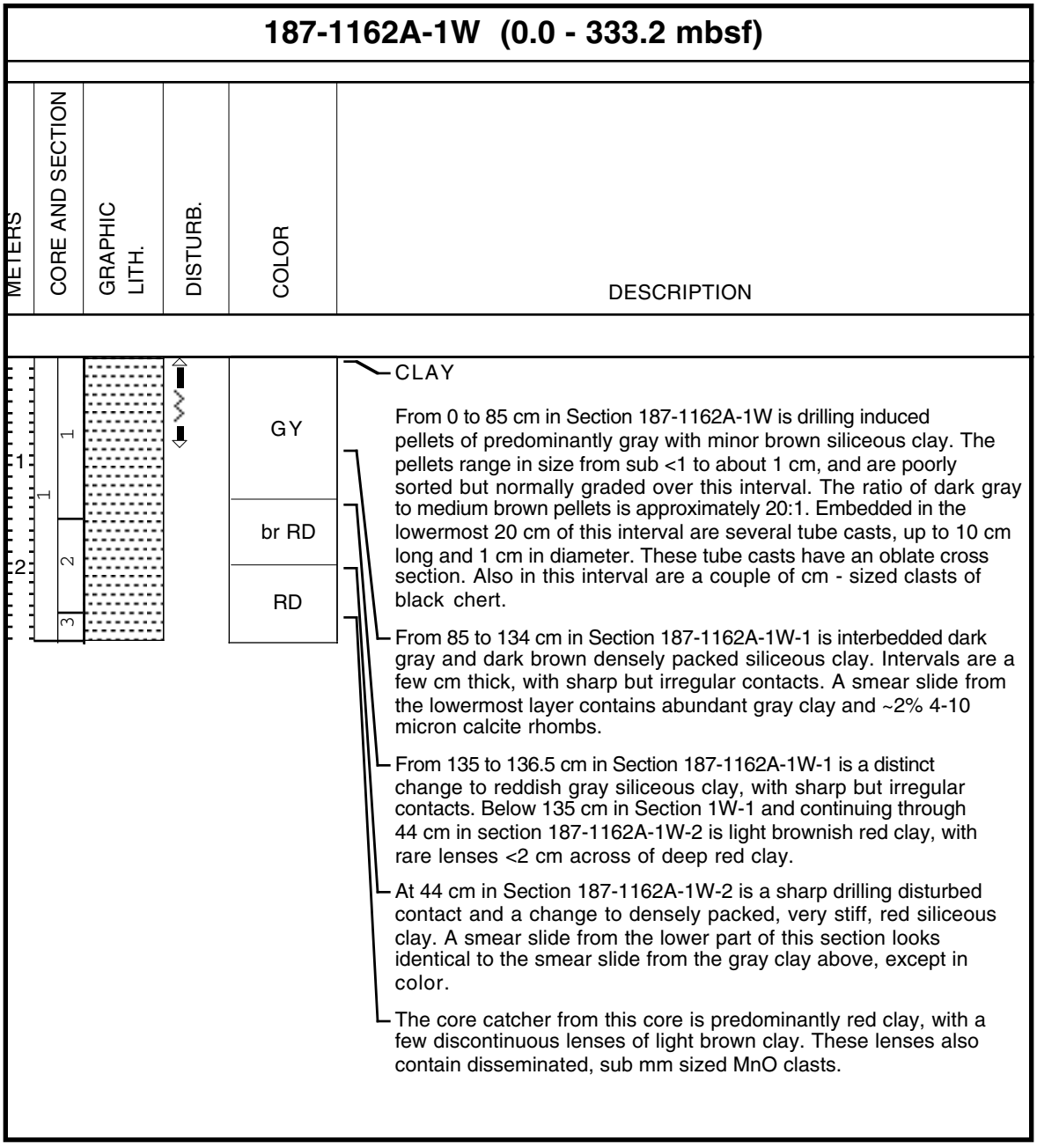
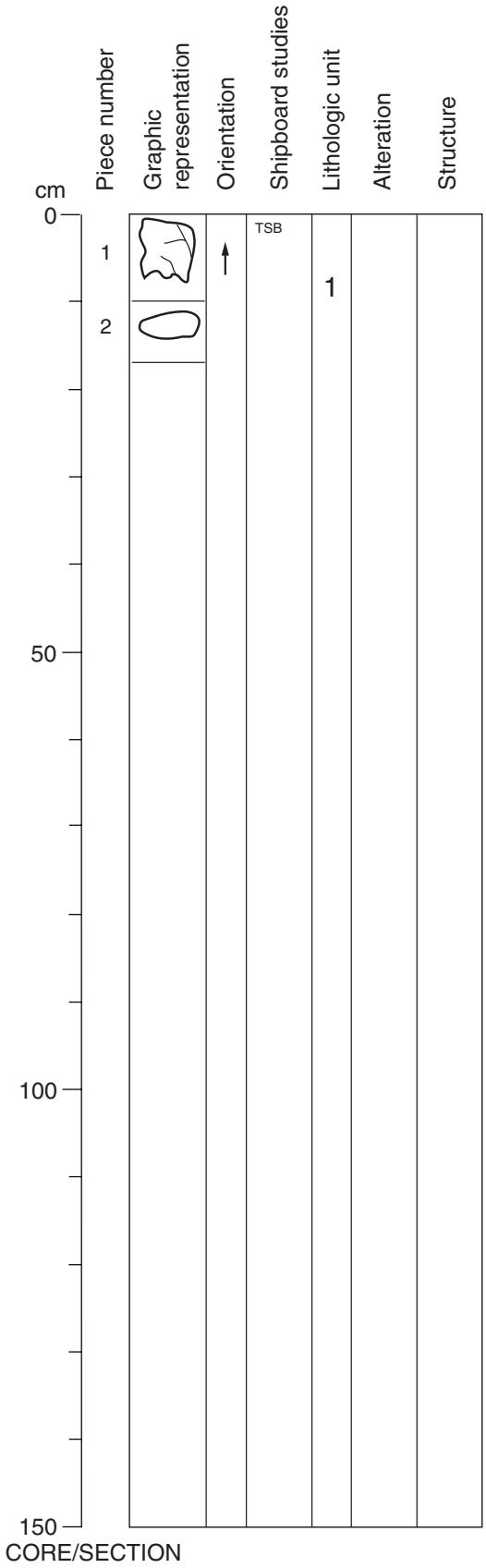
Core Photo


187-1162A-1W (0.0 - 333.2 mbsf)
METERS
CORE AND SECTION
GRAPHIC LITH.
DISTURB.
COLOR
DESCRIPTION
1
2
1
2
3
GY
br RD
RD
CLAY
From 0 to 85 cm in Section 187-1162A-1W is drilling induced pellets of predominantly gray with minor brown siliceous clay. The pellets range in size from sub <1 to about 1 cm, and are poorly sorted but normally graded over this interval. The ratio of dark gray to medium brown pellets is approximately 20:1. Embedded in the lowermost 20 cm of this interval are several tube casts, up to 10 cm long and 1 cm in diameter. These tube casts have an oblate cross section. Also in this interval are a couple of cm - sized clasts of black chert.
From 85 to 134 cm in Section 187-1162A-1W-1 is interbedded dark gray and dark brown densely packed siliceous clay. Intervals are a few cm thick, with sharp but irregular contacts. A smear slide from the lowermost layer contains abundant gray clay and ~2% 4-10 micron calcite rhombs.
From 135 to 136.5 cm in Section 187-1162A-1W-1 is a distinct change to reddish gray siliceous clay, with sharp but irregular contacts. Below 135 cm in Section 1W-1 and continuing through 44 cm in section 187-1162A-1W-2 is light brownish red clay, with rare lenses <2 cm across of deep red clay.
At 44 cm in Section 187-1162A-1W-2 is a sharp drilling disturbed contact and a change to densely packed, very stiff, red siliceous clay. A smear slide from the lower part of this section looks identical to the smear slide from the gray clay above, except in color.
The core catcher from this core is predominantly red clay, with a few discontinuous lenses of light brown clay. These lenses also contain disseminated, sub mm sized MnO clasts.

Core Photo



187-1162A-2R-1

UNIT 1: MIXED IGNEOUS CLASTS

PIECES 1-2

There is no distinguishable relationship between the pieces.

Piece 1: Altered basalt possibly andesitic

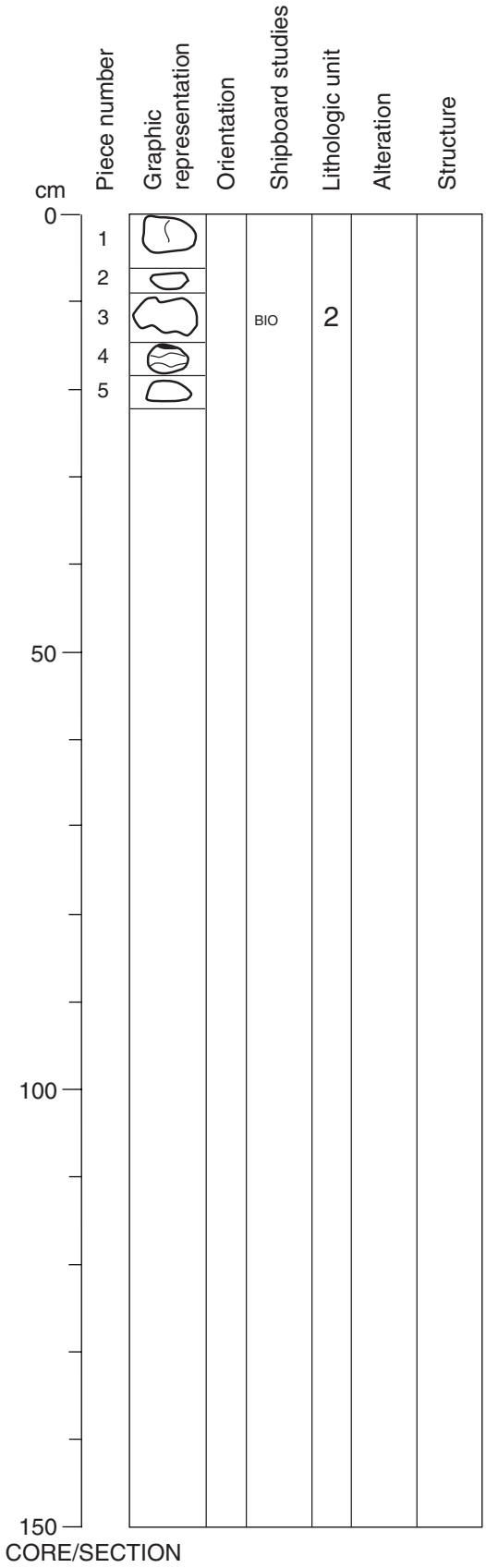
GROUNDMASS: Microcrystalline
COLOR: Red-purple and green to cream
VEINS/FRACTURES: Two veins infilled by chlorite and silica, ~0.7 mm wide
ALTERATION: Very high
ADDITIONAL COMMENTS: Vertical subparallel lineations of coalesced and discrete spherulites which increase in size from <0.4 mm at the outer edge to ~2 mm towards the center of the piece. Some of the larger (>1 mm) spherulites have a black, occasionally brown-red, shiny core which may be original black glassy material. This is concentrically ringed by (from the center of the spherulite outward) a pink-brown mineral (Fe dominated), a colorless zone and a white crystalline zone, then the actinolite/chlorite groundmass (replacing a Fe-Mg groundmass).

Piece 2: Altered moderately plagioclase phyric basalt

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2	1.5	3	<1	rounded to prismatic
Total	2				

GROUNDMASS: Fine grained
COLOR: Brown to orange-brown
VEINS/FRACTURES: One vein infilled silica <0.2 mm wide in Piece 2.
ALTERATION: Very high
ADDITIONAL COMMENTS: Interlocking Fe-stained groundmass. A second phase (~1.5 mm) is present which has been replaced by Fe oxyhydroxide(?) and has a plumose/dendritic habit.

Core Photo



187-1162A-3R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-5

The section consists of a dolomite cemented breccia and altered basalt fragments.

Pieces 4 and 5: Sparsely plagioclase phyric basalt

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	<2	1.5	3	<1	rounded to prismatic
Total	<2				

GROUNDMASS: Fine grained
COLOR: Piece 5 is buff and Piece 4 is green gray.
VEINS/FRACTURES: Open fractures lined with Mn oxide <0.2 mm wide.
ALTERATION: Very highly altered. Piece 4 has a chloritized groundmass and ~40% of the plagioclase is opaque and cream colored. Piece 5 is very highly altered to clays and Mn oxide.

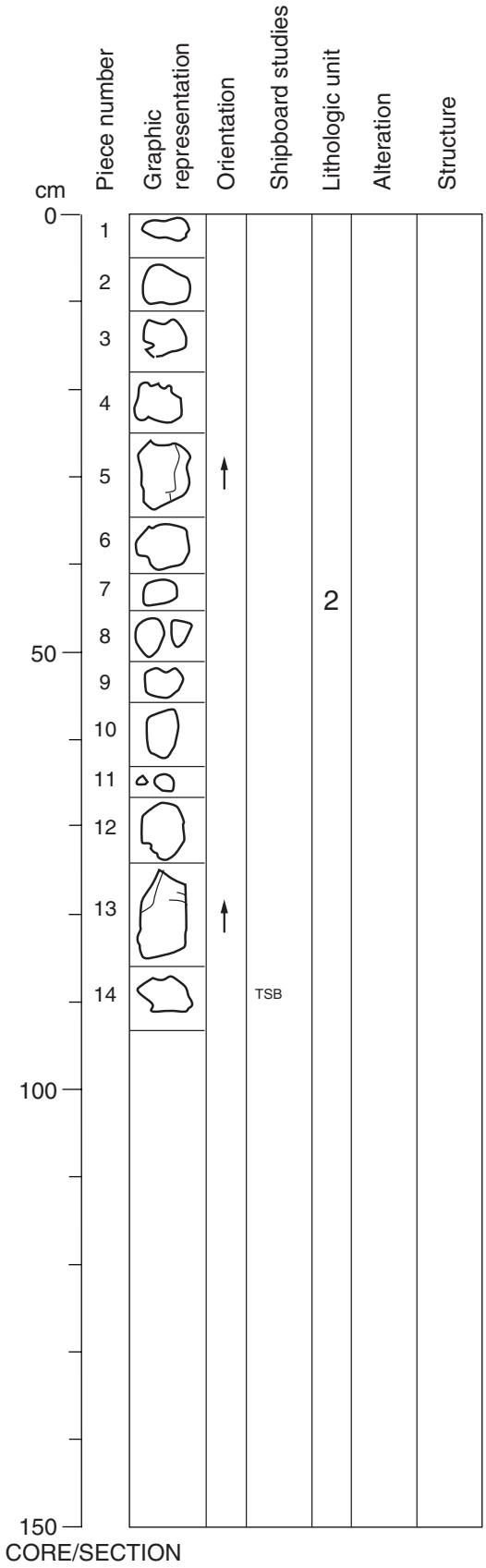
Pieces 1, 2 and 3: Dolomite-cemented basalt-breccia

BRECCIA: The breccia is poorly sorted overall with a bimodal clast distribution. The color ranges from pink-red-purple to orange-brown. The breccia is matrix supported with a clast to matrix ratio of ~90:10. The clasts are ~90% highly altered basalt clasts, ~10% highly altered palagonite and palagonite. Clast size ranges from ~30 mm to <0.5 mm, clasts between 20 and 10 mm are rare.

Clasts: The subangular to subrounded basaltic clasts vary from >30 mm (terminated by side of piece) to <1 mm and are fine grained highly altered basalt. Vein in Piece 1 cuts a basaltic clast (fractured 'in situ') and is 2 mm wide infilled by pink-cream matrix similar to that of the sediment. Palagonite clasts are rounded to subangular clasts and smaller than the basalt clasts, <1-4 mm.

Matrix: Pale pink to orange-cream and granular. When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction.

Core Photo



187-1162A-4R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-14

This section consists of a dolomite cemented basaltic breccia (Pieces 1-12), a chlorite bearing cataclasite (Piece 13) and a diabase clast (Piece 14).

Piece 14: Metamicrogabbro

MATRIX PHASES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	49	1.2	2	<1	subrounded
Olivine	1	0.5	1.2		?
Amphibole replacing clinopyroxene	45	1.5	2	<1	
Opaque minerals	5				
Total	100				

MATRIX: Medium grained
COLOR: Speckled dark green and buff-cream.
ALTERATION: High (~60%). Olivine completely replaced by Fe oxyhydroxide, clinopyroxene in groundmass ~95% replaced by dark green actinolite (in thin section), chlorite is also present. This rock appears to have undergone greenschist facies metamorphism.

Pieces 1-12: Dolomite-cemented basalt breccia

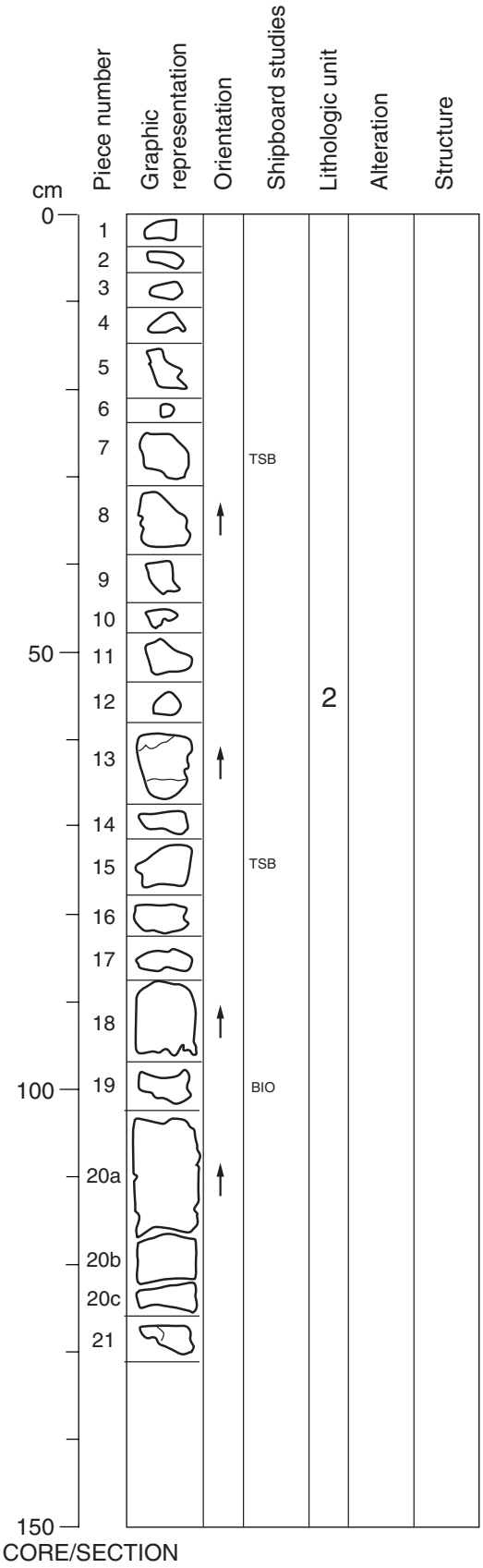
Poorly sorted matrix supported basalt breccia, cemented by reddish white to grayish green clay and dolomite.

CLASTS: Basaltic clasts dominate the breccia. They comprise moderately to highly altered aphyric basalt (Piece 1, 2, 3, 4, 6), highly altered, medium grained plagioclase-? basalt (Piece 10 and 12) and a greenish gray cataclasite (Piece 4 and 5). The average clast size is 0.5-1 cm, but is as small as 0.5-3 mm. The maximum sized clasts are 8 x 3.5 cm and 3 x 2 cm cataclasites in Piece 4 and 5. Clasts are subangular to subrounded. The aphyric basalt clasts are medium gray when moderately altered and greenish gray when highly altered. No alteration halos are observed indicating pervasive alteration. Clinopyroxene of the medium grained basalt clasts (Piece 10 and 12) is largely altered to Fe oxyhydroxide. In Piece 3, there are clasts of epidote(?) (0.5-1.3 mm) surrounded by white clay.
MATRIX: The matrix is made of reddish white to grayish green clay and dolomite. When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless dolomite in open cavities, initially there is little or no reaction until the sample is finely crushed and/or heated. Piece 3 has cavities filled with distorted rhombs of dolomite (also requires crushing and heating).

Piece 13: Cataclasite

STRUCTURE: Parallel sets of 1-3 mm wide, grayish green shear zones dissect the piece at an angle 30˚ from the vertical. The larger shear zones are connected by smaller (<0.5 mm), subvertical shear planes.
COLOR: Dark green.
CLASTS: The clasts are exclusively highly altered aphyric basalt, ranging from 1 to 10 mm, except for a 4 x 1 cm angular clast at the top of the piece. All clasts are cut by minute veins, consisting of the same greenish grey material as the large shear zones.
MATRIX: The matrix is greenish gray silt sized material, probably dolomite plus chlorite.

Core Photo



187-1162A-5R-1

UNIT 2: DOLOMITE CEMENTED BASALT BRECCIA

PIECES 1-21

The section consists of a dolomite-cemented breccia, highly altered basalt fragments and clasts of metamicrogabbro.

Pieces 1, 2, 5 and 7: Metamicrogabbro

MATRIX PHASES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	49	1.2	2	<1	subrounded
Olivine	1	0.5			?
Amphibole replacing clinopyroxene	45	1.5	2	<1	
Opaque minerals	5				
Total	100				

MATRIX: Medium grained
COLOR: Speckled dark green and buff-cream.
ALTERATION: High (~60%). Olivine completely replaced by Fe oxyhydroxide, clinopyroxene in groundmass ~95% replaced by dark green actinolite (in thin section), chlorite is also present.
ADDITIONAL COMMENTS: These pieces appear to be the continuation of the lowermost part (Piece 14) of Section 187 1162A-4R-1.

Pieces 8-14 and 16: Aphyric to moderately plagioclase-olivine phyric basalt

These pieces may all be clasts from the breccia described below.

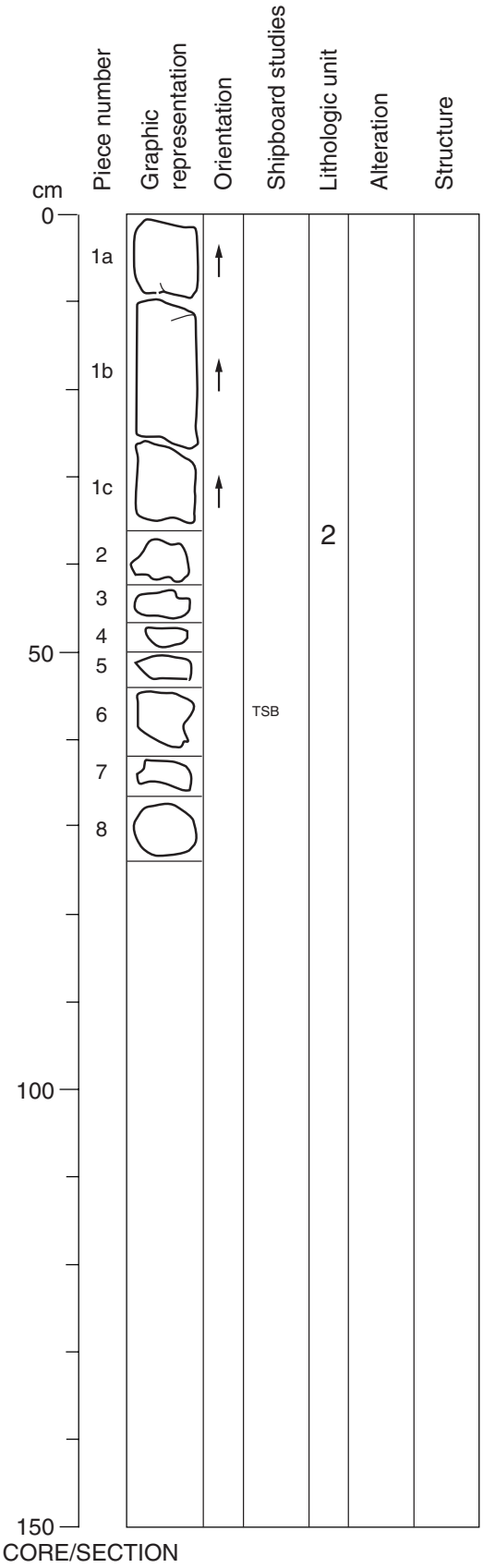
PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	5-7	3	4	0.5	prismatic to rounded
Olivine	3	1.5	2	0.5	equant
Total	5-10				

GROUNDMASS: Fine grained consisting of plagioclase and clinopyroxene to intersertal.
COLOR: Brownish gray
VEINS/FRACTURES: Piece 13 has a 0.5 mm wide vein filled with crystalline carbonate which requires heating to react with diluted HCl.
ALTERATION: Highly altered throughout. Pervasive replacement of groundmass clinopyroxene and olivine by Fe oxyhydroxide and chlorite. This type of alteration is patchy in Piece 13, being most intense along the outer margins of the piece. Plagioclase phenocrysts appear dark and crystal edges diffuse, indicating partial alteration. Metamorphism has taken place at least prehnite-pumpellyite facies conditions.

Pieces 3, 4, 6, and 16-21: Dolomite-cemented basalt breccia

CLASTS: There is no apparent sorting of clasts which range in size from 30 to 3 mm. All clasts are angular to subangular and are matrix supported. The basaltic clasts are comprised of moderately to highly altered aphyric basalt (Pieces 3, 4, 5, and 16). Piece 17 also contains a clast of a highly altered plagioclase-olivine phyric basalt, similar to the single pieces in this section. Piece 21 is a large, 50 mm, clast of aphyric basalt with dolomite matrix coating the side (opposite cut face) of the piece.
MATRIX: The matrix is made of pinkish red to pale white crystalline dolomite which reacts slowly with diluted HCl, and green chlorite. All pieces have several mm sized cavities filled with rhombohedral dolomite.
ADDITIONAL COMMENTS: Piece 18 (and to a lesser extent Piece 20) has oblique planes of chloritized matrix ~5 mm wide which appear to be partially wrapped around clasts. These could be interpreted as shear planes which have been subject to fluid associated alteration.

Core Photo



187-1162A-5R-2

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-8

The section consists of a dolomite-cemented breccia and clasts of highly altered basalt fragments.

Pieces 5, 6, 7 and 8: Highly plagioclase-olivine phyric basalt

These pieces may all be clasts from the breccia described below.

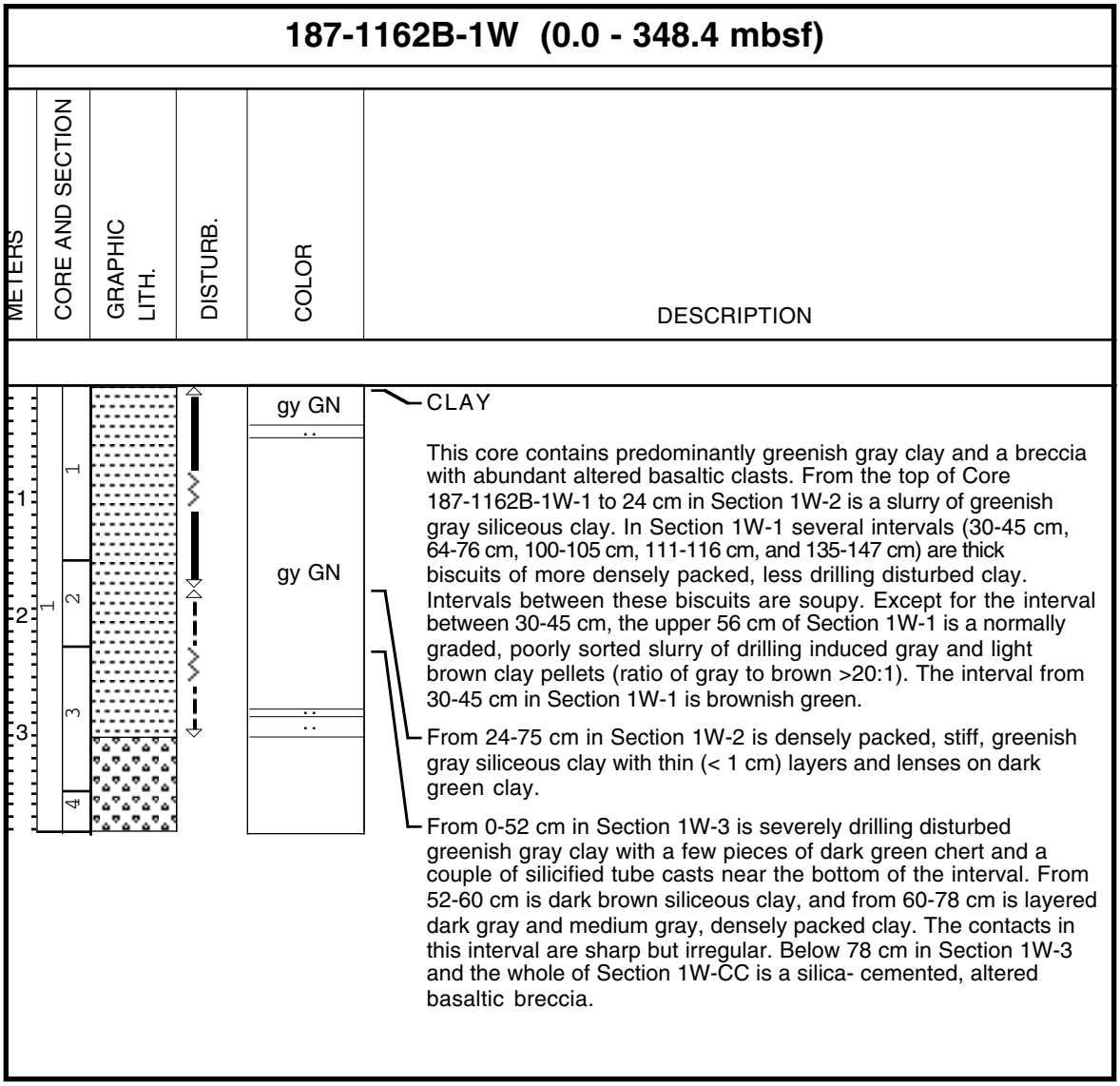
PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	20	3	8	1	prismatic rounded
Olivine	3	<1	3		equant
Total	23				

GROUNDMASS: Fine grained
COLOR: Pink-buff
VEINS/FRACTURES: Piece 5 has a fracture ~2 mm wide infilled with dolomite sediment.
ALTERATION: Highly altered.
ADDITIONAL COMMENTS: Plagioclase appears dark brown black on cut face because of fracture cleavage concentrated alteration.

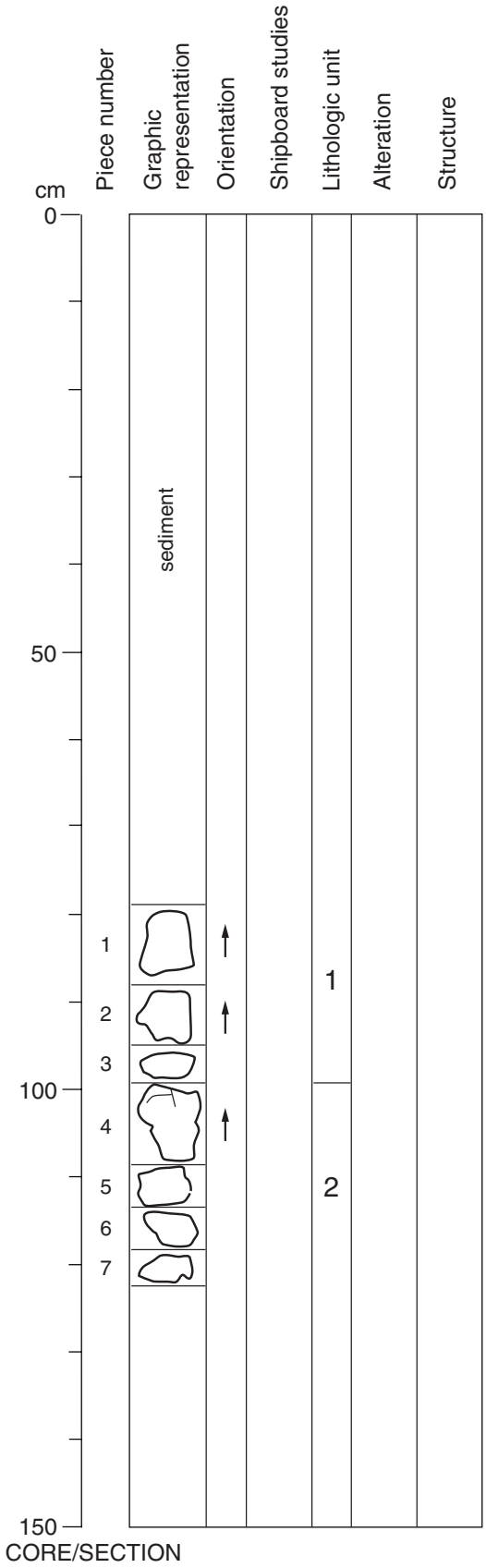
Pieces 1 to 4: Dolomite-cemented basalt breccia

CLASTS: Pieces 1a, 1b, 1c, 2, 3 and 4 (the first 3 described below as one typical piece). Clasts are moderately to highly altered, subrounded to sub angular and are matrix supported. Clast to matrix proportions are ~85:15. The largest clasts in the red matrix are smaller than those in the gray-green matrix, ~15-20 mm vs. ~25-35 mm respectively. The larger clasts in the red matrix are fine-grained aphyric to plagioclase phyric basalt, larger clasts in the gray-green matrix are coarser grained and similar to the ophimottled meta diabase in 1162A-5R-1 (e.g Piece 7). The dominant clast type is the fine-grained basalt (~70%) and there is no glass or palagonite. Unlike earlier breccias the clasts have no Mn oxide coating and Mn oxide is very rare in the matrix.
MATRIX: Two matrix colors, the top 15 mm has a red (oxidized) matrix with brown (Fe) stained clasts, below this is 80 mm of gray green matrix. Dolomite/high Mg calcite lines rare vugs up to 10 mm wide (e.g., Piece 4) forming typical 'saddle-shaped' distorted rhombohedral crystals of dolomite which react slowly but continuously with diluted HCl after crushing (heating increases the rate of reaction). More perfect rhombohedral crystals and colorless granules constitute ~75% of the matrix which are also slow to react with HCl (also dolomite). The remainder of the matrix is clay, and detrital igneous derived grains.

Core Photo


187-1162B-1W (0.0 - 348.4 mbsf)
METERS
CORE AND SECTION
GRAPHIC LITH.
DISTURB.
COLOR
DESCRIPTION
1
2
3
1
2
3
4
gy GN
gy GN
CLAY
This core contains predominantly greenish gray clay and a breccia with abundant altered basaltic clasts. From the top of Core 187-1162B-1W-1 to 24 cm in Section 1W-2 is a slurry of greenish gray siliceous clay. In Section 1W-1 several intervals (30-45 cm, 64-76 cm, 100-105 cm, 111-116 cm, and 135-147 cm) are thick biscuits of more densely packed, less drilling disturbed clay. Intervals between these biscuits are soupy. Except for the interval between 30-45 cm, the upper 56 cm of Section 1W-1 is a normally graded, poorly sorted slurry of drilling induced gray and light brown clay pellets (ratio of gray to brown >20:1). The interval from 30-45 cm in Section 1W-1 is brownish green.
From 24-75 cm in Section 1W-2 is densely packed, stiff, greenish gray siliceous clay with thin (< 1 cm) layers and lenses on dark green clay.
From 0-52 cm in Section 1W-3 is severely drilling disturbed greenish gray clay with a few pieces of dark green chert and a couple of silicified tube casts near the bottom of the interval. From 52-60 cm is dark brown siliceous clay, and from 60-78 cm is layered dark gray and medium gray, densely packed clay. The contacts in this interval are sharp but irregular. Below 78 cm in Section 1W-3 and the whole of Section 1W-CC is a silica- cemented, altered basaltic breccia.

Core Photo



187-1162B-1W-3

UNIT 1: DOLOMITE

PIECES 1-3

Pink-brown to mottled pink and cream and composed predominantly of dolomite crystals which require crushing and heating to react with diluted HCl, these three pieces are increasingly lithified down the section. Piece 1 consists of unlithified crystals of dolomite (<0.2 mm) with some (<2%) Mn oxide nodules often with black halos up to 15 mm wide. Similar sized oxidized Fe patches also occur. Piece 3 has a patch of coarser grained sediment consisting of coarser dolomite and highly altered palagonite (yellow concentric nodules <1 mm). These coarser areas have Mn oxide dendritic borders which extend down into the finer grained sediment.

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 4-7

The section consists of a dolomite cemented breccia and clasts of highly altered basalt fragments.

Pieces 5 and 6: Moderately plagioclase-olivine phyric basalt

These pieces may all be clasts from the breccia described below.

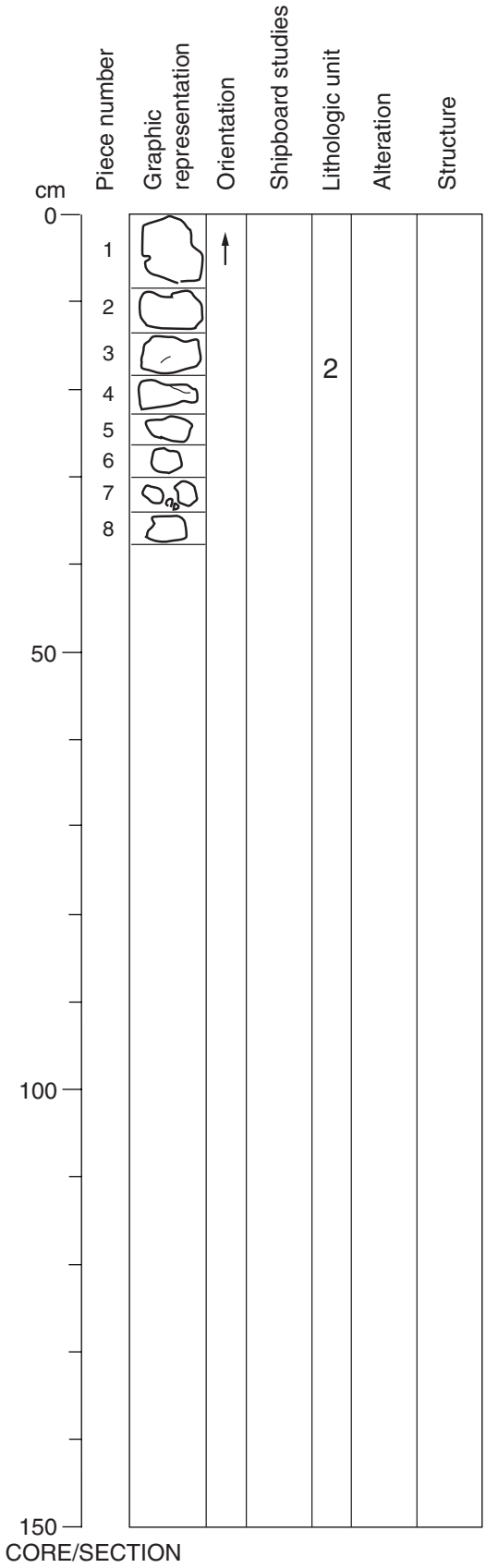
PHENOCRYSTS:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	4	1	1.2	<1	prismatic
Olivine	3	<1	<1	<1	?
Total	7				

GROUNDMASS: Fine grained
COLOR: Brown
VEINS/FRACTURES: Both pieces have a carbonate rhomb vein face on one outside edge.
ALTERATION: Highly altered, brown clay replacing all groundmass. Olivine has been completely replaced by Fe oxyhydroxide, making size and modal percentage estimates difficult.
ADDITIONAL COMMENTS: Glomerocrysts of olivine and plagioclase up to 6 mm are comprised of numerous (>20) small (<0.5 mm) crystals, and make up ~50% of the phenocrysts.

Pieces 4 and 7: Dolomite-cemented basalt breccia

CLASTS: A matrix supported breccia (clast to matrix ratio ~50:50) containing clasts of aphyric basalt and palagonite. The subangular highly altered brown clasts of aphyric basalt show some evidence of 'in situ' fracturing (e.g., Piece 4) has a clast broken into 3 pieces separated by open fractures ~10 mm wide lined with sparse dolomite rhombs. This fracturing could have been syn- or post-lithification. Palagonite clasts are rounded and highly altered to yellow clays (e.g., Piece 7). Rare (<1%) small (<5 mm) clasts in Piece 7 of a green crystalline phase in cream-white clay may be epidote.
MATRIX: The matrix in Piece 4 reacts more readily with diluted HCl than the previous breccias both in this section and Hole 1162A. This may be due to the presence of a calcite/dolomite mixture, Piece 4 is paler colored than other breccias we have recovered. Piece 7 has a open cavity lined with carbonate rhombs on one outside face.

Core Photo



187-1162B-1W-CC

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

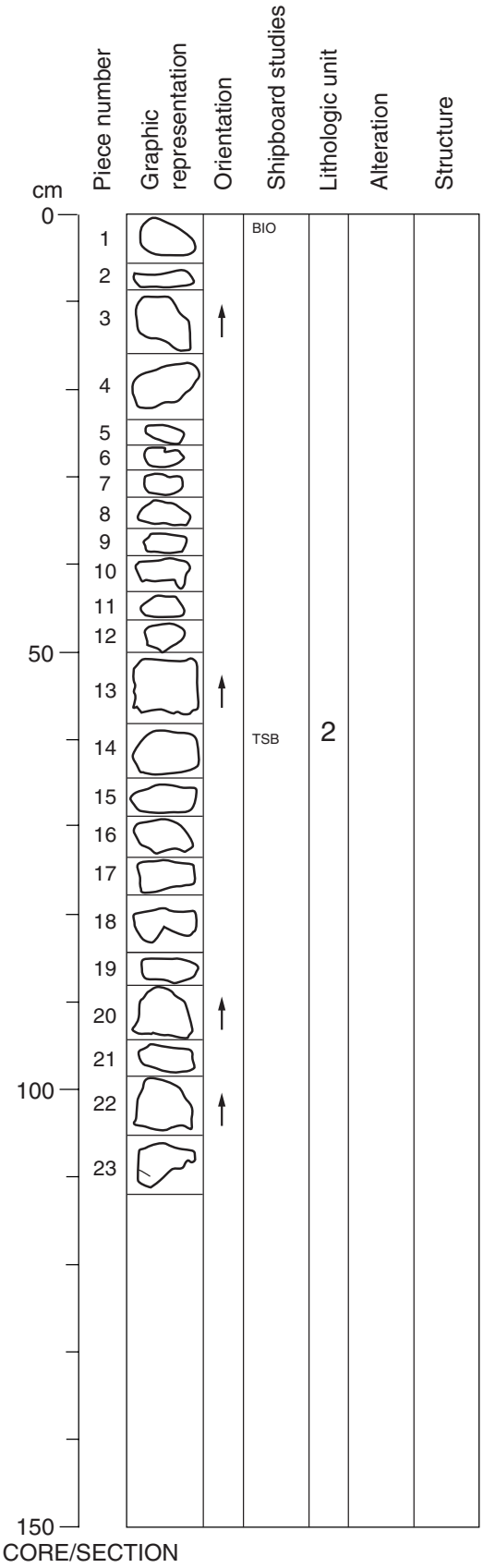
PIECES 1-8

The section consists of a dolomite-cemented breccia and clasts of highly altered basalt fragments.

CLASTS: A matrix supported breccia (clast to matrix ratio ~40:60), the majority (~98%) of clasts are aphyric basalt, phyric basalt and palagonite. Clast size ranges from ~20 mm to <0.5 mm. Basalt clasts are highly altered to orange-brown and red-brown clays (as is some palagonite). Palagonite is also a cream-yellow-green color. Basalt clasts (up to 20 mm) may be angular, e.g., box shaped in Piece 1 to subrounded. Some pieces have amygduales or open vesicles up to 2.5 mm across (e.g., Piece 2). Palagonite clasts (up to 15 mm) are rounded concentric nodules or clay which show a plastically deformed shape (prior to inclusion in this sediment(?); e.g., Piece 2). Piece 2 clasts also show concentric clay zoning in the palagonite clasts. There are also small, < 3 mm, green-gray crystalline clasts and <1 mm Mn oxide nodules. Approximately 30% of the larger clasts (>10 mm) have Mn oxide coatings. Open cavities partially filled with dolomite rhombs occur throughout the section on outside edges of the pieces (e.g., Piece 1).

MATRIX: The matrix is cream and composed of silt and clay sized particles with granular dolomite/calcite.

Core Photo



187-1162B-2R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-23

The section consists of a dolomite-cemented breccia and clasts of highly altered basalt fragments.

Pieces 3, 4, 5, 6, 7, 8, 19, and 21: Sparsely to moderately plagioclase-olivine phyric basalt

These pieces have little or no associated breccia, but of identical lithology to clasts seen in the rest of the breccia described below.

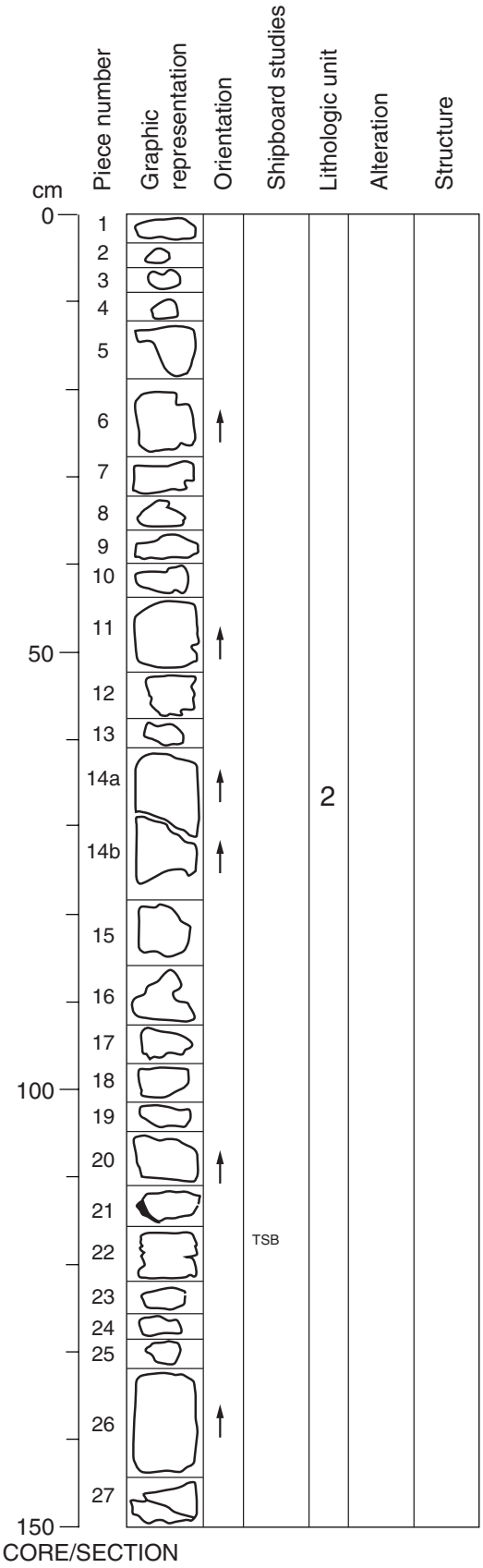
PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	3	1	4	<1	prismatic
Olivine	1	<1	1	<1	?
Total	4				

GROUNDMASS: Fine grained
COLOR: Brown
VEINS/FRACTURES: Both pieces have a carbonate rhomb vein face on one outside edge.
ALTERATION: Highly altered, brown clay replacing all groundmass. Olivine has been completely replaced by Fe oxyhydroxide, making size and modal percentage estimates difficult. The outer surfaces of most pieces have Mn oxide spots (~0.5 mm in diameter) and patchy dendritic Mn oxide coating.
STRUCTURE: Piece 21 has a 1.5 cm thick chilled margin with the outer 2.5 mm being strongly palagonitized, and this piece has an arcuate shape, both features of pillow lava debris.
ADDITIONAL COMMENTS: Olivine is mainly present with plagioclase in glomerocrysts which are made up of ~25% of phenocrysts (e.g., Piece 3). The pieces are large ranging in size from pebble-sized in Pieces 5, 6, 7, and 19 to cobble-sized (up to 7 cm across in Piece 4), these pieces have rounded outer surfaces with the exception of Piece 3 which has a drilled outer surface with angular top and bottom. Some basalt clasts contain vesicles up to 1 mm in diameter that are unfilled.

Pieces 1, 2, 9 to 18, 20, 22, and 23: Dolomite- cemented basalt breccia

CLASTS: A matrix supported breccia (clast to matrix ratio ~40:60), the clasts are poorly sorted and angular to subangular. and the clasts are either larger (7 cm to 3 mm) brown (highly altered) aphyric to moderately plagioclase basalt or smaller (1.7 cm to <1 mm) orange-brown glass fragments that have been completely palagonitized. The matrix has small Mn oxide spots throughout, ~0.5 mm up to 2 mm in diameter.
MATRIX: The matrix is a white to buff and has granular dolomite and clay to silt sized particles. In the interior of the breccia some clasts (~2%-3%) have rhombohedral dolomite lining the clast/matrix interface. The matrix is marbled with thin, <2 mm wide, crystalline colorless dolomite veins.

Core Photo



187-1162B-3R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-28

The section consists of a dolomite-cemented breccia and highly altered basalt fragments, with the exception of Piece 1: Green gray clay.

Pieces 2, 3, 10, 12, 15 and 21: Aphyric to moderately plagioclase-olivine phyric basalt

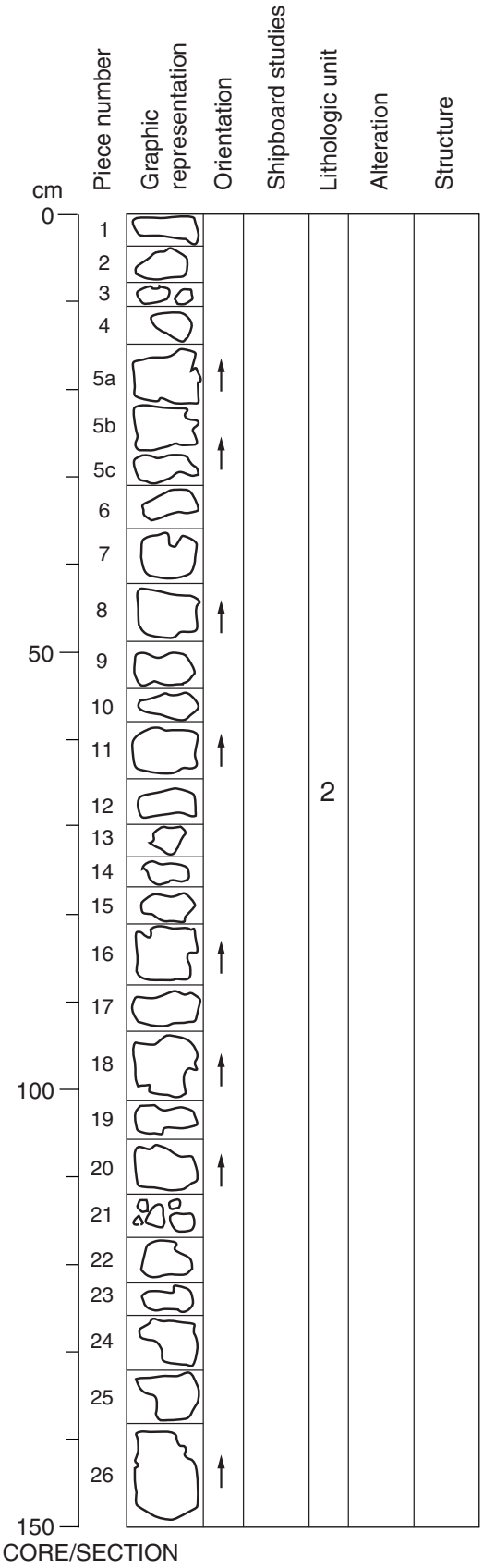
PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
Plagioclase	~3	1.5	3	<1	prismatic
Olivine	<1	0.5			?
Total	~3				

GROUNDMASS: Fine grained (when visible)
COLOR: Red-brown to orange brown (the freshest basalt is gray)
ALTERATION: Very high to high (~90 to 60%). Olivine completely replaced by Fe oxyhydroxide, groundmass by brown clays. Piece 10 has hematite spots with rhombs of carbonate on the outside of the clast (facing into some carbonate matrix). Oxidized margins (~3 mm) on Piece 21.
ADDITIONAL COMMENTS: Plagioclase and olivine glomerocrysts up to 4 mm (e.g., Piece 2). Olivine morphology and percentage is very difficult to asses because of alteration. Slickenslides lineation defined by quartz on the side of Piece 21.

Pieces 4 to 9, 11, 13, 14a, 14b, 16 to 20, and 22 to 28: Dolomite-cemented basalt breccia

BRECCIA: The breccia is poorly sorted overall and matrix supported with a clast to matrix ratio of ~40:60. The clasts are ~70% highly altered basalt clasts, ~25% highly altered palagonite. Clast size ranges from ~60 mm to <0.5 mm.
Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to subrounded. Palagonite clasts are rounded to subangular and smaller than the basalt clasts, <1-10 mm. Concentrically zoned clay within the palagonite is common. Piece 11 has a basalt clast with a chilled margin including the spherulitic zone. Epidote green clasts (~3 mm) of a clay and rare small (<3 mm) clasts of epidote(?) (e.g., Piece 28).
Matrix: Pale pink to cream with a network of colorless crystalline dolomite veins (<0.2 mm) (e.g., Piece 22), which includes fragments of the clasts and clays and Mn-oxide nodules (all <<0.5 mm). When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless carbonate in open cavities, initially there is little or no reaction until the sample is heated (dolomite).

Core Photo



187-1162B-3R-2

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

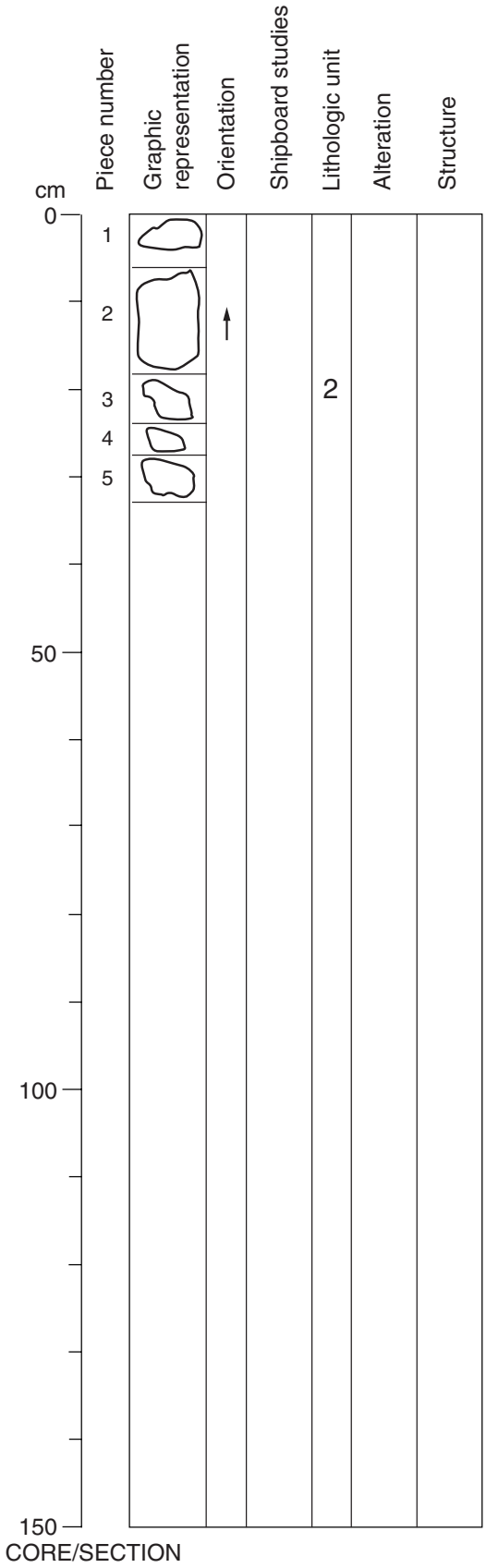
PIECES 1-26

BRECCIA: The breccia is poorly sorted overall and matrix supported with a clast to matrix ratio which varies from ~20:80 (e.g., Pieces 8 and 11) to ~70:30 (e.g., Piece 26). The clasts are ~75 % highly altered basalt clasts, ~25% highly altered palagonite. Clast size ranges from ~40 mm to <0.5 mm. Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to sub-rounded. Palagonite clasts are rounded to subangular and smaller than the basalt clasts, <1 - 10 mm. Piece 26 has a highly altered basalt clast with a chilled margin including the spherulitic zone. Epidote green clasts (~3 mm) of a clay, possibly altered palagonite are more common at the bottom of this section (e.g., Piece 26).

Matrix: Pale pink to cream with a network of colorless crystalline dolomite veins (up to 2 mm; e.g., Piece 7), which include fragments of the clasts and clays and Mn-oxide nodules (all <<0.5 mm). When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless carbonate in open cavities, initially there is little or no reaction until the sample is heated (dolomite).

ADDITIONAL COMMENTS: Piece 2 is a highly altered aphyric basalt clast with matrix adhering to the side.The groundmass is largely (~80%) replaced by clays and Fe oxyhydroxide. The basalt contains <1% altered olivine phenocrysts (0.5-1 mm). Piece 3 consists of two pebbles one of which has <1 mm of glass.

Core Photo



187-1162B-3R-3

UNIT 2: DOLOMITE-CEMENTED BRECCIA

PIECES 1-5

The section consists of a highly altered basalt fragments and a breccia that contains basalt clasts very similar to the single basalt pieces.

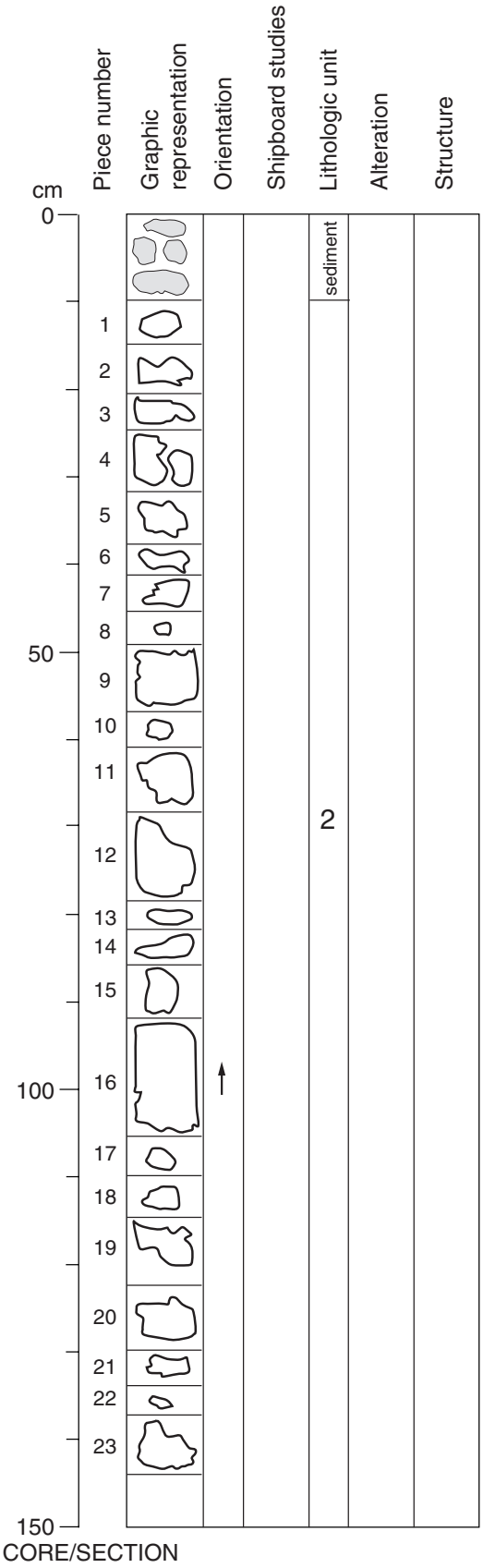
BASALT: Piece 3 is a highly altered aphyric basalt clast.The groundmass is largely (60%-70%) replaced by clays and Fe oxyhydroxide. The basalt contains less than 0.5% plagioclase phenocrysts (0.5-1 mm).

BRECCIA: Pieces 1, 2, 4, and 5 are matrix supported breccia (clast to matrix ratio ~20:80) with most clasts being aphyric basalt and palagonite. Clast size ranges from ~20 mm to <0.5 mm.

Clasts: The basalt clasts are highly altered to orange-brown and red-brown clays. They are up to 20 mm and angular to subrounded. Palagonite occurs in a cream-yellow and a yellowish green variety, with the latter being the more intensely altered. Palagonite clasts are rounded to subangular clasts and up to 10 mm across, but mostly 2-8 mm. Concentrically zoned clay is a very characteristic feature of the palagonite.

Matrix: The matrix itself is brecciated, consisting of at least two different materials. The first is pinkish pale, makes up 70%-80% of the matrix, is relatively soft and homogeneous and is a clay rich dolomite. It is brecciated to 0.1 to 10 mm sized angular clasts suggesting that it represents the first generation of matrix material. The spaces between the first generation matrix clasts are filled with clear crystalline material dolomite. Open cavities partially filled with dolomite rhombs occur throughout the section on outside edges of the pieces. Spots of Mn oxide (0.1-0.3 mm) are randomly distributed throughout the matrix, but are closely associated with the clay rich carbonate clasts.

Core Photo



187-1162B-4R-1

The very first piece of green clay is not labelled and probably fell into the hole.

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-23

The section consists of highly altered basalt fragments and a breccia that contains basalt clasts very similar to the single basalt pieces.

Pieces 1, 7, 8, 13, 14, 15, 21, and 22: Mostly aphyric basalt, except for sparsely plagioclase-olivine phyric basalt in Piece 1

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	1	1.5	3	<1	prismatic
Olivine	<1	0.5			?
Total	~1				

GROUNDMASS: Fine grained (when visible)
COLOR: Brownish gray
VESICLES: Not observed
ALTERATION: . All basalt is highly (70%-80%) to very highly (80%-95%) altered with groundmass being replaced by clays and Fe oxyhydroxide. Some grading of the alteration intensity is observed in Piece 1 as expressed by concentric alteration halos, aligned subparallel to the piece margins or in Piece 7 with one side being less intensely altered.
ADDITIONAL COMMENTS: Pieces 14 and 15 have 0.5 cm thick quenched margins, with the glass zone being completely altered to palagonite. Plagioclase phenocrysts in Piece 1 are still fresh.

Pieces 2-3, 9-12, 16-19, 20, and 23: Dolomite cemented basalt-breccia

BRECCIA: The breccia is poorly sorted overall. It is matrix supported with a clast to matrix ratio ~40:60. The majority of clasts are aphyric basalt and palagonite. Clast size ranges from ~30 mm to <0.5 mm.
Clasts: The basalt clasts are highly altered to orange-brown and red-brown clays. They are up to 30 mm and angular to subrounded. Palagonite occurs in a cream-yellow and a yellowish green variety, with the latter being the more intensely altered. Palagonite clasts are rounded to subangular clasts and up to 15 mm across, but mostly 4-10 mm. Concentric clay zoning is their most characteristic feature.
Matrix: The matrix itself is brecciated and consists of at least two different materials. The first is pinkish pale, relatively soft and homogeneous that makes up 70%-80% of the matrix and may represent a clay rich dolomitic carbonate. It is brecciated to 0.1 to 10 mm sized angular clasts indicating that is represents the first generation of matrix material. In places this matrix is fragmented in several box shaped elongated clasts that are bounded by parallel veins, suggesting a preferred direction of extension, which in oriented cores is often subhorizontal. The spaces between the first generation matrix clasts are filled with a clear, crystalline material, which is most likely dolomite. Open cavities partially filled with dolomite rhombs occur throughout the section on outside edges of the pieces. Spots of Mn oxide (0.1-0.3 mm) are randomly distributed throughout the matrix, but are closely associated with the clay rich carbonate clasts. In Piece 11, 16, 19, and 20, first generation matrix clasts contain a third type of light brown, homogeneous clasts which may be the very first matrix material.

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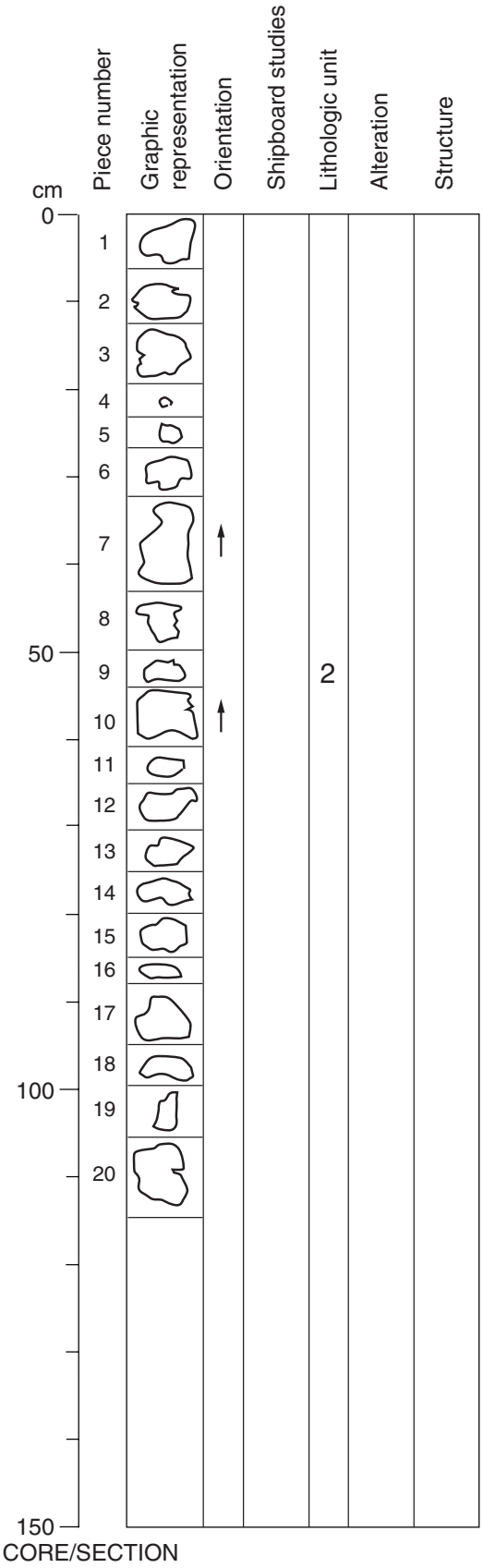

187-1162B-4R-2

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-20

The section consists of a breccia and highly altered basalt fragments, very similar to the previous sections of this hole

Pieces 9, 14, 16, and 18: Slightly plagioclase-olivine phyric basalt

PHENOCRYSTS:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	1	<1	1	<0.5	prismatic
Olivine	<0.5	0.5			?
Total	~1				

GROUNDMASS: Fine grained (when visible)
COLOR: Brownish gray

VESICLES:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
	<1	1	2	<1	rounded

Filling: Filled with bluish cryptocrystalline silica.

ALTERATION: Highly altered (40%-80%) throughout with the groundmass being pervasively replaced by clay and Fe oxyhydroxide. Plagioclase phenocrysts are 0.5-1 mm and in places transparent. Olivine phenocrysts are 100% altered to clay and Fe oxyhydroxide.

Pieces 1-8, 10-13, 15, 17, 19, and 20 : Dolomite cemented basalt breccia

BRECCIA: The breccia is poorly sorted overall. It is matrix supported with a clast to matrix ratio ~40:80. The majority (80%) of clasts are aphyric basalt and slightly phyric plagioclase olivine basalt and palagonite (20%). Clast size ranges from ~40 mm to <0.5 mm with most clasts being 2-20 mm.

Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to sub-rounded. Despite the altered status remnants of fresh plagioclase are preserved in some clasts (e.g., Piece 17). Palagonite occurs in a cream-yellow and a yellowish green variety, with the latter being the more intensely altered. Palagonite clasts are rounded to subangular clasts and mostly 2-10 mm. In some clasts the spherulitic texture of quench zones is preserved with the spherulites weathered to brownish red and the glass weathered to yellowish green (e.g., Piece 3). Again concentrically zoned clay is the most characteristic feature of the palagonite.

Matrix: The matrix is also brecciated and consists to 70%-80% of a pinkish pale clay rich dolomitic carbonate that is brecciated to 0.1 to 10 mm sized angular clasts. The spaces between these matrix clasts are filled with a clear crystalline dolomite. Open cavities partially filled with dolomite rhombs occur throughout the section on outside edges of the pieces. Spots of Mn oxide (0.1-0.3 mm) are randomly distributed throughout the matrix, but are closely associated with the clay-rich carbonate clasts. Piece 7 contains a basalt clast to which on one side the clayish carbonate is attached and dissected by the crystalline dolomite, further evidence that the breccia formed in multiple events.

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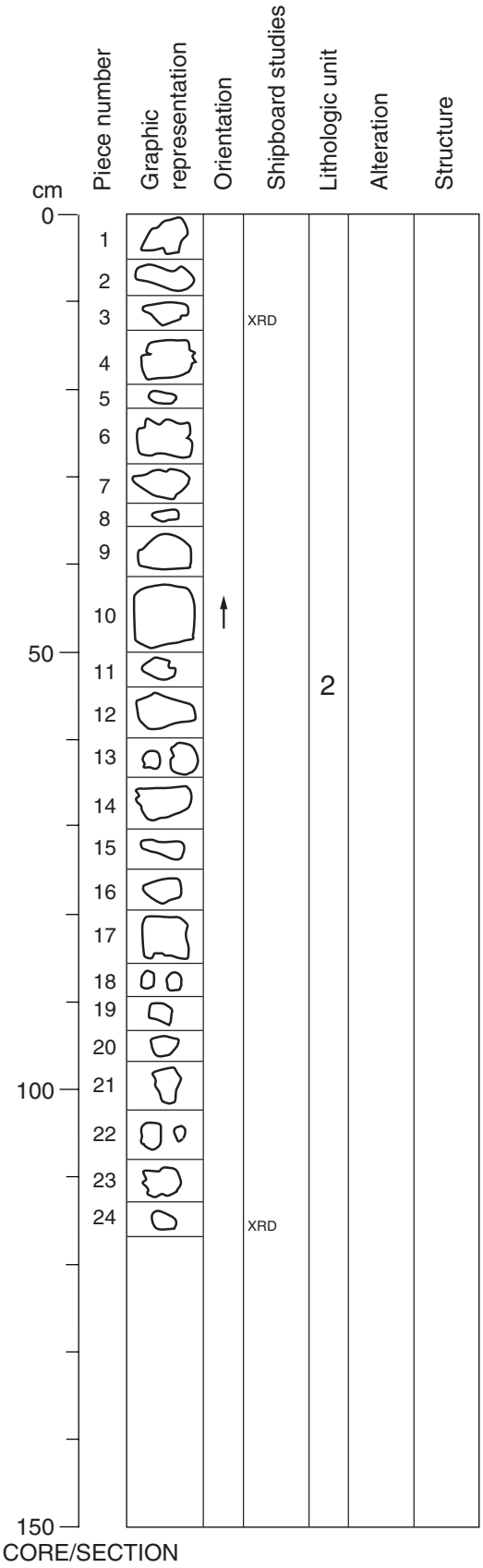


187-1162B-5R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-24

This section consists of highly altered basalt fragments and a breccia that contains basalt clasts very similar to the individual basalt pieces.

Pieces 1, 16, 17, 19, and 20: Sparsely to moderately plagioclase-olivine phyric basalt

INTERNAL CONTACTS: Chilled margins were recovered on Pieces 17, 19, and 20. The chilled margins are highly altered to palagonite + clay, although there is still some fresh glass. Piece 17 and 19 have 2 and 4 mm of fresh glass + phenocrysts, followed by 3 mm of spherulites + palagonite + white clay; Piece 20 has only ~3 mm of spherulites + palagonite + white clay.

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

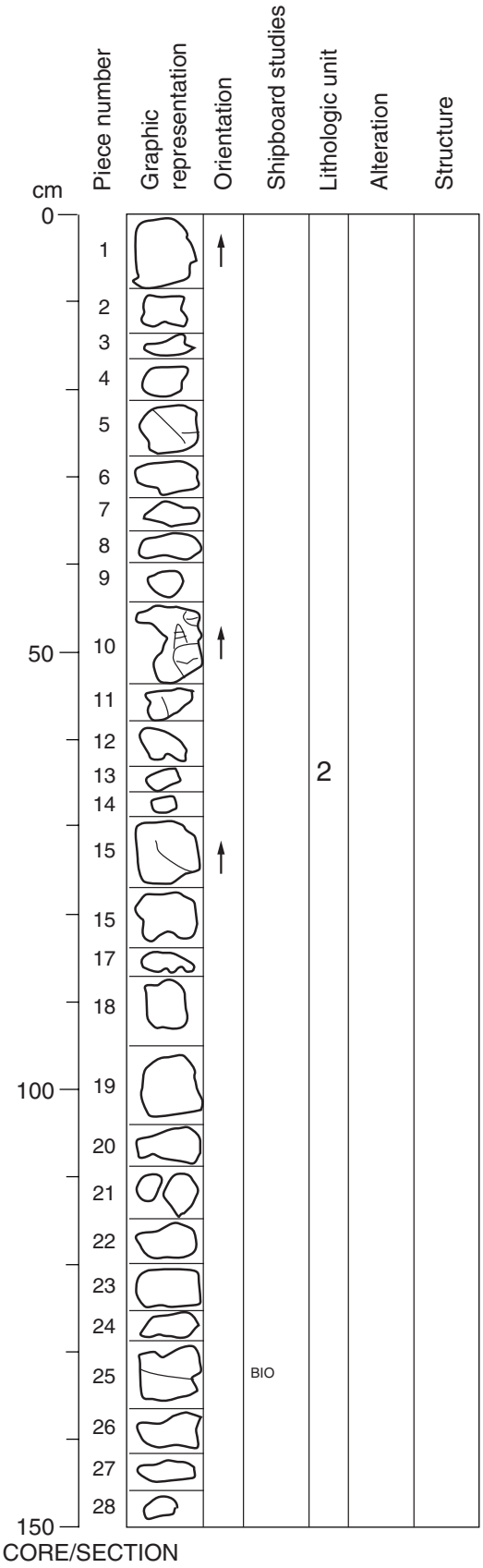
GROUNDMASS: Microcrystalline
COLOR: Reddish brown
VEINS/FRACTURES: A Mn oxide-lined fracture occurs in Piece 17 and 1 mm wide dolomite. A fracture surface, now forming the outside of Piece 17, is coated in blue cryptocrystalline silica.
ALTERATION: The rocks are very highly (85%) to completely (95%) altered. Alteration is characterized by total replacement of olivine phenocrysts and groundmass by Fe oxyhydroxides + clay. Patches of Mn oxide occur in the groundmass in Piece 17. Plagioclase phenocrysts are partially altered (20%-50%); where altered they appear to be partially replaced by Mn Fe oxyhydroxides. In spite of the high degree of alteration, small amounts of unaltered glass are still present in Pieces 17, 19, and 20. Pieces 1, 19, and 20 have small fragments of breccia matrix material adhering to outer surfaces.
STRUCTURE: Fault breccia
ADDITIONAL COMMENTS: ~50% of phenocrysts occur in glomerocrysts of plagioclase + olivine.

Pieces 2-15, 18, and 21-24: Dolomite-cemented basalt breccia

This is a matrix-supported basaltic breccia (clast to matrix ratio ~40:60); the majority of clasts are aphyric to plagioclase-olivine phyric basalt and palagonite.

CLASTS: Clast size ranges from sand size (<1 mm) to >5.5 cm. Basalt clasts are angular; palagonite clasts are angular to subrounded. The basalt clasts are very highly to completely altered to an orange-brown color as a result of replacement by Fe oxyhydroxides + clay. Palagonite (or clay after palagonite) occurs in a range of colors from orange- or reddish brown to yellowish green to pale yellow-beige, the latter being the more intensely altered. Concentric clay layering of palagonite clasts is common; in general, the center of the clast tends to be reddish and the outside pale yellowish green. In general, palagonite clasts are more abundant that basalt clasts in the 1-3 mm size range, but basalt is dominated in the larger clast sizes.
MATRIX: The matrix is composed of a pinkish beige clay, that is intensely veined by dolomite; the carbonate veins are thin, reaching a maximum of ~1 mm wide. This veining creates significant brecciation of the clay matrix, forming angular clasts that range from ~ 1 cm long to sand-size particles dispersed in the cement. In places the clay matrix is fragmented in several elongate box or lens-shaped clasts that are bounded by parallel veins, suggesting a preferred direction of extension; in oriented pieces these are usually subhorizontal relative to the core. The proportion of clay matrix to carbonate cement varies from piece to piece but is ~50:50. Open cavities partially filled with euhedral dolomite rhombs occur in Pieces 2-10, 12, 14, and 23. Spots of Mn oxide up to 1 mm in diameter (but usually ~0.3 mm) are randomly distributed throughout and form ~2% of the matrix; it occurs almost exclusively within the clay matrix.

Core Photo



187-1162B-6R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-28

The section consists of a breccia and highly altered basalt fragments.

Pieces 2, 5, 7, 8, 11, 15, 18, 19, and 21-23: Sparsely plagioclase-olivine phyric basalt

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	1-2	0.8	2	<0.5	prismatic
Olivine	<1	0.5			?
Total	1-2				

GROUNDMASS: Fine grained
COLOR: Reddish brown

VESICLES:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
	<1	0.3		

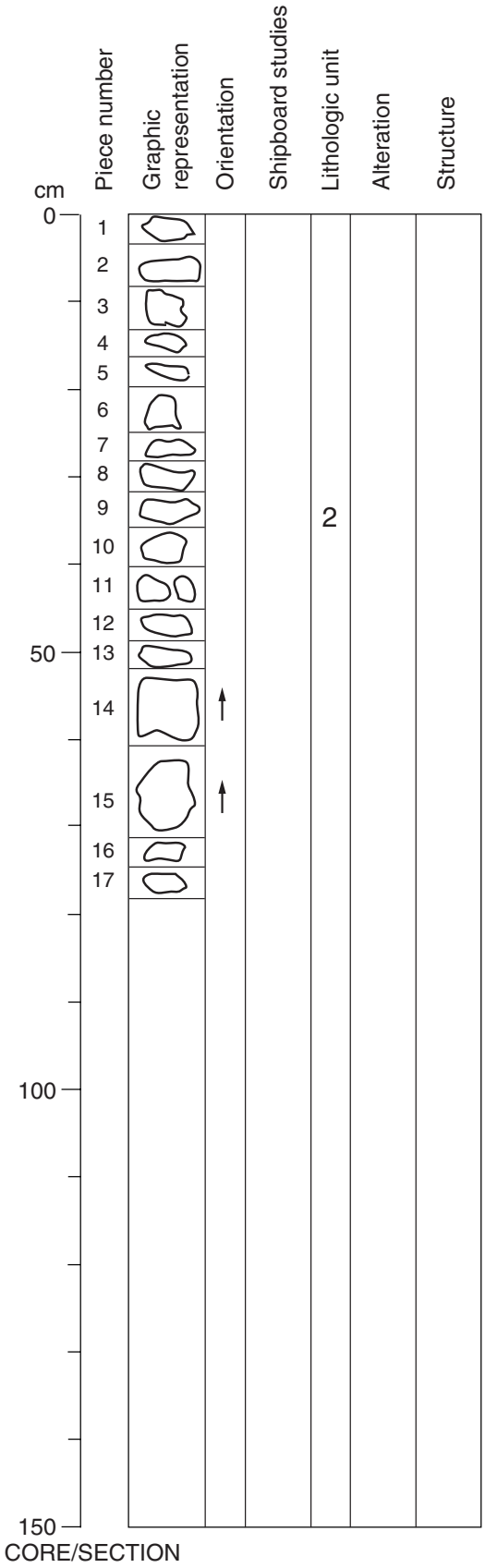
Filling: Bluish cryptocrystalline silica
VEINS/FRACTURES: Not observed
ALTERATION: Highly altered (40%-80%) throughout, in places completely altered. Groundmass clinopyroxene and olivine pervasively replaced by Fe oxyhydroxide and clay. Plagioclase phenocrysts are occasionally still fresh and transparent, but strongly fractured. Olivine phenocrysts 100% altered to clay + Fe oxyhydroxide.
STRUCTURE: Not distinguishable

Pieces 1, 3, 4, 6, 9, 10, 12-14, 16, 17, 20, and 25 through 28: Dolomite-cemented basalt breccia

The breccia is matrix supported with a clast to matrix ratio of ~10:90. Most clasts are highly altered basalt or palagonite. Clast size ranges from ~40 mm to <0.5 mm with most clasts being < 10 mm.

CLASTS: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to subrounded. Palagonite clasts are rounded to subangular clasts and mostly 2-10mm. Concentrically zoned clay within the palagonite is common. In Pieces 25-28 the outermost margin of palagonite clasts consists of a distinct green layer of clay.
MATRIX: The matrix of Pieces 1 through 20 consists of a single, homogeneous, pinkish pale carbonate material, dolomite. Piece 25 through 28 have two types of carbonate cement.

Core Photo



187-1162B-6R-2

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

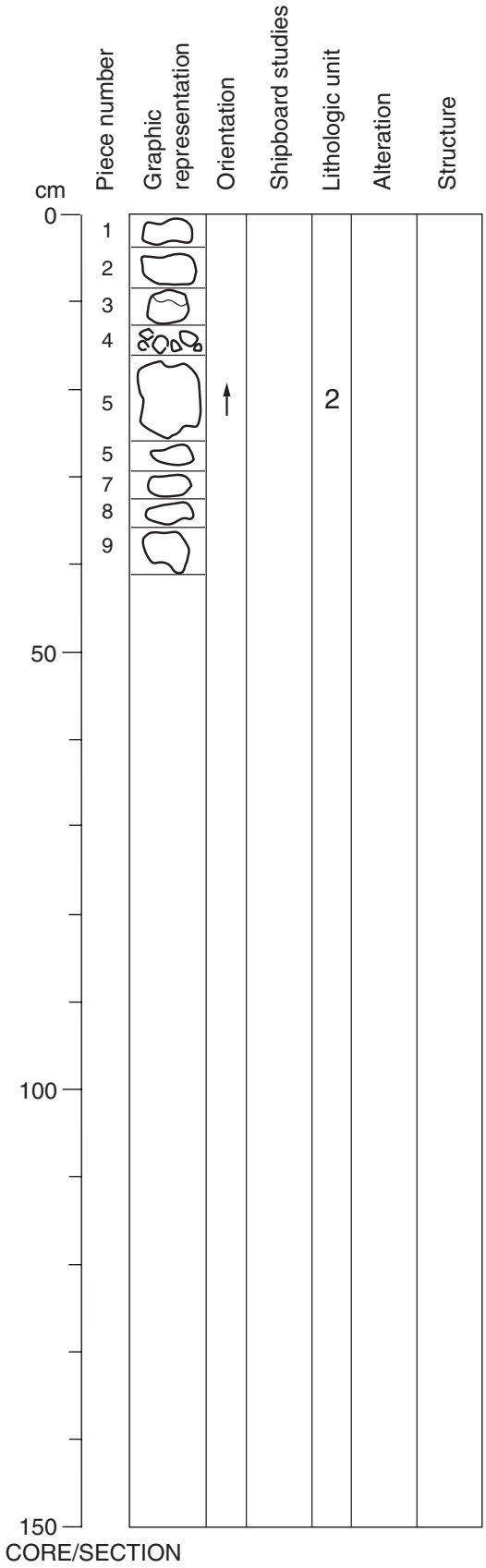
PIECES 1-17

BRECCIA: The breccia is poorly sorted overall and matrix supported with a clast to matrix ratio which is ~60:40. The clasts are ~80% highly altered basalt clasts, ~20% highly altered palagonite which includes epidote green clasts (~3 mm) of a clay, possibly altered palagonite. Clast size ranges from ~50 mm to <0.5 mm.

Clasts: The basalt clasts are highly altered to red-brown and orange-brown clay and Fe oxyhydroxide. They are up to 50 mm long and subrounded to subangular. Palagonite clasts are rounded to subangular and smaller than the basalt clasts, <1 - 10 mm. There appears to be 'pressure shadows' where matrix is devoid of small clasts underneath a large clast (e.g., Piece 14).

Matrix: Cream to pale pink, without the network of colorless crystalline dolomite veins which has been seen earlier in Section 1162B-3R-2. When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless carbonate in open cavities, initially there is little or no reaction until the sample is heated (dolomite).

Core Photo



187-1162B-7R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-9

The section consists of a dolomite-cemented breccia and highly altered basalt fragments.

Pieces 3, 6, 7, 8, and 9: Aphyric to moderately plagioclase-olivine phyric basalt

PHENOCRYSTS:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	~3	1.5	3	<1	prismatic
Olivine	<1	0.5			?
Total	~3				

GROUNDMASS: Fine grained (when visible)
COLOR: Brown (the freshest basalt is gray)

VESICLES:	**Abundance**	**Size** (mm)			**Shape**
	%	**avg.**	**max.**	**min.**	
	<1	1	2	<1	rounded

Filling: Lined with silica and Mn-oxide.

ALTERATION: Very high to high (~90% to 60%). Olivine completely replaced by Fe oxyhydroxide, groundmass by brown clays. Piece 3 has hematite spots with rhombs of dolomite on the outside of the basalt (facing into the dolomite matrix).

ADDITIONAL COMMENTS: Plagioclase and olivine glomerocrysts up to 3 mm (e.g., Piece 7). Olivine morphology and percentage is very difficult to asses because of alteration. Piece 9 is the least altered.

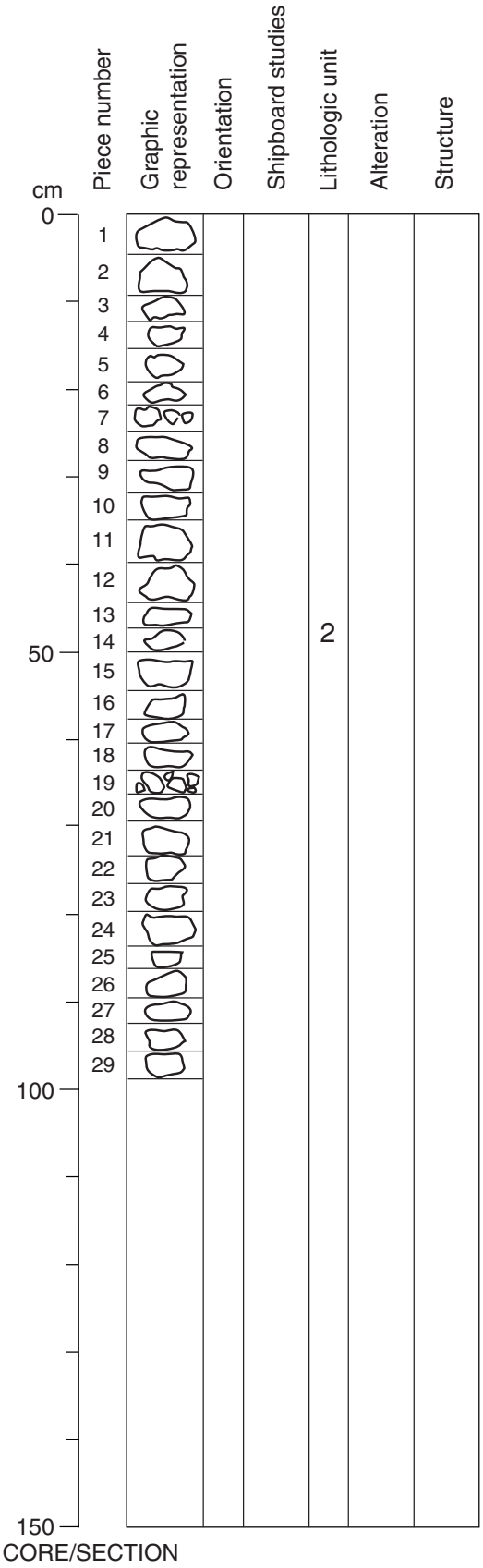
Pieces 1, 2, 4, and 5: Dolomite-cemented basalt breccia

BRECCIA: The breccia is poorly sorted overall but there are some clast 'shadows' and possible alignment (e.g., Piece 5). The breccia is matrix supported with a clast to matrix ratio of ~40:60. The clasts are ~70% highly altered basalt clasts, ~25% highly altered palagonite. Clast size ranges from ~40 mm to <0.5 mm.

Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to subrounded. Palagonite clasts are rounded to subangular clasts and smaller than the basalt clasts, <1-10 mm. Concentrically zoned clay within the palagonite is common..

Matrix: Pale pink to cream with a network of colorless crystalline dolomite veins (<0.2 mm). Includes fragments of the clasts and clays and Mn oxide nodules (all <<0.5 mm). When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction (dolomite). The same applies to the rhombs of colorless carbonate in open cavities, initially there is little or no reaction until the sample is heated. There are complex reaction rims (~1-2 mm wide) around the red-brown basaltic clasts. Next to the clast is a colorless crystalline matrix (forming a rim around the clast) then both matrix and clasts are stained red (to orange), this includes green palagonite clasts (e.g., Piece 1).

Core Photo



187-1162B-8R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-29

Pieces 2, 3, 5, 6, 7, and 9-29: Aphyric to moderately plagioclase phyric basalt

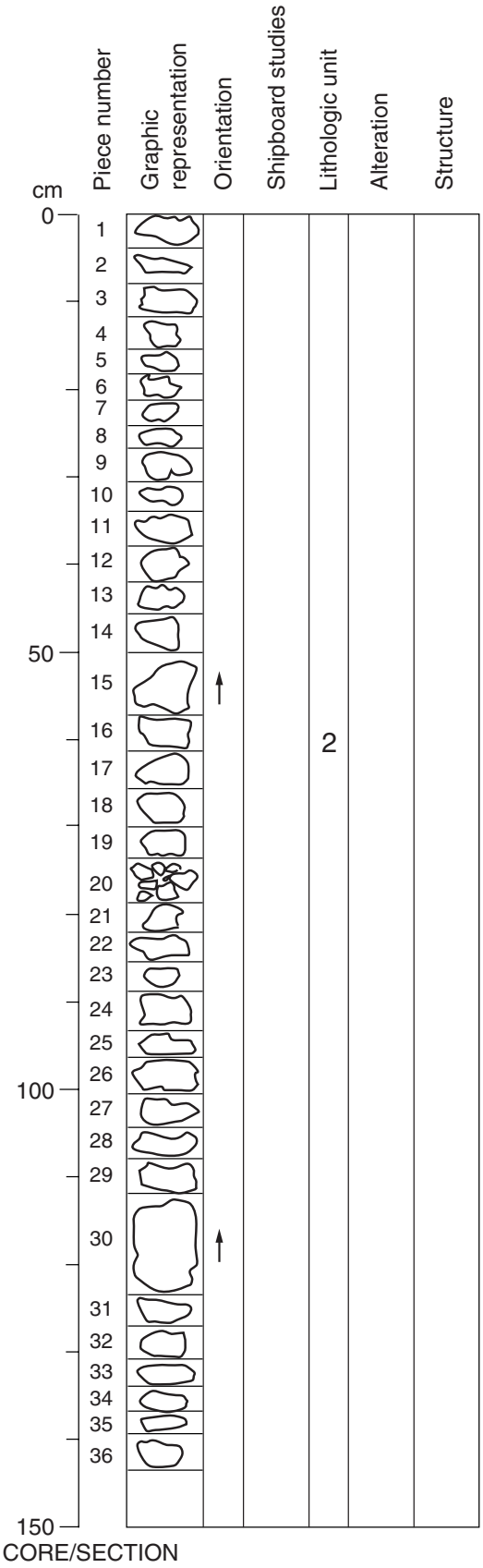
PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
Plagioclase	3	2	5.5	0.5	lath-like to prismatic
Total	3			

GROUNDMASS: Microcrystalline
COLOR: Brown (when highly altered) to orange brown (when very highly altered)
ALTERATION: Highly altered (40%-80%) throughout Pieces 3, 13, 14, 15, 18, and 25 are very highly altered (>80%). Piece 24 is the least altered in the section.
STRUCTURE: None
ADDITIONAL COMMENTS: These pieces are all pebble to cobble-sized with subangular to subrounded outer edges. Piece 24 has a 4 mm wide chilled margin including an ~1 mm thick rind of black relatively fresh basaltic glass. Piece 11 is cobble-sized and has breccia (described below) coating ~50% of its outer surface.

Pieces 1, 4, and 8: Dolomite-cemented basalt breccia

The breccia is matrix supported with poorly sorted angular to subangular clasts that are brown highly altered basalt clasts to orange-brown highly altered fragments of palagonite. Clasts range in size from <0.5 mm to 2 cm, with an average of ~1 mm. Piece 8 has a 2 mm wide white dolomite vein cross-cutting the entire piece. Piece 1 has a network of ~0.5 mm wide white branching dolomite veins.

Core Photo



187-1162B-9R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-36

The section consists of a dolomite-cemented breccia and highly altered basalt fragments.

Pieces 1, 2, 3, 4, 9 to 2, and 31 to 36: Aphyric to moderately plagioclase-olivine phyric basalt

PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	~3	1.5	3	<1	prismatic to rounded
Olivine	<1	0.5			?
Total	~3				

GROUNDMASS: Fine grained (when visible)
COLOR: Brown (the freshest basalt is gray)

VESICLES:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
	<1	1	2	<1	rounded

Filling: Lined with blue cryptocrystalline silica and Mn oxide. May reach 1% in some pieces (e.g., Piece 1).

ALTERATION: Very high to high (~90 to 60%). Olivine completely replaced by Fe oxyhydroxide, groundmass by brown clays.

ADDITIONAL COMMENTS: Chilled margins and/or glass are attached to clasts in Pieces 10, 26, and 30, Piece 26 has ~1 mm of fresh glass. Plagioclase and olivine glomerocrysts up to 4 mm. Olivine morphology and percentage is very difficult to asses because of alteration. Piece 9 is the least altered. Approximately 70% of these pieces have some breccia matrix adhering to the side.

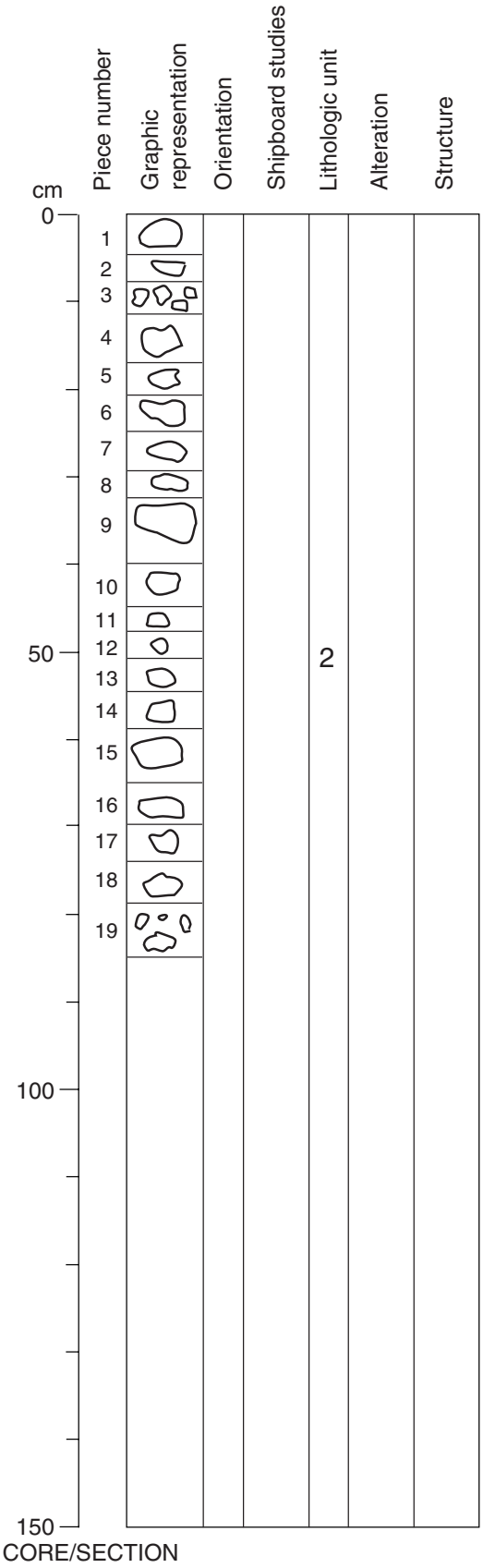
Pieces 5 to 8, and 28 to 30: Dolomite-cemented basalt breccia

BRECCIA: The breccia is poorly sorted overall. The breccia is matrix supported with a clast to matrix ratio of ~80:20. The clasts are ~65% highly altered basalt clasts, ~35% highly altered palagonite and palagonite. Clast size ranges from ~40 mm to <0.5 mm.

Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to subrounded. Palagonite clasts are rounded to subangular clasts and smaller than the basalt clasts, <1-8 mm. Concentrically zoned clay within the palagonite is common. There is more less altered brown palagonite in this section than in the previous sections, and more epidote green waxy clayey palagonite (e.g., Piece 17).

Matrix: Pale pink to cream with a network of colorless crystalline dolomite veins (<0.2 mm). Includes fragments of the clasts and clays and Mn oxide nodules (all <<0.5 mm). When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless dolomite in open cavities, initially there is little or no reaction until the sample is finely crushed and/or heated.

Core Photo



187-1162B-10R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-19

The section consists of highly altered basalt fragments and a few pieces of a dolomite-cemented breccia.

Pieces 1, 2, 4 to 8, and 10 to 18: Aphyric to moderately plagioclase-olivine phyric basalt

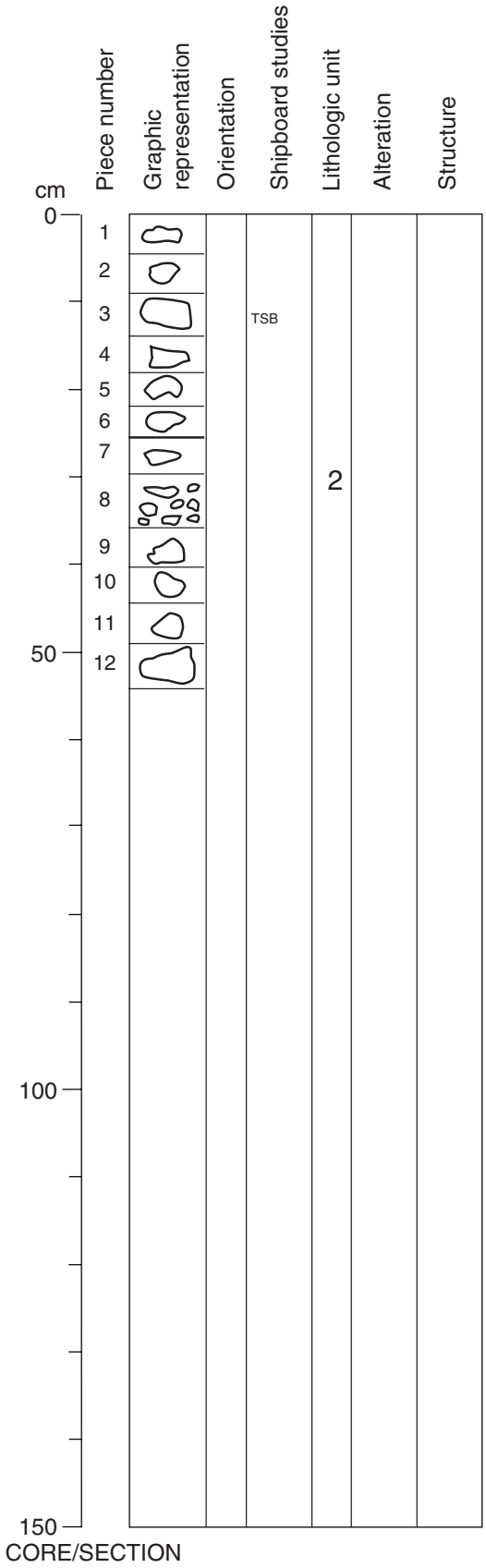
PHENOCRYSTS:	**Abundance**	**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**
Plagioclase	~2	1	3	<1	prismatic to rounded
Olivine	<1	0.5			?
Total	~2			

GROUNDMASS: Fine grained (when visible)
COLOR: Brown when completely altered, grayish red when highly altered
VESICLES: Single vesicle in Piece 1, 0.5 mm, round and unfilled
ALTERATION: Pieces 7 and 8 are completely altered to clay and Fe oxyhydroxide, except for plagioclase phenocrysts. Pieces 2, 5, 6, 11 to 13, 17, and 18 are highly altered (60% 80%), except for small (<1 mm) bits of fresh clast in a hyaloclastite attached to Piece 18 and remnants of a glass margin in Piece 13 (<1 mm). Pieces 1, 10, and 14 to 16 are also highly altered (40%-60%), but the groundmass is less pervasively replaced by clay and Fe oxyhydroxide. Olivine phenocrysts are completely replaced by Fe oxyhydroxide, but plagioclase phenocrysts are still fresh in places.
ADDITIONAL COMMENTS: Chilled margins and/or glass are attached to clasts in Pieces 13 and 18. Plagioclase and olivine glomerocrysts up to 4 mm. Olivine morphology and percentage is very difficult to asses because of alteration. Piece 1 is the least altered.

Pieces 3, 9, and 19: Dolomite-Cemented Basalt Breccia

BRECCIA: The breccia is poorly sorted overall with Piece 9 being the largest. The breccia is matrix supported with a clast to matrix ratio of ~70:30. The clasts are mostly (95%) highly altered basalt clasts with few highly altered palagonite and palagonite clasts. Clast size ranges from ~20 mm to <0.5 mm.
Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 20 mm long and angular to subrounded. Palagonite clasts are rounded to subangular clasts and smaller than the basalt clasts, <3 mm. Epidote green waxy clayey palagonite are common.
Matrix: Pale pink to cream with a network of colorless crystalline dolomite veins, <0.5 mm in Piece 9. Includes fragments of the clasts and clays and Mn oxide nodules (all <<0.5 mm). When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless dolomite in open cavities, initially there is little or no reaction until the sample is finely crushed and/or heated.

Core Photo



187-1162B-11R-1

UNIT 2: DOLOMITE-CEMENTED BASALT BRECCIA

PIECES 1-19

The section consists of highly altered basalt fragments and a few pieces of a dolomite-cemented breccia.

Pieces 1, 2, 4, 6, 7, and 9 to 12: Moderately plagioclase-olivine phyric basalt

PHENOCRYSTS:	**Abundance**		**Size** (mm)		**Shape**
	%	**avg.**	**max.**	**min.**	
Plagioclase	2-3	1	5	0.5	prismatic to rounded
Olivine	<1	0.5			?
Total	~2-3				

GROUNDMASS: Fine grained (when visible)
COLOR: Brown when completely altered, grayish red when highly altered
VESICLES: Not observed
ALTERATION: Highly altered throughout with pervasive replacement of groundmass by clay and Fe oxyhydroxide. Olivine phenocrysts are completely replaced by Fe oxyhydroxide, but a few plagioclase phenocrysts are still fresh in places.
ADDITIONAL COMMENTS: Plagioclase and olivine glomerocrysts up to 4 mm. Olivine morphology and percentage is very difficult to asses because of alteration. Piece 11 is the least altered.

Pieces 3, 5, and 8: Dolomite-cemented basalt breccia

BRECCIA: The breccia is poorly sorted and matrix supported with a clast to matrix ratio of ~80:20. The clasts are exclusively highly altered basalt clasts ranging from ~40 mm to <0.5 mm.
Clasts: The basalt clasts are highly altered to orange-brown and red-brown clay and Fe oxyhydroxide. They are up to 40 mm long and angular to subrounded.
Matrix: Pale pink to cream with a network of colorless crystalline dolomite veins, <0.5 mm (Piece 3). Includes fragments of the clasts and clays and Mn oxide nodules (all <<0.5 mm). When crushed the matrix is predominantly crystalline, there is little reaction with diluted HCl until heat is applied, then there is a sustained steady reaction. The same applies to the rhombs of colorless in open cavities, initially there is little or no reaction until the sample is finely crushed and/or heated.

187-1162A-2R-1, 1-3 cm (TS#71) **Unit: 1** **OBSERVER:** **Russo/Gee**

ROCK NAME: **Meta basalt**
WHERE SAMPLED: **unit 1 complex chilled margin piece 1**
GRAIN SIZE: **microcrystalline (quenched growth)**
TEXTURE: **spherulitic**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	<1			10			rounded	Only one in the thin section, plagioclase is rounded and 4.2 mm across, it contains 5 melt inclusions the largest of which is 0.8 mm across. 'Whisker' overgrowths on this crystal may be plagioclase or olivine.
Olivine								
Clinopyroxene								
GROUNDMASS								
Olivine	0	3		0.2				Microlites totally replaced by actinolite (?)
Plagioclase	45	48		0.7			spherulites	Spherulites are coalesced on one end of the thin section and are smaller (~0.4 mm) than spherulites further from the margin (up to 2 mm). These smaller spherulites make up ~10% of the thin section and have been replaced by a high birefringent mineral (possibly actinolite).
Clinopyroxene								
Opaque Minerals								
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	8					
Actinolite/chlorite	40				groundmass	See below. Second observer comment: the degree of alteration is probably higher than this.
Quartz vein w/ tr. epidote	7				veins	See below.

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

COMMENTS : Because of the very small crystal size there is some debate about whether the groundmass has been entirely replaced by chlorite or actinolite, there is definitly some of both present. There is a light to dark green (in plane polarized light) mineral that shows a slight pleochroism from green to yellow. Under cross polars the mineral displays high second order birefrigence and has a sweeping undulatory extinction, although some areas have anomalous (blue) interference colors. Individual grains are up to 10 microns long and 2 microns wide, but the average grain is about 5 microns. This may be a mixture of actinolite and chlorite. The thin section also has a series of cross-cutting quartz veins, ranging in width from 0.1 to 0.8 mm. These veins contain small ~10 micron long needles of possible apatite and chlorite (photomicrograph) with trace amounts of epidote, ~2-5 microns across. The quartz has undulose (strained) extinction and shows evidence of recrystallization (at T>250°C).

187-1162A-4R-1, 88-91 cm (TS#72) **Unit: 2** **OBSERVER:** **Kempton**

ROCK NAME: **Meta microgabbro**
WHERE SAMPLED: **rubble clast**
GRAIN SIZE: **medium grained**
TEXTURE: **holocrystalline**

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	0	3	0.5	2			probably equant, but can't tell because of intense alteration	Totally replaced by talc (or a white mica) + magnetite.
Plagioclase	39	49		>5			subhedral to anhedral, prismatic to tabular	~20% replaced by chlorite and/or clay along random sets of microcracks, some replacement by fibrous amphibole adjacent to other phases intensely replaced by this mineral. Most with albite twins, strong normal zoning.
Clinopyroxene	25	45		<5			anhedral, filling interstices between plagioclase	Replaced by actinolite, chlorite and clay.
Opaque Minerals	3	3		<0.2			anhedral, equant to irregular, space-filling shapes	Ilmenite with magnetite in lamellar intergrowths; clusters of FeTi oxides up to 1.5 mm long occur, but individual crystals appear to be <~0.2 mm.
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays + Fe oxyhydroxides(?)	11				clay filling veins with chlorite?; clay + Fe oxyhydroxides(?) partially replacing clinopyroxene	Numerous, thin (<25 microns) discontinuous veins crosscut all phases.
Chlorite	10				replacing all phases; filling thin veins along with clay?	Pale brown with anomalous blue interference colors.
Actinolite	10		0.25		replacing clinopyroxene and mesostasis	Mostly occurs in fibrous form, but locally forms larger, anhedral (sometimes subhedral) crystals replacing clinopyroxene and filling interstices.
Talc	1				replacing olivine	
Magnetite	1				replacing olivine	

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

COMMENTS :

187-1162A-5R-1, 25-28 cm (TS#73) **Unit:2** **OBSERVER:** **Gee**

ROCK NAME: **Meta microgabbro**
WHERE SAMPLED: **piece 7, typical piece**
GRAIN SIZE: **medium grained**
TEXTURE: **holocrystalline**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								These are not phenocrysts (ss), but are not matrix crystals.
Plagioclase	3	3		3			subhedral laths	Patially replaced by clays along veins, original igneous textures include complex disequilibrium zoning/disrupted twinning, many plagioclase have coroded cores.
Olivine	0	1		3			possibly equant	Totally replaced by concentric rings of a high birefringence phase (possibly talc) and magnetite, with cummingtonite(?) in the center (Image#177).
Clinopyroxene								
GROUNDMASS								
Olivine								
Plagioclase	42	46	0.2	1.5	~1		subhedral laths/prismatic	Undulose extinction and some radial clusters.
Clinopyroxene	7	45	0.6	1.4	~1.2		ophitic	Mainly replaced by actinolite.
Opaque Minerals	5	5	0.4	1	0.6	Ilmenite/ Magnetite	skeletal and interstitial	Mainly pink in reflected light.
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Actinolite	34	<0.1	1	<0.2	clinopyroxene	
Chlorite	3	<0.1	<0.1	<0.1	clinopyroxene	
Clays	6	<0.1	<0.1	<0.1	plagioclase/groundmass	

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

COMMENTS : Sub ophitic texture. A highly altered rock, a meta microgabbro with a greenschist facies mineralogy. The olivines have an alteration halo that extends into the groundmass (especially the clinopyroxene) which doubles the size of the altered area, hence original olivine size is difficult to judge.

187-1162A-5R-1, 73-75 cm (TS#74) **Unit: 2** **OBSERVER:** **Russo/Gee**

ROCK NAME: **Meta plagioclase-olivine phyric basalt**
WHERE SAMPLED: **basaltic clast piece 15**
GRAIN SIZE: **fine grained**
TEXTURE: **holocrystalline**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	5	8	g/mass	2.7	1.2		prismatic, subhedreal	Commonly twinned, many disequilibrium textures e.g. coroded cores, concentric oscillatory zoning, and undulatory (strain) extinction, some plagioclase have formed new sub-grains. All phenocrysts have some clay along fractures. Seriate.
Olivine	0	4	g/mass	2	1		possibly equant	~95-100% replaced by talc, opaques and clay. They opaques commonly occur as concentric bands with clay/talc concentrated in the core of the phenocrysts and along rims. Seriate.
Clinopyroxene								
GROUNDMASS								
Olivine	0	5			0.2		equant	Morphology tough to determine due to the replacement by prehnite(?) in the groundmass.
Plagioclase	37	40			0.4		lath-like	Some strain extinction.
Clinopyroxene	30	38			0.4		anhedral	Commonly with strain extinction.
Opaque Minerals	3	3			0.1			
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays	10				plagioclase and olivine	
Talc/actinolite/epidote	8				olivine/plagioclase boundaries	The alteration halo around olivines extends into the groundmass, e.g. the length of an alteration halo =5 mm, original olivine ~1.8 mm. Groundmass clinopyroxene is more affected than plagioclase.
Actinolite	7		0.2	<0.1	clinopyroxene	

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

COMMENTS : Sub ophitic texture. Groundmass percentages are very difficult to estimate due to the replacement mineralization. Talc/actinolite/epidote is a 'best guess' because of small crystal size, but actinolite is definitly identified.

187-1162A-5R-2, 55-60 cm (TS#75) **Unit: 2** **OBSERVER:** **Russo**

ROCK NAME: **Meta microgabbro**
WHERE SAMPLED: **clast**
GRAIN SIZE: **medium grained**
TEXTURE: **holocrystalline**

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	50			10	1		lath-like to prismatic	Commonly twinned, some display zoning, most plagioclase is resorbed and a majority of the crystals have been broken.
Clinopyroxene	35			3	0.6		anhedral-subrounded	~70% replaced by chlorite and actinolite.
Opaque Minerals	3				0.1		equant to bleb-like	
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays + Chlorite	12				groundmass clinopyroxene	Yellow-brown to red, commonly concentrated in the cores of clinopyroxene that have also been replaced by chlorite and prehnite.

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

COMMENTS : Second observer comment (PDK): The rock is probably more altered than this estimate implies. There was also olivine present originally, now totally replaced by talc and clay ± Fe oxyhydroxides ± calcite. This slide also contains one very large (~1 cm) plagioclase megacryst with a partially resorbed rim, as well as ~5% plagioclase "phenocrysts" i.e., crystals significantly larger than the rest of the groundmass. The rock is probably a metamorphosed, porphyritic diabase.

187-1162B-2R-1, 59-62 cm (TS#76) **Unit:2** **OBSERVER:** **Russo**

ROCK NAME: **Dolomite-cemented basalt breccia**
WHERE SAMPLED: **piece 14**
GRAIN SIZE:
TEXTURE:

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								
Clinopyroxene								
Opaque Minerals								
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays						

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

COMMENTS : Breccia clasts

Clasts are up to 18 mm across with approximately 50% of the clasts being aphyric to sparsely plagioclase phyric basalt that has intersertal groundmass texture. These clasts are light brown in hand sample. The other 50% of the clasts are fragments of palagonite. These clasts are orange to rust color in hand sample and one of these fragments has a spherulitic texture.

COMMENTS : Breccia matrix

The matrix is made of carbonate (no twinning, but refractive index is higher than mounting medium, so may be dolomite, confirmed by ICP and XRD) and represents about 55-60% of the thin section. The carbonate matrix is generally very fine grained (<0.15 mm) except surrounding clasts where the grain size increases to as large as 1 mm. These larger grains occur in margins surrounding the clasts which are up to 2 mm wide and are 'cleaner' i.e. recrystallised.

187-1162B-3R-1, 116-120 cm, (TS#77) **Unit:** 2 **OBSERVER:** **Gee**

ROCK NAME: **Dolomite-cemented basalt breccia**
WHERE SAMPLED: **piece 22**
GRAIN SIZE: **subrounded to subangular basaltic and palagonite clasts varying from <0.5 mm to 15 mm.**
TEXTURE: **matrix supported.**

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								
Clinopyroxene								
Opaque Minerals								
Glass								

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays						

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

COMMENTS : The largest basalt clast is ~15 mm long, with groundmass glass replaced by brown clay. Olivine phenocrysts (1 mm) are replaced by Fe-stained clay and have acted as nucelation sites for groundmass plagioclase. Palagonite clasts are <2 mm and are frequently disaggregated 'in situ' with the fractures infilled by crystalline dolomite (ICP and XRD). The palagonite has quench textured plagioclase up to 0.6 mm long. There are also mud clasts (<4 mm) enclosing fine grains of carbonate (<<0.1 mm).

Breccia clasts

COMMENTS : The clasts are surrounded by a ~0.3 mm wide carbonate rim often a single crystal width. There are no impurities in this rim. Carbonate crystals range from <0.2 to 1 mm and frequently display polygonal granoblastic texture. There are no strained or twinned crystals.

Breccia matrix

187-1162B-11R-1, 10-14 cm (TS#86) **Unit:2** **OBSERVER:** **Gee**

ROCK NAME: **Highly altered basalt**
WHERE SAMPLED: **piece 3.**
GRAIN SIZE: **fine to microcrystalline**
TEXTURE: **hypohyalline**

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	APPROX. COMP.	MORPHOLOGY	COMMENTS
PHENOCRYSTS								
Plagioclase	0.2	2		1.8	0.8		subhedral to anhedral laths and euhedral prismatic	Sieve texture common when plagioclase not totally replaced.
Olivine								
Clinopyroxene								
GROUNDMASS								
Olivine								Second observer comment: This rock also originally contained olivine microphenocrysts, now totally altered to Fe oxyhydroxides, clay, and calcite(?).
Plagioclase	~20	~30	0.1	0.8	0.3		euhedral	Sheaf and bundle textures and hollow swallowtail-plagioclase are common.
Clinopyroxene	0	~20		0.2			euhedral	Remant plumose quench textures now entirely replaced by clay.
Opaque Minerals								
Glass	10	48						

SECONDARY MINERALOGY	PERCENT	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	REPLACING / FILLING	COMMENTS
Clays + Fe oxyhydroxides	50					
Dolomite/calcite	20	0.1	0.2	0.15	Veins/plagioclase/vesicles	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm) min.	SIZE (mm) max.	SIZE (mm) av.	FILLING / MORPHOLOGY	COMMENTS
Vesicles	~0.5	throughout	<0.1	0.2	0.1	round, up to three-quarter filled with radial carbonate.	

COMMENTS : A highly altered basalt, thin section is brown, with three similarly aligned veins infilled with dolomite/calcite 0.2 and 0.8 mm wide. Each main vein is a series of anastomosing veins which apparently incorporate fragments of the basalt. The veins are undulose in form. Th precipitated crystals form a continuum between polygonal granoblastic and pefect alignment, i.e growth tips into the vein and growing from the vein walls. In some places where opposing crystals reach the centre there is a concentration of clays. Glomerocrysts up to 1.5 mm comprising mainly plagioclase (now replaced by up to 30%). Replacement of plagioclase is extreme, even swallow-tail plagioclase (0.2 mm) in the groundmass is replaced by carbonate.

STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
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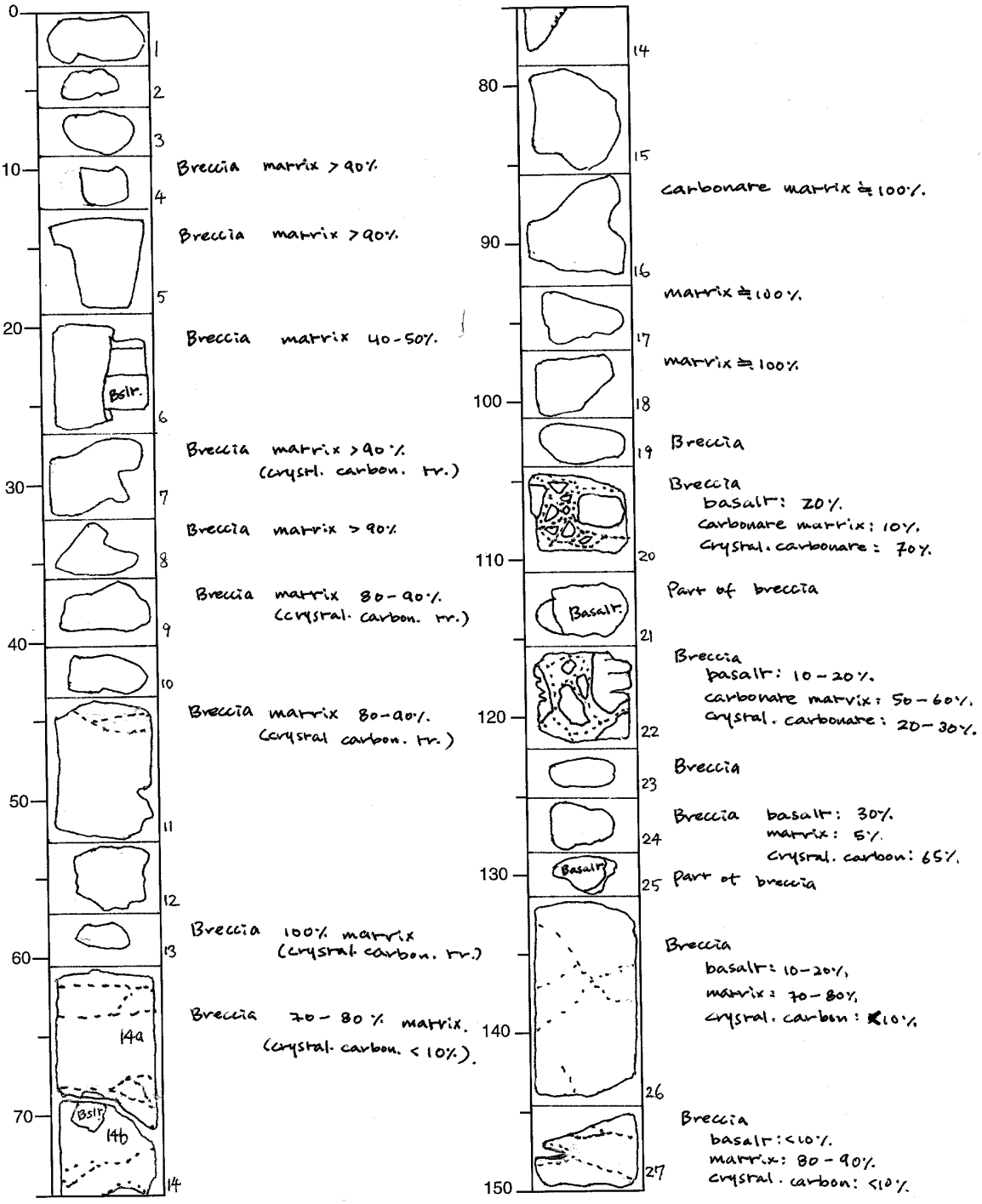
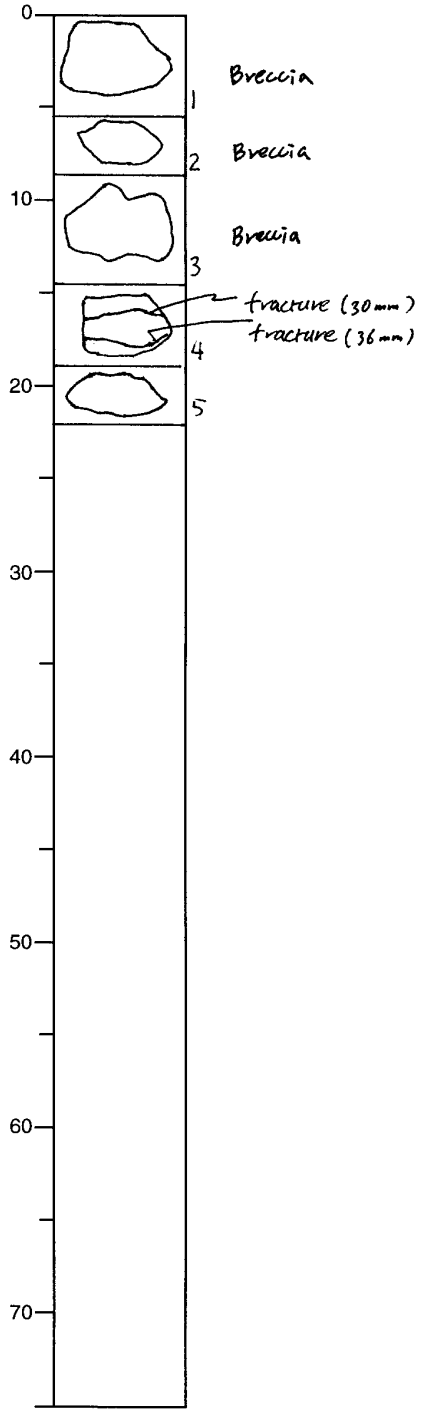
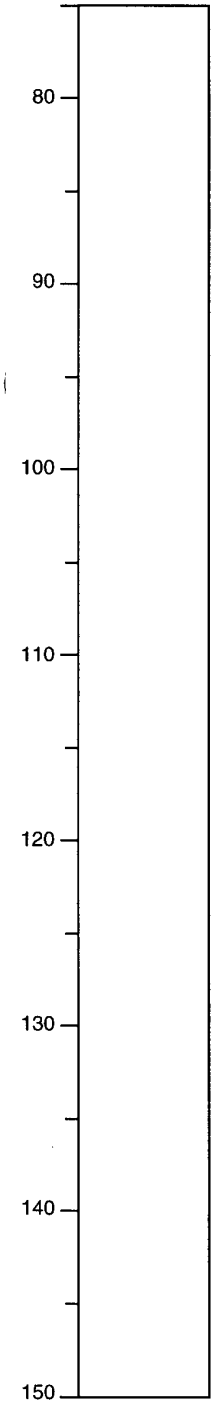


STRUCTURAL GEOLOGY DESCRIPTION

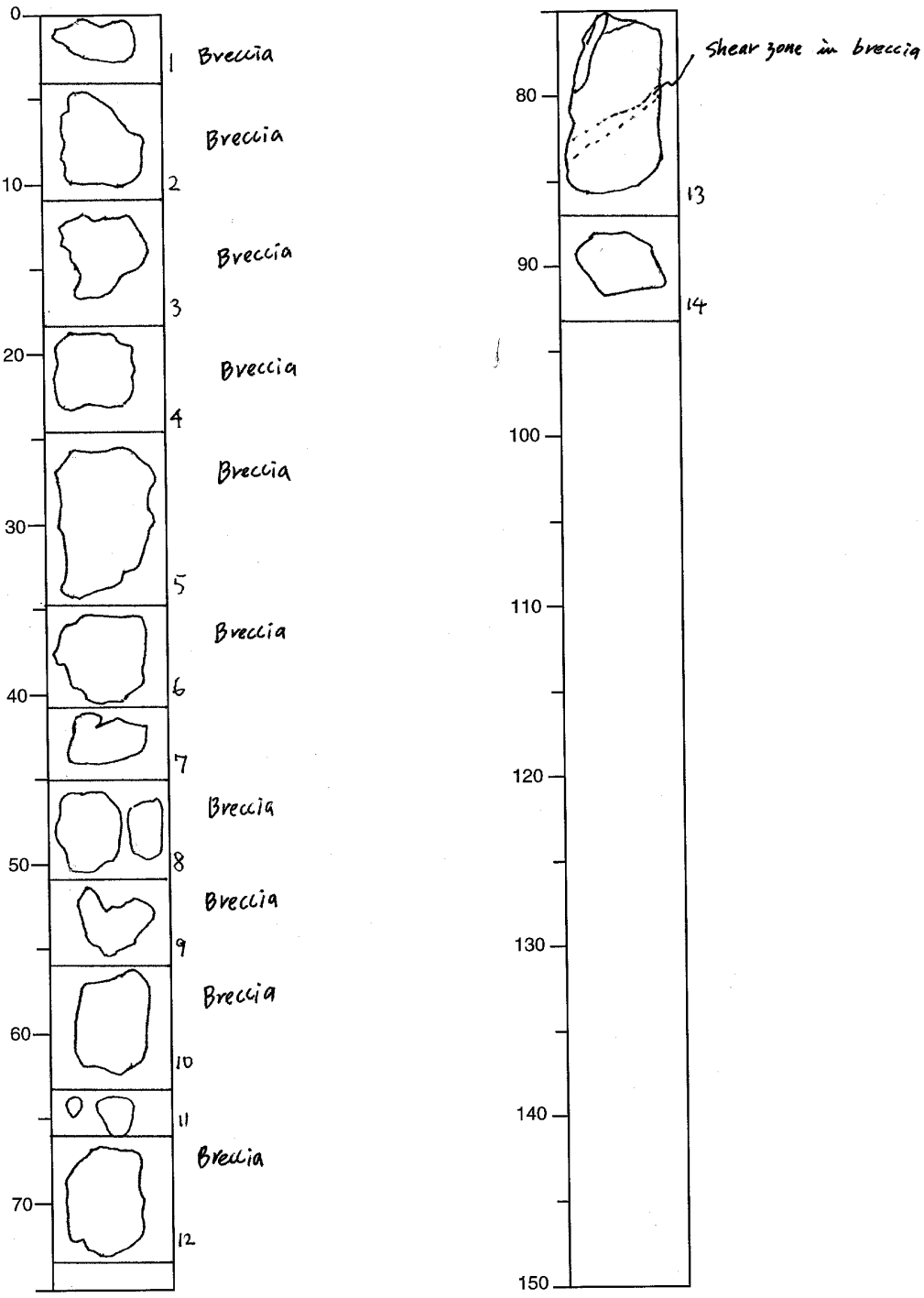
Leg	Hole	Core	Section
187	1162A	3R	1





STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1162A	4R	1



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
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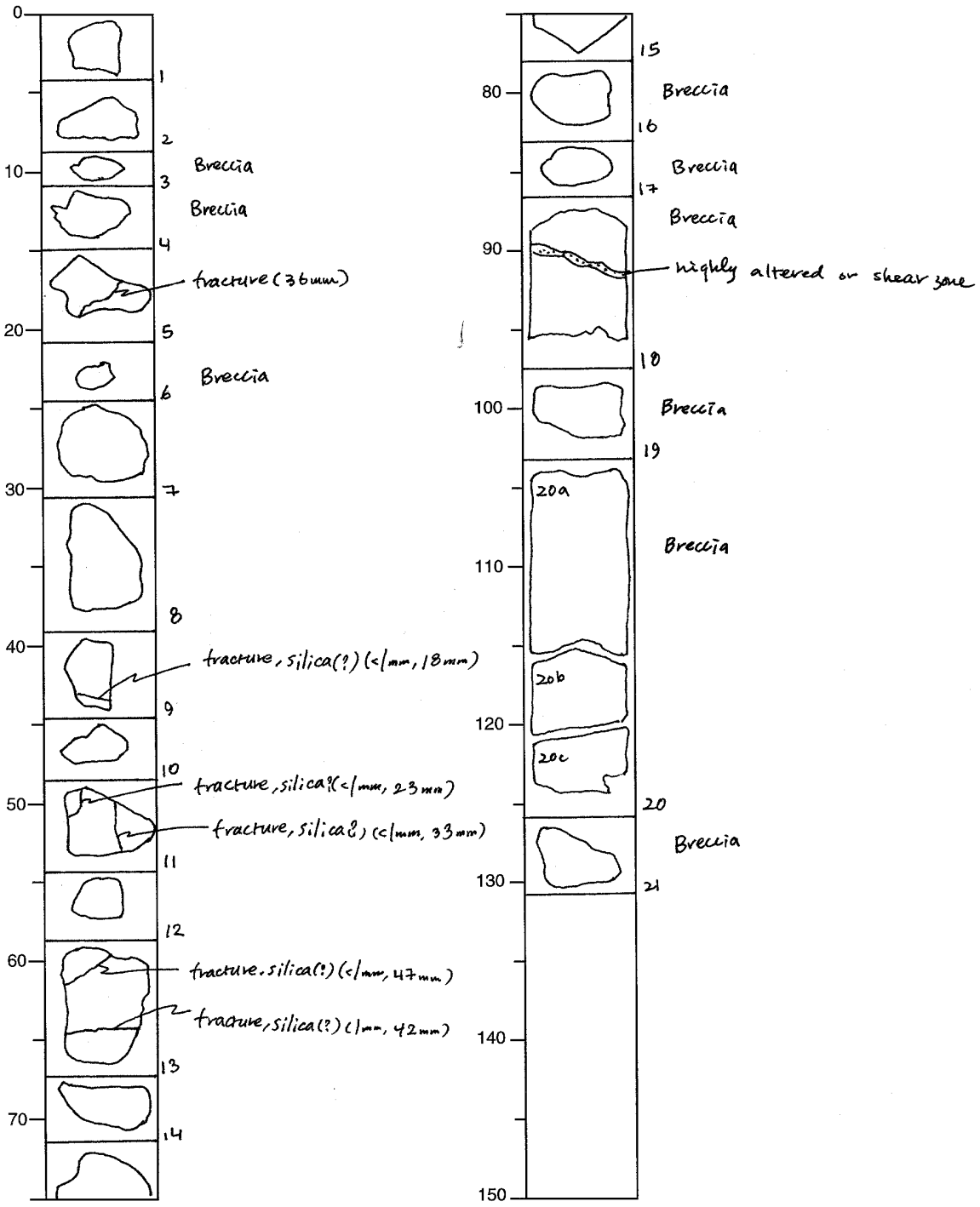

STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
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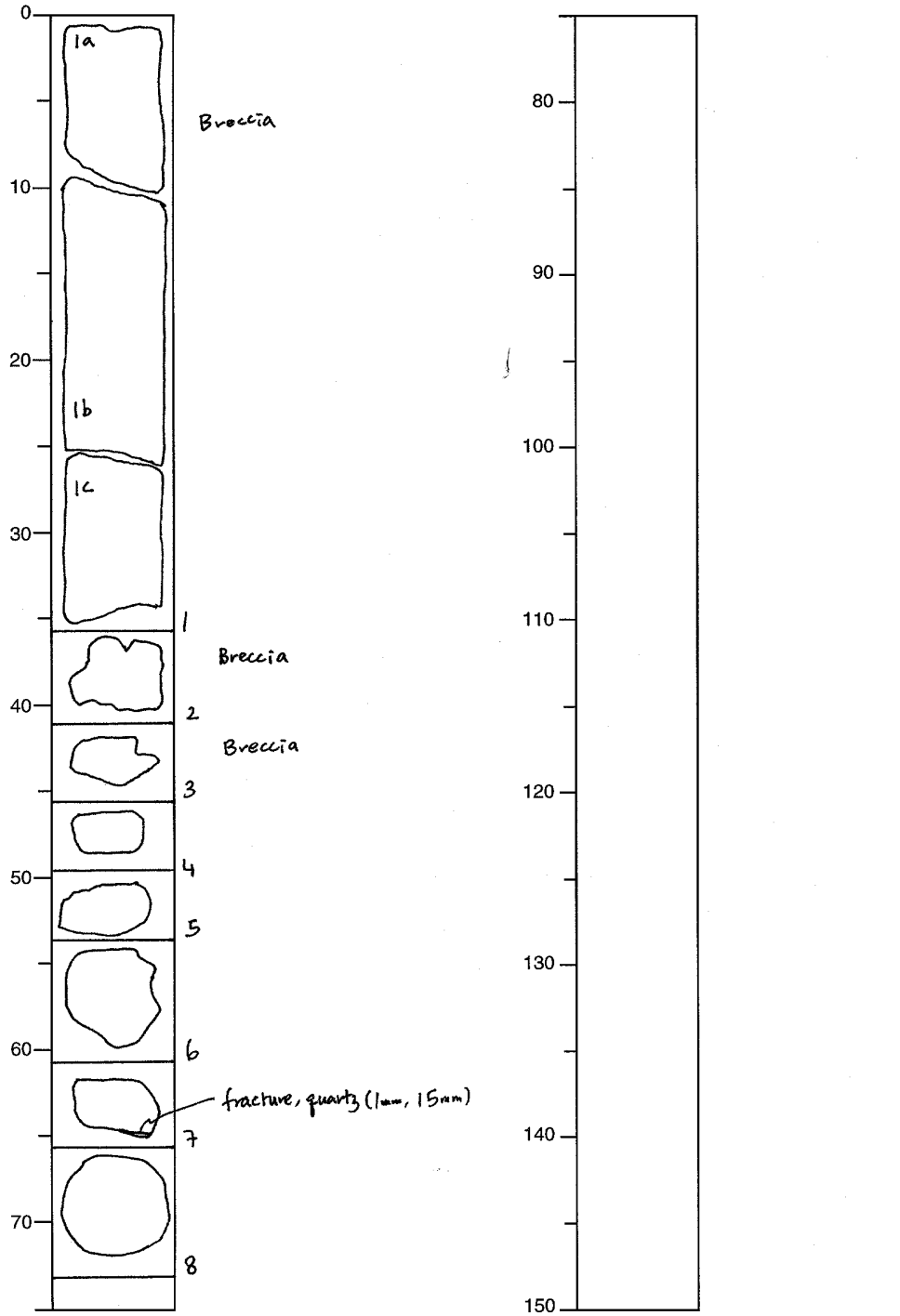
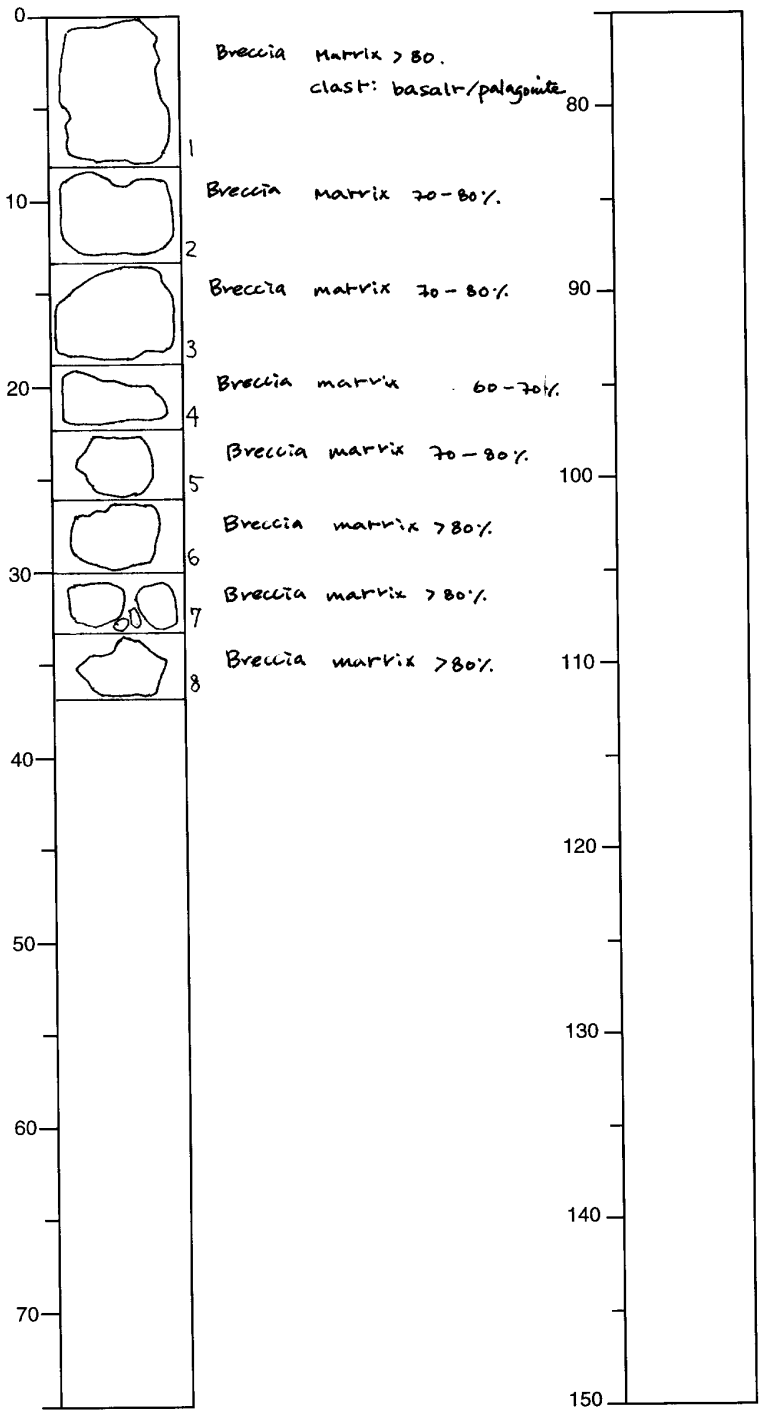


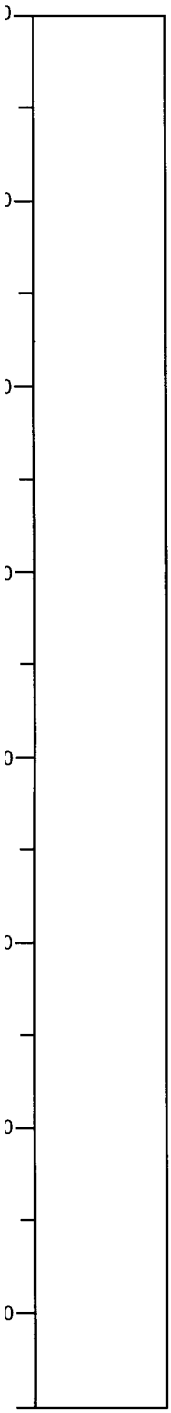
STRUCTURAL GEOLOGY DESCRIPTION

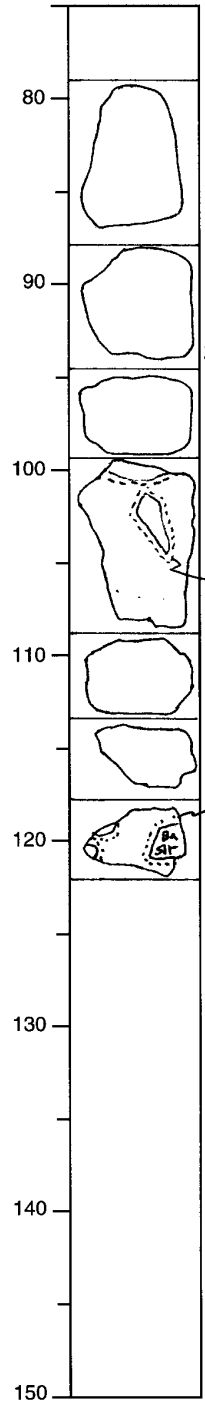
Leg	Hole	Core	Section
187	1162B	1W	CC



STRUCTURAL GEOLOGY DESCRIPTION

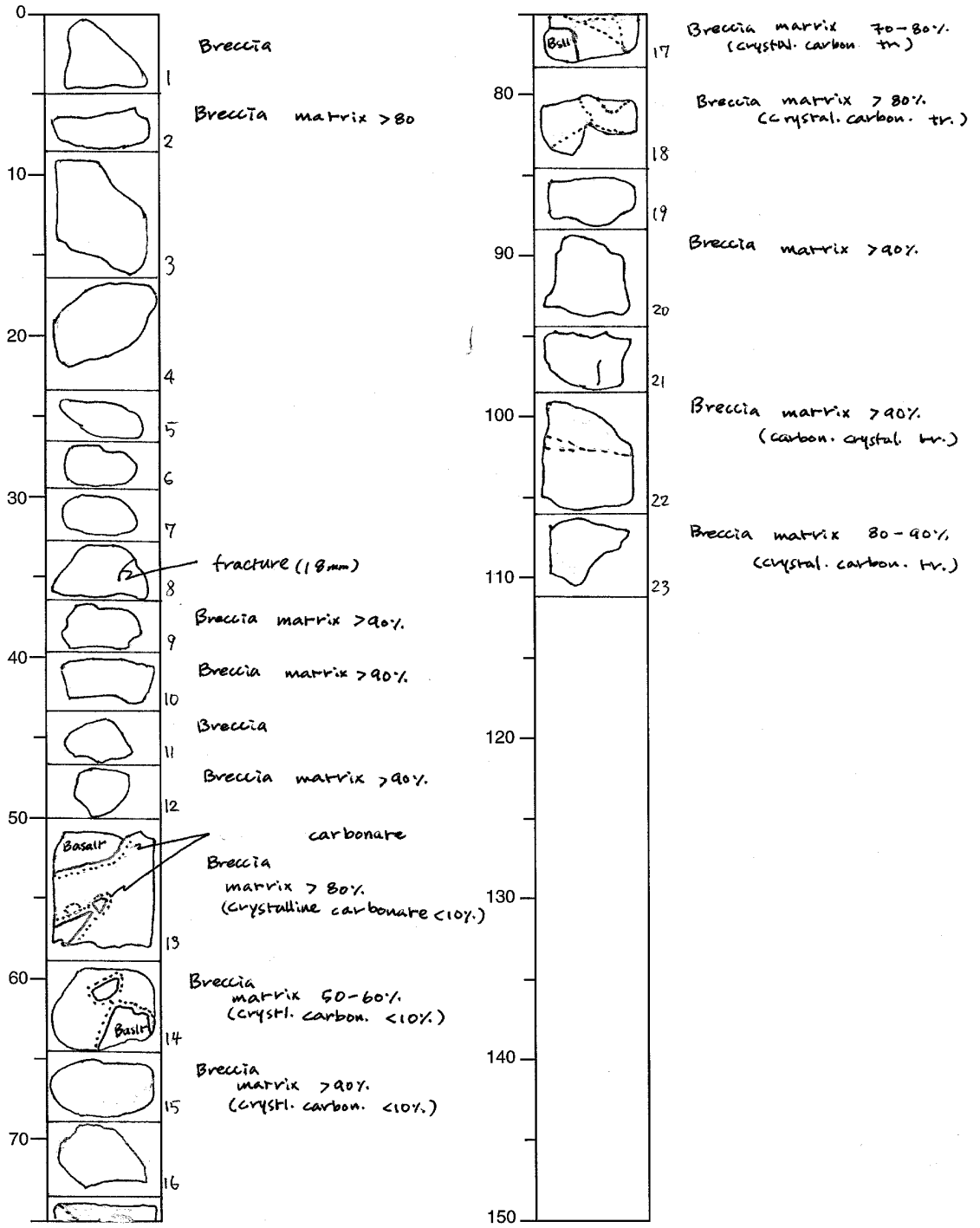
Leg	Hole	Core	Section	Observer
187	1162B	1W	3	





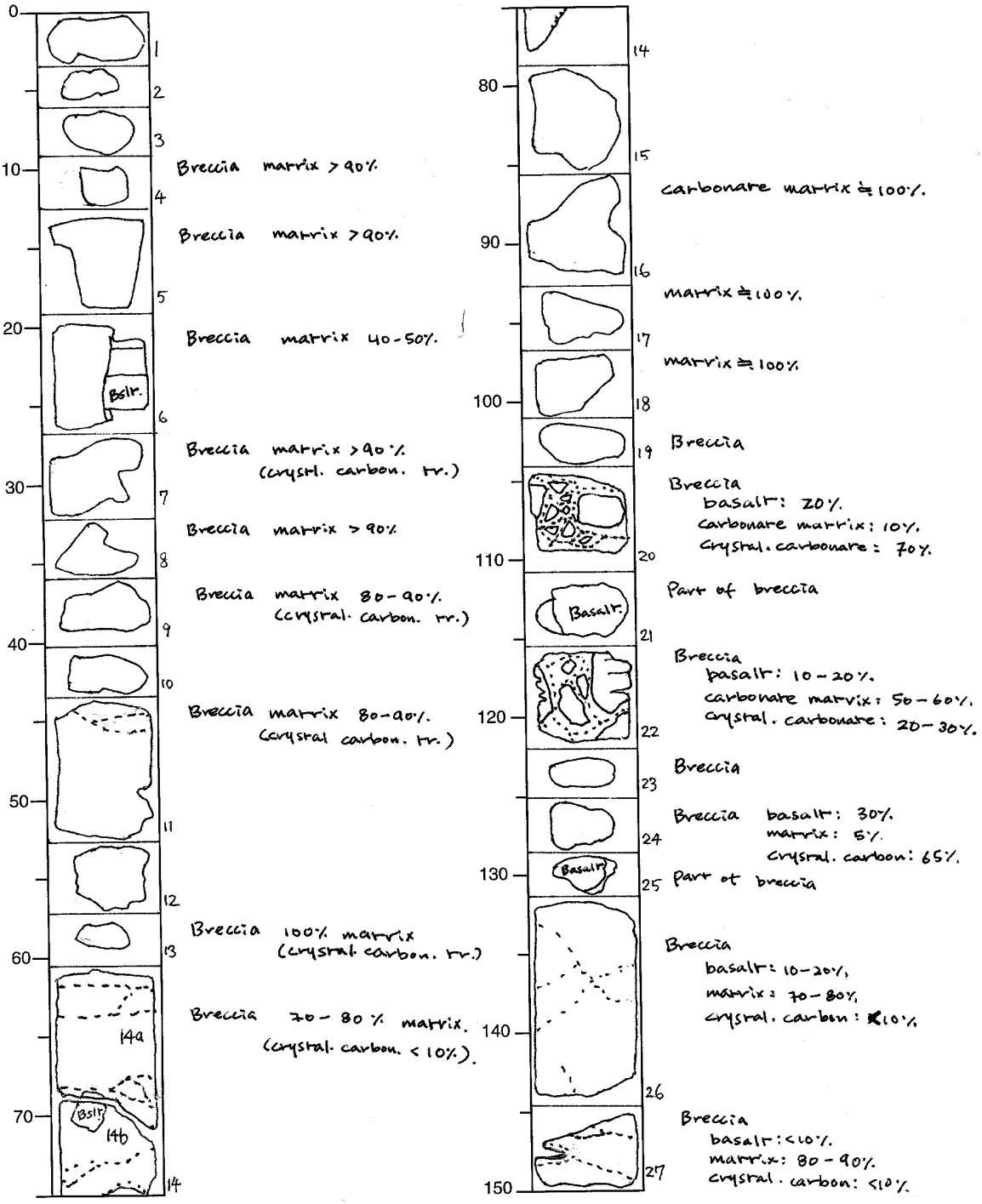
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	2R	1	



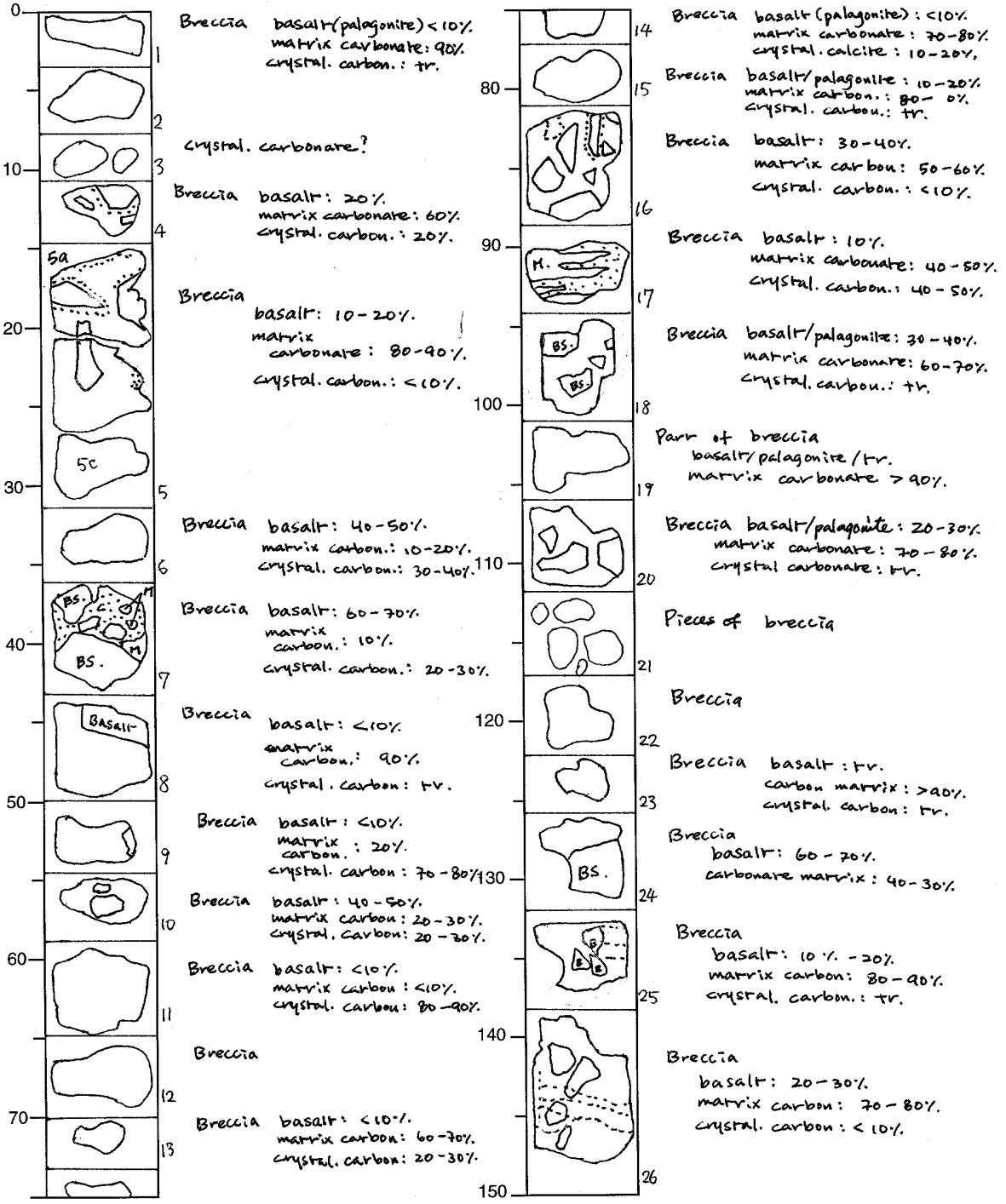
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	3R	1	



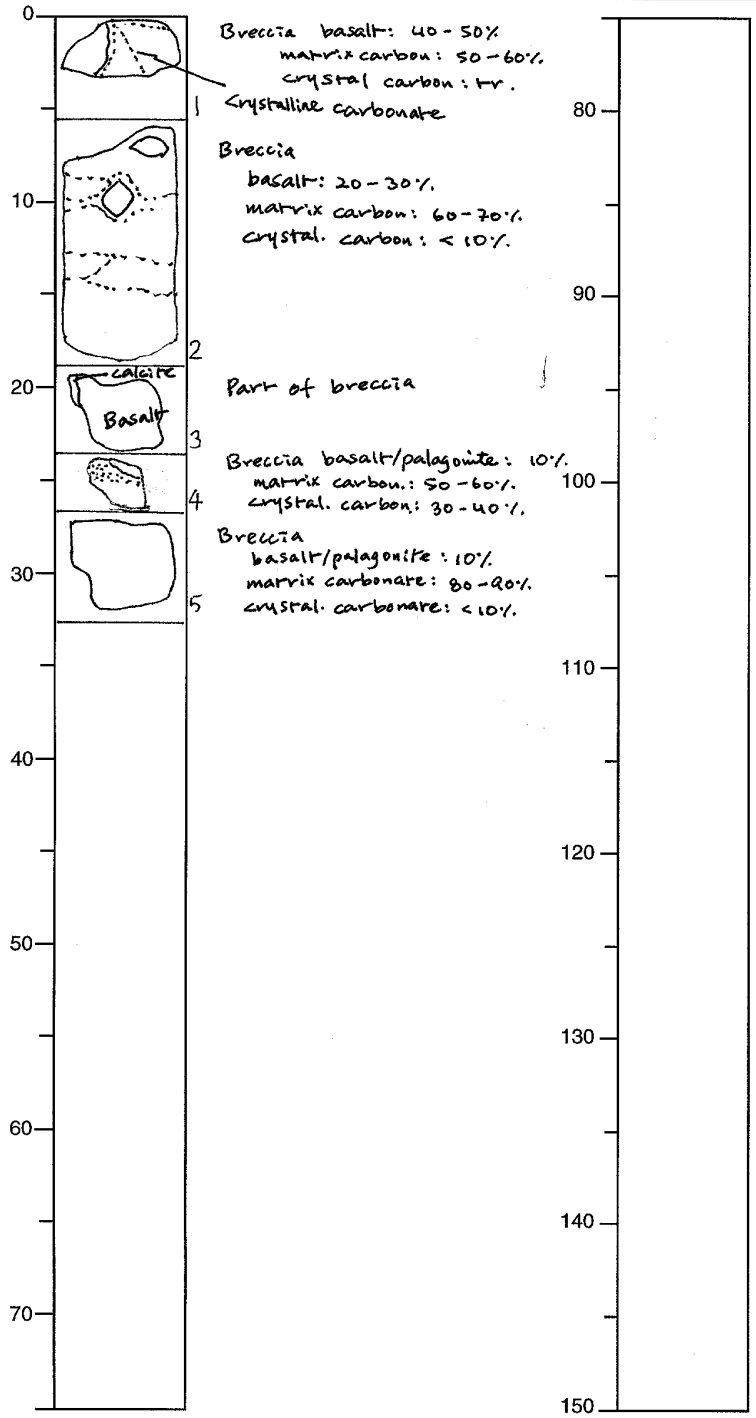
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	3R	2	



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1162B	3R	3



Breccia basalt: 40 - 50%
matrix carbon: 50 - 60%.
crystal carbon: tr.

Crystalline carbonate

Breccia
basalt: 20 - 30%.
matrix carbon: 60 - 70%.
crystal. carbon: < 10%.

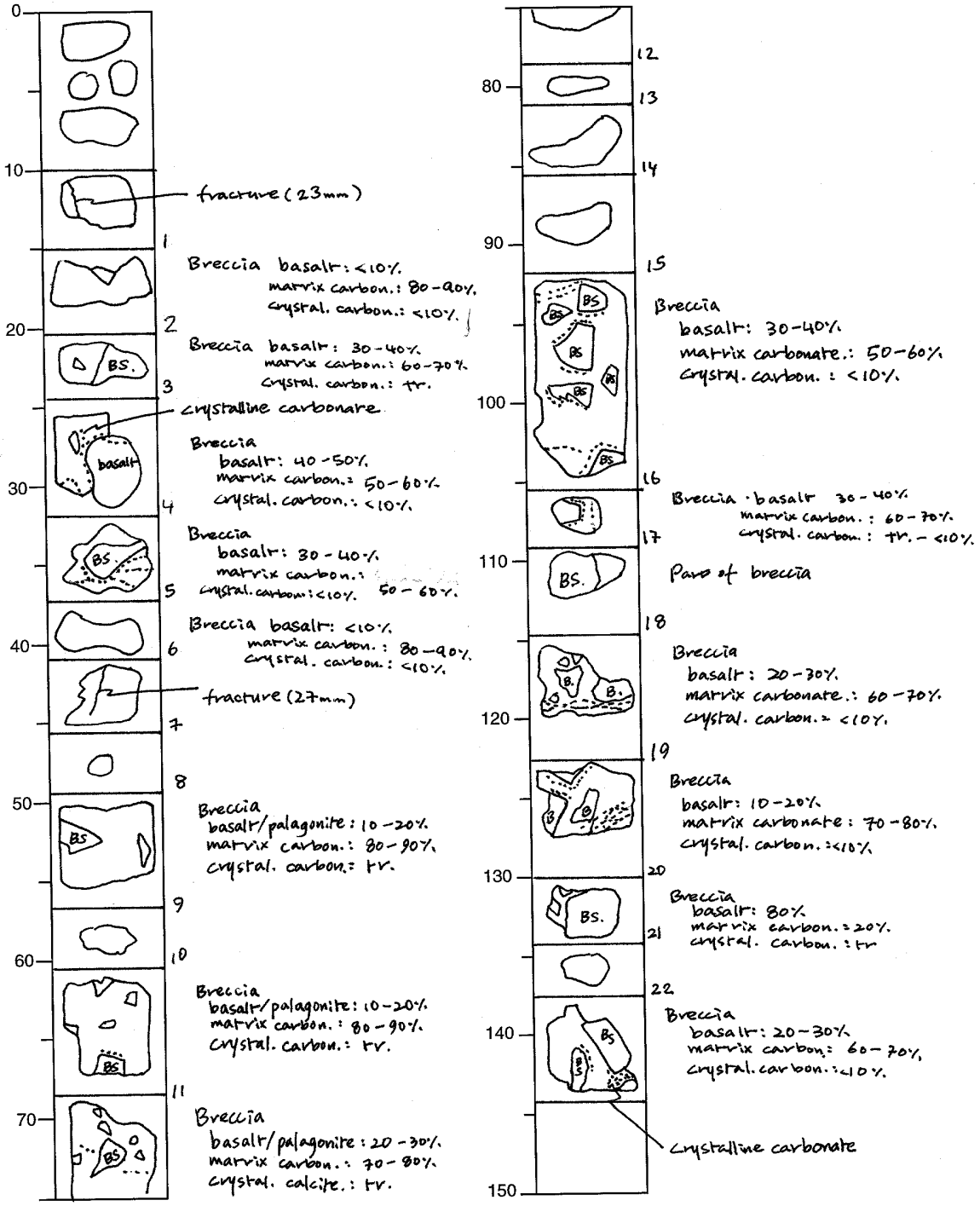
Part of breccia

Breccia basalt/palagonite: 10%.
matrix carbon.: 50 - 60%.
crystal. carbon: 30 - 40%.

Breccia
basalt/palagonite: 10%.
matrix carbonate: 80 - 90%.
crystal. carbonate: < 10%.

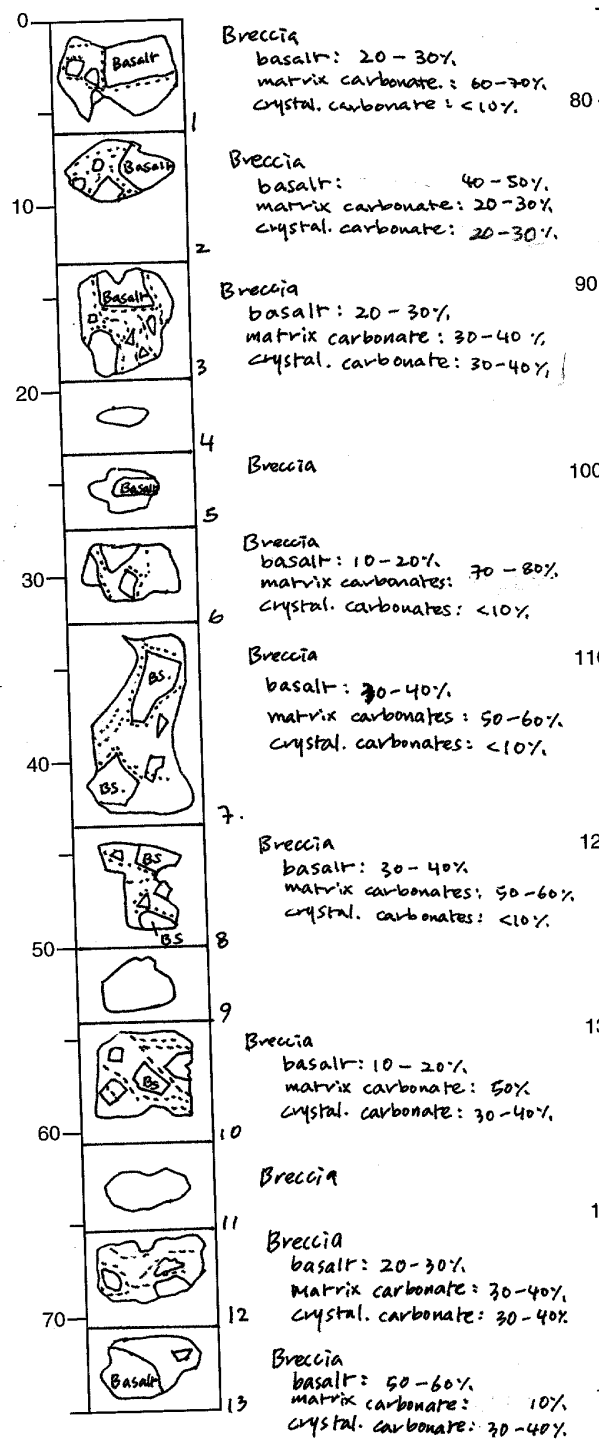
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	4R	1	



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	4R	2.	



1 Breccia
basalt: 20 – 30%
matrix carbonate.: 60–70%
crystal. carbonate: <10%.

2 Breccia
basalt: 40 – 50%.
matrix carbonate: 20–30%
crystal. carbonate: 20–30%.

3 Breccia
basalt: 20 – 30%
matrix carbonate: 30–40 %
crystal. carbonate: 30–40%

4

5 Breccia

6 Breccia
basalt: 10–20%. 70 – 80%.
matrix carbonates:
crystal. carbonates: <10%

7. Breccia
basalt: 30–40%.
matrix carbonates: 50–60%.
crystal. carbonates: <10%.

8 Breccia
basalt: 30 – 40%
matrix carbonates: 50–60%
crystal. carbonates: <10%

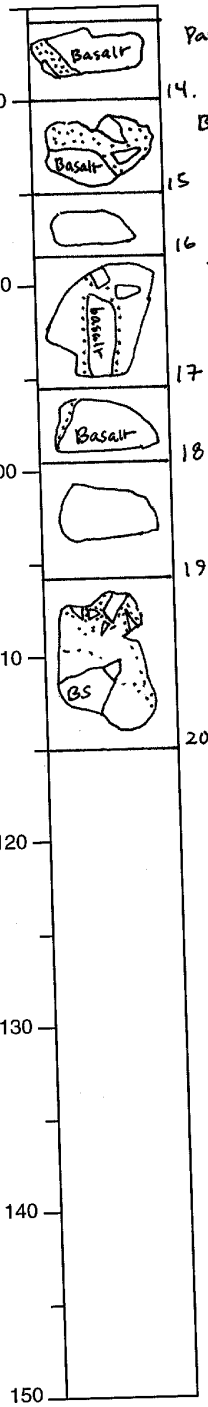
9

10 Breccia
basalt: 10 – 20%.
matrix carbonate: 50%
crystal. carbonate: 30–40%.

11 Breccia

12 Breccia
basalt: 20–30%.
Matrix carbonate: 30–40%.
crystal. carbonate: 30–40%

13 Breccia
basalt: 50–60%.
matrix carbonate: 10%.
crystal. carbonate: 30–40%.



14. Part of breccia

15 Breccia basalt: 30–40%.
crystalline carbonate: 60–70%.
matrix carbonate: tr.

16

17 Breccia
basalt: 20–30%.
matrix carbonate: 50–70%.
crystal. carbonate: <10%.

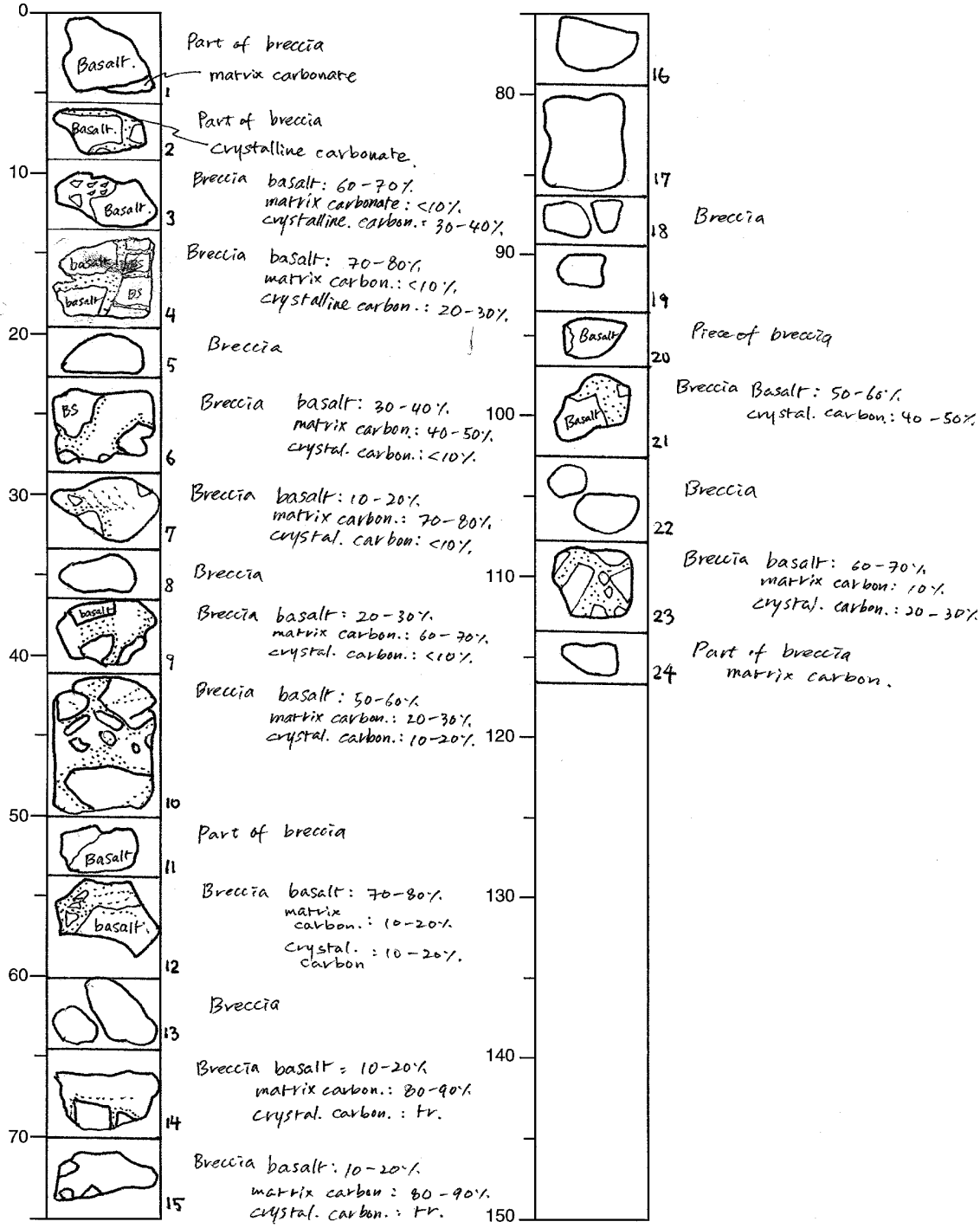
18 Piece of breccia

19 Breccia 10–20% basalt (palagonite)
70–80% matrix carbonate
tr. crystal. carbonate.

20 Breccia
basalt: 20–30%.
matrix carbonate: 60–70%.
Crystal. carbonate: 10%.

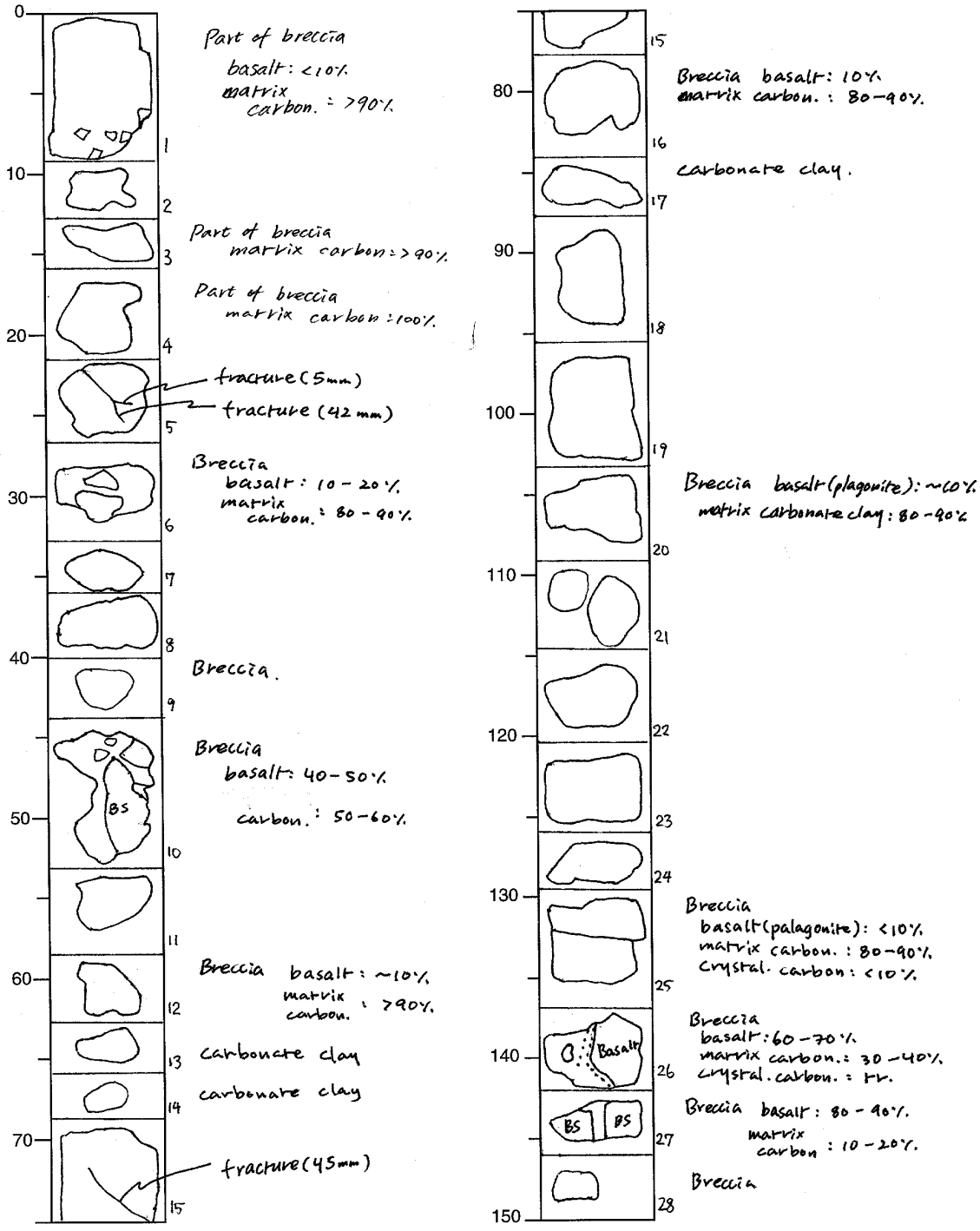
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	5R	1	



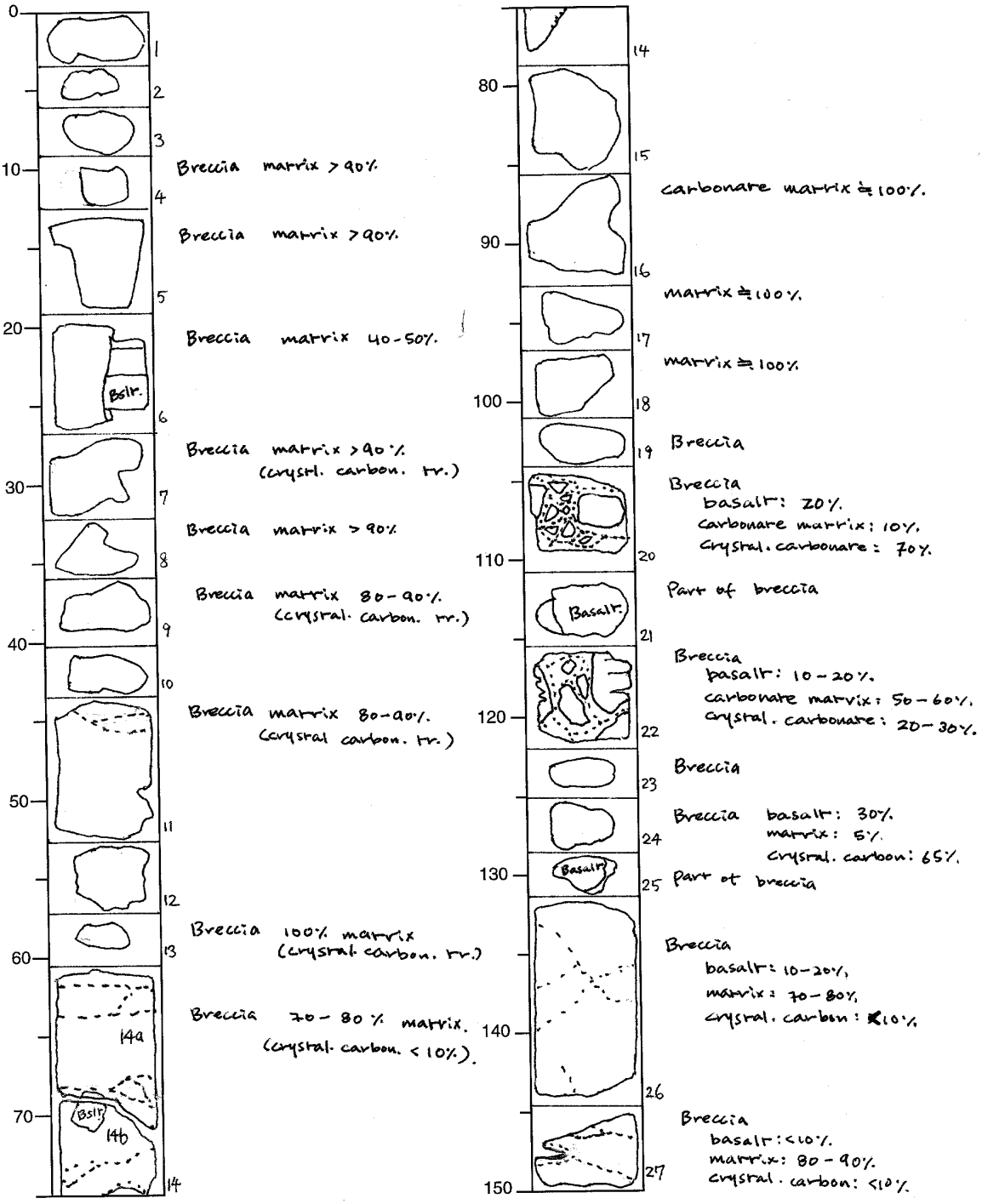
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	6R	1	



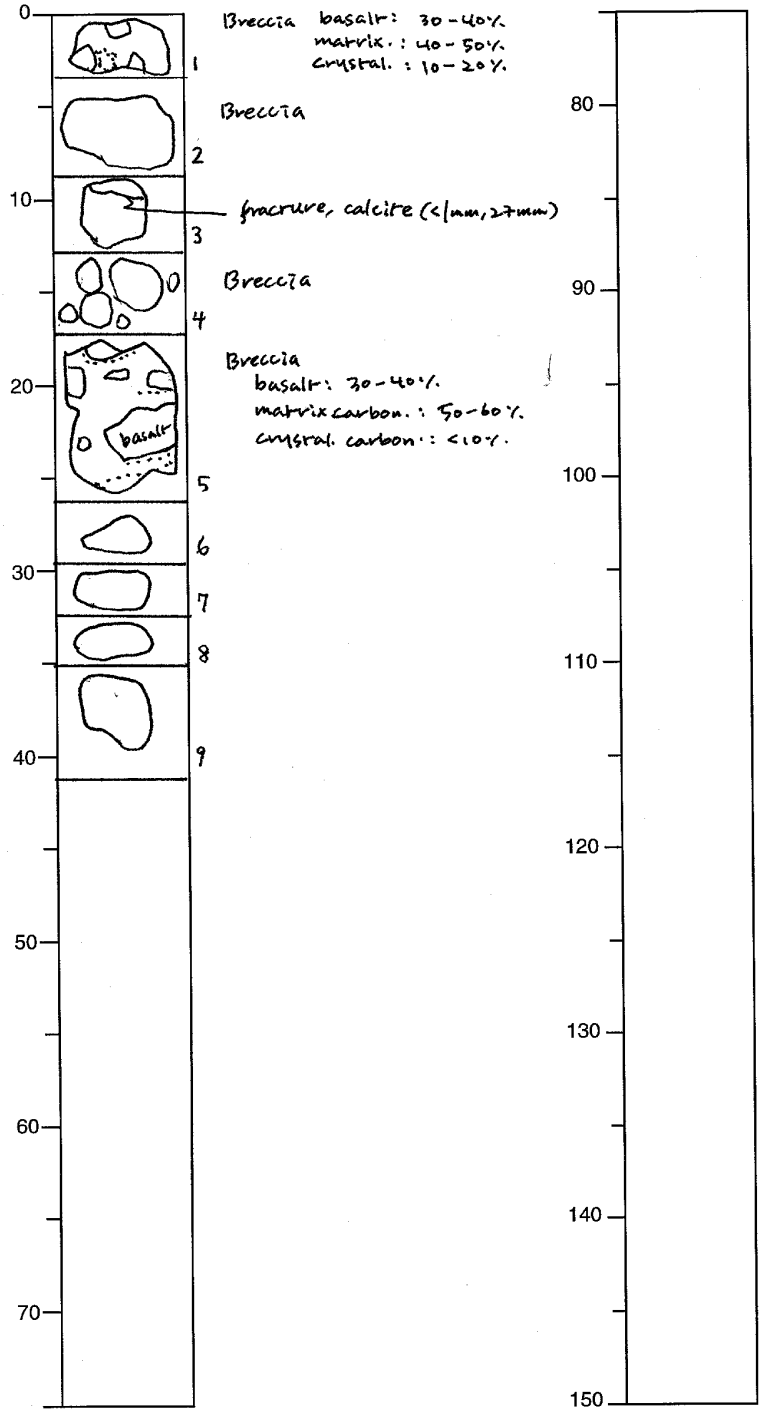
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
187	1162B	3R	1	



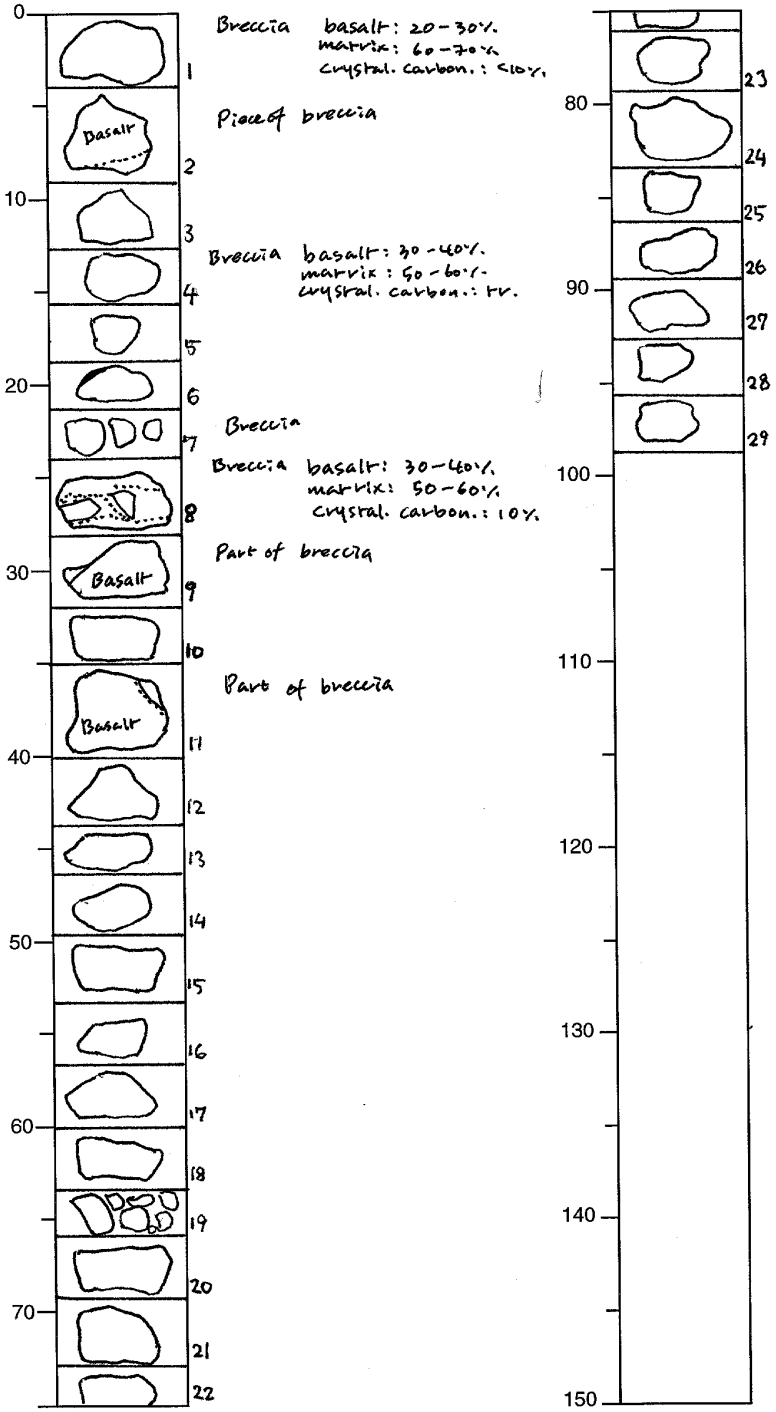
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1162B	7R	1



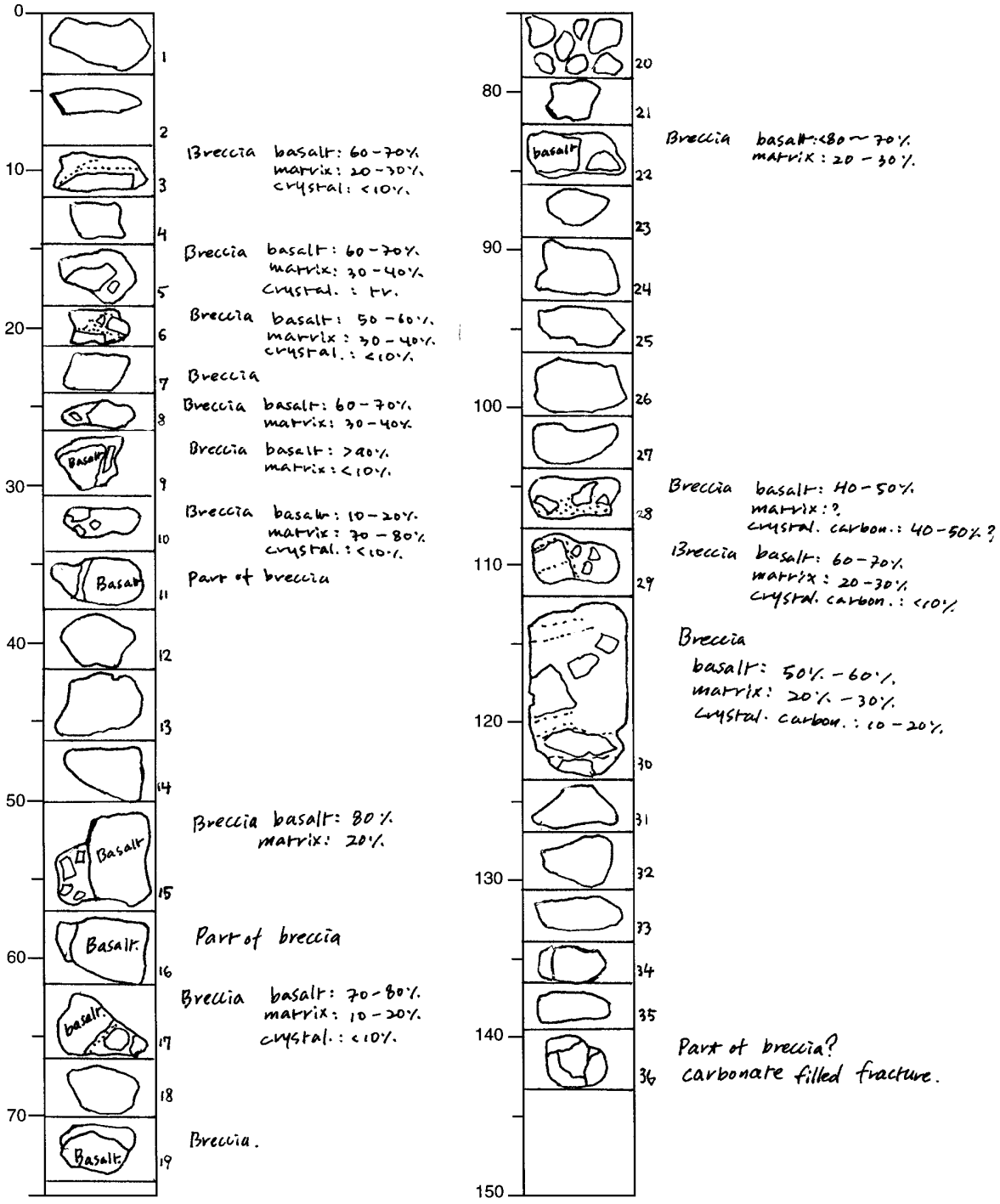
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1162B	8R	1



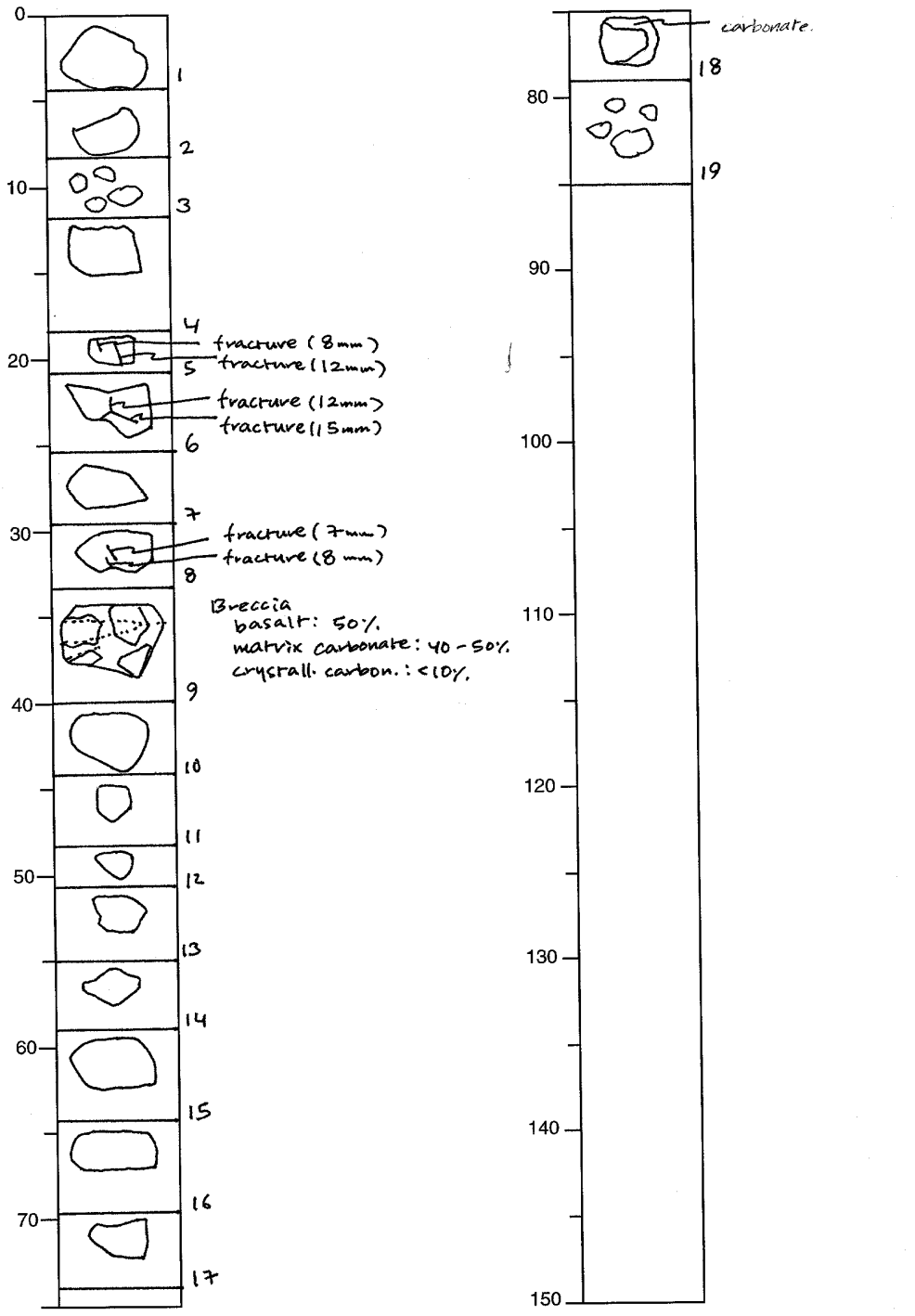
STRUCTURAL GEOLOGY DESCRIPTION

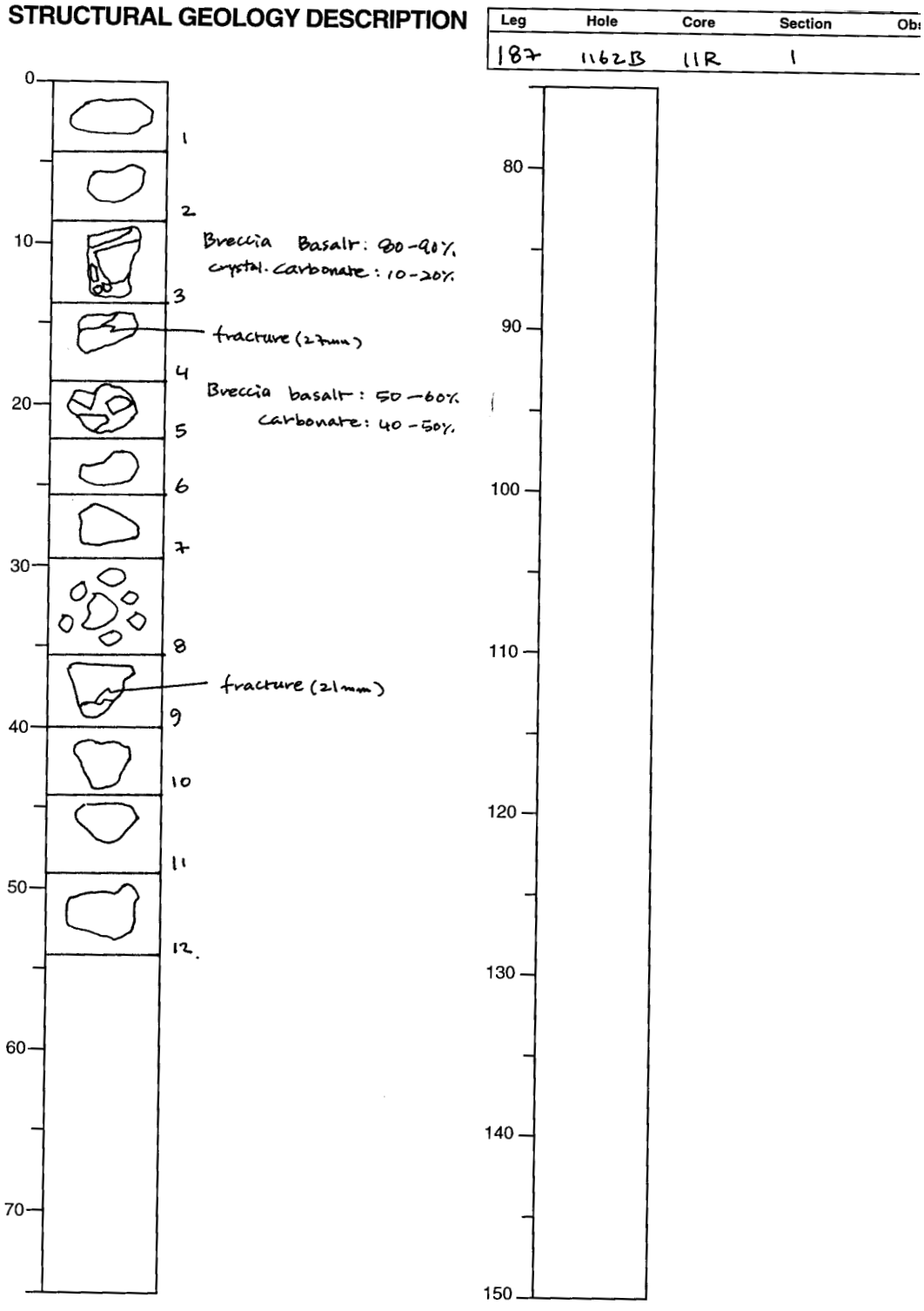
Leg	Hole	Core	Section	Observer
187	1162B	9R	1	



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section
187	1162B	10R	1.




STRUCTURAL GEOLOGY DESCRIPTION
Leg
Hole
Core
Section
187
1162B
11R
1
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
1
2
3
4
5
6
7
8
9
10
11
12
Breccia Basalt: 80-90%
crystal. carbonate: 10-20%
fracture (27mm)
Breccia basalt: 50-60%
carbonate: 40-50%
fracture (21mm)