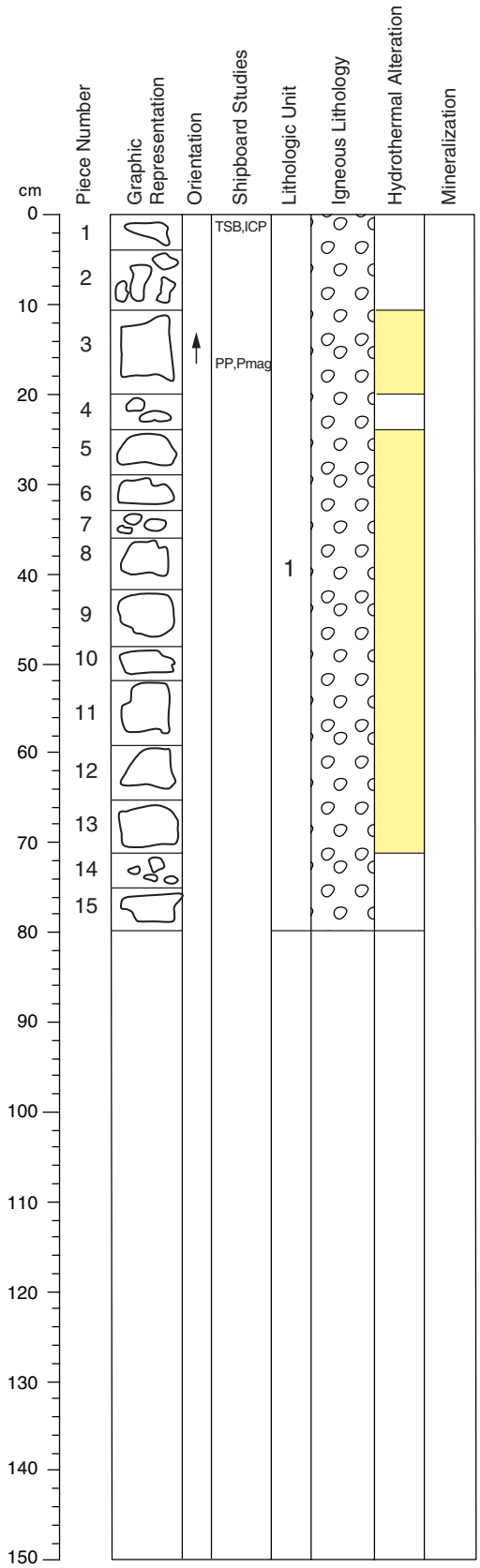
Core Photo



193-1191A-1R-1 (Section top: 0.0 mbsf)

ROCK NAME: Aphyric, moderately vesicular dacite.

UNIT: 1
Pieces: 1-15

Interval Location:	Core	Section	Piece	Depth (cm) in Section	Depth (mbsf)
Upper contact:	1R	1	1	0	0
Lower contact:	3R	1	14	93	15.57

Thickness (m): 15.57

CONTACTS: None.

PHENOCRYSTS: % Grain Size (mm):

Mineral	Mode	Max	Min	Avg.	Shape/Habit
Plagioclase	Trace			<1	Lath

Note: Only one plagioclase phenocryst was observed in Piece 6.

GROUNDMASS: Glass (Pieces 1, 2, 4, and 15). Others are fine-grained (aphanitic).

VESICLES: 5%-10%. The vesicles in the glassy specimens vary from sub-millimeter across to large tubular and flattened ones a few millimeters across and 1-2 centimeters long. The vesicles in the slightly altered, fine-grained specimens appear to have a bimodal size distribution. The coarse vesicles reach several centimeters in maximum dimension, and are open and lined with secondary minerals. The finer vesicles are either closed with secondary mineral growth, or partially filled. The tubular and flattened shapes, indicates considerable flow-related deformation during the emplacement of these lavas.

COLOR: Glassy specimens are black. Fine-grained specimens have a black matrix with small light-colored spots or bands that are filled with secondary white material, producing an overall gray color. The light features may represent original small flattened vesicles, as they are sub-parallel to the larger aligned vesicles.

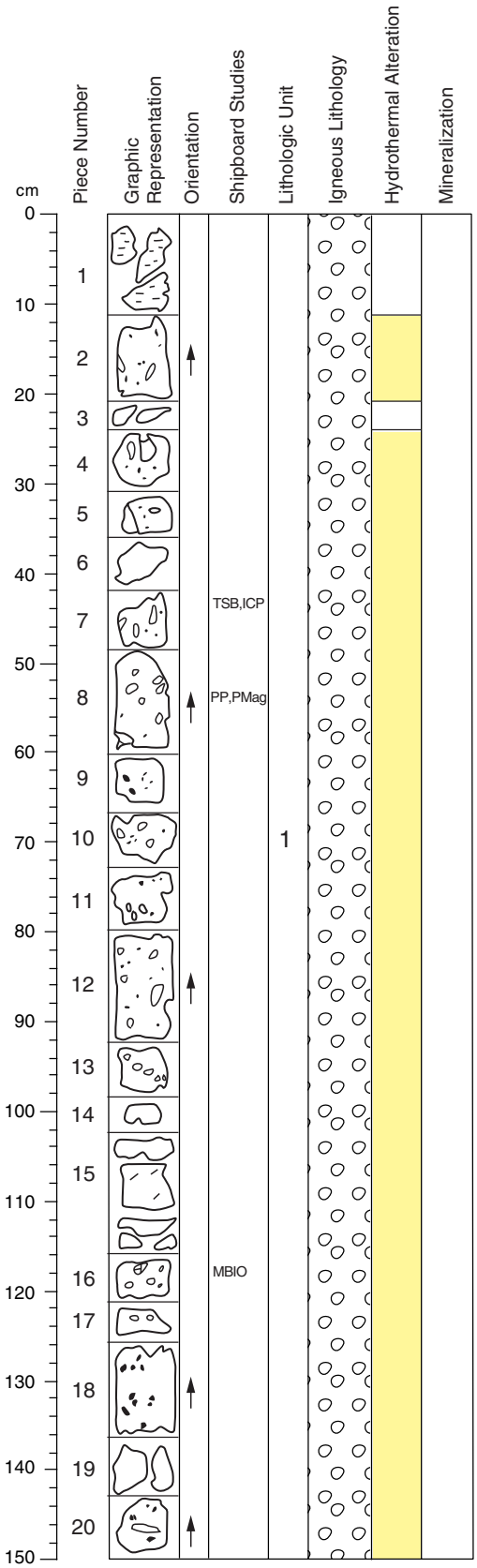
STRUCTURE: Massive, vesicular, flow aligned.

ALTERATION: Glassy specimens are fresh; the remaining specimens are slightly altered. Vesicles are lined with a soft drusy material that contains quartz or another similar refractive index mineral (RI=1.54) and possibly a clay. Most vesicles also contain rosettes of clear, bladed clinoptilolite (based upon RI and habit). By extension, the white material in the rock groundmass may be silica + zeolite + clay.

VEINS/FRACTURES: None.

COMMENTS: Refractive index of the glass is about 1.504 in Piece 1 (corresponding to about 71 wt% SiO_2) and 1.502 in Piece 15 (71 wt% SiO_2).

Core Photo



193-1191A-2R-1 (Section top: 9.4 mbsf)

ROCK NAME: Aphyric, moderately vesicular dacite.

UNIT: 1
Pieces: 1-20

Interval Location:	Core	Section	Piece	Depth (cm) in Section	Depth (mbsf)
Upper contact:	1R	1	1	0	0
Lower contact:	3R	1	14	93	15.57

Thickness (m): 15.57

CONTACTS: None.

PHENOCRYSTS: % Grain Size (mm):

Mineral	Mode	Max	Min	Avg.	Shape/Habit
Plagioclase	Trace			<1	Lath
Clinopyroxene	Trace			<1	Tabular elongate

Note: Only one plagioclase phenocryst was observed, in Piece 1. Only one pyroxene phenocryst (amber-colored, orthopyroxene?) was observed, in Piece 6.

GROUNDMASS: Glass (Pieces 1 and 3). Others are fine-grained (aphanitic).

VESICLES: 5%. The vesicles in the glassy specimens vary from sub-millimeter across to large tubular and flattened ones a few millimeters across and 1-2 centimeters long. The vesicles in the slightly altered, fine-grained specimens appear to have a bimodal size distribution. The coarse vesicles reach several centimeters in maximum dimension, and are open and lined with secondary minerals. The finer vesicles are either closed with secondary mineral growth, or partially filled. Vesicle alignment varies and may be steep with respect to the core axis (e.g., Piece 2). This, together with the tubular and flattened shapes, indicates considerable flow-related deformation during the emplacement of these lavas.

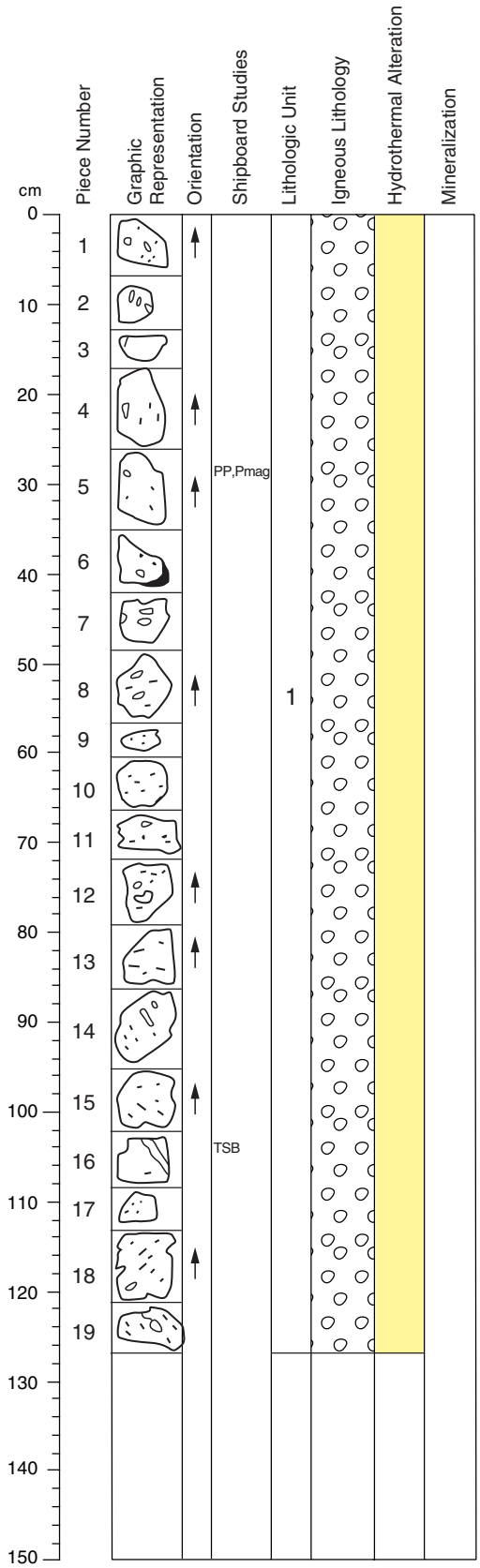
COLOR: Glassy specimens are black. Fine-grained specimens have a black matrix with small light-colored spots or bands that are filled with secondary white material, producing an overall gray color. The light features may represent original small flattened vesicles, as they are sub-parallel to the larger aligned vesicles.

STRUCTURE: Massive, vesicular, flow aligned.

ALTERATION: Glassy specimens are fresh; the remaining specimens are slightly altered. Vesicles are lined with a soft drusy material that contains quartz or another similar refractive index mineral (RI=1.54) and possibly a clay. Most vesicles also contain rosettes of clear, bladed clinoptilolite (based upon RI and habit). By extension, the white material in the rock groundmass may be silica + zeolite ± clay. A second zeolite, probably phillipsite (based upon RI and habit), forms rare rosettes of radiating, milky, acicular crystals.

VEINS/FRACTURES: Pyrite veins are present in Pieces 5, 9, and 16. Veins are thin (typically <1 mm) and have no halo.

Core Photo



193-1191A-2R-2 (Section top: 10.9 mbsf)

ROCK NAME: Aphyric, moderately vesicular dacite.

UNIT: 1
Pieces: 1-19

Interval Location:	Core	Section	Piece	Depth (cm) in Section	Depth (mbsf)
Upper contact:	1R	1	1	0	0
Lower contact:	3R	1	14	93	15.57

Thickness (m): 15.57

CONTACTS: None.

PHENOCRYSTS: Aphyric.

GROUNDMASS: Fine-grained (aphanitic).

VESICLES: 5%. The coarse vesicles reach several centimeters in maximum dimension, and are open and lined with secondary minerals. The finer vesicles are either closed with secondary mineral growth, or are partially filled.

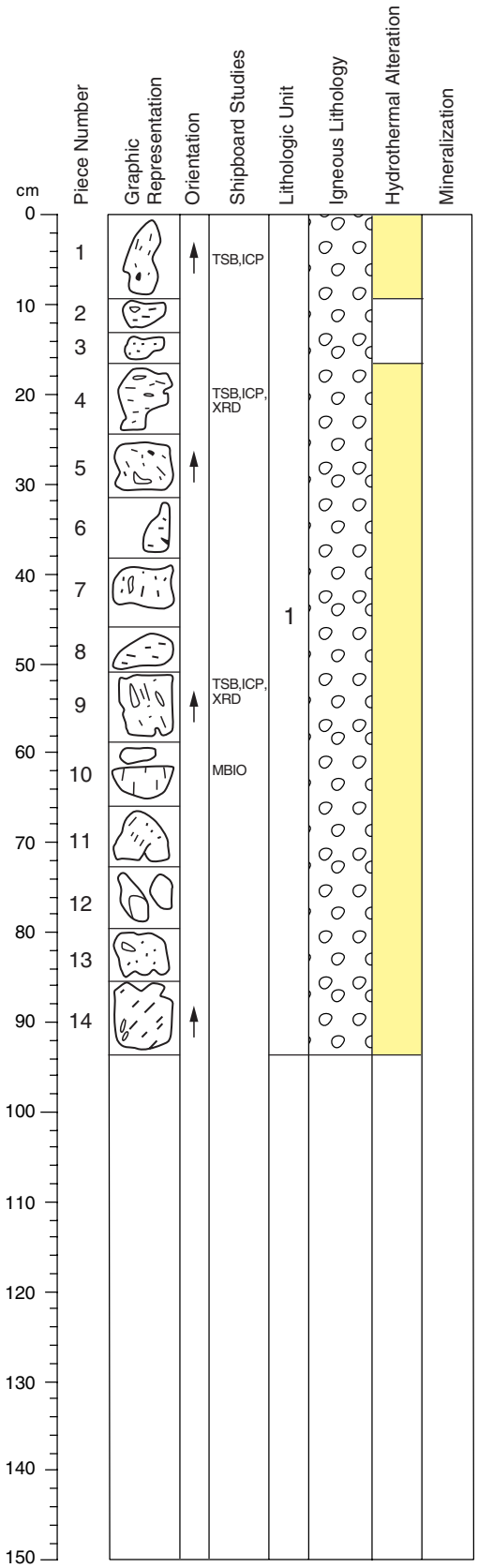
COLOR: Fine-grained specimens have a black matrix with small light-colored spots or bands that are filled with secondary white material, producing an overall gray color. The light features may represent original small flattened vesicles, as they are sub-parallel to the larger aligned vesicles.

STRUCTURE: Massive, vesicular, flow aligned.

ALTERATION: Slightly altered. Vesicles are lined with a soft drusy material that contains quartz or another similar refractive index mineral (RI=1.54) and possibly a clay. Most vesicles also contain rosettes of clear, bladed clinoptilolite (based upon RI and habit), as well as rare phillipsite. By extension, the white material in the rock groundmass may be silica + zeolite + clay.

VEINS/FRACTURES: Pyrite veins are present in Pieces 3, 4, 11, and 16. Veins are thin (typically < 1 mm) and have no halo, except for the vein in Piece 16, which has a faint 1-cm halo where pyrite occurs in vesicles.

Core Photo



193-1191A-3R-1 (Section top: 14.7 mbsf)

ROCK NAME: Aphyric, moderately vesicular dacite.

UNIT: 1
Pieces: 1-14

Interval Location:	Core	Section	Piece	Depth (cm) in Section	Depth (mbsf)
Upper contact:	1R	1	1	0	0
Lower contact:	3R	1	14	93	15.57

Thickness (m): 15.57

CONTACTS: None.

PHENOCRYSTS: Aphyric.

GROUNDMASS: Glass (Pieces 2 and 3). Others are fine-grained (aphanitic).

VESICLES: 5%. The vesicles in the glassy specimens vary from sub-millimeter across to large tubular and flattened ones a few millimeters across and 1-2 centimeters long. The vesicles in the slightly altered, fine-grained specimens appear to have a bimodal size distribution. The coarse vesicles reach several centimeters in maximum dimension, and are open and lined with secondary minerals. The finer vesicles are either closed with secondary mineral growth, or partially filled.

COLOR: Glassy specimens are black. Fine-grained specimens have a black matrix with small light-colored spots or bands that are filled with secondary white material, producing an overall gray color. The light features may represent original small flattened vesicles, as they are subparallel to the larger aligned vesicles.

STRUCTURE: Massive, vesicular, flow aligned.

ALTERATION: Glassy specimens are fresh; the remaining specimens are slightly altered. Vesicles are lined with a soft drusy material that contains quartz or another similar refractive index mineral (RI=1.54) and possibly a phylosilicate clay. Most vesicles also contain rosettes of clear, bladed clinoptilolite (based upon RI and habit), and rare phillipsite. Piece 1 has some brown weathering, and vesicles nearby contain additional black botryoidal spots that are possibly hematite or goethite. This sample also contains, in addition to the other zeolites, blocky clear crystals of a third zeolite, thought to be heulandite based on habit and RI (RI about 1.494). Some exterior surfaces have thin alteration films, and some have rusty spots that may be oxidized groundmass magnetite.

VEINS/FRACTURES: None.

TS: 47 193-1191A-1R1-5-7 #2				UNIT: 1		OBSERVERS:
						WB
ROCK NAME:	Aphyric,highly vesicular rhyodacite					SDS
TEXTURE:	Aphanitic					CY

PRIMARY		SIZE (mm)				
MINERALOGY	PERCENT	min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
None.						
GROUNDMASS						
Plagioclase	40				Acicular.	Aligned, microlitic
Interstitial glass (fresh)	60					
Clinopyroxene	Trace.				Acicular.	
Magnetite	Trace.	0.01	0.05	0.01	Anhedral.	

ALTERATION		SIZE (mm)				
MINERALOGY	PERCENT	min.	max.	av.	MORPHOLOGY	COMMENTS
None						

SULFIDE		SIZE (mm)				
MINERALOGY	PERCENT	min.	max.	av.	MORPHOLOGY	COMMENTS
None.						

COMMENTS:	A few plagioclase and one clinopyroxene microphenocrysts are present. See Chapter 6, Figure F3

TS: 48 193-1191A-2R1-42-46 #7			**UNIT: 1**			**OBSERVERS:**
						WB
ROCK NAME:	**Weakly altered, aphyric, moderately vesicular volcanic rock.**					**HP**
TEXTURE:	**Aphanitic.**					**AP**

PRIMARY		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
PHENOCRYSTS						
Plagioclase	Trace		0.7		Euhedral	
Clinopyroxene	Trace		0.1		Euhedral	
GROUNDMASS						
Plagioclase	50				Laths	Aligned
Interstitial glass (altered)	36					
Relict fresh glass	5					
Magnetite	1	0.001	0.01		Euhedral	Disseminated in groundmass. Seems to be replacive or in association with extremely fine grained quartz.

ALTERATION		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
Silica	4					Lines vesicle walls. Partly replaces glass along with clays.
Clay	4					
Zeolites	Trace					Late vesicle fill could be clinoptilolite.

SULFIDE		**SIZE (mm)**				
MINERALOGY	**PERCENT**	**min.**	**max.**	**av.**	**MORPHOLOGY**	**COMMENTS**
None.						

COMMENTS: Large vesicles are lined with silica, which is overgrown by a zeolite (clinoptilolite?).Groundmass is pervasively devitrified, volcanic glass is only preserved in minor, isolated shard like' shaped domains. Remnants of pervasive alteration. Alteration proceeded outward from vesicles.
See photomicrographs 1191A_02 and 1191A_03

TS: 49 193-1191A-2R2-103-106 #16 **UNIT: 1** **OBSERVERS:**

AP
ROCK NAME: **Moderately altered, aphyric, highly vesicular volcanic rock.** **WB**
TEXTURE: **Aphanitic.** **SDS**

PRIMARY MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Trace.				Euhedral	
GROUNDMASS						
Plagioclase	40				Laths	Aligned.
Interstitial glass(altered)	30					
Magnetite	Trace.	0.01	0.05		Anhedral	

ALTERATION MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
Silica	15					Lines vesicle walls. Partly replaces glass along with clays.
Clay	11					
Zeolites	Trace.					Late vesicle fill. Could be clinoptilolite.

SULFIDE MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
Marcasite	3	0.05	0.2		Aggregates of suhedral to euhedral crystal	Aggregates surrounding framboidal pyrite.
Pyrite	1	0.01	0.05		Aggregates.	Occurs as aggregates of framboidal pyrite forming the nucleus of the marcasite aggregates that overlap the older pyrite formation.

COMMENTS: A few plagioclase and one clinopyroxene microphenocrysts are present. Sulfides occur mainly as an approximately 1-mm vein crosscutting the groundmass. There are also pyrite + marcasite intergrowths disseminated throughout the groundmass and aggregates grown as very small druses inside vesicles.
See Chapter 6, Figures F6 and F7; see photomicrograph 1191A_08

TS: 50 193-1191A-3R1-4-7 #1			UNIT: 1			OBSERVERS:
ROCK NAME:	Weakly altered, aphyric, highly vesicular volcanic rock.					WB
TEXTURE:	Aphanitic.					AP

PRIMARY		SIZE (mm)				
MINERALOGY	PERCENT	min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Trace		0.4		Euhedral	
Clinopyroxene	Trace				Euhedral	One small crystal.
GROUNDMASS						
Plagioclase	43				Laths	Aligned.
Interstitial glass (altered)	45					

ALTERATION		SIZE (mm)				
MINERALOGY	PERCENT	min.	max.	av.	MORPHOLOGY	COMMENTS
Silica	5					Lines vesicle walls. Partly replaces glass along with clays.
Clay	5					
Zeolites	Trace					Late vesicle fill. Could be clinoptilolite.

SULFIDE		SIZE (mm)				
MINERALOGY	PERCENT	min.	max.	av.	MORPHOLOGY	COMMENTS
Magnetite	2	0.001	0.02		Discrete grains.	Disseminated in groundmass.

COMMENTS: Relict 'islands' of unaltered groundmass appear like xenoliths (or 'apparent clasts') within the dominately altered groundmass. Vesicles are always surrounded by altered groundmass => alteration extendeds outward from vesicles.
See Chapter 6, Figure F5; see photomicrograph 1191A_06

TS: 51 193-1191A-3R1-18-24 #4 **UNIT: 1** **OBSERVERS:**

WB
AP

ROCK NAME: **Moderately altered, aphyric, highly vesicular volcanic rock.**
TEXTURE: **Aphanitic.**

PRIMARY MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Trace.				Euhedral.	
GROUNDMASS						
Plagioclase	45				Laths	Aligned.
Interstitial glass (altered)	30					
Magnetite	1	0.001	0.05	0.005	Discrete grains.	Disseminated in groundmass.

ALTERATION MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
Silica	13					Lines vesicle walls. Partly replaces glass along with clays.
Clay	11					
Zeolites	Trace					Late vesicle fill. Could be clinoptilolite.

SULFIDE MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS

COMMENTS:

TS: 52 193-1191A-3R1-51-54 #9			UNIT: 1			OBSERVERS: WB AP HP
ROCK NAME:	**Moderately altered, aphyric, highly vesicular volcanic rock.**					
TEXTURE:	**Aphanitic.**					

PRIMARY MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Trace.				Euhedral.	
GROUNDMASS						
Plagioclase	45				Laths.	Aligned.
Interstitial glass (altered)	30					
Magnetite	2-Jan	0.001	0.05			Disseminated in the groundmass.

ALTERATION MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
Silica	12					Lines vesicle walls. Partly replaces glass along with clays.
Clay	11					
Zeolites	Trace					Late vesicle fill. Could be clinoptilolite.

SULFIDE MINERALOGY	PERCENT	SIZE (mm) min.	max.	av.	MORPHOLOGY	COMMENTS
Chalcopyrite	Trace.	0.001	0.02			Very rare grains disseminated in the groundmass.
Pyrite	Trace.					One example.

COMMENTS: Remnant, unaltered?, groundmass domains as 'islands' in altered, devitrified groundmass. Alteration extends outwards from vesicles.
See Chapter 6, Figure F4; see photomicrograph 1191A_05

Leg 193 Igneous Log - Hole 1191A

Identifiers									Phenocrysts													Gms	Vesicles	
						meas.	Depth	Depth	Olivine					Plagioclase				Clinopyroxene							
Unit	Core	Sec	Pc#	Inter.		length	core	Piece	%	2nd	Size	Size	%	2nd	Size	Size	%	2nd	Size	Size	Type		
				top	bot	(cm)	top	Top		minl	min	max		minl	min	max		minl	min	max		(%)	Comments
1	1R	1	1	0	5	4															Glass, microlitic.	5	Fresh, RI: 1.504 =71% SiO2. Vesicles are elongate, range: <1 mm to 1 mm x 3 to 10 mm.
1	1R	1	2	5	11	4															Glass, microlitic.	5	Do.
1	1R	1	3	11	20	6															microlitic.	7	Slightly altered: FeOx films on vesicle walls. Vesicles elongate, tubular to lensoidal: 1 to 3 mm across, maximum dimension 5 to 20 mm.
1	1R	1	4	20	25	1															Glass, microlitic.	7	Do.
1	1R	1	5	25	29	3															Microlitic.	7	Do.
1	1R	1	6	29	32	3							Tr.			<1					Do.	7	Do.
1	1R	1	7	32	37	2															Do.	7	Do.
1	1R	1	8	37	42	4															Do.	7	Do.
1	1R	1	9	42	48	5															Fine grained.	7	Bimodal vesicle population. Large tabular vesicles: diameter 1 to 4 mm x 4 to 10 mm, max. dimension: 20 to 40 mm. Small vesicles: 1 to 2 mm x 2 to 5 mm. Vesicles are streched normal to core axis. Slight alteration: Groundmass is dotted with fine white mineral (zeolite?) + minor quartz crystals which also form euhedral crystals on vesicle walls.
1	1R	1	10	48	52	3															Do.	7	Do.
1	1R	1	11	52	59	5															Do.	7	Do.
1	1R	1	12	59	65	3															Do.	5	Vesicles as above. Moderate alteration: FeOx films. Clinoptilolite(?) and minor quartz as vesicle fills and dotted through the groundmass.
1	1R	1	13	65	71	5															Do.	5	Vesicles as above. Slight alteration of the same type as above.
1	1R	1	14	71	75	5															Do.	5	Vesicles as above. Slight alteration of the same type as above.
1	1R	1	15	75	80	1															Glass, microlitic.	10	Vesicles as above. Fresh. RI measurement: 1.502 = 71% SiO2.
1	2R	1	1	0	11	8							Tr.			0.5					Glass.	5	Aphyric moderately vesicular dacite. Minor clay, pyrite, FeOx alteration on surface films and vesicle linings. Bimodal vesicle size distributions persist.
1	2R	1	2	11	21	9															Fine grained.	5	Here and in many other pieces, coarse vesicles are oriented steeply with respect to the core axis. Smaller sub-mm vesicles are partly filled by white material.
1	2R	1	3	21	24	2															Glass.	5	Rubble. One piece is fresh like pc. 1, and the other is slightly altered like pc. 2.
1	2R	1	4	24	31	5															Fine grained.	5	Similar to pc. 2.
1	2R	1	5	31	36	4															Fine grained.	5	Similar to pc. 2. Pyrite vein runs along one side.
1	2R	1	6	36	42	4											Tr.			1	Fine grained.	5	Amber-colored tabular elongate phenocryst. Rock is similar to pc. 2, but with a more pronounced groundmass texture consisting of dark, hard (> steel) matrix and about 20% thin white lines that appear to be tiny flattened vesicles filled or partially filled by white material.

Leg 193 Igneous Log - Hole 1191A

Identifiers									Phenocrysts												Gms	Vesicles	
						meas.	Depth	Depth	Olivine				Plagioclase				Clinopyroxene						
Unit	Core	Sec	Pc #	Inter.		length	core	Piece	%	2nd	Size	Size	%	2nd	Size	Size	%	2nd	Size	Size	Type		
				top	bot	(cm)	top	Top		minl	min	max		minl	min	max		minl	min	max		(%)	Comments
1	2R	1	7	42	49	5															Fine grained.	5	Do. The rosettes of bladed mineral that dot the insides of vesicles is probably clinoptilolite (based on RI and habit). The soft drusy vesicle lining underneath the zeolite contains quartz or another similar-RI mineral, possibly with some clay.
1	2R	1	8	49	60	10															Fine grained.	5	Do.
1	2R	1	9	60	67	6															Fine grained.	5	Do. Pyrite vein attached.
1	2R	1	10	67	73	6															Fine grained.	5	Do.
1	2R	1	11	73	80	5															Fine grained.	5	Do.
1	2R	1	12	80	92	11															Fine grained.	5	Do.
1	2R	1	13	92	99	6															Fine grained.	5	Do.
1	2R	1	14	99	102	2															Fine grained.	5	Do.
1	2R	1	15	102	116	10															Fine grained.	5	Do.
1	2R	1	16	116	121	5															Fine grained.	5	Do. Pyrite vein attached. Illustrates two styles of secondary alteration: a pervasive silica-zeolite, followed by a fracture-controlled pyrite veining.
1	2R	1	17	121	126	3															Fine grained.	5	Do.
1	2R	1	18	126	136	10															Fine grained.	5	Do. A second zeolite, probably phillipsite (based on habit) forms rare rosettes of radiating, acicular, milky crystals.
1	2R	1	19	136	143	6															Fine grained.	5	Do.
1	2R	1	20	143	149	6															Fine grained.	5	Do.
1	2R	2	1	0	8	8															Fine grained.	5	Do.
1	2R	2	2	8	13	5															Fine grained.	5	Do.
1	2R	2	3	13	17	3															Fine grained.	5	Do. Pyrite veins.
1	2R	2	4	17	26	8															Fine grained.	5	Do. Pyrite.
1	2R	2	5	26	35	9															Fine grained.	5	Do.
1	2R	2	6	35	42	6															Fine grained.	5	Do.
1	2R	2	7	42	49	5															Fine grained.	5	Do.
1	2R	2	8	49	57	7															Fine grained.	5	Do.
1	2R	2	9	57	61	3															Fine grained.	5	Do.
1	2R	2	10	61	67	6															Fine grained.	5	Do.
1	2R	2	11	67	72	3															Fine grained.	5	Do. Pyrite.
1	2R	2	12	72	79	7															Fine grained.	5	Do.
1	2R	2	13	79	87	7															Fine grained.	5	Do.
1	2R	2	14	87	96	8															Fine grained.	5	Do.
1	2R	2	15	96	103	6															Fine grained.	5	Do.
1	2R	2	16	103	109	6															Fine grained.	5	Do. Pyrite with a cm-scale pale halo where pyrite is observed on the vesicle walls.
1	2R	2	17	109	114	3															Fine grained.	5	Do.
1	2R	2	18	114	123	8															Fine grained.	5	Do.
1	2R	2	19	123	127	3															Fine grained.	5	Do.
1	3R	1	1	0	9	8															Fine grained.	5	Do. Two new minerals were observed in this sample. A brown-stained alteration is present in some parts, and a vesicle in this area contains, in addition to the silica lining and the clinoptilolite rosettes, tiny masses of black botryoidal material, possibly hematite, goethite, or magnetite. The other new mineral is a blocky clear mineral that occurs with clinoptilolite in vesicles. The RI is about 1.494, corresponding closely to heulandite or stilbite. The habit matches heulandite more closely.
1	3R	1	2	9	14	3															Glass.	5	Fresh rubble. Piece from higher up?
1	3R	1	3	14	17	2															Glass.	5	Do.

Leg 193 Igneous Log - Hole 1191A

Identifiers									Phenocrysts												Gms	Vesicles	
						meas.	Depth	Depth	Olivine				Plagioclase				Clinopyroxene						
Unit	Core	Sec	Pc #	Inter.		length	core	Piece	%	2nd	Size	Size	%	2nd	Size	Size	%	2nd	Size	Size	Type		
				top	bot	(cm)	top	Top		minl	min	max		minl	min	max		minl	min	max		(%)	Comments
1	3R	1	4	17	26	7							Tr.			0.5	Tr.			0.5	Glass.	10	Fresh piece, not oriented, but large.
1	3R	1	5	26	32	5															Fine grained.	5	Slightly altered as in most of the previous material from this unit.
1	3R	1	6	32	39	5															Fine grained.	5	Do.
1	3R	1	7	39	46	5															Fine grained.	5	Do.
1	3R	1	8	46	52	5															Fine grained.	5	Do. Some tiny rust spots on the outside surface, possibly after groundmass magnetite?
1	3R	1	9	52	60	7															Fine grained.	5	Do.
1	3R	1	10	60	66	5															Fine grained.	5	Do.
1	3R	1	11	66	73	6															Fine grained.	5	Do. Vesicle alignment shows a fold.
1	3R	1	12	73	80	4															Fine grained.	5	Do. Abundant rust spots as in pc. 8.
1	3R	1	13	80	87	6															Fine grained.	5	Do.
1	3R	1	14	87	95	7															Fine grained.	5	Do.

Leg 193 Alteration/Mineralization Log - Hole 1191A

Identifiers								Color		Alteration										Sulfide Mineralization							
Unit	Core	Sec	Pc#	Inter. Top	Inter. Bottom	length (cm)	Curated Depth (mbsf)	Dom.	Sec.	Inten - sity	Style	Type	Grain Size	Mineralogy (non sulfides)						Style	Grain Size	Mineralogy					Comments
														Domi-nant (%)		Second-ary (%)		Others (%)				Domi-nant (%)		Second-ary (%)		Others	
1	1R	1	1	0	5	4	0	Blk		Fr	Vf		vfg	FeOx	tr												Fresh glassy material.
1	1R	1	2	5	11	3	0.05	Blk		Fr	Vf		vfg	FeOx	tr												Fresh glassy material.
1	1R	1	3	11	20	6	0.11	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	1			FeOx	tr								Zeolite in vesicles.
1	1R	1	4	20	25	1	0.2	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								All vesicles lined with a soft silica (RI=1.54) + clay(?) lining, upon which are perched rosettes of bladed clinoptilolite(?) (RI=1.484) and rare acicular rosettes of milky phillipsite(?).
1	1R	1	5	25	29	3	0.25	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								Do.
1	1R	1	6	29	32	3	0.29	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								Do.
1	1R	1	7	32	37	2	0.32	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								Do.
1	1R	1	8	37	42	4	0.37	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								Similar to above, most vesicles filled.
1	1R	1	9	42	48	5	0.42	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								Similar to above, most vesicles filled.
1	1R	1	10	48	52	3	0.48	Blk	Gr	Sl	Vf/Pa	Sil	vfg	Si+Cl	5	Zeol	tr	FeOx	tr								Similar to above, most vesicles filled.
1	1R	1	11	52	59	5	0.52	Blk	Gr	Md	Vf/Pa	Sil	vfg	Si+Cl	10	Zeol	tr	FeOx	tr								Similar to above, most vesicles filled.
1	1R	1	12	59	65	3	0.59	Gr	Blk	Md	Pa/Pv	Sil	vfg	Si+Cl	10	Zeol	tr	FeOx	tr								More pervasive alteration? Some rust staining on out surface.
1	1R	1	13	65	71	5	0.65	Gr	Blk	Md	Vf/Pa	Sil	vfg	Si+Cl	10	Zeol	tr	FeOx	tr								
1	1R	1	14	71	75	1	0.71	Gr	Blk	Md	Vf/Pa	Sil	vfg	Si+Cl	10	Zeol	tr	FeOx	tr								
1	1R	1	15	75	80	4	0.75	Blk	Br	Sl	Vf/Pa	Sil	vfg	FeOx	3												Fresh glassy material (fall back from top?)
1	2R	1	1	0	11	8	9.4	Blk	Br	Sl	Vf/Pa	Sil	vfg	Si+Cl	2			FeOx	tr								Minor clay, pyrite, FeOx alteration on surface films and vesicle linings.
1	2R	1	2	11	21	9	9.51	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	3	Zeol	tr										Smaller sub-mm vesicles are partly filled by white material (silica?).
1	2R	1	3	21	24	2	9.61	Blk	Br	Fr	Vf/Pa	Sil	vfg	FeOx	1												Rubble. One piece is fresh like pc. 1, and the other is slightly altered like pc. 2.
1	2R	1	4	24	31	5	9.64	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Similar to pc. 2.
1	2R	1	5	31	36	4	9.71	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr			VF	fg	Py	1				Similar to pc. 2. Pyrite vein runs along one side.
1	2R	1	6	36	42	4	9.76	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	15	Zeol	tr										Rock is similar to pc. 2, but with about 20% thin white lines that appear to be tiny flattened vesicles filled or partially filled by white material.
1	2R	1	7	42	49	5	9.82	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	15	Zeol	tr										Do. The rosettes of bladed mineral that dot the insides of vesicles is probably clinoptilolite (based on RI and habit). The soft drusy vesicle lining underneath the zeolite contains quartz or another similar-RI mineral, possibly with some clay.
1	2R	1	8	49	60	10	9.89	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	1	9	60	67	6	10	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	15	Zeol	tr			VF	fg	Py	1				Do. Pyrite vein attached.
1	2R	1	10	67	73	6	10.07	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	1	11	73	80	5	10.13	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	1	12	80	92	11	10.2	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	15	Zeol	tr										Do.
1	2R	1	13	92	99	6	10.32	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	15	Zeol	tr										Do.
1	2R	1	14	99	102	2	10.39	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	1	15	102	116	10	10.42	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	1	16	116	121	5	10.56	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr			VF	fg	Py	1				Do. Pyrite vein attached. Illustrates two styles of secondary alteration: a pervasive silica-zeolite, followed by a fracture-controlled pyrite veining.
1	2R	1	17	121	126	3	10.61	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.

Leg 193 Alteration/Mineralization Log - Hole 1191A

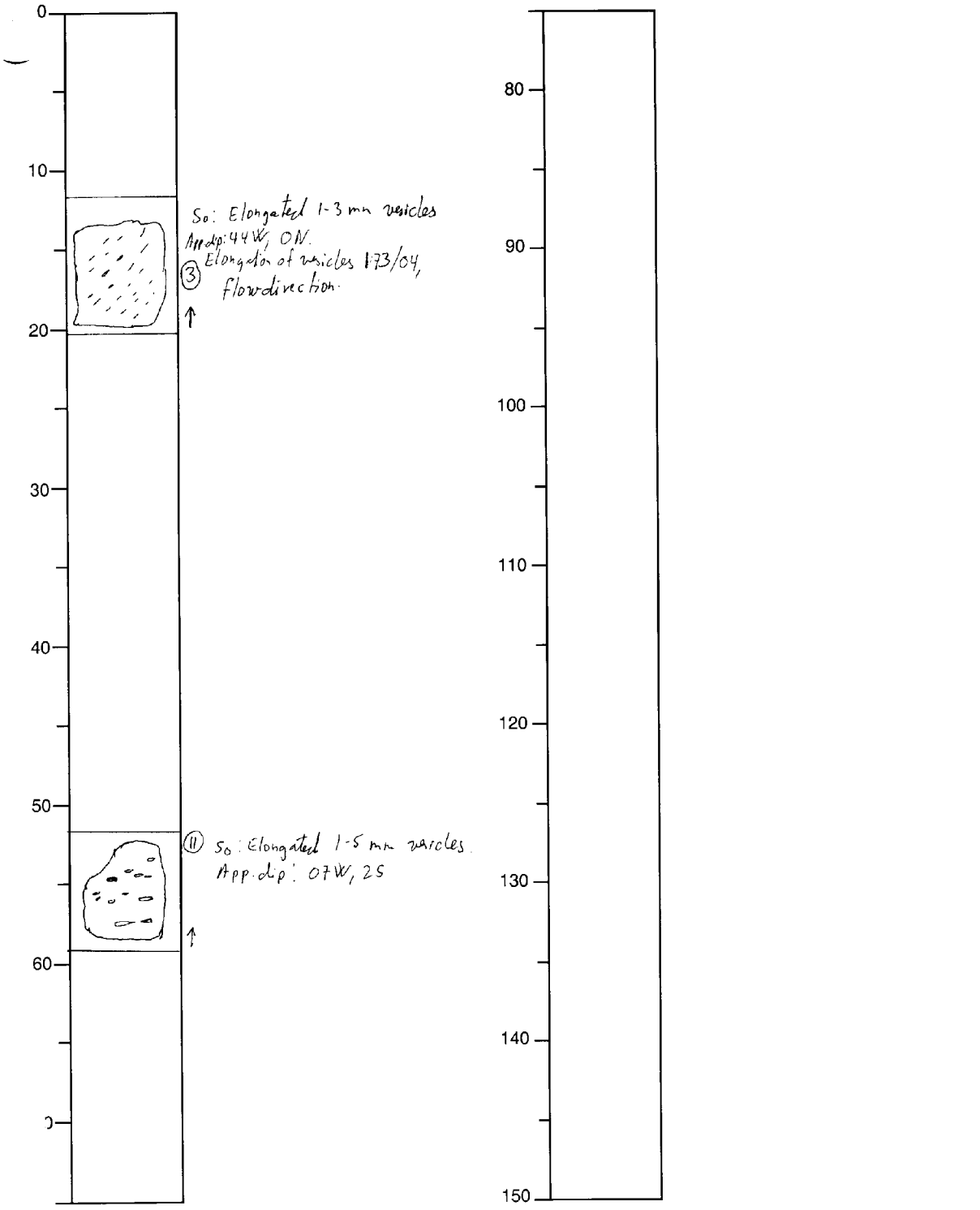
Identifiers								Color		Alteration										Sulfide Mineralization							
Unit	Core	Sec	Pc#	Inter. Top	Inter. Bottom	length (cm)	Curated Depth (mbsf)	Dom.	Sec.	Inten - sity	Style	Type	Grain Size	Mineralogy (non sulfides)						Style	Grain Size	Mineralogy					Comments
														Domi-nant (%)		Second-ary (%)		Others (%)				Domi-nant (%)		Second-ary (%)		Others	
1	2R	1	18	126	136	10	10.66	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do. A second zeolite, probably phillipsite (based on habit) forms rare rosettes of radiating, acicular, milky crystals.
1	2R	1	19	136	143	6	10.76	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	1	20	143	149	6	10.83	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	3	Zeol	tr										Do.
1	2R	2	1	0	8	8	9.4	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	2	2	8	13	5	9.48	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	2	3	13	17	3	9.53	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr			VF	fg	Py	1				Do. Pyrite veins.
1	2R	2	4	17	26	8	9.57	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr			VF	fg	Py	1				Do. Pyrite.
1	2R	2	5	26	35	9	9.66	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	2	6	35	42	6	9.75	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	2	7	42	49	5	9.82	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	8	49	57	7	9.89	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	9	57	61	3	9.97	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	15	Zeol	tr										Do.
1	2R	2	10	61	67	6	10.01	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	2R	2	11	67	72	3	10.07	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr			VF	fg	Py	1				Do. Pyrite.
1	2R	2	12	72	79	7	10.12	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	13	79	87	7	10.19	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	14	87	96	8	10.27	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	15	96	103	6	10.36	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	16	103	109	6	10.43	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr			VF	fg	Py	1				Do. Pyrite with a cm-scale pale halo where pyrite is observed on the vesicle walls.
1	2R	2	17	109	114	3	10.49	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	2R	2	18	114	123	8	10.54	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	2	Zeol	tr										Do.
1	2R	2	19	123	127	3	10.63	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	3R	1	1	0	9	8	14.7	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do. Two new minerals were observed in this sample. A brown-stained alteration is present in some parts, and a vesicle in this area contains, in addition to the silica lining and the clinoptilolite rosettes, tiny masses of black botryoidal material, possibly hematite, goethite, or magnetite. The other new mineral is a blocky clear mineral that occurs with clinoptilolite in vesicles. The RI is about 1.494, corresponding closely to heulandite or stilbite. The habit matches heulandite more closely.
1	3R	1	2	9	14	3	14.79	Blk	Gr	Fr	Vf	F	vfg														Fresh rubble. Piece from higher up?
1	3R	1	3	14	17	2	14.84	Blk	Gr	Fr	Vf	F	vfg														Do.
1	3R	1	4	17	26	7	14.87	Blk	Gr	Fr	Vf	F	vfg														Fresh piece, not oriented, but large.
1	3R	1	5	26	32	5	14.96	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	3	Zeol	tr										Slightly altered as in most of the previous material from this unit.
1	3R	1	6	32	39	5	15.02	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	3R	1	7	39	46	5	15.09	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	3R	1	8	46	52	5	15.16	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr	FeOx	tr								Do. Some tiny rust spots on the outside surface, possibly after groundmass magnetite?
1	3R	1	9	52	60	7	15.22	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	3R	1	10	60	66	5	15.3	Gr	Blk	Md	Pv/Vf	Sil	vfg	Si+Cl	10	Zeol	tr										Do.
1	3R	1	11	66	73	6	15.36	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	3	Zeol	tr										Do. Vesicle alignment shows a fold.
1	3R	1	12	73	80	4	15.43	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	2	Zeol	tr	FeOx	tr								Do. Abundant rust spots as in pc. 8.
1	3R	1	13	80	87	6	15.5	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.
1	3R	1	14	87	95	7	15.57	Gr	Blk	Sl	Pv/Vf	Sil	vfg	Si+Cl	5	Zeol	tr										Do.

Leg 193 Structure Log - Hole 1191A

Core identifiers							Structure				Structural orientation						Mineral infill						Alteration Halo		Comments
Core	Sec	pc#	Interv. (cm)	Depth cur. top (mbsf)	Length of piece (cm)	oriented piece Y/N	Feature Generation	Length (cm)	Thickness (mm)	Unit - Host-rock	App.dip, pitch of line		Calculated/Measured orientation				Nonsulfides			Sulfides			Intensity	Dom.	
											A.f.	S.f.	Strike Trend	Dip	Dip direction	General orientation	Dom.	Sec.	Others	Dom.	Sec.	Others			
1R1	1	3	12-20	0.12	6	Y	So			1-IGN	44W	0N	180	44	270	Inc									Elongated vesicles
1R1	1	3	12-20	0.12	6	Y	Lo			1-IGN			173	4	263	H									Long axis of vesicles
1R1	1	11	52-59	0.52	5	Y	So			1-IGN	7W	2S	164	7	254	Sh									Elongated vesicles
2R	1	2	11-21	9.51	9	Y	So			1-IGN	85W	88N	338	88	68	V									Elongated vesicles
2R	1	8	49-60	9.89	11	Y	So			1-IGN	31E	67S	76	68	166	Inc									Elongated vesicles
2R	1	8	49-60	9.89	11	Y	Lo			1-IGN			105	13	195	Sh									Long axis of vesicles
2R	1	9	60-68	10	7	Y	Lo			1-IGN			140	38	230	Inc				Py			Fr		Long axis of vesicles
2R	1	9	60-68	10	7	Y	Va	3.7	0.5	1-IGN	18W	13N	215	22	305	Inc				Py			Fr		Pyrite vein in slightly altered volcanics
2R	1	9	60-68	10	7	Y	Vb	1.9	0.5	1-IGN	39E	9N	349	40	79	Inc				Py			Fr		Pyrite vein in slightly altered volcanics
2R	1	10	68-73	10.08	5	Y	Lo			1-IGN			188	18	278	Sh				Py			Fr		Long axis of vesicles
2R	1	11	73-80	10.13	5	Y	Lo			1-IGN			5	6	95	Sh				Py			Fr		Long axis of vesicles
2R	1	12	80-92	10.2	11	Y	So			1-IGN	46W	54S	127	60	217	Inc									Elongated vesicles
2R	1	16	116-121	10.56	5	Y	So			1-IGN	19E	15S	38	24	128	Inc									Elongated vesicles
2R	1	16	116-121	10.56	5	Y	Va			1-IGN	90E	83S	0	90	90	V				Py			Fr		Pyrite vein in slightly altered volcanics
2R	1	16	116-121	10.56	5	Y	Vb			1-IGN	1W	1N	225	1	315	H				Py			Fr		Pyrite vein in slightly altered volcanics
2R	1	18	126-137	10.66	10	Y	Va			1-IGN			11	19	101	Sh				Py			Fr		Pyrite vein in slightly altered volcanics
2R	2	1	0-7	10.89	6	Y	So			1-IGN	64E	76N	297	77	27	Inc									Elongated vesicles, igneous fabric
2R	2	1	0-7	10.89	6	Y	Va	5	0.1	1-IGN	46E	0	0	46	90	Inc				Py					Fine grained
2R	2	3	12-17	11.01	3	N	Va	4	0.1	1-IGN							Si			Py			Fr		
2R	2	3	12-17	11.01	3	N	Vb	3	0.1	1-IGN							Si			Py			Fr		
2R	2	3	12-17	11.01	3	N	Vc	2	0.1	1-IGN							Si			Py			Fr		
2R	2	4	17-26	11.06	8	Y	Va	4	>0.1	1-IGN			347	59	77	Inc	Si			Py					
2R	2	4	17-26	11.06	8	Y	So			1-IGN			345	77	75	Inc	Si			Py					
2R	2	5	26-35	11.15	6	N	Va		0.1	1-IGN							Si			Py			Fr		
2R	2	13	80-87	11.69	6	Y	So			1-IGN	20W	30N	238	34	328	Inc									Elongated vesicles
2R	2	13	80-87	11.69	6	Y	Va		>0.2	1-IGN	52W	0	180	34	270	Inc				Py					Elongated vesicles
2R	2	14	87-96	11.76	7	Y	So			1-IGN	37E	20N	334	40	64	Inc									
2R	2	14	87-96	11.76	7	Y	Lo			1-IGN			357	15	447	Sh									Long axis of vesicles
2R	2	15	96-103	11.85	7	Y	So			1-IGN	36E	18N	336	39	66	Inc									
2R	2	15	96-103	11.85	7	Y	Va		<0.2	1-IGN			339	34	69	Inc	Si								
2R	2	16	103-110	11.92	5	Y	So			1-IGN	6W	55N	266	55	356	Inc									
2R	2	16	103-110	11.92	5	Y	Lo			1-IGN			270	21	360	Inc									Long axis of vesicles
2R	2	16	103-110	11.92	5	Y	Va		1	1-IGN	52E	2S	2	52	92	Inc	Si			Py					
2R	2	16	103-110	11.92	5	Y	Vb		0.3	1-IGN	51E	2S	2	51	92	Inc	Si			Py					
2R	2	18	114-123	12.03	8	Y	So			1-IGN	38W	13S	164	39	254	Inc									
2R	2	18	114-123	12.03	8	Y	Va	2		1-IGN	40W	8S	170	40	260	Inc				Py					
2R	2	18	114-123	12.03	8	Y	Lo			1-IGN			165	15	255	Sh									Long axis of vesicles
3R	1	9	51-59	15.21	6	Y	So			1-IGN	36E	8N	309	37	39	Inc									Elongated and flattened vesicles
3R	1	9	51-59	15.21	6	Y	Lo			1-IGN			19	12	109	Sh									Long axis of vesicles
3R	1	14	86-94	15.56	6	Y	So			1-IGN	60W	28S	163	61	253	Inc									Elongated and flattened vesicles

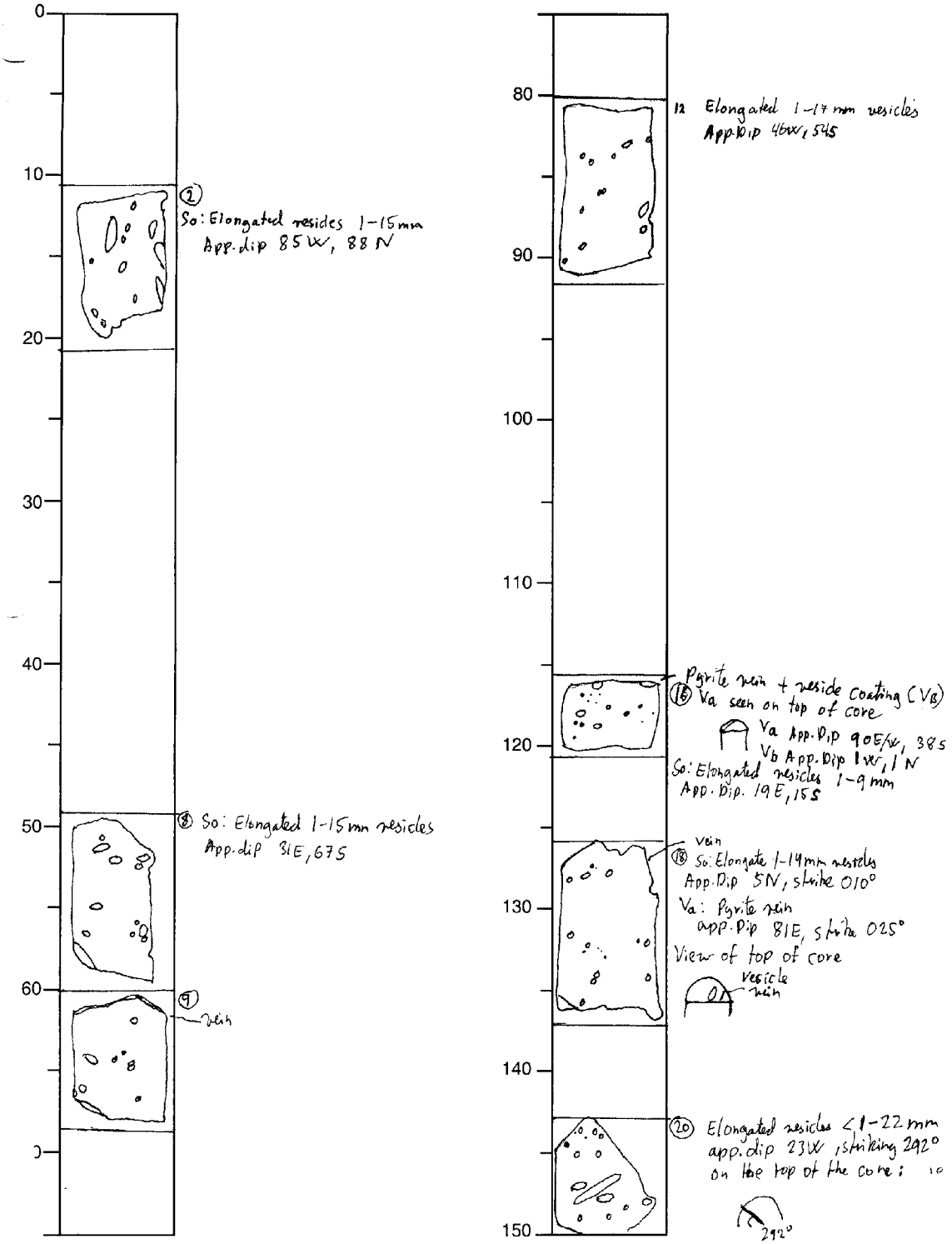
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
193	1191A	1R	1	BJE



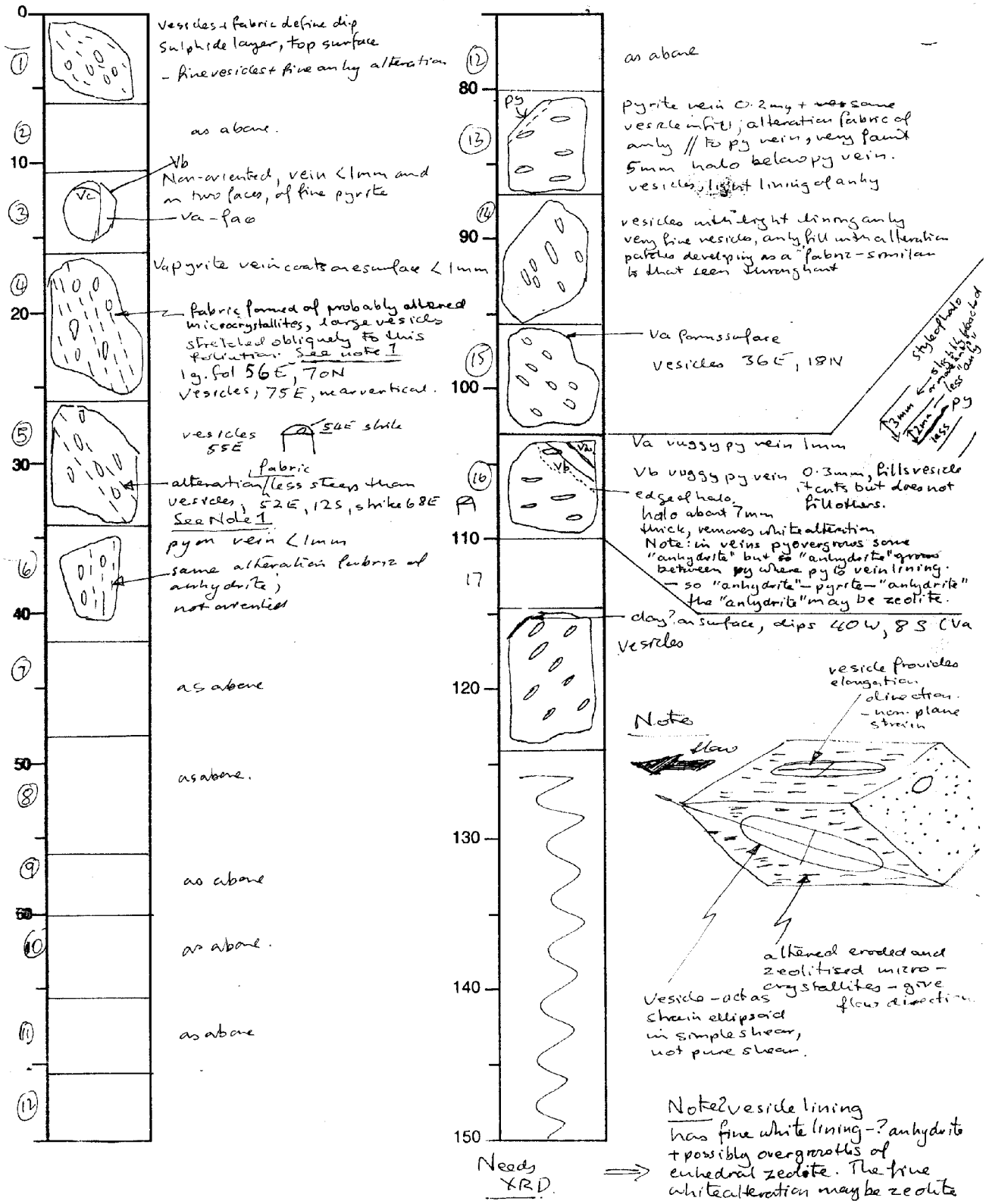
STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
193	1191A	2R	1	IAN W.



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
193	1191A	2R	2	RHF



STRUCTURAL GEOLOGY DESCRIPTION

Leg	Hole	Core	Section	Observer
193	1191A	3 R	1	ROAF