168-1023A-22X-CC (Piece 4, 034-040 cm)

ROCK NAME: Sparsely to moderately plagioclase-olivine phyric basalt

GRAIN SIZE: Aphanitic: microcrystalline to cryptocrystalline

TEXTURE: Variolitic to subvariolitic; hypocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.6	0.6	0.1-0.4		Euhedral-subhedral	Individual crystals or intergrown with plagioclase. Skeletal, hollow crystals. Clear glass inclusions with shrinkage bubbles are common.
Plagioclase	3.8	3.8	0.3-1.7		Euhedral to subhedral laths	Present as individual crystals and in monomineralic glomeroporphyritic clusters. Some exhibit simple to oscillatory zoning. Pale green or brown glass inclusions in the core of some, whilst others contain very fine opaque grains.
GROUNDMASS						
Plagioclase	3.8	3.8	≤0.2		Microlitic laths	Skeletal crystals (swallowtail and hollow forms).
Olivine	1.8	1.8	≤0.3		Euhedral to subhedral	See comments above.
Clinopyroxene	Tr	Tr	≤0.3		Granular, anhedral	May be present as granular grains intergrown with plagioclase microlites; grains too small to determine optically.
Mesostasis	87.8	87.8				Changes from dark brown subvariolitic, to a brown plumose to sheaf-spherulitic, to dark gray-brown intersertal texture with increasing distance from the chilled margin. Abundance of microlites and microphenocrysts increases with these zones.
Glass	1.6	1.6				Clear ≤1.5mm thick glass margin containing discrete varioles centered around plagioclase microlites and pyroxene microphenocrysts.
Pyrite	Tr	Tr	≤0.01		Granular	Very minor pyrite blebs (5 microns) in groundmass and in plagioclase microlites. Very minor submicron magnetite grains distributed throughout the groundmass.
Chalcopyrite	Tr	Tr	≤0.02		Granular	In mesostasis.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	Tr	Vesicles	Forms an inner lining of some vesicles.

VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	0.6	Even	0.05-0.16	Partial		Partially lined by saponite.

COMMENTS: Very fresh basalt.

168-1023A-22X-CC (Piece 6, 034-040 cm)

ROCK NAME: Sparsely to moderately plagioclase-olivine-phyric basalt

GRAIN SIZE: Aphanitic: microcrystalline to cryptocrystalline

TEXTURE: Variolitic, hypocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.2	1.2	0.1-0.5	~Fo85	Sub- to euhedral, equant	Fresh; individual crystals or attached to plagioclase, microphenocrysts of 0.1-0.2 mm diameter most common.
Plagioclase	3.6	3.6	0.3-2		Sub- to euhedral laths	Oscillatory zoning, sector zoning and glass inclusions (in cores) are common. Present as single crystals or monomineralic glomeroporphyritic clusters. Spinel inclusions (0.1 mm).
Spinel	Tr	Tr	0.04		Euhedral	
GROUNDMASS						
Plagioclase	17.0	17.0	≤0.5		Microlitic laths	Skeletal crystals (swallowtail and hollow forms).
Olivine	4.0	4.0	≤0.1	~Fo85	Sub- to euhedral, equant	See comments above.
Mesostasis	69.4	69.4				Subvariolitic groundmass. Contains traces of pyrite in rounded blebs (≤30 micron diameter) and traces of 2 micron magnetite grains.
Glass	3.2	3.2				Fresh quenched margin (1-2mm thick) with varioles. Light to dark brown.
Pyrite	Tr	Tr	≤0.01		Granular	In mesostasis.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite?	Tr	Fracture	Discontinuous 2 micron wide fracture fill. May correspond to the blue-gray to blue-green clay minerals observed on the surface of the handspecimen.

VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	1.6	Even	0.1-0.2	None	Spherical to oval.	The bluish mineral observed lining vesicles in the handspecimen is apparently not present in the thin section.

COMMENTS: Very fresh basalt. Trace plagioclase glomerocrysts (2mm).

168-1024B-18X-CC (Piece 3, 009-027 cm)

ROCK NAME: Aphyric plagioclase-clinopyroxene basalt

GRAIN SIZE: Aphanitic: cryptocrystalline-microcrystalline

TEXTURE: Variolitic-subvariolitic; holohyaline-hypocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.1	0.1	0.4-1.6		Euhedral laths	Present as individual crystals; simple to oscillatory zoning in the cores. One anhedral xenocryst present, with glass inclusions (c.8 microns) in the core.
Clinopyroxene	Tr	Tr	0.25		Euhedral	Two crystals found; faint oscillatory zoning.
GROUNDMASS						
Plagioclase	4.6	4.6	0.05-0.15		Microlitic laths	Swallowtail, acicular needles.
Clinopyroxene	3.3	3.3	≤0.2		Euhedral	
Mesostasis	86.3	86.3				Changes from dark brown subvariolitic, to a orange-brown honeycomb to a yellow-brown honeycomb and finally to a light gray-brown branching texture with increasing distance from the chilled margin.
Glass	3.5	3.5				Clear ≤0.6mm-thick glass margin containing discrete varioles centered around plagioclase and pyroxene microlites
Pyrite	Tr	Tr	0.0		Granular	In mesostasis.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Celadonite	Tr	Vesicles and microfractures				Forms an fine layer within some vesicles, and partially fills some microfractures.
Saponite	0.4	Vesicles and microfractures				Lines the microfractures cross cutting the section and partially fills some vesicles, after celadonite and/or iddingsite.
Iddingsite	Tr	Vesicles				Forms a layer of fine granules after celadonite in some vesicles.
Pyrite	Tr	Vesicles				Forms drusy euhedral grains partially lining some vesicles.
VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	1.8	Even	0.05-0.1	Partial to complete	Round to irregular.	See comments above.

COMMENTS: Plagioclase microlites and varioles exhibit a preferred alignment parallel to the chilled margin.
Secondary alteration minerals are restricted to a 1-2mm band on either side of the microfractures cross cutting the rock.

168-1024B-18X-CC (Piece 12, 009-027 cm)

ROCK NAME: Aphyric plagioclase-pyroxene basalt

GRAIN SIZE: Aphanitic: microcrystalline to cryptocrystalline

TEXTURE: Variolitic to subvariolitic; hypocrystalline

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	0.1-0.5		Sub- to euhedral laths	Individual crystals and as monomineralic and bimineralic glomeroporphyritic cluster with clinopyroxene; some glass inclusions present. Simple and oscillatory zoning in some crystals.
Clinopyroxene	Tr	Tr	0.2-0.3		Subhedral–euhedral	Present singly and in a bimineralic glomeroporphyritic clots with plag.
GROUNDMASS						
Plagioclase	11.3	11.3	0.03-0.1		Microlitic laths	Skeletal, hollow and swallowtails.
Olivine	Tr	Tr	0.05-0.1		Sub- to euhedral	
Clinopyroxene	7.6	7.6	≤0.05		Subhedral equant	Often aggregated with plagioclase microlite
Mesostasis	79.0	79.0				Changes from dark brown subvariolitic, to a deep reddish brown plumose, to dark gray-brown plumose and finally to a light gray-brown branching texture with increasing distance from the chilled margin.
Glass	0.7	0.7				Clear ≤2.5mm-thick glassy margin with minor amounts of plagioclase microlites, olivine ± pyroxene microphenocrysts (acting as nuclei for varioles) and devitrified glass.
Pyrite	Tr	Tr	≤0.002		Granular	In glass.
Chalcopyrite	Tr	Tr	≤0.02		Granular	In mesostasis.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite		Vesicles				Forms an inner lining in some vesicles, preceded by an earlier coating of celadonite.
Celadonite		Vesicles and fractures				Restricted to alteration halo, lines vesicles and forms irregular groundmass clots perhaps replacing olivine. In some vesicles, the lining may be followed by pale green celadonite, saponite or iddingsite.
Pyrite, pyrrhotite, chalcopyrite	Tr	Groundmass and vesicles				A 400 micron diffuse band contains concentrated 1-5 micron granular sulfides (a few reach 70 microns). This band corresponds to the inner edge of the alteration halo. In one vesicle, two botryoidal masses of sulfide (15 microns wide) occur on the wall.

VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	1.4	Even	0.05-0.1	Partial	Round to oval	Clear or partially filled with saponite, celadonite, iddingsite ± sulfide

COMMENTS: The crystallinity gradually increases towards the interior of the rock. A dark alteration halo extends 2-10mm into the rock from the glass margin. The shape of the halo is also influenced by the presence of small microfractures.

168-1024C-01R-01 (piece 1, 0–8 cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Aphanitic; cryptocrystalline
TEXTURE: Variolitic to subvariolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine						
Plagioclase	Tr	Tr	0.5-1.2		Euhedral	Solitary crystals or within glomeroporphyritic clots. Some have an irregular outline, and are partially devitrified with glass inclusions in the core; the crystals are strongly zoned.
Clinopyroxene						
Opaques						
GROUNDMASS						
Plagioclase	1.6	1.6	≤0.1		Euhedral	Laths and needles; microlites exhibit a subparallel orientation, parallel to the chilled margin. Microlite grain size increases with distance from the margin.
Olivine						
Clinopyroxene	0.4	0.4	≤0.05		Granular	Skeletal grains.
Opaques						
Glass	Tr	Tr				Fresh pale brown glass containing abundant varioles and plagioclase microlites.
Mesostasis	96.2	98				Skeletal cryptocrystalline microcrysts set within a sheaf-spherulitic to plumose cryptocrystalline mass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Iddingsite	0.6	Vesicles; mesostasis	Red-brown; granular to massive; fills the vesicles. In some vesicles, iddingsite is associated with hematite.
Saponite	0.2	Vesicles; mesostasis	Tan color; granular to massive texture.
Celadonite	1	Vesicles; mesostasis	Green; granular to fibrous, either forming bands at the rims or completely fills vesicles.
Pyrrhotite	Tr		Interstitial, granular (0.005–0.03mm) concentrated in a discontinuous band just beyond the leading edge (celadonitic) of the alteration halo.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.8	Even	≤0.05	Clay	Round	Iddingsite, saponite and celadonite partially to completely fill the vesicles. The type of clay filling the vesicle depends on its location in the alteration halo.

COMMENTS: The section contains one small vein (≈0.01mm wide) filled by red-orange iddingsite ± saponite, cutting across the mesostasis as well as plagioclase phenocrysts. The vein has a 1.5mm oxidation halo associated with it, on either side.

168-1024C-01R-01 (piece 2, 8–15 cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic; microcrystalline to cryptocrystalline

TEXTURE: Intersertal to intergranular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine						
Plagioclase	Tr	Tr	0.4-0.8		Euhedral	Laths and stubby crystals; occur singly and within monomineralic glomeroporphyritic clots; minor simple zoning.
Clinopyroxene						
Opaques						
GROUNDMASS						
Plagioclase	7.7	7.7	≤0.1		Euhedral-subhedral	Microlaths and microlites form an intersertal framework.
Olivine	Tr	Tr	≤0.1		Euhedral	Completely replaced by pale brown saponite.
Clinopyroxene	10.3	10.3	0.02-0.05		Granular	Grains are interstitial to plagioclase.
Opaques	Tr	Tr	≤0.005		Granular	Disseminated throughout the mesostasis.
Mesostasis	79.1	81.6				Characterized by sheaf-spherulitic to plumose texture, interstitial to the plagioclase ± pyroxene framework.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Iddingsite	0.2	Vesicles; mesostasis	Red–brown; granular to massive either filling or lining vesicles and cavities.
Saponite	0.2	Vesicles	Green; fibrous to granular; fills to lines vesicles and cavities.
Celadonite	2.5	Vesicles; mesostasis	Yellow to pale brown; granular; lines vesicles and can be pure or mixed with celadonite.
Pyrrhotite + pyrite	Tr	Vesicles; alteration halo	Small anhedral grains (≤0.02mm) located at the front of the alteration halo and within vesicles. One 0.3mm irregular pyrite grain fills the end of an irregular cavity.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.7	Even	0.05-0.15	None-clay	Round to ovoid	Iddingsite, saponite and celadonite partially to completely fill the vesicles. The type of clay filling the vesicle depends on its location in the alteration halo.
Cavities	1.7	Concentrated at the top.	0.1-1.5	None-clay	Irregular	The cavities are filled in a similar manner to the vesicles. They are irregular and convolute in shape, and occur in the upper half of the section, with their long axes parallel to the top of the rock.

COMMENTS: The alteration halo is c.5mm thick and zoned consisting of a sequence of iddingsite, celadonite and saponite from the external surface in towards the center of the rock.

168-1025B-11X-CC (Piece 2, 028-040 cm)

ROCK NAME: Aphyric plagioclase-pyroxene-olivine basalt

GRAIN SIZE: Aphanitic: microcrystalline

TEXTURE: Sheaf-spherulitic to intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	Tr	0.1-0.4		Sub- to euhedral	Replaced by secondary minerals.
Plagioclase	Tr	Tr	≤0.8		Euhedral laths	Unzoned to oscillatory zoned.
Clinopyroxene	Tr	Tr	0.8		Euhedral	One crystal, attached to a plagioclase lath.
GROUNDMASS						
Plagioclase	14.0	14.0	0.1-0.2		Microlitic laths	Equant and elongate laths, commonly hollow and skeletal; radiating clusters intergrown with clinopyroxene and/or olivine.
Olivine	0.0	2.0	0.1-0.4		Subhedral-euhedral	See comments above.
Clinopyroxene	9.4	9.4	0.1-0.2		Anhedral granular	Intergrown with radiating plagioclase.
Mesostasis	71.4	71.4				Sheaf-spherulitic plagioclase and clinopyroxene with interstitial skeletal magnetite (10-20 microns across) and numerous 2-10 microns (and one 250 microns) diameter pyrite globules.
Pyrite/pyrrhotite	Tr	Tr	≤0.02		Granular	In mesostasis; one grain, 0.12mm across, is a lamellar pyrite-pyrrhotite(?, anisotropic) intergrowth.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING			COMMENTS:
Clay	2.0	Olivine, veinlets and vesicles.	Mg-saponite + celadonite	Fibrous.	Olivine is apparently completely replaced by green-orange clay followed by pale brown clay; veinlets are several microns wide and filled with pale green to green-orange clay; whilst vesicles are thinly lined by pale brown to colorless clay.

VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	2.2	Even	0.2-0.6	Clay lining	Round to irregular.	

COMMENTS:

168-1025B-11X-CC (Piece 3, 028-040 cm)

ROCK NAME: Sparsely phyric plagioclase-pyroxene-olivine basalt

GRAIN SIZE: Aphanitic: microcrystalline to cryptocrystalline

TEXTURE: Variolitic to subvariolitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.0	0.2-0.4		Euhedral	Replaced by secondary minerals.
Plagioclase	0.6	0.6	≤1.5		Subhedral laths	Normal zoning and rare oscillatory zoning. Some have straight edges whilst others appear to be partially resorbed with respect to groundmass glass.
Clinopyroxene	0.2	0.2	1.9		Euhedral	One crystal; simply zoned and twinned, partially encloses plagioclase phenocrysts; the rim encloses euhedral plagioclase and magnetite microlites.
Pigeonite	0.8	0.8	0.1-0.3		Euhedral	Concentrated in one area of the thin section (could potentially be cpx). Low birefringence, biaxial positive 2V~30°.
GROUNDMASS						
Plagioclase	9.0	9.0	0.1-0.2		Microlite laths	Hollow, swallowtail and skeletal; radiating clusters intergrown with clinopyroxene.
Olivine	0.0	0.2	0.2-0.4		Euhedral	See comments above
Clinopyroxene	5.6	5.6	≤0.1		Euhedral to equant	Individual crystals and granular aggregates with plagioclase and altered olivine.
Mesostasis	80.4	80.4				Subvariolitic. Trace amount of pyrite globules (≤20 microns).
Glass	0.8	0.8				Fresh quenched margin (1-2mm thick) with varioles. Medium to dark brown.
Pyrite	Tr	Tr	≤0.05		Granular	In mesostasis, plagioclase.
Chalcopyrite	Tr	Tr	≤0.05		Granular	In mesostasis.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	1.2	Olivine, veinlets and vesicles			Fibrous to granular	Olivine is replaced by granular to fibrous green-orange to yellow-brown clay. Veinlets (≤30 microns wide) are filled with pale brown clay. Vesicles are thinly lined by brown-orange clay followed by pale brown clay.
Iddingsite	Tr	Olivine, veinlets and vesicles				One vesicle is thickly lined with iddingsite followed by green-orange clay followed by pale clay.
Calcite	Tr	Olivine				
Pyrite	Tr	Clay veins and vesicles	0.1-0.2			Concentrated near the glassy rim. Also occurs along microcracks and some vesicles. Postdates the clay linings of vesicles.
VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	1.4		0.1-0.2			

COMMENTS:

168-1025C-1R-01 (piece 3, 15-20cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Aphanitic; cryptocrystalline
TEXTURE: Intersertal; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	≤1.4		Euhedral	Simply zoned.
GROUNDMASS						
Plagioclase	24.3	24.3	0.2-0.6		Euhedral-subhedral	Present as euhedral-subhedral laths, as well as quench crystals (swallowtails, hollow crystals etc.).
Olivine	0	2.4	0.1-0.3		Euhedral	Completely replaced by clay (saponite?).
Clinopyroxene	16.3	16.3	0.1-0.3		Anhedral	Anhedral intergrowths with plagioclase.
Opaque oxide	1.8	1.8	≤0.1		Skeletal	Present in the mesostasis.
Pyrite	Tr	Tr	≤0.005		Blebs	Occurs as round globules inside plagioclase crystals and the mesostasis.
Mesostasis	52.3	54.9				Cryptocrystalline mass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	5.2	Olivine; mesostasis; vesicles	Pseudomorphs olivine microphenocrysts; lines vesicles (0.005-0.02mm layers).
Pyrite	Tr	Vesicles	Very thin (≤0.003mm) partial vesicle lining before clay in one vesicle.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.4	Even	≤0.3	None	Round	
Segregation vesicles	0.4	Even	≤0.5	Mesostasis	Round	

COMMENTS:

168-1025C-1R-01 (piece 8, 48–59cm)

ROCK NAME: Aphyric basalt (from near quenched margin)

GRAIN SIZE: Aphanitic; cryptocrystalline

TEXTURE: Locally glomeroporphyritic; quench microphenocrysts in intersertal mesostasis.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1	1	0.5-0.8		Euhedral	Single laths isolated in mesostasis and associated with small agglomerates of granular pyroxene; present as glomerocrysts.
GROUNDMASS						
Plagioclase	7.3	7.3	≤0.6 (Ave 0.3)		Euhedral-subhedral	Present as euhedral-subhedral laths and stubby crystals, as well as quench crystals (swallowtails, hollow crystals etc.). Occurs as single grains or within glomerocrysts with pyroxene.
Olivine	0	1.3	0.2-0.4		Euhedral	Completely replaced by clay (saponite?). The crystals are present as pseudomorphed outlines ± bands of fibrous-granular clay within an otherwise empty shape.
Clinopyroxene	4.3	4.3	0.1-0.3		Euhedral-anhedral	Present as euhedral microphenocrysts as well as anhedral intergrowths with plagioclase.
Pyrite/Pyrrhotite	Tr	Tr			Skeletal-anhedral	Occurs as discrete skeletal laths (≤0.06mm), round globules inside plagioclase crystals and angular grains in the mesostasis.
Mesostasis	86.1	86.1				Varies from dense, brown sub-isotropic material, to a gray-brown cryptocrystalline mass.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Clays	1.3	Olivine	Pseudomorphs olivine microphenocrysts; most has been ground away during polishing, although a fine lining is still present along the grain boundary.
Pyrite	Tr	Mesostasis; olivine	Forms granular grains in mesostasis, as well as occurring within the clay pseudomorphing olivine.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.9	Even	≤0.35	None	Round	

COMMENTS: The mesostasis texture varies from being dense and sub-isotropic at the quenched margin, passing down into a subvariolitic section with a weak honeycomb to sheaf-spherulitic texture. Around 37% of all phenocrysts and groundmass minerals are part of glomerocrysts.

168-1025C-1R-02 (piece 3, 16–20cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Aphanitic; microcrystalline
TEXTURE: Intergranular-intersertal; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Tr	0.3-0.5		Euhedral	Completely replaced by cryptocrystalline brown clay (saponite?).
Plagioclase	1.1	1.1	0.5-0.8		Anhedral - subhedral	Stubby, irregular crystals exhibiting simple zoning.
GROUNDMASS						
Plagioclase	43.2	43.2	0.2-0.5 (Ave 0.4)		Subhedral-anhedral	Elongate laths; majority of crystals are subhedral, forming a network of laths as well as stellate clusters. Some hollow/skeletal small laths occur.
Olivine	0	1.8	≤0.2		Euhedral-subhedral	Completely altered to cryptocrystalline brown clay (saponite?). Occur interstitially to plagioclase. Minor opaque inclusions occur in some grains.
Clinopyroxene	28.4	28.4	0.15-0.4 (Ave 0.2)		Subhedral-anhedral	Pale brown color in PPL; occurs interstitially to plagioclase laths, as well as at the center of stellate plagioclase clusters. Some grains contain minor opaque inclusions.
Opaques	9.1	9.1	≤0.2 (Ave 0.05)		Euhedral-skeletal	Majority of opaques are magnetite and ilmenite (≤0.2mm), along with a trace amount of pyrite (≤0.03mm), occurring as discrete grains and small rods (≤0.04mm) in the mesostasis. Ilmenite typically forms skeletal laths.
Mesostasis	3.1	13.2				Occur as irregular gray-brown cryptocrystalline patches with minor feathery px(?) plumes.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	15.1	Olivine; vesicles				Brown, cryptocrystalline to fibrous; completely pseudomorphs olivine and lines vesicles.
Zeolite	Tr	Vesicles				Forms small (≤0.09mm), euhedral, colorless crystals ± a fine (≤0.05mm)) band infilling parts of some vesicles. The zeolite has then been sequentially lined by pale brown fibrous saponite.
Pyrite	Tr	Vesicles				Occurs as discrete grains (c.0.001mm) within the clay lining of vesicles.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	6.4		0.6-1.6	Clay	Round	Majority of round vesicles are lined by a ≤0.05mm layer of fibrous saponite.
Vesicles/cavities	1.6		0.3-0.7	Clay + zeolite	Irregular - ovoid	Many contain a partial fill of mesostasis ± a ≤0.05mm layer of zeolite ± euhedral zeolite crystals in clay ± a ≤0.05mm layer of fibrous saponite.

COMMENTS:

168-1025C-2R-01 (piece 17, 143-147cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Aphanitic, microcrystalline
TEXTURE: Intergranular, locally intersertal

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.2	0.2	0.6-1.4		Euhedral	Stubby laths in monomineralic glomeroporphyritic clots; strongly zoned at edges.
GROUNDMASS						
Plagioclase	45.8	48.6	0.5-1.0		Subhedral-anhedral	Microlaths; strongly zoned.
Olivine	0	3.6	0.5-1.2		Euhedral-subhedral	Partially encloses plagioclase + clinopyroxene clots; completely replaced by brown clay (saponite).
Clinopyroxene	27.1	27.1	0.3-0.5		Euhedral-anhedral	Intergranular, occurring as discrete (0.3-0.5mm) grains, as well as a granular mass (≤0.1mm) within glomeroporphyritic clots with plagioclase laths.
Magnetite	7.2	7.2	0.05-0.3 (Ave 0.1)		Anhedral	Scant lamellae of ilmenite enclosed in magnetite grains.
Pyrite/pyrrhotite	Tr	Tr	0.03-0.05		Anhedral-globular	Accounts for c.10% of all opaque grains.
Mesostasis	0	13.3				Interstitial aggregates of microcrystalline to cryptocrystalline material with microcrysts of plagioclase + opaques + clay; some feathery cryptocrystalline plumes (cpx?).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite (brown)	19.7	Olivine; mesostasis, skeletal plagioclase	Dark olive brown, massive clay with masked interference colors; granular to cryptocrystalline texture.
Saponite (green)	Tr	Olivine; mesostasis	Pale yellow-green; fibrous to granular, surrounds brown saponite-replaced olivine microphenocryst.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
None						

COMMENTS: Some pale yellow-green clay (saponite?) occurs in one corner forming a band around some mesostasis and an olivine microphenocryst which have been replaced by brown saponite.

168-1025C-2R-02 (piece 11b, 139–142cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Fine grained.
TEXTURE: Intersertal to intergranular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	0.6-1.6		Euhedral	Stubby laths (much less elongate than groundmass laths); strongly zoned.
GROUNDMASS						
Plagioclase	40.6	40.6	0.2-1.2		Subhedral-anhedral	Microlaths and prisms; strongly zoned.
Olivine	0	3.6	0.1-0.4		Euhedral-subhedral	Completely replaced by olive-brown clay (saponite).
Clinopyroxene	27	28.6	0.1-0.3		Anhedral-subhedral	Intergranular, occurring as discrete grains.
Opaques	7.8	7.8	0.05-0.3		Skeletal-subhedral	Interstitial magnetite/maghemite + some globular sulfides.
Mesostasis	1.9	19.4				Interstitial; mostly replaced by clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	22.7	Olivine; mesostasis	Massive to cryptocrystalline aggregates.
Carbonate	Tr	Olivine	
Quartz		Vein	Not included in point count; chalcedony to drusy quartz.
Pyrite	Tr		Associated almost exclusively with clay alteration.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
None						

COMMENTS: Composite vein (1.5mm) with orange-brown mixture of clay and iddingsite in the outer rim of the vein, and quartz in the center. Quartz occurs as aggregates of euhedral crystals increasing in size towards the middles of open vugs. In these, chalcedonic quartz forms near the margin, changing to euhedral and drusy quartz in the middle (≤0.3mm). Patches (0.2-0.3mm) of pale brown clay are mixed with the quartz. Spots of dark orange iddingsite are widespread within the veins.

168-1025C-2R-04 (piece 12, 54-58cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic, cryptocrystalline to microcrystalline

TEXTURE: Hypocrystalline; intersertal; patches of sheaf-spherulitic to plumose mesostasis.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Tr	0.4-0.8 (Ave 0.6)		Euhedral	Completely replaced by fibrous brown clay (saponite?). The clay preserves the outline of the crystals as well as forming fibrous bands within the crystal (following fracture planes?).
Plagioclase	Tr	Tr	0.6-1.6 (Ave 0.8)		Euhedral	Laths and stubby crystals occur singly and within crystal clots; minor simple zoning.
GROUNDMASS						
Plagioclase	26.4	26.4	0.1-0.6 (Ave 0.2)		Subhedral-anhedral	Forms microphenocrysts which occur singly and within stellate clusters.
			≤0.2		Euhedral	Forms whole and quenched (swallowtail; hollow) microlaths and microlites.
Olivine	0	0.8	0.2-0.3 (Ave 0.2)		Euhedral	Completely replaced by brown clay (see comments above).
Clinopyroxene	22	22	0.1-0.3 (Ave 0.1)		Anhedral-subhedral	Occurs singly and at the center of microglomeroporphyritic clots of plagioclase + opaques; some bowtie structures with plagioclase.
Opaques	4.6	4.6	0.01-0.08 (Ave 0.05)		Euhedral-skeletal	Mostly magnetite plus some minor pyrite (≤0.04mm); some skeletal laths of magnetite (ilmenite?) extend up to 0.15mm.
Mesostasis	36	45.2				Brown, intersertal, cryptocrystalline patches. Some areas have a sheaf-spherulitic ± plumose texture, with feathery plumes of cryptocrystalline cpx(?).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	10	Olivine; vesicles; mesostasis	Brown, fibrous; replaces olivine and partially lines vesicles. Some vesicles contain rods of saponite (fibers extend perpendicular to rod axis), extending into the center of the vesicle.
Carbonate	Tr	Vesicles	Aragonite needles (≤0.28mm long) extend into the center of some vesicles. These needles are lined by fine fibers of saponite.
Zeolites	Tr	Vesicles	Forms a discontinuous layer (≤0.01mm thick) of blocky crystals at the outer edge of some vesicles, which has then been coated by a layer of fibrous clay (saponite?)

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1		0.3-0.5	Clay ± carbonate	Round-irregular	Lined by ≤0.03mm fibrous saponite ± rods of saponite extending into center. Some have semicircular stellate clusters of aragonite needles attached to the rim.
Segregation vesicles	Tr		≤0.4	Mesostasis ± clay	Round	Partially to completely filled by mesostasis ± opaque rods. Partially filled vesicles have ≤0.02mm layer of fibrous saponite after the mesostasis fill.

COMMENTS: Irregular gas vesicles/cavities (≤0.8mm) are empty.

168-1025C-3R-01 (piece 5, 19–27cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic to fine grained.

TEXTURE: Hypocrystalline; intersertal; sheaf-spherulitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.2	0.2	0.4-1.6 (Ave 0.8)		Euhedral-subhedral	Laths and stubby crystals; some oscillatory zoning.
GROUNDMASS						
Plagioclase	18.4	18.4	0.05-0.6 (Ave 0.3)		Subhedral-skeletal	Microlaths and microlites, plus some quench crystals form patches of intersertal texture; granular pyroxene commonly occurs the edges of the large plagioclase
Olivine	0	2.2	0.15-0.4 (Ave 0.25)		Euhedral-subhedral	Completely replaced by brown-green granular to fibrous saponite; center of all grains have been plucked out (by polishing?).
Clinopyroxene	15	15	0.05-0.3 (Ave 0.2)		Subhedral-anhedral	Present as discrete subhedral (0.1-0.3mm) crystals, granular (≤0.05mm) grains in the groundmass and granular crystals (0.05-0.15mm) in glomeroporphyritic clots.
Opaques			0.01-0.1 (Ave 0.05)		Granular-skeletal	(Abundance has been included in mesostasis count.) Mostly magnetite with minor granular and globular pyrite (≤0.01mm), disseminated throughout the groundmass and within and between crystals.
Mesostasis	63.2	63.2				Feathery sheafs of cryptocrystalline material (cpx?), as well as dark brown, massive areas; forms patches throughout the section.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	2.2	Olivine; vesicles				Massive saponite is brown; fibrous saponite is brown-green. Massive saponite replaces the margins and along fractures in olivine, whilst fibrous saponite replaces the center of olivine and lines vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1	Even	0.4-0.5	Clay	Round-ovoid	Lined by fibrous brown-green saponite (≤0.04mm layers).
Segregation vesicles	(incl. above)	Even	≤0.6	Mesostasis + clay	Round	Partially to completely filled by mesostasis. Partially filled vesicles have gas bubble inside lined by fibrous saponite, as above.

COMMENTS: A continuum exists between the segregation and gas vesicles from: i) completely filled segregation vesicles, filled by mesostasis + opaque needles + microlites of plagioclase + pyroxene; ii) partially filled segregation vesicles, as in (i); iii) geopetel infills of mesostasis (≤0.1mm thick) within vesicles, most of which occur at base of vesicle according to the way-up direction on the section (some however, are discordant). The geopetel infill and rest of the vesicle is then lined by a ≤0.04mm layer of fibrous brown-green saponite; and iv) empty gas vesicles, lined by a ≤0.04mm layer of fibrous brown-green saponite.
Minor crystal clots of plagioclase + pyroxene occur within the section.

168-1025C-3R-01 (piece 7, 30-34cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic; cryptocrystalline.

TEXTURE: Intersertal; hyalopilitic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.4	0.4	≤1.7		Euhedral-subhedral	Stubby laths; weak zoning.
GROUNDMASS						
Plagioclase	9.9	9.9	0.1-0.7 (Ave 0.3)		Subhedral-skeletal	Microlaths and microlites, plus some quench crystals.
Olivine	1	2.2	0.1-0.3		Euhedral	Partially replaced by brown saponite and carbonate.
Clinopyroxene	4	4	0.1-0.3		Anhedral	Intergrown with plagioclase.
Opaques	0.8	0.8	≤0.01		Granular-skeletal	Mostly magnetite with minor pyrite/pyrrhotite disseminated throughout the groundmass.
Mesostasis	82.1	82.1				Cryptocrystalline material with granular pyroxene + opaques.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	1.4	Olivine; vesicles				Filamentous, open mats partially fill vesicles and replace olivine.
Carbonate	Tr	Olivine				
Pyrite/pyrrhotite	Tr	Vesicles				Associated with clay; ≤0.03mm composite grains.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.8	Even	≤0.6	Filamentous clay	Round	

COMMENTS:

168-1025C-4R-01 (piece 4, 19–27cm)

ROCK NAME: Aphyric pyroxene-plagioclase-olivine basalt

GRAIN SIZE: Aphanitic: microcrystalline to cryptocrystalline.

TEXTURE: Intersertal to intergranular; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	≤0.75 (Ave 0.6)		Subhedral-euhedral stubby laths	Strong zoning which may be oscillatory. Many euhedral phenocrysts have subhedral to oval shaped cores.
GROUNDMASS						
Plagioclase	26	26	≤0.6		Subhedral-anhedral laths	Seriate texture; hollow and swallowtail crystals are common.
Olivine	0	2.2	0.25-0.4 (Ave 0.3)		Euhedral	Totally replaced by pale brown clay (saponite), with a granular to fibrous texture.
Clinopyroxene	32.2	32.2	0.05-0.2		Subhedral-anhedral	Granular grains, intergrown with plagioclase, as well as intergranular grains.
Opaque oxides	7.8	7.8	≤0.1 (Ave 0.05)		Anhedral-skeletal	Isotropic; magnetite ± maghemite (based on palaeomagnetics).
Pyrite	Tr	Tr	≤0.03		Globular	Globules in the mesostasis.
Mesostasis	26.8	30.4				Cryptocrystalline with granular cpx(?) + opaque rods and dendrites; patchy alteration to brown clay (saponite?).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	5.8	Olivine; vesicles; mesostasis	Brown granular saponite and olive to tan brown fibrous saponite are present replacing olivine and patches of mesostasis, and lining the vesicles (see below).
Pyrite	Tr	Vesicles; olivine	Occurs are globular grains within clay replacing olivine, as well as in the clay which lines some vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas	1.4	Even	0.2-0.75	Clay	Round	Thinly lined by fibrous clay.
Segregation	Tr	Even	0.4-0.5	Mesostasis	Round	Varying from partial (meniscus) fill to completely filled.
Cavities	Tr	Even	≤0.5	Clay	Irregular	Thinly lined by fibrous clay, identical to the gas vesicles. One cavity is connected to a vesicle by a tiny inlet.

COMMENTS: The typical vesicle/cavity lining consists of a 0.015mm layer of dark brown fibrous clay (with dark brown-orange birefringence), followed by a <0.005mm layer of pale tan brown fibrous clay (first order birefringence). Pyrite is generally absent, although one or two grains were observed in the mesostasis layer underlying the clay.

168-1025C-4R-01 (piece 16a, 123-125cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: microcrystalline to fine grained.

TEXTURE: Intergranular to intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
None						
GROUNDMASS						
Plagioclase	42.8	42.8	0.3-1.5 (Ave 0.3)		Subhedral	Elongate laths; strongly zoned.
Olivine	Tr	2.4	0.1-0.3 (Ave 0.3)		Subhedral	Completely to partially replaced by massive to cryptocrystalline olive-brown to olive-green clay; some relict, fresh olivine remains in a few grains.
Clinopyroxene	31.4	31.4	0.1-0.6 (Ave 0.2)		Anhedral-subhedral	Intergranular.
Opaques	6.2	6.2	0.05-0.5 (Ave 0.2)		Euhedral-anhedral	Mostly subhedral magnetite, with a trace amount of globular pyrite/pyrrhotite. Pyrite/pyrrhotite is only present within the mesostasis.
Mesostasis	4.3	17.2				Interstitial cryptocrystalline brown-gray material partially altered to brown clay (saponite?).

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Clay (saponite?)	15.3	Olivine; mesostasis	The saponite is more massive and olive-green to brown when replacing olivine, compared to that which replaces the mesostasis, where it is fibrous and brown-gray.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
None						

COMMENTS:

168-1025C-4R-03 (piece 1d, 24-28cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: microcrystalline to fine grained.

TEXTURE: Intergranular to intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	0.6-1.6 (Ave 0.8)		Euhedral-subhedral	Mostly euhedral laths + stubby crystals; simple zoning.
GROUNDMASS						
Plagioclase	37.4	37.4	0.2-0.7 (Ave 0.45)		Euhedral-subhedral	Elongate laths form an intergranular network; some simple zoning.
Olivine	0	2.8	0.2-0.4 (Ave 0.2)		Euhedral	Completely replaced by cryptocrystalline brown-green saponite. Some crystals contain an abundance of ≤0.02mm blebs of opaques.
Clinopyroxene	35.6	35.6	0.1-0.4 (Ave 0.2)		Subhedral-anhedral	A few euhedral crystals; glass inclusions occur in some crystals forming trails parallel to the crystal margins, or irregular patches within the core.
Opaques	8.8	8.8	≤0.3 (Ave 0.2)		Euhedral-anhedral	Majority are magnetite, some of which are euhedral and skeletal. There is also a trace amount of globular pyrite (≤0.04mm) within the mesostasis.
Mesostasis	3.7	15.4				Brown-gray cryptocrystalline material; partially replaced by saponite.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	14.1	Olivine; mesostasis				Brown-green to brown-gray cryptocrystalline clay replacing olivine and interstitial mesostasis material, respectively.
Carbonate	Tr	Olivine				Accessory to saponite, replacing olivine.
Zeolites	0.4	Mesostasis				Clear, fibrous aggregates replace interstitial mesostasis (± olivine), enclosing 0.002-0.005mm anhedral sulfide grains.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
None						

COMMENTS:

168-1025C-5R-01 (piece 7, 38-42cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Fine grained.
TEXTURE: Intergranular to intersertal; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.7	≤1.6 (Ave 1.2)		Subhedral-euhedral	Completely replaced by fibrous saponite ± talc (only near talc vein).
Plagioclase	0.5	0.5	0.8-1.2 (Ave 0.8)		Anhedral-subhedral	Stubby crystals and laths; some simple zoning.
GROUNDMASS						
Plagioclase	39.4	39.4	0.2-0.8 (Ave 0.4)		Subhedral laths	Minor parallel orientation perpendicular to the way up. Some stellate clusters with pyroxene at core.
Olivine	0	3.5	0.2-0.4 (Ave 0.4)		Subhedral-interstitial	Completely replaced by fibrous-granular olivine-brown saponite ± fibrous talc ± zeolites.
Clinopyroxene	26.4	26.4	0.1-0.4 (Ave 0.3)		Subhedral-anhedral	Grains occur singly and intergrown with plagioclase; interstitial.
Opaque oxides	9.2	9.2	0.02-0.1 (Ave 0.04)		Subhedral-anhedral	Occur in groundmass + pyroxene + olivine; contain lamellae of ilmenite.
Opaque sulfides	Tr	Tr	0.3-0.5 (Ave 0.3)		Subhedral-anhedral	Occurs in groundmass; one grain has a triangular 0.05mm chalcopyrite grain in it.
Mesostasis	0	20.3				Interstitial, all replaced by brown to olive brown saponite + colorless zeolite ± chlorite/smectite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	24.5	Olivine; mesostasis	Brown to olive-brown color; fibrous to granular. Only replaces pyroxene next to talc-filled fracture.
Zeolites	Tr	Mesostasis ± olivine	Forms colorless, spherulitic masses, replacing the mesostasis ± olivine. 0.005-0.015mm opaque oxides are held in zeolite.
Chlorite/smectite	Tr	Mesostasis	Blue-green fibrous patches in the mesostasis; blue-gray birefringence.
Talc	Tr	Vein; olivine	Small patch in fracture; fibrous. Also replaces olivine near the fracture.
Pyrite/Pyrrhotite	Tr	Vesicles	≤0.4mm subhedral-anhedral grains in some vesicles.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas	14.2	Even	0.9-3.2 (Ave 0.9)	Empty; pyrite	Round-irregular	Some have minor rim of clay; others contain some sulfide grains.

COMMENTS: In the olivine pseudomorphs, saponite ± talc forms circular bundles of fibers. Some crystals are replaced by granular saponite. Saponite has generally been plucked out by polishing.

168-1025C-5R-02 (piece 3, 41-45cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Aphanitic; microcrystalline
TEXTURE: Intergranular to glomeroporphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
None						
GROUNDMASS						
Plagioclase	39	39	0.3-1.5		Euhedral laths	Strongly zoned; forms randomly orientated laths as well as stellate clusters.
Olivine	0	3	0.2-0.4		Subhedral	Completely altered to olive-green to olive-brown clay (saponite?).
Clinopyroxene	31.8	31.8	0.1-0.5		Subhedral-anhedral	Intergranular; occurs as anhedral granules (≤0.1mm) at the center of plagioclase stellate clusters.
Opaque oxides	8.8	8.8	0.1-0.5		Subhedral	Interstitial; magnetite and/or maghemite.
Opaque sulfides	Tr	Tr	≤0.05		Globular	Occurs in the mesostasis; pyrite and/or pyrrhotite.
Mesostasis	4.4	17.4				Interstitial, brown to brown-gray cryptocrystalline, feathery material.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	16	Olivine; mesostasis				Brown to brown-gray color. Olivine is replaced by brown to brown-green cryptocrystalline saponite, whilst the mesostasis is replaced by brown to brown-gray cryptocrystalline clay.
Zeolites	Tr	Mesostasis ± olivine				Forms colorless, granular to spherulitic, isotropic masses, replacing the mesostasis ± olivine.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
None						

COMMENTS: The mesostasis forms larger, irregular patches (maximum length ≤4mm; average 0.8mm), than in the thin section from 1025C-4R. The texture is influenced by ≤1.6mm ovoid masses of granular (≤0.1mm) pyroxene + plagioclase, with larger (0.3-0.8mm) plagioclase laths (± subhedral pyroxenes) radiating out from the center.

168-1026B-1R-01 (piece 7, 29-33cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic

TEXTURE: Hypocrystalline; sheaf-spherulitic ± plumose; microglomeroporphyritic; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.4	0.4	≤0.5 (Ave 0.3)		Euhedral	Laths and stubby crystals; minor simple zoning.
GROUNDMASS						
Plagioclase	8.8	8.8	Ave 0.1		Euhedral laths	Microlites + microlaths form euhedral and quench crystals (swallowtail; hollow crystals etc.). Occur singly and within glomeroporphyritic clots.
Olivine	0	2.4	≤0.2 (Ave 0.1)		Euhedral-subhedral	Completely replaced by brown clay (saponite).
Clinopyroxene	3.2	3.2	≤0.06 (Ave 0.03)		Subhedral	Occurs as single grains throughout the groundmass, and as granular crystals in glomeroporphyritic clots with plagioclase.
Opaques			0.02-0.1		Subhedral-anhedral	Discrete 0.02-0.1mm grains of pyrite(?) only occur within the "fresh" interior of the rock; very fine (<0.01mm) opaques occur throughout the whole section. Point count together with mesostasis
Mesostasis	78	83.4				Gray-brown cryptocrystalline to granular material, with feathery plumes and sheafs separated by fine, disseminated opaques.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	4	Vesicles; mesostasis; olivine	Granular, tan brown. Only present within the inner core of the section (i.e. not in the alteration halo).
Celadonite	3.6	Vesicles; mesostasis; olivine	Granular, bright green. Occurs within the inner 4-5mm of the alteration halo only.
Iddingsite	1.3	Vesicles; mesostasis; olivine	Dark brown to orange; massive. Forms the outer 1-1.5mm band of the alteration halo.
Pyrrhotite	0.7	Vesicles, mesostasis	Sparse anhedral to subhedral grains (0.1-0.2mm) often associated with saponite; absent in the oxidation halo. Each grain is a mosaic of several smaller grains,
Hematite	Tr	Vesicles	Deep red; reflective. Occurs in the outer c.1mm layer of the alteration halo.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles		Even	0.05-0.1	Clay	Round	Completely filled by iddingsite, hematite, celadonite or saponite, depending on the location within the section; some vesicles are only partially filled by saponite.
Segregation vesicles		Even	≤0.2	Mesostasis ± clay	Round	Either completely filled by mesostasis, or with a partial fill of mesostasis followed by clay.

COMMENTS: The section has a very pronounced alteration halo around the margin, consisting of a brown-green 5-7mm band followed by a c.2mm light blue-gray band. Within the halo, there is a clear zonation of the alteration clays: 1) a 1-1.6mm band of iddingsite ± hematite, filling vesicles and replacing olivine ± mesostasis; 2) a ≤0.5mm iddingsite + celadonite mixed zone; some vesicles have a 0.005mm celadonite rim preceding the iddingsite ± celadonite infill; 3) a 4-5mm celadonite only zone, filling vesicles ± replacing mesostasis and olivine; 4) interior of the rock (beyond the alteration halo) with saponite only. Sub-anhedral grains of pyrrhotite are present only within this inner zone (i.e. they are absent in the alteration halo). Section contains microglomeroporphyritic clots (0.4-1.6mm) of plagioclase + pyroxene + opaques.

168-1026B-04R-01 (piece 7, 36–44 cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Cryptocrystalline
TEXTURE: Varitextured; glassy to variolitic, subvariolitic, sheaf spherulitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.6	0.6	0.5-0.7		Euhedral laths	Present as solitary crystals and within monomineralic glomerocrysts; oscillatory zoning common.
GROUNDMASS						
Plagioclase	12.4	12.4	≤0.4		Euhedral laths; skeletal	Present as laths, microlites and quench crystals.
Olivine + pyroxene	0.4	4	0.05-0.2		Anhedral–subhedral	Completely to partially replaced by secondary minerals; a few fresh very fined grained crystals are still present.
Mesostasis	64.6	72				Texture varies from variolitic to subvariolitic to sheaf spherulitic.
Glass	3.2	5.8				brown, to light brown, to dark brown. Only the core is fresh (completely extinct in xpl).
Pyrite	Tr	Tr	≤0.005		Granular	Present in the glass rim, and as euhedral grains within very small vesicles within the glass.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Celadonite	4	Vesicles; mafic phases				Bright green fibrous to cryptocrystalline aggregates infilling vesicles and partially to completely replacing groundmass mafic crystals.
Saponite	6.8	Vesicles; mafic phases; veins				Pale brown fibrous to cryptocrystalline aggregates infilling vesicles and partially to completely replacing groundmass mafic crystals.
Iddingsite	5.4	Vesicles; mafic phases				Bright orange-brown-red partially to completely infilling veins and replacing mafic phases.
Altered glass (palagonite?)	2.6	Quenched glass				From orange to pale brown.
Zeolites?	Tr	Veins				Colorless, low relief, possibly 2 types: 1) Fibrous radiate, birefringence white to gray; 2) Granular, forms within veins, very low birefringence.
Pyrite	Tr	Veins; vesicles				≤0.01mm; sparse, occurs within saponite within the rims of veins.
Hematite?	Tr	Veins				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.6	Even	0.05-0.1	Clay; iddingsite	Round	See comments below.

COMMENTS: The glassy margin has a highly fractured, hyaloclastic texture. Single fragments of glass exhibit decreasing concentric alteration bands from their rim to their cores. Alteration haloes exhibit a clear concentric zonation of secondary mineral phases from iddingsite to celadonite to saponite; this banding also occurs in the mesostasis and vesicle infills. Throughout the section, there is a network of veins, with individual veins 0.3-0.4mm wide, infilled by a mixture of saponite and minor amount of zeolite. One deep-red vein (≤0.1mm wide) is infilled by iddingsite ± hematite (deep red purple in ppl, light gray reflectance).

168-1026B-05R-01 (piece 1, 46–49cm)

ROCK NAME: Moderately phyric plagioclase–olivine-pyroxene basalt

GRAIN SIZE: Aphanitic

TEXTURE: Varitextured; intersertal; sheaf spherulitic; glomerophyric; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	0.4	0.5-0.7		Euhedral–subhedral	Present as pseudomorphs, completely replaced by celadonite ± saponite ± iddingsite.
Plagioclase	3	3	0.5-1.1		Euhedral laths	Commonly zoned; forms glomeroporphyritic clusters with interstitial groundmass material.
Clinopyroxene	0.2	0.2	0.5-0.8		Subhedral–anhedral	Present in glomeroporphyritic clusters with plagioclase.
GROUNDMASS						
Plagioclase	4	4	≤0.3		Subhedral	Present as laths, microlites and skeletal crystals.
Olivine	0	1.5	≤0.5		Euhedral to subhedral	Completely replaced by celadonite ± saponite ± iddingsite.
Clinopyroxene	3	3	≤0.2		Anhedral	Skeletal to granular, closely associated with interstitial plagioclase grains.
Opaques	0.4	0.4	≤0.05		Anhedral	Microcrystalline to cryptocrystalline grains present within the interstitial mesostasis ± forming skeletal chains.
Mesostasis	86.5	86.5				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	2.1	Olivine; vesicles				Yellow to pale brown; forms a thin rim within vesicles, as well as pseudomorphing olivine ± pyroxene.
Celadonite	0.6	Olivine; vesicles; mesostasis				Bright green; concentrated in the alteration halo.
Pyrrhotite	0.2	0.2	≤0.05		Anhedral	Disseminated individual grains where celadonite predominates or with saponite along the rim of gas vesicles. Absent in external alteration halo of the rock.
Iddingsite	Tr	Vesicles				Completely fills some vesicles, whilst being associated with celadonite in others.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	2.4					

COMMENTS: Saponite occurs throughout the section with the exception of the alteration halo, where celadonite and iddingsite are prevalent. There is an unusual abundance of sulfide grains (pyrrhotite) in the section (point count reveals 0.2%). These grains are absent in the alteration halo.

168-1026C-16R-01 (piece 10, 40–45cm)

ROCK NAME: Sparsely phyric plagioclase-pyroxene basalt

GRAIN SIZE: Aphanitic

TEXTURE: Sheaf-spherulitic; glomeroporphyritic; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1.4	1.4	0.8-1.5 (Ave 0.8)		Euhedral-subhedral	Occurs singly, but is more common in monomineralic, bimineralic and polymineralic glomeroporphyritic clots with pyroxene ± olivine.
Clinopyroxene	0.2	0.2	0.6-0.8 (Ave 0.8)		Subhedral-euhedral	Subophitic to ophitic arrangement with plagioclase in bimineralic glomeroporphyritic clots.
GROUNDMASS						
Plagioclase	11.6	11.6	0.1-0.5 (Ave 0.3)		Subhedral	Microlaths, microlites and quench crystals. Occurs in monomineralic, bimineralic and polymineralic glomeroporphyritic clots.
Olivine	0	1.8	0.1-0.3 (Ave 0.3)		Euhedral	Occurs in polymineralic glomeroporphyritic clots, as well as singly. All olivine is replaced by saponite ± iddingsite.
Clinopyroxene	6.4	6.4	0.05-0.3		Anhedral-euhedral	Anhedral grains are intergrown with plagioclase ± olivine in glomeroporphyritic clots. Smaller solitary euhedral-subhedral crystals (0.05-0.1mm) occur in the mesostasis.
Opaques	Tr	Tr	«0.01		Granular	Minor opaque oxides and sulfides occur in the mesostasis.
Mesostasis	71.1	77				Sheaf-spherulitic texture; cryptocrystalline with microcrysts of pyroxene + opaque oxides + opaque sulfides.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	4.2	Vesicles; olivine	Forms >0.02mm fibrous linings in vesicles inside of the alteration halo. Also forms <0.01mm granular bands followed by a fibrous filling in some vesicles.
Celadonite	4	Vesicles; olivine	Fibrous; lines some vesicles and fills others.
Iddingsite	1.1	Vein	Massive texture.
Hematite	Tr	Vein; olivine; vesicles	Limited to the alteration halo, associated with iddingsite and celadonite. The grains are irregular in shape and ≤15mm. Hematite fills some vesicles and forms a band between celadonite bands in others.
Calcite	Tr	Vein; vesicles	Sparry crystals.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.6	Even	0.05-0.4	Clay	Round	Partially to completely infilled by secondary clays and opaque oxides.
Segregation vesicles	Tr	Even	0.1-0.15	Mesostasis	Round	Infilled by mesostasis + opaque rods.

COMMENTS: Vein at the rock edge has a 0.1-0.2mm layer of iddingsite + isotropic opaque mineral, followed by a ≈0.07mm layer of anhedral, granular calcite (uniaxial). This is followed by an incomplete zone of rounded iddingsite "clasts" set within a clay(?) matrix. The alteration halo is 2-5mm wide, containing celadonite band followed by iddingsite filling vesicles, or celadonite followed by saponite.

Glomeroporphyritic clots vary in form; some exhibit a rounded external margin whilst others have mesostasis included between the crystals, frequently surrounded by a fine, lighter band of mesostasis. These may represent rip-up clots, rather than clots formed in the circulating magmatic melt.

168-1026C-17R-01 (piece 8, 31-38cm)
ROCK NAME: Aphyric basalt
GRAIN SIZE: Aphanitic
TEXTURE: Hypocrystalline; sheaf-spherulitic; glomeroporphyritic; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.8	0.8	0.4-0.9 (Ave 0.4)		Euhedral-subhedral	Blocky and elongate laths (one lath is 2mm long) occur singly and within monomineralic (1-2mm long) and bimineralic glomeroporphyritic clots. Simple to faint oscillatory zoning.
Clinopyroxene	0.2	0.2	0.5-0.7 (Ave 0.7)		Subhedral-euhedral; poikilitic	Subophitic to ophitic arrangement with plagioclase in bimineralic glomeroporphyritic clots.
GROUNDMASS						
Plagioclase	14.6	14.6	0.1-0.6 (Ave 0.35)		Euhedral-subhedral	Quench crystals, microlaths and microlites occurring singly and within glomeroporphyritic clots; some stellate clusters.
Olivine	0	1.6	0.1-0.2		Euhedral-subhedral	Occurs singly or attached to plagioclase; totally replaced by saponite.
Clinopyroxene	6	6	0.05-0.2		Euhedral-anhedral	Occurs singly or attached to/intergrown with plagioclase.
Opaques	Tr	Tr	≤0.02		Granular-skeletal	Intergranular in the mesostasis.
Mesostasis	61	75.2				Cryptocrystalline; brown-gray color with a massive to sheaf-spherulitic texture.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	8.6	Vesicles; olivine; mesostasis	Granular; olive-brown.
Celadonite	7.2	Vesicles; mesostasis	Fibrous in vesicles; granular to fibrous in mesostasis.
Iddingsite	1.6	Vein; vesicles	Granular to massive; hematite is associated with iddingsite.
Pyrite/pyrrhotite	Tr	Vein; vesicles	Interstitial at leading edge of alteration halo, ≤0.01mm grains.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.6	Even	0.1-0.25	Clay	Round	Lined to filled by fibrous ± granular saponite in the rock inside of the halo. Within the alteration halo, the vesicles are filled with iddingsite ± hematite; fibrous celadonite + iddingsite layers; fibrous celadonite.

COMMENTS: Alteration halo (≤8mm) shows bands of celadonite, iddingsite, then ± saponite in successive linings and fillings of the vesicles. Iddingsite dominates the fractured side of the halo, whereas celadonite dominates the rock core side. The leading edge of the halo is marked by a 0.2mm ± band of concentrated interstitial pyrrhotite/pyrite.

When viewed in PPL, a number of glomeroporphyritic clots exhibit pseudo-crystal outlines with cross-cutting plagioclase laths. The pseudocrystal is infilled by granular pyroxene and may represent the disequilibrium break-down of olivine or pyroxene, and replacement by fine grained pyroxene.

168-1027B-60X-CC (piece 5, 33-38 cm)

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: cryptocrystalline to microcrystalline

TEXTURE: Pilotaxitic; intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.6	≤0.5		Euhedral-subhedral	Completely replaced by secondary minerals - clay and calcite.
Plagioclase	Tr	Tr	≤0.5-0.6		Euhedral-subhedral	Contains small spinel inclusions.
GROUNDMASS						
Plagioclase	30.4	30.4	≤0.15		Microlitic laths	Exhibit quench textures (hollow crystals, swallowtails).
Mesostasis	54.4	63.0				Cryptocrystalline to microcrystalline; ghost/skeletal pyroxenes and magnetite may be discernible; patchy alteration to birefringent clays.
Pyrite	Tr	Tr	≤0.04		Granular, subhedral	In mesostasis.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING			COMMENTS:
Clay (poss. saponite?)	11.4	Mesostasis. Outer rim of vesicles.		Cryptocrystalline to fibrous.	Gray to yellow fibrous; low birefringence
Chlorite(?)		Groundmass minerals (mainly pyroxene). Lining vesicle.		Fibrous	White to yellow brownish in ppl. Gray to yellow in XPL.
Calcite	0.8	Vesicles; mafic phases; mesostasis.		Patchy to granular.	Infilling of gas vesicles; replacement of mafic phases with phyllosilicates.
Pyrite	Tr			Anhedral to euhedral.	Forms discrete irregular grains within the groundmass and along the edge of vesicles after the clay lining but before the calcite infill.
Zeolites(?)	Tr	Mafic crystals		Anhedral to euhedral	Pseudomorphs whole or part grains of primary mafic mineral grains.

VESICLES/ CAVITIES	PERCENT	PERCENT ORIGINAL	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas Vesicles	1.4	1.8	≤0.3	Clay; calcite; (chlorite?).	Spherical to irregular	Gas vesicles may be lined by a fine (5-10 micron) rim of fibrous phyllosilicate (saponite?), followed by a partial to complete infill of radial to sparry calcite.
Segregation vesicles	1.6	1.8	≤1.3			Filled wholly or partially by groundmass material with feathery pyroxene and granular iron oxides; commonly with a gas vesicle (see description above).

COMMENTS:

168-1027B-61X-CC, 13-15 cm

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: cryptocrystalline to microcrystalline

TEXTURE: Intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	≤0.5		Euhedral-subhedral	Contains small spinel inclusions
Mafic minerals (olivine? + pyroxene?)	0	3	≤0.8-0.3		Euhedral-subhedral, skeletal	Completely replaced by secondary minerals including clay (Fe-saponite) + calcite. (Original mineralogy based upon euhedral grain shape.)
GROUNDMASS						
Plagioclase	30.4	30.4	≤0.2		Microlitic laths	Exhibit quench textures (hollow crystals, swallowtails)
Mafic phases (olivine? + pyroxene?)	0	≤7	≤0.1		Subhedral-anhedral	Completely replaced by secondary minerals, the most common being calcite (c.5%) and clay (Fe-saponite; c.2%).
Spinel	Tr	Tr	≤0.005		Euhedral	Associated or partially enclosed in microlitic plagioclase laths
Pyrite	Tr	Tr	≤0.03		Granular	In mesostasis.
Magnetite	Tr	Tr	≤0.05		Euhedral-subhedral	Disseminated in the groundmass
Mesostasis	54	54				Cryptocrystalline to microcrystalline; ghost/skeletal mafic minerals and euhedral to subhedral magnetite; some of the groundmass is replaced by a yellowish-brown clay mineral (fibrous to patchy).
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clay (Fe-saponite?)	10	Mesostasis. Outer rim of gas vesicles.			Patchy to fibrous	Colorless to yellow/light brown; low birefringence.
Calcite	2.4	Vesicles; mafic minerals; vein.			Anhedral to subhedral.	Completely replaces mafic mineral phenocrysts and microlites, as well as infilling the center of vesicles (see below).
Chlorite?	Tr	Interstitial to groundmass minerals.			Fibrous	Colorless in PPL and with very low birefringence in XPL
Pyrite	Tr	Interstitial.			Anhedral to euhedral.	Forms concentrations (percolation veins?) within groundmass; a massive vesicle rim; lines some gas vesicles (preceding calcite); one area of mesostasis is 40% pyrite.
VESICLES/ CAVITIES	PERCENT	PERCENT ORIGINAL	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.4	3.6	≤0.5	Clay; calcite.	Spherical to irregular	Gas vesicles may be lined by a fine (0.03 mm) rim of fibrous phyllosilicate (Fe-saponite) mostly followed by a partial to complete infill of anhedral to subhedral to calcite.
Segregation vesicles	2.8	2.8	≤1		Spherical	Filled wholly or partially by groundmass material with feathery pyroxene and granular iron oxides; commonly with one or more gas vesicle (see description above). In one case a massive pyrite rim is present (see above).

COMMENTS: Bifurcating calcite-filled vein (0.1mm width) with partly detached groundmass fragments. It cross-cuts plagioclase crystals as well as calcite filled vesicles. There is no associated alteration halo around the vein within the groundmass.

168-1027B-61X-CC, 25-28 cm

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: cryptocrystalline to microcrystalline

TEXTURE: Intersertal.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	1		Euhedral-subhedral	Contains small spinel inclusions
Mafic minerals	0	5			Euhedral-subhedral, skeletal	Completely replaced by secondary minerals (calcite and clay [Fe-saponite])
GROUNDMASS						
Plagioclase	32.6	32.6	0.1-0.8 (Ave 0.4)		Microlitic laths	Exhibit quench textures (hollow crystals, swallowtails)
Spinel	Tr	Tr	≤0.01		Euhedral	Associated or partially enclosed in microlitic plagioclase lath
Pyrite	Tr	Tr	≤0.015		Granular	In mesostasis and plagioclase.
Magnetite	Tr	Tr	≤0.01		Euhedral-subhedral	Disseminated in the groundmass
Mesostasis	56.8	59.2				Cryptocrystalline to microcrystalline; texture varies throughout section with: i) intersertal texture with plagioclase microlites; ii) patches of comb-texture; iii) feathery pyroxene ± mt crystals; and iv) faint sheaf-spherical to branching texture. Contains ghost/skeletal mafic minerals and euhedral to sub-euhedral magnetite; some of the mesostasis is replaced by yellowish-to brown clay mineral (fibrous to patchy).
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clay (poss. saponite?)	7.2	Mesostasis. Outer rim of gas vesicles.			Patchy to fibrous	Colorless to yellowish to light browns; low birefringence.
Calcite	1.8	Vesicles; mafic minerals; vein.			Anhedral to subhedral; fibrous to platy.	Completely replaces mafic mineral phenocrysts and microlites, as well as infilling the center of segregation vesicles (see below).
VESICLES/ CAVITIES	PERCENT	PERCENT ORIGINAL	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.8	2.4	≤0.5	calcite ± saponite or empty	Spherical to irregular	Gas vesicles may be lined by a fine (0.03 mm) rim of fibrous phyllosilicate (saponite?) which is generally followed by a partial to complete infill of anhedral to subhedral sparry calcite.
Segregation vesicles	0.8	0.8	≤0.8		Spherical	Filled wholly or partially by groundmass material with feathery pyroxene and granular iron oxides; commonly with one or more gas vesicle (see description above).

COMMENTS: Anastomosing calcite vein (0.1mm width) infilled by calcite crystals (≤0.7mm long and ≤0.1mm wide), containing partly detached groundmass fragments. The vein cross-cuts plagioclase crystals and may be partially lined by a very fine layer of saponite. There is no associated alteration halo around the vein within the groundmass.

168-1027B-62X-CC, 07-10cm

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: cryptocrystalline to microcrystalline

TEXTURE: Varied: intersertal; pilotaxitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	≤1.6-0.5		Subhedral to euhedral laths.	Crystals exhibit a faint preferred parallel orientation across the section. Some crystals have an irregular to embayed shape possibly caused by i) skeletal growth; ii) alteration; and/or iii) partial resorption.
Mafic minerals (olivine? + pyroxene?)	Tr	1.2	≤0.55		Subhedral to anhedral.	Crystals have been completely to partially replaced by either calcite ± Fe-saponite. Some crystals exhibit an anhedral calcite replaced core, surrounded by a sub- to euhedral rim of fibrous clay. In a zone of highly altered groundmass, remnants of fresh anhedral to subhedral pyroxene crystals (0.3-0.15mm) are recognizable.
GROUNDMASS						
Plagioclase	30.4	30.4	0.1-0.5 (Ave ≤0.3)		Sub- to euhedral laths.	Skeletal and hollow laths; minor rim resorption (see plagioclase comment above.)
Mafic phases (olivine? + pyroxene?)	0	4.8	≤0.1		Sub- to anhedral.	All mafic groundmass phases have been replaced by calcite or Fe-saponite. Some skeletal/comb-textures crystals can be identified as pyroxene.
Magnetite	Tr	Tr	≤0.01		Euhedral	Disseminated throughout the groundmass.
Mesostasis	50.6	57.8				Cryptocrystalline; some of the groundmass is replaced by a yellowish-brown clay mineral (fibrous to patchy), mixed locally with fine fibrous calcite. Texture varies from i) intersertal; ii) pilotaxitic; iii) comb texture; to iv) faint sheaf-spherulitic.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clay (Fe-saponite?)	7	Mesostasis; mafic minerals; outer rim of vesicles; veinlet.			Patchy to fibrous	Colorless to yellow/light brown; low birefringence. Forms a ≤0.05mm fibrous rim around some of the spherical and irregular shaped vesicles. On one side of the section, an amorphous brown clay rim (≤0.4-0.15mm thick) partially coats the rock.
Calcite	2.4	Vesicles; mafic minerals.			Granular to anhedral.	Completely replaces mafic mineral phenocrysts and microlites, as well as infilling the center of vesicles (see below). Calcite in vesicles appears dusty and granular rather than clear and sparry.
Pyrite	Tr	Vein				Granular crystals, ≤0.005mm, in saponite vein.
Iddingsite	Tr	Mesostasis.			Anhedral	Forms irregular dark brown-red blebs in highly altered zone in mesostasis.
VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	3.4	Even	≤0.5	Clay; calcite.	Spherical to irregular	Vesicles are either i) empty; ii) lined by a fine (0.04 mm) rim of fibrous Fe-saponite, or iii) lined by Fe-saponite and then partially to completely infilled by granular to anhedral calcite.

COMMENTS: The degree of alteration varies across the section from slight (<2%) to very high (>80%), producing a patchy texture. In very highly altered zones, the mesostasis is replaced by fibrous Fe-saponite. A 0.04mm wide veinlet infilled by fibrous Fe-saponite, cross-cuts the section, cutting through plagioclase crystals and bifurcating around patches of mesostasis. There is no alteration halo associated with the veinlet.

168-1027B-62X-CC, 39-42 cm

ROCK NAME: Aphyric basalt

GRAIN SIZE: Aphanitic: cryptocrystalline to microcrystalline

TEXTURE: Pilotaxitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	Tr	Tr	≤1.2		Euhedral-subhedral	Lath-shaped crystals exhibit a preferred parallel orientation. Some crystals have a swallowtail structure. Crystals are present singly and within monomineralic and bimineralic clusters.
Mafic minerals (olivine? + pyroxene?)	0	3	≤0.8		Euhedral-subhedral, skeletal	Completely replaced by secondary minerals including clay (Fe-saponite) + calcite. (Original mineralogy based upon euhedral grain shape.) Present as single crystals and in bimineralic clusters with plagioclase.
GROUNDMASS						
Plagioclase	14.8	14.8	≤0.2 (two populations: 0.2 & 0.05)		Microphenocrysts; microlitic laths and needles.	Most form perfect euhedral laths, although a few skeletal crystals exist. Crystals occur singly and in stellate groupings.
Mafic phases (olivine? + pyroxene?)	0.3	3.5			Skeletal, subhedral-anhedral	Pseudomorphs of skeletal to anhedral-subhedral crystals (olivine) isolated or intergrown with plagioclase are completely replaced by secondary calcite and clay. A trace amount of fresh microlitic pyroxene also occurs in the groundmass.
Spinel	Tr	Tr	≤0.01		Euhedral-subhedral	Associated or partially enclosed in microlitic plagioclase laths.
Pyrite	Tr	Tr	≤0.01		Granular	In mesostasis.
Magnetite	1.8	1.8	≤0.01		Euhedral-subhedral	Disseminated in the groundmass.
Mesostasis	68.8	75.2				Cryptocrystalline; some of the groundmass is replaced by a yellowish-brown clay mineral (fibrous to patchy).
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clays	5	Mesostasis; outer rim of vesicles; interstitial to groundmass phase.			Patchy to fibrous; radiating fibrous.	Colorless to yellow/light brown; low birefringence. Two different clay minerals can be identified. The first (Fe-saponite) has a yellow-brown color in PPL, with low birefringence and commonly lines vesicles. The second clay is very pale to colorless, with a radiating fibrous texture, occurring within the groundmass and as vesicle infills; this may be a non-pleochroic chlorite or a mixed layer phase (chlorite-smectite).
Calcite	1.4	Vesicles; mafic minerals; vein.			Fibrous to anhedral.	Completely replaces mafic mineral phenocrysts and microlites, as well as infilling the center of vesicles (see below). Some calcite in vesicles is dusty and granular near the vesicle wall, and clear and sparry inside.
VESICLES/ CAVITIES	PERCENT	DISTRIBUTION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	1.4	Even	≤0.6	Clay; calcite.	Spherical to irregular	Gas vesicles can be i) lined by a fine (0.03 mm) rim of fibrous phyllosilicate (Fe-saponite); ii) lined by clay followed by a partial to complete infill of fibrous to anhedral calcite; ii) completely infilled by fibrous saponite.

COMMENTS: The groundmass is represented by patches of dark cryptocrystalline to lighter microcrystalline (pilotaxitic) material. A discontinuous band of coarser-grained material may represent a magmatic fracture or vein, filled with non-aligned crystals (which may have cooled slowly). In addition, a second (0.04mm) fracture crossing the section which is infilled by fibrous clay, appears to be associated with a zone of dusty alteration within the mesostasis.

168-1027C-01R-01 (piece 1A, 10-16cm)

ROCK NAME: Diabase

GRAIN SIZE: Phaneritic; holocrystalline; fine to medium grained

TEXTURE: Diabasic; ophitic to subophitic; intergranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
Olivine	2.4	14.6	≤0.6 (Ave 0.4)		Rounded – anhedral	Partially (outer rim) to completely replaced by olive brown clay (Fe-saponite?)
Plagioclase	50.4	50.4	0.2-1.6 (Ave 0.8)		Subhedral-euhedral laths	Normal zoning; seriate texture.
Clinopyroxene	21.8	21.8	0.15-2 (Ave 0.5;1)		Subhedral - anhedral	Fresh; subophitic to ophitic; contains minor opaque inclusions.
Opaque	3.2	3.2	0.02-0.4 (Ave 0.07-0.1)		Anhedral-skeletal	Occurs primarily in olivine and at grain boundaries of all silicate phases. Includes Fe-oxide and trace sulfide.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	18	Vesicles; vein; interstitial olivine	Pale brown to olive brown saponite (Fe?); fibrous to granular cryptocrystalline texture.
Carbonate	4	Vein	Anhedral to fibrous aggregates; both calcite and aragonite are present.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	0.2	Even.	0.6-0.7	Clay	Round	Fibrous to cryptocrystalline granular brown saponite infills vesicles (fibrous at rim to granular in core).

COMMENTS: A vein (≤2mm wide) anastomoses across the section. The infill is uneven, with a patchy to intermingled mixture of granular carbonate to fibrous saponite. Associated with the vein is an uneven 0.2-0.8mm alteration halo (saponite rich).

168-1027C-01R-01 (piece 1B, 38-42cm)

ROCK NAME: Diabase

GRAIN SIZE: Phaneritic; holocrystalline; fine grained

TEXTURE: Diabasic; ophitic to subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
Olivine	6.4	8.8	≤0.3	Fo85	Sub–euhedral	Colorless (ppl); interstitial and enclosed in clinopyroxene.
Plagioclase	54.2	54.2	≤1		Subhedral-anhedral laths	Strong normal zoning, plus some oscillatory zoning in larger stubby laths.
Clinopyroxene	29.5	32.8	≤1		Anhedral	Pinkish pale brown (ppl), strongly zoned; 2V ≈ 45°; ophitic to subophitic.
Opaques	4.2	4.2	≤0.2		Granular, elongate	Both magnetite and ilmenite are present as discrete or intergrown crystals. Some globular pyrite ± chalcopyrite is present.
Pyrite	Tr	Tr	≤0.05		Granular	Disseminated; interstitial; solitary or intergrown with magnetite; may be in contact with secondary clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	5.7	Pyroxene; interstitial; olivine	Fibrous to granular cryptocrystalline texture.
Carbonate	Tr	Olivine	Anhedral to fibrous aggregates.
Pyrite	Tr		Disseminated, replacing magnetite; very fine grained.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
None						

COMMENTS: Olivine is altered to a weakly pleochroic nearly colorless to pale green to darker olive green phase. The darker orientations have first order red birefringence, whilst the colorless sections exhibit second order colors; may be saponite.

168-1027C-01R-02 (piece 1A, 35-42cm)

ROCK NAME: Diabase

GRAIN SIZE: Phaneritic; holocrystalline; fine grained

TEXTURE: Diabasic; subophitic to intergranular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
Olivine	6.6	8.4	≤0.3	Fo85	Subhedral to rounded	Interstitial and enclosed in clinopyroxene; partially replaced by clay.
Plagioclase	53.2	53.2	0.2-1.3 (Ave 0.7)	An60	Subhedral laths	Normal zoning; partially to completely enclosed in clinopyroxene.
Clinopyroxene	25.6	25.6	0.2-2 (Ave 0.8)		Anhedral-subhedral	Pinkish pale brown (ppl), strongly zoned; 2V ≈ 45-50°; ophitic to subophitic.
Opaques	4	4	≤0.1		Skeletal; rounded to euhedral	Both magnetite and ilmenite are present; ilmenite forms skeletal grains, magnetite is rounded to euhedral.
Pyrite	Tr	Tr	≤0.05		Granular	Interstitial; solitary or intergrown with magnetite; may be in contact with secondary clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	10.6	Vesicles; interstitial	Fibrous to cryptocrystalline texture; pale olive green color.
Carbonate	Tr	Vesicles; interstitial	Cryptocrystalline to subhedral to fibrous aggregates.
Pyrite	Tr		Rounded grains (≤0.03mm); present as small grains in the clay.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	Tr	Even	0.8	Clay; carbonate	Rounded	

COMMENTS: (Plagioclase composition estimated using the Michel-Levy technique.)

168-1027C-01R-04 (piece 1C, 65-69cm)

ROCK NAME: Diabase

GRAIN SIZE: Phaneritic; holocrystalline; fine to medium grained

TEXTURE: Diabasic; subophitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
Olivine	5.4	9.2	0.1-0.2	Fo75	Subhedral to rounded	Colorless; interstitial; 2V≈80-30°.
Plagioclase	51.8	51.8	0.2-2.2 (Ave 1)		Subhedral laths	Normal simple ± oscillatory zoning; trace amount of hollow crystals.
Clinopyroxene	27.4	27.4	0.7-5 (Ave 1.6)		Anhedral	Pinkish pale brown (ppl), strongly zoned; 2V ≈ 50°; ophitic to subophitic.
Opaques	3.4	3.4	≤0.3 (Ave 0.1)		Skeletal; euhedral	Both magnetite and ilmenite are present; ilmenite forms skeletal grains, magnetite is euhedral to skeletal.
Pyrite	Tr	Tr	≤0.05		Granular	Interstitial; solitary or intergrown with magnetite; may be in contact with secondary clay.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	11.6	Olivine; interstitial	Cryptocrystalline texture; pale olive green color.
Carbonate	Tr	Veinlets	Fibrous carbonate infilling ≤0.02mm veinlet (straight extinction).
Pyrite	Tr		Rounded grains (≤0.03mm); present as small interstitial grains and included in magnetite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Vesicles	0.4	Even	≤0.8	Clay or empty	Rounded	Rimmed by clay or empty.

COMMENTS: A ≤0.02mm veinlet crosses clay filled interstitial areas whilst cutting around unaltered mineral phases; infilled by fibers of carbonate perpendicular to the vein margins.

168-1027C-01R-06 (piece 2, 67-70cm)

ROCK NAME: Aphyric basalt (chilled margin of diabase above)

GRAIN SIZE: Aphanitic; microcrystalline to cryptocrystalline.

TEXTURE: Intersertal; seriate.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.2	0.15-0.5 (Ave 0.2)		Subhedral–euhedral	Broken and whole crystals completely replaced by brown fibrous to amorphous saponite.
Plagioclase	1.2	1.2	0.4-1.2 (Ave 0.8)	An48	Euhedral to subhedral laths	Some large broken phenocrysts (≤1.6mm), plus laths and skeletal grains; simple or no zoning. Glomerocrysts up to 2mm.
GROUNDMASS						
Plagioclase	46.2	46.2	0.2-0.5 (Ave 0.2)	An50	Euhedral to subhedral laths	Microlaths to microlites; skeletal and hollow laths present, as well as stellate clusters forming an irregular network of crystals.
Olivine	0	4.6	≤0.2		Sub–euhedral	Completely replaced by brown saponite.
Pyroxene			≤0.05		Fibrous to granular	Intersertal granular to subcrystalline (microcrystalline to cryptocrystalline); partially replaced by clay.
Mesostasis	37.8	38.8				Interstitial pockets of skeletal crystals (fibrous cpx) to sheaf spherulitic cryptocrystalline brown material; partially altered by brown saponite.
Pyrite	Tr	Tr	≤0.005		Granular	In mesostasis.
Opaques	4.4	4.4	0.01-0.02		Euhedral to granular to skeletal	Enclosed in granular pyroxene as well as disseminated throughout the mesostasis.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	6	Olivine; pyroxene; mesostasis	Brown saponite with a fibrous to amorphous fine cryptocrystalline texture, replaces parts of the mesostasis (including fine pyroxenes) as well as microcrysts of olivine.
Saponite	0.2	Veins	Olive brown clay (yellow-gray birefringence) infills fractures.
Carbonate	2.4	Veins; vesicles	0.2-0.25mm veins infilled by fibrous carbonate; fibrous, radiating carbonate infills some vesicles.
Pyrite	Tr		Very fine grains; disseminated through the mesostasis and enclosed in magnetite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.8	Even	0.4-2	Carbonate or empty	Irregular to rounded	Irregular vesicles are empty; round vesicles are infilled by fibrous carbonate.
Segregation vesicles	Tr	Even	≤0.8	Mesostasis	Rounded	Filled by microcrystalline (px + opaques) to cryptocrystalline material; outer margin rimmed by plagioclase microlites.

COMMENTS: An alteration halo (≈8mm wide; pale gray-brown) occurs on either side of the main vein. Veins are primarily infilled by carbonate with patches of brown clay along its length; veins cuts across crystals.

168-1027C-03R-02 (piece 5, 125–126cm)

ROCK NAME: Moderately phyric plagioclase-olivine-pyroxene basalt

GRAIN SIZE: Aphanitic; cryptocrystalline to microcrystalline

TEXTURE: Varitextured; glomeroporphyritic; intersertal; sheaf-spherulitic; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	3.6	0.2-0.8 (Ave 1.3)		Euhedral	Solitary or intergrown with plagioclase laths; completely replaced by celadonite and/or saponite.
Plagioclase	5.8	5.8	1-2.4		Euhedral	Stubby zoned laths as well as more slender laths. Mostly glomerocrysts either monomineralic (pl alone) or polymineralic (pl+cpx).
Clinopyroxene	1.6	1.6	0.4-0.6 (Ave 0.5)		Anhedral–subhedral	Intergrown with slender plagioclase laths; some bowtie structures.
GROUNDMASS						
Plagioclase	14.0	14.0	0.1-0.5		Subhedral	Microcrysts of plagioclase (0.1-0.4mm) as well as microlites (0.2-0.05mm; average ≤0.1mm). Hollow, swallowtail and skeletal forms abound.
Olivine	7.4	7.4	≤0.1		Subhedral to granular	Microcrystalline to feathery, dendritic crystals, intergrown with opaques.
Opaques	1.5	1.5	Ave 0.02		Granular, elongate, skeletal	Intergrown with pyroxene and mesostasis.
Pyrite/pyrrhotite	Tr	Tr	≤0.008		Spherical bleb	In plagioclase crystal; lamellar intergrowth.
Pyrite	Tr	Tr	≤0.01		Granular	In mesostasis.
Mesostasis	65.1	65.1				Forms patches with sheaf spherulitic to sub-plumose texture.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Celadonite	4.0	Olivine; vesicles; mesostasis	Bright green, replacing rims to cores of olivine and filling vesicles; fibrous to granular cryptocrystalline texture.
Saponite	0.6	Olivine; vesicles	Tan brown saponite replacing cores of olivine, and infilling vesicles.
Carbonate	Tr	Olivine	Replaces the cores of some olivines.
Pyrite	Tr	Olivine, vesicles	Occurs as granules ≤0.005mm in saponite-celadonite pseudomorph of olivine, and as granules ≤0.001mm within celadonite vesicle fillings.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.0	Even	≤0.5	Clay	Round	Filled by bright green celadonite and brown saponite layers (see comments below).
Segregation vesicles	0.2	Even	≤0.6	Mesostasis	Round	Filled by cpx+opaques microcrystalline mesostasis, with incipient bright green celadonite alteration.

COMMENTS: Vesicles fills are simple (bright green celadonite) to complex (bands of bright green celadonite, blue green clay, tan saponite ± opaques). Most commonly have green clays followed by tan clay at core. Within the mesostasis there are altered patches dominated by either celadonite or a mixture of celadonite + saponite.

168-1027C-04R-01 (piece 11, 63–67 cm)

ROCK NAME: Moderately to highly phyric plagioclase–olivine–pyroxene basalt

GRAIN SIZE: Aphanitic; cryptocrystalline to microcrystalline.

TEXTURE: Varitextured; glomeroporphyritic; intersertal to intergranular; sheaf-spherulitic; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	2.8	0.1-0.7 (Ave 0.4)		Euhedral	Solitary or intergrown with plagioclase; phenocrysts and microphenocrysts present; completely replaced by celadonite ± saponite.
Plagioclase	5.8	5.8	0.4-1.6 (Ave 0.8)		Sub-euhedral	Large stubby laths form phenocrysts (≤1.6mm); more slender laths vary from 0.4-1.0mm and form microphenocrysts.
Clinopyroxene	1.4	1.4	0.2-1.2 (Ave 0.3)		An-euhedral	One 1.2mm euhedral phenocryst, plus numerous 0.2-0.5mm anhedral microphenocrysts, intergrown with plagioclase.
GROUNDMASS						
Plagioclase	14.8	14.8	<0.5		Thin microlaths	Microlites and skeletal, hollow crystals; no preferred alignment.
Clinopyroxene	8.6	8.6	0.02-0.05 (Ave 0.04)		Anhedral; sheaves	Small round crystals plus very fine fibrous grains; intersertal to sheaf-spherulitic between plagioclase laths.
Opaques	1.6	1.6	≤0.01		Granular; dendritic	Occurs disseminated throughout the mesostasis.
Mesostasis	55.8	63.8				Consists of sheaf spherulitic cryptocrystalline material + fibrous cpx(?) + opaques; partially altered to brown saponite ± green celadonite.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Celadonite	6.4	Vesicles; olivine; mesostasis; vein	Bright green color; fibrous texture.
Saponite	3.8	Vesicles; olivine; mesostasis; vein	Light brown to tan color; granular cryptocrystalline texture.
Iddingsite	1.8	Vesicles; olivine; mesostasis; vein	Includes some highly reflective hematite.
Carbonate	Tr	Olivine	Precedes celadonite at the rim of one vesicle.
Pyrite	Tr	Vesicles	Irregular pyrite-magnetite intergrowth (0.01mm) attached to a celadonite patch; globular pyrite (0.02mm) attached to a vesicle wall and covered by celadonite fill.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.6	Even	≤0.5	Clays	Round	Primarily occur within segregation vesicles; some occur within the mesostasis. Infilled by celadonite ± saponite ± iddingsite ± pyrite (see comments below).
Segregation vesicles	0.6	Even	≤0.6	Mesostasis	Round	Filled by cpx+opaque+plag rich mesostasis ± celadonite clay.

COMMENTS: Section cross cut by a 0.08-0.01mm wide vein, infilled locally by iddingsite, celadonite and saponite; everything is stained orange. Iddingsite is generally along the margins of the vein, whilst clay fills the interior. Vesicle fill chronology: minor pyrite, followed by isopachous celadonite, orange-stained green clay (also celadonite); celadonite followed by iddingsite; saponite (brown-orange) followed by celadonite; green–orange saponite followed by iddingsite, brown saponite and celadonite.

168-1027C-04R-01 (piece 17, 110–113 cm)

ROCK NAME: Sparsely to moderately phyric plagioclase-pyroxene-olivine basalt.

GRAIN SIZE: Aphanitic; hypocrystalline.

TEXTURE: Intersertal to intergranular; seriate.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.0	0.2-0.7 (Ave 0.6)		Euhedral	Replaced by bright green/yellow celadonite at rim and deep brown-red iddingsite in core.
Plagioclase	1.6	1.6	0.6-1.2 (Ave 0.8)		Sub–euhedral laths	Laths plus skeletal forms; solitary crystals and in glomeroporphyritic clusters with pyroxene (some bowtie structures); variable alteration.
Clinopyroxene	1.0	1.0	0.2-0.6 (Ave 0.4)		Euhedral–subhedral	Fresh; occurs as solitary crystals and in glomeroporphyritic clusters with plagioclase, or subophitic arrangements.
GROUNDMASS						
Plagioclase	42.0	42.0	0.1-0.2		Euhedral-subhedral	Laths plus quench crystals.
Olivine	0.0	3.0	0.1-0.2		Sub–euhedral	Completely replaced by colorless to pale green clay (saponite ± celadonite).
Clinopyroxene	24.0	24.0	0.05-0.12 (Ave 0.7)		Subhedral	Crystals become more euhedral and larger in unaltered areas of mesostasis.
Opaques	4.8	4.8	0.02-0.08 (Ave 0.04)		Granular; anhedral	Forms euhedral cubes as well as anhedral needles and laths; disseminated throughout the mesostasis.
Pyrite	Tr	Tr	≤0.01		Granular	In plagioclase.
Mesostasis	13.8	21.0				Varies from brown glass to cryptocrystalline material; altered to brown clay (saponite) in alteration halo.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clay (celadonite, saponite, iddingsite)	4.0	Olivine				Bright green celadonite rims to replaces olivine. After rim often find deep brown-red iddingsite. Microlites of olivine replaced by pale green clay (saponite?).
Clay (celadonite, saponite, iddingsite)	1.6	Vesicles				Either completely filled by bright green celadonite ± saponite, or rimmed by celadonite followed by brown saponite ± brown-red iddingsite.
Clay (celadonite, saponite, iddingsite)	6.4	Mesostasis				Brown saponite ± green celadonite replaces mesostasis in alteration halo.
Hematite	0.8	Olivine; vesicles				Forms the red "oxide" core in some vesicles, after a rim of celadonite. Also occurs within olivines which have been altered to celadonite.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.6	Even	0.2-0.8	Clays; empty	Round	Only filled in the alteration halo by green celadonite ± brown saponite. In the fresh rock, the vesicles can have a patchy ≤0.05mm pale green saponite(?) rim.

COMMENTS: The type of clay is controlled by the location of the alteration halo. The margin of the rock has a 0.8-1.2mm band in which the mesostasis + olivine is replaced by orange-brown-red clays with a granular to fibrous texture. This grades into a ≤2.5mm band with lime green celadonite alteration clays + brown-red iddingsite + hematite. Vesicles can be rimmed by green to brown saponite ± brown-red iddingsite or just green fibrous clay. The mesostasis in the next 6mm band of rock is altered to brown clay (saponite). There is a sharp boundary between the alteration halo and fresh rock.

168-1027C-04R-01 (piece 20, 131–136 cm)

ROCK NAME: Moderately phyric plagioclase-pyroxene-olivine basalt.

GRAIN SIZE: Aphanitic.

TEXTURE: Varitextured; glomeroporphyritic; intersertal to intergranular; sheaf spherulitic; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	2.2	0.25-1 (Ave 0.6)		Sub–euhedral	Completely replaced by olive brown-green clay.
Plagioclase	5.0	5.0	1-3		Euhedral laths	Laths and stubby crystals; coarse laths are zoned; glomeroporphyritic and solitary crystals; smaller phenocrysts are typically subhedral, elongate laths.
Clinopyroxene	3.0	3.0	1-2 (Ave 1.6)		Euhedral	Included plagioclase microlites embedded in the rim, as well as a common mesostasis embayment.
GROUNDMASS						
Plagioclase	30.0	30.0	≤1 (Ave 0.6)		Subhedral	Subhedral elongate laths intergrown with pyroxene; skeletal forms also present.
Olivine	0.0	2.8	≤0.25		Subhedral	Completely replaced by clays (see above).
Clinopyroxene	28.2	28.2	≤0.4		An-subhedral	Granular microphenocrysts, intergrown with plagioclase.
Opaques	3.8	3.8	≤0.1		Skeletal	Elongate skeletal crystals.
Pyrite	Tr	Tr	≤0.03		Granular	In plagioclase (≤0.015mm); interstitial.
Mesostasis	24.8	24.8				Patches of fined grained pyroxene(?) + opaques+clay throughout section.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	5.0	Olivine; vesicles; mesostasis				Olive green, non-pleochroic.
Calcite	Tr	Olivine				Trace amounts replace the cores of some olivines.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.2	Even	≤0.5	Clay	Round	Occur in mesostasis and within segregation vesicles.
Segregation vesicles	Tr	Even	≤0.6	Mesostasis	Round	Infilled by microcrystalline pyroxene (≤0.02mm) + opaque oxides (≤0.35mm) + plagioclase (≤0.04mm).

COMMENTS: This varitextured rock is dominantly intergranular, although portions are intersertal, plumose and sheaf-spherulitic. 1-5mm plagioclase-pyroxene glomerocrysts occur. One large pyroxene phenocryst contains a 25 micron glass inclusion with multiple vapor bubbles.

168-1027C-04R-02 (piece 2, 09–15 cm)

ROCK NAME: Moderately phyric plagioclase-olivine-clinopyroxene basalt.

GRAIN SIZE: Aphanitic, cryptocrystalline to microcrystalline.

TEXTURE: Varitextured: intergranular to intersertal, poikilitic, vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	2.2	0.1-1.0 (Ave 0.4)		Sub-euhedral	Completely replaced by pale brown granular Mg-saponite; some in poikilitic arrangement with plagioclase.
Plagioclase	4.2	4.2	≤1.4 (Ave 0.6)		Sub-euhedral	Stubby and slender laths.
Clinopyroxene	1.6	1.6	0.2-0.6 (Ave 0.3)		Sub-anhedral	Fresh; normally subophitic with respect to plagioclase.
GROUNDMASS						
Plagioclase	31.8	31.8	≤0.2		Laths, needles	Stellate arrangements; hollow crystals abound.
Olivine	0.0	0.8	≤0.01			
Clinopyroxene	36.2	36.2	≤0.15 (Ave 0.1)		Anhedral	Normally associated with plagioclase microlites in crystal clusters.
Opaques	5.2	5.2	0.01-0.05		Euhedral-skeletal	Located within mesostasis or within or at rims of olivine phenocrysts.
Pyrite	Tr	Tr	≤0.01		Granular	In plagioclase groundmass grains.
Mesostasis	14.8	17.2				Cryptocrystalline pyroxene and opaques, distributed heterogeneously.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	5.4	Vesicles; olivine; mesostasis				Granular.
Carbonate	0.2					Occurs as euhedral rhombs(?) along some vesicle walls; the vesicles were subsequently filled by clay.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.6	Even	≤0.5	Clay	Round	Infilled by amorphous Mg-saponite or empty.
Segregation vesicles	Tr	Even	≤0.5	Mesostasis	Round	Infilled by mesostasis with saponite-filled gas vesicle in center in most cases.

COMMENTS:

168-1027C-04R-02 (piece 9C, 85–89 cm)

ROCK NAME: Sparsely phyric plagioclase-olivine basalt.

GRAIN SIZE: Aphanitic, hypocrystalline to glassy.

TEXTURE: Glassy-variolitic-sheaf spherulitic-honeycomb; vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	1.0	0.2-2.8 (Ave 0.2)		Euhedral-skeletal	Fresh olivine is present only in the glassy chilled margin; elsewhere, completely replaced by pale brown clay.
Plagioclase	1.4	1.4	0.5-3.0 (Ave 0.7)		Euhedral to subhedral laths	Laths and skeletal, hollow and swallowtail forms.
GROUNDMASS						
Plagioclase	6.8	6.8	0.1-0.2 (Ave 0.2)		Microlites, skeletal	Swallowtail, hollow forms.
Olivine	0.0	1.8	≤0.2		Euhedral	Completely replaced by clay.
Clinopyroxene			0.1		Euhedral-anhedral	Solitary euhedral or granular, intergrown with plagioclase.
Mesostasis	82.0	82.0				
Pyrite	Tr	Tr	≤0.05		Granular	In mesostasis; heterogeneously distributed.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clay	2.8	Olivine				Pale brown granular to fibrous Mg-saponite(?) completely replaces olivine.
Clay	2.8	Veins				Colorless granular to fibrous, low birefringence.
Carbonate	1.4	Olivine(?), veins				Aragonite(?); fills center of large vein and some smaller fractures; replaces one large (2.8mm) phenocryst.
Zeolite	2.8	Veins				Granular/fibrous and columnar, possibly two types; colorless, lines and fills veins.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	Tr	Even	≤0.15	Saponite	Round	Infilled by fibrous saponite radiating into vesicle center; some vesicles are empty.
Segregation vesicles	Tr	Even	≤0.4	Glass	Ovoid	Infilled by glass and lined by plagioclase microlites.

COMMENTS: Section passes from chilled margin to sheaf spherulitic groundmass; percentage of microlites and phenocrysts increases with distance from chilled margin. Section is cut by a number of anastomosing and bifurcating veins, ranging from ≤0.1mm to 1.2mm wide; there are no alteration haloes. Some veins are infilled symmetrically by multiple layers of clay and zeolite ± a medial carbonate infill. Others are completely filled by granular or fibrous clay and zeolite. Veins cut across crystals and are themselves mutually cross-cutting.

168-1027C-04R-03 (piece 2, 09–14 cm)

ROCK NAME: Sparsely phyric olivine-plagioclase basalt.

GRAIN SIZE: Aphanitic cryptocrystalline to microcrystalline.

TEXTURE: Sheaf spherulitic, plumose, vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	1.8	≤0.7 (Ave 0.3)		Subhedral skeletal	Partially to completely replaced by either granular pale brown saponite ± iddingsite or massive celadonite.
Plagioclase	1.4	1.4	0.3-2.0 (Ave 0.7)		Subhedral-anhedral	Larger grains exhibit simple to oscillatory zoning; occurs singly or in glomerophyric clots; some swallowtail and hollow crystals.
Clinopyroxene	Tr	Tr	0.1-0.15		Subhedral-anhedral	One 0.4mm round crystal occurs in a plagioclase-olivine-pyroxene glomerophyric cluster.
Spinel	Tr?		0.2		Rounded	Single grain.
GROUNDMASS						
Plagioclase	11.4	11.4	≤0.5 (Ave 0.2)		Skeletal laths	Microlites, swallowtails, hollow crystals.
Olivine	0.0	2.0	≤0.2		Subhedral rounded	See above.
Clinopyroxene	0.4	0.4	≤0.1		Subhedral-anhedral	Intergranular with respect to plagioclase.
Opaques			0.01-0.02		Anhedral-dendritic	Part of mesostasis.
Pyrite	Tr	Tr	≤0.015		Granular	In mesostasis.
Mesostasis	75.8	77.6				Plumose, sheaf-spherulitic.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	3.4	Olivine, vein, vesicles				Granular Mg-saponite partially to completely replaces olivine; fibrous-granular saponite fills or lines vesicles and veins.
Celadonite	3.6	Olivine, vesicles, mesostasis				Celadonite and mixed saponite replaces olivine; fibrous to granular celadonite fills or lines vesicles.
Aragonite (+ calcite)	2.2	Vein, vesicles				Granular, fills center of large vein and part of iddingsite vein; fibrous-granular fills vesicles. (Determined by XRD)
Talc?	Tr	Olivine				
Iddingsite	1.8	Olivine, vein, vesicles				Partially replaces olivine; fills vein (mixed with brown saponite); fills some vesicles.
Hematite/FeO(OH)	Tr	Vesicles				Fills center of some gas and segregation vesicles.
Pyrite	Tr	Vesicles				Granular, ≤0.006mm, in celadonite vesicle fills.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.5	Even	≤0.5 (Ave 0.3)	Clay, iddingsite, hematite/ FeO(OH)	Round	Filled by pale brown saponite; or by iddingsite ± hematite close to the fracture; or by celadonite ± saponite ± iddingsite ± hematite/FeO(OH).
Segregation vesicles	Tr	Even	≤0.2	Clay, mesostasis, hematite/ FeO(OH)	Round	Filled by mesostasis plus either saponite or celadonite.

COMMENTS: Magmatic: glomeroporphyritic clots of olivine + plagioclase + pyroxene occur; some skeletal plagioclase crystals (large, 1-2mm, anhedral rounded, zoned, embayed). Alteration: dark haloes containing celadonite and iddingsite are linked to the location of the clay veins; one clay veinlet is ≤0.05mm wide, partly rimmed by iddingsite; another is 0.5mm wide and is filled by pale green and brown clays, and has iddingsite preferentially near the margins. A late stage carbonate vein with clay minerals at the edge is irregular and tortuous and it crosses halo boundaries with impunity (i.e., having no effect on the haloes). Vesicle infill can be monomineralic or consist of bands of celadonite, saponite ± iddingsite ± hematite/FeO(OH) core. Some are rimmed by opaques.

168-1027C-05R-01 (piece 2, 06–10 cm)

ROCK NAME: Moderately phyric plagioclase-olivine basalt.

GRAIN SIZE: Aphanitic.

TEXTURE: Subvariolitic, glomeroporphyritic, vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	2.4	0.2-0.9		Euhedral	Completely replaced by fibrous-granular clay.
Plagioclase	3.0	3.0	0.8-2.0		Euhedral	Simple and oscillatory zoning.
GROUNDMASS						
Plagioclase	3.8	3.8	≤0.5		Laths	Swallowtail, hollow forms common.
Olivine	0.0	0.4	≤0.2		Euhedral	Completely replaced by clay.
Clinopyroxene	2.2	2.2	≤0.1-0.5		Euhedral-anhedral	Solitary euhedral microphenocrysts; anhedral glomerophyric clots intergrown with plagioclase and olivine.
Pyrite	Tr	Tr	≤0.005		Granular	In mesostasis.
Opaques	Tr	Tr	≤0.005			In mesostasis at margins of cryptocrystalline sheafs.
Mesostasis	87.4	87.4				Sheaf-like varioles of fibrous pyroxene(?) and dusty opaques.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	2.8	Olivine, vesicles, vein				Vesicle fills comprise a lining of fibrous clay followed by spherulitic clay filling.
Celadonite	Tr	Vesicles				Restricted to one corner of the thin section.
Iddingsite/FeO(OH)	Tr	Olivine, vesicles, vein				Associated with the limited celadonite alteration.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.8	Even	0.1-0.4	Clay	Round	Filled by fibrous bands (≤0.02mm) or saponite.
Cavities			≤0.3	Clay	Irregular	≤0.02mm saponite band rims cavities; then infilled by radiating fibers of saponite.

COMMENTS: Several branching veinlets, ≤0.03mm wide, with saponite ± iddingsite/FeO(OH).

168-1027C-05R-01 (piece 8, 92-96 cm)

ROCK NAME: Moderately phyric plagioclase-olivine basalt.

GRAIN SIZE: Aphanitic.

TEXTURE: Glomeroporphyritic, intersertal, vesicular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.2	≤1.0		Euhedral	Completely replaced by clay (saponite); forms glomeroporphyritic clusters with plagioclase as well as solitary crystals.
Plagioclase	3.0	3.0	0.5-2.8 (Ave 0.8)		Euhedral-subhedral laths	Euhedral laths and stubby crystals. Some crystals exhibit resorption along the rims ± in the core. Strong oscillatory zoning is common. Inclusions of glass and spinel occur in the cores of some crystals.
Spinel	Tr	Tr	≤0.06		Euhedral	Occurs within plagioclase phenocrysts; deep red color.
GROUNDMASS						
Plagioclase	15.2	16.2	0.1-0.3 (Ave 0.15)		Euhedral; microlites	Occurs as solitary microlites and microlaths, as well as forming an intersertal network. Quench crystals are abundant.
Olivine	0.0	2.8	0.1-0.3		Euhedral	Completely replaced by fibrous saponite.
Clinopyroxene	6.4	6.4	≤0.1 (Ave 0.05)		Granular; subhedral-anhedral	Forms granular grains within the groundmass or attached to plagioclase microlites. Also present as very fine microlites (feathery to rodlike texture) in the mesostasis.
Opaques	1.0	1.0	≤0.005		Skeletal-euhedral	Disseminated throughout the mesostasis.
Mesostasis	51.0	68.6				Microcrystalline to cryptocrystalline; varitextured from plumose to comb to sheaf-spherulitic consisting of brown amorphous matter + feathery cpx(?) + opaques.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	20.6	Vesicles; mesostasis; mafic minerals; plagioclase	Fibrous and granular varieties; fibrous saponite commonly forms at the edges of vesicles and minerals, whilst the granular variety is restricted to the cores.
Celadonite	1.6	Vesicles; mesostasis	Fibrous; present as either pure celadonite or in a celadonite-saponite mixture.
Iddingsite/FeO(OH)	1.2	Mesostasis	Occurs in the center of irregular alteration patches within the mesostasis, following celadonite and saponite.
Pyrite	Tr		25-50µm euhedral to subhedral grains, associated with celadonite ± saponite alteration.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.8	Even	≤0.5	Clay	Round	Completely infilled by clays (saponite + celadonite)

COMMENTS: Numerous 1-2cm patches of intense clay alteration where the groundmass is completely replaced by saponite ± celadonitic clays, with vestiges of plagioclase microlites (±unaltered mesostasis) included. A few 0.4-1mm alteration patches consist primarily of celadonitic clay (either pure celadonite or a mixed celadonite-saponite clay). Within these patches, iddingsite/Fe(OH) staining and growth occurs. In addition, relatively coarse pyrite grains may be found associated with these patches. The clay + pyrite generally occur in the outer layers of the alteration patches, whereas iddingsite occurs within the center (oxidation gradient?).

168-1027C-05R-02 (piece 1A, 01–09 cm)

ROCK NAME: Moderately phyric plagioclase-olivine basalt.

GRAIN SIZE: Cryptocrystalline.

TEXTURE: Varitextured (glassy, variolitic, subvariolitic, spherulitic, intersertal)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.8	1.0	0.3-1.0		Euhedral to subhedral	Single microphenocrysts are fresh in the glass rim and completely altered to clay ± talc in the crystalline rock.
Plagioclase	2.0	2.0	1.0-1.5		Euhedral to subhedral	Equant to lath-shaped, mostly single phenocrysts.
GROUNDMASS						
Plagioclase	7.8	7.8	≤0.5		Skeletal laths	Microlites.
Olivine/ clinopyroxene	0.0	2.6	≤0.3		Pseudomorph/ subhedral	Completely replaced by clay ± talc
Spinel	Tr	Tr	0.1		Subhedral	
Mesostasis	68.6	71.5				
Glass	14.1	14.1				Fresh, transparent, pale brown. Contain few spherulites, grades to the variolitic zone.
Pyrite/pyrrhotite	Tr	Tr	0.03		Rounded, lamellar intergrowth	Spherical bleb in glass, lamellar intergrowth.
Pyrite	Tr	Tr	≤0.05		Granular	In mesostasis.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Clay (saponite?)	6.7	Olivine, mesostasis, vesicles, vein			Fibrous to cryptocrystalline grain	Yellow to colorless to pale brown. 2.2% after mafic mineral, 1.2% pseudomorph after olivine, 2.2% in vein, 1.1% as alteration of mesostasis (total 6.7%)
Talc	Tr	Olivine			Fibrous	Pale yellow to colorless
Zeolites	Tr	Veinlets			Fibrous	Colorless
Pyrite	Tr	Glass			Irregular bleb	Altered glass halo around the zeolite vein
Carbonate	Tr	Vein	≤0.05		Fibrous	Fibrous vein (0.4mm wide) with 0.02mm saponite selvages
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	Tr		≤0.3	Clay	Round	Completely filled

COMMENTS: Quench margin with complete gradation from fresh glass (7mm) to variolitic (1-2mm), subvariolitic (3-4mm) and spherulitic zone (honey comb, plumose, sheaf spherical and branching textures)

168-1027C-05R-02 (piece 2, 49-51 cm)

ROCK NAME: Moderately phyric plagioclase-pyroxene-olivine basalt.

GRAIN SIZE: Cryptocrystalline

TEXTURE: Varitextured: intersertal to intergranular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	1.0	0.5-1.2		Euhedral to subhedral	Almost completely replaced by clay or fibrous talc
Plagioclase	3.2	3.2	0.8-2.4		Laths	Normal and oscillatory zoning
Clinopyroxene	0.4	0.4	1.0-2.4		Subhedral	Polymineralic glomerocrysts with plagioclase; contain devitrified glass inclusion
GROUNDMASS						
Plagioclase	15.2	15.2	≤0.5		Laths	Skeletal crystal are common
Olivine	0.8	1.0	≤0.3		Euhedral	Variable from fresh to completely altered
Clinopyroxene	2.3	2.3	≤0.3		Anhedral	Intergrowth with plagioclase lath
Opaques	1.0	1.0	≤0.05		Skeletal grains	
Pyrite	Tr	Tr	≤0.015		Granular	In mesostasis
Mesostasis	67.1	74.4				Sheaf-spherulitic
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	3.8	Vesicles, olivine, vein, mesostasis				Pale brown, cryptocrystalline to fibrous aggregates
Celadonite	4.8	Vesicles, vein, mesostasis				Bright green, cryptocrystalline to fibrous aggregates
Iddingsite	0.4	Vesicles, vein				Bright orange to red
Carbonate	Tr	Vesicles, mesostasis				
Pyrite	Tr					0.01mm grains associated with saponite
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas/segregation vesicles	0.8		≤0.6	Iddingsite, celadonite, saponite		Complex filling are common

COMMENTS: Vein (0.05-0.1mm wide) consists of green celadonite margin and pale saponite interior, with some iddingsite-FeO(OH) patches
Significant groundmass replacement in millimetric patches (saponite+celadonite)

168-1027C-05R-03 (piece 8, 105-109 cm)

ROCK NAME: Moderately phyric plagioclase basalt.

GRAIN SIZE: Cryptocrystalline

TEXTURE: Varitextured (glassy, variolitic, subvariolitic, spherulitic, intersertal)

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	3.6	3.6	0.5-1.3		Subhedral, lath	Single megacryst (lath 8x1.4 mm) with labyrinthine amoeboid, devitrified glass inclusion
Spinel	Tr	Tr	0.2		Euhedral	
GROUNDMASS						
Plagioclase	15.4	15.4	0.1-0.5		Lath, skeletal	Local pilotaxitic
Olivine	0.4	3.0	≤0.6		Euhedral	Occur singly and in clots with plagioclase. Usually altered; some fresh crystal in glass margin
Clinopyroxene	Tr	Tr	≤0.001		Anhedral	Intergrown with plagioclase
Pyrite	Tr	Tr	≤0.4		Rounded	In mesostasis
Glass	0.3					Pale brown; fresh
Mesostasis	76.7	77.5				Variolitic, subvariolitic, honey comb, plumose, sheaf spherical, branching texture
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	3.6	Vesicles, vein, olivine, mesostasis				Pale brown, fibrous to cryptocrystalline aggregates
Carbonate	Tr	Olivine				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.2		0.1-0.25	Clay	Rounded	
Segregation vesicles			0.2-0.4	clay+ mesostasis	Ovoid	

COMMENTS: Vein (0.01-0.02 mm wide) filled by fibrous saponite

168-1027C-05R-04 (piece 5, 68-70 cm)

ROCK NAME: Sparsely phyric plagioclase-olivine basalt.

GRAIN SIZE: Aphanitic, cryptocrystalline to microcrystalline.

TEXTURE: Intersertal to intergranular.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.6	0.8-2.8		Euhedral	Replaced by saponite ± talc ± carbonate. Millerite (?) inclusion.
Plagioclase	1.0	1.0	0.6-2.0		Laths	Both stubby and slender, normally zoned.
Spinel	Tr	Tr	≤0.2		Euhedral	Enclosed or attached to olivine and plagioclase; may contain glass inclusions with bubbles.
GROUNDMASS						
Plagioclase	22.8	22.8	≤0.5		Euhedral lath, subhedral	Slender; quench forms abound.
Olivine	0.0	2.4	≤0.3-0.1 (Ave 0.2)		Anhedral to euhedral	Partially to completely replaced by saponite ± talc ± carbonate. Remnant olivine frequently left in core.
Clinopyroxene	2.8	2.8	≤0.3		Anhedral	Granular interstitial to plagioclase. Microcrystalline fibrous sheafs of cpx.
Pyrite	Tr		≤0.01		Anhedral	Granular crystals in mesostasis.
Mesostasis	61.2	69.0				Sheaf-spherical texture. Microcrystalline cpx fibers and opaques.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	11.0	Olivine, vesicle	Granular.
Carbonate	0.4	Olivine, vesicle	Fibrous to partially infill.
Talc	0.6	Olivine	Pseudomorph after olivine.
Millerite (?)	Tr	Olivine	Acicular sulfide fibers and laths in olivine pseudomorphs.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.4	≤0.4		Saponite ± carbonate filled	Round	
Segregation vesicles	Tr	≤0.5		Groundmass	Round	Infilled by mesostasis and microcrystalline cpx fibers + opaques. Some contain inner fill of granular saponite.

COMMENTS:

168-1027C-05R-05 (piece 3, 32-43 cm)

ROCK NAME: Moderately phyric plagioclase-olivine basalt.

GRAIN SIZE: Aphanitic, microcrystalline to cryptocrystalline.

TEXTURE: Intersertal to intergranular with locally sheaf-spherulitic patches.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.0	0.7-1.2		Euhedral to subhedral	Fresh to pseudomorph (replaced by talc, iddingsite, saponite).
Plagioclase	2.2	2.2	0.5-2.2		Euhedral	Single crystals to glomerocrysts. Two grain size populations: 2mm and 0.5-0.8mm.
GROUNDMASS						
Plagioclase	42.2	42.2	≤0.2-0.5		Euhedral lath to platy.	Arrange randomly or in stellate form.
Olivine/Pyroxene	31.5	32.5	≤0.2		Subhedral to anhedral	Olivine? replaced by clays and iddingsite. Skeletal and fresh pyroxene crystals (sheaf-spherical).
Opaques	Tr		≤0.05		Euhedral-anhedral and skeletal	Individual grains occurs singly or in pods
Mesostasis	18.3	21.0				Cryptocrystalline and also skeletal sheafs of fibrous crystals.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Celadonite	0.8	Vesicles, veins, groundmass				Bright green, fibrous to granular in vesicle and veins. Occurs as mixture with saponite. Fills vesicles completely or just core.
Saponite	1.2	Vesicles, veins, groundmass				Yellow to pale brown. Fills whole vesicles.
Carbonate	Tr	Vesicles, mafic phenocrysts				Fibrous in veins. Cross-fibers texture.
Iddingsite	3.8	Vesicles, veins, groundmass (olivine)				Red-brown rims (≤0.05mm) around olivine and some vesicles. Fills completely other vesicles.
Talc	Tr	Olivine				Replaces the core of some olivine crystals and forms isolated grains in saponite-replaced olivine pseudomorph.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	Tr		0.4-0.15	Clays	Round-ovoid	Mono or polymineralic infills including iddingsite, celadonite, olive brown, orange and pale brown saponite.
Segregation vesicles	Tr		≤0.45	Mesostasis, clays	Round	Mesostasis infills vesicle with celadonite or saponite.

COMMENTS: Sample is cut by a 0.5mm-wide vein filled by celadonite (green), saponite (yellow), iddingsite, carbonate. Smaller bifurcating and anastomosing (≤0.1mm) fractures diverges off main vein and partially line/to fill by layers of saponite ± iddingsite ± celadonite.

168-1027C-05R-05 (piece 11, 121-123 cm)

ROCK NAME: Sparsely to moderately phyric plagioclase-olivine basalt.

GRAIN SIZE: Aphanitic, microcrystalline to cryptocrystalline.

TEXTURE: Intersertal to intergranular with locally sheaf-spherulitic patches.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.0	1.0	0.6-1.6 (Ave 1.0)		Euhedral to anhedral	Fresh to variably altered crystals; replaced to pseudomorph by clay and carbonate.
Plagioclase	1.2	1.2	0.8-2.0 (Ave 1-2)		Euhedral to subhedral	Laths and stubby sections; simple to oscillatory zoning; crystals has core full of amoeboid glass inclusions.
Spinel	Tr	Tr	0.05		Euhedral	Single inclusion in plagioclase phenocryst.
GROUNDMASS						
Plagioclase	18.0	18.0	0.5-0.1 (Ave 0.2)		Euhedral	Microlaths and microlites; numerous quenched crystals.
Olivine	0.0	0.8	0.1-0.2 (Ave 0.15)		Euhedral to subhedral	Fresh to variably replaced by red-brown iddingsite and brown saponite and carbonate.
Clinopyroxene	1.0	1.0	≤0.1		Sub/anhedral and fibrous	Occurs as small grains interstitial to plagioclase and as microcrystalline fibrous sheafs in mesostasis.
Mesostasis	74.6	78.0				Cryptocrystalline to microcrystalline sheaf-spherical texture, intersertal.
Pyrite	Tr	Tr	≤0.025		Anhedral	Granular disseminated crystals in mesostasis.
Opaques	Tr	Tr	≤0.04		Anhedral to skeletal	Disseminated throughout mesostasis at margins of micro- to cryptocrystalline bundles.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	3.2	Olivine, vesicles	Granular pale brown.
Celadonite	0.4	Vesicles	Fibrous bright green.
Carbonate	Tr	Olivine, vesicles	Sparry aragonite (2V≈20°) after olivine.
Iddingsite	0.6	Olivine, vesicles, vein, groundmass	Brown-red, fibrous-granular; sometimes intermixed with celadonite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	Tr	Even	0.3-0.05	Clay	Round, irregular	Some are empty. Variable infill either monomineralic or polymineralic in bands. Includes pale brown saponite, fibrous celadonite, opaques.
Segregation vesicles	Tr	Even	≤0.2	Mesostasis and clay	Round	Infilled partially by opaque-rich mesostasis and inner core filled by rim of saponite, iddingsite followed by core of carbonate.

COMMENTS: Groundmass is variably altered by saponite, iddingsite ± celadonite. Some vein (≤0.02mm) crosscuts section. Vein is anastomosing and bifurcates at points. It is infilled by iddingsite with mixed celadonite in patches. Associated with celadonite + iddingsite zones is a ≤0.02mm alteration halo. Groundmass proximal to iddingsite vein is altered by iddingsite, elsewhere saponite is the dominant alteration phase.

168-1028A-15X-07 (piece 6, 47–51 cm)

ROCK NAME: Moderately phyric plagioclase-olivine basalt

GRAIN SIZE: Glassy, cryptocrystalline to microcrystalline

TEXTURE: Subvariolitic, honeycomb, sheaf-spherulitic and branching; porphyritic

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.2	1.8	0.4-0.8 (Ave 0.5)		Skeletal, euhedral, subhedral	Fresh or partially to completely replaced by clay minerals ± talc; occurs singly or together with plagioclase in glomerocrysts.
Plagioclase	4.0	4.0	1-2.5 (Ave 1.5)		Skeletal, subhedral, euhedral	Mostly in monomineralic or polymineralic glomerocrysts; normally zoned; contains glass inclusions measuring up to 0.1mm and partially to completely devitrified; some plagioclase is partially altered along cleavages and fractures.
GROUNDMASS						
Plagioclase	18.0	18.0	0.05-0.8 (Ave 0.3)		Laths, needles, skeletal	Locally, may exhibit subparallel alignment; some crystals form stellate aggregates.
Olivine	3.4	4.0	0.05-0.6 (Ave 0.2)		Euhedral, skeletal	Isolated or in clusters with plagioclase.
Opaque oxide	Tr	Tr	≤0.01		Skeletal	Sparse grains in mesostasis.
Pyrite	Tr	Tr	≤0.02		Anhedral	Granular, in mesostasis.
Mesostasis	64.4	71.8				Varies from red-brown, near the glass margin, to gray.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	6.6	Olivine, vesicles, veinlets, mesostasis				Pale brown; fibrous to cryptocrystalline aggregates.
Celadonite	2.0	Olivine, vesicles, veinlets, mesostasis				Bright green; fibrous to cryptocrystalline aggregates.
Talc	1.2	Olivine				Fibrous; partially replaces olivine together with saponite.
Iddingsite	0.2	Veinlets, vesicles				Concentrated near veinlets.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.4	Even	0.1-0.4	Clays + iddingsite	Round, irregular	Empty or partially or completely filled by saponite ± celadonite ± iddingsite.
Segregation	0.2	Even	≤0.35	Mesostasis	Round	Filled by massive dark brown mesostasis.

COMMENTS: Network of ≤0.05mm-wide veins, filled by saponite ± celadonite ± iddingsite (saponite typically at the middle).

168-1028A-15X-07 (piece 9, 75–79 cm)

ROCK NAME: Moderately phyric plagioclase-olivine-pyroxene basalt

GRAIN SIZE: Cryptocrystalline to microcrystalline

TEXTURE: Sheaf-spherulitic to intersertal; honeycomb in quench margin

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.6	0.8	1-2.8 (Ave 1.5)		Euhedral, subhedral, skeletal	Partially to completely replaced by clay minerals and talc. Present as solitary crystals and within polymineralic glomeroporphyritic clots.
Plagioclase	4.6	4.6	0.8-1.0		Skeletal, subhedral	Isolated crystals or in monomineralic or polymineralic glomeroporphyritic clots.
Clinopyroxene	Tr	Tr	0.3-0.9		Euhedral	Solitary crystals, pristine (no alteration), contains glass inclusions. As in poikilitic arrangement with plagioclase laths and altered olivine microcrysts.
GROUNDMASS						
Plagioclase	9.2	9.2	0.1-0.6		Needles, laths, skeletal	Seriate texture. Hollow and swallowtail forms are abundant.
Olivine	1.4	1.8	0.1-0.6 (Ave 0.2)			Isolated grains or in clusters with plagioclase microphenocrysts; mostly fresh although some are altered to talc ± saponite (granular).
Pyrite	Tr	Tr	≤0.005		Anhedral	In mesostasis; slide is not well-polished, though.
Mesostasis	78.8	83.4				Varies from reddish-brown to gray with a massive to sheaf-spherulitic texture.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	4.2	Olivine, vesicles, veinlets, mesostasis				Tan brown; fibrous to granular texture. (Fibers line edges of vesicles with granular saponite filling center.)
Celadonite	0.8	Vesicles, veinlets, mesostasis				Fibrous to granular. Concentrated in and around veinlets.
Talc	0.2	Olivine				Associated with saponite; talc exhibits strong micaceous cleavage.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	Trace	Even	0.05-0.4 (Ave 0.1)	Saponite, ± celadonite, iddingsite	Round to irregular	Filled by granular saponite. Some rare celadonite and iddingsite fills others.
Segregation vesicles	0.2	Even	0.05-0.2 (Ave 0.08)	Mesostasis ± saponite	Round	Most are filled by dark brown massive mesostasis; some have inner gas bubble filled by saponite.

COMMENTS: Veinlets, ≤0.05mm wide, filled by clays (primarily saponite with the addition of celadonite ± iddingsite locally).
Rounded plagioclase + olivine glomerocrysts reach 2.8mm across.

168-1029A-25X-03 (piece 12, 83–87 cm)

ROCK NAME: Glomeroporphyritic plagioclase-olivine basalt

GRAIN SIZE: Microcrystalline to cryptocrystalline

TEXTURE: Plumose; sheaf-spherulitic ± honeycomb; glomeroporphyritic; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.2	0.5–0.6 (Ave 0.6)		Subhedral to euhedral	Occur singly or associated with plagioclase laths. Completely replaced by clay minerals (granular saponite and celadonite). Highly fractured.
Plagioclase	2.4	2.4	0.5-1.0 (Ave 0.8)		Euhedral; skeletal	Form elongate laths and stubby crystals. Occur singly and within glomeroporphyritic clots with pyroxene microcrysts.
GROUNDMASS						
Plagioclase	6.6	6.6	0.05–0.4 (Ave 0.1)		Euhedral to anhedral	Form large glomeroporphyritic clusters (up to 6mm) associated with pyroxene; also occurs singly. Some swallowtail and hollow crystals.
Olivine	0	0.2	0.2–0.4 (Ave 0.3)		Anhedral to skeletal	Completely replaced by clay minerals, often consisting of intergrowths of saponite ± iddingsite ± celadonite. Occur singly, associated with plag laths, or at the edges of plag-px glomeroporphyritic clots.
Clinopyroxene	4.6	4.6	0.05–0.4 (Ave 0.1)		Anhedral to subhedral	Form large glomeroporphyritic clusters (up to 6mm) associated with plagioclase; sparse amount of small (≤0.1mm) grains occur singly.
Pyrite	Tr	Tr	≤0.03 (Ave 0.01)		Granular to globular	Disseminated through the mesostasis. Some round globules (0.02mm) occur — immiscible droplets.
Mesostasis	84.6	85.4				
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS:
Saponite	1.0	Vesicles; olivine; vein; mesostasis				Pale brown; cryptocrystalline granular to fibrous.
Celadonite	0.2	Vesicles; olivine; vein; mesostasis				Massive to microcrystalline to fibrous; bright green.
Iddingsite	Tr	Vesicle; olivine; vein				Massive texture; red.
Pyrite/pyrrhotite	Tr	Vesicle; mesostasis				Completely fills one 0.15mm vesicle; disseminated in groundmass.
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	0.6	Even	0.1–0.3 (Ave 0.2)	Clay	Round to ovoid	Filling varies in different zones from celadonite + iddingsite to saponite, to saponite + celadonite. When all phases are together, celadonite is the first phase to form, whereas saponite is the last.
Cavities	Tr	Near rim	≤0.6	Clay	Irregular	As vesicles; commonly have granular celadonite rim, followed by granular to fibrous saponite ± celadonite fill. Some have an iddingsite rim and mixed iddingsite + saponite + celadonite fill.

COMMENTS: Parallel bands of different textures occur in the mesostasis. Parallel to these are pyrite/pyrrhotite rich zones consisting of 0.02-0.03mm granules. These interstitial sulfides are preferentially localized along the edge of the oxidation halo.

168-1029A-25X-04 (piece 3, 18-21 cm)

ROCK NAME:

GRAIN SIZE: Microcrystalline to cryptocrystalline

TEXTURE: sheaf-spherulitic; glomeroporphyritic; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.6	0.4-0.6		Euhedral	Completely replaced by clays (celadonite + saponite); occur singly and associated with plagioclase laths.
Plagioclase	1.6	1.6	0.6-1.6 (Ave 0.8)		Euhedral to subhedral	Laths and stubby crystals. One lath is 3.6mm long, with simple zoning and a core rich in glass inclusions (along lamellae). Simple and oscillatory zoning; sector zoning in stubby crystals. Occur singly or in glomeroporphyritic clots.
Pyroxene	Tr	Tr	0.4-0.8		Subhedral	Occur singly, but more frequently in glomeroporphyritic clots or associated with plagioclase laths.
GROUNDMASS						
Plagioclase	6.4	6.4	0.05-0.5		Euhedral to skeletal	Microlaths, microlites and quench crystals (swallowtails and hollow). Occur singly and in glomeroporphyritic clots.
Olivine	0	0.2	0.1-0.3 (Ave 0.2)		Subhedral to euhedral	Completely replaced by granular saponite and/or fibrous celadonite.
Clinopyroxene	5.0	5.0	0.05-0.35 (Ave 0.2)		Subhedral to granular	Some single grains (0.05-0.1mm), but most are in glomeroporphyritic clots or attached to plagioclase laths.
Pyrite	Tr	Tr	0.005-0.05		Anhedral to granular	Disseminated throughout the groundmass. Some pyrite grains are ≤0.05mm; most are ≤0.01mm.
Mesostasis	83.8	84				

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	0.8	Olivine; vesicles; mesostasis	Tan brown; granular. Occurs as pure saponite or mixed with celadonite.
Celadonite	0.2	Olivine; vesicles; mesostasis	Bright green, fibrous. Mixed with saponite; restricted in the most part to the alteration halo.
Iddingsite	Tr	Vesicles	Fills or lines some vesicles in the alteration halo.
Hematite	Tr	Vesicles	Fills or lines some vesicles in the alteration halo.
Pyrite/pyrrhotite	Tr	Vesicles	≤0.03mm globules and granules in vesicle linings at the rim.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	2.2	Even	0.1-0.6 (Ave 0.4)	Empty or clay, hematite	Round to ovoid	In the interior of the rock, the vesicles are empty. In the alteration halo they are lined to filled by celadonite; saponite + celadonite mixture; ± saponite; ± iddingsite; ± hematite from rim to core.
Cavities	Tr	Even	≤0.5	Empty or clay, hematite	Irregular	As above.

COMMENTS: Vesicles can be filled by a series of layers, or have a more intricate mixed central fill.

168-1031A-6X-01 (piece 6, 24–28 cm)

ROCK NAME: Aphyric plagioclase-pyroxene-olivine basalt

GRAIN SIZE: Microcrystalline to cryptocrystalline

TEXTURE: Intersertal; microglomeroporphyritic; sheaf-spherulitic; vesicular

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	2.0	0.3-0.5		Euhedral	Completely pseudomorphed by celadonite + iddingsite.
Plagioclase	0.4	0.4	0.6-1.0 (Ave 0.8)		Subhedral to skeletal	Laths, stubby crystals and some quench crystals. Most are elongate laths occurring singly, in rare glomeroporphyritic clots and in plagioclase clusters.
Clinopyroxene	0.2	0.2	0.3-0.6 (Ave 0.35)		Subhedral to anhedral	Mostly in bimineralic glomeroporphyritic clots (plag + px). Some occur attached to plagioclase laths.
GROUNDMASS						
Plagioclase	11.2	11.2	0.05-0.5 (Ave 0.4)		Euhedral to skeletal	Microlaths and microlites. Most are swallowtail and hollow quench crystals.
Clinopyroxene	9.6	9.6	0.1-0.3		Euhedral to anhedral	Equant grains to short prisms; occur singly or intergrown with plagioclase microlites.
Opaques	1.4	1.4	0.01-0.025		Euhedral to anhedral	Granular; interstitial in the mesostasis.
Mesostasis	72.2	75.6				Gray; sheaf-spherulitic; consists mostly of cpx and opaque microgranules and fibers.

SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING	COMMENTS:
Saponite	1.0	Vesicles	Not abundant; absent in gray interior. Occurs inside of celadonite linings of vesicles in the alteration halo.
Celadonite	0.8	Vein; vesicles; mesostasis; olivine	Restricted to the alteration halo.
Zeolites	0.2	vesicles; vugs; mafic phenocrysts	Isotropic to near isotropic, colorless; radial splays are fine, to fibrous to columnar. Fills vesicles and replaces euhedral mafic crystals associated with plagioclase phenocrysts and in glomeroporphyritic clots.
Pyrite/pyrrhotite	Tr	Mesostasis	0.02-0.04mm granular, interstitial grains sparsely mark the internal edge of the alteration halo.
Iddingsite	3.0	Veins; vesicles; mesostasis; olivine	Heavily developed in the alteration halo, equivalent to c.1-20% (visual estimate).

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS:
Gas vesicles	1.6	Even	0.05-0.6	Variable	Round to irregular	Filled by celadonite/iddingsite ± saponite in alteration halo, and empty or filled (partially to completely) by zeolite in the gray rock interior.

COMMENTS: