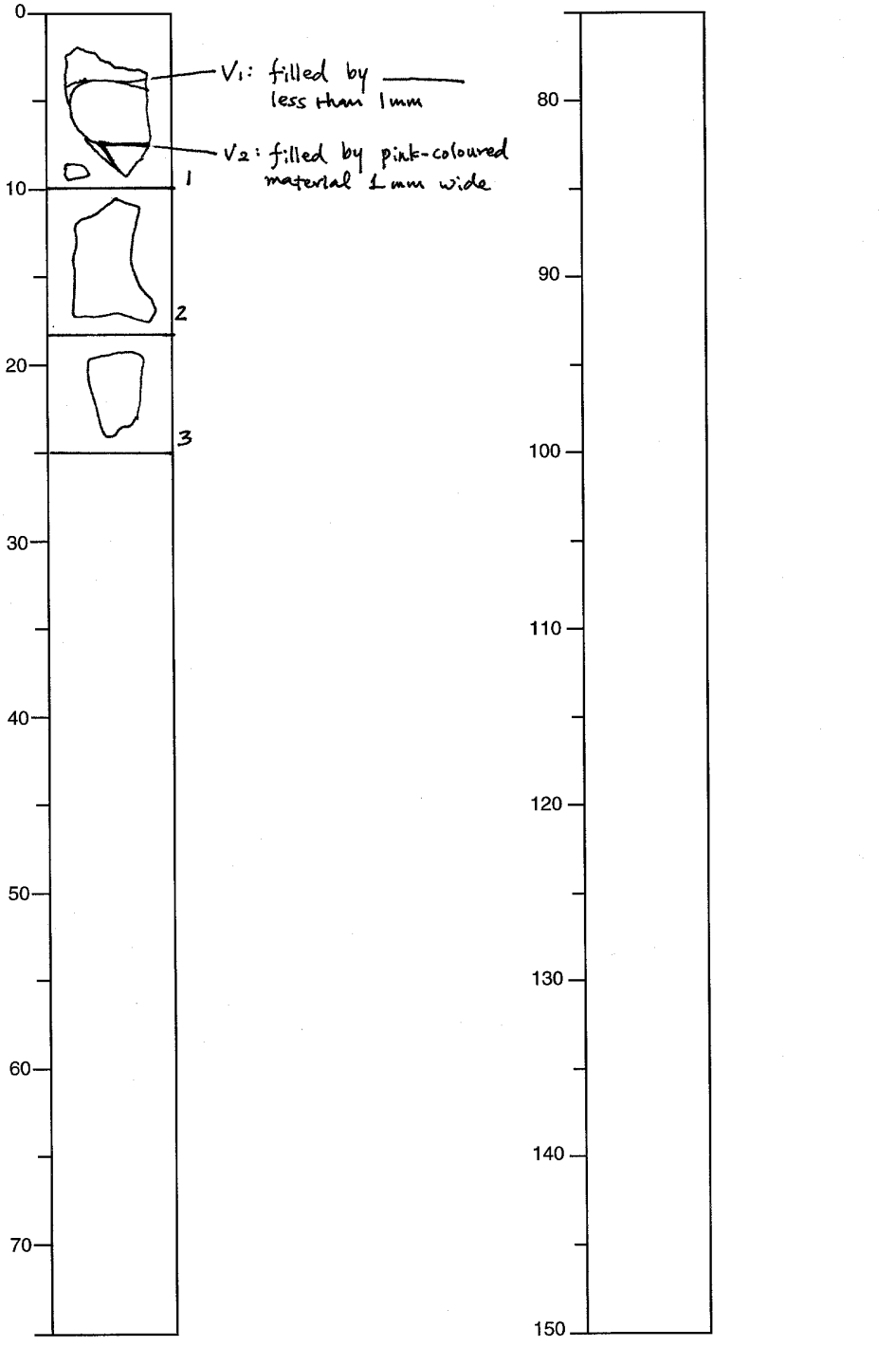


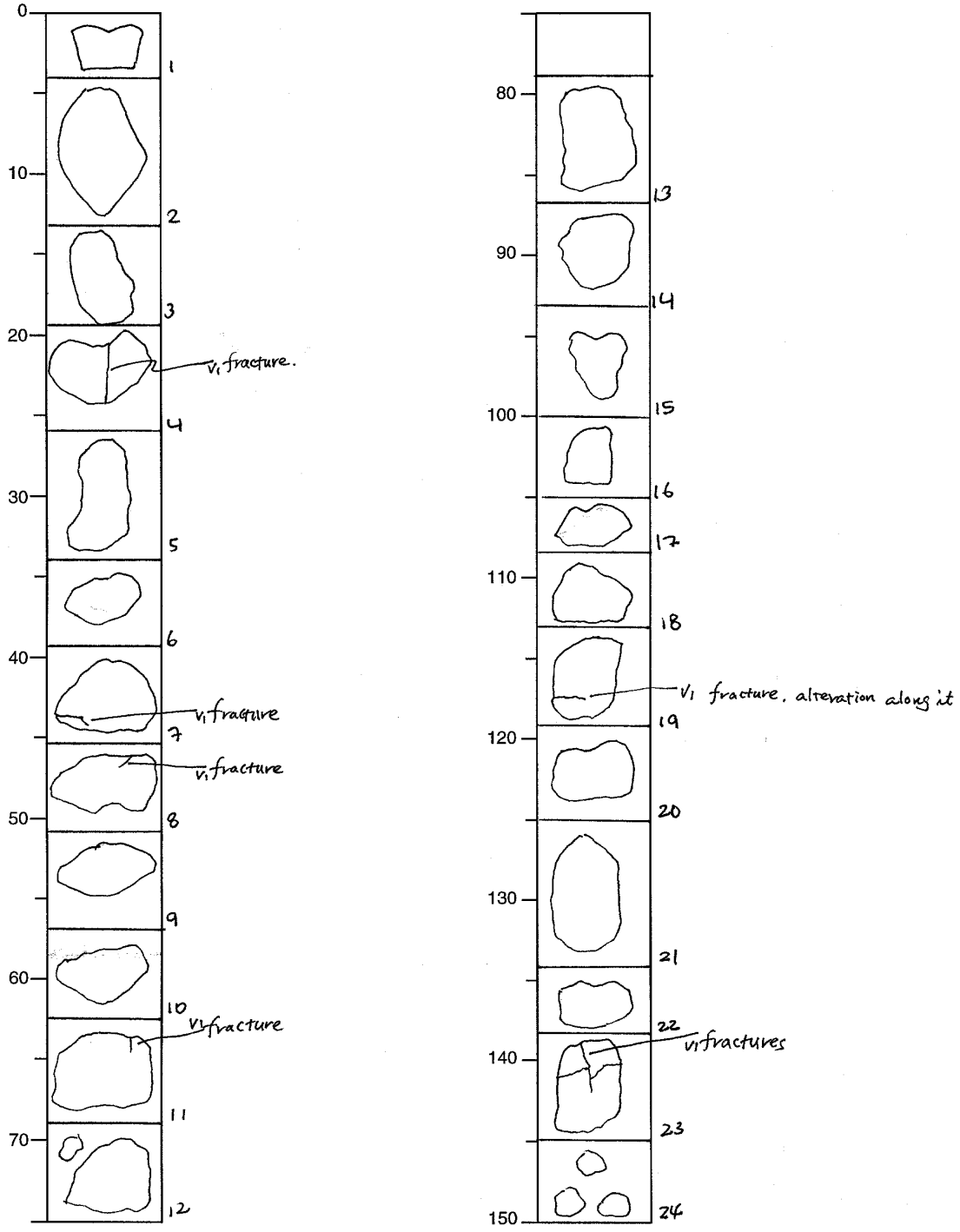
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1152B	3R	1



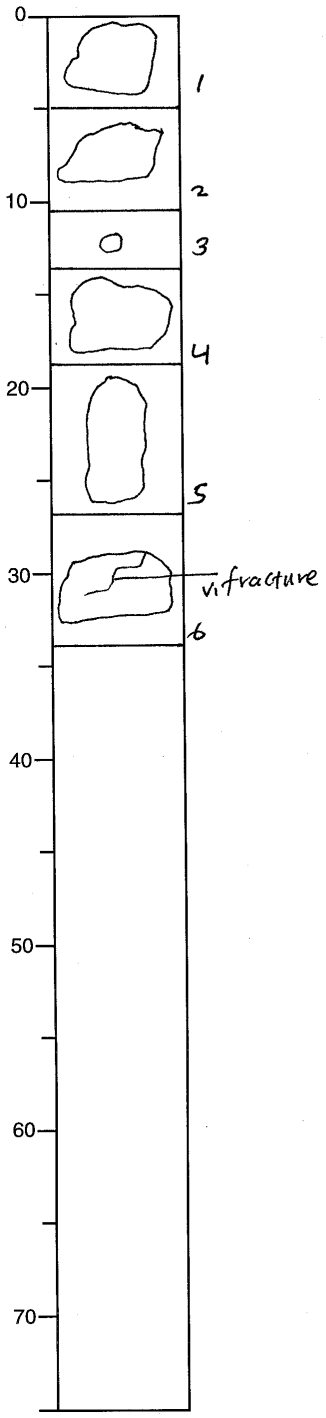
STRUCTURAL GEOLOGY DESCRIPTION

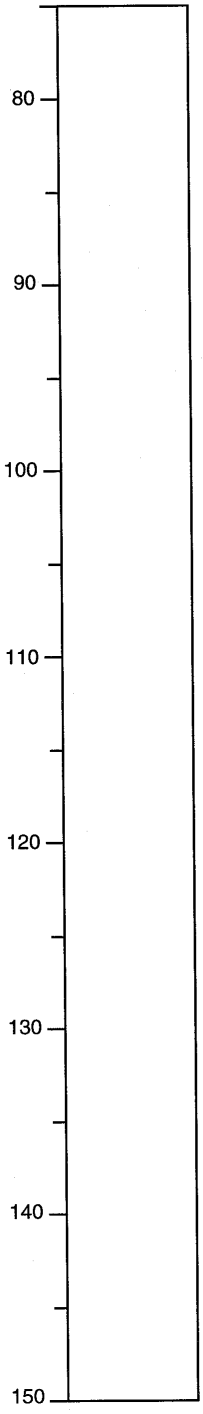
Leg	Hole	Core	Section	Observer
187	1152B	4R	1	HS



STRUCTURAL GEOLOGY DESCRIPTION

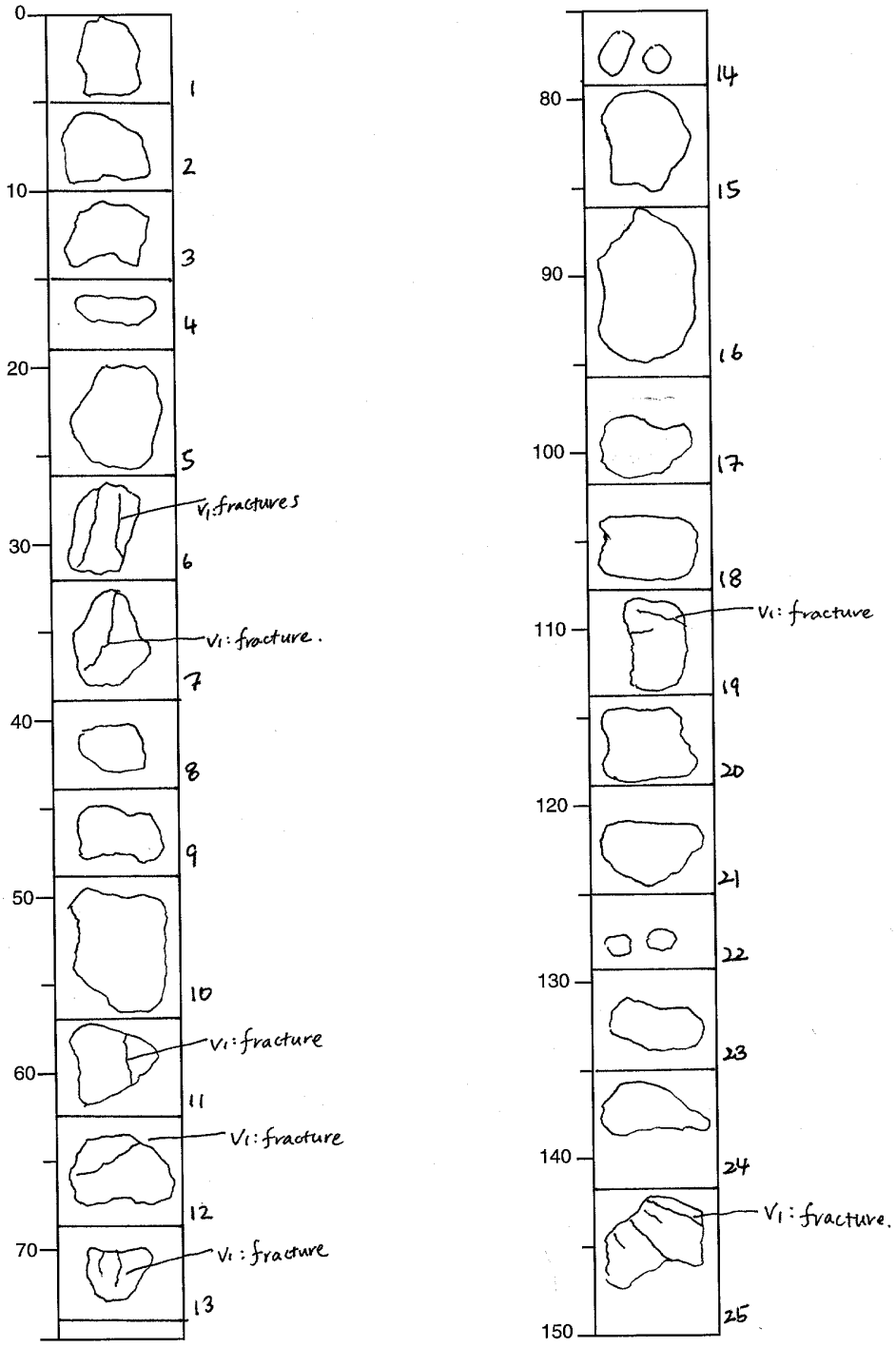
Leg	Hole	Core	Sectio
187	1152	4R	2





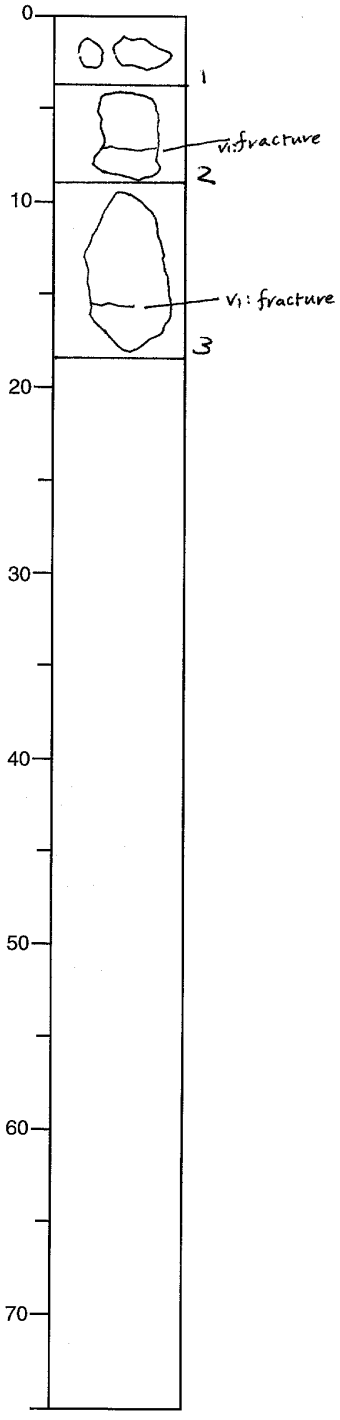
STRUCTURAL GEOLOGY DESCRIPTION

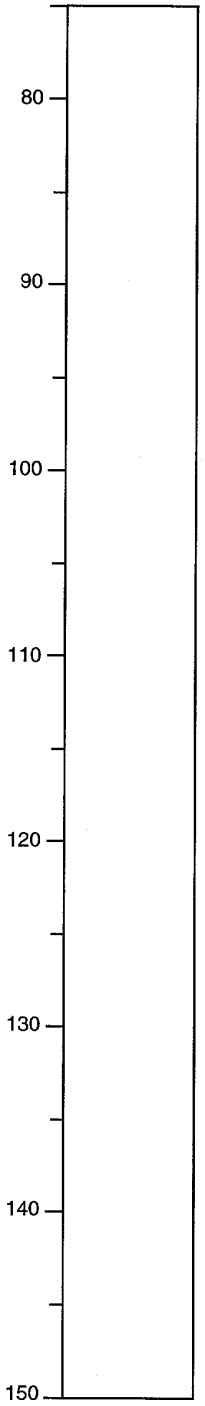
Leg	Hole	Core	Section
187	1152B	5R	1



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1152B	5R	2.





STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1152B	6R	1