

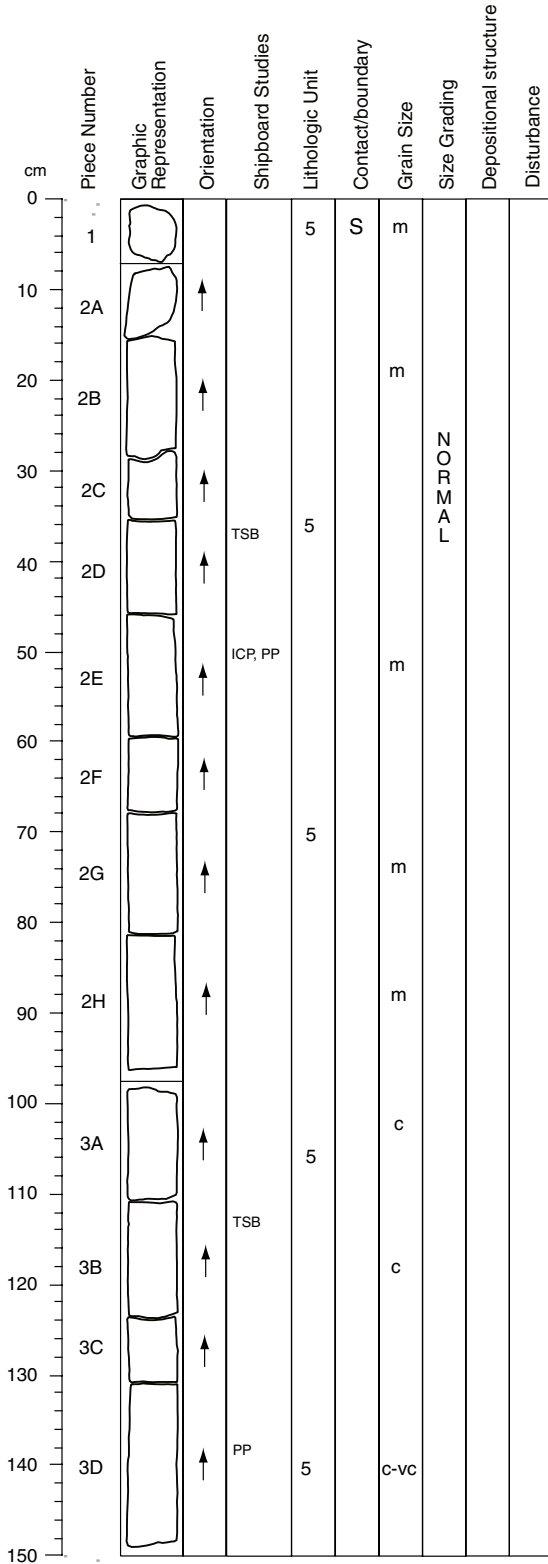
Core Photo

Site 1223 Hole A Core 1H Cored 0.0-7.7 mbsf											
METERS	SECTION	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	ICHNO.	FOSSILS	DISTURB.	SAMPLE	COLOR	DESCRIPTION
1	1								SS	dk ye BR	<p>DARK YELLOWISH BROWN CLAY and DARK VOLCANICLASTIC TURBIDITES</p> <p>Section 1, 86-101 cm: Black volcaniclastic turbidites (10YR 2/1) with fine sand normally graded to silt, bioturbated at the top and with a sharp erosional basal contact.</p>
1								SS	..		
2	2							SS	dk BR		
2								SS	SS	dk BR	<p>Section 2, 61-103 cm: Volcaniclastic turbidite, black at the base (10YR 2/1 at 100 cm) and very dark grayish brown near the top (10YR 3/2), sandy silt to fine grained sand, mineral clasts and glass fragments presents.</p>
3								SS	vdk gy BR		
3	3							SS	BK	..	
4								SS	SS	BR	<p>Section 2, 148-150 cm: Volcaniclastic turbidite.</p>
4								SS	SS	BR	
5	4							SS	SS	BR	<p>Section 3, 76-99 cm: Very dark grayish brown (10YR 3/2) turbidite with a sharp basal contact, fining upward, and composed of very fine sand with some oxide staining.</p>
6								SS	SS	vdk gy BR	<p>Section 4, 40-67 cm: Transition zone from clay to turbidite with color banding; darker bands are coarser silty clay and lighter bands are clay.</p>
6	4							SS	SS	vdk gy BR	
7	5							SS	SS	gy BK BR	<p>Section 4, 67 cm to Section 5, 78 cm: Turbidites; silty sand and very fine sand.</p>
7								SS	SS	..	<p>Section 5, 114-121 cm: Granular sand; very disturbed and may only be 3 cm thick (117-120 cm) (thin section sample). Radiolarians present.</p>
7								SS	SS	..	
7								SS	SS	vdk gy BR	<p>Section 5, 131 cm to base of section: very dark brown clay mixed with sand, highly disturbed by drilling.</p>
											<p>Section CC: Sandy clay underlain by dark brown to dark reddish brown clay.</p>

Core Photo

Site 1223 Hole A Core 2H Cored 7.7-12.7 mbsf											
METERS	SECTION	GRAPHIC LITH.	BIOTURB.	STRUCTURE	ACCESSORIES	ICHNO.	FOSSILS	DISTURB.	SAMPLE	COLOR	DESCRIPTION
1									SS	vdk BR	DARK BROWN CLAY and BLACK SAND
1									SS		Section 1, 0-20 cm: Dark brown to reddish brown clay with yellow laminae, with one laminae at the base.
2									SS	BK	Section 1, 20 cm to the base of the core: Unconsolidated black sand (10YR 2/1). Below the base of Section 1, the core has extreme coring disturbance. The sand was literally pouring out of the base of the core when recovered and was pushed back into Sections 2 and 3 for curation. The sand is full of fresh glass, with grain size varying from fine to coarse.
3									SS		

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-3X-1 (Section top: 12.70 mbsf)

UNIT 5: Crystal Vitric Tuff

Pieces: 1-3

Thin Section(s) #: 3 and 4

CONTACTS: none

GENERAL DESCRIPTION: Unit 5 is an angular to subrounded, clast supported, lithified, medium to coarse grained, crystal vitric tuff in a brown clayey matrix. The grain size increases with depth from medium to coarse grained. Section 3X-1 of unit 5 is predominantly medium grained.

COLOR: Dark gray (7.5YR/4/0)

COMPONENTS:

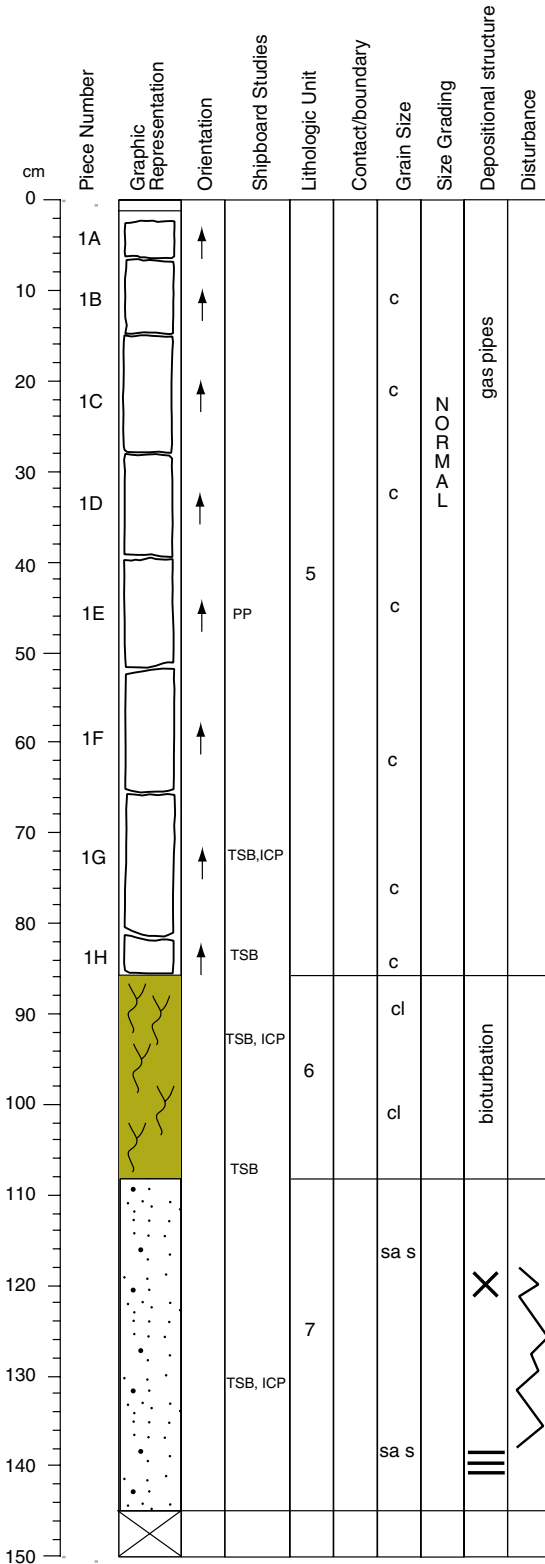
	%	average size (mm)
Olivine	~ 10-14	0.4
Glass Shards	~ 20-25	0.3-0.6
Plagioclase	~ 1	0.3
Lithic fragments	~ 8-15	0.4-0.7
Vitric fragments	~ 5-16	0.4-0.7
Clay minerals	~ 15-33	
Chlorite	< 1	0.5
Palagonite	<< 1	
Cavities	~ 7-30	

SEDIMENTARY TEXTURES: The texture is equigranular. Olivine, glassy shard, and vitric fragment content decreases from the top of 3X-1 toward the bottom of the unit in 3X-2 (from 13 - 6%, 20 - 10%, and 16 - 10%, respectively). The proportion of lithic fragments, however, increases downward from 8 to 20%; grain size also increases downward.

SEDIMENTARY STRUCTURES: Gas pipes are present in pieces 2H through 3D in 3X-1 and continues into 3X-2. The length and width of the pipes increase towards the middle (3X-1, piece 3C) and then they begin to decrease in size again.

COMMENTS: Glassy shards are almost entirely fresh, but all are bordered with a thin brown clay rim. Lithic fragments have intergranular, intersertal and/or subophitic textures with plagioclase, clinopyroxene, olivine, and Fe-Ti oxide crystals. Vitric fragments have spherulitic plagioclase and occasionally euhedral phenocrysts of olivine and plagioclase. All are cemented in a brown clayey matrix that range from 15 to 33% in volume. Many (~ 5-7 %) vesicles and cavities are filled with zeolites. There are rare rounded chlorite grains (< 1 %).

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-3X-2 (Section top: 14.18 mbsf)

UNIT 5: Crystal Vitric Tuff

Pieces: 1A-1H

Thin Section(s) #: 1 and 5

CONTACTS: There is a sharp contact between units 5 and 6. At the base of unit 5 there are distinct bands of color changes in the crystal vitric tuff unit, accompanied by increased grain size and vesicle content.

GENERAL DESCRIPTION: Unit 5 is an angular to subrounded, clast supported, lithified, medium to coarse grained, crystal vitric tuff in a brown clayey matrix. The grain size increases with depth from medium to coarse grained, and all of unit 5 in 3X-2 is coarse-grained.

COLOR: Dark gray (7.5YR/4/0)

COMPONENTS:

	%	average size (mm)
Olivine	~ 11.5 - 15	0.6
Glass Shards	~ 10-20	1.0
clinopyroxene	~ 1	0.1
Lithic fragments	~ 15-20	1.0
Vitric fragments	~ 10-15	0.6-1.0
Clay minerals	~ 20-40	
Chlorite	< 1	0.4
Zeolites	<< 1	
Cavities	~ 4	

SEDIMENTARY TEXTURES: The texture is equigranular. Olivine, glassy shard and vitric fragment content decreases toward the bottom of the unit (from ~ 13 - 6 %, ~ 20 - 10 %, and 16 -- 10%, respectively). The proportion of lithic fragments, however, increases downward from 8 to 20 %; grain size also increases downward.

SEDIMENTARY STRUCTURES: Gas pipes are present in pieces 2H through 3D in 3X-1 and continues into 3X-2. The length and width of the pipes increase towards the middle (3X-1, piece 3C) and then they begin to decrease in size again.

COMMENTS: Glassy shards are fresh and are missing the thin rim of clay seen in the top of the unit in 3X-1. Lithic fragments have subophitic to intergranular textures with plagioclase, clinopyroxene, olivine, and Fe-Ti oxide crystals. There are two types of vitric fragments, one similar to the type seen in the top of the unit, black to dark brown glass with spherulitic plagioclase and occasionally euhedral phenocrysts of olivine and plagioclase. The second type of vitric fragment is similar but is brown to pale brown colored. All are cemented in a brown clayey matrix that range from 20 to 40 % in volume. Many (~ 5-7 %) vesicles and cavities are filled with zeolites. There are rare rounded chlorite grains (< 1 %).

UNIT 6: Bioturbated Claystone

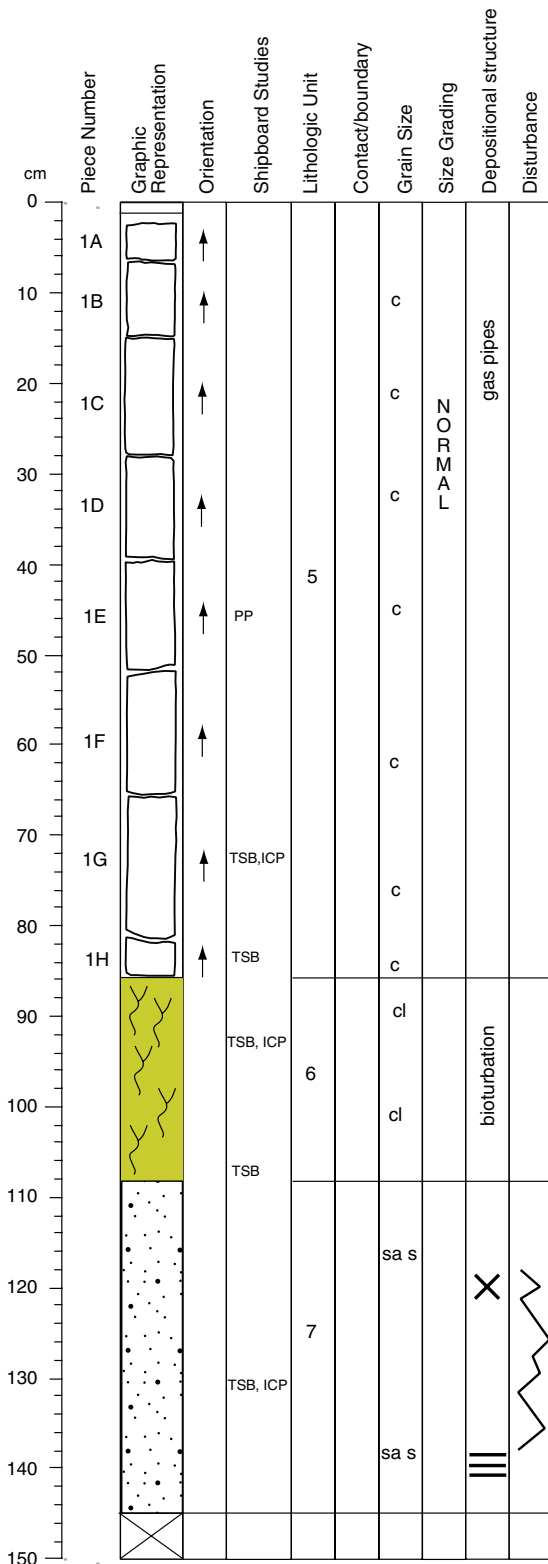
Pieces: N.A.

Thin Section(s) #: 6 and 7

CONTACTS: There are sharp contacts at the top and bottom of the ~ 24 cm unit with an erosional surface in between. The fine-grained, dark gray, < 0.5 cm thick, top and bottom contacts are parallel with their adjacent units. The thin laminae below the inclined erosional surface are <0.5 cm thick with cross-bedding.

Continued to next page.

Core Photo



Continued from Page 4

200-1223A-3X-2 (Section top: 14.18 mbsf)

GENERAL DESCRIPTION: An erosional surface separates this unit into an upper, massive and heavily bioturbated section and a lower intermediately laminated, with minor bioturbation section. Both matrix and burrow fill contain glass, olivine, and plagioclase, in clay.

COLOR: greenish gray (5GY 7/2)

COMPONENTS:

	%	average size (mm)
Olivine	<<1	0.01
Plagioclase	<1	0.01
Clay minerals	>>99	

SEDIMENTARY TEXTURES: Clay-sized matrix with silt-sized volcanoclastic components.

SEDIMENTARY STRUCTURES: The upper 10 cm of the unit is heavily bioturbated (~80%) with burrows, the following lower 5 cm, however, has significantly less bioturbation (~20%), and the remaining 8 cm have only ~5% bioturbation and is laminated. The dimensions of the burrows range from 0.1 – 1.0 cm in diameter, and from 0.5 – 2 cm in length. They are not orientated in any preferred direction; approximately 10% of the burrows are curved.

COMMENTS: Burrows are filled with a lighter colored sediment

UNIT 7: Volcanoclastic Sandy Siltstone

Pieces: N.A.

Thin Section(s) #: 8

CONTACTS: none

GENERAL DESCRIPTION: Layers of sand sized grains of clay interlayered in volcanoclastic sandy silt.

COLOR: greenish gray (5GB 5/1)

COMPONENTS:

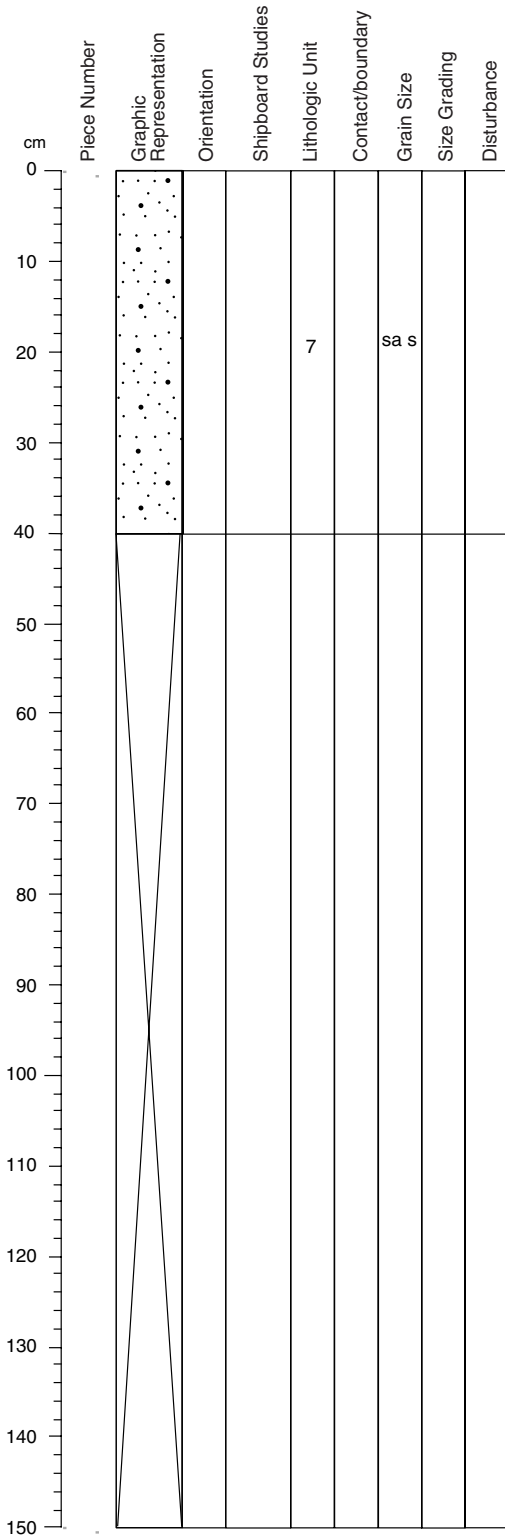
	%	average size (mm)
Olivine	~ 5	0.2
Plagioclase	~ 2	0.2
Glass Shards	> 10-20	0.2
Vitric fragments	~ 10	0.2
Lithic fragments	> 10	0.2
Clay minerals	~ 40	0.5
Zeolites	~ 10	filling vesicles
Palagonite	~ 2	0.2

SEDIMENTARY TEXTURES: Unit 7 is a weakly indurated, clast supported sandy siltstone with limited orientation in the silt particles. The sand grains are well rounded and composed of clay-sized particles. The silt is angular to subrounded.

SEDIMENTARY STRUCTURES: Cross bedding and planar laminations are present in the larger pieces that have not been significantly disturbed by drilling. The laminations may be due to concentrations of sand clasts composed of clay sized particles in parallel, linear orientation.

COMMENTS: This unit was highly disturbed by drilling and was broken into biscuits.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-3X-CC (Section top: 15.63 mbsf)

UNIT 7: Volcaniclastic Sandy Siltstone

Pieces: N.A.

Thin Section(s) #: 8

CONTACTS: none

GENERAL DESCRIPTION: Layers of sand sized grains of clay interlayered in volcaniclastic sandy silt.

COLOR: greenish gray (5GB 5/1)

COMPONENTS:

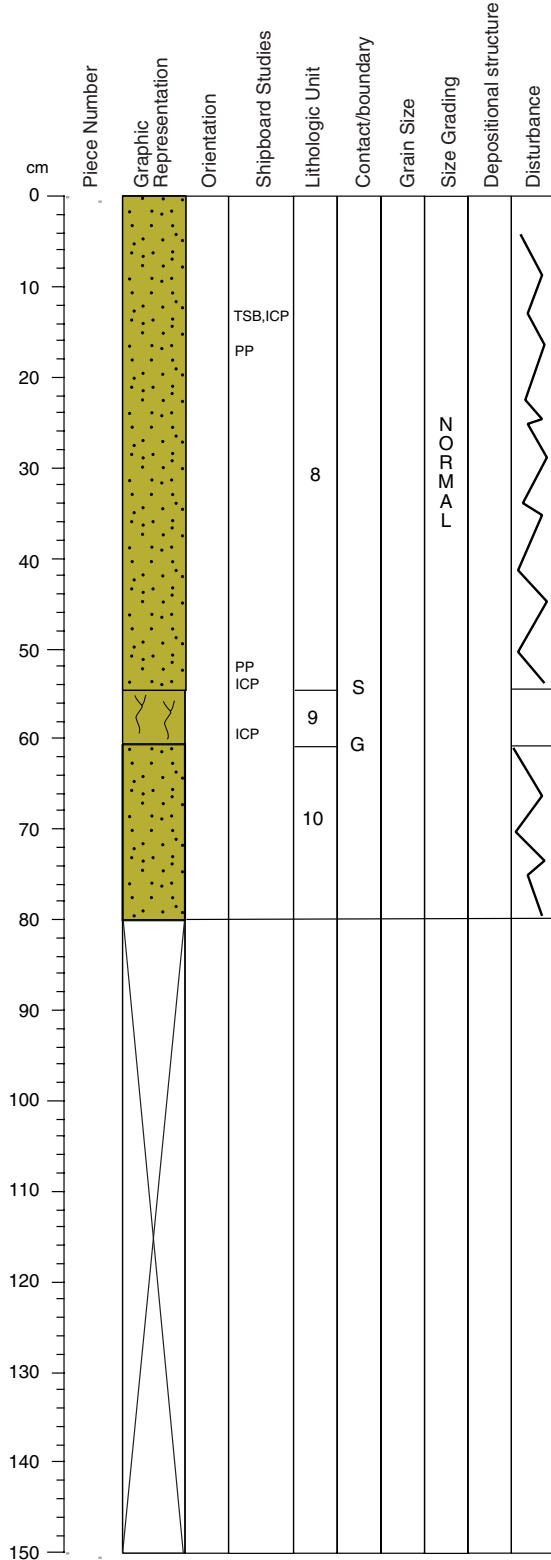
	%	average size (mm)
Olivine	~5	0.2
Plagioclase	~2	0.2
Glass Shards	>10-20	0.2
Vitric fragments	~10	0.2
Lithic fragments	>10	0.2
Clay minerals	~40	0.5
Zeolites	~ 10	filling vesicles
Palagonite	~2	0.2

SEDIMENTARY TEXTURES: Unit 7 is a weakly indurated, clast supported sandy siltstone with limited orientation in the silt particles. The sand grains are well rounded and composed of clay-sized particles. The silt is angular to subrounded.

SEDIMENTARY STRUCTURES: Cross bedding and planar laminations are present in the larger pieces that have not been significantly disturbed by drilling. The laminations may be due to concentrations of sand clasts composed of clay sized particles in parallel, linear orientation.

COMMENTS: This unit was highly disturbed by drilling and was broken into biscuits.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-4X-1 (Section top: 22.30 mbsf)

UNIT 8: Volcaniclastic silty claystone with carbonate filled cavities

Pieces: N.A.

Thin Section(s)#: 10

CONTACTS: There is a sharp contact (< 0.5 cm), with rip-up clasts at the base of the unit.

GENERAL DESCRIPTION: Overall, the volcaniclastic silty claystone fines upward with an intermediate layer containing ≤ 0.5 cm sized subangular to subrounded granules (carbonate and non-carbonate). Vesicles or cavities decrease in size and abundance with depth. The shape of the vesicles or cavities change from round to elongate in the upper part of the unit to almost entirely elongated in the lower portion.

COLOR: Dark gray (N4) to SY 4/1

COMPONENTS:

	%	average size (mm)
Olivine -	5	<1
Glass Shards -	5	<1
vesicles	1-3	<1

SEDIMENTARY TEXTURES: Crystals increase in size and abundance with depth (about 30-40 % crystals in lower section of the unit and only 15-20 % at the top). There are more vesicles or cavities at the top of the unit, the population of which ranges from round to elongate (flattened). The vesicles or cavities towards the bottom are almost all elongated.

SEDIMENTARY STRUCTURES: Massive

COMMENTS: This unit is disturbed by drilling and has broken in subparallel planes, averaging 2 cm thick intervals. Radiolarians are present in the matrix.

UNIT 9: Volcaniclastic claystone

Pieces: N.A.

Thin Section(s)#: No thin sections

CONTACTS: There are ~ 0.5 cm thick dark gray bands at the top and bottom of the unit.

GENERAL DESCRIPTION: Unit 9 is well sorted, with clay sized matrix and ~ 1% fine sand sized crystals.

COLOR: Greenish gray (SGY 5/1)

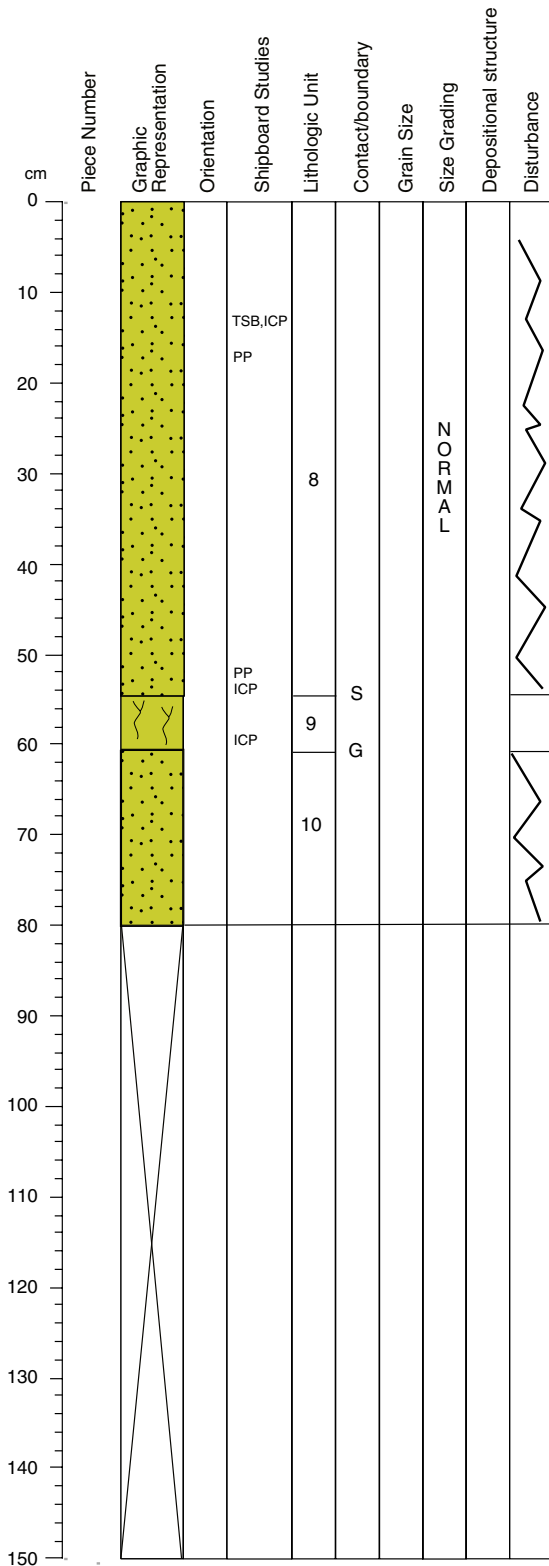
COMPONENTS: No thin section

SEDIMENTARY TEXTURES: Unit 9 is a matrix supported, weakly indurated claystone that does not show macroscopic laminations, however, it does appear to break along laminations.

SEDIMENTARY STRUCTURES: Massive

COMMENTS: There are a few burrows present in this unit. Their diameters are all <0.5 cm. Most diameters are ≤0.2 cm.

Core Photo



Continued from Page 7

200-1223A-4X-1 (Section top: 22.30 mbsf)

UNIT 10: Graded Volcaniclastic silty claystone

Pieces: N.A.,

Thin Section(s)#: 11-13

CONTACTS: An ~0.5 cm thick dark gray band marks the top of this unit. The bottom of core 4 denotes the base of this unit.

GENERAL DESCRIPTION: Unit 10 is a normally graded, matrix supported claystone with clasts that range from sand at the base to silt at the top. Minor laminations and scattered coarse lithic clasts are also present. A 10 cm section of granule and pebble breccia is present in the middle of the unit.

COLOR: Greenish black (10Y 2/1)

COMPONENTS:

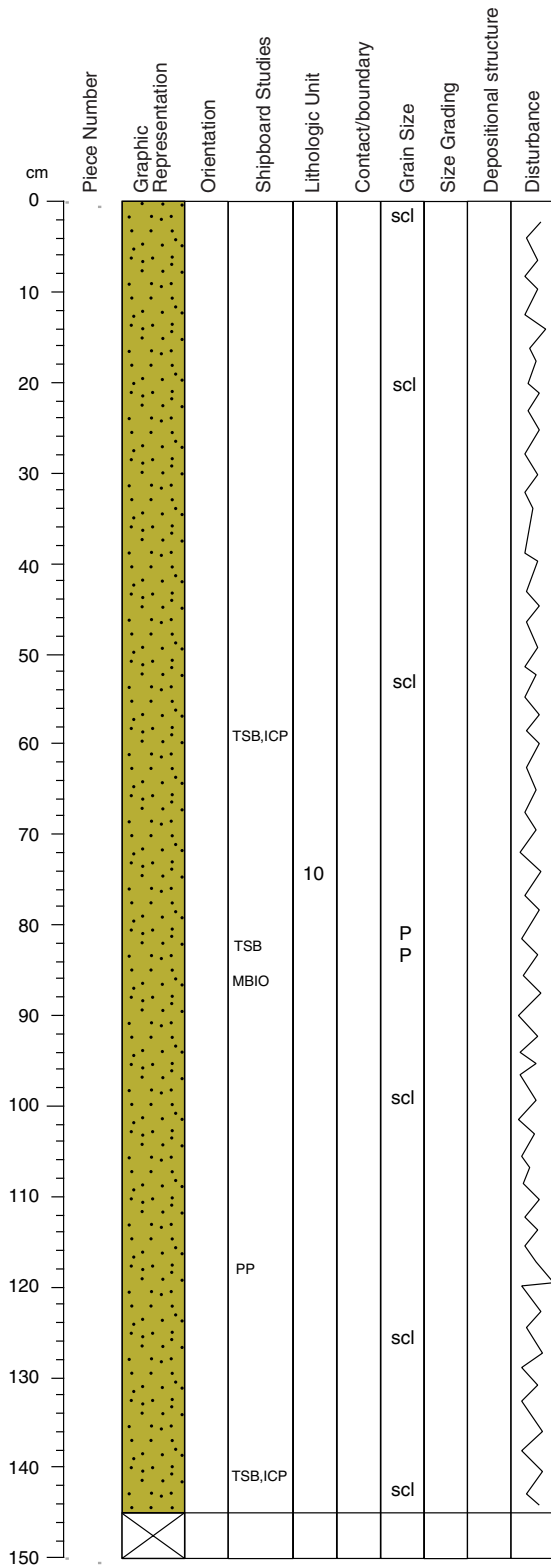
	%	average size (mm)
Olivine	5-7	0.1
Glass Shards	2	0.2
Vesicles	-	0.15
plagioclase	2-3	<0.1
cavities	~10	-

SEDIMENTARY TEXTURES: This unit is a normally graded, well sorted, matrix supported claystone. Near the top of the unit, there are small amounts of fine sand sized crystals of olivine and plagioclase (5-7% and 2-3 %, respectively) and glass (~2%). The glass shards and other clasts are subangular to subrounded. There is a 10 cm section of breccia with clasts up to 2 cm in diameter in the middle of the unit. One large (>5 cm) clast is located near the top of the unit.

SEDIMENTARY STRUCTURES: A few minor laminations are present throughout the unit. There is some microscopic orientation to the minerals, but it is not consistent.

COMMENTS: Coarse sand to granule sized angular to subrounded lithic clasts are rare but are located throughout the unit. The unit is disturbed to highly disturbed by drilling. Olivine, plagioclase, and glass shards appear fresh in thin section.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-4X-2 (Section top: 23.09 mbsf)

UNIT 10: Volcaniclastic silty claystone

Pieces: N.A.,

Thin Section(s)#: 11 and 13

CONTACTS: An ~0.5 cm thick dark gray band marks the top of this unit. The bottom of core 4 denotes the base of this unit.

GENERAL DESCRIPTION: Unit 10 is a normally graded, matrix supported claystone with clasts that range from sand at the base to silt at the top. Minor laminations and scattered coarse lithic clasts are also present. A 10 cm section of granule and pebble breccia is present in the middle of the unit.

COLOR: Greenish black (10Y 2/1)

COMPONENTS:

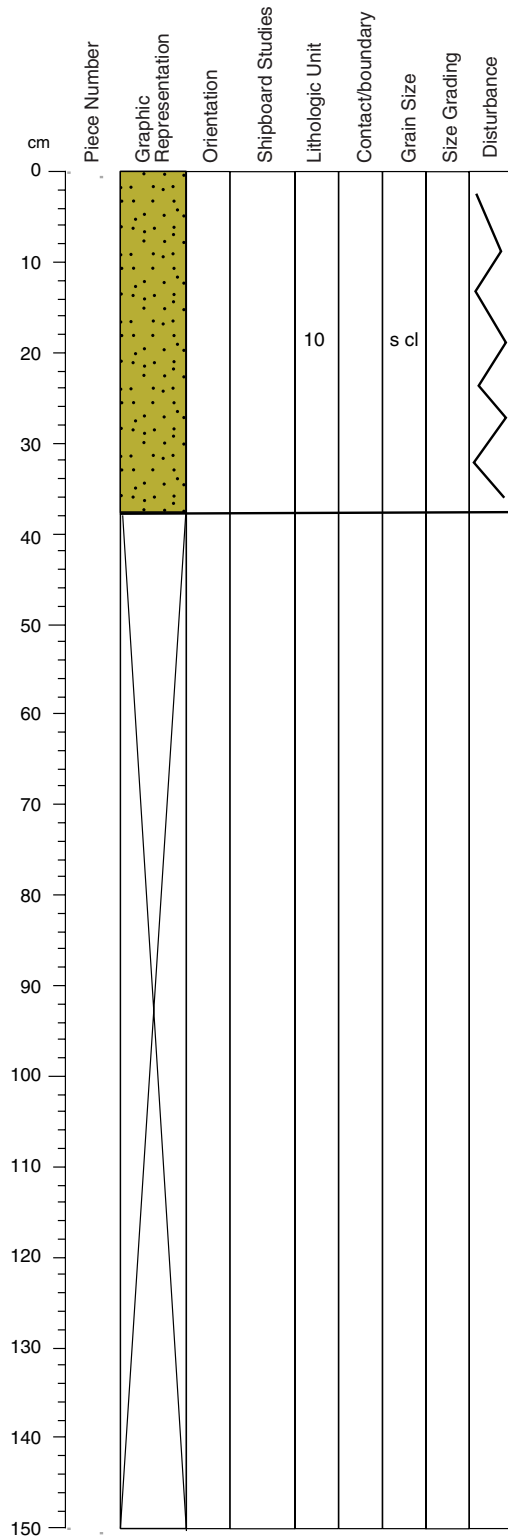
	%	average size (mm)
Olivine	5-7	0.15
Glass Shards	2	0.15
Vesicles	-	0.2
plagioclase	2-3	0.15
cavities	~10	0.2

SEDIMENTARY TEXTURES: This unit is a normally graded, well sorted, matrix supported claystone. Near the top of the unit, small amounts of fine sand sized crystals of olivine and plagioclase (5-7% and 2-3 %, respectively) and glass (~2%). The glass shards and other clasts are subangular to subrounded. There is a 10 cm section of breccia with clasts up to 2 cm in diameter in the middle of the unit. One large (>5 cm) clast is located near the top of the unit.

SEDIMENTARY STRUCTURES: A few minor laminations are present throughout the unit. There is some microscopic orientation to the minerals, but it is not consistent.

COMMENTS: Coarse sand to granule sized angular to subrounded lithic clasts are rare but are located throughout the unit. The unit is disturbed to highly disturbed by drilling. Olivine, plagioclase, and glass shards appear fresh in thin section.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-4X-CC (Section top: 24.54 mbsf)

UNIT 10: Volcaniclastic silty claystone

Pieces: N.A.,

Thin Section(s)#: 11 and 13

CONTACTS: An ~0.5 cm thick dark gray band marks the top of this unit. The bottom of core 4 denotes the base of this unit.

GENERAL DESCRIPTION: Unit 10 is a normally graded, matrix supported claystone with clasts that range from sand at the base to silt at the top. Minor laminations and scattered coarse lithic clasts are also present. A 10 cm section of granule and pebble breccia is present in the middle of the unit.

COLOR: Greenish black (10Y 2/1)

COMPONENTS:

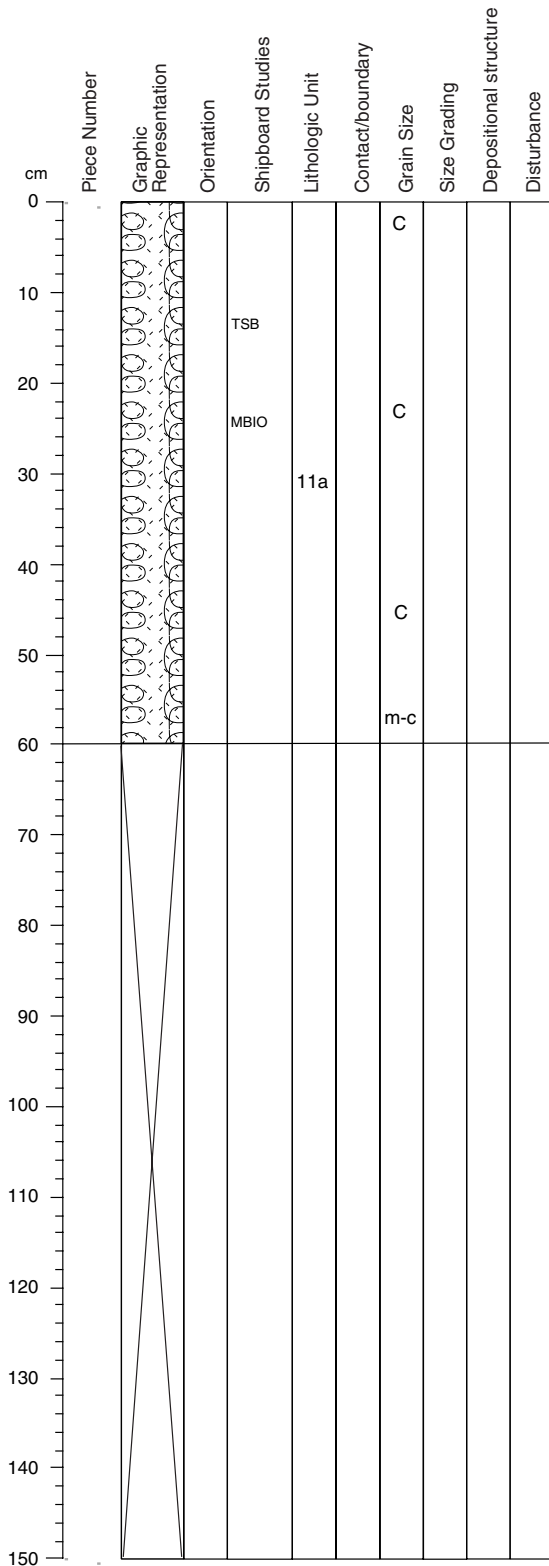
	%	average size (mm)
Olivine	5-7	0.15
Glass Shards	2	0.15
Vesicles	-	0.2
plagioclase	2-3	0.15
cavities	~10	0.2

SEDIMENTARY TEXTURES: This unit is a normally graded, well sorted, matrix supported claystone. Near the top of the unit, small amounts of fine sand sized crystals of olivine and plagioclase (5-7% and 2-3 %, respectively) and glass (~2%). The glass shards and other clasts are subangular to subrounded. There is a 10 cm section of breccia with clasts up to 2 cm in diameter in the middle of the unit. One large (>5 cm) clast is located near the top of the unit.

SEDIMENTARY STRUCTURES: A few minor laminations are present throughout the unit. There is some microscopic orientation to the minerals, but it is not consistent.

COMMENTS: Coarse sand to granule sized angular to subrounded lithic clasts are rare but are located throughout the unit. The unit is disturbed to highly disturbed by drilling. Olivine, plagioclase, and glass shards appear fresh in thin section.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-5X-1 (Section top: 32.0 mbsf)

UNIT 11A: Altered Palagonitized Crystal Vitric Tuff

Pieces: N.A., (Highly distrubed by drilling)

Thin Section(s)#: 22

CONTACTS: none

GENERAL DESCRIPTION: Unit 11A is a medium to very coarse grained, matrix supported, altered vitric tuff that has been strongly serpentinized. The main constituents are glassy shards (26%) altered to palagonite, vitric (8%) and lithic (4%) fragments, olivine (~ 7%), with minor amounts of plagioclase (1%). Vesicle size and abundance, as well as glass alteration increases upwards,

COLOR: 7.5R 4/0

COMPONENTS:

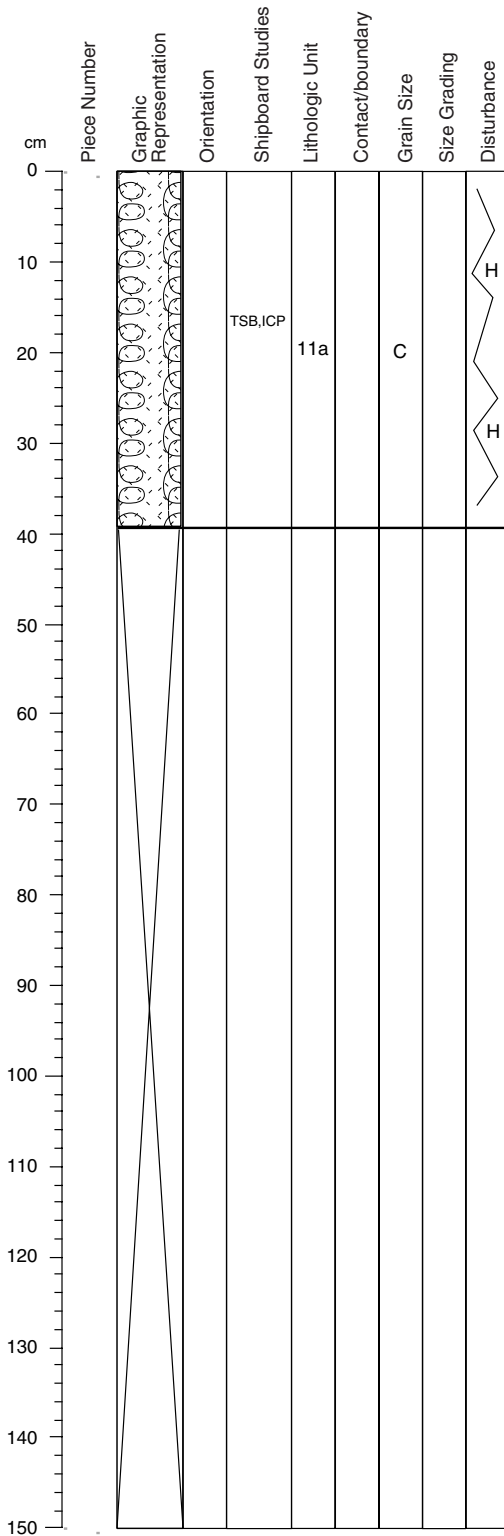
	%	average size (mm)
Olivine	4-7	0.2
Palagonitized Glass Shards	30	1.0
(filled) Vesicles	15	-
plagioclase	1-2	-0.3
Lithic frag	4	0.6
Spherulitic glass	8	0.7

SEDIMENTARY TEXTURES: The medium to very coarse grains are supported in a clay matrix. The glassy shards, spherulitic glass fragments, lithic fragments, and crystals are angular to subrounded. About half of the glassy fragments have vesicles, 60 – 70 % of which are partially filled.

SEDIMENTARY STRUCTURES: Massive.

COMMENTS: The glassy shards appear to have experienced two types of alteration. The glass alters to palagonite first and then proceeds to chlorite and clay. Alteration of the glass decreases with depth.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-5X-CC (Section top: 32.61 mbsf)

UNIT 11A: Altered Palagonitized Crystal Vitric Tuff

Pieces: N.A., (Highly distributed by drilling)

Thin Section(s)#: 2

CONTACTS: none

GENERAL DESCRIPTION: Unit 11A is a medium to very coarse grained, matrix supported, altered vitric tuff that has been strongly serpentinized. The main constituents are glassy shards (26%) altered to palagonite, vitric (8%) and lithic (4%) fragments, olivine (~ 7%), with minor amounts of plagioclase (1%). Vesicle size and abundance, as well as glass alteration increases upwards,

COLOR: 7.5R 4/0

COMPONENTS:

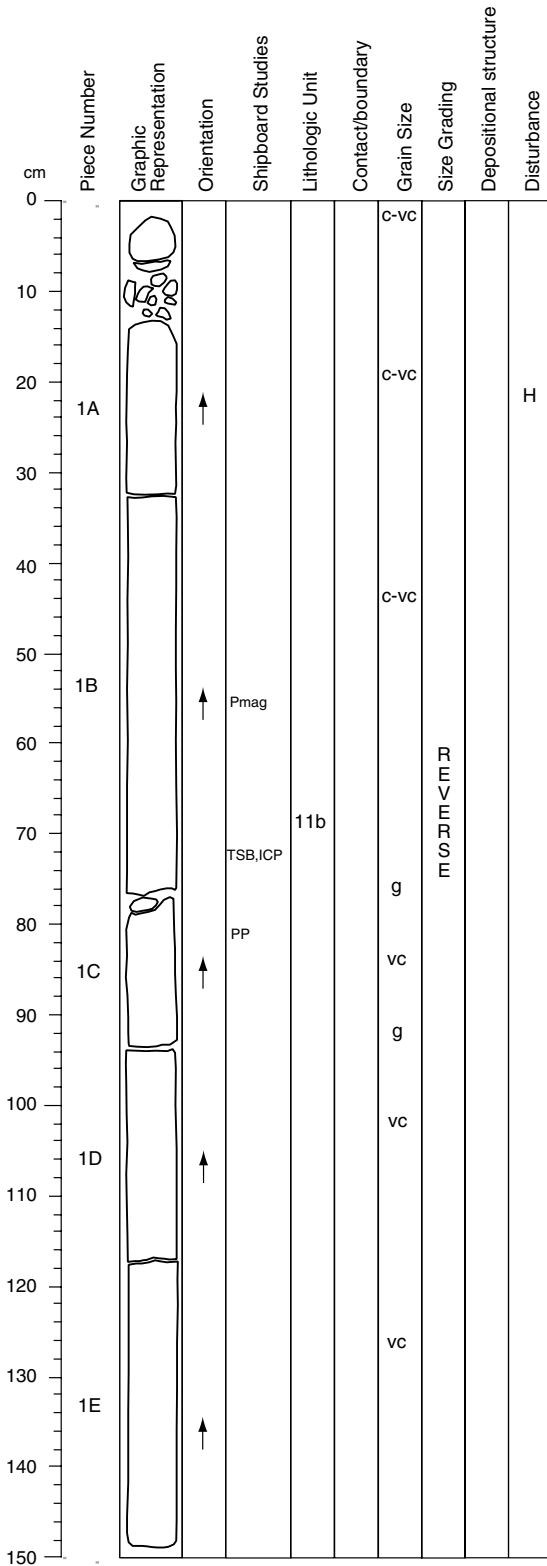
	%	average size (mm)
Olivine	7	0.4
Glass Shards (altered to palagonite)	26	0.4
(filled) Vesicles	15	-
plagioclase	1	0.2
Lithic frag	4	1.0
Spherulitic glass	8	-

SEDIMENTARY TEXTURES: The medium to very coarse grains are supported in a clay matrix. The glassy shards, spherulitic glass fragments, lithic fragments, and crystals are angular to subrounded. About half of the glassy fragments have vesicles, 60 – 70 % of which are partially filled.

SEDIMENTARY STRUCTURES: Massive.

COMMENTS: The glassy shards appear to have experienced two types of alteration. The glass alters to palagonite first and then proceeds to chlorite and clay. Alteration of the glass decreases with depth.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-6X-1 (Section top: 33.0 mbsf)

UNIT 11b: Palagonitized Crystal Vitric Tuff

Pieces : 1A-1E

Thin Section(s)#: 14

CONTACTS: none

GENERAL DESCRIPTION: Lithified, strongly altered, medium to coarse grained, palagonitized vitric tuff, with subangular to subrounded volcanic fragments in a brown clayey matrix. Grain size decreases from very coarse to coarse with depth within 6X-1 and down to medium coarse over the entire unit. For the entire unit, glassy shard content increases (30-80%), whereas spherulitic glassy abundances (10.5 – 6.5%) decreases with depth. Alteration of the glassy shards is more complete with depth. The lithic fragment content is low (~ 5%) and constant. Vesicles and cavities (~ 5-7%) are sometimes filled by zeolites.

COLOR: 5GY 4/1

COMPONENTS:

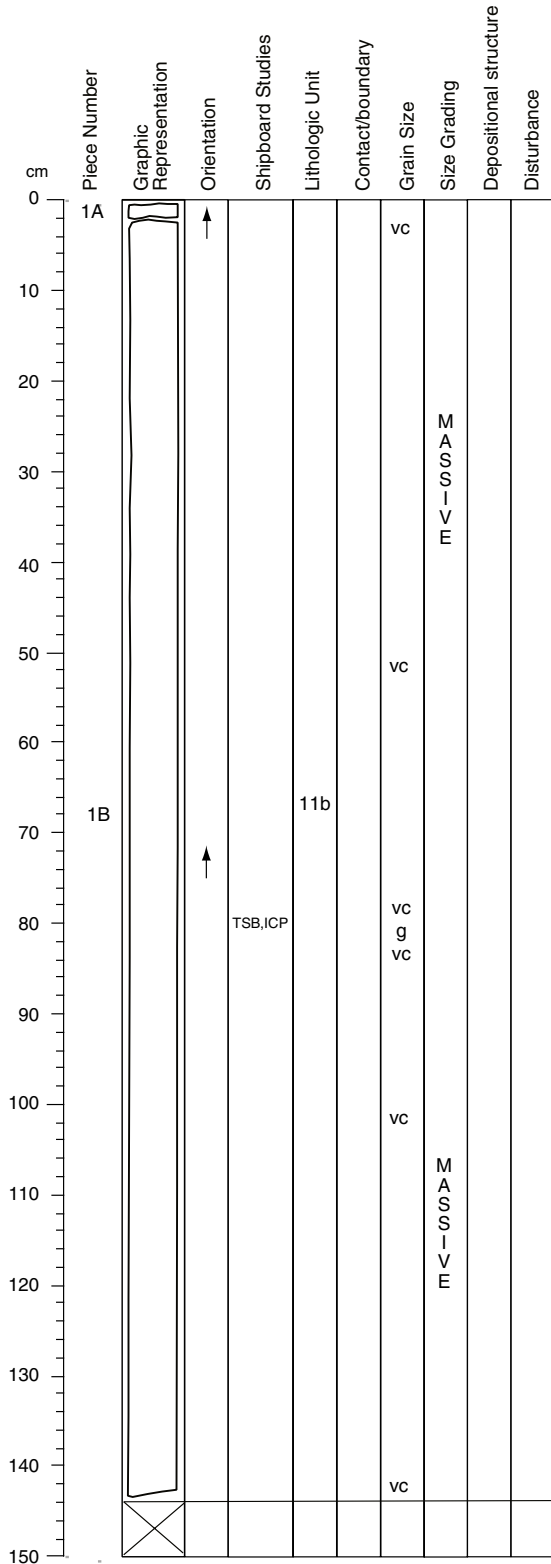
	%	average size (mm)
Olivine	~ 10.5	0.5
Glass Shards (altered to palagonite)	~ 30	0.5
Plagioclase	~ 1	0.2
Lithic fragments	~ 2	0.7
Vitric (Spherulitic) fragments	~ 10.5	0.7
Clay minerals	~ 36	
Zeolites	~ 6.5	
Vesicles	~ 1-5	

SEDIMENTARY TEXTURE: Grain size decreases with depth from very coarse to medium. Palagonitized glassy shards, spherulitic glassy fragments, and lithic fragments are subrounded to subangular.

SEDIMENTARY STRUCTURE: Massive.

COMMENTS: The average size of grains ranges from 0.2 to 0.7 mm in 6X-1. The glassy shards always have the outer rim altered to palagonite. These glassy shards sometimes enclose euhedral to anhedral olivine and/or plagioclase. The olivine and plagioclase crystals, unlike the glass, appear to be fresh. Cavities (6.5%) in the clayey matrix are filled with zeolites (possibly phillipsite). Vesicles in the glassy shards are also often filled in by zeolites.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-6X-2 (Section top: 34.5 mbsf)

UNIT 11b: Palagonitized Crystal Vitric Tuff

Pieces : 1A-1B

Thin Section(s)#: 20

CONTACTS: none

GENERAL DESCRIPTION: Lithified, strongly altered, medium to coarse grained, palagonitized crystal vitric tuff, with subangular to subrounded volcanic fragments in a brown clayey matrix. Grain size decreases slightly with depth within 6X-2. For the entire unit the glassy shard content increases (30-80%), whereas the vitric (spherulitic) fragments abundance (10.5 – 6.5%) decreases with depth. Alteration of the glassy shards increases with depth. The lithic fragment content is low (~ 5%) and constant. Vesicles and cavities (~ 5-7%) are sometimes filled by zeolites.

COLOR: 5GY 4/1

COMPONENTS:

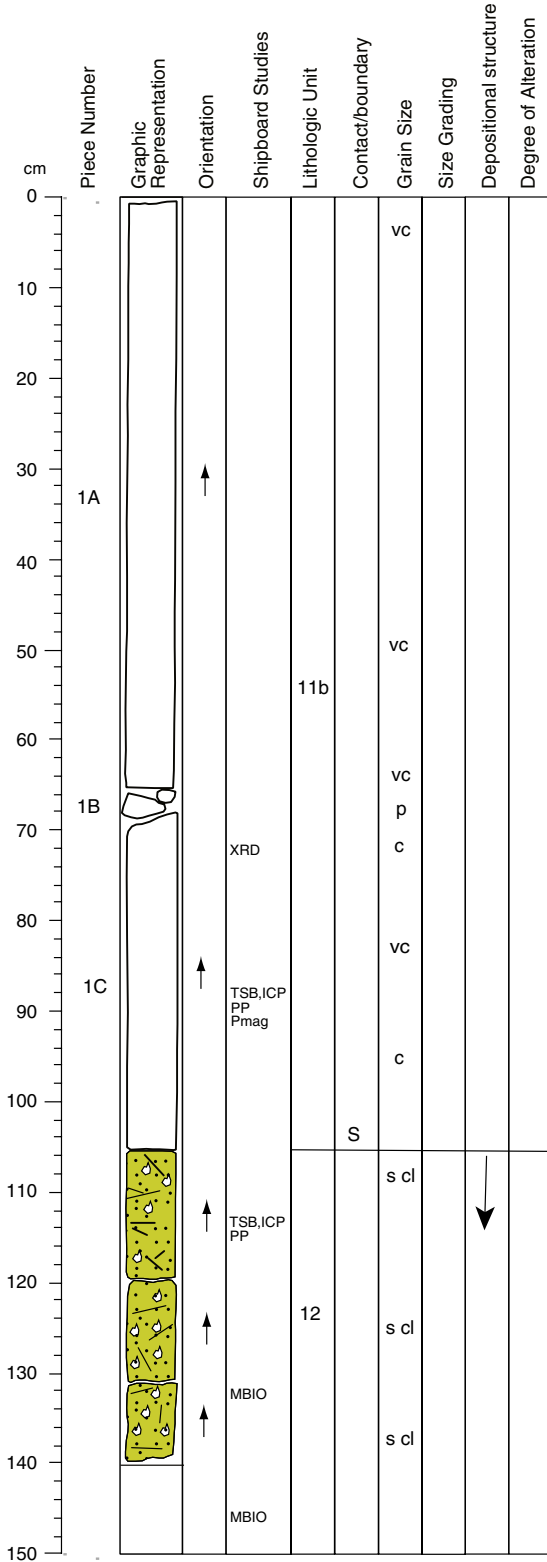
	%	average size (mm)
Olivine	~ 7	0.4
Glass Shards (altered to palagonite)	~ 35	0.6
Plagioclase	< 1	0.2
Lithic fragments	~ 5	0.6
Vitric (Spherulitic) fragments	~ 9	0.6
Clay minerals	~ 33	-
Zeolites	~ 7	-
Vesicles	~ 1.5	-
Radiolarians	0.5-1.0	-

SEDIMENTARY TEXTURE: Grain size is coarse, but decreases slightly with depth. Palagonitized glassy shards, vitric fragments, and lithic fragments are subrounded to subangular.

SEDIMENTARY STRUCTURE: Massive.

COMMENTS: The average size of grains ranges from 0.2 to 0.6 mm in 6X-2. The outer rim of the glassy shards are always altered to palagonite. These glassy shards sometimes enclose euhedral to anhedral olivine and/or plagioclase. The olivine and plagioclase crystals, unlike the glass, appear to be fresh. Cavities (6.5%) in the clayey matrix are filled with zeolites (possibly phillipsite). Vesicles in the glassy shards are also often filled by zeolites.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-6X-3 (Section top: 35.93 mbsf)

UNIT 11b: Palagonitized Crystal Vitric Tuff

Pieces : 1A-1C

Thin Section(s)#: 15

CONTACTS: A sharp contact is present at the base of the unit.

GENERAL DESCRIPTION: Lithified, strongly altered, medium to coarse grained, palagonitized vitric tuff, with subangular to subrounded volcanic fragments in a brown clayey matrix. Grain size decreases with depth within 6X-3 from coarse to medium. For the entire unit the glassy shard content increases (30-80%), whereas spherulitic glassy abundances (10.5 – 6.5%) decreases with depth. Alteration of the glassy shards is higher with depth. The lithic fragment content is low (~ 5%) and constant. Vesicles and cavities (~ 5-7%) are sometimes filled by zeolites.

COLOR: 5GY 4/1

COMPONENTS:

	%	average size (mm)
Olivine	~ 9	0.4
Glass Shards (altered to palagonite)	>80	0.4
Plagioclase	< 1	0.3
Lithic fragments	~ 5	0.4
Vitric fragments	~ 6.5	0.4
Clay minerals	~ 35	-
Vesicles	~ 5	-
Radiolarians	<<1	-

SEDIMENTARY TEXTURE: Grain size decreases from coarse to medium with depth. Glassy shards are angular and highly vesicular.

SEDIMENTARY STRUCTURE: Massive.

COMMENTS: The average size of grains ranges from 0.3 to 0.4 mm in 6X-3. The glassy shards are almost entirely altered to palagonite and are highly vesicular in the bottom of unit 11B. Some of these palagonitized glassy shards envelope olivine, and more rarely plagioclase. The olivine and plagioclase crystals, unlike the glass, appear to be fresh. Cavities (5%) in the clayey matrix are filled with zeolites (possibly phillipsite). Rarely the vesicles in the glassy shards are also filled in with zeolites. Many opaques in the spherulitic vitric fragments show dendritic textures, suggesting rapid undercooling.

UNIT 12: Volcaniclastic silty claystone with white vugs

Pieces : N.A.

Thin Section(s)#: 16 and 21.

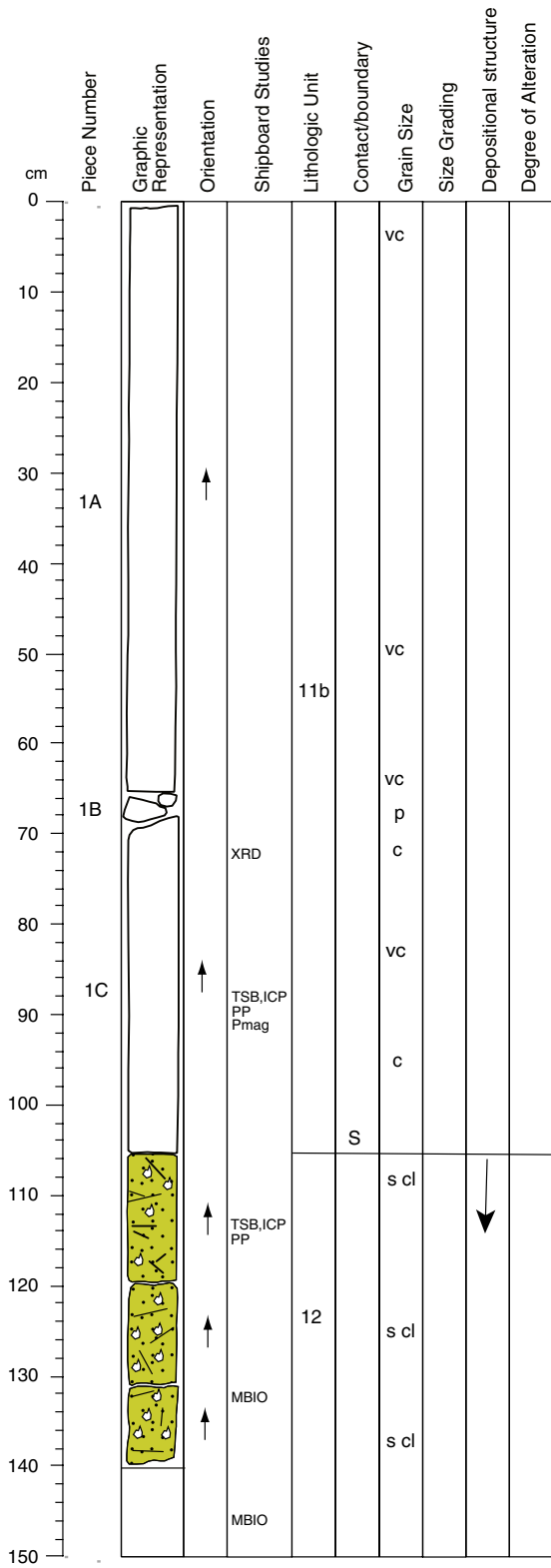
CONTACTS: A sharp contact is present at the top of the unit.

GENERAL DESCRIPTION: Unit 12 is a matrix supported, weakly indurated, silty claystone with secondary white minerals, some of which effervesce with HCl.

COLOR: Matrix is gray (5Y 6/1) with white clasts 5Y 8/1)

Continued to Next Page

Core Photo



Continued from Page 15

200-1223A-6X-3 (Section top: 35.93 mbsf)

COMPONENTS:

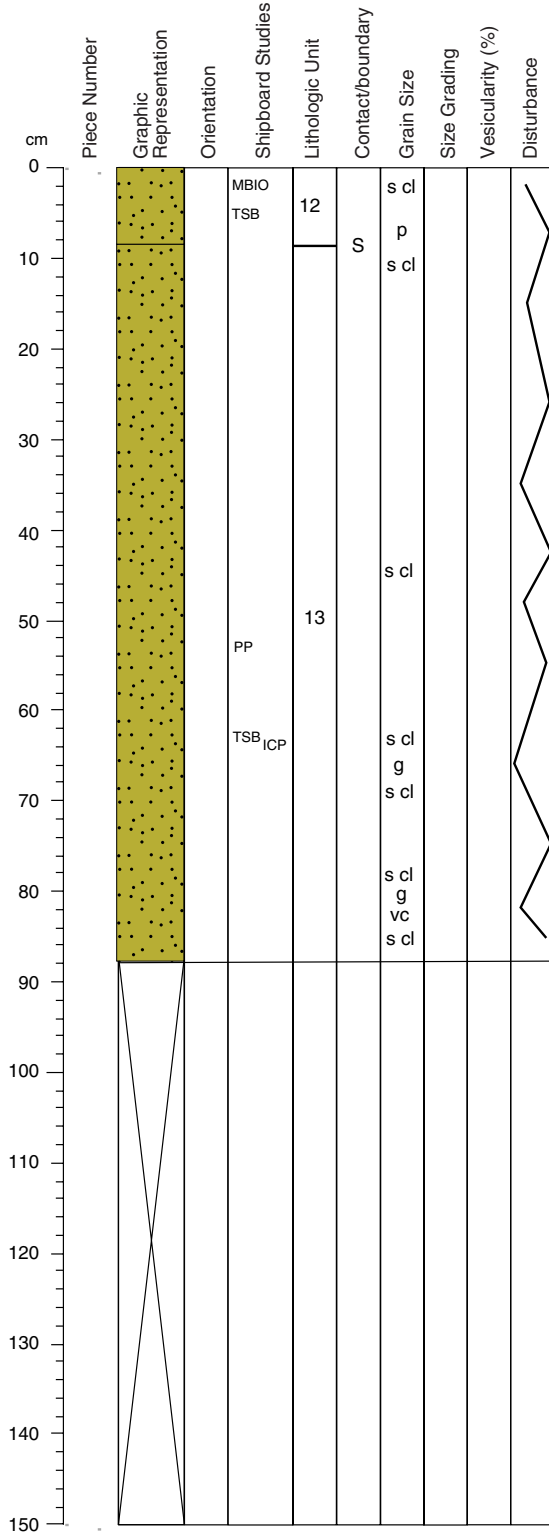
	%	average size (mm)
Clay minerals	~ 90	
Vugs	~ 7	0.7

SEDIMENTARY TEXTURE: Unit 12 consists of approximately 90% clay-sized matrix with ~ 0.7 mm sized white filled vugs.

SEDIMENTARY STRUCTURE: Massive.

COMMENTS: The white material filling the vugs typically effervesces vigorously and leaves a white flakey residue.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-6X-4 (Section top: 37.43 mbsf)

UNIT 13: Volcaniclastic silty claystone

Pieces : N.A. (Disturbed by drilling)

Thin Section(s) #: 17.

CONTACTS: A poorly defined, gradational contact is present at the top of the unit. The bottom of the unit is terminated at the end of the section of the core.

GENERAL DESCRIPTION: Unit 13 is a matrix supported, weakly indurated, silty claystone that contains < 7 % angular to subrounded, lithic clasts (average size is 0.3 mm) in the lower half of the unit. Two zones (~5-6 cm) of highly disturbed material between drilling biscuits contain broken pieces of carbonate that may have originally been veins.

COLOR: Matrix is gray (5Y 6/1) with white clasts 5Y 8/1)

COMPONENTS:

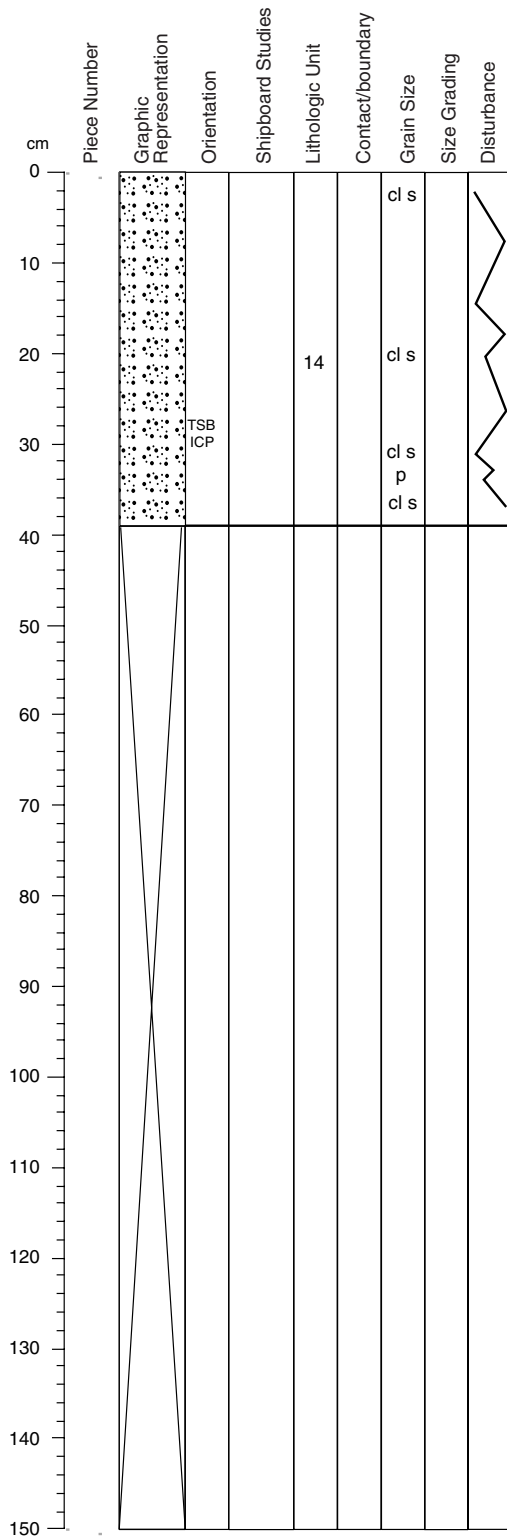
	%	average size (mm)
Olivine	<10	0.07
Vitric frag	~ 1	0.06
Clay minerals	~ 80	-
Radiolarians	2-3	-

SEDIMENTARY TEXTURE: Unit 13 consists of approximately 90% clay-sized matrix with angular to subrounded lithic clasts in the lower half of the unit which are rare above.

SEDIMENTARY STRUCTURE: Massive, but may have originally contained carbonate filled veins. Faint laminations are present in the lower half of the unit in the same region as the lithic clasts.

COMMENTS: The region with the laminated, lithic clasts is less disturbed than other parts of the unit.

Core Photo



VOLCANICLASTIC ROCK VISUAL CORE DESCRIPTION

200-1223A-6X-CC (Section top: 38.31 mbsf)

UNIT 14: Volcaniclastic clayey siltstone

Pieces : N.A. (Highly disturbed by drilling)

Thin Section(s) #: 23

CONTACTS: The top and bottom of the core catcher mark the boundaries of this unit.

GENERAL DESCRIPTION: Unit 14 is a matrix supported, weakly indurated, clayey siltstone. The few lithic clasts (<1%) present are very soft and are altered to clay minerals.

COLOR: Dark green gray (SGY 4/1)

COMPONENTS:

	%	average size (mm)
Olivine	5	0.07
Vitric Fragments	1	0.06
Clay minerals	60	-
Zeolites	10	-
Chlorite	1	-
Vesicles/Cavities	20	-

SEDIMENTARY TEXTURE: Unit 14 is a matrix supported clayey siltstone with less than 1% rounded lithic clasts (avg. 1-2%).

SEDIMENTARY STRUCTURE: Massive

COMMENTS: Highly disturbed by drilling. At the base of the core catcher, there is a fractured 1-2 cm green clay clast that has a dark gray rim.

Site 1223														
Core	Sample				Lithology	Texture			Mineral			Biogenic		Comments
	Core Type	Section	Top Interval (cm)	Depth (mbsf)		Sand	Silt	Clay	Olivine	Plagioclase	Volcanic Glass Shard	Radiolarians	Siliceous Sponge Spicules	
Hole A														
1	H	1	42.0	0.42	D		10	90	5	10				mostly clay minerals
1	H	1	95.0	0.95	D	90	10		40	50	10			
1	H	1	125.0	1.25	D	20		80	10	5	10			
1	H	2	3.0	1.53	D	30	10	60	5	5	10			
1	H	2	31.0	1.81	D	40		60	5	5	10			aggregations of clay minerals
1	H	2	57.0	2.07	D	20		80	10			25		
1	H	2	58.0	2.08	D	90	10		50	5	10	1		
1	H	2	65.0	2.15	D	90	10		40	5	40			
1	H	2	100.0	2.50	D	90	10		40		40			
1	H	2	105.0	2.55	D	70	30		5			1	10	spicule fragments very small
1	H	2	146.0	2.96	D	75	25		10	5	5	1	1	
1	H	2	149.0	2.99	D	40	60		60		40	1	1	
1	H	3	13.0	3.13	D		30	70	10		5			
1	H	3	97.0	3.97	D	100			60		40			grains mostly angular
1	H	3	100.0	4.00	D			100	5				1	spicules rare
1	H	4	22.0	4.72	D			100	1					
1	H	4	100.0	5.50	D	100			40	20	40	1		
1	H	5	10.0	6.10	D	30		70	20	15	10			
1	H	5	17.0	6.17	D	65	35		40		30	10	1	large spicules present
1	H	5	61.0	6.61	D	90	10		40		60		1	
1	H	5	74.0	6.74	D	80	20		40		60	5	1	
1	H	5	87.0	6.87	D	95	5		30		50	5		
1	H	5	132.0	7.32	D		10	90	1			60	10	
2	H	1	8.0	7.78	D	100								contains highly birefringent fibrous minerals
2	H	1	17.0	7.87	D	5		95					1	
2	H	1	35.0	8.05	D	100			10	10	70			
2	H	2	26.0	8.47	D	100			20		80			glass fragments sub-rounded to sub-angular
2	H	3	50.0	9.38	D	100			40		60			
3	X	2	138.0	15.56	D	90	10		60		40			
4	X	2	18.0	23.27	D		20	80	1	10				
6	X	4	4.0	37.47	D		40	60	40	30			1	

THIN SECTION:	200-1223A-1H-1 98-100 (27)					Unit: 1B	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	(average size of clasts < 0.1 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Sandy fraction	100							Main constituents (in order of abundance): clayey matrix (that in some cases coats the clasts), ol (anhedral and subangular), vitric fragments (black to dark brown), pl (anhedral), palagonitized glass, lithic fragments, cpx and organic material (sponge spicules and radiolarians).
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS :	Incoherent sand. This sample represents the sandy layer of a turbiditic sequence.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-1H-2 100-102 (28)					Unit: 1C	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	Very fine grained (average size of clasts ~ 0.2 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 14				~ 0.2	Chrysolite	anhedral, subangular	2V = 90°. In some cases found within glass shards.
Unaltered glass shards	~ 56				~ 0.2		Subangular	Pale yellow. In some cases vesicular.
Vitric fragments	~ 18				~ 0.2		subrounded, subangular	Black to dark brown. Rarely with pl crystallites.
Plagioclase	~ 8				~ 0.2	Bytownite (?)	subhedral, columnar	
Lithic fragments	~ 3				~ 0.2	pl,cpx,op,ol (?)	subrounded	
Clinopyroxene	~ 1				~ 0.2	Augite (?)		Pale yellow.
Palagonitized glass	~ 1				~ 0.2			Orange. Separated shards. Rarely associated with fresh glass.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS :	Incoherent sand. This sample represents the sandy layer of a turbiditic sequence.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-1H-3 8-10 (29)					Unit: 1E	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	Very fine grained (average size of clasts < 0.2 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 16				< 0.2	Chrysolite	anhedral	2V = 90°. In some cases found within glass shards.
Unaltered glass shards	~ 42				< 0.2		Subangular	Pale yellow. In some cases vesicular.
Vitric fragments	~ 18				< 0.2		subrounded, subangular	Black to dark brown. Rarely with pl crystallites.
Plagioclase	~ 14				< 0.2	Bytownite (?)	subhedral, columnar	
Lithic fragments	~ 3				< 0.2	pl,cpx,op,ol (?)	subrounded	
Clinopyroxene	~ 1				< 0.2	Augite (?)		Pale yellow.
Palagonitized glass	~ 4				< 0.2			Orange. Separated shards. Rarely associated with fresh glass.
Radiolarians	~ 1							
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS : Incoherent sand. This sample represents the sandy layer of a turbiditic sequence.								
Microphotos? No								
LEGEND: ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel								

THIN SECTION:	200-1223A-1H-3 97-99 (30)					Unit: 1F	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	Very fine grained (average size of clasts < 0.2 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 17				< 0.2	Chrysolite	anhedral	2V = 90°. In some cases found within glass shards.
Unaltered glass shards	~ 34				< 0.2		anhedral to subangular	Pale yellow. In some cases vesicular.
Vitric fragments	~ 21				< 0.2		subrounded, subangular	Black to dark brown. Rarely with pl crystallites.
Plagioclase	~ 14				< 0.2	Bytownite (?)	subhedral, columnar	
Lithic fragments	~ 2				< 0.2	pl,cpx,op,ol (?)	subrounded	
Clinopyroxene	~ 2				< 0.2	Augite (?)		Pale yellow.
Palagonitized glass	~ 9				< 0.2			Orange. Separated shards. Rarely associated with fresh glass.
Radiolarians	~ 1							
Groundmass/matrix								
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS : Incoherent sand. This sample represents the sandy layer of a turbiditic sequence.								
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-1H-4 134-136 (31)					Unit: 2A	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	Very fine grained (average size of clasts < 0.2 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 19				< 0.2	Chrysolite	anhedral	2V = 90°. In some cases found within glass shards.
Unaltered glass shards	~ 36				< 0.2		anhedral to subangular	Pale yellow. In some cases vesicular.
Vitric fragments	~ 19				< 0.2		subrounded, subangular	Black to dark brown. Rarely with pl crystallites.
Plagioclase	~ 11				< 0.2	Bytownite (?)	subhedral, columnar	
Lithic fragments	~ 4				< 0.2	pl,cpx,op,ol (?)	subrounded	
Clinopyroxene	~ 4				< 0.2	Augite (?)		Pale yellow.
Palagonitized glass	~ 8				< 0.2			Orange. Separated shards. Not associated with fresh glass.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS :	Incoherent sand. This sample represents the sandy layer of a turbiditic sequence.							
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-1H-5 88-90 (32)					Unit: 2C	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	Very fine grained (average size of clasts ranging from 0.1 to 0.3 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 18		0.1	0.3	0.2	Chrysolite	anhedral	2V = 90°. In some cases found within glass shards.
Unaltered glass shards	~ 45		0.1	0.5	0.3		Subangular	Pale yellow. In some cases vesicular.
Vitric fragments	~ 21		0.10	0.3	0.2		subrounded, subangular	Black to dark brown. Rarely with pl crystallites.
Plagioclase	~ 6		0.0	0.3	0.1	Bytownite (?)	subhedral, columnar	
Lithic fragments	~ 4		0.1	0.3	0.2	pl,cpx,op,ol (?)	subrounded	
Clinopyroxene	~ 2		0.0	0.3	0.1	Augite (?)		Pale yellow.
Palagonitized glass	~ 4		0.1	0.3	0.2			Orange. Separated shards. Not associated with fresh glass.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS :	Incoherent sand.							
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-1H-5 93-95 (18)					Unit: 2D	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand							
GRAIN SIZE:	Very fine to coarse grained (average size of clasts ranging from 0.3 to 1.8 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Conglomerate fraction								
Claystone clasts	~ 50		0.1	4.0	1.8		Subangular to spherical	In some cases these clasts have a relatively high percentage of carbonate fragments inside.
Carbonate clasts	~ 5		0.3	3.5	0.6		Subangular to spherical	Micrite.
Sandy fraction								
Volcanic sand	~ 45		0.01	0.5	0.3		Subangular	Ol, pl, gl and cpx clasts, plus basaltic (l.s.) lithic and vitric fragments. Among the components of the sandy fraction, the unaltered glass clasts are < 10 %.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
COMMENTS :								
	Well sorted. Two class of sizes. One ~ 1.8 mm and the other ~ 0.3 mm.							
Microphotos?								
	Yes							
LEGEND:								
	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-1H-CC 3-5 cm (19)					Unit: 3	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sand (volcanic ash)							
GRAIN SIZE:	Very fine grained with granular clasts (average size of clasts < 0-1 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Conglomerate fraction								
Claystone fragments	~ 7	~ 7	0.4	3.0	1.5		Subrounded to spherical	Many of them contain small (< 0.1 mm) pl and ol fragments.
Sandy fraction								
Clasts	> 90	> 90	0.1	0.4	0.3		Anhedral to subhedral	Mainly constituents: ol, pl, cpx, gl, vitric and lithic fragments, roughly in the same proportions. Glass is either fresh, palagonitized or bordered with a thin brown clayey rim.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
COMMENTS :	Incoherent sand.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-2H-1 24-26 cm (33)					Unit: 4A	OBSERVER(S): ML		
ROCK NAME:	Volcaniclastic sand (volcanic ash)								
GRAIN SIZE:	Very fine grained (average size of clasts ranging from 0.1 to 0.3 mm)								
WHERE SAMPLED:									
TEXTURE:									
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments	
			min.	max.	av.				
Phenocrysts/clasts									
Olivine	~ 15		0.1	0.3	0.2	Chrysolite	anhedral	2V = 90°. In some cases found within glass shards.	
Unaltered glass shards	~ 50		0.1	0.6	0.3		anhedral to subangular	Pale yellow. In some cases vesicular.	
Vitric fragments	~ 20		0.05	0.4	0.2		subrounded, subangular	Black to dark brown. Rarely with pl crystallites.	
Plagioclase	~ 4		0.0	0.3	0.1	Bytownite (?)	subhedral, columnar		
Lithic fragments	~ 5		0.1	0.3	0.2	pl,cpx,op,ol (?)	subrounded		
Clinopyroxene	~ 3		0.0	0.3	0.1	Augite (?)		Pale yellow.	
Palagonitized glass	~ 3		0.1	0.3	0.2			Orange. Separated shards. Not associated with fresh glass.	
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments	
			min.	max.	av.				
Vesicles/cavities									
COMMENTS :	Incoherent sand. Average size of the clasts: 0.25 mm.								
Microphotos?	No								
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel								

THIN SECTION:	200-1223A-3X-1 36-38 cm (3)					Unit: 5	OBSERVER(S): ML	
ROCK NAME:	Crystal vitric tuff							
GRAIN SIZE:	Very fine grained (average size of clasts ranging from 0.3 to 0.4 mm)							
WHERE SAMPLED:	Massive unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 10	~ 10	0.05	0.9	0.4	Chrysolite	Anhedral to subhedral	2V ~ 90°. Generally fresh. Ol occurs in a clayey matrix mainly as clasts of larger original phenocrysts and, more rarely, in glassy shards.
Plagioclase	~ 1	~ 1	0.05	0.4	0.3	Bytownite	Anhedral to subhedral	2Va > 80°.
Other								
Glassy shards	~ 25	~ 25	0.05	1.2	0.3		Subangular to subrounded	Relatively fresh. Always bordered by a thin brown clayey rim. Sometimes are present euhedral to anhedral ol and/or pl.
Lithic fragments	~ 15	~ 15	0.05	0.7	0.4		Subrounded to subangular	Textures are subophitic to intergranular. Main constituents: pl, cpx, op, ol, gl. Sometimes large ol phenocryst are present. Fine to very-fine grained.
Vitric fragments	~ 5	~ 5	0.03	0.9	0.4		Subrounded to subangular	Black to dark brown. In reflected light it is possible to identify tiny pl sheaf spherulites + op +/- cpx. Euhedral ol (0.6 mm) are sometimes present.
Groundmass/matrix								
Clay minerals	~ 15							
SECONDARY MINERALOGY	Percent	Size (mm)			Replacing/filling	Morphology	Comments	
		min.	max.	av.				
Chlorite	~1		0.1	0.6	0.3		Rounded clasts	
Palagonite	<< 1							
Vesicles/cavities								
Cavities	~ 30							
COMMENTS :	section thinner than normal (~ 20 mm) About 5 % of the glassy shards are completely altered to chlorite or clay minerals and Fe-oxihydroxides.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-3X-1 112-114 (4)					Unit: 5	OBSERVER(S): ML, JHN	
ROCK NAME:	Crystal vitric tuff							
GRAIN SIZE:	(average size of clasts ranging from 0.4 to 0.7 mm)							
WHERE SAMPLED:	Massive unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	13.5	13.5	<0.01	1.0	0.4	Chrysolite	Anhedral, subhedral; rarely euhedral and skeletal	2V ~ 90°. Generally fresh. The smallest crystals in the clayey matrix are more altered. It occurs in clayey matrix mainly as clast of larger original phenocrysts, as skeletal, as euhedral phenocryst in fresh and altered glass and in lithic fragments.
Other								
Glassy shards	20	22	<0.01	1.0	0.6		Subrounded to subangular	Often fresh. Always with a border of brown clayey matrix. In few cases the clayey alteration may be complete. Pale yellow. Sometime with euhedral and/or anhedral ol, euhedral pl; sometime vesiculated.
Lithic fragments	8	8	0.1	1.2	0.7	Basaltic	Subrounded	Textures from subophitic to intergranular and intersertal. Main constituents: pl, cpx, op, ol, gl. Sometime with large ol phenocryst. From fine to very-fine grained. Possible presence of pigeonite.
Vitric fragments	16	16	0.1	1.3	0.7		Subrounded	Black to dark brown. In reflected lights it is possible to identify tiny pl sheaf spherulites + op plus or minus cpx. Sometime with euhedral ol (0.6 mm).
Groundmass/matrix								
Clay minerals	33							Brownish.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Chlorite	0.5		0.1	0.5	0.2	Glassy shards	Rounded granules	In some cases chlorite replace in part or all the glass.
Vesicles/cavities								
Vesicles and cavities	7							
COMMENTS :	Modal abundance estimated on 1000 point counting. Alteration seems to have no effect on ol and pl in glassy shards.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-3X-2 82-84 cm (5)					Unit: 5	OBSERVER(S): ML	
ROCK NAME:	Crystal vitric tuff							
GRAIN SIZE:	(average size of clasts ranging from 0.6 to 1.0 mm)							
WHERE SAMPLED:	At contact with bioturbated siltstone							
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	5-7	5-7	0.2	1.4	0.6	Chrysolite	Anhedral to subhedral; rarely euhedral	Relatively fresh. 2V ~ 90°. Rare crystals with kink banding. Mainly clasts of larger volcanic phenocrysts. Rarely skeletal and/or euhedral in glassy shards.
Vitric fragments	~ 10-15	~ 10-15	0.2	2.0	1.0		Angular to subrounded	There are two types of vitric fragments. One black to dark brown, with euhedral ol,pl,cpx,op, and another brown to pale brown with pl spherulites plus or minus euhedral pl, ol.
Glassy shards	~ 10	~ 20 ?	0.1	2.0	0.9			Pale yellow. Often fresh. In some cases totally replaced by chlorite or clay minerals. With unfilled vesicles and relatively large (~ 1 mm) euhedral ol and/or pl.
Other								
Lithic fragments	~ 20	~ 20	0.3	2.0	1.0	Basaltic		Textures from subophitic to intergranular. Main constituents: pl, cpx, op, ol, gl. Sometime with large ol phenocryst. From fine to very-fine grained.
Groundmass/matrix								
Clay minerals	~ 20							
SECONDARY MINERALOGY	Percent	Size (mm)			Replacing/filling	Morphology	Comments	
		min.	max.	av.				
Chlorite	<< 1						In rare cases replaces the glass. In one case is present as alteration product of lithic fragment.	
Zeolites	<< 1							
Vesicles/cavities								Generally empty.
COMMENTS :	~ 40 % of holes. Not all of these are a primary feature. Some of them were produced during thin section preparation. Probably lost ol, gl and lithic fragments.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-3X-2 71-73 cm (1)					Unit: 5	OBSERVER(S): ML	
ROCK NAME:	Crystal vitric tuff							
GRAIN SIZE:	(average size of clasts ranging from 0.1 to 1.1 mm)							
WHERE SAMPLED:	Massive Unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	11.5	11.5	0.04	1.4	0.6	Chrysolite	Anhedral, subhedral, euhedral	2V = 90°. Fresh. It occurs mainly in a clayey matrix as clasts of larger original phenocrysts, skeletal crystals, euhedral phenocrysts in fresh and altered glass and in lithic fragments. In some cases kink banding is present.
Clinopyroxene	1	1	0.02	0.8	0.1	Augite	Euhedral, anhedral	2Vg ~ 60. Fresh. It is mainly in ~5 mm lithic fragments with subophitic texture. The crystal shape ranges from euhedral to anhedral with twinned crystals in a glass and clayey matrix.
Other								
Lithic fragments	15.5	15.5	0.1	2.2	1.1	Basaltic	Subrounded	Textures are subophitic to intergranular. Main constituents: pl, cpx, op, ol, gl. Large ol phenocrysts are occasionally present. Fine to very-fine grained.
Glassy shards	19	19	0.1	2.0	1.0		Subangular to subrounded	Fresh. Pale yellow. Euhedral and/or anhedral ol, euhedral pl are occasionally present. Some of the glassy shards are vesiculated.
Vitric fragments	12	12	0.1	1.2	0.6			Black to dark brown. In reflected light tiny pl spherulites + op + cpx. Sometime euhedral ol (0.6 mm) is present. Rarely chlorite is present.
Groundmass/matrix								
Plagioclase	1	1	0.0	0.1	0.1	Bytownite	Subhedral, euhedral, anhedral	2Va ~ 80°. Fresh; elongated.
Clay minerals	38.5	38.5						Brown to dark brown.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Chlorite	< 1		0.1	0.8	0.4			Slightly pleocroic pale green-green
Vesicles/cavities								
Vesicles	~ 2		0.2	0.4	0.15		Spherical	Generally unfilled. In rare cases filled with brownish clay minerals.
Cavities	~ 4							
COMMENTS :	Modal abundance estimated on 1000 point counting. Cavities in the thin section are ~ 40 % but many are produced during the thin section preparation.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-3X-2 92-94 (6)					Unit: 6	OBSERVER(S): ML	
ROCK NAME:	bioturbated Claystone							
GRAIN SIZE:	Very fine grained (< 10 mm)							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	<< 1		0.001	0.15	0.01		Subhedral to anhedral	Relatively fresh.
Plagioclase	<< 1		0.001	< 0.1	0.01	Labradorite/ Bytownite	Euhedral to anhedral	Max extinction angle measured = 35°.
Other								
Clay	>> 99							
Groundmass/matrix								
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS :								
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-3X-2 129-132 (8)					Unit: 7	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic sandy siltstone							
GRAIN SIZE:	Very fine grained (generally < 0.2 mm)							
WHERE SAMPLED:								
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 5	~ 5	0.05	0.7	0.2	Chrysolite	Anhedral to subhedral	2V ~ 90°. Relatively fresh. Highly fractured. Ol occurs mainly as small (< 0.15 mm) clasts.
Plagioclase	~ 2	~ 3	0.05	0.4	0.2	Bytownite ?		2Va < 80°.
Other								
Vitric fragments	~ 7	~ 10	0.05	0.4	0.2		Subrounded, subangular	Black to dark brown.
Glassy shards	<1	> 10-20?	0.02	0.3	0.2		Subrounded, subangular	Pale orange.
Lithic fragments	~ 7	> 10	0.05	0.4	0.2		Subrounded, subangular	Many of pl and cpx clasts may derive from originally larger lithic fragments.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Chlorite	1-2		0.05	0.3	0.2		from spherical to subrounded	Chlorite occurs as discrete granules in the clayey matrix.
Clayey clasts	~ 40		0.01	0.8	0.5			The clayey clasts occur in bands with different average diameters.
Zeolites	~ 10					filling vesicles		
Palagonite	~ 2		0.05	0.3	0.15		Subrounded	
Vesicles/cavities								
Cavities	~ 20							Partially filled by zeolites.
COMMENTS :	Laminated with clayey layers interbedded with volcanic ash layers. The clayey layers are made up of subrounded clayey clasts. Partially lithified. Almost all the original glassy shards are altered to clay minerals.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-4X-1 13-15 cm (10)					Unit: 8	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone with carbonate-filled cavities							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Carbonate granules	~ 20		0.1	>4	2.5		Subrounded to subangular	Micrite. Traces of radiolarians.
Groundmass/matrix								
Clay minerals	~ 80							Clayey matrix with ~ 15 % subangular pl, ol, gl, lithic and vitric fragments (< 0.2 mm) plus radiolarians.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
COMMENTS :	Many of the cavities have traces of radiolarians in them.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-4X-2 58-60 cm (11)					Unit: 10	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Sandy fraction	~ 20		0.01	0.3	0.1		Anhedral	Mainly constituents: ol, pl, gl, vitric fragments.
Groundmass/matrix								
Clay minerals	~ 40							Brownish.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Chlorite	~ 1		0.01	0.3	0.1		Subrounded	Discrete fragments.
Zeolites	~ 10							
Vesicles/cavities								
Cavities	~ 30							Partially filled with zeolites.
COMMENTS :								
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-4X-2 140-142 cm (13)					Unit: 10	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 5-7	~ 5-7	0.05	0.4	0.15	Chrysolite	Anhedral to subhedral	Fresh.
Plagioclase	~ 2-3	~ 2-3	0.03	0.4	0.15	Bytownite	Subhedral to anhedral	Fresh.
Vitric fragments	~ 5	~ 5	0.03	0.3	0.2		Subangular to subrounded	Mostly black. With coarsening they grade into lithic fragments.
Lithic fragments	~ 2	~ 2	0.1	0.2	0.15		Subangular to subrounded	Main constituents: pl, cpx, op and, possibly, ol. Intergranular texture.
Other								
Claystone clasts	~ 1-2	~ 1-2	0.1	1.3	0.4		Subrounded	Brownish.
Chlorite clasts	~ 1	~ 1	0.1	0.3	0.2		Subrounded	
Glassy shards	~ 1-2	> 2	0.1	0.2	0.15		Subangular	Pale yellow.
Palagonite	~ 1	~ 1	0.1	0.2	0.15		Subangular	Orange.
Groundmass/matrix								
Clay minerals	~ 70							Brownish.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Vesicles/cavities								
Cavities	~ 10							May not be a primary feature, but formed during thin section preparation.
COMMENTS :								
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-5X-1 12-14 cm (22)					Unit: 11A	OBSERVER(S): ML	
ROCK NAME:	Altered palagonitized crystal vitric tuff							
GRAIN SIZE:	(average size of clasts ranging from 0.2 to 0.7 mm)							
WHERE SAMPLED:	Massive Unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 1	~ 4 (?)	0.1	0.4	0.2	Chrysolite	Anhedral	Strongly to slightly altered. 2V = 90°. Possibly ol was present in larger amounts, but some were lost during thin section preparation.
Plagioclase	~ 1-2	~ 1-2	0.2	0.4	0.3	Bytownite	Subhedral to anhedral	Incipient to strong alteration. 2Vg ~ 90°.
Clinopyroxene	~ 1	~ 1	0.1	0.4	0.2	Augite (?)	Anhedral	
Other								
Lithic fragments	~ 3	~ 4-5	0.3	0.8	0.6	Basaltic	Subrounded	Main constituents: cpx, pl, gl, op. Intergranular to intersertal texture. Partially altered.
(spherulitic) Vitric fragments	~ 8	~ 8	0.3	1.0	0.7		Subrounded to subangular	Black to dark brown. Range almost totally from aphanitic to very fine grained. Often with pl spherulites. In some cases also vesicular.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Palagonite	~ 30		0.10	1.5	1.0		Subrounded to subangular	Pale to dark orange. From highly vesicular to almost bubble-free. In some cases vesicles are partially filled. Occasionally present euhedral to subhedral pl and ol crystals.
Clay minerals and Fe-oxyhydroxides	~ 50							Matrix.
Vesicles/cavities								
Zeolites	~ 10						Fill.vesicles and cavities	
Chlorite	~ 6						Repl. ol filling vesicles	In some cases chlorite alters to palagonitized glass, in other cases it is present as discrete granules.
COMMENTS :	Palagonite represents altered glassy shards; palagonitic shards have an atoll-like structure, the inner part is clay minerals. Therefore the glassy shards seems to have experienced two types of alteration: palagonitization and chlorite-clay replacement.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-5X-CC 16-19 cm (2)					Unit: 11A	OBSERVER(S): ML, JHN	
ROCK NAME:	Altered palagonitized crystal vitric tuff							
GRAIN SIZE:	Very fine to medium grained (average size of clasts ranging from 0.2 to 1.0 mm)							
WHERE SAMPLED:	Massive Unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	3	~ 7	0.1	0.8	0.4	Chrysolite	Anhedral	Strongly to slightly altered 2V = 90°. Possibly ol was present in larger amounts, but some were lost during thin section preparation.
Plagioclase	1	1	0.1	1.0	0.2	Bytownite	Euhedral, subhedral	Fresh. 2Vg ~ 90°. Max extinction angle measured ~ 35°.
Clinopyroxene	< 1	< 1	0.1	0.4	0.2	Augite (?)	Anhedral	
Other								
Lithic fragments	4	4	0.2	1.6	1.0	Basaltic	Subrounded	Main constituents: cpx, pl, gl, op. Intergranular to intersertal texture.
(spherulitic) Vitric fragments	8	8					Subrounded to subangular	Black to dark brown
Groundmass/matrix								
Clinopyroxene	< 1	< 1	0.2	0.6	0.4	Augite?	Anhedral	
SECONDARY MINERALOGY	Percent	Size (mm)			Replacing/filling	Morphology	Comments	
		min.	max.	av.				
Palagonite	26		0.04	1.6	0.4		Subrounded to subangular	Pale orange. Some Gas bubbles are partially filled; some have pl and ol crystals up to 0.9 mm in size.
Chlorite	10					Repl. ol; filling vesicles		
Zeolites	15					Vesicle and cavity filling		Some glass is totally replaced by zeolites.
Clay minerals	52							Matrix.
Vesicles/cavities								
COMMENTS :	Modal abundance estimated on 250 point counting. Palagonite represents altered glassy shards; palagonitic shards generally have an atoll-like structure, the inner part is chlorite clay minerals. Therefore the glassy shards seems to have experienced two types of alteration: palagonitization and chlorite-clay replacement.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-1 73-75 (14)					Unit: 11B	OBSERVER(S): ML, JHN	
ROCK NAME:	Palagonitized crystal vitric tuff							
GRAIN SIZE:	Very fine to fine grained (average size of clasts ranging from 0.2 to 0.7 mm)							
WHERE SAMPLED:	Massive unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	10.5		0.02	1.1	0.5	Chrysolite	Anhedral, subhedral, rarely euhedral	Fresh. 2V ~ 90°. Mainly fragments of possibly larger phenocrysts. Sometimes fluid/melt inclusions and Cr-sp are present. Rarely skeletal in palagonite.
Plagioclase	1		0.05	0.4	0.2	Bytownite	Subhedral to anhedral	Fresh. 2Va ~ 80°.
Other								
Glassy shards	1	30	0.2	1.3	0.5		Subrounded to subangular	Pale yellow. The outermost rim is always altered to palagonite. Sometimes it encloses euhedral to anhedral ol and/or pl. Weakly to highly vesiculated.
Lithic fragments	2	2	0.1	1.2	0.7	Basaltic	Subrounded	Main constituents: cpx, pl, op, ol, gl. Intersertal to intergranular texture. Fine to very fine grained. Large anhedral ol phenocrysts are present occasionally.
Vitric fragments	10.5	10.5	0.1	2.0	0.7		Subangular to subrounded	Black to dark brown. Large ol and/or smaller pl enclosed sometimes.
Groundmass/matrix								
Clay minerals	36							Brown.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Zeolites	6.5							Possibly phillipsite. All the cavities in the clayey matrix, and often the gas vesicles of the glassy shards are filled by this material.
Palagonite	~ 30		0.2	1.3	0.5			Almost completely replaces the glassy shards.
Vesicles/cavities								
Vesicles	1.5							
COMMENTS :	Modal abundance estimated on 1000 point counting.							
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-2 79-81 (20)					Unit: 11B	OBSERVER(S): ML, JHN	
ROCK NAME:	Palagonitized crystal vitric tuff							
GRAIN SIZE:	Very fine to fine grained (average size of clasts ranging from 0.2 to 0.6 mm)							
WHERE SAMPLED:	Massive unit							
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	7	7	0.05	1.2	0.4	Chrysolite	Anhedral, subhedral; rarely euhedral	Fresh. 2V ~ 90°. Mainly fragments of larger phenocrysts. Sometime with fluid/melt inclusions and Cr-sp.
Plagioclase	< 1	< 1	0.05	0.4	0.2	Bytownite	Subhedral to anhedral	Fresh. Max extinction angle measured ~ 40. 2Va > 80°. Sometime found as micrometric spherulites.
Other								
Glassy shards	3.5	~ 35	0.1	1.5	0.6		Subrounded	Pale yellow. Always the outermost rim is altered in palagonite. Sometime envelopes euhedral to anhedral ol and/or pl. From weakly to highly vesiculated.
Lithic fragments	5	5	0.1	1.5	0.6	Basaltic	Subrounded	Main constituents: cpx, pl, op, ol, gl. With intersertal to intergranular texture. From fine to very fine grained. Sometime with large anhedral ol phenocrysts.
Vitric fragments	9	9	<0.01	1.3	0.6		Subangular to subrounded	Black to dark brown. Sometime with large ol and/or smaller pl.
Groundmass/matrix								
Clay minerals	33							Brownish.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Zeolites	7					Filling vesicles		Possibly phillipsite. These fill all the cavities in the clayey matrix, and often the gas vesicles of the glassy shards.
Palagonite	~ 30		0.1	1.5	0.6			Almost totally replaces glassy shards.
Chlorite	< 1							In clayey matrix.
Paragonite (?)	<< 1							Associated with fresh ol.
Vesicles/cavities								
COMMENTS :	Modal abundance estimated on 1000 point counting. Radiolarians are present in the clayey matrix.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-3 86-89 cm (15)					Unit: 11B	OBSERVER(S): ML, JHN	
ROCK NAME:	Palagonitized crystal vitric tuff							
GRAIN SIZE:	Very fine grained (average size of clasts ranging from 0.3 to 0.4 mm)							
WHERE SAMPLED:								
TEXTURE:	Equigranular							
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	9	9	0.02	0.8	0.4	Chrysolite	Euhedral, subhedral, anhedral	Fresh. 2V ~ 90°. Mainly fragments of larger phenocrysts. Some fluid/melt inclusions are present and Cr-sp.
Plagioclase	<1	<1	0.02	0.6	0.3	Bytownite	Euhedral, subhedral, anhedral	Fresh. Max extinction angle measured ~ 40. 2Va ~ 80°. Some micrometric spherulites.
Other								
Lithic fragments	4.5	4.5	0.1	0.8	0.4	Basaltic		Main constituents: cpx,pl,op,gl,ol. These may represent pillow sections that cooled more slowly (pillow interiors).
Vitric fragments	6.5	6.5	0.05	1.0	0.4			Almost completely glass. Black to dark brown. In reflected light it is possible to distinguish gl,pl,cpx,op and possibly ol.
Glassy shards	3.5	> 80	0.1	1.2	0.4		Angular	Always bordered by a rim of palagonite. Highly vesicular. ol and, more rarely, pl are sometimes present.
Groundmass/matrix								
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Palagonite	35		0.06	1.4	0.4			Palagonite replaces part or all the glassy shards. When it completely replaces glass, it show a darker orange color in the core with respect to the rim of the shard.
Clay minerals	35.5						Glassy shards	
Vesicles/cavities								
Vesicles	4.5						zeolites, chlorite (?)	Rarely the vesicles are also filled by ol, op, gl and clay minerals.
COMMENTS :	Modal abundance estimated on 1000 point counting. Many opaques in the vitric fragments show dendritic textures, suggesting rapid undercooling. Alteration is limited to the glass. Ol and pl are always fresh or only slightly altered.							
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-3 113-118 cm (16)					Unit: 12	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone with white vugs							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
White vug filling	~ 7	~ 7	0.05	1.3	0.7		Spherical to subrounded	Possibly anhydrite
Groundmass/matrix								
Clay minerals	~ 90							Brown.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Zeolites	3-5					Partially filling veins		2Va > 50°.
Vesicles/cavities								
COMMENTS :								
Microphotos?	Yes							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-4 4-6 cm (21)					Unit: 12	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone with white vugs							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
White vug filling	~ 20	~ 20	0.40	3.5	1.7		Spherical to subrounded	Possibly anhydrite.
Groundmass/matrix								
Clay minerals	~ 80							Brown.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Zeolites	1-2					Partially filling veins		
Vesicles/cavities								
COMMENTS :								
	The section is thinner than normal (~ 15-20 mm)							
Microphotos?								
	Yes							
LEGEND:								
	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-4 62-64 (17)					Unit: 13	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	< 10		0.02	0.15	0.07	Chrysolite	Anhedral	2V - 90°.
Vitric fragments	~ 1		0.02	0.15	0.06			Spherulitic plagioclase often present.
Filled vugs	~ 1-2		0.1	0.6	0.4		Subspherical	Possibly is anhydrite.
Groundmass/matrix								
Clay minerals	~ 80							Brown.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Zeolites	~ 10							Zeolites partially replace glass shards.
Vesicles/cavities								
Cavities	~ 20							They represent the space formerly occupied by glassy shards.
COMMENTS :	Presence of radiolarians in the clayey matrix ~ 2 - 3%. Presence of angular to subangular glass shards now totally replaced by zeolites. In some cases only the outer edge of the glass shard is preserved, and the interior was lost, probably during thin section preparation.							
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							

THIN SECTION:	200-1223A-6X-CC 27-29 (23)					Unit: 14	OBSERVER(S): ML	
ROCK NAME:	Volcaniclastic silty claystone							
GRAIN SIZE:	Very fine grained							
WHERE SAMPLED:								
TEXTURE:								
PRIMARY MINERALOGY	Percent Present	Percent Original	Size (mm)			Approximate composition	Morphology	Comments
			min.	max.	av.			
Phenocrysts/clasts								
Olivine	~ 5		0.02	0.15	0.07	Chrysolite	Anhedral	2V ~ 90°.
Vitric fragments	~1		0.02	0.15	0.06			Often with spherulitic plagioclase.
Lithic fragments	~ 1					basaltic	Subrounded	Mainly constituents: cpx, pl, ol (?), gl.
Groundmass/matrix								
Clay minerals	~ 60							Brown.
SECONDARY MINERALOGY	Percent		Size (mm)			Replacing/filling	Morphology	Comments
			min.	max.	av.			
Zeolites	~ 10							Zeolites partially replace glass shards.
Chlorite	~ 1						Subrounded	Discrete granules.
Vesicles/cavities								
Cavities	~ 20							They represent the space formerly occupied by glassy shards.
COMMENTS :	Presence of radiolarians in the clayey matrix. Some glass shards are replaced by zeolites. In some cases only the outer edge of the glass shard is preserved, and the interior material (probably zeolites) was lost during the thin section preparation.							
Microphotos?	No							
LEGEND:	ol = olivine; cpx = clinopyroxene; pl = plagioclase; op = Fe-Ti oxides; sp = spinel							