



THIN SECTION: 330-U1372A-4R-1-W 27_29-BILLET1-SLIDE1 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE1
 ROCK NAME: highly plagioclase-olivine phyric basalt clast
 WHERE SAMPLED: Clast Type 5 in volcanic breccia
 GRAINSIZE: fine grained
 TEXTURE: porphyritic, highly phyric | groundmass composed of plagioclase, olivine, few augites & altered glass

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS									
olivine	1	100		0.5	1.1	euhedral			completely replaced (100%); iddingsite
plagioclase	10	0		3	1	euhedral			fresh (sometimes zoned), glomeroporphyritic; also polysynthetic twining; microlite.
MICROPHENOCRYST									
augite	1	0		0.1		subhedral			
plagioclase	5	0		0.1	0.02	subhedral			Laths in groundmass
VESICLES									
0									
GROUNDMASS									
83									
feldspar	5	0		0.4	0.3	laths			
clinopyroxene	1	0		0.2		prismatic			rare
olivine	3	100		0.4	0.2	anhedral			completely altered (100%); iddingsite
glass	74	100		0.01	0.01				highly altered glass; matrix, very fine grained.

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		

STRUCTURE Vein (1%, 0.02mm average, straight, interconnected straight veins and joints; infilled by brown clay), weak trachytic texture
 COMMENTS

SUMMARY DESCRIPTION Highly altered, fine grained porphyritic basalt with pl phenocrysts and ol (iddingsized), aug and pl microphenocrysts in an cryptocrystalline, highly altered (glass) matrix



THIN SECTION: 330-U1372A-4R-1-W 73_75-BILLET3-SLIDE3 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE3
 ROCK NAME: aphyric basalt clast
 WHERE SAMPLED: CLAST TYPE 1 in volcanic breccia
 GRAINSIZE: microcrystalline
 TEXTURE: glomeromicrophyritic & highly phyrlic; phenocrysts of isolated olivine (0.15 mm max, 0.05 mm); glomerocrysts (of fp laths, 0.05 mm max, mod 0.03 modal); glomerocrysts of ol+fp+aug+calcite)

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	15								
MICROPHENOCRYST									
plagioclase	12	0		0.03	0.01	euhedral			
olivine	3	100		0.24	0.04	anhedral		completely replaced by iddingsite.	
VESICLES	10		0.03	2.5	0.2		low to moderate[EXP330]	60 Variable vesicle sphericity from moderate to elongate. Filled with calcite (90%). Second generation of small vesicles (.09 mean size, moderate to high sphericity, Not filled.) Smaller & batryoidal zeolite & brown clay.	
GROUNDMASS	75								
Fe-Ti oxide	5	0			0.01				
augite	0.5	0			0.005				
olivine	4.5	100						Completely replaced by iddingsite	
plagioclase	65	0							

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite, brown clay (few), botryoidal zeolite, iron oxides (one occurrence)					40% filled with calcite

STRUCTURE Occasional, non-oriented, isolated veins, filled by calcite, no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION Cryptocrystalline to microcrystalline basalt with glomeroaggregates of olivine, augite and plagioclase. All olivine replaced by iddingsite. Fine grained groundmass.



THIN SECTION: 330-U1372A-4R-2-W 120_125-BILLET4-SLIDE4 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE4
 ROCK NAME: aphyric basalt clast
 WHERE SAMPLED: volcanic breccia; several clasts (1, 2, and 3) set in a calcite matrix (incl. foraminifera)
 GRAINSIZE: fine grained
 TEXTURE: Clast 1 (Clast Type 5): porphyritic & moderately plagioclase phyric | Clast 2 (Clast Type 1): microporphyritic & aphyric | Clast 3 (Clast Type 6): aphyric & vesicular

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	5								
olivine	0.5	100		1	1	anhedral		Clast 2 (Clast Type 1); completely altered and/or replaced	
plagioclase	6	0		2	1.5	subhedral		Clast 1 (Clast Type 5)	
MICROPHENOCRYST									
plagioclase	4	0		0.2	0.4	subhedral		Clast 2 (Clast Type 1)	
plagioclase	1	0		0.5	0.5	subhedral		Clast 1 (Clast Type 5)	
augite	0.5	0		0.05	0.05	subhedral		Clast 1 (Clast Type 5)	
olivine	0.5	100		0.3	0.1	anhedral		Clast 1 (Clast Type 5); altered	
VESICLES	1		0.2	0.4	0.2		high[330]	20 (some vesicles) lined (by alteration mineral); CLAST 1	
	1		0.1	1	0.4		low[330]	10 some vesicles filled by calcite (CLAST 3)	
	1		0.1	0.2	0.1		high[330]	10 (some vesicles) lined (by alteration mineral); CLAST 2	
GROUNDMASS	91: CLAST 1 94: CLAST 2 80: CLAST 3								
glass	44	100						Clast 2 (Clast Type 1); altered	
plagioclase	25	0		0.1	0.1	laths		Clast 1 (Clast Type 5)	
glass	60	100						Clast 1 (Clast Type 5); altered	
olivine	25	100		0.05	0.05	anhedral		Clast 2 (Clast Type 1); altered	
plagioclase	25	0		0.05	0.05	subhedral		Clast 2 (Clast Type 1)	
glass	80	100						Clast 3 (Clast Type 6); replaced	
glass	80	100						Clast 3 (Clast Type 6); replaced	
olivine	6	100		0.05	0.05	subhedral		Clast 1 (Clast Type 5); altered	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
zeolite				vesicle	clast type 2
calcite				vesicle	clast type 3

STRUCTURE CLAST 1 (CLAST TYPE 5): Quartz veins, no structures in groundmass or clasts. Veins & joints (1%, 0.02mm average, straight, interconnected; weak trachytic texture), infilled with brown clay
 COMMENTS CLAST TYPE 1, 6 & 7: no structures in groundmass; for CLAST TYPE 1: occasional non-oriented isolated veins filled by calcite.

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-4R-3-W 77_80-BILLET6-SLIDE6 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE6
 ROCK NAME: highly olivine-phyric basalt clast
 WHERE SAMPLED: clast type 2 in volcanic breccia
 GRAINSIZE: fine grained
 TEXTURE: porphyritic & highly olivine-phyric (CLAST 2) | Fine-grained matrix with 5 mm subhedral altered olivines.

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	13								
olivine	10	100		5	4	euhedral		completely replaced by iddingsite	
MICROPHENOCRYST									
olivine	3	100		0.5	0.3	subhedral		completely replaced by iddingsite	
VESICLES	7		0.01	1	0.75		low to elongate	80 Calcite in vesicles; zeolite filling & Fe-Oxides	
GROUNDMASS	80: CLAST TYPE 2								
glass	8	100						completely replaced by clay	
plagioclase	67	0		0.01	0.01	subhedral			
Fe-Ti oxides	5	0		0.001	0.001	subhedral			

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
calcite			60% filled with calcite

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION 70% of thin section consists of altered cryptocrystalline basalt. A third of the section is a border to a calcite matrix, the remainder is an angular clast of cryptocrystalline basalt. Clast is described separately.



THIN SECTION: 330-U1372A-5R-1-W 31_34-BILLET7-SLIDE7 Piece No: Unit: OBSERVER:THIN SECTION:SLIDE7
 ROCK NAME: foraminifera limestone
 WHERE SAMPLED: clast in sediment, likely CLAST TYPE 3
 GRAINSIZE: fine grained
 TEXTURE: CLAST TYPE 3: Highly phyrlic to aphyric basalt

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	30								
MICROPHENOCRYST									
plagioclase	29	0		0.57	0.2	euhedral		laths; CLAST #3	
olivine	10	100		0.25	0.2	anhedral		CLAST TYPE B	
olivine	1	80		0.15	0.1	subhedral		replaced by iddingsite; CLAST #3	
plagioclase	20	0		0.15	0.25	subhedral		laths; CLAST TYPE B	
VESICLES	1			0.25	0.2		low sphericity	0	
	1			0.25	2		elongate	0	
								0	
GROUNDMASS	69: CLAST TYPE 3 69: CLAST TYPE B (?)								
Fe-Ti oxide	9	0		0.03	0.06	subhedral		CLAST #3	
plagioclase	29	0		0.09	0.024	euhedral		laths (CLAST TYPE B ?)	
olivine	30	100		0.1	0.05	anhedral		iddingsite (CLAST TYPE B ?)	
glass	10	100						iddingsite replaced and altered glass (CLAST #3?)	
plagioclase	50	0		0.09	0.01	euhedral		CLAST #3	
glass	10	100						glass replaced by iddingsite (CLAST TYPE B ?)	

SECONDARY MINERALOGY SIZE(mm) min. max. mode. REPLACING/FILLING COMMENTS

STRUCTURE No structure in groundmass.
 COMMENTS

SUMMARY DESCRIPTION Fine-grained aphyric basalt clast in sediment (counts for both CLAST #3 & CLAST Type B [?]).



THIN SECTION: 330-U1372A-5R-1-W 32_34-BILLET8-SLIDE41 Piece No: Unit:IIb OBSERVER:THIN SECTION:SLIDE41
 ROCK NAME: aphyric basalt clast
 WHERE SAMPLED: Sedimentary rock (foraminifera limestone)
 GRAINSIZE: fine grained
 TEXTURE: highly phyrlic; CLAST TYPE 3: aphyric; CLAST TYPE 1: moderately phyrlic; aphano-porphyrritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	6								
plagioclase	5	100		0.3	0.2	euhedral		CLAST TYPE 1	
MICROPHENOCRYST									
plagioclase	29	0		0.57	0.25	euhedral		CLAST TYPE 1; laths	
olivine	0.5	100		0.3	0.2	subhedral		CLAST TYPE 3	
olivine	1	80		0.15	0.1	subhedral		CLAST TYPE 3; replaced by iddingsite	
olivine	10	100		0.25	0.2	anhedral			
olivine	3	100		1.2	1	subhedral		CLAST TYPE 1	
plagioclase	20	0		0.25	0.2	subhedral		CLAST TYPE 1; laths	
VESICLES	1			0.25	0.2		elongate[330]	CLAST TYPE 1	
	1		0.1	1	0.5		moderate[330]	CLAST TYPE 3	
	1		0.2	0.4	0.3		moderate[330]	CLAST TYPE 1	
	1			0.25	0.2		low[330]	CLAST TYPE 3	
GROUNDMASS	CLAST TYPE 1: 90 CLAST TYPE 3: 0								
olivine	5	100		0.05	0.03	euhedral		CLAST TYPE 3; iddingsite	
plagioclase	60	0		0.4	0.2	laths[330]		CLAST TYPE 3; iddingsite	
olivine	30	100		0.1	0.05	anhedral		CLAST TYPE 3; iddingsite	
plagioclase	29	0		0.09	0.024	euhedral		CLAST TYPE 1; laths	
Fe-Ti oxide	9	0		0.03	0.06	subhedral			
glass	10	100						CLAST TYPE 3; altered & replaced by iddingsite	
plagioclase	38	0		0.2	0.1	laths[330]		CLAST TYPE 1	
glass	24.5	100						CLAST TYPE 3; iddingsite	
glass	52	50				laths[330]		CLAST TYPE 1	
plagioclase	50	0		0.009	0.01	euhedral		CLAST TYPE 3	

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.		
clay		vesicle	CLAST TYPE 1
clay		vesicle	CLAST TYPE 3

STRUCTURE No structure in groundmass.
 COMMENTS

SUMMARY DESCRIPTION fine grained aphyric basalt clast in sediment



THIN SECTION: 330-U1372A-5R-3-W 16_20-BILLET10-SLIDE10 Piece No: Unit:IIC OBSERVER:THIN SECTION:SLIDE10
 ROCK NAME: foraminifera limestone with volcaniclasts
 WHERE SAMPLED: clast in sediment
 GRAINSIZE: fine grained
 TEXTURE: sparsely phyrlic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	2								
plagioclase	1			1.5	1	euhedral to subhedral			
plagioclase	1	50		3	1	euhedral to subhedral		replaced by sericite	
MICROPHENOCRYST									
VESICLES	5		0.2	0.5	0.3		high[330]		
GROUNDMASS	93								
glass		100							
plagioclase		50		0.4	0.25			sericite	
olivine		100		0.2	0.1			iddingsite	

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.		
STRUCTURE	No structures in groundmass.		
COMMENTS			

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-6R-1-W 28_31-BILLET13-SLIDE 54 Piece No: Unit:IIC OBSERVER:THIN SECTION:SLIDE 54
 ROCK NAME: aphyric basalt clast
 WHERE SAMPLED: clast in sediment
 GRAINSIZE: fine grained
 TEXTURE:

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS									
MICROPHENOCRYST									
VESICLES	25		0.2	1.5	0.4		low[330]	80	Mostly filled with calcite.
GROUNDMASS	75								
glass	5	0							
plagioclase	40	0		0.8	0.3	euohedral			laths
Fe-Ti oxide	15	0		0.025	0.01				
olivine	15	100		0.1	0.05				iddingsite

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min.	max. mode.	

STRUCTURE No structure in groundmass.
 COMMENTS

SUMMARY DESCRIPTION Clast is 50% of thin seccion.



THIN SECTION: 330-U1372A-6R-2-W 53_56-BILLET15-SLIDE15 Piece No: Unit:IIC OBSERVER:THIN SECTION:SLIDE15
 ROCK NAME: aphyric basalt clast
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE:

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0								
MICROPHENOCRYST									
VESICLES	3		0.3	1.8	1		moderate[330]	100	
GROUNDMASS	97								
Fe-Ti oxide	2	0		0.15	0.07	anhedral			
clinopyroxene	40	0		0.3	0.05	subhedral			
olivine	10	100		0.25	0.07	subhedral		iddingsite (red)	
plagioclase	45	0		0.3	0.1	subhedral			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
calcite				vesicle	also filled with clay

STRUCTURE No structure in groundmass.
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-7R-2-W 29_33-BILLET16-SLIDE 16 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE 16
 ROCK NAME: aphyric basalt clast
 WHERE SAMPLED: CLAST TYPE 4 in volcanic breccia
 GRAINSIZE: fine grained
 TEXTURE: microporphyritic & aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	1								
MICROPHENOCRYST									
olivine	1	60		0.6	0.2	subhedral		altered 60% to iddingsite	
VESICLES	5		0.01	3	0.1		low[330]	1 empty rim & brown clay	
GROUNDMASS	94								
olivine	8	0		0.1	0.05			altered 100% to iddingsite	
feldspar	28	0		0.1	0.05	laths			
Fe-Ti oxides	8	0		0.01	0.01				
glass	50	0						completely altered to clay	

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.		
STRUCTURE	Vesicle (1mm), subrounded, calcite; fracture (0.19mm), straight, empty; no structures in groundmass		
COMMENTS			

SUMMARY DESCRIPTION Photo taken of olivine microphenocrysts, groundmass & vesicle



THIN SECTION: 330-U1372A-7R-4-W 24_28-BILLET18-SLIDE18 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE18
 ROCK NAME: sparsely plagioclase-phyric basalt clast
 WHERE SAMPLED: CLAST TYPE 7
 GRAINSIZE: fine grained
 TEXTURE: sparsely plagioclase-phyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	5								
plagioclase	1	50		2.5	2	subhedral		Only a few grains observed in the section ("rare"); altered to clay.	
MICROPHENOCRYST									
olivine	1	10			0.5	subhedral		iddingsite	
augite	3	0		0.7	0.4	subhedral			
GROUNDMASS	95								
plagioclase	45	0			0.2				
augite	10	0			0.2				
Fe-Ti oxides	5	0			0.1				
olivine	10	100		0.1	0.05			altered to iddingsite	
glass	25	100							

SECONDARY MINERALOGY	STRUCTURE	COMMENTS
	no structures in groundmass	

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-7R-4-W 135_138-BILLET19-SLIDE19 Piece No: Unit:II OBSERVER:THIN SECTION:SLIDE19
 ROCK NAME: highly olivine-phyric basalt clast
 WHERE SAMPLED: type 2 clast in volcanic breccia
 GRAINSIZE: fine grained
 TEXTURE: highly olivine phyric & highly porphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	20								
olivine	19	50		2.6	1.5	subhedral		some olivines are glomerocrysts others are single crystals	
MICROPHENOCRYST									
plagioclase	1	0		0.2				few grains found ("rare"). Iddingsite at rim + clay (smectite & lizardite)	
VESICLES	5		1.3	2.7	1.7		moderate[330]	100 vesicles have a halo about 0.38 mm, darker in crossed nicols	
GROUNDMASS	75								
Fe-Ti oxides	3	0		0.09	0.04				
glass	20	100						altered to clay	
plagioclase	45	33		0.24	0.15	lath			
olivine	7	100			0.06			iddingsite	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
STRUCTURE	Vesicle (1mm), subrounded; calcite; fracture (0.19mm), straight, empty; no groundmass structure				
COMMENTS					

SUMMARY DESCRIPTION Porphyritic olivine basalt, moderately altered olivines. Plagioclase is rare, only a few grains are in thin section. Iddingsite on the rim; smectite & lizardite in inner part.



THIN SECTION: 330-U1372A-8R-4-W 40_43-BILLET22-SLIDE22 Piece No: Unit:1 OBSERVER:THIN SECTION:SLIDE22
 ROCK NAME: moderately olivine-phyric basalt
 WHERE SAMPLED: lava flow with peperitic top
 GRAINSIZE: fine grained
 TEXTURE: sparsely porphyritic & highly phyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	15								
olivine	2	100		3	2	subhedral		altered; completely replaced by iddingsite	
MICROPHENOCRYST									
olivine	13	100		0.5	0.1	subhedral		altered; completely replaced by iddingsite	
VESICLES	25		0.1	17	0.5		low to elongate	100 calcite & zeolite	
GROUNDMASS	60								
feldspar	22.5	100		0.15	0.1	laths			
glass	22.5	100						completely altered	
Fe-Ti oxide	10	0		0.05	0.02	euhedral			
olivine	5	100		0.2	0.15	subhedral		completely altered	

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.		
STRUCTURE COMMENTS	no structures in groundmass		

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-8R-6-W 114_119-BILLET23-SLIDE23
 ROCK NAME: aphyric basalt breccia
 WHERE SAMPLED: pepperite
 GRAINSIZE: fine grained
 TEXTURE: aphyric & aphyric

Piece No: Unit:4

OBSERVER:THIN SECTION:SLIDE23

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0								
MICROPHENOCRYST									
VESICLES	40		0.1	10	1		low[330]	100	calcite
GROUNDMASS	60								
plagioclase	20	50				lath			altered
glass	30	100							(completely) altered
Fe-Ti oxides	10	0				subhedral			

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
calcite			

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION aphyric pepperitic top to lava flow.



THIN SECTION: 330-U1372A-9R-1-W 45_48-BILLET24-SLIDE24 Piece No: Unit:4 OBSERVER:THIN SECTION:SLIDE24
 ROCK NAME: basalt sandstone
 WHERE SAMPLED: pepperitic top of lava flow
 GRAINSIZE: fine grained
 TEXTURE: aphyric & aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	1								
MICROPHENOCRYST									
olivine	0.1	100		0.4	0.2	subhedral		completely altered to iddingsite	
plagioclase	0.9	20		0.7	0.6	subhedral		altered	
VESICLES	10		0.1	0.8	0.5		low[330]	100 quartz?; calcite;	
GROUNDMASS	89								
glass	49	100						completely altered	
plagioclase	40	80		0.1	0.05	laths		altered	

SECONDARY MINERALOGY SIZE(mm) min. max. mode. REPLACING/FILLING COMMENTS

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-9R-3-W 98_104-BILLET25-SLIDE25 Piece No: Unit:6 OBSERVER:THIN SECTION:SLIDE25
 ROCK NAME: peperitic olivine-phyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: moderately phyrlic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	4								
olivine	4	100		3	1.5	euhedral to subhedral[330]			
MICROPHENOCRYST									
VESICLES	50		0.1	90	10		elongate[330]	100 filled with calcite	
GROUNDMASS	46								
glass	30	100							
plagioclase	17	0		0.2	0.1	laths			
olivine	3	100			0.1			iddingsite	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
calcite				vesicle	

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-9R-6-W 39_41-BILLET26-SLIDE26
 ROCK NAME: highly olivine-phyric basalt
 WHERE SAMPLED:
 GRAINSIZE:
 TEXTURE: phytic & phytic

Piece No: Unit:6

OBSERVER:THIN SECTION:SLIDE26

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	20								
olivine	15	5		5	1	subhedral		brown clay on the rim	
MICROPHENOCRYST									
olivine	5	5		0.5	0.4	subhedral			
VESICLES	1		0.25	0.5	0.4		high[330]	100	
GROUNDMASS	79								
glass	30	100						replaced by clay	
Fe-Ti oxides	10	0		0.5	0.3	subhedral			
olivine	25	0		0.5	0.3	subhedral			
plagioclase	25	0		0.7	0.5	subhedral		lath	

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.		
clay		vesicle	green clay on the rim

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-10R-6-W 39_41-BILLET27-SLIDE 27
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: lava flow with scoriaceous top
 GRAINSIZE: fine grained
 TEXTURE: aphyric & with micro phenocrysts

Piece No: Unit:9

OBSERVER:THIN SECTION:SLIDE 27

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0.1								
MICROPHENOCRYST									
plagioclase	0.05	0		0.05	0.05	euohedral		fresh	
olivine	0.025	100		0.06	0.05	euohedral		altered	
augite	0.025	0		0.05	0.05	euohedral		fresh	
VESICLES	1		0.01	5	1		moderate[330]	0	
GROUNDMASS	98.9								
Fe-Ti oxide	8.9	0		0.02	0.001	subhedral			
olivine	10	100		0.075	0.05	euohedral to subhedral[330]		Altered iddingsite; some are elongated & six-sided.	
plagioclase	40	0		0.075	0.001	laths[330]		fresh	
glass	40	0						altered to clay	

SECONDARY MINERALOGY	STRUCTURE	COMMENTS
	weak, horizontal trachytic texture	

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-11R-1-W 61_63-BILLET28-SLIDE28
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: lava flow with scoriaceous top
 GRAINSIZE: fine grained
 TEXTURE: glomerocrystic & aphyric

Piece No: Unit:10

OBSERVER:THIN SECTION:SLIDE28

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	2.5								
olivine	0.5	60		1.3	1	euhedral		altered to iddingsite	
MICROPHENOCRYST									
olivine	0.5	60		0.9	0.3	euhedral		altered to iddingsite	
augite	0.5	0		0.4				long crystals showing hour-glass zoning	
plagioclase	1	0		0.4	0.2	tabular		polysynthetic twinning	
VESICLES	7		0.1	1.5	1.2		moderate[330]	10 calcite, botryoidal brown clay iron oxides	
GROUNDMASS	91.5								
glass	40	100						replaced by brown clay	
olivine	1	90		0.08		subhedral to anhedral		replaced by iddingsite	
Fe-Ti oxide	7	0							
plagioclase	36	0		0.1	0.01	laths			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
calcite	min.	max.	mode.		
calcite					also filled with clay and iron-oxides

STRUCTURE weak trachytic texture, TS non oriented
 COMMENTS

SUMMARY DESCRIPTION

THIN SECTION: 330-U1372A-11R-1-W 84_86-BILLET29-SLIDE29
 ROCK NAME: sparsely plagioclase-pyric basalt
 WHERE SAMPLED: lava flow with scoriaceous top
 GRAINSIZE: fine grained
 TEXTURE: sparsely phyrlic & glomeroporphyritic

Piece No: Unit:10

OBSERVER:THIN SECTION:SLIDE29

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	1								
plagioclase	1	10		1.3	0.7	tabular		glomeroporphyritic clots	
MICROPHENOCRYST									
augite	1	0		0.2	0.1	subhedral		(sometimes) hour-glass zoning	
olivine	4	70		0.3	0.2	euhedral		replaced by brown & green clay.	
VESICLES	15		0.1	2.2	0.3		moderate[330]	calcite (few brown clay); subrounded sphericity.	
GROUNDMASS	78								
plagioclase	10	0		0.01	0.03	lath		intersertal (sometimes)	
glass	65	100						altered to clay.	
Fe-Ti oxides	3	0							

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
calcite			few brown clay

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION





THIN SECTION: 330-U1372A-11R-3-W 24_26-BILLET30-SLIDE30
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: cemented scoriaceous fragment
 GRAINSIZE: fine grained
 TEXTURE: aphyric

Piece No: Unit:11

OBSERVER:THIN SECTION:SLIDE30

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0.51								
MICROPHENOCRYST									
plagioclase	0.5	0		0.5	0.2	euohedral			
clinopyroxene	0.01	0		0.5		euohedral			
VESICLES	26		0.03	0.5	0.2		low[330]	50	angular roundness, filled with zeolite and calcite. Botryoidal calcite mixed with clay.
GROUNDMASS	73								
glass	60	100							replaced by clay
Fe-Ti oxides	1	0							
plagioclase	10	0				lath			
clinopyroxene	2	0							

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.	vesicle	
calcite					also filled with zeolite, botryoidal calcite mixed with clay

STRUCTURE No structures in groundmass.
 COMMENTS

SUMMARY DESCRIPTION

THIN SECTION: 330-U1372A-11R-3-W 83_85-BILLET31-SLIDE31
 ROCK NAME: moderately plagioclase-phyric basalt
 WHERE SAMPLED: lava flow with scoriaceous top
 GRAINSIZE: fine grained
 TEXTURE: moderately phyric

Piece No: Unit:11

OBSERVER:THIN SECTION:SLIDE31

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	6								
plagioclase	2	0		1	0.1	tabular		polysynthetic twinning	
MICROPHENOCRYST									
olivine	2	0		0.5	0.1	subhedral		100% replaced by iddingsite	
pyroxene	2	0		0.4	0.1	prismatic			
VESICLES	9		0.05	1.3	0.3		low[330]	100	filled by calcite and zeolite
GROUNDMASS	85								
Fe-Ti oxides	10	0							
olivine	3	100						replaced by iddingsite	
plagioclase	40	0		0.07	0.02	laths			
glass	30	100						replaced by clay	
pyroxene	2	0		0.03	0.01	prismatic			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
clacite	min.	max.	mode.		
					also filled with zeolite

STRUCTURE weak sense of horizontal trachytic texture
 COMMENTS

SUMMARY DESCRIPTION





THIN SECTION: 330-U1372A-11R-6-W 86_90-BILLET32-SLIDE32
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: lava flow with scoriaceous top
 GRAINSIZE: fine grained
 TEXTURE: micro-glomerocrysts & aphyric

Piece No: Unit:11

OBSERVER:THIN SECTION:SLIDE32

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0.5								
MICROPHENOCRYST									
olivine	0.1	80		0.4	0.3	euhedral		fresh (to altered)	
plagioclase	0.4	0		0.6	0.5	euhedral		fresh to iddingsite.	
VESICLES	0								
GROUNDMASS	99.5								
glass	32	80						altered	
plagioclase	45	0		0.4	0.15	lath		fresh. laths are aligned with trachytic flow texture	
Fe-Ti oxide	3	0		0.05	0.04	subhedral			
clinopyroxene	18	0		0.05	0.04	subhedral		fresh	
olivine	1.5	50		0.04	0.03	subhedral		green clay	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
STRUCTURE COMMENTS	Trachytic texture. No veins or vesicles. Plagioclase laths aligned, with strike of ~090-270 degrees.				

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-11R-7-W 18_20-BILLET33-SLIDE33 Piece No: Unit:11 OBSERVER:THIN SECTION:SLIDE33
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: scoriaceous base of unit
 GRAINSIZE: fine grained
 TEXTURE: aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0.5								
MICROPHENOCRYST									
augite	0.5	0		0.6	0.4	subhedral			
VESICLES	40		0.3	1.5	0.8		elongate[330]	50	50% of vesicles filled with calcite, 50% are empty
GROUNDMASS	59.5								
glass	20	0							glass completely altered to clay.
olivine	4	0		0.08	0.05				
Fe-Ti oxides	6	0			0.02				
plagioclase	30	0			0.1	laths			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.	vesicle	
calcite					50% of vesicles are empty

STRUCTURE COMMENTS Thin section contains large void (filled by calcite) -- not included in vesicle mode; no structures in groundmass

SUMMARY DESCRIPTION Scoriaceous portion of unit. Voids filled with calcite. Highly altered basalt



THIN SECTION: 330-U1372A-12R-2-W 10_12-BILLET34-SLIDE34 Piece No: Unit:13 OBSERVER:THIN SECTION:SLIDE34
 ROCK NAME: aphyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0.6								
MICROPHENOCRYST									
olivine	0.25	80		0.3	0.2	subhedral		iddingsite	
clinopyroxene	0.25	0		0.25	0.15	subhedral			
plagioclase	0.1	0		0.4	0.3	subhedral			
VESICLES	20		0.1	2.8	1		elongate[330]	40	calcite & few clays
GROUNDMASS	80								
plagioclase	49	0		0.1	0.1	subhedral			
clinopyroxene	5	0		0.1	0.05	subhedral			
glass	34	100							clay minerals
iddingsite									
olivine	10	70		0.1	0.05	subhedral			iddingsite
Fe-Ti Oxide	2	0		0.02	0.02	subhedral			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					

STRUCTURE COMMENTS irregular; carbonate veins (0.8 mm); no structures in groundmass

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-12R-4-W 20_23-BILLET35-SLIDE35 Piece No: Unit:15 OBSERVER:THIN SECTION:SLIDE35
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: lava flow with scoriaceous top
 GRAINSIZE: fine grained
 TEXTURE: sparsely phyric & microphenocrysts

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	1								
MICROPHENOCRYST									
augite	0.6	0		0.6	0.5	subhedral		fresh grains	
olivine	0.4	100		0.5	0.4	subhedral		altered to iddingsite	
VESICLES	40		0.4	12	1.5		moderate to elongate[EXP330]	0	Some vesicles are filled with calcite, some with calcite and Mn-oxides, some are empty
	40		0.4	12	1.5		moderate to moderate to elongate[EXP330]	100	Some vesicles are filled with calcite, some are empty
	40		0.4	12	1.5			100	Some vesicles are filled with calcite, some with a 100% mix of calcite and Mn-oxides, some are empty
GROUNDMASS	59								
plagioclase	35	0		0.2	0.015				
glass	2	100							altered to clay
Fe-Ti oxides	7	0							
olivine	15	100		0.08	0.05				altered to iddingsite

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
calcite				vesicle	
Mn-Fe-oxides				vesicle	

STRUCTURE variety of voids -- some are filled with calcite, some with Mn-Oxides + brown clay + calcites, some are empty, no structures in groundmass

COMMENTS

SUMMARY DESCRIPTION This scoriaceous basalt shows significant alteration with abundant calcite and Mn-oxides in vesicles and voids

THIN SECTION: 330-U1372A-13R-1-W 91_93-BILLET36-SLIDE36
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: lava flow
 GRAINSIZE: fine grained
 TEXTURE: sparsely porphyritic & aphyric

Piece No: Unit:16

OBSERVER:THIN SECTION:SLIDE36

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	1								
plagioclase	0.5	0		1.2	0.5	euhedral		fresh, zoned	
augite	0.3	80		1.5	0.8	euhedral		weakly altered to clay.	
MICROPHENOCRYST									
olivine	0.2	80		0.4	0.3	euhedral		altered to iddingsite	
VESICLES	1		0.1	3	2		elongate[330]	90 calcite altered to clay.	
GROUNDMASS	98								
glass	40	80							
Fe-Ti oxide	1	0		0.1	0.05	subhedral			
plagioclase	40	0		0.3	0.15	lath		Weak trachytic texture.	
pyroxene	16.5	80		0.1	0.05	subhedral			
olivine	0.5	80		0.03	0.02	subhedral		iddingsite	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
STRUCTURE COMMENTS	(plagioclase) laths have weak flow alignment (strike ~090-270 degrees); vesicles filled with clay + calcite				

SUMMARY DESCRIPTION





THIN SECTION: 330-U1372A-13R-3-W 18_21-BILLET37-SLIDE37 Piece No: Unit:19 OBSERVER:THIN SECTION:SLIDE37
 ROCK NAME: aphyric basalt breccia
 WHERE SAMPLED: volcanic breccia
 GRAINSIZE: fine grained
 TEXTURE: aphyric

PRIMARY MINERALOGY PHENOCRYSTS MICROPHENOCRYST VESICLES	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
VESICLES	7		0.1	0.7	0.2		low[330]	100	Some vesicles contain calcite, some green clay. Large voids filled with green clay (up to 60%) of vesicle modal abundance (altered cement).
GROUNDMASS	33								
Fe-Ti oxides	3	0			0.2				
glass	25	100							Altered into clay
plagioclase	5	0			0.2	0.15	lath		

SECONDARY MINERALOGY calcite and green clay	STRUCTURE COMMENTS	no structures in groundmass	SIZE(mm) min.	max.	mode.	REPLACING/FILLING vesicle	COMMENTS
							Some vesicles with green clay, others with calcite (botryoidal)

SUMMARY DESCRIPTION This section contains a large area with green clay.



THIN SECTION: 330-U1372A-13R-4-W 123_125-BILLET38-SLIDE38
 ROCK NAME: aphyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: aphyric

Piece No: Unit:20

OBSERVER:THIN SECTION:SLIDE38

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0.3								
MICROPHENOCRYST									
olivine	0.1	0		0.5	0.5	subhedral			
plagioclase	0.2	0		0.5	0.45	subhedral			
VESICLES	3		0.2	7	1		elongate[330]	95	filled with a mix of zeolite + carbonates/calcite + green clay
GROUNDMASS	95								
olivine	14	100		0.3	0.15	subhedral			completely altered into clay.
plagioclase	45	0		0.3	0.2	subhedral			trachytic flow texture
clinopyroxene	29	0		0.2	0.06				
glass	14	0		0.1	0.04				
Fe-Ti oxide	3	0		0.1	0.08				

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					filled with botryoidal carbonate and clay

STRUCTURE Plagioclase laths aligned ~090-270 (trachytic texture).
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-15R-2-W 90_92-BILLET39-SLIDE39
 ROCK NAME: aphyric basalt
 WHERE SAMPLED:
 GRAINSIZE:
 TEXTURE: aphyric & glomerocrysts

Piece No: Unit:25

OBSERVER:THIN SECTION:SLIDE39

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	10								
MICROPHENOCRYST									
plagioclase	3	0		0.4	0.2	subhedral		lath, oscillatory zoning	
clinopyroxene	3	0		0.4	0.15	subhedral		sector-zoning, lath	
olivine	5	100		0.6	0.3	subhedral		altered to brown, green clay	
VESICLES	0								
GROUNDMASS	90								
glass	15	0						clays	
clinopyroxene	55	0		0.55	0.03	subhedral		sector-zoning, lath	
plagioclase	25	0		0.4	0.1	subhedral		lath	
Fe-Ti oxide	5	0		0.05	0.03	subhedral			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
STRUCTURE	no structures in groundmass				
COMMENTS					

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-16R-2-W 58_60-BILLET42-SLIDE42 Piece No: Unit:27 OBSERVER:THIN SECTION:SLIDE42
 ROCK NAME: aphyric basalt breccia
 WHERE SAMPLED: cemented fragment description only (70%)
 GRAINSIZE: fine grained
 TEXTURE: aphyric & glomeroporphyritic; sometimes intersertal

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	10								
MICROPHENOCRYST									
olivine	2	40		0.4	0.1	subhedral			
plagioclase	6	0		0.5	0.2	euhedral		oriented flow; microlites	
pyroxene	1	0		0.4	0.3	subhedral			
olivine	1	100		0.7	0.5	euhedral		altered to brown clay.	
VESICLES	30		1	2	1		low to moderate[EXP330]	5 Rim of botryoidal brown clay	
GROUNDMASS	90								
plagioclase	15	0		0.2	0.04	laths[330]		oriented flow	
glass	73	100							
olivine	2	90		0.1	0.02	subhedral		altered to brown clay.	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
clay	min.	max.	mode.		
clay					rim of botryoidal brown clay

STRUCTURE slight sense of trachytic texture
 COMMENTS

SUMMARY DESCRIPTION cement is composed of brown clay, microlites of plagioclase, microcrystals of pyroxene.



THIN SECTION: 330-U1372A-17R-1-W 31_34-BILLET43-SLIDE43 Piece No: Unit:29 OBSERVER:THIN SECTION:SLIDE43
 ROCK NAME: aphyric basalt breccia
 WHERE SAMPLED: cemented fragments (30%); description only
 GRAINSIZE: fine grained
 TEXTURE: aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	7								
MICROPHENOCRYST									
olivine	1	90				subhedral		iddingsite	
pyroxene	1	0		0.2	0.08	subhedral			
plagioclase	5	0		0.4	0.2	euhedral			
GROUNDMASS	93								
glass	85	100							
plagioclase	8	0				laths[330]		altered to clay	

SECONDARY MINERALOGY SIZE(mm) min. max. mode. REPLACING/FILLING COMMENTS

STRUCTURE no structure in groundmass
 COMMENTS

SUMMARY DESCRIPTION cement is composed by brown green clay, microlites of plagioclase and calcite



THIN SECTION: 330-U1372A-17R-1-W 73_76-BILLET44-SLIDE 44 Piece No: Unit:30 OBSERVER:THIN SECTION:SLIDE 44
 ROCK NAME: aphyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: aphyric & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	7								
MICROPHENOCRYST									
olivine	1	80		0.4	0.1	subhedral			
pyroxene	2	0		0.2	0.1	subhedral			
plagioclase	4	0		1	0.2	euhedral			
VESICLES	5		0.03	0.6	0.1		low to moderate[EXP330]	80 filled by calcite and brown clay.	
GROUNDMASS	88								
glass	25	100							
olivine	5	90		0.05		subhedral		altered by brown & green clay	
Fe-Ti oxide	7	0							
plagioclase	50	0		0.1	0.05	euhedral		fresh; also laths	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
calcite	min.	max.	mode.		
					also filled by brown clay

STRUCTURE weak, sub-horizontal trachytic texture
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-17R-2-W 4_10-BILLET45-SLIDE45 Piece No: Unit:39 OBSERVER:THIN SECTION:SLIDE45
 ROCK NAME: moderately plagioclase-phyric basalt
 WHERE SAMPLED: margin between pillow lobe & hyaloclastite
 GRAINSIZE: fine grained
 TEXTURE: moderately phyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	9								
plagioclase	8	50		4	1.2	euhedral		altered clay	
MICROPHENOCRYST									
augite	1	0		0.6	0.5	subhedral			
VESICLES	6		0.1	2	1		low[330]	100 green-blue clay	
	6		0.1	2	1		low[330]	100 green-blue clay	
GROUNDMASS	85								
plagioclase	34	0		0.4	0.2	laths[330]			
Fe-Ti oxide	2	0		0.4	0.2	subhedral			
glass	35	100						altered to clay	
augite	14	0		0.2	0.1	anhedral			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					

STRUCTURE weak trachytic texture in clasts
 COMMENTS

SUMMARY DESCRIPTION Moderately plagioclase-phyric basalt in hyaloclastites. Voids are filled with calcite.



THIN SECTION: 330-U1372A-17R-2-W 46_48-BILLET46-SLIDE46 Piece No: Unit:40 OBSERVER:THIN SECTION:SLIDE46
 ROCK NAME: moderately plagioclase-phyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: moderately phyric & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	12								
plagioclase	5	0		1.6	1	laths[330]		fresh clots, occur as glomerocrysts	
MICROPHENOCRYST									
augite	1	0		1.3	0.5	subhedral		fresh clots, occur as glomerocrysts	
plagioclase	4	0		0.5	0.06	laths[330]			
olivine	3	100		0.2	0.4	subhedral		completely altered in clay.	
augite	2	0		0.5	0.06	subhedral			
VESICLES	5		0.07	0.7	0.1		low[330]	5 Angular roundness; rim of clay.	
GROUNDMASS	83								
augite	10	50		0.05	0.01	subhedral to euohedral[330]			
plagioclase	23	0		0.05		euohedral		laths	
glass	52	100						altered to clay	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
clay	min.	max.	mode.		
clay					rim of clay

STRUCTURE COMMENTS no structures in groundmass

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-17R-2-W 135_136-BILLET47-SLIDE47 Piece No: Unit:44 OBSERVER:THIN SECTION:SLIDE47
 ROCK NAME: moderately
 WHERE SAMPLED: boundary
 GRAINSIZE: fine grained
 TEXTURE: moderately

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	11								
plagioclase	10	0		2	1	subhedral		common as glomerocrysts; fresh	
MICROPHENOCRYST									
augite	1	0		0.5	0.3	euhedral		common as glomerocrysts; fresh	
VESICLES	20		0.1	2	1		moderate[330]	100 clay and calcite	
GROUNDMASS	69								
plagioclase	32	0		0.02	0.01	laths[330]			
augite	3	0		0.01	0.01	subhedral			
glass	33	100						also devitrified. spherulites	
Fe-Ti oxide	1	0		0.01	0.01	subhedral			

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
calcite			also filled with clay at another part of the section, see photo

STRUCTURE no structures
 COMMENTS

SUMMARY DESCRIPTION Boundary between lava lobe/pillow/fragment and hyaloclastite. glassy margin. globules of melt and quenched glass from lava in hyaloclastite. See photo for texture & physical volcanology comments. This description is for the lava only.



THIN SECTION: 330-U1372A-17R-3-W 93_95-BILLET48-SLIDE48 Piece No: Unit: OBSERVER: THIN SECTION: SLIDE48
 ROCK NAME: aphyric basalt hyaloclastite
 WHERE SAMPLED:
 GRAINSIZE:
 TEXTURE: phyrlic & phyrlic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	14								
clinopyroxene	1	0		0.4	0.2	subhedral			
plagioclase	10	0		0.8	0.4	subhedral			
olivine	3	90		0.4	0.2	subhedral		green clay	
MICROPHENOCRYST									
VESICLES	2		0.1	1	0.2		low[330]	80	Filled with clay. Voids filled with calcite & zeolite.
GROUNDMASS	80								
glass	90	0							
olivine	1	0		0.1	0.1	euohedral			
plagioclase	3	0		0.4	0.1	euohedral			lath
clinopyroxene	3	0		0.1	0.1	subhedral to euohedral[330]			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
clay	min.	max.	mode.		
clay					

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION voids are filled with calcite and some zeolite



THIN SECTION: 330-U1372A-17R-3-W 116_118-BILLET49-SLIDE49
 ROCK NAME: highly plagioclase-phyric basalt breccia
 WHERE SAMPLED: hyaloclastite
 GRAINSIZE: aphanitic
 TEXTURE: highly phyric & glassy

Piece No: Unit:46

OBSERVER:THIN SECTION:SLIDE49

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm) min.	max.	mode.	MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
PHENOCRYSTS	13								
plagioclase	10	0		3.6	1	euohedral			
MICROPHENOCRYST									
augite	3	0		0.8	0.3	euohedral			
VESICLES	40								voids - partly filled with clay
GROUNDMASS	47								
plagioclase	7	0		0.2	0.1	laths[330]			
glass	40	20							Mostly fresh.

SECONDARY MINERALOGY	SIZE(mm) min.	max.	mode.	REPLACING/FILLING	COMMENTS
STRUCTURE	no structures in groundmass				
COMMENTS					

SUMMARY DESCRIPTION Highly plagioclase-phyric basalt breccia or hyaloclastite



THIN SECTION: 330-U1372A-18R-1-W 116_118-BILLET50-SLIDE50 Piece No: Unit:46 OBSERVER:THIN SECTION:SLIDE50
 ROCK NAME: moderately plagioclase-phyric basalt breccia
 WHERE SAMPLED: hyaloclastite
 GRAINSIZE: aphanitic
 TEXTURE: microporphyritic & moderately phyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	10								
plagioclase	9	0		1.6	1	euhedral		occur as single crystals.	
MICROPHENOCRYST									
augite	1	0		0.8	0.4	euhedral		equant; occur as glomerocrysts	
VESICLES	0								
GROUNDMASS	50								
glass	50	50						mostly fresh.half either slightly altered or devitrified.	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
STRUCTURE	(40%) Voids -- rimmed & partly filled with greenish clay, no structures in groundmass				
COMMENTS					

SUMMARY DESCRIPTION Hyaloclastite comprising mostly fresh glass, plagioclase phenocrysts and glomerocrysts of plagioclase and augite microphenocrysts.



THIN SECTION: 330-U1372A-18R-3-W 14_16-BILLET51-SLIDE51
 ROCK NAME: aphyric basalt
 WHERE SAMPLED: Altered margin of clast in breccia
 GRAINSIZE: fine grained
 TEXTURE: aphyric

Piece No: Unit:46

OBSERVER:THIN SECTION:SLIDE51

PRIMARY MINERALOGY PHENOCRYSTS MICROPHENOCRYST	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
	1								
augite	0.4	0		0.6	0.4	euhedral to subhedral			
plagioclase	0.6	10		2	0.8	euhedral		glomerocrysts, oscillatory zonation, some crystals contain fresh glass inclusions (although most glass inclusions are devitrified)	
VESICLES	30		0.8	7	1.2		low to elongate	100	filled with calcite, zeolite and green clay
GROUNDMASS	69								
plagioclase	24	0			0.4	laths[330]			
glass	45	100							completely altered

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
calcite and zeolite	min.	max.	mode.		
					large vesicle filled with both calcite and zeolite

STRUCTURE no structure in groundmass
 COMMENTS

SUMMARY DESCRIPTION Completely altered glass. Large void & vesicles filled with calcite & zeolite



THIN SECTION: 330-U1372A-18R-3-W 60_62-BILLET52-SLIDE52 Piece No: Unit:46 OBSERVER:THIN SECTION:SLIDE52
 ROCK NAME: highly plagioclase-phyric basalt breccia
 WHERE SAMPLED: Hyaloclastite
 GRAINSIZE: glassy[330]
 TEXTURE: glomeroporphyritic, highly phyric & glomeroporphyritic; fine grained glassy matrix and glomerocrysts of augite, plagioclase and few olivines

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	15								
augite	0.5	0		1.2	0.5	subhedral		phenos occur in glomerocryst	
augite	0.5	0		0.025	0.045	subhedral		microphenos occur in matrix.	
plagioclase	10	0		2.8	1.2	euhedral		laths of plagioclase; contains glass inclusions. Zonation of glomerocrysts.	
MICROPHENOCRYST									
plagioclase	3.5	0		0.2	0.12	euhedral		laths	
olivine	0.5	20		0.2	0.2	anhedral		Partially replaced by iddingsite; rounded.	
augite	0.5	0		0.025	0.045	subhedral		microphenos are in the matrix.	
VESICLES	20		0.24	6	2		low to elongate	0.5 vesicles are filled with few smectites; glassy groundmass. Phenocrysts & microlites comprising olivine, augite, plagioclase and fine-grained, glassy matrix.	
GROUNDMASS	65								
plagioclase	1	0		0.01					
glass	64	10						Glass shards mostly fresh, partly altered and replaced by green clay.	

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.		
STRUCTURE COMMENTS	unfilled non-oriented cooling fractures, no groundmass structures		

SUMMARY DESCRIPTION glassy basalt with glomerocrysts of pl, aug and few ol, very fresh glass; photo of glass & glomerocryst taken.



THIN SECTION: 330-U1372A-19R-1-W 32_38-BILLET56-SLIDE 56 Piece No: Unit:47 OBSERVER:THIN SECTION:SLIDE 56
 ROCK NAME: moderately plagioclase-phyric basalt volcanoclastic sand
 WHERE SAMPLED: two layers of volcanic sand with volcanoclastic/hyaloclastic gravel
 GRAINSIZE: fine grained
 TEXTURE: moderately phyric & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	10								
plagioclase	8	0		2	1	euohedral		often occurs as glomerocrysts of plagioclase, sometimes also with augite. Some crystals have zonations, sieve texture, or glass inclusions	
MICROPHENOCRYST									
augite	2	0		0.4	0.3	euohedral		isolated crystals, also in glomerocrysts with plagioclase	
VESICLES	40						low[330]		
	40		0.5	2	1		low[330]	filled by calcite and clays	
	40		0.5	2	1		50	calcite + clays	
GROUNDMASS	0								
glass	40	80						replaced by calcite + brown clay	
plagioclase	10	0		0.2	0.1	euohedral		laths	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
STRUCTURE COMMENTS	coarser grain size and fresher glass in the lower layer. Numerous voids between volcanic fragments, no groundmass structures				

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-19R-3-W 44_47-BILLET57-SLIDE 57 Piece No: Unit:47 OBSERVER:THIN SECTION:SLIDE 57
 ROCK NAME: vitric-lithic volcanic sand and gravel basalt aphyric
 WHERE SAMPLED: hyaloclastite
 GRAINSIZE: glassy[330]
 TEXTURE: volcanic sand[330] & glassy matrix with phenocrysts (plagioclase, augite)

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	6								
MICROPHENOCRYST									
augite	1	0.5		0.2	0.1	subhedral			
plagioclase	5	0		1	0.6	euhedral			
VESICLES	3		0.04	0.6	0.2		high[330]	100	27% voids, vesicles and voids are filled by carbonate and green clay (smectite)
GROUNDMASS	60								
glass	60	20		3.5	0.8	glass shards			partly altered to hydrated glass ("palagonite"). Voids infilling is about 40%. Around grains is glass; band of smectite (saponite) is found.

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		
carbonate, green clay (saponite)				vesicle	
smectite, carbonate				vesicle	majority of vesicles are filled by green clay and are coated by smectite (saponite)

STRUCTURE no structures in groundmass. Photo of glass & voids obtained.
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-19R-3-W 109_112-BILLET58-SLIDE 58 Piece No: Unit:48 OBSERVER:THIN SECTION:SLIDE 58
 ROCK NAME: aphyric basalt breccia
 WHERE SAMPLED: hyaloclastite
 GRAINSIZE: glassy[330]
 TEXTURE: glassy matrix[330] with phenocrysts, plagioclase & augite; volcanic sand

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	7								
MICROPHENOCRYST									
augite	1	0		0.4	0.08	subhedral			
plagioclase	5	0		1.2	0.6	euhedral			
VESICLES	0.3		0.2	0.6	0.2		high[330]	100	filled by brown clay, smectite, 20 % voids
GROUNDMASS	70								
glass	70	30		5	2	glass shards			fresh glass with a palagonitic rim & Fe-Ti Oxides + smectite

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
brown clay, smectite			

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION photos of glass & vesicles are recorded



THIN SECTION: 330-U1372A-21R-1-W 107_109-BILLET60-SLIDE 60 Piece No: Unit:53 OBSERVER:THIN SECTION:SLIDE 60
 ROCK NAME: aphyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: moderately phyrlic & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	3.5								
plagioclase	3	0		1.2	0.5	euhedral			
MICROPHENOCRYST									
clinopyroxene	0.5	0		0.4	0.3	euhedral			
VESICLES	1		0.1	1.1	0.6		high[330]	100 filled by calcite + brown clay	
GROUNDMASS	95.5								
clinopyroxene	0.5	0		0.2	0.1	anhedral			
Fe-Ti oxides	5	0							
glass	38	50						replaced by brown clay	
plagioclase	52	0		0.3	0.1	laths[330]			

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
calcite			also filled with brown clay

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION

THIN SECTION: 330-U1372A-21R-2-W 20_23-BILLET61-SLIDE 61 Piece No: Unit:54 OBSERVER:THIN SECTION:SLIDE 61
 ROCK NAME: aphyric basalt hyaloclastite breccia
 WHERE SAMPLED: Fragments (70%) description of hyaloclastite breccia
 GRAINSIZE: fine grained
 TEXTURE: moderately phyrlic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	5								
plagioclase	4	0		1.3	0.5	euhedral		several glomerocrysts. many zoned crystals.	
MICROPHENOCRYST									
clinopyroxene	0.5	0		0.7	0.4	subhedral			
olivine	0.5	0		0.2		euhedral			
VESICLES	1		0.2	0.5	0.4		high[330]	100 filled by calcite	
GROUNDMASS	95								
glass	63	90						altered to brown clays + calcite	
clinopyroxene	1	0		0.1	0.03	subhedral			
plagioclase	20	0		0.1	0.07	laths[330]			
Fe-Ti oxide	5	0		0.2	0.01	anhedral		equigranular crystals to elongated skeletal crystals	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					filled by calcite

STRUCTURE strong trachytic texture (flow texture). aligned on a strike of ~090-270. Veins with green clays, veins are conjugate, straight, network, 0.5 mm
 COMMENTS

SUMMARY DESCRIPTION





THIN SECTION: 330-U1372A-22R-1-W 49_53-BILLET59-SLIDE 59 Piece No: Unit:59 OBSERVER:THIN SECTION:SLIDE 59
 ROCK NAME: moderately plagioclase-phyric basalt vitric-lithic volcanoclastic sand
 WHERE SAMPLED: glassy fragment (30%) description of vitric-lithic volcanic sand
 GRAINSIZE: fine grained
 TEXTURE: sparsely phyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	2.5								
plagioclase	1	0		1.2	1.1	euohedral			
MICROPHENOCRYST									
clinopyroxene	0.5	0		0.2	0.2	subhedral		very rare	
plagioclase	1	0		0.4	0.3	euohedral			
VESICLES	3		0.1	0.5	0.3		moderate[330]	100	green clay.
GROUNDMASS	92								
clinopyroxene	0.5	0		0.1	0.04	anhedral			
glass	92	90							altered to brown clay & calcite
plagioclase	2	0		0.1	0.05	laths[330]			

SECONDARY MINERALOGY	SIZE(mm)	REPLACING/FILLING	COMMENTS
	min. max. mode.	vesicle	
clay			filled with green clay

STRUCTURE veins filled by green clay, irregular, 2-3 mm, no groundmass structure
 COMMENTS

SUMMARY DESCRIPTION clasts are surrounded by green clay (nontronite) & brown clay.



THIN SECTION: 330-U1372A-22R-1-W 127_130-BILLET62-SLIDE 62 Piece No: Unit:60 OBSERVER:THIN SECTION:SLIDE 62
 ROCK NAME: moderately plagioclase-phyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: moderately phyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	7.5								
olivine	2	100		1.5	0.6	subhedral		replaced by brown & green clay	
plagioclase	0.7	0		1.2	1.4	euhedral			
MICROPHENOCRYST									
plagioclase	4	0		0.8	0.4	euhedral			
augite	0.5	0		0.4		euhedral		Hour-glass zoning	
VESICLES	1		0.1	0.5	0.3		low[330]	100 Filled by calcite + botryoidal brown clay	
GROUNDMASS	91.5								
glass	53	100						replaced by brown clay + calcite	
plagioclase	30	0		0.2	0.1	laths[330]			
augite	0.8	0			0.2	anhedral			
Fe-Ti oxides	7	0							
olivine	1	100		0.1		subhedral		replaced by brown clay and calcite	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					also filled by botryoidal brown clay

STRUCTURE moderate, horizontal trachytic texture
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-26R-1-W 25_27-BILLET63-SLIDE 63
 ROCK NAME: aphyric basalt volcanic breccia
 WHERE SAMPLED: hyaloclastite
 GRAINSIZE: glassy[330]
 TEXTURE: glomeroporphyritic & glomerophyric; volcanic breccia

Piece No: Unit:61

OBSERVER:THIN SECTION:SLIDE 63

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	9.9								
augite	0.5	0		0.6	0.2	subhedral			
plagioclase	9.5	0		2	0.6	euhedral			
MICROPHENOCRYST									
VESICLES	0.1		0.04	0.6	0.3		low and elongated	15% voids; vesicles & voids filled with green clay (smectite);	
GROUNDMASS	75								
glass	75	65		20	5	glass shards		partly altered to palagonite	

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
smectite	min.	max.	mode.		
STRUCTURE	clasts display trachytic textures, variably oriented				
COMMENTS					

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-26R-2-W 10_13-BILLET64-SLIDE 64 Piece No: Unit:62 OBSERVER:THIN SECTION:SLIDE 64
 ROCK NAME: aphyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	5.5								
MICROPHENOCRYST									
plagioclase	3	0		1	0.4	euedral			
olivine	2	100		0.8	0.4	subhedral		brown clay	
augite	0.5	0		0.3	0.1	subhedral			
VESICLES	0.5		0.3	0.5	0.5		low[330]	90 filled by calcite	
GROUNDMASS	94								
plagioclase	35	0		0.1		laths[330]			
olivine	2	100		0.2	0.1	subhedral		replaced by brown clay	
glass	50	100							
augite	0.5	0				anhedral			
Fe-Ti oxides	6.5	0							

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
calcite	min.	max.	mode.		

STRUCTURE weak to moderate trachytic texture
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-27R-3-W 108_110-BILLET65-SLIDE 65 Piece No: Unit:65 OBSERVER:THIN SECTION:SLIDE 65
 ROCK NAME: volcanic glass hyaloclastic breccia clast
 WHERE SAMPLED: altered clast 1 (15%)
 GRAINSIZE: fine grained
 TEXTURE: aphyric & aphyric

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS									
MICROPHENOCRYST									
olivine	5	100		0.2		subhedral to euhedral[330]			CLAST 1; completely altered;
plagioclase	2	0		0.4	0.2	euhedral			CLAST 2
plagioclase	5	0		0.5	0.3	euhedral			CLAST 1
VESICLES	5		0.1	0.7	0.3		high[330]	100	CLAST 2; vesicles filled by zeolite + calcite
	5								CLAST 1
GROUNDMASS									
CLAST 1: 90 CLAST 2: 93									
plagioclase	15	0		0.08	0.03	laths[330]			CLAST 1
clinopyroxene	1	0				anhedral			CLAST 1
glass	89	20							CLAST 2 (fresh); slight alteration to palagonite.
clinopyroxene	1	0				anhedral			CLAST 2
glass	74	100							CLAST 1
plagioclase	3	0		0.9		laths[330]			CLAST 2

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					also filled with zeolite; CLAST 2

STRUCTURE COMMENTS CLAST 1: vein filled by green clay + carbonate (?); CLAST 2: voids are filled by palagonite, calcite, brown clay + zeolite; no structure in groundmass

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-29R-3-W 86_89-BILLET66-SLIDE 66
 ROCK NAME: aphyric basalt breccia
 WHERE SAMPLED: hyaloclastite
 GRAINSIZE: fine grained
 TEXTURE: aphyric

Piece No: Unit:69

OBSERVER:THIN SECTION:SLIDE 66

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	4								
MICROPHENOCRYST									
plagioclase	3	0		0.4	0.3	euohedral			
olivine	1	100		0.7	0.4	subhedral		olivine crystals; clats altered to smectite (green clay)	
VESICLES	5		0.2	1.2	0.5		high[330]	100 sometimes elongate; filled by smectite (green clay)	
GROUNDMASS	91								
clinopyroxene	1	0		0.06	0.03	anhedral			
glass	88	15				glass shards[330]		Fresh glass; altered by palagonite; around clasts band of smectite exists;	
plagioclase	2	0		0.09	0.06	laths[330]			
SECONDARY MINERALOGY			SIZE(mm)						
smectite			min.	max.	mode.	REPLACING/FILLING vesicle			COMMENTS band of smectite at the rim of the vesicles, inside brown clay
STRUCTURE	no structures in groundmass; spherules								
COMMENTS									

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-31R-1-W 13_15-BILLET67-SLIDE 67 Piece No: Unit:70 OBSERVER:THIN SECTION:SLIDE 67
 ROCK NAME: vitric-lithic volcanic sand
 WHERE SAMPLED: lithic fragment I & II
 GRAINSIZE: fine grained
 TEXTURE:

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	0								
MICROPHENOCRYST									
VESICLES							0		CLAST TYPE 2
							0		CLAST TYPE 1
GROUNDMASS	0; CLAST TYPE 2 100; CLAST TYPE 1								
Fe-Ti oxides	3	0							lithic fragment I; CLAST TYPE 1
plagioclase	30	0				laths[330]			lithic fragment II; CLAST TYPE 2
clinopyroxene	7	0		0.09	0.03	subhedral to anhedral			lithic fragment I; CLAST TYPE 1
glass	70	100							CLAST TYPE 2
glass	40	100							highly altered; CLAST TYPE 1
plagioclase	50	0							lithic fragment I; CLAST TYPE 1

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING	COMMENTS
	min.	max.	mode.		

STRUCTURE no structures in groundmass; lithic fragment II: veins (straight; irregular; 0.08 mm)
 COMMENTS

SUMMARY DESCRIPTION see attached: Figure I & Figure II



THIN SECTION: 330-U1372A-31R-1-W 61_63-BILLET68-SLIDE 68 Piece No: Unit:71 OBSERVER:THIN SECTION:SLIDE 68
 ROCK NAME: moderately olivine-augite phyric[EXP330] basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: moderately phyric & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	12								
clinopyroxene	1	0		1.4	1.2	euhedral			
plagioclase	0.5	0		1.8		laths[330]			
olivine	2	100		2	1.2	euhedral to subhedral[330]		completely altered green clay, smectite & serpentine.	
MICROPHENOCRYST									
plagioclase	3	0		0.9	0.7	laths[330]			
olivine	3	100		0.9	0.5	subhedral		completely altered green clay, smectite & serpentine.	
clinopyroxene	2.5	0		0.9	0.4	euhedral			
VESICLES	0.5		0.2	1.6	0.2		elongate[330]	50	angular roundness, filled by calcite
GROUNDMASS	87.5								
glass	39.5	100							palagonite
Fe-Ti oxides	5	0							
clinopyroxene	3	0				anhedral			
plagioclase	40	0				laths[330]			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
calcite					

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION Calcite veins appear (0.5mm)



THIN SECTION: 330-U1372A-31R-1-W 104_106-BILLET69-SLIDE 69 Piece No: Unit:71 OBSERVER:THIN SECTION:SLIDE 69
 ROCK NAME: moderately olivine-plagioclase-phyric basalt basalt moderately olivine-plagioclase-phyric basalt
 WHERE SAMPLED:
 GRAINSIZE: fine grained
 TEXTURE: moderately phytic & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	14								
plagioclase	2	0		2.8	1.3	laths[330]		(Only in DL report:) tabular; polysynthetic twinning (only in	
olivine	2	100		2.4	1.6	euhedral			
MICROPHENOCRYST									
clinopyroxene	3	0		0.6	0.4	subhedral to euhedral[330]		hour-glass and centered zoning.	
plagioclase	4	0		0.9	0.4	laths[330]			
olivine	3	100		0.9	0.4	subhedral to euhedral[330]		highly altered & replaced to iddingsite, clay (smectite), chlorite & carbonate	
VESICLES	0.5		0.2	0.5	0.3		high[330]	100	very few carbonates
GROUNDMASS	85								
clinopyroxene	3	0		0.03	0.01	anhedral			
Fe-Ti oxides	10	0							
plagioclase	50	0		0.05		laths[330]			
glass	22	100							palagonite

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
	min.	max.	mode.		
carbonate					

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION carbonate vein in 1mm-size, green clay at the rim.



THIN SECTION: 330-U1372A-32R-1-W 44_48-BILLET70-SLIDE 70 Piece No: Unit:74 OBSERVER:THIN SECTION:SLIDE 70
 ROCK NAME: moderately olivine-phyric Volcanic breccia
 WHERE SAMPLED: clast
 GRAINSIZE: fine grained
 TEXTURE: moderately phyrlic & glomeroporphyritic

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	20								
plagioclase	0.5	0		1.4	1.2	laths[330]		glomerocrysts, fresh melt inclusions, zonation altered to green clay	
olivine	7	100		4.8	1	euohedral to subhedral[330]			
clinopyroxene	0.5	0		1.4		euohedral			
MICROPHENOCRYST olivine	3	100		0.9	0.4	euohedral to subhedral[330]			
clinopyroxene	5	0				euohedral			
plagioclase	4	0		0.8	0.5	laths[330]		glomerocrysts, fresh melt inclusions, zonation filled with green clay	
VESICLES	0.5		0.1	0.4	0.2		low[330]	100	
GROUNDMASS	79.5								
plagioclase	3	0							
glass	76	70							
clinopyroxene	0.5	0				anhedral			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
clay	min.	max.	mode.		
clay					filled with green clay

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION



THIN SECTION: 330-U1372A-38R-3-W 82_84-BILLET71-SLIDE 71
 ROCK NAME: sparsely olivine-phyric basalt
 WHERE SAMPLED: representative of unit 81
 GRAINSIZE: fine grained
 TEXTURE: sparsely phyric & glomeroporphyritic

Piece No: Unit:81

OBSERVER:THIN SECTION:SLIDE 71

PRIMARY MINERALOGY	PERCENT ORIGINAL	REL. VOL. REPLACED	SIZE(mm)			MORPHOLOGY	VESICLE SPHERICITY	VESICLE Infilling [%]	COMMENTS
			min.	max.	mode.				
PHENOCRYSTS	11								
olivine	1	10		1.8	1.2	euhedral to subhedral[330]			Moderately fresh! Melt inclusions. Undulose extinction in some larger crystals
MICROPHENOCRYST									
plagioclase	5	0		0.9	0.3	laths[330]			zonation, glomerocrysts
olivine	2	10		0.9	0.6	euhedral to subhedral[330]			Moderately fresh! Melt inclusions
clinopyroxene	3	0		0.9	0.4	euhedral to subhedral[330]			Melt inclusions
VESICLES	0.01		0.1	0.9	0.3		low[330]	70	partly filled with carbonate
GROUNDMASS	88.5								
glass	43	100							
Fe-Ti oxides	5	0							
clinopyroxene	0.5	0				anhedral			
plagioclase	40	0				laths[330]			

SECONDARY MINERALOGY	SIZE(mm)			REPLACING/FILLING vesicle	COMMENTS
carbonate	min.	max.	mode.		
carbonate					

STRUCTURE no structures in groundmass
 COMMENTS

SUMMARY DESCRIPTION